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COMPLIANCE EMISSION TEST REPORT

PHILLIPS PETROLEUM COMPANY

LAKE WASHINGTON CENTRAL BATTERY NO. 1 GENERATOR

ESE
A GLASCOF Company
Environmental
Science &
Engineering, Inc.

SOURCE TEST REPORT

OXIDES OF NITROGEN AND CARBON MONOXIDE EMISSION RESULTS

AT

LAKE WASHINGTON CENTRAL BATTERY

FOR

NO. 1 GENERATOR

Prepared for:

PHILLIPS PETROLEUM COMPANY
P. O. BOX 51107
LAFAYETTE, LOUISIANA 70505

Prepared by:

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ESE PROJECT 3927058-1

OCTOBER 1992

CONFIRMATION OF INFORMATION
EMISSION TEST REPORT

FOR

PHILLIPS PETROLEUM COMPANY
P. O. Box 51107
Lafayette, Louisiana 70505

LAKE WASHINGTON CENTRAL BATTERY

NO. 1 GENERATOR

Prepared by:

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
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October 27, 1992

I certify that I have personally examined and am familiar with the information contained herein, and based on my inquiries of the individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete, to the best of my knowledge.

Curtis Walley
Curtis Walley
Phillips Petroleum Company

Todd Jackson
M. Todd Jackson/ESE
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Steven J. Schwartz 12/3/92
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TABLE OF CONTENTS

Section		Page
1.0	INTRODUCTION	1-1
2.0	SUMMARY OF TEST RESULTS	2-1
3.0	LAKE WASHINGTON STATION DESCRIPTION	3-1
	3.1 SAMPLE PORTS	3-1
4.0	IN-SITU TEST PROCEDURES	4-1
	4.1 E.P.A. METHOD 1: SAMPLE AND VELOCITY TRAVERSE	4-1
	4.2 E.P.A. METHOD 2: VELOCITY DETERMINATION	4-1
	4.3 E.P.A. METHOD 3: ORSAT ANALYSIS	4-1
	4.4 E.P.A. METHOD 4: MOISTURE CONTENT	4-2
	4.5 E.P.A. METHODS 1-4: SAMPLING PROCEDURE	4-2
5.0	CONTINUOUS EMISSION MONITORING	5-1
	5.1 INSTRUMENTATION SAMPLING LOCATION	5-2
	5.2 E.P.A. METHOD 3A: OXYGEN	5-5
	5.3 E.P.A. METHOD 7E: OXIDES OF NITROGEN	5-7
	5.4 E.P.A. METHOD 10: CARBON MONOXIDE	5-9

APPENDICES

APPENDIX A -- COMPLETE FLOW RATE DATA AND EMISSION CALCULATIONS

APPENDIX B -- INSTRUMENTATION FIELD DATA, CALCULATIONS, AND STRIP CHART RECORDINGS

B.1 OXIDES OF NITROGEN
B.2 CARBON MONOXIDE
B.3 OXYGEN

APPENDIX C -- CALIBRATION GAS CERTIFICATES

APPENDIX D -- EQUIPMENT CALIBRATION WORKSHEETS

APPENDIX E -- OPERATIONAL DATA AND FUEL GAS ANALYSIS

APPENDIX F -- LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY CORRESPONDENCE

APPENDIX G -- PROJECT PARTICIPANTS

LIST OF TABLES

Table		Page
2-1	Summary of Oxides of Nitrogen, Oxygen, and Carbon Monoxide Emission Test Results: No. 1 Generator, Lake Washington Central Battery, Phillips Petroleum Company, Port Sulphur, Louisiana, October 27, 1992.	2-2
2-2	Summary of Stack Gas Flow Parameters: No. 1 Generator, Lake Washington Central Battery, Phillips Petroleum Company, Port Sulphur, Louisiana, October 27, 1992.	2-3
5-1	Technical Specifications of the Thermox Model FCA Oxygen Analyzer.	5-6
5-2	Technical Specifications of the Thermoelectron Model 10 NO/NO_x Analyzer.	5-8
5-3	Technical Specifications of the Thermo Environmental Instruments Model 48H GFC Carbon Monoxide Analyzer.	5-10

LIST OF FIGURES

Figure		Page
3-1	Lake Washington Central Battery Plot Plan	3-2
3-2	Lake Washington Central Battery Process Flow Diagram	3-3
3-3	Traverse Sampling Layout - No. 1 Generator	3-4
4-1	E.P.A. Method 1-4 Sampling Train	4-4
5-1	Continuous Emission Monitoring System	5-3
5-2	Instrumentation Sample Probe Location	5-4

1.0 INTRODUCTION

Environmental Science & Engineering, Inc. (ESE) was contracted by Phillips Petroleum Company to conduct compliance emission testing for Oxides of Nitrogen (NO_x) and Carbon Monoxide (CO) from the No. 1 Generator at the Lake Washington Central Battery located near Port Sulphur, Plaquemines Parish, Louisiana. Compliance emission testing of the No. 1 Generator was performed in accordance with U.S. E.P.A. Methodology. The No. 1 Generator is driven by a Waukesha Internal Combustion Engine (IC Engine). The IC Engine is a Waukesha Model L5108G driver rated at 550 BHP @ 900 RPM.

Oxides of Nitrogen emissions were determined by U.S. E.P.A. Method 7E. Oxygen was determined by U.S. E.P.A. Method 3A. Carbon Monoxide emissions were determined by U.S. E.P.A. Method 10. NO_x, CO, and O_2 emissions were measured with continuous emission monitors. Traverse sampling, stack gas velocity, dry gas molecular weight, and moisture content were determined by U.S. E.P.A. Methods 1-4, respectively. E.P.A. Methods are contained in Appendix A, Title 40, Part 60 of the Code of Federal Regulations.

Compliance stack testing of the No. 1 Generator was performed by the ESE testing team of M. Todd Jackson and Randy Young. Randy Young was responsible for determining the stack gas flow parameters; M. Todd Jackson was responsible for the continuous instrumental analysis of NO_x, CO, and O_2 emissions from the exhaust stack of the No. 1 Generator. Three (3) one-hour test runs were performed at near maximum horsepower load on the No. 1 Generator on October 27, 1992 from 800 - 900, 915 - 1015, and 1030 - 1130, respectively.

Correspondence with Thomas Coerver of the Louisiana Department of Environmental Quality, regarding the testing procedures and test schedule was arranged by Mr. Curtis Walley and Mrs. Cindy Smith of Phillips Petroleum Company. Mr. M. Todd Jackson coordinated the testing activities of the No. 1 Generator at the Lake Washington facility. Operational data during the compliance emission testing of the No. 1 Generator was recorded by Mr. Jerry Smith of Phillips Petroleum Company. The testing of the No. 1 Generator at the Lake Washington Central facility was not witnessed by LDEQ personnel.

2.0 SUMMARY OF TEST RESULTS

A summary of the Oxides of Nitrogen, Carbon Monoxide, and Oxygen emission results for the compliance test performed on the No. 1 Generator are presented in Table 2-1. The average NO_x and CO emission rates for the three (3) one-hour test runs were determined to be 2.63 and 1.71 lb/hr, respectively. The maximum NO_x emission rate of 2.81 lb/hr was determined on Test Run No. 1. The maximum CO emission rate of 1.83 lb/hr was determined during Test Run No. 2. Phillips Petroleum Company has applied for a Louisiana State Air Permit for this facility

Table 2-2 gives a summary of the stack gas temperature, moisture content, velocity, and volumetric flow rates for the three (3) one-hour compliance test runs performed on the No. 1 Generator. The stack gas volumetric flow rate, corrected to dry standard conditions (528 °R, 29.92 in. Hg) and the actual uncorrected volumetric flow rates are also tabulated.

Section 3.0 gives a description of the Lake Washington Central Battery Station. The method used in determining the location of the traverse sampling points is identified and discussed.

Section 4.0 contains a complete description of the velocity, volumetric flow rate determination, Orsat and moisture sample train equipment and testing procedures. Complete field test data and sample calculations are contained in Appendix A.

TABLE 2-1. Summary of Oxides of Nitrogen, Oxygen, and Carbon Monoxide Emission Test Results: No. 1 Generator, Lake Washington Central Battery, Phillips Petroleum Company, Port Sulphur, Louisiana, October 27, 1992.

Run No.	Engine Speed	Oxides of Nitrogen			Carbon Monoxide			Oxygen
	(RPM)	(ppmv)	(lb/hr)	(Ton/yr)	(ppmv)	(lb/hr)	(Ton/yr)	(%)
1	899	597.28	2.81	12.31	584.29	1.67	7.31	6.6
2	899	520.15	2.71	11.87	577.06	1.83	8.02	6.8
3	899	505.44	2.37	10.38	575.16	1.64	7.18	8.1
AVG.	**899**	**540.96**	**2.63**	**11.52**	**578.84**	**1.71**	**7.49**	**7.2**

Source: ESE, Inc., 1992

TABLE 2-2. Summary of Stack Gas Flow Parameters: No. 1 Generator, Lake Washington Central Battery, Phillips Petroleum Company, Port Sulphur, Louisiana, October 27, 1992.

Run No.	Stack Temperature (°R)	Moisture Content (%)	Stack Gas Velocity (ft/s)	Volumetric Flow Rate[1] (DSCFM)	Actual Flow Rate (CFM)
1	1255.6	13.69	55.01	656.7	1800.2
2	1263.8	13.89	61.48	726.6	2012.1
3	1247.8	14.36	54.98	654.0	1799.2
AVG.	**1255.7**	**13.98**	**57.16**	**679.1**	**1870.5**

Source: ESE, Inc., 1992

[1] Corrected to Dry, Standard Conditions.

Section 5.0 contains a complete description of the continuous emission monitoring testing procedures and instrumentation sampling system. Photocopies of the NO_x, CO, and O_2 field data worksheets, strip chart recordings, and emission rate calculations are contained in Appendix B.

Photocopies of the calibration gas certificates and equipment calibration worksheets are contained in Appendices C and D, respectively. Operational data for the No. 1 Generator recorded during the test series and a fuel gas analysis are contained in Appendix E.

A copy of the permit application and additional Louisiana Department of Environmental Quality correspondence is contained in Appendix F. A list of the personnel who participated on this project are contained in Appendix G.

3.0 LAKE WASHINGTON STATION DESCRIPTION

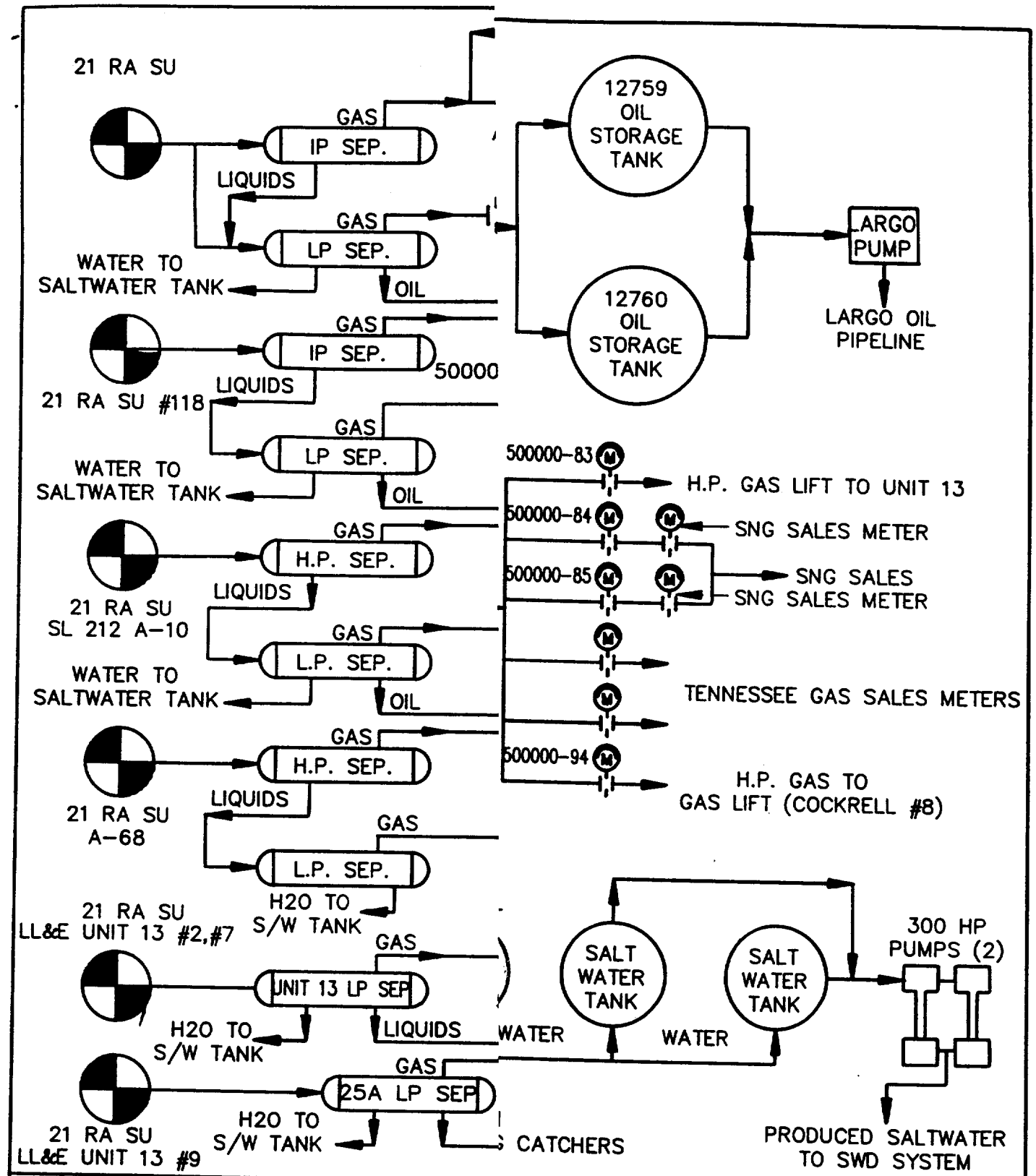
Phillips Petroleum operates an oil and natural gas exploration station near Port Sulphur, Louisiana. The station is comprised of several natural gas fired Compressors and Generators. Additional process equipment includes pumps, glycol reboiler, heater treater, and storage tanks. A plot plan of the Lake Washington Station can be seen in Figure 3-1. A process flow diagram of the Lake Washington Central facility is presented in Figure 3-2.

3.1 SAMPLE PORTS

The inside diameter of the stack was measured to be 10.0 inches. The distances to the next upstream (A) and downstream (B) flow disturbances were measured to be 25.0 and 30.0 inches, respectively. The upstream and downstream equivalent duct diameters were determined to be 2.5 and 3.0, respectively. The stack contained a single 3-inch male NPT nipple located on the horizontal section of the exhaust stack between the engine body and the muffler. Approval to conduct the velocity traverse testing from a single sample port was approved verbally by Thomas Coerver of LDEQ.

Based on criteria from E.P.A. Method 1, ESE personnel selected eight total traverse points to conduct the velocity and moisture sampling. Traverse points numbered 1 and 8 were determined to be within 1/2-inch of the stack wall and were therefore omitted from the velocity and moisture traverse sampling. Traverse points numbered 2 and 7 were sampled for twice the duration as stipulated in Method 1 of 40 CFR 60.

Figure 3-3 identifies the traverse points and lists the pertinent stack dimensions for the velocity traverse sampling of the No. 1 Generator.



1	11/26/91	JCV			REVISIONS OF FIELD
NO.	DATE	BY	CHK'D	APP'D	

WASHINGTON
RAL FACILITIES
PLIFIED PROCESS FLOW

	APP'D BY	
	DATE	
91	CLIENT APP	
R.S.	DWG. No.:	LAQP-02-B
91	SHEET No.:	1 OF 1

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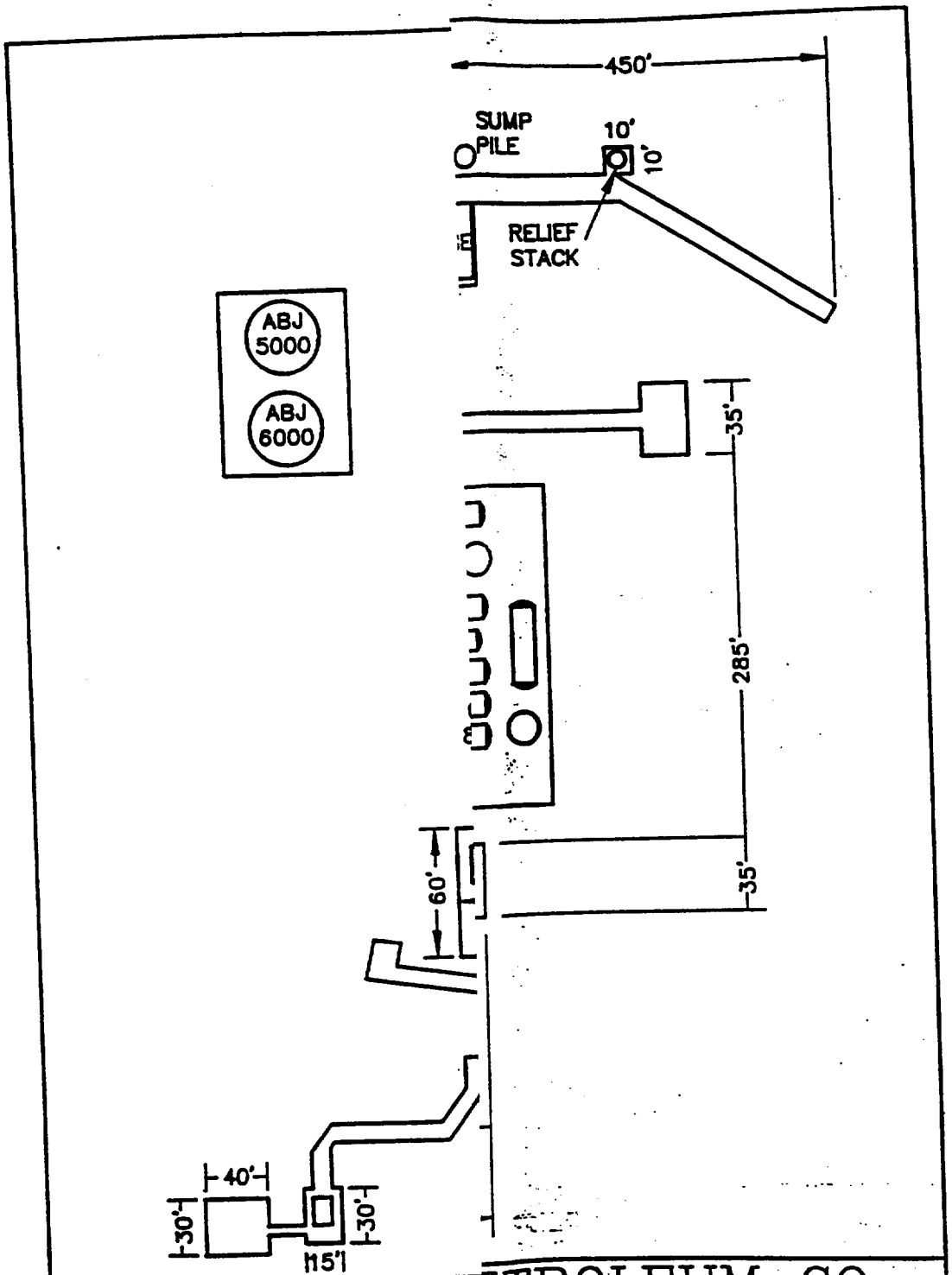

1	11/7/91	JCV	1	1	DRAWING C
NO.	DATE	BY	CHK'D	APP'D	

ETROLEUM CO.

IELD, CENTRAL BATTERY

T LAYOUT

APP'D BY	
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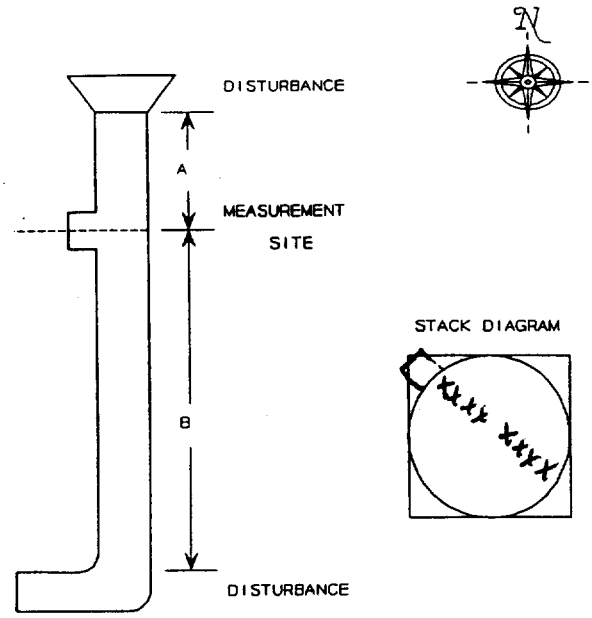
REVISION	

EPA METHOD 1
TRAVERSE POINT LAYOUT

Environmental Science & Engineering, Inc.

CLIENT: Phillips	
PROJECT NUMBER: 3927058	
SOURCE I.D.: #1 Generator	
DATE: 10-26-92	
INSIDE DIAMETER:	10 in
UPSTREAM DISTANCE (A):	25 in
DOWNSTREAM DISTANCE (B):	30 in
COUPLING LENGTH:	9 in
NUMBER OF PORTS:	1
UPSTREAM DIAMETERS:	2.5
DOWNSTREAM DIAMETERS:	3.0
CALCULATED BY: Randy Young	



TRAVERSE POINT	TRAVERSE % DIAMETER		INSIDE DIAMETER		COUPLING LENGTH		TRAVERSE LOCATION
1	.032	x	10	+	9	=	9.32
2	.105	x		+		=	10.05
3	.194	x		+		=	10.94
4	.323	x		+		=	12.23
5	.677	x		+		=	15.77
6	.806	x		+		=	17.06
7	.895	x		+		=	17.95
8	.968	x		+		=	18.68
9		x		+		=	
10		x		+		=	
11		x		+		=	
12		x		+		=	

COMMENTS: Points 2 & 7 were ~~[illegible]~~ traversed twice as long because Points 1 & 8 were less than .50in from stack wall

Only had one sample port so traverse points were hit going in and coming out. Stack was on Horizontal plain.

FORMS-1/017.51/TRAVERSE

4.0 IN-SITU TEST PROCEDURES

4.1 E.P.A. METHOD 1: SAMPLE AND VELOCITY TRAVERSE

The location of the traverse points used to determine the velocity of the stack gas within circular stack sources is based on the relation of the stack diameter to the upstream and downstream distances to the next obstruction or disturbance relative to the sampling port location. The minimum number of traverse points and the locations on each diameter area was determined from Figure 1-2 and Table 1-2 of Method 1, Appendix A, 40 CFR 60.

4.2 E.P.A. METHOD 2: VELOCITY DETERMINATION

The average gas velocity in the stack was determined from measurement of the velocity head with a Type "S" Pitot tube connected to an inclined manometer, stack gas temperature, and stack gas composition. A baseline coefficient value of 0.84 was assigned to the pitot tube based on measurements of the face opening alignments, external tubing diameter, and base-to-opening plane distances. Verification of these measurements were recorded onto a pitot tube calibration worksheet contained in Appendix D.

The velocity of the gas stream in the stack was calculated on the arithmetic average of all traverse velocity measurements during each test run. Gas velocity and flow rate calculations are included in Appendix A.

4.3 E.P.A. METHOD 3: ORSAT ANALYSIS

Carbon Monoxide, Oxygen, and Carbon Dioxide stack gas concentrations were determined with an Orsat analyzer. Sample gas from the stack source was collected in a leak-free Tedlar bag for the same sampling period as each test period. The

contents of the Tedlar bag were analyzed three times with the Orsat analyzer. The balance of the gas composition was assumed to be Nitrogen. The Tedlar bag was evacuated, purged with nitrogen, evacuated again, and reused for the next test run.

4.4 E.P.A. METHOD 4: MOISTURE CONTENT

The moisture content of the sample gas stream was determined by extracting the gas sample at a known and regulated rate through a glass condenser train consisting of four glass impingers connected in series with leak free glass U-tube connectors. The gas sample was extracted through the impinger train (maintained below 68 °F in an ice bath) with a vacuum pump and the volume of gas sampled was measured with a calibrated dry gas meter. The sampling rate was regulated with a critical orifice mounted on the outlet of the dry gas meter. The volume of moisture collected was measured gravimetrically and the volume of gas drawn, corrected to dry standard conditions (528 °R, 29.92 in Hg.) was determined. The dry gas meter and thermocouple calibration forms are contained in Appendix D.

4.5 E.P.A. METHODS 1-4: SAMPLING PROCEDURE

The sampling and analytical procedures follow the procedures outlined in E.P.A. Methods 1-4, of 40 CFR 60, revised as of July 1, 1991. The sampling equipment consisted of the following:

1. Pitot Tube Assembly
   a. Nozzle--Stainless steel with a sharp, tapered leading edge.
   b. Probe--Stainless steel (S.S.) sheath with a 5/8 inch diameter stainless steel insert wrapped with nichrome wire; electronically controlled and capable of maintaining a minimum temperature of 248 ± 25 °F.

c. Pitot--Type "S" constructed and attached to probe according to specifications outlined E.P.A. Method 2, Appendix A of 40 CFR 60.

d. Thermocouple--Type "K" attached to the pitot tube such that the tip has no contact with metal and does not interfere with the pitot tube face openings.

2. **Impingers**

Four impingers connected in series with glass ball/socket joint fittings and placed in an ice bath. The first, third, and fourth impingers are the modified Greenburg-Smith design. The second impinger is the Greenburg-Smith design with a standard orifice tip. Final gas exit temperature is measured with a Type "K" thermocouple immersed in the gas stream.

3. **Control Box**

Module containing vacuum gauge, external leak-free pump, thermocouples, dry gas meter with a minimum of 2 percent accuracy, valves and related equipment to determine sample volume.

A schematic of the sampling train can be seen in Figure 4-1.

Upon arrival at the sampling site, the control box was leak-checked from pump to orifice at 10 inches of water vacuum. The moisture sample train was prepared in the following manner: 200 ml of H_2O was added to the first and second impingers. The third impinger was left empty and approximately 200 g of silica gel (indicating type, 6-16 Mesh) was added to the fourth impinger. Each impinger was weighed on an analytical balance with a tolerance of 0.1 g, transferred to the cold box and assembled in series with glass U-tube connectors. The cold box was packed full with crushed ice and assembled to the sampling train with the pitot as shown in Figure 4-1. The sample system was leak-checked by plugging the inlet to the probe nozzle and pulling a vacuum of at least 10 in. Hg.

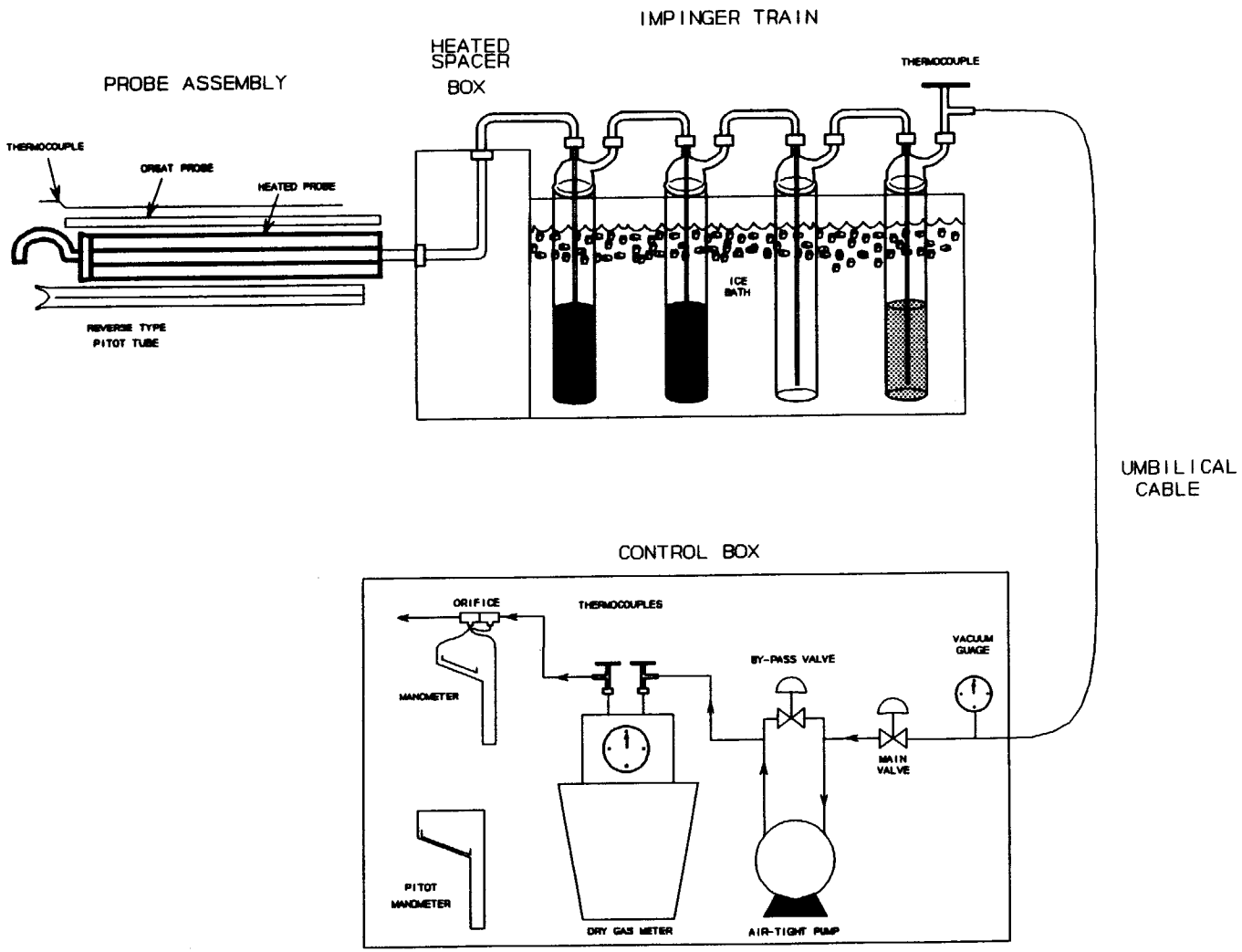


FIGURE 4-1: E.P.A. METHOD 1-4 SAMPLE TRAIN DIAGRAM

Source: ESE, Inc., 1992

FORMS-5/066A.51/M1-4.DGM

Environmental Science & Engineering, Inc.

A leak rate less than 0.02 cfm was determined and considered acceptable as outlined in 40 CFR 60. The pitot tube system was also vacuum leak-checked at 2 to 3 inches of water and was determined to be leak-free.

The traverse points were marked on the probe for easy visibility. The flow was determined to be noncyclonic by performing a flow check of the exhaust gas with the pitot and manometer. The nozzle was placed at the first traverse point with the tip pointing directly into the gas stream. The pump was started and the flow adjusted to a suitable pressure drop over the dry gas meter in order to draw at least 21.0 dry, standard cubic feet of sample gas during the test run. After the required time interval had elapsed, the probe tip was repositioned to the next traverse point. This was done for each point on the traverse until the test run was completed. Pressure head, stack gas temperature, and sample train measurements were taken at two minute intervals. At the conclusion of the run, the pump was turned off and the final readings were recorded. A final leak-check of the system was performed as previously described at the highest vacuum encountered during testing, and a leak-check of the pitot system was performed as previously described. The final leak checks were determined to be within the guidelines outlined in 40 CFR 60.

All velocity measurements, Orsat analysis, moisture data and leak check recordings are included in the field data worksheets in Appendix A.

5.0 CONTINUOUS EMISSION MONITORING

Stack gas emissions of Oxygen, Oxides of Nitrogen, and Carbon Monoxide from the stack sources were measured with continuous emission monitors. These tests were performed in accordance with Methods 3A, 7E, and 10 as outlined in Title 40, Part 60, Appendix A of the Code of Federal Regulations. All instrumentation field data collected during the testing, calculations, and photocopies of the actual O_2, NO_x, and CO strip charts are included in Appendix B.

A gas sample was continuously extracted from the stack with a stainless steel probe and traveled down a heated sample line to a glass condenser/cyclone moisture removal system. The condenser was jacketed with 27 °F water from a refrigerator system. Sample gas was sufficiently cooled to separate moisture from the gaseous sample. The condensed water was collected in a glass cyclone and later discarded. From the cyclone, the dry gas sample traveled through 1/4-inch outer diameter teflon tubing to a single-headed, teflon-lined, diaphragm pump. Flow control valves and rotameters were used to deliver the stack gas sample to each Continuous Emission Monitor via stainless steel manifold delivery network.

