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:	4. Article Number
Mr. James E. O'Connor Waste Management Inc. of Fla. 500 Cypress Creek Rd., Suite 300 Ft. Lauderdale, FL 33309	P 274 007 519 Type of Service: ☐ Registered ☐ Insured ☒ Certified ☐ COD ☐ Express Mail ☐ Return Receipt for Merchandise Always obtain signature of addressee or agent and DATE DELIVERED.
5. Signature – Address X	8. Addressee's Address *(ONLY if requested and fee paid)*
6. Signature – Agent X S Falconer	
7. Date of Delivery 11/17	

PS Form **3811**, Mar. 1988 ★ U.S.G.P.O. 1988-212-865 **DOMESTIC RETURN RECEIPT**

P 274 007 519

RECEIPT FOR CERTIFIED MAIL
NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to Mr. James E. O'Connor, Waste	
Street and No. Mgmt. of Fla. 500 Cypress Creek Rd., Ste 30(	
P.O., State and ZIP Code Ft. Lauderdale, FL 33309	
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: 11-15-88 Permit: AC 06-152683	

PS Form 3800, June 1985 ★ U.S.G.P.O. 1985-480-794

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

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PERMIT

Mr. James E. O'Connor
Waste Management Inc. of Florida
500 Cypress Creek Road, Suite 300
Ft. Lauderdale, Florida 33309

November 15,1988

Enclosed is permit No. AC 06-152683 for Waste Management Inc. of Florida to construct a landfill gas fired turbine generator facility in Pompano Beach, Broward 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.
Deputy Chief
Bureau of Air Quality Management

Copy furnished to:

S. Brooks, SE District
G. Carlson, Broward County

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 business on 11-15-88.

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.

Judy Rogers
Clerk

11-15-88
Date

Final Determination

Waste Management, Inc. of Florida
Pompano Beach, Broward County, Florida

CDSL Power-Production Facility
6 Turbine/Generator Units
Permit No. AC 06-152683

Florida Department of Environmental Regulation
Bureau of Air Quality Management
Central Air Permitting

November 9, 1988

Final Determination

Waste Management Inc.'s application for a construction permit to construct six landfill gas-fired turbine generators in Pompano Beach, Broward County, Florida, has been reviewed by the Bureau of Air Quality Management. Public Notice of the Department's Intent to Issue the permit was published in the Ft. Lauderdale News Sun Sentinel on October 27, 1988.

A comment was received from Waste Management in response to the Public Notice regarding the permitting of flares at the facility. Waste Management has agreed to submit construction permit applications for the flares at their facility.

The final action of the Department will be to issue the permit as proposed in the Preliminary Determination.

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

PERMITTEE:	Permit Number: AC 06-152683
Waste Management, Inc. of Florida	Expiration Date: October 1, 1989
500 Cypress Creek Road	County: Broward
Suite 300	Latitude/Longitude: 26° 17' 28"N
Fort Lauderdale, FL 33309	80° 10' 00"W
	Project: CDSL Power Production Facility, Six Landfill Gas-Fired Turbine/Generator Units

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code (F.A.C.) Rules 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 drawing(s), 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 a power production facility consisting of six turbine/generator units, combusting a total of 12.0 mcfd of landfill gas to generate about 19.2 MW of electricity. The total facility heat input rate will be 240 MMBtu/hr. The facility will be located near a landfill in Pompano Beach, Broward County, Florida.

The UTM coordinates for this facility are Zone 17, 583.19 km East and 2908.03 km North.

Construction shall be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the Preliminary Determination and Technical Evaluation or the General and Specific Conditions herein.

Attachments:

1. Waste Management's application package dated July 27, 1988.
2. Waste Management's letter received August 12, 1988.
3. Waste Management's letter received August 18, 1988.
4. Preliminary Determination dated October 20, 1988.

PERMITTEE:
Waste Management, Inc.
of Florida

Permit Number: AC 06-152683
Expiration Date: October 1, 1989

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

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. Nor 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 does not constitute 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, plant or aquatic life or property and penalties therefore caused by the construction or operation of this permitted source, 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.

GENERAL CONDITIONS:

6. The permittee shall at all times 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, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

a. Having access to and copying any records that must be kept under the conditions of the permit;

b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sampling or monitoring 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 notify and provide the Department with the following information:

a. a description of and cause of non-compliance; and

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

PERMITTEE:
Waste Management, Inc.
of Florida

Permit Number: AC 06-152683
Expiration Date: October 1, 1989

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or revocation of this permit.

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 arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

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 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any noncompliance of the permitted activity until the transfer is approved by the Department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

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

14. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the Department, during the course of any unresolved enforcement action.

GENERAL CONDITIONS:

b. The permittee shall retain 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), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be 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 date(s) 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 submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. The turbines may operate continuously (i.e., 8760 hrs/yr).

2. Only landfill gas shall be fired into the turbines. Prior DER approval shall be obtained before firing any other fuels.

3. The maximum heat input to each turbine shall not exceed 40 MMBTU/hr, based on a heat content of 480 BTU/cf of landfill gas, and a utilization rate of 1400 scfm per turbine (8400 scfm for the facility).

SPECIFIC CONDITIONS:

4. The maximum allowable emissions from this project are:

Pollutant	ppm *	Per Unit lbs/hr	Per Unit TPY	Facility lbs/hr	Facility TPY
NOx **	51.0	9.0	39.4	54.0	236.5
SO_2	8.8	7.13	31.2	42.8	187.4
CO	-	8.6	37.7	51.6	226.0
PM	-	0.263	1.2	1.6	6.9
HC ***	-	8.9	39.0	53.4	234.0

Visible emissions shall not exceed 5% opacity (six min. avg).

* The concentration corrected to 15% O_2 is not represented on a dry basis, however, the projected moisture content of the exhaust stream is about 4%.

** The NOx and SO_2 emissions are based on the upper range of potential emissions from landfill gas combustion.

*** HC is the unburned hydrocarbon content in the exhaust stream. The non-methane VOCs are expected to be negligible.

5. Initial and annual compliance tests shall be conducted as follows:

a. EPA Method 6, for SO_2
b. EPA Method 9, for visible emissions
c. EPA Method 20, for NOx

Initial compliance tests for CO and VOCs shall be conducted as follows:

d. EPA Method 10, for CO
e. EPA Method 25, for VOC

The above EPA reference methods are as prescribed in 40 CFR 60, Appendix A (1987 version). Other DER approved test methods may be used only after prior Departmental approval.

A PM compliance test using EPA Method 5 shall be required if warranted by test results of EPA Method 9.

6. If a flare is to be used at the facility to burn landfill gas, a permit shall be obtained for it from the Bureau of Air Quality Management.

SPECIFIC CONDITIONS:

7. If the compliance test for VOCs indicates emissions greater than 3.8 lbs/hr per unit (22.8 lbs/hr, 100 TPY for the facility) than this project will have to be re-evaluated for VOCs, in accordance with F.A.C. Rule 17-2.510, Nonattainment Review Requirements.

8. No objectionable odors resulting from this project shall be allowed off plant property (F.A.C. Rule 17-2.620).

9. A minimum of 15 days prior notification of the compliance tests shall be given to DER's Southeast District office. The compliance test results shall be submitted to the district office within 30 days after completion of the tests.

10. The permittee shall comply with all applicable provisions of F.A.C. Chapters 17-2 and 17-4, and 40 CFR 60 Subpart GG (1987 version).

11. The construction shall reasonably conform to the plans and schedule submitted in the application. If the permittee is unable to complete construction on schedule, the Department must be notified in writing 60 days prior to the expiration of the construction permit and submit a new schedule and request for an extension of the construction permit (Rule 17-2, F.A.C.).

12. To obtain a permit to operate, the permittee must demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit, including the application fee, compliance test results and Certificate of Completion, to DER's Southeast District office 90 days prior to the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms of the construction permit until its expiration date. Operation beyond the construction permit expiration date requires a valid permit to operate (Rules 17-2 and 17-4, F.A.C.).

13. If the construction permit expires prior to the permittee requesting an extension or obtaining a permit to operate, then all activities at the project must cease and the permittee must apply for a new permit to construct which can take up to 90 days to process a complete application (Rule 17-4, F.A.C.).

PERMITTEE:
Waste Management, Inc.
of Florida

Permit Number: AC 06-152683
Expiration Date: October 1, 1989

SPECIFIC CONDITIONS:

14. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to DER's Southeast District office.

Issued this 10 day of November, 1988

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Dale Twachtmann

Dale Twachtmann, Secretary

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" Spece 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. XX Show to whom delivered, date, and addressee's address. *†(Extra charge)†*
2. ☐ Restricted Delivery *†(Extra charge)†*

3. Article Addressed to:

Mr. James E. O'Connor
Waste Management Inc. of Fla.
500 Cypress Creek Road, Ste. 300
Ft. Lauderdale, FL 33309

4. Article Number
P 274 007 481

Type of Service:
☐ Registered ☐ Insured
XX Certified ☐ COD
☐ Express Mail

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature – Addressee
X

6. Signature – Agent
X Stephen K. Burden

7. Date of Delivery
10/24

8. Addressee's Address *(ONLY if requested and fee paid)*

PS Form **3811**, Mar. 1987 ★ U.S.G.P.O. 1987-178-268 **DOMESTIC RETURN RECEIPT**

P 274 007 481

RECEIPT FOR CERTIFIED MAIL
NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to Mr. James E. O'Connor, Waste	
Street and No. Mgmt. of Fla. 500 Cypress Creek Rd., Ste. 300	
P.O., State and ZIP Code Ft. Lauderdale, FL 33309	
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: 10-21-88 Permit: AC 06-152683	

PS Form 3800, June 1985 ☆ U.S.G.P.O. 1985-480-794

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

October 20, 1988

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. James E. O'Connor
Waste Management Inc. of Florida
500 Cypress Creek Road, Suite 300
Ft. Lauderdale, Florida 33309

Dear Mr. O'Connor:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permit for Waste Management's CDSL Power Production facility for the construction of six (6) landfill gas-fired turbine generators in Pompano Beach, Broward County, Florida.

Please submit any written comments you wish to have considered concerning the Department's proposed action to Mr. Bill Thomas of the Bureau of Air Quality Management.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/PR/s

Attachments

cc: S. Brooks, SE District
G. Carlson, Broward County

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Application for Permit by:

Waste Management Inc. of Florida
500 Cypress Creek Road, Suite 300
Ft. Lauderdale, Florida 33309

DER File No. AC 06-152683

INTENT TO ISSUE

The Department of Environmental Regulation hereby gives notice of its intent to issue a 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, Waste Management Inc. of Florida, applied on July 28, 1988, to the Department of Environmental Regulation for a permit to construct six landfill gas-fired turbine generators, each with an electrical generation capacity of about 3.2 MW, in Pompano Beach, Broward County, Florida.

The Department has permitting jurisdiction under Chapter 403, Florida Statutes, and Florida Administrative Code Rules 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that an air construction permit was needed 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 Proposed Agency Action on permit applications. The notice must be published one time only in a section of a major local newspaper of general circulation in the county in which the project is located and within thirty (30) days from receipt of this intent. Proof of publication must be provided to the Department within seven days of publication of the notice. 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. Petitions must comply with the requirements of Florida Administrative Code Rules 17-103.155 and 28-5.201 (copy enclosed) and be filed with (received by) the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant must be filed within fourteen (14) days of receipt of this intent. Petitions filed by other persons must be filed within fourteen (14) days of publication of the public notice or within fourteen (14) days of receipt of this intent, whichever first occurs. 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, concerning the subject permit application. Petitions which are not filed in accordance with the above provisions will be dismissed.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

Copies furnished to:

S. Brooks, SE District
G. Carlson, Broward

RULES OF THE ADMINISTRATIVE COMMISSION
MODEL RULES OF PROCEDURE
CHAPTER 28-5
DECISIONS DETERMINING SUBSTANTIAL INTERESTS

28-5.15 Requests for Formal and Informal Proceedings

(1) Requests for proceedings shall be made by petition to the agency involved. Each petition shall be printed, typewritten or otherwise duplicated in legible form on white paper of standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double spaced and indented.

(2) All petitions filed under these rules should contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name and address of the petitioner or petitioners;

(c) All disputed issues of material fact. If there are none, the petition must so indicate;

(d) A concise statement of the ultimate facts alleged, and the rules, regulations and constitutional provisions which entitle the petitioner to relief;

(e) A statement summarizing any informal action taken to resolve the issues, and the results of that action;

(f) A demand for the relief to which the petitioner deems himself entitled; and

(g) Such other information which the petitioner contends is material.

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF INTENT TO ISSUE and all copies were mailed before the close of business on 10/21/88.

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.

Judy Rogers
Clerk

10/21/88
Date

State of Florida
Department of Environmental Regulation
Notice of Intent

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to Waste Management Inc. of Florida to construct six landfill gas-fired turbine generators, each with an electrical generation capacity of about 3.2 MW, in Pompano Beach, Broward County, Florida. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

Persons whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative determination (hearing) in accordance with Section 120.57, Florida Statutes. The petition must conform to the requirements of Chapters 17-103 and 28-5, Florida Administrative Code, and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Failure to file a petition within this time period constitutes a waiver of any right such person has to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

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 proposed agency action. Therefore, persons who may not wish to file a petition may wish to intervene in the proceeding. A petition for intervention must be filed pursuant to Rule 28-5.207, Florida Administrative Code, at least five (5) days before the final hearing and be filed with the hearing officer if one has been assigned at the Division of Administrative Hearings, Department of Administration, 2009 Apalachee Parkway, Tallahassee, Florida 32301. If no hearing officer has been assigned, the petition is to be filed with the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Failure to petition to intervene within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, Florida Statutes.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Dept. of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dept. of Environmental Regulation
Southeast Florida District
1900 S. Congress Ave., Suite A
West Palm Beach, Florida 33406

Broward County Environmental Quality
Control Board
500 SW 14th Court
Ft. Lauderdale, Florida 33315

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 14 days of the publication of this notice will be considered in the Department's final determination.

Technical Evaluation
and
Preliminary Determination

Waste Management, Inc. of Florida
Pompano Beach, Broward County, Florida

CDSL Power-Production Facility
6 Turbine/Generator Units
Permit No. AC 06-152683

Florida Department of Environmental Regulation
Bureau of Air Quality Management
Central Air Permitting

October 20, 1988

I. Application

A. Applicant

Waste Management, Inc. of Florida
500 Cypress Creek Road
Suite 300
Ft. Lauderdale, Florida 33309

B. Project and Location

The applicant proposes to construct six (6) gas-fired turbine generator units combusting a total of 12.0 mcfd of landfill gas to generate about 19.2 MW of electricity. The project will be located in Pompano Beach, Broward County, Florida.

The UTM coordinates of the proposed facility are Zone 17, 583.19 km East and 2908.03 km North.

Waste Management applied for a construction permit on July 28, 1988, and the application was deemed complete on August 18, 1988.

C. Facility Category

Waste Management's proposed electrical generating facility in Pompano Beach is "major" as defined by Chapter 17-2 of the Florida Administrative Code (F.A.C.).

The facility is classified in accordance with the Standard Industrial Classification Code (SIC) as Major Group 49: Electric, Gas and Sanitary Services; and Industry No. 4931: Electric Services.

The turbines are classified in accordance with the NEDs Source Classification Code (SCC) as 4911 Electric Generation - Internal Combustion Engines. Although there is no subclassification for landfill gas-fired turbines, there is for natural gas which is 2-01-002-01.

II. Project Description

The project consists of a perforated pipe well type recovery system for the gases generated (by natural decomposition of refuse) in landfills; a piping system to convey these gases to the turbine facility; a gas pretreatment system to remove moisture, dirt particles, and compress the gas; and a turbine generator system where the gases are combusted to produce electricity.

The fuel gas (methane rich landfill gas) compression/clean-up system will draw gas from the landfill at a vacuum of 6" mercury, it will filter the gas to remove dirt particles and compress it in two stages to condition the gas for combustion. This system will be able to deliver up to 1800 scfm gas at 185 psi and 120°F.

A Solar Centaur GSC T4500 gas turbine/generator set will be used for the combustion of landfill gas to generate electricity. The turbine produces over 4000 HP which results in the generation of about 3.2 MW from a 4160 volt generator. The maximum heat input to each turbine will be 40 MMBTU/hr.

The facility will have numerous safety features including systems for gas detection, fire detection and suppression, alarms, and even automatic shutdown if operation is not within the normal parameters (described in detail in the application).

No add on air pollution control equipment is proposed for this project. The emissions of air pollutants are projected to be well below the applicable new source performance standards for gas turbines.

III. Rule Applicability

The proposed project is subject to a preconstruction review in accordance with Chapter 403 of the Florida Statutes, and Chapters 17-2 and 17-4 of the Florida Administrative Code (F.A.C.) since it results in emissions of the pollutants nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOCs).

The proposed project will be located in Broward County, an area designated as attainment for NOx, PM, SO_2, and CO in accordance with F.A.C. Rule 17-2.420. This area is designated as a nonattainment area for ozone, in accordance with F.A.C. Rule 17-2.410.

The proposed project is not subject to Prevention of Significant Deterioration, (PSD) review requirements since it will emit less than 250 tons per year of a criteria pollutant, in accordance with F.A.C. Rule 17-2.500(2)(d)1.

The proposed project is not subject to Nonattainment Area New Source Review requirements since VOC emissions are projected to be less than 100 TPY, in accordance with F.A.C. Rule 17-2.510(2)(d)1.

The proposed project is subject to F.A.C. Rule 17-2.520, Sources Not Subject to PSD or Nonattainment Requirements.

The proposed project is subject to F.A.C. Rule 17-2.610, General Particulate Emission Limiting Standards; and 17-2.620, General Pollutant Emission Limiting Standards.

The proposed project is subject to 40 CFR 60 Subpart GG, Standards of Performance for Stationary Gas Turbines, in accordance with F.A.C. Rule 17-2.660.

The proposed project is subject to compliance testing and reporting requirements in accordance with F.A.C. Rule 17-2.700 and 40 CFR 60.

IV. Source Impact Analysis

A. Emission Limitations

The emission limitations for this facility are based on test data from similar facilities owned by Waste Management, vendor data, and projected landfill gas quality in Broward County. Below are the maximum potential emissions estimated for SO_2 and NOx, which are lower than the standards stated in 40 CFR 60, Subpart GG. Also listed are the emission estimates for PM, CO, and hydrocarbons.

The projected maximum emissions from the project are:

Pollutant	ppm *	Per Unit lbs/hr	Per Unit TPY	Facility lbs/hr	Facility TPY
NOx **	51.0	9.0	39.4	54.0	236.5
SO_2	8.8	7.13	31.2	42.8	187.4
CO	-	8.6	37.7	51.6	226.0
PM	-	0.263	1.2	1.6	6.9
HC ***	-	8.9	39.0	53.4	234.0

Visible emissions shall not exceed 5% opacity (six min. avg).

* The concentration corrected to 15% O_2 is not represented on a dry basis, however, the projected moisture content of the exhaust stream is about 4%.

** The NOx and SO_2 emissions are based on the upper range of expected potential emissions from landfill gas combustion. Since these parameters are dependent upon site specific gas quality the applicant has made a conservative estimate.

*** HC is the unburned hydrocarbon content in the exhaust stream. It is projected, based on information available on landfill gas composition, that non methane VOCs will be negligible.

B. Air Quality Analysis

The technical evaluation of this application determined that preconstruction ambient air modeling would not be required to provide reasonable assurance that Florida's air quality standards would not be violated.

V. Conclusion

Based on the information provided by Waste Management, the Department has reasonable assurance that the proposed six turbine generators in the CDSL Power Production Facility, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of an ambient air quality standard or PSD increment or any other provisions of Chapters 17-2 and 17-4 of the Florida Administrative Code.

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

PERMITTEE:
Waste Management, Inc. of Florida
500 Cypress Creek Road
Suite 300
Fort Lauderdale, FL 33309

Permit Number: AC 06-152683
Expiration Date: October 1, 1989
County: Broward
Latitude/Longitude: 26° 17' 28"N
80° 10' 00"W
Project: CDSL Power Production Facility, Six Landfill Gas-Fired Turbine/Generator Units.

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code (F.A.C.) Rules 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 drawing(s), 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 a power production facility consisting of six turbine/generator units, combusting a total of 12.0 mcfd of landfill gas to generate about 19.2 MW of electricity. The total facility heat input rate will be 240 MMBtu/hr. The facility will be located near a landfill in Pompano Beach, Broward County, Florida.

The UTM coordinates for this facility are Zone 17, 583.19 km East and 2908.03 km North.

Construction shall be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the Preliminary Determination and Technical Evaluation or the General and Specific Conditions herein.

Attachments:

1. Waste Management's application package dated July 27, 1988.
2. Waste Management's letter received August 12, 1988.
3. Waste Management's letter received August 18, 1988.
4. Preliminary Determination dated October 20, 1988.

PERMITTEE:
Waste Management, Inc.
of Florida

Permit Number: AC 06-152683
Expiration Date: October 1, 1989

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

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. Nor 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 does not constitute 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, plant or aquatic life or property and penalties therefore caused by the construction or operation of this permitted source, 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.

GENERAL CONDITIONS:

6. The permittee shall at all times 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, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

a. Having access to and copying any records that must be kept under the conditions of the permit;

b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sampling or monitoring 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 notify and provide the Department with the following information:

a. a description of and cause of non-compliance; and

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

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or revocation of this permit.

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 arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

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 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any noncompliance of the permitted activity until the transfer is approved by the Department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

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

14. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the Department, during the course of any unresolved enforcement action.

GENERAL CONDITIONS:

b. The permittee shall retain 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), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be 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 date(s) 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 submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. The turbines may operate continuously (i.e., 8760 hrs/yr).

2. Only landfill gas shall be fired into the turbines. Prior DER approval shall be obtained before firing any other fuels.

3. The maximum heat input to each turbine shall not exceed 40 MMBTU/hr, based on a heat content of 480 BTU/cf of landfill gas, and a utilization rate of 1400 scfm per turbine (8400 scfm for the facility).

SPECIFIC CONDITIONS:

4. The maximum allowable emissions from this project are:

Pollutant	ppm *	Per Unit lbs/hr	Per Unit TPY	Facility lbs/hr	Facility TPY
NOx **	51.0	9.0	39.4	54.0	236.5
SO_2	8.8	7.13	31.2	42.8	187.4
CO	-	8.6	37.7	51.6	226.0
PM	-	0.263	1.2	1.6	6.9
HC ***	-	8.9	39.0	53.4	234.0

Visible emissions shall not exceed 5% opacity (six min. avg).

* The concentration corrected to 15% O_2 is not represented on a dry basis, however, the projected moisture content of the exhaust stream is about 4%.

** The NOx and SO_2 emissions are based on the upper range of potential emissions from landfill gas combustion.

*** HC is the unburned hydrocarbon content in the exhaust stream. The non-methane VOCs are expected to be negligible.

5. Initial and annual compliance tests shall be conducted as follows:

a. EPA Method 6, for SO_2
b. EPA Method 9, for visible emissions
c. EPA Method 20, for NOx

Initial compliance tests for CO and VOCs shall be conducted as follows:

d. EPA Method 10, for CO
e. EPA Method 25 or 25A, for VOC

The above EPA reference methods are as prescribed in 40 CFR 60, Appendix A (1987 version). Other DER approved test methods may be used only after prior Departmental approval.

A PM compliance test using EPA Method 5 shall be required if warranted by test results of EPA Method 9.

6. If a flare is to be used at the facility to burn landfill gas, a permit shall be obtained for it from the Bureau of Air Quality Management.

SPECIFIC CONDITIONS:

7. If the compliance test for VOCs indicates emissions greater than 3.8 lbs/hr per unit (22.8 lbs/hr, 100 TPY for the facility) than this project will have to be re-evaluated for VOCs, in accordance with F.A.C. Rule 17-2.510, Nonattainment Review Requirements.

8. No objectionable odors resulting from this project shall be allowed off plant property (F.A.C. Rule 17-2.620).

9. A minimum of 15 days prior notification of the compliance tests shall be given to DER's Southeast District office. The compliance test results shall be submitted to the district office within 30 days after completion of the tests.

10. The permittee shall comply with all applicable provisions of F.A.C. Chapters 17-2 and 17-4, and 40 CFR 60 Subpart GG (1987 version).

11. The construction shall reasonably conform to the plans and schedule submitted in the application. If the permittee is unable to complete construction on schedule, the Department must be notified in writing 60 days prior to the expiration of the construction permit and submit a new schedule and request for an extension of the construction permit (Rule 17-2, F.A.C.).

12. To obtain a permit to operate, the permittee must demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit, including the application fee, compliance test results and Certificate of Completion, to DER's Southeast District office 90 days prior to the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms of the construction permit until its expiration date. Operation beyond the construction permit expiration date requires a valid permit to operate (Rules 17-2 and 17-4, F.A.C.).

13. If the construction permit expires prior to the permittee requesting an extension or obtaining a permit to operate, then all activities at the project must cease and the permittee must apply for a new permit to construct which can take up to 90 days to process a complete application (Rule 17-4, F.A.C.).

PERMITTEE:
Waste Management, Inc.
of Florida

Permit Number: AC 06-152683
Expiration Date: October 1, 1989

SPECIFIC CONDITIONS:

14. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to DER's Southeast District office.

Issued this_____day of_____,
1988

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

_____
Dale Twachtmann, Secretary

ATTACHMENTS AVAILABLE UPON REQUEST

Check Sheet

Company Name: Waste Management of Florida, Inc.
Permit Number: AC06-152683
PSD Number: ~~PSDFL-098~~
Permit Engineer:

Application:

- ☑ Initial Application
  - ☐ Incompleteness Letters
  - ☐ Responses
  - ☐ Waiver of Department Action
  - ☐ Department Response
  - ☑ Other

Cross References:
- ☐
- ☐
- ☐

Intent:

- ☑ Intent to Issue
- ☑ Notice of Intent to Issue
- ☑ Technical Evaluation
- ☐ BACT or LAER Determination
- ☑ Unsigned Permit

  Correspondence with:
  - ☑ EPA
  - ☐ Park Services
  - ☐ Other
- ☑ Proof of Publication
- ☐ Petitions - (Related to extensions, hearings, etc.)
- ☐ Waiver of Department Action
- ☐ Other

Final Determination:

- ☑ Final Determination
- ☑ Signed Permit
- ☐ BACT or LAER Determination
- ☑ Other

Post Permit Correspondence:

- ☐ Extensions/Amendments/Modifications
- ☑ Other

In the folder labeled as follows there are documents, listed below, which were not reproduced in this electronic file. That folder can be found in one of the file drawers labeled Supplementary Documents Drawer. Folders in that drawer are arranged alphabetically, then by permit number.

Folder Name: Waste Management of Florida, Inc.

Permit(s) Numbered:

AC	06	-	152683
PSD	FL	-	098

Period during which document was received:		Detailed Description
APPLICATION 8 JULY 1988	1.	24" × 36" BLUEPRINT: SITE PLAN EXHIBIT B (PROJECT NO. 11737)

Central Sanitary Landfill & Recycling Center
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

August 31, 1994

Mr. Mike Harley
Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 33299-2400

Re: FDEP #AO 06-183180
Power Production Facility
Central Sanitary Landfill

Dear Mr. Harley:

The purpose of this letter is to inform you that during a recent review of the above referenced permit, it was discovered that the permit states that the turbine generator units combust a total of 10 mcfd of landfill gas. The turbines actually combust a total of 10 mmcfd of landfill gas.

Unless we hear otherwise within 30 days of the date of this letter, we will consider this correction as acceptable to FDEP. If you have any questions, please call Mr. Jim Barrett at (305) 977-9551, ext. 14.

Sincerely,

Michael J. Berg
Division Manager

cc: Richard Dormier
Jim Barrett
Stephanie Brooks

RAD/lyc

landgasmh.ltr

Central Sanitary Landfill & Recycling Center
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

August 31, 1994

Mr. Mike Harley
Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 33299-2400

Re: FDEP #AO 06-183180 SC #12
Power Production Facility
Central Sanitary Landfill

Dear Ms. Brooks:

The purpose of this letter is to clarify the above referenced specific condition. A recent review of the above referenced permit indicates that landfill gas shall be vented to the flare system during the Power Production Facility's start-up, shutdown or non-operation. It is the interpretation of the site that flaring of gas is necessary if the plant is shut down. However, if the plant is shut down due to the lack of gas supply, the flare cannot be operated. The permit also refers to three flare units. However, the site operates only one flare.

Unless we hear otherwise within 30 days of the date of this letter, we will consider this interpretation as acceptable to FDEP.

If you have any questions, please call Mr. Jim Barrett at (305) 977-9551, ext. 14.

Sincerely,

Michael J. Berg
Division Manager

cc: Jim Barrett, CSL
Richard Dormier, CSL
Andrew Neita, FDEP
Stephanie Brooks, FDEP
File

RAD/lyc

spcon12.ltr

Central Sanitary Landfill & Recycling Center
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

August 31, 1994

Mr. Mike Harley
Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 33299-2400

Re: FDEP #AO 06-183180
Power Production Facility
Central Sanitary Landfill

Dear Mr. Harley:

The purpose of this letter is to inform you that during a recent review of the above referenced permit, it was determined that a clarification of specific condition #2a was necessary to ensure that the facility is in compliance with the intent of the referenced permit condition.

Central Sanitary Landfill (CSL) requested that the consultant involved with the original design of the facility (RUST E & I) review this specific condition and determine whether CSL is in compliance with the intent of the permit condition.

Based on the review of heat input at CSL, RUST E&I concluded that the heat rate is regulated and that any combination of landfill gas, BTU and flow rate, which is less than or equal to the permitted maximum heat rate per hour should be considered in compliance with the permit condition. A copy of RUST E&I's letter dated 8/12/94 summarizing their findings/conclusions is attached for your review.

As a result of this review, we believe that the facility is in compliance with the permit condition, as long as the condition for heat rate is complied with. Unless we hear otherwise within 30 days of the date of this letter, we will consider this interpretation of the permit condition as acceptable to FDEP. If you have any questions, please call Mr. Jim Barrett at (305) 977-9551, ext. 14.

Sincerely,

Michael J. Berg
Division Manager

cc: Richard Dormier
Jim Barrett
Stephanie Brooks
Enclosure

cond-2.ltr

Printed on recycled paper

RUST ENVIRONMENT & INFRASTRUCTURE

RUST Environment & Infrastructure Inc.
1240 East Diehl Road
Naperville, IL 60563
Tel. (708) 955-6600 • FAX (708) 955-6601

August 12, 1994

Jim Barrett
CDSL Power Systems
3000 N.W. 48th St.
Pompano Beach, FL 33073

RE: CDSL Power Systems Gas Recovery Air Permit

SUBJECT: INTERNAL ENVIRONMENTAL AUDIT COMPLIANCE DEMONSTRATION FOR AIR PERMIT SPECIFIC CONDITION 2(a)

Dear Mr. Jim Barrett:

Pursuant to your request, the following is provided to clarify the air permit issues identified by the internal audit conducted at your facility.

Energy Content of Fuel

The energy content of a fuel is its heating value per standard volume or mass. Heating value is the amount of heat released when a known volume of a given hydrocarbon is burned. The heating value can be calculated based on the lower or higher heating value of the fuel, LHV or HHV respectively. The lower heating value represents the heat release from the combustion of a fuel when water is in a vapor state in the combustion products. The higher heating value results from the additional energy released by condensation of the water vapor from the product gas once the temperature drops below the dew point.

The energy content of different fuels vary widely. For example, landfill gas with a methane concentration of 50 percent by volume has an energy content of 454.85 BTU per cubic foot LHV. The energy content of 50% by volume Propane is 1157.45 BTU per cubic foot LHV. Table 1 illustrates the relationship between lower and higher heating values for these two fuels. The ideal lower and higher heating values are physical constants for each type of hydrocarbon.

Table 1

Fuel	% Volume	Ideal LHV	Ideal HHV	Actual LHV	Actual HHV
Methane	50	909.7	1012.0	454.9	506.0
Propane	50	2314.9	2516.1	1157.5	1258.0

% Volume ÷ 100 x Ideal LHV = Actual LHV
% Volume ÷ 100 x Ideal HHV = Actual HHV

For most combustion equipment utilized to do work (such as turbines), the energy (or available work) resulting from the combustion of the fuel is based on the lower heating value. The temperatures within the combustion chamber do not drop sufficiently to produce condensation. Therefore, no additional work can be derived from the combustion of the fuel as a result of the energy release from condensation. The energy release from condensation does not typically occur until the exhaust is high in the atmosphere.

Equipment manufacturer's specifications are typically based on the lower heating value of fuels (Figure 1). This allows manufacturers to predict the actual work which would result from the combustion of the fuel.

Heating Value Basis for Permit

The permit does not state whether lower or higher heating value formed the basis of the permitted heat rate.

Since manufacturers rate equipment based on the LHV and the actual work which can be performed, it is logical that the regulations are also based on LHV. The original "Permit to Construct an Air Source" application for the facility utilized lower heating value maximum heat rate data provided by the manufacturer. Therefore, although not specifically listed on the operating permit, the maximum heat rate is based on the lower heating value of the fuel.

Maximum Heat Rate

Most States, as does Florida, regulate combustion emission sources based on the heat rate of the equipment. The heat rate is a function of fuel flow and energy content. Regulating emissions sources based on heat rate (energy consumed per unit of time) allows varying types of equipment utilizing various fuels to be subject to a single rule. This obviously simplifies rule-making.

The manufacturers nominal rating for the turbine equipment at the CSL facility is 12,658 BTU/ kW-hr LHV. The continuous no loss power output rating is 3330 kW. Based on losses, the rated output for the turbines at CSL is 3150 kW. Therefore, the manufacturers nominal heat rate for the turbines at CSL is:

(12,658 BTU / kW-hr LHV x 3150 kW-hr) = 39.87 mm BTU/ hr LHV

Pursuant to Specific Condition 2(a) the maximum heat input to each turbine at the CSL facility was limited to 40 mm BTU/ hr. Based on the manufacturers data, the facility meets the maximum heat input limit specified in the permit provided the limit is based on lower heating value.

Table 2 illustrates example calculations of heat rate based on the values listed in the permit (40 mmBTU/ hr, 480 BTU/ scf and 1400 scfm). A calculation was performed on both a lower and higher heating value basis since no indication was provided. Assuming that the basis for the BTU and flow values stated in the permit was typical landfill conditions (50 - 55 percent methane), one would expect the permit values to be in this range.

Indeed, the lower heating value calculation predicted a result in the range of typical landfill gas. This would confirm the use of LHV in the permitting of the facility.

Site Specific Actual Heat Rate

The actual heat input at the CSL facility utilizing landfill gas as a fuel is based on two factors: gas flow rate (which is a function of equipment load) and BTU of the fuel (which is a function of the type of decomposition process (aerobic or anaerobic) occurring within the landfill, the gas extraction system integrity and the operation of the gas extraction system).

As demonstrated previously, **the maximum heat rate is a function of the equipment design at full load condition and is therefore constant.** The actual heat input will be variable based on gas quality and gas flow.

Based on a maximum heat rate of 40 mmBTU/ hour LHV, the relationship between the fuel flow and the energy content of the fuel (LHV) can be plotted (Figure 2). The chart represents the gas flow versus gas quality relationship for three specific heat inputs. There are infinite combinations of gas flow and gas quality which will result in a specific (constant) heat input.

Whereas, gas flow and to a certain extent gas quality can be impacted by equipment operation (load adjustment), the BTU of the gas can not be controlled. The BTU of the gas stream is primarily a function of the biological activity in the landfill. The BTU can not be controlled or regulated to a specific gas quality. Therefore, the BTU of the gas is an independent variable in the heat rate calculation.

Since the maximum heat rate is constant and the BTU of the gas is independent of the equipment operation, the gas flow is the only dependent variable. Gas flow is dependent on equipment load. The load can be affected by temperature, turbine efficiency or manual adjustment (up to the maximum rating). Depending on the load, the equipment will flow as much gas as required (based on the BTU of the gas) to sustain that load up to the designed maximum heat rate.

As BTU of the fuel increases, the fuel flow rate will decrease to maintain the heat input required by a specific load. As BTU falls, the fuel flow will increase.

Based on Table 1, it is evident that different fuels have varying heat content. Also, different equipment utilize different fuel flow rates to perform their designed function. Because of the wide variability of equipment and fuels, it is not practical to regulate each emissions source based on a specific energy content or specific flow. Because of the varying relationship between energy content of the fuel and the fuel flow rate, it is easier to regulate based on a single parameter. Since, the maximum heat rate is a constant for a particular piece of equipment, it makes sense to regulate this parameter.

I am not aware of States regulating the BTU content of the gas fuel or the fuel flow. The BTU of the fuel per cubic foot has no baring on potential air emissions. Because of the varying flow rates for different types of equipment, it is also not practical to regulate based on flow.

As the permit stipulates, the equipment heat rate is regulated (which is a function of various combinations of flow and BTU). This is typical for turbines. I do not believe the BTU and gas flow data reported in the permit are meant as permitted conditions. I believe that those values presented are an example calculation of maximum heat input rather than a maximum value of gas quality or fuel flow.

Energy Records

The recorded data at the facility is based on higher heating value. IRS rules governing the operation of landfill gas fueled projects for beneficial use, mandate that the higher heating value of the fuel be calculated and recorded. These records must be maintained for tax purposes.

Most business transactions concerning sales of hydrocarbon fuels are based on higher heating value because the transactions are typically conducted regardless of the equipment utilizing the fuel. Utilizing the lower heating value for transactions would depend on whether water vapor remains in the vapor state and does not contribute to the work. Since this is equipment specific, it is easier to base the transactions on the energy resulting from the combustion process going to completion. As a result, the IRS also requires documentation based on this standard.

Conclusion

Based on the review of heat input at CSL, the following conclusions can be made:

- The permit is based on the lower heating value of the landfill gas.
- The nominal manufacturers maximum heat rate complies with the permit limit.
- The BTU and gas flow stated in the permit are examples and are not the basis for permit limitation. The intent of the permit is to regulate the maximum heat rate per hour, not control the BTU value of landfill gas. Any combination of landfill gas BTU and flow rate which is less than or equal to the permitted maximum heat rate per hour should be considered in compliance with the permit condition.
- The records for energy usage at the facility are based on higher heating value.

If you have any questions please call me at (708) 955-6649.

Sincerely,

RUST Environment & Infrastructure Inc.

Michael Niemann
Landfill Gas Assessment Coordinator

cc: Chuck Anderson
File: CSL GRR-6.3

SUBSIDIARY OF CATERPILLAR TRACTOR CO.
P.O. Box 85376, San Diego, CA 92138-5376

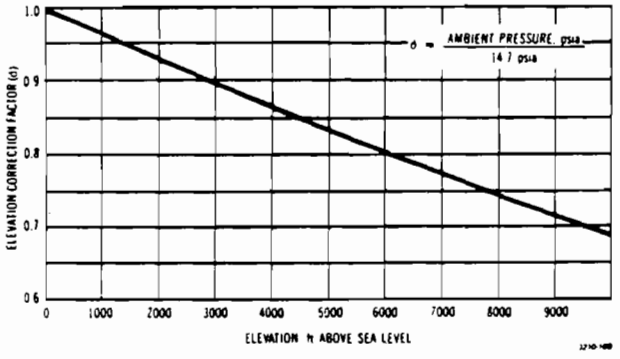
GSC 4500 Centaur Gas Turbine Generator Set

Medium Btu Gas Fuel Applications

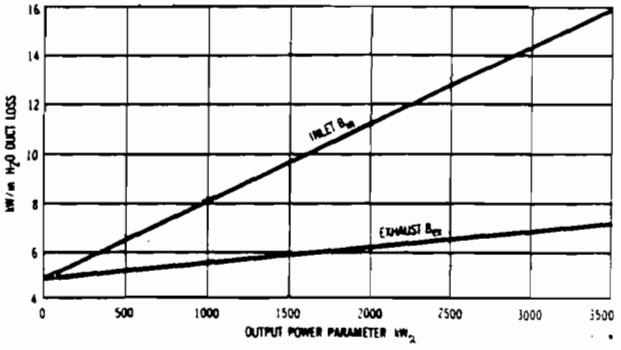
Nominal Rating - ISO (59°F, Sea Level, Relative Humidity 60%, No External Pressure Losses, No Gas Producer Power Extraction), CH_4/CO_2 Gas Fuel with LHV = 500 Btu/scf, Generator and Gearbox Efficiencies 96%

- Typical Landfill or Digester Gas Applications
- Output — 3330 kW Continuous
- Heat Rate — 12,658 Btu/kW-hr
- Exhaust Flow — 145,760 lb/hr
- Exhaust Temperature — 840°F

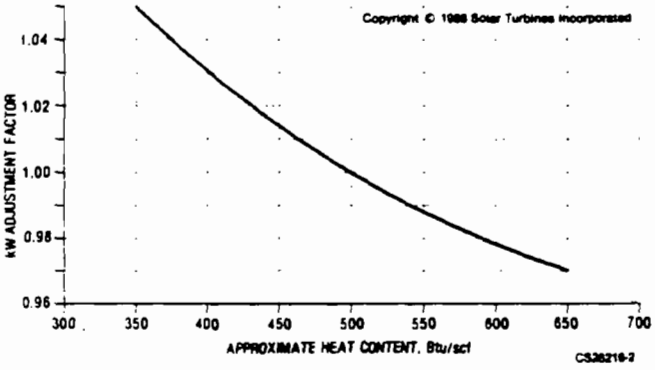
Performance Curves



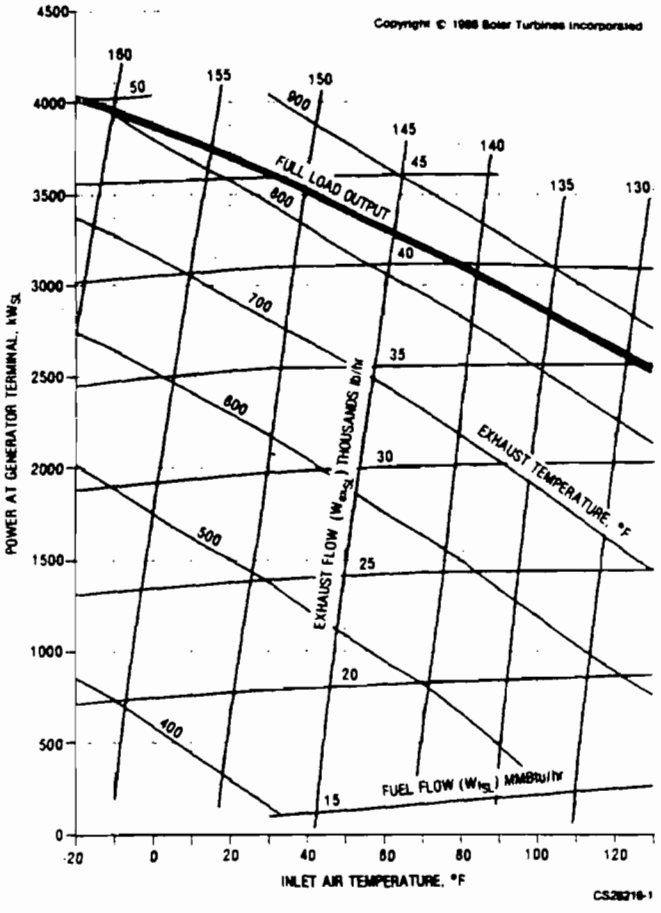
Elevation Correction Factor



Inlet and Exhaust Power Loss



Fuel Correction Factor, W_γ



Available Power

Available Site Power

Available site power (kW) is calculated from the following formula:

$$kW = [\delta\,(kW_{SL})\,W_\gamma] - L_{in} - L_{ex}$$

$$L_{in} = \Delta P_{in}\,B_{in}$$

$$L_{ex} = \Delta P_{ex}\,B_{ex}$$

where:

- W_γ = Fuel correction factor
- kW = kW generator output at site
- kW_{SL} = Output power (kW) at sea level, no losses
- δ = Elevation correction factor
- B_{in} = Inlet kW loss per unit of pressure drop
- B_{ex} = Exhaust kW loss per unit of pressure drop
- ΔP_{in} = Inlet duct pressure loss (inches of water)
- ΔP_{ex} = Exhaust duct pressure loss (inches of water)

Table 2

Heating Value Calculation:

Permitted Maximum Heat Input: 40 MMBTU/hr

Lower Heating Value

Based on 480 BTU/cf LHV, 1400 scfm

480.00 BTU/ SCF x 1400 scfm flow = 672000 BTU/ min

672000 BTU/ min. x 60 minutes/ hr. ÷ 1,000,000 = 40 MMBTU/h

Lower Heating Value of Methane: 909.7 BTU/ SCF

Lower Heating Value of Gas: 480.00 BTU/ SCF

480 BTU/ SCF ÷ 909.7 BTU/ SCF x 100 =

52.76 mole % methane

Higher Heating Value

Based on 480 BTU/cf HHV, 1400 scfm

480.00 BTU/ SCF x 1400 scfm flow = 672000 BTU/ min

672000 BTU/ min. x 60 minutes/ hr. ÷ 1,000,000 = 40 MMBTU/h

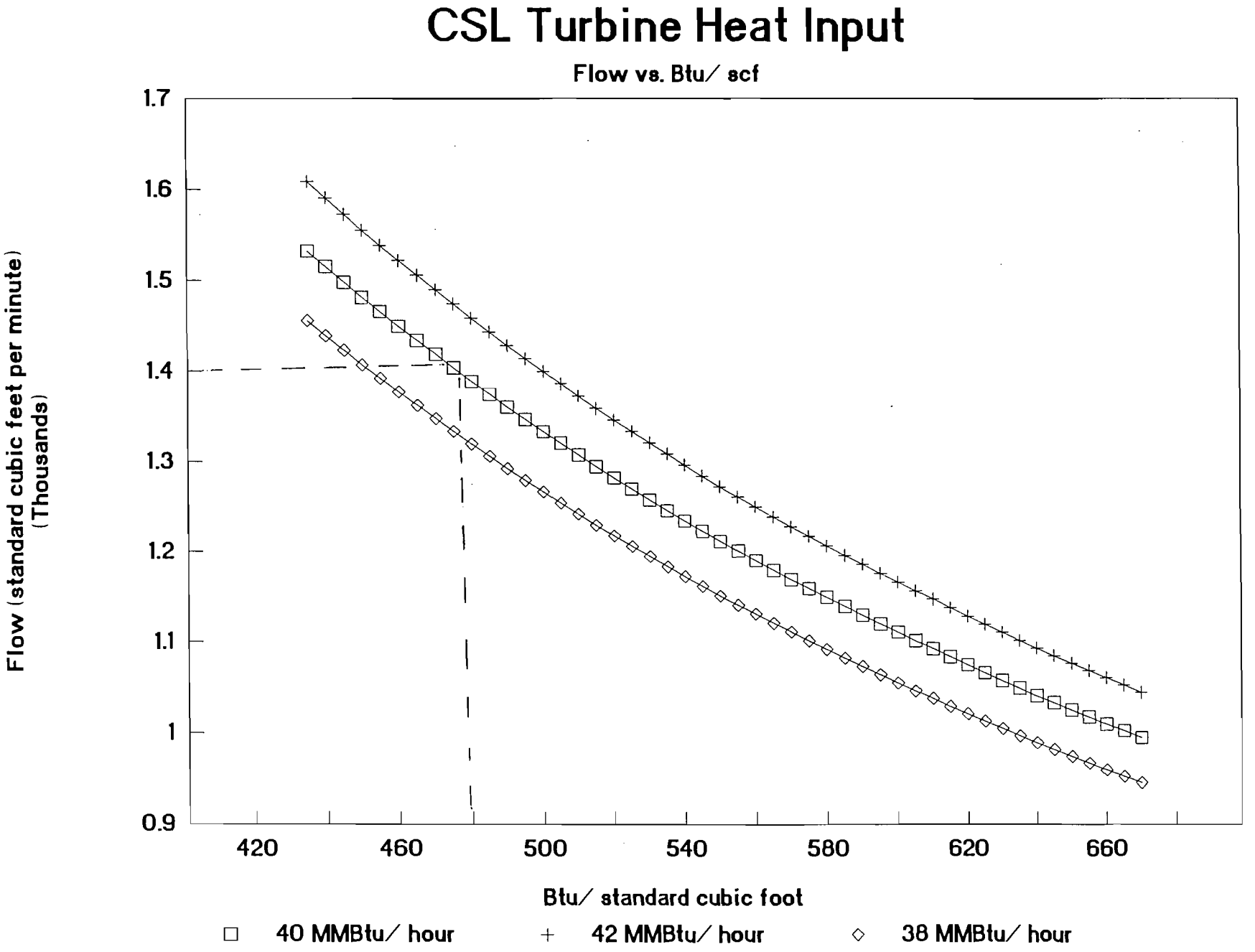
Higher Heating Value of Methane: 1012 BTU/ SCF

Higher Heating Value of Gas: 480.00 BTU/ SCF

480 BTU/ SCF ÷ 1012 BTU/ SCF x 100 =

47.43 mole % methane

Figure 2


CSL Turbine Heat Input
Flow vs. Btu/ scf
Flow (standard cubic feet per minute)
(Thousands)
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
420
460
500
540
580
620
660
Btu/ standard cubic foot
40 MMBtu/ hour
42 MMBtu/ hour
38 MMBtu/ hour

South Florida Environmental Services

COMPLIANCE EMISSIONS TEST REPORT

PREPARED FOR:

Waste Management of Florida, Inc.
3000 N.W. 48th Street
Pompano Beach, Florida 33073

CONCERNING:

Compliance Emissions Test Program
Central Disposal Sanitary Landfill
Gas Turbines #1, #2 and #5
August 19 through 21, 1992

PREPARED BY:

John P. Goodwin
Manager - Technical Operations
South Florida Environmental Services
6821 Vista Parkway North
West Palm Beach, FL 33411

I hereby certify that the information contained in this report is true and accurate to the best of my knowledge.

John P. Goodwin
Manager - Technical Operations

September 14, 1992
Date

CHAIN OF CUSTODY

All samples were in my custody during the Compliance Emissions Test Program conducted on Waste Management of Florida, Incorporated's Gas Turbines #1, #2 and #5 located at the Central Disposal Sanitary Landfill at 3000 N.W. 48th Street in Pompano Beach Florida. Testing was conducted August 19 through 21, 1992. This includes the time of initial sample preparation throughout the completion of the program .

Michael L. Wayt
Environmental Scientist

South Florida Environmental Services

TABLE OF CONTENTS

APPENDICES

1.0 COMPENDIUM

South Florida Environmental Services conducted a Compliance Emissions Test Program August 19 through 21, 1992 to determine the compliance status of Waste Management of Florida, Inc.'s Gas Turbines #1, #2 and #5 located at the Central Disposal Sanitary Landfill at 3000 N.W. 48th Street in Pompano Beach, Florida.

Compliance Emissions Testing was performed for Sulfur Dioxide (SO_2). Oxygen (O_2) and Carbon Dioxide (CO_2) concentrations were determined for diluent purposes.

All test methods and procedures were conducted in strict accordance with the Environmental Protection Agency's Methods 1 through 4 and 6 as found in 40 CFR 60 Appendix A, as amended. The O_2 and CO_2 concentrations were measured in accordance with Reference Method 3A. These tests were conducted in order to comply with the conditions in operating permit AO 06-183180 set forth by the Florida Department of Environmental Regulation.

Testing of Gas Turbines #1 and #2 was conducted while the unit was operating at approximately 2.7 megawatts. Testing of Gas Turbine #5 was conducted while the unit was operating at approximately 2.9 megawatts. Test results can be found in the Summary of Results on the following page.

John P. Goodwin was in charge of and responsible for the overall emissions testing program, located the probe at the proper traverse locations and assisted where necessary. Michael L. Wayt operated the meter box and performed the field laboratory aspects of the program. John Ficula of Waste Management of Florida, Inc. was responsible for the plant operation. Mr. Terry Singleton of the Florida Department of Environmental Regulation and Ms. Olga Ibarra of the Broward County Office Of Natural Resources Protection observed the testing.

$$pV = nRT$$

$$V = \frac{nRT}{p}$$

$$\frac{\%O_2}{20.9\% - \%O_2}$$

South Florida Environmental Services

SUMMARY OF RESULTS - GAS TURBINE NO. 1

	RUN 1	RUN 2	RUN 3	AVERAGE
SULFUR DIOXIDE				
CONCENTRATION (PPM)*	27.9	19.4	14.1	20.5
EMISSIONS (LBS/HR)	2.14	1.36	1.11	1.54

ALLOWABLE EMISSIONS	ppm*	lbs/hr
SULFUR DIOXIDE	32.0	7.13

* SO_2 Concentrations are corrected to 15% O_2 on a wet basis.

South Florida Environmental Services

SUMMARY OF RESULTS - GAS TURBINE NO. 2

	RUN 1	RUN 2	RUN 3	AVERAGE
SULFUR DIOXIDE				
CONCENTRATION (PPM)*	26.0	22.8	25.1	24.6
EMISSIONS (LBS/HR)	1.85	1.65	1.96	1.82

ALLOWABLE EMISSIONS	ppm*	lbs/hr
SULFUR DIOXIDE	32.0	7.13

* SO_2 Concentrations are corrected to 15% O_2 on a wet basis.

South Florida Environmental Services

SUMMARY OF RESULTS - GAS TURBINE NO. 5

	RUN 1	RUN 2	RUN 3	AVERAGE
SULFUR DIOXIDE				
CONCENTRATION (PPM)*	1.5	0.4	4.7	2.2
EMISSIONS (LBS/HR)	0.10	0.03	0.31	0.15

ALLOWABLE EMISSIONS	ppm*	lbs/hr
SULFUR DIOXIDE	32.0	7.13

* SO_2 Concentrations are corrected to 15% O_2 on a wet basis.

South Florida Environmental Services

2.0 STACK SCHEMATIC

Figure 2-1 details a schematic of the stack which services each of the Gas Turbines at Waste Management of Florida, Inc.'s Central Disposal Sanitary Landfill located in Pompano Beach, Florida.

Defined are the sampling port locations, interior duct dimensions and distances from the ports to the nearest upstream and downstream interferences.

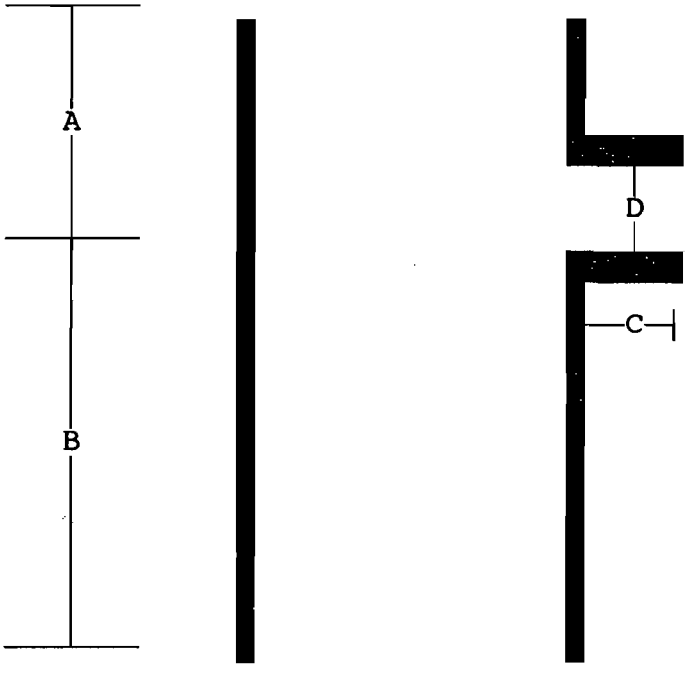


Figure 2-1

DISTANCE UPSTREAM FROM FLOW DISTURBANCE (A)	2.5	FEET
DISTANCE DOWNSTREAM FROM FLOW DISTURBANCE (B)	20.0	FEET
LENGTH OF PORT SLEEVE (C)	4	INCHES
DIAMETER OF PORT SLEEVE (D)	4	INCHES
NUMBER OF PORTS	2	
DIAMETER OF STACK AT SAMPLING PORTS	4.0	FEET

Drawing Not To Scale

3.0 SAMPLING TRAIN AND ANALYTICAL PROCEDURES

The five (5) Gas Turbines at Waste Management of Florida, Inc.'s Central Disposal Sanitary Landfill in Pompano Beach, Florida were tested for SO_2 in order to satisfy the conditions of the facility's air permit as issued by the Florida Department of Environmental Regulation.

The sampling train and analytical procedures for the test method is described below.

3.1 SULFUR DIOXIDE TESTING

3.1.1 SO_2 Sampling Equipment

The specific train used during these tests is manufactured by Research Appliance Company (RAC). The design specifications of this train met all the requirements of EPA's Reference Method 6 as found in the Federal Regulations under Section 40 CFR 60 Appendix A, as amended. The following is a description of the individual pieces of equipment that make up the train.

Probe - A six (6) foot heated stainless steel probe with a glass liner was used at the sampling location.

Pitot Tube - A Type S pitot tube attached to the probe was used to monitor the stack gas velocity. Since the pitot tubes met all of the dimensional criteria set forth in Method 2 of 40 CFR 60, a coefficient of 0.84 was used.

Condenser - Four impingers, connected in series with leak-free ground glass fittings, were used as the condenser. The first and third impingers were of the Greenburg-Smith design modified by replacing the tip with a 1/2" diameter glass tube extending to approximately 1/2" from the bottom of the impinger. The second and fourth impingers were of the standard Greenburg-Smith design.

Metering System - A vacuum gauge, inclined manometer, leak-free pump, calibrated thermocouples, and calibrated dry gas meter are the basic components used to meter the dried sample gas through the system.

Gas Density Determination - A transportable continuous emissions monitor system (TCEMS), capable of measuring CO_2, O_2 and CO, was used to determine flue gas density.

3.1.2 SO_2 Sampling Procedures

All sampling procedures were conducted in strict accordance with the Methods as found in 40 CFR 60 Appendix A, as amended. The following is the sequence of events that occurred prior to and during the actual test.

3.1 SULFUR DIOXIDE TESTING (cont.)

Traverse Points - The traverse points of the stack were calculated in accordance with Method 1, Section 2.5 and the probe was marked accordingly.

Static Pressure - The static pressure of the stack was checked and recorded.

Preliminary Traverse - A preliminary traverse was conducted at the stack. Readings included the pressure drops and flue gas temperatures.

Barometric Pressure - Barometric pressure was obtained and recorded using an aneroid barometer at the test site.

Sampling Train Set-Up -

(a) The first impinger was loaded with 100 ml of 80% Isopropal Alcohol (IPA). The weight was then recorded on the field data sheets,
(b) The second and third impingers were loaded with 100 ml of 3% Hydrogen Peroxide (H_2O_2). The weights were then recorded on the field data sheets,
(c) Approximately 200 grams of silica gel was placed in the fourth impinger. Exact weights were logged on the field data sheets,
(d) Crushed ice was placed around the impingers.

Pre-Test Leak Check - Once the train was assembled the system was leak checked at fifteen inches of vacuum (15"Hg). A leak rate of less than 0.02 CFM was achieved prior to the start of sampling.

Final Check - Once everything was set to begin, plant operations were checked to confirm that the gas turbine was operating at full capacity.

Sampling - Sampling, per Reference Method 6, then took place.

Post-Test Leak Check - Upon completion of each test run, the system was leak checked at the highest vacuum recorded during that run. All leak checks were less than 0.02 CFM.

Sample Recovery - All samples were recovered according to the respective Reference Method procedures. Because of the extreme importance of proper sample recovery techniques, details of the sample recovery procedures can be found in the Quality Control section of this report.

Operating Data Sheets - All pertinent operating data was logged throughout the test period by qualified SFES personnel.

4.0 QUALITY CONTROL PROCEDURES

Throughout all phases of the test program, including sampling, analysis, and data reduction, strict quality control procedures were adhered to.

Sampling was conducted by trained personnel with extensive experience in both inorganic and organic compound sampling. Sulfur Dioxide analysis was conducted by South Florida Environmental Services own inhouse laboratory located in West Palm Beach, Florida.

All sampling and analysis was conducted in strict accordance with EPA test procedures (where available). The quality control procedures found in the EPA Quality Assurance Handbook for Air Pollution Measurement Systems were adhered to as well.

These specific procedures in addition to South Florida Environmental Services usual high standard of quality control help to validate the results obtained in this test program. SFES is staffed by a team of qualified, experienced environmental professionals. As the majority of our emissions testing work is done for compliance purposes, strict QC procedures are incorporated into our everyday work performance.

All chemical reagents used in sampling, recovery and analysis were of certified American Chemical Society grade (unless a higher purity is specified in the Method).

South Florida Environmental Services entire equipment inventory is on a schedule of routine maintenance and calibration. This includes meter boxes, thermocouples, barometers, pitot tubes and sampling nozzles.

Meter boxes are calibrated over a full range of flow rates against a wet test meter every six months. After each field use the meter box is given a calibration check against the wet test meter at the average flow rates and highest vacuums experienced in the field.

Thermocouples are calibrated as specified in the EPA Handbook against an NBS traceable mercury in glass thermometer. Pitot tubes are visually inspected for conformance to the dimensional criteria specified in EPA Method 2. All pitot tubes used by meet this criteria and are assigned a pitot tube coefficient of 0.84. Pitot tubes which do not meet the criteria are either repaired or discarded.

4.0 QUALITY CONTROL PROCEDURES (cont.)

Sample train recovery procedures were conducted in accordance with the specific methods. Blanks were collected and submitted for analysis for all reagents used in sampling. Samples were transferred to the appropriate (glass or Nalgene bottles) containers which were then labelled for identification, volumes noted and liquid levels marked.

Chain of custody documentation was initiated in the field and maintained on all samples from their recovery through inter-laboratory transfer until their final analysis. Upon SFES return from the field, samples were assigned a sample bank number and logged into the master sample log book.

Analysis was conducted in accordance with the specific methods, using good laboratory procedures. Analytical results were used to calculate stack gas pollutant concentrations and emission rates.

All calculations were conducted in strict accordance with the equations found in the individual Methods. Velocity and emission rate calculations were conducted on a computer and the input data was checked by a person other than the original calculator to ensure that it is correct.

APPENDIX I

COMPUTER INPUT SHEETS

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #1

South Florida
Environmental Services

INPUT DATA SHEET

PLANT: Waste Management, Inc. RUN #:CT 1-1RT
LOCATION: Gas Turbine #1 DATE: 08-20-92

As (FT2)	12.57
Dn (IN)	N/A
FILTER#	N/A
PIT COEFF	.84
IMP-1 (INT)	386.8
IMP-2 (INT)	413.7
IMP-3 (INT)	421.0
IMP-4 (INT)	500.0
IMP-1 (FIN)	369.5
IMP-2 (FIN)	449.2
IMP-3 (FIN)	427.1
IMP-4 (FIN)	520.8
% CO2 (OUT)	.4
% O2 (OUT)	20.5
% CO (OUT)	.0
P BAR	30.12
P STK	-1.4
NO. PTS	12
TEST LNGTH	60
END METER	919.487
INT METER	872.908
BEGIN TIME:	09:19
END TIME:	10:19

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	1.8	1.34	2.00	87	82	810
2	2.0	1.41	2.00	92	83	811
3	2.1	1.45	2.00	99	89	814
4	1.6	1.26	2.00	100	88	806
5	1.1	1.05	2.00	100	88	792
6	.71	.84	2.00	106	92	774
B1	1.4	1.18	2.00	104	90	799
2	1.5	1.22	2.00	105	92	798
3	1.7	1.30	2.00	105	91	807
4	1.6	1.26	2.00	104	90	796
5	1.4	1.18	2.00	108	93	786
6	1.1	1.05	2.00	109	95	777
AVERAGE	1.5	1.21	2.00	101.6	89.4	797.5

South Florida Environmental Services

INPUT DATA SHEET

PLANT: Waste Management, Inc. RUN #:CT 1-2RT
LOCATION: Gas Turbine #1 DATE: 08-20-92

As (FT2)	12.57
Dn (IN)	N/A
FILTER#	N/A
PIT COEFF	.84
IMP-1 (INT)	399.9
IMP-2 (INT)	433.6
IMP-3 (INT)	417.7
IMP-4 (INT)	500.0
IMP-1 (FIN)	378.8
IMP-2 (FIN)	464.0
IMP-3 (FIN)	430.5
IMP-4 (FIN)	518.9
% CO2 (OUT)	.4
% O2 (OUT)	20.5
% CO (OUT)	.0
P BAR	30.12
P STK	-1.4
NO. PTS	12
TEST LNGTH	60
END METER	978.124
INT METER	931.500
BEGIN TIME:	10:45
END TIME:	11:45

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	1.2	1.10	2.00	96	93	814
2	1.4	1.18	2.00	95	92	812
3	1.6	1.26	2.00	96	89	818
4	1.6	1.26	2.00	99	91	813
5	1.3	1.14	2.00	100	93	808
6	1.1	1.05	2.00	101	94	800
B1	2.0	1.41	2.00	102	94	830
2	2.0	1.41	2.00	105	95	830
3	2.1	1.45	2.00	107	97	832
4	1.4	1.18	2.00	106	95	817
5	.98	.99	2.00	105	97	801
6	.66	.81	2.00	106	97	786
AVERAGE	1.4	1.19	2.00	101.5	93.9	813.4

South Florida Environmental Services

INPUT DATA SHEET

PLANT: Waste Management, Inc. RUN #:CT 1-3RT
LOCATION: Gas Turbine #1 DATE: 08-20-92

As (FT2)	12.57
Dn (IN)	N/A
FILTER#	N/A
PIT COEFF	.84
IMP-1 (INT)	386.6
IMP-2 (INT)	413.2
IMP-3 (INT)	421.2
IMP-4 (INT)	500.0
IMP-1 (FIN)	366.0
IMP-2 (FIN)	442.3
IMP-3 (FIN)	430.3
IMP-4 (FIN)	520.3
% CO2 (OUT)	.6
% O2 (OUT)	20.3
% CO (OUT)	.0
P BAR	30.12
P STK	-1.4
NO. PTS	12
TEST LNGTH	60
END METER	1037.840
INT METER	990.207
BEGIN TIME:	12:12
END TIME:	13:12

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	1.5	1.22	2.00	92	91	825
2	1.5	1.22	2.00	96	93	824
3	1.7	1.30	2.00	101	95	827
4	1.6	1.26	2.00	104	96	821
5	1.3	1.14	2.00	104	96	812
6	1.1	1.05	2.00	105	96	809
B1	2.1	1.45	2.00	104	96	835
2	2.1	1.45	2.00	104	96	838
3	2.2	1.48	2.00	103	96	840
4	1.5	1.22	2.00	103	96	821
5	.98	.99	2.00	103	96	806
6	.79	.89	2.00	102	95	794
AVERAGE	1.5	1.22	2.00	101.8	95.2	821.0

South Florida Environmental Services

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #2

South Florida
Environmental Services

INPUT DATA SHEET

PLANT: Waste Management, Inc. RUN #:CT 2-1RT
LOCATION: Gas Turbine #2 DATE: 08-20-92

		TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
As (FT2)	12.57							
Dn (IN)	N/A							
FILTER#	N/A							
PIT COEFF	.84							
		A1	1.4	1.18	2.00	90	90	794
IMP-1 (INT)	401.6	2	1.4	1.18	2.00	91	90	795
		3	1.7	1.30	2.00	93	90	801
IMP-2 (INT)	433.5	4	1.7	1.30	2.00	95	89	801
		5	1.5	1.22	2.00	96	89	797
IMP-3 (INT)	417.5	6	1.3	1.14	2.00	97	89	788
IMP-4 (INT)	500.0	B1	1.6	1.26	2.00	98	90	821
		2	1.8	1.34	2.00	99	90	824
IMP-1 (FIN)	381.4	3	1.9	1.38	2.00	99	90	832
		4	1.5	1.22	2.00	98	90	827
IMP-2 (FIN)	463.1	5	1.0	1.00	2.00	98	90	818
		6	.94	.97	2.00	98	90	815
IMP-3 (FIN)	430.0							
IMP-4 (FIN)	519.2							
% CO2 (OUT)	.4							
% O2 (OUT)	20.5							
% CO (OUT)	.0							
P BAR	30.06							
P STK	-1.5							
NO. PTS	12							
TEST LNGTH	60							
END METER	95.554							
INT METER	48.977							
BEGIN TIME:	13:49							
END TIME:	14:49							
AVERAGE			1.5	1.21	2.00	96.0	89.8	809.4

South Florida Environmental Services

INPUT DATA SHEET

PLANT: Waste Management, Inc. RUN #:CT 2-2RT
LOCATION: Gas Turbine #2 DATE: 08-21-92

As (FT2)	12.57
Dn (IN)	N/A
FILTER#	N/A
PIT COEFF	.84
IMP-1 (INT)	399.2
IMP-2 (INT)	433.2
IMP-3 (INT)	417.6
IMP-4 (INT)	500.0
IMP-1 (FIN)	381.2
IMP-2 (FIN)	462.7
IMP-3 (FIN)	429.8
IMP-4 (FIN)	516.4
% CO2 (OUT)	.4
% O2 (OUT)	20.5
% CO (OUT)	.0
P BAR	30.02
P STK	-1.5
NO. PTS	12
TEST LNGTH	60
END METER	213.375
INT METER	166.876
BEGIN TIME:	08:57
END TIME:	09:57

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	1.7	1.30	2.00	84	84	837
2	1.8	1.34	2.00	88	85	840
3	1.9	1.38	2.00	92	86	841
4	1.9	1.38	2.00	93	86	839
5	1.5	1.22	2.00	94	87	833
6	1.1	1.05	2.00	94	89	827
B1	1.8	1.34	2.00	95	90	833
2	1.9	1.38	2.00	96	90	837
3	2.0	1.41	2.00	102	93	840
4	1.5	1.22	2.00	101	92	832
5	1.1	1.05	2.00	101	92	824
6	.99	.99	2.00	101	93	819
AVERAGE	1.6	1.26	2.00	95.1	88.9	833.5

South Florida Environmental Services

INPUT DATA SHEET

PLANT: Waste Management, Inc. RUN #:CT 2-3RT
LOCATION: Gas Turbine #2 DATE: 08-21-92

As (FT2)	12.57							
Dn (IN)	N/A							
FILTER#	N/A	TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
PIT COEFF	.84							
		A1	1.7	1.30	2.00	94	91	838
IMP-1 (INT)	385.0	2	1.7	1.30	2.00	96	92	837
		3	1.8	1.34	2.00	98	93	837
IMP-2 (INT)	414.3	4	1.7	1.30	2.00	101	95	835
		5	1.5	1.22	2.00	101	95	829
IMP-3 (INT)	419.3	6	1.1	1.05	2.00	100	94	821
IMP-4 (INT)	500.0	B1	1.7	1.30	2.00	101	94	829
		2	1.7	1.30	2.00	101	94	831
IMP-1 (FIN)	367.1	3	1.9	1.38	2.00	100	94	835
		4	1.4	1.18	2.00	98	94	826
IMP-2 (FIN)	444.6	5	1.1	1.05	2.00	99	94	820
		6	1.0	1.00	2.00	99	94	816
IMP-3 (FIN)	428.1							
IMP-4 (FIN)	521.1							
% CO2 (OUT)	.5							
% O2 (OUT)	20.4							
% CO (OUT)	.0							
P BAR	30.02							
P STK	-1.5							
NO. PTS	12							
TEST LNGTH	60							
END METER	272.722							
INT METER	225.373							
BEGIN TIME:	10:23							
END TIME:	11:23							
AVERAGE			1.5	1.23	2.00	99.0	93.7	829.5

South Florida Environmental Services

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #5

South Florida
Environmental Services

INPUT DATA SHEET

PLANT: Waste Management, Inc.
LOCATION: Gas Turbine #5

RUN #:CT 5-1RT
DATE: 08-19-92

As (FT2)	12.57
Dn (IN)	N/A
FILTER#	N/A
PIT COEFF	.84
IMP-1 (INT)	387.5
IMP-2 (INT)	411.3
IMP-3 (INT)	420.0
IMP-4 (INT)	500.0
IMP-1 (FIN)	367.1
IMP-2 (FIN)	441.8
IMP-3 (FIN)	423.4
IMP-4 (FIN)	527.3
% CO2 (OUT)	.4
% O2 (OUT)	20.5
% CO (OUT)	.0
P BAR	30.09
P STK	-1.8
NO. PTS	12
TEST LNGTH	60
END METER	747.337
INT METER	700.927
BEGIN TIME:	10:47
END TIME:	11:47

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	1.9	1.38	2.00	91	88	841
2	1.8	1.34	2.00	108	92	843
3	1.9	1.38	2.00	110	97	844
4	1.8	1.34	2.00	104	98	837
5	1.2	1.10	2.00	101	98	830
6	1.3	1.14	2.00	97	98	827
B1	1.6	1.26	2.00	92	94	835
2	1.7	1.30	2.00	88	91	834
3	1.9	1.38	2.00	89	88	838
4	1.5	1.22	2.00	90	86	835
5	1.0	1.00	2.00	91	86	831
6	.92	.96	2.00	93	87	826
AVERAGE	1.5	1.23	2.00	96.2	91.9	835.1

South Florida Environmental Services

INPUT DATA SHEET

PLANT: Waste Management, Inc. RUN #:CT 5-2RT
LOCATION: Gas Turbine #5 DATE: 08-19-92

As (FT2)	12.57
Dn (IN)	N/A
FILTER#	N/A
PIT COEFF	.84
IMP-1 (INT)	397.8
IMP-2 (INT)	431.8
IMP-3 (INT)	417.4
IMP-4 (INT)	500.0
IMP-1 (FIN)	379.4
IMP-2 (FIN)	459.1
IMP-3 (FIN)	427.8
IMP-4 (FIN)	532.0
% CO2 (OUT)	.4
% O2 (OUT)	20.5
% CO (OUT)	.0
P BAR	30.11
P STK	-1.8
NO. PTS	12
TEST LNGTH	60
END METER	804.012
INT METER	757.876
BEGIN TIME:	12:17
END TIME:	13:17

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	1.9	1.38	2.00	92	90	839
2	1.9	1.38	2.00	97	92	843
3	1.9	1.38	2.00	98	92	844
4	1.8	1.34	2.00	97	92	838
5	1.3	1.14	2.00	97	92	826
6	1.1	1.05	2.00	97	92	821
B1	1.5	1.22	2.00	97	92	829
2	1.7	1.30	2.00	96	91	833
3	2.0	1.41	2.00	96	91	837
4	1.2	1.10	2.00	97	92	834
5	1.0	1.00	2.00	97	92	827
6	.92	.96	2.00	98	92	824
AVERAGE	1.5	1.22	2.00	96.6	91.7	832.9

South Florida Environmental Services

INPUT DATA SHEET

PLANT: Waste Management, Inc. RUN #:CT 5-3RT
LOCATION: Gas Turbine #5 DATE: 08-19-92

As (FT2)	12.57
Dn (IN)	N/A
FILTER#	N/A
PIT COEFF	.84
IMP-1 (INT)	387.1
IMP-2 (INT)	412.4
IMP-3 (INT)	418.6
IMP-4 (INT)	500.0
IMP-1 (FIN)	365.9
IMP-2 (FIN)	439.9
IMP-3 (FIN)	427.2
IMP-4 (FIN)	521.1
% CO2 (OUT)	.4
% O2 (OUT)	20.5
% CO (OUT)	.0
P BAR	30.04
P STK	-1.8
NO. PTS	12
TEST LNGTH	60
END METER	862.117
INT METER	815.412
BEGIN TIME:	13:45
END TIME:	14:45

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	1.7	1.30	2.00	93	91	837
2	1.8	1.34	2.00	94	92	839
3	2.0	1.41	2.00	96	92	841
4	1.8	1.34	2.00	98	93	836
5	1.4	1.18	2.00	98	93	831
6	1.3	1.14	2.00	99	94	827
B1	1.5	1.22	2.00	98	93	830
2	1.6	1.26	2.00	97	93	830
3	1.8	1.34	2.00	97	93	835
4	1.4	1.18	2.00	97	92	836
5	1.1	1.05	2.00	97	92	831
6	1.0	.98	2.00	96	92	828
AVERAGE	1.5	1.23	2.00	96.7	92.5	833.4

South Florida Environmental Services

APPENDIX II

VELOCITY CALCULATION SHEETS

South Florida Environmental Services

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #1

South Florida
Environmental Services

$$43.59 = \frac{17.64\,(46.519)(30.27)}{555.5}$$

ISOKINETIC CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 1-1RT
LOCATION: Gas Turbine #1 DATE : 08-20-92

TS (`F)=	797.5	% CO2=	.4	VM (CF) =	46.579
TS (`R)=	1257.5	% O2=	20.5	DELTA H (ABS)=	30.27
TM (`F)=	95.5	% CO=	.0	PS (ABS) =	30.02
TM (`R)=	555.5	% N2=	79.1	SQRT DELTA P =	1.21417
VI(TOT)=	45.1	CP=	.84	AREA NOZZLE =	0

Y = .9718

VM STD = $17.64 \frac{(VM)(Y)(\text{DELTA H ABS})}{(TM)}$ = 43.59 DSCF

VW STD = .04707 (VI TOT) = 2.12 CF

BWO = $\frac{\text{VW STD}}{\text{VW STD + VM STD}}$ = .05

1-BWO = 1 - BWO = .95

Md (DRY) = .44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2) = 28.88 LBS/LB MOLE

Ms (WET) = MD (1-BWO) + 18 (BWO) = 28.38 LBS/LB MOLE

G = SQRT (TS / PS / MS) = 1.21

VS = 85.49 (CP) (G) (SQRT DELTA P) = 105.9 FPS

V_{tot} = 45.71 SCF

South Florida Environmental Services

ISOKINETIC CALCULATION SHEET

PLANT: Waste Management, Inc.
LOCATION: Gas Turbine #1

RUN #: CT 1-2RT
DATE : 08-20-92

TS (`F)=	813.4	% CO2=	.4	VM (CF) =	46.624
TS (`R)=	1273.4	% O2=	20.5	DELTA H (ABS)=	30.27
TM (`F)=	97.7	% CO=	.0	PS (ABS) =	30.02
TM (`R)=	557.7	% N2=	79.1	SQRT DELTA P =	1.18838
VI(TOT)=	41	CP=	.84	AREA NOZZLE =	0
				Y =	.9718

VM STD	=	$17.64 \frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$	=	43.46 DSCF
VW STD	=	.04707 (VI TOT)	=	1.93 CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	=	.04
1-BWO	=	1 - BWO	=	.96
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	=	28.88 LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	=	28.42 LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	=	1.22
VS	=	85.49(CP)(G)(SQRT DELTA P)	=	104.3 FPS

South Florida Environmental Services

ISOKINETIC CALCULATION SHEET

PLANT: Waste Management, Inc.
LOCATION: Gas Turbine #1

RUN #: CT 1-3RT
DATE : 08-20-92

TS (`F)=	821.0	% CO2=	.6	VM (CF) =	47.633
TS (`R)=	1281.0	% O2=	20.3	DELTA H (ABS)=	30.27
TM (`F)=	98.5	% CO=	.0	PS (ABS) =	30.02
TM (`R)=	558.5	% N2=	79.1	SQRT DELTA P =	1.22435
VI(TOT)=	37.9	CP=	.84	AREA NOZZLE =	0
				Y =	.9718

VM STD = $17.64 \dfrac{(VM)(Y)(\text{DELTA H ABS})}{(TM)}$ = 44.34 DSCF

VW STD = .04707 (VI TOT) = 1.78 CF

BWO = $\dfrac{\text{VW STD}}{\text{VW STD + VM STD}}$ = .04

1-BWO = 1 - BWO = .96

Md (DRY) = (.44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2)) / 100 = 28.91 LBS/LB MOLE

Ms (WET) = (MD (1-BWO) + 18 (BWO)) / 100 = 28.49 LBS/LB MOLE

G = SQRT (TS / PS / MS) = 1.22

VS = 85.49(CP)(G)(SQRT DELTA P) = 107.6 FPS

South Florida Environmental Services

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #2

South Florida
Environmental Services

ISOKINETIC CALCULATION SHEET

PLANT: Waste Management, Inc.
LOCATION: Gas Turbine #2

RUN #: CT 2-1RT
DATE : 08-20-92

TS (`F)=	809.4	% CO2=	.4	VM (CF) =	46.577
TS (`R)=	1269.4	% O2=	20.5	DELTA H (ABS)=	30.21
TM (`F)=	92.9	% CO=	.0	PS (ABS) =	29.95
TM (`R)=	552.9	% N2=	79.1	SQRT DELTA P =	1.20986
VI(TOT)=	41.08	CP=	.84	AREA NOZZLE =	0
				Y =	.9718

