EMISSION TESTING AT COALINGA COGENERATION PLANT

September 19 and 20, 1990

Prepared for

Shell Western Exploration & Production, Inc.
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Prepared by

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Report PS-90-2284/Project 6882-90

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SECTION 1

INTRODUCTION

At the request of Shell Western Exploration & Production, Inc., Pape & Steiner Environmental Services conducted a series of emission tests on the effluent of two gas turbines at the cogeneration plant located north of Coalinga, California. The tests were conducted on September 19 and 20, 1990 to determine compliance with Fresno County Air Pollution Control District rules and regulations.

Duplicate particulate, sulfate and SO_2 tests were conducted on the effluent of each HRSG serving each gas turbine (101A and 101B) using EPA Method 5/8. Duplicate NO_x, CO, CO_2 and O_2 tests were conducted using EPA Method 20. Duplicate hydrocarbon tests were conducted using EPA Method 18. A sample of the PUC natural gas fired in each turbine was collected and analyzed for CHNOS, specific gravity, moisture and Btu using ASTM Methods. Finally, a single test for H_2S in the fuel gas was conducted using EPA Method 11.

Section 2 of the report summarizes the test matrix for this program.

SECTION 2

TEST PROGRAM

Table 2-1 summarizes the tests performed on each unit. Extended sampling times were used to maximize the amount of particulate and SO_2 for subsequent analysis.

No upsets occurred during the test program and the data should be representative of emissions from this plant.

Section 3 summarizes the results of these tests.

TABLE 2-1. COALINGA COGENERATION PLANT TEST MATRIX

Date	Unit #	Test #	Test Parameter	Test Time
09/19/90	101A	1	Particulates/Sulfates/SO_2/HC	10:30 am - 1:08 pm
			NO_x/CO/CO_2/O_2	10:30 am - 12:25 pm
	"	2	Particulates/Sulfates/SO_2/HC	2:11 pm - 4:55 pm
			NO_x/CO/CO_2/O_2	2:20 pm - 4:15 pm
09/20/90	101B	1	Particulates/Sulfates/SO_2/HC	9:35 am - 12:23 pm
			NO_x/CO/CO_2/O_2	9:35 am - 11:35 am
	"	2	Particulates/Sulfates/SO_2/HC	1:25 pm - 4:02 pm
			NO_x/CO/CO_2/O_2	1:25 pm - 3:25 pm
09/20/90	101B	1	H_2S	11:15 am - 3:15 pm

SECTION 3

TEST RESULTS

Tables 3-1 and 3-2 summarize the results of the tests performed on Units 101A and 101B. All data are reported at 60°F and 29.92 inches Hg. The fuel gas H_2S measured 0.10 ppm.

TABLE 3-1. SUMMARY OF SOURCE EMISSION TEST DATA (60°F)

Unit Tested: SWEPI Coalinga Cogen Plant HRSG Unit 101A

Date: September 19, 1990

Test Number	1	2	Average
Test Condition	Compl.	Compl.	
Barometric Pressure (in. Hg)	28.59	28.51	28.55
Stack Pressure (in. Hg)	28.57	28.49	28.53
Stack Area (ft^2)	15.67	15.67	15.67
Elapsed Sampling Time (min.)	140.00	140.00	140.00
Volume Gas Sampled (dscf)	111.422	111.939	111.681
F-Factor	8480.67	8480.67	8480.67
GAS DATA			
Average Gas Velocity (fps)	41.17	41.47	41.32
Average Gas Temperature (°F)	242.89	241.39	242.14
Gas Flowrate	24,991	25,113	25,052
Gas Analysis (Volume %)			
Carbon Dioxide, dry	3.37	3.38	3.38
Oxygen, dry	14.97	14.41	14.69
Water	8.59	8.74	8.67
EMISSION CONCENTRATION			
Filterable Particulate (gr/dscf)	0.0019	0.0013	0.0016
Total Particulate (gr/dscf)	0.0030	0.0016	0.0023
Total Sulfate	0.0001	0.0002	0.0001
CO (ppm)	3.70	3.37	3.54
SO_2 (ppm)	0.22	0.17	0.19
NO_x (ppm)	35.24	33.34	34.29
$>C_1$ HC (ppm)	24.91	27.53	26.22
EMISSION RATE - lb/hr			
Filterable Particulate	0.40	0.28	0.34
Total Particulate	0.65	0.34	0.49
Total Sulfate	0.02	0.04	0.03
CO	0.41	0.37	0.39
SO_2	0.06	0.04	0.05
NO_x	6.41	6.09	6.25
$>C_1$ HC	1.58	1.75	1.67
EMISSION FACTOR - lb/MMBtu			
Filterable Particulate	0.0079	0.0050	0.0065
Total Particulate	0.0129	0.0061	0.0095
Total Sulfate	0.0005	0.0007	0.0006
CO	0.0082	0.0068	0.0075
SO_2	0.0011	0.0008	0.0009
NO_x	0.1278	0.1105	0.1191
$>C_1$ HC	0.0315	0.0318	0.0316

TABLE 3-2. SUMMARY OF SOURCE EMISSION TEST DATA (60°F)

Unit Tested: SWEPI Coalinga Cogen Plant HRSG Unit 101B

Date: September 20, 1990

Test Number	1	2	Average
Test Condition	Compl.	Compl.	
Barometric Pressure (in. Hg)	28.49	28.47	28.48
Stack Pressure (in. Hg)	28.47	28.44	28.46
Stack Area (ft^2)	15.67	15.67	15.67
Elapsed Sampling Time (min.)	140.00	140.00	140.00
Volume Gas Sampled (dscf)	111.285	111.364	111.325
F-Factor	8470.27	8470.27	8470.27
GAS DATA			
Average Gas Velocity (fps)	41.32	41.28	41.30
Average Gas Temperature (°F)	239.93	235.82	237.88
Gas Flowrate	24,997	25,041	25,019
Gas Analysis (Volume %)			
Carbon Dioxide, dry	3.45	3.23	3.34
Oxygen, dry	14.38	14.47	14.43
Water	8.98	9.17	9.08
EMISSION CONCENTRATION			
Filterable Particulate (gr/dscf)	0.0011	0.0008	0.0010
Total Particulate (gr/dscf)	0.0013	0.0011	0.0012
Total Sulfate	0.0001	0.0001	0.0001
CO (ppm)	6.01	7.39	6.70
SO_2 (ppm)	0.20	0.17	0.18
NO_x (ppm)	24.54	23.37	23.96
$>C_1$ HC (ppm)	21.96	17.64	19.80
EMISSION RATE - lb/hr			
Filterable Particulate	0.24	0.17	0.21
Total Particulate	0.27	0.23	0.25
Total Sulfate	0.02	0.02	0.02
CO	0.67	0.82	0.74
SO_2	0.05	0.04	0.05
NO_x	4.46	4.26	4.36
$>C_1$ HC	1.39	1.12	1.26
EMISSION FACTOR - lb/MMBtu			
Filterable Particulate	0.0044	0.0031	0.0038
Total Particulate	0.0049	0.0041	0.0045
Total Sulfate	0.0003	0.0005	0.0004
CO	0.0121	0.0150	0.0135
SO_2	0.0009	0.0008	0.0009
NO_x	0.0808	0.0780	0.0794
$>C_1$ HC	0.0252	0.0205	0.0229

SECTION 4

SAMPLING EQUIPMENT AND PROCEDURES

This section of the report describes the equipment and procedures used to conduct the particulate and gaseous tests on this program.

4.1 PRELIMINARY MEASUREMENTS

Before conducting the stack tests a series of preliminary measurements were made to determine:

- The location of the sampling site and the number and location of the sampling points to be used (EPA Method 1)
- The velocity, temperature, and pressure of the gases in the stack (EPA Method 2)
- The composition of the stack gases (EPA Method 3)
- The moisture content of the stack gases (EPA Method 4)

Using the results of these preliminary measurements and the calibration constants for the sampling train, a series of calculations were made to determine the value of K, a constant, and N_d, ideal nozzle diameter, required to run an isokinetic test according to the equation:

$$\Delta H = \left\{ \frac{60^2 \pi^2 K_p^2 C_p^2 (1 - B_{wo})^2 P_s MW_d}{576^2 K_o^2 MW_s P_m} \right\} (N_d^4) \left(\frac{T_m}{T_s} \right) (\Delta P)$$

where

$$K = \left\{ \frac{60^2 \Pi^2 K_p^2 C_p^2 (1 - B_{wo})^2 P_s MW_d}{576^2 K_o^2 MW_s P_m} \right\}$$

An actual nozzle, whose diameter was as close as possible to the ideal nozzle diameter, was selected for the test. Isokinetic sampling rates for each sampling point in the stack were computed using the equation:

$$\Delta H = (K)(N_d^4)\left(\frac{T_m}{T_s}\right)(\Delta P)$$

Since K and N_d are known, and remain constant during a test, the only variables are the meter temperatures, the stack gas temperature and the velocity pressure for each sampling point.

4.2 PREPARATION OF THE PARTICULATE-SO_x SAMPLING TRAIN

All sampling train components were cleaned in the laboratory (soap and water, tap water rinse, distilled water rinse, and IPA rinse) to eliminate previous contamination. The sampling train components were sealed and transported to the sampling site in a mobile lab. The EPA Method 5/8 equipment used to measure particulates (filterable and total) and SO_x consisted of:

- A calibrated 316 stainless steel nozzle for isokinetic sampling
- A heated Pyres glass sampling probe (6 feet long) equipped with an S-type pitot tube and a thermocouple to measure stack velocity pressure and temperature

- A heated Pyrex glass filter holder containing a weighed 100-mm Whatman 934 AH glass fiber filter
- A Pyrex glass impinger train in an icebath (impinger 1 contained 100 ml 80-percent IPA; a Pyrex glass filter holder containing a 47-mm Whatman 934 AH filter; bubbler 2 and impinger 3 each contained 100 ml of 3-percent H_2O_2; bubbler 4 contained a weighed amount of silica gel)
- An umbilical to connect the probe and sample box to the control module
- A control module containing a vacuum pump, a calibrated dry gas meter and a calibrated orifice meter to measure the pressure, temperature and flowrate throughout the train.

The sampling train was charged in the mobile lab using freshly prepared reagents. Each impinger and its contents was weighed to the nearest 0.1 gm on a calibrated electronic balance. Blanks of all filters and reagents were retained for subsequent analysis. The sampling point locations were marked on the probe using a high-temperature marker. The sampling train was completely assembled and lifted to the sampling site.

4.3 SAMPLING PROCEDURES FOR PARTICULATE-SO_x SAMPLING TRAIN

Prior to a test, the sampling train was heated and leak-checked at 15-inches Mercury to insure leakage was less than 0.02 or 4% of the average sampling rate. The S-type pitot tube was also leak-checked. The sampling train was installed on the unirail and the probe was inserted into the stack at the farthest point. An isokinetic sampling rate was calculated using an HP-41CV calculator for each sampling point on the traverse (4 points per traverse; 7 traverses). Each point was sampled

for an equal period of time (5.0 minutes) and all pertinent data was recorded on the data sheet for each point. The probe and sample box were maintained at 250°F throughout the traverse. The gases leaving the impinger train were maintained at <68°F. At the end of a traverse, the probe was withdrawn from the stack and the entire sampling train was transferred intact to the next sampling port. Another traverse of the stack was completed and the sampling train was withdrawn for the final leak check. This leak check was performed at 15-inches Mercury or at the highest vacuum achieved during the test. The S-type pitot tube was also checked at this time. The sampling train was then purged with ambient air for 15-minutes using the highest ΔH measured during the test. After the train was purged, the filter holder and impinger train were sealed with aluminum foil and lowered to the mobile lab for sample recovery.

4.4 SAMPLE RECOVERY PROCEDURES FOR PARTICULATE-SO_x SAMPLING TRAIN

Sample recovery for the nozzle and probe occurred on the stack. The nozzle and probe were brushed and rinsed three times using ACS reagent grade acetone into a polyethylene sample bottle. Sample recovery for the filter holder and impinger train occurred in the mobile lab. The 100-mm filter was removed from the 4-inch filter holder and sealed in its petri dish. The glass fibers stuck to the gasket were scraped off and put into the petri dish. The front half of the 4-inch glass filter holder was brushed and rinsed with acetone. Each impinger was removed from the icebath, wiped dry and weighed to the nearest 0.1 gm. The contents of impinger 1 were transferred to a polyethylene sample bottle. The back half of the 4-inch glass filter holder, the glass connectors, impinger 1, and the front half of the 2-inch filter holder were rinsed

with 80-percent IPA and the rinsings were transferred to this same bottle. The 47-mm filter from the 2-inch filter holder was sealed in its petri dish. The contents of bubbler 2 and impinger 3 were transferred to a polyethylene sample bottle. Distilled water rinsings of the back half of the 2-inch filter holder, bubbler 2, the connector, and impinger 3 were transferred to this same bottle. All sample bottles and petri dishes were marked and labeled. A chain-of-custody log was completed and the field data sheet was also labeled with the sample ID numbers. The sampling train was then recharged in preparation for the next test.

4.5 SAMPLING PROCEDURES FOR CONTINUOUS MONITORING

The continuous monitors used in the Pape & Steiner Mobile Monitoring Lab are shown in Table 4-1. Figure 4-1 is a schematic of the continuous monitoring system. The procedures used to continuously monitor stack gases for NO_x, CO, CO_2, and O_2 strictly follow EPA Method 20.

Sample was taken from the stack (at 2 points) using a 316 stainless steel probe. A heated Balston filter holder and fiberglass filter (99.9999 percent efficiency retention of 0.6 micron particles) was connected to the outlet of the probe. Sample gas was transported through heated Teflon sample line (maintained at >250°F) by a Teflon-lined diaphragm pump to a 316 stainless steel refrigeration type conditioner (Hankison Model E-4G-SS). The sample gas was passed through the conditioner two separate times under vacuum before entering the pump, then two additional times under pressure. The clean, dry sample gas (~35°F) was then transported to the continuous analyzer system through an unheated Teflon line. A series of flowmeters, valves and regulators maintain constant flow through the system at a constant pressure.

TABLE 4-1 . CONTINUOUS MONITORING LAB - TRAILER 3

NO_x CHEMILUMINESCENT ANALYZER -- THERMO ELECTRON MODEL 10

Response Time (0-90%)	1.5 sec -- NO mode; 1.7 sec -- NO_x mode
Zero Drift	Negligible after 1/2 hour warmup
Linearity	±1% of full scale
Accuracy	Derived from the NO or NO_2 calibration gas, ±1% of full scale
Output	0-10 V
Operating Ranges	0-2, 5, 10, 25, 100, 250, 1000, 2500, and 10,000 ppm

O_2 ANALYZER, FUEL TYPE -- TELEDYNE MODEL 326

Response Time (0-90%)	60 seconds
Accuracy	±1% of scale at constant temperatures; ±1% of scale of ±5% of reading, whichever is greater, over the operating temperature range
Output	0-1 V
Operating Ranges	0-5%, 10%, 25% O_2

CO_2/CO INFRARED ANALYZER -- ANARAD MODEL AR-600

Response Time (0-90%)	5 seconds
Zero Drift	±1%
Span Drift	±1%
Linearity	1%
Resolution	Less than 1% of full scale
Output	0-1 V
Operating Ranges	0-20% CO_2/0-10,000 ppm CO

CO GAS FILTER CORRELATION - THERMO ELECTRON MODEL 48

Response Time (0-95%)	1 minute
Zero Drift	±0.2 ppm CO
Span Drift	Less than 1% full scale in 24 hours
Linearity	±1% full scale, all ranges
Accuracy	±0.1 ppm CO
Output	0-10 V
Operating Ranges	1, 2, 5, 10, 20, 50 ,100, 200, 500, and 1000 ppm

SO_2 UV ANALYZER -- DUPONT MODEL 400

Response Time (0-90%)	Less than 1 second
Zero Drift	Less than 1% full scale in 24 hours
Linearity	±1% full scale
Accuracy	±2% full scale
Output	0-5 V
Operating Ranges	0-100 ppm, 0-1000 ppm

STRIP CHART RECORDERS (2) -- LINSEIS MODEL 7025

Pen Response	0.35 seconds Full Scale
Input Spans	1, 2, 5, 10, 20, 50, 100, 200, 500 mV; 1, 2, 5, 10, 20, 50 V; Variable gain up to 2.5 times
Zero Set	Adjustable to 100% of Full Scale
Accuracy	0.35% of Span
Linearity	0.25% of Span
Chart Speed	1, 2, 5, 10, 20, 50, 100 cm/minute; 1, 2, 5, 10, 20, 50 cm/hour, LED indicator, forward/reverse
Recording Pen	Fiber tip
Chart Width	250 mm

SCOTSMAN TRAILER

Fully Insulated	Air conditioned	8-ft x 14-ft x 11-ft

1. Filter 0.6 μ, 99.9999 percent efficient
2. Duct
3. 316 stainless steel probe
4. 3/8-inch, heated (250°F) Teflon
5. Four-pass conditioner-dryer, 316 stainless steel internals
6. 3/8-inch, unheated Teflon
7. Teflon-lined sample pump
8. 3/8-inch unheated Teflon
9. Rotameter
10. 1/4-inch Teflon tubing
11. Calibration gas manifold
12. Calibration gas selector valve
13. Calibration gas cylinders
14. Backpressure regulator
15. Auxiliary analysis port

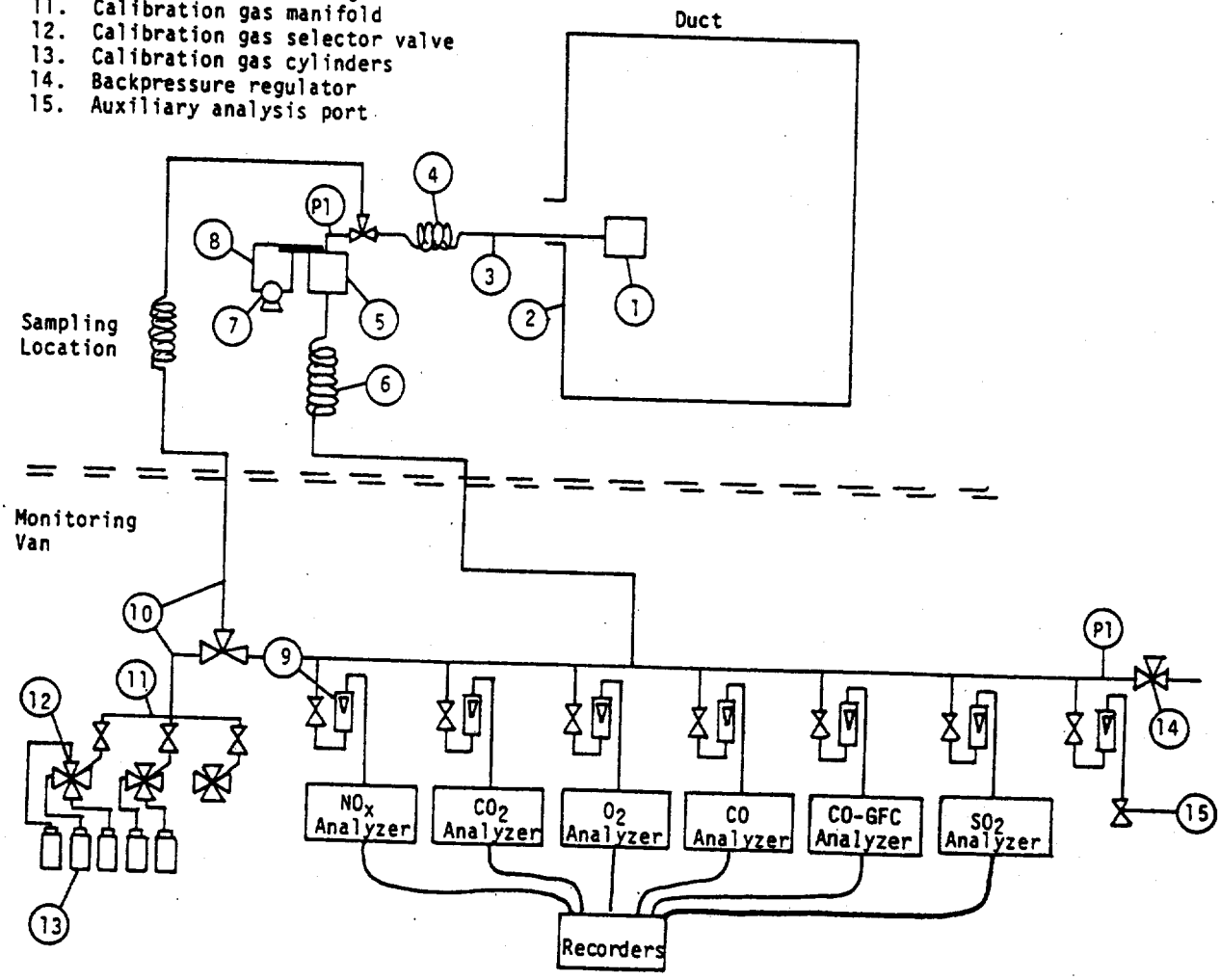


FIGURE 4-1. SCHEMATIC OF CONTINUOUS MONITORING SYSTEM

Calibrations of the continuous analyzers were performed using EPA Protocol 1 calibration gases (±1%) for NO_x and NBS certified calibration gases (±1%) for CO, CO_2 and O_2. Copies of the gas certifications are included in the Appendix of this report. All pertinent data (date, time, test locations, analyzer range, cal gas value) were recorded on both the field data sheets and continuous analyzer strip charts in the field.

At the start of a test day, a leak-check was performed. The sample probe was removed from the stack and the end was sealed. A leak-check was successful only if pressure at the analyzer system and flow through the rotameters to the individual analyzers all dropped to zero. A mandatory leak-check was performed at the completion of each test day.

An initial calibration was performed at the start of a test period by introducing zero and span gases for each analyzer and making the necessary adjustments. A multipoint linearity check was performed on each analyzer to insure all points were within ±2% of full scale. An NO_2 to NO converter check was performed to insure converter efficience was greater than 90%. And, finally, the upscale and downscale response time of the sampling system was measured to insure the sampling time per point could be set at 1-minute plus the system response time. Calibration gas values were recorded on the continuous monitor strip charts and field data sheets. A calibration check was completed at the end of a test and adjustments (if necessary) to the analyzers were made in preparation for another test.

An external calibration of the sampling system was performed at the start of a test day. EPA Protocol 1 gas was flowed through the entire sampling system from the probe tip. The response of the analyzers

had to be within ±5% of the certified tank value before testing could proceed. An external calibration was also performed at the end of each test day.

Test data was collected by recording 10-minute averages from the strip chart recordings onto the field data sheets. Data collected over the test period was averaged and reported. A fuel analysis was used to calculate the F-factor, dscf/MMBtu corrected to zero percent O_2 (standard conditions 60°F, 29.92 inches Mercury), as described in 40 CFR 60.45. The pollutant concentration and the F-factor were used to calculate an emission factor in lb/MMBtu.

4.6 SAMPLING PROCEDURES FOR HYDROCARBONS

The sampling train for hydrocarbons consisted of a probe (short piece of stainless steel), a Tygon sample line, a Tedlar bag and a hand pump. The entire train was purged with stack gas three times before collecting a sample. An integrated grab sample of the stack gases was collected over the test period. After sample collection, the Tedlar bag was lowered to the mobile lab for subsequent analysis. Duplicate grab samples were collected during the test series.

4.7 PREPARATION OF H_2S SAMPLING TRAIN

All sampling train components were cleaned in the laboratory (soap and water, tap water rinse, distilled water rinse, and IPA rinse) to eliminate previous contamination.

EPA Method 11, with cadmium sulfate as the absorbing solution, was used to collect H_2S. Samples were collected from the gas stream using the following sampling train:

- A Teflon sample line (3 feet long) to connect the impinger train to the duct
- An impinger train consisting of five midget impingers with glass connections (impinger 1 contained 15 mls of 3-percent H_2O_2; impingers 2, 3, and 4 each contained 15 mls of the 3 M cadmium sulfate absorbing solution; and, impinger 5 contained approximately 20 grams of silica gel)
- A control module containing a pump, control valves, gas meter, orifice meter, dual inclined manometer and temperature indicator with selector switch
- An umbilical cord to connect the control module and the sample train

4.8 SAMPLING PROCEDURES FOR H_2S

Tests were conducted in strict accordance with EPA Method 11. The entire sample train was assembled at the test site. An initial leak-check was performed at 5-inches Mercury vacuum to insure leakage was less than 0.002 cfm. After completing the leak-check, sample was drawn through the midget impinger train at approximately 0.13 cfm for 4 hours. A final leak-check was performed after completing each test. The impinger train was transported to the mobile lab for sample recovery.

4.9 SAMPLE RECOVERY PROCEDURES FOR H_2S

Recovery of the EPA Method 11 sample train was performed in the mobile lab. The contents of the hydrogen peroxide impinger were discarded. The contents of impingers 2, 3, and 4 were quantitatively transferred to a labelled polyethylene sample bottle.

SECTION 5

ANALYSIS PROCEDURES

This section of the report describes the procedures used to analyze the samples collected during the test program. The fuel gas was sent to Pacific Gas Technology for analysis. All other analyses were performed in the Pape & Steiner laboratory in Bakersfield.

5.1 ANALYSIS OF PARTICULATE-SO_x SAMPLES

5.1.1 Nozzle, Probe, Filter Holder Wash

The volume of the acetone washings was measured and the washings were transferred to clean, tared, aluminum weighing dishes. The dishes were placed on temperature-controlled water bath under a fume hood and gently heated to dryness (100°F). The dishes with the dry residue were desiccated and weighed repeatedly at 6-hour intervals until a constant weight was achieved (to the nearest 0.01 mg with a tolerance of <0.1 mg between weighings). The ACS reagent grade acetone blank was treated in the same manner.

5.1.2 Filter

The 100 mm filter was removed from its petri dish and transferred to an oven where it was heated for 2 hours at 105°C. The filter was then desiccated and weighed repeatedly at 6-hour intervals until a constant weight was achieved (to nearest 0.01 mg with a tolerance of <0.1 mg between weighings). An unused, tared blank filter was treated in the same manner.

5.1.3 Filterable Particulate Sulfate

The acetone washings residue and the 100 mm filter were combined and then leached with distilled water to remove sulfate and the leachate was diluted to 100 ml. An aliquot was passed through ion exchange resin and titrated against 0.01N $BaCl_2$ (which was previously standardized against 0.0100N H_2SO_4) using the barium-thorin titration procedure specified in EPA Method 8. The acetone blank and 100 mm filter blank were treated in an identical manner.

5.1.4 Condensible Particulate, Sulfate, and SO_3

The 47-mm glass fiber filter was leached with distilled water and the leachate was added to the contents and washings from impinger 1. The volume was measured and the entire volume was transferred to a clean, tared glass evaporating dish. The dish was placed on a temperature-controlled hot plate under a fume hood and gently heated to dryness (150°F). The dish with the dry residue was desiccated and weighed repeatedly at 6-hour intervals until a constant weight was achieved (to nearest 0.01 mg with a tolerance of <0.1 mg between weighings). The dry residue was dissolved in distilled water and diluted to 100 ml using distilled water and analyzed for sulfate using the barium-thorin titration procedure. A blank 47-mm filter and 80-percent IPA solution were treated in the same manner.

5.1.5 SO_2

The volume of contents and washings from bubbler 2 and impinger 3 was measured and an aliquot was analyzed for sulfate using the barium-thorin procedure. A 3-percent H_2O_2 blank was treated in the same manner.

5.2 ANALYSIS OF HYDROCARBON SAMPLES

The grab sample of hydrocarbons was analyzed using a Carle Model 211 AGC-FID. After purging the sample loop three times, a 1-ml sample was extracted from the Tedlar sample bag and injected onto a 6-foot long, 1/8-inch stainless steel column containing 80/100 mesh PoraPac Q, maintained at 150°C. The C_1 hydrocarbon was separated and the greater than C_1 hydrocarbons were backflushed to the detector for quantitation as a single peak. An HP Model 3390A reporting integrator was used to record and integrate the signal from the GC. A ±1 percent certified calibration gas (C_1-C_6 HC in N_2) was used to calibrate the GC before and after sample analysis to quantitate the C_1 and greater than C_1 hydrocarbons. The beginning and end calibrations must agree within ±5% for the data to be acceptable.

5.3 ANALYSIS PROCEDURES FOR H_2S

In the laboratory, the contents of the sample bottle were transferred to an iodine flask along with the water rinsings. A known amount of iodine was added to the sample and acidified with 3 M HCl. The iodine flask was immediately stoppered and shaken. The flask was placed in the dark for 30-minutes. Standard 0.01 N sodium thiosulfate was used to standardize the iodine solution used each day of testing. Samples were titrated with the same sodium thiosulfate solution to an iodine/starch blue endpoint. The blank and standard solutions were handled in exactly the same manner.

5.4 FUEL ANALYSIS

A sample of the fuel gas fired during this test program was collected and sent to Pacific Gas Technology (PGT) for analysis. Analysis

was performed by PGT in accordance with EPA Title 40 Section 60.45. The specific procedures are itemized in Table 5-1. The results appear at the end of this section.

TABLE 5-1. FUEL ANALYSIS METHODS

LABORATORY TEST PROCEDURES FOR FUEL OILS AND FUEL GASES

Reference: EPA Title 40, Section 60.45

FUEL OIL TESTS:	
Sediment and Water, Vol. %	ASTM D4007-81
Gravity by Hydrometer (API)	ASTM D1298-80
API Gravity Corrected to 60°F	ASTM Table 5A
Gross Calorific Value (Btu/lb)	ASTM D2015-77
Ultimate Analysis (C, H, O, N, S, wt. %)	
Carbon, Hydrogen	ASTM D3178-73
Nitrogen (chemiluminescence detector)	ASTM D3431-80
Sulfur	ASTM D2622-82
Ash	ASTM D482
Oxygen	ASTM D3176-74
GASEOUS FUELS BY GAS-LIQUID CHROMATOGRAPHY:	
Gas Analysis	ASTM D1945-81
Sulfur Analysis	CPA B16
Calculation of Gross Calorific Value	ASTM D3588-81
Component Weight %, F-factor calculations	EPA 40:60.45
PROCEDURES FOR SCRUBBER LIQUOR ANALYSIS:	
Specific Gravity	ASTM D1429
Chlorides	ASTM D512-67

PACIFIC GAS TECHNOLOGY

4200 Easton Drive - Suite 5
Bakersfield, California 93309
805/324-1317
Fax: 805/324-2746

RECEIVED
SEP 24 1990
Ans'd.....

GAS ANALYSIS BY CHROMATOGRAPH

PAPE & STEINER ENVIRONMENTAL SERVICES
5801 Norris Road
Bakersfield, CA 93308

Attention: Jim Steiner

SAMPLED: SEPTEMBER 19, 1990
SUBMITTED: SEPTEMBER 21, 1990
REPORTED: SEPTEMBER 21, 1990

LAB # 3030-1

Sample ID : SWEPI/COALINGA
HRSG 101A
FUEL GAS

P&S ID # : 24761

ANALYZED GAS

	MOLE %	WT %	CHONS WT %	
OXYGEN	0.08	0.15	CARBON	72.14
NITROGEN	1.26	2.05	HYDROGEN	23.34
CARBON DIOXIDE	1.25	3.19	OXYGEN	2.47
HYDROGEN	ND	0.00	NITROGEN	2.05
CARBON MONOXIDE	ND	0.00	SULFUR	0.00
HYDROGEN SULFIDE	ND	0.00		
METHANE	93.59	87.04		
ETHANE	3.02	5.27		
PROPANE	0.59	1.51		
iso-BUTANE	0.06	0.20		
n-BUTANE	0.08	0.27		
iso-PENTANE	0.02	0.08		
n-PENTANE	0.02	0.08		
HEXANE +	0.03	0.10		

SPECIFIC GRAVITY * : 0.596

SPECIFIC VOLUME : 22.08 cu ft/lb

HYDROGEN SULFIDE (Draeger) : ppm

TOTAL * BTU/cu ft DRY : 1023
WET : 1005

NET * BTU/cu ft DRY : 923
WET : 907

BTU/lb : 22585

BTU/lb : 20371

* CALCULATED ACCORDING TO : ASTM D-3588

PACIFIC GAS TECHNOLOGY

4200 Easton Drive - Suite 5
Bakersfield, California 93309
805/324-1317
Fax: 805/324-2746

RECEIVED
SEP 24 1990
Ans'd.....

GAS ANALYSIS BY CHROMATOGRAPH

PAPE & STEINER ENVIRONMENTAL SERVICES
5801 Norris Road
Bakersfield, CA 93308

Attention: Jim Steiner

SAMPLED: SEPTEMBER 20, 1990
SUBMITTED: SEPTEMBER 21, 1990
REPORTED: SEPTEMBER 21, 1990

LAB # 3030-2

Sample ID : SWEPI/COALINGA
HRSG 101B
FUEL GAS

P&S ID # : 24762

ANALYZED GAS

	MOLE %	WT %	CHONS WT %	
OXYGEN	0.02	0.04	CARBON	72.46
NITROGEN	0.94	1.53	HYDROGEN	23.47
CARBON DIOXIDE	1.34	3.43	OXYGEN	2.53
HYDROGEN	ND	0.00	NITROGEN	1.53
CARBON MONOXIDE	ND	0.00	SULFUR	0.00
HYDROGEN SULFIDE	ND	0.00		
METHANE	94.12	87.92		
ETHANE	2.87	5.03		
PROPANE	0.53	1.36		
iso-BUTANE	0.05	0.17		
n-BUTANE	0.07	0.24		
iso-PENTANE	0.02	0.08		
n-PENTANE	0.02	0.08		
HEXANE +	0.02	0.05		

SPECIFIC GRAVITY * : 0.593

SPECIFIC VOLUME : 22.18 cu ft/lb

HYDROGEN SULFIDE (Draeger) : ppm

TOTAL * BTU/cu ft	DRY :	1024	NET * BTU/cu ft	DRY :	923
	WET :	1006		WET :	907
BTU/lb	:	22713	BTU/lb	:	20467

* CALCULATED ACCORDING TO : ASTM D-3588

SECTION 6

QUALITY ASSURANCE

This section of the report describes the QA/QC procedures employed on the test program.

6.1 PARTICULATE/SO_x SAMPLING EQUIPMENT

A detailed record of repair and maintenance to each sampling train is kept. Preventative maintenance to each system is performed periodically to avoid complete component breakdown during a field test.

A detailed record of sampling system calibrations is also kept. Calibration data for the sampling nozzles, pitot tubes, dry gas meters and orifice meters are available for review. Results of the EPA Quality Assurance Branch biannual audits of the dry gas meter and orifice meter combinations are also logged and verify our in-house calibration data. The calibration data for the equipment used on this program can be found in the Appendix of this report.

6.2 LAB ANALYSIS

All field samples are assigned a label and an ID number. This ID is also affixed to a chain-of-custody log and to the field data sheet to eliminate any chance of sample mixup.

Prior to analysis, all glassware is thoroughly cleaned (soap and water, tap water rinse, distilled water rinse, IPA rinse) to eliminate any contamination. The evaporating dishes used to evaporate the washings

are treated the same as a sample (dried in an oven, desiccated and weighed repeatedly at 6-hour intervals until a constant weight is achieved). The glassware used to measure volumes and make transfers and dilutions are all NBS Class A to insure accurate measurements. All weighings are carried out on a Sartorius Research Model R160P electronic semi-micro balance supported by a marble table in a separate room from the main analytical laboratory. The balance is calibrated regularly against an NBS Class S-1 weight.

All reagents used in the field and in the laboratory are ACS reagent grade and blanks of these reagents are evaluated for every set of tests. Blanks are taken in the field from the squeeze bottles and not the original container. Records are kept on these blanks to insure consistent quality of the reagents. Prior to use, the IPA is also analyzed to insure no peroxides are present which could lead to high SO_3 and low SO_2 values.

A quality control program consisting of duplicate analyses (to measure precision), spikes (to measure recovery efficiency) or analysis of blind standards supplied by EPA's Quality Assurance Branch (to measure accuracy) is implemented for each test program. Table 6-1 summarizes the results of the QC checks on this program. Records of our lab's participation in the EPA bi-annual audits for SO_2 are kept on file and verify our in-house QA/QC effort.

6.3 QUALITY ASSURANCE OF HYDROCARBON ANALYSES

Each sample container is purged in the field with sample prior to the actual tests. A certified gas is used to calibrate the gas chromatograph used to measure the hydrocarbons. The calibration certificate for

the gas used appears at the end of this section. Duplicate analyses of some samples were conducted. The results of these quality assurance checks are included in Table 6-1.

6.4 CONTINUOUS MONITORS QUALITY ASSURANCE

The NO_x analyzer is calibrated before and after each test using an EPA Protocol 1 gas (±1%) traceable to NBS. The CO, CO_2 and O_2 analyzer are calibrated before and after each test using a NBS certified gas mixture (±1%). Copies of the calibration gas certificates appear in the Appendix of this report.

A sampling system check was performed at the beginning and end of each test day. This was done by introducing an EPA Protocol 1 gas at the sampling probe and measuring the system response. The purpose of this was to check the system for leaks and sample loss.

Multipoint calibration linearity checks of the continuous analyzers were performed on April 10, 13 and 25, 1990. These results were well within CARB limitations of ±2% of full scale. Tables 6-2 through 6-6 list the results of these checks.

All of the EPA Method 20 QA/QC checks (e.g., linearity, interference, response time, converter efficiency, etc.) were performed on the continuous monitoring system and the system passed these requirements.

TABLE 6-1. QA/QC RESULTS

Unit #	Test #	Test Parameter	Dupl. (%)	Rec (%)
101A	1	Filterable Sulfate	100.0	
	2	Filterable Sulfate		99.2
		EPA SO_2 0586 6XXX		100.1
101A	1	Condensible Sulfate	100.0	
	2	Condensible Sulfate		99.8
		EPA SO_2 0586 6XXX		100.1
101A	1	SO_2	100.0	
	2	SO_2		98.2
		EPA SO_2 0586 6XXX		100.1
101A	1	Hydrocarbon	108.8	
101B	1	Filterable Sulfate	100.0	
	2	Filterable Sulfate		100.0
101B	1	Condensible Sulfate	100.0	
	2	Condensible Sulfate		99.8
101B	1	SO_2	100.0	
	2	SO_2		100.7
101B	1	Hydrocarbon	96.6	

Pape & Steiner Environmental Services

TABLE 6-2.

NO_x CALIBRATION SUMMARY

1. Station T-3

2. Analyzer NOX TECO
   Model 10AR S/N
3. Calibration by [redacted] Date 4-10-90
4. Calibrator Manufacturer ENVIRONICS
   Model 201-152 S/N 1122
5. NO_x Standard ALM 5595/ALM 2882/ALM 8755 Concentration 202ppm/2973ppm/8805
   Cylinder Pressure 1150/1250/1200

NO_x CALIBRATION AND LINEARITY CHECKS

0-25 ppm

Calibration Points	1 Flow, Dil. cc/min	2 Flow, Std cc/min	3 $(NO_x)_{out}$ ppm	4 Chart ppm	% Difference + 2% Full Scale
Zero	8995	0	0	0	0
80% URL	8103.3	888.9	19.98	19.98	0
1	8325.6	667.2	14.99	15.0	+.04
2	8550.5	445.0	9.99	10.0	-.04
3	8772.8	222.8	5.00	5.0	0

Cross check Bottle # ALM 7729 12.34ppm = (12.65ppm 1.24%)

0-250 RANGE

Calibration Points	1 Flow, Dil. cc/min	2 Flow, Std cc/min	3 $(NO_x)_{out}$ ppm	4 Chart ppm	% Difference + 2% Full Scale
Zero	9000	0	0	0	0
80% URL	8393.1	604.6	199.7	199.7	0
1	8545.5	453.7	149.9	150.5	+.24%
2	8692.8	302.7	100.1	100.75	-.26%
3	8842.7	151.8	50.1	51.0	-.36%

Cross check Bottle CONC 81.35ppm ALM 2361
Reading 84ppm = 1.01%

Forms 1.20 03/20/89

TABLE 6-2. (Concluded)

NO_x CALIBRATION AND LINEARITY CHECKS

Calibration Points	Flow, Dil. 1 cc/min	Flow, Std 2 cc/min	0-2500 RANGE 3 $(NO_x)_{out}$ ppm	4 Chart ppm	% Difference + 2% Full Scale
Zero	3916.6	—	0	0	0
80% URL	2087.4	908.1	2000	2000	0
1	3317.2	681.1	1501	1505	+.16
2	3542	454.4	1002	1005	+.12
3	3769.3	227.7	501.8	512	+.4

Pape & Steiner Environmental Services

TABLE 6-3.
CO CALIBRATION SUMMARY

1. Station T-3

2. Analyzer CO TECO
   Model 48 S/N 13738-141
3. Calibration by JP Date 4/25/80
4. Calibrator Manufacturer ENVIRONICS
   Model 201-1520 S/N 1122
5. CO Standard ALM6164/AAL 114/AAL 566 Concentration 200 PPM/1003 PPM/9942 PPM
   Cylinder Pressure 1900/1500/1600

CO CALIBRATION AND LINEARITY CHECKS

0-20 RANGE

Calibration Points	Flow, Dil. 1 cc/min	Flow, Std 2 cc/min	3 (CO)$_{out}$ ppm	4 Chart ppm	% Difference + 2% Full Scale
Zero	9001	—	0	0	0
80% URL	8283.2	721.8	16.03	16.0	0
1	8463.0	541.5	12.03	12.08	+.25%
2	8640.4	361.4	8.03	7.96	-.35%
3	8820.2	180.9	4.01	3.81	-1%

0-100 RANGE

Calibration Points	Flow, Dil. 1 cc/min	Flow, Std 2 cc/min	3 (CO)$_{out}$ ppm	4 Chart ppm	% Difference + 2% Full Scale
Zero	9000	—	0	0	0
80% URL	8283.2	719.1	80.1	80.1	0
1	8460.5	539.4	60.1	60.0	-.1%
2	8640.4	360	40.1	39.8	-.3%
3	8820.2	180.6	20.1	19.8	-.3%

Forms 1.16 03/20/89

TABLE 6-3. (Concluded)
CO CALIBRATION AND LINEARITY CHECKS

0-1000 RANGE

Calibration Points	Flow, Dil. 1 cc/min	Flow, Std 2 cc/min	3 $(CO)_{out}$ ppm	4 Chart ppm	% Difference + 2% Full Scale
Zero	9000.09	—	0	0	0
80% URL	8275.7	725.5	801.0	801	0
1	8458.0	544.1	601	597	-.4%
2	8637.9	363.2	401	399	-.2%
3	8815.2	182.1	201	198	-.3%

Pape & Steiner Environmental Services

TABLE 6-4.
CO CALIBRATION SUMMARY

1. Station T-3

2. Analyzer ANARAD CO
   Model AK602 S/N 2340
3. Calibration by JP Date 4-13-90
4. Calibrator Manufacturer ENVIRONICS
   Model 201-1520 S/N 1122
5. CO Standard AAL-5660 Concentration 9942 PPM
   Cylinder Pressure 1600

CO CALIBRATION AND LINEARITY CHECKS

0 - 10,000 RANGE

Calibration Points	1 Flow, Dil. cc/min	2 Flow, Std cc/min	3 $(CO)_{out}$ ppm	4 Chart ppm	% Difference + 2% Full Scale
Zero	1004	0	0	0	0
80% URL	202.2	810.7	7938	7938	0
1	402.0	609.3	5990	6100	-1.1%
2	596.9	407.8	4036	4100	+.6%
3	801.7	203.6	2016	2090	-.74%

Calibration Points	1 Flow, Dil. cc/min	2 Flow, Std cc/min	3 $(CO)_{out}$ ppm	4 Chart ppm	% Difference + 2% Full Scale
Zero					
80% URL					
1					
2					
3					

Forms 1.16 03/20/89

÷2

Pape & Steiner Environmental Services

TABLE 6-5.

