Florida Gas Transmission Company

P.O. Box 945100, Maitland, Florida 32751 (407) 875-5800

March 19, 2001

CERTIFIED MAIL – RETURN RECEIPT

Mr. Clair H. Fancy, P.E.
Bureau of Air Regulation
Florida Department of Environmental Protection
Twin Towers Office Bldg.
2600 Blairstone
Tallahassee, FL 32399-2400

Reference: Facility: 0390029
Compressor Station No. 12, Santa Rosa County

Dear Mr. Fancy:

Subject: Application for Air Construction Permit

Florida Gas Transmission Company (FGT) is proposing to install a new Pignone PGT-10B 15,700 bhp compressor turbine, to upgrade an existing compressor turbine from 10,350 bhp to 13,000 bhp and to modify two existing 2,000 bhp reciprocating engines at the above referenced facility.

The facility is a major source under New Source Review definitions and the proposed new turbine and turbine modifications have associated NO_x emissions exceeding 40 tpy. The proposed modifications to the existing reciprocating engines will create reductions in NO_x emissions so that the net emissions do not exceed levels that are significant under Prevention of Significant Deterioration requirements. Therefore, a state only construction permit is required.

Enclosed is an Application with supporting documentation for an Air Construction Permit for the proposed modifications. FGT understands that no processing fee is required since this facility is operated under a Part 70 Permit.

If you have any questions or need additional information, please call me at (800) 381-1477.

Sincerely,

Jim Thompson
Project Manager, Environmental

CC: James Alexander, Phase V w/o attachments
Dan Pribble, w/o attachments
Frank Diemont
Clay Roesler
Jake Krautsch
Duane Pierce, AQMcs, LLC
Compressor Station No. 12

Florida Gas Transmission Company

Phase V Expansion Project

Compressor Station No. 12

APPLICATION
For
AIR CONSTRUCTION
PERMIT

March 2001

Prepared by AQMcs, LLC

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1.0 INTRODUCTION

Florida Gas Transmission Company (FGT), a Delaware Corporation and an ENRON/EL PASO affiliate of Houston, Texas, is proposing to expand its existing natural gas pipeline facility near Munson, in Santa Rosa County, Florida (Compressor Station No. 12). This proposed modification is part of FGT's Phase V Expansion Project, aimed at increasing the supply capacity of FGT's network servicing domestic suppliers, commercial, and industrial customers in Florida. The scope of work for the Phase V Expansion Project includes expansion through the addition of state-of-the-art compressor engines at eight existing compressor stations and the development of three new compressor stations and pipeline within the State of Florida. The basic project components include:

- Mainline loops, additions, and replacements;
- Lateral loops and additions;
- Meter station additions, modifications, and expansions;
- Regulator additions, modifications, and expansions; and
- Compressor station additions and modifications.

Compressor Station No. 12 is located in Santa Rosa County, Florida, north of Munson on Highway 191, approximately 5 miles north of Highway 4. Figure 1-1 shows the location of the existing compressor station.

The proposed expansion consists of the installation of a new 15,700 brake horsepower (bhp), natural gas-fired, turbine compressor engine and the upgrading of an existing turbine from 10,350 bhp to 13,000 bhp. The proposed new compressor turbine is a Pignone PGT10B equipped with dry low NO_X (oxides of nitrogen) combustion. The compressor turbine to be upgraded is a Solar Mars T-13000S equipped with dry low NO_X (oxides of nitrogen) combustion. The Solar Mars T-13000S unit is being constructed as part of FGT's Phase IV project. These compressor engines will be used solely for transporting natural gas by pipeline for distribution to markets in Florida.

Based on projected new annual emission rates, the proposed new sources would potentially constitute a significant modification at an existing major stationary source under Prevention of Significant Deterioration (PSD) regulations. However, FGT is also proposing to reduce the NO_x emissions from two existing 2,000 bhp reciprocating compressor engines by modifying the engine. Based on the projected net annual emission rate change, there will be no PSD significant increase in the emissions of any contaminant and a state only construction permit is required.

Engineering designs for the proposed expansion project include selection of an engine incorporating dry low NO_X combustion technology with NOx emissions at 25 ppmv. This dry low NO_X technology for control of NO_X emissions would represent Best Available Control Technology (BACT) for the proposed new gas turbine engine under PSD requirements.

This narrative contains four additional sections. Descriptions of the existing operation at FGT's Compressor Station No. 12, the proposed new turbine, the proposed upgraded turbine and the proposed reciprocating engine modifications are presented in Section 2.0. The air quality review requirements and applicability of state and federal regulations are discussed in Section 3.0. References are included in Section 4.0.

FDEP permit application forms are provided in Attachment A. Attachment B contains a plot plan of the facility. Attachment C contains vendor information, Attachment D contains emission calculations, and Attachment E contains a test report for the current emissions of the engines to be modified and a summary of a test of a similar unit that was modified.

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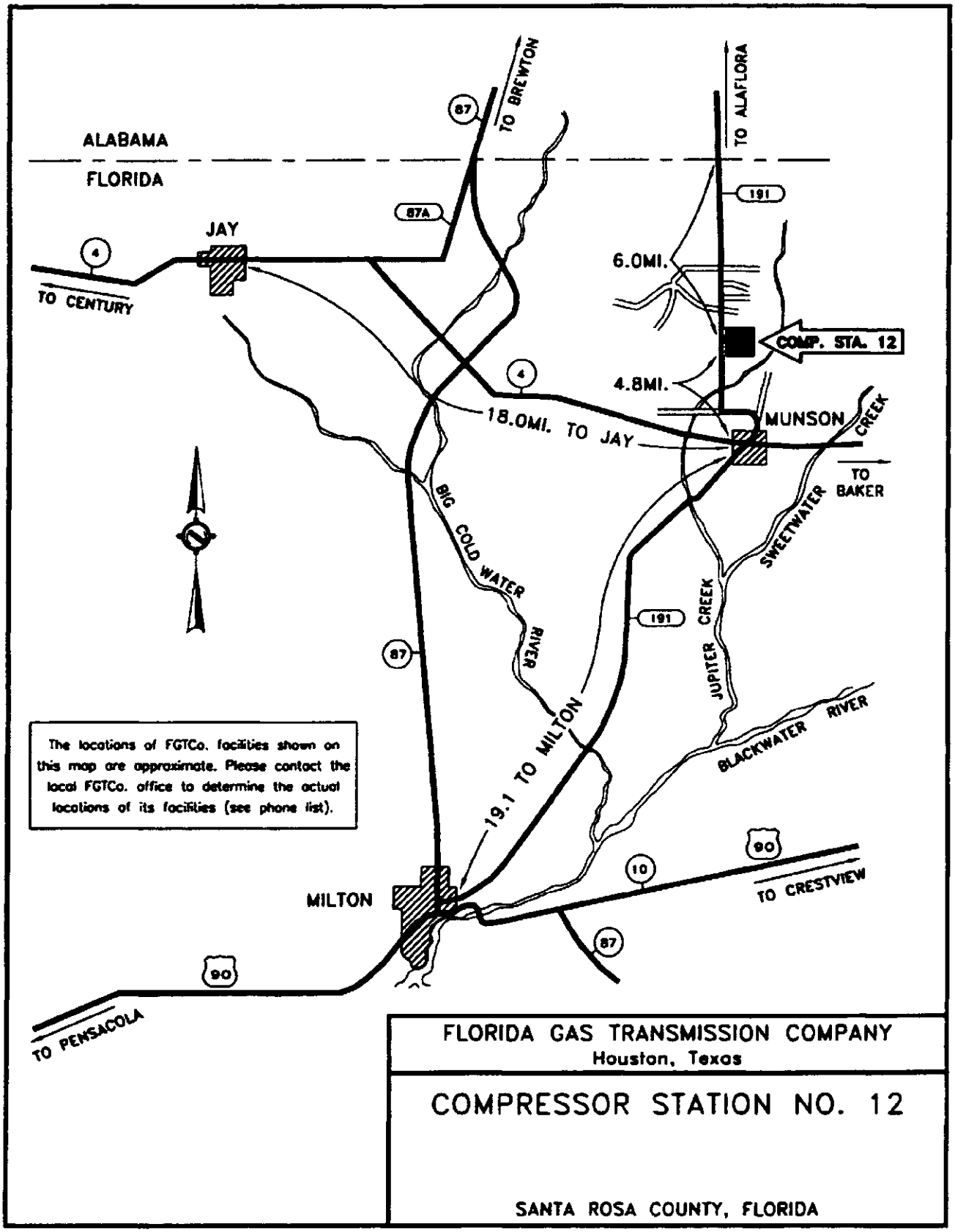
ALABAMA
FLORIDA
JAY
TO CENTURY
TO BREWTON
TO ALAFLORA
87
87A
191
6.0MI.
COMP. STA. 12
4.8MI.
4
18.0MI. TO JAY
MUNSON
CREEK
TO BAKER
BIG COLD WATER RIVER
SWEETWATER
JUPITER CREEK
191
87
19.1 TO MILTON
BLACKWATER RIVER
MILTON
90
10
TO CRESTVIEW
87
90
TO PENSACOLA
The locations of FGTCo. facilities shown on this map are approximate. Please contact the local FGTCo. office to determine the actual locations of its facilities (see phone list).
FLORIDA GAS TRANSMISSION COMPANY
Houston, Texas
COMPRESSOR STATION NO. 12
SANTA ROSA COUNTY, FLORIDA

2.0 PROJECT DESCRIPTION

A plot plan of FGT's Compressor Station No. 12, showing the location of the plant boundaries, the existing emission sources, and the location of the proposed engine addition, is presented in Attachment B. The following sections provide a description of the existing operations at this location, as well as a description of the proposed project.

2.1 Existing Operations

FGT's existing Compressor Station No. 12 consists of five 2,000 bhp, one 4,100 bhp natural-gas-fired reciprocating internal combustion (IC) engines and one 10,350 bhp natural gas-fired turbine. Table 2-1 summarizes engine manufacturer, model, and the date of installation for each of the existing engines. The original installation was made in 1958 (Compressor Engines 1201 through 1203). Engine 1204 was installed in 1966 and engine 1205 was installed in 1968. An addition referred to as Phase II was constructed in 1991 (Compressor Engine 1206) and was subject to PSD review. Compressor Engine 1207 was installed in February 2001 as part of the Phase IV Expansion Project.

Of the existing engines, 1204 and 1205 are being modified to reduce NO_X and CO emissions as part of this expansion project.

The existing facility also has supporting equipment including lube and used oil storage tanks, air compressors and emergency generators.

2.2 Proposed Compressor Station Addition

FGT proposes to increase the horsepower capacity of Compressor Station No. 12, as part of the Phase V Expansion Project. This will involve adding one new gas-fired turbine (Compressor Engine 1208) and upgrading an existing gas-fired turbine (Compressor Engine 1207). The proposed new engine and upgraded engine will be used to increase the volumetric delivery capacity by driving a gas compressor that is a part of a gas transmission line that transports natural gas from source wells in Texas and Louisiana for delivery throughout Florida. Without the proposed modifications, it would not be possible to increase the volumetric delivery capacity necessary to meet both short and long-term demands for natural gas in Florida.

2.2.1 New Compressor Turbine Engine Addition

FGT proposes to install one natural gas-fired turbine engine compressor unit and associated support equipment at Compressor Station No. 12. The turbine engine will be a Pignone PGT-

10B engine compressor unit rated at 15,700 bhp (ISO). Fuel will be exclusively natural gas from the FGT's natural gas pipeline. Engine specifications and stack parameters for the proposed engine are presented in Table 2-2.

Table 2-1 Summary of Existing Compressor Engines

Engine #	Date of Installation	Type	Manufacturer	Model #	Brake Horse Power (bhp)
1201	1958	Reciprocating	Cooper-Bessemer	LS-8-SG	2,000
1202	1958	Reciprocating	Cooper-Bessemer	LS-8-SG	2,000
1203	1958	Reciprocating	Cooper-Bessemer	LS-8-SG	2,000
1204	1966	Reciprocating	Cooper-Bessemer	LS-8-SG	2,000
1205	1968	Reciprocating	Cooper-Bessemer	LS-8-SG	2,000
1206	1991	Reciprocating	Dresser-Rand	TVC-10	4,100
1207	2001	Turbine	Solar	Mars 90 T-13000S	10,350

Table 2-2 Proposed New Compressor Turbine (1208) Specifications and Stack Parameters

Parameter	Design
Compressor Engine	1208
Type	Gas Turbine
Manufacturer	Nuovo Pignone
Model	PGT10B
Unit Size	15,700 bhp
Heat Input [a]	134.77 MMBtu/hr
Maximum Fuel Consumption [b]	0.1296 MMscf/hr
Speed	7,900 rpm
Stack Parameters	
Stack Height	61.5 ft
Stack Diameter	7.6 ft
Exhaust Gas Flow	215,175 acfm
Exhaust Temperature	909 °F
Exhaust Gas Velocity	79.1 ft/sec

NOTE:

acfm	=	actual cubic feet per minute.
bhp	=	brake horsepower.
Btu/hp-hr	=	British thermal units per brake horsepower per hour.
°F	=	degrees Fahrenheit.
ft	=	feet.
ft/sec	=	feet per second.
MMscf/hr	=	million standard cubic feet per hour
rpm	=	revolutions per minute.

[a] Based on vendor heat rate value plus 10%

[b] Based on heating value for natural gas of 1040 British thermal units per standard cubic foot (Btu/scf).

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Hourly and annual emissions of regulated pollutants from the proposed engine under normal operating conditions are presented in Table 2-3. Emissions of oxides of nitrogen (NO_X, carbon monoxide (CO) and non-methane hydrocarbons (NMHC) are based on the engine manufacturer's supplied data (See Attachment C).

Typically, turbine vendors do not provide information on particulate matter (PM) or sulfur dioxide (SO2) emissions; therefore, particulate matter emissions are based upon USEPA publication AP-42 Table 3.1-2a (USEPA, 2000) and emissions of SO_2 are based on FGT's Federal Energy Regulatory Commission (FERC) certificate limit of 10 grains sulfur per 100 cubic feet of natural gas. Hazardous air pollutant (HAP) emissions are based upon the Gas Research Institute's (GRI) HapCalc software which uses USEPA emission factors, emission factors found in research literature and emission factors based on GRI research data.

Table 2-3 Emissions from Proposed New Compressor Turbine Engine (1208)

Pollutant	Emission Factor	Reference	lb/hr	TPY
Nitrogen Oxides	14.1 lb/hr	Manufacturer Data	14.10	61.8
Carbon Monoxide	5.14 lb/hr @ 100% load 10.23 lb/hr @ 70% load 22.50 lb/hr @ 50% load	Manufacturer Data	7.03[a]	30.8[b]
Volatile Organic Compounds	0.29 lb/hr @ 100% load 0.80 lb/hr @ 70% load 1.46 lb/hr @ 50% load	Manufacturer Data	0.45[c]	2.0[b]
Particulate Matter	0.0066 lb/MMBtu	AP-42, Table 3.1-2a	0.89	3.9
Sulfur Dioxide	10 grains/100 scf	FERC Limit	3.70	16.2
HAPs	Various see Attachment D	GRI HapCalc 3.0	0.75	3.3

a) Nominal CO (annual) rate, maximum 22.50 lb/hr
b) @ 100% load for 75% of time, 70% load for 20% of time & 50% load for 5% of time
c) Nominal VOC (annual) rate, maximum 1.46 lb/hr

All contaminants have decreasing lb/hr emission rates with decreasing engine load except CO and VOCs. The new turbine will be operated at less than 100% load at times. The load may commonly drop as low as 60% and occasionally to 50%. The CO and VOC emission rates on the PGT-10B increase with decreasing engine load. Emission rates are based on 100% load

(worse case) for all contaminants except CO and VOC. CO and VOC emission rates are based on operation at 100% load for 75% of the time (6570 hr/yr), 70% load for 20% (1752 hr/yr) of the time and 50% load for 5% of the time (438 hr/yr).

2.2.2 Upgraded Compressor Turbine

FGT proposes to upgrade one existing natural gas-fired turbine engine compressor unit at Compressor Station No. 12. This unit is currently being constructed as part of FGT's Phase IV Expansion Project, to be completed in early 2001. The engine is a Solar Mars 90 T-13000S turbine compressor unit flat rated at 10,350 bhp that will be upgraded to 13,026 bhp. Fuel will be exclusively natural gas from FGT's natural gas pipeline. Engine specifications and stack parameters for the proposed engine are presented in Table 2-4.

Table 2-4 Proposed Upgraded Turbine (1207) Specifications and Stack Parameters

Parameter	Design
Compressor Engine	1407
Type	Gas Turbine
Manufacturer	Solar
Model	Mars 90 T-13000S
Unit Size	13,078 bhp
Heat Input [a]	8,626 Btu/hp-hr
Maximum Fuel Consumption [b]	0.10847 MMscf/hr
Speed	8,412 rpm
Stack Parameters	
Stack Height	58 ft
Stack Diameter	7.5 ft x 8 ft (rectangular)
Exhaust Gas Flow	179,531 acfm
Exhaust Temperature	867 °F
Exhaust Gas Velocity	50.3 ft/sec

NOTE:

acfm	=	actual cubic feet per minute.
bhp	=	brake horsepower.
Btu/hp-hr	=	British thermal units per brake horsepower per hour.
°F	=	degrees Fahrenheit.
ft	=	feet.
ft/sec	=	feet per second.
MMscf/hr	=	million standard cubic feet per hour.
rpm	=	revolutions per minute.

[a] Based on vendor heat rate value plus 10%
[b] Based on heating value for natural gas of 1040 British thermal units per standard cubic foot (Btu/scf).

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Hourly and annual emissions of regulated pollutants from the proposed engine under normal operating conditions are presented in Table 2-5. Emissions of NOX, CO and VOCs are based on the engine manufacturer's supplied data (See Attachment C).

Typically, turbine vendors do not provide information on particulate matter or SO_2 emissions; therefore, particulate matter emissions are based upon USEPA publication AP-42 Table 3.1-2 (USEPA, 2000) and emissions of SO_2 are based on FGT's Federal Energy Regulatory Commission (FERC) certificate limit of 10 grains sulfur per 100 cubic feet of natural gas. Hazardous air pollutant (HAP) emissions are based upon the Gas Research Institute's (GRI) HapCalc software which uses USEPA emission factors, emission factors found in research literature and emission factors based on GRI research data.

Table 2-5 Proposed Upgraded Turbine (1207) Compressor Engine Emissions

Pollutant	Emission Factor	Reference	lb/hr	TPY
Nitrogen Oxides	10.21 lb/hr	Manufacturer Data	10.21	44.7
Carbon Monoxide	12.43 lb/hr	Manufacturer Data	12.43	54.5
Volatile Organic Compounds	0.36 lb/hr	Manufacturer Data	0.36	1.6
Particulate Matter*	0.0066 lb/MMBtu	AP-42, Table 3.1-2a	0.74	3.3
Sulfur Dioxide*	10 grains/100 scf	FERC Limit	3.10	13.6
HAPs	Various see Attachment D	GRI HapCalc 3.0	0.62	2.7

* Emissions based on vendor provided heat rate plus 10 per cent

2.2.3 Proposed Reciprocating Engine Modifications

The following describes and explains the modifications to be made to Emission Unit 1204.

2.2.3.1 Background

For natural gas engines, there is small window of relative proportions of air and fuel for which combustion can occur. Too much air relative to the amount of fuel in a cylinder head will not ignite. Also, if there is not enough air relative to the amount of fuel in the cylinder head, it will not ignite.

"Rich burn" engines power most of the old pipeline compressors. This means that they mix air and fuel in proportions such that the combustible mixture is on the low air to fuel ratio side of the combustion envelope. It has been known for some time now that one of the secrets of producing less NO_X in the internal engine combustion process is to increase the air manifold pressure and operate at higher air to fuel ratios. By increasing the air manifold pressure, more air is let into the cylinder head per each stroke. This means that more air is added to the same or similar parts of fuel for each "explosion" that occurs in the cylinder head. The result is lower cylinder temperatures and lower NO_X levels.

Most of the original engine manufacturers (OEM's) want the users to purchase their kit for accomplishing the modifications. These kits consist of expensive jet cells, modifications to cylinder heads, a cooling system for the jet cells and sometimes a whole new turbocharger. These kits are designed to operate the engine at the high end of the air to fuel mixture window. While these kits reduce the amount of NO_X formation, they are generally expensive to install, increase the maintenance of the ignition and cooling systems and reduce the reliability of the compressor engine. Furthermore, as a side effect, they sometimes reduce fuel consumption slightly.

Most compressor engines have been operated with the same OEM engine parameters since their installation. Not many users will modify the operating parameters given by the OEM. However, with the need for cleaner combustion, OEM's started modifying the parameters by increasing the air to fuel ratio with their kits. Users caught on and later began implementing non-OEM approaches. FGT's approach is to increase the air to fuel ratio incrementally to reduce the amount of NO_X without the use of OEM systems. By doing this, many of the complicated, unreliable systems are not required. Since this approach generally cannot achieve the same air to fuel ratios it does not yield the same levels of NO_X reduction; however, significant reductions are still achieved.

With this approach, FGT has demonstrated significant emission reductions. FGT believes it has accomplished these reductions without the compromised reliability and increased complexity of the OEM packages; however, any unit modified, will have to operate at an increased fuel consumption rate and increased frequency of maintenance of the turbocharger.

Inlet air temperature is also another factor in NO_x production from an engine. Temperature, like pressure, affects density. Just as increased air pressure increases density, lower temperature increases density as well. The more dense the air, the more air that can be put into a cylinder head, and therefore the higher the air to fuel ratio of the engine and in turn, the less NO_x that will be produced. Conversely, as the ambient temperatures rises, less air is put in the engine, and more NO_x is produced. Temperatures fluctuate from season to season. However, the modification that increases air manifold pressure increases the air into the cylinder head for any ambient temperature. Thus the air to fuel ratios are higher for any air manifold temperature the engine has experienced in the past.

2.2.3.2 Engine Modifications

In order to reduce emissions, FGT selected two older slow speed engines (Emission Units 1204 and 1205) at Compressor Station No. 12. The modifications consist of modifying the turbocharger aerodynamics and the control system for the unit. The result is lower emissions but at a cost of added fuel and harder work from the turbocharger.

The turbocharger modifications consist of removing the turbocharger and sending it to a turbocharger overhaul and manufacturing facility where the internals will be modified to produce more air at higher pressures. By increasing the capability of the turbocharger to produce more air and at a higher pressure, higher air to fuel mixtures can be achieved. This means lower NO_X. The facility modifies the internals of the turbocharger with the correct aerodynamic components to produce the required air. FGT re-installs the turbocharger and re-adjusts the controls to make the compressor unit run with the modified turbocharger. The adjustment will consist of setting the air manifold pressure at a higher level than it was previously operated. In doing so, more air will enter into the cylinder for about the same amount of fuel. This will increase the air to fuel ratio. When the air manifold pressure setpoint is put into the controls, the unit is capable of operating at a higher air manifold pressure than it has in the past and the NO_X rate is reduced.

The controls modification consists of determining new engine operating settings for the modified condition, drawing curves to control the compressor unit to the desired settings, and reconfiguring the main control logic to control the compressor unit.

The basic effect of the modification on the units is increased air pressure to the engine, allowing higher air to fuel ratios. The resulting side effect on the turbocharger is that it must turn faster and will cause more backpressure on the engine. In basic terms, the turbocharger will "work harder" and is expected to require overhaul on a more frequent basis. Furthermore, the increased backpressure requires that the engine burn more fuel to function at the same horsepower levels. Based on FGT testing results, the increased fuel consumption for the compressor unit at Compressor Station No. 12 will be about 10%.

Engine parameters are given in Table 2-6 and pre-modification and post-modification emission rates are given in Tables 2-7 through Table 2-10. Pre-modification emissions are based on stack testing conducted in April 2000. A copy of the test report is located in Attachment E. Post-modification emission rates are based upon stack testing of modified unit 1205. A test report summary is included in Attachment E.

Table 2-6 Proposed Modified Engines(1204, 1205) Specifications and Stack Parameters

Parameter	Design
Compressor Engine	1204, 1205
Type	Reciprocating Engine
Manufacturer	Cooper-Bessemer
Model	LS-8-SG
Unit Size	2,000 bhp
Specific Heat Input	8,250 Btu/hp-hr
Maximum Fuel Consumption [a]	0.01587 MMscf/hr
Stack Parameters	
Stack Height	28 ft
Stack Diameter	1.44 ft
Exhaust Gas Flow	11,637 acfm
Exhaust Temperature	700 °F
Exhaust Gas Velocity	36.3 ft/sec

NOTE:

acfm	=	actual cubic feet per minute.
bhp	=	brake horsepower.
Btu/hp-hr	=	British thermal units per brake horsepower per hour.
°F	=	degrees Fahrenheit.
ft	=	feet.
ft/sec	=	feet per second.
MMscf/hr	=	million standard cubic feet per hour.

[a] Based on heating value for natural gas of 1040 British thermal units per standard cubic foot (Btu/scf).

Table 2-7 Pre-modification (1204) Compressor Engine Potential Emissions

Pollutant	Emission Factor	Reference	lb/hr	TPY
Nitrogen Oxides	9.50 g/hp-hr	Test Data	41.89	183.5
Carbon Monoxide	0.80 g/hp-hr	Test Data	3.53	15.5
Volatile Organic Compounds	0.09 g/hp-hr	Test Data	0.40	1.7
Particulate Matter	0.00999 lb/MMBtu	AP-42 Table 3.2-2	0.15	0.7
Sulfur Dioxide*	10 grains/100 scf	FERC Limit	0.41	1.8
HAPs	Various see Attachment D	GRI HapCalc 3.0	0.76	3.3

* Emissions based on vendor provided heat rate value

Table 2-8 Post-modification (1204) Compressor Engine Potential Emissions

Pollutant	Emission Factor	Reference	lb/hr	TPY
Nitrogen Oxides	5.4 g/hp-hr	Similar Unit Test Data	23.81	104.3
Carbon Monoxide*	0.8 g/hp-hr	Similar Unit Test Data	3.53	15.5
Volatile Organic Compounds	0.1 g/hp-hr	Similar Unit Test Data	0.44	1.9
Particulate Matter**	0.00999 lb/MMBtu	AP-42 Table 3.2-2	0.16	0.7
Sulfur Dioxide**	10 grains/100 scf	FERC Limit	0.45	2.0
HAPs	Various see Attachment D	GRI HapCalc 3.0	0.76	3.3

* EMISSION RATES REFLECT 80% control efficiency for CO converter
** Emissions based on vendor provided heat rate value plus expected 10 % fuel use increase

Table 2-9 Pre-modification (1205) Compressor Engine Potential Emissions

Pollutant	Emission Factor	Reference	lb/hr	TPY
Nitrogen Oxides	11.0 g/hp-hr	Test Data	48.68	213.2
Carbon Monoxide	0.83 g/hp-hr	Test Data	3.66	16.0
Volatile Organic Compounds	0.09 g/hp-hr	Test Data	0.40	1.7
Particulate Matter	0.00999 lb/MMBtu	AP-42 Table 3.2-2	0.15	0.7
Sulfur Dioxide*	10 grains/100 scf	FERC Limit	0.41	1.8
HAPs	Various see Attachment D	GRI HapCalc 3.0	0.76	3.32

* Emissions based on vendor provided fuel use value

Table 2-10 Post-modification (1205) Compressor Engine Potential Emissions

Pollutant	Emission Factor	Reference	lb/hr	TPY
Nitrogen Oxides	5.4 g/hp-hr	Test Data	23.81	104.3
Carbon Monoxide*	0.8 g/hp-hr	Test Data	3.53	15.5
Volatile Organic Compounds	0.10 g/hp-hr	Test Data	0.44	1.9
Particulate Matter**	0.00999 lb/MMBtu	AP-42 Table 3.2-2	0.16	0.7
Sulfur Dioxide**	10 grains/100 scf	FERC Limit	0.45	2.0
HAPs	Various see Attachment D	GRI HapCalc 3.0	0.76	3.3

* EMISSION RATES REFLECT 80% control efficiency for CO converter
** Emissions based on vendor provided fuel use value plus expected 10 % fuel use increase

2.2.3.3 Catalytic Converter for CO Emission Reduction.

Since the modifications described above will result in an increase in CO emissions, a catalytic converter will be added to the modified engine to reduce CO emissions. The converter will be a HIS Emission Reduction Systems Model DeCOHx-120/150/20WRL Converter/Silencer. Vendor information is provided in Attachment D. The emission rates provided in Tables 2-8 and 2-10 reflect reductions from this converter at approximately 42% control efficiency. The vendor is guaranteeing 90% control efficiency. A lower control level has been used in this application due to potential variations in the results of the modifications on different engines.

2.2.4 Fugitive Emissions

Potential new emissions from Compressor Station No. 12 also include fugitive emissions from the new valves and flanges that will be in gas service. These fugitive emissions have been estimated using USEPA factors for components in gas service at oil and gas facilities (EPA publication EPA-453/R-95-017, November 1995, "Protocol for Equipment Leak Emission Estimates"). Table 2-11 lists the quantities of existing and new components to be added as part of the Phase V Expansion Project and an estimate of the fugitive emissions from these sources.

2.2.5 Support Equipment Additions and Changes

In addition to the compressor engines, a new compressor building will be installed at the site. The location of the new building is shown on the facility plot plan contained in Attachment B. The new compressor building, housing the turbine, has approximate dimensions of 40 feet wide by 78.5 feet long by 35.3 feet high.

2.2.6 Emissions Summary

The total changes in emissions resulting from the project are listed on Table 2-12. As can be seen from the table, the emissions increases are not significant under PSD. The calculations used to estimate these emissions are presented in Attachment D.

Table 2-11 VOC Fugitive Emission Calculations and Summary

Component	Service	Component Count	Emissions * Factor (ton/yr)	NM/NE Fraction	Emissions (ton/yr)
Valves	Gas	54	0.0434606	0.05	0.12
Connector	Gas	0	0.0019316	0.05	0.00
Flanges	Gas	90	0.0037666	0.05	0.02
Open-Ended Line	Gas	15	0.0193158	0.05	0.01
Pumps	Gas	1	0.023179	0.05	0.00
Other	Gas	0	0.0849895	0.05	0.00
Valves	Light Oil	7	0.0241448	1.00	0.17
Connector	Light Oil	0	0.0020282	1.00	0.00
Flanges	Light Oil	18	0.0010624	1.00	0.02
Open-Ended Line	Light Oil	2	0.0135211	1.00	0.03
Pumps	Light Oil	0	0.1255527	1.00	0.00
Other	Light Oil	0	0.0724343	1.00	0.00
Valves	Heavy Oil	3	0.0000811	1.00	0.00
Connector	Heavy Oil	0	0.0000724	1.00	0.00
Flanges	Heavy Oil	11	0.0000038	1.00	0.00
Open-Ended Line	Heavy Oil	0	0.0013521	1.00	0.00
Other	Heavy Oil	0	0.0002994	1.00	0.00
				TOTAL:	**0.37**

* "EPA publication EPA-453/R-95-017, November 1995, "Protocol for Equipment Leak Emission Estimates"

Table 2-12 Potential Annual Emissions (tpy) Summary

SOURCE ID	DESCRIPTION	NO_x	CO	VOC[a]	SO_2	PM
	EXISTING FACILITY					
1201	2000 bhp Recip. Engine	212.5	27.0	8.5	1.8	0.7
1202	2000 bhp Recip. Engine	212.5	27.0	8.5	1.8	0.7
1203	2000 bhp Recip. Engine	212.5	27.0	8.5	1.8	0.7
1204	2000 bhp Recip. Engine[b]	183.5	15.5	1.7	1.8	0.7
1205	2000 bhp Recip. Engine[b]	213.2	16.0	1.7	1.8	0.7
1206	4100 bhp Recip. Engine	77.2	96.6	38.6	3.5	0.6
1207	10,350 bhp Turbine Engine	38.6	47.0	1.3	11.7	2.5
GEN03	637 bhp Recip. Engine	0.7	0.6	0.2	0.0	0.0
	OTHER SOURCES: [c]	0.0	0.0	3.5	0.0	0.0
	EXISTING ANNUAL POTENTIALTOTALS:	**1150.7**	**256.7**	**72.5**	**24.2**	**6.6**
	PROPOSED MODIFIED FACILITY					
1201	2000 bhp Recip. Engine	212.5	27.0	8.5	1.8	0.6
1202	2000 bhp Recip. Engine	212.5	27.0	8.5	1.8	0.6
1203	2000 bhp Recip. Engine	212.5	27.0	8.5	1.8	0.6
1204	2,000 bhp recip engine – modified[d]	104.3	15.5	1.9	2.0	0.7
1205	2,000 bhp recip engine – modified[d]	104.3	15.5	1.9	2.0	0.7
1206	4100 bhp Recip. Engine	77.2	96.6	38.6	3.5	0.6
1207	13,000 bhp Turbine Engine –upgraded	44.7	54.5	1.6	13.6	3.3
1208	15,700 bhp Turbine engine – new	61.8	30.8	2.0	16.2	3.9
GEN03	637 bhp Recip. Engine	0.7	0.6	0.2	0.0	0.0
	OTHER SOURCES: [c]	0.0	0.0	3.9	0.0	0.0
	PROPOSED ANNUAL POTENTIAL TOTALS:	**1030.5**	**294.5**	**75.6**	**42.7**	**11**
	NET CHANGES IN POTENTIAL EMISSIONS:	**-120.2**	**37.8**	**3.1**	**18.5**	**4.4**

(a) VOC = Non-methane/non-ethane HC
(b) Based on stack testing
(c) Other Sources Includes ancillary equipment, storage tanks and equipment leaks
(d) Based on test data for a similar unit

3.0 REGULATORY ANALYSIS

This section presents a review of federal and Florida State air quality regulations, which govern the operations and proposed modifications to be conducted at Compressor Station No. 12.

3.1 Federal Regulations Review

The federal regulatory programs administered by the USEPA have been developed under the authority of the Clean Air Act. The following subsections review the essential elements of the federal regulatory program and the impact they have on the operations and proposed modifications at Compressor Station No. 12.

3.1.1 Classification of Ambient Air Quality

The 1970 Amendments to the CAA gave the USEPA specific authority to establish the minimum level of air quality that all states would be required to achieve. These minimum values or standards were developed in order to protect the public health (primary) and welfare (secondary). The federally promulgated standards and additional state standards are presented on Table 3-1.

Areas of the country that have air quality equal to or better than these standards (i.e., ambient concentrations less than a standard) are designated as "Attainment Areas", while those where monitoring indicates air quality is worse than the standards are known as "Non-attainment Areas." The designation of an area has particular importance for a proposed project as it determines the type of permit review to which the application will be subject.

Major new sources or major modifications to existing major sources located in attainment areas are required to obtain a PSD permit before initiation of construction. Similar sources located in areas designated as non-attainment or that adversely impact such areas undergo more stringent Non-attainment New Source Review (NNSR). In either case, it is necessary, as a first step, to determine the air quality classification of a project site.

All areas of all states are classified as either attainment, non-attainment or unclassifiable for each criteria pollutant. Santa Rosa County in designated as unclassifiable or attainment for all criteria pollutants. These designations were obtained from 40 CFR 81.310, as updated in the June 5, 1998 Federal Register (FR31036) and 62-204.340 F.A.C.

Table 3-1 National and State Ambient Air Quality Standards ($\mu g/m^3$)

POLLUTANT	AVERAGING PERIOD	EPA STANDARDS		FLORIDA STANDARDS
		PRIMARY	SECONDARY	
PM_{10}	24-hour[1]	150	150	150
	Annual[2]	50	50	50
SO_2	3-hour[1]	---	1,300	1,300
	24-hour[1]	365	---	260
	Annual[2]	80	---	60
CO	1-hour[1]	---	40,000	40,000
	8-hour[1]	10,000	---	10,000
NO_2	Annual[2]	100	100	100
O_3	1-hour[3]	235	235	235

1) Not to be exceeded more than once per year.
2) Never to be exceeded.
3) Not to be exceeded on more than 3 days over 3 years.

Sources: 40 CFR 50; 36FR22384; Chap. 17-2.300.

The designation of Unclassifiable indicates that there is insufficient monitoring data to prove that the area has attained the federal standards; however, the limited data available indicate that the standard has been achieved. Areas with this classification are treated as attainment areas for permitting purposes. Since Santa Rosa County is considered in attainment for all pollutants, the proposed new emissions are potentially subject to PSD review and not non-attainment review.

3.1.2 PSD Applicability

The 1977 CAA Amendments added Part C: Prevention of Significant Deterioration to the Act. This part required proposed new major stationary sources or existing sources planning a major modification in an area that has attained the National AAQS, to conduct a preconstruction review that includes a detailed analysis of the impacts from the source's emissions.

Federal air quality permitting regulations for attainment areas are codified in the Code of Federal Regulations (CFR), Title 40- Protection of the Environment, Part 52.21 - Prevention of Significant Deterioration (40 CFR 52.21).

For the PSD regulations to apply to a given project, the project's potential to emit must constitute a major stationary source or major modification to an existing major stationary source. A major

stationary source is defined as any of the 28 sources identified in 40 CFR 52.21 that has a potential to emit 100 tons or more per year of any regulated pollutant, or any other stationary source that has the potential to emit 250 tons or more per year of a regulated pollutant. "Potential to emit" is determined on an annual basis after the application of air pollution control equipment, or any other federally enforceable restriction.

According to the "Draft New Source Review Workshop (NSR) Manual (USEPA, October 1990)," for a modification to be classified as major and therefore, subject to PSD review:

(1) The modification must occur at an existing major stationary source, and

(2) The net emissions increase of any pollutant emitted by the source, as a result of modification, is "significant", or

(3) The modification results in emissions increases, which if considered alone would constitute a major stationary source.

"Significant" emission rates are defined as amounts equal to or greater than the emission rates given in Table 3-2.

Table 3-2 Applicability of PSD Significant Emission Rates

Pollutant	Emission Rate Tons/Year
Carbon Monoxide	100
Nitrogen Oxides	40
Sulfur Dioxide	40
Particulate Matter (PM/PM_{10})	25/15
Ozone (VOC)	40
Lead	0.6
Fluorides	3
Reduced Sulfur including Hydrogen Sulfide	10
Total Reduced Sulfur including Hydrogen Sulfide	10
Sulfuric Acid Mist	7
Lead	0.6
Mercury	0.1
VOC = Volatile Organic Compounds Sources:40 CFR 52.21(b)(23); Table 212.400-2 62-212 F.A.C.	

Proposed project increases are determined for each pollutant and are equal to the actual emissions (average of the actual emissions over the two years immediately prior to the proposed project) subtracted from the proposed new allowable emissions. Fugitive emissions are only included in the potential to emit if the source is one of the 28 named source categories in 40 CFR 52.21(b)(1) or belongs to a stationary source category that is subject to an NSPS proposed prior to August 7, 1980 or that is subject to an NESHAPS promulgated prior to August 7, 1980. For this project, proposed new NO_X emissions are significant.

Netting is required for each regulated pollutant for which the proposed project increases (decreases are not considered yet) result in a significant increase in emissions. Netting is performed by identifying both the creditable and contemporaneous increases and the reductions in emissions. The contemporaneous period is defined as the period of time from five years prior to estimated start of construction through estimated start of operation.

a. 7 / 01/ 01 Date of estimated start of construction.

b. 7 / 01/ 96 Five years prior to estimated start of construction date.

c. 10 / 01/ 01 Date of estimated start of operation.

d. 7 / 01/ 96 to 10 / 01 / 01 Contemporaneous period (b. to c.).

The requirements for creditable increases and reductions are listed below.

- The increases/reductions occurred within the contemporaneous period.

- For each unit at the source at which the change occurred, the increases/reductions were calculated as the allowable emissions after the change minus the actual emissions averaged over the two-year period immediately preceding the change.

- The increases/reductions occurred at the applicant's contiguous or adjacent plant site and came from units under the same common ownership or control.

- The reductions have not been relied upon in issuing a previous PSD permit (including use in netting for a PSD permit).

- The reductions have not been relied upon in issuing a non-attainment permit and the

reductions have not been used as an offset1 in a non-attainment permit or reserved in an application for use as an offset.

- The reductions will be federally enforceable by the start of construction of the proposed project and actually accomplished by the start of operation.

- The reductions have the same qualitative significance for public health as the increase from the proposed project.

Actual emission changes are provided in Table 3.3 and a summary of contemporaneous emission increases and decreases for Compressor Station No. 12 are listed in Table 3.4.

Table 3-3 Actual Annual Emissions

Emission Unit	Total Hours of Operation 1/1/99 Through 12/31/00	*A.* Average Annual Hours of Operation	*B.* NOx Emission Rate (lbs/hr)	*A x B /2000* NOx Actual Annual Emission Rate (tpy)
1207 (Ph IV)	0.0	0.0	0.0	0.0
GEN03	0.0	0.0	0.0	0.0
1204	12,498.1	6249.1	41.89	130.9
1205	12,508.1	6254.1	48.68	152.2
1207 (Ph V)	0.0	0.0	0.0	0.0
1208	0.0	0.0	0.0	0.0

Table 3-4 Contemporaneous Emission Changes

Project Date	Emission Unit At Which Change Occurred	Project Name Or Activity	A. Allowable Emissions After The Activity (Tons/Year)	B. Actual Emissions Prior To The Activity (Tons/Year)	Difference (A-B) (Tons/Year)	Creditable Decrease Or Increase
NOx						
01/01/01	1207 (Ph IV)	New turbine	38.6	0.0	38.6	38.6
01/01/01	GEN03	New Generator	0.7	0.0	0.7	0.7
12/01/01	1204	Engine modified	104.3	130.9	-26.6	-26.6
12/01/01	1205	Engine modified	104.3	152.2	-47.9	-47.9
12/01/01	1207 (Ph V)*	Uprated turbine	6.1	0.0	6.1	6.1
12/01/01	1208	New turbine	61.8	0.0	61.8	61.8
						32.7

* Phase V portion only

Since Compressor Station No. 12 is not one of the 28 named source categories, but does emit >250 TPY of at least one regulated pollutant, it is considered a major source. However, the net increase in emissions resulting from the proposed actions will not exceed the PSD significant rates; therefore, the compressor station is not subject to PSD pre-construction review as shown in Table 3.5.

Table 3-5 PSD Applicability

Regulated Pollutant:	**NOx**
Significance level as defined in 40 CFR 52.21(b)(23)	40
Net contemporaneous change from Table3-4 (tpy)	32.7
Is PSD review applicable?	No

3.1.3 Non-Attainment New Source Review (NNSR) Applicability

Based on the current non-attainment provisions, all new major stationary sources, or major modifications to such sources, located in a non-attainment area must undergo non-attainment New Source Review, if they have the potential to emit above an NSR significant threshold. For major new sources or major modifications in an attainment or unclassifiable area, the non-attainment provisions apply if the source or modification is located within the area of influence of a non-attainment area. The area of influence is defined as an area, which is outside the boundary of a non-attainment area, but within the locus of all points that are 50 kilometers outside the non-attainment area.

Compressor Station No. 12 is located in an area that is designated as either attainment or not classifiable for all criteria pollutants and is not located in an area of influence outside a non-attainment area. Therefore, this compressor station is not subject to federal non-attainment New Source Review.

3.1.4 Applicability of New Source Performance Standards (NSPS)

Standards of Performance for New Sources are published in 40 CFR 60. All Standards apply to all new sources within a given category, regardless of geographic location or ambient air quality at the location.

The new turbine to be installed at Compressor Station No. 12 is subject to Subpart GG, Standards of Performance for Stationary Gas Turbines, because it will have a maximum heat input at peak load of >10.7 gigajoules/hour (10 MMBtu/hr) based on the lower heating value of the natural gas fuel. This regulation establishes emission limits for NO_X and SO_2 and requires performance testing and daily monitoring of fuel nitrogen and sulfur.

The NO_x emission limit for Subpart GG is calculated as follows:

$STD = 0.0150\ (14.4/Y) + F$

STD = Allowable NO_x emissions % by volume

Y = Heat rate at peak load not to exceed 14.4 Kj/watt-hour

F = NO_x emission allowance

The fuel bound nitrogen in natural gas is less than 0.015% by weight. Therefore, the value of F as defined in 40 CFR 60.332(3) is equal to zero.

For new Engine No. 1208

Y = Btu/bhp-hr x 1.055 Kj/Btu x hp-hr/745.7 watt-hour

= 7,807 Btu/bhp-hr x 1.055 Kj/Btu x hp-hr/745.7 watt-hour

= 11.0 Kj/watt-hr

STD = 0.0150 (14.4/11.0) + 0

= 0.0196 %

= 196 ppm_v

For uprated Engine No. 1207

Y = Btu/bhp-hr x 1.055 Kj/Btu x hp-hr/745.7 watt-hour

= 7,842 Btu/bhp-hr x 1.055 Kj/Btu x hp-hr/745.7 watt-hour

= 11.1 Kj/watt-hr

STD = 0.0150 (14.4/11.1) + 0

= *0.0195 %*

= 195 ppm_v

Table 3-6 summarizes the NSPS applicability for the proposed gas engines.

The two turbines at this facility will both meet the NSPS for NO_X of 196 ppmv and 195 ppmv (i.e., manufacturer's estimation of 25 ppmv), and for SO_2 of 150 ppmv (estimated for these turbines to be 4 ppmv).

3.1.2.6 Good Engineering Practice (GEP) Stack Height Analysis

The 1977 CAA Amendments require that the emission limitation required for control of any pollutant not be affected by a stack that exceeds GEP height. Further, no dispersion credit is given during air quality modeling for stacks that exceed GEP. GEP stack height is defined as the highest of:

- 65 meters; or
- a height established by applying the formula

  $H_{GEP} = H + 1.5 L$

Table 3-6 Applicability of New Source Performance Standards

NSPS Subpart	NSPS Regulations	Equipment	Fuel	Pollutant	Heat Input Applicability	Equipment Design Maximum*	NSPS Emission Limits	Equipment Emissions
GG	60.332(a)(2)	Engine No. 1207 Gas Turbine	Gas	NO_2	>10 MM Btu/hr	102 MM Btu/hr	195 ppm_v	25 ppm_v
GG	60.333(a)	Engine No. 1207 Gas Turbine	Gas	SO_2	>10 MM Btu/hr	102 MM Btu/hr	150 ppm_v	~4 ppm_v
NSPS Subpart	**NSPS Regulations**	**Equipment**	**Fuel**	**Pollutant**	**Heat Input Applicability**	**Equipment Design Maximum***	**NSPS Emission Limits**	**Equipment Emissions**
GG	60.332(a)(2)	Engine No. 1208 Gas Turbine	Gas	NO_2	>10 MM Btu/hr	122 MM Btu/hr	196 ppm_v	25 ppm_v
GG	60.333(a)	Engine No. 1208 Gas Turbine	Gas	SO_2	>10 MM Btu/hr	122 MM Btu/hr	150 ppm_v	~4 ppm_v

Design maximum based on vendor data.

Where:

H_{GEP} = GEP Stack Height,
H = Height of the structure or nearby structure, and
L = Lesser dimension (height or projected width) of the nearby structure; or

- a height demonstrated by fluid modeling or field study.

A structure or terrain feature is considered nearby if a stack is within a distance of five times the structure's height or maximum projected width. Only the smaller value of the height or projected width is used and the distance to the structure cannot be greater than 0.8 kilometers. Although GEP stack height regulations require that the stack height used in modeling for determining compliance with National AAQS and PSD increments not exceed GEP stack height, the actual stack height may be greater.

The stack height regulations also increase GEP stack height beyond that resulting from the formula in cases where plume impaction occurs. Plume impaction is defined as concentrations measured or modeled to occur when the plume interacts with elevated terrain. Elevated terrain is defined as terrain that exceeds the height calculated by the GEP stack height formula. Because terrain in the vicinity of the project site is generally flat, plume impaction was not considered in determining the GEP stack height.

The proposed stack for the new turbine (Engine No. 1208) at Compressor Station No. 12 will be 61.5 feet (18.74 meters) tall. Based on the proposed building dimensions, the calculated GEP stack height is less than 65 meters; therefore, GEP stack height is 65 meters. Since the stack is less than GEP stack height, it complies with the regulatory requirement.

3.1.5 Applicability of National Emission Standards for Hazardous Air Pollutants (NESHAPS)

Currently the only NESHAPS potentially applicable to this compressor station is 40 CFR 63 Subpart HHH. Compressor Station No. 12 has no affected sources as defined by 40 CFR 63 Subpart HHH and is, therefore, not subject to this subpart.

There are potential future regulations that may affect sources at this facility, but these regulations have not been promulgated at this time.

3.2 Florida State Air Quality Regulations

Compressor Station No. 12 is currently operating under Permit No.1130037-001-AV and is subject to the provisions of that permit. Rule 62, F.A.C., contains the air quality rules and regulations for the State of Florida. The primary federal regulations that affect Compressor Station No. 12 have been incorporated into or are referenced by these rules. The significant state regulations that are applicable to the new emission units are briefly listed below.

3.2.1 Rule 62-210.300 Permits Required

FGT is required to obtain a construction permit prior to construction of new emission units. This requirement is being met by the submittal of this application.

3.2.2 Rule 62-204.240 Ambient Air Quality Standards

FGT must not violate any of the ambient air quality standards listed under this rule. The proposed new emissions will not violate any air quality standards. Potential NOx emissions and impacts will be decreased.

3.2.3 Rule 62-296.320(2) Objectionable Odors

This rule prohibits the discharge of pollutants that will cause or contribute to an objectionable odor. There will be no odors from the proposed changes.

3.2.4 Rule 62-296.320(4)(b)1 General Particulate Emission Limiting Standards.

FGT is prohibited from allowing the new compressor engine to discharge into the atmosphere the emissions of air pollutants, the density of which is equal to or greater than that designated as Number 1 on the Ringelmann Chart (20 percent opacity). The new and modified engines will not violate this standard.

3.2.5 Rule 62-210.300(3)(a) Exempt Emissions Units and/or Activities.

The emissions from the fugitive leak emissions are insignificant sources and are exempt from the permitting requirements of Chapter 62-210 Stationary Sources - General Requirements, 62-213 Operation Permits For Major Sources Of Air Pollution and 62-4 Permits.

4.0 REFERENCES

Gas Research institute, 1999. GRI-HAPCalc Software Version 3.0, Radian International, LLC.

U.S. Environmental Protection Agency (USEPA). 1980. PSD Workshop Manual. Research Triangle Park, NC.

U.S. Environmental Protection Agency (USEPA). 2000. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources (5th Ed.) AP-42. Supplement E, Research Triangle Park, NC.

Attachment A

DEP Forms

Department of
Environmental Protection

Division of Air Resources Management

APPLICATION FOR AIR PERMIT - TITLE V SOURCE

See Instructions for Form No. 62-210.900(1)

I. APPLICATION INFORMATION

Identification of Facility

1. Facility Owner/Company Name: Florida Gas Transmission Company	
2. Site Name: Compressor Station No. 12	
3. Facility Identification Number: 1130037 [ ] Unknown	
4. Facility Location: Street Address or Other Locator: Rt. 1, Box 146 City: Milton County: Santa Rosa Zip Code: 32570-9740	
5. Relocatable Facility? [ ] Yes [X] No	6. Existing Permitted Facility? [X] Yes [ ] No

Application Contact

1. Name and Title of Application Contact: Jim Thompson, Environmental Project Manager
2. Application Contact Mailing Address: Organization/Firm: Florida Gas Transmission Company Street Address: 111 Kelsey Lane, Ste. A City: Tampa State: FL Zip Code: 33619
3. Application Contact Telephone Numbers: Telephone: (800) 381-1477 Fax: (813) 655-3951

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	3/26/01
2. Permit Number:	1130037-003-AC
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

Purpose of Application

Air Operation Permit Application

This Application for Air Permit is submitted to obtain: (Check one)

[ ] Initial Title V air operation permit for an existing facility which is classified as a Title V source.

[ ] Initial Title V air operation permit for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number: _____

[ ] Title V air operation permit revision to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number: _____

Operation permit number to be revised: _____

[X] Title V air operation permit revision or administrative correction to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. (Also check Air Construction Permit Application below.)

Operation permit number to be revised/corrected: ____ 1130037-001-AV_____

[ ] Title V air operation permit revision for reasons other than construction or modification of an emissions unit. Give reason for the revision; e.g., to comply with a new applicable requirement or to request approval of an "Early Reductions" proposal.

Operation permit number to be revised: _____

Reason for revision: _____

Air Construction Permit Application

This Application for Air Permit is submitted to obtain: (Check one)

[X] Air construction permit to construct or modify one or more emissions units.

[ ] Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.

[ ] Air construction permit for one or more existing, but unpermitted, emissions units.

Owner/Authorized Representative or Responsible Official

1. Name and Title of Owner/Authorized Representative or Responsible Official: Danny Pribble, Vice President, Operations
2. Owner/Authorized Representative or Responsible Official Mailing Address: Organization/Firm: Florida Gas Transmission Company Street Address: P.O. Box 1188 City: Houston State: TX Zip Code: 77251
3. Owner/Authorized Representative or Responsible Official Telephone Numbers: Telephone: (713) 345-7162 - Fax: (713) 646-3201
4. Owner/Authorized Representative or Responsible Official Statement: *I, the undersigned, am the owner or authorized representative*(check here [ ], if so) or the responsible official (check here [X], if so) of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.* Signature Date 3/21/01

* Attach letter of authorization if not currently on file.

Professional Engineer Certification

1. Professional Engineer Name: Kevin McGlynn Registration Number: 50908
2. Professional Engineer Mailing Address: Organization/Firm: McGlynn Consulting Company Street Address: 1967 Commonwealth Lane City: Tallahassee State: FL Zip Code: 32303
3. Professional Engineer Telephone Numbers: Telephone: (850)350-5035 Fax: (850) 350-5002

4. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

If the purpose of this application is to obtain a Title V source air operation permit (check here [ ], if so), I further certify that each emissions unit described in this Application for Air Permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance schedule is submitted with this application.

If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [X], if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [X], if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

Kevin J. McGlynn, P.E. — March 14, 2001

Signature — Date

(seal)

KEVIN J. McGLYNN CERTIFICATE NO. 50808 STATE OF FLORIDA PROFESSIONAL ENGINEER

* Attach any exception to certification statement.