VM STD = $17.64 \dfrac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$ = 43.71 DSCF

VW STD = .04707 (VI TOT) = 1.93 CF

BWO = $\dfrac{VW\ STD}{VW\ STD + VM\ STD}$ = .04

1-BWO = 1 - BWO = .96

Md (DRY) = .44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2) = 28.88 LBS/LB MOLE

Ms (WET) = MD (1-BWO) + 18 (BWO) = 28.42 LBS/LB MOLE

G = SQRT (TS / PS / MS) = 1.22

VS = 85.49(CP)(G)(SQRT DELTA P) = 106.1 FPS

South Florida Environmental Services

ISOKINETIC CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 2-2RT
LOCATION: Gas Turbine #2 DATE : 08-21-92

TS (`F)=	833.5	% CO2=	.4	VM (CF) =	46.499
TS (`R)=	1293.5	% O2=	20.5	DELTA H (ABS)=	30.17
TM (`F)=	92.0	% CO=	.0	PS (ABS) =	29.91
TM (`R)=	552.0	% N2=	79.1	SQRT DELTA P =	1.25655
VI(TOT)=	40.1	CP=	.84	AREA NOZZLE =	0
				Y =	.9718

VM STD = $17.64 \dfrac{(VM)(Y)(\text{DELTA H ABS})}{(TM)}$ = 43.65 DSCF

VW STD = .04707 (VI TOT) = 1.89 CF

BWO = $\dfrac{\text{VW STD}}{\text{VW STD + VM STD}}$ = .04

1-BWO = 1 - BWO = .96

Md (DRY) = .44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2) = 28.88 LBS/LB MOLE

Ms (WET) = MD (1-BWO) + 18 (BWO) = 28.43 LBS/LB MOLE

G = SQRT (TS / PS / MS) = 1.23

VS = 85.49(CP)(G)(SQRT DELTA P) = 111.3 FPS

South Florida Environmental Services

ISOKINETIC CALCULATION SHEET

PLANT: Waste Management, Inc.
LOCATION: Gas Turbine #2

RUN #: CT 2-3RT
DATE : 08-21-92

TS (`F)=	829.5	% CO2=	.5	VM (CF) =	47.349
TS (`R)=	1289.5	% O2=	20.4	DELTA H (ABS)=	30.17
TM (`F)=	96.3	% CO=	.0	PS (ABS) =	29.91
TM (`R)=	556.3	% N2=	79.1	SQRT DELTA P =	1.22874
VI(TOT)=	42.3	CP=	.84	AREA NOZZLE =	0
				Y =	.9718

VM STD = $17.64 \frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$ = 44.10 DSCF

VW STD = .04707 (VI TOT) = 1.99 CF

BWO = $\frac{VW\ STD}{VW\ STD + VM\ STD}$ = .04

1-BWO = 1 - BWO = .96

Md (DRY) = (.44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2)) = 28.90 LBS/LB MOLE

Ms (WET) = (MD (1-BWO) + 18 (BWO)) = 28.43 LBS/LB MOLE

G = SQRT (TS / PS / MS) = 1.23

VS = 85.49(CP)(G)(SQRT DELTA P) = 108.7 FPS

South Florida Environmental Services

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #5

South Florida Environmental Services

ISOKINETIC CALCULATION SHEET

PLANT: Waste Management, Inc.
LOCATION: Gas Turbine #5

RUN #: CT 5-1RT
DATE : 08-19-92

TS (`F)=	835.1	% CO2=	.4	VM (CF) =	46.41
TS (`R)=	1295.1	% O2=	20.5	DELTA H (ABS)=	30.24
TM (`F)=	94.0	% CO=	.0	PS (ABS) =	29.96
TM (`R)=	554.0	% N2=	79.1	SQRT DELTA P =	1.23390
VI(TOT)=	40.8	CP=	.84	AREA NOZZLE =	0
				Y =	.9718

VM STD = $17.64 \dfrac{(VM)(Y)(\text{DELTA H ABS})}{(TM)}$ = 43.51 DSCF

VW STD = .04707 (VI TOT) = 1.92 CF

BWO = $\dfrac{\text{VW STD}}{\text{VW STD + VM STD}}$ = .04

1-BWO = 1 - BWO = .96

Md (DRY) = .44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2) = 28.88 LBS/LB MOLE

Ms (WET) = MD (1-BWO) + 18 (BWO) = 28.42 LBS/LB MOLE

G = SQRT (TS / PS / MS) = 1.23

VS = 85.49(CP)(G)(SQRT DELTA P) = 109.3 FPS

South Florida Environmental Services

ISOKINETIC CALCULATION SHEET

PLANT: Waste Management, Inc.
LOCATION: Gas Turbine #5

RUN #: CT 5-2RT
DATE : 08-19-92

TS (`F)=	832.9	% CO2=	.4	VM (CF) =	46.136
TS (`R)=	1292.9	% O2=	20.5	DELTA H (ABS)=	30.26
TM (`F)=	94.1	% CO=	.0	PS (ABS) =	29.98
TM (`R)=	554.1	% N2=	79.1	SQRT DELTA P =	1.22194
VI(TOT)=	51.3	CP=	.84	AREA NOZZLE =	0
				Y =	.9718

VM STD = $17.64 \dfrac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$ = 43.27 DSCF

VW STD = .04707 (VI TOT) = 2.41 CF

BWO = $\dfrac{VW\ STD}{VW\ STD + VM\ STD}$ = .05

1-BWO = 1 - BWO = .95

Md (DRY) = .44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2) = 28.88 LBS/LB MOLE

Ms (WET) = MD (1-BWO) + 18 (BWO) = 28.31 LBS/LB MOLE

G = SQRT (TS / PS / MS) = 1.23

VS = 85.49(CP)(G)(SQRT DELTA P) = 108.3 FPS

(1-BWO)

South Florida Environmental Services

ISOKINETIC CALCULATION SHEET

PLANT: Waste Management, Inc.
LOCATION: Gas Turbine #5

RUN #: CT 5-3RT
DATE : 08-19-92

TS (`F)=	833.4	% CO2=	.4	VM (CF) =	46.705
TS (`R)=	1293.4	% O2=	20.5	DELTA H (ABS)=	30.19
TM (`F)=	94.6	% CO=	.0	PS (ABS) =	29.91
TM (`R)=	554.6	% N2=	79.1	SQRT DELTA P =	1.23108
VI(TOT)=	36	CP=	.84	AREA NOZZLE =	0
				Y =	.9718

VM STD	=	$17.64 \frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$	= 43.67	DSCF
VW STD	=	.04707 (VI TOT)	= 1.69	CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	= .04	
1-BWO	=	1 - BWO	= .96	
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	= 28.88	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	= 28.48	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	= 1.23	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 108.9	FPS

South Florida Environmental Services

APPENDIX III

SO_2 (M6) EMISSION CALCULATION SHEETS

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #1

South Florida
Environmental Services

A. $C_{CORR} = C_{ACT}(20.9 - x)/(20.9 - y)$ $\quad x = O_{2\,CORR} = 15\%$

$y = O_{2\,ACT} = 20.5$

$= C_{ACT}(20.9 - 15)/(20.9 - 20.5)$

$= C_{ACT}(5.9/0.4)$

$= C_{ACT}\ 14.75$

$C_{ACT} = \text{limitation ppm} / 14.75 =$ ppm

B. $acfm\ (1 - \%_{H_2O}) = dcfm$

C. $m_{lb/hr} = \dfrac{(14.7 \times 144)\ lb_f}{ft^2} \times dcf/m \times \dfrac{lb_m\text{-}R^\circ}{24.14\ ft\text{-}lb_f} \times$ (SO2)

$\dfrac{1}{(460^\circ + temp_{stack}^{F^\circ})^\circ R} \times 60m/hr \times$

$C_{ACT}/10^6 = lbs/hr$

SO2 (M6) EMISSION CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 1-1RT
LOCATION: Gas Turbine #1 DATE : 08-20-92

Mn (AMOUNT FOUND IN MILLIGRAMS)	=	22.30	mg
Mn FIELD BLANK		.31	mg
Mn TOTAL	=	21.99	mg

V_{tot} = 45.71 SCF

AS = 12.57 SQ FT

(.95) (105.9) (12.57) (17.64) (30.02) (1257.5)

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 1924290 DSCFH
32071 DSCFM
79671 ACFM

CS = (2.205 X 10-6) (Mn) / (VM STD) = 1.1123e-6 LBS/SCF

CS' = 0.0154 (Mn) / (VM STD) = .0078 GRAINS /SCF

PMR = (QS) (CS) = 2.14 LBS/HR

PPM DRY = (CS) / (1.66 x 10e-7) = 6.7 PPM DRY

PPM @15%O2 = PPM(wet) x (5.9/(20.9-%O2(wet))) = 27.9 PPM @15%O2

$C_{corr} = C_{act}(20.9-15)/(20.9-20.5)$

$C_{cor.}$ 5.9/.4 = 14.75 C_{act}

$C_{act} = C_{corr}/14.75$ = /14.75 =

79671 acfm x (1-0.05) = 75,687 dcfm → 32,071

South Florida Environmental Services

SO2 (M6) EMISSION CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 1-2RT
LOCATION: Gas Turbine #1 DATE : 08-20-92

Mn (AMOUNT FOUND IN MILLIGRAMS)	=	14.60	mg
Mn FIELD BLANK		.31	mg
Mn TOTAL	=	14.29	mg

AS	=	12.57	SQ FT
Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	1877894	DSCFH
		31298	DSCFM
		78439	ACFM
CS = (2.205 X 10-6) (Mn) / (VM STD)	=	7.2498e-7	LBS/SCF
CS' = 0.0154 (Mn) / (VM STD)	=	.0051	GRAINS /SCF
PMR = (QS) (CS)	=	1.36	LBS/HR
PPM DRY = (CS) / (1.66 x 10e-7)	=	4.4	PPM DRY
PPM @15%O2 = PPM(wet) x (5.9/(20.9-%O2(wet)))	=	19.4	PPM @15%O2

South Florida Environmental Services

SO2 (M6) EMISSION CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 1-3RT
LOCATION:Gas Turbine #1 DATE : 08-20-92

Mn (AMOUNT FOUND IN MILLIGRAMS)	=	11.80	mg
Mn FIELD BLANK		.31	mg
Mn TOTAL	=	11.49	mg

AS	=	12.57	SQ FT
Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	1934532 32242 80987	DSCFH DSCFM ACFM
CS = (2.205 X 10-6) (Mn) / (VM STD)	=	5.7134e-7	LBS/SCF
CS' = 0.0154 (Mn) / (VM STD)	=	.0040	GRAINS /SCF
PMR = (QS) (CS)	=	1.11	LBS/HR
PPM DRY = (CS) / (1.66 x 10e-7)	=	3.4	PPM DRY
PPM @15%O2 = PPM(wet) x (5.9/(20.9-%O2(wet)))	=	14.1	PPM @15%O2

South Florida Environmental Services

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #2

South Florida
Environmental Services

SO2 (M6) EMISSION CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 2-1RT
LOCATION: Gas Turbine #2 DATE : 08-20-92

Mn (AMOUNT FOUND IN MILLIGRAMS)	=	19.50	mg
Mn FIELD BLANK		.31	mg
Mn TOTAL	=	19.19	mg

AS	=	12.57	SQ FT
Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	1912935 31882 79819	DSCFH DSCFM ACFM
CS = (2.205 X 10-6) (Mn) / (VM STD)	=	9.6803e-7	LBS/SCF
CS' = 0.0154 (Mn) / (VM STD)	=	.0068	GRAINS /SCF
PMR = (QS) (CS)	=	1.85	LBS/HR
PPM DRY = (CS) / (1.66 x 10e-7)	=	5.8	PPM DRY
PPM @15%O2 = PPM(wet) x (5.9/(20.9-%O2(wet)))	=	26.0	PPM @15%O2

South Florida Environmental Services

SO2 (M6) EMISSION CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 2-2RT
LOCATION: Gas Turbine #2 DATE : 08-21-92

Mn (AMOUNT FOUND IN MILLIGRAMS)	=	16.90	mg
Mn FIELD BLANK		.31	mg
Mn TOTAL	=	16.59	mg

AS	=	12.57	SQ FT
Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	1968403 32807 83730	DSCFH DSCFM ACFM
CS = (2.205 X 10-6) (Mn) / (VM STD)	=	8.3806e-7	LBS/SCF
CS' = 0.0154 (Mn) / (VM STD)	=	.0059	GRAINS /SCF
PMR = (QS) (CS)	=	1.65	LBS/HR
PPM DRY = (CS) / (1.66 x 10e-7)	=	5.0	PPM DRY
PPM @15%O2 = PPM(wet) x (5.9/(20.9-%O2(wet)))	=	22.8	PPM @15%O2

South Florida Environmental Services

SO2 (M6) EMISSION CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 2-3RT
LOCATION: Gas Turbine #2 DATE : 08-21-92

Mn (AMOUNT FOUND IN MILLIGRAMS)	=	20.70	mg
Mn FIELD BLANK		.31	mg
Mn TOTAL	=	20.39	mg

AS	=	12.57	SQ FT
Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	1924550 32076 81749	DSCFH DSCFM ACFM
CS = (2.205 X 10-6) (Mn) / (VM STD)	=	1.0195e-6	LBS/SCF
CS' = 0.0154 (Mn) / (VM STD)	=	.0071	GRAINS /SCF
PMR = (QS) (CS)	=	1.96	LBS/HR
PPM = (CS) / (1.66 x 10e-7) DRY	=	6.1	PPM DRY
PPM = PPM(wet) x (5.9/(20.9-%O2(wet))) @15%O2	=	25.1	PPM @15%O2

South Florida Environmental Services

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #5

South Florida
Environmental Services

SO2 (M6) EMISSION CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 5-1RT
LOCATION: Gas Turbine #5 DATE : 08-19-92

Mn (AMOUNT FOUND IN MILLIGRAMS)	=	1.38	mg
Mn FIELD BLANK		.3	mg
Mn TOTAL	=	1.07	mg

AS	=	12.57	SQ FT
Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	1931918	DSCFH
		32199	DSCFM
		82212	ACFM
CS = (2.205 X 10-6) (Mn) / (VM STD)	=	5.4230e-8	LBS/SCF
CS' = 0.0154 (Mn) / (VM STD)	=	.0004	GRAINS /SCF
PMR = (QS) (CS)	=	.10	LBS/HR
PPM DRY = (CS) / (1.66 x 10e-7)	=	.3	PPM DRY
PPM @15%O2 = PPM(wet) x (5.9/(20.9-%O2(wet)))	=	1.5	PPM @15%O2

South Florida Environmental Services

SO2 (M6) EMISSION CALCULATION SHEET

PLANT: Waste Management, Inc. RUN #: CT 5-3RT
LOCATION: Gas Turbine #5 DATE : 08-19-92

Mn (AMOUNT FOUND IN MILLIGRAMS)	=	3.51	mg
Mn FIELD BLANK		.31	mg
Mn TOTAL	=	3.20	mg

AS	=	12.57	SQ FT
Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	1935212 32254 81995	DSCFH DSCFM ACFM
CS = (2.205 X 10-6) (Mn) / (VM STD)	=	1.6158e-7	LBS/SCF
CS' = 0.0154 (Mn) / (VM STD)	=	.0011	GRAINS /SCF
PMR = (QS) (CS)	=	.31	LBS/HR
PPM = (CS) / (1.66 x 10e-7) DRY	=	1.0	PPM DRY
PPM = PPM(wet) x (5.9/(20.9-%O2(wet))) @15%O2	=	4.7	PPM @15%O2

South Florida Environmental Services

APPENDIX IV

SO_2 LABORATORY RESULTS

South Florida Environmental Services

South Florida
Environmental Services

LABORATORY
SUMMARY OF RESULTS

PROJECT NUMBER: 92-550
PROJECT NAME: WASTE MANAGEMENT, INC.

ANALYSIS: EPA METHOD 6
ANALYST: M. WAYT

SAMPLE DESCRIPTION	SAMPLE VOLUME (mL)	mg SO_2
UNIT #1 CT1-1RT	474	22.3
CT1-2RT	440	14.6
CT1-3RT	460	11.8
UNIT #2 CT2-1RT	426	19.5
CT2-2RT	455	16.9
CT2-3RT	470	20.7
UNIT #5 CT5-1RT	418	1.38
CT5-2RT	454	0.64
CT5-3RT	466	3.51
BLANK	200	0.31
EPA Audit Samples		
EPA #C8636	100	14.5
EPA #C8874	100	33.4

EPA AUDIT #C8636 - 691 $mgSO_2/DSCM$
EPA AUDIT #C8874 - 1592 $mgSO_2/DSCM$

6821 Vista Parkway North, West Palm Beach, FL 33411
Tel: 407-687-5300 Fax: 407-687-3676

APPENDIX V

NOMENCLATURE SHEETS

South Florida Environmental Services

NOMENCLATURE

AN	Area of the nozzle in square feet.
AS	Area of the stack in square feet.
BWO	The amount of moisture in the flue gas.
Co	Average CEM response to initial and final zero gas system calibration.
Cm	Average CEM response to initial and final span gas system calibration.
Cma	Concentration of the calibration gases.
C'	Raw emissions data reported by the CEMs, uncorrected for calibration drift.
Cgas	Final emissions data reported by CEMs, adjusted for calibration drift.
% CO	Percent of carbon monoxide in the flue gas.
% CO2	Percent of carbon dioxide in the flue gas.
Cp	Pitot tube coefficient.
Cs	The concentration in the stack in pounds per standard cubic foot.
Cs'	The concentration in the stack in grains per standard cubic foot.
CS 12%	The concentration in milligrams per dry standard cubic meter corrected to 12% CO2.
DELTA H	The meter orifice differential.
DELTA H(ABS)	The meter orifice differential, absolute conditions in inches of mercury.
Dn (IN)	Diameter of the nozzle in inches.
DRY GAS IN	Temperature of the dr gas meter inlet degrees Fahrenheit.
DRY GAS OUT	Temperature of the dry gas meter outlet degrees Fahrenheit.
Ds (FT)	Diameter of the stack in feet.
DSCFM	Dry standard cubic feet per minute

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #1

South Florida
Environmental Services

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	WASTE MANAGEMENT	Run #:	CT1-1RT
Location:	UNIT #1	Date:	8-20-92
Ds (ft):	4'	No. Points:	12
Dn (in):	—	Test Length:	60 min
Filter #:	—	End Meter Reading:	919.487
Cp:	.84	Int Meter Reading:	872.908
P bar:	30.12	Begin Time:	919
P stack:	-1.4	End Time:	1019
IMP-1 (INT)	586.8g 80% IPA	IMP-1 (FINAL)	569.5g
IMP-2 (INT)	413.7g 3% H_2O_2	IMP-2 (FINAL)	449.2g
IMP-3 (INT)	421.0g 3% H_2O_2	IMP-3 (FINAL)	427.1g
IMP-4 (INT)	500.0g Silica	IMP-4 (FINAL)	520.8g

	TEST 1	TEST 2	TEST 3
% CO2			
% O2			
% CO			

Project Director:	J. GOODWIN	Field Laboratory:	M. WYATT
Meter Box Operator:	M. WYATT	Chain of Custody:	M. WYATT
Probe Operator:	J. GOODWIN	Plant Coordinator:	J. FICULA
Orsat Analyst:	—	Agency Rep:	

Comments:

TRAVERSE DATA SHEET

Page 1 of 1 | Sampling time per point: 5 min

Plant: WASTE MANAGEMENT | Run #: CT1-11PT

Location: UNIT #1 | Date: 8-20-92

Trav. No.	Delta P	Delta H	Meter Reading 872.908	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A1	1.8	2.0	878.0	87	82	N/A	64	810	3
2	2.0		881.2	92	83		49	811	3
3	2.1		884.6	99	89		55	814	3
4	1.6		887.1	100	88		55	806	3
5	1.1		892.5	100	88		56	792	3
6	.71		896.9	106	92		58	774	3
B1	1.4	2.0	900.1	104	90	N/A	56	799	3
2	1.5		903.9	105	92		58	798	3
3	1.7		908.0	105	91		57	807	3
4	1.6		913.2	104	90		56	796	3
5	1.4			108	93		58	786	3
6	1.0		919.487	109	95		59	777	3

Relationship: —
Box #: 4 Y: .9718 Delta H@: 2.11
Start Time: 919 End Time: _____
Pre Leak Ck: 0 CFM @ 12 "Hg
Mid Leak Ck: — CFM @ — "Hg (Vol: _____)
Post Leak CK: 0 CFM @ 12 "Hg
Pitot Leak CK: ok @ 7 "H2O
Box Oper: MWW Probe Oper: JPG

TURBINE TEMP = 1150°F
TURBINE OUTPUT = 2.7 MW
STATIC = -1.4

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	WASTE MANAGEMENT	Run #:	CTI-2AT
Location:	UNIT A1	Date:	8-20-92
Ds (ft):	4'	No. Points:	12
Dn (in):	—	Test Length:	60 MIN
Filter #:	—	End Meter Reading:	978.129
Cp:	.84	Int Meter Reading:	931.500
P bar:	30.12	Begin Time:	1045
P stack:	-1.4	End Time:	1145
IMP-1 (INT)	399.9g 80% IPA	IMP-1 (FINAL)	378.8g
IMP-2 (INT)	433.6g 3% H_2O_2	IMP-2 (FINAL)	464.0g
IMP-3 (INT)	417.7g 3% H_2O_2	IMP-3 (FINAL)	430.5g
IMP-4 (INT)	500.0g S.G.1	IMP-4 (FINAL)	518.9g

	TEST 1	TEST 2	TEST 3
% CO2			
% O2			
% CO			

Project Director:	J. GOODWIN	Field Laboratory:	M. WAYT
Meter Box Operator:	M. WAYT	Chain of Custody:	M. WAYT
Probe Operator:	J. GOODWIN	Plant Coordinator:	J. FICULA
Orsat Analyst:	—	Agency Rep:	

Comments:

TRAVERSE DATA SHEET

Page 1 of 1 | Sampling time per point: 5 min

Plant: WASTE MANAGEMENT | Run #: CTI-2 AT

Location: UNIT #1 | Date: 8-20-92

Trav. No.	Delta P	Delta H	Meter Reading 931.500	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A1	1.2	2.0	935.4	96	93	N/A	65	814	3
2	1.4	↓	939.3	95	92	↓	53	812	3
3	1.6		943.1	96	89		54	818	3
4	1.6		947.0	99	91		56	813	3
5	1.3		950.9	100	93		58	808	3
6	1.1	↓	954.8	101	94	↓	60	800	3
B1	2.0	2.0	958.7	102	94	N/A	60	830	3
2	2.0	↓	962.6	105	95	↓	60	830	3
3	2.1		966.4	107	97		64	832	3
4	1.4		970.2	106	95		63	817	3
5	.98		974.3	105	97		64	801	3
6	.66	↓	978.124	106	97	↓	66	786	3

Relationship: —
Box #: 4 Y: .9718 Delta H@: 2.11
Start Time: 1045 End Time: 1145
Pre Leak Ck: 0 CFM @ 12 "Hg
Mid Leak Ck: — CFM @ — "Hg (Vol: _____)
Post Leak CK: 0 CFM @ 4 "Hg
Pitot Leak CK: ok @ 7 "H2O
Box Oper: MLW Probe Oper: JAG

TURBINE TEMP. = 1150°F
TURBINE MW = 2.7
STATIC PRESSURE = -1.4

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	WASTE MANAGEMENT	Run #:	CTI-3AT
Location:	UNIT #1	Date:	8-20-92
Ds (ft):	4'	No. Points:	12
Dn (in):	—	Test Length:	60 min
Filter #:	—	End Meter Reading:	1037.841
Cp:	.84	Int Meter Reading:	990.207
P bar:	30.12	Begin Time:	1212
P stack:	-1.4	End Time:	1312

IMP-1 (INT)	386.6 g 86% IPA	IMP-1 (FINAL)	366.0g
IMP-2 (INT)	413.2 g 3% H_2O_2	IMP-2 (FINAL)	~~397~~ 442.3g
IMP-3 (INT)	421.2 g 3% H_2O_2	IMP-3 (FINAL)	430.3g
IMP-4 (INT)	500.0 g Silica	IMP-4 (FINAL)	508.3 g

	TEST 1	TEST 2	TEST 3
% CO2			
% O2			
% CO			

Project Director:	J. GOODWIN	Field Laboratory:	M. WAYT
Meter Box Operator:	M. WAYT	Chain of Custody:	M. WAYT
Probe Operator:	J. GOODWIN	Plant Coordinator:	J. FICULA
Orsat Analyst:	—	Agency Rep:	

Comments:

TRAVERSE DATA SHEET

Page 1 of 1 | Sampling time per point: 5 MIN

Plant: WASTE MANAGEMENT | Run #: CT 1-3 RT

Location: UNIT # 1 | Date: 8-20-92

Trav. No.	Delta P	Delta H	Meter Reading 990.207	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A 1	1.5	2.0	994.1	92	91	N/A	64	825	3
2	1.5		998.0	96	93		60	824	3
3	1.7		1002.9	101	95		59	827	3
4	1.6		1005.9	104	96		59	821	3
5	1.3		1009.8	104	96		59	812	3
6	1.1		1013.8	105	96		60	809	3
B 1	2.1	2.0	1017.7	104	96	N/A	61	835	3
2	2.1		1021.7	104	96		62	838	3
3	2.2		1025.7	103	96		62	840	3
4	1.5		1029.8	103	96		63	821	3
5	.98		1033.8	103	96		63	806	3
6	.79		1037.841	102	95		63	794	3

Relationship: —
Box #: 4 Y: .9718 Delta H@: 2.11
Start Time: 1212 End Time: 1312
Pre Leak Ck: 0 CFM @ 12 "Hg
Mid Leak Ck: — CFM @ — "Hg (Vol: _____)
Post Leak CK: .01 CFM @ 12 "Hg
Pitot Leak CK: OK @ 7 "H2O
Box Oper: MLW Probe Oper: SPG

TURBINE TEMP = 1160°F
TURBINE OUTPUT = 2.7 MW
P_{STATIC} = -1.4

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #2

South Florida
Environmental Services

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	WASTE MANAGEMENT	Run #:	CTZ-1RT
Location:	UNIT #2	Date:	8-20-92
Ds (ft):	4'	No. Points:	12
Dn (in):	—	Test Length:	60 MIN
Filter #:	—	End Meter Reading:	95.559
Cp:	.84	Int Meter Reading:	48.977
P bar:	30.06	Begin Time:	1349
P stack:	-1.5	End Time:	1499
IMP-1 (INT)	401.6 g 80% IPA	IMP-1 (FINAL)	391.8g
IMP-2 (INT)	433.5g 3% H_2O_2	IMP-2 (FINAL)	463.1g
IMP-3 (INT)	417.5g 3% H_2O_2	IMP-3 (FINAL)	430.0g
IMP-4 (INT)	500.g SILICA	IMP-4 (FINAL)	519.2g

	TEST 1	TEST 2	TEST 3
% CO2			
% O2			
% CO			

Project Director:	JGOODWIN	Field Laboratory:	MCUMPT
Meter Box Operator:	MCUMPT	Chain of Custody:	MCUMPT
Probe Operator:	JGOODWIN	Plant Coordinator:	JFIUCA
Orsat Analyst:	—	Agency Rep:	

Comments:

TRAVERSE DATA SHEET

Page 1 of 1 | Sampling time per point: 5 min.

Plant: WASTE MANAGEMENT | Run #: CT2-1RT

Location: UNIT #2 | Date: 8-20-92

Trav. No.	Delta P	Delta H	Meter Reading 48,977	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A 1	1.4	2.0	53.1	90	90	N/A	65	794	3
2	1.4	↓	57.0	91	90	↓	57	795	3
3	1.7		60.8	93	90		60	801	3
4	1.7		64.9	95	89		63	801	3
5	1.5		68.5	96	89		63	797	3
6	1.3	↓	72.4	97	89	↓	64	788	3
B 1	1.6	2.0	76.3	98	90	N/A	65	821	3
2	1.8	↓	80.2	99	90	↓	65	824	3
3	1.9		83.9	99	90		66	832	3
4	1.5		87.7	98	90		66	827	3
5	1.0		91.6	98	90		67	818	3
6	.94	↓	95.554	98	90	↓	68	815	3

Relationship: —
Box #: 4 Y: .9918 Delta H@: 2.11
Start Time: 1349 End Time: 1449
Pre Leak Ck: .0075 CFM @ 13 "Hg
Mid Leak Ck: — CFM @ — "Hg (Vol: ____)
Post Leak CK: .01 CFM @ 13 "Hg
Pitot Leak CK: OK @ 7 "H2O
Box Oper: MW Probe Oper: JAG

STATIC = -1.5
TURBINE TEMP = 1160°F
MW OUTPUT = 2.7

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	WASTE MANAGEMENT	Run #:	C72-2RT
Location:	UNIT # 2	Date:	8-21-92
Ds (ft):	4'	No. Points:	12
Dn (in):	—	Test Length:	60 min
Filter #:	—	End Meter Reading:	213.375
Cp:	.84	Int Meter Reading:	166.876
P bar:	30.02	Begin Time:	0857
P stack:	-1.5	End Time:	0957
IMP-1 (INT)	399.2 g 80% IPA	IMP-1 (FINAL)	381.2 g
IMP-2 (INT)	433.2 g 3% H_2O_2	IMP-2 (FINAL)	462.7 g
IMP-3 (INT)	417.6 g 3% H_2O_2	IMP-3 (FINAL)	429.8 g
IMP-4 (INT)	500.0 g Silica Gel	IMP-4 (FINAL)	516.4 g

	TEST 1	TEST 2	TEST 3
% CO2			
% O2			
% CO			

Project Director:	J. GOODWIN	Field Laboratory:	M. WAYT
Meter Box Operator:	M. WAYT	Chain of Custody:	M. WAYT
Probe Operator:	J. GOODWIN	Plant Coordinator:	J. FICUCA
Orsat Analyst:	—	Agency Rep:	

Comments:

TRAVERSE DATA SHEET

Page 1 of 1

Sampling time per point: 5 min

Plant: WASTE MANAGEMENT

Run #: CT2-2RT

Location: UNIT #2

Date: 8-21-92

Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
			166.876						
A 1	1.7	2.0	171.3	84	84	N/A	65	837	3
2	1.8		174.8	88	85		51	840	3
3	1.9		178.7	92	86		56	841	3
4	1.9		182.8	93	86		58	839	3
5	1.5		186.7	94	87		59	833	3
6	1.1		190.8	94	89		60	827	3
7									3
B 1	1.8	2.0	194.0	95	90	N/A	61	833	3
2	1.9		201.8	96	90		61	837	3
3	2.0		~~205.6~~	102	93		63	840	3
4	1.5		205.6	101	92		62	832	3
5	1.1			101	92		62	824	3
6	.99		213.375	101	93		63	819	3

Relationship: —

Box #: 4 Y: .9718 Delta H@: 2.11

Start Time: 0857 End Time: 0957

Pre Leak Ck: 0 CFM @ 12 "Hg

Mid Leak Ck: — CFM @ — "Hg (Vol: _____)

Post Leak CK: 0 CFM @ 6 "Hg

Pitot Leak CK: OK @ 7 "H2O

Box Oper: MLW Probe Oper: JAG

TURBINE TEMP = 1160 °F

TURBINE OUTPUT = 2.7 MW

STATIC PRESSURE = -1.5

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	WASTE MANAGEMENT	Run #:	CT2-3RT
Location:	UNIT #2	Date:	8-21-92
Ds (ft):	4'	No. Points:	12
Dn (in):	-	Test Length:	60 MIN
Filter #:	-	End Meter Reading:	272.722
Cp:	.84	Int Meter Reading:	225.373
P bar:	30.02	Begin Time:	1023
P stack:	-1.5	End Time:	1123
IMP-1 (INT)	385.0g 80% IPA	IMP-1 (FINAL)	367.1g
IMP-2 (INT)	414.3g 3% H_2O_2	IMP-2 (FINAL)	444.6g
IMP-3 (INT)	419.3g 3% H_2O_2	IMP-3 (FINAL)	428.1g
IMP-4 (INT)	500.0g SiGel	IMP-4 (FINAL)	521.1g

	TEST 1	TEST 2	TEST 3
% CO2			
% O2			
% CO			

Project Director:	J. GOODWIN	Field Laboratory:	M. WAYT
Meter Box Operator:	M. WAYT	Chain of Custody:	M. WAYT
Probe Operator:	J. GOODWIN	Plant Coordinator:	J. FICULA
Orsat Analyst:	—	Agency Rep:	

Comments:

TRAVERSE DATA SHEET

Page 1 of 1 — Sampling time per point: 5 min

Plant: WASTE MANAGEMENT — Run #: CT2-3RT

Location: UNIT A2 — Date: 8-21-92

Trav. No.	Delta P	Delta H	Meter Reading 225.373	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A1	1.7	2.0	229.2	94	91	N/A	67	838	3
2	1.7		233.2	96	92		65	837	3
3	1.8		237.1	98	93		64	837	3
4	1.7		241.1	101	95		62	835	3
5	1.5		245.0	101	95		62	829	3
6	1.1		249.0	100	94		63	821	3
									3
B1	1.7	2.0	253.1	101	94	N/A	64	829	3
2	1.7		257.0	101	94		63	831	3
3	1.9		260.8	100	94		64	835	3
4	1.4		264.8	98	94		64	826	3
5	1.1		268.8	99	94		65	820	3
6	1.0		272.722	99	94		64	816	3

Relationship: —
Box #: 4 Y: .9718 Delta H@: 2.11
Start Time: 1023 End Time: 1123
Pre Leak Ck: 0 CFM @ 13 "Hg
Mid Leak Ck: — CFM @ — "Hg (Vol: ____)
Post Leak CK: 0 CFM @ 13 "Hg
Pitot Leak CK: OK @ 7 "H2O
Box Oper: MLW Probe Oper: JAG

Compliance Emissions Test Report
Power Production Facility

Gas Turbine #5

South Florida
Environmental Services

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	WASTE MANAGEMENT	Run #:	C-5-IRT
Location:	UNIT #5	Date:	8-19-92
Ds (ft):	4'	No. Points:	12
Dn (in):	—	Test Length:	60 min
Filter #:	—	End Meter Reading:	747.337
Cp:	.84	Int Meter Reading:	700.927
P bar:	30.09	Begin Time:	1047
P stack:	-1.8	End Time:	1157
IMP-1 (INT)	387.5g 80% IPA	IMP-1 (FINAL)	362.1g
IMP-2 (INT)	411.3g 3% H_2O_2	IMP-2 (FINAL)	441.8g
IMP-3 (INT)	420.0g 3% H_2O_2	IMP-3 (FINAL)	423.4g
IMP-4 (INT)	500g S.Gel	IMP-4 (FINAL)	527.3g

	TEST 1	TEST 2	TEST 3
% CO2			
% O2			
% CO			

Project Director:	J. GOODWIN	Field Laboratory:	M. WYATT
Meter Box Operator:	M. WYATT	Chain of Custody:	M. WYATT
Probe Operator:	J. GOODWIN	Plant Coordinator:	J. FICULA
Orsat Analyst:	—	Agency Rep:	TERRY SINGERMAN, FDER CLAY IBARRA, ONRP

Comments:

TRAVERSE DATA SHEET

Page 1 of 1 | Sampling time per point: 5 min.

Plant: WASTE MANAGEMENT | Run #: CTS - IRT

Location: UNIT #5 | Date: 8-19-92

Trav. No.	Delta P	Delta H	Meter Reading 700.927	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A1	1.9	2.0	704.85	91	88	N/A	66	841	3
2	1.8		710.1	108	92		58	843	3
3	1.9		712.9	110	97		63	844	3
4	1.8		717.3	104	98		63	857	3
5	1.2		721.0	101	98		65	830	3
6	1.3		724.7	97	98		66	827	3
B1	1.6	2.0	728.5	92	94	N/A	65	855	3
2	1.7		732.4	88	91		65	854	3
3	1.9		736.2	89	88		66	838	3
4	1.5		740.0	90	86		65	835	3
5	1.0		743.5	91	86		65	831	3
6	.92		747.337	93	87		66	826	3

Relationship: —
Box #: 4 Y: .9718 Delta H@: 2.11
Start Time: 1047 End Time: 1157
Pre Leak Ck: 0 CFM @ 12 "Hg
Mid Leak Ck: — CFM @ — "Hg (Vol: _____)
Post Leak CK: 0 CFM @ 12 "Hg
Pitot Leak CK: OK @ 8 "H2O
Box Oper: MLW Probe Oper: JJG

TEMP TURBINE = 1150°F
TURBINE MW = 2.9
P_{STATIC} = -1.8

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	WASTE MANAGEMENT	Run #:	CTS-2RT
Location:	UNIT #5	Date:	8-19-92
Ds (ft):	4'	No. Points:	12
Dn (in):	—	Test Length:	60 min
Filter #:	—	End Meter Reading:	804.012
Cp:	.84	Int Meter Reading:	757.876
P bar:	30.11	Begin Time:	~~804.012~~ 1217
P stack:	-1.8	End Time:	1317
IMP-1 (INT)	397.8 g 80% FA	IMP-1 (FINAL)	379.4 g
IMP-2 (INT)	431.8 g 3% H2O2	IMP-2 (FINAL)	459.1 g
IMP-3 (INT)	417.4 g 3% H2O2	IMP-3 (FINAL)	427.8 g
IMP-4 (INT)	500 g S. Gel	IMP-4 (FINAL)	532.0 g

	TEST 1	TEST 2	TEST 3
% CO2			
% O2			
% CO			

Project Director:	J. GOODWIN	Field Laboratory:	M. WAYT
Meter Box Operator:	M. WAYT	Chain of Custody:	M. WAYT
Probe Operator:	J. GOODWIN	Plant Coordinator:	J. FICULA
Orsat Analyst:	—	Agency Rep:	TERRY SINGLETON, FAER OLGA IBARRA, CWRA

Comments:

TRAVERSE DATA SHEET

Page 1 of 1 | Sampling time per point: 5 MIN

Plant: WASTE MANAGEMENT | Run #: 1 TS 2 RT

Location: UNIT #5 | Date: 8-19-92

Trav. No.	Delta P	Delta H	Meter Reading 757,816	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A 1	1.9	2.0	763.0	92	90	N/A	67	839	3
2	1.9		765.4	97	92		57	843	3
3	1.9		769.4	98	92		58	844	3
4	1.8		773.2	97	92		69	838	3
5	1.3		776.9	97	92		63	826	3
6	1.1		781.4	97	92		62	821	3
B 1	1.5	2.0	789.7	97	92	N/A	62	829	3
2	1.7		788.6	96	91		61	833	3
3	2.0		792.9	96	91		62	837	3
4	1.2		796.3	97	92		63	834	3
5	1.0		780.1	97	92		69	827	3
6	.92		804.012	98	92		64	824	3

Relationship: —
Box #: 4 Y: .9718 Delta H@: 2.11
Start Time: 1217 End Time: 1317
Pre Leak Ck: .01 CFM @ 12 "Hg
Mid Leak Ck: — CFM @ — "Hg (Vol:)
Post Leak CK: 0 CFM @ 12 "Hg
Pitot Leak CK: OK @ 8 "H2O
Box Oper: MW Probe Oper: JPG

TEMP TURBINE = 1150°F
TURBINE MW = 2.9
P_{STATIC} = -1.8

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	WASTE MANAGEMENT	Run #:	CT5-3RT
Location:	UNIT # 5	Date:	8-19-92
Ds (ft):	4'	No. Points:	12
Dn (in):	—	Test Length:	60 min
Filter #:	—	End Meter Reading:	862.117
Cp:	.84	Int Meter Reading:	815.412
P bar:	30.04	Begin Time:	1345
P stack:	-1.8	End Time:	1445
IMP-1 (INT)	387.1g 80% EPA	IMP-1 (FINAL)	~~387.1~~ 365.9g
IMP-2 (INT)	412.4g 3% H_2O_2	IMP-2 (FINAL)	439.9g
IMP-3 (INT)	418.6g 3% H_2O_2	IMP-3 (FINAL)	427.2g
IMP-4 (INT)	500.0g Silica	IMP-4 (FINAL)	521.1g

	TEST 1	TEST 2	TEST 3
% CO2			
% O2			
% CO			

Project Director:	J. GOODWIN	Field Laboratory:	M. WYATT
Meter Box Operator:	M. WYATT	Chain of Custody:	M. WYATT
Probe Operator:	J. GOODWIN	Plant Coordinator:	J. FICKLA
Orsat Analyst:		Agency Rep:	TERRY SINGLETON, TARR OLGA TARRA ONRA

Comments:

TRAVERSE DATA SHEET

Page 1 of 1 — Sampling time per point: 5 min

Plant: WASTE MANAGEMENT — Run #: CTS-3RT

Location: UNIT #5 — Date: 8-19-92

Trav. No.	Delta P	Delta H	Meter Reading 815.412	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A1	1.7	2.0	819.8	93	91	N/A	67	837	3
2	1.8	↓	824.0	94	92	↓	57	839	3
3	2.0		827.1	96	92		60	841	3
4	1.8		831.0	98	93		61	836	3
5	1.4		835.1	98	93		62	831	3
6	1.3	↓	838.9	99	94	↓	63	827	3
B1	1.5	2.0	842.7	98	93	N/A	64	830	3
2	1.6	↓	846.9	97	93	↓	64	830	3
3	1.8		851.1	97	93		65	835	3
4	1.4		854.3	97	92		64	836	3
5	1.1		858.3	97	92		65	831	3
6	.97	↓	862.117	96	92	↓	65	828	3

Relationship: —
Box #: 4 Y: .9718 Delta H@: 2.11
Start Time: 1345 End Time: 1445
Pre Leak Ck: .01 CFM @ 12 "Hg
Mid Leak Ck: — CFM @ — "Hg (Vol: ____)
Post Leak CK: .01 CFM @ 12 "Hg
Pitot Leak CK: OK @ 8 "H2O
Box Oper: MLW Probe Oper: JAG

NITROGEN MONITORING

Daniels Gas Chromatograph

I. Calibration Documentation

A. Standard Gas

1. Matheson Certificate of Content

B. Calibration Sequence

1. 3 cycle runs

2. Analysis of raw data

3. Analysis

4. Final calibration

5. Peak printout sheet

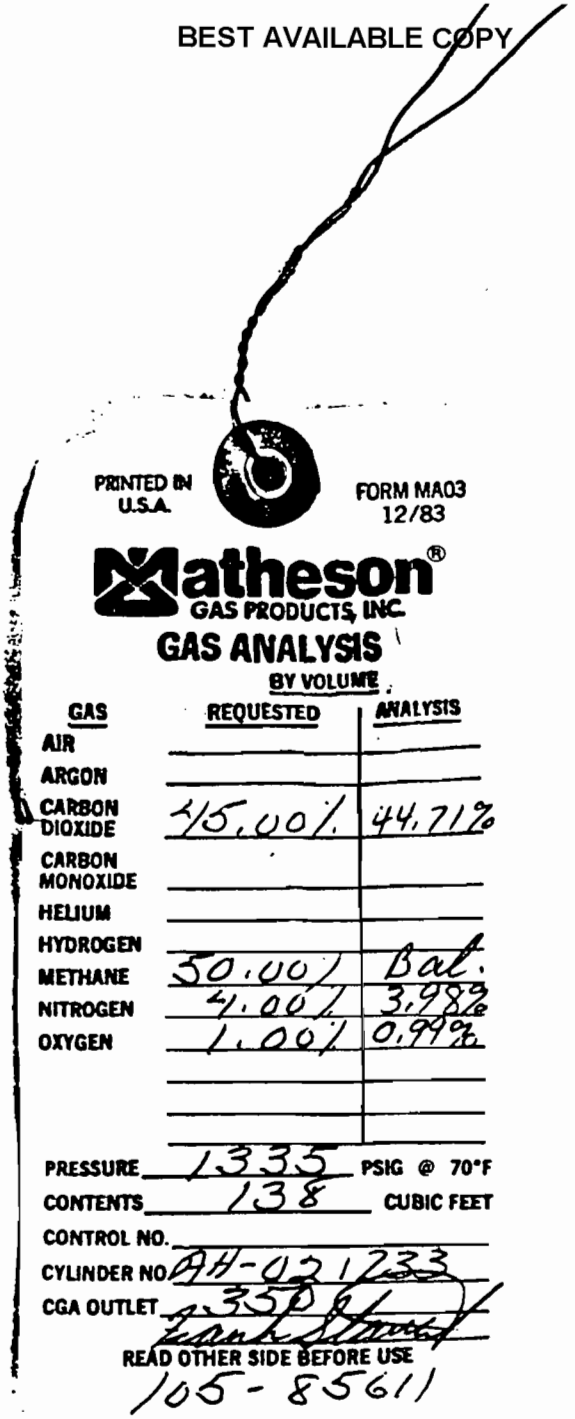
II. Monitoring Data

A. Cycle printout (every 3 minutes)

B. Accumulated monthly data (printed out 3/1/92 for month of February, 1992)

Parameters include methane, carbon dioxide, nitrogen, oxygen, specific gravity, BTU's, pressure, temperature, SCFH, energy, SCF, and run time in minutes per day.

Monthly readings include 5 tubes which represent collected data for each of the 5 turbine generators at the facility.



PRINTED IN U.S.A.

FORM MA03 12/83

Matheson®
GAS PRODUCTS, INC.

GAS ANALYSIS
BY VOLUME

GAS	REQUESTED	ANALYSIS
AIR		
ARGON		
CARBON DIOXIDE	45.00%	44.71%
CARBON MONOXIDE		
HELIUM		
HYDROGEN		
METHANE	50.00%	Bal.
NITROGEN	4.00%	3.98%
OXYGEN	1.00%	0.99%

PRESSURE 1335 PSIG @ 70°F
CONTENTS 138 CUBIC FEET
CONTROL NO.
CYLINDER NO. AH-021233
CGA OUTLET 350
Frank Stewart
READ OTHER SIDE BEFORE USE
105-8561

Standard gas certificate of content for Daniels Gas Chromatograph.

ANALYSIS RAW DATA

DATE: 01/07/92 ANALYSIS TIME: 165 STREAM SEQUENCE: 1
TIME: 14:26 CYCLE TIME: 180 STREAM#: 2
ANALYZER#: 802903 MODE: PGM CYCLE START TIME: 14:23

PEAK #	RETENTION TIME	PEAK AREA	PEAK HEIGHT
1	49.4	3.41031 E+07	217281
2	81.2	2058.00	37.1250
3	88.5	522918	7040.92
4	104.1	2.28449 E+06	22470.8
5	128.4	2.45708 E+07	132296

ACTIVE ALARMS

NONE

ANALYSIS

DATE: 01/07/92 ANALYSIS TIME: 165 STREAM SEQUENCE: 1
TIME: 14:26 CYCLE TIME: 180 STREAM#: 2
ANALYZER#: 802903 MODE: PGM CYCLE START TIME: 14:23

COMP NAME	COMP CODE	MOLE %	B.T.U.*	SP. GR.*
C O 2	117	44.708	0.00	0.6793
OXYGEN	116	0.979	0.00	0.0108
NITROGEN	114	3.977	0.00	0.0385
METHANE	100	50.336	509.40	0.2788
TOTALS		100.000	509.40	1.0074

* @ 14.730 PSIA DRY & UNCORRECTED FOR COMPRESSIBILITY

COMPRESSIBILITY FACTOR (1/Z) = 1.0033
DRY B.T.U. @ 14.730 PSIA & 60 DEG. F CORRECTED FOR (1/Z) = 511.1
SAT B.T.U. @ 14.730 PSIA & 60 DEG. F CORRECTED FOR (1/Z) = 502.2
REAL SPECIFIC GRAVITY = 1.0102
UNNORMALIZED TOTAL = 100.07

ACTIVE ALARMS

NONE

CALIBRATION FINAL

DATE: 01/07/92 ANALYSIS TIME: 165 STREAM SEQUENCE: 1
TIME: 14:26 CYCLE TIME: 180 CAL GAS STREAM#: 3
ANALYZER#: 802903 MODE: PGM CYCLE START TIME: 14:23

COMP NAME	COMP CODE	CAL CONC	RAW DATA	OLD RF	NEW* RF	% DEV	OLD RT	NEW* RT	% DEV
C O 2	117	44.7100	34.1017+6	762259.	762730.	* .06	49.533	49.399*	.26
OXYGEN	116	.990000	528979.	533813.	534323.	* .10	88.599	88.516*	.09
NITROGEN	114	3.98000	2.2864+6	574008.	574438.	* .08	104.46	104.13*	.31
METHANE	100	50.3200	24.5683+6	487791.	488242.	* .09	128.00	128.36*	.28

ACTIVE ALARMS

NONE

DATE: 01/07/92 ANALYSIS TIME: 165 STREAM SEQUENCE: 1
TIME: 14:19 CYCLE TIME: 180 CAL GAS STREAM#: 2
ANALYZER#: 802903 MODE: PGM CYCLE START TIME: 14:17

COMP NAME	COMP CODE	CAL CONC	RAW DATA	OLD RF	NEW* RF	% DEV	OLD RT	NEW* RT	% DEV
C O 2	117	44.7100	34.0814+6	762259.	762277.	.00	49.533	49.399	.26
OXYGEN	116	.990000	529916.	533813.	535268.	.27	88.599	88.500	.11
NITROGEN	114	3.98000	2.2893+6	574008.	575210.	.20	104.46	104.10	.35
METHANE	100	50.3200	24.5654+6	487791.	488183.	.08	128.00	128.36	.28

ACTIVE ALARMS

NONE

CALIBRATION RUN 2 OF 3

DATE: 01/07/92 ANALYSIS TIME: 165 STREAM SEQUENCE: 1
TIME: 14:22 CYCLE TIME: 180 CAL GAS STREAM#: 2
ANALYZER#: 802903 MODE: PGM CYCLE START TIME: 14:20

COMP NAME	COMP CODE	CAL CONC	RAW DATA	OLD RF	NEW* RF	% DEV	OLD RT	NEW* RT	% DEV
C O 2	117	44.7100	34.1003+6	762259.	762699.	.06	49.533	49.399	.26
OXYGEN	116	.990000	535041.	533813.	540445.	1.2	88.599	88.533	.08
NITROGEN	114	3.98000	2.2884+6	574008.	574984.	.16	104.46	104.13	.31
METHANE	100	50.3200	24.5659+6	487791.	488193.	.08	128.00	128.36	.28

ACTIVE ALARMS

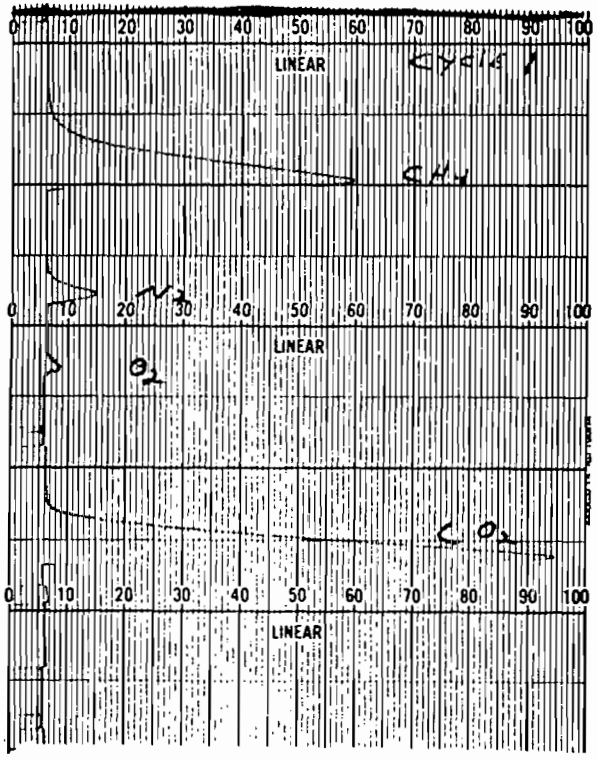
NONE

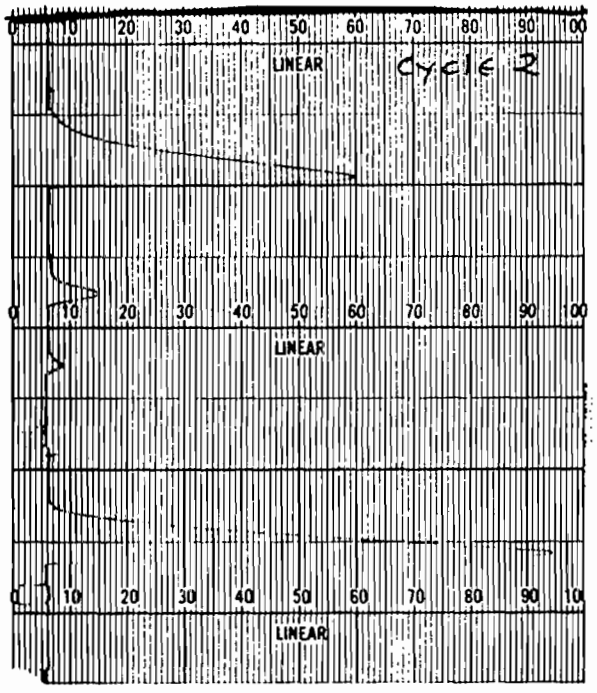
CALIBRATION RUN 3 OF 3

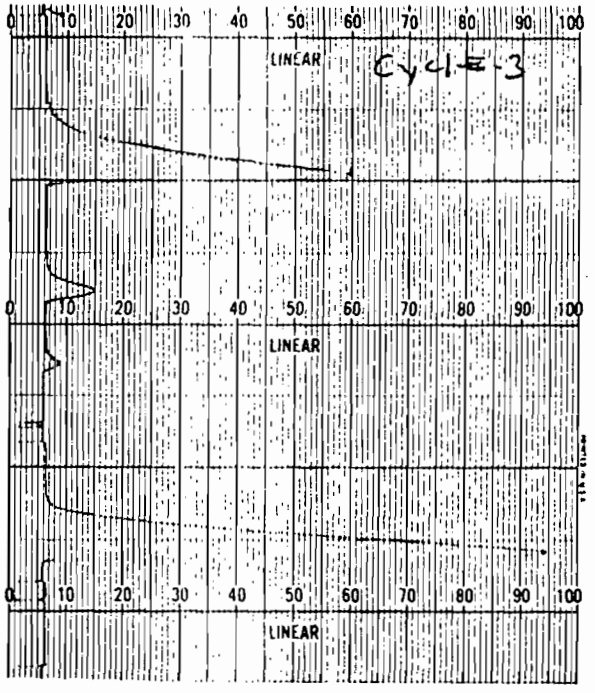
DATE: 01/07/92 ANALYSIS TIME: 165 STREAM SEQUENCE: 1
TIME: 14:25 CYCLE TIME: 180 CAL GAS STREAM#: 2
ANALYZER#: 802903 MODE: PGM CYCLE START TIME: 14:23

COMP NAME	COMP CODE	CAL CONC	RAW DATA	OLD RF	NEW* RF	% DEV	OLD RT	NEW* RT	% DEV
C O 2	117	44.7100	34.1031+6	762259.	762761.	.07	49.533	49.399	.26
OXYGEN	116	.990000	522918.	533813.	528200.	1.0	88.599	88.500	.11
NITROGEN	114	3.98000	2.2844+6	574008.	573993.	.00	104.46	104.13	.31
METHANE	100	50.3200	24.5708+6	487791.	488292.	.10	128.00	128.36	.28

ACTIVE ALARMS







Daniel's Calibration Peak Printout
Run 1, 2, and 3.

Daniel's Gas Chromatograph Printout
Typical Fuel Gas Sample

ANALYSIS

DATE:	02/26/92	ANALYSIS TIME:	165	STREAM SEQUENCE:	1
TIME:	16:59	CYCLE TIME:	180	STREAM#:	1
ANALYZER#:	802903	MODE:	RUN	CYCLE START TIME:	16:56

COMP NAME	COMP CODE	MOLE %	B.T.U.*	SP. GR.*
C O 2	117	42.366	0.00	0.6437
OXYGEN	116	0.482	0.00	0.0053
NITROGEN	114	2.905	0.00	0.0281
METHANE	100	54.247	548.98	0.3005
TOTALS		100.000	548.98	0.9776

* @ 14.730 PSIA DRY & UNCORRECTED FOR COMPRESSIBILITY

COMPRESSIBILITY FACTOR (1/Z)	= 1.0032
DRY B.T.U. @ 14.730 PSIA & 60 DEG. F CORRECTED FOR (1/Z)	= 550.8
SAT B.T.U. @ 14.730 PSIA & 60 DEG. F CORRECTED FOR (1/Z)	= 541.2
REAL SPECIFIC GRAVITY	= 0.9803
UNNORMALIZED TOTAL	= 99.20

ACTIVE ALARMS

NONE

TLOG1

Rec No	DATE	AUGCH4	AUGCO2	AUGN2	AUGO2
1	20192	53.74088	42.0824	3.58701	0.5798686
2	20292	53.84601	42.07327	3.503379	0.577259
3	20392	53.8202	42.03502	3.540958	0.603638
4	20492	53.70066	42.00671	3.652639	0.6393173
5	20592	53.93733	42.34406	3.183252	0.5351494
6	20692	53.9959	42.52416	2.955258	0.5141177
7	20792	53.75937	42.30017	3.362097	0.5678041
8	20892	53.58262	42.0355	3.779836	0.6019939
9	20992	53.59412	41.93411	3.887484	0.5838329
10	21092	53.92948	42.05139	3.496947	0.5121235
11	21192	53.73413	41.84269	3.835187	0.5880569
12	21292	53.60304	41.7036	4.034937	0.648505
13	21392	53.81091	41.75031	3.7949	0.6440176
14	21492	53.4995	41.74749	4.078232	0.6751683
15	21592	53.43971	41.76543	4.106991	0.6877505
16	21692	53.37436	41.75418	4.192194	0.6792093
17	21792	53.30675	41.72392	4.28851	0.6804931
18	21892	53.39726	41.80285	4.162613	0.6376194
19	21992	53.58492	42.0745	3.796643	0.5337261
20	22092	53.40976	41.91638	4.108935	0.5546558
21	22192	53.21953	41.81111	4.406696	0.5626066
22	22292	53.15997	41.88006	4.422935	-2.2618E+30
23	22392	53.04114	41.89634	4.556736	0.5061046
24	22492	52.89969	41.85272	4.735425	0.5121251
25	22592	54.07293	42.2392	3.244126	0.4438629
26	22692	54.29584	42.36835	2.90749	0.4283335
27	22792	53.9886	42.15707	3.326907	0.509763
28	22892	53.85871	41.98914	3.587909	0.5637633
29	22992	53.68184	41.94026	3.708464	0.5784113
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AUGGRAV	AUGBTU	AUGPRES	AUGTEMP
1	20192	0.9809011	545.7019	161.6439	123.2897
2	20292	0.9804522	546.6674	161.1504	128.8126
3	20392	0.9803791	546.4061	161.3519	132.6659
4	20492	0.9807662	545.1849	161.4787	139.055
5	20592	0.9815389	547.6067	160.9043	137.1525
6	20692	0.982233	548.3143	158.225	136.868
7	20792	0.9820239	545.9032	157.5556	136.7968
8	20892	0.9813559	543.9876	157.5246	129.6977
9	20992	0.9807166	544.102	157.9147	125.7088
10	21092	0.979853	547.6175	149.0911	140.4876
11	21192	0.9796425	545.523	155.5193	137.7955
12	21292	0.9794419	544.2858	153.8216	143.0031
13	21392	0.9788823	546.2995	155.2097	141.9658
14	21492	0.9801955	543.1328	153.6147	139.8517
15	21592	0.9805517	542.5239	154.2684	146.651
16	21692	0.980749	541.8626	153.914	144.6284
17	21792	0.9808563	541.1756	153.1689	147.2943
18	21892	0.9808724	542.0952	154.2967	139.7267
19	21992	0.9814307	544.1206	157.2881	131.841

17	21792	0.9808563	541.1756	153.1689	147.2943
18	21892	0.9808724	542.0952	154.2967	139.7267
19	21992	0.9814307	544.1206	157.2881	131.841
20	22092	0.9812967	542.3325	157.9633	134.9978
21	22192	0.981544	540.2892	158.1437	134.7282
22	22292	0.982024	539.897	159.4511	130.861
23	22392	0.9826737	538.4772	159.4729	132.4235
24	22492	0.9830166	537.0386	159.7364	129.2792
25	22592	0.9802637	548.9805	159.0914	137.4837
26	22692	0.9800476	551.2534	155.1178	136.9072
27	22792	0.9801687	548.3021	157.431	125.7673
28	22892	0.9799102	546.7966	158.9072	121.9089
29	22992	0.9800101	545.9204	158.643	135.3867
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AVGSCFH	ENERGY	SCF	RUNTIME
1	20192	77853.86	1018557	1866510	1440
2	20292	77600.26	1002681	1834172	1420
3	20392	75361.37	985396	1803413	1440
4	20492	72154.48	943742	1731039	1440
5	20592	71585.4	940189	1716905	1440
6	20692	71617.05	910507	1660516	1392
7	20792	70965.96	929731	1703113	1440
8	20892	71162.16	928981	1707719	1440
9	20992	71396.47	932283	1713430	1440
10	21092	74450.76	974899	1780277	1440
11	21192	71497.44	936033	1715847	1440
12	21292	70463.95	918205	1686991	1440
13	21392	72450.74	949807	1738650	1440
14	21492	71966.03	937135	1725430	1440
15	21592	72401.54	942655	1737526	1440
16	21692	73015.1	949463	1752223	1440
17	21792	73111.27	949534	1754575	1440
18	21892	72913.45	948496	1749693	1440
19	21992	72657.95	948755	1743658	1440
20	22092	72709.19	945938	1744208	1440
21	22192	73044.63	946783	1752364	1440
22	22292	72907.4	944566	1749533	1440
23	22392	73162.38	945444	1755776	1440
24	22492	72877.85	584399	1088197	904
25	22592	70075.96	299927	546333	468
26	22692	69203.53	914905	1659684	1440
27	22792	68966.26	907244	1654642	1440
28	22892	69369.71	910281	1664746	1440
29	22992	70079.29	918110	1681765	1440
30	0	0.	0	0	0
31	0	0.	0	0	0

40,184

ENERGY

I.

26364646 BTU

SCFSCALE I.

X1

BTUSCALE I.

X1000

VOLUME

I.

48418935 SCF

BLOG2

Rec No	DATE	AUGCH4	AUGCO2	AUGN2	AUGO2
1	20192	53.74021	42.08203	3.587924	0.5801002
2	20292	53.77757	42.05638	3.574329	0.5914499
3	20392	53.82269	42.01467	3.54556	0.6171626
4	20492	53.7005	42.00671	3.652555	0.6399443
5	20592	53.93924	42.34563	3.180837	0.5345981
6	20692	53.99657	42.52363	2.954943	0.5142422
7	20792	53.75946	42.30028	3.362079	0.5678098
8	20892	53.58257	42.03543	3.780217	0.6019359
9	20992	53.59427	41.93449	3.88743	0.5838043
10	21092	53.92899	42.05146	3.497464	0.5121722
11	21192	53.73424	41.84303	3.834708	0.5880855
12	21292	53.59719	41.70064	4.043076	0.6486414
13	21392	53.80998	41.75034	3.795665	0.6441336
14	21492	53.49923	41.7475	4.078216	0.6750665
15	21592	53.4399	41.76548	4.107148	0.6877942
16	21692	53.374	41.75382	4.192695	0.679434
17	21792	53.30747	41.72406	4.288341	0.6804502
18	21892	53.39673	41.80263	4.16281	0.6376681
19	21992	53.58281	42.07268	3.798738	0.5338772
20	22092	53.4095	41.91634	4.108789	0.5546736
21	22192	53.21923	41.81107	4.407191	0.5626469
22	22292	53.15983	41.87983	4.422926	-2.2567E+30
23	22392	53.04117	41.89605	4.556738	0.5061128
24	22492	52.97657	41.8805	4.645708	0.4970774
25	22592	53.64154	42.15249	3.790277	0.4159636
26	22692	54.29583	42.36835	2.907591	0.428292
27	22792	53.9889	42.15687	3.326927	0.5037484
28	22892	53.85913	41.9892	3.588028	0.5637867
29	22992	53.68134	41.94018	3.708623	0.578484
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AUGGRAV	AUGBTU	AUGPRES	AUGTEMP
1	20192	0.980902	545.6938	162.2298	121.1589
2	20292	0.9806645	545.9724	161.652	128.5752
3	20392	0.9802785	546.4292	161.6281	132.7625
4	20492	0.9807641	545.1878	161.7536	135.1505
5	20592	0.9815413	547.6246	161.0791	134.3773
6	20692	0.9822238	548.3257	158.8025	129.8386
7	20792	0.9820271	545.9044	157.9039	125.2674
8	20892	0.981361	543.9896	157.8503	128.9322
9	20992	0.980721	544.1058	158.2061	132.0981
10	21092	0.9798592	547.6107	149.3814	133.8459
11	21192	0.9796424	545.5248	155.7572	128.2763
12	21292	0.9794455	544.2287	154.0154	129.4884
13	21392	0.9788841	546.2909	155.8002	134.0135
14	21492	0.9801888	543.1287	153.9631	135.9849
15	21592	0.9805586	542.5265	154.6497	139.6629
16	21692	0.9807491	541.856	154.3318	138.4535
17	21792	0.9808621	541.1777	153.5431	139.2996
18	21892	0.9808686	542.0935	154.6341	136.8195

17	21792	0.9808621	541.1777	153.5431	139.2994
18	21892	0.9808686	542.0935	154.6341	136.8195
19	21992	0.98142	544.1093	157.6206	134.4808
20	22092	0.9812923	542.3288	157.9952	134.5713
21	22192	0.9815473	540.2867	158.2321	132.3951
22	22292	0.9820186	539.8941	159.4481	131.2991
23	22392	0.9826701	538.4762	159.4084	131.6539
24	22492	0.982842	537.8205	158.8358	130.7867
25	22592	0.9815172	544.5894	159.3357	130.7836
26	22692	0.9800466	551.255	155.0362	129.8468
27	22792	0.9801679	548.3043	157.6854	121.686
28	22892	0.9799125	546.7991	159.113	120.0976
29	22992	0.9800084	545.9212	158.7675	130.8634
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AUGSCFH	ENERGY	SCF	RUNTIME
1	20192	78863.48	1019931	1869054	1440
2	20292	77905.06	652173	1194523	921
3	20392	70274.62	314648	575824	492
4	20492	70438.28	921528	1690287	1440
5	20592	70100.87	920993	1681802	1440
6	20692	69730.59	917544	1673322	1440
7	20792	69995.54	917015	1679820	1440
8	20892	70774.78	923874	1698334	1440
9	20992	71419.12	932580	1713971	1440
10	21092	73738.65	965978	1764006	1440
11	21192	70526.83	923295	1692492	1440
12	21292	66283.24	860597	1581309	1440
13	21392	60554.88	793587	1452705	1440
14	21492	60588.51	789431	1453481	1440
15	21592	61111.32	795353	1466018	1440
16	21692	61538.26	799954	1476319	1440
17	21792	61768.46	801946	1481853	1440
18	21892	61893.91	804869	1484747	1440
19	21992	65025.77	844461	1552000	1440
20	22092	72106.82	938116	1729786	1440
21	22192	72651.41	941624	1742827	1440
22	22292	72569.48	940232	1741504	1440
23	22392	72821.22	941050	1747617	1440
24	22492	74828.36	964698	1793752	1440
25	22592	74846.81	976805	1793532	1440
26	22692	70518.77	932414	1691445	1440
27	22792	70863.53	931865	1699542	1440
28	22892	71461.73	937771	1715025	1440
29	22992	71950.47	942676	1726769	1440
30	0	0.	0	0	0
31	0	0.	0	0	0

40,293

ENERGY VOLUME

I. L.

25347008 BTU 46563666 SCF

SCFSCALE L BTUSCALE I.

X1 X1000

BLOCK

Rec No	DATE	AUGCH4	AUGCO2	AUGN2	AUGO2
1	20192	53.96943	42.21051	3.319172	0.50088
2	20292	53.97316	42.10511	3.371079	0.5505977
3	20392	53.82015	42.03562	3.540939	0.6033241
4	20492	53.70061	42.00663	3.652526	0.6399408
5	20592	53.94014	42.3464	3.178903	0.5341272
6	20692	53.99679	42.52355	2.955099	0.5142858
7	20792	53.75974	42.30018	3.362068	0.5678058
8	20892	53.58267	42.03566	3.779923	0.6020114
9	20992	53.59439	41.93427	3.88735	0.5837919
10	21092	53.92807	42.05135	3.497988	0.5123503
11	21192	53.73404	41.84268	3.835127	0.5881169
12	21292	53.60294	41.70347	4.035206	0.6484679
13	21392	53.81036	41.75026	3.79523	0.6440605
14	21492	53.49929	41.74716	4.078356	0.6753041
15	21592	53.43989	41.76547	4.10696	0.6877913
16	21692	53.37388	41.7539	4.19263	0.6794055
17	21792	53.30709	41.72387	4.288352	0.6804459
18	21892	53.39702	41.80268	4.162544	0.6376078
19	21992	53.58461	42.07456	3.796464	0.5337078
20	22092	53.40909	41.91602	4.109664	0.5546579
21	22192	53.21971	41.81129	4.406214	0.5625624
22	22292	53.15995	41.87997	4.42293	-2.2593E+30
23	22392	53.04076	41.89603	4.556726	0.5061014
24	22492	52.97712	41.88092	4.645157	0.4968651
25	22592	53.63908	42.15158	3.792919	0.4158283
26	22692	54.29577	42.36843	2.907777	0.4283016
27	22792	53.98879	42.15683	3.326824	0.5097385
28	22892	53.85878	41.98917	3.587942	0.5637664
29	22992	53.68179	41.94026	3.708358	0.5783648
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AUGGRAV	AUGBTU	AUGPRES	AUGTEMP
1	20192	0.9806087	547.9279	156.3735	139.0916
2	20292	0.9800694	547.9638	160.3701	138.1982
3	20392	0.9803838	546.4011	160.5039	138.4575
4	20492	0.9807636	545.1887	160.8871	140.9049
5	20592	0.9815334	547.6375	160.3443	140.5179
6	20692	0.9822279	548.322	157.9641	139.5727
7	20792	0.9820243	545.9023	156.9476	134.5855
8	20892	0.9813632	543.9858	156.923	133.6936
9	20992	0.9807161	544.1046	157.3133	132.9652
10	21092	0.9798621	547.6068	148.7124	135.6628
11	21192	0.9796349	545.5224	154.929	134.2778
12	21292	0.979442	544.284	153.2673	133.7135
13	21392	0.9788821	546.2944	154.6131	136.2625
14	21492	0.9801957	543.1317	153.0242	138.3376
15	21592	0.9805555	542.5294	153.6439	143.3576
16	21692	0.9807452	541.8592	153.3023	141.2496
17	21792	0.9808564	541.1758	152.5342	142.9366
18	21892	0.9808658	542.0928	153.6208	144.3687
19	21992	0.9814291	544.1188	156.5896	144.589
20	22092	0.9812918	542.3248	157.3134	143.997

17	21792	0.9808564	541.1758	152.5342	142.9366
18	21892	0.9808658	542.0923	153.6208	144.3687
19	21992	0.9814291	544.1188	156.5896	144.589
20	22092	0.9812918	542.3248	157.3126	143.997
21	22192	0.9815403	540.29	157.4907	142.859
22	22292	0.9820211	539.8981	158.7898	144.7891
23	22392	0.9826739	538.4762	158.7999	146.1474
24	22492	0.9828398	537.8253	158.1247	144.0956
25	22592	0.9815153	544.5671	158.3565	142.5914
26	22692	0.9800504	551.2527	154.3602	142.9979
27	22792	0.9801662	548.3044	156.7021	133.3772
28	22892	0.9799095	546.7972	158.09	133.1616
29	22992	0.9800137	545.9229	157.8144	142.0509
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AUGSCFH	ENERGY	SCF	RUNTIME
1	20192	68317.82	16251	29660	27
2	20292	83490.44	384779	702198	506
3	20392	80182.7	1043628	1909990	1440
4	20492	71220.81	931887	1709288	1440
5	20592	70530.33	926512	1691833	1440
6	20692	70890.18	932850	1701242	1440
7	20792	71218.55	933054	1709199	1440
8	20892	71475.11	933019	1715145	1440
9	20992	71784.43	937363	1722763	1440
10	21092	73296.68	961173	1755245	1440
11	21192	71513.75	936262	1716268	1440
12	21292	70675.11	920627	1691443	1440
13	21392	72366.73	948710	1736653	1440
14	21492	72129.	938999	1728866	1440
15	21592	72630.72	945714	1743164	1440
16	21692	72885.95	947820	1749203	1440
17	21792	73203.27	950763	1756842	1440
18	21892	73211.94	952415	1756919	1440
19	21992	72914.39	952132	1749865	1440
20	22092	73152.9	951628	1754715	1440
21	22192	73328.29	950698	1759597	1440
22	22292	73045.93	946421	1752968	1440
23	22392	73354.82	947976	1760479	1440
24	22492	76419.42	983136	1828018	1440
25	22592	76856.66	1002406	1840611	1440
26	22692	71510.66	945400	1715006	1440
27	22792	71735.18	943200	1720212	1440
28	22892	72308.69	948895	1735368	1440
29	22992	73050.88	957100	1753182	1440
30	0	0.	0	0	0
31	0	0.	0	0	0

39,413

ENERGY VOLUME

I. I.

26070818 BTU 47895942 SCF

SCFSCALE L BTUSCALE I.

X1 X1000

BLOG4

Rec No	DATE	AVGCH4	AVGCO2	AVGN2	AVGO2
1	20192	53.74263	42.0836	3.584543	0.5790542
2	20292	53.84824	42.07505	3.500564	0.5762325
3	20392	53.81948	42.03537	3.541659	0.6033324
4	20492	53.70061	42.00677	3.652712	0.6399847
5	20592	53.94153	42.34805	3.176545	0.5337786
6	20692	53.99972	42.52545	2.950671	0.5131205
7	20792	53.75949	42.30022	3.362022	0.5678165
8	20892	53.58183	42.03343	3.78311	0.6017885
9	20992	53.59451	41.93443	3.887411	0.5838049
10	21092	53.87542	42.0381	3.540566	0.5245852
11	21192	53.73054	41.83805	3.843016	0.5885205
12	21292	53.60511	41.70517	4.030507	0.6474218
13	21392	53.8142	41.75063	3.791877	0.6435714
14	21492	53.49903	41.74741	4.078404	0.675401
15	21592	53.44009	41.76569	4.10689	0.6877716
16	21692	53.37343	41.75345	4.193576	0.6797984
17	21792	53.30771	41.72442	4.287498	0.6804035
18	21892	53.39963	41.8058	4.158075	0.636587
19	21992	53.58498	42.07476	3.796113	0.5336154
20	22092	53.40948	41.91539	4.110355	0.5547928
21	22192	53.21979	41.81115	4.406302	0.562705
22	22292	53.15987	41.88002	4.422886	-2.2732E+30
23	22392	53.04137	41.8962	4.556616	0.5061194
24	22492	52.99801	41.88357	4.620902	0.4974424
25	22592	53.62153	42.14818	3.815428	0.414784
26	22692	54.29782	42.37031	2.902859	0.4290323
27	22792	53.99116	42.15837	3.323674	0.5093982
28	22892	53.85884	41.98936	3.588065	0.5637907
29	22992	53.68194	41.93982	3.708687	0.5785688
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AVGGRAV	AVGBTU	AVGPRES	AVGTEMP
1	20192	0.9808992	545.7225	161.3518	138.5936
2	20292	0.9804524	546.6888	160.9319	141.9323
3	20392	0.9803853	546.3998	161.1775	146.3587
4	20492	0.9807688	545.1906	161.5701	146.9339
5	20592	0.9815368	547.6503	160.9687	144.4271
6	20692	0.9822212	548.3564	158.587	139.2606
7	20792	0.982023	545.9034	157.4908	123.5753
8	20892	0.9813564	543.982	157.3974	133.2422
9	20992	0.9807221	544.1062	157.8686	139.0193
10	21092	0.9799751	547.1827	155.5224	133.7892
11	21192	0.9796253	545.4861	155.6706	123.436
12	21292	0.9794291	544.3217	153.8817	122.418
13	21392	0.97887	546.3345	155.1453	138.3564
14	21492	0.9801931	543.1301	153.7149	145.2644
15	21592	0.9805569	542.5309	154.2699	147.8911
16	21692	0.9807464	541.85	153.9848	143.8947
17	21792	0.9808588	541.1844	153.2813	144.8161
18	21892	0.9808768	542.1208	154.3326	140.419
19	21992	0.981429	544.1166	157.2268	135.4709

17	21792	0.9808588	541.1844	153.2813	144.8161
18	21892	0.9808768	542.1208	154.3326	140.419
19	21992	0.981429	544.1166	157.2268	135.4709
20	22092	0.981294	542.3292	158.3292	140.875
21	22192	0.98154	540.2891	158.2985	149.7049
22	22292	0.9820199	539.8963	159.545	149.9278
23	22392	0.9826735	538.479	159.5859	148.0217
24	22492	0.9827654	538.0397	157.8803	143.7001
25	22592	0.9815699	544.3879	158.8067	143.5333
26	22692	0.9800557	551.2737	154.4107	145.8471
27	22792	0.9801687	548.325	156.9308	141.6413
28	22892	0.9799112	546.7961	158.339	138.3608
29	22992	0.9800069	545.92	158.089	132.1691
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AUGSCFH	ENERGY	SCF	RUNTIME
1	20192	78494.78	1027798	1883372	1440
2	20292	78126.98	1024032	1873156	1440
3	20392	74153.59	962763	1762012	1440
4	20492	63773.52	834429	1530533	1440
5	20592	63140.45	829194	1514091	1440
6	20692	62651.17	823840	1502344	1440
7	20792	59224.59	775860	1421245	1440
8	20892	63267.06	824783	1516201	1440
9	20992	64981.52	848523	1559486	1440
10	21092	61497.11	419511	766676	753
11	21192	59936.84	782614	1434710	1440
12	21292	69280.26	899130	1651829	1440
13	21392	72996.15	956878	1751488	1440
14	21492	72851.47	946870	1743361	1440
15	21592	73725.82	959965	1769431	1440
16	21692	73034.05	949205	1751782	1440
17	21792	72325.31	939130	1735326	1440
18	21892	69189.21	896293	1653325	1440
19	21992	63440.31	826512	1518992	1440
20	22092	60667.61	787339	1451781	1440
21	22192	64001.99	829819	1535871	1440
22	22292	64266.45	832669	1542275	1440
23	22392	64205.87	829751	1540919	1440
24	22492	72554.23	701437	1303732	1096
25	22592	75668.96	977607	1795678	1440
26	22692	72294.32	949781	1722889	1440
27	22792	73024.06	957758	1746699	1440
28	22892	72919.34	956909	1750026	1440
29	22992	73231.23	959255	1757133	1440
30	0	0.	0	0	0
31	0	0.	0	0	0

40939

ENERGY

L

25309661 BTU

SCFSCALE I. BTUSCALE I.

X1 X1000

VOLUME

I.

