Source Test Report for Measurement of
Toxic Metals, 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.
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10/18/95

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 Neil Norcross, Siya Mokh, Steven Hernandez and Rachael Newman under the direction of S. Hugh Brown.

Approved: S. Hugh Brown

S. Hugh Brown, Director
Air Quality Testing

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 a petroleum byproduct material generated by Texaco Corporation.

The purpose of the test program was to evaluate the exhaust emissions resulting from a waste reduction process to be established in Canada. The source tests determined the particulate matter, total chromium, lead, manganese, copper, nickel, cadmium, beryllium, arsenic, selenium, molybdenum, silver, antimony, barium, thallium, zinc, nitrogen oxides, carbon monoxide, sulfur dioxide and total hydrocarbon (as C_3H_8) mass emission rates from the unit to atmosphere.

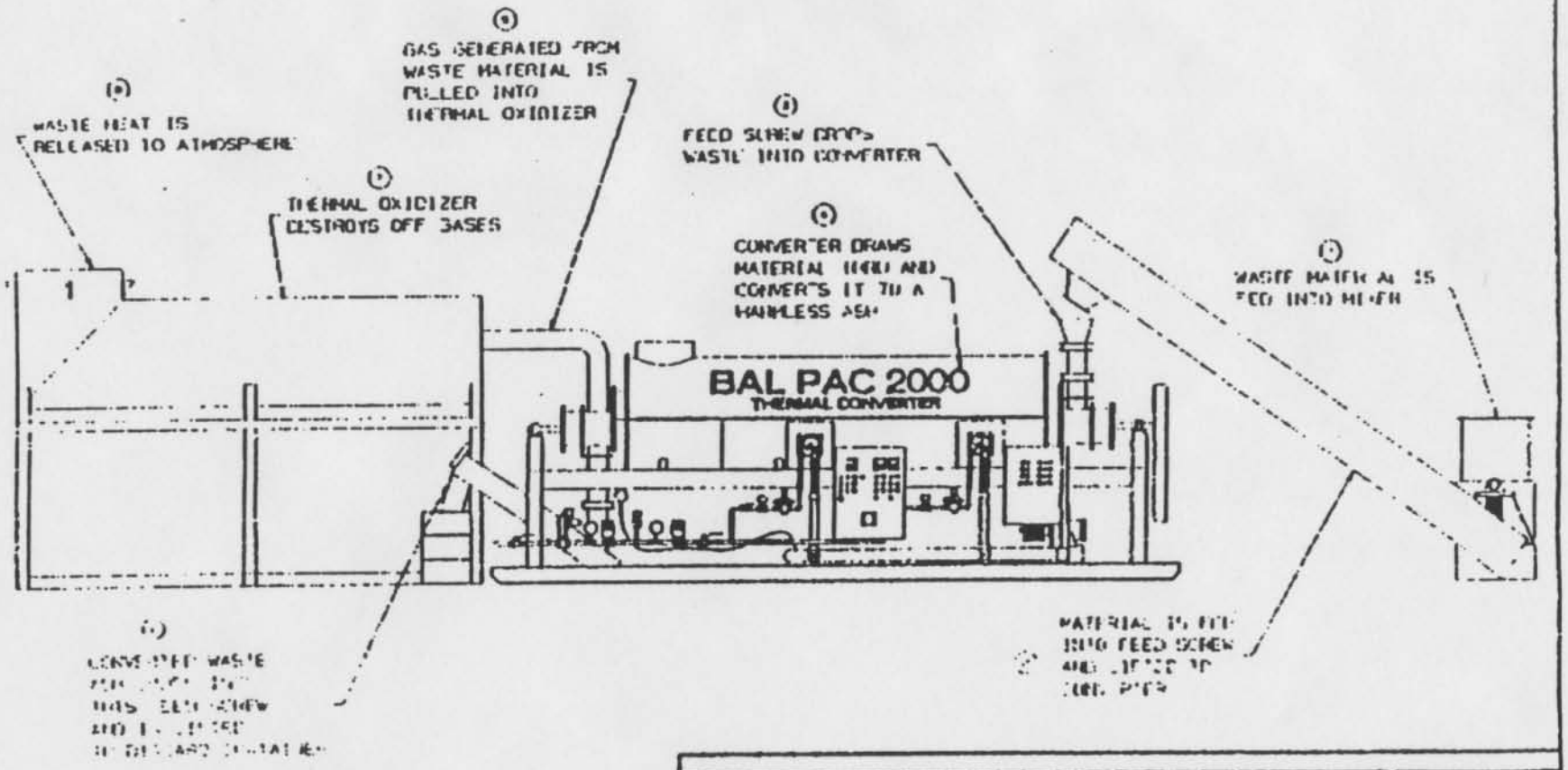
Pacific Environmental Services (PES), a participant in the California Air Resources Board (CARB) Independent Contractor Program and certified by the South Coast Air Quality Management District (SCAQMD) for various source testing, was hired by ATC Environmental Group, Inc. to perform the requested source 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 three separate batches of a petroleum byproduct material over three days of operation. Since there may have been differences in the composition of each batch of byproduct, one run for each parameter was conducted on each individual batch. A second test set consisting of triplicate test runs for each parameter was conducted on the pyrolysis of the char produced during the initial test set.

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 char, or as gas that is ducted to a thermal oxidizer via a particulate removal cyclone. The natural gas fired thermal oxidizer maintains a temperature of approximately 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.

PROCESS DIAGRAM



NOTE: THIS DRAWING REPRESENTS A BASIC LAYOUT OF THE BAL PAC UNIT. ACTUAL ORIENTATION OF COMPONENTS AND OTHER FEATURES OR OPTIONS ARE SUBJECT TO CHANGE.

Figure 1

BALBOA/PACIFIC CORP.

BAL PAC 2000 LAYOUT

TESTING METHODOLOGY

The approximate sampling port locations are shown in Figure 2. The number of traverse points required (6 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

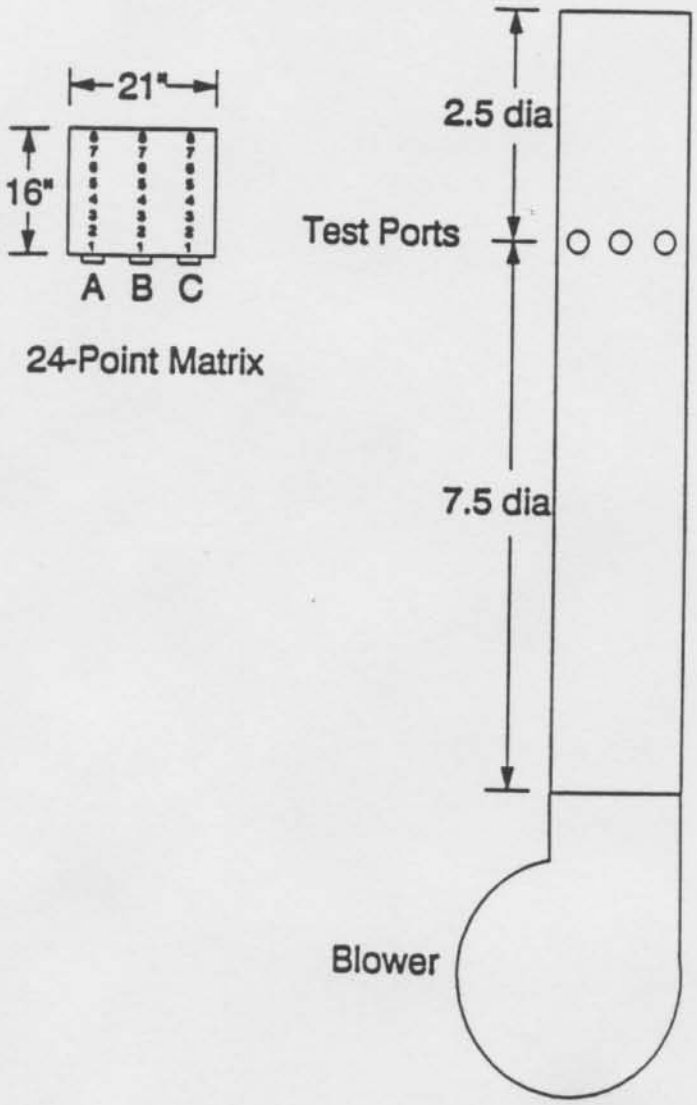
The particulate matter emissions of the waste heat boiler exhaust were determined by EPA Method 5. The sampling train is shown in Figure 3 and consisted of a glass nozzle, a Teflon union, an 36-inch glass probe, a tared Gelman type A/E glass fiber filter in a glass filter holder, a set of Greenburg-Smith impingers, a 30-foot umbilical line, a vacuum pump, a dry gas meter and a calibrated orifice connected to an inclined oil manometer. The heated probe and filter were 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 (4 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 recovered and placed in a plastic cassette. The sample train from the back half of the filter housing through the third impinger was rinsed three times with distilled water and these rinses were placed along with the impinger contents in a 1000-milliliter polyethylene container. Disposable vinyl gloves were worn during sample retrieval to help prevent contamination.

Balboa Pacific - ATC

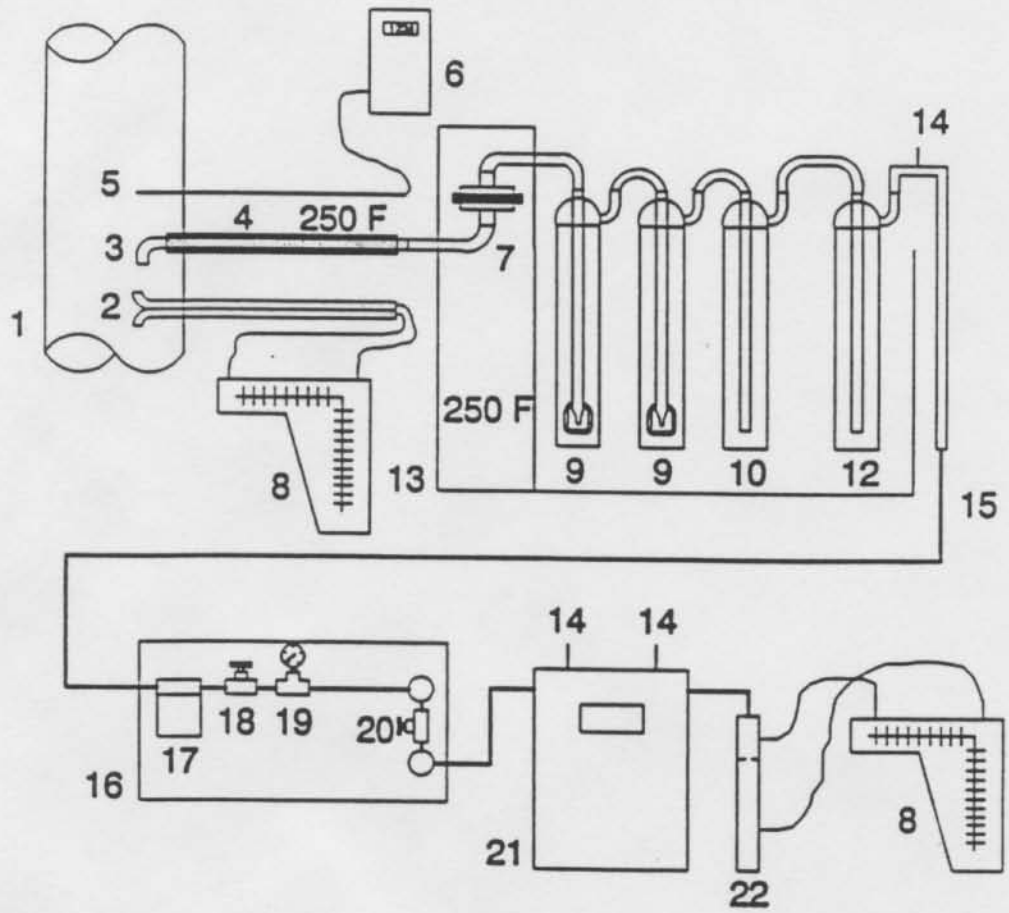


Pyrolyzer/Oxidizer/Waste Heat Boiler Exhaust

Figure 2

EPA METHOD 5

Particulate Matter



1. Stack
2. Pitot tube
3. Glass or quartz nozzle
4. SS probe w/glass liner
5. Thermocouple
6. Digital Potentiometer
7. Heated glass fiber filter
8. Inclined oil manometer
9. Greenberg/Smith impinger charged w/D.I. Water
10. Modified G/S impinger empty
11. (Reserved)
12. Modified G/S impinger charged w/silica gel
13. Ice bath
14. Thermocouple
15. Umbilical line
16. Sealed vacuum pump
17. Pump filter
18. Shut-off valve
19. Vacuum gage
20. Bypass metering valve
21. Dry gas meter
22. Orifice flow indicator

Figure 3

The acetone and aqueous 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).

Metals Sampling

The metals emissions of the oxidizer exhaust were determined by EPA Method 12 modified to incorporate the analyses for total chromium, lead, manganese, copper, nickel, cadmium, beryllium, arsenic, selenium, molybdenum, silver, antimony, barium, thallium and zinc. The sampling train is shown in Figure 4 and consisted of a borosilicate glass nozzle and probe, connected by a Teflon union, a glass filter holder connected to the first two impingers, two Greenburg-Smith impingers each charged with 100 mls of 0.1N nitric acid solution, an empty impinger, an impinger filled with silica gel, a 30-foot umbilical line, a vacuum pump, a dry gas meter and a calibrated orifice connected to an inclined oil manometer. Gelman A/E glass fiber filters were used in the filter holders.

Triplicate test runs were conducted and the samples were collected isokinetically for 120 minutes (5 minutes per point) generating a sample size of about 75 cubic feet. Field data was recorded on the data sheets presented in Appendix A, which also contains the calculation sheets. The velocity and temperature were measured at each traverse point as described previously for particulates.

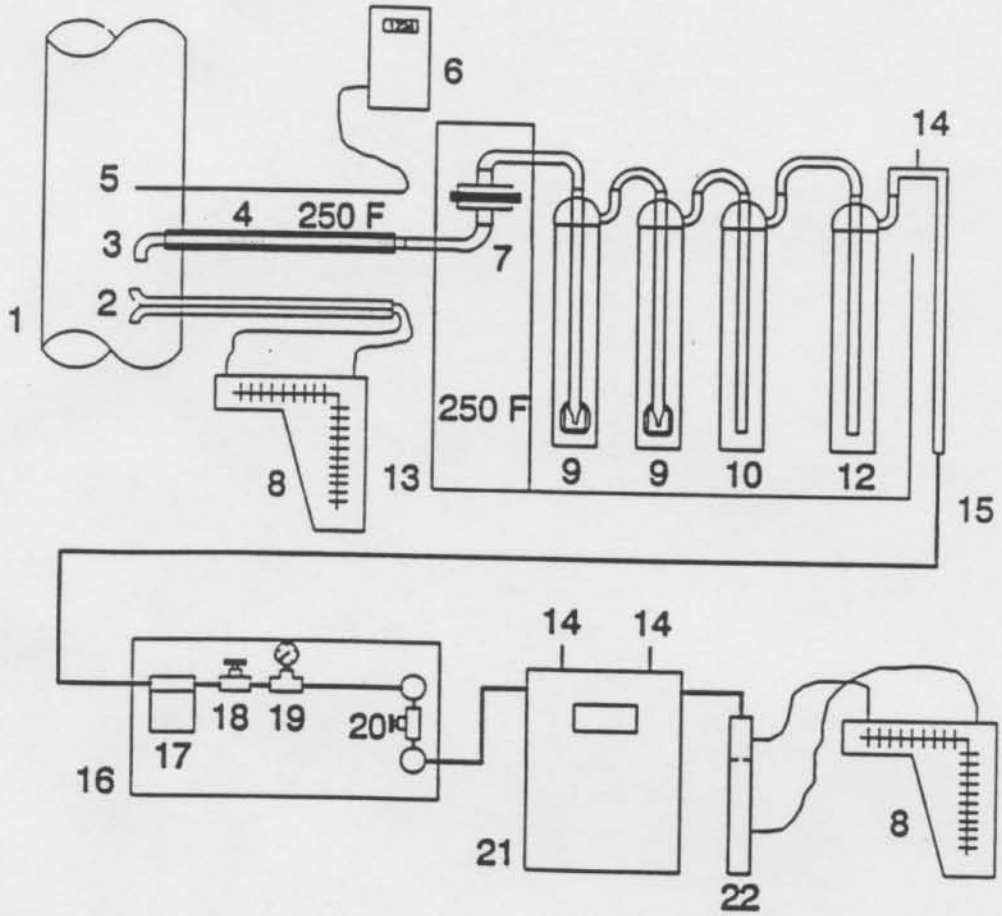
The weight of the impinger solution and the silica gel was recorded before and after the tests in order to obtain the moisture content of the stack gas stream. All sample weights were recorded immediately on sample recovery sheets (Appendix A) during charging and sample recovery. Leak checks were performed before and after the test.

After the test, the contents of each impinger set was placed in a 1000 ml. borosilicate glass container. The sampling train was then rinsed from the 3rd impinger to the nozzle with the 0.1N nitric acid solution and the rinse were added to the sample. The filter was recovered and placed in a separate container. The impinger solution and filter were kept refrigerated prior to the analyses in order to prevent degradation of the sample. Disposable vinyl gloves were worn during sample retrieval to help prevent contamination.

Laboratory analyses were conducted by West Coast Analytical Service, Inc., in Sante Fe Springs, California. Total chromium, lead, manganese, copper, nickel, cadmium, beryllium, arsenic, selenium, molybdenum, silver, antimony, barium, thallium and zinc determinations were made by ICP/MS. The laboratory report is included in Appendix B.

EPA METHOD 12

Metals



1. Stack
2. Pitot tube
3. Glass or quartz nozzle
4. SS probe w/glass liner
5. Thermocouple
6. Digital Potentiometer
7. Heated glass fiber filter
8. Inclined oil manometer
9. Greenberg/Smith impinger charged w/0.1N HNO3
10. Modified G/S impinger empty
11. (Reserved)
12. Modified G/S impinger charged w/silica gel
13. Ice bath
14. Thermocouple
15. Umbilical line
16. Sealed vacuum pump
17. Pump filter
18. Shut-off valve
19. Vacuum gage
20. Bypass metering valve
21. Dry gas meter
22. Orifice flow indicator

Figure 4

Continuous Monitoring

The pyrolytic chamber waste heat boiler exhaust was monitored for total hydrocarbons, CO, CO_2, O_2, SO_2 and NOx by EPA Methods 25A, 10, 3A, 6C and 7E, respectively. A JUM Model VE-7 heated total hydrocarbon analyzer was used to determine the total hydrocarbons, two 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, CO_2 and O_2 is shown in Figure 5 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 output of the analyzers was logged by a Yokogawa Model HR2400 multi-channel recorder and a Rustrak Ranger II data logger. The data logger information was used to determine the arithmetic means for each analyzer run and to generate graphs of the concentration versus time (see Appendix A).

The NOx and CO analyzers were operated in the respective ranges of 0-50 ppmv and 0-100 ppmv with span gases at about 50 and 90 percent of span. The SO_2 analyzer was operated in the 0-100 ppmv range with span gases of about 50 and 90 percent of span. The O_2 analyzer was operated on a range of 0-25 percent with span gases at about 10 and 18 per cent. The CO_2 analyzer was operated on a range of 0-20 per cent with span gases at about 10 and 18 per cent. 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 prior to the start of testing. A zero and mid-span bias check were conducted before and after each test run. Calibration correction calculations were preformed in accordance with EPA Method 6C for each instrument.

The total hydrocarbons (THC) were determined by EPA Method 25A. The THC concentrations were monitored with a JUM Model VE-7 total hydrocarbon analyzer that utilized a heated Teflon sample line and 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 6). The instrument was used on the 0-100 ppmv range and calibrated with zero, high, mid, and low span gases. The output of the analyzer was connected to a Rustrak Ranger II data logger for continuous monitoring of the total hydrocarbons. The data logger

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 +/- 1% calibration gas
Output	NO 0-5.0 Vdc NOx 0-0.5 Vdc

SO2 Photometric Analyzer - Bovar Engineering Model 721M

Response Time	1.5 sec
Zero Drift	+/- 0.5% after warm up (30 min)
Span Drift	+/- 0.5% of full scale
Linearity	+/- 0.5% up to 1000 ppm
Accuracy	+/- 1% of full scale
Output	0-10.0 Vdc

O2 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 +/- 1% calibration gas
Output	0-1.0 Vdc

CO/CO2 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 +/- 1% calibration gas
Output	0-1.0 Vdc

Table 1 (cont'd)

Continuous 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 +/- 1% calibration gas
Sensitivity	1 ppb
Range Change Consistency	Less than 1% Full Scale
Oxygen Synergism	Less than 2%
Output	0-10.0 Vdc Scaled:
	R_1 0-10 ppm as C_3
	R_2 0-100 ppm as C_3
	R_3 0-1,000 ppm as C_3
	R_4 0-10,000 ppm as C_3
	R_5 0-100,000 ppm as C_3
Sample Flow Rate	3 Liters/Minute

CONTINUOUS MONITORING SYSTEM

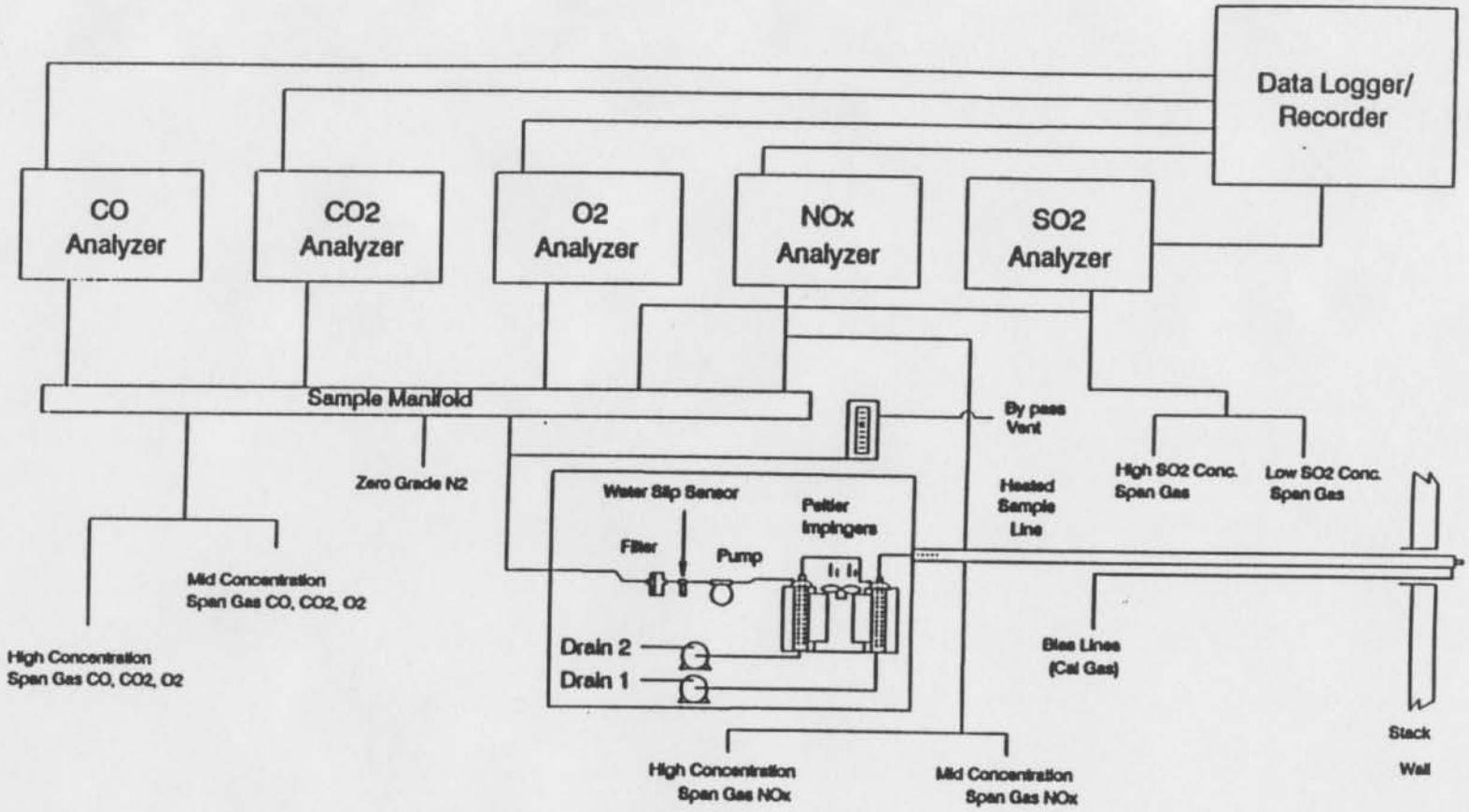


Figure 5

TOTAL HYDROCARBON SAMPLING TRAIN
EPA Method 25A

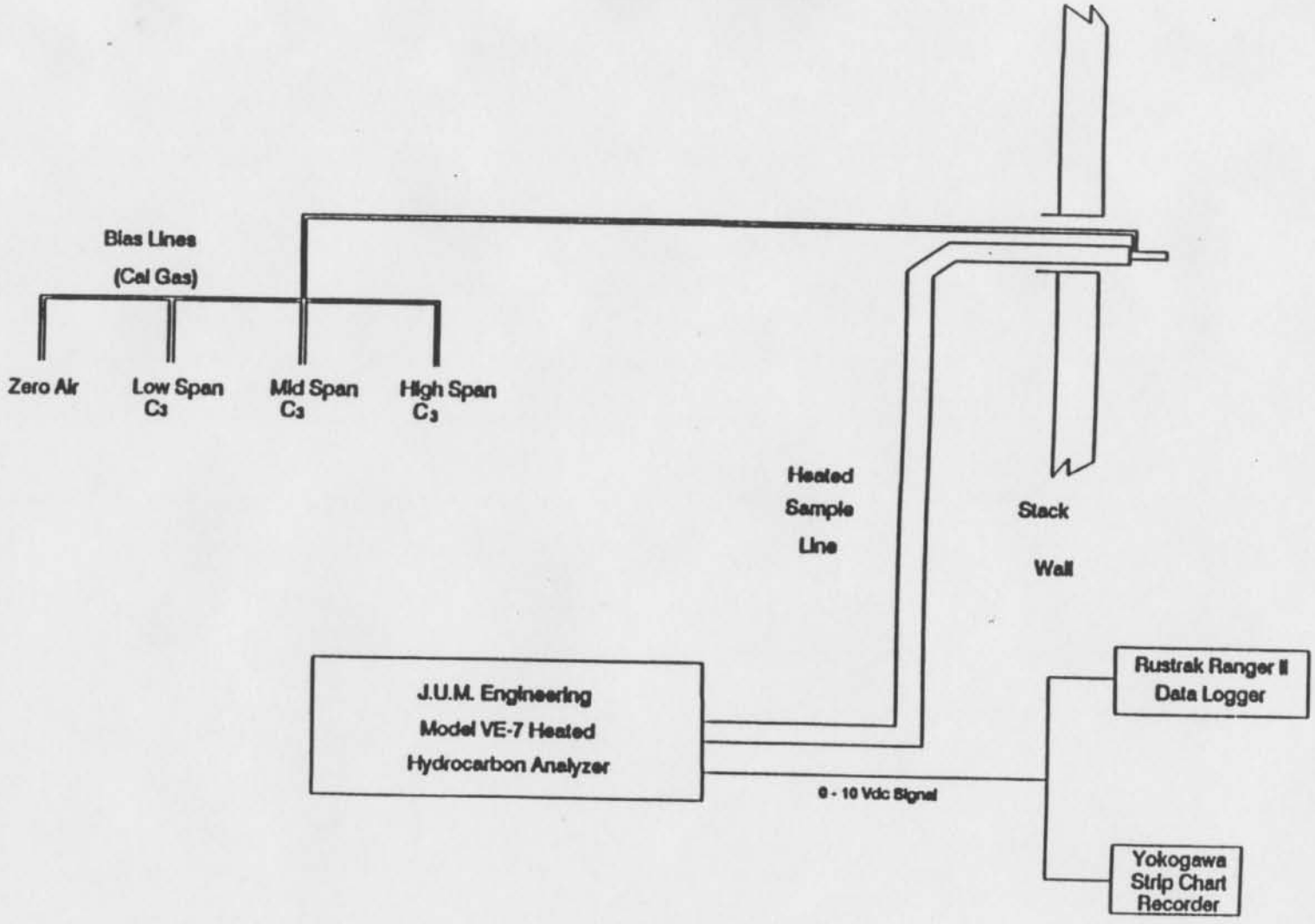


Figure 6

PACIFIC ENVIRONMENTAL SERVICES, INC.

information was used to determine the arithmetic means for each analyzer run and to generate graphs of the concentration versus time (see Appendix A). The hydrocarbon concentrations were monitored for about a 60-minute period.

Each THC measurement was taken at a single point near the center of the duct. The analyzer was spanned before and after the test run and a bias check was performed with one span gas to check the sample line for leakage.

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.

Tables 2 and 3 summarize the results of the source tests for particulates on the initial material and the char, respectively. The results of the testing are presented along with the stack conditions present during sampling. The particulate emissions are presented in grains per dry standard cubic foot (grains/DSCF) and pounds per hour (lbs/hr).

Tables 4 and 5 summarize the results of the source tests for the gaseous components on the initial material and the char, respectively. The results of the testing for nitrogen oxides, carbon monoxide, sulfur dioxide, carbon dioxide, oxygen and total hydrocarbons are presented in parts per million by volume (ppmv) and pounds per hour (lbs/hr).

Tables 6 and 7 summarize the results of the source tests for multiple metals on the initial material and the char, respectively. The results of the testing are presented along with the stack conditions present during the sampling period. The metals emissions are presented in milligrams per dry standard cubic meter (mg/DSCM) and milligrams per hour (mg/hr).

TABLE 2

Balboa Pacific/ATC Pyrolysis Unit
Oxidizer Exhaust
Particulate Emissions
Initial Pyrolysis

Date:	9/12/95	9/13/95	9/14/95
Test Number:	Batch 1	Batch 2	Batch 3
Sample Number:	ATC-2	ATC-4	ATC-6
Flue Gas			
Temperature, °F	374	378	382
Velocity, ft/sec	10.2	10.5	10.5
Static Pressure, in. H_2O	-0.02	-0.02	-0.02
Duct Area, sq. ft.	2.33	2.33	2.33
Flow Rate, ACFM	1,430	1,470	1,470
Flow Rate, DSCFM	844	874	872
Moisture, % v/v	6.4	5.4	5.4
CO2, %	2.8	2.7	2.9
O2, %	16.1	16.4	16.3
Particulate Matter			
Sample Start	1635	1430	1120
Sample Stop	1750	1554	1330
Sampling Time, min.	72	72	72
Sample Volume, DSCF	35.6	36.9	36.9
Isokinetic Rate, %	101	101	101
Concentration, grains/DSCF			
w/condensibles	0.0026	0.0112	0.0015
w/o condensibles	0.0008	0.0097	0.0008
Emission Rate, lbs/hr			
w/condensibles	0.019	0.084	0.012
w/o condensibles	0.006	0.073	0.006

TABLE 3

Balboa Pacific/ATC Pyrolysis Unit
Oxidizer Exhaust
Particulate Emissions
Char Pyrolysis

Date:	10/3/95	10/4/95	10/4/95
Test Number:	1	2	3
Sample Number:	PM-1	PM-2	PM-3
Flue Gas			
Temperature, °F	437	378	379
Velocity, ft/sec	7.8	9.8	11.7
Static Pressure, in. H_2O	-0.005	-0.01	-0.03
Duct Area, sq. ft.	2.33	2.33	2.33
Flow Rate, ACFM	1,080	1,360	1,630
Flow Rate, DSCFM	597	796	953
Moisture, % v/v	6.0	6.7	6.6
CO2, %	2.7	2.7	2.7
O2, %	16.0	16.1	16.0
Particulate Matter			
Sample Start	0942	1015	1456
Sample Stop	1100	1133	1614
Sampling Time, min.	72	72	72
Sample Volume, DSCF	27.0	36.1	40.4
Isokinetic Rate, %	110	110	103
Concentration, grains/DSCF			
w/condensibles	0.0038	0.0039	0.0021
w/o condensibles	0.0031	0.0025	0.0018
Emission Rate, lbs/hr			
w/condensibles	0.019	0.026	0.017
w/o condensibles	0.016	0.017	0.015

TABLE 4

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

Date:	9/12/95	9/13/95	9/14/95
Test Number:	Batch 1	Batch 2	Batch 3
Sample Start	2111	1520	1215
Sample Stop	2211	1620	1315
Sampling Time, min.	60	60	60
Concentration, %			
Carbon Dioxide	2.8	2.7	2.9
Oxygen	16.1	16.4	16.3
Concentration, ppmv			
Carbon Monoxide	62.8	38.2	37.8
Total HC (as C_3)	8.1	0.2	0.3
Sulfur Dioxide	0.0	0.7	0.0
Nitrogen Oxides	28.3	26.2	30.9
Emission Rate, lbs/hr			
Carbon Monoxide	0.23	0.15	0.17
Total HC (as C_3)	0.05	0.01	0.01
Sulfur Dioxide	0.00	0.01	0.00
Nitrogen Oxides	0.17	0.17	0.23

TABLE 5

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

Date:	10/3/95	10/3/95	10/3/95
Test Number:	1	2	3
Sample Start	1148	1346	1540
Sample Stop	1248	1446	1640
Sampling Time, min.	60	60	60
Concentration, %			
Carbon Dioxide	2.7	2.7	2.7
Oxygen	16.0	16.1	16.0
Concentration, ppmv			
Carbon Monoxide	32.0	28.1	28.6
Total HC (as C_3)	3.8	3.0	3.3
Sulfur Dioxide	0.5	0.1	0.3
Nitrogen Oxides	27.6	23.5	23.3
Emission Rate, lbs/hr			
Carbon Monoxide	0.08	0.10	0.12
Total HC (as C_3)	0.02	0.02	0.02
Sulfur Dioxide	0.02	0.02	0.03
Nitrogen Oxides	0.12	0.14	0.16

TABLE 6

Balboa Pacific/ATC Pyrolysis Unit
Oxidizer Exhaust
Toxic Metals Emissions
Initial Pyrolysis

Date:	9/13/95	9/14/95	9/15/95
Test Number:	Batch 1	Batch 2	Batch 3
Sample Number:	ATC-3	ATC-6	ATC-7
Flue Gas			
Temperature, °F	388	393	384
Velocity, ft/sec	9.4	12.5	11.1
Static Pressure, in. H_2O	-0.02	-0.02	-0.02
Duct Area, sq. ft.	2.33	2.33	2.33
Flow Rate, ACFM	1,320	1,750	1,550
Flow Rate, DSCFM	766	1,010	909
Moisture, % v/v	6.4	6.2	6.1
CO2, %	2.8	2.7	2.9
O2, %	16.1	16.4	16.3
Metals			
Sample Start	1125	1120	1047
Sample Stop	1335	1330	1253
Sampling Time, min.	120	120	120
Sample Volume, DSCF	54.3	70.8	62.7
Isokinetic Rate, %	103	101	100
Concentration, mg/DSCM			
Copper	8.30E-4	4.52E-4	2.72E-4
Chromium	4.61E-4	3.83E-4	4.66E-4
Lead	4.01E-4	2.43E-4	2.41E-4
Zinc	3.18E-3	1.67E-3	2.25E-3
Manganese	1.84E-4	1.39E-4	1.94E-4
Nickel	3.83E-4	1.63E-4	2.02E-4
Cadmium	< 9.22E-5	1.74E-4	1.94E-4
Beryllium	< 4.61E-5	< 3.48E-5	< 3.88E-5
Arsenic	1.06E-4	1.01E-4	9.32E-5
Selenium	< 3.23E-4	< 2.43E-4	< 2.72E-4
Molybdenum	3.88E-2	8.69E-2	9.59E-2
Silver	< 4.61E-6	< 3.48E-6	< 3.88E-6
Antimony	< 1.38E-4	< 1.04E-4	< 1.17E-4
Barium	1.50E-3	1.15E-3	1.33E-3
Thallium	< 4.61E-06	< 3.48E-06	< 3.88E-6

TABLE 6 (cont'd)

Balboa Pacific/ATC Pyrolysis Unit
Oxidizer Exhaust
Toxic Metals Emissions
Initial Pyrolysis

Date:	9/13/95	9/14/95	9/15/95
Test Number:	Batch 1	Batch 2	Batch 3
Sample Number:	ATC-3	ATC-6	ATC-7
Emission Rate, mg/hr			
Copper	1.1	0.8	0.4
Chromium	0.6	0.7	0.7
Lead		0.5	0.40.4
Zinc	4.1	2.9	3.5
Manganese	0.2	0.2	0.3
Nickel	0.5	0.3	0.3
Cadmium	< 0.1	0.3	0.3
Beryllium	< 0.1	< 0.1	< 0.1
Arsenic	0.1	0.2	0.1
Selenium	< 0.4	< 0.4	< 0.4
Molybdenum	51	150	150
Silver	< 0.1	< 0.1	< 0.1
Antimony	< 0.2	< 0.2	< 0.2
Barium	2.0	2.0	2.1
Thallium	< 0.1	< 0.1	< 0.1

TABLE 7

Balboa Pacific/ATC Pyrolysis Unit
Oxidizer Exhaust
Toxic Metals Emissions
Char Pyrolysis

Date:	10/3/95	9/14/95	9/15/95
Test Number:	Set 2	Set 2	Set 2
Sample Number:	MM1/ATC2	MM2/ATC2	MM3/ATC3
Flue Gas			
Temperature, °F	381	383	380
Velocity, ft/sec	9.4	12.1	9.8
Static Pressure, in. H_2O	0.01	0.04	-0.02
Duct Area, sq. ft.	2.33	2.33	2.33
Flow Rate, ACFM	1,320	1,690	1,380
Flow Rate, DSCFM	776	990	801
Moisture, % v/v	5.9	6.3	6.7
CO2, %	2.7	2.7	2.7
O2, %	16.0	16.1	16.0
Metals			
Sample Start	1100	1415	1220
Sample Stop	1336	1618	1425
Sampling Time, min.	120	120	120
Sample Volume, DSCF	58.4	70.3	57.4
Isokinetic Rate, %	105	99.6	100
Concentration, mg/DSCM			
Copper	5.46E-4	3.21E-4	4.41E-4
Chromium	2.73E-4	< 2.14E-4	3.09E-4
Lead	5.77E-4	2.67E-4	< 1.76E-4
Zinc	4.96E-3	2.32E-3	2.16E-2
Manganese	1.82E-4	1.43E-4	1.32E-4
Nickel	4.09E-4	< 3.21E-4	8.37E-4
Cadmium	1.36E-5	1.07E-4	< 3.09E-4
Beryllium	< 4.55E-5	< 3.57E-5	< 1.32E-4
Arsenic	< 4.55E-6	< 3.57E-6	2.20E-5
Selenium	< 4.55E-4	< 3.57E-4	< 8.81E-4
Molybdenum	3.64E-2	2.11E-2	1.32E-1
Silver	< 4.55E-6	< 3.57E-6	< 4.41E-6
Antimony	< 9.09E-5	< 7.13E-5	< 1.32E-4
Barium	1.82E-4	1.07E-4	6.17E-4
Thallium	< 9.09E-06	< 7.13E-06	< 4.41E-6

TABLE 7 (cont'd)

Balboa Pacific/ATC Pyrolysis Unit
Oxidizer Exhaust
Toxic Metals Emissions
Char Pyrolysis

Date:	10/3/95	9/14/95	9/15/95
Test Number:	Set 2	Set 2	Set 2
Sample Number:	MM1/ATC2	MM2/ATC2	MM3/ATC3
Emission Rate, mg/hr			
Copper	0.72	0.54	0.60
Chromium	0.36	< 0.36	0.42
Lead	0.76	0.45	< 0.24
Zinc	6.5	3.9	29
Manganese	0.24	0.24	0.18
Nickel	0.54	< 0.54	1.1
Cadmium	0.18	0.18	< 0.42
Beryllium	< 0.06	< 0.06	< 0.18
Arsenic	< 0.01	< 0.01	0.03
Selenium	< 0.60	< 0.60	< 1.2
Molybdenum	48	36	180
Silver	< 0.01	< 0.01	< 0.01
Antimony	< 0.12	< 0.12	< 0.18
Barium	0.24	0.18	0.84
Thallium	< 0.01	< 0.01	< 0.01

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, EPA Method 12 was used to determine the metals emissions, 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 C along with those for the nozzles, 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 downstream 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

Plant ATC - Bal. Pass.
Date 7-12-95
Sampling Location WHB Exhaust
Sample Type EPA 5
Run Number ATC-2
Operator NN
Ambient Temperature 90
Barometric Pressure 29.87
Static Pressure -0.02
Filter Number(s)
Pretest Leak Rate 0.006 CFM @ 5 in. Hg
Read And Record All Data Every 3 Minutes

Schematic of Traverse Point Layout

Probe Length and Type 2' Glass
Pitot Tube I.D. No. S-3B
Nozzle I.D. No. And Diameter 16 0.475
Assumed Moisture, % 6
Meter Box Number 1A
Meter Delta H@ 1.861
C Factor —
Meter Gamma 1.021
Heater Box Setting 250
Reference Delta P —
Post test Leak Rate 0.005 CFM @ 7 in. Hg
Impinger Box No. 9513 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)
1	0	1635	905.723	0.02	0.86	0.86	324	106	105	2.0	236	249	60
2	3		908.332	0.015	0.64	0.64	323	106	103	2.0	234	245	57
3	6		910.692	0.010	0.43	0.43	340	106	104	2.0	234	249	56
4	9		913.223	0.020	0.86	0.86	342	108	105	2.0	240	249	55
5	12		910.544	0.015	0.64	0.64	388	107	104	2.0	235	251	57
6	15		911.975	0.015	0.64	0.64	395	108	106	2.0	241	252	56
7	18		913.392	0.020	0.86	0.86	394	109	106	2.0	242	252	55
8	21		914.911	0.010	0.43	0.43	393	109	106	2.0	243	252	57
1	24	1657/1700	916.268	0.010	0.43	0.43	327	107	105	2.0	242	251	55
2	27		917.476	0.010	0.43	0.43	356	108	102	2.0	240	251	53
3	30		918.563	0.015	0.64	0.64	353	108	105	2.0	242	250	55
4	33		920.018	0.015	0.64	0.64	377	108	106	2.0	243	251	57
5	36		922.370	0.020	0.86	0.86	394	109	105	2.0	242	251	57
6	39		922.923	0.015	0.64	0.64	394	109	105	2.0	246	252	56
7	42		924.325	0.020	0.86	0.86	395	110	106	2.0	243	251	57
8	45		925.897	0.020	0.86	0.86	396	109	105	2.0	244	252	59
1	48	1724/1726	927.473	0.020	0.86	0.86	341	107	105	2.0	240	253	60
2	51		929.155	0.020	0.86	0.86	371	107	104	2.0	243	252	57
3	54		930.634	0.030	1.28	1.28	372	108	105	3.0	241	252	55
4	57		932.426	0.035	1.50	1.50	396	109	105	3.5	241	252	56
5	60		934.419	0.040	1.71	1.71	392	109	105	3.5	241	252	57
6	63		936.442	0.050	2.14	2.14	395	109	105	4.5	244	252	57
7	66		938.775	0.050	2.14	2.14	396	110	105	4.5	243	252	57
8	69		941.170	0.040	1.71	1.71	391	110	104	4.0	241	252	56
	72	1750	943.354										

θ = 72 V_m = 37.431 $\sqrt{\Delta P}$ = 0.145 ΔH = 0.955 T_s = 374 + 460 = 834 T_m = 107 + 460 = 567

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RETRIEVAL DATA

Plant: Balboa Pacific Corporation
Date: 9.12.94
Sampling Location:
Sampling Type (Method): EPA 5
Run Number: ATC-2
Sample Box Number: 5B
Clean-up Man: NN
Job Number:
Comments: Scale 765
Cal 794.9

Filter

Filter Number: 0.4574
Description of Filter:

Moisture

	#1	#2	#3
Impingers:			
Final Volume:	614.5 mL	545.1 mL	517.1 mL
Initial Volume:	584.9 (100) mL	537.9 (100) mL	514.2 (0) mL
Net Volume:	29.6 mL	7.2 mL	2.9 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	783.3 g	g	g
Initial Volume:	771.5 g	g	g
Net Volume:	11.8 g	g	g
Total Moisture:	g	g	g

51.5

Description of Inpinger catch:

PES Inc.