CO_2 CALIBRATION SUMMARY

1. Station T-3

2. Analyzer ANARAD
   Model AR602 S/N 2340
3. Calibration by JP Date 4/13/90
4. Calibrator Manufacturer ENVIRONICS
   Model 201-1520 S/N 1122
5. CO_2 Standard AAL-799 Concentration 20%
   Cylinder Pressure 950

CO_2 CALIBRATION AND LINEARITY CHECKS

0-20% RANGE

Calibration Points	Flow, Dil. 1 cc/min	Flow, Std 2 cc/min	3 $(CO_2)_{out}$ %	4 Chart %	% Difference + 2% Full Scale
Zero	1009.0	0	0	0	0
80% URL	209.7	813.4	15.9%	15.5%	0
1	404.5	612.3	12.0	11.7	-1.5%
2	609.4	406.9	8.0	7.7	-1.5%
3	809.2	201.5	3.98	3.8	-.9%

Forms 1.19 03/20/89

Pape & Steiner Environmental Services

TABLE 6-6.

O_2 CALIBRATION SUMMARY

1. Station T-3

2. Analyzer TELEDYNE 02
   Model 326A S/N 44535
3. Calibration by SP Date 4/13/90
4. Calibrator Manufacturer ENVIRONICS
   Model 701-1520 S/N 1122
5. O_2 Standard A-14722 Concentration 45%
   Cylinder Pressure 1850

O_2 CALIBRATION AND LINEARITY CHECKS

0-25% RANGE

Calibration Points	1 Flow, Dil. cc/min	2 Flow, Std cc/min	3 $(O_2)_{out}$ %	4 Chart %	% Difference + 2% Full Scale
Zero	1996	0	0	0	0
80% URL	1109	889.4	20	20	0
1	1331.3	667.3	15	15	0
2	1551.1	445.5	10.04	10.2	+.64%
3	1777.4	223.1	5.03	5.23	+.8%

0-10% RANGE

Calibration Points	1 Flow, Dil. cc/min	2 Flow, Std cc/min	3 $(O_2)_{out}$ %	4 Chart %	% Difference + 2% Full Scale
Zero	5005.8	0	0	0	0
80% URL	4116.5	890	8.0	8.0	0
1	4341.4	667.6	6.0	6.1	+1%
2	4561.1	445.5	4.0	4.15	+1.5%
3	4786.1	223.1	2.0	2.17	+1.6%

Forms 1.17 03/20/89

TABLE 6-5. (Concluded)

O_2 CALIBRATION AND LINEARITY CHECKS

0-5%

Calibration Points	Flow, Dil. 1 cc/min	Flow, Std 2 cc/min	3 $(O_2)_{\%out}$	4 Chart %	% Difference + 2% Full Scale
Zero		0	0	0	0
80% URL	6382.2	623.3	4.0	4.0	0
1	6539.6	467.7	3.0	3.03	± .6%
2	6694.5	312	2.0	2.075	± 1.6%
3	6849.3	156.5	1.0	1.05	± 1.0%

Forms 1.17 03/20/89

APPENDIX A

PAPE & STEINER RAW DATA

Pape & Steiner Environmental Services

SAMPLING POINT LOCATION DATA SHEET

Plant SWEPI

Date 9/19/90

Test Location HRSG 101 A, HRSG 101 B

Upstream Dist./Dia. 48" / 1.0 ϕ

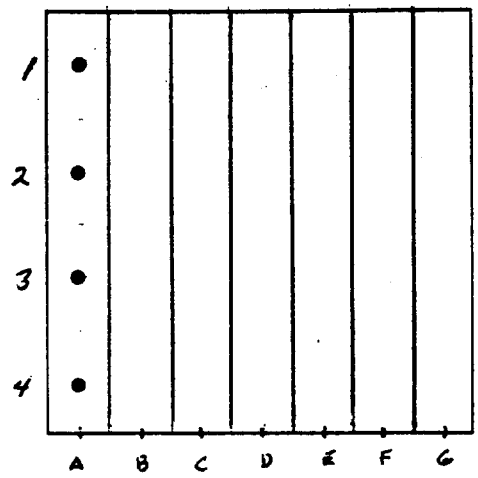
Downstream Dist./Dia. 96" / 2.0 ϕ

No. of Sampling Points 28

Stack Dimension 47.5 × 47.5

Coupling Length 7

7, 4 -inch MPT/FPT/Flange need C-Clamps
100' power
50' rope
(pulley stand/wheel)



XEQ PNT

Sample Point	Dist	Sample Point	Dist	Sample Point	Dist	Sample Point	Dist
1	12.9						
2	24.8						
3	36.7						
4	48.6						

SAMPLING POINT RELOCATION:

Pape & Steiner Environmental Services

VELOCITY TRAVERSE DATA SHEET

Plant SWEPI

Date 9/19/90

Test Location HRSG 101A

Static Pressure (in. wg) -0.30

Barometric Pressure 28.59

Probe Type/Length 6/6'

Pitot Coefficient 0.84

Stack Dimension 47.5 x 47.5

Time: 9:59 Time: Time: Time:

Smpl Pt.	ΔP	Ts	Smpl Pt	ΔP	Ts	Smpl Pt.	ΔP	Ts	Smpl Pt	ΔP	Ts
6 1	0.39	280									
2	0.41	272									
3	0.38	262									
4	0.34	255									
10:02 E 1	0.40	235									
2	0.39	232									
3	0.39	227									
4	0.37	237									
10:06 C 1	0.39	237									
2	0.39	231									
3	0.39	224									
4	0.22	239									

SAMPLING POINT RELOCATION:

Avg. $\sqrt{\Delta P}$ = 0.6081

Avg. ΔP = 0.37

Avg. Ts = 244

Pape & Stone Environmental Services

PLANT SWEPI TEST TYPE M5/8 FIELD TEST DATA SHEET (Page 1 of 3)

Date 9/19/90 Barometric Pressure 28.59
Test Location 101A Static in.wg. -0.30
Run Number 1 Probe Type/Length 6/6'
Stack Diameter 47.5x47.5 Pitot Coefficient 0.84
Operator JS Meter Box No./γ 644/1.0132
Filter No. 77 Nozzle No./Size #270/.3020

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
80% IPA	667.1	553.4	113.7
3% H_2O_2	577.0	540.4	36.6
3% H_2O_2	549.0	538.6	10.4
S.G.	832.6	767.3	65.3
		TOTAL	226.0

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial	0.012		15 mgle
Final			

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
A 1	10:30 0	0.38	2.10	257.873	272	275	243	62	79	77	3.5	0.616	pitot ok
2	5	0.39	2.16	261.995	276	225	241	60	84	80	3.5	0.624	
3	10	0.38	2.26	266.200	231	232	252	59	87	83	3.5	0.616	FHW 24751
4	15	0.31	1.84	270.550	234	244	243	58	90	84	3.0	0.557	
	20			274.487									FLT 24752
B 1	10:53 0	0.40	2.36	274.487	241	246	249	62	90	87	4.0	0.632	
2	5	0.40	2.37	278.866	241	245	227	60	95	89	4.0	0.632	IPA 24753
3	10	0.41	2.52	283.275	220	236	238	61	97	92	4.0	0.640	
4	15	0.24	1.47	287.920	223	231	236	63	97	93	3.0	0.490	AMF 24754
	20			291.582	254				48	94			
E 1	11:16 0	0.41	2.45	291.582	240	246	236	65	95	94	4.0	0.640	
2	5	0.40	2.40	296.115	239	242	258	64	99	95	4.0	0.632	H_2O_2 24755
3	10	0.40	2.45	300.645	278	244	254	66	101	98	4.0	0.632	
4	15	0.37	2.28	305.240	223	251	246	66	102	97	4.0	0.608	
	20			309.744									HCl 24763

Pape & Stei[illegible]nvironmental Services

PLANT SWEPI TEST TYPE M5/8 FIELD TEST DATA SHEET (Page 2 of 3)

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
S.G.			
		TOTAL	

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial			
Final			

Date 9/19/90 Barometric Pressure 28.59
Test Location 101A Static in.wg. -0.30
Run Number 1 Probe Type/Length 6/6'
Stack Diameter 47.5x47.5 Pitot Coefficient 0.84
Operator JS Meter Box No./γ 644/1.0132
Filter No. 77 Nozzle No./Size 270/.3020

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	$\sqrt{\Delta P}$	Comments
C 1	10:39 0	0.38	2.19	309.744	270	250	234	69	100	98	4.0	0.616	
2	5	0.40	2.32	314.095	286	258	275	68	118	113	4.0	0.632	
3	10	0.37	2.17	318.590	262	248	247	68	104	100	4.0	0.608	
4	15	0.33	1.98	322.890	245	255	234	68	104	101	3.5	0.574	
	20			326.995									
B 1	12:02 0	0.40	2.39	326.995	247	270	256	72	102	101	4.0	0.632	
2	5	0.41	2.43	331.492	257	253	258	68	105	102	4.5	0.640	
3	10	0.39	2.41	336.080	226	250	261	68	104	102	4.5	0.624	
4	15	0.36	2.20	340.615	235	250	237	68	104	102	4.0	0.600	
	20			345.020	~~259~~				~~104~~	~~102~~			
D 1	12:36 0	0.40	2.40	345.020	242	262	244	76	100	100	4.0	0.632	
2	5	0.38	2.30	349.560	241	253	246	73	105	102	4.0	0.616	

Pape & Stei[illegible] Environmental Services

PLANT SWEPI TEST TYPE M5/8 FIELD TEST DATA SHEET (Page 3 of 3)

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
S.G.			
		TOTAL	

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial			
Final	0.013		4.5 nozzle

Date 9/9/90 Barometric Pressure 28.59
Test Location 101A Static in.wg. -0.30
Run Number 1 Probe Type/Length 6/6'
Stack Diameter 42.5x42.5 Pitot Coefficient 0.84
Operator JS Meter Box No./γ 644/1.0132
Filter No. 77 Nozzle No./Size 270/.3020

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	$\sqrt{\Delta P}$	Comments
3	10	0.39	2.42	354.000	223	242	260	71	105	103	4.5	0.624	
4	15	0.36	2.23	358.550	226	236	231	70	106	104	4.0	0.600	
	20			362.946									
F 1	12:14B 0	0.39	2.30	362.946	260	242	233	72	105	103	4.0	0.624	
2	5	0.39	2.36	367.415	244	230	249	69	106	104	4.0	0.624	
3	10	0.39	2.36	371.910	242	233	231	69	106	104	4.0	0.624	
4	15	0.34	2.11	376.405	227	233	253	69	107	104	4.0	0.583	
	20			380.739									pitot ok
	140		2.26	122.866	242.89				98	38		0.6136	purge for 15 min.

Pape & Stei[illegible] Environmental Services

PLANT SWEPI TEST TYPE M5/8 FIELD TEST DATA SHEET (Page 1 of 3)

Date 9/19/90 Barometric Pressure 28.51
Test Location 101A Static in.wg. −0.30
Run Number 2 Probe Type/Length 6/6'
Stack Diameter 47.5×47.5 Pitot Coefficient 0.84
Operator JB Meter Box No./γ 644 / 1.0132
Filter No. 78 Nozzle No./Size 270 / .3020

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
80% IPA	652.2	531.9	120.3
3% H_2O_2	581.3	535.4	45.9
3% H_2O_2	544.6	544.9	−0.3
S.G.	829.3	763.9	65.4
		TOTAL	231.3

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial	0.007		.5 nozzle
Final			

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	$\sqrt{\Delta P}$	Comments
F 1	2:11 0	0.40	2.41	402.279	245	247	225	63	103	103	8.5	0.632	pitotok
2	5	0.40	2.39	406.500	240	242	225	60	95	95	9.5	0.632	
3	10	0.41	2.48	410.955	242	238	232	52	104	103	10.0	0.640	24756
4	15	0.37	2.29	415.511	227	230	233	52	105	104	9.5	0.608	
	20			420.039					40				24757
0 1	2:36 0	0.40	2.44	420.039	237	258	263	57	104	104	9.5	0.632	
2	5	0.40	2.43	424.525	240	249	246	50	106	105	10.0	0.632	24758
3	10	0.40	2.50	429.070	221	243	270	51	107	105	10.0	0.632	
4	15	0.38	2.37	433.675	223	240	231	51	107	105	9.5	0.616	24759
	20			438.281									
B 1	2:59 0	0.41	2.46	438.281	249	255	230	53	106	106	10.0	0.640	24760
2	5	0.41	2.45	442.890	256	244	227	50	108	108	10.0	0.640	
													HC 2
													24764

Pape & Stei[illegible]vironmental Services

PLANT SWEPI TEST TYPE M5/8 FIELD TEST DATA SHEET (Page 2 of 3)

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
S.G.			
		TOTAL	

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial			
Final			

Date 9/19/90 Barometric Pressure 28.51
Test Location 101A Static in.wg. -0.30
Run Number 2 Probe Type/Length 6/6'
Stack Diameter 47.5x47.5 Pitot Coefficient 0.84
Operator [illegible] Meter Box No./γ 644/1.0132
Filter No. 78 Nozzle No./Size 270/.3020

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	$\sqrt{\Delta P}$	Comments
3	10	0.40	2.50	447.500	225	237	244	51	108	107	10.0	0.632	
4	15	0.37	2.28	452.150	234	235	256	52	109	108	9.5	0.608	
	20			456.739					~~104~~	~~100~~			
				~~456.739~~					~~107~~				
6 1	3:23 0	0.35	2.02	456.739	280	255	227	51	107	107	8.0	0.592	
2	5	0.40	2.33	460.978	277	249	275	50	111	110	9.0	0.632	
3	10	0.37	2.19	465.445	265	239	248	54	111	109	9.0	0.608	
4	15	0.33	2.01	469.859	245	229	240	56	111	110	8.0	0.574	
	20			474.110					↓				
E 1	5:46 0	0.40	2.45	474.110	240	245	242	55	109	109	10.0	0.632	
2	5	0.39	2.41	478.810	235	244	244	58	111	110	10.0	0.624	
3	10	0.40	2.50	483.305	228	230	232	60	112	111	10.0	0.632	

Pape & Stei[illegible]nvironmental Services

PLANT SWEPI TEST TYPE M5/8 FIELD TEST DATA SHEET (Page 3 of 3)

Date 9/19/90 Barometric Pressure 28.51
Test Location 101A Static in.wg. -0.30
Run Number 2 Probe Type/Length 6/6'
Stack Diameter 42.5x42.5 Pitot Coefficient 0.84
Operator JS Meter Box No./γ 644/1.0132
Filter No. 78 Nozzle No./Size 270/.3020

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
S.G.			
		TOTAL	

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial			
Final	0.009		10.5 mm Hg

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft³	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
4	~~15~~	0.37	2.29	488.125	235	220	234	55	111	111	9.5	0.608	
	20			492.580									
A 1	4:09 0	0.39	2.29	492.580	270	230	227	54	108	108	9.0	0.624	
2	5	0.40	2.33	497.004	274	237	235	55	108	108	9.5	0.632	
3	10	0.40	2.49	501.562	226	234	232	58	108	108	9.5	0.632	
4	15	0.33	2.04	506.119	232	232	233	60	108	107	8.0	0.574	
	20			510.373									
C 1	4:33 0	0.39	2.39	510.373	233	253	234	60	105	105	10.0	0.624	
2	5	0.40	2.44	514.905	239	238	235	57	108	105	10.0	0.632	
3	10	0.39	2.46	519.520	220	233	236	52	108	107	10.0	0.624	
4	15	0.24	1.51	524.130	221	232	255	52	109	108	6.0	0.490	
	20			527.953									pitot ok
	140		2.33	125.674	241.39				107	102		0.6174	purge for 15 min

Pape & Stei Environmental Services

PLANT SWEPI-101-B TEST TYPE M-5/8 FIELD TEST DATA SHEET (Page 1 of 3)

Date 9-20-90 Barometric Pressure 28.49
Test Location 101-B Static in.wg. -.23
Run Number 1 Probe Type/Length 6-6
Stack Diameter 47.5x47.5 Pitot Coefficient .087
Operator SM Meter Box No./γ 644/1.0132
Filter No. 79 Nozzle No./Size #270/.3020

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
80% IPA	671.7	558.0	113.7
3% H_2O_2	583.4	543.9	39.5
3% H_2O_2	560.2	543.1	17.1
S.G.	964.9	798.3	66.6
		TOTAL	236.9

[GAS COMPOSITION]

Time	CO_2	O_2	CO

Leakrate	cfm	"Hg
Initial	.003	15"
Final	.001	5.0"

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
G-1	0.0 (0935)	0.37	2.13	536.210	263	261	270	67	91	92	3.5	0.608	PITOT O.K.
-2	5.0	0.40	2.32	540.334	255	255	262	59	91	89	4.0	0.632	LOSS POWER 0938 RESTART - 0951
-3	10.0	0.40	2.38	544.749	247	230	244	56	100	96	4.0	0.632	
-4	15.0	0.34	2.04	549.202	245	266	232	57	102	99	3.5	0.583	
E-1	20.0 (1008)	0.39	2.33	553.324	245	261	247	60	99	98	4.0	0.624	1011 LOSS OF POWER RESTART 1018
-2	25.0	0.40	2.41	557.772	245	230	237	54	105	103	4.0	0.632	LOSS OF POWER 1019 RESTART 1022
-3	30.0	0.40	2.45	562.328	231	257	238	55	103	101	4.5	0.632	FHW: 24765
-4	35.0	0.37	2.25	566.941	239	264	242	57	105	103	4.0	0.608	
C-1	40.0 (1043)	0.42	2.55	571.332	239	270	231	60	103	103	4.5	0.648	MF: 24766
-2	45.0	0.40	2.46	575.999	232	268	241	60	107	105	4.5	0.632	
-3	50.0	0.40	2.49	580.670	224	240	265	61	107	104	4.5	0.632	IPA: 24767
-4	55.0	0.25	1.53	585.239	238	235	246	63	108	107	3.0	0.500	
A-1	60.0 (1106)	0.38	2.28	588.933	248	251	244	65	105	105	3.5	0.616	AMF: 24768
													H_2O_2: 24769

Pape & Stei nvironmental Services

PLANT SWEPI 101-B TEST TYPE M-5/8 FIELD TEST DATA SHEET (Page 2 of 3)

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
S.G.			
		TOTAL	

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial	.003		15"
Final	.001		5.0"

Date 9-20-90 Barometric Pressure 28.49
Test Location 101-B Static in.wg. -.23
Run Number 1 Probe Type/Length G-6'
Stack Diameter 47.5x47.5 Pitot Coefficient 0.84
Operator SM Meter Box No./γ 644/1.0132
Filter No. 79 Nozzle No./Size #270/.3020

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
A-2	65.0	0.41	2.49	593.321	244	232	251	61	108	106	4.5	0.640	
-3	70.0	0.40	2.48	597.899	231	242	260	59	109	107	4.5	0.632	HC 24770
-4	75.0	0.33	1.96	602.519	264	237	267	56	111	109	4.0	0.574	
G-1 (11/29)	80.0	0.39	2.39	606.739	236	259	241	64	108	107	4.5	0.624	
-2	85.0	0.39	2.39	611.243	241	248	260	63	111	108	4.5	0.624	
-3	90.0	0.39	2.42	615.788	231	253	249	62	112	109	4.5	0.624	
-4	95.0	0.35	2.19	620.440	228	255	243	62	114	111	4.5	0.592	
D-1 (1151)	100.0	0.39	2.41	624.864	238	248	255	64	112	112	4.5	0.624	
-2	105.0	0.38	2.34	629.493	241	233	270	65	114	112	4.5	0.616	
-3	110.0	0.38	2.40	633.964	223	241	229	66	114	112	4.5	0.616	
-4	115.0	0.35	2.17	638.520	233	251	238	66	112	110	4.0	0.592	
B-1 (1213)	120.0	0.41	2.50	642.878	243	232	244	67	109	108	4.5	0.640	

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PLANT SWEPT - 101-B TEST TYPE M-5/8 FIELD TEST DATA SHEET (Page 3 of 3)

Date 9-20-90 Barometric Pressure 28.49
Test Location 101-B Static in.wg. -.23
Run Number 1 Probe Type/Length G-6'
Stack Diameter 472.5x472.5 Pitot Coefficient 0.84
Operator SM Meter Box No./γ 644/1.0132
Filter No. 79 Nozzle No./Size #270/.3020

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
S.G.			
		TOTAL	

[GAS COMPOSITION]

Time	CO_2	O_2	CO

Leakrate	cfm	"Hg
Initial	.003	15"
Final	.001	5.0"

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
B-2	125.0	0.40	2.43	647.499	245	237	256	65	110	109	4.5	0.632	
-3	130.0	0.39	2.43	652.101	229	230	242	64	111	109	4.5	0.624	
-4	135.0	0.35	2.15	656.729	240	228	229	65	111	109	4.0	0.592	
	140.0 (1223)			661.014									
													PITOT O.K.
T/A			2.31	124.804	239.93				105	98		0.6155	
													Purge 15 min

Pape & Stei[illegible] nvironmental Services

PLANT Swept TEST TYPE M-5/8 FIELD TEST DATA SHEET (Page 1 of 3)

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
80% IPA	668.9	533.8	135.1
3% H_2O_2	571.0	530.4	40.6
3% H_2O_2	545.8	545.5	0.3
S.G.	835.6	769.1	66.5
		TOTAL	242.5

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial	.013		15"
Final	.008		11"

Date 9-20-90 Barometric Pressure 28.47
Test Location 101-B Static in.wg. -.35
Run Number 2 Probe Type/Length G-6'
Stack Diameter 47.5x47.5 Pitot Coefficient 0.84
Operator SM Meter Box No./γ 644/1.0137
Filter No. 80 Nozzle No./Size #270/.3020

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
F-1	1325 0.0	0.39	2.36	673.187	240	248	242	67	103	103	9.5	0.624	Pitot O.K
-2	5.0	0.39	2.36	677.644	241	241	236	54	105	104	9.5	0.624	FHW 2 24771
-3	10.0	0.38	2.36	682.190	230	252	249	53	109	107	9.5	0.616	
-4	15.0	0.37	2.26	686.905	242	246	231	55	110	109	9.0	0.608	MF 2 24772
D-1	1350 20.0	0.38	2.35	691.157	231	243	241	61	108	108	9.0	0.616	
-2	25.0	0.38	2.38	695.705	224	247	270	50	110	110	9.0	0.616	IPA 2 24773
-3	30.0	0.38	2.40	700.165	220	245	264	46	111	111	9.0	0.616	
-4	35.0	0.36	2.23	704.759	236	241	250	47	113	111	9.0	0.600	AMF 2 24774
B-1	1412 40.0	0.41	2.52	709.247	239	246	237	52	111	112	10.0	0.640	
-2	45.0	0.40	2.47	713.856	237	243	234	49	111	111	10.0	0.632	H_2O_2 2 24775
-3	50.0	0.39	2.46	718.486	222	237	229	53	111	111	10.0	0.624	
-4	55.0	0.37	2.26	723.109	244	235	258	54	112	112	9.5	0.608	HC 2 24776
G-1	1435 60.0	0.35	2.16	727.594	237	251	230	54	110	111	8.5	0.592	

Pape & Stei[illegible] nvironmental Services

PLANT SWEPI 101-B TEST TYPE M-5/8 FIELD TEST DATA SHEET (Page 2 of 3)

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
S.G.			
		TOTAL	

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial	.013		15"
Final	.008		11"

Date 9-20-90 Barometric Pressure 28.47
Test Location 101-B Static in.wg. -.37
Run Number 2 Probe Type/Length G-6'
Stack Diameter 47.5 x 47.5 Pitot Coefficient 0.84
Operator SM Meter Box No./γ 644 / 1.0132
Filter No. 80 Nozzle No./Size 270 / .3020

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
G-2	65.0	0.40	2.40	731.940	257	251	247	56	112	112	9.5	0.632	
-3	70.0	0.39	2.39	736.605	243	246	259	61	113	111	9.5	0.624	24249
-4	75.0	0.39	2.39	740.995	244	251	256	60	113	114	9.5	0.624	
E-1	1458 80.0	0.40	2.49	745.606	230	253	231	53	111	112	9.5	0.632	24248
-2	85.0	0.40	2.50	750.247	230	255	270	44	113	112	9.5	0.632	
-3	90.0	0.41	2.61	754.867	219	242	274	43	114	113	10.0	0.640	24247
-4	95.0	0.36	2.27	759.601	227	256	251	51	115	114	9.0	0.600	
C-1	1520 100.0	0.41	2.55	764.057	235	260	245	55	115	114	10.0	0.640	24246
-2	105.0	0.39	2.41	768.747	242	265	243	51	116	115	9.5	0.624	
-3	110.0	0.40	2.53	773.385	227	252	269	47	117	115	10.0	0.632	24245
-4	115.0	0.24	1.49	777.998	237	252	264	46	116	115	5.5	0.490	
A-1	1542 120.0	0.36	2.20	781.588	250	268	247	60	116	116	8.0	0.600	

Pape & Stei[illegible]nvironmental Services

PLANT Swepi - 101-B TEST TYPE M-5/8 FIELD TEST DATA SHEET (Page 3 of 3)

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
S.G.			
		TOTAL	

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial	.013		15"
Final	.008		11"

Date 9-20-90 Barometric Pressure 28.47
Test Location 101-B Static in.wg. -.35
Run Number 2 Probe Type/Length G-6'
Stack Diameter 47.5/47.5 Pitot Coefficient 0.84
Operator SM Meter Box No./γ 644/1.0132
Filter No. 80 Nozzle No./Size #270/.3020

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	$\sqrt{\Delta P}$	Comments
A-2	1250	0.41	2.55	785.880	239	255	268	46	117	116	10.0	0.640	
-3	1300	0.39	2.46	790.764	230	235	241	45	117	117	9.5	0.624	
-4	1350	0.34	2.08	795.189	250	236	250	44	116	115	8.0	0.583	
	1400			799.498									
													Pitot O.K.
T/A			2.35	126.311	235.82				112.	07		0.6158	

Pape & Steiner Environmental Services

PLANT SWEPI Coalinga TEST TYPE H_2S FIELD TEST DATA SHEET (Page 1 of 2)

Date 9-20-90
Test Location Fuel Gas Line
Run Number 1
Stack Diameter ~4"
Operator VVP
Filter No. NA

Barometric Pressure 28.49
Static in. wg. —
Probe Type/Length TEFLON
Pitot Coefficient NA
Meter Box No./γ PORT / 0.9875
Nozzle No./Size NA

Impinger Volumes/Weights				Gas Composition			
Contents	Final	Initial	Net	Time	CO_2	O_2	CO
	106.3	105.5					
	104.6	107.5					
	82.2	81.5					
				Leak Rate		cfm	"Hg
				Initial		0.002	Max
S.G.	122.7	117.7		Final			
		Total					

Sample Point	1115 Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Temperature °F Stack	Probe	Oven	Imp.	Gas Meter In	Out	Pump Vacuum in. Hg	$\sqrt{\Delta P}$	Comments
	0			784.512				66	92	92			
	10			785.85				63	93	92			24777
	20			787.16				62	93	92			
	30			788.50				60	93	92			24778
	40			789.83				59	93	92			
	50			791.17				61	94	92			
	60			792.48				63	95	93			
	70			793.81				63	95	93			
	80			795.15				64	95	93			
	90			796.47				66	96	93			
	100			797.81				66	96	93			
	110			799.14				62	96	93			
	120			800.470									

Pape & Steiner Environmental Services

PLANT SWEPI Coalinga TEST TYPE H_2S FIELD TEST DATA SHEET (Page 2 of 2)

Date 9-20-90
Test Location Fuel Gas Line
Run Number 1
Stack Diameter ~ 4"
Operator VVM
Filter No. NA

Barometric Pressure 28.49
Static in. wg. —
Probe Type/Length TEFLON / NA
Pitot Coefficient NA
Meter Box No./γ DGT / 0.9875
Nozzle No./Size NA

Impinger Volumes/Weights			
Contents	Final	Initial	Net
S.G.			
		Total	

Gas Composition			
Time	CO_2	O_2	CO

Leak Rate	cfm	"Hg
Initial		
Final	0.002	Max

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Temperature °F						Pump Vacuum in. Hg	$\sqrt{\Delta P}$	Comments
					Stack	Probe	Oven	Imp.	Gas Meter In	Gas Meter Out			
	120			800.470				63	96	93			
	130			801.52				63	96	93			
	140			803.20				65	97	93			
	150			804.55				67	97	93			
	160			805.93				62	98	94			
	170			807.30				60	98	94			
	180			808.66				59	98	94			
	190			810.01				60	98	94			
	200			811.39				62	97	95			
	210			812.75				63	98	95			
	220			814.11				64	99	95			
	230			815.48				66	99	95			
	240			816.843									
	1515												
	TA			32.331					94.	56			

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CONTINUOUS MONITOR DATA SHEET

Plant SWEPI COALINGA COGEN
Date 9/19/90 Run No. #1 ~~(PAGE 1 of 2)~~
Test Location HRSG 101A OUTLET, PORT "B-3" & "A-3"
Operator PES
Fuel Type NATURAL GAS Trailer No. #3

APCD Witness/Number
Generator Type ALLISON CTG "501" KBS
Burner Type
O_2 Controller Type
Gas Cylinder Nos. NOx-AAL-13433, AAL-15365, AAL-2171
CO_2/CO/O_2 - IL-23410, CC12055,
CO - CC163, AAL-9841

Time	Sample Point	Fuel Flow	Dry Uncorrected O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	Response Time Up (sec)	Response Time Down (sec)	NO-NOx Converter Gas NO	NO2	NOx				Comments
0830			15.0	14.71	80.7			81.9									SPAN GAS VALUES
			Ø	Ø	Ø			Ø									ZERO GAS
								41.4									NO_x LIN ✓ = (41.39 PPM)
								20.6									NO_x LIN ✓ = (20.04 PPM)
			3.825														O_2 LIN ✓ = (3.82 %)
					36.0												CO LIN ✓ = (37.4 PPM)
				5.0													CO_2 LIN ✓ = (5.02 %)
0913			15.2	4.92	82.7			79.0									EXTERNAL CHECK
			0.12														LEAK CHECK - GOOD
																	RECALIBRATE
0939			15.0	5.02	8.21			81.9									SPAN GAS VALUES
			Ø	Ø	Ø			Ø									
1030	B-3		15.03	3.36	4.20			34.8									START RUN #1 @ 1025
1040			14.98	3.34	3.85			34.8									
1050			14.98	3.34	3.80			35.1									
1100			14.95	3.34	4.00			35.2									
1110			14.93	3.32	3.80			35.1									
1120			14.93	3.32	3.85			35.3									
1130			14.90	3.29	3.75			35.1									
1140	B-3 | A-3		14.91	3.28	3.80			35.2									CHANGE PROBE POSITION
1150			14.90	3.26	3.41			35.3									FROM B-3 TO A-3 @ 1140
1200			14.85	3.26	3.85			35.4									
1210			14.85	3.26	3.75			35.3									
1220			14.83	3.24	3.62			35.2									END RUN #1 @ 1225
1225			Ø	Ø	+0.25			+0.3									ZERO CHECK - NO ADJ
			14.90	4.80	8.43			81.1									SPAN CHECK - NO ADJ

24761

Pape & Sauer Environmental Services

CONTINUOUS MONITOR DATA SHEET

Plant SWEPI COALINGA COGEN
Date 9/19/90 Run No. #2
Test Location HRSG 101A OUTLET
Operator PES
Fuel Type NATURAL GAS Trailer No. #3

APCD Witness/Number
Generator Type ALLISON CTG "501" KB5
Burner Type
O_2 Controller Type
Gas Cylinder Nos. NO_x - AAL-13433, AAL-15365, AAL-2171
CO_2-CO-O_2 — 1L-23410, CC12055
CO — CC163, AAL-9891

Time	Sample Point	Fuel Flow	Dry Uncorrected O_2 %	Dry Uncorrected CO_2 %	Dry Uncorrected CO ppm	Dry Uncorrected SO_2 ppm	Dry Uncorrected NO ppm	Dry Uncorrected NO_x ppm	Response Time Up (sec)	Response Time Down (sec)	NO-NOx Converter Gas NO	NO-NOx Converter Gas NO2	NO-NOx Converter Gas NOx				Comments
1255			15.0	5.02	8.21			81.9									SPAN GAS VALUES
			Ø	Ø	Ø			Ø									ZERO GAS
1420	A-3		14.85	3.36	3.38			35.7									START RUN #2 @ 1415
1430			14.75	3.36	3.42			35.7									
1440			14.65	3.34	3.39			35.8									
1450			14.63	3.32	3.42			35.8									
1500			14.60	3.32	3.42			35.8									
1510			14.60	3.32	3.43			34.9									
1520	B-3		14.60	3.28	3.42			32.5									CHANGE PROBE POSITION
1530			14.60	3.30	3.39			31.0									FROM A-3 TO B-3 @ 1525
1540			14.58	3.27	3.42			30.0									
1550			14.55	3.24	3.40			29.2									
1600			14.55	3.24	3.40			28.8									
1610			14.55	3.22	3.44			28.4									END RUN #2 @ 1615
1615			Ø	-0.08	+0.12			+0.4									ZERO CHECK - NO ADJ
			15.45	4.80	8.24			78.5									SPAN CHECK - NO ADJ
			+0.15	4.70	8.36			77.2									EXTERNAL CHECK

Pape & Steiner Environmental Services

CONTINUOUS MONITOR DATA SHEET

Plant SWEPI COALINGA
Date 9-20-90 Run No. 1
Test Location HDSG 101B OUT
Operator VDM
Fuel Type NAT'L GAS Trailer No. 3

APCD Witness/Number
Client Rep
Generator Type
Burner Type
O_2 Controller Type

[Dry Uncorrected]

Time	Sample Point	O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	Comments
		15.0	14.71	8.21			81.9	SPAN VALUES
								CALS —
		0.0	0.0	0.0			0.0	ZERO
		15.0	14.71	8.21			81.9	SPAN
								LINEARITY CHECKS
							41.38	MID
		15.0	14.71	8.21			82.2	HI
		3.9	5.02	3.44			20.06	LOW
								RESET SPAN VALUES
		0.15	4.90	8.40			81.8	EXT (BIAS) CHECK
		15.0	5.02	37.4			41.39	CAL ADJUST
0935	PORT E	14.75	3.35	6.00			25.0	RUN 1
45		14.65	3.40	6.30			24.8	
55		14.60	3.40	6.60			24.5	
1005	CM PORT	14.60	3.40	6.10			24.8	
15		14.60	3.40	6.10			24.6	
25		14.50	3.40	6.30			24.6	
35		14.50	3.40	6.30			24.4	FG 24762
45		14.40	3.35	6.80			24.2	
55		14.35	3.35	6.60			24.2	
1105		14.30	3.30	4.90			25.0	
15		14.25	3.30	5.10			25.0	
25		14.25	3.30	5.20			25.0	
1135	CAL ✓	0.0	-0.15	0.10			0.2	ZERO —
		15.20	4.80	8.20			41.8	SPAN ✓

Miscellaneous Information

CALIBRATION GASES
NO_x 13433, 2171, 15365
SO_2
CO 86236, 9891
$CO/CO_2/O_2$ 23410, 12055

Wet Bulb: _____ Dry Bulb: _____
Barometric Press: _____

RESPONSE TIME

Upscale:	48	Downscale:	43
Upscale:	45	Downscale:	42
Upscale:	45	Downscale:	42

PROCESS DATA
Fuel Flow:
Steam Flow:
Rating:

CONVERTER GAS

	Cal Gas Values	Actual Values
NO		
NO_2		

Conv. Efficiency:

Pape & Steiner Environmental Services

CONTINUOUS MONITOR DATA SHEET

Plant SWEPI COALINGA
Date 9-20-90 Run No. 2
Test Location HTRSG 101B OUT
Operator VVM
Fuel Type N. GAS Trailer No. 3

APCD Witness/Number
Client Rep
Generator Type
Burner Type
O_2 Controller Type

[Dry Uncorrected]

Time	Sample Point	O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	Comments
		15.0	5.02	8.21			41.39	SPAN VALUES
1325	CMPORT	14.50	3.35	5.60			25.4	RUN 2
35		14.50	3.30	6.55			24.6	
45		14.45	3.30	6.70			24.0	
55		14.50	3.25	8.50			23.0	
1405		14.50	3.20	9.00			23.0	
15		14.45	3.20	8.10			23.6	
25		14.45	3.20	8.60			23.4	
35		14.40	3.20	9.20			23.6	
45		14.40	3.20	7.65			24.0	
55		14.60	3.20	6.80			24.6	
1505		14.60	3.20	6.40			25.0	
15		14.60	3.20	6.40			25.0	
1525		0.10	-0.15	-0.02			0.8	ZERO ✓
		15.05	4.85	8.36			43.2	SPAN ✓
		0.15	4.80	8.45			42.2	EXT (BIAS) ✓

Miscellaneous Information

CALIBRATION GASES
NO_x
SO_2
CO
$CO/CO_2/O_2$

Wet Bulb: Dry Bulb:
Barometric Press:

RESPONSE TIME
Upscale: Downscale:
Upscale: Downscale:
Upscale: Downscale:

PROCESS DATA
Fuel Flow:
Steam Flow:
Rating:

CONVERTER GAS

Cal Gas Values	Actual Values
NO	
NO_2	

Conv. Efficiency:

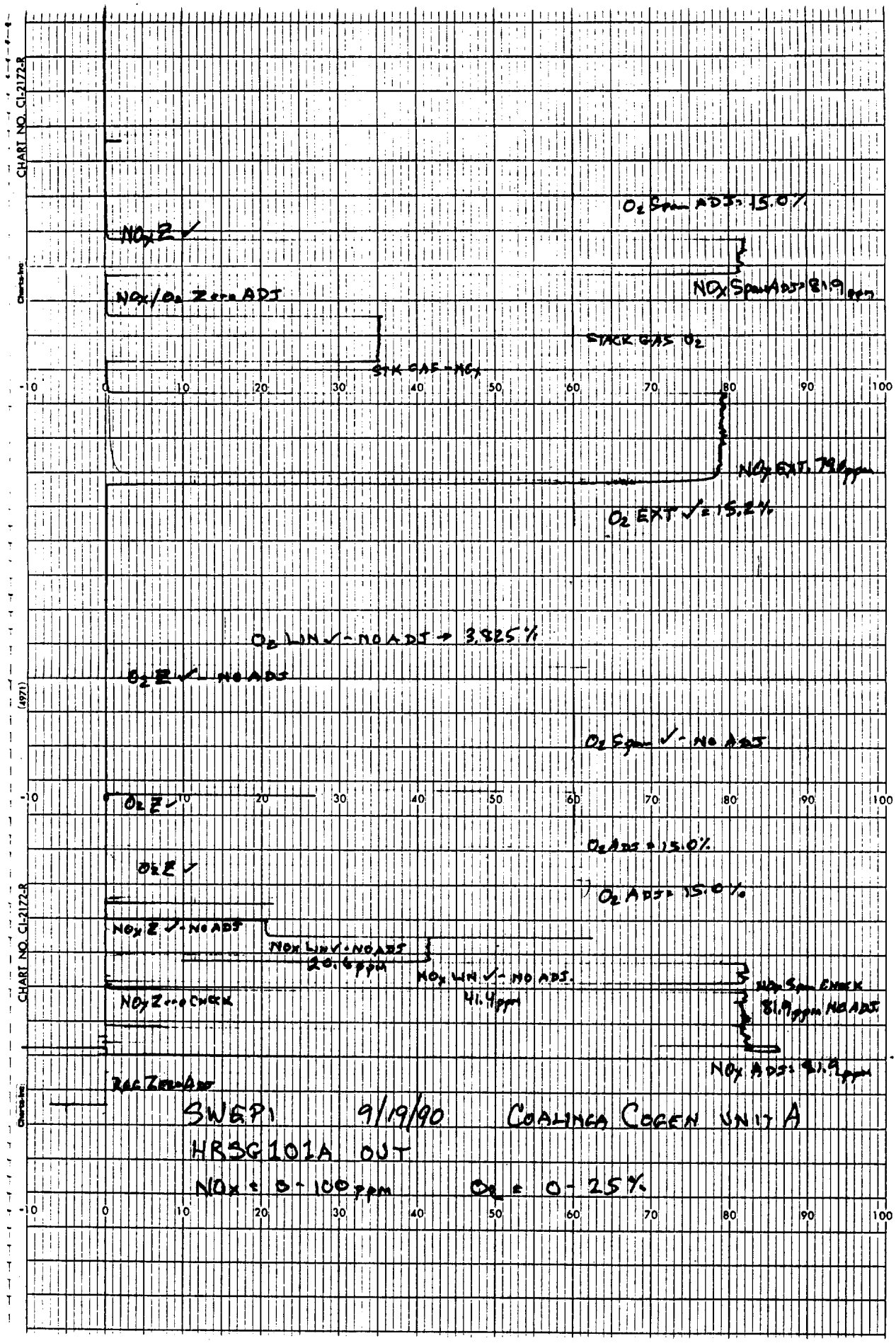
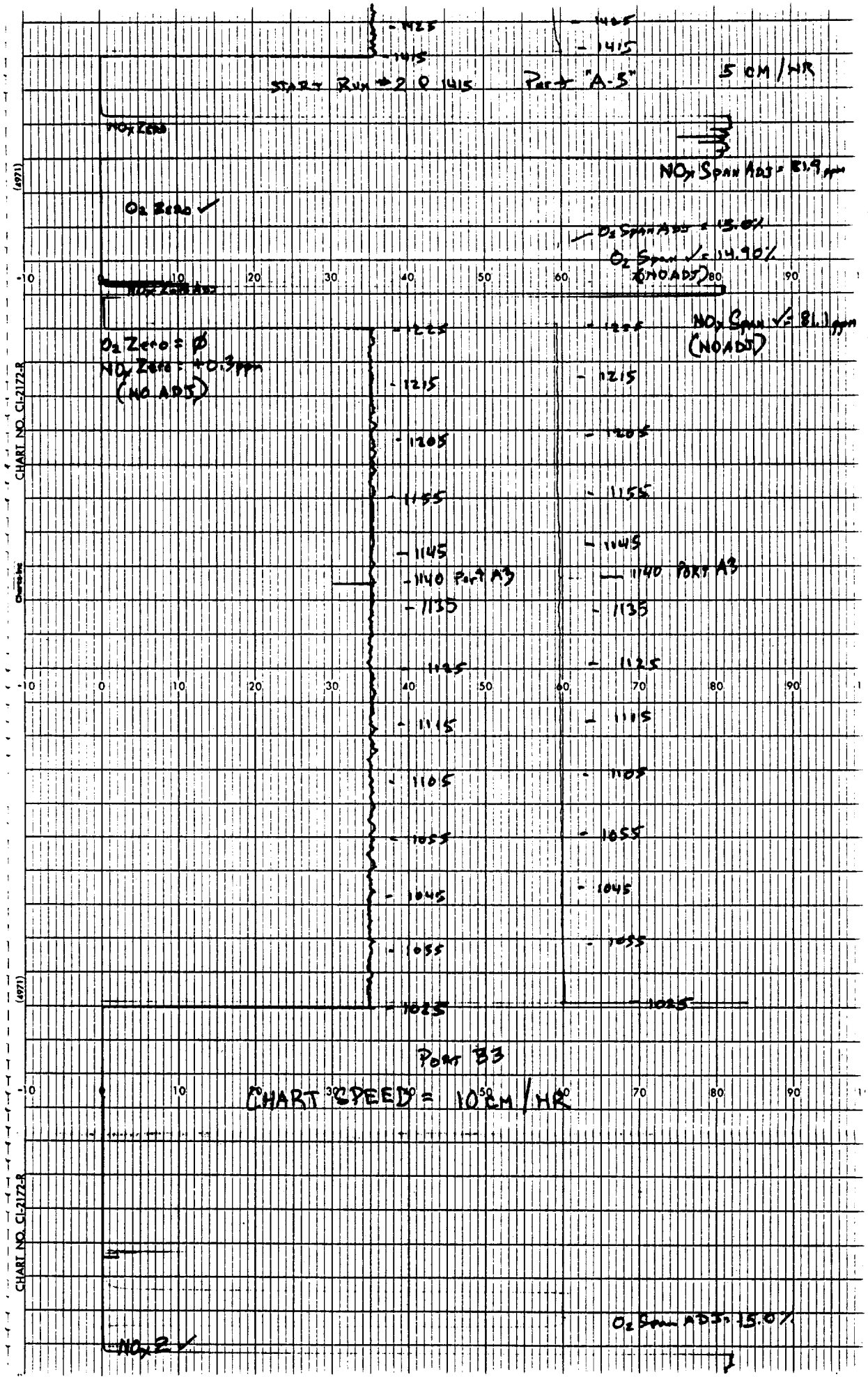
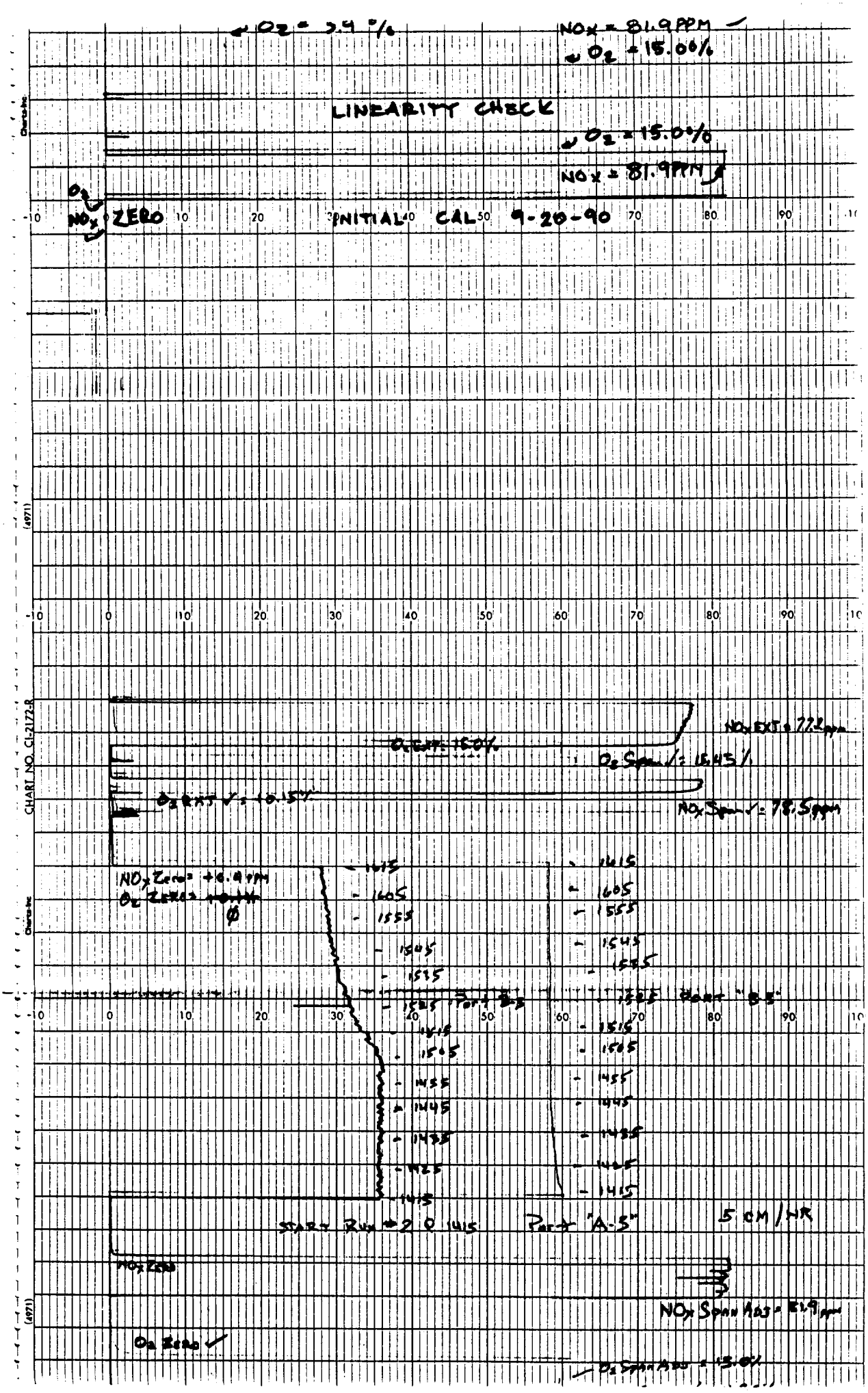
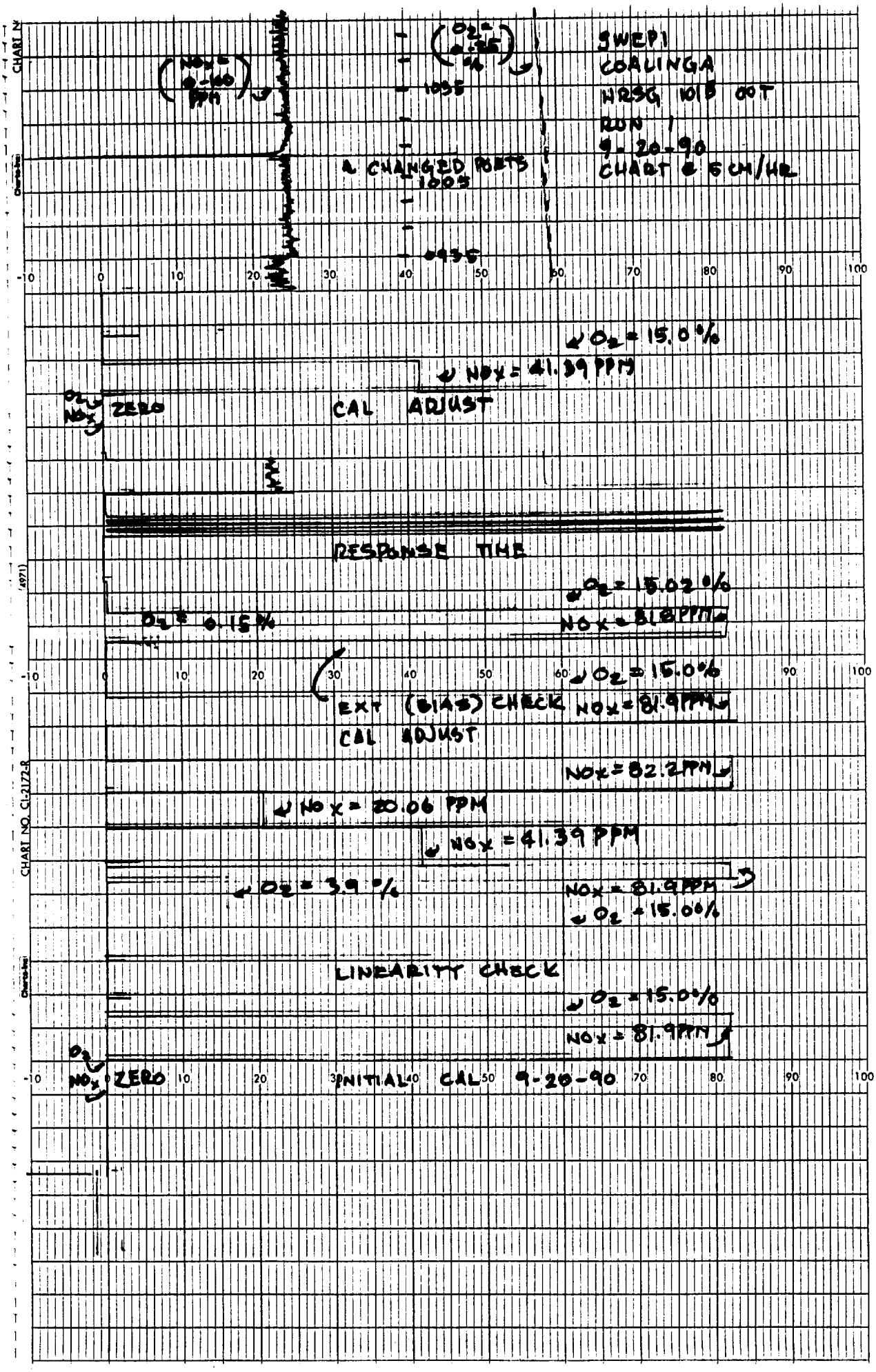
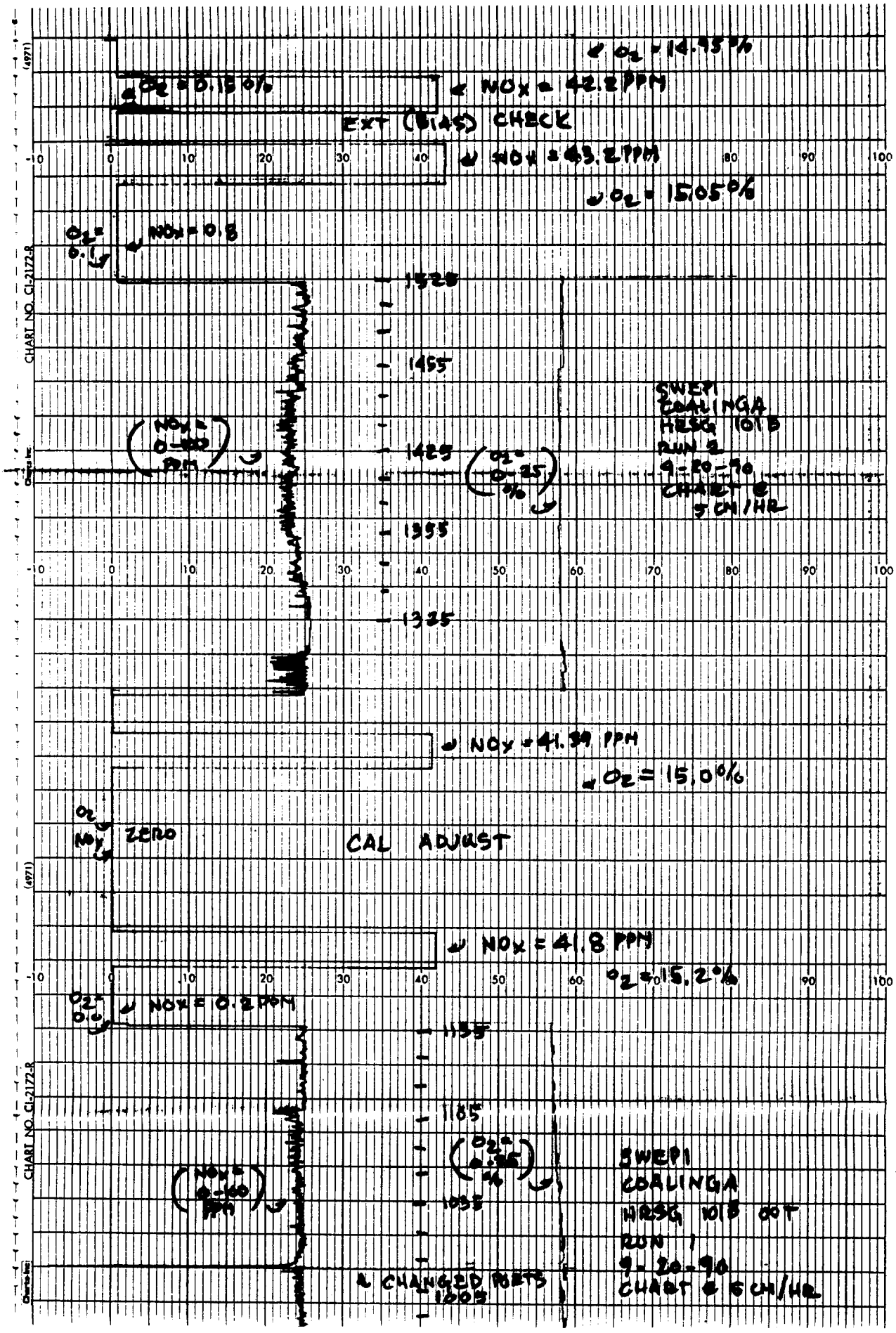


CHART NO. CI-2172-R
(4971)
Chart-Info
NOx Z ✓
NOx/O2 Zero ADJ
O2 Span ADJ: 15.0%
NOx Span ADJ: 81.9 ppm
STACK GAS O2
STK GAS - NOx
NOx EXT. 79.6 ppm
O2 EXT ✓ = 15.2%
O2 LIN ✓ - NO ADJ → 3.825%
O2 Z ✓ - NO ADJ
O2 Span ✓ - NO ADJ
O2 Z ✓
O2 ADJ = 15.0%
O2 ADJ: 15.0%
O2 Z ✓
NOx Z ✓ - NO ADJ
NOx LIN ✓ - NO ADJ
20.6 ppm
NOx LIN ✓ - NO ADJ.
41.4 ppm
NOx Span CHECK
81.9 ppm NO ADJ
NOx Z - o CHECK
NOx ADJ: 41.4 ppm
RAC Zero Adj
SWEP1 9/19/90 COALINGA COGEN UNIT A
HRSG101A OUT
NOx = 0 - 100 ppm O2 = 0 - 25%
-10 0 10 20 30 40 50 60 70 80 90 100


START RUN @ 1415
PORT "A-5"
5 CM/HR
NOx ZERO
NOx SPAN ADJ = 81.9 ppm
O2 ZERO ✓
O2 SPAN ADJ = 15.0%
O2 SPAN ✓ = 14.90%
(NO ADJ)
NOx SPAN ✓ = 81.1 ppm
(NO ADJ)
O2 ZERO = 0
NOx ZERO = +0.3 ppm
(NO ADJ)
1140 PORT A3
PORT B3
CHART SPEED = 10 CM/HR
O2 SPAN ADJ = 15.0%
NOx 2 ✓
CHART NO. CL-2172-B
(4971)


O2 = 3.9 %
NOx = 81.9PPM
O2 = 15.00%
LINEARITY CHECK
O2 = 15.0%
NOx = 81.9PPM
O2
NOx
ZERO
INITIAL CAL 9-20-90
O2 EXT = 15.0%
NOx EXT = 77.2 ppm
O2 Span = 15.45%
O2 EXT = 15.1%
NOx Span = 78.5ppm
NOx Zero = +6.9 ppm
O2 Zero = 0
Start Run @ 2 0 1415
Part "A-5"
5 CM/HR
NOx Zero
NOx Span Adj = 81.9 ppm
O2 Zero
O2 Span Adj = 15.0%
CHART NO. CL-2172-B


SWEP1
COALINGA
NRSG 1018 00T
RUN 1
9-20-90
CHART @ 5 CM/HR
CHANGED PORTS
1005
0935
O_2 = 15.0 %
NOx = 41.39 PPM
ZERO
CAL ADJUST
RESPONSE TIME
O_2 = 15.02 %
NOx = 81.8 PPM
O_2 = 0.15 %
O_2 = 15.0 %
EXT (BIAS) CHECK NOx = 81.9 PPM
CAL ADJUST
NOx = 82.2 PPM
NOx = 20.06 PPM
NOx = 41.39 PPM
O_2 = 3.9 %
NOx = 81.9 PPM
O_2 = 15.00 %
LINEARITY CHECK
O_2 = 15.0 %
NOx = 81.9 PPM
ZERO
INITIAL CAL 9-20-90
CHART NO. C1-2172-8


O2 = 14.95%
NOx = 42.2 PPM
EXT (BIAS) CHECK
NOx = 43.2 PPM
O2 = 15.05%
O2 = 0.1
NOx = 0.8
1525
1455
1425
1355
1325
SWEPI COALINGA HRSG 1015 RUN 2 9-20-90 CHART @ 5 CM/HR
(NOx 0-100 PPM)
(O2 0-25 %)
NOx = 41.39 PPM
O2 = 15.0%
O2
NOx
ZERO
CAL ADJUST
NOx = 41.8 PPM
O2 = 15.2%
O2 = 0.6
NOx = 0.2 PPM
1155
1185
1095
(O2 0-25 %)
(NOx 0-100 PPM)
SWEPI COALINGA HRSG 1015 OOT RUN 1 9-20-90 CHART @ 5 CM/HR
CHANGED PORTS 1000F
CHART NO. CL-2172-R
(4971)

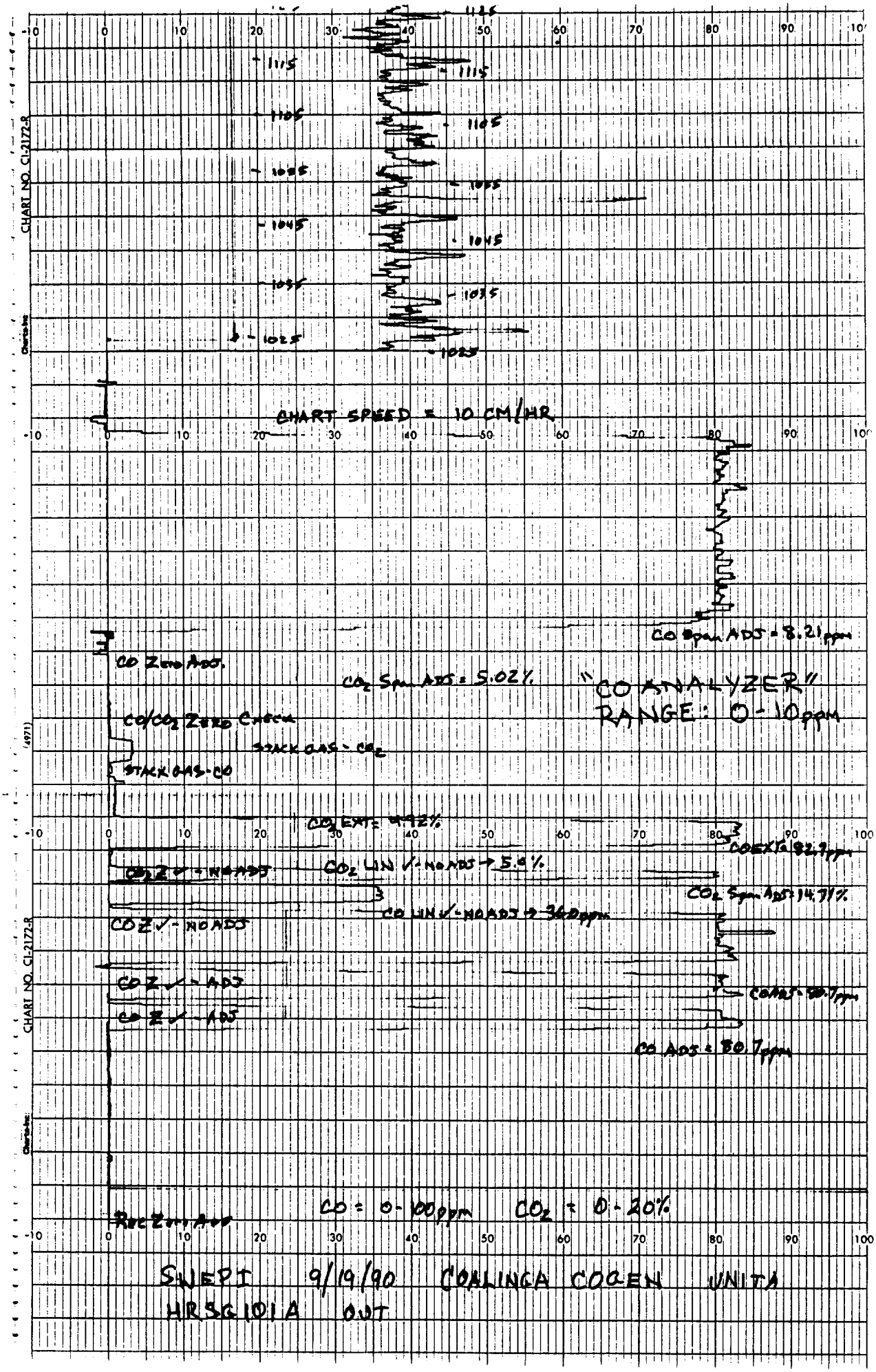
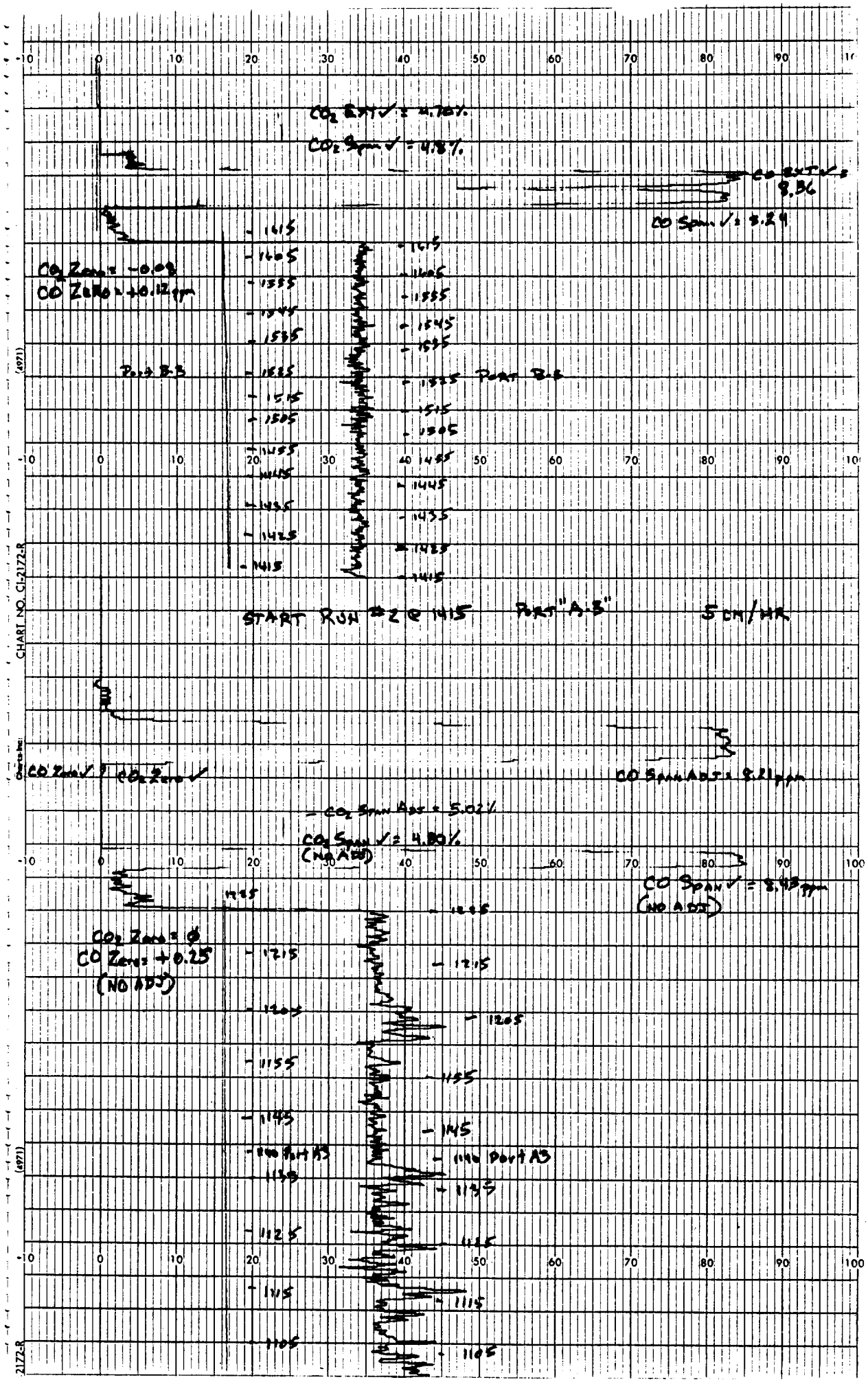
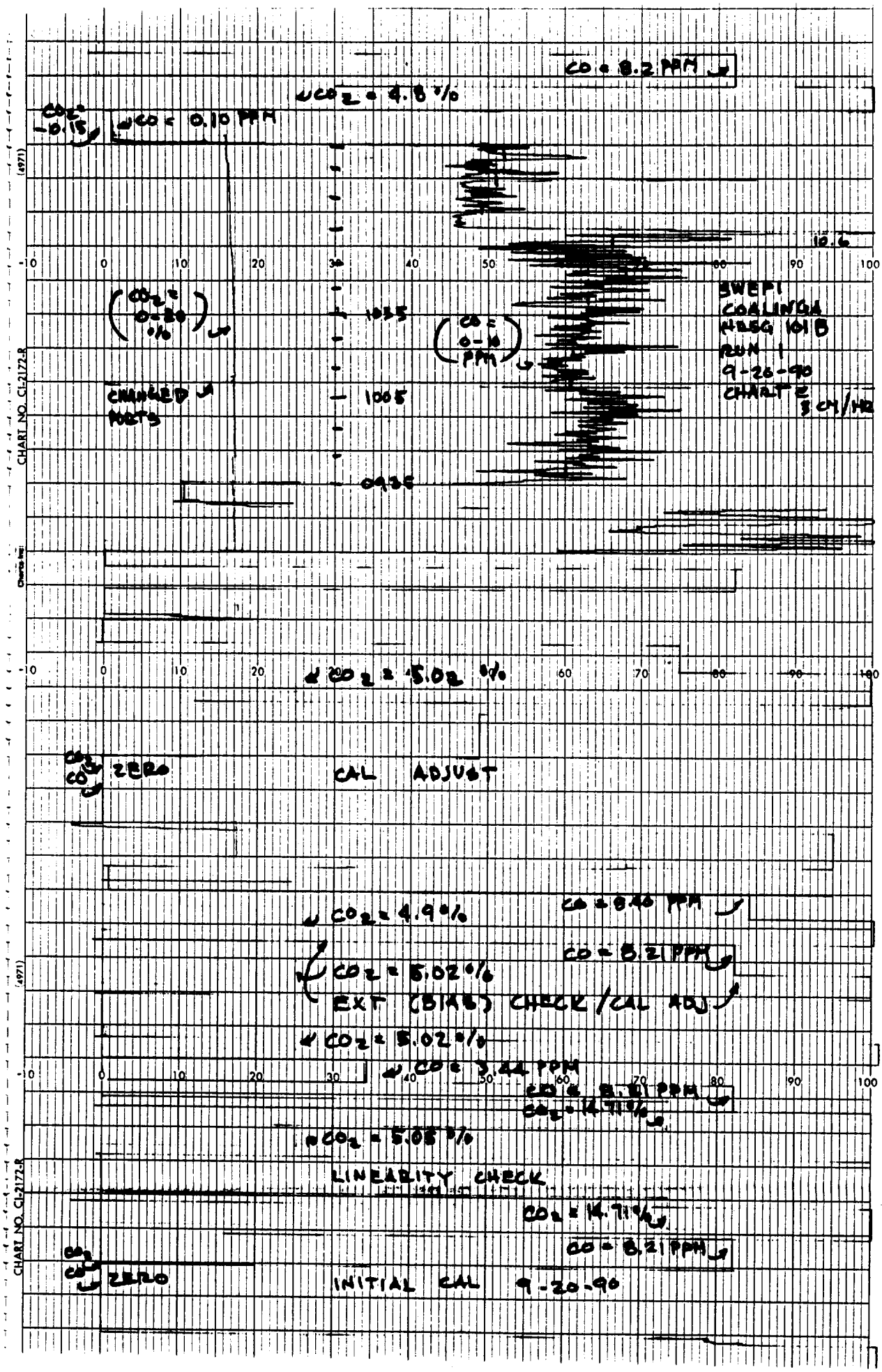
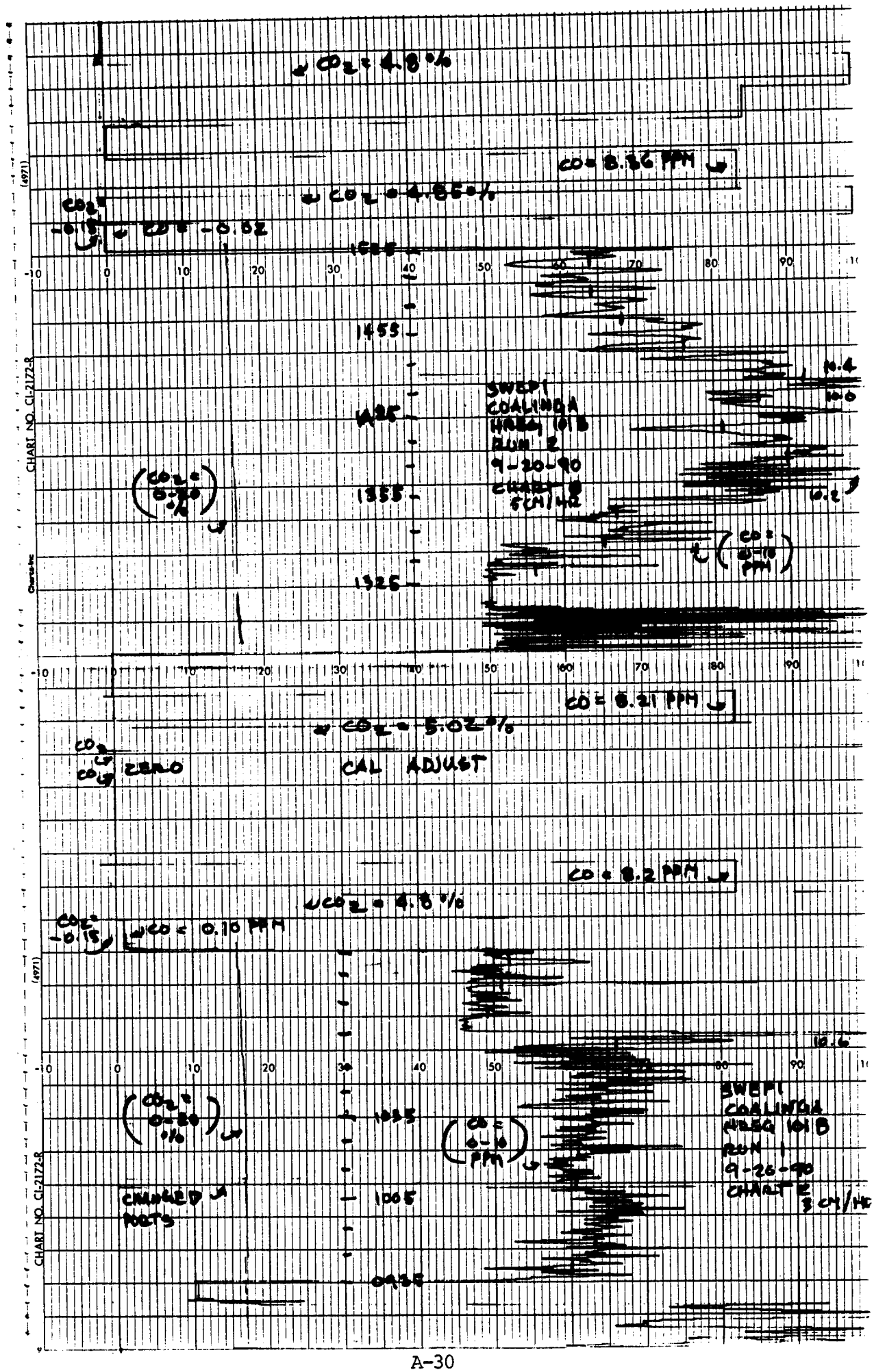


CHART NO. CL-2172-8
CHART SPEED = 10 CM/HR.
CO Span ADJ = 8.21 ppm
CO Zero Adj.
CO2 Span ADJ = 5.02%
"CO ANALYZER"
RANGE: 0-10 ppm
CO/CO2 Zero Check
STACK GAS - CO2
STACK GAS - CO
CO2 EXT = 9.92%
CO EXT = 82.7 ppm
CO2 ✓ - NO ADJ
CO2 LIN ✓ - NO ADJ → 5.6%
CO2 Span ADJ = 14.71%
CO LIN ✓ - NO ADJ → 360 ppm
CO2 ✓ - NO ADJ
CO ADJ = 80.7 ppm
CO2 ✓ - ADJ
CO ✓ - ADJ
Rec Zero Adj
CO = 0-100 ppm
CO2 = 0-20%
SWEPI 9/19/90 COALINGA COGEN UNIT 1
HRSG 101A OUT


CO2 Zero = -0.0%
CO Zero = +0.12 ppm
Port B-3
CO2 Span ✓ = 4.78%
CO Span ✓ = 8.24
CO Span ✓ = 8.36
START RUN #2 @ 1415 Port "A-3" 5 CM/HR
CO Zero ✓
CO2 Zero ✓
CO2 Span Adj = 5.02%
CO2 Span ✓ = 4.80%
(NO ADJ)
CO Span Adj = 8.21 ppm
CO Span ✓ = 8.03 ppm
(NO ADJ)
CO2 Zero = 0
CO Zero = +0.25
(NO ADJ)
Port A3
CHART NO. CI-2172-R
(6971)
2172-R


CO = 8.2 PPM
CO2 = 4.8 %
CO2 = -0.15
CO = 0.10 PPM
10.6
SWEPI
COALINGA
HRSG 101B
RUN 1
9-26-90
CHART 2
CO2 0-20 %
CO 0-10 PPM
CHANGED PORTS
1025
1005
0935
CHART NO. CL-2172-R
CO2 = 5.02 %
CO2 ZERO
CAL ADJUST
CO2 = 4.9 %
CO = 8.40 PPM
CO = 8.2 PPM
CO2 = 5.02 %
EXT (BIAS) CHECK / CAL ADJ
CO2 = 5.02 %
CO = 3.44 PPM
CO = 8.2 PPM
CO2 = 14.71 %
CO2 = 5.05 %
LINEARITY CHECK
CO2 = 14.71 %
CO = 8.21 PPM
CO2 ZERO
INITIAL CAL 9-30-90


CO2 = 4.8 %
CO = 8.36 PPM
CO2 = 4.85 %
CO2 = -0.15
CO = 0.52
1525
1455
1425
1355
1325
SWEEP 1
COALINGA
HRSG 101B
RUN 2
9-20-90
CHART 2
5 CH/HR
10.4
10.0
10.2
CO = 8.21 PPM
CO2 = 5.02 %
CO2 = -0.15
CO2 ZERO
CAL ADJUST
CO = 8.2 PPM
CO2 = 4.8 %
CO = 0.10 PPM
CO2 = -0.15
10.6
1025
1005
0935
SWEEP 1
COALINGA
HRSG 101B
RUN 1
9-26-90
CHART 2
5 CH/HR
CHANGED
PORTS
CHART NO. CI-2172-R
(4971)
Chart-Inc

A. CALIBRATION AND CORRECTION DATA

Company : SWEPI COALINGA
Station : HRSG 101A
Date : 9/19/90
Test Run : 1
Test Condition: COMPL

	Concentration : Drift Uncorrected (A) / Corrected (B)									
	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
Point #										
1	15.03	15.03	3.36	3.37	4.20	4.19			34.80	34.81
2	14.98	14.99	3.34	3.36	3.85	3.82			34.80	34.82
3	14.98	15.00	3.34	3.37	3.80	3.75			35.10	35.14
4	14.95	14.98	3.34	3.38	4.00	3.93			35.20	35.25
5	14.93	14.97	3.32	3.37	3.80	3.71			35.10	35.16
6	14.93	14.98	3.32	3.38	3.85	3.74			35.30	35.38
7	14.90	14.95	3.29	3.36	3.75	3.62			35.10	35.19
8	14.91	14.97	3.28	3.36	3.80	3.65			35.20	35.31
9	14.90	14.97	3.26	3.36	3.61	3.44			35.30	35.42
10	14.85	14.93	3.26	3.37	3.85	3.66			35.40	35.54
11	14.85	14.94	3.26	3.38	3.75	3.54			35.30	35.45
12	14.83	14.93	3.24	3.37	3.62	3.39			35.20	35.37
MEAN		14.97		3.37		3.70				35.24

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.00	0.00	0.25		0.30
Span Check	14.90	4.80	8.43		81.10
Cal. Gas	15.00	5.00	8.21		81.90
Scf	-0.00056	-0.00333	-0.00030		-0.00112
Zcf	0.00000	0.00000	0.02083		0.02500

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings
Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings
Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]
B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

A. CALIBRATION AND CORRECTION DATA

Company : SWEPI COALINGA
Station : HRSG 101A
Date : 9/19/90
Test Run : 2
Test Condition: COMPL

	Concentration : Drift Uncorrected (A) / Corrected (B)									
	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
Point #										
1	14.85	14.83	3.36	3.37	3.38	3.38			35.70	35.75
2	14.75	14.69	3.36	3.38	3.42	3.41			35.70	35.86
3	14.65	14.56	3.34	3.37	3.39	3.37			35.80	36.07
4	14.63	14.50	3.32	3.37	3.42	3.40			35.80	36.17
5	14.60	14.44	3.32	3.38	3.42	3.39			35.80	36.28
6	14.60	14.40	3.32	3.39	3.43	3.39			34.90	35.47
7	14.60	14.37	3.28	3.37	3.42	3.38			32.50	33.12
8	14.60	14.33	3.30	3.40	3.39	3.34			31.00	31.67
9	14.58	14.28	3.27	3.38	3.42	3.36			30.00	30.73
10	14.55	14.21	3.24	3.37	3.40	3.33			29.20	29.98
11	14.55	14.18	3.24	3.38	3.40	3.33			28.80	29.65
12	14.55	14.14	3.22	3.37	3.44	3.36			28.40	29.32
MEAN		14.41		3.38		3.37				33.34

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.00	-0.08	0.12		0.40
Span Check	15.45	4.80	8.24		78.50
Cal. Gas	15.00	5.00	8.21		81.90
Scf	0.00250	-0.00200	-0.00091		-0.00387
Zcf	0.00000	-0.00667	0.01000		0.03333

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings
Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings
Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]
B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

A. CALIBRATION AND CORRECTION DATA

Company : SWEPI COALINGA
Station : HRSG101B
Date : 09/20/90
Test Run : 1
Test Condition: COMPL

	Concentration : Drift Uncorrected (A) / Corrected (B)									
	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
Point #										
1	14.75	14.74	3.35	3.36	6.00	6.00			25.00	24.99
2	14.65	14.63	3.40	3.42	6.30	6.30			24.80	24.76
3	14.60	14.56	3.40	3.44	6.60	6.60			24.80	24.73
4	14.60	14.54	3.40	3.45	6.10	6.09			24.80	24.71
5	14.60	14.53	3.40	3.47	6.10	6.09			24.60	24.48
6	14.50	14.41	3.40	3.48	6.30	6.29			24.60	24.45
7	14.50	14.40	3.40	3.50	6.30	6.29			24.40	24.23
8	14.40	14.28	3.35	3.47	6.80	6.79			24.20	24.00
9	14.35	14.22	3.35	3.48	6.60	6.59			24.20	23.97
10	14.30	14.15	3.30	3.45	4.90	4.87			25.00	24.74
11	14.25	14.09	3.30	3.46	5.10	5.07			25.00	24.72
12	14.25	14.07	3.30	3.48	5.20	5.17			25.00	24.69
MEAN		14.38		3.45		6.01				24.54

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.00	-0.15	0.10		0.20
Span Check	15.20	4.80	8.20		41.80
Cal. Gas	15.00	5.00	8.21		41.39
Scf	0.00111	-0.00083	-0.00112		0.00042
Zcf	0.00000	-0.01250	0.00833		0.01667

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings
Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings
Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]
B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

A. CALIBRATION AND CORRECTION DATA

Company : SWEPI COALINGA
Station : HRSG101B

Date : 09/20/90
Test Run : 2
Test Condition: COMPL

	Concentration : Drift Uncorrected (A) / Corrected (B)									
	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
Point #										
1	14.50	14.50	3.35		5.60	5.60			25.40	25.34
2	14.50	14.49	3.30		6.55	6.54			24.60	24.43
3	14.45	14.44	3.30		6.70	6.68			24.00	23.71
4	14.50	14.48	3.25		8.50	8.45			23.00	22.61
5	14.50	14.48	3.20		9.00	8.94			23.00	22.49
6	14.45	14.43	3.20		8.10	8.03			23.00	22.38
7	14.45	14.42	3.20		8.60	8.52			23.40	22.67
8	14.40	14.37	3.20		9.20	9.09			23.60	22.75
9	14.40	14.36	3.20		7.65	7.55			24.00	23.04
10	14.60	14.56	3.20		6.80	6.71			24.60	23.51
11	14.60	14.55	3.20		6.40	6.30			25.00	23.79
12	14.60	14.55	3.20		6.40	6.29			25.00	23.68
MEAN		14.47	3.23			7.39				23.37

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.10	-0.15	-0.02		0.80
Span Check	15.05	4.85	8.36		43.20
Cal. Gas	15.00	5.00	8.21		41.39
Scf	-0.00028		0.00173		0.00203
Zcf	0.00833		-0.00167		0.06667

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings
Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings
Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]
B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

B. ZERO AND SPAN DRIFT PERCENT CALCULATIONS

Company : SWEPI COALINGA Date : 9/19/90

Station : HRSG 101A

Run 1	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	15.00	5.00	8.21		81.90
Measured Span	14.90	4.80	8.43		81.10
Zero Drift	0.00	0.00	0.25		0.30
Final, Actual Span	14.90	4.80	8.18		80.80
Percent Drift	-0.7	-4.0	-0.4		-1.3

Run 2	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	15.00	5.00	8.21		81.90
Measured Span	15.45	4.80	8.24		78.50
Zero Drift	0.00	-0.08	0.12		0.40
Final, Actual Span	15.45	4.88	8.12		78.10
Percent Drift	3.0	-2.4	-1.1		-4.6

Run	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span					
Measured Span					
Zero Drift					
Final, Actual Span					
Percent Drift					

Final, Actual Span = Measured Span - Zero Drift

Percent Drift = (Final, Actual Span - Initial Span) / Initial Span x 100

B. ZERO AND SPAN DRIFT PERCENT CALCULATIONS

Company : SWEPI COALINGA Date : 09/20/90

Station : HRSG101B

Run 1	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	15.00	5.00	8.21		41.39
Measured Span	15.20	4.80	8.20		41.80
Zero Drift	0.00	-0.15	0.10		0.20
Final, Actual Span	15.20	4.95	8.10		41.60
Percent Drift	1.3	-1.0	-1.3		0.5

Run 2	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	15.00	5.00	8.21		41.39
Measured Span	15.05	4.85	8.36		43.20
Zero Drift	0.10	-0.15	-0.02		0.80
Final, Actual Span	14.95	5.00	8.38		42.40
Percent Drift	-0.3	0.0	2.1		2.4

Run	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span					
Measured Span					
Zero Drift					
Final, Actual Span					
Percent Drift					

Final, Actual Span = Measured Span - Zero Drift

Percent Drift = (Final, Actual Span - Initial Span) / Initial Span x 100

Pape & Steiner Environmental Services

SAMPLE HANDLING/LOG-IN

Date 9/19/90 Test Location SWEPI Coalinga 101A

	Sample Type	Volume	Comments
1.	24751 5/8 (Meth) FHW (Sample) #1 (Test)		
2.	24752 5/8 (Meth) FLT (Sample) #1 (Test)		
3.	24753 5/8 (Meth) 80% IPA (Sample) #1 (Test)		
4.	24754 5/8 (Meth) AMF (Sample) #1 (Test)		
5.	24755 5/8 (Meth) H_2O_2 (Sample) #1 (Test)		
6.	24756 5/8 (Meth) FHW (Sample) #2 (Test)		
7.	24757 5/8 (Meth) MF (Sample) #2 (Test)		
8.	24758 5/8 (Meth) IPA (Sample) #2 (Test)		
9.	24759 5/8 (Meth) AMF (Sample) #2 (Test)		
10.	24760 5/8 (Meth) H_2O_2 (Sample) #2 (Test)		
11.	24763 GC (Meth) HC (Sample) 1 (Test)		
12.	24764 GC (Meth) HC (Sample) 2 (Test)		

CHAIN OF CUSTODY

VM

KW. + YC

Pape & Steiner Environmental Services

SAMPLE HANDLING/LOG-IN

Date 9/20/90 Test Location SWEPI Coalinga 101 B

	Sample Type	Volume	Comments
1.	24765 5/6 (Meth) FHW (Sample) 1 (Test)		
2.	24766 5/6 (Meth) MF (Sample) 1 (Test)		
3.	24767 5/6 (Meth) IPA (Sample) 1 (Test)		
4.	24768 5/8 (Meth) AMF (Sample) 1 (Test)		
5.	24769 5/8 (Meth) H_2O_2 (Sample) 1 (Test)		
6.	24770 GC (Meth) HC (Sample) 1 (Test)		
7.	24771 5/8 (Meth) FHW (Sample) 2 (Test)		
8.	24772 5/8 (Meth) MF (Sample) 2 (Test)		
9.	24773 5/8 (Meth) IPA (Sample) 2 (Test)		
10.	24774 5/8 (Meth) AMF (Sample) 2 (Test)		
11.	24775 5/8 (Meth) H_2O_2 (Sample) 2 (Test)		
12.	24776 GC (Meth) HC (Sample) 2 (Test)		

CHAIN OF CUSTODY

VM

LW & YC

Pape & Steiner Environmental Services

SAMPLE HANDLING/LOG-IN

Date 9-20-90 Test Location SWEPI Coalinga 101A, 101B

	Sample Type	Volume	Comments
1.	24777 Meth H2S Sample All Test		
2.	24778 Meth ~~Sample~~ H2S All Test		
3.	24245 Meth 5/8 ~~Sample~~ FHW All Test		
4.	24246 Meth 5/8 ~~Sample~~ MF All Test		
5.	24247 Meth 5/8 ~~Sample~~ IPA All Test		
6.	24248 Meth 5/8 ~~Sample~~ AMF All Test		
7.	24249 Meth 5/8 ~~Sample~~ H2O2 All Test		
8.			
9.			
10.			
11.			
12.			