46486363 SCF

DLOG5

Rec No	DATE	AVGCH4	AVGCO2	AVGN2	AVGO2
1	20192	53.73785	42.0826	3.588192	0.5797371
2	20292	53.84123	42.07232	3.50834	0.5782077
3	20392	53.82347	42.03763	3.536669	0.6021425
4	20492	53.6936	42.0013	3.658158	0.6414043
5	20592	53.93131	42.33675	3.194214	0.536966
6	20692	54.00087	42.52599	2.949574	0.5130445
7	20792	53.76019	42.30395	3.356624	0.5677683
8	20892	53.58829	42.04508	3.765327	0.6014835
9	20992	53.58479	41.92962	3.897919	0.587323
10	21092	53.92878	42.05245	3.496465	0.5116127
11	21192	53.74096	41.84825	3.82426	0.5865988
12	21292	53.6128	41.70506	4.028735	0.6533407
13	21392	53.81186	41.75076	3.793253	0.643811
14	21492	53.50038	41.74626	4.078585	0.6751244
15	21592	53.4422	41.76623	4.104162	0.6875465
16	21692	53.37473	41.7541	4.191816	0.679841
17	21792	53.30634	41.72283	4.289887	0.6814894
18	21892	53.39418	41.80045	4.166817	0.6389081
19	21992	53.5842	42.07199	3.798748	0.5343995
20	22092	53.41332	41.91925	4.10325	0.5547625
21	22192	53.22483	41.81264	4.399723	0.5626943
22	22292	53.15967	41.87791	4.423377	-2.3914E+30
23	22392	53.04667	41.89744	4.55032	0.5055602
24	22492	52.97027	41.87908	4.652426	0.4931045
25	22592	53.61699	42.14361	3.823121	0.4166793
26	22692	54.29347	42.36576	2.911136	0.4296503
27	22792	53.99441	42.16067	3.318653	0.5094774
28	22892	53.86264	41.99317	3.581878	0.562128
29	22992	53.68758	41.94289	3.702915	0.5778356
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AVGGRAV	AVGBTU	AVGPRES	AVGTEMP
1	20192	0.9809093	545.6781	161.5348	130.861
2	20292	0.9804758	546.6208	161.1474	133.8646
3	20392	0.9803789	546.4419	161.4016	136.7696
4	20492	0.9807415	545.1647	161.7189	140.4794
5	20592	0.9815195	547.5463	161.0442	138.1001
6	20692	0.9822203	548.3685	158.5979	134.604
7	20792	0.9820381	545.9148	157.5409	123.9844
8	20892	0.9813921	544.0474	157.7411	128.732
9	20992	0.9807373	544.0057	158.4533	133.2492
10	21092	0.9798599	547.6176	149.3913	132.8428
11	21192	0.9796436	545.5928	155.7401	122.4011
12	21292	0.979456	544.2858	154.7939	119.761
13	21392	0.9788816	546.3101	155.4258	127.1564
14	21492	0.980187	543.141	153.6989	129.1619
15	21592	0.9805501	542.5518	154.1132	133.5513
16	21692	0.9807548	541.8631	154.0877	132.271
17	21792	0.9808578	541.1699	153.7368	133.8173
18	21892	0.9808771	542.0637	154.553	134.6115
19	21992	0.9814274	544.1163	157.0385	136.8908

17	21792	0.9808578	541.1699	153.7368	133.8173
18	21892	0.9808771	542.0637	154.553	134.6115
19	21992	0.9814274	544.1163	157.0385	136.8908
20	22092	0.9813036	542.3611	158.2634	145.0772
21	22192	0.9815305	540.338	158.5314	143.9726
22	22292	0.9820066	539.903	159.7775	145.8837
23	22392	0.982657	538.5326	159.7873	143.7827
24	22492	0.982858	537.7562	159.0297	140.8775
25	22592	0.9815701	544.3399	159.4196	136.378
26	22692	0.980049	551.2301	155.1902	140.6772
27	22792	0.980164	548.3475	157.7141	136.1941
28	22892	0.9799188	546.837	159.2216	134.5787
29	22992	0.9800127	545.9522	158.9172	135.7946
30	0	0.	0.	0.	0.
31	0	0.	0.	0.	0.

Rec No	DATE	AVGSCFH	ENERGY	SCF	RUNTIME
1	20192	82159.52	1070202	1961222	1434
2	20292	81036.35	1056175	1932194	1434
3	20392	77449.89	1010316	1848904	1440
4	20492	69402.67	907676	1664947	1440
5	20592	71301.35	935722	1708930	1440
6	20692	73350.04	963697	1757350	1440
7	20792	76139.33	997344	1826917	1440
8	20892	70894.52	922577	1695769	1440
9	20992	64884.05	843737	1550964	1440
10	21092	67444.52	882255	1611087	1440
11	21192	73402.23	961058	1761494	1440
12	21292	71489.07	598617	1099825	926
13	21392	70591.15	925493	1694078	1440
14	21492	70435.49	917214	1688721	1440
15	21592	70797.97	921828	1699062	1440
16	21692	71040.31	923326	1704909	1440
17	21792	71420.37	927555	1713995	1440
18	21892	71324.55	927769	1711557	1440
19	21992	71102.27	928144	1705784	1440
20	22092	71166.38	925403	1706255	1440
21	22192	68206.21	884273	1636507	1440
22	22292	68726.74	890418	1649220	1440
23	22392	68585.39	886364	1645885	1440
24	22492	73181.2	940081	1748155	1440
25	22592	71747.06	934573	1716902	1440
26	22692	63933.33	839682	1523292	1440
27	22792	66911.45	878484	1602049	1440
28	22892	65498.94	859466	1571703	1440
29	22992	65703.13	860481	1576105	1440
30	0	0.	0	0	0
31	0	0.	0	0	0

41,234

ENERGY VOLUME

L L

26520430 BTU 48713782 SCF

SCFSCALE L BTUSCALE L

X1 X1000

SULFUR MONITORING

Hewlett-Packard Gas Chromatograph

I. Calibration

A. Standard Gas Concentration Content

1. Air Products and Chemicals Certificate of Analysis

B. Gas Chromatograph Operational Procedures

II. Monitoring Data

A. Daily Calculation Sheet

Includes 3 consistent standard calibration runs indicating average conversion factor and 2 fuel gas plant sample analysis runs followed by additional standard gas run.

B. Printout of Peak Area

Used to calculate conversion factor for daily calculation sheet.

C. Summary of Daily Analysis from 11/20 - 12/21/91

AIR PRODUCTS AND CHEMICALS, INC.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628
TELEPHONE (312) 785-3000
FAX (312) 785-3008

DATE: 01/30/90
TIME: 12:50
PAGE: 1

CERTIFICATE OF ANALYSES

WELD STAR COMPANY
2650 32ND
UNIVERSITY PARK IL 60466

CUSTOMER ACCOUNT : J0336
CUSTOMER ORDER NO : 30542
ORDER NO : 361-703260
ORDER DETAIL SEQ : 1

ANALYSIS

CERTIFIED GAS MIXTURE: HYDROGEN SULFIDE IN HELIUM

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 14472C ANAL DATE: 01/17/90	559644SCN2	HYDROGEN SULFIDE	750	775	MOLAR PP

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

James M. Burkhardt

AUTHORIZED SIGNATURE

START-UP/OPERATION PROCEDURES FOR THE HP5890 G.C. WITH FPD

A. Startup

1. Check gas cylinder (H2, H2S, He, Air), record volumes

2. Turn H2 and H2S cylinders on

3. Check He flow≈column head pressure (28-30 psi)
   flow 34 ±1

4. Set oven temperature to 45°C.

5. Set initial time to 6.0 min.

6. Remove FPD Hood and disconnect drip hose. (Position mirror near drip tube.)

7. Turn Hydrogen knob 2 revolutions.

8. Turn Oxygen 1 1/4 revolutions.

9. Press FPD ignitor and release.
   Note: When flame is ignited, moisture will appear on the mirror. If no moisture is observed, slightly increase the O2 and press ignitor.

10. Reconnect drip hose and replace FPD hood.

11. Turn Detector "B" on.

B. To Analyze Calibration Gas

1. Turn 3-way valve toward the back
   --check sho-rate for flow--

2. Count 3, press Start
   Note: After 15 seconds automatic valve will close and the 3-way valve can be returned to the middle position.

3. Monitor Sig 1*

4. At the completion of the analysis, calculate the conversion factor by dividing the standard gas PPM (775) by the peak area.
   (775 ÷ peak area = C.F.)

5. Run calibration samples until you achieve repeatability *3 consecutive analyses which are similar*

   * Before starting a new analysis, wait until signal 1 comes down to 550.

C. To Analyuze LFG

1. Turn 3-way valve forward

2. Count to 3, press Start
   --Return valve to middle position after 15-second purge cycle is completed.

3. At completion of analysis, multiply the conversion factor by the peak area to calculate PPM of H2S

4. Before starting the next analysis, make sure the signal 1 is at 550.

D. At Completion of Analysis (daily)

1. turn Det "B" off

2. Turn the H2 knob off

3. Turn the O2 knob off

4. Turn H2 and H2S cylinders off

Date	Time	Run	AREA	Conversion	
11/6/91	1628:41	174	6.7	115	
	1635.01	175	7.8	99	
	1642:10	176	8.3	93	} Average
	1650:24	177	8.4	92	
	1658:52	178	8.4	92	
	1707:49	179	8.6	90	
				Ave: 92	
			SAMPLE AREA	X 92	PPm H_2S
	1720.39	180	8.7		800
	1726:14	181	2.5		>82
STD	1735:37	182	2.6		>91
			1		
			1		

Plant Sample Average: 791

Sample Plant

RUN # 180 NOV/20/91 17:16:39
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.7636E+08	†SBH	1R	100.000

TOTAL AREA= 8.7636E+08
MUL FACTOR= 1.0000E+00

calib

Sample Plant

RUN # 181 NOV/20/91 17:26:14
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4751E+08	†SBH	1R	100.000

TOTAL AREA= 8.4751E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 174 NOV/20/91 16:28:41
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.6991E+08	†SBH	1R	100.000

TOTAL AREA= 6.6991E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 179 NOV/20/91 17:07:49
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.6293E+08	†SBH	1R	100.000

TOTAL AREA= 8.6293E+08
MUL FACTOR= 1.0000E+00

CALIB

RUN # 175 NOV/20/91 16:35:01
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.8868E+08	†SBH	1R	100.000

TOTAL AREA= 7.8868E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 182 NOV/20/91 17:35:37
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.6772E+08	†SBH	1R	100.000

TOTAL AREA= 8.6772E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 176 NOV/20/91 16:42:10
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3152E+08	†SBH	1R	100.000

TOTAL AREA= 8.3152E+08
MUL FACTOR= 1.0000E+00

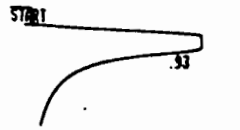
calib

RUN # 177 NOV/20/91 16:58:34
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4499E+08	†SBH	1R	100.000

TOTAL AREA= 8.4499E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 178 NOV/20/91 16:58:58
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4576E+08	†SBH	1R	100.000

TOTAL AREA= 8.4576E+08
MUL FACTOR= 1.0000E+00

4 DATE	TIME	RUN #	Area	CONVERSION	
11/21/91	1600:01	183	6.2	125	
	1606:52	184	7.6	102	
	1614:21	185	8.1	95	AVG
	1622:58	186	8.6	90	
	1631:33	187	8.6	90	
				Avg. 91	
			Sample Area	X CONVERSION Factor 91	PPM H2S
	1640:09	188	8.3		755
	1649:36	189	8.1		737
STD	1658	190	8.4		764

Plant Sample Average: 746

calib

RUN # 183 NOV/21/91 16:00:01
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.2454E+08	†SBH	1R	100.000

TOTAL AREA= 6.2454E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 184 NOV/21/91 16:06:52
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.6198E+08	†SBH	1R	100.000

TOTAL AREA= 7.6198E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 185 NOV/21/91 16:14:21
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.1039E+08	†SPH	1R	100.000

TOTAL AREA= 8.1039E+08
MUL FACTOR= 1.0000E+00

calib.

RUN # 186 NOV/21/91 16:22:58
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5722E+08	†SPH	1R	100.000

TOTAL AREA= 8.5722E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 187 NOV/21/91 16:31:33
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.6067E+08	†SPH	1R	100.000

TOTAL AREA= 8.6067E+08
MUL FACTOR= 1.0000E+00

Sample Plant

RUN # 188 NOV/21/91 16:40:09
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3554E+08	†SBH	1R	100.000

TOTAL AREA= 8.3554E+08
MUL FACTOR= 1.0000E+00

Sample Plant

RUN # 189 NOV/21/91 16:49:36
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.8870E+08	†SBH	1R	100.000

TOTAL AREA= 8.8870E+08
MUL FACTOR= 1.0000E+00

calib.

RUN # 190 NOV/21/91 16:58:41
WORKFILE ID: C
WORKFILE NAME:

NORM

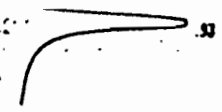
RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4646E+08	†SBH	1R	100.000

TOTAL AREA= 8.4646E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
11 22 91	1609:44	191	6.8	114	
	1616:10	192	8.0	97	
	1623:23	193	8.4	92	AVE
	1621:24	194	8.5	91	
	1639:42	195	8.5	91	

			Sample Area	X CONVERSION factor 91	ppm H_2S
	1642:23	196	8.4		764
	1657:37	197	8.3		755
S.D	1707:01	198	8.5		773

Plant Sample Average: 759.5



calib.

RUN # 191 NOV/22/91 16:09:44
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.8386E+08	†SBH	1R	100.000

TOTAL AREA= 6.8386E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 192 NOV/22/91 16:16:10
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.0582E+08	†SPH	1R	100.000

TOTAL AREA= 8.0582E+08
MUL FACTOR= 1.0000E+00

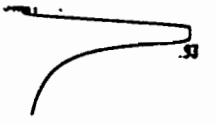
calib

RUN # 193 NOV/22/91 16:23:23
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4325E+08	†SPH	1R	100.000

TOTAL AREA= 8.4325E+08
MUL FACTOR= 1.0000E+00



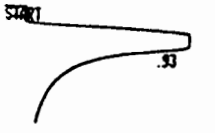
calib

RUN # 194 NOV/22/91 16:31:34
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5529E+08	†SPH	1R	100.000

TOTAL AREA= 8.5529E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 195 NOV/22/91 16:39:48
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5271E+08	†SPH	1R	100.000

TOTAL AREA= 8.5271E+08
MUL FACTOR= 1.0000E+00

Sample

RUN # 196 NOV/22/91 16:49:23
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4237E+08	†SBH	1R	100.000

TOTAL AREA= 8.4237E+08
MUL FACTOR= 1.0000E+00

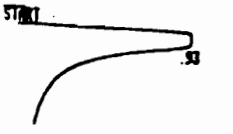
Sample

RUN # 197 NOV/22/91 16:57:37
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3148E+08	†SBH	1R	100.000

TOTAL AREA= 8.3148E+08
MUL FACTOR= 1.0000E+00



calib.

RUN # 198 NOV/22/91 17:07:01
WORKFILE ID: C
WORKFILE NAME:

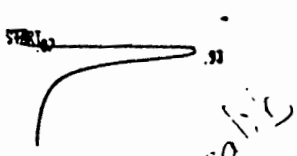
NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5417E+08	†SBH	1R	100.000

TOTAL AREA= 8.5417E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
11/23/91	15:31:57	199	6.3	123	
	1538:35	200	7.6	102	
	1545:50	201	8.2	94	
	1553:50	202	8.4	92	Avg.
	1602:10	203	8.6	90	
				Avg. 92	
			sample Area	X conversion factor 92	PPM H_2S
	1610:44	204	8.5		782
	1619:58	205	8.1		745
STD	1628:47	206	8.5		782

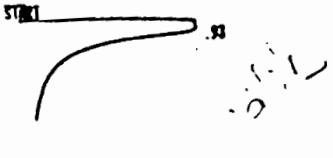
Plant Sample Average: 763.5



RUN # 199 NOV/23/91 15:31:57
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.2827E+08	†SPH	1R	100.000

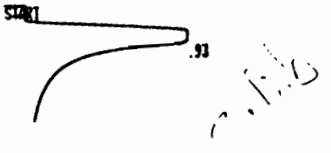
TOTAL AREA= 6.2827E+08
NUL FACTOR= 1.0000E+00



RUN # 200 NOV/23/91 15:38:35
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.5839E+08	†SBH	1R	100.000

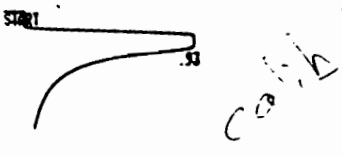
TOTAL AREA= 7.5839E+08
NUL FACTOR= 1.0000E+00



RUN # 201 NOV/23/91 15:45:50
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.1833E+08	†SPH	1R	100.000

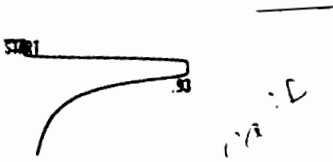
TOTAL AREA= 8.1833E+08
NUL FACTOR= 1.0000E+00



RUN # 202 NOV/23/91 15:53:52
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4822E+08	†SPH	1R	100.000

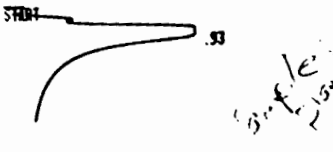
TOTAL AREA= 8.4822E+08
NUL FACTOR= 1.0000E+00



RUN # 203 NOV/23/91 16:02:10
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.6633E+08	†SPH	1R	100.000

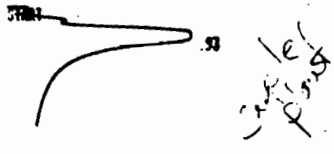
TOTAL AREA= 8.6633E+08
NUL FACTOR= 1.0000E+00



RUN # 204 NOV/23/91 16:10:44
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4884E+08	†SBH	1R	100.000

TOTAL AREA= 8.4884E+08
NUL FACTOR= 1.0000E+00



RUN # 205 NOV/23/91 16:19:58
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.0824E+08	†SBH	1R	100.000

TOTAL AREA= 8.0824E+08
NUL FACTOR= 1.0000E+00

RUN # 206 NOV/23/91 16:28:47
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5583E+08	†SPH	1R	100.000

TOTAL AREA= 8.5583E+08
NUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
11/24/91	1920:16	207	2e.5	119	
	1926:35	208	7.8	99	
	1933:46	209	8.3	93	
	1941:31	210	8.3	93	Avg
	1949:47	211	8.6	90	
				Avg. 92	
			Sample Area	Conversion factor 92	PPM H_2S
	1958:05	212	8.5		782
	2006:37	213	8.1		745
STD	2014:18	214	8.6		791

Plant Sample Average: 763.5

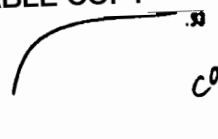
calib.

RUN # 207 NOV/24/91 19:20:16
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	6.4676E+08 ↑SPH	IR	100.000

TOTAL AREA= 6.4676E+08
MUL FACTOR= 1.0000E+00



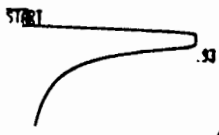
calib

RUN # 208 NOV/24/91 19:26:35
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	7.8425E+08 ↑SPH	IR	100.000

TOTAL AREA= 7.8425E+08
MUL FACTOR= 1.0000E+00



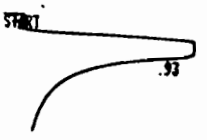
calib

RUN # 209 NOV/24/91 19:33:46
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.2682E+08 ↑SBH	IR	100.000

TOTAL AREA= 8.2682E+08
MUL FACTOR= 1.0000E+00



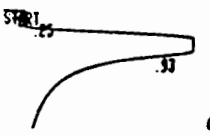
calib

RUN # 210 NOV/24/91 19:41:31
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.3149E+08 ↑SPH	IR	100.000

TOTAL AREA= 8.3149E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 211 NOV/24/91 19:49:47
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.6137E+08 ↑SBH	IR	100.000

TOTAL AREA= 8.6137E+08
MUL FACTOR= 1.0000E+00

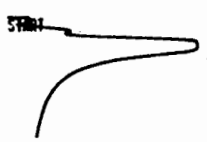
sample

RUN # 212 NOV/24/91 19:58:05
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.5175E+08 ↑SBH	IR	100.000

TOTAL AREA= 8.5175E+08
MUL FACTOR= 1.0000E+00



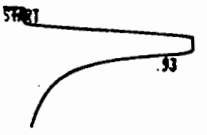
sample

RUN # 213 NOV/24/91 20:06:37
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.8781E+08 ↑SBH	IR	100.000

TOTAL AREA= 8.8781E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 214 NOV/24/91 20:14:18
WORKFILE ID: C
WORKFILE NAME:

NORM

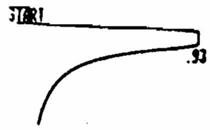
RT	AREA TYPE	CAL #	AMOUNT
0.93	8.6562E+08 ↑SBH	IR	100.000

TOTAL AREA= 8.6562E+08
MUL FACTOR= 1.0000E+00

8

DATE	TIME	RUN #	AREA	CONVERSION	
11/25/91	1608:14	215	4.6	168	
	1614:57	216	6.1	127	
	1620:55	217	6.9	112	
	1627:13	218	7.5	103	
	1633:12	219	7.8	99	
	1640:21	220	7.9	98	
	1647:[illegible]	221	8.0	96	
	1[illegible]:[illegible]0	[illegible]:0	8.0	94	} AVG
	1703:17	223	8.2	93	
	1711:37	224	8.5	91	
			Sample Area	X CONVERSION Factor 92	H_2S PPM
	1719:41	225	8.4		772
	1722:16	226	7.9		726
STD	1726:03	227	8.1		772

Plant Sample Average: 749



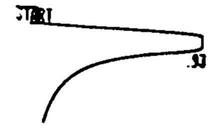
calib

RUN # 223 NOV/25/91 17:03:47
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3493E+08	†SBH	1R	100.000

TOTAL AREA= 8.3493E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 224 NOV/25/91 17:11:37
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5078E+08	†SBH	1R	100.000

TOTAL AREA= 8.5078E+08
MUL FACTOR= 1.0000E+00

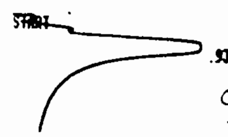
Sample blk.

RUN # 225 NOV/25/91 17:19:41
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4215E+08	†SBH	1R	100.000

TOTAL AREA= 8.4215E+08
MUL FACTOR= 1.0000E+00



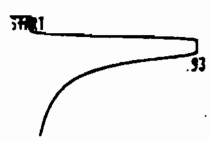
Sample plant

RUN # 226 NOV/25/91 17:28:16
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.9482E+08	†SBH	1R	100.000

TOTAL AREA= 7.9482E+08
MUL FACTOR= 1.0000E+00

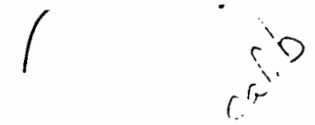


RUN # 227 NOV/25/91 17:36:23
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3687E+08	†SPH	1R	100.000

TOTAL AREA= 8.3687E+08
MUL FACTOR= 1.0000E+00

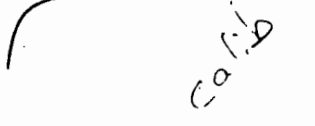


RUN # 215 NOV/25/91 16:08:14
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	4.5965E+08	↑SBP	1R	100.000

TOTAL AREA= 4.5965E+08
MUL FACTOR= 1.0000E+00

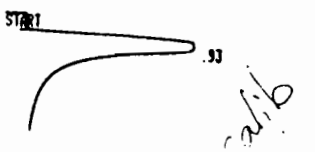


RUN # 216 NOV/25/91 16:14:33
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.1239E+08	↑SBH	1R	100.000

TOTAL AREA= 6.1239E+08
MUL FACTOR= 1.0000E+00

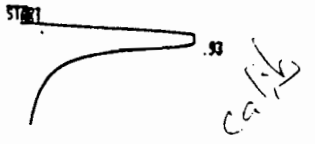


RUN # 217 NOV/25/91 16:20:55
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.9612E+08	↑SBH	1R	100.000

TOTAL AREA= 6.9612E+08
MUL FACTOR= 1.0000E+00

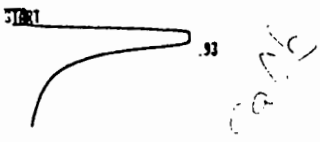


RUN # 218 NOV/25/91 16:27:13
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.5378E+08	↑SBH	1R	100.000

TOTAL AREA= 7.5378E+08
MUL FACTOR= 1.0000E+00

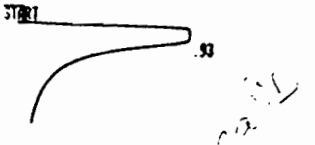


RUN # 219 NOV/25/91 16:33:31
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.8832E+08	↑SBH	1R	100.000

TOTAL AREA= 7.8832E+08
MUL FACTOR= 1.0000E+00

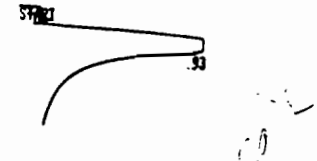


RUN # 220 NOV/25/91 16:40:21
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.9927E+08	↑SBH	1R	100.000

TOTAL AREA= 7.9927E+08
MUL FACTOR= 1.0000E+00

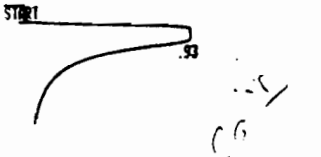


RUN # 221 NOV/25/91 16:47:35
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.0823E+08	↑SBH	1R	100.000

TOTAL AREA= 8.0823E+08
MUL FACTOR= 1.0000E+00



RUN # 222 NOV/25/91 16:55:12
WORKFILE ID: C
WORKFILE NAME:

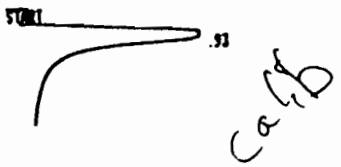
NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2273E+08	↑SBH	1R	100.000

TOTAL AREA= 8.2273E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
11/26/91	1619:56	228	6.4	121	
	1627:29	229	7.9	98	
	1634:28	230	8.3	93	
	1642:45	231	8.5	91	
	1650:59	232	8.5	91	
			Sample Area	Conversion Factor 91	H2S PPM
	1659:24	233	8.6		782
	1708:31	234	8.3		755
STD	1717:32	235	8.4		764

Plant Sample Average: 768.5

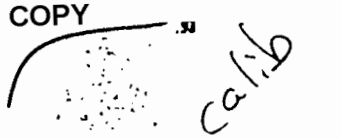


calib

RUN # 228 NOV/26/91 16:19:56
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.4074E+08	†SBH	1R	100.000

TOTAL AREA= 6.4074E+08
MUL FACTOR= 1.0000E+00

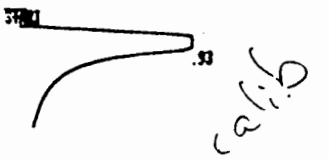


calib

RUN # 229 NOV/26/91 16:27:29
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.9211E+08	†SPH	1R	100.000

TOTAL AREA= 7.9211E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 230 NOV/26/91 16:34:28
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2864E+08	†SBH	1R	100.000

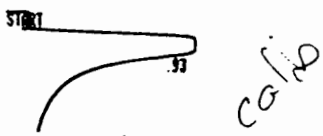
TOTAL AREA= 8.2864E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 231 NOV/26/91 16:42:45
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5618E+08	†SPH	1R	100.000

TOTAL AREA= 8.5618E+08
MUL FACTOR= 1.0000E+00

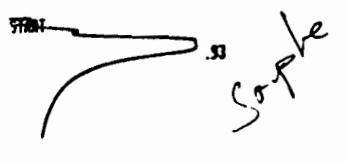


calib

RUN # 232 NOV/26/91 16:58:59
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5388E+08	†SBH	1R	100.000

TOTAL AREA= 8.5388E+08
MUL FACTOR= 1.0000E+00

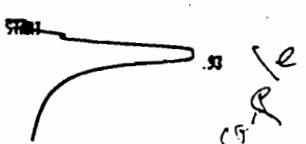


Sample

RUN # 233 NOV/26/91 16:59:24
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.6753E+08	†SBH	1R	100.000

TOTAL AREA= 8.6753E+08
MUL FACTOR= 1.0000E+00



Sample

RUN # 234 NOV/26/91 17:08:34
WORKFILE ID: C
WORKFILE NAME:

NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2528E+08	†SBH	1R	100.000

TOTAL AREA= 8.2528E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 235 NOV/26/91 17:17:32
WORKFILE ID: C
WORKFILE NAME:

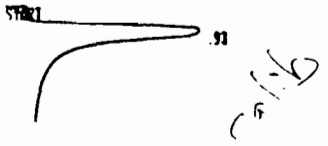
NORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4488E+08	†SBH	1R	100.000

TOTAL AREA= 8.4488E+08
MUL FACTOR= 1.0000E+00

10

DATE	TIME	RUN#	AREA	CONVERSION	
11/27/91	1603:33	236	6.4	121	
	1609:51	237	7.8	99	
	1617:56	283	8.4	92	AVG
	1625:39	284	8.6	90	
			Sample Area	CONVERSION factor 91	H_2S PPM
	1633:43	285	8.4		764
	1642:43	286	8.1		737
SD	1650:52	287	8.6		782

Plant Sample Average: 750.5

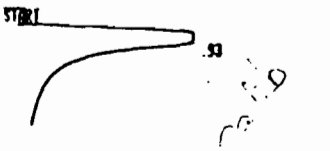


RUN # 236 NOV/27/91 16:03:33
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.4449E+08	†SPH	1R	100.000

TOTAL AREA= 6.4449E+08
MUL FACTOR= 1.0000E+00

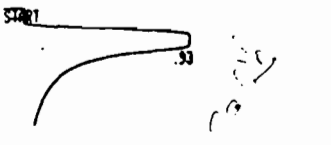


RUN # 237 NOV/27/91 16:09:51
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.8812E+08	†SBH	1R	100.000

TOTAL AREA= 7.8812E+08
MUL FACTOR= 1.0000E+00

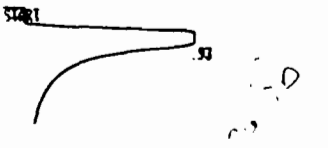


RUN # 239 NOV/27/91 16:25:39
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.6833E+08	†SPH	1R	100.000

TOTAL AREA= 8.6833E+08
MUL FACTOR= 1.0000E+00

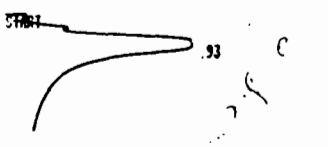


RUN # 238 NOV/27/91 16:17:56
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4289E+08	†SPH	1R	100.000

TOTAL AREA= 8.4289E+08
MUL FACTOR= 1.0000E+00

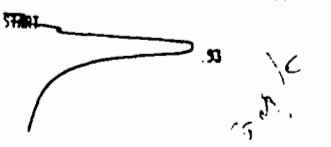


RUN # 240 NOV/27/91 16:33:43
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3666E+08	†SBH	1R	100.000

TOTAL AREA= 8.3666E+08
MUL FACTOR= 1.0000E+00



RUN # 241 NOV/27/91 16:42:43
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.0754E+08	†SBH	1R	100.000

TOTAL AREA= 8.0754E+08
MUL FACTOR= 1.0000E+00

RUN # 242 NOV/27/91 16:50:32
WORKFILE ID: C
WORKFILE NAME:

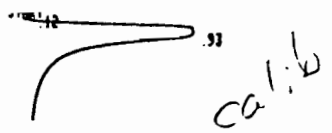
NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.6177E+08	†SBH	1R	100.000

TOTAL AREA= 8.6177E+08
MUL FACTOR= 1.0000E+00

DATE	Time	Run #	AREA	CONVERSION		
11/28/91	1152:18	243	6.5	119		
	1158:40	244	8.0	97		
	1206:22	245	8.3	93	}	AVG.
	1214:29	246	8.7	89		
	1223:13	247	8.6	90		
			Sample Area	CONVERSION factor 91		H_2S PPM
	1231:47	248	8.4			764
	1241:09	249	8.3			755
STD	1250:12	250	8.6			782

Plant Sample Average: 759.5



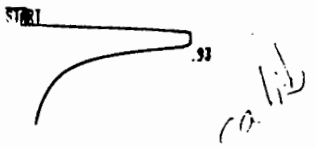
calib

RUN # 243 NOV/28/91 11:52:18
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	6.5078E+08 ↑SPH	1R	100.000

TOTAL AREA= 6.5078E+08
MUL FACTOR= 1.0000E+00



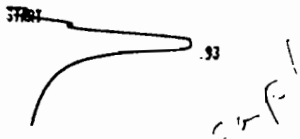
calib

RUN # 245 NOV/28/91 12:06:22
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.3347E+08 ↑SBH	1R	100.000

TOTAL AREA= 8.3347E+08
MUL FACTOR= 1.0000E+00



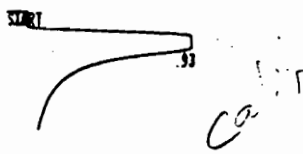
surface

RUN # 248 NOV/28/91 12:31:47
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.3755E+08 ↑SBH	1R	100.000

TOTAL AREA= 8.3755E+08
MUL FACTOR= 1.0000E+00



calib

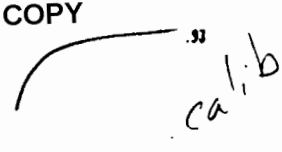
RUN # 250 NOV/28/91 12:50:12
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.6473E+08 ↑SPH	1R	100.000

TOTAL AREA= 8.6473E+08
MUL FACTOR= 1.0000E+00

?



calib

RUN # 244 NOV/28/91 11:58:40
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.8339E+08 ↑SBH	1R	100.000

TOTAL AREA= 8.8339E+08
MUL FACTOR= 1.0000E+00

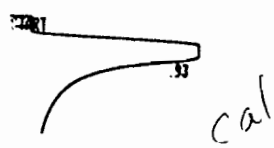
calib

RUN # 246 NOV/28/91 12:14:29
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.7845E+08 ↑SPH	1R	100.000

TOTAL AREA= 8.7845E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 247 NOV/28/91 12:23:13
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.6825E+08 ↑SPH	1R	100.000

TOTAL AREA= 8.6825E+08
MUL FACTOR= 1.0000E+00

surface

RUN # 249 NOV/28/91 12:41:09
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.3828E+08 ↑SBH	1R	100.000

TOTAL AREA= 8.3828E+08
MUL FACTOR= 1.0000E+00

DATE	Time	Run #	Area	CONVERSION	
11/29/91	1600:07	251	6.7	116	
"	1606:50	252	7.9	98	
"	1614:20	253	8.3	93	
	1622:21	254	8.5	91	
			sample Area	conversion factor 91	H_2S ppm
	1630:43	255	8.4		764
	1639:46	256	8.2		746
STD	1648:41	257	8.5		773

Plant Sample Average: 755

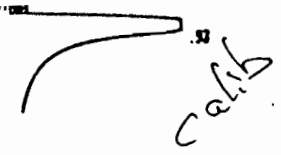
calib

RUN # 251 NOV/29/91 16:00:07
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.7886E+08	†SPH	1R	100.000

TOTAL AREA= 6.7886E+08
MUL FACTOR= 1.0000E+00



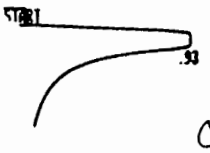
calib

RUN # 252 NOV/29/91 16:06:50
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.9554E+08	†SBH	1R	100.000

TOTAL AREA= 7.9554E+08
MUL FACTOR= 1.0000E+00



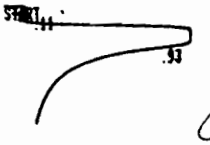
calib

RUN # 253 NOV/29/91 16:14:20
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2629E+08	†SBH	1R	100.000

TOTAL AREA= 8.2629E+08
MUL FACTOR= 1.0000E+00



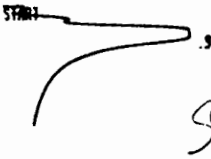
calib

RUN # 254 NOV/29/91 16:22:21
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5278E+08	†SPH	1R	100.000

TOTAL AREA= 8.5278E+08
MUL FACTOR= 1.0000E+00



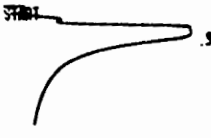
sample

RUN # 255 NOV/29/91 16:30:43
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4342E+08	†SBH	1R	100.000

TOTAL AREA= 8.4342E+08
MUL FACTOR= 1.0000E+00



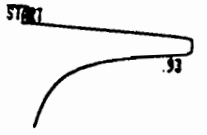
sample

RUN # 256 NOV/29/91 16:39:46
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.1798E+08	†SBH	1R	100.000

TOTAL AREA= 8.1798E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 257 NOV/29/91 16:40:41
WORKFILE ID: C
WORKFILE NAME:

NORM

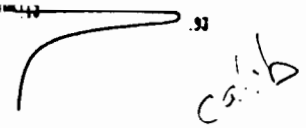
RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4997E+08	†SBH	1R	100.000

TOTAL AREA= 8.4997E+08
MUL FACTOR= 1.0000E+00

2m
e4
16
23

DATE	TIME	RUN #	AREA	CONVERSION	
11/30/91	1604:19	258	1.4	121	
	1610:39	259	8.1	95	
	1618:00	260	8.2	94	
	1626:06	261	8.3	93	AVG
	1634:23	262	8.7	89	
	1643:07	263	8.5	91	
				AVG = 91	
			Sample Area	CONVERSION FACTOR 91	H2S ppm
	1651:49	264	8.8		800
	1701:20	265	8.3		755
STD	1710:52	266	8.7		791

Plant Sample Average: 777.5

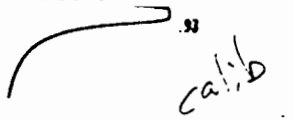


RUN # 258 NOV/30/91 16:04:19
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.4288E+08	†SPH	1R	100.000

TOTAL AREA= 6.4288E+08
MUL FACTOR= 1.0000E+00

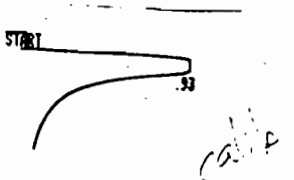


RUN # 259 NOV/30/91 16:10:37
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.1139E+08	†SPH	1R	100.000

TOTAL AREA= 8.1139E+08
MUL FACTOR= 1.0000E+00

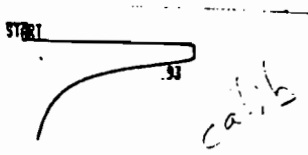


RUN # 260 NOV/30/91 16:18:08
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.1561E+08	†SBH	1R	100.000

TOTAL AREA= 8.1561E+08
MUL FACTOR= 1.0000E+00

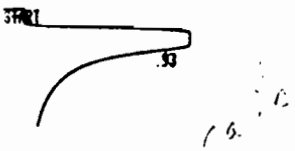


RUN # 261 NOV/30/91 16:26:06
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3192E+08	†SBH	1R	100.000

TOTAL AREA= 8.3192E+08
MUL FACTOR= 1.0000E+00

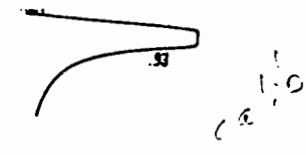


RUN # 262 NOV/30/91 16:34:23
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.7566E+08	†SPH	1R	100.000

TOTAL AREA= 8.7566E+08
MUL FACTOR= 1.0000E+00

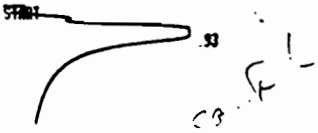


RUN # 263 NOV/30/91 16:43:07
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5285E+08	†SBH	1R	100.000

TOTAL AREA= 8.5285E+08
MUL FACTOR= 1.0000E+00

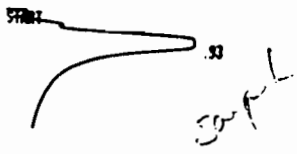


RUN # 264 NOV/30/91 16:51:49
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.8283E+08	†SBH	1R	100.000

TOTAL AREA= 8.8283E+08
MUL FACTOR= 1.0000E+00

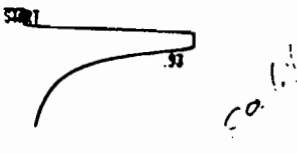


RUN # 265 NOV/30/91 17:01:20
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3427E+08	†SBH	1R	100.000

TOTAL AREA= 8.3427E+08
MUL FACTOR= 1.0000E+00



RUN # 266 NOV/30/91 17:10:52
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.7598E+08	†SPH	1R	100.000

TOTAL AREA= 8.7598E+08

14 DATE	TIME	RUN #	AREA	CONCENTRATION	
12/1/91	1549:06	267	6.8	114	
	1555:26	268	8.3	93	
	1603:16	269	8.4	92	AVG
	1612:27	270	8.7	89	
				AVG = 91	
			Sample Area	Conversion factor 91	H2S PPM
	1620:41	271	8.5		773
	1629:55	272	8.2		746
STD	1639:04	273	8.5		773

Plant Sample Average: 759.5

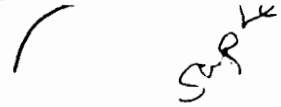
Calib

RUN # 273 DEC/01/91 16:39:04
WORKFILE ID: C
WORKFILE NAME:

HORN

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5022E+08	†SBH	1R	100.000

TOTAL AREA= 8.5022E+08
MUL FACTOR= 1.0000E+00



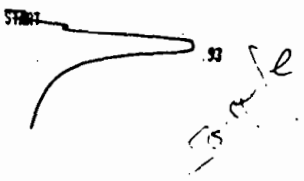
Sample

RUN # 272 DEC/01/91 16:29:55
WORKFILE ID: C
WORKFILE NAME:

HORN

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.1851E+08	†SBH	1R	100.000

TOTAL AREA= 8.1851E+08
MUL FACTOR= 1.0000E+00



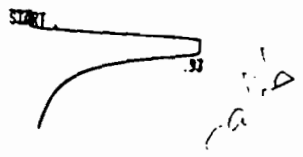
Sample

RUN # 271 DEC/01/91 16:20:41
WORKFILE ID: C
WORKFILE NAME:

HORN

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.5082E+08	†SBH	1R	100.000

TOTAL AREA= 8.5082E+08
MUL FACTOR= 1.0000E+00



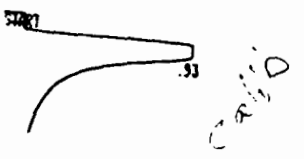
Calib

RUN # 270 DEC/01/91 16:12:27
WORKFILE ID: C
WORKFILE NAME:

HORN

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.7771E+08	†SPH	1R	100.000

TOTAL AREA= 8.7771E+08
MUL FACTOR= 1.0000E+00



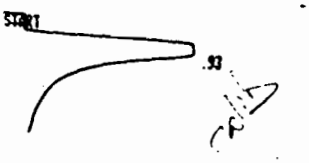
Calib

RUN # 269 DEC/01/91 16:03:16
WORKFILE ID: C
WORKFILE NAME:

HORN

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3981E+08	†SPH	1R	100.000

TOTAL AREA= 8.3981E+08
MUL FACTOR= 1.0000E+00



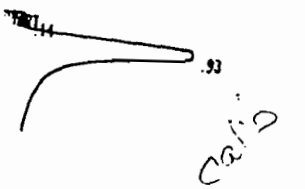
Calib

RUN # 268 DEC/01/91 15:55:26
WORKFILE ID: C
WORKFILE NAME:

HORN

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3459E+08	†SPH	1R	100.000

TOTAL AREA= 8.3459E+08
MUL FACTOR= 1.0000E+00



Calib

RUN # 267 DEC/01/91 15:49:06
WORKFILE ID: C
WORKFILE NAME:

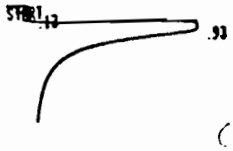
HORN

RT	AREA	TYPE	CAL #	AMOUNT
0.93	6.8654E+08	†SHH	1R	100.000

TOTAL AREA= 6.8654E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
12/2/91	1659:51	274	6.7	115	
	1606:14	275	8.3	93	
	1613:55	276	8.4	92	
	1621:57	277	8.5	91	
			sample AREA	conversion factor 91	H_2S PPM
	1630:15	278	8.3		755
	1639:26	279	8.2		746
S:D	1648:38	280	8.6		782

Plant Sample Average: 750.5



calib

RUN # 274 DEC/02/91 15:59:51
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	6.7089E+08 ↑SHH	IR	100.000

TOTAL AREA= 6.7089E+08
MUL FACTOR= 1.0000E+00

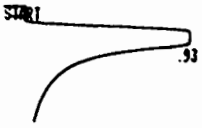
calib

RUN # 275 DEC/02/91 16:06:14
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.3624E+08 ↑SPH	IR	100.000

TOTAL AREA= 8.3624E+08
MUL FACTOR= 1.0000E+00



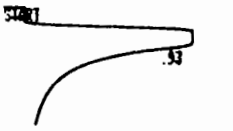
calib

RUN # 276 DEC/02/91 16:13:55
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.4139E+08 ↑SPH	IR	100.000

TOTAL AREA= 8.4139E+08
MUL FACTOR= 1.0000E+00



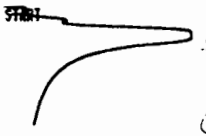
calib

RUN # 277 DEC/02/91 16:21:57
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.5634E+08 ↑SPH	IR	100.000

TOTAL AREA= 8.5634E+08
MUL FACTOR= 1.0000E+00



Simple

RUN # 278 DEC/02/91 16:30:15
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.2749E+08 ↑SBH	IR	100.000

TOTAL AREA= 8.2749E+08
MUL FACTOR= 1.0000E+00

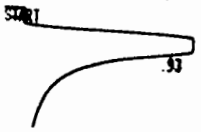
Simple

RUN # 279 DEC/02/91 16:39:26
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.1528E+08 ↑SBH	IR	100.000

TOTAL AREA= 8.1528E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 280 DEC/02/91 16:48:28
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA TYPE	CAL #	AMOUNT
0.93	8.6481E+08 ↑SPH	IR	100.000

TOTAL AREA= 8.6481E+08
MUL FACTOR= 1.0000E+00

H_2S cal. bottle low. pressure may be varying

DATE	TIME	RUN #	AREA	(illegible)
12/3/91	1557:22	281	7.1	109
	1603:50	282	8.3	93
	1612:04	283	7.8	88
	1620:46	284	9.0	86
	1629:50	285	9.0	86

			Sample Area	(illegible) 86	H_2S ppm
	1639:01	286	8.8		756
	1648:32	287	8.4		722
STD	1658:01	288	8.9		765

Plant Sample Average: 739

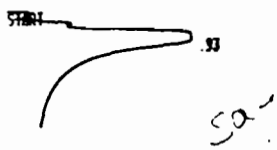
calib

RUN # 288 DEC/03/91 16:58:01
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.9348E+08	†SPH	1R	100.000

TOTAL AREA= 8.9348E+08
MUL FACTOR= 1.0000E+00



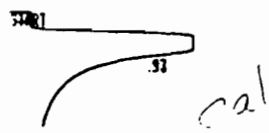
sample

RUN # 286 DEC/03/91 16:39:01
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.7667E+08	†SBH	1R	100.000

TOTAL AREA= 8.7667E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 284 DEC/03/91 16:20:46
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	9.0002E+08	†SBH	1R	100.000

TOTAL AREA= 9.0002E+08
MUL FACTOR= 1.0000E+00

calib

RUN # 282 DEC/03/91 16:03:58
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2852E+08	†SPH	1R	100.000

TOTAL AREA= 8.2852E+08
MUL FACTOR= 1.0000E+00

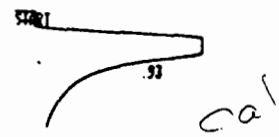
Sample

RUN # 287 DEC/03/91 16:48:32
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4152E+08	†SBH	1R	100.000

TOTAL AREA= 8.4152E+08
MUL FACTOR= 1.0000E+00



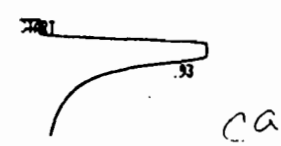
calib

RUN # 285 DEC/03/91 16:29:58
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	9.0935E+08	†SPH	1R	100.000

TOTAL AREA= 9.0935E+08
MUL FACTOR= 1.0000E+00



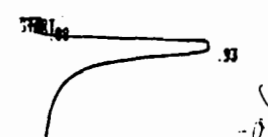
calib

RUN # 283 DEC/03/91 16:12:04
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.8318E+08	†SBH	1R	100.000

TOTAL AREA= 8.8318E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 281 DEC/03/91 15:57:22
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.8818E+08	†SPH	1R	100.000

TOTAL AREA= 7.8818E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	Run #	AREA	Conversion	
12/4/91	1555:38	289	7.5	103	
	1602:21	290	8.4	92	
	1610:31	291	8.7	89	
	1619:14	292	9.0	86	
	1628:19	293	9.0	86	
			Sample Area	conversion factor 86	H_2S PPM
	1637:33	294	8.8		756
	1646:55	295	8.2		705
STD	1655:53	296	8.9		765

Plant Sample Average: 730.5

calib

RUN # 296 DEC/04/91 16:55:53
WORKFILE ID: C
WORKFILE NAME:

WORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.8933E+08	†SBH	1R	100.000

TOTAL AREA= 8.8933E+08
MUL FACTOR= 1.0000E+00

sample

RUN # 295 DEC/04/91 16:46:55
WORKFILE ID: C
WORKFILE NAME:

WORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2011E+08	†SBH	1R	100.000

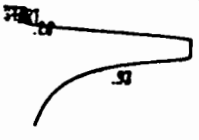
TOTAL AREA= 8.2011E+08
MUL FACTOR= 1.0000E+00

sample

RUN # 294 DEC/04/91 16:37:33
WORKFILE ID: C
WORKFILE NAME:

WORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.7915E+08	†SBH	1R	100.000

TOTAL AREA= 8.7915E+08
MUL FACTOR= 1.0000E+00

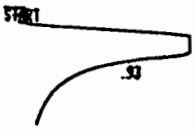


calib.

RUN # 293 DEC/04/91 16:28:19
WORKFILE ID: C
WORKFILE NAME:

WORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	9.8358E+08	†SPH	1R	100.000

TOTAL AREA= 9.8358E+08
MUL FACTOR= 1.0000E+00

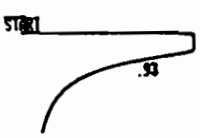


calib.

RUN # 292 DEC/04/91 16:19:14
WORKFILE ID: C
WORKFILE NAME:

WORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	9.0199E+08	†SPH	1R	100.000

TOTAL AREA= 9.0199E+08
MUL FACTOR= 1.0000E+00

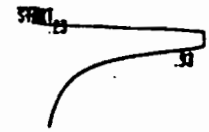


calib.

RUN # 291 DEC/04/91 16:10:31
WORKFILE ID: C
WORKFILE NAME:

WORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.7191E+08	†SBH	1R	100.000

TOTAL AREA= 8.7191E+08
MUL FACTOR= 1.0000E+00

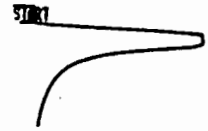


calib.

RUN # 290 DEC/04/91 16:02:21
WORKFILE ID: C
WORKFILE NAME:

WORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4506E+08	†SPH	1R	100.000

TOTAL AREA= 8.4506E+08
MUL FACTOR= 1.0000E+00



calib

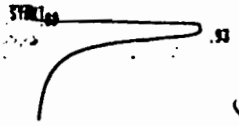
RUN # 289 DEC/04/91 15:55:38
WORKFILE ID: C
WORKFILE NAME:

WORM RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.5652E+08	†SPH	1R	100.000

TOTAL AREA= 7.5652E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
12/5/91	1600:02	297	7.1	109	
	1606:28	298	8.2	94	
	1613:53	299	8.4	92	AVG
	1622:00	300	8.6	90	
				AVG = 91	
		1			
		1			
			Sample Area	conversion factor 91	H_2S PPm
	1630:26	301	8.3		755
	1639:33	302	7.8		709
STD	1647:29	303	8.9		809

Plant Sample Average: 732

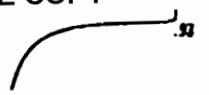


calib

RUN # 297 DEC/05/91 16:00:02
WORKFILE ID: C
WORKFILE NAME:

HORN RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.1068E+00	†SPH	1R	100.000

TOTAL AREA= 7.1068E+00
MUL FACTOR= 1.0000E+00

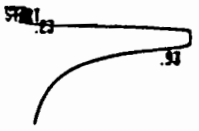


calib

RUN # 298 DEC/05/91 16:06:28
WORKFILE ID: C
WORKFILE NAME:

HORN RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2372E+00	†SPH	1R	100.000

TOTAL AREA= 8.2372E+00
MUL FACTOR= 1.0000E+00



calib

RUN # 299 DEC/05/91 16:13:53
WORKFILE ID: C
WORKFILE NAME:

HORN RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4346E+00	†SPH	1R	100.000

TOTAL AREA= 8.4346E+00
MUL FACTOR= 1.0000E+00

calib

RUN # 300 DEC/05/91 16:22:00
WORKFILE ID: C
WORKFILE NAME:

HORN RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.6675E+00	†SPH	1R	100.000

TOTAL AREA= 8.6675E+00
MUL FACTOR= 1.0000E+00

Sup Lc

RUN # 301 DEC/05/91 16:30:26
WORKFILE ID: C
WORKFILE NAME:

HORN RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2633E+00	†SBH	1R	100.000

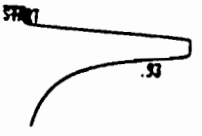
TOTAL AREA= 8.2633E+00
MUL FACTOR= 1.0000E+00

Sup Lc

RUN # 302 DEC/05/91 16:39:33
WORKFILE ID: C
WORKFILE NAME:

HORN RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.8488E+00	†SPH	1R	100.000

TOTAL AREA= 7.8488E+00
MUL FACTOR= 1.0000E+00



cont.

RUN # 303 DEC/05/91 16:47:29
WORKFILE ID: C
WORKFILE NAME:

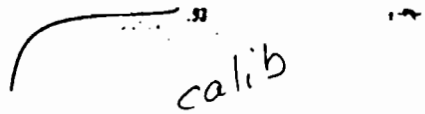
HORN RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.9981E+00	†SPH	1R	100.000

TOTAL AREA= 8.9981E+00
MUL FACTOR= 1.0000E+00

DATE	TIME	2WH	AREA	CONVERSION	
12/6/91	1603:32	304	7.1	109	
	1609:52	305	8.3	93	} AVG
	1617:53	302	8.6	90	
	1626:29	307	8.9	87	
				AVG = 90	
			sample Area	conversion factor 90	H_2S PPM
	1635:32	302	8.3		747
	1645:00	309	7.8		702
SD	1654:11	310	9.0		810

Plant Sample Average: 724.5

ppm
5
9
9



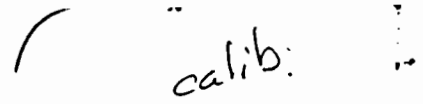
calib

RUN # 384 DEC/06/91 16:03:32
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.1422E+08	†SPH	1R	100.000

TOTAL AREA= 7.1422E+08
MUL FACTOR= 1.0000E+00



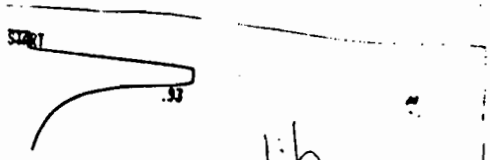
calib

RUN # 385 DEC/06/91 16:09:52
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2981E+08	†SBH	1R	100.000

TOTAL AREA= 8.2981E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 386 DEC/06/91 16:17:53
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.6496E+08	†SBH	1R	100.000

TOTAL AREA= 8.6496E+08
MUL FACTOR= 1.0000E+00

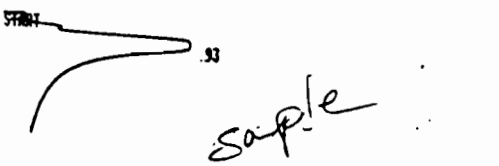
calib

RUN # 387 DEC/06/91 16:26:29
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.9109E+08	†SBH	1R	100.000

TOTAL AREA= 8.9109E+08
MUL FACTOR= 1.0000E+00



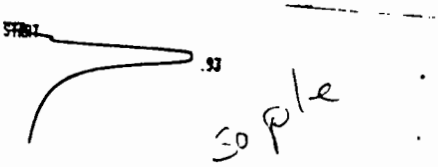
sample

RUN # 388 DEC/06/91 16:35:32
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.3825E+08	†SBH	1R	100.000

TOTAL AREA= 8.3825E+08
MUL FACTOR= 1.0000E+00



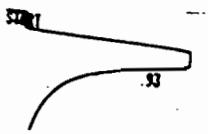
sample

RUN # 389 DEC/06/91 16:45:00
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.8554E+08	†SPH	1R	100.000

TOTAL AREA= 7.8554E+08
MUL FACTOR= 1.0000E+00



calib

RUN # 310 DEC/06/91 16:54:11
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	9.8174E+08	†SPH	1R	100.000

TOTAL AREA= 9.8174E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
12/7/91	1603:03	311	7.3	104	
	1610:25	312	8.4	92	
	1619:05	313	8.7	89	AVG
	1628:29	314	8.9	87	
				AVG = 89	
			Sample Area	conversion factor 89	H_2S PPM
	1637:50	315	8.3		>38
	1647:29	316	7.8		694
	1656:53	317	8.9		>92

Plant Sample Average: 716

calib.

RUN # 317 DEC/07/91 16:56:53
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.9588E+08	↑SPH	IR	100.000

TOTAL AREA= 8.9588E+08
MUL FACTOR= 1.0000E+00

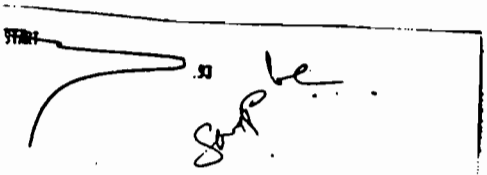
sample

RUN # 316 DEC/07/91 16:47:29
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.7983E+08	↑SBH	IR	100.000

TOTAL AREA= 7.7983E+08
MUL FACTOR= 1.0000E+00



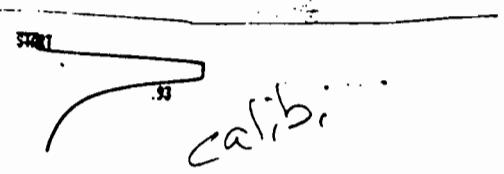
sample

RUN # 315 DEC/07/91 16:37:50
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.2951E+08	↑SBH	IR	100.000

TOTAL AREA= 8.2951E+08
MUL FACTOR= 1.0000E+00



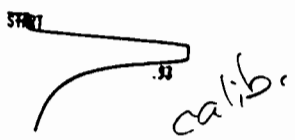
calib.

RUN # 314 DEC/07/91 16:28:29
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.9068E+08	↑SPH	IR	100.000

TOTAL AREA= 8.9068E+08
MUL FACTOR= 1.0000E+00



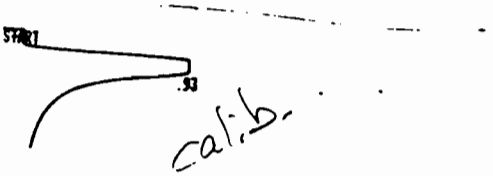
calib.

RUN # 313 DEC/07/91 16:19:05
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.7833E+08	↑SBH	IR	100.000

TOTAL AREA= 8.7833E+08
MUL FACTOR= 1.0000E+00



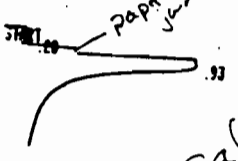
calib.

RUN # 312 DEC/07/91 16:10:25
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4085E+08	↑SBH	IR	100.000

TOTAL AREA= 8.4085E+08
MUL FACTOR= 1.0000E+00



calib.

RUN # 311 DEC/07/91 16:03:03
WORKFILE ID: C
WORKFILE NAME:

NORM

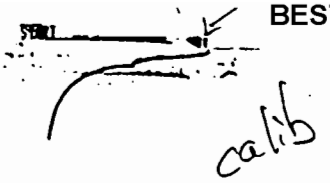
RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.3696E+08	↑SHH	IR	100.000

TOTAL AREA= 7.3696E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
12/8/91	1551:20	318	7.6	102	
	1600:22	319	8.4	92	AVG
	1609:15	320	8.8	88	
	1618:41	321	9.0	86	
				AVG = 88	
			sample Area	CONVERSION factor 88	H_2S PPM
	1628:17	322	8.2		721
	1638:09	323	7.8		686
STD.	1647:48	324	9.0		792

Plant Sample Average: 703.5

2m
1
2



calib

RUN # 318 DEC/08/91 15:51:20
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.6188E+08	†SPH	1R	100.000

TOTAL AREA= 7.6188E+08
MUL FACTOR= 1.0000E+00

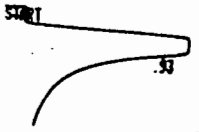
calib.

RUN # 319 DEC/08/91 16:00:22
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.4413E+08	†SBH	1R	100.000

TOTAL AREA= 8.4413E+08
MUL FACTOR= 1.0000E+00



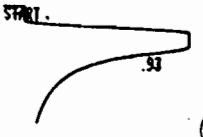
calib.

RUN # 320 DEC/08/91 16:09:15
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.8697E+08	†SPH	1R	100.000

TOTAL AREA= 8.8697E+08
MUL FACTOR= 1.0000E+00



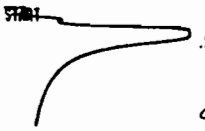
calib.

RUN # 321 DEC/08/91 16:18:41
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	9.0881E+08	†SPH	1R	100.000

TOTAL AREA= 9.0881E+08
MUL FACTOR= 1.0000E+00



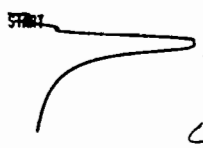
sample

RUN # 322 DEC/08/91 16:28:17
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	8.1652E+08	†SBH	1R	100.000

TOTAL AREA= 8.1652E+08
MUL FACTOR= 1.0000E+00



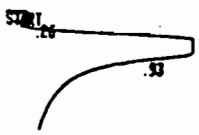
sample

RUN # 323 DEC/08/91 16:38:09
WORKFILE ID: C
WORKFILE NAME:

NORM

RT	AREA	TYPE	CAL #	AMOUNT
0.93	7.8253E+08	†SBH	1R	100.000

TOTAL AREA= 7.8253E+08
MUL FACTOR= 1.0000E+00



calib.

RUN # 324 DEC/08/91 16:47:48
WORKFILE ID: C
WORKFILE NAME:

NORM

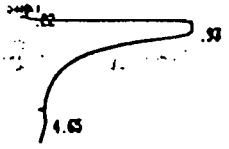
RT	AREA	TYPE	CAL #	AMOUNT
0.93	9.0624E+08	†SPH	1R	100.000

TOTAL AREA= 9.0624E+08
MUL FACTOR= 1.0000E+00

12/9/91 Plant Shut Down from 7:00Am - 10:00 Pm for maintanence. H_2S reading not taken Do to- Lack of power

DATE	TIME	Run #	AREA	CONVERSION	
12/10/91	1546:17	325	7.6	102	
	1555:03	326	8.7	89	
	1604:56	327	9.0	86	
	1615:14	328	9.1	85	
			Sample Area	conversion factor 86	H_2S PPM
	1626:03	329	8.2		705
	1636:47	330	8.0		688
STD.	1647:29	331	9.3		799

Plant Sample Average: 696.5



Cal/b

RUN # 325 DEC/10/91 15:46:17
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.22	136110	D BP	0.283	0.018
0.93	7.5889E+08	↑SPH	1.591	99.204
4.65	5958100	ITBB	0.816	0.778

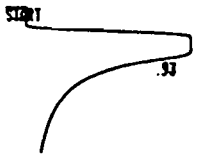
TOTAL AREA= 7.6497E+08
MUL FACTOR= 1.0000E+00

Cal/b

RUN # 326 DEC/10/91 15:55:03
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	8.6947E+08	↑SPH	1.828	100.000

TOTAL AREA= 8.6947E+08
MUL FACTOR= 1.0000E+00

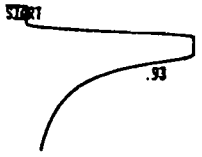


Cal/b

RUN # 327 DEC/10/91 16:04:56
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	9.0056E+08	↑SPH	1.894	100.000

TOTAL AREA= 9.0056E+08
MUL FACTOR= 1.0000E+00

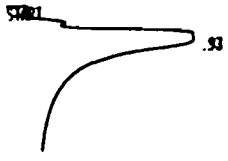


Cal/b

RUN # 328 DEC/10/91 16:15:14
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	9.1856E+08	↑SBH	1.933	100.000

TOTAL AREA= 9.1856E+08
MUL FACTOR= 1.0000E+00

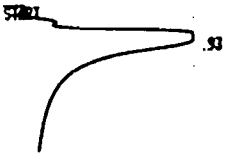


Cal/b

RUN # 329 DEC/10/91 16:26:03
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	8.2383E+08	↑SBH	1.726	100.000

TOTAL AREA= 8.2383E+08
MUL FACTOR= 1.0000E+00

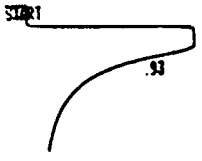


Cal/b

RUN # 330 DEC/10/91 16:36:47
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	8.0637E+08	↑SBH	1.692	100.000

TOTAL AREA= 8.0637E+08
MUL FACTOR= 1.0000E+00



Cal/b

RUN # 331 DEC/10/91 16:47:29
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	9.3547E+08	↑SPH	1.969	100.000

TOTAL AREA= 9.3547E+08
MUL FACTOR= 1.0000E+00

STI

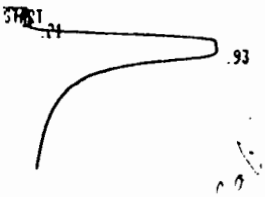
DATE	TIME	RUN #	AREA	CONVERSION	
12/11/91	1105:01	332	7.7	100	
	1103:40	333	8.6	90	
	1103:58	3341	9.1	85 } AVG	
	1134:25	335	9.2	84 }	
				AVG. 86	
			Sa-Pf Area	CONVERSION FACTOR 86	H2S PPM
	1105:06	336	8.6		739
	1155:54	337	8.3		713
STD	1706:34	338	9.1		782
		Plant Sample Average: 726			

RUN # 333 DEC/11/91 16:13:40
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.6592E+08 ↑SBH	1.830	100.000

TOTAL AREA= 8.6592E+08
MUL FACTOR= 1.0000E+00

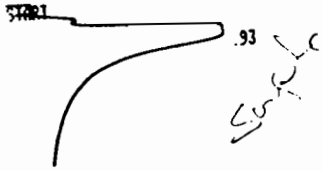


RUN # 332 DEC/11/91 16:05:01
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.21	2246000 D BH	0.305	0.289
0.93	7.7624E+08 ↑SBH	1.640	99.711

TOTAL AREA= 7.7848E+08

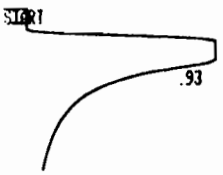


RUN # 336 DEC/11/91 16:45:06
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.6638E+08 ↑SBH	1.815	100.000

TOTAL AREA= 8.6638E+08
[illegible] 0000E+00

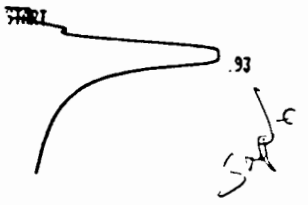


RUN # 334 DEC/11/91 16:23:58
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	9.1279E+08 ↑SBH	1.921	100.000

TOTAL AREA= 9.1279E+08
[illegible] FACTOR= 1.0000E+00

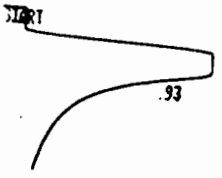


RUN # 337 DEC/11/91 16:55:54
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.3629E+08 ↑SBH	1.753	100.000

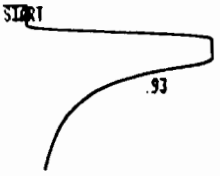
TOTAL AREA= 8.3629E+08
MUL FACTOR= 1.0000E+00



RUN # 335 DEC/11/91 16:34:25
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	9.2978E+08 ↑SBH	1.956	100.000



RUN # 338 DEC/11/91 17:06:34
WORKFILE ID: B
WORKFILE NAME:

AREA%

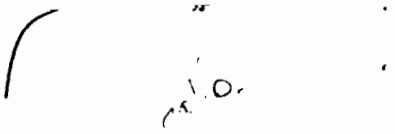
RT	AREA TYPE	AR/HT	AREA%
0.93	9.1787E+08 ↑SBH	1.932	100.000

TOTAL AREA= 9.1787E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
12/12/91	1619:46	339	5.3	113	
	1626:06	340	6.8	113	
	1632:28	341	7.5	103	
	1639:30	342	8.0	96	
	1647:01	343	8.4	92	
	1655:05	344	8.5	91	
			sample Area	Conversion Factor 91	H_2S PPm
	1703:25	345	7.8		709
	1712:38	346	7.5		682
STD	1721:42	374	8.4		764

Plant Sample Average: 695.5

H2S Film
239
713

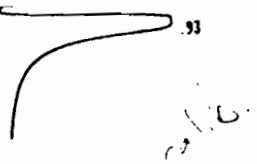


RUN # 339 DEC/12/91 16:19:46
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.24	934140	BH	0.288	0.174
0.93	5.3699E+08	†SHP	1.138	99.826

TOTAL AREA= 5.3792E+08
MUL FACTOR= 1.0000E+00

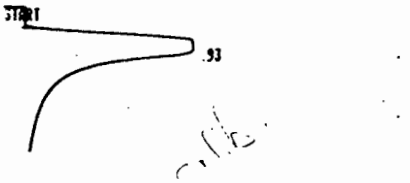


RUN # 340 DEC/12/91 16:26:05
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	6.8607E+08	†SPH	1.411	100.000

TOTAL AREA= 6.8607E+08
MUL FACTOR= 1.0000E+00

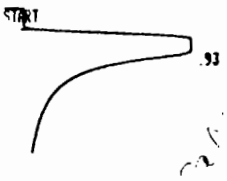


RUN # 341 DEC/12/91 16:32:28
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	7.5028E+08	†SBH	1.574	100.000

TOTAL AREA= 7.5028E+08
MUL FACTOR= 1.0000E+00

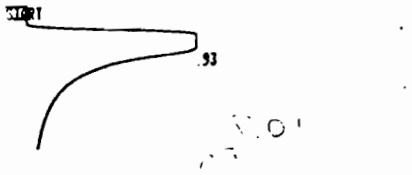


RUN # 342 DEC/12/91 16:39:30
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.0594E+08	†SBH	1.700	100.000

TOTAL AREA= 8.0594E+08
MUL FACTOR= 1.0000E+00

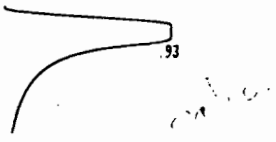


RUN # 343 DEC/12/91 16:47:01
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.4689E+08	†SBH	1.778	100.000

TOTAL AREA= 8.4689E+08
MUL FACTOR= 1.0000E+00

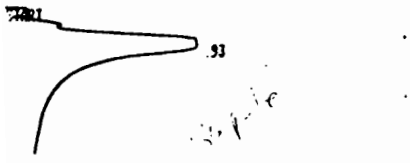


RUN # 344 DEC/12/91 16:55:05
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.5211E+08	†SPH	1.789	100.000

TOTAL AREA= 8.5211E+08
MUL FACTOR= 1.0000E+00

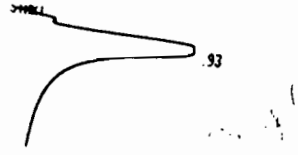


RUN # 345 DEC/12/91 17:03:25
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	7.8116E+08	†SBH	1.636	100.000

TOTAL AREA= 7.8116E+08
MUL FACTOR= 1.0000E+00

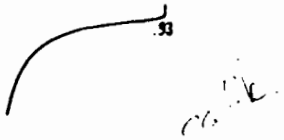


RUN # 346 DEC/12/91 17:12:38
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	7.5031E+08	†SBH	1.568	100.000

TOTAL AREA= 7.5031E+08
MUL FACTOR= 1.0000E+00



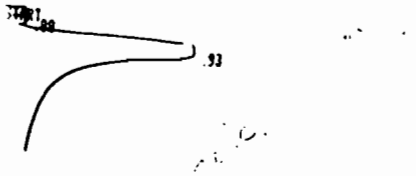
RUN # 347 DEC/12/91 17:21:42
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
8.93	8.4369E+08	†SBH	1.778	100.000

DATE	TIME	RUN #	AREA	CONVERSION	
12/13/91	1609:31	348	7.3	106	
	1616:23	349	8.7	89	AVG
	1625:05	350	8.6	90	
	1634:24	351	8.9	87	
				AVG = 88	
			Sample AREA	CONVERSION FACTOR 88	H2S PPM
	1644:15	352	8.5		>48
	1654:35	353	8.2		721
STD.	1704:19	354	9.1		800

Plant Sample Average: 734.5

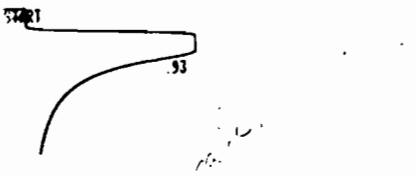


RUN # 348 DEC/13/91 16:09:31
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.88	211470	D BP	0.425	0.029
0.93	7.3230E+08	↑SPH	1.528	99.971

TOTAL AREA= 7.3251E+08

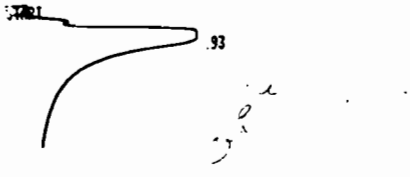


RUN # 350 DEC/13/91 16:25:05
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.6873E+08	↑SBH	1.832	100.000

TOTAL AREA= 8.6873E+08
MUL FACTOR= 1.0000E+00

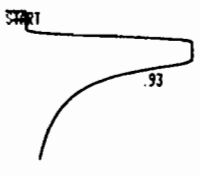


RUN # 352 DEC/13/91 16:44:15
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.5414E+08	↑SBH	1.789	100.000

TOTAL AREA= 8.5414E+08
MUL FACTOR= 1.0000E+00

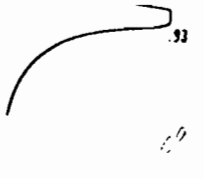


RUN # 354 DEC/13/91 17:04:19
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	9.1255E+08	↑SPH	1.918	100.000

TOTAL AREA= 9.1255E+08
MUL FACTOR= 1.0000E+00

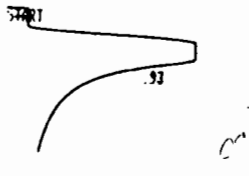


RUN # 349 DEC/13/91 16:16:23
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.26	433660	BH	0.259	0.050
0.93	8.7088E+08	↑SHH	1.836	99.950

TOTAL AREA= 8.7123E+08
MUL FACTOR= 1.0000E+00

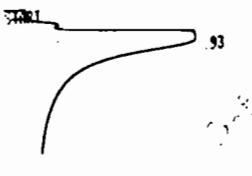


RUN # 351 DEC/13/91 16:34:24
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.9552E+08	↑SBH	1.886	100.000

TOTAL AREA= 8.9552E+08
MUL FACTOR= 1.0000E+00



RUN # 353 DEC/13/91 16:54:35
WORKFILE ID: B
WORKFILE NAME:

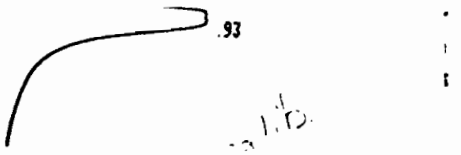
AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.1998E+08	↑SBH	1.714	100.000

TOTAL AREA= 8.1998E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
12/14/91	1405:58	355	7.5	103	
	1413:32	356	8.6	90 } AVG	
	1422:47	357	8.8	88 }	
				AVG: 89	
			Sample Area	Conversion Factor 89	H_2S PPM
	1432:36	358	8.6		765
	1443:00	359	8.3		738
STD	1453:17	360	9.2		818

Plant Sample Average: 751.5

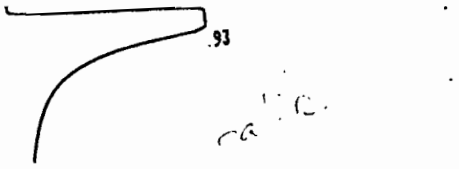


RUN # 355 DEC/14/91 14:05:58
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.25	95857 D PP	0.189	0.013
0.93	7.4987E+08 ↑SPH	1.574	99.987

TOTAL AREA= 7.4997E+08
MUL FACTOR= 1.0000E+00

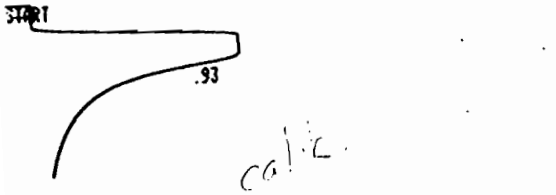


RUN # 356 DEC/14/91 14:13:32
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.6422E+08 ↑SPH	1.821	100.000

TOTAL AREA= 8.6422E+08
MUL FACTOR= 1.0000E+00

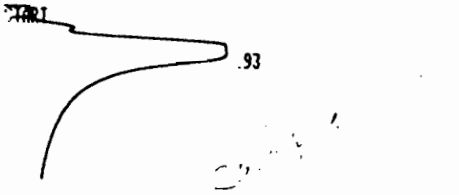


RUN # 357 DEC/14/91 14:22:47
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.8834E+08 ↑SPH	1.870	100.000

TOTAL AREA= 8.8834E+08
MUL FACTOR= 1.0000E+00

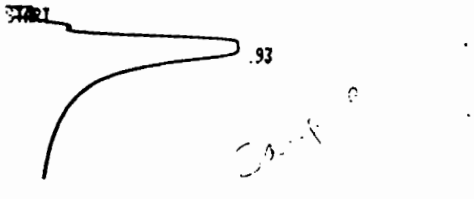


RUN # 358 DEC/14/91 14:32:36
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.6256E+08 ↑SBH	1.808	100.000

TOTAL AREA= 8.6256E+08
MUL FACTOR= 1.0000E+00

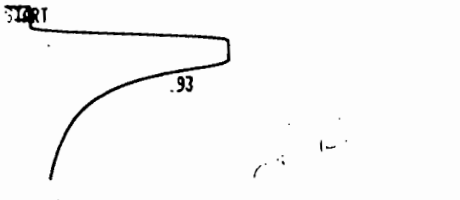


RUN # 359 DEC/14/91 14:43:00
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.3278E+08 ↑SPH	1.742	100.000

TOTAL AREA= 8.3278E+08
MUL FACTOR= 1.0000E+00



RUN # 360 DEC/14/91 14:53:17
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	9.2046E+08 ↑SPH	1.931	100.000

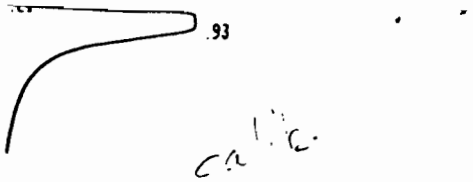
TOTAL AREA= 9.2046E+08
MUL FACTOR= 1.0000E+00

STI

DATE	TIME	RUN #	AREA	CONVERSION
12/15/91	15:37:39	361	7.7	100
	15:46:19	362	8.7	89 ← AVG
	15:56:40	363	9.1	82
				AVG = 87

		Sample AREA	conversion factor 87	H_2S PPM
16:07:01	364	8.4		730
16:17:31	365	8.2		713
16:27:37	366	9.3		809

Plant Sample Average: 721.5

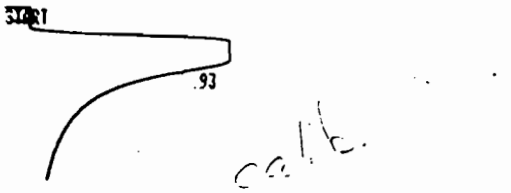


RUN # 361 DEC/15/91 15:37:39
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.21	2522400 D BH	0.382	0.324
0.93	7.7614E+08 †SHH	1.641	99.676

TOTAL AREA= 7.7866E+08
MUL FACTOR= 1.0000E+00

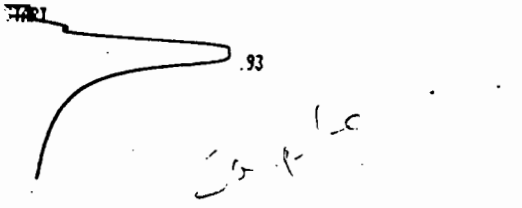


RUN # 363 DEC/15/91 15:56:40
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	9.1788E+08 †SPH	1.932	100.000

TOTAL AREA= 9.1788E+08
MUL FACTOR= 1.0000E+00

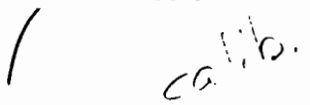


RUN # 365 DEC/15/91 16:17:31
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.2563E+08 †SBH	1.731	100.000

TOTAL AREA= 8.2563E+08
MUL FACTOR= 1.0000E+00

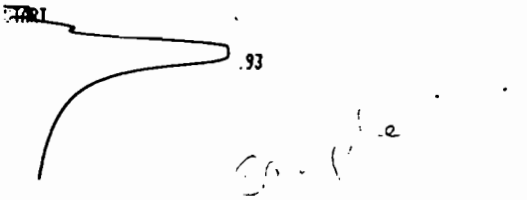


RUN # 362 DEC/15/91 15:46:19
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.7281E+08 †SBH	1.843	100.000