The sample conditioning system leak check was performed by introducing known calibration gas standards up the heated sample line in a second teflon line to a three-way ball valve positioned next to the stainless steel sample probe. The ball valve was turned to permit the calibration gases to return back down the main sample line, through the condenser/cyclone, diaphragm pump, and manifold to the continuous emission monitors. Instrument response time was found by alternating zero nitrogen and upscale span gases through the bias check line and recording the upscale and downscale time.

The analyzer calibration error and instrument response time was calculated between the known calibration gas concentration and the concentration exhibited by the analyzer. The instrument zero and upscale calibration drift was determined before and immediately following each test run with reference gas standards. Results of the instrument calibration error and drift determinations were recorded on the field data worksheets.

A schematic diagram of the continuous emission monitoring system can be seen in Figure 5-1.

5.1 INSTRUMENTATION SAMPLING LOCATION

The heated instrumentation sample line was connected to a 1/4 inch stainless steel probe with the tip positioned at the centroid of the exhaust stack. The sample probe was inserted into the same sample port as the velocity test train. The probe was positioned inside the sample port to minimize interference with the Method 1-4 sample train. Sufficient time was allowed after connection to allow a representative gas sample to be transported to the mobile sampling laboratory for analysis of the gas stream.

Figure 5-2 shows the position of the instrumentation probe and sample line relative to a typical exhaust stack source.

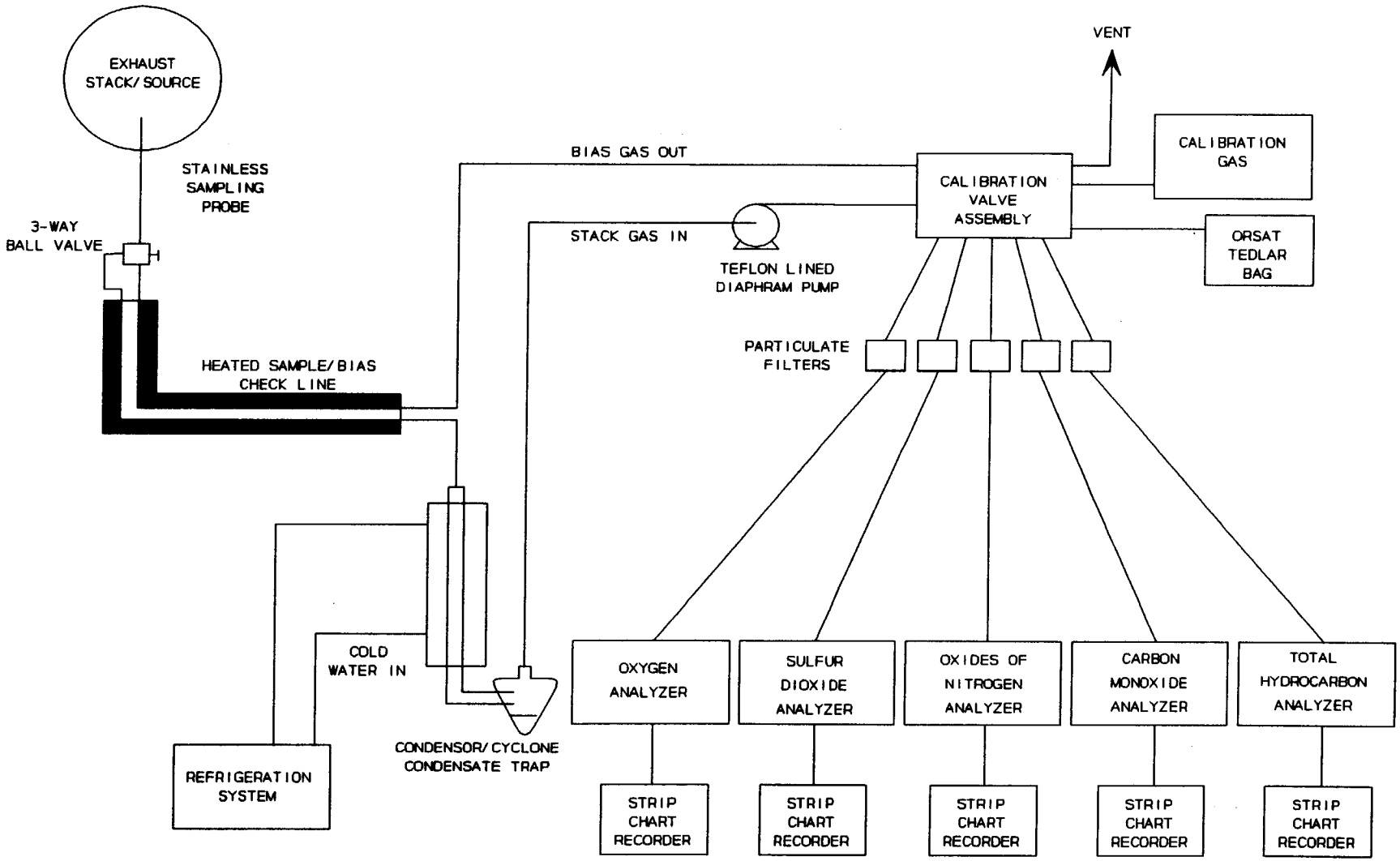


FIGURE 5-1: CONTINUOUS EMISSION MONITORING SYSTEM

Source: ESE, Inc., 1992

FORMS-1/014.51/CEMSYS.DWG

Environmental Science & Engineering, Inc.

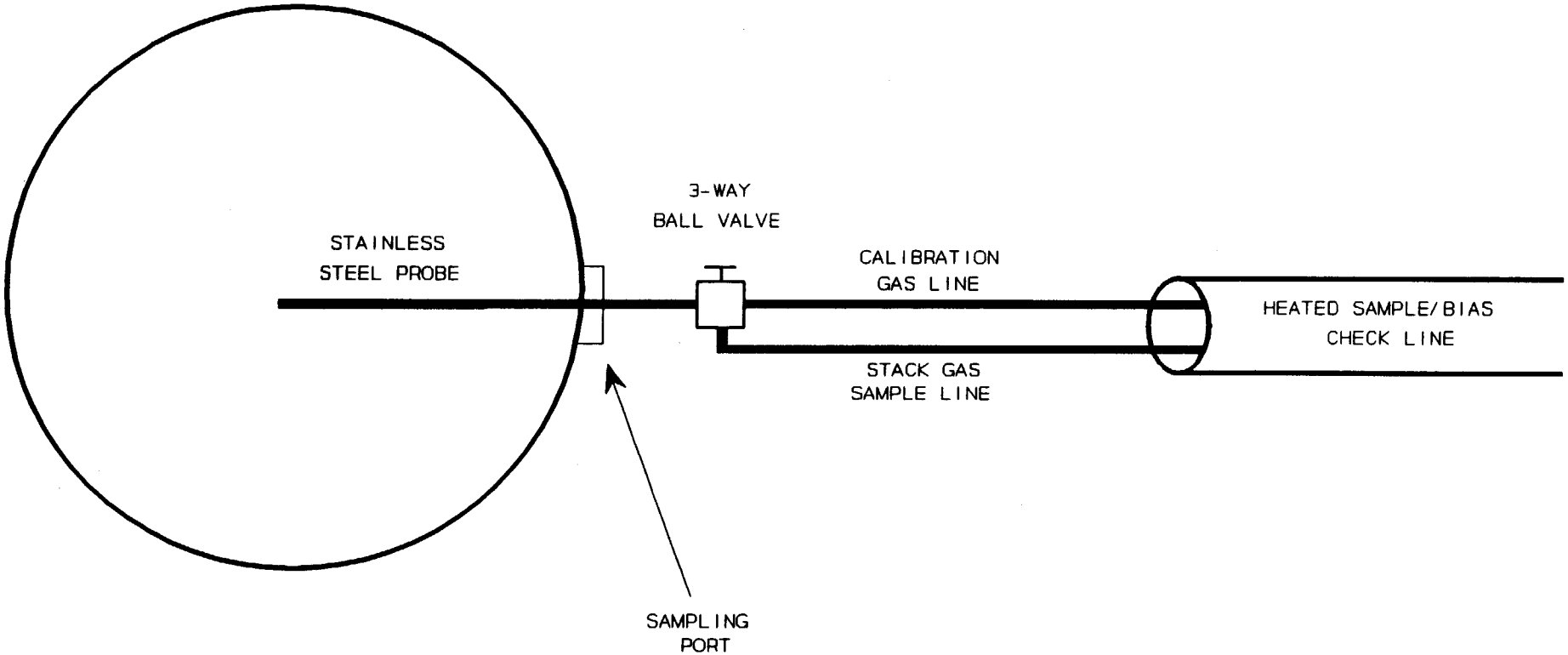


FIGURE 5-2: INSTRUMENTATION SAMPLE PROBE LOCATION

Source: ESE, Inc., 1992

FORMS-7/016D.51/PROBE.1

Environmental Science & Engineering, Inc.

5.2 E.P.A. METHOD 3A: OXYGEN

A gas sample was continuously conveyed to a Thermox Model FCA instrument which analyzed the gas stream for Oxygen. Zero Nitrogen and certified Oxygen reference gas standards were used to calibrate the instrument before and immediately following each test period. The output signal from the instrument was preset to give a 0-10 millivolt response signal to a strip chart recorder. The calibration gas concentrations and the resultant peak heights recorded on the strip chart were curve fitted into a linear regression equation of the general form:

$$\% \text{ Oxygen} = (\text{Grid Peak})(\text{Slope}) + \text{Y intercept}$$

Linearity of the instrument was established and assured by checking the correlation coefficient of the calibration curve. The concentration of the sample gas was determined by curve fitting the arithmetic mean of response peaks on the strip chart during a specified test period into the linear regression calibration curve.

Calibration of the instrument before and after each test period was performed to determine the analyzer calibration error, zero drift, span drift, and sampling system bias drift. These calibration statistics were determined to be within the guidelines specified in 40 CFR 60 and were recorded onto the field data worksheets contained in Appendix B.3.

Table 5-1 gives a detailed technical specification list for the Thermox Model FCA Oxygen instrument.

TABLE 5-1. Technical Specifications of the Thermox Model FCA Oxygen Analyzer.	
Sensitivity	Each instrument is equipped with the following ranges: 0 - 10% 0 - 25%
Accuracy	±1 percent of measured value
Repeatability	±0.2 percent of measured value
Response	90 percent of full scale in less than five seconds
Zero Drift	<0.1 percent of cell output in a month.
Span Drift	<0.1 percent of cell output in a month.
Signal Output	0 - 1 volt
Input Power Requirements	120 VAC or 220 VAC, 50/60 Hz.

Source: Ametek Thermox Instruments Division.

5.3 E.P.A. METHOD 7E: OXIDES OF NITROGEN

A gas sample was continuously conveyed to a Thermoelectron Model 10 chemiluminescent instrument which analyzed the sample gas stream for NO_x emissions. Zero Nitrogen and E.P.A. Protocol 1 NO_x reference gases were used to calibrate the analyzer. The output signal from the instrument was preset to give a 0-10 volt response signal to a strip chart recorder. The calibration gas concentrations and the resultant peak heights recorded on the strip chart were curve fitted into a linear regression equation of the general form:

$$\text{ppmv } NO_x = (\text{Grid Peak})(\text{Slope}) + \text{Y intercept}$$

Linearity of the instrument was established and assured by checking the correlation coefficient of the calibration curve. The concentration of the sample gas was determined by curve fitting the arithmetic mean of response peaks on the strip chart during a specified test period into the linear regression calibration curve.

Calibration of the instrument before and after each test period was performed to determine the analyzer calibration error, zero drift, span drift, and sampling system bias drift. These calibration statistics were determined to be within the guidelines specified in 40 CFR 60 and were recorded onto the field data worksheets contained in Appendix B.1.

Table 5-2 gives a detailed technical specification list for the Thermoelectron Model 10 NO/NO_x instrument.

TABLE 5-2. Technical Specifications of the Thermoelectron Model 10 NO/NO_x Analyzer.

Sensitivity	Each instrument is equipped with the following ranges: 0 - 2.5 ppmv 0 - 10 ppmv 0 - 25 ppmv 0 - 100 ppmv 0 - 250 ppmv 0 - 1,000 ppmv 0 - 2,500 ppmv 0 - 10,000 ppmv
Accuracy	Derived from the NO or NO_2 calibration gas, ±1% of full scale
Response Time (0-90%) Typical	1.5 seconds - NO mode 1.7 seconds - NO_x mode
Output	0 - 10 millivolt and 0 - 10 volt
Zero Drift	Negligible after 1/2-hour warm-up
Linearity	±1% of full scale to 2,500 ppmv with air as O_2 supply ±1% of full scale to 10,000 ppmv with compressed O_2
Input Power Requirements	115 VAC/60 Hz

Source: Thermoelectron.

5.4 E.P.A. METHOD 10: CARBON MONOXIDE

A continuous gas sample was conveyed to a Thermo Environmental Instruments Model 48H Gas Filter Correlation (GFC) infrared instrument which analyzed the unknown gas sample for Carbon Monoxide. Zero Nitrogen and E.P.A. Protocol 1 CO reference gas standards were utilized to calibrate the instrument. The output signal from the instrument was preset to give a 0-10 volt response signal to a strip chart recorder. The calibration gas concentrations and the resultant peak heights recorded on the strip chart were curve fitted into a linear regression equation of the general form:

$$\text{ppmv CO} = (\text{Grid Peak})(\text{Slope}) + \text{Y intercept}$$

Linearity of the instrument was established and assured by checking the correlation coefficient of the calibration curve. The concentration of the sample gas was determined by curve fitting the arithmetic mean of response peaks on the strip chart during a specified test period into the linear regression calibration curve.

Calibration of the instrument before and after each test period was performed to determine the analyzer calibration error, zero drift, span drift, and sampling system bias drift. These calibration statistics were determined to be within the guidelines specified in 40 CFR 60 and were recorded onto the field data worksheets contained in Appendix B.1.

A technical specification list follows for the Thermo Environmental Instruments Model 48H GFC Carbon Monoxide analyzer in Table 5-3.

TABLE 5-3. Technical Specifications of the Thermo Environmental Instruments Model 48H Gas Filter Correlation (GFC) Carbon Monoxide Analyzer.

Sensitivity	Each instrument is equipped with the following ranges: 0 - 1 ppmv 0 - 2 ppmv 0 - 5 ppmv 0 - 10 ppmv 0 - 20 ppmv 0 - 50 ppmv 0 - 100 ppmv 0 - 200 ppmv 0 - 500 ppmv 0 - 1,000 ppmv 0 - 5,000 ppmv 0 - 20,000 ppmv
Precision	± 0.1 ppmv
Response Time (0-90%)	1 minute at 1 ppmv flow and 30 second integration time
Output (Dual)	0 - 10 millivolts and 0 - 100 millivolts 0 - 1, 0 - 5, and 0 - 10 volts
Zero Drift	±0.2 ppmv over 24 hours
Span Drift	±1 % of full scale over 24 hours.
Linearity	± 1% of full scale for all ranges
Sample Flow Rate	1.0 liters per minute standard
Minimum Detection Limit	0.10 ppmv
Zero Noise Level	0.05 ppmv RMS with time constant = 30 seconds span range
Operating Temperature	5 - 45 °C
Input Power Requirements	105 - 125 VAC/60 Hz; 100 Watts

Source: Thermo Environmental Instruments, Inc.

APPENDICES

APPENDIX A -- COMPLETE FLOW RATE DATA AND EMISSION CALCULATIONS

Environmental Science & Engineering, Inc.

Client: Phillips Petro.	Hot Box No.: HB-6	Barometric Pressure: 30.22
Location: Port Sulphur, LA	Cold Box No.: CB-6	Stack Diameter, in: 10
Source I.D.: #1 Generator	Console No.: BR-5	Nozzle Diameter, in: N/A
Project No.: 3927058	Pitot No.: P-3-2	Filter No.: N/A
Date: 10-27-92	Pitot Coefficient: 0.84	Ambient Temp.: 73
Run Number: 1	DGMC Factor: 0.9832	Static Pressure: - 8.0 (@ Point 4)
Operator: Randy Young	Meter ΔH@: 1.9333	K Factor: N/A

Port and Traverse Point No.	Sample Time	Dry Gas Meter Reading	Velocity Head (" H_2O) ΔP	Velocity Head (" H_2O) $\sqrt{\Delta P}$	Orifice Pressure Differential (" H_2O) Calc.	Orifice Pressure Differential (" H_2O) Actual	Stack Gas Temperature (° F)	Sample Train Temperatures (° F) Probe	Filter Box	Last Impinger	Dry Gas Meter	Vacuum ("Hg)
a	8:00	052.120	0.40	0.632	N/A	3.0	785	251	252	54	76	3
2	8:02	054.140	0.39	0.624		3.0	783	252	256	54	76	3
3	8:04	055.940	0.41	0.640		3.0	784	253	257	55	77	3
4	8:06	057.940	0.39	0.624		3.0	787	254	260	55	78	3
5	8:08	059.810	0.37	0.608		3.0	792	256	261	56	82	3
6	8:10	062.110	0.38	0.616		3.0	795	256	261	56	82	3
7	8:12	063.550	0.37	0.608		3.0	799	257	262	57	85	3
7	8:14	065.560	0.37	0.608		3.0	802	258	264	57	87	3
off ①	8:16	067.250										
2	8:18	067.250	0.42	0.648	N/A	3.0	803	257	263	58	90	3
2	8:20	069.090	0.43	0.656		3.0	796	259	264	58	91	3
3	8:22	070.940	0.34	0.583		3.0	786	260	263	59	93	3
4	8:24	072.710	0.36	0.600		3.0	798	261	264	60	93	3
5	8:26	074.420	0.34	0.583		3.0	796	260	262	61	95	3
6	8:28	075.950	0.40	0.632		3.0	805	258	263	62	95	3
7	8:30	077.510	0.52	0.721		3.0	809	258	265	64	96	3
Total/Avg.												

	Final Weights	Initial Weights	Weight Gained
First Impinger	594.0	574.5	19.5
Second Impinger	643.7	608.4	35.3
Third Impinger	513.7	494.4	19.3
Silica Gel	739.9	721.4	18.5
Total Condensate			92.6

Flue Gas Analysis

Trial	O_2	CO_2	CO	N_2
1				
2				
3				
AVG				

COMMENTS:

Cyclonic Flow Check OK

Pretest Leak Check @ 10 "Hg for .008 CFM

Postest Leak Check @ 10 "Hg for .008 CFM

FORMS-1/013.51/METHOD

ESE Environmental Science & Engineering, Inc.

Client: Phillips Petro.	Hot Box No.: HB-6	Barometric Pressure: 30.22
Location: Port Sulphur, LA	Cold Box No.: CB-6	Stack Diameter, in: 10
Source I.D.: #1 Generator	Console No.: BR-5	Nozzle Diameter, in: N/A
Project No.: 3927058	Pitot No.: P-3-2	Filter No.: N/A
Date: 10-27-92	Pitot Coefficient: 0.84	Ambient Temp.: 73
Run Number: 1	DGMC Factor: 0.9832	Static Pressure:- 28 (@ Point 4)
Operator: Randy Young	Meter ΔH@: 1.9333	K Factor: N/A

Port and Traverse Point No.	Sample Time	Dry Gas Meter Reading	Velocity Head ("H_2O) ΔP	Velocity Head ("H_2O) $\sqrt{\Delta P}$	Orifice Pressure Differential ("H_2O) Calc.	Orifice Pressure Differential ("H_2O) Actual	Stack Gas Temperature (° F)	Sample Train Temperatures (° F) Probe	Filter Box	Last Impinger	Dry Gas Meter	Vacuum ("Hg)
7	8:32	079.240	0.42	0.648	N/A	3.0	809	260	263	65	96	3
off 0	8:34	080.630										
Total/Avg.	32.00 min	28.510		0.6269		3.0	795.6				87.0	

	Final Weights	Initial Weights	Weight Gained
First Impinger			
Second Impinger			
Third Impinger			
Silica Gel			
FORMS-1/013.51/METHOD		Total Condensate	

Flue Gas Analysis

Trial	O_2	CO_2	CO	N_2
1	6.6	8.0	0.0	85.4
2	6.6	8.0	0.0	85.4
3	6.6	8.0	0.0	85.4
AVG	6.6	8.0	0.0	85.4

COMMENTS:

Cyclonic Flow Check OK

Pretest Leak Check @ 10 "Hg for .008 CFM

Postest Leak Check @ 10 "Hg for .008 CFM

Plant Name:	PHILLIPS PETR.
Location:	PORT SULPHUR, LA
Unit:	#1 GENERATOR
Condition:	NORMAL
Test Run Number:	RUN #1

Data Summary

Parameter	Value	Units
Carbon Dioxide Concentration, Dry Basis	8	% Volume
Carbon Monoxide Concentration, Dry Basis	0	% Volume
Oxygen Concentration, Dry Basis	6.6	% Volume
Nitrogen Concentration, Dry Basis (gas balance)	85.4	% Volume
Barometric Pressure	30.22	in. Hg
Static Pressure of Gas Stream	-2	in. H20
Average Meter Differential Pressure	3	in. H20
Absolute Gas Stream Temperature	1255.6	degrees R
Average Meter Temperature	547	degrees R
Total Condensate Collected	92.6	grams H20
Metered Dry Sample Gas Volume	28.51	dcf
Dry Gas Meter Correction Factor (gamma)	0.9832	Dimensionless
Avg. Sq. Root of Velocity Head	0.6269	(in. H20)^0.5
Pitot Tube Coefficient	0.84	Dimensionless
Duct Diameter	10	inches
Gas Molecular Weight, Dry Basis	29.54	lb/lb-mole
Gas Molecular Weight, Wet Basis	27.96	lb/lb-mole
Absolute Stack Gas Pressure	30.07	in. Hg
Meter Pressure	30.44	in. Hg
Standard Metered Volume	27.528	dscf
Standard Volume of Water Vapor	4.366	scf
Moisture Content	0.1369	mole fraction
Moisture Content	13.69	% Volume
Stack Cross-Sectional Area	0.55	ft2
Gas Stream Velocity	55.01	ft/sec
Actual Volumetric Flow Rate, Wet Basis	1800.2	acfm
Standard Dry Volumetric Flow Rate	656.7	dscfm

PHILLIPS PETR. PORT SULPHUR, LA NORMAL #1 GENERATOR

MOISTURE CONTENT DETERMINATION
EPA METHOD 4 CALCULATIONS

Parameter	Definition	Units
Pm	- Absolute Meter Pressure	in. Hg
Po	- Average Meter Differential Pressure	in. H2O
Pstd	- Absolute Standard Barometric Pressure (29.92)	in. Hg
Pb	- Absolute Barometric Pressure	in. Hg
K	- Standard Volume H2O Vapor/Unit Weight Liquid Constant = 0.04715 cu.ft/g	ft3/g
Tm	- Average Meter Temperature	degrees R
Tstd	- Absolute Standard Temperature (528°R)	degrees R
DGMC	- Dry Gas Meter Correction Factor (gamma)	Dimensionless
Vlcg	- Total Condensate Collected	grams H2O
Vm	- Metered Dry Sample Gas Volume	dcf
Vmstd	- Metered Volume at Standard Conditions(528°R, 1atm)	dscf
Vwstd	- Volume of Water Vapor Collected, at Standard Conditions (528°R, 1atm)	scf
Bws	- Moisture Content	mole fraction
Bwd	- Moisture Content	% Volume

TEST DATA RUN #RUN #1

Pb =	30.22	Tm =	547
Vm =	28.51	Po =	3
Vlcg=	92.6	DGMC =	0.9832

$$Pm = Pb + (Po/13.6) = 30.22 + (3.00/13.6) = 30.44 \text{ in. Hg}$$

$$Vmstd = \frac{(Vm)(DGMC)(Pm)(Tstd)}{(Pstd)(Tm)} = \frac{28.51*0.9832*30.44*528}{29.92*547.0} = 27.528 \text{ ft3}$$

$$Vwstd = (K)(Vlcg) = (0.04715)*(92.6) = 4.366 \text{ g}$$

$$Bws = \frac{(Vwstd)}{(Vwstd) + (Vmstd)} = \frac{4.366}{(4.366 + 27.528)} = 0.1369$$

$$Bwd = (Bws)*100\ \% = 0.1369*100\% = 13.69\%V$$

PHILLIPS PETR. PORT SULPHUR, LA NORMAL #1 GENERATOR

MOLECULAR WEIGHT DETERMINATION
EPA METHOD 3 CALCULATIONS

Parameter	Definition	Units
Md	- Sample Gas Molecular Weight, Dry Basis	lb/lb-mole
Ms	- Sample Gas Molecular Weight, Wet Basis	lb/lb-mole
Bws	- Moisture Content	mole fraction
%CO2	- Carbon Dioxide Concentration, Dry Basis	% Volume
%CO	- Carbon Monoxide Concentration, Dry Basis	% Volume
%O2	- Oxygen Concentration, Dry Basis	% Volume
%N2	- Nitrogen Concentration, Dry Basis (gas balance)	% Volume
0.32	- Molecular Weight of Oxygen (O2), divided by 100%	lb/lb-mole
0.28	- Molecular Weight of Carbon Monoxide, divided by 100%	lb/lb-mole
0.28	- Molecular Weight of Nitrogen (N2), divided by 100%	lb/lb-mole
0.44	- Molecular Weight of Carbon Dioxide, divided by 100%	lb/lb-mole
18.0	- Molecular Weight of Water	lb/lb-mole

TEST DATA RUN #RUN #1

Bws =	0.1369	%CO =	0.00
%N2 =	85.40	%CO2 =	8.00
%O2 =	6.60		

Md = (0.44)(%CO2) + (0.32)(%O2) + (0.28)(%N2 + %CO)

= (0.44)*8.00 + (0.32)*6.60 + (0.28)*(85.40 + 0.00)

= 29.54 lb/lb-mol

Ms = (Md)(1 - Bws) + (18.0)(Bws)

= 29.54*(1 - 0.1369) + 18.0*0.1369

= 27.96 lb/lb-mol

PHILLIPS PETR. PORT SULPHUR, LA NORMAL #1 GENERATOR

VELOCITY AND VOLUMETRIC FLOWRATE DETERMINATION

EPA METHOD 2 CALCULATIONS

Parameter	Definition	Units
Cp	- Pitot Tube Coefficient	Dimensionless
Vs	- Gas Stream Velocity	ft/sec
Qsd	- Volumetric Flow Rate at Standard Conditions,Dry Basis	dscfm
Qact	- Actual Volumetric Flow Rate, Wet Basis	acfm
Bws	- Moisture Content	mole fraction
Dp	- Avg. Sq. Root of Velocity Head	(in. H2O)^0.5
Pb	- Absolute Barometric Pressure	in. Hg
Kp	- Constant = 89.49 (ft)(lb/lb-mol)(in.Hg^0.5)/(s)(°R)(in.H2O)	
Ts	- Absolute Gas Stream Temperature	degrees R
Ms	- Sample Gas Molecular Weight, Wet Basis	lb/lb-mole
Sp	- Static Pressure of Gas Stream	in. H2O
528	- Absolute Standard Temperature	degrees R
CSA	- Stack Cross-Sectional Area	ft2
Ps	- Absolute Stack Gas Pressure	in. Hg
60	- Conversion Factor	sec/min.
Pi	- Constant Ratio ~ 3.1416	Dimensionless
D	- Duct Diameter	inches

TEST DATA RUN #RUN #1

Ms =	27.96	Cp =	0.84
Bws =	0.1369	Pb =	30.22
Sp =	-2.00	Ts =	1255.6
D =	10.00	Dp =	0.6269

Ps = Pb + (Ps/13.6) = 30.22 + (-2.00/13.6) 30.07 in.Hg

Vs = (85.49)(Cp)(Dp)*[(Ts)/(Ms*Ps)]^0.5

= 85.49*0.84*0.6269*[1255.6/(27.96*30.07)]^0.5

= 55.01 ft/s 55.01 ft/s

CSA = (Pi)[(D)^2]/[(4)(144)] = 3.1416*(10.00^0.5)/(4*144)= 0.55 ft2

Qact = (Vs)*CSA*60 = 55.01*0.55*60 = 1800.2 acfm

$$Qsd = \frac{(Qact)(1-Bws)(528)(Ps)}{(Ts)(29.92)} = \frac{1800.16*(1 - 0.1369)*528*30.07}{1255.6*29.92}$$

= 656.7 dscfm 656.7 dscfm

ESE Environmental Science & Engineering, Inc.

Client: Phillips Petro	Hot Box No.: HB-6	Barometric Pressure: 30.18
Location: Port Sulphur, LA	Cold Box No.: CB-6	Stack Diameter, in: 10
Source I.D.: #1 Generator	Console No.: BR-5	Nozzle Diameter, in: N/A
Project No.: 3927058	Pitot No.: P-3-2	Filter No.: N/A
Date: 10-27-92	Pitot Coefficient: 0.84	Ambient Temp.: 74
Run Number: 2	DGMC Factor: 0.9832	Static Pressure: -2.0 (@ Point 4)
Operator: Randy Young	Meter ΔH@: 1.9333	K Factor: N/A

Port and Traverse Point No.	Sample Time	Dry Gas Meter Reading	Velocity Head (H_2O) ΔP	√ΔP	Orifice Pressure Differential (H_2O) Calc.	Actual	Stack Gas Temperature (°F)	Sample Train Temperatures (°F) Probe	Filter Box	Last Impinger	Dry Gas Meter	Vacuum (°Hg)
2	9:15	081.020	0.42	0.648	N/A	2.5	795	256	264	57	85	3
2	9:17	082.670	0.45	0.671		2.5	800	255	263	58	83	3
3	9:19	084.420	0.46	0.678		2.5	805	254	264	60	85	3
4	9:21	086.210	0.45	0.671		2.5	804	255	265	61	88	3
5	9:23	087.870	0.39	0.624		2.5	805	256	266	61	90	3
6	9:25	089.650	0.40	0.632		2.5	803	257	265	60	91	3
7	9:27	091.360	0.45	0.671		2.5	804	258	266	61	92	3
8	9:29	093.110	0.52	0.721		2.5	803	260	267	62	93	3
off 0	9:31	094.870										
2	9:33	094.870	0.47	0.686	N/A	2.5	806	261	267	63	95	3
2	9:35	096.570	0.52	0.721		2.5	807	260	265	63	95	3
3	9:37	098.120	0.60	0.775		2.5	804	258	266	60	96	3
4	9:39	099.780	0.50	0.707		2.5	805	257	265	60	96	3
5	9:41	101.280	0.50	0.707		2.5	805	258	264	61	96	3
6	9:43	102.850	0.54	0.735		2.5	801	260	265	61	97	3
7	9:45	104.460	0.59	0.768		2.5	806	261	266	63	98	3
Total/Avg.												

	Final Weights	Initial Weights	Weight Gained
First Impinger	629.9	594.0	35.9
Second Impinger	676.6	643.7	32.9
Third Impinger	521.6	513.7	7.9
Silica Gel	750.0	739.9	10.1
FORMS-1/013.51/METHOD		Total Condensate	86.8

Flue Gas Analysis

Trial	O_2	CO_2	CO	N_2
1				
2				
3				
AVG				

COMMENTS:

Cyclonic Flow Check Non-cyclonic

Pretest Leak Check @ 10 "Hg for .007 CFM

Postest Leak Check @ 10 "Hg for .007 CFM

Environmental Science & Engineering, Inc.

