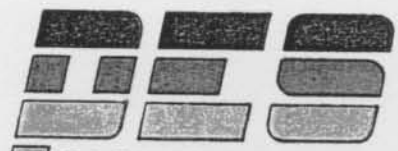

PACIFIC ENVIRONMENTAL SERVICES, INC.

WASHINGTON, D.C. • RESEARCH TRIANGLE PARK, NC • CINCINNATI, OH • LOS ANGELES, CA

Source Test Protocol for Measurement of
Particulate Matter, Nitrogen Oxides, Sulfur Dioxide,
Carbon Monoxide and Total Hydrocarbons on
the Exhaust of a Pyrolytic Oxidation Unit at

Balboa Pacific Corporation
11240 Bloomfield Ave.
Santa Fe Springs, CA 90670

Prepared For
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S. Hugh Brown
4/30/95

FOREWORD

This report was prepared by Pacific Environmental Services. Inc. (PES) using due and ordinary care and in accordance with the scope of work identified in the Professional Services Agreement. Purchase Order. or other written/verbal request.

Any measured contaminants and their concentrations detected or identified in this study are for the sample(s) obtained or for the observations made at the time(s) and location(s) referenced in the report and may not represent other times, locations, or contaminants and their concentrations.

Except for the tests and observations conducted by PES, no attempt was made to check for compliance of present or past owners or operators of the equipment, plant. or site with federal, state, or local laws and regulations.

The information provided in this report, including any drawings and specifications, was prepared solely for the use of the identified client and any use by any other party shall be at their own risk.

The project work was conducted by Siya Mokh and Steven Hernandez under the direction of S. Hugh Brown.

Approved: S. Hugh Brown

S. Hugh Brown, Director
Air Quality Testing

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A. Field Data and Calculation Sheets

B. Calibration Data

INTRODUCTION

Balboa Pacific Corporation operates a pyrolytic oxidation unit (BAL PAC 2000) at its Santa Fe Springs, CA facility. This unit is utilized for research and development purposes. Balboa Pacific Corporation was contracted to conduct a pilot test of petroleum coke and gangue material generated by Gulf Chemical and Metallurgical Corporation.

The purpose of the pilot test was to evaluate the exhaust emissions in demonstration of compliance with the Texas Natural Resources Conservation Commission (TNRCC) guidelines for pilot plants. In addition the units ability to produce thermal energy and high purity metallic oxide from the petroleum coke material was tested. The source tests determined the particulate matter, nitrogen oxides, carbon monoxide, sulfur dioxide and non-methane hydrocarbon mass emission rates from the unit to atmosphere.

Pacific Environmental Services (PES), a participant in the California Air Resources Board (CARB) Independent Contractor Program and certified by the South Coast Air Quality Management District (SCAQMD) for various source testing, was hired by ATC Environmental Group, Inc. to perform the requested source testing and data reduction. PES qualifies as an independent testing laboratory - no conflict of interest.

EQUIPMENT AND PROCESS DESCRIPTION

The pyrolytic oxidation unit utilized for this pilot study consisted of the equipment described below. The unit was tested while running on petroleum coke and gangue, a by-product material, which is comprised of greater than 95% pure organic material, and less than 5% metallic oxides and 4% sulfur.

The material is pumped into the pyrolytic chamber which maintains a low oxygen atmosphere and a temperature of at least 1200 degrees Fahrenheit. The waste is conveyed through the chamber by a ram transport system. Air locks are utilized at each end of the chamber to reduce fugitive emissions (see Figure 1). The temperature of the chamber is maintained by two low NOx natural gas burners that vent directly to the atmosphere. The waste exits the chamber either as non-hazardous dry ash, or as gas that is ducted to a thermal oxidizer. The natural gas fired thermal oxidizer maintains a temperature of aproximately 1400 degrees Fahrenheit to destroy any hazardous gases. The thermal oxidizer exhaust is then vented to the atmosphere via a waste heat recovery boiler, exhaust fan and rectangular exhaust duct. The source tests were conducted on the waste heat boiler exhaust.

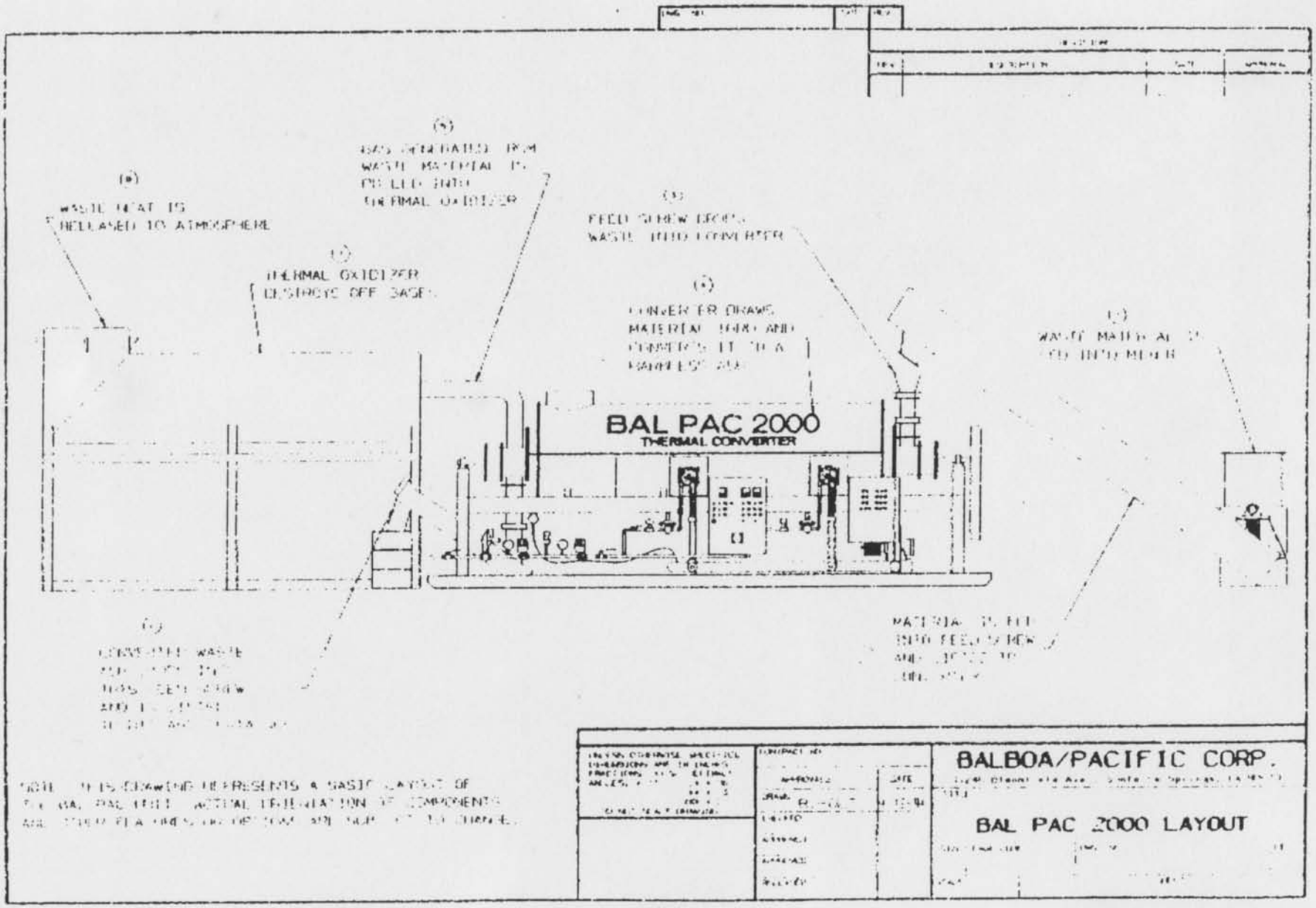

BAL PAC 2000
THERMAL CONVERTER
BALBOA/PACIFIC CORP.
BAL PAC 2000 LAYOUT

FIGURE 1

TESTING METHODOLOGY

The approximate sampling port locations are shown in Figure 2. The number of traverse points required (8 on each of three sample ports on the long dimension of the rectangular stack) and their locations are specified in EPA Method 1. Triplicate test runs were conducted for all parameters. In addition, EPA Methods 1,2,3 and 4 were utilized during each test run to determine moisture, molecular weight, temperature, velocity and flow rate.

Total Particulates

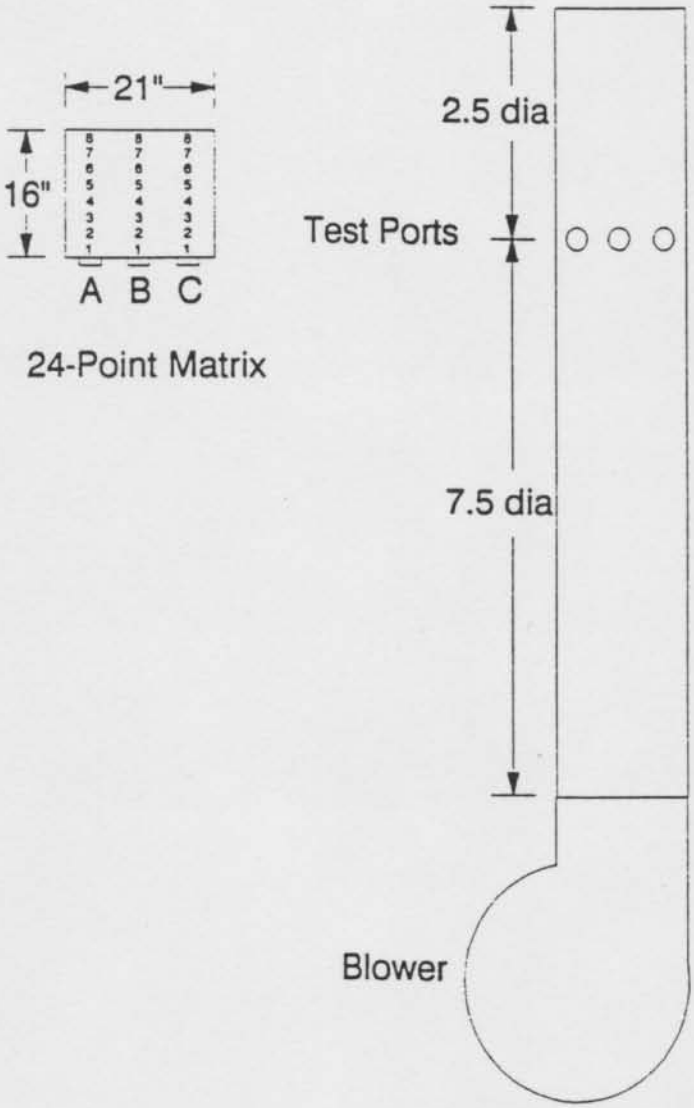
The particulate matter emissions of the waste heat boiler exhaust were determined by EPA Method 5. The sampling train is shown in Figure 3 and consisted of a glass nozzle, a Teflon union, an 36-inch glass probe, a tared Gelman type A/E glass fiber filter in a glass filter holder, a set of Greenburg-Smith imping-ers, a 30-foot umbilical line, a vacuum pump, a dry gas meter and a calibrated orifice connected to an inclined oil manometer. The probe was unheated due to the high stack temperature and the filter was maintained at about 250 degrees Fahrenheit. The impinger set consisted of 1 modified Greenberg-Smith impinger and 1 Greenberg-Smith impinger each containing 100 milliliters of distilled water, an empty modified Greenberg-Smith impinger, and an impinger filled with 250 grams of silica gel.

The sample was collected isokinetically for 72 minutes (3 minutes/point) generating a sample size of about 45 cubic feet through the train. The velocity and temperature were measured at each point as it was sampled. Field data and calculation sheets are shown in Appendix A.

The volume of the impinger solution and the weight of the silica gel were recorded before and after the tests in order to obtain the moisture content of the stack gas stream. The weight of the filter was also recorded before and after the tests as part of the analysis to determine the amount of particulate collected. All sample volumes and silica gel weights were recorded immediately on sample recovery sheets (Appendix A) during charging and sample recovery. Leak checks were performed before and after each test.

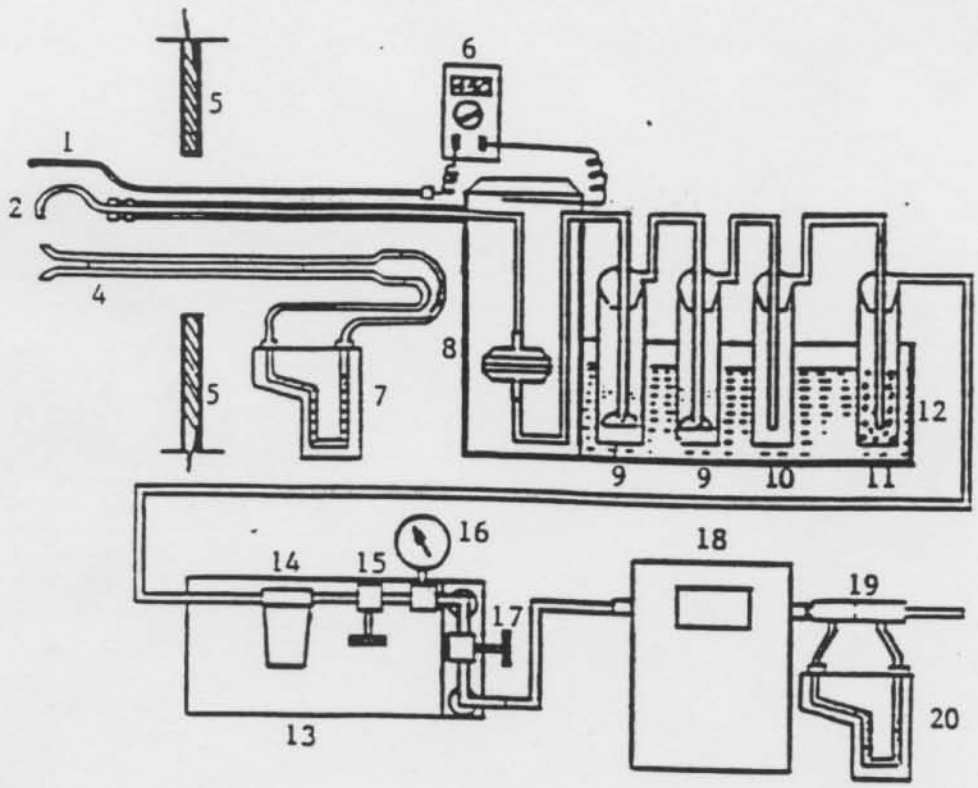
After the test, the nozzle, probe, and front filter bell were rinsed and brushed three times with acetone and the rinses placed in a 250-milliliter polyethylene container. The filter was placed in a plastic cassette. Disposable vinyl gloves were worn during sample retrieval to help prevent contamination.

Balboa Pacific - ATC



Pyrolyzer/Oxidzer/Waste Heat Boiler Exhaust

Figure 2



1. Temperature Sensor
2. Nozzle
3. Glass lined Stainless Steel Probe-Heated
4. S-type Pitot Tube
5. Stack Wall
6. Temperature Sensor Meter
7. Pitot Tube Inclined Manometer
8. Heated Box with Filter
9. Impinger with 100 ml H_2O
10. Empty Bubbler
11. Bubbler with Silica Gel
12. Ice Bath
13. Sealed Pump (Leak Free)
14. Filter for Pump
15. Metering Valve
16. Vacuum Gauge
17. By-pass Valve
18. [redacted] Dry Gas Meter
19. Orifice
20. Orifice Inclined Manometer

Figure 3

PARTICULATE Sampling Train Set-up with Heated Probe and Heated Filter

EPA METHOD 5

The particulate collections were evaporated to dryness at 100 degrees Centigrade and desiccated to a constant weight along with the sample filters. The particulate matter was reported with and without the condensibles (back half impinger collection).

Continuous Monitoring

The pyrolytic chamber waste heat boiler exhaust was monitored for VOC, CO, CO_2, O_2, SO_2 and NOx by EPA Methods 25A, 10, 3A, 6C and 7E, respectively. Rosemount Analytical Model 880 Infrared Analyzers were used to determine the CO and CO_2 concentrations. A Rosemount Analytical Model 755R Paramagnetic Analyzer was used to determine the oxygen concentration, a Bovar Engineering Model 721M was used to determine the SO_2 concentration and a Thermo Electron Model 10 Chemiluminescent Analyzer was used to determine the NOx concentration. The output of the analyzers was linearized by the manufacturers. Table 1 lists the instrument specifications.

The continuous monitoring train for the NOx, SO_2, CO_2 and O_2 is shown in Figure 4 and consisted of a 3/8-inch stainless steel sampling probe, a 3/8-inch heated Teflon sampling line, a sample refrigeration/pump system, a glass fiber filter in a 47-millimeter stainless steel holder, and a sample distribution manifold. The distribution manifold was equipped with a series of 3-way valves with flow meters (rotometer style). One flow meter acted as a bypass, and the others were connected to the individual analyzers.

The total hydrocarbon analyzer was served by a separate probe and heated Teflon sample line. The analyzer was a JUM Model VE-7 that utilized a flame ionization detector (FID) mounted in a heated oven. The sample line was maintained at 250°F, and the oven was maintained at 190°C (see Figure 5). Table 2 lists the instrument specifications of the JUM analyzer.

The output of the analyzers was logged by a Yokogawa Model HR2400 multi-channel recorder and a Rustrak Ranger II data logger.

Prior to the source tests, the suction side of the monitoring system was leak-checked at a full vacuum (greater than 20 inches mercury). All instruments were calibrated with a zero and two upscale span gases (three for the JUM) before and after each test. A zero and mid-span bias check was conducted before and after each test run.

The NOx analyzer was operated on a range of 0-50 ppmv with a high span gas at 47.4 and a low span gas at 25.9 ppmv. The CO analyzer was operated on a range of 0-100 ppmv with a high span gas at 40.0 and 20.0 ppmv. The SO_2 analyzer was operated on a range of 0-100 ppmv with a high span gas at 86.0 ppmv and a low span gas at 46.0 ppmv.

Table 1

Continuous Monitor Specifications

NOx Chemiluminescent Analyzer - Thermo-Electron Model 10A

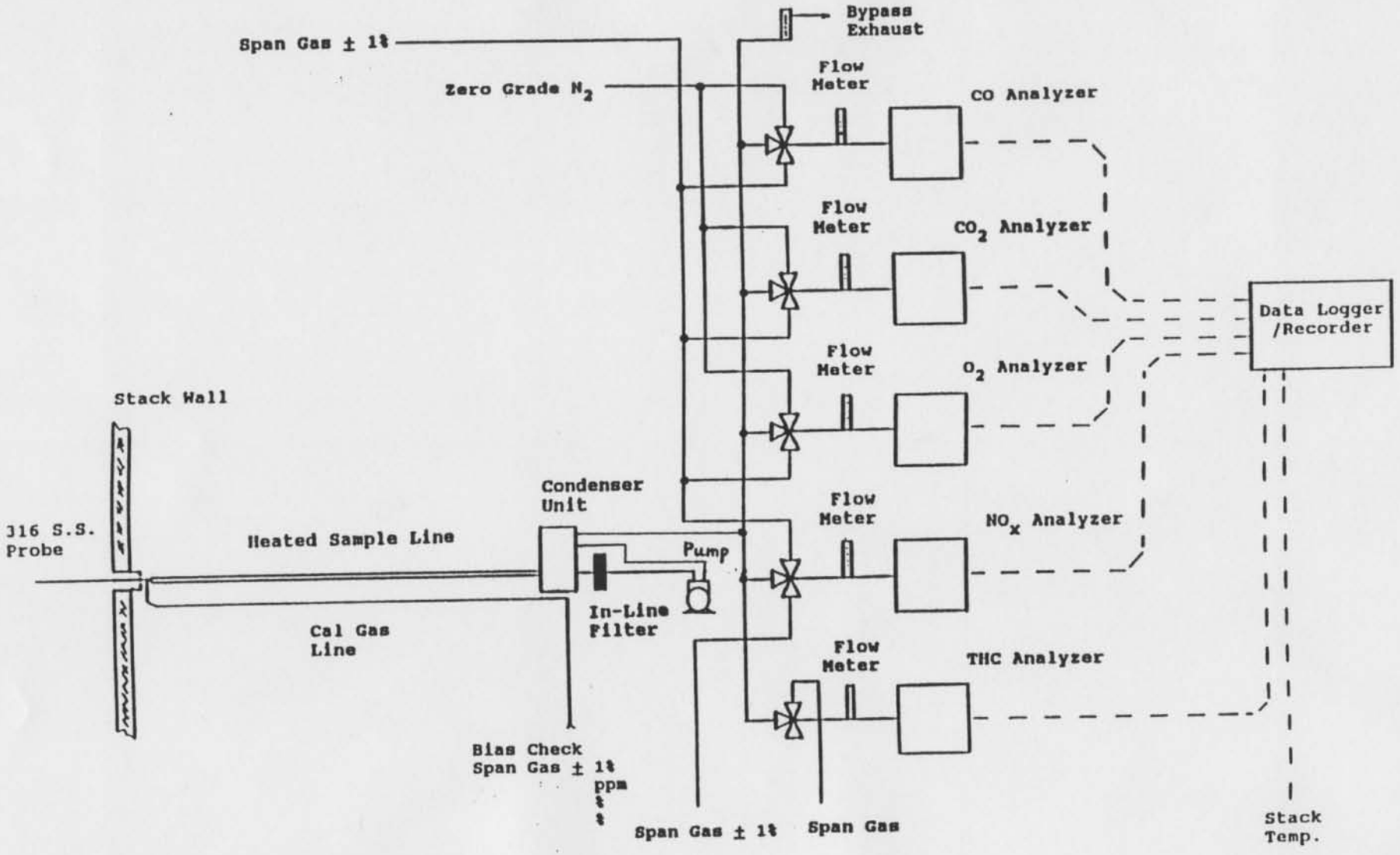
Response Time	1.5 sec - NO, 1.7 sec - NOx
Zero Drift	± 0.5% after warm up (30 min)
Span Drift	± 1% of full scale
Linearity	± 1% of full scale
Accuracy	Derived from the calibration ± 1% gas was used.
Output	NO 0-5.0 Vdc (scaled 0-25 ppm) NOx 0-5.0 Vdc (scaled 0-25 ppm)

O_2 Paramagnetic Analyzer - Beckman Model 755R

Response Time	2 Sec
Zero Drift	± 1% of full scale
Span Drift	± 1% of full scale
Linearity	± 1% of full scale
Accuracy	Derived from the calibration ± 1% gas was used.
Output	0-1.0 Vdc (scaled 0-25%)

CO/CO_2 Infrared Analyzers - Beckman Model 880

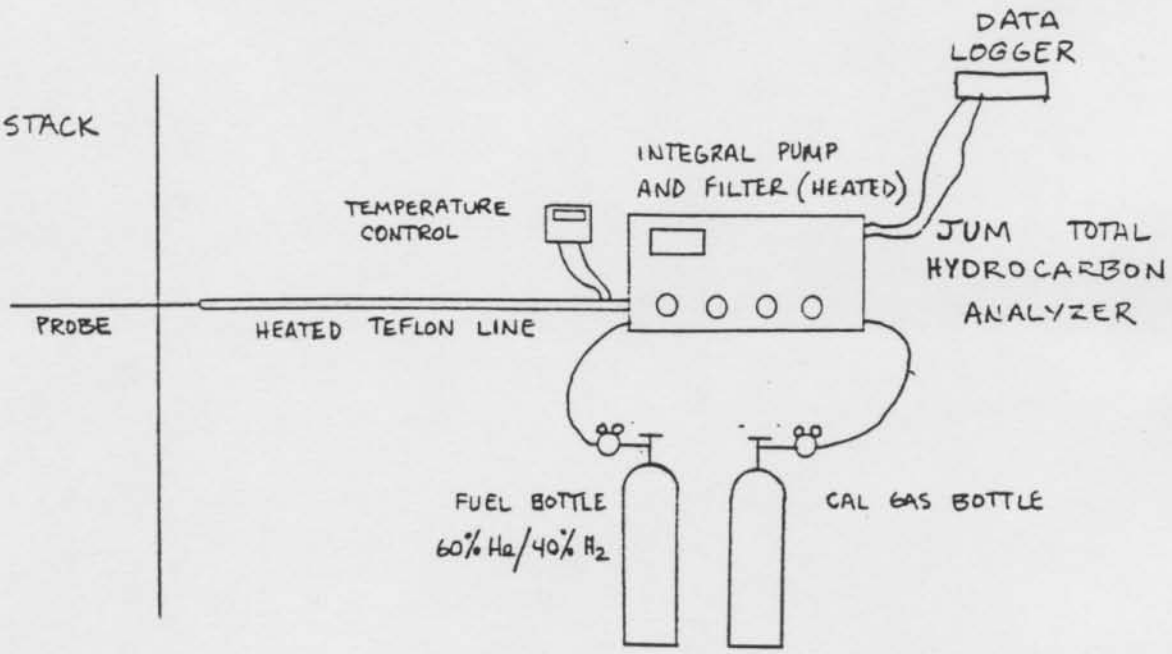
Response Time	2 sec.
Zero Drift	± 1% of full scale
Span Drift	± 1% of full scale
Linearity	± 1% of full scale
Accuracy	Derived from the calibration ± 1% gas was used.
Output	0-1.0 Vdc (scaled 0-100 ppm CO) 0-1.0 Vdc (scaled 0-20 % CO_2)



CONTINUOUS MONITORING

FIGURE 4

PACIFIC ENVIRONMENTAL SERVICES, INC.



