FLORIDA KEYS ELECTRIC COOPERATIVE ASSOCIATION, INC. - FKEC

91605 OVERSEAS HIGHWAY P.O. BOX 700377, TAVERNIER, FL 33070-0377 PHONE (305) 852-2431 FAX: (305) 852-4754

Post-it® Fax Note 7671	Date 3-4-98	# of pages ▶ 2
To CLEVE HOLLADAY	From DEB. SHAW	
Co./Dept. FDEP	Co. FKEC	
Phone # 850/488-1344	Phone # 305/852-2431	
Fax # 850/922-6979	Fax # 305/852-9129	

Mr. Cleve Holladay
Dept. of Environmental Protection
Bureau of Air Resources
Mail Station 5505
2600 Blairstone Rd.
Tallahassee, FL 32399-2400

Re: Design and engineering measures taken to reduce emissions on Unit #8.

4 March 1998

Dear Mr. Holladay:

As per you request of Monday, 3/2/98, I am faxing additional information describing exactly what measures were taken to reduce emissions from Unit #8 at the Marathon Generating Plant. The information was supplied by Mr. Robin Weeks of Engine Systems, Inc.

Please call me if you need more information or the fax is not legible. I will be working in the field later today and I can be reached at 305/852-6501. I will take my copy with me if you wish to discuss details. Thanks for your assistance, Cleve.

Sincerely,

Deborah A. Shaw, Ph.D.
Environmental Affairs Coordinator/Biologist

Enc:
Letter from Robin Weeks, ESI.

PC:

C. Russell
T. Planner

TO: Cleve Holladay

ENGINE SYSTEMS INC.

PO BOX 1928
ROCKY MOUNT, NC 27802-1928

1220 S WASHINGTON STREET
ROCKY MOUNT, NC, 27801

Fax Cover Sheet

DATE: March 3, 1998

TO: Chris Pankow
FKEC
PHONE: 305-743-5323
FAX: 305-743-9191

FROM: Robert L Weeks
Sales Support/Engineering
PHONE: 919-977-2720
FAX: 919-446-3830

RE: Unit 8 Emissions modifications to Engine

CC:

Number of pages including cover sheet: 1

Message

The following modifications were made to the standard engine configuration to reach the emissions goals

1. The four pass aftercoolers we used were of a higher flow rate design on the water side, i.e. through the tubes. This allowed us to use an aggressive flow rate of 150 gpm through each aftercooler core, and enabled a lowered airbox temperature relative to utilizing the standard aftercooler cores EMD provides with this engine

2. The separately cooled circuit uses the available sea water as a relatively cool medium in the heat exchanger. By utilizing the design value of 88°F sea water, we are able to supply the aftercooler cores with approximately 90-92°F fresh water on the engine side of the aftercooler heat exchanger. This greatly reduces the engine airbox temperature relative to using 175-180°F fresh water as would have been the case using the standard EMD cooling system.

3 The 6° retarded fuel injection timing was the third modification. We originally intended to retard 4°, however after much discussion with Tim Paulson at EMD, it was decided that 6° retarded fuel injection timing was probably necessary to guarantee meeting our contractual requirements.

I believe the comment about fuel injectors concerns the spray tip pattern. EMD found that an older version of the injector tip was spraying some fuel directly onto the crowns of some of the valves, which caused incomplete atomization to occur. They changed the angle of the orifices in the spray tip to prevent this from occurring. All of their engines use the new pattern, and we did not change these.

I hope this clarifies the questions you have. Please forward this information to Deborah Shaw and Tim Planer.

Thank you

Do they have a Continuous Combustion monitoring system

6132F121.DOC

February 20, 1998

FKEC's facility was remodeled to reflect its request for a higher NO_x limit for Unit 8. The requested limit is 68 lb/hr or 8.57 g/s. The results of the modeling reflecting this change are shown below

Requested Emission Rates and Stack Parameters for FKEC

Emission Units	Emission Rate (g/s)	Stack Height (m)	Stack Temp °K	Stack Vel (m/s)	Stack Diameter (m)
Unit 8	8.57	11.79	625	34.6	0.71
Unit 1	2.96	6.15	669	27.3	0.71
Unit 2	3.85	6.15	669	27.3	0.71
Unit 3	4.64	11.43	677	38.9	0.66
Unit 4	4.44	11.43	677	38.9	0.66
Unit 5	5.11	11.43	677	38.9	0.66
Unit 6	4.72	7.20	664	23.8	0.76
Unit 7	4.40	7.20	664	23.8	0.76

Location of Emission Units in Smith

Emission Units	x (m)	y (m)
No. 8	0.0	0.0
No. 1	-71.1	-34.8
No. 2	-71.1	-28.2
No. 3	-6.7	0.0
No. 4	-14.8	0.0
No. 5	-20.4	0.0
No. 6	-74.0	-48.9
No. 7	-74.0	-43.0

MODEL RESULTS FKEC

(All Values in ug/m^3, annual average)

	MET DATA	AAQS=100	PSD Class II=25	PSD ClassI SIL=0.1
		CONC	CONC	CONC
1987	Key West/Miami	77	18	0.04
1988	Key West/Miami	89	16	**0.04**
1989	Key West/Miami	89	18	0.03
1990	Key West/Miami	87	**21**	0.02
1991	Key West/Miami	**97**	21	0.02

Files: fk50_68.o87 throuh fk50_68.o91 for AAQS, fkspsd68.o87 through fkspsd68.o91 for PSD Class II; fkpsdc1.o87 through fkpsdc1.o90

South Florida Environmental Services

FINAL TEST REPORT

EMISSIONS COMPLIANCE TEST PROGRAM

FLORIDA KEYS ELECTRIC COOPERATIVE

MARATHON FACILITY

PREPARED FOR:

Engine Systems, Inc.
1220 Washington Street
Rocky Mount, NC 27802-1928

CONCERNING:

NO_x, CO, VOC and Opacity Compliance Testing
Emission Unit #8 3.58 MW Diesel Electric Generator
Florida Keys Electric Cooperative Association, Inc.
Marathon Facility
December 17, 1997

PREPARED BY:

South Florida Environmental Services
6821 Vista Parkway North
West Palm Beach, Florida 33411
SFES #97-581

Ron C. Cook Jr.
Senior Project Director

1/16/98
Date

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

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APPENDICES

1.0 COMPENDIUM

South Florida Environmental Services conducted an emissions compliance test program on behalf of Engine Systems, Inc. at Florida Keys Electric Cooperative Association, Inc. located in Marathon, Florida. The testing was conducted on the newly installed EMD generator set rated at 3.58 MW and took place on December 17, 1997.

The objective of the testing program was to determine the Compliance/Performance status of EMD diesel generator #8 with respect to oxides of nitrogen, carbon monoxide, total hydrocarbons and opacity limits. Set forth by the Florida, Department of Environmental Protection (FDEP) and Florida Keys Electric Cooperative.

All test methods and procedures were conducted in strict accordance with EPA Methods 3A, 7E, 9, 10 and 25A as found in the Federal Register (40CFR60), Appendix A. The approved test plan was adhered to throughout the program. All lb/MMBtu emission rates are based on the F-factor for oil in accordance with EPA Method 19.

The gaseous (CEM/VOC) sampling consisted of three 1-hour runs during the test program while the unit was operating at 100% of rated capacity. Finial results can be found in Table 1-1.

The opacity determination was an hour visible emissions run consisting of 240 readings, 4 readings per minute, from which the highest 6-minute average and maximum opacity values were obtained and reported as percent opacity. Finial results can be found in Table 1-2.

Ron C. Cook Jr. Senior Project Director, was responsible for all phases of the test program he was assisted by a team of qualified environmental professionals. Robin L. Weeks of Engine Systems, Inc. coordinated unit operation with testing. Tim Planner of Florida Keys Electric Cooperative was the company's representative.

1.0 COMPENDIUM (cont.)

The following tables summarize the results of the emissions testing program.

Table 1-1
Summary of Results
FKEC Emission Unit # 8
EMD Diesel Electric Generator
NOx

Run #	Time	BHP	NOx Gms/bhp-hr	NOx lb/hr	NOx Tons/yr
1	1500-1600	4981	6.01	65.95	288.86
2	1635-1735	4988	6.01	66.09	289.47
3	1800-1900	4983	5.93	65.10	285.14
Average			**5.98**	**65.71**	**287.82**

CO

Run #	Time	BHP	CO Gms/bhp-hr	CO lb/hr	CO Tons/yr
1	1500-1600	4981	.49	5.40	23.65
2	1635-1735	4988	.49	5.38	23.56
3	1800-1900	4983	.49	5.38	23.56
Average			**.49**	**5.39**	**23.59**

THC

Run #	Time	BHP	THC Gms/bhp-hr	THC lb/hr	THC Tons/yr
1	1500-1600	4981	.15	1.70	7.45
2	1635-1735	4988	.16	1.72	7.53
3	1800-1900	4983	.15	1.69	7.40
Average			**.15**	**1.70**	**7.46**

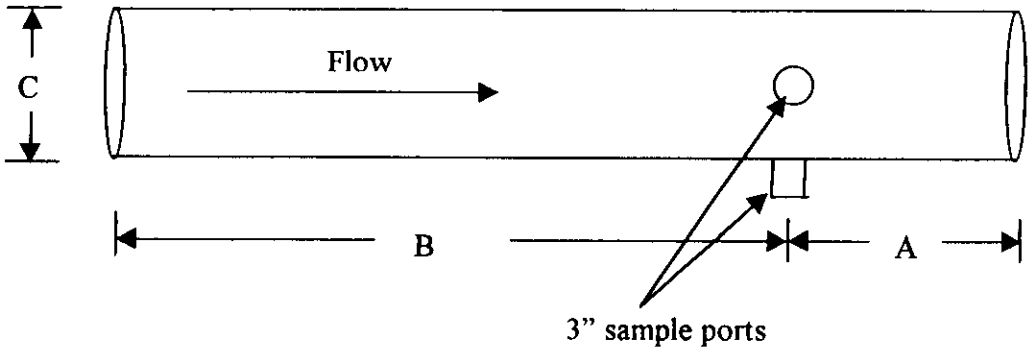
Note: Tons/yr were calculated using 8760 hours or continuous operation

Table 1-2
Visible Emission Results

Unit #	Length of Test	Highest 6 min. Average	Readings above 20%
EMD #8	60	5.0%	NONE

2.0 REFERENCE METHOD SAMPLING LOCATION

The emissions were measured in the 2.3-foot diameter exhaust duct. The sampling location is indoors, and is accessible via a man lift platform. Two 3-inch diameter sampling ports are installed 90° apart. Figure 2-1 depicts the sampling location.



Description	Dimension
Port To Downstream (A)	9.5 feet
Upstream To Port (B)	23.5 feet
Duct Diameter (C)	2.3 feet
Number Of Ports	2

Figure 2-1
Stack Sampling Location

3.0 SAMPLING POINT LOCATIONS

The stack has an inside diameter of 2.3-feet at the sampling location. The distance from the sampling ports to the nearest downstream disturbance is 9.5 feet or 4.1 diameters. The distance from the nearest upstream disturbance to the sampling ports is 23.5 feet or 10.2 diameters. Based upon the requirements of Methods in Appendix B, Specification 2, the CEM probe was placed at a total of 3 sampling points. The CEM probe was marked according to the measurements in **Table 3-1.** A rake probe was used to satisfy this criteria.

Table 3-1
CEM Sampling Points

Traverse Point	Distance %	Probe Marking
1	16.7	4.68"
2	50.0	14.00"
3	83.3	23.32"

4.0 SAMPLING TRAIN AND ANALYTICAL PROCEDURES

The subject unit was tested for nitrogen oxides, carbon monoxide, opacity and volatile organic compound emissions. Each pollutant parameter was tested in strict accordance with official EPA procedures at the sampling locations described in Sections 1, 2 and 3. In this section, the test procedures that were used, including sampling and analysis, are discussed.

4.1 DESCRIPTION OF METHODOLOGY

4.1.1 Nitrogen Oxides

Nitrogen oxides were measured in accordance with EPA Method 7E. This Method utilizes continuous emissions monitoring instrumentation. South Florida Environmental Services uses a Thermo Electron Model 10A NOx chemiluminescent monitor with 8 ranges from 0-10,000 ppm. The instrument meets all of the performance specifications of the Method. It was calibrated before and after each test period using calibration gases prepared according to EPA Protocol #1. Three 60-minute runs were conducted.

4.1.2 Carbon Monoxide/Carbon Dioxide

Carbon monoxide was measured in accordance with EPA Method 10 and carbon dioxide in accordance with EPA Method. This Method utilizes continuous emissions monitoring instrumentation. South Florida Environmental services uses a Fuji Model 3400 non-dispersive infra red analyzer with a range of 0-500 ppm for CO and 0-25% for CO_2. The instrument meets all of the performance specifications of the Methods. It was calibrated before and after each test period using calibration gases prepared according to EPA Protocol #1. Three 60-minute runs were conducted.

4.1.3 Volatile Organic Compounds

VOCs (Total Hydrocarbons) were determined in accordance with EPA Method 25A. This method utilizes a FID analyzer which is calibrated with certified methane standards. South Florida Environmental Services uses a TECO Model #51 flame ionization analyzer with four ranges between 0-10,000 ppm. The instrument meets all of the performance specifications of the Method. It was calibrated before and after each test period using three concentrations of calibration gas in the working range of the instrument. The calibration gases were prepared according to EPA Protocol #1. Three 60-minute runs were conducted.

4.0 SAMPLING TRAIN AND ANALYTICAL PROCEDURES

4.1.4 Oxygen

Oxygen was measured in accordance with EPA Method 3A. This Method utilizes continuous emissions monitoring instrumentation. South Florida Environmental Services uses a Teledyne Model 326A analyzer with a range of 0-25% The instrument meets all of the performance specifications of the Method. It was calibrated before and after each test period using calibration gases prepared according to EPA Protocol #1.

4.1.5 Opacity

Opacity observations were conducted in accordance with EPA Method 9. South Florida Environmental Services provided an EPA certified visible emissions observer. Measurements were made during each of the compliance test runs. Three 60-minutes runs were conducted. Each run consisted of 240 opacity observations which were recorded on Visible Emissions Data Sheets (appended).

4.0 SAMPLING TRAIN AND ANALYTICAL PROCEDURES (cont.)

4.2 DESCRIPTION OF CEM SAMPLING

4.2.1 CEM Sampling System

What follows is a description of the transportable continuous emissions monitor system that was used to quantify oxygen, carbon dioxide, oxides of nitrogen, and carbon monoxide, from the subject unit at the facility. The system meets all the specifications of Reference Methods 3A (O2/CO2), 7E (NOx), and 10 (CO).

Sample Probe - A stainless steel rake probe of sufficient length was used to sample at the location specified in Section 2.0.

Sample Line - Approximately 100' to 150' of 3/8" Teflon tubing (1/16" wall) was used to transport the sample gas from the probe to the sample conditioning system.

Sample Conditioning System-

Filter - A heated spun glass fiber filter was located at the end of the probe to remove particulate from the gas stream.