Scope of Application

Emissions Unit ID	Description of Emissions Unit	Permit Type	Processing Fee
007	Reciprocating I. C. Compressor Engine No. 1204, 2000 bhp, Natural Gas Fired	NA	$0
007	Reciprocating I. C. Compressor Engine No. 1205, 2000 bhp, Natural Gas Fired	NA	$0
008	Turbine Compressor Engine No. 1207, 13,026 bhp,Natural Gas Fired	NA	$0
	Turbine Compressor Engine No. 1208, 15,700 bhp,Natural Gas Fired	NA	$0

Application Processing Fee

Check one: [ ] Attached - Amount: $_____ [X] Not Applicable

Construction/Modification Information

1. Description of Proposed Project or Alterations:

Florida Gas Transmission Company (FGT) is proposing to install a new Pignone PGT-10B 15,700 bhp compressor turbine, to upgrade an existing Solar Mars 90 T-13000S to 13,078 bhp and to modify two existing 2,000 bhp reciprocating engines.

2. Projected or Actual Date of Commencement of Construction: 07/01/01

3. Projected Date of Completion of Construction: 10/01/01

Application Comment

This proposed modification is part of FGT's Phase V Expansion project, aimed at increasing the supply capacity of FGT's network servicing domestic, commercial, and industrial customers in Florida.

The existing facility is currently operating under Permit No. 1130037-002-AV.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates: Zone: 16	East (km): 510.83	North (km): 3419.03	
2. Facility Latitude/Longitude: Latitude (DD/MM/SS): 30/54/42		Longitude (DD/MM/SS): 86/53/12	
3. Governmental Facility Code: 0	4. Facility Status Code: A	5. Facility Major Group SIC Code: 49	6. Facility SIC(s): 4922
7. Facility Comment (limit to 500 characters): Compressor Station No. 12 is an existing natural gas pipeline compressor station with six reciprocating compressor engines and one compressor turbine.			

Facility Contact

1. Name and Title of Facility Contact: Wade Collins, Team Environmental Leader			
2. Facility Contact Mailing Address: Organization/Firm: Florida Gas Transmission Company Street Address: Rt. 1, Box 146 City: Milton	State: FL	Zip Code: 32570-9740	
3. Facility Contact Telephone Numbers: Telephone: (850)957-4221	Fax: (850)957-4619		

Facility Regulatory Classifications

Check all that apply:

1. [ ] Small Business Stationary Source? [ ] Unknown
2. [X] Major Source of Pollutants Other than Hazardous Air Pollutants (HAPs)?
3. [ ] Synthetic Minor Source of Pollutants Other than HAPs?
4. [X] Major Source of Hazardous Air Pollutants (HAPs)?
5. [ ] Synthetic Minor Source of HAPs?
6. [ ] One or More Emissions Units Subject to NSPS?
7. [ ] One or More Emission Units Subject to NESHAP?
8. [ ] Title V Source by EPA Designation?
9. Facility Regulatory Classifications Comment (limit to 200 characters): HAPs major source definition based on calculations performed using the Gas Research Institute's GRI-HAPCalc 3.0 software.

List of Applicable Regulations

FDEP Title V Core List	
62-296-320(4)(b)1 General Visible Emissions Standards	
40 CFR 60, Subpart GG Standards of Performance for Stationary Gas-fired Turbines	

B. FACILITY POLLUTANTS

List of Pollutants Emitted

1. Pollutant Emitted	2. Pollutant Classif.	3. Requested Emissions Cap lb/hour	tons/year	4. Basis for Emissions Cap	5. Pollutant Comment
NO_X	A				
CO	A				
VOC	B				
SO_2	B				
PM	B				
HAPs	A				

C. FACILITY SUPPLEMENTAL INFORMATION

Supplemental Requirements

1. Area Map Showing Facility Location:
   [X]Attached, Document ID: *Narrative Fig. 1-1* [ ] Not Applicable [ ] Waiver Requested

2. Facility Plot Plan:
   [X] Attached, Document ID: *Att. B* [ ] Not Applicable [X] Waiver Requested

3. Process Flow Diagram(s):
   [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested

4. Precautions to Prevent Emissions of Unconfined Particulate Matter:
   [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested

5. Fugitive Emissions Identification:
   [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested

6. Supplemental Information for Construction Permit Application:
   [X] Attached, Document ID: *Att. C* [ ] Not Applicable

7. Supplemental Requirements Comment:

Attachment B contains a plot plan.

Attachment C has vendor supplied information.

Attachment D has supporting calculations.

Attachment E consists of a test report for Engines 1204 and 1205.

Additional Supplemental Requirements for Title V Air Operation Permit Applications

8. List of Proposed Insignificant Activities:
   [ ] Attached, Document ID:_____ [X] Not Applicable

9. List of Equipment/Activities Regulated under Title VI:
   [ ] Attached, Document ID:_____
   [ ] Equipment/Activities On site but Not Required to be Individually Listed
   [X] Not Applicable

10. Alternative Methods of Operation:
    [ ] Attached, Document ID:_____ [X] Not Applicable

11. Alternative Modes of Operation (Emissions Trading):
    [ ] Attached, Document ID:_____ [X] Not Applicable

12. Identification of Additional Applicable Requirements:
    [ ] Attached, Document ID:_____ [X] Not Applicable

13. Risk Management Plan Verification:
    [ ] Plan previously submitted to Chemical Emergency Preparedness and Prevention Office (CEPPO). Verification of submittal attached (Document ID:_____) or previously submitted to DEP (Date and DEP Office:_____)
    [ ] Plan to be submitted to CEPPO (Date required:_____)
    [X] Not Applicable

14. Compliance Report and Plan:
    [ ] Attached, Document ID:_____ [X] Not Applicable

15. Compliance Certification (Hard-copy Required):
    [ ] Attached, Document ID: _____ [X] Not Applicable

III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through J as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application.

A. GENERAL EMISSIONS UNIT INFORMATION
(All Emissions Units)

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in This Section: (Check one)

[X] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Regulated or Unregulated Emissions Unit? (Check one)

[X] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):

15,700 bhp natural gas fired turbine compressor unit, Engine No. 1208

4. Emissions Unit Identification Number: [X] No ID
ID: [ ] ID Unknown

5. Emissions Unit Status Code:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A	10/01/01	49	[ ]

9. Emissions Unit Comment: (Limit to 500 Characters)

The proposed new turbine engine will be a Pignone PGT10B engine compressor unit ISO rated at 15,700 bhp. Fuel will be exclusively natural gas from FGT's gas pipeline. The proposed engine will incorporate dry, low NO_X combustion technology.

Emissions Unit Control Equipment

1. Control Equipment/Method Description (Limit to 200 characters per device or method):

The proposed engine will incorporate dry, low NOX combustion technology.

2. Control Device or Method Code(s): NA

Emissions Unit Details

1. Package Unit:
   Manufacturer: Pignone Model Number: PGT10B
2. Generator Nameplate Rating: MW
3. Incinerator Information:
   Dwell Temperature: °F
   Dwell Time: seconds
   Incinerator Afterburner Temperature: °F

B. EMISSIONS UNIT CAPACITY INFORMATION
(Regulated Emissions Units Only)

Emissions Unit Operating Capacity and Schedule

1. Maximum Heat Input Rate:	134.77	mmBtu/hr	
2. Maximum Incineration Rate: NA	lb/hr		tons/day
3. Maximum Process or Throughput Rate: NA			
4. Maximum Production Rate: NA			
5. Requested Maximum Operating Schedule:			
	24 hours/day		7 days/week
	52 weeks/year		8760 hours/year
6. Operating Capacity/Schedule Comment (limit to 200 characters):			
Heat input is 134.77 MM Btu/hr based on vendor specifications of 122.52 MM Btu/hr plus 10%.			

C. EMISSIONS UNIT REGULATIONS
(Regulated Emissions Units Only)

List of Applicable Regulations

FDEP Title V Core List	
62-296.320(4)(b)1 General Visible Emissions Standards	
40 CFR 60, Subpart GG Standards of Performance for Stationary Gas-fired	

D. EMISSI2ON POINT (STACK/VENT) INFORMATION
(Regulated Emissions Units Only)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram? 1208	2. Emission Point Type Code: 1	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): NA		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: None		
5. Discharge Type Code: V	6. Stack Height: 61.5 feet	7. Exit Diameter: 7.6 feet
8. Exit Temperature: 909 °F	9. Actual Volumetric Flow Rate: 215,175 acfm	10. Water Vapor:
11. Maximum Dry Standard Flow Rate: dscfm	12. Nonstack Emission Point Height: feet	
13. Emission Point UTM Coordinates: Zone: 16 East (km): 510.830 North (km): 3419.030		
14. Emission Point Comment (limit to 200 characters):		

E. SEGMENT (PROCESS/FUEL) INFORMATION
(All Emissions Units)

Segment Description and Rate: Segment __1__ of __1__

1. Segment Description (Process/Fuel Type) (limit to 500 characters):		
Natural gas fired reciprocating internal combustion engine driving a natural gas compressor, operating full time.		
2. Source Classification Code (SCC): 2-02-002-01	3. SCC Units: million cubic feet burned	
4. Maximum Hourly Rate: 0.1296	5. Maximum Annual Rate: 1135.3	6. Estimated Annual Activity Factor: NA
7. Maximum % Sulfur: 0.03	8. Maximum % Ash: 0.0	9. Million Btu per SCC Unit: 1040
10. Segment Comment (limit to 200 characters): Percent Sulfur is based on maximum Federal Energy Regulatory Commission (FERC) limit of 10 gr S/100scf and gas density of 0.0455 lb/scf.		

Segment Description and Rate: Segment _NA__ of _____

1. Segment Description (Process/Fuel Type) (limit to 500 characters):		
2. Source Classification Code (SCC):	CC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment (limit to 200 characters):		

F. EMISSIONS UNIT POLLUTANTS
(All Emissions Units)

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
VOC			EL
SO_2			EL
PM			EL
NO_X			EL
CO			EL
PM_{10}			EL
HAPs			NS

Emissions Unit Information Section ___1___ of ___5___

Pollutant Detail Information Page ___1__ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: NOX	2. Total Percent Efficiency of Control:
3. Potential Emissions: 14.10 lb/hour 61.8 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 14.1 lb/hr Reference: Vendor's data	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): (14.10 lb/hr)(1 ton/2000 lb)(8760hr/1 yr) = 61.76 tons/year	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Vendor's data based on ISO conditions and site elevation.	

Allowable Emissions Allowable Emissions ___1_ of __1__

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units: 25 ppmv	4. Equivalent Allowable Emissions: 14.10 lb/hour 61.8 tons/year
5. Method of Compliance (limit to 60 characters): Initial performance test.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): 40 CFR 60.332(3) limits NOX emissions to 196 ppmv.	

Emissions Unit Information Section ___1___ **of** ___5___

Pollutant Detail Information Page ___2__ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: CO	2. Total Percent Efficiency of Control:
3. Potential Emissions: 22.50 lb/hour 98.55 tons/year	4. Synthetically Limited? [Y]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 5.14 lb/hr @ 100% load; 10.23 lb/hr @ 70% load, 22.5 lb/hr @ 50% load Reference: Vendor's data	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): (22.5 lb/hr)(1 ton/2000 lb)(8760 hr/yr) = 98.55 tons/yr 100% load for 6570 hr/yr, 60% load for 1752 hr/yr and 50% load for 438 hr/yr. (5.14 lb/hr)(1 ton/2000 lb)(6570 hr/yr) = 16.88 tons/yr (10.23 lb/hr)(1 ton/2000 lb)(1752 hr/yr) = 8.96 tons/yr (22.5 lb/hr)(1 ton/2000 lb)(438 hr/yr) = 4.93 tons/yr 16.88 tpy + 8.96 tpy + 4.93 tpy = 30.77 tpy	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Vendor's data based on ISO conditions at various loads.	

Allowable Emissions Allowable Emissions ___1_ of __3___

1. Basis for Allowable Emissions Code: ESCPSD	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: 5.14 lb/hour 16.9 tons/year
5. Method of Compliance (limit to 60 characters): Compliance test and Recordkeeping of hours of operation and load.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): Hours at 100% load = to 6750 hr/yr or more (5.14 lb/hr)(1 ton/2000 lb)(6570 hr/yr) = 16.88 tons/yr	

Emissions Unit Information Section ___1___ of ___5___

Pollutant Detail Information Page ___2__ of ___6___

Allowable Emissions Allowable Emissions ___2_ of __3___

1. Basis for Allowable Emissions Code: ESCPSD	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: 10.23 lb/hour 9.0 tons/year
5. Method of Compliance (limit to 60 characters): Compliance test and Recordkeeping of hours of operation and load.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): Hours at 70% load = to 1752 hr/yr or less (10.23 lb/hr)(1 ton/2000 lb)(1752 hr/yr) = 8.96 tons/yr	

Allowable Emissions Allowable Emissions ___3_ of __3___

1. Basis for Allowable Emissions Code: ESCPSD	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: 22.5 lb/hour 4.9 tons/year
5. Method of Compliance (limit to 60 characters): Compliance test and Recordkeeping of hours of operation and load.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): Hours at 50% load = to 438 hr/yr or less (22.5 lb/hr)(1 ton/2000 lb)(438 hr/yr) = 4.93 tons/yr	

Emissions Unit Information Section ___1___ of ___5___

Pollutant Detail Information Page ___3_ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: VOC	2. Total Percent Efficiency of Control:
3. Potential Emissions: 1.46 lb/hour 6.39 tons/year	4. Synthetically Limited? [Y]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.29 lb/hr @ 100% load; 0.80 lb/hr @ 70% load, 1.46 lb/hr @ 50% load Reference: Vendor's data	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): (1.46 lb/hr)(1 ton/2000 lb)(8760 hr/yr) = 6.39 tons/yr 100% load for 6570 hr/yr, 70% load for 1752 hr/yr and 50% load for 438 hr/yr. (0.29 lb/hr)(1 ton/2000 lb)(6570 hr/yr) = 0.95 tons/yr (0.80 lb/hr)(1 ton/2000 lb)(1752 hr/yr) = 0.70 tons/yr (1.46 lb/hr)(1 ton/2000 lb)(438 hr/yr) = 0.32 tons/yr 0.95 tpy + 0.70 tpy + 0.32 tpy = 1.97 tpy	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Vendor's data based on ISO conditions at various loads for total hydrocarbons (THC). VOCs assumed to be 10% of THC	

Allowable Emissions Allowable Emissions __1__ of __3__

1. Basis for Allowable Emissions Code: ESCPSD	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: 0.29 lb/hour 0.95 tons/year
5. Method of Compliance (limit to 60 characters): Compliance test and Recordkeeping of hours of operation and load.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): Hours at 100% load = to 6750 hr/yr or more (0.29 lb/hr)(1 ton/2000 lb)(6570 hr/yr) = 0.95 tons/yr	

Allowable Emissions Allowable Emissions __2__ of __3__

1. Basis for Allowable Emissions Code: ESCPSD	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: 0.80 lb/hour 0.7 tons/year
5. Method of Compliance (limit to 60 characters): Compliance test and Recordkeeping of hours of operation and load.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): Hours at 70% load = to 1752 hr/yr or less (0.80 lb/hr)(1 ton/2000 lb)(1752 hr/yr) = 0.70 tons/yr	

Allowable Emissions Allowable Emissions __3__ of __3__

1. Basis for Allowable Emissions Code: ESCPSD	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: 1.46 lb/hour 0.32 tons/year
5. Method of Compliance (limit to 60 characters): Compliance test and Recordkeeping of hours of operation and load.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): Hours at 50% load = to 438 hr/yr or less (1.46 lb/hr)(1 ton/2000 lb)(438 hr/yr) = 0.32 tons/yr	

Emissions Unit Information Section ___1___ **of** __5___

Pollutant Detail Information Page ___4_ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: SO2	2. Total Percent Efficiency of Control:

3. Potential Emissions: 3.70 lb/hour 16.2 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 10 gr/100scf Reference: Vendor's fuel use and FERC limitation	7. Emissions Method Code: 3

8. Calculation of Emissions (limit to 600 characters):

(10 gr S/100 scf)(0.1296 MMscf/hr)(1 lb/7000 gr) = 1.85 lb S/hr
(1.85 lb S/hr)(2 lb SO2/lb S) = 3.70 lb SO2/hr
(3.70 lb SO2/hr)(8760 hr/yr)(1 ton/2000 lb) = 16.22 ton/yr

9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):

SO2 emission factor is based on maximum Federal Energy Regulatory Commission (FERC) limit of 10 gr S/100 scf and gas density of 0.0455 lb/scf.

Allowable Emissions Allowable Emissions ___1_ of __1__

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: 4 ppmv	4. Equivalent Allowable Emissions: 3.70 lb/hour 16.2 tons/year

5. Method of Compliance (limit to 60 characters):

Initial performance test and fuel monitoring.

6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):

40 CFR 60.332(3) limits SO2 emissions to 150 ppmv.

Emissions Unit Information Section ___1___ of ___5___

Pollutant Detail Information Page ___5__ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: PM	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.89 lb/hour 3.90 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.0066 lb/MM Btu Reference: Table 3.1-2a, AP-42 4/00, Supplement E	7. Emissions Method Code: 4
8. Calculation of Emissions (limit to 600 characters): (0.0066 lb/MM Btu)(134.77 MM Btu/hr) = 0.89 lb/hr (0.89 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 3.90 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: HAPs	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.751 lb/hour 3.29 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.0217 g/hp-hr Reference: GRI-HAPCalc 3.0	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): (0.0217g/hp-hr)(15,700 hp)(1 lb/453.6 g) = 0.751 lb/hr (0.751/lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 3.29 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Detailed calculations provided in Attachment D. HAP emissions are also included in VOC emissions.	

Allowable Emissions Allowable Emissions ___NA__ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

H. VISIBLE EMISSIONS INFORMATION
(Only Regulated Emissions Units Subject to a VE Limitation)

Visible Emissions Limitation: Visible Emissions Limitation _____ of _____

1. Visible Emissions Subtype: VE20	2. Basis for Allowable Opacity: [X] Rule [ ] Other
3. Requested Allowable Opacity: Normal Conditions: 20 % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment (limit to 200 characters):	

I. CONTINUOUS MONITOR INFORMATION
(Only Regulated Emissions Units Subject to Continuous Monitoring)

Continuous Monitoring System: Continuous Monitor __NA_ of _____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	[ ] Rule [ ] Other
4. Monitor Information: Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment (limit to 200 characters):	

J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION
(Regulated Emissions Units Only)

Supplemental Requirements

1. Process Flow Diagram [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
2. Fuel Analysis or Specification [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
3. Detailed Description of Control Equipment [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested
4. Description of Stack Sampling Facilities [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
5. Compliance Test Report [ ] Attached, Document ID:_____ [ ] Previously submitted, Date:_____ [X] Not Applicable
6. Procedures for Startup and Shutdown [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
7. Operation and Maintenance Plan [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested
8. Supplemental Information for Construction Permit Application [X] Attached, Document ID:_*Narrative*__ [ ] Not Applicable
9. Other Information Required by Rule or Statute [ ] Attached, Document ID:_____ [X] Not Applicable
10. Supplemental Requirements Comment: Supplemental information is provided in the narrative description and Attachment C accompanying these forms.

Additional Supplemental Requirements for Title V Air Operation Permit Applications

11. Alternative Methods of Operation
[ ] Attached, Document ID:_____ [X] Not Applicable

12. Alternative Modes of Operation (Emissions Trading)
[ ] Attached, Document ID:_____ [X] Not Applicable

13. Identification of Additional Applicable Requirements
[ ] Attached, Document ID:_____ [X] Not Applicable

14. Compliance Assurance Monitoring Plan
[ ] Attached, Document ID:_____ [X] Not Applicable

15. Acid Rain Part Application (Hard-copy Required) NA

[ ] Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))
Attached, Document ID:_____

[ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
Attached, Document ID:_____

[ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.)
Attached, Document ID:_____

[ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)
Attached, Document ID:_____

[ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)
Attached, Document ID:_____

[ ] Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)
Attached, Document ID:_____

[ ] Not Applicable

III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through J as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application.

A. GENERAL EMISSIONS UNIT INFORMATION
(All Emissions Units)

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in This Section: (Check one)

[X] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Regulated or Unregulated Emissions Unit? (Check one)

[X] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):

13,078 bhp natural gas fired turbine compressor unit, Engine No. 1207

4. Emissions Unit Identification Number: [X] No ID
ID: [ ] ID Unknown

5. Emissions Unit Status Code:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A	1/19/01	49	[ ]

9. Emissions Unit Comment: (Limit to 500 Characters)

The existing Solar Mars 90 turbine engine will be uprated from 10,350 bhp to 13,078 bhp. Fuel will be exclusively natural gas from the FGT's gas pipeline. The proposed engine will incorporate dry, low NO_X combustion technology.

Emissions Unit Control Equipment

1. Control Equipment/Method Description (Limit to 200 characters per device or method):

The proposed engine will incorporate dry, low NO_X combustion technology.

2. Control Device or Method Code(s): NA

Emissions Unit Details

1. Package Unit: Manufacturer:	Solar	Model Number: Mars 90 T-13000S
2. Generator Nameplate Rating:		MW
3. Incinerator Information:		
	Dwell Temperature:	°F
	Dwell Time:	seconds
	Incinerator Afterburner Temperature:	°F

B. EMISSIONS UNIT CAPACITY INFORMATION
(Regulated Emissions Units Only)

Emissions Unit Operating Capacity and Schedule

1. Maximum Heat Input Rate:	112.81	mmBtu/hr	
2. Maximum Incineration Rate: NA	lb/hr	tons/day	
3. Maximum Process or Throughput Rate: NA			
4. Maximum Production Rate: NA			
5. Requested Maximum Operating Schedule:			
	24 hours/day	7 days/week	
	52 weeks/year	8760 hours/year	
6. Operating Capacity/Schedule Comment (limit to 200 characters):			
Heat input is 112.81 MM Btu/hr based on vendor specifications of 7,842 Btu/Bhp-hr plus 10% and 13,078 bhp.			

C. EMISSIONS UNIT REGULATIONS
(Regulated Emissions Units Only)

List of Applicable Regulations

FDEP Title V Core List	
62-296.320(4)(b)1 General Visible Emissions Standards	
40 CFR 60, Subpart GG Standards of Performance for Stationary Gas-fired	

D. EMISSION POINT (STACK/VENT) INFORMATION
(Regulated Emissions Units Only)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram? 1207	2. Emission Point Type Code: 1	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): NA		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: None		
5. Discharge Type Code: V	6. Stack Height: 58 feet	7. Exit Diameter: 7.5 x 8 feet
8. Exit Temperature: 867 °F	9. Actual Volumetric Flow Rate: 179,531 acfm	10. Water Vapor:
11. Maximum Dry Standard Flow Rate: dscfm	12. Nonstack Emission Point Height: feet	
13. Emission Point UTM Coordinates: Zone: 16 East (km): 510.830 North (km): 3419.030		
14. Emission Point Comment (limit to 200 characters):		

E. SEGMENT (PROCESS/FUEL) INFORMATION
(All Emissions Units)

Segment Description and Rate: Segment __1__ of __1__

1. Segment Description (Process/Fuel Type) (limit to 500 characters): Natural gas fired turbine engine driving a natural gas compressor, operating full time.		
2. Source Classification Code (SCC): 2-02-002-01	3. SCC Units: million cubic feet burned	
4. Maximum Hourly Rate: 0.10847	5. Maximum Annual Rate: 950.21	6. Estimated Annual Activity Factor: NA
7. Maximum % Sulfur: 0.03	8. Maximum % Ash: 0.0	9. Million Btu per SCC Unit: 1040
10. Segment Comment (limit to 200 characters): Percent Sulfur is based on maximum Federal Energy Regulatory Commission (FERC) limit of 10 gr S/100scf and gas density of 0.0455 lb/scf.		

Segment Description and Rate: Segment _NA__ of _____

1. Segment Description (Process/Fuel Type) (limit to 500 characters):		
2. Source Classification Code (SCC):	CC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment (limit to 200 characters):		

F. EMISSIONS UNIT POLLUTANTS
(All Emissions Units)

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
VOC			EL
SO_2			EL
PM			EL
NO_X			EL
CO			EL
PM_{10}			EL
HAPs			NS

Emissions Unit Information Section ___2___ of ___5___

Pollutant Detail Information Page ___1__ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: NOX	2. Total Percent Efficiency of Control:
3. Potential Emissions: 10.21 lb/hour 44.7 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 10.21 lb/hr Reference: Vendor's data	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): (10.21 lb/hr)(1 ton/2000 lb)(8760hr/1 yr) = 44.72 tons/year	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Vendor's data based on ISO conditions with site elevation.	

Allowable Emissions Allowable Emissions ___1_ of __1__

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units: 25 ppmv	4. Equivalent Allowable Emissions: 10.21 lb/hour 44.7 tons/year
5. Method of Compliance (limit to 60 characters): Initial performance test.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): 40 CFR 60.332(3) limits NOX emissions to 195 ppmv.	

Emissions Unit Information Section ___2___ **of** ___5___

Pollutant Detail Information Page ___2__ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: CO	2. Total Percent Efficiency of Control:
3. Potential Emissions: 12.43 lb/hour 54.45 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 12.43 lb/hr Reference: Vendor's data	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): (12.43 lb/hr)(1 ton/2000 lb)(8760 hr/1 yr) = 54.45 tons/year	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Vendor emission factor is based on a guaranteed value of 50 ppmv.	

Allowable Emissions Allowable Emissions __NA__ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___2___ of ___5___

Pollutant Detail Information Page ___3_ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: VOC	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.356 lb/hour 1.56 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 3.56 lb/hr UHC Reference: Vendor's data	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): Vendor factor for unburned hydrocarbons (UHC) = 3.56 lb/hr. Assume 10% is VOC. (0.356 lb/hr)(1 ton/2000 lb)(8760 hr/1 yr) = 1.56 tons/year	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions __NA__ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___2___ of ___5___

Pollutant Detail Information Page ___4_ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: SO2	2. Total Percent Efficiency of Control:
3. Potential Emissions: 3.10 lb/hour 13.57 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 10 gr/100scf Reference: Vendor's fuel use and FERC limitation	7. Emissions Method Code: 3

8. Calculation of Emissions (limit to 600 characters):

(10 gr S/100 scf)(0.10847 MMscf/hr)(1 lb/7000 gr) = 1.55 lb S/hr
(1.55 lb S/hr)(2 lb SO2/lb S) = 3.10 lb SO2/hr
(3.10 lb SO2/hr)(8760 hr/yr)(1 ton/2000 lb) = 13.57 ton/yr

9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):

Based on vendor's fuel use data plus 10%.
SO2 emission factor is based on maximum Federal Energy Regulatory Commission (FERC) limit of 10 gr S/100 scf and gas density of 0.0455 lb/scf.

Allowable Emissions Allowable Emissions ___1_ of __1__

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: 4 ppmv	4. Equivalent Allowable Emissions: 3.10 lb/hour 13.6 tons/year

5. Method of Compliance (limit to 60 characters):

Initial performance test and fuel monitoring.

6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):

40 CFR 60.332(3) limits SO2 emissions to 150 ppmv.

Emissions Unit Information Section ___2___ of ___5___

Pollutant Detail Information Page ___5__ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: PM/PM10	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.74 lb/hour 3.3 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.0066 lb/MM Btu Reference: Table 3.1-2a, AP-42 4/00 Supplement E	7. Emissions Method Code: 4
8. Calculation of Emissions (limit to 600 characters): (0.0066 lb/MM Btu)(102.15 MM Btu/hr) = 0.74 lb/hr (0.74 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 3.26 ton/y	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Based on vendor's fuel use data plus 10%.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: HAPs	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.63 lb/hour 2.74 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.0217 g/hp-hr Reference: GRI-HAPCalc 3.0	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): (0.0217 g/hp-hr)(13,078 hp-hr)(1 lb/453.6 g) = 0.626 lb/hr (0.626 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 2.74 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Detailed calculations provided in Attachment D. HAP emissions are included in VOC emissions.	

Allowable Emissions Allowable Emissions ___NA__ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

H. VISIBLE EMISSIONS INFORMATION
(Only Regulated Emissions Units Subject to a VE Limitation)

Visible Emissions Limitation: Visible Emissions Limitation _____ of _____

1. Visible Emissions Subtype: VE20	2. Basis for Allowable Opacity: [X] Rule [ ] Other
3. Requested Allowable Opacity: Normal Conditions: 20 % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment (limit to 200 characters):	

I. CONTINUOUS MONITOR INFORMATION
(Only Regulated Emissions Units Subject to Continuous Monitoring)

Continuous Monitoring System: Continuous Monitor __NA_ of _____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	[ ] Rule [ ] Other
4. Monitor Information: Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment (limit to 200 characters):	

J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION
(Regulated Emissions Units Only)

Supplemental Requirements

1. Process Flow Diagram [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
2. Fuel Analysis or Specification [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
3. Detailed Description of Control Equipment [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested
4. Description of Stack Sampling Facilities [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
5. Compliance Test Report [ ] Attached, Document ID:_____ [ ] Previously submitted, Date:_____ [X] Not Applicable
6. Procedures for Startup and Shutdown [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
7. Operation and Maintenance Plan [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested
8. Supplemental Information for Construction Permit Application [X] Attached, Document ID:_Narrative__ [ ] Not Applicable
9. Other Information Required by Rule or Statute [ ] Attached, Document ID:_____ [X] Not Applicable
10. Supplemental Requirements Comment: Supplemental information is provided in the narrative description and Attachment C accompanying these forms. Emissions testing has not been performed on this unit.

Additional Supplemental Requirements for Title V Air Operation Permit Applications

11. Alternative Methods of Operation
[ ] Attached, Document ID:_____ [X] Not Applicable

12. Alternative Modes of Operation (Emissions Trading)
[ ] Attached, Document ID:_____ [X] Not Applicable

13. Identification of Additional Applicable Requirements
[ ] Attached, Document ID:_____ [X] Not Applicable

14. Compliance Assurance Monitoring Plan
[ ] Attached, Document ID:_____ [X] Not Applicable

15. Acid Rain Part Application (Hard-copy Required) NA

[ ] Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))
Attached, Document ID:_____

[ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
Attached, Document ID:_____

[ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.)
Attached, Document ID:_____

[ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)
Attached, Document ID:_____

[ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)
Attached, Document ID:_____

[ ] Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)
Attached, Document ID:_____

[ ] Not Applicable

III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through J as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application.

A. GENERAL EMISSIONS UNIT INFORMATION
(All Emissions Units)

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in This Section: (Check one)

[X] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Regulated or Unregulated Emissions Unit? (Check one)

[X] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):

Reciprocating I.C. Engine 1204, 2000 bhp, natural gas fired

4. Emissions Unit Identification Number: ID: 007 [ ] No ID [ ] ID Unknown

5. Emissions Unit Status Code:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A	1966	49	[ ]

9. Emissions Unit Comment: (Limit to 500 Characters)

This is an existing 2000 bhp reciprocating compressor engine that is being modified. See Narrative Section 2.2.3 for description of modifications. The modification will result in a decrease in NO_X emissions and an increase in fuel use.

Emissions Unit Control Equipment

1. Control Equipment/Method Description (Limit to 200 characters per device or method):

A catalytic converter for CO control is being added.
See Narrative Section 2.2.3.

2. Control Device or Method Code(s): 99

Emissions Unit Details

1. Package Unit:
   Manufacturer: Cooper-Bessemer Model Number: LS-8-SG
2. Generator Nameplate Rating: MW
3. Incinerator Information:
   Dwell Temperature: °F
   Dwell Time: seconds
   Incinerator Afterburner Temperature: °F

B. EMISSIONS UNIT CAPACITY INFORMATION
(Regulated Emissions Units Only)

Emissions Unit Operating Capacity and Schedule

1. Maximum Heat Input Rate:	16.5	mmBtu/hr
2. Maximum Incineration Rate: NA	lb/hr	tons/day
3. Maximum Process or Throughput Rate: NA		
4. Maximum Production Rate: NA		
5. Requested Maximum Operating Schedule:		
	24 hours/day	7 days/week
	52 weeks/year	8760 hours/year
6. Operating Capacity/Schedule Comment (limit to 200 characters):		
Manufacturer rated at 2000 bhp. Heat output based on expected 10% increase after modification.		

C. EMISSIONS UNIT REGULATIONS2
(Regulated Emissions Units Only)

List of Applicable Regulations

FDEP Title V Core List	
62-296.320(4)(b)1 General Visible Emissions Standards	

D. EMISSION POINT (STACK/VENT) INFORMATION
(Regulated Emissions Units Only)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram? 1204	2. Emission Point Type Code: 1	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): NA		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: None		
5. Discharge Type Code: V	6. Stack Height: 28 feet	7. Exit Diameter: 1.44 feet
8. Exit Temperature: 700 °F	9. Actual Volumetric Flow Rate: 11,637 acfm	10. Water Vapor: %
11. Maximum Dry Standard Flow Rate: dscfm	12. Nonstack Emission Point Height: feet	
13. Emission Point UTM Coordinates: Zone: 16 East (km): 510.830 North (km): 3419.030		
14. Emission Point Comment (limit to 200 characters):		

E. SEGMENT (PROCESS/FUEL) INFORMATION
(All Emissions Units)

Segment Description and Rate: Segment __1__ of __1__

1. Segment Description (Process/Fuel Type) (limit to 500 characters):		
Natural gas fired reciprocating internal combustion engine driving a natural gas compressor, operating full time.		
2. Source Classification Code (SCC): 2-02-002-54	3. SCC Units: million cubic feet burned	
4. Maximum Hourly Rate: 0.0159	5. Maximum Annual Rate: 138.98	6. Estimated Annual Activity Factor: NA
7. Maximum % Sulfur: 0.03	8. Maximum % Ash: 0.0	9. Million Btu per SCC Unit: 1040
10. Segment Comment (limit to 200 characters): Percent Sulfur is based on maximum Federal Energy Regulatory Commission (FERC) limit of 10 gr S/100scf and gas density of 0.0455 lb/scf.		

Segment Description and Rate: Segment _NA__ of _____

1. Segment Description (Process/Fuel Type) (limit to 500 characters):		
2. Source Classification Code (SCC):	CC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment (limit to 200 characters):		

F. EMISSIONS UNIT POLLUTANTS
(All Emissions Units)

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
VOC			EL
SO_2			EL
PM/PM_{10}			EL
NO_X			EL
CO	99		EL
HAPs			NS

Emissions Unit Information Section ___3___ **of** ___5___

Pollutant Detail Information Page ___1___ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: NOX	2. Total Percent Efficiency of Control:
3. Potential Emissions: 23.81 lb/hour 104.3 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 5.4 g/hp-hr Reference: Test data for similar unit	7. Emissions Method Code: 1
8. Calculation of Emissions (limit to 600 characters): (5.4 g/hp-hr)(2000 bhp)(1lb/453.6 g) = 23.81 lb/hr (23.81 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 104.3 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Expected emission rate based upon test data for modified engine of the same model.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___3___ **of** ___5___

Pollutant Detail Information Page ___2___ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: CO	2. Total Percent Efficiency of Control:
3. Potential Emissions: 3.53 lb/hour 15.5 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.8 g/hp-hr Reference: Test data for similar unit	7. Emissions Method Code: 1
8. Calculation of Emissions (limit to 600 characters): (0.8 g/hp-hr)(2000 bhp)(1lb/453.6 g) = 3.53 lb/hr (3.53 lb/hr)(1 ton/2000 lb)(8760 hr/1 yr) = 15.5 tons/year	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Expected emission rate based upon test data for modified engine of the same model. Catalytic converter used for control.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___3___ **of** ___5___

Pollutant Detail Information Page ___3___ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: VOC	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.44 lb/hour 1.93 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.1 g/hp-hr Reference: Test data for similar unit	7. Emissions Method Code: 1
8. Calculation of Emissions (limit to 600 characters): (0.1 g/hp-hr)(2000 bhp)(1lb/453.6 g) = 0.44 lb/hr (0.44 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 1.93 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Expected emission rate based upon test data for modified engine of the same model.	

Allowable Emissions Allowable Emissions __NA__ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___3___ **of** ___5___

Pollutant Detail Information Page ___4___ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: SO2	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.45 lb/hour 2.0 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 10 grains/100 scf Reference: FERC maximum allowable	7. Emissions Method Code: 2
8. Calculation of Emissions (limit to 600 characters): (10.0 gr S/100 scf)(0.0159 MM scf/hr)(1 lb/7000 gr) = 0.23 lb S/hr (0.23 lb S/hr)(2 lb/lb S) = 0.45 lb SO2/hr (0.45 lb SO2/hr)(8760 hr/yr)(1 ton/2000 lb) = 1.98 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Projected fuel use based on test data. SO2 emission factor is based on maximum Federal Energy Regulatory Commission (FERC) limit of 10 gr S/100 scf and gas density of 0.0455 lb/scf.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___3___ **of** ___5___

Pollutant Detail Information Page ___5___ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: PM	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.16 lb/hour 0.72 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.00999 lb/MM Btu Reference: AP-42 Section 3.2 Table 3.2-2, 4/00 Supplement E	7. Emissions Method Code: 4
8. Calculation of Emissions (limit to 600 characters): (0.00999 lb/MM Btu)(16.5 MM Btu/hr) = 0.16 lb/hr (0.16 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 0.72 ton/y	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Projected fuel use based on test data.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: HAPs	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.76 lb/hour 3.3 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.172 g/hp-hr Reference: GRI-HAPCalc 3.0	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): (0.172 g/hp-hr)(2,000 hp-hr)(1 lb/453.6 g) = 0.758 lb/hr (0.758 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 3.32 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Detailed calculations provided in Attachment D. HAP emissions are included in VOC emissions.	

Allowable Emissions Allowable Emissions ___NA__ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

H. VISIBLE EMISSIONS INFORMATION
(Only Regulated Emissions Units Subject to a VE Limitation)

Visible Emissions Limitation: Visible Emissions Limitation _____ of _____

1. Visible Emissions Subtype: VE20	2. Basis for Allowable Opacity: [X] Rule [ ] Other
3. Requested Allowable Opacity: Normal Conditions: 20 % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment (limit to 200 characters): Subject to 62-296-320(4)(b)1 General Visible Emissions Standards.	

I. CONTINUOUS MONITOR INFORMATION
(Only Regulated Emissions Units Subject to Continuous Monitoring)

Continuous Monitoring System: Continuous Monitor __NA_ of _____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	[ ] Rule [ ] Other
4. Monitor Information: Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment (limit to 200 characters):	

J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION
(Regulated Emissions Units Only)

Supplemental Requirements

1. Process Flow Diagram [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
2. Fuel Analysis or Specification [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
3. Detailed Description of Control Equipment [X] Attached, Document ID:_Att. C__ [ ] Not Applicable [ ] Waiver Requested
4. Description of Stack Sampling Facilities [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
5. Compliance Test Report [ ] Attached, Document ID:_____ [ ] Previously submitted, Date:_____ [X] Not Applicable
6. Procedures for Startup and Shutdown [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
7. Operation and Maintenance Plan [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested
8. Supplemental Information for Construction Permit Application [X] Attached, Document ID:_Narrative [ ] Not Applicable
9. Other Information Required by Rule or Statute [ ] Attached, Document ID:_____ [X] Not Applicable
10. Supplemental Requirements Comment: Process flow diagrams and fuel analyses have been previously submitted. Supplemental information is provided in the narrative description accompanying these forms. Attachment E contains an emissions test report for the pre-modification unit.

Additional Supplemental Requirements for Title V Air Operation Permit Applications

11. Alternative Methods of Operation
[ ] Attached, Document ID:_____ [X] Not Applicable

12. Alternative Modes of Operation (Emissions Trading)
[ ] Attached, Document ID:_____ [X] Not Applicable

13. Identification of Additional Applicable Requirements
[ ] Attached, Document ID:_____ [X] Not Applicable

14. Compliance Assurance Monitoring Plan
[ ] Attached, Document ID:_____ [X] Not Applicable

15. Acid Rain Part Application (Hard-copy Required) NA

[ ] Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))
Attached, Document ID:_____

[ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
Attached, Document ID:_____

[ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.)
Attached, Document ID:_____

[ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)
Attached, Document ID:_____

[ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)
Attached, Document ID:_____

[ ] Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)
Attached, Document ID:_____

[ ] Not Applicable

III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through J as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application.

A. GENERAL EMISSIONS UNIT INFORMATION
(All Emissions Units)

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in This Section: (Check one)

[X] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Regulated or Unregulated Emissions Unit? (Check one)

[X] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):

Reciprocating I.C. Engine 1205, 2000 bhp, natural gas fired

4. Emissions Unit Identification Number: ID: 007 [ ] No ID [ ] ID Unknown

5. Emissions Unit Status Code:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A	1968	49	[ ]

9. Emissions Unit Comment: (Limit to 500 Characters)

This is an existing 2000 bhp reciprocating compressor engine that is being modified. See Narrative Section 2.2.3 for description of modifications. The modification will result in a decrease in NO_X emissions and an increase in fuel use.

Emissions Unit Control Equipment

1. Control Equipment/Method Description (Limit to 200 characters per device or method):

A catalytic converter for CO control is being added.
See Narrative Section 2.2.3.

2. Control Device or Method Code(s): 99

Emissions Unit Details

1. Package Unit:
   Manufacturer: Cooper-Bessemer Model Number: LS-8-SG
2. Generator Nameplate Rating: MW
3. Incinerator Information:
   Dwell Temperature: °F
   Dwell Time: seconds
   Incinerator Afterburner Temperature: °F

B. EMISSIONS UNIT CAPACITY INFORMATION
(Regulated Emissions Units Only)

Emissions Unit Operating Capacity and Schedule

1. Maximum Heat Input Rate:	16.5	mmBtu/hr
2. Maximum Incineration Rate: NA	lb/hr	tons/day
3. Maximum Process or Throughput Rate: NA		
4. Maximum Production Rate: NA		
5. Requested Maximum Operating Schedule:		
	24 hours/day	7 days/week
	52 weeks/year	8760 hours/year
6. Operating Capacity/Schedule Comment (limit to 200 characters):		
Manufacturer rated at 2000 bhp. Heat output based on expected 10% increase after modification.		

C. EMISSIONS UNIT REGULATIONS
(Regulated Emissions Units Only)

List of Applicable Regulations

FDEP Title V Core List	
62-296.320(4)(b)1 General Visible Emissions Standards	

D. EMISSION POINT (STACK/VENT) INFORMATION
(Regulated Emissions Units Only)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram? 1205	2. Emission Point Type Code: 1	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): NA		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: None		
5. Discharge Type Code: V	6. Stack Height: 28 feet	7. Exit Diameter: 1.44 feet
8. Exit Temperature: 700 °F	9. Actual Volumetric Flow Rate: 11,637 acfm	10. Water Vapor: %
11. Maximum Dry Standard Flow Rate: dscfm	12. Nonstack Emission Point Height: feet	
13. Emission Point UTM Coordinates: Zone: 16 East (km): 510.830 North (km): 3419.030		
14. Emission Point Comment (limit to 200 characters):		

E. SEGMENT (PROCESS/FUEL) INFORMATION
(All Emissions Units)

Segment Description and Rate: Segment __1__ of __1__

1. Segment Description (Process/Fuel Type) (limit to 500 characters): Natural gas fired reciprocating internal combustion engine driving a natural gas compressor, operating full time.		
2. Source Classification Code (SCC): 2-02-002-54	3. SCC Units: million cubic feet burned	
4. Maximum Hourly Rate: 0.0159	5. Maximum Annual Rate: 138.98	6. Estimated Annual Activity Factor: NA
7. Maximum % Sulfur: 0.03	8. Maximum % Ash: 0.0	9. Million Btu per SCC Unit: 1040
10. Segment Comment (limit to 200 characters): Percent Sulfur is based on maximum Federal Energy Regulatory Commission (FERC) limit of 10 gr S/100scf and gas density of 0.0455 lb/scf.		

Segment Description and Rate: Segment _NA__ of _____

1. Segment Description (Process/Fuel Type) (limit to 500 characters):		
2. Source Classification Code (SCC):	CC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment (limit to 200 characters):		

F. EMISSIONS UNIT POLLUTANTS
(All Emissions Units)

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
VOC			EL
SO_2			EL
PM/PM_{10}			EL
NO_X			EL
CO	99		EL
HAPs			NS

Emissions Unit Information Section ___4___ of ___5___

Pollutant Detail Information Page ___1___ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: NOX	2. Total Percent Efficiency of Control:
3. Potential Emissions: 23.81 lb/hour 104.3 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 5.4 g/hp-hr Reference: Test data for similar unit	7. Emissions Method Code: 1
8. Calculation of Emissions (limit to 600 characters): (5.4 g/hp-hr)(2000 bhp)(1lb/453.6 g) = 23.81 lb/hr (23.81 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 104.3 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Expected emission rate based upon test data for modified engine of the same model.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___4___ **of** ___5___

Pollutant Detail Information Page ___2___ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: CO	2. Total Percent Efficiency of Control:
3. Potential Emissions: 3.53 lb/hour 15.5 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.8 g/hp-hr Reference: Test data for similar unit	7. Emissions Method Code: 1
8. Calculation of Emissions (limit to 600 characters): (0.8 g/hp-hr)(2000 bhp)(1lb/453.6 g) = 3.53 lb/hr (3.53 lb/hr)(1 ton/2000 lb)(8760 hr/1 yr) = 15.5 tons/year	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Expected emission rate based upon test data for modified engine of the same model. Catalytic converter used for control.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___4___ of ___5___

Pollutant Detail Information Page ___3___ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: VOC	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.44 lb/hour 1.9 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.1 g/hp-hr Reference: Test data for similar unit	7. Emissions Method Code: 1
8. Calculation of Emissions (limit to 600 characters): (0.1 g/hp-hr)(2000 bhp)(1lb/453.6 g) = 0.44 lb/hr (0.44 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 1.93 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Expected emission rate based upon test data for modified engine of the same model.	

Allowable Emissions Allowable Emissions __NA__ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___4___ **of** ___5___

Pollutant Detail Information Page ___4___ **of** ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: SO2	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.45 lb/hour 2.0 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 10 grains/100 scf Reference: FERC maximum allowable	7. Emissions Method Code: 2
8. Calculation of Emissions (limit to 600 characters): (10.0 gr S/100 scf)(0.0159 MM scf/hr)(1 lb/7000 gr) = 0.23 lb S/hr (0.23 lb S/hr)(2 lb/lb S) = 0.45 lb SO2/hr (0.45 lb SO2/hr)(8760 hr/yr)(1 ton/2000 lb) = 1.98 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Projected fuel use based on test data. SO2 emission factor is based on maximum Federal Energy Regulatory Commission (FERC) limit of 10 gr S/100 scf and gas density of 0.0455 lb/scf.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section ___4___ of ___5___

Pollutant Detail Information Page ___5___ of ___6___

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: PM	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.16 lb/hour 0.72 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.00999 lb/MM Btu Reference: AP-42 Section 3.2 Table 3.2-2, 4/00 Supplement E	7. Emissions Method Code: 4
8. Calculation of Emissions (limit to 600 characters): (0.00999 lb/MM Btu)(16.5 MM Btu/hr) = 0.16 lb/hr (0.16 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 0.72 ton/y	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Projected fuel use based on test data.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: HAPs	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.76 lb/hour 3.3 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: 0.172 g/hp-hr Reference: GRI-HAPCalc 3.0	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): (0.172 g/hp-hr)(2,000 hp-hr)(1 lb/453.6 g) = 0.758 lb/hr (0.758 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 3.32 ton/yr	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Detailed calculations provided in Attachment D. HAP emissions are included in VOC emissions.	

Allowable Emissions Allowable Emissions ___NA__ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

H. VISIBLE EMISSIONS INFORMATION
(Only Regulated Emissions Units Subject to a VE Limitation)

Visible Emissions Limitation: Visible Emissions Limitation _____ of _____

1. Visible Emissions Subtype: VE20	2. Basis for Allowable Opacity: [X] Rule [ ] Other
3. Requested Allowable Opacity: Normal Conditions: 20 % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment (limit to 200 characters): Subject to 62-296-320(4)(b)1 General Visible Emissions Standards.	

I. CONTINUOUS MONITOR INFORMATION
(Only Regulated Emissions Units Subject to Continuous Monitoring)

Continuous Monitoring System: Continuous Monitor __NA_ of _____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	[ ] Rule [ ] Other
4. Monitor Information: Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment (limit to 200 characters):	

J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION
(Regulated Emissions Units Only)

Supplemental Requirements

1. Process Flow Diagram [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
2. Fuel Analysis or Specification [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
3. Detailed Description of Control Equipment [X] Attached, Document ID:_Att. C__ [ ] Not Applicable [ ] Waiver Requested
4. Description of Stack Sampling Facilities [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
5. Compliance Test Report [ ] Attached, Document ID:_____ [ ] Previously submitted, Date:_____ [X] Not Applicable
6. Procedures for Startup and Shutdown [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
7. Operation and Maintenance Plan [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested
8. Supplemental Information for Construction Permit Application [X] Attached, Document ID:_Narrative [ ] Not Applicable
9. Other Information Required by Rule or Statute [ ] Attached, Document ID:_____ [X] Not Applicable
10. Supplemental Requirements Comment: Process flow diagrams and fuel analyses have been previously submitted. Supplemental information is provided in the narrative description accompanying these forms. Attachment E contains an emissions test report for the pre-modification unit.

Additional Supplemental Requirements for Title V Air Operation Permit Applications

11. Alternative Methods of Operation
[ ] Attached, Document ID:_____ [X] Not Applicable

12. Alternative Modes of Operation (Emissions Trading)
[ ] Attached, Document ID:_____ [X] Not Applicable

13. Identification of Additional Applicable Requirements
[ ] Attached, Document ID:_____ [X] Not Applicable

14. Compliance Assurance Monitoring Plan
[ ] Attached, Document ID:_____ [X] Not Applicable

15. Acid Rain Part Application (Hard-copy Required) NA

[ ] Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))
Attached, Document ID:_____

[ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
Attached, Document ID:_____

[ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.)
Attached, Document ID:_____

[ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)
Attached, Document ID:_____

[ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)
Attached, Document ID:_____

[ ] Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)
Attached, Document ID:_____

[ ] Not Applicable

III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through J as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application.

A. GENERAL EMISSIONS UNIT INFORMATION
(All Emissions Units)

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in This Section: (Check one)

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[X] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Regulated or Unregulated Emissions Unit? (Check one)

[ ] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[X] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):

Fugitive emissions from component leaks.

4. Emissions Unit Identification Number:
[X] ID: [ ] ID Unknown

5. Emissions Unit Status Code:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
C	10/01/00	49	[ ]

9. Emissions Unit Comment: (Limit to 500 Characters)

These are new fugitive leak emissions from new components (valves, flanges, etc.)

Emissions Unit Control Equipment

1. Control Equipment/Method Description (Limit to 200 characters per device or method):

   NA

2. Control Device or Method Code(s): NA

Emissions Unit Details

1. Package Unit:
   Manufacturer: Model Number:
2. Generator Nameplate Rating: MW
3. Incinerator Information:
   Dwell Temperature: °F
   Dwell Time: seconds
   Incinerator Afterburner Temperature: °F

B. EMISSIONS UNIT CAPACITY INFORMATION
(Regulated Emissions Units Only)

Emissions Unit Operating Capacity and Schedule

1. Maximum Heat Input Rate:	mmBtu/hr			
2. Maximum Incineration Rate:	lb/hr	tons/day		
3. Maximum Process or Throughput Rate:				
4. Maximum Production Rate:				
5. Requested Maximum Operating Schedule:				
	24	hours/day	7	days/week
	52	weeks/year	8760	hours/year
6. Operating Capacity/Schedule Comment (limit to 200 characters):				

C. EMISSIONS UNIT REGULATIONS
(Regulated Emissions Units Only)

List of Applicable Regulations

None	

D. EMISSION POINT (STACK/VENT) INFORMATION
(Regulated Emissions Units Only)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram? FUGITIVE	2. Emission Point Type Code: 4	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): NA		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: NA		
5. Discharge Type Code: F	6. Stack Height: NA feet	7. Exit Diameter: NA feet
8. Exit Temperature: 77 °F	9. Actual Volumetric Flow Rate: NA acfm	10. Water Vapor: NA %
11. Maximum Dry Standard Flow Rate: NA dscfm	12. Nonstack Emission Point Height: 0 feet	
13. Emission Point UTM Coordinates: Zone: 16 East (km): 510.830 North (km): 3419.030		
14. Emission Point Comment (limit to 200 characters):		

E. SEGMENT (PROCESS/FUEL) INFORMATION
(All Emissions Units)

Segment Description and Rate: Segment __1__ of __1__

1. Segment Description (Process/Fuel Type) (limit to 500 characters):		
Fugitive emissions from component leaks.		
2. Source Classification Code (SCC): 3-10-888-11	3. SCC Units: MM cubic feet produced	
4. Maximum Hourly Rate: 0	5. Maximum Annual Rate: 0	6. Estimated Annual Activity Factor: component count
7. Maximum % Sulfur: NA	8. Maximum % Ash: NA	9. Million Btu per SCC Unit: NA
10. Segment Comment (limit to 200 characters): Based on count of new components and USEPA emission factors provided in EPA publication EPA-453/R-95-017, November 1995, "Protocol for Equipment Leak Emission Estimates"		

Segment Description and Rate: Segment _NA__ of __NA_

1. Segment Description (Process/Fuel Type) (limit to 500 characters):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment (limit to 200 characters):		

F. EMISSIONS UNIT POLLUTANTS
(All Emissions Units)

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
VOC			NS

Emissions Unit Information Section ___5__ of ___5__

Pollutant Detail Information Page ___1__ of ___1__

G. EMISSIONS UNI2 POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: VOC	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.084 lb/hour 0.37 tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: lb/hr/component Reference: EPA-453/R-95-017, Protocol for Equipment Leak Emission Estimates"	7. Emissions Method Code: 5
8. Calculation of Emissions (limit to 600 characters): Assume non-methane/non-ethane fraction is 5%. (EPA tpy factor for specific component type) (Number of components of specific type) = tpy. lb/hr = (tons/year)(2000 lb/ton)(1 yr/8760 hr)	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Factors vary by component type. See Attachment D for specific factors and calculations.	