Client: Phillips Petro.	Hot Box No.: HB-6	Barometric Pressure: 30.18
Location: Port Sulphur, LA	Cold Box No.: CB-6	Stack Diameter, in: 10
Source I.D.: #1 Generator	Console No.: BR-5	Nozzle Diameter, in: N/A
Project No.: 3927058	Pitot No.: P-3-2	Filter No.: N/A
Date: 10-27-92	Pitot Coefficient: 0.84	Ambient Temp.: 74
Run Number: 2	DGMC Factor: 0.9832	Static Pressure: -2.0 (@ Point 4)
Operator: Randy Young	Meter ΔH@: 1.9333	K Factor: N/A

Port and Traverse Point No.	Sample Time	Dry Gas Meter Reading	Velocity Head (" H_2O) ΔP	Velocity Head (" H_2O) √ΔP	Orifice Pressure Differential (" H_2O) Calc.	Orifice Pressure Differential (" H_2O) Actual	Stack Gas Temperature (° F)	Sample Train Temperatures (° F) Probe	Filter Box	Last Impinger	Dry Gas Meter	Vacuum ("Hg)
7	9:47	106.030	0.57	0.755	N/A	2.5	807	260	266	64	98	3
off @	9:49	107.630										
Total/Avg.	3200ml	2.6.10		0.6981		2.5	803.8				92.4	

	Final Weights	Initial Weights	Weight Gained
First Impinger			
Second Impinger			
Third Impinger			
Silica Gel			
FORMS-1/013.51/METHOD		Total Condensate	

Flue Gas Analysis

Trial	O_2	CO_2	CO	N_2
1	6.8	8.2	0.0	85.0
2	6.8	8.2	0.0	85.0
3	6.8	8.2	0.0	85.0
AVG	6.8	8.2	0.0	85.0

COMMENTS:

Cyclonic Flow Check Non-Cyclonic

Pretest Leak Check @ 10 "Hg for .007 CFM

Postest Leak Check @ 10 "Hg for .007 CFM

Plant Name:	PHILLIPS PETR.
Location:	PORT SULPHUR, LA
Unit:	#1 GENERATOR
Condition:	NORMAL
Test Run Number:	RUN #2

Data Summary

Parameter	Value	Units
Carbon Dioxide Concentration, Dry Basis	8.2	% Volume
Carbon Monoxide Concentration, Dry Basis	0	% Volume
Oxygen Concentration, Dry Basis	6.8	% Volume
Nitrogen Concentration, Dry Basis (gas balance)	85	% Volume
Barometric Pressure	30.18	in. Hg
Static Pressure of Gas Stream	-2	in. H20
Average Meter Differential Pressure	2.5	in. H20
Absolute Gas Stream Temperature	1263.8	degrees R
Average Meter Temperature	552.4	degrees R
Total Condensate Collected	86.8	grams H20
Metered Dry Sample Gas Volume	26.61	dcf
Dry Gas Meter Correction Factor (gamma)	0.9832	Dimensionless
Avg. Sq. Root of Velocity Head	0.6981	(in. H20)^0.5
Pitot Tube Coefficient	0.84	Dimensionless
Duct Diameter	10	inches
Gas Molecular Weight, Dry Basis	29.58	lb/lb-mole
Gas Molecular Weight, Wet Basis	27.98	lb/lb-mole
Absolute Stack Gas Pressure	30.03	in. Hg
Meter Pressure	30.36	in. Hg
Standard Metered Volume	25.378	dscf
Standard Volume of Water Vapor	4.093	scf
Moisture Content	0.1389	mole fraction
Moisture Content	13.89	% Volume
Stack Cross-Sectional Area	0.55	ft2
Gas Stream Velocity	61.48	ft/sec
Actual Volumetric Flow Rate, Wet Basis	2012.1	acfm
Standard Dry Volumetric Flow Rate	726.6	dscfm

PHILLIPS PETR. PORT SULPHUR, LA NORMAL #1 GENERATOR

MOISTURE CONTENT DETERMINATION
EPA METHOD 4 CALCULATIONS

Parameter	Definition	Units
Pm	- Absolute Meter Pressure	in. Hg
Po	- Average Meter Differential Pressure	in. H2O
Pstd	- Absolute Standard Barometric Pressure (29.92)	in. Hg
Pb	- Absolute Barometric Pressure	in. Hg
K	- Standard Volume H2O Vapor/Unit Weight Liquid Constant = 0.04715 cu.ft/g	ft3/g
Tm	- Average Meter Temperature	degrees R
Tstd	- Absolute Standard Temperature (528°R)	degrees R
DGMC	- Dry Gas Meter Correction Factor (gamma)	Dimensionless
Vlcg	- Total Condensate Collected	grams H2O
Vm	- Metered Dry Sample Gas Volume	dcf
Vmstd	- Metered Volume at Standard Conditions(528°R, 1atm)	dscf
Vwstd	- Volume of Water Vapor Collected, at Standard Conditions (528°R, 1atm)	scf
Bws	- Moisture Content	mole fraction
Bwd	- Moisture Content	% Volume

TEST DATA RUN #RUN #2

Pb =	30.18	Tm =	552.4
Vm =	26.61	Po =	2.5
Vlcg=	86.8	DGMC =	0.9832

$$Pm = Pb + (Po/13.6) = 30.18 + (2.50/13.6) = 30.36 \text{ in. Hg}$$

$$Vmstd = \frac{(Vm)(DGMC)(Pm)(Tstd)}{(Pstd)(Tm)} = \frac{26.61*0.9832*30.36*528}{29.92*552.4} = 25.378 \text{ ft3}$$

$$Vwstd = (K)(Vlcg) = (0.04715)*(86.8) = 4.093 \text{ g}$$

$$Bws = \frac{(Vwstd)}{(Vwstd) + (Vmstd)} = \frac{4.093}{(4.093 + 25.378)} = 0.1389$$

$$Bwd = (Bws)*100\ \% = 0.1389*100\% = 13.89\%V$$

PHILLIPS PETR. PORT SULPHUR, LA NORMAL #1 GENERATOR

MOLECULAR WEIGHT DETERMINATION
EPA METHOD 3 CALCULATIONS

Parameter	Definition	Units
Md	- Sample Gas Molecular Weight, Dry Basis	lb/lb-mole
Ms	- Sample Gas Molecular Weight, Wet Basis	lb/lb-mole
Bws	- Moisture Content	mole fraction
%CO2	- Carbon Dioxide Concentration, Dry Basis	% Volume
%CO	- Carbon Monoxide Concentration, Dry Basis	% Volume
%O2	- Oxygen Concentration, Dry Basis	% Volume
%N2	- Nitrogen Concentration, Dry Basis (gas balance)	% Volume
0.32	- Molecular Weight of Oxygen (O2), divided by 100%	lb/lb-mole
0.28	- Molecular Weight of Carbon Monoxide, divided by 100%	lb/lb-mole
0.28	- Molecular Weight of Nitrogen (N2), divided by 100%	lb/lb-mole
0.44	- Molecular Weight of Carbon Dioxide, divided by 100%	lb/lb-mole
18.0	- Molecular Weight of Water	lb/lb-mole

TEST DATA RUN #RUN #2

Bws =	0.1389	%CO =	0.00
%N2 =	85.00	%CO2 =	8.20
%O2 =	6.80		

Md = (0.44)(%CO2) + (0.32)(%O2) + (0.28)(%N2 + %CO)

= (0.44)*8.20 + (0.32)*6.80 + (0.28)*(85.00 + 0.00)

= 29.58 lb/lb-mol

Ms = (Md)(1 - Bws) + (18.0)(Bws)

= 29.58*(1 - 0.1389) + 18.0*0.1389

= 27.98 lb/lb-mol

PHILLIPS PETR. PORT SULPHUR, LA NORMAL #1 GENERATOR

VELOCITY AND VOLUMETRIC FLOWRATE DETERMINATION
EPA METHOD 2 CALCULATIONS

Parameter	Definition	Units
Cp	- Pitot Tube Coefficient	Dimensionless
Vs	- Gas Stream Velocity	ft/sec
Qsd	- Volumetric Flow Rate at Standard Conditions,Dry Basis	dscfm
Qact	- Actual Volumetric Flow Rate, Wet Basis	acfm
Bws	- Moisture Content	mole fraction
Dp	- Avg. Sq. Root of Velocity Head	(in. H2O)^0.5
Pb	- Absolute Barometric Pressure	in. Hg
Kp	- Constant = 89.49 (ft)(lb/lb-mol)(in.Hg^0.5)/(s)(°R)(in.H2O)	
Ts	- Absolute Gas Stream Temperature	degrees R
Ms	- Sample Gas Molecular Weight, Wet Basis	lb/lb-mole
Sp	- Static Pressure of Gas Stream	in. H2O
528	- Absolute Standard Temperature	degrees R
CSA	- Stack Cross-Sectional Area	ft2
Ps	- Absolute Stack Gas Pressure	in. Hg
60	- Conversion Factor	sec/min.
Pi	- Constant Ratio - 3.1416	Dimensionless
D	- Duct Diameter	inches

TEST DATA RUN #RUN #2

Ms =	27.98	Cp =	0.84
Bws =	0.1389	Pb =	30.18
Sp =	-2.00	Ts =	1263.8
D =	10.00	Dp =	0.6981

Ps = Pb + (Ps/13.6) = 30.18 + (-2.00/13.6) 30.03 in.Hg

Vs = (85.49)(Cp)(Dp)*[(Ts)/(Ms*Ps)]^0.5

= 85.49*0.84*0.6981*[1263.8/(27.98*30.03)]^0.5

= 61.48 ft/s 61.48 ft/s

CSA = (Pi)[(D)^2]/[(4)(144)] = 3.1416*(10.00^0.5)/(4*144)= 0.55 ft2

Qact = (Vs)*CSA*60 = 61.48*0.55*60 = 2012.1 acfm

$$Qsd = \frac{(Qact)(1-Bws)(528)(Ps)}{(Ts)(29.92)} = \frac{2012.07*(1 - 0.1389)*528*30.03}{1263.8*29.92}$$

= 726.6 dscfm 726.6 dscfm

ESE Environmental Science & Engineering, Inc.

Client: Phillips Petro	Hot Box No.: HB-6	Barometric Pressure: 30.16
Location: Port Sulphur, LA	Cold Box No. CB-6	Stack Diameter, in: 10
Source I.D.: #1 Generator	Console No.: BR-5	Nozzle Diameter, in: N/A
Project No.: 3927058	Pitot No.: P-3-2	Filter No.: N/A
Date: 10-27-92	Pitot Coefficient: 0.84	Ambient Temp.: 76
Run Number: 3	DGMC Factor: 0.9832	Static Pressure: -2.0 (@ Point 4)
Operator: Randy Young	Meter ΔH@: 1.9333	K Factor: N/A

Port and Traverse Point No.	Sample Time	Dry Gas Meter Reading	Velocity Head (H_2O) ΔP	$\sqrt{\Delta P}$	Orifice Pressure Differential (H_2O) Calc.	Actual	Stack Gas Temperature (°F)	Sample Train Temperatures (°F) Probe	Filter Box	Last Impinger	Dry Gas Meter	Vacuum (°Hg)
a	10:30	108.020	0.36	0.600	N/A	2.5	787	260	262	52	86	3
2	10:32	109.790	0.36	0.600		2.5	787	261	261	52	86	3
3	10:34	111.540	0.42	0.648		2.5	790	262	263	53	86	3
4	10:36	113.240	0.43	0.656		2.5	791	263	262	54	87	3
5	10:38	115.140	0.39	0.624		2.5	790	263	262	55	91	3
6	10:40	116.970	0.32	0.566		2.5	785	262	263	56	92	3
7	10:42	118.760	0.36	0.600		2.5	783	263	266	57	92	3
7	10:44	120.360	0.35	0.592		2.5	785	263	266	57	92	3
@	10:46	122.110										
2	10:48	122.110	0.40	0.632	N/A	2.5	786	264	266	58	93	3
2	10:50	123.960	0.39	0.624		2.5	790	263	267	60	95	3
3	10:52	125.590	0.40	0.632		2.5	790	264	268	61	96	3
4	10:54	127.240	0.40	0.632		2.5	791	262	270	61	96	3
5	10:56	128.720	0.45	0.671		2.5	789	259	269	62	96	3
6	10:58	130.070	0.48	0.693		2.5	787	260	269	63	94	3
7	11:00	131.450	0.45	0.671		2.5	786	261	267	64	97	3
Total/Avg.												

	Final Weights	Initial Weights	Weight Gained
First Impinger	679.8	629.9	49.9
Second Impinger	704.7	676.6	28.1
Third Impinger	526.0	521.6	4.4
Silica Gel	698.6	691.5	7.1
Total Condensate			89.5

FORMS-1/013.51/METHOD

Flue Gas Analysis

Trial	O_2	CO_2	CO	N_2
1	8.0	8.0	0.0	85.0
2	8.0	8.0	0.0	85.0
3	8.0	8.0	0.0	85.0
AVG	8.0	8.0	0.0	85.0

COMMENTS:

Cyclonic Flow Check Non Cyclonic

Pretest Leak Check @ 10 "Hg for .006 CFM

Postest Leak Check @ 10 "Hg for .006 CFM

ESE Environmental Science & Engineering, Inc.

Client: Phillips Petro.	Hot Box No.: HB-6	Barometric Pressure: 30.16
Location: Port Sulphur, LA	Cold Box No.: CB-6	Stack Diameter, in: 10
Source I.D.: #1 Generator	Console No.: BR-5	Nozzle Diameter, in: N/A
Project No.: 3927058	Pitot No.: P-3-2	Filter No.: N/A
Date: 10-27-92	Pitot Coefficient: 0.84	Ambient Temp.: 76
Run Number: 3	DGMC Factor: 0.9832	Static Pressure: -2.0 (@ Point 4)
Operator: Randy Young	Meter ΔH@: 1.9333	K Factor: N/A

Port and Traverse Point No.	Sample Time	Dry Gas Meter Reading	Velocity Head (" H_2O) ΔP	√ΔP	Orifice Pressure Differential (" H_2O) Calc.	Actual	Stack Gas Temperature (° F)	Sample Train Temperatures (° F) Probe	Filter Box	Last Impinger	Dry Gas Meter	Vacuum (" Hg)
7	11:02	132.810	0.36	0.600	N/A	2.5	788	260	269	64	98	3
@	11:04	134.430										
Total/Avg.	32.00 min	26.410		0.6276		2.5	787.8				98.4	

	Final Weights	Initial Weights	Weight Gained
First Impinger			
Second Impinger			
Third Impinger			
Silica Gel			
FORMS-1/013.51/METHOD		Total Condensate	

Flue Gas Analysis

Trial	O_2	CO_2	CO	N_2
1				
2				
3				
AVG				

COMMENTS:

Cyclonic Flow Check Non Cyclonic

Pretest Leak Check @ 10 "Hg for .006 CFM

Postest Leak Check @ 10 "Hg for .006 CFM

Plant Name:	PHILLIPS PETR.
Location:	PORT SULPHUR, LA
Unit:	#1 GENERATOR
Condition:	NORMAL
Test Run Number:	RUN #3

Data Summary

Parameter	Value	Units
Carbon Dioxide Concentration, Dry Basis	8	% Volume
Carbon Monoxide Concentration, Dry Basis	0	% Volume
Oxygen Concentration, Dry Basis	8.1	% Volume
Nitrogen Concentration, Dry Basis (gas balance)	83.9	% Volume
Barometric Pressure	30.16	in. Hg
Static Pressure of Gas Stream	-2	in. H20
Average Meter Differential Pressure	2.5	in. H20
Absolute Gas Stream Temperature	1247.8	degrees R
Average Meter Temperature	552.4	degrees R
Total Condensate Collected	89.5	grams H20
Metered Dry Sample Gas Volume	26.41	dcf
Dry Gas Meter Correction Factor (gamma)	0.9832	Dimensionless
Avg. Sq. Root of Velocity Head	0.6276	(in. H20)^0.5
Pitot Tube Coefficient	0.84	Dimensionless
Duct Diameter	10	inches
Gas Molecular Weight, Dry Basis	29.60	lb/lb-mole
Gas Molecular Weight, Wet Basis	27.94	lb/lb-mole
Absolute Stack Gas Pressure	30.01	in. Hg
Meter Pressure	30.34	in. Hg
Standard Metered Volume	25.171	dscf
Standard Volume of Water Vapor	4.220	scf
Moisture Content	0.1436	mole fraction
Moisture Content	14.36	% Volume
Stack Cross-Sectional Area	0.55	ft2
Gas Stream Velocity	54.98	ft/sec
Actual Volumetric Flow Rate, Wet Basis	1799.2	acfm
Standard Dry Volumetric Flow Rate	654.0	dscfm

PHILLIPS PETR. PORT SULPHUR, LA NORMAL #1 GENERATOR

MOISTURE CONTENT DETERMINATION
EPA METHOD 4 CALCULATIONS

Parameter	Definition	Units
Pm	- Absolute Meter Pressure	in. Hg
Po	- Average Meter Differential Pressure	in. H2O
Pstd	- Absolute Standard Barometric Pressure (29.92)	in. Hg
Pb	- Absolute Barometric Pressure	in. Hg
K	- Standard Volume H2O Vapor/Unit Weight Liquid Constant = 0.04715 cu.ft/g	ft3/g
Tm	- Average Meter Temperature	degrees R
Tstd	- Absolute Standard Temperature (528°R)	degrees R
DGMC	- Dry Gas Meter Correction Factor (gamma)	Dimensionless
Vlcg	- Total Condensate Collected	grams H2O
Vm	- Metered Dry Sample Gas Volume	dcf
Vmstd	- Metered Volume at Standard Conditions(528°R, 1atm)	dscf
Vwstd	- Volume of Water Vapor Collected, at Standard Conditions (528°R, 1atm)	scf
Bws	- Moisture Content	mole fraction
Bwd	- Moisture Content	% Volume

TEST DATA RUN #RUN #3

Pb =	30.16	Tm =	552.4
Vm =	26.41	Po =	2.5
Vlcg=	89.5	DGMC =	0.9832

$$Pm = Pb + (Po/13.6) = 30.16 + (2.50/13.6) = 30.34 \text{ in. Hg}$$

$$Vmstd = \frac{(Vm)(DGMC)(Pm)(Tstd)}{(Pstd)(Tm)} = \frac{26.41*0.9832*30.34*528}{29.92*552.4} = 25.171 \text{ ft3}$$

$$Vwstd = (K)(Vlcg) = (0.04715)*(89.5) = 4.220 \text{ g}$$

$$Bws = \frac{(Vwstd)}{(Vwstd) + (Vmstd)} = \frac{4.220}{(4.220 + 25.171)} = 0.1436$$

$$Bwd = (Bws)*100\ \% = 0.1436*100\% = 14.36\%V$$

PHILLIPS PETR. PORT SULPHUR, LA NORMAL #1 GENERATOR

MOLECULAR WEIGHT DETERMINATION
EPA METHOD 3 CALCULATIONS

Parameter	Definition	Units
Md	- Sample Gas Molecular Weight, Dry Basis	lb/lb-mole
Ms	- Sample Gas Molecular Weight, Wet Basis	lb/lb-mole
Bws	- Moisture Content	mole fraction
%CO2	- Carbon Dioxide Concentration, Dry Basis	% Volume
%CO	- Carbon Monoxide Concentration, Dry Basis	% Volume
%O2	- Oxygen Concentration, Dry Basis	% Volume
%N2	- Nitrogen Concentration, Dry Basis (gas balance)	% Volume
0.32	- Molecular Weight of Oxygen (O2), divided by 100%	lb/lb-mole
0.28	- Molecular Weight of Carbon Monoxide, divided by 100%	lb/lb-mole
0.28	- Molecular Weight of Nitrogen (N2), divided by 100%	lb/lb-mole
0.44	- Molecular Weight of Carbon Dioxide, divided by 100%	lb/lb-mole
18.0	- Molecular Weight of Water	lb/lb-mole

TEST DATA RUN #RUN #3

Bws =	0.1436	%CO =	0.00
%N2 =	83.90	%CO2 =	8.00
%O2 =	8.10		

Md = (0.44)(%CO2) + (0.32)(%O2) + (0.28)(%N2 + %CO)

= (0.44)*8.00 + (0.32)*8.10 + (0.28)*(83.90 + 0.00)

= 29.60 lb/lb-mol

Ms = (Md)(1 - Bws) + (18.0)(Bws)

= 29.60*(1 - 0.1436) + 18.0*0.1436

= 27.94 lb/lb-mol

PHILLIPS PETR. PORT SULPHUR, LA NORMAL #1 GENERATOR

VELOCITY AND VOLUMETRIC FLOWRATE DETERMINATION

EPA METHOD 2 CALCULATIONS

Parameter	Definition	Units
Cp	- Pitot Tube Coefficient	Dimensionless
Vs	- Gas Stream Velocity	ft/sec
Qsd	- Volumetric Flow Rate at Standard Conditions,Dry Basis	dscfm
Qact	- Actual Volumetric Flow Rate, Wet Basis	acfm
Bws	- Moisture Content	mole fraction
Dp	- Avg. Sq. Root of Velocity Head	(in. H2O)^0.5
Pb	- Absolute Barometric Pressure	in. Hg
Kp	- Constant = 89.49 (ft)(lb/lb-mol)(in.Hg^0.5)/(s)(°R)(in.H2O)	
Ts	- Absolute Gas Stream Temperature	degrees R
Ms	- Sample Gas Molecular Weight, Wet Basis	lb/lb-mole
Sp	- Static Pressure of Gas Stream	in. H2O
528	- Absolute Standard Temperature	degrees R
CSA	- Stack Cross-Sectional Area	ft2
Ps	- Absolute Stack Gas Pressure	in. Hg
60	- Conversion Factor	sec/min.
Pi	- Constant Ratio - 3.1416	Dimensionless
D	- Duct Diameter	inches

TEST DATA RUN #RUN #3

Ms =	27.94	Cp =	0.84
Bws =	0.1436	Pb =	30.16
Sp =	-2.00	Ts =	1247.8
D =	10.00	Dp =	0.6276

Ps = Pb + (Ps/13.6) = 30.16 + (-2.00/13.6) 30.01 in.Hg

Vs = (85.49)(Cp)(Dp)*[(Ts)/(Ms*Ps)]^0.5

= 85.49*0.84*0.6276*[1247.8/(27.94*30.01)]^0.5

= 54.98 ft/s 54.98 ft/s

CSA = (Pi)[(D)^2]/[(4)(144)] = 3.1416*(10.00^0.5)/(4*144)= 0.55 ft2

Qact = (Vs)*CSA*60 = 54.98*0.55*60 = 1799.2 acfm

$$Qsd = \frac{(Qact)(1-Bws)(528)(Ps)}{(Ts)(29.92)} = \frac{1799.19*(1 - 0.1436)*528*30.01}{1247.8*29.92}$$

= 654.0 dscfm 654.0 dscfm

EPA METHOD 1
CYCLONIC FLOW
WORKSHEET

Environmental Science & Engineering, Inc.

CLIENT: Phillips	PROJECT NO.: 3927058
LOCATION: Lake Washington	DATE: 10-27-92
UNIT I.D.: A- Generator #1	ANALYST: Randy Young
RUN NO.: 1	PAGE NO.: 1
START TIME: 7:45	END TIME: 7:50

PORT/TRAVERSE POINT	INITIAL PRESSURE DROP	FINAL PRESSURE DROP	ANGLE (DEGREES)
2	.07	0.0	5
2	.07	0.0	10
3	.08	0.0	10
4	.07	0.0	5
5	.07	0.0	10
6	.07	0.0	10
7	.09	0.0	5
8	.09	0.0	5

COMMENTS:

FORMS-6/094.51/CYCLONIC.M1

APPENDIX B -- INSTRUMENTATION FIELD DATA, CALCULATIONS, AND STRIP CHART RECORDINGS

B.1 -- OXIDES OF NITROGEN

OXIDES OF NITROGEN EMISSION RATE CALCULATIONS

NO. 1 GENERATOR

En	-	Oxides of Nitrogen Emission Rate; lb/hr
Qsd	-	Volumetric Flow Rate of Stack Gas, Corrected to Dry Standard Conditions; DSCFM
F	-	Conversion Factor; 1.194×10^{-7} lb/SCF-ppmv
Cn	-	Concentration of Oxides of Nitrogen, Dry Basis; ppmv
K1	-	Conversion Factor; 60 minutes per hour

Where: $En = (Cn)(Qsd)(K1)(F)$

TEST DATA

Run 1:	Cn = 597.28	Qsd = 656.7
Run 2:	Cn = 520.15	Qsd = 726.6
Run 3:	Cn = 505.44	Qsd = 654.0

SAMPLE CALCULATIONS

Run 1: $En = (597.28)(656.7)(60)(1.194 \times 10^{-7}) = 2.81$ lb/hr

Run 2: $En = (520.15)(726.6)(60)(1.194 \times 10^{-7}) = 2.71$ lb/hr

Run 3: $En = (505.44)(654.0)(60)(1.194 \times 10^{-7}) = 2.37$ lb/hr

INSTRUMENTATION RESPONSE TIME WORKSHEET

Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum	PROJECT NO.: 39270
FACILITY: Lake Washington (Central)	ANALYST: Todd Jackson
SOURCE I.D. NO.: #1 Generator	DATE: 10-26-92

INSTRUMENT SPECIFICATIONS

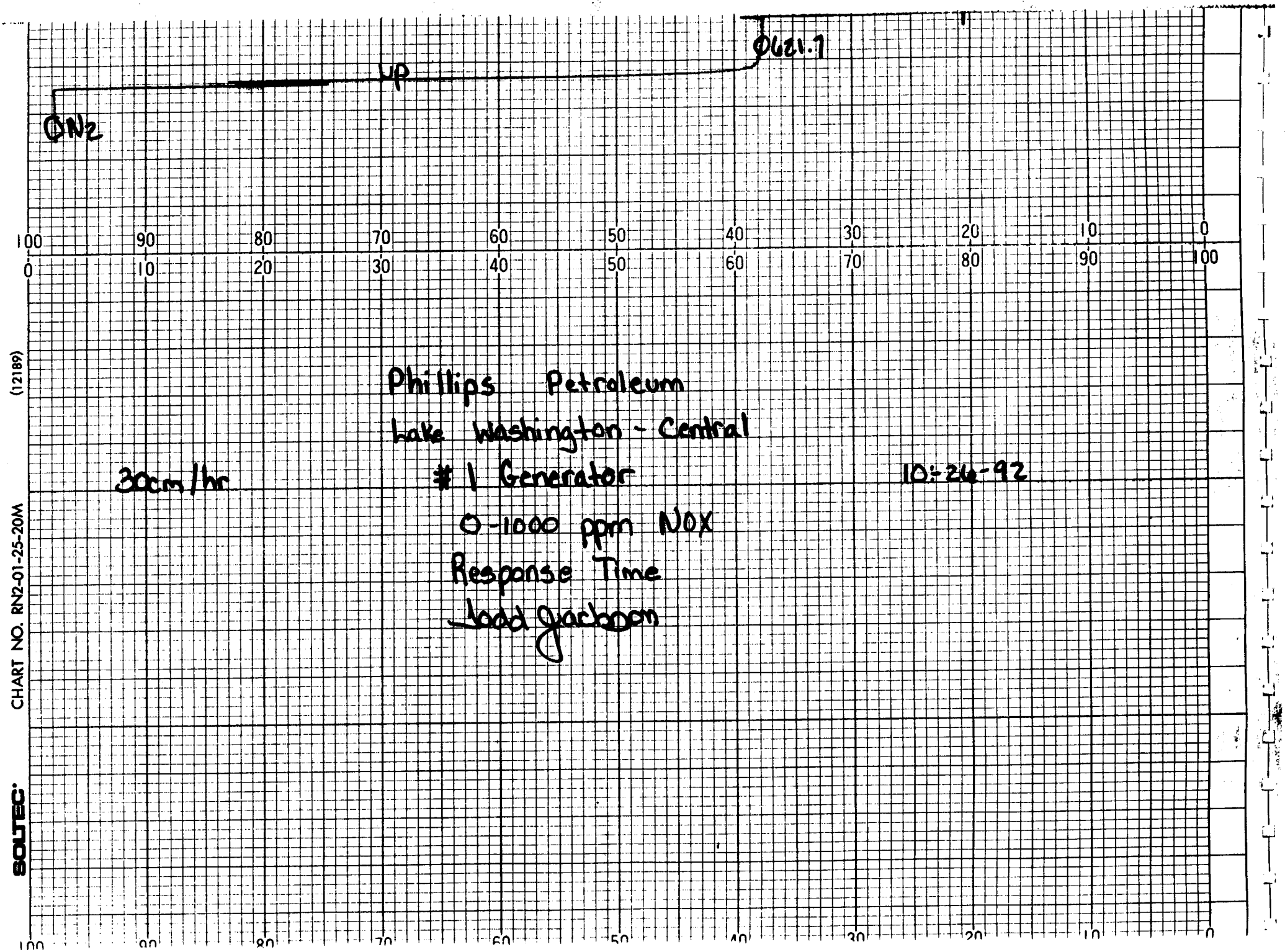
ANALYZER:	Thermo Electron	
MODEL NO.:	10AR	
SPAN RANGE:	0 - 1000	
SPAN GASES:	N_2 - 621.7 - 980.5	
CHART SPEED:	30cm/hr	

RESPONSE TIME DATA

UPSCALE RESPONSE	72:71	62:52
☑ SECONDS	72:03	62:33
☐ MINUTES	72:36	62:42
AVERAGE		
DOWNSCALE RESPONSE	62:32	72:47
☑ SECONDS	62:78	72:68
☐ MINUTES	62:71	72:52
AVERAGE		

