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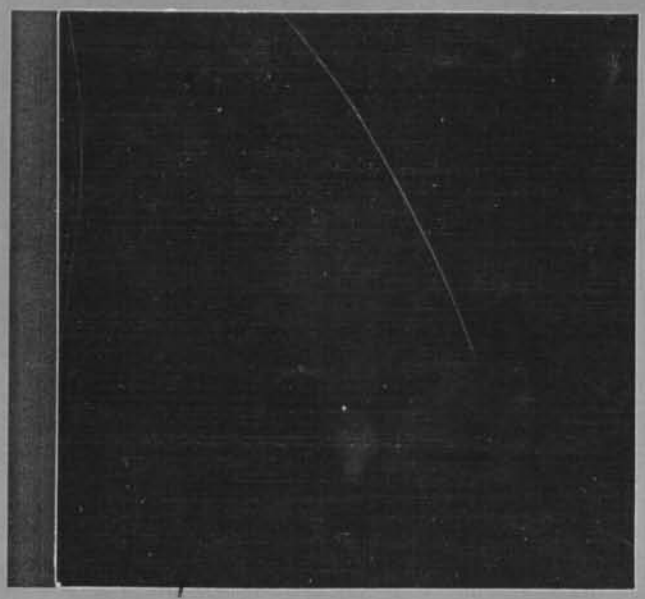

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SOURCE TEST REPORT
MULTIPLE METALS EMISSIONS TESTING

Sandia National Laboratories
P.O. Box 969, MS 9053
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Prepared by:
Dames & Moore Emission Measurement Section
Submitted: April 14, 1997
Date of Test: March 10-14, 1997
Job No. 35746-001-131

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PREFACE

Firm Tested:	Balboa Pacific Corporation
Address	11240 Bloomfield Ave
City:	Santa Fe Springs, CA 90670
Contact:	Dr. Shapoor Hamid (310) 929-1633
Source:	BAL-PAC Pyrolysis Unit Exhaust

Date of Test:	March 10, March 12, & March 14,1997
Test Requested by:	Sandia National Laboratories
Contact:	David Hahn (510) 294-3337
Test Observed by:	Sandia/Balboa Staff
Test Performed by:	Dames & Moore
Team Members:	Christopher J. Barth, Brian Satow, Jason Wirth
Test Objectives:	Quantify and compare multiple metal emissions using reference EPA Method 29 and Sandia National Laboratory's multiple metal continuous emissions monitor.
Test Methods:	EPA Method 29 "Determination of Multiple Metals Emissions from Stationary Sources"
	CARB Method 100 "Instrumental Methods for Gaseous Emissions"

EXECUTIVE SUMMARY

Dames & Moore was retained by Sandia National Laboratories to conduct multiple metals emission testing on the BAL-PAC pyrolytic unit manufactured by Balboa Pacific Corporation. The emissions testing was conducted concurrently with Sandia's multiple metal Continuous Emissions Monitor (CEM) unit. The primary goal of the sampling project was to compare the metal emissions recorded by Sandia's CEM unit with the metals emissions determined by Dames & Moore using USEPA Reference Method 29 "Determination of Metals Emissions From Stationary Sources".

Testing was conducted during the week of March 10, 1997 and consisted of three test days utilizing one feed per day of the following: municipal waste, shredded tires, and a molybdenum-rich spent catalyst. Each day of testing entailed a 2-hr test run in which the CEM unit looked for six (6) specific target metals: Iron (Fe), Manganese (Mn), Molybdenum (Mo), Chromium (Cr), Nickel (Ni) and Cadmium (Cd). Table ES-1 summarizes the target metal results.

TABLE ES-1

Target Metal Sampling Summary

Multiple Metals Summary	Run-1		Run-2		Run-3	
Date Tested	3/10/97		3/12/97		3/14/97	
Feed	Municipal Waste		Shredded Tires		Spent Catalyst	
Metals Emissions, ug/m^3	RM	CEM	RM	CEM	RM	CEM
Iron, Fe	39.9	22.6	82.2	48.7	139.7	91.3
Manganese, Mn	3.3	3.1	4.9	9.3	4.5	7.0
Molybdenum, Mo	76.2	NA	20.2	NA	16.6	NA
Chromium, Cr	2.9	2.3	1.9	1.5	1.0	NA
Nickel, Ni	1.3	4.8	1.8	5.0	1.3	2.0
Cadmium, Cd	1.4	NA	1.6	NA	0.6	NA

RM = Metals results using Reference Method 29 "Multiple Metals Emissions from Stationary Sources"

CEM = Average metals results using Sandia's Multiple Metal Continuous Emissions Monitor

1.0 INTRODUCTION

Sandia National Laboratories is developing the technology of a multiple metals continuous emissions monitor (CEM). Dames & Moore was retained by Sandia National Laboratories (Sandia) to conduct multiple metal emissions testing, using a reference method, simultaneously with the multiple metals CEM. The purpose of the testing was to compare Sandia's CEM results with a reference method to fine tune this new CEM technology.

The emissions testing was performed on the exhaust stack of a pilot-model pyrolytic conversion unit used to treat hazardous and non-hazardous waste. The pyrolysis unit was manufactured and operated by Balboa Pacific Inc., Santa Fe Springs, CA.

In addition to the multiple metals testing, exhaust gas sampling was conducted and the results are included for Sandia's information. Constituents analyzed include oxides of nitrogen (NO_x), carbon monoxide (CO), total hydrocarbons (THC), oxygen (O_2), and carbon dioxide (CO_2). The following test methods were used:

- **EPA Method 29** "Determination of Multiple Metals Emissions from Stationary Sources"
- **CARB Method 100** "Instrumental Methods for Gaseous Emissions, NO_x, CO, THC, O_2 and CO_2"

The testing was conducted at Balboa Pacific, 11240 Bloomfield Avenue, Santa Fe Springs, California 90670.

This document presents a detailed description of the system, a description of the operating parameters within which the system was operated during the course of the test, a description of the monitoring, sampling techniques and analytical procedures which were used, and the results of the testing.

2.0 EQUIPMENT AND PROCESS INFORMATION

2.1 Balboa Pacific Corporation Pyrolytic Conversion System

The BAL-PAC Pyrolytic Conversion System is based on patented technology. The basic principle of this technology is the destruction and stabilization of the waste stream using very high temperatures (1900-2000 °F) in an oxygen free environment. By this process the waste stream entering the unit is converted into combustible gases and a stabilized solid waste stream. The gases produced are further subjected to high temperatures (2250 °F) in a thermal oxidizer where the combustible gases are destroyed. There are four main subsystems to the BAL-PAC system described below. A diagram of the unit is shown in Figure 2-1.

- The Feed or Input System: The waste material is introduced into the system through a series of valves and gates that are synchronized to prevent unwanted oxygen or air from entering into the processing chamber.

- Pyrolytic Conversion Chamber (retort): A thermally insulated outer housing surrounding a retort or pyrolytic chamber containing a rotary screw that conveys the waste through the retort as pyrolysis occurs. The space between the outer housing and the internal retort chamber contains a heat chamber, through which natural gas at a maximum rate of 500 cubic feet per minute is routed for combustion, providing the heat source for pyrolysis.

