

Total Source Analysis, Inc.

Environmental Testing Consultants

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**COMBUSTION TURBINE
EMISSIONS
TEST REPORT
FOR
ORLANDO UTILITIES
COMMISSIONS
INDIAN RIVER
CTA**

JULY 25/26, 1989

89-093



TOTAL SOURCE ANALYSIS, INC.
ENVIRONMENTAL TESTING CONSULTANTS
Services Worldwide

August 24, 1989

I, Bruce Woods, Jr., hereby certify that the combustion turbine emissions tests conducted on CTA at Indian River Plant for Orlando Utilities Commission are in accordance with procedures established by the USEPA. This report accurately and faithfully presents the data obtained from the tests and the results determined from analysis of this data.

Bruce Woods, Jr.
Crew Chief

I, Carl Vineyard, P.E., hereby attest that all work on this project was completed under my supervision and this report accurately presents the emissions from the unit.

Carl Vineyard, P.E.
Chief Test Engineer

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INTRODUCTION

INTRODUCTION

This report presents the results of the combustion turbine emissions tests performed on CTA at Indian River Plant for Orlando Utilities Commission.

The purpose of the tests was to determine the emissions of the combustion turbines for compliance. The results of the tests can be found in Sections II and III of this report.

The emissions testing was performed by Total Source Analysis, Inc., whose main office is located at 139 W. Herrick, Wellington, Ohio 44090.

The tests were performed on July 25/26, 1989. The testing was performed in accordance with EPA reference methods as published in the July 1, 1988 Federal Register, - "Standards of Performance for New Stationary Sources" and subsequent revisions.

The testing equipment, sampling procedures and analytical procedures are described in Section IV of this report. The raw field data, lab analysis reports and equations used in determining final results are presented in the Appendix.

EXECUTIVE SUMMARY OF TEST RESULTS

EXECUTIVE SUMMARY

The following table presents the results of the emissions tests performed on July 25 and 26, 1989 on Combustion Turbine A at the Indian River Plant.

POLLUTANT	FUEL	ALLOWABLE lb/hr	MEASURED lb/hr
Carbon Monoxide	Gas	10.0	2.12
Carbon Monoxide	Oil	10.1	2.07
Nitrogen Oxides	Gas	75.1	56.1
Nitrogen Oxides	Oil	118.3	95.7
Total Particulates	Gas	2.5	N/A
Total Particulates	Oil	10.0	15.34
Sulfur Dioxide	Gas	.34	.23 *
Sulfur Dioxide	Oil	142.7	87.4 *
Beryllium	Oil	.0001	<.0022 *
Visible Emissions	Gas	5%	0%
Visible Emissions	Oil	10%	1%

* Calculated from fuel analysis.

SUMMARY OF TEST RESULTS

SUMMARY OF TEST RESULTS

The following tables present the results of the emissions tests performed on Combustion Turbine A, Indian River Plant for Orlando Utilities Commission.

RUN #	LOAD %	DATE	FUEL	CO LB/HR	NOx LB/HR	NOx PPM (15% O2)	PART LB/HR	SO2 LB/HR	BE LB/HR	OPACITY %
1	30	7-25-89	Gas			33.27				
2	30	7-25-89	Gas			27.70				
3	30	7-25-89	Gas			25.87				
1	50	7-25-89	Gas			33.30				
2	50	7-25-89	Gas			31.19				
3	50	7-25-89	Gas			32.33				
1	75	7-25-89	Gas			34.92				
2	75	7-25-89	Gas			33.98				
3	75	7-25-89	Gas			28.25				
1	100	7-25-89	Gas	2.43	55.6	27.70		.23		0%
2	100	7-25-89	Gas	2.09	59.9	29.95		.23		
3	100	7-25-89	Gas	1.85	53.0	26.34		.23		
1	30	7-26-89	Oil			57.67				
2	30	7-26-89	Oil			38.85				
3	30	7-26-89	Oil			49.19				
1	50	7-26-89	Oil			45.26				
2	50	7-26-89	Oil			40.62				
3	50	7-26-89	Oil			39.99				
1	75	7-26-89	Oil			53.99				
2	75	7-26-89	Oil			53.39				
3	75	7-26-89	Oil			53.98				
1	100	7-26-89	Oil	2.11	100.29	51.51		87.1	<.0022	
2	100	7-26-89	Oil	2.16	91.25	60.98	12.65	87.3	<.0022	
3	100	7-26-89	Oil	1.94	95.57	54.18	19.40	87.7	<.0022	
4	100	7-27-89	Oil				13.97			1.0%

Total Source Analysis, Inc.
Particulate Test Analysis

ERMCO

89-093

Run Number	2	3	4
Data set	[01]	[02]	[03]
Date	7-26-89	7-26-89	7-26-89
Location	CTA	CTA	CTA
Start time	5:30	7:05	8:43
End time	6:57	8:21	10:02
Barometric Pressure	In. Hg 30.33	30.28	30.28
Static Pressure	In. H2O 5.10	1.30	1.80
Volume of Condensate	Mls 105	88	157
Volume Sampled	DCF 67.841	68.071	67.814
Meter Correction Factor	1.00	1.00	1.00
Square Root of Delta P	1.418	1.413	1.407
Orifice Pressure	In. H2O 0.63	0.63	0.63
Meter Temperature	Deg. F 95	84	94
Flue Temperature	Deg. F 996	996	999
Percent CO2	% 4.00	4.35	4.10
Percent O2	% 13.50	13.45	13.60
Diameter of Nozzle	In 0.250	0.250	0.250
Area of Flue	Sq Ft 108.21	108.21	108.21
Sample Time	Min 70	70	70
Weight Gain	Grams 0.0212	0.0332	0.0244
Absolute Flue Pressure	In. Hg 30.70	30.38	30.41
Corrected Sample Volume	DSCF 65.50	66.94	65.48
Moisture in Flue Gas	% 7.0	5.8	10.1
Molecular Weight	Lb/LbMole 28.39	28.58	28.07
Velocity of Flue Gas	FpS 131.60	131.40	132.10
Volume of Flue Gas	ACFM 854,407	853,157	857,662
Volume of Flue Gas	DSCFM 295,450	295,743	283,445
Dust Concentration	Lb/DSCF 7.13E-07	1.09E-06	8.21E-07
Dust Concentration	Lbs/Hour 12.65	19.40	13.97
Dust Concentration	Grs/ACF 1.76E-03	2.71E-03	1.94E-03
Dust Concentration	Grs/DSCF 4.99E-03	7.65E-03	5.75E-03
Isokinetic Rate	% 100.4	102.5	104.6

**SAMPLING AND ANALYTICAL
PROCEDURES**

TESTING EQUIPMENT-EPA REFERENCE METHOD 5 SAMPLING TRAIN

A Acurex Corporation Aerotherm High-Volume Stack Sampler (Model HVSS-045) was used at the sampling location(s). The HVSS particulate sampling train consisted basically of a stainless-steel probe; a variable-heat-controlled filter oven with a calibrated Type K (Chromel/Alumel) thermocouple located at the impinger outlet; a 3/4-hp shaft sealed carbon vane vacuum pump assembly with a vacuum gauge; a control unit with an elapse time indicator, a temperature selector switch, a temperature indicator (potentiometer), temperature controllers, calibrated magnehelic gauges, a calibrated dry gas meter, and a calibrated variable-diameter orifice; and an umbilical and various interconnecting hoses, fitting and valves. An appropriately sized stainless-steel nozzle, a calibrated Type K temperature sensor, a static pressure tube, a calibrated S type pitot tube and a variable-heat-controlled stainless-steel liner with a calibrated Type K (Chromel/Alumel) thermocouple are integral parts of the probe assembly.

The vacuum pump was used to control gas sampling rates. The control unit was used to control probe and oven temperatures. The control unit was also used to monitor elapsed sampling times, temperatures, velocities, static pressure, gas sampling rates and sampled gas volume.

Integrated Gas Sampling Train

Flue gas was collected at the sampling location(s) for analysis with an integrated gas sampling train. The sampling train consisted basically of a Mann-Made polystyrene gas filter drying tube; a Thomas 1/20-hp sealed-head diaphragm vacuum pump, a Dwyer flowmeter, a plastic bag housed in a protective case, and tygon tubing with various interconnecting fittings and valves.

Analyzer (Orsat)

Flue gas concentrations were determined with a Gas Analyzer (Orsat) which measures percent carbon dioxide, percent oxygen and percent carbon monoxide to the nearest tenth of a percent.

Programable Calculator

A Texas Instruments, Model TI-66, programable calculator was used to determine the isokinetic sampling rate at each sampling point.

Barometer:

The barometric pressure (actual station pressure) was determined from a calibrated Aneroid barometer located near the test site which read directly in inches of mercury to the nearest hundredth of an inch.

SAMPLING PROCEDURES-EPA REFERENCE METHOD 5 (PARTICULATE)

Prior to the field testing, the following procedures were performed: All instruments were checked and calibrated. Gelman Spectro Grade, glass-fiber-mat filters with 99.9 percent retention of 0.3-micron particles were individually numbered, placed in similarly numbered glass petri dishes, oven dried at 220 degrees Fahrenheit for two to three hours, cooled in a desiccator and individually weighed on a Sartorius analytical balance to the nearest 0.1-milligram, and weighed every six hours, minimum until two consecutive weights within +0.5 milligram were obtained. Several 250 milliliter crucibles were desiccated for a minimum of 24 hours and weighed in the same manner as the filters and petri dishes. Also, several 350-gram quantities of Type 6-16 mesh indicating silica gel were weighed on an Ohaus beam balance and placed into separate airtight polypropylene storage bottles.

The number of sampling points and positions of the points in the flue at the sampling location(s), and the sampling time at each point were determined prior to the particulate testing. The sampling procedures were performed in accordance with the Environmental Protection Agency's Reference Method 5, "Determination of Particulate Emissions from Stationary Sources" in the July 1, 1988 Federal Register, "Standards of Performance for New Stationary Sources and subsequent revisions.

A HVSS particulate sampling train was prepared in part at the sampling location(s), before each test run, in the following manner: An appropriately sized sampling nozzle was installed onto the inlet of the sampling probe and capped. The probe was then dimensioned and marked with glass-cloth tape at increments that corresponded with the predetermined sampling positions in the flue. A standard impinger assembly was prepared by adding 250 milliliters of distilled water, to each of the first two lexan impingers. The lexan third impinger was left dry and the fourth was filled with approximately 350 grams of type 6-16 mesh indicating silica gel. The entire impinger assembly was then placed in an ice bath. A disc filter was removed from its petri dish and placed inside of a filter holder. The filter holder was then placed inside of a filter oven and assembled to the sampling probe outlet and the impinger unit inlet. Next, an umbilical and sampling hoses were connected to the sampling probe, filter oven, impinger unit a vacuum pump and the control unit, accordingly. The probe and oven were then heated to and held at temperatures between 223 and 320 degrees Fahrenheit. All magnehelic gauges were checked and zeroed.

As soon as the probe and oven temperatures had stabilized the entire sampling train assembly was leak-checked at 15 inches of mercury vacuum, minimum, for one minute and the leakage rate recorded. A leakage rate of less than .02 cfm and no vacuum loss was considered acceptable.

After the HVSS particulate sampling train had been assembled, the probe and oven heated, and the entire system leak-checked, as previously described, the particulate sampling was performed.

Prior to the particulate sampling, a preliminary temperature and velocity traverse, orsat analysis and calculations were performed to determine a correct nozzle and orifice size, and the factors that would be used in calculating the isokinetic sampling rate for each sampling point. Knowing the actual pressure differential across the pitot tube used, the isokinetic sampling rate was calculated at each sampling point using a HP11C, Programmable Calculator.

After the completion of a test run, the following procedures were performed: A final leak-check was performed at 15 inches of mercury vacuum, minimum, for one minute and the leakage rate recorded. The flue gas moisture collected in the first three impingers was measured and recorded. The moisture laden silica gel in the fourth impinger was transferred to an appropriately marked, airtight polypropylene bottle and retained for latter weighing. The weight gain of the silica gel moisture collection was added to the measured moisture condensed for that test run. The sample nozzle, probe and filter holder were capped and taken to a clean area for sample recovery. At the recovery area, the disc filter was carefully removed from the filter holder and transferred to its petri dish for later weighing. The sampling nozzle, probe and filter holder were washed with nanograde acetone. The acetone washing and acetone blank were collected and labeled polypropylene sample bottles and retained for latter evaporation, desiccation and weighing.

Flue gas concentrations (percent CO₂, percent O₂) were determined by taking several orsat samples of the gas collected, simultaneously, with the particulate sampling. The concentrations for each test run were recorded on a field test form.

ANALYTICAL PROCEDURES - EPA REFERENCE METHOD 5 (PARTICULATE)

After the field testing was completed, the following procedures were performed: Each silica gel moisture collection was weighed in its storage bottle on an Ohaus beam balance with a sensitivity of 0.1-gram. Each disc filter and petri dish was oven dried at 220 degrees Fahrenheit for two to three hours and cooled in a desiccator for two hours before weighing. Each acetone washing and acetone blank was transferred from its sample bottle to a preweighed crucible for evaporation. When the acetone in a crucible had completely evaporated, the crucible was transferred to a desiccator for further drying at room temperature. Each acetone blank collected was used to determine the amount of residual weight each crucible retained due to acetone impurities. Each disc filter and petri dish, acetone washing and acetone blank was weighed on a Sartorius analytical balance with a sensitivity of 0.1-milligram.

All test instruments were recalibrated to determine the deviation percentage.

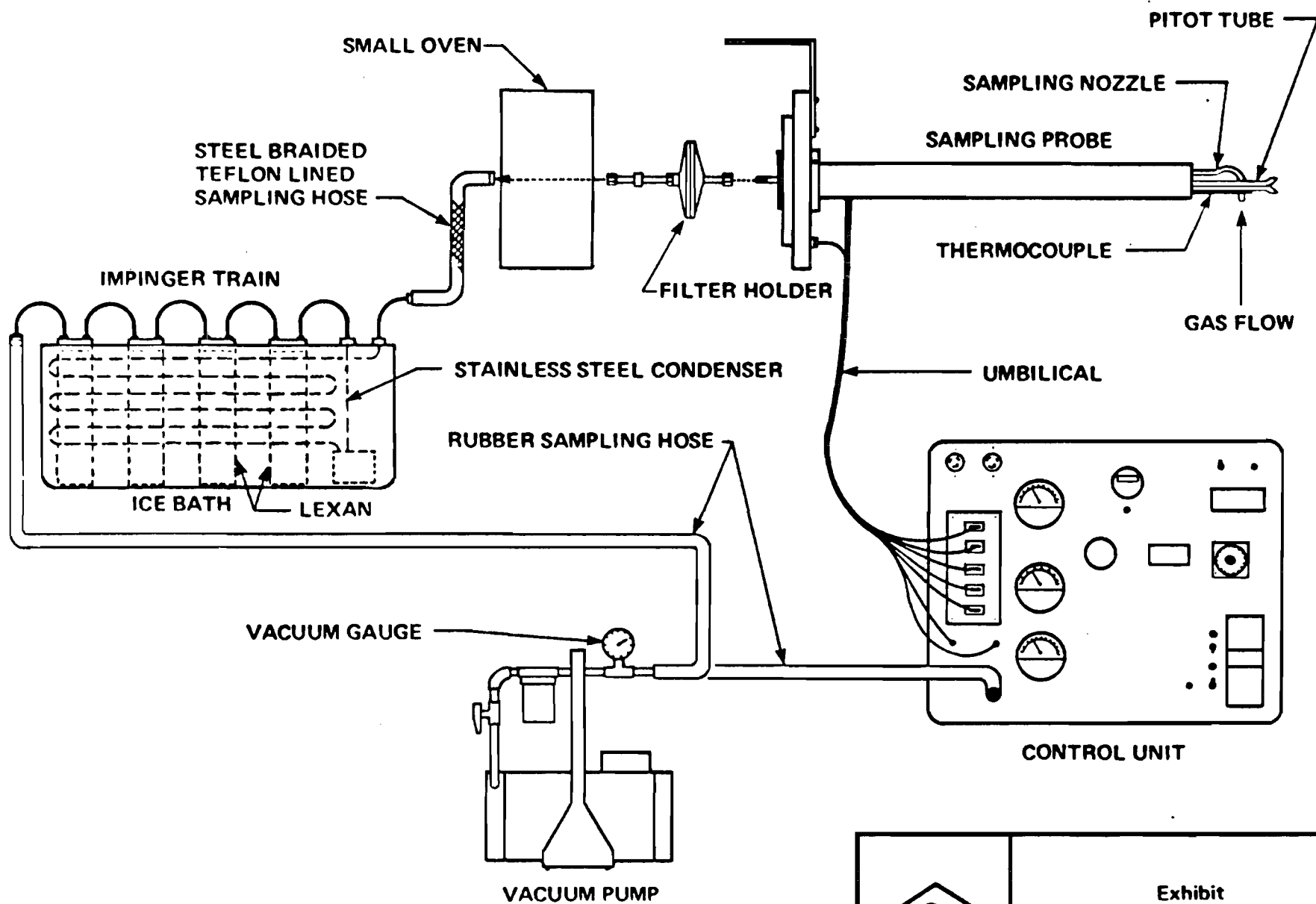


Exhibit
 AEROTHERM
 SAMPLING TRAIN

EPA METHOD 10

DETERMINATION OF CARBON MONOXIDE EMISSIONS FROM STATIONARY SOURCES

1. Principle

1.1 Principle - An integrated or continuous gas sample is extracted from a sampling point and analyzed for carbon monoxide (CO) content using a nondispersive infrared analyzer (NDIR).

2. Range and Sensitivity

2.1 Range - 0 to 1,000 ppm.

2.2 Sensitivity - Minimum detectable concentration is 20 ppm for a 0 to 1,000 ppm span.

3. Precision and Accuracy

3.1 Precision - The precision of most NDIR analyzers is approximately +2 percent of span.

3.2 Accuracy - The accuracy of most NDIR analyzers is approximately +5 percent of span after calibration.

4. Apparatus

4.1 Probe - Stainless steel or sheathed Pyrex glass, equipped with a filter to remove particulate matter.

- 4.2 Air-cooled Condenser or Equivalent - To remove any excess moisture.
- 4.3 Valve - Needle valve, or equivalent, to adjust flow rate.
- 4.4 Pump - Leak-free diaphragm type, or equivalent, to transport gas.
- 4.5 Rate Meter - Rotometer, or equivalent, to measure a flow range from 0 to 1.0 liter per minute (0.035 cfm).
- 4.6 Flexible Bag - Tedlar, or equivalent, with a capacity of 60 to 90 liters (2 to 3 feet). The bag was leak tested in the laboratory before using by evacuating the bag with a pump followed by a dry gas meter. When evacuation was complete, there was no flow through the meter.

5. Analysis

- 5.1 Carbon Monoxide Analyzer - A Horiba Model 321 or Fuji Model 730 nondispersive infrared analyzer is used. The instrument was demonstrated by the manufacturer, to meet or exceed manufacturer's specifications and those described in this method.

6. Reagents

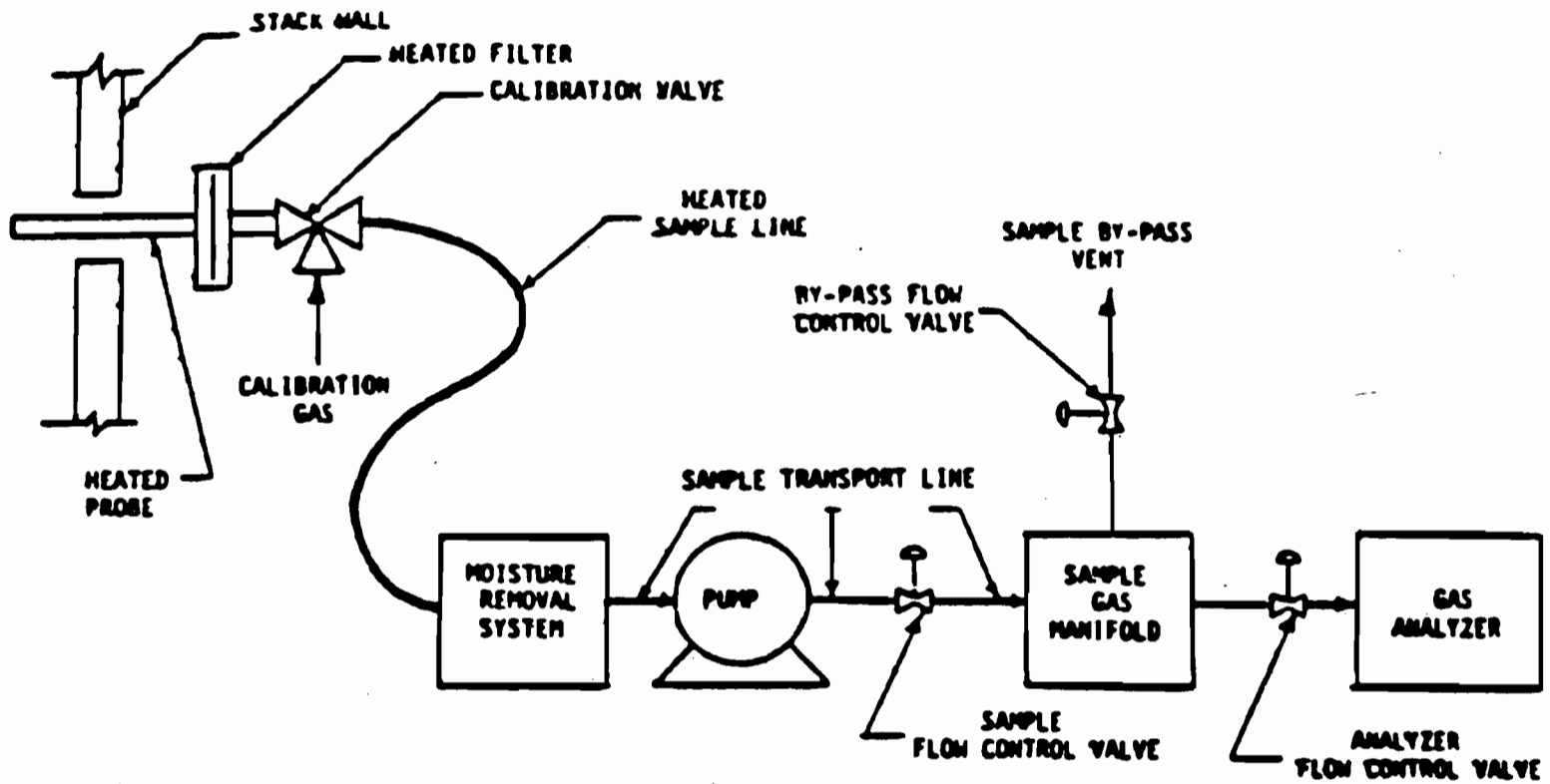
- 6.1 Calibration Gases - Known concentration of CO in nitrogen for instrument span, prepurified grade of nitrogen for zero, and two additional concentrations corresponding approximately to 60 percent and 30 percent span. The span concentration shall not exceed 1.5 times the applicable source performance standard. The calibration gases are certified by the manufacturer to be within +2 percent of the specified concentration.
- 6.2 Silica Gel - Indicating type, 6 to 16 mesh, dried at 175 degrees C (347 degrees F) for two hours.
- 6.3 Ascarite

7. Procedure

- 7.1 Continuous Sampling - Set up the equipment as shown in Figure 10-1 making sure all connections are leak free. Place the probe in the stack at a sampling point and purge the sampling line. Connect the analyzer and begin drawing sample into the analyzer. Allow 5 minutes for the system to stabilize, then record the analyzer reading as required by the test procedure. CO₂ content of the gas may be determined by using the Method 3 integrated sample procedure (36 FR 24886), or by weighing the ascrate CO₂ concentration from the gas volume sampled and the weight gain of the tube.

7.1.1 Integrated Sampling - Evacuate the flexible bag.

Set up the equipment as shown in Figure 10-2 with the bag disconnected. Place the probe in the stack and purge the sampling line. Connect the bag, making sure that all connections are leak free. Sample at a rate proportional to the stack velocity. CO₂ content of the gas may be determined by using the Method 3 integrated sample procedures (36 FR 24886), or by weighing the ascarite CO₂ removal tube and computing CO₂ concentration from the gas volume sampled and the weight gain of the tube.



Measurement System Schematic

Figure 10-1

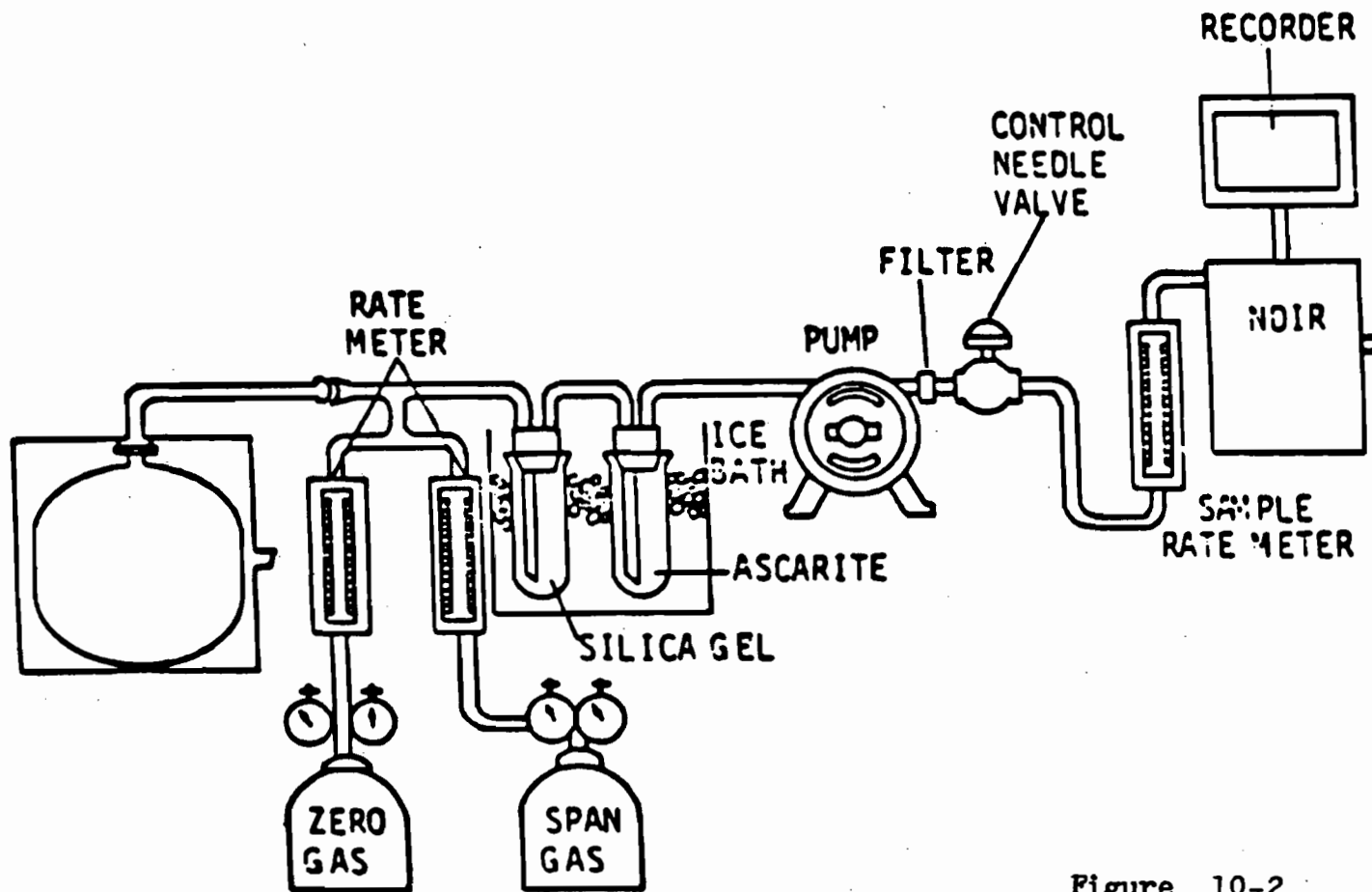


Figure 10-2

Source identification: _____

Test personnel: _____

Date: _____

Analyzer calibration data for sampling runs: _____

Span: _____

	Cylinder value	Analyzer calibration response (indicate units)	Absolute difference	Difference (% of span)
Zero gas				
Low range				
Mid-range				
High range				

Analyzer calibration data.

Date of test	_____
Analyzer type	_____ SN _____
Span gas concentration	_____ (indicate units)
Analyzer span setting	_____ (indicate units)
Upscale	1 _____ seconds
	2 _____ seconds
	3 _____ seconds
Average upscale response	_____ seconds
Downscale	1 _____ seconds
	2 _____ seconds
	3 _____ seconds
Average downscale response	_____ seconds
System response time = slower average time =	_____ seconds

Response time.

Source identification: _____

Test personnel: _____

Date: _____ Run number: _____

Span: _____

	Analyzer calibration response	Initial Values		Final Values		Drift
		System calibration response	System cal. bias (% of span)	System calibration response	System cal. bias (% of span)	
Zero gas						
Mid-range						

$$\text{System Calibration Bias} = \frac{\text{System Cal. Response} - \text{Analyzer Cal. Response}}{\text{Span}} \times 100$$

$$\text{Drift} = \frac{\text{Final System Cal. Response} - \text{Initial System Cal. Response}}{\text{Span}} \times 100$$

System calibration bias and drift data.

SAMPLING AND ANALYTICAL PROCEDURES

SAMPLING EQUIPMENT

A Beckman Corporation Portable Compliance Monitor Model 951A and/or a Teco Model 10AR NO/NO_x analyzer, as shown in Exhibit 1, is used for the sampling of nitrogen oxides in the flue gas. A Beckman Oxygen Analyzer Model 755 and/or a teledyne Model 326RA is used to determine the oxygen content in the flue gas.

The sampling of the flue gas takes place via a porous filter connected to a variable control heated stainless steel probe. The sample is then transported to the analyzers via a self regulating heated sample line constructed of reinforced Teflon tubing. The sample is pulled by means of a diaphragm pump with the gas flow being regulated by a flow rate meter.

Certified calibration gases are used to calibrate the analyzers. Three span gases are used for the NO_x analyzer. The gases were based on a span value of 300 ppm and are 80-90 percent range for the high-level gas, 45-55 percent range for the mid-level gas and 20-30 percent range for the low-level gas. Ambient air was used to zero the NO_x analyzer. Ambient air and a cylinder of 12 percent O₂ were used as the high, and mid-range span gases respectively. Any one of the NO_x gases are used to zero the oxygen analyzer. Residence time is calculated by using the pump flow rate and the internal volume of the sampling system.

Interference gases are introduced into the analyzers prior to use in the field. Four interference gases are used, CO, CO₂, O₂ and SO₂, for this particular test.

Response times are run in the field prior to the start of the test. The barometric pressure is obtained from an Aneroid barometer.

Relative humidity is obtained with the use of a sling psychrometer to obtain a wet/dry bulb temperature. A psychrometric chart is used to determine the relative humidity.

SAMPLE PREPARATION

The sampling and conditioning portion of the system is designed to prevent loss of NO_x and O₂ from the sample gas as follows:

The sample is drawn through a filtered probe to remove any particulates from the sample gas, thereby eliminating the possibility of its reaching the monitor. A heated sample line conveys the sample gas to a sample pump at a temperature above the dew point of the sample, thereby preventing condensation and subsequent losses of soluble sample components. An ice bath sample conditioner, which is a simple form of a heat exchanger, completes the sampling conditioning. The object of this device is to reduce the temperature of the sample to a low enough level to allow the moisture in the sample to be regenerated in droplet form and to prevent condensation in the monitor.

SAMPLE ANALYSIS

The NO/NO_x analyzer continuously analyzes a flowing gas sample, performing the desired one of two switch-selectable determinations:

1. Nitric oxide (NO); or
2. Combined nitric oxide (NO) and nitrogen dioxide (NO₂), designated NO_x. By definition,
 $(NO_x) = (NO) + (NO_2)$.

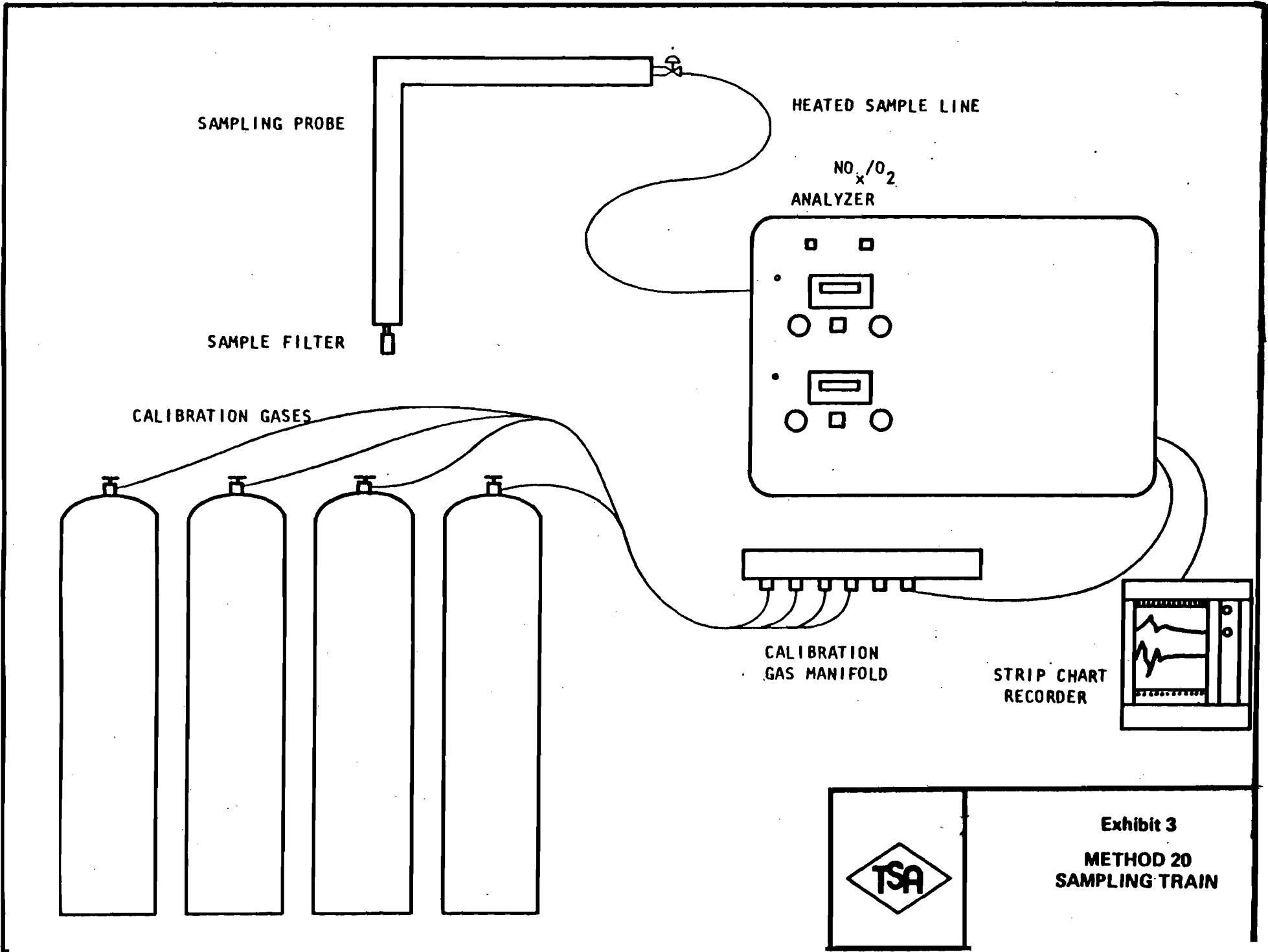
The analyzer utilizes the chemiluminescent method of detection. In the nitric oxide determination, sample NO is quantitatively converted into NO₂ by gas-phase oxidation with molecular ozone produced within the analyzer, from air or oxygen supplied by an external cylinder. A characteristic of this reaction is the elevation of approximately 10 percent of the NO₂ molecules to an electronically excited state, followed by immediate reversion to the nonexcited state accompanied by emission of photons. These impinge on a photomultiplier detector generating a low level d.c. current. The current is amplified to drive the front panel meter and the strip chart recorder.

Analyzer functioning for the NO_x determination is identical to that described above for the NO determination except that before entry into the chamber, the sample is routed through a converter where the NO_2 component is disassociated to form NO. Instrument response is proportional to total NO in the converted sample, that is, the sum of the NO present in the original sample plus the NO produced by disassociation of NO_2 .

The oxygen content of the flue gas is determined by utilizing a oxygen analyzer which provided a continuous readout of the oxygen content of the flowing gas sample. The determination is based on measurement of the magnetic susceptibility of the sample gas. Oxygen is strongly paramagnetic; other common gases, with only a few exceptions, are weakly diamagnetic. The volume magnetic susceptibility of the flowing gas sample is sensed in the detector/magnet assembly, which in turn displays the front panel reading on the analyzer and the output for the strip chart recordings.

At the beginning of each test run, the gas turbine operational data is recorded. The probe is then positioned in the gas stream and the pump turned on. Sampling time for each run is approximately 30 minutes, including the system response time. The average steady-state concentration of NO_x and O_2 at the sample points are recorded on the test forms, and recorded on the strip charts.

Immediately following each run, the gas turbine operational data is again recorded. A post-test zero and calibration drift test is performed on the analyzers after each test run. Three test runs are made at each load, thus constituting a complete test.



APPENDIX

SAMPLE CALCULATIONS

NOMENCLATURE

acf	= actual cubic feet	P_f	= static pressure in flue in inches water, average
acfm	= actual cubic feet per minute	$\sqrt{\Delta P}$	= square root of velocity head in inches water, average
A	= effective area of flue in square feet	%S	= percent sulfur by weight, dry basis
acm	= actual cubic meters	scf	= standard cubic feet
acmm	= actual cubic meters per minute	scm	= standard cubic meters
A_n	= inside area of sampling nozzle in square feet	T_{std}	= absolute temperature of air in degrees Rankine at standard conditions (528 degrees)
B_{ws}	= water vapor in gas stream, proportion by volume	T_S	= absolute temperature of flue gas in degrees Rankin, average
%C	= percent carbon by weight, dry basis	T_m	= absolute temperature at meter in degrees Rankine, average
%CO	= percent carbon monoxide by volume, dry basis	V_S	= velocity of flue gas in feet (meters) per second
%CO ₂	= percent carbon dioxide by volume, dry basis	V_l	= volume of condensate through the impingers in milliliters
C_p	= pitot tube coefficient	V_{lc}	= volume of liquid collected in condenser in milliliters plus weight of liquid absorbed in silica gel in grams indicated as milliliters
D_l	= dust loading per heat input in pounds (grams) per million Btu (calories) per Fr constant	V_m	= volume of metered gas measured at meter conditions in cubic feet (meters)
D_l'	= dust loading per heat input in pounds (grams) per million Btu (calories) per Fr calculated	V_{ms}	= volume of metered gas corrected to dry standard conditions in cubic feet (meters)
dscf	= dry standard cubic feet	V_o	= volume of flue gas at actual conditions in cubic feet (meters) per minute
dscfh	= dry standard cubic feet per hour	Q_{sd}	= volume of flue gas corrected to dry standard conditions in cubic feet (meters) per hour
dscm	= dry standard cubic meters	V_t	= total volume of flue gas sampled at actual conditions in cubic feet (meters)
dscmh	= dry standard cubic meters per hour	V_w	= volume of water vapor in metered gas corrected to standard conditions in cubic feet (meters)
fps	= feet per second	V_{wc}	= volume of water condensed in impingers corrected to standard conditions
F_r	= ratio factor of dry flue gas volume to heat value of combusted fuel in dry standard cubic feet (meters) per million Btu (calories)	V_{wsg}	= volume of water collected in silica gel corrected to standard conditions
gms	= grams	W_a	= total weight of dust collected per unit volume in grains (grams) per actual cubic feet (meters)
gm-mole	= gram-mole	W_d	= total weight of dust collected per unit volume in pounds (grams) per dry standard cubic feet (meters)
grs	= grains	W_g	= total weight of dust collected in grams
ΔH	= orifice pressure drop in inches water, average	W_h	= total weight of dust collected per unit volume in pounds (grams) per hour, dry basis
%H	= percent hydrogen by weight, dry basis	W_p	= total weight of dust collected in pounds
H_c	= heat of combustion in Btu per pound, dry basis	W_s	= total weight of dust collected per unit volume in grains (grams) per dry standard cubic feet (meters)
hr	= hour	W_{sg}	= impinger silica gel weight gain in grams
%I	= percent isokinetic	Y	= metered gas volume correction factor
in. Hg	= inches mercury	Θ	= total elapsed sampling time in minutes
lbs	= pounds		
lb-mole	= pound-mole		
%M	= percent moisture by volume		
mmBtu	= million Btu		
mmcal	= million calories		
mm Hg	= millimeters mercury		
mps	= meters per second		
M_s	= molecular weight in pounds (gram) per pound (gram) mole (wet basis)		
%N	= percent nitrogen by weight, dry basis		
%N ₂	= percent nitrogen by difference, dry basis		
%O	= percent oxygen by difference, dry basis		
%O ₂	= percent oxygen by volume, dry basis		
P_b	= barometric pressure in inches mercury		
P_{std}	= standard absolute pressure (29.92 in Hg)		
P_s	= absolute pressure in flue in inches (millimeters) mercury		



EPA DUST LOADING Formulas

- (1) ABSOLUTE FLUE PRESSURE (in. Hg)

$$P_s = (\pm P_f \div 13.6) + P_b$$

- (2) WATER VAPOR VOLUME IN METERED GAS CORRECTED TO STANDARD CONDITIONS (scf)

$$V_{wc} = .04707 \times V_l \quad V_{wsg} = .04715 \times W_{sg}$$

$$V_w = V_{wc} + V_{wsg}$$

- (3) METERED GAS VOLUME CORRECTED TO STANDARD CONDITIONS (scf)

$$V_{ms} = 17.64 \times Y \times V_m \frac{P_b + (\Delta H/13.6)}{T_m}$$

- (4) PERCENT MOISTURE IN FLUE GAS

$$B_{ws} = \frac{V_w}{(V_{ms} + V_w)} \%M = B_{ws} \times 100$$

- (5) AVERAGE RESULTS OF FLUE GAS ANALYSIS

$$\%N_2 \text{ dry} = 100 - (\%CO_2 + \%O_2 + \%CO)$$

- (6) APPROXIMATE MOLECULAR WEIGHT OF FLUE GAS (WET BASIS) (lb/lb-mole)

$$M_s = (18 \times B_{ws}) + ((.440 (\%CO_2) + .320 (\%O_2) + .280 (\%N_2 + \%CO)) \times (1 - B_{ws}))$$

- (7) GAS VELOCITY IN FLUE (fps)

$$V_s = 85.49 \times C_p \times (\sqrt{\Delta P}) \text{ avg. } \sqrt{\frac{T_s}{P_s \times M_s}}$$

- (8) FLUE GAS VOLUME AT ACTUAL CONDITIONS (acfm)

$$V_o = V_s \times A \times 60$$

- (9) FLUE GAS VOLUME CORRECTED TO DRY STANDARD CONDITIONS (dscfh)

$$Q_{sd} = \frac{T_{std}}{29.92} \times \frac{P_s}{T_s} \times V_o \times (1 - B_{ws}) \times 60$$

- (10) TOTAL FLUE GAS VOLUME SAMPLED AT ACTUAL CONDITIONS (acf)

$$V_t = \left[V_m \times Y \times \frac{T_s}{T_m} \times \left(\frac{P_b + (\Delta H/13.6)}{P_s} \right) \right] + \left(0.00267 \times V_{lc} \times \frac{T_s}{P_s} \right)$$



EPA DUST LOADING FORMULAS (Continued)