CARB METHOD 100

CONTINUOUS MONITORING TRAIN

TOTAL HYDROCARBONS

(SCAQMD METHOD 100.1)

(EPA METHOD 25A)

FIGURE 5

Table 2

JUM Monitor Specifications

VOC Heated Hydrocarbon Analyzer - J.U.M. Engineering Model VE-7 FID Analyzer

Response Time	0-95% in less than 1.2 Seconds
Zero Drift	± 1% of Full Scale in 24 Hrs
Span Drift	± 1% of Full scale in 24 Hrs
Linearity	± 1% of Full Scale
Accuracy	Derived from the Calibration Gas ± 1% gas was used
Sensitivity	1 ppb
Range Change Consistency	Less than 1% Full Scale
Oxygen Synergism	Less than 2%
Output	0-10.0 Vdc Scaled: $R_1$0-10ppm as C_3 $R_2$0-100ppm as C_3 $R_3$0-1,000ppm as C_3 $R_4$0-10,000ppm as C_3 $R_5$0-100,000ppm as C_3
Sample Flow Rate	3 Liters/Minute

The oxygen analyzer was operated on a range of 0-25 per cent with a high span gas at 18.0 and a low span gas at 10.0 per cent. The CO_2 analyzer was operated on a range of 0-5 per cent with a high span gas at 4.0 and a low span gas at 2.0 per cent. The JUM instrument was used on the 0-100 ppmv range and calibrated with a high span gas at 80.4 ppmv as propane, a mid span gas at 48.0 ppmv as propane, and a low span gas at 20.0 ppmv as propane.

Methane

The methane was determined by EPA Method 18. The train is shown in Figure 6, and consisted of a stainless steel probe connected through a flow control device to an evacuated 12-liter stainless steel cylinder. A single integrated sample was collected concurrently with each hydrocarbon monitoring run. Leak checks were performed on all sampling trains before and after each test run. The methane samples were returned to the PES laboratory for analysis.

Laboratory analysis for methane (CH_4) was performed by PES utilizing an HNU Systems, Inc. Model 301 Gas Chromatograph with Flame Ionization Detection (GC/FID). The methane values were subtracted from the monitored total hydrocarbon values as propane.

RESULTS

Calculations were made from the field data sheets to determine sample volume, dry gas average molecular weight, velocities, flow rate, component concentrations, and isokinetic variation for each test. The calculations are shown on the emission test calculation sheets in Appendix A.

Table 1 summarizes the results of the source tests for particulates. The particulate concentrations without condensibles for the three test runs were 0.0101, 0.0154, and 0.0193 grains/DSCF, respectively, for an average of 0.0149 grains/DSCF. The particulate emission rates without condensibles for the three test runs were 0.078, 0.12, and 0.14 lbs/hr, respectively, for an average of 0.11 lbs/hr. The particulate concentrations with condensibles for the three test runs were 0.0115, 0.0164, and 0.0223 grains/DSCF, respectively, for an average of 0.0167 grains/DSCF. The particulate emission rates without condensibles for the three test runs were 0.089, 0.13, and 0.16 lbs/hr, respectively, for an average of 0.13 lbs/hr.

Table 2 summarizes the results of the source tests for the gaseous components. The carbon monoxide concentrations for the three test runs were 31, 39, and 38 ppmv, respectively, for an average of 36 ppmv. The carbon monoxide emission rates for the three test runs were 0.12, 0.16, and 0.14 lbs/hr, respectively, for an average of 0.14 lbs/hr. The nitrogen oxides concentrations for the three test runs were 22, 21, and 20 ppmv, respectively, for an average of 21 ppmv. The nitrogen oxides emission rates for the three test runs were 0.14, 0.14, and 0.12 lbs/hr, respectively, for an average of 0.13 lbs/hr. The sulfur dioxide concentrations for the three test runs were 9, 15, and 15 ppmv, respectively, for an average of 13 ppmv. The sulfur dioxide emission rates for the three test runs were 0.08, 0.14, and 0.13 lbs/hr, respectively, for an average of 0.12 lbs/hr. The nonmethane hydrocarbons (as C_3) concentrations for the three test runs were 20, 7, and 1 ppmv, respectively, for an average of 9 ppmv. The nonmethane hydrocarbons (as C_3) emission rates for the three test runs were 0.12, 0.05, and 0.01 lbs/hr, respectively, for an average of 0.06 lbs/hr. The methane concentration was not determined on the first test run so the total hydrocarbons were corrected as C_3 by using the average of the second and third test runs for methane (11 and 7 ppmv, respectively).

TABLE 1

Balboa Pacific/ATC Pyrolysis Unit
Oxidizer Exhaust
Particulate Emissions

Date:	4/12/95	4/12/95	4/13/95
Test Number:	1	2	3
Sample Number:	BP-1	BP-2	BP-3
Flue Gas			
Temperature, °F	370	363	367
Velocity, ft/sec	10.8	11.2	10.3
Static Pressure, in. H_2O	-0.02	-0.02	-0.02
Duct Dimension, in.	16 x 21	16 x 21	16 x 21
Duct Area, sq. ft.	2.33	2.33	2.33
Flow Rate, ACFM	1,510	1,570	1,440
Flow Rate, DSCFM	905	946	853
Moisture, % v/v	6.0	6.1	6.7
Particulate Matter (M5)			
Sample Start	10:40	14:00	10:40
Sample Stop	11:58	15:18	11:58
Sampling Time, min.	72	72	72
Sample Volume, DSCF	56.2	41.1	33.7
Isokinetic Rate, %	93.5	96.4	97.7
Collection, grams			
Filter	0.0302	0.0271	0.0348
Impingers	0.0053	0.0027	0.0065
Acetone	0.0065	0.0138	0.0074
Total w/condensibles	0.0420	0.0436	0.0487
Total w/o condensibles	0.0367	0.0409	0.0422
Concentration, grains/DSCF			
w/condensibles	0.0115	0.0164	0.0223
w/o condensibles	0.0101	0.0154	0.0193
Emission Rate, lbs/hr			
w/condensibles	0.089	0.13	0.16
w/o condensibles	0.078	0.12	0.14

TABLE 2

Balboa Pacific/ATC Pyrolysis Unit
Oxidizer Exhaust
Continuous Monitoring of Gases

Date:	4/12/95	4/12/95	4/13/95
Test Number:	1	2	3
Sample Start	13:58	10:45	09:40
Sample Stop	14:58	11:45	11:50
Sampling Time, min.	60	60	120
Concentration, %			
Carbon Dioxide	2.9	3.0	2.9
Oxygen	16.0	16.1	15.7
Concentration, ppmv			
Carbon Monoxide	31	39	38
Total HC (as C_3)	23	10	4
Methane *	-	11	7
Nonmethane HC (as C_3)	20	7	1
Sulfur Dioxide	9	15	15
Nitrogen Oxides	22	21	20
Emission Rate, lbs/hr			
Carbon Monoxide	0.12	0.16	0.14
Nonmethane HC (as C_3)	0.12	0.05	0.01
Sulfur Dioxide	0.08	0.14	0.13
Nitrogen Oxides	0.14	0.14	0.12

* Determined by GC from Tedlar bag for adjusting total HC to nonmethane HC.

QUALITY ASSURANCE/QUALITY CONTROL

Source tests are performed to determine the types and amounts of pollutants emitted by a source. Information from this source test program may be used for obtaining permits, evaluating control equipment performance, updating emission inventories, and determining compliance with present and future emission regulations. For these purposes, reliable data are required. PES provides this reliability by using the following work practices:

Use Of Standard Test Procedures

EPA Methods 1 and 2 were utilized to measure flow rates. EPA Method 5 was used to determine the total particulate emission rates, and EPA Methods 3A, 6C, 7E, 10 and 25A were used to determine the continuous emission rates for the gases. A procedure must be thoroughly studied under various conditions in order to be designated as a state or federal Method. Results of many executions of the procedure are compared to demonstrate accuracy and repeatability before adoption of the procedure as a source testing method.

Use Of Trained Test Personnel

Because of the complexity of typical source testing methods, testers should be trained and experienced with the test procedures in order to assure reliable results. PES personnel have had professional training and routinely conduct source tests.

Knowledge Of Source's Operation

The source testing team should have sufficient knowledge of the process to be tested in order to properly document the process parameters during the tests. Without documentation of the process parameters used, results are much less meaningful. PES has previously tested boilers and combustion sources and is familiar with the processes and equipment.

Equipment Maintenance and Calibration

Use of properly maintained and calibrated test equipment is essential for minimizing systematic errors in results. All sampling devices were constructed, maintained, and calibrated as suggested in EPA documents APTD-0576, and APTD-0581 (These are commonly accepted construction and maintenance manuals for source testing equipment).

The dry gas meters were calibrated with a transfer gas meter with NBS traceability. These calibrations are included in Appendix B along with those for the nozzles, cyclone, thermocouples, digital potentiometers, and Pitot tubes.

Quality control procedures used for continuous monitoring included the use of non-reactive 316 stainless steel or Teflon tubing and fittings throughout the system. A 2-pass refrigeration unit was used with the pump in between each pass of the sample gas conditioner. All instrumentation was continuously monitored and checked between load conditions to insure data reliability during all sample runs. Bias checks were made with a calibration gas blend to confirm they met the tolerances specified in the EPA Methods.

All calibration gases were ± 1 per cent accuracy and provided by Scott Specialty Gases in San Bernardino, California.

Thorough Record Keeping

All data relating to the operation of the sampling train must be immediately recorded to ensure that it is not lost or misinterpreted. PES accomplishes this thorough record keeping by use of the field data sheets shown in Appendix A. The PES test team is familiar with these sheets and the information required to complete them. Any unusual occurrences in the process operation, unusual test instrument readings, or any other items that could affect the test results were also noted.

Use Of Thoroughly Cleaned Glassware

All glassware and probe lines were cleaned prior to the tests with hot tap water and detergent. The trains were then rinsed with laboratory grade distilled water, air dried, and sealed until the tests.

Use Of Standardized Data Reduction Techniques

Data reduction was accomplished by the use of step by step calculation sheets. The calculations were systematic and easy to follow. All calculations for the source test are included in Appendix A.

Submission Of Blank Samples

Filter and reagent samples were analyzed with the particulate samples to detect any possible contamination of sampling media or problems with lab analyses. No corrections were made to the measured concentrations of the collected samples, but the blank results were reported on the calculation sheets.

APPENDIX A

FIELD DATA AND CALCULATION SHEETS

TRAVERSE POINT LOCATIONS FOR RECTANGULAR DUCTS

PLANT BALBOA PACIFIC

DATE 4-12-95

SAMPLING LOCATION EXHAUST STACK

INSIDE STACK DIMENSIONS 16 x 21

INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE. (Distance B) 1 1/2"

EQUIVALENT STACK I.D.

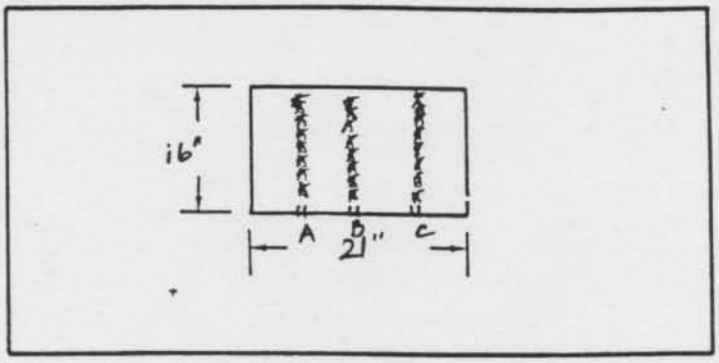
NEAREST UPSTREAM DISTURBANCE 29"

NEAREST DOWNSTREAM DISTURBANCE 92"

NUMBER OF TRAVERSE POINTS 24 ARRAY 3 x 8

CALCULATOR MOKH

ILLUSTRATE PORT LOCATIONS AND STACK DIMENSIONS



TRAVERSE POINT NUMBER	INSIDE OF NEAR WALL TO TRAVERSE POINT (Distance A)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF DISTANCES A+B)	PORT LOCATION	DISTANCE FROM EDGE OF STACK
1	1"	1 1/2"	2 1/2"		
2	3"		4 1/2"		
3	5"		6 1/2"		
4	7"		8 1/2"		
5	9"		10 1/2"		
6	11"		12 1/2		
7	13"		14 1/2"		
8	15"	↓	16 1/2"		

PRELIMINARY VELOCITY TRAVERSE

Plant: BALBOA PACIFIC
Date: 4-12-95
Location: EXHAUST STACK
Stack I.D.: 16"x21"
Barometric Pressure, in. Hg: 29.75
Stack Gauge Pressure, in. H_2O: -0.020
Operators: MOKH
Pitot Tube I.D. Number: S-4A
Temperature Readout I.D.: BOX 5A
Pitot Tube Leak Check: ✓

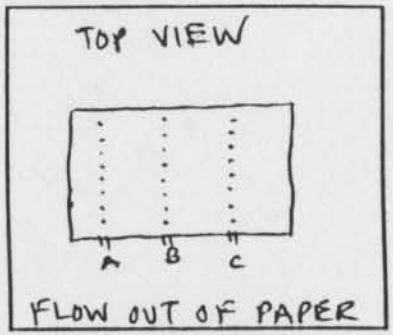
Schematic of Traverse Point Layout

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
A 1	0.010	369	
2	0.015	380	
3	0.020	391	
4	0.030	393	
5	0.030	392	
6	0.030	391	
7	0.030	388	
8	0.030	387	
B 1	0.010	310	
2	0.015	362	
3	0.020	385	$\overline{\Delta P}$ = 0.020
4	0.020	388	$\overline{T}$ = 381
5	0.020	390	
6	0.020	388	
7	0.025	387	
8	0.025	383	
Average			

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
C 1	0.005	352	
2	0.015	385	
3	0.020	388	
4	0.020	389	
5	0.020	390	
6	0.020	390	
7	0.020	388	
8	0.020	388	
Average			

FIELD DATA

Plant BALBOA PACIFIC
Date 4-12-95
Sampling Location EXHAUST STACK
Sample Type SCAQMD 5
Run Number BP-1
Operator MOKH
Ambient Temperature 80°F
Barometric Pressure 30.0
Static Pressure -0.020
Filter Number(s) —
Pretest Leak Rate 0.000 CFM @ 5.0 in. Hg
Read And Record All Data Every 3 Minutes



Schematic of
Traverse Point Layout

Probe Length and Type 48" GLASS LINED SS
Pitot Tube I.D. No. S-4A
Nozzle I.D. No. And Diameter 0.628
Assumed Moisture, % 10
Meter Box Number 5A
Meter Delta H@ 1.917
C Factor 1.00
Meter Gamma 0.997
Heater Box Setting 250
Reference Delta P ΔP_a = 0.017
Post test Leak Rate 0.022 CFM @ 80 in. Hg
Impinger Box No. 8B Blank Box No. ____

Traverse Point Number	Sampling Time Θ (minutes)	Clock Time (24 hr clock)	Gas Meter Reading Vm (cubic feet)	Velocity Head Ps (in. H20)	Orifice Pressure Differential (in. H20) ΔH Desired	ΔH Actual	Stack Temp. Ts (F)	Dry Gas Meter Temp. Inlet Tm in (F)	Dry Gas Meter Temp. Outlet Tm out (F)	Pump Vacuum (in. Hg)	Heated Probe Temp. (F)	Filter Box Temp. (F)	Impinger Temp. (F)
A8	0	10:40	847.414	0.030	2.95	✓	375	90	87	5.0	NA	242	66
A7	3	10:43	850.2	0.030	2.95	✓	385	92	87	5.0	—	249	57
A6	6	10:46	853.0	0.040	3.90	✓	390	94	88	7.0	—	253	59
A5	9	10:49	856.1	0.030	2.95	✓	390	96	87	5.0	—	253	62
A4	12	10:52	859.0	0.025	2.50	✓	388	98	92	5.0	—	252	62
A3	15	10:55	861.4	0.020	2.00	✓	382	100	91	4.0	—	256	62
A2	18	10:58	863.8	0.020	2.00	✓	363	102	92	4.0	—	257	62
A1	21	11:01	866.1	0.010	1.00	✓	334	102	93	3.0	—	256	62
END/B8	24	11:04/07	867.8	0.020	2.00	✓	385	99	94	5.0	—	255	69
B7	27	11:10	870.2	0.020	2.00	✓	387	102	95	5.0	—	252	61
B6	30	11:13	872.4	0.020	2.00	✓	390	103	95	5.0	—	253	62
B5	33	11:16	874.7	0.020	2.00	✓	389	104	96	5.0	—	253	63
B4	36	11:19	876.9	0.020	2.00	✓	384	105	97	5.0	—	253	64
B3	39	11:22	879.2	0.020	2.00	✓	372	106	97	5.0	—	252	65
B2	42	11:25	881.5	0.020	2.00	✓	353	106	98	5.0	—	252	65
B1	45	11:28	883.7	0.015	1.50	✓	291	106	98	4.0	—	252	65
END/C8	48	11:31/34	885.7	0.030	2.95	✓	352	104	99	6.0	—	254	70
C7	51	11:37	888.5	0.030	2.95	✓	386	107	100	6.0	—	252	65
C6	54	11:40	891.3	0.030	2.95	✓	389	108	100	6.0	—	253	67
C5	57	11:43	894.2	0.025	2.50	✓	387	109	101	5.0	—	253	66
C4	60	11:46	896.7	0.025	2.50	✓	384	108	101	5.0	—	252	63
C3	63	11:49	899.3	0.025	2.50	✓	375	109	101	5.0	—	251	63
C2	66	11:52	902.0	0.020	2.00	✓	337	108	100	5.0	—	251	63
C1	69	11:55	904.3	0.020	2.00	✓	301	109	102	5.0	—	253	64
END	72	11:58	906.588	—	—	—	—	—	—	—	—	—	—

$\sqrt{\Delta P}$ = 0.152 ΔH = 2.34 T_s = 310 T_m = 99

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RETRIEVAL DATA

Plant: BALBOA PACIFIC
Date: 4-12-95
Sampling Location:
Sampling Type (Method): SCAQMD 5
Run Number: BP2-1
Sample Box Number: 8B
Clean-up Man: BROWN
Job Number:
Comments:

Filter

Filter Number:	0.4495		
Description of Filter:	GREY		

Moisture

Impingers:			
Final Volume:	144. mL	116. mL	4 mL
Initial Volume:	100.0 mL	100.3 mL	0 mL
Net Volume:	44. mL	16 mL	4 mL
Total H_2O:	44 → mL	60 → mL	64 → mL

Silica Gel

Final Volume:	657.8 g	g	g
Initial Volume:	645.4 g	g	g
Net Volume:	12.4 g	g	g
Total Moisture:	(76.4) g	g	g

Description of Impinger catch: CLEAR

Plant: SALSOA PACIFIC

Date: 4-12-95

Source/Sample Number: BP-1

1. $Vm(std) = (17.64)(Vm)(Y)\left[\frac{P_{bar} + (\Delta H/13.6)}{Tm}\right]$

$Vm(std) = (17.64)(\ 59.2\ )(0.997)\left[\frac{(30.0\ ) + (2.34\ /13.6)}{(\ 559\ )}\right]$

$Vm(std) =$ 56.2 dscf.

2. Volume water vapor collected (standard conditions).

$V(lo) =$ 76.4 condensate from impingers and selica gel.

$Vw(std) = (0.04707)\ V(lo) = (0.04707)(76.4\ )$

$Vw(std) =$ 3.60 scf.

3. Percent moisture, by volume.

$Bw_s = \frac{Vw(std)}{Vw(std) + Vm(std)} = \frac{(\ 3.60\ )}{(\ 3.60\ ) + (\ 56.2\ )} =$ 0.06

$Bw_s =$ 6.0 %.

4. Molecular weight, stack gas.

Dry molecular weight.

$Md = 0.440(\%\ CO_2) + 0.320(\%\ O_2) + 0.280(\%\ N_2 + \%\ CO)$

$Md = 0.440\ (\ 2.87\ ) + 0.320(\ 16.0\ ) + 0.280(\ 81.13\ )$

$Md =$ 29.1 lb/lb-mole.

$Ms = Md + Bw_s\ (18 - Md) = (\ 29.1\ ) + (\ 0.06\ )(18 - 29.1\ )$

$Ms =$ 28.43 lb/lb-mole.