Allowable Emissions Allowable Emissions ___NA_ of _____

1. Basis for Allowable Emissions Code: NA	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

H. VISIBLE EMISSIONS INFORMATION
(Only Regulated Emissions Units Subject to a VE Limitation)

Visible Emissions Limitation: Visible Emissions Limitation ___NA__ of _____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: [ ] Rule [ ] Other
3. Requested Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment (limit to 200 characters):	

I. CONTINUOUS MONITOR INFORMATION
(Only Regulated Emissions Units Subject to Continuous Monitoring)

Continuous Monitoring System: Continuous Monitor _NA__ of _____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement: [ ] Rule [ ] Other	
4. Monitor Information: Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment (limit to 200 characters):	

J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION
(Regulated Emissions Units Only)

Supplemental Requirements

1. Process Flow Diagram [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
2. Fuel Analysis or Specification [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
3. Detailed Description of Control Equipment [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested
4. Description of Stack Sampling Facilities [ ] Attached, Document ID:_____ [ ] Not Applicable [X] Waiver Requested
5. Compliance Test Report [ ] Attached, Document ID:_____ [ ] Previously submitted, Date:_____ [X] Not Applicable
6. Procedures for Startup and Shutdown [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested
7. Operation and Maintenance Plan [ ] Attached, Document ID:_____ [X] Not Applicable [ ] Waiver Requested
8. Supplemental Information for Construction Permit Application [X] Attached, Document ID:_Narrative [ ] Not Applicable
9. Other Information Required by Rule or Statute [ ] Attached, Document ID:_____ [X] Not Applicable
10. Supplemental Requirements Comment: Process flow diagrams and fuel analyses have been previously submitted. Supplemental information is provided in the narrative description and Attachment C accompanying these forms.

Emissions Unit Information Section __5__ of __5__

Additional Supplemental Requirements for Title V Air Operation Permit Applications

11. Alternative Methods of Operation
[ ] Attached, Document ID:_____ [X] Not Applicable

12. Alternative Modes of Operation (Emissions Trading)
[ ] Attached, Document ID:_____ [X] Not Applicable

13. Identification of Additional Applicable Requirements
[ ] Attached, Document ID:_____ [X] Not Applicable

14. Compliance Assurance Monitoring Plan
[ ] Attached, Document ID:_____ [X] Not Applicable

15. Acid Rain Part Application (Hard-copy Required)

[ ] Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))
Attached, Document ID:_____

[ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
Attached, Document ID:_____

[ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.)
Attached, Document ID:_____

[ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)
Attached, Document ID:_____

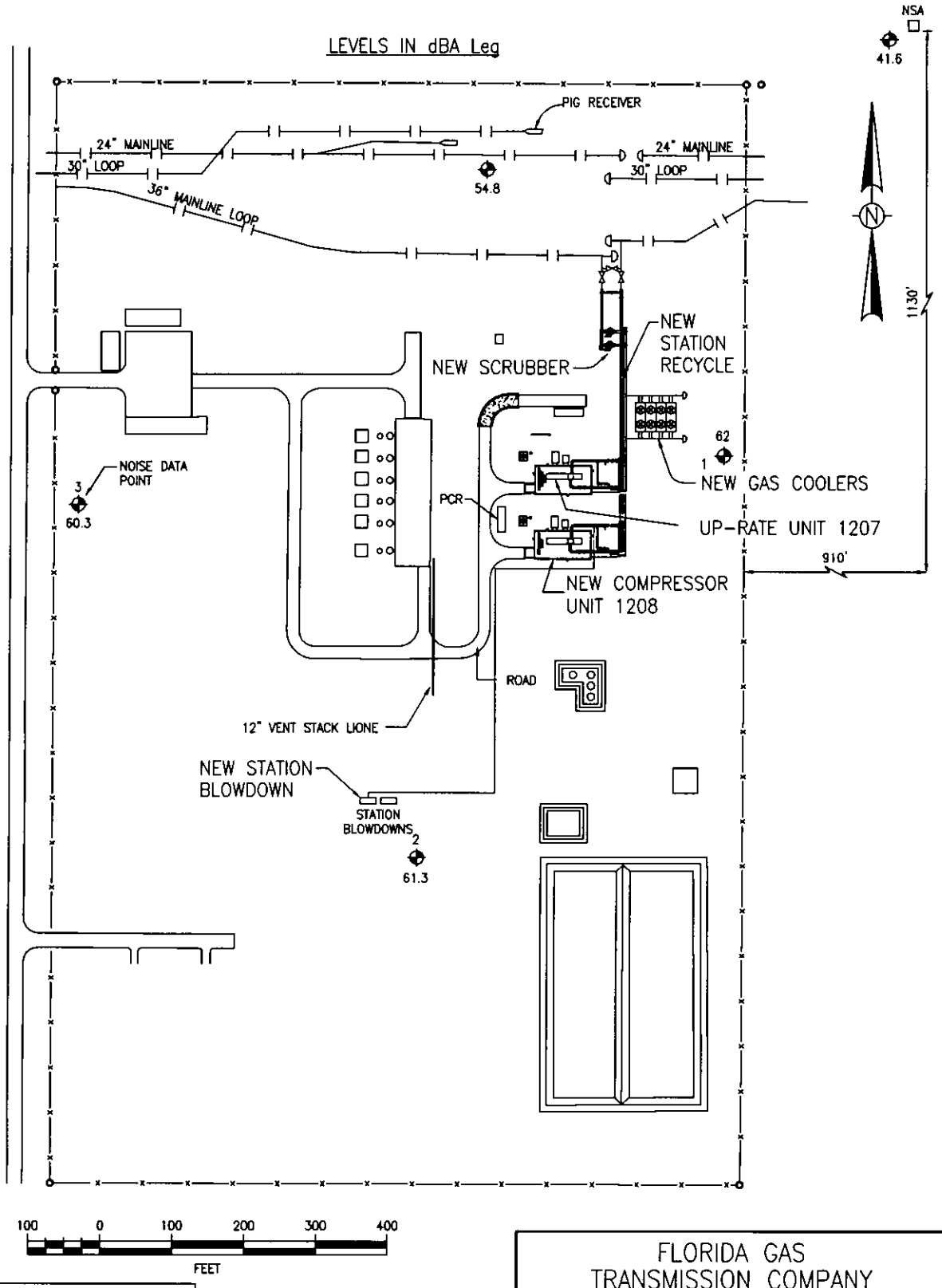
[ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)
Attached, Document ID:_____

[ ] Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)
Attached, Document ID:_____

[X] Not Applicable

Attachment B

Plot Plan



NOISE DATA:

Avg. 3–15 Sec.
LEQ taken 8 a.m. 10/26/98
Temp. 68°F
Wind: 2–8 MPH SE

FLORIDA GAS TRANSMISSION COMPANY

PROPOSED FGT PHASE V
COMPRESSOR STATION NO. 12A
PLOT PLAN

DWG. NO. NV-2 9/15/00

NV2.DWG - 07/25/2000 - 08:17

Attachment C

Vendor Information

Pignone Model PGT10B Turbine

Solar Model Mars 90 T-13000S Turbine

HIS Emission Reduction Systems Model DeCOHx Converter/Silencer

Pignone Model PGT10B Turbine

Nuovo Pignone FIRENZE	CLIENTE - CUSTOMER ENRON ENGINEERING COMPANY
	LOCALITA' - PLANT LOCATION FLORIDA/ALABAMA - USA
COMMESSA - JOB 1604865-66-67-68	IMPIANTO - PLANT FGT PHASE V

TITOLO - TITLE

EXPECTED EMISSION DATA

REV	DESCRIZIONE - DESCRIPTION	PREPD	CONT'D-CHD	APP. APPRD	DATA - DATE
2	GENERAL REVISION	AC			15/12/00
1	CUSTOMER COMMENTS INCLUDED	AC			02/11/00
0	EMESSO - ISSUED	AC	Castelli	Pisano	04/10/00

ITEM

N. SOM38867/4

LINGUA-LANG. A

PAGINA-SHEET 1/2

SOSTITUISCE IL - REPLACES

SOSTITUITO DA - REPLACED BY

File: c:\documenti\enron\emissioni.doc

Nuovo Pignone

FIRENZE

ISO

% Load	100	90	80	70	60	50
Hp	15700	14130	12560	10990	9420	7850
Exhaust ACFM	203557	197108	190636	179898	167739	155705
Exhaust Mass Flow lb/s	103.54	103.45	103.33	100.07	95.56	90.81
ExhaustTemp °F	909	868	826	793	763	735
Fuel Flowrate MMbtu/hr	122.52	114.17	105.72	96.10	86.25	76.61
Fuel Heat val. Btu/lb	20823	20823	20823	20823	20823	20823
Fuel Flow lb/h	5884	5483	5077	4615	4142	3679
NOx ppmvd @15%O2	25	25	25	25	25	25
CO ppmvd @15%O2	15	15	20	30	55	75
UHC ppvw @15%O2	7	7	10	20	30	40
VOC Lb/h	0.29104	0.29104	0.41516	0.80036	1.14704	1.4552
UHC Lb/h	1.36	1.36	1.94	3.74	5.36	6.8
NOx Lb/h	14.071	14.06	14.04	13.6	12.99	12.34
CO Lb/h	5.14	5.13	6.82	10.23	17.34	22.5

NOTES:

1) NOx values in ppmvd at ISO condition are contractually guaranteed. All other values per the above table have to be considered as expected values not subject to any contractual obligation.

2) In order to give in theis document the expected worst case conditions. All values herein are based on the referenced percentage of load at Full Speed.

		ITEM
		N. SOM33867/4
3	REVISED	LINGUA-LANG. A / PAGINA-SHEET 2 / 3
REV	DESCRIZIONE - DESCRIPTION	

SOSTITUISCE IL - REPLACES

SOSTITUITO DA - REPLACED BY

Solar Model Mars 90 T-13000S Turbine

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 2.85
CUSTOMER: FGT
JOB ID:

DATE RUN: 22-NOV-00
RUN BY: Casadonte, Corrine

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR STATION 12

Fuel: SD NATURAL GAS
Water Injection: NO
Number of Engines Tested: 0
Model: MARS 90-T13002S CS/MD 122F MATCH GAS
Emissions Data: REV. 0.0

Customer: FGT
Inquiry Number: Station 12

CRITICAL WARNINGS IN USE OF DATA FOR PERMITTING

1. Short term permitting values such as PPMV or lbs/hr should be based on worst case actual operating conditions specific to the application and the site. Worst case for one pollutant is not necessarily the same for another. The values on this form are only predicted emissions at one specific operating condition; not necessarily the worst case.

2. Long term reference emission units (e.g. tons/yr) should reference the average conditions at the site (e.g. ISO). That number should not be derived from the worst case value referenced above, or conversely this average must not be used to calculate worst case.

3. Nominal values are based on actual test results, or predicted in the case of no actual engine tests. Expected maximum values should be referenced for permitting.

4. If a SoLoNOx model is planned to be installed in the future, use no less than 50 PPMv CO.

The following predicted emissions performance is based on the following specific single point: (see attached)

Hp= 13078, %Full Load= 100.0, Elev= 90 ft, %RH= 60.0, Temperature= 59.0 F

NOX		CO		UHC		
NOM	MAX	NOM	MAX	NOM	MAX	
*	25.00	*	50.00	*	25.000	PPMvd at 15% O2
*	10.21	*	12.43	*	3.560	lbm/hr
*	44.72	*	54.45	*	15.594	ton/yr

p= 12424, %Full Load= 95.0, Elev= 90 ft, %RH= 60.0, Temperature= 59.0 F

NOX NOM	NOX MAX	CO NOM	CO MAX	UHC NOM	UHC MAX	
*	25.00	*	50.00	*	25.000	PPMvd at 15% O2
*	9.80	*	11.93	*	3.416	lbm/hr
*	42.90	*	52.24	*	14.960	ton/yr

Hp= 11770, %Full Load= 90.0, Elev= 90 ft, %RH= 60.0, Temperature= 59.0 F

NOX NOM	NOX MAX	CO NOM	CO MAX	UHC NOM	UHC MAX	
*	25.00	*	50.00	*	25.000	PPMvd at 15% O2
*	9.36	*	11.40	*	3.265	lbm/hr
*	41.01	*	49.93	*	14.300	ton/yr

Hp= 11116, %Full Load= 85.0, Elev= 90 ft, %RH= 60.0, Temperature= 59.0 F

NOX NOM	NOX MAX	CO NOM	CO MAX	UHC NOM	UHC MAX	
*	25.00	*	50.00	*	25.000	PPMvd at 15% O2
*	8.95	*	10.90	*	3.122	lbm/hr
*	39.21	*	47.75	*	13.673	ton/yr

Hp= 9808, %Full Load= 75.0, Elev= 90 ft, %RH= 60.0, Temperature= 59.0 F

NOX NOM	NOX MAX	CO NOM	CO MAX	UHC NOM	UHC MAX	
*	25.00	*	50.00	*	25.000	PPMvd at 15% O2
*	8.51	*	10.36	*	2.966	lbm/hr
*	37.26	*	45.36	*	12.991	ton/yr

Hp= 9155, %Full Load= 70.0, Elev= 90 ft, %RH= 60.0, Temperature= 59.0 F

NOX NOM	NOX MAX	CO NOM	CO MAX	UHC NOM	UHC MAX	
*	25.00	*	50.00	*	25.000	PPMvd at 15% O2
*	8.29	*	10.09	*	2.891	lbm/hr
*	36.31	*	44.21	*	12.661	ton/yr

* NOMINAL EMISSIONS DATA UNAVAILABLE FOR THIS ENGINE

OTHER IMPORTANT NOTES

1. Solar does not provide maximum values for water-to-fuel ratio, SOx, particulates, or conditions outside those above without separate written approval.
2. Solar can optionally provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.

3. Fuel must meet Solar standard fuel specification ES 9-98. Predicted emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If the above information is being used regarding existing equipment, it should be verified by actual site testing.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 2.85
CUSTOMER: FGT
JOB ID: STATION 12

DATE RUN: 22-NOV-00
RUN BY: Casadonte, Corrine

MARS 90-T13002S
CS/MD
122F MATCH
GAS
TME-2S REV. 2.1

DATA FOR NOMINAL PERFORMANCE

Fuel Type	SD NATURAL GAS	
Elevation	Feet	90
Inlet Loss	in. H2O	0
Exhaust Loss	in. H2O	0

	LOAD	**FULL**	**95%**	**90%**	**85%**	**75%**	**70%**
Engine Inlet Temp.	Deg. F	59.0	59.0	59.0	59.0	59.0	59.0
Relative Humidity	%	60.0	60.0	60.0	60.0	60.0	60.0
Elevation Loss	Hp	43	41	39	37	32	30
Inlet Loss	Hp	0	0	0	0	0	0
Exhaust Loss	Hp	0	0	0	0	0	0
Driven Equipment Speed	RPM	8412	8292	8154	8013	7806	7687
Optimum Equipment Speed	RPM	8412	8292	8154	8013	7806	7687
Gas Generator Speed	RPM	11168	11066	10964	10865	10702	10615
Specified Load	Hp	FULL	12424	11770	11116	9808	9155
Net Output Power	Hp	13078	12424	11770	11116	9808	9155
Fuel Flow	MMBtu/hr	102.56	98.41	94.09	89.99	85.51	83.34
Heat Rate	Btu/Hp-hr	7842	7921	7994	8095	8718	9104
Inlet Air Flow	lbm/hr	318061	312434	306562	300051	288572	283072
Engine Exhaust Flow	lbm/hr	321991	316182	310119	303431	291772	286184
PCD	psi(g)	227.7	221.5	215.2	208.3	192.0	184.1
PT Inlet Temp. (T5)	Deg. F	1253	1227	1201	1179	1183	1186
Compensated PTIT	Deg. F	1273	1247	1221	1198	1203	1205
Exhaust Temperature	Deg. F	867	853	838	827	845	854

HIS Emission Reduction Systems Model DeCOHx Converter/Silencer

HIS Emissions Reduction Systems

HIS Emissions Reduction Systems

DeCOEx SILENCER in OXIDATION SERVICE

* SPECIFICATIONS
* OPERATION CONDITIONS
* INSTALLATION INSTRUCTIONS
* CLEANING INSTRUCTIONS
* DISASSEMBLY INSTRUCTIONS
* TROUBLE SHOOTING INSTRUCTIONS

9837 Whithorn Drive · Houston, Texas 77095 · 281-463-8883
P.O. Box 1639 · Cypress, Texas 77410 · Fax 281-463-8951

OXIDATION SERVICE

DeCOHx

H.L. Harris

The DeCCHx Silencer in oxidation service provides simultaneous reduction of CO, NMHC, aldehydes and HAP exhaust emissions, and exhaust noise for lean burning (oxygen rich), engines.

SPECIFICATIONS (General)

The DeCOHx Silencer design shall be multi-chamber, reactive type for the noise level specified, or the "generic" description "Commercial," "Standard," "Residential," or "Hospital."

Construction shall be of heavy gauge, carbon steel plate, minimum 11 gauge, rolled and continuously welded, incorporating standard flanged and dished heads for pressure vessel-like construction.

Flanges shall be 150 lb. F.F. ANSI diameter and drilling template.

Couplings shall be 3000 lb. rating and shall be sufficient in number to provide sample ports for: Catalyst upstream temperature, catalyst downstream temperature, high temperature alarm/shutdown, and drain.

Pressure drop, including exit loss to atmosphere, will be limited to 5.0 inches of water column, unless otherwise specified.

The DeCOHx Silencer shall be equipped with optional mounting brackets, trunnion pins, legs, or other types of supports for horizontal or vertical installation.

The DeCOHx Silencer shall be equipped with a "catalyst portal" at near midsection for easy access to the catalyst monolith, a seal ring shall provide the catalyst monolith a seal against exhaust gas bypass, and support to withstand vibration and thermal stress.

The DeCOHx Silencer shall be installed in a manner which best fits the piping configuration (with side inlet and/or side outlet) and in a location where inlet gas temperature is approximately 550°F minimum to 1200°F maximum.

The DeCHOx Silencer shall have external surfaces metallized by the flame spray method for carbon steel construction.

OXIDATION SERVICE

DeCOHx

H.L. Harris

CATALYST

A noble metal catalyst is offered for simultaneous reduction of CO, NMHC, aldehydes and HAP. Due to the high concentrations of oxygen in the exhaust of lean burn engines, the oxidation of CO and NMHC can easily be accomplished by the following reactions:

1. $2CO + O_2 \rightarrow 2CO_2$
2. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
3. $2H_2 + O_2 \rightarrow 2H_2O$

PERFORMANCE

Operating as prescribed in the "OPERATING CONDITIONS" portion of these specifications, the DeCHOx Silencer will perform to reduce exhaust emissions to the following minimum values. Catalyst application can be made to provide emissions rates lower than those stated here.

CO	reduction by 90% or more
NMHC/ROG	reduction to 70% (depending on gas composition and exhaust gas temperature)

New catalyst performance can be more than 99 percent efficient. As aging and accumulation of sulphated ash occur, performance will be within above limits until cleaning is required.

The catalyst in the DeCOHx Silencer has an operational life expectancy of five (5) to seven (7) years. Operation and maintenance within good operating practices will provide a long and trouble-free life.

for Oil and Fuel Specifications
Oxidation Service

DeCOHx

H.L. Harris

CATALYTIC CONVERTER/SILENCER OPERATING CONDITIONS

Exhaust gas temperature to the catalyst is to be 550°F minimum to 1200°F maximum. Reaction occurs at catalyst inlet temperature lower than 550°F, but reduction efficiency is decreased. Exhaust gas temperature below 700°F reduces the oxidation efficienty of VOCs.

Engine crankcase is to be properly vented to reduce oil carryover to the exhaust stream.

Combustibles content in the exhaust gas shall not produce catalyst outlet temperature higher than 1600°F.

Engine lube oil shall be no ash (0.0%) or low ash (0.5%) type. Oil lube additive packages shall not contain heavy metals or compounds in excess of those described in the following paragraph.

The following contaminants are known catalyst deactivators and contribute to shortened catalyst life: Heavy and base metals such as lead, mercury, arsenic, antimony, zinc, copper, tin, iron, barium, nickel and chrome, sulphur, silicon and phosphorous. Hence, the content of these elements in emissions at the catalytic inlet must not singularly exceed 1.0 ppm, or collectively must not exceed 5.0 ppm.

Chlorinated compounds in the fuel gas are not to exceed 10 ppm. Silicon compounds in the fuel gas are not to exceed 1 ppm. (Sulphur compounds in the fuel gas are not to exceed 400 ppm.)

Contaminants in excess of these amounts shall void the warranty.

Engine operation and maintenance shall be in accordance with manufacturers' recommended procedures at minimum and within good operation practices. A preventive or predictive maintenance program with attention to manufacturer's specific low emission operating parameters is preferred.

OXIDATION SERVICE

DeCOHx

H.L. Harris

INSTALLATION

The DeCOHx Silencer is installed in the same manner as the usual exhaust silencer or muffler, either in the horizontal or vertical position. Location should be as close to the engine manifold as practical, where exhaust temperature is at least 550°F.

The DeNOx Silencer shall be properly supported within the limits of good piping practice.

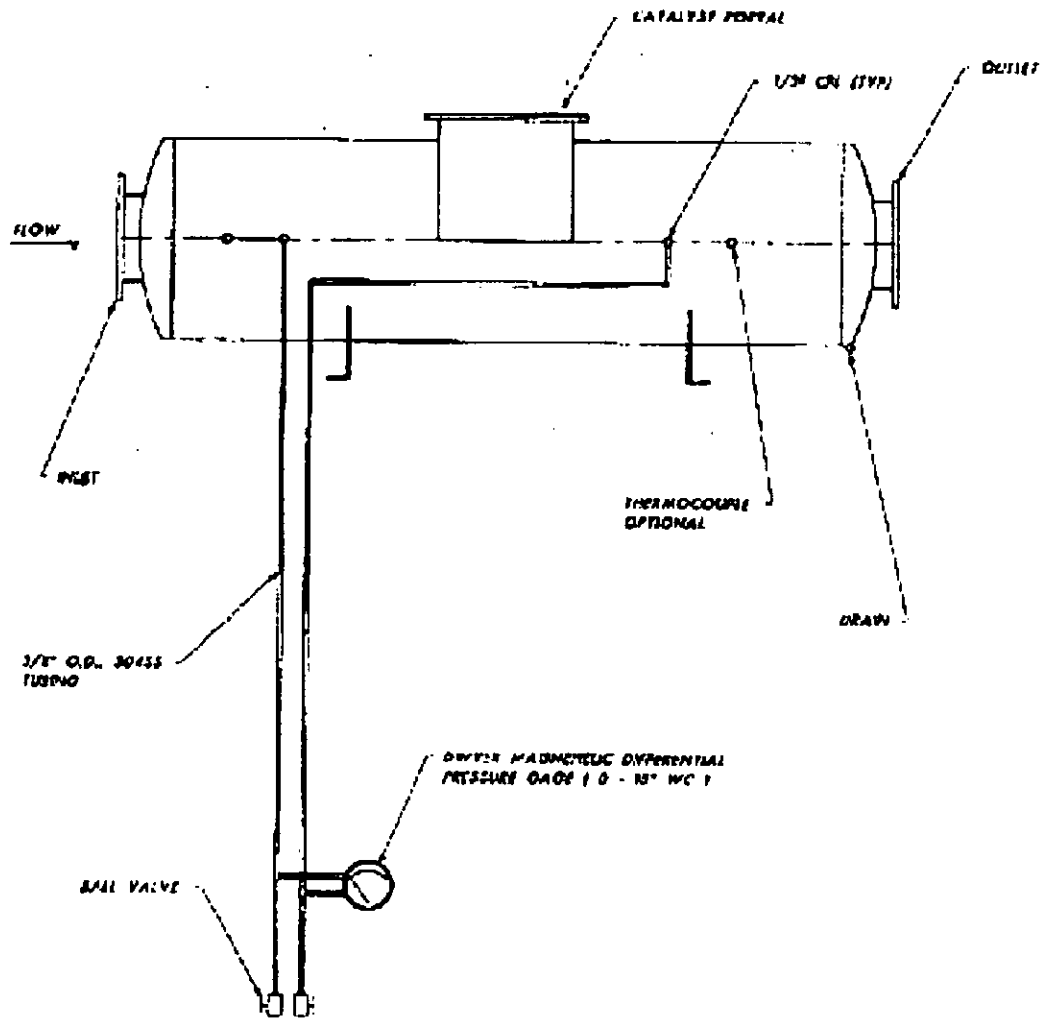
Multiple couplings are provided for gas sampling, pressure differential measurements, temperature monitoring, and drain of free liquid and condensate. See Figure 1 for typical installation of sample lines, differential pressure gage and thermocouple.

DeCOllx Silencer - Oxidation Service

SAMPLE LINE CONFIGURATION

REFERENCE DeCOllx

PREPARED BY H.L. Harris



Houston Industrial Silencing

OXIDATION SERICE

DeCOHx

M.L. Harris

CLEANING

The DeNOx Silencer catalyst module is accessible through the catalyst portal. Determine the safest method to disassemble the unit, then follow instructions described below.

There are several methods suggested for cleaning the catalyst monolith depending on the degree of loading. Following are some suggestions:

When the catalyst inlet has an accumulation of residual ash and other products of combustion (not caked oil), surfaces can be cleaned with the application of low pressure dry steam from the outlet side of the catalyst, blowing the dirt away from (instead of blowing into) the surface of the catalyst.

Another method is to soak the catalyst monolith in a solution of State 999 detergent in deionized water, rinse with deionized water, then blow dry when the particulate has soaked free.

When the "honeycomb" catalyst inlet is severely covered with oil carryover and other products of combustion, it is recommended that the module be cleaned with an ammonium hydroxide wash, free of lead and other heavy metals, and other contaminates which could poison the catalyst.

For assurance of cleanliness and inspection including refurbishment and repair, return the catalyst module to HIS.

Attachment D

Emission Calculations

Engine Emissions

Engine HAP Emissions

Fugitive Leak Emissions

Engine Emissions

Compressor Station No. 12
Engine No. 1207 EPN: 008

NOx Emissions: (Based on Vendor Data)

lb NOx/hr = 10.21

tons NOx/yr = (lb NOx/hr)(hr/yr)(1 ton/2000 lb)
= (10.21 lb NOx/hr)(8760 hr/yr)(1 ton/2000 lb)
= 44.72

CO Emissions: (Based on Vendor Data)

lb CO/hr = 12.43

tons CO/yr = (lb CO/hr)(hr/yr)(1 ton/2000 lb)
= (12.43 lb CO/hr)(8760 hr/yr)(1 ton/2000 lb)
= 54.45

VOC Emissions: (Based on Vendor Data)

lb VOC/hr = 0.356

tons VOC/yr = (lb VOC/hr)(hr/yr)(1 ton/2000 lb)
= (0.356 lb VOC/hr)(8760 hr/yr)(1 ton/2000 lb)
= 1.56

SO2 Emissions: (Based on FERC Limits)

lb S/hr = (gr S/100 scf)(MMscf/hr)(1 lb/7000 gr)
= (10 gr S/100 scf)(0.1085 MMscf/hr)(1 lb/7000 gr)
= 1.55

lb SO2/hr = (lb S/hr)(2 lb SO2/lb S)
= (1.55 lb S/hr)(2 lb SO2/lb S)
= 3.10

tons SO2/yr = (lb SO2/hr)(hr/yr)(1 ton/2000 lb)
= (3.10 lb SO2/hr)(8760 hr/yr)(1 ton/2000 lb)
= 13.57

PM Emissions: (Based on AP-42 Table 3.1-2a, 4/00)

lb PM/hr = (lb PM/MMBtu)(MMBtu/hr)
= (0.0066 lb/MMBtu)(112.81 MMBtu/hr)
= 0.74

tons PM/yr = (lb PM/hr)(hr/yr)(1 ton/2000 lb)
= (0.74 lb PM/hr)(8760 hr/yr)(1 ton/2000 lb)
= 3.26

Engine No. 1208 EPN:

CO Emissions: (Based on Vendor Data)

A lb CO/hr = 5.14@ 100% load
B lb CO/hr = 10.23@ 70% load
C lb CO/hr = 22.5@ 50% load

A 75% of year = 6570
B 15% of year = 1752
C 10% of year = 438

tons CO = (lb CO/hr)(hr/yr)(1 ton/2000 lb)
= (5.14 lb CO/hr)(6570 hr/yr)(1 ton/2000 lb)
= 16.88

tons CO = (lb CO/hr)(hr/yr)(1 ton/2000 lb)
= (10.23 lb CO/hr)(1752 hr/yr)(1 ton/2000 lb)
= 8.96

tons CO = (lb CO/hr)(hr/yr)(1 ton/2000 lb)
= (22.50 lb CO/hr)(438 hr/yr)(1 ton/2000 lb)
= 4.93

tons CO/yr = (16.88 tons/yr) + (8.96 tons/yr) + (4.93 tons/yr)
= 30.77

VOC Emissions: (Based on Vendor Data)

A lb VOC/hr = 0.29@ 100% load
B lb VOC/hr = 1.15@ 70% load
C lb VOC/hr = 1.46@ 50% load

A 75% of year = 6570
B 15% of year = 1752
C 10% of year = 438

tons VOC/yr = (lb VOC/hr)(hr/yr)(1 ton/2000 lb)
= (0.29 lb VOC/hr)(6570 hr/yr)(1 ton/2000 lb)
= 0.95

tons VOC/yr = (lb VOC/hr)(hr/yr)(1 ton/2000 lb)
= (0.80 lb VOC/hr)(1752 hr/yr)(1 ton/2000 lb)
= 0.70

tons VOC/yr = (lb VOC/hr)(hr/yr)(1 ton/2000 lb)
= (1.46 lb VOC/hr)(438 hr/yr)(1 ton/2000 lb)
= 0.32

tons VOC/yr = (0.95 tons/yr) + (0.70 tons/yr) + (0.32 tons/yr)
= 1.97

NOx Emissions: (Based on Vendor Data)

lb NOx/hr = 14.10

tons NOx/yr = (lb NOx/hr)(hr/yr)(1 ton/2000 lb)
= (14.10 lb NOx/hr)(8760 hr/yr)(1 ton/2000 lb)
= 61.76

SO2 Emissions: (Based on FERC Limits)

lb S/hr = (gr S/100 scf)(MMscf/hr)(1 lb/7000 gr)
= (10 gr S/100 scf)(0.1296 MMscf/hr)(1 lb/7000 gr)
= 1.85

lb SO2/hr = (lb S/hr)(2 lb SO2/lb S)
= (1.85 lb S/hr)(2 lb SO2/lb S)
= 3.70

tons SO2/yr = (lb SO2/hr)(hr/yr)(1 ton/2000 lb)
= (3.70 lb SO2/hr)(8760 hr/yr)(1 ton/2000 lb)
= 16.22

PM Emissions: (Based on AP-42 Table 3.2-2, 4/00)

lb PM/hr = (lb PM/MMBTU)(MMscf/hr)
= (0.0066 lb/MMBtu)(134.77 MMBtu/hr)
= 0.89

tons PM/yr = (lb PM/hr)(hr/yr)(1 ton/2000 lb)
= (0.89 lb PM/hr)(8760 hr/yr)(1 ton/2000 lb)
= 3.90

Modified Engine No. 1204
EPN: 007

NOx Emissions: (Based on Test Data for Similar Unit)

lb NOx/hr =(g/bhp-hr)(bhp)(1 lb/453.59 g)
=(5.4 g/bhp-hr)(2000 bhp)(1 lb/453.59 g)
=23.81

tons NOx/yr =(lb NOx/hr)(hr/yr)(1 ton/2000 lb)
=(23.8 lb NOx/hr)(8760 hr/yr)(1 ton/2000 lb)
=104.29

CO Emissions: (Based on Test Data for Similar Unit)

lb CO/hr =(g/bhp-hr)(bhp)(1 lb/453.59 g)
(0.8 g/bhp-hr)(2000 bhp)(1 lb/453.59 g)
3.53

tons CO/yr =(lb CO/hr)(hr/yr)(1 ton/2000 lb)
=(3.53 lb CO/hr)(8760 hr/yr)(1 ton/2000 lb)
=15.45

VOC Emissions: (Based on Test Data for Similar Unit)

lb VOC/hr =(g/bhp-hr)(bhp)(1 lb/453.59 g)
=(0.1 g/bhp-hr)(2000 bhp)(1 lb/453.59 g)
=0.441

tons VOC/yr =(lb VOC/hr)(hr/yr)(1 ton/2000 lb)
=(0.44 lb VOC/hr)(8760 hr/yr)(1 ton/2000 lb)
=1.93

SO2 Emissions: (Based on FERC Limits)

lb S/hr =(gr S/100 scf)(MMscf/hr)(1 lb/7000 gr)
=(10 gr S/100 scf)(0.0159 MMscf/hr)(1 lb/7000 gr)
=0.23

lb SO2/hr =(lb S/hr)(2 lb SO2/lb S)
=(0.23 lb S/hr)(2 lb SO2/lb S)
=0.45

tons SO2/yr =(lb SO2/hr)(hr/yr)(1 ton/2000 lb)
=(0.45 lb SO2/hr)(8760 hr/yr)(1 ton/2000 lb)
=1.99

PM Emissions: (Based on AP-42 Table 3.2-2, 4/00)

lb PM/hr =(lb PM/MMBtu)(MMBtu/hr)
=(0.00999 MMBtu)(16.5 MMBtu/hr)
=0.16

tons PM/yr =(lb PM/hr)(hr/yr)(1 ton/2000 lb)
=(0.16 lb PM/hr)(8760 hr/yr)(1 ton/2000 lb)
=0.72

Modified Engine No. 1205
EPN: 007

NOx Emissions: (Based on Test Data)

lb NOx/hr =(g/bhp-hr)(bhp)(1 lb/453.59 g)
=(5.4 g/bhp-hr)(2000 bhp)(1 lb/453.59 g)
=23.81

tons NOx/yr =(lb NOx/hr)(hr/yr)(1 ton/2000 lb)
=(23.8 lb NOx/hr)(8760 hr/yr)(1 ton/2000 lb)
=104.29

CO Emissions: (Based on Test Data)

lb CO/hr =(g/bhp-hr)(bhp)(1 lb/453.59 g)
(0.8 g/bhp-hr)(2000 bhp)(1 lb/453.59 g)
3.53

tons CO/yr =(lb CO/hr)(hr/yr)(1 ton/2000 lb)
=(3.53 lb CO/hr)(8760 hr/yr)(1 ton/2000 lb)
=15.45

VOC Emissions: (Based on Test Data)

lb VOC/hr =(g/bhp-hr)(bhp)(1 lb/453.59 g)
=(0.1 g/bhp-hr)(2000 bhp)(1 lb/453.59 g)
=0.441

tons VOC/yr =(lb VOC/hr)(hr/yr)(1 ton/2000 lb)
=(0.44 lb VOC/hr)(8760 hr/yr)(1 ton/2000 lb)
=1.93

SO2 Emissions: (Based on FERC Limits)

lb S/hr =(gr S/100 scf)(MMscf/hr)(1 lb/7000 gr)
=(10 gr S/100 scf)(0.0159 MMscf/hr)(1 lb/7000 gr)
=0.23

lb SO2/hr =(lb S/hr)(2 lb SO2/lb S)
=(0.23 lb S/hr)(2 lb SO2/lb S)
=0.45

tons SO2/yr =(lb SO2/hr)(hr/yr)(1 ton/2000 lb)
=(0.45 lb SO2/hr)(8760 hr/yr)(1 ton/2000 lb)
=1.99

PM Emissions: (Based on AP-42 Table 3.2-2, 4/00)

lb PM/hr =(lb PM/MMBtu)(MMBtu/hr)
=(0.00999 MMBtu/hr)(16.5000 MMBtu/hr)
=0.16

tons PM/yr =(lb PM/hr)(hr/yr)(1 ton/2000 lb)
=(0.16 lb PM/hr)(8760 hr/yr)(1 ton/2000 lb)
=0.72

Engine HAP Emissions

GRI-HAPCalc Version 3.0 is a personal computer-based database program that estimates emissions of hazardous air pollutants (HAPs) and criteria pollutants from natural gas industry operations. HAPCalc 3.0 estimates emissions from the following point sources: amine sweetening units, sulfur recovery units, reciprocating engines, combustion turbines, small external combustion devices, flares, liquid hydrocarbon storage tanks, truck loading, miscellaneous process vents, and fugitives.

Emissions are estimated with factors derived from data collected during various GRI Environment and Safety research programs or by the U.S. Environmental Protection Agency (EPA). The GRI Literature database, developed during Phase I of the Air Toxics Program (1990 to 1992), compiled available emission test results from 40 reciprocating engines, 2 gas turbines, and 1 steam generator. The GRI Field Test database, developed from 1994 to 1997, contains GRI test data from 26 engines, 9 gas turbines, and 8 external combustion devices operating at several natural gas transmission, storage, and processing facilities. EPA emission factors are obtained from AP-42, 5th Edition [U.S. Environmental Protection Agency].

Since data are not available for all pollutants for some of the emission factor sets, a hierarchical combination of EPA > GRI Field > GRI Literature was used. Emission factors are prioritized in the listed order.

Turbine 1208 HAP Emission Factors and Emissions

Chemical	g/bhp-hr	tpy	lbs/hour	Factor set
Formaldehyde	0.0146323	2.22	0.5060	EPA
Acetaldehyde	0.0003443	0.05	0.0119	EPA
1,3-Butadiene	0.0000019	0.00	0.0001	EPA
Acrolein	0.000034	0.01	0.0012	EPA
Propional	0.000865	0.13	0.0299	GRI Field
Propylene Oxide	0.0001248	0.02	0.0043	EPA
n-Nitrosodimethylamine	0.000001	0.00	0.0000	EPA
Benzene	0.0006025	0.09	0.0208	EPA
Toluene	0.0005595	0.08	0.0193	EPA
Ethylbenzene	0.0001033	0.02	0.0036	EPA
Xylenes(m,p,o)	0.0001162	0.02	0.0040	EPA
2,2,4-Trimethylpentane	0.0016053	0.24	0.0555	GRI Field
n-Hexane	0.0015058	0.23	0.0521	GRI Field
Phenol	0.0001101	0.02	0.0038	GRI Field
n-Nitrosomorpholine	0.000001	0.00	0.0000	EPA
Naphthalene	0.0006025	0.09	0.0208	EPA
2-Methylnaphthalene	0.0000013	0.00	0.0000	GRI Field
Biphenyl	0.0003305	0.05	0.0114	GRI Field
Phenanthrene	0.0000005	0.00	0.0000	GRI Field
Chrysene	0.000001	0.00	0.0000	GRI Field
Beryllium	0.0000001	0.00	0.0000	GRI Field
Phosphorous	0.0000652	0.01	0.0023	GRI Field
Chromium	0.0000056	0.00	0.0002	EPA
Chromium	0.0000082	0.00	0.0003	GRI Field
Manganese	0.0000069	0.00	0.0002	EPA
Nickel	0.0000061	0.00	0.0002	GRI Field
Cobalt	0.0000016	0.00	0.0001	GRI Field
Arsenic	0.0000002	0.00	0.0000	EPA
Selenium	0.0000003	0.00	0.0000	GRI Field
Cadmium	0.0000036	0.00	0.0001	EPA
Mercury	0.0000019	0.00	0.0001	EPA
Lead	0.0000689	0.01	0.0024	EPA
TOTALS:	0.0217114	3.29	0.7508	

Turbine 1207 HAP Emission Factors and Emissions

Chemical	g/bhp-hr	tpy	lbs/hour	Factor set
Formaldehyde	0.0146323	1.84	0.4198	EPA
Acetaldehyde	0.0003443	0.04	0.0099	EPA
1,3-Butadiene	0.0000019	0.00	0.0001	EPA
Acrolein	0.000034	0.00	0.0010	EPA
Propional	0.000865	0.11	0.0248	GRI Field
Propylene Oxide	0.0001248	0.02	0.0036	EPA
n-Nitrosodimethylamine	0.000001	0.00	0.0000	EPA
Benzene	0.0006025	0.08	0.0173	EPA
Toluene	0.0005595	0.07	0.0161	EPA
Ethylbenzene	0.0001033	0.01	0.0030	EPA
Xylenes(m,p,o)	0.0001162	0.01	0.0033	EPA
2,2,4-Trimethylpentane	0.0016053	0.20	0.0461	GRI Field
n-Hexane	0.0015058	0.19	0.0432	GRI Field
Phenol	0.0001101	0.01	0.0032	GRI Field
n-Nitrosomorpholine	0.000001	0.00	0.0000	EPA
Naphthalene	0.0006025	0.08	0.0173	EPA
2-Methylnaphthalene	0.0000013	0.00	0.0000	GRI Field
Biphenyl	0.0003305	0.04	0.0095	GRI Field
Phenanthrene	0.0000005	0.00	0.0000	GRI Field
Chrysene	0.000001	0.00	0.0000	GRI Field
Beryllium	0.0000001	0.00	0.0000	GRI Field
Phosphorous	0.0000652	0.01	0.0019	GRI Field
Chromium	0.0000056	0.00	0.0002	EPA
Chromium	0.0000082	0.00	0.0002	GRI Field
Manganese	0.0000069	0.00	0.0002	EPA
Nickel	0.0000061	0.00	0.0002	GRI Field
Cobalt	0.0000016	0.00	0.0000	GRI Field
Arsenic	0.0000002	0.00	0.0000	EPA
Selenium	0.0000003	0.00	0.0000	GRI Field
Cadmium	0.0000036	0.00	0.0001	EPA
Mercury	0.0000019	0.00	0.0001	EPA
Lead	0.0000689	0.01	0.0020	EPA
TOTALS:	**0.0217114**	**2.73**	**0.6229**	

Engines 1204 AND 1205 HAP Emission Factors and Emissions

Chemical	g/bhp-hr	tpy	lbs/hour	Factor set
Formaldehyde	0.127006	2.45	0.5595	EPA
Methanol	0.0044452	0.09	0.0196	EPA
Acetaldehyde	0.0163293	0.32	0.0719	EPA
Acrolein	0.0074	0.14	0.0326	GRI Literature
Benzene	0.0034927	0.07	0.0154	EPA
Toluene	0.0036287	0.07	0.0160	EPA
Ethylbenzene	0.0003221	0.01	0.0014	EPA
Xylenes(m,p,o)	0.0012701	0.02	0.0056	EPA
2,2,4-Trimethylpentane	0.0013154	0.03	0.0058	EPA
n-Hexane	0.0032205	0.06	0.0142	EPA
Phenol	0.0000907	0.00	0.0004	EPA
Styrene	0.0001724	0.00	0.0008	EPA
Naphthalene	0.0000381	0.00	0.0002	EPA
Biphenyl	0.0007711	0.01	0.0034	EPA
Fluorene	0.0000367	0.00	0.0002	EPA
Ethylene Dibromide	0.0003629	0.01	0.0016	EPA
Vinyl Chloride	0.0001225	0.00	0.0005	EPA
Methylene Chloride	0.000313	0.01	0.0014	EPA
1,1-Dichloroethane	0.0001905	0.00	0.0008	EPA
1,3-Dichloropropene	0.0002177	0.00	0.0010	EPA
Chlorobenzene	0.0002177	0.00	0.0010	EPA
Chloroform	0.0002313	0.00	0.0010	EPA
1,1,2-Trichloroethane	0.0002087	0.00	0.0009	EPA
1,1,2,2-Tetrachloroethane	0.0004082	0.01	0.0018	EPA
Carbon Tetrachloride	0.0002994	0.01	0.0013	EPA
Per engine TOTALS:	**0.1721109**	**3.32**	**0.7582**	

Fugitive Leak Emissions

Fugitive Leak Emissions - FGT Compressor Station No. 12

Fugitive Emissions Factors					
Component		Service	Emissions *		
			Factor tpy	Factor lb/hr	Factor kg/hr
Valves		Gas	0.0434606	0.00992251	0.00450085
Connector		Gas	0.0019316	0.00044100	0.00020004
Flanges		Gas	0.0037666	0.00085995	0.00039008
Open-Ended Line		Gas	0.0193158	0.00441000	0.00200038
Pumps		Gas	0.023179	0.00529201	0.00240046
Other		Gas	0.0849895	0.01940400	0.00880165
Valves		Light Oil	0.0241448	0.00551251	0.00250048
Connector		Light Oil	0.0020282	0.00046306	0.00021004
Flanges		Light Oil	0.0010624	0.00024256	0.00011002
Open-Ended Line		Light Oil	0.0135211	0.00308701	0.00140027
Pumps		Light Oil	0.1255527	0.02866500	0.01300244
Other		Light Oil	0.0724343	0.01653751	0.00750142
Valves		Heavy Oil	0.0000811	0.00001852	0.00000840
Connector		Heavy Oil	0.0000724	0.00001653	0.00000750
Flanges		Heavy Oil	0.0000038	0.00000087	0.00000039
Open-Ended Line		Heavy Oil	0.0013521	0.00030870	0.00014003
Pumps		Heavy Oil	NA	0.00529	NA
Other		Heavy Oil	0.0002994	0.00006836	0.00003101

*EPA publication EPA-453/R-95-017, November 1995, "Protocol for Equipment Leak EmissionEstimates"

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New Component Emissions					
Component	Service	Component	Emissions *	NM/NE	Emissions
	2	Count	Factor (ton/yr)	Fraction	(ton/yr)
Valves	Gas	54	0.0434606	0.05	0.12
Connector	8Gas	0	0.0019316	0.05	0.00
Flanges	Gas	90	0.0037666	0.05	0.02
Open-Ended Line	Gas	15	0.0193158	0.05	0.01
Pumps	Gas	1	0.023179	0.05	0.00
Other	Gas	088	0.0849895	0.05	0.00
Valves	Light Oil	7	0.0241448	1.00	0.17
Connector	Light Oil	0	0.0020282	1.00	0.00
Flanges	Light Oil	18	0.0010624	1.00	0.02
Open-Ended Line	Light Oil	2	0.0135211	1.00	0.03
Pumps	Light Oil	0	0.1255527	1.00	0.00
Other	Light Oil	0	0.0724343	1.00	0.00
Valves	Heavy Oil	3	0.0000811	1.00	0.00
Connector	Heavy Oil	0	0.0000724	1.00	0.00
Flanges	Heavy Oil	11	0.0000038	1.00	0.00
Open-Ended Line	Heavy Oil	0	0.0013521	1.00	0.00
Other	Heavy Oil	0	0.0002994	1.00	0.00
				TOTAL:	0.37

Attachment E

Test Reports

Engine 1204 and 1205 Pre-modification Report
Summary of Modified Engine 1205

Engine 1204 and 1205 Pre-modification Report

TEST REPORT
ON
EXHAUST EMISSIONS

FROM
TWO COOPER-BESSEMER LS-G-8
COMPRESSOR ENGINES
AT
COMPRESSOR STATION NO. 12

PREPARED FOR

FLORIDA GAS TRANSMISSION COMPANY

MAY, 2000

CUBIX JOB NO. 5832

PREPARED BY

Cubix Corporation
http://www.cubixcorp.com

CORPORATE HEADQUARTERS
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INTRODUCTION

Emission testing was conducted on two reciprocating engines in service at Florida Gas Transmission Station 12 near Munson in Santa Rosa County, Florida. Nitrogen oxides (NO_X), carbon monoxide (CO), and other combustion products were measured in the exhaust of the engines. Cubix Corporation of Austin, Texas conducted these tests April 24, 2000.

The purpose of this testing was to provide baseline mass emission rates for two Cooper-Bessemer LS-8-SG engines (Units 1204 and 1205). For each source, three one-hour test runs were conducted documenting engine operational data, emission concentrations, and mass emission rates.

The tests followed the procedures set forth in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1, 2, 3a, 4, 7e, 9, 10, 19 and 25a. Table 1 summarizes the background information pertinent to these tests.

This report has been reviewed and is approved for submittal by the following representatives:

Cubix Corporation

Florida Gas Transmission Co.

TABLE 1:
Background Data

Source Owner:	**Florida Gas Transmission Company** 601 South Lake Destiny Drive Maitland, Florida 32751 (407) 875-5865 TEL (407) 875-5896 FAX Attn: Clay Roesler, D.E.S.
Test Contractor:	**Cubix Corporation** 9225 US Highway 183 South Austin, Texas 78747 (512) 243-0202 TEL (512) 243-0222 FAX Attn: Jeff Thomason
Process Description:	Reciprocating compressor engines are used to compress natural gas for pipeline transmission.
Test Dates:	April 24, 2000
Locations:	4 and one-half miles north of Munson, Florida
Emission Sampling Points:	Sampling on each reciprocating engine occurred from appropriately positioned sample ports on the exhaust stack of each source. Please see Appendix A for stack diagrams.
Test Participants:	**Florida Gas Transmission** George Gardener William Rogers Sid Burrows Danny Parker **Enron Construction & Engineering** Marcello Minotti V. Duane Pierce (AQMcs)

Cubix Corporation
Jeff Thomason
Greg Madsen

Test Methods:

Environmental Protection Agency (EPA) Method 1 was used for selection of velocity traverse point locations.

EPA Method 2 was used for conducting stack gas velocity, i.e., pitot tube, measurements.

EPA Method 3a was used for determination of oxygen (O_2) and carbon dioxide (CO_2) concentrations.

EPA Method 4 was used for determination of stack gas moisture content.

Stoichiometric calculations were also used for moisture content determination.

EPA Method 7e was used for determination of oxides of nitrogen (NO_X) concentrations.

EPA Method 9 was used for determination of visual emission observations.

EPA Method 10 was used for determination of carbon monoxide (CO) concentrations.

EPA Method 19 was used for verification of volumetric flow rates by stoichiometric calculations based on O_2 and CO_2 "F Factors".

EPA Method 25a was used for determination of total hydrocarbon (THC) concentrations. VOC is calculated from THC and fuel analysis (see Appendix B, *Example Calculations*)
Measurements were conducted on a propane basis.

SUMMARY OF RESULTS

FGT owns and operates Compressor Station 12 located near Munson, in Santa Rosa County, Florida. At this station, a number of reciprocating compressor engines are utilized for the compression of natural gas for transport in an underground pipeline. The following units were tested to establish baseline emission rates for a specific engine type:

Unit 1204	Cooper-Bessemer LS-8-SG
Unit 1205	Cooper-Bessemer LS-8-SG

The tests on these sources are the subject of this report.

For each source, three one-hour test runs were conducted for each required EPA test method. NO_X, CO, THC, O_2, and CO_2 emissions were continuously monitored during each of these runs. Moisture content was determined gravimetrically during each test run using a chilled water impingement system. Stack velocity measurements were performed concurrently with each test run. Each unit was operating at greater than 90% of site rated torque and horsepower during each test run

Tables 2-3 are summaries of the testing results. Each summary table contains operating data recorded during the test from the engine's control panels (supplied by FGT personnel), ambient conditions, the measured emissions, and calculated mass emission rates. The emission rates for NO_X and CO are reported in terms of parts per million by volume (ppmv) on a dry basis, pounds per hour (lbs/hr), tons per year (tons/yr), and grams per brake horsepower hour (g/bhp-hr). Emission rates for Volatile Organic Compounds (VOC) (as derived from measured THC concentrations and the non methane, non ethane fraction of the fuel gas) are presented in terms of lbs/hr and g/bhp-hr.

Volumetric flow and mass emission rates were determined by two different techniques. The first technique employed a physical measurement of exhaust flow (EPA Methods 1-4), which included measurements of stack gas molecular weight, stack gas moisture, stack gas temperature, atmospheric pressure, and stack gas static and differential pressures (i.e., velocity). The field data sheets, used for collection of data specific to stack gas moisture and velocity, are in Appendix A.

The second technique employed a stoichiometric calculation (EPA Method 19) based on measurements of diluent gas (O_2 or CO_2) concentration, "F Factors" determined from fuel composition, and the engine's fuel consumption rate. This technique is performed to verify the accuracy of the physical measurement technique. Sometimes measuring engine exhaust flow with a pitot tube in a location with turbulent, pulsating flow (i.e., before a silencer) can produce inaccurate flow rate values.

Pollutant mass emission rates were calculated using the volumetric flow rates determined by EPA Methods 1-4. Examples of mass emission rate calculations and other calculations necessary for the presentation of the results of this section are contained in Appendix B. FGT determined and supplied the engine brake-specific horsepower data used in the determination of the emission rate units of g/bhp-hr.