(11) DUST CONCENTRATION FOR INDIRECT HEATING UNIT ACTUAL CONDITIONS AND STANDARD CONDITIONS

$$W_g = \text{gms}$$

$$W_p = 0.002205 \times W_g \quad (\text{lb})$$

$$W_d = \frac{V_p}{V_{ms}} \quad (\text{lb/dscf})$$

$$W_h = W_d \times Q_{sd} \quad (\text{lb/hr dry})$$

$$W_a = \frac{7000 \times W_p}{V_t} \quad (\text{gr/acf})$$

$$W_s = 7000 \times W_d \quad (\text{gr/dscf})$$

$$D_l = \frac{9820 \times 20.9 \times W_d}{(20.9 - \%O_2)} \quad (\text{lb/mmBtu with constant 9820 Fr})$$

$$F_r = \frac{10^6 \times [(3.64 \times \%H) + (1.53 \times \%C) + (0.57 \times \%S) + (0.14 \times \%N) - (0.46 \times \%O)]}{H_c} \quad (\text{dscf/mmBtu})$$

$$D_l' = \frac{20.9 \times W_d \times F_r}{(20.9 - \%O_2)} \quad (\text{lb/mmBtu with calculated } F_r)$$

(12) PERCENT OF ISOKINETIC SAMPLING

$$\%I = \frac{1.667 \times T_s \times \left\{ 0.00267 \times V_{lc} + \left[\frac{V_m \times Y}{T_m} \times (P_b + \Delta H/13.6) \right] \right\}}{\Theta \times V_s \times P_s \times A_n}$$



Gas Flow Calculation

Avg of 11 mths analyses

$$Sp = .584$$

$$Air = .07655 \text{ lb/cf}$$

$$Btu = 1006 \text{ Btu/cf}$$

$$Gas = .04471 \text{ lb/cf}$$

$$Gas \text{ Btu/lb} = 1006 / .04471 = 22503 \text{ Btu/lb}$$

$$F \text{ Factor Nat Gas } 8,710 \text{ dscf} / 10^6 \text{ Btu}$$

$$8710 \times .022503 \text{ } 10^6 \text{ Btu/lb} = 196.00 \text{ dscf / lb flue gas}$$

gas flow dscfh

Run 1 CO 1454-1554

Gas Fuel 6.72 lb/sec

$$6.72 \times 3600 \text{ s/hr} \times 196 = 4,741,632 \text{ dscfh}$$

$$4,741,632 \times \frac{20.9}{(20.9 - O_2)} \quad O_2 = 14.67$$

$$15,906,920 \text{ dscfh at flue gas } O_2$$

Run 2 CO 1603-1703

Gas Fuel 6.70 lb/sec

$$6.70 \times 3600 \times 196 = 4,727,520 \text{ dscfh}$$

$$4,727,520 \times \frac{20.9}{(20.9 - O_2)} \quad O_2 = 15.04$$

$$16,860,950 \text{ dscfh at flue gas } O_2$$

Run 3 CO 1714-1814

6.74 lb/sec

$$6.74 \times 3600 \times 196 = 4,755,744 \text{ dscfh}$$

$$4,755,744 \times \frac{20.9}{(20.9 - 15.02)} =$$

$$16,903,920 \text{ dscfh } f_{SO_2}$$

CO

$$Run 1 \quad 1.5288 \times 10^{-7} \text{ lb/dscf} \times 15,906,920 = 2.432 \text{ lb/hr}$$

Run 2

$$2.086$$

Run 3

$$1.845$$

$$\text{Avg } 2.12$$

$$NO_x \text{ Run 1 } 3.4925 \times 10^{-6} \text{ lb/dscf} \times 15,906,920$$

$$55.55$$

Run 2

$$59.88$$

Run 3

$$53.00$$

Avg

SO₂ Run 1

$$.232$$

2

$$.231$$

CTA OIL Flue Gas Calculation

Oil flow rate

Run 1	6.05 #/sec	x 3600 sec/hr	x 19533 Btu/#	= 425.43 10^6 Btu/hr
2	6.06 #/sec	x 3600	x 19533	= 426.13 10^6 Btu/hr
3	6.09 #/sec	x 3600	x 19533	= 428.24

Run 1	9190 dsct/MBtu	x 425.43	x $\frac{20.9}{(20.9-14.71)}$	= 13,200,770 dsct/h
2	9190	x 426.13	x $\frac{20.9}{(20.9-14.54)}$	= 12,869,059 dsct/h
3	9190	x 428.24	x $\frac{20.9}{(20.9-14.72)}$	= 13,309,464 dsct/h

CO

Run 1	2.11 lb/hr
2	2.16
3	<u>1.94</u>
Avg	2.07 lb/hr

NO_x

100.29 lb/hr
91.25
<u>95.57</u>
95.70 lb/hr

SO₂
 $S = .002 \text{ lb/lb oil}$ $\text{SO}_2 = .004 \text{ lb/lb oil}$

Run 1	6.05 #/sec	x 3600	x .004	= 87.12
2	6.06	x 3600	x .004	= 87.26
3	6.09	x 3600	x .004	= <u>87.70</u>
				87.36

Be < .1 ppm

Run 1	= < .0022 lb/hr
2	= < .0022 lb/hr
3	= < .0022 lb/hr

NO_x Test Data

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River

Run No. 1

Plant Load 100% Turbine A

Fuel Type oil

RH = 76%

Test Time:

Ambient Temp. 92

Start 1:46 PM

Ambient Pressure 30.33

Finish 2:04 PM

Sample Point	Time	% O ₂	NO _x PPM	NO _x CORRECTED TO 15% O ₂
S2.7		13.50	66.5	53.02
.6		13.50	67.0	53.42
S3.7		13.50	67.0	53.42
.6		13.50	65.0	51.82
.15		13.50	64.0	51.03
.14		13.50	65.0	51.82
.3		13.50	64.5	51.43
.2		14.50	50.00	46.09
				51.51
			63.63	

Test Performed By

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site INDIAN RIVER

Run No. 2

Plant Load 100% Turbine A

Fuel Type oil

RH = 68%

Test Time:

Ambient Temp. 91

Start 2:10 PM

Ambient Pressure 30.33

Finish 2:20 PM

Sample Point	Time	% O ₂	NO _x PPM	NO CORRECTED TO 15% O ₂
S3.2		16.00	50.00	60.20
.3		15.25	60.00	62.65
.4		15.00	60.00	60.00
.5		15.00	62.00	62.00
.6		15.00	62.00	62.00
.7		15.00	61.00	61.00
S2.6		15.00	60.00	60.00
.7		15.00	60.00	60.00
				60.98

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River

Run No. 3

Plant Load 100% Turbine A

Fuel Type oil

RH = 66%

Test Time:

Ambient Temp. 92

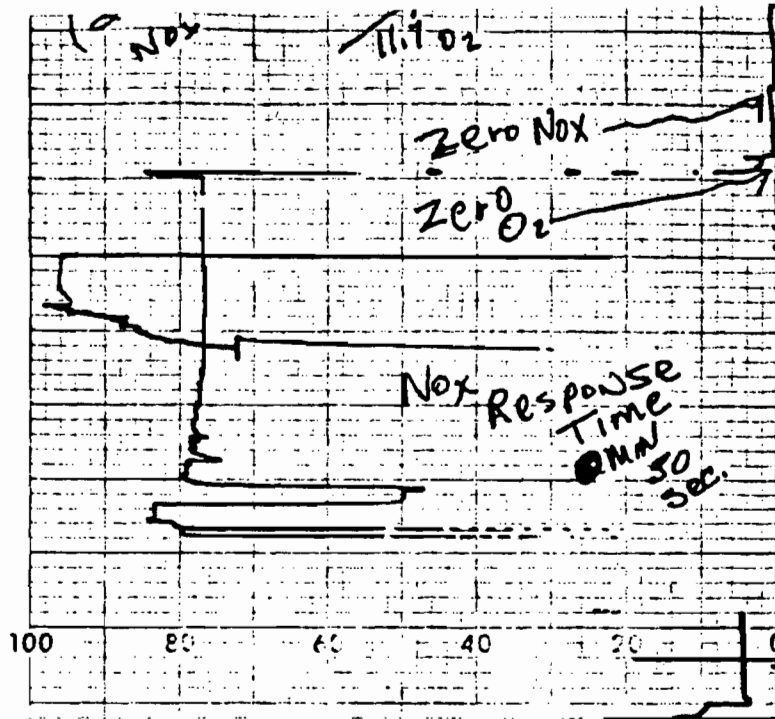
Start 2:33 PM

Ambient Pressure 30.33

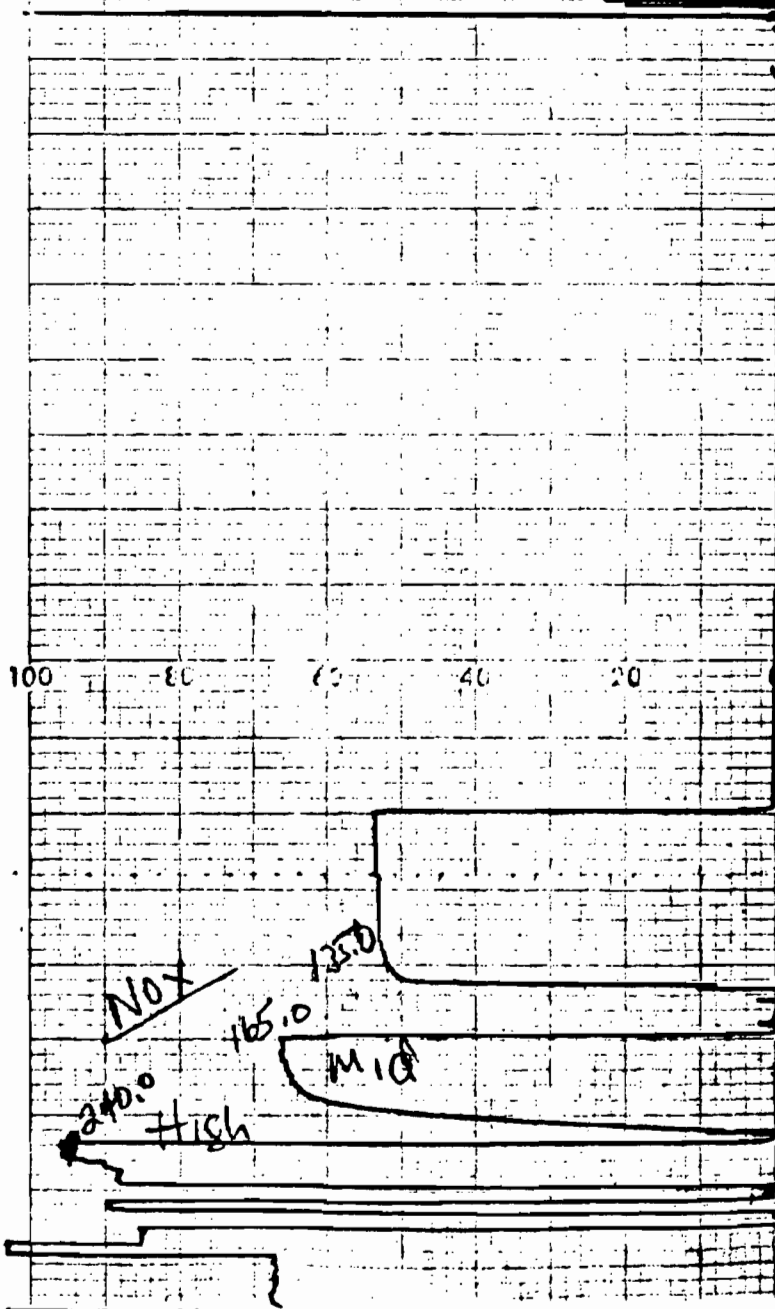
stop 241 PM
Finish 5:31 PM

Sample Point	Time	% O ₂	NO _x PPM	NO _x CORRECTED TO 15% O ₂
S2.7		14.17	62.5	54.79
.6		14.17	60.00	52.60
S3.7		14.37	62.00	56.02
.L		14.37	60.00	54.21
.5		14.37	60.00	54.21
.4		14.37	59.00	53.31
.3		14.50	62.5	57.62
.2		14.50	55.0	50.70
				54.18
			60.13	

Test Runned By



7-25-89
A Turbine



ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. MADE IN CANADA CHART No. 59001

100

8

17.0% O₂

18.25% O₂
S.I.

8:05 AM 7-25-89
O₂ Traverse

132.5
NOX

NOX 152.6

20.9% O₂

241.7
NOX

11.7 O₂

Zero NOX

Zero O₂

ESTERLINE ANALYTICAL INDIANAPOLIS, IND.

Order No. 50001

NOX ICE

17.95 O₂
52.3

15.9 NO_x

17.95 O₂
52.2

17.0 NO_x

18.0 O₂
52.1

18 NO_x

Change Points

17.7
17.50 O₂

NO_x
8.25

17.6
17.56

9.0
NO_x

← 17.5
17.75 O₂

12.0
NO_x

← 17.75 O₂
17.4

14.0
NO_x

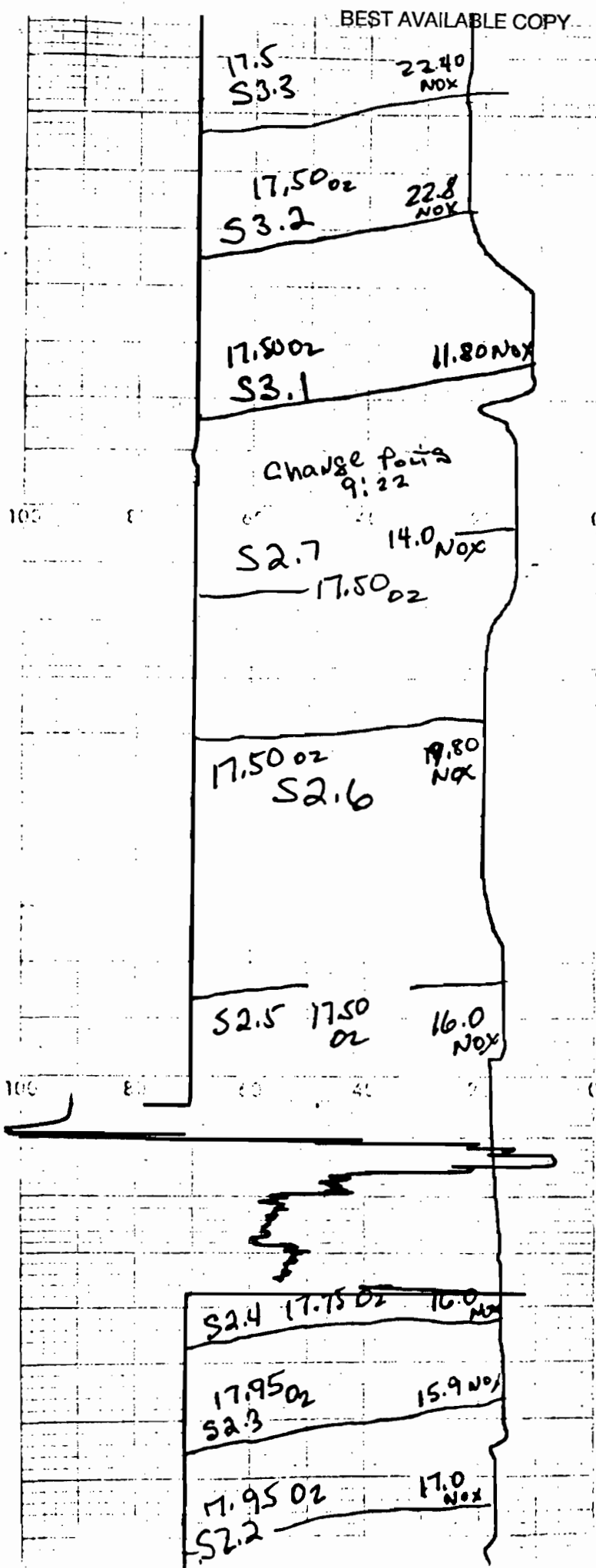
18.0 O₂
17.3

16.5
NO_x

17.3

17.0 O₂
17.2

17.0 O₂



ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. MADE IN CANADA CHART No. 59001

Change Points

54.7
17.46 O₂ 24.0 NO_x

54.6
17.46 O₂ 24.50 NO_x

54.5
17.46 O₂ 24.0 NO_x

54.4
17.46 O₂ 24.0 NO_x

17.50 O₂
54.3 24.0 NO_x

54.2
17.50 O₂ 25.60 NO_x

54.1
17.50 O₂ 23.60 NO_x

Change Points
9:36 AM

53.7
17.46 O₂ 24.0 NO_x

17.50
53.6 Nox 22.50

17.50 O₂ 53.5 22.50 NO_x

100%
= 25% O₂

17.50 O₂ 53.4 22.0 NO_x

17.5
53.3 22.40 NO_x

100% 100 PPM
NO_x

SMART PLO 59001

17.4502 NOX

56.2
17.4502 27.5

56.1
17.4502 26.6
NOX

Change Points

55.7
17.37 28.8
NOX

55.6
17.37
02 27.0
NOX

55.5
17.3702 26.0
NOX

55.4
17.3702 25.9
NOX

55.3
17.3702 26.5
NOX

55.2
17.3702 25.5
NOX

17.3702 55.1 26.0
NOX

Change Points

CHART No. 59001

100

57.5
17.12 O2
21.80
NOX

17.25
57.4
21.0
NOX

57.3
17.25 O2
22.0
NOX

17.25
57.2
22.0
NOX

57.1
17.25 O2
19.0

CHANGE
POINTS

17.13 O2
56.7
28.50
NOX

17.25 O2
56.6
29.0
NOX

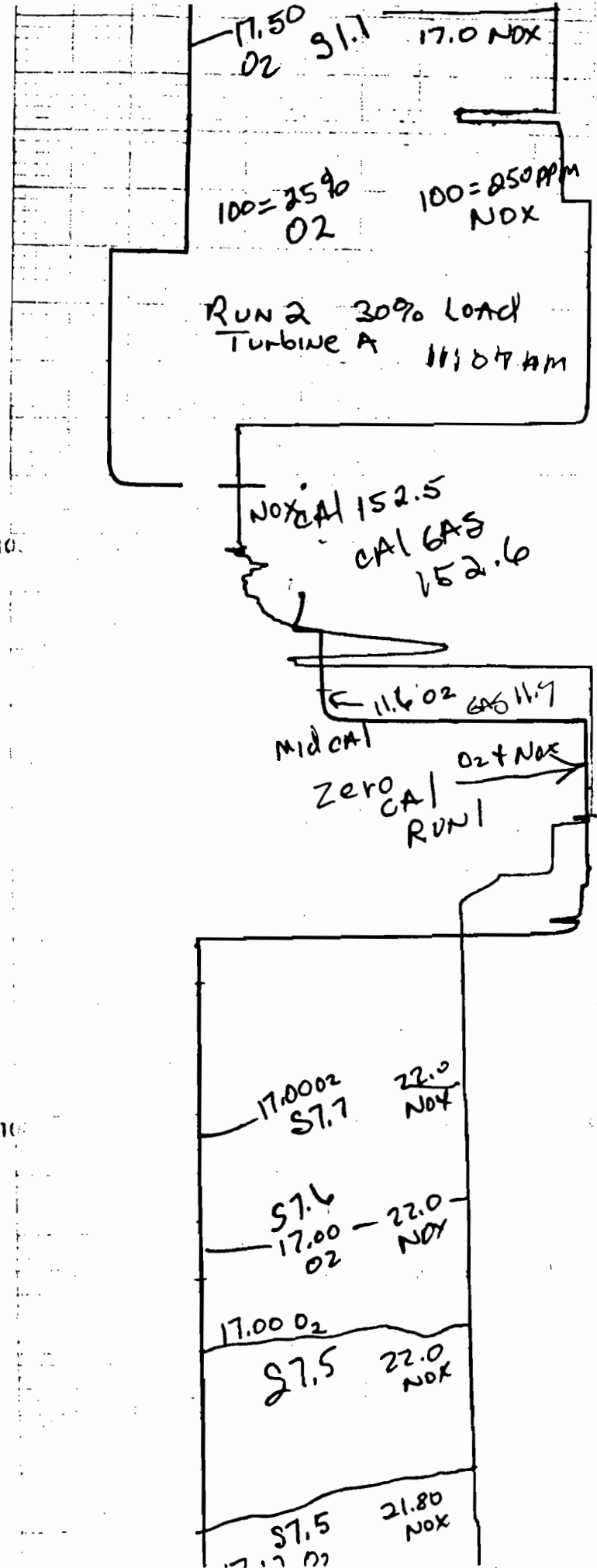
56.5
17.37
27.5
NOX

56.4
17.45
O2
27.0
NOX

56.3
17.45 O2
27.5
NOX

100

CHAI CANADA MADE IN U.S.A. INDIANAPOLIS, INDIANA



Vertical text on the right edge of the page, possibly a page number or reference code.

O2 CAT = 12.0
CAL GAS = 11.7

17.30 O2
S7.4

19.0
NOX

17.30 O2
S7.3

18.0 NOX

17.30 O2
S7.2

15.0
NOX

17.20 O2
S7.1

10 NOX
PPM

Change Ports

17.12 O2
~~17.10~~ S6.7

18.0
NOX

17.30 O2
S6.6

20.0
NOX

change ports

17.5 O2
S1.2

17.5
NOX

17.50 O2
S1.1

17.0 NOX

100 80

100 80

CHART NO. 1000
CANADA

100

80

END 30% test 12:00 Noon

17.00 O ₂	51.1	16.5 NOx
-------------------------	------	-------------

17.0 O ₂	51.2	12.50 NOx
------------------------	------	--------------

change parts

17.00 O ₂	56.6	20.0 NOx
-------------------------	------	-------------

17.00 O ₂	56.7	20.0 NOx
-------------------------	------	-------------

change parts

17.0 O ₂	57.1	15.0 NOx
------------------------	------	-------------

17.0 O ₂	57.2	17.5 NOx
------------------------	------	-------------

17.0 O ₂	57.3	17.0 NOx
------------------------	------	-------------

17.12 O ₂	57.4	18.0 NOx
-------------------------	------	-------------

↑ RUN 3 30% load ↑
 O₂ zero →
 NOx zero →

O₂ CAL = 12.0
 CAL GAS = 11.7

17.25 O₂ 51.1 20.0 NOx

Change ports

17.25 56.7 24.0 NOx

17.37 56.6 23.5

Change ports

17.25 51.2 21.5 NOx

17.25 O₂ 51.1 21.5 NOx

100 = 250 PPM
100 = 25% O₂

RUN 1

50% Load GAS
7-25-89 12:10 PM

O₂ CAL 20.9

NOx
Zero

NOx CAL GAS 152.6

NOx 159

CAL GAS 11.7

O₂ CAL 11.7%

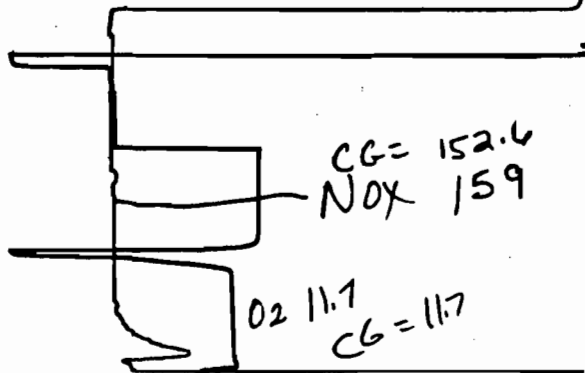
END 30% test 12:00
NOx

17.00 O₂ 51.1 16.5 NOx

16.89 O ₂	S7.1	16.0 NOX
16.89 O ₂	S7.2	22.5 NOX
16.87	S7.3	23.00
17.00	S7.4	23.00

Start Run 2 509 GAS
2:33 PM

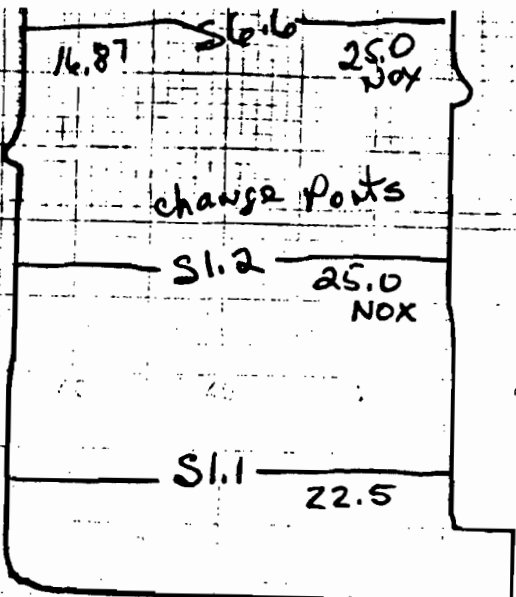
Zero NOX + O₂ →



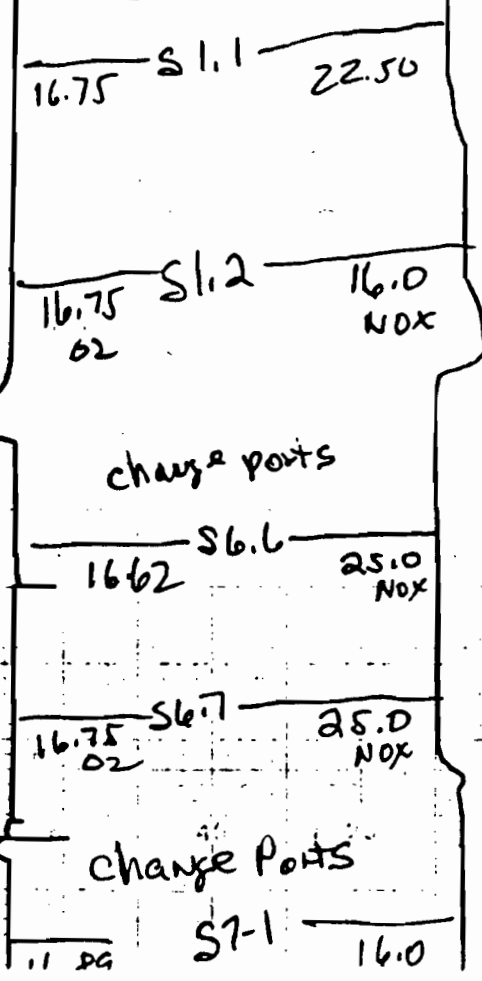
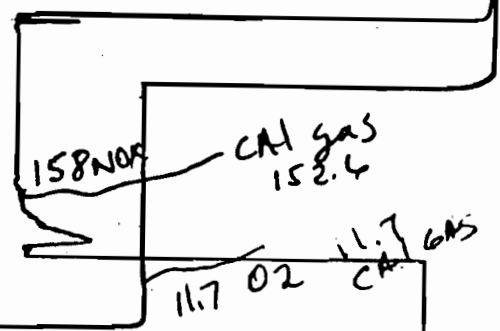
17.25 O ₂	S7.4	22.0 NOX
17.25	S7.3	20.0 NOX
17.25 O ₂	S7.2	12.0 NOX
17.25 O ₂	S7.1	20.0 NOX

change ports

MADE IN CANADA QUART NO. 59001



RUN 3 50% load ↑
Zero CAI →



LINE TYPE: SOLID LINE, DASH LINE, MADE BY: ANSYS CHART

\leftarrow 87.4
 15.75
 NOX 3.6
 JUN 1 75% LOAD
 GAS 8-25-F9
 13:26

Zero \rightarrow

NOX Mid 15.6
 O₂ Mid 16.7

16.75 O₂ 87.4
 23.0 NOX

16.75 O₂ 87.3
 22.0 NOX

16.75 O₂ 87.2
 21.5 NOX

16.75 O₂ 87.1
 14.0

Change Points

16.87 O₂ 86.7
 25.0 NOX

16.87 O₂ 86.6
 25.0 NOX

change points

100 80

15.50 51.1 20 NIX

15.50 51.2 25.0 NIX

change parts

15.45 56.6 39.0

15.50 56.7 39.0

change parts

15.50 DC 57.1 28.8 NIX

15.50 DC 57.2 25

15.50 DC 57.3 28.5 NIX

15.75 57.4 28.5 NIX

RUN 1 75% LOAD
GAS 7-25-F9
13:24

100

100

Nox cal 155.0
O2 cal 11.7

15.70 O2 57.4 29.50

15.70 O2 57.3 29.80
not

15.70 O2 57.2 27.0
NOx

15.70 O2 57.1 17.5
NOx

change ports

15.5 O2 56.7 37.0

15.62 O2 56.6 38.50

change ports

16.00 O2 51.2 30.0
NOx

51.1 28.0
NOx

Run 2 75% Load
GAS 7-28-89

Zero cal →

159.5
Nox
mid cal

O2 mid cal
11.7

100 80

Sl.1 — 35.0 NOx
14.80 O2

↑ 2:44 GAS Turbine A 7-25-89
Start RUN 1 100% load
Zero CAI O2 →
NOx →

158.7 NOx
12.0 O2

Step 2:38 PM

Sl.1 — 15.00 NOx
15.87 O2

Sl.2 — 13.5 NOx

change ports

Sl.6 — 35.00 NOx
15.75 O2

Sl.7 — 38.5 NOx
15.75 O2

change ports

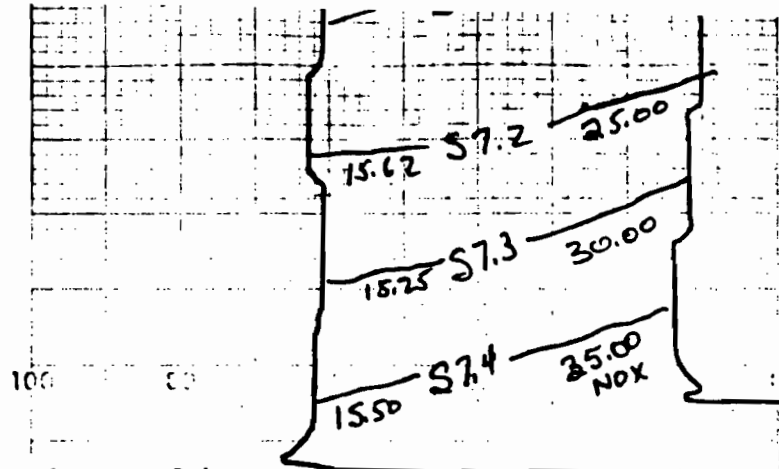
Sl.7.1 — 25.00 NOx
16.00 O2

Sl.7.2 — 15.00 NOx
16.00 O2

Sl.7.3 — 18.00 NOx
16.00 O2

Sl.7.4 — 30.0 NOx
16.25 O2

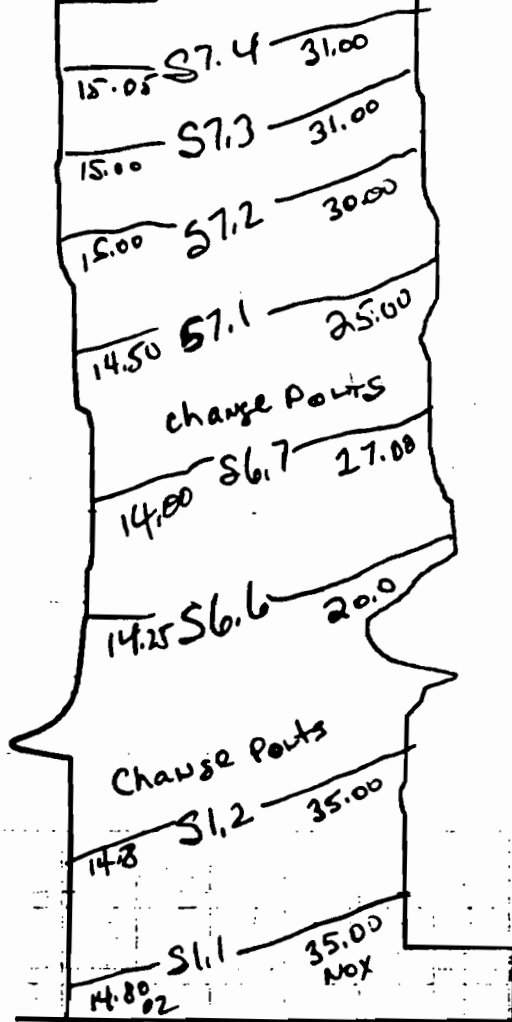
↑ Start RUN 3 75% load GAS
Zero O2 →
NOx →



↑ 3:10 PM
 Run 2 100% Load
 GAS 7-25-87 O₂ & Nox 2000 CAI →

Nox CAI 156

O₂ CAI 11.9



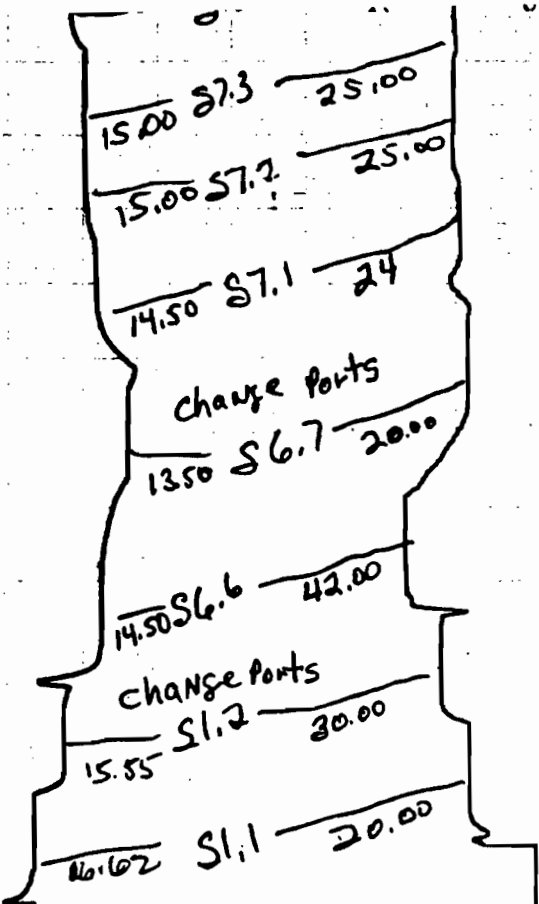
change Points

Change Points

↑ 2:44 GAS Turbine A 7-25-89
 Start Run 1 100% load
 cal O₂ →

MADE IN U.S.A.

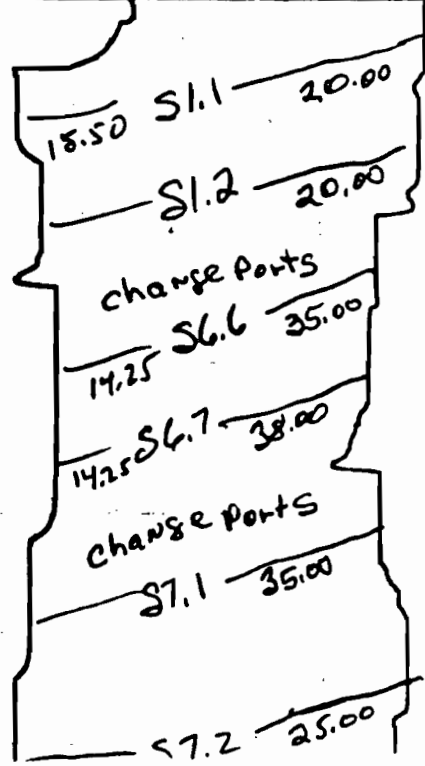
MADE IN THE U.S.A. ANGUS INDIANAPOLIS, IN

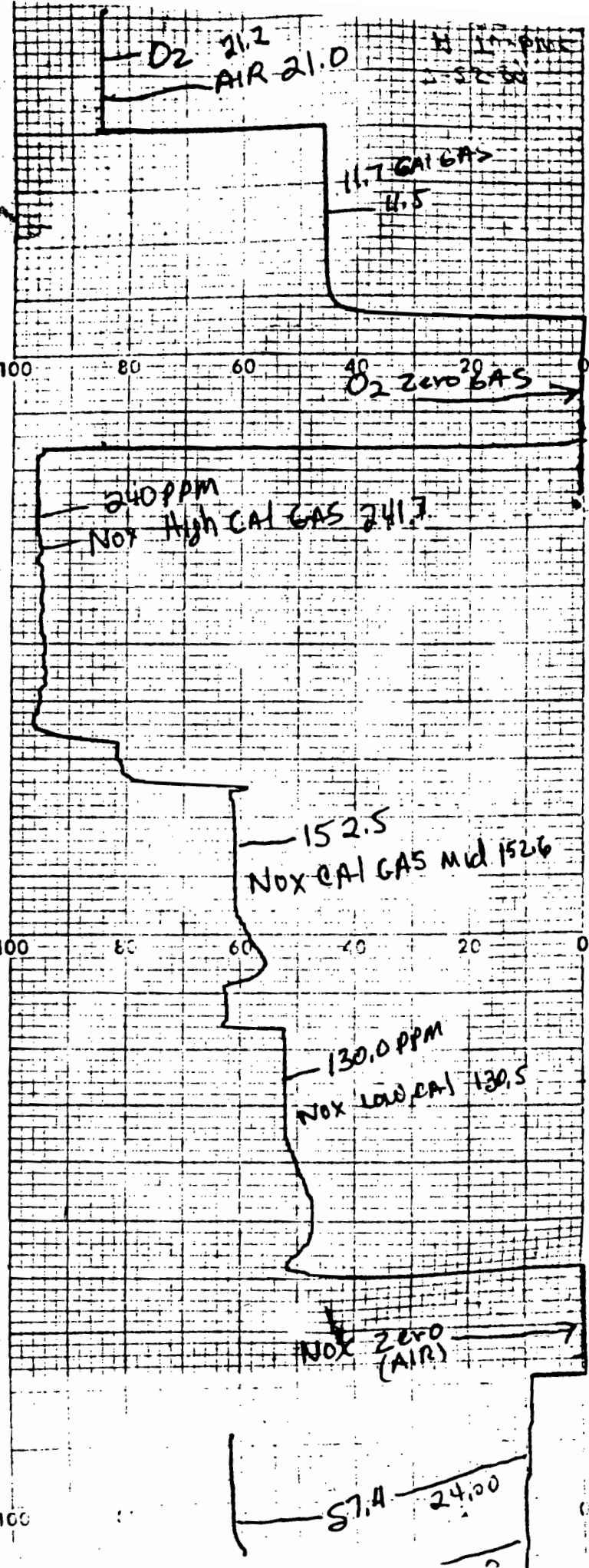


↑ Start Run 3 3:40 PM 100% load GAS
Zero CAI NOX + O2

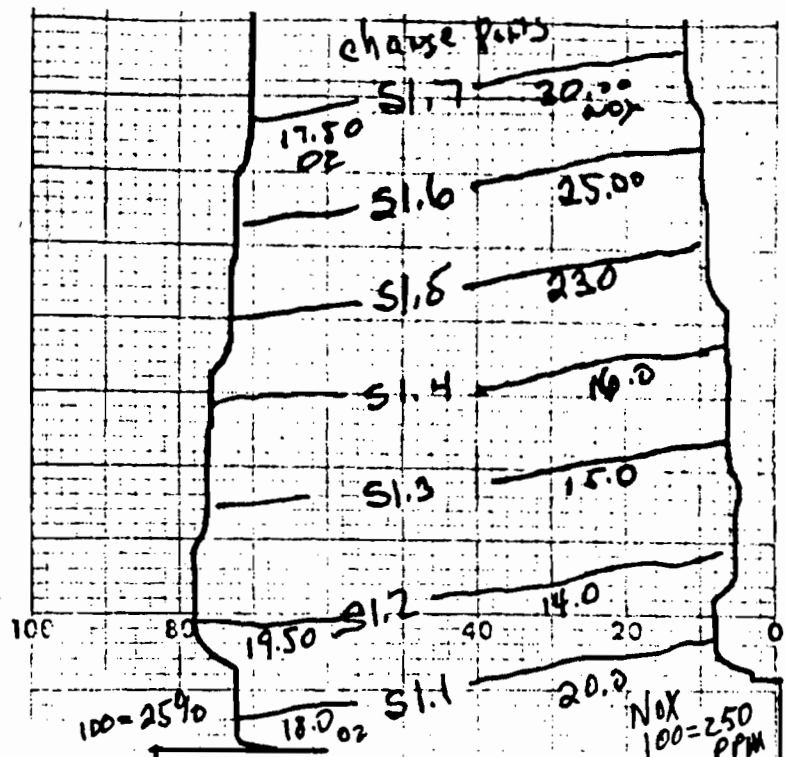
152.5
152.6 NOX CAI GAS

11.8 O2
CAI GAS 11.7





CANADA CHART No. 59001



RUN1 O₂ Traverse + Nox
 7-26-89 Turbine A Oil
 Start 8:23 AM

High Level NOx 240.0

High level O₂ 20.620

Mid level NOx 155.0

Low Level NOx 135

Mid Level O₂ 11.7

Zero NOx + O₂

7-26-89
 A Turbine

17.62	20	
17.62	55.3	36.0
18	55.2	01
19.0	25.1	200
Change Ports		
17.5	54.7	35.2
17.5	54.6	35.1
17.5	54.5	35
17.62	54.4	35
17.62	54.3	35.0
17.62	54.2	34.0
18.5	54.1	24.0
Change Ports		
17.50	53.7	34.1
17.5	53.6	34.0
17.50	53.5	34.0
17.50	53.4	34.00
17.50	53.3	33.00
17.50	53.2	32.25
17.62	53.1	26.0
Change Ports		
17.50	52.7	32.00
17.50	52.6	32.50
17.50	52.5	32.50
17.50	52.4	31.0
17.50	52.3	29.0
17.75	52.2	24.9
	52.1	27.0

100

100

0000

18.12	27.7	32.5
18.12	27.6	32.5
18.12	27.5	32.5
18.75	27.4	25.4
18.75	27.3	25.2
	27.2	20.0

20.28 27.1 10

change ports

17.87	27.7	35.0
17.62	26.6	35.2 ADM Nox
17.62	26.5	35.2
17.75	26.4	35.0
18.0	26.3	32.5
18.8	26.2	25
18.0	26.1	29.0

change ports

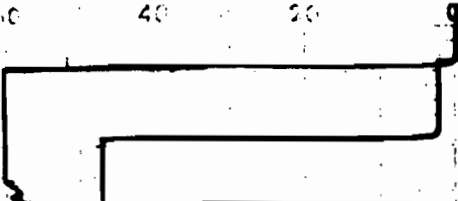
18.31	25.7	30
18.19	25.6	31
18.00	25.5	33
17.62	25.4	35.5
17.62	25.3	36.0
18	25.2	31
19.0	25.1	200

change ports

17.5	24.7	35.2
17.5	24.6	25.1
17.5	24.5	35
17.5	24.4	35

100

100



14.85	S3.2	25.0
16.87	S3.3	25.5
16.87	S3.4	25.5
16.87	S3.5	26.00
16.87	S3.6	27.00
16.87	S3.7	27.00
Change Points		
17.0	S2.6	27.00
17.00	S2.7	27.5

Start RUN 2 30% oil
9:56 AM Turbine A

Zero CAI O₂
+ NOx

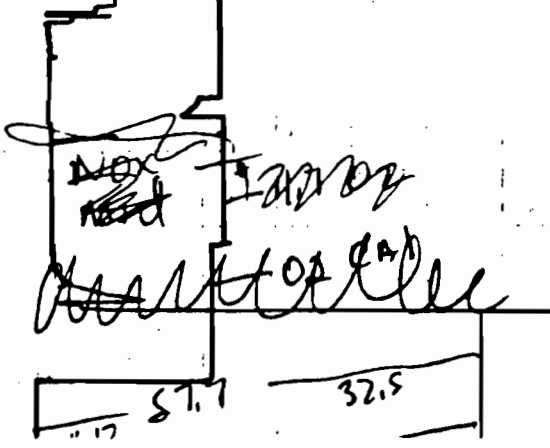
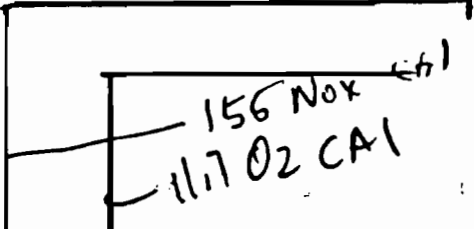


CHART No. 59001

18.00	S3.2	20
18.06	S3.3	19.0
18.00	S3.4	20
16.50	S3.5	34.75
16.50	S3.6	35.0
16.56	S3.7	35.5
change ports		
16.62	S2.6	35.5
16.81	S2.7	35