COMMENTS: 200 ft Sample Line

FORMS-7/102.51/TIME.CEM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UP
@N2
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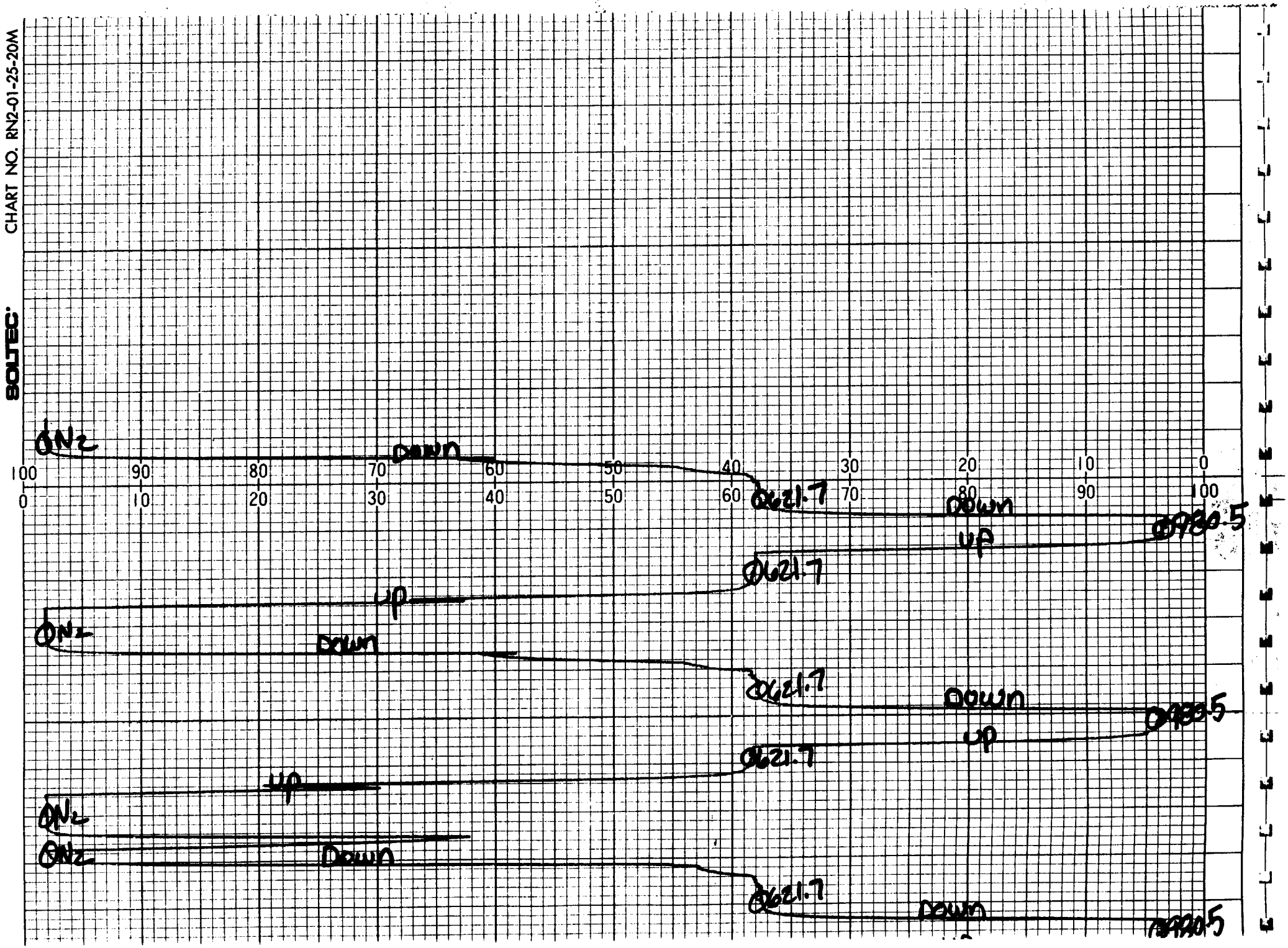
0 10 20 30 40 50 60 70 80 90 100
Phillips Petroleum
Lake Washington - Central
1 Generator
10-26-92
30cm/hr
0-1000 ppm NOX
Response Time
Todd Jackson
(12189)
CHART NO. RN2-01-25-20M
SOLTEC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90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
ØN2
Down
Ø621.7
Down
up
Ø930.5
Ø621.7
up
ØN2
Down
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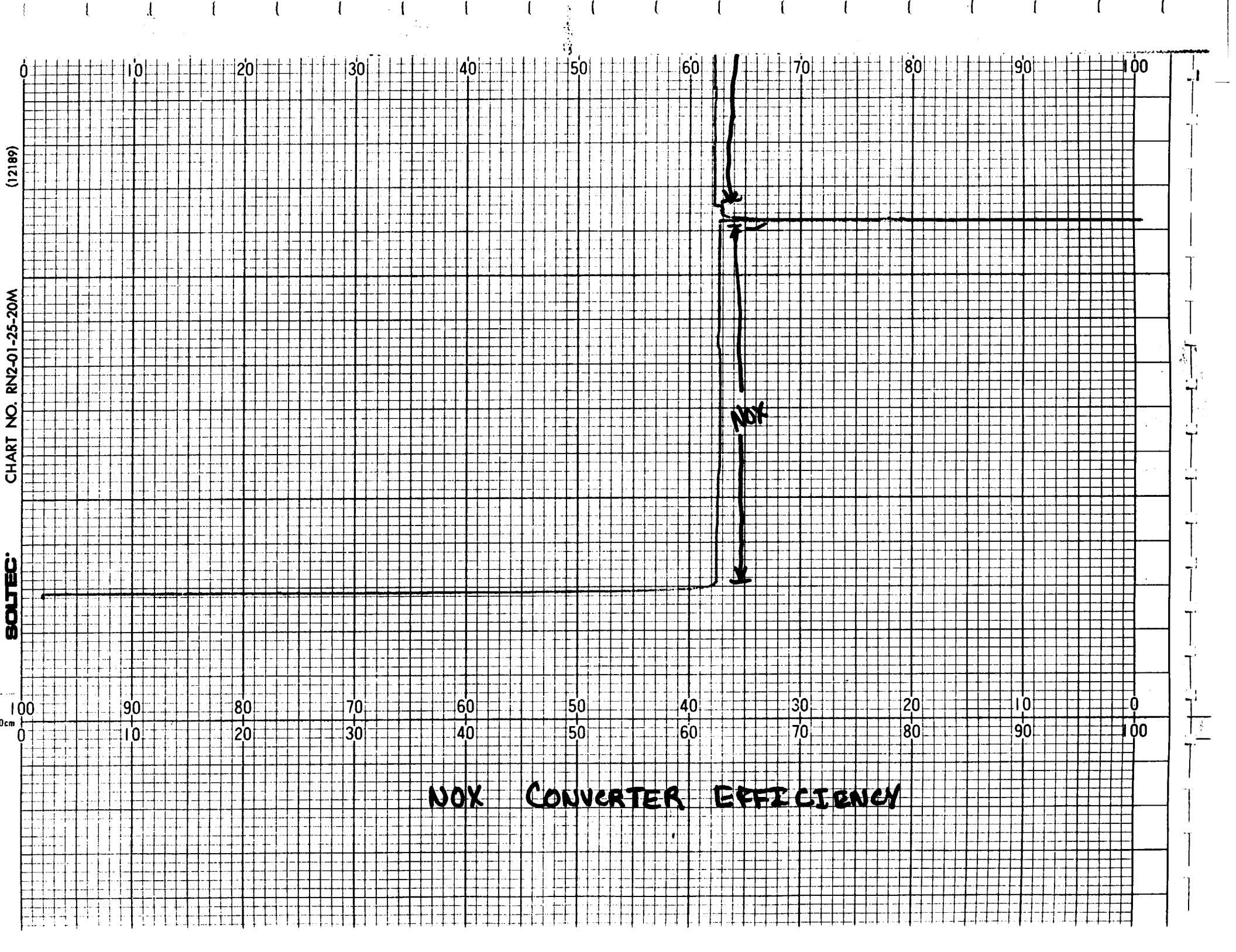
Down
Ø930.5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NOX
100 90 80 70 60 50 40 30 20 10 0
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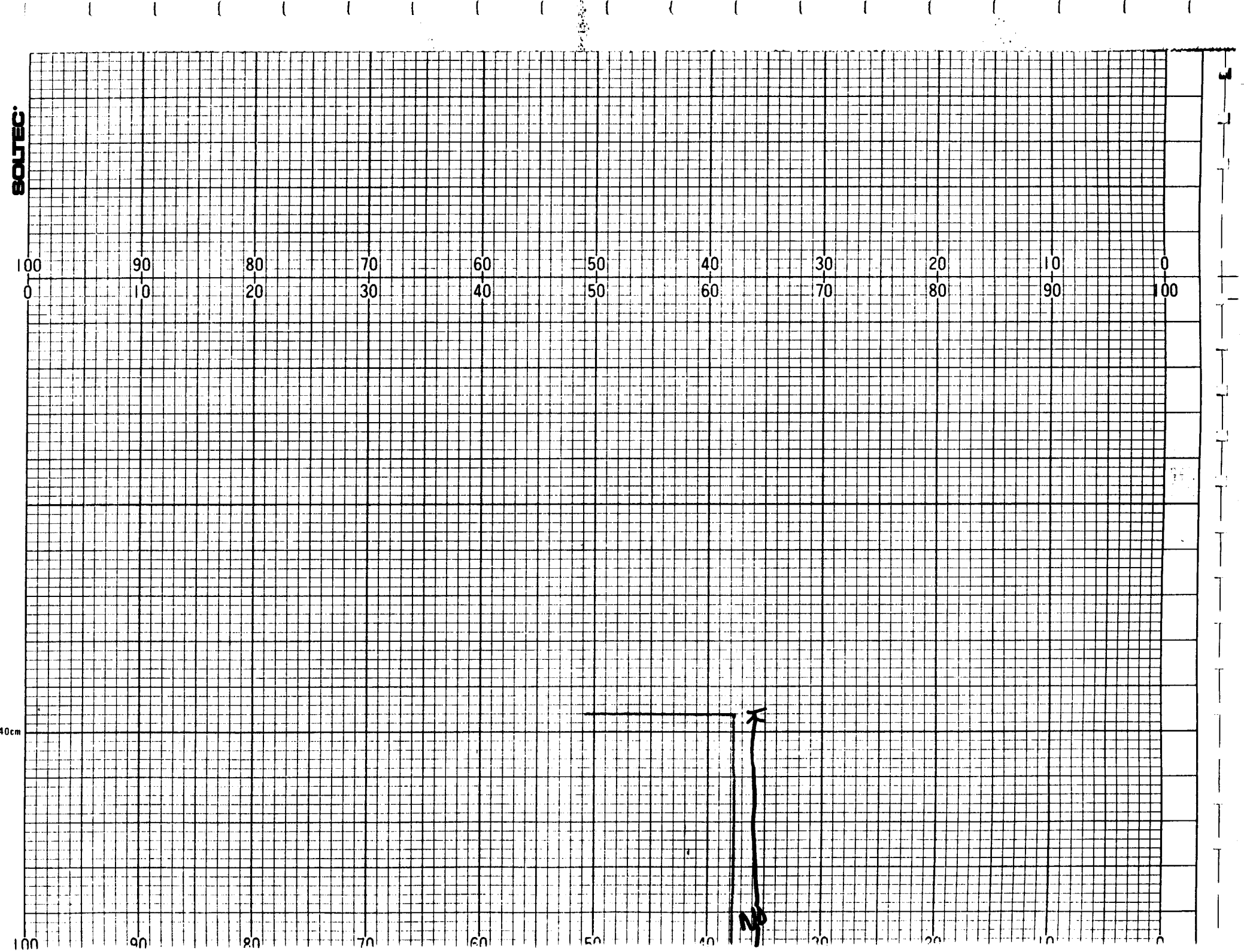
NOX CONVERTER EFFICIENCY
(12189)
CHART NO. RN2-01-25-20M
BOLTEC


BOLTEC
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0 10 20 30 40 50 60 70 80 90 100
40cm
N

EPA METHOD 7E
OXIDES OF NITROGEN

ESE Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum		PROJECT NO: 3927058
SOURCE: #1 Generator		RUN NO.: 1
TIME START: 8:00	TIME END: 9:00	MINUTES PER POINT: 2
DATE: 10-27-92	ANALYST: Todd Jackson	

INSTRUMENT CALIBRATION STATISTICS

	Cylindar Value	Initial Analyzer Response		Final Analyzer Response		Drift
	ppmv	reading	ppmv	reading	ppmv	%
Zero	N_2	2.0	-2.65	2.0	-2.65	0.0
Low						
Mid	621.7	64.0	629.2	63.0	618.9	-1.00
High	980.5	98.0	975.7	98.0	975.7	0.0
Bias CO	459.5	2.0	-2.65	2.0	-2.65	0.0

Linear Regression Curve: ppmv NO_x = (reading)(slope) + y intercept

$$\% \text{ Drift} = \frac{\text{Final Response - Initial Response}}{\text{Span}} \times 100$$

Slope	10.1908	y intercept	-23.0311	Span Range	996.1 ppmv

TEST DATA

Test Point	Reading	Test Point	Reading	Test Point	Reading
1	62.0	11	60.0	21	63.0
2	62.0	12	61.0	22	60.0
3	58.0	13	64.0	23	60.5
4	60.0	14	62.5	24	62.0
5	60.0	15	63.5	25	63.0
6	63.0	16	67.5	26	54.0
7	63.0	17	63.0	27	51.0
8	65.0	18	62.0	28	52.0
9	65.0	19	62.0	29	54.0
10	64.0	20	65.0	30	54.0

Average Reading: 60.87 Concentration: 597.28 ppmv

FORMS-1/010.31/NOX.CEM

EPA METHOD 7E
OXIDES OF NITROGEN

Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum		PROJECT NO: 3927058
SOURCE: #1 Generator		RUN NO.: 2
TIME START: 9:15	TIME END: 10:15	MINUTES PER POINT: 2
DATE: 10-27-92	ANALYST: Todd Jacboom	

INSTRUMENT CALIBRATION STATISTICS

	Cylindar Value	Initial Analyzer Response		Final Analyzer Response		Drift
	ppmv	reading	ppmv	reading	ppmv	%
Zero	N_2	2.0	-0.31	2.0	-0.31	0.0
Low						
Mid	621.7	63.0	622.6	63.0	622.6	0.0
High	980.5	98.0	979.9	98.0	979.9	0.0
Bias CO	459.5	2.0	-0.31	2.0	-0.31	0.0

Linear Regression Curve: ppmv NO_x = (reading)(slope) + y intercept

$$\% \text{ Drift} = \frac{\text{Final Response} - \text{Initial Response}}{\text{Span}} \times 100$$

Slope	10.2111	y intercept	-20.7368	Span Range	1000 ppmv

TEST DATA

Test Point	Reading	Test Point	Reading	Test Point	Reading
1	56.0	11	55.0	21	55.0
2	54.5	12	58.0	22	45.5
3	57.5	13	57.5	23	46.0
4	56.5	14	55.0	24	45.0
5	57.0	15	55.5	25	38.0
6	56.0	16	56.0	26	38.5
7	54.0	17	58.0	27	40.0
8	55.0	18	55.0	28	56.0
9	55.5	19	55.0	29	58.0
10	56.0	20	54.0	30	55.0

Average Reading: 52.97 Concentration: 520.15 ppmv

EPA METHOD 7E
OXIDES OF NITROGEN

Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum		PROJECT NO: 3927058	
SOURCE: #1 Generator		RUN NO.: 3	
TIME START: 10:30	TIME END: 11:30	MINUTES PER POINT: 2	
DATE: 10-27-92	ANALYST: Todd Jackson		

INSTRUMENT CALIBRATION STATISTICS

	Cylindar Value	Initial Analyzer Response		Final Analyzer Response		Drift
	ppmv	reading	ppmv	reading	ppmv	%
Zero	N_2	2.0	-0.31	2.0	-0.31	0.00
Low						
Mid	621.7	63.0	622.6	63.0	622.6	0.00
High	980.5	98.0	979.9	98.5	985.1	0.50
Bias CO	459.5	2.0	-0.31	2.0	-0.31	0.00

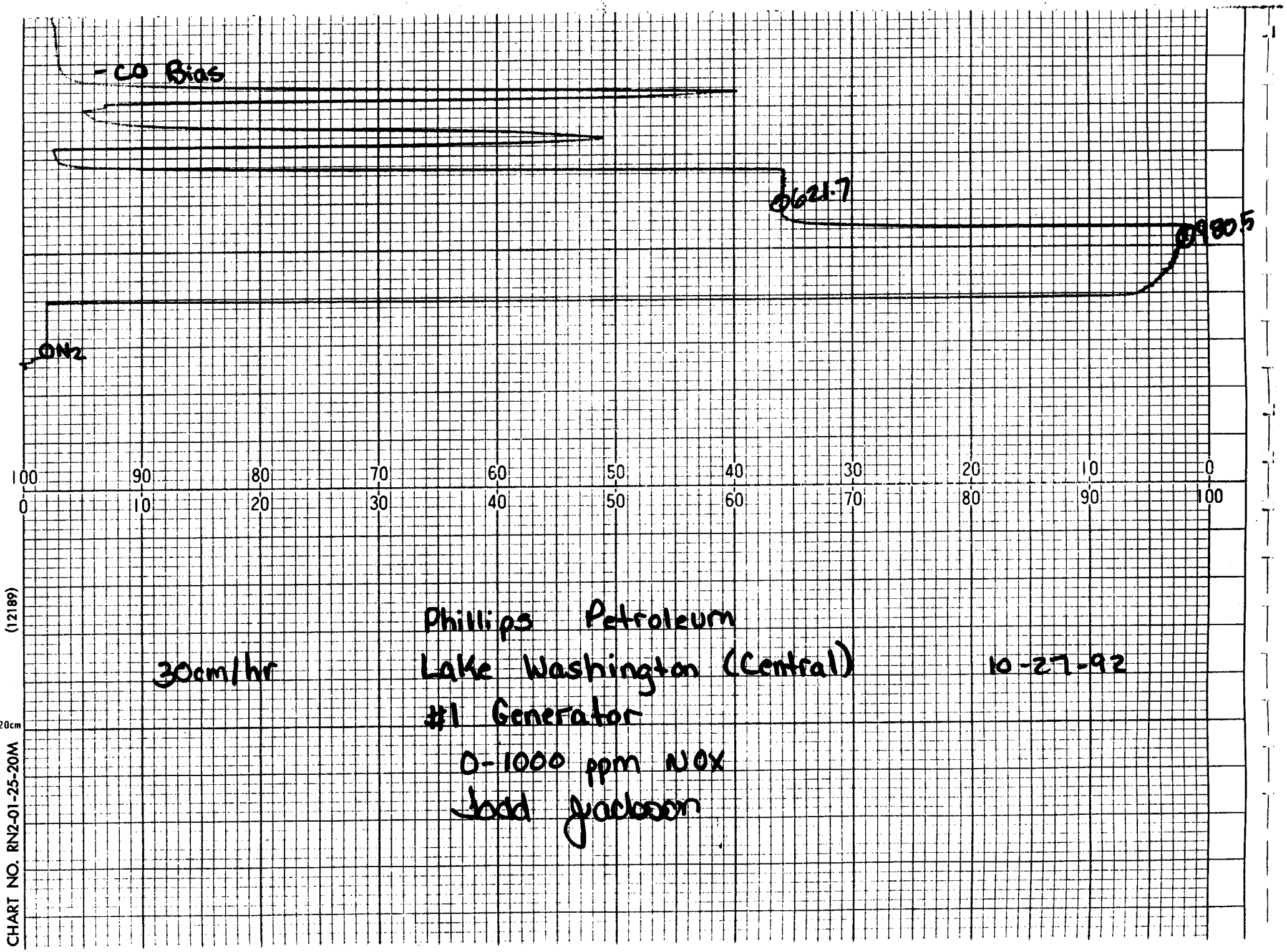
Linear Regression Curve: ppmv NO_x = (reading)(slope) + y intercept

$$\% \text{ Drift} = \frac{\text{Final Response - Initial Response}}{\text{Span}} \times 100$$

Slope	10.2111	y intercept	-20.7368	Span Range	1000 ppmv

TEST DATA

Test Point	Reading	Test Point	Reading	Test Point	Reading
1	54.0	11	55.5	21	39.0
2	54.5	12	55.0	22	40.5
3	55.0	13	54.0	23	44.0
4	55.0	14	55.5	24	43.0
5	54.0	15	53.5	25	44.0
6	56.0	16	53.5	26	42.0
7	53.0	17	55.0	27	52.0
8	54.0	18	56.5	28	50.0
9	53.0	19	55.0	29	50.0
10	53.5	20	50.0	30	56.0
Average Reading:	51.53		Concentration:	505.44	ppmv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0805
0N2
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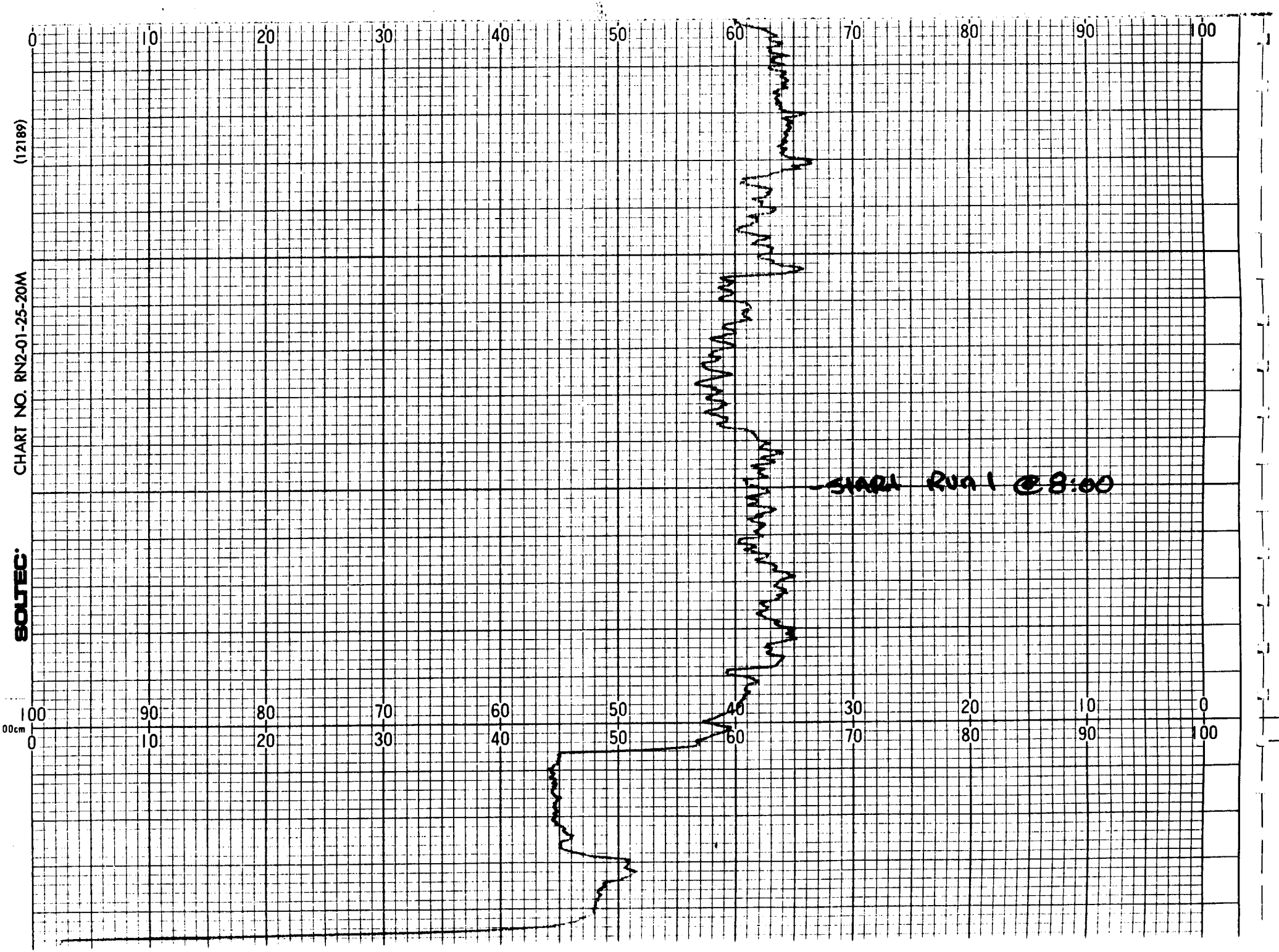
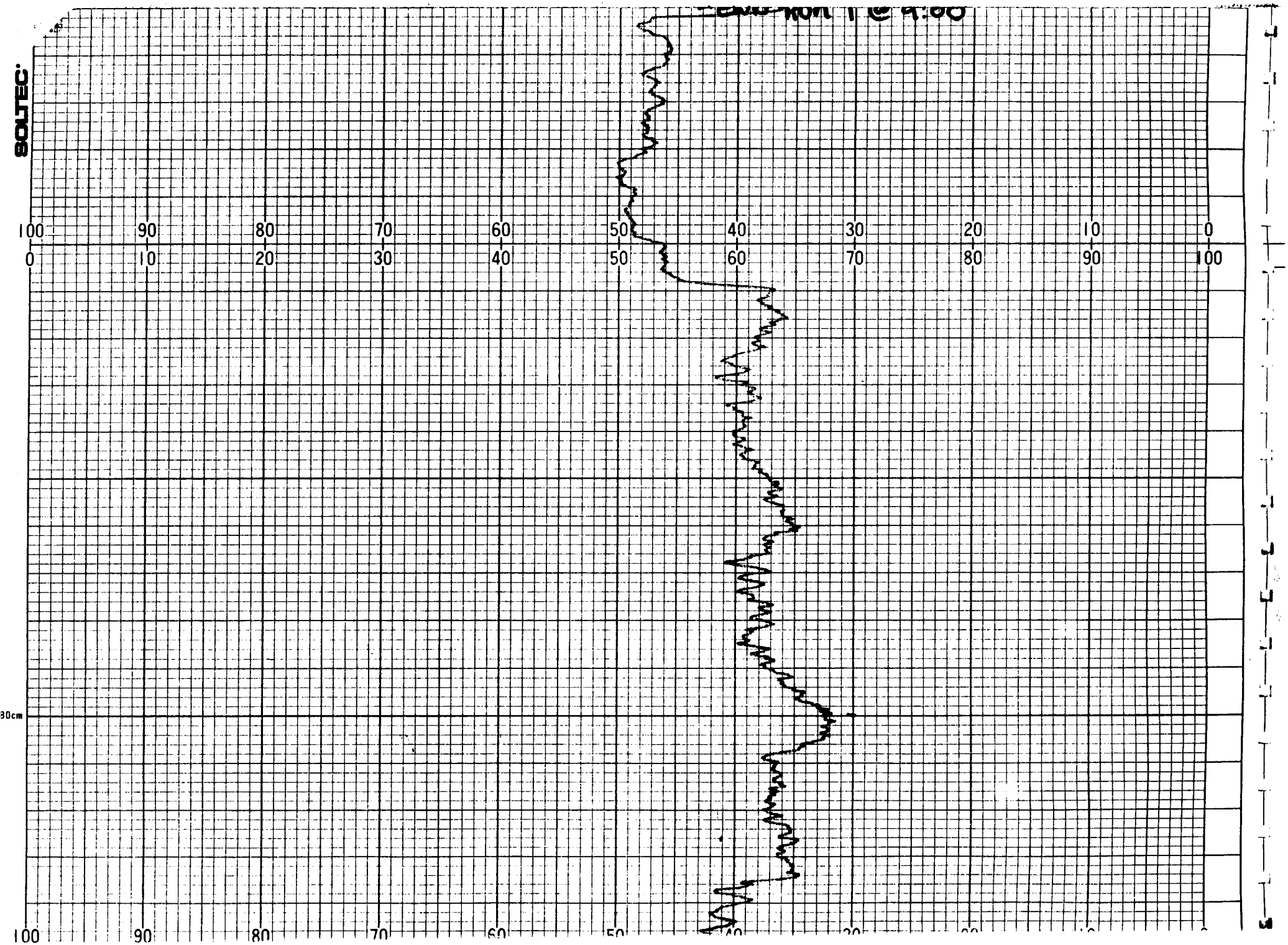
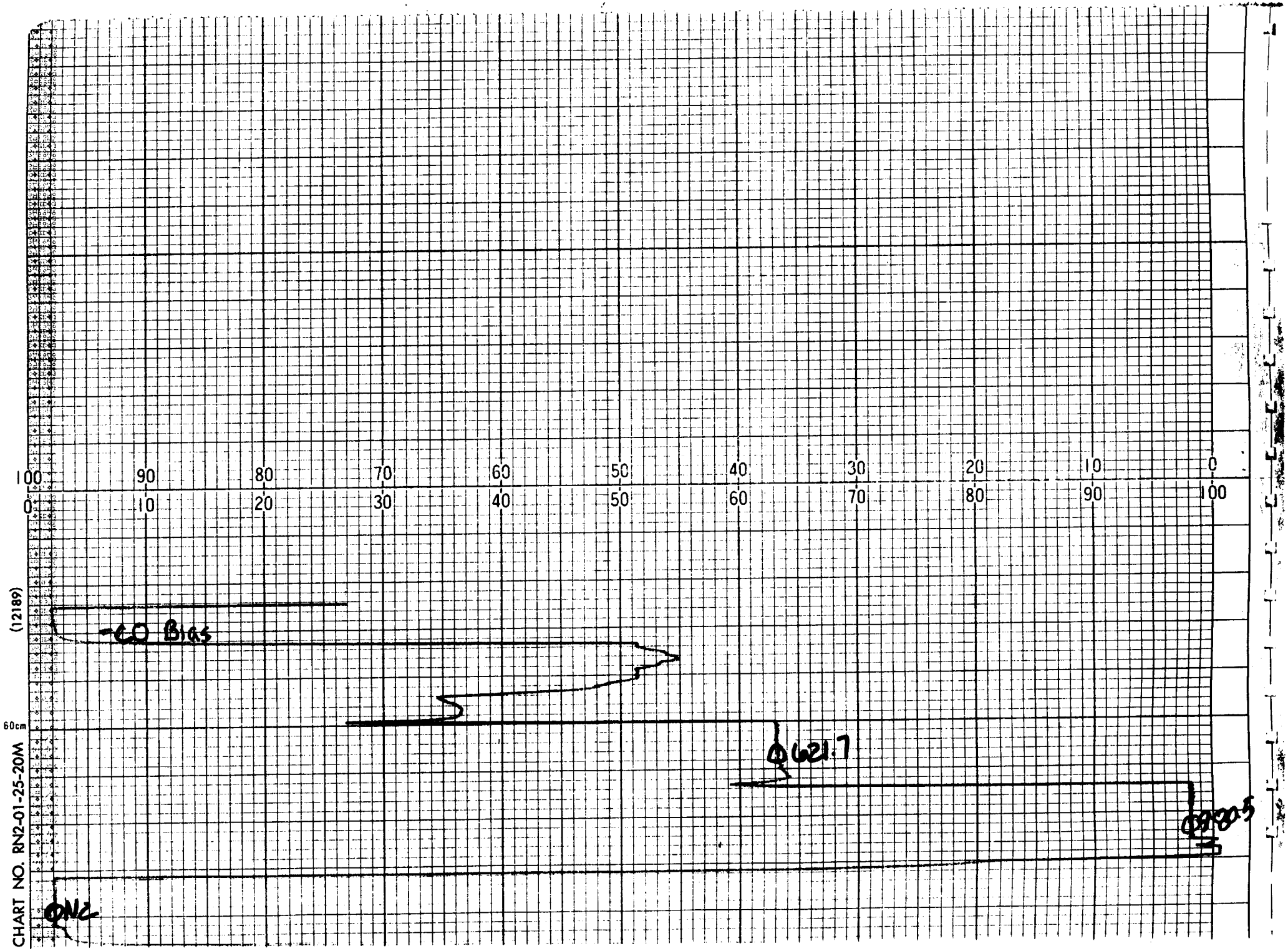
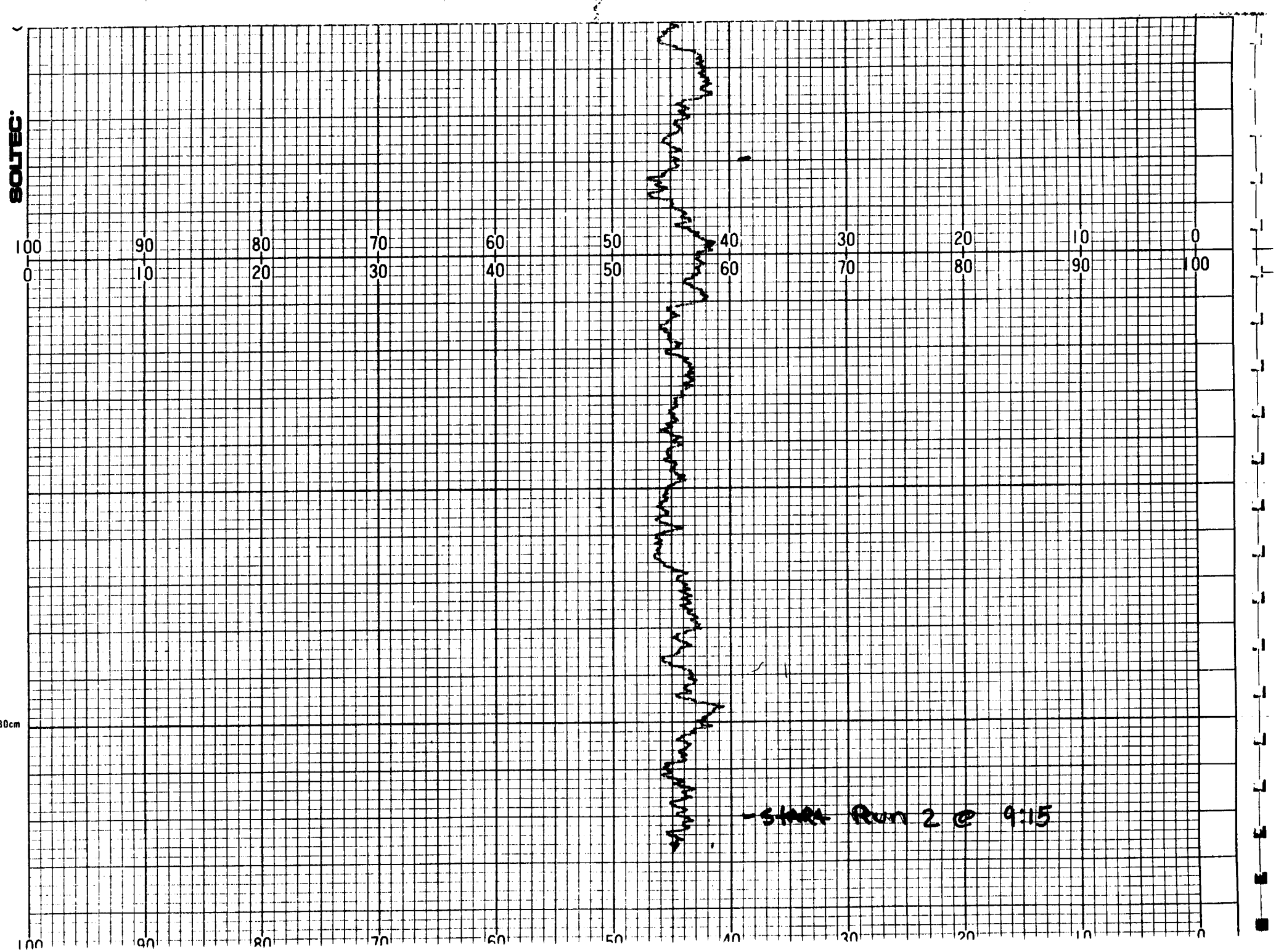
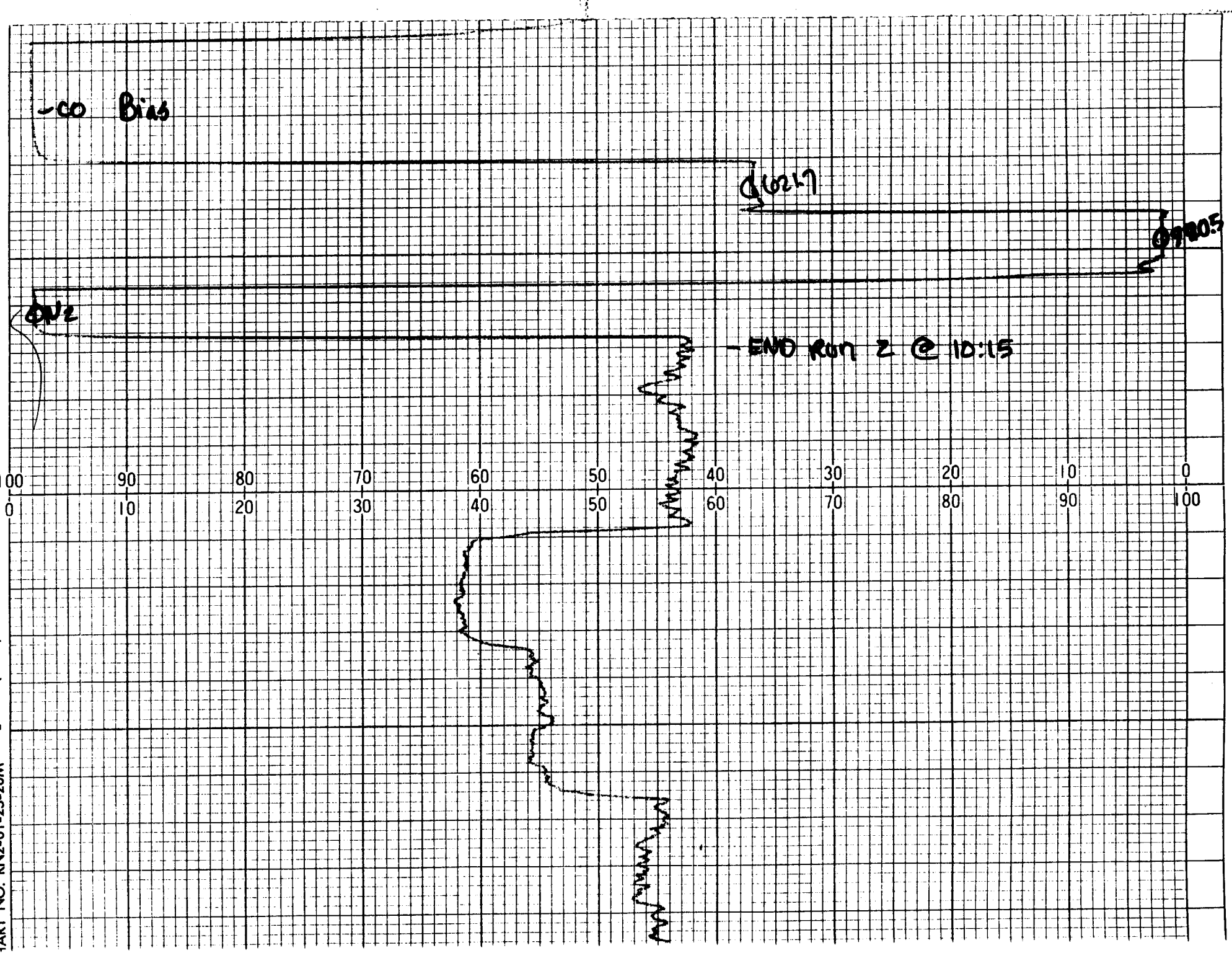
0 10 20 30 40 50 60 70 80 90 100
Phillips Petroleum
Lake Washington (Central)
#1 Generator
0-1000 ppm NOX
Todd Jackson
30cm/hr
10-27-92
(12189)
20cm
CHART NO. RN2-01-25-20M