Plant: SALEDA PACIFIC

Date: 4-12-95

Source/Sample Number: BP-1

5. Stack gas velocity average.

$$Vs(avg) = (85.49)(Cp)(\sqrt{\Delta P})\left[avg\sqrt{\frac{(Ts)}{(Ps)(Ms)}}\right]$$

$$Vs(avg) = (85.49)(0.84)(0.152)\left[\sqrt{\frac{(830)}{(30.0)(28.43)}}\right]$$

Vs(avg) = 10.8 ft/sec.

6. Stack volumetric flow rate, actual conditions (stack temperature and pressure).

$$Qs = (60)(Vs)(A) = (60)(10.8)(2.33)$$

Qs = 1510 acfm.

7. Stack volumetric flow rate, standard conditions (68 degrees F, 29.92 Hg).

$$Q(std) = (17.64)(Qs)(1-Bw_s)\left[\frac{(Ps)}{(Ts)}\right]$$

$$Q(std) = (17.64)(1510)(1-0.06)\left[\frac{(30.0)}{(830)}\right]$$

Q(std) = 905 dscfm.

8. Isokinetic variation.

$$\%I = (K)\left[\frac{(Ts)(Vm(std))}{(Ps)(Vs)(An)(\theta)(1-Bw_s)}\right]$$

$$\%I = (0.0945)\left[\frac{(830)(56.2)}{(30.0)(10.8)(0.00215)(72)(1-0.06)}\right]$$

%I = 93.5 %

CLIENT: BALBOA PACIFIC

Project No. 5024

PARTICULATE CALCULATIONS

Sampling Location: BOILER EXHAUST Test Date: 4-12-95

Sample Number: BP-1 Sample Volume: 56.2 DSCF

Stack Flow Rate: 905 DSCFM

Particulate Catch: (grams)

					BLANK
Filter:	Final Weight	0.4797			0.4494
	Initial Weight	0.4495			0.4494
	Net Weight	0.0302			~~0~~
Impinger:	Final Weight	29.1602			28.7170
	Initial Weight	29.1549			28.7170
	Net Weight	0.0053			~~0~~
ACETONE: ~~Extract:~~	Final Weight	28.6423			28.6498
	Initial Weight	28.6358			28.6498
	Net Weight	0.0065			~~0~~
Total:	w/CONDENSIBLES	0.0420			~~0~~
	w/o	0.0367			

Particulate Concentration:

$$\frac{(\ 0.0420\ /\ 0.0367\ ) \text{ grams} \times 15.43 \text{ grains/gram}}{(\ 56.2\ ) \text{ DSCF}} = \underset{\text{w/COND}}{0.0115\ /\ 0.0101} \text{ grains/DSCF}$$

Particulate Emissions:

$$\frac{(\ 0.0115\ /\ 0.0101\ ) \text{ gr/DSCF} \times (\ 905\ ) \text{ DSCFM} \times 60 \text{ min/hr}}{7000 \text{ grains/lb}} = \underset{\text{w/COND}}{0.089\ /\ 0.088} \text{ lbs/hr}$$

Rule 404 Limitation @ _____ SCFM = NA grains/DSCF

Rule 405 Limitation @ _____ lbs/hr = NA lbs/hr

FIELD DATA

Plant BALBOA PACIFIC
Date 4-12-95
Sampling Location EXHAUST STACK
Sample Type SCAQMD 5
Run Number BP-2
Operator MOKH
Ambient Temperature 85°F
Barometric Pressure 30.0
Static Pressure -0.020
Filter Number(s) —
Pretest Leak Rate 0.019 CFM @ 5.0 in. Hg
Read And Record All Data Every 3 Minutes

SAME AS BP-1
Schematic of
Traverse Point Layout

Probe Length and Type 48" GLASS LINED SS
Pitot Tube I.D. No. S-4A
Nozzle I.D. No. And Diameter 249 & 0.517
Assumed Moisture, % 10
Meter Box Number 5A
Meter Delta H@ 1.917
C Factor 1.00
Meter Gamma 0.997
Heater Box Setting 250
Reference Delta P ΔPa = 0.040
Post test Leak Rate 0.018 CFM @ 5.0 in. Hg
Impinger Box No. 4B Blank Box No.

Traverse Point Number	Sampling Time θ (minutes)	Clock Time (24 hr clock)	Gas Meter Reading Vm (cubic feet)	Velocity Head Ps (in. H20)	Orifice Pressure Differential (in. H20) ΔH		Stack Temp. Ts (F)	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)	Heated Probe Temp. (F)	Filter Box Temp. (F)	Impinger Temp. (F)
					Desired	Actual		Inlet Tm in (F)	Outlet Tm out (F)				
C8	0	14:00	907.777	0.025	1.15	✓	371	95	94	3.0	NA	230	66
C7	3	14:03	910.0	0.030	1.40	✓	382	94	94	3.5	—	231	60
C6	6	14:06	911.9	0.030	1.40	✓	384	95	94	3.5	—	237	60
C5	9	14:09	913.9	0.025	1.15	✓	384	96	95	3.0	—	241	61
C4	12	14:12	915.7	0.025	1.15	✓	381	97	94	3.0	—	24[illegible]	61
C3	15	14:15	917.4	0.020	0.94	✓	372	97	95	3.0	—	247	62
C2	18	14:18	919.0	0.020	0.94	✓	359	98	95	3.0	—	256	62
C1	21	14:21	920.6	0.015	0.70	✓	298	99	95	2.0	—	256	64
END/B8	24	14:24/:27	922.0	0.030	1.40	✓	345	97	96	3.5	—	258	69
B7	27	14:30	924.0	0.030	1.40	✓	385	100	96	3.5	—	255	62
B6	30	14:33	925.9	0.030	1.40	✓	387	100	97	3.5	—	255	63
B5	33	14:36	927.9	0.020	0.94	✓	381	102	97	3.0	—	254	64
B4	36	14:39	929.5	0.020	0.94	✓	376	101	97	3.0	—	255	64
B3	39	14:42	931.0	0.020	0.94	✓	346	101	97	3.0	—	254	65
B2	42	14:45	932.7	0.010	0.47	✓	306	102	98	2.0	—	253	63
B1	45	14:48	934.0	0.010	0.47	✓	283	102	98	2.0	—	253	64
END/A8	48	14:51/:54	935.0	0.040	1.85	✓	366	100	98	4.0	—	254	71
A7	51	14:57	937.1	0.040	1.85	✓	386	102	99	4.0	—	255	66
A6	54	15:00	939.4	0.040	1.85	✓	389	103	99	4.0	—	253	64
A5	57	15:03	941.7	0.040	1.85	✓	390	104	100	4.0	—	253	63
A4	60	15:06	943.9	0.035	1.60	✓	388	105	100	4.0	—	256	65
A3	63	15:09	945.9	0.030	1.40	✓	384	106	101	4.0	—	254	66
A2	66	15:12	947.7	0.020	0.94	✓	355	106	101	3.0	—	255	66
A1	69	15:15	949.6	0.020	0.94	✓	308	105	101	3.0	—	253	67
END	72	15:18	951.178	—	—	—	—	—	—	—	—	—	—

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RETRIEVAL DATA

Plant: SALSA PACIFIC
Date: 4-12-15
Sampling Location:
Sampling Type (Method): SCAQMD 5
Run Number: BP2-2
Sample Box Number: 4B
Clean-up Man: BROWN
Job Number:
Comments:

Filter

Filter Number:	0.4444		
Description of Filter:	GREY		

Moisture

Impingers:			
Final Volume:	137 mL	108. mL	2 mL
Initial Volume:	100 mL	100 mL	0 mL
Net Volume:	37 mL	8 mL	2 mL
Total H_2O:	37 → mL	45 → mL	47 → mL

Silica Gel

Final Volume:	631.0 g	g	g
Initial Volume:	621.4 g	g	g
Net Volume:	9.6 g	g	g
Total Moisture:	56.6 g	g	g

Description of Impinger catch: CLEAR

Plant: BALBOA PACIFIC

Date: 4-12-95

Source/Sample Number: BP-2

1. $Vm(std) = (17.64)(Vm)(Y)\left[\frac{P_{bar} + (\Delta H/13.6)}{Tm}\right]$

$Vm(std) = (17.64)(43.4)(0.997)\left[\frac{(30.0) + (1.21/13.6)}{(559)}\right]$

$Vm(std) =$ 41.1 dscf.

2. Volume water vapor collected (standard conditions).

$V(lo) =$ 56.6 condensate from impingers and selica gel.

$Vw(std) = (0.04707)\ V(lo) = (0.04707)(56.6)$

$Vw(std) =$ 2.66 scf.

3. Percent moisture, by volume.

$Bw_s = \frac{Vw(std)}{Vw(std) + Vm(std)} = \frac{(2.66)}{(2.66) + (41.1)} =$ 0.061

$Bw_s =$ 6.1 %.

4. Molecular weight, stack gas.

Dry molecular weight.

$Md = 0.440(\%\ CO_2) + 0.320(\%\ O_2) + 0.280(\%\ N_2 + \%\ CO)$

$Md = 0.440\ (2.95) + 0.320(16.1) + 0.280(80.95)$

$Md =$ 29.1 lb/lb-mole.

$Ms = Md + Bw_s\ (18 - Md) = (29.1) + (0.061)(18 - 29.1)$

$Ms =$ 28.72 lb/lb-mole.

Plant: BALBOA PACIFIC

Date: 4-12-95

Source/Sample Number: BP-2

5. Stack gas velocity average.

$$Vs(avg) = (85.49)(Cp)(\sqrt{\Delta P})\left[avg\sqrt{\frac{(Ts)}{(Ps)(Ms)}}\right]$$

$$Vs(avg) = (85.49)(0.84)(0.159)\left[\sqrt{\frac{(823)}{(30.0)(28.42)}}\right]$$

Vs(avg) = 11.2 ft/sec.

6. Stack volumetric flow rate, actual conditions (stack temperature and pressure).

$$Qs = (60)(Vs)(A) = (60)(11.2)(2.33)$$

Qs = 1566 acfm.

7. Stack volumetric flow rate, standard conditions (68 degrees F, 29.92 Hg).

$$Q(std) = (17.64)(Qs)(1-Bw_s)\left[\frac{(Ps)}{(Ts)}\right]$$

$$Q(std) = (17.64)(1566)(1-0.061)\left[\frac{(30.0)}{(823)}\right]$$

Q(std) = 946 dscfm.

8. Isokinetic variation.

$$\%I = (K)\left[\frac{(Ts)(Vm(std))}{(Ps)(Vs)(An)(\theta)(1-Bw_s)}\right]$$

$$\%I = (0.0945)\left[\frac{(823)(41.1)}{(30.0)(11.2)(0.00146)(72)(1-0.061)}\right]$$

%I = 96.4 %

CLIENT: BALBOA PACIFIC

Project No. 5024

PARTICULATE CALCULATIONS

Sampling Location: BOILER EXHAUST Test Date: 4-12-95

Sample Number: BP-2 Sample Volume: 41.1 DSCF

Stack Flow Rate: 946 DSCFM

Particulate Catch: (grams)

Filter:	Final Weight	0.4715			
	Initial Weight	0.4444			
	Net Weight	0.0271			
Impinger:	Final Weight	28.6049			
	Initial Weight	28.5976			
	Net Weight	0.0027			
ACETONE ~~Extract~~:	Final Weight	28.6234			
	Initial Weight	28.6096			
	Net Weight	0.0138			
Total: w/CONDENSIBLES		0.0436			
w/o		0.0409			

Particulate Concentration:

$$\frac{(0.0436 \text{ or } 0.0409) \text{ grams} \times 15.43 \text{ grains/gram}}{(41.1) \text{ DSCF}} = 0.0164 \text{ w/COND.} \text{ or } 0.0154 \text{ grains/DSCF}$$

Particulate Emissions:

$$\frac{(0.0164 \text{ or } 0.0154) \text{ gr/DSCF} \times (946) \text{ DSCFM} \times 60 \text{ min/hr}}{7000 \text{ grains/lb}} = 0.13 \text{ w/COND} \text{ or } 0.12 \text{ lbs/hr}$$

Rule 404 Limitation @ _____ SCFM = NA grains/DSCF

Rule 405 Limitation @ _____ lbs/hr = NA lbs/hr

FIELD DATA

Plant BALBOA PACIFIC
Date 4-13-95
Sampling Location EXHAUST STACK
Sample Type SCAQMD 5
Run Number BP-3
Operator MOKH
Ambient Temperature 70°F
Barometric Pressure 29.75
Static Pressure −0.020
Filter Number(s) —
Pretest Leak Rate 0.012 CFM @ 6.0 in. Hg
Read And Record All Data Every 3 Minutes

SAME AS BP-1

Schematic of Traverse Point Layout

Probe Length and Type 48" GLASS LINED SS
Pitot Tube I.D. No. S-4A
Nozzle I.D. No. And Diameter 0.491
Assumed Moisture, % 10
Meter Box Number 5A
Meter Delta H@ 1.917
C Factor 1.00
Meter Gamma 0.997
Heater Box Setting 250
Reference Delta P ΔP_R = 0.048
Post test Leak Rate 0.004 CFM @ 5.0 in. Hg
Impinger Box No. 1B Blank Box No.

Traverse Point Number	Sampling Time θ (minutes)	Clock Time (24 hr clock)	Gas Meter Reading Vm (cubic feet)	Velocity Head Ps (in. H20)	Orifice Pressure Differential (in. H20) ΔH Desired	ΔH Actual	Stack Temp. Ts (F)	Dry Gas Meter Temp. Inlet Tm in (F)	Dry Gas Meter Temp. Outlet Tm out (F)	Pump Vacuum (in. Hg)	Heated Probe Temp. (F)	Filter Box Temp. (F)	Impinger Temp. (F)
A8	0	10:40	951.390	0.035	1.30	✓	387	84	80	3.5	NA	244	67
A7	3	10:43	953.2	0.035	1.30	✓	388	86	81	3.5	—	249	54
A6	6	10:46	955.0	0.035	1.30	✓	391	86	81	3.5	—	252	52
A5	9	10:49	956.8	0.030	1.15	✓	392	87	81	3.0	—	250	53
A4	12	10:52	958.6	0.030	1.15	✓	388	88	81	3.0	—	251	55
A3	15	10:55	960.3	0.025	0.93	✓	384	90	83	3.0	—	253	58
A2	18	10:58	962.0	0.015	0.57	✓	372	90	83	2.0	—	252	61
A1	21	11:01	963.2	0.010	0.38	✓	286	91	83	1.0	—	255	62
END/B8	24	11:04/:07	964.3	0.020	0.76	✓	367	88	83	2.5	—	253	64
B7	27	11:10	965.8	0.020	0.76	✓	388	90	84	2.5	—	249	60
B6	30	11:13	967.2	0.020	0.76	✓	390	90	84	2.5	—	250	60
B5	33	11:16	968.7	0.020	0.76	✓	386	91	85	2.5	—	253	61
B4	36	11:19	970.1	0.015	0.57	✓	368	91	85	2.0	—	252	62
B3	39	11:22	971.4	0.010	0.38	✓	329	92	86	1.0	—	251	62
B2	42	11:25	972.5	0.010	0.38	✓	308	92	86	1.0	—	252	63
B1	45	11:28	973.5	0.010	0.38	✓	318	92	86	1.0	—	249	63
END/C8	48	11:31/:34	974.5	0.030	1.15	✓	365	90	86	3.5	—	254	66
C7	51	11:37	976.3	0.030	1.15	✓	388	93	87	3.5	—	254	62
C6	54	11:40	978.0	0.025	0.93	✓	370	94	88	3.0	—	252	63
C5	57	11:43	979.6	0.020	0.76	✓	387	94	88	2.5	—	251	63
C4	60	11:46	981.0	0.020	0.76	✓	384	94	89	2.5	—	254	64
C3	63	11:49	982.5	0.020	0.76	✓	380	95	89	2.5	—	253	65
C2	66	11:52	983.9	0.020	0.76	✓	374	95	89	2.5	—	253	66
C1	69	11:55	985.3	0.015	0.57	✓	291	96	90	2.0	—	251	66
END	72	11:58	986.623	—	—	—	—	—	—	—	—	—	—

$\sqrt{\Delta P}$ = 0.1116 ΔH = 0.89 T_s = 367 T_m = 88

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES

SAMPLE RETRIEVAL DATA

Plant: BALBOA PACIFIC
Date: 4-12-95
Sampling Location:
Sampling Type (Method): EPA 5
Run Number: BP2-3
Sample Box Number: 1B
Clean-up Man: BROWN
Job Number:
Comments:

Filter

Filter Number:	~~0.4441~~	0.4440	
Description of Filter:	CLEAN		

Moisture

	#1	#2	#3
Impingers:			
Final Volume:	135 mL	103 mL	4 mL
Initial Volume:	100 mL	100 mL	0 mL
Net Volume:	35 mL	3 mL	4 mL
Total H_2O:	35 → mL	38 → mL	42 → mL

Silica Gel

Final Volume:	713.5 g	g	g
Initial Volume:	704.0 g	g	g
Net Volume:	9.5 g	g	g
Total Moisture:	51.5 g	g	g

Description of Impinger catch: CLEAR

Plant: BALBOA PACIFIC

Date: 4-13-95

Source/Sample Number: BP-3

1. $Vm(std) = (17.64)(Vm)(Y)\left[\frac{P_{bar} + (\Delta H/13.6)}{Tm}\right]$

$Vm(std) = (17.64)(35.2)(0.997)\left[\frac{(29.75) + (0.89/13.6)}{(548)}\right]$

$Vm(std) =$ 33.7 dscf.

2. Volume water vapor collected (standard conditions).

$V(lo) =$ 51.5 condensate from impingers and selica gel.

$Vw(std) = (0.04707)\ V(lo) = (0.04707)(51.5)$

$Vw(std) =$ 2.42 scf.

3. Percent moisture, by volume.

$Bw_s = \frac{Vw(std)}{Vw(std) + Vm(std)} = \frac{(2.42)}{(2.42) + (33.7)} = 0.067$

$Bw_s =$ 6.7%.

4. Molecular weight, stack gas.

Dry molecular weight.

$Md = 0.440(\%\ CO_2) + 0.320(\%\ O_2) + 0.280(\%\ N_2 + \%\ CO)$

$Md = 0.440\ (2.91) + 0.320(15.7) + 0.280(81.39)$

$Md =$ 29.1 lb/lb-mole.

$Ms = Md + Bw_s\ (18 - Md) = (29.1) + (0.067)(18 - 29.1)$

$Ms =$ 28.36 lb/lb-mole.

Plant: BALBOA PACIFIC

Date: 4-13-95

Source/Sample Number: BP-3

5. Stack gas velocity average.

$$Vs(avg) = (85.49)(Cp)(\sqrt{\Delta P})\left[avg\sqrt{\frac{(Ts)}{(Ps)(Ms)}}\right]$$

$$Vs(avg) = (85.49)(0.84)(0.145)\left[\sqrt{\frac{(827)}{(29.75)(28.36)}}\right]$$

Vs(avg) = 10.3 ft/sec.

6. Stack volumetric flow rate, actual conditions (stack temperature and pressure).

$$Qs = (60)(Vs)(A) = (60)(10.3)(2.33)$$

Qs = 1440 acfm.

7. Stack volumetric flow rate, standard conditions (68 degrees F, 29.92 Hg).

$$Q(std) = (17.64)(Qs)(1-Bw_s)\left[\frac{(Ps)}{(Ts)}\right]$$

$$Q(std) = (17.64)(1440)(1-0.067)\left[\frac{(29.75)}{(827)}\right]$$

Q(std) = 853 dscfm.

8. Isokinetic variation.

$$\%I = (K)\left[\frac{(Ts)(Vm(std))}{(Ps)(Vs)(An)(\theta)(1-Bw_s)}\right]$$

$$\%I = (0.0945)\left[\frac{(827)(33.7)}{(29.75)(10.3)(0.001331)(72)(1-0.067)}\right]$$

%I = 97.7 %

CLIENT: BALBOA PACIFIC

Project No. 5024

PARTICULATE CALCULATIONS

Sampling Location: BOILER EXHAUST Test Date: 4-13-95

Sample Number: BP-3 Sample Volume: 33.7 DSCF

Stack Flow Rate: 853 DSCFM

Particulate Catch: (grams)

Filter:	Final Weight	0.4788			
	Initial Weight	0.4440			
	Net Weight	0.0348			
Impinger:	Final Weight	28.6049			
	Initial Weight	28.5984			
	Net Weight	0.0065			
ACETONE ~~Extract~~:	Final Weight	28.6497			
	Initial Weight	28.6423			
	Net Weight	0.0074			
Total:	W/CONDENSIBLES	0.0487			
	W/O	0.0422			

Particulate Concentration:

$$\frac{(0.0487 - 0.0422) \text{ grams} \times 15.43 \text{ grains/gram}}{(33.7) \text{ DSCF}} = 0.0223 \text{ W/COND} = 0.0193 \text{ grains/DSCF}$$

Particulate Emissions:

$$\frac{(0.0223 \text{ gr/DSCF}) \times (853) \text{ DSCFM} \times 60 \text{ min/hr}}{7000 \text{ grains/lb}} = 0.16 \text{ W/COND} = 0.14 \text{ lbs/hr}$$

Rule 404 Limitation @ _____ SCFM = NA grains/DSCF

Rule 405 Limitation @ _____ lbs/hr = NA lbs/hr

PACIFIC ENVIRONMENTAL SERVICES, INC.