10:53 AM Start Run 1 50% oil

Zero cal O₂ + Nox →

17.25	S2.7	29.5
17.25	S2.6	30
change ports		
17.31	S3.7	30
17.44	S3.6	30
17.50	S3.5	30
17.50	S3.4	28.0
17.56	S3.3	27.0
	S3.2	25.0

MADE IN CANADA

100 EC
15.94 52.7 36.5
15.94

↑ 11:42 AM Start Run 3 50% Turbine A

Mid NOx 155
Mid O2 11.7

Stop 11:38 AM

16.0 52.7 35.5

16.00 52.4 35.5

Change Points
15.87 53.7 36

15.87 53.6 36

15.87 53.5 35

16.00 53.4 34.0

17.75 53.3 20.0

18.00 53.2 17.5

↑ 5 Run 2 50% Oil Turbine A
Start 11:15 AM

Zero Cal O2 stop →

NOx Cal 155

O2 Cal 11.7

18.00 53.2 20

INDIANAPOLIS, IND., U.S.A.
1000

15.12	S3.2	55
change points		
15	S3.7	55
15.00	S3.6	55
15.00	S3.5	55
15.0	S3.4	62.0
14.97	S3.3	48.5
15.5	S3.2	47.0
12:08 AM RUN 1 75% Load (OIL)		

Zero O₂ & NO_x →

MID Range NO_x 15.6

MID Range O₂ 11.7

17.62	S3.2	16
	S3.3	27.0
	S3.4	31
15.94	S3.5	34.7
15.94	S3.6	37
15.94	S3.7	37.0
change points		
15.94	S2.6	36.5
15.94	S2.7	36.5

↑ 11:42 AM start Run 3 50% Turbine A

100
15.75 3.2 45
start Run 3 75% oil
12:58 AM

zero O₂ + NO_x →

NO_x = 156
O₂ = 11.7

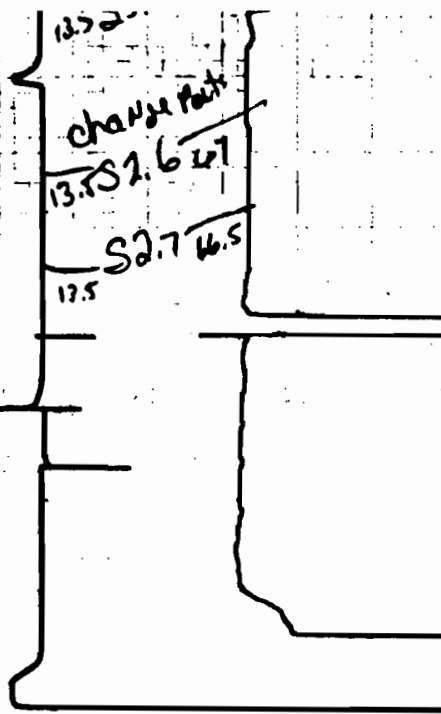
15.2 44.5
63.3
53.4
15 53.5 53.5
15 53.6 53.5
15.00 53.7 54.00
change ports
15.00 52.6 54.00
15.25 52.7 52.5

start Run 2 75% 12:33 AM
zero CA/O₂ + NO_x →

NO_x CA 156
O₂ CA 117

15.2 52.7 55

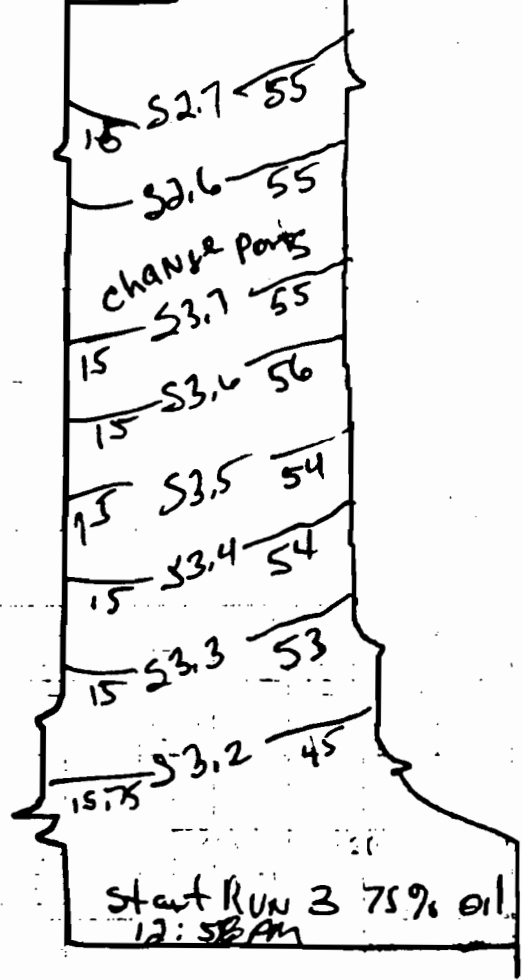
Start \uparrow
 7-26-89 1:46 PM
 100% LOAD
 OIL
 Turbine A



Zero CAI O₂ + Nox →

NOX CAI
 155

O₂ CAI 11.7



15	S2.6	60
change points		
15	S3.7	61
15	S3.6	62
15.0	S3.5	62
15	S3.4	60
15.25	S3.3	60
16.00	S3.2	50

start 2:10 Run 2 10090
 7-26-85 OIL
 zero O₂ + NOx cal →

O₂ cal 11.7

	S3.2	50
13.5	S3.3	64.5
13.5	S3.4	65
13.5	S3.5	64
13.5	S3.6	65
13.5	S3.7	67
change points		

↑ 11:20 AM

ANALYSIS CHART NO. 10001

14.5
5:24 PM
Restart RUN 3 At

Lost Water
2:41 PM

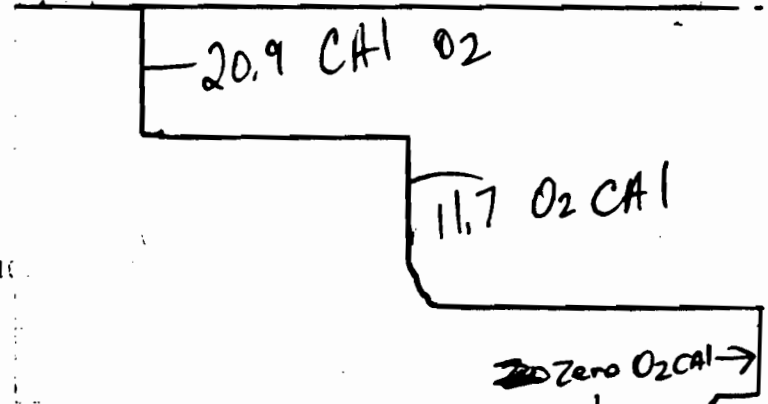
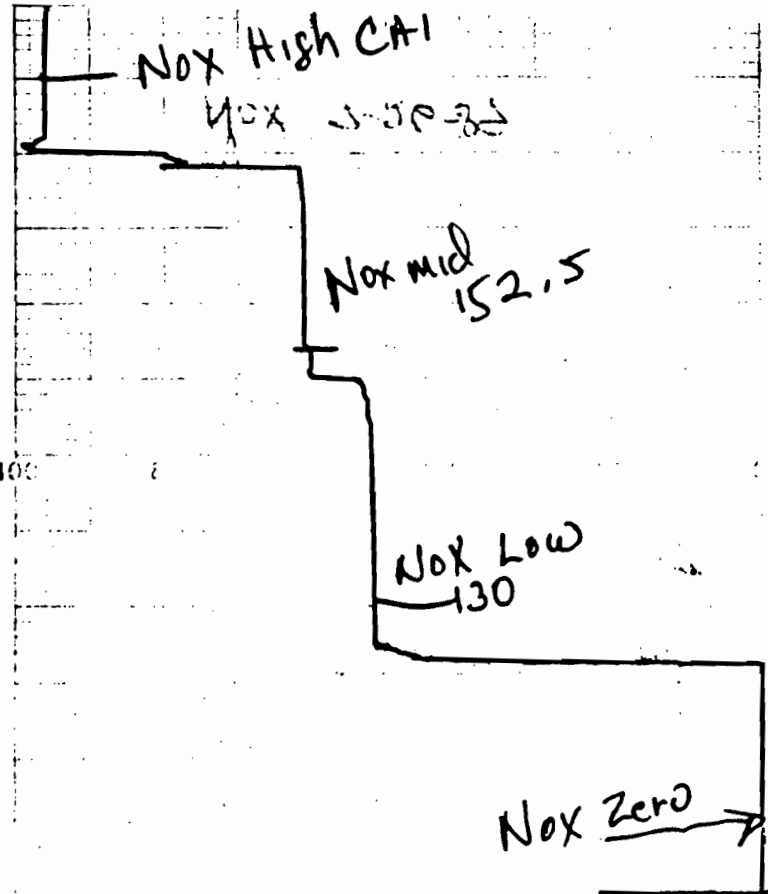
14.37	S3.4	59
14.37	S3.5	60
14.37	S3.6	60
14.35	S3.7	62
change points		
14.17	S2.6	60
14.17	S2.7	62.5

↑ start RUN 2 2:35 PM 100% boiler

zero CAI O₂ + NO_x →

NO_x CAI
O₂ CAI 16.7

150	S2.7	60
15	S2.6	60
change points		



14:50 53.2 55

14:15 53.3

5:24 PM
Restart RUN 3 At

Detailed description: A series of handwritten notes and a time stamp. The first two lines show a value of 53.2 at 14:50 and 53.3 at 14:15. Below that is a time stamp '5:24 PM' followed by 'Restart RUN 3 At'.

Lost Water
2:41 PM

Detailed description: A handwritten note at the bottom of the page stating 'Lost Water' at '2:41 PM'.

Particulate Test Data

Particulate Field Data Sheet

Client DUC			Date 7-26-89	Page 1 of 2																				
Project No. 89-093		Operator CSU		Orsat Analysis <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CO₂</td> <td style="width: 25%;">+O₂</td> <td style="width: 25%;">O₂</td> <td style="width: 25%;">CO</td> </tr> <tr> <td style="text-align: center;">4.0</td> <td style="text-align: center;">17.5</td> <td style="text-align: center;">13.5</td> <td style="text-align: center;">—</td> </tr> <tr> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> </tr> <tr> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> </tr> <tr> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> </tr> </table>	CO ₂	+O ₂	O ₂	CO	4.0	17.5	13.5	—	—	—	—	—	—	—	—	—	—	—	—	—
CO ₂	+O ₂	O ₂	CO																					
4.0	17.5	13.5	—																					
—	—	—	—																					
—	—	—	—																					
—	—	—	—																					
Sampling Location Indian River CTA			Run No. 2																					
Filter No. 89-251	Acetone No.	Condensate 70 ml																						
Barometric Pressure 30.33	Static Pressure +5.1	Probe Number N-7-3																						
Nozzle Diameter .250	Nozzle Number	Pitot Coefficient .84	Pitot Number N7-3																					
Meter Corr. Factor 1.00	Meter-Orifice 65-2																							
Sample Pl. Time 2 min	Assumed % Moisture 5	Leak Test Before .016 e15" After .028 e15"																						

Sample Point	ΔP	√ΔP	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out		
START 5:30											870.870
A 1	5.00	2.236	1.30	985	520		260	95	95	3	874.52
2	5.20	2.280	1.36	991	547		246	95	95	3	878.15
3	3.60	1.897	.94	1004	589		237	95	95	3	880.03
4	3.00	1.732	.78	1007	392		248	95	95	3	882.42
5	1.80	1.342	.47	1009	372		263	95	95	3	884.375
B 1	3.70	1.924	.96	1008	424		266	95	95	3	887.03
2	2.90	1.703	.76	1013	377		272	95	95	3	889.70
3	1.95	1.396	.51	1014	372		252	95	95	3	891.62
4	.95	.975	.25	1014	519		250	95	95	2	893.14
5	.33	.574	.09	1013	421		257	95	95	2	893.940
C 1	4.50	2.121	1.17	1010	407		263	95	94	3	896.90
2	5.30	2.302	1.38	1015	415		260	95	94	3	900.27
3	4.95	2.225	1.29	1016	437		268	95	94	3	903.10
4	2.80	1.673	.73	1015	401		259	96	94	3	905.40
5	1.20	1.095	.31	1012	400		256	96	94	2	906.90
D 1	1.50	1.225	.39	994	315		262	96	94	1	908.59
2	2.60	1.612	.68	1014	425		259	96	94	2	910.82
3	2.30	1.517	.60	1015	441		258	96	94	2	912.90
4	4.10	2.025	1.07	1016	427		258	96	94	2	915.59
5	3.00	2.236	1.30	1016	401		258	96	94	2	918.67
E 1	.65	.806	.17	1004	371		254	96	94	1	919.78
2	.55	.742	.14	1002	417		260	96	94	1	920.80
3	.45	.671	.12	1016	429		257	96	94	1	921.72
4	1.00	1.000	.26	1011	411		259	96	94	1	923.10
5	.90	.949	.23	1014	401		250	95	94	1	924.745

Pitot Tube Leak Check: Before OK After OK

Integrated Bag Leak Check: Before _____ After _____

Particulate Field Data Sheet (Continued)

Client: <u>DOC CTA Run 2</u>				Project No. <u>89-093</u>				Date <u>7-26-89</u>			
Sample Point	ΔP	√ΔP	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out		
F 1	4.20	2.049	1.10	989	374		263	95	94	3	27.56
2	1.00	1.000	.26	1012	412		260	95	94	3	928.94
3	0	.000	.00	1014	424		251	95	94	3	928.94
4	0	.000	.00	1011	420		252	95	94	3	928.97
5	.20	.447	.05	1002	311		263	95	94	3	929.51
G 1	5.4	2.324	1.41	992	379		258	94	94	8	932.71
2	3.6	1.897	.94	1011	416		255	94	94	7	935.32
3	2.00	1.414	.52	915	420		259	94	94	6	937.10
4	1.40	1.183	.37	873	367		257	94	94	4	938.72
5	1.10	1.049	.29	807	315		261	94	94	4	939.711
	16.57	4.071									
		1.418	.63	996				95			67.841

Comments (Problems with Tested Facility or Testing Equipment):

Duct 8.83×12.25 $A = 108.21$
 Wet Weight = .013 = 7.80
 $0.2 = 12.00$ 16/hr

Particulate Field Data Sheet

Client <u>Orlando Utilities</u>				Date <u>7-27-89</u>	Page <u>1</u> of <u>2</u>
Project No. <u>89-093</u>		Operator <u>Bruce Woods</u>		Orsat Analysis	
Sampling Location <u>Turbine A 100 90 oil</u>		Run No. <u>3</u>			
Filter No. <u>89-260</u>	Acetone No. <u>3A</u>	Condensate <u>55</u>		CO ₂ <u>4.3</u>	+O ₂ <u>17.7</u>
Barometric Pressure <u>30.28</u>		Static Pressure <u>-1.3</u>	Probe Number <u>N-7-3</u>	O ₂ <u>13.4</u>	CO _____
Nozzle Diameter <u>.250</u>	Nozzle Number <u>C250</u>	Pitot Coefficient <u>.89</u>	Pitot Number <u>N-7-3</u>	<u>4.4</u>	<u>17.9</u>
Meter Corr. Factor <u>1.00</u>	Meter-Orifice <u>065-2</u>				
Sample Pl. Time <u>2 MIN</u>	Assumed % Moisture <u>3%</u>	Leak Test <u>.006 at 15"</u>		Before _____	After <u>.010 at 15"</u>

North Port

Sample Point	ΔP	√ΔP	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out		
Start	7:05 AM										941.803
A1	.95	.975	.25	1015	358	<70	263	79	78	1.0	943.15
2	1.60	1.265	.42	1008	400		248	80	78	1.0	944.89
3	2.50	1.581	.65	1000	389		247	80	78	1.0	947.07
4	2.20	1.789	.83	1003	390		270	80	79	1.0	949.52
5	4.40	2.098	1.14	1005	380		266	80	79	1.5	952.39
B1	.40	.622	.10	1000	300		226	80	79	1.0	953.26
2	.90	.949	.23	1002	345		229	80	79	1.0	954.56
3	1.50	1.225	.39	1006	346		231	81	79	1.0	956.24
4	2.50	1.581	.65	998	350		264	80	80	1.5	958.41
5	3.20	1.789	.83	1008	360		300	81	79	1.5	960.86
C1	1.60	1.265	.41	994	302		261	82	80	1.0	962.59
2	4.50	2.121	1.16	971	350		260	82	80	2.0	965.50
3	6.0	2.449	1.55	989	348		262	82	80	2.0	968.16
4	6.4	2.530	1.65	965	350		254	84	81	2.5	972.33
5	5.2	2.280	1.34	970	348		255	84	81	2.0	975.45
D1	5.8	2.408	1.50	982	320		257	84	81	2.0	978.75
2	5.6	2.366	1.45	955	334		246	84	81	2.0	981.99
3	4.7	2.168	1.26	978	346		248	84	81	2.0	985.01
4	2.6	1.612	.70	998	324		254	86	82	2.0	987.26
5	1.55	1.245	.41	970	301		277	87	82	2.0	989.00
E1	.65	.806	.17	1008	306		260	86	82	1.5	990.12
2	1.30	1.140	.35	1007	330		265	86	83	1.5	991.71
3	1.40	1.183	.37	1007	360		240	86	83	1.5	993.36
4	.95	.975	.25	1013	352		239	86	84	1.0	994.72
5	1.0	1.000	.27	1012	369		240	86	84	1.0	986.11
F1	.25	.500	.06	1000	289		261	86	84	1.0	996.80
2	.03	.173	.01	1000	305		259	86	84	1.0	997.04
3	.02	.141	.01	980	330		260	86	84	1.0	997.23
4	.28	.529	.07	1009	344		255	86	84	1.0	997.96
5	1.1	1.049	.28	1001	349		260	86	84	1.0	999.40

Pitot Tube Leak Check: Before OK After OK

Integrated Bag Leak Check: Before OK After OK

Particulate Field Data Sheet

Client <u>Orlando Utilities</u>		Date <u>7-27-14</u>	Page <u>2</u> of <u>2</u>
Project No. <u>89-093</u>	Operator <u>Bruce</u>		Orsat Analysis CO ₂ +O ₂ O ₂ CO
Sampling Location <u>A Turbine 100% oil</u>		Run No. <u>3</u>	
Filter No. _____	Acetone No. _____	Condensate _____	
Barometric Pressure <u>RUN 3 Second PAGE</u>		Static Pressure _____	
Nozzle Diameter _____		Probe Number _____	
Meter Corr. Factor _____		Pitot Coefficient _____	Pitot Number _____
Sample Pt. Time _____		Meter-Orifice _____	
Assumed % Moisture _____		Leak Test _____	Before <u>See Page 1</u> After _____

Sample Point	ΔP	√ΔP	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out		
											999.40
G-1	1.20	1.095	.31	998	311	670	249	88	84	1.00	1,000.90
2	1.15	1.072	.30	996	322	}	258	86	84	1.00	2.37
3	1.15	1.072	.30	1001	339		260	86	84	1.00	3.84
4	3.80	1.949	.98	1004	355		257	87	85	1.50	6.51
5	6.0	2.449	1.55	1001	348		253	87	85	2.0	9.874
stop											
8:21 AM									84		
		1.413	.63	996							

Pitot Tube Leak Check: Before OK After OK
 Integrated Bag Leak Check: Before OK After OK

Particulate Field Data Sheet

Client Orlando Utilities				Date 7-27-89	Page 1 of 2
Project No. 89-093		Operator Bruce Woods		Orsat Analysis	
Sampling Location Turbine A 10090 oil		Run No. 4			
Filter No. 89-269	Acetone No. 4A	Condensate 125		CO ₂ 4.2	+O ₂ 17.8
Barometric Pressure 30.28		Static Pressure -1.8	Probe Number N7-3	O ₂ 13.6	CO
Nozzle Diameter .250	Nozzle Number C250	Pitot Coefficient .84	Pitot Number N7-3	4.0	17.6
Meter Corr. Factor 1.00	Meter-Orifice 65-2				
Sample Pt. Time 2 min	Assumed % Moisture 79.0	Leak Test .012 @ 15" O		Before .014 @ 17"	After .014 @ 17"

Sample Point	ΔP	√ΔP	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out		
Start	8:43 AM										10.803
A1	1.125	1.061	.29	986	250	270	246	88	87	1.00	12.26
2	1.90	1.378	.49	989	299		257	88	88	1.50	14.15
3	2.70	1.643	.70	1002	300		261	88	87	1.50	16.40
4	4.70	2.168	1.21	1001	339		267	89	88	2.0	19.37
5	5.6	2.366	1.47	991	358		254	89	87	2.0	22.64
B1	.25	.500	.07	998	312		262	90	88	1.0	23.33
2	.22	.469	.06	1003	327		260	90	88	1.0	23.98
3	.70	.837	.18	1004	340		257	90	88	1.0	25.14
4	2.00	1.414	.53	1012	358		246	91	89	1.50	27.10
5	2.60	1.612	.68	1011	362		244	91	89	2.00	29.33
C1	1.25	1.118	.33	1003	321		254	91	89	1.50	30.88
2	1.20	1.095	.32	1004	332		256	91	89	1.50	32.39
3	3.50	1.871	.92	1011	340		251	93	90	2.00	34.98
4	6.2	2.490	1.63	1013	344		255	93	90	2.50	38.42
5	4.7	2.168	1.24	1002	339		250	93	90	2.00	41.42
D1	5.4	2.324	1.42	1010	344		256	94	91	2.00	44.63
2	5.6	2.366	1.47	1011	350		254	94	91	2.00	47.90
3	4.50	2.121	1.18	999	360		250	95	91	2.00	50.83
4	2.6	1.612	.68	985	352		254	95	91	2.00	53.06
5	2.0	1.414	.53	960	344		258	96	92	1.50	55.02
E1	.80	.894	.21	1010	320		242	96	93	1.00	56.26
2	1.05	1.025	.28	1015	330		245	96	93	1.50	57.68
3	1.05	1.025	.28	1003	363		247	97	93	1.50	59.09
4	.90	.949	.24	986	371		251	97	94	1.50	60.40
5	.70	.837	.18	980	337		259	97	94	1.50	61.55
F1	.40	.632	.11	1008	320		263	97	95	1.0	62.42
2	.25	.500	.07	964	337		249	97	95	1.0	63.12
3	.05	.224	.01	947	347		242	98	96	1.0	63.27
4	.60	.775	.16	1006	378		243	98	96	1.0	64.34
5	3.60	1.897	.95	998	319		247	98	96	1.5	66.96

Pitot Tube Leak Check: Before OK After OK
 Integrated Bag Leak Check: Before OK After OK

Particulate Field Data Sheet (Continued)

Client <u>OUC CTA 0-1 Run 4</u>				Project No.				Date <u>7-27-89</u>			
Sample Point	ΔP	$\sqrt{\Delta P}$	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out		
G 1	1.10	1.049	.29	1012	391		243	98	96	1.0	68.41
2	1.70	1.304	.45	1012	357		250	98	96	1.0	70.21
3	2.70	1.643	.71	1016	372		249	99	96	1.5	72.48
4	4.60	2.145	1.21	1016	315		247	99	96	2.5	75.45
5	5.40	2.324	1.42	1011	319		247	99	96	3.0	78.617
STOP 10:02											
		1.407	.63	999				94			67.814

Comments (Problems with Tested Facility or Testing Equipment):

Particulate Field Data Sheet

20.71
16.97
19.14

27.01
19.36

Client: <u>Orlando utilities</u>			Date: <u>7-25-89</u>	Page: <u>1</u> of <u>2</u>
Project No.: <u>89-0</u>		Operator: <u>Bruce Woods</u>		
Sampling Location: <u>Turbine A</u>			Run No.: <u>1</u>	
Filter No.:	Acetone No.:	Condensate:		
Barometric Pressure:		Static Pressure:	Probe Number: <u>NOX 1</u>	
Nozzle Diameter: <u>N/A</u>	Nozzle Number: <u>N/A</u>	Pitot Coefficient:	Pitot Number:	
Meter Corr. Factor: <u>N/A</u>		Meter-Orifice: <u>TECO model 10A2</u>		
Sample Pl. Time: <u>3 MIN</u>	Assumed % Moisture:	Leak Test:	Before: <u>OK</u>	After: <u>OK</u>

Orsat Analysis			
CO ₂	+O ₂	O ₂	CO
N/A			

Sample Point	ΔP	√ΔP	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.	
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out			
	NOx	O ₂		5	NOx	O ₂						
X S11-1	16.0	16.25		5 51	16.0	17.37						
X 2	16.0	17.0		- 2	25.5	17.37	Point #		NOx	O ₂		
3	16.5	18.0		- 3	26.5	17.37		1	16.0	16.25		
4	14.0	17.75		- 4	25.9	17.37		2	16.0	17.00		
5	12.0	17.75		- 5	26.0	17.37		3	29.0	17.25		
6	9.0	17.56		- 6	27.0	17.37		4	28.50	17.13		
7	8.25	17.50		7	28.80	17.37		5	21.80	17.12		
S21	18.0	18.0		S61	26.60	17.45		6	22.00	17.00		
2	17.0	17.95		2	27.50	17.45		7	22.00	17.00		
3	15.9	17.95		3	27.50	17.45		8	22.00	17.00		
4	16.0	17.75		4	27.0	17.45						
5	16.0	17.50		X 5	27.50	17.37	Average	22.16	16.97			
6	19.80	17.50		- 6	29.0	17.25						
7	14.0	17.50		X - 7	28.50	17.13						
S31	11.80	17.50		X 571	19.0	17.25						
2	22.80	17.50		2	22.0	17.25						
3	22.40	17.50		3	22.0	17.25						
4	22.0	17.50		X 4	21.80	17.12						
5	22.50	17.50		X 5	22.0	17.00						
6	22.5	17.50		X 6	22.0	17.00						
7	24.0	17.46		X 7	22.0	17.00						
S41	23.60	17.50										
2	25.60	17.50										
3	24.0	17.50										
4	24.0	17.46										
5	24.0	17.46										
6	24.50	17.46										
7	24.0	17.46										

Pitot Tube Leak Check: Before N/A After N/A

Integrated Bag Leak Check: Before N/A After N/A

Particulate Field Data Sheet

Client Orlando Utilities					Date 7-25-89		Page 1 of 2																	
Project No.			Operator B. Wood			Orsat Analysis <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; border-bottom: 1px solid black;">CO₂</td> <td style="width: 25%; border-bottom: 1px solid black;">+O₂</td> <td style="width: 25%; border-bottom: 1px solid black;">O₂</td> <td style="width: 25%; border-bottom: 1px solid black;">CO</td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> </table>			CO ₂	+O ₂	O ₂	CO												
CO ₂	+O ₂	O ₂	CO																					
Sampling Location TURB A 30 90			Run No. 2 + 3																					
Filter No.		Acetone No.		Condensate																				
Barometric Pressure			Static Pressure		Probe Number																			
Nozzle Diameter		Nozzle Number		Pitot Coefficient		Pitot Number																		
Meter Corr. Factor			Meter-Orifice																					
Sample Pt. Time PPM			Assumed % Moisture			Leak Test Before _____ After _____																		
Sample Point	NO _x	O ₂	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.													
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out															
	30%	LOAD																						
S1.1	17.00	17.50																						
S1.2	17.50	17.50																						
S6.6	20.0	17.12																						
S6.7	18.0	17.31																						
S7.1	10.0	17.20																						
S7.2	15.0	17.30																						
S7.3	18.0	17.30																						
S7.4	19.0	17.30																						
	16.81	17.32																						
	12.5	17.00																						
S1.1	12.5	17.00																						
S1.2	12.5	17.00																						
S6.6	20.00	17.00																						
S6.7	20.00	17.00																						
S7.1	15.00	17.00																						
S7.2	17.50	17.00																						
S7.3	17.0	17.00																						
S7.4	18.0	17.12																						
	17.06	17.01																						
Stop	12:00	NOON																						

RUN 2

RUN 3

27.70 PPM Corrected

25.87 PPM corrected

Pitot Tube Leak Check: Before _____ After _____
 Integrated Bag Leak Check: Before _____ After _____

Particulate Field Data Sheet

Client <u>Orlando utilities</u>			Date <u>7-25-89</u>	Page <u>1</u> of <u>2</u>
Project No. <u>89-</u>		Operator <u>Ben Wood</u>		Orsat Analysis CO ₂ +O ₂ O ₂ CO _____ _____ _____ _____ _____
Sampling Location <u>A Turbine 50% Load (GAS)</u>			Run No. _____	
Filter No. _____	Acetone No. _____	Condensate _____		
Barometric Pressure _____		Static Pressure _____	Probe Number <u>NOX 1</u>	
Nozzle Diameter _____	Nozzle Number _____	Pitot Coefficient _____	Pitot Number _____	N/A
Meter Corr. Factor _____		Meter-Orifice _____		
Sample Pl. Time _____		Assumed % Moisture _____		Leak Test
				Before <u>OK</u>
				After <u>OK</u>

Sample Point	NOX	VSP	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out		
Run 1	NOX	0.2	12:10 AM								
S1.1	21.50	17.25									
S1.2	21.50	17.25									
S6.6	23.5	17.37									
S6.7	24.0	17.25									
S7.1	20.0	17.25									
S7.2	12.0	17.25									
S7.3	20.0	17.25									
S7.4	22.0	17.25									
	20.56	17.26									
Run 2	23.00	17.00									
S7.4	↓	↓									
S7.3	23.00	16.87									
S7.2	22.5	16.87									
S7.1	16.0	16.87									
S6.7	25.0	16.75									
S6.6	25.0	16.62									
S1.2	16.0	16.75									
S1.1	22.50	16.75									
	21.62	16.81									
Run 3											
S1.1	22.5	17.00									
S1.2	25.0	17.00									
S6.6	25.0	16.87									
S6.7	25.0	16.87									
S7.1	14.0	16.75									
S7.2	21.5	16.75									
S7.3	22.0	16.75									
S7.4	20.0	16.75									
	22.25	16.84									

33.3

31.19

32.33

Ambient Temp OF — 89
 Rel Humidity — 74
 PB — 30.36
 (33.3) ppm NOx corrected

Ambient Temp — 89
 Rel Humidity — 74
 PB — 30.36
 (31.19) ppm NOx corrected

Ambient Temp — 89
 Rel Humidity — 74
 PB — 30.36
 (32.33) ppm NOx corrected

Pitot Tube Leak Check: Before N/A After N/A
 Integrated Bag Leak Check: Before N/A After N/A

Particulate Field Data Sheet

Client <u>Orlando utilities</u>			Date <u>7-25-89</u>	Page <u>1</u> of <u>2</u>
Project No. <u>89-</u>		Operator <u>Ed Wood</u>		Orsat Analysis CO ₂ +O ₂ O ₂ CO <u>N/A</u>
Sampling Location <u>A Turbine 75% Load (GAS)</u>			Run No. <u>1, 2, 3</u>	
Filter No. _____	Acetone No. _____	Condensate _____		
Barometric Pressure <u>30.36</u>		Static Pressure _____	Probe Number <u>Nox 1</u>	
Nozzle Diameter _____	Nozzle Number _____	Pitot Coefficient _____	Pitot Number _____	
Meter Corr. Factor _____		Meter-Orifice <u>TECO 10AR</u>		
Sample Pl. Time _____	Assumed % Moisture _____	Leak Test		Before <u>OK</u> After <u>OK</u>

Sample Point	ΔP	√ΔP	ΔH	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out		
<u>Run 1</u>	<u>Nox</u>	<u>O2</u>		<u>13:24 START</u>							
<u>S7.4</u>	<u>36.0</u>	<u>15.75</u>									
<u>S7.3</u>	<u>30.6</u>	<u>15.63</u>					<u>Ambient Temp</u>	<u>90°</u>			
<u>S7.2</u>	<u>28.6</u>	<u>15.50</u>					<u>Rel Humidity</u>	<u>69%</u>			
<u>S7.1</u>	<u>28.8</u>	<u>15.50</u>					<u>PP</u>	<u>30.36</u>			
<u>S6.7</u>	<u>39.0</u>	<u>15.50</u>			<u>34.92</u>	<u>PPM</u>	<u>Nox corrected</u>				
<u>S6.6</u>	<u>39.0</u>	<u>15.45</u>									
<u>S1.2</u>	<u>25.0</u>	<u>15.50</u>									
<u>S1.1</u>	<u>20.0</u>	<u>15.50</u>									
	<u>21.72</u>	<u>15.54</u>									
<u>Run 2</u>	<u>28.0</u>	<u>16.12</u>									
<u>S1.1</u>	<u>20.0</u>	<u>16.00</u>									
<u>S1.2</u>							<u>Ambient Temp</u>	<u>91°</u>			
<u>S6.6</u>	<u>39.50</u>	<u>15.62</u>					<u>Rel Humidity</u>	<u>66%</u>			
<u>S6.7</u>	<u>37.0</u>	<u>15.50</u>					<u>PB</u>	<u>30.36</u>			
<u>S7.1</u>	<u>17.5</u>	<u>15.70</u>			<u>33.98</u>	<u>PPM</u>	<u>Nox corrected</u>				
<u>S7.2</u>	<u>27.0</u>	<u>15.70</u>									
<u>S7.3</u>	<u>29.80</u>	<u>15.70</u>									
<u>S7.4</u>	<u>29.50</u>	<u>15.70</u>									
	<u>29.66</u>	<u>15.75</u>									
<u>Run 3</u>											
<u>S7.4</u>	<u>30.00</u>	<u>16.25</u>									
<u>S7.3</u>	<u>18.00</u>	<u>16.00</u>									
<u>S7.2</u>	<u>15.00</u>	<u>16.00</u>					<u>Ambient temp</u>	<u>91°</u>			
<u>S7.1</u>	<u>25.00</u>	<u>16.00</u>					<u>Rel Humidity</u>	<u>64%</u>			
<u>S6.7</u>	<u>38.5</u>	<u>15.75</u>					<u>PB</u>	<u>30.36</u>			
<u>S6.6</u>	<u>25.00</u>	<u>15.75</u>			<u>28.25</u>	<u>PPM</u>	<u>Nox corrected</u>				
<u>S1.2</u>	<u>13.50</u>	<u>15.87</u>									
<u>S1.1</u>	<u>15.00</u>	<u>15.87</u>									
	<u>23.75</u>	<u>15.94</u>									

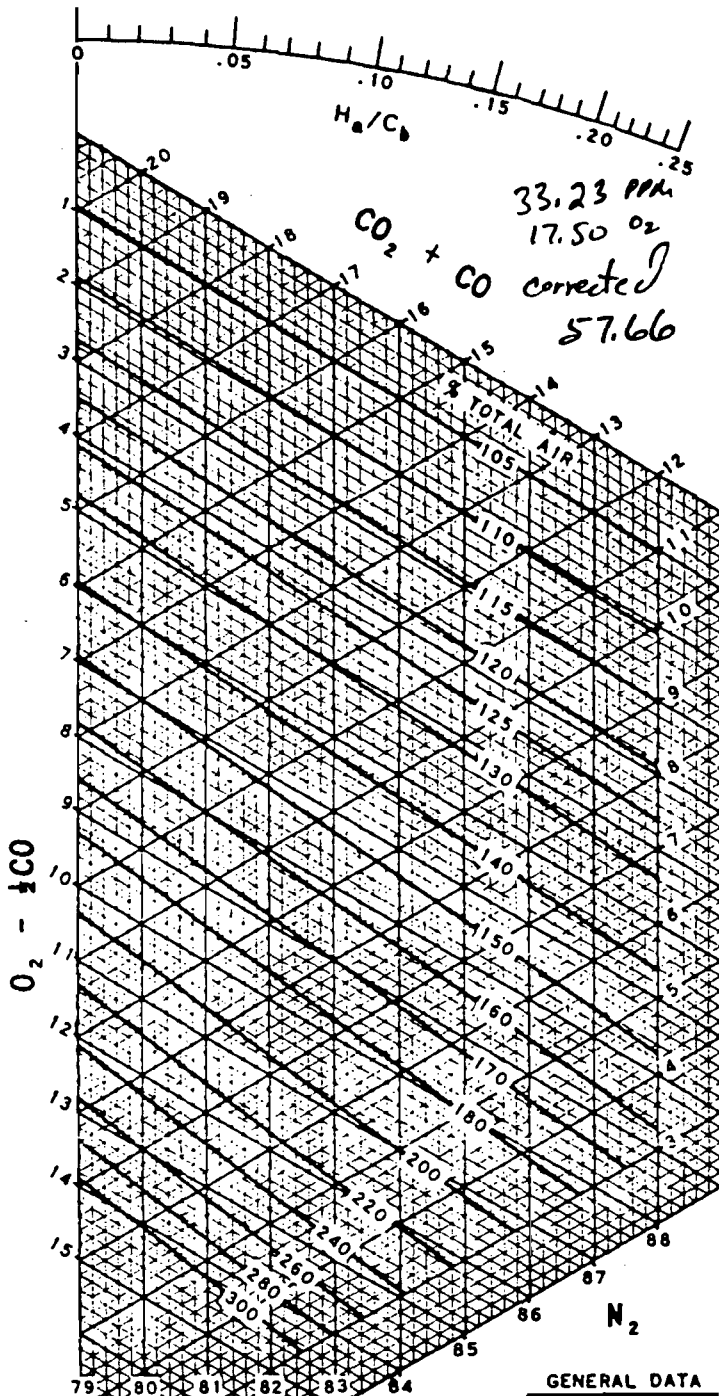
Pitot Tube Leak Check: Before OK After OK
 Integrated Bag Leak Check: Before OK After OK

Particulate Field Data Sheet

Client: <u>Orlando Utilities</u>			Date: <u>7-25-89</u>	Page: <u>1</u> of <u>2</u>
Project No.: <u>89-</u>		Operator: <u>Bruce Woods</u>		Orsat Analysis CO ₂ +O ₂ O ₂ CO <u>N/A</u>
Sampling Location: <u>A Turbine 100% Load (GAS)</u>			Run No. <u>1,2,3</u>	
Filter No. _____	Acetone No. _____	Condensate _____		
Barometric Pressure: <u>30.36</u>		Static Pressure _____	Probe Number: <u>NOX 1</u>	
Nozzle Diameter _____	Nozzle Number _____	Pitot Coefficient _____	Pitot Number _____	
Meter Corr. Factor _____		Meter-Orifice _____		
Sample Pl. Time _____	Assumed % Moisture _____	Leak Test: Before <u>OK</u> After <u>OK</u>		

Sample Point	NOX PPM	O ₂ % VER	AM	Temperature °F						Vac. Pr. (In. HG)	Dry Gas Meter Reading in Cu. Ft.
				Stack	Probe	Imp. Out	Oven	Meter In	Meter Out		
RUN1	Start	2.44 2.44	PM								
S1.1	36.0	14.8									
S1.2	35.0	14.8									
S6.6	20.0	14.25						Ambient Temp	92		
S6.7	27.00	14.00						Rel Humidity	69.1 %		
S7.1	25.00	14.50						PB	30.36		
S7.2	30.00	15.00						(27.70) PPM	NOX corrected to 15% O ₂		
S7.3	31.00	15.00									
S7.4	31.00	15.05									
	<u>29.25</u>	<u>14.67</u>									
RUN2	Start	3:10 PM									
S7.4	35.00	15.50									
S7.3	30.00	15.25						Ambient Temp	92		
S7.2	25.00	15.62						Rel Humidity	69 %		
S7.1	35.00	15.20						PB	30.36		
S6.7	38.00	14.25						(29.95) PPM	NOX corrected to 15% O ₂		
S6.6	35.00	14.25									
S1.2	20.00	14.75									
S1.1	20.00	15.50									
	<u>29.75</u>	<u>15.04</u>									
RUN3	Start	3:40 PM									
S1.1	20.00	16.62									
S1.2	30.00	15.55						Ambient Temp			
S6.6	42.00	14.50						Relative Humidity			
S6.7	20.00	13.50						PB			
S7.1	24.06	14.50						(26.34) PPM	NOX corrected to 15% O ₂		
S7.2	25.00	15.00									
S7.3	25.00	15.00									
S7.4	24.00	15.50									
	<u>26.25</u>	<u>15.02</u>									

Pitot Tube Leak Check: Before N/A After N/A
 Integrated Bag Leak Check: Before N/A After N/A



Unburned Loss $U = \left(1 - \frac{H_a/C_b}{H_a/C_b}\right) \frac{C_{cal} 6500}{\text{Btu/lb.}}$

Where:

$\frac{H_a}{C_b}$ is from gas analysis

$\frac{H}{C}$ Btu/lb. is from coal analysis

Note: For complete uniform combustion, all points should lie along straight line drawn through pivot point

GENERAL DATA

S.F. _____
A.F. _____

FUEL ANALYSIS

H _____
O _____
C _____
BTU/LB _____
H_a/C _____

Next

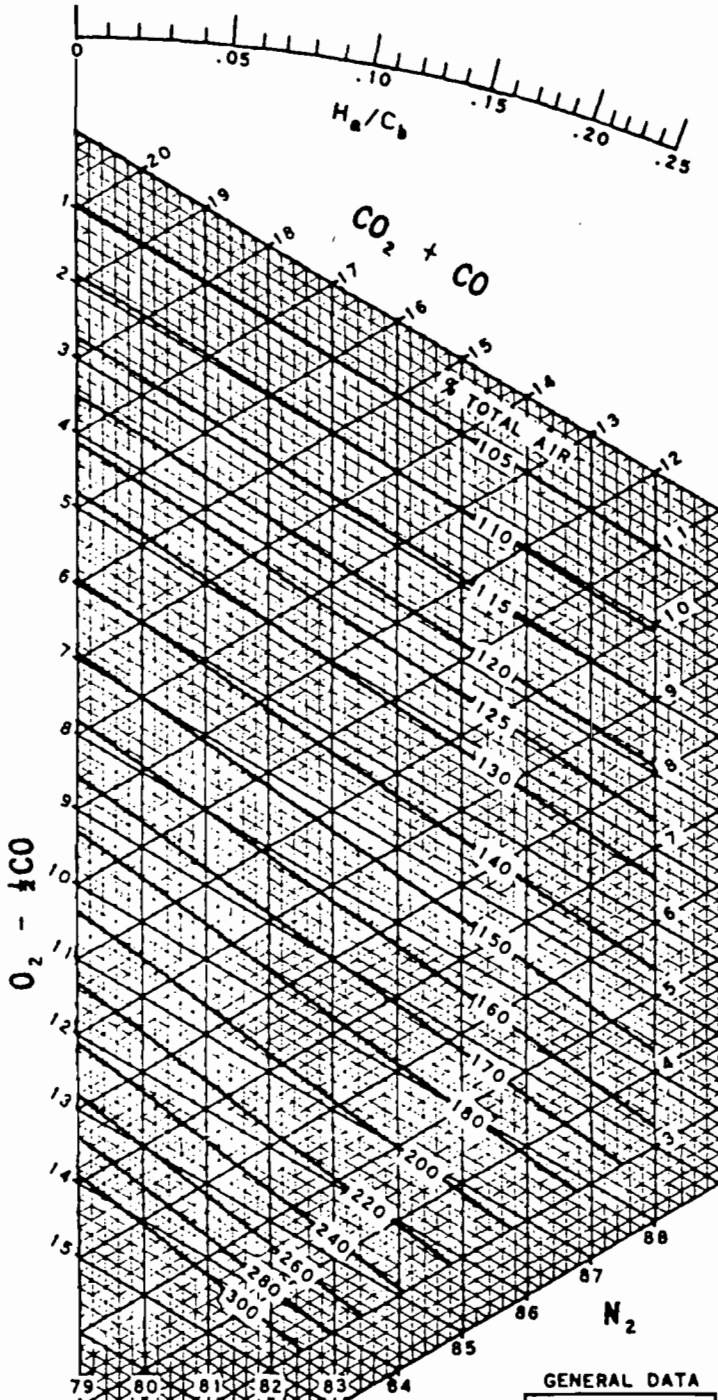
SUBJECT O₂ traverse Turbine A
oil fuel PAGE 1 of 2
78°F 91% RH 30.33 PB
4 Run 30% Load

FILE NO. _____
BY Bruce Woods
DATE 7-26-89
REV. 89-093



TIME	LOCATION	NOx			O ₂		corrected to 15% O ₂	
		CO _x	NO _x	NO	O ₂	CO ₂	NO _x	NO _x
8:23	S1.1		20.00		18.00		40.49	
	.2		14.0		19.5		59.00	
	.3		15.0		19.0			
	.4		16.0		19.0			
	.5		23.0		18.25			
	.6		25.00		18.00		50.90	
	.7		30.00		17.50			
	S2.1		27.00		18.00		54.93	
	2		21.9		17.75			
	3		29.0		17.50			
	4		31.0		17.50			
	5		32.50		17.50			
X	6		32.50		17.50		56.40	
X	7		32.00		17.50		55.53	
	S3.1		26.00		17.62			
X	2		32.25		17.50		55.96	
X	3		33.00		17.50		57.26	
X	4		34.00		17.50		59.00	
X	5		34.00		17.50		59.00	
X	6		24.0		17.5		59.00	
X	7		34.1		17.5		59.17	
	S4.1		24.0		18.5			
	2		24.0		17.62			
	3		35.0		17.62			
	4		35.0		17.62			
	5		35.0		17.5			
	6		35.1		17.5		60.91	
	7		35.2		17.5		61.08	
	S5.1		20.0		19.0		62.10	
	2		31.0		18.0			
	3		36.0		17.62			
	4		35.5		17.62			
	5		33.0		18.00			
	6		31.0		18.19			
	7		30.0		18.31			
	S6.1		29.0		18.0		59	
	2		25.0		18.8			
	3		32.5		18.0			
	4		35.0		17.75			
	5		35.2		17.62			
	6		35.3		17.69			
	7		35.6		17.87			

Aug 5, 1989



Unburned Loss % = $\left(1 - \frac{H_a/C_b}{C_{14500}}\right) \frac{C_{14500}}{H_a/C_b}$ Btu/lb.