SOLTEC
CHART NO. RN2-01-25-20M
(12189)
START RUN 1 @ 8:00
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
00cm
0 10 20 30 40 50 60 70 80 90 100


END RUN 1 @ 9:00
SOLTEC
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
30cm


100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
-CO Bias
φ621.7
φ1305
φN2
(12189)
60cm
CHART NO. RN2-01-25-20M

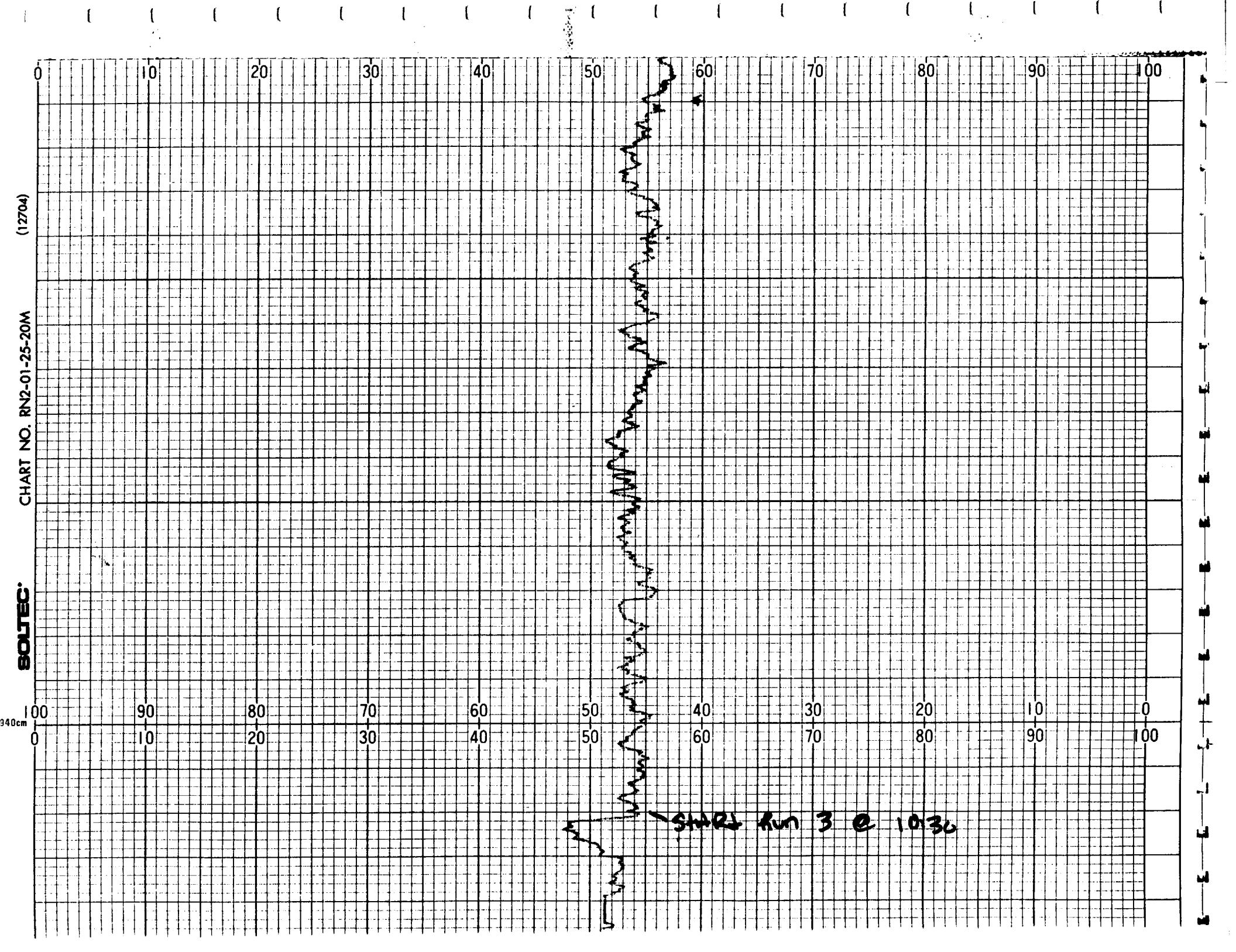

SOLTEC
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
30cm
-start Run 2 @ 9:15

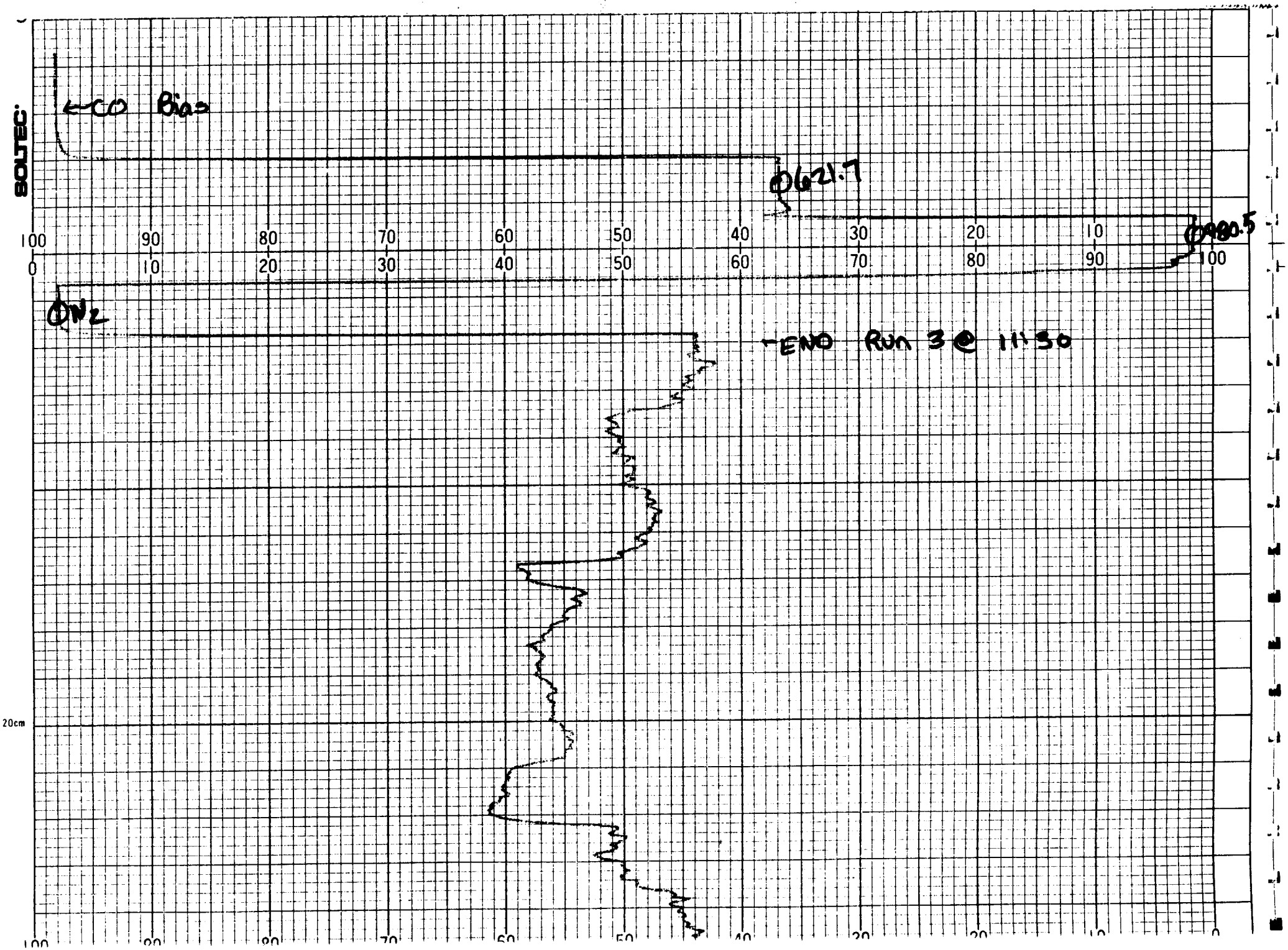


(12704)

0cm

ART NO. RN2-01-25-20M


(12704)
CHART NO. RN2-01-25-20M
BOLTEC
940cm
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
Start Run 3 @ 1036


SOLTEC
←CO Bias
621.7
980.5
N2
END Run 3 @ 11:30
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
20cm

B.2 -- CARBON MONOXIDE

CARBON MONOXIDE EMISSION RATE CALCULATIONS

NO. 1 GENERATOR

En	-	Carbon Monoxide Emission Rate; lb/hr
Qsd	-	Volumetric Flow Rate of Stack Gas, Corrected to Dry Standard Conditions; DSCFM
F	-	Conversion Factor; 7.267×10^{-8} lb/SCF-ppmv
Cn	-	Concentration of Carbon Monoxide, Dry Basis; ppmv
K1	-	Conversion Factor; 60 minutes per hour

Where: $En = (Cn)(Qsd)(K1)(F)$

TEST DATA

Run 1:	Cn = 584.29	Qsd = 656.7
Run 2:	Cn = 577.06	Qsd = 726.6
Run 3:	Cn = 575.16	Qsd = 654.0

SAMPLE CALCULATIONS

Run 1: $En = (584.29)(656.7)(60)(7.267 \times 10^{-8}) = 1.67$ lb/hr

Run 2: $En = (577.06)(726.6)(60)(7.267 \times 10^{-8}) = 1.83$ lb/hr

Run 3: $En = (575.16)(654.0)(60)(7.267 \times 10^{-8}) = 1.64$ lb/hr

EPA METHOD 10
CARBON MONOXIDE

Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum		PROJECT NO: 3927058
SOURCE: #1 Generator		RUN NO.: 1
TIME START: 8:00	TIME END: 9:00	MINUTES PER POINT: 2
DATE: 10-27-92	ANALYST: Todd Jackson	

INSTRUMENT CALIBRATION STATISTICS

	Cylindar Value	Initial Analyzer Response		Final Analyzer Response		Drift
	ppmv	reading	ppmv	reading	ppmv	%
Zero	N_2	2.0	3.75	2.0	3.75	0.0
Low	181.7	19.5	179.5	19.5	179.5	0.0
Mid	459.5	47.0	455.7	47.0	455.7	0.0
High	950.7	96.5	952.9	96.5	952.9	0.0
Bias CO	459.5	46.0	445.7	47.0	455.7	1.0

Linear Regression Curve: ppmv CO = (reading)(slope) + y intercept

$$\% \text{ Drift} = \frac{\text{Final Response} - \text{Initial Response}}{\text{Span}} \times 100$$

Slope	10.0439	y intercept	-16.3356	Span Range	988.1 ppmv

TEST DATA

Test Point	Reading	Test Point	Reading	Test Point	Reading
1	60.0	11	60.0	21	59.0
2	59.5	12	60.0	22	59.0
3	60.5	13	59.0	23	59.0
4	60.0	14	59.0	24	58.5
5	60.0	15	59.0	25	58.5
6	59.0	16	59.0	26	62.5
7	59.0	17	58.5	27	63.5
8	59.0	18	59.0	28	62.5
9	59.0	19	59.5	29	62.0
10	59.0	20	59.0	30	62.5

Average Reading: 59.80 Concentration: 584.29 ppmv

FORMS-1/011.31/CO.CEM

EPA METHOD 10
CARBON MONOXIDE

Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum		PROJECT NO: 3927058	
SOURCE: #1 Generator		RUN NO.: 2	
TIME START: 9:15	TIME END: 10:15	MINUTES PER POINT: 2	
DATE: 10-27-92	ANALYST: Todd Jackson		

INSTRUMENT CALIBRATION STATISTICS

	Cylindar Value	Initial Analyzer Response		Final Analyzer Response		Drift
	ppmv	reading	ppmv	reading	ppmv	%
Zero	N_2	2.0	3.75	2.0	3.75	0.0
Low	181.7	19.5	179.5	19.5	179.5	0.0
Mid	459.5	47.0	455.7	47.0	455.7	0.0
High	950.7	96.5	952.9	96.0	947.9	-0.5
Bias CO	459.5	47.0	458.7	46.5	450.7	-0.5

Linear Regression Curve: ppmv CO = (reading)(slope) + y intercept

% Drift = $\frac{\text{Final Response - Initial Response}}{\text{Span}}$ X 100

Slope	10.0439	y intercept	-16.336	Span Range	988.1 ppmv

TEST DATA

Test Point	Reading	Test Point	Reading	Test Point	Reading
1	58.5	11	58.5	21	57.5
2	59.0	12	58.5	22	62.0
3	58.0	13	59.5	23	63.0
4	58.5	14	59.5	24	61.5
5	57.0	15	58.5	25	62.0
6	58.0	16	58.0	26	64.0
7	59.0	17	57.5	27	63.5
8	58.0	18	57.5	28	58.5
9	58.0	19	57.5	29	58.0
10	57.5	20	57.0	30	59.0

Average Reading: 59.08 Concentration: 577.06 ppmv

FORMS-1/011.51/CO.CEM

EPA METHOD 10
CARBON MONOXIDE

Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum		PROJECT NO: 3927058	
SOURCE: #1 Generator		RUN NO.: 3	
TIME START: 10:30	TIME END: 11:30	MINUTES PER POINT: 2	
DATE: 10-27-92	ANALYST: todd gadbson		

INSTRUMENT CALIBRATION STATISTICS

	Cylindar Value	Initial Analyzer Response		Final Analyzer Response		Drift
	ppmv	reading	ppmv	reading	ppmv	%
Zero	N2	2.0	2.86	3.0	12.96	1.00
Low	181.7	19.5	179.6	19.5	179.6	0.00
Mid	459.5	47.0	457.3	47.0	457.3	0.00
High	950.7	96.0	952.1	96.0	952.1	0.00
Bias CO	459.5	46.5	452.3	46.5	452.3	0.00

Linear Regression Curve: ppmv CO = (reading)(slope) + y intercept

% Drift = $\frac{\text{Final Response - Initial Response}}{\text{Span}}$ X 100

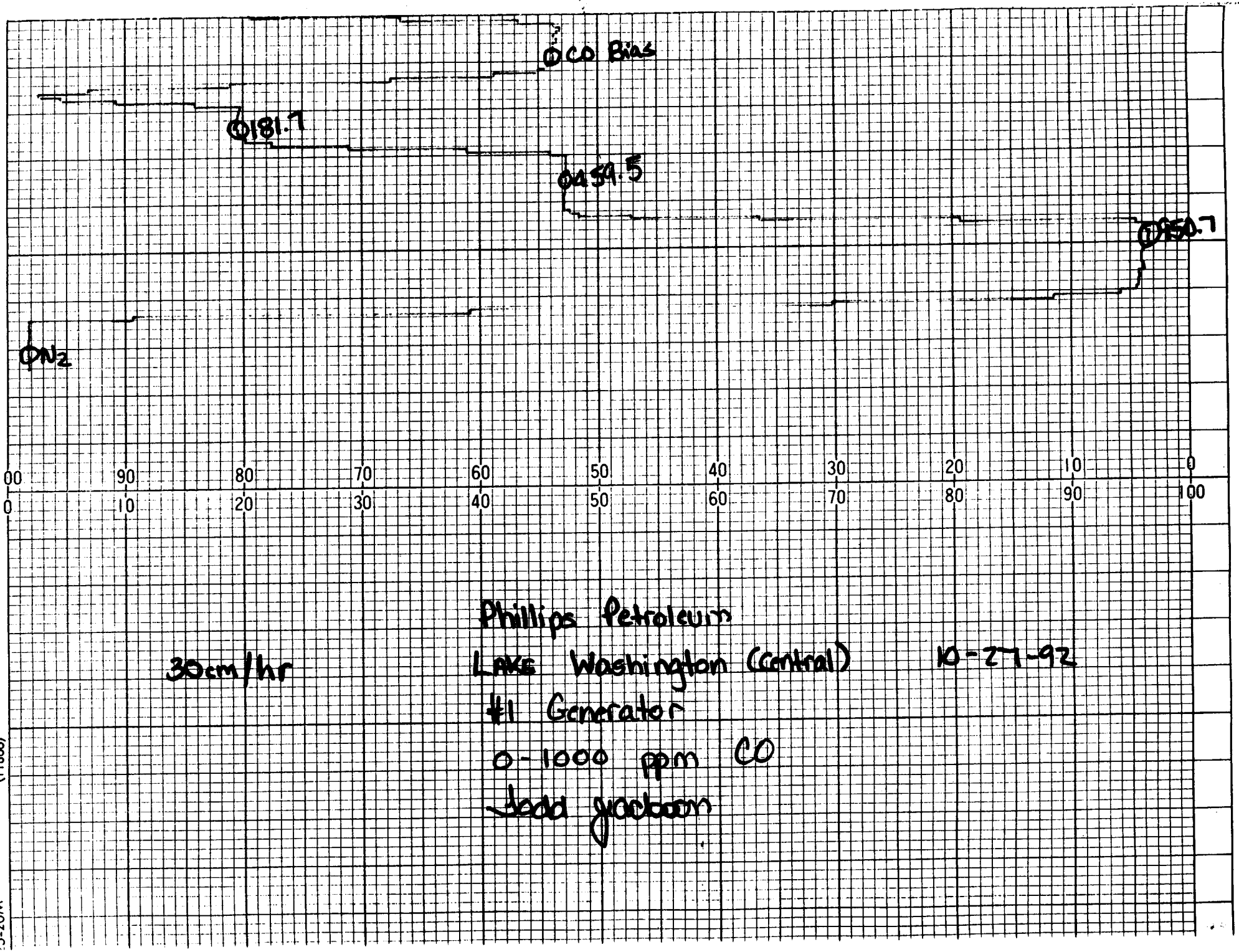
Slope	10.0987	y intercept	-17.3359	Span Range	992.5 ppmv

TEST DATA

Test Point	Reading	Test Point	Reading	Test Point	Reading
1	58.0	11	58.0	21	60.5
2	57.5	12	58.0	22	62.0
3	58.0	13	57.5	23	61.5
4	58.5	14	57.5	24	62.0
5	58.0	15	58.0	25	61.5
6	57.5	16	58.0	26	60.0
7	57.0	17	58.0	27	58.5
8	57.5	18	57.5	28	59.0
9	57.0	19	57.5	29	61.0
10	57.5	20	59.0	30	58.5

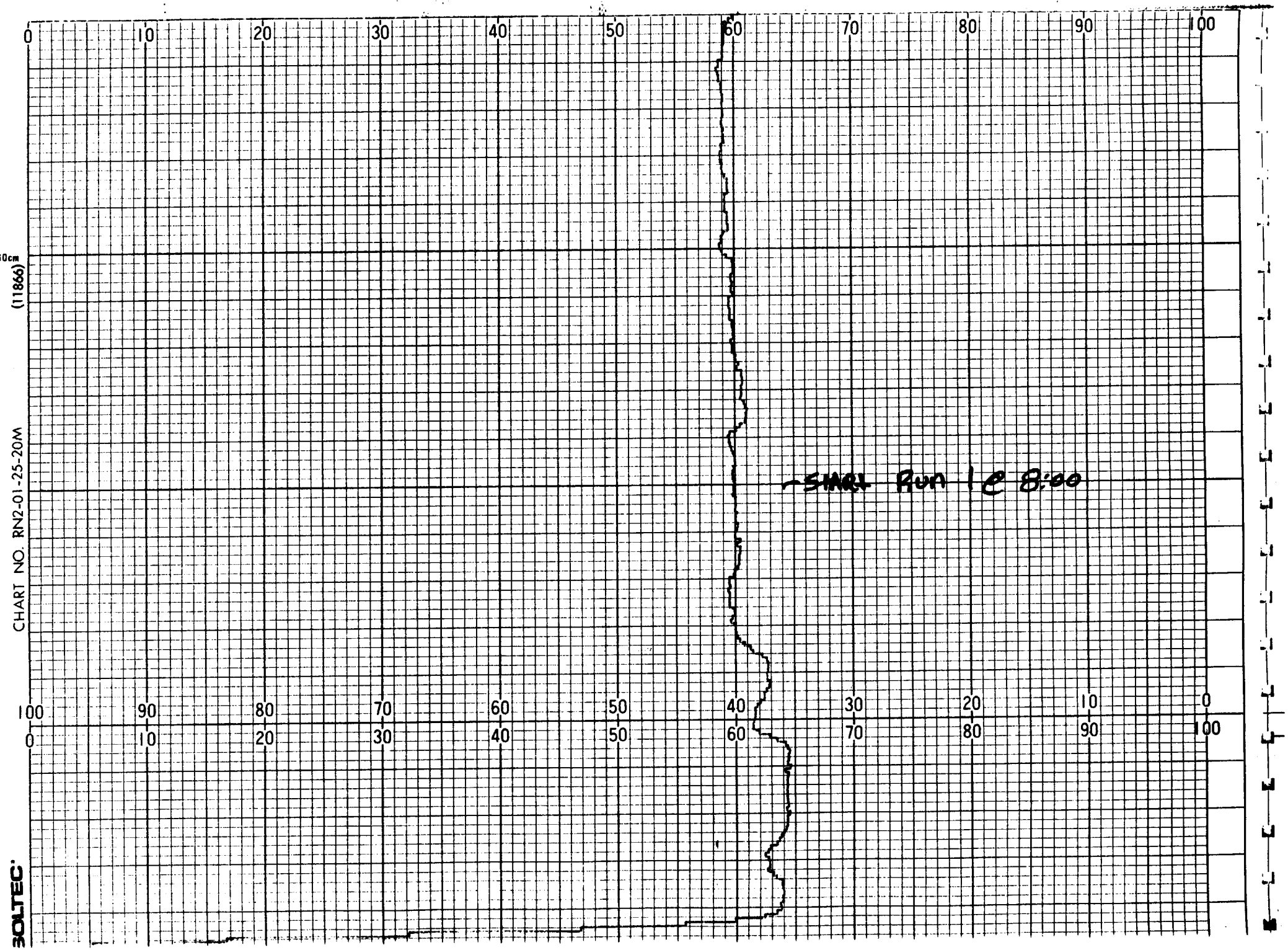
Average Reading: 58.67 Concentration: 575.16 ppmv

FORMS-1/011.31/CO.CEM


CO Bias
181.7
459.5
150.7
N2
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
30cm/hr
Phillips Petroleum
Lake Washington (Central)
#1 Generator
0-1000 ppm CO
Todd Jackson
10-27-92

(11866)

25-20M


0 10 20 30 40 50 60 70 80 90 100
~START Run 1 @ 8:00
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
CHART NO. RN2-01-25-20M
(11866)
BOLTEC

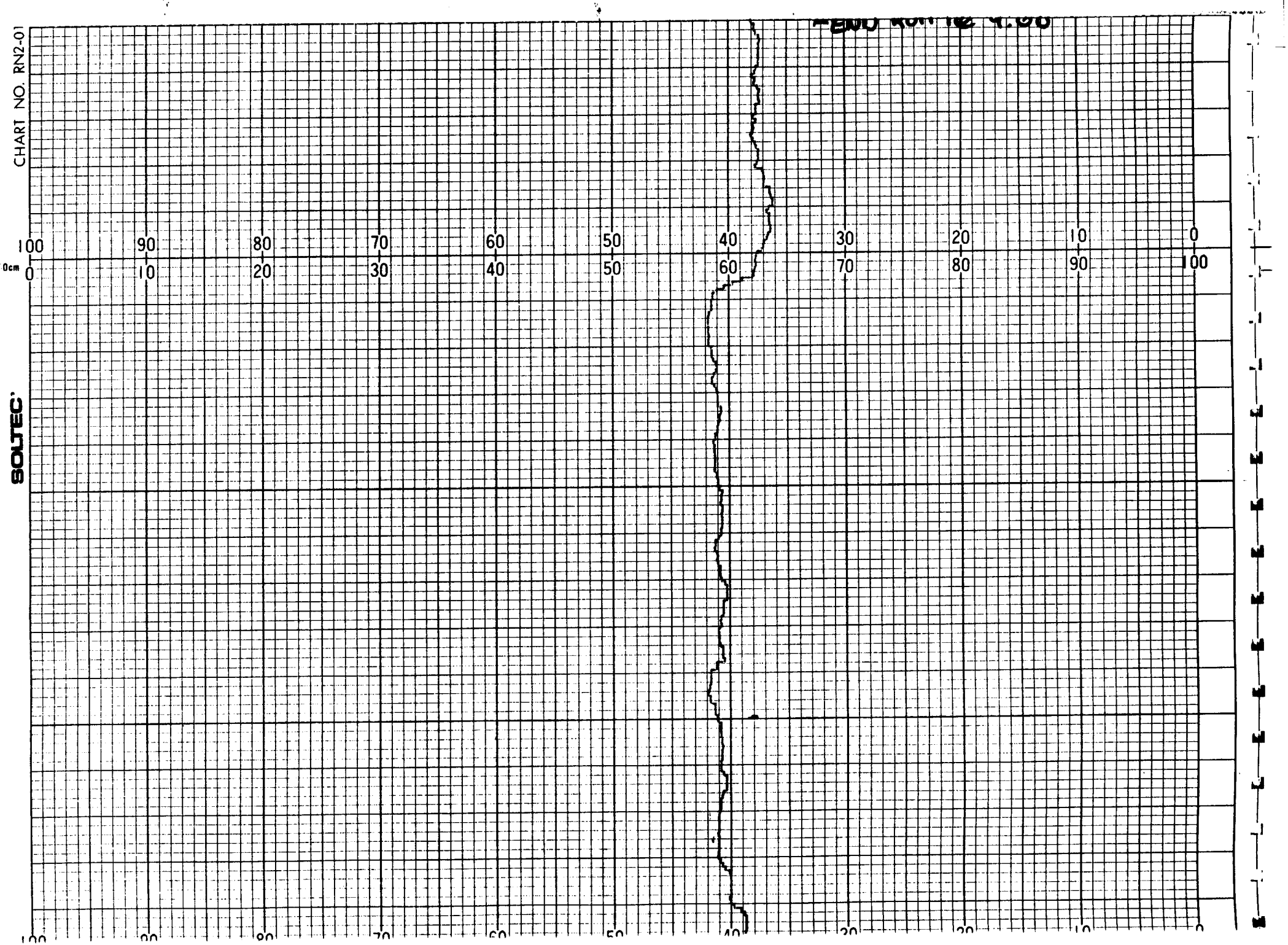
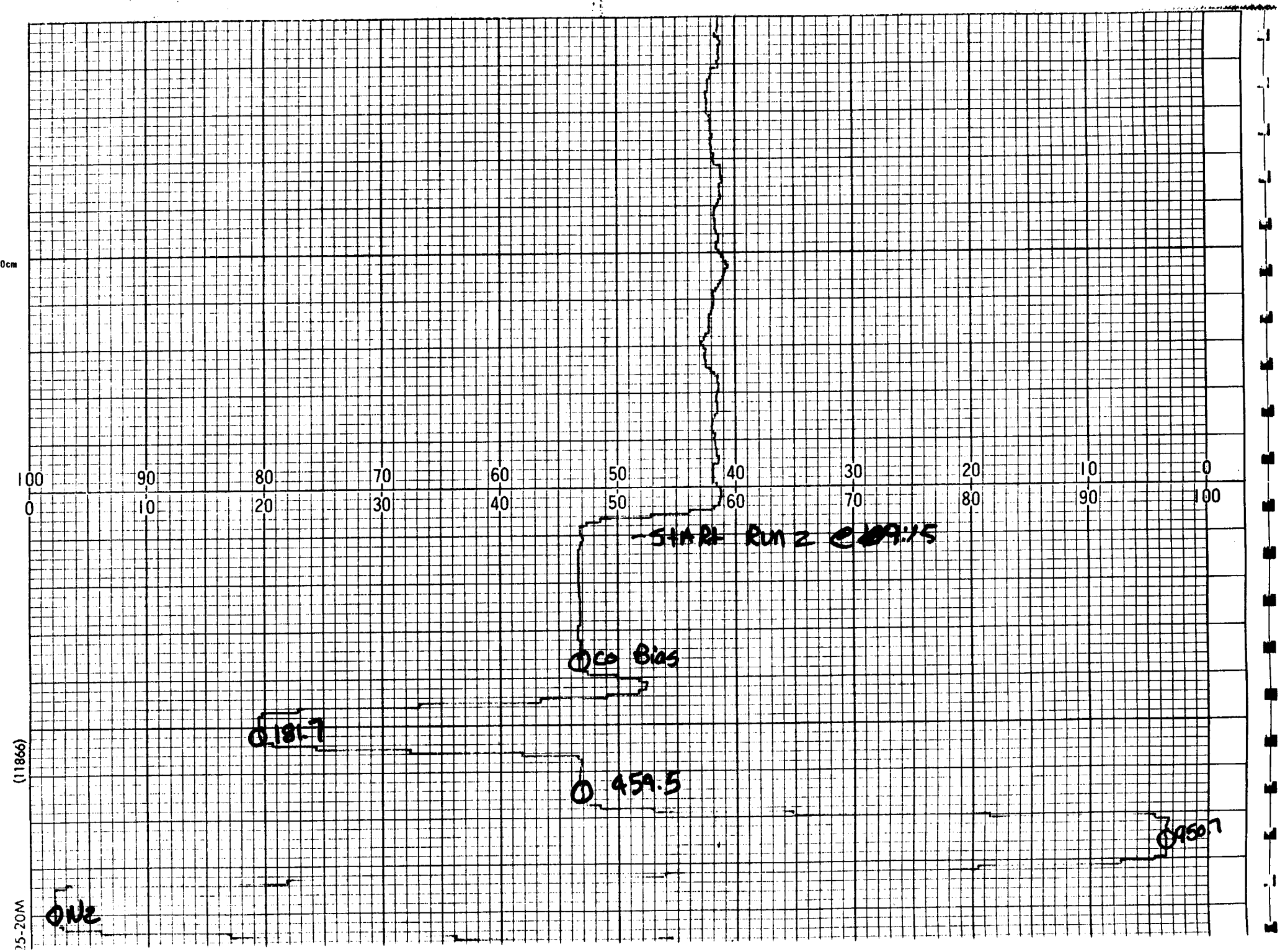