- Thermal Oxidizer: The gases liberated by pyrolysis are drawn off by a "closed coupled thermal oxidizer" where they are ignited, converting them primarily to carbon dioxide and water. The temperature in the thermal oxidizer can reach 2500 degrees F. The retention time for the gases in the chamber is at least 2 seconds. The thermal oxidizer is also fired on natural gas.

- Output System: This system handles the solid by-product produced after the pyrolytic retort. It is characterized by air locks controlled by synchronized valves that expel inert residual pyrolysis matter for post-pyrolytic processing.

FIGURE 2-1

Diagram of BAL-PAC System

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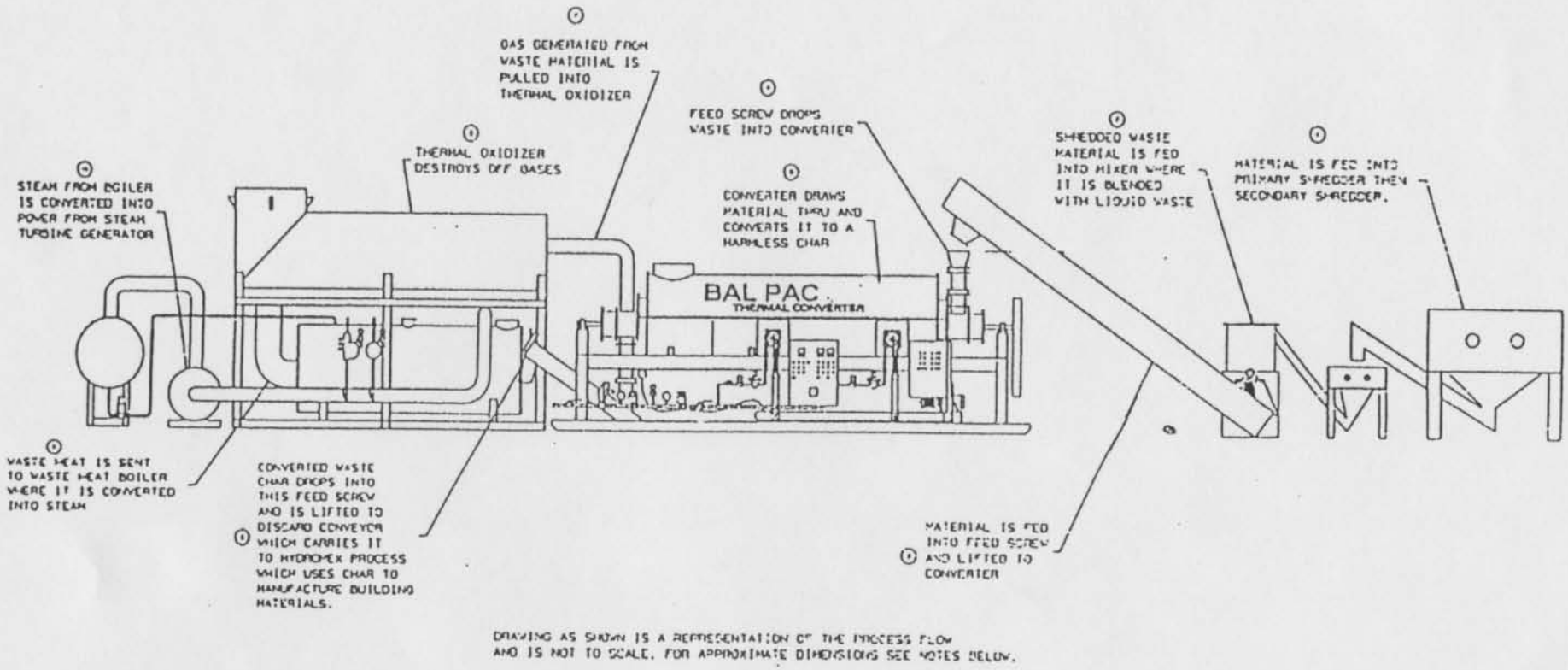


DRAWING AS SHOWN IS A REPRESENTATION OF THE PROCESS FLOW AND IS NOT TO SCALE. FOR APPROXIMATE DIMENSIONS SEE NOTES BELOW.

WASTE HEAT BOILER, Ø7'• 25'L
THERMAL OXIDIZER, Ø17'6"• 30'L
BAL PAC 8000, Ø10'6"• 40'L
STEAM TURBINE GENERATOR, 12'W • 32'L • 10'H (WEIGHT • APPOX. 100,000•)

2.2 Process Information

Mr. Jerry Hold of Balboa Pacific was responsible for the operation of the BAL-PAC during all testing and for the recording of specific process parameters during the testing. Table 4-1 "BAL-PAC Operating Parameters" tabulates the system parameters during the course of the testing.

TABLE 2-1

BAL-PAC Operating Conditions
During the Destruction of Several Waste Feeds

Feed Material	Feed Rate lb/hr	Retort Temperature Inlet °F	Retort Temperature Outlet °F	Oxidizer Temp. °F	Boiler Exh. Temp. °F	Stack Temp. °F
Waste/Sludge	21	1600	1589	1700	560	138
Shredded Tires	30	1500	1450	1700	520	138
Spent Catalyst	10	1700	1650	1700	560	136

Since the purpose of testing was to determine the accuracy of Sandia's multiple metal CEM, Balboa Pacific was operating the BAL-PAC unit at temperatures which were higher than what would be considered normal operating conditions for the purposes of generating metals emissions that could be detected by both Sandia's CEM and Dames & Moore's reference method testing.

3.0 SAMPLING METHODOLOGIES

3.1 Sampling Locations

The exhaust stack from the wet scrubber was 16 inches by 21 inches (18" equivalent diameter). Figure 3-1 shows the port locations on the exhaust stack. Three test ports were located on the 21 inch face, the ports being 4 inches in diameter and 1.5 inches in length. They were located 77" upstream (4.3 duct diameters) and 92" downstream (5.1 duct diameters) of the nearest flow disturbance, meeting EPA Method 1 requirements. Eight sampling points for each sample port were used for the Method 29 multiple metals testing as shown in Figure 3-2.

Sandia located their multiple metal CEM probe approximately 18 inches downstream of the three 4-inch diameter sampling ports.