Where:
 $\frac{H_a}{C_b}$ is from gas analysis

$\frac{H_a}{C}$ Btu/lb. is from coal analysis

Note: For complete uniform combustion, all points should lie along straight line drawn through pivot point

GENERAL DATA

S.F.
A.F.

FUEL ANALYSIS

H
O
C
BTU/LB
H _a /C

TIME	LOCATION	CO ₂	NO _x	F _{SO}	O ₂	CO	Corrected to 15% O ₂
			Nox		O ₂		
	57.1		10.0		20.8		
	2		20.0		19.43		
	3		25.2		18.75		
	4		25.4		18.75		
	5		32.5		18.12		
	6		32.5		18.12		
	7		32.5		18.12		
9:45							

SUBJECT Nox + O₂ Traverse Turbine A
 oil fuel Page 2 of 2
 & Run 1 30% load

FILE NO.
 BY 7-26-89
 DATE Dr. Wood
 REV. 89-093



SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A

Run No. 2

Plant Load 30% oil

Fuel Type oil

Relative humidity = 70%

Test Time:

Ambient Temp. 85°

Start 9:56 AM

Ambient Pressure 30.33

Finish 10:18 AM

Sample Point	Time	% O ₂	NO _x PPM	NO _x CORRECTED TO 15% O ₂
	Start			
S2.7	9:56 AM	17.00	27.5	41.60
S2.6		17.00	27.00	40.85
S3.7		16.87	27.00	39.53
S3.6		16.87	27.00	39.53
S3.5		16.87	26.00	38.06
S3.4		16.87	25.50	37.33
S3.3		16.87	25.50	37.33
S3.2	stop 10:18 AM	16.87	25.00	36.60
			Ave.	
				38.85

Test Performed By

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A

Run No. 3

Plant Load 30% oil

Fuel Type oil

Relative humidity 70%

Test Time:

Ambient Temp. 85

Start 10:23

Ambient Pressure 30.33

Finish 10:42

Sample Point	Time	% O ₂	NO _x PPM	NO _x CORRECTED TO 15% O ₂
S3.2	10:23	17.81	25.00	47.73
S3.3		17.56	27.00	47.69
S3.4		17.50	28.00	48.59
S3.5		17.50	30.00	52.06
S3.6		17.44	30.00	51.16
S3.7		17.31	30.00	49.30
S2.6		17.25	30.00	48.49
S2.7		17.25	29.50	48.49
				49.19

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A

Run No. 1

Plant Load 50%

Fuel Type oil

Relative humidity 69%

Test Time:

Ambient Temp. 86°

Start 10:53

Ambient Pressure 30.33

Finish 11:11

Sample Point	Time	% O ₂	NO _x PPM	NO _x CORRECTED TO 15% O ₂
S2.7		16.81	35.00	50.49
S2.6		16.62	35.50	48.94
S3.7		16.56	35.50	48.26
S3.6		16.50	35.0	46.93
S3.5		16.50	34.75	46.60
S2.4		18.00	20.00	40.69
S3.3		18.06	19.00	39.47
S3.2		18.00	20	40.69
				45.26

Test checked by

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A

Run No. 2

Plant Load 5076

Fuel Type oil

Relative humidity 69%

Test Time:

Ambient Temp. 86°

Start 11:15 AM

Ambient Pressure 30.33

Finish 11:38 AM

Sample Point	Time	% O ₂	NO, PPM	NO CORRECTED TO 15% O ₂
S3.2		18.00	17.50	35.60
.3		17.75	20.00	37.46
.4		16.00	24.00	40.94
.5		15.87	35.00	41.05
.6		15.87	36.00	42.23
.7		15.87	36.00	42.23
S2.6		16.00	35.5	42.74
.7		16.00	35.5	42.74
				40.62

Test Checked By

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River

Run No. 3

Plant Load S090 Turbine A

Fuel Type oil

Relative Humidity ~~87~~ 90.63

Test Time:

Ambient Temp. ~~87~~ 87

Start 11:42 AM

Ambient Pressure 30.33

Finish 12:02 PM

Sample Point	Time	% O ₂	NO _x PPM	NO CORRECTED TO 15% O ₂
S2.7		15.94	36.5	43.42
.6		15.94	36.5	43.42
S3.7		15.94	27.0	44.01
.6		15.94	27.0	44.01
.5		15.94	34.70	41.28
.4		16.19	31.00	38.83
.3		16.50	27.00	36.20
.2		17.62	16.00	28.78
				39.99

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-85

Plant Site Indian River

Run No. 1

Plant Load 75% Turbine A

Fuel Type oil

Relative Humidity 63%

Test Time:

Ambient Temp. 87°

Start 12:08 PM

Ambient Pressure 30.33

Finish 12:28 PM

Sample Point	Time	% O ₂	NO _x PPM	NO _x CORRECTED TO 15% O ₂
S3.2		15.50	47.00	54.37
.3		14.97	48.50	48.25
.4		15.00	52.00	52.00
.5		15.00	55.00	55.00
.4		15.00	55.00	55.00
.7		15.00	55.00	55.00
S2.6		15.12	55.00	56.14
.7		15.12	55.00	56.14
				53.99

Test Performed By

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River

Run No. 2

Plant Load 75% Turbine A

Fuel Type oil

Relative Humidity \rightarrow 62

Test Time:

Ambient Temp. 90

Start 12:35 PM

Ambient Pressure 30.33

Finish 12:53

Sample Point	Time	% O ₂	NO _x PPM	NO _x CORRECTED TO 15% O ₂
52.7		15.25	52.5 55.00	54.82 54.43
.6		15.00	54.00	54.00
53.7		15.00	54.00	54.00
.6		15.00	53.50	53.50
.5		15.00	53.50	53.50
.4		15.00	53.50	53.50
.3		15.00	53.50	53.50
.2		15.68	44.50	50.30
				53.39

Test Checked By

SAMPLE POINT RECORD

Client Orlando Utilities

Run By Bruce Wood

Project No. 89-093

Date 7-26-89

Plant Site Indian River

Run No. 3

Plant Load 75% Turbine A
RH = 62%

Fuel Type oil

Test Time:

Ambient Temp. 90

Start 12:58

Ambient Pressure 30.33

Finish 1:16 PM

Sample Point	Time	% O ₂	NO _x PPM	NO _x CORRECTED TO 15% O ₂
S3.2		15.75	45.00	51.55
.3		15.00	53.00	53.00
.4		15.00	54.00	54.00
.5		15.00	54.00	54.00
.6		15.00	56.00	56.00
.7		15.00	55.00	55.00
S2.4		14.81	55.00	53.28
.7		15.00	55.00	55.00
				53.98

CO Test Data

GO TO 20 PPM RANGE (30.5%) ← READS 28%

6.1 ppm CO

ZERO CO

34.9 CO (69.8%)

20 ppm CO (40.0%)

30.4 ppm CO (60.8%)

GO TO 50 PPM RANGE

ZERO POT 455 CO

6.1 ppm CO 20 PPM RANGE

ZERO CO

ZERO O2

GTA 7-25-89

CALIBRATION FACTOR = 6.0/5.4 = 1.11 x STACK PPM CO

6.1 ppm (30.5%)

GO TO 20 PPM RANGE

6.1 ppm (12.2%)

ZERO POT 451
SPAN POT 730

20 ppm CO (40%)

34.9 CO (69.8%)

CO 30.4 ppm (60.8%)

CO 50 PPM RANGE

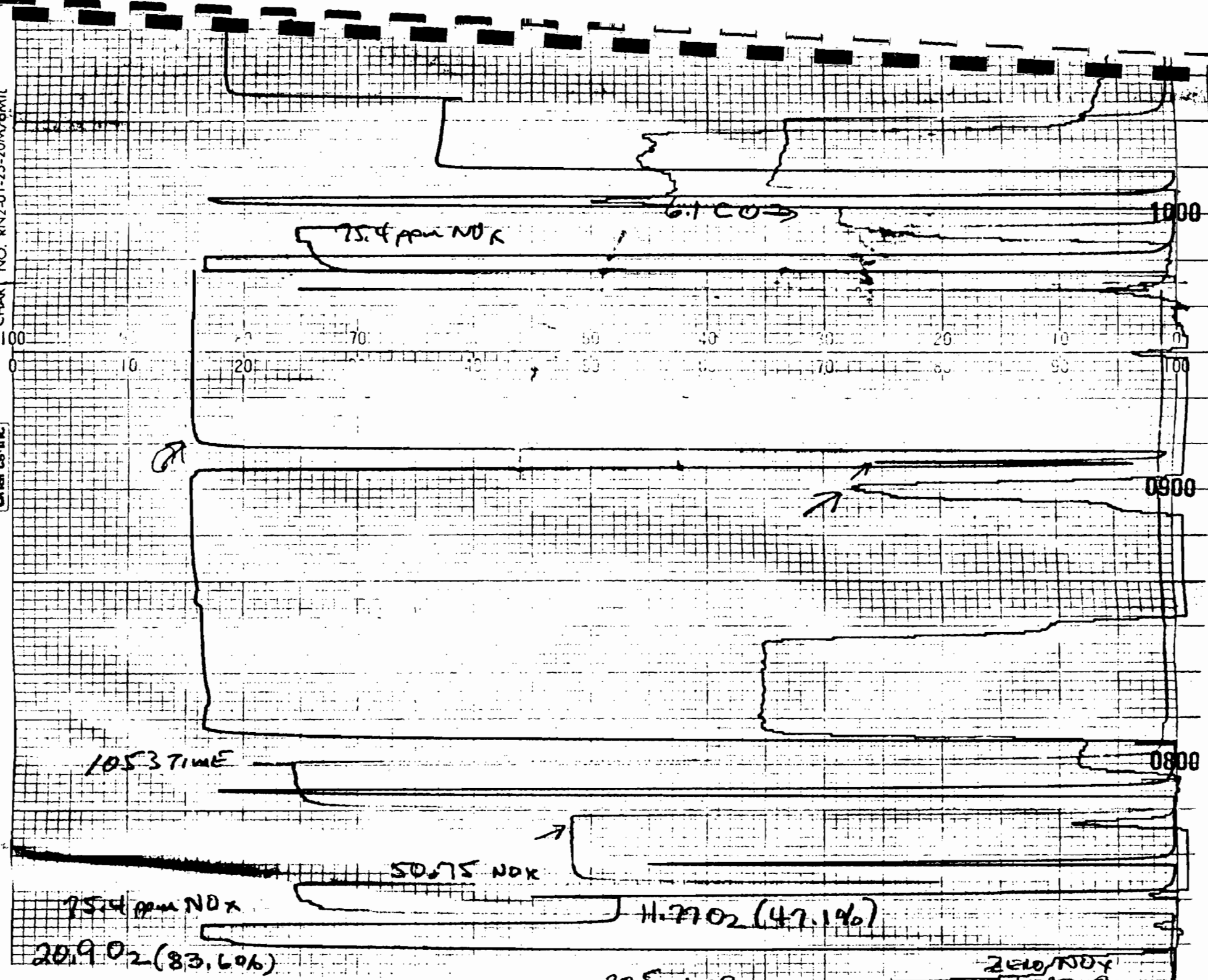
(1624)

PART NO. RN2-01-5-20M/6MIL

LS-INC

CHART NO. RN2-01-25-20M/6MIL

Charts, Inc



75.4 ppm NOx

6.1 CO

1000

Q

0900

1053 TIME

0800

50.75 NOx

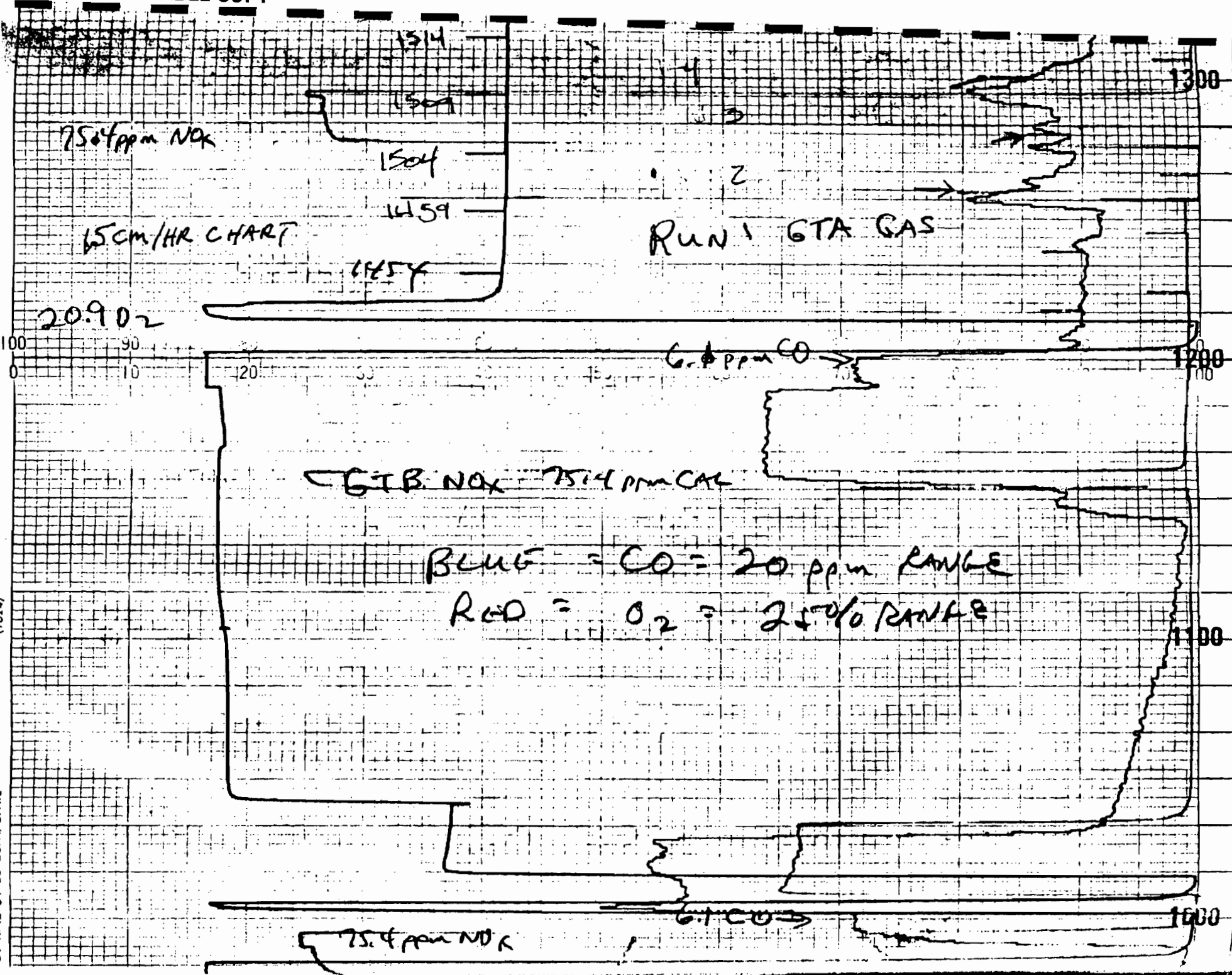
75.4 ppm NOx

11.77 O2 (47.1%)

20.9 O2 (83.6%)

30.5 - 1.09

2000/NOx
2000 O2



(1624)

O. RN2-01-25-20M/6MIL

11024)

CHART NO. KNZ-01-25-ZUM/CUMIL

CHARTS-INC

1628

1623

1618

1613

1608

1603

1551

1549

1544

1539

1534

1529

1524

1519

1514

5

4

3

2

1

12

11

10

9

8

7

6

5

4

1600

1500

1400

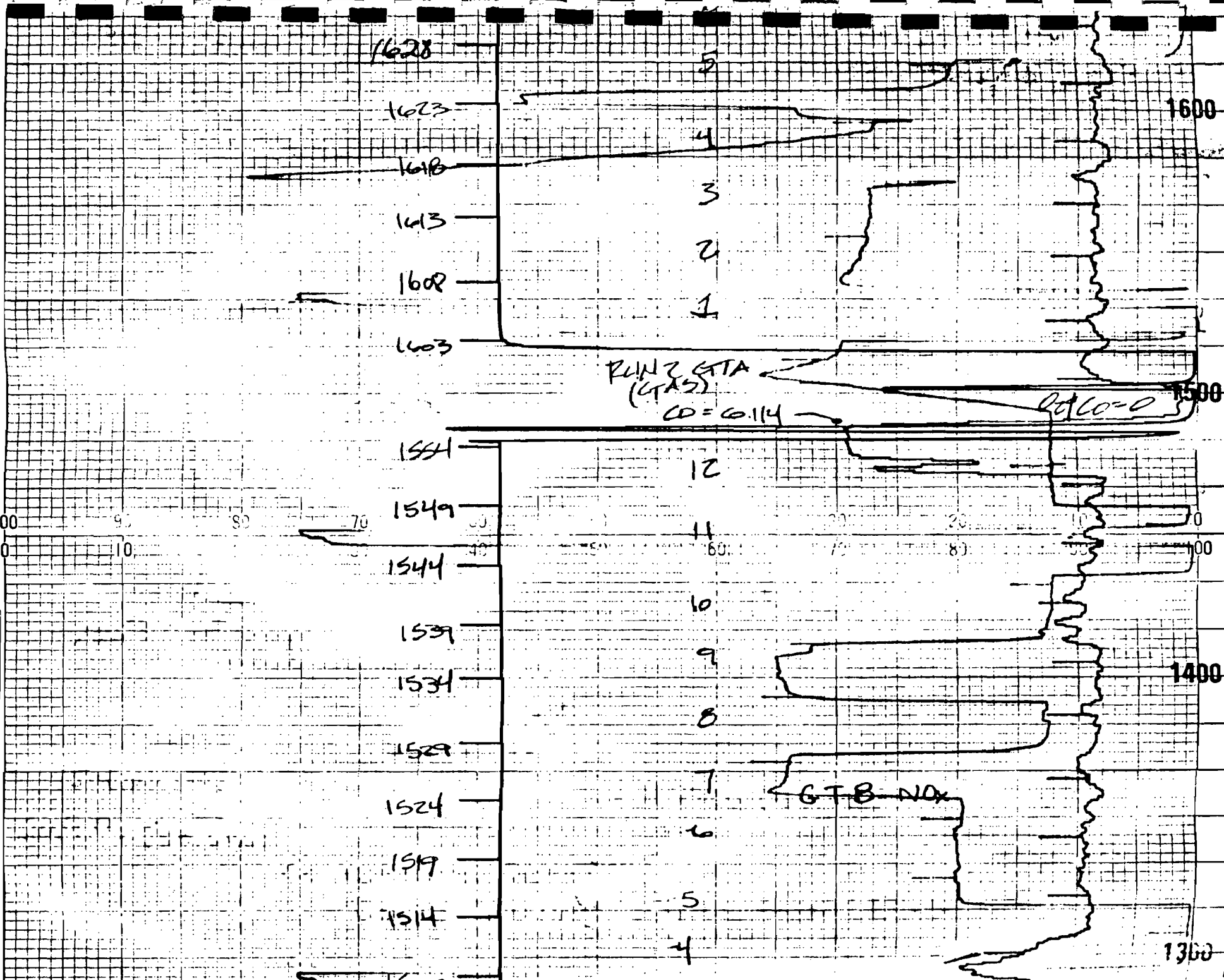
1300

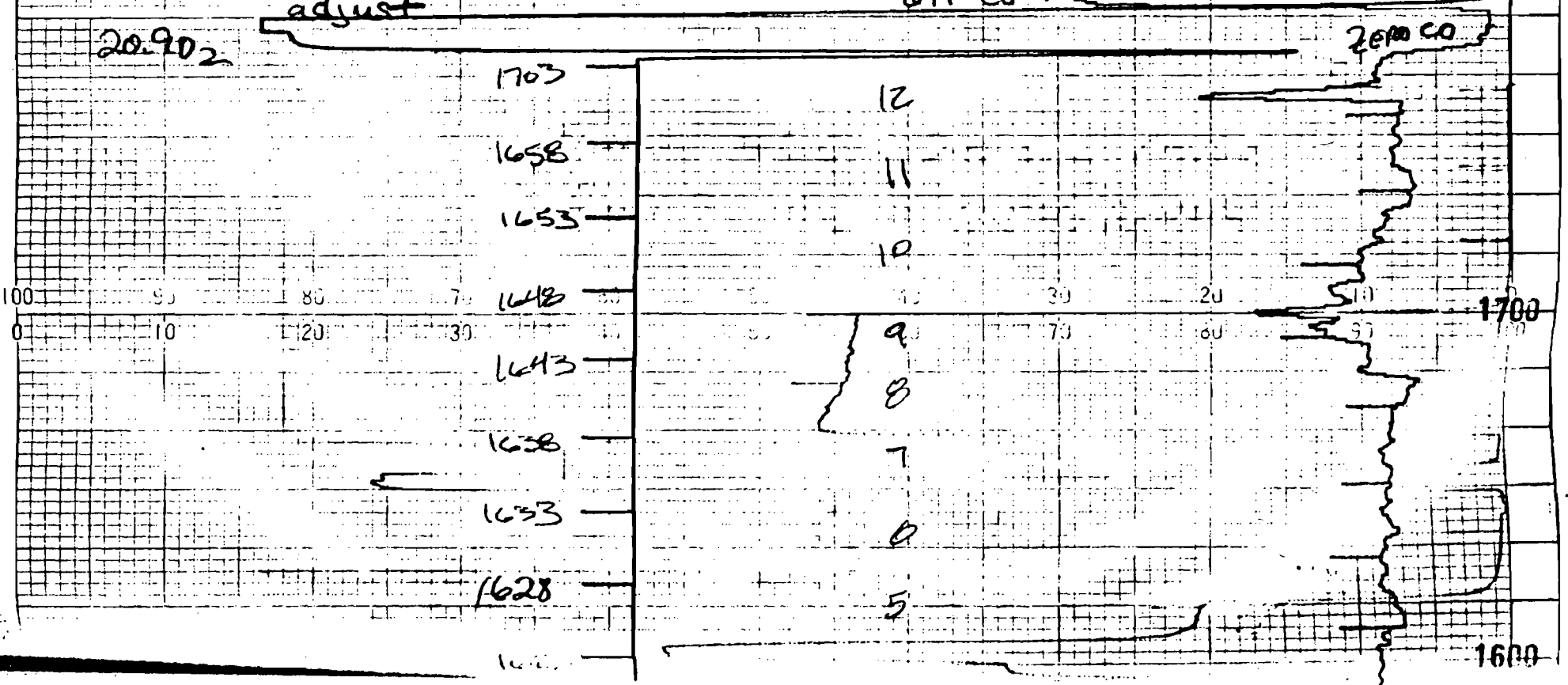
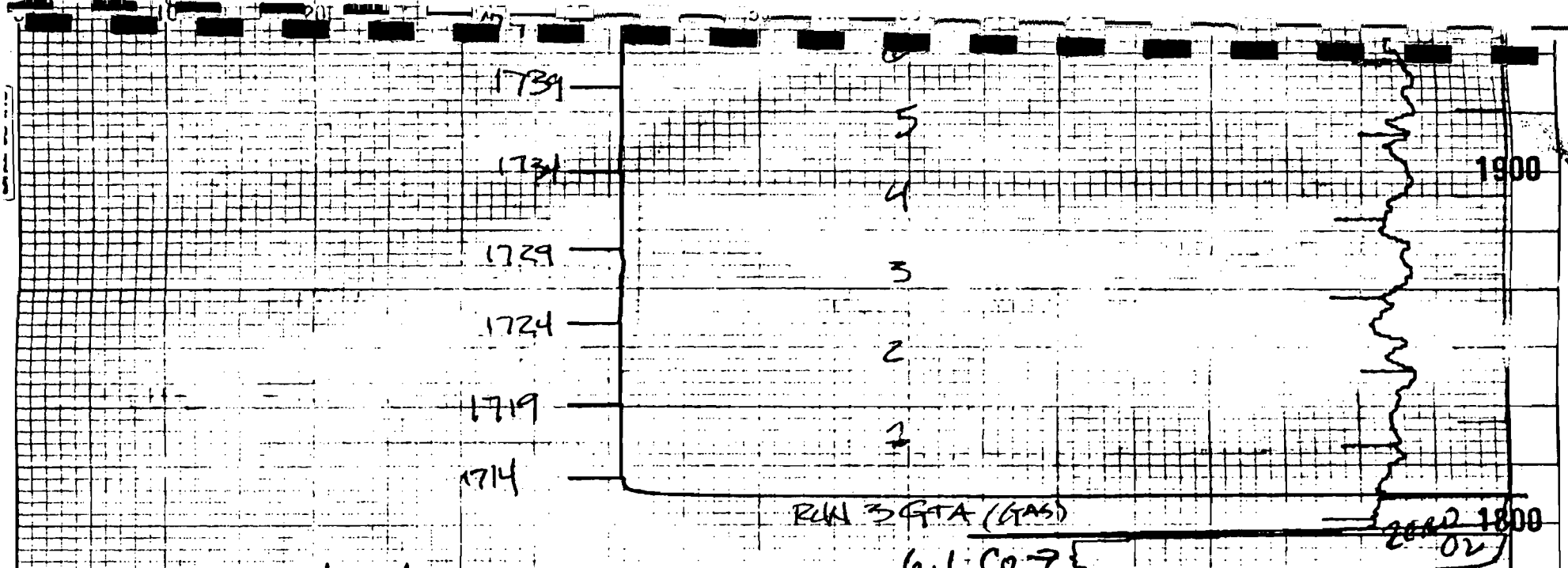
RUN 2 GTA (GTAS)

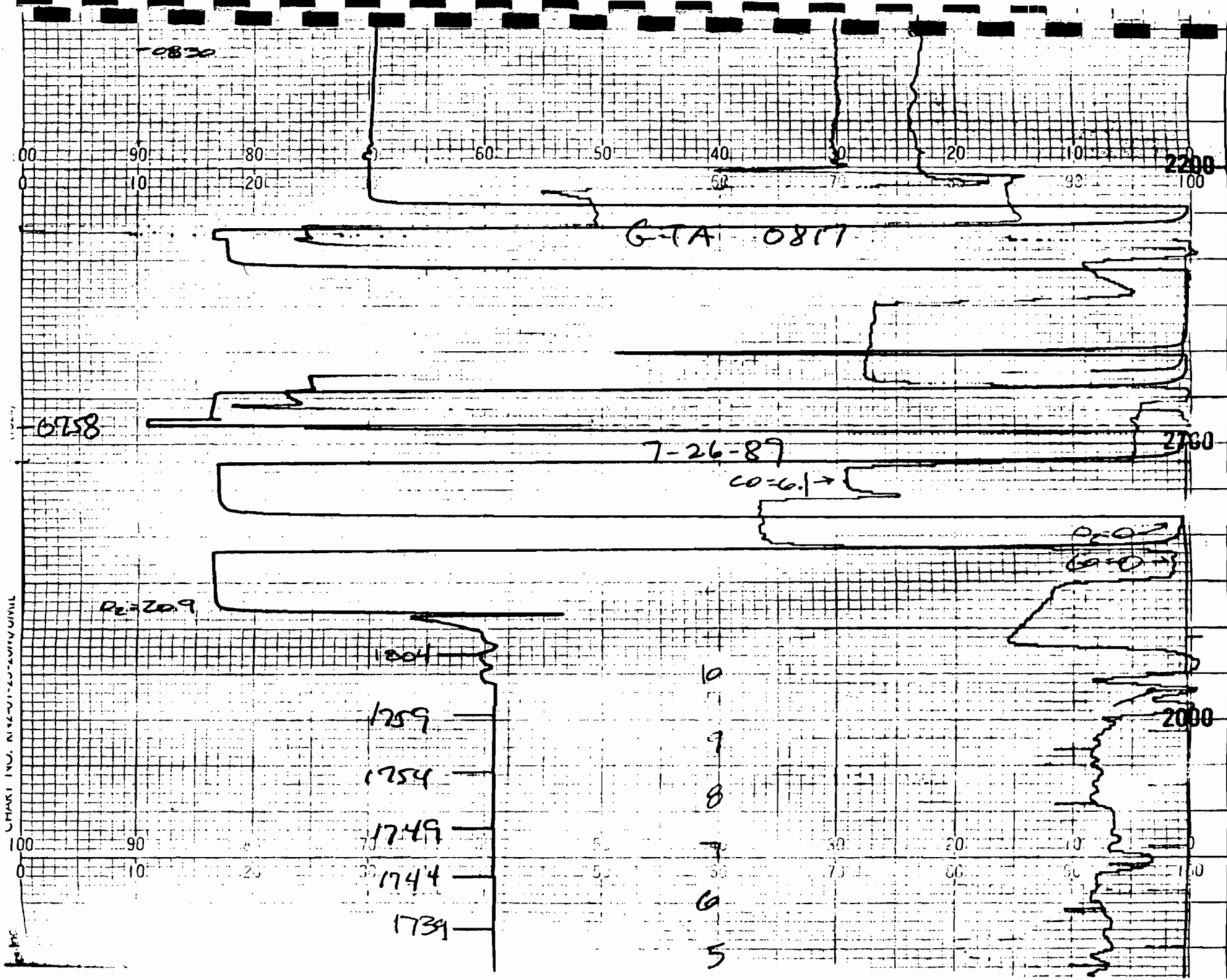
CO = 6.114

CO/CO = 0

GTB NOx







100
90
80
70
60
50
40
30
20
10
0

100
90
80
70
60
50
40
30
20
10
0

100 90 80 70 60 50 40 30 20 10 0

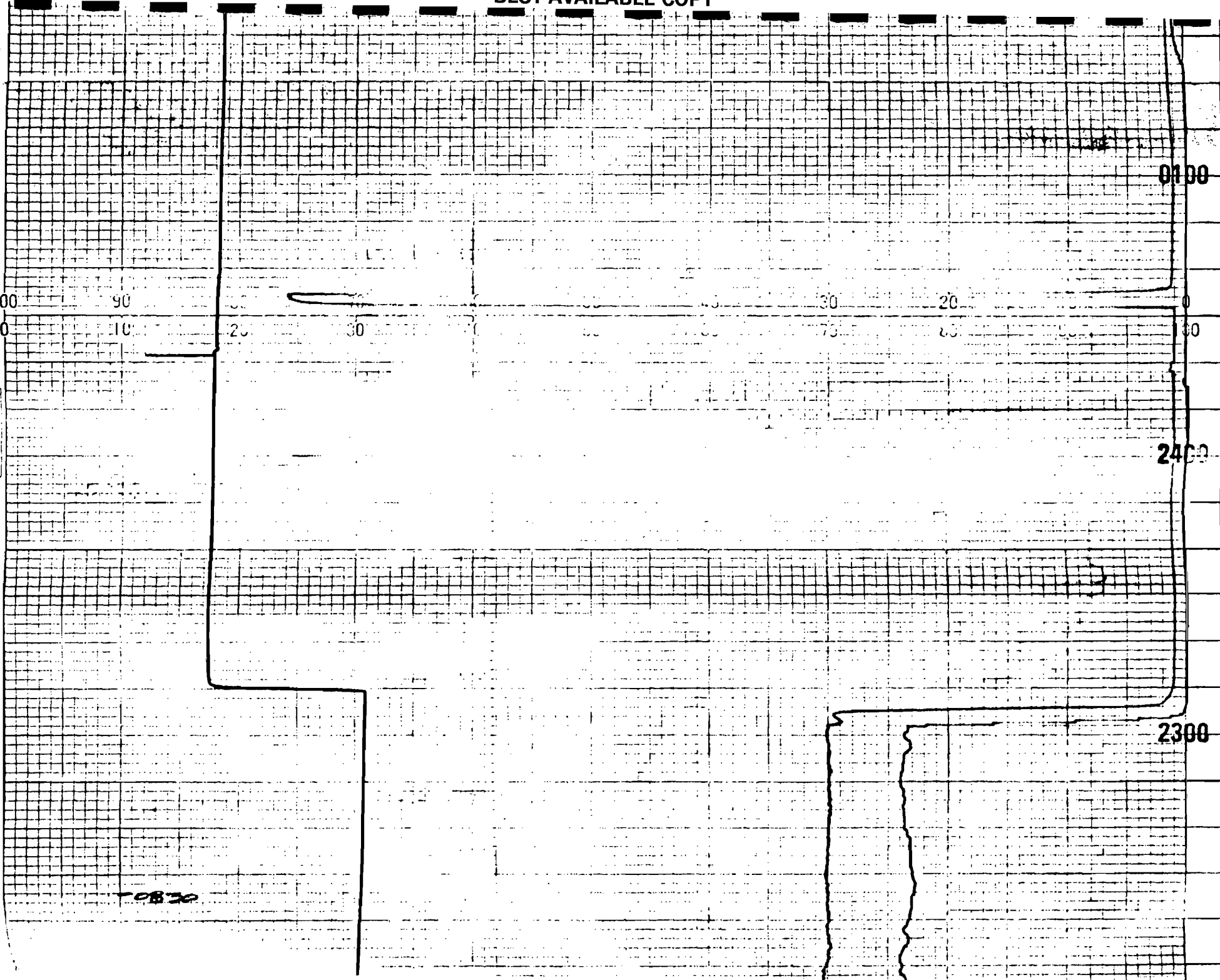
0 10 20 30 40 50 60 70 80 90 100

0100

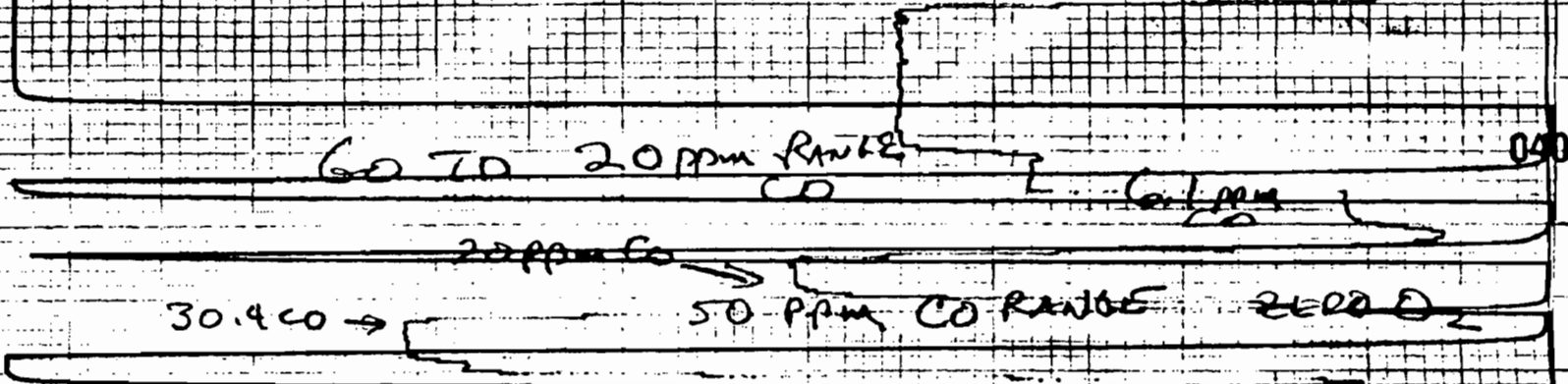
2400

2300

0830



14.0/1.8
14.0/1.6
14.7/1.8
14.7/2.8
14.8/2.6 (5)
14.75/2.0
14.75/2.4
14.75/1.7



0400

0300

0200

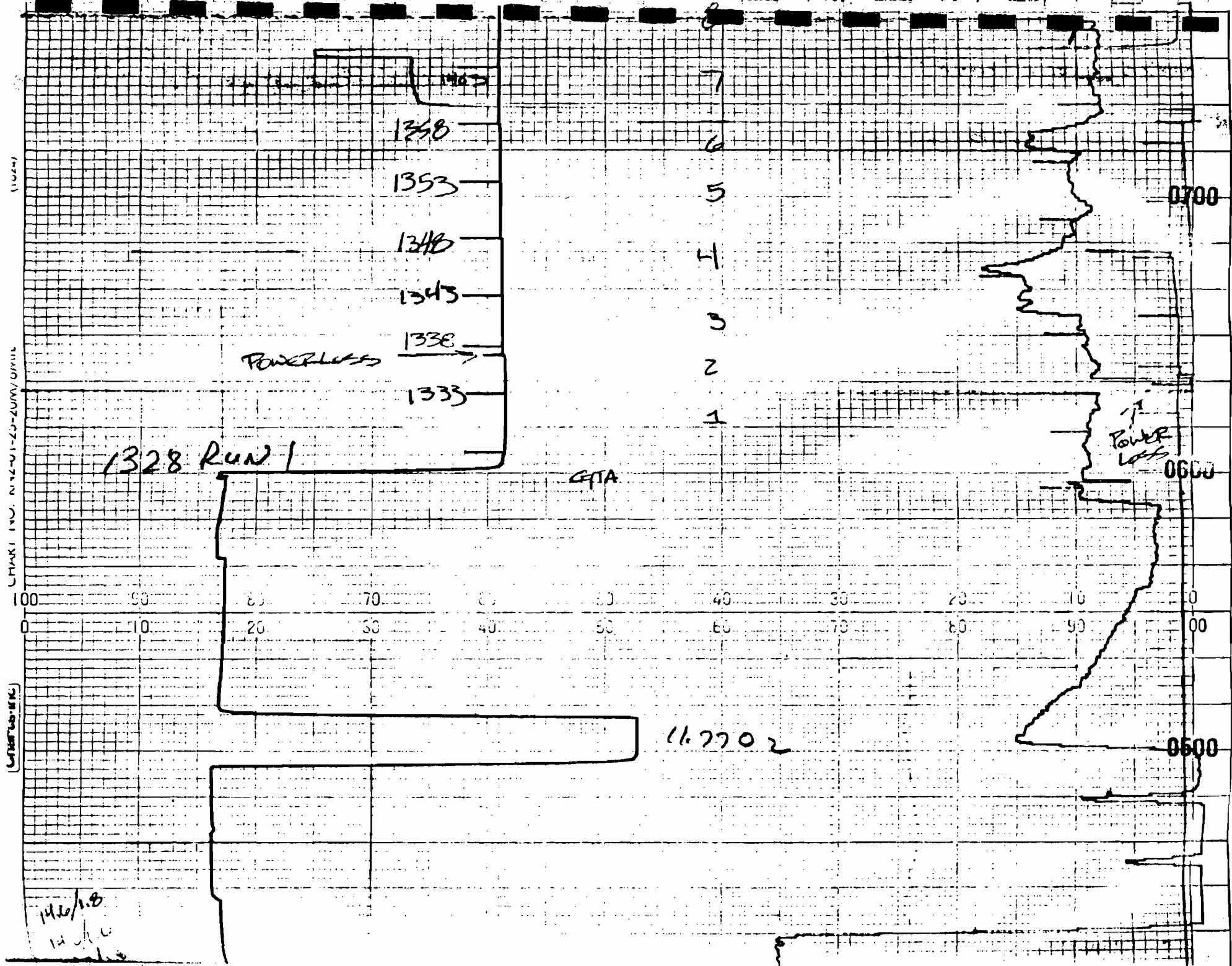
7-26-89
GTA OIL

116MIL (1024)

10247

MARK IN. N42°11'25"ZUM/DIML

10247



1348

1353

1348

1343

1338

1333

POWERLESS

1328 Run 1

GTA

POWER
LOSS

11.7702

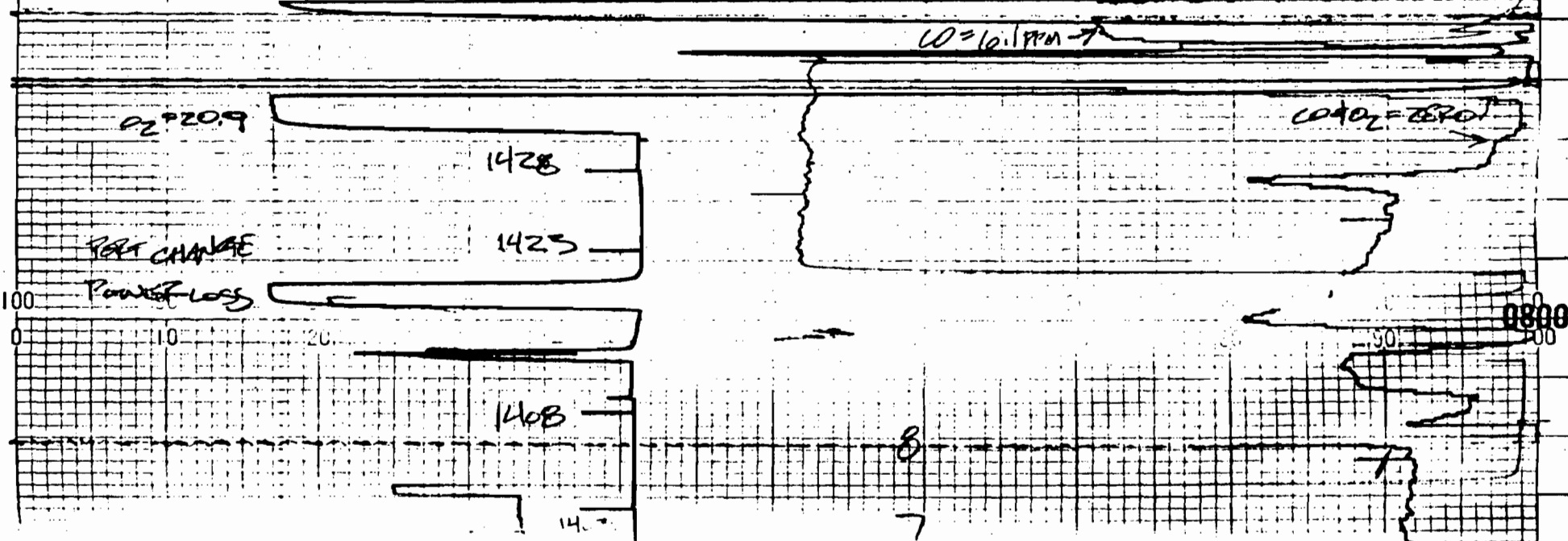
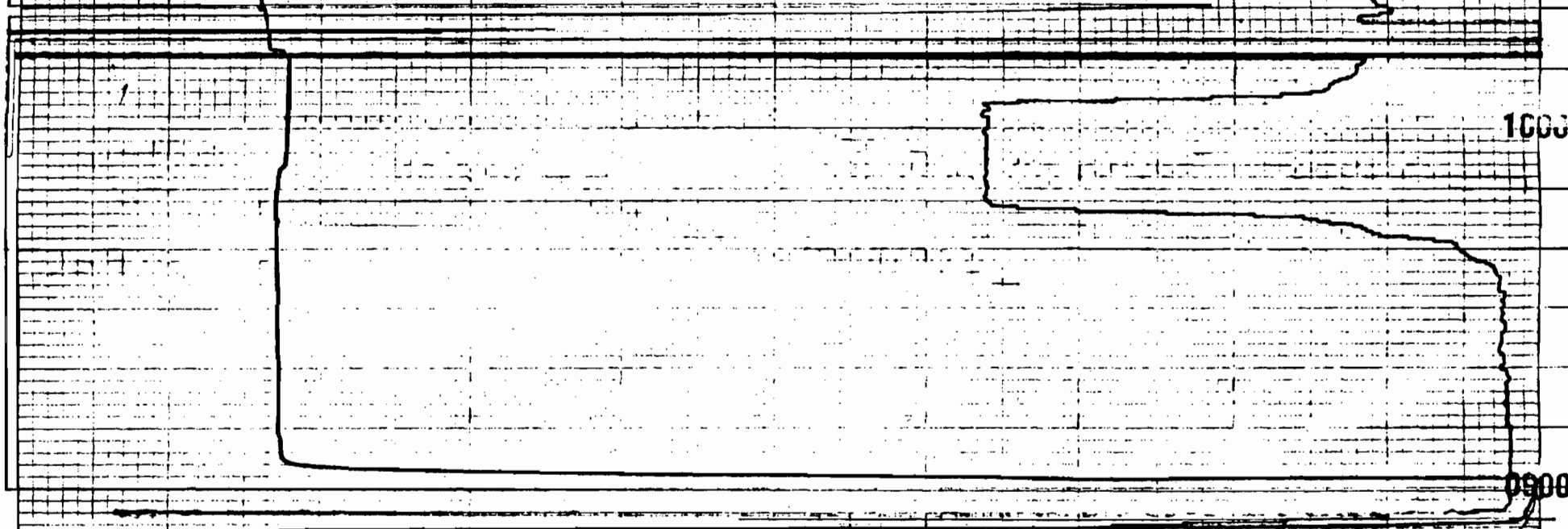
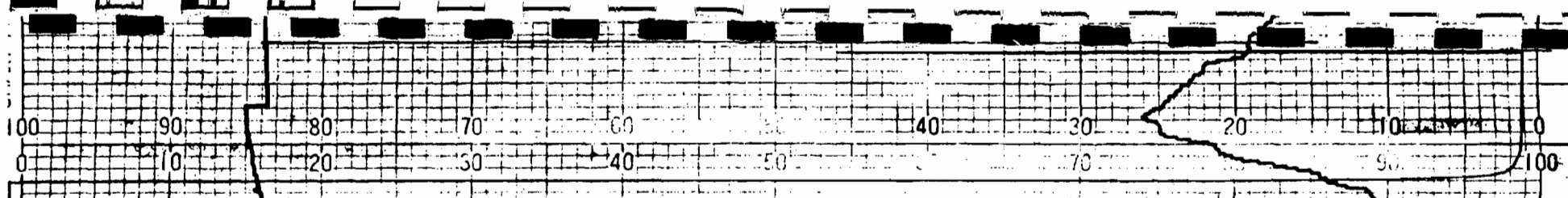
7
6
5
4
3
2
1