CHAIN OF CUSTODY

VM

LW & YC

Pape & Steiner Environmental Services

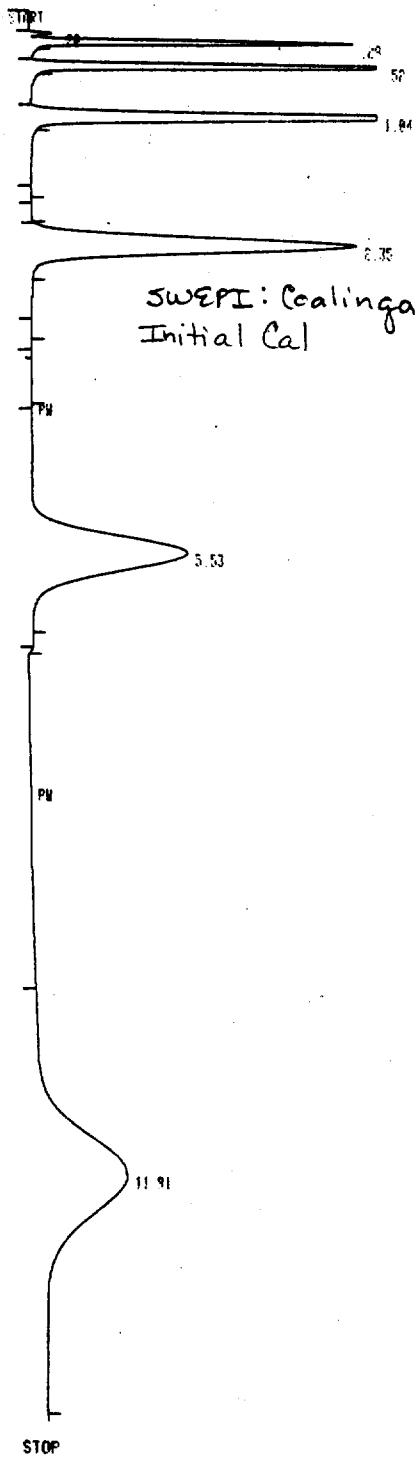
SAMPLE HANDLING/LOG-IN

Date 9/19-20/90 Test Location SWEDI Coalinga
101A, 101B

	Sample Type	Volume	Comments
1.	24761 Meth F.G. Sample All Test		
2.	24762 Meth FG Sample All Test		
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

CHAIN OF CUSTODY

VM



SWEPI: Coalinga 9/19-20/90
Initial Cal

Initial Cal → calibrated

RUN # 1 SEP/21/90 07:55:09

ESTD

RT	AREA	TYPE	CAL#	AMOUNT
0.20	254	PV	2	1.000
0.29	4611	VB	IR	21.190
0.52	9505	PB		43.680
1.04	14890	PB		68.427
2.35	20344	BB		93.491
5.53	23186	BB		106.550
11.91	30515	PB		140.230

TOTAL AREA= 103310
MUL FACTOR= 1.0000E+00

Initial Cal → % Area

RUN # 1 SEP/21/90 07:55:09

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.20	254	PV	0.033	0.246
0.29	4611	VB	0.042	4.464
0.52	9505	PB	0.045	9.201
1.04	14890	PB	0.080	14.414
2.35	20344	BB	0.180	19.693
5.53	23186	BB	0.431	22.444
11.91	30515	PB	1.019	29.539

TOTAL AREA= 103310
MUL FACTOR= 1.0000E+00

SWEPI: Coalinga
9/19/90
Unit 101A
Test 1a

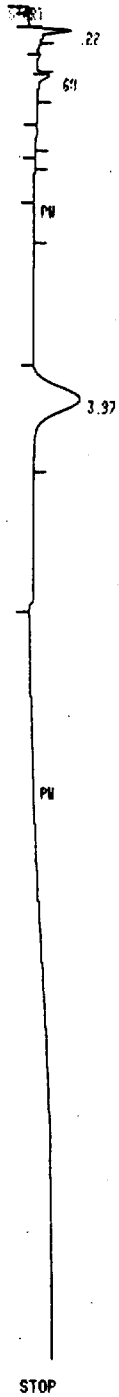
STOP

RUN # 15 SEP/21/90 13:48:17
ID 24763-1a

ESTD

RT	AREA	TYPE	CAL#	AMOUNT
0.18	722	PV	2	2.843
0.64	381	BB		1.751 } > C_i
3.93	5040	PB		23.161 }

TOTAL AREA= 6143
MUL FACTOR= 1 [illegible]



SWEPI: Coalinga
9/19/90
Unit 101A
Test 1b
(duplicate)

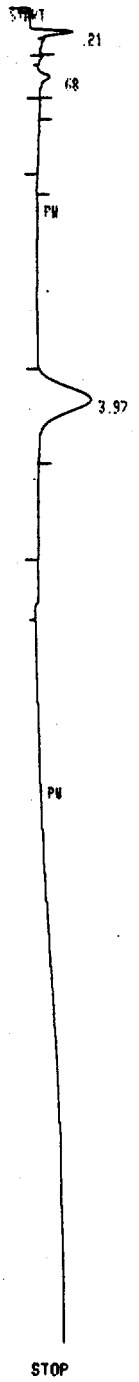
STOP

RUN # 16 SEP/21/90 14:11:56
ID 24763-1b
NO CALIB PEAKS FOUND

AREA%

RT	AREA	TYPE	AR/HT	AREA%	PPM
0.22	784	PB	0.057	13.028	8.685
0.68	169	BB	0.049	2.808	0.777
3.97	5065	BB	0.310	84.164	28.276

TOTAL AREA= 6018
MUL FACTOR= 1 [illegible]



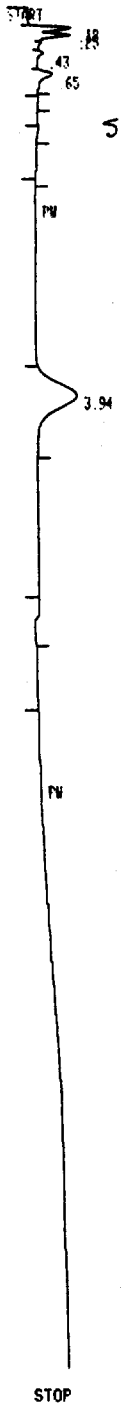
SWEPI: Coalinga
9/19/90
Unit 101A
Test 2

RUN # 17 SEP/21/90 14:35:39
ID 24764-2

ESTD

RT	AREA	TYPE	CAL#	AMOUNT
0.21	522	PV	2	2.055
0.68	326	PB		1.498 } >C1
3.97	5665	BB		26.033 }

TOTAL AREA= 6513
MUL FACTOR= 1.0000E+00



SWEPI: Coalinga
9/20/90
Unit 101B
Test 1b
(duplicate)

RUN # 19 SEP/21/90 15:25:51
ID 24770-1b

ESTD

RT	AREA	TYPE	CAL#	AMOUNT	
0.18	686	BV	2	2.701	
0.25	787	VV	1R	3.249	C_1
0.43	363	VV		1.668	
0.65	544	VB		2.580	$> C_1$
3.94	4292	BB		19.724	

TOTAL AREA= 6592
MUL FACTOR= 1.0000E+00

SWEPI: Coalinga
9/20/90
Unit 101B
Test 1a

RUN # 18 SEP/21/90 14:59:46
ID 24770-1a

ESTD

RT	AREA	TYPE	CAL#	AMOUNT	
0.21	644	PV	2	2.535	
0.29	578	VB	1R	2.656	C_1
0.68	451	PB		2.073	
3.98	4328	BB		19.889	$> C_1$

TOTAL AREA= 6981
MUL FACTOR= 1.0000E+00

SWEPI: Coalinga
Unit 101B
9/20/90
Test 2

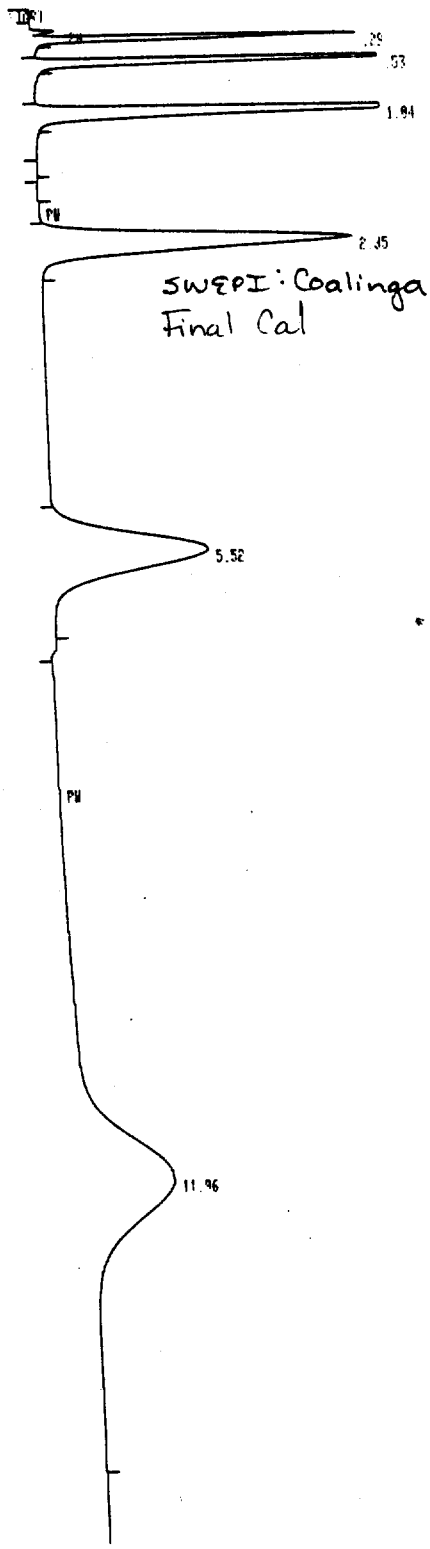
RUN # 20 SEP/21/90 15:49:43
ID 24776-2

ESTD

RT	AREA	TYPE	CAL#	AMOUNT	
0.21	623	PV	2	2.453	
0.28	512	VB	IR	2.353	C_1
0.67	443	BB		2.036	} $>C_1$
3.97	3396	BB		15.686	

TOTAL AREA= 4974
MUL FACTOR= 1 [illegible]

DELETE ID



SWEPI: Coalinga 9119-20/90
Final Cal

Final Cal

RUN # 21 SEP/21/90 16:18:58

ESTD RT	AREA	TYPE	CAL#	AMOUNT
0.20	198	PV	2	0.700
0.29	4603	VB	IR	21.153
0.53	9600	PB		44.117
1.04	15086	PB		69.328
2.35	20244	BB		93.031
5.52	23258	BB		106.880
11.96	28882	PD		132.730

TOTAL AREA= 101870

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :FHW ANALYSIS (g) DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :ACETONE ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101A, 9/19/90
ANALYTICAL METHOD :GRAVIMETRIC

	Test No.	Sample Volume (ml)		Analytical Result (total sample) Uncorrected	Blank Corr. (g)
	1	140		0.01395	0.01342
	2	160		0.00990	0.00929
	Blank	100		0.00038	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :FILTERABLE PARTICULATE DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :100 mm FILTER ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101A, 9/19/90
ANALYTICAL METHOD :GRAVIMETRIC

	Test No.	Filter No.		Analytical Result (total sample) Uncorrected	Blank Corr. (g)
	1	77		-0.00122	-0.00104
	2	78		-0.00102	-0.00084
	Blank	116		-0.00018	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :CONDENSIBLE PARTICULATE DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :80% IPA + Amf ANALYST :
REQUESTED BY :SWEPI COALINGA, 101A, 9/19/90
ANALYTICAL METHOD :GRAVIMETRIC

	Test No.	Sample Volume		Analytical Result (total sample) Uncorrected	Blank Corr. (g)
	1	350		0.00951	0.00834
	2	270		0.00319	0.00207
IPA	Blank	100		0.00006	
AMF	Blank	100		0.00087	
DI	Blank	100		-0.00009	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :FILTERABLE SO4 DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :FHW + MF ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101A, 9/19/90
ANALYTICAL METHOD :BaCl2 Titration

	Test No.	Sample Volume	Sample Aliquot	TITER mls or (Absorbance)	Analyt. Result (total sample) mg H2SO4
	1	100	10	0.30	0.37
	2	100	10	0.29	0.33
	Blank	100	10	0.22	1.03

% Duplicate = 100.0 RUN NO. 1

% Recovery = 99.2 RUN NO. 2

% CONFIDENCE = 100.1 EPA SO2 LOT 0586 6XXX
NORMALITY = 0.009560229

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :CONDENSIBLE SULFATE DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :BHW + AMF ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101A, 9/19/90
ANALYTICAL METHOD :BaCL2 Titration

	Test No.	Sample Volume	Sample Aliquot	TITER mls or (Absorbance)	Analyt. Result (total sample) mg H2SO4
	1	100	10	0.16	0.47
	2	100	10	0.27	0.98
IPA	Blank	100	10	0.06	0.28
AMF	Blank	100	10	0.05	0.23
DI	Blank	100	10	0.05	0.23

% Duplicate = 100.0 RUN NO. 1

% Recovery = 99.8 RUN NO. 2
% CONFIDENCE = 100.1 EPA SO2 LOT 0586 6XXX
NORMALITY = 0.009560229

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :SO2 DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :3% H2O2 ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101A, 9/19/90
ANALYTICAL METHOD :BaCL2 Titration

Test No.	Sample Volume	Sample Aliquot	TITER mls or (Absorbance)	Analyt. Result (total sample) mg H2SO4
1	360	10	0.17	2.88
2	290	10	0.16	2.18
Blank			0.00	0.00

% Duplicate = 100.0 RUN NO. 1

% Recovery = 98.2 RUN NO. 2

% CONFIDENCE = 100.1 EPA SO2 LOT 0586 6XXX
NORMALITY = 0.009606148

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :FHW ANALYSIS (g) DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :ACETONE ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101B, 9/20/90
ANALYTICAL METHOD :GRAVIMETRIC

Test No.	Sample Volume (ml)	Analytical Result (total sample) Uncorrected	Blank Corr. (g)
1	150	0.00881	0.00824
2	200	0.00639	0.00563
Blank	100	0.00038	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :FILTERABLE PARTICULATE DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :100 mm FILTER ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101B, 9/20/90
ANALYTICAL METHOD :GRAVIMETRIC

Test No.	Filter No.	Analytical Result (total sample) Uncorrected	Blank Corr. (g)
1	79	-0.00078	-0.00060
2	80	-0.00044	-0.00026
Blank	116	-0.00018	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :CONDENSIBLE PARTICULATE DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :80% IPA + Amf ANALYST :
REQUESTED BY :SWEPI COALINGA, 101B, 9/20/90
ANALYTICAL METHOD :GRAVIMETRIC

	Test No.	Sample Volume		Analytical Result (total sample) Uncorrected	Blank Corr. (g)
	1	300		0.00201	0.00087
	2	290		0.00308	0.00195
IPA	Blank	100		0.00006	
AMF	Blank	100		0.00087	
DI	Blank	100		-0.00009	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :FILTERABLE SO4 DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :FHW + MF ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101B, 9/20/90
ANALYTICAL METHOD :BaCl2 Titration

	Test No.	Sample Volume	Sample Aliquot	TITER mls or (Absorbance)	Analyt. Result (total sample) mg H2SO4
	1	100	10	0.26	0.19
	2	100	10	0.25	0.14
	Blank	100	10	0.22	1.03

% Duplicate = 100.0 RUN NO. 1

% Recovery = 100.0 RUN NO. 2

% CONFIDENCE = 100.1 EPA SO2 LOT 0586 6XXX
NORMALITY = 0.009560229

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :CONDENSIBLE SULFATE DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :BHW + AMF ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101B, 9/20/90
ANALYTICAL METHOD :BaCL2 Titration

	Test No.	Sample Volume	Sample Aliquot	TITER mls or (Absorbance)	Analyt. Result (total sample) mg H2SO4
	1	100	10	0.15	0.42
	2	100	10	0.21	0.70
IPA	Blank	100	10	0.06	0.28
AMF	Blank	100	10	0.05	0.23
DI	Blank	100	10	0.05	0.23

% Duplicate = 100.0 RUN NO. 1

% Recovery = 99.8 RUN NO. 2
% CONFIDENCE = 100.1 EPA SO2 LOT 0586 6XXX
NORMALITY = 0.009560229

A N A L Y T I C A L R E P O R T

SAMPLE TYPE :SO2 DATE : 9/28/90
SAMPLING METHOD :M5/8
SAMPLE COMPONENT :3% H2O2 ANALYST : LW & YC
REQUESTED BY :SWEPI COALINGA, 101B, 9/20/90
ANALYTICAL METHOD :BaCL2 Titration

	Test No.	Sample Volume	Sample Aliquot	TITER mls or (Absorbance)	Analyt. Result (total sample) mg H2SO4
	1	340	10	0.16	2.56
	2	300	10	0.16	2.26
	Blank			0.00	0.00

% Duplicate = 100.0 RUN NO. 1

% Recovery = 100.7 RUN NO. 2

% CONFIDENCE = 100.1 EPA SO2 LOT 0586 6XXX
NORMALITY = 0.009606148

Pape & Steiner Environmental Services

ANALYTICAL REPORT

SAMPLE TYPE Method 11 H_2S DATE 9/26/90

SAMPLE COMPONENT $CdSO_4$ Abs. Solution ANALYST JW.

REQUESTED BY SWEPI: Coalinga 9/19-20/90

ANALYTICAL METHOD H_2S : I_2 Addition w/ $Na_2S_2O_3$ titration

Sample ID No.	Test No.	Sample Volume	ml I_2 Added	Titer mls	Sample Color	Normality of Iodine
	1	95	35	1.80	very pale yellow	$\frac{(2.225)(.01)}{25} = .00089$
	B1	95	35	2.50	clear	

SOURCE TEST CALCULATIONS

PLANT : SWEPI COALINGA
HRSG 101A

RUN NO.: 1
DATE : SEPT 19,1990

STANDARD TEMP.: 60 DEG. F

METER TEMP.	=	98.38 DEG. F	STATIC PRESS.	=	-0.30 in. H2O
STACK TEMP.	=	242.89 DEG. F	Cp	=	0.840
SQ.RT. dP	=	0.6136 in. H2O	STACK I.D.	=	inch
METER ORIFICE	=	2.26 in. H2O	DUCT LENGTH	=	47.5 inch
METER VOLUME	=	122.866 Cu.Ft.	DUCT WIDTH	=	47.5 inch
METER Y	=	1.0132	STACK AREA	=	15.668 Sq.Ft.
BAR. PRESSURE	=	28.59 in.Hg	TEST TIME	=	140.00 min.
COND.(Vlc)	=	226.0 ml	NOZZLE DIA.	=	0.3020 inch

GAS ANALYSIS = 14.97 % O2 0.00 % CO
3.37 % CO2 81.66 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 111.422 dscf

Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic = 10.477 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.086 | Lower Bws value used.

Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.) ..... = 1.000

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 227.22

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 29.14

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.18

P(stack) = Pbar + [Pstatic / 13.6] ..... = 28.57 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)] ..... = 41.17 ft/sec

Qs = vs x As x 60 ..... = 38,707 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92) ..... = 24,991 dscf/min

I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60) = 100.31 %

SOURCE TEST CALCULATIONS

PLANT : SWEPI COALINGA
HRSG 101A

RUN NO.: 2
DATE : SEPT 19,1990

STANDARD TEMP.: 60 DEG. F

METER TEMP.	=	107.02 DEG. F	STATIC PRESS.	=	-0.30 in. H2O
STACK TEMP.	=	241.39 DEG. F	Cp	=	0.840
SQ.RT. dP	=	0.6174 in. H2O	STACK I.D.	=	inch
METER ORIFICE	=	2.33 in. H2O	DUCT LENGTH	=	47.5 inch
METER VOLUME	=	125.674 Cu.Ft.	DUCT WIDTH	=	47.5 inch
METER Y	=	1.0132	STACK AREA	=	15.668 Sq.Ft.
BAR. PRESSURE	=	28.51 in.Hg	TEST TIME	=	140.00 min.
COND.(Vlc)	=	231.3 ml	NOZZLE DIA.	=	0.3020 inch

GAS ANALYSIS : 14.41 % O2 0.00 % CO
3.38 % CO2 82.21 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 111.939 dscf

Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic = 10.722 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.087 | Lower Bws value used.

Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.) ..... = 1.000

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 197.57

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 29.12

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.15

P(stack) = Pbar + [Pstatic / 13.6] ..... = 28.49 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)] ..... = 41.47 ft/sec

Qs = vs x As x 60 ..... = 38,984 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92) ..... = 25,113 dscf/min

I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60) = 100.29 %

SOURCE TEST CALCULATIONS

PLANT : SWEPI COALINGA
HRSG101B

RUN NO.: 1
DATE : SEPT 20,1990

STANDARD TEMP.: 60 DEG. F

METER TEMP.	= 105.98 DEG. F		STATIC PRESS.	=	-0.23 in. H2O
STACK TEMP.	= 239.93 DEG. F		Cp	=	0.840
SQ.RT. dP	= 0.6155 in. H2O		STACK I.D.	=	inch
METER ORIFICE	= 2.31 in. H2O		DUCT LENGTH	=	47.5 inch
METER VOLUME	= 124.804 Cu.Ft.		DUCT WIDTH	=	47.5 inch
METER Y	= 1.0132		STACK AREA	=	15.668 Sq.Ft.
BAR. PRESSURE	= 28.49 in.Hg		TEST TIME	=	140.00 min.
COND.(Vlc)	= 236.9 ml		NOZZLE DIA.	=	0.3020 inch

GAS ANALYSIS = 14.38 % O2 0.00 % CO
3.45 % CO2 82.17 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 111.285 dscf

Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic = 10.982 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.090 | Lower Bws value used.

Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.) ..... = 1.000

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 196.64

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 29.13

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.13

P(stack) = Pbar + [Pstatic / 13.6] ..... = 28.47 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)] ..... = 41.32 ft/sec

Qs = vs x As x 60 ..... = 38,846 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92) ..... = 24,997 dscf/min

I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60) = 100.17 %

SOURCE TEST CALCULATIONS

PLANT : SWEPI COALINGA
HRSG101B

RUN NO.: 2
DATE : SEPT 20,1990

STANDARD TEMP.: 60 DEG. F

METER TEMP.	=	112.07 DEG. F	STATIC PRESS.	=	-0.35 in. H2O
STACK TEMP.	=	235.82 DEG. F	Cp	=	0.840
SQ.RT. dP	=	0.6158 in. H2O	STACK I.D.	=	inch
METER ORIFICE	=	2.35 in. H2O	DUCT LENGTH	=	47.5 inch
METER VOLUME	=	126.311 Cu.Ft.	DUCT WIDTH	=	47.5 inch
METER Y	=	1.0132	STACK AREA	=	15.668 Sq.Ft.
BAR. PRESSURE	=	28.47 in.Hg	TEST TIME	=	140.00 min.
COND.(Vlc)	=	242.5 ml	NOZZLE DIA.	=	0.3020 inch

GAS ANALYSIS : 14.47 % O2 0.00 % CO
3.23 % CO2 82.30 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460).....	=	111.364	dscf
Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic	=	11.242	scf
Bws = Vw(std) / (Vm(std) + Vw(std)).....	=	0.092	Lower Bws value used.
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.)	=	1.000	
%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100	=	199.39	
Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)]	=	29.10	
Ms = (Md x (1-Bws)) + (18.0 x Bws).....	=	28.08	
P(stack) = Pbar + [Pstatic / 13.6]	=	28.44	in. Hg
vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)]	=	41.28	ft/sec
Qs = vs x As x 60	=	38,804	acf/min
Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92)	=	25,041	dscf/min
I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60)	=	100.06	%

EMISSION RATE CALCULATIONS

PLANT : SWEPI COALINGA
HRSG 101A

RUN NO.: 1
DATE : SEPT 19,1990
O2 CORR.: 15.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.01342 grams	Vm(std)	111.422 ft3
Mass Filter (MF)	0.00000 grams	Vw(std)	10.477 ft3
Back Half Wash (BHW)	0.00834 grams	Qs(std)	24,991 dscfm
Front Half Sulfate (FHS)	0.37 mg H2SO4	Bws	0.086
Back Half Sulfate (BHS)	0.47 mg H2SO4	CO2	3.37 %
H2O2 Catch (SO2)	2.88 mg H2SO4	O2	14.97 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8480.67 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0017 gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0019 gr/dscf
gr/dscf x (12 / %CO2)	0.0066 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.40 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0079 lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0028 gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0030 gr/dscf
gr/dscf x (12 / %CO2)	0.0107 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.65 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0129 lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0001 gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0001 gr/dscf
gr/dscf x (12 / %CO2)	0.0004 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.02 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0005 lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	0.22 ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	0.22 @ O2 corr.
ppm x (1 - Bws)	0.20 ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	0.06 lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0011 lb/MMBtu
lb/hr / (dscfm x 60 min/hr)	3.72E-08 lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0006 lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0002 lb/MMBtu
Total Sulfur	0.0007 lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT :SWEPI COALINGA
HRSG 101A

RUN NO.: 2
DATE : SEPT 19,1990
O2 CORR.: 15.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.00929 grams	Vm(std)	111.939 ft3
Mass Filter (MF)	0.00000 grams	Vw(std)	10.722 ft3
Back Half Wash (BHW)	0.00207 grams	Qs(std)	25,113 dscfm
Front Half Sulfate (FHS)	0.33 mg H2SO4	Bws	0.087
Back Half Sulfate (BHS)	0.98 mg H2SO4	CO2	3.38 %
H2O2 Catch (SO2)	2.18 mg H2SO4	O2	14.41 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8480.67 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0012 gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0013 gr/dscf
gr/dscf x (12 / %CO2)	0.0045 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.28 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0050 lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0014 gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0016 gr/dscf
gr/dscf x (12 / %CO2)	0.0056 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.34 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0061 lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0002 gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0002 gr/dscf
gr/dscf x (12 / %CO2)	0.0006 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.04 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0007 lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	0.17 ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	0.15 @ O2 corr.
ppm x (1 - Bws)	0.15 ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	0.04 lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0008 lb/MMBtu
lb/hr / (dscfm x 60 min/hr) 2.81E-08	lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0004 lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0002 lb/MMBtu
Total Sulfur	0.0006 lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT :SWEPI COALINGA
HRSG101B

RUN NO.: 1
DATE : SEPT 20,1990
O2 CORR.: 15.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.00824 grams	Vm(std)	111.285 ft3
Mass Filter (MF)	0.00000 grams	Vw(std)	10.982 ft3
Back Half Wash (BHW)	0.00087 grams	Qs(std)	24,997 dscfm
Front Half Sulfate (FHS)	0.19 mg H2SO4	Bws	0.090
Back Half Sulfate (BHS)	0.42 mg H2SO4	CO2	3.45 %
H2O2 Catch (SO2)	2.56 mg H2SO4	O2	14.38 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8470.27 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0010 gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0011 gr/dscf
gr/dscf x (12 / %CO2)	0.0040 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.24 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0044 lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0011 gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0013 gr/dscf
gr/dscf x (12 / %CO2)	0.0044 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.27 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0049 lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0001 gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0001 gr/dscf
gr/dscf x (12 / %CO2)	0.0003 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.02 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0003 lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	0.20 ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	0.18 @ O2 corr.
ppm x (1 - Bws)	0.18 ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	0.05 lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0009 lb/MMBtu
lb/hr / (dscfm x 60 min/hr)	3.32E-08 lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0005 lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0001 lb/MMBtu
Total Sulfur	0.0006 lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT :SWEPI COALINGA
HRSG101B

RUN NO.: 2
DATE : SEPT 20,1990
O2 CORR.: 15.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.00563 grams	Vm(std)	111.364 ft3
Mass Filter (MF)	0.00000 grams	Vw(std)	11.242 ft3
Back Half Wash (BHW)	0.00195 grams	Qs(std)	25,041 dscfm
Front Half Sulfate (FHS)	0.14 mg H2SO4	Bws	0.092
Back Half Sulfate (BHS)	0.70 mg H2SO4	CO2	3.23 %
H2O2 Catch (SO2)	2.26 mg H2SO4	O2	14.47 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8470.27 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0007	gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0008	gr/dscf
gr/dscf x (12 / %CO2)	0.0029	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.17	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0031	lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0010	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0011	gr/dscf
gr/dscf x (12 / %CO2)	0.0039	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.23	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0041	lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0001	gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0001	gr/dscf
gr/dscf x (12 / %CO2)	0.0004	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.02	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0005	lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	0.17	ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	0.16	@ O2 corr.
ppm x (1 - Bws)	0.16	ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	0.04	lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0008	lb/MMBtu
lb/hr / (dscfm x 60 min/hr) 2.92E-08		lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0004	lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0001	lb/MMBtu
Total Sulfur	0.0006	lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT : SWEPI COALINGA
SOURCE : HRSG 101A

Temp. Std. : 60 dF
Press. Std.: 29.92 in. Hg. 15 % O2 Correction

Run No.	1	2	AVERAGE
Date	9/19/90	9/19/90	
Oxygen (%)	14.97	14.41	14.69
Qs(std), dscfm	24,991	25,113	25,052
NOx, ppm	35.24	33.34	34.29
SO2, ppm			
CO, ppm	3.70	3.37	3.54
HC, ppm	24.91	27.53	26.22
F-Factor	8480.67	8480.67	8480.67
NOx, MW = 46.005			
NOx, lb/hr	6.41	6.09	6.25
NOx, ppm @ O2	35.06	30.31	32.69
NOx, lb/MMBtu	0.1278	0.1105	0.1191
SO2, MW = 64.058			
SO2, lb/hr			
SO2, ppm @ O2			
SO2, lb/MMBtu			
CO, MW = 28.010			
CO, lb/hr	0.41	0.37	0.39
CO, ppm @ O2	3.69	3.06	3.37
CO, lb/MMBtu	0.0082	0.0068	0.0075
HC, MW = 16.043			
HC, lb/hr	1.58	1.75	1.67
HC, ppm @ O2	24.79	25.03	24.91
HC, lb/MMBtu	0.0315	0.0318	0.0317

* lb/hr = 8.223E-5 x Qs(std) x MW x ppm / (Tstd + 460)

* ppm @ O2 = ppm measured x [(20.9 - O2% correction) / (20.9 - %O2 measured)]

* lb/MMBtu = F-Factor x MW x [1.3711E-6 / (Tstd + 460)] x [20.9 / (20.9 - O2%)] x ppm

* lb/Bbl = (lb/MMBtu) x (MMBtu/Bbl)

EMISSION RATE CALCULATIONS

PLANT : SWEPI COALINGA
SOURCE : HRSG 101B

Temp. Std. : 60 dF
Press. Std.: 29.92 in. Hg. 15 % O2 Correction

Run No.	1	2	AVERAGE
Date	9/20/90	9/20/90	
Oxygen (%)	14.38	14.47	14.43
Qs(std), dscfm	24,997	25,041	25,019
NOx, ppm	24.54	23.37	23.96
SO2, ppm			
CO, ppm	6.01	7.39	6.70
HC, ppm	21.96	17.64	19.80
F-Factor	8470.27	8470.27	8470.27
NOx, MW = 46.005			
NOx, lb/hr	4.46	4.26	4.36
NOx, ppm @ O2	22.21	21.44	21.83
NOx, lb/MMBtu	0.0808	0.0780	0.0794
SO2, MW = 64.058			
SO2, lb/hr			
SO2, ppm @ O2			
SO2, lb/MMBtu			
CO, MW = 28.010			
CO, lb/hr	0.67	0.82	0.74
CO, ppm @ O2	5.44	6.78	6.11
CO, lb/MMBtu	0.0121	0.0150	0.0135
HC, MW = 16.043			
HC, lb/hr	1.39	1.12	1.26
HC, ppm @ O2	19.87	16.19	18.03
HC, lb/MMBtu	0.0252	0.0205	0.0229

* lb/hr = 8.223E-5 x Qs(std) x MW x ppm / (Tstd + 460)

* ppm @ O2 = ppm measured x [(20.9 - O2% correction) / (20.9 - %O2 measured)]

* lb/MMBtu = F-Factor x MW x [1.3711E-6 / (Tstd + 460)] x [20.9 / (20.9 - O2%)] x ppm

* lb/Bbl = (lb/MMBtu) x (MMBtu/Bbl)

E. HYDROCARBON DATA
UNIT 101A

CALIBRATIONS

Methane Calibration gas = 21.19 ppm

	Area Count	ppm	
Initial Cal.	4611	21.19	C1
Final Cal. Check	4603	21.15	C1

% cal. diff. = 0.19
ppm/area count = 4.60E-03

SAMPLES

AREA COUNTS

Run. No.		1	2
HC	C1		
HC	>C1	381	326
	"	5040	5665
	"		
	"		
	"		
Total HC >C1 =		5421	5991

ppm

Run. No.		1	2
HC	C1		
HC	>C1	24.91	27.53
	"	23.16	26.03
	"		
	"		
	"		
Total HC >C1 =		24.91	27.53

lb/hr

Run. No.		1	2
HC	C1		
HC	>C1	0.11	0.10
	"	1.47	1.66
	"		
	"		
	"		
Total HC >C1 =		1.58	1.75

E. HYDROCARBON DATA
UNIT 101B

CALIBRATIONS

Methane Calibration gas = 21.19 ppm

	Area Count	ppm	
Initial Cal.	4611	21.19	C1
Final Cal. Check	4603	21.15	C1

% cal. diff. = 0.19
ppm/area count = 4.60E-03

SAMPLES

	AREA COUNTS		ppm	
Run. No.	1	2	1	2
HC C1	578	512		
HC >C1 ¦	451	443	2.07	2.04
" ¦	4328	3396	19.89	15.61
" ¦				
" ¦				
" ¦				
Total HC >C1 =	4779	3839	21.96	17.64

lb/hr

Run. No.	1	2
HC C1		
HC >C1 ¦	0.13	0.13
" ¦	1.26	0.99
" ¦		
" ¦		
" ¦		
Total HC >C1 =	1.39	1.12

H_2S CALCULATIONS AT S_t

(Standard Temperature to be defined)

$$V_{m,std} = \frac{S_t}{29.92}(\gamma)(Vm)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$$

$$\text{Blank } CdSO_4 = [N_{I_2}(\text{mls } I_2) - N_{Na_2S_2O_3}(\text{mls } Na_2S_2O_3)]$$

$$\text{ppm } H_2S = \frac{0.8039(St + 460)\left([N_{I_2}(\text{mls } I_2) - (N_{Na_2S_2O_3})(\text{mls } Na_2S_2O_3)] - \text{Blank}\right)}{V_{m,std}}$$

$$V_{m,std} = \frac{(60 + 460)}{29.92}\ (0.9875)(32.331)\left(\frac{28.49 + \frac{0}{13.6}}{94.56 + 460}\right)$$

$$= 28.5064$$

$$\text{Blank } CdSO_4 = [\,0.00089\ (\,35.00\,) - 0.0100\,(\,2.50\,)]$$

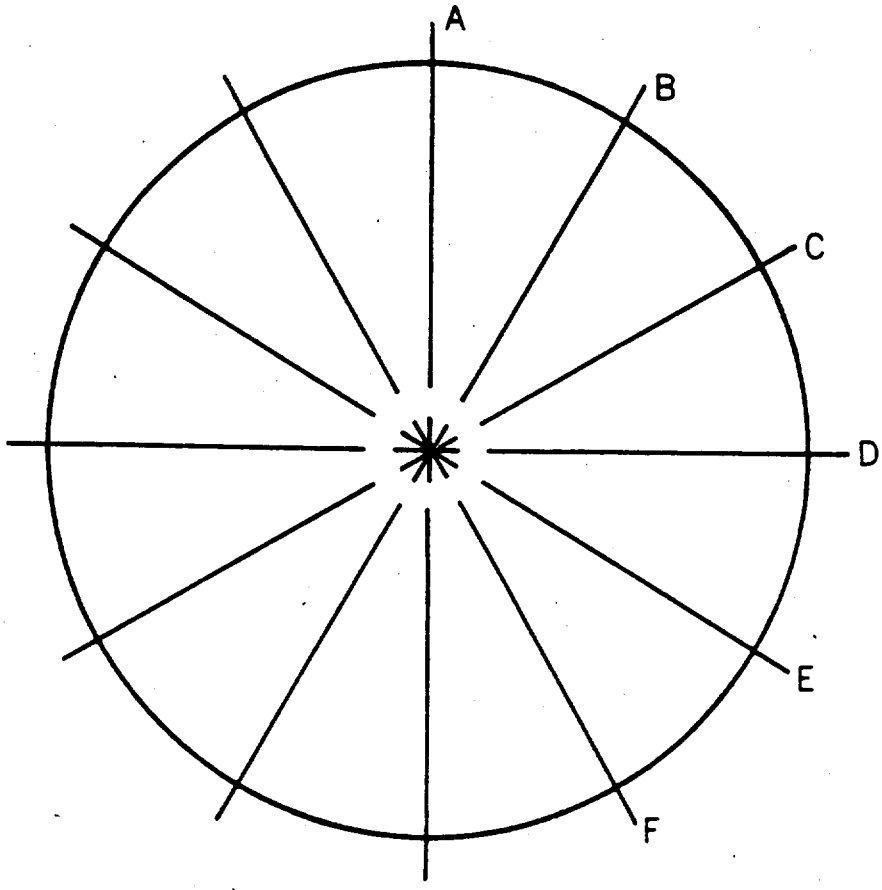
$$= 0.0062$$

$$\text{ppm } H_2S = \frac{0.8039(60 + 460)\left([0.00089\ (\,35.00\,) - 0.0100\,(\,1.80\,)] - 0.0062\right)}{28.5064}$$

$$= 0.10$$

Pape & Steiner Environmental Services

NOZZLE CALIBRATION DATA



DIAMETER (in.)