FIGURE 3-1

Exhaust Stack Diagram

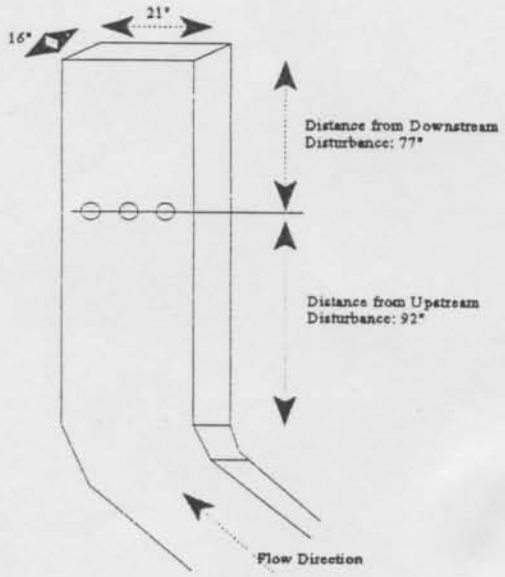
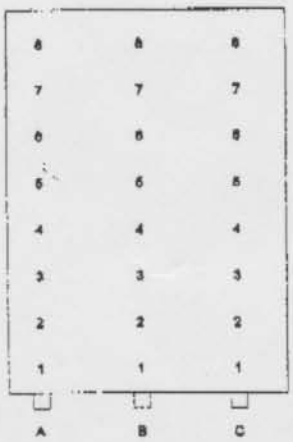


FIGURE 3-2

EPA Method 29 Traverse Point Locations



Traverse Point	From Inner Stack Wall	From Outside of Nipple
1	1.0	2.5
2	3.0	4.5
3	5.0	6.5
4	7.0	8.5
5	9.0	10.5
6	11.0	12.5
7	13.0	14.5
8	15.0	16.5

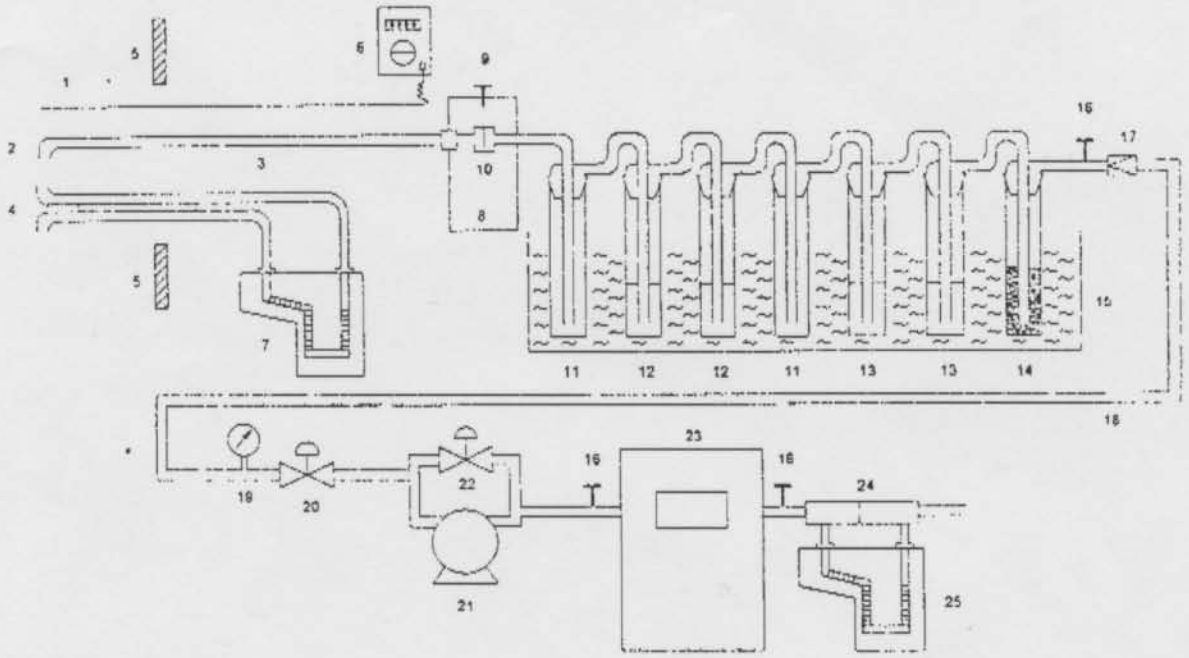
3.2 EPA Method 29: Determination of Metals Emissions from Stationary Sources

EPA Method 29 was used to collect samples for multiple metal determination. Multi-point isokinetic sampling was conducted at five minutes per traverse point for a total of 120 minutes. The sampling train consisted of a glass-lined, heat traced probe with a glass, button hook nozzle with an attached thermocouple and pitot tube assembly. Figure 3-3 shows the Method 29 sampling apparatus.

Five 500-ml impingers were connected in series with leak-free ground-glass joints. The first impinger was used as a moisture drop-out impinger due to the high moisture content of the stack gas. The second and third impingers each contained 100 ml of a 5% HNO_3/10% H_2O_2 absorbing solution. The fourth impinger was left empty and the fifth impinger contained a known amount of silica gel. The mercury absorbing impingers specified in Method 29 was left out as mercury was not requested. Also, the filter and glass filter holder were replaced with a filter bypass. All recovered fractions; probe rinse, moisture dropout, impinger contents, were combined for subsequent analysis. The collected sample was sent under chain-of-custody to West Coast Analytical, Santa Fe Springs, CA for predetermined target metal determination.

FIGURE 3-3

Multi Metals Sampling Apparatus



1.	Temperature Sensor	14.	Silica Gel
2.	Glass Probe Tip	15.	Ice Bath
3.	Glass Probe Liner	16.	Thermocouple
4.	S-Type Pitot Tube	17.	Check Valve
5.	Stack Wall	18.	Vacuum Line
6.	Temperature Sensor Meter	19.	Vacuum Gauge
7.	Pitot Tube Inclined Manometer	20.	Main Valve
8.	Heated Area	21.	Air Tight Pump
9.	Thermometer	22.	By-Pass Valve
10.	Glass Filter Holder	23.	Dry Gas Meter
11.	Empty Impinger (optional)	24.	Orifice
12.	5% HNO_3/10% H_2O_2	25.	Manometer
13.	4% $KMnO_4$/10% H_2SO_4 (eliminated)		

3.5 CARB Method 100: Instrumental Methods for Gaseous Emissions (NO_x, CO, THC, O_2, CO_2)

Oxides of nitrogen (NO_x), carbon monoxide (CO), total hydrocarbons (THC), oxygen (O_2), and carbon dioxide (CO_2) gas concentrations in the flue gas were measured using an extractive Continuous Emissions Monitoring System (CEMS) in Dames & Moore's Mobile Laboratory. One 2-hour test was conducted simultaneous with the Method 29 testing.

The Dames & Moore Continuous Monitoring System is comprised of four major subsystems. They are: (1) the sample acquisition and conditioning system, (2) the calibration gas system, (3) the analyzers, and (4) the data recording system. A schematic of the Dames & Moore CEM system is presented in Figure 3-4.

The sample acquisition and conditioning system extracts a representative sample from the stack, removes moisture and particulate material from the sample, and transports the sample to the analyzers. The sample acquisition system consists of a 7 micron stainless steel filter and a 3/8 inch 316 stainless steel probe. The probe is insulated and heated between 250-275 °F to avoid condensation. From the probe, the sample gas is transported through a heat-traced Teflon sample line maintained at 240-260 °F from the probe to the Universal Analyzer Thermoelectric Gas Sample Cooler Model 3080 via a Teflon-lined diaphragm pump. The outlet temperature of the thermoelectric sample cooler is fully automatic and maintains the dew-point of sample gas below 37 °F.

Sample gas flow is controlled by a series of flow-meter, valves, and regulators upstream of the instrument manifold. Excess sample is vented through a back-pressure regulator, maintaining a constant pressure of 6-7 psig and flow of 2 scfh to each analyzer rotameter. Instrument response is permanently recorded using an online data acquisition system. All fittings and sample line which may contact the sample gas are constructed of stainless steel and Teflon.