TOTAL AREA= 8.7281E+08
MUL FACTOR= 1.0000E+00

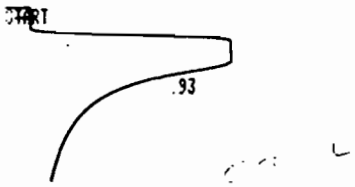


RUN # 364 DEC/15/91 16:07:01
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	8.4647E+08 †SBH	1.776	100.000

TOTAL AREA= 8.4647E+08
MUL FACTOR= 1.0000E+00



RUN # 366 DEC/15/91 16:27:37
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA TYPE	AR/HT	AREA%
0.93	9.3749E+08 †SPH	1.977	100.000

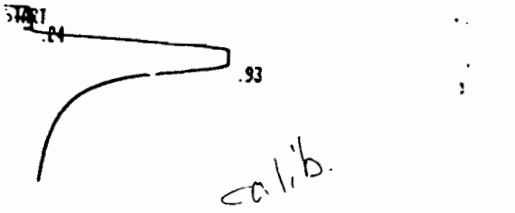
TOTAL AREA= 9.3749E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
12/16/91	1659:13	367	8.2	94	AVG
	1619:52	368	9.0	86	
	1700:01	369	9.1	85	
				AVG = 88	

			Sample Area	Conversion factor 88	H_2S PPM
	1711:18	370	8.7		765
	1721:56	371	8.6		756
STD	1732:35	372	9.6		844

Plant Sample Average: 760.5

(H2S PPM)
730
713
809

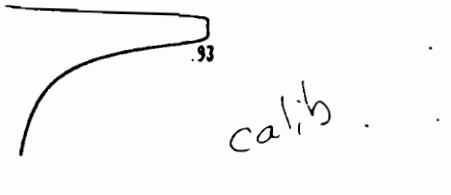


RUN # 367 DEC/16/91 16:39:13
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.24	1449200	BH	0.290	0.175
0.93	8.2770E+08	↑SHH	1.733	99.825

TOTAL AREA= 8.2915E+08
MUL FACTOR= 1.0000E+00



RUN # 368 DEC/16/91 16:49:52
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	9.0708E+08	↑SPH	1.898	100.000

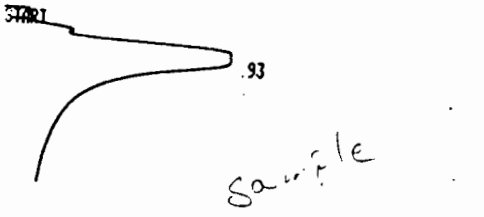
TOTAL AREA= 9.0708E+08
MUL FACTOR= 1.0000E+00

RUN # 369 DEC/16/91 17:00:01
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	9.1857E+08	↑SBH	1.929	100.000

TOTAL AREA= 9.1857E+08
MUL FACTOR= 1.0000E+00

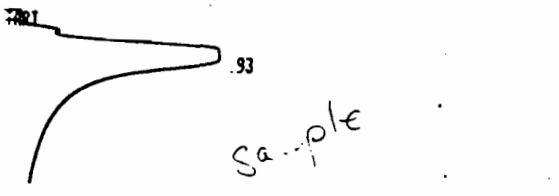


RUN # 370 DEC/16/91 17:11:18
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.7172E+08	↑SBH	1.821	100.000

TOTAL AREA= 8.7172E+08
MUL FACTOR= 1.0000E+00

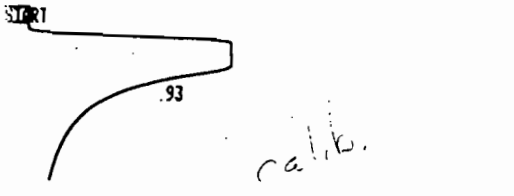


RUN # 371 DEC/16/91 17:21:56
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.5979E+08	↑SPH	1.797	100.000

TOTAL AREA= 8.5979E+08
MUL FACTOR= 1.0000E+00



RUN # 372 DEC/16/91 17:32:25
WORKFILE ID: B
WORKFILE NAME:

AREA%

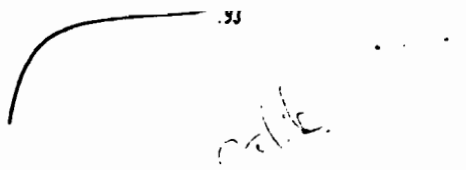
RT	AREA	TYPE	AR/HT	AREA%
0.93	9.6514E+08	↑SBH	2.021	100.000

TOTAL AREA= 9.6514E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
12/17	1604:12	373	7.3	106	
	1612:41	374	8.6	90	AVG
	1624:00	375	9.2	84	
				AVG = 87	

		Sample AREA	CONVERSION factor 87	H_2S PPM
1633:55	376	8.4		730
1644:21	377	8.4		730
1654:89	378	9.3		809

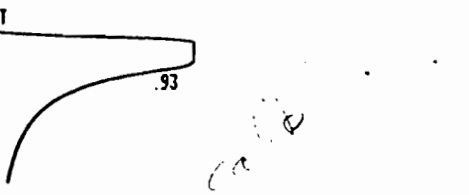
Plant Sample Average: 730



RUN # 373 DEC/17/91 16:04:12
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.19	1332300 D BH	0.285	0.181
0.93	7.3455E+08 †SHH	1.549	99.819

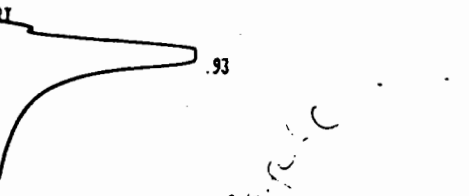
TOTAL AREA= 7.3588E+08
MUL FACTOR= 1.0000E+00



RUN # 375 DEC/17/91 16:24:00
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	9.2589E+08 †SBH	1.929	100.000

TOTAL AREA= 9.2589E+08
MUL FACTOR= 1.0000E+00



RUN # 377 DEC/17/91 16:44:21
WORKFILE ID: B
WORKFILE NAME:

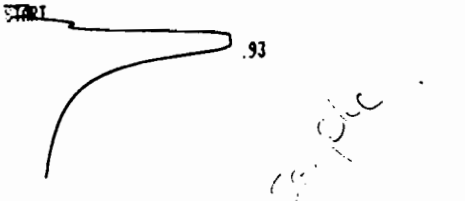
AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	8.4466E+08 †SPH	1.766	100.000

TOTAL AREA= 8.4466E+08
MUL FACTOR= 1.0000E+00

RUN # 374 DEC/17/91 16:12:41
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.26	138420 D PH	0.206	0.016
0.93	8.6373E+08 †SHH	1.821	99.984

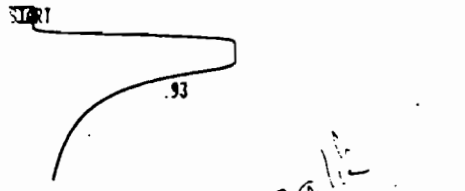
TOTAL AREA= 8.6387E+08
MUL FACTOR= 1.0000E+00



RUN # 376 DEC/17/91 16:33:55
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	8.4441E+08 †SBH	1.772	100.000

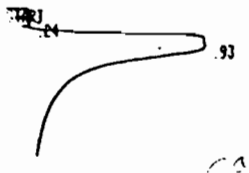
TOTAL AREA= 8.4441E+08
MUL FACTOR= 1.0000E+00



RUN # 378 DEC/17/91 16:54:29
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	9.3501E+08 †SBH	1.963	100.000

TOTAL AREA= 9.3501E+08
MUL FACTOR= 1.0000E+00

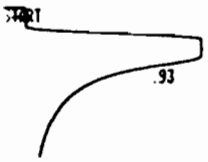


RUN # 379 DEC/18/91 15:56:30
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.24	455718	D BH	0.268	0.059
0.93	7.7661E+08	†SHH	1.630	99.941

TOTAL AREA= 7.7707E+08
MUL FACTOR= 1.0000E+00

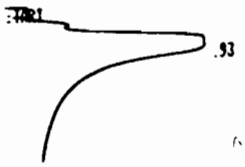


RUN # 381 DEC/18/91 16:13:52
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.9106E+08	†SBH	1.880	100.000

TOTAL AREA= 8.9106E+08
MUL FACTOR= 1.0000E+00

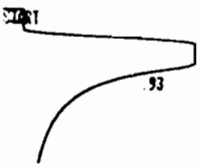


RUN # 383 DEC/18/91 16:34:56
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.8616E+08	†SBH	1.858	100.000

TOTAL AREA= 8.8616E+08
MUL FACTOR= 1.0000E+00



RUN # 385 DEC/18/91 16:56:38
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	9.5231E+08	†SPH	2.001	100.000

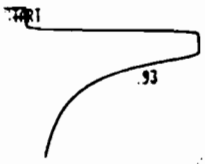
TOTAL AREA= 9.5231E+08
MUL FACTOR= 1.0000E+00

RUN # 380 DEC/18/91 16:04:21
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.6385E+08	†SBH	1.822	100.000

TOTAL AREA= 8.6385E+08
MUL FACTOR= 1.0000E+00

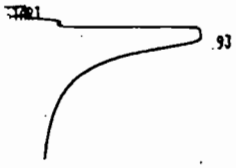


RUN # 382 DEC/18/91 16:24:06
WORKFILE ID: B
WORKFILE NAME:

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	9.1548E+08	†SPH	1.931	100.000

TOTAL AREA= 9.1548E+08
MUL FACTOR= 1.0000E+00



RUN # 384 DEC/18/91 16:45:39
WORKFILE ID: B
WORKFILE NAME:

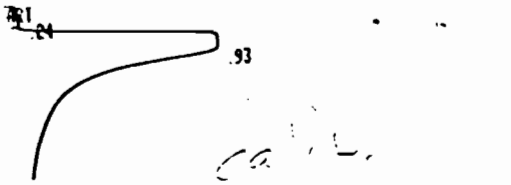
AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.93	8.5787E+08	†SBH	1.799	100.000

TOTAL AREA= 8.5787E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	ZONE	AREA	CONDITION
12/19/91	1356:34	386	7.9	98.
	1406:39	387	8.7	89 (AVG
	1416:34	388	9.0	86)
				AVG. 87
			Sample Area	CONDITION FACTOR 87
	1426:45	389	8.5	
	1437:05	390	8.4	
STD.	1447:14	391	9.4	

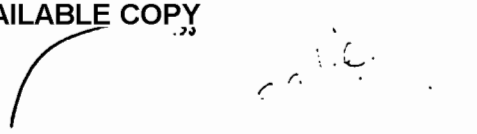
Plant Sample Average: 734.5



RUN # 386 DEC/19/91 13:56:34
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.24	1878200	BH	0.300	0.236
0.93	7.9534E+08	↑SBH	1.678	99.764

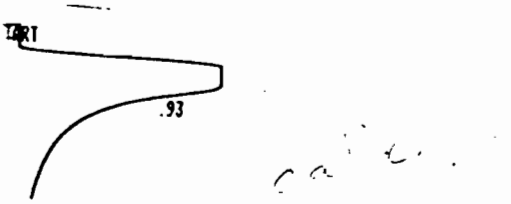
TOTAL AREA= 7.9722E+08
MUL FACTOR= 1.0000E+00



RUN # 387 DEC/19/91 14:06:39
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.26	47138	D PP	0.145	0.005
0.93	8.7642E+08	↑SPH	1.846	99.995

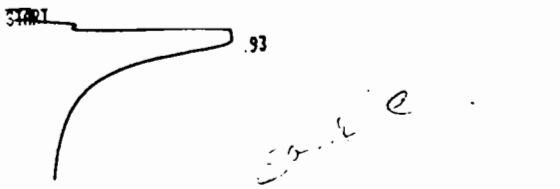
TOTAL AREA= 8.7646E+08
MUL FACTOR= 1.0000E+00



RUN # 388 DEC/19/91 14:16:34
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	9.0019E+08	↑SPH	1.894	100.000

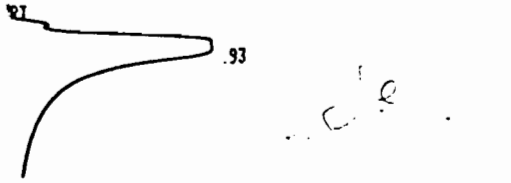
TOTAL AREA= 9.0019E+08
MUL FACTOR= 1.0000E+00



RUN # 389 DEC/19/91 14:26:45
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	8.5551E+08	↑SBH	1.794	100.000

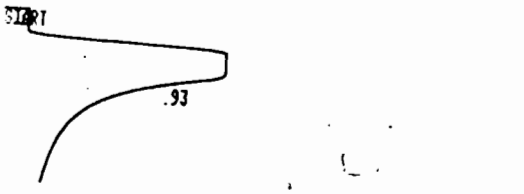
TOTAL AREA= 8.5551E+08
MUL FACTOR= 1.0000E+00



RUN # 390 DEC/19/91 14:37:05
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	8.4419E+08	↑SPH	1.771	100.000

TOTAL AREA= 8.4419E+08
MUL FACTOR= 1.0000E+00



RUN # 391 DEC/19/91 14:47:44
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	9.4007E+08	↑SBH	1.976	100.000

TOTAL AREA= 9.4007E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	RUN #	AREA	CONVERSION	
12/20/91	1555:21	392	7.8	99	
	1603:24	393	8.8	88	AVG
	1613:15	394	9.0	86	
	1624:31	395	9.3	83	
				AVG = 85	
			Sample Area	conversion factor 85	H_2S ppm
	1635:09	396	9.5		807
	1645:55	397	9.7		824
	1656:47	398	9.3		790

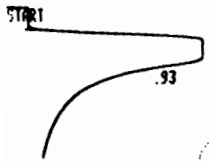
Plant Sample Average: 815.5

H_2S ppm
739
730
812

RUN # 392 DEC/20/91 15:55:21
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.23	1816200 BH	0.304	0.232
0.93	7.8238E+08 †SHH	1.648	99.768

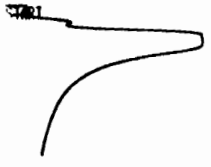
TOTAL AREA= 7.8420E+08
MUL FACTOR= 1.0000E+00



RUN # 394 DEC/20/91 16:13:15
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	9.8161E+08 †SBH	1.915	100.000

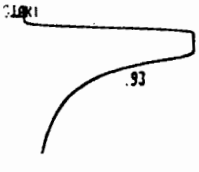
TOTAL AREA= 9.8161E+08
MUL FACTOR= 1.0000E+00



RUN # 396 DEC/20/91 16:35:09
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	9.5013E+08 †SBH	1.986	100.000

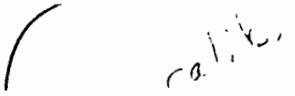
TOTAL AREA= 9.5013E+08
MUL FACTOR= 1.0000E+00



RUN # 398 DEC/20/91 16:56:47
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	9.3590E+08 †SBH	1.967	100.000

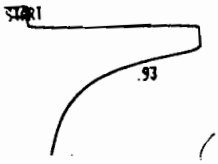
TOTAL AREA= 9.3590E+08
MUL FACTOR= 1.0000E+00



RUN # 393 DEC/20/91 16:03:24
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	8.8519E+08 †SPH	1.866	100.000

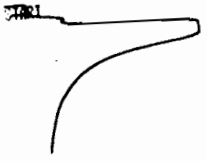
TOTAL AREA= 8.8519E+08
MUL FACTOR= 1.0000E+00



RUN # 395 DEC/20/91 16:24:31
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	9.3949E+08 †SPH	1.965	100.000

TOTAL AREA= 9.3949E+08
MUL FACTOR= 1.0000E+00



RUN # 397 DEC/20/91 16:45:55
WORKFILE ID: B
WORKFILE NAME:

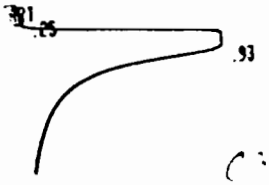
AREA% RT	AREA TYPE	AR/HT	AREA%
0.93	9.2750E+08 †SPH	1.942	100.000

TOTAL AREA= 9.2750E+08
MUL FACTOR= 1.0000E+00

DATE	TIME	Run #	AREA	CONVERSION
12/21/91	1509:17	399	8.1	96
	1519:52	400	8.8	88 AVG
	1529:46	401	9.0	86
				AVG: 87

			Sample Area	CONVERSION (87)	
	1540:06	402	9.2		8
	1550:44	403	9.2		8
STD	1602:10	404	9.3		80

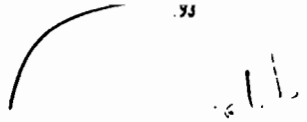
Plant Sample Average: 800



RUN # 399 DEC/21/91 15:09:17
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.25	2703500	BH	0.382	0.331
0.93	8.1355E+08	†SHH	1.724	99.669

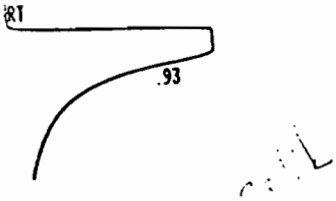
TOTAL AREA= 8.1626E+08
MUL FACTOR= 1.0000E+00



RUN # 400 DEC/21/91 15:19:52
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	8.8055E+08	†SPH	1.855	100.000

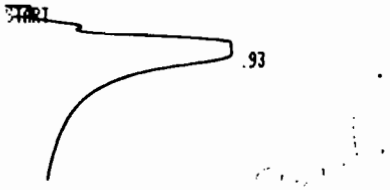
TOTAL AREA= 8.8055E+08
MUL FACTOR= 1.0000E+00



RUN # 401 DEC/21/91 15:29:46
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	9.0866E+08	†SPH	1.917	100.000

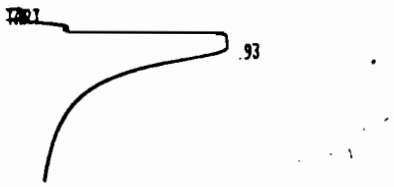
TOTAL AREA= 9.0866E+08
MUL FACTOR= 1.0000E+00



RUN # 402 DEC/21/91 15:40:06
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	9.2338E+08	†SBH	1.939	100.000

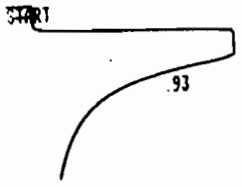
TOTAL AREA= 9.2338E+08
MUL FACTOR= 1.0000E+00



RUN # 403 DEC/21/91 15:50:44
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	9.2762E+08	†SBH	1.947	100.000

TOTAL AREA= 9.2762E+08
MUL FACTOR= 1.0000E+00



RUN # 404 DEC/21/91 16:02:10
WORKFILE ID: B
WORKFILE NAME:

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.93	9.3361E+08	†SPH	1.966	100.000

TOTAL AREA= 9.3361E+08
MUL FACTOR= 1.0000E+00

11/20	791
	746
	759.5
	763.5
	763.5
	749
	768.5
	750.5
	759.5
	755
	777.5
	759.5
	750.5
	739
	730.5
	732
	724.5
	716
	703.5
	696.5
	726
	695.5
	734.5
	751.5
	721.5
	760.5
	730.0
	752
	734.5
	815.5
12/21	800
	23,157.0 ÷ 31 = 747

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

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

4APT-AEB

MAY 27 1992

Mr. James K. Pennington, P.E., Administrator
Compliance and Enforcement Section
Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: Custom Fuel Monitoring Plan Proposed for Stationary Gas Turbines at Central Disposal, Pompano Beach, Florida

Dear Mr. Pennington:

We have reviewed the referenced plan that was submitted to your agency by Central Disposal on March 12, 1992, and the purpose of this letter is to summarize the results of our review. Central Disposal operates six stationary gas turbines that are subject to 40 C.F.R. Part 60, Subpart GG (Standards of Performance for Stationary Gas Turbines). These turbines burn sanitary landfill gas as fuel, and the purpose of the March 12, 1992, letter from Central Disposal was to seek approval for the following aspects of their plan for addressing the fuel monitoring requirements in 40 C.F.R. §60.334(b).

1. The company is seeking approval to use a gas chromatograph and thermal conductivity detector (GC/TCD) to measure the nitrogen content of the fuel burned in the turbines. This is the method currently being used to determine the nitrogen content of the fuel, and analyses are conducted every three (3) minutes.

2. The company is seeking approval to use procedures similar to those in EPA Method 16 (gas chromatography and flame photometric analysis) to determine the sulfur content of the fuel burned in the turbines. This is the method currently being used and analyses are conducted on a daily basis.

3. The company is seeking approval for a reduction in the frequency of required sulfur analyses. 40 C.F.R. §60.334(b) generally requires that analyses be conducted on a daily basis, but 40 C.F.R. §60.334(b)(2) provides a

mechanism for facilities to request approval for custom fuel monitoring schedules in cases where a custom schedule is warranted due to the design and operation of the facility or characteristics of its fuel supply.

After reviewing the nitrogen analytical method used by Central Disposal and the results of analyses conducted in February 1992, we have determined that using a GC/TCD to measure the nitrogen content of the fuel is acceptable. The basis for this determination is that a GC/TCD is capable of accurately measuring nitrogen concentrations at the levels present in the fuel at Central Disposal.

Although using a GC/TCD for nitrogen analyses is acceptable, the company should use an analyzer span gas that contains at least five (5) percent nitrogen. The basis for this recommendation is that the results presented for February 1992 indicate that the nitrogen concentration in the fuel exceeded the concentration in the span gas currently in use (four percent) approximately 40 percent of the time. Due to concerns about the accuracy of samples whose concentration does not fall within the calibration range of the analyzer, the company should use a span gas whose nitrogen concentration is expected to exceed that of any samples analyzed.

The request to use gas chromatography and flame photometric detection as an alternative to the sulfur analytical procedures specified in 40 C.F.R. §60.335(d) is acceptable because the proposed alternative should yield results equivalent to those that would be obtained with EPA Method 16. The analytical results that Central Disposal provided for November and December 1991 confirm that the method being used by the company is capable of measuring the sulfur content at the levels present in the fuel being burned.

EPA Headquarters provided the Regions with guidance regarding custom fuel monitoring schedules in 1987, and a copy of this guidance is provided for your information. Based upon the criteria established in the Headquarters guidance, we have determined that Central Disposal would be eligible for a reduction in the frequency of required sulfur analysis. The company should be allowed to reduce its analytical frequency because results from November and December 1991 indicate sulfur concentrations were both consistent and well below the applicable standard. The results for 31 days in the period addressed by the Central Disposal submittal indicate that the average H_2S concentration in the fuel was 746.7 ppm with a standard deviation of 27.7 ppm. This average concentration corresponds to a sulfur content of approximately 0.09 weight percent which is well below the applicable limit of 0.8 weight percent.

Although we believe that the data submitted by Central Disposal provides adequate justification for reducing the required frequency for sulfur analyses, we do not believe that analyzing the fuel for sulfur content one time per year is acceptable. According to the 1987 guidance provided by Headquarters, the minimum acceptable analytical frequency for custom fuel monitoring plans would be semiannual (twice per year). In addition, in order to qualify for a semiannual monitoring frequency, a facility must verify that sulfur levels in its fuel are consistent and well below applicable limits. This verification is conducted over a period of two years, and an incremental reduction in the daily sampling frequency is allowed while data for the verification is being collected.

Based upon the guidance provided by Headquarters, it would be acceptable for Central Disposal to initiate the process to qualify for semiannual sampling by reducing its sampling frequency to twice monthly for six months. If results of this sampling indicate that the sulfur content of the fuel is consistent and is in compliance with the applicable standard, the company would be allowed to reduce the analytical frequency to once per quarter for six quarters. If the results of quarterly sampling indicate that results are consistent and in compliance with the applicable standard, the company could reduce its fuel sampling frequency to twice per year.

If you have any questions regarding the determination provided in this letter, please contact Mr. David McNeal of my staff at 404/347-5014

Sincerely yours,

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

Enclosure

cc: Mr. Mike Harley
Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 14 1987

OFFICE OF
AIR AND RADIAT

MEMORANDUM

SUBJECT: Authority for Approval of Custom Fuel Monitoring Schedules Under NSPS Subpart GG

FROM: John B. Rasnic, Chief
Compliance Monitoring Branch

TO: Air Compliance Branch Chiefs
Regions II, III, IV, V, VI and IX

Air Programs Branch Chiefs
Regions I-X

The NSPS for Stationary Gas Turbines (Subpart GG) at 40 CFR 60.334(b)(2) allows for the development of custom fuel monitoring schedules as an alternative to daily monitoring of the sulfur and nitrogen content of fuel fired in the turbines. Regional Offices have been forwarding custom fuel monitoring schedules to the Stationary Source Compliance Division (SSCD) for consideration since it was understood that authority for approval of these schedules was not delegated to the Regions. However, in consultation with the Emission Standards and Engineering Division, it has been determined that the Regional Offices do have the authority to approve Subpart GG custom fuel monitoring schedules. Therefore it is no longer necessary to forward these requests to Headquarters for approval.

Over the past few years, SSCD has issued over twenty custom schedules for sources using pipeline quality natural gas. In order to maintain national consistency, we recommend that any schedules Regional Offices issue for natural gas be no less stringent than the following: sulfur monitoring should

be bimonthly, followed by quarterly, then semiannual, given at least six months of data demonstrating little variability in sulfur content and compliance with §60.333 at each monitoring frequency; nitrogen monitoring can be waived for pipeline quality natural gas, since there is no fuel-bound nitrogen and since the free nitrogen does not contribute appreciably to NO_x emissions. Please see the attached sample custom schedule for details. Given the increasing trend in the use of pipeline quality natural gas, we are investigating the possibility of amending Subpart GG to allow for less frequent sulfur monitoring and a waiver of nitrogen monitoring requirements where natural gas is used.

Where sources using oil request custom fuel monitoring schedules, Regional Offices are encouraged to contact SSCD for consultation on the appropriate fuel monitoring schedule. However, Regions are not required to send the request itself to SSCD for approval.

If you have any questions, please contact Sally M. Farrell at FTS 382-2875.

Attachment

cc: John Crenshaw
George Walsh
Robert Ajax
Earl Salo

Enclosure

Conditions for Custom Fuel Sampling Schedule for Stationary Gas Turbines

1. Monitoring of fuel nitrogen content shall not be required while natural gas is the only fuel fired in the gas turbine.

2. Sulfur Monitoring

   a. Analysis for fuel sulfur content of the natural gas shall be conducted using one of the approved ASTM reference methods for the measurement of sulfur in gaseous fuels, or an approved alternative method. The reference methods are: ASTM D1072-80; ASTM D3031-81; ASTM D3246-81; and ASTM D4084-82 as referenced in 40 CFR 60.335(b)(2).

   b. Effective the date of this custom schedule, sulfur monitoring shall be conducted twice monthly for six months. If this monitoring shows little variability in the fuel sulfur content, and indicates consistent compliance with 40 CFR 60.333, then sulfur monitoring shall be conducted once per quarter for six quarters.

   c. If after the monitoring required in item 2(b) above, or herein, the sulfur content of the fuel shows little variability and, calculated as sulfur dioxide, represents consistent compliance with the sulfur dioxide emission limits specified under 40 CFR 60.333, sample anaylsis shall be conducted twice per annum. This monitoring shall be conducted during the first and third quarters of each calendar year.

   d. Should any sulfur analysis as required in items 2(b) or 2(c) above indicate noncompliance with 40 CFR 60.333, the owner or operator shall notify the State Air Control Board) of such excess emissions and the custom schedule shall be re-examined by the Environmental Protection Agency. Sulfur monitoring shall be conducted weekly during the interim period when this custom schedule is being re-examined.

3. If there is a change in fuel supply, the owner or operator must notify the State of such change for re-examination of this custom schedule. A substantial change in fuel quality shall be considered as a change in fuel supply. Sulfur monitoring shall be conducted weekly during the interim period when this custom schedule is being re-examined.

4. Records of sample analysis and fuel supply pertinent to this custom schedule shall be retained for a period of three years, and be available for inspection by personnel of federal, state,and local air pollution control agencies.

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

March 12, 1992

RECEIVED
MAR 16 1992
Division of Air
Resources Management

Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

Attn: Mr. James Pennington, P.E.

Re: CDSL Power Production Facility
Permit Nos. AC-06-152683
AO-06-183180
Request for Exception and Approval of
Alternative Procedures

Dear Mr. Pennington:

Pursuant to our request for approval of alternative test procedures for Nitrogen and custom monitoring schedules for Sulfur, I am forwarding the enclosed data requested in your letter (copy enclosed) of September 10, 1991.

Additionally I have spoken with Mike Harley, FDER and David McNeil, EPA to take all steps possible to be certain the required information is complete.

NITROGEN: We are requesting approval for the use of Gas Chromatograph analysis equipment to monitor the levels of nitrogen in our fuel supply. Currently we are using a gas chromatograph to analyze for Nitrogen. The chromatograph samples and analizes the landfill gas every three minutes; a computer-generated report is produced daily and monthly. The monthly report compiles all the daily data of gas concentrations and engineering values. A copy of this monthly report is included.

The chromatograph we are using is made by Daniels Corporation and is a thermal conductivity detector. The unit is a 4-column analyzer, giving it the capability to analyze for oxygen, nitrogen, carbon dioxide, and methane. It consists of computerized controls with self-diagnostics and self-calibration and is programmed to calibrate itself every 12 hours by utilizing standard gas with prescribed values for comparative reference. Manual calibration of the unit is also performed on a periodic basis in order to ensure normal operation.

The concentration levels of the calibration gas are in the range of the actual landfill gas conditions. A copy of the calibration gas standards and the actual parameters of the landfill gas is included.

SULFUR: We are requesting approval for the use of a gas chromatograph for analysis and a custom fuel monitoring schedule.

Currently we have installed a flame photometric gas chromatograph for the purpose of monitoring sulfur. This chromatograph is made by Hewlett Packard and has limited computerized control functions. The analysis cycle must be initiated manually. However, representative graphs are generated for peak and volume metric measurement of the sulfur content.

Our procedure for the operation of this unit includes calibrating it with known standard gas at values in the range of those found in our fuel gas. The unit is run through several calibration cycles to verify accuracy and obtain a consistent peak area conversion factor. Once this is accomplished, two sample runs are performed followed by an additional calibration run to verify accuracy. Copies of the above procedure analysis are included.

Currently we are performing daily monitoring of sulfur in our fuel gas and request your review of the need for such frequency. We also ask your aid in developing a schedule for decreased frequency of sulfur monitoring, with the ultimate goal being an annual monitoring of sulfur in our fuel supply.

The enclosed support documents have been divided by category for your convenience.

Should you have any questions, please contact me at (305) 977-9551, Ext. 14.

Sincerely,

Jim Barrett

Jim Barrett
Waste Management
BIO Energy Partners
CDSL Gas Recovery
Plant Manager

JB:ma

cc: Michael Berg
Harvey Bush
Jim Lukens
Scott McCallister w/enc
Mike Neimann w/enc
Andi Samuels
Stephanie Brooks, FDER
Isidore Goldman, FDER
Mike Harley, FDER w/enc
Daniela Banu, ONRP
David McNeil, USEPA w/enc

Florida Department of Environmental Regulation

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

Lawton Chiles, Governor

Carol M. Browner, Secretary

September 10, 1991

Jim Barrett, Plant Manager
CDSL Power-Production Facility
Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33703

RE: CDSL Power-Production Facility
Permit Nos. AC 06-152683
AO 06-183180
Request For Exception And Approval Of
An Alternative Procedure

Dear Mr. Barrett:

On July 5, 1991, we received comments requesting additional information from the Region IV Office of the U.S. EPA about the above referenced request. The following information will be needed in order for the review of your request to proceed:

- The information requested in the attached comments from the Region IV office of the U.S. EPA.

- An explanation of the procedure that would be used to measure the nitrogen content of the fuel gas. EPA Method 16 is a chromatographic procedure specifically designed for the semicontinuous determination of sulfur emissions [hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide] from stationary sources.

The review of your request will continue upon receipt of the requested information. The sampling procedures and schedules required by the above referenced permits

and 40 CFR 60 Subpart GG remain in effect until the Department formally acts on the request. Please call Mike Harley at (904) 488-1344, if you have any questions about the above.

Sincerely,

James K. Pennington, P.E.
Administrator
Compliance and Enforcement
Section
Bureau of Air Regulation

JKP/mdh

cc: Isidore Goldman, FDER SE District
Stephanie Brooks, FDER SE District
Daniela Banu, ONRP
Sarah Solano, Waste Management

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

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

JUL 2 1991

RECEIVED

JUL 0 5 1991

Division of Air
Resources Management

4APT-AE

Mr. C. 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

Dear Mr. Fancy:

This is in response to your April 15, 1991, letter and attached request from Central Disposal to use a custom fuel monitoring schedule and alternate fuel monitoring methods to demonstrate compliance with the requirements of 40 CFR Part 60, Subpart GG, Standards of Performance for Stationary Gas Turbines. As noted in your letter, Central Disposal is a Waste Management company. Similar requests have been made by Waste Management of North America for a number of their facilities utilizing landfill gas, prompting the development of guidance from EPA's Stationary Source Compliance Division (SSCD) to ensure consistent review of custom fuel monitoring requests throughout the EPA regional offices.

Central Disposal is proposing to conduct sulfur and nitrogen fuel sampling and analysis on eight occasions during the first year of an approved custom fuel monitoring schedule and annually thereafter. Reference Method 16 (gas chromatography) would be used for determining fuel sulfur and nitrogen content. EPA has reviewed the proposal and finds some aspects unacceptable. A discussion of the problems associated with the proposal follows.

The SSCD guidance referenced above suggests use of step-down reductions in sulfur and nitrogen monitoring frequency, similar to the approach proposed by Central Disposal. However, data must first be submitted to the regional office for review which indicates that fuel sulfur and nitrogen contents are significantly below the limits in Subpart GG and sample variability is low. Central Disposal has submitted data for fuel samples collected on July 23, 1990 from stationary gas turbines at their Pompano Beach facility. The fuel sulfur concentration on that day was well below the Subpart GG limit and no fuel bound nitrogen was present. However, considerably more data will be needed to allow assessment of sample variability.

The request from Central Disposal references previous EPA approval for use of Reference Method 16 for analysis of sulfur and nitrogen samples. This office has been unable to verify such approval. Subpart GG specifies at 40 CFR 60.335(d) that ASTM test methods D 1072-80, D 3031-81, D 4084-82, or D 3246-81 will be used to

determine the sulfur content of gaseous fuels. The Subpart does allow considerable latitude when selecting a test method to determine fuel nitrogen content.

This office will consider a custom monitoring schedule for Central Disposal if the proposal conforms with the following requirements:

1. Recent daily monitoring data for fuel sulfur and nitrogen content at the source should be submitted for a minimum of 30 days. To the extent possible, data should be from consecutive days, to allow evaluation of sample variability.

2. Data should be submitted in the same units as the standard (% weight and % volume at 15% O_2 dry).

3. Sampling data should include:

   * Sulfur and nitrogen contents of fuel

   * Identification of each unit and its location

   * The specific sulfur and nitrogen values for each sample collected and a calculation of the mean with standard deviation

4. Analyses for fuel sulfur and nitrogen content should be conducted using the procedures specified at 40 CFR 60.335(e). Properly conducted Method 16 test results for fuel nitrogen content will be acceptable to this office.

To simplify compliance procedures, data from one turbine may be submitted as representative of other turbines of the same model, if the physical condition and operational usage of the turbines within that one facility are consistent.

Should EPA determine that the data submitted are representative of Central Disposal's operation and that less frequent monitoring is justified, a weekly fuel monitoring frequency leading to quarterly monitoring will be considered. At least six months of data at each step which demonstrates little variability of fuel sulfur and nitrogen content will be required.

Any questions you may have regarding this response, should be directed to Dennis Beauregard of my staff at (404) 347-5014.

Sincerely yours,

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

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

October 12, 1990

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

RECEIVED
OCT 17 1990
DER - BAQM

Re: CDSL - Power Production Facility
DER Permit # AC 06-152683

Dear Mr. Fancy;

It was recently brought to my attention that the CDSL - Power Production Facility operates above the maximum heat input specified under specific condition #3 of the referenced permit. The permit condition required that the heat input to each turbine not exceed 40 MMBTU/hr, based on a heat content of 480 BTU/cf of landfill gas and a utilization rate of 1400 scfm per turbine.

The above operation data was submitted with the application to construct as an average from the existing plants operated by Waste Management, Inc. across the United States. It is the intent of this letter to clarify that the values are relative to certain operating conditions rather than a fixed number.

I have enclosed part of section 8.7.6 of volume II of the maintenance manual for the Solar/Centaur Turbines which describes maximum output power, flow and temperature. The curves provided can be used to describe the fuel flow relative to the inlet air temperature. The relationship between inlet air temperature is inversely proportional to the fuel flow, ie. when the temperature decreases, the fuel flow increases. Typically the landfill would experience ambient air temperatures of approximately 80° F which relates to 40 MMBTU/lb at full load output. The fuel flow of 40 MMBTU/hr corresponds to the permit condition. However, we have experienced temperatures as low as approximately 30° F during last December which relates to a maximum fuel flow of 45 MMBTU/hr at full load output.

The landfill gas at the Central Disposal Sanitary Landfill in Pompano Beach is richer, more methane, than the average at approximately 540 BTU/cf. This is due to more moisture within the landfill than experienced in non-tropical areas. Because the utilization rate is inversely proportional to the heat content, CDSL experiences a lower utilization rate than average. This relation is shown below using typical operation levels at CDSL.

$$\text{Utilization Rate} = \frac{\text{Fuel Flow}}{\text{Heat Content X 60 min/hr}}$$

where: Fuel Flow = 40 MMBTU/hr @ 80°F
Heat Content = 540 BTU/cf ±

Utilization Rate = 1235 cfm

The information provided in this letter is to show you that the operating conditions are variable and should not be fixed to a maximum or minimum value. For purposes of permitting, the following conditions are provided:

* The ambient air temperature in South Florida could approach 0° F under extreme conditions which would result in a fuel flow of approximately 48 MMBTU/hr at full load output taken from figure 8.7.1 enclosed. The range of the chart shows the fuel flow will vary from approximately 37 MMBTU/hr at 125° F to approximately 51 MMBTU/hr at -20° F at full load output.

* Rule of thumb for landfill gas is 100 BTU/cf for every 10% of methane in the landfill gas. This comes from the fact that pure methane or 100% methane has a heat content of approximately 1010 BTU/cf. From experience, methane will typically not exceed 60% of the landfill gas, therefore, maximum heat content of landfill gas would approximate 600 BTU/cf.

* The utilization rate is directly related to the fuel flow and indirectly related to the heat content. Based on machine testing performed during the start up, we achieved a maximum utilization rate of 1550 cfm by reducing the BTU input and maximizing fuel flow.

This letter serves as a request to modify the construction permit for the CDSL - Power Production Facility, Specific Condition #3 to include this information. If you have any questions, please feel free to call either myself or Jim Barrett at 305/977-9551.

Sincerely,

Sarah C. Solano

Sarah C. Solano
Site Engineer

cc: Harvey Bush
Stephanie Brooks, DER Air
Jim Barrett
Tom Craig
Sherri Nachtigal, WMNA Env. Audit
Daniela Banu, EQCB Air

8.7.6 Use of Curves

MAXIMUM OUTPUT POWER, FLOW, AND TEMPERATURE

This set of curves (Figure 8.7.1) may be used to determine the maximum continuous and standby duty output power in kilowatts available at a given engine inlet (ambient) air temperature. In addition, fuel flow in Millions of Btu per hour (MMBtu/hr), together with exhaust flow in thousands of pounds per hour, and temperature in degrees Fahrenheit may be obtained for a wide range of power outputs.

To find the maximum available output power in kilowatts, enter at the bottom of the applicable graph the appropriate engine inlet air temperature, and move vertically until the pertinent maximum continuous power line is intersected. Then move left horizontally, and read the corresponding output kilowatts power values. The matching fuel flow, exhaust flow, and temperature readings are then obtained by interpolating between the constant flows and temperature lines, if the intersection point does not fall exactly on any one line.

CENTAUR T4500 GENERATOR SET
REF: CS-26216.SHT.1
LANDFILL GAS:(55% CH4. 45% CO2)

- CONTINUOUS DUTY
- NOMINAL PERFORMANCE
- RELATIVE HUMIDITY 60%
- ELEVATION - SEA LEVEL
- ZERO EXTERNAL DUCT PRESSURE LOSSES
- GENERATOR EFFICIENCY 96%
- GEARBOX EFFICIENCY 96%

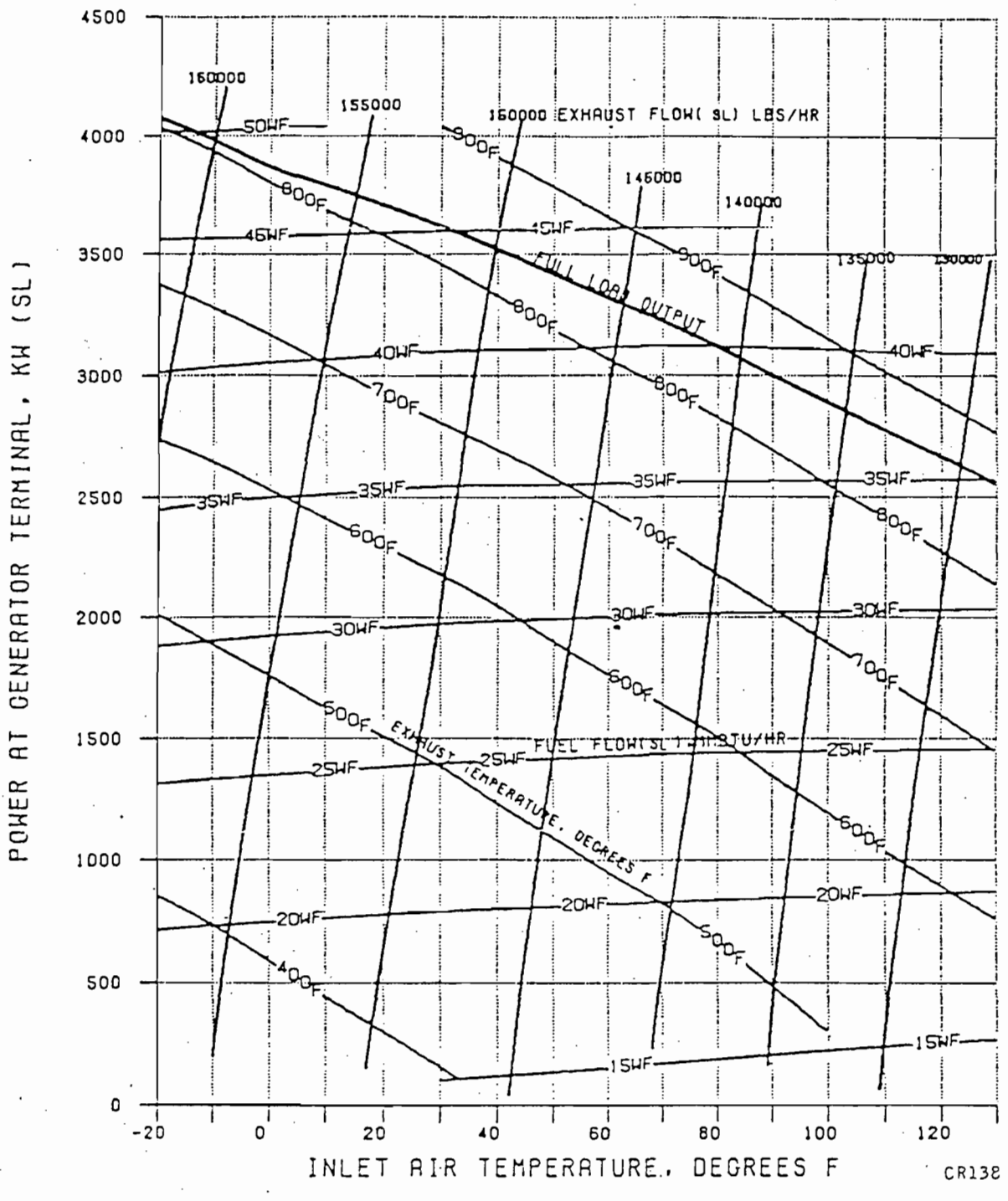


Figure 8.7.1. Output Power, Fuel Flow, Exhaust Flow, and Exhaust Temperature - Landfill Gas Fuel Operation

DEPARTMENT OF HEALTH, WELFARE
& BIO-ENVIRONMENTAL SERVICES
Air Resources Division

May 17, 1991

RECEIVED
MAY 20 1991
Division of Air
Resources Management

Mr. Mike Harley
Bureau of Air Regulation
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301

RE: Request for Exception and Approval of an Alternative Procedure
CDSL Power-Production Facility

Dear Mr. Harley:

The Air Resources Division (ARD) has reviewed the request for an alternative procedure by Central Disposal for fuel monitoring. ARD does not object to the custom fuel monitoring schedule as described in Mr. Clair Fancy's memo dated April 15, 1991.

ARD does not have any literature documenting the use of gas chromatography for the determination of fuel nitrogen content. Please provide ARD with any literature or research material available regarding this subject.

Please contact the undersigned for comments or questions at (904) 630-3666.

Very truly yours,

Ronald L. Roberson
Associate Engineer

RLR/nic

cc: Mr. Andy Kutyna, P.E.,
ARD Air Permitting File
ARD File 'NP' Misc. A

Florida Department of Environmental Regulation

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

Lawton Chiles, Governor

Carol M. Browner, Secretary

April 15, 1991

Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division
Region IV
U. S. Environmental Protection Agency
345 Courtland Street
Atlanta, Georgia 30365

RE: CDSL Power-Production Facility
Permit Nos. AC 06-152683
AO 06-183180
Request for Exception and Approval of
An Alternative Procedure

Dear Ms. Harper:

On March 21, 1991, we received Central Disposal's request for approval of a custom fuel monitoring schedule and alternate fuel monitoring methods. Central Disposal is a Waste Management Company that is located in Pompano Beach, Florida. The company operates a facility that consists of six stationary gas turbines which burn sanitary landfill gas as fuel. All six gas turbines were constructed pursuant to air construction permit AC 06-152683 and are subject to the requirements of F.A.C. Rule 17-2.660 [Standards of Performance for New Stationary Sources] and 40 CFR 60 Subpart GG [Standards of Performance for Stationary Gas Turbines].

The company's request cites the provisions of 40 CFR 60.334(b)(2) as the basis for the requested custom fuel monitoring schedule. Central Disposal proposes to monitor the sulfur and nitrogen content of the fuel eight times during the first year and annually thereafter.

The provisions of 40 CFR 60.335(d) are cited as a basis for the requested alternate fuel monitoring methods. Central Disposal is requesting approval to use EPA Method 16 (measurement of TRS emissions from kraft pulp mills) for determining the fuel sulfur content and gas chromatography (an unspecified method) for determining fuel nitrogen.

Please review the attached document and provide appropriate guidance. We would appreciate written comments and guidance by May 15, 1991. Dennis Beauregard and Mike Harley discussed Central Disposal's request on April 4, 1991. If you have any questions, please contact Mike Harley at (904) 488-1344.

Sincerely,

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

CHF/MDH/ht

cc: Mike Harley, FDER
Isidore Goldman, FDER SE District
Stephanie Brooks, FDER SE District
Daniela Banu, ONRP
Jim Barrett, Central Disposal
Sarah Solano, Waste Management
Dennis Beauregard, EPA-Region IV

Jim

Central Disposal
[illegible] Beach, Florida 33073
[illegible]

91-D-01

A Waste Management Company

March 18, 1991

Mr. Clair Fancy
Florida Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

RE: CDSL POWER-PRODUCTION FACILITY
PERMIT NOS. AC-06-152683
AC-06-183180
40 CFR SUBPART GG 60.330 - 60.335

Dear Mr. Fancy:

During June of 1990, a letter was sent to the FDER office requesting approval of a custom sulfur monitoring schedule. The letter is dated June 8, 1990. During our follow-up investigation, your name was provided as the appropriate person to contact regarding such requests.

Our specific permit conditions provide for annual compliance testing for sulfur and nitrogen compounds. However, 40 CFR subpart GG outlines daily sulfur and nitrogen monitoring or an approved custom monitoring schedule.

Test methods required in 440 CFR for gaseous fuels indicate that the applicable ranges of some ASTM methods mentioned are not adequate to measure sulfur in some fuel gases. With carbon dioxide being a major component (approximately 40%) of landfill gas, the approved titrimetric test methods for sulfur monitoring could be less than accurate. Therefore, the U.S. EPA test method 16 found in 40 CFR chapter 1, page 825, which prescribes the use of a gas chromatograph, appears to be the most reliable test method for sulfur. Additionally accumulated and vendor data indicated that gas chromatography provides nitrogen test results within the plus or minus five percent range required by 40 CFR.

In an effort to coordinate with our Corporate Office's request of the U.S. EPA for a custom sulfur monitoring schedule guideline variance, we are seeking your approval of the following schedule. The schedule is outlined in Attachment 4 - Sulfur Monitoring Schedule in accordance with subpart GG (see attached letter). The

schedule requires sulfur testing eight times during the first year, then annually thereafter. Historical data and analysis information has been included for several WMNA Gas Recovery Turbine facilities for your review.

In summary, we are requesting approval of alterative test methods (i.e. gas chromatography) for sulfur and nitrogen monitoring, and a revised monitoring schedule. Included with this letter are copies of our current permits, CDSL's landfill gas analysis and the above mentioned June 8, 1990 letter. Should you have any questions, please call me at (305) 977-9557.

Regards,

WASTE MANAGEMENT, INC.
BIO ENERGY PARTNERS

Jim Barrett
CDSL POWER-PRODUCTION FACILITY
PLANT MANAGER

JB:ma

Enclosures

cc: Chuck Anderson
Sarah Solano
Michael Berg
Harvey Bush
Jim Pennington FDER
Stephanie Brooks FDER
Daniela Baneu EQCB

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

June 8, 1990

Florida Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

RE: Custom Sulfur Monitoring Schedule
40 CFR Subpart GG 60.330 - 60.335

Gentlemen:

Waste Management of North America's CDSL Gas Recovery Power-Production Plant has developed a customized sulfur monitoring schedule in accordance with the NSPS for your approval. Specifically, 40 CFR 60.334(b)(2) states that owners may develop custom schedules based on the design and operation of the affected facility and the characteristics of the fuel supply. As explained in the attached exploratory materials, landfill gas is substantially different from natural gas, particularly with respect to its low sulfur concentrations.

We understand the U.S. EPA Office of Enforcement and Compliance Monitoring, Stationary Source Compliance Division, is reviewing this matter, and that appropriate guidance for responding to this request will be provided to your Regional office shortly.

We look forward to your review and approval of the attached customized schedule. If you have any questions regarding this request, please call Jeff Douglas (708) 572-2465 at Waste Management of North America in Oak Brook, Illinois.

Sincerely,

WASTE MANAGEMENT
BIO ENERGY PARTNERS

Jim Barrett
CDSL Gas Recovery
Plant Manager

JB:ma

Attachment

cc: Bob Donohue
Jeff Douglas
Sarah Solano

Attachment 1

February 22, 1990

TO: Bob Donohue

FROM: Jeff Douglas JD

SUBJECT: **SULFUR MONITORING REQUIREMENT**
U.S. EPA MEETING FEBRUARY 21, 1990

Our meeting with the U.S. EPA Office of Stationary Source Compliance Division (SSCD) was successful in that they have tentatively accepted our proposed customized schedule to monitor sulfur. The schedule is "reasonable" based on the information and data submitted on February 21. Sue Briggum, Peter Kelly, and I met with Ron Schafer and Myra Cypser of the SSCD. Our document was well received, and they understand the need to develop a custom monitoring schedule. The SSCD has requested additional monitoring data, in order for them to issue guidance to their ten Regional offices.

The NSPS requires daily sulfur monitoring at all WMNA gas recovery plants, which can cost approximately $70/day, or $25k/year. Facilities in noncompliance are subject to enforcement and seeks financial penalties (up to $25k/day). The issue can be addressed by submitting additional data to SSCD to demonstrate that landfill gas is typically well below levels needed to assure routine compliance. The Agency was unwilling to act on the limited data presented - for many sites we have only a single sample result.

The attachment describes the workplan necessary to develop the requested information for SSCD. Both we and the Agency are eager to resolve this issue for all WMNA gas recovery facilities. The Federal EPA's guidance will instruct the ten EPA Regional offices to approve custom schedules for sulfur monitoring.

I will coordinate the workplan activities with the Gas Recovery Group who, in turn, will coordinate the gathering of data from selected plants. The Agency has indicated they would like to resolve this issue quickly and have apologized for the delay. Therefore, I strongly suggest a completion date of May 1, 1990 to submit our additional data and custom monitoring schedule.

JMD:jf
Attachment
cc: Mike Andrews
Sue Briggum
Peter Kelly
Mike Nieman
Marty Sara
Don Wallgren
Gary Williams
c:\wp50\jmd\sulfrmtg.epa

Testing protocol

The testing protocol outlined below should be followed for the analysis of total reduced sulfur (TRS) in landfill gas. EPA Method 16 has been identified as the procedure the following labs will use in the determination of TRS. The following modification to Method 16 has been approved by the EPA for use by Waste Management of North America: in lieu of stack sampling, samples will be collected in canisters.

Method 16 allows for the use of a gas chromatograph and flame photometric detector. Both labs identified below have the capability to perform the analyses and have been informed of the required calibrations necessary to conduct the monitoring.

1) The plant should contact one of the two labs identified below for sample canisters:

Radian Laboratories
8501 Mo-Pac Blvd.
Austin, Texas 78766
(512) 454-4797
Attn: Ruth Carlson

Core Laboratories
1300 South Potomac Street, Suite 130
Aurora, Colorado 80012-4526
(303) 751-1780
Attn: Dave McWharter

The lab should be informed that the plant is requesting sample canisters as part of Waste Management of North America's sulfur monitoring program coordinated by Corporate Gas Recovery.

2) Following receipt of the sample canister, a sample should be extracted according to the general sampling protocol outlined in the Operation and Maintenance Manual Section 327.

a) The sample should be extracted at the Daniel System's welker probe (AE) located in the turbine fuel gas line. The sample line to the gas chromatograph should be disconnected at the outlet to the sample probe (1/4" compression fitting).

b) The sample canister should be connected to the 1/4" fitting via stainless steel tubing with a provision for purging the sample line (tee).

c) The sample line should be purged no less than 30 seconds.

d) The valve to the canister should be opened allowing the sample to flow into the canister.

e) Following extraction of the sample, close the canister valve and reconnect the line to the gas chromatograph.

d) The sample should be shipped Federal Express to the labs addressed above

6.6 Recovery Efficiency.

$$R = \frac{C_{ma}}{C_{ma}} \times 100 \qquad \text{Eq. 15A-6}$$

7. *Bibliography*

1. *American Society for Testing and Materials*

Annual Book of ASTM Standards. Part 31: Water, Atmospheric Analysis. Philadelphia, Pennsylvania. 1974. p. 40-42.

2. *Blosser, R.O., H.S. Oglesby, and A.K. Jain*

A Study of Alternate SO_2 Scrubber Designs Used for TRS Monitoring. National Council of the Paper Industry for Air and Stream Improvement, Inc., New York, New York. Special Report 77-06. July 1977.

3. *Curtis, F., and G.D. McAlister*

Development and Evaluation of an Oxidation/Method 6 TRS Emission Sampling Procedure. Emission Measurement Branch, Emission Standards and Engineering Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. February 1980.

4. *Gellman, I.*

A Laboratory and Field Study of Reduced Sulfur Sampling and Monitoring Systems.

National Council of the Paper Industry for Air and Stream Improvement, Inc., New York, New York. Atmospheric Quality Improvement Technical Bulletin No. 81. October 1976.

5. *Margeson, J.H., J.E. Knoll, M.R. Midgett, R.B. Ferguson, and P.J. Schwoerer*

A Manual Method for TRS Determination. Journal of Air Pollution Control Association. 35:1230-1236. December 1985.

[redacted] From Stationary Sources

Introduction

The method described below uses the principle of gas chromatographic separation and flame photometric detection. Since there are many systems or sets of operating conditions that represent usable methods of determining sulfur emissions, all systems which employ this principle, but differ only in details of equipment and operation, may be used as alternative methods, provided that the criteria set below are met.

1. *Principle and Applicability*

1.1 Principle. A gas sample is extracted from the emission source and diluted with clean dry air. An aliquot of the diluted sample is then analyzed for hydrogen sulfide (H_2S), methyl mercaptan (MeSH), dimethyl sulfide (DMS) and dimethyl disulfide (DMDS) by gas chromatographic (GC) separation and flame photometric detection (FPD). These four compounds are known collectively as total reduced sulfur (TRS).

1.2 Applicability. This method is applicable for determination of TRS compounds from recovery furnaces, lime kilns, and smelt dissolving tanks at kraft pulp mills.

2. *Range and Sensitivity*

2.1 Range. Coupled with a gas chromatographic system utilizing a ten milliliter sample size, the maximum limit of the FPD for each sulfur compound is approximately 1 ppm. This limit is expanded by dilution of the sample gas before analysis. Kraft mill gas samples are normally diluted tenfold (9:1), resulting in an upper limit of about 10 ppm for each compound.

For sources with emission levels between 10 and 100 ppm, the measuring range can be best extended by reducing the sample size to 1 milliliter.

2.2 Sensitivity. Using the 10-ml sample size, the minimum detectable concentration is approximately 50 ppb.

3. *Interferences*

3.1 Moisture Condensation. Moisture condensation in the sample delivery system, the analytical column, or the FPD burner block can cause losses or interferences. This potential is eliminated by heating the sample line, and by conditioning the sample with dry dilution air to lower its dew point below the operating temperature of the GC/FPD analytical system prior to analysis.

3.2 Carbon Monoxide and Carbon Dioxide. CO and CO_2 have substantial desensitizing effect on the flame photometric detector even after 9:1 dilution. Acceptable systems must demonstrate that they have eliminated this interference by some procedure such as eluting these compounds before any of the compounds to be measured. Compliance with this requirement can be demonstrated by submitting chromatograms of calibration gases with and without CO_2 in the diluent gas. The CO_2 level should be approximately 10 percent for the case with CO_2 present. The two chromatograms should show agreement within the precision limits of Section 4.1.

3.3 Particulate Matter. Particulate matter in gas samples can cause interference by eventual clogging of the analytical

tion with a wet test meter before a test is optional.

6.6.3 Permeant Temperature Bath. Device capable of maintaining the permeation tubes at the calibration temperature within ±0.1° C.

6.6.4 Temperature Gauge. Thermometer or equivalent to monitor bath temperature within ±1° C.

6. *Reagents*

6.1 Fuel. Hydrogen (H_2), prepurified grade or better.

6.2 Combustion Gas. Oxygen (O_2) or air, research purity or better.

6.3 Carrier Gas. Prepurified grade or better.

6.4 Diluent. Air containing less than 50 ppb total sulfur compounds and less than 10 ppm each of moisture and total hydrocarbons. This gas must be heated prior to mixing with the sample to avoid water condensation at the point of contact.

6.5 Calibration Gases. Permeation tubes, one each of H_2S, MeSH, DMS, and DMDS, gravimetrically calibrated and certified at some convenient operating temperature. These tubes consist of hermetically sealed FEP Teflon tubing in which a liquified gaseous substance is enclosed. The enclosed gas permeates through the tubing wall at a constant rate. When the temperature is constant, calibration gases covering a wide range of known concentrations can be generated by varying and accurately measuring the flow rate of diluent gas passing over the tubes. These calibration gases are used to calibrate the GC/FPD system and the dilution system.

6.6 Citrate Buffer. Dissolve 300 grams of potassium citrate and 41 grams of anhydrous citric acid in 1 liter of deionized water. 284 grams of sodium citrate may be substituted for the potassium citrate.

7. *Pretest Procedures*

The following procedures are optional but would be helpful in preventing any problem which might occur later and invalidate the entire test.

7.1 After the complete measurement system has been set up at the site and deemed to be operational, the following procedures should be completed before sampling is initiated.

7.1.1 Leak Test. Appropriate leak test procedures should be employed to verify the integrity of all components, sample lines, and connections. The following leak test procedure is suggested: For components upstream of the sample pump, attach the probe end of the sample line to a manometer or vacuum gauge, start the pump and pull greater than 50 mm (2 in.) Hg vacuum, close off the pump outlet, and then stop the pump and ascertain that there is no leak for 1 minute. For components after the pump, apply a slight positive pressure and check for leaks by applying a liquid (detergent in water, for example) at each joint. Bubbling indicates the presence of a leak.

7.1.2 System Performance. Since the complete system is calibrated following each test, the precise calibration of each component is not critical. However, these components should be verified to be operating properly. This verification can be performed by observing the response of flowmeters or of the GC output to changes in flow rates or calibration gas concentrations and ascertaining the response to be within predicted limits. In any component, or if the complete system fails to respond in a normal and predictable manner, the source of the discrepancy should be identified and corrected before proceeding.

8. *Calibration*

Prior to any sampling run, calibrate the system using the following procedures. (If more than one run is performed during any 24-hour period, a calibration need not be performed prior to the second and any subsequent runs. The calibration must, however, be verified as prescribed in Section 10, after the last run made within the 24-hour period.)

8.1 General Considerations. This section outlines steps to be followed for use of the GC/FPD and the dilution system. The procedure does not include detailed instructions because the operation of these systems is complex, and it requires an understanding of the individual system being used. Each system should include a written operating manual describing in detail the operating procedures associated with each component in the measurement system. In addition, the operator should be familiar with the operating principles of the components, particularly the GC/FPD. The citations in the Bibliography at the end of this method are recommended for review for this purpose.

8.2 Calibration Procedure. Insert the permeation tubes into the tube chamber. Check the bath temperature to assure agreement with the calibration temperature of the tubes within ±0.1° C. Allow 24 hours for the tubes to equilibrate. Alternatively equilibration may be verified by injecting samples of calibration gas at 1-hour intervals. The permeation tubes can be assumed to have reached equilibrium when consecutive hourly samples agree within the precision limits of Section 4.1.

Vary the amount of air flowing over the tubes to produce the desired concentrations for calibrating the analytical and dilution systems. The air flow across the tubes must at all times exceed the flow requirement of the analytical systems. The concentration in parts per million generated by a tube containing a specific permeant can be calculated as follows:

system. This interference must be eliminated by use of a probe filter.

3.4 Sulfur Dioxide. SO_2 is not a specific interferent but may be present in such large amounts that it cannot be effectively separated from other compounds of interest. The procedure must be designed to eliminate this problem either by the choice of separation columns or by removal of SO_2 from the sample. In the example system, SO_2 is removed by a citrate buffer solution prior to GC injection. This scrubber will be used when SO_2 levels are high enough to prevent baseline separation from the reduced sulfur compounds.

Compliance with this section can be demonstrated by submitting chromatograms of calibration gases with SO_2 present in the same quantities expected from the emission source to be tested. Acceptable systems shall show baseline separation with the amplifier attenuation set so that the reduced sulfur compound of concern is at least 50 percent of full scale. Base line separation is defined as a return to zero ±5 percent in the interval between peaks.

4. Precision and Accuracy

4.1 GC/FPD and Dilution System Calibration Precision. A series of three consecutive injections of the same calibration gas, at any dilution, shall produce results which do not vary by more than ±5 percent from the mean of the three injections.

4.2 GC/FPD and Dilution System Calibration Drift. The calibration drift determined from the mean of three injections made at the beginning and end of any 8-hour period shall not exceed ±10 percent.

4.3 System Calibration Accuracy. Losses through the sample transport system must be measured and a correction factor developed to adjust the calibration accuracy to 100 percent.

5. Apparatus

5.1. Sampling.

5.1.1 Probe. See Figure 16-1. The probe must be made of inert material such as stainless steel or glass. It should be designed to incorporate a filter and to allow calibration gas to enter the probe at or near the sample entry point. Any portion of the probe not exposed to the stack gas must be heated to prevent moisture condensation.

5.1.2 Sample Line. The sample line must be made of Teflon,[1] no greater than 1.3 cm (½ in.) inside diameter. All parts from the probe to the dilution system must be thermostatically heated to 120° C.

5.1.3 Sample Pump. The sample pump shall be a leakless Teflon-coated diaphragm type or equivalent. If the pump is upstream of the dilution system, the pump head must be heated to 120° C.

5.2 Dilution System. The dilution system must be constructed such that all sample contacts are made of inert materials (e.g., stainless steel or Teflon). It must be heated to 120° C and be capable of approximately a 9:1 dilution of the sample.

5.3 SO_2 Scrubber. The SO_2 Scrubber is a midget impinger packed with glass wool to eliminate entrained mist and charged with potassium citrate-citric acid buffer.

5.4 Gas Chromatograph. The gas chromatograph must have at least the following components:

5.4.1 Oven. Capable of maintaining the separation column at the proper operating temperature ±1° C.

5.4.2 Temperature Gauge. To monitor column oven, detector, and exhaust temperature ±1° C.

5.4.3 Flow System. Gas metering system to measure sample, fuel, combustion gas, and carrier gas flows.

5.4.4 Flame Photometric Detector.

5.4.4.1 Electrometer. Capable of full scale amplification of linear ranges of 10^{-9} to 10^{-4} amperes full scale.

5.4.4.2 Power Supply. Capable of delivering up to 750 volts.

5.4.4.3 Recorder. Compatible with the output voltage range of the electrometer.

5.5 Gas Chromatogram Columns. The column system must be demonstrated to be capable of resolving the four major reduced sulfur compounds: H_2S, MeSH, DMS, and DMDS. It must also demonstrate freedom from known interferences.

To demonstrate that adequate resolution has been achieved, the tester must submit a chromatogram of a calibration gas containing all four of the TRS compounds in the concentration range of the applicable standard. Adequate resolution will be defined as base line separation of adjacent peaks when the amplifier attenuation is set so that the smaller peak is at least 50 percent of full scale. Base line separation is defined in Section 3.4. Systems not meeting this criteria may be considered alternate methods subject to the approval of the Administrator.

5.6 Calibration System. The calibration system must contain the following components.

5.6.1 Tube Chamber. Chamber of glass or Teflon of sufficient dimensions to house permeation tubes.

5.6.2 Flow System. To measure air flow over permeation tubes at ±2 percent. Each flowmeter shall be calibrated after a complete test series with a wet test meter. If the flow measuring device differs from the wet test meter by 5 percent, the completed test shall be discarded. Alternatively, the tester may elect to use the flow data that would yield the lower flow measurement. Calibra-

[1] Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

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tubes in the calib
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5.6.4 Tempera
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within ±1° C.
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6.2 Combustion
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calibrate the GC/FPD
tion system.
6.6 Citrate Buffer.
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284 grams of sodium c
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7. Pretest Procedures

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would be helpful in pre
which might occur late
entire test.
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7.1.1 Leak Test. Ap
procedures should be em
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and connections. The
procedure is suggested:
stream of the sample
probe end of the sampl
ter or vacuum gauge,
pull greater than 50 mm
close off the pump outle
pump and ascertain tha
1 minute. For compone
apply a slight positive

$$C = K \frac{P_r}{ML}$$

Eq. 16-1

Where:

C = Concentration of permeant produced in ppm.

P_r = Permeation rate of the tube in μg/min.

M = Molecular weight of the permeant (g/g-mole).

L = Flow rate, l/min, of air over permeant @ 20° C, 760 mm Hg.

K = Gas constant at 20° C and 760 mm Hg = 24.04 l/g mole.

8.3 Calibration of Analysis System. Generate a series of three or more known concentrations spanning the linear range of the FPD (approximately 0.05 to 1.0 ppm) for each of the four major sulfur compounds. Bypassing the dilution system, but using the SO_2 scrubber, inject these standards into the GC/FPD analyzers and monitor the responses. Three injects for each concentration must yield the precision described in Section 4.1. Failure to attain this precision is an indication of a problem in the calibration or analytical system. Any such problem must be identified and corrected before proceeding.

8.4 Calibration Curves. Plot the GC/FPD response in current (amperes) versus their causative concentrations in ppm on log-log coordinate graph paper for each sulfur compound. Alternatively, a least squares equation may be generated from the calibration data.

8.5 Calibration of Dilution System. Generate a known concentration of hydrogen sulfide using the permeation tube system. Adjust the flow rate of diluent air for the first dilution stage so that the desired level of dilution is approximated. Inject the diluted calibration gas into the GC/FPD system and monitor its response. Three injections for each dilution must yield the precision described in Section 4.1. Failure to attain this precision in this step is an indication of a problem in the dilution system. Any such problem must be identified and corrected before proceeding. Using the calibration data for H_2S (developed under 8.3) determine the diluted calibration gas concentration in ppm. Then calculate the dilution factor as the ratio of the calibration gas concentration before dilution to the diluted calibration gas concentration determined under this paragraph. Repeat this procedure for each stage of dilution required. Alternatively, the GC/FPD system may be calibrated by generating a series of three or more concentrations of each sulfur compound and diluting these samples before injecting them into the GC/FPD system. This data will then serve as the calibration data for the unknown samples and a separate determination of the dilution factor will not be necessary. However, the precision requirements of Section 4.1 are still applicable.

9. *Sampling and Analysis Procedure*

9.1 Sampling. Insert the sampling probe into the test port making certain that no dilution air enters the stack through the port. Begin sampling and dilute the sample approximately 9:1 using the dilution system. Note that the precise dilution factor is that which is determined in paragraph 8.5. Condition the entire system with sample for a minimum of 15 minutes prior to commencing analysis.

9.2 Analysis. Aliquots of diluted sample pass through the SO_2 scrubber, and then are injected into the GC/FPD analyzer for analysis.

9.2.1 Sample Run. A sample run is composed of 16 individual analyses (injects) performed over a period of not less than 3 hours or more than 6 hours.

9.2.2 Observation for Clogging of Probe. If reductions in sample concentrations are observed during a sample run that cannot be explained by process conditions, the sampling must be interrupted to determine if the sample probe is clogged with particulate matter. If the probe is found to be clogged, the test must be stopped and the results up to that point discarded. Testing may resume after cleaning the probe or replacing it with a clean one. After each run, the sample probe must be inspected and, if necessary, dismantled and cleaned.

10. *Post-Test Procedures*

10.1 Sample line loss. A known concentration of hydrogen sulfide at the level of the applicable standard, ±20 percent, must be introduced into the sampling system in sufficient quantities to insure that there is an excess of sample which must be vented to the atmosphere. The sample must be introduced immediately after the probe and filter and transported through the remainder of the sampling system to the measurement system in the normal manner. The resulting measured concentration should be compared to the known value to determine the sampling system loss.

For sampling losses greater than 20 percent in a sample run, the sample run is not to be used when determining the arithmetic mean of the performance test. For sampling losses of 0-20 percent, the sample concentration must be corrected by dividing the sample concentration by the fraction of recovery. The fraction of recovery is equal to one minus the ratio of the measured concentration to the known concentration of hydrogen sulfide in the sample line loss procedure. The known gas sample may be generated using permeation tubes. Alternative-

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...ent Procedure

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10.2 Recalibration. After each run, or after a series of runs made within a 24-hour period, perform a partial recalibration using the procedures in Section 8. Only H_2S (or other permeant) need be used to recalibrate the GC/FPD analysis system (8.2) and the dilution system (8.5).

10.3 Determination of Calibration Drift. Compare the calibration curves obtained prior to the runs, to the calibration curves obtained under Section 10.2. The calibration drift should not exceed the limits set forth in Section 4.2. If the drift exceeds this limit, the intervening run or runs should be considered not valid. The tester, however, may instead have the option of choosing the calibration data set which would give the highest sample values.

11. *Calculations*

11.1 Determine the concentrations of each reduced sulfur compound detected directly from the calibration curves. Alternatively, the concentrations may be calculated using the equation for the least squares line.

11.2 Calculation of TRS. Total reduced sulfur will be determined for each analysis made by summing the concentrations of each reduced sulfur compound resolved during a given analysis.

$$TRS = \Sigma\,(H_2S,\ MeSH,\ DMS,\ 2DMDS)d \qquad \text{Eq. 16-2}$$

Where:

TRS = Total reduced sulfur in ppm, wet basis.

H_2S = Hydrogen sulfide, ppm.

MeSH = Methyl mercaptan, ppm.

DMS = Dimethyl sulfide, ppm.

DMDS = Dimethyl disulfide, ppm.

d = Dilution factor, dimensionless.

11.3 Average TRS. The average TRS will be determined as follows:

$$\text{Average TRS} = \frac{\sum_{i=1}^{N} TRS_i}{N(1-B_{wo})}$$

Where:

Average TRS = Average total reduced sulfur in ppm, dry basis.

TRS_i = Total reduced sulfur in ppm as determined by Equation 16-2.

N = Number of samples.

B_{wo} = Fraction of volume of water vapor in the gas stream as determined by reference Method 4—Determination of Moisture in Stack Gases (36 FR 24887).

11.4 Average Concentration of Individual Reduced Sulfur Compounds.

$$C = \frac{\sum_{i=1}^{N} S_i}{N} \qquad \text{Eq. 16-3}$$

Where:

S_i = Concentration of any reduced sulfur compound from the ith sample injection, ppm.

C = Average concentration of any one of the reduced sulfur compounds for the entire run, ppm.

N = Number of injections in any run period.

12. *Example System*

Described below is a system utilized by EPA in gathering NSPS data. This system does not now reflect all the latest developments in equipment and column technology, but it does represent one system that has been demonstrated to work.

12.1 Apparatus.

12.1.1 Sampling System.

12.1.1.1 Probe. Figure 16-1 illustrates the probe used in lime kilns and other sources where significant amounts of particulate matter are present. The probe is designed with the deflector shield placed between the sample and the gas inlet holes and the glass wool plugs to reduce clogging of the filter and possible adsorption of sample gas. The exposed portion of the probe between the sampling port and the sample line is heated with heating tape.

12.1.1.2 Sample Line. 3/16 inch inside diameter Teflon tubing, heated to 120° C. This temperature is controlled by a thermostatic heater.

12.1.1.3 Sample Pump. Leakless Teflon coated diaphragm type or equivalent. The pump head is heated to 120° C by enclosing it in the sample dilution box (12.1.2.4 below).

12.1.2 Dilution System. A schematic diagram of the dynamic dilution system is given in Figure 16-2. The dilution system is constructed such that all sample contacts are made of inert materials. The dilution system which is heated to 120° C must be capable of a minimum of 9:1 dilution of sample. Equipment used in the dilution system is listed below:

12.1.2.1 Dilution Pump. Model A-150 Kohmyhr Teflon positive displacement type, nonadjustable 150 cc/min ±2.0 percent, or equivalent, per dilution stage. A 9:1 dilution of sample is accomplished by combining 150 cc of sample with 1,350 cc of clean dry air as shown in Figure 16-2.

12.1.2.2 Valves. Three-way Teflon solenoid or manual type.

12.3.2 High-Molecular Weight Sulfur Compounds. The operating parameters for the GC/FPD system for high molecular weight compounds are the same as in 12.3.1 except: oven temperature of 70° C, and nitrogen carrier gas flow of 100 cc/min.

12.4 Analysis Procedure.

12.4.1 Analysis. Aliquots of diluted sample are injected simultaneously into both GC/FPD analyzers for analysis. GC/FPD-I is used to measure the low-molecular weight reduced sulfur compounds. The low molecular weight compounds include hydrogen sulfide, methyl mercaptan, and dimethyl sulfide. GC/FPD-II is used to resolve the high-molecular weight compound. The high-molecular weight compound is dimethyl disulfide.

12.4.1.1 Analysis of Low-Molecular Weight Sulfur Compounds. The sample valve is actuated for 3 minutes in which time an aliquot of diluted sample is injected into the stripper column and analytical column. The valve is then deactivated for approximately 12 minutes in which time, the analytical column continues to be fore-flushed, the stripper column is backflushed, and the sample loop is refilled. Monitor the responses. The elution time for each compound will be determined during calibration.

12.4.1.2 Analysis of High-Molecular Weight Sulfur Compounds. The procedure is essentially the same as above except that no stripper column is needed.

13. *Bibliography*

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13.5 Grimley, K. W., W. S. Smith, and R. M. Martin. "The Use of a Dynamic Dilution System in the Conditioning of Stack Gases for Automated Analysis by a Mobile Sampling Van." Presented at the 63rd Annual APCA Meeting in St. Louis, MO. June 14-19, 1970.

13.6 General Reference. Standard Methods of Chemical Analysis Volume III A and B Instrumental Methods. Sixth Edition. Van Nostrand Reinhold Co.

12.1.2.3 Tubing. Teflon tubing and fittings are used throughout from the sample probe to the GC/FPD to present an inert surface for sample gas.

12.1.2.4 Box. Insulated box, heated and maintained at 120° C, of sufficient dimensions to house dilution apparatus.

12.1.2.5 Flowmeters. Rotameters or equivalent to measure flow from 0 to 1500 ml/min ±1 percent per dilution stage.

12.1.3 SO_2 Scrubber. Midget impinger with 15 ml of potassium citrate buffer to absorb SO_2 in the sample.

12.1.4 Gas Chromatograph Columns. Two types of columns are used for separation of low and high molecular weight sulfur compounds:

12.1.4.1 Low Molecular Weight Sulfur Compounds Column (GC/FPD-I).

12.1.4.1.1 Separation Column. 11 m by 2.16 mm (36 ft by 0.085 in.) inside diameter Teflon tubing packed with 30/60 mesh Teflon coated with 5 percent polyphenyl ether and 0.05 percent orthophosphoric acid, or equivalent (see Figure 16-3).

12.1.4.1.2 Stripper or Precolumn. 0.6 m by 2.16 mm (2 ft by 0.085 in.) inside diameter Teflon tubing.

12.1.4.1.3 Sample Valve. Teflon 10-port gas sampling valve, equipped with a 10 ml sample loop, actuated by compressed air (Figure 16-3).

12.1.4.1.4 Oven. For containing sample valve, stripper column and separation column. The oven should be capable of maintaining an elevated temperature ranging from ambient to 100° C, constant within ±1° C.

12.1.4.1.5 Temperature Monitor. Thermocouple pyrometer to measure column oven, detector, and exhaust temperature ±1° C.

12.1.4.1.6 Flow System. Gas metering system to measure sample flow, hydrogen flow, and oxygen flow (and nitrogen carrier gas flow).

12.1.4.1.7 Detector. Flame photometric detector.

12.1.4.1.8 Electrometer. Capable of full scale amplification of linear ranges of 10^{-9} to 10^{-4} amperes full scale.

12.1.4.1.9 Power Supply. Capable of delivering up to 750 volts.

12.1.4.1.10 Recorder. Compatible with the output voltage range of the electrometer.

12.1.4.2 High Molecular Weight Compounds Column (GC/FPD-II).

12.1.4.2.1 Separation Column. 3.05 m by 2.16 mm (10 ft by 0.0885 in.) inside diameter Teflon tubing packed with 30/60 mesh Teflon coated with 10 percent Triton X-305, or equivalent.

12.1.4.2.2 Sample Valve. Teflon 6-port gas sampling valve equipped with a 10 ml sample loop, actuated by compressed air (Figure 16-3).

12.1.4.2.3 Other Components. All components same as in 12.1.4.1.3 to 12.1.4.1.10.

12.1.5 Calibration. Permeation tube system (Figure 16-4).

12.1.5.1 Tube Chamber. Glass chamber of sufficient dimensions to house permeation tubes.

12.1.5.2 Mass Flowmeters. Two mass flowmeters in the range 0-3 l/min and 0-10 l/min to measure air flow over permeation tubes at ±2 percent. These flowmeters shall be cross-calibrated at the beginning of each test. Using a convenient flow rate in the measuring range of both flowmeters, set and monitor the flow rate of gas over the permeation tubes. Injection of calibration gas generated at this flow rate as measured by one flowmeter followed by injection of calibration gas at the same flow rate as measured by the other flowmeter should agree within the specified precision limits. If they do not, then there is a problem with the mass flow measurement. Each mass flowmeter shall be calibrated prior to the first test with a wet test meter and thereafter, at least once each year.

12.1.5.3 Constant Temperature Bath. Capable of maintaining permeation tubes at certification temperature of 30° C within ±0.1° C.

12.2 Reagents.

12.2.1 Fuel. Hydrogen (H_2), prepurified grade or better.

12.2.2 Combustion Gas. Oxygen (O_2), research purity or better.

12.2.3 Carrier Gas. Nitrogen (N_2), prepurified grade or better.

12.2.4 Diluent. Air containing less than 50 ppb total sulfur compounds and less than 10 ppm each of moisture and total hydrocarbons, and filtered using MSA filters 46727 and 79030, or equivalent. Removal of sulfur compounds can be verified by injecting dilution air only, described in Section 8.3.