EPA Methods 5 Calculations

Plant	ATC - Balboa Pacific
Project #	5102
Operation	Pyrolytic Waste Incinerator
Run	1 - Particulate
Location	Santa Fe Springs, CA
Date	9/12/95

Emission Data

Vlc =	51.5	cc	Vol. of H2O collected (impingers)
Vm =	37.431	cf	Dry gas meter reading
Pb =	29.87	in. Hg	Barometric pressure
Ps =	29.87	in. Hg	Stack pressure
dP =	0.145		Average sq.rt delta P
dH =	0.955	in. H2O	Average draft gauge reading
Tm =	566.6	R	Average meter temperature
Ts =	833.60	R	Average stack temperature
Dn =	0.499	in.	Nozzle diameter
Y =	1.021		Meter calibration factor
t =	72	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

1) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	35.62	cu.ft
	1.01	cu.m

2) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) =	2.42	scf

3) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.064

4) Molecular weight of the stack gas on a dry basis Md.

Ms = ((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))

Ms = 29.10

Instrumental gas analysis

% CO2	2.83
% CO	0
% O2	16.06
% N2	81.11

5) Average stack gas velocity.

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 10.20 ft/sec

6) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1425.71 cfm
40.38 cmm

7) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 844.05 dscfm
23.90 dscmm

8) Analytical data

a) Front half acetone wash

0.0013	g	wash net wt
0	g	acetone blank net wt
100	ml	blank vol.
152	ml	Final wash volume
152	ml	aliquot
0.0013	g	soluble particulate*

b) Front half glass microfibre filter

0.0006	g	filter net wt

c) Back half water wash - soluble

0.0041	g	net wt
0	g	water blank net wt
220	ml	blank vol
550	ml	Final wash volume
550	ml	aliquot
0.0041	g	soluble net wt*

* Weights are not blank corrected

9) Particulate concentrations

0.0008	grains/dscf	Front 1/2
0.0026	grains/dscf	Total

11) Particulate emission rate

Conc.*(1 lb/7000 gr)* Qstd *60 min/hr

W =	0.006	lbs/hr	Front 1/2
W =	0.019	lbs/hr	Total Particulate

12) Isokinecity

An =	0.001	ft^2	Area of nozzle orifice

% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

% I = 100.61

Plant ATC - Bal Pac
Date 9.15.94
Sampling Location WHB Exhaust
Sample Type EPA 17
Run Number ATC-7
Operator UN
Ambient Temperature 80
Barometric Pressure 29.85
Static Pressure -0.02
Filter Number(s)
Pretest Leak Rate 0.018 CFM @ 5 in. Hg
Read And Record All Data Every 5 Minutes

Schematic of Traverse Point Layout

Probe Length and Type 3' Glass
Pitot Tube I.D. No. S-2A
Nozzle I.D. No. And Diameter N-6 0.495
Assumed Moisture, % 6
Meter Box Number 1A
Meter Delta H@ 1.861
C Factor —
Meter Gamma 1.021
Heater Box Setting 250
Reference Delta P —
Post test Leak Rate 0.016 CFM @ 5.5 in. Hg
Impinger Box No. 3B 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)
1	0	1043	167.221	0.02	0.41	0.41	370	97	95	2.0	226	250	60
2	5	1048	169.677	0.02	0.83	0.83	378	97	96	2.0	244	255	57
3	10	1053	167.092	0.03	1.24	1.24	390	98	97	2.0	255	253	60
4	15	1102	170.015	0.025	1.04	1.04	399	100	97	2.0	255	263	58
5	20	1107	173.223	0.02	0.83	0.83	405	103	99	2.0	255	255	56
6	25	1112	175.635	0.02	0.83	0.83	406	104	99	2.0	252	242	53
7	30	1117	178.175	0.02	0.83	0.83	406	105	100	2.0	253	247	58
8	35	1122	180.725	0.02	0.83	0.83	405	107	101	2.0	252	258	55
1	40	1127/1128	183.274	0.01	0.41	0.41	356	106	103	2.0	247	234	60
2	45	1133	185.095	0.01	0.41	0.41	366	107	103	2.0	248	262	60
3	50	1140	186.765	0.01	0.41	0.41	389	107	103	2.0	249	257	57
4	55	1141	188.554	0.015	0.62	0.62	406	108	104	2.0	251	266	55
5	60	1150	190.462	0.025	1.04	1.04	410	108	105	2.0	254	264	57
6	65	1155	193.875	0.03	1.24	1.24	409	111	104	2.0	251	271	54
7	70	1200	196.451	0.03	1.24	1.24	410	112	107	3.0	251	263	55
8	75	1205	199.503	0.03	1.24	1.24	411	113	107	3.0	253	265	56
1	80	1210/1213	202.547	0.015	0.62	0.62	309	112	108	3.0	247	254	60
2	85	1214	204.755	0.02	0.83	0.83	339	111	108	2.0	248	257	66
3	90	1223	208.265	0.025	1.04	1.04	372	112	108	3.0	247	256	54
4	95	1228	210.222	0.035	1.45	1.45	398	112	108	3.0	251	257	64
5	100	1233	213.465	0.040	1.66	1.66	405	113	107	4.0	247	256	56
6	105	1238	216.917	0.045	1.87	1.87	407	113	108	4.5	247	254	57
7	110	1243	220.622	0.05	2.07	2.07	406	112	108	5.0	243	223	59
8	115	1248	224.471	0.056	2.28	2.28	403	113	108	5.0	248	268	60
	120	1253	228.546										

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RETRIEVAL DATA

Plant: ATC
Date: 9.15.95
Sampling Location:
Sampling Type (Method): EPA 17
Run Number: ATC-7
Sample Box Number: 3R
Clean-up Man: NN
Job Number:
Comments: Sample F 997.4
T 340.0

Filter

Filter Number:
Description of Filter:

Moisture

Impingers:			
Final Volume:	702.3 mL	620.9 mL	480.3 mL
Initial Volume:	640.6 mL	614.3 mL	479.5 mL
Net Volume:	61.7 mL	6.6 mL	1.8 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	700.1 g	g	g
Initial Volume:	684.0 g	g	g
Net Volume:	16.1 g	g	g
Total Moisture:	78.2 g	g	g

Description of Inpinger catch:

PES, Inc.
Multi-Metals Method Calculations (EPA 12)

Plant	ATC-Balboa Pacific
Project #	5102
Operation	Pyrolytic Oxidation Unit
Run	Batch 1
Location	Outlet
Date	9/13/95

Test Data

Vlc =	79.4	cc	Vol. of H2O collected (impingers)
Vm =	57.373	cf	Dry gas meter reading
Pb =	29.85	in. Hg	Barometric pressure
Ps =	29.85	in. Hg	Stack pressure
dP =	0.131		Average sq.rt delta P
dH =	0.794	in. H2O	Average draft gauge reading
Tm =	569.1	R	Average meter temperature
Ts =	848.25	R	Average stack temperature
Dn =	0.495	in.	Nozzle diameter
Y =	1.021		Meter calibration factor
t =	120	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

Instrumentation Data

[O2] =	16.1	%
[CO2] =	2.8	%

CALCULATIONS

1) Volume of gas sampled at standard conditions, Vmstd
Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	54.31	cu.ft
	1.54	cu.m

2) Volume of water vapor collected at standard conditions.
Vw(std) = K2 * Vlc

Vw(std) = 3.74 scf

3) Decimal fraction of moisture by volume in stack gas
Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.064

4) Molecular weight of the stack gas on a dry basis Md.
Md = (1-Bws)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Bws)

Md = 28.38

5) Average stack gas velocity.
vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 9.43 ft/sec

6) Average actual stack gas volumetric flowrate.
Q = 60 * vs * As

Q = 1317.85 cfm
37.32 cmm

7) Average stack gas dry volumetric flowrate.
Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 765.66 dscfm
21.68 dscmm

8) Toxic metal concentrations and emission rates

Element	Sample Mass (ug)	Blank Mass (ug) DL	Conc. (mg/dscm)	Emission Rate (mg/hr)
Copper	18.00	1.00	8.30E-04	1.1E+00
Chromium	10.00	2.00	4.61E-04	6.0E-01
Lead	8.70	0.20	4.01E-04	5.2E-01
Zinc	69.00	8.00	3.18E-03	4.1E+00
Manganese	4.00	1.00	1.84E-04	2.4E-01
Nickel	8.30	0.40	3.83E-04	5.0E-01
Cadmium	2.00	2.00	9.22E-05	1.2E-01
Beryllium	1.00	1.00	4.61E-05	6.0E-02
Arsenic	2.30	0.20	1.06E-04	1.4E-01
Selenium	7.00	7.00	3.23E-04	4.2E-01
Molybdenu	842.00	3.00	3.88E-02	5.1E+01
Silver	0.10	0.10	4.61E-06	6.0E-03
Antimony	3.00	3.00	1.38E-04	1.8E-01
Barium	32.60	0.40	1.50E-03	2.0E+00
Thallium	0.10	0.10	4.61E-06	6.0E-03

9) Isokinecity

An = 0.001 ft^2 Area of nozzle orifice

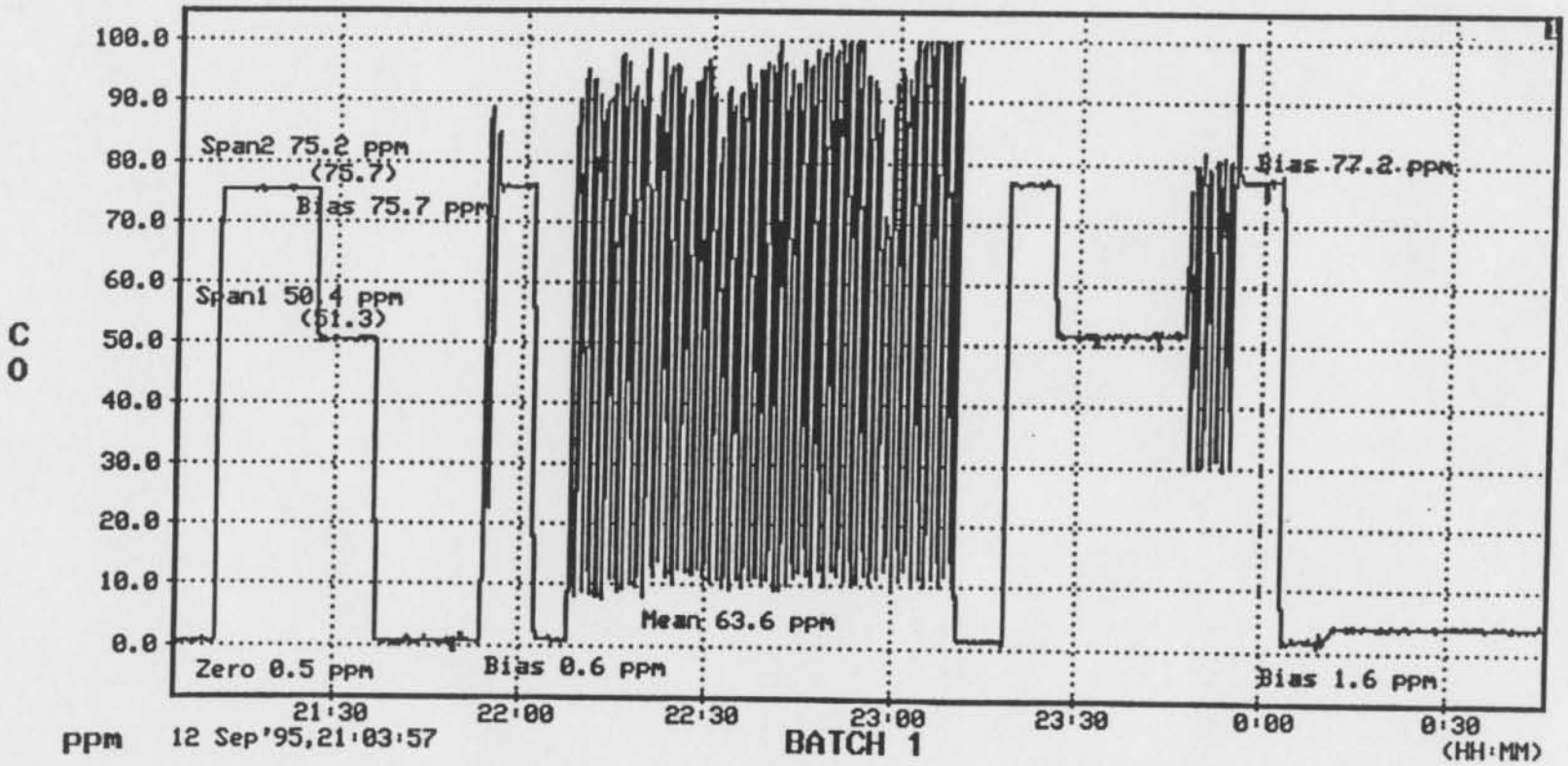
% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

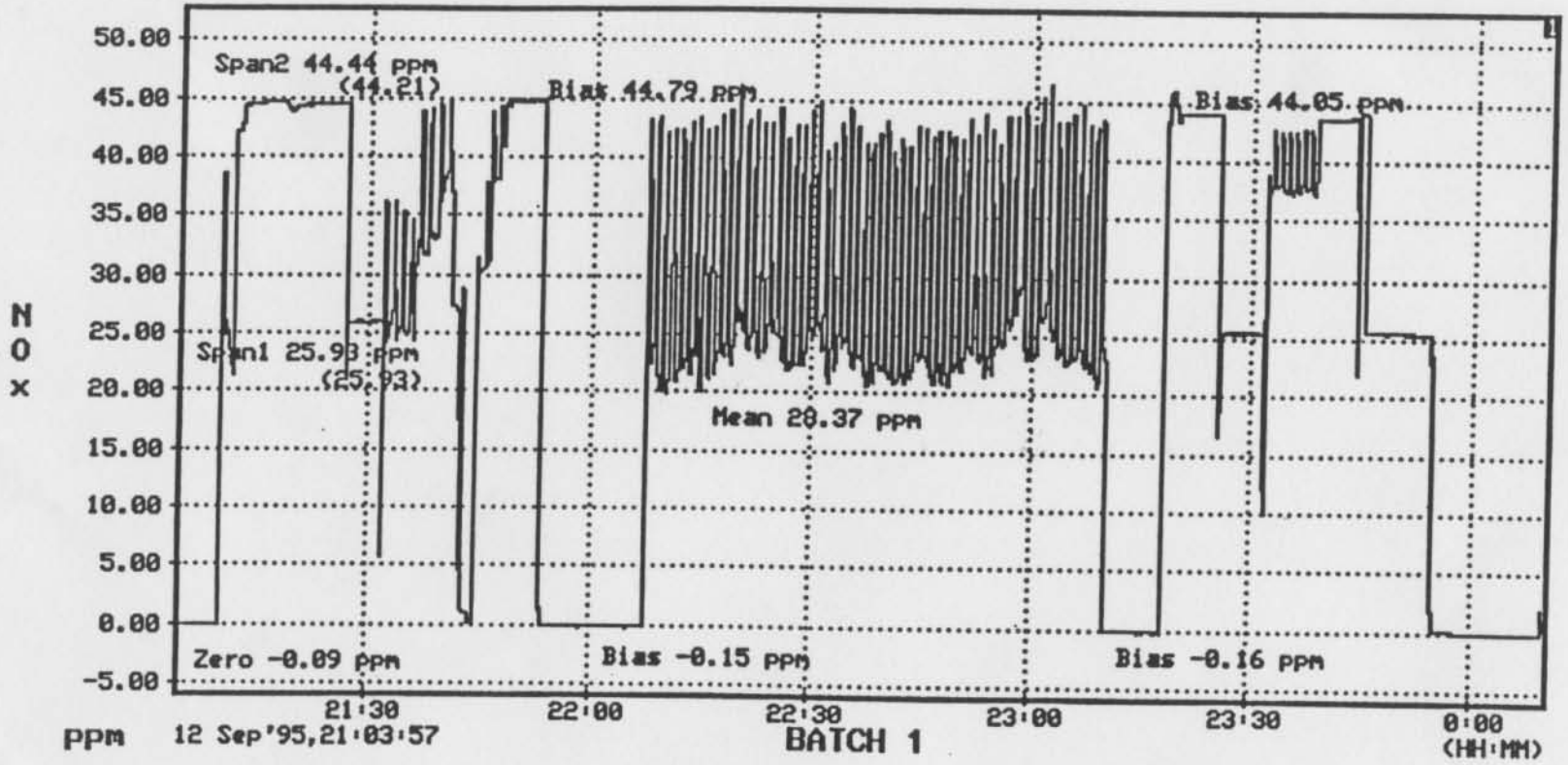
% I = 103.10

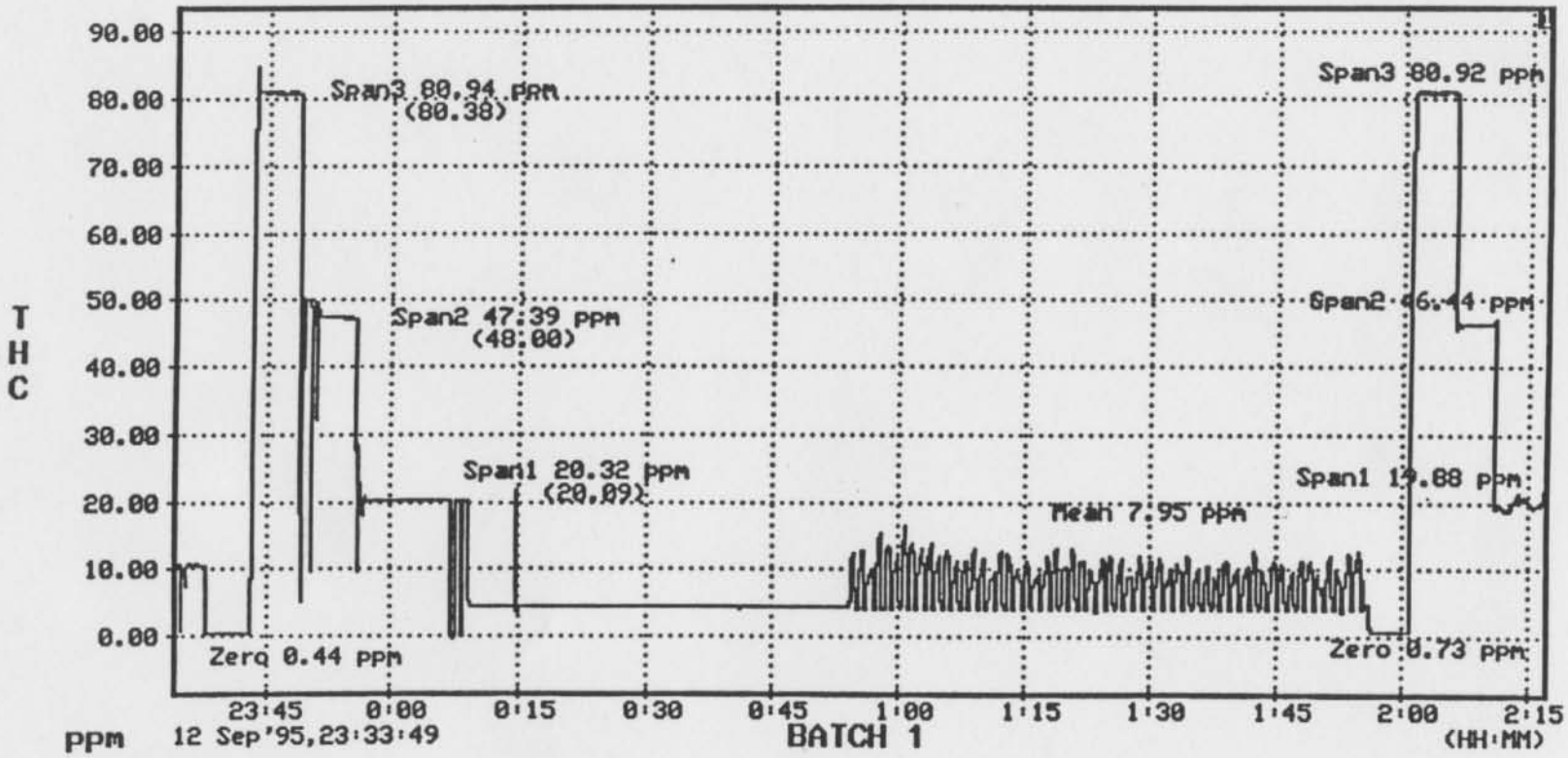
Sample Train Operation Data

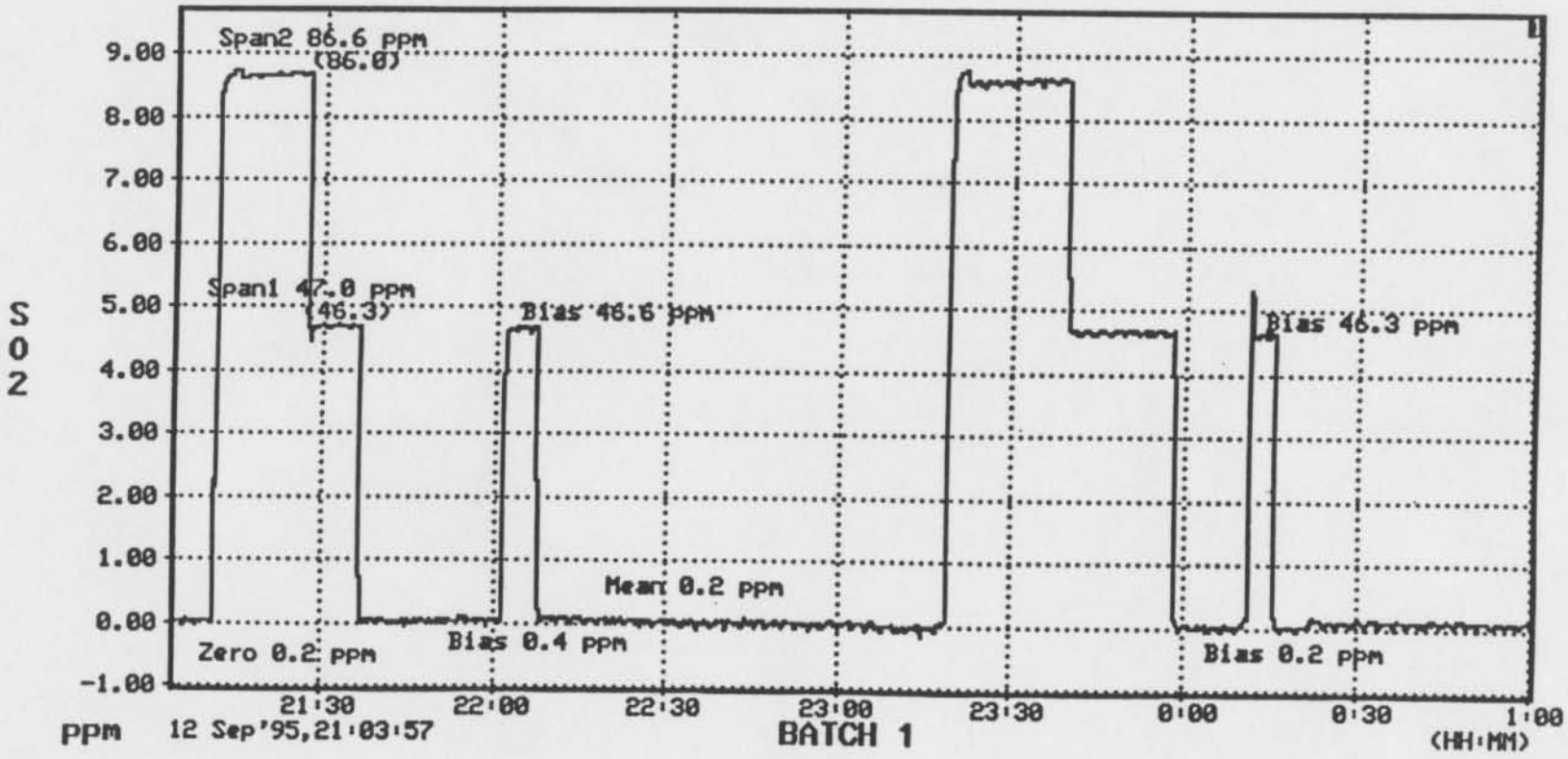
Test Date	9/13/95	
Barometer	29.85	in.Hg
Run #	1	
Static P	-0.02	in.H2O
Pitot Cp	0.84	
Nozzle	0.495	

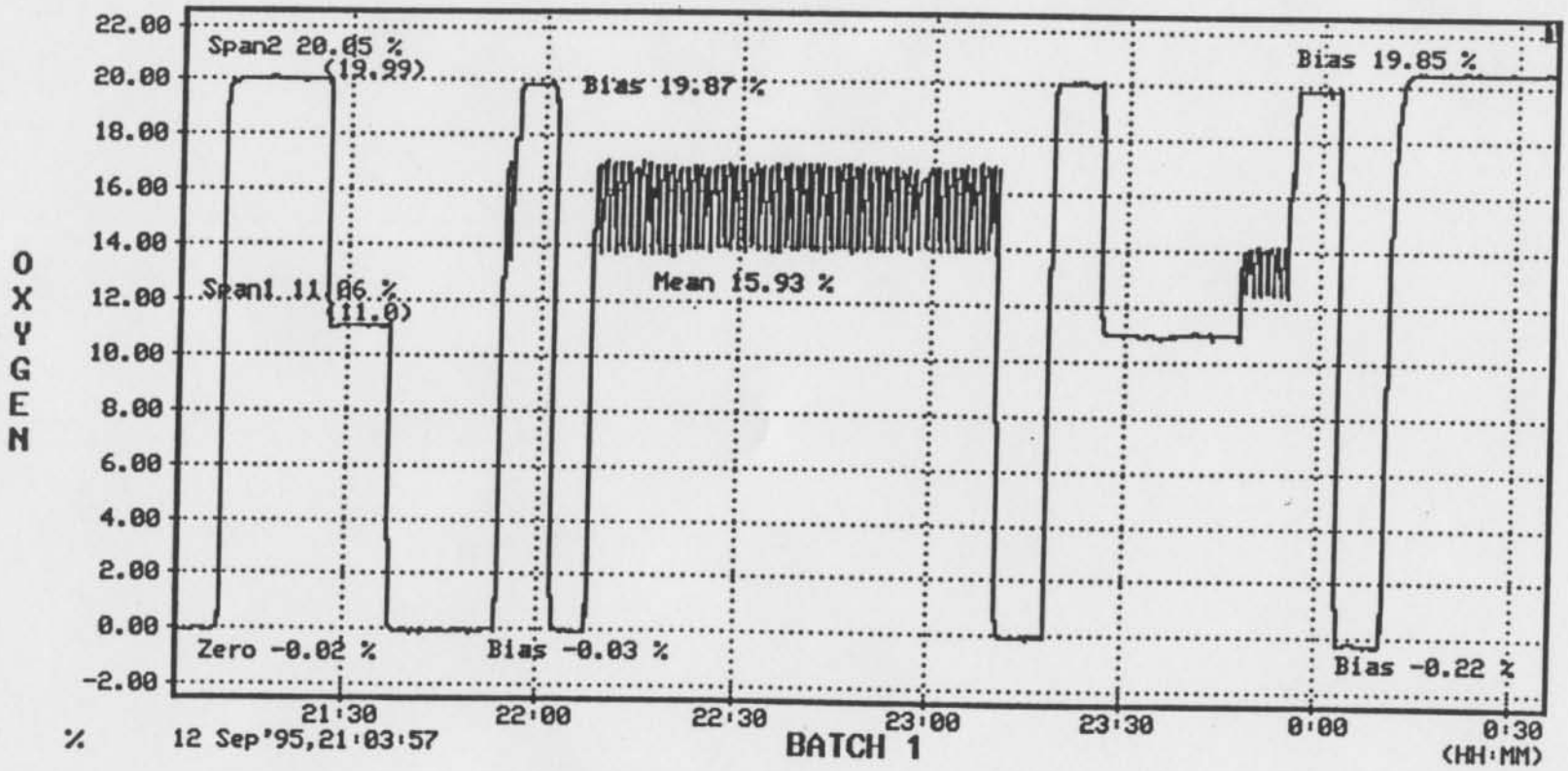
Traverse Point	Delta-P (in. H2O)	Temp. (Deg.F)	delta H	Dry Gas Meter Temp IN	Dry Gas Meter Temp OUT	(dP)^.5
A-1	0.01	279	0.42	105	103	0.1
A-2	0.01	379	0.42	105	103	0.1
A-3	0.01	395	0.42	106	104	0.1
A-4	0.01	403	0.42	108	105	0.1
A-5	0.01	403	0.42	109	105	0.1
A-6	0.01	401	0.42	109	105	0.1
A-7	0.01	401	0.42	109	106	0.1
A-8	0.01	392	0.42	110	106	0.1
B-1	0.01	345	0.42	108	106	0.1
B-2	0.01	360	0.42	109	107	0.1
B-3	0.01	395	0.42	111	108	0.1
B-4	0.01	405	0.42	111	108	0.1
B-5	0.01	405	0.42	112	107	0.1
B-6	0.015	407	0.64	112	109	0.122474
B-7	0.02	405	0.85	113	109	0.141421
B-8	0.025	399	1.06	113	109	0.158114
C-1	0.015	364	0.64	111	109	0.122474
C-2	0.025	388	1.06	113	110	0.158114
C-3	0.03	400	1.27	115	110	0.173205
C-4	0.03	405	1.27	115	110	0.173205
C-5	0.035	404	1.49	114	110	0.187083
C-6	0.04	402	1.7	114	109	0.2
C-7	0.045	397	1.91	114	109	0.212132
C-8	0.04	384	1.7	114	109	0.2
Average		388.25	0.79375	110.833333	107.3333	0.131176
					109.0833	

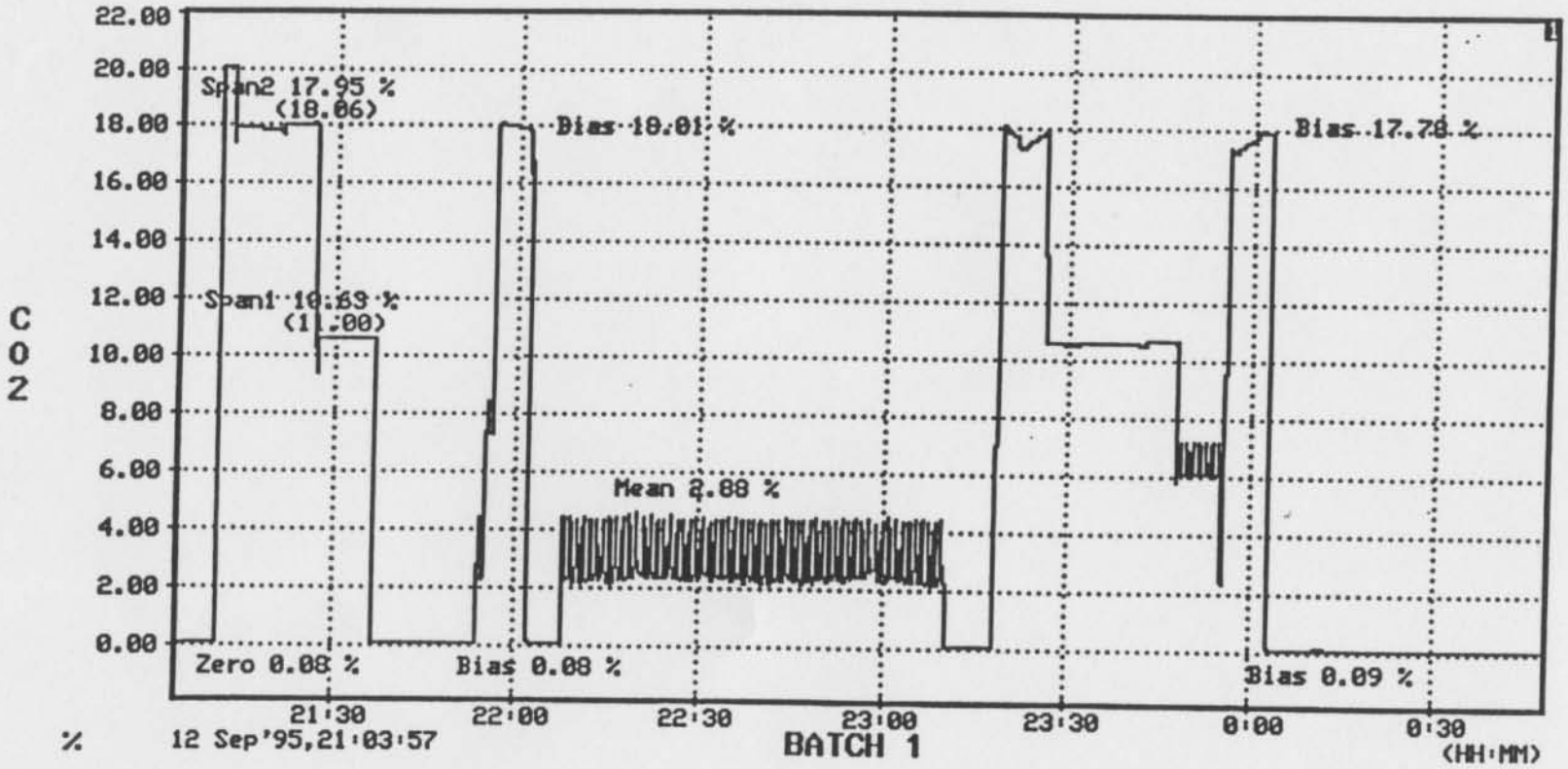

CO
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Span2 75.2 ppm
(75.7)
Bias 75.7 ppm
Span1 50.4 ppm
(51.3)
Zero 0.5 ppm
Bias 0.6 ppm
Mean 63.6 ppm
Bias 77.2 ppm
Bias 1.6 ppm
ppm
12 Sep'95,21:03:57
21:30
22:00
22:30
23:00
23:30
0:00
0:30
(HH:MM)
BATCH 1


50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
N
O
x
Span2 44.44 ppm
(44.21)
Span1 25.93 ppm
(25.93)
Bias 44.79 ppm
Mean 28.37 ppm
Bias 44.85 ppm
Zero -0.09 ppm
Bias -0.15 ppm
Bias -0.16 ppm
21:30
22:00
22:30
23:00
23:30
0:00
(HH:MM)
ppm
12 Sep'95,21:03:57
BATCH 1


90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
THC
Span3 80.94 ppm
(80.38)
Span2 47.39 ppm
(48.00)
Span1 20.32 ppm
(20.09)
Zero 0.44 ppm
Mean 7.95 ppm
Span3 80.92 ppm
Span2 46.44 ppm
Span1 19.88 ppm
Zero 0.73 ppm
23:45
0:00
0:15
0:30
0:45
1:00
1:15
1:30
1:45
2:00
2:15
(HH:MM)
ppm
12 Sep'95,23:33:49
BATCH 1


Span2 86.6 ppm
(86.0)
Span1 47.0 ppm
(46.3)
Bias 46.6 ppm
Bias 46.3 ppm
Mean 0.2 ppm
Zero 0.2 ppm
Bias 0.4 ppm
Bias 0.2 ppm
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
SO2
21:30
22:00
22:30
23:00
23:30
0:00
0:30
1:00
(HH:MM)
ppm
12 Sep'95,21:03:57
BATCH 1


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
Span2 20.05 %
(19.99)
Span1 11.06 %
(11.0)
Zero -0.02 %
Bias -0.03 %
Bias 19:87 %
Mean 15.93 %
Bias 19.85 %
Bias -0.22 %
21:30
22:00
22:30
23:00
23:30
0:00
0:30
(HH:MM)
12 Sep'95,21:03:57
BATCH 1


22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
C
O
2
Span2 17.95 %
(18.06)
Span1 10.69 %
(11.00)
Bias 18.01 %
Bias 17.78 %
Mean 8.88 %
Zero 0.08 %
Bias 0.08 %
Bias 0.09 %
21:30
22:00
22:30
23:00
23:30
0:00
0:30
(HH:MM)
%
12 Sep'95,21:03:57
BATCH 1

PES Inc.
Calculations for : EPA Method 2,3a,4,6c,7E,10 and 25a

Plant	ATC Consultants - Balboa Pacific
Project #	5102
Operation	Pyrolytic Unit
Run	1
Load	Batch 1
Location	Santa Fe Springs, CA
Date	9/12/95

D A T A I N P U T

INPUT	Vlc =	51.5	cc	Vol. of H2O collected
INPUT	Vm =	37.431	cf	Dry gas meter reading
INPUT	Pb =	29.87	in. Hg	Barometric pressure
INPUT	Pg =	-0.02	in. H2O	Static pressure
INPUT	dP =	0.145		Avg. sq.rt delta P
INPUT	dH =	0.955	in. H2O	Avg. delta H
INPUT	Tm =	566.6	R	Avg. meter temp.
INPUT	Ts =	833.6	R	Avg. stack temp.
INPUT	Y =	1.021		Meter calibration factor
INPUT	t =	72	min.	Duration of sampling time
INPUT	A =	2.3300	sq.ft.	Stack Area
INPUT	Cp =	0.84		Pitot tube coefficient
	Kp =	85.49		Pitot tube constant
	K1 =	17.64	R/in.Hg	constant
	K2 =	0.04707	cu.ft/ml	constant
	K3 =	0.002669	in.Hg-cf/	constant

Gas Analysis

INPUT	[O2] =	15.93	%(dry)
INPUT	[O2] =	-0.03	initial zero bias
INPUT	[O2] =	-0.22	final zero bias
	[O2] =	-0.13	average zero bias
INPUT	[O2] =	19.99	midspan concentration
INPUT	[O2] =	19.87	initial midspan bias
INPUT	[O2] =	19.85	final midspan bias
	[O2] =	19.86	average midspan bias
INPUT	[CO2] =	2.88	%(dry)
INPUT	[CO2] =	0.08	initial zero bias
INPUT	[CO2] =	0.09	final zero bias
	[CO2] =	0.09	average zero bias
INPUT	[CO2] =	18.06	midspan concentration
INPUT	[CO2] =	18.01	initial midspan bias
INPUT	[CO2] =	17.78	final midspan bias
	[CO2] =	17.90	average midspan bias
	[O2] =	16.06	adjusted concentration
	[CO2] =	2.83	adjusted concentration
	[N2] =	81.1	%
INPUT	[CO] =	63.60	ppmV(dry)
INPUT	[CO] =	0.6	initial zero bias
INPUT	[CO] =	1.6	final zero bias
	[CO] =	1.10	average zero bias
INPUT	[CO] =	75.7	midspan concentration
INPUT	[CO] =	75.7	initial midspan bias
INPUT	[CO] =	77.2	final midspan bias
	[CO] =	76.45	average midspan bias
INPUT	[NOx] =	28.4	ppmV(dry)
INPUT	[NOx] =	-0.15	initial zero bias
INPUT	[NOx] =	-0.16	final zero bias
	[NOx] =	-0.16	average zero bias
INPUT	[NOx] =	44.21	midspan concentration
INPUT	[NOx] =	44.79	initial midspan bias
INPUT	[NOx] =	44.05	final midspan bias
	[NOx] =	44.42	average midspan bias
INPUT	[THC] =	8.0	ppmV(wet)
INPUT	[THC] =	0.44	initial zero bias
INPUT	[THC] =	0.73	final zero bias
	[THC] =	0.59	average zero bias
INPUT	[THC] =	48	midspan concentration
INPUT	[THC] =	47.39	initial midspan bias
INPUT	[THC] =	46.44	final midspan bias
	[THC] =	46.915	average midspan bias
INPUT	[SO2] =	0.2	ppmV(dry)
INPUT	[SO2] =	0.4	initial zero bias
INPUT	[SO2] =	0.2	final zero bias
	[SO2] =	0.30	average zero bias
INPUT	[SO2] =	46.3	midspan concentration
INPUT	[SO2] =	46.6	initial midspan bias
INPUT	[SO2] =	46.3	final midspan bias
	[SO2] =	46.45	average midspan bias
	[CO] =	62.79	ppmV(dry) adj concentration
	[NOx] =	28.29	ppmV(dry) adj concentration
	[THC] =	7.63	ppmV(wet) adj concentration
	[SO2] =	-0.10	ppmV(dry) adj concentration

C A L C U L A T I O N S

01) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd = 35.62 cu.ft
1.01 cu.m

02) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) 2.42 scf

03) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.064

04) Molecular weight of the stack gas on a wet basis

Ms = (1-Q)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Q)

Ms = 28.37

05) Average stack gas velocity.