Condenser (2) - a Universal Analyzer Sample Cooler or ice cooled condenser was located near the probe for bulk moisture removal and a thermo-electric condenser system was located downstream from the pump to remove any remaining moisture from the gas stream

Sample Pump - A diaphragm type vacuum pump was used to draw gas from the probe through the conditioning system and to the analyzers. The pump head is stainless steel, the valve disks are Viton and the diaphragm is Teflon coated.

Calibration Valve - A t-valve, located at the base of the probe, allows the operator to select either the sample stream or inject calibration gas to the CEM system.

4.0 SAMPLING TRAIN AND ANALYTICAL PROCEDURES (cont.)

Sample Distribution System - A series of flow meters, valves and back pressure regulators allowed the operator to maintain constant flow and pressure conditions during sampling and calibration.

Gas Analyzers - capable of the continuous determination of O2, CO2, CO, and NOx concentrations in a sample gas stream. They each meet or exceed the following specifications:

Calibration Error	- Less than ±2% of span for the zero, mid- and hi-range calibration gases.
System Bias	- Less than ±5% of span for the zero, mid- or hi-range calibration gases.
Zero Drift	- Less than ±3% of span over the period of each test run.
Calibration Drift	- Less than ±3% of span over the period of each test run.

Data Acquisition System - A Molytek strip chart/data logger system was used to record analyzer response to the sample and calibration gas streams. The chart recorder operated continuously while the data logger recorded thirty (30) minute interval averages.

The Molytek was linked, via an RS232 cable, to an IBM compatible computer system with a VGA screen. Data was written to file at fifteen (15) second intervals. Separate files for each run, and associated calibrations, were generated. Data was loaded into a spreadsheet for calculation of interval averages and emission rates. Preliminary reports were available on-site.

4.2.2 CEMS Sampling Procedures

All sampling and analytical procedures were conducted in accordance with EPA Reference Methods 3A, 7E, and 10 (40CFR60, Appendix A). The following is the sequence of events leading up to and including the compliance test:

Selection of Sampling Traverse Point Locations - Sampling point locations were determined prior to testing in accordance with EPA Methods 3A, 7E, and 10.

Determination of System Response Time - System response time was determined prior to testing. System response time was determined according to procedures delineated in Performance Specification 2 (40CFR60, Appendix B).

4.0 SAMPLING TRAIN AND ANALYTICAL PROCEDURES (cont.)

Determination of Analyzer Calibration Error - Analyzer calibration error was determined immediately prior to testing in accordance with EPA Methods 3A, 7E, and 10.

Determination of Sampling System Bias - Sampling system bias was determined immediately prior to testing in accordance with EPA Methods 3A, 7E and 10.

Determination of Zero and Calibration Drift - Before and after each test run, each analyzer's response to zero and mid- or hi-range calibration gases were determined. The pre-and post-test analyzer responses were compared to determine drift. The results were evaluated based upon specifications defined in EPA Methods 3A, 7E and 10.

Data Reduction - An average pollutant/diluent concentration for each test run was determined from the data acquisition system. This data was then reduced to determine relative pollutant concentrations.

4.3 DESCRIPTION OF VOLATILE ORGANIC COMPOUNDS SAMPLING

4.3.1 VOC Sampling Equipment

Probe - A single opening 3/8" OD stainless steel probe was used at each sample location.

Calibration Valve - A three way valve was located at the end of each sample line to select either sample mode or system calibration mode.

Sample Line - A heated 3/8" OD Teflon sample line was used to transport the sample stream from the test locations to the analyzers. The lines were heated to the temperature of the sample duct, or to a maximum of 300°F, to maintain integrity of the sample.

System Calibration Line - A 1/4" OD Teflon tube was used to transfer calibration gas from the cylinder to the calibration valve.

VOC Analyzer - The analyzer used was a TECO Model #51 flame ionization analyzer (FIA).

Data Acquisition - **The** FIA's response was sent to a Molytek Data Acquisition System (DAS). The DAS recorded the response of each FIA on a strip chart recorder and IBM compatible computer via an RS-232 cable. The computer stored each analyzer's response at fifteen second intervals over the course of each run. Run averages were determined from all stored data points over the course of the run.

4.0 SAMPLING TRAIN AND ANALYTICAL PROCEDURES (cont.)

4.3.2 VOC Sampling Procedures

Calibrations - The FIA was calibrated prior to sampling using zero, low, mid and high calibration gases of certified cylinders of methane in a balance of nitrogen. Calibrations were conducted through the entire sample system. A description of the specific procedures is provided below.

Zero: The zero point of the analyzer was determined using a pre-purified cylinder of nitrogen. The zero point was analyzed for a minimum of five minutes to monitor drift before sampling commenced.

High Span: The high calibration gas, ~ 85% of span, was introduced to the sample system and the response of the analyzer was adjusted accordingly.

Mid & Low Span: The mid and low calibration gases, ~50% and 30% of span respectively, were introduced to the sample system and the response of the analyzer was recorded. The analyzer met Method 25A criteria for accuracy.

Sampling - Once the analyzer was calibrated, the system calibration valve was switched to sample mode and sampling was conducted. The response time of the system was determined by the time the valve is actuated to the time the response of the FIA is 95% of the steady state sample value.

Post Calibration - Immediately following each test run, the sample system was switched into calibration mode, and the zero and mid span gas was introduced to monitor analyzer drift. All post calibrations met or exceeded the Method 25A criteria for drift.

5.0 QUALITY CONTROL PROCEDURES

Sampling was conducted by trained personnel with extensive experience in Reference Method sampling.

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

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

All CEM analyzer and system calibrations were performed using NIST-traceable gas prepared in accordance with EPA Protocol #1.

All calculations were conducted in strict accordance with the equations found in the individual Methods. 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.

These specific procedures in addition to South Florida Environmental Services usual high standard of quality control I validated the results obtained in this test program. South Florida Environmental Services 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.

APPENDIX A

CEMS/VOC EMISSION CALCULATIONS

EMISSION CALCULATION SHEET

PLANT: FPL — UNIT: NO.2
LOCATION: GENERATOR #2 — DATE: 17-DEC-97

Load	=	3580 KW			
PPMV NOx	=	652.65	BTu/gl	=	138870
O2 % DRY	=	13.26	gl/hr	=	242.43
Humidity	=	0.008 lb/lbdry air 58.8 gr/lbdry air	Fuel Density	=	7.189 lb/gl
" K "	=	0.994956	Air Temp	=	70 ° F

NOx @15% O2 = NOx PPMV X (20.9-15(20.9-%O2)	=	503.98	ppmvd
NOx Corrected = " K " X NOx @15% O2	=	501.44	ppmvd
CS NOx = NOx PPMV X (1.194 e -7)	=	7.79E-05	lb/scf
NOx lb/mmbtu = CS NOx X Fd X 20.9/(20.9-%O2) Fd = 9190	=	1.96	lb/mmbtu
Qs SCFM = NOx lb/hr / CS NOx / 60	=	14105	scfm
NOx lb/hr = NOx lb/btu X btu/gl X gl/hr	=	**65.95**	lb/hr
NOx gms/ BHP_HR = NOx lb/hr x 454gms/lb / BHP	=	**6.01**	gms/bhp-hr
TEST BHP = 4981			

South Florida Environmental Services

EMISSION CALCULATION SHEET

PLANT	: FKEC	RUN #	: NOX-2
LOCATION	: Generator # 8	DATE	: 17DEC97

Load	= 3580 KW		
PPMV NOx	= 646.79	BTu/gl	= 138870
O2 % DRY	= 13.35	gl/hr	= 242.27
Humidity	= 0.008 lb/lbdry air 58.8 gr/lbdry air	Fuel Density	= 7.189 lb/gl
" K "	= 0.994956	Air Temp	= 70 ° F

NOx @15% O2	= NOx PPMV X (20.9-15(20.9-%O2)	= 505.34 ppmv
NOx Corrected	= " K " X NOx @15% O2	= 502.79 ppmv
CS NOx	= NOx PPMV X (1.194 e -7)	= 7.72E-05 lb/scf
NOx lb/mmbtu	= CS NOx X Fd X 20.9/(20.9-%O2) Fd = 9190	= 1.96 lb/mmbtu
Qs SCFM	= NOx lb/hr / CS NOx / 60	= 14262 scfm
NOx lb/hr	= NOx lb/btu X btu/gl X gl/hr	= **66.09** lb/hr
NOx gms/ BHP_HR	= NOx lb/hr x 454gms/lb / BHP	= **6.01**
TEST BHP	= 4988	

South Florida Environmental Services

EMISSION CALCULATION SHEET

PLANT	FKEC	RUN #	NOX-3
LOCATION	Generator # 3	DATE	17DEC97

Load	=	3580 KW			
PPMV NOx	=	646.80	BTu/gl	=	138870
O2 % DRY	=	13.26	gl/hr	=	241.47
Humidity	=	0.008 lb/lbdry air 58.8 gr/lbdry air	Fuel Density	=	7.189 lb/gl
" K "	=	1.017222	Air Temp	=	60 ° F

NOx @15% O2 = NOx PPMV X (20.9-15(20.9-%O2)	=	499.49 ppmv
NOx Corrected = " K " X NOx @15% O2	=	508.09 ppmv
CS NOx = NOx PPMV X (1.194 e -7)	=	7.72E-05 lb/scf
NOx lb/mmbtu = CS NOx X Fd X 20.9/(20.9-%O2) Fd = 9190	=	1.94 lb/mmbtu
Qs SCFM = NOx lb/hr / CS NOx / 60	=	14050 scfm
NOx lb/hr = NOx lb/btu X btu/cf X cf/hr	=	**65.10** lb/hr
NOx gms/ BHP_HR = NOx lb/hr x 454gms/lb / BHP	=	**5.93**
TEST BHP = 4983		

South Florida Environmental Services

EMISSION CALCULATION SHEET

PLANT : FKEC		RUN #	NOX-1
LOCATION : GENERATOR #6		DATE	17DEC97

Load	=	3580 KW		
PPMV CO	=	87.94	BTu/gl	138870
O2 % DRY	=	13.26	gl/hr	242.43
Humidity	=	0.008 lb/lbdry air 58.8 gr/lbdry air	Fuel Density	7.189 lb/gl
" K "	=	0.994956	Air Temp	70 ° F

CO @15% O2 = CO PPMVD X (20.9-15(20.9-%O2	=	67.90	ppmvd
CO Corrected = " K " X CO @15% O2	=	67.56	ppmvd
CS CO = CO PPMVD X (28.010/386.3)/1000000	=	6.38E-06	lb/scf
CO lb/mmbtu = CS CO X Fd X 20.9/(20.9-%O2) Fd = 9190	=	0.16	lb/mmbtu
Qs SCFM = CO lb/hr / CS CO / 60	=	14105	scfm
CO lb/hr = CO lb/btu X btu/gl X gl/hr	=	**5.40**	lb/hr
CO gms/ BHP_HR = CO lb/hr x 454gms/lb / BHP	=	**0.49**	gms/bhp-hr
TEST BHP = 4981			

South Florida Environmental Services

EMISSION CALCULATION SHEET

PLANT	FKEC	RUN #	NOX-2
LOCATION	GENERATOR #8	DATE	17DEC97

Load	=	3580 KW			
PPMV CO	=	86.70	BTu/gl	138870	
O2 % DRY	=	13.35	gl/hr	242.27	
Humidity	=	0.008 lb/lbdry air 58.8 gr/lbdry air	Fuel Density	7.189	lb/gl
" K "	=	0.994956	Air Temp	70 ° F	

CO @15% O2 = CO PPMVD X (20.9-15(20.9-%O2	=	67.74	ppmvd
CO Corrected = " K " X CO @15% O2	=	67.40	ppmvd
CS CO = CO PPMVD X (28.010/386.3)/1000000	=	6.29E-06	lb/scf
CO lb/mmbtu = CS CO X Fd X 20.9/(20.9-%O2) Fd = 9190	=	0.16	lb/mmbtu
Qs SCFM = CO lb/hr / CS CO / 60	=	14262	scfm
CO lb/hr = CO lb/btu X btu/gl X gl/hr	=	**5.38**	lb/hr
CO gms/ BHP_HR = CO lb/hr x 454gms/lb / BHP	=	**0.49**	gms/bhp-hr
TEST BHP = 4988			

South Florida Environmental Services

EMISSION CALCULATION SHEET

PLANT : FKEC RUN # : NOX-3
LOCATION : GENERATOR #8 DATE : 17DEC97

Load	=	3580 KW		
PPMV CO	=	87.98	BTu/gl	138870
O2 % DRY	=	13.26	gl/hr	241.47
Humidity	=	0.008 lb/lbdry air 58.8 gr/lbdry air	Fuel Density	7.189 lb/gl
" K "	=	0.994956	Air Temp	70 ° F

CO @15% O2 = CO PPMVD X (20.9-15(20.9-%O2	=	67.94	ppmvd
CO Corrected = " K " X CO @15% O2	=	67.60	ppmvd
CS CO = CO PPMVD X (28.010/386.3)/1000000	=	6.38E-06	lb/scf
CO lb/mmbtu = CS CO X Fd X 20.9/(20.9-%O2) Fd = 9190	=	0.16	lb/mmbtu
Qs SCFM = CO lb/hr / CS CO / 60	=	14050	scfm
CO lb/hr = CO lb/btu X btu/gl X gl/hr	=	5.38	lb/hr
CO gms/ BHP_HR = CO lb/hr x 454gms/lb / BHP	=	0.49	gms/bhp-hr

TEST BHP = 4983

South Florida Environmental Services

EMISSION CALCULATION SHEET

PLANT : TREC RUN # : NOX-1
LOCATION : GENERATOR #8 DATE : 17DEC97

Load	= 3580 KW		
PPMVD THC	= 48.36	BTu/gl	= 138870
O2 % DRY	= 13.26	gl/hr	= 242.43
Humidity	= 0.008 lb/lbdry air 58.8 gr/lbdry air	Fuel Density	= 7.189 lb/gl
" K "	= 0.994956	Air Temp	= 70 ° F

THC @15% O2 = THC PPMVD X (20.9-15(20.9-%O2)	=	37.34	ppmvd
THC Corrected = " K " X CO @15% O2	=	37.16	ppmvd
CS THC = THC PPMVD X (16.043/386.3)/100000	=	2.01E-06	lb/scf
THC lb/mmbtu = CS THC X Fd X 20.9/(20.9-%O2 Fd = 9190	=	0.05	lb/mmbtu
Qs SCFM = THC lb/hr / CS THC / 60	=	14105	scfm
THC lb/hr = THC lb/btu X btu/gl X gl/hr	=	**1.70**	lb/hr
THC gms/ BHP_HR = THC lb/hr x 454gms/lb / BHP	=	**0.15**	gms/bhp-hr
TEST BHP = 4981			

South Florida Environmental Services

EMISSION CALCULATION SHEET

PLANT	FKEG	RUN #	NOX 2
LOCATION	GENERATOR #8	DATE	17DEC97

Load =	3580 KW		
PPMVD THC =	48.36	BTu/gl =	138870
O2 % DRY =	13.35	gl/hr =	242.27
Humidity =	0.008 lb/lbdry air 58.8 gr/lbdry air	Fuel Density =	7.189 lb/gl
" K " =	0.994956	Air Temp =	70 ° F