12.2.5 Compressed Air. 60 psig for GC valve actuation.

12.2.6 Calibrated Gases. Permeation tubes gravimetrically calibrated and certified at 30.0° C.

12.2.7 Citrate Buffer. Dissolve 300 grams of potassium citrate and 41 grams of anhydrous citric acid in 1 liter of deionized water. 284 grams of sodium citrate may be substituted for the potassium citrate.

12.3 Operating Parameters.

12.3.1 Low-Molecular Weight Sulfur Compounds. The operating parameters for the GC/FPD system used for low molecular weight compounds are as follows: nitrogen carrier gas flow rate of 50 cc/min, exhaust temperature of 110° C, detector temperature of 105° C, oven temperature of 40° C, hydrogen flow rate of 80 cc/min, oxygen flow rate of 20 cc/min, and sample flow rate between 20 and 80 cc/min.

Attachment 4

SULFUR MONITORING SCHEDULE

IN ACCORDANCE WITH SUBPART GG

STANDARDS OF PERFORMANCE

FOR STATIONARY GAS TURBINES

§60.330 - 60.335

WASTE MANAGEMENT OF NORTH AMERICA

TESTING PROTOCOL

SULFUR MONITORING TESTING PROTOCOL
FOR
WASTE MANAGEMENT OF NORTH AMERICA

1.0 INTRODUCTION

(Landfill or Plant Name) operates (#) gas turbine(s), rated at (xx) x 10^6 btu/hour each. Landfill gas generated by the decomposition of refuse, is utilized as the fuel for combustion in the turbine/ generator set which, in turn, produces electricity. The USEPA New Source Performance Standard (NSPS), Subpart GG, Article 60.334 (Attachment 1) applies to all new stationary natural gas turbines greater than 10 million btu/hour. The owner is subject to monitoring the fuel for sulfur content daily.

However, the NSPS also allows the owner to develop a customized monitoring schedule based on the design and operation of the affected facility and the characteristics of the fuel supply. The customized monitoring schedules must be substantiated with data. Waste Management of North America (WMNA) has provided this testing protocol in accordance with §60.334(b)(2). This customized schedule is described below and substantiated with data included in the attachments.

2.0 FACILITY OPERATION

The ____ Power Production Plant utilizes landfill gas as a fuel for combustion in the turbine generator set which in turn produces electricity. A facility description and flow diagram is described in Appendix A.

3.0 HISTORICAL MONITORING DATA

Waste Management of North America has compiled a substantial database of landfill gas information. Waste Management's sulfur analyses indicate a range of 0-100 ppm total sulfur measured as H_2S, with an average concentration of 21 ppm. Attachment 2 provides analyses for several WMNA sites. These analyses were performed to confirm the low concentrations of total sulfur measured as H_2S. Attachment 3 provides further evidence demonstrating the low sulfur content in landfill gas for two individual site tests. Attachment 4 is an air emission test summary for nine (9) different turbines. [Sulfur dioxide (SO_2) emission rates are based on maximum available load conditions.] These concentrations of sulfur in fuel fall far below the levels found in the types of natural gas for which the NSPS was promulgated.

Routine Monitoring

The (Landfill or Plant Name) facility is equipped with a process gas chromatograph which analyzes the fuel gas for methane, oxygen, carbon dioxide, and nitrogen every three minutes. The facility also monitors the fuel gas temperature, flow, and btu on a continuous basis. There parameters are logged on a computer, and the hourly and daily average report logs are filed on site. In addition to monitoring the fuel gas, equipment operating parameters and electrical generating loads are monitored and filed. Monitoring these parameters ensures optimum system operation.

4.0 CUSTOMIZED SULFUR MONITORING SCHEDULE

Because the fuel gas remains characteristically constant and the plant operates at optimum conditions, sulfu emissions will remain constant. The historical data and WMNA's turbine operation experience demonstrat that a customized sulfur monitoring schedule will provide assurance of compliance with emissions standard The following schedule is presented for (Agency's Name) approval:

The first year's monitoring is comprised of eight monitoring events.

Initial Monitoring Tests:

a. Initial emission performance test measuring sulfur dioxide (SO_2) as a part of the requisit stack emission testing using USEPA Reference Method 6.

b. During the performance test, a fuel gas sample will be analyzed to determine the total sulfu content of the landfill gas.

During the first six months of operation, sulfur analyses will be performed monthly to determine total sulfu content of the fuel gas. The same test will be performed twice during the next six months of plant operation (one test every three (3) months). This would conclude the eight monitoring events. Annual fuel ga analyses for total sulfur will be conducted thereafter. All sulfur monitoring will be performed by test method referenced in §60.335, or an accepted test method.

5.0 RECORDING

Records of sample analysis and fuel supply pertinent to this customized monitoring schedule will be retained at the (Plant name) and will be available for inspection by personnel of Federal, State, and local air pollution control agencies.

Should any sulfur analysis indicate noncompliance with 40 CFR 60.333, the Plant owner will notify the State Air Control Board of the emissions, and the custom schedule shall be re-examined by the State Agency.

JMD:jf
Attachments

c:\wp50\jmd\testprot

APPENDIX A

FACILITY OPERATION DESCRIPTION

COMPRESSION PROCESS DESCRIPTION

The fuel gas compression (FGC) system draws gas from the landfill at a vacuum of 6" mercury, filters the gas with an inlet scrubber to remove dirt particulates, and compresses the gas using two stages of compression to 185 pounds per square inch gauge (psig) at 120°F. The FGC can deliver 1800 standard cubic feet per minute (scfm) of landfill gas at the above conditions.

The FGC is controlled from a master control panel located in the plant control room. A gauge panel is located adjacent to the FGC skid allowing the operator to monitor operations and indicating the cause of a shutdown or alarm. The FGC control system is electrically interlocked with the turbine operation and safety controls, the plant ventilation system, gas detection system, fire detection and suppression systems, and the voice synthesized auto dialer (used when the plant is operated in an unattended mode). Each system promotes safe operation of the plant and protects the equipment from damage.

The FGC is automatically shut down in the event that the following conditions occur:

1. High discharge temperature
2. High discharge pressure
3. High vibration on the electric motors
4. High vibration on the compressor housings
5. Low oil level
6. Low oil pressure
7. High oil temperature
8. High liquid level in vessels

In addition, pressure and temperature gauges for each step of both stages of compression are mounted on the FGC gauge panel. The cooler section of the FGC, located outside of the building, also has a system shutdown for high vibration on the fan motors.

The decomposition of refuse results in production of water saturated gas. The two stages of compression, which add heat to the gas, are followed by subsequent cooling stages. The combination of increased gas pressure and cooling results in water condensation which is collected in various vessels on the compressor skid. The condensate is then disposed of in an environmentally acceptable manner. In the event of failure of the condensate discharge system, high liquid level switches will shut down the FGC to prevent damage and uncontrolled liquid and gas flows.

All shutdown and alarm conditions have both audible and visual indicators to alert the plant operators of potential problems.

TURBINE/GENERATOR DESCRIPTION

The landfill gas quality and quantity delivered to each turbine/ generator are measured after the FGC compression process using an orifice plate flow meter and gas chromatograph. The landfill gas is delivered to a Solar Centaur GSC T4500 gas turbine/generator set. The turbine produces over 4000 horsepower which results in the generation of approximately 3300 kW from the 4160-volt generator.

The turbine/generator is automatically shut down in the event the following conditions occur:

1. Turbine overspeed (also backup overspeed circuit)
2. Ignition failure
3. Generator undervoltage
4. Generator overvoltage
5. Low oil pressure generator bearings
6. Low pre/post lube oil pressure
7. High fuel gas temperature
8. Fail to start
9. Fail to crank
10. Fuel gas valve failure
11. High starting fuel flow
12. Summary fuel gas compressor (FGC) fault
13. Low oil level lube oil tank
14. Low lube oil pressure
15. High lube oil temperature
16. High turbine engine (T5) temperature
17. Low fuel gas pressure
18. High fuel gas pressure
19. Summary high vibration/temperature level from the turbine/generator's vibration and temperature monitoring system
20. High differential pressure across inlet air filters

The plant uses two central transformers: the main plant transformer located in the plant switchyard is used to deliver and receive power from the utility (a 4160V to necessary utility interconnection voltage transformer), and a step-down transformer is used to distribute power to the 480-volt circuit of the plant (a 4160/480-volt transformer).

The plant's electrical system is typically protected by the following Power System shutdowns:

1. Generator breaker open
2. High transformer pressure
3. High transformer oil temperature
4. High transformer winding temperature
5. Low transformer relay pressure
6. Switchyard breaker trip
7. Summary switchgear malfunction
8. Utility breaker open
9. Utility lockout relay trip
10. Plant lockout relay trip
11. Differential protection on the generators and main transformer

In addition to these shutdowns, both the plant and utility side protective relays will shut down the plant upon activation.

FACILITY SAFETY DESCRIPTION

The entire plant is equipped with a methane detection system to monitor combustible gases. When a low level of methane is detected (10% of the lower explosive limit), an alarm annunciates, ventilation fans in the plant switch to high speed, and the autodialer is activated. At a higher level of methane detection (40% of the lower explosive limit, 2.5 times less than an explosive mixture), all plant equipment is shut down, the plant ventilation equipment is switched to high speed, the condition is annunciated through the turbine control panel, and the autodialer is activated.

The plant is also equipped with a fire detection and suppression system. Fire detection and suppression is provided throughout the plant. A water sprinkler fire suppression system is installed in the compressor and turbine rooms, while a Halon fire suppression system is provided in the control and viewing rooms. The detection and suppression systems are consistent with the National Fire Protection Association Life Safety Code (1981).

The fire system control panel is located in the plant's control room and is integrated into the overall plant controls and autodialer system. In the event the fire detection system is activated, all plant equipment including the ventilation equipment, will be shut down and the autodialer will be activated. A time delay for activation of the sprinkler or Halon systems is incorporated for personnel safety and for preventing accidental activation of the fire suppression systems.

Appropriate hand-held fire extinguishers will be placed throughout the plant. An emergency eyewash station will be located in both the compressor room and turbine room.

A plant security system will deter entry into the plant by non-operators and trespassers.

The plant will be shut down in the event that the following occurs:

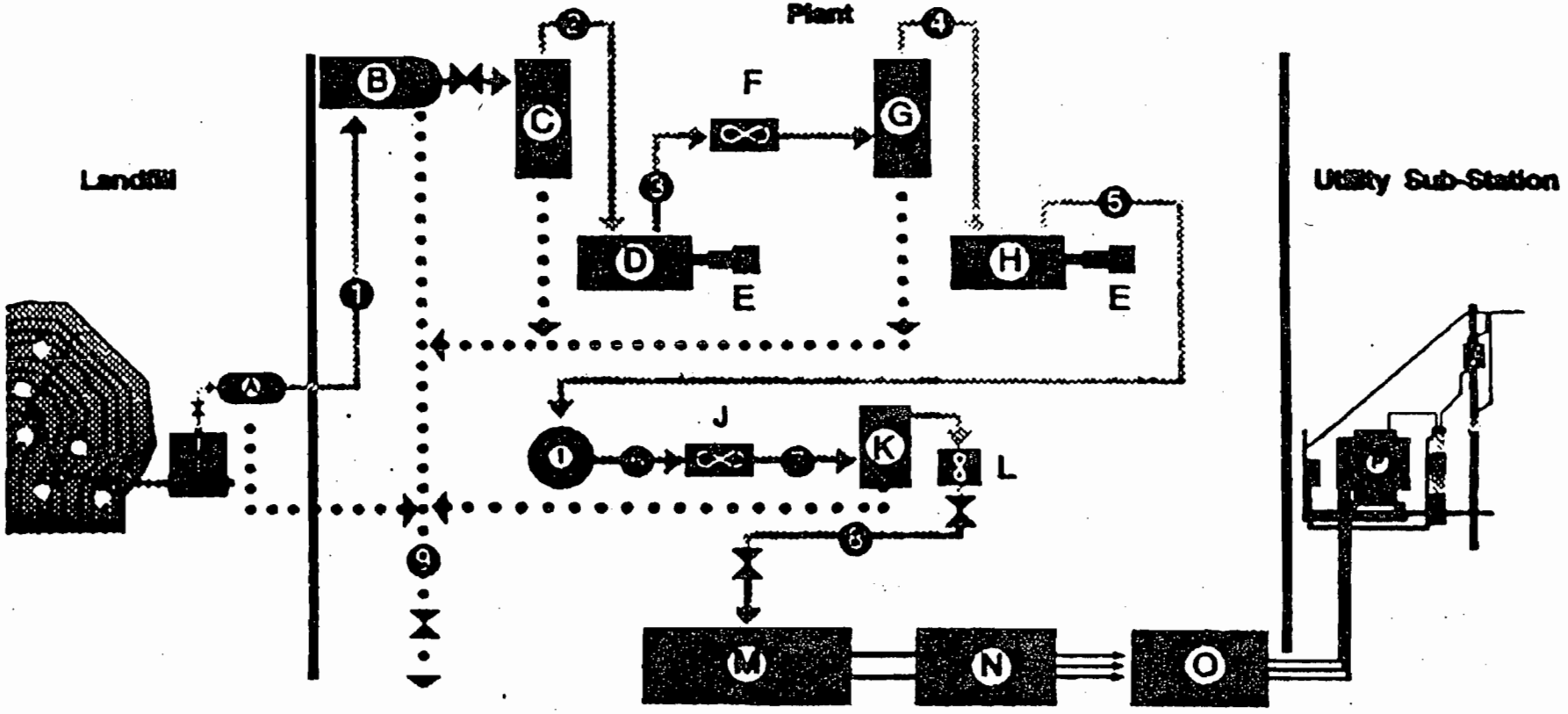
1. Fire Suppression System Activation
2. High-High Facility Methane Concentration

SUMMARY

The FGC control panel, the fire detection and suppression panel, the gas detection panel, the security system and the autodialer (all with battery back-up) comprise the total plant control system. The control system is designed to protect and maintain safe operation for both equipment and personnel.

The FGC room and the equipment housed in the FGC room are designed for a Class I, Division II, Group D environment (hazardous area operation) per 1984 National Electric Code. The remainder of the plant is designed as a non-hazardous area location. The following codes were incorporated into the plant design: 1984 BOCA Basic Building Code, 1984 BOCA Basic National Plumbing Code, 1984 BOCA Basic National Mechanical Code, 1981 National Fire Protection Association Life Safety Code, and the 1984 National Electric Code.

Turbine-Electric/Gas Recovery Process Flow Sheet



Design Conditions:

	Temperature	Pressure
1.	100°F	6" Hg (Vacuum)
2.	100°F	6" Hg (Vacuum, particulates removed)
3.	275°F	12 psig
4.	110°F	12 psig
5.	225°F	350 psig
6.	Oil Free Gas	
7.	110°F	175 psig
8.	130°F	175 psig
9.	Total Plant Condensate	

A. Condensate Tank
B. Inlet Filter
C. 1st Stage Suction Scrubber
D. 1st Stage Compressor
E. Electric Motor
F. Gas Cooler
G. 2nd Stage Scrubber
H. 2nd Stage Compressor
I. Oil/Gas Separator
J. Gas Cooler
K. Coalescing Gas Filter/Knockout
L. Reheat Exchanger
M. Turbine
N. Generator
O. Control Room
P. High Voltage Transformer

LIST OF ATTACHMENTS

1. SUBPART GG - STANDARDS OF PERFORMANCE FOR STATIONARY GAS TURBINES

2. DRAEGER TUBE ANALYSIS - SULFUR COMPOUND CONCENTRATIONS

3. INDIVIDUAL SITE SUMMARY REPORTS

4. WMNA CENTAUR TURBINE - AIR EMISSION TEST SUMMARY

5. WASTE MANAGEMENT OF NORTH AMERICA POWER PRODUCTION PLANTS

ATTACHMENT 1

SUBPART GG - STANDARDS OF PERFORMANCE FOR STATIONARY GAS TURBINES

40 CFR Part 60 - SUBPART GG

STANDARDS OF PERFORMANCE FOR STATIONARY GAS TURBINES
(Promulgated as a New Source Performance Standard)

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§60.330 Applicability and Designation of Affected Facility

- All stationary gas turbines with a heat input $\geq 10 \times 10^6$ btu/hr at peak load
- Any facility which commences construction, modification or reconstruction after October 3, 1977

§60.333 Standard for Sulfur Dioxide

- No fuel can be burned which contains sulfur in excess of 0.8 percent by weight

§60.334 Monitoring Operations

- Owner shall monitor sulfur content and record daily
- Owners may develop custom schedules based on the design and operation of the affected facility
- Custom schedules must be substantiated with data and approved by the Administrator
- Sulfur content exceeding 0.8 percent by weight must be reported to the Administrator for every calendar quarter [see §60.7(c)]

§60.335 Test Methods and Procedures

- Owner must determine compliance with the sulfur content standard as follows for gaseous fuels:

ASTM D 1072 - 80	ASTM D 3031 - 81
ASTM D 4084 - 81	ASTM D 3246 - 81

- The analyses may be performed by owner or operator, service contractor or other qualified agency

Subpart GG—Standards of Performance for Stationary Gas Turbines

§ 60.330 Applicability and designation of affected facility.

[Former 60.330 revised and designated as (a), (b) added by 52 FR 42434, November 5, 1987]

(a) The provisions of this subpart are applicable to the following affected facilities: All stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour, based on the lower heating value of the fuel fired.

(b) Any facility under paragraph (a) of this section which commences construction, modification, or reconstruction after October 3, 1977, is subject to the requirements of this part except as provided in paragraphs (e) and (i) of § 60.332.

§ 60.331 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act and in Subpart A of this part.

(a) "Stationary gas turbine" means any simple cycle gas turbine, regenerative cycle gas turbine or any gas turbine portion of a combined cycle steam/electric generating system that is not self propelled. It may, however, be mounted on a vehicle for portability.

(b) "Simple cycle gas turbine" means any stationary gas turbine which does not recover heat from the gas turbine exhaust gases to preheat the inlet combustion air to the gas turbine, or which does not recover heat from the gas turbine exhaust gases to heat water or generate steam.

(c) "Regenerative cycle gas turbine" means any stationary gas
which recovers heat from the
bine exhaust gases to preheat
combustion air to the gas turb

(d) "Combined cycle gas
means any stationary gas
which recovers heat from the
bine exhaust gases to heat
generate steam.

(e) "Emergency gas turbine"
any stationary gas turbine whi
ates as a mechanical or e
power source only when the
power source for a facility h
rendered inoperable by an em
situation.

(f) "Ice fog" means an atmo
suspension of highly reflecti
crystals.

(g) "ISO standard day cond
means 288 degrees Kelvin, 60 p
relative humidity and 101.3 kilo
pressure.

(h) "Efficiency" means the ga
bine manufacturer's rated heat r
peak load in terms of heat inpu
unit of power output based o
lower heating value of the fuel.

(i) "Peak load" means 100 perce
the manufacturer's design capaci
the gas turbine at ISO standard
conditions.

(j) "Base load" means the load
at which a gas turbine is normally
erated.

(k) "Fire-fighting turbine" me
any stationary gas turbine that is
solely to pump water for extinguis
fires.

(l) "Turbines employed in oil/
production or oil/gas transportati
means any stationary gas turbine u
to provide power to extract crude
natural gas from the earth or to m
crude oil/natural gas, or products
fined from these substances throu
pipelines.

(m) A "Metropolitan Statisti
Area" or "MSA" as defined by the
partment of Commerce.

(n) "Offshore platform gas turbin
means any stationary gas turbine
cated on a platform in an ocean.

(o) "Garrison facility" means a
permanent military installation.

(p) "Gas turbine model" means
group of gas turbines having the sa
nominal air flow, combuster inlet pr
sure, combuster inlet temperatu
firing temperature, turbine inlet te
perature and turbine inlet pressure.

(q) "Electric utility stationary
turbine" means any stationary gas t
bine constructed for the purpose
supplying more than one-third of
potential electric output capacity

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any utility power distribution system for sale.

(r) "Emergency fuel" is a fuel fired by a gas turbine only during circumstances, such as natural gas supply curtailment or breakdown of delivery system, that make it impossible to fire natural gas in the gas turbine.

(s) "Regenerative cycle gas turbine" means any stationary gas turbine that recovers thermal energy from the exhaust gases and utilizes the thermal energy to preheat air prior to entering the combustor.

§ 60.332 Standard for nitrogen oxides.

(a) On and after the date of the performance test required by § 60.8 is completed, every owner or operator subject to the provisions of this subpart as specified in paragraphs (b), (c), and (d) of this section shall comply with one of the following, except as provided in paragraphs (e), (f), (g), (h), (i), (j), (k), and (l) of this section.

(1) No owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any stationary gas turbine, any gases which contain nitrogen oxides in excess of:

$$STD = 0.0075 \frac{(14.4)}{Y} + F$$

22

where:

STD = allowable NO_x emissions (percent by volume at 15 percent oxygen and on a dry basis).

Y = manufacturer's rated heat rate at manufacturer's rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not exceed 14.4 kilojoules per watt hour.

F = NO_x emission allowance for fuel-bound nitrogen as defined in paragraph (a)(3) of this section.

(2) No owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any stationary gas turbine, any gases which contain nitrogen oxides in excess of:

$$STD = 0.0150 \frac{(14.4)}{Y} + F$$

where:

STD = allowable NO_x emissions (percent by volume at 15 percent oxygen and on a dry basis).

Y = manufacturer's rated heat rate at manufacturer's rated peak load (kilojoules per watt hour), or actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not exceed 14.4 kilojoules per watt hour.

F = NO_x emission allowance for fuel-bound nitrogen as defined in paragraph (a)(3) of this section.

(3) F shall be defined according to the nitrogen content of the fuel as follows:

Fuel-bound nitrogen (percent by weight)	F (NO_x, percent by volume)
N≤0.015	0
0.015 < N≤0.1	0.04(N − 0.015)
0.1 < N≤0.25	0.004 + 0.0067(N − 0.1)
N>0.25	0.005

where:

N = the nitrogen content of the fuel (percent by weight).

or:

Manufacturers may develop custom fuel-bound nitrogen allowances for each gas turbine model they manufacture. These fuel-bound nitrogen allowances shall be substantiated with data and must be approved for use by the Administrator before the initial performance test required by § 60.8. Notices of approval of custom fuel-bound nitrogen allowances will be published in the FEDERAL REGISTER.

(b) Electric utility stationary gas turbines with a heat input at peak load greater than 107.2 gigajoules per hour (100 million Btu/hour) based on the lower heating value of the fuel fired shall comply with the provisions of paragraph (a)(1) of this section.

(c) Stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (10 million Btu/hour) but less than or equal to 107.2 gigajoules per hour (100 million Btu/hour) based on the lower heating value of the fuel fired, shall comply with the provisions of paragraph (a)(2) of this section.

(d) Stationary gas turbines with a manufacturer's rated base load at ISO conditions of 30 megawatts or less except as provided in § 60.332(b) shall comply with paragraph (a)(2) of this section.

(e) Stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (10 million Btu/hour) but less than or equal to 107.2 gigajoules per hour (100 million Btu/hour) based on the lower heating value of the fuel fired and that have commenced construction prior to October 3, 1982 are exempt from paragraph (a) of this section.

(f) Stationary gas turbines using water or steam injection for control of NO_x emissions are exempt from paragraph (a) when ice fog is deemed a traffic hazard by the owner or operator of the gas turbine.

(g) Emergency gas turbines, military gas turbines for use in other than a garrison facility, military gas turbines installed for use as military training facilities, and fire fighting gas turbines are exempt from paragraph (a) of this section.

(h) Stationary gas turbines engaged by manufacturers in research and development of equipment for both gas turbine emission control techniques and gas turbine efficiency improvements are exempt from paragraph (a) on a case-by-case basis as determined by the Administrator.

(i) Exemptions from the requirements of paragraph (a) of this section will be granted on a case-by-case basis as determined by the Administrator in specific geographical areas where mandatory water restrictions are required by governmental agencies because of drought conditions. These exemptions will be allowed only while the mandatory water restrictions are in effect.

(j) Stationary gas turbines with a heat input at peak load greater than 107.2 gigajoules per hour that commenced construction, modification, or reconstruction between the dates of October 3, 1977, and January 27, 1982, and were required in the September 10, 1979, FEDERAL REGISTER (44 FR 53792) to comply with paragraph (a)(1) of this section, except electric utility stationary gas turbines, are exempt from paragraph (a) of this section.

[Sec. 60.332(j)]

(k) Stationary gas turbines with a heat input greater than or equal to 10.7 gigajoules per hour (10 million Btu/hour) when fired with natural gas are exempt from paragraph (a)(2) of this section when being fired with an emergency fuel.

(l) Regenerative cycle gas turbines with a heat input less than or equal to 107.2 gigajoules per hour (100 million Btu/hour) are exempt from paragraph (a) of this section.

§ 60.333 Standard for sulfur dioxide.

On and after the date on which the performance test required to be conducted by § 60.8 is completed, every owner or operator subject to the provision of this subpart shall comply with one or the other of the following conditions:

(a) No owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any stationary gas turbine any gases which contain sulfur dioxide in excess of 0.015 percent by volume at 15 percent oxygen and on a dry basis.

(b) No owner or operator subject to the provisions of this subpart shall burn in any stationary gas turbine any fuel which contains sulfur in excess of 0.8 percent by weight.

§ 60.334 Monitoring of operations.

(a) The owner or operator of any stationary gas turbine subject to the provisions of this subpart and using water injection to control NO_x emissions shall install and operate a continuous monitoring system to monitor and record the fuel consumption and the ratio of water to fuel being fired in the turbine. This system shall be accurate to within ±5.0 percent and shall be approved by the Administrator.

(b) The owner or operator of any stationary gas turbine subject to the provisions of this subpart shall monitor sulfur content and nitrogen content of the fuel being fired in the turbine. The frequency of determination of these values shall be as follows:

(1) If the turbine is supplied its fuel from a bulk storage tank, the values shall be determined on each occasion that fuel is transferred to the storage tank from any other source.

(2) If the turbine is supplied its fuel without intermediate bulk storage the values shall be determined and recorded daily. Owners, operators or fuel vendors may develop custom schedules for determination of the values based on the design and operation of the affected facility and the characteristics of the fuel supply. These custom schedules shall be substantiated with data and must be approved by the Administrator before they can be used to comply with paragraph (b) of this section.

(c) For the purpose of reports required under § 60.7(c), periods of excess emissions that shall be reported are defined as follows:

(1) *Nitrogen oxides.* Any one-hour period during which the average water-to-fuel ratio, as measured by the continuous monitoring system, falls below the water-to-fuel ratio determined to demonstrate compliance with § 60.332 by the performance test required in § 60.8 or any period during which the fuel-bound nitrogen of the fuel is greater than the maximum nitrogen content allowed by the fuel-bound nitrogen allowance used during the performance test required in § 60.8. Each report shall include the average water-to-fuel ratio, average fuel consumption, ambient conditions, gas turbine load, and nitrogen content of the fuel during the period of excess emissions, and the graphs or figures developed under § 60.335(a).

(2) *Sulfur dioxide.* Any daily period during which the sulfur content of the fuel being fired in the gas turbine exceeds 0.8 percent.

(3) *Ice fog.* Each period during which an exemption provided in § 60.332(g) is in effect shall be reported in writing to the Administrator quarterly. For each period the ambient conditions existing during the period, the date and time the air pollution control system was deactivated, and the date and time the air pollution control system was reactivated shall be reported. All quarterly reports shall be postmarked by the 30th day following the end of each calendar quarter.

(4) *Emergency fuel.* Each period during which an exemption provided in § 60.332(k) is in effect shall be included in the report required in § 60.7(c). For each period, the type, reasons, and duration of the firing of the emergency fuel shall be reported.

[60.334(c)(4) added by 47 FR 3770 January 27, 1982]

§ 60.335 Test methods and procedures

[60.335 revised by 54 FR 6662, February 14, 1989]

(a) To compute the nitrogen oxides emissions, the owner or operator shall use analytical methods and procedures that are accurate to within 5 percent and are approved by the Administrator to determine the nitrogen content of the fuel being fired.

(b) In conducting the performance tests required in § 60.8, the owner or operator shall use as reference methods and procedures the test methods in Appendix A of this part or other methods and procedures as specified in this section, except as provided for in § 60.8(b). Acceptable alternative methods and procedures are given in paragraph (f) of this section.

(c) The owner or operator shall determine compliance with the nitrogen oxides and sulfur dioxide standards in §§ 60.332 and 60.333(a) as follows:

(1) The nitrogen oxides emission rate (NO_x) shall be computed for each run using the following equation:

$$NO_x = (NO_{x_o})(P_r/P_i)^{0.5}\, e^{19(H_o - 0.00633)(288°K/T_a)^{1.53}}$$

where:

NO_x = emission rate of NO_x at 15 percent O and ISO standard ambient conditions, volume percent.

NO_{x_o} = observed NO_x concentration, ppm by volume.

P_r = reference combustor inlet absolute pressure at 101.3 kilopascals ambient pressure, mm Hg.

P_i = observed combustor inlet absolute pressure at test, mm Hg.

H_o = observed humidity of ambient air, g H_2O/g air.

e = transcendental constant, 2.718.

T_a = ambient temperature, °K.

(2) The monitoring device of § 60.334(a) shall be used to determine the fuel consumption and the water-to-fuel ratio necessary to comply with § 60.332 at 30, 50, 75, and 100 percent of peak load or at four points in the normal operating range of the gas turbine, including the minimum point in the range and peak load. All loads shall be corrected to ISO conditions using the appropriate equations supplied by the manufacturer.

(3) Method 20 shall be used to determine the nitrogen oxides, sulfur dioxide, and oxygen concentrations. The

span values shall be 300 ppm of nitrogen oxide and 21 percent oxygen. The NO_x emissions shall be determined at each of the load conditions specified in paragraph (c)(2) of this section.

(d) The owner or operator shall determine compliance with the sulfur content standard in § 60.333(b) as follows: ASTM D 2880–71 shall be used to determine the sulfur content of liquid fuels and ASTM D 1072–80, D 3031–81, D 4084–82, or D 3246–81 shall be used for the sulfur content of gaseous fuels (incorporated by reference—see § 60.17). The applicable ranges of some ASTM methods mentioned above are not adequate to measure the levels of sulfur in some fuel gases. Dilution of samples before analysis (with verification of the dilution ratio) may be used, subject to the approval of the Administrator.

(e) To meet the requirements of § 60.334(b), the owner or operator shall use the methods specified in paragraphs (a) and (d) of this section to determine the nitrogen and sulfur contents of the fuel being burned. The analysis may be performed by the owner or operator, a service contractor retained by the owner or operator, the fuel vendor, or any other qualified agency.

(f) The owner or operator may use the following as alternatives to the reference methods and procedures specified in this section:

(1) Instead of using the equation in paragraph (b)(1) of this section, manufacturers may develop ambient condition correction factors to adjust the nitrogen oxides emission level measured by the performance test as provided in § 60.8 to ISO standard day conditions. These factors are developed for each gas turbine model they manufacture in terms of combustion inlet pressure, ambient air pressure, ambient air humidity, and ambient air temperature. They shall be substantiated with data and must be approved for use by the Administrator before the initial performance test required by § 60.8. Notices of approval of custom ambient condition correction factors will be published in the Federal Register.

ATTACHMENT 2

DRAEGER TUBE ANALYSIS - SULFUR COMPOUND CONCENTRATIONS

DRAEGER TUBE ANALYSIS - SULFUR COMPOUND CONCENTRATIONS

LANDFILL	# OF SAMPLES	HYDROGEN SULFIDE - ppm (actual measurements)	MERCAPTANS - ppm (actual measurements)	
			TUBE READING	ESTIMATED CONCENTRATION*
DADS	1	1	20	18
LAKEVIEW	1	4	20	12
NEW MILFORD	1	20	50	10
DFW	1	25	50	0
GREEN VALLEY	1	4.5	30	21
SIMI VALLEY	1	8	20	4
SETTLER'S HILL	1	9	38	20
HIGH ACRES	4	9 (7,13,6,<1)	24 (20,35,20,<20)	6
OUTER LOOP	4	35 (20,80,20,20)	55 (40,100,40,40)	0
ALTAMONT	1	2	20	16
LAKE COUNTY	1	0	60	60
DURHAM ROAD	1	120	>100	0
TURNKEY	4	35 (14,90,<1,2)	44 (40,>100,17,20)	0
AUSTIN	1	9	35	17
PINNACLE	4	16 (25,10,14,14)	55 (100,37,40,45)	23
EVERGREEN	3	27 (2,60,20)	60 (20,100,60)	6
TAZEWELL	4	all >100	all >200	0
SANDY HILL	1	4	18	10
HUNT ROAD	4	27 (20,50,12,25)	46 (30,>100,20,35)	0
GULF COAST	1	3	14	8
WOODLAND	1	4	10	2
ELDA	1	26	0	0
MON-LIV	1	6	12	0
L&D (MH)	1	25	30	0
(EH)	1	10	20	0
Total Landfill Avg (Range)		21 ppm (0-100)	41 ppm (0-200)	9 ppm (0-60)

*(Per Draeger Detector Tube Handbook) hydrogen sulfide reacts with the mercaptan Draeger tube, with a sensitivity which is twice as high (e.g., 10 ppm H_2S will give the same indication as 20 ppm mercaptan). The numbers in this column are estimated using the assumption that twice the associated H_2S concentration is subtracted from the direct reading on the mercaptan tube, which results in the actual mercaptan concentration.

ATTACHMENT 3

INDIVIDUAL SITE SUMMARY REPORTS

STOWE (POTTSTOWN) POWER PRODUCTION PLANT

DAILY SULFUR MONITORING RESULTS

DATE	DAILY SULFUR AS H_2S (ppm) *	NSPS STANDARD
11/04/89	60	
11/22/89	38	
11/26/89	42	
11/27/89	74	
11/28/89	51	
11/29/89	58	
12/05/89	51	
12/06/89	45	
12/07/89	49	
12/08/89	48	
12/11/89	39	
12/12/89	48	
12/13/89	61	
12/15/89	64	
12/19/89	63	
12/20/89	54	
12/21/89	51	
12/22/89	63	
12/27/89	42	
12/28/89	40	
1/03/90	36	
1/04/90	38	
1/15/90	33	
1/08/90	44	
	—	——
Average to date	50 ppm	8000 ppm

* Analysis performed by Atlantic Analytical Laboratory

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PENNSBURY (G.R.O.W.S.) POWER PRODUCTION PLANT
MORRISVILLE, PENNSYLVANIA

DAILY SULFUR MONITORING RESULTS

DATE	DAILY SULFUR AS H_2S (ppm) *
10/19/89	36
10/20/89	55
10/23/89	69
10/24/89	52
10/25/89	55
10/26/89	49
10/27/89	47
10/30/89	61
10/31/89	60
11/01/89	60
11/02/89	55
11/03/89	60
11/06/89	46
11/07/89	42
11/08/89	51
11/09/89	64
11/10/89	61
11/13/89	49
11/14/89	53
11/15/89	58
11/16/89	60
11/20/89	55
11/21/89	54
11/22/89	49
11/24/89	52
11/27/89	43
11/28/89	65
11/29/89	58
11/30/89	56
12/01/89	43
12/04/89	48
12/05/89	44
12/06/89	42
12/07/89	45
12/08/89	45
12/11/89	43

Pennsbury Continued

DATE	DAILY SULFUR AS H_2S (ppm) *	NSPS STANDARD
12/12/89	62	
12/13/89	61	
12/14/89	69	
12/15/89	61	
12/18/89	46	
12/20/89	54	
12/26/89	58	
12/27/89	58	
12/28/89	59	
1/02/90	55	
1/03/90	53	
1/04/90	46	
1/15/90	51	
1/16/90	60	
1/17/90	55	
1/18/90	60	
1/19/90	54	
1/22/90	58	
1/23/90	54	
1/24/90	58	
1/25/90	47	
1/29/90	65	
1/30/90	54	
2/01/90	43	
2/02/90	52	
2/05/90	48	
2/06/90	54	
2/07/90	55	
	—	——
Average to date	53.7 ppm	8000 ppm

* Analysis performed by Atlantic Analytical Laboratory

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ATTACHMENT 4

WMNA CENTAUR TURBINE - AIR EMISSION TEST SUMMARY

WMNA CENTAUR TURBINE - AIR EMISSION TEST SUMMARY

		NOx			SO2			CO		PARTICULATES
VENDOR GUARANTEE		9.0 lb/hr			not available			12.8 lb/hr		1.5 lb/hr
DATE SITE	TEST	ppm	@15%O2	lb/hr	ppm	@15%O2	lb/hr	ppm	lb/hr	lb/hr
4-96 OMEGA 1 Hills	1	15.80	24.70	4.75	6.50	10.10	2.72			0.11
	2	16.40	21.70	4.93	7.00	9.30	2.93			0.10
	3	16.80	26.00	5.05	5.50	8.20	2.30			0.09
	AVG	16.30	23.80	4.90	6.30	9.20	2.60			0.10
4-96 OMEGA 2 Hills	1	18.60	30.57	5.60	5.50	9.04	2.30			
	2	19.60	30.42	5.98	4.50	6.91	1.89			
	3	20.20	29.21	6.08	4.50	6.51	1.89			
	AVG	19.53	30.07	5.88	4.83	7.49	2.02			
4-96 METRO 1	1	16.80	32.15	5.66	5.00	8.56	2.09			
	2	19.40	39.06	5.64	5.00	10.07	2.09			
	3	17.00	30.56	5.11	6.00	10.79	2.51			
	AVG	18.40	33.93	5.50	5.33	9.80	2.23			
5-96 OMEGA 1 Hills	1				-			25.5	4.67	
	2							29.8	5.46	
	3							30.7	5.62	
	AVG							28.7	5.26	
7-96 GROWS 1	1		23.00	3.90		5.30	1.30			
	2		22.10	3.70		6.10	1.40			
	3		25.10	4.40		6.70	1.60			
	AVG		23.40	4.00		6.00	1.40			
8-96 GROWS 2	1		18.30	2.70		25.40	5.30			
	2		21.80	3.10		24.40	5.00			
	3		6.60	1.00		21.60	4.50			
	AVG		15.60	2.30		23.80	4.90			
9-96 LAKE 1	1	25.10	36.30	6.20	2.20	3.10	0.74			
	2	25.80	36.20	6.60	2.70	3.80	0.98			
	3	24.60	35.40	5.64	2.70	3.90	0.86			
	AVG	25.20	35.80	6.15	2.60	3.60	0.86			
9-96 LAKE 2	1	23.90	36.80	5.62	2.80	4.20	0.92			
	2	22.00	33.30	5.43	0.50	0.80	0.17			
	3	23.90	37.10	6.17	1.00	1.60	0.37			
	AVG	23.50	35.50	5.74	1.40	3.30	0.49			
10-96 METRO 1	1	19.00	28.00	5.50	0.00	0.00	0.00	42.00	7.94	0.11
	2	20.00	32.00	5.80				39.80	7.27	0.43
	3	20.59	31.80	6.10				41.00	7.60	0.11
	AVG	19.86	30.53	5.80				40.87	7.60	0.22
10-96 METRO 2	1	15.44	32.30	4.20	0.00	0.00	0.00	33.00	4.67	0.18
	2	15.13	29.50	4.30				30.00	4.33	0.08
	3	15.25	30.00	4.20				32.10	5.27	1.13
	AVG	15.27	30.60	4.23				31.70	4.76	0.46
7-99 DFW 1	1100 KW		21.00	1.99					1.27	
	1500 KW		23.00	2.28					2.28	
	1600 KW		23.00	3.46			0.80		3.46	
	AVG		22.33	2.58			0.80		2.34	

WMNA CENTAUR TURBINE – AIR EMISSION TEST SUMMARY •

		NOx			SO2			CO		PARTICULATES
VENDOR GUARANTEE		9.0 lb/hr			not available			12.6 lb/hr		1.5 lb/hr
DATE SITE	TEST	ppm	@15%O2	lb/hr	ppm	@15%O2	lb/hr	ppm	lb/hr	lb/hr
7-00 STOWE 1 (Pottstown)	1	17.30	29.80		2.40	4.00	1.45			
	2	17.90	30.80		1.30	2.30	0.68			
	3	17.20	32.70		2.20	3.30	1.27			
	AVG	17.50	31.10		2.00	3.20	1.27			
TOTAL AVERAGE		19.43	28.40	4.71	3.45	7.72	1.80	33.75	4.99	0.26

• UNLESS OTHERWISE SPECIFIED, EMISSION RATES ARE BASED ON MAXIMUM AVAILABLE LOAD CONDITIONS FOR THE TURBINES. COPIES OF THE ANALYTICAL REPORTS ARE AVAILABLE IF ADDITIONAL INFORMATION IS REQUIRED.

ATTACHMENT 5

WASTE MANAGEMENT OF NORTH AMERICA

POWER PRODUCTION PLANTS

SULFUR MONITORING TESTING PROTOCOL

FOR

WASTE MANAGEMENT OF NORTH AMERICA

1.0 INTRODUCTION

Central Disposal Sanitary Landfill Gas Recovery operates 5 gas turbines, rated at (42) x 10^6 btu/hour each. Landfill ga generated by the decomposition of refuse, is utilized as the fuel for combustion in the turbine/ generator set which, in turn produces electricity. The USEPA New Source Performance Standard (NSPS), Subpart GG, Article 60.334 (Attachment 1) applies t all new stationary natural gas turbines greater than 10 million btu/hour. The owner is subject to monitoring the fuel for sulfu content daily.

However, the NSPS also allows the owner to develop a customized monitoring schedule based on the design and operation of the affected facility and the characteristics of the fuel supply. The customized monitoring schedules must be substantiated with data. Waste Management of North America (WMNA) has provided this testing protocol in accordance with §60.334(b)(2). This customized schedule is described below and substantiated with data included in the attachments.

2.0 FACILITY OPERATION

The CDSL Power Production Plant utilizes landfill gas as a fuel for combustion in the turbine generator set which in turn produces electricity. A facility description and flow diagram is described in Appendix A.

3.0 HISTORICAL MONITORING DATA

Waste Management of North America has compiled a substantial database of landfill gas information. Waste Management's sulfur analyses indicate a range of 0-100 ppm total sulfur measured as H_2S, with an average concentration of 21 ppm. Attachment 2 provides analyses for several WMNA sites. These analyses were performed to confirm the low concentrations of total sulfur measured as H_2S. Attachment 3 provides further evidence demonstrating the low sulfur content in landfill gas for two individual site tests. Attachment 4 is an air emission test summary for nine (9) different turbines. [Sulfur dioxide (SO_2) emission rates are based on maximum available load conditions.] These concentrations of sulfur in fuel fall far below the levels found in the types of natural gas for which the NSPS was promulgated.

Routine Monitoring

The CDSL Power Production Facility is equipped with a process gas chromatograph which analyzes the fuel gas for methane, oxygen, carbon dioxide, and nitrogen every three minutes. The facility also monitors the fuel gas temperature, flow, and btu on a continuous basis. There parameters are logged on a computer, and the hourly and daily average report logs are filed on site. In addition to monitoring the fuel gas, equipment operating parameters and electrical generating loads are monitored and filed. Monitoring these parameters ensures optimum system operation.

4.0 CUSTOMIZED SULFUR MONITORING SCHEDULE

Because the fuel gas remains characteristically constant and the plant operates at optimum conditions, sulfur emissions will remain constant. The historical data and WMNA's turbine operation experience demonstrate that a customized sulfur monitoring schedule will provide assurance of compliance with emissions standards. The following schedule is presented for (Agency's Name) approval:

The first year's monitoring is comprised of eight monitoring events.

Initial Monitoring Tests:

a. Initial emission performance test measuring sulfur dioxide (SO_2) as a part of the requisite stack emission testing using USEPA Reference Method 6.

b. During the performance test, a fuel gas sample will be analyzed to determine the total sulfur content of the landfill gas.

During the first six months of operation, sulfur analyses will be performed monthly to determine total sulfur content of the fuel gas. The same test will be performed twice during the next six months of plant operations (one test every three (3) months). This would conclude the eight monitoring events. Annual fuel gas analyses for total sulfur will be conducted thereafter. All sulfur monitoring will be performed by test methods referenced in §60.335, or an accepted test method.

5.0 RECORDING

Records of sample analysis and fuel supply pertinent to this customized monitoring schedule will be retained at the CDSL Power Production Facility and will be available for inspection by personnel of Federal, State, and local air pollution control agencies.

Should any sulfur analysis indicate noncompliance with 40 CFR 60.333, the Plant owner will notify the State Air Control Board of the emissions, and the custom schedule shall be re-examined by the State Agency.

JMD:jf
Attachments

Florida Department of Environmental Regulation

Southeast District ● 1900 S. Congress Ave., Suite A ● West Palm Beach, Florida 33406 ● 407-964-9668

Bob Martinez, Governor Dale Twachtmann, Secretary John Shearer, Assistant Secretary
Scott Benyon, Deputy Assistant Secretary

SEP 4 1990

NOTICE OF PERMIT

Broward County
AP - Waste Management Inc. of Florida
CDSL Power Production Facility, Five Landfill Gas-Fired Turbine/Generator Units

Mr. James E. O'Connor
Waste Management Inc. of Florida
500 Cypress Creek Road, Suite 300
Ft. Lauderdale, Florida 33309

Dear Mr.O'Connor:

Enclosed is Permit Number AO 06-183180 to operate an air pollution source issued pursuant to Section 403.087, Florida Statutes.

Persons whose substantial interests are affected by this permit have a right, pursuant to Section 120.57, Florida Statutes, to petition for an administrative determination (hearing) on it. The petition must conform to the requirements of Chapters 17-103 and 28-5.201, FAC, and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, FL 32399-2400, within fourteen (14) days of receipt of this notice. Failure to file a petition within the fourteen (14) days constitutes a waiver of any right such person has to an administrative determination (hearing) pursuant to Section 120.57, Florida Statutes. This permit is final and effective on the date filed with the Clerk of the Department unless a petition is filed in accordance with this paragraph or unless a request for extension of time in which to file a petition is filed within the time specified for filing a petition and conforms to Rule 17-103.070, FAC. Upon timely filing of a petition or a request for an extension of time this permit will not be effective until further Order of the Department.

When the Order (Permit) is final, any party to the Order has the right to seek judicial review of the Order 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, FL 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 Final Order is filed with the Clerk of the Department.

In addition, please be advised that some processes generate hazardous wastes. Please consult 40 C.F.R. Parts 260-271 and Chapter 17-730, F.A.C. for specific rules and regulations applicable to hazardous waste handlers. Attached for your use is a document entitled "Highlights of Hazardous Waste Regulations" which outlines typical compliance items applicable to various hazardous waste generators/facilities.

Executed in West Palm Beach, Florida

STATE OF FLORIDA
DEPARTMENT OF REGULATION

J. Scott Benyon
Deputy Assistant Secretary
1900 South Congress Ave., Suite A
West Palm Beach, FL 33406
407/433-2650

JSB:SSB/k58

cc: Broward County Environmental Quality Control Board
Harry Bush, Jr., P.E.

DER Permit Number AO 06-183180

CERTIFICATE OF SERVICE

This is to certify that this NOTICE OF PERMIT and all copies were mailed before the close of business on SEP 4 1990 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGEMENT FILED, on this date, pursuant to §120.52(10), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Phyllis D. Kerr
Clerk

SEP 4 1990
Date

Florida Department of Environmental Regulation

Southeast District • 1900 S. Congress Ave., Suite A • West Palm Beach, Florida 33406 • 407-964-9668

Bob Martinez, Governor Dale Twachtmann, Secretary John Shearer, Assistant Secretary
Scott Benyon, Deputy Assistant Secretary

PERMITTEE:
Mr. James E. O'Connor
Waste Management Inc. of Florida
500 Cypress Creek Road , Suite 300
Ft. Lauderdale, Florida 33309

I.D. NUMBER: 50/BRO/06/2094
PERMIT/CERTIFICATION NUMBER: AO 06-183180
DATE OF ISSUE: SEP 4 1990
EXPIRATION DATE: October 1, 1995
COUNTY: Broward
LATITUDE/LONGITUDE: 26°17'28"N/80°10'00"W
UTM: Zone 17; 583.19 Km. E; 2908.03 Km. N
PROJECT: CDSL Power Production Facility
Five Landfill Gas-Fired Turbine/
Generator Units

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule 17-2, and in conformance with all existing regulations of the Florida Department of Environmental Regulation. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

OPERATE: An air pollution source consisting of a power production facility. The source utilizes five turbine/generator units combusting a total of 10.0 mcfd of landfill gas to generate approximately 16.0 MW of electricity with a total facility heat input rate of 240 MM BTU/hr.

IN ACCORDANCE WITH: Certificate of Completion of Construction and Application to Operate Air Pollution Sources received July 6, 1990; Permit No. AC 06-152683 issued November 10, 1988 and amended January 25, 1990, September 8, 1989 and January 19, 1989; letters received from Waste Management on June 26, 1990, March 14, 1990, November 11, 1989, October 3, 1989, August 21, 1989, December 19, 1988, August 18, 1988, August 12, 1988 and Application to Construct Air Pollution Sources received July 28, 1988 (none are attached).

LOCATED AT: 3000 N.W 48th Street, Pompano Beach, Broward County, Florida.

TO SERVE: An electrical generating facility (SIC # 4931).

SUBJECT TO: General Conditions 1-14 and Specific Conditions 1-13.

DER Form 17-1.201 (58)
Effective November 30, 1982

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, F.S. 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), F.S., 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.

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 reasonable times, 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 the permit, the permittee shall immediately notify and provide the Department with the following information:

   (a) A description of and cause of noncompliance; and

   (b) The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

PERMITTEE:
Mr. James E. O'Connor
Waste Management Inc. of Florida
Ft. Lauderdale, Florida

I.D. NUMBER: 50/BRO/06/2094
PERMIT/CERTIFICATION NUMBER: AO 06-183180
DATE OF ISSUE: SEP 4 1990
EXPIRATION DATE: October 1, 1995

SPECIFIC CONDITIONS:

1. Compliance testing shall be conducted for the sources covered by this permit in accordance with the methods specified below and the following schedule.

Testing Schedule:

Turbines:

Pollutant	Frequency
SO_2	Annual, by May 31, 1991
Visible Emissions	Annual, by May 31, 1991
NO_x	Annual, by May 31, 1991
CO	Every 2.5 years, by November 30, 1991
VOC	Every 2.5 years, by November 30, 1991
PM	If Visible Emissions exceed 5% opacity (6-minute average)

Flares:

Pollutant	Frequency
Visible Emissions	Annual, by May 31, 1991

2. Emission limiting standards are as follows:

In accordance with Permit No. AC 06-152683 issued November 10, 1988:

a) The maximum heat input to each turbine shall not exceed 40 mm BTU/hr., based on a heat content of 480 BTU/cf of landfill gas, and a utilization rate of 1,400 scfm per turbine (8,400 scfm for the facility).

b) The maximum allowable emissions from this project are:

Pollutant	ppm*	Per Unit Lbs./hr.	Per Unit TPY	Facility Lbs./hr.	Facility TPY
NO_x**	51.0	9.0	39.4	45	197
SO_2	32.0	25.93	113.45	129.65	567.25
CO		8.6	37.7	43	188.5
PM		0.263	1.2	1.315	6
HC***		8.9	39.0	44.5	195.0

Visible emissions shall not exceed 5% opacity. (six-minute average).

* The concentration corrected to 15% O_2 is not represented on a dry basis, however, the projected moisture content of the exhaust stream is about 4%.

** The NO_x and SO_2 emissions are based on the upper range of potential emissions from a landfill gas combustion.

*** HC is the unburned hydrocarbon content in the exhaust stream. The non-methane VOCs are expected to be negligible.

c) No objectionable odors resulting from this project are allowed off plant property (FAC Rule 17-2.620).

d) The permittee shall comply with all applicable provisions of F.A.C. Chapter 17-2 and 17-4, and 40 CFR 60 Subpart GG (1987 version).

PERMITTEE:
Mr. James E. O'Connor
Waste Management Inc. of Florida
Ft. Lauderdale, Florida

I.D. NUMBER: 50/BRO/06/2094
PERMIT/CERTIFICATION NUMBER: AO 06-183180
DATE OF ISSUE: SEP 4 1990
EXPIRATION DATE: October 1, 1995

SPECIFIC CONDITIONS:

3. The compliance test report shall include results of tests by the following methods:

Source/Emission Point	Pollutant	Test Method
Turbine & Exhaust:		
	SO_2	EPA Method 6
	VE	EPA Method 9
	NO_x	EPA Method 20
	CO	EPA Method 10
	VOC	EPA Method 25A or 25B
	PM	EPA Method 5
Flare:		
	VE	EPA Method 9

The above EPA reference methods are prescribed in 40 CFR 60, Appendix A (1987 versions). Other DER-approved test methods may be used only after prior Department approval.

4. Testing of emissions should be conducted using the fuel and/or process input which are expected to result in the highest emissions and within ten percent (10%) of the rated capacity of the source. Otherwise the Department may require the test to be repeated or modify the permit to reflect tested rates and/or fuels.

5. The Department shall be notified of expected test dates at least fifteen (15) days prior to compliance testing. Compliance test results shall be submitted to the Department within 30 days after completion of the tests.

6. On or before March 1 of each calendar year, a completed DER Form 17-1.202(6), Annual Operations Report Form for Air Emissions Sources shall be submitted to the Department.

7. The turbines may operate continuously (i.e., 8,760 hours/year).

8. Only landfill gas shall be fired into the turbines. Prior DER approval shall be obtained before firing any other fuels.

9. Copies of all reports, tests, notifications or other submittals required by this permit shall be submitted to both the Department of Environmental Regulation, Southeast District Office and Broward County Environmental Quality Control Board.

10. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to the Southeast District Office.

11. The operation of this facility shall be in accordance with the permit applications, plans, documents, and reference material submitted unless otherwise stated in the Preliminary Determination & Technical Evaluation or the General and Specific Conditions herein.

12. Landfill gas shall be vented to the flare system during the Power Production Facility's start-up, shutdown, or non-operation. Flare Units 1 and 2 (enclosed flares), and Unit 3 (open flare) shall meet the applicable requirements of 40 CFR 60, General Control Device Requirements. Visible Emissions shall not exceed 5% opacity.

PERMITTEE:
Mr. James E. O'Connor
Waste Management Inc. of Florida
Ft. Lauderdale, Florida

I.D. NUMBER: 50/BRO/06/2094
PERMIT/CERTIFICATION NUMBER: AO 06-183180
DATE OF ISSUE: SEP 4 1990
EXPIRATION DATE: October 1, 1995

SPECIFIC CONDITIONS:

13. The permittee shall be aware of and operate under the attached "General Permit Conditions #1 thru 14.". General Permit Conditions are binding upon the permittee and enforceable pursuant to Chapter 403 of the Florida Statutes.

Issued this 4th day of September, 1990

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

J. Scott Benyon
Deputy Assistant Secretary

DER Form 17-1.201(58)
Effective November 30, 1982

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

PERMITTEE:
Waste Management, Inc. of Florida
500 Cypress Creek Road
Suite 300
Fort Lauderdale, FL 33309

Permit Number: AC 06-152683
Expiration Date: October 1, 1989
County: Broward
Latitude/Longitude: 26° 17' 28"N
80° 10' 00"W
Project: CDSL Power Production Facility, Six Landfill Gas-Fired Turbine/Generator Units

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code (F.A.C.) Rules 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 drawing(s), 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 a power production facility consisting of six turbine/generator units, combusting a total of 12.0 mcfd of landfill gas to generate about 19.2 MW of electricity. The total facility heat input rate will be 240 MMBtu/hr. The facility will be located near a landfill in Pompano Beach, Broward County, Florida.

The UTM coordinates for this facility are Zone 17, 583.19 km East and 2908.03 km North.

Construction shall be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the Preliminary Determination and Technical Evaluation or the General and Specific Conditions herein.

Attachments:

1. Waste Management's application package dated July 27, 1988.
2. Waste Management's letter received August 12, 1988.
3. Waste Management's letter received August 18, 1988.
4. Preliminary Determination dated October 20, 1988.

PERMITTEE:
Waste Management, Inc.
of Florida

Permit Number: AC 06-152683
Expiration Date: October 1, 1989

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

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. Nor 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 does not constitute 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, plant or aquatic life or property and penalties therefore caused by the construction or operation of this permitted source, 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.

GENERAL CONDITIONS:

6. The permittee shall at all times 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, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

a. Having access to and copying any records that must be kept under the conditions of the permit;

b. Inspecting the facility, equipment, practices, or operations regulated or required under this pe: it; and

c. Sampling or monitoring 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 notify and provide the Department with the following information:

a. a description of and cause of non-compliance; and

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

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or revocation of this permit.

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 arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

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 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any noncompliance of the permitted activity until the transfer is approved by the Department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

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

14. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the Department, during the course of any unresolved enforcement action.

GENERAL CONDITIONS:

b. The permittee shall retain 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), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be 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 date(s) analyses were performed;
- the person responsible fo· 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 submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. The turbines may operate continuously (i.e., 8760 hrs/yr).

2. Only landfill gas shall be fired into the turbines. Prior DER approval shall be obtained before firing any other fuels.

3. The maximum heat input to each turbine shall not exceed 40 MMBTU/hr, based on a heat content of 480 BTU/cf of landfill gas, and a utilization rate of 1400 scfm per turbine (8400 scfm for the facility).

SPECIFIC CONDITIONS:

4. The maximum allowable emissions from this project are:

Pollutant	ppm *	Per Unit lbs/hr	Per Unit TPY	Facility lbs/hr	Facility TPY
NOx **	51.0	9.0	39.4	54.0	236.5
SO_2	8.8	7.13	31.2	42.8	187.4
CO	-	8.6	37.7	51.6	226.0
PM	-	0.263	1.2	1.6	6.9
HC ***	-	8.9	39.0	53.4	234.0

Visible emissions shall not exceed 5% opacity (six min. avg).

* The concentration corrected to 15% O_2 is not represented on a dry basis, however, the projected moisture content of the exhaust stream is about 4%.

** The NOx and SO_2 emissions are based on the upper range of potential emissions from landfill gas combustion.

*** HC is the unburned hydrocarbon content in the exhaust stream. The non-methane VOCs are expected to be negligible.

5. Initial and annual compliance tests shall be conducted as follows:

a. EPA Method 6, for SO_2
b. EPA Method 9, for visible emissions
c. EPA Method 20, for NOx

Initial compliance tests for CO and VOCs shall be conducted as follows:

d. EPA Method 10, for CO
e. EPA Method 25, for VOC

The above EPA reference methods are as prescribed in 40 CFR 60, Appendix A (1987 version). Other DER approved test methods may be used only after prior Departmental approval.

A PM compliance test using EPA Method 5 shall be required if warranted by test results of EPA Method 9.

6. If a flare is to be used at the facility to burn landfill gas, a permit shall be obtained for it from the Bureau of Air Quality Management.

SPECIFIC CONDITIONS:

7. If the compliance test for VOCs indicates emissions greater than 3.8 lbs/hr per unit (22.8 lbs/hr, 100 TPY for the facility) than this project will have to be re-evaluated for VOCs, in accordance with F.A.C. Rule 17-2.510, Nonattainment Review Requirements.

8. No objectionable odors resulting from this project shall be allowed off plant property (F.A.C. Rule 17-2.620).

9. A minimum of 15 days prior notification of the compliance tests shall be given to DER's Southeast District office. The compliance test results shall be submitted to the district office within 30 days after completion of the tests.

10. The permittee shall comply with all applicable provisions of F.A.C. Chapters 17-2 and 17-4, and 40 CFR 60 Subpart GG (1987 version).

11. The construction shall reasonably conform to the plans and schedule submitted in the application. If the permittee is unable to complete construction on schedule, the Department must be notified in writing 60 days prior to the expiration of the construction permit and submit a new schedule and request for an extension of the construction permit (Rule 17-2, F.A.C.).

12. To obtain a permit to operate, the permittee must demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit, including the application fee, compliance test results and Certificate of Completion, to DER's Southeast District office 90 days prior to the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms of the construction permit until its expiration date. Operation beyond the construction permit expiration date requires a valid permit to operate (Rules 17-2 and 17-4, F.A.C.).

13. If the construction permit expires prior to the permittee requesting an extension or obtaining a permit to operate, then all activities at the project must cease and the permittee must apply for a new permit to construct which can take up to 90 days to process a complete application (Rule 17-4, F.A.C.).

PERMITTEE:
Waste Management, Inc.
of Florida

Permit Number: AC 06-152683
Expiration Date: October 1, 1989

SPECIFIC CONDITIONS:

14. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to DER's Southeast District office.

Issued this 10 day of November, 1988

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Dale Twachtmann

Dale Twachtmann, Secretary

Certificate of Analysis No. G0727499

Company: WASTE MANAGEMENT, INC.
Location: CDSL GAS RECOVERY PLANT
Field: POMPANO BEACH, FLORIDA
Sample of: INLET GAS
Sample Date 7-23-90
Sampled by: J. BLISSETT (SPL)
For: WASTE MANAGEMENT, INC.
3001 BUTTERFIELD ROAD
OAKBROOK, ILL. 60521
Attention: MIKE NIEMANN

COMPONENT	OUTLET OF DRY FILTER	INLET TO DRY FILTER	INLET TO TURBINE	
NITROGEN	7.46%	12.83%	5.14%	TEST #1
METHANE	50.53%	47.65%	51.86%	TEST #1
CARBON DIOXIDE	42.01%	39.52%	43.01%	TEST #1
HYDROGEN SULFIDE	1947PPM	2436PPM	2477PPM	TEST #1
	2173PPM	2447PPM	2501PPM	TEST #2
CARBONYL SULFIDE	0.5PPM	0.7PPM	0.8PPM	TEST #1
	0.6PPM	0.8PPM	0.8PPM	TEST #2
CARBON DISULFIDE	0.5PPM	0.7PPM	0.7PPM	TEST #1
	0.5PPM	0.6PPM	0.7PPM	TEST #2
METHYL MERCAPTAN	15.06PPM	28.0PPM	29.0PPM	TEST #1
	20.9 PPM	28.0PPM	30.5PPM	TEST #2

----------STANDARD AREA COUNTS USED FOR CALIBRATIONS--------

HYDROGEN SULFIDE	1235PPM	AREA COUNTS USED	32,513,500
CARBONYL SULFIDE	1PPM	AREA COUNTS USED	13,362
CARBON DISULFIDE	1PPM	AREA COUNTS USED	384,340
	50PPM	AREA COUNTS USED	9,218,700
METHYL MERCAPTANS	50PPM	AREA COUNTS USED	521,570

SPL, Incorporated

Wayne Boling

CERTIFICATE OF ANALYSIS NO. L- 1

COMPANY: WASTE MANAGEMENT INC.
LOCATION: CDSL GAS RECOVERY
FIELD: POMPANO BEACH FLORIDA
SAMPLE OF: GAS
SAMPLE POINT: D/S OF DRY FILTER
CONDITIONS: 0 PSIG AT 0 DEG. F.
SAMPLED BY: J.BLISSETT (SPL)
SUBMITTED BY: J. BLISSETT (SPL)
SAMPLE DATE: 7-23-90 AT

FOR: WASTE MANAGEMENT INC.
3001 BUTTERFIELD ROAD
OAKBROOK ILL. 60521
MIKE NIEMANN

ANALYSIS	MOL. %	GPM @ 15.025 PSIA
NITROGEN	7.46	
CARBON-DIOXIDE	42.01	
METHANE	50.53	
ETHANE	0.00	0.000
PROPANE	0.00	0.000
ISO-BUTANE	0.00	0.000
N-BUTANE	0.00	0.000
ISO-PENTANE	0.00	0.000
N-PENTANE	0.00	0.000
HEXANE	0.00	0.000
HEPTANES PLUS	0.00	0.000
	100.00	0.000

SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1) .9925

Calculated B.T.U./cu. ft. @ 15.025 psia and 60 deg. F.
Dry basis 523
Wet basis 514

METHYL SULFIDE = 0.5 PPM
CARBON DISULFIDE = 0.5 PPM
ETHYL MERCAPTAN = 0 PPM
PROPYL MERCAPTAN = 0 PPM
HYDROGEN SULFIDE = 1947 PPM
SULFUR DIOXIDE = 0 PPM
METHYL MERCAPTAN = 15.06 PPM
BUTYL MERCAPTAN = 0 PPM

REMARKS:
REMARKS:

Southern Petroleum Laboratories, Inc.

CERTIFICATE OF ANALYSIS NO. L- 2

COMPANY: WASTE MANAGEMENT INC.
LOCATION: CDSL GAS RECOVERY
FIELD: POMPANO BEACH FLORIDA
SAMPLE OF: GAS
SAMPLE POINT: D/S OF DRY FILTER
CONDITIONS: 0 PSIG AT 0 DEG. F.
SAMPLED BY: JOHNNY BLISSETT (SPL)
SUBMITTED BY: JOHNNY BLISSETT (SPL)
SAMPLE DATE: 7-23-90 AT

FOR: WASTE MANAGEMENT INC.
3001 BUTTERFIELD ROAD
OAKBROOK ILLINOIS 60521
MIKE NIEMANN

ANALYSIS	MOL. %	GPM @ 15.025 PSIA
NITROGEN	7.46	
CARBON-DIOXIDE	42.01	
METHANE	50.53	
ETHANE	0.00	0.000
PROPANE	0.00	0.000
ISO-BUTANE	0.00	0.000
N-BUTANE	0.00	0.000
ISO-PENTANE	0.00	0.000
N-PENTANE	0.00	0.000
HEXANE	0.00	0.000
HEPTANES PLUS	0.00	0.000
	100.00	0.000

SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1) .9925

Calculated B.T.U./cu. ft. @ 15.025 psia and 60 deg. F.
Dry basis 523
Wet basis 514

CARBONYL SULFIDE = 0.6 PPM
CARBON DISULFIDE = 0.5 PPM
ETHYL MERCAPTAN = 0 PPM
PROPYL MERCAPTAN = 0 PPM
HYDROGEN SULFIDE = 2173 PPM
SULFUR DIOXIDE = 0 PPM
METHYL MERCAPTAN = 20.9 PPM
BUTYL MERCAPTAN = 0 PPM

REMARKS:
REMARKS:

CERTIFICATE OF ANALYSIS NO. L- 3

COMPANY: WASTE MANAGEMENT INC.
LOCATION:
FIELD: POMPANO BEACH FLORIDA
SAMPLE OF: GAS
SAMPLE POINT: INLET TO TURBINE
CONDITIONS: 0 PSIG AT 0 DEG. F.
SAMPLED BY: JOHNNY BLISSETT (SPL)
SUBMITTED BY: JOHNNY BLISSETT (SPL)
SAMPLE DATE: 7-23-90 AT

FOR: WASTE MANAGEMENT INC.
3001 BUTTERFIELD ROAD
OAKBROOK ILLINOIS 60521
MIKE NIEMANN

ANALYSIS	MOL. %	GPM @ 15.025 PSIA
NITROGEN	12.83	
CARBON-DIOXIDE	39.52	
METHANE	47.65	
ETHANE	0.00	0.000
PROPANE	0.00	0.000
ISO-BUTANE	0.00	0.000
N-BUTANE	0.00	0.000
ISO-PENTANE	0.00	0.000
N-PENTANE	0.00	0.000
HEXANE	0.00	0.000
HEPTANES PLUS	0.00	0.000
	100.00	0.000

SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1) .9905

Calculated B.T.U./cu. ft. @ 15.025 psia and 60 deg. F.
Dry basis 496
Wet basis 485

CARBONYL SULFIDE = 0.7 PPM
CARBON DISULFIDE = 0.5 PPM
ETHYL MERCAPTAN = 0 PPM
PROPYL MERCAPTAN = 0 PPM
HYDROGEN SULFIDE = 2436 PPM
SULFUR DIOXIDE = 0 PPM
METHYL MERCAPTAN = 28 PPM
BUTYL MERCAPTAN = 0 PPM

REMARKS:
REMARKS:

Southern Petroleum Laboratories, Inc.

CERTIFICATE OF ANALYSIS NO. -- 4

COMPANY: WASTE MANAGEMENT INC.
LOCATION: CDSL GAS RECOVERY
FIELD: POMPANO BEACH FLORIDA
SAMPLE OF: GAS
SAMPLE POINT: INLET TO DRY FILTER
CONDITIONS: 0 PSIG AT 0 DEG. F.
SAMPLED BY: JOHNNY BLISSETT (SPL)
SUBMITTED BY: JOHNNY BLISSETT (SPL)
SAMPLE DATE: 7-23-90 AT

FOR: WASTE MANAGEMENT INC.
3001 BUTTERFIELD ROAD
OAKBROOK ILLINOIS 60521
MIKE NIEMANN

ANALYSIS	MOL. %	GPM @ 15.025 PSIA
NITROGEN	12.83	
CARBON-DIOXIDE	39.52	
METHANE	47.65	
ETHANE	0.00	0.000
PROPANE	0.00	0.000
ISO-BUTANE	0.00	0.000
N-BUTANE	0.00	0.000
ISO-PENTANE	0.00	0.000
N-PENTANE	0.00	0.000
HEXANE	0.00	0.000
HEPTANES PLUS	0.00	0.000
	100.00	0.000

SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1) .9905

Calculated B.T.U./cu. ft. @ 15.025 psia and 60 deg. F.
Dry basis 493
Wet basis 485

CARBONYL SULFIDE = 0.8 PPM
CARBON DISULFIDE = 0.6 PPM
ETHYL MERCAPTAN = 0 PPM
PROPYL MERCAPTAN = 0 PPM
HYDROGEN SULFIDE = 2447 PPM
SULFUR DIOXIDE = 0 PPM
METHYL MERCAPTAN = 28 PPM
BUTYL MERCAPTAN = 0 PPM

REMARKS:
REMARKS:

Southern Petroleum Laboratories, Inc.

CERTIFICATE OF ANALYSIS NO. L- 5

COMPANY: WASTE MANAGEMENT INC.
LOCATION: CDSL GAS RECOVERY
FIELD: POMPANO BEACH FLORIDA
SAMPLE OF: GAS
SAMPLE POINT: INLET TO TURBINE
CONDITIONS: 0 PSIG AT 0 DEG. F.
SAMPLED BY: JOHNNY BLISSETT (SPL)
SUBMITTED BY: JOHNNY BLISSETT (SPL)
SAMPLE DATE: 7-23-90 AT

FOR: WASTE MANAGEMENT INC.
3001 BUTTERFIELD ROAD
OAKBROOK ILLINOIS 60521
MIKE NIEMANN

ANALYSIS	MOL. %	GPM @ 15.025 PSIA
NITROGEN	5.14	
CARBON-DIOXIDE	43.01	
METHANE	51.85	
ETHANE	0.00	0.000
PROPANE	0.00	0.000
ISO-BUTANE	0.00	0.000
N-BUTANE	0.00	0.000
ISO-PENTANE	0.00	0.000
N-PENTANE	0.00	0.000
HEXANE	0.00	0.000
HEPTANES PLUS	0.00	0.000
	100.00	0.000

SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1) .9927

Calculated B.T.U./cu. ft. @ 15.025 psia and 60 deg. F.
Dry basis 537
Wet basis 528

CARBONYL SULFIDE = 0.8 PPM
CARBON DISULFIDE = 0.7 PPM
ETHYL MERCAPTAN = 0 PPM
PROPYL MERCAPTAN = 0 PPM
HYDROGEN SULFIDE = 2477 PPM
SULFUR DIOXIDE = 0 PPM
METHYL MERCAPTAN = 29 PPM
BUTYL MERCAPTAN = 0 PPM

REMARKS:
REMARKS:

Southern Petroleum Laboratories, Inc.

ANALYSIS — MOL. % — GPM @ 15.025 PSIA

	MOL. %	GPM @ 15.025 PSIA
NITROGEN	5.14	
CARBON-DIOXIDE	43.01	
METHANE	51.85	
ETHANE	0.00	0.000
PROPANE	0.00	0.000
ISO-BUTANE	0.00	0.000
N-BUTANE	0.00	0.000
ISO-PENTANE	0.00	0.000
N-PENTANE	0.00	0.000
HEXANE	0.00	0.000
HEPTANES PLUS	0.00	0.000
	100.00	0.000

SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1) .8927

Calculated B.T.U./cu. ft. @ 15.025 psia and 60 deg. F.
Dry basis 537
Wet basis 528

CARBONYL SULFIDE = 0.9 PPM — HYDROGEN SULFIDE = 2501 PPM
CARBON DISULFIDE = 0.7 PPM — SULFUR DIOXIDE = 0 PPM
ETHYL MERCAPTAN = 0 PPM — METHYL MERCAPTAN = 30.5 PPM
PROPYL MERCAPTAN = 0 PPM — BUTYL MERCAPTAN = 0 PPM

REMARKS:
REMARKS:

Southern Petroleum Laboratories, Inc.

File Copy

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

October 12, 1990

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

RECEIVED
OCT 17 1990
DER - BAQM

Re: CDSL - Power Production Facility
DER Permit # AC 06-152683

Dear Mr. Fancy;

It was recently brought to my attention that the CDSL - Power Production Facility operates above the maximum heat input specified under specific condition #3 of the referenced permit. The permit condition required that the heat input to each turbine not exceed 40 MMBTU/hr, based on a heat content of 480 BTU/cf of landfill gas and a utilization rate of 1400 scfm per turbine.

The above operation data was submitted with the application to construct as an average from the existing plants operated by Waste Management, Inc. across the United States. It is the intent of this letter to clarify that the values are relative to certain operating conditions rather than a fixed number.

I have enclosed part of section 8.7.6 of volume II of the maintenance manual for the Solar/Centaur Turbines which describes maximum output power, flow and temperature. The curves provided can be used to describe the fuel flow relative to the inlet air temperature. The relationship between inlet air temperature is inversely proportional to the fuel flow, ie. when the temperature decreases, the fuel flow increases. Typically the landfill would experience ambient air temperatures of approximately 80° F which relates to 40 MMBTU/lb at full load output. The fuel flow of 40 MMBTU/hr corresponds to the permit condition. However, we have experienced temperatures as low as approximately 30° F during last December which relates to a maximum fuel flow of 45 MMBTU/hr at full load output.

The landfill gas at the Central Disposal Sanitary Landfill in Pompano Beach is richer, more methane, than the average at approximately 540 BTU/cf. This is due to more moisture within the landfill than experienced in non-tropical areas. Because the utilization rate is inversely proportional to the heat content, CDSL experiences a lower utilization rate than average. This relation is shown below using typical operation levels at CDSL.

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073

A Waste Management Company

Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Attn: Mr. Clair Fancy

$$\text{Utilization Rate} = \frac{\text{Fuel Flow}}{\text{Heat Content X 60 min/hr}}$$

where: Fuel Flow = 40 MMBTU/hr @ 80°F
Heat Content = 540 BTU/cf ±

Utilization Rate = 1235 cfm

The information provided in this letter is to show you that the operating conditions are variable and should not be fixed to a maximum or minimum value. For purposes of permitting, the following conditions are provided:

* The ambient air temperature in South Florida could approach 0° F under extreme conditions which would result in a fuel flow of approximately 48 MMBTU/hr at full load output taken from figure 8.7.1 enclosed. The range of the chart shows the fuel flow will vary from approximately 37 MMBTU/hr at 125° F to approximately 51 MMBTU/hr at -20° F at full load output.

* Rule of thumb for landfill gas is 100 BTU/cf for every 10% of methane in the landfill gas. This comes from the fact that pure methane or 100% methane has a heat content of approximately 1010 BTU/cf. From experience, methane will typically not exceed 60% of the landfill gas, therefore, maximum heat content of landfill gas would approximate 600 BTU/cf.

* The utilization rate is directly related to the fuel flow and indirectly related to the heat content. Based on machine testing performed during the start up, we achieved a maximum utilization rate of 1550 cfm by reducing the BTU input and maximizing fuel flow.

This letter serves as a request to modify the construction permit for the CDSL - Power Production Facility, Specific Condition #3 to include this information. If you have any questions, please feel free to call either myself or Jim Barrett at 305/977-9551.

Sincerely,

Sarah C. Solano

Sarah C. Solano
Site Engineer

cc: Harvey Bush
Stephanie Brooks, DER Air
Jim Barrett
M. Baig
Sherri Nachtigal, WMNA Env. Audit
Daniela Banu, EQCB Air

8.7.6 Use of Curves

MAXIMUM OUTPUT POWER, FLOW, AND TEMPERATURE

This set of curves (Figure 8.7.1) may be used to determine the maximum continuous and standby duty output power in kilowatts available at a given engine inlet (ambient) air temperature. In addition, fuel flow in Millions of Btu per hour (MMBtu/hr), together with exhaust flow in thousands of pounds per hour, and temperature in degrees Fahrenheit may be obtained for a wide range of power outputs.

To find the maximum available output power in kilowatts, enter at the bottom of the applicable graph the appropriate engine inlet air temperature, and move vertically until the pertinent maximum continuous power line is intersected. Then move left horizontally, and read the corresponding output kilowatts power values. The matching fuel flow, exhaust flow, and temperature readings are then obtained by interpolating between the constant flows and temperature lines, if the intersection point does not fall exactly on any one line.

CENTAUR T4500 GENERATOR SET
REF: CS-26216.SHT.1
LANDFILL GAS:(55% CH4. 45% CO2)

- CONTINUOUS DUTY
- NOMINAL PERFORMANCE
- RELATIVE HUMIDITY 60%
- ELEVATION - SEA LEVEL
- ZERO EXTERNAL DUCT PRESSURE LOSSES
- GENERATOR EFFICIENCY 96%
- GEARBOX EFFICIENCY 96%

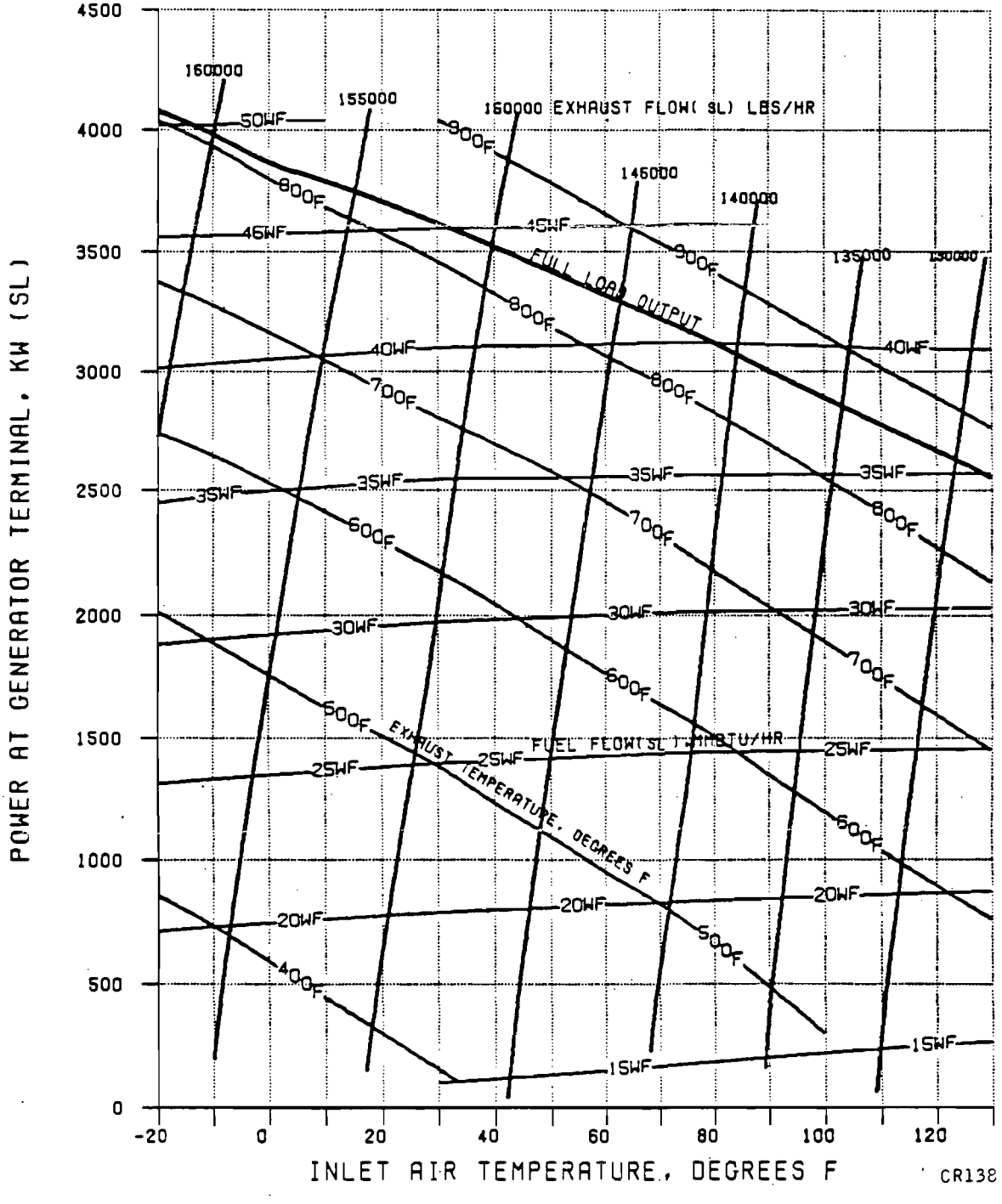

Figure 8.7.1. Output Power, Fuel Flow, Exhaust Flow, and Exhaust Temperature - Landfill Gas Fuel Operation

● **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:	4. Article Number
Mr. James E.O'Conner Waste Management, Inc. of Fla. 500 Cypress Creek Rd., Suite 300 Ft. Lauderdale, FL 33309	P 938 762 823
	Type of Service: ☐ Registered ☐ Insured ☒ Certified ☐ COD ☐ Express Mail ☐ Return Receipt for Merchandise
	Always obtain signature of addressee or agent and DATE DELIVERED.
5. Signature — Address X	8. Addressee's Address *(ONLY if requested and fee paid)*
6. Signature — Agent X Julianne Sonsu	
7. Date of Delivery 2/1	

PS Form **3811**, Mar. 1988 ★ U.S.G.P.O. 1988-212-865 **DOMESTIC RETURN RECEIPT**

P 938 762 823

RECEIPT FOR CERTIFIED MAIL
NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to Mr. James E. O'Conner, Waste	
Street and No. Mgmt. of F 500 Cypress Creek Rd., St. 300	
P.O., State and ZIP Code Ft. Lauderdale, FL 33309	
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: 1-30-90 Permit: AC 06-152683	

PS Form 3800, June 1985

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

January 25, 1990

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. James E. O'Conner
Waste Management, Inc., of Florida
500 Cypress Creek Road, Suite 300
Ft. Lauderdale, Florida 33309

Dear Mr. O'Conner:

Re: Permit Amendment
CDSL Facility, Six Turbine Generator Units
Permit No. AC 06-152683

The Department has reviewed your request dated November 7, 1989 to amend the above referenced permit's sulfur dioxide emission concentration, and change the compliance test method requirement for volatile organic compounds.