CHART NO. RN2-01
SOLTEC
END RUN @ 4.00
100
90
80
70
60
50
40
30
20
10
0
0cm
0
10
20
30
40
50
60
70
80
90
100


0cm
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
START Run 2 @ 09:45
Co Bias
181.7
459.5
950.7
We
(11866)
25-20M

END Run 2@ 10:15
10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
10cm
(11866)
CHART NO. RN2-01-25-20M
SOLTEC

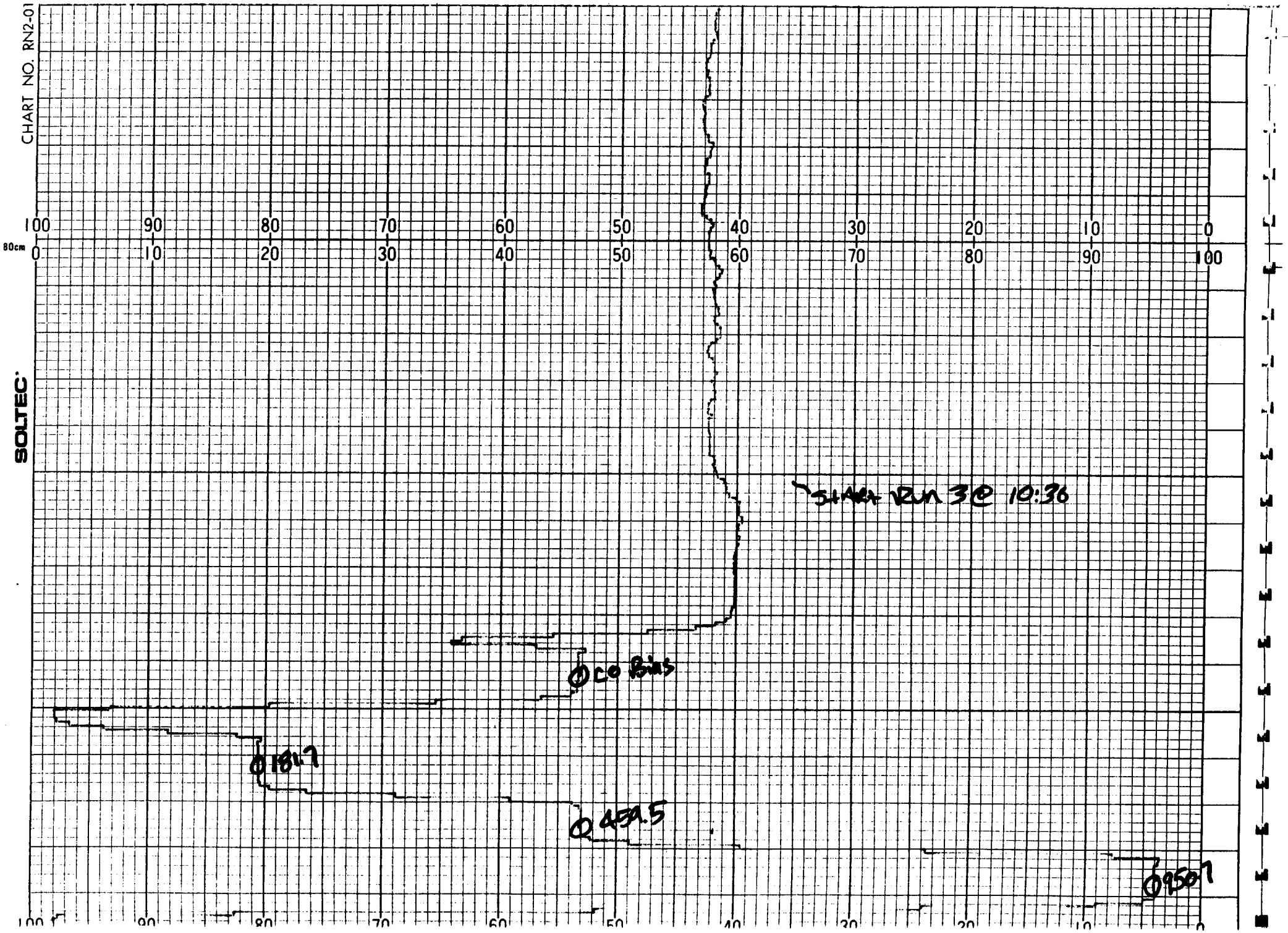
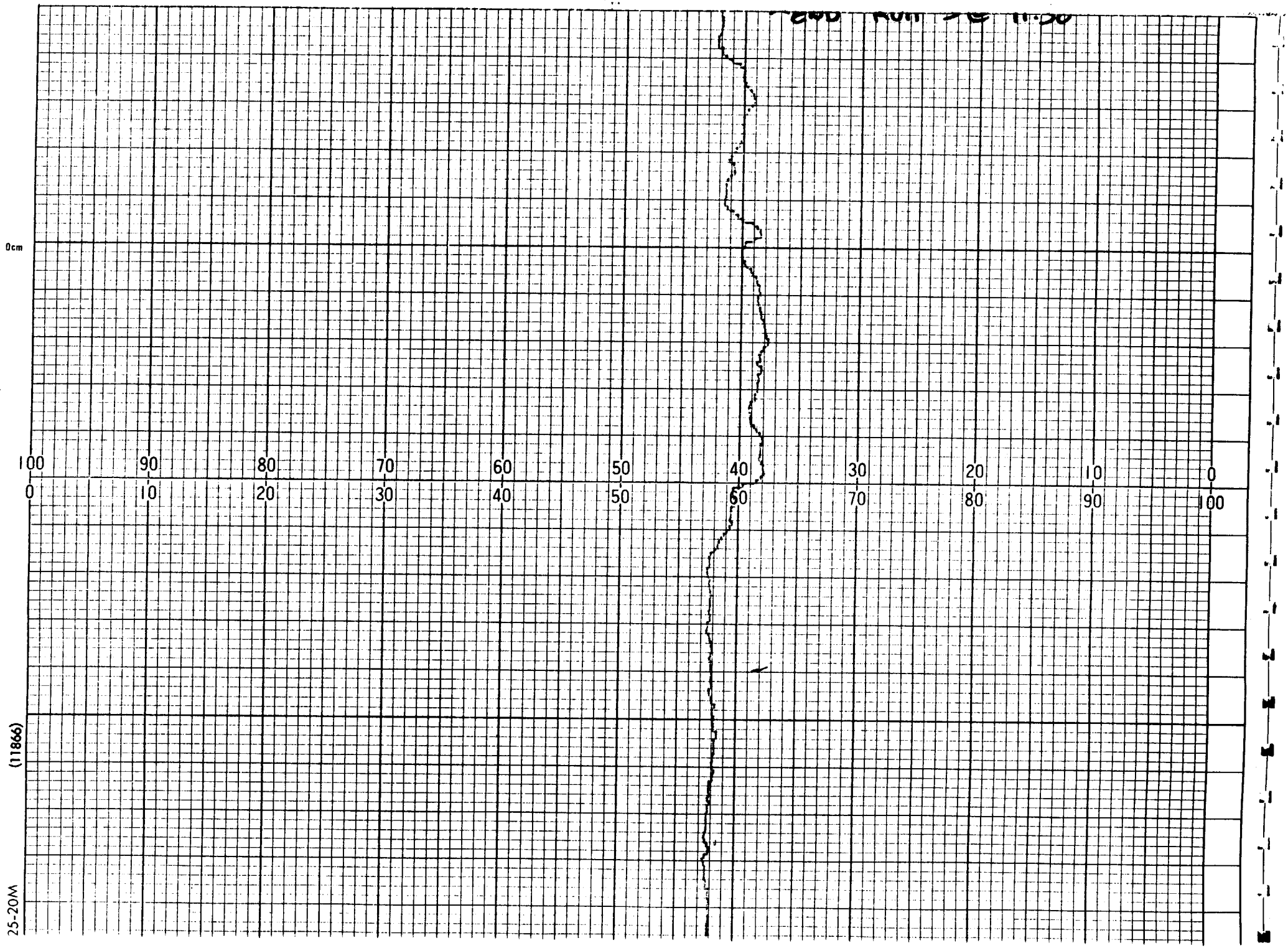
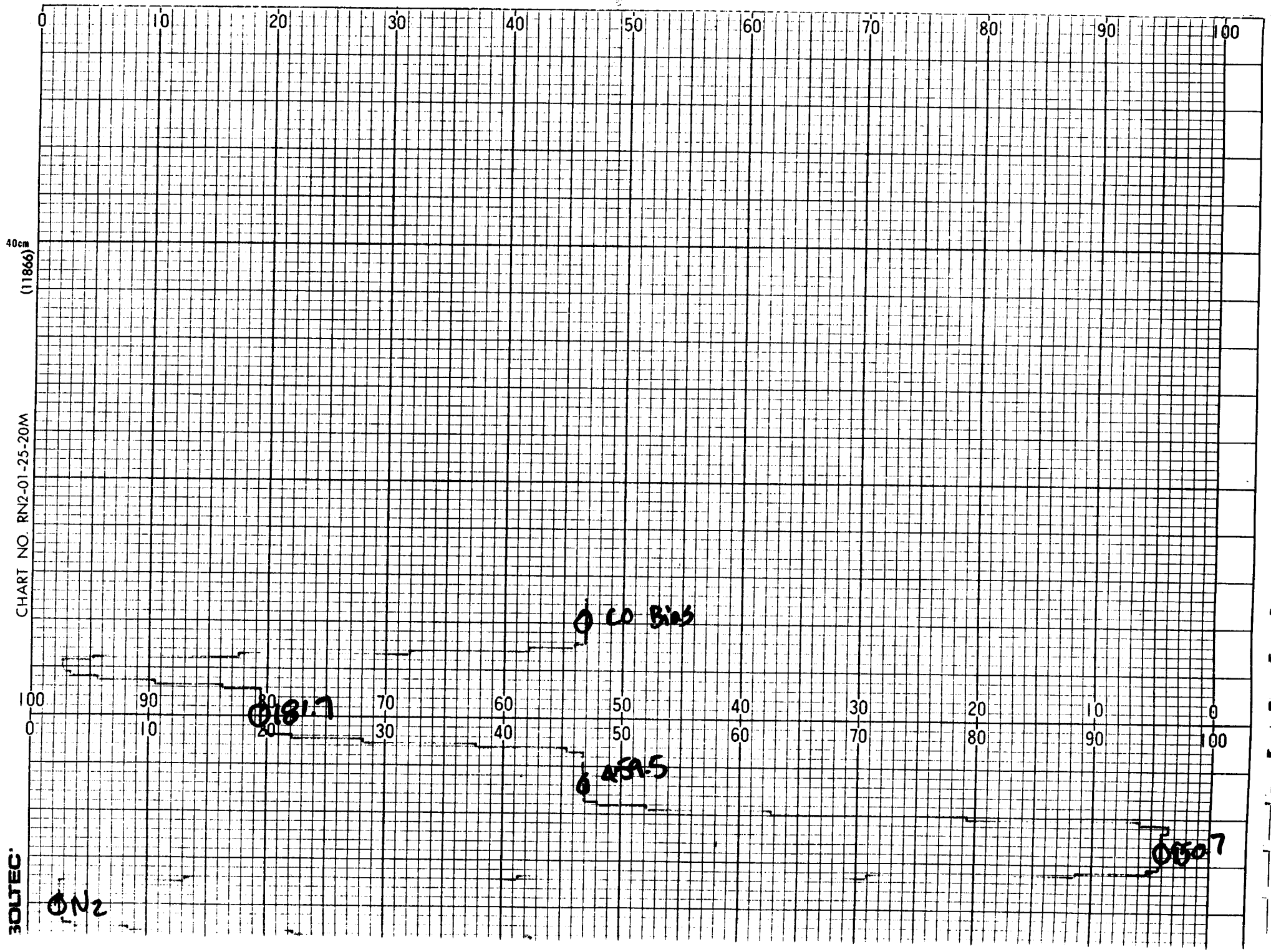


CHART NO. RN2-01
SOLTEC
80cm
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
START RUN 3 @ 10:36
CO BIAS
1817
459.5
9507


0cm
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
(11866)
25-20M


40cm
(11866)
CHART NO. RN2-01-25-20M
BOLTEC
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
CO Bias
N2

B.3 – OXYGEN

EPA METHOD 3A
OXYGEN

ESE Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum		PROJECT NO: 3927058	
SOURCE: #1 Generator		RUN NO.: 1	
TIME START: 8:00	TIME END: 9:00	MINUTES PER POINT: 2	
DATE: 10-27-92	ANALYST: Todd Jacobson		

INSTRUMENT CALIBRATION STATISTICS

	Cylindar Value	Initial Analyzer Response		Final Analyzer Response		Drift
	%	reading	%	reading	%	%
Zero	N2	2.0	-0.14	2.0	-0.14	0.0
Low						
Mid	9.04	37.0	9.30	37.0	9.30	0.0
High	19.68	75.0	19.55	75.0	19.55	0.0
Bias CO	459.5	2.5	0.00	2.0	-0.14	-0.5

Linear Regression Curve: % O_2 = (reading)(slope) + y intercept

% Drift = $\frac{\text{Final Response - Initial Response}}{\text{Span}}$ X 100

Slope	0.26697	y intercept	-0.67667	Span Range	26.30 %

TEST DATA

Test Point	Reading	Test Point	Reading	Test Point	Reading
1	27.0	11	26.5	21	27.5
2	26.5	12	26.5	22	27.5
3	26.5	13	27.0	23	27.5
4	26.5	14	27.0	24	27.5
5	26.5	15	27.0	25	27.5
6	27.0	16	27.0	26	26.5
7	27.0	17	27.5	27	26.5
8	27.0	18	27.0	28	27.0
9	27.0	19	27.0	29	26.5
10	27.0	20	27.5	30	26.5

Average Reading: 26.95 Concentration: 6.59 %

FORMS-1/008.51/02.CEM

EPA METHOD 3A
OXYGEN

ESE Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum		PROJECT NO: 3927058
SOURCE: #1 Generator		RUN NO.: 2
TIME START: 9:15	TIME END: 10:15	MINUTES PER POINT: 2
DATE: 10-27-92	ANALYST: todd jacobson	

INSTRUMENT CALIBRATION STATISTICS

	Cylindar Value	Initial Analyzer Response		Final Analyzer Response		Drift
	%	reading	%	reading	%	%
Zero	N_2	2.0	-0.14	2.0	-0.14	0.00
Low						
Mid	9.04	37.0	9.30	37.0	9.30	0.00
High	19.68	75.0	19.55	74.5	19.42	-0.50
Bias CO	459.5	2.0	-0.14	2.0	-0.14	0.00

Linear Regression Curve: % O_2 = (reading)(slope) + y intercept

$$\% \text{ Drift} = \frac{\text{Final Response - Initial Response}}{\text{Span}} \times 100$$

Slope	0.2697	y intercept	-0.67167	Span Range	26.30 %

TEST DATA

Test Point	Reading	Test Point	Reading	Test Point	Reading
1	28.0	11	28.0	21	28.0
2	28.0	12	27.5	22	27.0
3	28.0	13	28.0	23	27.0
4	28.0	14	28.0	24	27.0
5	27.5	15	28.0	25	27.0
6	28.0	16	28.0	26	27.0
7	28.0	17	28.0	27	27.0
8	27.5	18	28.0	28	27.5
9	28.0	19	28.0	29	27.5
10	28.0	20	28.0	30	27.0

Average Reading: 27.68 Concentration: 6.79 %

FORMS-1/008.31/02.CEM

EPA METHOD 3A
OXYGEN

ESE Environmental Science & Engineering, Inc.

CLIENT: Phillips Petroleum		PROJECT NO: 3927058	
SOURCE: #1 Generator		RUN NO.: 3	
TIME START: 10:30	TIME END: 11:30	MINUTES PER POINT: 2	
DATE: 10-27-92	ANALYST: Todd Jackson		

INSTRUMENT CALIBRATION STATISTICS

	Cylindar Value	Initial Analyzer Response		Final Analyzer Response		Drift
	%	reading	%	reading	%	%
Zero	N_2	2.0	0.95	2.0	0.95	0.00
Low						
Mid	9.04	37.0	10.24	37.0	10.24	0.00
High	19.68	74.5	20.18	74.5	20.18	0.00
Bias CO	459.5	2.0	0.95	2.0	0.95	0.00

Linear Regression Curve: % O_2 = (reading)(slope) + y intercept

$$\% \text{ Drift} = \frac{\text{Final Response - Initial Response}}{\text{Span}} \times 100$$

Slope	0.2652	y intercept	0.4234	Span Range	26.95 %

TEST DATA

Test Point	Reading	Test Point	Reading	Test Point	Reading
1	29.0	11	29.0	21	28.5
2	29.0	12	29.0	22	28.0
3	29.0	13	29.0	23	28.0
4	29.0	14	29.0	24	28.5
5	29.0	15	29.0	25	28.5
6	29.0	16	29.0	26	28.5
7	29.0	17	29.0	27	28.5
8	29.0	18	29.0	28	28.0
9	29.0	19	29.0	29	28.0
10	29.0	20	29.0	30	28.0

Average Reading: 28.75 Concentration: 8.05 = 8.1 %

FORMS-1/008.51/02.CEM

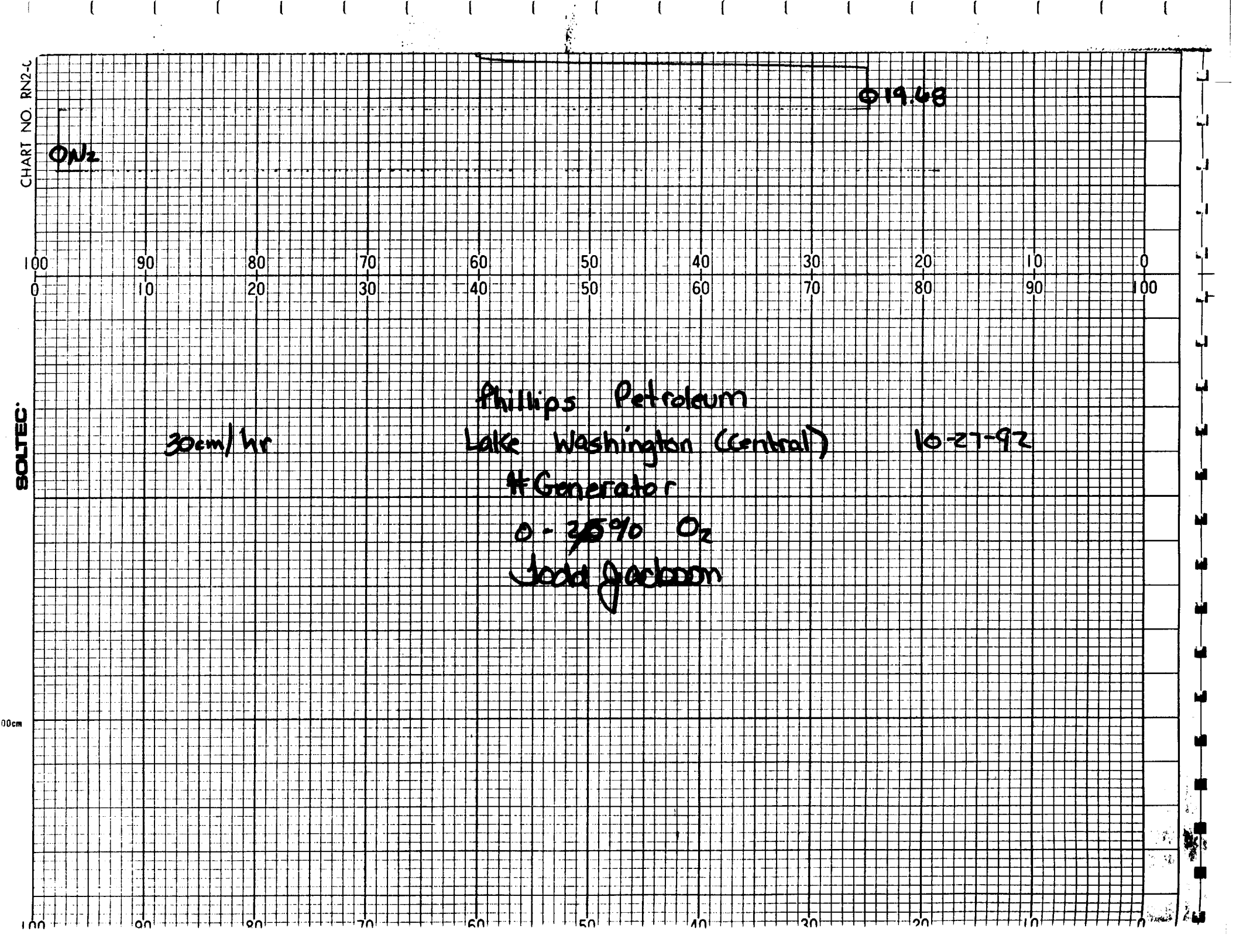
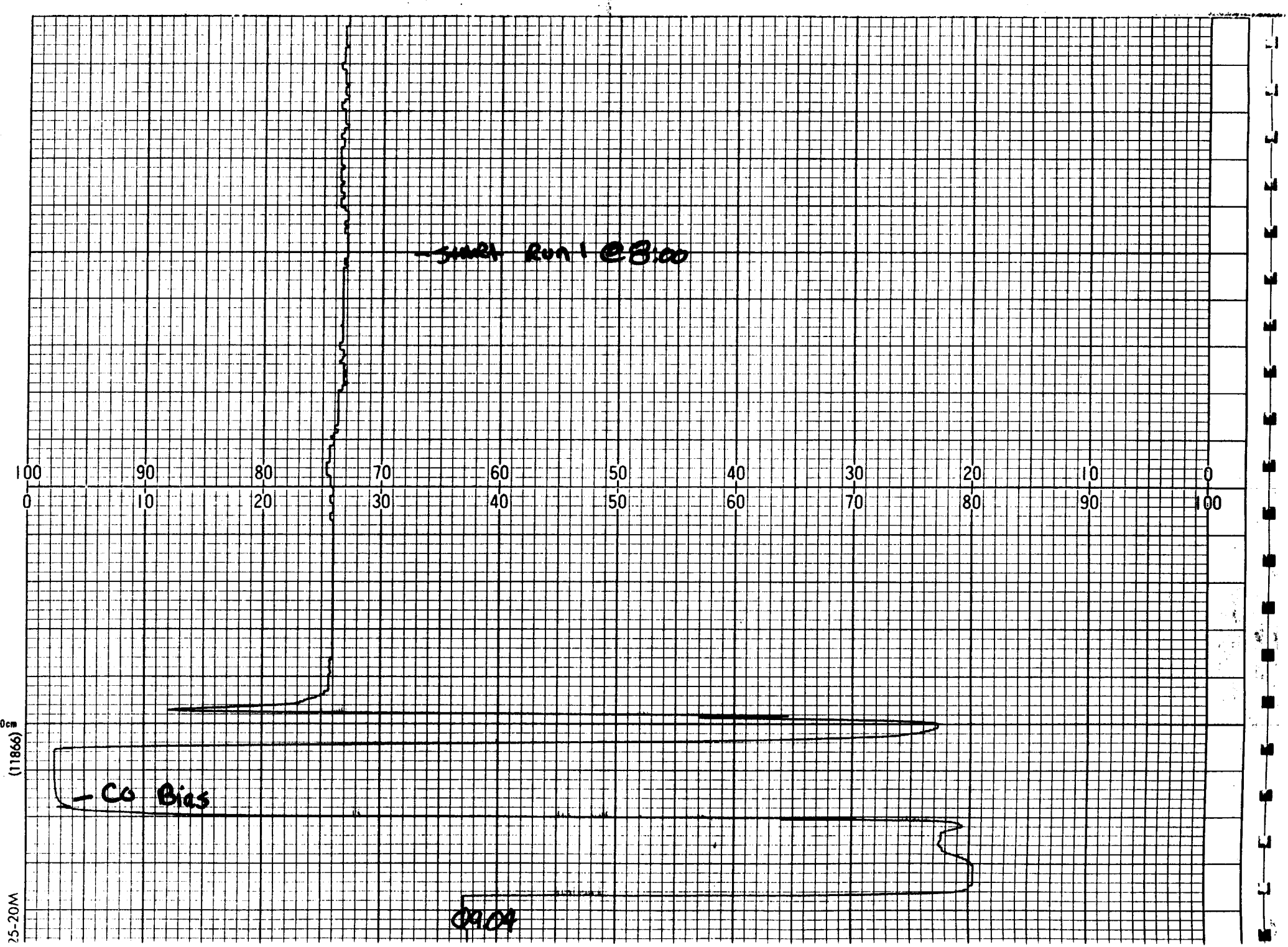


CHART NO. RN2-C
SOLTEC
00cm
ΦN2
Φ19.68
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
30cm/hr
Phillips Petroleum
Lake Washington (Central)
10-27-92
#Generator
0 - 25% O2
Todd Jackson


START RUN 1 @ 8:00
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
Co Bias
0904
0cm
(11866)
25-20M

0
10
20
30
40
50
60
70
80
90
100
(11866)
CHART NO. RN2-01-25-20M
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
BOLTEC

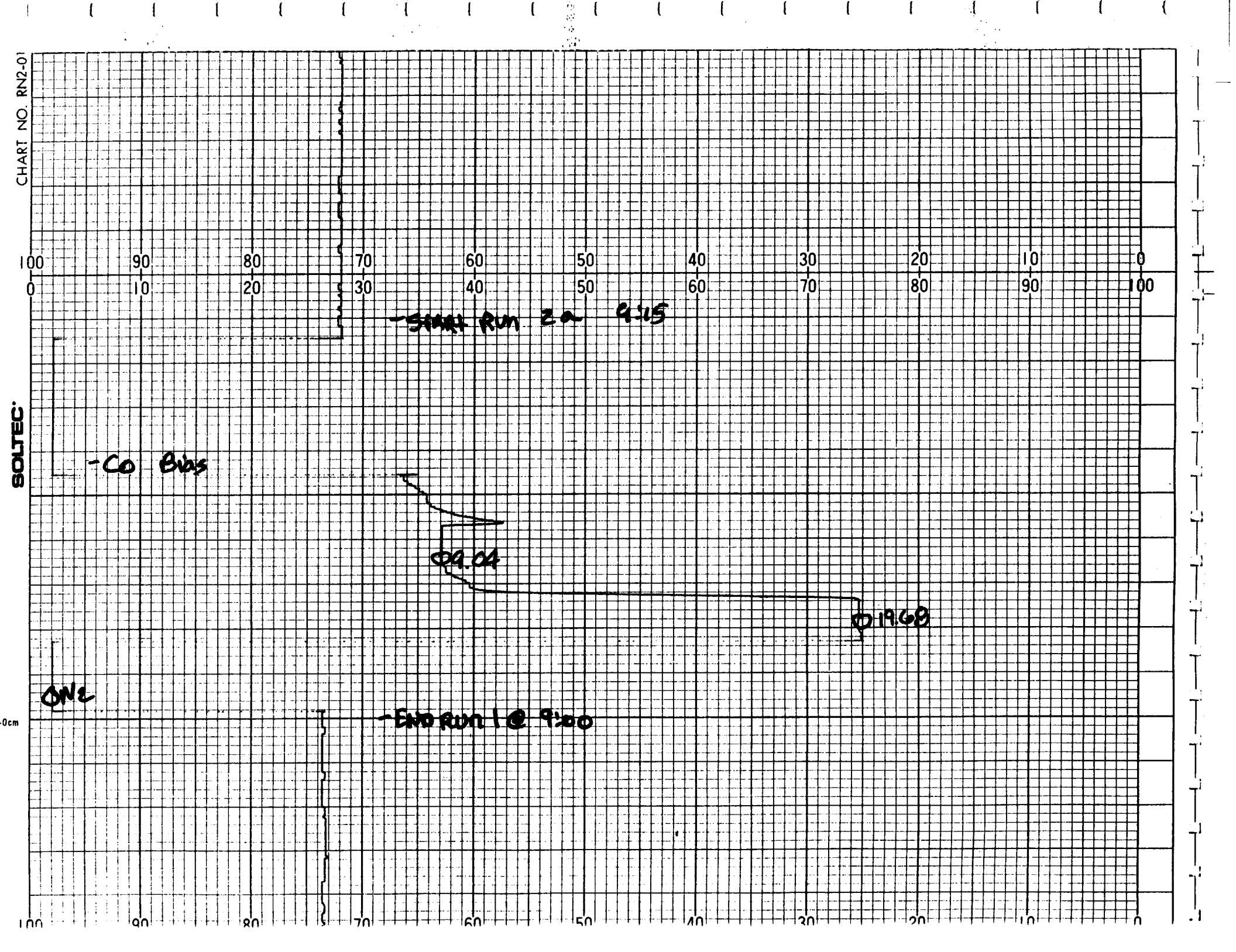
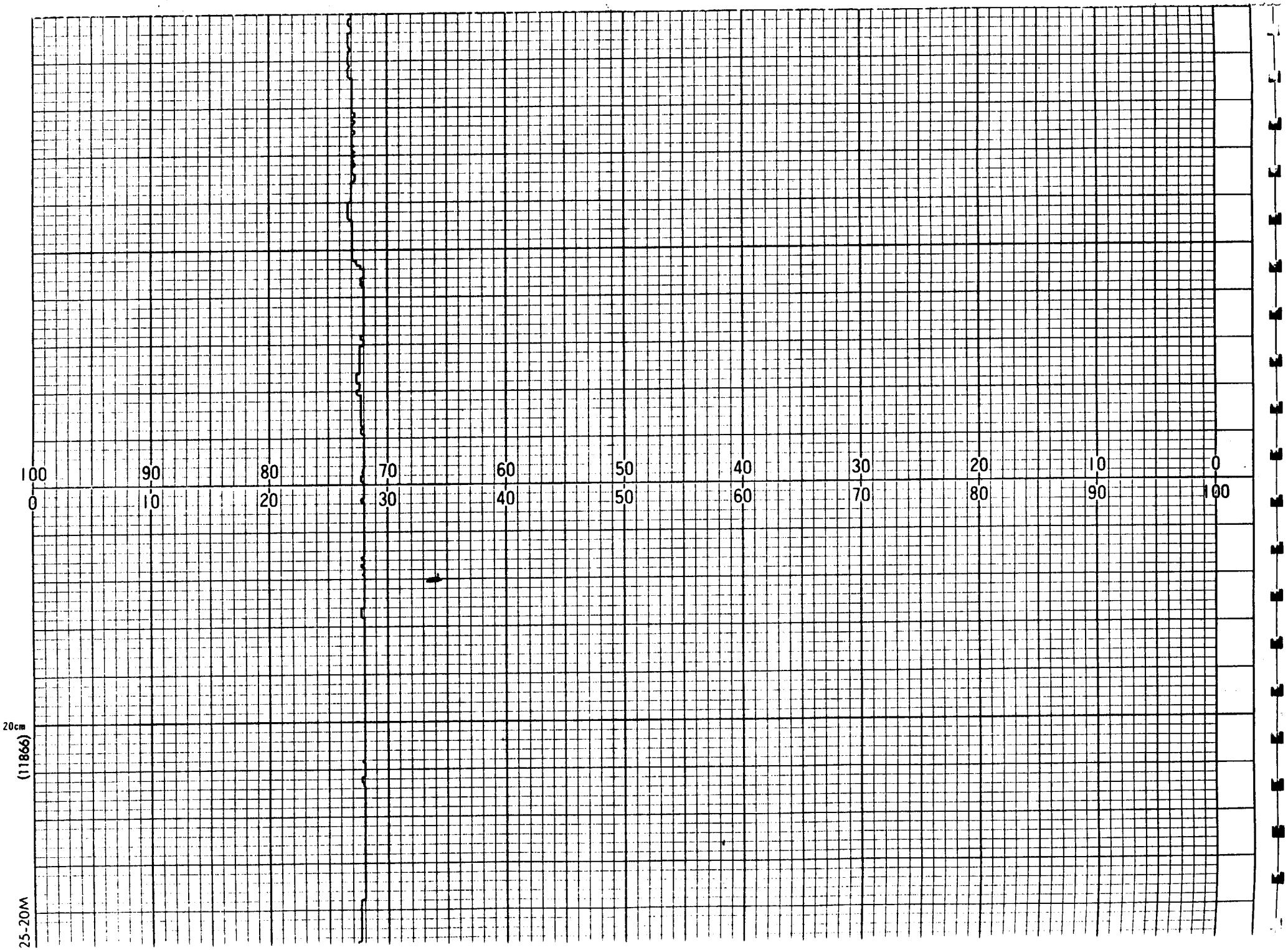
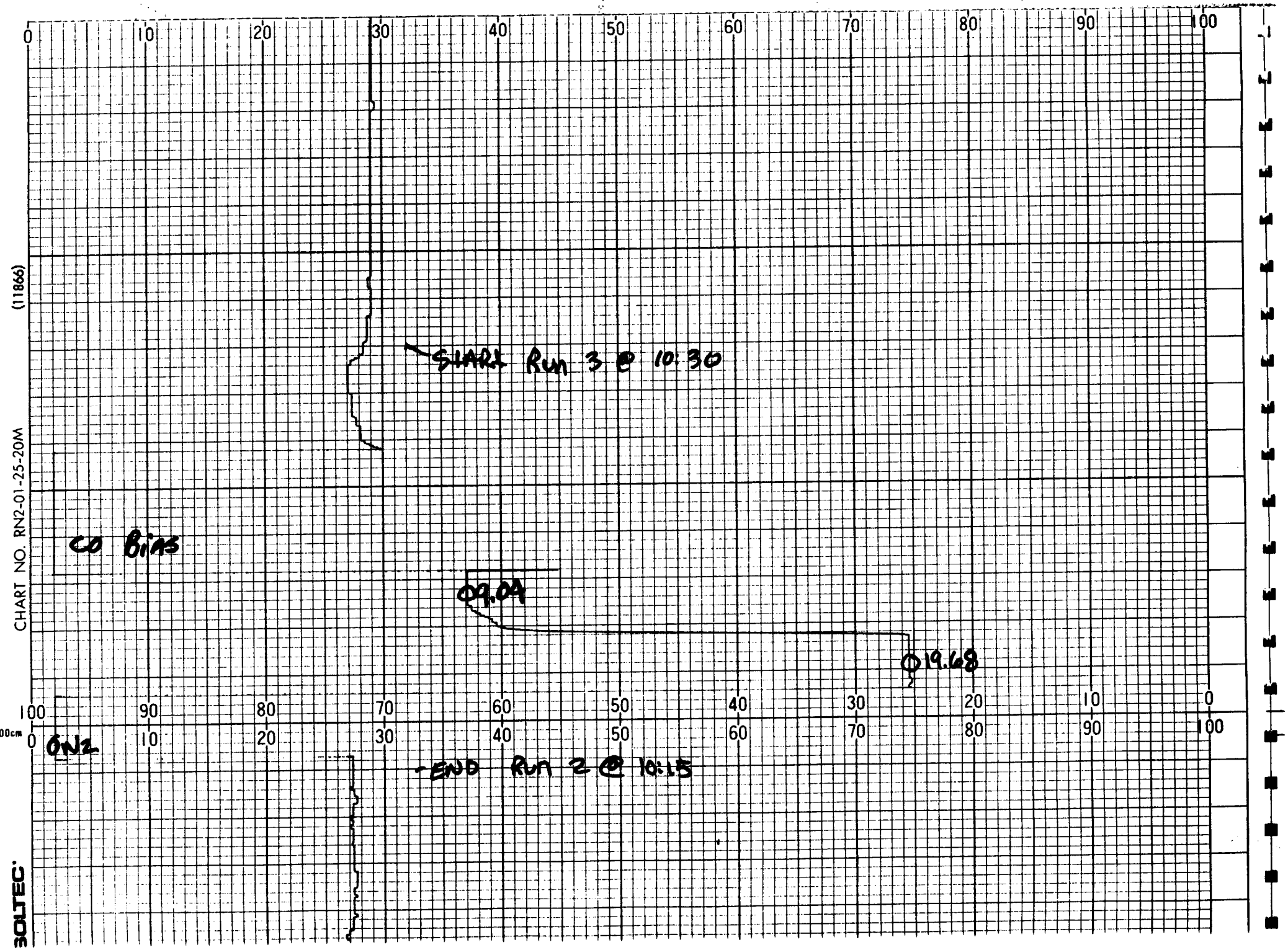