Project No.	Page 1 of 1
Client: BALBOA PACIFIC	
Location: PYROLYZER / OXIDIZER	

Prepared By	Date	Checked By	Date	Sheet Title
SH	4/13			PARTICULATES

	FILTER	FRONT	BACK	TOTAL
BP-1	0.4797	28.6423	29.1602	
	0.4495	(12) 28.6358	(13) 29.1549	
	0.0302	0.0065	0.0053	0.0420
		(0.0367) FRONT ONLY		
BP-2	0.4715	28.6234	28.6003	
	0.4444	(15) 28.6096	(17) 28.5976	
	0.0271	0.0138	0.0027	0.0436
		(0.0409) FRONT ONLY		
BP-3	0.4788	28.6497	28.6049	
	0.4440	(12) 28.6423	(17) 28.5984	
	0.0348	0.0074	0.0065	0.0487
		(0.0422) FRONT ONLY		
BP-4 (BLANK)	0.4494	28.6498	28.7170	
	0.4494	(12) 28.6498	(16) 28.7170	
	0.0000	0.0000	0.0000	0

Name: [illegible] Date: 4-12-95

Experiment: BARBOA POWER CATALYTIC OXIDIZER UNIT

T_A = 83°F P_{in} 30.00

082

TIME	NOx	CO	CO_2	O_2	Ts	SO_2	ROG	NOTES
- -	0.0	0.0	0.0	0.0	- -	0.0	0.0	ZERO
- -	47.2	39.2	4.0	18.1	- -	86.2	80.0	H SPAN
- -	25.6	19.6	2.0	10.1	- -	45.7	39.2	M SPAN
- -	24.8	19.9	1.9	10.1	- -	45.0	3.9	BIAS
								-20" VAC - 10 min
								BACKGND HC
13:58	19.7	20.7	3.3	16.3	395	9.9	32.5	in Sample Line
13:59	15.0	48.8	2.4	16.9	397	9.3	29.9	14 ppm
14:00	13.7	20.1	3.6	15.8	396	11.6	71.2	
14:01	26.3	43.6	3.6	15.4	396	9.8	27.3	
14:02	16.0	44.7	3.1	16.6	395	10.0	30.2	5 min
14:03	28.5	40.8	2.3	15.4	396	9.6	40.2	100 lbs/hr
14:04	14.8	51.9	2.2	16.9	397	9.4	18.5	
14:05	17.5	44.2	2.2	16.1	398	9.1	14.5	
14:06	15.5	42.4	2.7	16.8	396	8.6	16.7	
14:07	15.0	48.8	2.1	16.7	396	8.0	18.3	10 min
14:08	15.1	48.9	2.2	16.9	397	8.1	17.2	
14:09	15.2	45.8	2.3	17.0	396	7.9	13.5	
14:10	16.9	45.9	2.2	16.2	398	8.3	17.3	
14:11	16.1	47.0	2.1	16.4	398	8.4	29.4	
14:12	14.9	51.5	2.2	16.6	397	8.9	24.6	15 min
14:13	23.5	50.3	2.4	16.8	397	8.3	15.4	
14:14	20.1	50.0	2.2	16.9	397	8.8	34.5	
14:15	17.5	45.9	2.1	17.0	399	8.6	21.0	
14:16	16.1	48.1	2.1	16.4	399	8.7	25.7	
14:17	15.6	48.0	2.2	16.5	399	8.2	15.4	20 min
14:18	24.0	29.6	2.4	15.3	399	8.3	19.3	
14:19	22.1	20.8	3.5	15.8	399	8.0	14.2	
14:20	29.4	12.1	3.1	15.1	398	7.9	16.4	
14:21	26.6	17.5	2.9	14.8	397	8.7	22.4	
14:22	21.3	16.8	3.6	16.4	398	9.0	18.9	25 min
14:23	25.6	24.2	2.5	15.1	398	8.3	15.3	
14:24	31.0	7.7	3.5	16.5	398	8.1	10.4	
14:25	20.3	26.2	3.3	16.5	397	8.3	14.9	
14:26	30.5	9.4	3.3	14.9	398	8.4	13.0	
14:27	25.8	12.6	3.6	15.7	397	8.4	18.0	30 min

Name: Steve Hollander Date: 4-12-95

Experiment: Burner Design Pyrolytic Oxidizer Unit Run 1

$T_A = 35°F$ $P_{bar} = 29.95$

083

TIME	NOV	CO	CO_2	O_2	TS	SO_2	NOx	NOTES
14:29	16.4	36.3	2.9	16.7	398	8.2	23.0	Constant
14:29	15.5	46.3	2.2	16.8	400	7.7	13.3	W/ H-S
14:30	22.0	32.8	2.3	15.5	400	8.3	13.8	Run II
14:31	21.3	34.9	2.3	15.5	400	8.4	10.9	
14:32	21.9	22.3	3.4	16.3	397	7.9	13.8	55 sec
14:33	16.0	41.2	3.6	16.0	397	7.6	12.9	
14:34	16.1	38.7	2.8	16.9	397	8.4	30.2	
14:35	16.8	36.4	3.0	16.7	398	8.2	20.9	
14:36	19.4	28.9	3.3	16.5	398	8.8	28.4	* BOX GO High
14:37	22.6	21.4	3.6	16.0	398	10.5	61.7	40 sec
14:38	14.8	56.7	2.6	16.9	398	9.8	29.5	* SHIFT IN
14:39	14.7	49.7	2.8	16.8	397	10.0	39.9	NOx Conc.
14:40	14.7	46.2	2.2	16.7	397	9.0	25.2	
14:41	21.1	54.6	2.2	16.9	400	8.6	19.1	
14:42	14.8	54.7	2.3	17.0	400	8.1	16.3	45 sec
14:43	15.5	47.2	2.5	17.0	400	7.7	16.7	
14:44	27.1	38.5	4.1	16.8	399	7.6	16.1	
14:45	16.2	45.4	2.2	16.7	400	7.1	13.8	Good check
14:46	16.3	27.2	2.2	16.8	399	7.2	18.2	* BOX Good Probably OK
14:47	24.9	40.8	2.3	16.8	399	6.8	7.4	50 sec
14:48	23.5	30.7	2.2	16.9	399	6.8	7.8	
14:49	25.4	9.9	3.6	14.8	400	7.3	9.6	
14:50	19.2	39.1	2.2	16.0	401	7.2	26.9	
14:51	25.5	51.1	2.7	16.5	401	9.0	41.3	
14:52	27.8	10.9	3.1	15.1	399	10.7	29.4	55 sec
14:53	27.7	11.7	2.3	15.4	401	10.2	43.2	
14:54	19.3	47.2	2.2	15.6	402	10.0	26.2	
14:55	18.5	49.1	2.2	15.9	403	8.9	17.4	
14:56	22.3	20.0	2.9	14.9	401	9.1	22.3	
14:57	26.0	26.6	2.6	15.0	401	8.8	20.0	60 sec
- -	0.1	-0.2	0.0	0.1	- -	-0.1	0.12	ZERO
- -	47.9	38.5	3.9	18.0	- -	86.6	81.60	H SPAN
- -	48.1	18.9	1.9	10.1	- -	46.2	47.9	H SPAN
- -	- -	- -	- -	- -	- -	- -	19.2	L SPAN
- -	20.2	18.7	1.9	10.0	- -	45.5	49.6	BIAS

Important: Place card under blue copy

Name: Steve Hernandez Date: 4-13-95

Experiment: Bourbon Decker Pyrolytic Oxidizer Unit

Ta = 77°F R = ~~29.75~~ 30.05

084

TIME	NOx	CO	CO2	O2	T>	SO2	Rad	NOTES
	0.0	0.0	0.0	0.0	- -	0.0	0.5	ZERO
	~~47.~~ 2	41.4	4.0	18.0	- -	86.2	81.3	H SPAN
	26.2	20.6	2.0	10.0	- -	~~45.~~ 5	48.7	H SPAN
	- -	- -	- -	- -	- -	- -	20.4	L SPAN
	26.2	21.2	2.0	10.0	- -	44.9		BIAS
10:46	28.5	41.1	3.3	14.9	401	16.7	7.8	RUN 2
10:47	19.0	~~55.~~ 14.7	2.2	7.8	403	13.9	7.9	Pyrolyth
10:48	28.9	14.6	3.6	15.6	403	16.3	7.5	Unit @ 11.5% O_2
10:49	19.2	71.6	2.3	12.6	403	14.3	7.9	
10:50	14.0	54.8	2.2	17.1	402	14.9	8.1	RES-4
10:51	20.4	51.2	2.3	15.6	404	16.5	7.5	
10:52	20.9	48.4	2.3	15.5	403	17.5	7.4	* DIFFERENT
10:53	14.2	53.2	3.2	16.8	400	14.3	8.1	PRODUCT
10:54	27.5	56.1	3.8	15.1	403	17.3	8.1	USED TODAY
10:55	28.7	41.8	2.4	15.2	403	16.8	7.3	10 lbs/hr
10:56	27.1	60.1	2.5	15.1	404	17.1	7.3	100 lbs/hr
10:57	25.7	15.2	3.9	15.6	402	15.4	7.8	FEED RATE
10:58	25.1	16.2	3.9	15.6	402	15.3	8.1	
10:59	25.2	16.3	2.7	14.9	404	17.6	7.4	
11:00	14.8	60.3	2.8	16.9	402	14.6	8.1	15 lbs/hr
11:01	23.4	61.3	3.9	15.9	402	15.0	8.1	
11:02	16.2	24.4	3.9	16.0	401	15.3	8.2	
11:03	14.8	63.2	2.5	17.1	402	14.6	8.0	
11:04	14.6	60.7	2.5	17.1	401	14.2	7.9	
11:05	14.5	69.1	2.2	17.0	402	15.0	8.2	20 lbs/hr
11:06	16.8	68.0	2.5	17.0	403	15.0	8.1	
11:07	16.8	70.0	3.1	17.0	402	14.9	7.9	
11:08	21.4	26.8	3.9	16.4	402	14.9	8.1	
11:09	29.4	30.1	2.5	14.9	403	17.3	7.7	
11:10	14.9	55.9	2.5	17.2	404	14.0	7.9	25 lbs/hr
11:11	15.0	56.6	2.5	16.5	402	14.8	8.1	
11:12	14.7	65.5	3.8	16.4	402	14.8	8.2	
11:13	14.3	71.9	2.3	12.2	404	16.0	8.5	
11:14	19.7	54.8	3.5	15.6	403	17.4	7.5	
11:15	14.5	70.2	3.6	16.7	402	15.3	8.3	30 lbs/hr

Name Steve Heinrich Date 4-13-95

Experiment: Diesel Burner Pyrolytic Oxidation Unit K-2 085

T_A = 80°F P_{bar} = 30.05

TIME	NO_x	CO	CO_2	O_2	T_S	SO_2	ROG	NOTES
11:16	14.7	43.0	3.5	16.3	402	14.3	8.0	
11:17	14.9	63.2	2.4	16.8	402	14.2	8.1	
11:18	24.3	42.1	2.4	15.2	405	17.3	7.9	
11:19	14.9	42.4	2.3	17.0	405	14.5	7.9	
11:20	14.7	60.7	2.3	17.1	405	15.0	7.6	35 sec
11:21	24.3	11.8	2.5	15.1	405	13.8	7.8	
11:22	23.9	38.1	2.5	15.1	405	16.6	7.4	
11:23	24.4	34.3	2.5	15.1	405	16.3	7.3	
11:24	15.9	46.9	2.3	16.9	403	15.5	7.8	
11:25	28.0	11.2	3.9	15.4	403	15.9	7.9	40 sec
11:26	27.9	9.9	3.9	15.4	403	15.3	7.8	
11:27	15.3	39.9	~~2.3~~ 3sec	16.8	401	13.4	7.8	
11:28	17.1	35.1	2.3	16.8	402	13.0	7.6	
11:29	16.9	35.8	2.3	16.9	401	12.6	7.5	
11:30	28.3	30.1	2.5	15.1	404	15.0	7.3	45 sec
11:31	15.3	51.5	2.3	16.9	404	13.0	7.5	
11:32	15.4	49.4	2.3	16.9	404	13.2	7.4	
11:33	15.6	50.1	2.3	16.9	404	12.9	7.4	* (SO2 dropping in conc.)
11:34	26.1	28.1	2.5	15.4	404	13.8	7.4	
11:35	24.8	44.9	2.5	17.0	404	12.2	7.3	50 sec
11:36	25.0	29.4	2.5	15.2	405	13.2	7.4	
11:37	32.1	16.4	3.5	15.6	405	12.3	7.4	
11:38	23.4	16.9	3.2	14.8	404	13.0	7.6	
11:39	21.9	18.4	3.2	14.9	404	13.4	7.5	
11:40	20.6	21.3	3.8	14.6	405	12.8	7.6	55 sec
11:41	15.7	45.1	2.3	16.6	402	12.1	7.4	
11:42	15.9	44.3	2.4	17.1	402	12.2	7.4	
11:43	15.6	35.9	2.4	12.2	404	11.9	7.3	
11:44	22.6	34.9	2.4	15.4	404	12.4	7.4	End Pt
11:45	15.6	43.1	2.4	12.1	403	12.0	7.4	60 sec 2
~~11:46~~								
~~11:47~~	0.0	0.7	0.0	0.1	--	0.1	0.1	ZERO
11:-	46.4	41.0	4.2	18.1	--	86.5	81.5	H SPAN
--	25.4	20.2	2.1	10.1	--	46.1	49.5	M SPAN
--	--	--	--	--	--	--	21.1	L SPAN

Important: Please [illegible]

Name: STEVE HERNANDEZ Date: 4-13-95

Experiment: BARBOT PUMP REGENERATIVE OXIDIZER Unit R-3

T_{in} = 73°F (A/C ON) P_{in} = 30.00

086

TIME	NO_x	CO	CO_2	O_2	TS	SO_2	ROG	NOTES:
12:15	28.8	30.4	3.3	14.4	401	16.1	2.9	RUN 3 (START)
12:16	17.7	52.3	2.2	15.6	402	14.5	0.6	
12:17	14.2	25.4	3.2	14.3	400	16.1	2.8	PES-13
12:18	20.2	57.2	2.5	16.7	398	13.7	5.3	
12:19	20.7	29.3	3.2	14.4	399	18.0	3.5	5m
12:20	18.9	29.1	3.0	15.0	399	17.2	3.8	
12:21	14.6	26.8	2.4	15.8	399	15.1	6.7	
12:22	16.7	58.9	2.4	16.7	399	14.4	6.3	
12:23	22.5	12.9	3.2	14.6	400	17.9	3.5	
12:24	20.1	29.5	3.2	14.4	402	17.4	3.3	10m
12:25	16.9	64.9	2.4	16.7	401	14.6	5.2	
12:26	28.4	35.2	3.4	14.4	403	17.8	0.7	
12:27	27.6	29.2	3.8	15.7	403	16.3	0.7	
12:28	28.6	28.5	3.1	14.3	403	15.6	0.8	
12:29	14.2	31.0	3.7	14.4	401	17.4	3.9	15m
12:30	14.1	35.4	3.7	16.0	399	17.7	4.1	
12:31	14.1	66.9	2.2	16.0	400	15.8	8.1	
12:32	18.6	63.0	3.3	14.3	400	17.9	3.9	
12:33	14.3	62.3	3.8	15.9	398	14.8	7.2	
12:34	18.3	64.0	2.4	16.7	400	14.2	4.1	20m
12:35	18.9	53.3	2.3	16.7	400	15.1	4.0	
12:36	14.1	66.7	2.3	16.7	400	14.8	4.5	
12:37	14.3	35.5	3.6	16.0	398	15.3	7.5	
12:38	14.5	60.1	3.6	16.1	398	14.6	6.6	
12:39	13.7	42.1	2.2	15.1	401	15.9	0.8	25m
12:40	27.7	12.9	3.6	14.5	401	17.6	0.8	
12:41	27.9	13.6	2.3	14.6	401	17.8	0.8	
12:42	21.5	45.1	2.3	14.9	402	16.9	0.9	
12:43	20.9	43.5	2.3	14.9	401	17.4	0.9	
12:44	21.5	42.8	2.3	14.8	401	16.5	1.0	30m
12:45	20.2	51.3	2.3	16.6	400	14.8	3.4	
12:46	28.6	12.6	3.1	14.1	400	17.9	2.9	
12:47	17.0	12.4	2.4	16.3	399	14.8	4.4	
12:48	20.1	24.3	2.5	15.7	398	12.3	2.7	
12:49	15.2	48.3	2.2	16.4	399	14.5	5.9	35m

Important: Place card under blue copy.

National Brand

Name: [illegible] Date: 4-13-95

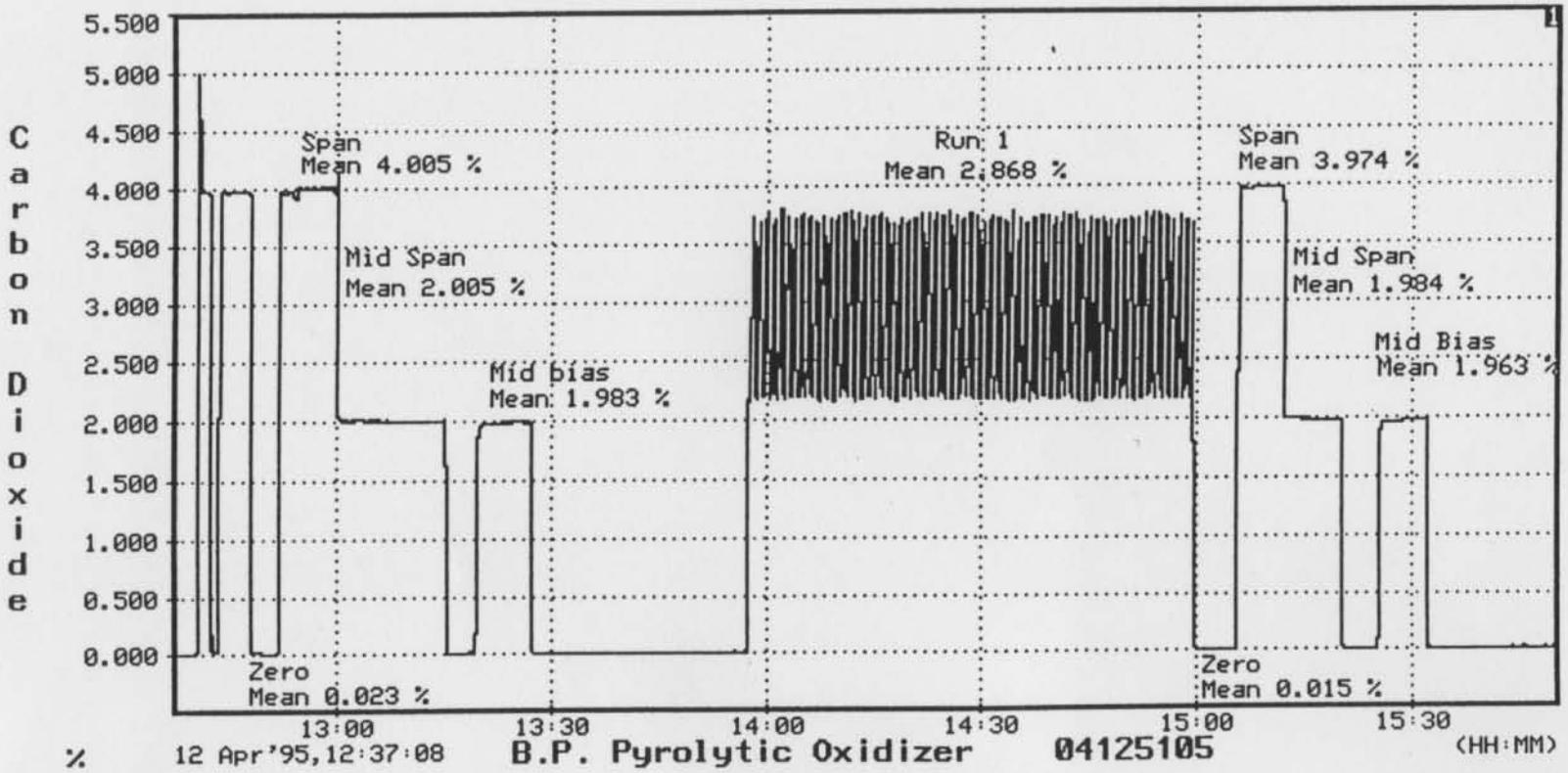
Experiment: DOUBLE BEAM RESIDUAL OXIDIZER UNIT 1, 2, 3