A 0.3015

B 0.3000

C 0.3041

D 0.3025

E _____

F _____

AVG. 0.3020

DATE 7-27-89

NOZZLE NO. 270

OPERATOR SM

DRY GAS METER / ORIFICE METER CALIBRATION DATA

Date 8/16/90
Bar. Press, in.Hg 29.69
Meter Box No. ... 644

Dry Gas Meter No. ... 1008455
Standard Test Meter # 69279
Operator ..... TD

STANDARD TEST METER			DRY TEST METER				
Press. dHs (in. H2O)	Temp. Ts (dF)	Volume Vs (ft3)	Press. dH (in. H2O)	Temp. Tdi (dF)	Temp. Tdo (dF)	Volume Vd (ft3)	Time t (min)
	67.0	91.560		99	96	44.501	
2.0	67.0	58.418	0.5	99	97	10.178	80.0
Avg/Net :	67.0	33.142			98	34.323	
	70.0	135.344		91	87	89.503	
3.0	76.0	92.168	1.0	83	82	45.118	77.0
Avg/Net :	73.0	43.176			86	44.385	
	68.0	58.038		100	97	1009.786	
3.7	68.0	36.041	1.5	97	95	986.788	33.0
Avg/Net :	68.0	21.997			97	22.998	
	68.0	35.860		99	96	986.606	
4.6	67.0	10.724	2.0	97	96	960.383	33.0
Avg/Net :	67.5	25.136			97	26.223	
	69.0	157.223		94	88	112.278	
6.3	69.0	135.583	3.0	89	87	89.752	23.0
Avg/Net :	69.0	21.640			90	22.526	

$$y = Vs \times (Pbar + (dHs / 13.6)) \times (Avg.\ Td + 460) / [\ Vd \times (Pbar + (dH / 13.6)) \times (\ Ts + 460)]$$

$$Ko = [(Vs/t) \times [(Tdo + 460) / (Ts + 460)] \times [(Pbar + (dHs/13.6) / (Pbar + (dH/13.6)] / [((Tdo + 460) \times dH) / (Pbar + (dH/13.6)) \times (Mm)]^{0.5}$$

dH :	0.5	1.0	1.5	2.0	3.0	Avg.	Std.Dev.
y :	1.0257	1.0010	1.0149	1.0186	1.0060	1.0132	0.0088
Ko :	0.7723	0.7243	0.7179	0.7123	0.7129	0.7279	0.0226

y : 0.87 % Relative Std. Dev.

Ko : 3.11 % Relative Std. Dev.

DRY GAS METER / ORIFICE METER CALIBRATION DATA

Date 8/17/90
Bar. Press, in.Hg 29.68
Meter Box No. ...PORTABLE

Dry Gas Meter No. ... 6825354
Standard Test Meter # 69279
Operator ..... TD

STANDARD TEST METER			DRY TEST METER				
Press. dHs (in. H2O)	Temp. Ts (dF)	Volume Vs (ft3)	Press. dH (in. H2O)	Temp. Tdi (dF)	Temp. Tdo (dF)	Volume Vd (ft3)	Time t (min)
	0.0	0.000		0	0	0.000	
0.0	0.0	0.000	0.5	0	0	0.000	0.0
Avg/Net :	0.0	0.000			0	0.000	
	0.0	0.000		0	0	0.000	
0.0	0.0	0.000	1.0	0	0	0.000	0.0
Avg/Net :	0.0	0.000			0	0.000	
	66.0	358.901		84	76	415.874	
-3.4	66.0	330.682	1.5	68	68	387.215	51.0
Avg/Net :	66.0	28.219			74	28.659	
	0.0	0.000		0	0	0.000	
0.0	0.0	0.000	2.0	0	0	0.000	0.0
Avg/Net :	0.0	0.000			0	0.000	
	0.0	0.000		0	0	0.000	
0.0	0.0	0.000	3.0	0	0	0.000	0.0
Avg/Net :	0.0	0.000			0	0.000	

$$y = Vs \times (Pbar + (dHs / 13.6)) \times (Avg.\ Td + 460) / [\ Vd \times (Pbar + (dH / 13.6)) \times (\ Ts + 460)]$$

$$Ko = [(Vs/t) \times [(Tdo + 460) / (Ts + 460)] \times [(Pbar + (dHs/13.6) / (Pbar + (dH/13.6)] / [((Tdo + 460) \times dH) / (Pbar + (dH/13.6)) \times (Mm)]^{0.5}$$

dH :	0.5	1.0	1.5	2.0	3.0	Avg.	Std.Dev.
y :			0.9875			0.9875	0.3950
Ko :			0.5748			0.5748	0.2299

y : 40.00 % Relative Std. Dev.

Ko : 40.00 % Relative Std. Dev.

Scott Specialty Gases

a division of

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

PAPE & STEINER
ATTN: SUE POWERS

Shipped From: Scott SAN BERNARDINO
Date Shipped 5-10-89
Our Project No: 00252
Your P.O. No: SP2302-89 R12
Page 1 of 1
Expiration Date: 11-10-90

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. AAL-15365 Cylinder Pressure 1900 psig Certified Accuracy ±1 % NBS Traceable

REFERENCE STD

COMPONENTS	CERTIFIED CONC	SRM/CRM NO.	CYL. NO.	CONC.
Nitric Oxide	19.78 PPM	SRM 2629 A	AAL-14755	23.33 PPM
NOX	20.04 PPM			

GAS ANALYZER

MAKE/MODEL/SERIAL NO.	LAST CAL. DATE	ANALYTICAL PRINCIPLE
Thermo-Electron 10 AR S/N 14853-150	5-2-89	Chemi-Luminenscent

BALANCE GAS Nitrogen

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component Nitric Oxide
First Analysis Date 4-24-89 Units PPM

Z 0.00	R 93.73	T 79.09
R 93.68	Z 0.08	T 79.02
Z 0.08	T 79.03	R 93.78

Mean Test Assay 19.68 PPM

Second Analysis Date 5-6-89 Units PPM

Z 0.00	R 92.99	T 79.66
R 94.05	Z 0.01	T 79.78
Z 0.00	T 79.81	R 94.13

Mean Test Assay 19.78

Component _____
Date _____ Units _____

Z _____	R _____	T _____
R _____	Z _____	T _____
Z _____	T _____	R _____

Mean Test Assay _____

Date _____ Units _____

Z _____	R _____	T _____
R _____	Z _____	T _____
Z _____	T _____	R _____

Mean Test Assay _____

Component _____
Date _____ Units _____

Z _____	R _____	T _____
R _____	Z _____	T _____
Z _____	T _____	R _____

Mean Test Assay _____

Date _____ Units _____

Z _____	R _____	T _____
R _____	Z _____	T _____
Z _____	T _____	R _____

Mean Test Assay _____

Chronology: Date _____
Assay _____

Analyst Doug Hagberg/Carrie Boddy

Approved By: _____

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases

a division of

Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

Shipped From: Scott SAN BERNARDINO
Date Shipped 7-17-89
Our Project No: 01341
Your P.O. No: SP2302-89 R20
Page 1 of 1
Expiration Date: 1-17-91

PAPE & STEINER
ATTN: SUE POWERS

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. AAL-13433 Cylinder Pressure 1900 psig Certified Accuracy ±1 % NBS Traceable

COMPONENTS	CERTIFIED CONC	REFERENCE STD SRM/CRM NO.	REFERENCE STD CYL. NO.	REFERENCE STD CONC.	GAS ANALYZER MAKE/MODEL/SERIAL NO.	GAS ANALYZER LAST CAL. DATE	GAS ANALYZER ANALYTICAL PRINCIPLE
Nitric Oxide	81.59 PPM	SRM 1684 B	CAL-12787	94.80 PPM	Thermo-Electron 10 AR S/N 14853-150	5-2-89	Chemi-Luminenscent
NOX	81.90 PPM						

BALANCE GAS Nitrogen

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component Nitric Oxide
First Analysis Date 7-5-89 Units PPM

Z 0.00	R 94.83	T 81.70
R 94.78	Z -0.01	T 81.63
Z -0.03	T 81.67	R 94.75

Mean Test Assay 81.68 PPM

Second Analysis Date 7-12-89 Units PPM

Z 0.00	R 94.50	T 81.32
R 94.50	Z 0.02	T 81.32
Z 0.03	T 81.30	R 94.43

Mean Test Assay 81.59 PPM

Component _____
Date _____ Units _____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Date _____ Units _____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Component _____
Date _____ Units _____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Date _____ Units _____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Chronology: Date _____
Assay _____

Analyst Doug Hagberg

Approved By: _____

A-77

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of

Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

Pape & Steiner

Shipped From: Scott San Bernardino
Date Shipped 11/27/89
Our Project No: 3535
Your P.O. No: SP2302-89 REL 35
Page 1 of 1
Expiration Date: 5/91
CGA G6.0

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. AAL 2171 Cylinder Pressure 1900 PSIG Certified Accuracy ±1 % NBS Traceable

COMPONENTS	CERTIFIED CONC	REFERENCE STD SRM/CRM NO.	REFERENCE STD CYL. NO.	REFERENCE STD CONC.	GAS ANALYZER MAKE/MODEL/SERIAL NO.	GAS ANALYZER LAST CAL. DATE	GAS ANALYZER ANALYTICAL PRINCIPLE
Nitric Oxide	41.32 PPM	CRM 1684 B	ALM-3640	97.28 PPM	Thermo-Electron 10 S/N 14853-150	AR 11/10/89	Chemi-Luminenscent
NOX	41.39 PPM						

BALANCE GAS Nitrogen

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component Nitric Oxide
First Analysis Date 11/13/89 Units PPM

Z 0.0	R 97.23	T 41.21
R 97.14	Z 0.0	T 41.23
R 0.0	T 41.27	R 97.20
Z	T	R

Mean Test Assay 41.27

Second Analysis Date 11/21/89 Units PPM

Z 0.0	R 97.26	T 41.30
R 97.25	Z 0.05	T 41.33
Z 0.06	T 41.40	R 97.32

Mean Test Assay 41.32

Component ____ Date ____ Units ____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ____

Date ____ Units ____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ____

Component ____ Date ____ Units ____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ____

Date ____ Units ____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ____

Chronology: Date ____
Assay ____

Analyst Lee Oldham

Approved By: Doug Grant

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

PAPE01

TO:
SUE POWERS
PAPE & STEINER ENVIRONMENTAL
5801 NORRIS RD.
BAKERSFIELD, CA 93308

DATE: 08/23/90

CUSTOMER ORDER NUMBER: SP-2750-90 REL2

CYLINDER NUMBER	COMPONENT	CONCENTRATION (v/v)	NIST TRACEABLE REFERENCE STANDARD
CC73017	Carbon Dioxide	15.24 ± 0.15 %	SRM 1675b
	Oxygen	7.38 ± 0.07 %	SRM 2658a
	Carbon Monoxide	75.4 ± 0.8 ppm	SRM 1679c
	Nitrogen	Balance	
CC12055	Carbon Dioxide	14.71 ± 0.15 %	SRM 1675b
	Oxygen	3.82 ± 0.04 %	SRM 2658a
	Carbon Monoxide	37.4 ± 0.4 ppm	SRM 2614a
	Nitrogen	Balance	
CC7262	Oxygen	0.967 ± 0.010 %	SRM 2657
	Carbon Dioxide	9.53 ± 0.10 %	SRM 1675b
	Carbon Monoxide	394 ± 4 ppm	SRM 1680b
	Nitrogen	Balance	

ppm = umole/mole % = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: J.W. Gay Approved: J.T.Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: SP-2750-90 REL2

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC28200	Carbon Dioxide	15.03 ± 0.15 %	SRM 1675b
	Oxygen	7.61 ± 0.08 %	SRM 2658a
	Carbon Monoxide	142.4 ± 1.4 ppm	SRM 2636
	Nitrogen	Balance	

ppm = umole/mole % = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

Date: 2/14/90

PAPE & STEINER
5801 NORRIS ROAD
BAKERSFIELD, CA 93308

Our Project No.: 5087
Your P.O. No.: SP 2546-90 REL# 5

Gentlemen:

Thank you for choosing Scott for your Specialty Gas needs. The analyses for the gases ordered, as reported by our laboratory, are listed below. Results are in volume percent, unless otherwise indicated.

ANALYTICAL REPORT

Cyl. No. 1L-23410	Analytical Accuracy ±1%
Component	Concentration
CARBON DIOXIDE	5.02%
CARBON MONOXIDE	80.7 ppm
OXYGEN	15.0%
CO NIST TRACEABLE TO SRM 1679	
NITROGEN	BALANCE

Cyl. No. _____	Analytical Accuracy _____
Component	Concentration

Cyl. No. _____	Analytical Accuracy _____
Component	Concentration

Cyl. No. _____	Analytical Accuracy _____
Component	Concentration

Analyst _____

Approved By _____

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

TELEX: 510-100-6831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

PAPE & STEINER
SUE POWERS

Date: 8/21/90
Our Project No.: 8369
Your P.O. No.: SP 25469 REL 19

Gentlemen:

Thank you for choosing Scott for your Specialty Gas needs. The analyses for the gases ordered, as reported by our laboratory, are listed below. Results are in volume percent, unless otherwise indicated.

ANALYTICAL REPORT

1300 psig
Cyl. No. AAL-9891 Analytical Accuracy ±1%

Component	Concentration
CARBON MONOXIDE	3.484 ppm
NITROGEN	BALANCE
*GRAVIMETRIC MASTER GAS	

Cyl. No. _____ Analytical Accuracy _____

Component	Concentration

Cyl. No. _____ Analytical Accuracy _____

Component	Concentration

Cyl. No. _____ Analytical Accuracy _____

Component	Concentration

Analyst _____ Approved By _____

*CERTIFEID TO HAVE BEEN BLENDED AGANIST NIST CERTIFIED WEIGHTS AND VERIFIED TO BE CORRECT BY INDEPENDENT ANALYSIS.

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS

PAPEØ1

TO: Pape & Steiner Environmental Services
5801 Norris Rd.
Bakersfield, CA 93308

DATE: 30 August 1990

IMPORTANT ANALYSIS REPORT
Please forward to user
of calibration gases.

CUSTOMER ORDER NUMBER: B-SP-2750-90 Rel. 2

CYLINDER NUMBER CC92991

COMPONENT	CONCENTRATION(v/v)
Carbon Monoxide	3.24 ± 0.07 ppm
Nitrogen	Balance

CYLINDER NUMBER _____

COMPONENT	CONCENTRATION(v/v)		
Replicate	8/23/90	8/30/90	
Analysis	3.30 ppm	3.21 ppm	
Data On	3.21 ppm	3.23 ppm	
CO:	3.25 ppm	3.25 ppm	
Mean	3.25 ppm	3.23 ppm	

Expiration Date CO: 2/30/92

CYLINDER NUMBER CC63352

COMPONENT	CONCENTRATION(v/v)
Carbon Monoxide	8.24 ± 0.16 ppm
Nitrogen	Balance

CYLINDER NUMBER _____

COMPONENT	CONCENTRATION(v/v)		
Replicate	8/23/90	8/30/90	
Analysis	8.24 ppm	8.23 ppm	
Data On	8.22 ppm	8.30 ppm	
CO:	8.23 ppm	8.19 ppm	
Mean	8.23 ppm	8.24 ppm	

Expiration Date CO: 2/30/92

ANALYST J.W. Gay

APPROVED J.T. Marrin

SCOTT-MARRIN, INC. 2001 THIRD ST., UNIT I RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: B-SP-2750-90 Rel. 2

CYLINDER NUMBER CC86236

COMPONENT	CONCENTRATION(v/v)
Carbon Monoxide	8.21 ± 0.16 ppm
Nitrogen	Balance

CYLINDER NUMBER _____

COMPONENT		CONCENTRATION(v/v)		
Replicate	8/23/90	8.13 ppm	8/30/90	8.17 ppm
Analysis		8.19 ppm		8.21 ppm
Data On		8.24 ppm		8.28 ppm
CO:	Mean	8.19 ppm		8.22 ppm

Expiration Date CO: 2/30/92

CYLINDER NUMBER CC56541

COMPONENT	CONCENTRATION(v/v)
Carbon Monoxide	825 ± 8 ppm
Nitrogen	Balance

CYLINDER NUMBER _____

COMPONENT		CONCENTRATION(v/v)		
Replicate	8/24/90	825 ppm	8/31/90	827 ppm
Analysis		822 ppm		824 ppm
Data On		821 ppm		831 ppm
CO:	Mean	823 ppm		827 ppm

Expiration Date CO: 2/31/92

CYLINDER NUMBER CC56425

COMPONENT	CONCENTRATION(v/v)
Carbon Monoxide	4130 ± 41 ppm
Nitrogen	Balance

CYLINDER NUMBER _____

COMPONENT		CONCENTRATION(v/v)		
Replicate	8/24/90	4140 ppm	8/31/90	4100 ppm
Analysis		4110 ppm		4130 ppm
Data On		4130 ppm		4150 ppm
CO:	Mean	4130 ppm		4130 ppm

Expiration Date CO: 2/31/92

CYLINDER NUMBER CC92991

COMPONENT	CONCENTRATION(v/v)

CYLINDER NUMBER _____

COMPONENT	CONCENTRATION(v/v)

(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the National Institute of Standards & Technology by direct intercomparison with SRM 2612, cylinder number FF11054 at 9.92 ppm Carbon Monoxide in Air. The analysis was performed using a Carle Model 8000 gas chromatograph with catalytic methanation/flame ionization detection. The last multi-point calibration was performed 9/11/90.)

SCOTT-MARRIN, INC. 2001 THIRD ST., UNIT I RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: B-SP-2750-90 Rel. 2

CYLINDER NUMBER CC86236		CYLINDER NUMBER CC63352	
COMPONENT	CONCENTRATION(v/v)	COMPONENT	CONCENTRATION(v/v)

(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the revised)
(EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the)
(National Institute of Standards & Technology by direct intercomparison with SRM 2612,)
(cylinder number FF11054 at 9.92 ppm Carbon Monoxide in Air. The analysis was performed)
(using a Carle Model 8000 gas chromatograph with catalytic methanation/flame ionization)
(detection. The last multipoint calibration was performed 9/11/90.)

CYLINDER NUMBER CC56541		CYLINDER NUMBER	
COMPONENT	CONCENTRATION(v/v)	COMPONENT	CONCENTRATION(v/v)

(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the revised)
(EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the)
(National Institute of Standards & Technology by direct intercomparison with GMIS, cylinder)
(number L382 at 1046 ppm Carbon Monoxide in Nitrogen. The analysis was performed using a)
(Carle Model 8000 gas chromatograph with catalytic methanation/flame ionization detection.)
(The last multipoint calibration was performed 9/11/90.)

CYLINDER NUMBER CC56425		CYLINDER NUMBER	
COMPONENT	CONCENTRATION(v/v)	COMPONENT	CONCENTRATION(v/v)

(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the revised)
(EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the)
(National Institute of Standards & Technology by direct intercomparison with GMIS, cylinder)
(number CC7245 at 5040 ppm Carbon Monoxide in Nitrogen. The analysis was performed using)
(a Carle Model 8000 gas chromatograph with catalytic methanation/flame ionization detection.)
(The last multipoint calibration was performed 9/11/90.)

CYLINDER NUMBER		CYLINDER NUMBER	
COMPONENT	CONCENTRATION(v/v)	COMPONENT	CONCENTRATION(v/v)

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

PAPE & STEINER
5801 NORRIS ROAD
BAKERSFIELD, CA 93308

Date: 5/11/90
Our Project No.: 5843
Your P.O. No.: SP2546-90 REL# 10

Gentlemen:

Thank you for choosing Scott for your Specialty Gas needs. The analyses for the gases ordered, as reported by our laboratory, are listed below. Results are in volume percent, unless otherwise indicated.

ANALYTICAL REPORT

CGA 350
Cyl. No. ALM-12308 Analytical Accuracy +1%

Component	Concentration
METHANE	21.19 ppm
ETHANE	21.98 ppm
PROPANE	22.63 ppm
n-BUTANE	22.33 ppm
n-PENTANE	19.74 ppm
n-HEXANE	19.48 ppm
NITROGEN	BALANCE

Cyl. No. _____ Analytical Accuracy _____

Component	Concentration

Cyl. No. _____ Analytical Accuracy _____

Component	Concentration

Cyl. No. _____ Analytical Accuracy _____

Component	Concentration

Analyst _____

Approved By _____

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

APPENDIX B

SWEPI COALINGA COGEN OPERATING DATA

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/29/90 TIME: 08:52:09

FUEL GAS	398.7973 MCF	24 HR RUNNING	
FUEL GAS	1081.823 MCF	24 HR PREVIOUS	
FUEL GAS	3633.233 MCF	7 DAY RUNNING	
FUEL GAS	7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS	19911.15 MCF	MONTH RUNNING	
FUEL GAS	31982.16 MCF	MONTH PREVIOUS	

FUEL GAS	404.9142 MCF	24 HR RUNNING	
FUEL GAS	1098.213 MCF	24 HR PREVIOUS	
FUEL GAS	3687.500 MCF	7 DAY RUNNING	
FUEL GAS	7874.877 MCF	7 DAY PREVIOUS	
FUEL GAS	21218.15 MCF	MONTH RUNNING	
FUEL GAS	33160.49 MCF	MONTH PREVIOUS	

0.74 RATIO

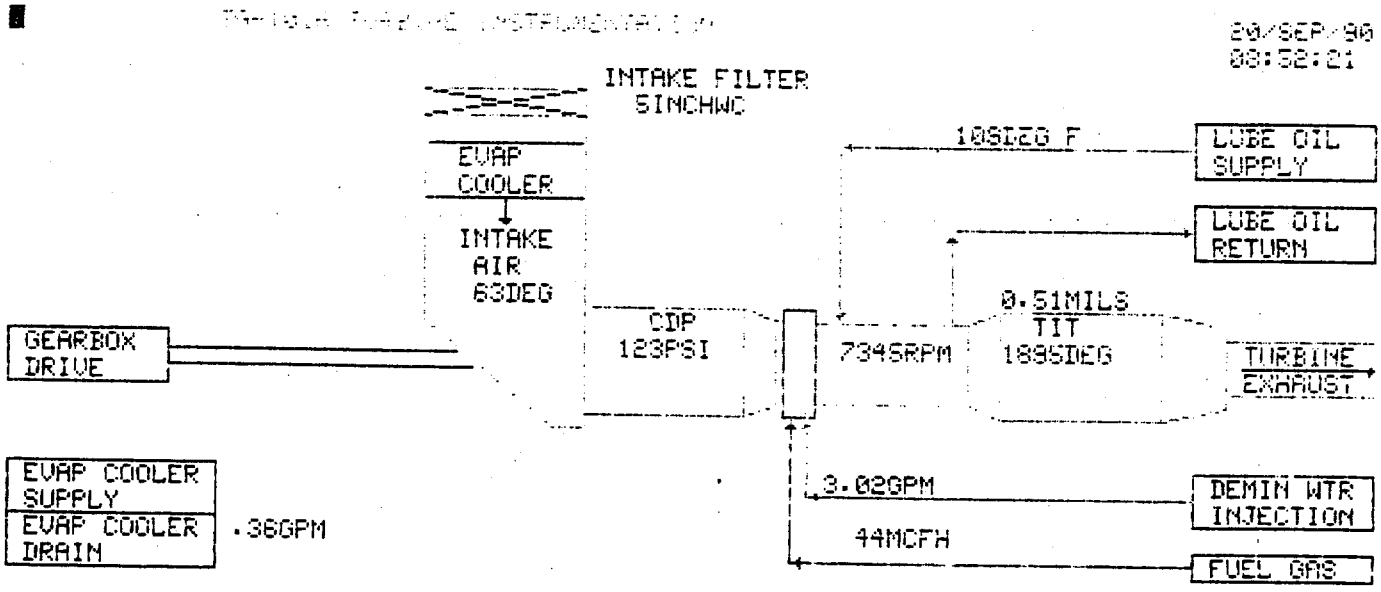
FUEL GAS	817.2146 MCF	24 HR RUNNING
FUEL GAS	2211.638 MCF	24 HR PREVIOUS
FUEL GAS	7427.847 MCF	7 DAY RUNNING
FUEL GAS	15438.58 MCF	7 DAY PREVIOUS
FUEL GAS	41730.47 MCF	MONTH RUNNING
FUEL GAS	67366.09 MCF	MONTH PREVIOUS

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 05:52:25



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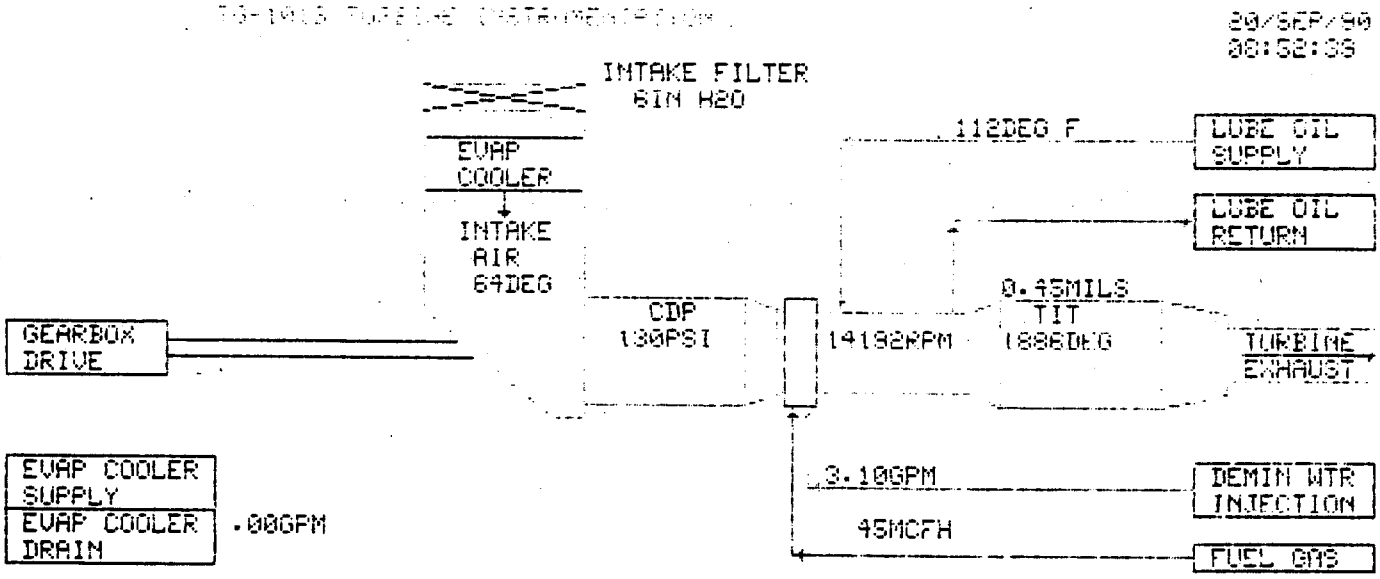


COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 10:27:11

[redacted]

FUEL GAS 475.1517 MCF	24 HR RUNNING	FUEL GAS 481.9123 MCF	24 HR RUNNING
FUEL GAS 1075.172 MCF	24 HR PREVIOUS	FUEL GAS 1090.968 MCF	24 HR PREVIOUS
FUEL GAS 2627.750 MCF	7 DAY RUNNING	FUEL GAS 2666.136 MCF	7 DAY RUNNING
FUEL GAS 7588.784 MCF	7 DAY PREVIOUS	FUEL GAS 7674.677 MCF	7 DAY PREVIOUS
FUEL GAS 18964.00 MCF	MONTH RUNNING	FUEL GAS 20218.31 MCF	MONTH RUNNING
FUEL GAS 31882.16 MCF	MONTH PREVIOUS	FUEL GAS 33160.48 MCF	MONTH PREVIOUS

[redacted]

0.73 RATIO

FUEL GAS 873.8858 MCF	24 HR RUNNING
FUEL GAS 2195.396 MCF	24 HR PREVIOUS
FUEL GAS 5370.815 MCF	7 DAY RUNNING
FUEL GAS 15436.58 MCF	7 DAY PREVIOUS
FUEL GAS 39645.33 MCF	MONTH RUNNING
FUEL GAS 67388.09 MCF	MONTH PREVIOUS

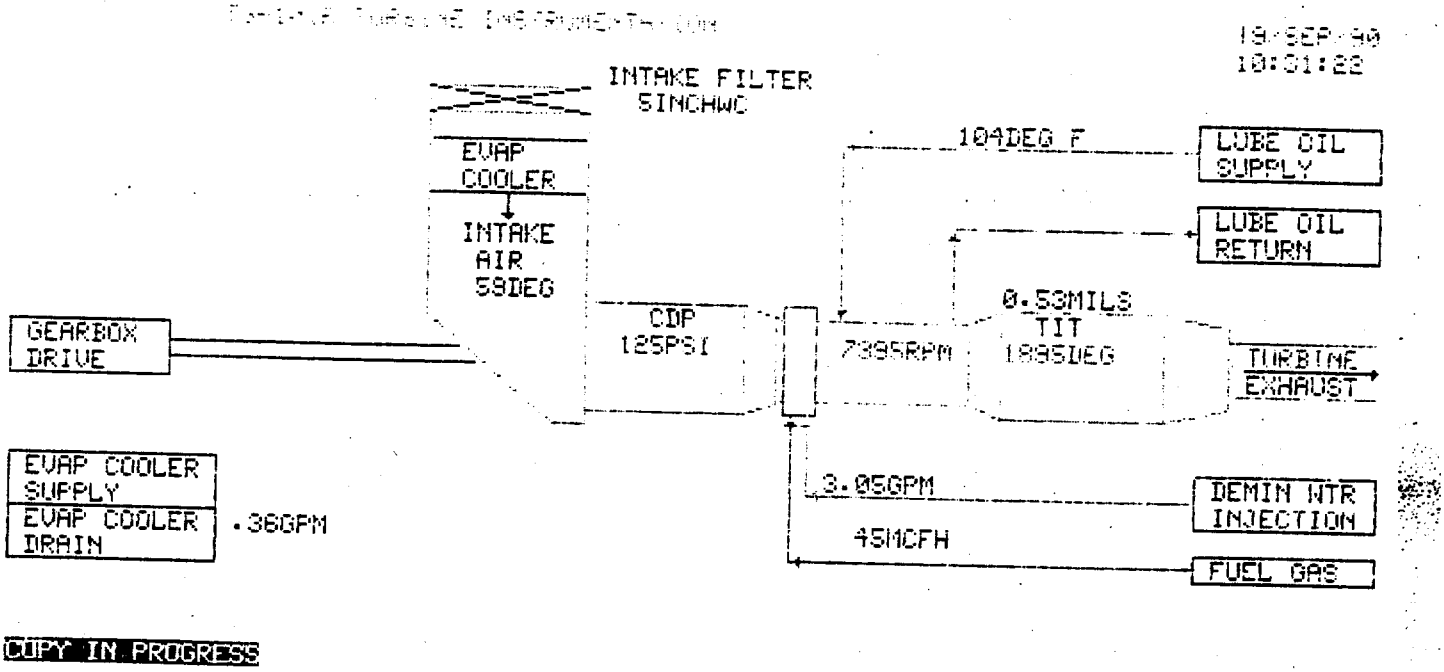
[redacted]

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/19/90 TIME: 10:31:25



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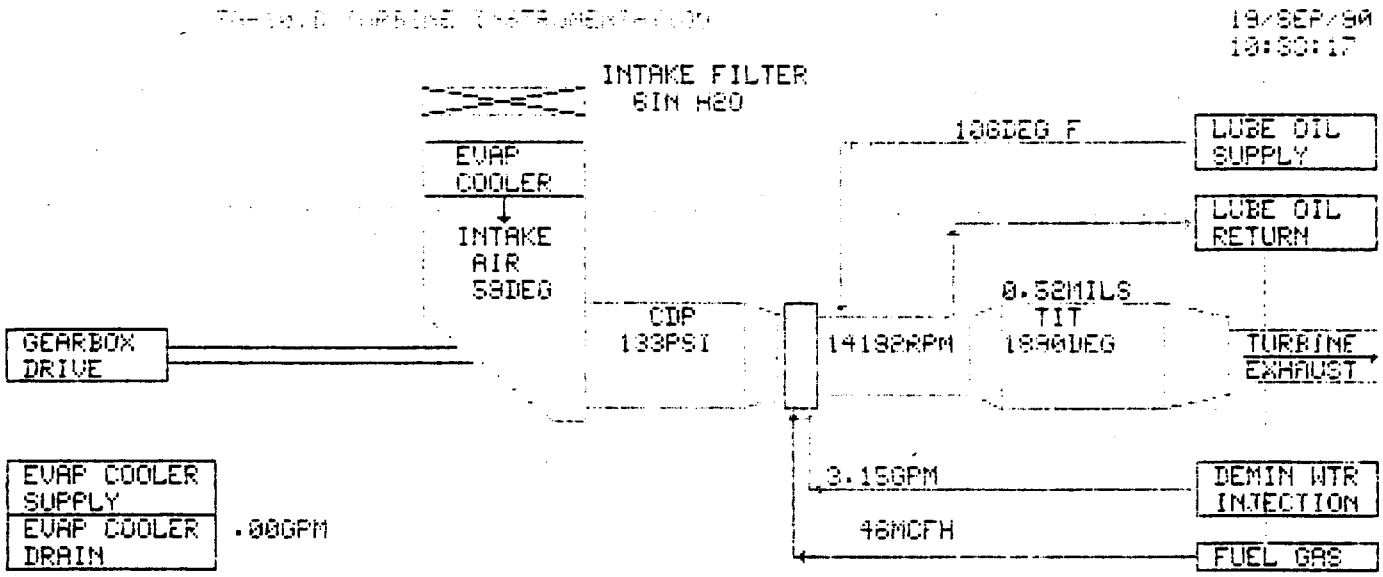


COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 10:43:15

19/SEP/90

FUEL GAS 487.2579 MCF	24 HR RUNNING	FUEL GAS 494.2513 MCF	24 HR RUNNING
FUEL GAS 1075.172 MCF	24 HR PREVIOUS	FUEL GAS 1090.959 MCF	24 HR PREVIOUS
FUEL GAS 2639.865 MCF	7 DAY RUNNING	FUEL GAS 2678.468 MCF	7 DAY RUNNING
FUEL GAS 7588.784 MCF	7 DAY PREVIOUS	FUEL GAS 7674.377 MCF	7 DAY PREVIOUS
FUEL GAS 18975.42 MCF	MONTH RUNNING	FUEL GAS 20231.35 MCF	MONTH RUNNING
FUEL GAS 31982.16 MCF	MONTH PREVIOUS	FUEL GAS 33160.98 MCF	MONTH PREVIOUS

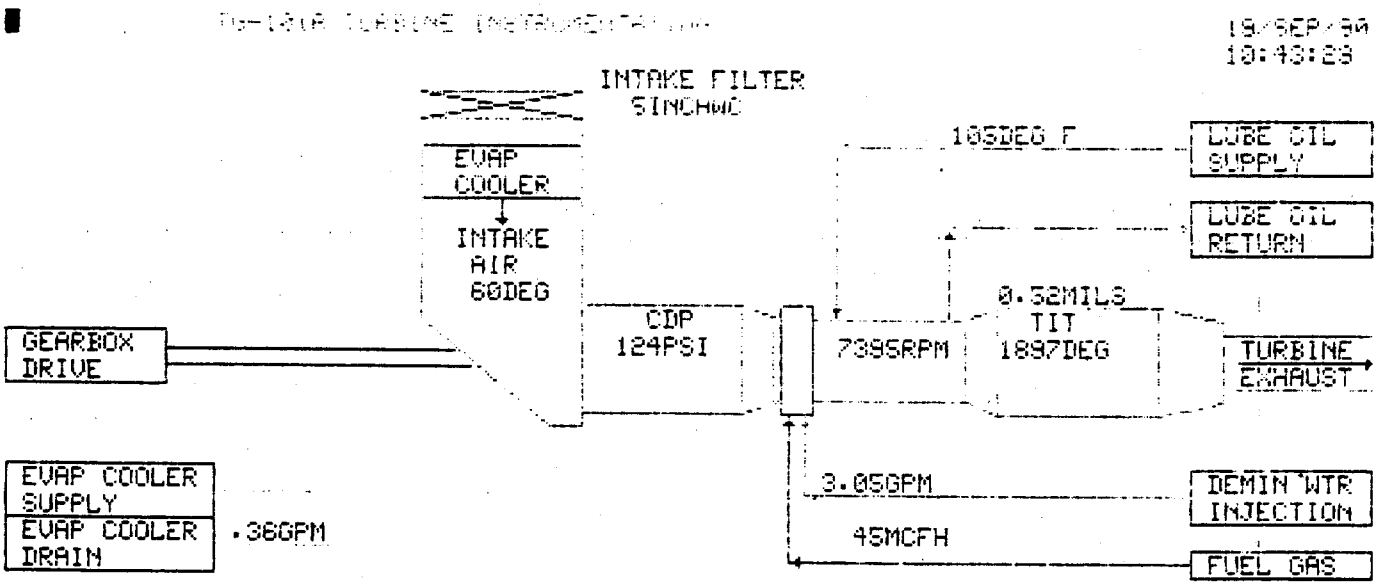
0.73 RATIO

FUEL GAS 338.6928 MCF	24 HR RUNNING	
FUEL GAS 2195.396 MCF	24 HR PREVIOUS	0.74 RATIO
FUEL GAS 5395.759 MCF	7 DAY RUNNING	
FUEL GAS 15436.58 MCF	7 DAY PREVIOUS	
FUEL GAS 39671.69 MCF	MONTH RUNNING	
FUEL GAS 87386.09 MCF	MONTH PREVIOUS	

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/19/90 TIME: 10:43:33



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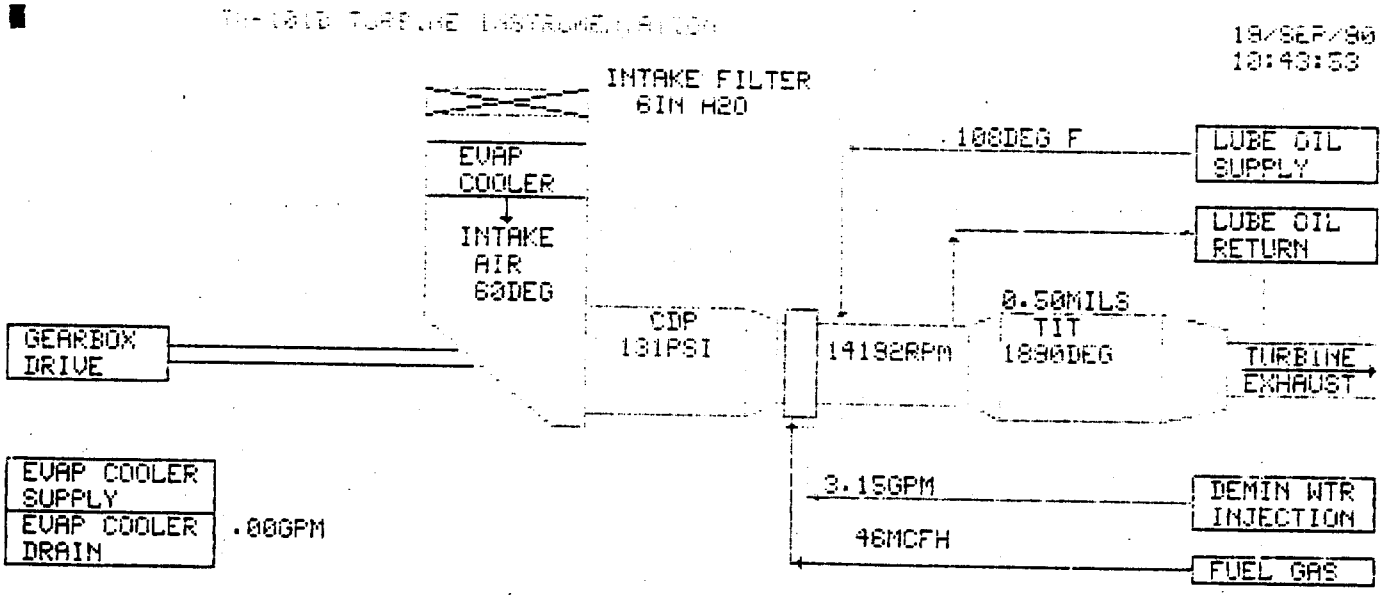

COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 11:03:56

FUEL GAS 502.9284 MCF	24 HR RUNNING	
FUEL GAS 1075.172 MCF	24 HR PREVIOUS	
FUEL GAS 2655.485 MCF	7 DAY RUNNING	
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS 18990.23 MCF	MONTH RUNNING	
FUEL GAS 31982.16 MCF	MONTH PREVIOUS	

FUEL GAS 510.1555 MCF	24 HR RUNNING	
FUEL GAS 1090.859 MCF	24 HR PREVIOUS	
FUEL GAS 2694.373 MCF	7 DAY RUNNING	
FUEL GAS 7674.877 MCF	7 DAY PREVIOUS	
FUEL GAS 20248.17 MCF	MONTH RUNNING	
FUEL GAS 33160.43 MCF	MONTH PREVIOUS	