Operational data obtained during the testing is presented in Appendix D. Records of quality assurance activities are in Appendix E. Certifications of calibration gases and equipment used to conduct tests at this facility are in Appendix F. Appendix G contains a copy of the strip chart records of the analyzer monitored emission concentrations

Table 2: Unit 1204 Baseline

Florida Gas Transmission
Compressor Station No. 12
near Munson on Hwy 191, Santa Rosa County, FL
Cooper-Bessemer LSG8 Compressor Engine — **2000** bhp @ **330** rpm
Technicians: JT, GM

Test Run No.	**1204-C-1**	**1204-C-2**	**1204-C-3**	
Date	4/24/00	4/24/00	4/24/00	
Start Time	15:28	16:53	18:13	
Stop Time	16:28	17:53	19:23	
Engine/Compressor Operation				**Averages**
Engine Load (bhp, measured at the compressor)	1979	1963	1987	**1976**
Fuel Horsepower (bhp, based upon fuel torque)	1940	1940	1924	**1935**
Engine Speed (rpm)	329	329	329	**329**
Torque (%, full load = 2000 bhp at 330 rpm)	99	98	98	**98**
Ignition Timing (°BTDC)	29	29	30	-
Air Manifold Pressure ("Hg)	6.5	6.5	6.5	**6.5**
Fuel Manifold Pressure (psig)	7.2	7.2	7.2	**7.2**
Station Suction Pressure (psig)	746	739	737	**741**
Station Suction Temperature (°F)	67	67	67	**67**
Station Discharge Pressure (psig)	964.0	964.0	960.0	**963**
Unit Discharge Temperature (°F)	107	108	108	**108**
Loading Step Number	3.0	3.0	3.0	-
Compressor Throughput (MMSCFD)	140	136	136	**137.3**
Engine Fuel Data (Natural Gas)				
Fuel Heating Value (Btu/SCF, HHV)	1042.9	1042.9	1042.9	**1042.9**
Fuel Specific Gravity	0.5891	0.5891	0.5891	**0.5891**
O2 "Fd-factor" (DSCFcx/MMBtu @ 0% excess air)	8642	8642	8642	**8642**
CO2 "Fc-factor" (DSCFcx/MMBtu @ 0% excess air)	1028	1028	1028	**1028**
Heat Input (MMBtu/hr)	14	14	14	**14**
Brake-specific Fuel Consumption (Btu/bhp-hr)	7110.77	7067.23	7086.98	**7088.33**
Ambient Conditions				
Atmospheric Pressure ("Hg)	29.44	29.44	29.44	**29.44**
Temperature (°F) : Dry bulb	70.0	81.0	78.0	**76.3**
(°F): Wet bulb	65.0	73.0	69.0	**69.0**
Humidity (lbs moisture/lb air)	0.0120	0.0155	0.0131	**0.0135**
Measured Emissions				
NOX (ppmv, dry basis)	1731.1	1561.1	1545.1	**1612.4**
CO (ppmv, dry basis)	220.4	224.7	226.3	**223.8**
O2 (% volume, dry basis)	9.3	9.2	9.4	**9.3**
CO2 (% volume, dry basis)	6.51	6.53	6.49	**6.51**
THC (ppmv)	616.7	608.0	590.8	**605.2**
VOC (ppmv as % of THC by weight from fuel gas analysis)	16.33	16.10	15.64	**16.02**
FO (fuel factor, range = 1.600-1.836 for NG)	1.79	1.79	1.77	**1.78**
Stack Volumetric Flow Rates				
via Pitot Tube (SCFH, dry basis)	2.24E+05	1.95E+05	2.11E+05	**2.12E+05**
via O2 "F-factor" (SCFH, dry basis)	2.14E+05	2.12E+05	2.14E+05	**2.18E+05**
via CO2 "F-factor" (SCFH, dry basis)	2.18E+05	2.16E+05	2.16E+05	**2.19E+05**
Calculated Emission Rates (via pitot tube)				
NOX (lbs/hr)	46.3	36.4	38.9	**40.6**
CO (lbs/hr)	3.59	3.19	3.46	**3.41**
VOC (lbs/hr)	0.418	0.359	0.377	**0.38**
NOX (tons/yr)	202.7	159.3	170.2	**177.4**
CO (tons/yr)	15.7	14.0	15.2	**14.9**
VOC (tons/yr)	1.83	1.57	1.65	**1.7**
NOX (g/bhp-hr)	10.83	8.51	9.17	**9.51**
CO (g/bhp-hr)	0.84	0.75	0.82	**0.80**
VOC (g/bhp-hr)	0.10	0.08	0.09	**0.09**

Table 3: Unit 1205 Baseline

Florida Gas Transmission
Compressor Station No. 12
near Munson on Hwy 191, Santa Rosa County, FL
Cooper-Bessemer LSG8 Compressor Engine — **2000 bhp @ 330 rpm**
Technicians: JT, GM

Test Run No.	1205-C-4	1205-C-5	1205-C-6	
Date	4/24/00	4/24/00	4/24/00	
Start Time	20:43	21:56	23:06	
Stop Time	21:43	22:56	00:06	
Engine/Compressor Operation				**Averages**
Engine Load (bhp, measured at the compressor)	1987	1978	1953	**1964**
Fuel Horsepower (bhp, based upon fuel torque)	1861	1939	1938	**1913**
Engine Speed (rpm)	330	330	330	**330**
Torque (%, full load = 2000 bhp at 330 rpm)	99	99	98	**99**
Ignition Timing (°BTDC)	27.0	26.5	26.7	**26.7**
Air Manifold Temperature (°F)	80.0	80.5	82.0	**80.8**
Fuel Manifold Pressure (psig)	8	8	8	**8**
Station Suction Pressure (psig)	723	718	712	**718**
Station Suction Temperature (°F)	67.0	67.0	67.0	**67**
Station Discharge Pressure (psig)	967	964	960	**964**
Unit Discharge Temperature (°F)	110.0	111.0	111.0	**110.7**
Loading Step Number	3	3	3	-
Compressor Throughput (MMSCFD)	124	121	119	**121.3**
Engine Fuel Data (Natural Gas)				
Fuel Heating Value (Btu/SCF, HHV)	1042.9	1042.9	1042.9	**1042.9**
Fuel Specific Gravity	0.5891	0.5891	0.5891	**0.5891**
O2 "Fd-factor" (DSCFex/MMBtu @ 0% excess air)	8642	8642	8642	**8642**
CO2 "Fc-factor" (DSCFex/MMBtu @ 0% excess air)	1028	1028	1028	**1028**
Heat Input (MMBtu/hr)	14	14	14	**14**
Brake-specific Fuel Consumption (Btu/bhp-hr)	7536.47	7210.17	7164.93	**7303.86**
Ambient Conditions				
Atmospheric Pressure ("Hg)	29.59	29.59	29.62	**29.60**
Temperature (°F) : Dry bulb	66.0	66.0	63.0	**65.0**
(°F): Wet bulb	62.0	62.0	60.0	**61.3**
Humidity (lbs moisture/lb air)	0.0109	0.0109	0.0103	**0.0**
Measured Emissions				
NOX (ppmv, dry basis)	1984.5	1803.8	1711.2	**1833.2**
CO (ppmv, dry basis)	228.3	225.0	223.9	**225.7**
O2 (% volume, dry basis)	9.2	9.4	9.5	**9.4**
CO2 (% volume, dry basis)	6.66	6.47	6.51	**6.55**
THC (ppmv)	563.2	564.3	559.3	**562.3**
VOC (ppmv as % of THC by weight from fuel gas analysis)	14.91	14.94	14.81	**14.89**
FO (fuel factor, range = 1.600-1.836 for NG)	1.76	1.78	1.75	**1.76**
Stack Volumetric Flow Rates				
via Pitot Tube (SCFH, dry basis)	2.09E+05	2.15E+05	2.11E+05	**2.12E+05**
via O2 "F-factor" (SCFH, dry basis)	2.16E+05	2.19E+05	2.20E+05	**2.18E+05**
via CO2 "F-factor" (SCFH, dry basis)	2.17E+05	2.22E+05	2.19E+05	**2.19E+05**
Calculated Emission Rates (via pitot tube)				
NOX (lbs/hr)	49.6	46.4	43.2	**46.4**
CO (lbs/hr)	3.48	3.52	3.44	**3.48**
VOC (lbs/hr)	0.358	0.369	0.358	**0.362**
NOX (tons/yr)	217.4	203.3	189.3	**203.4**
CO (tons/yr)	15.2	15.4	15.1	**15.2**
VOC (tons/yr)	1.57	1.61	1.57	**1.58**
NOX (g/bhp-hr)	12.11	10.87	10.13	**11.04**
CO (g/bhp-hr)	0.85	0.82	0.81	**0.83**
VOC (g/bhp-hr)	0.09	0.09	0.08	**0.09**

ANALYTICAL TECHNIQUE

The emissions from two Cooper-Bessemer compressor engines were measured to determine the quantity of emissions being emitted to the atmosphere under full load operating conditions. The sampling and analysis procedures used during these tests conformed with those outlined in The Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1, 2, 3a, 4, 7e, 9, 10, 19, and 25a. This section of the report describes the analytical techniques and procedures used during the testing.

The test matrix for each engine consisted of three-one hour test runs following each required test method. The stack gas was analyzed for NO_X, CO, THC, O2, and CO_2 by continuous instrumental monitors. THC analysis was on a wet basis; all other exhaust gas analyses were performed on a dry basis. Table 3 lists the instruments and detection principles used for these analyses.

Provisions were made to introduce the calibration gases to the instrumental monitors via two paths: 1) directly to the instruments via the sample manifold quick-connects and rotameters, and 2) through the complete sampling system including the sample probe, filter, heat trace, condenser, sample line, manifold, and rotameters. The former method was used for quick, convenient calibration checks. The latter method was used to demonstrate that the sample was not altered due to leakage, reactions, or adsorption within the sampling system (sample system bias check). A NO_X standard calibration gas was introduced into the NO_X analyzer directly. Then the response from the NO_X analyzer was noted as the calibration gas was introduced at the probe. Any difference between the two responses in the instrument was attributed to the bias of the sample system. Following the span gas bias check, a zero gas bias check was performed on the NO_X analyzer using nitrogen, or another calibration gas as a zero for NO_X, to check for any zero gas bias of the sample system. In accordance with EPA Method 3a, this span and zero bias check procedure was repeated for the O_2 and CO_2 analyzers. This procedure was also used for the CO analyzer (although not required by EPA Method 10). All calibrations for the THC analyzer were performed through the entire system as required by EPA Method 25a. While not required the more stringent bias and drift corrections of EPA Method 6c were applied to reported concentrations of THC.

As shown in Figure 1, a $^1/_2$-inch diameter stainless steel probe was inserted into the sample port of the stack. The gas sample was continuously pulled through the probe and transported via a 100-foot long $^3/_8$-inch diameter heat-traced Teflon® line into the mobile laboratory using a stainless steel/Teflon®

diaphragm pump. At the pump exit the pressurized sample was pushed into a heated sample manifold. A portion of this hot, wet sample was delivered to the THC analyzer. The bulk of the gas stream then passed into a stainless steel minimum contact condenser to dry the sample stream and into the (dry) sample manifold. From the manifold, the sample was partitioned to the analyzers through glass and stainless steel rotameters for flow control of the sample.

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

EPA Method 1 was used to determine the velocity traverse point locations. Prior to conducting the tests, a cyclonic flow check was conducted. No significant cyclonic flow was encountered. The stack met the minimum criteria set forth in the method. The location of the sample ports and the pitot tube traverse point distances for the engine are denoted in the "Circular Stack Sampling Traverse Point Layout" data sheet, see Appendix A.

EPA Method 2 was used for determination of stack gas velocity during each run. Pitot tubes and either an inclined gauge oil manometer or NIST-traceable digital electronic manometer were used to measure the differential pressure at each traverse point. The stack temperature was determined with a K-type thermocouple and digital thermometer.

Stack volumetric flow rates were also determined using EPA Method 19 O_2 and CO_2 "F Factors". These "F Factors" and the heating value of the fuel were based on a fuel analysis provided by FGT's in-house laboratory. The fuel analysis and Cubix's fuel calculation table can be found in Appendix C of this report.

The stack gas analyses for CO_2 and O_2 concentrations were performed in accordance with procedures set forth in EPA Method 3a. Instrumental analyses were used in lieu of an Orsat or Fyrite procedure due to the greater accuracy and precision provided by the instruments. The CO_2 analyzer was based on the principle of infrared absorption; and, the O_2 analyzer operated using a current generating micro-fuel cell.

The F_O calculation of EPA Method 3b (Section 4.1.1) was used to verify that the ratios of O_2 to CO_2 combustion byproducts were within an acceptable range during each test run. In each case the F_O fell within the expected values for natural gas.

EPA Method 4 was used to measure the moisture content of the stack gas. A chilled liquid impingement system was used in conjunction with a calibrated dry gas meter to pull a sample greater than 21 scf coincident with each test run. A K-type (chromel-alumel) thermocouple was used in conjunction with a digital thermometer to determine the last impinger temperature in the chilled liquid impingement sampling train. This parameter is measured to ensure that the gas stream is cooled to a minimum of 68 degrees Fahrenheit as required by sampling methodology.

EPA Method 7e procedures were used to determine concentrations of NO_X (via chemiluminescence). NO_X mass emission rates were calculated as if the NO_X emissions were only in the form of NO_2. This approach corresponds to EPA's convention; however, it tends to overestimate the actual NO_X mass emission rates since the majority of NO_X is in the form of NO. NO has less mass per unit volume (i.e., lbs. of emissions per ppmv concentration) than NO_2.

CO emission concentrations were quantified in accordance with procedures set forth in EPA Method 10. A continuous non-dispersive infrared (NDIR) analyzer was used for this purpose. This reference method analyzer was equipped with a gas correlation filter that removes most interference from moisture, CO_2, and other combustion products.

THC measurements were made via EPA Method 25a. Measurements were made and reported on a propane basis. A flame ionization detector (FID) analyzer was used for this purpose. VOC concentrations were calculated based on the percentage by weight of non-methane/non-ethane hydrocarbons present in the fuel gas. This calculation assumes a proportionate burn ratio, and presents a "worst case" VOC concentration.

Test data from the continuous monitoring instruments were recorded on two synchronized 3-pen strip chart recorders (Soltec Model 1243). These recorders were operated at a chart speed of 30 centimeters/hour and record over a 25-centimeter width. Strip chart records for Units 1204 and 1205 may be found in Appendix G of this report.

Cubix personnel collected ambient absolute pressure, temperature and humidity data. A wet/dry bulb sling psychrometer was used to determine ambient temperature and humidity conditions. An aircraft-type aneroid barometer (altimeter) was used to measure absolute atmospheric pressure.

FGT personnel also collected key operational data during each of the test runs and supplied it to Cubix. Key operational data collected included a current

fuel analysis, fuel flow, fuel and air manifold pressures/temperatures, suction and discharge pressures, brake horsepower, engine torque, and engine speed.

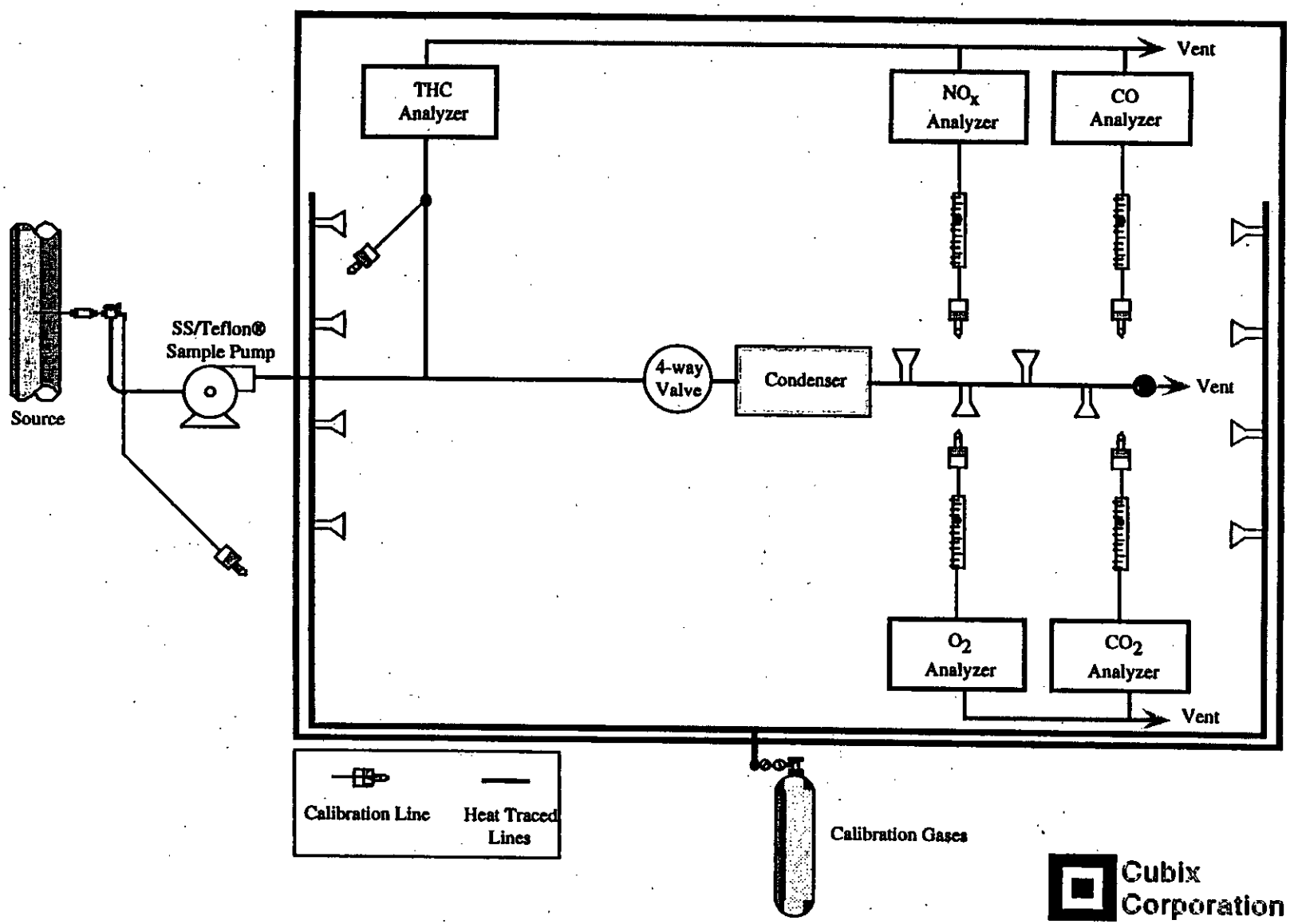
Emission calculations were conducted by a computer spreadsheet as shown in Tables 2-3 of this report. Example calculations were performed manually using a hand-held calculator in order to verify the formulas used in the spreadsheet. Example calculations are in Appendix B of this report.

TABLE 4
ANALYTICAL INSTRUMENTATION

Parameter	Model and Manufacturer	Common Use Ranges	Sensitivity	Response Time (sec.)	Detection Principle
NOx	TECO 10	0-10 ppm 0-100 ppm 0-200 ppm 0-500 ppm 0-1,000 ppm	0.1 ppm	1.7	Thermal reduction of NO to NO_2 Chemiluminescence of reaction of NO with O_3. Detection by PMT. Inherently linear for listed ranges.
CO	TECO 48H	0-10 ppm 0-100 ppm 0-500 ppm 0-1,000 ppm	1 ppm	10.0	Infrared absorption, gas filter correlation detector, microprocessor based linearization.
CO_2	Servomex 1400	0-20% 0-4%	0.02%	10.0	Infrared absorption, solid state detector
O_2	Teledyne Model 320	0-10% 0-23%	0.10%	15.0	Paramagnetic, inherently linear
THC	JUM Model 3-300	0-10, 0-100, 0-1000, 0-10000 0-100000 ppm	0.2 ppm	5.0	Flame ionization of hydrocarbons inherently linear over 2 orders of magnitude.
Temperature	Omega HH-26K	-120 to 2000 °F	0.1 °F	n/a	Chromel-alumel, K-type thermocouple with digital thermometer. Response time based on thermocouple design.

NOTE: Higher ranges available by sample dilution
Other ranges available via signal attenuation.

FIGURE 1
SAMPLE SYSTEM DIAGRAM



QUALITY ASSURANCE ACTIVITIES

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

Each instrument's response was checked and adjusted in the field prior to the collection of data via a multi-point calibration. The instrument's linearity was checked by first adjusting the instrument's zero and span responses to zero nitrogen and an upscale calibration gas in the range of the expected concentrations. The instrument response was then challenged with other calibration gases of known concentration. For NO_X, CO, THC, O_2, and CO_2, the instrument's response was accepted as being linear if the response of the other calibration gases agreed within $\pm 2\%$ span of the predicted values. The response of the infrared absorption type CO and CO_2 analyzers is made linear through electronic suppression.

The efficiency of the NO_2 to NO converter in the NO_X analyzer was checked by monitoring a mixture of NO in N_2 standard gas and zero grade air from a Tedlar® bag. When this bag is mixed and exposed to sunlight, the NO is oxidized to NO_2. If the NO_X instrument's converter is 100% efficient, then the total NO_X response does not decrease as the NO in the bag is converted to NO_2. The criterion for acceptability is demonstrable NO_X converter efficiency greater than 90%; this is demonstrated if the concentration of NO_X does not decrease by more than 2% of the highest read value over a 30-minute period. The strip chart and data log excerpts that demonstrate the converter efficiency test are available in Appendix G. Quality assurance worksheets, found in Appendix E, also summarize the results of each converter efficiency test.

System bias checks were performed both before and after the sampling system was used for emissions testing. The sampling system's integrity was tested by comparing the responses of the NO_X analyzer to a calibration gas (and a zero gas) introduced via two paths as previously described in the *Analytical Techniques* section of this report. This system bias test was performed to assure that no alteration of the sample had occurred during the test due to leakage, reactions, or absorption. Similarly, system bias checks were performed with CO, O_2, and CO_2 for added assurance of sample system integrity. Examination of the strip chart excerpts and Instrumental Analysis Quality Assurance Data worksheet

in Appendix E shows that the analyzer response via both sample paths agreed within ±5%.

The residence time of the sampling and measurement system was estimated using the pump flow rate and the sampling system volume. The pump's rated flow rate is 0.8 scf per minute (scfm) at 5 psig. The sampling system volume was approximately 0.39 scf. Therefore, the minimum sample residence time was approximately 29 seconds.

Cubix Corporation and instrument vendors conducted interference response tests on the NO_X, CO, and O_2 analyzers. The sum of the interference responses for H_2O, C_3H_8, CO, CO_2 and O_2 is less than 2 percent of the applicable full-scale span value. The instruments used for the tests meet the performance specifications for EPA Methods 3a, 7e, 10, and 20. The results of the interference tests are available in Appendix E of this report.

The sampling system was leak checked by demonstrating that it could hold a vacuum greater than 10 inches of mercury (Hg) for at least 1 minute with a decline of less than 1 inch Hg. A leak test was conducted after the sample system was set up (i.e., before testing began) and before the system was dismantled (i.e., after testing was completed). These tests were conducted to insure that ambient air was not diluting the sampling system. The actual vacuum was greater than 25 inches Hg in each case with no leakage detected.

Prior to and following each test run, the analyzers were checked for zero and span drift using the calibration gas line attached to the sample probe. This brackets each test run by calibrations and documents the precision of the data just collected. Based on the applicable test method, the criterion for acceptable data is that each instrument drift no more than ±3% or ±5% of the full-scale response. Appendix E contains quality assurance tables summarizing all calibration error checks and the zero and span checks that were performed for each test run. These worksheets (as prepared from the strip chart records) show that no drift in excess of each gas constituent's calibration requirement was found. The worksheets also contain data used to correct gas concentrations for drift (Method 6c, equation 6c-1).

The control gases used to calibrate the instruments were analyzed and certified by the compressed gas vendors to ±1% accuracy for each calibration gas. EPA Protocol No. 1 was used, where applicable (i.e., NO_X gases), to assign the concentration values traceable to the National Institute of Standards and Technology (NIST), Standard Reference Materials (SRM's). The gas calibration sheets as prepared by the vendor are contained in Appendix F.

The pitot tube tips used during the testing were visually inspected to insure that they met the criteria of EPA Method 2. The pitot tube lines were leak checked in the field in accordance with EPA Method 2 guidelines each time connection to a manometer was made.

The dry gas meters used for the moisture trains were calibrated prior to testing in accordance with EPA Method 4. A NIST reference instrument, a bell prover, was used for these calibrations. Calibration certification documentation of the dry gas meters can be found in Appendix F.

Appendix F also contains calibration data on the altimeter and thermocouples used during this testing.

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

APPENDIX A:
FIELD DATA SHEETS

SIGN IN SHEET

Job Name FGT #11 & #12 DATE(S): 04/24-26/00

Job Number 5825-3 PERMIT #

Plant Name/Location FGT STATION 12, FGT STATION 11

Emission Source(s) COOPER-BESSEMER LSV8 2000 Hp @ 330 RPM

PARTICIPANTS: CUBIX CORPORATION Test Contractor

ENRON / FGT owner / operator

Name:	Affliation:	Position:	Phone Number	Job Safety Review (Y/N)
Marcello Mirotti	Enron	Sr Mech Engr	713 646-7419	Y
V. Duane Pierce	FGT / ABMCO	consultant	3813775365	Y
George Gardner	ET&S	DMS	806-342-2040	Y
Sid Burrows	ET&S	MA	316-544-3098	Y
DANNY PARKER	ENRON/FGT	SR OPS TECH	850 350 5212	Y

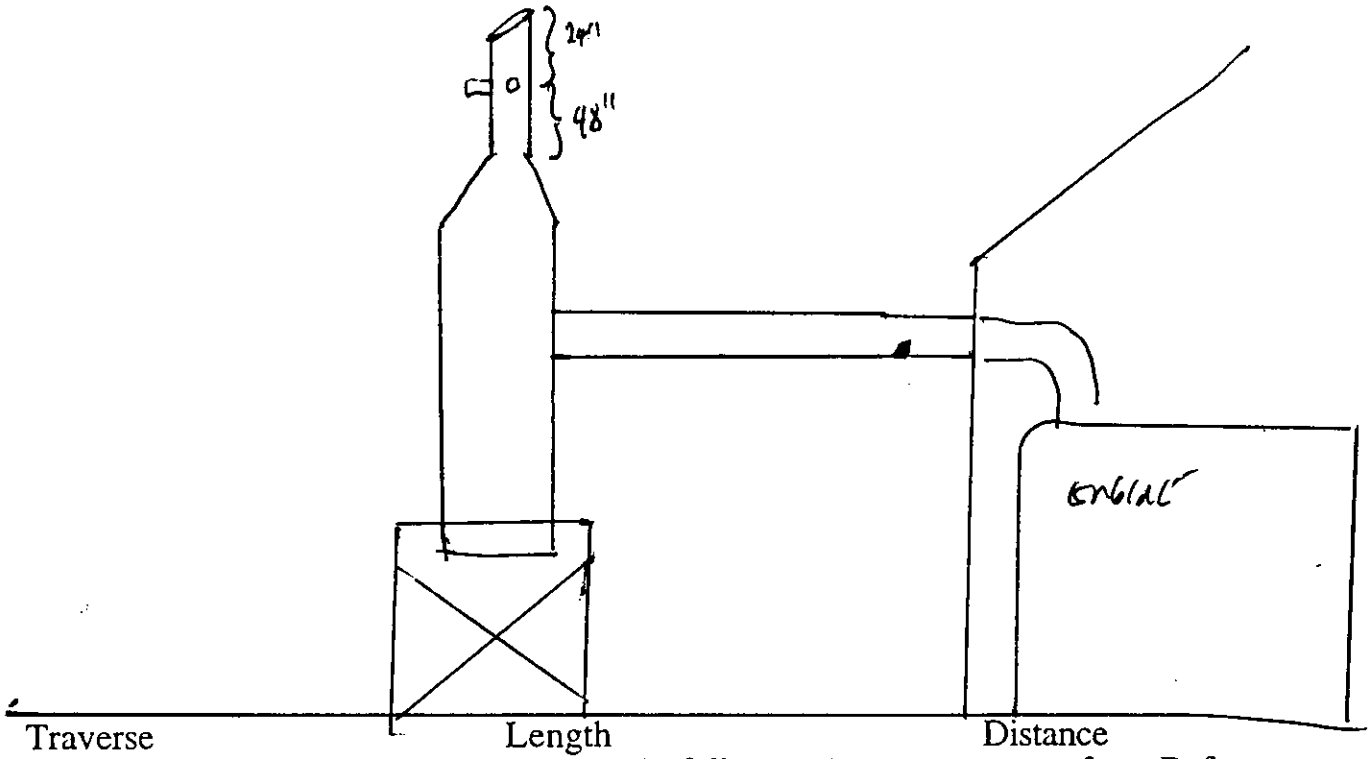
Circular Stack Sampling Traverse Point Layout
(EPA Method 1)

Date: 4/24/00
Plant: F&T STATION 12
Source: C-B&S-8-SG UNITS 1204/1205
Technician(s) JT, GM

UNITS 1204 & 1205 ARE IDENTICAL

Port + Stack ID:: 17.5 in.
Port Extension 2.5 in.
Stack ID: 15.0 in.
Stack Area 1.23 ft^2
Total Req'd Traverse Pts. 16
No. of Traverse Pts. 8 /diam.
No. of Traverse Pts. 8 /port

Stack Diagram (Side View showing major unit components, dimensions and nearest upstream & downstream flow disturbances)



Traverse Point Number	Length Factor (% of diameter) Number of traverse pts./diameter 4	6	8	12	Distance from Reference Point (inches)
1	6.7	4.4	3.2	2.1	0.51
2	25.0	14.6	10.5	6.7	1.68
3	75.0	29.6	19.4	11.8	3.10
4	93.3	70.4	32.3	17.7	5.17
5		85.4	67.7	25.0	10.83
6		95.6	80.6	35.6	12.90
7			89.5	64.4	14.32
8			96.8	75.0	15.49
9				82.3	
10				88.2	
11				93.3	
12				97.9	

Moisture, Molecular Weight, Volumetric Flow

Location:	Station #12
Source:	Cooper-Bessemer LSG8
Technicians:	JT, GM
Engine Rated:	2000 Hp @ 330 RPM
Unit Number:	1204

Test Run No.	**1204-C-1**	**1204-C-2**	**1204-C-3**
Date	4/24/2000	4/24/2000	4/24/2000
Start Time	15:28	16:53	18:13
Stop Time	16:28	17:53	19:23
Stack Moisture & Molecular Wt. via Method 4			
CO2 (%) (corrected)	6.51	6.53	6.49
O2 (%) (corrected)	9.26	9.23	9.38
Beginning Meter Reading (ft3)	863.294	886.33	908.65
Ending Meter Reading (ft3)	886.246	908.45	930.01
Beginning Impinger Wt (g)	2321.00	2344.40	2378.90
Ending Impinger Wt. (g)	2380.40	2404.30	2435.50
Dry Gas Meter Factor (Y)	0.9925	0.9925	0.9925
Dry Gas Meter Temperature (°F begin)	78.00	82.00	82.00
Dry Gas Meter Temperature (°F end)	82.00	82.00	84.00
Atmospheric Pressure (in Hg, abs.)	29.44	29.44	29.44
Stack Gas Moisture by EPA M.4 (% volume)	11.34	11.84	11.64
Dry Gas Fraction	0.89	0.88	0.88
Stack Gas Molecular Wt. (lbs/lb-mole)	28.12	28.06	28.08
Stack Flow Rate via Pitot Tube			
Pitot Tube Factor	0.84	0.84	0.84
ΔP #1	1.90	1.16	1.64
ΔP #2	2.06	1.06	1.88
ΔP #3	2.50	1.41	2.01
ΔP #4	2.34	1.22	2.02
ΔP #5	2.42	1.65	2.42
ΔP #6	2.41	2.26	2.15
ΔP #7	2.91	2.17	2.16
ΔP #8	2.24	1.87	1.91
ΔP #9	2.25	1.25	2.07
ΔP #10	2.28	2.05	2.19
ΔP #11	2.41	2.24	2.45
ΔP #12	2.36	2.26	2.49
ΔP #13	2.34	2.45	2.31
ΔP #14	2.41	2.30	2.18
ΔP #15	2.33	2.11	1.97
ΔP #16	2.25	1.95	1.87
Sum of Square Root of ΔP's	24.4	21.5	23.2
Number of Traverse Points	16	16	16
Average Square Root of ΔP's	1.53	1.34	1.45
Average Temperature (°F)	745.625	757.0	759.9
Static Pressure (in. H2O)	1.52	1.41	1.53
Stack Diameter (in., at sample point)	15	15	15
Stack Area (ft2)	1.23	1.23	1.23
Stack Velocity (ft/min)	7927	7015	7571
Stack Flow,wet (ACF/Sec.)	162	143	155
Stack Flow,wet (ACFM)	9728	8608	9291
Stack Flow,dry (SCFH)	2.24E+05	1.95E+05	2.11E+05

MOISTURE AND VELOCITY FIELD DATA SHEET

Date: 04/24/00
Plant/Operator: FGT STATION 12
Source: C-B LSFB / 1204
Technicians: JT, BM
Atm. Pres. 29.44 in.Hg(Pb)
Test Run # 1

Dry Gas Meter ID: EQUIMETER 1348739
Dry Gas Meter Factor: 0.9925 (Kd)(Y)
Pitot Tube #/Type: 301 / "S"
Pitot Tube Factor: 0.84 (Kp)
Static Press. 1.52 in.H2O(Pg)
Average Stack Temp. [illegible] °F(Ts)

Impinger #	Contents	Initial Weight	Final Weight
1	DI H2O	657.6	703.9
2	DI H2O	594.1	602.0
3	MT	477.4	478.3
4	SIGEL	591.9	596.2
5			
6			
Totals		2321.0	2380.4

Moisture Train

Sample Box #	T3	
Leak Check		
Pre-test Leak check	0.0 (ft.3) or L/min at 21.0" in. Hg Vacuum	
Post-test Leak check	0.0 (ft.3) or L/min at 23.0" in. Hg Vacuum	
	Initial	Final
Time:	1535	1632
Meter Reading (ft.3 or L)	863.294	886.246
Meter Temp. (°F)	76	72
O2 %		
CO2 %		

Pitot Tube Traverse/Stack Temp.

CYCLONIC Sample Port 4 Sample Port B

Traverse Pt.	ΔP (" H2O)	°F	ΔP (" H2O)	°F
00 1 -2°	1.902	749	2.251	685
-1° 2 1°	2.063	749	2.283	736
0° 3 0°	2.496	752	2.408	731
0° 4 0°	2.336	756	2.362	736
1° 5 0°	2.424	750	2.339	750
1° 6 0°	2.408	752	2.411	757
0° 7 2°	2.907	748	2.329	761
0° 8 1°	2.244	754	2.251	764
~~9~~				
10				
11				
~~12~~				

PITOT TUBE LEAK CHECK

pre post

3.5"/:30 + 3.0"/:15

-2.5"/:15 — -3.0"/:15

NO EVIDENCE OF SIGNIFICANT CYCLONIC FLOW

MOISTURE AND VELOCITY FIELD DATA SHEET

Date: 4/24/00
Plant/Operator: FGT STATION 12
Source: CB 4568 / 1204
Technicians: JT, EM
Atm. Pres. 29.44 in.Hg(Pb)
Test Run # 2

Dry Gas Meter ID: EQUIMETER 1348739
Dry Gas Meter Factor: 0.9925 ~~(Kd)~~ (Y)
Pitot Tube #/Type: 301 / "S"
Pitot Tube Factor: 0.84 (Kp)
Static Press. 1.046 in.H2O(Pg)
Average Stack Temp. 757.0 °F(Ts)

Impinger #	Contents	Initial Weight	Final Weight
1	DI H2O	687.9	737.8
2	DI H2O	582.0	585.9
3	MT	478.3	479.7
4	SILICA	596.2	600.9
5			
6			
Totals		2344.4	2404.3

Moisture Train

Sample Box #	T3	
Leak Check		
Pre-test Leak check	0.0 (ft.3) or L/min at ___ in. Hg Vacuum 21 in Hg	
Post-test Leak check	0.0 ft.3 or L/min at ___ in. Hg Vacuum 21 in Hg	
	Initial	Final
Time:	1655	1750
Meter Reading (ft3 or L)	886.325	908.450
Meter Temp. (°F)	82	82
O2 %		
CO2 %		

Pitot Tube Traverse/Stack Temp.

Sample Port A Sample Port B

Traverse Pt.	ΔP (" H2O)	°F	ΔP (" H2O)	°F
1	1.16	742	1.252	748
2	1.06	748	2.046	756
3	1.405	748	2.241	758
4	1.215	761	2.258	759
5	1.652	757	2.454	762
6	2.258	761	2.295	769
7	2.169	758	2.112	758
8	1.873	764	1.945	762
~~9~~				
10				
11				
12				

MOISTURE AND VELOCITY FIELD DATA SHEET

Date: 4/24/00
Plant/Operator: FGT STATION 12
Source: CABLSG8 / 1204
Technicians: JT GM
Atm. Pres. 29.44 in.Hg(Pb)
Test Run # 3

Dry Gas Meter ID: EQUIMETER 1348739
Dry Gas Meter Factor: 0.9925 (Kd)(Y)
Pitot Tube #/Type: 301 / "S"
Pitot Tube Factor: 0.84 (Kp)
Static Press. 1.53 in.H2O(Pg)
Average Stack Temp. 759.9 °F(Ts)

Impinger #	Contents	Initial Weight	Final Weight
1	DI H_2O	712.4	755.7
2	DI H_2O	585.9	596.7
3	MT	479.7	480.4
4	SILICA	600.9	602.7
5			
6			
Totals		2378.9	2435.5

Moisture Train

Sample Box #	T3	
Leak Check		
Pre-test Leak check	0.01 (ft3) or L/min at 24" in. Hg Vacuum	
Post-test Leak check	0.001 (ft3) or L/min at 23.5" in. Hg Vacuum	
	Initial	Final
Time:	1813	1923
Meter Reading (ft3 or L)	908.651	930.01
Meter Temp. (°F)	82	84
O2 %		
CO2 %		

Pitot Tube Traverse/Stack Temp.

Sample Port A Sample Port B

Traverse Pt.	ΔP (" H2O)	°F	ΔP (" H2O)	°F
1	1.636	752	2.066	749
2	1.882	754	2.185	761
3	2.009	762	2.446	756
4	2.024	758	2.490	754
5	2.423	771	2.311	758
6	2.142	766	2.177	767
7	2.160	768	1.974	750
8	1.914	774	1.872	754
9				
10				
11				
12				

Location: Station #12
Source: Cooper-Bessemer LS-8-SG
Technicians: JT, GM
Engine Rated: 2000 Hp @ 330 RPM
Unit Number 1205

Test Run No.	**1205-C-4**	**1205-C-5**	**1205-C-6**
Date	4/24/2000	4/24/2000	4/24/2000
Start Time	20:43	21:56	23:06
Stop Time	21:43	22:56	00:06
Stack Moisture & Molecular Wt. via Method 4			
CO2 (%) (corrected)	6.66	6.47	6.51
O2 (%) (corrected)	9.19	9.36	9.51
Beginning Meter Reading (ft3)	930.06	952.28	974.28
Ending Meter Reading (ft3)	952.22	974.182	996.46
Beginning Impinger Wt (g)	2282.10	2310.40	2342.80
Ending Impinger Wt. (g)	2340.30	2367.70	2402.10
Dry Gas Meter Factor (Y)	0.9925	0.9925	0.9925
Dry Gas Meter Temperature (°F begin)	72.00	72.00	68.00
Dry Gas Meter Temperature (°F end)	73.00	69.00	65.00
Atmospheric Pressure (in Hg, abs.)	29.59	29.59	29.62
Stack Gas Moisture by EPA M.4 (% volume)	11.30	11.22	11.36
Dry Gas Fraction	0.89	0.89	0.89
Stack Gas Molecular Wt. (lbs/lb-mole)	28.14	28.13	28.12
Stack Flow Rate via Pitot Tube			
Pitot Tube Factor	0.84	0.84	0.84
ΔP #1	1.74	2.06	1.60
ΔP #2	1.87	2.16	1.65
ΔP #3	2.14	2.40	2.04
ΔP #4	2.25	2.41	2.26
ΔP #5	2.30	2.38	2.44
ΔP #6	2.35	2.23	2.35
ΔP #7	2.21	1.91	2.04
ΔP #8	1.56	1.74	1.77
ΔP #9	1.62	1.86	1.79
ΔP #10	1.82	1.95	1.91
ΔP #11	2.05	2.07	1.97
ΔP #12	2.12	2.18	2.34
ΔP #13	2.38	2.52	2.24
ΔP #14	2.55	2.34	2.41
ΔP #15	2.16	2.40	2.29
ΔP #16	1.77	1.86	2.20
Sum of Square Root of ΔP's	22.9	23.5	23.0
Number of Traverse Points	16	16	16
Average Square Root of ΔP's	1.43	1.47	1.44
Average Temperature (°F)	754.5	748.0	746.6
Static Pressure (in. H2O)	1.604	1.77	1.608
Stack Diameter (in., at sample point)	15	15	15
Stack Area (ft2)	1.23	1.23	1.23
Stack Velocity (ft/min)	7428	7591	7449
Stack Flow,wet (ACF/Sec.)	152	155	152
Stack Flow,wet (ACFM)	9115	9316	9141
Stack Flow,dry (SCFH)	2.09E+05	2.15E+05	2.11E+05

MOISTURE AND VELOCITY FIELD DATA SHEET

Date: 4/24/00
Plant/Operator: FGT STATION 12
Source: C-BLSCK UNIT 1205
Technicians: JT, GM
Atm. Pres. 29,59 in.Hg(Pb)
Test Run # 4

Dry Gas Meter ID: EQUIMETER 1348739
Dry Gas Meter Factor: 0,9925 (Kd)
Pitot Tube #/Type: 301 5"
Pitot Tube Factor: 0,84 (Kp)
Static Press. 1,604 in.H2O(Pg)
Average Stack Temp. 754,5 °F(Ts)

Impinger #	Contents	Initial Weight	Final Weight
1	D. H_2O	588,6	644,2
2	D. H_2O	639,2	639,2
3	MT	495,1	495,2
4	SIGEL	559,2	561,7
5			
6			
Totals		2282,1	2340,3

Moisture Train

Sample Box #	T3	
Leak Check		
Pre-test Leak check	0,0 (ft.3) or L/min at 21" Hg Vacuum	
Post-test Leak check	0,0 ft.3 or L/min at 22,5" Hg Vacuum	
	Initial	Final
Time:	2042	2132
Meter Reading (ft3 or L)	930,055	952,221
Meter Temp. (°F)	72	73
O2 %		
CO2 %		

Pitot Tube Leak Check
Pre: 4.5"/:15 + 2.0"/:20
Post: -3,8"/:15 — -2,5"/:20

Pitot Tube Traverse/Stack Temp.

CYCLONIC FLOW Sample Port A Sample Port B

Traverse Pt.	ΔP (" H2O)	°F	ΔP (" H2O)	°F
0° 1 0°	1,74	749	1,62	740
0° 2 0°	1,876	757	1,824	756
0° 3 0°	2,143	760	2,048	759
0° 4 1°	2,246	762	2,124	764
0° 5 0°	2,296	756	2,384	749
0° 6 0°	2,354	750	2,553	753
1° 7 2°	2,206	755	2,164	756
2° 8 2°	1,558	758	1,767	758
9				
10				
11				
12				

NO EVIDENCE OF SIGNIFICANT CYCLONIC FLOW

MOISTURE AND VELOCITY FIELD DATA SHEET

Date: 4/24/00
Plant/Operator: FGT STATION 12
Source: C-B LSG8 UNIT 1205
Technicians: JT, GM
Atm. Pres. 29.59 in.Hg(Pb)
Test Run # 5

Dry Gas Meter ID: EQUIMETER 1348739
Dry Gas Meter Factor: 0.9925 (Kd)
Pitot Tube #/Type: 301 / "S"
Pitot Tube Factor: 0.84 (Kp)
Static Press. 1.77 in.H2O(Pg)
Average Stack Temp. °F(Ts)

Impinger #	Contents	Initial Weight	Final Weight
1	DI H2O	614.2	667.6
2	DI H2O	639.3	640.1
3	MT	495.2	495.4
4	SILICA	561.7	564.6
5			
6			
Totals		2310.4	2367.7

Moisture Train

Sample Box #	T3	
Leak Check		
Pre-test Leak check	~~0~~ (ft.3) or L/min at 21.5" in. Hg Vacuum	
Post-test Leak check	~~0~~ (ft.3) or L/min at 21.5" in. Hg Vacuum	
	Initial	Final
Time:	2156	2249
Meter Reading (~~ft3~~ or L)	952.28	974.182
Meter Temp. (°F)	72	69
O2 %		
CO2 %		

PITOT TUBE LEAK CHECK
pre + post
+
−

Pitot Tube Traverse/Stack Temp.

Sample Port A Sample Port B

Traverse Pt.	ΔP (" H2O)	°F	ΔP (" H2O)	°F
1	2.064	732	1.864	735
2	2.157	729	1.953	732
3	2.397	746	2.066	752
4	2.412	753	2.178	758
5	2.384	760	2.522	756
6	2.231	761	2.372	749
7	1.913	762	2.397	741
8	1.741	763	1.859	739
~~9~~				
10				
11				
12				

MOISTURE AND VELOCITY FIELD DATA SHEET

Date: 4/24/00
Plant/Operator: FGT STATION 12
Source: C-BLSG 8 UNIT 1205
Technicians: JT GM
Atm. Pres. 29.62 in.Hg(Pb)
Test Run # 6

Dry Gas Meter ID: EQUIMETER 134x739
Dry Gas Meter Factor: 0.9925 (Kd)
Pitot Tube #/Type: 301 / 5"
Pitot Tube Factor: 0.84 (Kp)
Static Press. 1.605 in.H2O(Pg)
Average Stack Temp. 746.6 °F(Ts)

Impinger #	Contents	Initial Weight	Final Weight
1	DI H2O	646.6	691.5
2	DI H2O	639.3	646.4
3	MT	495.2	496.1
4	SILICA	561.7	568.1
5			
6			
Totals		2342.8	2402.1

Moisture Train

Sample Box #	T3	
Leak Check		
Pre-test Leak check	6 ft.3 or L/min at 21.5" in. Hg Vacuum	
Post-test Leak check	6 ft.3 or L/min at 21.0" in. Hg Vacuum	
	Initial	Final
Time:	2304	2355
Meter Reading (ft3 or L)	974.282	996.455
Meter Temp. (°F)	68	65
O2 %		
CO2 %		

PITOT TUBE LEAK CHECK

pre: 4.4"/:20 + 2.0"/:15
post: 2.5"/:15 = 3.2"/:15

Pitot Tube Traverse/Stack Temp.

Sample Port A Sample Port B

Traverse Pt.	ΔP (" H2O)	°F	ΔP (" H2O)	°F
1	1.602	728	1.793	718
2	1.647	740	1.911	734
3	2.044	746	1.971	744
4	2.263	753	2.343	755
5	2.437	755	2.236	754
6	2.353	756	2.410	749
7	2.037	755	2.286	757
8	1.765	749	2.196	753
9				
10				
11				
12				

Cubix Corporation
Air Emission Testing Job Safety Analysis

Job Name FGT STATION 12	*Description of Testing Activities:*
Job Number 5825	MAPPING OF TAG/CHECK POINTS
Project Mgr. THOMSEN	
Plant Contact DANNY PULLEN	
Date 4/24, 26/00	

Permits Required (Y or N)		**Personal Protective Equipment Required (Y or N)**			
Hot Work	N	hard hat	Y	acid suit	N
Cold Work	Y	ear plugs/muffs	Y	rubber boots	N
Lock & Tag	N	safety glasses	Y	monogoggles	N
Scaffolding	N	steel toed shoes	Y	face shield	N
Crane/Lift	N	gloves	Y	safety harness	N
Line Break	N	hot gloves	N	respirator	N

Emergency Response			
Safe Haven Location: @ MAIN OFFICE		Alarm Knowledge (list type of sound)	NA
Wind Direction: N NE E (SE) S SW W NW		Evacuate:	Fire
Evacuation Route E TO POND, N TO GATE		Poison Gas:	All Clear:
Assembly Points MAIN GATE, COMM. TOWER		Other	EVACUATE ON WIND
Plant Map Reviewed/ Posted (Y or N) Y			

Emergency Equipment Locations Identified (Y or N)	
fire monitors	Y
fire extinguishers	Y
safety showers	Y
escape air	NA

JOB HAZARD IDENTIFIED (circle)		**PRECAUTIONS (circle items completed or required)**		
Hazardous Materials				
flammability, reactivity, health hazards		MSDS reviewed		
Environmental Hazards				
airborne particulate		respirator		
heat stress		liquid intake	shade breaks	
cold ~~weather~~/frostbite		cold weather clothing	gloves	hard hat liner
inadequate lighting		flash light/head lamp	night lighting	
noise		hearing protection		
poor access/egress		housekeeping	alternate route	
Chemical Hazards				
asfixiation	carcinogen	**Respiratory**	**Protective Clothing**	
poison gas	chemical burns	supplied fresh air	slicker suit	
chemical eye exposure	chemical skin exposure	SCBA	acid suit	
flammable gas	flamable liquid	respirator	rubber boots	
strong acid	strong base	escape pack	monogoggles	
		exposure dosiometer	face shield	
Equipment/lifting				
test equipment hoisting (pulley/boom)		equipment secure	clear lift zone	
fork lift		certification reviewed	rope condition	
man lift (hydraulic)		guy lines	harness	
personnel basket (crane)		radios/handsignals	guard rails, toe plates	
stairs/ladders		housekeeping	braces/tie offs	
rigging		lines secure	monorails secure	
scaffold		secure tools	hard hats	

APPENDIX B:
EXAMPLE CALCULATIONS

Example Calculations

(Note: Any differences between these calculations and the computer generated field summaries are attributed to numerical rounding and truncating.)