Ps = 29.87 in. Hg

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 10.31 ft/sec

06) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1441.26 cfm
40.82 cmm

07) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)

Qstd = 853.23 dscfm
24.16 dscmm
51193.61 dscfh

08) Emission Calculation - Carbon Monoxide

lbs CO/hr = ([CO] * DSCFH * MW)/387*10^6

[CO] =	62.79	ppmv (dry)	Actual conc.
[CO] =	0.23	Lbs/hr	

09) Emission Calculation - Nitrogen Oxides

lbs NOx/hr = ([NOx] * DSCFH * MW)/387*10^6

[NOx] =	28.3	ppmv (dry)	Actual Conc.
[NOx] =	0.17	Lbs/hr	

10) Emission Calculation - Total Hydrocarbons

lbs THC/hr = ([THC] * DSCFH * MW)/387*10^6

[THC] =	8.1	ppmv (dry)	Actual Conc.
[THC] =	0.05	Lbs/hr	

11) Emission Calculation - Sulfur Dioxide

lbs NMHC/hr = ([NMHC] * DSCFH * MW)/387*10^6

[SO2] =	-0.1	ppmv (dry)	Actual Conc.
[SO2] =	0.07	Lbs/hr	

FIELD DATA

Plant ~~Boiler~~ ATC - Bal. Pwr.
Date ~~3-6-95~~ 9-13-95
Sampling Location ~~Stack 2~~ WHB Exhaust
Sample Type ~~Method 4 +~~ EPA-5
Run Number ~~88~~ ATC-4
Operator S-LAPLM
Ambient Temperature 90
Barometric Pressure 29.85
Static Pressure -0.02
Filter Number(s)
Pretest Leak Rate 0.005 CFM @ 5 in. Hg
Read And Record All Data Every 3 Minutes

Schematic of Traverse Point Layout

Probe Length and Type 2' Glass
Pitot Tube I.D. No. S-3B
Nozzle I.D. No. And Diameter 16, 0.499
Assumed Moisture, % 6
Meter Box Number 1A
Meter Delta H@ 1.861
C Factor -
Meter Gamma 1.021
Heater Box Setting 250
Reference Delta P -
Post test Leak Rate 0.005 CFM @ 5 in. Hg
Impinger Box No. 5B 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)
							1	6	7		2	3	4
1	0	14.30	003.160	0.02	0.86	✓	343	107	105	2.0	240	260	48
2	3	14.33	004.7	0.02	0.86	✓	375	108	105	2.0	241	254	50
3	6	14.36	006.4	0.025	1.07	✓	391	109	106	2.5	243	256	50
4	9	14:39	007.9	0.02	0.86	✓	397	110	106	2.5	244	251	50
5	12	14:42	009.6	0.02	0.86	✓	402	111	106	2.5	245	250	51
6	15	14:45	011.1	0.02	0.86	✓	400	111	107	2.5	245	251	51
7	18	14:48	012.5	0.015	0.64	✓	393	112	107	2.0	245	255	52
8	21	14:51	014.0	0.01	0.43	✓	384	112	107	1.5	247	256	52
1	24	14:54/15:00	015.3	0.01	0.43	✓	385	111	107	1.5	242	239	49
2	27	15:03	016.1	0.01	0.43	✓	369	111	107	1.5	244	240	50
3	30	15:06	017.6	0.015	0.64	✓	381	111	107	2.0	244	250	50
4	33	15:09	018.9	0.015	0.64	✓	391	112	108	2.0	245	252	51
5	36	15:12	020.2	0.02	0.86	✓	395	112	108	2.5	245	255	52
6	39	15:15	021.7	0.02	0.86	✓	397	113	108	2.5	243	260	52
7	42	15:18	023.4	0.025	1.07	✓	397	113	109	3.0	243	260	53
4	45	15:21	025.1	0.025	1.07	✓	395	113	108	3.0	245	259	53
1	48	15:24/15:30	026.7	0.015	0.64	✓	337	109	107	2.0	240	242	50
2	51	15:33	028.1	0.020	0.86	✓	361	110	107	2.5	241	249	51
3	54	15:36	029.7	0.025	1.07	✓	384	111	107	3.0	240	254	53
4	57	15:39	031.0	0.030	1.28	✓	390	112	108	3.0	245	249	52
5	60	15:42	033.2	0.045	1.93	✓	395	112	108	4.0	243	247	53
6	63	15:45	035.1	0.050	2.14	✓	395	113	109	4.5	243	255	53
7	66	15:48	038.0	0.050	2.14	✓	393	114	109	4.5	243	255	54
8	69	15:51	040.0	0.040	1.71	✓	389	114	109	4.0	244	260	59
	72	15:54	042.132	—	—	—	—	—	—	—	—	—	—

Θ=72 V_m=38.972 $\sqrt{\Delta P}$=0.419 ΔH=1.01 T_s=392+460 = 852 T_m=109+460 = 569

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES

SAMPLE RETRIEVAL DATA

Plant: ATC
Date: 9.13.95
Sampling Location:
Sampling Type (Method): EPN 5
Run Number: ATC-4
Sample Box Number: 5 B
Clean-up Man: NN
Job Number:
Comments: sample I- 667 4
T 124.5

Filter

Filter Number:
Description of Filter:

Moisture

Impingers:			
Final Volume:	663.4 mL	595.1 mL	494.5 mL
Initial Volume:	648.9 mL	589.7 mL	491.4 mL
Net Volume:	14.5 mL	5.4 mL	3.1 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	~~711.7~~ 681.8 g	g	g
Initial Volume:	660.2 g	g	g
Net Volume:	21.6 g	g	g
Total Moisture:	g	g	g

44.6

Description of Inpinger catch:

PES Inc.

EPA Methods 5 Calculations

Plant	ATC - Balboa Pacific
Project #	5102
Operation	Pyrolytic Waste Incinerator
Run	2 - Particulate
Location	Santa Fe Springs, CA
Date	9/13/95

Emission Data

Vlc =	44.6	cc	Vol. of H2O collected (impingers)
Vm =	38.972	cf	Dry gas meter reading
Pb =	29.85	in. Hg	Barometric pressure
Ps =	29.85	in. Hg	Stack pressure
dP =	0.149		Average sq.rt delta P
dH =	1.010	in. H2O	Average draft gauge reading
Tm =	569.3	R	Average meter temperature
Ts =	837.90	R	Average stack temperature
Dn =	0.499	in.	Nozzle diameter
Y =	1.021		Meter calibration factor
t =	72	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

1) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	36.89	cu.ft
	1.04	cu.m

2) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) =	2.10	scf

3) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.054

4) Molecular weight of the stack gas on a dry basis Md.

Ms = ((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))

Ms = 29.08

Instrumental gas analysis

% CO2	2.68
% CO	0
% O2	16.39
% N2	80.93

5) Average stack gas velocity.

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 10.51 ft/sec

6) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1469.58 cfm
41.62 cmm

7) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 874.10 dscfm
24.75 dscmm

8) Analytical data

a) Front half acetone wash

0.0032	g	wash net wt
0	g	acetone blank net wt
100	ml	blank vol.
152	ml	Final wash volume
152	ml	aliquot
0.0032	g	soluble particulate*

b) Front half glass microfibre filter

0.02	g	filter net wt

c) Back half water wash - soluble

0.0035	g	net wt
0	g	water blank net wt
220	ml	blank vol
550	ml	Final wash volume
550	ml	aliquot
0.0035	g	soluble net wt*

* Weights are not blank corrected

9) Particulate concentrations

0.0097	grains/dscf	Front 1/2
0.0112	grains/dscf	Total

11) Particulate emission rate

Conc.*(1 lb/7000 gr)* Qstd *60 min/hr

W =	0.073	lbs/hr	Front 1/2
W =	0.084	lbs/hr	Total Particulate

12) Isokinecity

An =	0.001	ft^2	Area of nozzle orifice

% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

% I = 100.62

FIELD DATA

Plant ATC - Bal Pgal
Date 9.13.95
Sampling Location WHB Exhaust
Sample Type EPA 12
Run Number ATC-3
Operator [illegible]
Ambient Temperature 90
Barometric Pressure 29.95
Static Pressure -0.02
Filter Number(s) —
Pretest Leak Rate 0.014 CFM @ 5 in. Hg
Read And Record All Data Every 5 Minutes

Schematic of Traverse Point Layout

Probe Length and Type 3' Glass
Pitot Tube I.D. No. S-2A
Nozzle I.D. No. And Diameter N-6 0.495
Assumed Moisture, % 6.0
Meter Box Number 1A
Meter Delta H@ 1.861
C Factor —
Meter Gamma 1.021
Heater Box Setting 250
Reference Delta P —
Post test Leak Rate 0.014 CFM @ 5.0 in. Hg
Impinger Box No. 3 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)
							1	6	7		2	3	4
1	0	11:25	945.335	0.010	0.42	✓	279	105	103	1.5	249	247	55
2	5	11:30	947.2	0.010	0.42	✓	379	105	103	1.5	250	247	53
3	10	11:35	949.0	0.010	0.42	✓	395	106	104	1.5	251	252	56
4	15	11:40	950.9	0.010	0.42	✓	403	108	105	1.5	252	252	56
5	20	11:45	952.7	0.010	0.42	✓	403	109	105	1.5	249	253	57
6	25	11:50	954.7	0.010	0.42	✓	401	109	105	1.5	252	252	57
7	30	11:55	956.4	0.010	0.42	✓	401	109	106	1.5	254	253	57
8	35	12:00	958.4	0.010	0.42	✓	391	110	106	1.5	257	257	58
1	40	12:05/12.10	960.0	0.010	0.42	✓	345	108	106	1.5	253	254	47
2	45	12:15	962.0	0.010	0.42	✓	360	109	107	1.5	245	246	49
3	50	12:20	963.7	0.010	0.42	✓	395	111	108	1.5	253	289	49
4	55	12:25	965.6	0.010	0.42	✓	405	111	108	1.5	253	280	50
5	60	12:30	967.5	0.010	0.42	✓	405	112	107	1.5	255	8295	51
6	65	12:35	969.3	0.015	0.64	✓	407	111	109	1.5	258	252	52
9	70	12:40	971.4	0.020	0.85	✓	405	113	109	2.0	253	260	53
11	75	12:45	973.9	0.025	1.06	✓	399	113	109	3.5	253	260	54
1	80	12:50/12.55	977.2	0.015	0.64	✓	364	111	109	2.0	248	250	54
2	85	13:00	979.5	0.025	1.06	✓	384	113	110	3.5	251	248	55
3	90	13:05	982.7	0.030	1.27	✓	403	115	110	3.5	249	253	56
4	95	13:10	985.7	0.030	1.27	✓	405	115	110	3.5	257	258	57
5	100	13:15	988.8	0.035	1.49	✓	404	114	110	3.5	246	259	58
6	105	13:20	992.6	0.04	1.70	✓	402	114	109	4.0	254	248	59
7	110	13:25	995.5	0.045	1.91	✓	377	114	109	4.5	253	255	60
8	115	13:30	999.3	0.040	1.70	✓	384	114	109	4.0	252	253	60
	120	13:35	002.708	—	—	—	—	—	—	—	—	—	—

θ = 120 V_m = 57.373 $\sqrt{\Delta P}$ = 0.131 ΔH = 0.794 T_s = 398 + 460 T_m = 109 + 460

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RETRIEVAL DATA

Plant: ATC
Date: 9.12.94
Sampling Location:
Sampling Type (Method): EPA 12
Run Number: ATC-3
Sample Box Number: 3B
Clean-up Man: NN
Job Number:
Comments: Wash/Catch F 8699
T 3507

Filter

Filter Number:
Description of Filter:

Moisture

Impingers:			
Final Volume:	707.1 mL	627.5 mL	479.4 mL
Initial Volume:	650.4 mL	623.2 mL	474.5 mL
Net Volume:	56.7 mL	4.3 mL	0.9 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	691.5 g	g	g
Initial Volume:	674.0 g	g	g
Net Volume:	17.5 g	g	g
Total Moisture:	g (79.4)	g	g

Description of Inpinger catch:

PES, Inc.
Multi-Metals Method Calculations (EPA 12)

Plant	ATC-Balboa Pacific
Project #	5102
Operation	Pyrolytic Oxidation Unit
Run	Batch 2
Location	Outlet
Date	9/14/95

Test Data

Vlc =	99.7	cc	Vol. of H2O collected (impingers)
Vm =	74.572	cf	Dry gas meter reading
Pb =	29.88	in. Hg	Barometric pressure
Ps =	29.88	in. Hg	Stack pressure
dP =	0.174		Average sq.rt delta P
dH =	1.286	in. H2O	Average draft gauge reading
Tm =	568.8	R	Average meter temperature
Ts =	853.50	R	Average stack temperature
Dn =	0.495	in.	Nozzle diameter
Y =	1.021		Meter calibration factor
t =	120	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

Instrumentation Data

[O2] =	16.4	%
[CO2] =	2.7	%

CALCULATIONS

1) Volume of gas sampled at standard conditions, Vmstd
Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	70.78	cu.ft
	2.00	cu.m

2) Volume of water vapor collected at standard conditions.
Vw(std) = K2 * Vlc

Vw(std) = 4.69 scf

3) Decimal fraction of moisture by volume in stack gas
Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.062

4) Molecular weight of the stack gas on a dry basis Md.
Md = (1-Bws)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Bws)

Md = 28.40

5) Average stack gas velocity.
vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 12.54 ft/sec

6) Average actual stack gas volumetric flowrate.
Q = 60 * vs * As

Q = 1752.47 cfm
49.63 cmm

7) Average stack gas dry volumetric flowrate.
Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 1015.31 dscfm
28.75 dscmm

8) Toxic metal concentrations and emission rates

Element	Sample Mass (ug)	Blank Mass (ug) DL	Conc. (mg/dscm)	Emission Rate (mg/hr)
Copper	13.00	1.00	4.52E-04	7.8E-01
Chromium	11.00	2.00	3.83E-04	6.6E-01
Lead	7.00	0.20	2.43E-04	4.2E-01
Zinc	48.00	8.00	1.67E-03	2.9E+00
Manganese	4.00	1.00	1.39E-04	2.4E-01
Nickel	4.70	0.40	1.63E-04	2.8E-01
Cadmium	5.00	2.00	1.74E-04	3.0E-01
Beryllium	1	1.00	3.48E-05	6.0E-02
Arsenic	2.9	0.20	1.01E-04	1.7E-01
Selenium	7	7.00	2.43E-04	4.2E-01
Molybdenu	2500	3.00	8.69E-02	1.5E+02
Silver	0.1	0.10	3.48E-06	6.0E-03
Antimony	3	3.00	1.04E-04	1.8E-01
Barium	33	0.40	1.15E-03	2.0E+00
Thallium	0.1	0.10	3.48E-06	6.0E-03

9) Isokinecity

An = 0.001 ft^2 Area of nozzle orifice

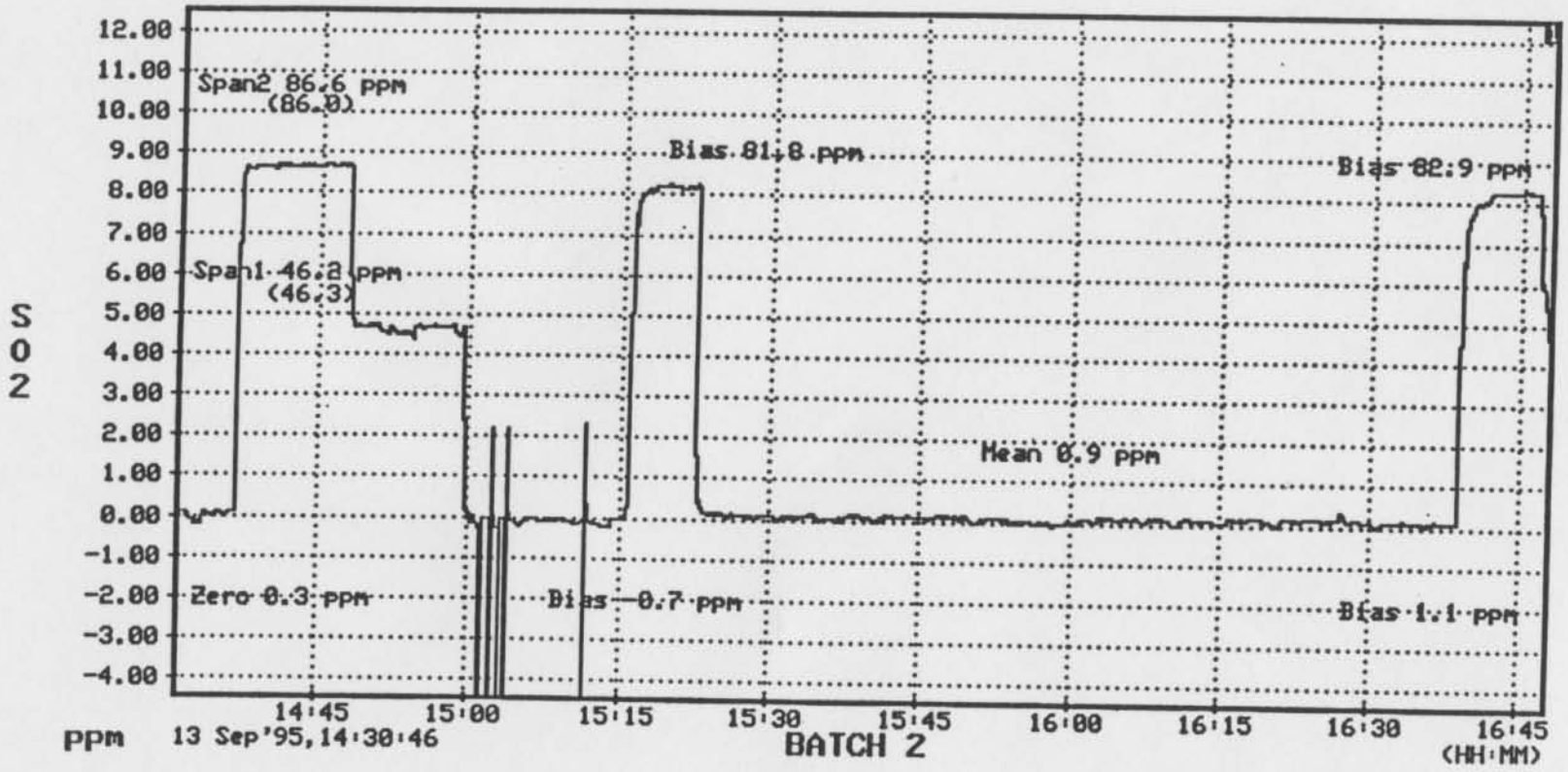
% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

% I = 101.34

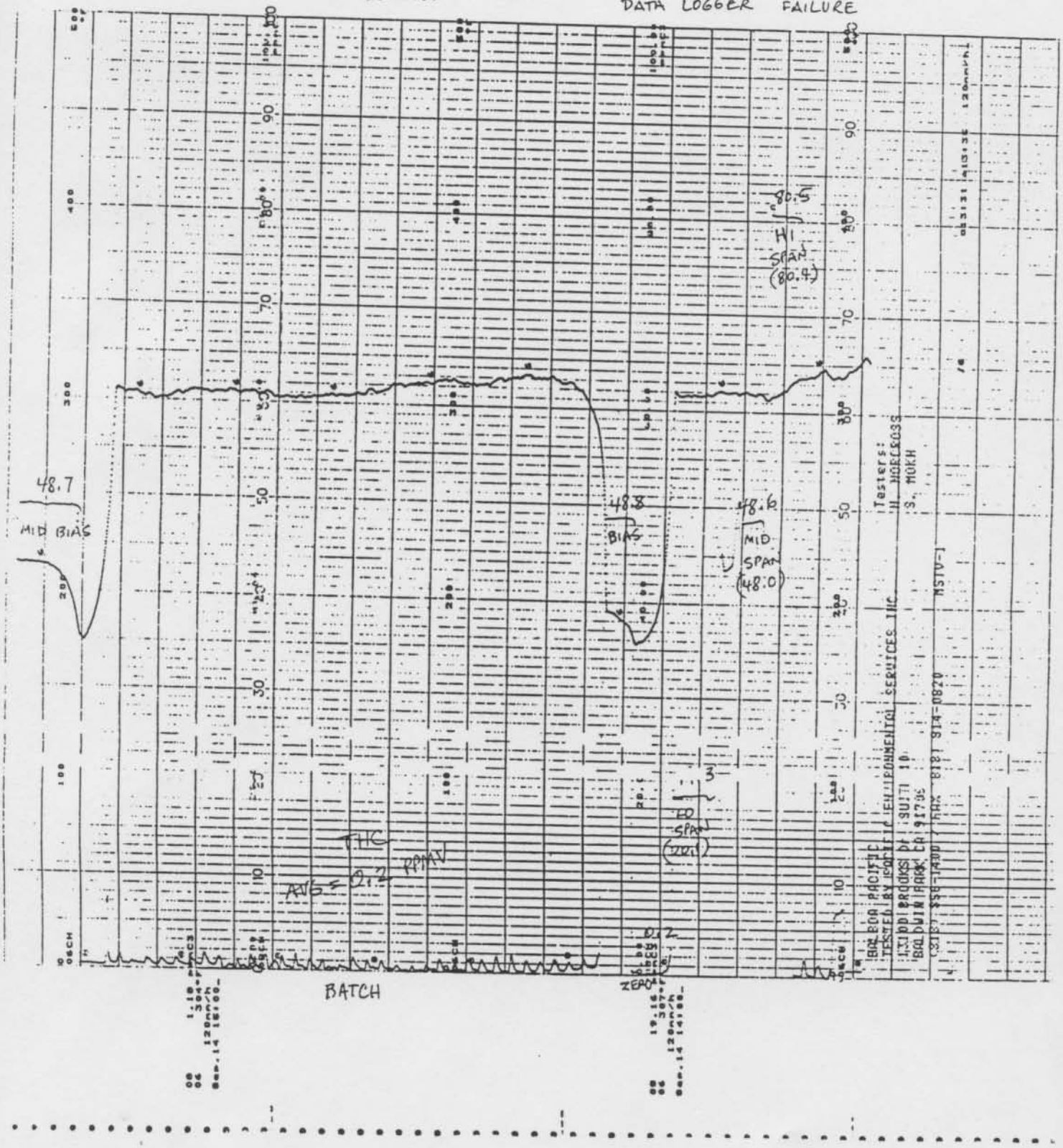
Sample Train Operation Data

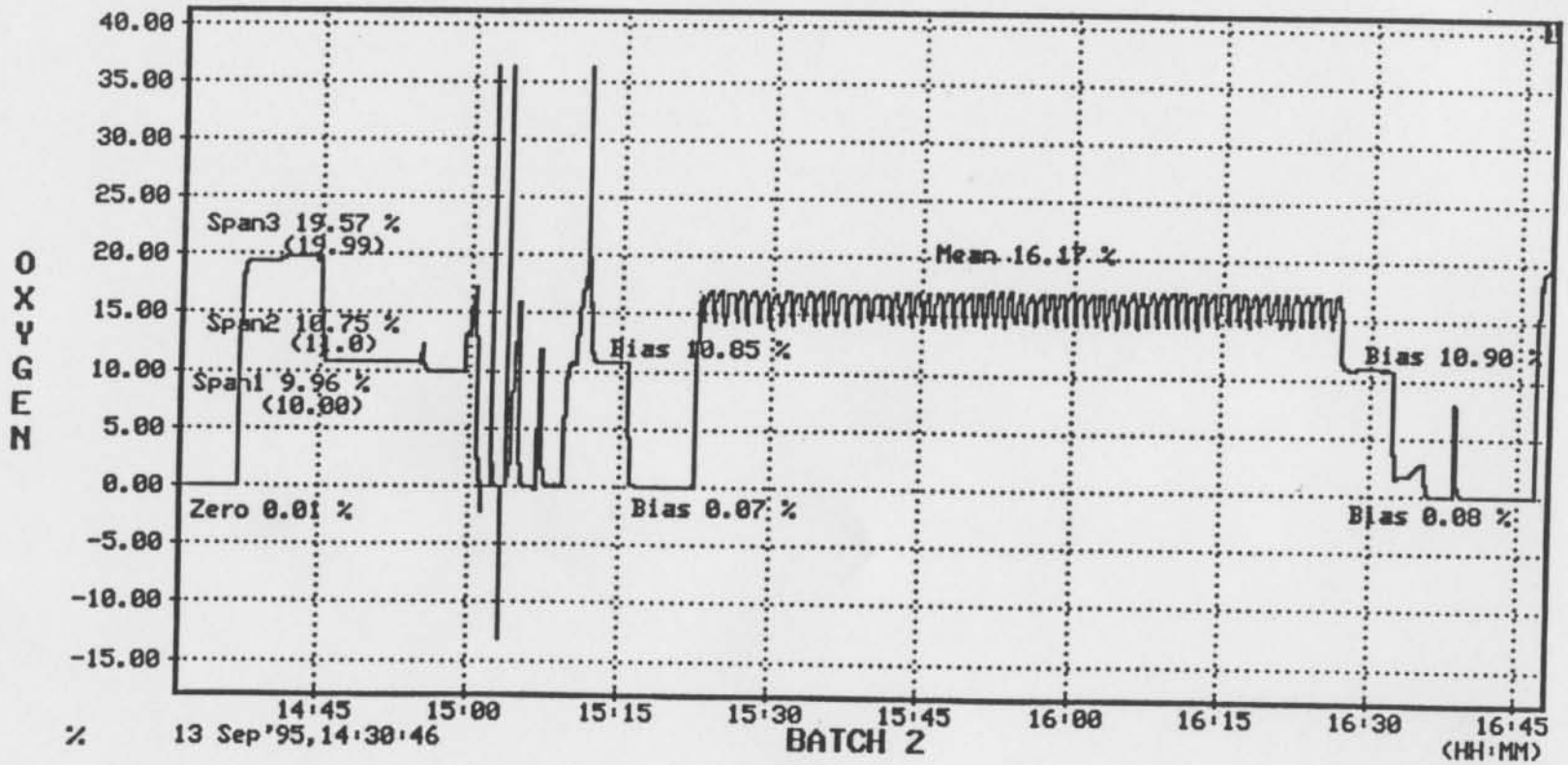
Test Date	9/14/95	
Barometer	29.88	in.Hg
Run #	2	
Static P	-0.02	in.H2O
Pitot Cp	0.84	
Nozzle	0.495	

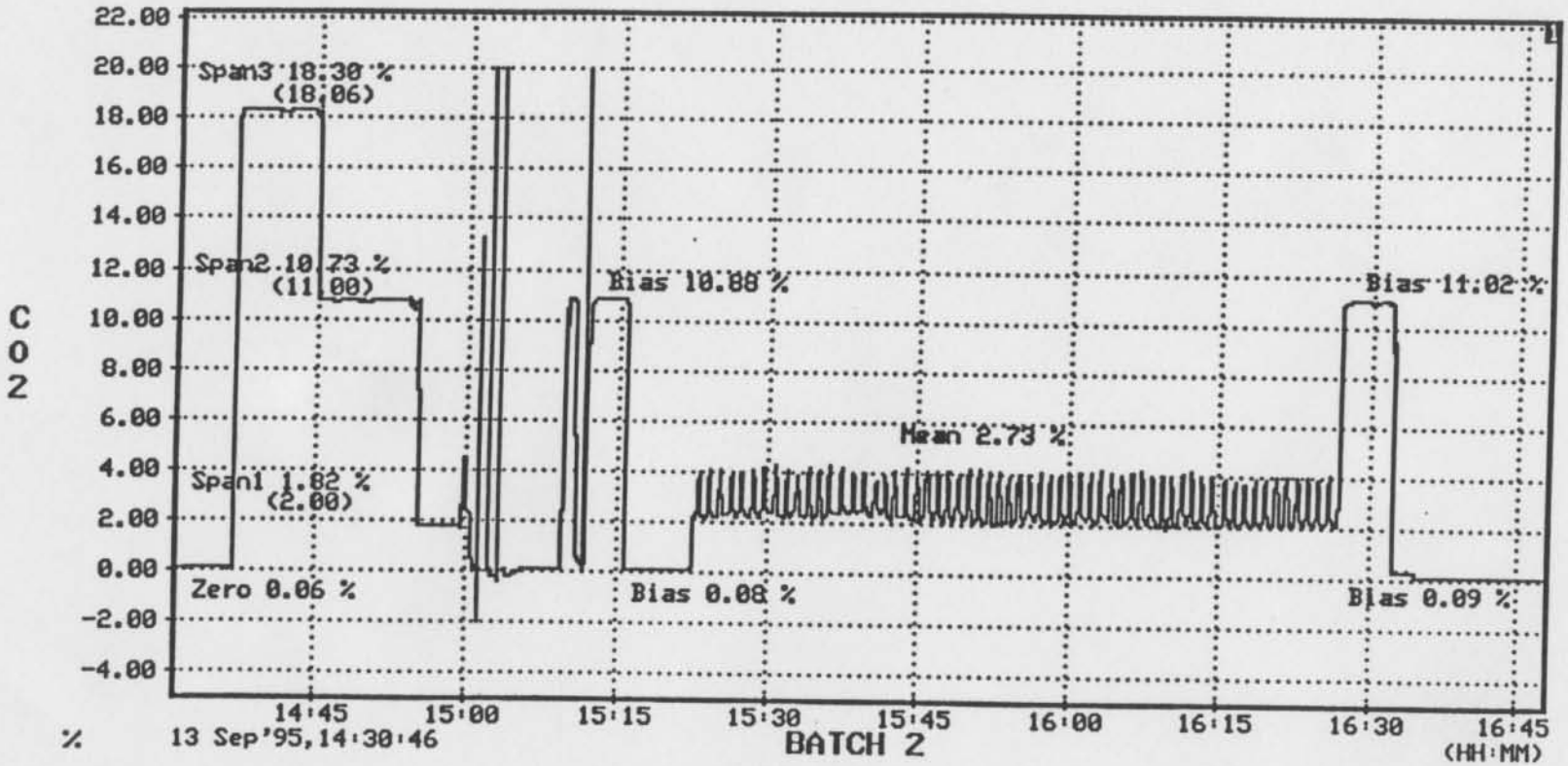
Traverse Point	Delta-P (in. H2O)	Temp. (Deg.F)	delta H	Dry Gas Meter Temp IN	OUT	(dP)^.5
A-1	0.03	397	1.24	101	101	0.173205
A-2	0.03	400	1.24	102	101	0.173205
A-3	0.04	401	1.66	104	101	0.2
A-4	0.035	402	1.45	106	102	0.187083
A-5	0.04	398	1.66	109	104	0.2
A-6	0.04	402	1.66	112	105	0.2
A-7	0.03	376	1.24	111	105	0.173205
A-8	0.03	370	1.24	111	105	0.173205
B-1	0.045	395	1.87	108	105	0.212132
B-2	0.035	403	1.45	110	106	0.187083
B-3	0.04	402	1.66	111	106	0.2
B-4	0.03	403	1.24	112	106	0.173205
B-5	0.03	401	1.24	112	107	0.173205
B-6	0.03	402	1.24	114	108	0.173205
B-7	0.025	378	1.04	114	108	0.158114
B-8	0.03	370	1.24	114	109	0.173205
C-1	0.04	401	1.66	112	110	0.2
C-2	0.035	402	1.45	113	110	0.187083
C-3	0.035	403	1.45	114	109	0.187083
C-4	0.03	402	1.24	115	110	0.173205
C-5	0.025	400	1.04	115	110	0.158114
C-6	0.02	392	0.83	115	110	0.141421
C-7	0.01	373	0.41	114	110	0.1
C-8	0.01	371	0.41	113	110	0.1
Average		393.5	1.28583333	110.916667	106.5833	0.17404
					108.75	

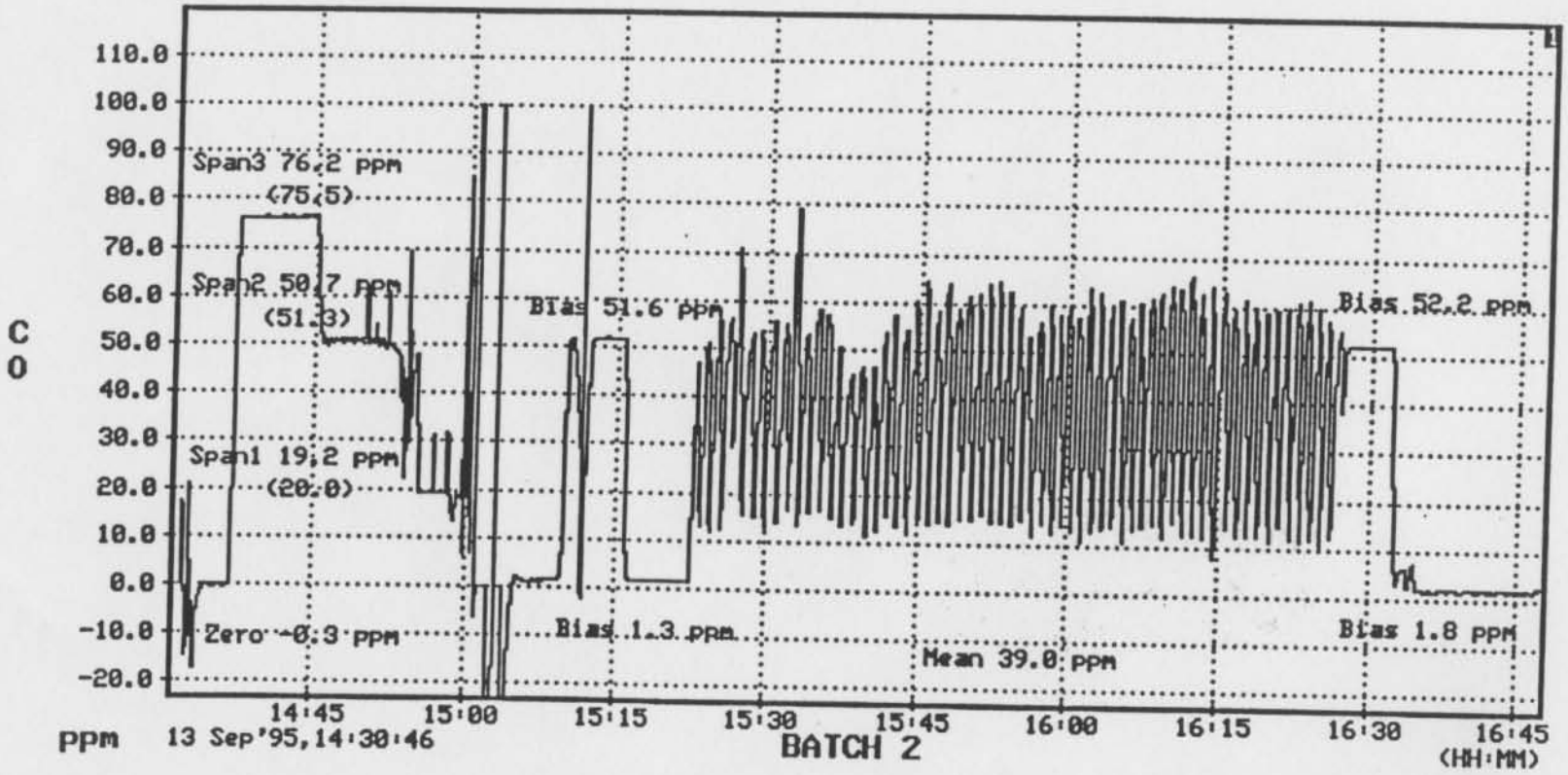

12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
S
O
2
Span2 86.6 ppm
(86.0)
Span1 46.2 ppm
(46.3)
Zero 0.3 ppm
Bias 81.8 ppm
Bias -0.7 ppm
Mean 0.9 ppm
Bias 82.9 ppm
Bias 1.1 ppm
14:45
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
(HH:MM)
ppm
13 Sep'95,14:30:46
BATCH 2

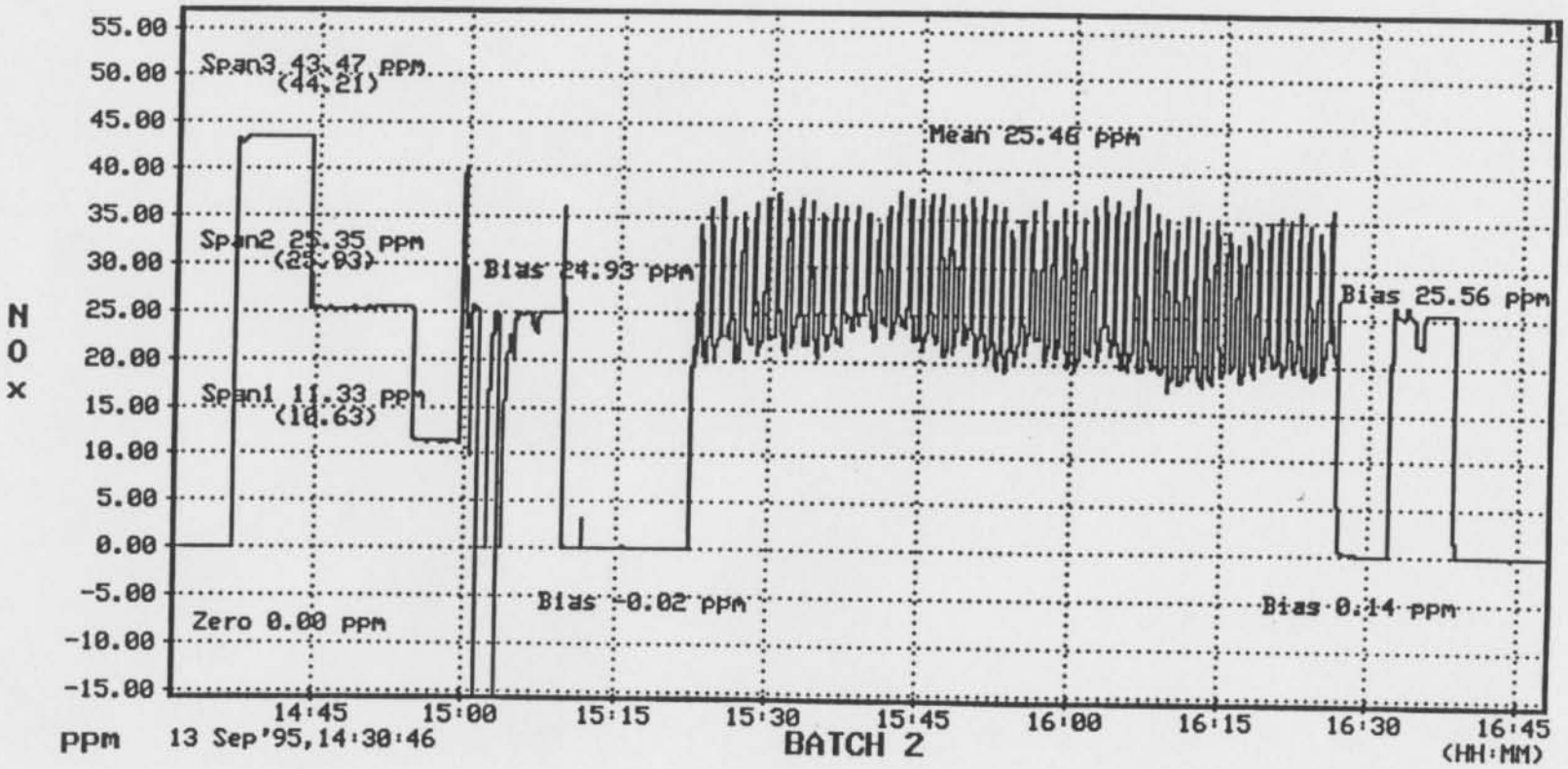
STRIP CHART INTEGRATED — DATA LOGGER FAILURE




OXYGEN
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
Span3 19.57 %
(19.99)
Span2 10.75 %
(11.0)
Span1 9.96 %
(10.00)
Zero 0.01 %
Bias 10.85 %
Bias 0.07 %
Mean 16.17 %
Bias 10.90 %
Bias 0.08 %
%
13 Sep'95,14:30:46
14:45
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
(HH:MM)
BATCH 2


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
-4.00
C
O
2
%
Span3 18.30 %
(18.06)
Span2 10.73 %
(11.00)
Span1 1.82 %
(2.00)
Zero 0.06 %
Bias 10.88 %
Bias 0.08 %
Mean 2.73 %
Bias 11.02 %
Bias 0.09 %
14:45
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
(HH:MM)
13 Sep'95,14:30:46
BATCH 2


CO
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
Span3 76.2 ppm
(75.5)
Span2 50.7 ppm
(51.3)
Span1 19.2 ppm
(20.0)
Zero -0.3 ppm
Bias 51.6 ppm
Bias 1.3 ppm
Mean 39.0 ppm
Bias 52.2 ppm
Bias 1.8 ppm
14:45
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
(HH:MM)
ppm
13 Sep'95,14:30:46
BATCH 2


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
-10.00
-15.00
NOx
Span3 43.47 ppm
(44.21)
Span2 25.35 ppm
(25.93)
Span1 11.33 ppm
(10.63)
Zero 0.00 ppm
Bias 24.93 ppm
Bias -0.02 ppm
Mean 25.46 ppm
Bias 25.56 ppm
Bias 0.14 ppm
14:45
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
(HH:MM)
ppm
13 Sep'95,14:30:46
BATCH 2

PES Inc.
Calculations for : EPA Method 2,3a,4,6c,7E,10 and 25a

Plant	ATC Consultants - Balboa Pacific
Project #	5102
Operation	Pyrolytic Unit
Run	2
Load	Batch 2
Location	Santa Fe Springs, CA
Date	9/13/95

D A T A I N P U T

INPUT	Vlc =	44.6	cc	Vol. of H2O collected
INPUT	Vm =	38.972	cf	Dry gas meter reading
INPUT	Pb =	29.85	in. Hg	Barometric pressure
INPUT	Pg =	-0.02	in. H2O	Static pressure
INPUT	dP =	0.149		Avg. sq.rt delta P
INPUT	dH =	1.010	in. H2O	Avg. delta H
INPUT	Tm =	569.3	R	Avg. meter temp.
INPUT	Ts =	837.9	R	Avg. stack temp.
INPUT	Y =	1.021		Meter calibration factor
INPUT	t =	72	min.	Duration of sampling time
INPUT	A =	2.3300	sq.ft.	Stack Area
INPUT	Cp =	0.84		Pitot tube coefficient
	Kp =	85.49		Pitot tube constant
	K1 =	17.64	R/in.Hg	constant
	K2 =	0.04707	cu.ft/ml	constant
	K3 =	0.002669	in.Hg-cf/	constant

Gas Analysis

INPUT	[O2] =	16.17	%(dry)
INPUT	[O2] =	0.07	initial zero bias
INPUT	[O2] =	0.08	final zero bias
	[O2] =	0.08	average zero bias
INPUT	[O2] =	11	midspan concentration
INPUT	[O2] =	10.85	initial midspan bias
INPUT	[O2] =	10.9	final midspan bias
	[O2] =	10.875	average midspan bias
INPUT	[CO2] =	2.73	%(dry)
INPUT	[CO2] =	0.08	initial zero bias
INPUT	[CO2] =	0.09	final zero bias
	[CO2] =	0.09	average zero bias
INPUT	[CO2] =	11	midspan concentration
INPUT	[CO2] =	10.88	initial midspan bias
INPUT	[CO2] =	11.02	final midspan bias
	[CO2] =	10.95	average midspan bias
	[O2] =	16.39	adjusted concentration
	[CO2] =	2.68	adjusted concentration
	[N2] =	80.9	%
INPUT	[CO] =	39.00	ppmV(dry)
INPUT	[CO] =	1.3	initial zero bias
INPUT	[CO] =	1.8	final zero bias
	[CO] =	1.55	average zero bias
INPUT	[CO] =	51.3	midspan concentration
INPUT	[CO] =	51.6	initial midspan bias
INPUT	[CO] =	52.2	final midspan bias
	[CO] =	51.9	average midspan bias
INPUT	[NOx] =	25.5	ppmV(dry)
INPUT	[NOx] =	-0.02	initial zero bias
INPUT	[NOx] =	0.14	final zero bias
	[NOx] =	0.06	average zero bias
INPUT	[NOx] =	25.93	midspan concentration
INPUT	[NOx] =	24.93	initial midspan bias
INPUT	[NOx] =	25.56	final midspan bias
	[NOx] =	25.245	average midspan bias
INPUT	[THC] =	0.4	ppmV(wet)
INPUT	[THC] =	0.2	initial zero bias
INPUT	[THC] =	0.3	final zero bias
	[THC] =	0.25	average zero bias
INPUT	[THC] =	48	midspan concentration
INPUT	[THC] =	48.7	initial midspan bias
INPUT	[THC] =	48.7	final midspan bias
	[THC] =	48.7	average midspan bias
INPUT	[SO2] =	0.9	ppmV(dry)
INPUT	[SO2] =	-0.7	initial zero bias
INPUT	[SO2] =	1.1	final zero bias
	[SO2] =	0.20	average zero bias
INPUT	[SO2] =	86	midspan concentration
INPUT	[SO2] =	81.8	initial midspan bias
INPUT	[SO2] =	82.9	final midspan bias
	[SO2] =	82.35	average midspan bias
	[CO] =	38.16	ppmV(dry) adj concentration
	[NOx] =	26.15	ppmV(dry) adj concentration
	[THC] =	0.15	ppmV(wet) adj concentration
	[SO2] =	0.73	ppmV(dry) adj concentration

C A L C U L A T I O N S

01) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd = 36.90 cu.ft
1.04 cu.m

02) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) 2.10 scf

03) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.054

04) Molecular weight of the stack gas on a wet basis

Ms = (1-Q)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Q)

Ms = 28.44

05) Average stack gas velocity.