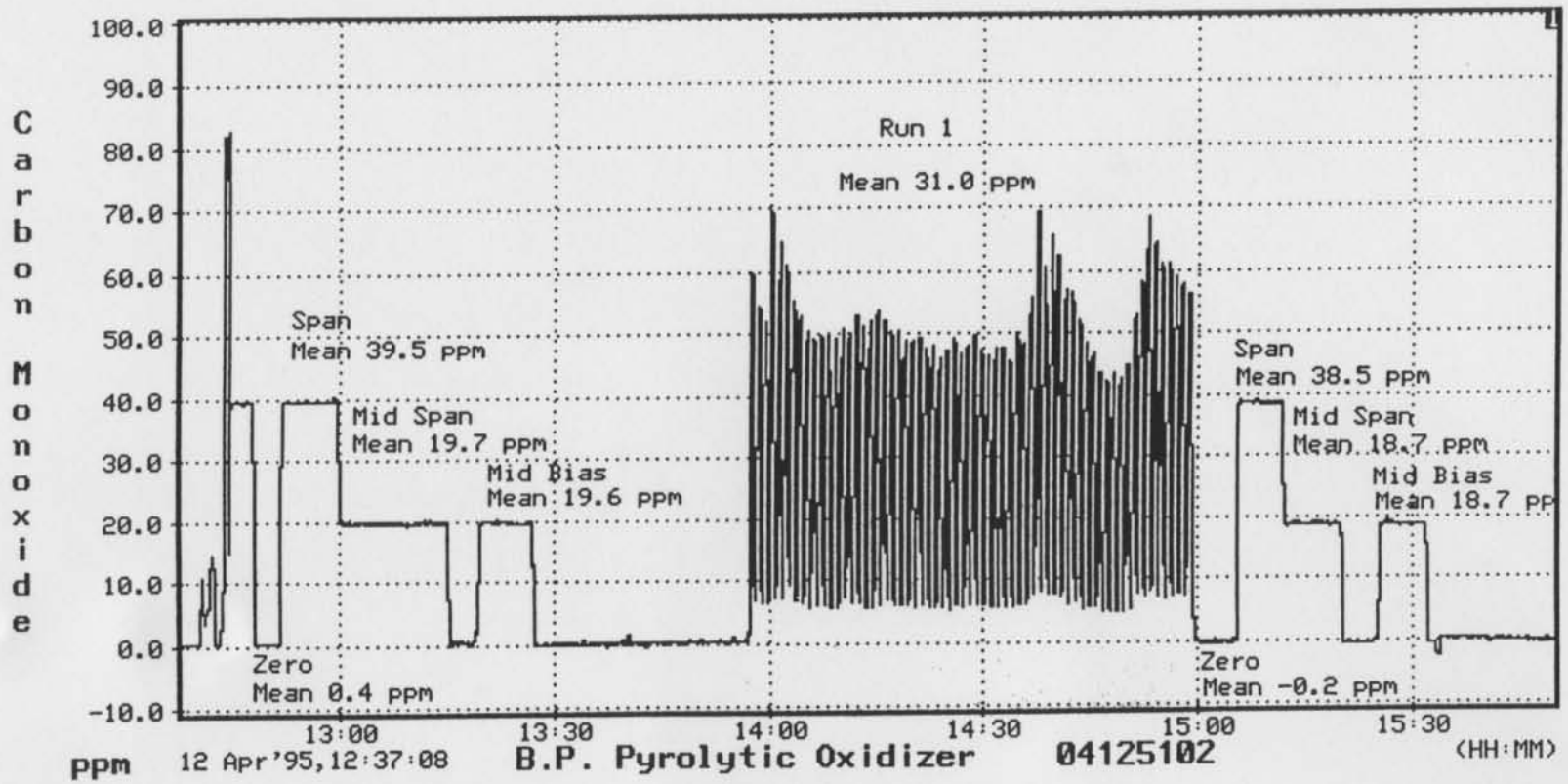
T_a = 79°F (A/C ON) P_{bar} 30.00

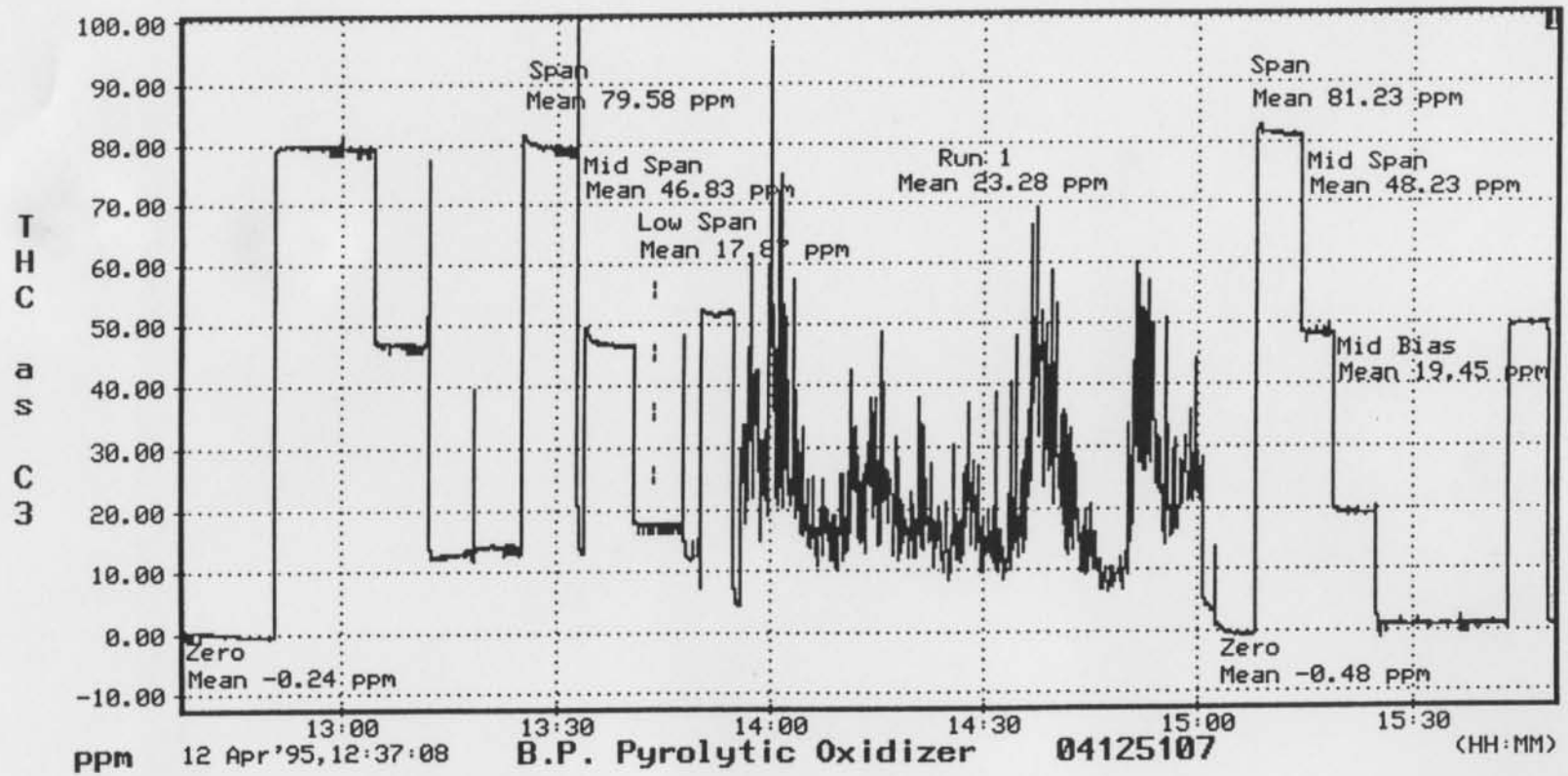
C87

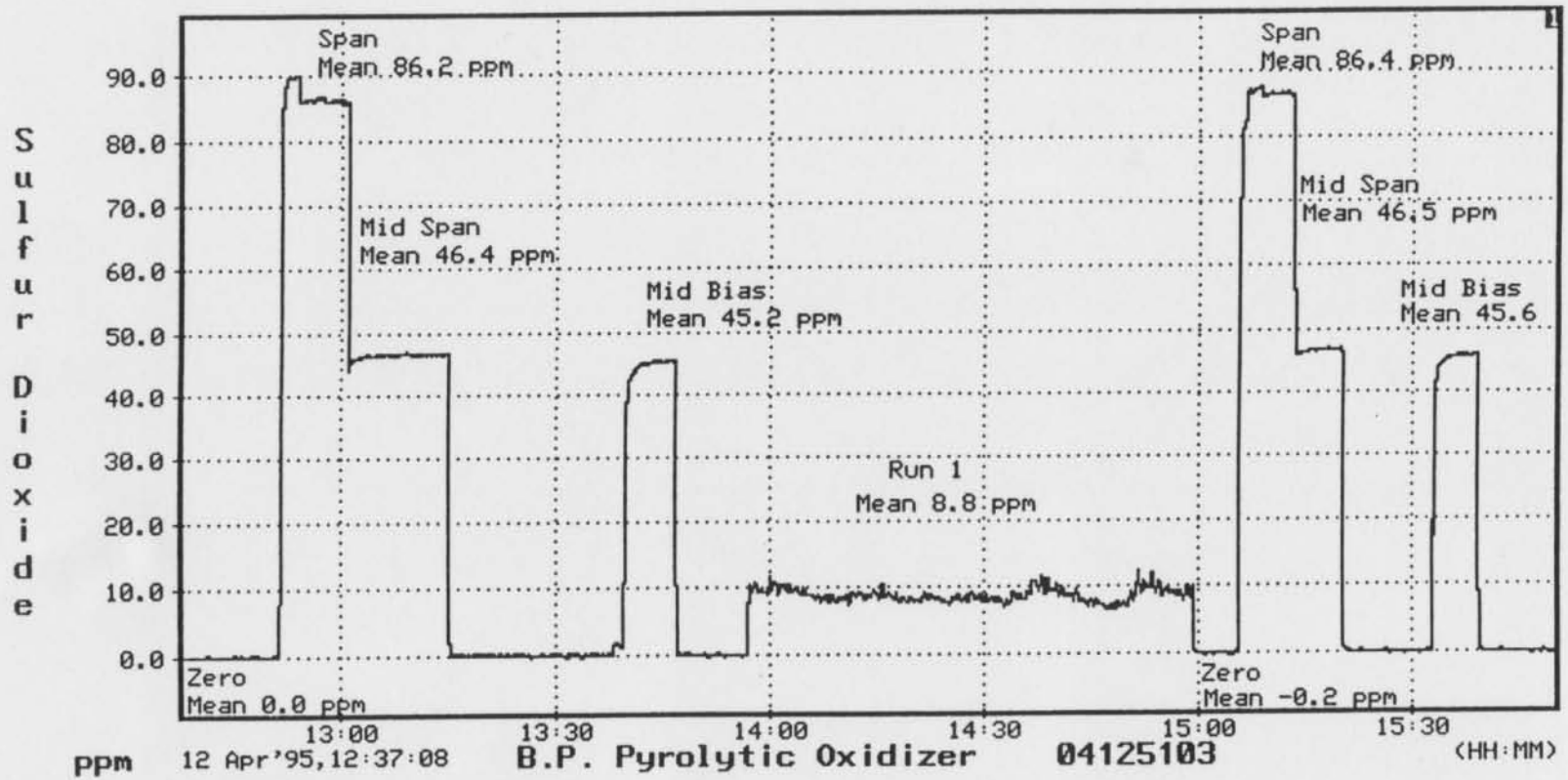
TIME	N_2	CO	CO_2	O_2	TS	SO_2	DOG	NOTES
12:50	22.5	36.1	2.4	16.4	401	15.1	1.9	(TS drops
12:51	17.6	2.2	2.7	16.5	400	16.3	1.3	Shifting
12:52	23.5	32.4	2.5	14.6	399	12.5	1.5	
12:53	14.5	51.3	2.3	16.5	400	15.2	1.7	
12:54	24.1	34.5	2.5	16.4	400	14.9	1.9	40
12:55	25.6	27.4	2.6	14.6	400	15.6	1.2	
12:56	26.8	26.3	2.6	16.4	400	16.8	1.3	
12:57	26.6	10.9	3.9	15.2	399	14.6	3.9	
12:58	25.9	40.4	3.9	15.3	401	14.7	1.3	
12:59	25.3	12.0	4.0	15.4	399	15.6	2.9	45
13:00	25.0	13.6	3.9	15.6	399	13.8	3.5	
13:01	24.3	14.9	3.9	15.6	399	13.9	3.1	
13:02	15.3	40.3	2.6	16.7	399	12.7	3.0	
13:03	15.3	42.7	2.7	16.7	399	13.1	2.9	
13:04	17.9	40.2	2.3	16.7	400	12.6	2.6	50
13:05	23.1	43.9	3.9	15.9	401	14.1	1.7	
13:06	30.3	18.4	3.2	14.3	402	13.5	0.8	
13:07	12.5	42.6	2.2	15.8	402	14.4	0.8	
13:08	29.0	17.6	3.1	14.4	400	15.6	1.9	
13:09	12.3	47.0	2.2	15.9	402	14.1	0.8	55
13:10	29.0	17.9	3.1	14.4	401	16.2	2.3	
13:11	30.3	14.8	3.2	14.4	401	16.0	2.5	
13:12	19.1	44.1	2.3	15.5	403	15.9	0.8	
13:13	19.1	29.7	3.3	14.4	402	15.8	3.1	
13:14	19.1	29.0	3.7	16.1	400	14.2	4.8	60
	2.1	-0.1	0.0	+0.2	--	-0.1	0.3	ZERO
	47.0	39.9	4.1	17.9	--	85.3	80.9	H SPAN
	20.4	19.4	2.1	9.8	--	45.5	48.6	H SPAN
	--	--	--	--	--	--	20.2	L SPAN
	26.0	20.1	2.0	9.8	--	44.9	51.5	BIAS

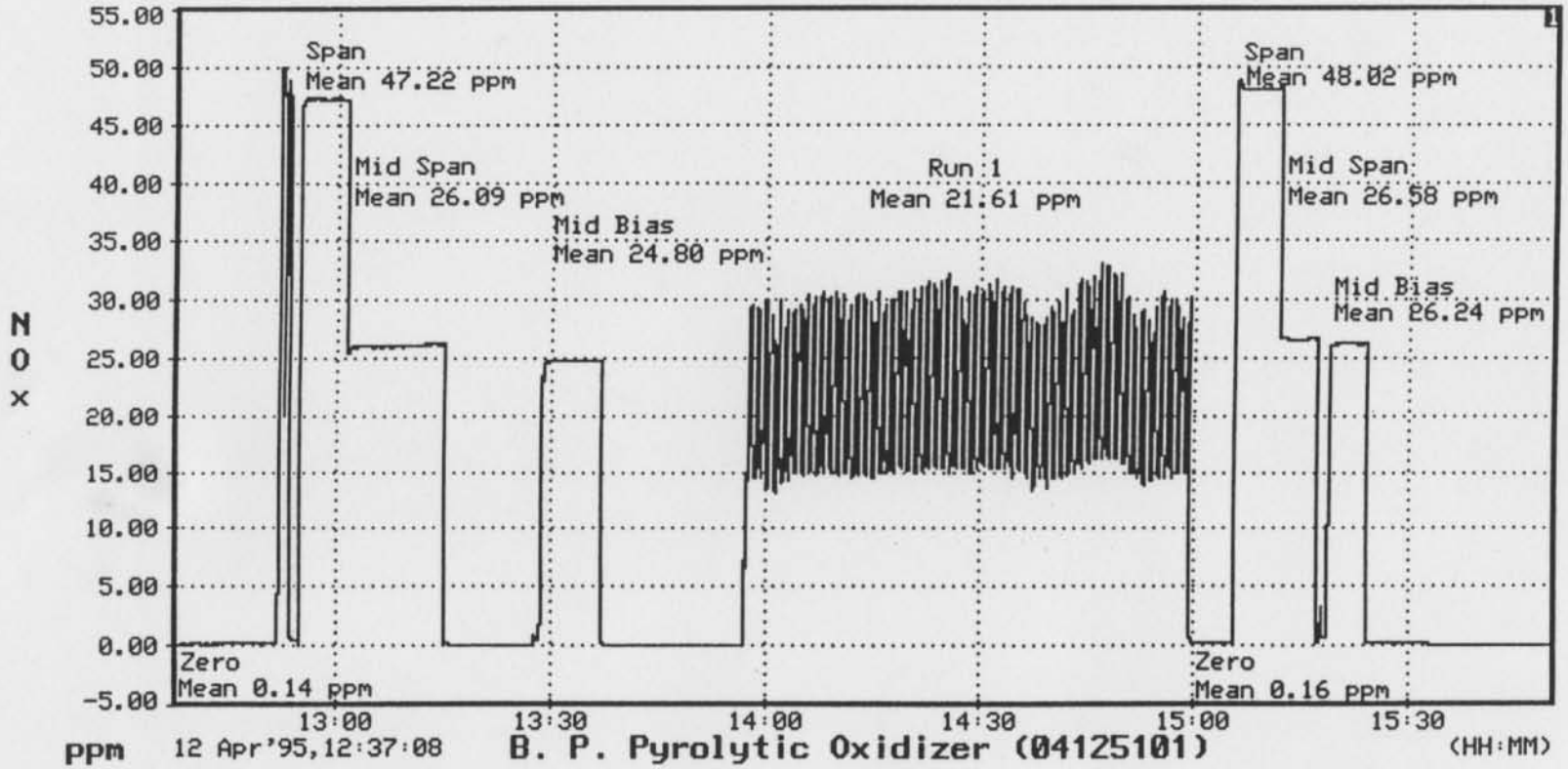
Important: [illegible]

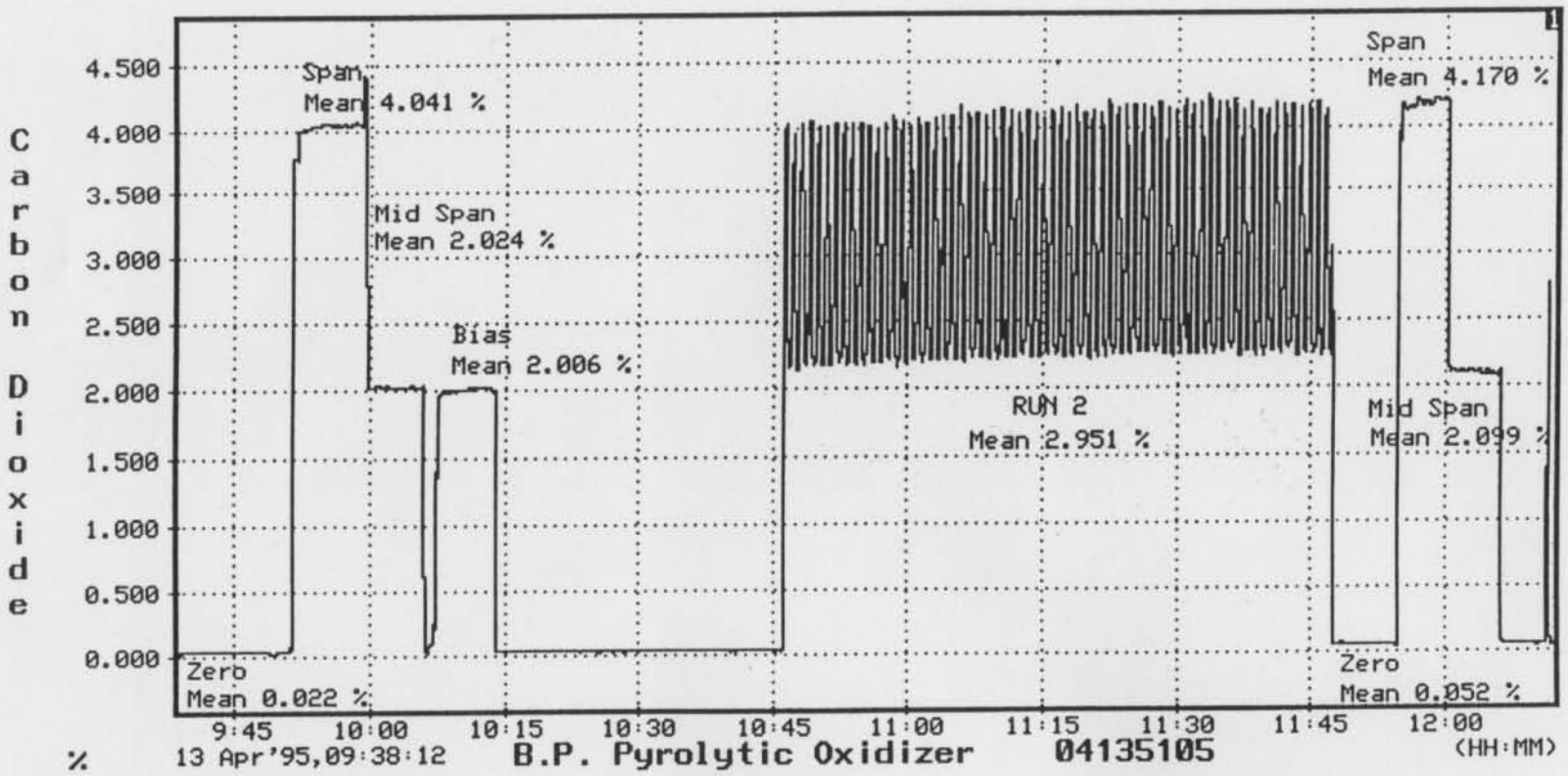

Carbon Dioxide
5.500
5.000
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Span
Mean 4.005 %
Mid Span
Mean 2.005 %
Mid bias
Mean 1.983 %
Run 1
Mean 2.868 %
Span
Mean 3.974 %
Mid Span
Mean 1.984 %
Mid Bias
Mean 1.963 %
Zero
Mean 0.023 %
Zero
Mean 0.015 %
13:00
13:30
14:00
14:30
15:00
15:30
(HH:MM)
%
12 Apr'95,12:37:08
B.P. Pyrolytic Oxidizer
04125105

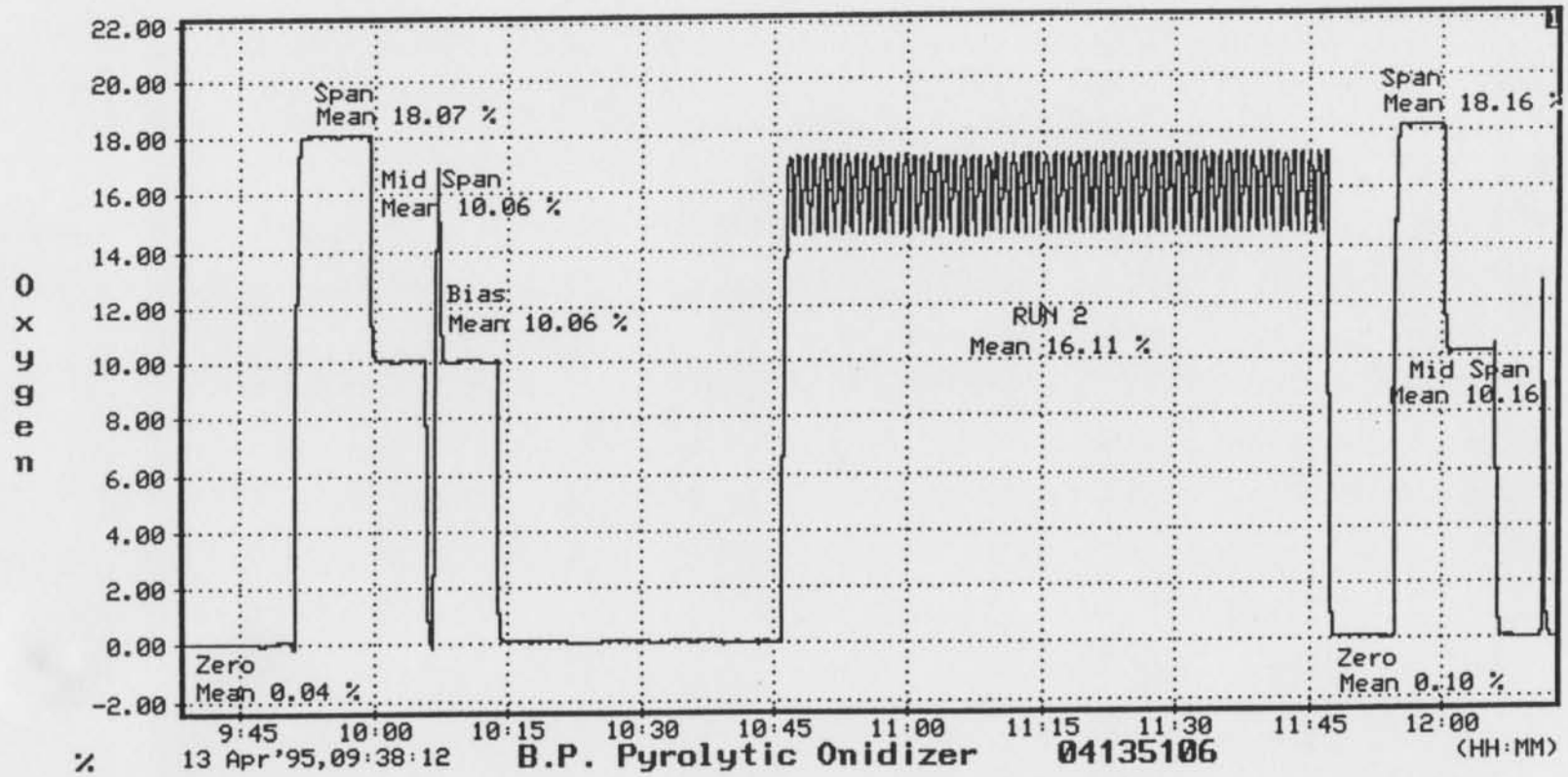

Carbon Monoxide
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
Run 1
Mean 31.0 ppm
Span
Mean 39.5 ppm
Mid Span
Mean 19.7 ppm
Mid Bias
Mean 19.6 ppm
Zero
Mean 0.4 ppm
Span
Mean 38.5 ppm
Mid Span
Mean 18.7 ppm
Mid Bias
Mean 18.7 pp
Zero
Mean -0.2 ppm
13:00
13:30
14:00
14:30
15:00
15:30
(HH:MM)
ppm
12 Apr'95,12:37:08
B.P. Pyrolytic Oxidizer
04125102