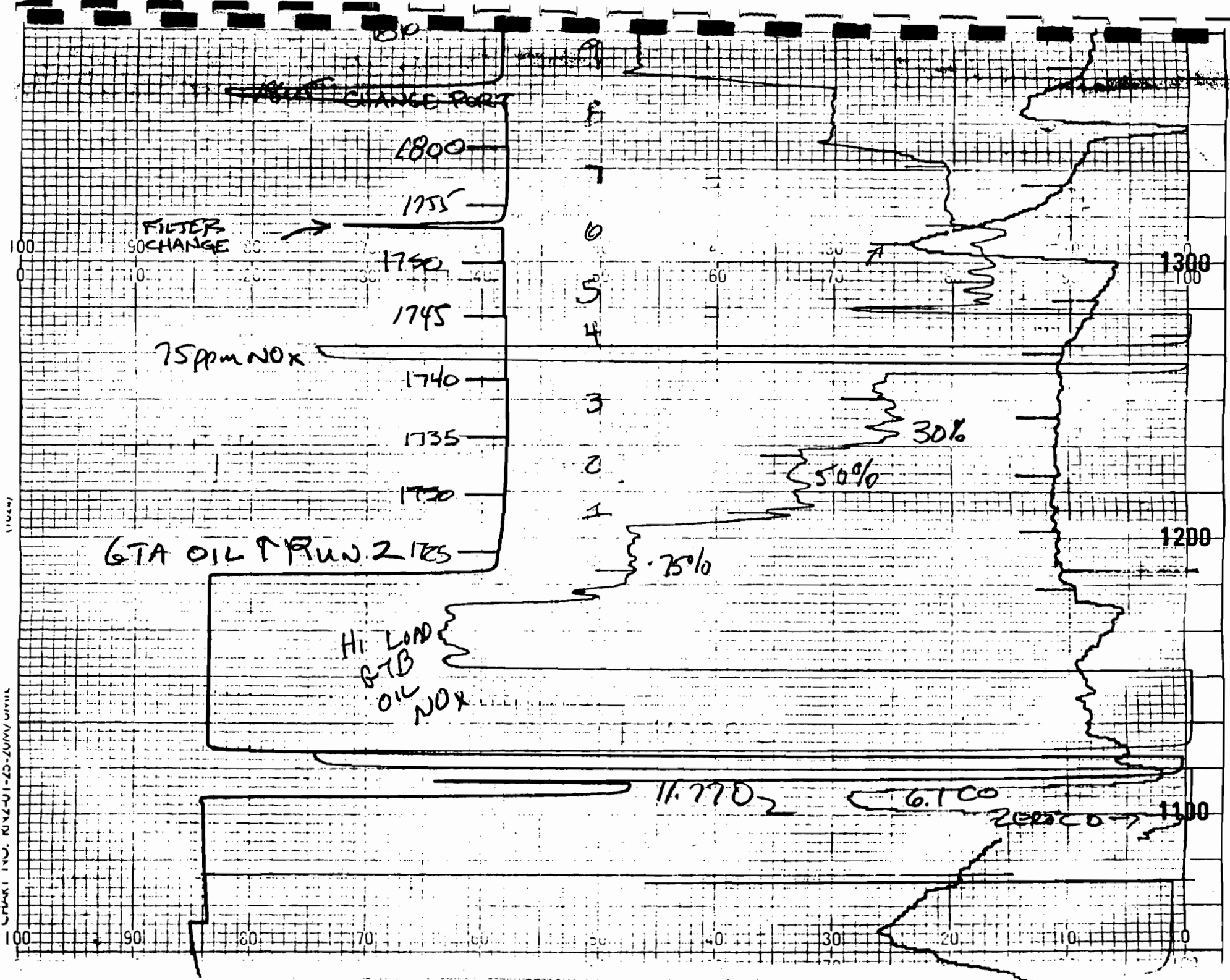
0700

0600

0500

14/10/18
12/1/16





80

~~CHANGE PORT~~

1800

1755

FILTER CHANGE

1750

1745

75ppm NOx

1740

1735

1730

GTA OIL RUN 2 1735

Hi LOAD
BTB
OIL
NOx

11.770

6.100

20000

8
7
6
5
4
3
2
1

1300

1200

1100

TIME IN. KXZ-01-25-ZUMV/UMIL

1920

1915

1910

~~1905~~
~~1900~~

1900

1895

1890

1845

1840

1825

1820

1815

1810

CHANGE P. 27

9
8
7
6
5
4
3
2
1
12
11
10
9

Run 3 G-TA OIL

ZERO Co

1600

1500

1400

UNIT 100 IN 1000 FT

UNIT 100 IN 1000 FT

adjust →
Q₂ = 2009

75 ppm NOx

CO - SO PPM RANGE

1900

ZERO CO
ZERO O₂

1913

7-27-89 GTB GAS

1800

100
0

6 CO

ZERO O₂
CO

20.9 O₂

1940

1935

1930

1925

1920

1915

1910

10

9

8

7

6

1700

(1624)

ORLANDO UTILITIES-INDIAN RIVER PLANT
 GAS TURBINE- GTA
 NATURAL GAS FIRING
 JULY 25, 1989

CALIBRATION ERROR RESULTS

CO CAL	GASRESULT	% RANGE
ZERO	0.00	0.00
6.10	5.85	0.50
30.40	30.85	0.90
20.00	20.35	0.70
34.90	36.00	2.20

"F" FACTOR=8710

RUN 1

SPAN DRIFT= 0%

ZERO DRIFT= 0%

Time	PPM CO	O2 %	CO		C3H8		
			lb/MM BTU	PPM C3H8	lb/MM BTU		
1454-1459	2.0	14.55	0.00416	0.0	0.00000		1
1459-1504	2.6	14.50	0.00537	0.0	0.00000		2
1504-1509	3.0	14.50	0.00620	0.0	0.00000		3
1509-1514	3.0	14.50	0.00620	0.0	0.00000		4
1514-1519	2.2	14.50	0.00454	0.0	0.00000		5
1519-1524	1.9	14.50	0.00392	0.0	0.00000		6
1524-1529	1.8	14.50	0.00372	0.0	0.00000		7
1529-1534	1.8	14.50	0.00372	0.0	0.00000		8
1534-1539	1.7	14.50	0.00351	0.0	0.00000		9
1539-1544	2.0	14.50	0.00413	0.0	0.00000		10
1544-1549	2.0	14.55	0.00416	0.0	0.00000		11
1549-1554	1.6	14.55	0.00333	0.0	0.00000		12
AVERAGES	2.1	14.51	0.00441	0.0	0.00000		

RUN 2 SPAN DRIFT=0% ZERO DR=0%

1603-1608	1.7	14.55	0.00354	0.0	0.00000		1
1608-1613	1.7	14.60	0.00357	0.0	0.00000		2
1613-1618	1.5	14.60	0.00315	0.0	0.00000		3
1618-1623	1.8	14.60	0.00378	0.0	0.00000		4
1623-1628	1.7	14.60	0.00357	0.0	0.00000		5
1628-1633	1.6	14.60	0.00336	0.0	0.00000		6
1633-1638	1.6	14.60	0.00336	0.0	0.00000		7
1638-1643	1.6	14.60	0.00336	0.0	0.00000		8
1643-1648	1.6	14.55	0.00333	0.0	0.00000		9
1648-1653	2.6	14.50	0.00537	0.0	0.00000		10
1653-1658	1.8	14.50	0.00372	0.0	0.00000		11
1658-1703	1.5	14.50	0.00310	0.0	0.00000		12
AVERAGES	1.7	14.57	0.00000	0.0	0.00000		

RUN 3 SPAN DRIFT=0% ZERO DR=0%

1714-1719	1.6	14.75	0.00344	0.0	0.00000		1
1719-1724	1.5	14.80	0.00325	0.0	0.00000		2
1724-1729	1.6	14.80	0.00347	0.0	0.00000		3
1729-1734	1.6	14.75	0.00344	0.0	0.00000		4
1734-1739	1.6	14.75	0.00344	0.0	0.00000		5
1739-1744	1.5	14.75	0.00322	0.0	0.00000		6
1744-1749	1.4	14.75	0.00301	0.0	0.00000		7
1749-1754	1.2	14.75	0.00258	0.0	0.00000		8
1754-1759	1.6	14.75	0.00344	0.0	0.00000		9
1759-1804	1.0	15.00	0.00224	0.0	0.00000		10
AVERAGES	1.5	14.79	0.00315	0.0	0.00000		

ORLANDO UTILITIES-INDIAN RIVER PLANT
 GAS TURBINE- GTA
 NUMBER 6 OIL FIRING
 JULY 26, 1989

CALIBRATION ERROR RESULTS

CO CAL	GASRESULT	% RANGE
ZERO	0.00	0.00
6.10	5.60	1.00
30.40	30.85	0.90
20.00	20.35	0.70
RUN 1	11.802	11.80
		0.00

"F" FACTOR=9190

SPAN DRIFT=0% ZERO DRIFT=0%

Time	PPM CO	O2 %	CO		C3H8		
			lb/MM BTU	PPM C3H8	lb/MM BTU		
1328-1333	1.8	14.60	0.004	0.00	0.00000		1
1333-1338	1.6	14.60	0.004	0.00	0.00000		2
1338-1343	1.8	14.70	0.004	0.00	0.00000		3
1343-1348	2.8	14.70	0.006	0.00	0.00000		4
1348-1353	2.8	14.75	0.006	0.00	0.00000		5
1353-1358	2.0	14.75	0.005	0.00	0.00000		6
1358-1403	2.4	14.75	0.005	0.00	0.00000		7
1403-1408	1.7	14.75	0.004	0.00	0.00000		8
1408-1413	1.7	14.75	0.004	0.00	0.00000		9
1413-1418	2.4	14.75	0.005	0.00	0.00000		10
1418-1423	2.6	14.70	0.006	0.00	0.00000		11
1423-1428	2.6	14.70	0.006	0.00	0.00000		12
AVERAGES	2.2	14.71	0.005	0.00	0.00000		

RUN 2 SPAN DRIFT=0% ZERO DRIFT=0%

1725-1730	2.2	14.60	0.005	0.00	0.00000		1
1730-1735	2.2	14.50	0.005	0.00	0.00000		2
1735-1740	2.2	14.50	0.005	0.00	0.00000		3
1740-1745	2.2	14.50	0.005	0.00	0.00000		4
1745-1750	1.8	14.50	0.004	0.00	0.00000		5
1750-1755	1.8	14.60	0.004	0.00	0.00000		6
1755-1800	5.4	14.50	0.012	0.00	0.00000		7
1800-1805	2.0	14.50	0.004	0.00	0.00000		8
1805-1810	2.6	14.50	0.006	0.00	0.00000		9
1810-1815	1.6	14.60	0.004	0.00	0.00000		10
1815-1820	1.6	14.60	0.004	0.00	0.00000		11
1820-1825	2.2	14.60	0.005	0.00	0.00000		12
AVERAGES	2.3	14.542	0.005	0.00	0.00000		

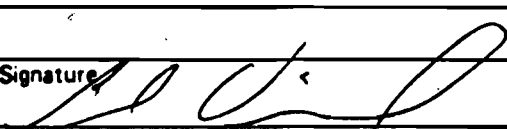
RUN 3 ZERO DRIFT=0% SPAN DRIFT=0

1840-1845	2.0	14.70	0.004	0.00	0.00000		1
1845-1850	2.0	14.70	0.004	0.00	0.00000		2
1850-1855	2.0	14.70	0.004	0.00	0.00000		3
1855-1900	1.8	14.70	0.004	0.00	0.00000		4
1900-1905	1.6	14.70	0.004	0.00	0.00000		5
1905-1910	2.0	14.70	0.004	0.00	0.00000		6
1910-1915	2.0	14.70	0.004	0.00	0.00000		7
1915-1920	2.0	14.70	0.004	0.00	0.00000		8
1920-1925	2.0	14.75	0.005	0.00	0.00000		9
1925-1930	2.0	14.75	0.005	0.00	0.00000		10
1930-1935	2.0	14.75	0.005	0.00	0.00000		11
1935-1940	2.0	14.75	0.005	0.00	0.00000		12
AVERAGES	2.0	14.72	0.004	0.00	0.00000		

Opacity Test Data

Visible Emissions Evaluation Data Sheet

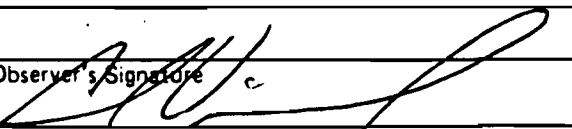
Client OUC Observer CSV
 Project No. _____ Date 7-25-89
 Plant Name Indian River Observation began 15:50
 Location _____ ended 16:49
 Type of Facility CTA (Gas) Page 2 of 2

	Min.	Seconds				Min.	Seconds			
		0	15	30	45		0	15	30	45
Source Identification (Stack, Duct, etc.) <u>See Sheet #1</u>	0	0	0	0	0	30	0	0	0	0
_____	1	0	0	0	0	31	0	0	0	0
_____	2	0	0	0	0	32	0	0	0	0
_____	3	0	0	0	0	33	0	0	0	0
_____	4	0	0	0	0	34	0	0	0	0
Observer Location (Diagram on back of sheet) Distance from Observer to source _____ Height of Source (above ground) _____	5	0	0	0	0	35	0	0	0	0
_____	6	0	0	0	0	36	0	0	0	0
Weather Conditions Wind Direction _____ Wind Speed _____ Temperature _____ Position of Sun _____ Sky Condition _____ (clear, overcast, % clouds, color of clouds, etc.)	7	0	0	0	0	37	0	0	0	0
_____	8	0	0	0	0	38	0	0	0	0
_____	9	0	0	0	0	39	0	0	0	0
_____	10	0	0	0	0	40	0	0	0	0
_____	11	0	0	0	0	41	0	0	0	0
_____	12	0	0	0	0	42	0	0	0	0
_____	13	0	0	0	0	43	0	0	0	0
_____	14	0	0	0	0	44	0	0	0	0
_____	15	0	0	0	0	45	0	0	0	0
_____	16	0	0	0	0	46	0	0	0	0
Plume Description Color _____ Background _____ Type (wet or dry) _____ Dist. _____	17	0	0	0	0	47	0	0	0	0
_____	18	0	0	0	0	48	0	0	0	0
_____	19	0	0	0	0	49	0	0	0	0
Comments _____	20	0	0	0	0	50	0	0	0	0
_____	21	0	0	0	0	51	0	0	0	0
_____	22	0	0	0	0	52	0	0	0	0
_____	23	0	0	0	0	53	0	0	0	0
_____	24	0	0	0	0	54	0	0	0	0
_____	25	0	0	0	0	55	0	0	0	0
Observer's Signature 	26	0	0	0	0	56	0	0	0	0
_____	27	0	0	0	0	57	0	0	0	0
Date of Last EPA Method 9 Examination	28	0	0	0	0	58	0	0	0	0
_____	29	0	0	0	0	59	0	0	0	0
Examination Passed in EPA Region										

* If wet, distance (ft.) from plume outlet to point in plume where observations made.

Visible Emissions Evaluation Data Sheet

Client OUC Observer CSV
 Project No. 89- Date 7-25-89
 Plant Name Indian River Observation began 12:50
 Location _____ ended 15:49
 Type of Facility Combustion Turbine A Page 1 of 2

	Min.	Seconds				Min.	Seconds			
		0	15	30	45		0	15	30	45
Source Identification (Stack, Duct, etc.) <u>A (Gas)</u>	0	0	0	0	0	30	0	0	0	0
_____	1	0	0	0	0	31	0	0	0	0
_____	2	0	0	0	0	32	0	0	0	0
_____	3	0	0	0	0	33	0	0	0	0
_____	4	0	0	0	0	34	0	0	0	0
Observer Location (Diagram on back of sheet)	5	0	0	0	0	35	0	0	0	0
Distance from Observer to source <u>200'</u>	6	0	0	0	0	36	0	0	0	0
Height of Source (above ground) <u>35'</u>	7	0	0	0	0	37	0	0	0	0
Weather Conditions	8	0	0	0	0	38	0	0	0	0
Wind Direction <u>SE</u>	9	0	0	0	0	39	0	0	0	0
Wind Speed <u>10-15</u>	10	0	0	0	0	40	0	0	0	0
Temperature <u>95</u>	11	0	0	0	0	41	0	0	0	0
Position of Sun _____	12	0	0	0	0	42	0	0	0	0
Sky Condition <u>PC 30% C</u>	13	0	0	0	0	43	0	0	0	0
(clear, overcast, % clouds, color of clouds, etc.)	14	0	0	0	0	44	0	0	0	0
_____	15	0	0	0	0	45	0	0	0	0
_____	16	0	0	0	0	46	0	0	0	0
Plume Description	17	0	0	0	0	47	0	0	0	0
Color <u>None</u>	18	0	0	0	0	48	0	0	0	0
Background <u>partial clouds</u>	19	0	0	0	0	49	0	0	0	0
Type (wet or dry) _____ Dist. _____	20	0	0	0	0	50	0	0	0	0
Comments <u>Heat from exhaust</u>	21	0	0	0	0	51	0	0	0	0
<u>distorted back ground some</u>	22	0	0	0	0	52	0	0	0	0
<u>but no color was detected</u>	23	0	0	0	0	53	0	0	0	0
<u>in the plume.</u>	24	0	0	0	0	54	0	0	0	0
_____	25	0	0	0	0	55	0	0	0	0
Observer's Signature 	26	0	0	0	0	56	0	0	0	0
Date of Last EPA Method 9 Examination <u>5-28-89</u>	27	0	0	0	0	57	0	0	0	0
Examination Passed in EPA Region <u>EPA IV</u>	28	0	0	0	0	58	0	0	0	0
_____	29	0	0	0	0	59	0	0	0	0

* If wet, distance (ft.) from plume outlet to point in plume where observations made.

Visible Emissions Evaluation Data Sheet

Client DUC Observer CSV
 Project No. 89-093 Date 7-27-89
 Plant Name Indian River CTA Observation began 7:05
 Location Titusville Fla ended 8:09
 Type of Facility Combustion Turbine (Oil) Page 1 of 20

Source Identification (Stack, Duct, etc.)	Seconds				Min.	Seconds			
	0	15	30	45		0	15	30	45
<u>CTA exhaust</u>	0	0	0	5	30	0	0	0	0
	1	0	5	5	31	0	0	0	0
	2	0	0	0	32	5	5	0	0
	3	0	0	0	33	0	0	0	0
	4	0	0	0	34	0	0	5	5
	5	0	0	0	35	0	0	5	5
	6	0	0	0	36	5	5	0	0
	7	0	0	0	37	0	0	0	0
	8	5	5	0	38	0	0	0	0
	9	5	0	5	39	5	5	5	5
	10	0	0	0	40	0	0	0	5
	11	0	0	0	41	0	0	0	0
	12	0	0	5	42	5	5	5	5
	13	0	0	0	43	0	0	0	0
	14	0	0	0	44	0	0	0	0
	15	5	5	0	45	0	0	0	0
	16	0	0	0	46	5	5	5	0
	17	0	5	5	47	0	0	0	0
	18	0	0	0	48	0	0	0	0
	19	0	5	5	49	0	0	0	0
	20	0	0	0	50	0	0	0	0
	21	0	5	5	51	5	5	5	0
	22	0	0	0	52	0	0	0	0
	23	0	0	0	53	0	0	0	0
	24	5	0	0	54	0	0	0	0
	25	0	0	0	55	5	0	0	0
	26	5	5	5	56	5	5	5	5
	27	5	5	5	57	5	5	5	5
	28	5	0	0	58	5	5	5	5
	29	0	0	0	59	0	5	0	0

Observer Location
(Diagram on back of sheet)
 Distance from Observer to source 150
 Height of Source (above ground) 30

Weather Conditions
 Wind Direction SSE
 Wind Speed 5-10
 Temperature 80
 Position of Sun E
 Sky Condition Hazy
 (clear, overcast, % clouds,
 color of clouds, etc.)
1

Plume Description
 Color Black
 Background Blue
 Type (wet or dry) dry Dist. _____

Comments _____

Observer's Signature [Signature]

Date of Last EPA Method Examination 5-2-89

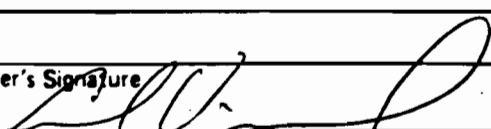
Examination Passed in EPA Region EPA II

66

* If wet, distance (ft.) from plume outlet to point in plume where observations made.

Visible Emissions Evaluation Data Sheet

Client OUC Observer CSV
 Project No. 89-093 Date 7-27-89
 Plant Name Indian River Observation began 8:05
 Location Titusville Fla. ended 9:05
 Type of Facility CTA Oil page 2 of 2

	Min.	Seconds				Min.	Seconds			
		0	15	30	45		0	15	30	45
Source Identification (Stack, Duct, etc.) <u>See Pg 1</u>	0	5	0	0	0	30	0	0	0	5
_____	1	0	0	0	0	31	5	5	0	0
_____	2	0	0	0	0	32	5	5	5	0
_____	3	0	0	0	0	33	5	5	5	0
_____	4	0	0	0	0	34	0	0	0	0
Observer Location (Diagram on back of sheet)	5	0	0	0	0	35	0	0	0	0
Distance from Observer to source _____	6	5	5	5	0	36	0	0	0	0
Height of Source (above ground) _____	7	0	0	0	0	37	0	0	0	0
Weather Conditions	8	0	0	0	0	38	0	0	5	5
Wind Direction _____	9	0	0	0	0	39	0	0	0	0
Wind Speed _____	10	0	0	5	5	40	0	0	0	0
Temperature _____	11	5	0	5	0	41	0	0	0	0
Position of Sun _____	12	0	0	0	0	42	0	0	0	0
Sky Condition _____ (clear, overcast, % clouds, color of clouds, etc.)	13	0	0	0	0	43	0	0	0	0
_____	14	0	0	0	0	44	0	0	0	0
_____	15	0	0	0	0	45	5	5	0	0
Plume Description	16	5	0	5	0	46	0	0	0	0
Color _____	17	0	0	0	0	47	0	0	0	0
Background _____	18	0	0	0	0	48	0	0	0	0
Type (wet or dry) _____ Dist. _____	19	5	5	0	5	49	0	0	0	0
Comments _____	20	0	5	5	5	50	5	5	5	0
_____	21	0	0	0	0	51	5	0	0	0
_____	22	0	0	0	0	52	5	5	5	0
_____	23	0	0	0	0	53	0	0	0	0
_____	24	0	0	0	0	54	0	0	0	0
Observer's Signature 	25	0	0	0	0	55	0	0	0	0
Date of Last EPA Method 9 Examination _____	26	0	0	0	0	56	0	0	0	0
Examination Passed in EPA Region _____	27	5	0	0	0	57	0	0	0	0
	28	5	5	0	0	58	0	0	0	0
	29	0	0	0	0	59	0	0	0	0
	Avg = 1.08% 30									

* If wet, distance (ft.) from plume outlet to point in plume where observations made.

Joe 7/21/89

This hereby confirms that
CARL VINEYARD

of the TOTAL SOURCE ANALYSIS
is certified by the State of Ohio to
perform visible emission evaluations in
accordance with 40 CFR 60, Appendix A,
Reference Method 9

Sabrina P. Walling
Chief, DAPC

1-24-90
Expiration Date

PLANT DATA SHEETS

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 08:49:57 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	0.00	#/sec	
TTXM	701	deg F	FQG	3.21	#/sec	
TNH	100.03	% SPD	FQT	3.21	#/sec	
TNR	101.36	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	31.4	% FSR				
CSGV	60.4	DGA				
SP_LVL	14HS		CMHUM	0.0216	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	83	deg F	
MESSAGE2			WQJF	1.32	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.50	#/sec	
			WQJ	1.32	#/sec	
			WQR2	1.26	#/sec	

SELECT:

CPD	111.3	Psi
WQPL	2.14	#/sec
DW	10.75	MW

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 08:50:25

HOOR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 08:50:00	3.25	0.00	1.33	0.408	0.381

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 08:50:00	3.27	0.00	1.31	0.401	0.378
25 JUL 89 08:49:00	3.26	0.00	1.31	0.401	0.377
25 JUL 89 08:48:00	3.27	0.00	1.31	0.401	0.378
25 JUL 89 08:47:00	3.26	0.00	1.31	0.402	0.379
25 JUL 89 08:46:00	3.25	0.00	1.32	0.406	0.378
25 JUL 89 08:45:00	3.25	0.00	1.34	0.411	0.380
25 JUL 89 08:44:00	3.25	0.00	1.34	0.411	0.380
25 JUL 89 08:43:00	3.26	0.00	1.34	0.412	0.380
25 JUL 89 08:42:00	3.26	0.00	1.34	0.410	0.380
25 JUL 89 08:41:00	3.26	0.00	1.34	0.411	0.381

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 09:00:01 #1 PAGE 0
CHANG
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FR	0.00	#/sec	
TTXM	700	deg F	FQG	3.25	#/sec	
TNH	100.01	% SPD	FQT	3.25	#/sec	
TNR	101.36	% SPD	H2O_SEL	ON		WATER INJ_0
FSR	31.3	% FSR				
CSGV	60.0	DGA				
SP_LVL	14HS		CMHUM	0.0212	#H/#A	WATER INJ_0
MESSAGE1			CTIM	83	deg F	
MESSAGE2			WQJF	1.31	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.54	#/sec	
			WQJ	1.34	#/sec	
			WQR2	1.30	#/sec	
			SELECT:			
			CPD	111.4	psi	
			WQPL	2.19	#/sec	
			DW	10.90	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 09:00:36

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 09:00:00	3.26	0.00	1.33	0.407	0.381
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 09:00:00	3.28	0.00	1.32	0.404	0.383
25 JUL 89 08:59:00	3.29	0.00	1.33	0.404	0.385
25 JUL 89 08:58:00	3.28	0.00	1.32	0.403	0.384
25 JUL 89 08:57:00	3.29	0.00	1.31	0.399	0.382
25 JUL 89 08:56:00	3.29	0.00	1.31	0.399	0.382
25 JUL 89 08:55:00	3.27	0.00	1.30	0.398	0.381
25 JUL 89 08:54:00	3.28	0.00	1.30	0.399	0.382
25 JUL 89 08:53:00	3.28	0.00	1.31	0.400	0.379
25 JUL 89 08:52:00	3.27	0.00	1.31	0.400	0.380
25 JUL 89 08:51:00	3.28	0.00	1.30	0.397	0.380

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 09:15:08 #1 PAGE 0
CHANG
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	PART LOAD		FQ	0.00	#/sec	
CONTROL	SPEED		FQG	3.25	#/sec	
TTXM	700	deg F	FQT	3.25	#/sec	
TNH	100.03	% SPD	H2O_SEL	ON		WATER INJ_LO
TNR	101.36	% SPD				
FSR	31.3	% FSR				
CSGV	60.3	DGA				
SP_LVL	14HS		CMHUM	0.0218	#H/#A	WATER INJ_LO
MESSAGE1			CTIM	85	deg F	
MESSAGE2			WQJF	1.31	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.54	#/sec	
			WQJ	1.32	#/sec	
			WQR2	1.29	#/sec	
			SELECT:			
			CPD	112.1	psi	
			WQPL	2.18	#/sec	
			DW	10.99	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 09:15:31

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 09:15:00	3.27	0.00	1.33	0.406	0.381

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 09:15:00	3.29	0.00	1.32	0.403	0.381
25 JUL 89 09:14:00	3.29	0.00	1.33	0.404	0.381
25 JUL 89 09:13:00	3.30	0.00	1.32	0.401	0.379
25 JUL 89 09:12:00	3.29	0.00	1.33	0.402	0.378
25 JUL 89 09:11:00	3.28	0.00	1.32	0.404	0.378
25 JUL 89 09:10:00	3.29	0.00	1.33	0.404	0.381
25 JUL 89 09:09:00	3.28	0.00	1.33	0.404	0.381
25 JUL 89 09:08:00	3.27	0.00	1.32	0.405	0.382
25 JUL 89 09:07:00	3.29	0.00	1.33	0.403	0.383
25 JUL 89 09:06:00	3.29	0.00	1.33	0.404	0.384

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	0.00	#/sec	
TTXM	700	deg F	FQG	3.26	#/sec	
TNH	100.01	% SPD	FQT	3.26	#/sec	
TNR	101.36	% SPD	H2O_SEL	ON		WATER INJ_OI
FSR	31.5	% FSR				
CSGV	60.7	DGA				
SP_LVL	14HS		CMHUM	0.0220	#H/#A	WATER INJ_OI
MESSAGE1			CTIM	86	deg F	
MESSAGE2			WQJF	1.36	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.56	#/sec	
			WQJ	1.36	#/sec	
			WQR2	1.29	#/sec	
			SELECT:			
			CPD	112.2	psi	
			WQPL	2.18	#/sec	
			DW	10.84	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 09:30:29

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 09:30:00	3.28	0.00	1.32	0.404	0.381
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 09:30:00	3.28	0.00	1.27	0.388	0.380
25 JUL 89 09:29:00	3.27	0.00	1.37	0.417	0.379
25 JUL 89 09:28:00	3.30	0.00	1.33	0.404	0.381
25 JUL 89 09:27:00	3.29	0.00	1.32	0.403	0.378
25 JUL 89 09:26:00	3.29	0.00	1.32	0.401	0.379
25 JUL 89 09:25:00	3.29	0.00	1.32	0.403	0.381
25 JUL 89 09:24:00	3.29	0.00	1.32	0.403	0.380
25 JUL 89 09:23:00	3.29	0.00	1.32	0.402	0.381
25 JUL 89 09:22:00	3.28	0.00	1.32	0.402	0.379
25 JUL 89 09:21:00	3.29	0.00	1.32	0.403	0.380

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	PART LOAD		FQ	0.00	#/sec	
CONTROL	SPEED		FQG	3.32	#/sec	
TTXM	700	deg F	FQT	3.32	#/sec	
TNH	100.01	% SPD				
TNR	101.36	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	31.7	% FSR				
CSGV	60.7	DGA				
SP_LVL	14HS		CMHUM	0.0214	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	85	deg F	
MESSAGE2			WQJF	1.35	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.55	#/sec	
			WQJ	1.37	#/sec	
			WQR2	1.37	#/sec	
			SELECT:			
			CFD	112.6	Psi	
			WQFL	2.25	#/sec	
			DW	11.04	MW	

ID: #1

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 09:49:00	3.29	0.00	1.33	0.406	0.381

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 09:49:00	3.31	0.00	1.36	0.411	0.386
25 JUL 89 09:48:00	3.31	0.00	1.36	0.410	0.383
25 JUL 89 09:47:00	3.30	0.00	1.36	0.410	0.381
25 JUL 89 09:46:00	3.30	0.00	1.36	0.412	0.382
25 JUL 89 09:45:00	3.27	0.00	1.36	0.415	0.381
25 JUL 89 09:44:00	3.28	0.00	1.36	0.414	0.382
25 JUL 89 09:43:00	3.27	0.00	1.36	0.415	0.384
25 JUL 89 09:42:00	3.28	0.00	1.36	0.414	0.386
25 JUL 89 09:41:00	3.27	0.00	1.36	0.415	0.385
25 JUL 89 09:40:00	3.28	0.00	1.36	0.414	0.385

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 10:00:01 #1 PAGE 02
CHANGE PAGE

NAME	VALUE	UNITS
STATUS CONTROL	PART LOAD SPEED	
TTXM	700	deg F
TNH	100.02	% SPD
TNR	101.36	% SPD
FSR	31.4	% FSR
CSGV	60.5	DGA

NAME	VALUE	UNITS
FQ	0.00	#/sec
FQG	3.33	#/sec
FQT	3.33	#/sec

NAME	VALUE	UNITS
H2O_SEL	ON	

WATER INJ_OI

NAME	VALUE	UNITS
SP_LVL	14HS	
MESSAGE1		
MESSAGE2		
MESSAGE3	IGV TEMP CONTROL	

NAME	VALUE	UNITS
CMHUM	0.0217	#H/#A
CTIM	86	deg F
WQJF	1.36	#/sec
WSQ	1.55	#/sec
WQJ	1.35	#/sec
WQR2	1.34	#/sec

WATER INJ_OI

SELECT:

CPD	112.0	psi
WQPL	2.22	#/sec
DW	10.78	MW

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 10:00:20

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:00:00	3.29	0.00	1.34	0.408	0.382

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:00:00	3.29	0.00	1.36	0.412	0.383
25 JUL 89 09:59:00	3.28	0.00	1.36	0.413	0.383
25 JUL 89 09:58:00	3.29	0.00	1.36	0.412	0.384
25 JUL 89 09:57:00	3.30	0.00	1.36	0.412	0.384
25 JUL 89 09:56:00	3.29	0.00	1.36	0.412	0.387
25 JUL 89 09:55:00	3.30	0.00	1.36	0.411	0.386
25 JUL 89 09:54:00	3.32	0.00	1.36	0.409	0.386
25 JUL 89 09:53:00	3.32	0.00	1.36	0.410	0.385
25 JUL 89 09:52:00	3.31	0.00	1.36	0.410	0.387
25 JUL 89 09:51:00	3.31	0.00	1.36	0.410	0.388

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	PART LOAD		FQ	0.00	#/sec	
CONTROL	SPEED		FQG	3.29	#/sec	
TTXM	699	deg F	FQT	3.29	#/sec	
TNH	100.02	% SPD	H2O_SEL	ON		WATER INJ_0
TNR	101.36	% SPD				
FSR	31.3	% FSR				
CSGV	60.4	DGA				
SP_LVL	14HS		CMHUM	0.0217	#H/#A	WATER INJ_0
MESSAGE1			CTIM	86	deg F	
MESSAGE2			WQJF	1.37	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.56	#/sec	
			WQJ	1.39	#/sec	
			WOR2	1.32	#/sec	
			SELECT:			
			CPD	112.2	psi	
			WQPL	2.21	#/sec	
			DW	10.90	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 25 JUL 89 10:15:31

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:15:00	3.29	0.00	1.35	0.410	0.383
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:15:00	3.29	0.00	1.36	0.414	0.382
25 JUL 89 10:14:00	3.29	0.00	1.36	0.412	0.381
25 JUL 89 10:13:00	3.28	0.00	1.36	0.414	0.381
25 JUL 89 10:12:00	3.28	0.00	1.36	0.413	0.383
25 JUL 89 10:11:00	3.30	0.00	1.36	0.412	0.384
25 JUL 89 10:10:00	3.30	0.00	1.36	0.412	0.385
25 JUL 89 10:09:00	3.28	0.00	1.36	0.414	0.384
25 JUL 89 10:08:00	3.29	0.00	1.36	0.412	0.385
25 JUL 89 10:07:00	3.30	0.00	1.36	0.412	0.388
25 JUL 89 10:06:00	3.28	0.00	1.36	0.415	0.391

ID: #1

SOFT SW'S ENABLED MANUAL CONTROL 25 JUL 89 10:30:01 #1 PAGE 00
 WATER INJECTION CONTROL CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS CONTROL	PART LOAD SPEED		FQ	0.00	#/sec
TTXM	700	deg F	FQG	3.24	#/sec
TNH	100.02	% SPD	FQT	3.24	#/sec
TNR	101.36	% SPD	H2O_SEL	ON	WATER INJ_ON
FSR	31.3	% FSR			
CSGV	60.1	DGA			
SP_LVL	14HS		CMHUM	0.0218	#/H#A
MESSAGE1			CTIM	85	deg F
MESSAGE2			WQJF	1.35	#/sec
MESSAGE3	IGV TEMP CONTROL		WSQ	1.57	#/sec
			WQJ	1.36	#/sec
			WQR2	1.30	#/sec
			SELECT:		
			CPD	111.8	Fsi
			WQFL	2.18	#/sec
			DW	10.81	MW

ID: #1

DATA LIST 07 WLNOX DISPLAY 25 JUL 89 10:30:27

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:30:00	3.29	0.00	1.36	0.412	0.384
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:30:00	3.27	0.00	1.36	0.414	0.383
25 JUL 89 10:29:00	3.28	0.00	1.35	0.413	0.383
25 JUL 89 10:28:00	3.29	0.00	1.36	0.414	0.384
25 JUL 89 10:27:00	3.29	0.00	1.36	0.412	0.385
25 JUL 89 10:26:00	3.29	0.00	1.36	0.413	0.384
25 JUL 89 10:25:00	3.29	0.00	1.36	0.413	0.382
25 JUL 89 10:24:00	3.31	0.00	1.36	0.409	0.382
25 JUL 89 10:23:00	3.32	0.00	1.36	0.409	0.383
25 JUL 89 10:22:00	3.30	0.00	1.36	0.411	0.382
25 JUL 89 10:21:00	3.31	0.00	1.36	0.410	0.379

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 10:53:15 #1 PAGE 004

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	PART LOAD		FQ	0.00	#/sec	
CONTROL:	SPEED		FQG	3.24	#/sec	
TTXM	700	deg F	FQT	3.24	#/sec	
TNH	100.01	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	101.36	% SPD				
FSR	31.4	% FSR				
CSGV	60.6	DGA				
SP_LVL	14HS		CMHUM	0.0224	#/H/A	WATER INJ_OFF
MESSAGE1			CTIM	88	deg F	
MESSAGE2			WQJF	1.37	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.56	#/sec	
			WQJ	1.36	#/sec	
			WQR2	1.30	#/sec	
			SELECT:			
			CPD	112.1	Psi	
			WQPL	2.19	#/sec	
			DW	10.73	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 10:53:34

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:53:00	3.29	0.00	1.36	0.412	0.384
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:53:00	3.29	0.00	1.36	0.413	0.380
25 JUL 89 10:52:00	3.29	0.00	1.36	0.413	0.378
25 JUL 89 10:51:00	3.29	0.00	1.36	0.411	0.379
25 JUL 89 10:50:00	3.31	0.00	1.36	0.410	0.381
25 JUL 89 10:49:00	3.31	0.00	1.36	0.410	0.381
25 JUL 89 10:48:00	3.31	0.00	1.36	0.409	0.383
25 JUL 89 10:47:00	3.31	0.00	1.36	0.411	0.382
25 JUL 89 10:46:00	3.30	0.00	1.36	0.410	0.382
25 JUL 89 10:45:00	3.30	0.00	1.36	0.412	0.382
25 JUL 89 10:44:00	3.30	0.00	1.36	0.411	0.380

ID: #1

HOURLY AVERAGE
TIME

	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:59:00	3.29	0.00	1.36	0.412	0.383

MINUTE AVERAGES
TIME

	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 10:59:00	3.35	0.00	1.38	0.421	0.389
25 JUL 89 10:58:00	3.28	0.00	1.36	0.414	0.381
25 JUL 89 10:57:00	3.28	0.00	1.36	0.413	0.382
25 JUL 89 10:56:00	3.28	0.00	1.36	0.414	0.382
25 JUL 89 10:55:00	3.27	0.00	1.36	0.416	0.381
25 JUL 89 10:54:00	3.27	0.00	1.36	0.416	0.379
25 JUL 89 10:53:00	3.29	0.00	1.36	0.413	0.380
25 JUL 89 10:52:00	3.29	0.00	1.36	0.413	0.378
25 JUL 89 10:51:00	3.29	0.00	1.36	0.411	0.379
25 JUL 89 10:50:00	3.31	0.00	1.36	0.410	0.381

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	0.00	#/sec	
TTXM	700	deg F	FQG	3.28	#/sec	
TNH	100.01	% SPD	FQT	3.28	#/sec	
TNR	101.36	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	31.4	% FSR				
CSGV	61.2	DGA				
SP_LVL	14HS		CMHUM	0.0223	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	89	deg F	
MESSAGE2			WQJF	1.38	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.57	#/sec	
			WQJ	1.35	#/sec	
			WQR2	1.32	#/sec	

SELECT:

CPD	113.0	psi
WQFL	2.21	#/sec
DW	10.84	MW

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 11:14:32

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 11:14:00	3.30	0.00	1.36	0.412	0.383

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 11:14:00	3.30	0.00	1.36	0.411	0.384
25 JUL 89 11:13:00	3.31	0.00	1.36	0.411	0.385
25 JUL 89 11:12:00	3.30	0.00	1.36	0.413	0.386
25 JUL 89 11:11:00	3.29	0.00	1.36	0.412	0.387
25 JUL 89 11:10:00	3.30	0.00	1.36	0.412	0.388
25 JUL 89 11:09:00	3.30	0.00	1.36	0.411	0.388
25 JUL 89 11:08:00	3.30	0.00	1.36	0.411	0.390
25 JUL 89 11:07:00	3.30	0.00	1.36	0.413	0.385
25 JUL 89 11:06:00	3.30	0.00	1.36	0.412	0.385
25 JUL 89 11:05:00	3.30	0.00	1.36	0.410	0.385

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	PART LOAD		FQ	0.00	#/sec	
CONTROL	SPEED		FQG	3.28	#/sec	
TTXM	700	deg F	FQT	3.28	#/sec	
TNH	100.03	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	101.36	% SPD				
FSR	31.3	% FSR				
CSGV	61.4	DGA				
SP_LVL	14HS		CMHUM	0.0228	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	90	deg F	
MESSAGE2			WQJF	1.33	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.56	#/sec	
			WQJ	1.36	#/sec	
			WQR2	1.30	#/sec	
			SELECT:			
			CPD	112.4	psi	
			WRPL	2.18	#/sec	
			DW	10.78	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 12:00:19