Following system performance checks, preliminary calibration error checks were performed on each analyzer by introducing zero and high span gases and recording the response. A system bias check was then performed to determine the effect of the sample lines, pump, and sample cooler on the measurements. This was done by comparing the calibrations through a 3-way valve at the probe outlet, to calibrations done using calibration gases (zero and upscale concentrations) introduced directly to the instruments. EPA Protocol 1 calibration gases in current certification were used for

all calibration purposes. Calibration gas certifications are included in Appendix D. Post test calibration and bias checks were performed upon completion of the test.

Specifications for the continuous monitors used in Dames & Moore's Mobile Lab are presented in Table 3-1.

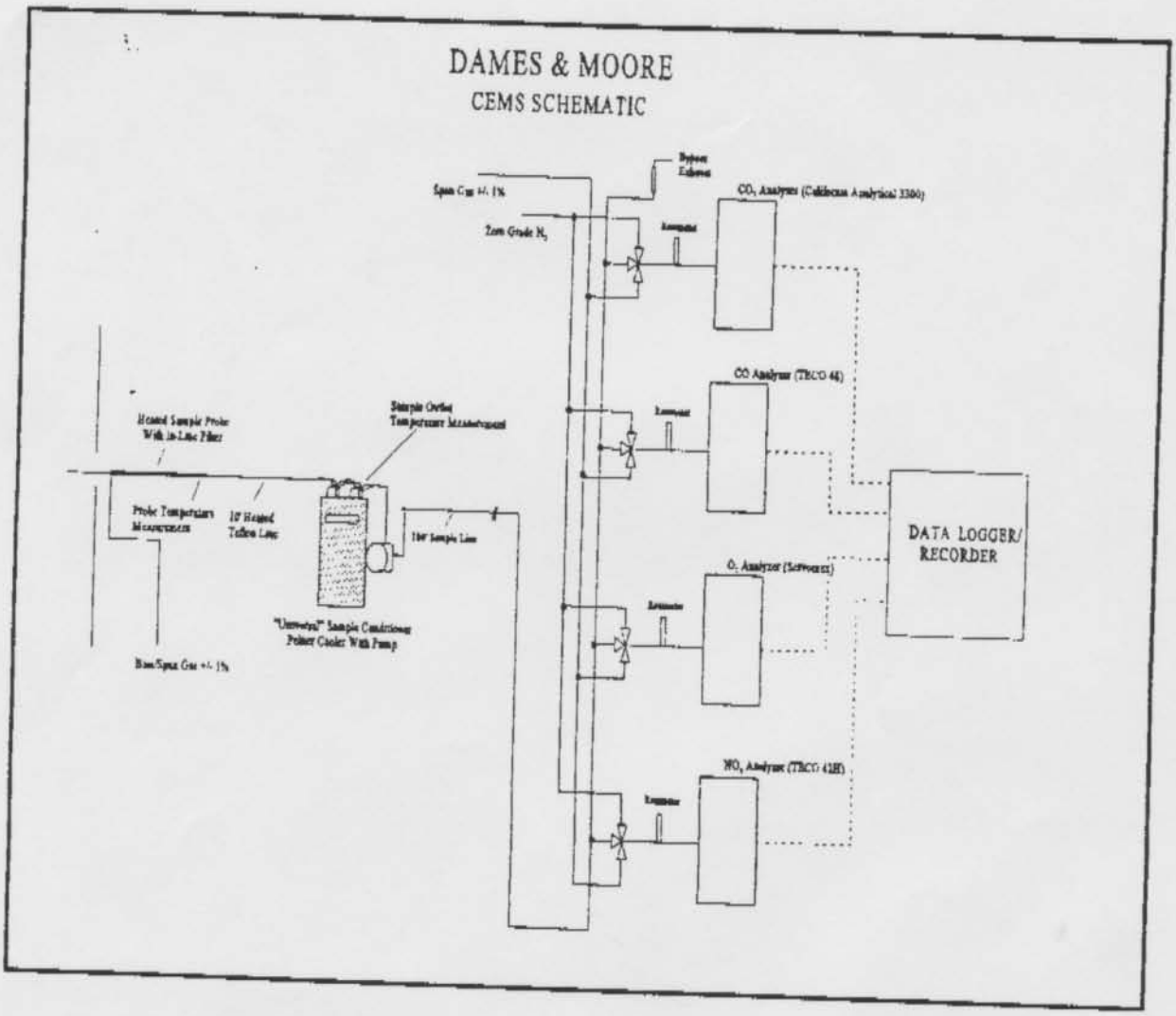
TABLE 3-1

Continuous Emissions Monitoring Instrumentation

Gas	Nitrogen Oxides (NO_x)	Carbon Monoxide (CO)	Oxygen O_2	Carbon Dioxide CO_2	Hydrocarbons THC
Instrument Manufacturer and Model Number	TECO 42H	TECO Model 48	Servomex Model 1400	California Analytical Model 3300	TECO 51
Detection Principle	Chemiluminescence Photo-Multiplier Tube	Gas filter Correlation Analyzer	Magneto-Dynamic Paramagnetic Analyzer	Nondisp. Infrared Absorption (NDIR)	Flame Ionization (FID)
Drift: Zero Span	50 ppb 24 hr <1 % full scal/24hr>	± 0.2 ppm ± 1 %full scale	<1 %full scale/24 hr <1 %full scale/24 hr	± 1 % full scale/ 24 hr ± 1% fullscale/24 hr	± 1 % full scal/ 24 hr
Output	0-10 V	0-10V	0-1V	0-1V	0-10 V
Ranges	0-10, 20, 50, 100, 200,500, 1000, 2000, 5000 ppm	0-1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 ppm	0-25 percent 0-10 percent	0-10 percent 0-20 percent	0 - 10,000 selectable
Response Time	30 sec	30 sec	30 sec	30 sec	5 sec

FIGURE 3-4

Dames & Moore CEMS Schematic



4.0 TEST RESULTS

All reference method (EPA Method 29) testing was conducted simultaneously with Sandia's multiple metal CEM testing. One 2-hour run was performed on each day of testing. At the end of each test day, Sandia supplied the Dames & Moore test crew with a printout of their CEM data collected during the 2-hour test run. This data as well as all Dames & Moore field data and calculations are included in the Appendices. On the third day of testing, March 4, the Sandia CEM Laser malfunctioned approximately 30-minutes into the run. Dames & Moore stopped sampling upon notification that the CEM was not operating. Approximately two hours later, Sandia informed Dames & Moore that the CEM would be inoperable for the remainder of the day. Dames & Moore proceeded with the Method 29 sampling in order to obtain a sufficient sample volume to achieve the project data quality objectives. The test results are summarized in Tables 4-1, 4-2 and 4-3.