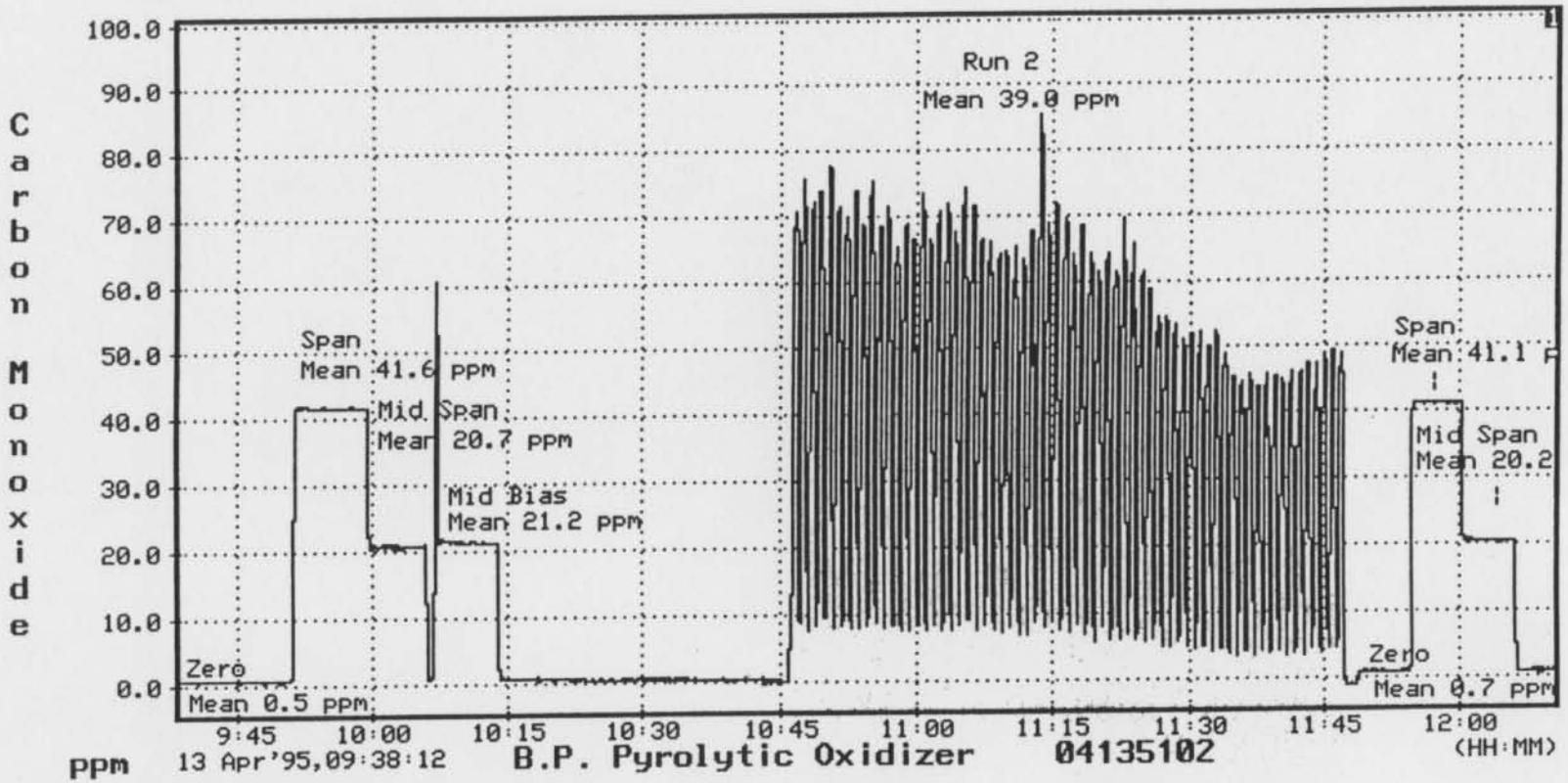

100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
THC as C3
Span
Mean 79.58 ppm
Mid Span
Mean 46.83 ppm
Low Span
Mean 17.87 ppm
Run 1
Mean 23.28 ppm
Span
Mean 81.23 ppm
Mid Span
Mean 48.23 ppm
Mid Bias
Mean 19.45 ppm
Zero
Mean -0.24 ppm
Zero
Mean -0.48 ppm
13:00
13:30
14:00
14:30
15:00
15:30
(HH:MM)
ppm
12 Apr'95,12:37:08
B.P. Pyrolytic Oxidizer
04125107

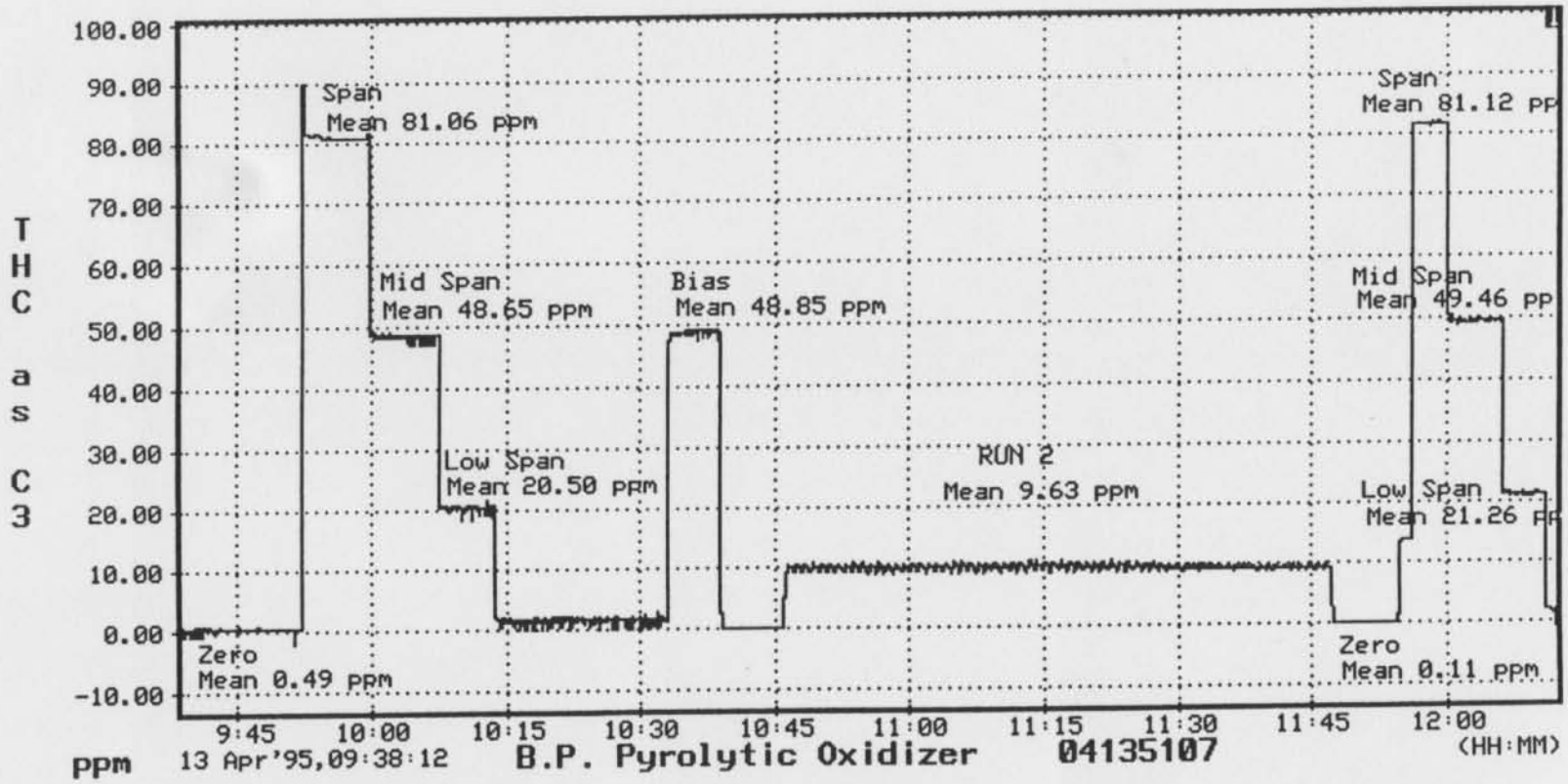

Sulfur Dioxide
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Span
Mean 86.2 ppm
Mid Span
Mean 46.4 ppm
Mid Bias
Mean 45.2 ppm
Run 1
Mean 8.8 ppm
Zero
Mean 0.0 ppm
Span
Mean 86.4 ppm
Mid Span
Mean 46.5 ppm
Mid Bias
Mean 45.6
Zero
Mean -0.2 ppm
13:00
13:30
14:00
14:30
15:00
15:30
ppm
12 Apr'95,12:37:08
B.P. Pyrolytic Oxidizer
04125103
(HH:MM)

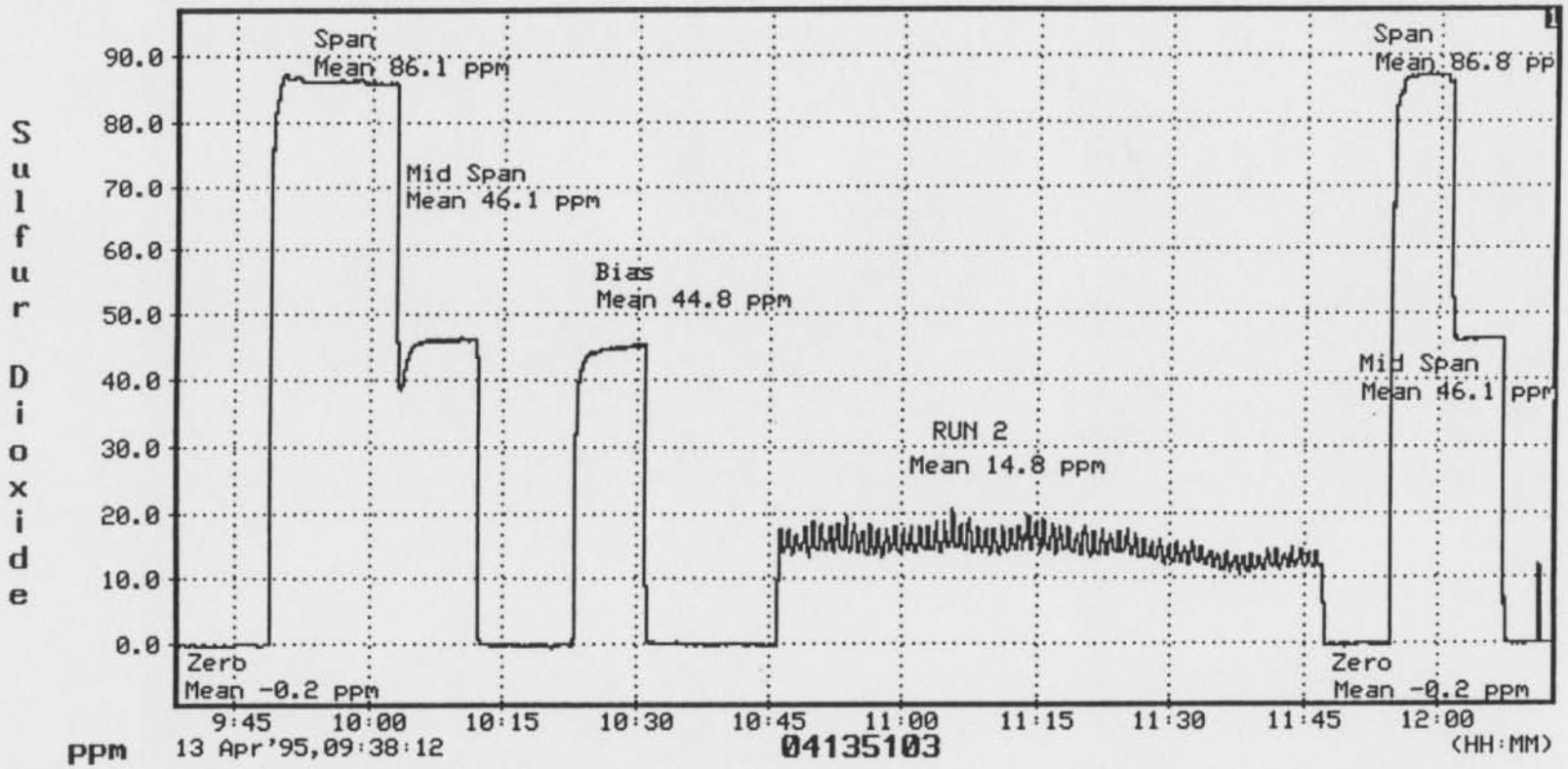

55.00
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
NOx
ppm
Span
Mean 47.22 ppm
Mid Span
Mean 26.09 ppm
Mid Bias
Mean 24.80 ppm
Run 1
Mean 21.61 ppm
Span
Mean 48.02 ppm
Mid Span
Mean 26.58 ppm
Mid Bias
Mean 26.24 ppm
Zero
Mean 0.14 ppm
Zero
Mean 0.16 ppm
13:00
13:30
14:00
14:30
15:00
15:30
12 Apr'95,12:37:08
B. P. Pyrolytic Oxidizer (04125101)
(HH:MM)

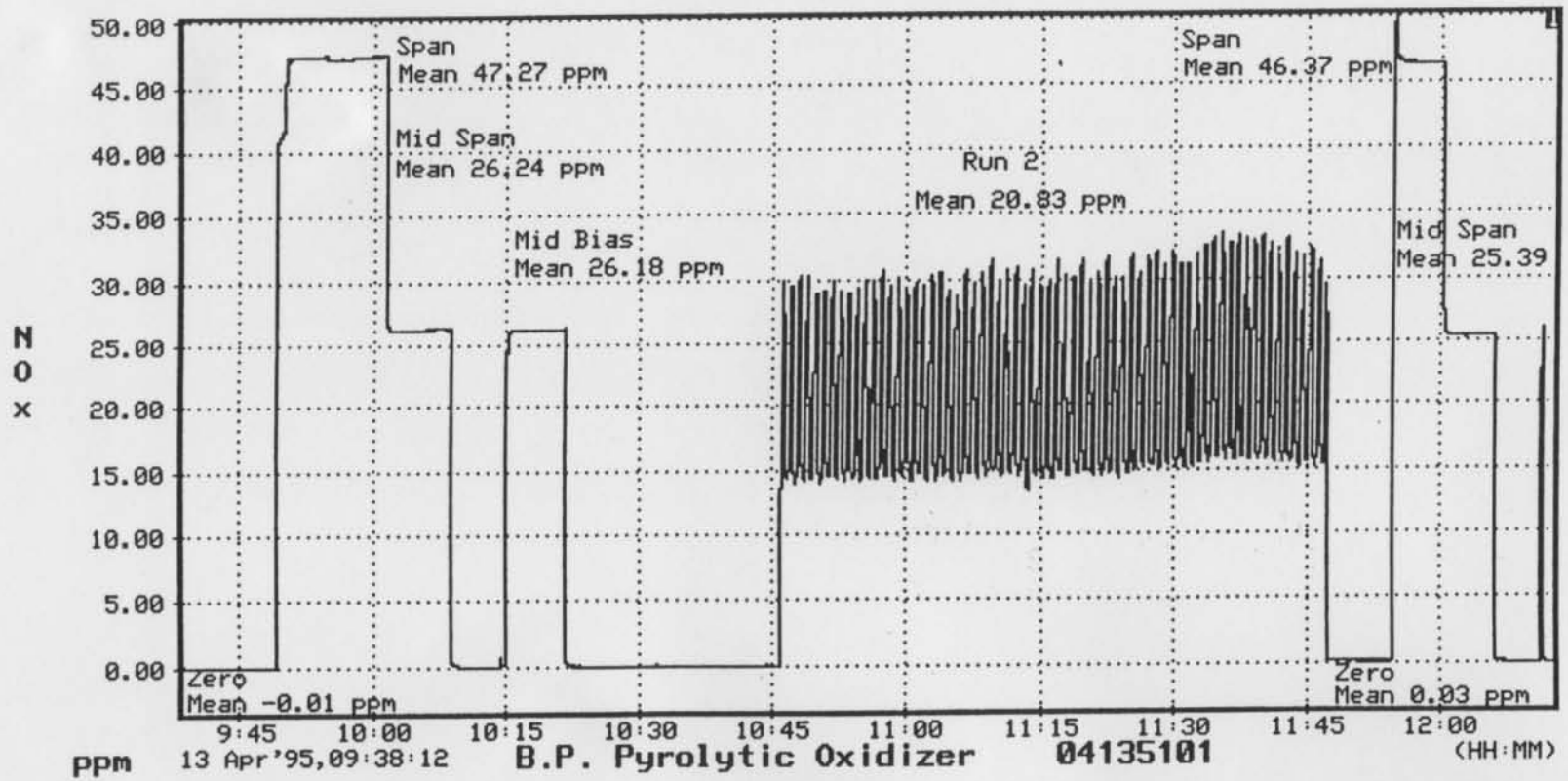

Carbon Dioxide
%
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Span
Mean 4.041 %
Mid Span
Mean 2.024 %
Bias
Mean 2.006 %
Zero
Mean 0.022 %
RUN 2
Mean 2.951 %
Span
Mean 4.170 %
Mid Span
Mean 2.099 %
Zero
Mean 0.052 %
9:45
10:00
10:15
10:30
10:45
11:00
11:15
11:30
11:45
12:00
(HH:MM)
13 Apr'95,09:38:12
B.P. Pyrolytic Oxidizer
04135105

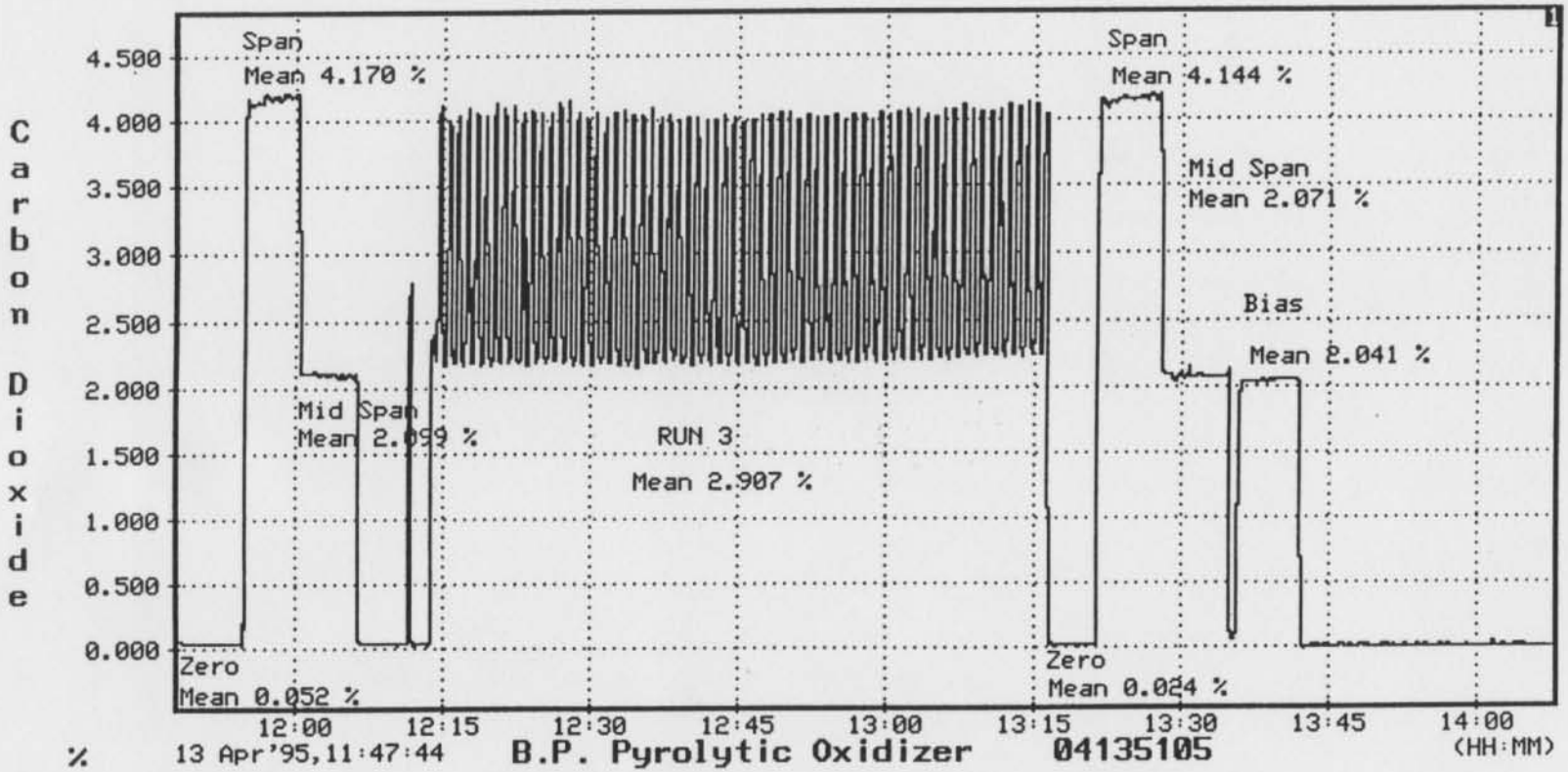

Oxygen
%
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
Span
Mean 18.07 %
Mid Span
Mean 10.06 %
Bias
Mean 10.06 %
RUN 2
Mean 16.11 %
Span
Mean 18.16 %
Mid Span
Mean 10.16
Zero
Mean 0.04 %
Zero
Mean 0.10 %
9:45
10:00
10:15
10:30
10:45
11:00
11:15
11:30
11:45
12:00
(HH:MM)
13 Apr'95,09:38:12
B.P. Pyrolytic Onidizer
04135106