The Department is in agreement with your request and so the following shall be changed and added to the permit:

Specific Condition No. 4 Change for SO_2 Concentration

	Pollutant	ppm*
From:	SO_2	8.8
To:	SO_2	32

Specific Condition 5.e. Change

From: EPA Method 25, for VOC

To: EPA Method 25 or 25A, for VOCs

Attachment to be Added

7. Waste Management's letter received November 11, 1989.

This letter must be attached to the construction permit No. AC 06-152683, and shall become a part of that permit.

Sincerely,

Dale Twachtmann
Secretary

DT/plm

c: S. Brooks, SE District
G. Carlson, Broward County

Attachment 7

BEST AVAILABLE COPY

Waste Management of North America, Inc.
Southeast Region
500 Cypress Creek Road West • Fort Lauderdale, Florida 33309
Suite 30[illegible] • 305 771 [illegible]

RECEIVED
NOV 16 1989
DER - BAQM

November 7, 1989

Mr. Pradeep Raval
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Re: CDSL-Power Production Facility
Permit # AC 06-152683

Dear Mr. Raval;

Waste Management d.b.a. CDSL Power Production Facility conducted the state adopted EPA rule, 40 CFR part 60 subpart GG, that requires emissions testing for NO_x and SO_2 within 180 days of start up. These tests were conducted during the week of October 23, 1989; results are forthcoming.

During the testing, the site was visited by Tom Tittle of the DER Southeast District. Mr. Tittle reviewed our construction permit issued by your office for compliance. He pointed out a couple of issues that need to be modified on the construction permit prior to obtaining an operation permit to make the items EPA enforceable. These items are as follows:

Item 1: Specific Condition #4 indicates the following allowable emissions for SO_2:

		Per Unit		Facility	
	$PPM_{15\%O2}$	lbs/hr	TPY	lbs/hr	TPY
SO_2	8.8	7.13	31.2	42.8	187.4

The correlation between lb/hr and PPM is incorrect. The following equations take the correct value for lb/hr emissions and back calculates the corrected concentration for SO_2.

$lb/scf = PPM_{(SO2)} \times 1.66E-7$		EPA meth 20 Conversion Factor
$PPM_{15\%O2} = PPM\ (5.9\ /\ (20.9 - \%O2))$		EPA meth 20 Egn 20-4
known:	16.6% O_2	Trial Run Avg.
	30,000 scfm	Design Inlet Air
	1,400 scfm	Permit Gas Utilization
	31,400 scfm	Oulet scfm

PPM_{SO2} = (7.13 / 60 / 31400)/1.66E-7 = **22.80**

$PPM_{SO2-15\%O2}$ = 22.80(5.9/(20.9-16.6)) = **31.28**

It is our belief that the original 8.8 ppm was pulled from existing facility data, submitted to you as supplementary information with the construction permit application. That data was not intended for use as basis of our permit. The corrected allowable emissions for SO_2 should be modified as follows:

		Per Unit		Facility	
	$PPM_{15\%O2}$	lbs/hr	TPY	lbs/hr	TPY
SO_2	31.28	7.13	31.2	42.8	187.4

Item 2: Specific Condition #5 requires EPA Method 25 for VOC initial compliance testing. Waste Management proposes that a modification include the option of using EPA Method 25A or EPA Method 25B which, based on the discussion with Mr. Tittle, would be more appropriate.

It is through the direction of Mr. Tittle that we are requesting these modifications. He informed Sarah Solano, Site Engineer, that only the construction permit is EPA enforceable thus must be corrected before an operation permit is granted. If you have any questions regarding the modification proposals, please call Mrs. Solano at 305/977-9551.

I look forward to your response.

Harvey H. Bush

Harvey H. Bush, Jr., P.E.
Regional Environmental Manager

cc: Stephanie Brooks
Joe Lurix
Daniela Banu
Jim Barrett
Sarah Solano

copied PRaval 11/17 PR
CF/BT

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: Dale Twachtmann

for FROM: Steve Smallwood

DATE: January 23, 1990

SUBJ: Approval of Construction Permit Amendment
Waste Management, Inc., of Florida
CDSL Facility, Six Turbine Generators, AC 06-152683

Attached for your approval and signature is a construction permit amendment prepared by the Bureau of Air Regulation for Waste Management, Inc.'s power generation facility in Pompano Beach, Broward County, Florida.

I recommend your approval and signature.

SS/PR/plm

Attachment

RECEIVED
JAN 25 1990
Office of the Secretary

Waste Management of North America, Inc.
Southeast Region
500 Cypress Creek Road, West ◦ Fort Lauderdale, Florida 33309
Suite 300 ◦ 305/771-9850

November 7, 1989

Mr. Pradeep Raval
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301-8241

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Permit # AC 06-152683

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known:	16.6% O_2	Trial Run Avg.
	30,000 scfm	Design Inlet Air
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I look forward to your response.

Harvey H. Bush, Jr., P.E.
Regional Environmental Manager

cc: Stephanie Brooks
Joe Lurix
Daniela Banu
Jim Barrett
Sarah Solano

copied PRaval 11/17 PR
CF/B7

Waste Management of Florida, Inc.

Central Disposal Sanitary Landfill

Power Production/Gas Recovery System

Gas Turbine No. 2

Report 1296-S

October 26, 1989

TABLE OF CONTENTS

INTRODUCTION

Waste Management of Florida, Inc., Central Disposal Sanitary Landfill, operates five Solar Centaur PT4500 Stationary Gas Turbines located at 3140 N.W. 48th Street in Pompano Beach, Florida.

Performance testing was conducted as required under New Source Performance Standards for Stationary Gas Turbines, subpart GG of the Code of Federal Regulations (CFR).

On October 26, 1989, South Florida Environmental Services, Inc. was contracted to conduct tests for Nox Emissions on Unit No. 2.

Testing was conducted in accordance with U. S. EPA Method 20 - Determination of Nitrogen Oxide from Stationary Gas Turbines.

The fuel was analyzed for Sulfur Dioxide as required by subpart 60.333(b), Standard for Sulfur Dioxide. The result of this analysis was 0.013 percent by weight, with an allowable of 0.8 percent by weight.

The average Nitrogen Oxide Emissions @ ISO standard conditions were 25.78 ppm, with an emission standard of 75.0 ppm.

This report presents the results of the emission test which found Waste Management of Florida, Inc. to be operating the Gas Turbine in compliance with New Source Performance Standards.

SOUTH FLORIDA ENVIRONMENTAL SERVICES, INC.

Waste Management of Florida, Inc.
Central Disposal Sanitary Landfill
3000 N.W. 48th Street
Pompano Beach, Florida 33073

Facility located at 3140 N.W. 48th Street, Pompano Beach, Florida

Type Process - Power Production/Gas Recovery System

Compliance Stack Test

Report 1296-S

Gas Turbine No. 2

October 26, 1989

Nitrogen Oxide Results (@ ISO standard conditions)

Load	Emission Rate (ppm)	Allowable Emission Rate (ppm)
30%	22.89	75.0
50%	25.98	75.0
75%	26.46	75.0
100%	27.77	75.0

Fuel Analysis Results

Actual Percent by Weight (ppm)	Allowable Percent by Weight (ppm)
0.013	0.8

All testing and analysis was performed in accordance with the New Source Performance Standards for Stationary Gas Turbines, subpart GG of the Code of Federal Regulations (CFR).

I hereby certify that to my knowledge all data submitted in this report is true and correct.

William D. Arlington
Project Director

II. ALLOWABLE EMISSION DETERMINATION

The allowable emissions were determined according to the U.S. Environmental Protection Agency Standards of Performance for New Stationary Sources, CFR 40, Part 60, subpart GG 60:332:

$$Std = 0.0075 \frac{(14.4)}{Y} + F$$

Std = Allowable NOx emissions (percent by volume at 15 percent oxygen and on a dry basis).

Y = Manufacturer's rated heat rate at manufacturer's rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not exceed 14.4 kilojoules per watt hour.

F = NOx emission allowance for fuel bound nitrogen.

F shall be defined according to the nitrogen content of the fuel as follows:

Fuel Bound Nitrogen (percent by weight)	F (NOx percent by volume)
$N < 0.15$	0
$0.015 < N \leq 0.25$	$0.004 + 0.0067(N-0.1)$
$N > 0.25$	0.005

According to the fuel analysis presented in Appendix C, the value for Y was 14.4 and the value of F was 0.

The allowable emissions were determined as follows:

$$Std = \frac{0.0075\ (14.4)}{14.4} + 0$$

$$Std = 75.0 \text{ ppm}$$

SUMMARY OF RESULTS
WASTE MANAGEMENT
UNIT NO.2
REPORT 1296-S
DATE 10-26-89

LOAD (%)	START TIME	OBSERVED LOAD (MW)	FUEL FLOW (CFM)	NOX @ STACK (PPM)	O2 %	NOX @ 15% O2 (PPM)	NOX @ ISO (PPM)
30	0722	1.00	693	6.98	18.89	20.42	22.89
50	0834	1.50	852	9.63	18.39	22.63	25.98
75	0941	2.25	1102	12.65	17.61	22.68	26.46
100	1049	2.83	1304	15.46	17.05	23.64	27.77

PROCESS AND EMISSION DATA
WASTE MANAGEMENT
UNIT NO.2
REPORT 1296-S
DATE 10-26-89

RUN	START TIME	POINT NO.	OBSERVED LOAD (MW)	FUEL FLOW (CFM)	P REF. (PSIA)	P OBS. (PSIA)	TEMP F	R.H.	SPECIFIC HUMIDITY H	NOx @ STACK (PPM)	O2 %	NOx @ 15% O2 (PPM)	NOx @ ISO (PPM)	AVG NOx @ ISO (PPM)
1A	0722	1	1.00	691	29.92	29.96	65	97	.0129	7.00	18.95	21.18	23.56	
		2			29.92	29.96	65	97	.0129	7.00	18.90	20.65	22.97	
		3			29.92	29.96	65	97	.0129	7.00	18.85	20.15	22.41	
		4			29.92	29.96	65	97	.0129	7.00	18.80	19.67	21.88	
		5			29.92	29.96	65	97	.0129	8.00	18.85	23.02	25.61	
		6			29.92	29.96	65	97	.0129	7.50	18.90	22.13	24.61	
		7			29.92	29.96	65	97	.0129	7.00	18.95	21.18	23.56	
		8		692	29.92	29.96	65	97	.0129	7.00	18.95	21.18	23.56	23.52
2A	0746	1	1.00	696	29.92	29.96	67	97	.0138	6.00	19.00	18.63	20.96	
		2			29.92	29.96	67	97	.0138	6.50	18.95	19.67	22.13	
		3			29.92	29.96	67	97	.0138	6.50	18.90	19.18	21.57	
		4			29.92	29.96	67	97	.0138	7.00	18.85	20.15	22.67	
		5			29.92	29.96	67	97	.0138	8.00	18.75	21.95	24.70	
		6			29.92	29.96	67	97	.0138	7.50	18.80	21.07	23.71	
		7			29.92	29.96	67	97	.0138	7.00	18.85	20.15	22.67	
		8		692	29.92	29.96	67	97	.0138	7.00	18.90	20.65	23.23	22.70
3A	0807	1	1.00	692	29.92	29.96	67	97	.0138	6.00	19.00	18.63	20.96	
		2			29.92	29.96	67	97	.0138	6.00	19.00	18.63	20.96	
		3			29.92	29.96	67	97	.0138	6.50	18.90	19.18	21.57	
		4			29.92	29.96	67	97	.0138	6.50	18.90	19.18	21.57	
		5			29.92	29.96	67	97	.0138	7.50	18.75	20.58	23.16	
		6			29.92	29.96	67	97	.0138	7.50	18.75	20.58	23.16	
		7			29.92	29.96	67	97	.0138	7.50	18.90	22.13	24.89	
		8		692	29.92	29.96	67	97	.0138	7.00	18.90	20.65	23.23	22.44
1B	0834	1	1.50	854	29.92	29.96	67	97	.0138	8.50	18.50	20.90	23.51	
		2			29.92	29.96	67	97	.0138	8.50	18.45	20.47	23.03	
		3			29.92	29.96	67	97	.0138	9.00	18.40	21.24	23.90	
		4			29.92	29.96	67	97	.0138	9.50	18.30	21.56	24.25	
		5			29.92	29.96	67	97	.0138	10.50	18.35	24.29	27.33	
		6			29.92	29.96	67	97	.0138	10.00	18.35	23.14	26.03	
		7			29.92	29.96	67	97	.0138	10.00	18.40	23.60	26.55	
		8		849	29.92	29.96	67	97	.0138	10.00	18.50	24.58	27.66	25.28
2B	0855	1	1.50	862	29.92	29.96	70	98	.0155	9.50	18.40	22.42	25.83	
		2			29.92	29.96	70	98	.0155	9.50	18.40	22.42	25.83	
		3			29.92	29.96	70	98	.0155	9.50	18.35	21.98	25.32	
		4			29.92	29.96	70	98	.0155	10.00	18.30	22.69	26.14	
		5			29.92	29.96	70	98	.0155	10.00	18.30	22.69	26.14	
		6			29.92	29.96	70	98	.0155	10.00	18.35	23.14	26.65	
		7			29.92	29.96	70	98	.0155	10.00	18.45	24.08	27.74	
		8		851	29.92	29.96	70	98	.0155	10.00	18.45	24.08	27.74	26.42
3B	0917	1	1.50	851	29.92	29.96	72	97	.0165	9.00	18.40	21.24	24.79	
		2			29.92	29.96	72	97	.0165	9.00	18.35	20.82	24.31	
		3			29.92	29.96	72	97	.0165	9.00	18.40	21.24	24.79	
		4			29.92	29.96	72	97	.0165	9.50	18.25	21.15	24.69	
		5			29.92	29.96	72	97	.0165	10.00	18.40	23.60	27.55	
		6			29.92	29.96	72	97	.0165	10.00	18.40	23.60	27.55	
		7			29.92	29.96	72	97	.0165	10.00	18.40	23.60	27.55	
		8		846	29.92	29.96	72	97	.0165	10.00	18.50	24.58	28.70	26.24

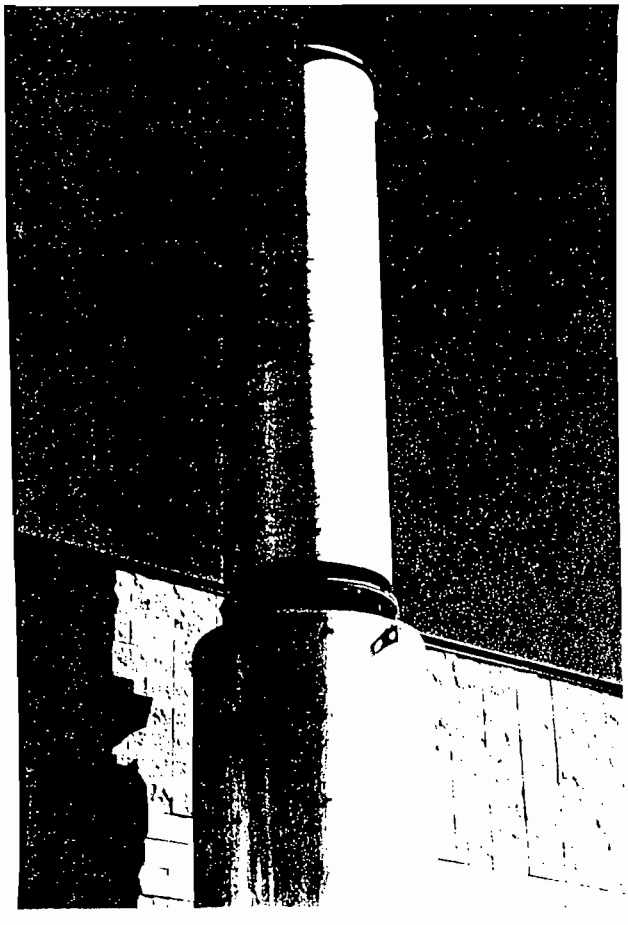
PROCESS AND EMISSION DATA
WASTE MANAGEMENT
UNIT NO.2
REPORT 1296-S
DATE 10-26-89

RUN	START TIME	POINT NO.	LOAD (MW)	OBSERVED FUEL FLOW (CFM)	P REF. (PSIA)	P OBS. (PSIA)	TEMP F	R.H. H	SPECIFIC HUMIDITY	NOx @ STACK (PPM)	O2 %	NOx @ 15% O2 (PPM)	NOx @ ISO (PPM)	AVG NOx @ ISO (PPM)
1C	0941	1	2.25	1088	29.92	29.96	72	97	.0165	11.50	17.60	20.56	24.00	
		2			29.92	29.96	72	97	.0165	11.50	17.60	20.56	24.00	
		3			29.92	29.96	72	97	.0165	12.00	17.60	21.45	25.04	
		4			29.92	29.96	72	97	.0165	13.00	17.60	23.24	27.13	
		5			29.92	29.96	72	97	.0165	13.50	17.60	24.14	28.17	
		6			29.92	29.96	72	97	.0165	13.00	17.60	23.24	27.13	
		7			29.92	29.96	72	97	.0165	13.00	17.75	24.35	28.42	
		8		1091	29.92	29.96	72	97	.0165	13.50	17.75	25.29	29.52	26.68
2C	1005	1	2.25	1143	29.92	29.96	74	94	.0171	12.00	17.60	21.45	25.19	
		2			29.92	29.96	74	94	.0171	12.00	17.60	21.45	25.19	
		3			29.92	29.96	74	94	.0171	12.00	17.60	21.45	25.19	
		4			29.92	29.96	74	94	.0171	12.50	17.50	21.69	25.46	
		5			29.92	29.96	74	94	.0171	13.50	17.50	23.43	27.50	
		6			29.92	29.96	74	94	.0171	13.00	17.60	23.24	27.28	
		7			29.92	29.96	74	94	.0171	13.00	17.65	23.60	27.70	
		8		1095	29.92	29.96	74	94	.0171	13.00	17.70	23.97	28.14	26.46
3C	1027	1	2.25	1097	29.92	29.96	75	88	.0166	12.00	17.60	21.45	24.88	
		2			29.92	29.96	75	88	.0166	12.00	17.60	21.45	24.88	
		3			29.92	29.96	75	88	.0166	12.00	17.55	21.13	24.51	
		4			29.92	29.96	75	88	.0166	13.00	17.50	22.56	26.16	
		5			29.92	29.96	75	88	.0166	13.50	17.55	23.78	27.57	
		6			29.92	29.96	75	88	.0166	13.00	17.60	23.24	26.95	
		7			29.92	29.96	75	88	.0166	13.00	17.65	23.60	27.36	
		8		1095	29.92	29.96	75	88	.0166	13.00	17.70	23.97	27.79	26.26
1D	1049	1	2.90	1326	29.92	29.96	77	85	.0171	13.00	17.30	21.31	24.80	
		2			29.92	29.96	77	85	.0171	13.00	17.25	21.01	24.46	
		3			29.92	29.96	77	85	.0171	14.00	17.15	22.03	25.64	
		4			29.92	29.96	77	85	.0171	15.00	17.00	22.69	26.41	
		5			29.92	29.96	77	85	.0171	17.00	16.95	25.39	29.55	
		6			29.92	29.96	77	85	.0171	16.50	16.95	24.65	28.68	
		7			29.92	29.96	77	85	.0171	16.50	17.00	24.96	29.05	
		8		1299	29.92	29.96	77	85	.0171	17.00	17.00	25.72	29.93	27.32
2D	1110	1	2.80	1302	29.92	29.96	79	84	.0181	13.50	17.25	21.82	25.74	
		2			29.92	29.96	79	84	.0181	14.00	17.25	22.63	26.69	
		3			29.92	29.96	79	84	.0181	14.50	17.00	21.94	25.87	
		4			29.92	29.96	79	84	.0181	15.50	17.00	23.45	27.66	
		5			29.92	29.96	79	84	.0181	16.50	16.90	24.34	28.71	
		6			29.92	29.96	79	84	.0181	17.00	16.90	25.08	29.58	
		7			29.92	29.96	79	84	.0181	17.50	17.00	26.47	31.23	
		8		1305	29.92	29.96	79	84	.0181	17.00	17.00	25.72	30.33	28.23
3D	1132	1	2.80	1285	29.92	29.96	80	82	.0183	13.50	17.25	21.82	25.76	
		2			29.92	29.96	80	82	.0183	13.50	17.25	21.82	25.76	
		3			29.92	29.96	80	82	.0183	14.50	17.10	22.51	26.58	
		4			29.92	29.96	80	82	.0183	15.00	16.90	22.13	26.12	
		5			29.92	29.96	80	82	.0183	16.00	16.90	23.60	27.86	
		6			29.92	29.96	80	82	.0183	17.00	16.85	24.77	29.24	
		7			29.92	29.96	80	82	.0183	17.00	17.00	25.72	30.36	
		8		1304	29.92	29.96	80	82	.0183	17.00	17.00	25.72	30.36	27.76

]SAMPLING POINT DETERMINATION
WASTE MANAGEMENT
GAS TURBINE

STACK CONFIGURATION:	CIRCULAR
DIAMETER (INCHES):	48
DISTANCE A - PORT TO DOWNSTREAM DISTURBANCE (INCHES):	1
DISTANCE B - PORT TO UPSTREAM DISTURBANCE (INCHES):	2
NUMBER OF SAMPLING POINTS:	16
NUMBER OF TEST PORTS:	2
NUMBER OF POINTS ON A TRAVERSE:	8

POINT LOCATION ON A TRAVERSE:



TRAVERSE POINT NUMBER	INCHES T STACK WA
1	1.6
2	5
3	9.3
4	15.5
5	32.5
6	38.7
7	43
8	46.4

VI. FIELD AND ANALYTICAL PROCEDURES

The sampling system is shown on page 6-3. A sample was drawn from the stack at a rate of approximately 2 SCFH. A heated stainless steel probe and filter assembly was follwoed by a three-way stainless steel motorized valve. Immediately following the valve was an ice cooled knock-out bottle which allowed condensation and removal of stack gas moisture without the opportunity for potential reaction (NOx absorption) with the stack gases. The sample was pumped through a non-heated 1/4" O.D. teflon sampling line approximately 100' long to instrumentation near the bottom of the stack. Calibration gases were introduced at the sampling interface (the three way valve) through another 1/4" O.D. 100' teflon line that was not heated. The calibration gas cylinders were also housed near the bottom of the stack.

Gases are induced through a sample pump with teflon diaphragm to a sample manifold. One stream was directed to a Thermo Electron Model 10 AR Chemiluminescent Analyzer, converted to nitric oxide, reacted with ozone, and a chemiluminescent response measured by a photomultiplier. A second stream was directed through a Teledyne Model 320P digital oxygen analyzer. A third stream was dumped to the ambient air. All instrument responses were recorded on strip chart recorders.

Calibration gases consisted of three NO/NO2 gases (ambient air at 20.9% and 11.8%). All calibration gases were certified NBS traceable. Quality assurance procedures and results are provided in Appendix I.

An overview of the EPA Method 20 NOx sampling procedure as adapted for Subpart GG gas turbine requirements can be easily presented. Three test runs are performed at four expected operated load ranges of the unit. These load ranges are nominally 33, 50, 75 and 100%, but can be adjusted to reflect realistic expected operation. Although gas turbine NOx generation is maximized at high (100%) load, testing at other loads is necessary to ensure that combuster water injection systems usually utilized on such units for purposes of NOx reduction are effective and properly adjusted for other loads.

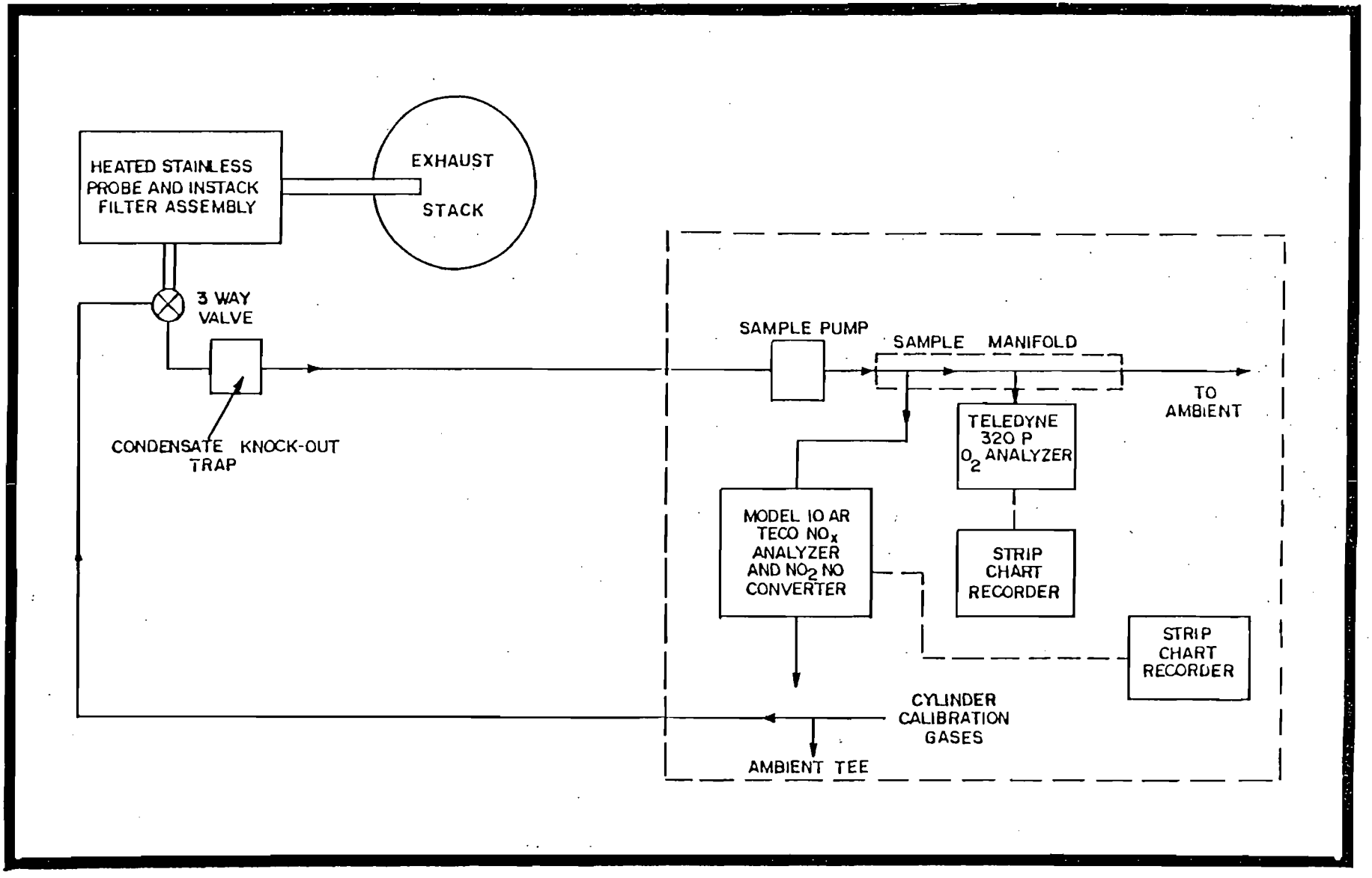
Each of the three test runs are conducted by withdrawing a sample of stack gas from each of eight sampling locations across a stack cross-section. Each test point is analyzed for a minimum of one minute plus demonstrated instrument response time. To

normalize NOx emission to a referenced standard, it is necessary to measure the oxygen content of the gases in addition to NOx; therefore, two analyzers are required for testing. ACE utilized a Thermo Electron Model 10 AR Chemiluminescent NOx analyzer and a Teledyne Model 320P O2 analyzer for this purpose. As gas turbine NOx emissions consist of mostly NO, some NO2 can be expected to be present (5-20% by volume). The 10 AR is, therefore, equipped with a NO2/No converter for reduction of any NO2 back to NO before analysis. This is effected by heating the gas stream to 650 degrees C in the presence of stainless steel. Method 20 quality assurance measures calls for demonstration of converter efficiency by filling a Tedlar bag with a 50% NO/N2 gas and ambient air and immediately performing analysis on the 10 AR. If the converter is working properly, analyzer response will not change more than +2% over a 30 minute period, although NO2 is being formed in the Tedlar bag.

To further ensure accuracy of the monitoring instruments, it is necessary to demonstrate linear response using National Bureau of Standards (NBS) traceable NO/N2 and O2/N2 calibration gases. Three NO/N2 and a zero NO calibration gas are required for the NOx analyzer; and two O2 calibration gases and an O2 zero are required for the oxygen analyzer. The analyzer must demonstrate linearity with these gases within 2% of span which is 300 ppm for the NOx analyzer and 25% for the oxygen analyzer.

The eight points that are required to be tested for each of the three test runs necessary to constitute an emission evaluation are selected after evaluating the sampling location for potential stratification. Stratification was examined at 42 points, in keeping with EPA reference Method 1 criteria, and such analysis was combined with the actual testing. The only differences in concentrations of either parameter are as a result of instrument drift and/or minor load fluctuations and are not test point dependent.

The results of accuracy and response time testing are included in Appendix E.



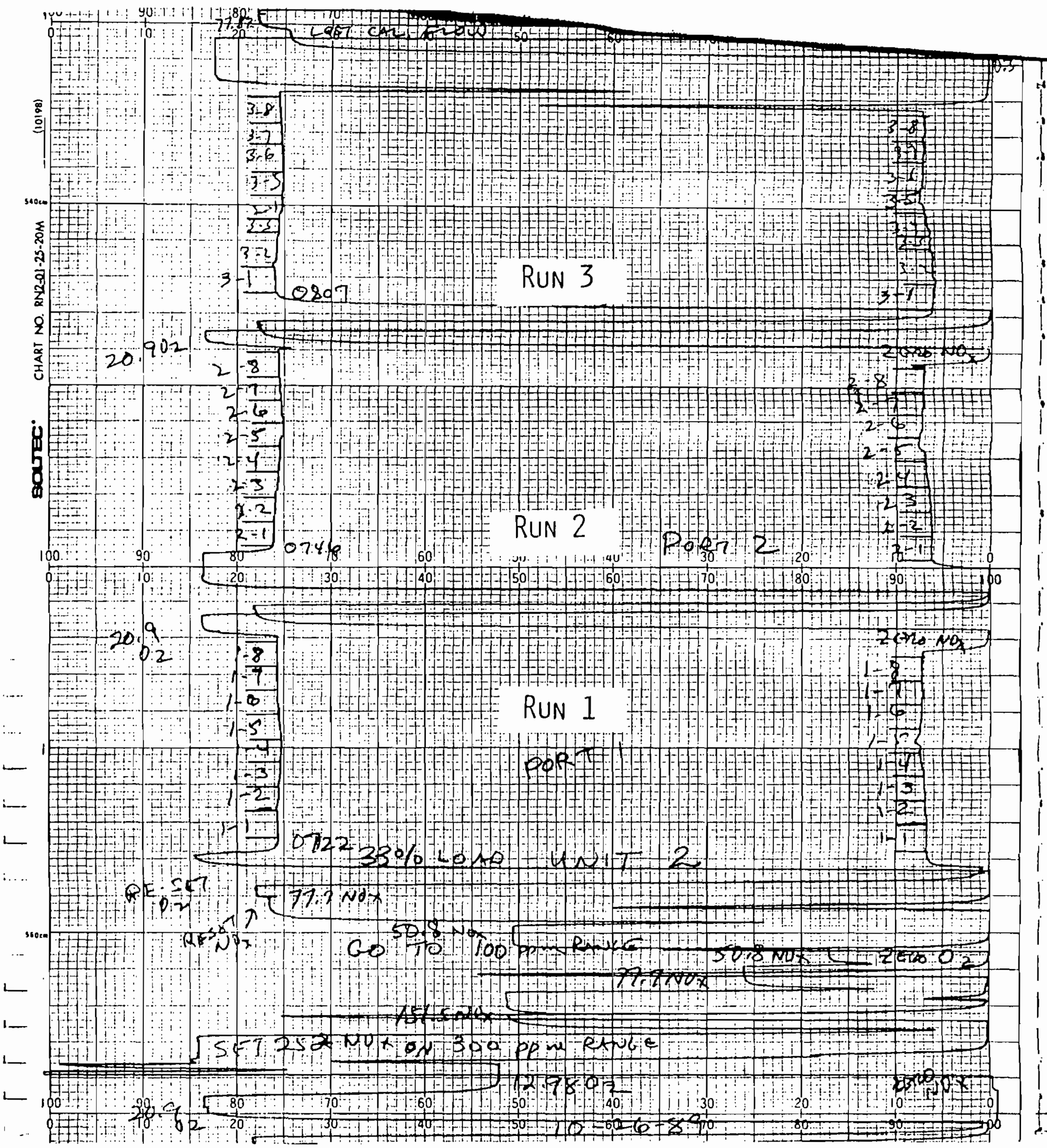
SAMPLING SCHEMATIC

EPA METHOD 20

AIR CONSULTING and ENGINEERING

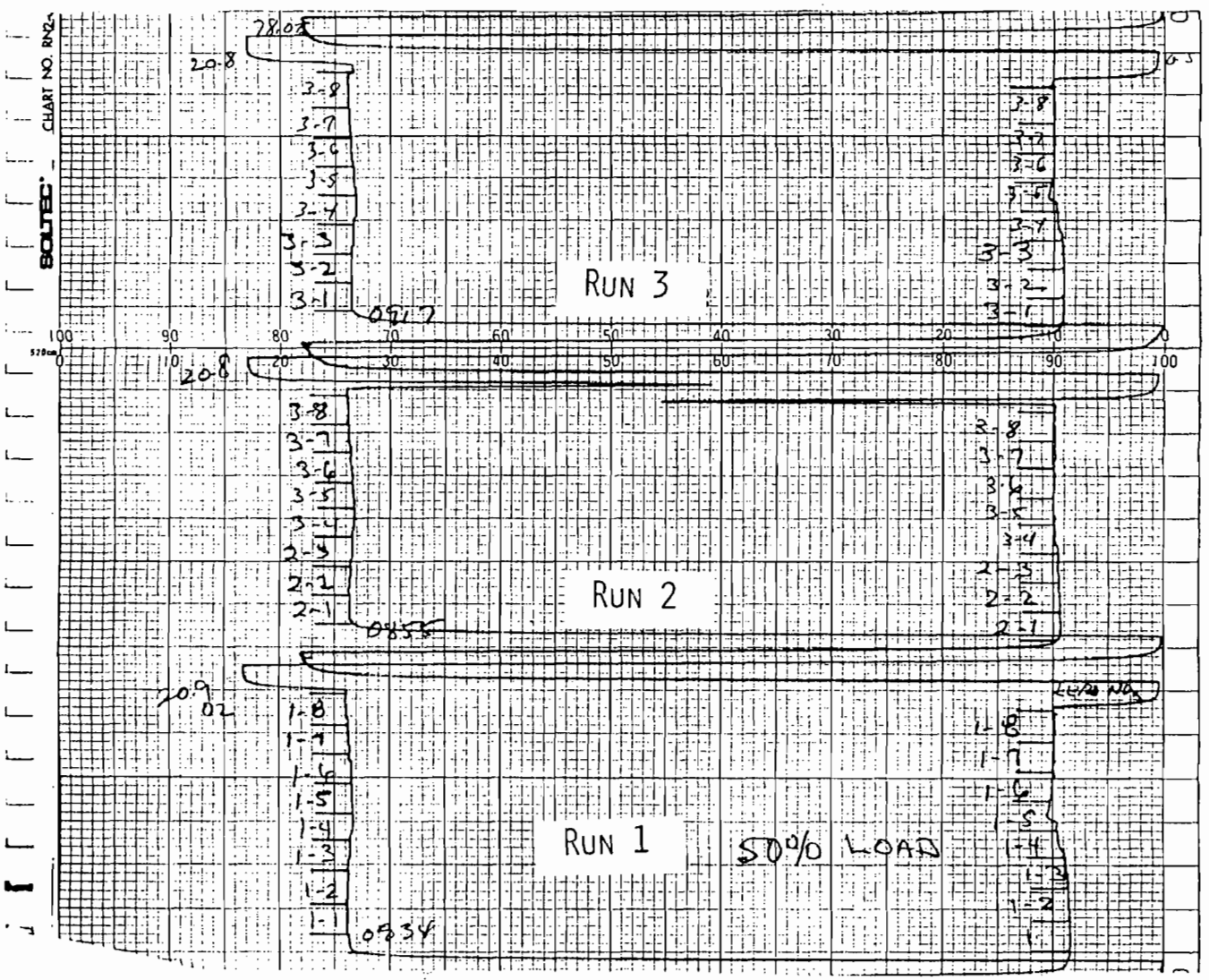
Appendix A - Field Data

UNIT 2

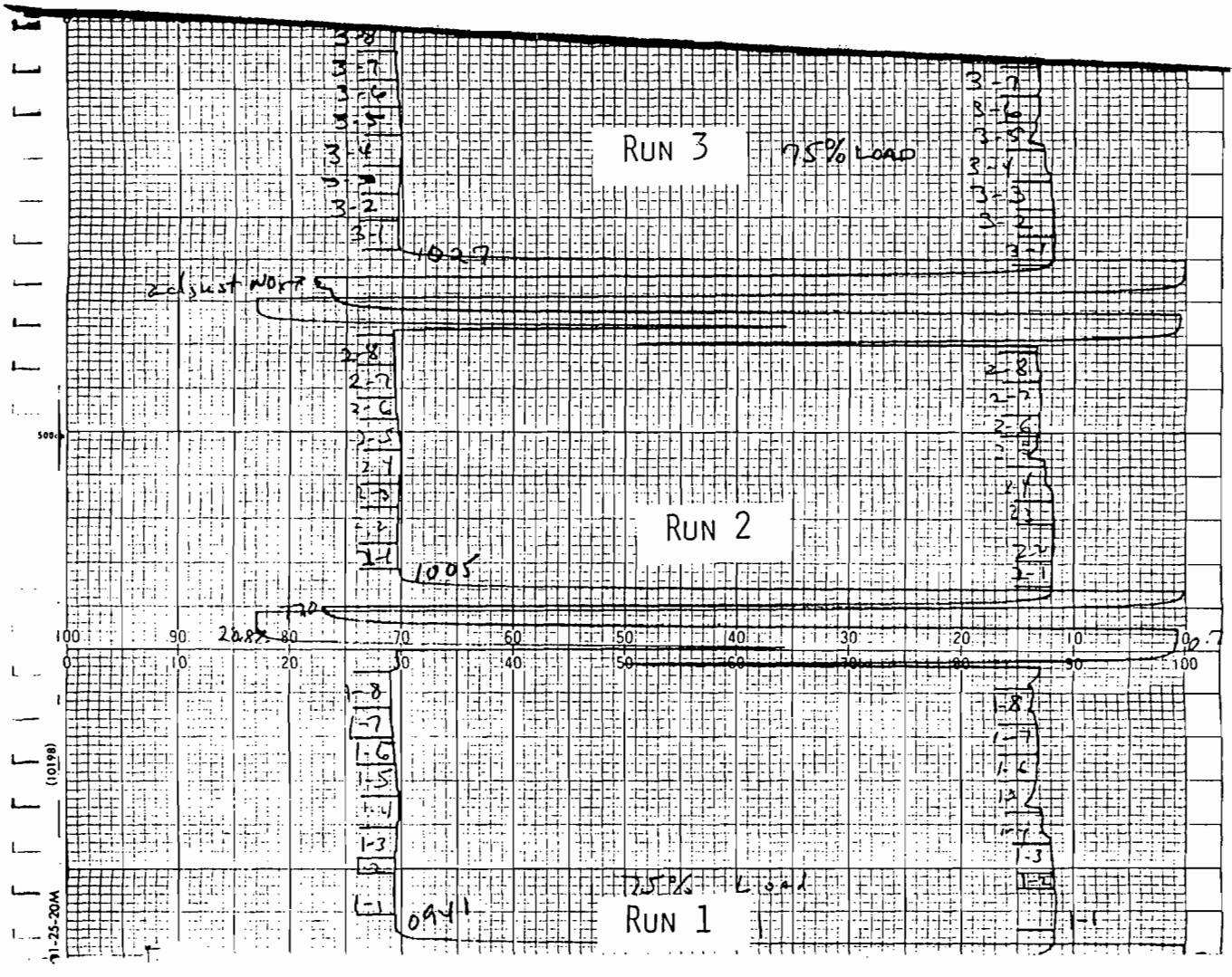


SOLTEC
CHART NO. RN2-01-25-20M
RUN 3
0807
RUN 2
PORT 2
0746
RUN 1
PORT 1
0722
33% LOAD UNIT 2
GO TO 100 ppm RANGE
SET 252 NOx ON 300 ppm RANGE
10-26-89

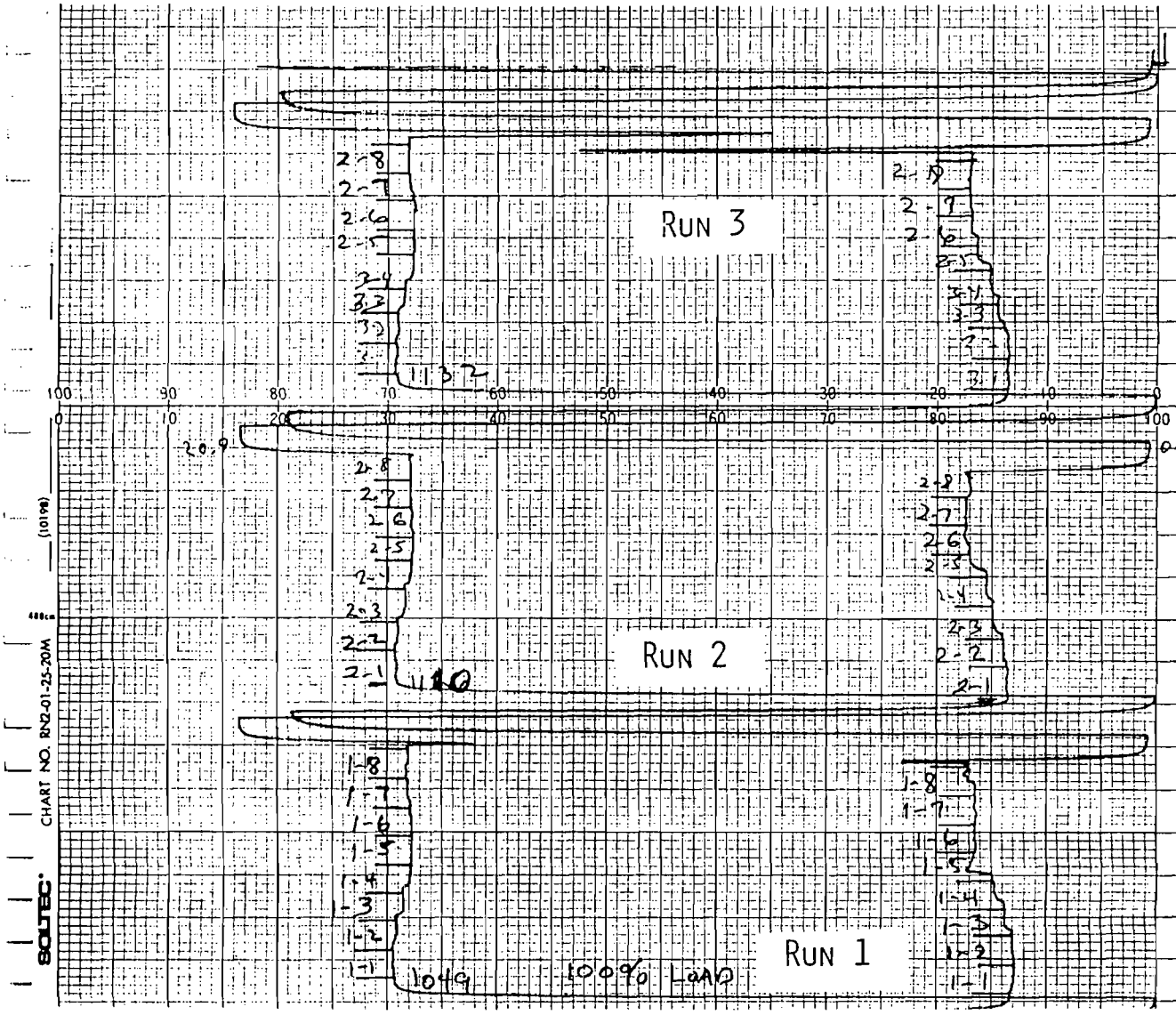
UNIT 2


SOLTEC
CHART NO. RN2
28.0
20.8
RUN 3
0917
20.8
RUN 2
0855
20.9
02
RUN 1
0834
50% LOAD

UNIT 2



UNIT 2



EMISSION SUMMARY

FACILITY: Waste Management
SOURCE: UNIT 2
DATE: 10-26-89

33% LOAD

LOAD	TIME	ACTUAL NO_x PPM	% O_2	$P_{REF.}$	$P_{OBS.}$	T (F°)	R.H.	H	ISO. PPM
1-1	0722	7	18.95			65	97	.0129	
2		7	18.9						
3		7	18.85						
4		7	18.8						
5		8	18.85						
6		7.5	18.9						
7		7	18.95						
8	0736	7	18.95						
2-1	0744	6	19.0			67	97	.0138	
2		6.5	18.95						
3		6.5	18.9						
4		7	18.85						
5		8	18.9						
6		7.5	18.8						
7		7	18.85						
8	0802	7	18.9						
3-1	0807	6.0	19.0			67	97	.0138	
2		6.0	19.0						
3		6.5	18.9						
4		6.5	18.9						
5		7.5	18.75						
6		7.5	18.75						
7		7.5	18.9						
8	0821	7	18.9						

BEST AVAILABLE COPY

EMISSION SUMMARY

FACILITY: Waste Management
SOURCE: UNIT 2
DATE: 10/26/89

50% LOAD

LOAD	TIME	ACTUAL NO_x PPM	% O_2	$P_{REF.}$	$P_{OBS.}$	T (F°)	R.H.	H	ISO. PPM
1-1	0834	8.5	18.5			67	97	.0130	
2		8.5	18.45						
3		9.0	18.4						
4		9.5	18.3						
5		10.5	18.35						
6		10	18.35						
7		10	18.4						
8	0850	10	18.5						
2-1	0855	9.5	18.4			70	98	.0155	
2		9.5	18.4						
3		9.5	18.35						
4		10	18.3						
5		10	18.3						
6		10	18.35						
7		10	18.45						
8	0911	10	18.45						
3-1	0917	9	18.4			72	97	.065	
2		9	18.35						
3		9	18.4						
4		9.5	18.25						
5		10.0	18.4						
6		10.0	18.4						
		10.0	18.4						
8	0933	10.0	18.5						

EMISSION SUMMARY

FACILITY: WASTE Management
SOURCE: Unit # 2
DATE: 10-26-89

	LOAD	TIME	ACTUAL NO_x PPM	% O_2	$P_{REF.}$	$P_{OBS.}$	T (F°)	R.H.	H	ISO. PPM
1-1	75%	0941	11.5	17.6	29.92	29.96	72	97	.0165	
2			11.5	17.6						
3			12.0	17.6						
4			13.0	17.6						
5			13.5	17.6						
6			13.0	17.6						
7			13.0	17.75						
8			13.5	17.75						
2-1		1005	12.0	17.6			74	94	.0171	
2			12.0	17.6						
3			12.0	17.6						
4			12.5	17.5						
5			13.5	17.5						
6			13.0	17.6						
7			13	17.65						
8			13	17.7			75	88	.0166	
	3-1	1027	12	17.6						
	2		12	17.6						
	3		12	17.55						
	4		13	17.5						
	5		13.5	17.55						
	6		13	17.6						
	7		13	17.65						
	8		13	17.70						

EMISSION SUMMARY

FACILITY: Waste Management
SOURCE: UNIT 2
DATE: 10-26-89

100% LOAD

LOAD	TIME	ACTUAL NO_x PPM	% O_2	$P_{REF.}$	$P_{OBS.}$	T (F°)	R.H.	H	ISO. PPM
1-1	1049	13	17.3			77	85	.0171	
2		13	17.25						
3		14	17.15						
4		15	17.0						
5		17	16.95						
6		16.5	16.95						
7		16.5	17.0						
8	1105	17	17.0						
2-1	1110	13.5	17.25			79	84	.0181	
2		14.0	17.25						
3		14.5	17.0						
4		15.5	17.0						
5		16.5	16.9						
6		17.0	16.9						
7		17.5	17.0						
8	1126	17.0	17.0						
3-1	1132	13.5	17.25			80	82	.0183	
2		13.5	17.25						
3		14.5	17.1						
4		15.0	16.9						
5		16.0	16.9						
6		17	16.85						
7		17	17.0						
8	1148	17	17.0						

Appendix B - Fuel Analysis

ATLANTIC
ANALYTICAL
LABORATORY

Ms. Sarah Solano
Central Disposal Sanitary Landfill
3000 NW 48th Street
Pompano Beach, FL 33077

Report No. AAL-1840
Date Requested 10-22-89
Date Reported 10-25-89
P.O. No. 302247

Material Submitted: One Tedlar Bag

Information Requested: Total Sulfur Analysis

Notebook: RF012,p169

Results of Analysis

Total sulfur as H2S	130 ppm/volume

Victor H. Given
Atlantic Analytical Laboratory, Inc.

d1025

P.O. Box 220 • SALEM INDUSTRIAL PARK • BUILDING #4
ROUTE 22 EAST • WHITEHOUSE, N.J. 08888
PHONE 201-534-5600 • FAX 201-534-2017

Appendix C - Process Data

SOUTH FLORIDA ENVIRONMENTAL SERVICES, INC.

COMPANY - WASTE MANAGEMENT COMPANY UNIT NO. 2

DATE 10-26-89

33% LOAD

RUN NO.	TIME	POINT NO.	OBSERVED LOAD (MW)	FUEL FLOW (CFM)	REFERENCE PRESSURE (PSIA)	OBSERVED PRESSURE (PSIA)	TEMP. DEGREES F
1	0722	1	1.0	691			
		2					
		3					
		4					
		5					
		6					
		7					
		8		692			
2	0807	1	1.0	696			
		2					
		3					
		4					
		5					
		6					
		7					
		8		692			
3	0746	1	1.0	692			
		2					
		3					
		4					
		5					
		6					
		7					
		8		692			

SOUTH FLORIDA ENVIRONMENTAL SERVICES, INC.

COMPANY - WASTE MANAGEMENT COMPANY UNIT NO. 2

DATE 10/26/89 50% LOAD

RUN NO.	TIME	POINT NO.	OBSERVED LOAD (MW)	FUEL FLOW (CFM)	REFERENCE PRESSURE (PSIA)	OBSERVED PRESSURE (PSIA)	TEMP. DEGREES F
1	0807	1	1.5	854			
		2					
		3					
		4					
		5					
		6					
		7					
		8		849			
2	0855	1	1.5	862			
		2					
		3					
		4					
		5					
		6					
		7					
		8		851			
3	0917	1	1.5	851			
		2					
		3					
		4					
		5					
		6					
		7					
		8		846			

SOUTH FLORIDA ENVIRONMENTAL SERVICES, INC.

COMPANY - WASTE MANAGEMENT COMPANY UNIT NO. 2

DATE 10/26/89

75% LOAD

RUN NO.	TIME	POINT NO.	OBSERVED LOAD (MW)	FUEL FLOW (CFM)	REFERENCE PRESSURE (PSIA)	OBSERVED PRESSURE (PSIA)	TEMP. DEGREES F
1	0941	1	2.25	1088			
		2					
		3					
		4					
		5					
		6					
		7					
		8		1091			
2	1005	1	2.25	1143			
		2					
		3					
		4					
		5					
		6					
		7					
		8		1095			
3	1027	1	2.25	1097			
		2					
		3					
		4					
		5					
		6					
		7					
		8		1095			

SOUTH FLORIDA ENVIRONMENTAL SERVICES, INC.

COMPANY - WASTE MANAGEMENT COMPANY UNIT NO. 2

DATE 10/26/89

100% LOAD

RUN NO.	TIME	POINT NO.	OBSERVED LOAD (MW)	FUEL FLOW (CFM)	REFERENCE PRESSURE (PSIA)	OBSERVED PRESSURE (PSIA)	TEMP. DEGREES F
1	1049	1	2.85	1320			
		2					
		3					
		4					
		5					
		6					
		7					
		8		1299			
2	1110	1	2.85	1302			
		2					
		3					
		4					
		5					
		6					
		7					
		8		1305			
3	1132	1	2.85	1285			
		2					
		3					
		4					
		5					
		6					
		7					
		8		1304			

Appendix D - Test Method

METHOD 20—DETERMINATION OF NITROGEN OXIDES, SULFUR DIOXIDE, AND DILUENT EMISSIONS FROM STATIONARY GAS TURBINES

1. Applicability and Principle

1.1 Applicability. This method is applicable for the determination of nitrogen oxides (NO_x), sulfur dioxide (SO_2), and a diluent gas, either oxygen (O_2) or carbon dioxide (CO_2), emissions from stationary gas turbines. For the NO_x and diluent concentration determinations, this method includes: (1) measurement system design criteria; (2) analyzer performance specifications and performance test procedures; and (3) procedures for emission testing.

1.2 Principle. A gas sample is continuously extracted from the exhaust stream of a stationary gas turbine; a portion of the sample stream is conveyed to instrumental analyzers for determination of NO_x and diluent content. During each NO_x and diluent determination, a separate measurement of SO_2 emissions is made, using Method 6, or it's equivalent. The diluent determination is used to adjust the NO_x and SO_2 concentrations to a reference condition.

2. Definitions

2.1 Measurement System. The total equipment required for the determination of a gas concentration or a gas emission rate. The system consists of the following major subsystems:

2.1.1 Sample Interface. That portion of a system that is used for one or more of the following: sample acquisition, sample transportation, sample conditioning, or protection of the analyzers from the effects of the stack effluent.

2.1.2 NO_x Analyzer. That portion of the system that senses NO_x and generates an output proportional to the gas concentration.

2.1.3 O_2 Analyzer. That portion of the system that senses O_2 and generates an output proportional to the gas concentration.

2.1.4 CO_2 Analyzer. That portion of the system that senses CO_2 and generates an output proportional to the gas concentration.

2.1.5 Data Recorder. That portion of the measurement system that provides a permanent record of the analyzer(s) output. The data recorder may include automatic data reduction capabilities.

2.2 Span Value. The upper limit of a gas concentration measurement range that is specified for affected source categories in the applicable part of the regulations.

2.3 Calibration Gas. A known concentration of a gas in an appropriate diluent gas.

2.4 Calibration Error. The difference between the gas concentration indicated by the measurement system and the known concentration of the calibration gas.

2.5 Zero Drift. The difference in the measurement system output readings from zero after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place and the input concentration at the time of the measurements was zero.

2.6 Calibration Drift. The difference in the measurement system output readings from the known concentration of the calibration gas after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place and the input at the time of the measurements was a high-level value.

2.7 Response Time. The amount of time required for the measurement system to display on the data output 95 percent of a step change in pollutant concentration.

2.8 Interference Response. The output response of the measurement system to a component in the sample gas, other than the gas component being measured.

3. Measurement System Performance Specifications

3.1 NO_2 to NO Converter. Greater than 90 percent conversion efficiency of NO_2 to NO.

3.2 Interference Response. Less than ± 2 percent of the span value.

3.3 Response Time. No greater than 30 seconds.

3.4 Zero Drift. Less than ± 2 percent of the span value over the period of each test run.

3.5 Calibration Drift. Less than ± 2 percent of the span value over the period of each test run.

4. Apparatus and Reagents

4.1 Measurement System. Use any measurement system for NO_x and diluent that is expected to meet the specifications in this method. A schematic of an acceptable measurement system is shown in Figure 20-1. The essential components of the measurement system are described below:

4.1.1 Sample Probe. Heated stainless steel, or equivalent, open-ended, straight tube of sufficient length to traverse the sample points.

4.1.2 Sample Line. Heated (>95°C) stainless steel or Teflon tubing to transport the sample gas to the sample conditioners and analyzers.

4.1.3 Calibration Valve Assembly. A three-way valve assembly to direct the zero and calibration gases to the sample conditioners and to the analyzers. The calibration valve assembly shall be capable of blocking the sample gas flow and of introducing calibration gases to the measurement system when in the calibration mode.

4.1.4 NO_2 to NO Converter. That portion of the system that converts the nitrogen dioxide (NO_2) in the sample gas to nitrogen oxide (NO). Some analyzers are designed to measure NO_x as NO_2 on a wet basis and can be used without an NO_2 to NO converter or a moisture removal trap provided the sample line to the analyzer is heated (>95°C) to the inlet of the analyzer. In addition, an NO_2 to NO converter is not necessary if the NO_2 portion of the exhaust gas is less than 5 percent of the total NO_x concentration. As a guideline, an NO_2 to NO converter is not necessary if the gas turbine is operated at 90 percent or more of peak load capacity. A converter is necessary under lower load conditions.

4.1.5 Moisture Removal Trap. A refrigerator-type condenser or other type device designed to continuously remove condensate from the sample gas while maintaining minimal contact between any condensate and the sample gas. The moisture removal trap is not necessary for analyzers that can measure NO_x concentrations on a wet basis; for these analyzers, (a) heat the sample line up to the inlet of the analyzers, (b) determine the moisture content using methods subject to the approval of the Administrator, and (c) correct the NO_x and diluent concentrations to a dry basis.

4.1.6 Particulate Filter. An in-stack or an out-of-stack glass fiber filter, of the type specified in EPA Reference Method 5; however, an out-of-stack filter is recommended when the stack gas temperature exceeds 250 to 300°C.

4.1.7 Sample Pump. A nonreactive leak-free sample pump to pull the sample gas through the system at a flow rate sufficient to minimize transport delay. The pump shall be made from stainless steel or coated with Teflon or equivalent.

4.1.8 Sample Gas Manifold. A sample gas manifold to divert portions of the sample gas stream to the analyzers. The manifold may be constructed of glass, Teflon, stainless steel, or equivalent.

4.1.9 Diluent Gas Analyzer. An analyzer to determine the percent O_2 or CO_2 concentration of the sample gas.

4.1.10 Nitrogen Oxides Analyzer. An analyzer to determine the ppm NO_x concentration in the sample gas stream.

4.1.11 Data Recorder. A strip-chart recorder, analog computer, or digital recorder for recording measurement data.

4.2 Sulfur Dioxide Analysis. EPA Reference Method 6 apparatus and reagents.

4.3 NO_x Calibration Gases. The calibration gases for the NO_x analyzer shall be NO in N_2. Use four calibration gas mixtures as specified below:

4.3.1 High-level Gas. A gas concentration that is equivalent to 80 to 90 percent of the span value.

4.3.2 Mid-level Gas. A gas concentration that is equivalent to 45 to 55 percent of the span value.

4.3.3 Low-level Gas. A gas concentration that is equivalent to 20 to 30 percent of the span value.

4.3.4 Zero Gas. A gas concentration of less than 0.25 percent of the span value. Ambient air may be used for the NO_x zero gas.

4.4 Diluent Calibration Gases.

4.4.1 For O_2 calibration gases, use purified air at 20.9 percent O_2 as the high-level O_2 gas. Use a gas concentration between 11 and 15 percent O_2 in nitrogen for the mid-level gas, and use purified nitrogen for the zero gas.

4.4.2 For CO_2 calibration gases, use a gas concentration between 8 and 12 percent CO_2 in air for the high-level calibration gas. Use a gas concentration between 2 and 5 percent CO_2 in air for the mid-level calibration gas, and use purified air (<100 ppm CO_2) as the zero level calibration gas.

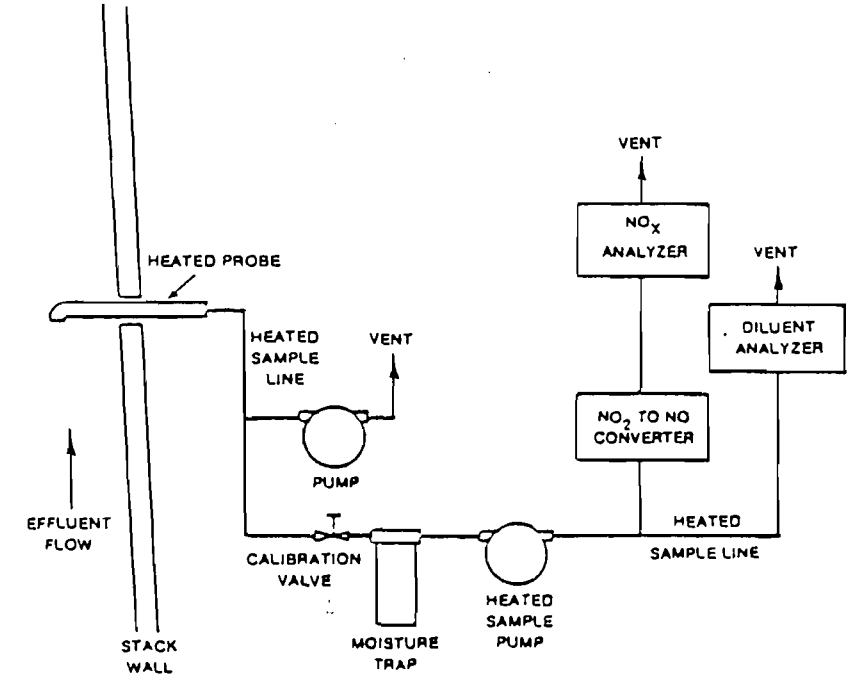


FIGURE 20-1—MEASUREMENT SYSTEM DESIGN

5. Measurement System Performance Test Procedures

Perform the following procedures prior to measurement of emissions (Section 6) and only once for each test program, i.e., the series of all test runs for a given gas turbine engine.

5.1 Calibration Gas Checks. There are two alternatives for checking the concentrations of the calibration gases. (a) The first is to use calibration gases that are documented traceable to National Bureau of Standards Reference Materials. Use *Traceability Protocol for Establishing True Concentrations of Gases Used for Calibrations and Audits of Continuous Source Emission Monitors* (Protocol Number 1) that is available from the Environmental Monitoring and Support Laboratory, Quality Assurance Branch, Mail Drop 77, Environmental Protection Agency, Research Triangle Park, North Carolina 27711. Obtain a certification from the gas manufacturer that the protocol was followed. These calibration gases are not to be analyzed with the Reference Methods. (b) The second alternative is to use calibration gases not prepared according to the protocol. If this alternative is chosen, within 1 month prior to the emission test, analyze each of the calibration gas mixtures in triplicate using Reference Method 7 or the procedure outlined in Citation 8.1 for NO_x and use Reference Method 3 for O_2 or CO_2. Record the results on a data sheet (example is shown in Figure 20-2). For the low-level, mid-level, or high-level gas mixtures, each of the individual NO_x analytical results must be within 10 percent (or 10 ppm, whichever is greater) of the triplicate set average (O_2 or CO_2 test results must be within 0.5 percent O_2 or CO_2); otherwise, discard the entire set and repeat the triplicate analyses. If the average of the triplicate reference method test results is within 5 percent for NO_x gas or 0.5 percent O_2 or CO_2 for the O_2 or CO_2 gas of the calibration gas manufacturer's tag value, use the tag value; otherwise, conduct at least three additional reference method test analyses until the results of six individual NO_x runs (the three original plus three additional) agree within 10 percent (or 10 ppm, whichever is greater) of the average (O_2 or CO_2 test results must be within 0.5 percent O_2 or CO_2). Then use this average for the cylinder value.

5.2 Measurement System Preparation. Prior to the emission test, assemble the measurement system following the manufacturer's written instructions in preparing and operating the NO_2 to NO converter, the NO_x analyzer, the diluent analyzer, and other components.

FIGURE 20-2—ANALYSIS OF CALIBRATION GASES

Date _____ (Must be within 1 month prior to the test period)
Reference method used _____

Sample run	Gas concentration, ppm		
	Low level[a]	Mid level[b]	High level[c]
1			
2			
3			
Average			
Maximum % deviation[d]			

[a] Average must be 20 to 30% of span value.
[b] Average must be 45 to 55% of span value.
[c] Average must be 80 to 90% of span value.
[d] Must be < ± 10% of applicable average or 10 ppm, whichever is greater.

5.3 Calibration Check. Conduct the calibration checks for both the NO_x and the diluent analyzers as follows:

5.3.1 After the measurement system has been prepared for use (Section 5.2), introduce zero gases and the mid-level calibration gases; set the analyzer output responses to the appropriate levels. Then introduce each of the remainder of the calibration gases described in Sections 4.3 or 4.4 one at a time, to the measurement system. Record the responses on a form similar to Figure 20-3.

5.3.2 If the linear curve determined from the zero and mid-level calibration gas responses does not predict the actual response of the low-level (not applicable for the diluent analyzer) and high-level gases within 2 percent of the span value, the calibration shall be considered invalid. Take corrective measures on the measurement system before proceeding with the test.

5.4 Interference Response. Introduce the gaseous components listed in Table 20-1 into the measurement system separately, or as gas mixtures. Determine the total interference output response of the system to these components in concentration units, record the values on a form similar to Figure 20-4. If the sum of the interference responses of the test gases for either the NO_x or diluent analyzers is greater than 2 percent of the applicable span value, take corrective measure on the measurement system.

TABLE 20-1—INTERFERENCE TEST GAS CONCENTRATION

CO	500 ± 50 ppm	CO_2	10 ± 1 percent.
SO_2	200 ± 20 ppm	C_2	20.9 ± 1 percent.

FIGURE 20-4—INTERFERENCE RESPONSE

Date of test _____
Analyzer type _____
Serial No. _____

Test gas type	Concentration, ppm	Analyzer output response	% of span

$$\% \text{ of span} = \frac{\text{Analyzer output response}}{\text{Instrument span}} \times 100.$$

Conduct an interference response test of each analyzer prior to its initial use in the field. Thereafter, recheck the measurement system if changes are made in the instrumentation that could alter the interference response, e.g., changes in the type of gas detector.

In lieu of conducting the interference response test, instrument vendor data, which demonstrate that for the test gases of Table 20-1 the interference performance specification is not exceeded, are acceptable.

5.5 Response time. To determine response time, first introduce zero gas into the system at the calibration valve until all readings are stable; then, switch to monitor the stack effluent until a stable reading can be obtained. Record the upscale response time. Next, introduce high-level calibration gas into the system. Once the system has stabilized at the high-level concentration, switch to monitor the stack effluent and wait until a stable value is reached. Record the downscale response time. Repeat the procedure three times. A stable value is equivalent to a change of less than 1 percent of span value for 30 seconds or less than 5 percent of the measured average concentration for 2 minutes. Record the response time data on a form similar to Figure 20-5, the readings of the upscale or downscale response time, and report the greater time as the "response time" for the analyzer. Conduct a response time test prior to the initial field use of the measurement system, and repeat if changes are made in the measurement system.

FIGURE 20-5—RESPONSE TIME

Date of test _____
Analyzer type _____
S/N _____
Span gas concentration: _____ ppm.
Analyzer span setting: _____ ppm.
Upscale:
1 _____ seconds.
2 _____ seconds.
3 _____ seconds.
Average upscale response _____ seconds.
Downscale:
1 _____ seconds.
2 _____ seconds.
3 _____ seconds.
Average downscale response _____ seconds.
System response time = Slower average time = _____ seconds.

FIGURE 20-3—ZERO AND CALIBRATION DATA

Turbine type _____ Identification number _____
Date _____ Test number _____
Analyzer type _____ Identification number _____

	Cylinder value, ppm or %	Initial analyzer response, ppm or %	Final analyzer responses, ppm or %	Difference: initial-final, ppm or %
Zero gas				
Low-level gas				
Mid-level gas				
High-level gas				

$$\text{Percent drift} = \frac{\text{Absolute difference}}{\text{Span value}} \times 100$$

5.6 NO_2 to NO Conversion Efficiency.

5.6.1 Add gas from the mid-level NO in N_2 calibration gas cylinder to a clean, evacuated, leak-tight Tedlar bag. Dilute this gas approximately 1:1 with 20.9 percent O_2, purified air. Immediately attach the bag outlet to the calibration valve assembly and begin operation of the sampling system. Operate the sampling system, recording the NO_x response, for at least 30 minutes. If the NO_2 to NO conversion is 100 percent, the instrument response will be stable at the highest peak valve observed. If the response at the end of 30 minutes decreases more than 2.0 percent of the highest peak valve, the system is not acceptable and corrections must be made before repeating the check.

5.6.2 Alternatively, the NO_2 to NO converter check described in Title 40, Part 86: certification and Test Procedures for Heavy-duty Engines for 1979 and Later Model Years may be used. Other alternative procedures may be used with approval of the Administrator.

6. Emission Measurement Test Procedure

6.1 Preliminaries.

6.1.1 Selection of a Sampling Site. Select a sampling site as close as practical to the exhaust of the turbine. Turbine geometry, stack configuration, internal baffling, and point of introduction of dilution air will vary for different turbine designs. Thus, each of these factors must be given special consideration in order to obtain a representative sample. Whenever possible, the sampling site shall be located upstream of the point of introduction of dilution air into the duct. Sample ports may be located before or after the upturn elbow, in order to accommodate the configuration of the turning vanes and baffles and to permit a complete, unobstructed traverse of the stack. The sample ports shall not be located within 5 feet or 2 diameters (whichever is less) of the gas discharge to atmosphere. For supplementary-fired, combined-cycle plants, the sampling site shall be located between the gas turbine and the boiler. The diameter of the sample ports shall be sufficient to allow entry of the sample probe.

6.1.2 A preliminary O_2 or CO_2 traverse is made for the purpose of selecting sampling points of low O_2 or high CO_2 concentrations, as appropriate for the measurement system. Conduct this test at the turbine operating condition that is the lowest percentage of peak load operation included in the test program. Follow the procedure below, or use an alternative procedure subject to the approval of the Administrator.

6.1.2.1 Minimum Number of Points. Select a minimum number of points as follows: (1) Eight, for stacks having cross-sectional areas less than 1.5 m^2 (16.1 ft^2); (2) eight plus one additional sample point for each 0.2 M^2 (2.2 ft^2 of area, for stacks of 1.5 m^2 to 10.0 m^2 (16.1-107.6 ft^2) in cross-sectional area; and (3) 49 sample points (48 for circular stacks) for stacks greater than 10.0 m^2 (107.6 ft^2) in cross-sectional area. Note that for circular ducts, the number of sample points must be a multiple of 4, and for rectangular ducts, the number of points must be one of those listed in Table 20-2; therefore, round off the number of points (upward), when appropriate.

6.1.2.2 Cross-sectional Layout and Location of Traverse Points. After the number of traverse points for the preliminary diluent sampling has been determined, use Method 1 to locate the traverse points.

6.1.2.3 Preliminary Diluent Measurement. While the gas turbine is operating at the lowest percent of peak load, conduct a preliminary diluent measurement as follows: Position the probe at the first traverse point and begin sampling. The minimum sampling time at each point shall be 1 minute plus the average system response time. Determine the average steady-state concentration of diluent at each point and record the data on Figure 20-6.

6.1.2.4 Selection of Emission Test Sampling Points. Select the eight sampling points at which the lowest O_2 concentrations or highest CO_2 concentrations were obtained. Sample at each of these selected points during each run at the different turbine load conditions. More than eight points may be used, if desired, providing that the points selected as described above are included.

TABLE 20-2—CROSS-SECTIONAL LAYOUT FOR RECTANGULAR STACKS

No. of traverse points:	Matrix layout
9	3 x 3
12	4 x 3
16	4 x 4
20	5 x 4
25	5 x 5
30	6 x 5
36	6 x 6
42	7 x 6
49	7 x 7

FIGURE 20-6—PRELIMINARY DILUENT TRAVERSE

Date _____

Location:
Plant _____
City, State _____

Turbine identification:
Manufacturer _____
Model, serial number _____

Sample point	Diluent concentration, ppm

6.2 NO_x and Diluent Measurement. This test is to be conducted at each of the specified load conditions. Three test runs at each load condition constitute a complete test.

6.2.1 At the beginning of each NO_x test run and, as applicable, during the run, record turbine data as indicated in Figure 20-7. Also, record the location and number of the traverse points on a diagram.

6.2.2 Position the probe at the first point determined in the preceding section and begin sampling. The minimum sampling time at each point shall be at least 1 minute plus the average system response time. Determine the average steady-state concentration of diluent and NO_x at each point and record the data on Figure 20-8.

FIGURE 20-7—STATIONARY GAS TURBINE DATA

TURBINE OPERATION RECORD

Test operator _____ Date _____

Turbine identification:
Type _____
Serial No. _____

Location:
Plant _____
City _____

Ambient temperature _____
Ambient humidity _____
Test time start _____
Test time finish _____
Fuel flow rate[a] _____
Water or steam Flow rate[a] _____
Ambient Pressure _____
Ultimate fuel Analysis:
C _____
H _____
O _____
N _____
S _____
Ash _____
H_2O _____
Trace Metals:
Na _____
Va _____
K _____
etc[b] _____
Operating load _____

[a]Describe measurement method, i.e., continuous flow meter, start finish volumes, etc.
[b]i.e., additional elements added for smoke suppression.

FIGURE 20-8—STATIONARY GAS TURBINE SAMPLE POINT RECORD

Turbine identification:
Manufacturer _____
Model, serial No. _____

Location:
Plant _____
City, State _____

Ambient temperature _____
Ambient pressure _____
Date _____
Test time: start _____
Test time: finish _____
Test operator name _____
Diluent instrument type _____
Serial No. _____

NO_x instrument type _____
Serial No. _____

Sample point	Time, min.	Diluent[a], %	NO_x[a], ppm

[a]Average steady-state value from recorder or instrument readout.

6.2.3 After sampling the last point, conclude the test run by recording the final turbine operating parameters and by determining the zero and calibration drift, as follows:

Immediately following the test run at each load condition, or if adjustments are necessary for the measurement system during the tests, reintroduce the zero and mid-level calibration gases as described in Sections 4.3, and 4.4, one at a time, to the measurement system at the calibration valve assembly. (Make no adjustments to the measurement system until after the drift checks are made.) Record the analyzers' responses on a form similar to Figure 20-3. If the drift values exceed the specified limits, the test run preceding the check is considered invalid and will be repeated following corrections to the measurement system. Alternatively, recalibrate the measurement system and recalculate the measurement data. Report the test results based on both the initial calibration and the recalibration data.

6.3 SO_2 Measurement. This test is conducted only at the 100 percent peak load condition. Determine SO_2 using Method 6, or equivalent, during the test. Select a minimum of six total points from those required for the NO_x measurements; use two points for each sample run. The sample time at each point shall be at least 10 minutes. Average the diluent readings taken during the NO_x test runs at sample points corresponding to the SO_2 traverse points (see Section 6.2.2) and use this average diluent concentration to correct the integrated SO_2 concentration obtained by Method 6 to 15 percent diluent (see Equation 20-1).

If the applicable regulation allows fuel sampling and analysis for fuel sulfur content to demonstrate

compliance with sulfur emission unit, emission sampling with Reference Method 6 is not required, provided the fuel sulfur content meets the limits of the regulation.

7. Emission Calculations

7.1 Moisture Correction. Measurement data used in most of these calculations must be on a dry basis. If measurements must be corrected to dry conditions, use the following equation:

$$C_d = \frac{C_w}{1 - B_{ws}}$$

Eq. 20-1

where:

C_d = Pollutant or diluent concentration adjusted to dry conditions, ppm or percent.

C_w = Pollutant or diluent concentration measured under moist sample conditions, ppm or percent.

B_{ws} = Moisture content of sample gas as measured with Method 4, reference method, or other approved method, percent/100.

7.2 CO_2 Correction Factor. If pollutant concentrations are to be corrected to 15 percent O_2 and CO_2 concentration is measured in lieu of O_2 concentration measurement, a CO_2 correction factor is needed. Calculate the CO_2 correction factor as follows:

7.2.1 Calculate the fuel-specific Fo value for the fuel burned during the test using values obtained from Method 19, Section 5.2 and the following equation.

$$F_o = \frac{0.209\ F_d}{F_c}$$

Eq. 20-2

where:

F_o = Fuel factor based on the ratio of oxygen volume to the ultimate CO_2 volume produced by the fuel at zero percent excess air, dimensionless.

0.209 = Fraction of air that is oxygen, percent/100.

F_d = Ratio of the volume of dry effluent gas to the gross calorific value of the fuel from Method 19, dsm^3/J ($dscf/10^6$ Btu).

F_c = Ratio of the volume of carbon dioxide produced to the gross calorific value of the fuel from Method 19, dsm^3/J ($dscf/10^6$ Btu).

7.2.2 Calculate the CO_2 correction factor for correcting measurement data to 15 percent oxygen, as follows:

$$X_{CO_2} = \frac{5.9}{F_o}$$

Eq. 20-3

where:

X_{CO_2} = CO_2 Correction factor, percent.

5.9 = 20.9 percent O_2 — 15 percent O_2, the defined O_2 correction value, percent.

7.3 Correction of Pollutant Concentrations to 15 percent O_2. Calculate the NO_x and SO_2 gas concentrations adjusted to 15 percent O_2 using Equation 20-4 or 20-5, as appropriate. The correction to 15 percent O_2 is very sensitive to the accuracy of the O_2 or CO_2 concentration measurement. At the level of the analyzer drift specified in Section 3, the O_2 or CO_2 correction can exceed 5 percent at the concentration levels expected in gas turbine exhaust gases. Therefore, O_2 or CO_2 analyzer stability and careful calibration are necessary.

7.3.1 Correction of Pollutant Concentration Using O_2 Concentration. Calculate the O_2 corrected pollutant concentration, as follows:

$$C_{adj} = C_d \frac{5.9}{20.9 - \%O_2}$$

Eq. 20-4

where:

C_{adj} = Pollutant concentration corrected to 15 percent O_2 ppm.

C_d = Pollutant concentration measured, dry basis, ppm.

$\%O_2$ = Measured O_2 concentration dry basis, percent.

7.3.2 Correction of Pollutant Concentration Using CO_2 Concentration. Calculate the CO_2 corrected pollutant concentration, as follows:

$$C_{adj} = C_d \frac{X_{CO_2}}{\%CO_2}$$

Eq. 20-5

where:

$\%CO_2$ = Measured CO_2 concentration measured, dry basis, percent.

7.4 Average Adjusted NO_x Concentration. Calculate the average adjusted NO_x concentration by summing the adjusted values for each sample point and dividing by the number of points for each run.