THC @15% O2 = THC PPMVD X (20.9-15(20.9-%O2)	=	37.78	ppmvd
THC Corrected = " K " X CO @15% O2	=	37.59	ppmvd
CS THC = THC PPMVD X (16.043/386.3)/100000	=	2.01E-06	lb/scf
THC lb/mmbtu = CS THC X Fd X 20.9/(20.9-%O2 Fd = 9190	=	0.05	lb/mmbtu
Qs SCFM = THC lb/hr / CS THC / 60	=	14262	scfm
THC lb/hr = THC lb/btu X btu/gl X gl/hr	=	**1.72**	lb/hr
THC gms/ BHP_HR = THC lb/hr x 454gms/lb / BHP	=	**0.16**	gms/bhp-hr
TEST BHP = 4988			

South Florida Environmental Services

EMISSION CALCULATION SHEET

PLANT	FPEC	RUN #	NOX3
LOCATION	GENERATOR #5	DATE	17DEC97

Load	=	3580 KW			
PPMVD THC	=	48.36	BTu/gl	=	138870
O2 % DRY	=	13.26	gl/hr	=	241.47
Humidity	=	0.008 lb/lbdry air 58.8 gr/lbdry air	Fuel Density	=	7.189 lb/gl
" K "	=	0.994956	Air Temp	=	70 ° F

THC @15% O2 = THC PPMVD X (20.9-15(20.9-%O2)	=	37.35	ppmvd
THC Corrected = " K " X CO @15% O2	=	37.16	ppmvd
CS THC = THC PPMVD X (16.043/386.3)/100000	=	2.01E-06	lb/scf
THC lb/mmbtu = CS THC X Fd X 20.9/(20.9-%O2 Fd = 9190	=	0.05	lb/mmbtu
Qs SCFM = THC lb/hr / CS THC / 60	=	14050	scfm
THC lb/hr = THC lb/btu X btu/gl X gl/hr	=	1.69	lb/hr
THC gms/ BHP_HR = THC lb/hr x 454gms/lb / BHP	=	0.15	gms/bhp-hr

TEST BHP = 4983

South Florida Environmental Services

CALIBRATION CORRECTION SHEET

PLANT: [redacted] UNIT: [redacted]
LOCATION: [redacted] DATE: [redacted]

START TIME: 1000
END TIME: 1600

SYSTEM CALIBRATION DATA

	POLLUTANT	O2	CO2	CO	SO2	NOX
	INITIAL ZERO	0.00	0.00	1.60		3.80
	FINAL ZERO	0.00	0.10	-0.10		5.00
Co=	AVG ZERO	0.00	0.05	0.75		4.40
	INIT SPAN	12.00	10.20	153.30		913.20
	FINAL SPAN	12.10	10.30	153.10		931.80
Cm=	AVG SPAN	12.05	10.25	153.20		922.50
Cma=	CAL GAS	12.30	10.40	154.00		902.00
	Cgas = (C'-Co)xCma/(Cm-Co)					
C'=	Raw RM Data	12.99	6.00	87.80		668.70
Cgas=	Adj. RM data	13.26	6.07	87.94		652.65

CALIBRATION CORRECTION SHEET

PLANT: FKEC — RUN #: NOX-2
LOCATION: Chaparral #3 — DATE: 17DEC97
START TIME: 1635
END TIME: 1745

SYSTEM CALIBRATION DATA

	POLLUTANT	O2	CO2	CO	SO2	NOX
	INITIAL ZERO	0.00	0.10	-0.10		5.00
	FINAL ZERO	0.00	0.20	1.10		2.40
Co=	AVG ZERO	0.00	0.15	0.50		3.70
	INIT SPAN	12.10	10.30	153.10		931.80
	FINAL SPAN	12.30	10.30	153.80		926.30
Cm=	AVG SPAN	12.20	10.30	153.45		929.05
Cma=	CAL GAS	12.30	10.40	154.00		902.00
	Cgas = (C'-Co)xCma/(Cm-Co)					
C'=	Raw RM Data	13.24	6.01	86.61		667.23
Cgas=	Adj. RM data	13.35	6.00	86.70		646.79

CALIBRATION CORRECTION SHEET

PLANT: FKEC | RUN #: NOX'S
LOCATION: CT-G Inertor # 5 | DATE: 17DEC97

START TIME: 1800
END TIME: 1900

SYSTEM CALIBRATION DATA

	POLLUTANT	O2	CO2	CO	SO2	NOX
	INITIAL ZERO	0.00	0.20	1.10		2.40
	FINAL ZERO	0.00	0.20	3.50		2.40
Co=	AVG ZERO	0.00	0.20	2.30		2.40
	INIT SPAN	12.30	10.30	153.80		926.30
	FINAL SPAN	12.30	10.30	155.80		912.60
Cm=	AVG SPAN	12.30	10.30	154.80		919.45
Cma=	CAL GAS	12.30	10.40	154.00		902.00
	Cgas = (C'-Co)xCma/(Cm-Co)					
C'=	Raw RM Data	13.26	6.05	87.98		659.99
Cgas=	Adj. RM data	13.26	6.02	86.52		646.80

APPENDIX B

OPACITY OBSERVATIONS

VISIBLE EMISSIONS TEST

DATA REDUCTION SHEET

COMPANY: FKEC

DATE: 17DEC97

SOURCE: UNIT #8

RUN TIME: 1500-1600

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

NUMBER OF READINGS ABOVE 20% - 0

HIGHEST SIX MINUTE AVERAGE - 5.0 %

OVERALL AVERAGE OPACITY - 5.0 %

READINGS RANGED FROM - 5 TO 5 %

South Florida Environmental Services

EPA

VISIBLE EMISSION OBSERVATION FORM 1

Form Number | Page 1 of 2

Continued on VEO Form Number

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

Company Name: FKEC

Facility Name: SAME

Street Address: MM 29

City: Marathon | State: FL | Zip:

Process: Generator #8 | Unit: 8 | Operating Mode: 3.58 MW

Control Equipment | Operating Mode

Describe Emission Point: Leftmost Silver STACK

Height of Emiss. Pt. Start ~30 End ~30' | Height of Emiss. Pt. Rel. to Observer Start ~30 End ~30'

Distance to Emiss. Pt. Start ~200' End ~200' | Direction to Emiss. Pt. (Degrees) Start 90° End 90°

Vertical Angle to Obs. Pt. Start ~15° End ~15° | Direction to Obs. Pt. (Degrees) Start 90° End 90°

Distance and Direction to Observation Point from Emission Point Start ~200' 90° End ~200' 90°

Describe Emissions: Start Smoke End Smoke

Emission Color: Start LT grey End Same | Water Droplet Plume: Attached ☐ Detached ☐ None ☒

Describe Plume Background: Start Sky End Sky

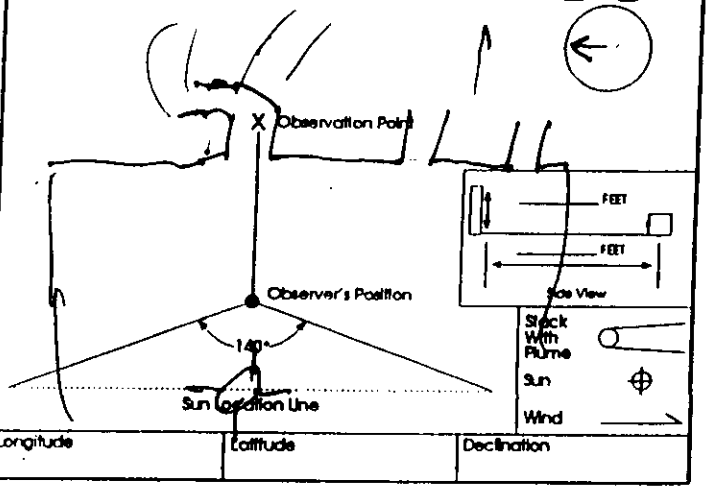
Background Color: Start Blue End Same | Sky Conditions: Start Scattered End Same

Wind Speed: Start ~5-10" End ~5-10" | Wind Direction: Start West End West

Ambient Temp: Start 70 End 65 | Wet Bulb Temp: | RH Percent:

Source Layout Sketch

Draw North Arrow ☐TN ☐MN



Longitude | Latitude | Declination

Additional Information

Observation Date	Time Zone	Start Time	End Time
12/17/97	EST	1500	1680

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

Observer's Name (Print): Ken C Cook

Observer's Signature: Ken C Cook | Date: 12/17/97

Organization: SFES

Certified By: ETA | Date: 7/15/97

EPA

VISIBLE EMISSION OBSERVATION FORM 1

Form Number | Page 2 of 2

Continued on VEO Form Number

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

Company Name: FKEC

Facility Name: SAME

Street Address: MM 29

City: Marathon | State: FL | Zip:

Process: Generator #8 | Unit #: 8 | Operating Mode:

Control Equipment: | Operating Mode:

Describe Emission Point: leftmost Silver Stack

Height of Emiss. Pt. Start ~30 End ~30 | Height of Emiss. Pt. Rel. to Observer Start ~30 End ~30

Distance to Emiss. Pt. Start ~200 End ~200 | Direction to Emiss. Pt. (Degrees) Start | End

Vertical Angle to Obs. Pt. Start ~15° End ~15° | Direction to Obs. Pt. (Degrees) Start 90° End 90°

Distance and Direction to Observation Point from Emission Point Start ~200' 90° End ~200 90°

Describe Emissions: Start Smoke End Smoke

Emission Color: Start Lt Grey End SAME | Water Droplet Plume: Attached ☐ Detached ☐ None ☒

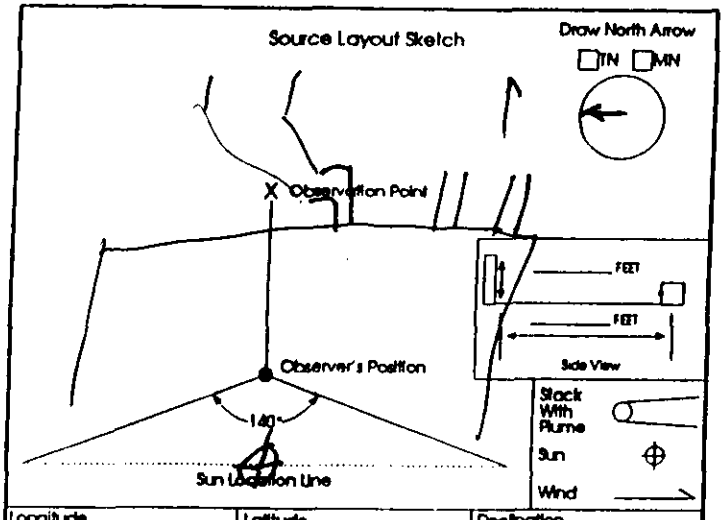
Describe Plume Background: Start SKY End SKY

Background Color: Start Blue End Blue | Sky Conditions: Start Scattered End SAME

Wind Speed: Start ~5-10 End ~5-10 | Wind Direction: Start West End West

Ambient Temp: Start 70 End 65 | Wet Bulb Temp. | RH Percent 55

Source Layout Sketch



Longitude | Latitude | Declination

Additional Information

Observation Date	Time Zone	Start Time	End Time
		1530	1600

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

Observer's Name (Print): Ron C Cook Jr

Observer's Signature: Ron C Cook Jr | Date 12/17/97

Organization: SFES

Certified By: ETM | Date 7/15/97

VEOF1.1

APPENDIX C

CALIBRATION GAS CERTIFICATIONS

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #:	88-52889	CYLINDER #:	CC 50751	CYL. PRESSURE:	2000 PSIG	P.O. #:	43416
EXP. DATE:	5/29/99	LAST ANALYSIS DATE:	5/29/97	CUSTOMER:	SOUTHHEAST AIRGAS		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT:	NITRIC OXIDE
STANDARD	
SRM #:	1687B
CYL. #:	CLM 9893
CONC:	986.0 PPM
INSTRUMENT:	BECKMAN CHEMILUMINESCENT
MODEL #:	951A
SERIAL #:	0100532
LAST CAL.:	5/1/97

MEAN CONC.: [redacted] +/- 7.22 PPM

REPLICATE CONC.

DATE: 5/22/97	DATE: 5/29/97
898 PPM	906 PPM
899 PPM	905 PPM
898 PPM	906 PPM

COMPONENT:	CARBON MONOXIDE
STANDARD	
SRM #:	1680B
CYL. #	CLM 951I
CONC:	490.4 PPM
INSTRUMENT:	ROSEMOUNT NDIR
MODEL #:	880A
SERIAL #:	2000172
LAST CAL.:	5/15/97

MEAN CONC.: 286 PPM +/- 2.29 PPM

REPLICATE CONC.

DATE: 5/22/97	DATE: 5/29/97
286 PPM	285 PPM
286 PPM	286 PPM
285 PPM	286 PPM

BALANCE GAS: NITROGEN TRACE GASES: NITROGEN DIOXIDE < 0.1 PPM

REPLICATE DATA

DATE: 5/22/97

Z	0	R	420.4	C	382.9
R	420.3	Z	0	C	383.2
Z	0	C	383.0	R	420.5

DATE 5/29/97

Z	0	R	440.4	C	404.7
R	440.5	Z	0	C	404.3
Z	0	C	404.9	R	440.6

REPLICATE DATA

DATE: 5/22/97

Z	0	R	490	C	286
R	490	Z	0	C	286
Z	0	C	284	R	489

DATE: 5/29/97

Z	0	R	490	C	285
R	491	Z	0	C	286
Z	0	C	286	R	490

REPLICATE DATA

Z= ZERO C=CANDIDATE R=REFERENCE

ANALYST: [signature]

APPROVED BY: Richard Sykes

Airgas Specialty Gases
325 McCausland Court
Cheshire, CT 06410
Phone: (203) 250-6827
FAX: (203) 250-6842

Certificate of Analysis: E.P.A. Protocol Gas Mixture

Rec#	2085		
Cylinder No :	CC46126	Purchase Order #	100416
Cylinder Pressure:	2000	Expiration Date:	3/31/99
Certification Date	3/31/97	Laboratory:	Cheshire, CT

Reference Standard Information:

Type	Component	Cyl. Number	Concentration
NTRM	Nitric Oxide	CC50149	980 ppm

Instrumentation:

Instrument/Model/Serial No.	Analytical Principle
Nicolet/550/ACN9402102	FTIR

Analytical Methodology does not require correction for analytical interferences.

Certified Concentrations:

Component	Concentration	Accuracy	Procedure
Nitric Oxide	[illegible] ppm	[illegible]	[illegible]
Nitrogen	Balance		

Analytical Results:

1st Component: Nitric Oxide

1st Analysis Date: 3/24/97

R	973.600	S	1766.300	Z	0.406	Conc	1778.244 ppm
S	1766.300	Z	0.117	R	974.300	Conc	1778.741 ppm
Z	0.226	R	974.200	S	1766.600	Conc	1777.504 ppm
						AVG:	1778.163 ppm

2nd Analysis Date: 3/31/97

R	980.500	S	1785.000	Z	0.289	Conc	1784.327 ppm
S	1766.700	Z	0.336	R	975.900	Conc	1774.396 ppm
Z	0.363	R	974.700	S	1773.100	Conc	1783.040 ppm
						AVG:	1780.588 ppm

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1993)" using the assay procedures listed.

Do not use cylinder below 150 psig.