Ps = 29.85 in. Hg

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 10.66 ft/sec

06) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1490.38 cfm
42.21 cmm

07) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)

Qstd = 886.46 dscfm
25.10 dscmm
53187.44 dscfh

08) Emission Calculation - Carbon Monoxide

lbs CO/hr = ([CO] * DSCFH * MW)/387*10^6

[CO] =	38.16	ppmv (dry)	Actual conc.
[CO] =	0.15	Lbs/hr	

09) Emission Calculation - Nitrogen Oxides

lbs NOx/hr = ([NOx] * DSCFH * MW)/387*10^6

[NOx] =	26.2	ppmv (dry)	Actual Conc.
[NOx] =	0.17	Lbs/hr	

10) Emission Calculation - Total Hydrocarbons

lbs THC/hr = ([THC] * DSCFH * MW)/387*10^6

[THC] =	0.2	ppmv (dry)	Actual Conc.
[THC] =	0.00	Lbs/hr	

11) Emission Calculation - Sulfur Dioxide

lbs NMHC/hr = ([NMHC] * DSCFH * MW)/387*10^6

[SO2] =	0.7	ppmv (dry)	Actual Conc.
[SO2] =	0.00	Lbs/hr	

FIELD D/

Plant ATC - BALBOA PACIFIC
Date 4-14-95
Sampling Location
Sample Type PARTICULATE
Run Number ATC-5
Operator MOKH
Ambient Temperature 100 °F
Barometric Pressure 29.88
Static Pressure -0.005
Filter Number(s) —
Pretest Leak Rate 0.012 CFM @ 5.0 in. Hg
Read And Record All Data Every ~3 Minutes

Schematic of Traverse Point Layout

Probe Length and Type 3' Glass
Pitot Tube I.D. No. S-2A
Nozzle I.D. No. And Diameter N-6 0.495
Assumed Moisture, % 6.0
Meter Box Number 1A
Meter Delta H@ 1.861
C Factor —
Meter Gamma 1.021
Heater Box Setting ~250
Reference Delta P —
Post test Leak Rate 0.002 CFM @ 5.0 in. Hg
Impinger Box No. 5B Blank Box No. 2 3

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	Orifice Pressure Differential (in. H20) 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)
C8	0	14:10	117.225	0.040	1.71	✓	397	108	107	4.0	237	223	61
C7	3	14:13	119.2	0.035	1.50	✓	398	109	107	3.5	241	223	60
C6	6	14:16	121.3	0.035	1.50	✓	398	110	107	3.5	240	232	55
C5	9	14:19	123.4	0.030	1.28	✓	395	112	108	3.0	243	238	54
C4	12	14:22	125.3	0.025	1.07	✓	387	113	108	3.0	242	240	55
C3	15	14:25	127.0	0.020	0.86	✓	361	113	109	2.5	244	258	57
C2	18	14:28	128.6	0.015	0.64	✓	281	113	109	2.0	241	253	59
C1	21	14:31	129.9	0.015	0.64	✓	280	114	109	2.0	239	252	64
END/BB	24	14:34/:37	131.3	0.040	1.71	✓	384	112	109	4.0	241	252	67
B7	27	14:40	133.4	0.040	1.71	✓	397	113	109	4.0	239	249	60
B6	30	14:43	135.5	0.040	1.71	✓	398	114	110	4.0	241	259	59
B5	33	14:46	137.7	0.040	1.71	✓	396	114	110	4.0	245	257	61
B4	36	14:49	139.9	0.040	1.71	✓	386	114	110	4.0	244	255	63
B3	39	14:52	142.0	0.030	1.86	✓	380	115	110	3.0	241	258	65
B2	42	14:55	143.5	0.015	0.64	✓	348	114	110	2.0	239	253	67
B1	45	14:58	145.0	0.015	0.64	✓	303	114	111	2.0	240	260	61
END/AB	48	15:01/04	146.3	0.030	1.28	✓	381	113	110	3.0	239	250	65
A7	51	15:07	148.2	0.035	1.50	✓	397	114	110	4.0	242	246	65
A6	54	15:10	150.1	0.040	1.71	✓	401	114	110	4.0	244	251	66
A5	57	15:13	152.2	0.035	1.50	✓	401	115	111	4.0	244	252	66
A4	60	15:16	154.3	0.040	1.71	✓	394	116	111	4.0	243	251	67
A3	63	15:19	156.4	0.030	1.28	✓	392	117	111	4.0	245	252	68
A2	66	15:22	158.5	0.030	1.28	✓	340	116	111	4.0	242	252	69
A1	69	15:25	160.4	0.030	1.28	✓	327	118	112	4.0	237	251	66
END	72	15:28	162.245	—	—	—	—	—	—	—	—	—	—

PACIFIC ENVIRONMENTAL SERVICES INC

SAMPLE RETRIEVAL DATA

Plant: ATC
Date: 9.14.92
Sampling Location:
Sampling Type (Method): EPA 5
Run Number: ATC-#5
Sample Box Number: #B
Clean-up Man: VN
Job Number:
Comments: Sample P 707.5
T 127.6

Filter

Filter Number:			
Description of Filter:			

Moisture

Impingers:			
Final Volume:	695.2 mL	601.3 mL	492.0 mL
Initial Volume:	653.9 mL	595.2 mL	490.7 mL
Net Volume:	41.3 mL	6.1 mL	1.3 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	729.0 g	g	g
Initial Volume:	718.3 g	g	g
Net Volume:	10.7 g	g	g
Total Moisture:	g	g	g
		59.5	

Description of Inpinger catch:

PES Inc.

EPA Method 5 Calculations

Plant	ATC - Balboa Pacific
Project #	5102
Operation	Pyrolytic Waste Incinerator
Run	3 - Particulate
Location	Santa Fe Springs, CA
Date	9/14/95

Emission Data

Vlc =	44.6	cc	Vol. of H2O collected (impingers)
Vm =	38.972	cf	Dry gas meter reading
Pb =	29.85	in. Hg	Barometric pressure
Ps =	29.85	in. Hg	Stack pressure
dP =	0.149		Average sq.rt delta P
dH =	1.010	in. H2O	Average draft gauge reading
Tm =	569.0	R	Average meter temperature
Ts =	842.00	R	Average stack temperature
Dn =	0.499	in.	Nozzle diameter
Y =	1.021		Meter calibration factor
t =	72	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

1) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	36.91	cu.ft
	1.05	cu.m

2) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) =	2.10	scf

3) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.054

4) Molecular weight of the stack gas on a dry basis Md.

Ms = ((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))

Ms = 29.11

Instrumental gas analysis

% CO2	2.88
% CO	0
% O2	16.33
% N2	80.79

5) Average stack gas velocity.

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 10.53 ft/sec

6) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1472.42 cfm
41.70 cmm

7) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 871.55 dscfm
24.68 dscmm

8) Analytical data

a) Front half acetone wash

0.0019	g	wash net wt
0	g	acetone blank net wt
100	ml	blank vol.
133	ml	Final wash volume
133	ml	aliquot
0.0019	g	soluble particulate*

b) Front half glass microfibre filter

0	g	filter net wt

c) Back half water wash - soluble

0.0018	g	net wt
0	g	water blank net wt
220	ml	blank vol
579.9	ml	Final wash volume
579.9	ml	aliquot
0.0018	g	soluble net wt*

* Weights are not blank corrected

9) Particulate concentrations

0.0008	grains/dscf	Front 1/2
0.0015	grains/dscf	Total

11) Particulate emission rate

Conc.*(1 lb/7000 gr)* Qstd *60 min/hr

W =	0.006	lbs/hr	Front 1/2
W =	0.012	lbs/hr	Total Particulate

12) Isokinecity

An =	0.001	ft^2	Area of nozzle orifice

% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

% I = 100.97

Plant ATC - Bal Pac
Date 9-14-95
Sampling Location
Sample Type MULTIPLE METALS
Run Number ATC-6
Operator MDKH
Ambient Temperature 100 °F
Barometric Pressure 29.88
Static Pressure +0.005
Filter Number(s) —
Pretest Leak Rate 0.018 CFM @ 5.0 in. Hg
Read And Record All Data Every 5 Minutes

Schematic of Traverse Point Layout

Probe Length and Type 3' GLASS LINED SS
Pitot Tube I.D. No. S-2A
Nozzle I.D. No. And Diameter N-6 0.495
Assumed Moisture, % 6
Meter Box Number 1A
Meter Delta H@ 1.461
C Factor —
Meter Gamma 1.021
Heater Box Setting ~250
Reference Delta P —
Post test Leak Rate 0.020 CFM @ 5.0 in. Hg
Impinger Box No. 3B 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	Orifice Pressure Differential (in. H20) ΔH Actual	Stack Temp. Ts (F) [1]	Dry Gas Meter Temp. Inlet Tm in (F)	Dry Gas Meter Temp. Outlet Tm out (F)	Pump Vacuum (in. Hg)	Heated Probe Temp. (F) [2]	Filter Box Temp. (F) [3]	Impinger Temp. (F)
AB	0	11.20	042.451	0.030	1.24	✓	397	101	101	3.0	253	222	73
A7	5	11:25	045.6	0.030	1.24	✓	400	102	101	3.0	257	216	68
A6	10	11:30	048.5	0.040	1.66	✓	401	104	101	4.0	255	238	66
A5	15	11:35	051.9	0.035	1.45	✓	402	106	102	3.5	256	239	64
A4	20	11:40	055.1	0.040	1.66	✓	398	109	104	4.0	237	245	63
A3	25	11:45	058.6	0.040	1.66	✓	402	112	105	4.0	261	242	63
A2	30	11:50	062.1	0.030	1.24	✓	376	111	105	3.0	254	237	62
A1	35	11:55	065.4	0.030	1.24	✓	370	111	105	3.0	252	231	63
END/BB	40	12:00/05	068.3	0.045	1.87	✓	395	108	105	4.0	250	232	67
B7	45	12:10	072.0	0.035	1.45	✓	403	110	106	4.0	256	231	64
B6	50	12:15	075.3	0.040	1.66	✓	402	111	106	4.0	255	238	66
B5	55	12:20	078.9	0.030	1.24	✓	403	112	106	3.5	256	239	68
B4	60	12:25	082.2	0.030	1.24	✓	401	112	107	3.5	258	237	68
B3	65	12:30	085.5	0.030	1.24	✓	402	114	108	3.0	257	262	67
B2	70	12:35	088.5	0.025	1.04	✓	378	114	108	3.0	254	253	66
B1	75	12:40	091.4	0.030	1.24	✓	370	114	109	3.0	255	251	67
END/CB	80	12:45/50	094.4	0.040	1.66	✓	401	112	110	4.0	251	266	67
C7	85	12:55	098.0	0.035	1.45	✓	402	113	110	4.0	257	251	66
C6	90	13.00	101.2	0.035	1.45	✓	403	114	109	4.0	254	250	67
C5	95	13:05	104.6	0.030	1.24	✓	402	115	110	3.5	253	279	67
C4	100	13:10	107.7	0.025	1.04	✓	400	115	110	3.0	256	272	64
C3	105	13:15	110.6	0.020	0.83	✓	392	115	110	3.0	253	263	66
C2	110	13:20	113.2	0.010	0.41	✓	373	114	110	1.0	254	265	67
C1	115	13:25	115.1	0.010	0.41	✓	371	113	110	1.0	252	247	65
END	120	13:30	117.023	—	—	—	—	—	—	—	—	—	—

SAMPLE RETRIEVAL DATA

Plant: ATC
Date: 9.14.95
Sampling Location:
Sampling Type (Method): EPA 12
Run Number: ATC-6
Sample Box Number: 3B
Clean-up Man:
Job Number:
Comments: Sample # 984.2
T 356.3

Filter

Filter Number:
Description of Filter:

Moisture

Impingers:			
Final Volume:	696.0 mL	617.5 mL	486.4 mL
Initial Volume:	676.1 mL	608.0 mL	474.5 mL
Net Volume:	19.9 mL	9.5 mL	11.9 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	689.5 g	g	g
Initial Volume:	671.1 g	g	g
Net Volume:	18.4 g	g	g
Total Moisture:	99.1 g	g	g

Description of Inpinger catch:

PES, Inc.
Multi-Metals Method Calculations (EPA 12)

Plant	ATC-Balboa Pacific
Project #	5102
Operation	Pyrolytic Oxidation Unit
Run	Batch 3
Location	Outlet
Date	9/15/95

Test Data

Vlc =	86.2	cc	Vol. of H2O collected (impingers)
Vm =	65.825	cf	Dry gas meter reading
Pb =	29.85	in. Hg	Barometric pressure
Ps =	29.85	in. Hg	Stack pressure
dP =	0.155		Average sq.rt delta P
dH =	1.053	in. H2O	Average draft gauge reading
Tm =	565.6	R	Average meter temperature
Ts =	843.88	R	Average stack temperature
Dn =	0.495	in.	Nozzle diameter
Y =	1.021		Meter calibration factor
t =	120	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-	constant

Instrumentation Data

[O2] =	16.3	%
[CO2] =	2.9	%

CALCULATIONS

1) Volume of gas sampled at standard conditions, Vmstd
Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	62.72	cu.ft
	1.78	cu.m

2) Volume of water vapor collected at standard conditions.
Vw(std) = K2 * Vlc

Vw(std) = 4.06 scf

3) Decimal fraction of moisture by volume in stack gas
Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.061

4) Molecular weight of the stack gas on a dry basis Md.
Md = (1-Bws)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Bws)

Md = 28.44

5) Average stack gas velocity.
vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 11.09 ft/sec

6) Average actual stack gas volumetric flowrate.
Q = 60 * vs * As

Q = 1550.67 cfm
43.92 cmm

7) Average stack gas dry volumetric flowrate.
Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 909.11 dscfm
25.75 dscmm

8) Toxic metal concentrations and emission rates

Element	Sample Mass (ug)	Blank Mass (ug) DL	Conc. (mg/dscm)	Emission Rate (mg/hr)
Copper	7.00	1.00	2.72E-04	4.2E-01
Chromium	12.00	2.00	4.66E-04	7.2E-01
Lead	6.20	0.20	2.41E-04	3.7E-01
Zinc	58.00	8.00	2.25E-03	3.5E+00
Manganese	5.00	1.00	1.94E-04	3.0E-01
Nickel	5.20	0.40	2.02E-04	3.1E-01
Cadmium	5.00	2.00	1.94E-04	3.0E-01
Beryllium	1	1.00	3.88E-05	6.0E-02
Arsenic	2.4	0.20	9.32E-05	1.4E-01
Selenium	7	7.00	2.72E-04	4.2E-01
Molybdenum	2470	3.00	9.59E-02	1.5E+02
Silver	0.1	0.10	3.88E-06	6.0E-03
Antimony	3	3.00	1.17E-04	1.8E-01
Barium	34.2	0.40	1.33E-03	2.1E+00
Thallium	0.1	0.10	3.88E-06	6.0E-03

9) Isokinecity

An = 0.001 ft^2 Area of nozzle orifice

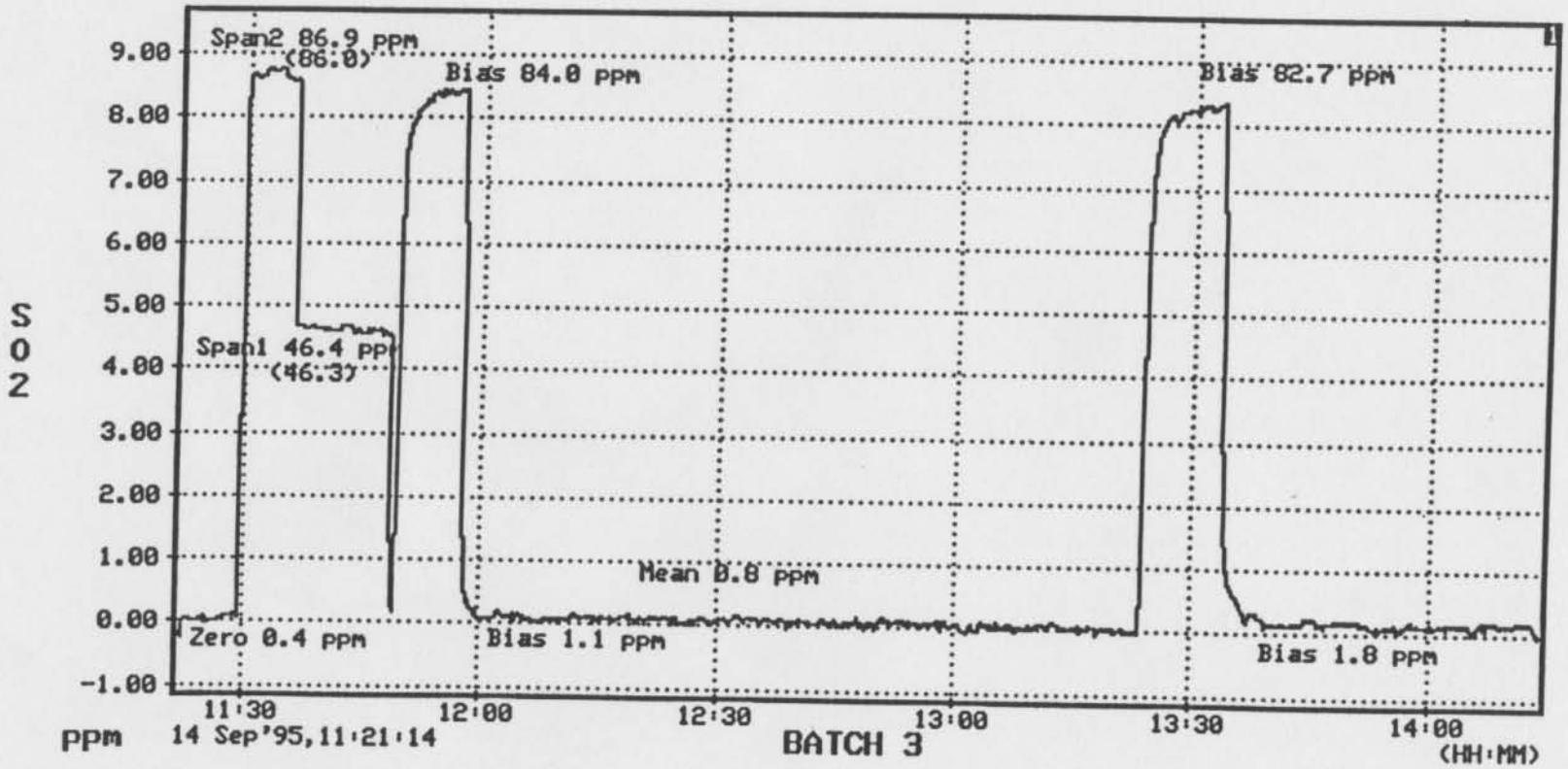
% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

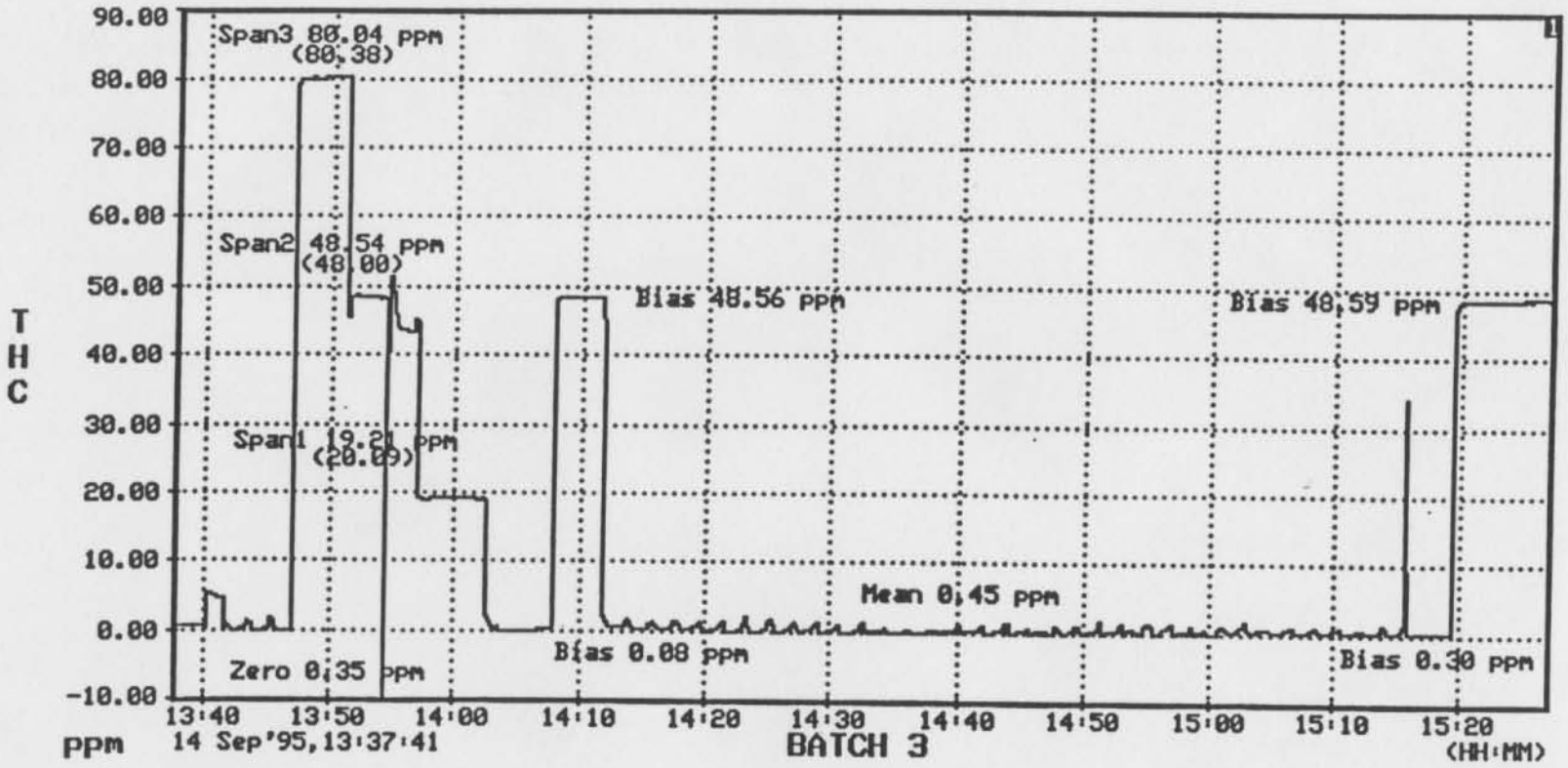
% I = 100.29

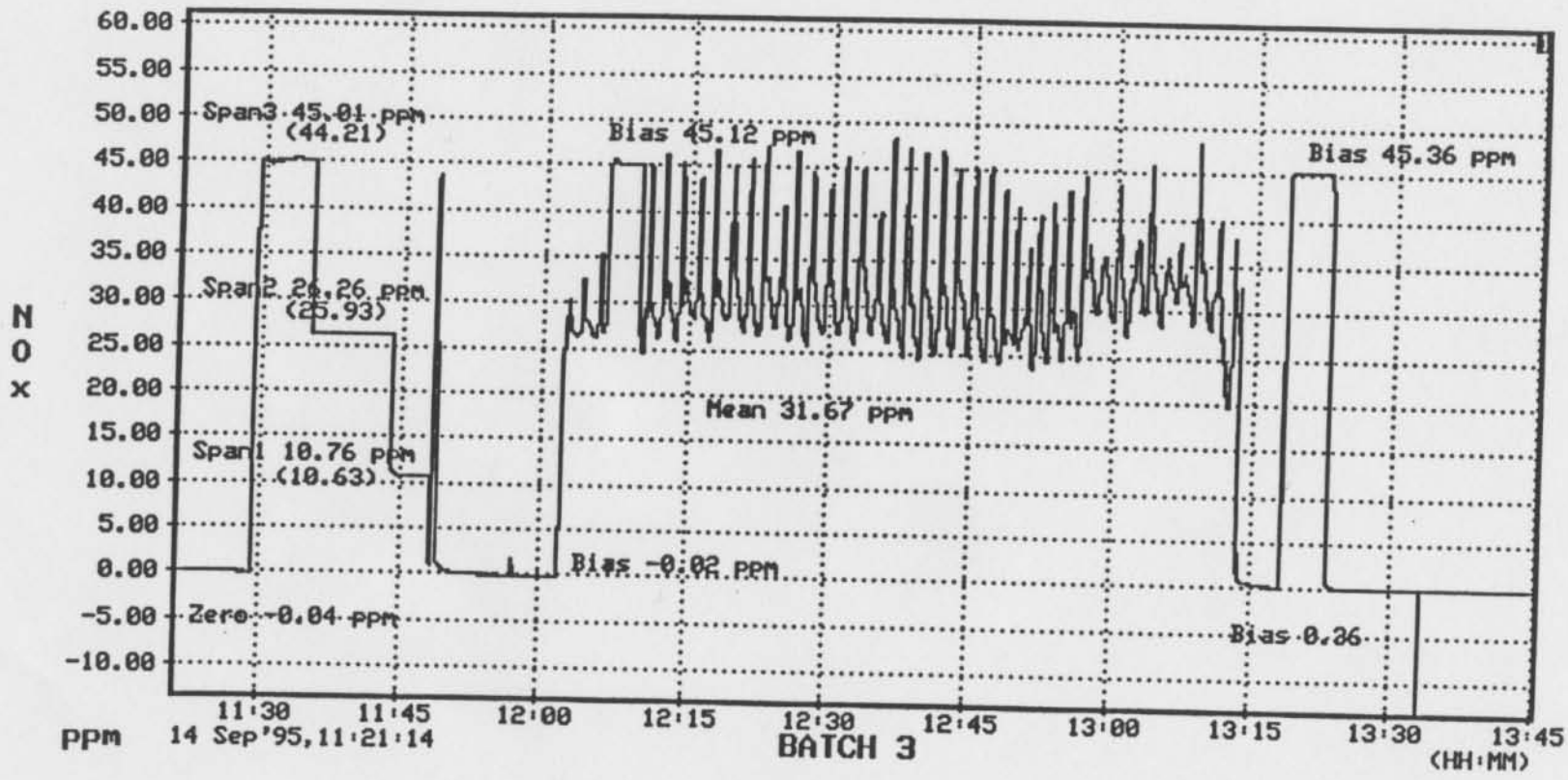
Sample Train Operation Data

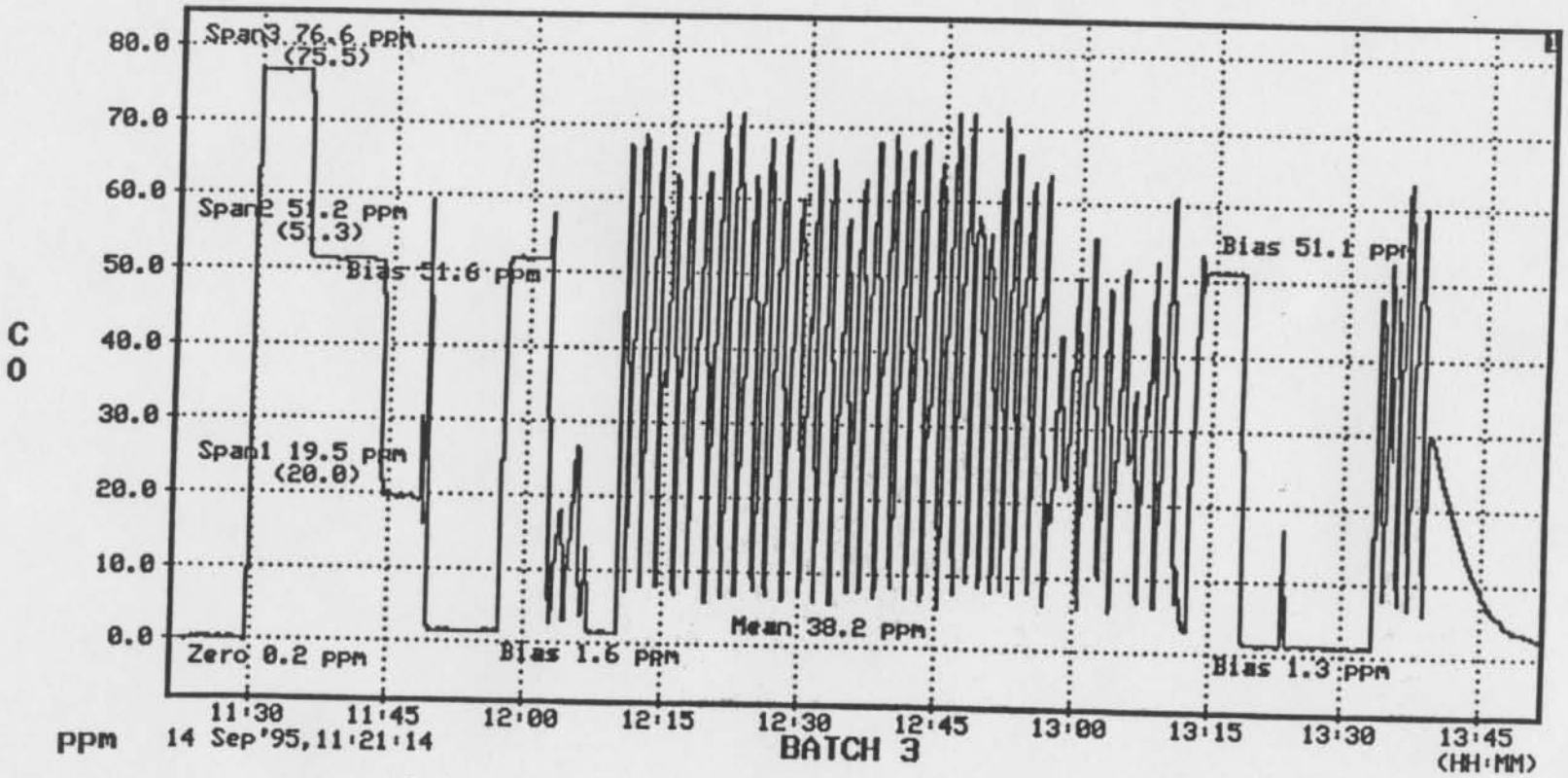
Test Date	9/15/95	
Barometer	29.85	in.Hg
Run #	3	
Static P	-0.02	in.H2O
Pitot Cp	0.84	
Nozzle	0.495	

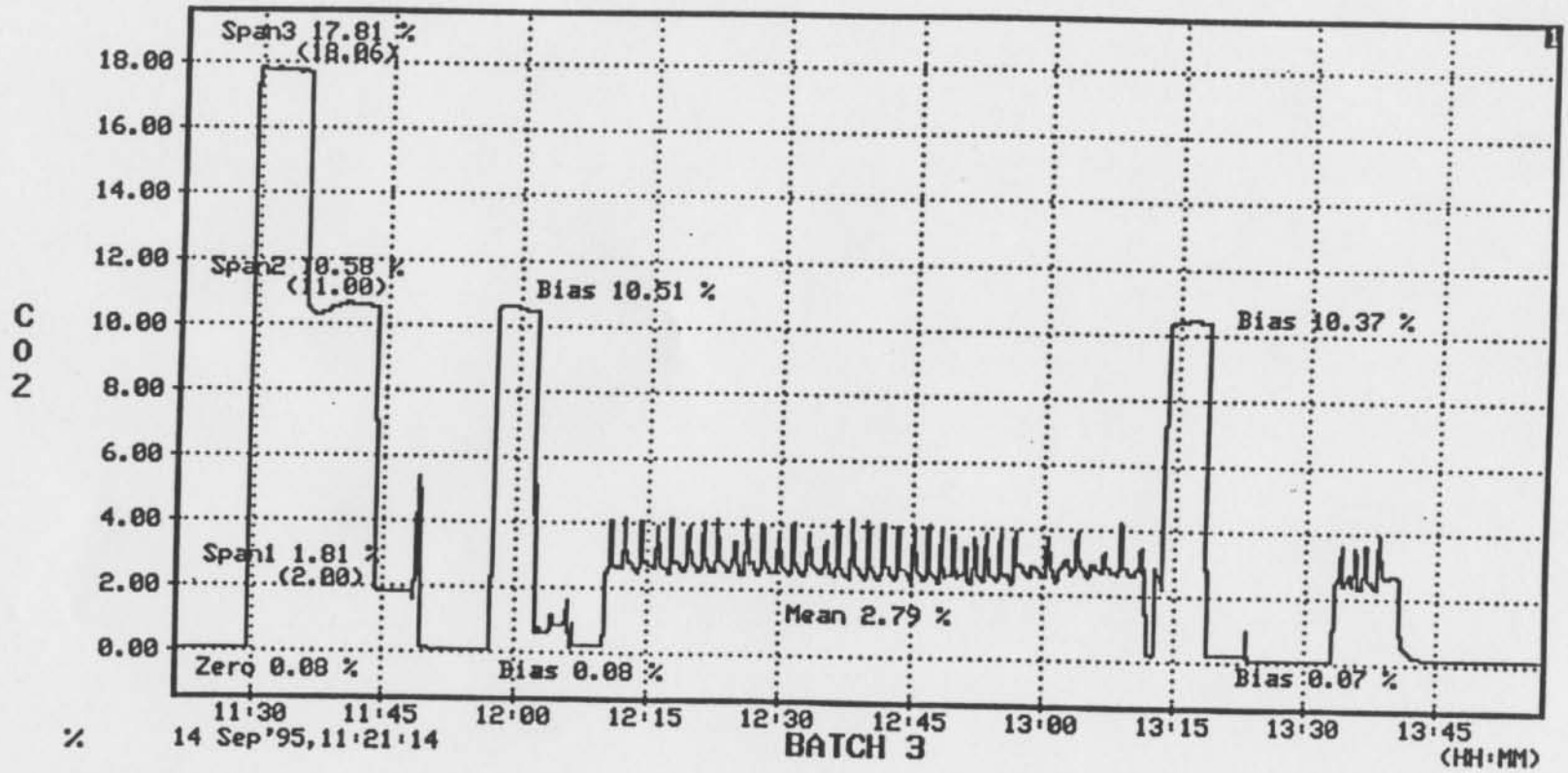
Traverse Point	Delta-P (in. H2O)	Temp. (Deg.F)	delta H	Dry Gas Meter Temp IN	Dry Gas Meter Temp OUT	(dP)^.5
A-1	0.01	230	0.41	97	96	0.1
A-2	0.02	376	0.83	97	96	0.14142
A-3	0.03	390	1.24	99	97	0.17321
A-4	0.025	399	1.04	100	97	0.15811
A-5	0.02	405	0.83	103	98	0.14142
A-6	0.02	406	0.83	104	99	0.14142
A-7	0.02	406	0.83	105	100	0.14142
A-8	0.02	405	0.83	107	101	0.14142
B-1	0.01	356	0.41	106	103	0.1
B-2	0.01	366	0.41	107	103	0.1
B-3	0.01	389	0.41	107	103	0.1
B-4	0.015	406	0.62	108	104	0.12247
B-5	0.025	410	1.04	108	105	0.15811
B-6	0.03	409	1.24	111	108	0.17321
B-7	0.03	410	1.24	112	107	0.17321
B-8	0.03	411	1.24	113	107	0.17321
C-1	0.015	309	0.62	112	108	0.12247
C-2	0.02	339	0.83	111	108	0.14142
C-3	0.025	372	1.04	112	108	0.15811
C-4	0.035	398	1.45	112	108	0.18708
C-5	0.04	405	1.66	113	109	0.2
C-6	0.045	407	1.87	113	108	0.21213
C-7	0.05	406	2.07	112	108	0.22361
C-8	0.055	403	2.28	113	108	0.23452
Average		383.875	1.0529167	107.58333	103.708	0.15492
					105.646	

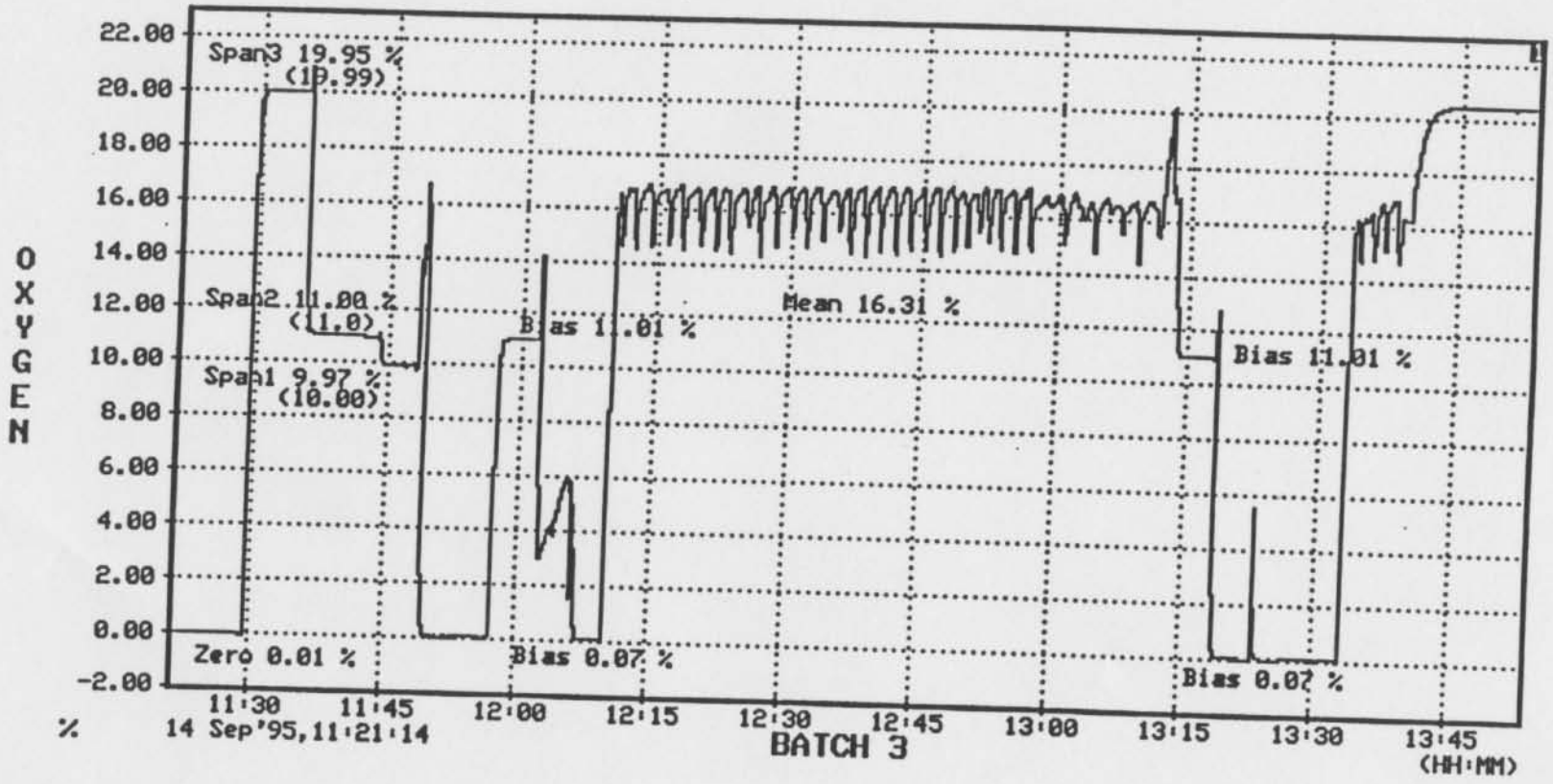

Span2 86.9 ppm
(86.0)
Bias 84.0 ppm
Bias 82.7 ppm
Span1 46.4 ppm
(46.3)
Mean 0.8 ppm
Zero 0.4 ppm
Bias 1.1 ppm
Bias 1.8 ppm
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
SO2
ppm
11:30
12:00
12:30
13:00
13:30
14:00
(HH:MM)
14 Sep'95,11:21:14
BATCH 3


90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
THC
ppm
Span3 80.04 ppm
(80.38)
Span2 48.54 ppm
(48.00)
Span1 19.21 ppm
(20.09)
Zero 0.35 ppm
Bias 48.56 ppm
Bias 0.08 ppm
Mean 0.45 ppm
Bias 48.59 ppm
Bias 0.30 ppm
13:40
13:50
14:00
14:10
14:20
14:30
14:40
14:50
15:00
15:10
15:20
(HH:MM)
14 Sep'95,13:37:41
BATCH 3


60.00
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
-10.00
NOx
Span3 45.01 ppm
(44.21)
Span2 26.26 ppm
(25.93)
Span1 10.76 ppm
(10.63)
Zero -0.04 ppm
Bias 45.12 ppm
Mean 31.67 ppm
Bias -0.02 ppm
Bias 45.36 ppm
Bias 0.26
11:30
11:45
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
(HH:MM)
ppm
14 Sep'95,11:21:14
BATCH 3


Span3 76.6 ppm
(75.5)
Span2 51.2 ppm
(51.3)
Bias 51.6 ppm
Span1 19.5 ppm
(20.0)
Zero 0.2 ppm
Bias 1.6 ppm
Mean 38.2 ppm
Bias 51.1 ppm
Bias 1.3 ppm
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
CO
ppm
11:30
11:45
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
(HH:MM)
14 Sep'95,11:21:14
BATCH 3


Span3 17.81 %
(18.00)
Span2 10.58 %
(11.00)
Span1 1.81 %
(2.00)
Zero 0.08 %
Bias 10.51 %
Bias 0.08 %
Mean 2.79 %
Bias 10.37 %
Bias 0.07 %
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
C
O
2
%
11:30
11:45
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
(HH:MM)
14 Sep'95,11:21:14
BATCH 3


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
Span3 19.95 %
(19.99)
Span2 11.00 %
(11.0)
Span1 9.97 %
(10.00)
Zero 0.01 %
Bias 11.01 %
Bias 0.07 %
Mean 16.31 %
Bias 11.01 %
Bias 0.07 %
11:30
11:45
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
(HH:MM)
14 Sep'95,11:21:14
BATCH 3

PES Inc.
Calculations for : EPA Method 2,3a,4,6c,7E,10 and 25a

Plant	ATC Consultants - Balboa Pacific
Project #	5102
Operation	Pyrolytic Unit
Run	3
Load	Batch 3
Location	Santa Fe Springs, CA
Date	9/14/95

D A T A I N P U T

INPUT	Vlc =	59.9	cc	Vol. of H2O collected
INPUT	Vm =	45.020	cf	Dry gas meter reading
INPUT	Pb =	29.88	in. Hg	Barometric pressure
INPUT	Pg =	-0.02	in. H2O	Static pressure
INPUT	dP =	0.173		Avg. sq.rt delta P
INPUT	dH =	1.310	in. H2O	Avg. delta H
INPUT	Tm =	571.5	R	Avg. meter temp.
INPUT	Ts =	831.9	R	Avg. stack temp.
INPUT	Y =	1.021		Meter calibration factor
INPUT	t =	72	min.	Duration of sampling time
INPUT	A =	2.3300	sq.ft.	Stack Area
INPUT	Cp =	0.84		Pitot tube coefficient
	Kp =	85.49		Pitot tube constant
	K1 =	17.64	R/in.Hg	constant
	K2 =	0.04707	cu.ft/ml	constant
	K3 =	0.002669	in.Hg-cf/	constant

Gas Analysis

INPUT	[O2] =	16.31	%(dry)
INPUT	[O2] =	0.07	initial zero bias
INPUT	[O2] =	0.07	final zero bias
	[O2] =	0.07	average zero bias
INPUT	[O2] =	11	midspan concentration
INPUT	[O2] =	11.01	initial midspan bias
INPUT	[O2] =	11.01	final midspan bias
	[O2] =	11.01	average midspan bias
INPUT	[CO2] =	2.79	%(dry)
INPUT	[CO2] =	0.08	initial zero bias
INPUT	[CO2] =	0.07	final zero bias
	[CO2] =	0.08	average zero bias
INPUT	[CO2] =	11	midspan concentration
INPUT	[CO2] =	10.51	initial midspan bias
INPUT	[CO2] =	10.37	final midspan bias
	[CO2] =	10.44	average midspan bias
	[O2] =	16.33	adjusted concentration
	[CO2] =	2.88	adjusted concentration
	[N2] =	80.8	%
INPUT	[CO] =	38.20	ppmV(dry)
INPUT	[CO] =	1.6	initial zero bias
INPUT	[CO] =	1.3	final zero bias
	[CO] =	1.45	average zero bias
INPUT	[CO] =	51.3	midspan concentration
INPUT	[CO] =	51.6	initial midspan bias
INPUT	[CO] =	51.1	final midspan bias
	[CO] =	51.35	average midspan bias
INPUT	[NOx] =	31.7	ppmV(dry)
INPUT	[NOx] =	-0.02	initial zero bias
INPUT	[NOx] =	0.36	final zero bias
	[NOx] =	0.17	average zero bias
INPUT	[NOx] =	44.21	midspan concentration
INPUT	[NOx] =	45.12	initial midspan bias
INPUT	[NOx] =	45.36	final midspan bias
	[NOx] =	45.24	average midspan bias
INPUT	[THC] =	0.5	ppmV(wet)
INPUT	[THC] =	0.08	initial zero bias
INPUT	[THC] =	0.3	final zero bias
	[THC] =	0.19	average zero bias
INPUT	[THC] =	48	midspan concentration
INPUT	[THC] =	48.56	initial midspan bias
INPUT	[THC] =	48.59	final midspan bias
	[THC] =	48.575	average midspan bias
INPUT	[SO2] =	0.8	ppmV(dry)
INPUT	[SO2] =	1.1	initial zero bias
INPUT	[SO2] =	1.8	final zero bias
	[SO2] =	1.45	average zero bias
INPUT	[SO2] =	86	midspan concentration
INPUT	[SO2] =	84	initial midspan bias
INPUT	[SO2] =	82.7	final midspan bias
	[SO2] =	83.35	average midspan bias
	[CO] =	37.78	ppmV(dry) adj concentration
	[NOx] =	30.90	ppmV(dry) adj concentration
	[THC] =	0.26	ppmV(wet) adj concentration
	[SO2] =	-0.68	ppmV(dry) adj concentration

C A L C U L A T I O N S

01) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd = 42.53 cu.ft
1.20 cu.m

02) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) 2.82 scf

03) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.062

04) Molecular weight of the stack gas on a wet basis

Ms = (1-Q)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Q)

Ms = 28.38

05) Average stack gas velocity.