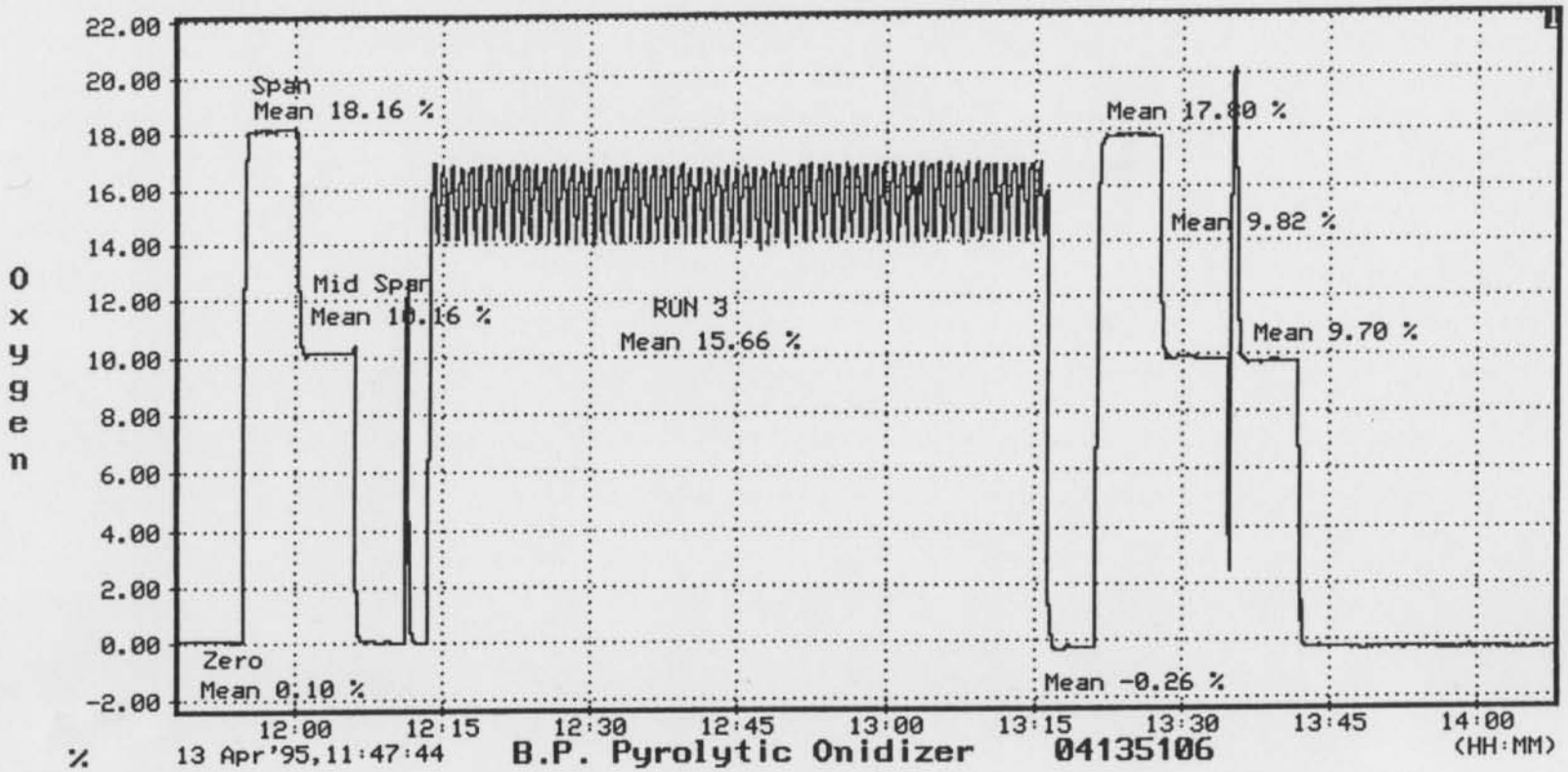

Carbon Monoxide
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Run 2
Mean 39.0 ppm
Span
Mean 41.6 ppm
Mid Span
Mean 20.7 ppm
Mid Bias
Mean 21.2 ppm
Span
Mean 41.1 p
Mid Span
Mean 20.2
Zero
Mean 0.5 ppm
Zero
Mean 0.7 ppm
9:45
10:00
10:15
10:30
10:45
11:00
11:15
11:30
11:45
12:00
(HH:MM)
ppm
13 Apr'95,09:38:12
B.P. Pyrolytic Oxidizer
04135102

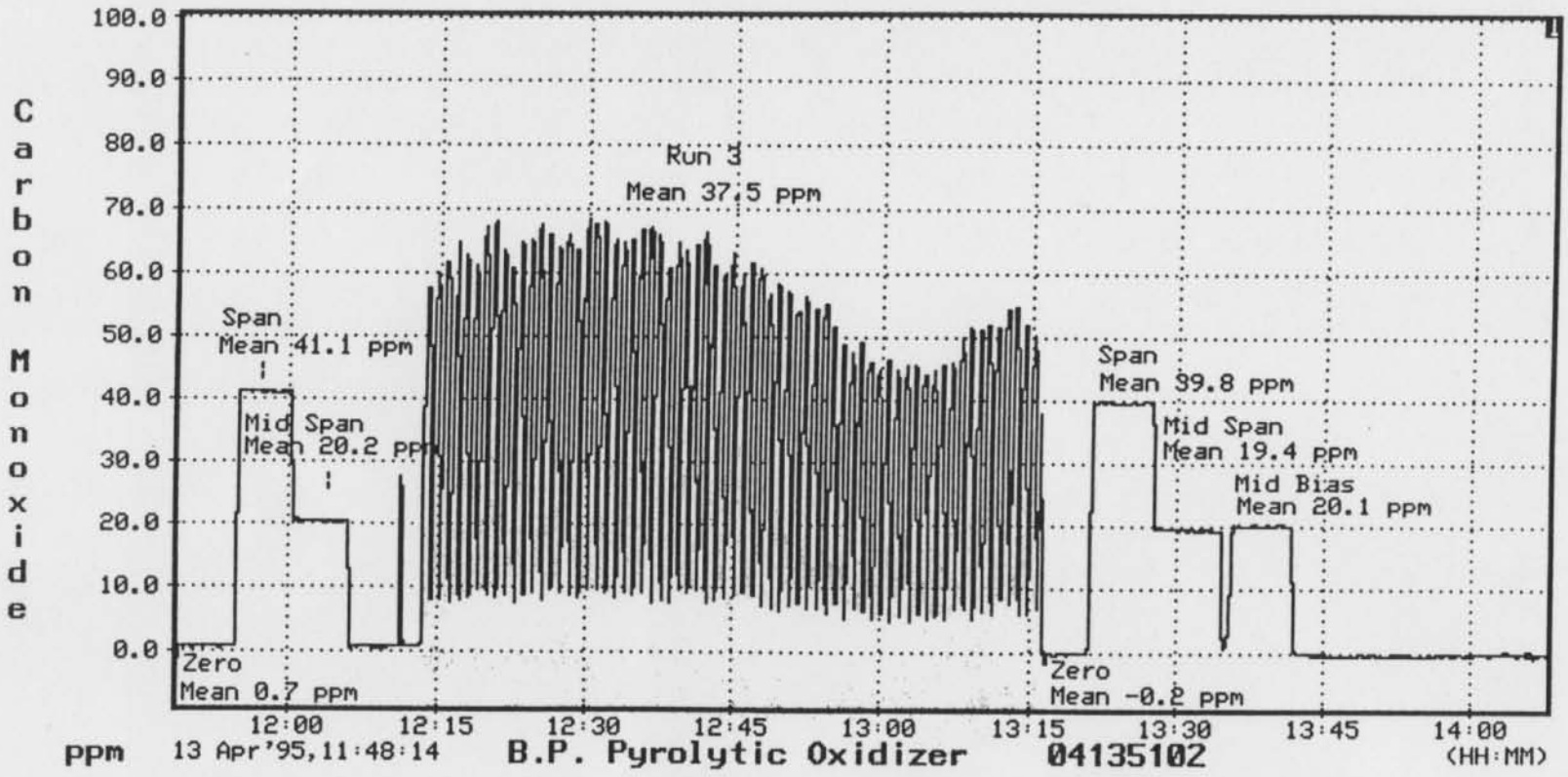

THC as C3
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
Span
Mean 81.06 ppm
Mid Span
Mean 48.65 ppm
Low Span
Mean 20.50 ppm
Bias
Mean 48.85 ppm
RUN 2
Mean 9.63 ppm
Zero
Mean 0.49 ppm
Span
Mean 81.12 pp
Mid Span
Mean 49.46 pp
Low Span
Mean 21.26 pp
Zero
Mean 0.11 ppm
9:45
10:00
10:15
10:30
10:45
11:00
11:15
11:30
11:45
12:00
(HH:MM)
ppm
13 Apr'95,09:38:12
B.P. Pyrolytic Oxidizer
04135107

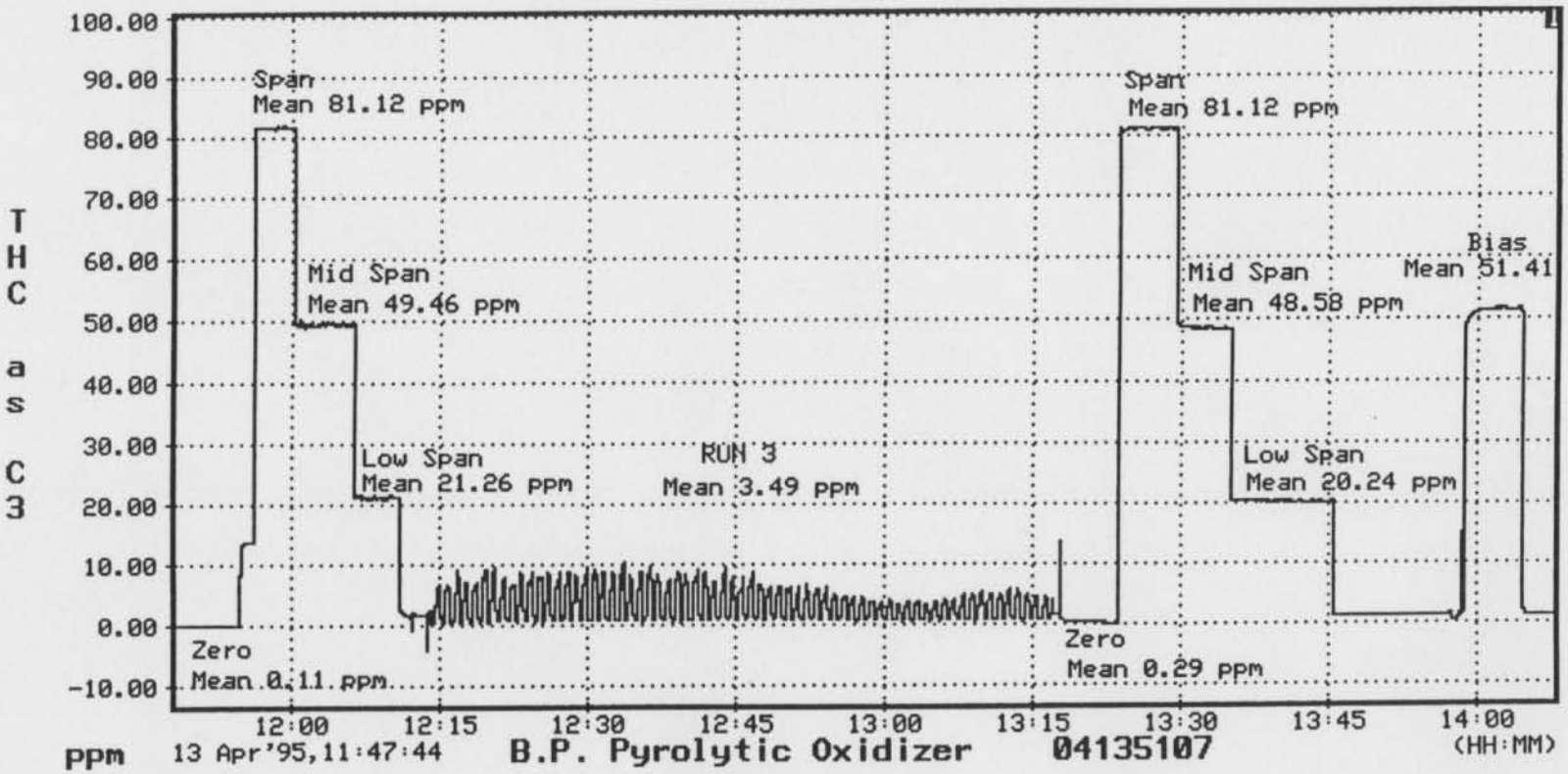

Sulfur Dioxide
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Span
Mean 86.1 ppm
Mid Span
Mean 46.1 ppm
Bias
Mean 44.8 ppm
RUN 2
Mean 14.8 ppm
Span
Mean 86.8 pp
Mid Span
Mean 46.1 ppm
Zero
Mean -0.2 ppm
Zero
Mean -0.2 ppm
9:45
10:00
10:15
10:30
10:45
11:00
11:15
11:30
11:45
12:00
(HH:MM)
ppm
13 Apr'95,09:38:12
04135103

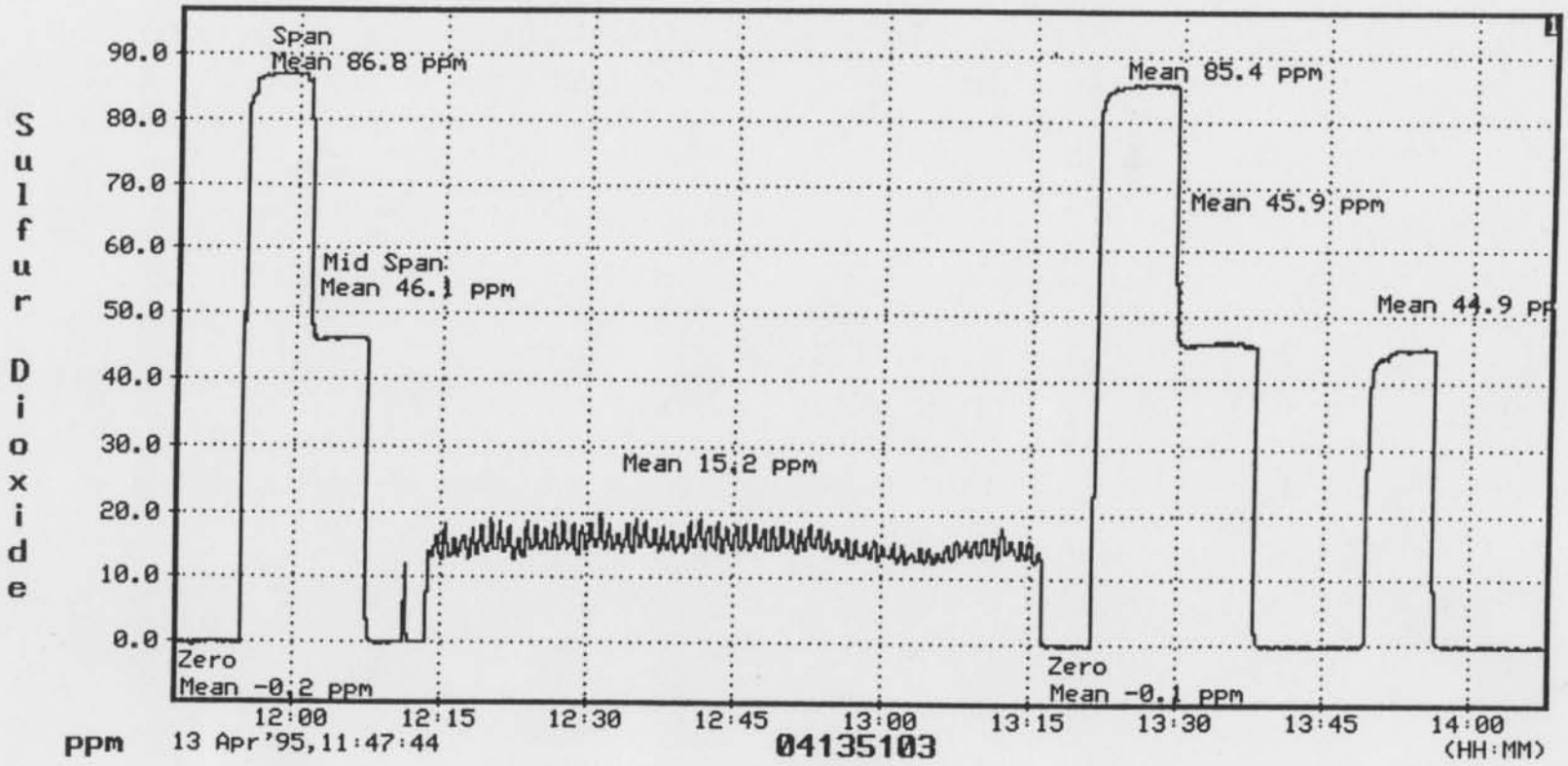

50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
NOx
Span
Mean 47.27 ppm
Mid Span
Mean 26.24 ppm
Mid Bias
Mean 26.18 ppm
Run 2
Mean 20.83 ppm
Span
Mean 46.37 ppm
Mid Span
Mean 25.39
Zero
Mean -0.01 ppm
Zero
Mean 0.03 ppm
9:45
10:00
10:15
10:30
10:45
11:00
11:15
11:30
11:45
12:00
(HH:MM)
ppm
13 Apr'95,09:38:12
B.P. Pyrolytic Oxidizer
04135101

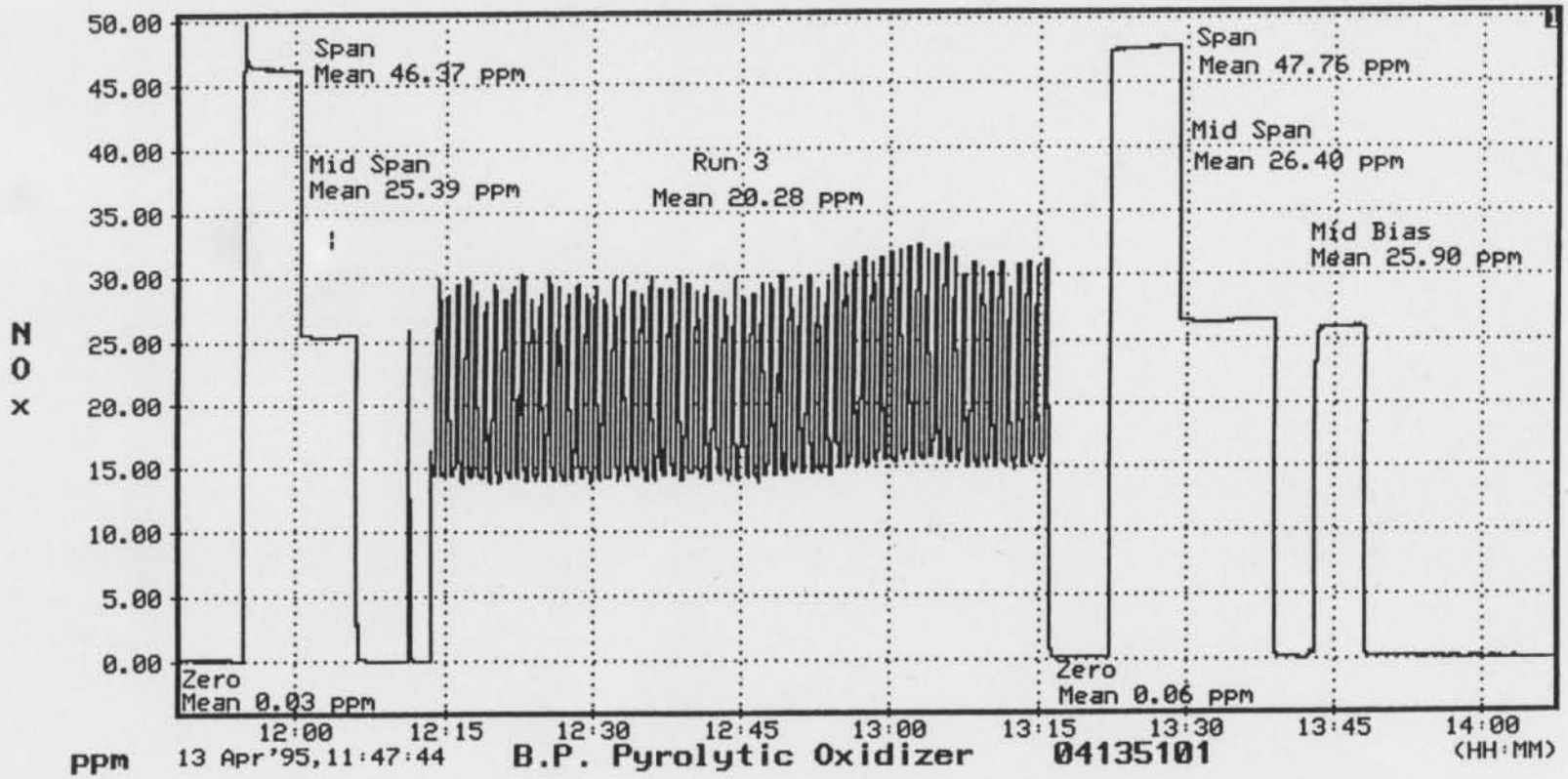

Carbon Dioxide
%
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Span
Mean 4.170 %
Mid Span
Mean 2.099 %
RUN 3
Mean 2.907 %
Span
Mean 4.144 %
Mid Span
Mean 2.071 %
Bias
Mean 2.041 %
Zero
Mean 0.052 %
Zero
Mean 0.024 %
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
14:00
(HH:MM)
13 Apr'95,11:47:44
B.P. Pyrolytic Oxidizer
04135105


22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
Oxygen
%
Span
Mean 18.16 %
Mid Span
Mean 10.16 %
RUN 3
Mean 15.66 %
Zero
Mean 0.10 %
Mean -0.26 %
Mean 17.80 %
Mean 9.82 %
Mean 9.70 %
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
14:00
(HH:MM)
13 Apr'95,11:47:44
B.P. Pyrolytic Onidizer
04135106


Carbon Monoxide
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Run 3
Mean 37.5 ppm
Span
Mean 41.1 ppm
Mid Span
Mean 20.2 ppm
Span
Mean 39.8 ppm
Mid Span
Mean 19.4 ppm
Mid Bias
Mean 20.1 ppm
Zero
Mean 0.7 ppm
Zero
Mean -0.2 ppm
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
14:00
ppm
13 Apr'95,11:48:14
B.P. Pyrolytic Oxidizer
04135102
(HH:MM)


THC as C3
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
Span
Mean 81.12 ppm
Mid Span
Mean 49.46 ppm
Low Span
Mean 21.26 ppm
RUN 3
Mean 3.49 ppm
Zero
Mean 0.11 ppm
Span
Mean 81.12 ppm
Mid Span
Mean 48.58 ppm
Low Span
Mean 20.24 ppm
Zero
Mean 0.29 ppm
Bias
Mean 51.41
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
14:00
(HH:MM)
ppm
13 Apr'95,11:47:44
B.P. Pyrolytic Oxidizer
04135107


Sulfur Dioxide
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Span
Mean 86.8 ppm
Mid Span
Mean 46.1 ppm
Mean 15.2 ppm
Zero
Mean -0.2 ppm
Mean 85.4 ppm
Mean 45.9 ppm
Mean 44.9 pp
Zero
Mean -0.1 ppm
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
14:00
(HH:MM)
ppm
13 Apr'95,11:47:44
04135103


50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
NOx
Span
Mean 46.37 ppm
Mid Span
Mean 25.39 ppm
Run 3
Mean 20.28 ppm
Span
Mean 47.76 ppm
Mid Span
Mean 26.40 ppm
Mid Bias
Mean 25.90 ppm
Zero
Mean 0.03 ppm
Zero
Mean 0.06 ppm
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
14:00
(HH:MM)
ppm
13 Apr'95,11:47:44
B.P. Pyrolytic Oxidizer
04135101

APPENDIX B

CALIBRATION DATA

Scott Specialty Gases, Inc.

Shipped From: 2600 CAJON BLVD.
SAN BERNARDINO CA 92411
Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ANALYSIS

PACIFIC ENVIRONMENTAL SER
PO# 025-000
13100 BROOKS DRIVE

BALDWIN PARK CA 91706

PROJECT #: 02-27672-002
PO#: F028-000
ITEM #: 02024520 2AL
DATE: 9/16/93

CYLINDER #: ALM033923
FILL PRESSURE: 2000PSIG
BLEND TYPE : ACUBLEND MASTER GAS

ANALYTICAL ACCURACY: +-1%

COMPONENT	REQUESTED GAS CONC	MOLES	ANALYSIS (MOLES)	
CARBON DIOXIDE	4.	PCT	4.000	PCT
CARBON MONOXIDE	40.	PPM	40.00	PPM
OXYGEN	18.	PCT	18.00	PCT
NITROGEN		BAL		BAL

2000PSIG BIN#2 09-24
NIST TRACEABLE TO: CO CRM1678 AAL5970, CO2 SRM2621A FF19052,
O2 CRM2659 ALM017555

NIST TRACEABILITY: AS NOTED BELOW

ANALYST: _____

Scott Specialty Gases, Inc.