Approved for Release

Scott Specialty Gases

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

CERTIFICATE OF ANALYSIS:Interference-Free™ Multi-Component EPA Protocol Gas

Customer
EASTMOUNT ENVIRONMENTAL
STEVEN BLAKE
C/O S FLORIDA ENV SERV
6821 VISTA PARKWAY NORTH
WEST PALM BEACH,FL 33411

Assay Laboratory
SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

Project No.: 12-20784-003
P.O. No.: 2289

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #811 September, 1993.

Cylinder Number: ALM011221
Cylinder Pressure ***: 1940 PSIG
Certification Date: 2/19/97
Exp. Date: 2/19/1999

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY **
CARBON MONOXIDE	154.0	PPM	+/- 1% NIST Traceable
NITRIC OXIDE	124.7	PPM	+/- 1% NIST Traceable
SULFUR DIOXIDE *	122.8	PPM	+/- 1% NIST Traceable
OXIDES OF NITROGEN	124.7	PPM	Reference Value
NITROGEN, OXYGEN FREE		BALANCE	

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.
* This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected Protocols.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1680	1/08/98	ALM024842	474.0 PPM	CO/N2
NTRM 1680	7/10/97	ALM050738	247.8 PPM	NO/N2
NTRM #0260	8/24/97	ALM042284	265.0 PPM	SO2/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/6220/AB9400252	02/17/97	Scott Enhanced FTIR
FTIR System/6220/AB9400252	02/17/97	Scott Enhanced FTIR
FTIR System/6220/AB9400252	02/17/97	Scott Enhanced FTIR

ANALYZER READINGS

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

CARBON MONOXIDE

First Triad Analysis	Second Triad Analysis	Calibration Curve
Date: 02/11/97 Response Unit: PPM	Date: 02/19/97 Response Unit: PPM	Concentration = A + Bx + Cx2 + Dx3 + Ex4
Z1 = 0.0660 R1 = 473.68 T1 = 154.18	Z1 = 0.0617 R1 = 474.27 T1 = 153.97	r = 0.999990
R2 = 473.56 Z2 = 0.0411 T2 = 153.70	R2 = 473.48 Z2 = 0.0697 T2 = 153.96	Constants: A = 0.000000
Z3 = 0.0739 T3 = 154.16 R3 = 474.76	Z3 = 0.1111 T3 = 154.03 R3 = 474.26	B = 1.000000 C = 0.000000
Avg. Concentration: 154.0 PPM	Avg. Concentration: 153.9 PPM	D = 0.000000 E = 0.000000

NITRIC OXIDE

First Triad Analysis	Second Triad Analysis	Calibration Curve
Date: 02/11/97 Response Unit: PPM	Date: 02/19/97 Response Unit: PPM	Concentration = A + Bx + Cx2 + Dx3 + Ex4
Z1 = 0.1947 R1 = 247.41 T1 = 124.68	Z1 = 0.2334 R1 = 247.36 T1 = 124.55	r = 0.999990
R2 = 247.31 Z2 = 0.1040 T2 = 124.52	R2 = 247.41 Z2 = 0.3540 T2 = 124.68	Constants: A = 0.000000
Z3 = 0.2369 T3 = 124.81 R3 = 247.77	Z3 = 0.3822 T3 = 124.90 R3 = 247.72	B = 1.000000 C = 0.000000
Avg. Concentration: 124.7 PPM	Avg. Concentration: 124.8 PPM	D = 0.000000 E = 0.000000

SULFUR DIOXIDE *

First Triad Analysis	Second Triad Analysis	Calibration Curve
Date: 02/11/97 Response Unit: PPM	Date: 02/19/97 Response Unit: PPM	Concentration = A + Bx + Cx2 + Dx3 + Ex4
Z1 = 0.0074 R1 = 264.88 T1 = 122.39	Z1 = 0.2060 R1 = 264.67 T1 = 122.59	r = 0.999990
R2 = 264.67 Z2 = 0.3377 T2 = 122.62	R2 = 266.11 Z2 = 0.3196 T2 = 123.10	Constants: A = 0.000000
Z3 = 0.2606 T3 = 122.96 R3 = 265.25	Z3 = 0.1043 T3 = 123.14 R3 = 266.32	B = 1.000000 C = 0.000000
Avg. Concentration: 122.7 PPM	Avg. Concentration: 122.9 PPM	D = 0.000000 E = 0.000000

Special Notes:

ANALYST: B. Becton
B. Becton

Scott Specialty Gases

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

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
EASTMOUNT ENVIRONMENTAL
STEVEN BLAKE
C/O S FLORIDA ENV SERV
6821 VISTA PARKWAY NORTH
WEST PALM BEACH,FL 33411

Assay Laboratory
SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

Project No.: 12-20784-001
P.O. No.: 2289

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: AAL17320 Certification Date: 2/12/97 Exp. Date: 2/12/2000
Cylinder Pressure***: 2000 PSIG

COMPONENT	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY**
CARBON DIOXIDE	10.4 %	+/- 1% NIST TRACEABLE
OXYGEN	12.3 %	+/- 1% NIST TRACEABLE
NITROGEN	BALANCE	

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

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1[illegible]	4/30/97	ALM047899	17.95 %	CARBON DIOXIDE
NTRM 2659	11/30/98	AAL17320	20.72 PCT	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN GC/3400/0160	01/31/97	GC / TCD
VARIAN GC/3400/16804	01/13/97	GC / TCD

ANALYZER READINGS

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

First Triad Analysis | Second Triad Analysis | Calibration Curve

CARBON DIOXIDE

Date: 02/10/97 Response Unit: AREA
Z1 = 0.0000 R1 = 117119 T1 = 875884
R2 = 117[illegible] Z2 = 0.0000 T2 = 876483
Z3 = 0.0000 T3 = 878403 R3 = 117049
Avg. Concentration: 10.37 %

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.999990
Constants: A = 0.00
B = 1.00 C = 0.00
D = 0.00 E = 0.00

OXYGEN

Date: 02/12/97 Response Unit: AREA
Z1 = 0.0000 R1 = 816460 T1 = 305164
R2 = 817018 Z2 = 0.0000 T2 = 306069
Z3 = 0.0000 T3 = 306023 R3 = 817592
Avg. Concentration: 12.30 %

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.99999
Constants: A = 0.00
B = 1.00 C = 0.00
D = 0.00 E = 0.00

Special Notes:

ANALYST: B. Becton
B. BECTON

Scott Specialty Gases

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

CERTIFICATE OF ANALYSIS:Interference-Free™ Multi-Component EPA Protocol Gas

Customer
EASTMOUNT ENVIRONMENTAL
STEVEN BLAKE
C/O S FLORIDA ENV SERV
6821 VISTA PARKWAY NORTH
WEST PALM BEACH,FL 33411

Assay Laboratory
SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

Project No.: 12-20783-004
P.O. No.: 2289

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM045678 **Certification Date:** 1/20/97 **Exp. Date:** 1/20/1999
Cylinder Pressure*:** 1790 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**
CARBON MONOXIDE	296.6	PPM	+/- 1% NIST Traceable
NITRIC OXIDE	229.7	PPM	+/- 1% NIST Traceable
SULFUR DIOXIDE *	223.7	PPM	+/- 1% NIST Traceable
OXIDES OF NITROGEN	229.8	PPM	Reference Value
NITROGEN - OXYGEN FREE		BALANCE	

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.
* This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected Protocols.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1680	1/08/98	ALM024780	474.0 PPM	CO/N2
NTRM 1685	7/10/97	ALM050988	247.5 PPM	NO/N2
NTRM R0260	5/24/97	ALM042108	266.0 PPM	SO2/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/6220/AAB9400252	01/16/97	Scott Enhanced FTIR
FTIR System/6220/AAB9400252	01/16/97	Scott Enhanced FTIR
FTIR System/6220/AAB9400252	01/16/97	Scott Enhanced FTIR

ANALYZER READINGS

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

CARBON MONOXIDE

First Triad Analysis
Date: 01/13/97 Response Unit: PPM
Z1 = -0.055 R1 = 473.33 T1 = 295.77
R2 = 473.65 Z2 = -0.026 T2 = 296.61
Z3 = -0.064 T3 = 296.66 R3 = 475.02
Avg. Concentration: 296.3 PPM

Second Triad Analysis
Date: 01/20/97 Response Unit: PPM
Z1 = 0.0248 R1 = 473.82 T1 = 297.32
R2 = 474.16 Z2 = 0.0192 T2 = 296.72
Z3 = 0.0449 T3 = 296.56 R3 = 474.01
Avg. Concentration: 296.9 PPM

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

NITRIC OXIDE

First Triad Analysis
Date: 01/13/97 Response Unit: PPM
Z1 = 0.2642 R1 = 247.66 T1 = 231.31
R2 = 247.96 Z2 = 0.2689 T2 = 230.21
Z3 = 0.3162 T3 = 229.66 R3 = 248.38
Avg. Concentration: 230.4 PPM

Second Triad Analysis
Date: 01/20/97 Response Unit: PPM
Z1 = 0.1665 R1 = 247.48 T1 = 229.43
R2 = 247.53 Z2 = 0.1928 T2 = 229.09
Z3 = 0.2059 T3 = 228.84 R3 = 247.49
Avg. Concentration: 229.1 PPM

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

SULFUR DIOXIDE *

First Triad Analysis
Date: 01/13/97 Response Unit: PPM
Z1 = 0.0659 R1 = 264.87 T1 = 223.05
R2 = 264.88 Z2 = 0.2208 T2 = 223.56
Z3 = 0.2775 T3 = 223.41 R3 = 265.24
Avg. Concentration: 223.3 PPM

Second Triad Analysis
Date: 01/20/97 Response Unit: PPM
Z1 = -0.118 R1 = 265.36 T1 = 224.11
R2 = 264.98 Z2 = 0.0720 T2 = 224.19
Z3 = 0.0493 T3 = 224.20 R3 = 264.69
Avg. Concentration: 224.2 PPM

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

Special Notes:

ANALYST: B. Becton

Scott Specialty Gases

1760 EAST CLUB BLVD,DURHAM,NC [illegible] Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
EASTMOUNT ENVIRONMENTAL
STEVEN [illegible]
C/O S [illegible]
6821 [illegible] NORTH
WEST[illegible]

Address
[illegible]

Project No.: 12-20784-002
P.O. No.: 2289

[illegible] Calibration Standards:

ALM039900
2000 PSIG

Exp. Date: 2/12/2000

CARBON DIOXIDE
OXYGEN
NITROGEN

ANALYTICAL ACCURACY**
+/-1% NIST TRACEABLE
+/-1% NIST TRACEABLE

*** Do not use [illegible] cylinder pressure is below 150 psig.
** Analytical [illegible] is inclusive of usual known errors [illegible] measurement processes.
[illegible] analytical accuracy is [illegible]

REFERENCE STANDARD

TYPE	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM [illegible]	[illegible]/97	ALM0[illegible]	[illegible]	CARBON DIOXIDE
NTRM 2659	[illegible]/08	ALM0[illegible]	[illegible]	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	CALIBRATED WITH	ANALYTICAL PRINCIPLE
VARIAN GC/3400/[illegible]	[illegible]	GC / TCD
VARIAN GC/3400/[illegible]	[illegible]	GC / TCD

ANALYTICAL READINGS

(Z = Zero Gas, [illegible], R = Correlation Coefficient)

First Three Analyses

Calibration Curve

CARBON DIOXIDE

Date: 02/10/97 — Response Unit Area

Z1 = 0.0000	[illegible]	T1 = 118329
R2 = [illegible]	Z2 = 0.0000	T2 = 118467
Z3 = [illegible]	T3 = 118486	R3 = 117049
Average	[illegible]	%

[illegible]

Concentration = A + Bx + Cx2 + Dx3 + Ex4
R = 0.999990
Constants: A = 0.00, B = 1.00, C = 0.00, D = 0.00, E = 0.00

OXYGEN

Date: [illegible] — Response Unit Area

Z1 = [illegible]	[illegible]	T1 = 622566
R2 = [illegible]	Z2 = 0.0000	T2 = 623150
Z3 = [illegible]	T3 = [illegible]	R3 = 617662
Average	[illegible]	%

[illegible]

Concentration = A + Bx + Cx2 + Dx3 + Ex4
R = 0.999990
Constants: A = 0.00, B = [illegible], C = 0.00, D = 0.00, E = 0.00

Specialty [illegible]

ANALYST: B. Becton
B. BECTON

Scott Specialty Gases, Inc.

1750 EAST GLOP [illegible],
[illegible] NC 27294
[illegible]: 919-220-0903 Fax: 919-220-0909

C E R T I F I C A T E O F A N A L Y S I S

[illegible] FLORIDA
[illegible] ENVIRONMENTAL SERVICES
[illegible] SITE #1005
[illegible] 2151A FARMWAY ROAD
[illegible] LAKE WORTH FL 33411

PROJECT #: 12-12320 004
PO#: ACCT #20351300
ITEM #: 12032750 AAL
DATE: 3/09/95

CYLINDER #: ALM031004 ANALYTICAL ACCURACY: +/- 2%

[illegible] TYPE : CERTIFIED MASTER GAS

COMPONENT	REQUESTED GAS CONC	MOLES	ANALYSIS (MOLES)	
[illegible]	30.	PPM	30.2	PPM
[illegible]	BALANCE		BALANCE	

ANALYST: K. COOKE

Scott Specialty Gases, Inc.

1750 EAST GUDE BLVD.
DURHAM NC 27704
Phone: 919 220 0803 Fax: 919-220-0808

CERTIFICATE OF ANALYSIS

SOUTH FLORIDA
ENVIRONMENTAL SERVICES
4151 RIDGE
11 VISTA PARKWAY SOUTH
WEST PALM BEACH FL 33411

PROJECT #: 12-10930-006
PO#: ACCT #20351300
ITEM #: 13022751 AAL
DATE: 3/09/95

CYLINDER #: AAL6509 ANALYTICAL ACCURACY: +/-2%

BLEND TYPE : CERTIFIED MASTER GAS

COMPONENT	REQUESTED GAS CONC	MOLES	ANALYSIS (MOLES)	
METHANE	85.	PPM	86.1	PPM
NITROGEN		BALANCE		BALANCE

APPROVED BY: K. COOKE

Scott Specialty Gases, Inc.