TABLE 4-1

EPA Method 29 Metal Sampling and Stack Gas Data

Parameter	Units	Run-1	Run-2	Run-3
Test Date		03/10/97	03/12/97	03/04/97
Feed		Municipal Waste	Shredded Tires	Molybdenum Catalyst
Sampling Time	min	120.5	119	120
Sample Volume	ft^3	70.356	69.300	68.790
Static Pressure	in H_2O	-0.02	-.02	-.02
Isokinetics	%	98.3	100.5	100.5
Stack Temperature	°F	138	138	136
Moisture	%	18.4	17.3	17.2
Stack Gas Velocity	ft/sec	6.4	6.2	6.0
Stack Gas Flow Rate	ACFM DSCFM	897 648	863 633	846 622

TABLE 4-2

EPA Method 29 - Multiple Metal Emission Results

Test Date	Run-1 3/10/97		Run-2 3/12/97		Run-3 3/14/97	
Fuel	Municipal Waste		Shredded Tires		Spent Catalyst	
Emissions	mg/hr	ug/m^3	mg/hr	ug/m^3	mg/hr	ug/m^3
Aluminum (Al)	23.7	15.52	33.3	22.70	9.7	6.72
Antimony (Sb)	0.8	0.51	0.5	0.34	0.1	0.08
Arsenic (As)	< 1.1	1.42	< 1.1	1.46	< 1.1	1.48
Barium (Ba)	1.4	0.94	2.4	1.61	0.7	0.49
Beryllium (Be)	< 0.0	0.04	< 0.0	0.04	< 0.0	0.04
Cadmium (Cd)	2.1	1.38	2.4	1.64	0.8	0.57
Chromium (Cr)	4.4	2.90	2.8	1.94	1.5	1.02
Copper (Cu)	8.1	5.29	9.6	6.57	4.4	3.09
Lead (Pb)	16.0	10.52	5.4	3.66	2.2	1.51
Iron (Fe)	60.8	39.90	120.5	82.15	200.9	139.70
Manganese (Mn)	5.0	3.26	7.1	4.85	6.5	4.53
Molybdenum (Mo)	116.1	76.15	29.5	20.14	23.9	16.59
Nickel (Ni)	2.0	1.34	2.6	1.76	1.9	1.32
Phosphorus (P)	23.8	15.60	17.0	11.58	9.8	6.80
Selenium (Se)	< 0.5	0.71	< 0.5	0.73	< 0.5	0.74
Silver (Ag)	0.4	0.25	0.3	0.19	0.2	0.11
Thallium (Tl)	< 0.0	0.04	< 0.0	0.04	< 0.0	0.04
Zinc (Zn)	27.6	18.14	273.9	186.71	40.2	27.94

Note: Concentrations (ug/m^3) based on stack conditions (i.e. stack temperature and moisture content)

< denotes non-detects, emissions based on 1/2 the detection limit

TABLE 4-3

Additional Gaseous Emissions Data

CONSTITUENT	UNITS	CONCENTRATION	
		03/10/97	03/12/97
Oxygen, O_2	%	11.3	13.4
Carbon Dioxide, CO_2	%	5.8	4.6
Carbon Monoxide, CO	ppmvd	< 1	< 1
Oxides of Nitrogen, NO_x as NO_2	ppmvd	75.5	59.1
Total Hydrocarbons, THC as C_3	ppmvd	< 1	< 1

Note: No gaseous emissions testing was performed on March 14.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

5.1 Sampling Protocol

Dames & Moore is organized to facilitate sample management, analytical performance management, and data management. Personnel are assigned specific tasks to ensure implementation of the QA/QC program. The Senior Scientist in charge of air emission measurements reports directly to the Associate of the Air Quality Group and is the QA officer responsible for program effectiveness and compliance.

The sample custodian is responsible for the care, custody and control of all samples for analysis and for the accumulation and consolidation of the analytical results, including internal quality controls and approvals.

The analysts perform the analyses and initial data review. Each analyst must check and initial their work, making certain that it is complete, determining that any instrumentation has been properly calibrated, and ensuring that the analysis has been performed within the QA/QC limits. Completed work is placed in the job jacket and submitted for review.

The Senior Scientist evaluates the data submitted by the analyst by first assessing the validity of the analytical method chosen for the analysis. They then verifies that the data and documentation are complete, that each analysis has been performed within QA criteria specific to each method, check calculations, assembly and sign the data package and prepares the report.

5.1.2 Sample Management

5.1.2.1 Chain of Custody Definition

The highest quality analyses have no validity unless all aspects of sample collection, transport, receipt, analysis, and data compilation can be validated. The following procedures are employed to maintain "chain of custody" for samples received by Dames & Moore. Because of the nature of the data being collected, the possession of samples must be traceable from the time the samples are collected until final disposition. A sample is under custody if:

- It is in your actual possession, or

- It is in your view, after being in your possession, or
- It is locked in a secure area.

5.1.2.2 Sample Identification

Each sample shall have affixed a label containing the sample number and sample description to identify the contents of the container. Additionally, the sample number shall be marked on the outside of any special packaging container.

5.1.2.3 Sample Management: Sample Custody During Transport

To assure custody of samples during transport and shipping, each sample within a packing container is recorded on a chain of custody record. Each sample number is recorded along with the number of containers shipped. Chain of Custody record forms must always be signed and dated when samples change hands or are shipped to another location. Copies of the COC sheets are provided to sample delivery personnel if requested. The original custody sheet is then placed inside the package (protected from damage) and the package sealed. Sample containers, shipping boxes, coolers or other packages may be sealed by using custody seals. The seals must be placed so the container cannot be opened within breaking the seal.

5.2 Equipment Calibration and Maintenance

The Senior Field Technician and Field Technician are in charge of routine maintenance and calibrations of all source testing equipment. Most recent calibration information can be found in the Appendix.

5.2.1 Equipment Maintenance

All major pieces of equipment have maintenance logs where all maintenance activities are recorded and documented. Table 5-1 shows routine maintenance that is performed on source testing equipment.

TEST EQUIPMENT MAINTENANCE SCHEDULE

Equipment	Acceptance Limits	Frequency of Service	Methods of Service
Pump	1. Absence of leaks 2. Ability to draw manuf. Reg. Vacuum and flow	Every 500 hrs or operation or 6 months, whichever is less	1. Visual inspection
Flow Meter	1. Free mechanical movement 2. Absence of malfunction	Every 500 hrs. of operation or 5 mos whichever is less	1. Visual insp. 2. Clean 3. Calibrate
Sampling Instrument	1. Absence of malfunction 2. Proper response to aero, span gas	As recommended by manufacturer	As recommended by manufacturer
Mobile Van Sampling System	1. Absence of leaks	Depends on nature of use	1. Change filters 2. Change gas dryer 3. Leak check 4. Check for system contamination
Sampling Line	Sampling degradation after each test less than one percent of test series		Flush with solvent. Blow air through line until dry.

Table 5-1 Maintenance Schedule Information

5.2.2 Equipment Calibration

Current calibration information on equipment used during testing will be available for viewing during the source test. Examples of calibration current calibration information can be found in the appendix.

The S-Type pitot tubes are measured initially upon purchase and then semiannually. Visual measurements are taken prior to each use to insure accidental damage has not occurred. This check

is documented on the testing forms. Measurement is performed using a micrometer and compass.

Each temperature sensor is marked and identified. This is done by marking each thermocouple end connector with a number. This sensor is calibrated as a unit with the control box potentiometer and associated lead wire as an identified unit. Calibration are performed initially and annually at multiple three-points over the range of expected temperatures for that particular thermocouple. A non-multiple three-point check is performed bimonthly thereafter. As al alternative to the three baths, an Oyster Calibrator Thermometer may be used as a temperature reference source.