Ps = 29.88 in. Hg

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 12.29 ft/sec

06) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1717.44 cfm
48.64 cmm

07) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)

Qstd = 1020.89 dscfm
28.91 dscmm
61253.10 dscfh

08) Emission Calculation - Carbon Monoxide

lbs CO/hr = ([CO] * DSCFH * MW)/387*10^6

[CO] =	37.78	ppmv (dry)	Actual conc.
[CO] =	0.17	Lbs/hr	

09) Emission Calculation - Nitrogen Oxides

lbs NOx/hr = ([NOx] * DSCFH * MW)/387*10^6

[NOx] =	30.9	ppmv (dry)	Actual Conc.
[NOx] =	0.23	Lbs/hr	

10) Emission Calculation - Total Hydrocarbons

lbs THC/hr = ([THC] * DSCFH * MW)/387*10^6

[THC] =	0.3	ppmv (dry)	Actual Conc.
[THC] =	0.00	Lbs/hr	

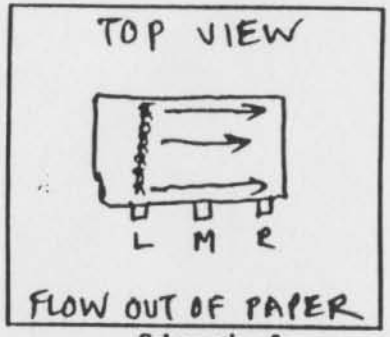
11) Emission Calculation - Sulfur Dioxide

lbs NMHC/hr = ([NMHC] * DSCFH * MW)/387*10^6

[SO2] =	-0.7	ppmv (dry)	Actual Conc.
[SO2] =	0.00	Lbs/hr	

FIELD DATA

Plant ATC Balboa Pacific
Date 10-3-95
Sampling Location EXHAUST STACK
Sample Type EPA METHOD 5
Run Number ATC2 PM1
Operator NEWMAN / MOKH
Ambient Temperature 90
Barometric Pressure 29.80
Static Pressure -0.005
Filter Number(s) —
Pretest Leak Rate 0.017 CFM @ 4 in. Hg
Read And Record All Data Every 3 Minutes



Schematic of
Traverse Point Layout

Probe Length and Type 3' Stainless Steel lined
Pitot Tube I.D. No. S-4A
Nozzle I.D. No. And Diameter M2 0.494
Assumed Moisture, % 2
Meter Box Number 2A
Meter Delta H@ 1.941
C Factor 1.15
Meter Gamma 1.003
Heater Box Setting ≈ 250
Reference Delta P ΔPa = 0.043
Post test Leak Rate 0.018 CFM @ 4.5 in. Hg
Impinger Box No. 7B 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	Orifice Pressure Differential (in. H20) ΔH Actual	5 Stack Temp. Ts (F)	6 Dry Gas Meter Temp. Inlet Tm in (F)	7 Dry Gas Meter Temp. Outlet Tm out (F)	Pump Vacuum (in. Hg)	2 Heated Probe Temp. (F)	3 Filter Box Temp. (F)	4 Impinger Temp. (F)
L8	0	9:42	037.516	0.04	1.70	✓	391	90	76	3.5	248	269	68
L7	3	9:45	041.300	0.03	1.25	✓	394	80	76	3.0	252	268	67
L6	6	9:48	043.072	0.03	1.25	✓	395	83	77	3.0	251	269	64
L5	9	9:51	044.800	0.03	1.25	✓	395	83	77	3.0	253	269	65
L4	12	9:54	046.531	0.03	0.84	✓	388	84	79	2.5	251	269	64
L3	15	9:57	048.080	0.01	0.44	✓	347	85	80	2.0	261	269	64
L2	18	10:00	049.223	0.01	0.44	✓	354	85	80	2.0	248	269	65
L1	21	10:03	050.000	0.005	0.22	✓	[illegible]	95	90	2.0	245	270	64
END/M8	24	10:06/10:10	051.500	0.01	0.44	✓	367	86	82	2.0	247	269	63
M7	27	10:13	052.517	0.01	0.44	✓	388	87	82	2.0	241	271	68
M6	30	10:16	053.641	0.01	0.44	✓	395	89	83	2.0	250	270	62
M5	33	10:19	054.752	0.005	0.22	✓	393	89	84	2.0	249	270	64
M4	36	11:22	055.580	0.005	0.22	✓	385	91	85	2.0	247	270	64
M3	39	11:25	056.415	0.005	0.22	✓	361	91	85	2.0	248	270	66
M2	42	11:28	057.229	0.005	0.22	✓	304	92	86	2.0	248	269	65
M1	45	11:31	058.049	0.005	0.22	✓	—	92	87	2.0	246	268	64
END/R8	48	11:34/10:36	059.882	0.02	0.84	✓	344	93	88	2.5	244	269	67
R7	51	10:39	060.300	0.01	0.44	✓	373	94	89	2.5	246	270	59
R6	54	10:42	061.578	0.01	0.44	✓	396	95	90	2.5	251	270	60
R5	57	10:45	062.730	0.01	0.44	✓	395	95	90	2.0	248	270	62
R4	60	10:48	063.820	0.01	0.44	✓	394	96	91	2.0	247	271	62
R3	63	10:51	064.977	0.005	0.22	✓	387	96	92	2.0	241	269	63
R2	66	10:54	065.796	0.005	0.22	✓	305	96	93	2.0	246	271	65
R1	69	10:57	066.583	0.005	0.22	✓	—	96	93	2.0	247	268	65
END	72	11:00	067.453	—	—	—	—	—	—	—	—	—	—

θ = 72 V_m = 27.937 $\sqrt{\Delta P}$ = 0.108 ΔH = 0.54 T_s = [illegible] + 460 = [illegible] T_m = 86 + 460 = 546

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RETRIEVAL DATA

Plant: ATC- BALBOA
Date: 10-3-95
Sampling Location: OUTLET
Sampling Type (Method): PARTICULATE
Run Number: PM1
Sample Box Number: 7B
Clean-up Man: MOKH
Job Number:
Comments:

Filter

Filter Number:
Description of Filter: SLIGHTLY (MOISE) COLORED WITH SMALL BLACK PARTICLES

Moisture

Impingers:	#1		#2		#3	
Final Volume:	605.4	mL	603.3	mL	501.8	mL
Initial Volume:	584.9	mL	596.0	mL	500.1	mL
Net Volume:	20.5	mL	7.3	mL	1.7	mL
Total H_2O:		mL		mL		mL

Silica Gel

Final Volume:	656.6 g	g	g
Initial Volume:	649.4 g	g	g
Net Volume:	7.2 g	g	g
Total Moisture:	g	g	g

Description of Impinger catch: 36.7

PES Inc.

EPA Method 5 Calculations

Plant	ATC - Balboa Pacific
Project #	5102
Operation	Pyrolytic Waste Incinerator
Run	1 - Particulate - set 2
Location	Santa Fe Springs, CA
Date	10/3/95

Emission Data

Vlc =	36.7	cc	Vol. of H2O collected (impingers)
Vm =	27.937	cf	Dry gas meter reading
Pb =	29.8	in. Hg	Barometric pressure
Ps =	29.80	in. Hg	Stack pressure
dP =	0.106		Average sq.rt delta P
dH =	0.540	in. H2O	Average draft gauge reading
Tm =	546.0	R	Average meter temperature
Ts =	897.00	R	Average stack temperature
Dn =	0.494	in.	Nozzle diameter
Y =	1.003		Meter calibration factor
t =	72	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

1) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	27.01	cu.ft
	0.77	cu.m

2) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) =	1.73	scf

3) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.060

4) Molecular weight of the stack gas on a dry basis Md.

Ms = ((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))

Ms = 29.06

Instrumental gas analysis

% CO2	2.65
% CO	0
% O2	15.95
% N2	81.4

5) Average stack gas velocity.

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 7.75 ft/sec

6) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1083.02 cfm
30.67 cmm

7) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 596.77 dscfm
16.90 dscmm

8) Analytical data

a) Front half acetone wash

0.0022	g	wash net wt
0.0002	g	acetone blank net wt
100	ml	blank vol.
133	ml	Final wash volume
133	ml	aliquot
0.0022	g	soluble particulate*

b) Front half glass microfibre filter

0.0032	g	filter net wt

c) Back half water wash - soluble

0.0012	g	net wt
0	g	water blank net wt
220	ml	blank vol
579.9	ml	Final wash volume
579.9	ml	aliquot
0.0012	g	soluble net wt*

* Weights are not blank corrected

9) Particulate concentrations

0.0031	grains/dscf	Front 1/2
0.0038	grains/dscf	Total

11) Particulate emission rate

Conc.*(1 lb/7000 gr)* Qstd *60 min/hr

W =	0.016	lbs/hr	Front 1/2
W =	0.019	lbs/hr	Total Particulate

12) Isokinecity

An =	0.001	ft^2	Area of nozzle orifice

% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

% I = 110.11

FIELD DATA

Plant ATC Balboa Pacific
Date 10-3-95
Sampling Location EXHAUST STACK
Sample Type EPA METHOD 12
Run Number ___ PES/ATC2 MM1
Operator NEWMAN / MOKH
Ambient Temperature 90
Barometric Pressure 29.80
Static Pressure + 0.01
Filter Number(s) —
Pretest Leak Rate 0.016 CFM @ 5 in. Hg
Read And Record All Data Every 5 Minutes

Schematic of Traverse Point Layout

Probe Length and Type 3' Glass lined
Pitot Tube I.D. No. S-21
Nozzle I.D. No. And Diameter M4 0.504
Assumed Moisture, % 2
Meter Box Number 4A
Meter Delta H@ 1.826
C Factor 1.15
Meter Gamma 1.005
Heater Box Setting ~250
Reference Delta P ΔP_a = 0.041
Post test Leak Rate 0.017 CFM @ 3 in. Hg
Impinger Box No. 83 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	5 Stack Temp. Ts (F)	6 Dry Gas Meter Temp. Inlet Tm in (F)	7 Dry Gas Meter Temp. Outlet Tm out (F)	Pump Vacuum (in. Hg)	2 Heated Probe Temp. (F)	3 Filter Box Temp. (F)	4 Impinger Temp. (F)
L6	0	10:50	613.203	0.03	1.35	✓	400	86	86	2.0	287	320	107
L7	5	11:15	616.689	0.03	1.35	✓	399	89	86	2.0	—	232	55
L6	10	11:20	619.168	0.04	1.80	✓	402	93	88	2.5	252	246	56
L5	15	11:25	622.688	0.03	1.35	✓	402	97	89	2.0	253	252	53
L4	20	11:30	625.865	0.02	0.90	✓	399	100	91	2.0	255	251	54
L3	25	11:35	628.579	0.01	0.45	✓	397	102	93	2.0	254	249	56
L2	30	11:40	630.550	0.005	0.24	✓	355	100	97	1.0	—	250	63
L1	35	11:45	632.100	0.005	0.24	✓	359	99	92	1.0	246	247	62
END/MS	40	11:50 / 12:14	633.400	0.01	0.45	✓	346	99	97	1.0	247	246	64
M7	45	12:19	635.561	0.005	0.24	✓	358	101	99	1.0	246	246	61
M6	50	12:24	636.900	0.005	0.24	✓	396	099	99	1.0	250	244	62
M5	55	12:29	638.200	0.005	0.24	✓	396	100	99	1.0	250	244	104
M4	60	12:34	639.968	0.02	0.90	✓	396	102	100	1.5	249	247	66
M3	65	12:39	642.000	0.02	0.90	✓	391	105	102	1.5	250	246	61
M2	70	12:44	645.350	0.02	0.90	✓	348	106	102	1.5	249	247	60
M1	75	12:49	647.944	0.02	0.90	✓	350	107	102	1.5	251	247	67
END/28	80	12:54 / 12:58	650.700	0.02	0.90	✓	355	108	103	1.5	252	248	66
R7	85	13:01	653.500	0.03	1.35	✓	391	106	103	2.0	247	244	64
R6	90	13:06	656.623	0.03	1.35	✓	392	110	104	2.0	252	248	64
R5	95	13:11	659.849	0.03	1.35	✓	391	110	105	2.0	248	244	66
R4	100	13:16	663.089	0.03	1.35	✓	385	107	103	2.0	244	244	66
R3	105	13:21	666.361	0.02	0.90	✓	383	109	105	1.5	250	246	67
R2	110	13:26	669.142	0.02	0.90	✓	386	111	106	1.5	248	243	67
R1	115	13:31	671.900	0.01	0.45	✓	349	111	107	1.5	248	244	67
END	120	13:36	674.790	—	—	—	—	—	—	—	—	—	—

PACIFIC ENVIRONMENTAL SERVICES, INC.

θ=120 V_m= 61.787 $\sqrt{\Delta P}$= 0.126 ΔH= 0.875 T_s=365+460 = 825 T_{in}=100+460 = 560

SAMPLE RETRIEVAL DATA

Plant: ATC-BALBOA
Date: 10-3-95
Sampling Location: OUTLET
Sampling Type (Method): M.M.
Run Number: MM1
Sample Box Number: BB
Clean-up Man: MUKH
Job Number:
Comments: 579.0-60.1 =
284.6-59.0 =

Filter

Filter Number:
Description of Filter: SLIGHTLY COLORED (GREEN) BLACK SOLID PARTICLES ON FILTER (LOOSE)

Moisture

Impingers:

Final Volume:	669.9 mL	607.4 mL	483.9 mL
Initial Volume:	616.7 mL	596.9 mL	482.1 mL
Net Volume:	53.2 mL	10.5 mL	1.8 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	689.0 g	g	g
Initial Volume:	677.2 g	g	g
Net Volume:	11.8 g	g	g
Total Moisture:	g	g	g

77.3

Description of Impinger catch: CLEAR

PES, Inc.
Multi-Metals Method Calculations (EPA 12)

Plant	ATC-Balboa Pacific
Project #	5102
Operation	Pyrolytic Oxidation Unit
Run	4
Location	Outlet
Date	10/3/95

Test Data

Vlc =	77.3	cc	Vol. of H2O collected (impingers)
Vm =	61.787	cf	Dry gas meter reading
Pb =	29.8	in. Hg	Barometric pressure
Ps =	29.80	in. Hg	Stack pressure
dP =	0.132		Average sq.rt delta p
dH =	0.875	in. H2O	Average draft gauge reading
Tm =	560.3	R	Average meter temperature
Ts =	841.42	R	Average stack temperature
Dn =	0.504	in.	Nozzle diameter
Y =	1.005		Meter calibration factor
t =	120	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-	constant

Instrumentation Data

[O2] =	16.0	%
[CO2] =	2.7	%

CALCULATIONS

1) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	58.39	cu.ft
	1.65	cu.m

2) Volume of water vapor collected at standard conditions.
Vw(std) = K2 * Vlc

Vw(std) = 3.64 scf

3) Decimal fraction of moisture by volume in stack gas
Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.059

4) Molecular weight of the stack gas on a dry basis Md.
Md = (1-Bws)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Bws)

Md = 28.41

5) Average stack gas velocity.
vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 9.44 ft/sec

6) Average actual stack gas volumetric flowrate.
Q = 60 * vs * As

Q = 1320.01 cfm
37.38 cmm

7) Average stack gas dry volumetric flowrate.
Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 776.62 dscfm
21.99 dscmm

8) Toxic metal concentrations and emission rates

Element	Sample Mass (ug)	Blank Mass (ug) DL	Conc. (mg/dscm)	Emission Rate (mg/hr)
Copper	12.00	1.00	5.46E-04	7.2E-01
Chromium	6.00	6.00	2.73E-04	3.6E-01
Lead	12.70	0.10	5.77E-04	7.6E-01
Zinc	109.00	9.00	4.96E-03	6.5E+00
Manganese	4.00	4.00	1.82E-04	2.4E-01
Nickel	9.00	9.00	4.09E-04	5.4E-01
Cadmium	3.00	1.00	1.36E-04	1.8E-01
Beryllium	1.00	1.00	4.55E-05	6.0E-02
Arsenic	0.10	0.10	4.55E-06	6.0E-03
Selenium	10.00	10.00	4.55E-04	6.0E-01
Molybdenum	801.00	2.00	3.64E-02	4.8E+01
Silver	0.10	0.10	4.55E-06	6.0E-03
Antimony	2.00	2.00	9.09E-05	1.2E-01
Barium	4.00	1.00	1.82E-04	2.4E-01
Thallium	0.20	0.20	9.09E-06	1.2E-02

9) Isokinecity

An = 0.001 ft^2 Area of nozzle orifice

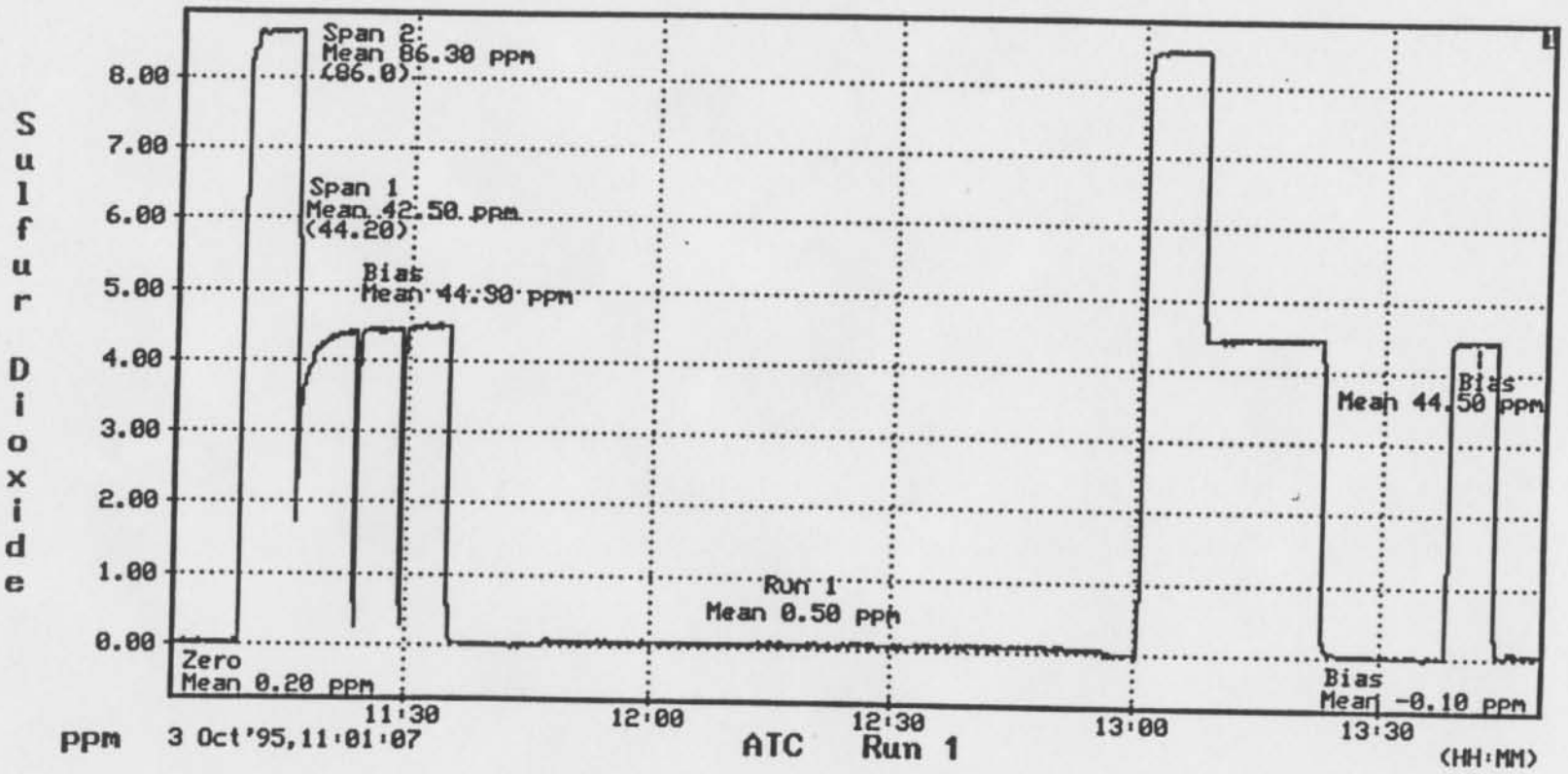
% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

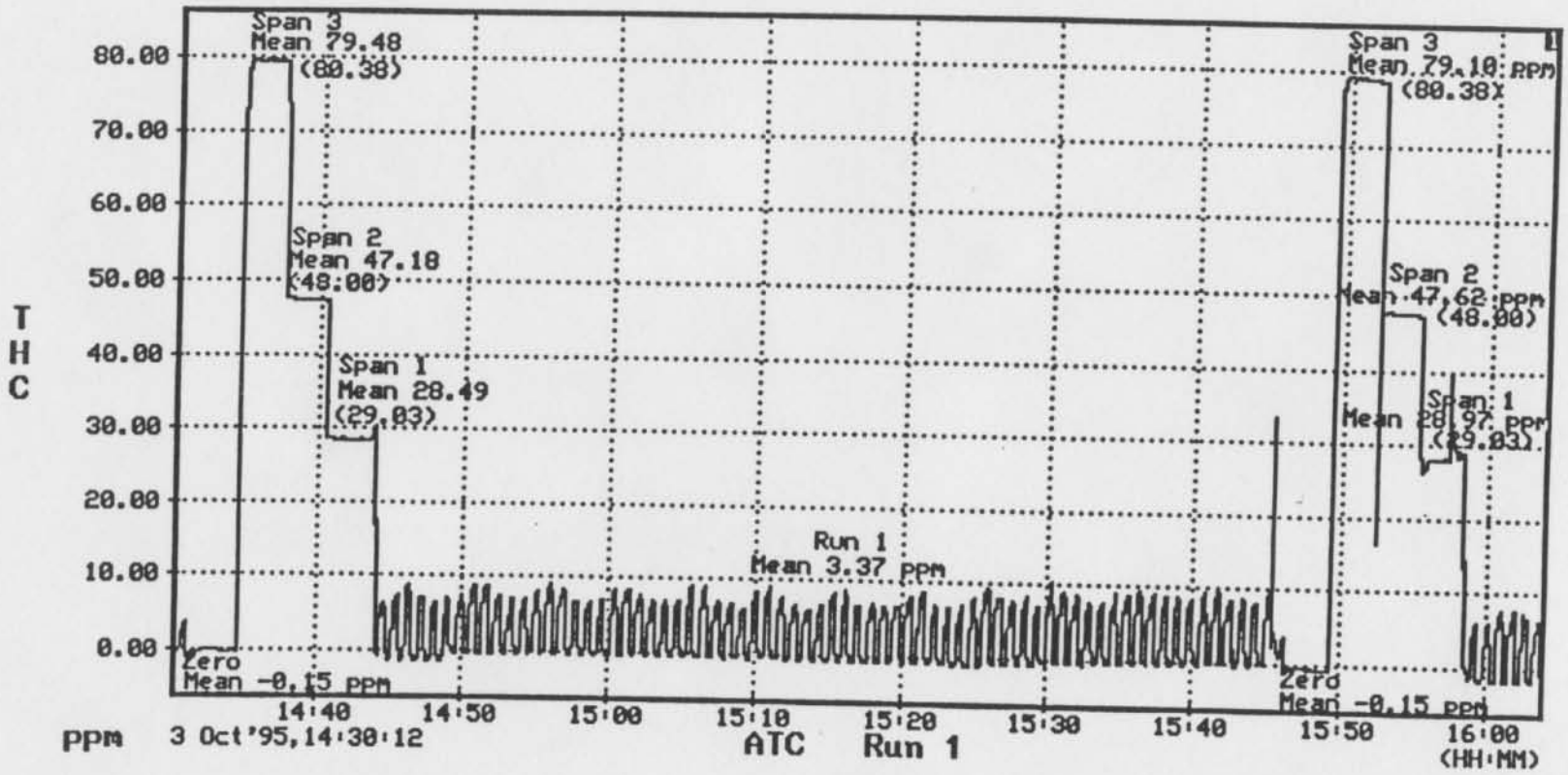
% I = 105.41

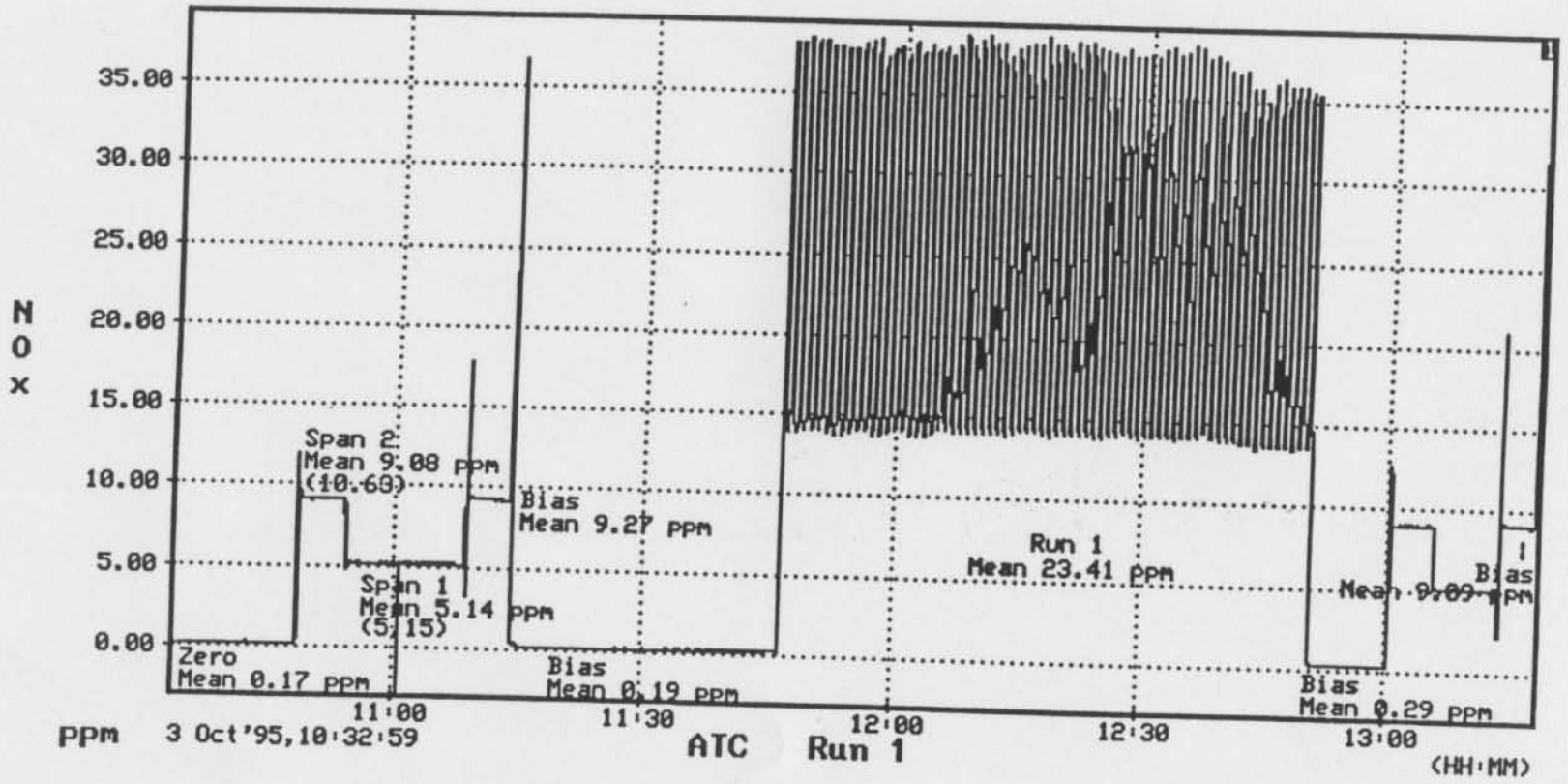
Sample Train Operation Data

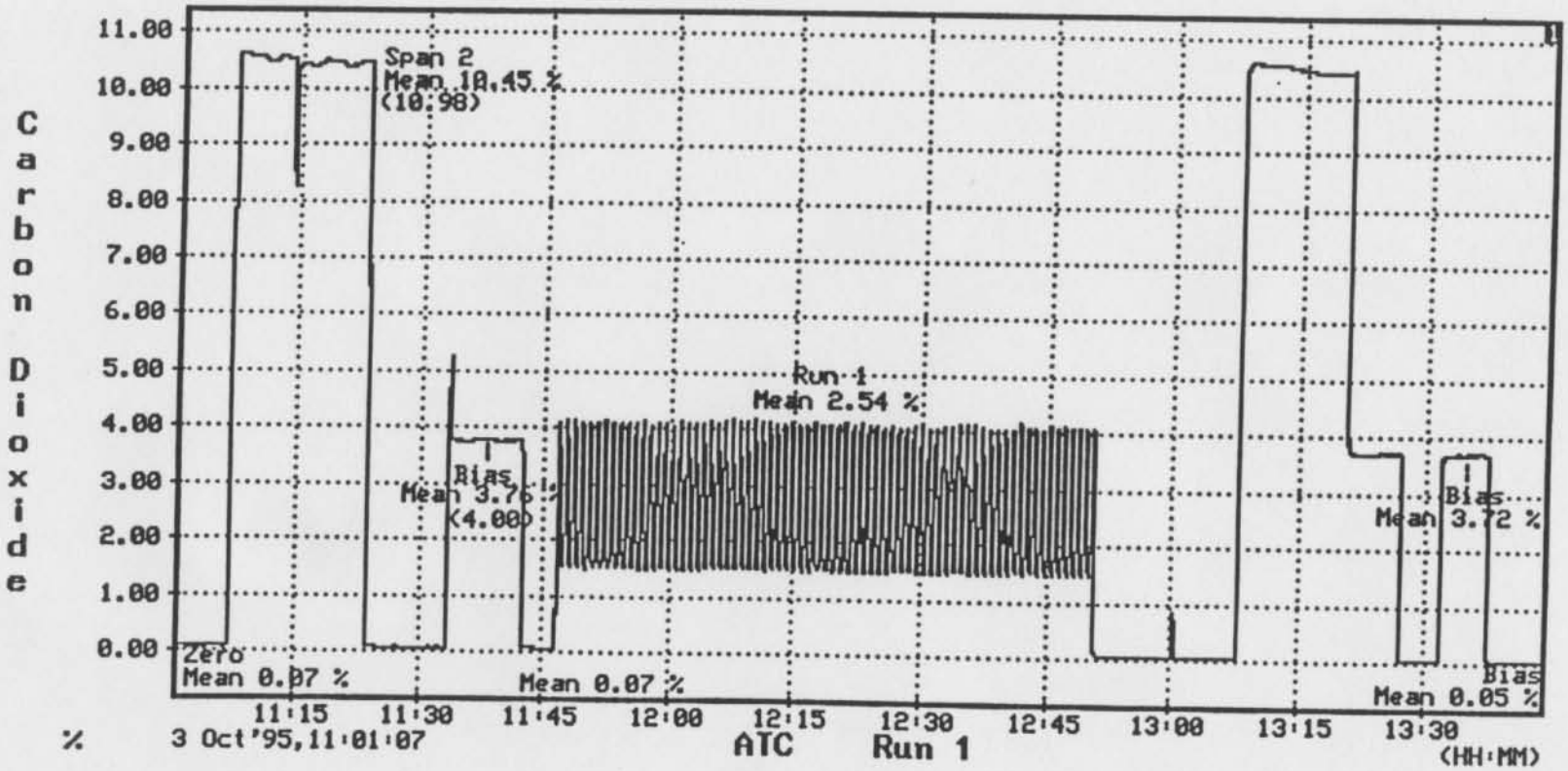
Test Date	10/3/95	
Barometer	29.85	in.Hg
Run #	1	
Static P	0.01	in.H2O
Pitot Cp	0.84	
Nozzle	0.504	

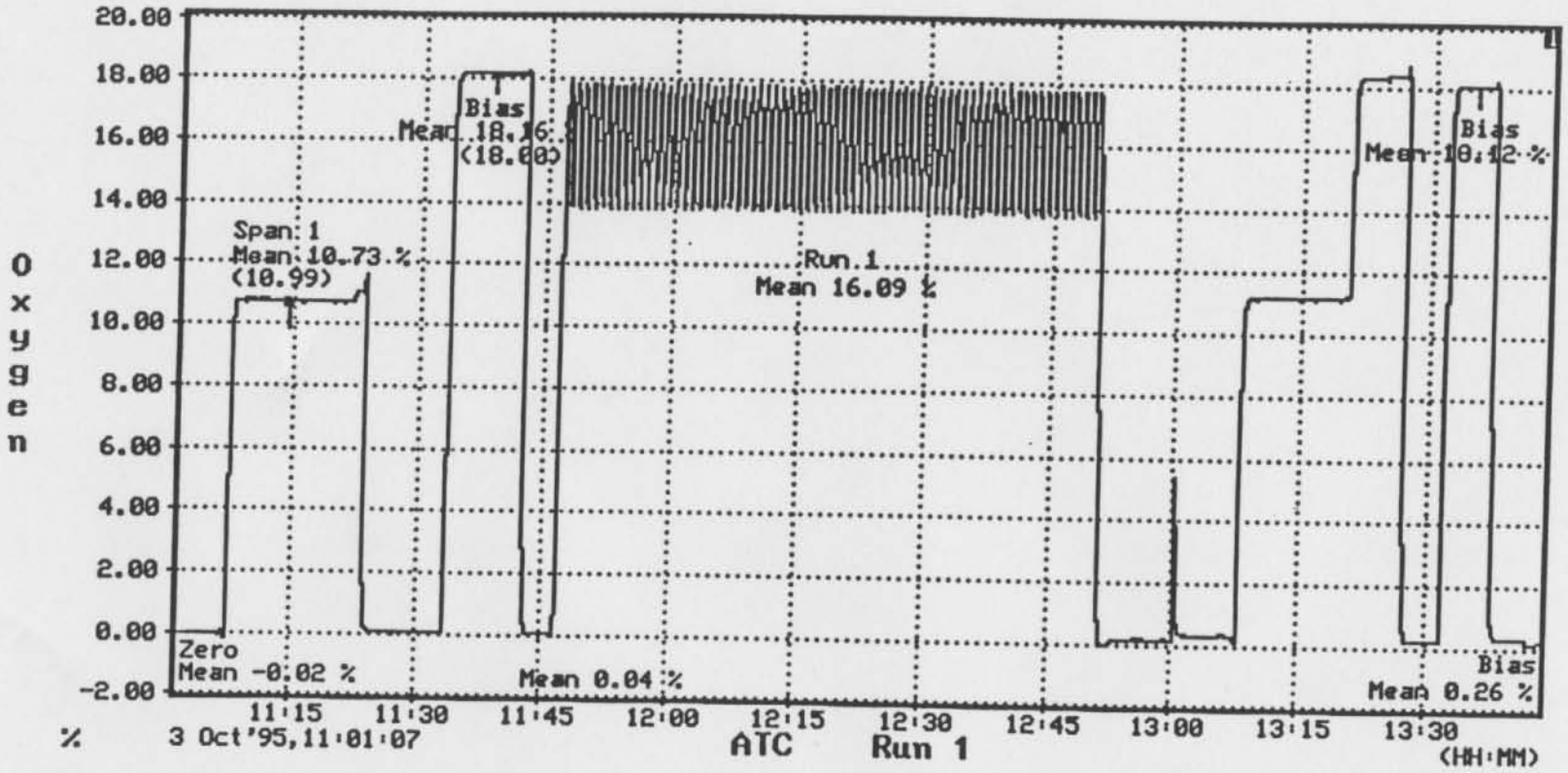
Traverse Point	Delta-P (in. H2O)	Temp. (Deg.F)	delta H	Dry Gas Meter Temp IN	Dry Gas Meter Temp OUT	(dP)^.5
A-1	0.03	400	1.35	88	86	0.17321
A-2	0.02	399	1.35	89	86	0.14142
A-3	0.04	402	1.8	93	88	0.2
A-4	0.03	402	1.35	97	89	0.17321
A-5	0.02	399	0.9	100	91	0.14142
A-6	0.01	397	0.45	102	93	0.1
A-7	0.005	355	0.24	100	97	0.07071
A-8	0.005	359	0.24	99	92	0.07071
B-1	0.01	340	0.45	99	97	0.1
B-2	0.005	398	0.24	101	99	0.07071
B-3	0.005	396	0.24	99	98	0.07071
B-4	0.005	396	0.24	100	99	0.07071
B-5	0.02	396	0.9	102	100	0.14142
B-6	0.02	391	0.9	105	102	0.14142
B-7	0.02	348	0.9	106	102	0.14142
B-8	0.02	350	0.9	107	102	0.14142
C-1	0.02	355	0.9	106	102	0.14142
C-2	0.03	391	1.35	106	103	0.17321
C-3	0.03	392	1.35	110	104	0.17321
C-4	0.03	391	1.35	110	105	0.17321
C-5	0.03	385	1.35	107	103	0.17321
C-6	0.02	383	0.9	109	105	0.14142
C-7	0.02	380	0.9	111	106	0.14142
C-8	0.01	349	0.45	111	107	0.1
Average		381.416667	0.875	102.375	98.1667	0.1319
					100.271	


Sulfur Dioxide
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Span 2
Mean 86.30 ppm
(86.0)
Span 1
Mean 42.50 ppm
(44.20)
Bias
Mean 44.30 ppm
Run 1
Mean 0.50 ppm
Bias
Mean 44.50 ppm
Zero
Mean 0.20 ppm
Bias
Mean -0.10 ppm
ppm
3 Oct'95,11:01:07
11:30
12:00
12:30
13:00
13:30
(HH:MM)
ATC Run 1


Span 3
Mean 79.48
(80.38)
Span 2
Mean 47.18
(48.00)
Span 1
Mean 28.49
(29.83)
Run 1
Mean 3.37 ppm
Zero
Mean -0.15 ppm
Span 3
Mean 79.10 ppm
(80.38)
Span 2
Mean 47.62 ppm
(48.00)
Span 1
Mean 28.97 ppm
(29.83)
Zero
Mean -0.15 ppm
THC
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
ppm
3 Oct'95,14:30:12
14:40
14:50
15:00
15:10
15:20
15:30
15:40
15:50
16:00
(HH:MM)
ATC Run 1


35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
N
O
x
Span 2
Mean 9.08 ppm
(10:60)
Span 1
Mean 5.14 ppm
(5:15)
Zero
Mean 0.17 ppm
Bias
Mean 9.27 ppm
Bias
Mean 0.19 ppm
Run 1
Mean 23.41 ppm
Bias
Mean 0.29 ppm
Bias
Mean 9.09 ppm
11:00
11:30
12:00
12:30
13:00
(HH:MM)
ppm
3 Oct'95,10:32:59
ATC
Run 1


Carbon Dioxide
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
%
Span 2
Mean 10.45 %
(10:98)
Bias
Mean 3.7%
(4.00)
Run 1
Mean 2.54 %
Zero
Mean 0.07 %
Mean 0.07 %
Bias
Mean 3.72 %
Bias
Mean 0.05 %
11:15
11:30
11:45
12:00
12:15
12:30
12:45
13:00
13:15
13:30
(HH:MM)
3 Oct'95,11:01:07
ATC
Run 1


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 1
Mean 10.73 %
(10.99)
Bias
Mean 18.16 %
(18.00)
Run 1
Mean 16.09 %
Bias
Mean 10.12 %
Zero
Mean -0.02 %
Mean 0.04 %
Bias
Mean 0.26 %
11:15
11:30
11:45
12:00
12:15
12:30
12:45
13:00
13:15
13:30
(HH:MM)
3 Oct'95,11:01:07
ATC Run 1

PES Inc.
Calculations for :

EPA Method 2,3a,4,6c,7E,10 and 25a

Plant	ATC Consultants - Balboa Pacific
Project #	5102
Operation	Pyrolytic Unit
Run	1
Load	Batch 1
Location	Santa Fe Springs, CA
Date	10/3/95

DATA INPUT

INPUT	Vlc =	36.7	cc	Vol. of H2O collected
INPUT	Vm =	27.937	cf	Dry gas meter reading
INPUT	Pb =	29.80	in. Hg	Barometric pressure
INPUT	Pg =	-0.01	in. H2O	Static pressure
INPUT	dP =	0.106		Avg. sq.rt delta P
INPUT	dH =	0.540	in. H2O	Avg. delta H
INPUT	Tm =	546.0	R	Avg. meter temp.
INPUT	Ts =	897.0	R	Avg. stack temp.
INPUT	Y =	1.003		Meter calibration factor
INPUT	t =	72	min.	Duration of sampling time
INPUT	A =	2.3300	sq.ft.	Stack Area
INPUT	Cp =	0.84		Pitot tube coefficient
	Kp =	85.49		Pitot tube constant
	K1 =	17.64	R/in.Hg	constant
	K2 =	0.04707	cu.ft/ml	constant
	K3 =	0.002669	in.Hg-cf/ml	constant

Gas Analysis

INPUT	[O2] =	16.09	%(dry)
INPUT	[O2] =	0.04	initial zero bias
INPUT	[O2] =	0.26	final zero bias
	[O2] =	0.15	average zero bias
INPUT	[O2] =	18	midspan concentration
INPUT	[O2] =	18.16	initial midspan bias
INPUT	[O2] =	18.12	final midspan bias
	[O2] =	18.14	average midspan bias
INPUT	[CO2] =	2.54	%(dry)
INPUT	[CO2] =	0.07	initial zero bias
INPUT	[CO2] =	0.05	final zero bias
	[CO2] =	0.06	average zero bias
INPUT	[CO2] =	4	midspan concentration
INPUT	[CO2] =	3.88	initial midspan bias
INPUT	[CO2] =	3.72	final midspan bias
	[CO2] =	3.80	average midspan bias
	[O2] =	15.95	adjusted concentration
	[CO2] =	2.65	adjusted concentration
	[N2] =	81.4	%
INPUT	[CO] =	29.40	ppmV(dry)
INPUT	[CO] =	0.1	initial zero bias
INPUT	[CO] =	0.1	final zero bias
	[CO] =	0.10	average zero bias
INPUT	[CO] =	50	midspan concentration
INPUT	[CO] =	51	initial midspan bias
INPUT	[CO] =	40.8	final midspan bias
	[CO] =	45.9	average midspan bias
INPUT	[NOx] =	23.4	ppmV(dry)
INPUT	[NOx] =	0.19	initial zero bias
INPUT	[NOx] =	0.29	final zero bias
	[NOx] =	0.24	average zero bias
INPUT	[NOx] =	10.63	midspan concentration
INPUT	[NOx] =	9.27	initial midspan bias
INPUT	[NOx] =	9.09	final midspan bias
	[NOx] =	9.18	average midspan bias
INPUT	[THC] =	3.4	ppmV(wet)
INPUT	[THC] =	-0.15	initial zero bias
INPUT	[THC] =	-0.15	final zero bias
	[THC] =	-0.15	average zero bias
INPUT	[THC] =	48	midspan concentration
INPUT	[THC] =	47.18	initial midspan bias
INPUT	[THC] =	47.62	final midspan bias
	[THC] =	47.4	average midspan bias
INPUT	[SO2] =	0.5	ppmV(dry)
INPUT	[SO2] =	0.2	initial zero bias
INPUT	[SO2] =	-0.1	final zero bias
	[SO2] =	0.05	average zero bias
INPUT	[SO2] =	44.2	midspan concentration
INPUT	[SO2] =	44.3	initial midspan bias
INPUT	[SO2] =	44.5	final midspan bias
	[SO2] =	44.4	average midspan bias

[CO] =	31.99	ppmV(dry)	adj concentration
[NOx] =	27.55	ppmV(dry)	adj concentration
[THC] =	3.55	ppmV(wet)	adj concentration
[SO2] =	0.45	ppmV(dry)	adj concentration

CALCULATIONS

01) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd = 27.01 cu.ft
0.77 cu.m

02) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) = 1.73 scf

03) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.060

04) Molecular weight of the stack gas on a wet basis

Ms = (1-Q)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Q)

Ms = 28.39

05) Average stack gas velocity.