CHART NO. RN2-01
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
-START RUN 2a 9:15
-Co Bias
09.04
19.68
ON2
-END RUN 1 @ 9:00


100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
20cm
(11866)
25-20M


(11866)
CHART NO. RN2-01-25-20M
00cm
BOLTEC
START Run 3 @ 10:30
CO Bias
09.04
19.68
0N2
END Run 2 @ 10:15

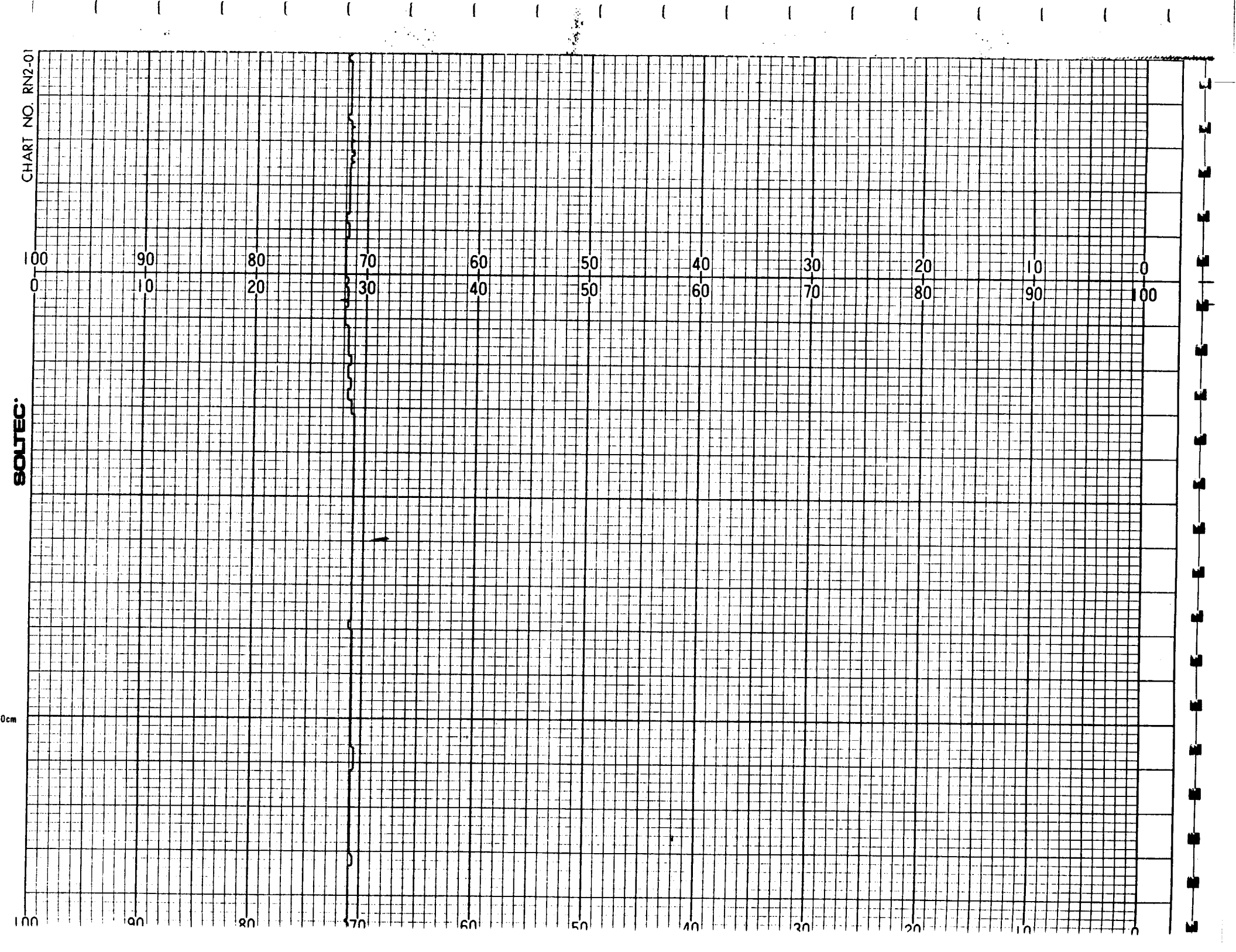
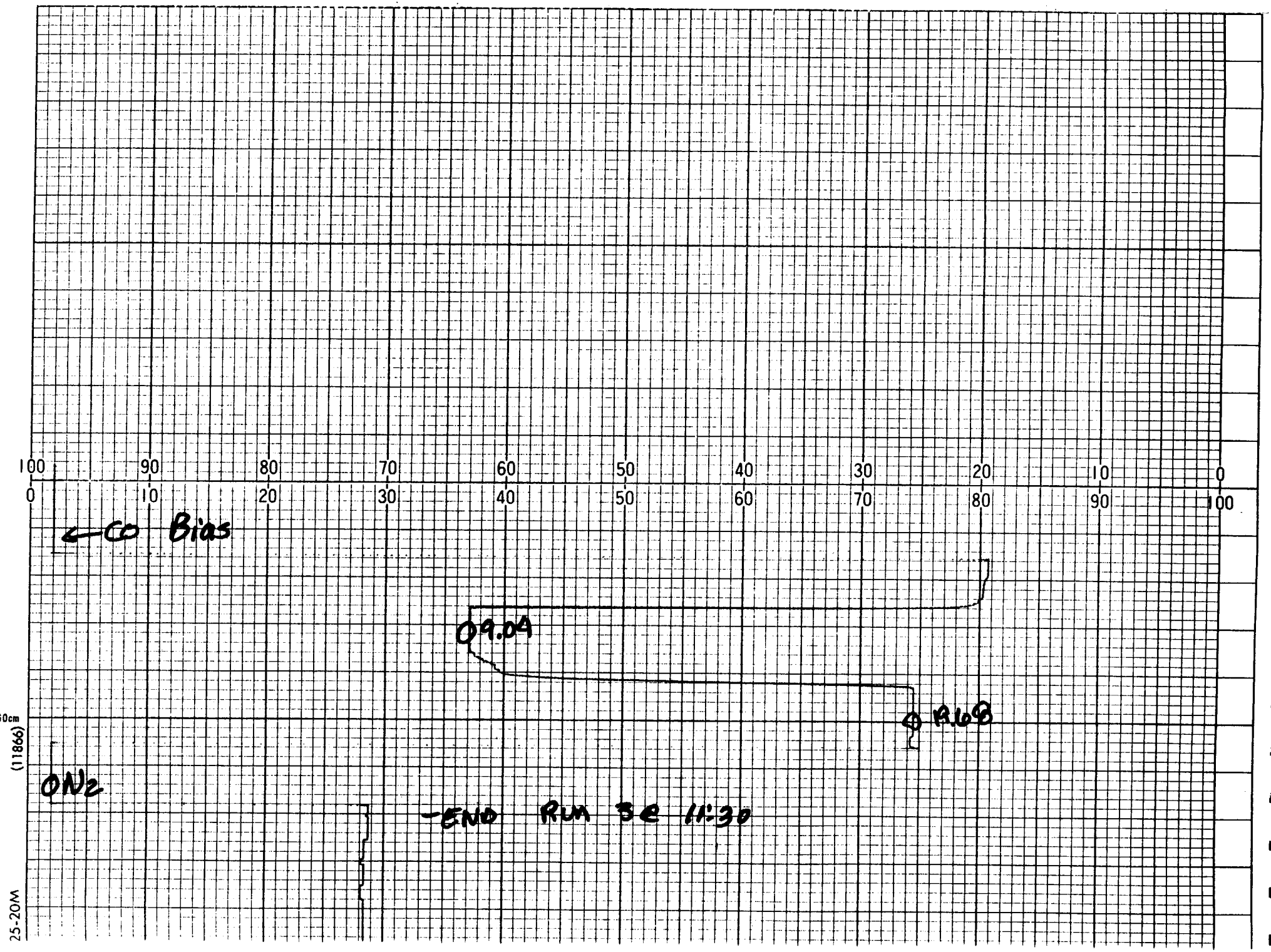


CHART NO. RN2-01
SOLTEC
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
0cm


100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
← CO Bias
09.04
R.68
ON2
END RUN 3e 11:30
60cm
(11866)
25-20M

APPENDIX C -- CALIBRATION GAS CERTIFICATES

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 530567

Your P.O. # : 34482

Expiration Date : 5-21-93

Cylinder Number : ALM-001481

Cylinder Pressure 1200 psig

Customer :
ENV SCIENCE & ENGINEERING
2644 S. SHERWOOD FOREST
SUITE 138
BATON ROUGE, LA. 70816

* * * * CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES * * * *
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1 — Procedure # G1

File # PO-1584

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	621.7 PPM	1684B	FF24138	965.5 PPM	BECKMAN 951A 270-0828998	10-30-91	CHEMILUMINESCENCE
		1685	ALM-008700	250.3 PPM			

BALANCE GAS : NITROGEN

NITROGEN DIOXIDE 2.90 PPM (FROM SECOND ANALYSIS)

FIRST ANALYSIS DATE : 11-21-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	62.10	621.1	965.5 PPM	96.50	965.5
0.00	62.10	621.1		96.50	965.5
0.00	62.10	621.1		96.50	965.5

CALCULATED RESULTS 621.1, 621.1, 621.1

AVERAGE : 621.1 PPM

RECERTIFICATION

CALIBRATION CURVE 1 ST DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1684B	965.5	100	96.50	965.5	0.00
	748.0	77	75.00	750.3	0.30
	395.0	41	39.60	395.9	0.22
1685	250.3	26	25.10	250.7	0.16
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
1685	250.3	LOW	25.10	250.7	0.16
1684B	965.5	HIGH	96.50	965.5	0.00

* GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : Jon Eichler Jr

Approved By : J. Shapiro

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

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped from : [illegible]

Our Project # : 539969

Your P.O. # : 34462

Expiration Date : 6-2-93

Cylinder Number : AAL-17900

Cylinder Pressure 1900 psig

Customer :
ENV SCIENCE & ENGINEERING

2644 S SHERWOOD FOREST
SUITE 138
BATON ROUGE LA 70816

* * * * CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES * * * *
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1

Procedure # G1

File # FO-1808

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER

COMPONENT	CERTIFIED CONC.
NITRIC OXIDE	980.5 PPM

BALANCE GAS : NITROGEN

REFERENCE STD

SRM # (CRM #)	CYLINDER NUMBER	CONC.
1684B	FF24138	965.5 PPM
1685	ALM-008300	[illegible] PPM

INSTRUMENTATION

INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
BECKMAN 951A 270-05/2338	10-30-91	CHEMILUMINESCENCE

NITROGEN DIOXIDE 4.00 PPM (FROM SECOND ANALYSIS)

FIRST ANALYSIS DATE : 11-23-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	98.20	982.5	965.5 PPM	96.50	965.5
0.00	98.20	982.5		96.50	965.5
0.00	98.20	982.5		96.50	965.5

CALCULATED RESULTS 982.5, 982.5, 982.5

AVERAGE : 982.5 PPM

SECOND ANALYSIS DATE : 12-2-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	[illegible]	[illegible]	965.5 PPM	96.50	965.5
0.00	[illegible]	[illegible]		96.50	965.5
0.00	[illegible]	[illegible]		96.50	965.5
0.00	[illegible]	[illegible]			

CALCULATED RESULTS [illegible], [illegible], [illegible]

965.5 PPM NO2

AVERAGE : [illegible] PPM

CALIBRATION CURVE 1 ST DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1684B	965.5	100	96.50	965.5	0.00
	748.0	77	75.00	750.3	0.30
	395.0	41	39.60	395.9	0.22
1685	250.3	26	25.10	250.7	0.16
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
1685	250.3	LOW	25.10	250.7	0.16
1684B	965.5	HIGH	96.50	965.5	0.00

* GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : F. P. Dorn

Approved By : Thomas J. Hulse

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

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 530569

Your P.O. # : 34482

Expiration Date : 6-18-93

Cylinder Number : ALM023502

Cylinder Pressure 1900 psig

Customer :
ENV SCIENCE & ENGINEERING

2644 S SHERWOOD FOREST
SUITE 138
BATON ROUGE LA 70816

* * * * CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES * * * *
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1

Procedure # 61

File # PO-1816

Certified Accuracy 1 % NBS Traceable

CERTIFIED EPA PROTOCOL

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
CARBON MONOXIDE	181.7 PPM	1681	ALM-010502	967.1 PPM	HOR[illegible]	12-14-91	NON-DISPERSIVE INFRARED
		1680	AAL-16199	475.[illegible]	OPE-[illegible]4E		
					560172/53		

BALANCE GAS : NITROGEN

FIRST ANALYSIS DATE : 12-10-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	19.80	182.0	243.4 PPM	26.40	243.8
0.00	19.80	182.0		26.40	243.8
0.00	19.80	182.0		26.40	243.8

CALCULATED RESULTS 181.7
181.7
181.7

AVERAGE : 181.7 PPM

SECOND ANALYSIS DATE : 12-18-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	19.80	182.0	243.4 PPM	26.40	243.8
0.00	19.80	182.0		26.40	243.8
0.00	19.80	182.0		26.40	243.8

CALCULATED RESULTS 181.7
181.7
181.7

AVERAGE : 181.7 PPM

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1681	967.1	100	100.00	967.1	0.00
1680	475.0	49	50.60	474.6	-0.08
2636	243.4	25	26.40	243.8	0.16
1679	96.67	10	10.60	96.77	0.11
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
1679	96.67	LOW	10.60	96.77	0.11
1681	967.1	HIGH	100.00	967.1	0.00

* GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : L. P. Dore

Approved By : Thomas V. Hulsman

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

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 530569

Your P.O. # : 34482

Expiration Date : 6-18-93

Cylinder Number : ALM023275

Cylinder Pressure 1900 psig

Customer :

ENV SCIENCE & ENGINEERING

2644 S SHERWOOD FOREST
SUITE 139
BATON ROUGE LA 70816

* * * * CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES * * * *
PERFORMED ACCORDING TO SECTION 3.0.4

Certified For Traceability Procedure # G1
Protocol # 1

File # FO-1815

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
CARBON MONOXIDE	459.5 PPM	1681	ALM-010592	967.1 PPM	HORIBA	12-14-91	NON-DISPERSIVE INFRARED
		1680	AAL-16199	475.0 PPM	OPE-144E		
					560172152		

BALANCE GAS : NITROGEN

FIRST ANALYSIS DATE : 12-10-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	49.00	459.1	475.0 PPM	50.60	474.6
0.00	49.00	459.1		50.60	474.6
0.00	49.00	459.1		50.60	474.6

CALCULATED RESULTS 459.5
459.5
459.5

AVERAGE : 459.5 PPM

SECOND ANALYSIS DATE : 12-18-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	49.00	459.1	475.0 PPM	50.60	474.6
0.00	49.00	459.1		50.60	474.6
0.00	49.00	459.1		50.60	474.6

CALCULATED RESULTS 459.5
459.5
459.5

AVERAGE : 459.5 PPM

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1681	967.1	100	100.00	967.1	0.00
1680	475.0	49	50.60	474.6	-0.08
2636	243.4	25	26.40	243.8	0.16
1679	96.67	10	10.60	96.77	0.11
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
1679	96.67	LOW	10.60	96.77	0.11
1681	967.1	HIGH	100.00	967.1	0.00

* GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : F. P. Dorn

Approved By : Thomas V. Duke

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

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 530569

Your P.O. # : 34482

Expiration Date : 6-17-93

Cylinder Number : ALM023517

Cylinder Pressure 1900 psig

Customer :
ENV SCIENCE & ENGINEERING

2644 S SHERWOOD FOREST
SUITE 138
BATON ROUGE LA 70816

* * * * CERTIFICATE OF ANALYSIS FPA PROTOCOL GASES * * * *
PERFORMED ACCORDING TO SECTION 3.0.4

Certified for traceability Procedure # G1
Protocol # 1

File # F0-1814

Certified accuracy ± 1 NBS Traceable

ANALYZED CYLINDER

COMPONENT	CERTIFIED CONC.
CARBON MONOXIDE	950.7 PPM

BALANCE GAS : NITROGEN

REFERENCE STD

SRM # (CRM #)	CYLINDER NUMBER	CONC.
1681	ALM-016002	967.1 PPM
1680	AAL-16199	475.0 PPM

INSTRUMENTATION

INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
HORIBA OPE-144E 560172153	12-14-91	NON-DISPERSIVE INFRARED

FIRST ANALYSIS

DATE : 12-10-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	98.30	949.7	967.1 PPM	100.00	967.1
0.00	98.30	949.7		100.00	967.1
0.00	98.30	949.7		100.00	967.1

CALCULATED RESULTS 949.7
949.7
949.7

AVERAGE : 949.7 PPM

SECOND ANALYSIS

DATE : 12-17-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	95.50	951.7	967.1 PPM	100.00	967.1
0.00	99.50	951.7		100.00	967.1
0.00	99.50	951.7		100.00	967.1

CALCULATED RESULTS 951.7
951.7
951.7

AVERAGE : 951.7 PPM

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1681	967.1	100	100.00	967.1	0.00
1680	475.0	49	50.60	474.6	-0.08
2636	243.4	25	26.40	243.8	0.16
1679	96.67	10	10.60	96.77	0.11
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
1679	96.67	LOW	10.60	96.77	0.11
1681	967.1	HIGH	100.00	967.1	0.00

Analyst : F. P. Dora

Approved By : Thomas V. Hulbert

* GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

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.

LIQUID CARBONIC
SPECIALTY GAS CORPORATION

SPECIALTY GAS and CHEMICAL PRODUCTS

CERTIFICATE OF ANALYSIS

To: Environmental Science
Baton Rouge, LA

Date: 9/25/91
Ref. #
Cust. P.O. #

Product: Oxygen/Nitrogen Mixture

Components	Requested	Cyl. Serial No. SGAL8H9 Actual	Cyl. Serial No. CC37031 Actual	Cyl. Serial No. Actual
Oxygen		19.68%	9.04%	
Nitrogen		Balance	Balance	

Cyl. Volume: 135 cubic feet

CGA Valve No.: 590

Total Cyl. Pressure: 2000

Method of Analysis:
GC

Certified By: Jim Felps

It is recommended the above cylinders not be depleted below 50 psig unless otherwise indicated.

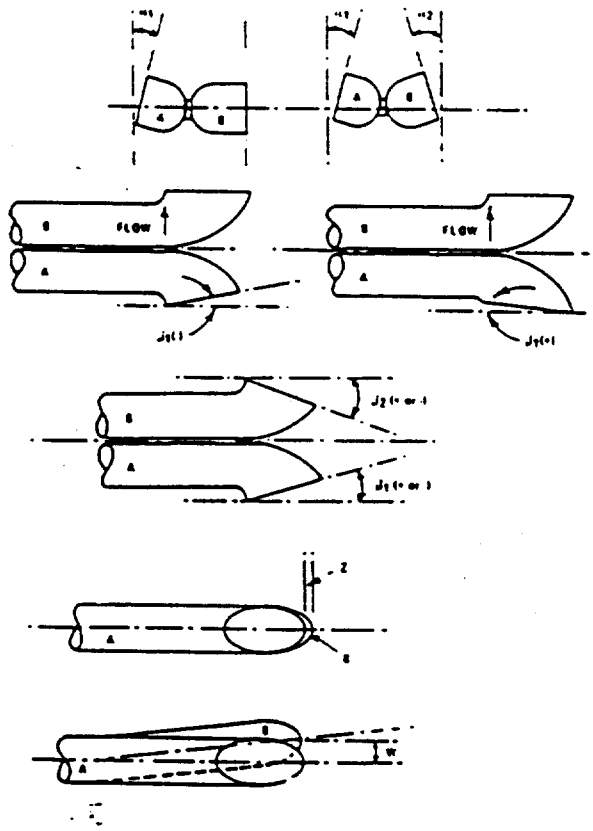
APPENDIX D -- EQUIPMENT CALIBRATION WORKSHEETS

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

TYPE S PITOT TUBE CALIBRATION

PITOT TUBE P-3-2

DATE 10-10-92

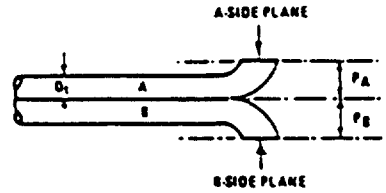


Are a_1 and a_2 <10°? Yes No

Are B_1 and B_2 < 5°? Yes No

Is Z<1/8 inch? Yes No

Is W<1/32 inch? Yes No



External tube diameter (D_t) 3/8

Is D_t between 3/16 and 3/8 in.? Yes No

Base-to-opening plane distances:

P_A 0.5

P_B 0.5

Does $P_A = P_b$? Yes No

Is $1.05\ D_t \leq P \leq 1.50\ D_t$?

0.39 ≤ .5 ≤ 0.56 Yes No

When pitot tube is part of an assembly:

Is the thermocouple 2 inches behind the pitot tube opening? Yes No

Does the pitot tube extend 3 inches beyond the compression fitting on the nozzle? Yes No

Is the distance between the nozzle and the pitot tube more than 3/4 inch when a ½ inch nozzle is in place? Yes No

If any answer is no, the pitot tube must be calibrated in a wind tunnel against a standard type pitot tube.

If all answers are yes, the pitot tube may be assigned a baseline coefficient of 0.84.

Assigned Baseline Coefficient 0.84

Signature R Lumpy

KDM 6/94

DRY GAS METER AND ORIFICE CALIBRATION

FORMS-4/059.51/DRY.CAL

Environmental Science & Engineering, Inc.

Dry Gas Meter or Console Number B.R. #5

Date: 9-22-92

Barometric Pressure (P_b) 30.10 in. Hg

Analyst: Brent S. Lemoine

ΔH	DRY GAS METER							WET TEST METER				Test Time Minute		
	Volume (ft³)			Temperature (°F)			Pressure (in. Hg)	Volume (ft³)			Temp. (°F)			
	Final	Initial	Net V_d	Inlet	Outlet	Avg. T_d	P_m	Final	Initial	Net V_w	T_w	β	Y	$\Delta H_@$
0.5	18.840	12.340	6.5	96	95	555.5	30.14	05.00	000.0	5.00	552.0	16.12	0.773	3.00
0.5	28.165	18.840	9.325	94	94	554.0	30.14	15.00	05.00	10.00	552.0	23.06	1.074	1.54
1.0	33.020	28.165	4.855	91	91	551.0	30.17	20.00	15.00	5.00	552.0	8.24	1.025	1.58
1.0	42.805	33.020	9.785	91	90	550.5	30.17	30.00	20.00	10.00	552.0	17.30	1.017	1.74
1.5	47.720	42.805	4.915	90	90	550.0	30.21	35.00	30.00	5.00	552.0	7.32	1.010	1.876
1.5	57.650	47.720	9.93	90	89	549.5	30.21	45.00	35.00	10.00	552.0	14.60	0.999	1.867
													0.9832	1.9333

$$P_m = (\Delta H / 13.6) + P_b$$

$$Y = \frac{V_w P_b T_d}{V_d P_m T_w}$$

Y is the ratio of accuracy of the wet test meter to the dry gas meter with tolerance limits of ±0.01

$$\Delta H_@ = \frac{0.0317 \Delta H T_w^2 \beta^2}{P_b T_d V_w^2}$$

$\Delta H_@$ is the orifice differential pressure which gives an air flow rate of 0.75 cfm at 70 °F and 29.92 in. Hg. with tolerance limits of ±0.15 in. H_2O.

THERMOCOUPLE CALIBRATION WORK SHEET

Environmental Science & Engineering, Inc.

Dry Gas Meter I.D.:	#BR 5	Analyst:	Kevin Rodriguez
Date:	8-4-92	Office:	Baton Rouge, La
Thermometer No.:	Standard	Temperature Range:	0-2000
Vegetable Oil:	Wesson		

Trial Number	Temperature Sensor Channel	Thermometer Reading				Thermocouple Reading				Relative Accuracy			
		(TF)	(TA)	(TB)	(TO)	(Tf)	(Ta)	(Tb)	(To)	(%F)	(%A)	(%B)	(%O)
1	1	32	95	212	535	32	96	212	535	0.00	1.05	0.00	0.00
2	1	32	95	212	535	32	95	212	535	0.00	0.00	0.00	0.00
1	2	32	95	212	540	33	96	213	540	3.13	1.05	0.47	0.00
2	2	32	95	212	540	33	96	213	540	3.13	1.05	0.47	0.00
1	3	32	95	212	545	33	96	213	545	3.13	1.05	0.47	0.00
2	3	32	95	212	545	33	96	212	545	3.13	1.05	0.00	0.00
1	4	32	95	212	550	33	96	213	550	3.13	1.05	0.47	0.00
2	4	32	95	212	550	32	96	214	551	0.00	1.05	0.94	0.18
1	5	32	95	212	550	32	96	213	549	0.00	1.05	0.47	0.18
2	5	32	95	212	550	33	96	212	548	3.13	1.05	0.00	0.36
1	6	32	95	212	550	33	96	211	549	3.13	1.05	0.47	0.18
2	6	32	95	212	550	33	95	211	549	3.13	0.00	0.47	0.18
1	7	32	95	212	550	33	96	212	549	3.13	1.05	0.00	0.18
2	7	32	95	212	550	33	96	211	548	3.13	1.05	0.47	0.36

CALCULATIONS:

$$\%F = \frac{TF - Tf}{TF} \times 100 \qquad \%B = \frac{TB - Tb}{TB} \times 100$$

$$\%A = \frac{TA - Ta}{TA} \times 100 \qquad \%O = \frac{TO - To}{TO} \times 100$$

FORMS-8/113.51/THERMO.CAL

BAROMETER CALIBRATION WORKSHEET

Environmental Science & Engineering, Inc.

BAROMETER I.D. NO.: No 2	PROJECT NUMBER: 3927058
LOCATION: Lake Washington, Val.	STANDARD BAROMETER: Princo
ANALYST: Randy Young	AMBIENT TEMPERATURE (°F): 72
INITIAL DATE: 10-25-92	FINAL DATE: 11-17-92

PRETEST CALIBRATION DATA

TRIAL NUMBER	TIME	STANDARD BAROMETER	FIELD BAROMETER
1	11:30	30.16	30.16
2	12:00	30.16	30.16
3	12:30	30.16	30.16
AVERAGE:			

POST TEST CALIBRATION DATA

TRIAL NUMBER	TIME	STANDARD BAROMETER	FIELD BAROMETER
1	12:30	30.22	30.22
2	1:00	30.22	30.22
3	1:30	30.22	30.22
AVERAGE:			

FORMS-15/183.51/BAR.CAL

APPENDIX E -- OPERATIONAL DATA AND FUEL GAS ANALYSIS

COMPRESSOR OPERATIONAL FIELD TEST DATA

Environmental Science & Engineering, Inc.

COMPANY: Phillips Petroleum	FACILITY: LK, Wash. Cent. Btry.
ENGINE: Louisiana	UNIT I.D. NO.: 161942
MODEL NO.: L5108GK	TEST DATE: 10-27-92
NUMBER OF CYLINDARS: 12	MAXIMUM LOAD: 120 KW
READINGS RECORDED EVERY 15 MINUTES	RECORDED BY: J. Smith

Clock Time	10 30 AM	10 45 AM	11 AM	11 15 AM	Avery	
Engine Speed (RPM)	898	902	897	899	899	
Jacket Water Temperature (°F)	170°F	170°F	170°F	170°F		
Engine Timing (°BTDC)	28°	28°	28°	28°		
Engine Oil Pressure ( )	35#	35#	35#	35#		
Engine Oil Temperature (°F)	NA	NA	NA	NA		
Manifold Pressure ( )	12 oz	12 oz	12 oz	12 oz		
Suction Pressure ( )	DNA	DNA	DNA	DNA		
1st Discharge Pressure ( )						
1st Discharge Temperature (°F)						
2nd Discharge Pressure ( )						
2nd Discharge Temperature (°F)						
Interstage Pressure ( )						
Compressor Oil Pressure ( )						
Compressor Oil Temperature (°F)						

COMMENTS:

FORMS-4/0/0.51/COMP

COMPRESSOR OPERATIONAL FIELD TEST DATA

Environmental Science & Engineering, Inc.

COMPANY:	FACILITY:
ENGINE:	UNIT I.D. NO.:
MODEL NO.:	TEST DATE:
NUMBER OF CYLINDARS:	MAXIMUM LOAD:
READINGS RECORDED EVERY 15 MINUTES	RECORDED BY:

Clock Time						
Engine Speed (RPM)						
Jacket Water Temperature (°F)						
Engine Timing (°BTDC)						
Engine Oil Pressure (_____)						
Engine Oil Temperature (°F)						
Manifold Pressure (_____)		11 oz		11 oz		
Suction Pressure (_____)						
1 st Discharge Pressure (_____)						
1 st Discharge Temperature (°F)						
2 nd Discharge Pressure (_____)						
2 nd Discharge Temperature (°F)						
Interstage Pressure (_____)						
Compressor Oil Pressure (_____)						
Compressor Oil Temperature (°F)						

COMMENTS:

FORMS-4/060.51/COMP

COMPRESSOR OPERATIONAL FIELD TEST DATA

Environmental Science & Engineering, Inc.