Shipped 1750 EAST GLEN BLVD.
DURHAM NC 27704
Phone: 919-220-0903 Fax: 919-220-0909

C E R T I F I C A T E O F A N A L Y S I S

[illegible] PLUMBING
[illegible] ENVIRONMENTAL SERVICES
[illegible] MIKE RIDGE
[illegible] VISTA PARKWAY NORTH
[illegible] FL 33411

PROJECT #: 12-10820 005
PO#: ACCT #20351300
ITEM #: 12022751 CAL
DATE: 3/09/95

CYLINDER #: ALM002055 ANALYTICAL ACCURACY: +/- 2%

CYLINDER TYPE : CERTIFIED MASTER GAS

COMPONENT	REQUESTED GAS CONC	MOLES	ANALYSIS (MOLES)	
[illegible]	50.	PPM	50.5	PPM
NITROGEN	BALANCE		BALANCE	

ANALYST: K. COOKE

APPENDIX D

FIELD DATA SHEETS

ANALYZER CALIBRATION SHEET

CLIENT: FKEC OPERATOR: RCook

PLANT: Marathon DATE: 12/17/97

LOCATION:

SPAN:	O2	%	CO2	%	CO	PPM	SO2	PPM	NOx	PPM

GAS / RANGE		CYLINDER VALUE	ANALYZER RESPONSE	ABSOLUTE DIFFERENCE	PERCENT SPAN
O2	LOW	0.0	0.0	0.0	0.0
	MID	12.3	12.2	0.1	0.4
	HIGH	21.0	21.0	0.0	0.0
CO2	LOW	0.0	0.0	0.0	0.0
	MID	10.4	10.4	0.0	0.0
	HIGH	18.16	18.4	0.24	1.2
CO	LOW	0.0	2.2	2.2	0.4
	MID	154.0	154.2	0.2	0.1
	HIGH	296.6	297.3	0.7	0.1
SO2	LOW	0.0			
	MID				
	HIGH				
NOx	LOW	0.0	2.5	2.5	0.1
	MID	902	906.4	4.4	0.2
	HIGH	1779.38	1758.9	*20.48	1.02

PERCENT SPAN = (CYLINDER VALUE - ANALYZER RESPON)/SPAN * 100

(ALLOWED 2% SPAN)

South Florida Environmental Services

SYSTEM CALIBRATION DATA SHEET

CLIENT: FKEC TIME: 1500 to 1600

PLANT: Marathon DATE: 12/17/87

LOCATION: Unit #8 RUN #: 1

	O2	CO2	CO	SO2	NOx
SPAN:	%	%	PPM	PPM	PPM
	X			X	

GAS		ANALYZER CAL RESPONSE	INITIAL SYSTEM CAL RESPON	INITIAL SYSTEM BIAS %SPAN	FINAL SYSTEM CAL RESPON	FINAL SYSTEM BIAS %SPAN	DRIFT
O2	ZERO	0.0	0.0	0.0	0.0	0.0	0.0
	UPSCALE	12.2	12.0	-0.8	12.1	-0.4	0.4
CO2	ZERO	0.0	0.0	0.0	0.1	0.5	0.4
	UPSCALE	10.4	10.2	-1.0.	10.3	-0.5	0.5
CO	ZERO	2.2	1.6	-0.1	-0.1	-0.5	-0.3
	UPSCALE	154.2	153.3	-0.2	153.1	-0.2	-0.1
SO2	ZERO	-	-	-	-	-	-
	UPSCALE	-	-	-	-	-	-
NOX	ZERO	2.5	3.8	0.1	5.0	0.2	0.1
	UPSCALE	906.4	913.2	0.7	931.8	2.5	1.9

SYSTEM CAL BIAS = (SYS CAL RESPON - ANALYZER RESPON)/SPAN * 100 (5%)
DRIFT = (FNL SYS CAL RESPON - INTL SYS CAL RESPON)/SPAN * 100 (3%)

	O2	CO2	CO	SO2	NOx
RAW	12.59	6.00	87.80		668.70
CAL CORR	13.26	6.07	87.94		652.65
~~POUND PER MILLION BTU~~ gms/BHP-HR			0.49		6.01
POUND PER HOUR			5.40		65.95
PLANT					
POUND PER MILLION BTU					
POUND PER HOUR					

THC gms/BHP-HR = 0.15

South Florida Environmental Services

SYSTEM CALIBRATION DATA SHEET

CLIENT: FKEC TIME: 1635 to 1735

PLANT: Marathon DATE: 12/17/97

LOCATION: Unit #8 RUN #: 2

	O2	CO2	CO	SO2	NOx
SPAN:	%	%	PPM	PPM	PPM

GAS		ANALYZER CAL RESPONSE	INITIAL SYSTEM CAL RESPON	INITIAL SYSTEM BIAS %SPAN	FINAL SYSTEM CAL RESPON	FINAL SYSTEM BIAS %SPAN	DRIFT
O2	ZERO	0.0	0.0	0.0	0.0	0.0	0.0
	UPSCALE	12.2	12.1	-0.4	12.3	0.4	0.8
CO2	ZERO	0.0	0.1	0.5	0.2	1.0	0.5
	UPSCALE	10.4	10.3	-0.5	10.3	-0.5	0.0
CO	ZERO	2.2	-0.1	-0.5	1.1	-0.2	0.2
	UPSCALE	154.2	153.1	-0.2	153.8	-0.1	0.1
SO2	ZERO	—	—				
	UPSCALE	—	—				
NOX	ZERO	2.5	5.0	0.2	2.4	-0.1	-0.2
	UPSCALE	906.4	931.8	2.5	926.3	2.0	-0.6

SYSTEM CAL BIAS = (SYS CAL RESPON - ANALYZER RESPON)/SPAN * 100 (5%)
DRIFT = (FNL SYS CAL RESPON - INTL SYS CAL RESPON)/SPAN * 100 (3%)

	O2	CO2	CO	SO2	NOx
RAW	13.24	6.01	86.61		667.23
CAL CORR	13.35	6.00	86.70		646.75
~~POUND PER MILLION BTU~~ gms/BHP-HR					
POUND PER HOUR					66.09
PLANT					
POUND PER MILLION BTU					
POUND PER HOUR					

South Florida Environmental Services

SYSTEM CALIBRATION DATA SHEET

CLIENT: FKEC TIME: 1800 to 1900

PLANT: Marathon DATE: 12/17/97

LOCATION: Unit #8 RUN #: 3

SPAN: O2 ____ % CO2 ____ % CO ____ PPM SO2 ____ PPM NOx ____ PPM

GAS	ANALYZER CAL RESPONSE	INITIAL SYSTEM CAL RESPON	INITIAL SYSTEM BIAS %SPAN	FINAL SYSTEM CAL RESPON	FINAL SYSTEM BIAS %SPAN	DRIFT
O2 ZERO	0.0	0.0	0.0	0.0	0.0	0.0
O2 UPSCALE	12.2	12.3	0.4	12.3	0.4	0.0
CO2 ZERO	0.0	0.2	1.0	0.2	1.0	0.0
CO2 UPSCALE	10.4	10.3	-0.5	10.3	-0.5	0.0
CO ZERO	2.2	1.1	-0.2	3.5	0.3	0.5
CO UPSCALE	154.2	153.8	-0.1	155.8	0.3	0.4
SO2 ZERO	-	-	-	-	-	-
SO2 UPSCALE	-	-	-	-	-	-
NOX ZERO	2.5	2.4	-0.1	2.4	-0.1	0.0
NOX UPSCALE	906.4	926.3	2.0	912.6	0.6	-1.4

SYSTEM CAL BIAS = (SYS CAL RESPON - ANALYZER RESPON)/SPAN * 100 (5%)
DRIFT = (FNL SYS CAL RESPON - INTL SYS CAL RESPON)/SPAN * 100 (3%)

	O2	CO2	CO	SO2	NOx
RAW	13.26	6.05	87.98		659.55
CAL CORR	13.26	6.02	86.52		648.80
~~POUND PER MILLION BTU~~ gms/BHP HR			~~5.93~~		5.93
POUND PER HOUR			~~65.10~~		65.10
PLANT					
POUND PER MILLION BTU					
POUND PER HOUR					

South Florida Environmental Services

EPA METHOD 25A FIELD DATA SHEET

ANALYZER ERROR DATA

LOCATION: FKEC

DATE: 12/17/97

INSTRUMENT: K555 RANGE: 0 TO 100

GAS	CALIBRATION CYLINDER VALUE (PPM)	ANALYZER RESPONSE (PPM)	ANALYZER ERROR
ZERO	0.0	0.3	0.3
LOW	30.2	30.9	0.7
MID	50.6	51.6	1.0
HIGH	86.1	86.9	0.8

$$\text{ANALYZER CALIBRATION ERROR} = \frac{\text{CYLINDER VALUE} - \text{ANALYZER RESPONSE}}{\text{CYLINDER VALUE}} \times 100$$

South Florida Environmental Services

EPA METHOD 25A FIELD DATA SHEET

SYSTEM DRIFT DATA

LOCATION: EKEC RUN #: 1-3

DATE: 10/17/97 RUN TIME: SEE TO CEM SYS CAL

INSTRUMENT: K55 RANGE: 0 TO 100

		INITIAL		FINAL			
GAS	ANALYZER CAL RESPONSE	SYSTEM CAL RESPONSE	SYSTEM BIAS % SPAN	SYSTEM CAL RESPONSE	SYSTEM BIAS % SPAN	SYSTEM DRIFT	
ZERO	0.3	0.1	-0.2	0.6	0.3	0.5	48.36
SPAN	30.9	30.8	-0.1	30.9	0.0	0.1	
ZERO	0.3	0.6	0.3	0.3	0.0	-0.3	42.62
SPAN	30.9	30.9	0.0	30.7	-0.2	-0.2	
ZERO	0.3	0.3	0.0	0.1	-0.2	-0.2	47.10
SPAN	30.9	30.7	-0.2	30.7	-0.2	0.0	

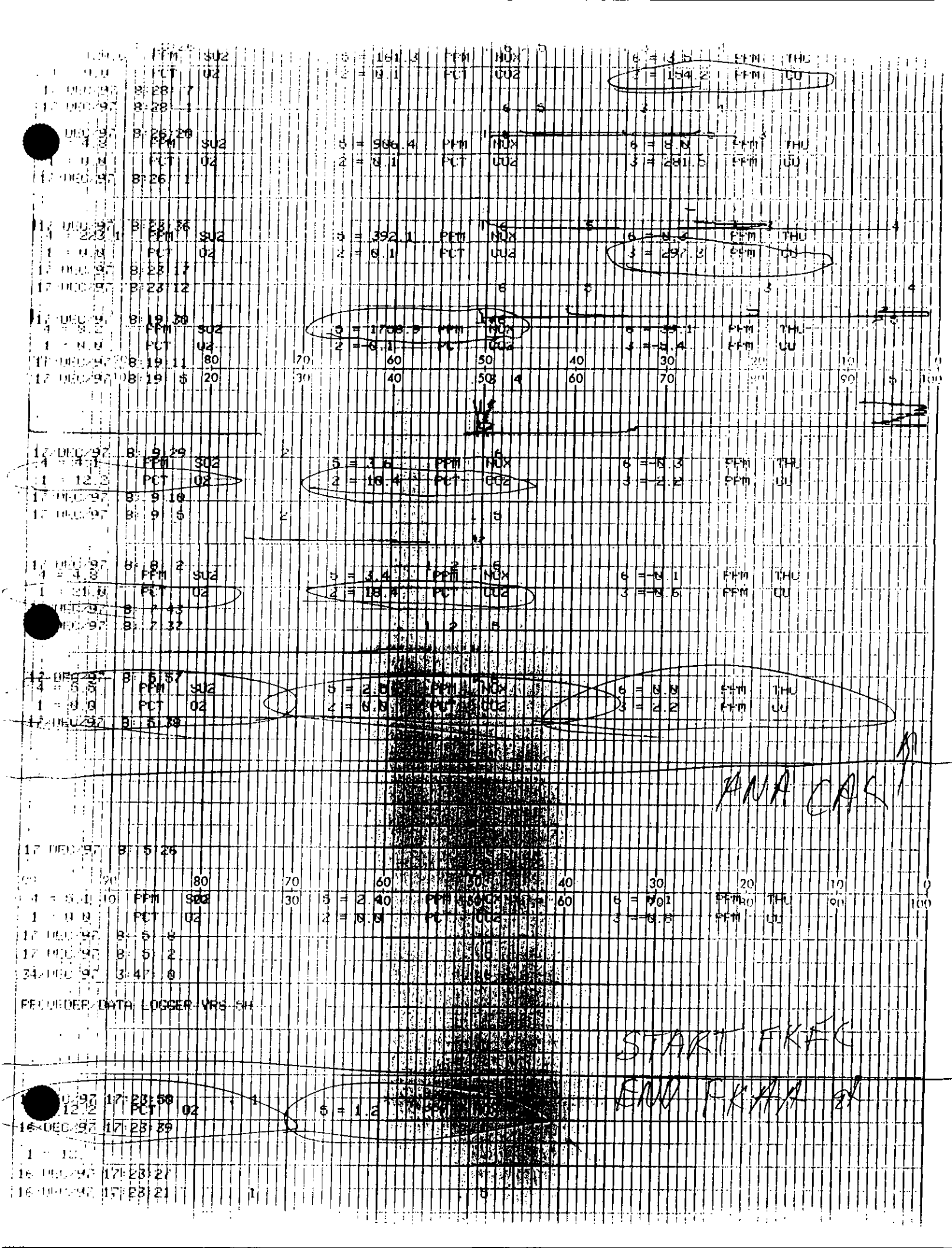
$$\text{SYSTEM BIAS} = \frac{\text{SYSTEM RESPONSE} - \text{ANALYZER RESPONSE}}{\text{SPAN}} \times 100$$

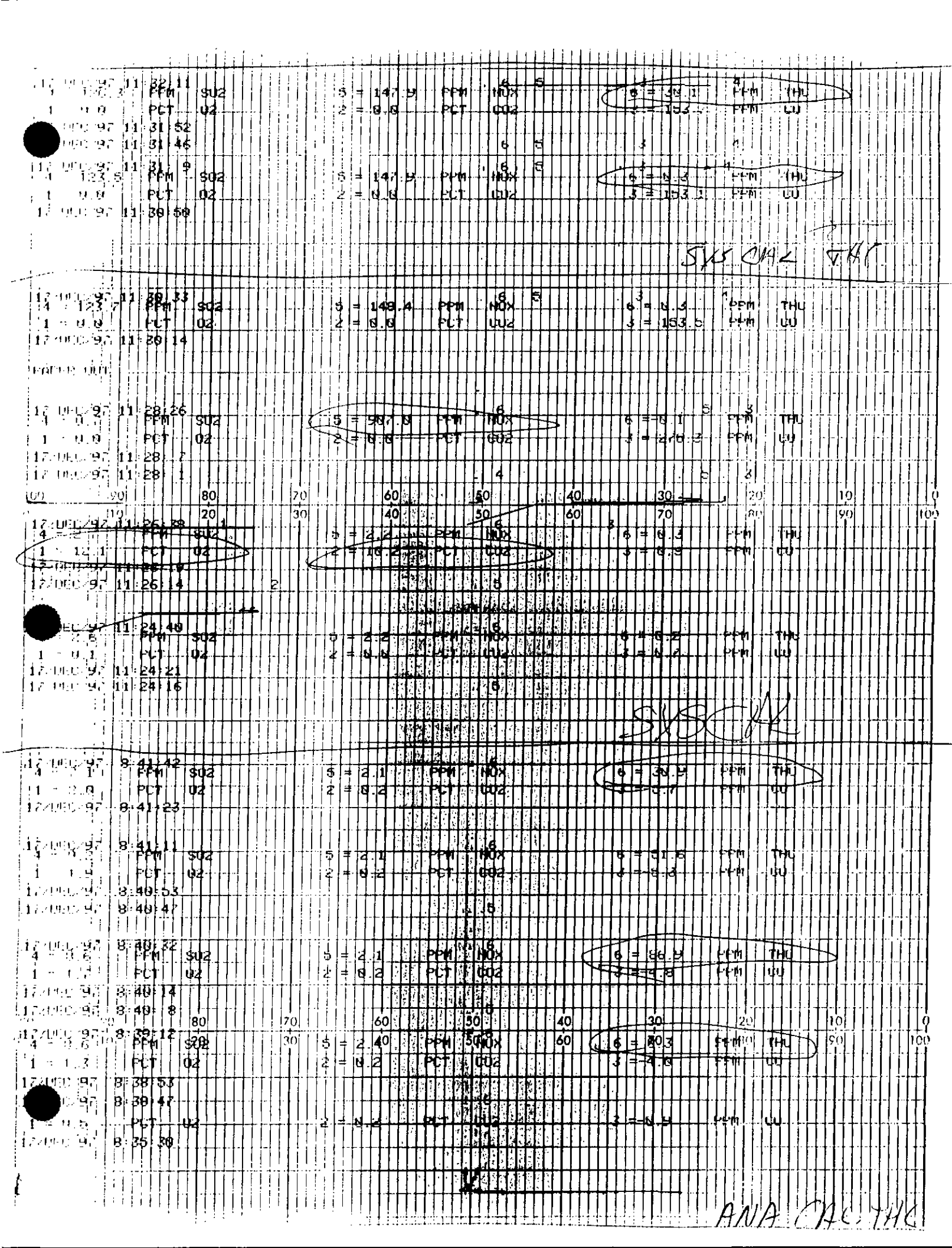
$$\text{SYSTEM DRIFT} = \frac{\text{SYSTEM RESPONSE IN.} - \text{SYSTEM RESPONSE OUT.}}{\text{SPAN}} \times 100$$