7.5 NO_x and SO_2 Emission Rate Calculations. The emission rates for NO_x and SO_2 in units of pollutant mass per quantity of heat input can be calculated using the pollutant and diluent concentrations and fuel-specific F-factors based on the fuel combustion characteristics. The measured concentrations of pollutant in units of parts per million by volume (ppm) must be converted to mass per unit volume concentration units for these calculations. Use the following table for such conversions:

CONVERSION FACTORS FOR CONCENTRATION

From	To	Multiply by
g/sm^3	ng/sm^3	10^9
mg/sm^3	ng/sm^3	10^6
lb/scf	ng/sm^3	1.602×10^{13}
ppm (SO_2)	ng/sm^3	2.660×10^6
ppm (NO_x)	ng/sm^3	1.912×10^6
ppm (SO_2)	lb/scf	1.660×10^{-7}
ppm (NO_x)	lb/scf	1.194×10^{-7}

7.5.1 Calculation of Emission Rate Using Oxygen Correction. Both the O_2 concentration and the pollutant concentration must be on a dry basis. Calculate the pollutant emission rate, as follows:

$$E = C_d F_d \frac{20.9}{20.9 - \%O_2}$$

Eq. 20-6

where:

E = Mass emission rate of pollutant, ng/J (lb/10^6 Btu).

7.5.2 Calculation of Emission Rate Using Carbon Dioxide Correction. The CO_2 concentration and the pollutant concentration may be on either a dry basis or a wet basis, but both concentrations must be on the same basis for the calculations. Calculate the pollutant emission rate using Equation 20-7 or 20-8:

$$E = C_d F_c \frac{100}{\%CO_2}$$

Eq. 20-7

$$E = C_w F_c \frac{100}{\%CO_{2w}}$$

Eq. 20-8

where:

C_w = Pollutant concentration measured on a moist sample basis, ng/sm^3 (lb/scf).

CO_{2w} = Measured CO_2 concentration measured on a moist sample basis, percent.

8. Bibliography

1. Curtis, F. A Method for Analyzing NO_x Cylinder Gases-Specific Ion Electrode Procedure. Monograph available from Emission Measurement Laboratory, ESED, Research Triangle Park, N.C. 27711, October 1978.

2. Sigsby, John E., F. M. Black, T. A. Bellar, and D. L. Klosterman. Chemiluminescent Method for Analysis of Nitrogen Compounds in Mobile Source Emissions (NO, NO_2, and NH_3). "Environmental Science and Technology," 7:51-54. January 1973.

3. Shigehara, R. T., R. M. Neulicht, and W. S. Smith. Validating Orsat Analysis Data from Fossil Fuel-Fired Units. Emission Measurement Branch, Emission Standards and Engineering Division. Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. June 1975.

Appendix E - Calibration Data

air Consulting and Engineering

CONTINUOUS MONITOR DRIFT CERTIFICATION

PLANT Waste Management
LOCATION POMPANO BCH, FL.
SOURCE ID UNIT 2
DATE 10-26-89
GAS ID O2

RUN NUMBER	TIME	SPAN DRIFT			% SPAN	ZERO DRIFT			% SPAN
		INITIAL	FINAL	DRIFT		INITIAL	FINAL	DRIFT	
33 - 1	0740	20.9	20.9	0	0	0	0	0	0
2	0804	20.9	20.9	0	0	0	0	0	0
3	0827	20.9	20.6	0.3	1.2	0	0	0	0
50 - 1	0852	20.6	20.8	.2	.8	0	0	0	0
2	0916	20.8	20.8	0	0	0	0	0	0
3	0937	20.8	20.8	0	0	0	0	0	0
75 - 1	1002	20.8	20.8	0	0	0	0	0	0
2	1024	20.8	20.8	0	0	0	0	0	0
3	1046	20.8	20.5	.3	1.2	0	0	0	0
100 - 1	1107	20.9	20.9	0	0	0	0	0	0
2	1128	20.9	20.9	0	0	0	0	0	0
3	1150	20.9	20.9	0	0	0	0	0	0

Air Consulting and Engineering

CONTINUOUS MONITOR DRIFT CERTIFICATION

PLANT Waste Management
LOCATION PUMPAND B.CH, FL.
SOURCE ID UNIT 2
DATE 10-26-89
GAS ID NOx

RUN NUMBER	TIME	SPAN DRIFT			% SPAN	ZERO DRIFT			% SPAN
		INITIAL	FINAL	DRIFT		INITIAL	FINAL	DRIFT	
23-1	0740	77.7	78	.3	.3	0	0	0	0
2	0804	78.0	77.7	.3	.3	0	0	0	0
3	0827	77.7	77.8	0.1	0.1	0	0.3	0.3	0.3
50-1	0842	77.8	77.8	0	0	.3	.3	0	0
2	0916	77.8	77.8	0	0	.3	.3	0	0
3	0937	77.8	78.0	0	0	0.3	0.5	0.2	0.2
75-1	1002	78.0	77.0	1.0	1.0	0.5	0.7	0.2	0.2
2	1024	77.0	76.3	.7	.7	.7	.6	.1	.1
3	1046	77.7	78	.3	.3	.6	.6	0	0
100-1	1107	78	78.8	0.8	0.8	.8	.8	.2	.2
2	1128	78.8	79.0	0.2	0.2	.8	.5	.3	.3
3	1150	79.0	79.6	.6	.6	.5	.8	.3	.3

CONTINUOUS MONITOR ACCURACY CERTIFICATION

PLANT: Waste Management
LOCATION: Pompano Bch, FL
SOURCE ID: UNIT 2
DATE: 10-26-89

NO_x

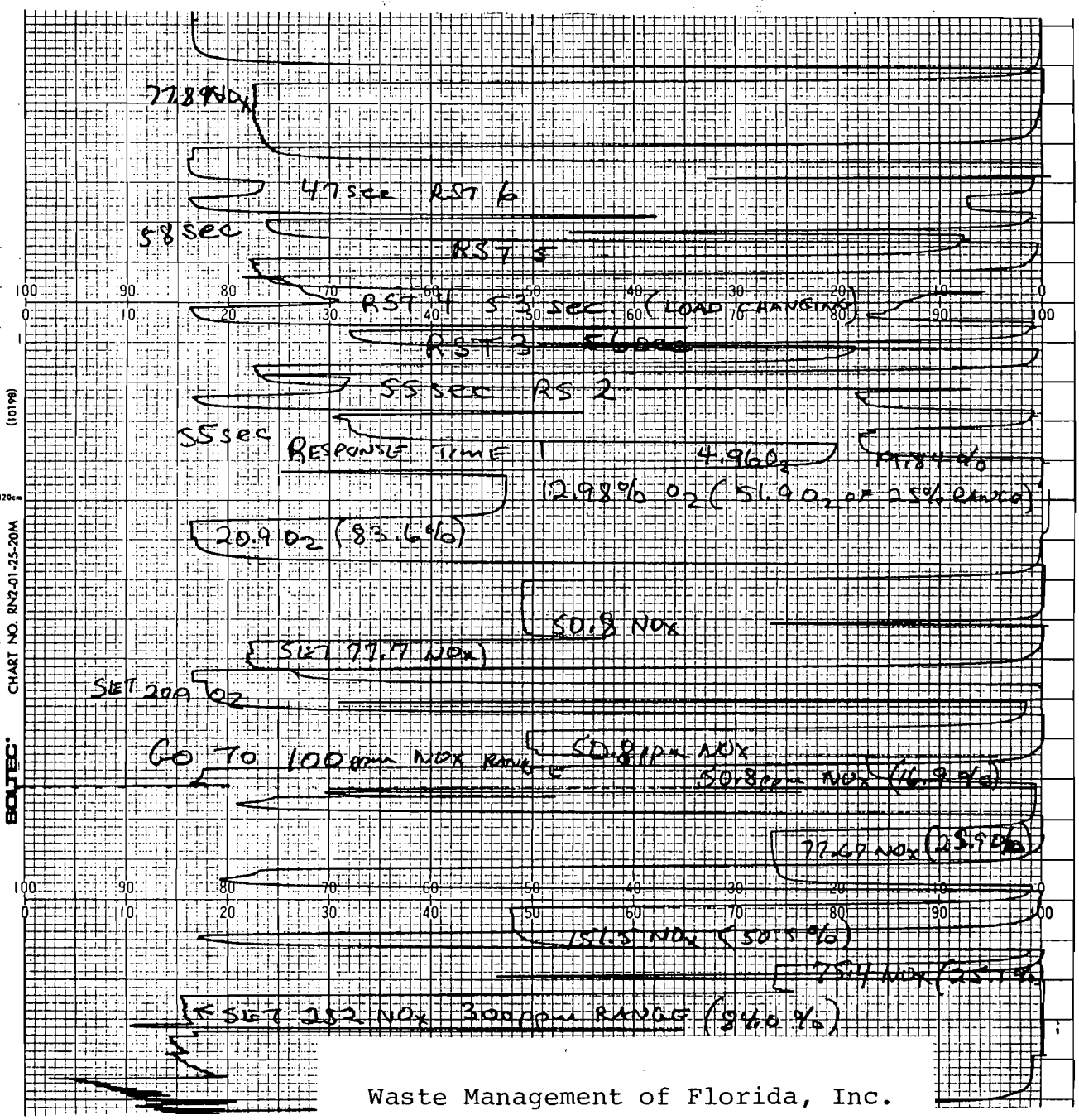
Calibration Gas	Monitor Value ppm	Difference ppm	% Span
252	252	0	0
151.5	153.6	2.1	0.7
77.7	78.3	0.6	0.2
50.8	51.0	0.2	0.1
0	0	0	0

O_2

Calibration Gas	Monitor Value %	Difference %	% Span
20.9	20.9	0	0
12.98	13.02	0.04	0.2

CO

Calibration Gas	Monitor Value	Difference	% Span



Waste Management of Florida, Inc.

10/23/89

RESPONSE TIME DATA SHEET

PLANT: WASTE MANAGEMENT

DATE: 10-23-89

ANALYZER TYPE: NOx THERMOELECTRON 10AR, O_2 TELEDYNE 320

S/N:

SPAN GAS CONCENTRATION: 76.7 NOx 20.9 O2
300 PPM NOx THEN 100 PPM NOx

ANALYZER SPAN SETTING: 25% O_2

UPSCALE:

NOx / O2

1. 55 / 55 SECONDS
2. 53 / 56 SECONDS
3. 47 / 58 SECONDS

AVERAGE:_____SECONDS

DOWNSCALE:

NOx / O2

1. 55 / 55 SECONDS
2. 56 / 53 SECONDS
3. 58 / 47 SECONDS

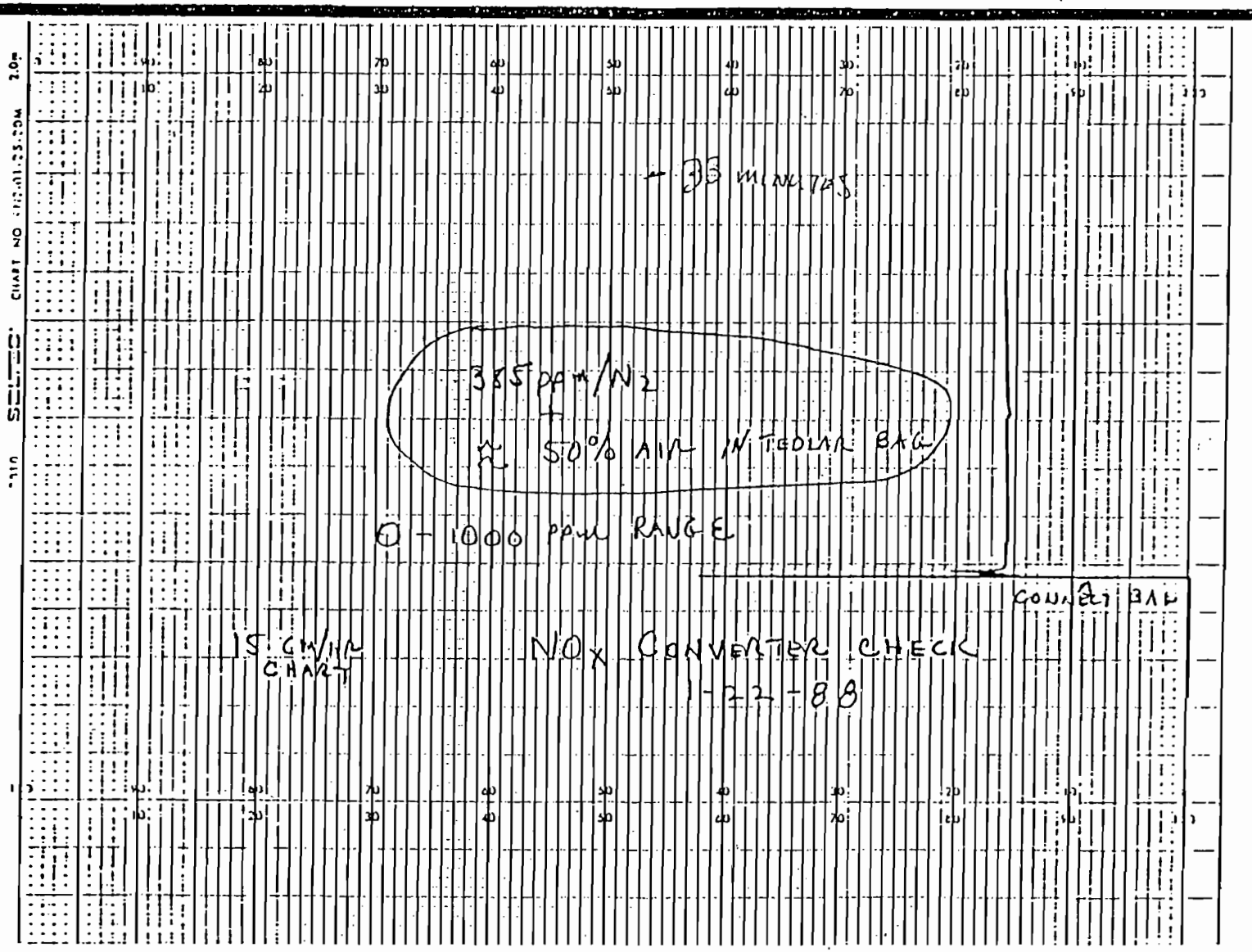
AVERAGE:_____SECONDS

SYSTEM RESPONSE TIME = SLOWER AVERAGE TIME:

60 SECONDS

ANALYZED BY: NECK

Appendix F - NO2 - NO Converter Check



NO$_x$ CONVERTER CHECK

AIR CONSULTING
and
ENGINEERING

Appendix G - NOx Interference

Inteference Response

Procedure: Introduce the gaseous components into the measurement system. Record the inteference response.

Specification: Inteference $\leq$ 2 percent of span.

Compliance Test Result of January 18, 1980, Thermo Electron, Inc.

Gas Type	ppm	Analyzer Response	Percent of Span
CO	500	<.1 ppm	<.1%
SO2	201	<.1 ppm	<.1%
CO2	10%	<.1 ppm	<.1%
O2	20.9%	<.1 ppm	<.1%

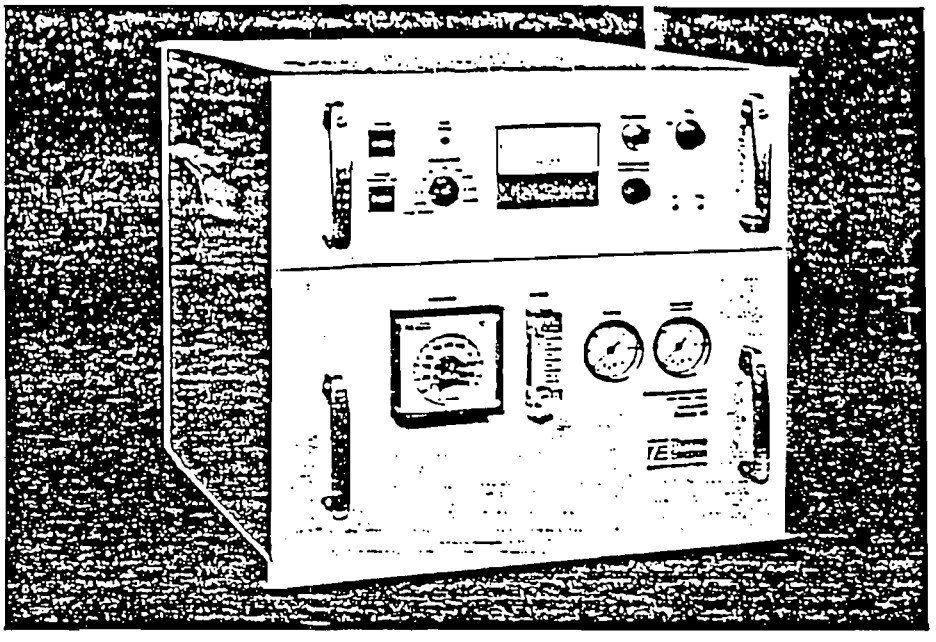
DATE OF TEST Jan 18, 1980

ANALYZER TYPE 10AR RANGE 0-25 PPM SERIAL NO. 10AR-0148-80

TEST GAS TYPE	CONCENTRATION PPM	ANALYZER OUTPUT RESPONSE	% OF SPAN
CO	500	< .1 PPM	< .1%
SO_2	201	< .1 PPM	< .1%
CO_2	10%	< .1 PPM	< .1%
O_2	20.9%	< .1 PPM	< .1%

Thermo Electron CORPORATION
Environmental Instruments Division

Chemiluminescent NO/NO_x Analyzer



Model 10

For Continuous Source Gas Monitoring

Thermo Electron's Model 10 NO/NO_x Analyzer is based on the chemiluminescent reaction between nitric oxide (NO) and ozone (O_3) according to the reaction:

$$NO + O_3 \rightarrow NO_2 + O_2 + h\nu$$

Light emission results when the electronically excited NO_2 molecules revert to their ground state.

A front panel mode switch provides for either a direct readout of the NO concentration in the sample being analyzed ("NO" mode) or the total NO_x concentration ("NO_x" mode). When the Model 10 is placed in the "NO_x" mode, the sample stream passes through a NO_x-to-NO converter prior to entering the reaction chamber for subsequent analysis.

Key Features

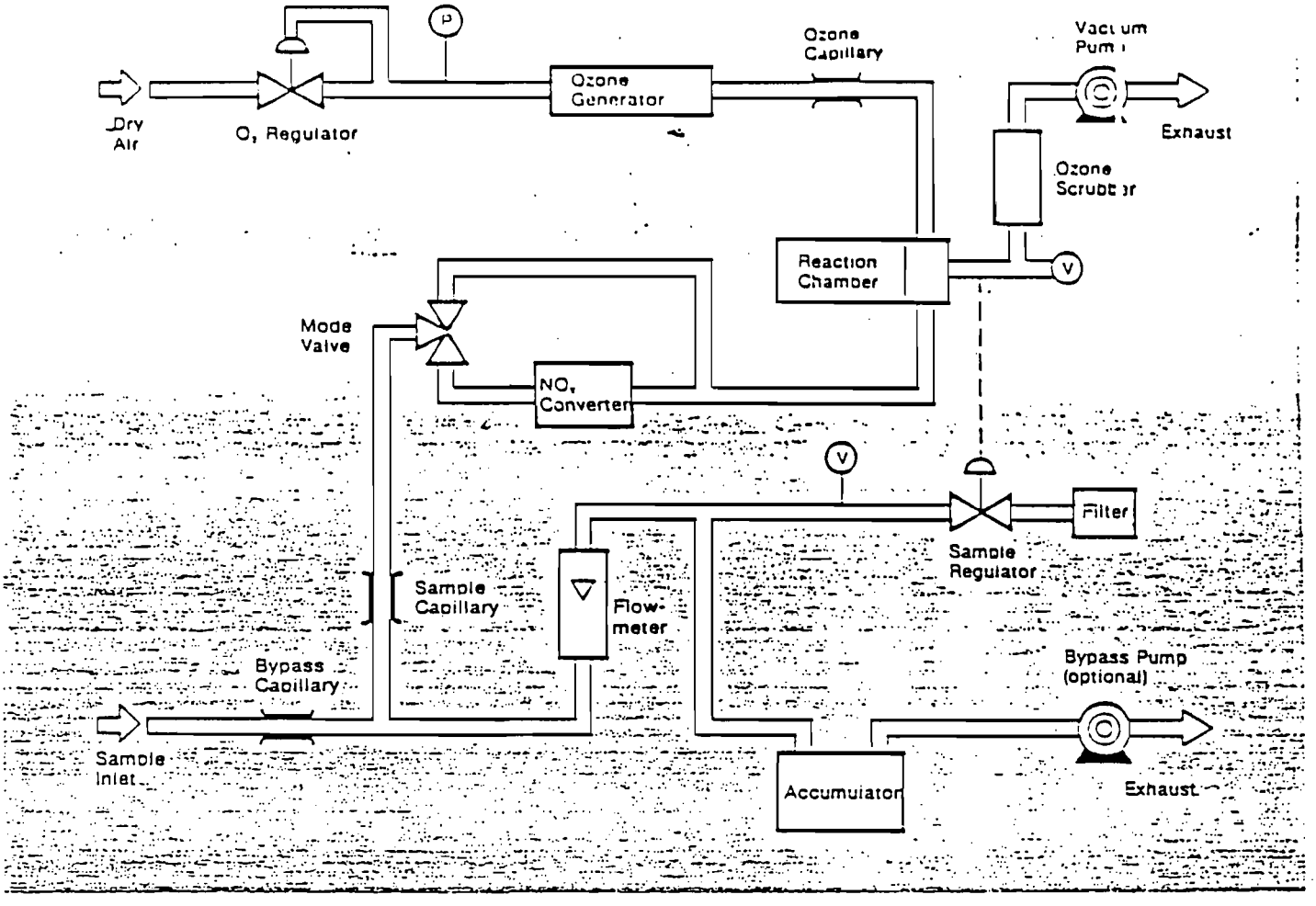
- Selective detection of NO or NO_x
- Eight ranges, from 2.5 to 10,000 ppm FS
- Continuous monitoring with rapid response
- Linear on all ranges
- Field proven reliability
- Insensitive to changes in sample flow

Model 10 Specifications*

Ranges	0–2.5 ppm, 0–10 ppm, 0–25 ppm, 0–100 ppm, 0–250 ppm, 0–1000 ppm, 0–2500 ppm, 0–10,000 ppm
Minimum Detectable Concentration	.05 ppm
Noise	Less than 1% of FS
Reproducibility	1% of FS
Operating Temperature Extremes	0–40°C
Response Time (0–90%)	–1.5 second NO mode –1.7 second NO_x mode
Zero Stability	±1 ppm in 24 hours
Span Stability	±1% in 24 hours
Linearity	±1% from 0.05 to 10,000 ppm**
Power Requirements	1000 watts, 115 ± 10 volts, 60 Hz standard. Also available in 115V 50 Hz, and 210 ± 15 volts, 50 Hz versions
Physical Dimensions	19" wide × 17" high × 20" deep
Instrument Weight	75 lbs. (including pump)
Outputs	Two standard outputs supplied: 1) 0–10V; 2) Field selectable from 0–10V, 5V, 1V, 100mV or 10mV. (ma options available.)

*Specifications are typical and subject to change without notice
**With O_3 Feed; With dry air, linearity to 2000 ppm

Model 10 Flow Scheme



As illustrated in the above diagram, sample gas enters the Model 10, flows through the bypass capillary, and divides. Most of the sample flows through the flowmeter, accumulator, bypass pump, and exhausts. Only a small amount of sample flows through the sample capillary for analysis. The bypass pump in conjunction with the sample regulator maintain a constant pressure differential across the sample capillary, thus maintaining constant sample flow for analysis. This plumbing network makes the analyzer insensitive to pressure fluctuation in the sample inlet.

From the sample capillary, the sample to be analyzed is either directed through the NO_x to NO converter or around it, depending on the choice of the operator. In the reaction chamber the sample reacts with ozone to produce the light emission and is exhausted. The ozone is produced internally from dry air entering through the oxygen regulator and ozonator. The light emission is sensed by the photomultiplier tube and amplified.

Options

10-001 Bypass pump assembly includes pump, shock tray, accumulator, tubing, and fittings.

Accessory Instruments

Model 700 Heated Capillary Module
Model 606H Heated Particulate Filter
Model 800 Sample Gas Conditioner
Model 900 Sample Gas Conditioner

Thermo Electron
CORPORATION
Environmental Instruments Division
108 South Street
Hopkinton, MA 01748
Telephone (617) 435-9321
Telex 948326

Printed in USA 3/84 5M

Appendix H - O2 Interference

SPECIFICATION
FOR
TELEDYNE ANALYTICAL INSTRUMENTS
MODEL 320P-4
PORTABLE OXYGEN ANALYZER
(WITH BUILT-IN PUMP)

Ranges:	0–5, 0–10, 0–25% O_2
Sensitivity:	0–5% of Full Scale
Accuracy:	±1% of full scale at constant temperature; ±5% of reading or ±1% of full scale, whichever is greater, throughout the operating temperature range.
Operating Temperature:	30–125° F.
Response Time:	Class B-1, 90% in less than 5 seconds.
Signal Output:	Internal, high resolution meter External, 0–100 mv DC full Scale
Micro-Fuel Cell:	Class B-1, Life is dependent upon duty cycle (e.g. 2.5 years, assuming 10% duty cycle in air). continuous duty in air 6 months.
Power Requirements:	2 NiCad rechargeable batteries. Batteries fully charged provide 1 month's continuous operation. Charging time overnight (14 hours). Charger built-in requires 115VAC, 50-60 Hz, power.

PUMP SPECIFICATION

Type:	Diaphragm
Duty:	Designed for Intermittant use.
Flow Rate:	3 to 4 scfh (about 1500 - 2000 cc/min) 5 VDC supplied by Amplifier batteries. (30 - 40 hrs. per charge)
Max. Vacuum:	60" water column

NOTE: TELEDYNE DOES NOT PUBLISH INTEFERENCE DATA BUT ACCORDING TO MR. JEFF BURKS OF CORPORATE ENGINEERING, THE B-1 FUEL CELL HAS NO INTEFERENCES, SO_2, NO_x, CO_2, AND CO EFFECT ONLY CELL LIFE, NOT ACCURACY.

Appendix I - Calibration Gas Certification

Scott Specialty Gases

PLUMSTEADVILLE, PA. 18949 PHONE: 215-766-8861 TWX: 510-665-9344

Date Shipped 4-13-89
Our Project No: 9930
Your P.O. No: 89196
Page 1 of 1

AIR CONSULTING & ENGRG.
SUITE #4
2106 NW 67th PLACE
GAINESVILLE, FL 32606

ATTN: STEVE NECK

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

(Concentrations are in mole % or ppm)

Cylinder Number AAL 17381 Certified Accuracy ±1 % NBS Traceable Analysis Dates: First 3-30-89 Last 4-10-89

Cylinder Pressure = 2000 psig

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	SECOND
NITRIC OXIDE	150.1 ppm	6-10-90	Chemilumenexcence	1686	149.7 ppm	150.3 ppm
NOx	151.5 ppm				149.7 ppm	150.3 ppm
					149.7 ppm	150.6 ppm
O2 Free NITROGEN	BALANCE					

Cylinder Number ALM 000544 Certified Accuracy ±1 % NBS Traceable Analysis Dates: First 3-30-89 Last 4-6-89

Cylinder Pressure = 2000 psig

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	SECOND
NITRIC OXIDE	252.5 ppm	10-6-90	Chemilumenexcence	1686	251.8 ppm	253.4 ppm
NOx	252.5 ppm			1687	251.8 ppm	253.4 ppm
					252.4 ppm	253.4 ppm
O2 Free NITROGEN	BALANCE					

*We hereby certify the cylinder gas has been analyzed according to EPA Protocol No: 1 Procedure G1

Analyst Wesley J Bleeker for TS
TOM SASSAMAN

Approved By Mark S Sirinides
MARK S. SIRINIDES

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.

Scott Specialty Gases

PLUMSTEADVILLE, PA. 18949 PHONE: 215-766-8861 TWX: 510-665-9344

AIR CONSULTING & ENG

Date Shipped 9-8-89
Our Project No: 12923
Your P.O. No: 89-228
Page 2 of 3

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

(Concentrations are in mole % or ppm)

Cylinder Number AAL 15048 cp=2000psig Certified Accuracy ±1 % NBS Traceable Analysis Dates: First 8-28-89 Last 9-6-89

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	SECOND
NITRIC OXIDE	245ppm	3-6-91	CHEMILUMENESCENCE	1685	245.4ppm	245.4ppm
NOX	252ppm				245.1ppm	245.4ppm
					244.9ppm	246.4ppm
NITROGEN	BAL					

Cylinder Number _____ Certified Accuracy _____ % NBS Traceable Analysis Dates: First _____ Last _____

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	SECOND

*We hereby certify the cylinder gas has been analyzed according to EPA Protocol No: 1 PROCEDURE G1

Analyst _____ Approved By MARK S. SIRINIDES

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.

Scott Specialty Gases

PLUMSTEADVILLE, PA. 18949 PHONE: 215-766-8861 TWX: 510-665-9344

Date Shipped 8/17/89
Our Project No: 13293
Your P.O. No: 89-200F
Page 1 of 1

AIR CONSULTING & ENGR
SUITE #4
2106 NW 67TH PLACE
GAINESVILLE FL 32606

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

(Concentrations are in mole % or ppm)

Cylinder Number ALM007394 CP=2000 PSIG Certified Accuracy ±1 % NBS Traceable Analysis Dates: First 8/15/89 Last NR

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	SECOND
Oxygen	12.98%	2/15/91	TCD	2652	12.97%	
					12.99%	
					12.98%	
Nitrogen	Balance					

Cylinder Number ALM007380 CP=2000 PSIG Certified Accuracy ±1 % NBS Traceable Analysis Dates: First 8/15/89 Last NR

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	SECOND
O_2	5.03%	2/15/91	TCD	2652	5.04%	
					5.04%	
					5.02%	
N_2	Balance					

*We hereby certify the cylinder gas has been analyzed according to EPA Protocol No: 1 Procedure G1

Analyst Rene J. Bedoya FDL (T.S) Approved By Mark S. Sirinides

Tom Sassaman

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.

Scott Specialty Gases

PLUMSTEADVILLE, PA. 18949 PHONE: (215) 766-8861 TWX: 510-665-9344

Date: 3-27-87

Our Project No.: 338458

Your P.O. No.: 87102

AIR CONSULTING AND ENGINEERING
ATTN: STEVE NECK
2106 NW 67TH PLACE
SUITE 4
GAINESVILLE, FL 32606

Gentlemen:

Thank you for choosing Scott for your Specialty Gas needs. The analyses for the gases ordered, as reported by our laboratory, are listed below. Results are in volume percent, unless otherwise indicated.

ANALYTICAL REPORT

Cyl. No. AAL-1988 — Analytical Accuracy ±1%

Component	Concentration
CARBON MONOXIDE	14.99 PPM
NITROGEN	BALANCE
NBS TRACEABLE	

Cyl. No. AAL-771 — Analytical Accuracy ±1%

Component	Concentration
CARBON MONOXIDE	6.114 PPM
NITROGEN	BALANCE
NBS TRACEABLE	

Cyl. No. AAL-2618 — Analytical Accuracy ±1%

Component	Concentration
NITRIC OXIDE	86.17 PPM
NITROGEN	BALANCE
NBS TRACEABLE	

Cyl. No. AAL-12822 — Analytical Accuracy ±1%

Component	Concentration
NITRIC OXIDE	50.75 PPM
NITROGEN	BALANCE
NBS TRACEABLE	

Analyst John L. Sanson
JOHN SANSON

Approved By
FRANCIS E. NEVILL

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.

Scott Specialty Gases

PLUMSTEADVILLE, PA. 18949 PHONE: (215) 766-8861 TWX: 510-665-9344

Date: 1/27/88

Our Project No.: 343202

Your P.O. No.: 87127

AIR CONSULTING & ENGINEERING
ATTN: STEVE NECK

Gentlemen:

Thank you for choosing Scott for your Specialty Gas needs. The analyses for the gases ordered, as reported by our laboratory, are listed below. Results are in volume percent, unless otherwise indicated.

ANALYTICAL REPORT

Cyl. No. AAL-20762 Analytical Accuracy ±1%

Component	Concentration
NITRIC OXIDE	149.9 PPM
NITROGEN	BALANCE
NBS TRACEABLE	

Cyl. No. AAL-1965 Analytical Accuracy ±2%

Component	Concentration
PROPANE	50.01 PPM
AIR	BALANCE

Cyl. No. AAL-20767 Analytical Accuracy ±1%

Component	Concentration
NITRIC OXIDE	77.67 PPM
NITROGEN	BALANCE
NBS TRACEABLE	

Cyl. No. _____ Analytical Accuracy _____

Component	Concentration

Analyst TOM SASSAMAN

Approved By MARK S. SIRINIDES

LED

Appendix J - Project Participants

Project Participants

SOUTH FLORIDA ENVIRONMENTAL SERVICES, INC.

William D. Arlington
Gerard P. Gauthreaux

AIR CONSULTING AND ENGINEERING, INC.

Steven L. Neck
Colleen Hodge

WASTE MANAGEMENT OF FLORIDA, INC.

Sara Solano

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Joe Kahn
Tom Tittle

BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD

Daniela Banu

Waste Management of North America, Inc.
Southeast Region
500 Cypress Creek Road, West ◦ Fort Lauderdale, Florida 33309
Suite 300 ◦ 305/771-9850

October 2, 1989

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

Re: CDSL Power Production Facility
DER Permit AC 06-152683
Request for Gas Production Curve

Dear Mr. Raval;

Please find enclosed the CDLS landfill gas production curve. The curve takes the three different sites to be on line with the Power Production Facility into account.

The graph shows a 1990 estimated peak production in CDSL I with a recoverable amount of gas at 12 MM cfd. CDSL III production with CDSL I decline has a peak in the year 2000, approximately the same time that the final site, CDSL II, will be contructed. The final peak of gas generation is estimated to occur in the year 2003 with a rate of 10 MM cfd.

Your concern was for tying in the new sites and possibly overloading the Power Production Facility. With this curve, you can see that we have accounted for all sites and are or will be at estimated peak production in the next year or so. Currently we are operating five turbines using a total of 10 MM cfd, under our 12 MM cfd design limit.

If you have any questions or require further information, please do not hesitate to call me.

Sincerely,

Sarah C. Solano

Sarah C. Solano
Site Engineer

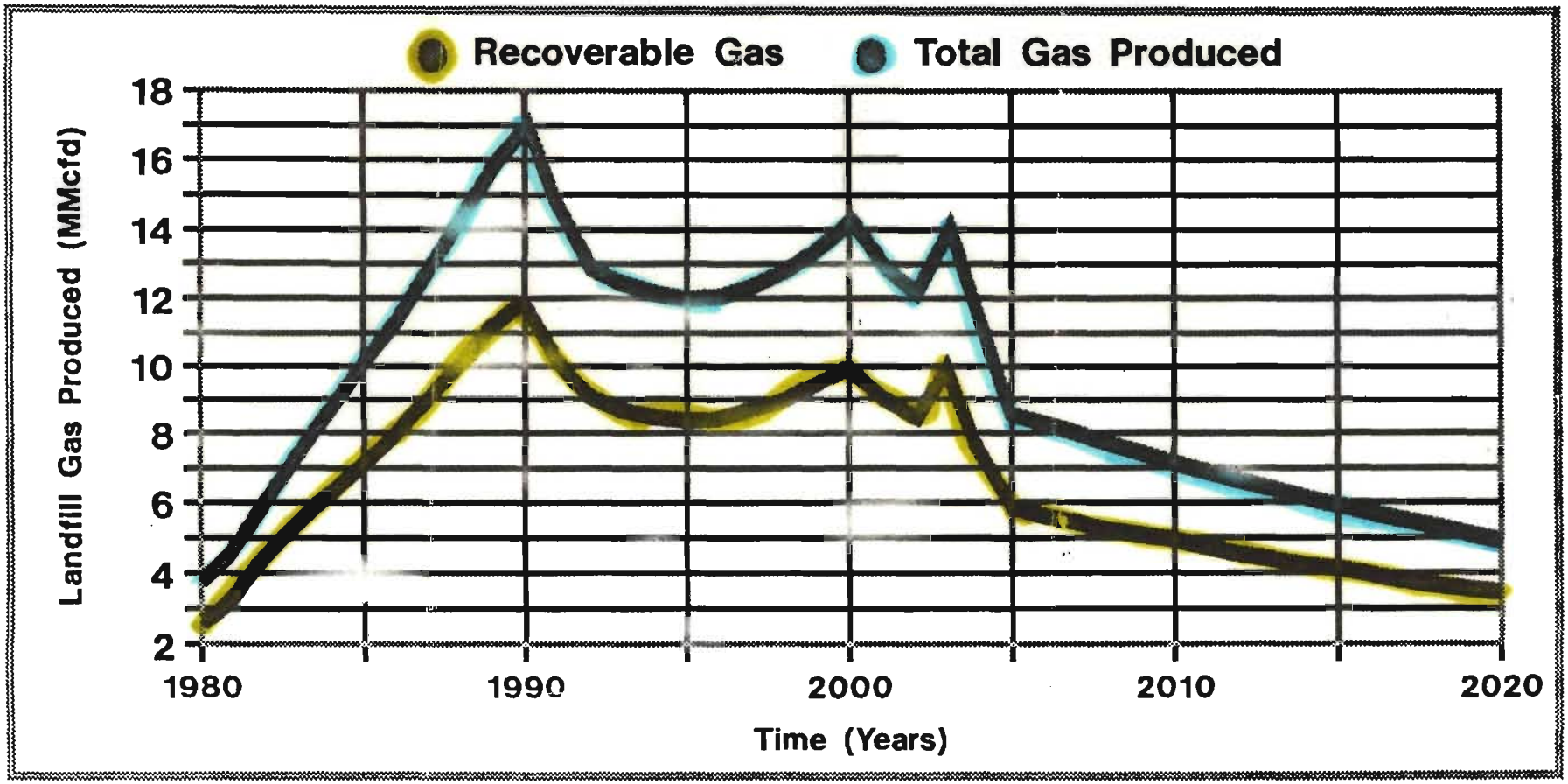
cc: Daniela Banu
Joe Lurix
Tom Soychak
Harvey Bush

Slide:1937 001 Opid:BETAVISUALS CORP. Job#:1937SF DDS:5000 Size:4596 Mon Jul 24 13:45:25 1989

Waste Management of North America
Gas Recovery Program

Landfill — CDSL (Total)

Gas Production Curve



GAS PRODUCTION DATA SHEET

DATE OF ENTRY: APRIL, 1988

SITE: CDSL - TOTAL

SITE CLOSURE DATE: 2002
GAS GENERATION RATE : .37/.26/.15 cu ft/lb -yr
GAS PRODUCTION : 4.5 cu ft/lb
REFUSE DENSITY : 500 lb/cu gate yd
RECOVERABLE GAS: 70 %

YEAR	ANNUAL REFUSE (tons)	GAS PRODUCED (mmcfd)	RECOVERABLE GAS PRODUCED (mmcfd)
1971	200000	0.00	0.00
1972	200000	0.41	0.29
1973	200000	0.78	0.55
1974	200000	1.12	0.78
1975	200000	1.43	1.00
1976	200000	1.72	1.20
1977	200000	1.98	1.39
1978	500000	2.23	1.56
1979	500000	3.06	2.14
1980	500000	3.82	2.67
1981	930000	4.52	3.16
1982	930000	6.03	4.22
1983	930000	7.42	5.19
1984	980000	8.70	6.09
1985	1040000	9.97	6.98
1986	1200000	11.26	7.88
1987	1300000	12.77	8.94
1988	1368000	14.35	10.05
1989	1231000	15.97	11.18
1990	1305000	17.15	12.01
1991	1383000	14.73	10.31
1992	152000	13.09	9.16
1993	240000	12.55	8.79
1994	333000	12.23	8.56
1995	432000	12.11	8.48
1996	537000	12.20	8.54
1997	648000	12.49	8.74
1998	766000	12.97	9.08
1999	890000	13.64	9.55
2000	1023000	14.51	10.16
2001	1163000	13.07	9.15
2002	1312000	12.33	8.63

Waste Management of North America, Inc.
Southeast Region
500 Cypress Creek Road, West • Fort Lauderdale, Florida 33309-6127
Suite 300 • 305/771-9850

October 2, 1989

Ms. Stephanie Brooks
Department of Environmental Regulation
1900 S. Congress Avenue
West Palm Beach, FL

RE: CDSL Power Production Facility
DER Permit AC 06-152683
Compliance with 40 CFR part 60, Performance Tests

Dear Ms. Brooks:

The CDSL Power Production Facility (PPF) had the initial start up of the stationary gas turbines on July 1, 1989. From that time, have had two shut downs and unexpected concentrations of Hydrogen Sulfide in the gas stream. We are currently addressing any possible operational problems from the additional H_2S.

The PPF reached a maximum unsustained production rate on or around September 1, 1989. In compliance with 40 CFR part 60.8, we will be conducting performance tests in accordance with 40 CPR part 60, subpart GG. The tests are scheduled for October 23, 1989.

We have just recently received an extension of our construction permit, allowing for the adjustment of the unexpected concentrations of H_2S. Because of this extension and possible plant modifications, we reserve the right to conduct the initial compliance tests as required by specific condition #6 of the construction permit at a later date. The initial compliance tests will be included in our operation permit application next year.

This letter serves as notification of the October 23rd tests for the EPA required performance standards under 40 CFR part 60.

Sincerely,

Harvey H. Bush, P.E.
Manager, Environmental Engineering

cc: Pradeep Raval
Daniela Banu
Joe Lurix
Tom Soychak
Sarah Solano

HB/lf

Waste Management of North America, Inc.
Southeast Region
500 Cypress Creek Road, West ◦ Fort Lauderdale, Florida 33309
Suite 300 ◦ 305/771-9850

September 14, 1989

Mr. Pradeep Raval
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Waste Management, Inc. of Florida
CDSL Gas Recovery
Pompano Beach, Broward County, Florida
DER Permit No: AC 06-152683
Broward County License: AC-54827

Dear Mr. Raval;

Please be reminded of our telephone conversation on September 11, 1989 regarding the above facility. We discussed the use of a process flare for odor control of our new cell, Site III. CDSL Gas Recovery will need to use the flare for odor control until the gas is of the quality to connect to the Power Production Facility.

Specific Condition No. 6 of the DER Air Section permit AC 06-152683 allows for the use of flares during start-up, shut down and periods of non-operation. We plan to operate the process flare under this condition for an estimated period of 6 months to one year starting in January 1990.

Waste Management is planning to submit the application for the operation of the Power Production Facility sometime in June of 1990. We will request at that time to include in the permit a condition which specifically allows the use of flares for odor control in new cells until the cells are brought on-line with the Power Production Facility.

This letter serves as documentation of our planned actions to be implemented in compliance with the state and county permits. If you have any questions, please call me at 305-977-9551.

Sincerely,

Sarah C. Solano

Sarah C. Solano
Site Engineer

cc: Harvey Bush
Tom Soychak
Joe Lurix
Daniela Banu
Ken Kruszynski

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:

Mr. H. H. Bush, Jr.
Waste Management Inc. of Florida
500 Cypress Creek Road, Suite 300
Ft. Lauderdale, FL 33309

4. Article Number

P 938 762 677

Type of Service:

☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature — Address

X

6. Signature — Agent

X

7. Date of Delivery 9/18

8. Addressee's Address *(ONLY if requested and fee paid)*

PS Form **3811**, Mar. 1988 ★ U.S.G.P.O. 1988-212-865 **DOMESTIC RETURN RECEIPT**

P 938 762 677

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to Mr. H. H. Bush, Waste Mgmt.	
Street and No. 500 Cypress Creek Rd., Ste. 300	
P.O., State and ZIP Code Ft. Lauderdale, FL 33309	
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: 9-13-89 Permit; AC 06-152683	

PS Form 3800, June 1985

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

September 8, 1989

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. H. H. Bush, Jr.
Waste Management, Inc. of Florida
500 Cypress Creek Road, Suite 300
Ft. Lauderdale, Florida 33309

Dear Mr. Bush:

Re: Extension of Expiration Date, CDSL Power Production Facility
AC 06-152683

The Department has received and reviewed your request dated August 22, 1989, for an extension of the expiration date of the above referenced permit.

The Department is in agreement with your request. The following shall be changed and added to the permit:

Expiration Date Change:

From: October 1, 1989
To: October 1, 1990

Attachment to be Added:

5. Waste Management's letter dated August 22, 1989.

This letter must be attached to your construction permit, AC 06-152683, and shall become a part of the permit.

Sincerely,

Dale Twachtmann
Secretary

DT/PR

cc: S. Brooks, SE District
G. Carlson, Broward County

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: Dale Twachtmann

FROM: Steve Smallwood

DATE: September 6, 1989

SUBJ: Extension of Permit Expiration Date for CDSL Power Production Facility, Permit No. AC 06-152683

Attached for your approval and signature is a letter extending the expiration date for the above referenced construction permit.

The Division recommends your approval.

SS/PR

attachment

Please call Patty Adams when signed
8-1344

Waste Management, Inc. of Florida
500 Cypress Creek Road, West • Fort Lauderdale, Florida 33309-6127
Suite 300 • 305/771-9850

August 22, 1989

Mr. Pradeep Raval
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301-8241

RE: CDSL Power Production Facility

Dear Mr. Raval:

As previously discussed, preliminary emission tests were conducted on one of the five units at the CDSL Power Production Facility on August 12, 1989 by South Florida Environmental Services.

Results of the average of three test runs are as follows:

	Allowable lbs/hr	Actual lbs/hr
NO_x	9.0	4.5
SO_2	7.13	6.84
CO	8.6	4.5

These results when extrapolated to a six turbine facility, as permitted are as follows:

	Allowable Tons/Yr	Actual Tons/Yr
NO_x	236.5	118.26
SO_2	187.4	180.0
CO	226.0	118.26

As is evident from these results, full compliance with permitted emissions levels is anticipated.

Also, as stated in our letters of August 7 and 17, 1989 we are experiencing some operational and maintenance problems caused by H_2S which we need time to properly evaluate and correct. The anticipated changes are expected to reduce operational and maintenance problems and induce improved performance.

Your consideration in granting us the additional time requested on our construction permit will allow us to implement minor corrective actions which will result in a more reliable and less maintenance intensive facility.

If you have further questions, I'll respond promptly to your request.

Sincerely,

Harvey H. Bush, Jr., P.E.
Manager, Environmental Engineering

cc: Tom Soychak
Sarah Solano
Joe Lurix
Daniela Banu

HB/lf
cc: P. Raval
CHF/BT

BEST AVAILABLE COPY

FEDERAL EXPRESS — AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 3631262493

3631262493

Date: 8/28/89

RECIPIENT'S COPY

1 From (Your Name) Please Print: H. Bush
Your Phone Number (Very Important): (305) 771-9850
Company: T&E MANAGEMENT OF NO AMERICA
Department/Floor No.:
Street Address: 1 N CYPRESS CREEK RD STE 300
City: LAUDERDALE State: FL ZIP Required: 3 3 3 0 9

2 To (Recipient's Name) Please Print: Pradeep Raval
Recipient's Phone Number (Very Important): (4)
Company: Dept of Environmental Regulation
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. # Zip Codes.): 2600 Blair Stone Road
City: Tallahassee, State: FL ZIP Required: 32301-82

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)

PAYMENT ☒ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City: State: ZIP Required:

4 SERVICES

1 ☐ PRIORITY 1 Overnight Delivery
2 ☐ COURIER-PAK OVERNIGHT ENVELOPE*
3 ☐ OVERNIGHT BOX
4 ☐ OVERNIGHT TUBE
5 ☐ STANDARD AIR Delivery not later than second business day
6 ☒ OVERNIGHT LETTER*
7 ☐
8 ☐
9 ☐
10 ☐
*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 ☐ HOLD FOR PICK-UP (Fill in Box H)
2 ☒ DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charge) ☐
4 ☐ DANGEROUS GOODS (Extra charge)
5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Release Signature Not Applicable)
6 ☐ DRY ICE ____ Lbs.
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐ SATURDAY PICK-UP (Extra charge)
10 ☐
11 ☐
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

	PACKAGES	WEIGHT OF POUNDS - ONLY	YOUR DECLARED VALUE	OVER SIZE
Total	Total	Total		

Received At: 1 ☐ Regular Stop 2 ☐ On-Call Stop 3 ☐ Drop Box 4 ☐ B.S.C. 5 ☐ Station
FEDEX Corp. Employee No.:
Date/Time for FEDEX Use:

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:

Federal Express Use	
Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #111800
REVISION DATE 10/88
PRINTED IN U.S.A. FXEM
009 PROD. 1/BV

Waste Management of North America, Inc.
Southeast Region
500 Cypress Creek Road, West • Fort Lauderdale, Florida 33309-6127
Suite 300 • 305/771-9850

August 17, 1989

Mr. Pradeep Raval
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301-8241

RE: Waste Management, Inc. of Florida
CDSL Power Production Facility
Permit # AC 06-162683

Dear Mr. Raval:

We have just recently received verbal data from South Florida Environmental Services, Inc. for preliminary testing done on one of our gas turbines. The analysis confirms that present emissions as tested are within allowable limits for yearly emissions.

As discussed in our permit extension proposal dated August 7, 1989, we are concerned with the H_2S causing operational as well as future SO_2 emission problems. We feel that a full year extension on our potential construction permit is necessary to collect substantial background data for fine tuning our system and to determine corrective measures if needed.

Sincerely,

Harvey H. Bush

Harvey H. Bush, Jr., P.E.
Manager, Environmental Engineering

cc: Tom Soychak
Mike Berg
Sarah Solano
Joe Lurix
Daniela Banu

SS/lf
copied: I. Goldman, SE Dist.
CAF/13T

BEST AVAILABLE COPY

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 363126315b

363126315b

RECIPIENT'S COPY

Date 8/17/92

1 From (Your Name) Please Print: Harvey Bush
Your Phone Number (Very Important): (305) 771-9850
Company: STE MANAGEMENT OF NO AMERICA
Department/Floor No.:
Street Address: 2 W CYPRESS CREEK RD STE 300
City: LAUDERDALE State: FL ZIP Required: 3 3 3 0 9

2 To (Recipient's Name) Please Print: Pardeep Raval
Recipient's Phone Number (Very Important): 904 488-4
Company: Dept. of Environmental Regulation
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. • Zip Codes.): 2600 Bull Stone Road
City: Tallahassee State: FL ZIP Required: 32301-824

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City: State: ZIP Required:

PAYMENT ☒ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☒ Bill Credit Card ☐ Cash

4 SERVICES

1 ☐ **PRIORITY 1** Overnight Delivery
2 ☐ **COURIER-PAK OVERNIGHT ENVELOPE***
3 ☐ **OVERNIGHT BOX**
4 ☐ **OVERNIGHT TUBE**
5 ☐ **STANDARD AIR** Delivery not later than second business day
6 ☒ **OVERNIGHT LETTER***
7 ☐
8 ☐
9 ☐
10 ☐
*Declared Value Limit $100

DELIVERY AND SPECIAL HANDLING

1 ☐ **HOLD FOR PICK-UP** (Fill in Box H)
2 ☒ **DELIVER WEEKDAY**
3 **DELIVER SATURDAY** (Extra charge) ☐
4 ☐ **DANGEROUS GOODS** (Extra charge)
5 ☐ **CONSTANT SURVEILLANCE SERVICE (CSS)** (Extra charge) (Release Signature Not Applicable)
6 ☐ **DRY ICE** ____ Lbs.
7 ☐ **OTHER SPECIAL SERVICE**
8 ☐
9 ☐ **SATURDAY PICK-UP** (Extra charge)
10 ☐
11 ☐
12 ☐ **HOLIDAY DELIVERY** (If offered) (Extra charge)

	PACKAGES	WEIGHT IN POUNDS ONLY	YOUR DECLARED VALUE	OVER SIZE
Total	Total	Total		

Received At
1 ☐ Regular Stop 2 ☐ On-Call Stop
3 ☐ Drop Box 4 ☐ B.S.C. 5 ☐ Station

FEDEX Corp. Employee No.:

Date/Time for FEDEX Use:

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: _____

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

PART #111800
REVISION DATE 10/88
PRINTED IN U.S.A. FXEM
009 PSOD.4/89

file copy

Waste Management of North America, Inc.
Southeast Region
500 Cypress Creek Road, West ◦ Fort Lauderdale, Florida 33309
Suite 300 ◦ 305/771-9850

August 7, 1989

RECEIVED
AUG 9 1989
DER - BAQM

Mr. Pradeep Raval
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Waste Management, Inc. of Florida
CDSL Power Production Facility
Permit # AC 06-152683

Dear Mr. Raval;

Please be reminded of a telephone conversation with Sarah Solano on August 4, 1989 at which time you discussed the problems delaying obtaining the operation permit for the above referenced facility.

We are currently experiencing higher levels of Hydrogen Sulfide in the landfill gas stream than originally present in our initial gas surveys. The H_2S is forming Iron Sulfide within the Power Production Facility system causing operational problems.

Anticipating operational problems and the possibility of making process changes to account for the H_2S, we need to extend our construction permit for a period of nine to twelve months. During this extension, Waste Management in conjunction with the facility designers will be performing extensive analysis of the H_2S situation, how it can be addressed, and its possible effects on emissions.

Please consider modifying our current construction permit to expire October 1, 1990. We are submitting a copy of this letter to Daniela Banu of the Broward County Air Section as an application for the same extension period of Air License AC-54827.

I anticipate your response.

Sincerely,

Harvey Bush

Harvey Bush, P.E.
Regional Environmental Manager

cc: Tom Soychak
Mike Berg
Sarah Solano
Joe Lurix, D.E.R. Southeast District
Daniela Banu, BCEQCB Air Section

copied: P. Raval
CHF/BT

BEST AVAILABLE COPY

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USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 3329407001

9CLTM 3329407001

[redacted]

Date 8/8/89

RECIPIENT'S COPY

1 From (Your Name) Please Print: Sarah Solano
Your Phone Number (Very Important): (305) 977 9551
Company: TE MGMT CENTRAL DISPOSAL
Department/Floor No.:
Street Address: 0 NW 48TH ST
City: PAND BEACH State: FL ZIP Required: 33073

2 To (Recipient's Name) Please Print: Mr. Pradeep Raval
Recipient's Phone Number (Very Important): ( )
Company: Dept. of Environmental Reg
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O.® Zip Codes): 2600 Blair Stone Road
City: Tallahassee State: FL ZIP Required: 32399

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)

PAYMENT [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash [redacted]

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address
City State ZIP Required

4 SERVICES
1 [ ] PRIORITY 1 Overnight Delivery
6 [X] OVERNIGHT LETTER*
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
7 [ ]
3 [ ] OVERNIGHT BOX
8 [ ]
4 [ ] OVERNIGHT TUBE
9 [ ]
5 [ ] STANDARD AIR Delivery not later than second business day
10 [ ]
*Declared Value Limit $100

DELIVERY AND SPECIAL HANDLING
1 [ ] HOLD FOR PICK-UP (Fill in Box H)
2 [X] DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charge) [ ]
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Release Signature Not Applicable)
6 [ ] DRY ICE ______ Lbs.
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT IN POUNDS ONLY	YOUR DECLARED VALUE	OVER SIZE
Total	Total	Total	

Received At: 1 [ ] Regular Stop 2 [ ] On-Call Stop 3 [ ] Drop Box 4 [ ] B.S.C. 5 [ ] Station

FEDEX Corp. Employee No.

Date/Time for FEDEX Use

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: ____________

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

PART #111800
REVISION DATE 10/88
PRINTED IN U.S.A. FXEM
009

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

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

Entered on PATS
4-4-89
PA

To: Air Quality

From: David M. Beebe, Assistant Chief DMB
Bureau of Finance and Accounting

Date: April 4, 1989

Subject: Refund of Fees

Your application for refund for Central Disposal Division of Waste Management Inc. of Florida

File# AC 06-1526839, is complete.

State of Florida Warrant 4 2019 920, dated 03-28-89 and

in the amount of $ 500.00, was mailed 03-30-89.

DMB/ls

Refund processed on Agency Voucher C 05455

Fiscal Year 88-89

27

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:

Mr. James E. O'Connor
Waste Management Inc. of Fla.
500 Cypress Creek Road, Suite 300
Ft. Lauderdale, FL 33309

4. Article Number
P 274 007 562

Type of Service:
☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature — Address
X J. Hesel

6. Signature — Agent
X

7. Date of Delivery

8. Addressee's Address *(ONLY if requested and fee paid)*

PS Form **3811**, Mar. 1988 ★ U.S.G.P.O. 1988-212-865 **DOMESTIC RETURN RECEIPT**

P 274 007 562

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to Mr. James E. O'Connor, Waste Mgmt.	
Street and No. 500 Cypress Creek Rd.	
P.O., State and ZIP Code Ft. Lauderdale, FL 33309	
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: 1-24-89 Permit: AC 06-152683	

PS Form 3800, June 1985 ★ U.S.G.P.O. 1985-480-794

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

January 19, 1989

CERTIFIED - RETURN RECEIPT REQUESTED

Mr. James E. O' Connor
Waste Management Inc. of Florida
500 Cypress Creek Road, Suite 300
Ft. Lauderdale, Florida 33309

Dear Mr. O'Connor:

Re: Permit Amendment of CDSL Power Production Facility
Permit No. AC 06-152683

The Department has received the information dated December 19, 1988, on the flare system related to the above mentioned permit.

The Department approves of the emergency venting of landfill gas via flares operated in accordance with 40 CFR 60, General Control Device Requirements. Specific Condition No. 6 shall be changed as follows:

Specific Condition No. 6

From: If a flare is to be used at the facility to burn landfill gas, a permit shall be obtained for it from the Bureau of Air Quality Management.

To: Landfill gas shall be vented to the flare systems during the Power Production Facility's start-up, shut down, or non operation. Flare Units 1 and 2 (enclosed flares), and Unit 3 (open flare) shall meet the applicable requirements of 40 CFR 60, General Control Device Requirements. Visible emissions shall not exceed 5% opacity.

Attachment to be Added

5. Waste Management's package received December 19, 1989.

This letter shall be attached to your construction permit, AC 06-152683, and shall become a part of the permit.

Sincerely,

Dale Twachtmann
Secretary

DT/mch

cc: S. Brooks, SE District
G. Carlson, Broward County

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: Dale Twachtmann

FROM: Steve Smallwood

SUBJ: Approval of Amendment to Construction Permit, Waste Management's CDSL Power Production Facility Permit No. AC 06-152683

DATE: January 17, 1989

Attached for your approval and signature is a permit amendment prepared by Central Air Permitting for the above mentioned company to use a flare system at their existing facility near Pompano Beach, Broward County, Florida.

I recommend your approval and signature.

SS/pr

attachments

RECEIVED
JAN 17 1989
Office of the Secretary

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

December 19, 1988

RECEIVED

DEC 21 1988

DER - BAQM

Mr. Pradeep Raval
Florida Department of Environmental Regulation
Air Monitoring Division
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: CDSL Power-Production Facility
Pompano Beach, FL 33073
CER NO. 88-101
CONSTRUCTION PERMIT APPLICATION FOR ODOR CONTROL
FLARE UNITS CENTRAL DISPOSAL SANITARY LANDFILL

Dear Mr. Raval:

The attached Permit Application is the result of the DER's approval to construct the CDSL Power-Production Facility (AC-06-152683). As previously discussed, the flare units will be in operation only during a shutdown situation of the Power-Production Facility.

Thank you for your continual cooperation during the processing of the previous permit for the Power-Production Facility and the review of the enclosed application.

Please do not hesitate to contact me if any questions arise during the review process of this application.

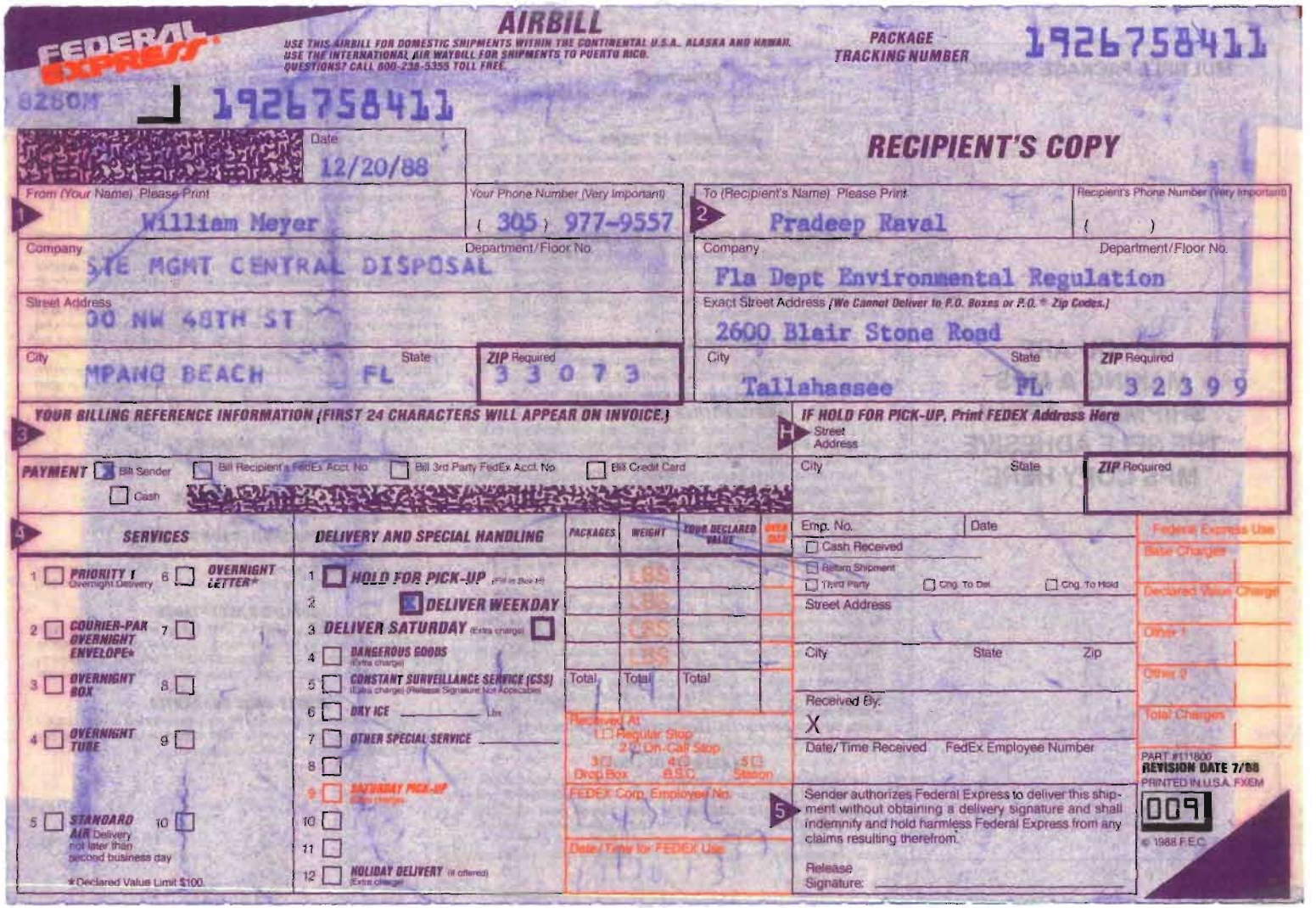
Sincerely,

William Meyer
Plant Manager

WM:ma

Attachments

BEST AVAILABLE COPY



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USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 1926758411

8280M 1926758411

RECIPIENT'S COPY

Date: 12/20/88

From (Your Name) Please Print: William Meyer
Your Phone Number (Very Important): (305) 977-9557
Company: SYE MGMT CENTRAL DISPOSAL
Department/Floor No.:
Street Address: 30 NW 48TH ST
City: MPANO BEACH **State:** FL **ZIP Required:** 33073

To (Recipient's Name) Please Print: Pradeep Raval
Recipient's Phone Number (Very Important): ( )
Company: Fla Dept Environmental Regulation
Department/Floor No.:
Exact Street Address *(We Cannot Deliver to P.O. Boxes or P.O. * Zip Codes.)*: 2600 Blair Stone Road
City: Tallahassee **State:** FL **ZIP Required:** 32399

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)

4 PAYMENT ☒ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash

4 SERVICES

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2 ☐ COURIER-PAK OVERNIGHT ENVELOPE*
3 ☐ OVERNIGHT BOX
4 ☐ OVERNIGHT TUBE
5 ☐ STANDARD AIR Delivery not later than second business day
6 ☐ OVERNIGHT LETTER*
7 ☐
8 ☐
9 ☐
10 ☐
*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 ☐ HOLD FOR PICK-UP (Fill in Box H)
2 ☒ DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charge) ☐
4 ☐ DANGEROUS GOODS (Extra charge)
5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Release Signature Not Applicable)
6 ☐ DRY ICE ____ Lbs.
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐ SATURDAY PICK-UP (Extra charge)
10 ☐
11 ☐
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT	YOUR DECLARED VALUE	OVER $100
	LBS		
	LBS		
	LBS		
	LBS		
Total	Total	Total	

Received At: ☐ Regular Stop ☐ 2 On-Call Stop ☐ 3 Drop Box ☐ 4 B.S.O. ☐ 5 Station
FEDEX Emp. Employee No.
Date/Time for FEDEX Use

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address
City State ZIP 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:

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

PART #111800
REVISION DATE 7/88
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009
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STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHEAST FLORIDA DISTRICT
3301 GUN CLUB ROAD
P.O. BOX 3858
WEST PALM BEACH, FLORIDA 33402

BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY
ROY DUKE
DISTRICT MANAGER

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Odor Control Flares [X] New[1] [X] Existing[1]

APPLICATION TYPE: [X] Construction [ ] Operation [ ] Modification

COMPANY NAME: Waste Management Inc. of Florida COUNTY: Broward

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) _____

SOURCE LOCATION: Street 3000 N.W. 48th Street City Pompano Beach

UTM: East NA North NA

Latitude 26 ° 17 ' 28 "N Longitude 80 ° 10 ' 00 "W

APPLICANT NAME AND TITLE: William Meyer

APPLICANT ADDRESS: 3000 N.W. 48th Street, Pompano Beach, FL 33073

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of _____

I certify that the statements made in this application for a _____ 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: _____

James E. O'Connor Region Vice-President
Name and Title (Please Type)

Date: 12/19/88 Telephone No. 771-9850

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 judgment, that

[1] See Florida Administrative 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 Harvey H. Bush, Jr., P.E.

Name (Please Type)

Waste Management Inc. of Florida

Company Name (Please Type)

500 NW 62nd Street Ft. Lauderdale, FL 33309

Mailing Address (Please Type)

Florida Registration No. 6267 Date: 12/20/88 Telephone No. (305) 771-9850

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 I

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction See Attachment I Completion of Construction See Attachment I

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.)

N/A

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

See Attachment I

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? Yes

   a. If yes, has "offset" been applied? No

   b. If yes, has "Lowest Achievable Emission Rate" been applied? No

   c. If yes, list non-attainment pollutants. Ozone

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. No

3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. No

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.

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		
Landfill gas for all units	None	-	3600 scfm	Diagrams three and four

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): NA

2. Product Weight (lbs/hr): NA

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/yr	T/yr	
				See Attachment I			

[1]See Section V, Item 2.

[2]Reference 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)

[3]Calculated from operating rate and applicable standard.

[4]Emission, 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)
		NA		

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Landfill gas	-	-	118 mm BTU/Hr

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: 350 ppmv Percent Ash: 0

Density: - lbs/gal Typical Percent Nitrogen: .4% by volume

Heat Capacity: 480 BTU/cf ~~BTU/lb~~ 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 NA Maximum NA

G. Indicate liquid or solid wastes generated and method of disposal.

Liquids which may be produced during this process are collected, pumped and transported to the North Broward County Waste Water Treatment Plant (Attachment V.)

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: See Attachment I ft. Stack Diameter: _____ ft.

Gas Flow Rate: _____ ACFM _____ DSCFM Gas Exit Temperature: _____ °F.

Water Vapor Content: _____ % Velocity: _____ FPS

SECTION IV: INCINERATOR INFORMATION

NA

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (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 NA

Total Weight Incinerated (lbs/hr) NA Design Capacity (lbs/hr) NA

Approximate Number of Hours of Operation per day NA day/wk NA wks/yr. NA

Manufacturer NA

Date Constructed NA Model No. NA

	Volume $(ft)^3$	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diamter: _____ 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 device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) _____

Brief description of operating characteristics of control devices: NA

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.): NA

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

NA

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.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

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.)

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).

6. An 8 1/2" 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 1/2" 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 (Example: Copy of relevant portion of USGS topographic map).

8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

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 NA

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

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 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:

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:

[1]Explain method of determining efficiency.
[2]Energy 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 Costs:

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:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data NA

1. _____no. sites _____ TSP _____( ) SO^{2}* _____ Wind spd/dir

Period of Monitoring _____/_____/_____ to _____/_____/_____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

*Specify bubbler (B) or continuous (C).

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

I. 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)_____

J. 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.

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

LIST OF ATTACHMENTS

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

ATTACHMENT I.

Section II.

Point A: The flare units are designed for the proper control of odors due to landfill gas at Central Disposal. These units, however, will only be operational during a shutdown situation of the CDSL Power-Production Facility. (D.E.R. Air Permit AC-06-152683.)

The system is comprised of two types of flares. Units one and two are enclosed flares; (see Diagrams one and two) whereas unit three is a standard open unit (see Diagram three). In conjunction to the odor control function, the third unit also operates as a process flare. A process flare is defined as one which combusts blowdown and venting landfill gas from the CDSL Power-Production Facility. The venting process is very short in duration and only occurs during normal system start-up.

Point B:

Unit Number	Start of Construction	End of Construction
One	June 15, 1987	September 16, 1987
Two	June 15, 1987	September 16, 1987
Three	January, 1989	April, 1989

Point D:

License No.	Title	Date Issue	Exp. Date	Attach.
AO-44113-1.2	B.C.E.Q.C.B. Operate Air Pollution Source	1-15-88	8-12-89	II.
AC-06-152683	D.E.R. Construct Air Pollution Source	11-15-88	10-01-89	III.
AC-54827	B.C.E.Q.C.B. Construct Air Pollution Source	12-06-88	10-01-89	IV.

Section III.

Point C: The manufacturer of the flare units guarantees a combustion efficiency of at least 99% for the enclosed units and 96% for the open flare units. The efficiency rating would include the destruction of all organics which includes methane.

Point H:

	Units One - Two	Unit Three
Stack Height	40 ft.	40 ft.
Stack Diameter	11 ft. 5 in.	one foot
Gas Flow Rate	2600 - 3600 scfm	3600 scfm
Gas Exit Temp.	1200 - 1800° F	1000 - 1200° F
Water Vapor Content	6.86%	6.86%
Velocity	190 ft/min	114.7 ft/sec

Attachment II.

BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD
500 S.W. 14th Court
Fort Lauderdale, Florida 33315
(305) 765-5881
AIR SECTION
621 S. Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 765-4436

Air License

LICENSE TO OPERATE AN AIR POLLUTION SOURCE ISSUED UNDER THE PROVISIONS OF BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD CODE OF REGULATIONS, CHAPTERS 27-3 AND 27-4, AND FLORIDA ADMINISTRATIVE CODE, CHAPTER 17-2.

LICENSE NO. AO-44113-1,2 DATE OF ISSUE January 15, 1988

DATE OF EXPIRATION August 12, 1989

LICENSE ISSUED TO: NAME Waste Management Inc. of Florida

ADDRESS 500 N.W. 62nd St.
Ft. Lauderdale, Fl. 33309

TELEPHONE 771-9850

TO BE KNOWN AS Same as Above

TO BE LOCATED AT 2900 N.W. 48th St.
Pompano Beach, Fl.

FOR THE Operation of two enclosed ground flare systems with 40 HP Blower Flame Pilot System, Operating Temperature: 1200-1800°F, Exhaust exit velocity 190 ft/min. Net heating value of the gas being combusted: 500 Btu/ft.^{3}.

WORK SCHEDULE N/A

EMISSION LIMITING STANDARDS B.C.E.Q.C.B. Code of Regulations, Chapter 27-4
40 CFR 60.18

IN ACCORDANCE WITH THE LICENSE APPLICATION WHICH IS CONSIDERED PART OF THIS LICENSE. THIS LICENSE IS SUBJECT TO ALL FLORIDA STATE, BROWARD COUNTY AND LOCAL LAWS, REGULATIONS, RULES, AND THE CONDITIONS ATTACHED HERETO.

POST THIS LICENSE IN A PROMINENT PLACE ON THE PLANT PREMISES.

Victor N. Howard, P.E.
Pollution Control Director

Attachment CC.

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

PERMITTEE:
Waste Management, Inc. of Florida
500 Cypress Creek Road
Suite 300
Fort Lauderdale, FL 33309

Permit Number: AC 06-152683
Expiration Date: October 1, 1989
County: Broward
Latitude/Longitude: 26° 17' 28"N
80° 10' 00"W
Project: CDSL Power Production Facility, Six Landfill Gas-Fired Turbine/Generator Units

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code (F.A.C.) Rules 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 drawing(s), 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 a power production facility consisting of six turbine/generator units, combusting a total of 12.0 mcfd of landfill gas to generate about 19.2 MW of electricity. The total facility heat input rate will be 240 MMBtu/hr. The facility will be located near a landfill in Pompano Beach, Broward County, Florida.

The UTM coordinates for this facility are Zone 17, 583.19 km East and 2908.03 km North.

Construction shall be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the Preliminary Determination and Technical Evaluation or the General and Specific Conditions herein.

Attachments:

1. Waste Management's application package dated July 27, 1988.
2. Waste Management's letter received August 12, 1988.
3. Waste Management's letter received August 18, 1988.
4. Preliminary Determination dated October 20, 1988.

Attachment IV.

BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD
500 S.W. 14th Court
Fort Lauderdale, Florida 33315
(305) 765-5881
AIR SECTION
621 S. Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 765-4436

Air License

LICENSE TO CONSTRUCT AN AIR POLLUTION SOURCE ISSUED UNDER THE PROVISIONS OF BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD CODE OF REGULATIONS, CHAPTERS 27-3 AND 27-4, AND FLORIDA ADMINISTRATIVE CODE, CHAPTER 17-2.

LICENSE NO. AC-54827 DATE OF ISSUE December 6, 1988

DATE OF EXPIRATION October 1, 1989

LICENSE ISSUED TO: NAME WASTE MANAGEMENT INC. OF FLORIDA

ADDRESS 500 Cypress Creek Road, Suite 300
Fort Lauderdale, Fl. 33309

TELEPHONE 771-9850

TO BE KNOWN AS CDSL Power Production Facility

TO BE LOCATED AT 3140 N.W. 48th St.
Pompano Beach, Fl. 33073

FOR THE INstallation of landfill gas fired turbine generator facility. The facility shall consist of 6 turbine units generating about 19.2 MW of electricity. The total heat input rate will be 240 MMBTU/hr.

WORK SCHEDULE 24 Hours/Day x 6 Days/Week

EMISSION LIMITING STANDARDS B.C.E.Q.C.B. Code of Regulations, Chapter 27-4
40 CFR 60 - Subpart GG

IN ACCORDANCE WITH THE LICENSE APPLICATION WHICH IS CONSIDERED PART OF THIS LICENSE. THIS LICENSE IS SUBJECT TO ALL FLORIDA STATE, BROWARD COUNTY AND LOCAL LAWS, REGULATIONS, RULES, AND THE CONDITIONS ATTACHED HERETO.

POST THIS LICENSE IN A PROMINENT PLACE ON THE PLANT PREMISES.

Victor N. Howard, P.E.
Pollution Control Officer

AIR LICENSE

LICENSEE: WASTE MANAGEMENT INC. OF FLORIDA

LICENSE NO. AC-54827
DATE OF ISSUE: December 6, 1988
EXPIRATION DATE: October 1, 1989

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations and restrictions set forth herein are accepted by the licensee and enforceable by the EQCB pursuant to Chapter 27 of the Broward County Environmental Quality Control Board (EQCB) Code. The EQCB will review this license periodically and may revoke the license, initiate administrative and/or judicial action for any violation of the conditions by the licensee, its agents, employees, servants or representatives.

2. This license is valid only for the specific uses set forth in the license application and any deviation from the approved uses may constitute grounds for revocation and enforcement action by the EQCB.

3. In the event the licensee is temporarily unable to comply with any of the conditions of the license, the licensee shall notify the PCO within 12 hours. Within 5 working days of the event, the licensee shall submit a written report to the PCO that describes the incident, its cause, the measures being taken to correct the problem and prevent its reoccurrence, the owner's intention toward repair, replacement, and reconstruction of destroyed facilities, and a schedule of events leading toward operation within the license condition.

4. The issuance of this license does not convey any vested rights or exclusive privileges, nor does it authorize any injury to public or private property or any invasion of personal rights, or any violations of federal, state or local laws or regulations.

5. This license must be available for inspection on licensee's premises during the entire life of the license.

6. By accepting this license, the licensee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, that are submitted to the EQCB, may be used by the EQCB as evidence in any enforcement proceeding arising under EQCB rules and regulations, except where such use is prohibited by Section 403.111, Florida Statutes.

7. The licensee agrees to comply with Chapter 27, Code of Regulations of the EQCB.

8. Any new owner of a licensed facility shall apply by letter for a transfer of license within thirty (30) days after sale or legal transfer. The transferor shall remain liable for performance in accordance with the license until the transferee applies for, and is granted a transfer of license.

9. The licensee, by acceptance of this license, specifically agrees to allow access to the licensed source at reasonable times by EQCB personnel for the purpose of inspection and testing to determine compliance with this license and EQCB rules and regulations.

10. This license does not constitute a waiver or approval of any other license that may be required for other aspects of the total project.

11. If the licensee wishes to renew the license or extend its term, he shall make application 60 days prior to its expiration. Expired licenses are not renewable.

12. In addition to the general conditions set forth above, each license issued by the EQCB shall contain specific conditions determined by site conditions and requirements pursuant to the regulations as determined by the PCO. Licensee agrees that specific conditions are enforceable by the EQCB for any violation thereof.

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

LICENSEE: WASTE MANAGEMENT INC. OF FLORIDA

License No. AC-54827
Issue Date: December 6, 1988
Expiration Date: October 1, 1989

SPECIFIC CONDITIONS

1. This license has been issued under the provision of Broward County Environmental Quality Control Board Code of Regulations, Chapter 27-3 and 27-4 and in accordance with the Application to Construct an Air Pollution Source dated: July 27, 1988.

2. The facility shall comply with all applicable provisions of F.A.C. Chapter 17-2 and 40 CFR 60 Subpart GG.

3. The maximum allowable emissions from the operation of this facility are:

POLLUTANT	ppm *	Per Unit lbs/hr.	Per Unit TPY	Facility lbs/hr	Facility TPY
NOx **	51.0	9.0	39.4	54.0	236.5
SO_2	8.8	7.13	31.2	42.8	187.4
CO	-	8.6	37.7	51.6	226.0
PM	-	0.263	1.2	1.6	6.9
HC ***	-	8.9	39.0	53.4	234.0

Visible emissions shall not exceed 5% opacity (six min. avg).

* The concentration corrected to 15% O_2 is not represented on a dry basis, however, the projected moisture content of the exhaust stream is about 4%.

** The NOx and SO_2 emissions are based on the upper range of potential emissions from landfill gas combustion.

*** HC is the unburned hydrocarbon content in the exhaust stream. The non-methane VOCs are expected to be negligible.

4. Maximum heat input per turbine shall not exceed 40 MMBTU/hr, based on a heat content of 480 BTU/cf of landfill gas and a utilization rate of 1400 scfm per turbine.

5. The turbines shall be fired only with landfill gas.

6. In accordance with Broward County Environmental Quality Control Board Code of Regulations Chapter 27-4.03.5 no person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor.

7. Initial and annual compliance tests shall be conducted as follows:

   a. EPA Method 6, for SO_2
   b. EPA Method 9, for visible emissions
   c. EPA Method 20, for NOx

   Initial compliance tests for CO and VOCs shall be conducted as follows:

   d. EPA Method 10, for CO
   e. EPA Method 25, for VOC

   The above EPA reference methods are as prescribed in 40 CFR 60, Appendix A (1987 version). Other DER approved test methods may be used only after prior Departmental approval.

   A PM compliance test using EPA Method 5 shall be required if warranted by test results of EPA Method 9.