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 12:00:00	3.29	0.00	1.36	0.413	0.387
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 12:00:00	3.26	0.00	1.35	0.416	0.381
25 JUL 89 11:59:00	3.26	0.00	1.36	0.417	0.383
25 JUL 89 11:58:00	3.27	0.00	1.36	0.414	0.386
25 JUL 89 11:57:00	3.28	0.00	1.36	0.414	0.385
25 JUL 89 11:56:00	3.29	0.00	1.36	0.412	0.385
25 JUL 89 11:55:00	3.29	0.00	1.36	0.412	0.382
25 JUL 89 11:54:00	3.29	0.00	1.35	0.413	0.382
25 JUL 89 11:53:00	3.29	0.00	1.35	0.411	0.385
25 JUL 89 11:52:00	3.28	0.00	1.36	0.414	0.385
25 JUL 89 11:51:00	3.29	0.00	1.36	0.415	0.385

ID: #1

HOURLY AVERAGE
TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 12:11:00	3.43	0.00	1.43	0.417	0.391

MINUTE AVERAGES
TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 12:11:00	4.25	0.00	1.87	0.439	0.414
25 JUL 89 12:10:00	4.25	0.00	1.87	0.440	0.416
25 JUL 89 12:09:00	4.26	0.00	1.87	0.439	0.419
25 JUL 89 12:08:00	4.26	0.00	1.87	0.438	0.419
25 JUL 89 12:07:00	4.27	0.00	1.87	0.438	0.417
25 JUL 89 12:06:00	4.28	0.00	1.87	0.438	0.417
25 JUL 89 12:05:00	4.26	0.00	1.87	0.440	0.415
25 JUL 89 12:04:00	4.26	0.00	1.87	0.438	0.416
25 JUL 89 12:03:00	3.77	0.00	1.57	0.417	0.399
25 JUL 89 12:02:00	3.28	0.00	1.36	0.414	0.383

ID: #1

SOFT SW'S ENABLED			MANUAL CONTROL WATER INJECTION CONTROL			25 JUL 89 12:12:33 #1 PAGE 004 CHANGE PAGE		
NAME	VALUE	UNITS	NAME	VALUE	UNITS			
STATUS CONTROL	PART LOAD		FR	0.00	#/sec			
TTXM	730	deg F	FRG	4.24	#/sec			
TNH	100.02	% SPD	FRT	4.24	#/sec			
TNR	102.06	% SPD	H2O_SEL	ON				WATER INJ_ON
FSR	39.9	% FCR						
CSGV	84.1	DGA						
SP_LVL	14HS		CMHUM	0.0221	#H/#A			WATER INJ_OFF
MESSAGE1			CTIM	89	deg F			
MESSAGE2			WQJF	1.88	#/sec			
MESSAGE3	IGV FULL OPEN		WSQ	1.93	#/sec			
			WQJ	1.85	#/sec			
			WQR2	1.83	#/sec			
			SELECT:					
			CPD	137.9	psi			
			WQPL	2.71	#/sec			
			DW	17.43	MW			

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS CONTROL	PART LOAD SPEED		FQ	0.00	#/sec
TTXM	739	deg F	FQG	4.28	#/sec
TNH	99.99	% SPD	FQT	4.28	#/sec
TNR	102.06	% SPD	H2O_SEL	ON	
FSR	39.9	% FSR			
CSGV	84.2	DGA			
SP_LVL	14HS		CMHUM	0.0230	#H/#A
MESSAGE1			CTIM	90	deg F
MESSAGE2			WQJF	1.86	#/sec
MESSAGE3	IGV FULL OPEN		WSQ	1.96	#/sec
			WQJ	1.87	#/sec
			WQR2	1.84	#/sec

WATER INJ_ON

WATER INJ_OFF

SELECT:

CPD	137.7	Psi
WQPL	2.72	#/sec
DW	17.64	MW

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 12:30:25

HOURLY AVERAGE TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 12:30:00	3.73	0.00	1.59	0.425	0.401

MINUTE AVERAGES TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 12:30:00	4.29	0.00	1.88	0.437	0.412
25 JUL 89 12:29:00	4.27	0.00	1.87	0.437	0.413
25 JUL 89 12:28:00	4.27	0.00	1.88	0.439	0.413
25 JUL 89 12:27:00	4.27	0.00	1.88	0.438	0.416
25 JUL 89 12:26:00	4.27	0.00	1.87	0.439	0.418
25 JUL 89 12:25:00	4.25	0.00	1.87	0.439	0.418
25 JUL 89 12:24:00	4.27	0.00	1.87	0.439	0.413
25 JUL 89 12:23:00	4.27	0.00	1.87	0.438	0.414
25 JUL 89 12:22:00	4.27	0.00	1.87	0.438	0.413
25 JUL 89 12:21:00	4.27	0.00	1.87	0.438	0.411

ID: #1

BEST AVAILABLE COPY

25 JUL 89 12:45:00 3.99 0.00 1.72 0.430 0.406

MINUTE AVERAGES
TIME

	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 12:45:00	4.31	0.00	1.88	0.435	0.419
25 JUL 89 12:44:00	4.32	0.00	1.87	0.433	0.419
25 JUL 89 12:43:00	4.32	0.00	1.88	0.434	0.416
25 JUL 89 12:42:00	4.32	0.00	1.87	0.433	0.416
25 JUL 89 12:41:00	4.33	0.00	1.87	0.432	0.416
25 JUL 89 12:40:00	4.32	0.00	1.88	0.434	0.414
25 JUL 89 12:39:00	4.31	0.00	1.88	0.435	0.413
25 JUL 89 12:38:00	4.32	0.00	1.87	0.433	0.411
25 JUL 89 12:37:00	4.30	0.00	1.87	0.435	0.410
25 JUL 89 12:36:00	4.31	0.00	1.87	0.435	0.412

ID: #1

25 JUL 89 12:45:33.2700 C0129 HIGH VIBRATION ALARM
25 JUL 89 12:45:38.3800 C0129 HIGH VIBRATION ALARM

NORMAL
ALARM

ID: #1

25 JUL 89 12:45:57.7800 C0129 HIGH VIBRATION ALARM

NORMAL

ID: #1

25 JUL 89 12:46:02.8900 C0129 HIGH VIBRATION ALARM

ALARM

ID: #1

25 JUL 89 12:46:04.7800 C0129 HIGH VIBRATION ALARM

NORMA

ID: #1

ID: #1

SOFT SW'S ENABLED MANUAL CONTROL 25 JUL 89 13:00:28 #1 PAGE 004
WATER INJECTION CONTROL CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FR	0.00	#/sec	
TTXM	736	deg F	FQG	4.29	#/sec	
TNH	100.04	% SPD	FQT	4.29	#/sec	
TNR	102.06	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	39.8	% FSR				
CSGV	84.1	DGA				
SP_LVL	14HS		CMHUM	0.0224	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	91	deg F	
MESSAGE2			WQJF	1.86	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	1.96	#/sec	
			WQJ	1.89	#/sec	
			WQR2	1.86	#/sec	
			SELECT:			
			CPD	137.2	psi	
			WQPL	2.74	#/sec	
			DW	17.52	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 25 JUL 89 13:00:46

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 13:00:00	4.24	0.00	1.85	0.436	0.414

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 13:00:00	4.24	0.00	1.87	0.442	0.419
25 JUL 89 12:59:00	4.23	0.00	1.87	0.443	0.420
25 JUL 89 12:58:00	4.24	0.00	1.88	0.443	0.418
25 JUL 89 12:57:00	4.26	0.00	1.87	0.439	0.418
25 JUL 89 12:56:00	4.26	0.00	1.87	0.439	0.417
25 JUL 89 12:55:00	4.26	0.00	1.87	0.440	0.418
25 JUL 89 12:54:00	4.26	0.00	1.88	0.440	0.417
25 JUL 89 12:53:00	4.27	0.00	1.87	0.438	0.417
25 JUL 89 12:52:00	4.27	0.00	1.87	0.439	0.417

SOFT SW'S ENABLED

MANUAL CONTR
WATER INJECTION

25 JUL 89 13:16:21 #1 PAGE 00
CHANGE
PAGE

NAME	VALUE	UNITS	UNITS
STATUS	PART LOAD		
CONTROL	SPEED		
TTXM	736	deg F	
TNH	100.03	% SPD	
TNR	102.06	% SPD	
FSR	39.5	% FSR	
CSGV	84.1	DGA	
SP_LVL	14HS		
MESSAGE1			
MESSAGE2			
MESSAGE3	IGV FULL OPEN		

137.9
2.71
17.41

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 13:16:40

HOUR AVERAGE TIME	GAS FUEL #/sec	LIG FUEL #/sec	WATER #/sec	ANNUAL RATIO	REQUIRED RATIO
25 JUL 89 13:16:00	4.28	0.00	1.87	0.416	0.416

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIG FUEL #/sec	WATER #/sec	ANNUAL RATIO	REQUIRED RATIO
JUL 89 13:16:00	4.28	0.00	1.88	0.415	0.415
JUL 89 13:15:00	4.27	0.00	1.87	0.419	0.419
JUL 89 13:14:00	4.26	0.00	1.87	0.417	0.417
JUL 89 13:13:00	4.27	0.00	1.87	0.415	0.415
JUL 89 13:12:00	4.27	0.00	1.87	0.411	0.411
JUL 89 13:11:00	4.27	0.00	1.88	0.412	0.412
JUL 89 13:10:00	4.26	0.00	1.88	0.411	0.411
JUL 89 13:09:00	4.26	0.00	1.88	0.412	0.412
JUL 89 13:08:00	4.24	0.00	1.87	0.413	0.413
JUL 89 13:07:00	4.27	0.00	1.87	0.413	0.413
JUL 89 13:07:00	4.26	0.00	1.88	0.415	0.415

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	PART LOAD		FQ	0.00	#/sec	
CONTROL	SPEED		FQG	5.59	#/sec	
TTXM	885	deg F	FQT	5.59	#/sec	
TNH	100.01	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	103.00	% SPD				
FSR	51.5	% FSR				
CSGV	84.0	DGA				
SP_LVL	14HS		CMHUM	0.0228	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	91	deg F	
MESSAGE2			WQJF	2.51	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.52	#/sec	
			WQJ	2.54	#/sec	
			WQR2	2.54	#/sec	
			SELECT:			
			CPD	147.2	psi	
			WQPL	3.42	#/sec	
			DW	26.02	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 13:31:47

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 13:31:00	4.54	0.00	2.00	0.441	0.422
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 13:31:00	5.56	0.00	2.52	0.453	0.443
25 JUL 89 13:30:00	5.55	0.00	2.52	0.454	0.442
25 JUL 89 13:29:00	5.54	0.00	2.52	0.455	0.442
25 JUL 89 13:28:00	5.53	0.00	2.52	0.455	0.445
25 JUL 89 13:27:00	5.52	0.00	2.52	0.455	0.447
25 JUL 89 13:26:00	5.53	0.00	2.51	0.455	0.444
25 JUL 89 13:25:00	5.53	0.00	2.52	0.454	0.442
25 JUL 89 13:24:00	5.53	0.00	2.52	0.455	0.440
25 JUL 89 13:23:00	5.52	0.00	2.52	0.457	0.440
25 JUL 89 13:22:00	5.52	0.00	2.52	0.455	0.440

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 13:45:28 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	0.00	#/sec	
TTXM	881	deg F	FQG	5.56	#/sec	
TNH	100.01	% SPD	FQT	5.56	#/sec	
TNR	103.00	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	51.2	% FSR				
CSGV	84.3	DGA				
SP_LVL	14HS		CMHUM	0.0229	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	91	deg F	
MESSAGE2			WQJF	2.51	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.55	#/sec	
			WQJ	2.52	#/sec	
			WQR2	2.50	#/sec	
			SELECT:			
			CPD	147.7	psi	
			WQPL	3.38	#/sec	
			DW	25.90	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 13:45:53

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 13:45:00	4.83	0.00	2.15	0.446	0.428

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 13:45:00	5.55	0.00	2.52	0.454	0.437
25 JUL 89 13:44:00	5.55	0.00	2.52	0.454	0.441
25 JUL 89 13:43:00	5.54	0.00	2.52	0.455	0.440
25 JUL 89 13:42:00	5.54	0.00	2.52	0.455	0.444
25 JUL 89 13:41:00	5.55	0.00	2.52	0.455	0.443
25 JUL 89 13:40:00	5.55	0.00	2.52	0.454	0.444
25 JUL 89 13:39:00	5.54	0.00	2.52	0.455	0.444
25 JUL 89 13:38:00	5.54	0.00	2.52	0.455	0.442
25 JUL 89 13:37:00	5.53	0.00	2.52	0.456	0.441
25 JUL 89 13:36:00	5.54	0.00	2.52	0.455	0.442

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL.

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	0.00	#/sec	
TTXM	881	deg F	FQG	5.52	#/sec	
TNH	100.02	% SPD	FQT	5.52	#/sec	
TNR	103.00	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	51.1	% FSR				
CSGV	84.2	DGA				
SP_LVL	14HS		CMHUM	0.0223	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	91	deg F	
MESSAGE2			WQJF	2.51	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.53	#/sec	
			WQJ	2.52	#/sec	
			WQR2	2.51	#/sec	
			SELECT:			
			CPD	147.2	psi	
			WQPL	3.39	#/sec	
			DW	25.78	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 13:55:48

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 13:55:00	5.04	0.00	2.26	0.448	0.432
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 13:55:00	5.55	0.00	2.52	0.455	0.446
25 JUL 89 13:54:00	5.54	0.00	2.52	0.455	0.444
25 JUL 89 13:53:00	5.54	0.00	2.52	0.455	0.445
25 JUL 89 13:52:00	5.54	0.00	2.52	0.456	0.444
25 JUL 89 13:51:00	5.55	0.00	2.52	0.454	0.445
25 JUL 89 13:50:00	5.54	0.00	2.52	0.454	0.444
25 JUL 89 13:49:00	5.54	0.00	2.52	0.455	0.445
25 JUL 89 13:48:00	5.54	0.00	2.52	0.455	0.446
25 JUL 89 13:47:00	5.55	0.00	2.52	0.454	0.438
25 JUL 89 13:46:00	5.55	0.00	2.52	0.454	0.436

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 14:05:10 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD		FQ	0.00	#/sec	
TTXM	SPEED		FQG	5.48	#/sec	
TNH	877	deg F	FQT	5.48	#/sec	
TNR	100.03	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	103.00	% SPD				
CSGV	50.8	% FSR				
	84.2	DGA				
SP_LVL	14HS		CMHUM	0.0229	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	91	deg F	
MESSAGE2			WQJF	2.51	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.55	#/sec	
			WQJ	2.53	#/sec	
			WQR2	2.47	#/sec	
			SELECT:			
			CPD	146.9	psi	
			WQPL	3.35	#/sec	
			DW	25.64	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 14:05:40

HOURLY AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:05:00	5.25	0.00	2.37	0.451	0.436

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:05:00	5.52	0.00	2.52	0.456	0.436
25 JUL 89 14:04:00	5.51	0.00	2.52	0.457	0.439
25 JUL 89 14:03:00	5.52	0.00	2.52	0.457	0.439
25 JUL 89 14:02:00	5.53	0.00	2.52	0.456	0.439
25 JUL 89 14:01:00	5.53	0.00	2.52	0.456	0.441
25 JUL 89 14:00:00	5.53	0.00	2.52	0.456	0.442
25 JUL 89 13:59:00	5.54	0.00	2.52	0.456	0.441
25 JUL 89 13:58:00	5.53	0.00	2.52	0.456	0.444
25 JUL 89 13:57:00	5.54	0.00	2.52	0.454	0.444
25 JUL 89 13:56:00	5.54	0.00	2.52	0.455	0.444

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 14:15:08 #1 PAGE 00
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	0.00	#/sec	
TTXM	880	deg F	FQG	5.49	#/sec	
TNH	100.03	% SPD	FQT	5.49	#/sec	
TNR	103.00	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	51.0	% FSR				
CSGV	84.2	DGA				
SP_LVL	14HS		CMHUM	0.0229	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	91	deg F	
MESSAGE2			WQJF	2.52	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.52	#/sec	
			WQJ	2.51	#/sec	
			WQR2	2.49	#/sec	
			SELECT:			
			CPD	146.9	psi	
			WQPL	3.37	#/sec	
			DW	25.75	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 14:15:26

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:15:00	5.46	0.00	2.48	0.454	0.440
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:15:00	5.52	0.00	2.52	0.457	0.440
25 JUL 89 14:14:00	5.52	0.00	2.52	0.457	0.442
25 JUL 89 14:13:00	5.52	0.00	2.52	0.456	0.446
25 JUL 89 14:12:00	5.51	0.00	2.52	0.457	0.446
25 JUL 89 14:11:00	5.52	0.00	2.52	0.457	0.445
25 JUL 89 14:10:00	5.53	0.00	2.52	0.456	0.441
25 JUL 89 14:09:00	5.52	0.00	2.52	0.456	0.439
25 JUL 89 14:08:00	5.52	0.00	2.52	0.457	0.438
25 JUL 89 14:07:00	5.51	0.00	2.52	0.457	0.440
25 JUL 89 14:06:00	5.52	0.00	2.52	0.457	0.438

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 14:25:47 #1 PAGE 004

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FR	0.00	#/sec	
TTXM	878	deg F	FQG	5.54	#/sec	
TNH	100.02	% SPD	FQT	5.54	#/sec	
TNR	103.00	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	50.9	% FSR				
CSGV	84.1	DGA				
SP_LVL	14HS		CMHUM	0.0225	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	91	deg F	
MESSAGE2			WQJF	2.52	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.51	#/sec	
			WQJ	2.52	#/sec	
			WQR2	2.51	#/sec	
			SELECT:			
			CPD	147.1	psi	
			WQPL	3.39	#/sec	
			DW	25.73	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 14:26:05

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:26:00	5.53	0.00	2.52	0.456	0.442
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:26:00	5.52	0.00	2.52	0.456	0.443
25 JUL 89 14:25:00	5.52	0.00	2.53	0.458	0.441
25 JUL 89 14:24:00	5.52	0.00	2.52	0.457	0.442
25 JUL 89 14:23:00	5.51	0.00	2.52	0.457	0.445
25 JUL 89 14:22:00	5.51	0.00	2.52	0.458	0.444
25 JUL 89 14:21:00	5.51	0.00	2.52	0.458	0.445
25 JUL 89 14:20:00	5.51	0.00	2.52	0.458	0.448
25 JUL 89 14:19:00	5.51	0.00	2.52	0.457	0.444
25 JUL 89 14:18:00	5.51	0.00	2.52	0.458	0.443
25 JUL 89 14:17:00	5.53	0.00	2.52	0.456	0.444

ID: #1

SOFT SW'S ENABLED			MANUAL CONTROL			WATER INJECTION CONTROL			25 JUL 89 14:39:43	PAGE 00
NAME	VALUE	UNITS	NAME	VALUE	UNITS	NAME	VALUE	UNITS	CHANGES	PAGE
STATUS CONTROL	PART LOAD SPEED		FQ	0.00	#/sec					
TTXM	878	deg F	FQG	5.54	#/sec					
TNH	100.03	% SPD	FQT	5.54	#/sec					
TNR	103.00	% SPD	H2O_SEL	ON					WATER	
FSR	51.1	% FSR							INJ_ON	
CSGV	84.0	DGA								
SP_LVL	14HS		CMHUM	0.0228	#H/#A				WATER	
MESSAGE1			CTIM	91	deg F				INJ_OF	
MESSAGE2			WQJF	2.53	#/sec					
MESSAGE3	IGV FULL OPEN		WSQ	2.52	#/sec					
			WQJ	2.50	#/sec					
			WQR2	2.50	#/sec					
			SELECT:							
			CPD	147.3	psi					
			WQPL	3.38	#/sec					
			DW	25.78	MW					

ID: #1

DATA LIST 07 WLNOX DISPLAY 25 JUL 89 14:39:43

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:39:00	5.53	0.00	2.52	0.456	0.442

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:39:00	5.53	0.00	2.52	0.456	0.440
25 JUL 89 14:38:00	5.53	0.00	2.52	0.456	0.439
25 JUL 89 14:37:00	5.52	0.00	2.52	0.457	0.437
25 JUL 89 14:36:00	5.52	0.00	2.52	0.456	0.437
25 JUL 89 14:35:00	5.53	0.00	2.52	0.456	0.438
25 JUL 89 14:34:00	5.52	0.00	2.52	0.456	0.439
25 JUL 89 14:33:00	5.52	0.00	2.52	0.457	0.439
25 JUL 89 14:32:00	5.52	0.00	2.52	0.457	0.439
25 JUL 89 14:31:00	5.51	0.00	2.52	0.457	0.439
25 JUL 89 14:30:00	5.50	0.00	2.52	0.458	0.441

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 14:45:08 #1 PAGE 00
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS	BASE LOAD		FQ'	0.00	#/sec
CONTROL	TEMP		FQG	6.76	#/sec
TTXM	1017	deg F	FQT	6.76	#/sec
TNH	100.01	% SPD	H2O_SEL	ON	
TNR	104.30	% SPD			
FSR	62.8	% FSR			
CSGV	84.1	DGA			
SP_LVL	14HS		CMHUM	0.0228	#H/#A
MESSAGE1			CTIM	91	deg F
MESSAGE2			WQJF	3.18	#/sec
MESSAGE3	IGV FULL OPEN		WSQ	3.19	#/sec
			WQJ	3.16	#/sec
			WQR2	3.13	#/sec

WATER
INJ_ON

WATER
INJ_OF

SELECT:

CPD	155.8	psi
WQPL	4.02	#/sec
DW	32.90	MW

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 14:45:26

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:45:00	5.56	0.00	2.54	0.456	0.442

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 14:45:00	6.79	0.00	3.16	0.466	0.452
25 JUL 89 14:44:00	6.46	0.00	2.95	0.456	0.450
25 JUL 89 14:43:00	5.57	0.00	2.53	0.454	0.442
25 JUL 89 14:42:00	5.54	0.00	2.52	0.456	0.440
25 JUL 89 14:41:00	5.54	0.00	2.52	0.456	0.443
25 JUL 89 14:40:00	5.54	0.00	2.52	0.455	0.440
25 JUL 89 14:39:00	5.53	0.00	2.52	0.456	0.440
25 JUL 89 14:38:00	5.53	0.00	2.52	0.456	0.439
25 JUL 89 14:37:00	5.52	0.00	2.52	0.457	0.437
25 JUL 89 14:36:00	5.52	0.00	2.52	0.456	0.437

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

25 JUL 89 15:44:19 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FR	0.00	#/sec	
CONTROL	TEMP		FQG	6.73	#/sec	
TTXM	1018	deg F	FQT	6.73	#/sec	
TNH	100.03	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	104.30	% SPD				
FSR	62.1	% FSR	CMHUM	0.0229	#H/#A	WATER INJ_OFF
CSGV	84.0	DGA	CTIM	91	deg F	
SP_LVL	14HS		WQJF	3.13	#/sec	
MESSAGE1			WSQ	3.14	#/sec	
MESSAGE2			WQJ	3.13	#/sec	
MESSAGE3	IGV FULL OPEN		WQR2	3.08	#/sec	
			SELECT:			
			CPD	155.9	psi	
			WQPL	3.97	#/sec	
			DW	32.64	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 15:44:50

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 15:44:00	6.71	0.00	3.10	0.462	0.451
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 15:44:00	6.71	0.00	3.12	0.464	0.452
25 JUL 89 15:43:00	6.71	0.00	3.11	0.464	0.453
25 JUL 89 15:42:00	6.71	0.00	3.11	0.464	0.454
25 JUL 89 15:41:00	6.73	0.00	3.12	0.464	0.448
25 JUL 89 15:40:00	6.73	0.00	3.13	0.466	0.446
25 JUL 89 15:39:00	6.72	0.00	3.13	0.466	0.447
25 JUL 89 15:38:00	6.72	0.00	3.14	0.467	0.449
25 JUL 89 15:37:00	6.72	0.00	3.14	0.467	0.450
25 JUL 89 15:36:00	6.71	0.00	3.14	0.468	0.450
25 JUL 89 15:35:00	6.71	0.00	3.14	0.468	0.449

TD: #1

SOFT SW'S ENABLED MANUAL CONTROL 25 JUL 89 15:59:17 #1 PAGE 00
 WATER INJECTION CONTROL CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD		FR	0.00	#/sec	
TTXM	TEMP		FRG	6.73	#/sec	
TNH	1018	deg F	FRT	6.73	#/sec	
TNR	100.03	% SPD	H2O_SEL	ON		WATER INJ_LOF
FSR	104.30	% SPD				
CSGV	62.2	% FSR				
	84.1	DGA				
SP_LVL	14HS		CMHUM	0.0233	#H/#A	WATER INJ_LOF
MESSAGE1			CTIM	90	deg F	
MESSAGE2			WQJF	3.12	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.14	#/sec	
			WQJ	3.11	#/sec	
			WQR2	3.07	#/sec	
			SELECT:			
			CPD	155.9	psi	
			WQPL	3.95	#/sec	
			DW	32.73	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 25 JUL 89 15:59:36

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 15:59:00	6.71	0.00	3.09	0.460	0.450

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 15:59:00	6.72	0.00	3.11	0.464	0.445
25 JUL 89 15:58:00	6.73	0.00	3.12	0.463	0.445
25 JUL 89 15:57:00	6.73	0.00	3.11	0.462	0.449
25 JUL 89 15:56:00	6.74	0.00	3.12	0.463	0.451
25 JUL 89 15:55:00	6.75	0.00	3.11	0.461	0.453
25 JUL 89 15:54:00	6.73	0.00	3.11	0.462	0.450
25 JUL 89 15:53:00	6.74	0.00	3.11	0.462	0.448
25 JUL 89 15:52:00	6.73	0.00	3.11	0.463	0.449
25 JUL 89 15:51:00	6.72	0.00	3.12	0.463	0.448
25 JUL 89 15:50:00	6.72	0.00	3.12	0.463	0.447

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FR	0.00	#/sec	
CONTROL	TEMP		FQG	6.71	#/sec	
TTXM	1016	deg F	FQT	6.71	#/sec	
TNH	100.01	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	104.30	% SPD				
FSR	52.5	% FSR	CMHUM	0.0229	#H/#A	WATER INJ_OFF
CSGV	84.1	DGA	CTIM	92	deg F	
SP_LVL	14HS		WQJF	3.11	#/sec	
MESSAGE1			WSQ	3.10	#/sec	
MESSAGE2			WQJ	3.08	#/sec	
MESSAGE3	IGV FULL OPEN		WQR2	3.09	#/sec	
			SELECT:			
			CPD	155.5	Psi	
			WQFL	3.97	#/sec	
			DW	32.64	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 25 JUL 89 16:35:54

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 16:35:00	6.72	0.00	3.11	0.463	0.450

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 16:35:00	6.70	0.00	3.09	0.461	0.450
25 JUL 89 16:34:00	6.70	0.00	3.09	0.462	0.449
25 JUL 89 16:33:00	6.69	0.00	3.09	0.462	0.448
25 JUL 89 16:32:00	6.69	0.00	3.10	0.463	0.449
25 JUL 89 16:31:00	6.70	0.00	3.09	0.463	0.450
25 JUL 89 16:30:00	6.70	0.00	3.10	0.462	0.451
25 JUL 89 16:29:00	6.70	0.00	3.10	0.462	0.450
25 JUL 89 16:28:00	6.71	0.00	3.10	0.461	0.452
25 JUL 89 16:27:00	6.71	0.00	3.10	0.462	0.448
25 JUL 89 16:26:00	6.72	0.00	3.10	0.461	0.446

ID: #1

HOUR LOG ----- ROLLING AVG -----

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 17:20:00	6.71	0.00	3.07	0.458	0.446

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 17:20:27

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 17:20:00	6.71	0.00	3.07	0.458	0.446

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 17:20:00	6.72	0.00	3.03	0.452	0.445
25 JUL 89 17:19:00	6.71	0.00	3.04	0.453	0.444
25 JUL 89 17:18:00	6.69	0.00	3.04	0.454	0.443
25 JUL 89 17:17:00	6.71	0.00	3.04	0.454	0.442
25 JUL 89 17:16:00	6.70	0.00	3.04	0.454	0.443
25 JUL 89 17:15:00	6.70	0.00	3.05	0.456	0.442
25 JUL 89 17:14:00	6.71	0.00	3.10	0.462	0.443
25 JUL 89 17:13:00	6.71	0.00	3.10	0.462	0.443
25 JUL 89 17:12:00	6.71	0.00	3.10	0.461	0.441
25 JUL 89 17:11:00	6.73	0.00	3.10	0.461	0.441

ID: #1

MANUAL CONTROL
WATER INJECTION CONTROL

SOFT SW'S ENABLED

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FG	0.00	#/sec	
CONTROL	TEMP		FGG	6.78	#/sec	
TTXM	1016	deg F	FQT	6.78	#/sec	
TNH	100.04	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	104.38	% SPD				
FSR	63.0	% FSR				
CSGV	83.5	DGA				
SP_LVL	14HS		CMHUM	0.0226	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	90	deg F	
MESSAGE2			WQJF	3.14	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.19	#/sec	
			WQJ	3.12	#/sec	
			WQR2	3.13	#/sec	
			SELECT:			
			CPD	155.9	psi	
			WQFL	4.01	#/sec	
			DW	33.19	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

25 JUL 89 17:30:55

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 17:30:00	6.72	0.00	3.07	0.457	0.445
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 17:30:00	6.77	0.00	3.09	0.456	0.445
25 JUL 89 17:29:00	6.79	0.00	3.07	0.454	0.446
25 JUL 89 17:28:00	6.78	0.00	3.12	0.460	0.446
25 JUL 89 17:27:00	6.73	0.00	3.14	0.466	0.444
25 JUL 89 17:26:00	6.76	0.00	3.18	0.472	0.445
25 JUL 89 17:25:00	6.72	0.00	3.12	0.466	0.444
25 JUL 89 17:24:00	6.80	0.00	3.09	0.457	0.445
25 JUL 89 17:23:00	6.72	0.00	3.08	0.459	0.444
25 JUL 89 17:22:00	6.73	0.00	3.03	0.450	0.444
25 JUL 89 17:21:00	6.72	0.00	3.03	0.452	0.444

BEST AVAILABLE COPY

SOFT SW'S ENABLED MANUAL CONTROL 25 JUL 89 17:45:45 #1 PAGE 00
 WATER INJECTION CONTROL CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD		FQ	0.00	#/sec	
TTXM	TEMP		FQG	6.73	#/sec	
TNH	1016	deg F	FQT	6.73	#/sec	
TNR	100.02	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	104.37	% SPD				
CSGV	62.9	% FSR				
	83.7	DGA				
SP_LVL	14HS		CMHUM	0.0226	#H/#A	WATER INJ_OF
MESSAGE1			CTIM	87	deg F	
MESSAGE2			WQJF	3.05	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.07	#/sec	
			WQJ	3.06	#/sec	
			WQR2	3.07	#/sec	
			SELECT:			
			CPD	156.6	psi	
			WQPL	3.95	#/sec	
			DW	32.52	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 25 JUL 89 17:46:05

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 17:46:00	6.74	0.00	3.08	0.458	0.445
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
25 JUL 89 17:46:00	6.73	0.00	3.08	0.456	0.445
25 JUL 89 17:45:00	6.77	0.00	3.13	0.462	0.444
25 JUL 89 17:44:00	6.76	0.00	3.14	0.466	0.446
25 JUL 89 17:43:00	6.79	0.00	3.15	0.463	0.446
25 JUL 89 17:42:00	6.77	0.00	3.13	0.463	0.449
25 JUL 89 17:41:00	6.75	0.00	3.13	0.462	0.446
25 JUL 89 17:40:00	6.76	0.00	3.11	0.461	0.446
25 JUL 89 17:39:00	6.76	0.00	3.10	0.459	0.446
25 JUL 89 17:38:00	6.74	0.00	3.09	0.458	0.447
25 JUL 89 17:37:00	6.77	0.00	3.13	0.460	0.448

ID: #1

BEST AVAILABLE COPY

SOFT SW'S ENABLED MANUAL CONTROL 26 JUL 89 08:30:46 #1 PAGE 00
 WATER INJECTION CONTROL CHANGE
 PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	2.92	#/sec	
TTXM	700	deg F	FQG	0.00	#/sec	
TNH	100.02	% SPD	FQT	2.23	#/sec	
TNR	101.42	% SPD	H2O_SEL	ON		WATER INJ_OF
FSR	32.2	% FSR				
CSGV	58.7	DGA				
SP_LVL	14HS		CMHUM	0.0199	#H/#A	WATER INJ_OF
MESSAGE1			CTIM	81	deg F	
MESSAGE2			WQJF	1.38	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.56	#/sec	
			WQJ	1.38	#/sec	
			WQR2	1.36	#/sec	
			SELECT:			
			CPD	109.9	psi	
			WQPL	4.04	#/sec	
			DW	10.28	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 08:31:41

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 08:31:00	2.34	0.82	1.30	0.450	0.440
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 08:31:00	0.00	2.92	1.38	0.617	0.576
26 JUL 89 08:30:00	0.00	2.92	1.38	0.616	0.575
26 JUL 89 08:29:00	0.00	2.91	1.38	0.617	0.574
26 JUL 89 08:28:00	0.00	2.91	1.38	0.618	0.575
26 JUL 89 08:27:00	0.00	2.91	1.38	0.619	0.574
26 JUL 89 08:26:00	0.00	2.90	1.38	0.620	0.572
26 JUL 89 08:25:00	0.00	2.90	1.38	0.621	0.570
26 JUL 89 08:24:00	0.00	2.90	1.38	0.620	0.571
26 JUL 89 08:23:00	0.00	2.90	1.38	0.620	0.573
26 JUL 89 08:22:00	0.00	2.90	1.38	0.619	0.573

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 08:47:17 #1 PAGE 004

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	2.90	#/sec	
TTXM	700	deg F	FQG	0.00	#/sec	
TNH	100.03	% SPD	FQT	2.23	#/sec	
TNR	101.42	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	32.0	% FSR				
CSGV	59.2	DGA				
SP_LVL	14HS		CMHUM	0.0202	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	83	deg F	
MESSAGE2			WQJF	1.39	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.55	#/sec	
			WQJ	1.38	#/sec	
			WQR2	1.35	#/sec	
			SELECT:			
			CPD	109.6	psi	
			WQPL	4.03	#/sec	
			DW	10.23	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 08:47:36

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 08:47:00	1.68	1.41	1.32	0.498	0.478
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 08:47:00	0.00	2.91	1.38	0.617	0.573
26 JUL 89 08:46:00	0.00	2.90	1.38	0.620	0.574
26 JUL 89 08:45:00	0.01	2.91	1.38	0.617	0.576
26 JUL 89 08:44:00	0.00	2.90	1.38	0.622	0.575
26 JUL 89 08:43:00	0.00	2.89	1.38	0.622	0.575
26 JUL 89 08:42:00	0.00	2.89	1.38	0.623	0.576
26 JUL 89 08:41:00	0.00	2.90	1.38	0.621	0.576
26 JUL 89 08:40:00	0.00	2.90	1.38	0.621	0.577
26 JUL 89 08:39:00	0.00	2.90	1.38	0.621	0.575
26 JUL 89 08:38:00	0.00	2.90	1.38	0.623	0.574

ID: #1

SOFT SW'S ENABLED MANUAL CONTROL 26 JUL 89 09:00:18 #1 PAGE 00
 WATER INJECTION CONTROL CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	2.91	#/sec	
TTXM	700	deg F	FQG	0.00	#/sec	
TNH	100.03	% SPD	FQT	2.23	#/sec	
TNR	101.42	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	32.0	% FSR				
CSGV	58.9	DGA				
SP_LVL	14HS		CMHUM	0.0200	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	83	deg F	
MESSAGE2			WQJF	1.35	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.56	#/sec	
			WQJ	1.37	#/sec	
			WQR2	1.35	#/sec	
			SELECT:			
			CPD	109.6	psi	
			WQPL	4.03	#/sec	
			DW	10.17	MW	

ID: #1

DATA LIST 07 WLNQX DISPLAY 26 JUL 89 09:00:45

HOUR AVERAGE		GAS FUEL	LIQ FUEL	WATER	ACTUAL	REQUIRED
TIME		#/sec	#/sec	#/sec	RATIO	RATIO
26 JUL 89 09:00:00		1.06	1.96	1.37	0.552	0.514
MINUTE AVERAGES		GAS FUEL	LIQ FUEL	WATER	ACTUAL	REQUIRED
TIME		#/sec	#/sec	#/sec	RATIO	RATIO
26 JUL 89 09:00:00		0.01	2.89	1.38	0.621	0.574
26 JUL 89 08:59:00		0.00	2.89	1.38	0.623	0.573
26 JUL 89 08:58:00		0.00	2.89	1.38	0.623	0.574
26 JUL 89 08:57:00		0.00	2.90	1.38	0.622	0.575
26 JUL 89 08:56:00		0.00	2.90	1.38	0.622	0.577
26 JUL 89 08:55:00		0.00	2.91	1.38	0.619	0.576
26 JUL 89 08:54:00		0.00	2.91	1.42	0.638	0.578
26 JUL 89 08:53:00		0.00	2.91	1.42	0.637	0.577
26 JUL 89 08:52:00		0.00	2.91	1.38	0.621	0.577
26 JUL 89 08:51:00		0.00	2.90	1.38	0.621	0.576

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 09:15:30 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	2.91	#/sec	
TTXM	700	deg F	FQG	0.00	#/sec	
TNH	100.03	% SPD	FQT	2.23	#/sec	
TNR	101.42	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	31.8	% FSR				
CSGV	59.5	DGA				
SP_LVL	14HS		CMHUM	0.0195	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	84	deg F	
MESSAGE2			WQJF	1.38	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.54	#/sec	
			WQJ	1.37	#/sec	
			WQR2	1.39	#/sec	
			SELECT:			
			CPD	110.4	Psi	
			WQFL	4.09	#/sec	
			DW	10.31	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 09:15:50

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 09:15:00	0.24	2.69	1.38	0.604	0.561
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 09:15:00	0.00	2.91	1.38	0.618	0.584
26 JUL 89 09:14:00	0.00	2.91	1.38	0.618	0.587
26 JUL 89 09:13:00	0.00	2.90	1.38	0.621	0.586
26 JUL 89 09:12:00	0.00	2.90	1.38	0.620	0.584
26 JUL 89 09:11:00	0.00	2.90	1.38	0.620	0.578
26 JUL 89 09:10:00	0.00	2.91	1.38	0.620	0.579
26 JUL 89 09:09:00	0.00	2.92	1.38	0.620	0.581
26 JUL 89 09:08:00	0.00	2.91	1.38	0.620	0.579
26 JUL 89 09:07:00	0.00	2.90	1.38	0.620	0.578
26 JUL 89 09:06:00	0.00	2.90	1.38	0.620	0.577

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 09:33:15 #1 PAGE 004

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FR	2.92	#/sec	
TTXM	700	deg F	FRG	0.00	#/sec	
TNH	100.02	% SPD	FRT	2.24	#/sec	
TNR	101.42	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	32.1	% FSR				
CSGV	59.1	DGA				
SP_LVL	14HS		CMHUM	0.0190	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	84	deg F	
MESSAGE2			WQJF	1.34	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.54	#/sec	
			WQJ	1.35	#/sec	
			WOR2	1.39	#/sec	
			SELECT:			
			OPD	110.4	psi	
			WQPL	4.10	#/sec	
			DW	10.37	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 09:33:40

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 09:33:00	0.00	2.91	1.39	0.623	0.581

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 09:33:00	0.00	2.93	1.35	0.604	0.592
26 JUL 89 09:32:00	0.00	2.92	1.34	0.599	0.593
26 JUL 89 09:31:00	0.00	2.91	1.34	0.598	0.593
26 JUL 89 09:30:00	0.00	2.91	1.38	0.617	0.591
26 JUL 89 09:29:00	0.00	2.91	1.44	0.645	0.590
26 JUL 89 09:28:00	0.00	2.91	1.43	0.641	0.589
26 JUL 89 09:27:00	0.00	2.91	1.43	0.642	0.589
26 JUL 89 09:26:00	0.00	2.92	1.43	0.640	0.591
26 JUL 89 09:25:00	0.00	2.92	1.43	0.639	0.591
26 JUL 89 09:24:00	0.00	2.92	1.43	0.637	0.592

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 09:45:14 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS
STATUS CONTROL	PART LOAD SPEED	
TTXM	700	deg F
TNH	100.02	% SPD
TNR	101.42	% SPD
FSR	32.1	% FSR
CSGV	59.6	DGA

NAME	VALUE	UNITS
FQ	2.93	#/sec
FQG	0.00	#/sec
FQT	2.23	#/sec

SP_LVL	14HS	
MESSAGE1		
MESSAGE2		
MESSAGE3	IGV TEMP CONTROL	

H2O_SEL	ON		WATER INJ_ON
CMHUM	0.0191	#H/#A	WATER INJ_OFF
CTIM	84	deg F	
WQJF	1.38	#/sec	
WSQ	1.54	#/sec	
WQJ	1.37	#/sec	
WQR2	1.40	#/sec	

SELECT:

CPD	110.8	psi
WQPL	4.11	#/sec
DW	10.37	MW

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 09:45:33

HOOR AVERAGE
TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 09:45:00	0.00	2.91	1.40	0.626	0.584

MINUTE AVERAGES
TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 09:45:00	0.00	2.93	1.43	0.639	0.592
26 JUL 89 09:44:00	0.00	2.93	1.47	0.653	0.593
26 JUL 89 09:43:00	0.00	2.93	1.47	0.654	0.595
26 JUL 89 09:42:00	0.00	2.93	1.47	0.655	0.595
26 JUL 89 09:41:00	0.00	2.92	1.47	0.654	0.594
26 JUL 89 09:40:00	0.00	2.92	1.47	0.655	0.592
26 JUL 89 09:39:00	0.00	2.91	1.45	0.646	0.591
26 JUL 89 09:38:00	0.01	2.91	1.41	0.632	0.591
26 JUL 89 09:37:00	0.00	2.91	1.36	0.610	0.592
26 JUL 89 09:36:00	0.00	2.91	1.35	0.605	0.593

ID: #1

BEST AVAILABLE COPY

SOFT SW'S ENABLED MANUAL CONTROL 26 JUL 89 10:00:50 #1 PAGE 00
 WATER INJECTION CONTROL CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	PART LOAD		FR	2.93	#/sec	
CONTROL	SPEED		FQG	0.00	#/sec	
TTXM	700	deg F	FQT	2.24	#/sec	
TNH	100.06	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	101.42	% SPD				
FSR	32.1	% FSR				
CSGV	59.2	DGA				
SP_LVL	14HS		CMHUM	0.0191	#H/#A	WATER INJ_OF
MESSAGE1			CTIM	84	deg F	
MESSAGE2			WQJF	1.50	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.65	#/sec	
			WQJ	1.51	#/sec	
			WQR2	1.40	#/sec	
			SELECT:			
			CPD	109.9	psi	
			WQPL	4.10	#/sec	
			DW	10.19	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 10:01:07

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 10:01:00	0.00	2.91	1.40	0.628	0.590
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 10:01:00	0.01	2.92	1.46	0.649	0.599
26 JUL 89 10:00:00	0.01	2.92	1.45	0.649	0.599
26 JUL 89 09:59:00	0.00	2.92	1.42	0.632	0.596
26 JUL 89 09:58:00	0.00	2.96	1.44	0.645	0.607
26 JUL 89 09:57:00	0.00	2.91	1.42	0.635	0.596
26 JUL 89 09:56:00	0.00	2.91	1.42	0.634	0.596
26 JUL 89 09:55:00	0.01	2.91	1.42	0.635	0.596
26 JUL 89 09:54:00	0.01	2.91	1.42	0.633	0.597
26 JUL 89 09:53:00	0.00	2.91	1.46	0.653	0.595
26 JUL 89 09:52:00	0.00	2.91	1.44	0.645	0.594