Corrected Emission Concentrations

Refers to test run 1205-C-4 (Eq. 6c-1)

$$Cgas = (Ç - C_o) \times \frac{C_{ma}}{C_m - C_o} = \text{equation 6c-1}$$

ÇNOx = concentration of NOx (uncorrected) = 2135.0 ppmv
C_o = avg. of initial and final cal. bias checks, zero gas = 0.0 ppmv
C_m = avg. of initial and final cal. bias checks, drift check gas = 961.25 ppmv
C_{ma} = actual concentration of upscale cal. gas = 893.5 ppmv

$$\textbf{CNOx} = (2135.0 - 0.0) \times \frac{893.5}{961.25 - 0.0} = \textbf{1984.5 ppmv}$$

ÇCO = concentration of CO (uncorrected) = 225.0 ppmv
C_o = avg. of initial and final cal. bias checks, zero gas = 0.0 ppmv
C_m = avg. of initial and final cal. bias checks, drift check gas = 445.5 ppmv
C_{ma} = actual concentration of upscale cal. gas = 452.0 ppmv

$$\textbf{CCO} = (225.0 - 0.0) \times \frac{452.0}{445.5 - 0.0} = \textbf{228.3 ppmv}$$

$ÇO_2$ = concentration of O_2 (uncorrected) = 9.28%
C_o = avg. of initial and final cal. bias checks, zero gas = 0.0%
C_m = avg. of initial and final cal. bias checks, drift check gas = 21.11%
C_{ma} = actual concentration of upscale cal. gas = 20.90%

$$\textbf{CO}_2 = (9.28 - 0.0) \times \frac{20.90}{21.11 - 0.0} = \textbf{9.19\%}$$

$ÇCO_2$ = concentration of CO_2 (uncorrected) = 6.04%
C_o = avg. of initial and final cal. bias checks, zero gas = (-0.04)%
C_m = avg. of initial and final cal. bias checks, drift check gas = 3.64%
C_{ma} = actual concentration of upscale cal. gas = 4.03%

$$\textbf{CCO}_2 = (6.04 - (-0.04)) \times \frac{4.03}{3.64 - (-0.04)} = \textbf{6.66\%}$$

ÇTHC = concentration of THC (uncorrected) = 558.0 ppmv
C_o = avg. of initial and final cal. bias checks, zero gas = (-4.0) ppmv
C_m = avg. of initial and final cal. bias checks, drift check gas = 913.0 ppmv

C_{ma} = actual concentration of upscale cal. gas = 919.0 ppmv

CTHC = (558.0 - (-4.0)) x $\frac{919.0}{913.0 - (-4\ 0)}$ = **563.23 ppmv**

Calculation of VOC from THC ppmv and fuel analysis

Refers to test run 1205-C-4

CTHC = 563.23 ppmv
%NM,NE = 2.65% (from fuel analysis)

CVOC = CTHC x %NM, NE
= 563.23 x 0.0265

CVOC = 14.93 ppmv

F_o Calculation to Verify O2/CO2 Measurements

Refers to test run 1205-C-4

C_{CO2} = concentration of cabon dioxide = 6.66% (from analyzer)
C_{O2} = concentration of oxygen = 9.19% (from analyzer)

$$F_o = \frac{20.9 - \%\ O_2}{\%\ CO_2}$$

$$F_o = \frac{20.9 - 9.19}{6.66}$$

F_o = 1.758 *(acceptable F_o values for natural gas = 1.600 to 1.836)*

Moisture Content via EPA Method 4

Refers to test run 1205-C-4 (eq. 4-4)

V_1 = initial dry gas meter reading = 930.06 ft^3

V_2 = final dry gas meter reading = 952.22 ft^3

V_M = total gas sample volume collected

= $V_2 - V_1$ = 22.16 ft^3

Y = dry gas meter factor (unitless) = 0.9925

$V_{Mcorrected}$ = V_M x Y = 21.21 x 0.9925

= 21.994 ft^3

W_i = initial weight of impinger train = 2282.1 g

W_f = final weight of impinger train = 2340.3 g

W_{tot} = total weight gain of all impingers (g)

= $W_f - W_i$ = 58.2 g

K_2 = 1.335 liters /1.0 gram @ EPA STP

K_3 = $\left(\frac{528°R}{29.92"Hg}\right)$ x 28.3 l/ft^3 = 499.4 @ EPA STP

P_{atm} = atmospheric pressure (in Hg), ground level = 29.59

T = average temperature of Dry Gas Meter (°F) = 72.5

$$V_{M(std)} = \left(\frac{V_{Mcorrected} \times P_{atm} \times K_3}{T + 460}\right)$$

$$= \left(\frac{21.994 \times 29.59 \times 499.4}{72.5 + 460}\right) = 610.343$$

B_{WS} = moisture fraction by volume

$$= \left(\frac{W_{tot} \times K_2}{(W_{tot} \times K_2) + V_{M(std)}}\right)$$

$$= \left(\frac{58.2 \times 1.335}{(58.2 \times 1.335) + 610.343}\right)$$

B_{WS} = 0.1129 = 11.29% moisture

Stack Gas Molecular Weight

Refers to test run 1205-C-4 (eq. 3-1 and eq. 2-5)

M_S	= wet molecular weight of stack gas (lb/lb-mole)	
M_d	= dry molecular weight of stack gas (lb/lb-mole)	
B_{WS}	= moisture fraction by volume = 0.1129	
MW_{H_2O}	= molecular wt of H_2O	= 18 lb/lb-mole
MW_{CO_2}	= molecular wt of CO_2	= 44 lb/lb-mole
MW_{O_2}	= molecular wt of O_2	= 32 lb/lb-mole
MW_{N_2}	= molecular wt of N_2	= 28 lb/lb-mole
C_{CO_2}	= vol. fraction dry CO_2	= 0.0666 (from analyzer)
C_{O_2}	= vol. fraction dry O_2	= 0.0919 (from analyzer)
C_{N_2}	= vol. fraction dry = $1-(C_{CO_2} + C_{O_2}) = 0.8415$	
$1- B_{WS}$	= dry gas fraction	= 0.8871

M_S = wt. of CO_2 + wt. of O_2 + wt. of N_2 (Eq. 3-1)

$= ((MW_{CO_2} \times C_{CO_2}) + (MW_{O_2} \times C_{O_2}) + (MW_{N_2} \times C_{N_2}))$

$= ((44 \times 0.0666) + (32 \times 0.0919) + (28 \times 0.8415))$

M_S = 29.433 lb/lb-mole

M_d = $(18 \times B_{WS}) + ((1-B_{WS}) \times M_d)$ (Eq 2-5)

$= (18 \times 0.1129) + (0.8871 \times 29.433)$

M_d = 28.14 lb/lb-mole

Stack Gas Flow Rate via Pitot Tube

Refers to test run 1205-C-4 (eq. 2-6, 2-8, 2-9, 2-10)

C_p = pitot tube coefficient, dimensionless = 0.84

ΔP = pressure difference in stack as measured (in. H_2O)

$(\sqrt{\Delta P})_{avg}$ = average of square root of ΔP's =1.43 (from pitot readings)

t_s = stack temperature = 754.5 °F

T_s = absolute stack temperature, °R

$= t_s + 460 = 1214.5$ °R (eq. 2-8)

K_p = pitot tube constant = 85.49 ft/sec $\sqrt{\left(\frac{\text{lb/lb mole x in. Hg}}{\text{°R x in. } H_2O}\right)}$

= pitot tube constant =5129 ft/min $\sqrt{\left(\frac{\text{lb/lb mole x in. Hg}}{\text{°R x in. } H_2O}\right)}$

K_y = standard temperature/pressure constant

$$= \frac{528°R}{29.92\ "Hg} \times \frac{60\ \text{minutes}}{\text{hour}} = 1059$$

P_b = atmospheric pressure (in Hg) = 29.59

P_g = stack static pressure (in. H_2O) = 1.604

P_s = absolute stack pressure (eq. 2-6)

$= P_b + (P_g \times .0735\ \text{in.Hg / in.}H_2O) = 29.71$ in. Hg

A = area of stack (ft^2) $= \dfrac{\dfrac{\text{diameter}^2}{4} \times \Pi}{144\ in^2/ft^2}$

$$= \frac{\frac{15.00^2}{4} \times 3.1416}{144\ in^2/ft^2} = 1.227\ ft^2$$

v_s = stack velocity (ft/min)

$= K_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\dfrac{T_s}{P_s \times M_s}}$ (eq. 2-9)

$$= 5129 \times 0.84 \times 1.43 \times \sqrt{\frac{1214.5}{29.71 \times 28.14}}$$

= 7,425.9 ft/min at stack conditions

Q_a = stack flow rate (ft^3/min)

$= v_s \times A$, where A= area of stack = 1.227 ft^2

= 7425.9 x 1.227 = 9,111.6 ft^3/min at stack conditions

Qd = stack flow rate on dry basis at standard conditions (DSCFH)

$$= Q_a \times K_y \times \frac{P_S}{T_S} \times 1 - B_{WS} \text{ (eq. 2-10)}$$

$$= 9{,}111.6 \times 1059 \times \frac{29.71}{1214.5} \times 0.8871$$

Qd = 209,396 DSCFH = 2.09E+05 DSCFH

Mass Emission Rates using EPA Methods 1-4, lb/hr

Refers to test run 1205-C-4

CNOx	=1984.5 ppmv (corrected)
CCO	= 228.3 ppmv (corrected)
CVOC	= 14.93 PPMV (calculated from corrected THC)
Qd	= 2.09E+05 (from pitot tube data)
MW of NOx	= 46.01 lb/lb-mole
MW of CO	= 28.00 lb/lb-mole
MW of VOC (as C_3H_8)	= 44.09 lb/lb-mole

for ideal gas, 385.15 SCF = 1.0 lb/mole @ EPA STP

E_X = mass emission rate of x, (lb/hr)

$$= C_X \times Qd \times 10^{-6} \times \frac{MW}{385.15}$$

$$E_{NOx} = CNOx \times Qd \times 10^{-6} \times \frac{46.01}{385.15}$$

E_{NOx} = 49.60 lb/hr

$$E_{CO} = CCO \times Qd \times 10^{-6} \times \frac{28.00}{385.15}$$

E_{CO} = 3.47 lb/hr

$$E_{voc} = CVOC \times Qd \times 10^{-6} \times \frac{44.09}{385.15}$$

E_{voc} = 0.358 lb/hr

Mass Emission Rates using EPA Methods 1-4, g/BHp-H

Refers to test run 1205-C-4

ENOx	= 49.60 lb/hr
ECO	= 3.47 lb/hr
CVOC	= 0.358 lb/hr
BHp	= 1877
g/lb	= 454

$$\text{g/BHp-H} = \frac{E_X \times \text{g/lb}}{\text{BHp}}$$

$$\text{NOx g/Hp-H} = \frac{49.60 \times 454}{1877}$$

NOx g/Hp-H = 11.997

$$\text{CO g/Hp-H} = \frac{3.47 \times 454}{1877}$$

CO g/Hp-H = 0.839

$$\text{VOC g/Hp-H} = \frac{0.358 \times 454}{1877}$$

VOC g/Hp-H = 0.09

APPENDIX C:
FUEL ANALYSES AND CALCULATIONS

COMPRESSOR STATION 12

	Station 12 36"	Station 12 30"	Station 15 36"	Station 15 30"	Station 15 24"	Station 16	Gainsville Lab	Station 21
n-Hexanes +	0.0385	0.0644	0.0363	0.0584	0.0743	0.0526	0.0445	0.0512
Nitrogen	0.2617	0.4619	0.2973	0.4104	0.4040	0.3873	0.2607	0.3441
Methane	97.0609	94.8826	96.7191	95.1949	95.3336	95.1663	97.0133	95.9914
Carbon Dioxide	0.7268	0.6698	0.7267	0.6868	0.6957	0.7388	0.7283	0.7117
Ethane	1.4686	3.1686	1.7283	2.8878	2.7603	2.9053	1.5263	2.2826
Propane	0.2910	0.4903	0.3216	0.4899	0.4681	0.4917	0.2749	0.4010
Iso-Butane	0.0616	0.1053	0.0691	0.1087	0.1045	0.1046	0.0594	0.0870
n-Butane	0.0623	0.1089	0.0696	0.1109	0.1070	0.1072	0.0622	0.0881
Iso-Pentane	0.0173	0.0297	0.0203	0.0316	0.0319	0.0288	0.0190	0.0263
n-Pentane	0.0112	0.0186	0.0119	0.0205	0.0207	0.0175	0.0116	0.0000
Neo-Pentane								0.0000
Normalized Totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Specific Gravity	0.5763	0.5892	0.5782	0.5878	0.5873	0.5879	0.5766	0.5829
BTU / cu. ft.	1025.2	1043.6	1027.7	1041.8	1040.9	1041.0	1025.7	1034.6
	CR12			CR15		CRO1	GLAB	CR2

Dew Point and H2S Recall West Chromatographs

Gas Fuel F Factor & Heating Value Calculation

Client FGT
Sample ID Station 12 30"
Time 13:46
Date 4/24/2000

CALCULATION OF DENSITY AND HEATING VALUE @ 60°F and 30 in Hg

Component	% Volume	Molecular Wt.	Density (lb/ft3)	% volume x Density	weight %	Component Gross Btu/lb	Weight Fract. Btu	Gross Heating Value (Btu/SCF)	Volume Fract. Btu
Hydrogen		2.016	0.0053	0.00000	0.0000	61100	0.00	325.0	0
Oxygen		32.000	0.0846	0.00000	0.0000	0	0.00	0.0	0
Nitrogen	0.4619	28.016	0.0744	0.00034	0.7626	0	0.00	0.0	0
CO2	0.6698	44.010	0.1170	0.00078	1.7389	0	0.00	0.0	0
CO		28.010	0.0740	0.00000	0.0000	4347	0.00	322.0	0
Methane	94.8826	16.041	0.0424	0.04023	89.2704	23879	21316.87	1013.0	961.160738
Ethane	3.1686	30.067	0.0803	0.00254	5.6460	22320	1260.18	1792.0	56.781312
Ethylene		28.051	0.0746	0.00000	0.0000	21644	0.00	1614.0	0
Propane	0.4903	44.092	0.1196	0.00059	1.3012	21661	281.86	2590.0	12.69877
propylene		42.077	0.1110	0.00000	0.0000	21041	0.00	2336.0	0
Isobutane	0.1053	58.118	0.1582	0.00017	0.3696	21308	78.76	3363.0	3.541239
n-butane	0.1089	58.118	0.1582	0.00017	0.3823	21257	81.26	3370.0	3.66993
Isobutene		56.102	0.1480	0.00000	0.0000	20840	0.00	3068.0	0
Isopentane	0.0297	72.144	0.1904	0.00006	0.1255	21091	26.47	4008.0	1.190376
n-pentane	0.0186	72.144	0.1904	0.00004	0.0786	21052	16.54	4016.0	0.746976
n-hexane	0.0644	86.169	0.2274	0.00015	0.3250	20940	68.05	4762.0	3.066728
H2S		34.076	0.0911	0.00000	0.0000	7100	0.00	647.0	0
total	100.00	Average Density		0.04507	100.0000	Gross Heating Value		Gross Heating Value	
		Specific Gravity		0.58909		Btu/lb	23130	Btu/SCF	1043

CALCULATION OF F FACTORS

Component	Mol. Wt.	C Factor	H Factor	% volume	Fract. Wt.	Weight Percents Carbon	Hydrogen	Nitrogen	Oxygen	Sulfur
Hydrogen	2.016	0	1	0.00	0.0000		0			
Oxygen	32.000	0	0	0.00	0.0000				0	
Nitrogen	28.016	0	0	0.46	12.9406			0.759958791		
CO2	44.010	0.272273	0	0.67	29.4779	0.471342977			1.25853957	
CO	28.010	0.42587	0	0.00	0.0000	0			0	
Methane	16.041	0.75	0.25	94.88	1522.0118	67.03710194	22.34570065			
Ethane	30.067	0.8	0.2	3.17	95.2703	4.475931739	1.118982935			
Ethylene	28.051	0.85714	0.14286	0.00	0.0000	0	0			
Propane	44.092	0.81818	0.181818	0.49	21.6183	1.038739157	0.230831206			
Propene	42.077	0.85714	0.14286	0.00	0.0000	0	0			
Isobutane	58.118	0.82759	0.17247	0.11	6.1198	0.297433731	0.061985277			
n-butane	58.118	0.82759	0.17247	0.11	6.3291	0.307602405	0.064104432			
Isobutene	56.102	0.85714	0.14286	0.00	0.0000	0	0			
Isopentane	72.144	0.83333	0.16667	0.03	2.1427	0.104859948	0.020972493			
n-pentane	72.144	0.83333	0.16667	0.02	1.3419	0.065669866	0.013134288			
n-hexane	86.169	0.83721	0.16279	0.06	5.5493	0.272839522	0.053051858			
H2S	34.076	0	0.058692335	0.00	0.0000	0	0			0
Totals				100.00010	1702.8016	74.07152129	23.91	0.759958791	1.25853957	0

CALCULATED VALUES		
O2 F Factor (dry)	**8642**	DSCF of Exhaust/MM Btu of Fuel Burned @ 0% excess air
O2 F Factor (wet)	**10637**	SCF of Exhaust/MM Btu of Fuel Burned @ 0% excess air
Moisture F Factor	**1995**	SCF of Water/MM Btu of Fuel Burned @ 0% excess air
Combust. Moisture	**18.76**	volume % water in flue gas @ 0% excess air
CO2 F Factor	**1028**	DSCF of CO2/MM Btu of Fuel Burned @ 0% excess air
Carbon Dioxide	**11.90**	volume % CO2 in flue gas @ 0% O2
Predicted Fo Factor	**1.76**	EPA Method 3a Fo value
Fuel VOC % (non-C1)	**8.38%**	non-methane fuel VOC content
Fuel VOC % (non-C1,C2)	**2.65%**	non-methane non-ethane fuel VOC content

Test/Inspection Report
Orifice Meter and Temperature Recorder

★ Required Entries
Procedure 60.201A

★Station Number: 0 8 6 1 2 8 — Station Name: Munson Compressor — GMSDC: 3 7 0 5 Systems

★Company Number: 0 6 2 (060-TW, 179-NNG, 062-FGT, 014-VPL, 017-HPL, 018-ICC, 028-OFL, 000-Other) — ★Date: Month 0 4 Day 2 1 Year 0 0 — ☑ Test OR ☐ Inspection — Gas in / Gas out of

Stat. Inlet Pressure PSIG — H_2S ☐ Grain/CSCF ☐ PPM — Water Vapor #/MMSCF — CO_2 PPM

	Run 1	Run 2	Run 3
Run Number	12 05		
Meter Type (☐ HG ☐ DRI ☐ Elec.)			
Measurement Found in Error ± 1% or Greater (☐ Yes ☐ No)	☑ No		
Differential Connection (☐ Pipe OR ☐ Flange)	☑ Flange		
Static Connection (☐ U/S OR ☐ D/S)	☑ D/S		
High Range PSI / "H(O	50 PSI / 50 "H(O		
Chart Rotation days OR ☐ Electronic	☑ Electronic		
Diff Found / Left			

CALIBRATION "AS FOUND"

	Run 1	Run 2	Run 3
Diff. W. P. Zero "	0		
Shut in Leak Test	OK		
Diff. Pen Arc ☐ OK / Min. Slow / Min. Fast			

Diff. Up STD. ★	Diff. Up METER ★	Diff. Down STD. ★	Diff. Down METER ★
0	0	25	25
25	25.0	0	0
50	50.1		

(Runs 2 and 3: Diff. Up / Diff. Down tables blank.)

STATIC PRESSURE

	Run 1	Run 2	Run 3
Atmos. Press. PSIA	14.73		
ZERO			
W. P.			
Std. (PSIG)			
Recorder ☐ PSIG ☐ PSIA			

ORIFICE PLATE

	Run 1	Run 2	Run 3
Present Size	2" x 1.125"		
Condition	oily + sharp		

TEMPERATURE RECORDER "AS FOUND"

Range °F	Spot Test STD.	Spot Test REC.	STD.	REC.	Span Test STD.	Span Test REC.
20 To 200	°F	°F	20 °F	19.7 °F	200 °F	200.2 °F

Remarks

Witness: — Tester: Jerry Dotson

Form 022-2873 (4/92) — Distribution: Original — Gas Measurement Services — Copies: 1 - District Office, 1 - Witness

APPENDIX D:
OPERATIONAL DATA

Compressor Health Report
FloridaGas
Munson #1204

Unit Name:	1204-C	Model:	KM-2	Date:	4/24/00 4:00:55 PM
Location:	Munson,Florida	Unit Mfr:	Cooper-Bessemer	Serial No.:	

Mechanical Efficiency, %	95	Marker Correction Angle, deg	165.0	Periods Collected (PT)	6
Overall Efficiency, %	85	Stroke, (ins)	14.000		
Atmospheric Pressure, psia	3.0	Speed, RPM	327	Specific Gravity	0.577
Load Step	3				

Cyl End	Stg	Clr Set (%)	Bore (ins)	Rod Diam (ins)	ConRod Length (ins)	Pressure Ps (psig)	Pressure Pd (psig)	Temp. Ts	Temp. Td	Comp. Ratio	Calc. Capacity (mmscfd)	Indicated Power (ihp)	Suction Loss (ihp)	Disch. Loss (ihp)	Flow Balance	Dis T Delta (F)	Rod Load (%)	SVE (%)	DVE (%)
1H	1	150	18.500	N/A	38.000	740	966	65F	107F	1.30	37.95	504.3	39.9	29.0	1.00	13	97C	67	56
1C	1	159	18.500	4.000	38.000	735	956	65F	107F	1.30	35.22	455.4	18.6	39.3	1.90	14	74T	66	55
2H	1	189	18.500	N/A	38.000	733	971	65F	106F	1.32	30.96	411.1	10.4	13.9	0.98	9	97C	55	46
2C	1	157	18.500	4.000	38.000	741	961	65F	106F	1.30	35.80	472.2	36.7	36.4	1.01	13	73T	67	55

Notes:

1. Rod loading is based on maximum differential pressure across the rings. C - Compression, T - Tension.
   Forces due to inertia are not accounted for in this table.
2. Flow Balance = capacity from suction VE / capacity from discharge VE.
3. If the flow balance is much greater than 1.0 suspect leaking suction valves or rings.
   If the flow balance is much less than 1.0 suspect leaking discharge valves or rings.
4. Discharge Temp. Delta = actual discharge temp - theoretical.
5. If Suction or Discharge Temperatures are not found, some calculations may not be available as indicated by a "--".
6. Gas power = Total indicated power for all cylinders / Mechanical Efficiency.
7. Compressor total brake power = Gas power + Auxiliary brake power * RPM / Rated RPM.
8. Derated power is obtained by derating the rated power to actual run speed.
9. Compressor efficiency is the total indicated power - suction and discharge losses
   as a percentage of the total indicated power.
10. Marker Type: Encoder (ENC) and Trap Type: 9002.
11. Channel Resonance Correction (CRC) applied: 1H 1C 2H 2C
12. Corrected VE applied, PS and PD values Corrected: None

Total Indicated Power, (ihp)	1843	@	327	RPM	Rated Power, (bhp)	2000	@	330	RPM
Gas Power, (ghp)	1940	@	327	RPM	Derated Power, (bhp)	1980	@	327	RPM
Auxiliary Power, (bhp)	0	@	330	RPM	Percent Torque Load, %	98	%		
Compressor Total Power, (bhp)	1940	@	327	RPM	Compressor Efficiency, %	88	%		

Observations and Recommendations	Machine Condition Notes

Analyst Signature: 4/24/00 4:20:49 PM

1204 UNIT OPERATING DATA

3:31:58 PM 4/24/00

TEST # 1204-C1A

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.2	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.6	"Hg
AIR MANIFOLD TEMP.	76	°F
TURBOCHARGER VIBRATION	0.60	IN/SEC
FUEL STATIC PRESS.	71.5	PSIG
FUEL DIFF. PRESS.	15.9	"H20
FUEL GAS HEADER PRESS.	7.2	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13203	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	961	°F
CYLINDER #2 TEMP.	964	°F
CYLINDER #3 TEMP.	940	°F
CYLINDER #4 TEMP.	935	°F
CYLINDER #5 TEMP.	922	°F
CYLINDER #6 TEMP.	921	°F
CYLINDER #7 TEMP.	960	°F
CYLINDER #8 TEMP.	918	°F
MODE	AUTO	

AMBIENT TEMPERATURE	81	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	748	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	106	°F
COMPRESSOR FLOW RATE	141	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	106	°F
"B" COMP. DISCHARGE TEMP.	106	°F
FUEL TORQUE HP	1975	BHP
TORQUE	99	%
GEO. HP	1969	BHP
GEO. HP - FUEL TORQUE HP	-6	BHP

M PS

1204 UNIT OPERATING DATA

3:58:04 PM 4/24/00

TEST # 1204-C1B

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.2	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	76	°F
TURBOCHARGER VIBRATION	0.68	IN/SEC
FUEL STATIC PRESS.	71.1	PSIG
FUEL DIFF. PRESS.	16.1	"H20
FUEL GAS HEADER PRESS.	7.2	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13251	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	960	°F
CYLINDER #2 TEMP.	966	°F
CYLINDER #3 TEMP.	937	°F
CYLINDER #4 TEMP.	933	°F
CYLINDER #5 TEMP.	925	°F
CYLINDER #6 TEMP.	934	°F
CYLINDER #7 TEMP.	958	°F
CYLINDER #8 TEMP.	924	°F
MODE	AUTO	

AMBIENT TEMPERATURE	80	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	746	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	107	°F
COMPRESSOR FLOW RATE	140	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	107	°F
"B" COMP. DISCHARGE TEMP.	106	°F
FUEL TORQUE HP	1983	BHP
TORQUE	99	%
GEO. HP	1968	BHP
GEO. HP - FUEL TORQUE HP	-15	BHP

M PS

1204 UNIT OPERATING DATA

4:08:52 PM 4/24/00

TEST # 1204-C/L

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	29.2	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	76	°F
TURBOCHARGER VIBRATION	0.64	IN/SEC
FUEL STATIC PRESS.	70.8	PSIG
FUEL DIFF. PRESS.	15.9	"H20
FUEL GAS HEADER PRESS.	7.3	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13287	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	959	°F
CYLINDER #2 TEMP.	964	°F
CYLINDER #3 TEMP.	939	°F
CYLINDER #4 TEMP.	929	°F
CYLINDER #5 TEMP.	922	°F
CYLINDER #6 TEMP.	938	°F
CYLINDER #7 TEMP.	961	°F
CYLINDER #8 TEMP.	924	°F
MODE	AUTO	

AMBIENT TEMPERATURE	79	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	745	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	107	°F
COMPRESSOR FLOW RATE	139	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	107	°F
"B" COMP. DISCHARGE TEMP.	106	°F
FUEL TORQUE HP	1989	BHP
TORQUE	100	%
GEO. HP	1971	BHP
GEO. HP - FUEL TORQUE HP	-19	BHP

1204 UNIT OPERATING DATA

4:19:44 PM 4/24/00

TEST # 1204 C 10

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.3	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	76	°F
TURBOCHARGER VIBRATION	0.66	IN/SEC
FUEL STATIC PRESS.	71.3	PSIG
FUEL DIFF. PRESS.	15.9	"H20
FUEL GAS HEADER PRESS.	7.2	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13213	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	962	°F
CYLINDER #2 TEMP.	965	°F
CYLINDER #3 TEMP.	939	°F
CYLINDER #4 TEMP.	928	°F
CYLINDER #5 TEMP.	923	°F
CYLINDER #6 TEMP.	940	°F
CYLINDER #7 TEMP.	956	°F
CYLINDER #8 TEMP.	922	°F
MODE	AUTO	

AMBIENT TEMPERATURE	79	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	744	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	107	°F
COMPRESSOR FLOW RATE	138	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	107	°F
"B" COMP. DISCHARGE TEMP.	107	°F
FUEL TORQUE HP	1977	BHP
TORQUE	99	%
GEO. HP	1963	BHP
GEO. HP - FUEL TORQUE HP	-14	BHP

M PS

1204 UNIT OPERATING DATA

4:30:18 PM 4/24/00

TEST # Nov-C/F

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.3	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	77	°F
TURBOCHARGER VIBRATION	0.55	IN/SEC
FUEL STATIC PRESS.	71.1	PSIG
FUEL DIFF. PRESS.	15.9	"H20
FUEL GAS HEADER PRESS.	7.2	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13186	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	956	°F
CYLINDER #2 TEMP.	964	°F
CYLINDER #3 TEMP.	936	°F
CYLINDER #4 TEMP.	934	°F
CYLINDER #5 TEMP.	922	°F
CYLINDER #6 TEMP.	933	°F
CYLINDER #7 TEMP.	958	°F
CYLINDER #8 TEMP.	920	°F
MODE	AUTO	

AMBIENT TEMPERATURE	80	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	742	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	107	°F
COMPRESSOR FLOW RATE	137	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	107	°F
FUEL TORQUE HP	1971	BHP
TORQUE	99	%
GEO. HP	1965	BHP
GEO. HP - FUEL TORQUE HP	-5	BHP

M IPS

1204 UNIT OPERATING DATA

4:53:40 PM 4/24/00

TEST # 1204-C 2A

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.3	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	76	°F
TURBOCHARGER VIBRATION	0.56	IN/SEC
FUEL STATIC PRESS.	71.2	PSIG
FUEL DIFF. PRESS.	15.9	"H20
FUEL GAS HEADER PRESS.	7.2	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13200	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	959	°F
CYLINDER #2 TEMP.	961	°F
CYLINDER #3 TEMP.	935	°F
CYLINDER #4 TEMP.	930	°F
CYLINDER #5 TEMP.	919	°F
CYLINDER #6 TEMP.	926	°F
CYLINDER #7 TEMP.	954	°F
CYLINDER #8 TEMP.	917	°F
MODE	AUTO	

AMBIENT TEMPERATURE	79	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	741	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	136	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	107	°F
FUEL TORQUE HP	1974	BHP
TORQUE	99	%
GEO. HP	1957	BHP
GEO. HP - FUEL TORQUE HP	-17	BHP

M PS

1204 UNIT OPERATING DATA

5:03:11 PM 4/24/00

TEST # C-2-B

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.5	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	75	°F
TURBOCHARGER VIBRATION	0.52	IN/SEC
FUEL STATIC PRESS.	71.2	PSIG
FUEL DIFF. PRESS.	15.9	"H20
FUEL GAS HEADER PRESS.	7.1	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13135	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	957	°F
CYLINDER #2 TEMP.	962	°F
CYLINDER #3 TEMP.	934	°F
CYLINDER #4 TEMP.	931	°F
CYLINDER #5 TEMP.	919	°F
CYLINDER #6 TEMP.	916	°F
CYLINDER #7 TEMP.	956	°F
CYLINDER #8 TEMP.	915	°F
MODE	AUTO	

AMBIENT TEMPERATURE	81	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	740	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	136	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	107	°F
FUEL TORQUE HP	1961	BHP
TORQUE	98	%
GEO. HP	1956	BHP
GEO. HP - FUEL TORQUE HP	-5	BHP

M PS

1204 UNIT OPERATING DATA

5:13:50 PM 4/24/00

TEST # C-22

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.4	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	77	°F
TURBOCHARGER VIBRATION	0.54	IN/SEC
FUEL STATIC PRESS.	71.2	PSIG
FUEL DIFF. PRESS.	15.8	"H20
FUEL GAS HEADER PRESS.	7.2	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13128	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	959	°F
CYLINDER #2 TEMP.	962	°F
CYLINDER #3 TEMP.	937	°F
CYLINDER #4 TEMP.	932	°F
CYLINDER #5 TEMP.	923	°F
CYLINDER #6 TEMP.	927	°F
CYLINDER #7 TEMP.	957	°F
CYLINDER #8 TEMP.	918	°F
MODE	AUTO	

AMBIENT TEMPERATURE	81	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	740	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	136	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	107	°F
FUEL TORQUE HP	1960	BHP
TORQUE	98	%
GEO. HP	1959	BHP
GEO. HP - FUEL TORQUE HP	-1	BHP

M1 PS

1204 UNIT OPERATING DATA

5:26:02 PM 4/24/00

TEST # 6-2-A

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.4	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.4	"Hg
AIR MANIFOLD TEMP.	77	°F
TURBOCHARGER VIBRATION	0.63	IN/SEC
FUEL STATIC PRESS.	71.3	PSIG
FUEL DIFF. PRESS.	15.9	"H20
FUEL GAS HEADER PRESS.	7.2	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13139	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	960	°F
CYLINDER #2 TEMP.	964	°F
CYLINDER #3 TEMP.	936	°F
CYLINDER #4 TEMP.	931	°F
CYLINDER #5 TEMP.	924	°F
CYLINDER #6 TEMP.	932	°F
CYLINDER #7 TEMP.	960	°F
CYLINDER #8 TEMP.	919	°F
MODE	AUTO	

AMBIENT TEMPERATURE	80	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	739	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	136	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	84	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	107	°F
FUEL TORQUE HP	1961	BHP
TORQUE	98	%
GEO. HP	1957	BHP
GEO. HP - FUEL TORQUE HP	-3	BHP

M PS

1204 UNIT OPERATING DATA

5:39:23 PM 4/24/00

TEST # 1204-C26

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.4	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	77	°F
TURBOCHARGER VIBRATION	0.62	IN/SEC
FUEL STATIC PRESS.	71.2	PSIG
FUEL DIFF. PRESS.	15.8	"H20
FUEL GAS HEADER PRESS.	7.2	PSIG
FUEL TEMP.	78	°F
COMPUTER FUEL FLOW SCF	13138	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	955	°F
CYLINDER #2 TEMP.	962	°F
CYLINDER #3 TEMP.	936	°F
CYLINDER #4 TEMP.	929	°F
CYLINDER #5 TEMP.	919	°F
CYLINDER #6 TEMP.	930	°F
CYLINDER #7 TEMP.	957	°F
CYLINDER #8 TEMP.	916	°F
MODE	AUTO	

AMBIENT TEMPERATURE	81	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	738	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	963	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	136	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	84	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	108	°F
FUEL TORQUE HP	1960	BHP
TORQUE	98	%
GEO. HP	1955	BHP
GEO. HP - FUEL TORQUE HP	-5	BHP

Compressor Health Report
FloridaGas
Munson #1204

Unit Name:	1204-C	Model:	KM-2	Date:	4/24/00 6:03:51 PM
Location:	Munson,Florida	Unit Mfr:	Cooper-Bessemer	Serial No.:	

Mechanical Efficiency, %	95	Marker Correction Angle, deg	0.0	Periods Collected (PT)	6
Overall Efficiency, %	85	Stroke, (ins)	14.000		
Atmospheric Pressure, psia	3.0	Speed, RPM	327	Specific Gravity	0.577
Load Step	3				

Cyl End	Stg	Clr Set (%)	Bore (ins)	Rod Diam (ins)	ConRod Length (ins)	Pressure Ps (psig)	Pressure Pd (psig)	Temp. Ts	Temp. Td	Comp. Ratio	Calc. Capacity (mmscfd)	Indicated Power (ihp)	Suction Loss (ihp)	Disch. Loss (ihp)	Flow Balance	Dis T Delta (F)	Rod Load (%)	SVE (%)	DVE (%)
1H	1	150	18.500	N/A	38.000	729	963	65F	108F	1.32	36.27	498.1	37.0	23.5	1.01	13	98C	66	54
1C	1	159	18.500	4.000	38.000	725	950	65F	108F	1.31	33.90	452.9	17.3	37.3	0.98	14	75T	64	54
2H	1	189	18.500	N/A	38.000	728	965	65F	108F	1.33	30.47	409.2	15.9	10.3	1.01	11	97C	55	45
2C	1	157	18.500	4.000	38.000	731	956	65F	108F	1.31	34.76	467.7	35.7	33.4	1.00	14	74T	65	54

Notes:

1. Rod loading is based on maximum differential pressure across the rings. C - Compression, T - Tension.
   Forces due to inertia are not accounted for in this table.
2. Flow Balance = capacity from suction VE / capacity from discharge VE.
3. If the flow balance is much greater than 1.0 suspect leaking suction valves or rings.
   If the flow balance is much less than 1.0 suspect leaking discharge valves or rings.
4. Discharge Temp. Delta = actual discharge temp - theoretical.
5. If Suction or Discharge Temperatures are not found, some calculations may not be available as indicated by a "--".
6. Gas power = Total indicated power for all cylinders / Mechanical Efficiency.
7. Compressor total brake power = Gas power + Auxiliary brake power * RPM / Rated RPM.
8. Derated power is obtained by derating the rated power to actual run speed.
9. Compressor efficiency is the total indicated power - suction and discharge losses
   as a percentage of the total indicated power.
10. Marker Type: Encoder (ENC) and Trap Type: 9002.
11. Channel Resonance Correction (CRC) applied: 1C 1H 2H 2C
12. Corrected VE applied, PS and PD values Corrected: None

Total Indicated Power, (ihp)	1828	@	327	RPM	Rated Power, (bhp)	2000	@	330	RPM
Gas Power, (ghp)	1924	@	327	RPM	Derated Power, (bhp)	1983	@	327	RPM
Auxiliary Power, (bhp)	0	@	330	RPM	Percent Torque Load, %	97	%		
Compressor Total Power, (bhp)	1924	@	327	RPM	Compressor Efficiency, %	88	%		

Observations and Recommendations	Machine Condition Notes

Analyst Signature: 4/24/00 6:25:40 PM

1204 UNIT OPERATING DATA

6:09:45 PM 4/24/00

TEST # (-C-A

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	29.4	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	79	°F
TURBOCHARGER VIBRATION	0.57	IN/SEC
FUEL STATIC PRESS.	71.4	PSIG
FUEL DIFF. PRESS.	15.7	"H20
FUEL GAS HEADER PRESS.	7.2	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13145	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	957	°F
CYLINDER #2 TEMP.	964	°F
CYLINDER #3 TEMP.	937	°F
CYLINDER #4 TEMP.	929	°F
CYLINDER #5 TEMP.	918	°F
CYLINDER #6 TEMP.	937	°F
CYLINDER #7 TEMP.	959	°F
CYLINDER #8 TEMP.	916	°F
MODE	AUTO	

AMBIENT TEMPERATURE	78	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	737	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	963	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	135	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	84	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	108	°F
FUEL TORQUE HP	1962	BHP
TORQUE	98	%
GEO. HP	1957	BHP
GEO. HP - FUEL TORQUE HP	-5	BHP

M PS

1204 UNIT OPERATING DATA

6:19:10 PM 4/24/00

TEST # C-3-B

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	29.5	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	78	°F
TURBOCHARGER VIBRATION	0.56	IN/SEC
FUEL STATIC PRESS.	71.5	PSIG
FUEL DIFF. PRESS.	15.5	"H20
FUEL GAS HEADER PRESS.	7.1	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13090	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	953	°F
CYLINDER #2 TEMP.	960	°F
CYLINDER #3 TEMP.	937	°F
CYLINDER #4 TEMP.	931	°F
CYLINDER #5 TEMP.	919	°F
CYLINDER #6 TEMP.	933	°F
CYLINDER #7 TEMP.	955	°F
CYLINDER #8 TEMP.	914	°F
MODE	AUTO	

AMBIENT TEMPERATURE	77	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	737	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	962	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	135	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	84	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	108	°F
FUEL TORQUE HP	1951	BHP
TORQUE	98	%
GEO. HP	1953	BHP
GEO. HP - FUEL TORQUE HP	1	BHP

M PS

1204 UNIT OPERATING DATA

6:35:16 PM 4/24/00

TEST # C-3-C

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	29.5	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.4	"Hg
AIR MANIFOLD TEMP.	79	°F
TURBOCHARGER VIBRATION	0.68	IN/SEC
FUEL STATIC PRESS.	71.4	PSIG
FUEL DIFF. PRESS.	15.6	"H20
FUEL GAS HEADER PRESS.	7.1	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13084	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	955	°F
CYLINDER #2 TEMP.	963	°F
CYLINDER #3 TEMP.	939	°F
CYLINDER #4 TEMP.	929	°F
CYLINDER #5 TEMP.	918	°F
CYLINDER #6 TEMP.	935	°F
CYLINDER #7 TEMP.	956	°F
CYLINDER #8 TEMP.	913	°F
MODE	AUTO	

AMBIENT TEMPERATURE	76	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	736	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	961	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	135	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	84	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	108	°F
FUEL TORQUE HP	1950	BHP
TORQUE	98	%
GEO. HP	1952	BHP
GEO. HP - FUEL TORQUE HP	3	BHP

M PS

1204 UNIT OPERATING DATA

6:52:23 PM 4/24/00

TEST # C-3-D

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	29.6	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.4	"Hg
AIR MANIFOLD TEMP.	76	°F
TURBOCHARGER VIBRATION	0.66	IN/SEC
FUEL STATIC PRESS.	71.5	PSIG
FUEL DIFF. PRESS.	15.6	"H20
FUEL GAS HEADER PRESS.	7.1	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13074	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	954	°F
CYLINDER #2 TEMP.	960	°F
CYLINDER #3 TEMP.	937	°F
CYLINDER #4 TEMP.	927	°F
CYLINDER #5 TEMP.	918	°F
CYLINDER #6 TEMP.	934	°F
CYLINDER #7 TEMP.	957	°F
CYLINDER #8 TEMP.	915	°F
MODE	AUTO	

AMBIENT TEMPERATURE	74	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	736	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	960	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	135	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	84	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	108	°F
FUEL TORQUE HP	1948	BHP
TORQUE	97	%
GEO. HP	1956	BHP
GEO. HP - FUEL TORQUE HP	8	BHP


1204 UNIT OPERATING DATA

7:06:07 PM 4/24/00

TEST # 1204 C3 E

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.5	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.4	"Hg
AIR MANIFOLD TEMP.	78	°F
TURBOCHARGER VIBRATION	0.57	IN/SEC
FUEL STATIC PRESS.	71.7	PSIG
FUEL DIFF. PRESS.	15.4	"H20
FUEL GAS HEADER PRESS.	7.1	PSIG
FUEL TEMP.	75	°F
COMPUTER FUEL FLOW SCF	13032	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	953	°F
CYLINDER #2 TEMP.	959	°F
CYLINDER #3 TEMP.	938	°F
CYLINDER #4 TEMP.	931	°F
CYLINDER #5 TEMP.	918	°F
CYLINDER #6 TEMP.	932	°F
CYLINDER #7 TEMP.	951	°F
CYLINDER #8 TEMP.	915	°F
MODE	AUTO	

AMBIENT TEMPERATURE	73	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	737	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	960	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	136	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	107	°F
FUEL TORQUE HP	1941	BHP
TORQUE	97	%
GEO. HP	1947	BHP
GEO. HP - FUEL TORQUE HP	6	BHP

M PS

1204 UNIT OPERATING DATA

7:10:50 PM 4/24/00

TEST # C-3-F

ENGINE SPEED	329	RPM
IGNITION TIMING OUTPUT	29.5	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	79	°F
TURBOCHARGER VIBRATION	0.56	IN/SEC
FUEL STATIC PRESS.	71.7	PSIG
FUEL DIFF. PRESS.	15.5	"H20
FUEL GAS HEADER PRESS.	7.1	PSIG
FUEL TEMP.	75	°F
COMPUTER FUEL FLOW SCF	13071	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	956	°F
CYLINDER #2 TEMP.	959	°F
CYLINDER #3 TEMP.	938	°F
CYLINDER #4 TEMP.	928	°F
CYLINDER #5 TEMP.	917	°F
CYLINDER #6 TEMP.	930	°F
CYLINDER #7 TEMP.	956	°F
CYLINDER #8 TEMP.	914	°F
MODE	AUTO	

AMBIENT TEMPERATURE	73	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	737	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	959	PSIG
STATION DISCH. TEMP.	108	°F
COMPRESSOR FLOW RATE	136	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	107	°F
FUEL TORQUE HP	1948	BHP
TORQUE	98	%
GEO. HP	1948	BHP
GEO. HP - FUEL TORQUE HP	1	BHP

M PS

1204 UNIT OPERATING DATA

7:20:47 PM 4/24/00

TEST # 1-3-6

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	29.5	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.4	"Hg
AIR MANIFOLD TEMP.	79	°F
TURBOCHARGER VIBRATION	0.68	IN/SEC
FUEL STATIC PRESS.	71.8	PSIG
FUEL DIFF. PRESS.	15.5	"H20
FUEL GAS HEADER PRESS.	7.1	PSIG
FUEL TEMP.	75	°F
COMPUTER FUEL FLOW SCF	13096	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	955	°F
CYLINDER #2 TEMP.	960	°F
CYLINDER #3 TEMP.	935	°F
CYLINDER #4 TEMP.	931	°F
CYLINDER #5 TEMP.	918	°F
CYLINDER #6 TEMP.	927	°F
CYLINDER #7 TEMP.	955	°F
CYLINDER #8 TEMP.	911	°F
MODE	AUTO	

AMBIENT TEMPERATURE	72	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	737	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	958	PSIG
STATION DISCH. TEMP.	107	°F
COMPRESSOR FLOW RATE	137	MMSCFD
"A" COMP. EFFICIENCY	79	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	108	°F
"B" COMP. DISCHARGE TEMP.	107	°F
FUEL TORQUE HP	1952	BHP
TORQUE	98	%
GEO. HP	1952	BHP
GEO. HP - FUEL TORQUE HP	1	BHP

M PS

Compressor Health Report
FloridaGas
Munson #1205

Unit Name:	1205-C	Model:	KM-2	Date:	4/24/00 9:00:57 PM
Location:	Munson,Florida	Unit Mfr:	Cooper-Bessemer	Serial No.:	

Mechanical Efficiency, %	95	Marker Correction Angle, deg	0.0	Periods Collected (PT)	6
Overall Efficiency, %	85	Stroke, (ins)	14.000		
Atmospheric Pressure, psia	3.1	Speed, RPM	330	Specific Gravity	0.577
Load Step	3				

Cyl End	Stg	Clr Set (%)	Bore (ins)	Rod Diam (ins)	ConRod Length (ins)	Pressure Ps (psig)	Pressure Pd (psig)	Temp. Ts	Temp. Td	Comp. Ratio	Calc. Capacity (mmscfd)	Indicated Power (ihp)	Suction Loss (ihp)	Disch. Loss (ihp)	Flow Balance	Dis T Delta (F)	Rod Load (%)	SVE (%)	DVE (%)
1H	1	157	18.500	N/A	38.000	715	970	65F	111F	1.35	31.87	484.9	31.9	15.9	1.06	12	104C	61	47
1C	1	165	18.500	4.000	38.000	707	962	65F	111F	1.36	28.67	435.6	7.9	24.3	0.93	11	80T	55	48
2H	1	192	18.500	N/A	38.000	707	964	65F	109F	1.36	26.74	393.2	9.4	18.2	0.97	8	102C	49	40
2C	1	160	18.500	4.000	38.000	714	965	65F	109F	1.35	30.21	454.1	25.6	21.7	0.94	10	81T	58	49

Notes:

1. Rod loading is based on maximum differential pressure across the rings. C - Compression, T - Tension.
   Forces due to inertia are not accounted for in this table.
2. Flow Balance = capacity from suction VE / capacity from discharge VE.
3. If the flow balance is much greater than 1.0 suspect leaking suction valves or rings.
   If the flow balance is much less than 1.0 suspect leaking discharge valves or rings.
4. Discharge Temp. Delta = actual discharge temp - theoretical.
5. If Suction or Discharge Temperatures are not found, some calculations may not be available as indicated by a "--".
6. Gas power = Total indicated power for all cylinders / Mechanical Efficiency.
7. Compressor total brake power = Gas power + Auxiliary brake power * RPM / Rated RPM.
8. Derated power is obtained by derating the rated power to actual run speed.
9. Compressor efficiency is the total indicated power - suction and discharge losses
   as a percentage of the total indicated power.
10. Marker Type: Encoder (ENC) and Trap Type: 9002.
11. Channel Resonance Correction (CRC) applied: 1H 1C 2H 2C
12. Corrected VE applied, PS and PD values Corrected: None

Total Indicated Power, (ihp)	1768	@	330	RPM	Rated Power, (bhp)	2000	@	330	RPM
Gas Power, (ghp)	1861	@	330	RPM	Derated Power, (bhp)	1999	@	330	RPM
Auxiliary Power, (bhp)	100	@	330	RPM	Percent Torque Load, %	98	%		
Compressor Total Power, (bhp)	1961	@	330	RPM	Compressor Efficiency, %	91	%		

Observations and Recommendations	Machine Condition Notes

Analyst Signature: 4/24/00 9:35:32 PM

1205 UNIT OPERATING DATA

8:42:38 PM 4/24/00

TEST # 1205 A

ENGINE SPEED	332	RPM
IGNITION TIMING OUTPUT	26.7	°BTDC
AIR MANIFOLD PRESS.	6.6	"Hg
AIR MANIFOLD TEMP.	80	°F
TURBOCHARGER VIBRATION	0.26	IN/SEC
FUEL STATIC PRESS.	67.9	PSIG
FUEL DIFF. PRESS.	17.5	"H20
FUEL GAS HEADER PRESS.	7.7	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13589	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	941	°F
CYLINDER #2 TEMP.	940	°F
CYLINDER #3 TEMP.	908	°F
CYLINDER #4 TEMP.	966	°F
CYLINDER #5 TEMP.	953	°F
CYLINDER #6 TEMP.	876	°F
CYLINDER #7 TEMP.	888	°F
CYLINDER #8 TEMP.	904	°F
MODE	AUTO	

AMBIENT TEMPERATURE	65	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	727	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	968	PSIG
STATION DISCH. TEMP.	110	°F
COMPRESSOR FLOW RATE	126	MMSCFD
"A" COMP. EFFICIENCY	82	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	110	°F
"B" COMP. DISCHARGE TEMP.	109	°F
FUEL TORQUE HP	2003	BHP
TORQUE	100	%
GEO. HP	1889	BHP
GEO. HP - FUEL TORQUE HP	-114	BHP

M PS

1205 UNIT OPERATING DATA

8:56:00 PM 4/24/00

TEST # C-4-B

ENGINE SPEED	328	RPM
IGNITION TIMING OUTPUT	26.2	°BTDC
AIR MANIFOLD PRESS.	6.4	"Hg
AIR MANIFOLD TEMP.	80	°F
TURBOCHARGER VIBRATION	0.24	IN/SEC
FUEL STATIC PRESS.	68.1	PSIG
FUEL DIFF. PRESS.	17.3	"H20
FUEL GAS HEADER PRESS.	7.6	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13498	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	943	°F
CYLINDER #2 TEMP.	945	°F
CYLINDER #3 TEMP.	908	°F
CYLINDER #4 TEMP.	963	°F
CYLINDER #5 TEMP.	951	°F
CYLINDER #6 TEMP.	877	°F
CYLINDER #7 TEMP.	888	°F
CYLINDER #8 TEMP.	899	°F
MODE	AUTO	

AMBIENT TEMPERATURE	65	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	725	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	967	PSIG
STATION DISCH. TEMP.	111	°F
COMPRESSOR FLOW RATE	124	MMSCFD
"A" COMP. EFFICIENCY	81	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	110	°F
"B" COMP. DISCHARGE TEMP.	109	°F
FUEL TORQUE HP	1993	BHP
TORQUE	100	%
GEO. HP	1860	BHP
GEO. HP - FUEL TORQUE HP	-133	BHP

M1 PS

1205 UNIT OPERATING DATA

9:10:00 PM 4/24/00

TEST #C-4-C

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	26.7	°BTDC
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	80	°F
TURBOCHARGER VIBRATION	0.22	IN/SEC
FUEL STATIC PRESS.	68.1	PSIG
FUEL DIFF. PRESS.	17.3	"H20
FUEL GAS HEADER PRESS.	7.5	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13541	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	943	°F
CYLINDER #2 TEMP.	946	°F
CYLINDER #3 TEMP.	911	°F
CYLINDER #4 TEMP.	968	°F
CYLINDER #5 TEMP.	949	°F
CYLINDER #6 TEMP.	875	°F
CYLINDER #7 TEMP.	889	°F
CYLINDER #8 TEMP.	898	°F
MODE	AUTO	

AMBIENT TEMPERATURE	64	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	722	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	968	PSIG
STATION DISCH. TEMP.	111	°F
COMPRESSOR FLOW RATE	124	MMSCFD
"A" COMP. EFFICIENCY	82	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	111	°F
"B" COMP. DISCHARGE TEMP.	109	°F
FUEL TORQUE HP	1999	BHP
TORQUE	100	%
GEO. HP	1868	BHP
GEO. HP - FUEL TORQUE HP	-131	BHP

M PS

1204 UNIT OPERATING DATA

9:18:36 PM 4/24/00

TEST # C-4-D

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	29.6	°BTDC
GOVERNOR SETTING		
AIR MANIFOLD PRESS.	6.4	"Hg
AIR MANIFOLD TEMP.	78	°F
TURBOCHARGER VIBRATION	0.64	IN/SEC
FUEL STATIC PRESS.	68.4	PSIG
FUEL DIFF. PRESS.	16.0	"H20
FUEL GAS HEADER PRESS.	7.1	PSIG
FUEL TEMP.	72	°F
COMPUTER FUEL FLOW SCF	13070	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	951	°F
CYLINDER #2 TEMP.	961	°F
CYLINDER #3 TEMP.	933	°F
CYLINDER #4 TEMP.	921	°F
CYLINDER #5 TEMP.	912	°F
CYLINDER #6 TEMP.	933	°F
CYLINDER #7 TEMP.	958	°F
CYLINDER #8 TEMP.	913	°F
MODE	AUTO	

AMBIENT TEMPERATURE	64	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	722	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	967	PSIG
STATION DISCH. TEMP.	111	°F
COMPRESSOR FLOW RATE	123	MMSCFD
"A" COMP. EFFICIENCY	80	%
"B" COMP. EFFICIENCY	85	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	112	°F
"B" COMP. DISCHARGE TEMP.	111	°F
FUEL TORQUE HP	1946	BHP
TORQUE	97	%
GEO. HP	1920	BHP
GEO. HP - FUEL TORQUE HP	-26	BHP

M PS

1205 UNIT OPERATING DATA

9:27:58 PM 4/24/00

TEST # 6-4-2

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	26.6	°BTDC
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	80	°F
TURBOCHARGER VIBRATION	0.25	IN/SEC
FUEL STATIC PRESS.	68.1	PSIG
FUEL DIFF. PRESS.	17.1	"H20
FUEL GAS HEADER PRESS.	7.6	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13506	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	939	°F
CYLINDER #2 TEMP.	940	°F
CYLINDER #3 TEMP.	909	°F
CYLINDER #4 TEMP.	966	°F
CYLINDER #5 TEMP.	951	°F
CYLINDER #6 TEMP.	877	°F
CYLINDER #7 TEMP.	888	°F
CYLINDER #8 TEMP.	904	°F
MODE	AUTO	

AMBIENT TEMPERATURE	64	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	721	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	966	PSIG
STATION DISCH. TEMP.	111	°F
COMPRESSOR FLOW RATE	122	MMSCFD
"A" COMP. EFFICIENCY	81	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	111	°F
"B" COMP. DISCHARGE TEMP.	110	°F
FUEL TORQUE HP	1993	BHP
TORQUE	100	%
GEO. HP	1856	BHP
GEO. HP - FUEL TORQUE HP	-137	BHP

M PS

1205 UNIT OPERATING DATA

9:36:35 PM 4/24/00

TEST # 1205C-F

ENGINE SPEED	331	RPM	AMBIENT TEMPERATURE	63	°F
IGNITION TIMING OUTPUT	26.4	°BTDC	LOAD STEP NUMBER	3	
AIR MANIFOLD PRESS.	6.4	"Hg	STATION SUCTION PRESSURE	721	PSIG
AIR MANIFOLD TEMP.	80	°F	STATION SUCTION TEMP.	67	°F
TURBOCHARGER VIBRATION	0.25	IN/SEC	STATION DISCH. PRESSURE	966	PSIG
FUEL STATIC PRESS.	68.1	PSIG	STATION DISCH. TEMP.	111	°F
FUEL DIFF. PRESS.	17.3	"H20	COMPRESSOR FLOW RATE	123	MMSCFD
FUEL GAS HEADER PRESS.	7.6	PSIG	"A" COMP. EFFICIENCY	81	%
FUEL TEMP.	77	°F	"B" COMP. EFFICIENCY	83	%
COMPUTER FUEL FLOW SCF	13491		AVERAGE COMP. EFFICIENCY	82	%
AGA3 CAL. FUEL FLOW SCF			"A" COMP. SUCTION TEMP.	#	°F
CYLINDER #1 TEMP.	942	°F	"B" COMP. SUCTION TEMP.	#	°F
CYLINDER #2 TEMP.	940	°F	"A" COMP. DISCHARGE TEMP.	111	°F
CYLINDER #3 TEMP.	915	°F	"B" COMP. DISCHARGE TEMP.	110	°F
CYLINDER #4 TEMP.	962	°F	FUEL TORQUE HP	1985	BHP
CYLINDER #5 TEMP.	954	°F	TORQUE	99	%
CYLINDER #6 TEMP.	877	°F	GEO. HP	1866	BHP
CYLINDER #7 TEMP.	889	°F	GEO. HP - FUEL TORQUE HP	-119	BHP
CYLINDER #8 TEMP.	902	°F			
MODE	AUTO				

M PS

Compressor Health Report
FloridaGas
Munson #1205

Unit Name:	1205-C	Model:	KM-2	Date:	4/24/00 10:14:19 PM
Location:	Munson,Florida	Unit Mfr:	Cooper-Bessemer	Serial No.:	

Mechanical Efficiency, %	95	Marker Correction Angle, deg	0.0	Periods Collected (PT)	6
Overall Efficiency, %	85	Stroke, (ins)	14.000		
Atmospheric Pressure, psia	14.7	Speed, RPM	329	Specific Gravity	0.577
Load Step	3				

Cyl End	Stg	Clr Set (%)	Bore (ins)	Rod Diam (ins)	ConRod Length (ins)	Pressure Ps (psig)	Pressure Pd (psig)	Temp. Ts	Temp. Td	Comp. Ratio	Calc. Capacity (mmscfd)	Indicated Power (ihp)	Suction Loss (ihp)	Disch. Loss (ihp)	Flow Balance	Dis T Delta (F)	Rod Load (%)	SVE (%)	DVE (%)
1H	1	157	18.500	N/A	38.000	711	964	65F	111F	1.35	33.56	502.2	33.6	21.4	1.03	13	104C	62	49
1C	1	165	18.500	4.000	38.000	704	958	65F	111F	1.35	30.20	448.5	9.6	25.7	0.95	12	81T	57	49
2H	1	192	18.500	N/A	38.000	707	958	65F	110F	1.35	28.48	418.7	16.1	23.4	0.97	11	104C	51	43
2C	1	160	18.500	4.000	38.000	712	958	65F	110F	1.34	31.89	472.7	31.1	28.7	0.98	13	82T	60	51

Notes:

1. Rod loading is based on maximum differential pressure across the rings. C - Compression, T - Tension.
   Forces due to inertia are not accounted for in this table.
2. Flow Balance = capacity from suction VE / capacity from discharge VE.
3. If the flow balance is much greater than 1.0 suspect leaking suction valves or rings.
   If the flow balance is much less than 1.0 suspect leaking discharge valves or rings.
4. Discharge Temp. Delta = actual discharge temp - theoretical.
5. If Suction or Discharge Temperatures are not found, some calculations may not be available as indicated by a "--".
6. Gas power = Total indicated power for all cylinders / Mechanical Efficiency.
7. Compressor total brake power = Gas power + Auxiliary brake power * RPM / Rated RPM.
8. Derated power is obtained by derating the rated power to actual run speed.
9. Compressor efficiency is the total indicated power - suction and discharge losses
   as a percentage of the total indicated power.
10. Marker Type: Encoder (ENC) and Trap Type: 9002.
11. Channel Resonance Correction (CRC) applied: 1H 1C 2H 2C
12. Corrected VE applied, PS and PD values Corrected: None

Total Indicated Power, (ihp)	1842	@	329	RPM	Rated Power, (bhp)	2000	@	330	RPM
Gas Power, (ghp)	1939	@	329	RPM	Derated Power, (bhp)	1995	@	329	RPM
Auxiliary Power, (bhp)	100	@	330	RPM	Percent Torque Load, %	102	%		
Compressor Total Power, (bhp)	2039	@	329	RPM	Compressor Efficiency, %	90	%		