Ps = 29.80 in. Hg

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 7.84 ft/sec

06) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1095.69 cfm
31.03 cmm

07) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)

Qstd =	603.75	dscfm
	17.10	dscmm
	36225.23	dscfh

08) Emission Calculation - Carbon Monoxide

lbs CO/hr = ([CO] * DSCFH * MW)/387*10^6

[CO] =	31.99	ppmv (dry)	Actual conc.
[CO] =	0.08	Lbs/hr	

09) Emission Calculation - Nitrogen Oxides

lbs NOx/hr = ([NOx] * DSCFH * MW)/387*10^6

[NOx] =	27.6	ppmv (dry)	Actual Conc.
[NOx] =	0.12	Lbs/hr	

10) Emission Calculation - Total Hydrocarbons

lbs THC/hr = ([THC] * DSCFH * MW)/387*10^6

[THC] =	3.8	ppmv (dry)	Actual Conc.
[THC] =	0.02	Lbs/hr	

11) Emission Calculation - Sulfur Dioxide

lbs NMHC/hr = ([NMHC] * DSCFH * MW)/387*10^6

[SO2] =	0.4	ppmv (dry)	Actual Conc.
[SO2] =	0.02	Lbs/hr	

FIELD DATA

Plant ATC BALBOA PACIFIC
Date 10-4-95
Sampling Location EXHAUST STACK
Sample Type EPA 5
Run Number PES/ATC2 AM 2
Operator NEWMAN/BROWN
Ambient Temperature
Barometric Pressure 29.70
Static Pressure -0.01
Filter Number(s) 0.4429
Pretest Leak Rate 0.014 CFM @ 6 in. Hg
Read And Record All Data Every 3 Minutes

Schematic of Traverse Point Layout

Probe Length and Type 3' Stainless steel lined
Pitot Tube I.D. No. S-4A
Nozzle I.D. No. And Diameter M2 0.494
Assumed Moisture, % 2
Meter Box Number 4A
Meter Delta H@ 1.826
C Factor 1.15
Meter Gamma 1.005
Heater Box Setting ~250
Reference Delta P 0.041
Post test Leak Rate 0.008 CFM @ 3 in. Hg
Impinger Box No. 5B 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	5 Stack Temp. Ts (F)	6 Dry Gas Meter Temp. Inlet Tm in (F)	7 Dry Gas Meter Temp. Outlet Tm out (F)	Pump Vacuum (In. Hg)	2 Heated Probe Temp. (F)	3 Filter Box Temp. (F)	4 Impinger Temp. (F)
L8	0	10:15	750.685	0.03	1.35	✓	387	77	74	2.0	247	258	69
L7	3	10:16	752.621	0.03	1.35	✓	389	75	73	2.0	245	265	62
L6	6	10:21	754.449	0.03	1.35	✓	391	77	74	2.0	248	268	61
L5	9	10:24	756.289	0.03	1.35	✓	393	79	75	1.5	248	269	63
L4	12	10:27	758.193	0.03	1.35	✓	392	81	75	1.5	250	270	64
L3	15	10:30	759.907	0.02	0.90	✓	388	84	76	1.0	249	270	65
L2	18	10:33	761.590	0.01	0.45	✓	331	84	77	1.0	250	269	65
L1	21	10:36	762.981	0.01	0.45	✓	—	85	78	1.0	251	269	64
END/M8	24	10:39/10:43	769.959	0.03	0.90	✓	348	84	78	1.0	250	267	65
M7	27	10:46	765.528	0.02	0.90	✓	389	86	79	1.0	249	268	62
M6	30	10:49	767.127	0.02	0.90	✓	393	87	80	1.0	251	267	62
M5	33	10:52	768.731	0.02	0.90	✓	391	89	81	1.0	251	268	63
M4	36	10:55	770.325	0.02	0.90	✓	389	90	81	1.0	251	267	63
M3	39	10:58	771.952	0.02	0.90	✓	374	92	82	1.0	250	267	63
M2	42	11:01	773.409	0.01	0.45	✓	346	92	83	1.0	251	266	64
M1	45	11:04	774.780	0.01	0.45	✓	—	93	84	1.0	251	267	64
END/P8	48	11:07/11:09	775.359	0.02	0.90	✓	356	92	85	1.0	250	266	66
R7	51	11:12	777.518	0.02	0.90	✓	382	95	86	1.0	250	266	65
R6	54	11:15	779.120	0.02	0.90	✓	388	76	86	1.0	251	266	65
R5	57	11:18	780.756	0.02	0.90	✓	391	97	87	1.0	251	266	64
R4	60	11:21	782.371	0.02	0.90	✓	389	98	88	1.0	252	266	64
R3	63	11:24	783.972	0.02	0.90	✓	383	100	76	1.0	253	267	64
R2	66	11:27	785569	0.01	0.45	✓	351	100	90	1.0	251	263	64
R1	69	11:30	786.777	0.01	0.45	✓	—	100	91	1.0	250	262	64
END	72	11:33	787.932	—	—	—	—	—	—	—	—	—	—

θ = 72 V_m = 37.247 $\sqrt{\Delta P}$ = 0.138 ΔH = 0.88 T_s = 378 + 460 = 838 T_m = 85 + 460 = 545

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES

SAMPLE RETRIEVAL DATA

Plant: ATC - BALBOA
Date: 10-3-95
Sampling Location:
Sampling Type (Method): PARTICULATE
Run Number: PM2
Sample Box Number: 5B
Clean-up Man:
Job Number:
Comments:

Filter

Filter Number: 0.4429
Description of Filter:

Moisture

	#1	#2	#3
Impingers:			
Final Volume:	676.2 mL	600.3 mL	485.3 mL
Initial Volume:	588.7 mL	591.6 mL	484.7 mL
Net Volume:	37.5 mL	8.7 mL	0.6 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	681.7 g	g	g
Initial Volume:	473.4 g	g	g
Net Volume:	8.3 g	g	g
Total Moisture:	g	g	g

55.1

Description of Impinger catch:

PES Inc.

EPA Method 5 Calculations

Plant	ATC - Balboa Pacific
Project #	5102
Operation	Pyrolytic Waste Incinerator
Run	2 - Particulate - set 2
Location	Santa Fe Springs, CA
Date	10/4/95

Emission Data

Vlc =	55.1	cc	Vol. of H2O collected (impingers)
Vm =	37.247	cf	Dry gas meter reading
Pb =	29.7	in. Hg	Barometric pressure
Ps =	29.70	in. Hg	Stack pressure
dP =	0.138		Average sq.rt delta P
dH =	0.880	in. H2O	Average draft gauge reading
Tm =	545.0	R	Average meter temperature
Ts =	838.00	R	Average stack temperature
Dn =	0.494	in.	Nozzle diameter
Y =	1.005		Meter calibration factor
t =	72	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

1) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	36.06	cu.ft
	1.02	cu.m

2) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) =	2.59	scf

3) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.067

4) Molecular weight of the stack gas on a dry basis Md.

Ms = ((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))

Ms = 29.08

Instrumental gas analysis

% CO2	2.71
% CO	0
% O2	16.05
% N2	81.24

5) Average stack gas velocity.

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 9.76 ft/sec

6) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1364.79 cfm
38.65 cmm

7) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 796.30 dscfm
22.55 dscmm

8) Analytical data

a) Front half acetone wash

0.0053	g	wash net wt
0.0002	g	acetone blank net wt
100	ml	blank vol.
196	ml	Final wash volume
196	ml	aliquot
0.0053	g	soluble particulate*

b) Front half glass microfibre filter

0.0006	g	filter net wt

c) Back half water wash - soluble

0.0031	g	net wt
0	g	water blank net wt
220	ml	blank vol
602.3	ml	Final wash volume
602.3	ml	aliquot
0.0031	g	soluble net wt*

* Weights are not blank corrected

9) Particulate concentrations

0.0025	grains/dscf	Front 1/2
0.0039	grains/dscf	Total

11) Particulate emission rate

Conc.*(1 lb/7000 gr)* Qstd *60 min/hr

W =	0.017	lbs/hr	Front 1/2
W =	0.026	lbs/hr	Total Particulate

12) Isokinecity

An =	0.001	ft^2	Area of nozzle orifice

% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

% I = 110.16

FIELD DATA

Plant: ATC BALBOA PACIFIC
Date: 10-3-95
Sampling Location: EXHAUST STACK
Sample Type: EPA METHOD 12
Run Number: PES/ LIC 2 MM2
Operator: NEWMAN/ MOKH
Ambient Temperature: 90
Barometric Pressure: 29.80
Static Pressure: + 0.04
Filter Number(s):
Pretest Leak Rate: 0.001 CFM @ 4 in. Hg
Read And Record All Data Every: 5 Minutes

Schematic of Traverse Point Layout:

Probe Length and Type: 3' GLASS LINED
Pitot Tube I.D. No.: S-2A
Nozzle I.D. No. And Diameter: M4 0.504
Assumed Moisture, %: 2
Meter Box Number: 4A
Meter Delta H@: 1.826
C Factor: 1.15
Meter Gamma: 1.005
Heater Box Setting: ~250
Reference Delta P: ΔP_R = 0.041
Post test Leak Rate: 0.009 CFM @ 5 in. Hg
Impinger Box No.: 2B 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	5 Stack Temp. Ts (F)	6 Dry Gas Meter Temp. Inlet Tm in (F)	7 Dry Gas Meter Temp. Outlet Tm out (F)	4 Pump Vacuum (in. Hg)	2 Heated Probe Temp. (F)	3 Filter Box Temp. (F)	#4 Impinger Temp. (F)
R9	0	14:15	674.576	0.005	0.24	✓	394	107	108	1.0	247	—	68
R7	5	14:20	676.180	0.02	0.96	✓	391	107	107	1.5	248	—	68
R6	10	14:25	679.010	0.01	0.45	✓	390	105	105	1.0	245	230	68
R5	15	14:30	681.045	0.005	0.24	✓	394	109	109	1.0	247	248	65
R4	20	14:35	682.568	0.005	0.24	✓	389	109	108	1.0	247	247	62
R3	25	14:40	684.040	0.03	1.35	✓	388	109	109	1.5	246	247	62
R2	30	14:45	686.700	0.03	1.35	✓	373	111	109	1.5	248	245	57
R1	35	14:50	689.900	0.04	1.80	✓	365	112	109	2.0	246	242	56
END/M8	40	14:55/14:56	693.511	0.03	1.35	✓	327	111	109	2.0	244	244	59
M7	45	15:01	696.801	0.03	1.35	✓	392	112	110	2.0	249	244	58
M6	50	15:06	700.051	0.03	1.35	✓	395	110	110	2.0	244	244	59
M5	55	15:11	703.901	0.02	0.90	✓	395	115	112	1.5	250	245	61
M4	60	15:16	706.480	0.03	1.35	✓	397	115	112	1.5	250	246	62
M3	65	15:21	709.290	0.04	1.80	✓	386	115	112	2.0	248	246	61
M2	70	15:26	712.910	0.04	1.80	✓	367	116	112	2.5	249	245	62
M1	75	15:31	716.620	0.04	1.80	✓	359	117	113	2.5	245	245	63
END/L8	80	15:36/15:38	720.293	0.05	2.25	✓	374	112	112	3.5	247	—	66
L7	85	15:43	725.189	0.115	2.25	✓	386	111	109	4.0	244	265	56
L6	90	15:48	728.491	0.05	2.25	✓	389	112	110	4.0	246	242	56
L5	95	15:53	732.618	0.04	1.80	✓	391	116	112	3.0	249	241	57
L4	100	15:58	736.390	0.04	1.80	✓	391	116	112	3.0	251	243	57
L3	105	16:03	740.061	0.04	1.80	✓	389	115	110	3.0	251	245	58
L2	110	16:08	743.770	0.03	1.35	✓	365	115	111	2.5	245	244	60
L1	115	16:13	747.002	0.03	1.35	✓	—	114	112	2.0	245	—	61
END	120	16:14	750.235	—	—	—	—	—	—	—	—	—	—

PACIFIC ENVIRONMENTAL SERVICES, INC.

c: 1.20 V_m = 75.659 $\sqrt{\Delta P}$ = 0.182 ΔH = 1.38 T_s = 384 +460 T_m = 111 +460

SAMPLE RETRIEVAL DATA

Plant: ATC - BALBOA
Date: 10-3-95
Sampling Location: OUTLET
Sampling Type (Method): M.M.
Run Number: MM2
Sample Box Number: 2B
Clean-up Man: MDKH
Job Number:
Comments: 521.8 - 60.1 =
410.0 - 58.9 =

Filter

Filter Number:
Description of Filter: SLIGHTLY COLORED WITH SMALL BLACK PARTICLES (LOOSE)

Moisture

Impingers:			
Final Volume:	622.5 mL	596.6 mL	457.0 mL
Initial Volume:	556.7 mL	580.8 mL	450.4 mL
Net Volume:	65.8 mL	15.8 mL	3.6 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	733.5 g	g	g
Initial Volume:	718.1 g	g	g
Net Volume:	15.4 g	g	g
Total Moisture:	g, 100.6	g	g
		g	g

Description of Impinger catch: CLEAR

PES, Inc.
Multi-Metals Method Calculations (EPA 12)

Plant	ATC-Balboa Pacific
Project #	5102
Operation	Pyrolytic Oxidation Unit
Run	2
Location	Outlet
Date	10/3/95

Test Data

Vlc =	100.6	cc	Vol. of H2O collected (impingers)
Vm =	75.659	cf	Dry gas meter reading
Pb =	29.85	in. Hg	Barometric pressure
Ps =	29.85	in. Hg	Stack pressure
dP =	0.169		Average sq.rt delta P
dH =	1.383	in. H2O	Average draft gauge reading
Tm =	571.1	R	Average meter temperature
Ts =	842.63	R	Average stack temperature
Dn =	0.504	in.	Nozzle diameter
Y =	1.005		Meter calibration factor
t =	120	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-	constant

Instrumentation Data

[O2] =	16.1	%
[CO2] =	2.7	%

CALCULATIONS

1) Volume of gas sampled at standard conditions, Vmstd
Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	70.34	cu.ft
	1.99	cu.m

2) Volume of water vapor collected at standard conditions.
Vw(std) = K2 * Vlc

Vw(std) = 4.74 scf

3) Decimal fraction of moisture by volume in stack gas
Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.063

4) Molecular weight of the stack gas on a dry basis Md.
Md = (1-Bws)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Bws)

Md = 28.38

5) Average stack gas velocity.
vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 12.09 ft/sec

6) Average actual stack gas volumetric flowrate.
Q = 60 * vs * As

Q = 1690.21 cfm
47.87 cmm

7) Average stack gas dry volumetric flowrate.
Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 990.08 dscfm
28.04 dscmm

8) Toxic metal concentrations and emission rates

Element	Sample Mass (ug)	Blank Mass (ug) DL	Conc. (mg/dscm)	Emission Rate (mg/hr)
Copper	9.00	1.00	3.21E-04	5.4E-01
Chromium	6.00	6.00	2.14E-04	3.6E-01
Lead	7.50	0.10	2.67E-04	4.5E-01
Zinc	65.00	9.00	2.32E-03	3.9E+00
Manganese	4.00	4.00	1.43E-04	2.4E-01
Nickel	9.00	9.00	3.21E-04	5.4E-01
Cadmium	3.00	1.00	1.07E-04	1.8E-01
Beryllium	1.00	1.00	3.57E-05	6.0E-02
Arsenic	0.10	0.10	3.57E-06	6.0E-03
Selenium	10.00	10.00	3.57E-04	6.0E-01
Molybdenum	592.00	2.00	2.11E-02	3.6E+01
Silver	0.10	0.10	3.57E-06	6.0E-03
Antimony	2.00	2.00	7.13E-05	1.2E-01
Barium	3.00	1.00	1.07E-04	1.8E-01
Thallium	0.20	0.20	7.13E-06	1.2E-02

9) Isokinecity

An = 0.001 ft^2 Area of nozzle orifice

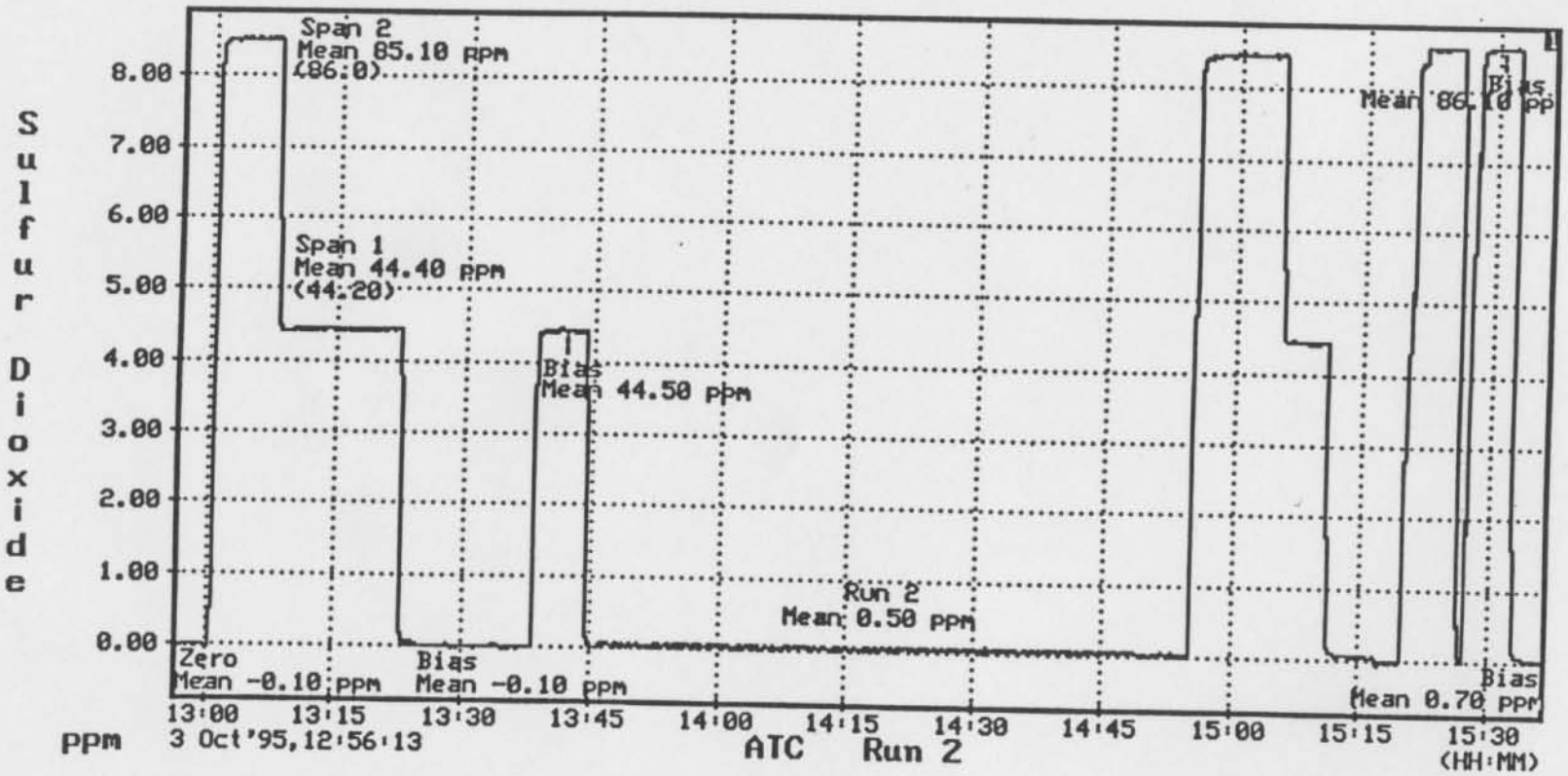
% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

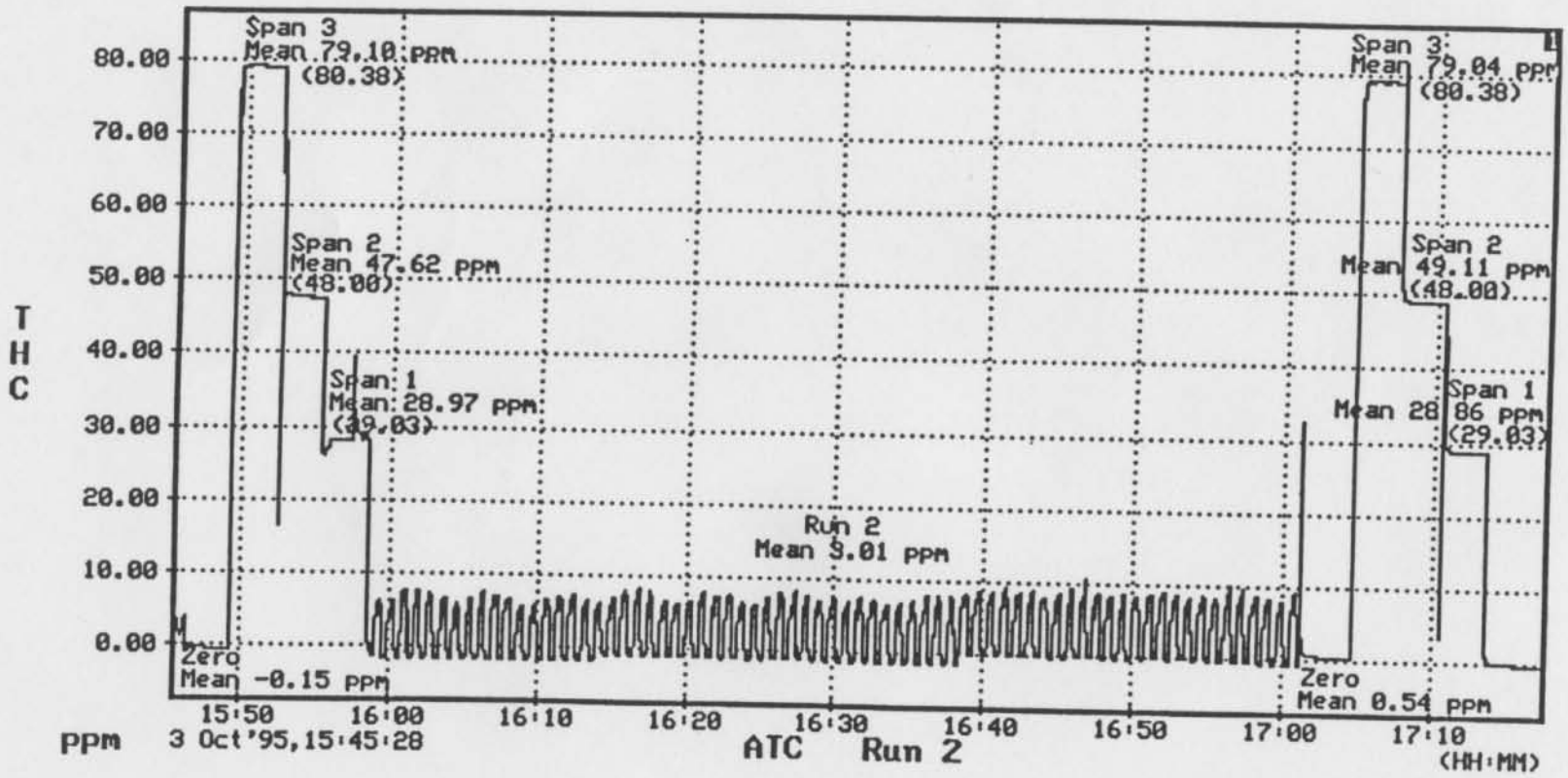
% I = 99.61

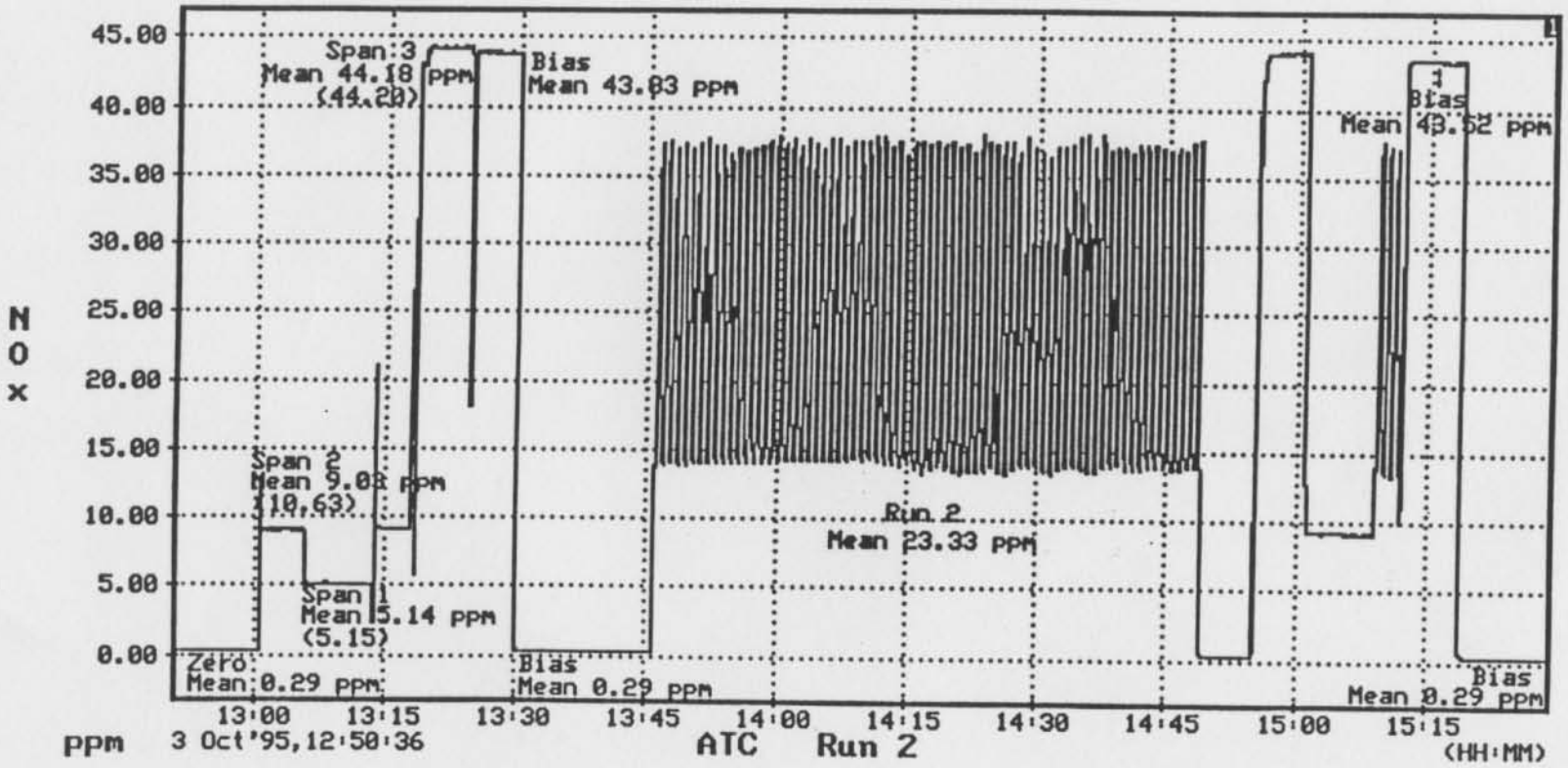
Sample Train Operation Data

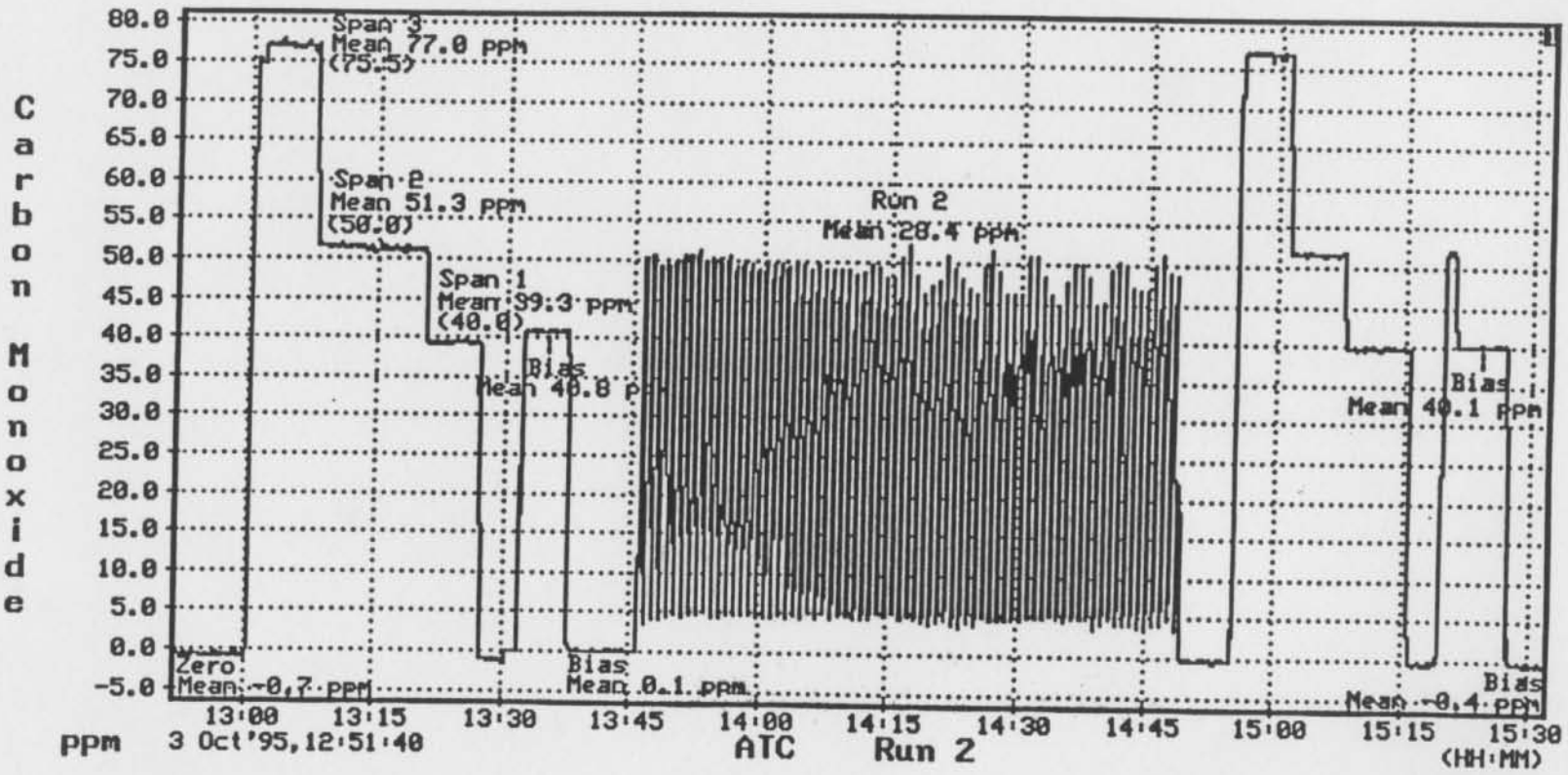
Test Date	10/3/95	
Barometer	29.85	in.Hg
Run #	2	
Static P	0.04	in.H2O
Pitot Cp	0.84	
Nozzle	0.504	

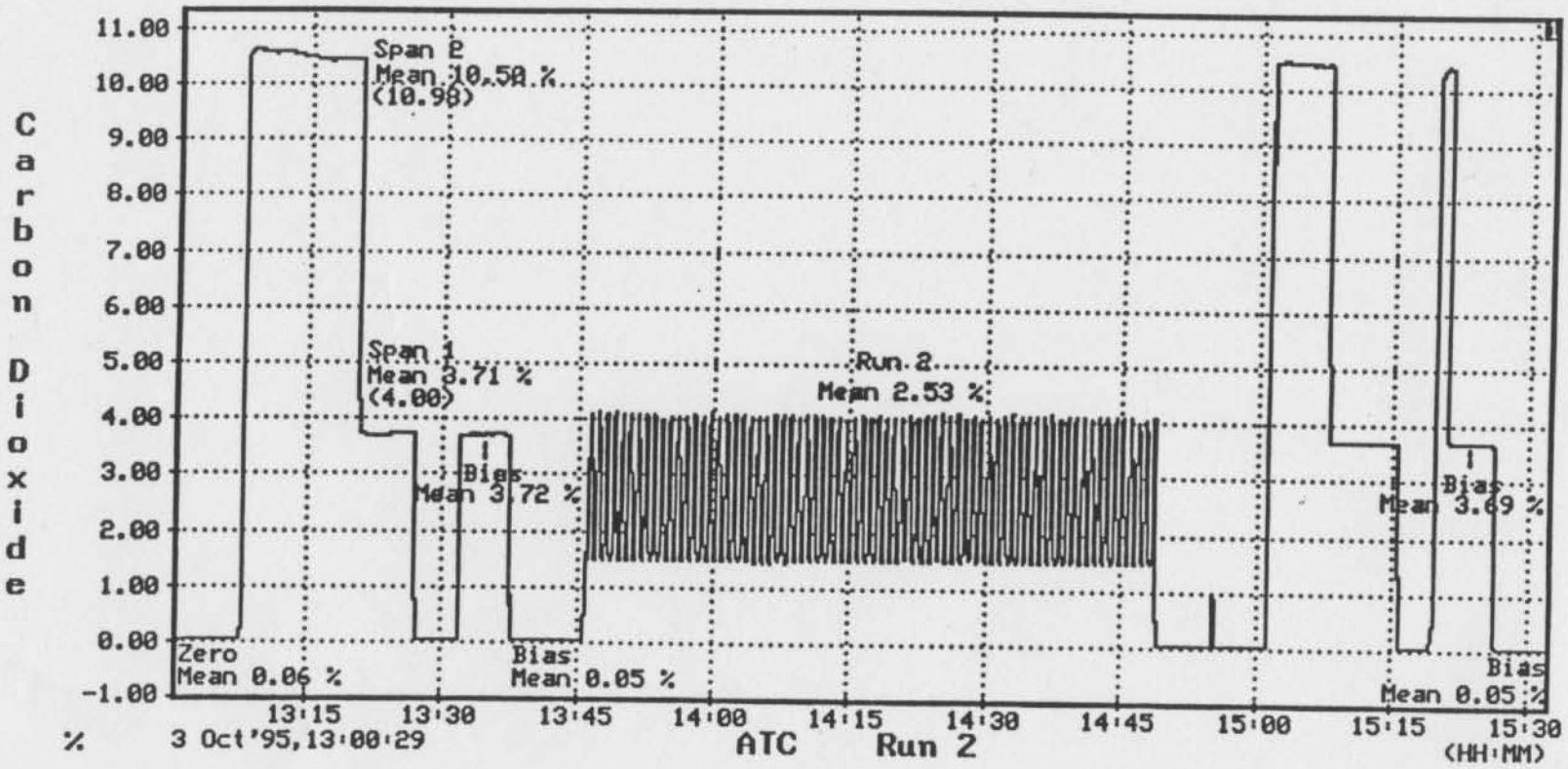
Traverse Point	Delta-P (in. H2O)	Temp. (Deg.F)	delta H	Dry Gas Meter Temp IN	OUT	(dP)^.5
A-1	0.005	394	0.24	107	108	0.07071
A-2	0.02	391	0.96	107	107	0.14142
A-3	0.01	390	0.45	105	105	0.1
A-4	0.005	394	0.24	109	109	0.07071
A-5	0.005	389	0.24	109	108	0.07071
A-6	0.03	388	1.35	109	109	0.17321
A-7	0.03	373	1.35	111	109	0.17321
A-8	0.04	365	1.8	112	109	0.2
B-1	0.03	377	1.35	111	109	0.17321
B-2	0.03	392	1.35	112	110	0.17321
B-3	0.03	395	1.35	112	110	0.17321
B-4	0.02	395	0.9	115	112	0.14142
B-5	0.03	392	1.35	115	112	0.17321
B-6	0.04	386	1.8	115	112	0.2
B-7	0.04	367	1.8	116	112	0.2
B-8	0.04	359	1.8	117	113	0.2
C-1	0.05	374	2.25	112	112	0.22361
C-2	0.05	388	2.25	111	109	0.22361
C-3	0.05	389	2.25	112	110	0.22361
C-4	0.04	391	1.8	116	112	0.2
C-5	0.04	391	1.8	116	112	0.2
C-6	0.04	389	1.8	115	110	0.2
C-7	0.03	365	1.35	115	111	0.17321
C-8	0.03	349	1.35	114	112	0.17321
Average		382.625	1.3825	112.20833	110.083	0.16881
					111.146	

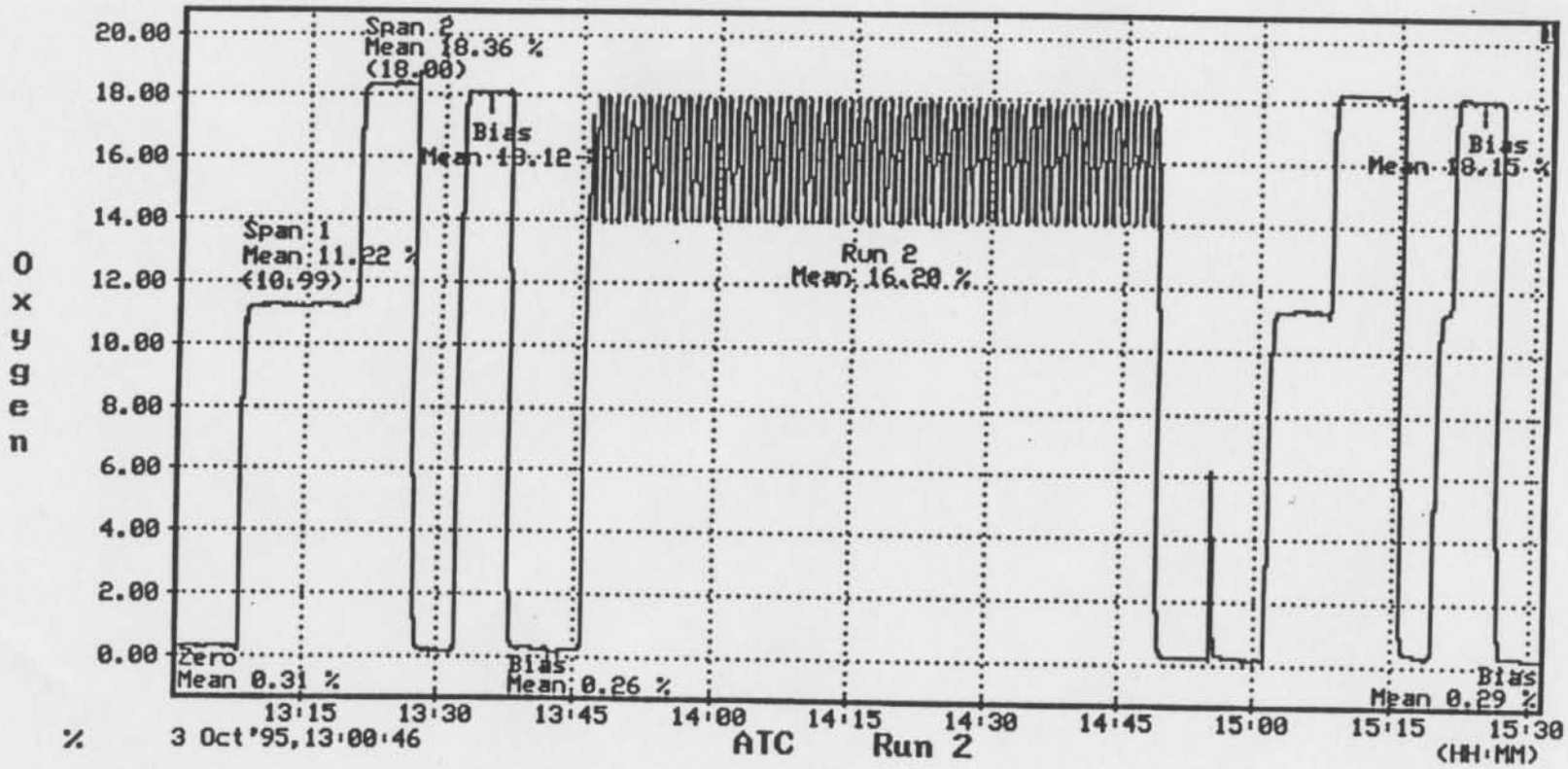

Sulfur Dioxide
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
ppm
Span 2
Mean 85.10 ppm
(86.0)
Span 1
Mean 44.40 ppm
(44.20)
Bias
Mean 44.50 ppm
Zero
Mean -0.10 ppm
Bias
Mean -0.10 ppm
Run 2
Mean 0.50 ppm
Mean 86.10 pp
Bias
Mean 0.70 ppm
13:00
13:15
13:30
13:45
14:00
14:15
14:30
14:45
15:00
15:15
15:30
(HH:MM)
3 Oct'95,12:56:13
ATC Run 2