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 10:15:07 #1 PAGE 004

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	2.92	#/sec	
TTXM	700	deg F	FQG	0.00	#/sec	
TNH	100.03	% SPD	FQT	2.24	#/sec	
TNR	101.42	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	32.0	% FSR				
CSGV	59.6	DGA				
SP_LVL	14HS		CMHUM	0.0192	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	84	deg F	
MESSAGE2			WQJF	1.47	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.62	#/sec	
			WQJ	1.42	#/sec	
			WQR2	1.39	#/sec	
			SELECT:			
			CPD	110.3	psi	
			WQPL	4.10	#/sec	
			DW	10.28	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 10:15:26

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 10:15:00	0.00	2.92	1.42	0.634	0.593
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 10:15:00	0.00	2.91	1.45	0.647	0.591
26 JUL 89 10:14:00	0.01	2.91	1.45	0.644	0.593
26 JUL 89 10:13:00	0.00	2.92	1.45	0.646	0.590
26 JUL 89 10:12:00	0.00	2.93	1.45	0.642	0.590
26 JUL 89 10:11:00	0.01	2.93	1.47	0.652	0.591
26 JUL 89 10:10:00	0.01	2.94	1.42	0.627	0.594
26 JUL 89 10:09:00	0.00	2.93	1.46	0.650	0.592
26 JUL 89 10:08:00	0.00	2.93	1.47	0.654	0.592
26 JUL 89 10:07:00	0.00	2.93	1.47	0.650	0.596
26 JUL 89 10:06:00	0.01	2.92	1.46	0.651	0.594

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS CONTROL	PART LOAD		FQ	2.93	#/sec
TTXM	701	deg F	FQG	0.00	#/sec
TNH	100.03	% SPD	FQT	2.24	#/sec
TNR	101.42	% SPD	H2O_SEL	ON	
FSR	31.9	% FSR			
CSGV	59.3	DGA			
SP_LVL	14HS		CMHUM	0.0193	#H/#A
MESSAGE1			CTIM	86	deg F
MESSAGE2			WQJF	1.47	#/sec
MESSAGE3	IGV TEMP CONTROL		WSQ	1.59	#/sec
			WQJ	1.45	#/sec
			WOR2	1.41	#/sec
			SELECT:		
			CPD	110.6	psi
			WQPL	4.14	#/sec
			DW	10.34	MW

ID: #1

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 10:31:00	0.00	2.92	1.43	0.638	0.594

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 10:31:00	0.00	2.92	1.45	0.643	0.597
26 JUL 89 10:30:00	0.01	2.92	1.46	0.651	0.594
26 JUL 89 10:29:00	0.01	2.92	1.46	0.648	0.596
26 JUL 89 10:28:00	0.01	2.92	1.47	0.653	0.594
26 JUL 89 10:27:00	0.00	2.93	1.43	0.634	0.595
26 JUL 89 10:26:00	0.00	2.92	1.41	0.627	0.591
26 JUL 89 10:25:00	0.00	2.93	1.45	0.645	0.593
26 JUL 89 10:24:00	0.01	2.93	1.47	0.654	0.593
26 JUL 89 10:23:00	0.01	2.92	1.48	0.659	0.592
26 JUL 89 10:22:00	0.01	2.93	1.47	0.654	0.593

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	2.97	#/sec	
TTXM	700	deg F	FQG	0.00	#/sec	
TNH	99.97	% SPD	FQT	2.28	#/sec	
TNR	101.42	% SPD	H2O_SEL	ON		WATER INJ_0
FSR	32.2	% FSR				
CSGV	60.9	DGA				
SP_LVL	14HS		CMHUM	0.0196	#H/#A	WATER INJ_0
MESSAGE1			CTIM	86	deg F	
MESSAGE2			WQJF	1.45	#/sec	
MESSAGE3	IGV TEMP CONTROL		WSQ	1.59	#/sec	
			WQJ	1.45	#/sec	
			WQR2	1.41	#/sec	
			SELECT:			
			CPD	112.0	Psi	
			WQPL	4.14	#/sec	
			DW	10.61	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 10:43:51

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 10:43:00	0.01	2.93	1.44	0.640	0.595
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 10:43:00	0.01	2.95	1.47	0.650	0.594
26 JUL 89 10:42:00	0.01	2.95	1.46	0.638	0.594
26 JUL 89 10:41:00	0.01	2.95	1.46	0.641	0.596
26 JUL 89 10:40:00	0.02	2.95	1.40	0.615	0.595
26 JUL 89 10:39:00	0.00	2.94	1.42	0.627	0.595
26 JUL 89 10:38:00	0.01	2.94	1.40	0.618	0.594
26 JUL 89 10:37:00	0.02	2.94	1.44	0.633	0.595
26 JUL 89 10:36:00	0.01	2.94	1.40	0.620	0.590
26 JUL 89 10:35:00	0.01	2.94	1.47	0.653	0.591
26 JUL 89 10:34:00	0.00	2.94	1.45	0.644	0.595

ID: #1

SOFT SW'S ENABLED MANUAL CONTROL 26 JUL 89 11:00:17 #1 PAGE 00
 WATER INJECTION CONTROL CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	3.85	#/sec	
TTXM	724	deg F	FQG	0.00	#/sec	
TNH	100.04	% SPD	FQT	2.95	#/sec	
TNR	102.25	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	42.1	% FSR				
CSGV	84.4	DGA				
SP_LVL	14HS		CMHUM	0.0198	#H/#A	WATER INJ_OF
MESSAGE1			CTIM	86	deg F	
MESSAGE2			WQJF	2.09	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.14	#/sec	
			WRJ	2.09	#/sec	
			WQR2	2.02	#/sec	
			SELECT:			
			CPD	138.4	psi	
			WQFL	5.56	#/sec	
			DW	17.11	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 11:00:49

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 11:00:00	0.01	3.10	1.56	0.652	0.607
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 11:00:00	0.00	3.85	2.07	0.699	0.660
26 JUL 89 10:59:00	0.01	3.85	2.07	0.700	0.662
26 JUL 89 10:58:00	0.01	3.85	2.10	0.708	0.662
26 JUL 89 10:57:00	0.00	3.87	2.10	0.705	0.664
26 JUL 89 10:56:00	0.01	3.87	2.10	0.706	0.663
26 JUL 89 10:55:00	0.00	3.87	2.10	0.707	0.663
26 JUL 89 10:54:00	0.01	3.86	2.08	0.701	0.664
26 JUL 89 10:53:00	0.01	3.85	2.09	0.704	0.662
26 JUL 89 10:52:00	0.01	3.90	2.09	0.698	0.664
26 JUL 89 10:51:00	0.01	3.92	2.12	0.702	0.663

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FR	3.87	#/sec	
TTXM	729	deg F	FRG	0.00	#/sec	
TNH	100.03	% SPD	FRT	2.97	#/sec	
TNR	102.25	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	42.2	% FSR				
CSGV	84.3	DGA				
SP_LVL	14HS		CMHUM	0.0200	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	86	deg F	
MESSAGE2			WQJF	2.08	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.10	#/sec	
			WQJ	2.10	#/sec	
			WQR2	2.03	#/sec	
			SELECT:			
			CPD	138.5	psi	
			WQPL	5.58	#/sec	
			DW	17.46	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 11:15:17

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 11:15:00	0.01	3.34	1.72	0.666	0.623

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 11:15:00	0.00	3.87	2.09	0.701	0.660
26 JUL 89 11:14:00	0.00	3.85	2.03	0.703	0.662
26 JUL 89 11:13:00	0.02	3.85	2.05	0.692	0.659
26 JUL 89 11:12:00	0.01	3.85	2.05	0.690	0.659
26 JUL 89 11:11:00	0.00	3.87	2.07	0.699	0.661
26 JUL 89 11:10:00	0.01	3.87	2.07	0.694	0.663
26 JUL 89 11:09:00	0.02	3.87	2.10	0.707	0.661
26 JUL 89 11:08:00	0.01	3.88	2.09	0.700	0.664
26 JUL 89 11:07:00	0.00	3.88	2.14	0.718	0.664
26 JUL 89 11:06:00	0.01	3.88	2.10	0.705	0.662

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 11:32:16 #1 PAGE 004

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	3.87	#/sec	
TTXM	732	deg F	FQG	0.00	#/sec	
TNH	100.02	% SPD	FQT	2.98	#/sec	
TNR	102.25	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	42.4	% FSR				
CSGV	84.6	DGA				
SP_LVL	14HS		CMHUM	0.0199	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	88	deg F	
MESSAGE2			WQJF	2.10	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.13	#/sec	
			WQJ	2.08	#/sec	
			WQR2	2.04	#/sec	
			SELECT:			
			CPD	138.5	psi	
			WQPL	5.61	#/sec	
			DW	17.40	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 11:32:26

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 11:32:00	0.01	3.61	1.90	0.682	0.643
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 11:32:00	0.01	3.87	2.09	0.703	0.664
26 JUL 89 11:31:00	0.01	3.87	2.12	0.711	0.667
26 JUL 89 11:30:00	0.01	3.87	2.04	0.687	0.666
26 JUL 89 11:29:00	0.02	3.86	2.04	0.685	0.664
26 JUL 89 11:28:00	0.01	3.86	2.09	0.707	0.660
26 JUL 89 11:27:00	0.01	3.86	2.09	0.701	0.661
26 JUL 89 11:26:00	0.01	3.87	2.11	0.705	0.662
26 JUL 89 11:25:00	0.00	3.87	2.09	0.703	0.662
26 JUL 89 11:24:00	0.00	3.88	2.10	0.703	0.663
26 JUL 89 11:23:00	0.00	3.88	2.11	0.706	0.662

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 12:30:03 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD SPEED		FQ	5.00	#/sec	
TTXM	871	deg F	FQG	0.00	#/sec	
TNH	100.04	% SPD	FQT	3.83	#/sec	
TNR	103.24	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	53.8	% FSR				
CSGV	84.5	DGA				
SP_LVL	14HS		CMHUM	0.0206	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	89	deg F	
MESSAGE2			WQJF	2.82	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.83	#/sec	
			WQJ	2.82	#/sec	
			WQR2	2.90	#/sec	
			SELECT:			
			CFD	147.7	psi	
			WQPL	7.56	#/sec	
			DW	25.49	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 12:30:43

HOOR AVERAGE
TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 12:30:00	0.01	4.37	2.43	0.720	0.687

MINUTE AVERAGES
TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 12:30:00	0.01	4.97	2.84	0.743	0.712
26 JUL 89 12:29:00	0.01	4.97	2.85	0.742	0.716
26 JUL 89 12:28:00	0.02	4.97	2.84	0.739	0.714
26 JUL 89 12:27:00	0.02	4.97	2.86	0.746	0.711
26 JUL 89 12:26:00	0.03	4.98	2.84	0.739	0.710
26 JUL 89 12:25:00	0.03	4.97	2.82	0.735	0.710
26 JUL 89 12:24:00	0.03	4.98	2.79	0.728	0.709
26 JUL 89 12:23:00	0.04	4.97	2.87	0.745	0.716
26 JUL 89 12:22:00	0.02	4.98	2.85	0.741	0.715
26 JUL 89 12:21:00	0.01	4.98	2.84	0.737	0.713

ID: #1

26 JUL 89 13:31:17.5100 C0028 GAS RATIO VALVE POSITION SERVO TROUBLE ALARM

ID: #1

26 JUL 89 13:31:40.2700 C0028 GAS RATIO VALVE POSITION SERVO TROUBLE LOCK

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 13:31:53

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 13:31:00	0.01	5.18	2.99	0.748	0.721

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 13:31:00	0.03	6.02	3.57	0.770	0.744
26 JUL 89 13:30:00	0.03	6.02	3.56	0.768	0.743
26 JUL 89 13:29:00	0.00	6.01	3.52	0.762	0.743
26 JUL 89 13:28:00	0.01	6.02	3.52	0.761	0.743
26 JUL 89 13:27:00	0.03	6.04	3.63	0.781	0.752
26 JUL 89 13:26:00	0.01	6.03	3.57	0.769	0.750
26 JUL 89 13:25:00	0.02	6.05	3.63	0.776	0.756
26 JUL 89 13:24:00	0.02	6.05	3.63	0.779	0.757
26 JUL 89 13:23:00	0.00	6.04	3.54	0.763	0.751
26 JUL 89 13:22:00	0.02	6.08	3.62	0.775	0.746

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 13:30:33 #1 PAGE 00
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD TEMP		FQ	6.02	#/sec	
TTXM	1017	deg F	FQG	0.00	#/sec	
TNH	100.01	% SPD	FQT	4.62	#/sec	
TNR	104.54	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	65.0	% FSR				
CSGV	84.3	DGA				
SP_LVL	14HS		CMHUM	0.0205	#H/#A	WATER INJ_OF
MESSAGE1			CTIM	90	deg F	
MESSAGE2			WQJF	3.69	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.71	#/sec	
			WQJ	3.67	#/sec	
			WQR2	3.49	#/sec	
			SELECT:			
			CPD	156.1	psi	
			WQPL	8.85	#/sec	
			DW	32.23	MW	

ID: #1

26 JUL 89 13:30:57.2700 C0028 GAS RATIO VALVE POSITION SERVO TROUBLE UNLOC

ID: #1

26 JUL 89 13:31:06.5300 C0028 GAS RATIO VALVE POSITION SERVO TROUBLE NORMA

ID: #1



SOFT SW'S ENABLED

MANUAL CONTROL
 WATER INJECTION CONTROL

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	PART LOAD		FQ	4.98	#/sec	
TTXM	SPEED		FQG	0.00	#/sec	
TNH	871	deg F	FQT	3.81	#/sec	
TNR	100.04	% SPD	H2O_SEL	ON		WATER INJ_OI
FSR	103.24	% SPD				
CSGV	53.6	% FSR				
	84.3	DGA				
SP_LVL	14HS		CMHUM	0.0198	#H/#A	WATER INJ_OI
MESSAGE1			CTIM	89	deg F	
MESSAGE2			WQJF	2.89	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.89	#/sec	
			WQJ	2.91	#/sec	
			WQR2	2.81	#/sec	
			SELECT:			
			CPD	147.7	psi	
			WQPL	7.36	#/sec	
			DW	25.34	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 13:02:33

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 13:02:00	0.02	4.97	2.84	0.740	0.713

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 13:02:00	0.01	4.98	2.86	0.745	0.721
26 JUL 89 13:01:00	0.02	4.98	2.89	0.751	0.721
26 JUL 89 13:00:00	0.02	4.98	2.87	0.750	0.719
26 JUL 89 12:59:00	0.01	4.98	2.88	0.753	0.717
26 JUL 89 12:58:00	0.02	4.97	2.88	0.751	0.716
26 JUL 89 12:57:00	0.01	4.96	2.86	0.746	0.719
26 JUL 89 12:56:00	0.01	4.97	2.86	0.745	0.714
26 JUL 89 12:55:00	0.02	4.97	2.84	0.742	0.708
26 JUL 89 12:54:00	0.01	4.97	2.85	0.744	0.708
26 JUL 89 12:53:00	0.00	4.98	2.87	0.750	0.712

ID: #1

HOUR AVERAGE
TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 12:46:00	0.02	4.67	2.63	0.730	0.700

MINUTE AVERAGES
TIME

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 12:46:00	0.03	4.98	2.84	0.739	0.714
26 JUL 89 12:45:00	0.03	4.98	2.83	0.735	0.709
26 JUL 89 12:44:00	0.01	4.98	2.82	0.734	0.706
26 JUL 89 12:43:00	0.01	4.99	2.81	0.732	0.711
26 JUL 89 12:42:00	0.01	4.99	2.84	0.741	0.710
26 JUL 89 12:41:00	0.01	5.00	2.86	0.745	0.714
26 JUL 89 12:40:00	0.01	4.99	2.84	0.739	0.715
26 JUL 89 12:39:00	0.02	4.99	2.79	0.729	0.713
26 JUL 89 12:38:00	0.01	4.99	2.84	0.739	0.709
26 JUL 89 12:37:00	0.01	4.99	2.84	0.740	0.711

ID: #1

SOFT SW'S ENABLED			MANUAL CONTROL WATER INJECTION CONTROL			26 JUL 89 12:46:35 #1 PAGE 00 CHANGE PAGE		
NAME	VALUE	UNITS	NAME	VALUE	UNITS			
STATUS CONTROL	PART LOAD SPEED		FQ	4.98	#/sec			
TTXM	871	deg F	FQG	0.00	#/sec			
TNH	100.02	% SPD	FQT	3.81	#/sec			
TNR	103.24	% SPD	H2O_SEL	ON		WATER INJ_ON		
FSR	53.8	% FSR						
CSGV	84.1	DGA						
SP_LVL	14HS		CMHUM	0.0203	#H/#A	WATER INJ_OFF		
MESSAGE1			CTIM	89	deg F			
MESSAGE2			WQJF	2.80	#/sec			
MESSAGE3	IGV FULL OPEN		WSQ	2.82	#/sec			
			WQJ	2.80	#/sec			
			WQR2	2.78	#/sec			

SELECT:

CPD	147.6	psi
WQPL	7.32	#/sec
DW	25.31	MW

ID: #1

BEST AVAILABLE COPY

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FR	6.05	#/sec	
CONTROL	TEMP		FRG	0.00	#/sec	
TTXM	1016	deg F	FRT	4.64	#/sec	
TNH	100.01	% SPD				
TNR	104.54	% SPD	H2O_SEL	ON		WATER
FSR	65.1	% FSR				INJ_OF
CSGV	84.3	DGA				
SP_LVL	14HS		CMHUM	0.0203	#H/#A	WATER
MESSAGE1			CTIM	89	deg F	INJ_OF
MESSAGE2			WQJF	3.54	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.58	#/sec	
			WQJ	3.55	#/sec	
			WQR2	3.52	#/sec	
			SELECT:			
			CPD	156.6	psi	
			WQPL	8.85	#/sec	
			DW	32.38	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 13:46:42

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 13:46:00	0.02	5.44	3.17	0.755	0.729
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 13:46:00	0.04	6.03	3.54	0.762	0.742
26 JUL 89 13:45:00	0.05	6.02	3.54	0.762	0.746
26 JUL 89 13:44:00	0.01	6.03	3.58	0.772	0.745
26 JUL 89 13:43:00	0.01	6.04	3.57	0.769	0.744
26 JUL 89 13:42:00	0.03	6.03	3.55	0.763	0.741
26 JUL 89 13:41:00	0.02	6.04	3.59	0.771	0.743
26 JUL 89 13:40:00	0.01	6.05	3.58	0.769	0.746
26 JUL 89 13:39:00	0.02	6.04	3.57	0.768	0.748
26 JUL 89 13:38:00	0.02	6.04	3.56	0.765	0.747
26 JUL 89 13:37:00	0.01	6.03	3.55	0.768	0.746

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD		FR	6.08	#/sec	
TTXM	TEMP		FQG	0.00	#/sec	
TNH	1015	deg F	FQT	4.66	#/sec	
TNR	100.06	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	104.54	% SPD				
CSGV	65.6	% FSR				
	84.6	DGA				
SP_LVL	14HS		CMHUM	0.0199	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	87	deg F	
MESSAGE2			WQJF	3.58	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.62	#/sec	
			WQJ	3.58	#/sec	
			WQR2	3.52	#/sec	
			SELECT:			
			CPD	157.3	psi	
			WQPL	8.85	#/sec	
			DW	32.55	MW	

ID: #1

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 14:01:00	0.02	5.71	3.34	0.760	0.736

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 14:01:00	0.01	6.07	3.59	0.770	0.743
26 JUL 89 14:00:00	0.03	6.06	3.56	0.760	0.740
26 JUL 89 13:59:00	0.04	6.05	3.52	0.754	0.740
26 JUL 89 13:58:00	0.04	6.04	3.52	0.755	0.740
26 JUL 89 13:57:00	0.01	6.04	3.57	0.768	0.741
26 JUL 89 13:56:00	0.02	6.04	3.55	0.766	0.741
26 JUL 89 13:55:00	0.02	6.05	3.58	0.767	0.742
26 JUL 89 13:54:00	0.05	6.06	3.57	0.761	0.743
26 JUL 89 13:53:00	0.01	6.05	3.51	0.754	0.736
26 JUL 89 13:52:00	0.02	6.07	3.53	0.754	0.741

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 14:14:40 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD		FQ	6.03	#/sec	
TTXM	TEMP		FQG	0.00	#/sec	
TNH	1017	deg F	FQT	4.63	#/sec	
TNR	100.03	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	104.54	% SPD				
CSGV	65.1	% FGR				
	84.3	DGA				
SP_LVL	14HS		CMHUM	0.0208	#/H/A	WATER INJ_OFF
MESSAGE1			CTIM	89	deg F	
MESSAGE2			WQJF	3.59	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.60	#/sec	
			WQJ	3.58	#/sec	
			WQR2	3.48	#/sec	
			SELECT:			
			CPD	156.6	psi	
			WQPL	8.85	#/sec	
			DW	32.23	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 14:14:51

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 14:14:00	0.02	5.94	3.49	0.764	0.741
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 14:14:00	0.02	6.04	3.55	0.763	0.741
26 JUL 89 14:13:00	0.02	6.03	3.53	0.759	0.738
26 JUL 89 14:12:00	0.03	6.04	3.56	0.765	0.738
26 JUL 89 14:11:00	0.02	6.04	3.54	0.765	0.737
26 JUL 89 14:10:00	0.03	6.04	3.56	0.763	0.740
26 JUL 89 14:09:00	0.02	6.04	3.50	0.753	0.737
26 JUL 89 14:08:00	0.03	6.06	3.55	0.760	0.737
26 JUL 89 14:07:00	0.03	6.07	3.56	0.762	0.736
26 JUL 89 14:06:00	0.02	6.06	3.55	0.762	0.737
26 JUL 89 14:05:00	0.03	6.07	3.55	0.759	0.743

ID: #1

SOFT SW'S ENABLED

WATER INJECTION CONTROL

CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FQ	6.04	#/sec	
CONTROL	TEMP		FQG	0.00	#/sec	
TTXM	1017	deg F	FQT	4.62	#/sec	
TNH	100.04	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	104.54	% SPD				
FSR	65.0	% FSR	CMHUM	0.0209	#H/#A	WATER INJ_OFF
CSGV	84.6	DGA	CTIM	88	deg F	
SP_LVL	14HS		WQJF	3.55	#/sec	
MESSAGE1			WSQ	3.59	#/sec	
MESSAGE2			WQJ	3.56	#/sec	
MESSAGE3	IGV FULL OPEN		WQR2	3.46	#/sec	
			SELECT:			
			CPD	156.4	Psi	
			WQPL	8.85	#/sec	
			DW	32.11	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 14:37:22

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 14:37:00	0.02	6.04	3.55	0.762	0.741

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 14:37:00	0.04	6.03	3.48	0.747	0.735
26 JUL 89 14:38:00	0.04	6.04	3.52	0.755	0.736
26 JUL 89 14:35:00	0.03	6.05	3.59	0.769	0.742
26 JUL 89 14:34:00	0.02	6.04	3.54	0.759	0.743
26 JUL 89 14:33:00	0.01	6.03	3.49	0.753	0.738
26 JUL 89 14:32:00	0.02	6.04	3.58	0.769	0.746
26 JUL 89 14:31:00	0.03	6.05	3.54	0.754	0.737
26 JUL 89 14:30:00	0.04	6.04	3.50	0.753	0.734
26 JUL 89 14:29:00	0.04	6.03	3.53	0.758	0.734
26 JUL 89 14:28:00	0.01	6.03	3.51	0.758	0.737

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD		FQ	5.91	#/sec	
TTXM	TEMP		FQG	0.00	#/sec	
TNH	1018	deg F	FQT	4.53	#/sec	
TNR	100.06	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	104.36	% SPD				
CSGV	63.9	% FSR				
	84.5	DGA				
SP_LVL	14HS		CMHUM	0.0214	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	88	deg F	
MESSAGE2			WQJF	2.22	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	2.21	#/sec	
			WQJ	2.22	#/sec	
			WQR2	3.35	#/sec	
			SELECT:			
			CPD	155.2	psi	
			WQPL	8.71	#/sec	
			DW	31.67	MW	

ID: #1

DATA LIST 12

DEMAND DISPLAY LOG

NAME	VALUE	UNITS	NAME	VALUE	UNITS
TNH	100.06	% SPD	TTWS1A01	824	deg F
TNH_PR	5095	rpm	TTWS1A02	813	deg F
TNR	104.36	% SPD	FPG3	362.0	psi
FSR	63.6	% FSR	FPG1	349.3	psi
DW	31.64	MW	FQG	0.00	#/sec
TTXSP1	75	deg F	FTG	98	deg F
TTXSP2	49	deg F	CMHUM	0.0220	#H/#A
TTXSP3	43	deg F	TTXC	1019	deg F
TTXSPL	128	deg F	WSQX	22.01	% STR
CPD	154.8	psi	WQJ	2.20	#/sec
CTIF1	87	deg F	LTTH1	142	deg F
CTDA1	668	deg F	CSGV	84.6	DGA
TTWS1FI1	674	deg F	FSG	-2.93	% STR
TTWS1FI2	712	deg F	FAG	-4.52	mA
TTWS1F01	693	deg F	FSGR	1.35	% STR
TTWS1F02	712	deg F	FAGR	-4.38	mA

HEALTHY LINKS: R S T

LOG PERIOD = 0005 MINUTES

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 17:18:04

HOURLY AVERAGE
TIME

	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 17:18:00	0.02	5.74	0.59	0.130	0.721

MINUTE AVERAGES
TIME

	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 17:18:00	0.01	5.90	2.21	0.488	0.721
26 JUL 89 17:17:00	0.01	5.91	2.21	0.486	0.723
26 JUL 89 17:16:00	0.02	5.91	2.21	0.485	0.725
26 JUL 89 17:15:00	0.00	5.91	2.21	0.488	0.725
26 JUL 89 17:14:00	0.00	5.90	2.21	0.489	0.724
26 JUL 89 17:13:00	0.01	5.91	2.22	0.488	0.727
26 JUL 89 17:12:00	0.00	5.84	2.22	0.493	0.727
26 JUL 89 17:11:00	0.02	5.71	1.26	0.277	0.721
26 JUL 89 17:10:00	0.03	5.71	0.00	0.000	0.719
26 JUL 89 17:09:00	0.01	5.71	2.02	0.458	0.719

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD		FQ	6.02	#/sec	
TTXM	TEMP		FQG	0.00	#/sec	
TNH	1017	deg F	FQT	4.62	#/sec	
TNR	100.06	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	104.48	% SPD				
CSGV	64.9	% FSR				
	84.4	DGA				
SP_LVL	14HS		CMHUM	0.0218	#H/#A	WATER INJ_OF
MESSAGE1			CTIM	88	deg F	
MESSAGE2			WQJF	3.37	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.38	#/sec	
			WQJ	3.39	#/sec	
			WQR2	3.40	#/sec	
			SELECT:			
			CPD	155.8	psi	
			WQPL	8.85	#/sec	
			DW	31.96	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 17:27:26

HOOR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 17:27:00	0.02	5.79	1.13	0.248	0.722

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 17:27:00	0.00	6.03	3.45	0.746	0.724
26 JUL 89 17:26:00	0.02	6.03	3.47	0.748	0.726
26 JUL 89 17:25:00	0.01	6.01	3.44	0.744	0.724
26 JUL 89 17:24:00	0.03	6.01	3.44	0.743	0.726
26 JUL 89 17:23:00	0.01	6.00	3.37	0.730	0.726
26 JUL 89 17:22:00	0.01	6.01	3.44	0.745	0.725
26 JUL 89 17:21:00	0.01	6.02	3.46	0.748	0.728
26 JUL 89 17:20:00	0.02	5.91	2.45	0.538	0.724
26 JUL 89 17:19:00	0.03	5.90	2.21	0.486	0.725
26 JUL 89 17:18:00	0.01	5.90	2.21	0.488	0.721

ID: #1

BEST AVAILABLE COPY

SOFT SW'S ENABLED MANUAL CONTROL 26 JUL 89 17:51:14 #1 PAGE 0
 WATER INJECTION CONTROL CHANGE
 PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FQ	6.05	#/sec	
CONTROL	TEMP		FQG	0.00	#/sec	
TTXM	1017	deg F	FQT	4.65	#/sec	
TNH	100.02	% SPD				
TNR	104.51	% SPD	H2O_SEL	ON		WATER INJ_OI
FSR	65.2	% FSR				
CSGV	84.5	DGA				
SP_LVL	14HS		CMHUM	0.0207	#H/#A	WATER INJ_OI
MESSAGE1			CTIM	86	deg F	
MESSAGE2			WQJF	3.52	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.52	#/sec	
			WQJ	3.55	#/sec	
			WQR2	3.47	#/sec	
			SELECT:			
			CPD	156.6	psi	
			WQPL	8.85	#/sec	
			DW	32.43	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 17:51:29

TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 17:51:00	0.01	6.07	3.52	0.754	0.732
MINUTE AVERAGES					
TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 17:51:00	0.02	6.06	3.53	0.758	0.733
26 JUL 89 17:50:00	0.01	6.05	3.46	0.745	0.730
26 JUL 89 17:49:00	0.00	6.06	3.47	0.746	0.731
26 JUL 89 17:48:00	0.01	6.07	3.54	0.758	0.732
26 JUL 89 17:47:00	0.01	6.07	3.54	0.759	0.732
26 JUL 89 17:46:00	0.01	6.07	3.54	0.758	0.732
26 JUL 89 17:45:00	0.01	6.08	3.54	0.755	0.733

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FQ	6.05	#/sec	
CONTROL	TEMP		FQG	0.00	#/sec	
TTXM	1017	deg F	FQT	4.63	#/sec	
TNH	100.03	% SPD	H2O_SEL	ON		WATER INJ_LOI
TNR	104.51	% SPD				
FSR	65.3	% FSR				
CSGV	84.3	DGA				
SP_LVL	14HS		CMHUM	0.0210	#H/#A	WATER INJ_LOI
MESSAGE1			CTIM	88	deg F	
MESSAGE2			WQJF	3.52	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.51	#/sec	
			WQJ	3.50	#/sec	
			WQR2	3.47	#/sec	
			SELECT:			
			CPD	156.8	Psi	
			WQPL	8.85	#/sec	
			DW	32.34	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 18:17:53

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 18:17:00	0.01	6.05	3.51	0.756	0.732

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 18:17:00	0.01	6.05	3.52	0.756	0.731
26 JUL 89 18:16:00	0.01	6.05	3.56	0.765	0.735
26 JUL 89 18:15:00	0.01	6.05	3.50	0.755	0.731
26 JUL 89 18:14:00	0.01	6.04	3.49	0.754	0.731
26 JUL 89 18:13:00	0.00	6.04	3.52	0.760	0.733
26 JUL 89 18:12:00	0.01	6.04	3.50	0.751	0.735
26 JUL 89 18:11:00	0.00	6.04	3.53	0.759	0.735
26 JUL 89 18:10:00	0.00	6.04	3.53	0.761	0.734
26 JUL 89 18:09:00	0.01	6.03	3.52	0.759	0.731
26 JUL 89 18:08:00	0.01	6.03	3.51	0.759	0.733

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

26 JUL 89 18:24:52 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS CONTROL	BASE LOAD		FQ	6.04	#/sec
TTXM	TEMP		FQG	0.00	#/sec
TNH	1016	deg F	FQT	4.64	#/sec
TNR	100.06	% SPD	H2O_SEL	ON	
FSR	104.51	% SPD			
CSGV	65.2	% FSR			
	84.3	DGA			
SP_LVL	14HS		CMHUM	0.0209	#H/#A
MESSAGE1			CTIM	87	deg F
MESSAGE2			WQJF	3.50	#/sec
MESSAGE3	IGV FULL OPEN		WSQ	3.48	#/sec
			WQJ	3.50	#/sec
			WQR2	3.47	#/sec

WATER
INJ_ON

WATER
INJ_OFF

SELECT:

CPD 156.4 psi
WQPL 8.85 #/sec
DW 32.29 MW

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 18:25:02

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 18:25:00	0.00	6.05	3.51	0.757	0.732

MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 18:25:00	0.00	6.05	3.51	0.756	0.733
26 JUL 89 18:24:00	0.01	6.04	3.51	0.756	0.734
26 JUL 89 18:23:00	0.00	6.04	3.54	0.763	0.734
26 JUL 89 18:22:00	0.00	6.05	3.54	0.760	0.736
26 JUL 89 18:21:00	0.00	6.04	3.55	0.764	0.735
26 JUL 89 18:20:00	0.01	6.04	3.54	0.763	0.733
26 JUL 89 18:19:00	0.01	6.04	3.50	0.755	0.731
26 JUL 89 18:18:00	0.00	6.05	3.52	0.759	0.731
26 JUL 89 18:17:00	0.01	6.05	3.52	0.756	0.731
26 JUL 89 18:16:00	0.01	6.05	3.56	0.765	0.735

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD		FQ	6.07	#/sec	
TTXM	TEMP		FQG	0.00	#/sec	
TNH	1015	deg F	FQT	4.66	#/sec	
TNR	100.06	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	104.53	% SPD				
CSGV	65.5	% FSR				
	84.3	DGA				
SP_LVL	14HS		CMHUM	0.0204	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	86	deg F	
MESSAGE2			WQJF	3.52	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.53	#/sec	
			WQJ	3.55	#/sec	
			WQR2	3.50	#/sec	
			SELECT:			
			CPD	157.1	Psi	
			WQPL	8.85	#/sec	
			DW	32.58	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 18:58:54

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 18:58:00	0.01	6.05	3.53	0.759	0.735
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 18:58:00	0.01	6.08	3.54	0.757	0.735
26 JUL 89 18:57:00	0.04	6.07	3.55	0.759	0.735
26 JUL 89 18:56:00	0.02	6.08	3.56	0.760	0.737
26 JUL 89 18:55:00	0.00	6.08	3.52	0.755	0.733
26 JUL 89 18:54:00	0.01	6.08	3.54	0.758	0.731
26 JUL 89 18:53:00	0.01	6.09	3.56	0.760	0.733
26 JUL 89 18:52:00	0.00	6.07	3.54	0.758	0.732
26 JUL 89 18:51:00	0.01	6.06	3.53	0.757	0.732
26 JUL 89 18:50:00	0.01	6.05	3.53	0.759	0.733
26 JUL 89 18:49:00	0.00	6.06	3.57	0.767	0.736

TTWS1F12	713	deg F	FAG	-4.54	mA
TTWS1F01	593	deg F	FSGR	0.00	% STR
TTWS1F02	711	deg F	FAGR	-4.02	mA

HEALTHY LINKS: R S T

LOG PERIOD = 0005 MINUTES

ID: #1

26 JUL 89 19:27:36.6300 C0232 LOCAL DIAGNOSTIC ALARM - SEE DISPLAY ALARM

ID: #1

SOFT SW'S ENABLED MANUAL CONTROL 26 JUL 89 19:31:25 #1 PAGE 004
 WATER INJECTION CONTROL CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FR	6.10	#/sec	
CONTROL	TEMP		FRG	0.00	#/sec	
TTXM	1014	deg F	FQT	4.69	#/sec	
TNH	100.02	% SPD				
TNR	104.55	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	55.9	% FSR				
CSGV	84.3	DGA				
SP_LVL	14HS		CMHUM	0.0199	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	85	deg F	
MESSAGE2			WQJF	3.53	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.57	#/sec	
			WQJ	3.55	#/sec	
			WOR2	3.52	#/sec	
			SELECT:			
			CPD	157.5	psi	
			WRPL	8.85	#/sec	
			DW	32.64	MW	

ID: #1

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 19:31:57

HOURLY AVERAGE

DATA LIST 07

WLNOX DISPLAY

26 JUL 89 19:32:34

HOUR AVERAGE
TIME

	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 19:32:00	0.01	6.08	3.55	0.759	0.736

MINUTE AVERAGES
TIME

	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 19:32:00	0.03	6.10	3.56	0.756	0.737
26 JUL 89 19:31:00	0.02	6.10	3.55	0.758	0.737
26 JUL 89 19:30:00	0.01	6.10	3.59	0.764	0.737
26 JUL 89 19:29:00	0.01	6.10	3.57	0.760	0.737
26 JUL 89 19:28:00	0.02	6.09	3.55	0.755	0.737
26 JUL 89 19:27:00	0.00	6.10	3.56	0.762	0.735
26 JUL 89 19:26:00	0.01	6.09	3.58	0.764	0.736
26 JUL 89 19:25:00	0.01	6.09	3.59	0.766	0.737
26 JUL 89 19:24:00	0.02	6.09	3.54	0.755	0.737
26 JUL 89 19:23:00	0.01	6.10	3.58	0.764	0.737

ID: #1

26 JUL 89 19:33:08.1100 C0232 LOCAL DIAGNOSTIC ALARM - SEE DISPLAY NORMAL

ID: #1

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD		FQ	6.11	#/sec	
TTXM	TEMP		FQG	0.00	#/sec	
TNH	1015	deg F	FQT	4.70	#/sec	
TNR	100.06	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	104.55	% SPD				
CSGV	65.7	% FSR				
	84.6	DGA				
SP_LVL	14HS		CMHUM	0.0197	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	85	deg F	
MESSAGE2			WQJF	3.59	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.59	#/sec	
			WQJ	3.60	#/sec	
			WQR2	3.53	#/sec	
			SELECT:			
			CPD	157.6	Fsi	
			WQPL	8.85	#/sec	
			DW	32.81	MW	

ID: #1

DATA LIST 07 WLNOX DISPLAY 26 JUL 89 19:42:26

HOUR AVERAGE TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 19:42:00	0.01	6.09	3.55	0.759	0.736
MINUTE AVERAGES TIME	GAS FUEL #/sec	LIQ FUEL #/sec	WATER #/sec	ACTUAL RATIO	REQUIRED RATIO
26 JUL 89 19:42:00	0.01	6.11	3.60	0.766	0.739
26 JUL 89 19:41:00	0.02	6.11	3.59	0.766	0.738
26 JUL 89 19:40:00	0.00	6.11	3.57	0.762	0.738
26 JUL 89 19:39:00	0.01	6.10	3.57	0.761	0.738
26 JUL 89 19:38:00	0.00	6.09	3.54	0.756	0.738
26 JUL 89 19:37:00	0.04	6.08	3.46	0.739	0.739
26 JUL 89 19:36:00	0.01	6.10	3.56	0.758	0.737
26 JUL 89 19:35:00	0.01	6.10	3.58	0.762	0.738
26 JUL 89 19:34:00	0.00	6.10	3.59	0.768	0.736
26 JUL 89 19:33:00	0.02	6.10	3.56	0.758	0.737

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

27 JUL 89 07:29:43 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FQ	6.33	#/sec	
CONTROL	TEMP		FQG	0.00	#/sec	
TTXM	1007	deg F	FQT	4.87	#/sec	
TNH	100.06	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	104.80	% SPD				
FSR	68.5	% FSR				
CSGV	84.2	DGA				
SP_LVL	14HS		CMHUM	0.0170	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	73	deg F	
MESSAGE2			WQJF	3.75	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.71	#/sec	
			WQJ	3.70	#/sec	
			WOR2	3.69	#/sec	
			SELECT:			
			CPD	161.9	psi	
			WQPL	8.85	#/sec	
			DW	34.43	MW	

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS CONTROL	BASE LOAD		FQ	6.30	#/sec
TTXM	TEMP		FQG	0.00	#/sec
TNH	1009	deg F	FQT	4.83	#/sec
TNR	100.02	% SPD	H2O_SEL	ON	
FSR	104.80	% SPD			
CSGV	68.0	% FSR			
	84.0	DGA			
SP_LVL	14HS		CMHUM	0.0175	#H/#A
MESSAGE1			CTIM	73	deg F
MESSAGE2			WQJF	3.63	#/sec
MESSAGE3	IGV FULL OPEN		WSD	3.63	#/sec
			WQJ	3.63	#/sec
			WQR2	3.64	#/sec

WATER
INJ_ON

WATER
INJ_OFF

WATER TO FUEL RATIO LOW - HOURLY AVG

SELECT:

CPD	161.1	psi
WQPL	8.85	#/sec
DW	34.04	MW

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
 WATER INJECTION CONTROL

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FQ	6.28	#/sec	
CONTROL	TEMP		FQ3	0.00	#/sec	
TTXM	1010	deg F	FQT	4.81	#/sec	
TNH	100.02	% SPD				
TNR	104.80	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	67.7	% FSR				
CSGV	83.8	DGA				
SP_LVL	14HS		CMHUM	0.0183	#H/#A	WATER INJ_OFI
MESSAGE1			CTIM	74	deg F	
MESSAGE2			WQJF	3.67	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.65	#/sec	
			WQJ	3.67	#/sec	
			WQR2	3.60	#/sec	
			SELECT:			
			CPD	160.8	psi	
			WQPL	8.85	#/sec	
			DW	33.99	MW	

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

27 JUL 89 08:14:52 #1 PAGE 004

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FQ	6.23	#/sec	
CONTROL	TEMP		FQG	0.00	#/sec	
TTXM	1011	deg F	FQT	4.78	#/sec	
TNH	100.03	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	104.79	% SPD				
FSR	67.2	% FSR				
CSGV	83.6	DGA				
SP_LVL	14HS		CMHUM	0.0191	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	77	deg F	
MESSAGE2			WQJF	3.62	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.63	#/sec	
			WQJ	3.60	#/sec	
			WQR2	3.54	#/sec	
			SELECT:			
			CPD	159.8	Psi	
			WQPL	8.85	#/sec	
			DW	33.61	MW	

ID: #1

MANUAL CONTROL
WATER INJECTION CONTROL

27 JUL 89 08:29:44 #1 PAGE 004

SOFT SW'S ENABLED

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FR	6.16	#/sec	
CONTROL	TEMP		FRG	0.00	#/sec	
TTXM	1013	deg F	FQT	4.74	#/sec	
TNH	100.02	% SPD	H2O_SEL	ON		WATER
TNR	104.72	% SPD				INJ_ON
FSR	66.5	% FSR				
CSGV	84.0	DGA				
SP_LVL	14HS		CMHUM	0.0202	#H/#A	WATER
MESSAGE1			CTIM	80	deg F	INJ_OFF
MESSAGE2			WQJF	3.53	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.51	#/sec	
			WQJ	3.53	#/sec	
			WOR2	3.49	#/sec	
			SELECT:			
			CPD	158.8	psi	
			WQPL	8.85	#/sec	
			DW	33.25	MW	

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS CONTROL	BASE LOAD		FQ	6.16	#/sec
TTXM	TEMP		FQG	0.00	#/sec
TNH	1013	deg F	FQT	4.73	#/sec
TNR	100.02	% SPD	H2O_SEL	ON	
FSR	104.70	% SPD			
CSGV	66.5	% FSR			
	84.2	DGA			
SP_LVL	14HS		CMHUM	0.0207	#H/#A
MESSAGE1			CTIM	82	deg F
MESSAGE2			WQJF	3.48	#/sec
MESSAGE3	IGV FULL OPEN		WSQ	3.46	#/sec
			WQJ	3.50	#/sec
			WRR2	3.46	#/sec

WATER
INJ_ON

WATER
INJ_OFF

SELECT:

CPD	158.3	psi
WQPL	8.85	#/sec
DW	33.02	MW

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL.