The field barometer is adjusted initially and semiannually to within 0.1 in Hg of the atmospheric pressure as reported by John Wayne Airport. There is no correction between John Wayne Airport and Dames & Moore.

The field dry gas test meter is calibrated before its initial use and semiannually thereafter. Its calibration is checked bimonthly. It is calibrated against a reference dry gas test meter.

The dry gas meter orifice is calibrated before its initial use and then annually. This calibration is performed during the calibration of the dry gas test meter. The unit is checked in the field after every series of tests using a field gas meter check procedure.

Probe nozzles are measured prior to use in the field using a micrometer.

Analytical balances are internally calibrated prior to use following the manufacturer's instructions. The balances are further checked using Class S-1 analytical weights prior to daily usage. Field top loading balances are also internally calibrated prior to use and checked with a field analytical weight prior to usage.

5.3 Instrument Calibration

The analytical range is selected so that the sample gas concentration for each run is between 10 and 95 percent of the range, for 95 percent of the test period. The run is considered invalid if the measured gas concentration exceeds the range during the test period. Data obtained below 10 percent of the range can be used only for qualitative purposes.

All continuous emission monitoring analyzers will be calibrated to meet the following specifications:

- Analyzer Calibration Error less than $\pm$ 2 percent of the range of the zero, mid-range, and high-range calibration gases.
- Sampling System Bias less than $\pm$ 5 percent of the range for the zero, and mid-or high range calibration gases.
- Zero Drift less than $\pm$ 3 percent of the range over the period of each run.
- Calibration Drift less than $\pm$ 3 percent of the range over the period of each run.
- Linearity less than $\pm$ 2.0 percent of the range for the pretest and post test values.

Bias calibration gases are introduced to the probe tip by flooding the probe with calibration gas during probe calibrations. Calibration and zero gases are introduced into the manifold through a valving system that shunts the sample flow to vent and allows calibration or zero gases into the sample manifold.

Calibration gases shall be certified to an analytical accuracy of $\pm$ 1 percent and be traceable to applicable NIST Standard Reference Materials (SRM's). Traceability shall include identification of applicable SRM and its cylinder number. Superblends may be used for simultaneous calibration of multiple analyzers. The average deviation of each component gas shall not exceed $\pm$ 1 percent of the tag value.

Operation of the continuous emission monitoring system is as follows:

- Cleaning of Sample Train as needed. Thoroughly flush the probe, heat-trace line, and sample conditioner with distilled water, followed by acetone. Dry with filtered dry air.

- Allow analyzers to warm up according to manufacturers instructions or until stable readings are obtained.

- Sampling System leak check.

- Calibrate instruments by Introducing zero and high range calibration gases directly to the instruments and make all necessary adjustments to calibrate the analyzer and the data recorder. Adjust system components to achieve individual analyzer sampling rates recommended by the instrument manufacturer.

- Conduct the analyzer calibration error check at the beginning and end of each test run by introducing calibration gases to the analyzers through the manifold system. The calibration error check should be considered invalid if the gas concentration displayed by the analyzer exceeds $\pm$ 2 percent of the range for any of the calibration gases. If an invalid calibration is exhibited, take corrective action and repeat the analyzer calibration error check until acceptable performance is achieved.

- Instrument Response Time is establish during semi-annual certification.

- Sampling System Bias Check is performed by flooding calibration gases into the sample probe. A zero gas and either the mid-range or high-range gas, whichever most closely approximates the effluent concentrations, is used. The sampling system bias check shall be considered invalid if the difference between the gas concentrations exhibited by the measurement system when a known concentration gas is introduced at the sampling probe tip and when the same gas is introduced directly to the analyzer, exceeds $\pm$ 5 percent of the analyzer range. If an invalid calibration is exhibited, take corrective action and repeat the sampling system bias check until acceptable performance is achieved.

- NO_2 to NO conversion efficiency conversion test is performed by introducing an NO_2 standard and measuring the NO_x concentration.

Switch the analyzer mode to NO and record the NO reading. The converter efficiency is the percent difference between the two readings.

- Zero and Calibration Drift Tests are performed immediately preceding and following each run. If either the zero or upscale calibration value exceeds the sampling system bias specification, then the run is considered invalid. Repeat both the analyzer calibration error check procedure and the sampling system bias check procedure before repeating the run.

- If both the zero and upscale calibration values are within the sampling system bias specification, then use the average of the initial and final bias check values to calculate the gas concentration for the run. If the zero or upscale calibration drift value exceeds the drift limits, based on the difference between the sampling system bias check responses immediately before and after the run, repeat both the analyzer calibration error check procedure and the sampling system bias check procedure before conducting additional runs.

5.4 Data Validation

The data presented on final reports are reviewed three times. First, the analyst reviews and certify that raw data complies to technical controls, documentation requirements, and standard group procedures. Second, the Senior Scientist reviews and certifies that data packages comply to specifications for sample holding conditions, chain of custody, data documentation, and the final report is free of transcription errors. Third, a QA review is performed by another senior personnel. This review thoroughly examines the entire completed data report. The report is signed off and sent out. All raw laboratory data and final reports are stored for 5 years.

APPENDIX A

FIELD DATA SHEETS

DAMES & MOORE
PRELIMINARY TRAVERSE

Company: BALBOA PACIFIC
Source: EXHAUST - BAL PAC
Date: 3.10.97
Test Number: Prelim.

Sampling Location: BAL-PAC EXHAUST
Static Pressure: -0.025
Barometric Pressure: 29.99
Engineer's Initials: C.S., T.W.

TRAVERSE POINT LOCALE	TRAVERSE POINT NUMBER	VELOCITY HEAD IN. H20	STACK TEMP DEG F.	SWIRL ANGLE DEG
1		0.03	135	
2		0.025	134	
3		0.025	135	
4		0.025	134	
5		0.02	134	
6		0.02	133	
7		0.015	135	
8		0.015	135	
9		0.015	135	
AVG:		0.02	135	

TRAVERSE POINT LOCALE	TRAVERSE POINT NUMBER	VELOCITY HEAD IN. H20	STACK TEMP DEG F.	SWIRL ANGLE DEG
AVG:				

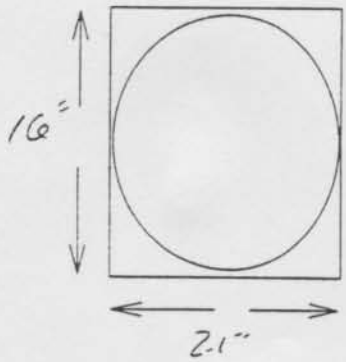
Equipment

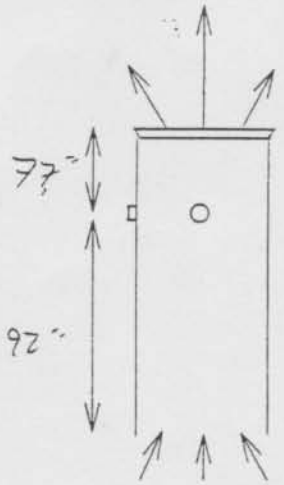
Pressure Gauge	1/4" MAGG
T/C Potentiometer	ATKINS
Pitot Tube	S'-PITOT-S
Pitot C.F.	0.84