8. The construction shall reasonably conform to the plans and schedule submitted in the application. If the licensee is unable to complete construction on schedule, the Agency must be notified in writing 60 days prior to the expiration of the construction permit and submit a new schedule and request for an extension of the construction license (Rule 17-2, F.A.C.).

9. The licensee shall provide any data deemed necessary to ascertain that the source is operating in an acceptable fashion.

10. In accordance with the Broward County Environmental Quality Control Board Code of Regulations, Chapter 27-4.03:

    a) Concealment - No person shall build, erect, install, or use any article, machine, equipment or other contrivance, the use of which will conceal an emission which would otherwise constitute a violation of any of the provisions of this Chapter.

    b) Circumvention - No person shall circumvent any air pollution device, or allow the emission of air pollutants without the applicable air pollution control device operating properly.

    c) Maintenance - All air pollution control devices and systems shall be properly and consistently maintained in order to maintain emissions in compliance with Board Rules.

Attachment V.

BEST AVAILABLE COPY

BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD

500 S.W. 14th Court
Fort Lauderdale, Florida 33315
(305) 765-5881

INDUSTRIAL
LICENSE TO HAUL SLUDGE

Source Name: Central Disposal Sanitary Landfill / Methane Gas Recovery Plant

Source Address: 3000 N.W. 48th Street

Pompano Beach, Fl. 33067

Source Tel. No. (305) 977-9551

(OWNER) (Owner's Agent) Name: Michael Berg, General Manager

Address: Same As Above

Tel. No. Same As Above

INDUSTRIAL SLUDGE HAULING

This license is issued under the provisions of Chapter 27-12 of the Code of Regulations of the Broward County Environmental Quality Control Board. This license is in response to and is based on an application received 2/17/88.

The above named (OWNER) (owner's agent), hereinafter called the licensee, is authorized to operate an industrial sludge hauling business and is limited to hauling industrial sludge in the vehicles and to the disposal sites listed hereinafter. The licensee shall comply with General conditions 1 through 12 and Specific Conditions 1 through 15.

Issue Date 2/21/88
Expiration Date 2/21/90
Revision Date N/A
Automatic Revocation Date N/A
(see Spec. Condition ____)

By Victor N. Howard (JSH)
VICTOR N. HOWARD. P.E.
POLLUTION CONTROL OFFICER

Renewal Application Due 12/23/89

Attachment VI.

II. DESIGN CONDITIONS PER UNIT

FLARE GAS

Max. Flow Rate (SCFM):	2600-3600 SCFM
Pressure (in. w.c.):	10"
Temperature (°F):	100°F
Operating Temperature (°F):	1800-2000
Max. Heat Release (MMBtu/hr:	118

UTILITIES

Pilot Gas (15 psig)	44 SCFH propane
Ignition Gas (15 psig)	65 SCFH propane (during pilot ignition only)
Area Classification	Non-hazardous
Electricity	120 Volt/1 Phase/60 Hz
Fuel Gas (15 psig)	1304 SCFH

III. EQUIPMENT DESCRIPTION

Two (2) McGill Americas, Inc. CVC-40 Enclosed Ground Flare Systems, complete with the following components:

A. Enclosed Ground Flare with the following features:

1. One (1) 40'-0" overall height refractory lined cylinder complete with 2" thick lining of ceramic fiber refractory.

2. Five (5) McGill Americas, Inc. high efficiency burners constructed of stainless steel for high temperature corrosion resistance. The burners have two (2) 150# RFWN flanges for connection to the flare header system. The burners are equipped with an auxiliary fuel gas injection ring to add fuel when the flare gas is low in heat content.

3. One (1) McGill Americas, Inc. high efficiency pilot system constructed of stainless steel. The pilot system includes an electric ignition system to allow remote ignition of the continuous pilot. Connections to the pilot and flame front lines are 1/2" NPT connections.

4. One (1) temperature control system designed to maintain temperature at a maximum of 2000°F and a minimum of 500°F. This ensures efficient destruction of the flare gases under the varying conditions. The temperature control system is designed to add auxiliary fuel when the stack temperature is below 800°F, and vapors are flowing to the flare. A damper will control excess air to the unit to maintain a maximum temperature of 2000°F.

5. Two (2) 12" - Protecto Seal Series 4950 Flame Arrestors (shipped loose).

B. Automatic Ignition Panel

One McGill Americas, Inc. automatic ignition panel is included for the automatic remote ignition of the flare pilots. The panel requires 15 psig gas along with 110V electricity. To light the flare pilot, the gas solenoid valve is opened to allow gas to inspirate air and mix at the tip. A spark will be sent to the pilot on a timed cycle until the pilot thermocouple indicates the pilot is lit. The ignition panel will automatically relight the pilot should a pilot flame-out be sensed. Auxiliary contacts are provided for control room monitoring of the panel. The automatic ignition panel is complete with:

1. 1/2" ignition gas and 1" discharge connections.

2. Fuel gas pressure regulator.

3. Fuel gas manual valve.

4. Fuel gas solenoid valve.

5. Pressure gauge for the ignition fuel gas.

6. Restriction orifice for the ignition fuel gas.

7. Ignition transformer, temperature switch and rotary timer.

8. Pilot failure indicating lights.

9. All the above items are mounted on a carbon steel panel and shop piped and wired and mounted to free standing legs.

C. One (1) Honeywell Self-Checking Scanners, Shipped Loose

D. Ladders And Platforms

The flare system is complete with an uncaged galvanized ladder to service the flame scanner. Ladders are fabricated to McGill Americas, Inc. standards and are designed to meet OSHA guidelines. Ladders are constructed of welded carbon steel angle iron and are galvanized before shipment. Ladder support clips are shop installed onto the flare stack assembly. Clips are designed to allow for the differential expansion between the shell and ladder.

E. Purge Air Blower

Blower - One American Model SC-800 (Arrangement 4) blower fan with electric motor drive is included in this system. The blower and motor are shipped completely assembled to be mounted in the field by others. Design features include:

1. Single speed motor (T.E.F.C.)
2. 3/4 H.P. (30/460V/60HZ)
3. Inlet Damper (manual)
4. Discharge flanges.
5. Inlet screen
6. Drain
7. SCFM @ W.C. S.P.

F. Control Description

The instrumentation is supplied as either automatic or manual firing arrangement. Operation includes a timed air purge cycle which is required following a shut down. In the auto or manual mode there are three choices of heat-up. The propane only mode will not allow waste gas to enter

the system until the low temperature set point is cleared. The propane/waste gas mode introduces propane with waste gas. The waste gas with propane back-up is provided to save propane use. In this mode waste gas will fire without propane addition. Should the temperature fall below 800°F propane will be added to maintain at least 800°F.

With the waste gas composition specified by Waste Management the temperature is maintained by the control of two air dampers positioned by TIC-201.

IV. SYSTEM CONTROL

A. Burner Control and Operation

The burner management system includes a flame safeguard package which monitors key parameters and will shut the unit down if an unsafe situation exists. The shutdown interlocks are as follows:

1. Low fuel gas pressure
2. High fuel gas pressure
3. High combustor temperature
4. Low combustor temperature
5. Flame failure

If any of the above alarms are activated the unit will shut down and cannot be restarted until that condition is corrected.

B. Panel Description

1. Power OFF/ON Switch. The power control switch is the main disconnect for the unit. Normal operation will be in the "ON" position. A "Power ON" light is provided for easy identification of the status for unit.

2. Purge Start Button. When in the manual mode, this button is used to begin the purge cycle prior to operation.

3. Purging Light. Prior to unit firing the incinerator must be thoroughly purged with clean air. The air is provided through the fume booster fan (by others). The purging light will illuminate prior to burner light off.

4. Purge Complete Light. Will illuminate after the purge cycle is complete.

5. Manual Mode Ignition Start Button. Upon completion of the purge cycle in the manual mode, this button begins the low fire sequence.

6. Flame Proved. Flame proved light will be illuminated whenever the pilot is lit.

7. Waste Gas On Light . This light will illuminate at 400°F in the manual mode. This will notify the operator if low temperature exists in the unit.

8. Acknowledge Button. When an alarm has been detected, the acknowledge button will stop the horn.

9. Reset Button. The reset button will display the alarm that caused the shutdown.

10. Test. Test button is used to verify all lights are functional.

11. Heat-Up Mode

    1. Propane Only - Will only allow firing of propane in the ground flare.

    2. Propane/Waste - Allows introduction of propane and waste simultaneously.

    3. Waste Gas/Propane Back-Up - Waste gas is introduced initially propane will be added until 800°F is made.

12. Waste Gas Blower

    1. Off - Turns of the waste gas blower.

    2. Auto - Will automatically turn on the waste gas blower in the propane/waste and waste gas/propane back-up mode.

    3. On - Turns blower on.

13. Pilot Gas On - Indicates pilot gas valve is open.

14. Waste Gas On - Indicates waste gas blower has been given a signal to turn on.

15. Propane On - Indicates propane valve is open.

V. START-UP PROCEDURE

A qualified McGill representative should be present for initial start-up.

Initial start-up consists of the following steps:

1. Flow Sheet Check
2. Mechanical Check
3. Electrical Check
4. Detailed Equipment Check
5. Start-Up

1. Flow Sheet Check

McGill Americas, Inc. will construct the Waste Gas Enclosed Flare in accordance with final drawings. Operating personnel should conduct a flow sheet check to familiarize themselves with the equipment.

2. Mechanical Check

Operating personnel should verify all equipment, including valves and the control system is functional prior to start-up.

3. System Check

The following set points should be verified prior to initial start-up.

1.	TSH-101	Set @ 2100°F
2.	TIC-201	Set @ 2000°F
3.	PSL-601	Set @ .15 psig
4.	PSH-602	Set @ 20 psig
5.	TSL-102	Set @ 800°F
6.	TSLL-100	Set @ 400°F
7.	FSL-203	Minimum Blower Turndown
8.	74TR	Set @ 3 minutes
9.	85TR	Set @ 20 seconds
10.	99TR	Set @ 3 minutes
11.	TIC-101	Set @ 800°F

START-UP - MANUAL

1. Turn panel power on.
2. Place start-up cycle in manual.
3. Verify waste gas blower is off.
4. Depress purge start.
5. Place heat-up mode in propane only.

6. When purge complete illuminates depress manual mode ignition start.

7. When flame is proved depress propane waste start.

8. Raise the temperature to 300°F and turn the waste gas blower "on" and switch the heat up mode to propane/waste gas.

9. Verify the waste gas block valve does not open fully until 400°F is reached.

AUTOMATIC

1. Place start-up cycle in Auto.

2. Place waste gas blower in Auto.

3. Place heat-up mode to waste gas (propane back-up).

4. Turn panel power "on".

5. Observe the system purges, lights the pilot, and turns the waste gas on.

NOTE: Although the system has the capability of start-up with flare gas only, McGill recommends that a propane fire always be established first. This will ensure a good draft will be available in the furnace prior to flare gas light-off. If flare gas is introduced under a low draft circumstance flame may burn out the top of the stack.

VI. TROUBLESHOOTING

A. Pilot Failure

1. Verify the spark plug is in good condition.

2. If the spark plug still does not spark, test the transformer for performance. If the transformer is okay, the ignition wire is broken. Power to the transformer, but no low outlet voltage indicates a defective transformer.

3. Power is not delivered to the transformer unless the purge cycle is complete and shutdown limits are not broken.

4. If the pilot does not light with a spark present, check the inspirator on the gas pilot lines. The orifices may become clogged with dirt and oil over a period of time.

5. The air/gas ratio of the pilot may be altered by changing the pressure on the gas lines. This may help provide an easily ignited mixture.

6. If the pilot lights for a short time before going out, check the flame relay and scanners for proper operation. Dirt and residue may limit the flame scanner visibility.

B. High Temperature Shutdown

1. If a high temperature shutdown occurs on waste gas operation, verify the temperature control valve is operating correctly.

2. Verify the temperature controller is set and operating correctly.

3. Verify thermocouple continuity and type. Discontinuity in the thermocouple circuit will cause a high temperature shutdown.

4. Check thermocouple type.

Pernle

VIII SAFETY PRECAUTIONS

Explosion Hazards

Hydrocarbon vapors are potentially combustible when mixed with air. The Contained Vapor Combustor will normally operate with a combustible vapor mixture entering the system.

Mechanical Equipment

Moving equipment can cause injury unless personnel are adequately and properly alert to avoid the potential dangers. Protection has been provided by guards or other confinement of moving machinery; however, the individual alertness of the employee is the greatest factor in accident prevention.

CAUTION: The Contained Vapor Combustor Unit Starts and Stops Automatically

Before performing any maintenance, shut down the system by turning the control power to OFF position and disengage main breaker.

Electrical Equipment

Electrical shock can cause death. Severe and painful burns can result from electric arc flash. All electrical equipment is insulated or enclosed to reduce the potential hazard of electric shock. Only fully qualified personnel should work on electrical equipment and only when fully protected. Any circuit on which work is being performed should be de-energized and the switch should be locked open. Be sure the Control Rack is grounded through an adequate ground rod to field prior to turning on the power.

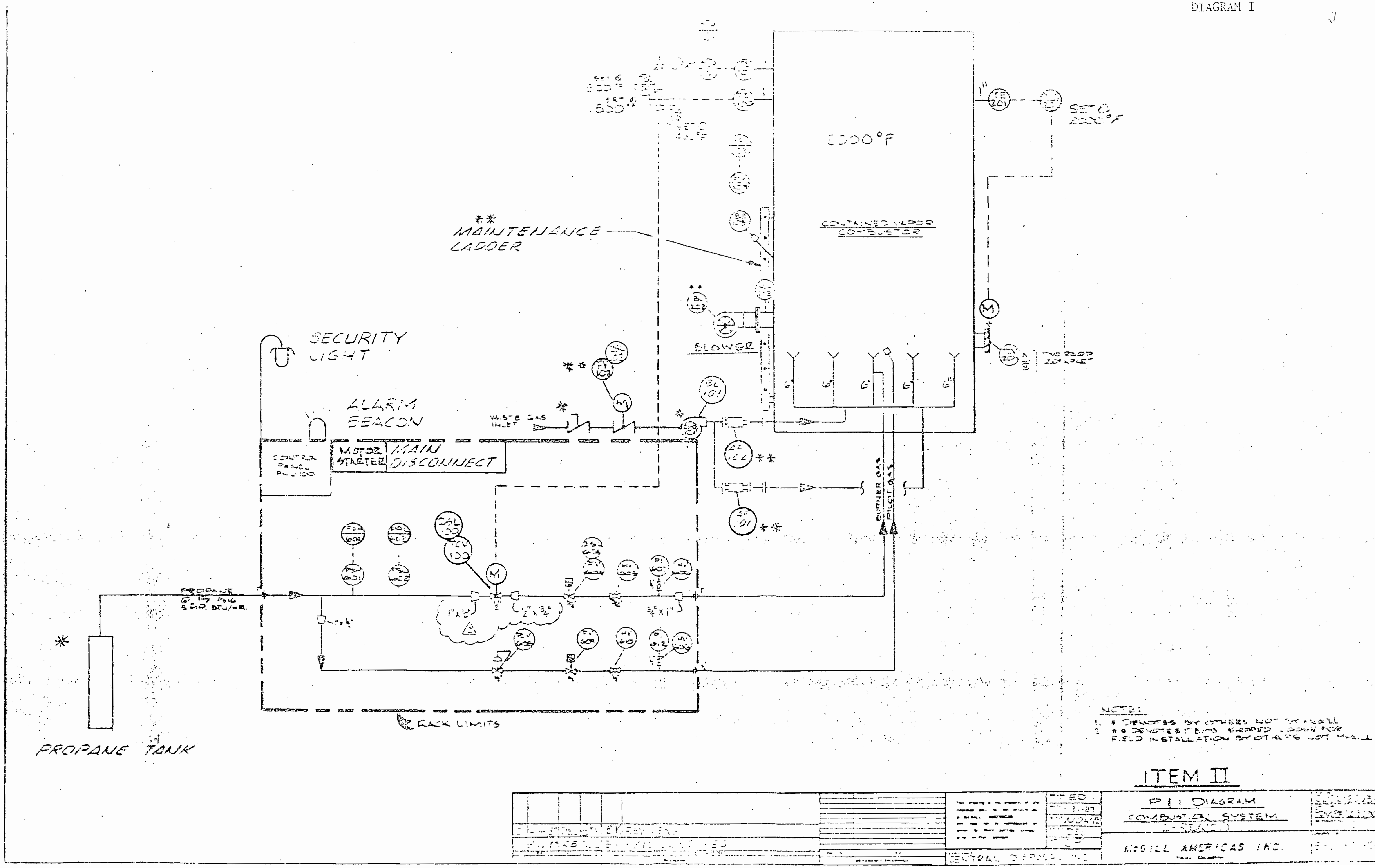
Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

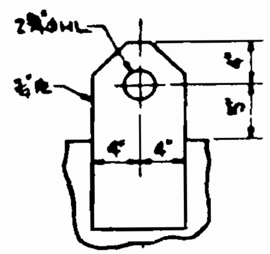
A Waste Management Company

LIST OF DIAGRAMS

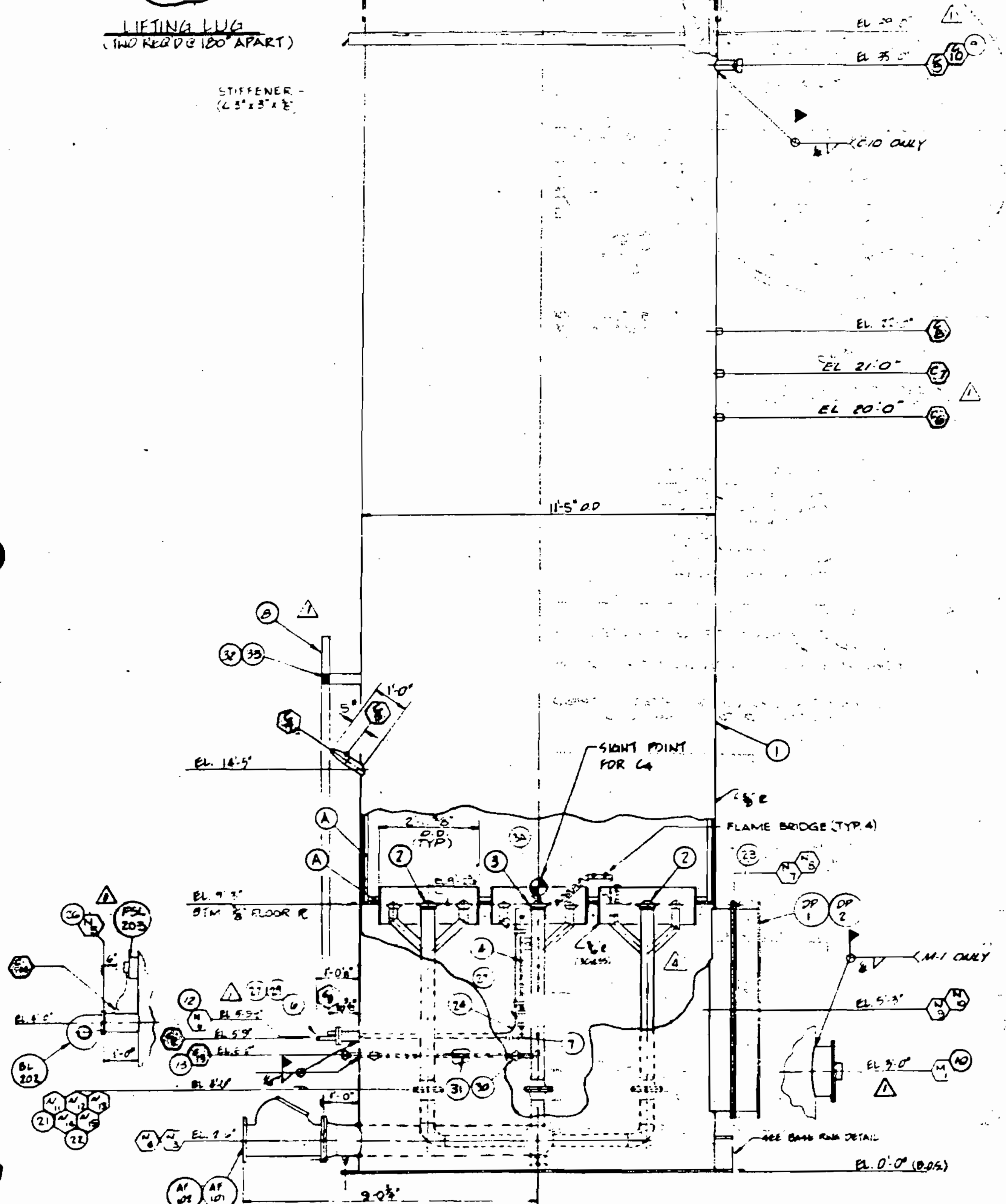
BEST AVAILABLE COPY

DIAGRAM I

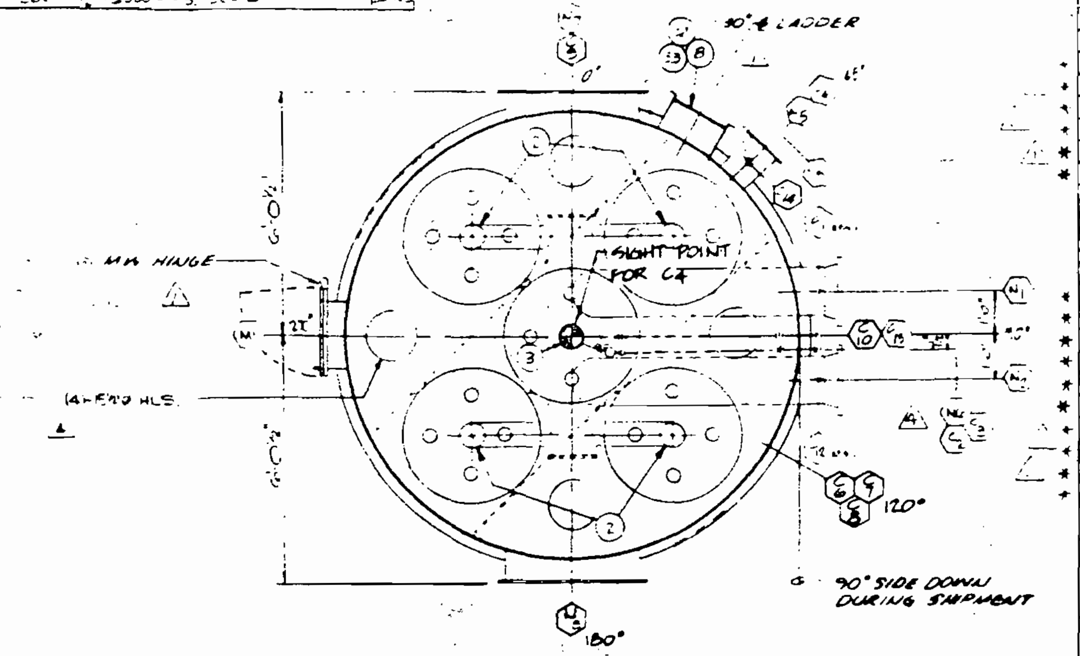




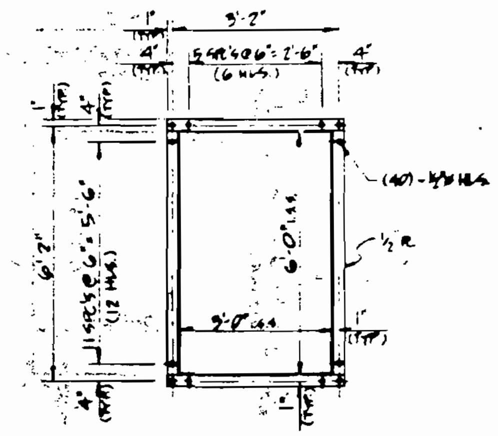
LIFTING LUG
(TWO REQ'D @ 180° APART)



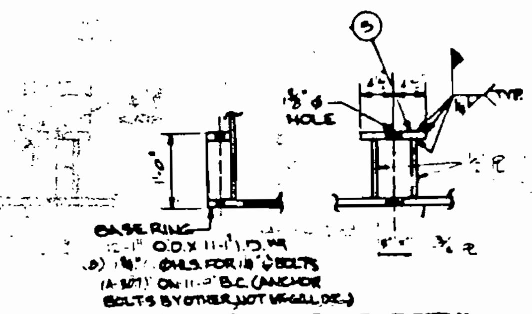
ELEVATION
(NOT TRUE ORIENTATION)
NOT TO SCALE



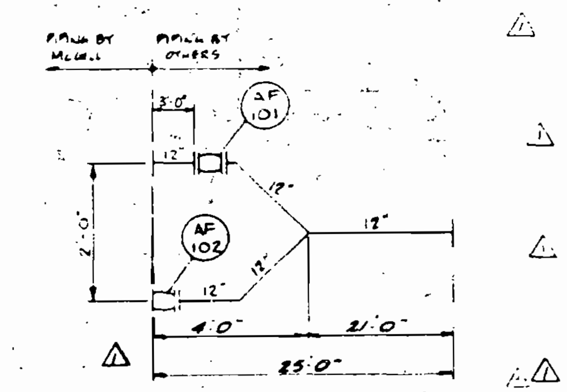
ORIENTATION PLAN



DETAIL N7 THRU N10



BASE RING DETAIL



WASTE BLOWER TO INCINERATOR PIPING

DESIGN DATA

DESIGN TEMP 300°F
MOMENT @ BASE
SHEAR @ BASE
DEADLOAD
CORROSION ALLOW.
WIND LOAD
(PER ANSI A58.1-1982 EXP C)

NOTES CON'T.

7. CONTROL PANEL TO BE LOCATED 25'-0" MAX. FROM CVC.
8. (*) DENOTES ITEMS SHIPPED LOOSE FOR FIELD INSTALLATION.
9. COMBUSTOR SHOULD BE LIFTED W/ SPREADER BAR & CABLES ATTACHED TO LIFTING LUGS

PARTS LIST (CONT'D)

ITEM	TAG Nº	QTY	DESCRIPTION	MAT'L
12	[illegible]	1	PILOT MTG CONN	—
13	C-13	1	1" AUX FUEL GAS CONN	
14	—	2	½ HEX PLUG – [illegible] 3000# FS [illegible]	[illegible]

BILL OF MATERIAL (CONT'D)

ITEM	TAG Nº	QTY	DESCRIPTION	MAT'L
33	HB 5-1¼	8	HEX BOLT ⅝" Ø [illegible]	[illegible]
34	30-101-34	25 FT	SPARE IGNITION CABLE [illegible] OR EQUAL	—

PARTS LIST

ITEM	TAG Nº	QTY	DESCRIPTION	MAT'L
1	[illegible]	1	COMBUSTION CHAMBER	—
2	[illegible]	4	OUTSIDE WASTE GAS GUN	—
3	[illegible]	1	CENTER WASTE GAS GUN	—
4	—	1	FUEL GAS GUN	—
5	[illegible]	1	PILOT ASSY	—
6	[illegible]	6	[illegible] PLATE	A-36
7	[illegible]	1	[illegible] FLANGE [illegible]	—
[illegible]	570-A-601	1	PILOT GAS LINE	—
8	30-101-8	[illegible]	UNCAGED LADDER ASS'Y	GALV
9	C-10	1	[illegible]	—
10	M-1	1	18" MANWAY ASS'Y W/ HINGED COVER	—

BILL OF MATERIAL

ITEM	TAG Nº	QTY	DESCRIPTION	MAT'L
21	[illegible]	5	GASKET – 6" 150# RF – ⅛" THK	[illegible]
22	[illegible]	[illegible]	STUD BOLT – [illegible] W/ 2 HEX NUTS EA	[illegible]
23	[illegible]	80	HEX BOLT – ⅝" Ø W/ NUT	[illegible]
24	30-[illegible]-24	6'-0"	IGNITION WIRE – [illegible] OR EQUAL	—
25	[illegible]	2	GASKET – 12" 150# FF – ⅛" THK	[illegible]
26	30-101-26	1	GASKET – [illegible]	[illegible]
27	30-101-27	[illegible]	[illegible]	—
28	[illegible]	24	STUD BOLT – [illegible] NUTS EA	[illegible]
29	[illegible]	1	[illegible]	—
30	[illegible]	1	[illegible]	[illegible]
31	[illegible]	[illegible]	[illegible]	[illegible]
32	A-STD 0005	6	PLATFORM SUPT. WASHER	GALV.

REFRACTORY LEGEND

A	1½" A.P. GREEN "INSWOOL-HT" BLANKET (8# DENSITY, 2600°F) BACKED W/ ½" A.P. GREEN "INSWOOL-LT" BLANKET (4# DENSITY, 1800°F) W/ INCONEL ANCHORS ON 9" CTRS. EACH WAY.

GENERAL NOTES

1. ALL CARBON STEEL PLATE TO BE A-36, UNLESS NOTED.
2. ALL FLANGE BOLT HOLES TO STRADDLE NORMAL ℄'S, UNLESS NOTED.
3. TAG Nº'S TO BE PRECEDED BY JOB Nº
4. NOZZLE PROJECTIONS TO BE 6", UNLESS NOTED.
5. COMBUSTOR IS NOT TO BE USED AS AN ANCHOR POINT FOR CUSTOMER PIPING.
6. EXTERIOR CARBON STEEL SURFACES, BOTTOM OF FLOOR PLATE, AND INSIDE OF SKIRT TO BE SANDBLASTED PER SPECIFICATION Nº SSPC-SP6 AND PAINTED W/ DIMETCOTE EZ II (2½ MILS MIN. DFT) & FINISH W/ DEVOE/NAPKO HT10-6475-9001 (2 MIL MIN. DFT)

NOZZLE LEGEND

MK	QTY	DESCRIPTION
N1-4	4	WASTE GAS CONN – 12" 150# FF
N5	1	[illegible] BLOWER CONN. – [illegible]
N6	1	4 PILOT CONN – 4-150# FF
N7-10	4	DAMPER CONN. – SEE DETAIL
N11-15	5	TIP CONN – 6" 150# RF
M1	1	18" MANWAY CONN – [illegible]
C1	1	PILOT GAS CONN. – ½" MNPT
C3	1	CONDUIT CONN. – 1" FNPT
C4	1	SCANNER CONN. – 1" MNPT
C5	1	PURGE CONN. – ½" FNPT
[illegible]	3	THERMOCOUPLE CONN. – 1" FNPT
[illegible]	2	SAMPLE CONN. – 3" MNPT W/ PIPE CAP
[illegible]	2	DRAIN – 1" FNPT W/ PLUG
C13	1	AUX FUEL GAS CONNECTION – 1" FNPT
C14	1	PRESSURE SWITCH CONN. ½" FNPT

REVISIONS

NO	DATE	BY	CHK'D	APP'D	DESCRIPTION
5	[illegible]-1-87	[illegible]	dh	JF	REV. PER ECN-4120
4	5-8-87	[illegible]	[illegible]	JF	REV/ENGR
3	4-23-87	DEL	dh	BK	REV./ENG.
2	4-[illegible]-87	DEL	dh	JF	REV./ENG.
1	3-10-87	RB	DEL	BK	REV PER CUST APPROVAL

CUSTOMER: CENTRAL DISPOSAL, INC.

DRAWN: [illegible] DATE: [illegible]-87 CHK'D: dh APP'D: JF

Diagram II.
CONTAINED VAPOR COMBUSTOR
(2-REQ'D)

McGILL AMERICAS INC.
TULSA, OKLAHOMA

P.O. NO: COM-[illegible]
LOCATION: POMPANO BEACH, FL.
REVISION NO: 5
DRAWING NO: D-120948-30-101

REV: 7/1/87

FROM
STATE OF FLORIDA

STATE OF FLORIDA)

COUNTY OF LEON)

Pursuant to the provisions of Section 215.26, or Section _____*, Florida Statutes, I hereby apply for a refund and request that a State Warrant be drawn in favor of:

NAME: Central Disposal Division of Waste Management Inc. of Florida

ADDRESS: 3000 N.W. 48th Street

Pompano Beach, Florida 33067

AMOUNT: $500.00

which represents moneys I paid into the State Treasury subject to refund, and to substantiate such claim the following facts are submitted:

Reason for Claim: Overpayment of processing fee for AC 06-152683

(Receipt No. 117565 Cash Listing No. 0005 Dep #0024)

(Receipt No. 123268 - Issued SE District 7-28-88)

CERTIFIED TRUE AND CORRECT this _____ day of _____, 19_____.

_____
Signature

*Must be completed if authority is other than Section 215.26, Florida Statutes.

****

(FOR AGENCY USE ONLY)

(1) Agency recommends denial of above claim based on the following facts, including statutory authority for collection: _____

or

(2) Agency recommends approval of above claim and submits the following information to substantiate such claim. The amount recommended: $_____.

The amount requested above was originally deposited into the State Treasury, included in State Treasurer's Receipt #_____, dated_____.

NAME OF ACCOUNT:

SAMAS ACCOUNT CODE

Statutory Authority for Collection _____
It is requested that payment be made from:

NAME OF ACCOUNT:

SAMAS ACCOUNT CODE

CERTIFIED TRUE AND CORRECT this 22 day of November, 1988.

Department of Environmental Regulation
Agency

Signature of ~~Authorized Person~~

Engineer
Title

****

SECTION 215.26 STATES, IN PART: "APPLICATION FOR REFUNDS AS PROVIDED BY THIS SECTION SHALL BE FILED WITH THE COMPTROLLER, EXCEPT AS OTHERWISE PROVIDED HEREIN, WITHIN 3 YEARS AFTER THE RIGHT TO SUCH REFUND SHALL HAVE ACCRUED ELSE SUCH RIGHT SHALL BE BARRED." Three years is interpreted as meaning three years from the date of payment into the State Treasury.

BEST AVAILABLE COPY

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
№ 123268

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from Central Disposal Date July [illegible]

Address 3000 NW 48th St. Pompano Beach, Fl. 33067 Dollars $ 1000.00

Applicant Name & Address James O'Connor 500 Cypress Creek Rd W. Ste 300, [illegible]

Source of Revenue Waste Management Inc. of Florida

Revenue Code 001031 (1951) Application Number AC 06-[illegible]

By B. J. Jones

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
№ 117565

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from Central Disposal Waste Mgmt Date Aug. 19, 198[illegible]

Address 3000 N.W. 48th St., Pompano Beach FL 33067 Dollars $ [illegible]00.00

Applicant Name & Address Same as above

Source of Revenue [illegible] # 7965

Revenue Code 001031 Application Number AC [illegible]

By [illegible]

Central Disposal
3003 NW 48th Terrace
Pompano Beach, Florida 33073
305-977-4511

A Waste Management Company

October 31, 1988
LCFDER-002

Mr. Bill Thomas
Florida Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: CDSL Power-Production Facility
Pompano Beach, FL 33073
CER No. 88-101
FILE NO. AC-06-152683 - NOTARIZED RECEIPT

Dear Mr. Thomas:

Enclosed is the notarized receipt from the Fort Lauderdale News Sun Sentinel concerning the publication of Notice of Intent to issue a permit.

Sincerely,

William Meyer
Plant Manager

WM:ma

Enclosure

cc: Daniela Banu - Broward County Environmental Quality Control Board

copied: Pradeep Raval
Stephanie Brooks, SE Dist.

FORT LAUDERDALE NEWS/SUN-SENTINEL

PASTE COPY OF

Published Daily

Fort Lauderdale, Broward County, Florida
Boca Raton, Palm Beach County, Florida

STATE OF FLORIDA
COUNTY OF BROWARD/PALM BEACH .

Before the undersigned authority personally appeared A. Shepard

who on oath says that he is Classified Supervisor of the Fort Lauderdale News/Sun-Sentinel, Daily newspapers published in Broward/Palm Beach County, Florida that the attached copy of advertisement, being a Notice of Intent in the matter of to issue a permit

in the Court,

was published in said newspaper in the issues of Oct. 27, 1988

Affiant further says that the said Fort Lauderdale News/Sun-Sentinel are newspapers published in said Broward/Palm Beach County, Florida, and that the said newspapers have heretofore been continuously published in said Broward/Palm Beach County, Florida, each day, and have been entered as second class matter at the post office in Fort Lauderdale, in said Broward County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant 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 said newspapers.

A. Shepard

Sworn to and subscribed before me
this 27th day of October 88
A.D. 19.....

Judith A. Yarnall
(SEAL) Notary Public

Notary Public, State of Florida
My Commission Expires Aug. 22, 1992
Bonded Thru Troy Fain Insurance Inc.

State of Florida
Department of
Environmental
Regulation

Notice of Intent

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to Waste Management Inc. of Florida to construct six landfill gas-fired turbine generators, each with an electrical generation capacity of about 3.2 MW, in Pompano Beach, Broward County, Florida. The Department is issuing this intent to issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

Persons whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative determination (hearing) in accordance with Section 120.57, Florida Statutes. The petition must conform to the requirements of Chapters 17-103 and 28-5, Florida Administrative Code, and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Failure to file a petition within this time period constitutes a waiver of any right such person has to request an admistrative determination (hearing) pursuant to Section 120.57, Florida Statutes.

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 proposed agency action. Therefore, persons who may not wish to file a petition may wish to intervene in the proceeding. A petition for intervention must be filed pursuant to Rule 28-5.207, Florida Administrative Code, at least five (5) days before the final hearing and be filed with the hearing officer if one has been assigned at the Division of Administrative Hearings, Department of Administration, 2009 Apalachee Parkway, Tallahassee, Florida 32301. If no hearing officer has been assigned, the petition is to be filed with the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Failure to petition to intervene within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, Florida Statutes.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m, Monday through Friday, except legal holidays, at:

Dept. of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dept. of Environmental Regulation
Southeast Florida District
1900 S. Congress Ave., Suite A
W. Palm Beach, Florida 33406

Broward County Environmental Quality Control Board
500 SW 14th Court
Ft. Lauderdale, Florida 33315

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 14 days of the publication of this notice will be considerd in the Department's final determination.

October 27, 1988

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

PM
10-31-88
Tallahassee, FL

file copy

A Waste Management Company

RECEIVED
NOV 1 1988
DER - BAQM

October 26, 1988
LCFDER-001

Mr. Bill Thomas
Florida Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: CDSL Power-Production Facility
Pompano Beach, FL 33073
CER No. 88-101
COMMENTS TO PERMIT NO. AC 06-152683

Dear Mr. Thomas:

Pertaining to specific condition number six, I have attached a Broward County Environmental Regulation Quality Control Board (BCERQCB) Operational License for an existing enclosed Flare Station.

An additional process flare unit will be installed, however, it will only be functional during start-up of the turbine units. Also, when the facility is in operation the enclosed flares will be non-operational. As a result, an operational permit for the proposed process flare should not be required because of the intermittent service.

I am available to discuss any other comments which may require clarification.

Thank you for your time and consideration in this matter.

Sincerely,

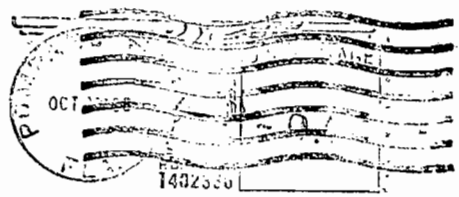
William Meyer
Plant Manager

WM:ma

Attachment
copied: Pradeep Raval
Stephanie Brooks, SE Dist
Gary Carlson, BCEQCB
CHF/BT

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073

A Waste Management Company



Mr. Bill Thomas
Florida Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, FL 32399-2400

CDSC

BEST AVAILABLE COPY

BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD

500 S.W. 14th Court
Fort Lauderdale, Florida 33315
(305) 765-5881

RECEIVED
NOV 1 1988
DER - BAQM

RECEIVED
JAN 27 1988
Ans'd.....

January 25, 1988

Mr. Harvey H. Bush, Jr.
WAste Management Inc. of Florida
500 N.W. 62nd Street
Fort Lauderdale, Fl. 33309

Gentlemen:

Enclosed is your Broward County Air Pollution License.

Broward County Environmental Quality Control Board Air Pollution licenses must be posted at the work site and be available for inspection by Broward County personnel at all times.

Broward County Environmental Quality Control Board Air Pollution licenses are not transferable. The Board must be notified in writing within 30 days of any change of ownership or location.

The enclosed license is based upon the information supplied to the Board in your application. Any changes must be approved by the Board prior to initiation of the changes.

If no objection to this license is received within 14 days, you will be deemed to have accepted it and all the enclosed conditions.

If you have any questions concerning these matters, please contact Ms. Daniela Banu at 765-4442.

Sincerely,

Gary D. Carlson
Chief, Air Section

GDC/mm
encl.

BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD
500 S.W. 14th Court
Fort Lauderdale, Florida 33315
(305) 765-5881
AIR SECTION
621 S. Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 765-4436

Air License

LICENSE TO OPERATE AN AIR POLLUTION SOURCE ISSUED UNDER THE PROVISIONS OF BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD CODE OF REGULATIONS, CHAPTERS 27-3 AND 27-4, AND FLORIDA ADMINISTRATIVE CODE, CHAPTER 17-2.

LICENSE NO. AO-44113-1,2 DATE OF ISSUE January 15, 1988

DATE OF EXPIRATION August 12, 1989

LICENSE ISSUED TO: NAME Waste Management Inc. of Florida

ADDRESS 500 N.W. 62nd St.
Ft. Lauderdale, Fl. 33309

TELEPHONE 771-9850

TO BE KNOWN AS Same as Above

TO BE LOCATED AT 2900 N.W. 48th St.
Pompano Beach, Fl.

FOR THE Operation of two enclosed ground flare systems with 40 HP Blower Flame Pilot System, Operating Temperature: 1200-1800°F, Exhaust exit velocity 190 ft/min. Net heating value of the gas being combusted: 500 Btu/ft.^{3}.

WORK SCHEDULE N/A

EMISSION LIMITING STANDARDS B.C.E.Q.C.B. Code of Regulations, Chapter 27-4
40 CFR 60.18

IN ACCORDANCE WITH THE LICENSE APPLICATION WHICH IS CONSIDERED PART OF THIS LICENSE. THIS LICENSE IS SUBJECT TO ALL FLORIDA STATE, BROWARD COUNTY AND LOCAL LAWS, REGULATIONS, RULES, AND THE CONDITIONS ATTACHED HERETO.

POST THIS LICENSE IN A PROMINENT PLACE ON THE PLANT PREMISES.

Victor N. Howard, P.E.
Pollution Control

AIR LICENSE

LICENSEE: Waste Management, Inc. of Florida

LICENSE NO. AO-44113 - 1,2
DATE OF ISSUE: January 15, 1988
EXPIRATION DATE: August 12, 1989

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations and restrictions set forth herein are accepted by the licensee and enforceable by the EQCB pursuant to Chapter 27 of the Broward County Environmental Quality Control Board (EQCB) Code. The EQCB will review this license periodically and may revoke the license, initiate administrative and/or judicial action for any violation of the conditions by the licensee, its agents, employees, servants or representatives.

2. This license is valid only for the specific uses set forth in the license application and any deviation from the approved uses may constitute grounds for revocation and enforcement action by the EQCB.

3. In the event the licensee is temporarily unable to comply with any of the conditions of the license, the licensee shall notify the PCO within 12 hours. Within 5 working days of the event, the licensee shall submit a written report to the PCO that describes the incident, its cause, the measures being taken to correct the problem and prevent its reoccurrence, the owner's intention toward repair, replacement, and reconstruction of destroyed facilities, and a schedule of events leading toward operation within the license condition.

4. The issuance of this license does not convey any vested rights or exclusive privileges, nor does it authorize any injury to public or private property or any invasion of personal rights, or any violations of federal, state or local laws or regulations.

5. This license must be available for inspection on licensee's premises during the entire life of the license.

6. By accepting this license, the licensee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, that are submitted to the EQCB, may be used by the EQCB as evidence in any enforcement proceeding arising under EQCB rules and regulations, except where such use is prohibited by Section 403.111, Florida Statutes.

7. The licensee agrees to comply with Chapter 27, Code of Regulations of the EQCB.

8. Any new owner of a licensed facility shall apply by letter for a transfer of license within thirty (30) days after sale or legal transfer. The transferor shall remain liable for performance in accordance with the license until the transferee applies for, and is granted a transfer of license.

9. The licensee, by acceptance of this license, specifically agrees to allow access to the licensed source at reasonable times by EQCB personnel for the purpose of inspection and testing to determine compliance with this license and EQCB rules and regulations.

10. This license does not constitute a waiver or approval of any other license that may be required for other aspects of the total project.

11. If the licensee wishes to renew the license or extend its term, he shall make application 60 days prior to its expiration. Expired licenses are not renewable.

12. In addition to the general conditions set forth above, each license issued by the EQCB shall contain specific conditions determined by site conditions and requirements pursuant to the regulations as determined by the PCO. Licensee agrees that specific conditions are enforceable by the EQCB for any violation thereof.

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

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

PM
8-16-88
Ft. Lauderdale, FL

0024
file copy

A Waste Management Company

RECEIVED
DER - MAIL ROOM
1988 AUG 18 AM 11: 14

August 16, 1988
LCDER-002

Mr. Pradeep Raval
Department of Environmental Regulation
Air Monitoring Department
2600 Blair Stone Road
Tallahassee, FL 32399-2400

SUBJECT: CDSL Power-Production Facility
Pompano Beach, FL 33073
CER No. 88-101
APPLICATION INFORMATION

Dear Mr. Raval:

Per our telephone conversation of August 15th, I have enclosed the requested information.

If any other information may be required in order to complete the application, please do not hesitate to call.

Sincerely,

William Meyer
Plant Manager

A.C.
001031

WM:ma

Enclosures
copied: Stephanie Brooks
Gary Carlson
BT

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

August 16, 1988

Power-Production Facility
Pompano Beach, FL 33073
CDSL CER NO. 88-101
ADDITIONAL APPLICATION INFORMATION

1. Application Fee

   Enclosed check in the amount of $500.00.

2. Test Data of NO_x and SO_2 Emissions

   Refer to Attachments I and II.

3. Clarification of Raw Material Utilization Rates

   Section III: Point A:

   The flow rate of landfill gas was based on 1400 scfm per unit. This rate will be under normal operating parameters.

   Section III: Point B:

   The total input flow rate was based on 1800 scfm per unit. This is the maximum design flow rate. As a result, the system will not be operated at this rate under normal parameters.

4. Clarification of Unburned Hydrocarbon Emissions

   The composition of this parameter is site specific. As a result, there is no data which the vendor can supply at this point which will answer the question of composition. However, the efficiency of combustion is greater than 99.9%.

5. Nitrogen Composition

   The 4% by volume of nitrogen (Section III, part E) is elemental.

6. Heat Rate For Allowable NO_x Emissions.

   Pertaining to the equation outlined in 40 CFR Sec. 60.332.A.2
   The value for "Y" is 12658 BTU per kilowatt hour.
   If 1 BTU (mean) = 1054.8 absolute joules, then the correct value for "Y" is 13.352 kilojoules per watt hour.

ATTACHMENT I

WASTE MANAGEMENT OF WISCONSIN, INC.
OMEGA HILLS LANDFILL
GAS TURBINE NO. 1
$NO_x/SO_2/O_2$ EMISSION SUMMARY
APRIL 17, 1986

TEST NO.	NO_x PPM	SO_2 PPM	O_2 %	AT 15% O_2			
				NO_x PPM	SO_2 PPM	NO_x % BY VOL	SO_2 % BY VOL
1	15.8	6.5	17.12	24.7	10.1	0.0025	0.0010
2	16.4	7.0	16.45	21.7	9.3	0.0022	0.0009
3	16.8	5.5	16.93	25.0	8.2	0.0025	0.0008
AVERAGE	16.3	6.3	16.83	23.8	9.2	0.0024	0.0009

ATTACHMENT II

WASTE MANAGEMENT OF WISCONSIN, INC.
OMEGA HILLS LANDFILL
GAS TURBINE NO. 2
$NO_x/SO_2/O_2$ EMISSION SUMMARY
APRIL 18, 1986

TEST NO.	NO_x PPM	SO_2 PPM	O_2 %	AT 15% O_2 NO_x PPM	AT 15% O_2 SO_2 PPM	NO_x % BY VOL	SO_2 % BY VOL
1	18.60	5.50	17.31	30.57	9.04	0.0031	0.0009
2	19.80	4.50	17.06	30.42	6.91	0.0030	0.0007
3	20.20	4.50	16.82	29.21	6.51	0.0029	0.0007
AVERAGE	19.53	4.83	17.06	30.07	7.49	0.0030	0.0008

Fed Exp # 8614014464
5-11-88
Pompano Beach, FL

file copy

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

August 11, 1988

RECEIVED
AUG 12 1988
DER - BAQM

Mr. Pradeep Raval
Department of Environmental Regulation
Air Monitoring Department
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Raval:

Pertaining to our telephone conversation yesterday, I have enclosed information which summarizes an emissions test which was completed at a similar facility in Germantown, Wisconsin.

The expected emission rate for carbon monoxide and unburned hydrocarbons is site specific. Parameters which would influence the rate would be the quality of landfill gas and rate of combustion. As we discussed in our telephone conversation, the emission rates are worst case numbers.

If any other information may be required, please do not hesitate to call.

Sincerely,

William Meyer
Plant Manager

WM:ma

Enclosure
copied: Pradeep Raval
Stephanie Brooks, SE Dist.
Gary Carlson, Broward County

MOSTARDI
PLATT
ASSOCIATES
INC.

PARTICULATE & GASEOUS EMISSION STUDY
PERFORMED FOR
WASTE MANAGEMENT OF WISCONSIN, INC.
AT THE
OMEGA HILLS LANDFILL
GERMANTOWN, WISCONSIN
GAS TURBINE STACK NOS. 1 AND 2
APRIL 15, 17 & 18, 1986

INTRODUCTION

A particulate and gaseous emission test program was performed by MOSTARDI-PLATT ASSOCIATES, INC. (MPA) on Gas Turbine Nos. 1 and 2 flue gas exhaust stacks at the Omega Hills Landfill of Waste Management of Wisconsin, Inc. (Waste Management) in Germantown, Wisconsin on April 15, 17 and 18, 1986. The tests were authorized by and performed for Waste Management.

The purpose of this test program was to determine particulate, sulfur dioxide (SO_2) and nitrogen oxides (NO_x) emission rates while each gas turbine was operating at design capacity.

The tests were conducted by Messrs. D. Ozawa, K. Cook, G. Hammar and J. Platt of MPA. Messrs. Tom Krumplitsch and Brian Zimdars of Waste Management provided assistance and coordinated plant operating conditions during the test program. Mr. Bill Haas of the State of Wisconsin Department of Natural Resources was at the test site to observe the test program.

SUMMARY OF RESULTS

Three (3) particulate tests were performed on Gas Turbine Stack No. 1 only, to determine particulate compliance. The average emission rate was 0.002 pounds per million BTU at an average gas volumetric flow of 95,206 ACFM and temperature of 664.3°F. A complete particulate test results summary is given on page 10.

The gaseous emission sampling included monitoring the nitrogen oxide (NO_x) and oxygen (O_2). Simultaneously with each 1-hour sample, two (2) twenty minute sulfur dioxide (SO_2) samples were extracted and analyzed. The results of the gaseous emission monitoring and sampling for Gas Turbine Stack Nos. 1 and 2 are summarized on pages 11 and 12.

During the length of each particulate test, samples of the fuel gas being fired to the turbine were extracted for analysis. The results of these analyses are given on page 13.

TEST PROCEDURES

All testing, sampling, analytical and calibration procedures used for this test program were performed as described in the Code of Federal Regulations, Title 40, Part 60, and Appendix A, Methods 1 through 5, 6 and 20 and the latest revisions thereof. Where applicable, the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific MEthods, EPA 600/4-77-027b was used to determine the precise procedures.

PARTICULATE TEST RESULTS SUMMARY

PLANT: Omega Hills Landfill SOURCE: Gas Turbine No. 1

Test Run Number	1	2	3		Average	
Test Location	#1 Stack	#1 Stack	#1 Stack			
Source Condition						
Date	4-15-86	4-15-86	4-15-86			
Time	1004-1112	1228-1335	1437-1543			
Particulate Concentration: @ Flue Conditions, grains/acf	0.0001	0.0001	0.0001		0.0001	
@ Standard Conditions, grains/dscf	0.0003	0.0003	0.0003		0.0003	
Emission Rate: pounds/hour	0.11	0.10	0.09		0.10	
pounds/million Btu*	0.002	0.002	0.002		0.002	
Average Gas Volumetric Flow Rate: @ Flue Conditions, acfm	95,844	94,470	95,304		95,206	
@ Standard Conditions, dscfm	43,087	42,321	42,119		42,509	
Average Gas Temperature, °F	655.9	660.6	676.4		664.3	
Average Gas Velocity, ft/sec	127.08	125.29	126.36		126.24	
Absolute Flue Pressure, in. Hg	29.57	29.57	29.64		29.59	
Barometric Pressure, in. Hg	29.75	29.75	29.75		29.75	
Flue Gas Moisture, percent by volume	3.9	3.8	4.0		3.9	
Average $\%CO_2$ by volume, dry basis	3.80	3.00	3.00		3.27	
Average $\%O_2$ by volume, dry basis	16.00	17.00	17.00		16.67	
Dry Molecular Wt. of Gas, lb/lb-mole	29.248	29.160	29.160		29.189	
Percent Excess Air	309.31	412.62	412.62		378.18	
Gas Sample Volume, dscf	49.825	47.897	47.345		-	
Isokinetic Variance	1.04	1.02	1.01		-	

*Calculated using and "F" factor of 8740 for gaseous fossil fuels.

SUMMATION OF OMEGA HILLS TEST DATA WITH APPROPRIATE EXPLANATIONS

Pollutant	lbs/1000 ft^3	lbs/DSCF ($x10^{-6}$)	PPMV(1)	Lb/Hr(2)	TPY(2)
NO_x	0.108	4.69	51.0	9.0*	39.4
SO_2	0.028	1.20	8.8	2.3**	12.9
C_2			17.19%		
Particulate	0.0031	0.0010(3)		0.263	1.2

(1) Parts per million corrected to 15 % excess 02

(2) Based on 24 hr/day, 7 day/week, 52 weeks/year operation at 100% of capacity

(3) Units are grains/DSCF

(*) Vendor supplied information

(**) CDSL emission rate expected to be higher due to the inlet gas composition at CDSL. The expected rate was determined stoichiometrically.

EXAMPLE:

Emissions (particulate) = (fuel rate in 1000 ft^3/hr) X
(emission rate in lbs/1000 ft^3)

= (83.3) X (0.003)

= 0.263 lbs/hr

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To: _____	Locn. _____	
To: _____	Locn. _____	
To: _____	Locn. _____	
From: _____	Date _____	
Reply Optional [ ]	Reply Required [ ]	Info. Only [ ]
Date Due: _____	Date Due: _____	

TO: Broward County Environmental Quality Control Board
Broward County Health Department
Dade County Public Health Unit
Metropolitan Dade County Environmental Resources Management
Palm Beach County Public Health Unit

FROM: Donald B. White, P.E., West Palm Beach

DATE: July 29, 1988

SUBJECT: Application

Application File No. AC 06-152683
Application Name Waste Management, Inc. of Florida

This office has received the following application for:

- [X] Air Pollution Source
- [ ] Domestic Wastewater
- [ ] Drainage Well
- [ ] Hazardous Waste Facility
- [ ] Industrial Wastewater
- [ ] Injection Well
- [ ] Public Water Well/Plant
- [ ] Solid Waste Facility

for

- [X] Construction Permit
- [ ] Operating Permit
- [ ] Temporary Operating Permit

Your comments regarding completeness of the application are requested by 8/12/88.

A copy of the application has been provided to you by:

- [X] The applicant or his engineer; or Is attached

If you have any questions please call 305/ 964-9668

DBW:bj

RECEIVED
AUG 5 1988
DER-BAQM

WPB 116P (Rev. 5/82)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

Nº 123268

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from Chemical Disposal Date July 28, 1988

Address 3000 NW 48th Street Pompano Beach, FL 33067 Dollars $ 1000.00

Applicant Name & Address James O'Connor 500 Cypress Creek Rd W. Ste 300, Ft. Lauderdale, FL 33309

Source of Revenue Waste Management, Inc. of Florida

Revenue Code 001031 (7951) Application Number HC 06-152683

By B. J. Jones

RECEIVED
SEP 1 1988
DER BROWARD

APPLICATION TRACKING SYSTEM 07/29/88

APPL NO:152683
APPL RECVD:07/28/88 TYPE CODE:AC SUBCODE:00 LAST UPDATE:07/29/88
DER OFFICE RECVD:WPB DER OFFICE TRANSFER TO:___ APPLICATION COMPLETE:__/__/__
DER PROCESSOR:BROOKS, STEPHANIE
APPL STATUS:AC DATE:07/28/88 (ACTIVE/DENIED/WITHDRAWN/EXEMPT/ISSUED/GENERAL)
RELIEF:__ (SSAC/EXEMPTIONS/VARIANCE)
(Y/N) N MANUAL TRACKING DISTRICT:50 COUNTY:06
(Y/N) N DNR REVIEW REQD? LAT/LONG:26.17.28/80.10.00
(Y/N) N PUBLIC NOTICE REQD? BASIN-SEGMENT:__.___
(Y/N) N GOV BODY LOCAL APPROVAL REQD? COE #:_____
(Y/N) Y LETTER OF INTENT REQD? _ (I/ISSUE D/DENY) ALT#:___-_____

PROJECT SOURCE NAME:WASTE MANAGEMENT, INC. OF FLORIDA
STREET:3140 NW 48 STREET CITY:POMPANO BEACH
STATE:FL ZIP:33309 PHONE:___-___-____
APPLICATION NAME:JAMES O'CONNOR, VP/REGIONAL MANAGER
STREET:500 CYPRESS CREEK RD W,STE 300 CITY:FT.LAUDERDALE
STATE:FL ZIP:33309 PHONE:305-771-9850
AGENT NAME:HARVEY BUSH
STREET:SAME CITY:_____
STATE:__ ZIP:_____ PHONE:___-___-____
FEE #1 DATE PAID:07/28/88 AMOUNT PAID:01000 RECEIPT NUMBER:00123268

B DATE APPLICANT INFORMED OF NEED FOR PUBLIC NOTICE - - - __/__/__
C DATE DER SENT DNR APPLICATION/SENT DNR INTENT - - - - - __/__/__--__/__/__
D DATE DER REQ. COMMENTS FROM GOV. BODY FOR LOCAL APP. -. __/__/__
E DATE #1 ADDITIONAL INFO REQ--REC FROM APPLICANT - - - - __/__/__--__/__/__
E DATE #2 ADDITIONAL INFO REQ--REC FROM APPLICANT - - - - __/__/__--__/__/__
E DATE #3 ADDITIONAL INFO REQ--REC FROM APPLICANT - - - - __/__/__--__/__/__
E DATE #4 ADDITIONAL INFO REQ--REC FROM APPLICANT - - - - __/__/__--__/__/__
E DATE #5 ADDITIONAL INFO REQ--REC FROM APPLICANT - - - - __/__/__--__/__/__
E DATE #6 ADDITIONAL INFO REQ--REC FROM APPLICANT - - - - __/__/__--__/__/__
F DATE GOVERNING BODY REQUESTED SURVEY RESULTS/REPORTS - - __/__/__
G DATE FIELD REPORT WAS REQ--REC - - - - - - - - - - - - __/__/__--__/__/__
H DATE DNR REVIEW WAS COMPLETED - - - - - - - - - - - - __/__/__

I DATE APPLICATION WAS COMPLETE - - - - - - - - - - - - __/__/__
J DATE GOVERNING BODY PROVIDED COMMENTS OR OBJECTIONS - - __/__/__
K DATE NOTICE OF INTENT WAS SENT--REC TO APPLICANT - - - - __/__/__--__/__/__
L DATE PUBLIC NOTICE WAS SENT TO APPLICANT - - - - - - - __/__/__
M DATE PROOF OF PUBLICATION OF PUBLIC NOTICE RECEIVED - - __/__/__
N WAIVER DATE BEGIN--END (DAY 90) - - - - - - - - - - - - __/__/__--__/__/__

COMMENTS:

Subject to Part 66 Stationary Gas Turbines

AC 06-152683

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHEAST FLORIDA DISTRICT
3301 GUN CLUB ROAD
P.O. BOX 3858
WEST PALM BEACH, FLORIDA 33402

BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY
ROY DUKE
DISTRICT MANAGER

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: CDSL Power-Production Facility [X] New[1] [ ] Existing[1]

APPLICATION TYPE: [X] Construction [ ] Operation [ ] Modification

COMPANY NAME: Waste Management, Inc. of Florida COUNTY: Broward

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) Exhaust from 6 landfill gas-fired turbine units

SOURCE LOCATION: Street 3140 N. W. 48th Street City Pompano Beach

UTM: East NA North NA

Latitude 26 ° 17 ' 28 "N Longitude 80 ° 10 ' 00 "W

APPLICANT NAME AND TITLE: James E. O'Connor, Vice-President/Region Manager

APPLICANT ADDRESS: 500 Cypress Creek Road, Suite 300, Fort Lauderdale, FL 33309

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of _____

I certify that the statements made in this application for a Power-Production Facility 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: James E. O'Connor

James E. O'Connor
Vice-President/Region Manager
Name and Title (Please Type)

Date: 7/27/88 Telephone No. 771-9850

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 judgment, that

[1] See Florida Administrative 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 inatructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed Harvey H. Bush

Harvey H. Bush, Jr.
Name (Please Type)

Waste Management, Inc.
Company Name (Please Type)

500 N.W. 62nd Street, Ft. Lauderdale, FL 33309
Mailing Address (Please Type)

Florida Registration No. 6267 Date: 7/27/88 Telephone No. 305-771-9850

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.

Refer to Exhibit C: Description of the CDSL Power-Production Facility

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction 11/88 Completion of Construction 4/89

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.)

A dry filter which removes particulates is incorporated with the standard design of the power system. Due to the combustion of the fuel gas, the emissions are within the proper parameters.

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

None

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

if power plant, hrs/yr 210240; 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?	Yes
a. If yes, has "offset" been applied?	NA
b. If yes, has "Lowest Achievable Emission Rate" been applied?	NA
c. If yes, list non-attainment pollutants.	Ozone
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI.	No
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII.	No
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?	NA
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.

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		
Landfill Gas	None		8400 scfm	Exhibit A
Air	None		180000 scfm	Exhibit A
Water	None		300 gal/hr	Exhibit A

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): 10800 scfm landfill gas

2. Product Weight (lbs/hr): NA

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] (Total)		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/yr	T/yr	
Nitrogen Oxide	54	236.40					Exhibit A
Carbon Monoxide	51.6	225.6					Exhibit A
Unburned hydro carbons	53.4	234.0					Exhibit A
Sulfur Dioxide	42.80	187.3					Exhibit A

[1]See Section V, Item 2.

[2]Reference 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)

[3]Calculated from operating rate and applicable standard.

[4]Emission, 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)

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Landfill Gas			240 x 10^6 BTU/hr

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: 350 ppmv Refer to Attach,II Percent Ash: 0

Density: 0 lbs/gal Typical Percent Nitrogen: 4% by volume

Heat Capacity: 480 but/cf BTU/lb _____ BTU/gal

Other Fuel Contaminants (which may cause air pollution): _____

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average NA Maximum NA

G. Indicate liquid or solid wastes generated and method of disposal.

450 gallons per hour is generated from the emissions of six Centaur Turbine units. The liquid is collected, pumped and transported to the Broward County Waste Water Treatment Center.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):*

Stack Height: 37 ft. Stack Diameter: 4 ft.

Gas Flow Rate: _____ ACFM 32000 DSCFM Gas Exit Temperature: 840 °F.

Water Vapor Content: _____ % Velocity: 8594 FPS

* This information is the same for each of the six gas-fired turbine units.

SECTION IV: INCINERATOR INFORMATION

NA

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (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 NA

Total Weight Incinerated (lbs/hr) NA Design Capacity (lbs/hr) NA

Approximate Number of Hours of Operation per day NA day/wk NA wks/yr. NA

Manufacturer NA

Date Conatructed NA Model No. NA

	Volume $(ft)^3$	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber	NA				
Secondary Chamber	NA				

Stack Height: NA ft. Stack Diamter: NA Stack Temp. NA

Gas Flow Rate: NA ACFM NA DSCFM* Velocity: NA 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 device: [ ] 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 NA

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.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

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.) NA

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). NA

6. An 8 1/2" 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 1/2" 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 (Example: Copy of relevant portion of USGS topographic map).

8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram. NA

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

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
NA	

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[ ] Yes [ ] No

Contaminant	Rate or Concentration
NA	

C. What emission levels do you propose as best availsble control technology?

Contaminant	Rate or Concentration
NA	

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
NA	

10. Stack Parameters NA

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. NA

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 conetruction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to conatruct 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:

[1]Explain method of determining efficiency.
[2]Energy 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 conatruction 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 Costs:

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:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data

1. _____no. sites _____ TSP _____( ) SO^2* _____ Wind spd/dir

Period of Monitoring _____/____/____ to _____/____/____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

*Specify bubbler (B) or continuous (C).

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.

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305/977-9551

A Waste Management Company

ATTACHMENT I

RECEIVED
'88 JUL 28 AM 9 41
FLA. DEPARTMENT OF
ENVIRONMENTAL REG.
WEST PALM BEACH

July 21, 1988

Ms. Stephanie Brooks
Department of Environmental Regulation
1900 South Congress Avenue
Suite A
West Palm Beach, FL 33406

RE: EMISSION RATES FOR CDSL POWER-PRODUCTION FACILITY

Dear Ms. Brooks:

Pertaining to the construct-to-operate permit application, listed below are the emission rates from each Solar Centaur T-4500 gas turbine's exhaust. The following data is based on exhausting 32000 scfm (dry basis) of total gas from each gas turbine unit.

Pollutant	Expected Emission Rate	Total (Based on Max of 6 Units
NO_x (nitrogen oxide)	9 lb/hr or 39.4 tons/yr	54 lb/hr or 236.40 tons/yr
CO (carbon monoxide)	8.6 lb/hr or 37.6 tons/yr	51.6 lb/hr or 234.0 tons/yr
UHC (unburned hydro-carbons)	8.90 lb/hr or 39.0 tons/yr	53.4 lb/hr or 234.0 tons/yr
SO_2 (sulfur dioxide)	7.13 lb/hr or 31.22 tons/yr	42.8 lb/hr or 187.3 tons/yr

If any other information may be required, please do not hesitate to call me.

Sincerely,

William Meyer
Plant Manager

WM:ma

ATTACHMENT II

CDSL RAW GAS COMPOSITION, VOL % (WET) July 18, 1988

	EXPECTED	RANGE
Methane	46.72	43.3 to 50.1
Carbon Dioxide	37.44	34.7 to 40.1
Nitrogen	4.0	3 to 7
Oxygen	0.14	0.11 to 0.20
Hydrogen	0.40	0.10 to 0.60
Hydrogen Sulfide	350 ppmv	100 to 600 ppmv
Water	10.80	6.5 to 13.2

GAS CONDITIONS (@ inlet of 1st stage compressor)

Temperature, °F	110	95 to 115
Pressure, PSIA	11.8	11.2 to 12.5

WASTE MANAGEMENT OF NORTH AMERICA, INC.
LANDFILL GAS TO ELECTRICAL GENERATION FACILITY
TURBINE POWER SYSTEM

INTRODUCTION

The following is a description of the the Power System that Waste Management of North America, Inc. (WMNA) will use for its landfill gas to electricity turbine projects. The natural decomposition of refuse results in production of methane rich landfill gas which is used for fuel. The fuel gas compression/clean-up (FGC) system conditions the fuel for combustion in a turbine/generator set which in turn produces electricity.

COMPRESSION PROCESS DESCRIPTION

The FGC draws gas from the landfill at a vacuum of 6" mercury, the gas is filtered with a dry inlet filter to remove dirt particulates, and compresses the gas using two stages of compression to 185 pounds per square inch gauge (psig) at 120±F. The FGC can deliver 1800 standard cubic feet per minute (SCFM) of landfill gas at the above conditions.

The FGC is controlled from a master control panel mounted adjacent to the FGC skid and can be monitored via a remote panel located in the plant control room. The FGC control system is electrically interlocked with the turbine operation and safety controls, the plant ventilation system, gas detection system, fire detection and suppression systems, and the voice synthesized auto dialer (used when the plant is operated in an unattended mode). Each system promotes safe operation of the plant and protects the equipment from damage.

The FGC is automatically shutdown in the event that the following conditions occur:

1. High discharge temperature
2. High discharge pressure
3. High vibration on the electric motors
4. High vibration on the compressor housings
5. Low oil level
6. Low oil pressure
7. High oil temperature
8. High liquid level in vessels

In addition, pressure and temperature gauges for each step of both stages of compression are mounted on the compressor gauge panel adjacent to the compressor. The cooler section of the compressor skid, located outside of the building, also has a system shutdown for high vibration on the fan motors.

The decomposition of refuse results in production of water saturated gas. The two stages of compression, which add heat to the gas, are followed by subsequent cooling stages. The combination of increased gas pressure and cooling results in water condensation which is collected in various vessels on the compressor skid. The condensate is then disposed of in an environmentally acceptable manner. In the event of failure of the condensate discharge system, high liquid level switches will shutdown the FGC to prevent damage and uncontrolled liquid and gas flows.

All shutdown and alarm conditions have both audible and visual indicators to alert the plant operators of potential problems.

TURBINE/GENERATOR DESCRIPTION

The landfill gas quality and quantity delivered to each turbine/generator are measured after the FGC compression process using an orifice plate flow meter and gas chromatograph. The landfill gas is delivered to a Solar Centaur GSC T4500 gas turbine/generator set. The turbine procedures over 4000 horsepower which results in generation of approximately 3200 kw from the 4160 volt generator.

The turbine/generator is automatically shutdown in the event the following conditions occur:

1. Turbine overspeed (also backing overspeed circuit)
2. Ignition failure
3. Generator undervoltage
4. Generator overvoltage
5. Low oil pressure generator bearings
6. Low pre/post lube oil pressure
7. High fuel gas temperature
8. Fail to start
9. Fail to crank
10. Fuel gas valve failure
11. High starting fuel flow
12. Summary fuel gas compressor (FGC) fault
13. Low oil level lube oil tank
14. Low lube oil pressure
15. High lube oil temperature
16. High turbine engine temperature (T5)
17. Low fuel gas pressure
18. High fuel gas pressure
19. Summary high vibration/temperature level from the turbine/generator's vibration and temperature monitoring system
20. High differential pressure across inlet air filters

The plant uses two central transformers; the main plant transformer located in the plant switchyard is used to deliver and receive power from the utility (a 4160 to necessary utility interconnection voltage transformer), and a step-down transformer is used to distribute power to the 480 volt circuit of the plant (a 4160/480 volt transformer).

The plant's electrical system is typically protected by the following Power System shutdowns:

1. Generator breaker open
2. High transformer pressure
3. High transformer oil temperature
4. High transformer winding temperature
5. Low transformer relay pressure
6. Switchyard breaker trip
7. Summary switchgear malfunction
8. Utility breaker open
9. Utility lockout relay trip
10. Plant lockout relay trip
11. Differential protection on the generators and main transformer

In addition to these shutdowns, both the plant and utility side protective relays will shutdown the plant upon activation.

FACILITY DESCRIPTION

The entire plant is equipped with a methane detection system to monitor combustible gases. When a low level of methane is detected (20% of the lower explosive limit), an alarm annunciates, ventilation fans in the plant switch to high speed and the autodialer is actuated. At a higher level of methane detection (40% of the lower explosive limit, 2.5 times less than an explosive mixture) all plant equipment is shut down, the plant ventilation equipment is switched to high speed, the condition is annunciated through the turbine control panel and the autodialer is activated.

The plant is also equipped with a fire detection and suppression system. Fire detection and suppression is provided throughout the plant. A water sprinkler fire suppression system is installed in the compressor and turbine rooms while a Halon fire suppression system is provided in the control and viewing rooms. The detection and suppression systems are consistent with the National Fire Protection Association Life Safety Code (1981).

The fire system control panel is located in the turbine control room and is integrated into the overall plant controls and autodialer system. In the event the fire detection system is activated, all plant equipment including the ventilation equipment, will be shutdown and the autodialer will be activated. A time delay for activation of the sprinkler or Halon systems is incorporated for personnel safety and for preventing accidential activation of the fire suppression systems.

Appropriate hand held fire extinguishers will be placed throughout the plant. An emergency eye wash station will be located in both the compressor room and turbine room.

A plant security system will deter entry into the plant by non-operators and trespassers.

The plant will be shut down in the event that the following occurs:

1. Fire Suppression System Activation
2. High-High Facility Methane Concentration

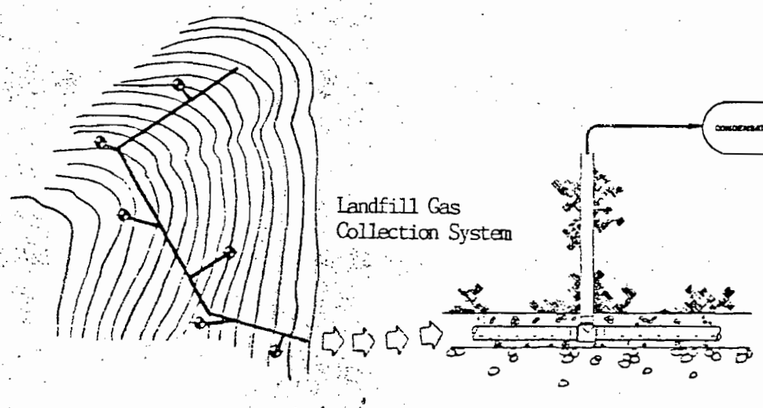
SUMMARY

The FGC control panel, the fire detection and suppression panel, the gas detection panel, the security system and the autodialer (all with battery back-up) comprise the total plant control system. The control system is designed to protect and maintain safe operation for both equipment and personnel.

The FGC room and the equipment housed in the FGC room are designed for a Class I, Division II, Group D environment (hazardous area operation) per 1984 National Electric Code. The remainder of the plant is designed as a non-hazardous area location. The following codes were incorporated into the plant design: 1984 BOCA Basic Building code, 1984 BOCA Basic National Plumbing Code, 1984 BOCA Basic National Mechanical Code, 1981 National Fire Protection Association Life Safety Code, and the 1984 National Electric Code.

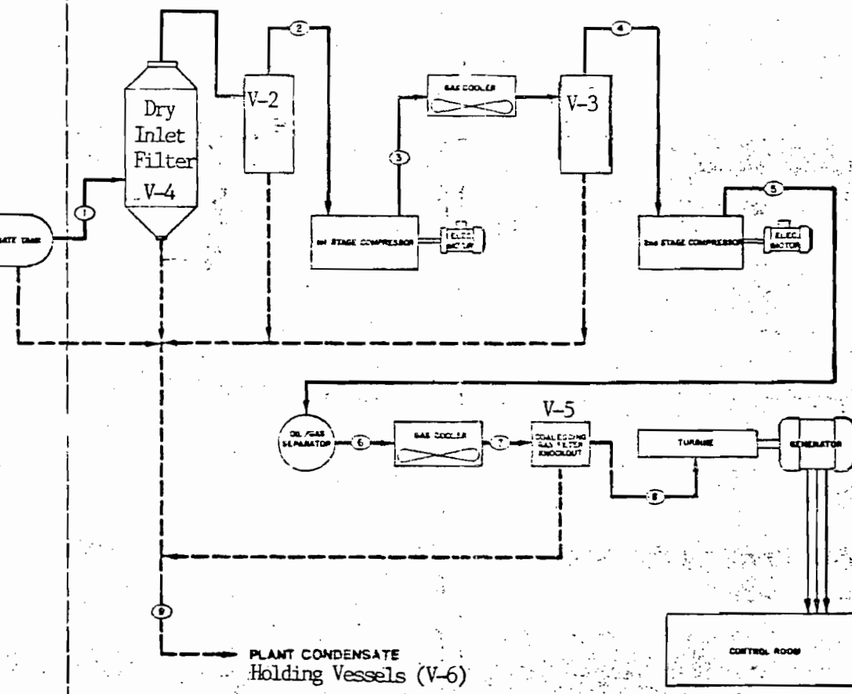
EXHIBIT A

LANDFILL



Landfill Gas
Collection System

PLANT



① 100°F 6" Hg (Vacuum)

② 100°F 6" Hg (Vacuum, with particulate removed)

③ 80°F 27 psia

④ 120°F 26 psia

⑤ 230°F 210 psia

⑥ OIL FREE GAS

⑦ 120°F 206.1 psia

⑧ 150°F 165psig

⑨ TOTAL PLANT CONDENSATE

LEGEND

GAS

LIQUID CONDENSATE

3 PHASE, 4160 VOLT ELECTRIC POWER

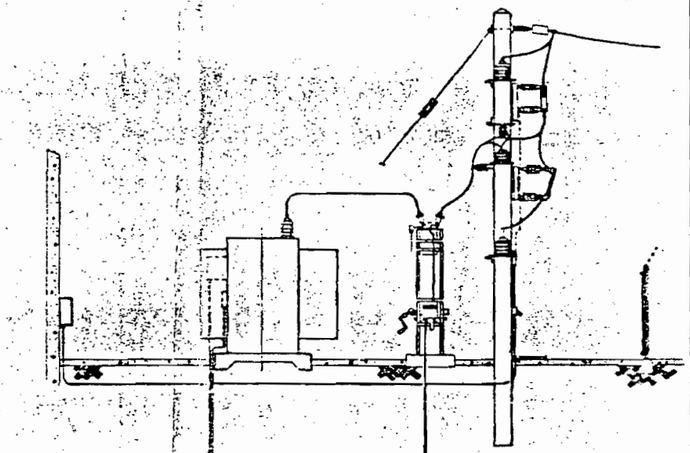
GAS WELL

V-2 1st stage knockout vessel
V-3 2nd stage knockout vessel

NOTE

GAS IS COOLED IN A SINGLE COOLER WITH INDIVIDUAL COOLING SECTIONS

UTILITY SUB-STATION



NO.	DATE	DESCRIPTION	DR BY	APP BY
SCALE:	NONE	PROJECT NO.		
	MAY 14, 1996	PROJECT: STANDARD DESIGN		
DSG BY	RD	SHEET TITLE: TURBINE-ELECTRIC/GAS RECOVERY PROCESS FLOW SHEET		
CK BY	VRV			
ENG BY				
APP BY				

Waste Management of North America, Inc.
Oak Brook, Illinois 60521

SHEET ____ OF ____

Transfer to Tally

SOUTHEAST FLORIDA DISTRICT PERMIT PROCESSING WORKSHEET

LOGGING

NAME OF PROJECT Waste Management, Inc. of Florida

PROJECT LOG NO. AC 06-152083 COUNTY Broward

DATE APPLICATION RECEIVED 7/28/88 30-DAY (HW 60-DAY) DATE 8/26/88

Rec# 123268

AMOUNT OF FEE PAID $1000.00 COPIES OF PLANS 3

COPIES OF APPLICATION 3 COPIES OF SPECIFICATIONS 3

COPIES TO: CORPS __; LOCAL PROGRAM ✓; TALLAHASSEE __; DNR __; OTHER __

7/29/88

PERMIT REVIEW

PERMIT ASSIGNED TO Brooks, Stephanie AMOUNT OF FEE REQUIRED _____

DISCHARGED TO OR LOCATED IN AN AQUATIC PRESERVE: Yes ___ No ___ N/A ___

PERMIT STATUS AND CHRONOLOGY

DATE	REVIEWER'S INITIALS	COMMENTS
8-8-88	SKB	Subject to 40CFR Section 66 for Stationary Gas Turbines Need to request more info

Continued on Back Side

FIELD INSPECTION BY: _____ DATE _____; N/A _____

WATER MANAGEMENT COMMENTS (DATE) _____; N/A _____

LOCAL PROGRAM APPROVAL (DATE) DBarm 8-10-88 agrees NSPS standards apply N/A _____

GPSI, APIS, OR DWS UPDATE DRAFTED: YES _____; N/A _____

PUBLIC NOTICE LETTER ISSUED/PUBLISHED (DATES) _____/_____; N/A _____

APPLICATION COMPLETION DATE _____ DEFAULT DATE

COMMENTS: _____

_____

PERMIT, EXEMPTION, DENIAL DRAFTED BY: _____ DATE _____

REVIEWED BY: _____ DATE _____

APPROVED BY: _____ DATE _____

FINAL PROCESSING

DISTRIBUTION BY: _____ DATE _____

PATS UPDATED BY: _____ DATE _____

GPSI, APIS OR DWS UPDATED BY: _____ DATE _____

WORD PROCESSOR: _____