Observations and Recommendations	Machine Condition Notes

Analyst Signature: 4/27/00 11:57:08 AM

1205 UNIT OPERATING DATA

9:56:31 PM 4/24/00

TEST # 1205C5A

ENGINE SPEED	330	RPM	AMBIENT TEMPERATURE	63	°F
IGNITION TIMING OUTPUT	26.3	°BTDC	LOAD STEP NUMBER	3	
AIR MANIFOLD PRESS.	6.4	"Hg	STATION SUCTION PRESSURE	719	PSIG
AIR MANIFOLD TEMP.	80	°F	STATION SUCTION TEMP.	67	°F
TURBOCHARGER VIBRATION	0.25	IN/SEC	STATION DISCH. PRESSURE	965	PSIG
FUEL STATIC PRESS.	68.2	PSIG	STATION DISCH. TEMP.	112	°F
FUEL DIFF. PRESS.	17.3	"H20	COMPRESSOR FLOW RATE	122	MMSCFD
FUEL GAS HEADER PRESS.	7.6	PSIG	"A" COMP. EFFICIENCY	81	%
FUEL TEMP.	77	°F	"B" COMP. EFFICIENCY	83	%
COMPUTER FUEL FLOW SCF	13511		AVERAGE COMP. EFFICIENCY	82	%
AGA3 CAL. FUEL FLOW SCF			"A" COMP. SUCTION TEMP.	#	°F
CYLINDER #1 TEMP.	941	°F	"B" COMP. SUCTION TEMP.	#	°F
CYLINDER #2 TEMP.	937	°F	"A" COMP. DISCHARGE TEMP.	111	°F
CYLINDER #3 TEMP.	912	°F	"B" COMP. DISCHARGE TEMP.	110	°F
CYLINDER #4 TEMP.	962	°F	FUEL TORQUE HP	1992	BHP
CYLINDER #5 TEMP.	953	°F	TORQUE	100	%
CYLINDER #6 TEMP.	878	°F	GEO. HP	1859	BHP
CYLINDER #7 TEMP.	887	°F	GEO. HP - FUEL TORQUE HP	-133	BHP
CYLINDER #8 TEMP.	900	°F			
MODE	AUTO				

M PS

1205 UNIT OPERATING DATA

10:06:02 PM 4/24/00

TEST # C-5-0

ENGINE SPEED	331	RPM
IGNITION TIMING OUTPUT	26.4	°BTDC
AIR MANIFOLD PRESS.	6.4	"Hg
AIR MANIFOLD TEMP.	80	°F
TURBOCHARGER VIBRATION	0.25	IN/SEC
FUEL STATIC PRESS.	68.1	PSIG
FUEL DIFF. PRESS.	17.1	"H20
FUEL GAS HEADER PRESS.	7.6	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13451	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	942	°F
CYLINDER #2 TEMP.	942	°F
CYLINDER #3 TEMP.	913	°F
CYLINDER #4 TEMP.	962	°F
CYLINDER #5 TEMP.	950	°F
CYLINDER #6 TEMP.	876	°F
CYLINDER #7 TEMP.	888	°F
CYLINDER #8 TEMP.	899	°F
MODE	AUTO	

AMBIENT TEMPERATURE	63	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	718	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	965	PSIG
STATION DISCH. TEMP.	112	°F
COMPRESSOR FLOW RATE	122	MMSCFD
"A" COMP. EFFICIENCY	81	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	111	°F
"B" COMP. DISCHARGE TEMP.	110	°F
FUEL TORQUE HP	1979	BHP
TORQUE	99	%
GEO. HP	1862	BHP
GEO. HP - FUEL TORQUE HP	-117	BHP

M PS

1205 UNIT OPERATING DATA

10:21:40 PM 4/24/00

TEST #1-S-C

ENGINE SPEED	328	RPM
IGNITION TIMING OUTPUT	25.9	°BTDC
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	80	°F
TURBOCHARGER VIBRATION	0.27	IN/SEC
FUEL STATIC PRESS.	68.2	PSIG
FUEL DIFF. PRESS.	17.2	"H20
FUEL GAS HEADER PRESS.	7.6	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13436	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	937	°F
CYLINDER #2 TEMP.	936	°F
CYLINDER #3 TEMP.	909	°F
CYLINDER #4 TEMP.	960	°F
CYLINDER #5 TEMP.	948	°F
CYLINDER #6 TEMP.	876	°F
CYLINDER #7 TEMP.	882	°F
CYLINDER #8 TEMP.	896	°F
MODE	AUTO	

AMBIENT TEMPERATURE	62	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	718	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	112	°F
COMPRESSOR FLOW RATE	120	MMSCFD
"A" COMP. EFFICIENCY	81	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	111	°F
"B" COMP. DISCHARGE TEMP.	110	°F
FUEL TORQUE HP	1983	BHP
TORQUE	100	%
GEO. HP	1836	BHP
GEO. HP - FUEL TORQUE HP	-147	BHP

M PS

1205 UNIT OPERATING DATA

10:28:13 PM 4/24/00

TEST # C-5-0

ENGINE SPEED	331	RPM	AMBIENT TEMPERATURE	62	°F
IGNITION TIMING OUTPUT	26.4	°BTDC	LOAD STEP NUMBER	3	
AIR MANIFOLD PRESS.	6.4	"Hg	STATION SUCTION PRESSURE	717	PSIG
AIR MANIFOLD TEMP.	80	°F	STATION SUCTION TEMP.	67	°F
TURBOCHARGER VIBRATION	0.26	IN/SEC	STATION DISCH. PRESSURE	964	PSIG
FUEL STATIC PRESS.	68.1	PSIG	STATION DISCH. TEMP.	112	°F
FUEL DIFF. PRESS.	17.0	"H20	COMPRESSOR FLOW RATE	121	MMSCFD
FUEL GAS HEADER PRESS.	7.5	PSIG	"A" COMP. EFFICIENCY	81	%
FUEL TEMP.	77	°F	"B" COMP. EFFICIENCY	83	%
COMPUTER FUEL FLOW SCF	13407		AVERAGE COMP. EFFICIENCY	82	%
AGA3 CAL. FUEL FLOW SCF			"A" COMP. SUCTION TEMP.	#	°F
CYLINDER #1 TEMP.	936	°F	"B" COMP. SUCTION TEMP.	#	°F
CYLINDER #2 TEMP.	937	°F	"A" COMP. DISCHARGE TEMP.	111	°F
CYLINDER #3 TEMP.	910	°F	"B" COMP. DISCHARGE TEMP.	110	°F
CYLINDER #4 TEMP.	962	°F	FUEL TORQUE HP	1971	BHP
CYLINDER #5 TEMP.	950	°F	TORQUE	98	%
CYLINDER #6 TEMP.	879	°F	GEO. HP	1856	BHP
CYLINDER #7 TEMP.	885	°F	GEO. HP - FUEL TORQUE HP	-115	BHP
CYLINDER #8 TEMP.	889	°F			
MODE	AUTO				

M PS

1205 UNIT OPERATING DATA

10:32:36 PM 4/24/00

TEST # 120505E

ENGINE SPEED	330	RPM
IGNITION TIMING OUTPUT	26.6	°BTDC
AIR MANIFOLD PRESS.	6.3	"Hg
AIR MANIFOLD TEMP.	80	°F
TURBOCHARGER VIBRATION	0.25	IN/SEC
FUEL STATIC PRESS.	68.2	PSIG
FUEL DIFF. PRESS.	17.1	"H20
FUEL GAS HEADER PRESS.	7.5	PSIG
FUEL TEMP.	77	°F
COMPUTER FUEL FLOW SCF	13441	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	927	°F
CYLINDER #2 TEMP.	940	°F
CYLINDER #3 TEMP.	909	°F
CYLINDER #4 TEMP.	963	°F
CYLINDER #5 TEMP.	949	°F
CYLINDER #6 TEMP.	877	°F
CYLINDER #7 TEMP.	885	°F
CYLINDER #8 TEMP.	899	°F
MODE	AUTO	

AMBIENT TEMPERATURE	62	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	717	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	964	PSIG
STATION DISCH. TEMP.	112	°F
COMPRESSOR FLOW RATE	121	MMSCFD
"A" COMP. EFFICIENCY	81	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	111	°F
"B" COMP. DISCHARGE TEMP.	110	°F
FUEL TORQUE HP	1975	BHP
TORQUE	99	%
GEO. HP	1853	BHP
GEO. HP - FUEL TORQUE HP	-123	BHP

1205 UNIT OPERATING DATA

10:47:41 PM 4/24/00

TEST #12056

ENGINE SPEED	331	RPM	AMBIENT TEMPERATURE	62	°F
IGNITION TIMING OUTPUT	26.6	°BTDC	LOAD STEP NUMBER	3	
AIR MANIFOLD PRESS.	6.4	"Hg	STATION SUCTION PRESSURE	717	PSIG
AIR MANIFOLD TEMP.	81	°F	STATION SUCTION TEMP.	67	°F
TURBOCHARGER VIBRATION	0.24	IN/SEC	STATION DISCH. PRESSURE	963	PSIG
FUEL STATIC PRESS.	68.2	PSIG	STATION DISCH. TEMP.	112	°F
FUEL DIFF. PRESS.	17.4	"H20	COMPRESSOR FLOW RATE	121	MMSCFD
FUEL GAS HEADER PRESS.	7.6	PSIG	"A" COMP. EFFICIENCY	81	%
FUEL TEMP.	77	°F	"B" COMP. EFFICIENCY	83	%
COMPUTER FUEL FLOW SCF	13398		AVERAGE COMP. EFFICIENCY	82	%
AGA3 CAL. FUEL FLOW SCF			"A" COMP. SUCTION TEMP.	#	°F
CYLINDER #1 TEMP.	919	°F	"B" COMP. SUCTION TEMP.	#	°F
CYLINDER #2 TEMP.	937	°F	"A" COMP. DISCHARGE TEMP.	111	°F
CYLINDER #3 TEMP.	909	°F	"B" COMP. DISCHARGE TEMP.	110	°F
CYLINDER #4 TEMP.	962	°F	FUEL TORQUE HP	1968	BHP
CYLINDER #5 TEMP.	947	°F	TORQUE	98	%
CYLINDER #6 TEMP.	874	°F	GEO. HP	1856	BHP
CYLINDER #7 TEMP.	883	°F	GEO. HP - FUEL TORQUE HP	-111	BHP
CYLINDER #8 TEMP.	893	°F			
MODE	AUTO				

M PS

Compressor Health Report
FloridaGas
Munson #1205

Unit Name:	1205-C	Model:	KM-2	Date:	4/24/00 11:50:49 PM
Location:	Munson,Florida	Unit Mfr:	Cooper-Bessemer	Serial No.:	

Mechanical Efficiency, %	95	Marker Correction Angle, deg	0.0	Periods Collected (PT)	6
Overall Efficiency, %	85	Stroke, (ins)	14.000		
Atmospheric Pressure, psia	14.7	Speed, RPM	330	Specific Gravity	0.577
Load Step	3				

Cyl End	Stg	Clr Set (%)	Bore (ins)	Rod Diam (ins)	ConRod Length (ins)	Pressure Ps (psig)	Pressure Pd (psig)	Temp. Ts	Temp. Td	Comp. Ratio	Calc. Capacity (mmscfd)	Indicated Power (ihp)	Suction Loss (ihp)	Disch. Loss (ihp)	Flow Balance	Dis T Delta (F)	Rod Load (%)	SVE (%)	DVE (%)
1H	1	157	18.500	N/A	38.000	704	961	65F	112F	1.36	33.11	499.7	28.6	19.0	1.02	13	105C	61	48
1C	1	165	18.500	4.000	38.000	699	953	65F	112F	1.36	30.07	452.0	12.2	25.3	0.96	13	81T	58	49
2H	1	192	18.500	N/A	38.000	699	954	65F	110F	1.36	27.51	415.4	12.9	21.3	0.95	10	104C	50	42
2C	1	160	18.500	4.000	38.000	707	955	65F	110F	1.34	31.47	473.9	31.5	26.5	0.96	12	81T	59	51

Notes:

1. Rod loading is based on maximum differential pressure across the rings. C - Compression, T - Tension.
   Forces due to inertia are not accounted for in this table.
2. Flow Balance = capacity from suction VE / capacity from discharge VE.
3. If the flow balance is much greater than 1.0 suspect leaking suction valves or rings.
   If the flow balance is much less than 1.0 suspect leaking discharge valves or rings.
4. Discharge Temp. Delta = actual discharge temp - theoretical.
5. If Suction or Discharge Temperatures are not found, some calculations may not be available as indicated by a "--".
6. Gas power = Total indicated power for all cylinders / Mechanical Efficiency.
7. Compressor total brake power = Gas power + Auxiliary brake power * RPM / Rated RPM.
8. Derated power is obtained by derating the rated power to actual run speed.
9. Compressor efficiency is the total indicated power - suction and discharge losses
   as a percentage of the total indicated power.
10. Marker Type: Encoder (ENC) and Trap Type: 9002.
11. Channel Resonance Correction (CRC) applied: 1C 1H 2H 2C
12. Corrected VE applied, PS and PD values Corrected: None

Total Indicated Power, (ihp)	1841	@	330	RPM	Rated Power, (bhp)	2000	@	330	RPM
Gas Power, (ghp)	1938	@	330	RPM	Derated Power, (bhp)	1997	@	330	RPM
Auxiliary Power, (bhp)	100	@	330	RPM	Percent Torque Load, %	102	%		
Compressor Total Power, (bhp)	2038	@	330	RPM	Compressor Efficiency, %	90	%		

Observations and Recommendations	Machine Condition Notes

Analyst Signature: 4/25/00 12:10:24 AM

1205 UNIT OPERATING DATA

11:08:34 PM 4/24/00

TEST # 1205C A

ENGINE SPEED	330	RPM	AMBIENT TEMPERATURE	61	°F
IGNITION TIMING OUTPUT	27.0	°BTDC	LOAD STEP NUMBER	3	
AIR MANIFOLD PRESS.	6.3	"Hg	STATION SUCTION PRESSURE	714	PSIG
AIR MANIFOLD TEMP.	81	°F	STATION SUCTION TEMP.	67	°F
TURBOCHARGER VIBRATION	0.27	IN/SEC	STATION DISCH. PRESSURE	962	PSIG
FUEL STATIC PRESS.	68.0	PSIG	STATION DISCH. TEMP.	112	°F
FUEL DIFF. PRESS.	17.0	"H20	COMPRESSOR FLOW RATE	120	MMSCFD
FUEL GAS HEADER PRESS.	7.5	PSIG	"A" COMP. EFFICIENCY	82	%
FUEL TEMP.	77	°F	"B" COMP. EFFICIENCY	83	%
COMPUTER FUEL FLOW SCF	13363		AVERAGE COMP. EFFICIENCY	82	%
AGA3 CAL. FUEL FLOW SCF			"A" COMP. SUCTION TEMP.	#	°F
CYLINDER #1 TEMP.	921	°F	"B" COMP. SUCTION TEMP.	#	°F
CYLINDER #2 TEMP.	936	°F	"A" COMP. DISCHARGE TEMP.	111	°F
CYLINDER #3 TEMP.	909	°F	"B" COMP. DISCHARGE TEMP.	110	°F
CYLINDER #4 TEMP.	967	°F	FUEL TORQUE HP	1964	BHP
CYLINDER #5 TEMP.	950	°F	TORQUE	98	%
CYLINDER #6 TEMP.	875	°F	GEO. HP	1848	BHP
CYLINDER #7 TEMP.	885	°F	GEO. HP - FUEL TORQUE HP	-115	BHP
CYLINDER #8 TEMP.	894	°F			
MODE	AUTO				

M PS

1205 UNIT OPERATING DATA

11:22:45 PM 4/24/00

TEST # C-6-8

ENGINE SPEED	331	RPM
IGNITION TIMING OUTPUT	26.7	°BTDC
AIR MANIFOLD PRESS.	6.5	"Hg
AIR MANIFOLD TEMP.	82	°F
TURBOCHARGER VIBRATION	0.25	IN/SEC
FUEL STATIC PRESS.	68.1	PSIG
FUEL DIFF. PRESS.	17.0	"H20
FUEL GAS HEADER PRESS.	7.6	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13373	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	916	°F
CYLINDER #2 TEMP.	931	°F
CYLINDER #3 TEMP.	904	°F
CYLINDER #4 TEMP.	963	°F
CYLINDER #5 TEMP.	944	°F
CYLINDER #6 TEMP.	869	°F
CYLINDER #7 TEMP.	881	°F
CYLINDER #8 TEMP.	891	°F
MODE	AUTO	

AMBIENT TEMPERATURE	60	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	714	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	962	PSIG
STATION DISCH. TEMP.	112	°F
COMPRESSOR FLOW RATE	120	MMSCFD
"A" COMP. EFFICIENCY	81	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	112	°F
"B" COMP. DISCHARGE TEMP.	110	°F
FUEL TORQUE HP	1961	BHP
TORQUE	98	%
GEO. HP	1850	BHP
GEO. HP - FUEL TORQUE HP	-110	BHP

M PS

1205 UNIT OPERATING DATA

11:40:54 PM 4/24/00

TEST #C-6-C

ENGINE SPEED	331	RPM
IGNITION TIMING OUTPUT	26.7	°BTDC
AIR MANIFOLD PRESS.	6.3	"Hg
AIR MANIFOLD TEMP.	82	°F
TURBOCHARGER VIBRATION	0.26	IN/SEC
FUEL STATIC PRESS.	68.2	PSIG
FUEL DIFF. PRESS.	16.6	"H20
FUEL GAS HEADER PRESS.	7.4	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13267	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	919	°F
CYLINDER #2 TEMP.	940	°F
CYLINDER #3 TEMP.	910	°F
CYLINDER #4 TEMP.	962	°F
CYLINDER #5 TEMP.	949	°F
CYLINDER #6 TEMP.	875	°F
CYLINDER #7 TEMP.	884	°F
CYLINDER #8 TEMP.	891	°F
MODE	AUTO	

AMBIENT TEMPERATURE	59	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	712	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	960	PSIG
STATION DISCH. TEMP.	112	°F
COMPRESSOR FLOW RATE	120	MMSCFD
"A" COMP. EFFICIENCY	81	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	112	°F
"B" COMP. DISCHARGE TEMP.	110	°F
FUEL TORQUE HP	1942	BHP
TORQUE	97	%
GEO. HP	1845	BHP
GEO. HP - FUEL TORQUE HP	-97	BHP

M PS

1205 UNIT OPERATING DATA

11:48:05 PM 4/24/00

TEST # C-60

ENGINE SPEED	331	RPM
IGNITION TIMING OUTPUT	27.0	°BTDC
AIR MANIFOLD PRESS.	6.3	"Hg
AIR MANIFOLD TEMP.	82	°F
TURBOCHARGER VIBRATION	0.26	IN/SEC
FUEL STATIC PRESS.	68.2	PSIG
FUEL DIFF. PRESS.	16.7	"H20
FUEL GAS HEADER PRESS.	7.4	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13296	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	919	°F
CYLINDER #2 TEMP.	935	°F
CYLINDER #3 TEMP.	910	°F
CYLINDER #4 TEMP.	964	°F
CYLINDER #5 TEMP.	948	°F
CYLINDER #6 TEMP.	876	°F
CYLINDER #7 TEMP.	885	°F
CYLINDER #8 TEMP.	893	°F
MODE	AUTO	

AMBIENT TEMPERATURE	59	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	711	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	959	PSIG
STATION DISCH. TEMP.	112	°F
COMPRESSOR FLOW RATE	119	MMSCFD
"A" COMP. EFFICIENCY	82	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	112	°F
"B" COMP. DISCHARGE TEMP.	110	°F
FUEL TORQUE HP	1945	BHP
TORQUE	97	%
GEO. HP	1844	BHP
GEO. HP - FUEL TORQUE HP	-101	BHP

M PS

1205 UNIT OPERATING DATA

11:55:56 PM 4/24/00

TEST # C-4-C

ENGINE SPEED	326	RPM
IGNITION TIMING OUTPUT	26.1	°BTDC
AIR MANIFOLD PRESS.	6.3	"Hg
AIR MANIFOLD TEMP.	82	°F
TURBOCHARGER VIBRATION	0.26	IN/SEC
FUEL STATIC PRESS.	68.3	PSIG
FUEL DIFF. PRESS.	16.7	"H20
FUEL GAS HEADER PRESS.	7.4	PSIG
FUEL TEMP.	76	°F
COMPUTER FUEL FLOW SCF	13260	
AGA3 CAL. FUEL FLOW SCF		
CYLINDER #1 TEMP.	918	°F
CYLINDER #2 TEMP.	938	°F
CYLINDER #3 TEMP.	911	°F
CYLINDER #4 TEMP.	961	°F
CYLINDER #5 TEMP.	950	°F
CYLINDER #6 TEMP.	874	°F
CYLINDER #7 TEMP.	883	°F
CYLINDER #8 TEMP.	895	°F
MODE	AUTO	

AMBIENT TEMPERATURE	59	°F
LOAD STEP NUMBER	3	
STATION SUCTION PRESSURE	711	PSIG
STATION SUCTION TEMP.	67	°F
STATION DISCH. PRESSURE	960	PSIG
STATION DISCH. TEMP.	112	°F
COMPRESSOR FLOW RATE	117	MMSCFD
"A" COMP. EFFICIENCY	81	%
"B" COMP. EFFICIENCY	83	%
AVERAGE COMP. EFFICIENCY	82	%
"A" COMP. SUCTION TEMP.	#	°F
"B" COMP. SUCTION TEMP.	#	°F
"A" COMP. DISCHARGE TEMP.	112	°F
"B" COMP. DISCHARGE TEMP.	110	°F
FUEL TORQUE HP	1952	BHP
TORQUE	99	%
GEO. HP	1806	BHP
GEO. HP - FUEL TORQUE HP	-146	BHP

M PS

1205 UNIT OPERATING DATA

12:04:53 AM 4/25/00

TEST # 12056-P

ENGINE SPEED	331	RPM	AMBIENT TEMPERATURE	58	°F
IGNITION TIMING OUTPUT	26.6	°BTDC	LOAD STEP NUMBER	3	
AIR MANIFOLD PRESS.	6.3	"Hg	STATION SUCTION PRESSURE	710	PSIG
AIR MANIFOLD TEMP.	82	°F	STATION SUCTION TEMP.	67	°F
TURBOCHARGER VIBRATION	0.26	IN/SEC	STATION DISCH. PRESSURE	959	PSIG
FUEL STATIC PRESS.	68.2	PSIG	STATION DISCH. TEMP.	112	°F
FUEL DIFF. PRESS.	16.7	"H20	COMPRESSOR FLOW RATE	119	MMSCFD
FUEL GAS HEADER PRESS.	7.5	PSIG	"A" COMP. EFFICIENCY	81	%
FUEL TEMP.	76	°F	"B" COMP. EFFICIENCY	83	%
COMPUTER FUEL FLOW SCF	13333		AVERAGE COMP. EFFICIENCY	82	%
AGA3 CAL. FUEL FLOW SCF			"A" COMP. SUCTION TEMP.	#	°F
CYLINDER #1 TEMP.	918	°F	"B" COMP. SUCTION TEMP.	#	°F
CYLINDER #2 TEMP.	942	°F	"A" COMP. DISCHARGE TEMP.	112	°F
CYLINDER #3 TEMP.	910	°F	"B" COMP. DISCHARGE TEMP.	110	°F
CYLINDER #4 TEMP.	961	°F	FUEL TORQUE HP	1953	BHP
CYLINDER #5 TEMP.	947	°F	TORQUE	97	%
CYLINDER #6 TEMP.	876	°F	GEO. HP	1843	BHP
CYLINDER #7 TEMP.	885	°F	GEO. HP - FUEL TORQUE HP	-110	BHP
CYLINDER #8 TEMP.	893	°F			
MODE	AUTO				

M PS

APPENDIX E:
QUALITY ASSURANCE ACTIVITIES

Quality Assurance Worksheet
NOx Convertor Efficiency, Response Time, THC Calibration Error, Leak Checks, Interference Response

Date: 4/24/2000
Company: Enron/Florida Gas Transmission
Source: Cooper-Bessemer LSG8
Technicians: JT, GM

NOx Analyzer: NO2 to NO Converter Efficiency Test

NO Calibration Gas: 449.1 ppmv
Diluent Gas: Air- 20.9% O2

	NOx conc. (ppmv)	% NOx Decrease from peak conc.	NO conc. (ppmv)
Peak Concentration:	275.0		
10 minute conc.	275.0	0.00	200
20 minute conc.	271.0	1.45	161
30 minute conc.	273.0	0.73	141.0

Hydrocarbon Calibration Error Check

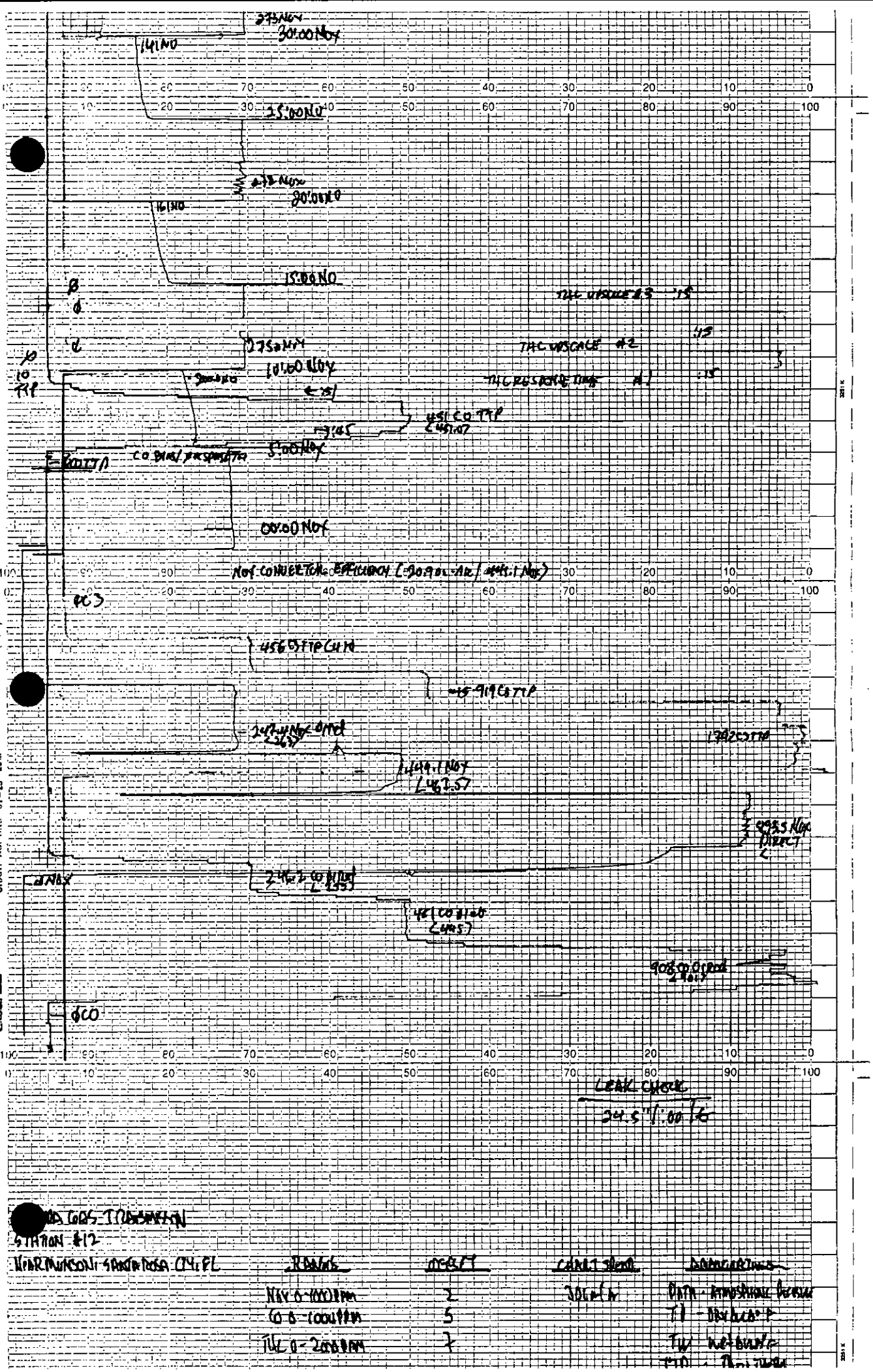
Test Date	concentration (ppmv)	measured value	predicted value	measured value	difference, %
4/24/2000	0.0 THC	0.0 THC			
	456.0 THC		458.0 THC	470.0 THC	2.61%
	919.0 THC		923.1 THC	910.0 THC	1.42%
	1792.0 THC	1784.0 THC			

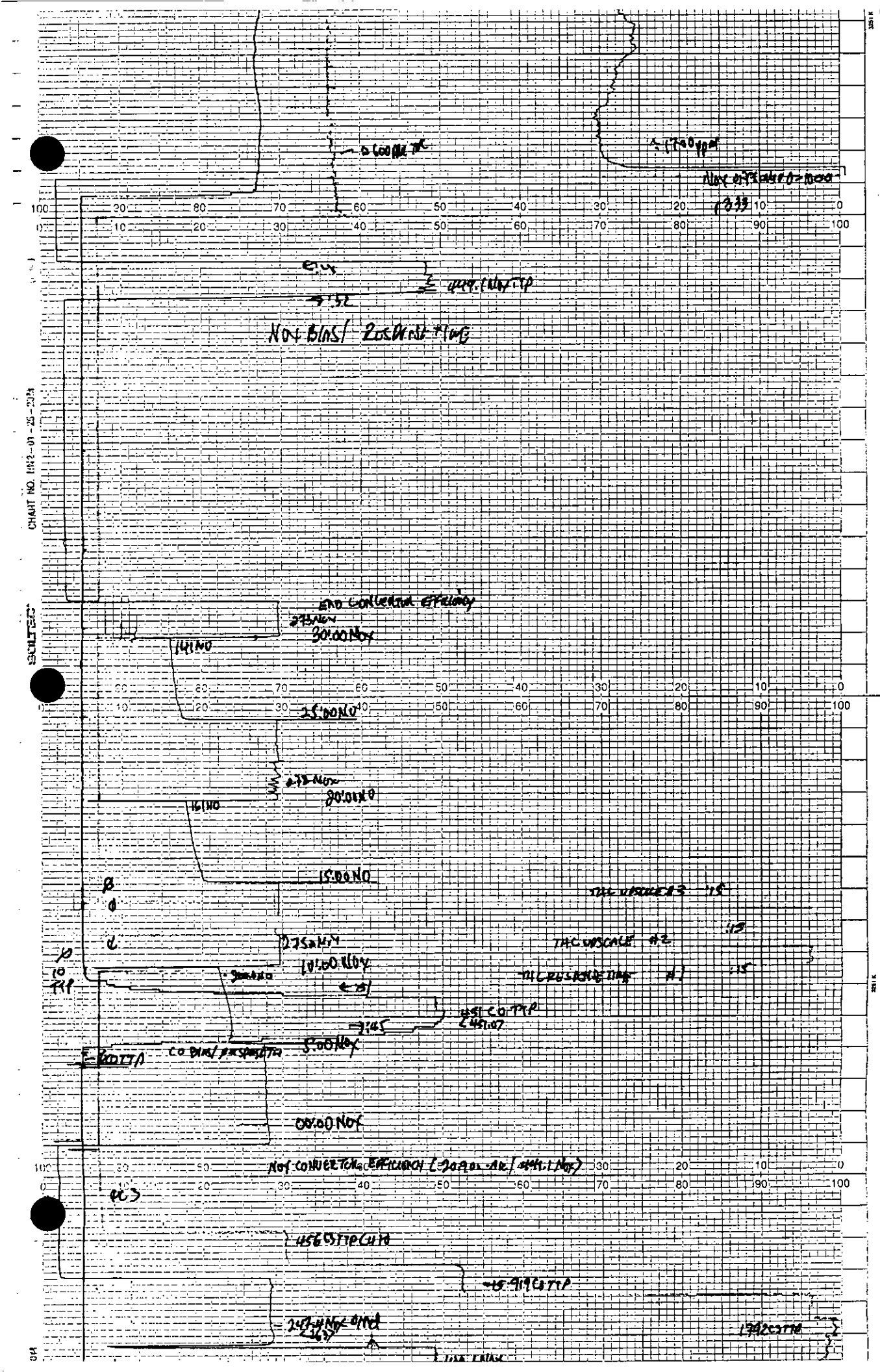
Response Time

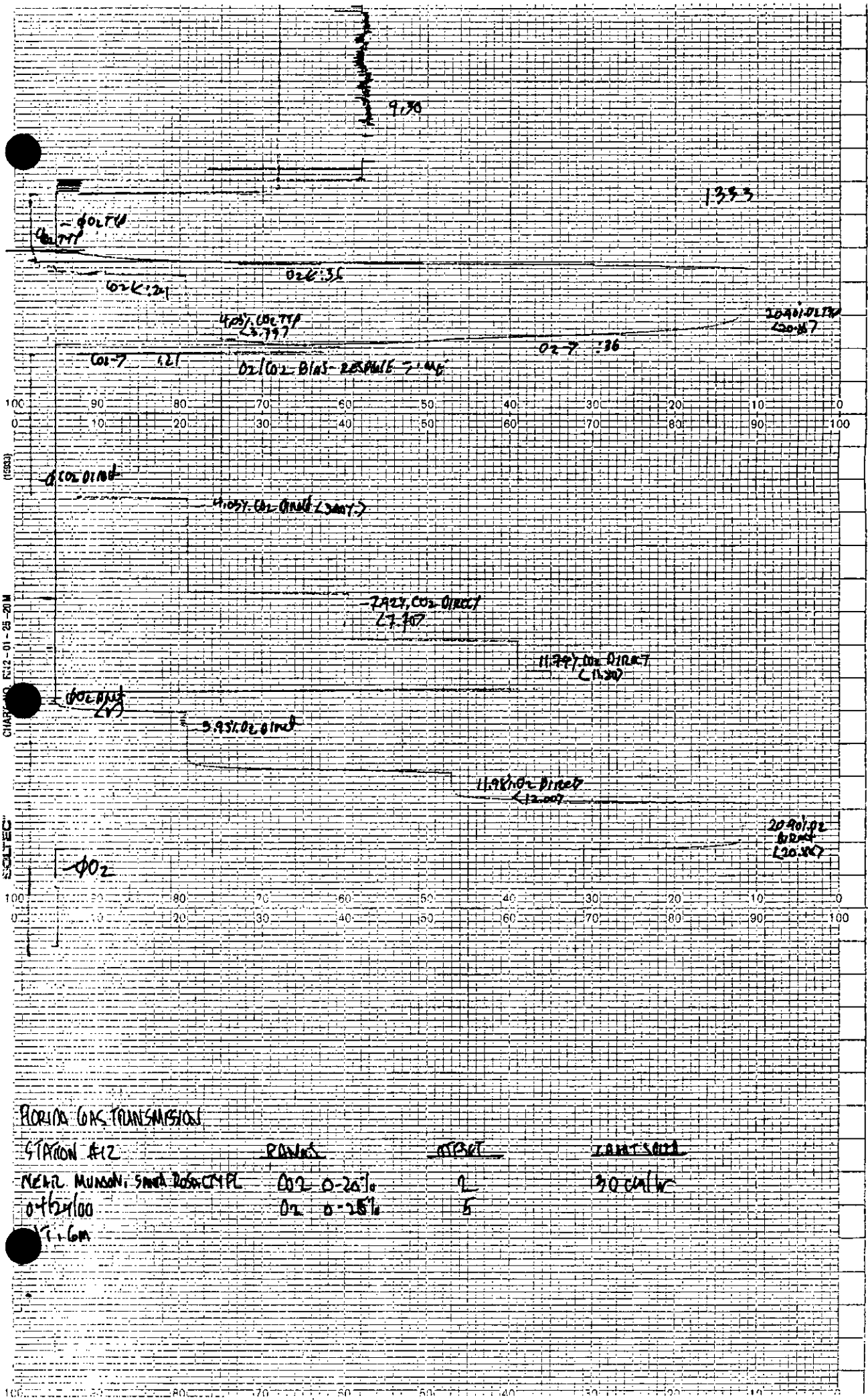
Analyzer	zero gas concentration	span gas concentration	upscale response time	downscale response time	System Response Time
THC	0.0 ppmv	1792.0 THC	:15	n/a	
			:15	n/a	
			:15	n/a	:15
NOx	0.0 ppmv	893.5 NOx	:32	:28	:32
CO	0.0 ppmv	452.0 CO	:45	:51	:51
O2	0.0%	20.90 O2	:36	:36	:36
CO2	0.0%	4.03 O2	:21	:24	:24

Sample System Leak Check

	Date	Sample System	Vacuum (in. Hg)	Leak Rate (in. Hg/min)
PRE TEST	4/24/2000	A	24.5	0.00
POST TEST	4/24/2000	A	23.0	0.00


30.00 NOx
15.00 NO
80.00 NO
15.00 NO
10.00 NOx
5.00 NOx
00.00 NOx
LEAK CHECK


NOx BINS / ZOOM



FLORIDA GAS TRANSMISSION

STATION #12	RANGE	OFFSET	TAPE SPEED
NEAR MUNSON, SANTA ROSA CNTY, FL	CO2 0-20%	2	30 CM/HR
04/24/00	O2 0-25%	5	
V1.6M			

Quality Assurance Worksheet
FGT Compressor Station 12 Unit 1204

Company: Enron/Florida Gas Transmission
Location: Station #12
Source: Cooper-Bessemer LSG8 Unit 1204

	CALIBRATION GAS CONCENTRATIONS		INITIAL CALIBRATION & LINEARITY CHECK		SAMPLE SYSTEM RESPONSE		TEST RUN 1204-C-1	ZERO and SPAN CALIBRATION CHECK				TEST RUN 1204-C-2	ZERO and SPAN CALIBRATION CHECK				TEST RUN 1204-C-3	ZERO and SPAN CALIBRATION CHECK			
	Certified Concentration	Target (% Chart)	Analyzer Response	Calibration Error	Thru Probe Response	System Bias		Initial Response	Final Response	Drift <3%	Bias <5%		Initial Response	Final Response	Drift <3%	Bias <5%		Initial Response	Final Response	Drift <3%	Bias <5%
NOx							Avg. ppmv					Avg. ppmv					Avg. ppmv				
zero	0.0 ppmv	2.0	0.00	0.0%	0.0	0%	1795.0	0.0 ppmv	0.0 ppmv	0.0%	0.00%	1610.0	0.0 ppmv	0.0 ppmv	0.0%	0.00%	1612.5	0.0 ppmv	0.0 ppmv	0.0%	0.00%
low	449.1 ppmv	24.5	462.50	0.7%			Corr. ppmv					Corr. ppmv					Corr. ppmv				
mid	893.5 ppmv	46.7	910.00	0.8%	915.0	0%	1731.1	915.0 ppmv	938.0 ppmv	1.2%	1.15%	1561.1	938.0 ppmv	905.0 ppmv	-1.7%	0.50%	1545.1	905.0 ppmv	960.0 ppmv	2.8%	2.25%
high	1705.0 ppmv	87.3	1737.00	1.6%																	
full scale	2000.0 ppmv																				
CO							Avg. ppmv					Avg. ppmv					Avg. ppmv				
zero	0.0 ppmv	5.0	0.00	0.0%	0.0	0%	218.0	0.0 ppmv	0.0 ppmv	0.0%	0.00%	222.0	0.0 ppmv	0.0 ppmv	0.0%	0.00%	224.0	0.0 ppmv	0.0 ppmv	0.0%	0.00%
low	246.2 ppmv	29.6	253.00	0.7%			Corr. ppmv					Corr. ppmv					Corr. ppmv				
mid	452.0 ppmv	50.2	445.00	-0.7%	451.0	0%	220.4	451.0 ppmv	443.0 ppmv	-0.8%	0.8%	224.7	443.0 ppmv	450.0 ppmv	0.7%	0.10%	226.3	450.0 ppmv	445.0 ppmv	-0.5%	0.60%
high	908.0 ppmv	95.8	901.00	-0.7%																	
full scale	1000.0 ppmv																				
O2							Avg.%					Avg.%					Avg.%				
zero	0.00%	5.00	0.00	0.00%	0.00	0%	9.23	0.00%	0.00%	0.0%	0.00%	9.21	0.00%	0.00%	0.0%	0.00%	9.43	0.00%	0.00%	0.0%	0.00%
low	3.93%	20.72	3.98	0.20%			Corr. %					Corr. %					Corr. %				
mid	11.98%	52.92	12.00	0.08%			9.26					9.23					9.38				
high	20.90%	88.60	20.88	-0.08%	20.88	0%		20.88%	20.78%	-0.4%	0.40%		20.78%	20.94%	0.6%	0.24%		20.94%	21.10%	0.6%	0.88%
full scale	25.00%																				
CO2							Avg.%					Avg.%					Avg.%				
zero	0.00%	2.00	0.00	0.00%	0.00	0%	5.97	0.00%	0.00%	0.0%	0.00%	5.86	0.00%	0.00%	0.0%	0.00%	5.84	0.00%	0.00%	0.0%	0.00%
low	4.03%	22.15	3.80	-1.15%	3.77	0%	Corr. %	3.77%	3.62%	-0.8%	0.75%	Corr. %	3.62%	3.61%	-0.1%	0.80%	Corr. %	3.61%	3.64%	0.2%	0.65%
mid	7.92%	41.60	7.70	-1.10%			6.51					6.53					6.49				
high	11.74%	60.70	11.80	0.30%																	
full scale	20.00%																				
THC			*All calibrations through entire system*				Avg. ppmv					Avg. ppmv					Avg. ppmv				
zero	0.0 ppmv	7.00	0.00	0.0%	0.0	0%	608.00	0.0 ppmv	0.0 ppmv	0.0%	0.00%	604.00	0.0 ppmv	0.0 ppmv	0.0%	0.00%	594.00	0.0 ppmv	0.0 ppmv	0.0%	0.00%
low	456.0 ppmv	29.80	470.00	0.7%			Corr. ppmv					Corr. ppmv					Corr. ppmv				
mid	919.0 ppmv	52.95	910.00	-0.5%	910.0	0%	616.72	910.0 ppmv	902.0 ppmv	-0.4%	0.40%	607.97	902.0 ppmv	924.0 ppmv	1.1%	0.70%	590.79	924.0 ppmv	924.0 ppmv	0.0%	0.70%
high	1792.0 ppmv	96.60	1784.00	-0.4%																	
full scale	2000.0 ppmv																				

Quality Assu[illegible]e Worksheet
FGT Compressor Station 12 Unit 1205

Company: Enron/Florida Gas Transmission
Location: Station #12
Source: Cooper-Bessemer LS-8-SG Unit 1205 *From Unit 1204, Run 3 Finals*

	CALIBRATION GAS CONCENTRATIONS		INITIAL CALIBRATION & LINEARITY CHECK		SAMPLE SYSTEM RESPONSE		TEST RUN 1205-C-4	ZERO and SPAN CALIBRATION CHECK				TEST RUN 1205-C-5	ZERO and SPAN CALIBRATION CHECK				TEST RUN 1205-C-6	ZERO and SPAN CALIBRATION CHECK			
	Certified Concentration	Target (% Chart)	Analyzer Response	Calibration Error	Thru Probe Response	System Bias		Initial Response	Final Response	Drift <3%	Bias <5%		Initial Response	Final Response	Drift <3%	Bias <5%		Initial Response	Final Response	Drift <3%	Bias <5%
NOx							**Avg. ppmv**					**Avg. ppmv**					**Avg. ppmv**				
zero	0.0 ppmv	2.0	0.00	0.0%	0.0	0%	2135.0	0.0 ppmv	0.0 ppmv	0.0%	0.00%	1928.0	0.0 ppmv	0.0 ppmv	0.0%	0.00%	1805.0	0.0 ppmv	0.0 ppmv	0.0%	0.00%
low	449.1 ppmv	24.5	462.50	0.7%			**Corr. ppmv**					**Corr. ppmv**					**Corr. ppmv**				
mid	893.5 ppmv	46.7	910.00	0.8%	915.0	0%	**1984.5**	960.0 ppmv	962.5 ppmv	0.1%	2.38%	**1803.8**	962.5 ppmv	947.5 ppmv	-0.8%	1.63%	**1711.2**	947.5 ppmv	937.5 ppmv	-0.5%	1.13%
high	1705.0 ppmv	87.3	1737.00	1.6%																	
full scale	2000.0 ppmv																				
CO							**Avg. ppmv**					**Avg. ppmv**					**Avg. ppmv**				
zero	0.0 ppmv	5.0	0.00	0.0%	0.0	0%	225.0	0.0 ppmv	0.0 ppmv	0.0%	0.00%	222.0	0.0 ppmv	0.1 ppmv	0.0%	0.01%	221.0	0.1 ppmv	1.0 ppmv	0.1%	0.10%
low	246.2 ppmv	29.6	253.00	0.7%			**Corr. ppmv**					**Corr. ppmv**					**Corr. ppmv**				
mid	452.0 ppmv	50.2	445.00	-0.7%	451.0	0%	**228.3**	445.0 ppmv	446.0 ppmv	0.1%	0.5%	**225.0**	446.0 ppmv	446.0 ppmv	0.0%	0.50%	**223.9**	446.0 ppmv	445.0 ppmv	-0.1%	0.60%
high	908.0 ppmv	95.8	901.00	-0.7%																	
full scale	1000.0 ppmv																				
O2							**Avg.%**					**Avg.%**					**Avg.%**				
zero	0.00%	5.00	0.00	0.00%	0.00	0%	9.28	0.00%	0.00%	0.0%	0.00%	9.38	0.00%	0.00%	0.0%	0.00%	9.44	0.00%	0.00%	0.0%	0.00%
low	3.93%	20.72	3.98	0.20%			**Corr. %**					**Corr. %**					**Corr. %**				
mid	11.98%	52.92	12.00	0.08%			**9.19**					**9.36**					**9.51**				
high	20.90%	88.60	20.88	-0.08%	20.88	0%		21.10%	21.12%	0.1%	0.96%		21.12%	20.75%	-1.5%	0.52%		20.75%	20.75%	0.0%	0.52%
full scale	25.00%																				
CO2							**Avg.%**					**Avg.%**					**Avg.%**				
zero	0.00%	2.00	0.00	0.00%	0.00	0%	6.04	0.00%	-0.08%	-0.4%	0.40%	6.04	-0.08%	-0.10%	-0.1%	0.50%	6.20	-0.10%	-0.10%	0.0%	0.50%
low	4.03%	22.15	3.80	-1.15%	3.77	0%	**Corr. %**	3.64%	3.64%	0.0%	0.65%	**Corr. %**	3.64%	3.82%	0.9%	0.25%	**Corr. %**	3.82%	3.78%	-0.2%	0.05%
mid	7.92%	41.60	7.70	-1.10%			**6.66**					**6.47**					**6.51**				
high	11.74%	60.70	11.80	0.30%																	
full scale	20.00%																				
THC			*All calibrations through entire system*				**Avg. ppmv**					**Avg. ppmv**					**Avg. ppmv**				
zero	0.0 ppmv	7.00	0.00	0.0%	0.0	0%	558.00	0.0 ppmv	-8.0 ppmv	-0.4%	0.40%	550.00	-8.0 ppmv	-9.0 ppmv	-0.1%	0.45%	544.00	-9.0 ppmv	-4.0 ppmv	0.3%	0.20%
low	456.0 ppmv	29.80	470.00	0.7%			**Corr. ppmv**					**Corr. ppmv**					**Corr. ppmv**				
mid	919.0 ppmv	52.95	910.00	-0.5%	910.0	0%	**563.23**	924.0 ppmv	902.0 ppmv	-1.1%	0.40%	**564.33**	902.0 ppmv	900.0 ppmv	-0.1%	0.50%	**559.33**	900.0 ppmv	896.0 ppmv	-0.2%	0.70%
high	1792.0 ppmv	96.60	1784.00	-0.4%																	
full scale	2000.0 ppmv																				

APPENDIX F:
CALIBRATION CERTIFICATIONS

BOC GASES

EPA PROTOCOL GAS
CERTIFICATE OF ANALYSIS

ORDER NO. 040188

CUSTOMER
CUBIX CORPORATION
RECEIVING DEPT.
9225 US HIGHWAY 183 SOUTH
AUSTIN, TX 78747 - 0

CYLINDER NO: CC18347
EXPIRATION DATE: 09/07/01
CERTIFICATION DATE: 09/07/99
CYLINDER PRESSURE: 2000 psig

PURCHASE ORDER: 99251

COMPONENT	CERTIFIED CONCENTRATION	TOTAL RELATIVE UNCERTAINTY	CALIBRATION STANDARDS USED IN ASSAY TYPE	LOT ID	CYLINDER	CONC.	CAS NO.
Nitric Oxide	447.1 ppm	+/- 1 %	NTRM 1686b		XC-003340B	502 ppm	10102-43-9
Total Oxides of Nitrogen	449.1 ppm	+/- 1 %					10102-43-9
Nitrogen	Balance Gas						7727-37-9

ANALYZER READINGS

ASSAY LABORATORY: Port Allen

TEST NUMBER: 113785

COMPONENT: Nitric Oxide

Analyzer: THERMO ENVIRONMENTAL Model 42C Chemiluminescence S/N 42CHL-57906-315
Last Multipoint Calibration: 08/18/99

First Triad: 08/30/99 Analyst: R JACARUSO

Zero	Ref.	Sample
.1	494	439
.15	493	439
.08	493	440

Mean First Assay: 447.4 ppm

Second Triad: 09/07/99 Analyst: R JACARUSO

Zero	Ref.	Sample
.13	493	437
.2	495	440
.18	494	441

Mean Second Assay: 446.8 ppm

This Calibration Standard has been certified per the September, 1993 EPA Traceability Protocol, Document EPA-600/R93/224, using Procedure G1.
All values certified to be +/- 1% NIST Traceable. Do not use this cylinder below 1.0 Megapascal, i.e., 150psig

QA APPROVED R. Jacaruso

A410

BOC GASES

EPA PROTOCOL GAS
CERTIFICATE OF ANALYSIS

ORDER NO. 040125

CUSTOMER
CUBIX CORPORATION
RECEIVING DEPT.
9225 US HIGHWAY 183 SOUTH
AUSTIN, TX 78747 - 0

CYLINDER NO: CC19199
EXPIRATION DATE: 09/07/01
CERTIFICATION DATE: 09/07/99
CYLINDER PRESSURE: 2000 psig

PURCHASE ORDER: 99251

COMPONENT	CERTIFIED CONCENTRATION	TOTAL RELATIVE UNCERTAINTY	CALIBRATION STANDARDS USED IN ASSAY TYPE	LOT ID	CYLINDER	CONC.	CAS NO.
Nitric Oxide	890.5 ppm	+/- 1 %	NTRM 1687	81687	XN-000483B	957 ppm	10102-43-9
Total Oxides of Nitrogen	893.5 ppm	+/- 1 %					10102-43-9
Nitrogen	Balance Gas						7727-37-9

ANALYZER READINGS

ASSAY LABORATORY: Port Allen

TEST NUMBER: 113788

COMPONENT: Nitric Oxide

Analyzer: THERMO ENVIRONMENTAL Model 42C Chemiluminescence S/N 42CHL-67906-315
Last Multipoint Calibration: 08/18/99

First Triad: 08/30/99 Analyst: R JACARUSO

Zero	Ref.	Sample
.02	958	889
.15	961	891
.2	962	892

Mean First Assay: 887.8 ppm

Second Triad: 09/07/99 Analyst: R JACARUSO

Zero	Ref.	Sample
0	952	885
.2	951	889
.2	952	890

Mean Second Assay: 893.2 ppm

This Calibration Standard has been certified per the September, 1993 EPA Traceability Protocol, Document EPA-600/R93/224, using Procedure G1.
All values certified to be +/- 1% NIST Traceable. Do not use this cylinder below 1.0 Megapascal, i.e., 150psig

QA APPROVED R. Jacaruso

A410

BOC GASES

EPA PROTOCOL GAS
CERTIFICATE OF ANALYSIS

ORDER NO. 040125

CUSTOMER
CUBIX CORPORATION
RECEIVING DEPT.
9225 US HIGHWAY 183 SOUTH
AUSTIN, TX 78747 - 0

CYLINDER NO: CC12059
EXPIRATION DATE: 09/09/01
CERTIFICATION DATE: 09/09/99
CYLINDER PRESSURE: 2000 psig

PURCHASE ORDER: 99251

COMPONENT	CERTIFIED CONCENTRATION	TOTAL RELATIVE UNCERTAINTY	CALIBRATION STANDARDS USED IN ASSAY TYPE	LOT ID	CYLINDER	CONC.	CAS NO.
Nitric Oxide	1704 ppm	+/- 1 %	NTRM XC012	00001	XC-012062B	2907 ppm	10102-43-9
Total Oxides of Nitrogen	1705 ppm	+/- 1 %					10102-43-9
Nitrogen	Balance Gas						7727-37-9

ANALYZER READINGS

ASSAY LABORATORY: Port Allen

TEST NUMBER: 113787

COMPONENT: Nitric Oxide
Analyzer: NICOLET Model 550 FTIR S/N ADI9603531
Last Multipoint Calibration: 08/24/99

First Triad: 09/02/99 Analyst: R JACARUSO

Zero	Ref.	Sample
0	2.628	1.911
0	2.628	1.911
0	2.628	1.912

Mean First Assay: 1703 ppm

Second Triad: 09/09/99 Analyst: R JACARUSO

Zero	Ref.	Sample
0	2.628	1.912
0	2.629	1.913
0	2.629	1.913

Mean Second Assay: 1704 ppm

This Calibration Standard has been certified per the September, 1993 EPA Traceability Protocol, Document EPA-600/R93/224, using Procedure G1.
All values certified to be +/- 1% NIST Traceable. Do not use this cylinder below 1.0 Megapascal, i.e., 150psig

QA APPROVED

A410

1-3

BOC GASES

EPA PROTOCOL GAS
CERTIFICATE OF ANALYSIS

ORDER NO. 040234

CUSTOMER
CUBIX CORPORATION
RECEIVING DEPT.
9225 US HIGHWAY 183 SOUTH
AUSTIN, TX 78747-0

CYLINDER NO: CC105626
EXPIRATION DATE: 09/10/02
CERTIFICATION DATE: 09/10/99
CYLINDER PRESSURE: 2000 psig

PURCHASE ORDER: 99251

COMPONENT	CERTIFIED CONCENTRATION	TOTAL RELATIVE UNCERTAINTY
Carbon Monoxide	248.9 ppm	+/- 1 %
Propane	251.5 ppm	+/- 1 %
Air	Balance Gas	

CALIBRATION STANDARDS USED IN ASSAY

TYPE	LOT ID	CYLINDER	CONC.	CAS NO.
GMIS	[illegible]	XC-004229B	295.3 ppm	630-08-0
NTRM 82644	990608.14	XC-012047B	248.9 ppm	74-98-6
				7727-37-9/7782-44

ANALYZER READINGS

ASSAY LABORATORY: Riverton

TEST NUMBER: 113697

COMPONENT: Carbon Monoxide
Analyzer: TECO Model 48H Non-Dispersive Infrared S/N 48H-46045-275
Last Multipoint Calibration: 09/24/99

First Triad: 09/03/99 Analyst: A. Lattanze

Zero	Ref.	Sample
.11	309.06	259.10
.11	309.07	259.06
.1	309.12	259.1

Mean First Assay: 248.9 ppm

Second Triad: 09/10/99 Analyst: P. Lott

Zero	Ref.	Sample
.12	309.37	259.32
.17	309.66	259.65
.18	309.48	259.58

Mean Second Assay: 248.9 ppm

COMPONENT: Propane
Analyzer: HP Model 5890 GC S/N 3022A29265
Last Multipoint Calibration: 09/03/99

First Triad: 09/09/99 Analyst: A. Lattanze

Zero	Ref.	Sample
0	27011	27278
0	26977	27270
0	26986	27262

Mean First Assay: 251.5 ppm

This Calibration Standard has been certified per the September, 1993 EPA Traceability Protocol, Document EPA-600/R93/224, using Procedure G1.
All values certified to be +/-.1% NIST Traceable. Do not use this cylinder below 1.0 Megapascal, i.e., 150psig

QA APPROVED P. Lott 9/10

T-3

SPECTRA GASES INC.
3434 Route 22 West • Branchburg, NJ 08876 USA Tel.: (908) 252-9300 • (800) 932-0624 • Fax: (908) 252-0811
Shipped From: 80 Industrial Drive • Alpha, NJ 08865

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

CUSTOMER: Cubix Corporation
SGI ORDER # : 152659
ITEM# : 2
P.O.# : 2000096

CYLINDER # : CC118634
CYLINDER PRES: 2000 PSIG
CGA OUTLET: 590

CERTIFICATION DATE: 4/10/2000
EXPIRATION DATE: 4/6/2003

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Carbon Monoxide	4/3/2000 4/10/2000	455.0 ppm 455.6 ppm	455 ppm	+/- 1%
Propane	4/6/2000	451 ppm	451 ppm	+/- 1%

BALANCE Air

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Carbon Monoxide	NTRM-81681	CC55789	994 ppm
Propane	GMIS-1	CC57162	500.3 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Carbon Monoxide	Horiba VIA-510	570423011	NDIR	3/27/2000
Propane	H. Packard 6890	US00001434	GC - FID	4/6/2000

THIS STANDARD WAS CERTIFIED ACCORDING TO THE EPA PROTOCOL PROCEDURES.
DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 150 PSIG.