0.73 RATIO

FUEL GAS 1030.859 MCF	24 HR RUNNING	
FUEL GAS 2195.386 MCF	24 HR PREVIOUS	
FUEL GAS 5427.868 MCF	7 DAY RUNNING	
FUEL GAS 15438.58 MCF	7 DAY PREVIOUS	
FUEL GAS 38705.62 MCF	MONTH RUNNING	
FUEL GAS 67366.09 MCF	MONTH PREVIOUS	

0.74 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

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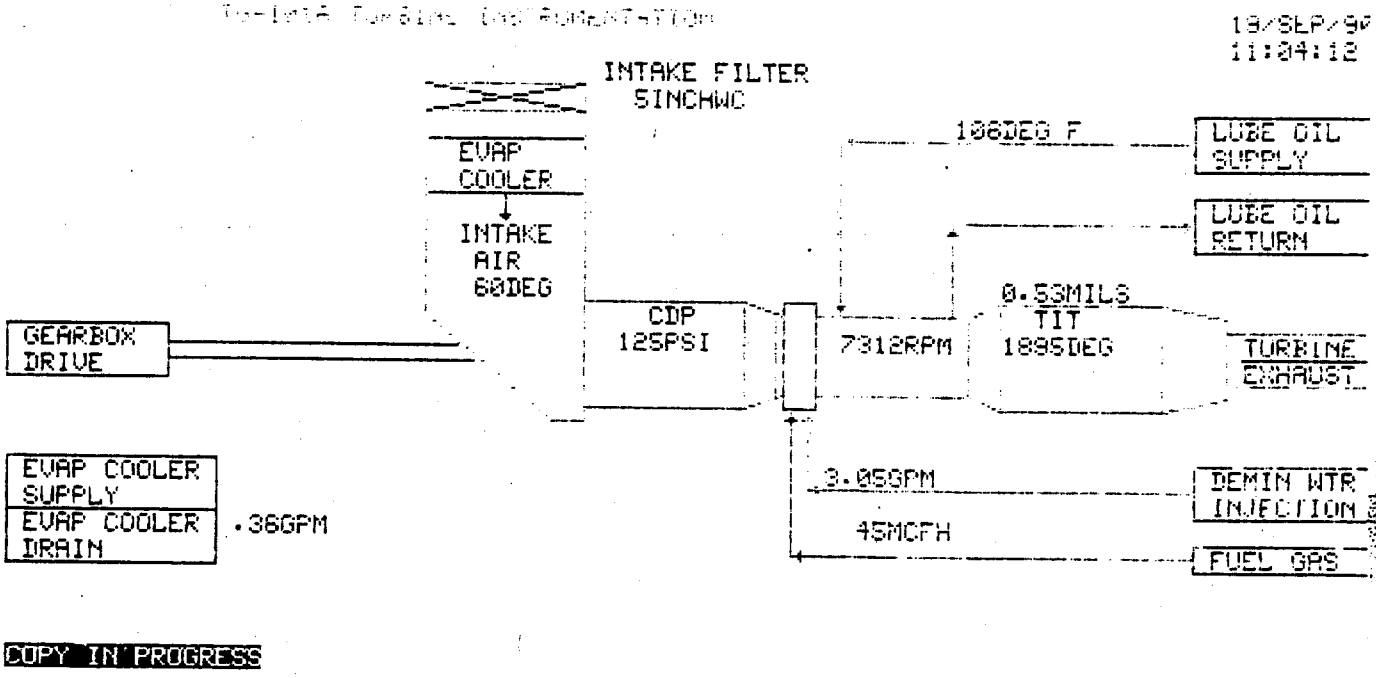

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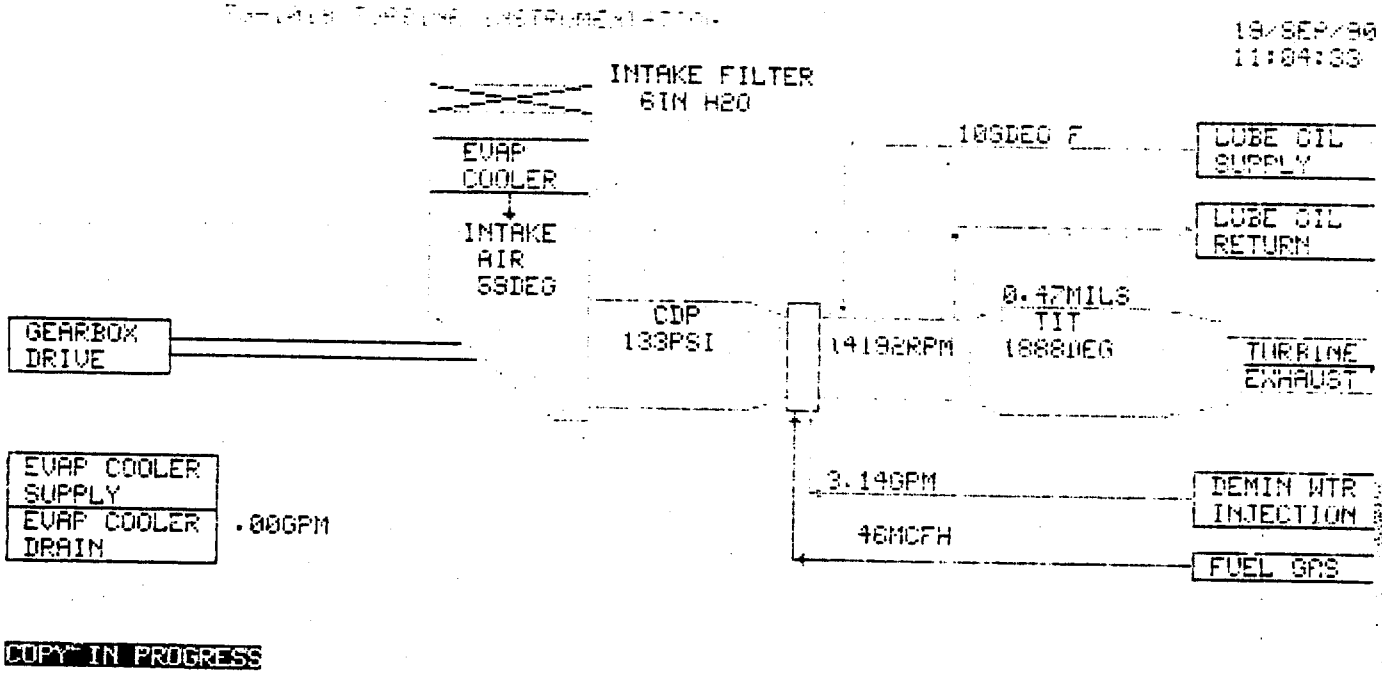

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 11:25:33

FUEL GAS 519.1915 MCF	24 HR RUNNING	
FUEL GAS 1075.172 MCF	24 HR PREVIOUS	
FUEL GAS 2671.788 MCF	7 DAY RUNNING	
FUEL GAS 7588.784 MCF	7 DAY PREVIOUS	
FUEL GAS 19005.58 MCF	MONTH RUNNING	
FUEL GAS 31382.16 MCF	MONTH PREVIOUS	

FUEL GAS 526.7547 MCF	24 HR RUNNING	
FUEL GAS 1090.353 MCF	24 HR PREVIOUS	
FUEL GAS 2711.903 MCF	7 DAY RUNNING	
FUEL GAS 7674.877 MCF	7 DAY PREVIOUS	
FUEL GAS 20265.71 MCF	MONTH RUNNING	
FUEL GAS 33160.48 MCF	MONTH PREVIOUS	

0.72 RATIO

FUEL GAS 1064.023 MCF	24 HR RUNNING	
FUEL GAS 2195.398 MCF	24 HR PREVIOUS	
FUEL GAS 5481.381 MCF	7 DAY RUNNING	
FUEL GAS 15436.58 MCF	7 DAY PREVIOUS	
FUEL GAS 38741.11 MCF	MONTH RUNNING	
FUEL GAS 67366.09 MCF	MONTH PREVIOUS	

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

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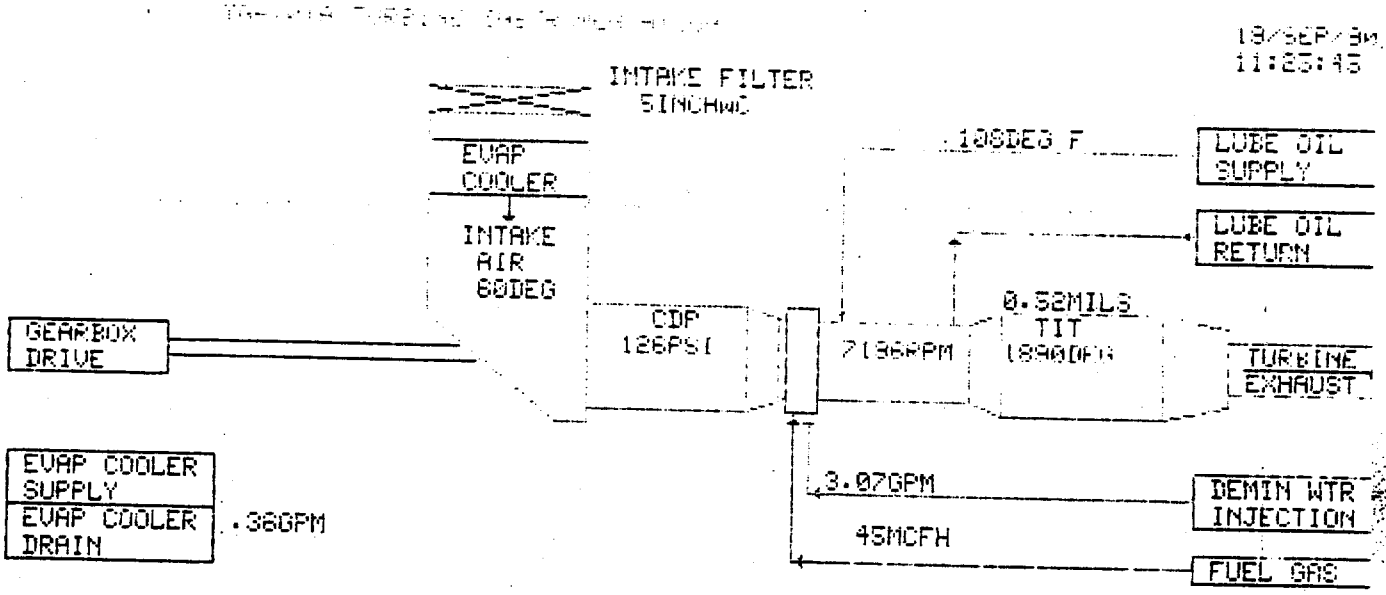

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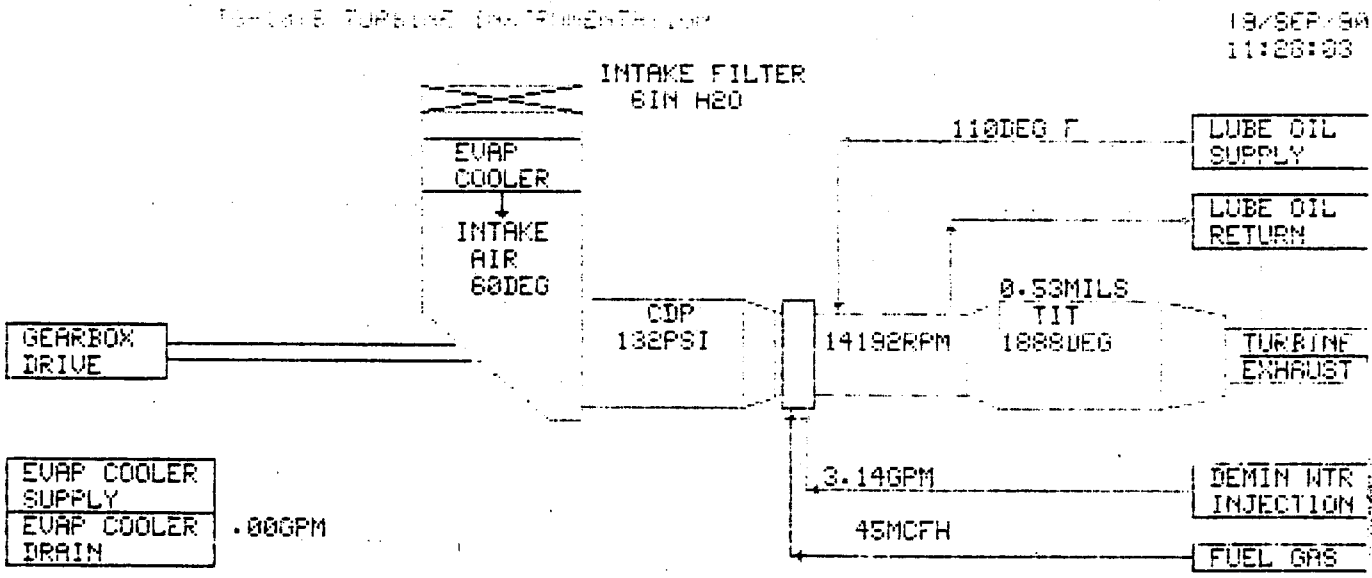

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 11:45:47

FUEL GAS 534.4415 MCF	24 HR RUNNING	
FUEL GAS 1075.172 MCF	24 HR PREVIOUS	
FUEL GAS 2687.048 MCF	7 DAY RUNNING	
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS 19019.91 MCF	MONTH RUNNING	
FUEL GAS 31982.16 MCF	MONTH PREVIOUS	

FUEL GAS 542.2972 MCF	24 HR RUNNING	
FUEL GAS 1090.858 MCF	24 HR PREVIOUS	
FUEL GAS 2726.530 MCF	7 DAY RUNNING	
FUEL GAS 7674.877 MCF	7 DAY PREVIOUS	
FUEL GAS 20282.04 MCF	MONTH RUNNING	
FUEL GAS 33160.49 MCF	MONTH PREVIOUS	

0.74

FUEL GAS 1085.219 MCF	24 HR RUNNING	
FUEL GAS 2195.398 MCF	24 HR PREVIOUS	
FUEL GAS 5482.638 MCF	7 DAY RUNNING	
FUEL GAS 15438.58 MCF	7 DAY PREVIOUS	
FUEL GAS 38774.31 MCF	MONTH RUNNING	
FUEL GAS 67366.09 MCF	MONTH PREVIOUS	

0.74

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

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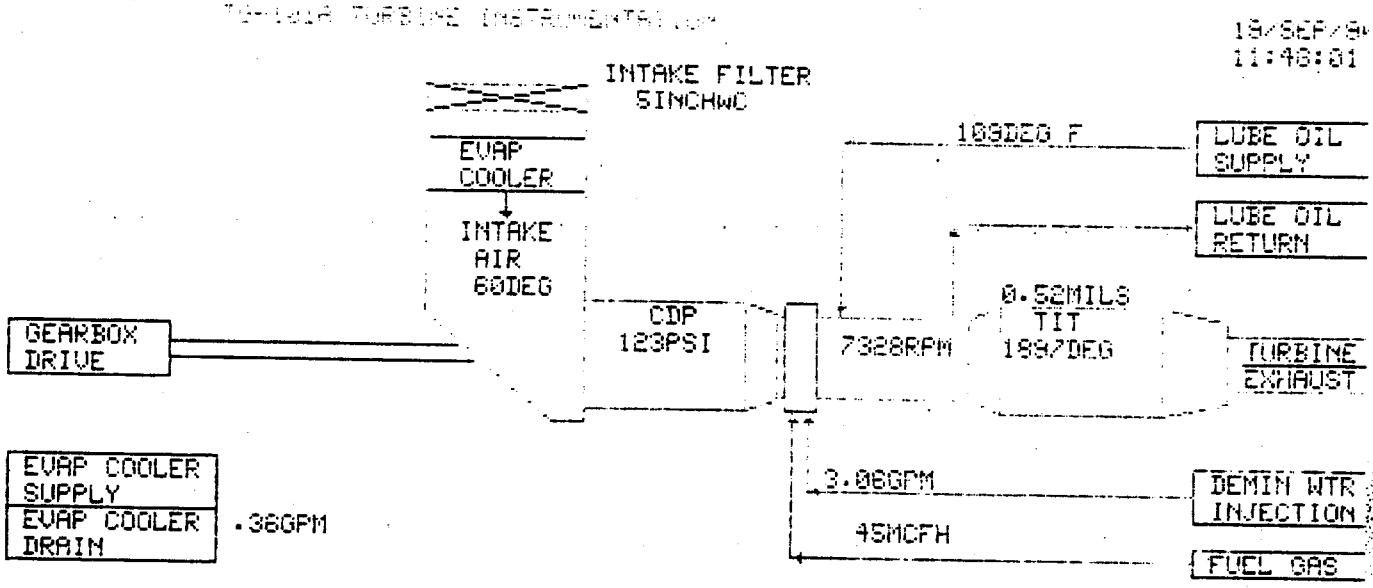

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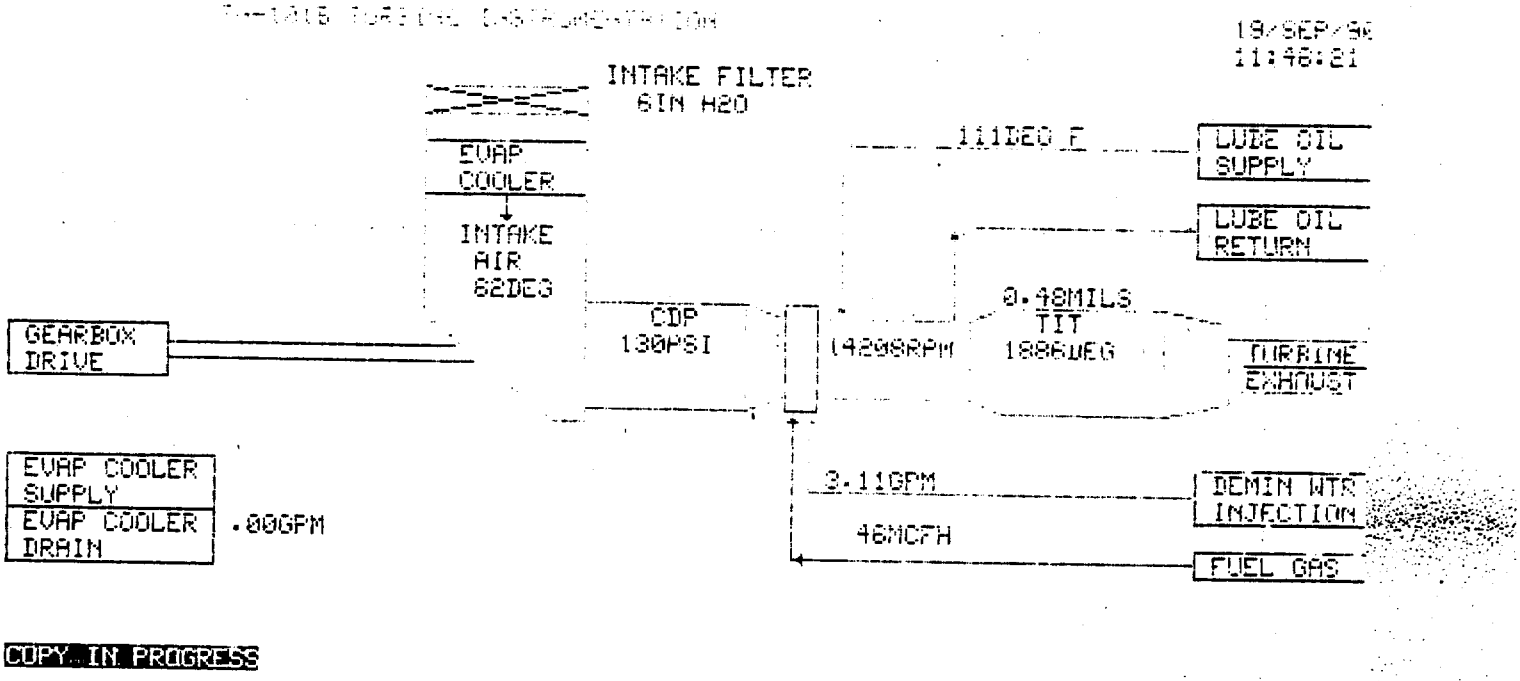

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 12:04:23

19/SEP/90 [illegible] [illegible]

FUEL GAS	548.4100	MCF	24 HR RUNNING		
FUEL GAS	1075.172	MCF	24 HR PREVIOUS		
FUEL GAS	2701.015	MCF	7 DAY RUNNING		
FUEL GAS	7588.784	MCF	7 DAY PREVIOUS		
FUEL GAS	19033.01	MCF	MONTH RUNNING		
FUEL GAS	31982.16	MCF	MONTH PREVIOUS		

FUEL GAS	556.5137	MCF	24 HR RUNNING		
FUEL GAS	1000.958	MCF	24 HR PREVIOUS		
FUEL GAS	2740.750	MCF	7 DAY RUNNING		
FUEL GAS	7674.877	MCF	7 DAY PREVIOUS		
FUEL GAS	20296.73	MCF	MONTH RUNNING		
FUEL GAS	33160.48	MCF	MONTH PREVIOUS		

0.72 RATIO

FUEL GAS	1123.784	MCF	24 HR RUNNING
FUEL GAS	2185.386	MCF	24 HR PREVIOUS
FUEL GAS	5521.145	MCF	7 DAY RUNNING
FUEL GAS	15436.59	MCF	7 DAY PREVIOUS
FUEL GAS	38804.82	MCF	MONTH RUNNING
FUEL GAS	67366.09	MCF	MONTH PREVIOUS

0.74 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

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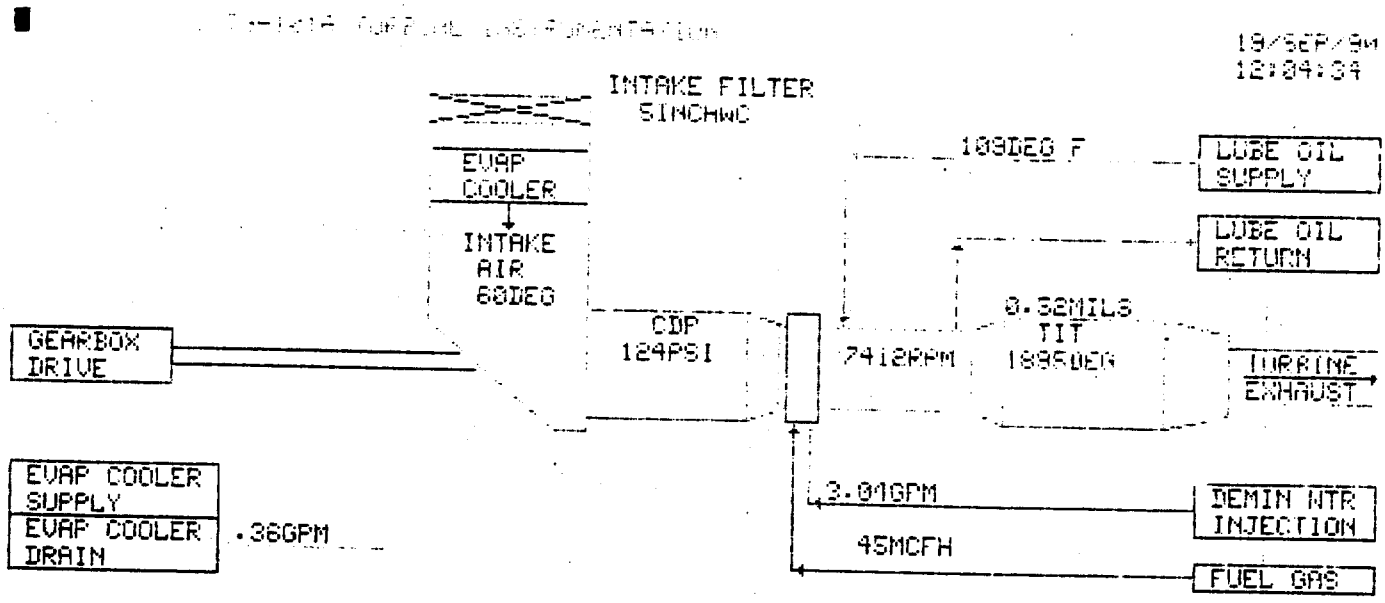

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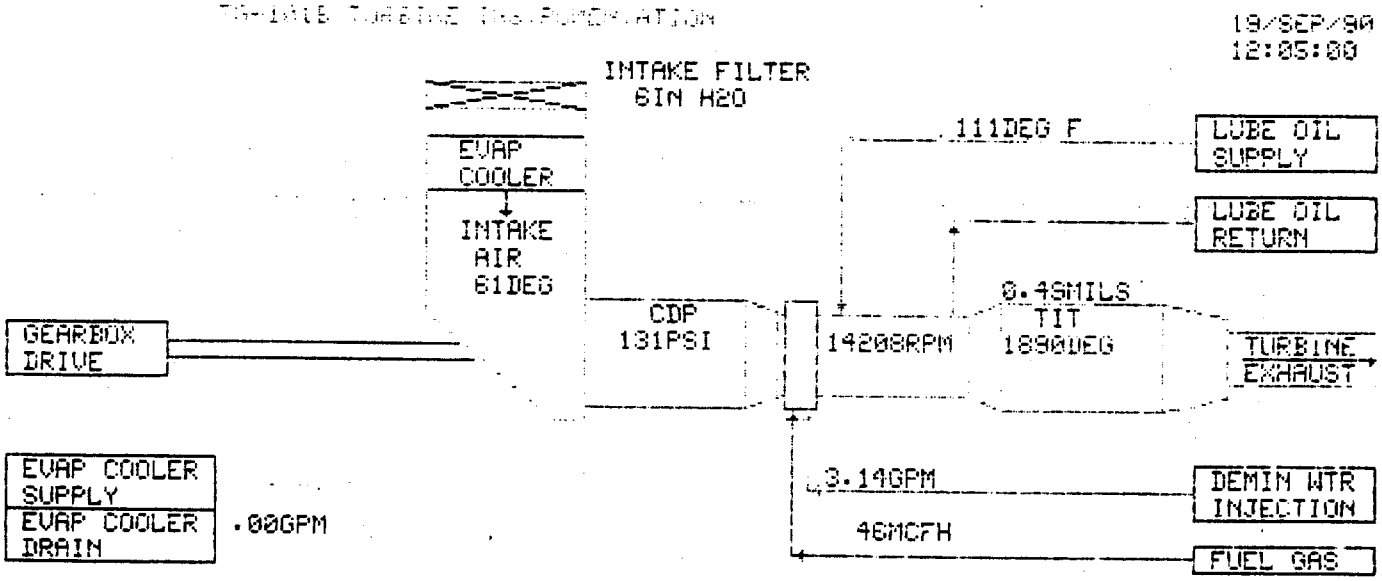


COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 12:37:17

FUEL GAS 573.1163 MCF	24 HR RUNNING	
FUEL GAS 1075.172 MCF	24 HR PREVIOUS	
FUEL GAS 2725.705 MCF	7 DAY RUNNING	
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS 19056.21 MCF	MONTH RUNNING	
FUEL GAS 31882.16 MCF	MONTH PREVIOUS	

FUEL GAS 581.6487 MCF	24 HR RUNNING	
FUEL GAS 1090.959 MCF	24 HR PREVIOUS	
FUEL GAS 2765.876 MCF	7 DAY RUNNING	
FUEL GAS 7674.877 MCF	7 DAY PREVIOUS	
FUEL GAS 20322.35 MCF	MONTH RUNNING	
FUEL GAS 33160.48 MCF	MONTH PREVIOUS	

0.73 RATIO

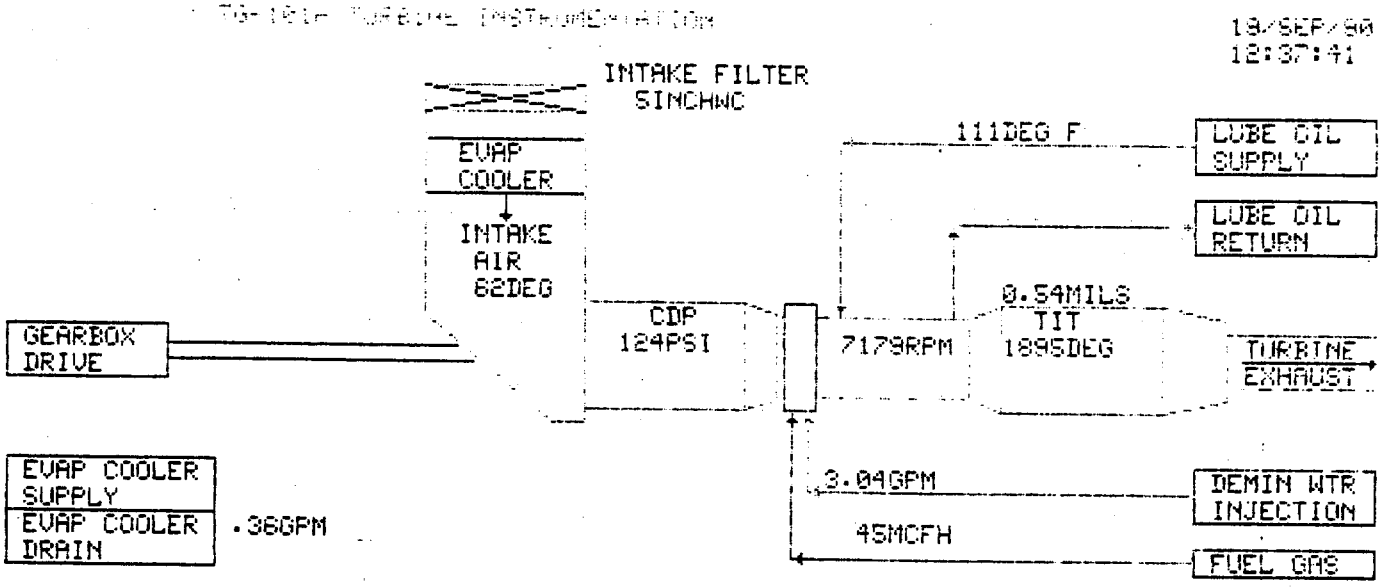
FUEL GAS 1174.208 MCF	24 HR RUNNING	
FUEL GAS 2195.398 MCF	24 HR PREVIOUS	
FUEL GAS 5571.372 MCF	7 DAY RUNNING	
FUEL GAS 15438.58 MCF	7 DAY PREVIOUS	
FUEL GAS 39858.65 MCF	MONTH RUNNING	
FUEL GAS 67366.09 MCF	MONTH PREVIOUS	

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/19/90 TIME: 12:37:41



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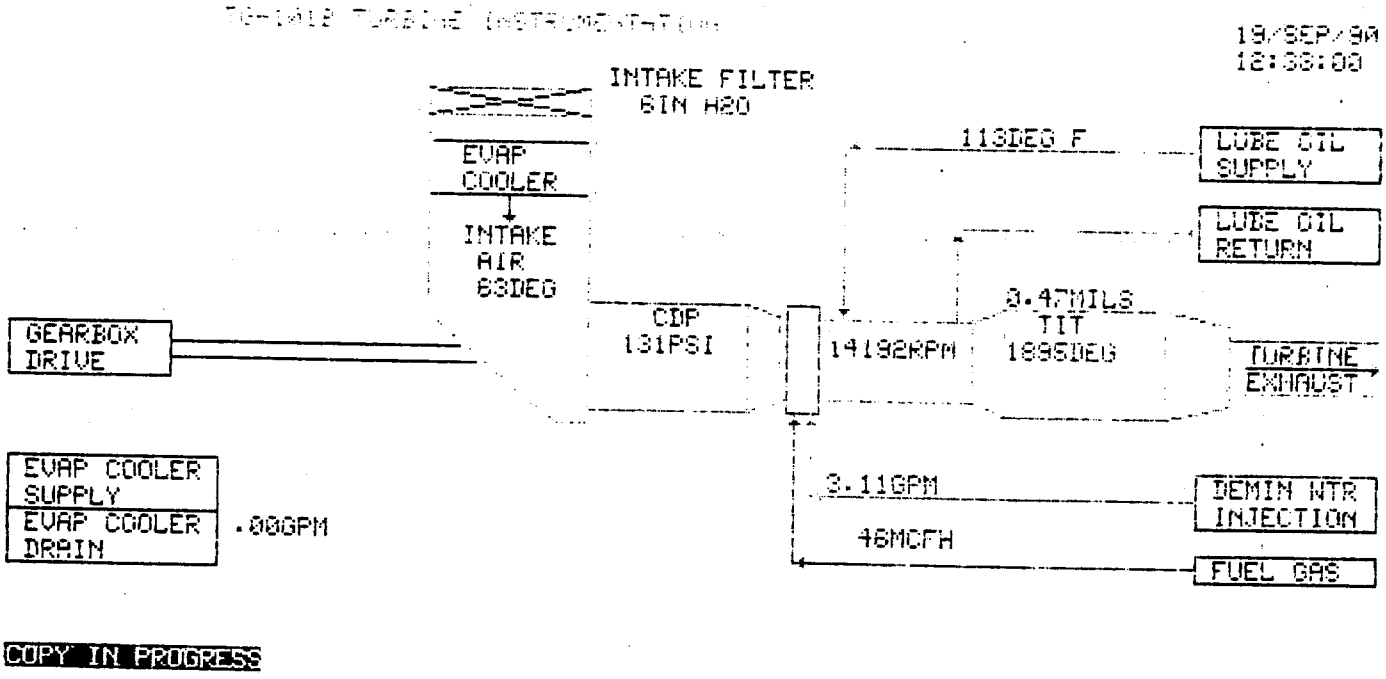

COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 12:59:23

FUEL GAS 589.6591 MCF	24 HR RUNNING	
FUEL GAS 1075.172 MCF	24 HR PREVIOUS	
FUEL GAS 2742.237 MCF	7 DAY RUNNING	
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS 19071.74 MCF	MONTH RUNNING	
FUEL GAS 31982.16 MCF	MONTH PREVIOUS	

FUEL GAS 586.4755 MCF	24 HR RUNNING	
FUEL GAS 1060.059 MCF	24 HR PREVIOUS	
FUEL GAS 2782.688 MCF	7 DAY RUNNING	
FUEL GAS 7874.877 MCF	7 DAY PREVIOUS	
FUEL GAS 20339.08 MCF	MONTH RUNNING	
FUEL GAS 33160.48 MCF	MONTH PREVIOUS	

0.73

FUEL GAS 1207.308 MCF	24 HR RUNNING	
FUEL GAS 2195.396 MCF	24 HR PREVIOUS	
FUEL GAS 5805.015 MCF	7 DAY RUNNING	
FUEL GAS 15436.58 MCF	7 DAY PREVIOUS	
FUEL GAS 38893.52 MCF	MONTH RUNNING	
FUEL GAS 67386.09 MCF	MONTH PREVIOUS	

0.73

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

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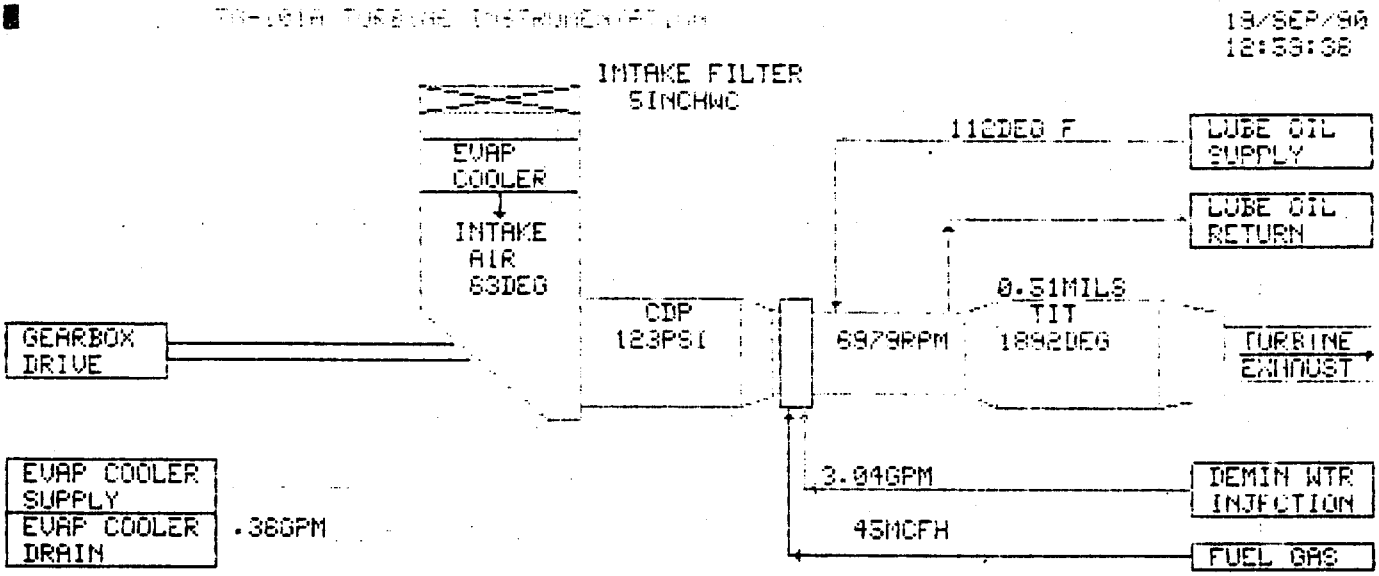

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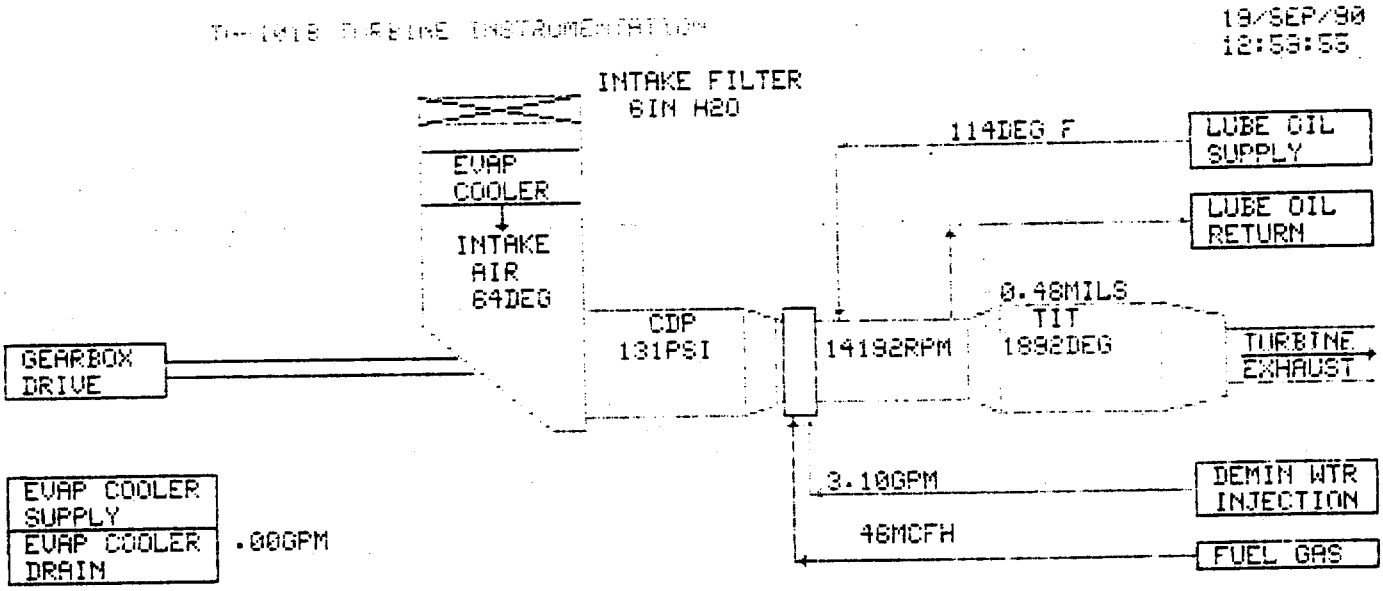

COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 13:21:34

FUEL GAS	606.2029	MCF	24 HR RUNNING		
FUEL GAS	1075.172	MCF	24 HR PREVIOUS		
FUEL GAS	2758.788	MCF	7 DAY RUNNING		
FUEL GAS	7588.764	MCF	7 DAY PREVIOUS		
FUEL GAS	19087.34	MCF	MONTH RUNNING		
FUEL GAS	31982.16	MCF	MONTH PREVIOUS		

FUEL GAS	615.3093	MCF	24 HR RUNNING		
FUEL GAS	1030.859	MCF	24 HR PREVIOUS		
FUEL GAS	2789.555	MCF	7 DAY RUNNING		
FUEL GAS	7674.877	MCF	7 DAY PREVIOUS		
FUEL GAS	20355.24	MCF	MONTH RUNNING		
FUEL GAS	33180.49	MCF	MONTH PREVIOUS		

0.73 RATIO

FUEL GAS	1241.583	MCF	24 HR RUNNING		
FUEL GAS	2195.398	MCF	24 HR PREVIOUS		
FUEL GAS	5638.810	MCF	7 DAY RUNNING		
FUEL GAS	15436.58	MCF	7 DAY PREVIOUS		
FUEL GAS	39924.94	MCF	MONTH RUNNING		
FUEL GAS	67368.09	MCF	MONTH PREVIOUS		