Shipped From: 2600 CAJON BLVD.
SAN BERNARDINO CA 92411
Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ANALYSIS

PACIFIC ENVIRONMENTAL SER
PO# 025-000
13100 BROOKS DRIVE

BALDWIN PARK CA 91706

PROJECT #: 02-27672-001
PO#: F028-000
ITEM #: 02024520 2AL
DATE: 9/17/93

CYLINDER #: ALM008830
FILL PRESSURE: 2000PSIG
BLEND TYPE : ACUBLEND MASTER GAS

ANALYTICAL ACCURACY: +-1%

COMPONENT	REQUESTED GAS CONC	MOLES	ANALYSIS (MOLES)	
CARBON DIOXIDE	2.	PCT	2.000	PCT
CARBON MONOXIDE	20.	PPM	20.00	PPM
OXYGEN	10.	PCT	10.00	PCT
NITROGEN		BAL		BAL

2000PSIG BIN#1 09-24
TRACEABLE TO: CO2 SRM 2621 CYL# FF19052, CO CRM 1678
CYL# AAL5970, O2 CRM 2658 CYL# ALM015888

NIST TRACEABILITY: AS NOTED ABOVE

ANALYST: _____

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
PACIFIC ENVIRONMENTAL SER.
STEVE HERNANDEZ
13100 BROOKS DRIVE
BALDWIN PARK, CA 91706

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 0640-102
Project # 29933.002

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1 , Section Number 3.0.4

Cylinder Number ALM035663 **Certification Date** 02-15-94 **Exp. Date** 02-15-96
Cylinder Pressure 1900 psig

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
SULFUR DIOXIDE	**86.01 PPM**	**± 1 % NIST Traceable**

Balance Gas: Nitrogen

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
GMIS	06-94	AAL9133	238.8 ppm

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Horiba / OPE-135D / 56463601	01-31-94	NDIR

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

Components: Sulfur Dioxide

First Triad Analysis

Date: 02-08-94	Response Units: mv	
Z1= 0.00	R1= 97.0	T1= 36.5
R2= 97.0	Z2= 0.00	T2= 36.5
Z3= 0.00	T3= 36.5	R3= 97.0
Avg. Conc. of Cust Cyl.	86.01 ppm	

Second Triad Analysis

Date: 02-15-94	Response Units: mv	
Z1= 0.00	R1= 97.0	T1= 36.5
R2= 97.0	Z2= 0.00	T2= 36.5
Z3= 0.00	T3= 36.5	R3= 97.0
Avg. Conc. of Cust Cyl.	86.01 ppm	

Calibration Curve

Concentration= Ax^2+Bx+C
A =0.001735
B =2.295
C =-0.07555

Date:	Response Units: mv	
Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=
Avg. Conc. of Cust Cyl.		

Concentration=

Date:	Response Units: mv	
Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=
Avg. Conc. of Cust Cyl.		

Concentration=

SPECIAL NOTES IF THIS PRODUCT IS USED FOR ACID RAIN COMPLIANCE, THE ACID RAIN EXPIRATION DATE NOTED ABOVE APPLIES PER 40 CFT PART 75,APPENDIX H. OTHERWISE THE GENERAL EXPIRATION DATE APPLIES.

ANALYST H. Wilson

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS RECERTIFICATION

Customer
PACIFIC ENVIRONMENTAL SER
13100 BROOKS DRIVE
BALDWIN PARK, CA 91706

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 06-40-102
Scott Project # 34935.002

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1, Section Number 3.0.4

Cylinder Number ALM014364
Cylinder Pressure 1850 PSIG
Certification Date 12/13/94
Previous Certification Dates 02/15/94
Acid Rain Exp. 12/13/96

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(SULFUR DIOXIDE)	46.03 PPM	±1% NIST Traceable

Balance Gas: Nitrogen

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM 1693	12/94	ALM024287	47.2 PPM S02 IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Horiba / OPE - 135D / 56463601	12/03/94	NDIR

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

Components	Previous Certification	Third Triad Analysis	Calibration Curve
SULFUR DIOXIDE	Date: 02/15/94 Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl. 46.28 PPM	Date: 12/13/94 Response Units: mv Z1= 0.00 R1= 94.9 T1= 91.9 R2= 94.9 Z2= 0.00 T2= 91.9 Z3= 0.00 T3= 91.9 R3= 94.9 Avg. Conc. of Cust Cyl. 46.03 PPM	Concentration= Ax + B A =0.5013 B =-0.04437
	Date: Response Units: Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units: Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=
	Date: Response Units: Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units: Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=

SPECIAL NOTES: IF THIS PRODUCT IS USED FOR ACID RAIN COMPLIANCE, THE ACID RAIN DATE NOTED ABOVE APPLIES PER 40 CFT PART 75, APPENDIX H. OTHERWISE THE GENERAL EXPIRATION DATE APLLIES.

Analyst

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
PACIFIC ENVIRONMENTAL SER
13100 BROOKS DRIVE
BALDWIN PARK CA91706

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 0640-102
Project # 32847.001

ANALYTICAL INFORMATION

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

Cylinder Number AAL3905 **Certification Date** 08-11-94 **Exp. Date** 08-11-96
Cylinder Pressure+ 2000PSIG

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(NITRIC OXIDE)	47.35PPM	± 1 % NIST Traceable
TOTAL OXIDES OF NITROGEN	47.45PPM	REFERENCE VALUE ONLY
(Nitrogen)	Balance Gas	

+Do not use when cylinder pressure is below 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
CRM1684	06-95	ALM024719	95.22PPM NO IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
TECO / 10AR / 14853-150	08-05-94	Chemi-Luminescent

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

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
NITRIC OXIDE	Date:11-18-93 Response Units: mv Z1= 0.00 R1= 94.7 T1= 46.6 R2= 94.7 Z2= 0.00 T2= 46.6 Z3= 0.00 T3= 46.6 R3= 94.7 Avg. Conc. of Cust Cyl. 47.25PPM	Date:08-11-94 Response Units: mv Z1= 0.00 R1= 94.7 T1= 46.7 R2= 94.7 Z2= 0.00 T2= 46.7 Z3= 0.00 T3= 46.7 R3= 94.7 Avg. Conc. of Cust Cyl. 47.35PPM	Concentration= Ax + B A =0.99744 B =0.76795
	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=
	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=

Special Notes:

Analyst: _____

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
PACIFIC ENVIRONMENTAL SER
13100 BROOKS DRIVE
BALDWIN PARK, CA 91706

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 0640-102
Project # 36545.002

ANALYTICAL INFORMATION

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

Cylinder Number ALM052505 **Certification Date** 03/14/95 **Exp. Date** 03/14/97
Cylinder Pressure+ 2000 PSIG

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(NITRIC OXIDE)	25.71 PPM	±1% NIST TRACEABLE
TOTAL OXIDES IN NITROGEN	25.93 PPM	REFERENCE VALUE ONLY
(Nitrogen)	Balance Gas	

+Do not use when cylinder pressure is below 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes

REFERENCE STANDARD

Type/SRM Sample No.	Expiration Date	Cylinder Number	Concentration
CRM 1683	06/30/95	ALM015394	49.6 PPM N0 IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
TECO / 10AR / 14853-150	03/04/95	Chemi-Luminescent

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

Components: NITRIC OXIDE

First Triad Analysis
Date: 03/07/95 Response Units: mv
Z1= 0.00 R1= 46.82 T1= 24.17
R2= 46.80 Z2= 0.01 T2= 24.20
Z3= 0.01 T3= 24.21 R3= 46.78
Avg. Conc. of Cust Cyl. 25.71 PPM

Second Triad Analysis
Date: 03/14/95 Response Units: mv
Z1= 0.00 R1= 46.79 T1= 24.20
R2= 46.81 Z2= 0.00 T2= 24.18
Z3= 0.01 T3= 24.18 R3= 46.81
Avg. Conc. of Cust Cyl. 25.71 PPM

Calibration Curve
Concentration= Ax + B
A =2.592
B =0.07521

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Concentration=

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Concentration=

Special Notes:

Analyst: _____

DICK MUNNS COMPANY

Liquid and Gas - Flowmeter Calibration Service
10571 Calle Lee - 133 • Los Alamitos, California 90720
Telephone (310) 596-1559 • Telefax (714) 827-0823

CERTIFICATE OF CALIBRATION

Client Name:	P.E.S.,INC.	Calibration Date:	12-02-1994
Reference Number:	25507	Calibration Due:	12-02-1995
Instrument Manufacturer:	ROCKWELL	Calibration Fluid:	AIR 14.7 PSIA 70F
Instrument Description:	P.D.METER	Test Unit(s):	A-3 DUE 5-2-95
Model Number:	190 CFH	NIST Traceability Per:	M-0122
Serial Number:	25507	Ambient Conditions:	29.96"HGA 70F RH.38%
Mfg.Rated Accuracy:	+/-.5%	CERT NUMBER:	PES25507
Accuracy Given:	WITHIN MFG TOLERANCE		

	IND.SCFM	ACT.SCFM
1	0.100	0.100
2	0.200	0.200
3	0.399	0.400
4	0.814	0.813
5	1.000	0.999
6	1.508	1.504
7	2.091	2.087
8	2.305	2.312
9	2.559	2.553
10	2.920	2.919
11	3.334	3.325

Comments:

All instruments used in the performance of the above calibration have direct traceability to the National Institute of Standards and Technology (NIST). Calibration has been performed in accordance with MIL-STD-45662A.

Calibration Performed By:

RALPH AWAD

Approved By:

MICHAEL MUNNS

Form CERT1

THERMOCOUPLE CALIBRATION

CALIBRATED BY: SOLANKI

DATE: 8-30-94

Thermocouple number	Thermocouple reading (°F)	Thermometer reading (°F)
TC-1	37.4	39.8
	75.2	77.8
	208.4	210.4
TC-2	34.0	35.0
	77.6	77.0
	212.8	213.8
TC-3 (D-5)	38.4	40.8
	75.2	75.2
	206.6	205.4
TC-4 (D-6)	37.4	38.8
	75.2	75.4
	212.2	211.6
TC-5 (D-3)	37.4	38.8
	75.2	75.8
	208.4	209.6
TC-6	35.6	34.8
	75.2	75.2
	210.2	211.0
TC-7 (BLUE)	36.0	34.0
	74.0	74.0
	214.0	214.0
TC-8	37.4	39.2
	77.4	77.7
	215.6	216.6

TC-10	33.0 77.0 217.2	33.0 77.0 215.6
TC-11	35.0 73.0 209.0	34.0 74.0 210.0
TC-12	N/A	
TC-14 (D-10)	37.4 75.2 208.4	37.8 75.2 209.0
TC-15	35.6 75.2 210.2	39.0 75.6 213.2
TC-16	37.4 75.2 208.4	38.2 75.8 208.8
TC-17 (IVORY)	34.0 75.0 213.0	34.5 75.0 213.0
TC-18 (BROWN)	35.0 74.0 213.0	35.0 75.0 213.0
TC-19	37.4 77.0 198.8	39.2 77.0 213.8
S-1A	33.0 73.0 208.0	34.5 75.0 208.5
S-2A	34.0 73.5 208.0	34.0 75.0 208.5
S-3A	34.0 73.0 207.0	34.5 75.0 208.0

S-4A	34.5	34.0
	74.0	75.0
	202.0	204.0
S-14A	34.0	34.0
	73.0	75.0
	209.0	210.0
S-15A	33.0	34.0
	73.0	75.0
	206.0	208.0
S-16A	34.0	35.0
	73.0	75.0
	209.0	209.0
S-17A	35.0	34.0
	73.0	75.0
	211.0	212.0
S-18A	34.0	34.0
	73.0	75.0
	208.0	208.5
S-19A	34.0	34.0
	73.0	75.0
	208.0	208.5
D-8	34.0	34.0
	74.0	75.0
	206.0	206.5

Thermometer Standard Serial Number: 128239
Thermometer NIST I.D. Number: 88024

METER BOX TEMPRATURE READOUT CALIBRATION

CALIBRATED BY: SOLANKI

DATE: 09-14-94

	Inlet (°F)	Outlet (°F)	Thermometer (°F)
	35.5	36.0	36.5
BOX 1A	74.0	74.0	75.0
	210.5	212.0	212.0
	31.0	31.0	33.8
BOX 2A	74.0	74.0	77.0
	212.0	214.0	213.8
	33.0	37.0	37.4
BOX 3A	70.0	70.0	73.0
	213.0	214.0	213.8
	32.0	30.0	34.7
BOX 4A	70.0	70.0	73.0
	211.0	213.0	212.0
	33.0	35.0	33.0
BOX 5A	73.0	74.0	73.0
	212.0	210.0	212.0

NOTE:
Thermometer Standard Serial Number: 128239
Thermometer NIST I.D. Number: 88024

EVER READY THERMOMETER CO., INC.
401 PARK AVENUE SOUTH
NEW YORK, NY 10016

REPORT OF CALIBRATION

LIQUID-IN-GLASS-THERMOMETER

CALIBRATED BY EVER READY THERMOMETER CO.

MARKED: ERTCO 611-3FC S/N-2269
RANGE: -20 TO +110 DEGREES C IN 1 DEGREE GRADUATIONS.

THERMOMETER READING	CORRECTION (ITS-90)**
0.0 C	0.0 C
37.0	-0.1
56.0	0.0

** ALL TEMPERATURES IN THIS REPORT ARE BASED ON THE INTERNATIONAL TEMPERATURE SCALE OF 1990 (ITS-90) PUBLISHED IN THE METROLGIA 27, NO. 1, 3/10/90.

THIS THERMOMETER WAS CALIBRATED AGAINST A STANDARD CALIBRATED AT THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) FORMERLY THE NATIONAL BUREAU OF STANDARDS (NBS).

FOR A DISCUSION OF ACCURACIES ATTAINABLE WITH SUCH THERMOMETERS SEE NBS MONOGRAPH 150.

IF NO SIGN IS GIVEN ON THE CORRECTION, THE TRUE TEMPERATURE IS HIGHER THAN THE INDICATED TEMPERATURE; IF THE SIGN GIVEN IS NEGATIVE, THE TRUE TEMPERATURE IS LOWER THAN THE INDICATED TEMPERATURE. TO USE THE CORRECTIONS PROPERLY, REFERENCE SHOULD BE MADE TO THE NOTES GIVEN BELOW.

THE THERMOMETER WAS TESTED IN A LARGE, CLOSED-TOP, ELECTRICALLY HEATED, LIQUID BATH, BEING "IMMERSED" 76MM. THE TEMPERATURE OF THE ROOM WAS ABOUT 25 DEGREES C (77 DEGREES F). IF THE THERMOMETER IS USED UNDER CONDITIONS WHICH WOULD CAUSE THE AVERAGE TEMPERATURE OF THE EMERGENT LIQUID COLUMN TO DIFFER MARKEDLY FROM THAT PREVAILING IN THE TEST, APPRECIABLE DIFFERENCES IN THE INDICATIONS OF THE THERMOMETER WOULD RESULT.

THE TABULATED CORRECTIONS APPLY PROVIDED THE ICE POINT READING IS 0.0 DEGREES C. IF THE ICE-POINT READING IS FOUND TO BE HIGHER (OR LOWER) THAN STATED, ALL OTHER READINGS WILL BE HIGHER (OR LOWER) TO THE SAME EXTENT.

TEST NUMBER: 140381
DATE: 06/21/90
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

EVER READY THERMOMETER CO.

Pitot Tube Calibration Data Sheet

Calibrated by: Solanki

Date: 8-30-94

Pitot Tube I.D. S-4A

Effective Length: 37"

Pitot Tube Assembly Level ? ☒ Yes ☐ No

Pitot Tube Openings Damaged ? ☐ Yes ☒ No

If Yes, Explain _____

α_1 = 0 °(<10°) α_2 = 0 °(<10°)

β_1 = 0 °(<10°) β_2 = 0 °(<10°)

γ = 0 ° θ = 0 ° A = 0.934" °

Z = A sin γ = 0 cm (in.) 0.32 cm (<⅛ in.)

W = A sin θ = 0 cm (in.) 0.08 cm (<1/32 in.)

P_A = 0.467 cm (in.)

P_B = 0.467 cm (in.)

D_t = 0.375 cm (in.)

Comments: _____

Calibration Required ? ☐ Yes ☑ No

DRY GAS METER AND ORIFICE CALIBRATION

Dry Gas Meter No.: 677169 Meter Box No.: 5A Reference Dry Gas Meter No.: 25507

Barometric Pressure: 29.50 Calibration Date: 8/8/94 Calibration Performed By: Solanki

Orifice Manometer Setting	Initial Reference DGM Reading	Final Reference DGM Reading	Reference Gas Volume	Initial DGM Reading	Final DGM Reading	Test DGM Volume	Temperature				Run Time	Flow Rate	Meter Gamma	Delta H @
							Reference DGM	DGM Inlet	DGM Outlet	DGM Average				
H = "H2O	V = ft3	V = ft3	Vr = ft3	V = ft3	V = ft3	Vd = ft3	tr = F	t = F	t = F	td	minutes	Q = cfm		
0.5	103.045	113.080	10.035	101.672	111.832	10.160	78	87	81	84	25.4	0.38	0.997	1.831
1.0	126.650	136.652	10.002	125.649	135.901	10.252	77	94	86	90	18.4	0.53	0.997	1.907
2.0	137.188	147.152	9.964	136.464	146.700	10.236	77	97	88	93	13.2	0.73	0.997	1.969
4.0	148.002	158.030	10.028	147.584	157.885	10.301	77	101	90	96	9.4	1.03	0.997	1.961

Average	0.997	1.917

MAGNEHELIC CALIBRATION CHECK

UNIT	LOW		MED		HIGH	
	Mag	Man	Mag	Man	Mag	Man
11-26-93						
R15E (0-1")	0.11	0.10	0.51	0.51	0.87	0.87
JW16 (0-1")	0.10	0.10	0.51	0.51	0.89	0.89
GF17 (0-0.5")	0.050	0.045	0.250	0.250	0.430	0.440
CA59 (0-4")	0.51	0.49	2.02	2.00	3.65	3.65
04-22-94						
R15E (0-1")	0.10	0.10	0.50	0.50	0.89	0.89
JW16 (0-1")	0.10	0.10	0.50	0.50	0.88	0.88
GF17 (0-0.5")	0.050	0.050	0.250	0.250	0.45	0.45
CA59 (0-4")	0.50	0.51	2.00	2.00	3.50	3.50
10-31-94						
R15E (0-1")	0.08	0.07	0.51	0.50	0.96	0.95
JW16 (0-1")	0.06	0.06	0.50	0.48	0.95	0.93
GF17 (0-0.5")	0.055	0.050	0.245	0.245	0.445	0.445
CA59 (0-4")	0.55	0.50	2.00	2.00	3.50	3.50

Readings in " H_2O

Reference: Oil Manometer - Dwyer #400-10
0-1" inclined, 1-10" vertical

SOURCE SAMPLING NOZZLE CALIBRATION

CALIBRATED/UPDATED BY: _____

DATE: 8/31/94

NOZZLE ID #	READING (INCHES) 1	2	3	AVERAGE DIAMETER	SHAPE	COMMENTS
05P	0.236	0.235	0.236	0.236	CURVED	
10Q	0.379	0.382	0.379	0.380	90	
12Q	0.383	0.382	0.381	0.382	90	
16	0.491	0.493	0.496		CURVED	NO GOOD
18P	0.493	0.493	0.496	0.494	CURVED	
21S	0.366	0.366	0.367	0.366	B.H.	
22S	0.495	0.496	0.496	0.496	B.H.	
23S	0.248	0.247	0.248	0.248	B.H.	
24Q	0.515	0.518	0.518	0.517	90	
26S	0.487	0.487	0.486	0.487	B.H.	
40P	0.220	0.221	0.223	0.221	90	
44PB	0.306	0.304	0.305	0.305	B.H.	
45PB	0.374	0.375	0.375	0.375	B.H.	
46PB	0.384	0.385	0.376		B.H.	NO GOOD
112			N/A		B.H.	
Q	0.140	0.139	0.140	0.140	B.H.	
Q1	0.140	0.140	0.140	0.140	B.H.	
Q2	0.140	0.140	0.140	0.140	B.H.	
X1	0.310	0.309	0.310	0.310	CURVED	
X2	0.371	0.370	0.369	0.370	CURVED	
X3	0.241	0.240	0.240	0.240	CURVED	
X4	0.240	0.240	0.239	0.240	CURVED	
X5	0.239	0.238	0.238	0.238	CURVED	
X6	0.269	0.270	0.268	0.269	CURVED	
X7	0.269	0.269	0.270	0.269	CURVED	
X8	0.333	0.332	0.331	0.332	CURVED	
X9	0.329	0.333	0.332	0.331	CURVED	
X10	0.353	0.353	0.352	0.353	CURVED	
X11	0.354	0.355	0.355	0.355	CURVED	
X12	0.320	0.320	0.320	0.320	CURVED	
X13	0.294	0.294	0.294	0.294	CURVED	
X14	0.295	0.296	0.294	0.295	CURVED	
X15	0.281	0.284	0.284	0.283	CURVED	
X16	0.246	0.247	0.248	0.246	CURVED	
X17	0.249	0.249	0.248	0.249	CURVED	
X18	0.176	0.178	0.178	0.177	CURVED	
X19	0.163	0.164	0.164	0.164	CURVED	
X20	0.190	0.190	0.191	0.190	CURVED	
X21	0.258	0.258	0.260	0.259	CURVED	
X22	0.277	0.278	0.277	0.277	CURVED	

PRECISION INSTRUMENT REPAIR CO
13414 WOODRUFF AVE., BELLFLOWER CA 90706
310/925-6672

PRECISION
INSTRUMENT
REPAIR

Certification Report
Of
Precision Balances and Scales

This is to certify that the balance calibrated is in compliance to US Government MIL-STD #45662A and N.I.S.T. Hanbook 44, Table 2 tolerences for devices I, II and III.

REPORT NUMBER: 4038
PURCHASE ORDER NUMBER:
COMPANY: PACIFIC ENVIRONMENTAL SERVICES
ADDRESS: 13100 BROOKS, SUITE 100
BALDWIN PARK, CA. 91706

DATE OF TEST: 11-23-94
TEMPERATURE: 65°F
R.H. 50%
NIST TRACEABLE STANDARD USED: CLASS 1 SET

SERIAL NUMBER OF STANDARD: L233

BALANCE MFG.	MODEL	SERIAL NUMBER
TORBAL	EA-1 ANALYTICAL BALANCE.	S/N 156636

CALIBRATION AS FOUND: 100 mg = 103.3 mg

CALIBRATED TO: 100 mg = 100.0 mg

LINEARITY: In Spec
MAXIMUM LOAD: In Spec 160 GRAMS
REPETEABILITY: In Spec

Date of Calibration 11-23-94 Technician TD Tom Benson License 1-0903