ANALYST: FRED PIKULA

DATE: 4/10/2000

T3

BOC GASES

EPA PROTOCOL GAS
CERTIFICATE OF ANALYSIS

ORDER NO. 040225

CUSTOMER
CUBIX CORPORATION
RECEIVING DEPT.
9225 US HIGHWAY 183 SOUTH
AUSTIN, TX 78747 - 0

CYLINDER NO: CC115066
EXPIRATION DATE: 09/16/02
CERTIFICATION DATE: 09/16/99
CYLINDER PRESSURE: 2000 psig

PURCHASE ORDER: 99251

COMPONENT	CERTIFIED CONCENTRATION	TOTAL RELATIVE UNCERTAINTY	CALIBRATION STANDARDS USED IN ASSAY TYPE	LOT ID	CYLINDER	CONC.	CAS NO.
Carbon Monoxide	908 ppm	+/- 1.0 %	GMIS		CC-13735	970 ppm	630-08-0
Propane	919 ppm	+/- 1.0 %	NTRM 82646	99060708	XC-014168B	960.9 ppm	74-98-6
Air	Balance Gas						7727-37-9/7782-44

ANALYZER READINGS

ASSAY LABORATORY: Riverton

TEST NUMBER: 113853

COMPONENT: Carbon Monoxide
Analyzer: TECO Model 48H NON-DISPERSIVE INFRARED S/N 48H-43279-269
Last Multipoint Calibration: 09/09/99

First Triad: 09/09/99 Analyst: P. Long

Zero	Ref.	Sample
.86	1033	969
.42	1033	971
1.03	1034	972

Mean First Assay: 910.9 ppm

Second Triad: 09/16/99 Analyst: M. McAveety

Zero	Ref.	Sample
.38	1038	970
.95	1041	971
.88	1039	971

Mean Second Assay: 905.8 ppm

COMPONENT: Propane
Analyzer: HP Model 5890 GC S/N 3022A29265
Last Multipoint Calibration: 09/03/99

First Triad: 09/09/99 Analyst: P. Long

Zero	Ref.	Sample
0	101099	96720
0	101047	96677
0	101108	96607

Mean First Assay: 918.7 ppm

~~This Calibration Standard has been certified per the September, 1989 EPA Traceability Protocol, Document EPA-600/R93/224, using Procedure G1.~~
All values certified to be +/- 1% NIST Traceable. Do not use this cylinder below 1.0 Megapascal, i.e., 150psig
Comments: This calibration standard has been certified per the 1997 EPA traceability protocol, EPA-600/97/121 procedure G1

QA APPROVED AA10

BOC GASES

EPA PROTOCOL GAS
CERTIFICATE OF ANALYSIS

ORDER NO. 040316

CUSTOMER
CUBIX CORPORATION
RECEIVING DEPT.
9225 US HIGHWAY 183 SOUTH
AUSTIN, TX 78747 - 0

CYLINDER NO: CC84270
EXPIRATION DATE: 09/03/02
CERTIFICATION DATE: 09/03/99
CYLINDER PRESSURE: 2000 psig

PURCHASE ORDER: 99251

COMPONENT	CERTIFIED CONCENTRATION	TOTAL RELATIVE UNCERTAINTY	CALIBRATION STANDARDS USED IN ASSAY TYPE	LOT ID	CYLINDER	CONC.	CAS NO.
Oxygen	3.925 %	+/- 1 %	NTRM 82659	95030915	CC-15268	20.7 %	7782-44-7
Carbon Dioxide	11.74 %	+/- 1 %	NTRM 82745X	97660205	XN-003279B	19.98 %	124-38-9
Nitrogen	Balance Gas						7727-37-9

ANALYZER READINGS

ASSAY LABORATORY: Port Allen

TEST NUMBER: 113625

COMPONENT: Oxygen
Analyzer: ROSEMOUNT Model 755R PARAMAGNETIC S/N 1000379
Last Multipoint Calibration: 09/02/99
First Tried: 09/03/99 Analyst: R JACARUSO

Zero	Ref.	Sample
.03	20.68	3.94
.02	20.68	3.93
.01	20.67	3.93

Mean First Assay: 3.925 %

COMPONENT: Carbon Dioxide
Analyzer: ROSEMOUNT Model 880A Non-Dispersive Infrared S/N 1000286
Last Multipoint Calibration: 09/02/99
First Tried: 09/03/99 Analyst: R JACARUSO

Zero	Ref.	Sample
22	4523	2701
23	4532	2701
22	4533	2706

Mean First Assay: 11.74 %

This Calibration Standard has been certified per the September, 1993 EPA Traceability Protocol, Document EPA-600/R93/224, using Procedure G1.
All values certified to be +/- 1% NIST Traceable. Do not use this cylinder below 1.0 Megapascal, i.e., 150psig

QA APPROVED R. Jacaruso

A410

BOC GASES

Assay Laboratory
BOC GASES
1075 Cinclare Drive
Port Allen,LA 70767
(225) 388 0900

CERTIFICATE OF ANALYSIS

EPA Protocol Gas

CUSTOMER	CYLINDER NO	: CC29702
DUKE/TETCO PERULACK	EXPIRATION DATE	: 02/21/03
COMPRESSOR STATION	CERTIFICATION DATE	: 02/21/00
HIGHWAY 75 SOUTH	CYLINDER PRESSURE	: 2000 psig
EAST WATERFORD, PA 170210000	PRODUCT ID NO	: 03000745
CUSTOMER PO NO: 2000051	LOT NUMBER	: 373241
Previous Certification Date(s):		

ANALYTICAL INFORMATION

This calibration standard has been certified per the 1997 EPA Traceability Protocol, Document EPA-600/97/121, Using Procedure G1. All Values certified to be +/-1% NIST Traceable.

Do Not Use This Cylinder below 150 psig. i.e. 1.0 Megapascal

Component	Requested Mixture Concentration	Certified Analytical Concentration	Analytical Uncertainty
CARBON DIOXIDE	[illegible]	[illegible]	[illegible]
OXYGEN	[illegible]	[illegible]	[illegible]
NITROGEN	[illegible]	BALANCE GAS	[illegible]

CALIBRATION STANDARDS USED IN ASSAY

Type	LOT ID	Cylinder No	Concentration	Expiration
NTRM 81674	01079404	CC15486	7.08 +/- 0.08 % CO2/N2	04/14/01
NTRM 82659	02109415	CC15268	20.70 +/- 0.23 % O2/N2	12/04/00

ANALYTICAL INSTRUMENTS USED IN ASSAY

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Rosemount/880A	NonDispersive Infrared	02/18/00
Rosemount/755R	Paramagnetic	02/18/00

QA Approved A Lowe

BOC GASES

Assay Laboratory
BOC GASES
2009 Bellaire Avenue
Royal Oak,MI 48067
(248) 399 9150

CERTIFICATE OF ANALYSIS
EPA Protocol Gas

CUSTOMER
BOC DALLAS TX NORTH
2515 JOE FIELD RD
DALLAS, TX 752294602

CUSTOMER PO NO: CUBIX C9006

Previous Certification Date(s):

CYLINDER NO : CC1856
EXPIRATION DATE : 01/04/03
CERTIFICATION DATE : 01/05/00
CYLINDER PRESSURE : 2000 psig
PRODUCT ID NO : 03000059
LOT NUMBER : 367596

ANALYTICAL INFORMATION

This calibration standard has been certified per the 1997 EPA Traceability Protocol, Document EPA-600/97/121, Using Procedure G1 All Values certified to be +/-1% NIST Traceable.

Do Not Use This Cylinder below 150 psig, i.e. 1.0 Megapascal

Analytical Results

Components	Requested Mixture	Certified Concentration	Analytical Uncertainty	Assay Dates
CARBON DIOXIDE	4.00 %	4.03 %	+/-1.00% NIST Traceable	01/04/00
OXYGEN	20.90 %	20.90 %		
NITROGEN	BALANCE GAS			

CALIBRATION STANDARDS USED IN ASSAY

Type	LOT ID	Cylinder No	Concentration	Expiration
NTRM 81674	95031213	CC15192	7.06 +/- 0.08 % CO2/N2	04/12/01
NTRM 82059	95030903	CC15262	20.70 +/- 0.23 % O2/N2	12/04/00

ANALYTICAL INSTRUMENTS USED IN ASSAY

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Rosemount 880A L3 1000331	NonDispersive Infrared	01/04/00
Rosemount 755R L8 1000314	Paramagnetic	01/03/00

Procedure G2:O2

QA Approved

Dry Gas Meter Calibration		Date	4/20/2000
Austin Laboratory		Technician	KRH

Reference Meter		Working Meter	
Manufacturer	American Singer	Manufacturer	Equimeter
Meter No.	P164240	Meter No.	1348739
Previous Calibration Date	3/9/1999	Previous Calibration Date	Rebuilt
Calibration Factor	1.012	Previous Calibration Factor	NA
Units of Measure	ft3	Units of Measure	ft3
Run 1			
Start Time			0:00
Stop Time			0:00
Run Time (minutes)	29	Run Time (minutes)	29
Start Temperature °F	75	Start Temperature °F	82
Stop Temperature (°F)	76	Stop Temperature (°F)	88
Average Temperature (°F)	75.5	Average Temperature (°F)	85
Start Meter Reading (ft3)	0.00	Start Meter Reading (ft3)	825.308
Stop Meter Reading (ft3)	16.462	Stop Meter Reading (ft3)	842.33
Net Volume (ft3)	16.656	Net Volume (ft3)	17.022
Meter Rate (ft3/minute)	0.57435	Meter Rate (ft3/minute)	0.58697
Corrected Volume (ft3 @ STP)	16.174	Corrected Volume (ft3 @ STP)	16.241
Calculated Meter Factor	0.9958724		
Run 2			
Start Time			
Stop Time			
Run Time (minutes)	17	Run Time (minutes)	17
Start Temperature °F	76	Start Temperature °F	87
Stop Temperature (°F)	78	Stop Temperature (°F)	92
Average Temperature (°F)	77	Average Temperature (°F)	89.5
Start Meter Reading (ft3)	0.000	Start Meter Reading (ft3)	842.33
Stop Meter Reading (ft3)	12.81	Stop Meter Reading (ft3)	855.746
Net Volume (ft3)	12.961	Net Volume (ft3)	13.416
Meter Rate (ft3/minute)	0.7624	Meter Rate (ft3/minute)	0.7892
Corrected Volume (ft3 @ STP)	12.551	Corrected Volume (ft3 @ STP)	12.696
Calculated Meter Factor	0.9885853		
Run 3			
Start Time			
Stop Time			
Run Time (minutes)	22	Run Time (minutes)	22
Start Temperature °F	78	Start Temperature °F	92
Stop Temperature (°F)	78	Stop Temperature (°F)	98
Average Temperature (°F)	78	Average Temperature (°F)	95
Start Meter Reading (ft3)	0.000	Start Meter Reading (ft3)	855.746
Stop Meter Reading (ft3)	17.844	Stop Meter Reading (ft3)	874.504
Net Volume (ft3)	18.055	Net Volume (ft3)	18.758
Meter Rate (ft3/minute)	0.821	Meter Rate (ft3/minute)	0.852636364
Corrected Volume (ft3 @ STP)	17.451	Corrected Volume (ft3 @ STP)	17.575
Calculated Meter Factor	0.9929127		
AVERAGE DGM FACTOR	0.992457		

Pitot Tube Calibration Sheet

Date: 5/5/1999
Technician: I MM
Calibration pitot tube
Type: std
Size (OD): 1/4"
ID number: 450
Cp (std): 0.99
S-Type pitot tube
Size (OD): 1/4"
Length (in) 36
ID Number: 301

A-Side Calibration			
Δp std in H2O	**Δp s in H2O**	**Cp(s)**	**DEV**
0.270	0.375	0.840	0.006
0.270	0.375	0.840	0.006
0.273	0.370	0.850	0.005
0.510	0.705	0.842	0.004
0.510	0.704	0.843	0.003
0.508	0.702	0.842	0.003
0.590	0.800	0.850	0.005
0.590	0.799	0.851	0.005
0.592	0.799	0.852	0.007
	A-Side Averages	**0.846**	**0.005**

B-Side Calibration			
Δp std in H2O	**Δp s in H2O**	**Cp(s)**	**DEV**
0.274	0.369	0.853	0.005
0.270	0.368	0.848	0.000
0.270	0.369	0.847	0.002
0.504	0.690	0.846	0.002
0.502	0.691	0.844	0.005
0.502	0.694	0.842	0.006
0.592	0.795	0.854	0.006
0.587	0.794	0.851	0.003
0.585	0.794	0.850	0.001
	B-Side Averages	**0.848**	**0.003**

Average DEV =	0.004	must be less ≤ 0.
Cp(s) from Side A - Cp(s) from Side B =	0.003	must be less ≤ 0.

Calibrations Performed by Cubix Corporation, Austin, Texas

CO ID: 09452 AIRDATA MULTIMETER/FLOWMETER CERTIFICATE OF CALIBRATION S/N: M00013

Customer: CUBIX Corporation State: TX Order #: 000066

Model #: 850-1.0Z PO #: Calibration Due Date: QA Code: 10CFR21:

Procedure used: Calibration Procedure for AirData Multimeters Revision: 05 Dated: 05/18/99

Pressure Standard: Heise #1 S/N: 41739/42449 Calibration Date: 11/25/98 Calibration Due Date: 11/2000 Test 1 Test 2 Test 3
Pressure Standard: Heise #3 S/N: 41738/42448 Calibration Date: 11/25/98 Calibration Due Date: 11/2000 Test 1 Test 2 Test 3
Pressure Standard: Heise #5 S/N: 41740/42450 Calibration Date: 11/25/98 Calibration Due Date: 11/2000 Test 1 Test 2 Test 3
Heise used for 0.05 in wc Differential Pressure Set Point Rated Accuracy: 0.07% fs (0.000175 in wc) Uncertainty: 0.00035

Pressure Standard: AirData Multimeter S/N: M99420 Calibration Date: 09/18/99 Calibration Due Date: 09/2000 Test 1 Test 2 Test 3
Pressure Standard: AirData Multimeter S/N: M96455 Calibration Date: 09/18/99 Calibration Due Date: 09/2000 Test 1 Test 2 Test 3
Pressure Standard: AirData Multimeter S/N: M96100 Calibration Date: 09/18/99 Calibration Due Date: 09/2000 Test 1 Test 2 Test 3
Rated Accuracy: Absolute Pressure ± 0.5 % ± .02 in Hg; Differential Pressure: ± 0.5 % ± 0.0001 in wc Uncertainty: As stated at test points.

Temperature Standards: Rated Accuracy: Thermometer .023° F / Thermistor .018° F Total Temperature System Uncertainty: 0.039° F
Thermometer S/N 92143/Thermistor S/N 871513 Calibration Dates: 02/24/99;02/01/99 Cal Due Date: 02/2001 Set Point: 35° F 95° F 155° F
Thermometer S/N 8A089/Thermistor S/N 881708 Calibration Dates: 10/09/98;10/28/98 Cal Due Date: 10/2000 Set Point: 35° F 95° F 155° F
Thermometer S/N 92142/Thermistor S/N 850104 Calibration Dates: 02/16/99;02/01/99 Cal Due Date: 02/2001 Set Point: 35° F 95° F 155° F

Vel/Flow Standard: AirData Multimeter S/N: M99420 Calibration Date: 09/18/99 Calibration Due Date: 09/2000 Test 1 Test 2 Test 3
Vel/Flow Standard: AirData Multimeter S/N: M96455 Calibration Date: 09/18/99 Calibration Due Date: 09/2000 Test 1 Test 2 Test 3
Vel/Flow Standard: AirData Multimeter S/N: M96100 Calibration Date: 09/18/99 Calibration Due Date: 09/2000 Test 1 Test 2 Test 3
Rated Accuracy: Velocity ± 2.0 % ± 3 fpm; Flow ± 2.0 % ± 3 cfm Uncertainty: See Uncertainty Table

METER ACCURACY TESTS

Flange Test By DJ
Date 1-11-00 Rh 27
Ambient Temperature 71
Within spec YES NO

_____ Test By _____
Date _____ Rh _____
Ambient Temperature _____
Within spec YES NO

_____ Test By _____
Date _____ Rh _____
Ambient Temperature _____
Within spec YES NO

TEMPERATURE TEST (° F) TOLERANCE = ± 0.2° F

Approx Set Point	Master Meter	Test Meter	Diff	Master Meter	Test Meter	Diff	Master Meter	Test Meter	Diff
35°	35.0	35.1	+.1						
95°	95.0	95.1	+.1						
155°	155.0	155.0	0						

ABSOLUTE PRESSURE TEST (In Hg) TOLERANCE = ± 2.0 % ± .1 in Hg

Approx Set Point	Master Meter	Test Meter	% Diff	Master Meter	Test Meter	% Diff	Master Meter	Test Meter	% Diff
14.0	14.09	14.1	.07						
28.4	28.63	28.8	.59						
40.0	40.68	40.9	.54						

DIFFERENTIAL PRESSURE TEST (in wc) TOLERANCE = ± 2.0 % ± 0.001 in wc

Approx Set Pt	Master Meter	Test Meter	% Diff	Master Meter	Test Meter	% Diff	Master Meter	Test Meter	% Diff
.0500	.0503	.0504	.20						
.1250	.1247	.1250	.24						
.2250	.2248	.2252	.18						
.2700	.2732	.2734	.07						
2.000	2.070	2.074	.19						
3.500	3.635	3.640	.14						
4.400	4.466	4.473	.16						
27.00	27.10	27.14	.15						
50.00	50.26	50.31	.10						
Overange	✓	✓							

Shortridge Instruments, Inc.
7855 E. Redfield Rd Scottsdale, AZ 85260

AIRDATA MULTIMETER/FLOWMETER CERTIFICATE OF CALIBRATION

S/N: M00013

Order #:

LOW VELOCITY/FLOW CONFIRMATION (AIRFOIL/FLOW MODE)
TEST METER TOLERANCE = ± 3.0% ± 7 FPM/CFM

Approx Set Point	Master Meter	Test Meter	Diff	Master Meter	Test Meter	Diff	Master Meter	Test Meter	Diff
100	137.2	132	-.2						
500	543.8	544	+.2						

ADM-870 and ADM-860 AirData Multimeters are read in AirFoil Mode. ADM-850 and CFM-88 meters are read in air flow.

UNCERTAINTY TABLE (All AirData Multimeter Calibration Standards)

Mode	Differential Pressure (in wc)								Absolute Pressure (in Hg)			Velocity/Flow	
Set Point	.1250	.2250	.2700	2.000	3.600	4.400	27.00	50.00	14.0	28.4	40.0	100.0	500.0
2 X U_{max}	< .00022	< .00023	< .00031	< .0005	< .0015	< .0023	< .006	< .007	< .02	< .02	< .02	< 3.99	< 1.82

All Uncertainties are expressed in expanded terms (twice the calculated uncertainty). Uncertainties shown for Low Velocity/Flow Confirmation represent Uncertainty of the Transfer Standard Meter exposed to the pressure source only.

NOTES:

This instrument has been calibrated using Calibration Standards which are traceable to NIST (National Institute of Standards and Technology). Quality Assurance Program and calibration procedures meet the requirements for 10CFR50 Appendix B; ANSI/N45.2; ANSI/NCSL Z540-1-1994; MIL-STD 45662A and manufacturers specifications. Calibration accuracy is certified when meters are used with properly functioning accessories only. This report shall not be reproduced, except in full, without the written approval of Shortridge Instruments, Inc. Results relate only to the item calibrated.

Calibration Technician(s): [signature]

Calibration Date: 1-11-2000

Calibration Approved by: [signature]

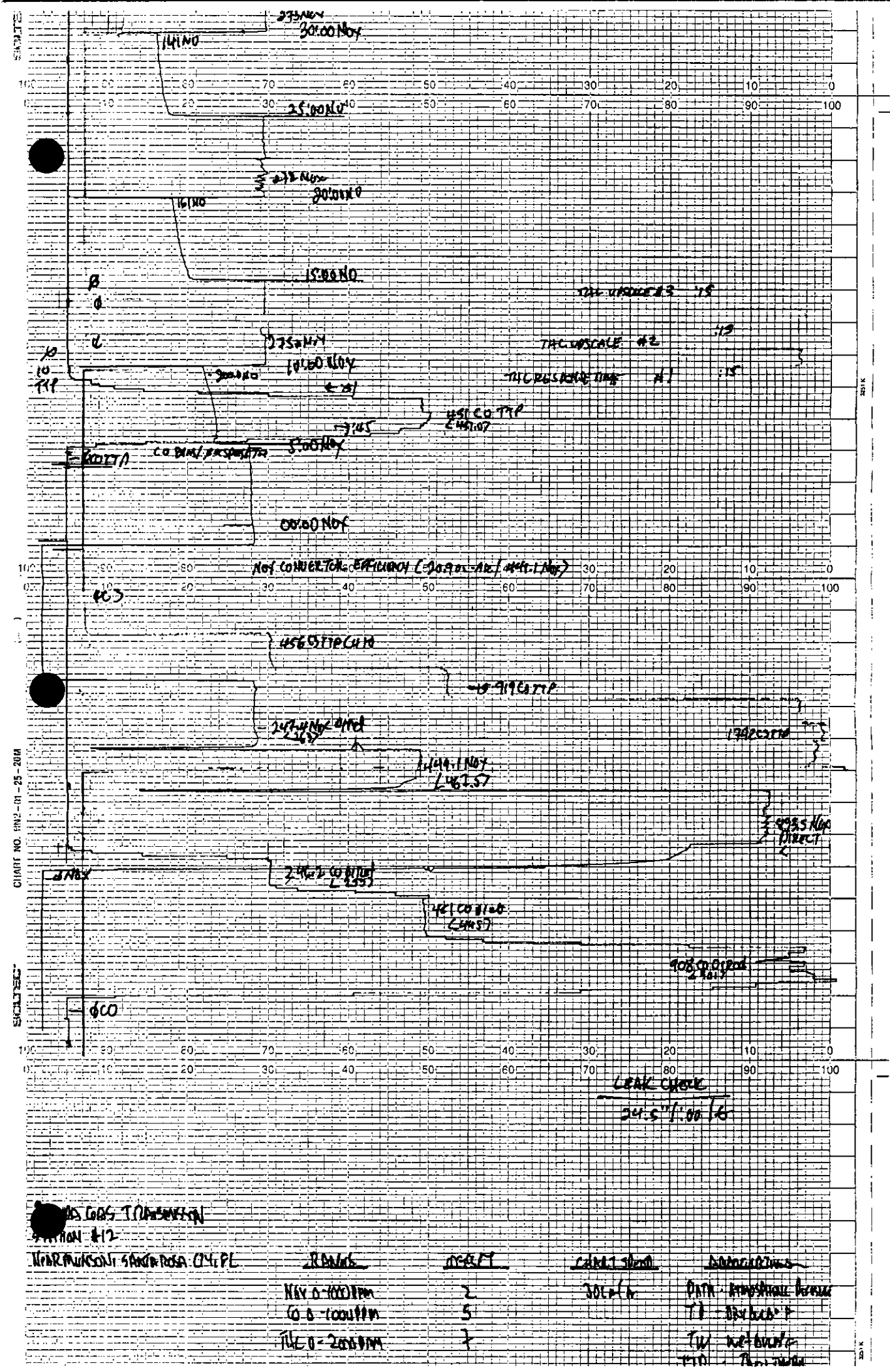
Title: Prod. Mgr.

Date: 1-11-2000

Shortridge Instruments, Inc.
7855 E. Redfield Rd Scottsdale, AZ 85260
(480) 991-6744 Fax (480) 443-1267

APPENDIX G:
STRIP CHART RECORDS

NO_X, CO, THC



RANGE	SCALE	CHART SPEED
NOx 0-100 ppm	2	30 cm/hr
CO 0-100 ppm	5	
THC 0-200 ppm	2	

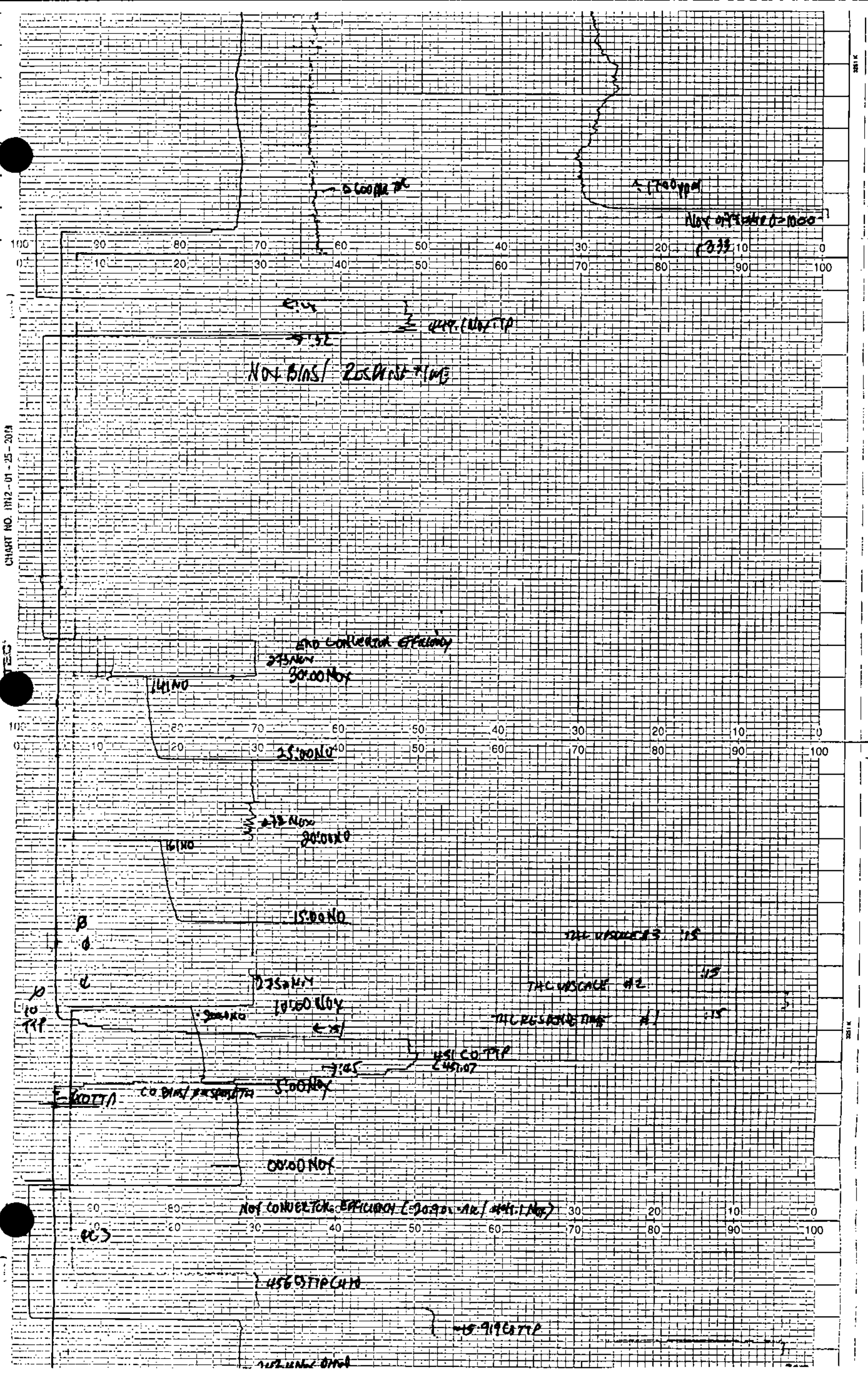


CHART NO.
NOx BIAS/ RESPONSE TIME
END CONVERTER EFFICIENCY
30.00 NOx
141 NO
25.00 NO
161 NO
15.00 NO
THC UPSCALE #3
THC UPSCALE #2
THC RESPONSE TIME #1
10.00 NOx
451 CO TTP
5.00 NOx
CO BIAS/ RESPONSE TIME
00.00 NOx
NOx CONVERTER EFFICIENCY

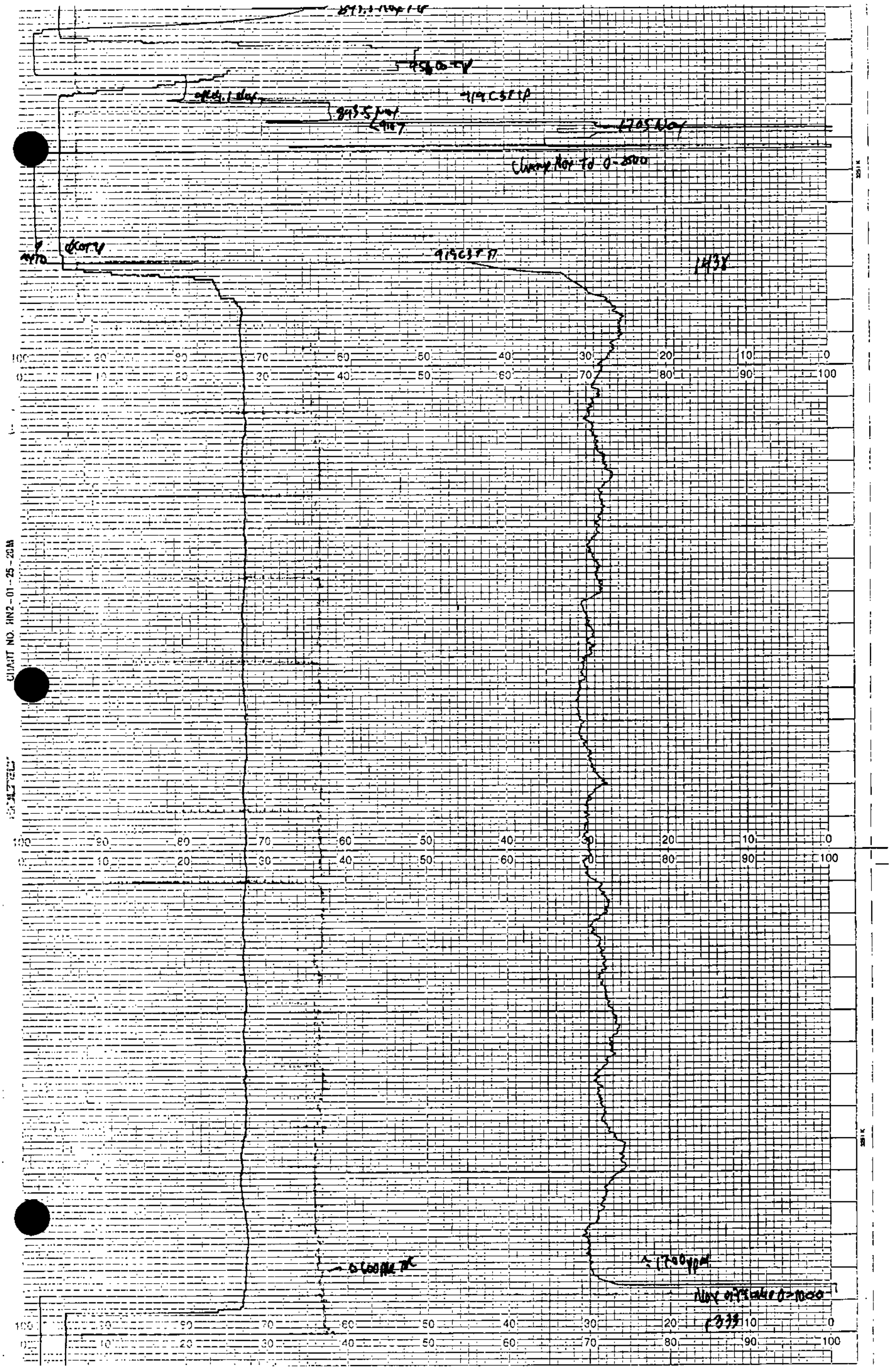


CHART NO. HN2-01-25-20M
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100

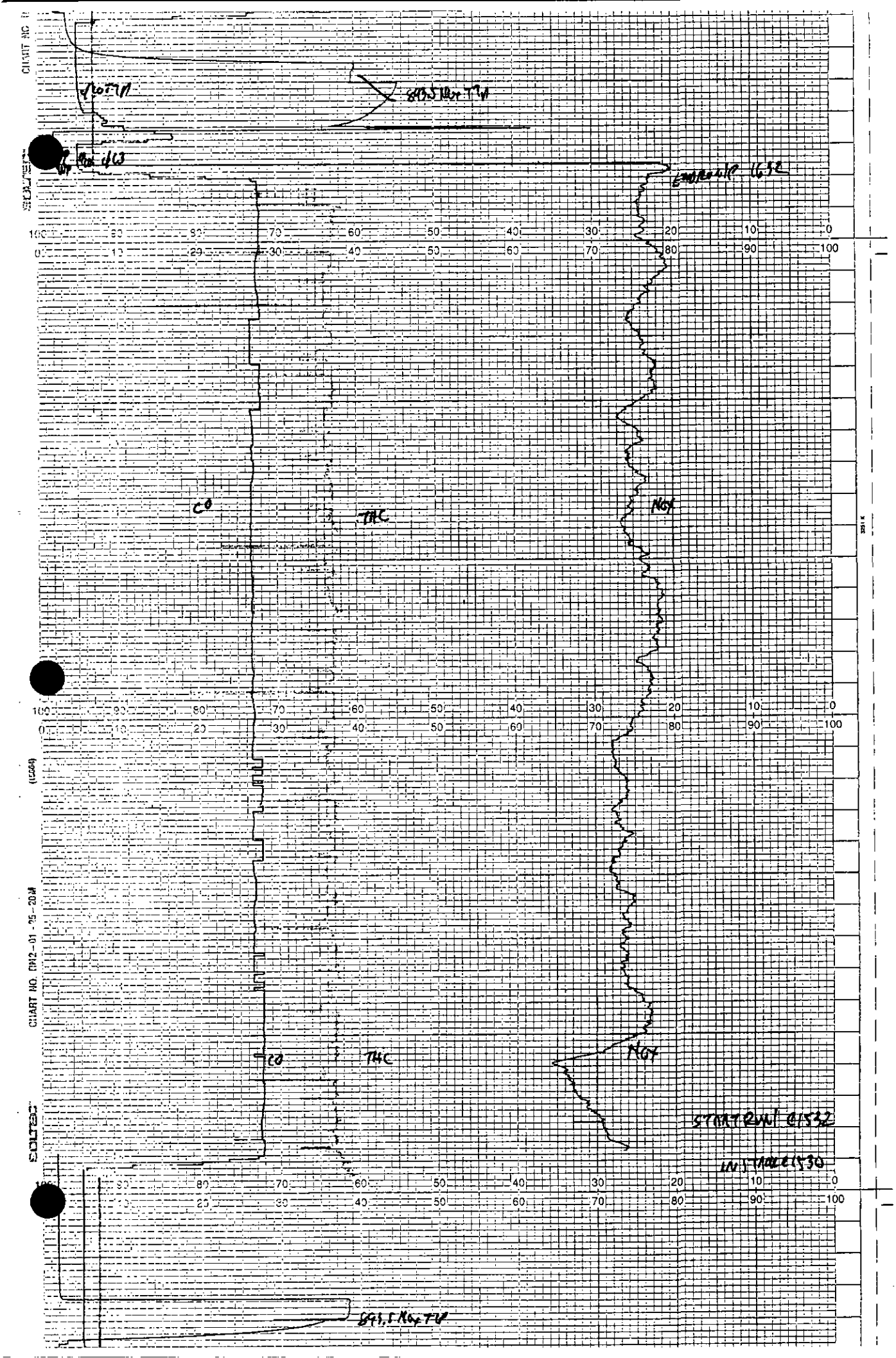
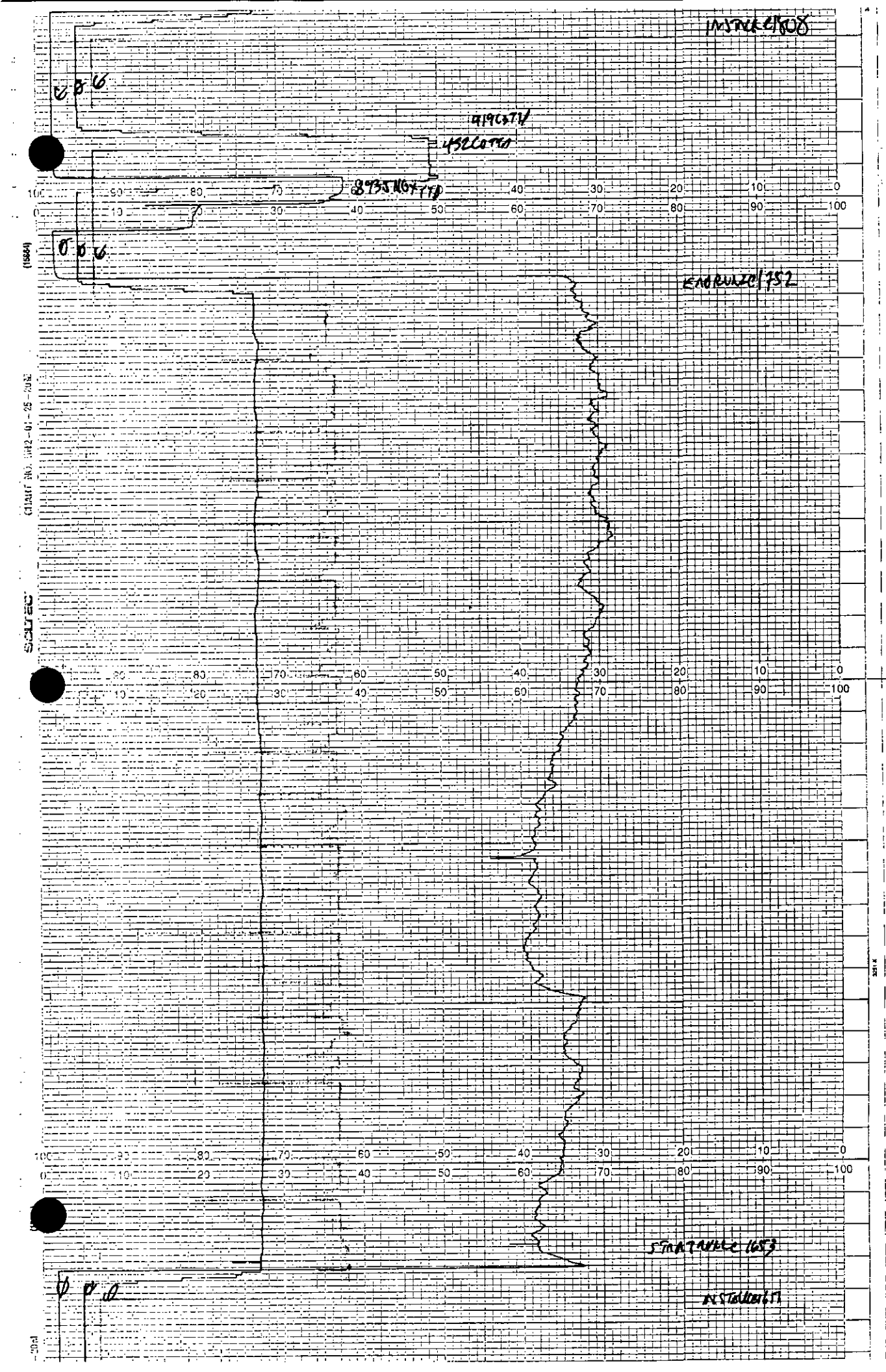
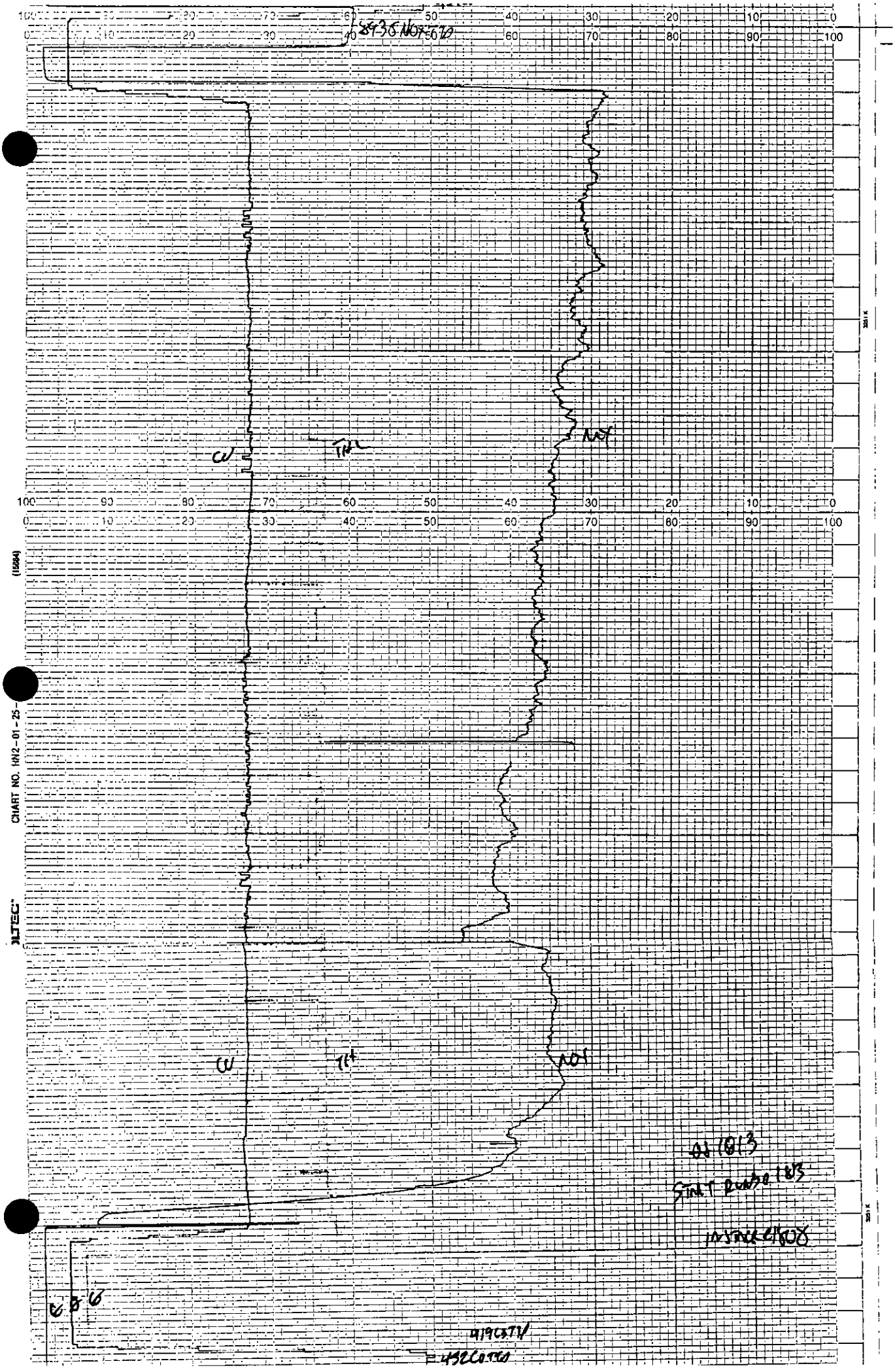
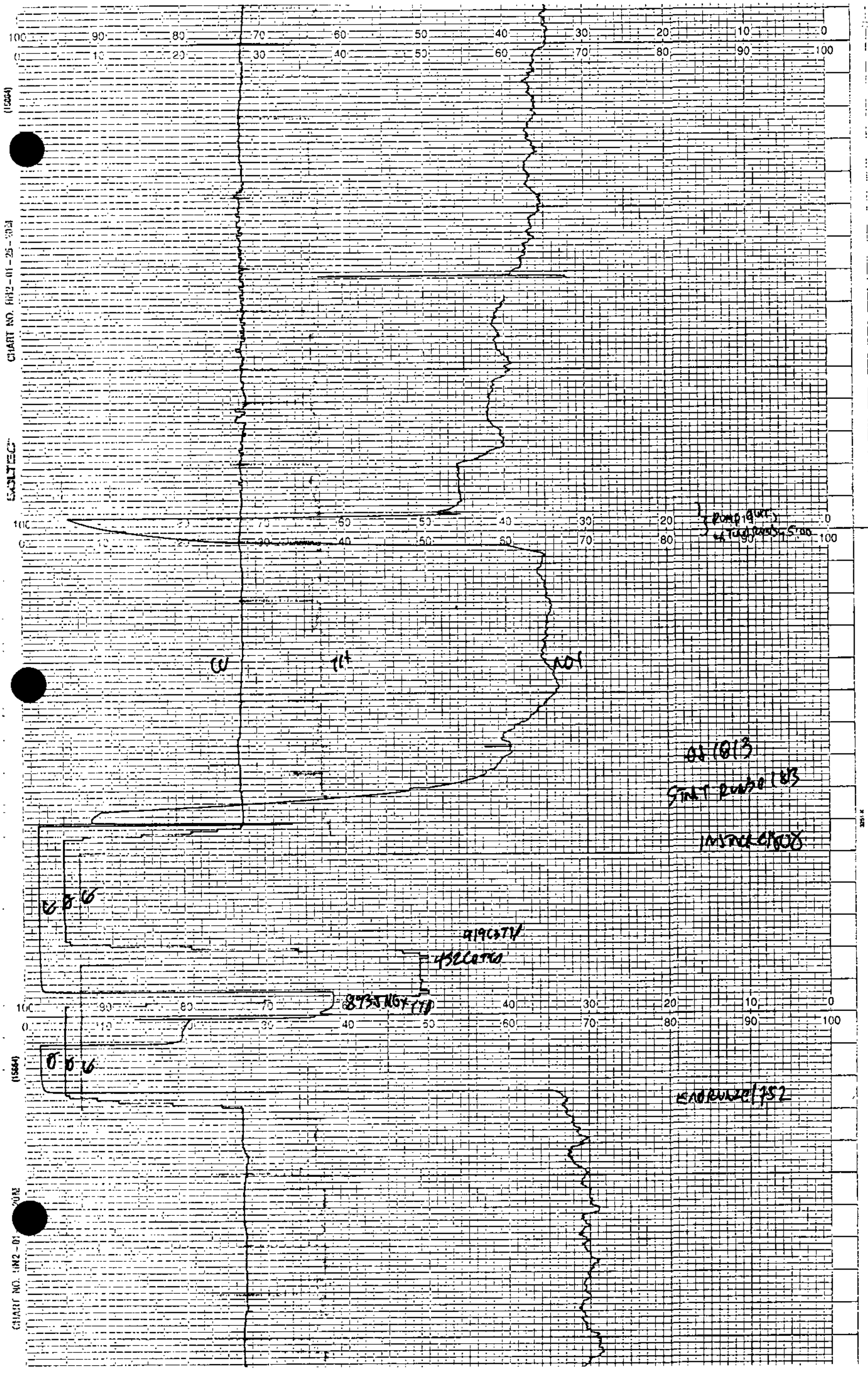


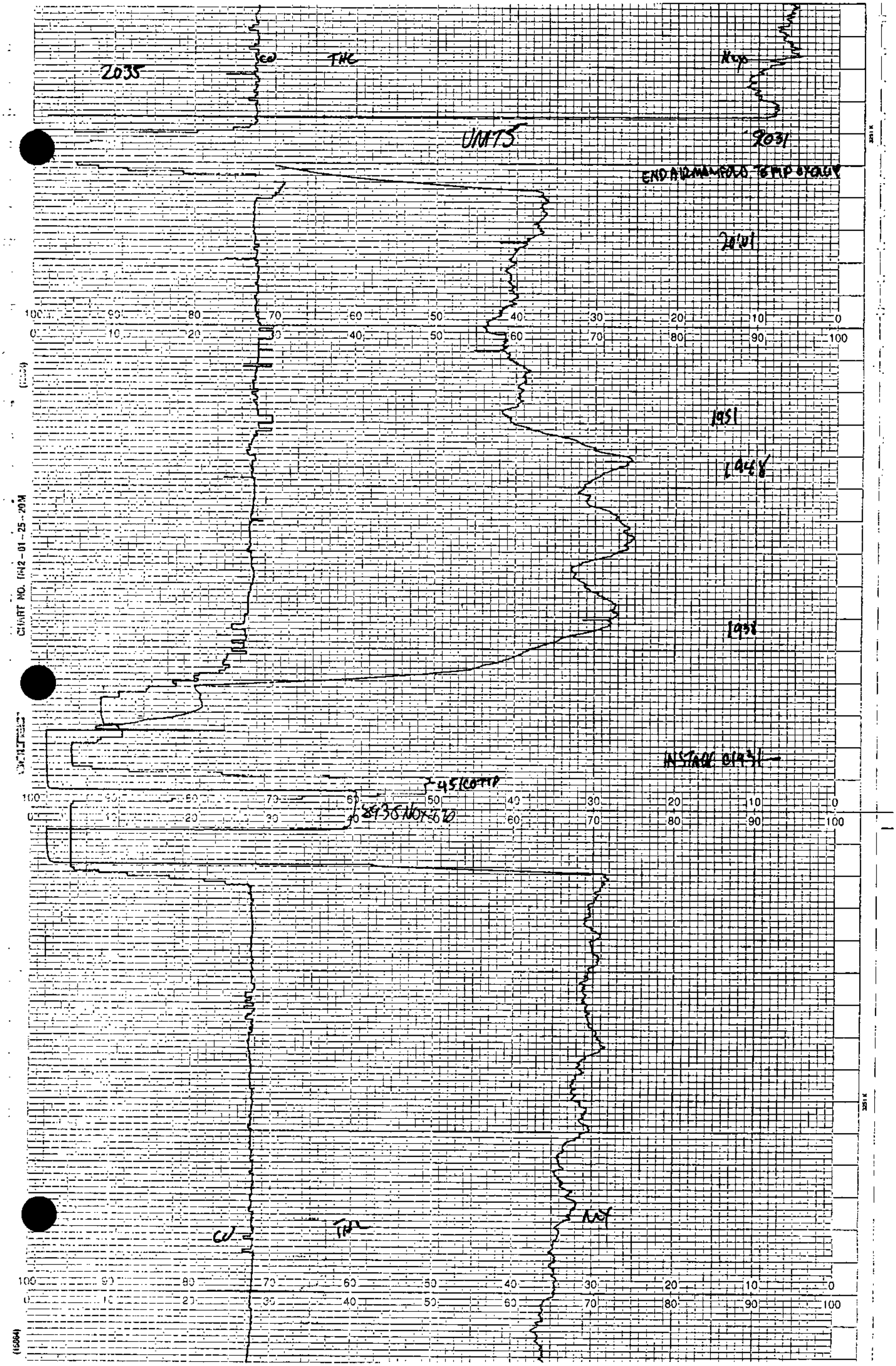
CHART NO.
SOLTEC
CHART NO. CR12-01-75-20M
(5564)
CO
THC
NOX
CO
THC
NOX
START RUN 1532
INJ TIME 1530