Leak Checks

Pre ☑
Post ☑

Nipple Dimensions
Length: 1.5"
Diameter: 3"





8.5

$O_2 \sim 15\%$

$CO_2 \sim 3.5\%$

DAMES & MOORE
TRAVERSE SOURCE TEST DATA

Company: Balzca Pacific
Sampling Location: Bal Pac Exhaust
Test No. Multi-Metals - Run-1

Date: 3-10-97
Time Start: 1115
Time End: 1325

System Pre-Test Leak Check:
0.004 cfm @ 10 "Hg vac
(Pitot tube Leak Check: 0.0)

System Post-Test Leak Check
0.002 cfm @ 14 "Hg vac
(Pitot tube Leak Check: 0.0)

28.154
0.01525
139

Time On	Source Point #	Gas Meter Reading (scf)	Stack Velocity Head ("H_2O)	Stack Temp °F	dH Calculated dH	dH Set dH	Probe Temp °F	Hot Box Temp °F	Dryer Temp °F	Meter Temp °F in	Meter Temp °F out	Vacuum "Hg
0		111.861	—	—	—	—	—	—	—	—	—	—
5	1	—	.015	141	1.64	1.6	250	250	61	92	92	1
10	2	118.59	.013	140	1.42	1.4	250	251	60	94	91	1
15	3	121.85	.013	141	1.4	1.4	250	250	47	97	92	1
20	4	—	.015	138	1.65	1.7	250	250	45	88	93	1
25	5	—	.018	139	1.98	2.0	250	251	46	99	94	1
30	6	132.85	.017	140	1.87	1.9	249	250	49	101	95	1
35	7	136.4	.015	137	1.66	1.7	250	250	49	101	96	1
40	8	140.015	.016	139	1.77	1.8	250	250	49	101	97	1
		(28.154)	(.01525)	(139)	—	(1.69)	—	—	(51)	—	(96)	(1)
45	1	143.35	.013	137	1.44	1.4	250	255	58	101	98	1
50	2	146.45	.012	138	1.33	1.3	249	251	50	101	98	1
55	3	149.86	.014	140	1.55	1.6	250	250	52	102	99	1
60	4	153.22	.013	138	1.44	1.4	251	251	50	102	99	1
65	5	156.39	.011	139	1.22	1.2	249	250	55	102	99	1
70	6	159.14	.008	138	0.88	0.88	250	248	56	102	99	1
75	7	161.8	.008	137	.88	0.9	257	250	57	102	100	1
80	8	164.890	.009	138	1.0	1.0	250	249	58	102	100	1
		(52.63)	(.011)	(138)	—	(1.21)	—	—	(55)	—	(100)	(1)
85	1	—	.005	138	.55	.55	249	251	61	101	99	1
90	2	169.05	.007	136	.78	.78	250	253	67	101	99	1
95	3	171.61	.008	137	.88	0.89	250	247	67	101	99	1
100	4	—	.007	139	.78	.78	250	250	67	101	99	1
105	5	176.75	.007	137	.78	.78	249	251	57	101	99	1
110	6	179.47	.008	138	.88	.88	249	249	53	102	99	1
115	7	182.25	.008	139	.88	.88	250	250	54	102	99	1
120.5	8	185.339	.009	139	1.0	1.0	257	249	54	102	99	1
AVERAGES		73.478	.01121	138	—	1.24	—	—	55	—	~~100~~ 99	1

.011
138

PRE-TEST DATA

Nozzle Diameter: 0.626
Barometric Pressure: 29.99 "Hg
Static Pressure in Stack: -.025 "H2O
Pitot Factor: .84
Est. Moisture: ~~22%~~ 20%, sat'd @ 140°F
Est. MW_s: ~~28~~ 26

CHAIN OF CUSTODY INFO

Impingers Loaded By [signature]
Impingers Recovered By [signature]
Filter Loaded By NA
Filter No.
Filter Recovered By ↓
Probe Wash By CE, JW.

EQUIPMENT/CALIBRATION DATA

Pitot Tube No.: PT-003-1 (Cal:)
Potentiometer No.: MSB-2 (Cal: 3-4-97)
Thermocouple No.: UMB-75-03 (Cal: 3-4-97)
Gas Meter No: 2962369 (Cal: 3-4-97)
Meter Corr. Factor: 1.0083
Delta H @: 1.84263

18
28
36

64

27.4

	Soln.	Final	Initial	Net
Impinger #1	Dry	770.7	555.6	215.1
Impinger #2	Dry	626.2	553.0	73.2
Impinger #3	100ml HNO_3/H_2O_2	699.0	668.3	30.7
Impinger #4	" "	782.5	778.4	4.1
Impinger #5	dry	574.0	573.4	0.6
Impinger #6	Silica	856.9	845.6	11.3g

323.7g

Total Wt Gain: 335.0g

POST TEST INFO

Filter Appearance NA
Impinger Appearance Clear/colorless
Silica Gel Spent (%) 30%

Recorded by: [signature] Date: 3-10-97
Checked by: [signature] Date: 4/8/97

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NOTE: VELOCITY HEAD MEASURED WITH EXTENDED

DAMES & MOORE
TRAVERSE SOURCE TEST DATA

Company: Balboa Pacific
Sampling Location: Bal-Pac Exhaust
Test No. SO_2 Run-1

Date: 3-10-97
Time Start: 1115
Time End: 1317

System Pre-Test Leak Check:
0.00 ~~cfm~~ lpm @ —— "Hg vac
(Pitot tube Leak Check:)

System Post-Test Leak Check
0.00 cfm @ —— "Hg vac
(Pitot tube Leak Check: ——)

Time On	Source Point #	Gas Meter Reading ~~(scf)~~ M^3	Stack Velocity Head ("H_2O)	Stack Temp °F	dH Calculated dH	dH Set dH	Probe Temp °F	Hot Box Temp °F	Dryer ~~Temp °F~~ Rotameter	Meter Temp °F in	Meter Temp °F out	Vacuum "Hg
1115	t	0.47215	—	—	—	—	—	—	1.5	83	—	—
1130		0.48620	—	—	—	—	—	—	1.5	86	—	—
1136		0.4948	—	—	—	—	—	—	1.5	89	—	—
1149		0.5070	—	—	—	—	—	—	1.5	93	—	—
1212		0.5298	—	—	—	—	—	—	1.5	96	—	—
1223		0.5396	—	—	—	—	—	—	1.5	96	—	—
1247		0.5630	—	—	—	—	—	—	1.6	97	—	—
1311		.5858	—	—	—	—	—	—	1.6	99	—	—
1317		.59315	—	—	—	—	—	—	1.6	98	—	—
AVERAGES		0.1210 M^3 (121 liters)	—	—	—	—	—	—	1.5	93	—	—

PRE-TEST DATA

Nozzle Diameter: NA
Barometric Pressure: ____ "Hg
Static Pressure in Stack: ____ "H2O
Pitot Factor: ____
Est. Moisture: ____
Est. MW_s: ____

CHAIN OF CUSTODY INFO

Impingers Loaded By: L.B.
Impingers Recovered By: L.B.
Filter Loaded By: NA
Filter No.
Filter Recovered By
Probe Wash By