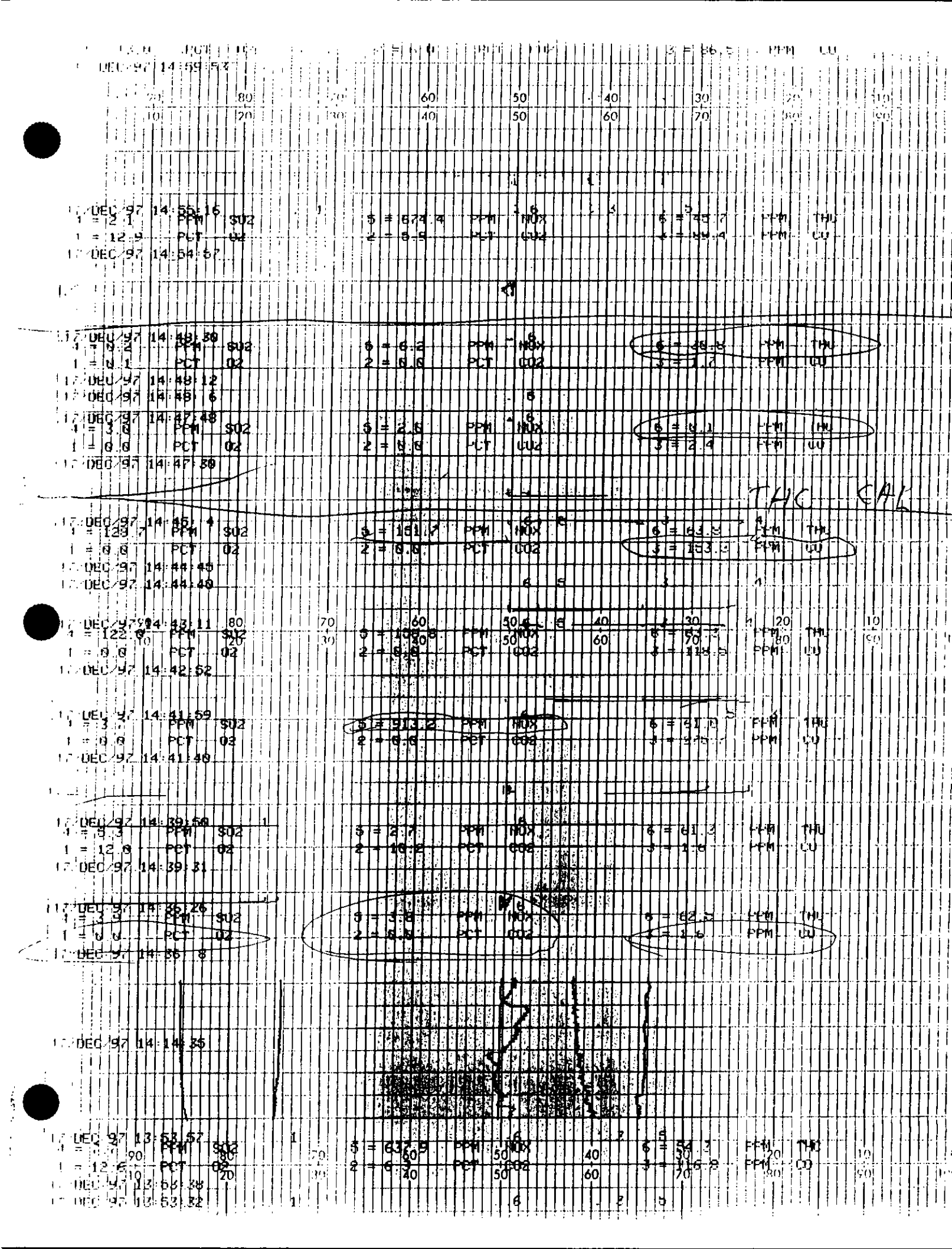
South Florida Environmental Services

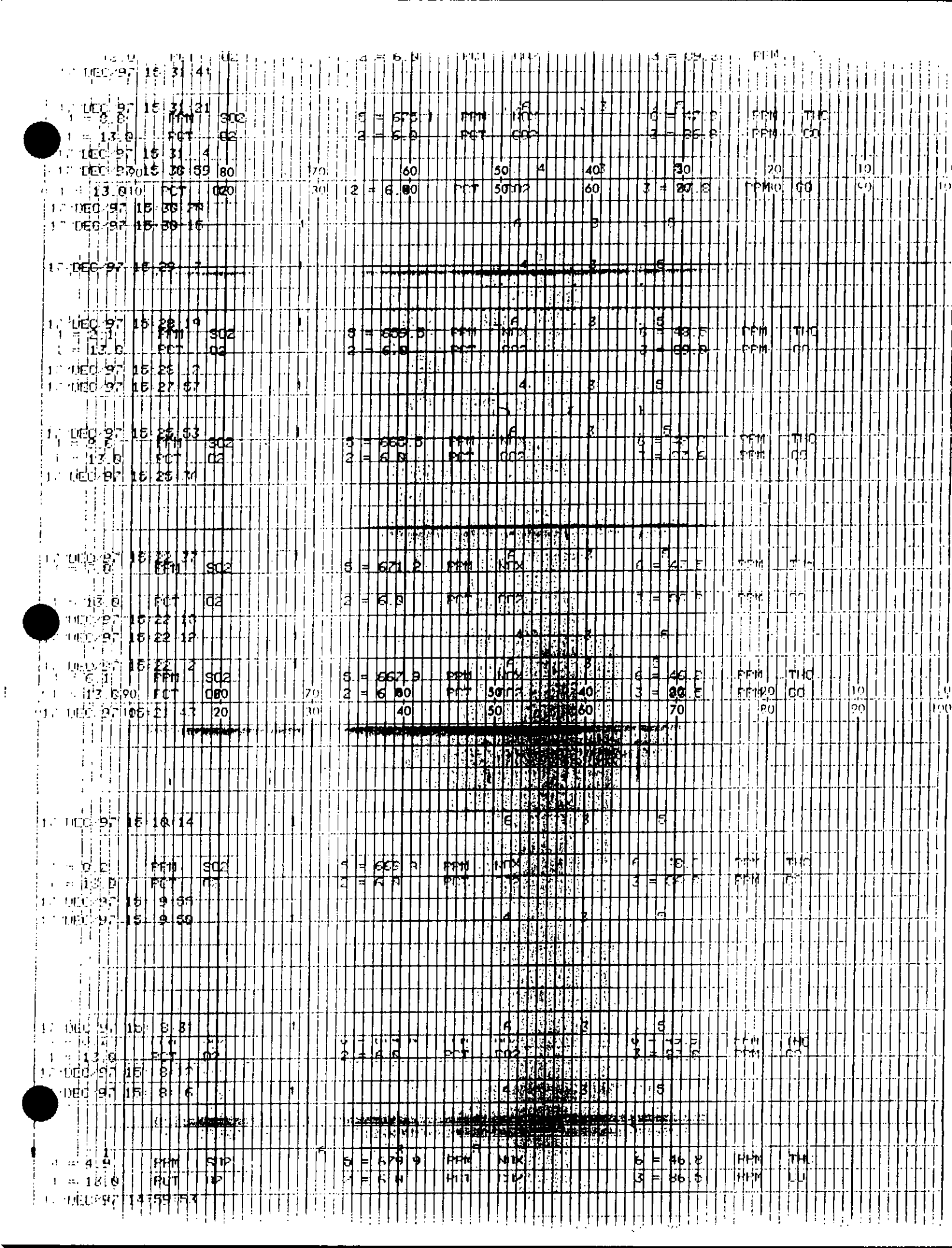
APPENDIX E

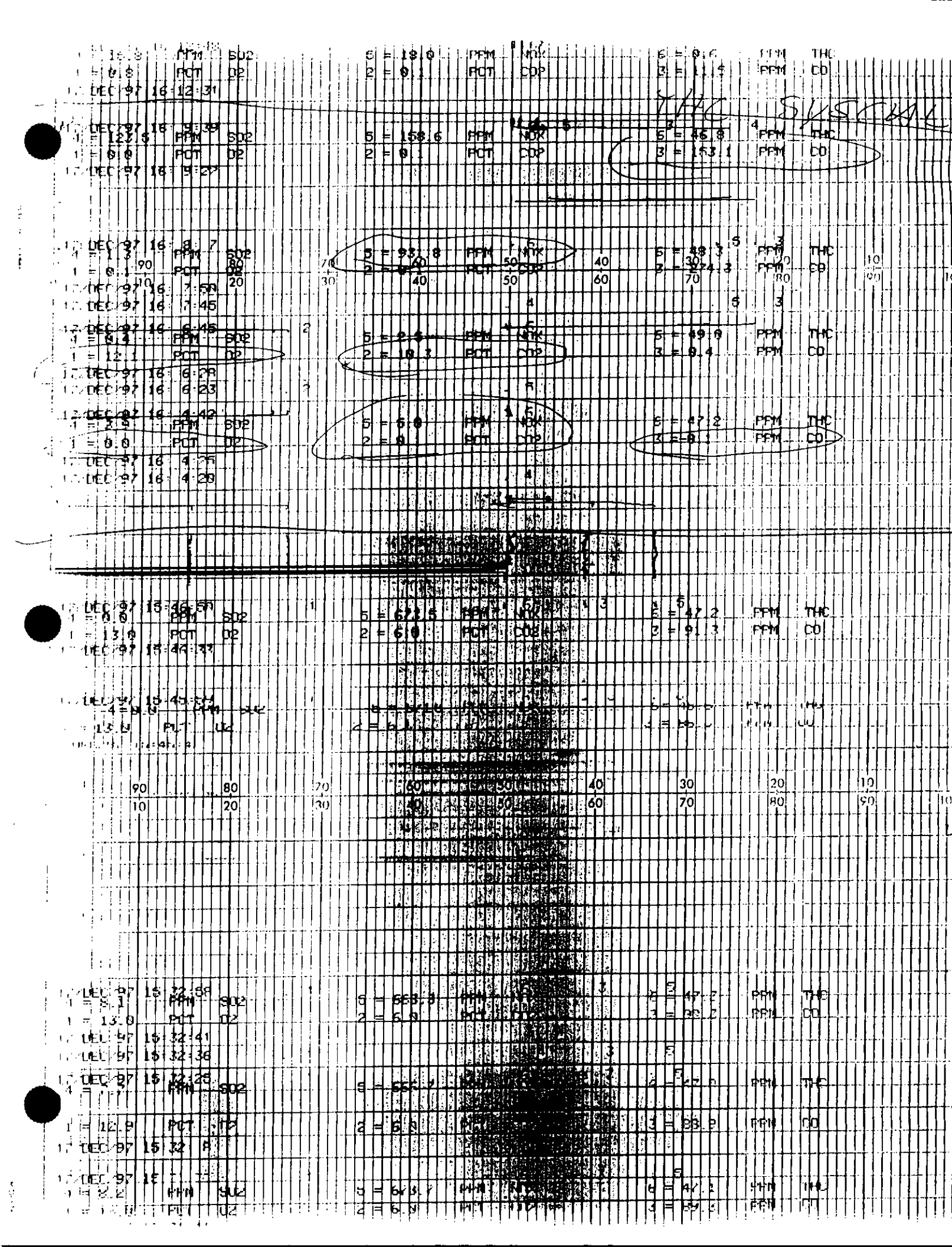
STRIP CHARTS

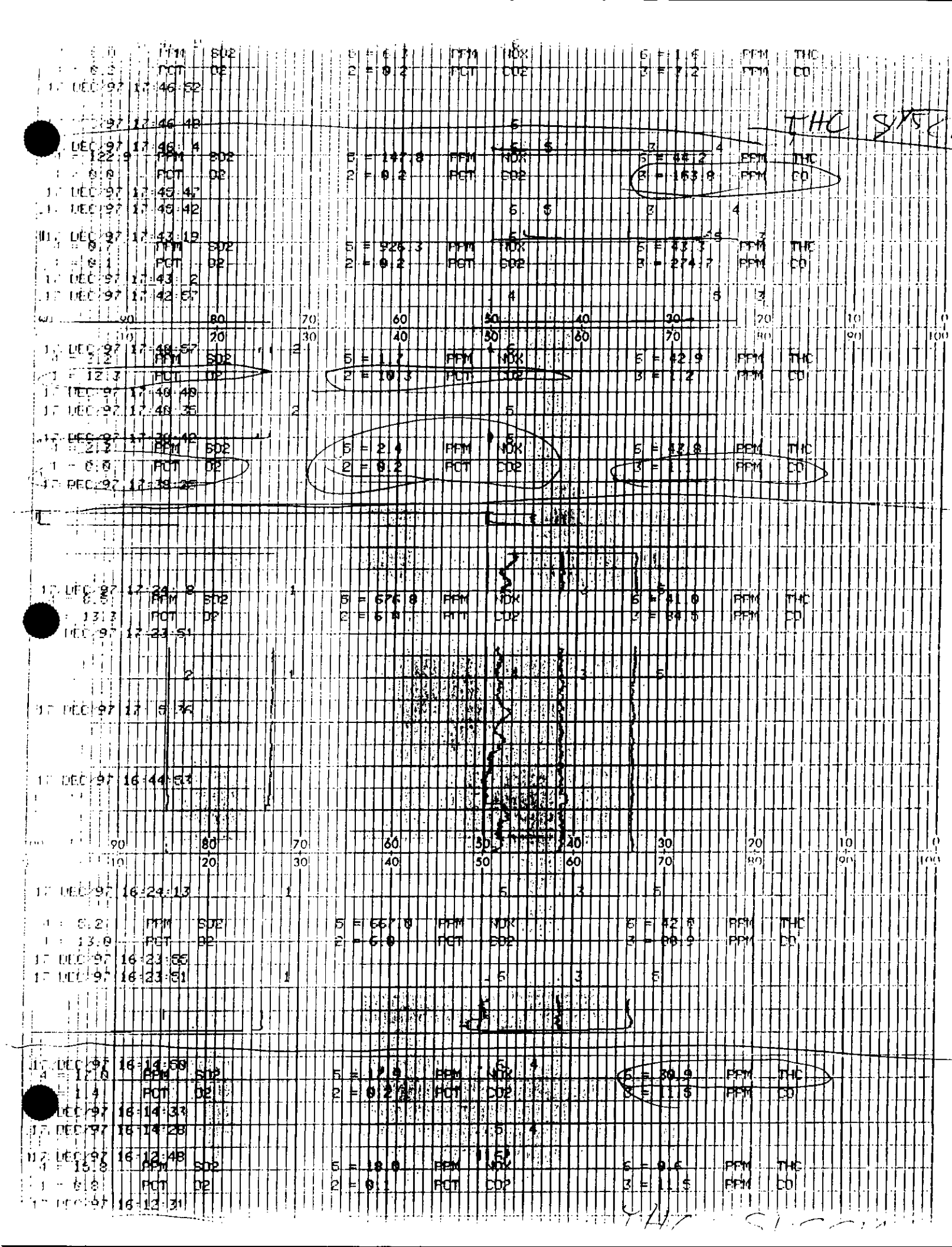

ANA CAL
START FKH
END FKH

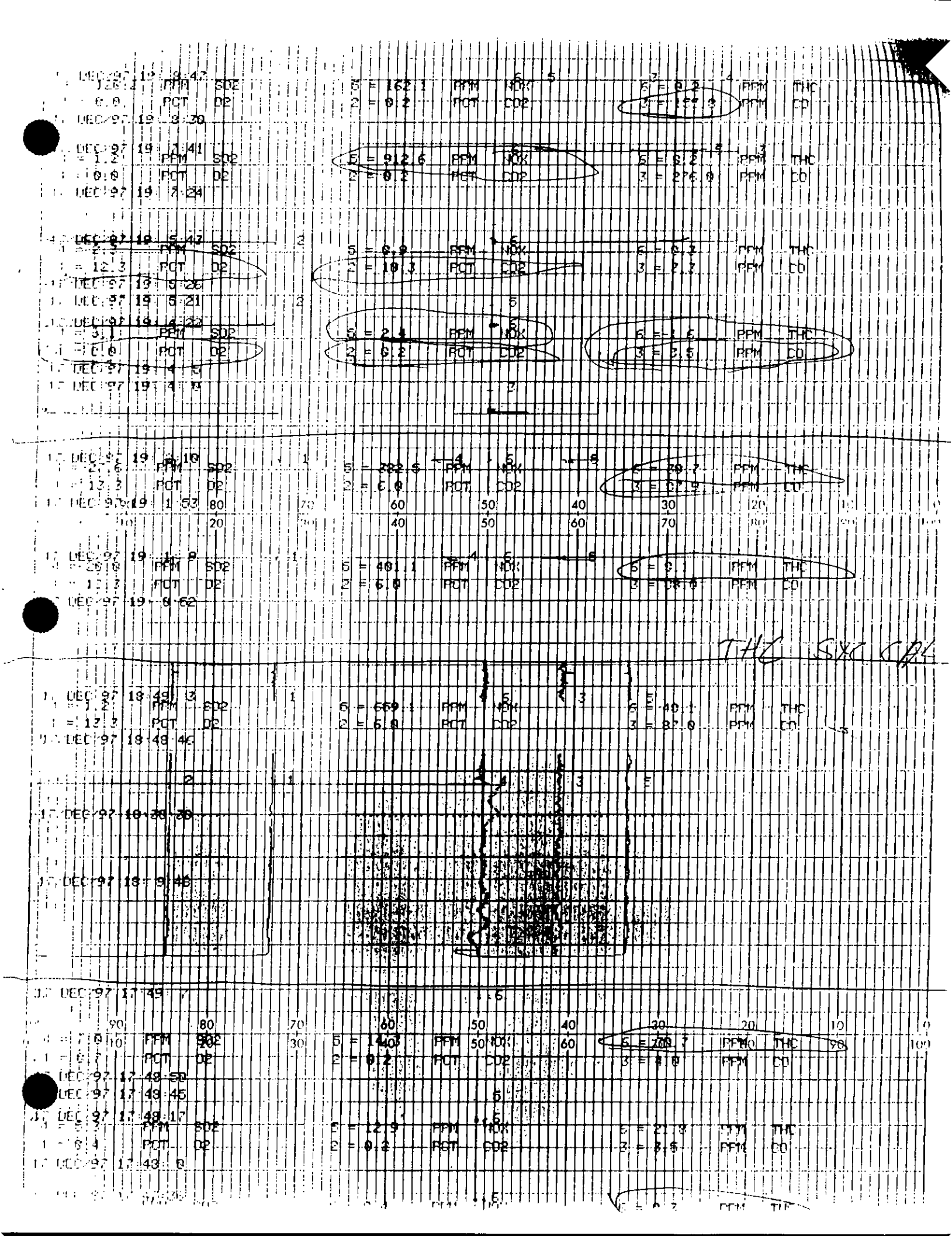



DEC 97 14:55:16
1 = 2.1 PPM SO2
1 = 12.9 PCT O2
DEC 97 14:54:57
DEC 97 14:49:30
1 = 0.4 PPM SO2
1 = 0.1 PCT O2
DEC 97 14:48:12
DEC 97 14:48:6
DEC 97 14:47:48
1 = 3.6 PPM SO2
1 = 0.0 PCT O2
DEC 97 14:47:30
DEC 97 14:45:4
1 = 129.7 PPM SO2
1 = 0.0 PCT O2
DEC 97 14:44:45
DEC 97 14:44:40
DEC 97 14:43:11
1 = 122.0 PPM SO2
1 = 0.0 PCT O2
DEC 97 14:42:52
DEC 97 14:41:59
1 = 3.0 PPM SO2
1 = 0.0 PCT O2
DEC 97 14:41:40
DEC 97 14:39:50
1 = 3.3 PPM SO2
1 = 12.0 PCT O2
DEC 97 14:39:31
DEC 97 14:36:26
1 = 3.0 PPM SO2
1 = 0.0 PCT O2
DEC 97 14:36:8
DEC 97 14:14:35
DEC 97 13:53:57
1 = 3.7 PPM SO2
1 = 12.6 PCT O2
DEC 97 13:53:38
DEC 97 13:53:32
5 = 674.4 PPM NOX
2 = 5.5 PCT CO2
6 = 45.7 PPM THC
4 = 89.4 PPM CO
5 = 6.2 PPM NOX
2 = 0.6 PCT CO2
6 = 48.6 PPM THC
3 = 1.0 PPM CO
5 = 2.6 PPM NOX
2 = 0.6 PCT CO2
6 = 0.1 PPM THC
3 = 2.4 PPM CO
THC CAL
5 = 161.7 PPM NOX
2 = 0.0 PCT CO2
6 = 63.8 PPM THC
3 = 183.5 PPM CO
5 = 100.8 PPM NOX
2 = 0.0 PCT CO2
6 = 64.2 PPM THC
3 = 118.5 PPM CO
5 = 913.2 PPM NOX
2 = 0.0 PCT CO2
6 = 61.0 PPM THC
3 = 2.5 PPM CO
5 = 2.7 PPM NOX
2 = 10.2 PCT CO2
6 = 61.3 PPM THC
3 = 1.6 PPM CO
5 = 3.8 PPM NOX
2 = 0.5 PCT CO2
6 = 62.2 PPM THC
3 = 1.6 PPM CO
5 = 637.9 PPM NOX
2 = 6.3 PCT CO2
6 = 54.3 PPM THC
3 = 116.8 PPM CO






THC SPEC



APPENDIX F

NOMENCLATURE

NOMENCLATURE

%DRE	= percent destruction/removal efficiency
% ISO	= percent isokinetic sampling rate
$\%CO_2$	= percent carbon dioxide by volume (dry)
$\%H_2O$	= percent moisture
$\%N_2$	= percent nitrogen by volume (dry)
$\%O_2$	= percent oxygen by volume (dry)
µg	= micrograms
$\Delta H_@$	= pressure drop across orifice of meter for 0.75 CFM at standard conditions
ΔP_{avg}	= average velocity pressure
A_n	= sampling nozzle cross-sectional area (ft2)
Ar	= acetone residue - result of blank evaporation
A_s	= stack cross sectional area (ft2)
B_{wo}	= moisture content of stack gas; expressed as a decimal
C	= final emissions data reported by CEMs, adjusted for calibration drift
C'	= raw emissions data reported by the CEMs, uncorrected for calibration drift.
Cm	= average CEM response to initial and final span gas system calibration
Co	= average CEM response to initial and final zero gas system calibration
C_p	= pitot tube coefficient
C_s	= concentration in stack gas in pounds per standard cubic foot
$C_{s'}$	= concentration in stack gas in grains per standard cubic foot
C_{s12}	= concentration corrected to 12 percent CO_2
D_e	= equivalent diameter of rectangular stack
D_n	= nozzle diameter in inches
D_s	= stack inside diameter in feet
Delta H(abs)	= the meter orifice differential, absolute conditions in inches of mercury
Delta H	= the meter orifice differential
dgm	= dry gas meter
Dry Gas In	= temperature of the dgm inlet in degrees Fahrenheit
Dry Gas Out	= temperature of the dgm outlet in degrees Fahrenheit
F factor	= a factor representing a ratio of the volume of dry flue gases generated to the calorific value of the fuel combusted
F_c	= a factor representing a ratio of the volume of carbon dioxide generated to the calorific value of the fuel combusted
Fw	= a F factor on a wet basis
dscf	= dry standard cubic foot
dscfh	= dry standard cubic foot per hour
dscfm	= dry standard cubic foot per minute
E	= emission rate in pounds per million Btu

NOMENCLATURE (cont.)

End Meter	= the dgm reading in cubic feet at the end of the sampling period
F_d	= F-factor dry standard cubic feet per million Btu at zero percent oxygen and at 68
FID	= flame ionization detection
F_o	= EPA method 3 fuel factor
fps	= feet per second
GC	= gas chromatograph
GC/MS	= gas chromatograph/mass spectrograph