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS	BASE LOAD		FQ	6.15	#/sec
CONTROL	TEMP		FOG	0.00	#/sec
TTXM	1013	deg F	FOT	4.72	#/sec
TNH	100.03	% SPD	H2O_SEL	ON	
TNR	104.69	% SPD			
FSR	66.2	% FSR			
CSGV	84.0	DGA			
SP_LVL	14HS		CMHUM	0.0200	#H/#A
MESSAGE1			CTIM	82	deg F
MESSAGE2			WQJF	3.54	#/sec
MESSAGE3	IGV FULL OPEN		WSQ	3.55	#/sec
			WQJ	3.56	#/sec
			WQR2	3.52	#/sec

WATER
INJ_ON

WATER
INJ_OFF

SELECT:

CPD	158.3	psi
WQPL	8.85	#/sec
DW	32.93	MW

ID: #1

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

27 JUL 89 09:16:27 #1 PAGE 004
CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS CONTROL	BASE LOAD		FQ	6.12	#/sec	
TTXM	TEMP		FQG	0.00	#/sec	
TNH	1014	deg F	FQT	4.69	#/sec	
TNR	99.99	% SPD	H2O_SEL	ON		WATER INJ_ON
FSR	104.67	% SPD				
CSGV	65.9	% FSR				
	83.8	DGA				
SP_LVL	14HS		CMHUM	0.0208	#H/#A	WATER INJ_OFF
MESSAGE1			CTIM	83	deg F	
MESSAGE2			WQJF	3.54	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.55	#/sec	
			WQJ	3.53	#/sec	
			WQR2	3.47	#/sec	
			SELECT:			
			CPD	157.6	psi	
			WQPL	8.85	#/sec	
			DW	32.73	MW	

ID: #1

SOFT SW'S ENABLED MANUAL CONTROL WATER INJECTION CONTROL

CHANGE PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS CONTROL	BASE LOAD		FQ	6.11	#/sec
TTXM	1014	deg F	FQG	0.00	#/sec
TNH	99.97	% SPD	FQT	4.69	#/sec
TNR	104.66	% SPD	H2O_SEL	ON	
FSR	65.9	% FSR			
CSGV	83.9	DGA			
SP_LVL	14HS		CMHUM	0.0209	#H/#A
MESSAGE1			CTIM	83	deg F
MESSAGE2			WQJF	3.52	#/sec
MESSAGE3	IGV FULL OPEN		WSQ	3.53	#/sec
			WQJ	3.52	#/sec
			WQR2	3.44	#/sec

WATER INJ_ON

WATER INJ_OFF

SELECT:

CPD	157.7	psi
WQFL	8.85	#/sec
DW	32.73	MW

BEST AVAILABLE COPY

27 JUL 89 09:45:00 #1 PAGE 004

SOFT SW'S ENABLED

MANUAL CONTROL
WATER INJECTION CONTROL

CHANGE
PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS
STATUS CONTROL	BASE LOAD		FQ	6.11	#/sec
TTXM	TEMP		FQG	0.00	#/sec
TNH	1014	deg F	FQT	4.69	#/sec
TNR	100.02	% SPD	H2O_SEL	ON	
FSR	104.64	% SPD			
CSGV	65.9	% FSR			
	84.1	DGA			
SP_LVL	14HS		CMHUM	0.0211	#H/#A
MESSAGE1			CTIM	84	deg F
MESSAGE2			WQJF	3.48	#/sec
MESSAGE3	IGV FULL OPEN		WSQ	3.53	#/sec
			WQJ	3.53	#/sec
			WOR2	3.44	#/sec

WATER
INJ_ON

WATER
INJ_OFF

SELECT:

CPD 157.6 psi
WQFL 8.85 #/sec
DW 32.73 MW

ID: #1

BEST AVAILABLE COPY

SOFT SW'S ENABLED MANUAL CONTROL 27 JUL 89 10:00:53 #1 PAGE 00
 WATER INJECTION CONTROL CHANGE
 PAGE

NAME	VALUE	UNITS	NAME	VALUE	UNITS	
STATUS	BASE LOAD		FQ	6.10	#/sec	
CONTROL	TEMP		FQG	0.00	#/sec	
TTXM	1015	deg F	FQT	4.67	#/sec	
TNH	100.02	% SPD	H2O_SEL	ON		WATER INJ_ON
TNR	104.64	% SPD				
FSR	65.8	% FSR				
CSGV	83.5	DGA				
SP_LVL	14HS		CMHUM	0.0213	#H/#A	WATER INJ_OF
MESSAGE1			CTIM	85	deg F	
MESSAGE2			WQJF	3.48	#/sec	
MESSAGE3	IGV FULL OPEN		WSQ	3.50	#/sec	
			WQJ	3.47	#/sec	
			WOR2	3.43	#/sec	
			SELECT:			
			CPD	157.3	psi	
			WQPL	8.85	#/sec	
			OW	32.52	MW	

CALIBRATION OF TEST EQUIPMENT

Dry Gas Meter Calibration Sheet

Client OUC Run By J. SATTON
 Project No. 89-093 Date 6-17-89
 Module 065 Barometric Press 29.71
 Orifice middle

ΔH in. H ₂ O	Vw Initial	Vw final	Vw ft. ³	Vd Initial	Vd final	Vd ft. ³	tw °F	tdi °F	tdo °F	Pw in. H ₂ O	Time θ min.
.5	331.430	340.542	9.412	201.284	210.954	9.640	70	80	74		10.0
1.0	340.970	355.165	14.195	211.053	225.526	14.473	70	80	74		10.3
2.0	355.460	374.650	19.190	225.828	245.274	19.446	70	81	75		10.0
4.0	375.320	402.430	27.310	245.931	273.270	27.339	70	82	75		10.0
6.0	403.431	437.002	33.171	274.444	309.362	33.918	70	82	75		10.2

ΔH	$\frac{\Delta H}{13.6}$	$M_c (Y)$		ΔH_a (For Small Orifice Only)	
		$\frac{V_w P_b (td + 460)}{V_d (P_b + \Delta H/13.6) (tw + 460)}$		$\frac{0.0317 \Delta H}{P_b (td + 460)}$	$\left[\frac{(tw + 460) \theta}{V_w} \right]^2$
.5	.0368	.99			
1.0	.0737	.99			
2.0	.147	1.00			
4.0	.294	1.00			
6.0	.441	.98			
Average		.99			

- ΔH = Orifice Setting
- Vw = Volume of Gas of Wet Test Meter
- Vd = Volume of Gas of Dry Gas Meter
- Pw = Pressure of Wet Test Meter
- tw = Temperature of Fluid in Wet Test Meter
- tdi = Inlet Temperature of Dry Gas Meter
- tdo = Outlet Temperature of Dry Gas Meter
- td = Average Temperature of Dry Gas Meter
- θ = Time required to pull specified cubic feet
- M_c = Dry Gas Meter Correction Factor
- ΔH_a = Orifice setting that would pull .75 cfm of air at standard conditions

Nozzle Calibration

Sized By H. Stiles

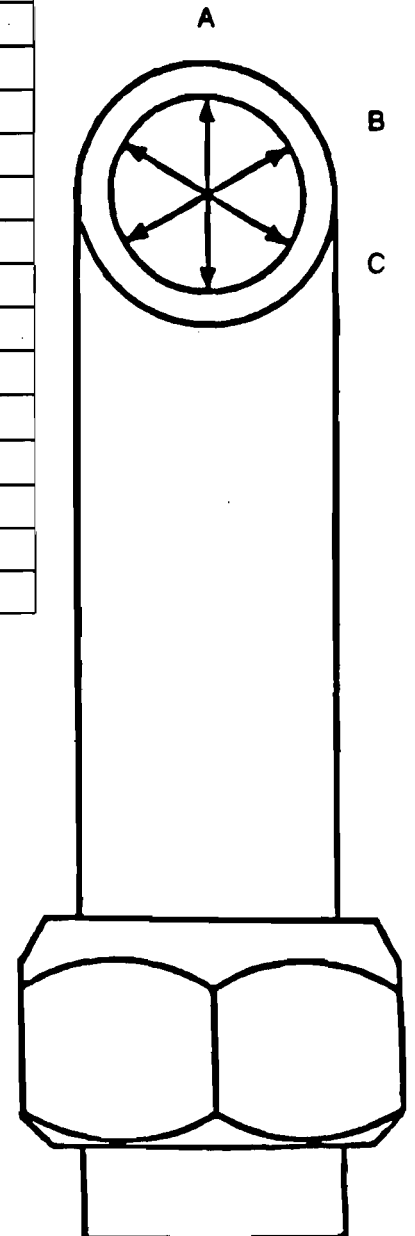
ASME

Date	Nozzle	Dimension			Difference	Avg. Diameter
		A	B	C		
J 6-10-89	A 125	.126	.126	.126	.000	.126
	B	.127	.124	.123	.002	.123
	C	.125	.125	.125	.000	.125
L X	A 250	.240	.239	.238	.002	.239
	B	.243	.244	.245	.002	.244
	C	.250	.250	.250	.000	.250
	D	.250	.250	.250	.000	.250
	E	.250	.248	.250	.002	.249
	F	.243	.245	.245	.002	.244
	G	.251	.250	.251	.001	.251
	H	.250	.250	.250	.000	.250
	I	.251	.252	.251	.001	.251
	J	.253	.251	.250	.003	.251
	K	.250	.253	.252	.003	.252
	L	.255	.256	.257	.002	.255
J	A 375	.375	.375	.375	.000	.375
	B	.375	.375	.373	.002	.374
	C	.378	.375	.375	.003	.376
	D	.380	.379	.380	.001	.380
	E	.376	.376	.375	.001	.376

All Dimensions are in inches.



Total Source Analysis, Inc.
Environmental Testing Consultants



Thermocouple Calibrations

(Gas Meter, Impinger, ~~Outlet Stack~~)

Client OLC Barometric Press 29.40
 Project No. 89-093

Thermocouple Identification	Ice Bath		Boiling Water		Thermometer Number	Date
	Trendicator	Thermometer	Trendicator	Thermometer		
(GAS Meter)				GCA\PS	30755	6-7-8
065 IN	36	36	198	198		
OUT	36	36	198	198		
066 IN	38	37	200	200		
OUT	38	37	200	200		
090 IN	40	40	191	190		
OUT	40	40	191	190		
091 IN	36	36	199	199		
OUT	36	36	199	199		
201-1 Ave.	37	37	200	200		
201-2 Ave.	41	41	210	210		
201-3 Ave.	38	38	206	206		
201-4 IN	38	38	205	205		
OUT	39	39	201	201		
201-5 IN	42	42	200	200		
OUT	42	42	200	200		
201-6 IN	44	44	198	198		
OUT	44	44	198	198		
201-7 IN	42	42	187	186		
OUT	42	43	187	187		
201-8 IN	40	40	200	199		
OUT	40	40	200	200		

Pitot Calibration Form

Client OUC
 Project No. 89-093
 Test Location _____

Run By Bruce Woods
 Date 6-8-89
 Pitot No. N7-3

● "A" Side Calibration

Run No.	Δ P std cm H ₂ O (in. H ₂ O)	Δ P (s) cm H ₂ O (in. H ₂ O)	C _p (s)	Deviation C _p (s) - $\bar{C}_p(A)$
1	1.0	1.41	.84	—
2	1.0	1.41	.84	—
3	1.0	1.41	.84	—
Average		\bar{C}_p (Side A)	.84	—

Calculations:

$$C_p(s) = 0.99 \sqrt{\frac{\Delta P \text{ (standard)}}{\Delta P (s)}}$$

$$\text{Deviation} = C_p(s) - \bar{C}_p(A \text{ or } B)$$

$$\text{Average Deviation} = \sigma(A \text{ or } B) = \frac{1}{3} \sum |C_p(s) - \bar{C}_p(A \text{ or } B)|$$

●● "B" Side Calibration

Run No.	Δ P std cm H ₂ O (in. H ₂ O)	Δ P (s) cm H ₂ O (in. H ₂ O)	C _p (s)	Deviation C _p (s) - $\bar{C}_p(B)$
1	1.0	1.41	.84	—
2	1.0	1.41	.84	—
3	1.0	1.41	.84	—
Average		\bar{C}_p (Side B)	.84	—

$$|\bar{C}_p(\text{Side A}) - \bar{C}_p(\text{Side B})| = \underline{\hspace{2cm}}$$

Nozzle size used for Calibrations (inches) .490

Intercomponent Spacings During Calibrations:

Pitot - Nozzle: 1/2" ±

Pitot - Thermocouple: 1/2" ±

Pitot - Probe Sheath: 6

Thermocouple Calibrations

(Oven, Probe) STACK

Client OU C

Barometric Press 29.40

Project No. 89-093

Aerotherm

Thermocouple Identification	Trendicator	Thermometer	Thermometer Number	Date
(Probes)		GCA/PS	30755	6-8-89
A3-1	248	247		
A3-2	300	301		
AS-1	247	247		
AS-2	249	249		
AS-3	310	310		
AS-4	308	307		
A7-1	248	249		
A7-2	310	310		
A10-1	247	247		
A10-2	245	245		
A10-3	249	249		
A10-4	310	310		
A15-1	290	290		
A15-2	320	320		
A15-3	311	311		
A15-4	315	315		
A20-1	312	312		
A20-2	310	310		
(OVENS)				
A-1	300	300		
A-2	300	300		
A-3	248	248		
A-4	248	248		
A-5	250	250		
A-6	280	280		
A-7	300	300		
A-8	310	310		

ZERO AND CALIBRATION DATA

Client Orlando utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A
oil

Initial Cal + Run 1 final
30% Load

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient O ₂	20.9	—	20.63	—	N/A	—	N/A
Low-level Gas	130.5	135.0	—	N/A	—	0	—
Mid-level Gas	152.6	155.0	—	155	—	0	—
High-level Gas	241.7	240.0	—	N/A	—	N/A	—
Mid-Level O ₂	11.7 %	—	11.7	—	11.7	—	0

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

Zero O₂ | Zero O₂ | 0 | 0 | — | 0 | — | 0

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span
 	 	 	
 	 	 	
 	 	 	
 	 	 	

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A
Oil

Run 30% Load

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient NO _x	20.9	0	—	0	—	0	—
Low-level Gas	130.5	—	—	—	—	—	—
Mid-level Gas	152.6	155	—	150	—	5.0	— 2%
High-level Gas	241.7	—	—	—	—	—	—
Mid-Level O ₂	11.7 %	11.7	11.7	11.7	11.7	—	0 0%

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

Zero O₂ | 0 | 0 | 0 | - | 0 | - | 0 |

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span
/	/	/	/

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando utilities

Run By Bruce Woods

Project No. 89-092

Date 7-26-89

Plant Site Indian River

30% oil RUN 2 final cal
50% oil RUN 1 Initial

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9	0	—	0	—		
Low-level Gas	_____						
Mid-level Gas	152.6			152.5		.1	
High-level Gas	_____						
Mid-Level O ₂	11.7		11.7		11.7	0	0

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A
oil

Run 1 50% Load Final
2 " Initial

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9	0					
Low-level Gas							
Mid-level Gas	152.6	155.0				2.4	
High-level Gas							
Mid-Level O ₂	11.7	—	11.7				

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

Zero O₂ 0 | | 0

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89 Final

Plant Site Indian River Turbine A
OIL

RUN 2 75% Load ~~Initial~~
RUN 3 50% Load ~~Initial~~

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9			0			
Low-level Gas	—						
Mid-level Gas	152.6			1550			
High-level Gas	—						
Mid-Level O ₂	11.7				11.7		

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

Zero O₂ | 0 | | | (-10)

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-85

Plant Site Indian River Turbine A Oil

RUN 3 50% load final
RUN 1 75% load Initial

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9						
Low-level Gas	—						
Mid-level Gas	152.6			156		3.4	
High-level Gas	—						
Mid-Level O ₂	11.7				11.7		

290
090

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

Zero O₂ | | | | | | | | | | |

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A

RUN 1 75% final
RUN 2 75% Initial

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9	0		0		0	
Low-level Gas	—						
Mid-level Gas	152.6			156		3.4	2%
High-level Gas	—						
Mid-Level O ₂	11.7				11.7		

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

zero | 0 | | | (0) | (0) 100%

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando Utilities
 Project No. 89-093
 Plant Site Indian River

Run By Bruce Woods
 Date 7-26-85
final CAL RUN 2 75%
Initial CAL RUN 3 75%

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9						
Low-level Gas	—						
Mid-level Gas	152.6			156		3.4	2%
High-level Gas	—						
Mid-Level O ₂	11.7						

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

zero | 0 | | | | 0 | | |

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A
oil

Run 3 75% Load final
Run 1 100% Load Initial

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9			0			
Low-level Gas	—						
Mid-level Gas	152.6			155			
High-level Gas	—						
Mid-Level O ₂	11.7				11.7		

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

Zero O₂ | 0 | | | 0 | | |

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River

Final CAL Run1 100%
Initial CAL Run2 100%

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9			0			
Low-level Gas	—						
Mid-level Gas	152.6			155			
High-level Gas	—						
Mid-Level O ₂	11.7				11.7		

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

Zero O₂ | 0 | | | | 0 | | |

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando Utilities Run By Bruce Woods
 Project No. 89-093 Date 7-26-89
 Plant Site Indian River Turbine A Oil final cal 100% Run 2
Initial cal 100% Run 3

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9			0			
Low-level Gas	—						
Mid-level Gas	152.6			155			
High-level Gas	—						
Mid-Level O ₂	11.7			11.7	11.7		

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

Zero O₂ | 0 | | | 0 | | |

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

ZERO AND CALIBRATION DATA

Client Orlando Utilities

Run By Bruce Woods

Project No. 89-093

Date 7-26-89

Plant Site Indian River Turbine A
oil

final cal

	Cylinder Value PPM or %	Initial Analyzer Response PPM or %		Final Analyzer Response PPM or %		Difference Initial - Final PPM or %	
		NOx	O ₂	NOx	O ₂	NOx	O ₂
Ambient	20.9	0	20.9			0	
Low-level Gas	130.5			130		.50	
Mid-level Gas	152.6			152.5		.1	
High-level Gas	241.7			240		1.7	
Mid-Level O ₂	11.7 %						

$$\text{Percent Drift} = \frac{\text{Absolute Difference}}{\text{Span Value}} \times 100$$

zero O₂ | 0 | | 1 | 0 | 1 | 0 |

INTERFERENCE RESPONSE

Test Gas Type	Concentration	Analyzer Output Response	% of Span

$$\% \text{ of Span} = \frac{\text{Analyzer Output Response}}{\text{Instrument Span}} \times 100$$

March

FLORIDA GAS TRANSMISSION COMPANY
GAS ANALYSIS ID NO: 89 125

STATION NAME: FLA HYDROCARBON - OUTLET

DIST 7 STA NO: 047188

FIELD DATA TAKEN BY: A. Kattawar

DATE TAKEN 2-21-89

PRESS 654 TEMP 0 SP GRAV 0.581
BTU 0 WATER 0.60 H2S 0.1 gr/hcf

ANALYSIS DATA: ANALYST Michael P. Campo

DATE ANALYZED 3-7-89

COMPONENT	MOLE %	B.T.U.	GPM	SP. GR.
OXYGEN	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.4980	0.0000	0.0000	0.0048
CARBON DIOXIDE	0.8970	0.0000	0.0000	0.0136
METHANE	95.9220	953.9400	0.0000	0.5314
ETHANE	2.3380	40.7300	0.0000	0.0243
PROPANE	0.1590	3.9400	0.0438	0.0024
iBUTANE	0.0050	0.1600	0.0016	0.0001
nBUTANE	0.0070	0.2200	0.0022	0.0001
iPENTANE	0.0520	2.0500	0.0190	0.0013
nPENTANE	0.0330	1.3000	0.0120	0.0008
HEXANE plus	0.0890	4.5700	0.0394	0.0029
TOTALS:	100.0000	1006.9100	0.1180	0.5817

BTU PER CU FT AT 14.73 PSIA
 60 DEG F SAT & CORRECTED FOR Z CALC 1009 CALORIMETER 1006
 60 DEG F DRY & CORRECTED FOR Z CALC 1027 CALORIMETER 1024
 60 DEG F 0.60 LB/MMCF & CORRECTED FOR Z CALC 1027
 SP GRAV (AIR = 1.0000) CALC 0.5817 RANAREX 0.582

COMPRESSIBILITY FACTOR Z = 0.9979

SUPERCOMPRESSIBILITY FACTOR
 CALC AT 0.582 SP GR 600 PSIG 90 DEG

BY TEST WITH BURNETT APPARATUS***** 1.0345
 CALCULATED AGA-NX-19 NO DILUENTS***** 1.0372
 CALCULATED AGA-NX-19 ADJUSTED FOR DILUENTS*** 1.0358

NOTES:
 PHYSICAL CONSTANTS FROM AGA 3
 GPM FROM NGPA PUB NO 2145-84
 HEXANE PLUS DERIVED FROM ALPHAGAZ REF STANDARD

REMARKS:
 3000 cc line pressure spot sample.
 Percent difference with respect to Burnett Apparatus
 for calculated value using AGA-NX-19 formula
 and adjusted for diluents equals (+ 0.126 %).

FLORIDA GAS TRANSMISSION COMPANY
GAS ANALYSIS ID NO: 89 69

STATION NAME: FLA HYDROCARBON - OUTLET

DIST 7 STA NO: 047188

FIELD DATA TAKEN BY: A. Kattawar

DATE TAKEN 1-30-89

PRESS 753 TEMP 0 SP GRAV 0.580
BTU 0 WATER 0.60 H25 0.2 gal/hcf

ANALYSIS DATA: ANALYST Michael P. Campo

DATE ANALYZED 2-7-89

COMPONENT	MOLE %	B.T.U.	GPM	SP. GR.
OXYGEN	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.5240	0.0000	0.0000	0.0051
CARBON DIOXIDE	0.9030	0.0000	0.0000	0.0137
METHANE	95.9030	953.7600	0.0000	0.5313
ETHANE	2.3260	40.5200	0.0000	0.0241
PROPANE	0.2550	6.3200	0.0703	0.0039
iBUTANE	0.0320	1.0300	0.0105	0.0006
nBUTANE	0.0270	0.8700	0.0085	0.0005
iPENTANE	0.0070	0.2800	0.0026	0.0002
nPENTANE	0.0050	0.2000	0.0018	0.0001
HEXANE plus	0.0180	0.9200	0.0080	0.0006
TOTALS:	100.0000	1003.9000	0.1017	0.5801

BTU PER CU FT AT 14.73 PSIA

0 DEG F SAT & CORRECTED FOR Z CALC 1006 CALORIMETER 1006
 0 DEG F DRY & CORRECTED FOR Z CALC 1024 CALORIMETER 1024
 0 DEG F 0.60 LB/MMCF & CORRECTED FOR Z CALC 1024
 SP GRAV (AIR = 1.0000) CALC 0.5801 RANAREX 0.581

COMPRESSIBILITY FACTOR Z = 0.9979

SUPERCOMPRESSIBILITY FACTOR

CALC AT 0.581 SP GR 600 PSIG 90 DEG

BY TEST WITH BURNETT APPARATUS***** 1.0350
 CALC" AGA-NX-19 NO DILUENTS***** 1.0370
 CALCULATED AGA-NX-19 ADJUSTED FOR DIL N'S

TICAL CONSTANTS FROM AGA 3
 GPM FROM NGPA PUB NO 2145 84
 HEXANE PLUS DERIVED FROM ALPHAGAZ REF STANDARD

REMARKS:

3000 cc line pressure spot sample.
 Percent difference with respect to Burnett pp
 for calculation value using AGA-NX-19 formula and
 adjusted for diluents equals (+ 0.068 %)

FLORIDA GAS TRANSMISSION COMPANY
GAS ANALYSIS ID NO: 88 2

STATION NAME: FLA HYDROCARBON - OUTLET

DIST 7 STA NO: 047188

FIELD DATA TAKEN BY: Johnny Walker

DATE TAKEN 12-27-88

PRESS	749	TEMP	0	SP GRAV	0.593
BTU	0	WATER	0.00	H2S	

ANALYSIS DATA: ANALYST Michael P. Campo

DATE ANALYZED 1- 5-88

COMPONENT	MOLE %	B.T.U.	GPM	SP. GR.
OXYGEN	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.8590	0.0000	0.0000	0.0083
CARBON DIOXIDE	0.9990	0.0000	0.0000	0.0152
METHANE	94.8320	943.1000	0.0000	0.5254
ETHANE	2.8110	48.9700	0.0000	0.0292
PROPANE	0.3160	7.8300	0.0871	0.0048
iBUTANE	0.0360	1.1500	0.0118	0.0007
nBUTANE	0.0350	1.1200	0.0110	0.0007
iPENTANE	0.0280	1.1000	0.0102	0.0007
nPENTANE	0.0190	0.7500	0.0069	0.0005
HEXANE plus	0.0650	3.3400	0.0288	0.0021
TOTALS:	100.0000	1007.3600	0.1558	0.5876

BTU PER CU FT AT 14.73 PSIA

60 DEG F SAT & CORRECTED FOR Z	CALC	1009	CALORIMETER	1010
60 DEG F DRY & CORRECTED FOR Z	CALC	1027	CALORIMETER	1028
60 DEG F 0.00 LB/MMCF & CORRECTED FOR Z	CALC	1027		
SP GRAV (AIR = 1.0000)	CALC	0.5876	RANAREX	0.589

COMPRESSIBILITY FACTOR Z = 0.9979

SUPERCOMPRESSIBILITY FACTOR

CALC AT	0.589	SP GR	600	PSIG	90	DEG
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BY TEST WITH BURNETT APPARATUS*****	1.0359
CALCULATED AGA-NX-19 NO DILUENTS*****	1.0382
CALCULATED AGA-NX-19 ADJUSTED FOR DILUENTS***	1.0364

NOTES:

PHYSICAL CONSTANTS FROM AGA 3
GPM FROM NGPA PUB NO 2145-84
HEXANE PLUS DERIVED FROM ALPHAGAZ REF STANDARD

REMARKS:

3000 cc line pressure spot sample.
Percent difference with respect to Burnett Apparatus
for calculated value using AGA-NX-19 formula
and adjusted for diluents equals (+ 0.048 %).

FLORIDA GAS TRANSMISSION COMPANY
GAS ANALYSIS ID NO: 88 700

STATION NAME: FLA HYDROCARBON - OUTLET

DIST 7 STA NO: 047188

FIELD DATA TAKEN BY: A. KATTAWAR

DATE TAKEN 11-22-88

PRESS	690	TEMP	0	SP GRAV	0.590
BTU	0	WATER	1.20	H2S	0.15 GR/HC

ANALYSIS DATA: ANALYST Michael P. Campo

DATE ANALYZED 11-30-88

COMPONENT	MOLE %	B.T.U.	GPM	SP. GR.
OXYGEN	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.8490	0.0000	0.0000	0.0082
CARBON DIOXIDE	1.0020	0.0000	0.0000	0.0152
METHANE	94.4740	939.5400	0.0000	0.5234
ETHANE	2.9490	51.3800	0.0000	0.0306
PROPANE	0.5830	14.4500	0.1606	0.0089
iBUTANE	0.0620	1.9900	0.0203	0.0012
nBUTANE	0.0390	1.2500	0.0123	0.0008
iPENTANE	0.0100	0.3900	0.0037	0.0002
nPENTANE	0.0060	0.2400	0.0022	0.0001
HEXANE plus	0.0260	1.3400	0.0115	0.0009
TOTALS:	100.0000	1010.5800	0.2106	0.5895

BTU PER CU FT AT 14.73 PSIA			
60 DEG F SAT & CORRECTED FOR Z	CALC	1013	CALORIMETER 1010
60 DEG F DRY & CORRECTED FOR Z	CALC	1031	CALORIMETER 1028
60 DEG F 1.20 LB/MMCF & CORRECTED FOR Z	CALC	1031	
SP GRAV (AIR = 1.0000)	CALC	0.5895	RANAREX 0.590

COMPRESSIBILITY FACTOR Z = 0.9979

SUPERCOMPRESSIBILITY FACTOR

CALC AT 0.590 SP GR 600 PSIG 90 DEG

BY TEST WITH BURNETT APPARATUS*****	1.0355
CALCULATED AGA-NX-19 NO DILUENTS*****	1.0384
CALCULATED AGA-NX-19 ADJUSTED FOR DILUENTS***	1.0365

NOTES:

PHYSICAL CONSTANTS FROM AGA 3
GPM FROM NGPA PUB NO 2145-84
HEXANE PLUS DERIVED FROM ALPHAGAZ REF STANDARD

REMARKS:

3000 cc line pressure spot sample.
Percent difference with respect to Burnett Apparatus
for calculated value using AGA-NX-19 formula and
adjusted for diluents equals (+ 0.097 %).

NOV 04 1988

FLORIDA GAS TRANSMISSION COMPANY
GAS ANALYSIS ID NO: 88 647

STATION NAME: FLA HYDROCARBON - OUTLET

DIST 7 (STA NO: 04718)

FIELD DATA TAKEN BY: A. Kattawar

DATE TAKEN 10-25-88

PRESS 683 TEMP 0 SP GRAV 0.000
BTU 1016 WATER 0.00 H28

ANALYSIS DATA: ANALYST Michael P. Campo

DATE ANALYZED 11- 2-88

COMPONENT	MOLE %	B.T.U.	GPM	SP. GR.
OXYGEN	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.7790	0.0000	0.0000	0.0075
CARBON DIOXIDE	1.1880	0.0000	0.0000	0.0180
METHANE	94.9120	943.9000	0.0000	0.5258
ETHANE	2.8110	48.9700	0.0000	0.0292
PROPANE	0.1970	4.8800	0.0543	0.0030
iBUTANE	0.0250	0.8000	0.0082	0.0005
nBUTANE	0.0240	0.7700	0.0076	0.0005
iPENTANE	0.0130	0.5100	0.0048	0.0003
nPENTANE	0.0080	0.3200	0.0029	0.0002
HEXANE plus	0.0430	2.2100	0.0190	0.0014
TOTALS:	100.0000	1002.3600	0.0968	0.5864

RTN PER CU FT AT 14.73 PSIA

60 DEG F SAT & CORRECTED FOR Z	CALC	1004	CALORIMETER	1003
60 DEG F DRY & CORRECTED FOR Z	CALC	1022	CALORIMETER	1021
60 DEG F 0.00 LB/MMCF & CORRECTED FOR Z	CALC	1022		
SP GRAV (AIR = 1.0000)	CALC	0.5864	RANAREX	0.586

COMPRESSIBILITY FACTOR Z = 0.9979

SUPERCOMPRESSIBILITY FACTOR

CALC AT 0.586 SP GR 600 PSIG 90 DEG

BY TEST WITH BURNETT APPARATUS*****	1.0352
CALCULATED AGA-NX-19 NO DILUENTS*****	1.0378
CALCULATED AGA-NX-19 ADJUSTED FOR DILUENTS***	1.0359

NOTES:

PHYSICAL CONSTANTS FROM AGA 3
GPM FROM NGPA PUB NO 2145-84
HEXANE PLUS DERIVED FROM ALPHAGAZ REF STANDARD

REMARKS:

3000 cc line pressure spot sample.
Percent difference with respect to Burnett Apparatus
for calculated value using AGA-NX-19 formula and
adjusted for diluents equals (+ 0.068 %).

FLORIDA GAS TRANSMISSION COMPANY
GAS ANALYSIS ID NO: 88 596

STATION NAME: FLA HYDROCARBON - OUTLET

DIST 7 STA NO: 047188

FIELD DATA TAKEN BY: A. Kattawar

DATE TAKEN 9-27-88

PRESS	691	TEMP	0	SP GRAV	0.579
BTU	1014	WATER	0.50	H2S	0.2 gr/hcf

ANALYSIS DATA: ANALYST Michael P. Campo DATE ANALYZED 10-5-88

COMPONENT	MOLE %	B.T.U.	GPM	SP. GR.
OXYGEN	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.5060	0.0000	0.0000	0.0049
CARBON DIOXIDE	1.1220	0.0000	0.0000	0.0170
METHANE	95.7970	952.7000	0.0000	0.5307
ETHANE	2.2570	39.3200	0.0000	0.0234
PROPANE	0.2340	5.8000	0.0645	0.0036
iBUTANE	0.0300	0.9600	0.0098	0.0006
nBUTANE	0.0240	0.7700	0.0076	0.0005
iPENTANE	0.0060	0.2400	0.0022	0.0001
nPENTANE	0.0050	0.2000	0.0018	0.0001
HEXANE plus	0.0190	0.9800	0.0084	0.0006
TOTALS:	100.0000	1000.9700	0.0943	0.5815

BTU PER CU FT AT 14.73 PSIA

60 DEG F SAT & CORRECTED FOR Z	CALC	1003	CALORIMETER	1004
60 DEG F DRY & CORRECTED FOR Z	CALC	1021	CALORIMETER	1022
60 DEG F 0.50 LB/MMCF & CORRECTED FOR Z	CALC	1021		
SP GRAV (AIR = 1.0000)	CALC	0.5815	RANAREX	0.581

COMPRESSIBILITY FACTOR Z = 0.9979

SUPERCOMPRESSIBILITY FACTOR

CALC AT 0.581 SP GR 600 PSIG 90 DEG

BY TEST WITH BURNETT APPARATUS*****	1.0346
CALCULATED AGA-NX-19 NO DILUENTS*****	1.0370
CALCULATED AGA-NX-19 ADJUSTED FOR DILUENTS***	1.0355

NOTES:

PHYSICAL CONSTANTS FROM AGA 3
GPM FROM NGPA PUB NO 2145-84
HEXANE PLUS DERIVED FROM ALPHAGAZ REF STANDARD

REMARKS:

3000 cc line pressure spot sample.
Percent difference with respect to Burnett Apparatus
for calculated value using AGA-NX-19 formula and
adjusted for diluents equals (+ 0.087 %).

Fuel Analysis

FLORIDA GAS TRANSMISSION COMPANY
GAS ANALYSIS ID NO: 88 544

STATION NAME: PLA HYDROCARBON - OUTLET

DIST 7 STA NO: 047188

FIELD DATA TAKEN BY: A. Kattawar

DATE TAKEN 9- 1-88

PRESS	792	TEMP	0	SP GRAV	0.583
BTU	1020	WATER	0.00	H2S	

ANALYSIS DATA: ANALYST Michael P. Campo

DATE ANALYZED 9- 9-88

COMPONENT	MOLE %	B.T.U.	GPM	SP. GR.
OXYGEN	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.4540	0.0000	0.0000	0.0044
CARBON DIOXIDE	<u>1.0340</u>	0.0000	0.0000	0.0157
METHANE	95.5030	949.7800	0.0000	0.5291
ETHANE	2.4760	43.1400	0.0000	0.0257
PROPANE	0.4320	10.7100	0.1190	0.0066
iBUTANE	0.0170	0.5400	0.0056	0.0003
nBUTANE	0.0210	0.6700	0.0066	0.0004
iPENTANE	0.0110	0.4300	0.0040	0.0003
nPENTANE	0.0070	0.2800	0.0025	0.0002
HEXANE plus	0.0450	2.3100	0.0199	0.0015
TOTALS:	100.0000	1007.8600	0.1576	0.5842

BTU PER CU. FT AT 14.73 PSIA

60 DEG F SAT & CORRECTED FOR Z	CALC	1010	CALORIMETER	1010
60 DEG F DRY & CORRECTED FOR Z	CALC	1028	CALORIMETER	1028
60 DEG F 0.00 LB/MMCF & CORRECTED FOR Z	CALC	1028		
SP GRAV (AIR = 1.0000)	CALC	0.5842	RANAREX	0.583

COMPRESSIBILITY FACTOR Z = 0.9979

SUPERCOMPRESSIBILITY FACTOR

CALC AT	0.583	SP GR	600	PSIG	90	DEG
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BY TEST WITH BURNETT APPARATUS*****	1.0351
CALCULATED AGA-NX-19 NO DILUENTS*****	1.0373
CALCULATED AGA-NX-19 ADJUSTED FOR DILUENTS***	1.0359

NOTES:

PHYSICAL CONSTANTS FROM AGA 3
GPM FROM NGPA PUB NO 2145-84
HEXANE PLUS DERIVED FROM ALPHAGAZ REF STANDARD

REMARKS:

3000 cc line pressure spot sample.
Percent difference with respect to Burnett Apparatus
for calculated value using AGA-NX-19 formula and
adjusted for diluents equals (+ 0.077 %).

FLORIDA GAS TRANSMISSION COMPANY
GAS ANALYSIS ID NO: 88 403

STATION NAME: FLA HYDROCARBON - OUTLET

DIST 7 STA NO: 047188

FIELD DATA TAKEN BY: A. Kattawar

DATE TAKEN 6-21-88

PRESS 680 TEMP 0 SP GRAV 0.584
BTU 1018 WATER 0.40 H2S

ANALYSIS DATA: ANALYST Michael P. Campo

DATE ANALYZED 6-29-88

COMPONENT	MOLE %	B.T.U.	GPM	SP. GR.
OXYGEN	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.4770	0.0000	0.0000	0.0046
CARBON DIOXIDE	0.9960	0.0000	0.0000	0.0151
METHANE	95.6520	951.2600	0.0000	0.5299
ETHANE	2.5210	43.9200	0.0000	0.0262
PROPANE	0.2540	6.3000	0.0700	0.0039
iBUTANE	0.0310	0.9900	0.0101	0.0006
nBUTANE	0.0310	1.0000	0.0098	0.0006
iPENTANE	0.0080	0.3200	0.0029	0.0002
nPENTANE	0.0050	0.2000	0.0018	0.0001
HEXANE plus	0.0250	1.2800	0.0111	0.0008
TOTALS:	100.0000	1005.2700	0.1057	0.5820

BTU PER CU FT AT 14.73 PSIA

60 DEG F SAT & CORRECTED FOR Z CALC 1007 CALORIMETER 1006
60 DEG F DRY & CORRECTED FOR Z CALC 1025 CALORIMETER 1024
60 DEG F 0.40 LB/MMCF & CORRECTED FOR Z CALC 1025
SP GRAV (AIR = 1.0000) CALC 0.5820 RANAREX 0.582

COMPRESSIBILITY FACTOR Z = 0.9979

SUPERCOMPRESSIBILITY FACTOR

CALC AT 0.582 SP GR 600 PSIG 90 DEG

BY TEST WITH BURNETT APPARATUS***** 1.0355
CALCULATED AGA-NX-19 NO DILUENTS***** 1.0372
CALCULATED AGA-NX-19 ADJUSTED FOR DILUENTS*** 1.0358

NOTES:

PHYSICAL CONSTANTS FROM AGA 3
GPM FROM NGPA PUB NO 2145-84
HEXANE PLUS DERIVED FROM ALPHAGAZ REF STANDARD

REMARKS:

3000 cc line pressure spot sample.
Percent difference with respect to Burnett Apparatus
for calculated value using AGA-NX-19 formula and
adjusted for diluents equals (+ 0.029 %).

FLORIDA GAS TRANSMISSION COMPANY
GAS ANALYSIS ID NO: 88 344

STATION NAME: FLA HYDROCARBON - OUTLET

DIST 7 STA NO: 047188

FIELD DATA TAKEN BY: A. Kattawar

DATE TAKEN 5-25-88

PRESS 704 TEMP 0 SP GRAV 0.580
BTU 1019 WATER 0.80 H2S

ANALYSIS DATA: ANALYST Michael P. Campo DATE ANALYZED 6- 7-88

COMPONENT	MOLE %	B.T.U.	GPM	SP. GR.
OXYGEN	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.4890	0.0000	0.0000	0.0047
CARBON DIOXIDE	0.9800	0.0000	0.0000	0.0149
METHANE	95.7850	952.5800	0.0000	0.5306
ETHANE	2.2830	39.7700	0.0000	0.0237
PROPANE	0.3230	8.0100	0.0890	0.0049
iBUTANE	0.0520	1.6700	0.0170	0.0010
nBUTANE	0.0420	1.3500	0.0132	0.0008
iPENTANE	0.0120	0.4700	0.0044	0.0003
nPENTANE	0.0070	0.2800	0.0025	0.0002
HEXANE plus	0.0270	1.3900	0.0119	0.0009
TOTALS:	100.0000	1005.5200	0.1380	0.5820

BTU PER CU FT AT 14.73 PSIA

60 DEG F SAT & CORRECTED FOR Z CALC 1008 CALORIMETER 1007
 60 DEG F DRY & CORRECTED FOR Z CALC 1026 CALORIMETER 1025
 60 DEG F 0.80 LB/MMCF & CORRECTED FOR Z CALC 1026
 SP GRAV (AIR = 1.0000) CALC 0.5820 RANAREX 0.582

COMPRESSIBILITY FACTOR Z = 0.9979

SUPERCOMPRESSIBILITY FACTOR

CALC AT 0.582 SP GR 600 PSIG 90 DEG

BY TEST WITH BURNETT APPARATUS***** 1.0351
 CALCULATED AGA-NX-19 NO DILUENTS***** 1.0372
 CALCULATED AGA-NX-19 ADJUSTED FOR DILUENTS*** 1.0358

NOTES:

PHYSICAL CONSTANTS FROM AGA 3
 GPM FROM NGPA PUB NO 2145-84
 HEXANE PLUS DERIVED FROM ALPHAGAZ REF STANDARD

REMARKS:

3000 cc line pressure spot sample.
 Percent difference with respect to Burnett Apparatus
 for calculated value using AGA-NX-19 formula and
 adjusted for diluents equals (+ 0.068 %).



Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

August 10, 1989

FOR: Orlando Utilities Commission
500 S. Orange Ave.
Orlando, FL 32802

ATTN: Bob Hicks

RE: Sample Received 7/27/89 , Submitted by Client for Analysis

LABORATORY REPORT

LAB I.D. NO:
MARKS:

895142
#2 Fuel Oil

Total Metals

Beryllium as Be, mg/kg

< 0.10

Signed

Mark Kromis
Mark Kromis, Chemist

LABORATORY REPORTS

Analytical Data Sheet

Client OUC Project No. 89-093 Date 7-27-89

Run No. 2A
 Filter No. 89-251
 Acetone No. 2A
 Amount liquid lost during transport 0
 Acetone blank volume, ml 200
 Acetone wash volume, ml 200
 Acetone blank concentration, mg/mg (equation 5-4)** 0
 Acetone wash blank, mg (equation 5-5)** 0

Run No. 3A
 Filter No. 89-260
 Acetone No. 3A
 Amount liquid lost during transport 0
 Acetone blank volume, ml 200
 Acetone wash volume, ml 200
 Acetone blank concentration, mg/mg (equation 5-4)** 0
 Acetone wash blank, mg (equation 5-5)** 0

Container Number	Weight of Particulate Collected		
	Final Weight	Tare Weight	Weight Gain
1	11213	1.1017	.0096
2	102.2903	102.2887	.0016
Total	 		
Less acetone blank			.0 -
Weight of particulate matter			.0212

Container Number	Weight of Particulate Collected		
	Final Weight	Tare Weight	Weight Gain
1	1.1295	1.1010	.0285
2	105.4633	105.4586	.0047
Total	 		
Less acetone blank			-0-
Weight of particulate matter			.0332

	Volume of Liquid Water Collected	
	Impinger Volume, ml.	Silica Gel Weight, g
Final		435.4
Initial		400.0
Liquid Collected		35.4
Total Volume Collected		g° ml

	Volume of Liquid Water Collected	
	Impinger Volume, ml.	Silica Gel Weight, g
Final		432.6
Initial		400.0
Liquid Collected		32.6
Total Volume Collected		g° ml

*Convert weight of water to volume by dividing total weight increase by density of water (1g/ml): $\frac{\text{Increase, g}}{1\text{g/ml}} = \text{Volume Water, ml}$

**See Federal Register, Method 5, 6.6 & 6.7.

Analytical Data Sheet

Client DUC Project No. 89-093 Date 7-27-89

Run No. 4A
 Filter No. 89-269
 Acetone No. 4A
 Amount liquid lost during transport 0
 Acetone blank volume, ml 200
 Acetone wash volume, ml 200
 Acetone blank concentration, mg/mg (equation 5-4)** 0
 Acetone wash blank, mg (equation 5-5)** 0

Run No. _____
 Filter No. _____
 Acetone No. _____
 Amount liquid lost during transport _____
 Acetone blank volume, ml _____
 Acetone wash volume, ml _____
 Acetone blank concentration, mg/mg (equation 5-4)** _____
 Acetone wash blank, mg (equation 5-5)** _____

Container Number	Weight of Particulate Collected		
	Final Weight	Tare Weight	Weight Gain
1	1.1239	1.1075	.0164
2	101.3409	101.3329	.0080
Total	 		
Less acetone blank			0
Weight of particulate matter			.0244

Container Number	Weight of Particulate Collected		
	Final Weight	Tare Weight	Weight Gain
1			
2			
Total	 		
Less acetone blank			
Weight of particulate matter			

	Volume of Liquid Water Collected	
	Impinger Volume, ml.	Silica Gel Weight, g
Final		431.6
Initial		400.0
Liquid Collected		31.6
Total Volume Collected		g ^o ml

	Volume of Liquid Water Collected	
	Impinger Volume, ml.	Silica Gel Weight, g
Final		
Initial		
Liquid Collected		
Total Volume Collected		g ^o ml

*Convert weight of water to volume by dividing total weight increase by density of water (1g/ml): $\frac{\text{Increase, g}}{1\text{g/ml}} = \text{Volume Water, ml}$

**See Federal Register, Method 5.6.6 & 6.7