0.74 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/19/90 TIME: 13:21:51

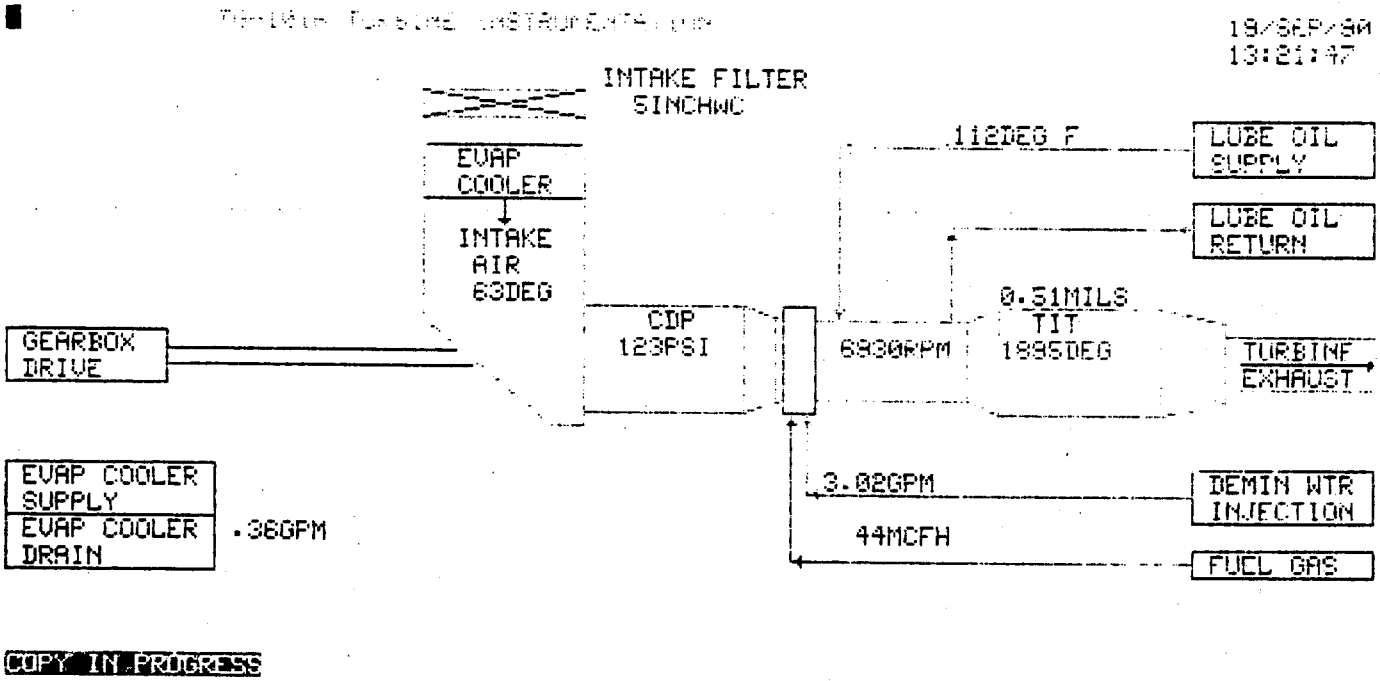

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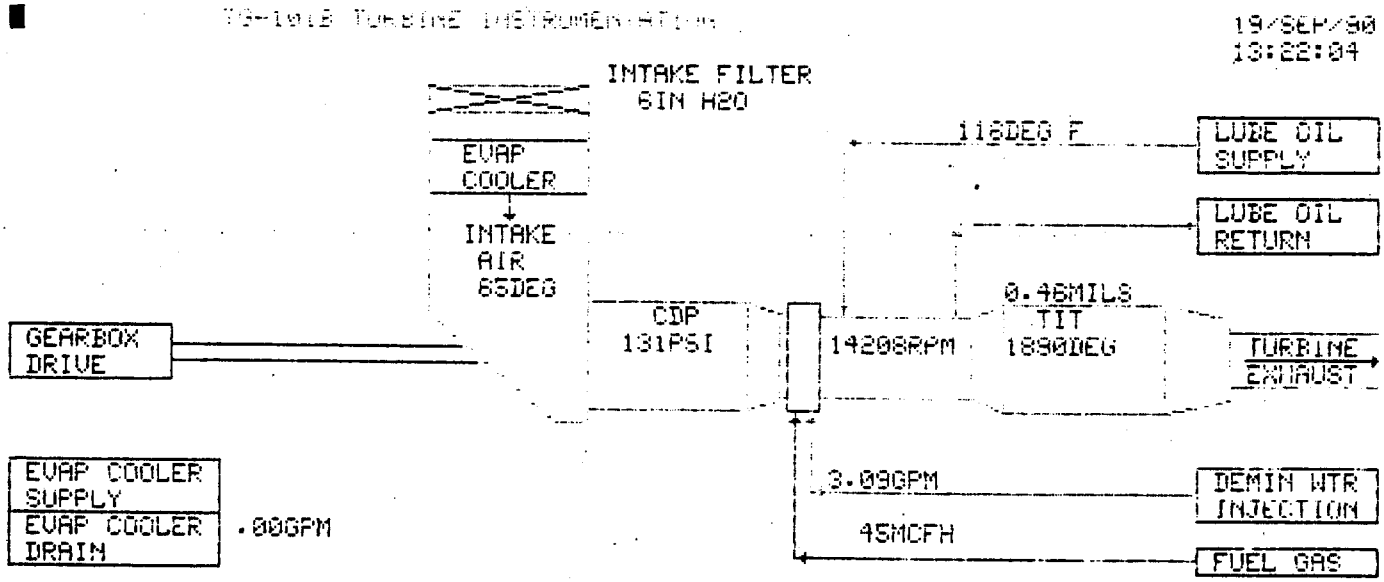
DIAGRAM NUMBER: 2011 VERSION: 0

DATE: 09/19/90 TIME: 13:22:09



COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 13:41:15

FUEL GAS	620.8849	MCF	24 HR RUNNING		
FUEL GAS	1073.172	MCF	24 HR PREVIOUS		
FUEL GAS	2773.473	MCF	7 DAY RUNNING		
FUEL GAS	7588.764	MCF	7 DAY PREVIOUS		
FUEL GAS	19101.17	MCF	MONTH RUNNING		
FUEL GAS	31982.16	MCF	MONTH PREVIOUS		
FUEL GAS	530.2517	MCF	24 HR RUNNING		
FUEL GAS	1060.353	MCF	24 HR PREVIOUS		
FUEL GAS	2814.511	MCF	7 DAY RUNNING		
FUEL GAS	7674.877	MCF	7 DAY PREVIOUS		
FUEL GAS	20369.79	MCF	MONTH RUNNING		
FUEL GAS	33180.48	MCF	MONTH PREVIOUS		

0.72 RATIO

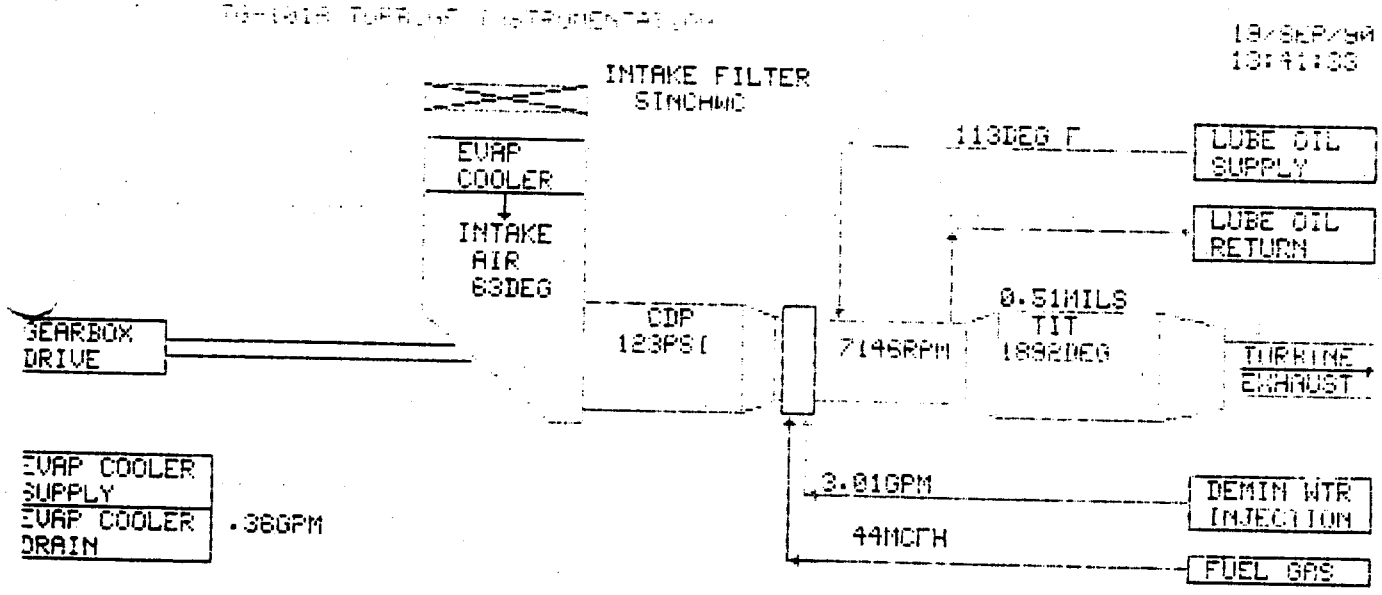
FUEL GAS	1271.487	MCF	24 HR RUNNING
FUEL GAS	2195.396	MCF	24 HR PREVIOUS
FUEL GAS	5868.771	MCF	7 DAY RUNNING
FUEL GAS	15436.58	MCF	7 DAY PREVIOUS
FUEL GAS	33954.00	MCF	MONTH RUNNING
FUEL GAS	67386.09	MCF	MONTH PREVIOUS

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/19/90 TIME: 13:41:37



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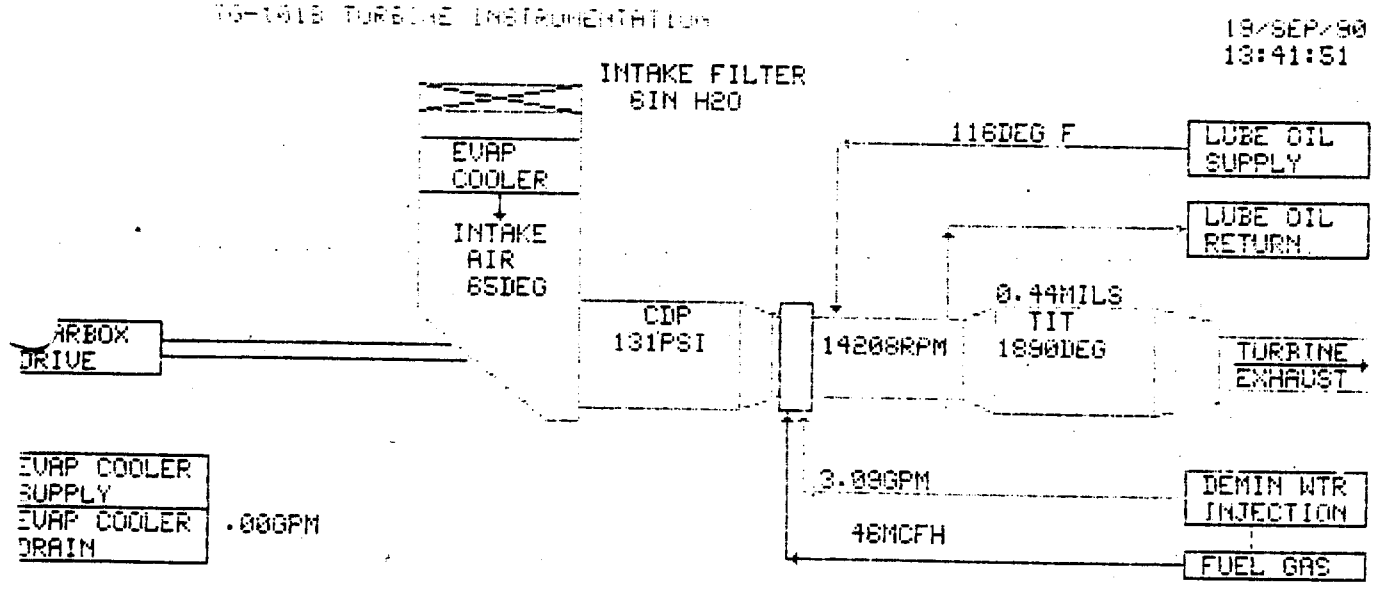
DATE: 09/19/90 TIME: 13:41:56



COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/19/90 TIME: 14:00:17

FUEL GAS	635.0634 MCF	24 HR	RUNNING
FUEL GAS	1075.172 MCF	24 HR	PREVIOUS
FUEL GAS	2787.654 MCF	7 DAY	RUNNING
FUEL GAS	7588.784 MCF	7 DAY	PREVIOUS
FUEL GAS	19114.56 MCF	MONTH	RUNNING
FUEL GAS	31982.18 MCF	MONTH	PREVIOUS

FUEL GAS	644.6689 MCF	24 HR	RUNNING
FUEL GAS	1090.958 MCF	24 HR	PREVIOUS
FUEL GAS	2828.948 MCF	7 DAY	RUNNING
FUEL GAS	7674.877 MCF	7 DAY	PREVIOUS
FUEL GAS	20383.43 MCF	MONTH	RUNNING
FUEL GAS	33160.48 MCF	MONTH	PREVIOUS

0.73 RATIO

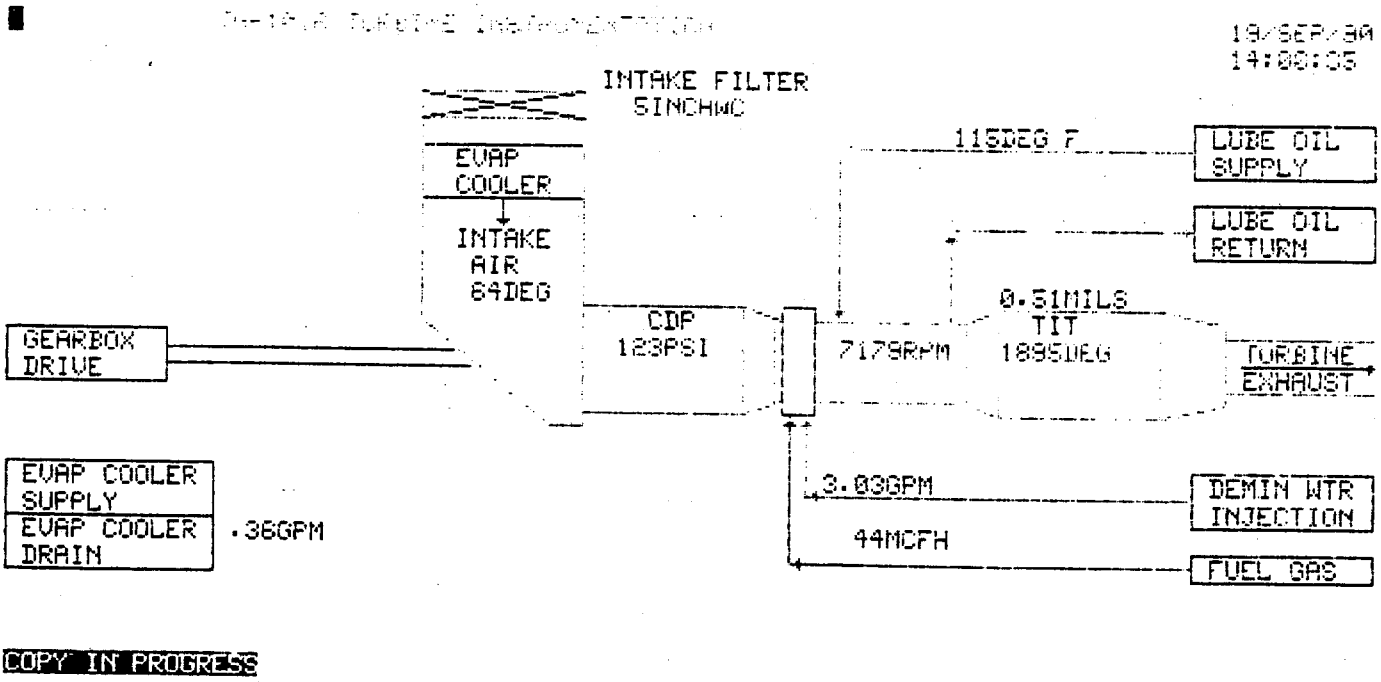
FUEL GAS	1300.350 MCF	24 HR	RUNNING
FUEL GAS	2195.396 MCF	24 HR	PREVIOUS
FUEL GAS	5637.788 MCF	7 DAY	RUNNING
FUEL GAS	15436.58 MCF	7 DAY	PREVIOUS
FUEL GAS	39980.85 MCF	MONTH	RUNNING
FUEL GAS	67366.09 MCF	MONTH	PREVIOUS

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/19/90 TIME: 14:00:39



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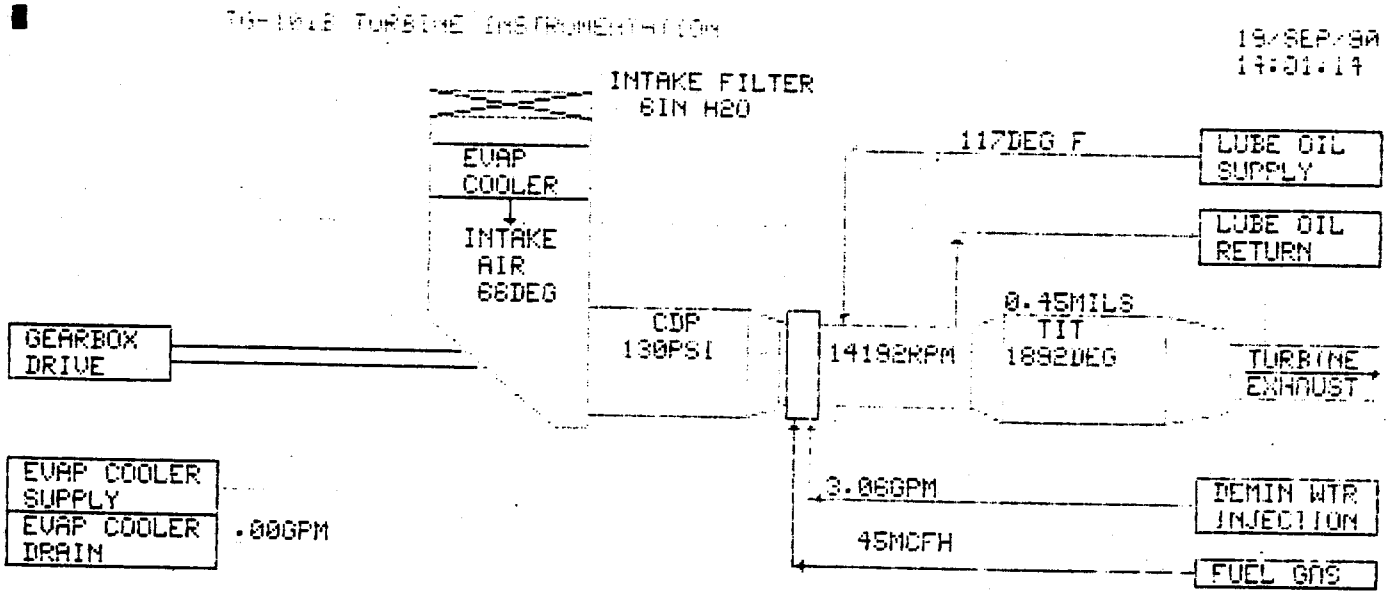

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 09:33:34

[illegible] [illegible] [illegible]

FUEL GAS 429.4771 MCF	24 HR RUNNING	
FUEL GAS 1081.823 MCF	24 HR PREVIOUS	
FUEL GAS 3883.883 MCF	7 DAY RUNNING	
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS 19940.26 MCF	MONTH RUNNING	
FUEL GAS 31982.16 MCF	MONTH PREVIOUS	

FUEL GAS 436.0505 MCF	24 HR RUNNING	
FUEL GAS 1038.213 MCF	24 HR PREVIOUS	
FUEL GAS 3718.628 MCF	7 DAY RUNNING	
FUEL GAS 7674.877 MCF	7 DAY PREVIOUS	
FUEL GAS 21247.41 MCF	MONTH RUNNING	
FUEL GAS 33180.48 MCF	MONTH PREVIOUS	

0.74 [illegible]

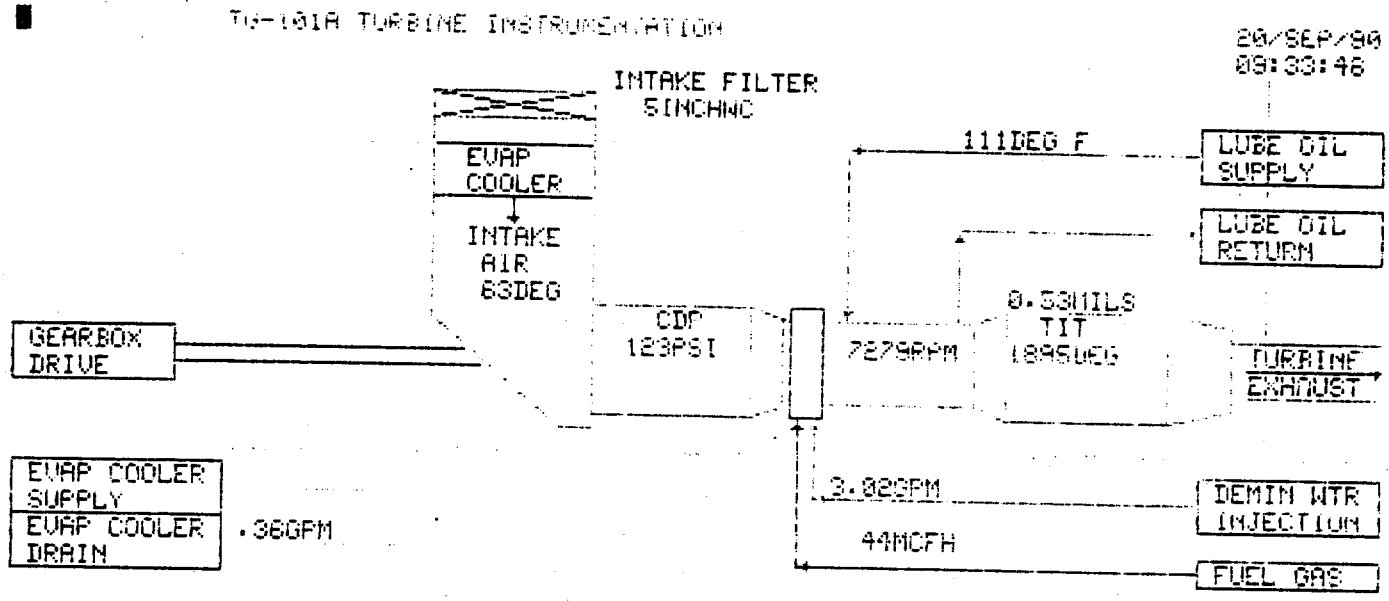
FUEL GAS 879.7786 MCF	24 HR RUNNING	
FUEL GAS 2211.638 MCF	24 HR PREVIOUS	
FUEL GAS 7480.578 MCF	7 DAY RUNNING	
FUEL GAS 15436.58 MCF	7 DAY PREVIOUS	
FUEL GAS 41788.63 MCF	MONTH RUNNING	
FUEL GAS 67386.09 MCF	MONTH PREVIOUS	

0.74 [illegible]

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 09:33:50



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DATE: 09/20/90 TIME: 09:34:12

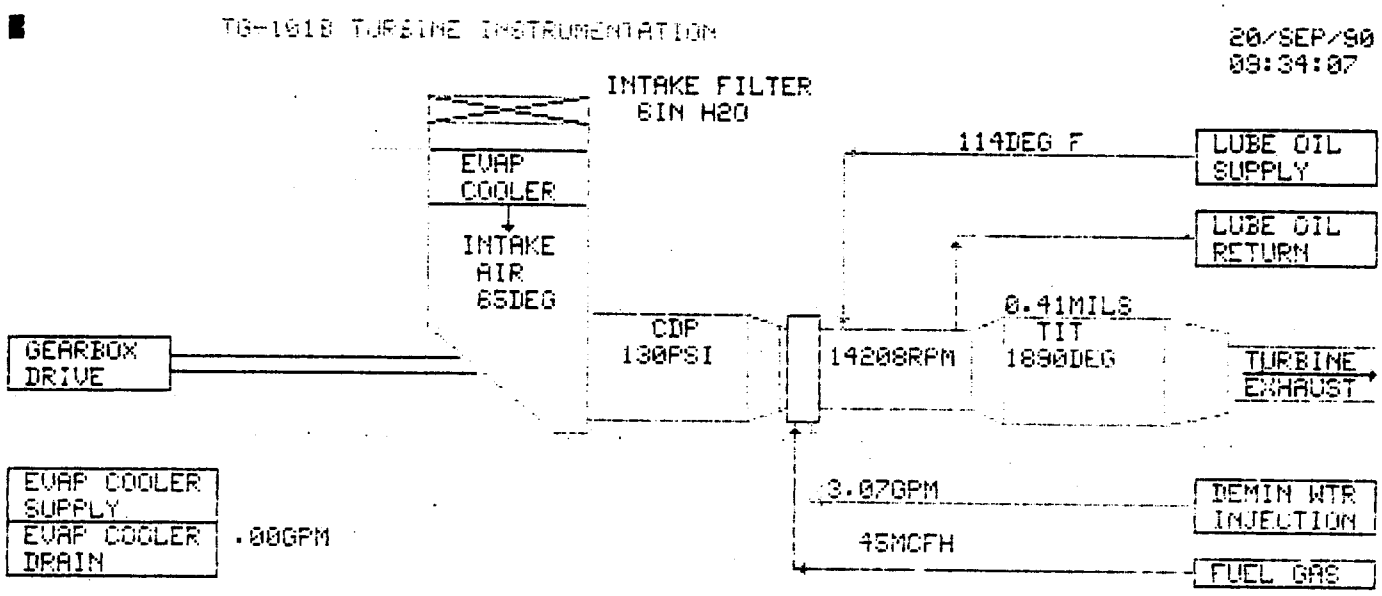

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 10:26:02

10/SEP/90 [redacted] 10:26:01

[redacted]

FUEL GAS 468.3777 MCF 24 HR RUNNING
FUEL GAS 1081.823 MCF 24 HR PREVIOUS

FUEL GAS 3702.833 MCF 7 DAY RUNNING
FUEL GAS 7588.784 MCF 7 DAY PREVIOUS

FUEL GAS 19977.15 MCF MONTH RUNNING
FUEL GAS 31982.16 MCF MONTH PREVIOUS

[redacted]

FUEL GAS 475.5262 MCF 24 HR RUNNING
FUEL GAS 1088.213 MCF 24 HR PREVIOUS

FUEL GAS 3758.094 MCF 7 DAY RUNNING
FUEL GAS 7674.877 MCF 7 DAY PREVIOUS

FUEL GAS 21284.50 MCF MONTH RUNNING
FUEL GAS 33160.48 MCF MONTH PREVIOUS

[redacted]

0.73 RATIO

[redacted]

FUEL GAS 959.1521 MCF 24 HR RUNNING
FUEL GAS 2211.638 MCF 24 HR PREVIOUS

FUEL GAS 7570.386 MCF 7 DAY RUNNING
FUEL GAS 15436.58 MCF 7 DAY PREVIOUS

FUEL GAS 41862.47 MCF MONTH RUNNING
FUEL GAS 87366.09 MCF MONTH PREVIOUS

[redacted]

0.73 RATIO

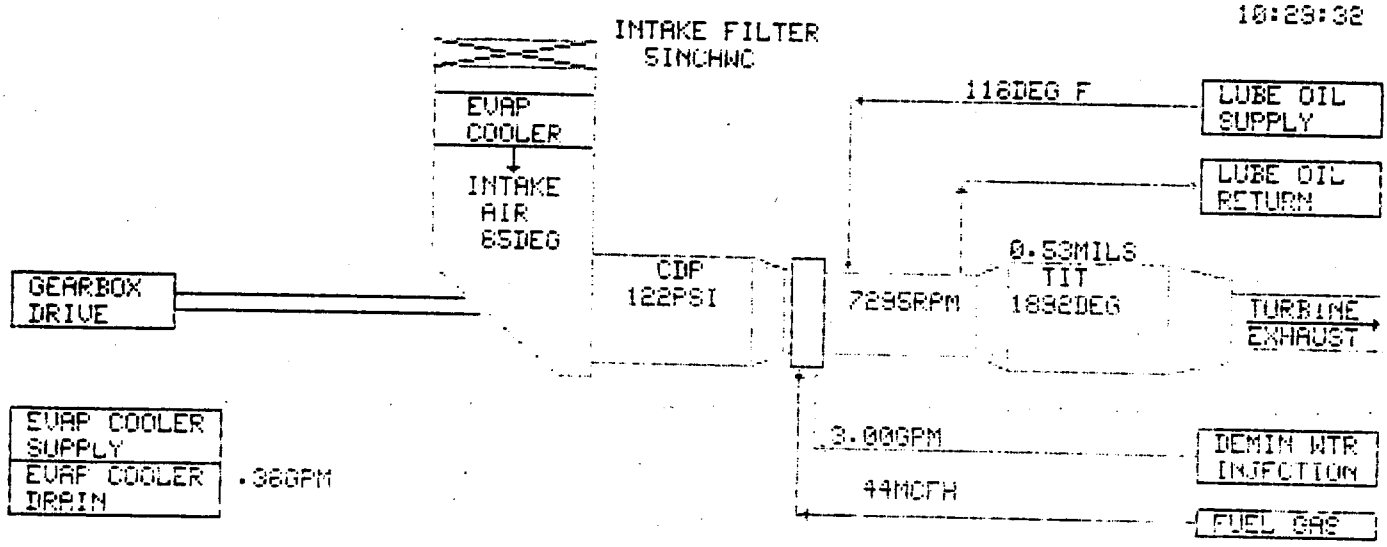
COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 10:29:34

TG-101A TURBINE INSTRUMENTATION

20/SEP/90
10:29:32



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DATE: 09/20/90 TIME: 10:29:50

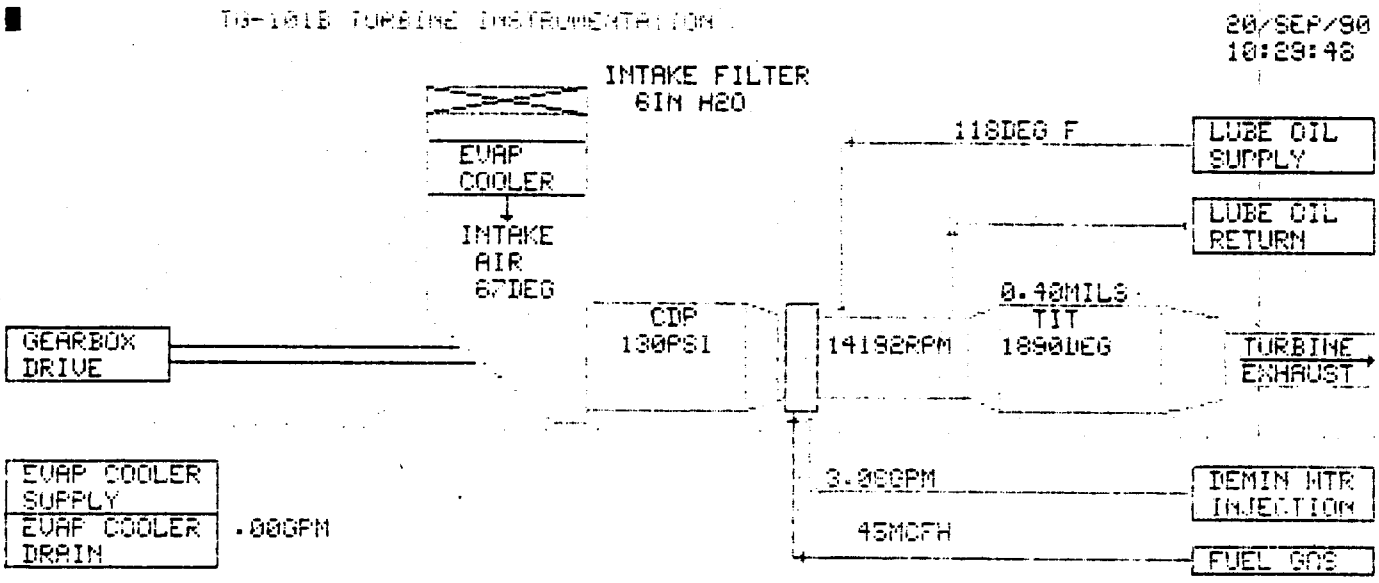

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 10:46:37

FUEL GAS 483.6721 MCF	24 HR RUNNING	
FUEL GAS 1081.823 MCF	24 HR PREVIOUS	
FUEL GAS 3718.143 MCF	7 DAY RUNNING	
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS 19991.65 MCF	MONTH RUNNING	
FUEL GAS 31982.16 MCF	MONTH PREVIOUS	

FUEL GAS 491.0188 MCF	24 HR RUNNING	
FUEL GAS 1088.213 MCF	24 HR PREVIOUS	
FUEL GAS 3773.573 MCF	7 DAY RUNNING	
FUEL GAS 7674.877 MCF	7 DAY PREVIOUS	
FUEL GAS 21299.04 MCF	MONTH RUNNING	
FUEL GAS 33160.49 MCF	MONTH PREVIOUS	

0.73

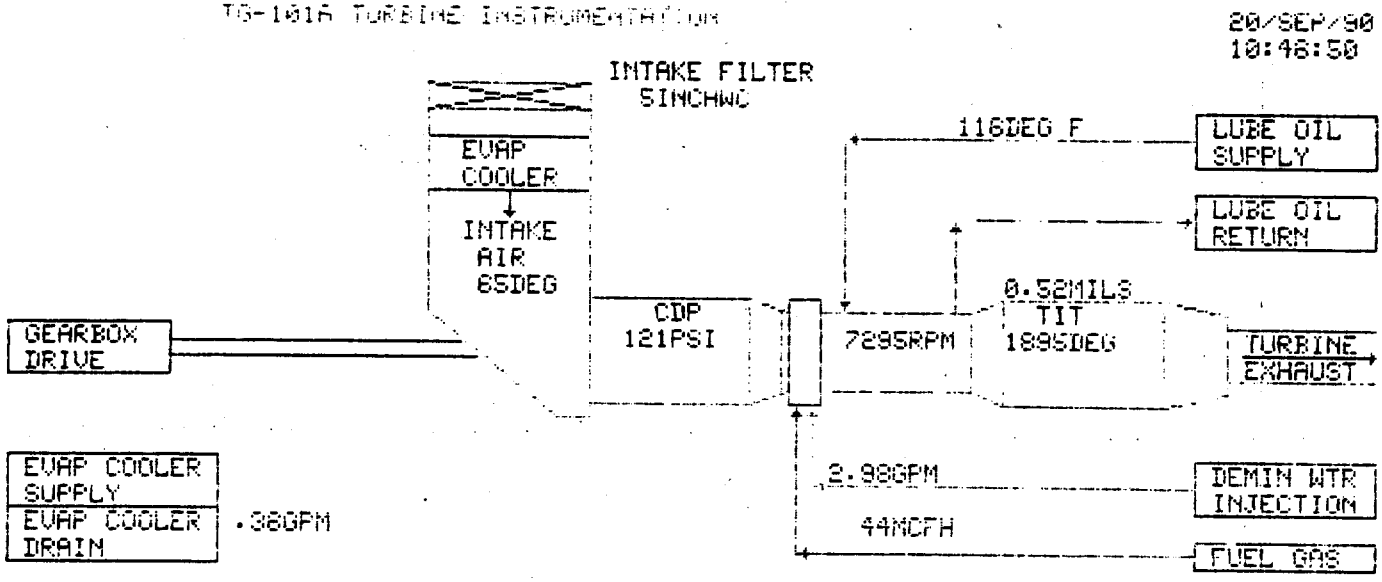
FUEL GAS 890.2777 MCF	24 HR RUNNING	
FUEL GAS 2211.638 MCF	24 HR PREVIOUS	
FUEL GAS 7601.649 MCF	7 DAY RUNNING	
FUEL GAS 19439.58 MCF	7 DAY PREVIOUS	
FUEL GAS 41691.44 MCF	MONTH RUNNING	
FUEL GAS 87388.09 MCF	MONTH PREVIOUS	

0.72

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 10:46:55



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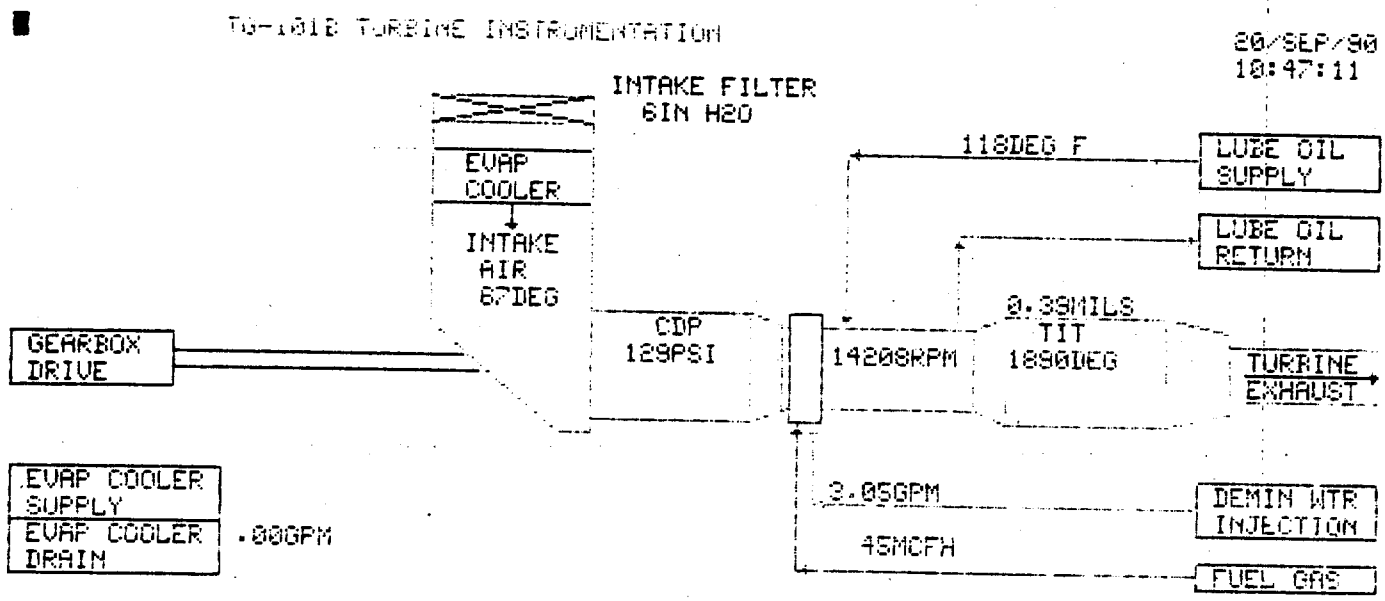
DATE: 09/20/90 TIME: 10:47:13



COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 11:23:04

20/SEP/90 11:23:03

FUEL GAS	510.6813	MCF	24 HR RUNNING		
FUEL GAS	1081.823	MCF	24 HR PREVIOUS		
FUEL GAS	3745.143	MCF	7 DAY RUNNING		
FUEL GAS	7588.764	MCF	7 DAY PREVIOUS		
FUEL GAS	20017.27	MCF	MONTH RUNNING		
FUEL GAS	31882.16	MCF	MONTH PREVIOUS		

FUEL GAS	518.4785	MCF	24 HR RUNNING		
FUEL GAS	1098.213	MCF	24 HR PREVIOUS		
FUEL GAS	3801.024	MCF	7 DAY RUNNING		
FUEL GAS	7674.877	MCF	7 DAY PREVIOUS		
FUEL GAS	21324.90	MCF	MONTH RUNNING		
FUEL GAS	33160.49	MCF	MONTH PREVIOUS		

0.72 RATIO

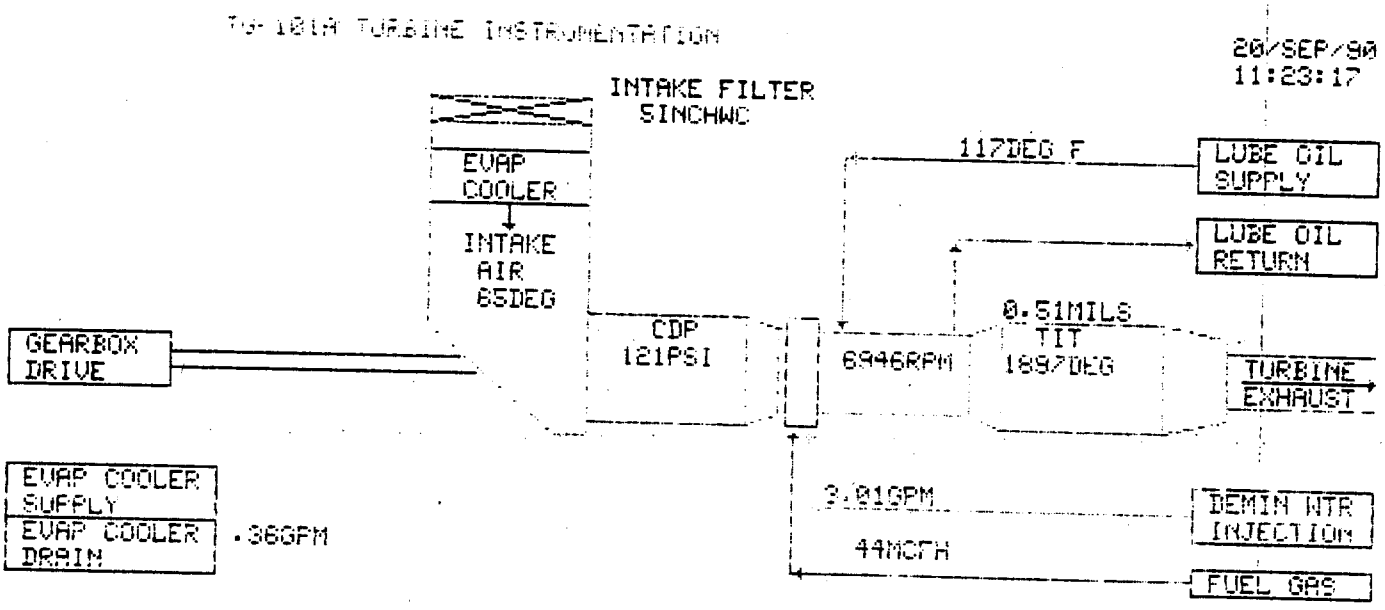
FUEL GAS	1045.343	MCF	24 HR RUNNING		
FUEL GAS	2211.638	MCF	24 HR PREVIOUS		
FUEL GAS	7656.774	MCF	7 DAY RUNNING		
FUEL GAS	15436.58	MCF	7 DAY PREVIOUS		
FUEL GAS	41948.70	MCF	MONTH RUNNING		
FUEL GAS	67366.09	MCF	MONTH PREVIOUS		