gr	= grain of particulate; 1 lb. = 7000 grains
gr/dscf	= grains per dry standard cubic foot
gr@12%	= grains per dry standard cubic foot corrected to 12 percent oxygen
gr@7%	= grains per dry standard cubic foot corrected to 7 percent oxygen
Hg	= mercury
int/i	= initial
IN	= inches
Int Meter	= the dgm reading in cubic feet at the beginning of the test period
K	= degrees Kelvin
PIT Coeff	= pitot tube coefficient
lb/SCF	= pounds per standard cubic foot
lb/hr	= pounds per hour
lb/MMBtu	= pounds per million Btu
Cma	= concentration of the calibration gases
M_d	= dry molecular weight of flue gas
mg	= milligrams
mg/DSCM	= milligrams per dry standard cubic meter
ml	= milliliters
MM5	= modified EPA method 5
MMBtu/hr	= million Btu per hour
M_s	= molecular weight of flue gas, wet basis
Md	= molecular weight of flue gas, dry basis
ng	= nanograms
NMHC	= non-methane hydrocarbons
Θ	= net run time in minutes
^oC	= degrees Celsius
^oF	= degrees Fahrenheit
^oR	= degrees Rankine
P bar	= barometric pressure in inches of mercury
P stk	= pressure of the stack in inches of water
P_{abs}	= absolute pressure

NOMENCLATURE (cont.)

ppm_{vd}	= parts per million by volume, dry
P_s	= flue gas static pressure in absolute pressure
P_{std}	= standard absolute pressure at 29.92 inches of mercury
Qa	= volumetric air flow rate actual cubic feet per minute
Q_s	= volumetric air flow rate dry standard cubic feet per minute
rh	= relative humidity
scf	= standard cubic feet
scfm	= standard cubic feet per minute
T_m	= dry gas meter temperature in degrees Fahrenheit
T_s	= flue gas temperature in degrees Fahrenheit
t_{std}	= standard temperature in degrees Fahrenheit
T_{std}	= standard absolute temperature
THC	= total hydrocarbons
V	= volume
V_I	= total volume of liquid collected in impingers and silica gel
V_m	= volume of metered gas sampled in cubic feet
$V_{m\ std}$	= volume of metered gas sample at dry standard conditions in dry standard cubic feet
VOC	= volatile organic compounds
VS	= average flue gas velocity in feet per second
$V_{w\ std}$	= volume of water vapor in cubic feet
wscfm	= wet standard cubic feet per minute
Y	= dry gas meter calibration factor

APPENDIX G

FACILITY OPERATING DATA

CALCULATIONS USE SAE J1349 STANDARD CONDITIONS: AIR IN=77°F FUEL IN=104°F BAROM=29.60"Hg FUEL S.G.=.850							
DATE: 12-17-97	INLET AIR - F	BAROM - "HG	AIRWET - P.S.I.	FUEL-lbs/hr	BHP-obs	RPM	AIRDRY-kpa
SAE J1349							
EMISS. TEST # 1	70	30.4892449	0.21	1742.82927	4981.3166	900	101.758144
Includes Power Factor>>>>>>>>>>>		Gen-obs MW					
		3.58					
		3.59		Site Performance observations			
BAROMETER-millibars		3.59		NOx - ppm>	652.65		
1017		3.59		%R. Humidity>	55		
		3.58		Air Temp-F>	70		
Start 3:00 PM (15:00)		3.59		Fuel temp-F>	97		
Stop 4:00 PM (16:00)		3.58		Barometer>	30.489		
6.01 gm NOx/BHP-hr		3.59		Fuel rate-obs>	1742.8	<<<Lbs./hour	
133 deg. F airbox		3.58		Fuel S.G.>	0.8633		
2.1 in. water exh. backpressure		3.59		Eng BHP-obs>	4981.3		
STD. DEVIATION>>>>>>>>>>>>>		0.004898979					
TEST at ESI-Florida Keys Electr.			100% of RATED LOAD - TEST POINT				
			0.965	<<<<Key in Generator efficiency (used in column 'L' c			
6 deg. ATDC timing		FLOWDATA METERS USED AS FUEL DATA INPUT					
EDPS #218 PERFORMANCE CALCULATIONS per Tim Paulson -EMD PM&I Engineering							
CALCULATIONS USE EMD STANDARD CONDITIONS: AIR IN=60°F FUEL IN=60°F BAROM=29.92"Hg FUEL S.G.=.845							
O#963612E1	20G4B	ENG. S/N	TURBO S/N			900 RPM	P/N 5235595 INJECTORS
BAROMETER	INLET AIR	INLET FUEL	FUEL S.G.	FUEL RATE	OBS. K.W.	B.H.P.-corr.	B.S.F.C.-corr.
IN. Hg.	DEG. F	Flowmeter DEG. F		LBS-OBSERVED	at GEN.	AIRBOX DRAINS CLOSE	
30.4892449	70	97	0.863	1743	3586	5009	0.3500
DATE: 12-17-97		TIME: 16:00:00	.8633 S.G.-spec.	Flowdata	KW-corr.>>>	3736	AIRBOX P.S.I = 25.0
AVG. GPH/meter>>	242.43	TURBO P/N				EMD-gm/KWH >>>>	212.82
Test Time Period>>	1:00						
92.1		7.189	<<Key in Fuel weight per gallon at correct Fuel Specific Gravity				