COMPANY: Phillips Petroleum Co.	FACILITY: Lk. Wash. Cent. Btry.
ENGINE: Waukesha	UNIT I.D. NO.: 161942
MODEL NO.: L5108GU	TEST DATE: 10-27-92
NUMBER OF CYLINDARS: 12	MAXIMUM LOAD: [redacted] KW
READINGS RECORDED EVERY 15 MINUTES	RECORDED BY: J. Smith

Clock Time	9:15 AM	9:30 AM	9:45 AM	10 AM	AVG	
Engine Speed (RPM)	900	895	901	900	894	
Jacket Water Temperature (°F)	165°F	165°F	165°F	165°F		
Engine Timing (°BTDC)	28°	28°	28°	28°		
Engine Oil Pressure ( )	35#	35#	35#	35#		
Engine Oil Temperature (°F)	NA	NA	NA	NA		
Manifold Pressure ( )	[redacted] oz.	[redacted] oz.	12 oz.	12 oz.		
Suction Pressure ( )	DNA	DNA	DNA	DNA		
1st Discharge Pressure ( )	↓	↓	↓	↓		
1st Discharge Temperature (°F)	↓	↓	↓	↓		
2nd Discharge Pressure ( )	↓	↓	↓	↓		
2nd Discharge Temperature (°F)	↓	↓	↓	↓		
Interstage Pressure ( )	↓	↓	↓	↓		
Compressor Oil Pressure ( )	↓	↓	↓	↓		
Compressor Oil Temperature (°F)	↓	↓	↓	↓		

COMMENTS:

FORMS-4/060.51/COMP

PETROLEUM ANALYST INC.

ANALYTICAL CONSULTANTS

GAS ANALYSIS REPORT NO: 031-120291-01 DATE: 12-02-91

FOR: PHILLIPS PETROLEUM CO.
ATTN: MR. LOUIS GASPARD
P.O. BOX 51107
LAFAYETTE LA 70505

SAMPLE IDENTIFICATION:
COMPANY: PHILLIPS PETROLEUM CO.
FIELD: LAKE WASHINGTON
LEASE: STA 300000-84 85 96

SAMPLE DATA: DATE: 11-20-91 BY: M. GASTON
PSIG: 742 TEMP: 69 DEG.F. GRAV:
MCF/D: DIF: IN. DP: LBS H2O

REMARKS:

CYL #

COMPONENT ANALYSIS

COMPONENT		MOL PERCENT	GPM @ 15.025 PSIA
CARBON DIOXIDE	(CO2)	0.81	
NITROGEN	(N2)	0.25	
METHANE	(C1)	88.35	
ETHANE	(C2)	5.48	1.495
PROPANE	(C3)	2.65	0.745
ISO-BUTANE	(IC4)	0.63	0.210
N-BUTANE	(NC4)	0.90	0.289
ISO-PENTANE	(IC5)	0.34	0.127
N-PENTANE	(NC5)	0.24	0.089
HEXANES	(C6)	0.20	0.084
HEPTANES PLUS	(C7+)	0.15	0.071
TOTAL		100.00	

ETHANE + GPM	3.110
ISO-PENTANE + GPM	0.371
COMPRESSIBILITY FACTOR	0.9971
SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1)	0.660
BTU/CU. FT. @ 60 DEG. F., 15.025 PSIA DRY	1175.9
WET	1155.9

PROGRAM AG666-
PGMA655

DATE RANGE (EFFECTIVE)
10/12/92 - 10/31/92

GPM GAS CORPORATION
BATCH PRINT REPORT FOR METER STATION 500000

RUN DATE [illegible]
RUN TIME [illegible]

METER ID: 0500-500000-9:
RUN-NBR: 01-104

PRODUCER:
TITLE: E. COCKRELL JR. (COMP FUEL)

SECURED: [illegible]
ANALYZED: 10/13/92 VALID: Y

EFFECTIVE 10/01/92
SETTLEMENT: Y

FLOW TEMP: 52.00
FLOW PRES: 78.00
Z FACTOR: .99692
SPECIFIC GRAV: .682
NO TEST CAR

	H2S	HE	N2	O2	CO2	C1	C2	C3	IC4	NC4	IC5	NC5	C6+	TOTAL
FCTB:	00.00	00.00	00.28	00.00	00.99	86.46	06.17	02.87	00.70	00.97	00.4[illegible]	[illegible]	00.85	100.00
LRM:							01.641	00.787	00.228	00.304	00.145	[illegible]	[illegible]	[illegible]

MBTU @14.65 PSIA - BAT: 1158.1 DEL. COND: 1175.3

Lk. Wash. Cent. Btry. Fuel

APPENDIX F -- LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY CORRESPONDENCE

Department of Environmental Quality
Air Quality Division
P.O. Box 44096
Baton Rouge, LA 70804
(504) 342-1206

LOUISIANA

Application for Approval of Emissions of Air Pollutants

1 Please Type or Print	Company Name: Phillips Petroleum Company	For Permit Section Use Only
	Parent Company (if Company Name given above is a division):	
	Plant name (if any): Lake Washington Field, Central Facility	
	Nearest town: Port Sulfur (Sulphur) — Parish where located: Plaquemine	

2 PROPOSED ACTION Give a brief description of proposed action. Attach flow diagrams, illustrations required to convey an understanding.

Requesting a permit for a previously unpermitted oil and gas exploration facility. (See attached simplified process flow diagram)

3 OWNERSHIP AND USE OF ADJOINING PROPERTY [X] Map or description attached. Consult instructions

See attached site plot map.

4 TYPE OF APPLICATION

- [ ] a. Entirely new facility
- [ ] b. Modification or expansion of existing facility
- [ ] c. Reconciliation
- [x] d. Previously grandfathered or exempted

Note: A completed Emission Inventory Questionnaire (EIQ) that reflects projected emissions from your facility as a whole after the project described in this application becomes operational must be submitted with this application. If you are submitting an application that is for modification or expansion of an existing facility, the Department of Environmental Quality must also have an EIQ for existing emissions. If you have already submitted an EIQ that is on file with the Department, it may fulfil this requirement. Consult instructions for further details.

5. KEY DATES

Estimated date construction will commence: _____ Estimated date operation will commence: _____

6 EMISSIONS BY POLLUTANT

List each emission from all sources . Group by pollutant. Show total tons/yr for each pollutant. Consult instructions.

Point Source ID number	Pollutant (List individual toxics and non-criteria hydrocarbons separately)	Permitted Emission Rate Before		Permitted Emission Rate After	
		lbs/hr	tons/yr	lbs/hr	tons/yr
1	NM/NE HC's			4.41	19.316
2	" "			4.41	19.316
3	" "			0.429	1.88
4	" "			0.429	1.88
5	" "			0.61	2.67
6	" "			0.61	2.67
7	" "			0.61	2.67
8	" "			0.73	3.20
9	" "			0.11	0.48
10	" " (stand by Only)			(0.11	0.48)
11	" "			0.236	1.034
12	" " (stand by only)			(0.324	1.419)
13	" "			0.0286	0.125
14	" "			0.011	0.046
16	" "			0.004	0.017
18	" "			0.00265	0.0116
	Total NM/NE HC's			13.06425	57.2146
	Total minus stand by equip.			12.63025	55.3947*
14	SO2			0.0012	0.0053
16	SO2			0.00045	0.00197
18	SO2			0.0003	0.0013
	Total SO2			0.00195	0.00857
15	Benzene			3.057	13.39
17	Benzene			2.555	11.19
	Total Benzene			5.612	24.58
15	Ethylbenzene			0.358	1.57
17	"			0.178	0.780
	Total Ethylbenzene			0.536	2.35
15	Toluene			4.009	17.56
17	"			2.694	11.80
	Total Toluene			6.703	29.36
15	Xylene			2.717	11.90
17	"			1.205	5.28
	Total Xylene			3.922	17.18
14	Particulate Matter			0.01	0.0435
16	" "			0.004	0.016
18	" "			0.0025	0.01095
	Total Particulate			0.0165	0.07045

amended 3/4/92

EMISSIONS BY POLLUTANT

List each emission from all sources. Group by pollutant. Show total tons/yr for each pollutant. Consult instructions.

Point Source ID number	Pollutant (List individual toxics and non-criteria hydrocarbons separately)	Permitted Emission Rate Before		Permitted Emission Rate After		
		lbs/hr	tons/yr	lbs/hr	tons/yr	
1	NOX			~~79.295~~	~~347.31~~	326
2 KVS	NOX			~~79.295~~	~~347.31~~	767
3	NOX			~~26.10~~	~~114.32~~	102
4 CoT	NOX			~~26.10~~	~~114.32~~	94
5	NOX			~~18.17~~	~~79.58~~	30
6	NOX			~~18.17~~	~~79.58~~	22
7	NOX			~~18.17~~	~~79.58~~	25
8	NOX			~~21.81~~	~~95.53~~	55
9	NOX			~~5.51~~	~~24.13~~	
10	NOX (Stand by Only)			~~(5.51~~	~~24.13)~~	
11 Gen.	NOX			~~11.78~~	~~51.60~~	
12 Gen.	NOX (Stand by Only)			~~(16.21~~	~~71.0)~~	
13	NOX			~~1.43~~	~~6.26~~	
14	NOX			~~0.20~~	~~0.88~~	
16	NOX			~~0.075~~	~~0.3285~~	
18	NOX			~~0.050~~	~~0.219~~	
	Total NOX			~~327.875~~	~~1,436.0775~~	
	Minus stand by equip.			~~-21.72~~	~~-95.13~~	
	Total NOX			~~306.155~~	~~1,340.9475~~	1085
1	CO			~~8.81~~	~~35.478~~	
2	CO			~~8.81~~	~~35.478~~	
3	CO			~~4.46~~	~~19.53~~	
4	CO			~~4.46~~	~~19.53~~	
5	CO			~~2.18~~	~~9.55~~	
6	CO			~~2.18~~	~~9.55~~	
7	CO			~~2.18~~	~~9.55~~	
8	CO			~~2.62~~	~~11.48~~	
9	CO			~~1.10~~	~~4.82~~	
10	CO (stand by equip.)			~~(1.10~~	~~4.82)~~	
11	CO			~~2.36~~	~~10.34~~	
12	CO (stand by equip.)			~~(3.24~~	~~14.19)~~	
13	CO			~~0.286~~	~~1.25~~	
14	CO			~~0.04~~	~~0.17~~	
16	CO			~~0.015~~	~~0.0657~~	
18	CO			~~0.010~~	~~0.0438~~	
	~~Total CO~~			~~43.851~~	~~135.8455~~	
	Total CO (minus stand by equip.)			39.511	166.8355	

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8 EMISSION SOURCES
ach emission source. Use unique ID numbers. Consult instructions.

Source ID number	Descriptive name of source
1	~~Compressor CBA-1000~~
2 KVS	~~Compressor, CBA-2000~~ 1500
3	~~Compressor, CBA-3000~~
4 CaT.	~~Compressor, CBA-4000~~ 750
5	~~Compressor, CBA-5000~~ 550
6	~~Compressor, CBA-6000~~
7	~~Compressor, CBA-7000~~ 550
8	~~Compressor, CBA-8000~~ 660
9	~~Saltwater Disposal Pump, PAT-1000~~
10	~~Saltwater Disposal pump, PAT-2000 (stand by only)~~
11 Gen.	~~Generator, LAN-1000~~
12 Gen.	~~Generator, LAN-2000~~ (stand by only)
13	~~Pipeline Pump, PAX-1000~~
14	~~Fired Componenet of Glycol Regenerator, EAW 1000~~
15	~~Glycol Regenerator BBC-1000~~
16	~~Fired Component of Glycol Regenerator EAW-2000~~
17	~~Glycol Regenerator, BBC-2000~~
18	~~Heater Treater, NBK-300 (EAW-3000 fired component)~~
19	~~Gunbarrel Tank, ABJ-1000~~
20	~~Crude Oil Tank, ABJ-5000~~
21	~~Crude Oil Tank, ABJ-6000~~
22	~~Fugitive HC Emissions~~

amended 3/4/92

Department of Environmental Quality
Air Quality Division
P.O. Box 44096
Baton Rouge, LA 70804
(504) 342-1206

LOUISIANA

Emission Inventory Questionnaire (EIQ) for Air Pollutants

For Permit Section Use Only

1 Please Type or Print

Company Name: Phillips Petroleum Company

Parent Company (if Company Name given above is a division):

Plant name (if any): Lake Washington Field, Central Facility

Nearest town: Port Sulfur

Parish where located: Plaquemine

2 TYPE OF EIQ [X] a. *ONLY* presently existing emissions [ ] b. *BOTH* proposed additional emissions associated with an application for a permit, variance, or exemption *AND* presently existing emissions expected to be still existing after facility or modification described in application becomes operational

3 CONFIDENTIALITY If you are requesting confidentiality for all information, *except air pollutant emission rates*, check box. (You must attach justification for confidentiality request) [ ]

4 ORGANIZATIONAL ACTIVITIES

Days of week normally *NOT* operating: [ ] Mon [ ] Tue [ ] Wed [ ] Thu [ ] Fri [ ] Sat [ ] Sun

Days per year facility typically operates: 365

Peak production season (list months): _____

Daily operating schedule: [X] 24-hours OR specify number of hours _____

Approximate number of employees at this location: 0-2

Details of facilities that, as a whole, operate intermittently: _____

Ownership:

[X] corporation, partnership, or sole proprietorship [ ] regulated utility [ ] municipal government

[ ] state government [ ] federal government [ ] other, specify _____

Industrial category—Indicate Standard Industrial Classification (SIC) Code(s) that apply to facility:

_____ _____ _____ _____ _____ _____

Description of operation with emphasis on air pollution sources. Use attachments if more space is needed.

Extraction of crude oil and natural gas from underground reservoirs separation of the raw streams, storage and transportation.

Department of Environmental Quality
Air Quality Division
P.O. Box 44096
Baton Rouge, LA 70804
(504) 342-1206

LOUISIANA

SINGLE POINT SOURCE / AREA SOURCE
Emission Inventory Questionnaire (EIQ)
for Air Pollutants

Company Name	Plant location and name (if any)	Date of submittal
Phillips Petroleum Company	Lake Washington Field, Central Facilities	

Source ID number	Descriptive name of the equipment served by this stack or vent	Location of stack or vent (see instructions on how to determine location of area sources)
2	Compressor CBA-2000	UTM zone no. ☐ 15 ☒ 16; Horizontal coordinate 230.36543 m E; Vertical coordinate 3255.92236 m N

Stack and Discharge Physical Characteristics	Height of stack above grade (ft)	Diameter (ft) or stack discharge area (ft²)	Stack gas exit temperature (°F)	Stack gas flow at process conditions, not at standard (ft³/min)	Stack gas exit velocity (ft/sec)	For tanks, list volume (gals)
	40'	1 ☒ ft ☐ ft²	N/A	N/A	N/A	N/A

Fuel	Type of fuel used and heat input (see instructions)		Operating Characteristics	Percent of annual throughput of pollutants through this emission point				Normal operating time of this point			Normal operating rate
		Type of fuel	Heat input (MM BTU/hr)		Dec-Feb	Mar-May	Jun-Aug	Sep-Nov	hrs/day	days/week	weeks/year	
	a	Natural Gas	N/A		25%	25%	25%	@%5	24	7	52	2000 HP
	b											
	c											

Air Pollutant Specific Information

Pollutant	Control equipment code	Control equipment efficiency	Emission Rate Average (lbs/hr)	Emission Rate Maximum (lbs/hr)	Emission Rate Annual (tons/yr)	Emission estimation method	Add, change, or delete code	Concentration in gases exiting at stack
								gr/std ft³
particulate matter								ppm by vol
sulfur dioxide								ppm by vol
nitrogen dioxide	000	0	79.295	79.295	347.31	5	Add	ppm by vol
carbon monoxide	000	0	8.81	8.81	35.478	5	Add	ppm by vol
total NM/NE HC (excl. those listed below)	000	0	4.41	4.41	19.316	5	Add	ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol

Fuel Usage: 175.2 MMCF/Yr. Max.

.KE WASHINGTON FIELD CENTRAL BATTERY
COMPRESSOR #2 KVS
EMISSION SOURCE #2
EQUIPMENT NO. 161913 1500 BHP

	1990	1991
NOX	79.29515 lb/hr 347.3127 ton/yr	79.29515 lb/hr 267.4229 ton/yr
CO	8.810572 lb/hr 38.59030 ton/yr	8.810572 lb/hr 29.71365 ton/yr
NM/NE	4.405286 lb/hr 19.29515 ton/yr	4.405286 lb/hr 14.85682 ton/yr
.UTAL TONS/YR	405.1982	311.9933

COMPRESSOR CBA-2000 EMISSION PT #2
INGERSOL RAND COMPRESSOR #2 KVS
S/N B412FT511 EQUIPMENT # 161913
Model B-412 KVS-2
OPERATES 24 HRS, 7 DAYS, 52 WEEKS
STARTUP NA
2000 HP

FROM MANUFACTURER'S DATA: NOX = 18.0 GRAM/HP HR

CO = 2.0 GRAM/HP HR

NM,NE= 1.0 GRAM/HP HR

NOX LB/HR = (2000 HP)(18.0 GM/HP HR)/(454 GM/LB) = 79.295 LB/HR
TON/YR= (79.295 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 347.31 TON/YR

CO LB/HR = (2000 HP)(2.0 GM/HP HR)/(454 GM/LB) = 8.81 LB/HR
TON/YR= (8.81 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 35.478 TON/YR

NMNE LB/HR = (2000 HP)(1.0 GM/HP·HR)/(454 GM/LB) = 4.41 LB/HR
TON/YR= (4.41 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 19.316 TON/YR

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P.O. Box 44096
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(504) 342-1206

LOUISIANA

SINGLE POINT SOURCE / AREA SOURCE
Emission Inventory Questionnaire (EIQ)
for Air Pollutants

Company Name	Plant location and name (if any)	Date of submittal
Phillips Petroleum Company	Lake Washington Field, Central Facilities	

Source ID number	Descriptive name of the equipment served by this stack or vent	Location of stack or vent (see instructions on how to determine location of area sources)
4	Compressor CBA-4000	UTM zone no. ☐ 15 ☒ 16 Horizontal coordinate 230.36543 m E Vertical coordinate 3255.92236 m N

Stack and Discharge Physical Characteristics	Height of stack above grade (ft)	Diameter (ft) or stack discharge area (ft²) ☒ ft ☐ ft²	Stack gas exit temperature (°F)	Stack gas flow at process conditions, not at standard (ft³/min)	Stack gas exit velocity (ft/sec)	For tanks, list volume (gals)
	35'	.5	N/A	N/A	N/A	N/A

Fuel		Type of fuel used and heat input (see instructions)	
		Type of fuel	Heat input (MM BTU/hr)
	a	Natural Gas	N/A
	b		
	c		

Operating Characteristics	Percent of annual throughput of pollutants through this emission point				Normal operating time of this point			Normal operating rate
	Dec-Feb	Mar-May	Jun-Aug	Sep-Nov	hrs/day	days/week	weeks/year	
	25%	25%	25%	25%	24	7	52	750 HP

Air Pollutant Specific Information

Pollutant	Control equipment code	Control equipment efficiency	Emission Rate Average (lbs/hr)	Emission Rate Maximum (lbs/hr)	Emission Rate Annual (tons/yr)	Emission estimation method	Add, change, or delete code	Concentration in gases exiting at stack
								gr/std ft³
particulate matter								ppm by vol
sulfur dioxide								ppm by vol
nitrogen dioxide	000	0	26.10	26.10	114.32	5	Add	ppm by vol
carbon monoxide	000	0	4.46	4.46	19.53	5	Add	ppm by vol
total NM/NE HC (excl. those listed below)	000	0	0.429	0.429	1.88	5	Add	ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol

January 1990

Fuel Usage: 65.7 MMCF/Yr. Max.

.KE WASHINGTON FIELD CENTRAL BATTERY
COMPRESSOR #2 CaT.
EMISSION SOURCE #4
EQUIPMENT NO. 168245

	1990	1991
NOX	28.88546 lb/hr 126.5183 ton/yr	28.88546 lb/hr 94.48434 ton/yr
CO	4.936123 lb/hr 21.62022 ton/yr	4.936123 lb/hr 16.14605 ton/yr
NM/NE	0.475330 lb/hr 2.081947 ton/yr	0.475330 lb/hr 1.554805 ton/yr
.UTAL TONS/YR	150.2204	112.1852

COMPRESSOR CBA-4000 EMISSION PT #4
CATERPILLAR MOTOR COMPANY/CP COMPRESSOR
S/N 49C01208 EQUIPMENT # 168245 #2 CAT.
Model G399SI
OPERATES 24 HRS, 7 DAYS, 52 WEEKS
STARTUP NA
~~750~~ HP
830

FROM MANUFACTURER'S DATA:

NOX = 15.8 GRAM/HP HR

CO = 2.7 GRAM/HP HR

NM,NE= 0.26 GRAM/HP HR

NOX LB/HR = (750 HP)(15.8 GM/HP HR)/(454 GM/LB) = 26.10 LB/HR
TON/YR= (26.10 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 114.32 TON/YR

CO LB/HR = (750 HP)(2.7 GM/HP HR)/(454 GM/LB) = 4.46 LB/HR
TON/YR= (4.46 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 19.53 TON/YR

NMNE LB/HR = (750 HP)(0.26 GM/HP HR)/(454 GM/LB) = 0.429 LB/HR
TON/YR= (0.429 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 1.88 TON/YR

Department of Environmental Quality
Air Quality Division
P.O. Box 44096
Baton Rouge, LA 70804
(504) 342-1206

LOUISIANA

SINGLE POINT SOURCE / AREA SOURCE
Emission Inventory Questionnaire (EIQ)
for Air Pollutants

Company Name: Phillips Petroleum Company

Plant location and name (if any): Lake Washington Field, Central Facilities

Date of submittal:

Source ID number: 11

Descriptive name of the equipment served by this stack or vent: Generator LAN-1000

Location of stack or vent (see instructions on how to determine location of area sources)
UTM zone no. ☐ 15 ☒ 16
Horizontal coordinate: ~~230.36543~~ m E
Vertical coordinate: ~~3255.92236~~ m N

Stack and Discharge Physical Characteristics	Height of stack above grade (ft)	Diameter (ft) or stack discharge area (ft²)	Stack gas exit temperature (°F)	Stack gas flow at process conditions, not at standard (ft³/min)	Stack gas exit velocity (ft/sec)	For tanks, list volume (gals)
	30'	.66 ☒ ft ☐ ft²	N/A	N/A	N/A	N/A

Fuel	Type of fuel used and heat input (see instructions)		Operating Characteristics	Percent of annual throughput of pollutants through this emission point				Normal operating time of this point			Normal operating rate
		Type of fuel	Heat input (MM BTU/hr)		Dec-Feb	Mar-May	Jun-Aug	Sep-Nov	hrs/day	days/week	weeks/year	
	a	Natural Gas	N/A		25%	25%	25%	25%	24	7	52	535 HP
	b											
	c											

Air Pollutant Specific Information

Pollutant	Control equipment code	Control equipment efficiency	Emission Rate Average (lbs/hr)	Emission Rate Maximum (lbs/hr)	Emission Rate Annual (tons/yr)	Emission estimation method	Add, change, or delete code	Concentration in gases exiting at stack
								gr/std ft³
particulate matter								ppm by vol
sulfur dioxide	000	0	11.78	11.78	51.60	5	Add	ppm by vol
nitrogen dioxide	000	0	2.36	2.36	10.34	5	Add	ppm by vol
carbon monoxide	000	0	0.236	0.236	1.034	5	Add	ppm by vol
total NM/NE HC (excl. those listed below)								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol

January 1990

Fuel Usage: 46.866 MMCF/Yr. Max.

L.W. CENTRAL ~~161942~~ 161942
Emission PT 011
550 HP

Estimate Engine Exhaust Flow in SCFH

#1 Gen.

GIVEN:

ENGINE DISPLACEMENT (Cu. In.)	5108
FULL LOAD RPM	1000
EXHAUST GAS TEMPERATURE (F)	750

ESTIMATE :

SCFH - Turbo = 275,642
SCFH - N/A = 167,354

<RETURN TO CONTINUE>

Convert Grams/bhp-hr to Tons/Year

GIVEN:

Grams/bhp-hr	10
BHP	535
SCFH	167354

CALCULATE:

TONS/YEAR = 51.6

ppm NOx = 821
ppm CO = 903
ppm THC = 1,405

<RETURN TO CONTINUE>

GENERATOR, LAN-1000 EMISSION PT #11
WAUKESHA MOTOR COMPANY/EM BEMAC II 300KW
S/N 184264 EQUIP. # 161942
Model L5108GU #1 Gen.
OPERATES 24 HRS, 7 DAYS, 52 WEEKS
STARTUP N/A
535 HP

FROM MANUFACTURER'S DATA:

NOX = 10.0 GRAM/HP HR

CO = 2.0 GRAM/HP HR

NM,NE= 0.2 GRAM/HP HR

NOX LB/HR = (535 HP)(10.0 GM/HP HR)/(454 GM/LB) = 11.78 LB/HR
TON/YR= (11.78 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 51.60 TON/YR

CO LB/HR = (535 HP)(2.0 GM/HP HR)/(454 GM/LB) = 2.36 LB/HR
TON/YR= (2.36 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 10.34 TON/YR

NMNE LB/HR = (535 HP)(0.2 GM/HP HR)/(454 GM/LB) = 0.236 LB/HR
TON/YR= (0.236 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 1.034 TON/YR

Department of Environmental Quality
Air Quality Division
P.O. Box 44096
Baton Rouge, LA 70804
(504) 342-1206

LOUISIANA

SINGLE POINT SOURCE / AREA SOURCE
Emission Inventory Questionnaire (EIQ)
for Air Pollutants

Company Name: Phillips Petroleum Company

Plant location and name (if any): Lake Washington Field, Central Facilities

Date of submittal:

Source ID number: (Stand By Only) 12

Descriptive name of the equipment served by this stack or vent: Generator LAN-2000 (Stand By Only)

Location of stack or vent (see instructions on how to determine location of area sources)
UTM zone no. ☐ 15 ☒ 16
Horizontal coordinate 230.36543 m E
Vertical coordinate 3255.92236 m N

Stack and Discharge Physical Characteristics	Height of stack above grade (ft)	Diameter (ft) or stack discharge area (ft²)	Stack gas exit temperature (°F)	Stack gas flow at process conditions, not at standard (ft³/min)	Stack gas exit velocity (ft/sec)	For tanks, list volume (gals)
	35'	.75 ☒ ft ☐ ft²	N/A	N/A	N/A	N/A

Fuel		Type of fuel	Heat input (MM BTU/hr)
	a	Natural Gas	N/A
	b		
	c		

Operating Characteristics	Percent of annual throughput of pollutants through this emission point				Normal operating time of this point			Normal operating rate
	Dec-Feb	Mar-May	Jun-Aug	Sep-Nov	hrs/day	days/week	weeks/year	
	25%	25%	25%	25%	24	7	52	736 HP

Air Pollutant Specific Information

Pollutant	Control equipment code	Control equipment efficiency	Emission Rate Average (lbs/hr)	Emission Rate Maximum (lbs/hr)	Emission Rate Annual (tons/yr)	Emission estimation method	Add, change, or delete code	Concentration in gases exiting at stack
								gr/std ft³
particulate matter								ppm by vol
sulfur dioxide								ppm by vol
nitrogen dioxide	000	0	16.21	16.21	71.0	5	Add	ppm by vol
carbon monoxide	000	0	3.24	3.24	14.19	5	Add	ppm by vol
total NM/NE HC (excl. those listed below)	000	0	0.324	0.324	1.419	5	Add	ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol
								ppm by vol

amended 3/4/92

January 1990

Fuel Usage: 64.4736 MMCF/Yr. Max.

L. W. CENTRAL 162150
Emission PT 12 #162150
750 HP

Estimate Engine Exhaust Flow in SCFH

#2 Gen.

GIVEN:

ENGINE DISPLACEMENT (Cu. In.)	7042
FULL LOAD RPM	1000
EXHAUST GAS TEMPERATURE (F)	1038

ESTIMATE :

SCFH - Turbo = 470,454
SCFH - N/A = 285,633

<RETURN TO CONTINUE>

Convert Grams/bhp-hr to Tons/Year

GIVEN:

Grams/bhp-hr	10
BHP	750
SCFH	285633

CALCULATE:

TONS/YEAR = 72.4

ppm NOx = 674
ppm CO = 742
ppm THC = 1,154

<RETURN TO CONTINUE>

Estimate Engine Exhaust Flow in SCFH

GIVEN:

GENERATOR, LAN-2000 EMISSION PT #12 (stand By Only)
WAUKESHA MOTOR COMPANY/EM BEMAC II 400KW
S/N 122540 EQUIP. # 162150 #2 Gen
Model L7042GU
OPERATES 24 HRS, 7 DAYS, 52 WEEKS
STARTUP 1/91
736 HP

FROM MANUFACTURER'S DATA:

NOX = 10.0 GRAM/HP HR

CO = 2.0 GRAM/HP HR

NM,NE= 0.2 GRAM/HP HR

NOX LB/HR = (736 HP)(10.0 GM/HP HR)/(454 GM/LB) = 16.21 LB/HR
TON/YR= (16.21 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 71.0 TON/YR

CO LB/HR = (736 HP)(2.0 GM/HP HR)/(454 GM/LB) = 3.24 LB/HR
TON/YR= (3.24 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 14.19 TON/YR

NMNE LB/HR = (736 HP)(0.2 GM/HP HR)/(454 GM/LB) = 0.324 LB/HR
TON/YR= (0.324 LB/HR)(8760 HR/YR)/(2000 LB/TON) = 1.419 TON/YR

PHILLIPS 66

PHILLIPS PETROLEUM COMPANY

LAFAYETTE, LOUISIANA 70505-1107
P.O. BOX 51107 TELEPHONE: 318 261-4100

EXPLORATION AND PRODUCTION GROUP

VERBAL APPROVAL TO L.H III 10-14-92

October 8, 1992

RECEIVED
NOV 25 1992

Mr. Thomas Coerver
LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY
P. O. Box 82135
Baton Rouge, Louisiana 70884

SUBJECT: Notification to Conduct Emission Testing for Phillips Petroleum Company

Attention: Mr. Coerver:

This letter will serve as notification to perform compliance emission testing of several on shore Compressor Stations for Phillips Petroleum Company. Phillips Petroleum has secured the testing service of Environmental Science & Engineering,Inc. (ESE) to conduct the compliance testing of Internal Combustion Engines (Compressors) at the following Compressor facilities:

Lake Washington Station -Central Battery-4 Compressors-Permit No:
Lake Washington Station - A Battery - 1 Compressor -Permit No:2240-00059-00
Valentine Field - 1 Compressor - Permit No:
Hog Bayou - 1 Compressor - Permit No:
Johnson Bayou - 1 Compressor - Permit No:

In accordance with the Specific Conditions of the corresponding Louisiana State Air Permits for these facilities, the Compressors will be tested to demonstrate compliance for Oxides of Nitrogen (NOx) and Carbon Monoxide (CO) emissions.

TEST PROCEDURES:

EPA Reference Methods 1-4 will be performed by ESE to determine the number of traverse sampling points, stack gas velocity, stack gas composition, and moisture content. Oxides of Nitrogen will be tested in accordance with EPA Reference Method 7E. Carbon Monoxide will be tested by EPA Reference Method 10. EPA Reference Methods will be performed in accordance with Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60).

ESE proposes to conduct three (3), one-hour test runs for each subject Compressor source. Stack gas velocity, gas composition, moisture content, NOx and CO will be performed simultaneously during the one-hour test runs.

PRODUCTION AND OPERATIONAL DATA:

Each Compressor will be operated normally during the compliance test series. Operational characteristics will be carefully monitored and recorded in fifteen minute intervals during the compliance testing.

SCHEDULE:

Phillips Petroleum requests conducting the compliance testing during October 26 through November 6, 1992. Phillips Petroleum and ESE personnel will attend a pretest conference with LDEQ in advance of the proposed test date, if required. LDEQ confirmation on or before October 19, 1992 to proceed with this project will be appreciated.

Should you have any questions with the proposed schedule or test methodology, please do not hesitate to contact me at (318) 261-4141.

Sincerely,

PHILLIPS PETROLEUM COMPANY

C.W. Walley

C. W. Walley
Mechanical Maintenance Superintendent

cc: Jerry Smith
Louis Hoover III
Cindy Smith
File

APPENDIX G -- PROJECT PARTICIPANTS