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 11:23:22



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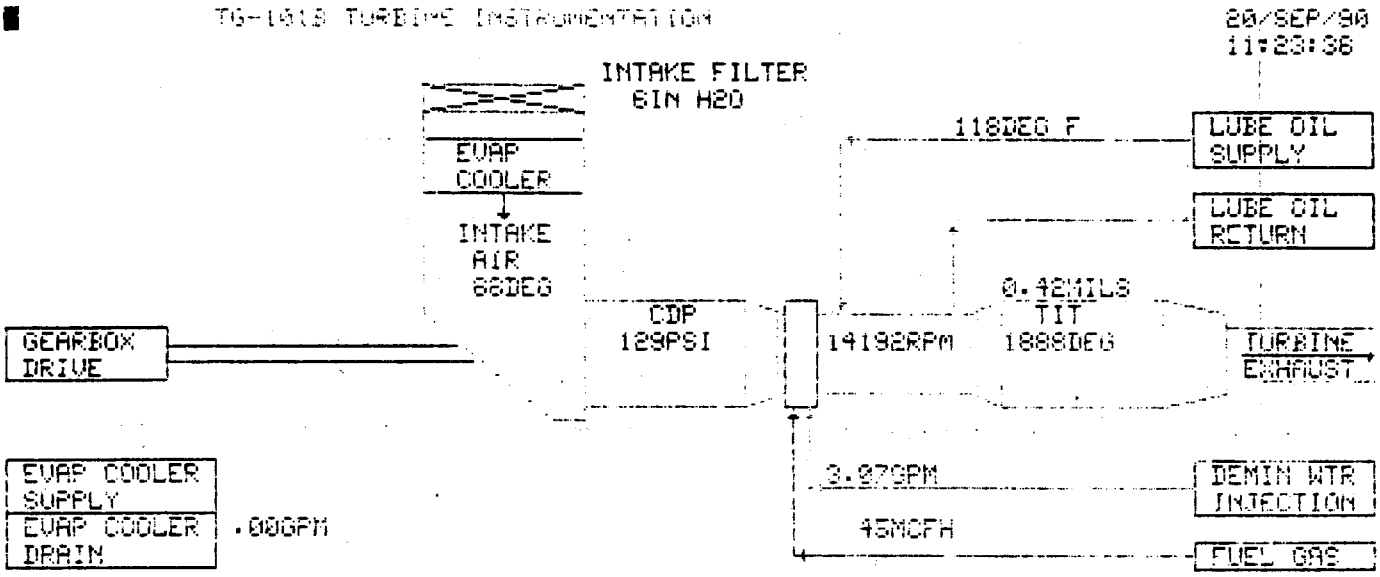

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 11:39:57

[redacted]

FUEL GAS 523.1826 MCF	24 HR RUNNING	
FUEL GAS 1081.823 MCF	24 HR PREVIOUS	
FUEL GAS 3757.648 MCF	7 DAY RUNNING	
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS 20029.14 MCF	MONTH RUNNING	
FUEL GAS 31382.16 MCF	MONTH PREVIOUS	

FUEL GAS 531.2003 MCF	24 HR RUNNING	
FUEL GAS 1080.213 MCF	24 HR PREVIOUS	
FUEL GAS 3813.748 MCF	7 DAY RUNNING	
FUEL GAS 7674.877 MCF	7 DAY PREVIOUS	
FUEL GAS 21336.90 MCF	MONTH RUNNING	
FUEL GAS 33160.43 MCF	MONTH PREVIOUS	

[redacted] 0.73 RATIO

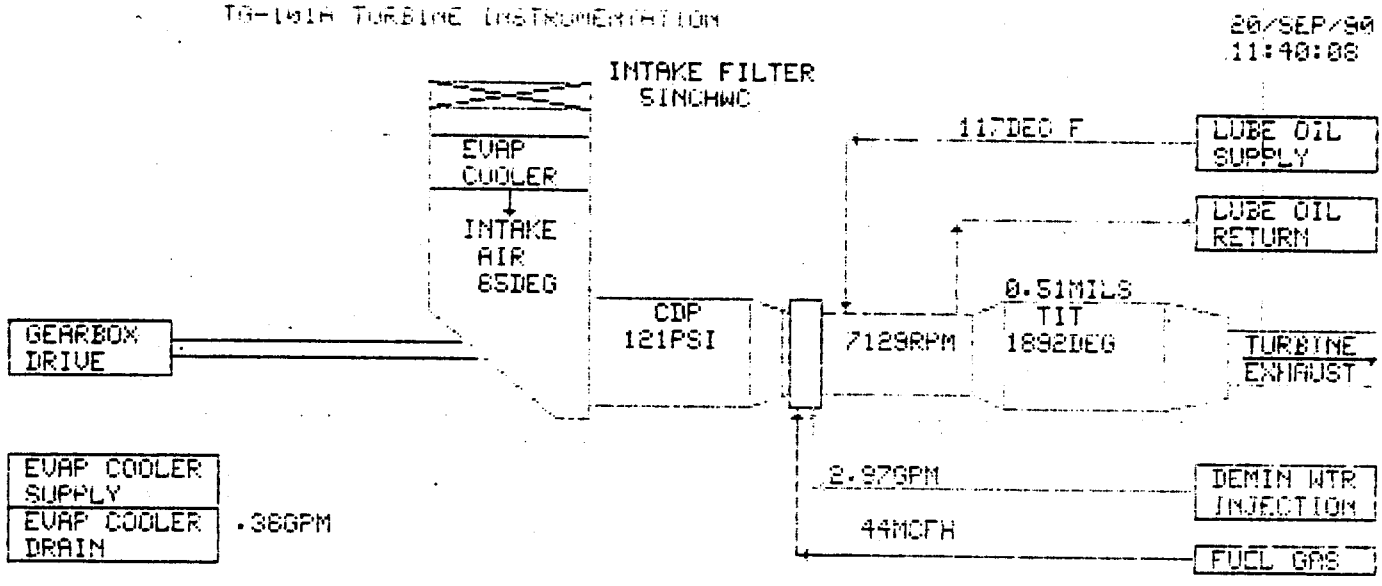
FUEL GAS 1070.853 MCF	24 HR RUNNING	
FUEL GAS 2211.938 MCF	24 HR PREVIOUS	
FUEL GAS 7682.401 MCF	7 DAY RUNNING	
FUEL GAS 15436.58 MCF	7 DAY PREVIOUS	
FUEL GAS 41868.42 MCF	MONTH RUNNING	
FUEL GAS 67366.09 MCF	MONTH PREVIOUS	

[redacted] 0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 11:40:12



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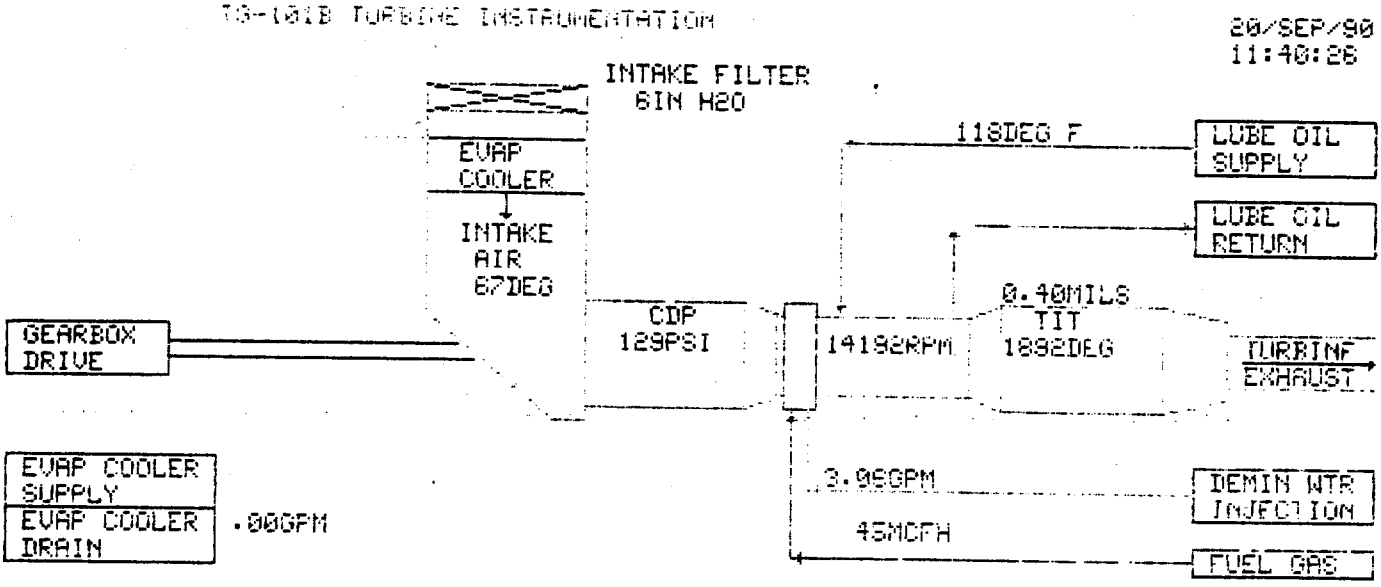


COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 12:29:30

20/SEP/90 12:29:30

FUEL GAS 559.6349 MCF	24 HR RUNNING	
FUEL GAS 1081.823 MCF	24 HR PREVIOUS	
FUEL GAS 3794.102 MCF	7 DAY RUNNING	
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS 20063.97 MCF	MONTH RUNNING	
FUEL GAS 31982.16 MCF	MONTH PREVIOUS	

FUEL GAS 568.4310 MCF	24 HR RUNNING	
FUEL GAS 1088.213 MCF	24 HR PREVIOUS	
FUEL GAS 3850.952 MCF	7 DAY RUNNING	
FUEL GAS 7874.877 MCF	7 DAY PREVIOUS	
FUEL GAS 21371.89 MCF	MONTH RUNNING	
FUEL GAS 33160.49 MCF	MONTH PREVIOUS	

0.74 RATIO

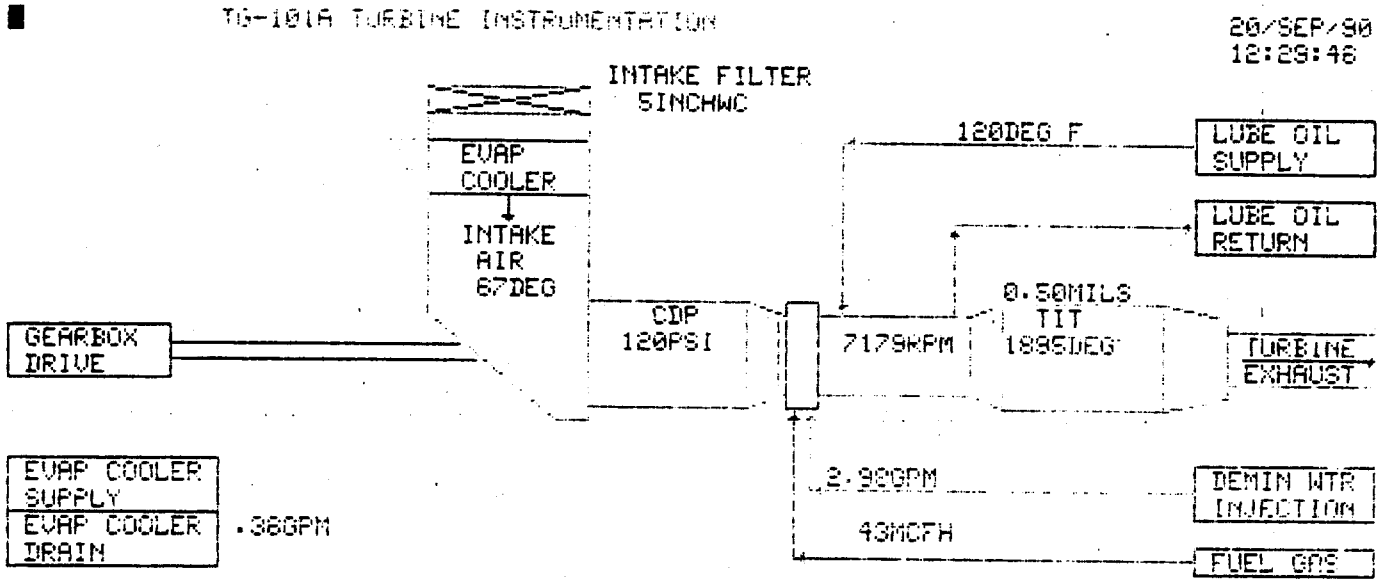
FUEL GAS 1145.263 MCF	24 HR RUNNING	
FUEL GAS 2211.639 MCF	24 HR PREVIOUS	
FUEL GAS 7756.431 MCF	7 DAY RUNNING	
FUEL GAS 15438.58 MCF	7 DAY PREVIOUS	
FUEL GAS 42036.10 MCF	MONTH RUNNING	
FUEL GAS 67388.09 MCF	MONTH PREVIOUS	

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 12:29:51



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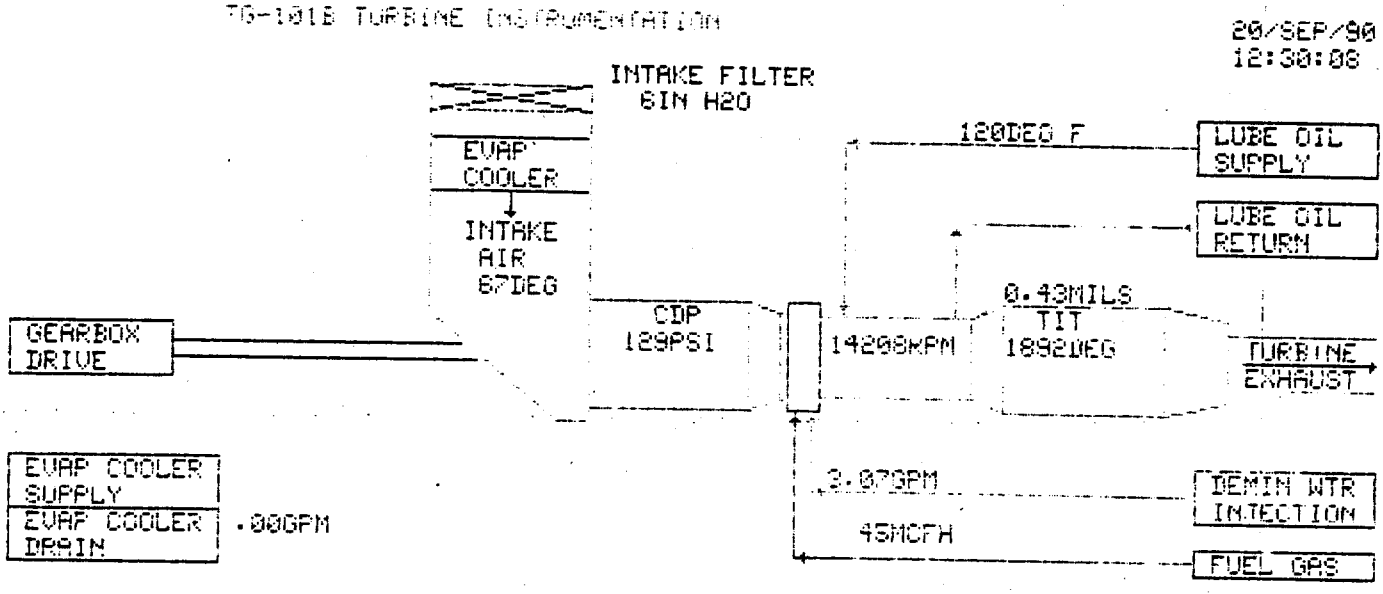

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 12:48:01

20-SEP-90 [illegible] [illegible]

FUEL GAS	573.2182	MCF	24 HR RUNNING		
FUEL GAS	1081.823	MCF	24 HR PREVIOUS		
FUEL GAS	3807.681	MCF	7 DAY RUNNING		
FUEL GAS	7588.764	MCF	7 DAY PREVIOUS		
FUEL GAS	20076.98	MCF	MONTH RUNNING		
FUEL GAS	31982.16	MCF	MONTH PREVIOUS		

FUEL GAS	582.3170	MCF	24 HR RUNNING		
FUEL GAS	1098.213	MCF	24 HR PREVIOUS		
FUEL GAS	3864.831	MCF	7 DAY RUNNING		
FUEL GAS	7674.877	MCF	7 DAY PREVIOUS		
FUEL GAS	21384.92	MCF	MONTH RUNNING		
FUEL GAS	33160.49	MCF	MONTH PREVIOUS		

[illegible]

0.72 RATIO

FUEL GAS	1172.580	MCF	24 HR RUNNING
FUEL GAS	2211.638	MCF	24 HR PREVIOUS
FUEL GAS	7784.088	MCF	7 DAY RUNNING
FUEL GAS	15438.59	MCF	7 DAY PREVIOUS
FUEL GAS	42062.14	MCF	MONTH RUNNING
FUEL GAS	67388.09	MCF	MONTH PREVIOUS

[illegible]

0.74 RATIO

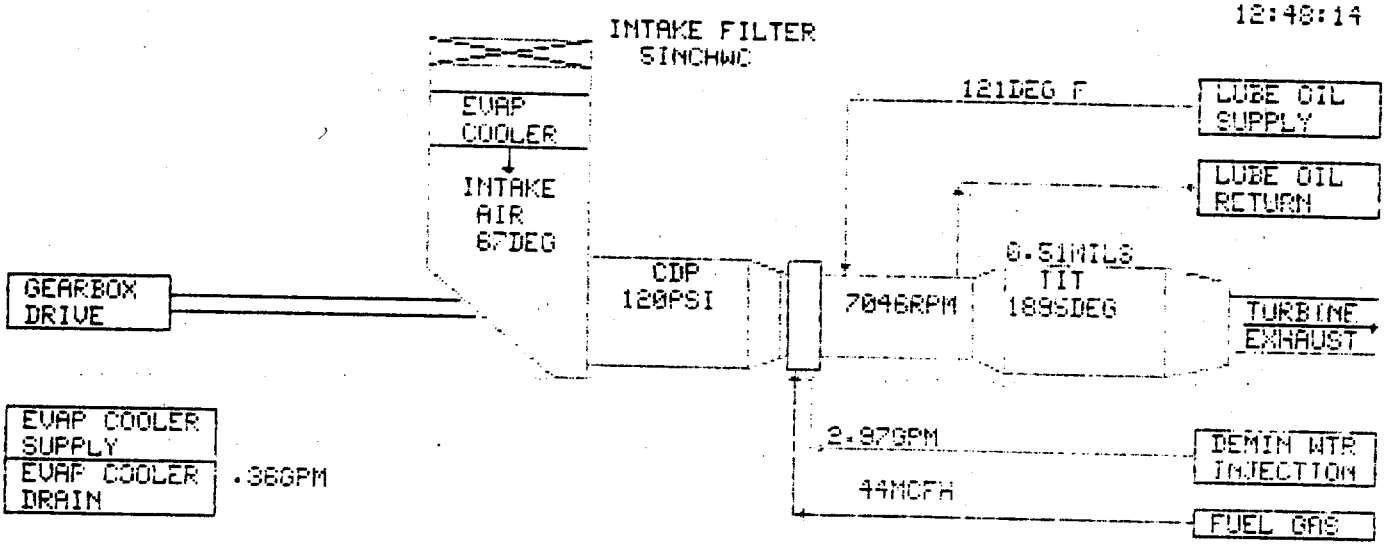
COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 12:48:19

TG-101A TURBINE INSTRUMENTATION

20/SEP/90
12:48:14



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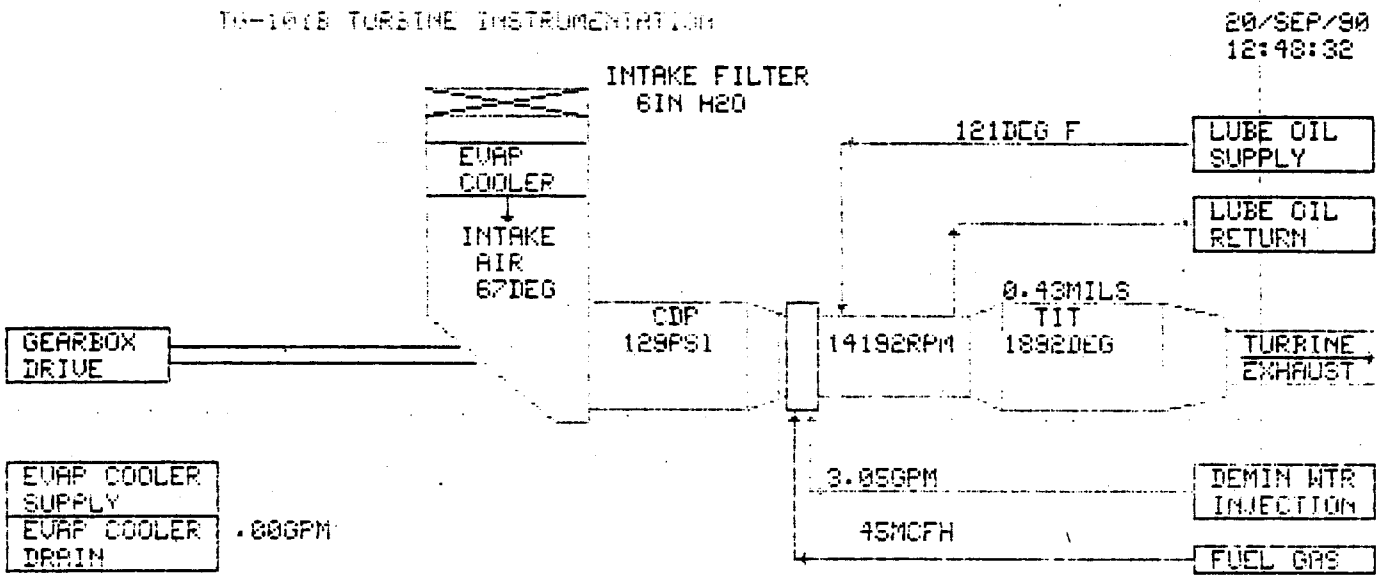


COPY IN PROGRESS

DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 13:20:21

FUEL GAS 596.9731 MCF	24 HR RUNNING	
FUEL GAS 1081.823 MCF	24 HR PREVIOUS	
FUEL GAS 3831.434 MCF	7 DAY RUNNING	
FUEL GAS 7588.784 MCF	7 DAY PREVIOUS	
FUEL GAS 20099.73 MCF	MONTH RUNNING	
FUEL GAS 31962.16 MCF	MONTH PREVIOUS	

FUEL GAS 606.5720 MCF	24 HR RUNNING	
FUEL GAS 1058.213 MCF	24 HR PREVIOUS	
FUEL GAS 3889.071 MCF	7 DAY RUNNING	
FUEL GAS 7674.877 MCF	7 DAY PREVIOUS	
FUEL GAS 21407.71 MCF	MONTH RUNNING	
FUEL GAS 33160.49 MCF	MONTH PREVIOUS	

0.72 RATIO

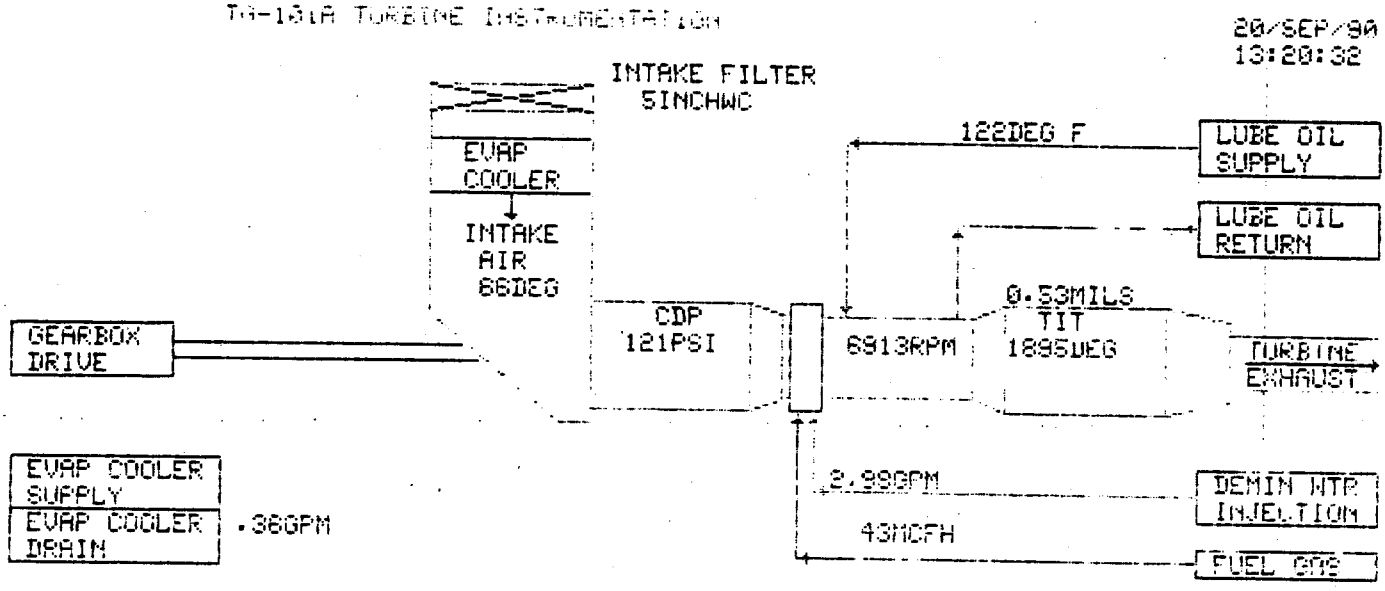
FUEL GAS 1221.430 MCF	24 HR RUNNING	
FUEL GAS 2211.638 MCF	24 HR PREVIOUS	
FUEL GAS 7832.433 MCF	7 DAY RUNNING	
FUEL GAS 15436.58 MCF	7 DAY PREVIOUS	
FUEL GAS 42107.83 MCF	MONTH RUNNING	
FUEL GAS 67366.09 MCF	MONTH PREVIOUS	

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 13:20:37



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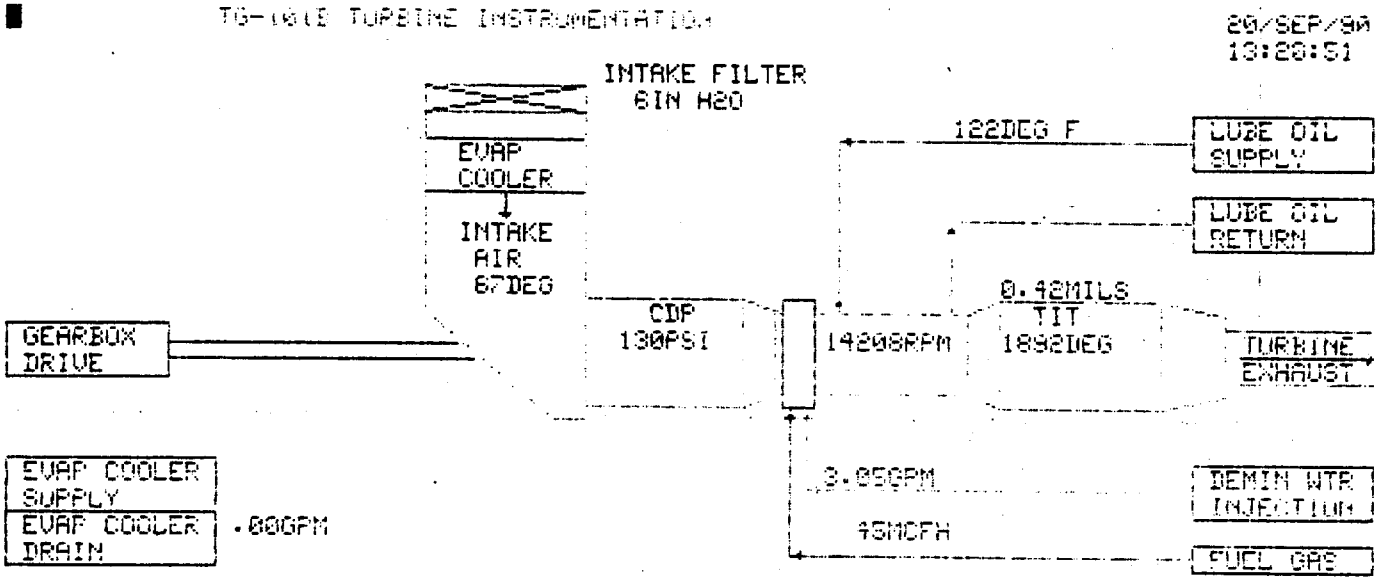

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DATE: 09/20/90 TIME: 13:48:08

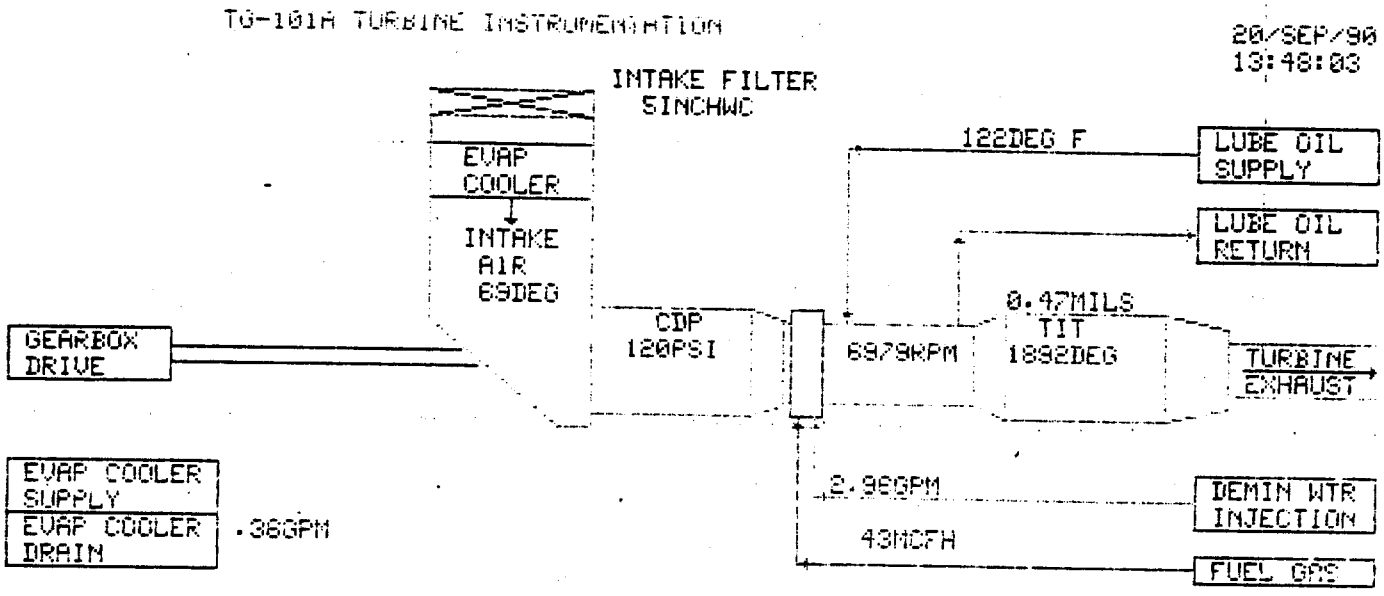

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 13:47:52

09/20/90 13:47:52

FUEL GAS 617.1351 MCF	24 HR RUNNING	
FUEL GAS 1081.823 MCF	24 HR PREVIOUS	
FUEL GAS 3851.598 MCF	7 DAY RUNNING	
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	
FUEL GAS 20119.08 MCF	MONTH RUNNING	
FUEL GAS 31982.16 MCF	MONTH PREVIOUS	

FUEL GAS 627.0920 MCF	24 HR RUNNING	
FUEL GAS 1098.213 MCF	24 HR PREVIOUS	
FUEL GAS 3909.581 MCF	7 DAY RUNNING	
FUEL GAS 7674.877 MCF	7 DAY PREVIOUS	
FUEL GAS 21427.07 MCF	MONTH RUNNING	
FUEL GAS 33160.43 MCF	MONTH PREVIOUS	

0.75 RATIO

FUEL GAS 1262.444 MCF	24 HR RUNNING	
FUEL GAS 2211.638 MCF	24 HR PREVIOUS	
FUEL GAS 7873.543 MCF	7 DAY RUNNING	
FUEL GAS 15438.58 MCF	7 DAY PREVIOUS	
FUEL GAS 42148.32 MCF	MONTH RUNNING	
FUEL GAS 67368.09 MCF	MONTH PREVIOUS	

0.73 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2011 VERSION: 0

DATE: 09/20/90 TIME: 13:51:36

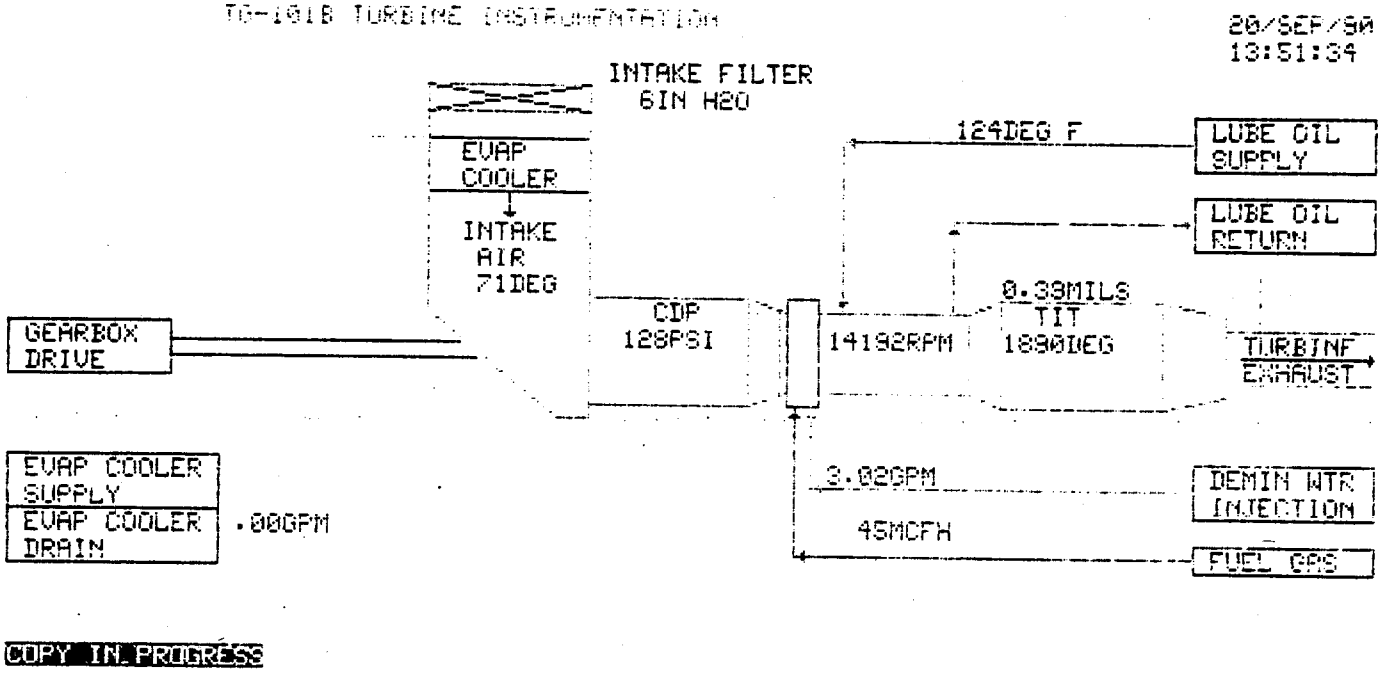

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DIAGRAM NUMBER: 3050 VERSION: 0

DATE: 09/20/90 TIME: 14:19:13

FUEL GAS 640.0001 MCF	24 HR RUNNING	FUEL GAS 650.3140 MCF	24 HR RUNNING
FUEL GAS 1081.823 MCF	24 HR PREVIOUS	FUEL GAS 1086.213 MCF	24 HR PREVIOUS
FUEL GAS 3874.468 MCF	7 DAY RUNNING	FUEL GAS 3832.815 MCF	7 DAY RUNNING
FUEL GAS 7588.764 MCF	7 DAY PREVIOUS	FUEL GAS 7674.877 MCF	7 DAY PREVIOUS
FUEL GAS 20141.12 MCF	MONTH RUNNING	FUEL GAS 21449.11 MCF	MONTH RUNNING
FUEL GAS 31982.16 MCF	MONTH PREVIOUS	FUEL GAS 33160.49 MCF	MONTH PREVIOUS

0.72 RATIO

FUEL GAS 1308.840 MCF	24 HR RUNNING
FUEL GAS 2211.638 MCF	24 HR PREVIOUS
FUEL GAS 7920.040 MCF	7 DAY RUNNING
FUEL GAS 15438.58 MCF	7 DAY PREVIOUS
FUEL GAS 42190.41 MCF	MONTH RUNNING
FUEL GAS 87388.09 MCF	MONTH PREVIOUS

0.72 RATIO

COPY IN PROGRESS

DIAGRAM NUMBER: 2005 VERSION: 0

DATE: 09/20/90 TIME: 14:20:01

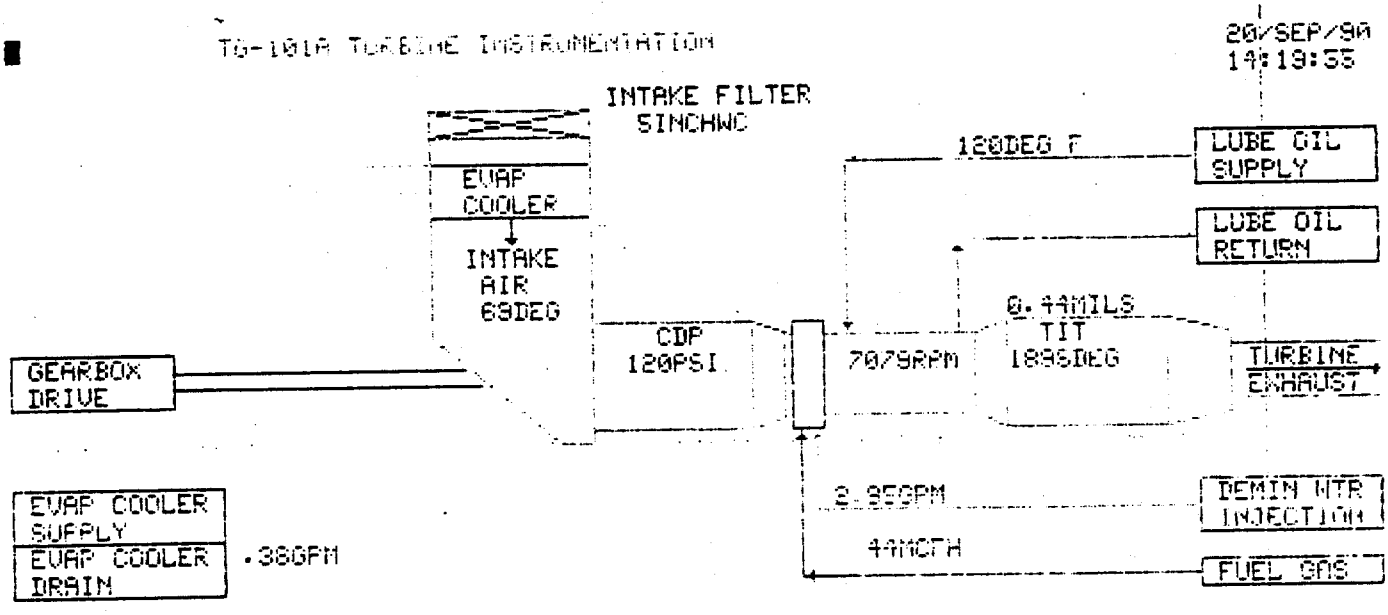

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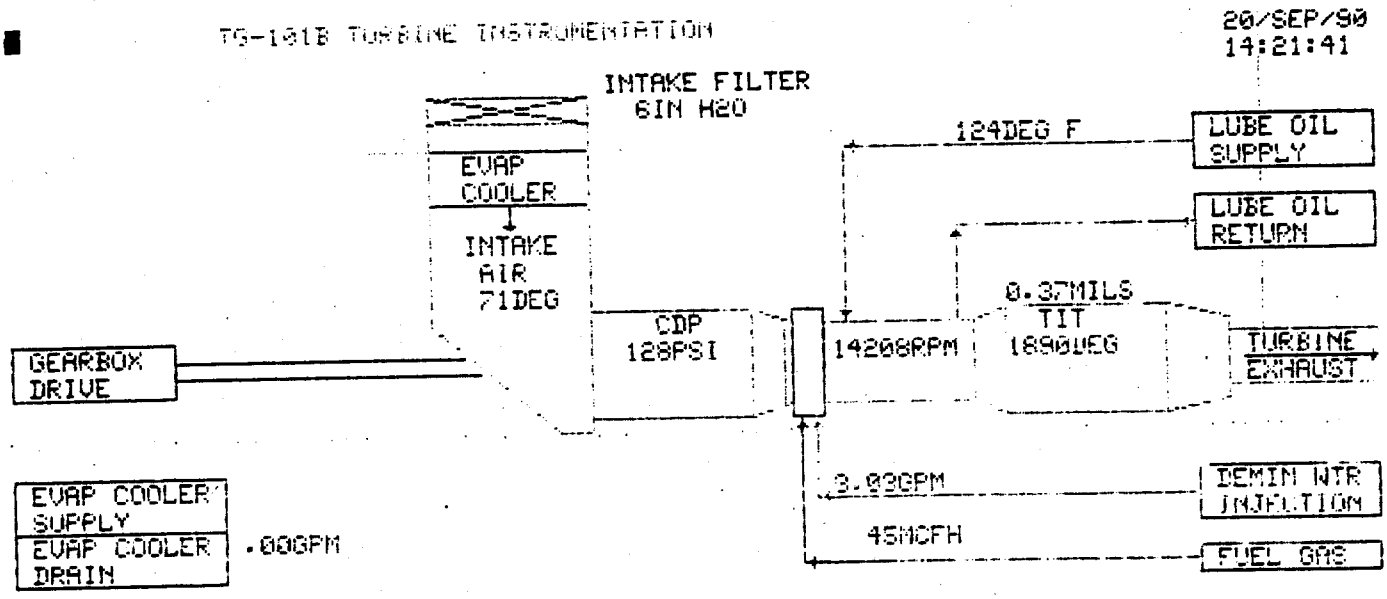
DIAGRAM NUMBER: 2011 VERSION: 0

DATE: 09/20/90 TIME: 14:21:43



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