CALCULATIONS USE SAE J1349 STANDARD CONDITIONS: AIR IN=77°F FUEL IN=104°F BAROM=29.60"Hg FUEL S.G.=.850

DATE: 12-17-97	INLET AIR - F	BAROM - "HG	AIRWET - P.S.I.	FUEL-lbs/hr	BHP-obs	RPM	AIRDRY-kpa
SAE J1349							
EMISS. TEST # 2	70	30.4892449	0.21	1741.67903	4988.2621	900	101.758144
Includes Power Factor>>>>>>>>>>>>		Gen-obs MW					
		3.59					
		3.59					
BAROMETER-millibars		3.58					
1017		3.59					
		3.59					
Start 4:35 PM (16:35)		3.59					
Stop 5:35 PM (17:35)		3.6					
		3.59					
135 deg. F airbox		3.6					
1.9 in. water exh. backpressure		3.59					
STD. DEVIATION>>>>>>>>>>>>>		0.005385165					

Site Performance observations			Sep. Aftrcool stats.
NOx - ppm>	646.79		LB pre A/C duct = 274 F
%R. Humidity>	55		LB A/C water in = 72 F
Air Temp-F>	70		LB post A/C duct = 98 F
Fuel temp-F>	97		LB A/C water out = 82 F
Barometer>	30.489		RB pre A/C duct = 266 F
Fuel rate-obs>	1741.7	<<<Lbs./hour	RB A/C water in = 70 F
Fuel S.G.>	0.8633		RB post A/C duct = 93 F
Eng BHP-obs>	4988.3		RB A/C water out = 83 F

TEST at ESI-Florida Keys Electr. **100% of RATED LOAD - TEST POINT**

0.965 <<<<Key in Generator efficiency (used in column 'L' c

6 deg. ATDC timing **FLOWDATA METERS USED AS FUEL DATA INPUT**

EDPS #218 PERFORMANCE CALCULATIONS per Tim Paulson -EMD PM&I Engineering

CALCULATIONS USE EMD STANDARD CONDITIONS: AIR IN=60°F FUEL IN=60°F BAROM=29.92"Hg FUEL S.G.=.845

O#963612E1	20G4B	ENG. S/N	TURBO S/N			900 RPM	P/N 5235595 INJECTORS
BAROMETER	INLET AIR	INLET FUEL	FUEL S.G.	FUEL RATE	OBS. K.W.	B.H.P.-corr.	B.S.F.C.-corr.
IN. Hg.	DEG. F	Flowmeter DEG. F		LBS-OBSERVED	at GEN.	AIRBOX DRAINS CLOSE	
30.4892449	70	97	0.863	1742	3591	5016	0.3493
DATE: 12-17-97		TIME: 17:35:00	.8633 S.G.-spec.	Flowdata	KW-corr.>>>	3742	AIRBOX P.S.I = 26.1
AVG. GPH/meter>>	242.27	TURBO P/N				EMD-gm/KWH >>>>	212.39
Test Time Period>>	1:00						
93.1		7.189	<<Key in Fuel weight per gallon at correct Fuel Specific Gravity				

CALCULATIONS USE SAE J1349 STANDARD CONDITIONS: AIR IN=77°F FUEL IN=104°F BAROM=29.60"Hg FUEL S.G.=.850							
DATE: 12-17-97	INLET AIR - F	BAROM - "HG	AIRWET - P.S.I.	FUEL-lbs/hr	BHP-obs	RPM	AIRDRY-kpa
SAE J1349							
EMISS. TEST # 3	70	30.4892449	0.21	1735.92783	4982.7057	900	101.758144
Includes Power Factor>>>>>>>>>>>>		Gen-obs MW					
		3.58					
		3.57		Site Performance observations			Sep. Aftrcool stats.
BAROMETER-millibars		3.59		NOx - ppm>	648.8		LB pre A/C duct = 275 F
1017		3.59		%R. Humidity>	55		LB A/C water in = 72 F
		3.59		Air Temp-F>	70		LB post A/C duct = 97 F
Start 6:00 PM (18:00)		3.59		Fuel temp-F>	97		LB A/C water out = 82 F
Stop 7:00 PM (19:00)		3.59		Barometer>	30.489		RB pre A/C duct = 267 F
5.93 gm NOx/BHP-hr		3.59		Fuel rate-obs>	1735.9	<<<Lbs./hour	RB A/C water in = 70 F
131 deg. F airbox		3.59		Fuel S.G.>	0.8633		RB post A/C duct = 66 F
2.0 in. water exh. backpressure		3.59		Eng BHP-obs>	4982.7		RB A/C water out = 62 F
STD. DEVIATION>>>>>>>>>>>>>		0.006403124					
TEST at ESI-Florida Keys Electr.			**100% of RATED LOAD - TEST POINT**				
			0.965	<<<<Key in Generator efficiency (used in column 'L' c			
6 deg. ATDC timing			**FLOWDATA METERS USED AS FUEL DATA INPUT**				
EDPS #218 PERFORMANCE CALCULATIONS per Tim Paulson -EMD PM&I Engineering							
CALCULATIONS USE EMD STANDARD CONDITIONS: AIR IN=60°F FUEL IN=60°F BAROM=29.92"Hg FUEL S.G.=.845							
O#963612E1	20G4B	ENG. S/N	TURBO S/N			900 RPM	P/N 5235595 INJECTORS
BAROMETER	INLET AIR	INLET FUEL	FUEL S.G.	FUEL RATE	OBS. K.W.	B.H.P.-corr.	B.S.F.C.-corr.
IN. Hg.	DEG. F	Flowmeter DEG. F		LBS-OBSERVED	at GEN.		AIRBOX DRAINS CLOSE
30.4892449	70	97	0.863	1736	3587	5010	0.3485
DATE: 12-17-97		TIME: 19:00:00	.8633 S.G.-spec.	Flowdata	KW-corr.>>>	3738	AIRBOX P.S.I = 26.3
AVG. GPH/meter>>	241.47	TURBO P/N				EMD-gm/KWH >>>>	211.92
Test Time Period>>	1:00						
91.75		7.189	<<Key in Fuel weight per gallon at correct Fuel Specific Gravity				

FLORIDA KEYS ELECTRIC COOPERATIVE ASSOCIATION, INC. - FKEC

91605 OVERSEAS HIGHWAY P.O. BOX 700377, TAVERNIER, FL 33070-0377 PHONE (305) 852-2431 FAX: (305) 852-4794

Mr. Clair Fancy
Chief
Bureau of Air Regulation
Dept. of Environmental Protection
Mail Station 5505
2600 Blairstone Rd.
Tallahassee, FL 32399-2400

RECEIVED

JAN 28 1998

BUREAU OF
AIR REGULATION

Re: PSD-FL-237. NOx emissions test result.

26 January 1998

Dear Mr. Fancy:

Enclosed are the results of the emissions compliance testing conducted on Florida Keys Electric Cooperative's Marathon Generating Plant Unit # 8 by South Florida Environmental Services. The engine passed all test parameters except for NOx, which was emitted at an average rate of 65.71 lbs/hr. FKEC's permitted limit for NOx is 62 lbs/hr. The 62 lbs/hr limit was based on theoretical calculations that I made over one year ago based on EPA emissions data (AP-42, which EPA acknowledges has limited value based on small sample sizes and variable operating conditions) and on manufacturer's estimates on fuel consumption and emissions rates (there were no units of this type and model running then so no real emissions data were available). Based on the data available to me at the time, I calculated that the uncontrolled NOx emissions of the EMD 20-710G4B would be 96.6 lbs/hr. Based on the manufacturer's claim of a 40% reduction in NOx emissions with the emissions reduction package that FKEC had ordered, I further reduced my emissions calculation by 36% (taking what I thought was a conservative approach) resulting in the projected 62 lbs/hr NOx emission rate.

In August 1997, FKEC's vendor informed us that the lowest feasible NOx emission rate would be 71 lbs/hr. I immediately contacted your office for guidance on how to change the hourly limit proposed in our draft permit which was at that time undergoing the public notice period. During August 1997, I had several conversations with David Knowles, Syed Arif and Al Linero of your Ft. Myers and Tallahassee offices. We were advised that we could write a "comment letter" on the draft permit and ask that the NOx hourly limit be increased to 71 lbs/hr. Doing that would have required further review by your office and another 30-day public notice period. FKEC did write a comment letter (copy enclosed for your reference), but elected not to send it because our construction schedule had no slack left for further delays. Instead, FKEC asked the vendor to strive for the best NOx emission rate possible under FKEC's specifications. The fact that the engine tested at an average NOx rate of 65.71 lbs/hr (significantly better than the

vendor thought feasible) demonstrates that our efforts to reduce NOx were successful, but we were striving for an unrealistic goal. The technician conducting the emissions tests commented that he had never tested a cleaner running engine.

Where does this leave us? FKEC has already accepted a 50% reduction in operating hours for Units 1-7 at the Marathon Generating Plant. FKEC is reluctant to accept further limits on operating hours. It should be noted that while Unit # 8 is currently allowed unlimited operating hours, in reality, no unit can operate 8760 hours per year. So while Unit # 8 cannot meet the hourly NOx limit of 62 lbs/hr, it will never exceed the current 271 tons/yr annual limit. Therefore, FKEC requests an increase in the hourly NOx limit to 68 lbs/hr for our operating permit for Unit # 8 and for our Title V air operating permit.

Thank you for your consideration and assistance.

Sincerely,

Deborah A. Shaw, Ph.D.
Environmental Affairs Coordinator

Enc:
1) Draft comment letter.
2) Final Test Report - So. Fla. Environmental Services

PC: without test report.
C.A. Russell, CEO/GM, FKEC
T.E. Planer, Supt. Transmission , FKEC
D.M. Knowles, Air Program Administrator, FDEP

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1) Draft comment letter.
2) Final Test Report - So. Fla. Environmental Services

PC: without test report.
C.A. Russell, CEO/GM, FKEC
T.E. Planer, Supt. Transmission , FKEC
D.M. Knowles, Air Program Administrator, FDEP

ENGINE SYSTEMS, INC.
P.O. Box 1928
1220 South Washington St.
Rocky Mount, NC 27802-1928
Telephone: 919/977-2720
Fax: 919/446-1136 or 919/446-3830

DOCUMENT TRANSMITTAL RECORD

To: Florida Keys Electric Cooperative
91605 Overseas Highway
Tavernier, FL 33070

Date: January 20, 1998

Ref. S/N: 51229C-O-0050

Attn: Tim Planer

Subject: Marathon Generating Plant - Diesel Generating Set
P.O. 961588
ESI Job No. 51229

Enclosed are the following:

Copies	Code	Drawing/Document No.	Sheet	Rev.	Title/Description
3	B	N/A	All	--	Final Test Report - Emissions Compliance Test Program - Florida Keys Electric Cooperative Marathon Facility

Code:

A	Submitted For Approval	F	Approved
B	Submitted For Information	G	Approved As Noted
C	Submitted For Comments	H	Revise and Resubmit
D	Final Drawings/Documents Enclosed	I	Not Approved
E	Issued For Construction	J	Return _____ Signed Copies

Remarks: _____

Signed: Wanda D. Davis
Wanda D. Davis - Contract Administrator

Copy To: R. Weeks
Doc. Control

South Florida Environmental Services

FINAL TEST REPORT

EMISSIONS COMPLIANCE TEST PROGRAM

FLORIDA KEYS ELECTRIC COOPERATIVE

MARATHON FACILITY

PREPARED FOR: Engine Systems, Inc.
1220 Washington Street
Rocky Mount, NC 27802-1928

CONCERNING: NO_x, CO, VOC and Opacity Compliance Testing
Emission Unit #8 3.58 MW Diesel Electric Generator
Florida Keys Electric Cooperative Association, Inc.
Marathon Facility
December 17, 1997

PREPARED BY: South Florida Environmental Services
6821 Vista Parkway North
West Palm Beach, Florida 33411
SFES #97-581

Ron C. Cook Jr.
Senior Project Director

1/16/98
Date

a Parkway North, West Palm Beach, FL 33411
687-5300 Fax: 407-687-3676

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APPENDICES

South Florida Environmental Services

1.0 COMPENDIUM

South Florida Environmental Services conducted an emissions compliance test program on behalf of Engine Systems, Inc. at Florida Keys Electric Cooperative Association, Inc. located in Marathon, Florida. The testing was conducted on the newly installed EMD generator set rated at 3.58 MW and took place on December 17, 1997.

The objective of the testing program was to determine the Compliance/Performance status of EMD diesel generator #8 with respect to oxides of nitrogen, carbon monoxide, total hydrocarbons and opacity limits. Set forth by the Florida, Department of Environmental Protection (FDEP) and Florida Keys Electric Cooperative.

All test methods and procedures were conducted in strict accordance with EPA Methods 3A, 7E, 9, 10 and 25A as found in the Federal Register (40CFR60), Appendix A. The approved test plan was adhered to throughout the program. All lb/MMBtu emission rates are based on the F-factor for oil in accordance with EPA Method 19.

The gaseous (CEM/VOC) sampling consisted of three 1-hour runs during the test program while the unit was operating at 100% of rated capacity. Finial results can be found in Table 1-1.

The opacity determination was an hour visible emissions run consisting of 240 readings, 4 readings per minute, from which the highest 6-minute average and maximum opacity values were obtained and reported as percent opacity. Finial results can be found in Table 1-2.

Ron C. Cook Jr. Senior Project Director, was responsible for all phases of the test program he was assisted by a team of qualified environmental professionals. Robin L. Weeks of Engine Systems, Inc. coordinated unit operation with testing. Tim Planner of Florida Keys Electric Cooperative was the company's representative.

1.0 COMPENDIUM (cont.)

The following tables summarize the results of the emissions testing program.

Table 1-1
Summary of Results
FKEC Emission Unit # 8
EMD Diesel Electric Generator

NOx

Run #	Time	BHP	NOx Gms/bhp-hr	NOx lb/hr	NOx Tons/yr
1	1500-1600	4981	6.01	65.95	288.86
2	1635-1735	4988	6.01	66.09	289.47
3	1800-1900	4983	5.93	65.10	285.14
Average			**5.98**	**65.71**	**287.82**

CO

Run #	Time	BHP	CO Gms/bhp-hr	CO lb/hr	CO Tons/yr
1	1500-1600	4981	.49	5.40	23.65
2	1635-1735	4988	.49	5.38	23.56
3	1800-1900	4983	.49	5.38	23.56
Average			**.49**	**5.39**	**23.59**

THC

Run #	Time	BHP	THC Gms/bhp-hr	THC lb/hr	THC Tons/yr
1	1500-1600	4981	.15	1.70	7.45
2	1635-1735	4988	.16	1.72	7.53
3	1800-1900	4983	.15	1.69	7.40
Average			**.15**	**1.70**	**7.46**

Note: Tons/yr were calculated using 8760 hours or continuous operation

Table 1-2
Visible Emission Results

Unit #	Length of Test	Highest 6 min. Average	Readings above 20%
EMD #8	60	5.0%	NONE

South Florida Environmental Services