Span 3
Mean 79.10 ppm
(80.38)
Span 2
Mean 47.62 ppm
(48.00)
Span 1
Mean 28.97 ppm
(29.03)
Run 2
Mean 9.01 ppm
Zero
Mean -0.15 ppm
Span 3
Mean 79.04 ppm
(80.38)
Span 2
Mean 49.11 ppm
(48.00)
Span 1
Mean 28.86 ppm
(29.03)
Zero
Mean 0.54 ppm
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
THC
ppm
15:50
16:00
16:10
16:20
16:30
16:40
16:50
17:00
17:10
(HH:MM)
3 Oct '95, 15:45:28
ATC Run 2


45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
NOx
Span 3
Mean 44.18 ppm
(44.20)
Bias
Mean 43.83 ppm
Span 2
Mean 9.08 ppm
(10.63)
Span 1
Mean 5.14 ppm
(5.15)
Zero
Mean 0.29 ppm
Bias
Mean 0.29 ppm
Run 2
Mean 23.33 ppm
Bias
Mean 43.52 ppm
Bias
Mean 0.29 ppm
13:00
13:15
13:30
13:45
14:00
14:15
14:30
14:45
15:00
15:15
(HH:MM)
ppm
3 Oct'95,12:50:36
ATC Run 2


Carbon Monoxide
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
Span 3
Mean 77.0 ppm
(75.5)
Span 2
Mean 51.3 ppm
(50.0)
Span 1
Mean 39.3 ppm
(40.0)
Bias
Mean 40.8 p
Zero
Mean -0.7 ppm
Bias
Mean 0.1 ppm
Run 2
Mean 28.4 ppm
Bias
Mean 40.1 ppm
Bias
Mean -0.4 ppm
13:00
13:15
13:30
13:45
14:00
14:15
14:30
14:45
15:00
15:15
15:30
(HH:MM)
ppm
3 Oct'95,12:51:40
ATC
Run 2


Carbon Dioxide
%
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
Span 2
Mean 10.58 %
(10.98)
Span 1
Mean 3.71 %
(4.00)
Bias
Mean 3.72 %
Run 2
Mean 2.53 %
Bias
Mean 3.69 %
Zero
Mean 0.06 %
Bias
Mean 0.05 %
Bias
Mean 0.05 %
13:15
13:30
13:45
14:00
14:15
14:30
14:45
15:00
15:15
15:30
(HH:MM)
3 Oct'95,13:00:29
ATC Run 2


Span 2
Mean 18.36 %
(18.00)
Bias
Mean 13.12
Span 1
Mean 11.22 %
(10.99)
Run 2
Mean 16.20 %
Bias
Mean 18.15 %
Zero
Mean 0.31 %
Bias
Mean 0.26 %
Bias
Mean 0.29 %
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Oxygen
%
13:15
13:30
13:45
14:00
14:15
14:30
14:45
15:00
15:15
15:30
(HH:MM)
3 Oct'95,13:00:46
ATC Run 2

PES Inc.
Calculations for : EPA Method 2,3a,4,6c,7E,10 and 25a

Plant	ATC Consultants - Balboa Pacific
Project #	5102
Operation	Pyrolytic Unit
Run	2
Load	Batch 2
Location	Santa Fe Springs, CA
Date	10/4/95

DATA INPUT

INPUT	Vlc =	55.1	cc	Vol. of H2O collected
INPUT	Vm =	37.247	cf	Dry gas meter reading
INPUT	Pb =	29.70	in. Hg	Barometric pressure
INPUT	Pg =	-0.01	in. H2O	Static pressure
INPUT	dP =	0.138		Avg. sq.rt delta P
INPUT	dH =	0.880	in. H2O	Avg. delta H
INPUT	Tm =	545.0	R	Avg. meter temp.
INPUT	Ts =	838.0	R	Avg. stack temp.
INPUT	Y =	1.005		Meter calibration factor
INPUT	t =	72	min.	Duration of sampling time
INPUT	A =	2.3300	sq.ft.	Stack Area
INPUT	Cp =	0.84		Pitot tube coefficient
	Kp =	85.49		Pitot tube constant
	K1 =	17.64	R/in.Hg	constant
	K2 =	0.04707	cu.ft/ml	constant
	K3 =	0.002669	in.Hg-cf/ml	constant

Gas Analysis

INPUT	[O2] =	16.20	%(dry)
INPUT	[O2] =	0.26	initial zero bias
INPUT	[O2] =	0.29	final zero bias
	[O2] =	0.28	average zero bias
INPUT	[O2] =	18	midspan concentration
INPUT	[O2] =	18.12	initial midspan bias
INPUT	[O2] =	18.15	final midspan bias
	[O2] =	18.135	average midspan bias
INPUT	[CO2] =	2.53	%(dry)
INPUT	[CO2] =	0.05	initial zero bias
INPUT	[CO2] =	0.05	final zero bias
	[CO2] =	0.05	average zero bias
INPUT	[CO2] =	4	midspan concentration
INPUT	[CO2] =	3.72	initial midspan bias
INPUT	[CO2] =	3.69	final midspan bias
	[CO2] =	3.71	average midspan bias
	[O2] =	16.05	adjusted concentration
	[CO2] =	2.71	adjusted concentration
	[N2] =	81.2	%
INPUT	[CO] =	28.40	ppmV(dry)
INPUT	[CO] =	0.1	initial zero bias
INPUT	[CO] =	-0.4	final zero bias
	[CO] =	-0.15	average zero bias
INPUT	[CO] =	40	midspan concentration
INPUT	[CO] =	40.8	initial midspan bias
INPUT	[CO] =	40.1	final midspan bias
	[CO] =	40.45	average midspan bias
INPUT	[NOx] =	23.3	ppmV(dry)
INPUT	[NOx] =	0.29	initial zero bias
INPUT	[NOx] =	0.29	final zero bias
	[NOx] =	0.29	average zero bias
INPUT	[NOx] =	44.2	midspan concentration
INPUT	[NOx] =	43.83	initial midspan bias
INPUT	[NOx] =	43.52	final midspan bias
	[NOx] =	43.675	average midspan bias
INPUT	[THC] =	3.0	ppmV(wet)
INPUT	[THC] =	-0.15	initial zero bias
INPUT	[THC] =	0.54	final zero bias
	[THC] =	0.20	average zero bias
INPUT	[THC] =	48	midspan concentration
INPUT	[THC] =	47.62	initial midspan bias
INPUT	[THC] =	49.11	final midspan bias
	[THC] =	48.365	average midspan bias
INPUT	[SO2] =	0.5	ppmV(dry)
INPUT	[SO2] =	-0.1	initial zero bias
INPUT	[SO2] =	0.7	final zero bias
	[SO2] =	0.30	average zero bias
INPUT	[SO2] =	44.2	midspan concentration
INPUT	[SO2] =	44.5	initial midspan bias
INPUT	[SO2] =	86.1	final midspan bias
	[SO2] =	65.3	average midspan bias

[CO] =	28.13	ppmV(dry)	adj concentration
[NOx] =	23.47	ppmV(dry)	adj concentration
[THC] =	2.81	ppmV(wet)	adj concentration
[SO2] =	0.14	ppmV(dry)	adj concentration

CALCULATIONS

01) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd = 36.06 cu.ft
1.02 cu.m

02) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) = 2.59 scf

03) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.067

04) Molecular weight of the stack gas on a wet basis

Ms = (1-Q)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Q)

Ms = 28.30

05) Average stack gas velocity.

Ps = 29.70 in. Hg

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 9.89 ft/sec

06) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1383.31 cfm
39.18 cmm

07) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)

Qstd =	807.11	dscfm
	22.86	dscmm
	48426.43	dscfh

08) Emission Calculation - Carbon Monoxide

lbs CO/hr = ([CO] * DSCFH * MW)/387*10^6

[CO] =	28.13	ppmv (dry)	Actual conc.
[CO] =	0.10	Lbs/hr	

09) Emission Calculation - Nitrogen Oxides

lbs NOx/hr = ([NOx] * DSCFH * MW)/387*10^6

[NOx] =	23.5	ppmv (dry)	Actual Conc.
[NOx] =	0.14	Lbs/hr	

10) Emission Calculation - Total Hydrocarbons

lbs THC/hr = ([THC] * DSCFH * MW)/387*10^6

[THC] =	3.0	ppmv (dry)	Actual Conc.
[THC] =	0.02	Lbs/hr	

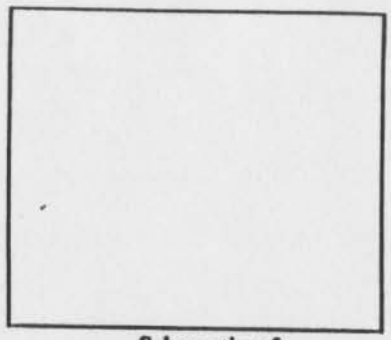
11) Emission Calculation - Sulfur Dioxide

lbs NMHC/hr = ([NMHC] * DSCFH * MW)/387*10^6

[SO2] =	0.1	ppmv (dry)	Actual Conc.
[SO2] =	0.02	Lbs/hr	

FIELD DATA

Plant ATC BALBOA PARK
Date 10-4-95
Sampling Location EXHAUST STACK
Sample Type EPA METHOD 5
Run Number PES/ATC2 PM3
Operator NEUMAN / BROWN
Ambient Temperature 90
Barometric Pressure 29.70
Static Pressure -0.03
Filter Number(s) 0.4490
Pretest Leak Rate 0.016 CFM @ 5 in. Hg
Read And Record All Data Every 3 Minutes



Schematic of
Traverse Point Layout

Probe Length and Type 3' SS LINED
Pitot Tube I.D. No. S-4A
Nozzle I.D. No. And Diameter M2 0.494
Assumed Moisture, % 2
Meter Box Number 4A
Meter Delta H@ 1.826
C Factor 1.15
Meter Gamma 1.005
Heater Box Setting ~250
Reference Delta P ΔP_R = 0.041
Post test Leak Rate 0.000 CFM @ 3 in. Hg
Impinger Box No. 7B 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	Orifice Pressure Differential (in. H20) 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)
L8	0	14:56	851.472	0.03	1.35	✓	381	109	108	2.0	247	236	68
L7	3	14:59	853.363	0.03	1.35	✓	387	109	108	2.0	248	249	68
L6	6	15:02	855.249	0.03	1.35	✓	392	111	109	2.0	248	251	65
L5	9	15:05	857.159	0.03	1.35	✓	392	112	109	2.0	250	250	66
L4	12	15:08	859.061	0.03	1.35	✓	389	114	109	2.0	250	250	68
L3	15	15:11	860.960	0.03	1.35	✓	385	115	110	2.0	250	248	68
L2	18	15:14	862.863	0.03	1.35	✓	347	116	110	2.0	247	246	68
L1	21	15:17	864.788	0.03	1.35	✓	—	116	116	2.0	250	247	68
END/M5	24	15:20/15:22	866.646	0.03	1.35	✓	352	116	111	2.0	249	247	68
M7	27	15:25	868.932	0.03	1.35	✓	389	117	111	2.0	249	248	68
M6	30	15:28	870.399	0.02	0.90	✓	392	117	111	1.5	250	245	68
M5	33	15:31	872.180	0.02	0.90	✓	390	118	112	1.5	249	246	68
M4	36	15:34	873.712	0.02	0.90	✓	388	118	112	1.5	249	247	67
M3	39	15:37	875.390	0.02	0.90	✓	383	119	113	1.5	250	247	45
M2	42	15:40	876.964	0.02	0.90	✓	357	118	113	1.5	250	246	62
M1	45	15:43	878.624	0.02	0.90	✓	—	119	113	1.5	250	246	62
END/L8	48	15:47/15:50	880.282	0.03	1.35	✓	369	116	113	2.0	250	246	67
R7	51	15:53	882.123	0.03	1.35	✓	377	118	113	2.0	248	246	67
R6	54	15:56	883.949	0.03	1.35	✓	390	118	113	2.0	250	247	62
R5	57	15:59	885.887	0.03	1.35	✓	390	120	114	2.0	250	246	62
R4	60	16:02	887.782	0.03	1.25	✓	388	120	114	2.0	249	246	63
R3	63	16:05	889.688	0.03	1.35	✓	383	120	114	2.0	251	247	62
R2	66	16:08	891.616	0.03	1.35	✓	376	120	114	2.0	250	245	63
R1	69	16:11	893.517	0.03	1.35	✓	341	121	114	2.0	250	248	64
END	72	16:14	895.412	—	—	—	—	—	—	—	—	—	—

0:72

V_m = 43.94 $\sqrt{\Delta P}$ = 0.165 ΔH = 1.29 T_s = 377 + 460 = 829 T_m = 114 + 460 = 574

SAMPLE RETRIEVAL DATA

Plant: ATC BALBOA
Date: 10-4-95
Sampling Location:
Sampling Type (Method): PARTICULATE
Run Number: PM3
Sample Box Number: 7B
Clean-up Man:
Job Number:
Comments:

Filter

Filter Number: 0.4490
Description of Filter: LT. GREEN

Moisture

	#1	#2	#3
Impingers:			
Final Volume:	612.2 mL	625.6 mL	500.5 mL
Initial Volume:	592.8 mL	604.2 mL	499.5 mL
Net Volume:	21.4 mL	21.4 mL	1.0 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	668.2 g	g	g
Initial Volume:	659.7 g	g	g
Net Volume:	8.5 g	g	g
Total Moisture:	g	g	g
		g	g

60.3

Description of Impinger catch: CLEAR

PES Inc.

EPA Method 5 Calculations

Plant	ATC - Balboa Pacific
Project #	5102
Operation	Pyrolytic Waste Incinerator
Run	3 - Particulate - set 2
Location	Santa Fe Springs, CA
Date	10/4/95

Emission Data

Vlc =	60.3	cc	Vol. of H2O collected (impingers)
Vm =	43.94	cf	Dry gas meter reading
Pb =	29.7	in. Hg	Barometric pressure
Ps =	29.70	in. Hg	Stack pressure
dP =	0.165		Average sq.rt delta P
dH =	1.240	in. H2O	Average draft gauge reading
Tm =	574.0	R	Average meter temperature
Ts =	839.00	R	Average stack temperature
Dn =	0.494	in.	Nozzle diameter
Y =	1.005		Meter calibration factor
t =	72	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

1) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	40.43	cu.ft
	1.14	cu.m

2) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) =	2.84	scf

3) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.066

4) Molecular weight of the stack gas on a dry basis Md.

Ms = ((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))

Ms = 29.08

Instrumental gas analysis

% CO2	2.73
% CO	0
% O2	16.04
% N2	81.23

5) Average stack gas velocity.

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 11.68 ft/sec

6) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1632.75 cfm
46.24 cmm

7) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 952.99 dscfm
26.99 dscmm

8) Analytical data

a) Front half acetone wash

0.0005	g	wash net wt
0.0002	g	acetone blank net wt
100	ml	blank vol.
175	ml	Final wash volume
175	ml	aliquot
0.0005	g	soluble particulate*

b) Front half glass microfibre filter

0.0042	g	filter net wt

c) Back half water wash - soluble

0.0009	g	net wt
0	g	water blank net wt
220	ml	blank vol
550	ml	Final wash volume
550	ml	aliquot
0.0009	g	soluble net wt*

* Weights are not blank corrected

9) Particulate concentrations

0.0018	grains/dscf	Front 1/2
0.0021	grains/dscf	Total

11) Particulate emission rate

Conc.*(1 lb/7000 gr)* Qstd *60 min/hr

W =	0.015	lbs/hr	Front 1/2
W =	0.017	lbs/hr	Total Particulate

12) Isokinecity

An =	0.001	ft^2	Area of nozzle orifice

% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

% I = 103.19

FIELD DATA

Plant ATC BALBOA PACIFIC
Date 10-4-95
Sampling Location EXHAUST STACK
Sample Type EPA METHOD 12
Run Number PES/ATC 2 MM3
Operator NEWMAN/BROWN
Ambient Temperature 90
Barometric Pressure 29.70
Static Pressure -0.02
Filter Number(s)
Pretest Leak Rate 0.020 CFM @ 4 in. Hg
Read And Record All Data Every 5 Minutes

Schematic of Traverse Point Layout

Probe Length and Type 3' GLASS LINED
Pitot Tube I.D. No. S-2A
Nozzle I.D. No. And Diameter M4 · 0.504
Assumed Moisture, % 2
Meter Box Number 4A
Meter Delta H@ 1.826
C Factor 1.15
Meter Gamma 1.005
Heater Box Setting 4 250
Reference Delta P ΔP = 0.041
Post test Leak Rate 0.025 CFM @ 2 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)
R8	0	12:20	789.384	0.03	1.35	✓	383	98	96	2.0	225	262	68
R7	5	12:25	792.459	0.03	1.35	✓	395	102	97	2.0	248	266	68
R6	10	12:30	795.500	0.02	0.90	✓	396	105	98	1.5	248	262	66
R5	15	12:35	798.260	0.02	0.90	✓	394	107	99	1.5	246	258	63
R4	20	12:40	800.900	0.02	0.90	✓	391	107	100	1.5	249	257	61
R3	25	12:45	803.657	0.02	0.90	✓	387	108	100	1.5	245	257	60
R2	30	12:50	806.289	0.02	0.90	✓	380	108	100	1.5	247	258	60
R1	35	12:55	808.978	0.01	0.45	✓	305	109	102	1.0	245	266	62
END/M8	40	13:00/13:01	811.023	0.02	0.90	✓	368	107	102	1.5	246	256	68
M7	45	13:06	813.675	0.02	0.90	✓	397	109	103	1.5	249	258	62
M6	50	13:11	816.349	0.02	0.90	✓	395	110	103	1.5	249	256	64
M5	55	13:16	819.042	0.02	0.90	✓	397	111	104	1.5	249	257	64
M4	60	13:21	821.731	0.01	0.45	✓	392	112	105	1.0	248	255	66
M3	65	13:24	823.666	0.01	0.45	✓	376	111	106	1.0	250	254	67
M2	70	13:31	825.1560	0.01	0.45	✓	343	111	105	1.0	244	252	68
M1	75	13:36	827.426	0.01	0.45	✓	—	111	106	1.0	247	254	68
END/L9	80	13:41/13:45	829.298	0.03	1.35	✓	378	110	106	2.0	250	253	68
L7	85	13:50	832.236	0.03	1.35	✓	394	113	107	2.0	249	254	64
L6	90	13:55	835.349	0.03	1.35	✓	396	114	107	2.0	247	253	67
L5	95	14:00	838.439	0.03	1.35	✓	398	116	108	2.0	249	251	68
L4	100	14:05	841.537	0.02	0.90	✓	397	116	109	1.5	249	250	67
L3	105	14:10	844.269	0.02	0.90	✓	393	117	109	1.5	249	249	67
L2	110	14:15	847.021	0.01	0.45	✓	383	116	109	1.0	251	249	67
L1	115	14:20	849.084	0.01	0.45	✓	323	115	110	1.0	252	245	68
END	120	14:25	851.027	←	↓	—	—	—	—	—	—	—	—

θ = 120 V_m = 61.643 $\sqrt{\Delta P}$ = 0.137 ΔH = 0.68 T_s = 381 + 460 = 841 T_m = 107 + 460 = 567

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES, Inc.
Multi-Metals Method Calculations (EPA 12)

Plant	ATC-Balboa Pacific
Project #	5102
Operation	Pyrolytic Oxidation Unit
Run	3
Location	Outlet
Date	10/4/95

Test Data

Vlc =	88.1	cc	Vol. of H2O collected (impingers)
Vm =	61.643	cf	Dry gas meter reading
Pb =	29.7	in. Hg	Barometric pressure
Ps =	29.70	in. Hg	Stack pressure
dP =	0.137		Average sq.rt delta P
dH =	0.881	in. H2O	Average draft gauge reading
Tm =	567.0	R	Average meter temperature
Ts =	840.21	R	Average stack temperature
Dn =	0.504	in.	Nozzle diameter
Y =	1.005		Meter calibration factor
t =	120	min.	Duration of sampling time
A =	2.3300	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-	constant

Instrumentation Data

[O2] =	16.0	%
[CO2] =	2.7	%

CALCULATIONS

1) Volume of gas sampled at standard conditions, Vmstd
Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd =	57.37	cu.ft
	1.62	cu.m

2) Volume of water vapor collected at standard conditions.
Vw(std) = K2 * Vlc

Vw(std) = 4.15 scf

3) Decimal fraction of moisture by volume in stack gas
Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.067

4) Molecular weight of the stack gas on a dry basis Md.
Md = (1-Bws)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Bws)

Md = 28.33

5) Average stack gas velocity.
vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 9.85 ft/sec

6) Average actual stack gas volumetric flowrate.
Q = 60 * vs * As

Q = 1377.27 cfm
39.00 cmm

7) Average stack gas dry volumetric flowrate.
Qstd = Q * (Tstd/Ts) * (Ps/Pstd)

Qstd = 801.18 dscfm
22.69 dscmm

8) Toxic metal concentrations and emission rates

Element	Sample Mass (ug)	Blank Mass (ug) DL	Conc. (mg/dscm)	Emission Rate (mg/hr)
Copper	10.00	2.00	4.41E-04	6.0E-01
Chromium	7.00	4.00	3.09E-04	4.2E-01
Lead	4.00	4.00	1.76E-04	2.4E-01
Zinc	491.00	10.00	2.16E-02	2.9E+01
Manganese	3.00	2.00	1.32E-04	1.8E-01
Nickel	19.00	10.00	8.37E-04	1.1E+00
Cadmium	7.00	7.00	3.09E-04	4.2E-01
Beryllium	3.00	3.00	1.32E-04	1.8E-01
Arsenic	0.50	0.30	2.20E-05	3.0E-02
Selenium	20.00	20.00	8.81E-04	1.2E+00
Molybdenum	3000.00	2.00	1.32E-01	1.8E+02
Silver	0.10	0.10	4.41E-06	6.0E-03
Antimony	3.00	3.00	1.32E-04	1.8E-01
Barium	14.00	1.00	6.17E-04	8.4E-01
Thallium	0.10	0.10	4.41E-06	6.0E-03

9) Isokinecity

An = 0.001 ft^2 Area of nozzle orifice

% I = 100*Ts*((K3*Vlc+(Vm*Y/Tm)(Pb+dH/13.6))/(60*t*Ps*vs*An)

% I = 100.40

Sample Train Operation Data

Test Date	10/4/95	
Barometer	29.70	in.Hg
Run #	3	
Static P	-0.02	in.H2O
Pitot Cp	0.84	
Nozzle	0.504	

Traverse Point	Delta-P (in. H2O)	Temp. (Deg.F)	delta H	Dry Gas Meter Temp IN	OUT	(dP)^.5
A-1	0.03	383	1.35	98	96	0.17321
A-2	0.03	395	1.35	102	97	0.17321
A-3	0.02	396	0.9	105	98	0.14142
A-4	0.02	394	0.9	107	99	0.14142
A-5	0.02	391	0.9	107	100	0.14142
A-6	0.02	382	0.9	108	100	0.14142
A-7	0.02	380	0.9	108	100	0.14142
A-8	0.01	305	0.45	109	102	0.1
B-1	0.02	368	0.9	107	102	0.14142
B-2	0.02	397	0.9	109	103	0.14142
B-3	0.02	395	0.9	110	103	0.14142
B-4	0.02	397	0.9	111	104	0.14142
B-5	0.01	392	0.45	112	105	0.1
B-6	0.01	378	0.45	111	106	0.1
B-7	0.01	343	0.45	111	105	0.1
B-8	0.01	359	0.45	111	106	0.1
C-1	0.03	378	1.35	110	106	0.17321
C-2	0.03	394	1.35	113	107	0.17321
C-3	0.03	396	1.35	114	107	0.17321
C-4	0.03	398	1.35	116	108	0.17321
C-5	0.02	397	0.9	116	109	0.14142
C-6	0.02	393	0.9	117	109	0.14142
C-7	0.01	389	0.45	116	109	0.1
C-8	0.01	325	0.45	115	110	0.1
Average		380.208333	0.88125	110.125	103.792	0.13729
					106.958	

PES

SAMPLE RETRIEVAL DATA

Plant: ATC - BALBOA
Date: 10-4-95
Sampling Location: BLANK
Sampling Type (Method): M.M.
Run Number: MM-4
Sample Box Number: _____
Clean-up Man: _____
Job Number: _____
Comments: 399.6 − 60.1 =

Filter

Filter Number: _____ _____ _____
Description of Filter: _____ _____ _____

Moisture

Impingers:

Final Volume:	_____ mL	_____ mL	_____ mL
Initial Volume:	_____ mL	_____ mL	_____ mL
Net Volume:	_____ mL	_____ mL	_____ mL
Total H_2O:	_____ mL	_____ mL	_____ mL

Silica Gel

Final Volume:	_____ g	_____ g	_____ g
Initial Volume:	_____ g	_____ g	_____ g
Net Volume:	_____ g	_____ g	_____ g
Total Moisture:	_____ g	_____ g	_____ g

Description of Impinger catch: _____

SAMPLE RETRIEVAL DATA

Plant: ATC BALBOA
Date: 10-4-95
Sampling Location:
Sampling Type (Method): M.M.
Run Number: MM3
Sample Box Number: BB
Clean-up Man: BROWN/NEWMAN
Job Number: 5024.0
Comments:

Filter

Filter Number:
Description of Filter: LT. GREEN

Moisture

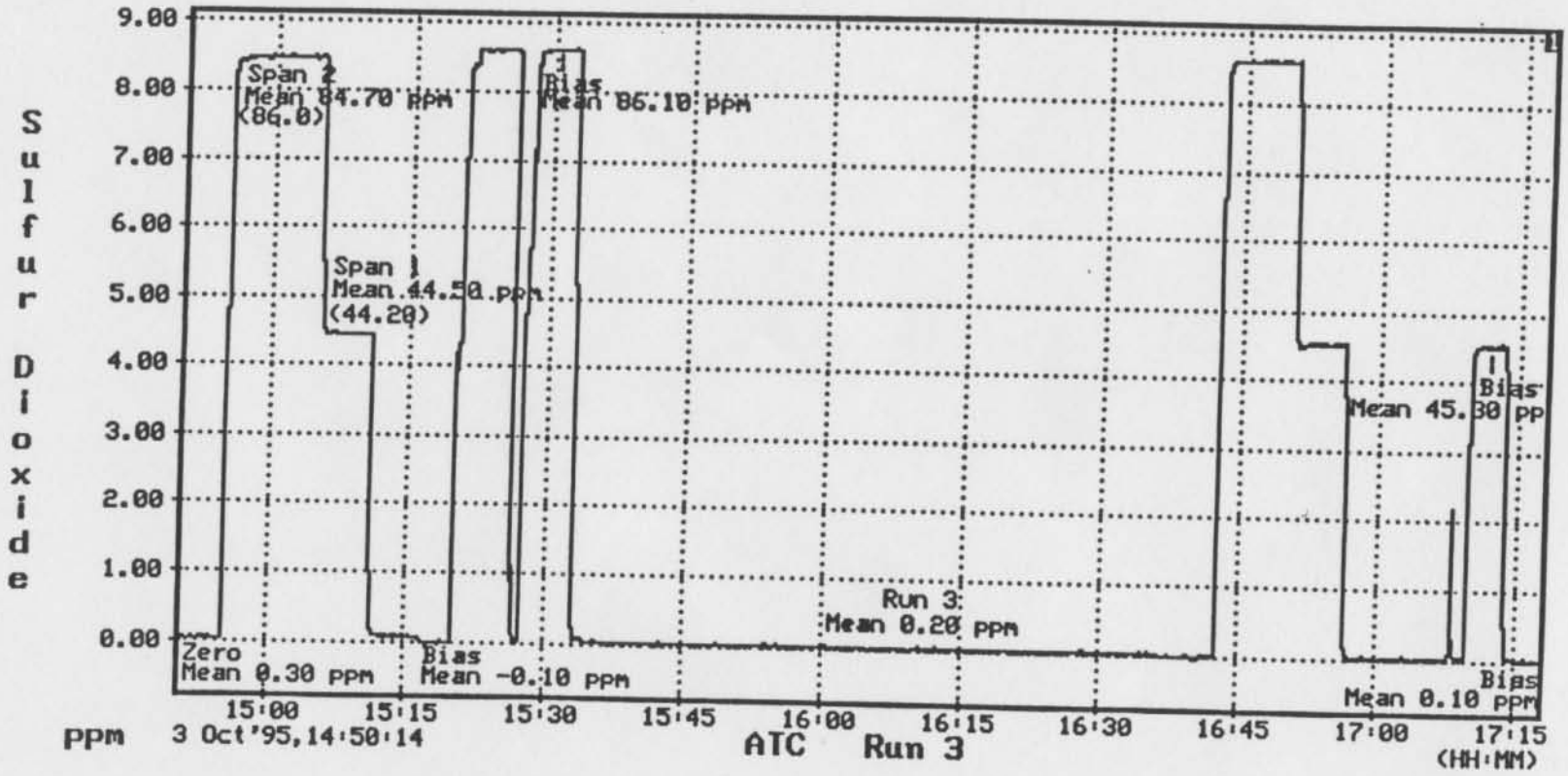
Impingers:	#1		#2		#3	
Final Volume:	694.1	mL	610.1	mL	492.9	mL
Initial Volume:	630.7	mL	600.5	mL	490.8	mL
Net Volume:	63.4	mL	9.6	mL	2.1	mL
Total H_2O:		mL		mL		mL

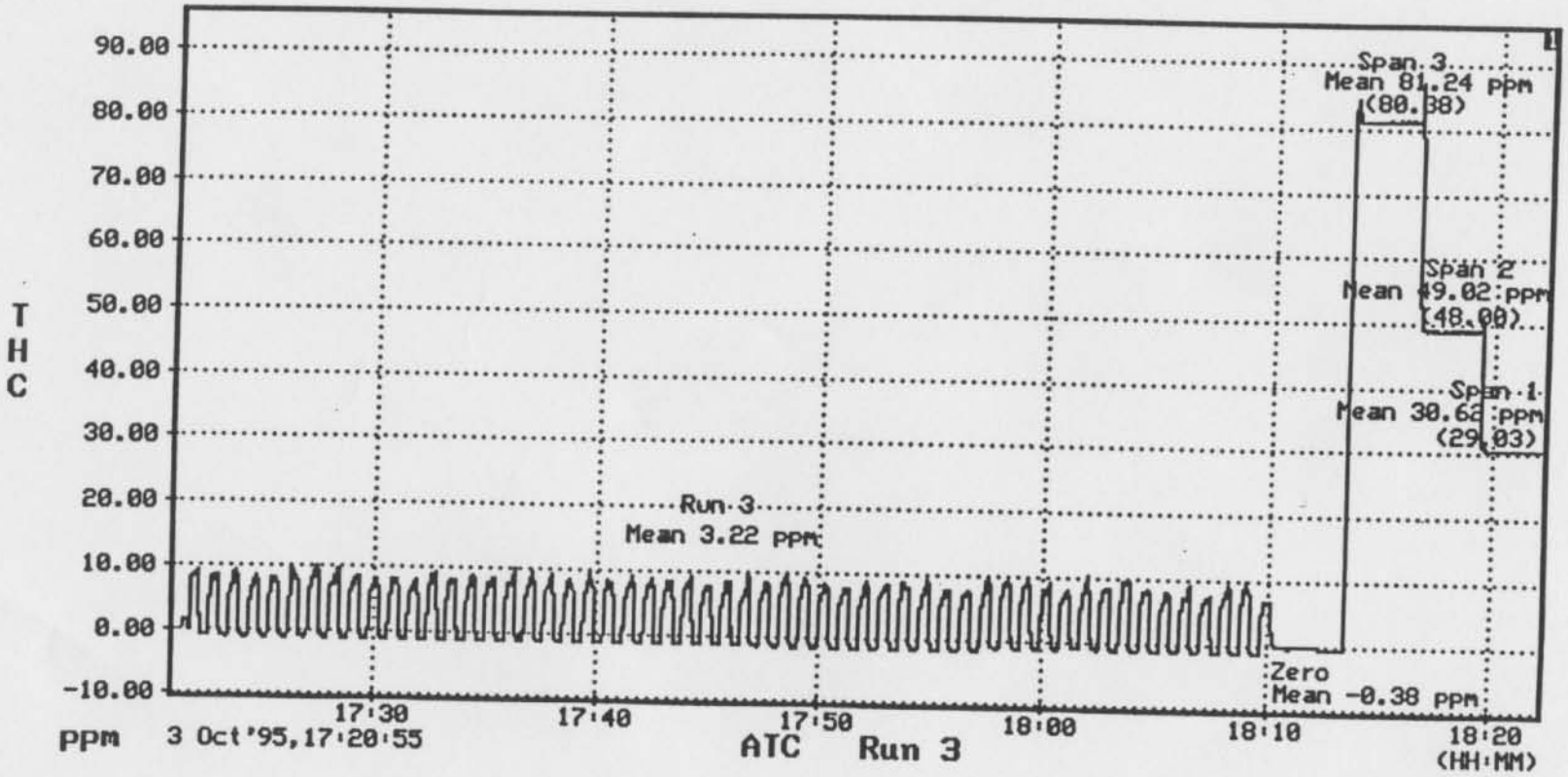
Silica Gel

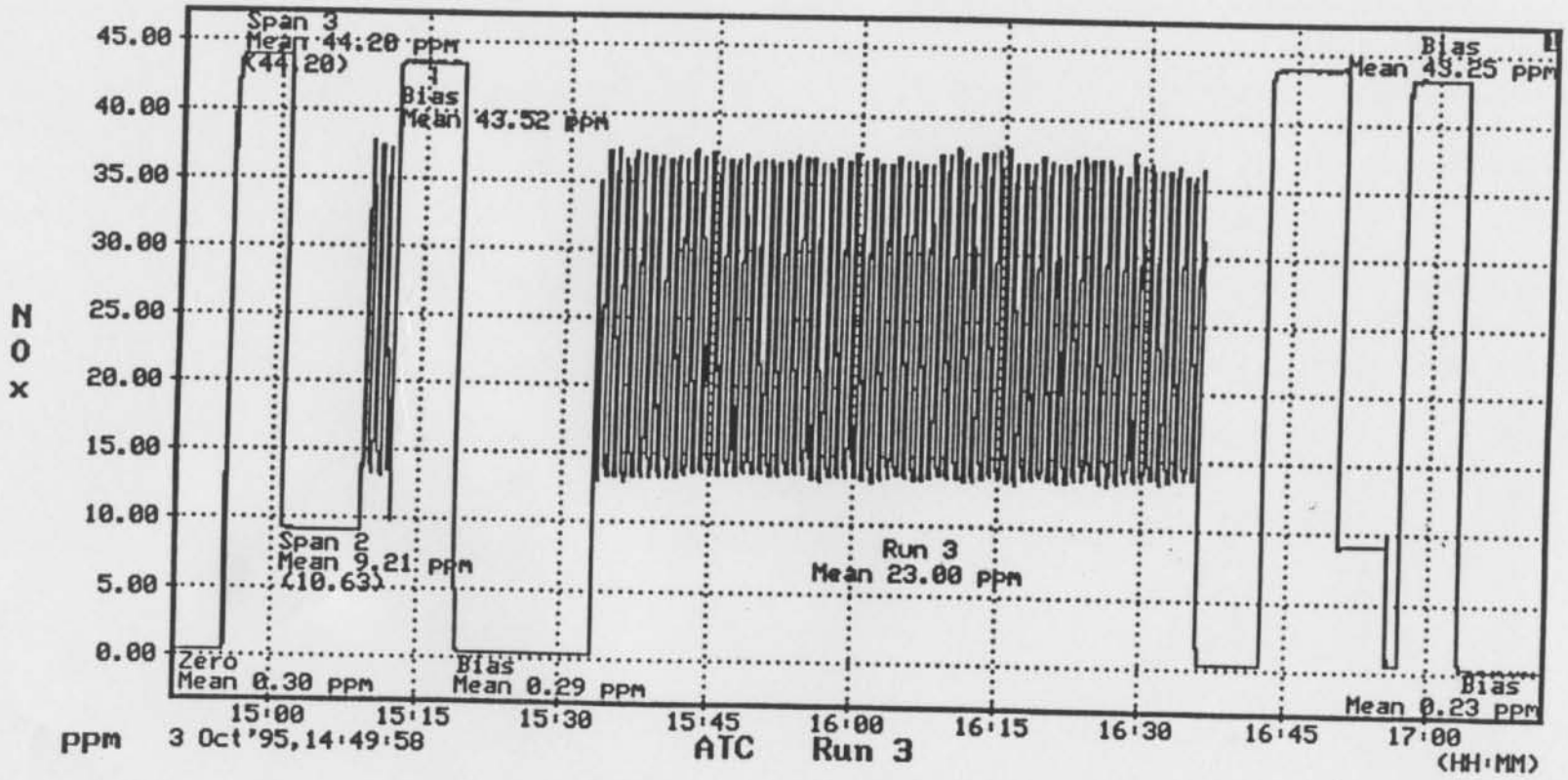
Final Volume:	686.0	g		g		g
Initial Volume:	673.0	g		g		g
Net Volume:	13.0	g		g		g
Total Moisture:		g		g		g

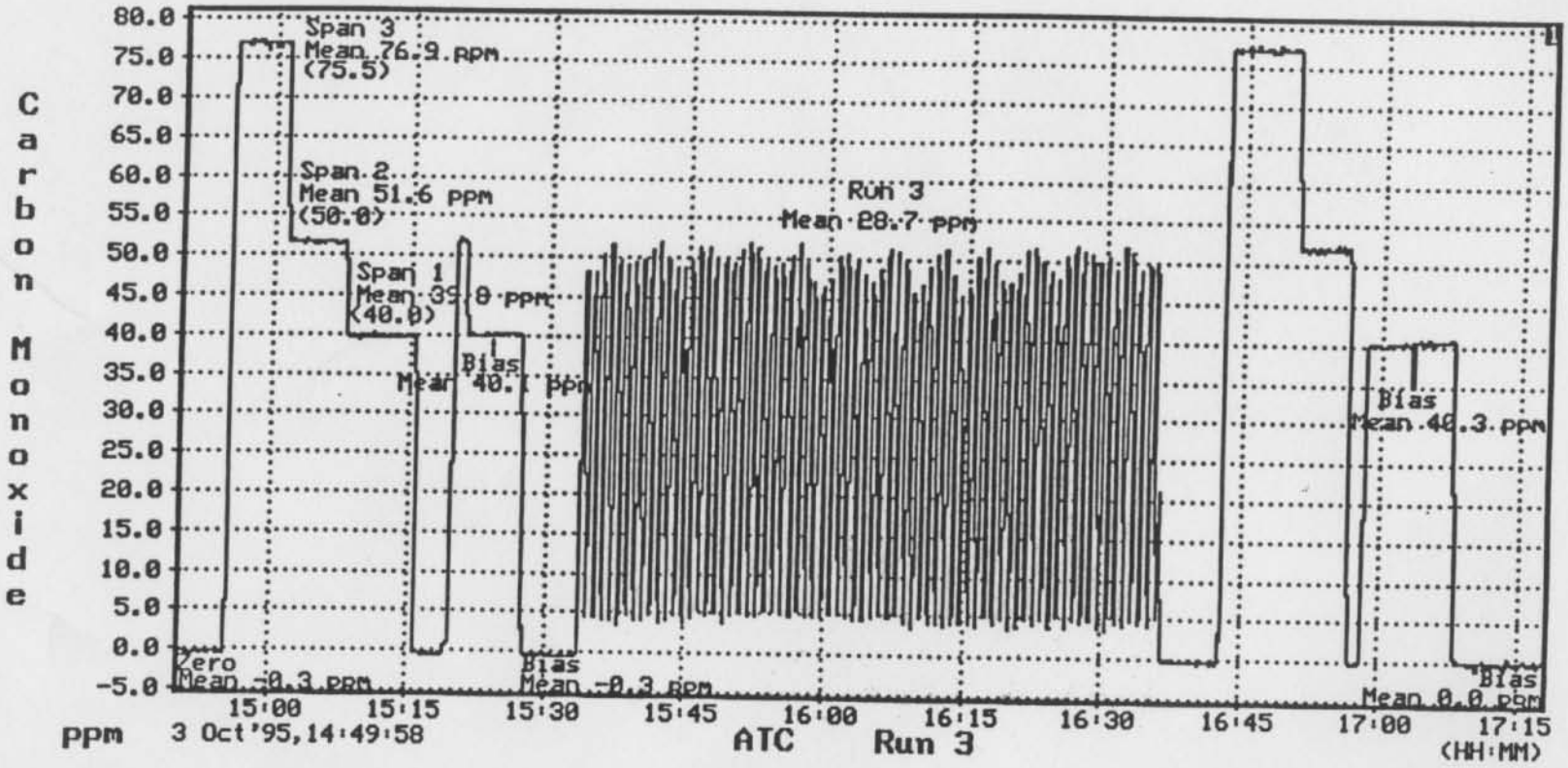
(688.1)