INSTRUCTIONS
ENDURANCE 752
SMARTABLE 1653

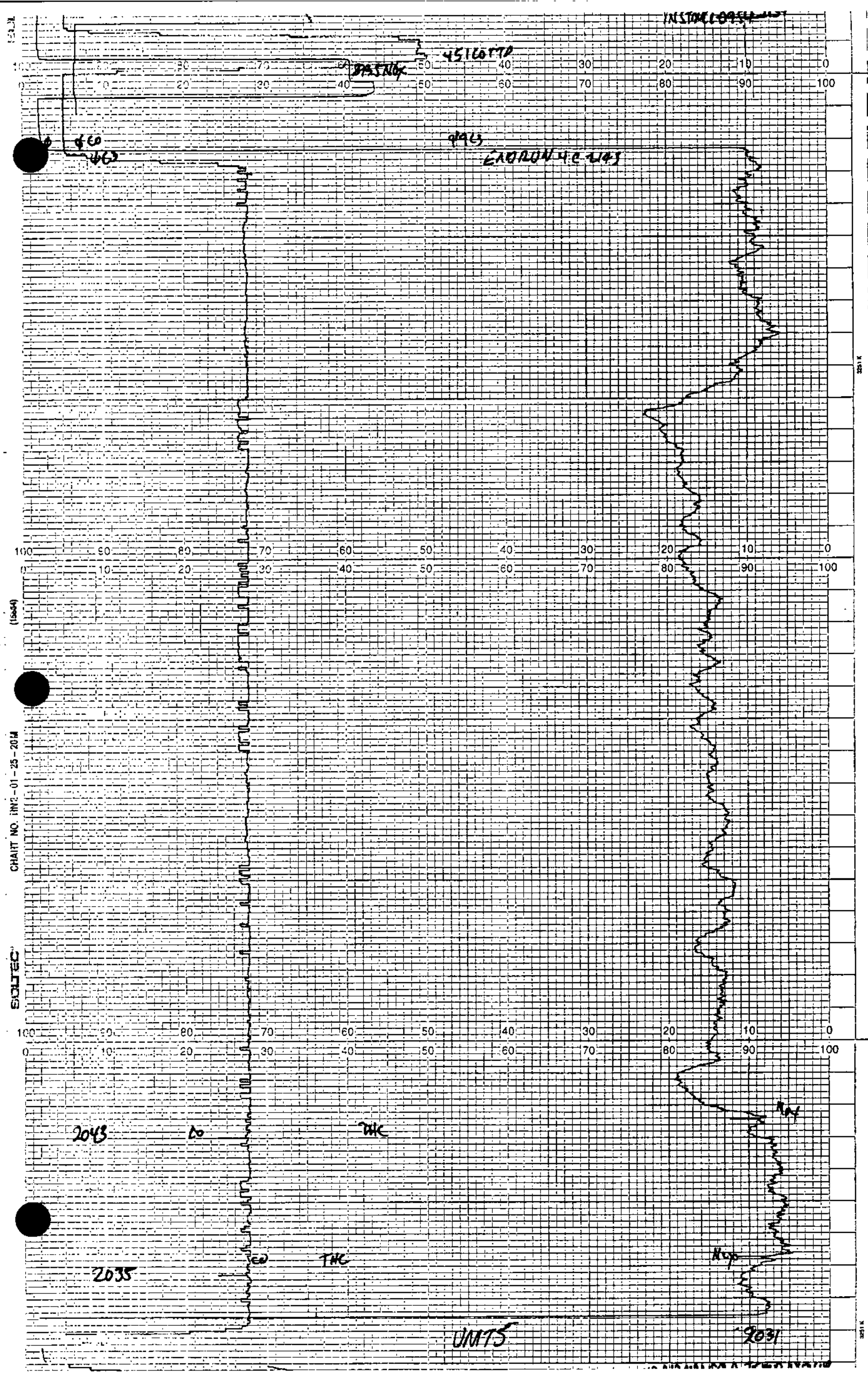

100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
CHART NO. HN2-01-25
(15684)
JLTEC



100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100



2035
CO
THC
NOx
UNITS
2031
1951
1948
1938
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
CO
THC
NOX



SOLTEC
CHART NO. 1N2-01-25-20M
2043
THC
2035
CO
THC
UNITS
2031

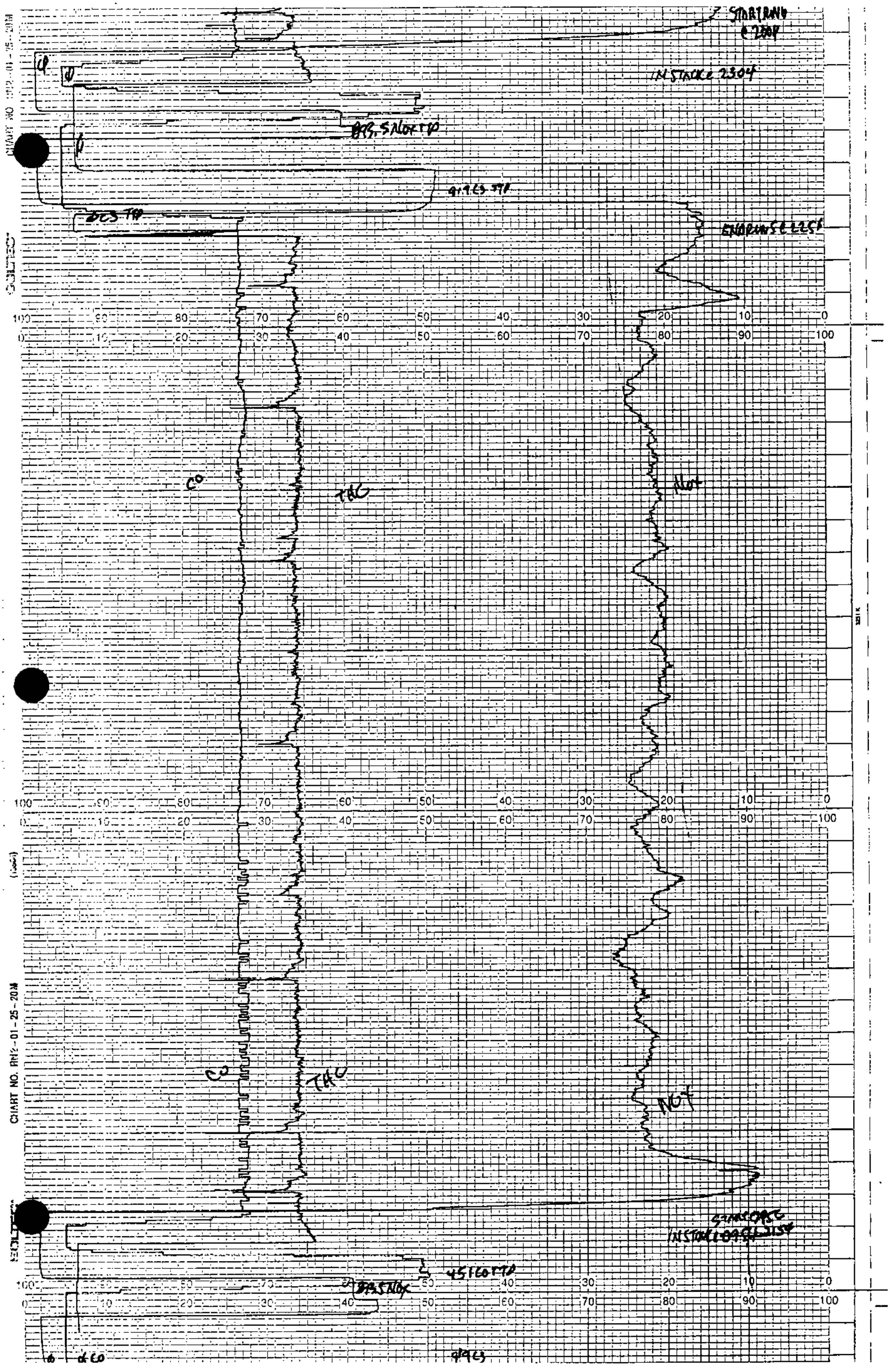
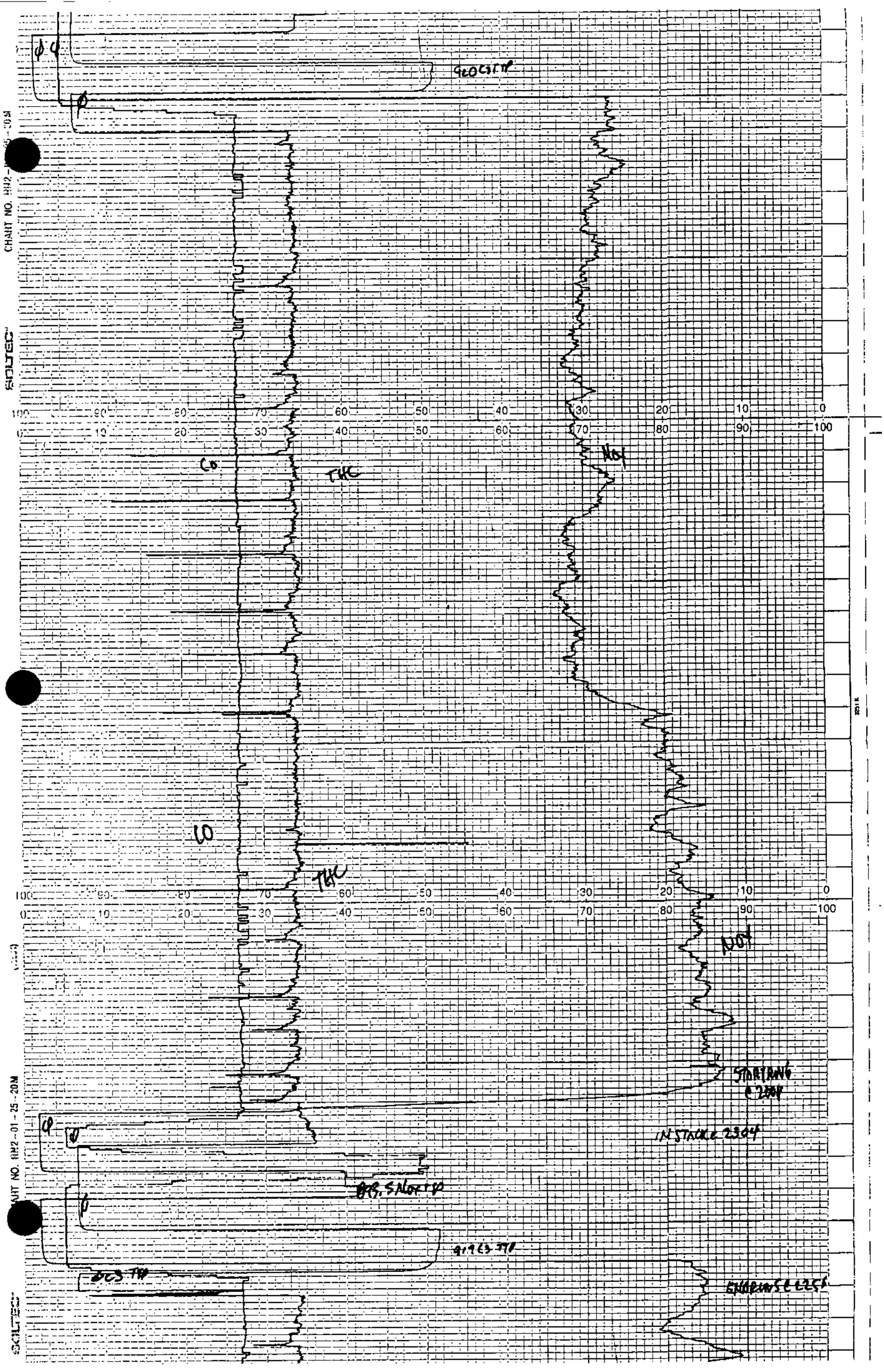


CHART NO. RN2-01-25-20M
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
INSTACK 2304
CO
THC
NOx


SOLTEC
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
CO
THC
NOx
STARTING @ 2304
INSTACK 2304

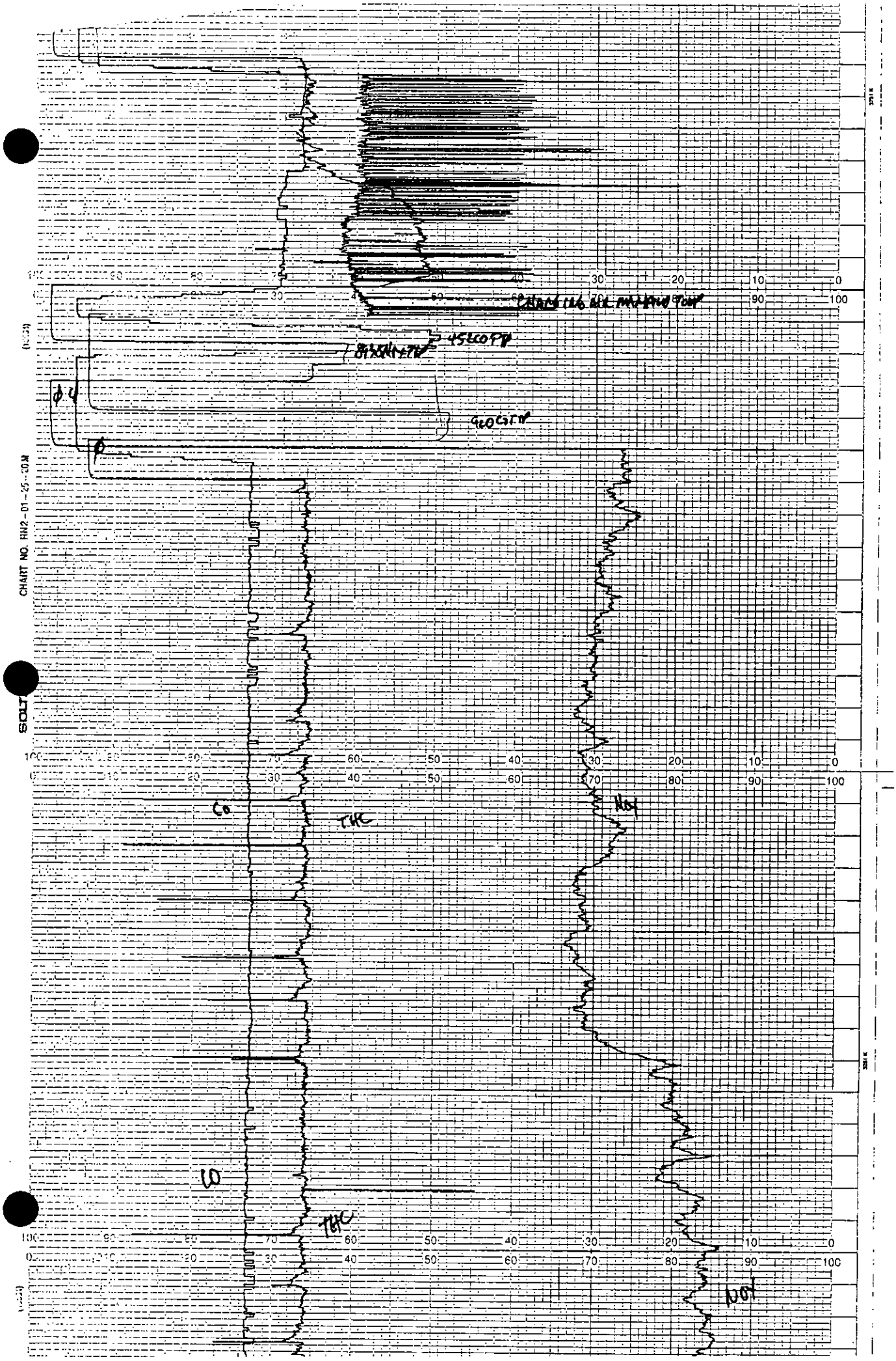
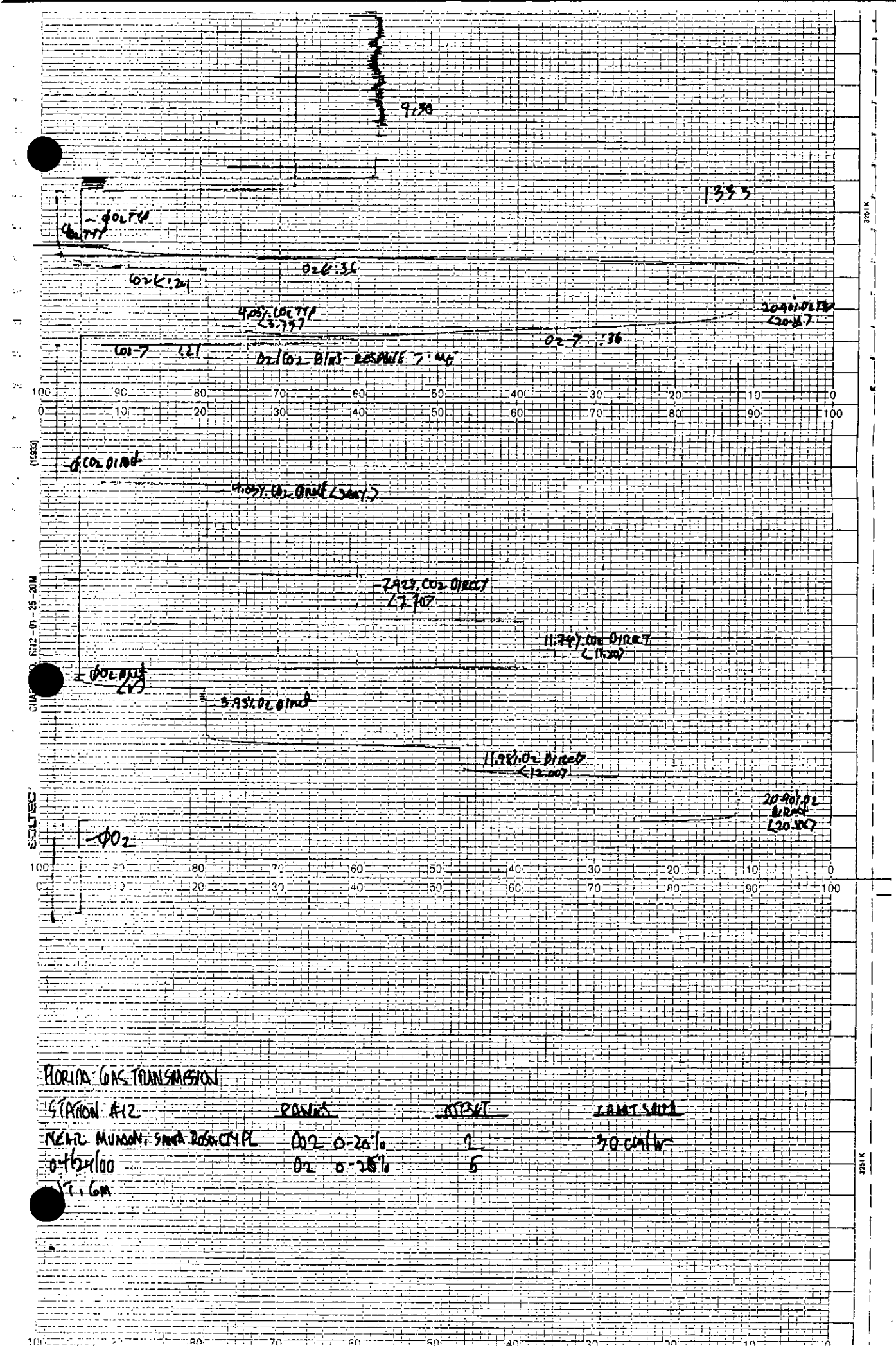


CHART NO. RH2-01-25-20M
SOLT
Co
THC
NOx
CO
THC
NOx

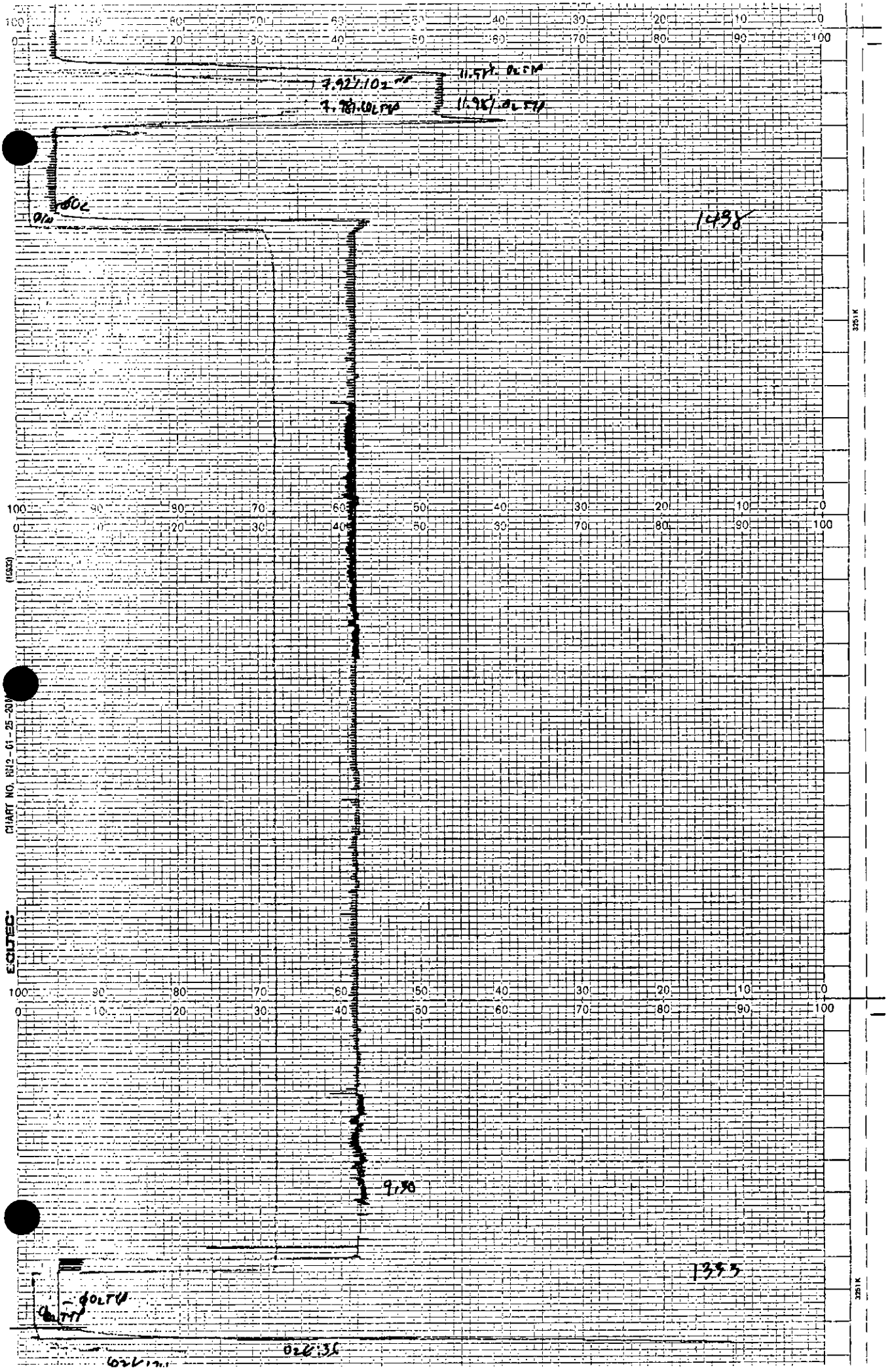
O_2 AND CO_2



FLORIDA GAS TRANSMISSION

STATION #12	RANGE	RESET	CHART SPEED
NEAR MUNSON, SANTA ROSA CTY FL	CO2 0-20%	2	30 cm/hr
0-1621100	O2 0-25%	5	

T: 6m


1438
9.50
1355
CHART NO. MP2-01-25-30
EQUITEC

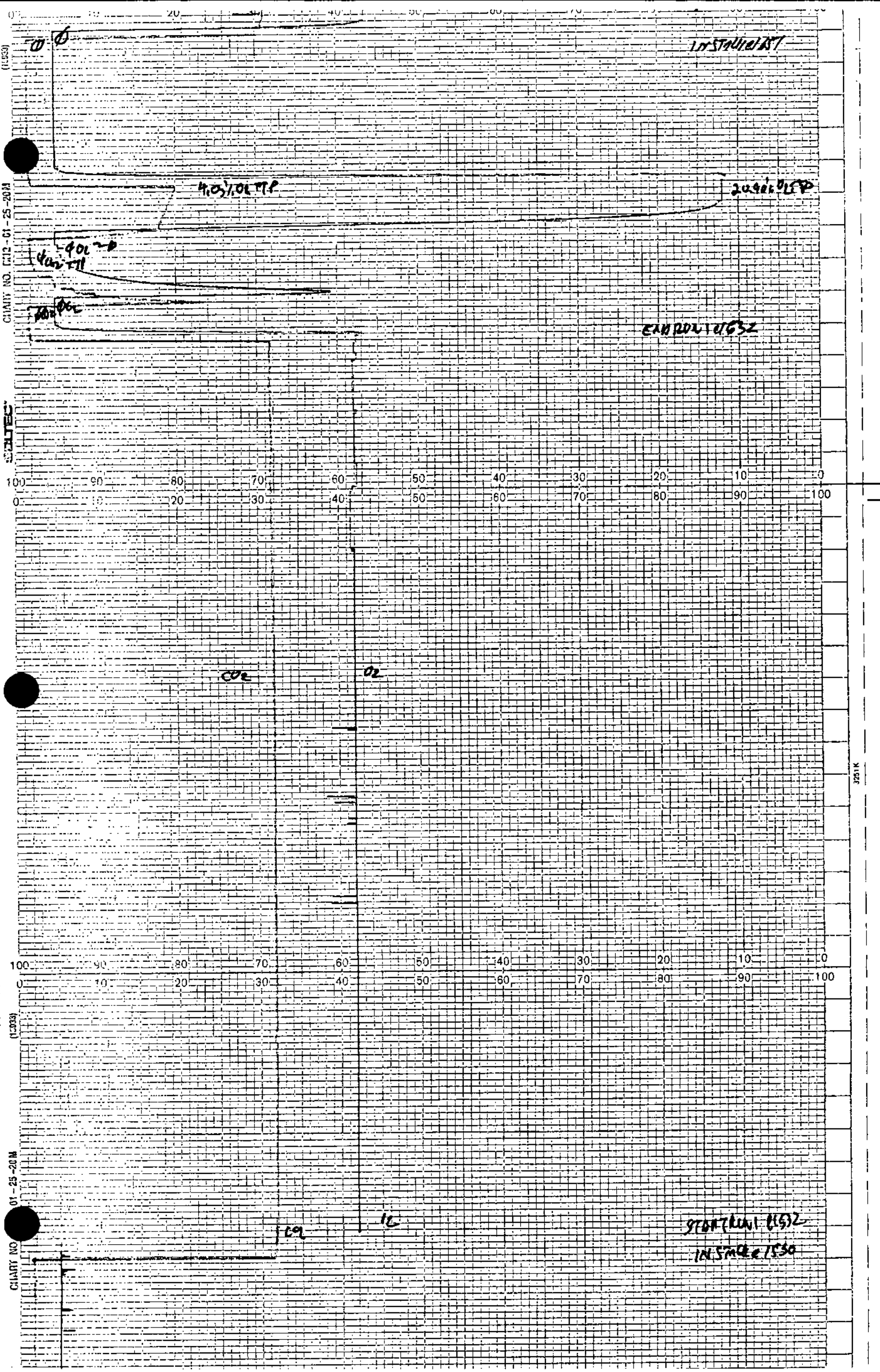
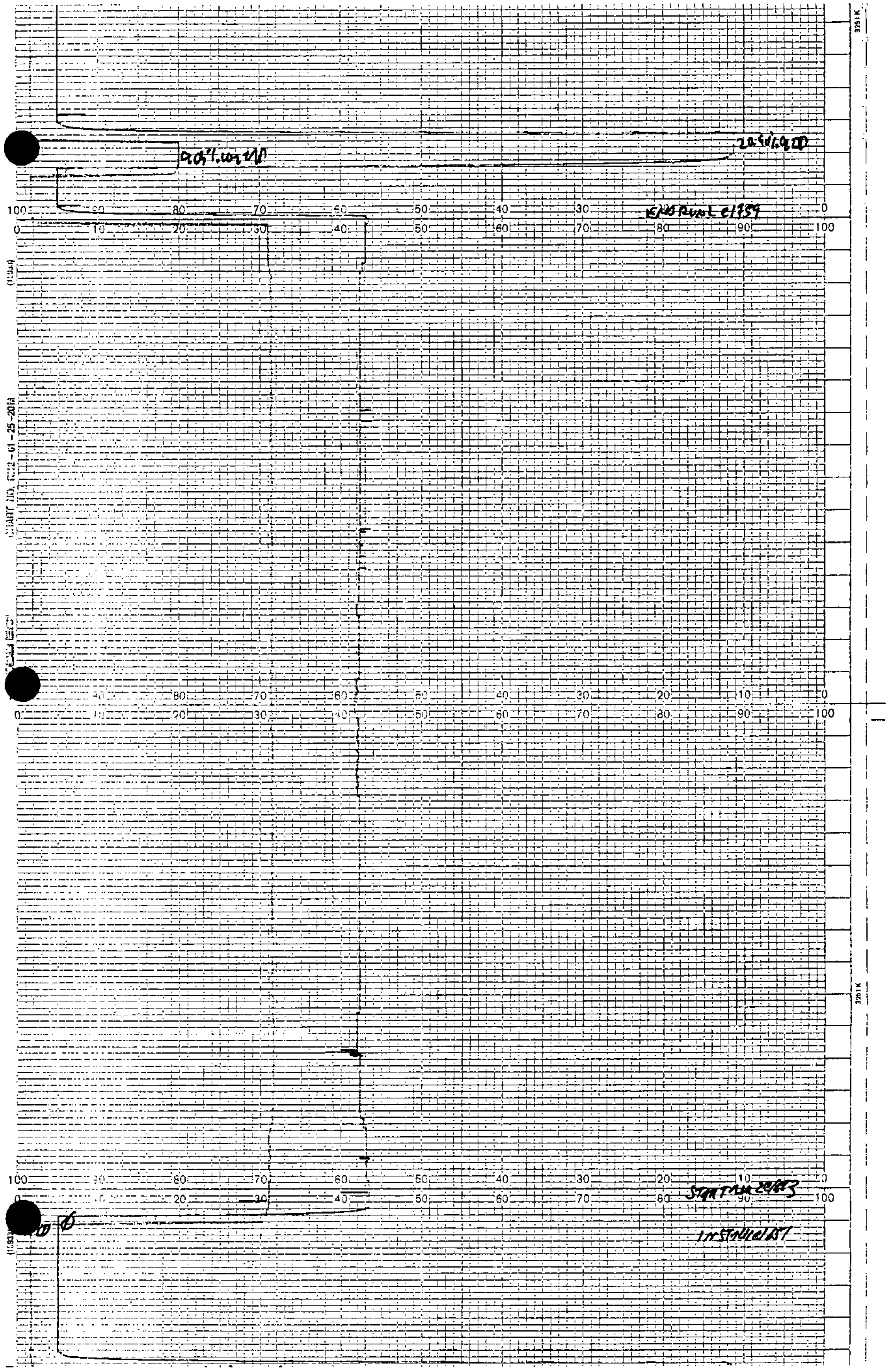


CHART NO. C12-01-25-20M
(1033)
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
CO2
O2
3251K


100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
3251K

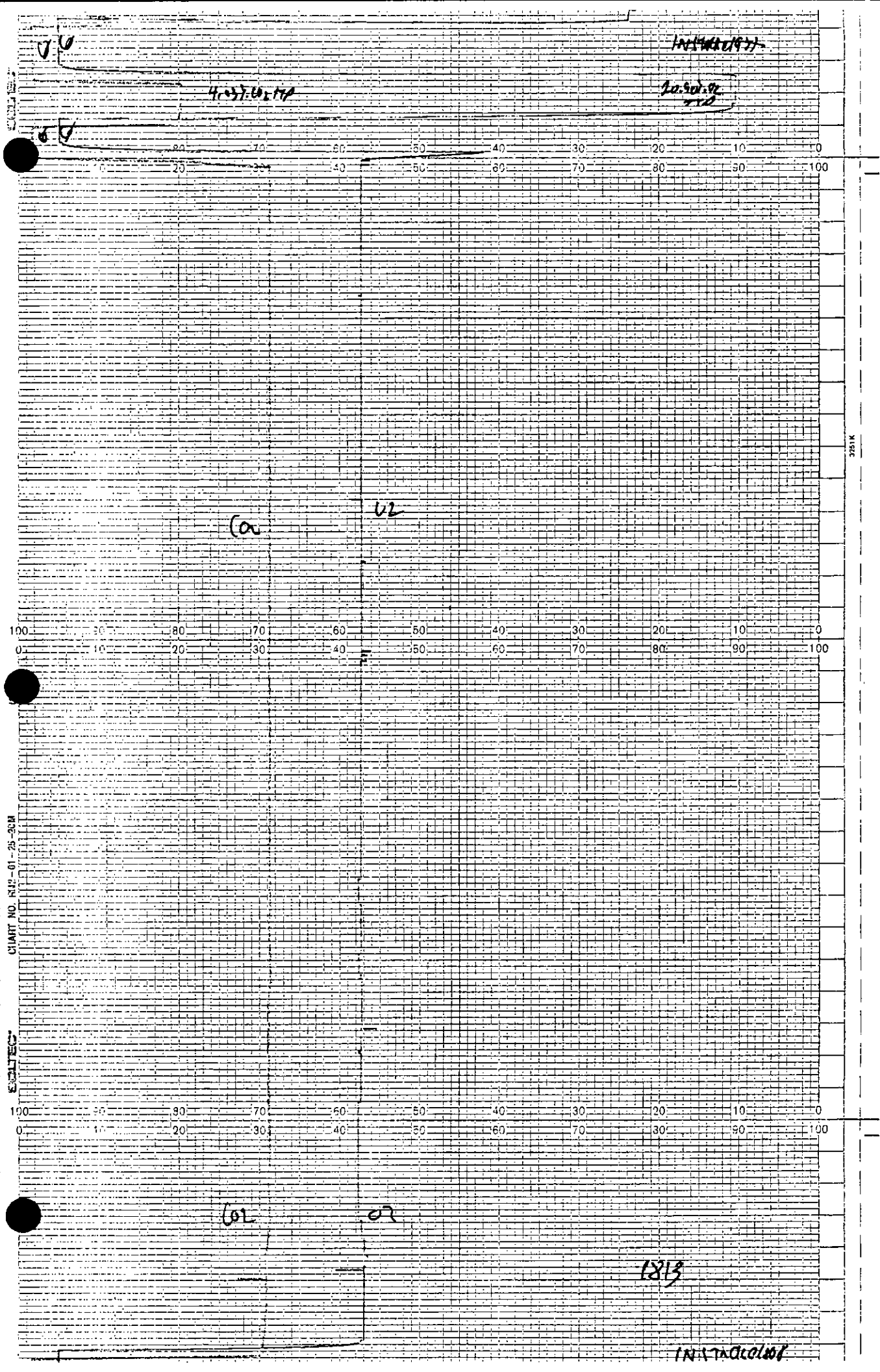
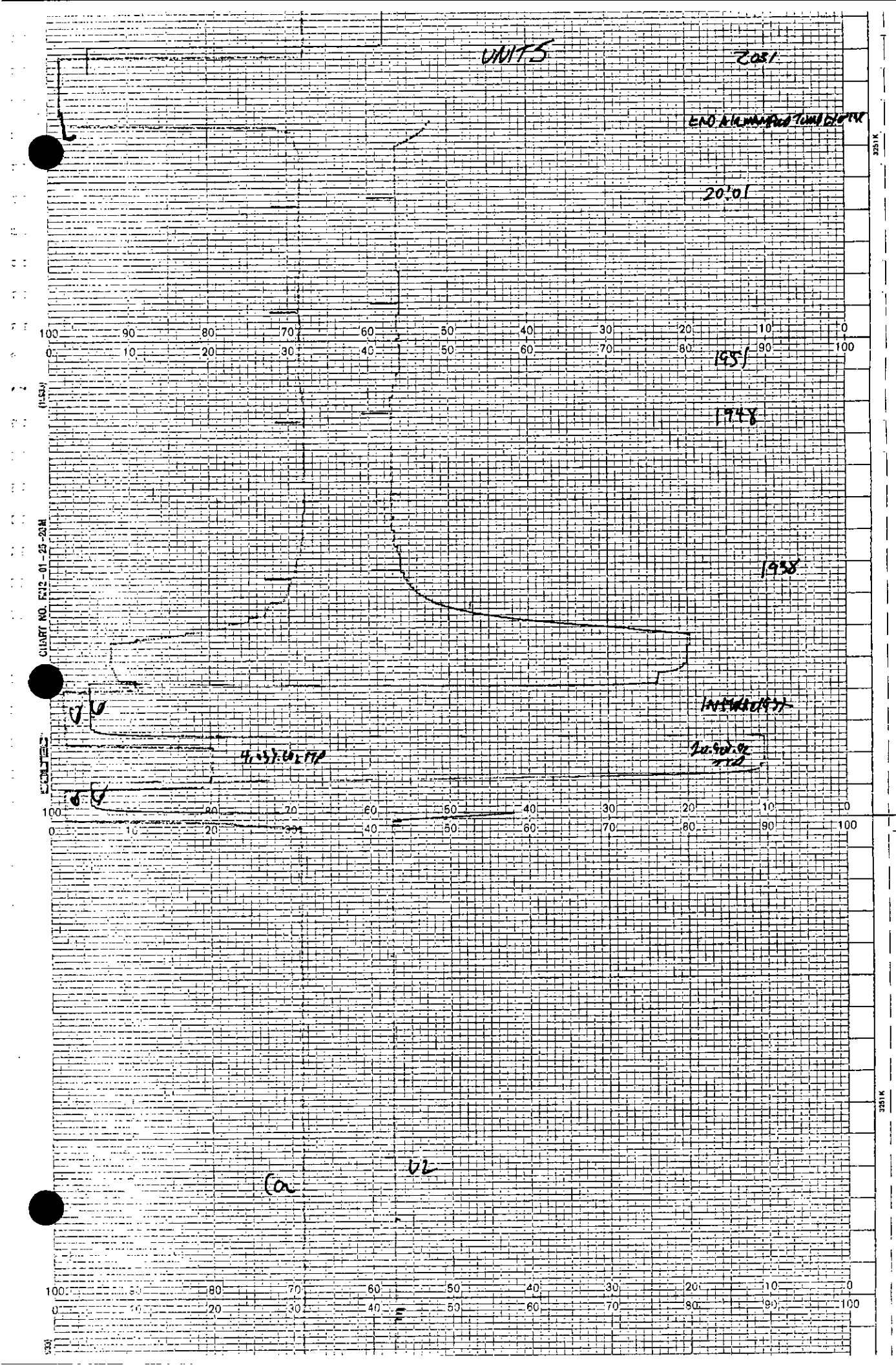
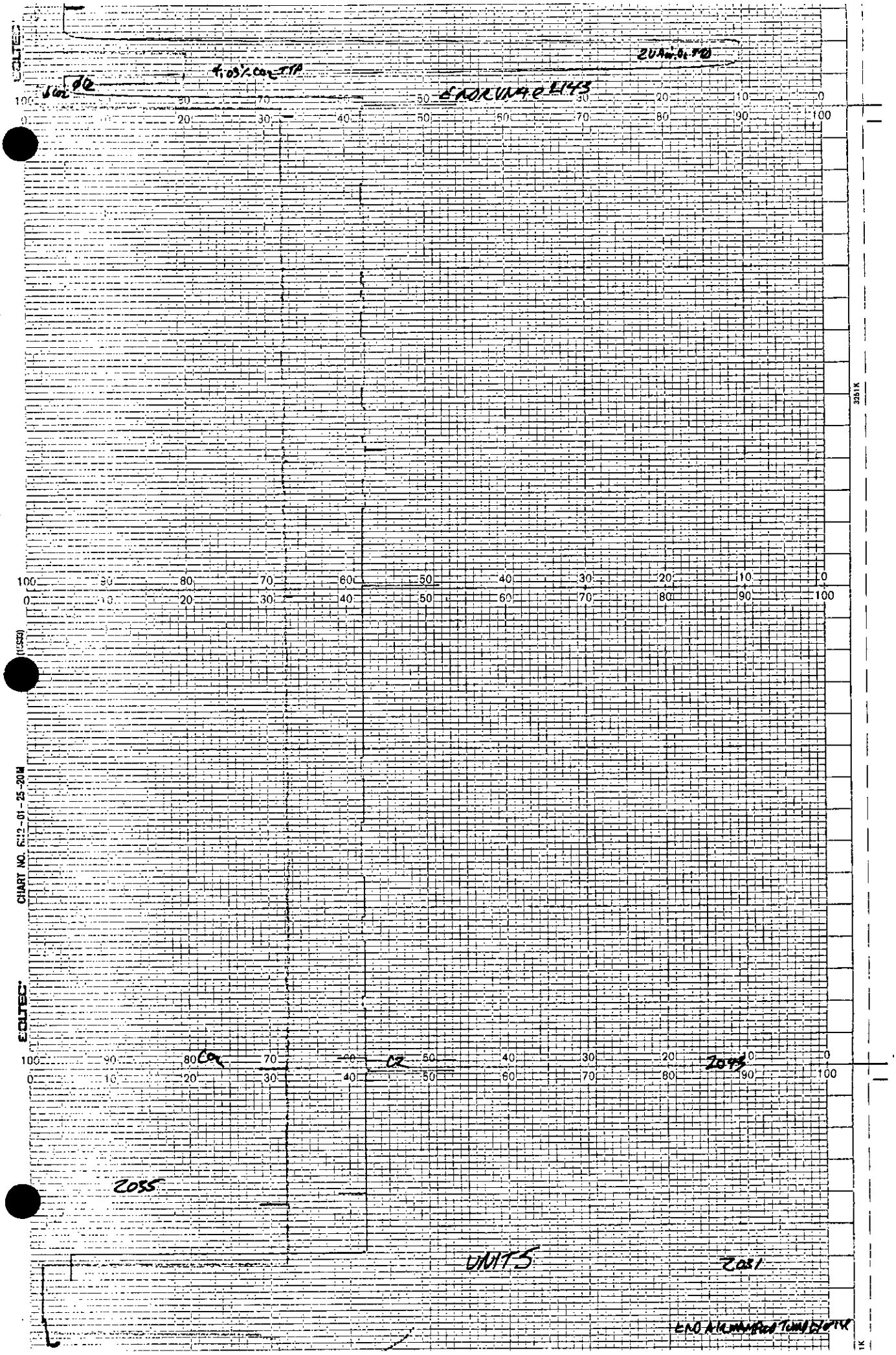
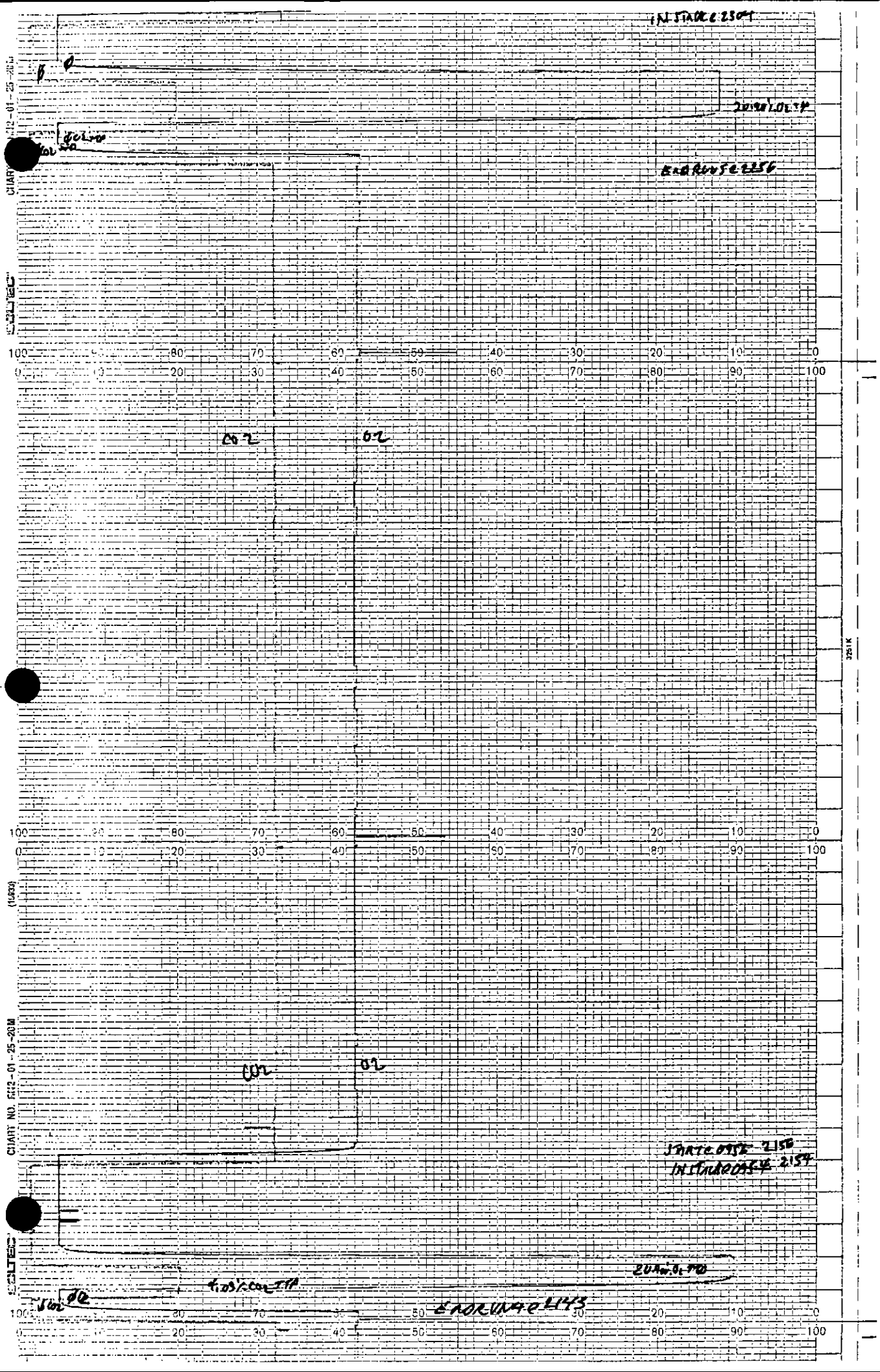
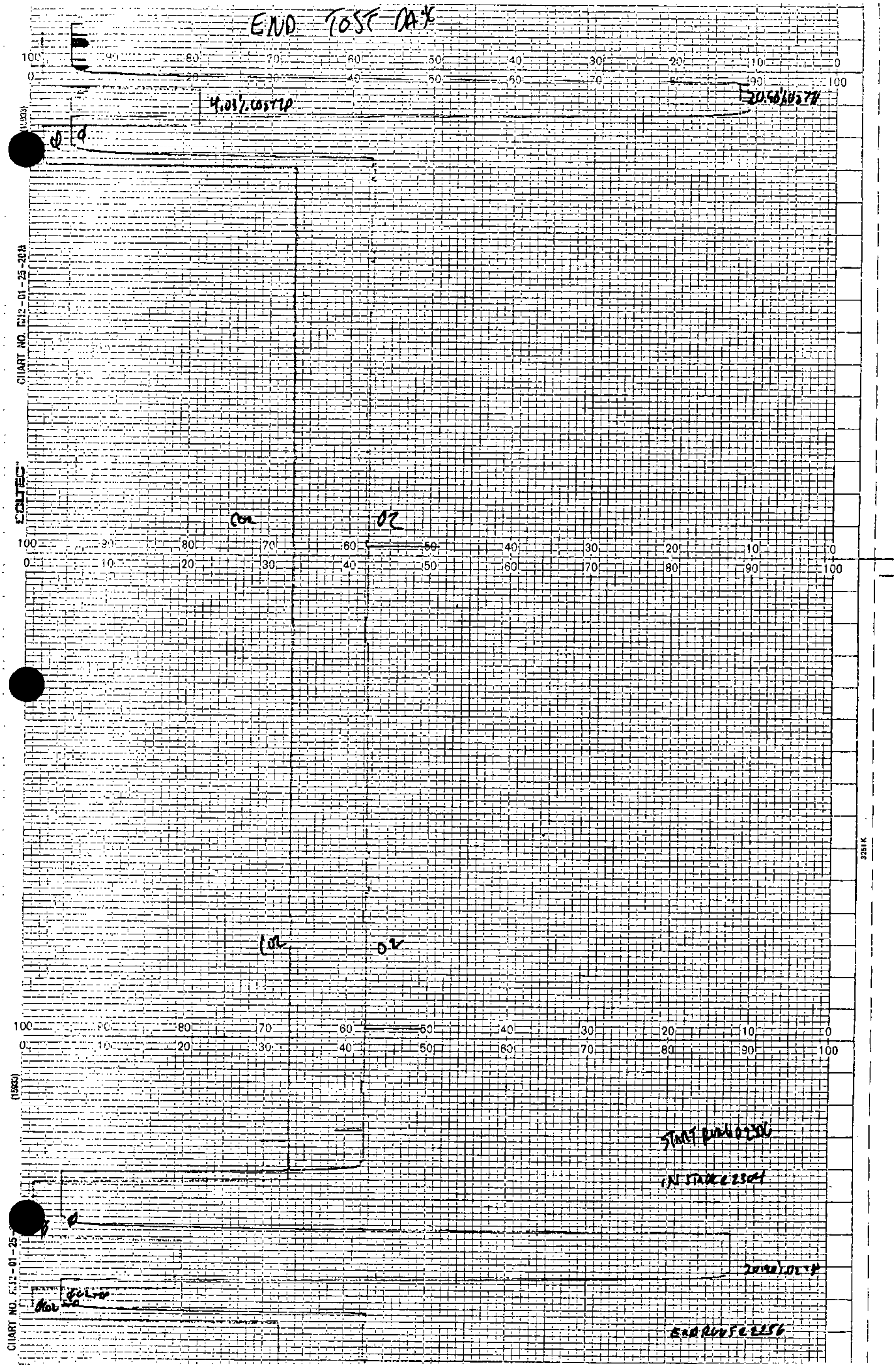


CHART NO. RH2-01-25-30M
ESCALTEC


UNIT 5
2031
20'01
1951
1948
1938
CHART NO. R12-01-25-23M


EDLTEC
CHART NO. 6-12-01-25-20M
UNITS
2055
2048
2031
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100


INTAKE 2304
EXHAUST 2256
CO2
O2
INTAKE 2158
EXHAUST 2154
EXHAUST 2143
CO2
O2


END TEST DAY
CO2
O2
CHART NO. 632-01-25-20
COLTEC
3251K

Summary of Modified 1205 Test Report

Table 3: Unit 1205 Post-Modification

Florida Gas Transmission
Compressor Station No. 12
near Munson on Hwy 191, Santa Rosa County, FL
Cooper-Bessemer LSG8 Compressor Engine 2000 bhp @
Technicians: JT, GM 330 rpm

Test Run No.	1205-C-7	1205-C-8	1205-C-9	
Date	4/26/00	4/26/00	4/26/00	
Start Time	20:52	22:05	23:16	
Stop Time	21:52	23:05	00:29	
Engine/Compressor Operation				**Averages**
Engine Load (bhp, measured at the compressor)	1905	1905	1905	**1905**
Fuel Horsepower (bhp, based upon fuel torque)	2072	2081	2088	**2080**
Engine Speed (rpm)	330	329	329	**329**
Torque (%, full load = 2000 bhp at 330 rpm)	104	104	105	**104**
Ignition Timing (°BTDC)	24.0	24.0	24.0	-
Air Manifold Pressure ("Hg)	10.7	10.9	10.9	**10.8**
Air Manifold Temperature (°F)	80	80	80	**80**
Fuel Manifold Pressure (psig)	9	9	9	**9**
Station Suction Pressure (psig)	694.0	695.0	696.0	**695**
Station Suction Temperature (°F)	67	67	67	**67**
Station Discharge Pressure (psig)	942.0	943.0	945.0	**943.3**
Unit Discharge Temperature (°F)	112	112	112	**112.0**
Loading Step Number	5	5	5	-
Compressor Throughput (MMSCFD)	122	122	122	**122.0**
Engine Fuel Data (Natural Gas)				
Fuel Heating Value (Btu/SCF, HHV)	1027.0	1027.0	1027.0	**1027.0**
Fuel Specific Gravity	0.5800	0.5800	0.5800	**0.5800**
O2 "Fd-factor" (DSCFex/MMBtu @ 0% excess air)	8637	8637	8637	**8637**
CO2 "Fc-factor" (DSCFex/MMBtu @ 0% excess air)	1025	1025	1025	**1025**
Heat Input (MMBtu/hr)	15	15	15	**15**
Brake-specific Fuel Consumption (Btu/bhp-hr)	7627.68	7663.25	7702.77	**7664.57**
Ambient Conditions				
Atmospheric Pressure ("Hg)	29.91	29.91	29.88	**29.90**
Temperature (°F) : Dry bulb	59.0	57.0	55.0	**57.0**
(°F): Wet bulb	55.0	54.0	52.0	**53.7**
Humidity (lbs moisture/lb air)	0.0082	0.0081	0.0075	**0.0079**
Measured Emissions				
NOX (ppmv, dry basis)	526.2	485.8	488.7	**500.2**
CO (ppmv, dry basis)	287.3	278.2	271.5	**279.0**
O2 (% volume, dry basis)	10.6	10.6	10.7	**10.6**
CO2 (% volume, dry basis)	5.72	5.65	5.64	**5.67**
THC (ppmv)	675.7	646.5	673.7	**665.3**
VOC (ppmv as % of THC by weight from fuel gas analysis)	12.63	12.08	12.59	**12.43**
FO (fuel factor, range = 1.600-1.836 for NG)	1.81	1.82	1.81	**1.81**
Stack Volumetric Flow Rates				
via Pitot Tube (SCFH, dry basis)	2.83E+05	2.80E+05	2.85E+05	**2.12E+05**
via O2 "F-factor" (SCFH, dry basis)	2.53E+05	2.56E+05	2.60E+05	**2.18E+05**
via CO2 "F-factor" (SCFH, dry basis)	2.61E+05	2.65E+05	2.67E+05	**2.19E+05**
Calculated Emission Rates (via pitot tube)				
NOX (lbs/hr)	17.8	16.2	16.6	**16.9**
CO (lbs/hr)	5.92	5.66	5.63	**5.73**
VOC (lbs/hr)	0.409	0.387	0.411	**0.402**
NOX (tons/yr)	78.0	71.1	72.9	**74.0**
CO (tons/yr)	25.9	24.8	24.6	**25.1**
VOC (tons/yr)	1.79	1.69	1.80	**1.76**
NOX (g/bhp-hr)	4.24	3.87	3.97	**4.03**
CO (g/bhp-hr)	1.41	1.35	1.34	**1.37**
VOC (g/bhp-hr)	0.10	0.09	0.10	**0.10**