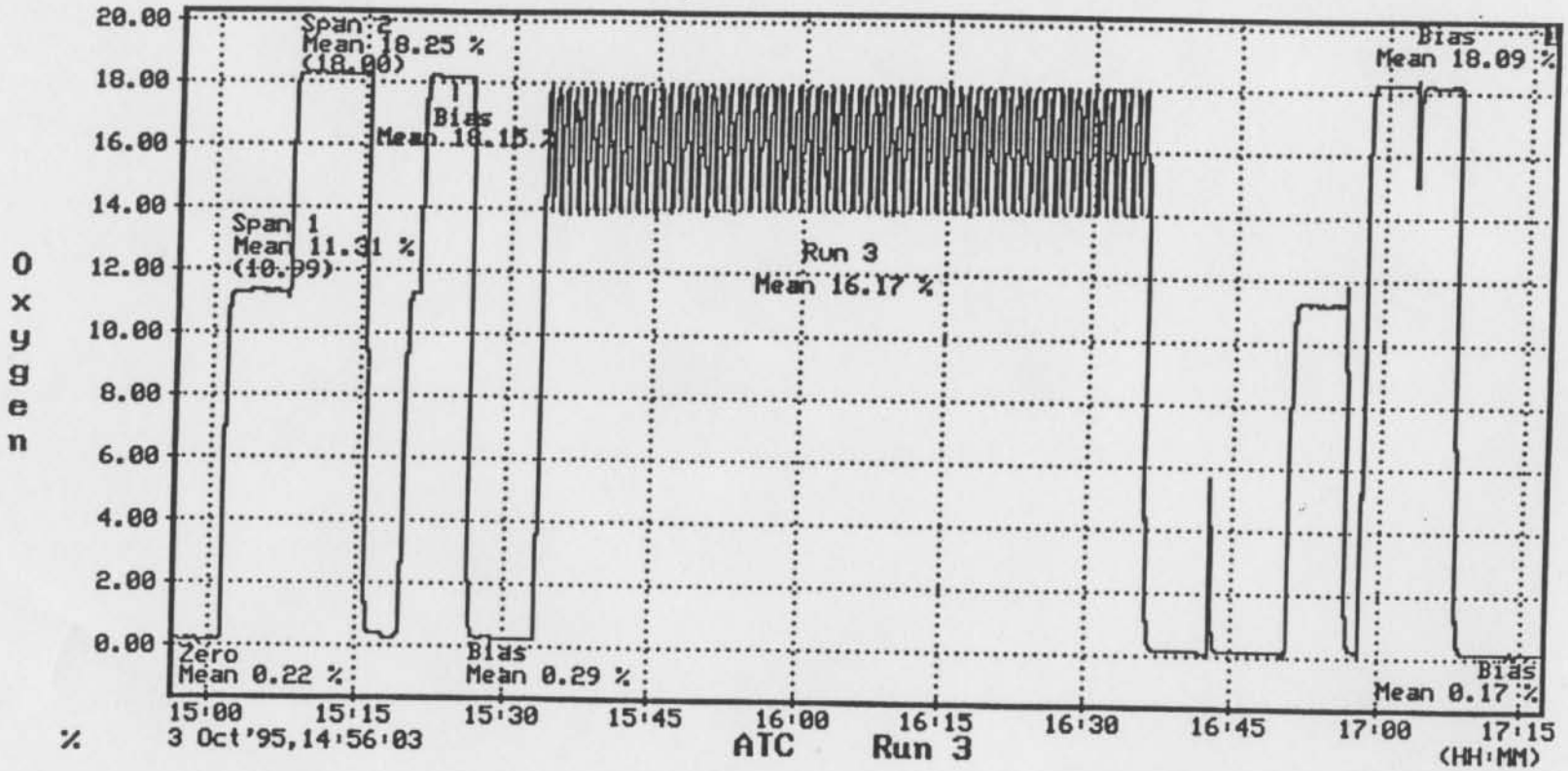
Description of Impinger catch: CLEAR


Sulfur Dioxide
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Span 2
Mean 84.70 ppm
(86.0)
Span 1
Mean 44.50 ppm
(44.20)
Bias
Mean 86.10 ppm
Zero
Mean 0.30 ppm
Bias
Mean -0.10 ppm
Run 3:
Mean 0.20 ppm
Bias
Mean 45.30 pp
Bias
Mean 0.10 ppm
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
17:00
17:15
(HH:MM)
ppm
3 Oct'95,14:50:14
ATC Run 3


90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
THC
Span 3
Mean 81.24 ppm
(80.38)
Span 2
Mean 49.02 ppm
(48.00)
Span 1
Mean 30.62 ppm
(29.83)
Run 3
Mean 3.22 ppm
Zero
Mean -0.38 ppm
17:30
17:40
17:50
18:00
18:10
18:20
(HH:MM)
ppm
3 Oct'95,17:20:55
ATC Run 3


Span 3
Mean 44.20 ppm
(44.20)
Bias
Mean 43.52 ppm
Bias
Mean 45.25 ppm
Span 2
Mean 9.21 ppm
(10.63)
Run 3
Mean 23.00 ppm
Zero
Mean 0.30 ppm
Bias
Mean 0.29 ppm
Bias
Mean 0.23 ppm
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
NOx
ppm
3 Oct'95,14:49:58
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
17:00
(HH:MM)
ATC Run 3


Carbon Monoxide
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
Span 3
Mean 76.9 ppm
(75.5)
Span 2
Mean 51.6 ppm
(50.0)
Span 1
Mean 39.8 ppm
(40.0)
Bias
Mean 40.1 ppm
Zero
Mean -0.3 ppm
Bias
Mean -0.3 ppm
Run 3
Mean 28.7 ppm
Bias
Mean 40.3 ppm
Bias
Mean 0.0 ppm
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
17:00
17:15
(HH:MM)
ppm
3 Oct '95,14:49:58
ATC
Run 3


20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Oxygen
%
Span 2
Mean 18.25 %
(18.00)
Bias
Mean 18.15 %
Span 1
Mean 11.31 %
(10.99)
Run 3
Mean 16.17 %
Bias
Mean 18.09 %
Zero
Mean 0.22 %
Bias
Mean 0.29 %
Bias
Mean 0.17 %
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
17:00
17:15
(HH:MM)
3 Oct'95,14:56:03
ATC Run 3

PES Inc.
Calculations for :

EPA Method 2,3a,4,6c,7E,10 and 25a

Plant	ATC Consultants - Balboa Pacific
Project #	5102
Operation	Pyrolytic Unit
Run	3
Load	Batch 3
Location	Santa Fe Springs, CA
Date	10/4/95

DATA INPUT

INPUT	Vlc =	60.3	cc	Vol. of H2O collected
INPUT	Vm =	43.940	cf	Dry gas meter reading
INPUT	Pb =	29.70	in. Hg	Barometric pressure
INPUT	Pg =	-0.03	in. H2O	Static pressure
INPUT	dP =	0.165		Avg. sq.rt delta P
INPUT	dH =	1.240	in. H2O	Avg. delta H
INPUT	Tm =	574.0	R	Avg. meter temp.
INPUT	Ts =	839.0	R	Avg. stack temp.
INPUT	Y =	1.005		Meter calibration factor
INPUT	t =	72	min.	Duration of sampling time
INPUT	A =	2.3300	sq.ft.	Stack Area
INPUT	Cp =	0.84		Pitot tube coefficient
	Kp =	85.49		Pitot tube constant
	K1 =	17.64	R/in.Hg	constant
	K2 =	0.04707	cu.ft/ml	constant
	K3 =	0.002669	in.Hg-cf/ml	constant

[CO] =	28.60	ppmV(dry)	adj concentration
[NOx] =	23.31	ppmV(dry)	adj concentration
[THC] =	3.08	ppmV(wet)	adj concentration
[SO2] =	0.26	ppmV(dry)	adj concentration

CALCULATIONS

01) Volume of gas sampled at standard conditions, Vmstd

Vmstd =K1* Y * Vm *(Pb + dH/13.6)/Tm

Vmstd = 40.43 cu.ft
1.14 cu.m

02) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) = 2.84 scf

03) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.066

04) Molecular weight of the stack gas on a wet basis

Ms = (1-Q)*((44*%CO2)+(28*%CO)+(32*%O2)+(28*%N2))+(18*Q)

Ms = 28.31

05) Average stack gas velocity.

Ps = 29.70 in. Hg

vs = Kp*Cp*(dP^0.5)*(Ts/Ps*Md)^.5

vs = 11.84 ft/sec

06) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 1654.77 cfm
46.86 cmm

07) Average stack gas dry volumetric flowrate.

Qstd = Q * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)

Qstd =	965.84	dscfm
	27.35	dscmm
	57950.53	dscfh

08) Emission Calculation - Carbon Monoxide

lbs CO/hr = ([CO] * DSCFH * MW)/387*10^6

[CO] =	28.60	ppmv (dry)	Actual conc.
[CO] =	0.12	Lbs/hr	

09) Emission Calculation - Nitrogen Oxides

lbs NOx/hr = ([NOx] * DSCFH * MW)/387*10^6

[NOx] =	23.3	ppmv (dry)	Actual Conc.
[NOx] =	0.16	Lbs/hr	

10) Emission Calculation - Total Hydrocarbons

lbs THC/hr = ([THC] * DSCFH * MW)/387*10^6

[THC] =	3.3	ppmv (dry)	Actual Conc.
[THC] =	0.02	Lbs/hr	

11) Emission Calculation - Sulfur Dioxide

lbs NMHC/hr = ([NMHC] * DSCFH * MW)/387*10^6

[SO2] =	0.3	ppmv (dry)	Actual Conc.
[SO2] =	0.03	Lbs/hr	

APPENDIX B

LABORATORY REPORTS

WCAS
WEST COAST
ANALYTICAL
SERVICE, INC.
ANALYTICAL CHEMISTS

September 29, 1995

PACIFIC ENVIRONMENTAL SERVICES
13100 Brooks Drive
Baldwin Park, CA 91706

Attn: S. Hugh Brown

JOB NO. 30387

S

LABORATORY REPORT

Samples Received: Three (3) Impingers & Three (3) Filters
Date Received: 9-15-95
Project Name: ATC-Balboa Pacific

The samples were analyzed as follows:

Samples Analyzed	Analysis	Page
Three (3) samples	Metals by CARB 436	2 - 3

Michael Shelton
Technical Director

D. J. Northington, Ph.D.
President

9840 Alburtis Avenue • Santa Fe Springs, California 90670 • 310/948-2225 • FAX 310/948-5850

WEST COAST ANALYTICAL SERVICE, INC.

PACIFIC ENVIRONMENTAL SERVICES
Mr. S. Hugh Brown

Job # 30387
September 29, 1995

LABORATORY REPORT

Carb Method 436
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Total Micrograms Per Impinger Train (ug)

	ATC-3	ATC-5	ATC-7	Blank DL
Beryllium	ND<1	ND<1	ND<1	1
Chromium	10	11	12	2
Manganese	4	4	5	1
Nickel	8.3	4.7	5.2	0.4
Copper	18	13	7	1
Zinc	69	48	58	8
Arsenic	2.3	2.9	2.4	0.2
Selenium	ND<7	ND<7	ND<7	7
Molybdenum	842	2500	2470	3
Silver	ND<0.1	ND<0.1	ND<0.1	0.1
Cadmium	ND<2	ND<5	ND<5	2
Antimony	ND<3	ND<3	ND<3	3
Barium	32.6	33	34.2	0.4
Thallium	ND<0.1	ND<0.1	ND<0.1	0.1
Lead	8.7	7	6.2	0.2

Date Analyzed: 9-26-95

WEST COAST ANALYTICAL SERVICE, INC.

PACIFIC ENVIRONMENTAL SERVICES
Mr. S. Hugh Brown

Job # 30387
September 29, 1995

LABORATORY REPORT

Client: ATC-3 (Quality Control)
Matrix: Impinger train

Total micrograms Per Impinger Train (ug)

	Sample	Duplicate	RPD %	Spike Conc ug	Spk Rslt	% Recovery	Detect. Limit
Beryllium	ND<1	ND<1		125	159	127.2	1
Chromium	10	10		125	140	104	2
Nickel	8.3	6.9		125	129	97.1	0.4
Copper	18	17		125	139	97.2	1
Zinc	72	63		125	177	87.6	10
Arsenic	2.3	3.3		125	121	94.6	0.5
Selenium	ND<7	ND<7		1250	1240	99.2	7
Molybdenum	842	854	1.4	125	980		3
Silver	ND<0.1	ND<0.1		125	126	100.8	0.1
Cadmium	ND<2	ND<2		125	124	99.2	2
Antimony	ND<3	ND<3		125	138	110.4	3
Barium	32.6	34.5	5.7	125	158	99.6	0.4
Thallium	ND<0.1	ND<0.1		125	122	97.6	0.1
Lead	8.7	9.1	4.5	125	130	96.9	0.2

Date Analyzed: 9-26-95

WCAS

Abbreviations Summary

General Reporting Abbreviations:

B Blank - Indicates that the compound was found in both the sample and the blank. The sample value is reported without blank subtraction. If the sample value is less than 10X the blank value times the sample dilution factor, the compound may be present as a laboratory contaminant.

D Indicates that the sample was diluted, and consequently the surrogates were too dilute to accurately measure.

DL Detection Limit - Is the minimum value which we believe can be detected in the sample with a high degree of confidence, taking into account dilution factors and interferences. The reported detection limits are equal to or greater than Method Detection Limits (MDL) to allow for day to day and instrument to instrument variations in sensitivity.

J Indicates that the value is an estimate.

ND Not Detected - Indicates that the compound was not found in the sample at or above the detection limit.

ppm parts per million (billion) in liquids is usually equivalent
ppb to mg/l (ug/l), or in solids to mg/kg (ug/kg). In the gas phase it is equivalent to ul/l (ul/m^3).

TR Trace - Indicates that the compound was observed at a value less than our normal reported Detection Limit (DL), but we feel its presence may be important to you. These values are subject to large errors and low degrees of confidence.

kg kilogram	mg milligram	l liter	m meter
g gram	ug microgram	ul microliter	

QC Abbreviations:

Control Control Limits are determined from historical data for a QC parameter. The test value must be within this acceptable range for the test to be considered in control. Usually this range corresponds to the 99% confidence interval for the historical data.

% Error Percent Error - This is a measure of accuracy based on the analysis of a Laboratory Control Standard (LCS). An LCS is a reference sample of known value such as an NIST Standard Reference Material (SRM). The % Error is expressed in percent as the difference between the known value and the experimental value, divided by the known value. The LCS may simply be a solution based standard which confirms calibration (ICV or CCV - initial or continuing calibration verification), or it may be a reference sample taken through preparation and analysis.

PACIFIC ENVIRONMENTAL SERVICES, INC.

CHAIN-OF-CUSTODY RECORD

DATE 9-15-95 PAGE 1 OF 1

PROJECT NAME ATC-Balboa Pacific
COMPANY NAME West Coast Analytical
REFERENCE
ADDRESS
SAMPLERS (SIGNATURE) Neil Norcross

SAMPLE	DATE	TIME	LOCATION	METHODS: CARB 436	METHODS: includes NR, C-N, and Pb	NUMBER OF CONTAINERS	COMMENTS/ CONTAINER TYPE
ATC-3	9.13		Pyrolytic Exhaust	✓		2	combine wash and filter for one analysis
(ATC-5)	9.14		" "	✓		"	"
(ATC-7)	9.15		" "	✓		"	"

1 RELINQUISHED BY	DATE	3 RELINQUISHED BY	DATE	5 RELINQUISHED BY	DATE
SIGNATURE: Neil Norcross		SIGNATURE		SIGNATURE	
PRINTED NAME: Neil Norcross	TIME	PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY: PES Inc		COMPANY		COMPANY	
2 RECEIVED BY	**DATE**	**4 RECEIVED BY**	**DATE**	**6 RECEIVED BY**	**DATE**
SIGNATURE: Jennifer Holmes	9/15	SIGNATURE		SIGNATURE	
PRINTED NAME: Jennifer Holmes	TIME 5:44	PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY: WCAS		COMPANY		COMPANY	

6 TOTAL NUMBER OF CONTAINERS

SAMPLE CONDITIONS
RECEIVED ON ICE (YES) NO
SEALED YES (NO)

SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS

~~10385~~ 10387

WCAS
WEST COAST
ANALYTICAL
SERVICE, INC.
ANALYTICAL CHEMISTS

November 6, 1995

PACIFIC ENVIRONMENTAL SERVICES
13100 Brooks Drive
Suite 100
Baldin Park, CA 91706

Attn: Siya Mokm

Re: WCAS Job Number: 30527

Dear Mr. Mokm,

Please find enclosed a copy of the revised laboratory report for WCAS Job No: 30527. Per your request, molybdenum has been added to the results.

Sincerely,

WEST COAST ANALYTICAL SERVICE, INC.

Robert Olson

Ramona Lee Northington
Laboratory Director

RLN:sm

WEST COAST
ANALYTICAL
SERVICE, INC.
ANALYTICAL CHEMISTS

October 26, 1995

PACIFIC ENVIRONMENTAL SERVICES
13100 Brooks Drive
Suite 100
Baldwin Park, CA 91706

Attn: Siya Mokm

JOB NO. 30527 S

LABORATORY REPORT

Samples Received: Four (4) Impinger Samples in Seven (7) Containers & One (1) Filter Received 10-5-95 & One (1) Filter Received 10-13-95
Purchase Order No: 5102

The samples were analyzed as follows:

Samples Analyzed	Analysis	Page
Four (4) samples	Metals by CARB 436	2 - 4

Michael Shelton
Technical Director

D. J. Northington, Ph.D.
President

9840 Alburtis Avenue • Santa Fe Springs, California 90670 • 310/948-2225 • FAX 310/948-5850

WEST COAST ANALYTICAL SERVICE, INC.

PACIFIC ENVIRONMENTAL SERVICES
Mr. Siya Mokm

Job # 30527
October 26, 1995

LABORATORY REPORT

Metals by CARB 436
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Total micrograms per Sample Train

	MM1/ATC2	MM2/ATC2	MM4/ATC2	Blank Detect. Limit
Antimony	ND<2	ND<2	ND<2	2
Arsenic	ND<0.1	ND<0.1	ND<0.1	0.1
Barium	4	3	ND<1	1
Beryllium	ND<1	ND<1	ND<1	1
Cadmium	3	3	ND<0.3	1
Chromium	ND<6	ND<6	ND<6	6
Copper	12	9	ND<1	1
Lead	12.7	7.5	0.2	0.1
Manganese	ND<4	ND<4	ND<4	4
Molybdenum	801	592	ND<2	2
Nickel	ND<9	ND<9	16	9
Selenium	ND<10	ND<10	ND<10	10
Silver	ND<0.1	ND<0.1	ND<0.1	0.1
Thallium	ND<0.2	ND<0.2	ND<0.2	0.2
Zinc	109	65	ND<9	9

Date Analyzed: 10-13-95

WEST COAST ANALYTICAL SERVICE, INC.

PACIFIC ENVIRONMENTAL SERVICES
Mr. Siya Mokm

Job # 30527
October 26, 1995

LABORATORY REPORT

Metals by CARB 436
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Total micrograms per Sample Train

	MM3/ATC2	Blank DL
Antimony	ND<3	3
Arsenic	0.5	0.3
Barium	14	1
Beryllium	ND<3	3
Cadmium	ND<7	7
Chromium	7	4
Copper	10	2
Lead	ND<4	4
Manganese	3	2
Molybdenum	3000	2
Nickel	19	10
Selenium	ND<20	20
Silver	ND<0.1	0.1
Thallium	ND<0.1	0.1
Zinc	491	10

Date Analyzed: 10-23-95

WEST COAST ANALYTICAL SERVICE, INC.

PACIFIC ENVIRONMENTAL SERVICES
Mr. Siya Mokm

Job # 30527
October 26, 1995

LABORATORY REPORT

Sample: MM2/ATC2 (Quality Control)
Matrix: Impinger

Total micrograms per Sample Train

	Sample	Spike Conc ppm	MS	% Recovery	MSD	% Recovery	% RPD
Antimony	ND<2	142.9	135	94.5	135	94.5	0
Arsenic	ND<0.1	142.9	126	126	126	126	0
Barium	3	142.9	145	99.4	141	96.6	2.8
Beryllium	ND<1	142.9	152	106.4	168	117.6	10
Cadmium	3	142.9	145	99.4	155	106.4	6.7
Chromium	ND<6	142.9	158	110.6	154	107.8	2.6
Copper	9	142.9	152	100.1	159	105	4.5
Lead	7.5	142.9	163	108.8	162	108.1	0.6
Molybdenum	592	142.9	732	-----	731	-----	0.1
Nickel	ND<9	142.9	157	109.9	157	109.9	0
Selenium	ND<10	1428.6	1340	93.8	1410	98.7	5.1
Silver	ND<0.1	142.9	138	96.6	147	102.9	6.3
Thallium	ND<0.2	142.9	148	103.6	151	105.7	2
Zinc	59	142.9	204	101.5	204	101.5	0

Date Analyzed: 10-13-95

CHAIN OF CUSTODY RECORD

COMPANY
ADDRESS
PHONE NO. FAX
MAIL REPORT TO:

PROJECT MANAGER
PROJECT NAME
PROJECT NO.
PURCHASE ORDER NO. 5102

WEST COAST ANALYTICAL SERVICE, INC.
9840 Alburtis Avenue
Santa Fe Springs, CA 90670
(310) 948-2225 Fax (310) 948-5850

COMMENTS:

If sample is liquid & has sediment or particulate should we:
_____ test filtrate only?
_____ mix sample by shaking?
_____ test particulate only?

If sample is multi-phased, should we:
_____ test each phase separately?
_____ test only ONE phase? Which phase?
_____ mix all phases by shaking, if possible?

Sample I.D. #	Date Sampled	Time Sampled	Preservative	MATRIX: soil	water	air	other	# of containers	8015 Modified Gas Diesel	Total Petroleum Hydrocarbons 418.1	Halo. Volatiles 601/8010	Aromatic Volatiles 602/8020	Volatile Organics 624/8260	Semi-Volatile Org 625/8270	Chlor Pest/PCB 608/8080	Herbicides 615/8150	CAM (17) Metals	TCLP Metals	STLC Metals	Hex Chrome EPA 218.6	CARB 425/Total & Hex Chrome	CARB 436 Multi-metals	RUSH	Remarks
						✓		2													✓			
						✓		2													✓			"
						✓		2													✓			"
						✓		1													✓			"

Relinquished by:	Company	Date/Time	Received by:	Company	Date/Time
Relinquished by:	Company	Date/Time	Received by:	Company	Date/Time
Relinquished by:	Company	Date/Time	Received by:	Company	Date/Time

NOTE: Samples are discarded 30 days after date of final report.

White Copy - WCAS • Yellow - Report • Pink - Client

WCAS Job No. 930527

PACIFIC ENVIRONMENTAL SERVICES, INC.

Project No. 5102.000	Page / of /
Client ATC Ballona Pacific	
Location	

Prepared By	Date	Checked By	Date	Sheet Title
RN	9/21/99			EPA Method 5 Analysis

SAMPLE	FILTER	IMPINGERS	ACETONE	TOTAL
- ATC-2	0.4580 0.4574 0.0006	29.1615 (13) 29.1574 00.0041	29.1574 (13) 29.1561 0.0013	
- ATC-4	0.4717 0.4517 0.0200	28.6174 (15) 28.6139 0.0035	28.6139 (15) 28.6107 0.0032	
- ATC-6	0.4457 0.4491 -0.0034	28.6414 (12) 28.6396 0.0018	28.6396 (12) 28.6377 0.0019	
BLANK	0.4532		29.0844 29.0844 0.0000	

PACIFIC ENVIRONMENTAL SERVICES, INC.

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

Prepared By	Date	Checked By	Date	Sheet Title
[illegible]	[illegible]			EPA Method 5 Analysis

SAMPLE	FILTER	IMPINGERS	ACETONE	TOTAL
ATC2/PM1	0.4502 0.4470 0.0032	(15) 28.6141 (2) 28.6129 0.0012	28.6129 (15) 28.6107 0.0022	0.0066
ATC2/PM2	0.4435 0.4429 0.0006	(4) (18) 28.7259 28.7228 0.0031	(16) 28.7228 28.7175 0.0053	0.0090
ATC2/PM3	0.4532 0.4490 0.0042	(17) (6) 28.6019 28.6010 0.0009	28.6010 (17) 28.6005 0.0005	0.0056
BLANK	0.4514 0.4514 0.0000	J 28.6877 28.6877 0.0000	(19) 28.6877 28.6875 0.0002	0.0002

APPENDIX C

CALIBRATION DATA

Scott Specialty Gases, Inc.

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

CERTIFICATE OF ANALYSIS

PACIFIC ENVIRONMENTAL SER

13100 BROOKS DRIVE

BALDWIN PARK CA 91706

PROJECT #: 02-36512-001
PO#: 0640-102
ITEM #: 02024520 4AL
DATE: 2/21/95

CYLINDER #: ALM041187
FILL PRESSURE: 2000 PSIG
BLEND TYPE : CERTIFIED MASTER GAS

ANALYTICAL ACCURACY: +-1% NIST

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
CARBON DIOXIDE	11.	%	10.98	%
CARBON MONOXIDE	50.	PPM	50.00	PPM
OXYGEN	11.	%	10.99	%
NITROGEN		BALANCE		BALANCE

2000 PSIG BIN 1 HC/RG 02/24

CRM 1675 ALM001136 - CO2
NTRM 1678 ALM09624 - CO
CRM 2658 ALM017565 - O2

ANALYST: MJ

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

13100 BROOKS DRIVE

BALDWIN PARK CA 91706

PROJECT #: 02-37653-001
PO#: 0640-102 REPLACEMENT
ITEM #: 02024520 4AL
DATE: 4/10/95

CYLINDER #: AAL1060
FILL PRESSURE: 2000 PSIG
BLEND TYPE : CERTIFIED MASTER GAS

ANALYTICAL ACCURACY: +-1% NIST

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
CARBON DIOXIDE	18.	%	18.06	%
CARBON MONOXIDE	75.	PPM	75.47	PPM
OXYGEN	20.	%	19.99	%
NITROGEN		BALANCE		BALANCE

2000 PSIG BIN 1 04-14-95

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 # 33323.001

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 ALM007529
Cylinder Pressure+ 1850PSIG
Certification Date 09-21-94
Exp. Date 09-21-96

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(NITRIC OXIDE)	5.095PPM	± 1 % NIST Traceable
TOTAL OXIDES OF NITROGEN	5.154PPM	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
SRM2627A	12-95	CLM004199	4.8PPM NO IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
TECO / 10AR / 14853-150	09-14-94	Chemi-Luminescent

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

Components: NITRIC OXIDE

First Triad Analysis

Date: 09-14-94 Response Units: mv
Z1= 0.00 R1= 39.3 T1= 41.8
R2= 39.3 Z2= 0.00 T2= 41.8
Z3= 0.00 T3= 41.7 R3= 39.3
Avg. Conc. of Cust Cyl. 5.101PPM

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.

Second Triad Analysis

Date: 09-21-94 Response Units: mv
Z1= 0.00 R1= 39.3 T1= 41.7
R2= 39.3 Z2= 0.00 T2= 41.7
Z3= 0.00 T3= 41.6 R3= 39.3
Avg. Conc. of Cust Cyl. 5.089PPM

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.

Calibration Curve

Concentration= LINEAR CURVE

Concentration=

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 RECERTIFICATION

Customer
PACIFIC ENVIRONMENTAL SER
STEVE HERNANDEZ
13100 BROOKS DRIVE
BALDWIN PARK CA91706

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

Purchase Order F028-000
Scott Project # 29408.001

ANALYTICAL INFORMATION

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

Cylinder Number ALM010841
Cylinder Pressure 1800PSIG

Certification Date 01-25-94
Previous Certification Dates 10-26-93

Acid Rain Exp.
General Exp.01-25-96

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
NITRIC OXIDE	10.43PPM	±1% NIST Traceable
Balance Gas: Nitrogen NOX.	10.63PPM	

*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	12-13-96	ALM033926	9.950PPM

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
TECO / 10AR-38644-258	12-02-93	Chemi-Luminescent

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

Components: NITRIC OXIDE

Previous Certification

Date: 10-26-93 Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl. 10.26PPM

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.

Third Triad Analysis

Date: 01-25-94 Response Units: mv
Z1= 0.08 R1= 92.48 T1= 96.83
R2= 92.52 Z2= 0.12 T2= 96.96
Z3= 0.140.08 T3= 96.98 R3= 92.49
Avg. Conc. of Cust Cyl. 10.43PPM

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.

Calibration Curve LINEAR

Concentration=

Concentration=

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 A. 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, 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
Cylinder Pressure+ 2000 PSIG
Certification Date 03/14/95
Exp. Date 03/14/97

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 NO 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

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.

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

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.

Calibration Curve

Concentration= Ax + B
A =2.592
B =0.07521

Concentration=

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.
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 # 29933.001

ANALYTICAL INFORMATION

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

Cylinder Number ALM014364
Cylinder Pressure 1900 psig
Certification Date 02-15-94
Exp. Date 08-15-94

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
SULFUR DIOXIDE	46.28 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=	19.9
R2=	97.0	Z2=	0.00	T2=	19.9
Z3=	0.00	T3=	19.9	R3=	97.0

Avg. Conc. of Cust Cyl. 46.28 ppm

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.

Second Triad Analysis

Date: 02-15-94 Response Units: mv

Z1=	0.00	R1=	97.0	T1=	19.9
R2=	97.0	Z2=	0.00	T2=	19.9
Z3=	0.00	T3=	19.9	R3=	97.0

Avg. Conc. of Cust Cyl. 46.28 ppm

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.

Calibration Curve

Concentration= Ax + B
A =0.4925
B =0.03282

Concentration=

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: K 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

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

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

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.

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

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.

Calibration Curve

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

Concentration=

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 T. 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
C/O STEVE HERNANDEZ

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

Purchase Order 4896-000
Project # 31442.001

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 AAL018067
Cylinder Pressure+ 200 PSIG
Certification Date 05-17-94
Previous Certification Date 10-20-93
Exp. Date 05-17-97

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(PROPANE)	20.01 PPM	± 1 % NIST Traceable
(Air)	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
SRM1667B	04-98	CLM005374	47.30 ppm C3H8/Air

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
C3H8: OPE-435	03-25-94	F.I.D.

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

Components	Previous Certification	Third Triad Analysis	Calibration Curve
Propane	Date: 10-20-93 Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl. 20.09 ppm	Date: 05-17-94 Response Units: mv Z1= 0.00 R1= 47.2 T1= 20.0 R2= 47.2 Z2= 0.00 T2= 20.0 Z3= 0.00 T3= 20.0 R3= 47.2 Avg. Conc. of Cust Cyl. 20.01 ppm	Concentration= Ax + B A =1.002 B =-0.03716
	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: [signature]

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 # 31576.001

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 AAL-14083
Cylinder Pressure+ 2000 PSIG
Certification Date 6/2/94
Exp. Date 4/4/98

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(PROPANE)	29.03 PPM	± 1 % NIST Traceable
(AIR)	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
SRM1666B	4/4/98	CLM007196	95.50 PPM C3H8 IN AIR

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
OPE435	6/3/94	FID

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

Components: PROPANE

First Triad Analysis

Date: 6/3/94 Response Units: mv

Z1= 00.0	R1= 95.3	T1= 29.0
R2= 95.3	Z2= 00.0	T2= 29.0
Z3= 00.0	T3= 29.0	R3= 95.3

Avg. Conc. of Cust Cyl. 29.03

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.

Second Triad Analysis

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.

Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

Avg. Conc. of Cust Cyl.

Calibration Curve

Concentration= Ax + B
A =1.002165
B =-0.037166

Concentration=

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 4896-000
Project # 31443.001

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 AAL 2522
Cylinder Pressure+ 2000 PSIG
Certification Date 5/23/94
Exp. Date 5/23/97

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(PROPANE)	48.00 PPM	± 1 % NIST Traceable
(AIR)	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
SRM	3/4/98	CLM005374	47.30 PPM C3H8 IN AIR

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
OPE435/FID/5603411215	3/25/94	FID

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

Components: PROPANE

First Triad Analysis

Date: 5/23/94 Response Units: mv

Z1= 0.00	R1= 95.3	T1= 48.0
R2= 95.3	Z2= 0.00	T2= 47.9
Z3= 0.00	T3= 47.9	R3= 95.3

Avg. Conc. of Cust Cyl. 48.00 PPM

Second Triad Analysis

Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

Avg. Conc. of Cust Cyl.

Calibration Curve

Concentration= Ax + B
A =1.002
B =-0.03716

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: _____

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
STEVE HERNANDEZ
13100 BROOKS DRIVE

BALDWIN PARK CA 91706

PROJECT #: 02-28207-004
PO#: PO# 0640-102
ITEM #: 0202RC0C AL
DATE: 10/20/93

CYLINDER #: ALM06161
FILL PRESSURE: 2000PSIG

COMPONENT	ANALYSIS (MOLES)
PROPANE	OLD# 80.58 PPM
PROPANE	NEW# 80.38 PPM
AIR	BALANCE

2000PSIG 30M#2 10-22
TRACEABLE TO SRM 1668B
CYL# CLM007196

ANALYST:

DRY GAS METER AND ORIFICE CALIBRATION

Dry Gas Meter No.: 677152 Meter Box No.: 4A Reference Dry Gas Meter No.: 25507

Barometric Pressure: 29.56 Calibration Date: 5/15/95 Calibration Performed By:

Orifice Manometer Setting H = "H2O	Initial Reference DGM Reading V = ft3	Final Reference DGM Reading V = ft3	Reference Gas Volume Vr = ft3	Initial DGM Reading V = ft3	Final DGM Reading V = ft3	Test DGM Volume Vd = ft3	Temperature				Run Time minutes	Flow Rate Q = cfm	Meter Gamma	Delta H @
							Reference DGM tr = F	DGM Inlet t = F	DGM Outlet t = F	DGM Average td				
0.5	417.842	427.866	10.024	508.593	518.615	10.022	71	77	72	75	24.9	0.40	1.006	1.745
1.0	428.236	438.253	10.017	518.984	529.027	10.043	70	83	75	79	17.9	0.55	1.012	1.785
2.0	438.827	448.881	10.054	529.596	539.694	10.098	70	88	78	83	13.0	0.76	1.015	1.855
4.0	449.612	459.777	10.165	540.430	550.651	10.221	70	91	79	85	9.3	1.08	1.013	1.851

Average	1.011	1.809

DRY GAS METER AND ORIFICE CALIBRATION

Dry Gas Meter No.: 6847415 Meter Box No.: 2A Reference Dry Gas Meter No.: 25507

Barometric Pressure: 29.45 Calibration Date: 5/12/95 Calibration Performed By:

Orifice Manometer Setting H = "H2O	Initial Reference DGM Reading V = ft3	Final Reference DGM Reading V = ft3	Reference Gas Volume Vr = ft3	Initial DGM Reading V = ft3	Final DGM Reading V = ft3	Test DGM Volume Vd = ft3	Temperature				Run Time minutes	Flow Rate Q = cfm	Meter Gamma	Delta H @
							Reference DGM tr = F	DGM Inlet t = F	DGM Outlet t = F	DGM Average td				
0.5	287.442	297.528	10.086	665.563	675.750	10.187	74	80	75	78	25.9	0.38	0.995	1.883
1.0	298.279	308.342	10.063	676.415	686.712	10.297	74	88	83	86	18.7	0.52	0.996	1.943
2.0	309.885	319.965	10.080	688.260	698.416	10.156	74	88	83	86	13.3	0.74	1.009	1.959
4.0	321.039	331.463	10.424	699.510	709.982	10.472	74	93	84	89	9.8	1.03	1.012	1.978

Average	1.003	1.941

DRY GAS METER AND ORIFICE CALIBRATION

Dry Gas Meter No.: 1042485 Meter Box No.: 1A Reference Dry Gas Meter No.: 25507

Barometric Pressure: 29.45 Calibration Date: 5/12/95 Calibration Performed By:

Orifice Manometer Setting H = "H2O	Initial Reference DGM Reading V = ft3	Final Reference DGM Reading V = ft3	Reference Gas Volume Vr = ft3	Initial DGM Reading V = ft3	Final DGM Reading V = ft3	Test DGM Volume Vd = ft3	Temperature				Run Time minutes	Flow Rate Q = cfm	Meter Gamma	Delta H @
							Reference DGM tr = F	DGM Inlet t = F	DGM Outlet t = F	DGM Average td				
0.5	375.847	385.983	10.136	186.880	196.893	10.013	75	82	76	79	25.3	0.39	1.019	1.781
1.0	386.451	396.531	10.080	197.360	207.368	10.008	75	87	80	84	18.1	0.54	1.021	1.828
2.0	397.015	407.094	10.079	207.863	217.875	10.022	75	89	81	85	13.2	0.74	1.019	1.939
4.0	407.473	417.604	10.131	218.254	228.281	10.027	75	93	83	88	9.3	1.06	1.025	1.895

Average	1.021	1.861

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

R E P O R T O F C A L I B R A T I O N

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
ATE: 06/21/90
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

EVER READY THERMOMETER CO.

METER BOX TEMPRATURE READOUT CALIBRATION

CALIBRATED BY: Anja Rickl

DATE: 5/25/95

	Inlet (°F)	Outlet (°F)	Thermometer (°F)
BOX 1A	34.0	35.0	33.8 (1 °C)
	74.0	75.0	75.2 (24 °C)
	202.0	203.0	203.0 (95 °C)
BOX 2A	34.0	33.0	33.8 (1 °C)
	74.0	76.0	75.2 (24 °C)
	214.0	215.0	212.0 (100 °C)
BOX 3A	32.0	30.0	32.0 (0 °C)
	70.0	71.0	73.4 (23 °C)
	213.0	212.0	212.0 (100 °C)
BOX 4A	32.0	32.0	32.0 (0 °C)
	71.0	71.0	75.2 (24 °C)
	211.0	210.0	212.0 (100 °C)
BOX 5A	35.0	33.0	32.0 (0 °C)
	75.0	74.0	75.2 (24 °C)
	214.0	212.0	212.0 (100 °C)

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

THERMOCOUPLE TEMPERATURE CALIBRATION

CALIBRATED BY: [signature]

DATE: 5/26/95

TC #	ROOM		FREEZING		BOILING	
	REF. (C)	DIG. (C)	REF. (C)	DIG. (C)	REF. (C)	DIG. (C)
22	23	23	1	1	100	100
11	19	19	1	1	100	100
5	23	23	0.5	0-1	95.5	100
100	23	23	1	1	100	100
10	23	23	1	1	100	99
101	23	23	2	2	100	100
17	23	23	0.5	1	100	100
6	23	23	0.2	0	100	100
9	23	23	1	1	100	100
16	23	23	1	1	100	100
102	23	23	1	1	100	100
S-3A	24	23	2.5	1	100	99
S-4A	24	23-24	3	3	100	99
S-2A	24	23-24	0.3	1	100	99
S-19A	24	24	1	1	99.5	98
S-16A	24	24	0.5	1	99	97
S-18A	24	24	1.5	1	100	99
S-15A	24	24	1	1	100	99
S-17A	24	24	1.2	2	99.5	97
S-14A	24	24	2	2	100	99
2	24	24	1	1	99.5	100
103	24	24	1	1	100	101
104	24	24	2	2	99	99
D8	24	23-24	1	2	99	99
*A	24	22	2	1	100	100
*B	24	23	2	1	100	100

* New Probes: Need to be numbered.

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 Tom Benson License 1-0903

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

MICHAEL MUNNS

Form CERT1

Pitot Tube Calibration Data Sheet

Calibrated by: [illegible]

Date: 5-30-95

Pitot Tube I.D. S-2A

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 = 0-5 ° θ = 0 ° A = 0.945 °

Z = A sin γ = 0 - 0.0824 cm (in.) 0.32 cm (<⅛ in.)

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

P_A = 0.472 cm (in.)

P_B = 0.472 cm (in.)

D_t = 0.381 cm (in.)

Comments: _____

Calibration Required ? ☐ Yes ☑ No

PES

Pitot Tube Calibration Data Sheet

Calibrated by: [illegible]

Date: 5-30-95

Pitot Tube I.D. S-3R

Effective Length: 39"

Pitot Tube Assembly Level ? ☑ Yes ☐ No

Pitot Tube Openings Damaged ? ☐ Yes ☑ No

If Yes, Explain _____

α_1 = C °(<10°) α_2 = C °(<10°)

β_1 = ~1.5 °(<10°) β_2 = 1.0 °(<10°)

γ = C ° θ = C ° A = 1.11 °

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

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

P_A = 0.561 cm (in.)

P_B = 0.561 cm (in.)

D_t = 0.377 cm (in.)

Comments: _____

Calibration Required ? ☐ Yes ☑ No

PES

Pitot Tube Calibration Data Sheet

Calibrated by: [illegible]

Date: 5-30-95

Pitot Tube I.D. S-4A

Effective Length: 36"

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 = 0-2 °(<10°) β_2 = 0 °(<10°)

γ = 0-2 ° θ = 0 ° A = .952 °

Z = A sin γ = 0-0.332 cm (in.) 0.32 cm (<⅛ in.)

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

P_A = 0.459 cm (in.)

P_B = 0.459 cm (in.)

D_t = 0.377 cm (in.)

Comments: _____

Calibration Required ? ☐ Yes ☑ No

PES

SOURCE SAMPLING NOZZLE CALIBRATION

CALIBRATED/UPDATED BY: [signature]

DATE: 9-21-95

NOZZLE ID #	READING (INCHES) 1	2	3	AVERAGE DIAMETER	SHAPE	COMMENTS
X1	0.311	0.311	0.312	0.311	CURVED	
X2	0.372	0.371	0.373	0.372	CURVED	
X5	0.239	0.241	0.240	0.240	CURVED	
X6	0.269	0.272	0.271	0.271	CURVED	
X9	0.333	0.334	0.334	0.334	CURVED	
X10	0.353	0.354	0.354	0.354	CURVED	
X11	0.355	0.356	0.356	0.356	CURVED	
X12	0.323	0.323	0.324	0.323	CURVED	
X13	0.298	0.298	0.299	0.298	CURVED	
X15	0.281	0.283	0.287	0.284	CURVED	NO GOOD
X16	0.245	0.248	0.248	0.247	CURVED	
X21	0.261	0.258	0.262	0.260	CURVED	
X22	0.276	0.277	0.279	0.277	CURVED	
X23	0.219	0.217	0.217	0.217	CURVED	
X24	0.169	0.166	0.168	0.168	CURVED	
X25	0.240	0.242	0.240	0.240	CURVED	
X26	0.190	0.193	0.194	0.192	CURVED	
X27	0.256	0.256	0.256	0.256	CURVED	
X28	0.180	0.180	0.180	0.180	CURVED	
N1	0.143	0.142	0.142	0.142	B.H.	
N3	0.142	0.141	0.141	0.141	B.H.	
N6	0.494	0.493	0.495	0.494	B.H.	
N9	0.430	0.431	0.430	0.431	B.H.	
M1	0.749	0.751	0.752	0.751	B.H.	
M2	0.494	0.496	0.491	0.494	B.H.	NO GOOD
M3	0.446	0.443	0.444	0.444	B.H.	
M4	0.504	0.504	0.504	0.504	B.H.	
M5	0.472	0.471	0.473	0.472	B.H.	
M6	0.808	0.802	0.805	0.805	B.H.	NO GOOD
M7	0.431	0.437	0.432	0.433	B.H.	NO GOOD
M8	0.275	0.277	0.275	0.276	B.H.	
05P	0.239	0.241	0.240	0.240	CURVED	
40P	0.226	0.225	0.225	0.225	ELBOW	
28PB	0.439	0.438	0.436	0.438	B.H.	
30PB	0.798	0.803	0.805	0.802	B.H.	NO GOOD
38PB	0.796	0.806	0.805	0.802	B.H.	NO GOOD
44PB	0.309	0.307	0.309	0.308	B.H.	
45PB	0.375	0.375	0.372	0.374	B.H.	
10O	0.385	0.385	0.384	0.385	ELBOW	
12O	0.381	0.382	0.383	0.382	ELBOW	