EQUIPMENT/CALIBRATION DATA

Pitot Tube No.: NA (Cal: ——)
Potentiometer No.: ATKINS (Cal: ——)
Thermocouple No.: NA (Cal: ——)
Gas Meter No: 1031635 (Cal: 3-6-97)
Meter Corr. Factor: CM2583573
Delta H @: NA

	Soln.	Final	Initial	Net
Impinger #1	80% IPA	NA	NA	NA
Impinger #2	3% H_2O_2	↓	↓	↓
Impinger #3	3% H_2O_2	↓	↓	↓
Impinger #4	Silica	↓	↓	↓
Impinger #5				
Impinger #6				

Total Wt Gain: ____

POST TEST INFO

Filter Appearance: NA
Impinger Appearance: clear/colorless
Silica Gel Spent (%): 20

Recorded by: [signature] Date: 3-10-97
Checked by: [signature] Date: 4/8/97

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File	Time	Species	Line	Freq.	(µg/acm)
Macintosh HD:L:	3/10/97 9:43	He	388.86	100.00	94.8
Macintosh HD:L:	3/10/97 9:44	He	388.86	100.00	93.6
Macintosh HD:L:	3/10/97 10:29	Fe	259.90	2.20	16.3
Macintosh HD:L:	3/10/97 11:19	Fe	259.90	1.17	7.5
Macintosh HD:L:	3/10/97 11:21	Fe	238.20	2.00	24.5
Macintosh HD:L:	3/10/97 11:25	Fe	259.90	2.00	7.0
Macintosh HD:L:	3/10/97 11:32	Mn	257.60	0.10	0.2
Macintosh HD:L:	3/10/97 11:38	Mn	257.60	1.50	3.9
Macintosh HD:L:	3/10/97 11:42	Mn	257.60	0.90	1.9
Macintosh HD:L:	3/10/97 11:47	Fe	238.20	2.80	21.7
Macintosh HD:L:	3/10/97 11:52	Fe	238.20	2.00	30.1
Macintosh HD:L:	3/10/97 11:58	Fe	238.20	3.70	33.8
Macintosh HD:L:	3/10/97 12:03	Fe	238.20	2.10	20.3
Macintosh HD:L:	3/10/97 12:09	Ni	243.80	1.42	9.5
Macintosh HD:L:	3/10/97 12:14	Ni	243.80	1.50	-5.4
Macintosh HD:L:	3/10/97 12:19	Mn	257.60	1.10	2.9
Macintosh HD:L:	3/10/97 12:23	Mn	257.60	2.00	4.1
Macintosh HD:L:	3/10/97 12:27	Fe	238.20	1.86	7.6
Macintosh HD:L:	3/10/97 12:32	Cr	283.56	1.88	1.6
Macintosh HD:L:	3/10/97 12:37	Cr	283.56	1.82	2.1
Macintosh HD:L:	3/10/97 12:41	Fe	238.20	2.62	15.5
Macintosh HD:L:	3/10/97 12:45	Fe	238.20	3.88	29.7
Macintosh HD:L:	3/10/97 12:49	Mn	257.60	1.80	3.7
Macintosh HD:L:	3/10/97 12:53	Mn	257.60	2.80	6.6
Macintosh HD:L:	3/10/97 12:57	Fe	238.20	3.25	39.1
Macintosh HD:L:	3/10/97 13:03	Cr	283.56	1.88	1.9
Macintosh HD:L:	3/10/97 13:07	Cr	283.56	2.70	3.1
Macintosh HD:L:	3/10/97 13:11	Cr	283.56	1.20	2.6
Macintosh HD:L:	3/10/97 13:17	Fe	238.20	1.71	30.2
Macintosh HD:L:	3/10/97 13:20	Fe	238.20	1.57	33.5
Macintosh HD:L:	3/10/97 13:24	Mn	257.60	0.40	1.6

D. Ake 3/10/97 1:33pm

DAMES & MOORE

TRAVERSE SOURCE TEST DATA

Company: BALBOA
Sampling Location: BAL PAC EXHAUST
Test No. 2 - Multi Metals (Tires)

Date: 3-12-97
Time Start: 0930
Time End: 1[illegible]

System Pre-Test Leak Check:
0.002 cfm @ 14 "Hg vac
(Pitot tube Leak Check: 0.0)

System Post-Test Leak Check
0.000 cfm @ 8 "Hg vac
(Pitot tube Leak Check: 0.0)

Time On	Source Point #	Gas Meter Reading (scf)	Stack Velocity Head ("H_2O)	Stack Temp °F	dH Calculated dH	dH Set dH	Probe Temp °F	Hot Box Temp °F	Dryer Temp °F	Meter Temp °F in	Meter Temp °F out	Vacuum "Hg
0		185.639	—	—	—	—	—	—	—	—	—	—
5	1	189.10	.016	138	1.72	1.7	247	251	55	72	69	1
10	2	192.55	.016	132	1.7	1.7	251	251	52	77	70	1
15	3	196.30	.018	138	1.91	1.9	250	251	50	78	71	1
20	4	199.70	.014	135	1.49	1.5	249	249	51	79	72	1
25	5	203.40	.017	139	1.80	1.8	250	250	53	80	73	1
30	6	207.07	.017	140	1.8	1.8	252	250	54	81	74	1
35	7	210.20	.013	136	1.3	1.3	251	249	54	82	79	1
40	8	213.615	.015	139	~~1.51~~ 1.6	~~1.51~~ 1.6	250	249	56	82	75	1
		(27.976)	(.016)	(138)	(1.7)	(1.7)	—	—	(53)	—	(76)	(1)
45	1	216.21	.008	134	.88	.88	250	250	59	81	77	1
50	2	219.17	.010	136	1.2	1.2	248	249	57	82	78	1
55	3	222.20	.011	140	1.22	1.2	252	250	57	83	78	1
60	4	224.92	.008	137	.88	.88	253	252	57	83	78	1
65	5	227.10	.008	139	.88	.9	248	250	56	84	79	1
70	6	230.23	.008	137	.88	.9	250	250	55	85	80	1
75	7	233.03	.009	140	1.01	1.0	248	250	56	85	80	1
80	8	235.844	0.010	143	1.124	1.0	250	250	56	85	81	1
			(0.009)	(138)	—	(1.01)	—	—	~~56~~ (57)	—	(81)	(1)
85	1	238.49	0.008	137	0.899	0.90	251	251	59	85	82	1
90	2	241.2	0.008	137	0.899	0.90	249	252	58	85	83	1
95	3	243.85	.008	138	.9	.9	250	250	56	85	83	1
100	4	246.70	.008	140	.9	.9	251	250	57	86	83	1
105	5	249.35	.007	135	.85	.85	251	249	52	86	84	1
110	6	251.7	.005	139	.56	.56	251	250	58	86	84	1
115	7	253.8	.005	140	.56	.56	247	250	59	87	84	1
119	8	255.604	.005	140	.56	.56	250	252	54	87	84	1
AVERAGES		69.965	.0106	138	—	1.16	—	—	58	—	81	1

PRE-TEST DATA
Nozzle Diameter: 0.626
Barometric Pressure: 30.03 "Hg
Static Pressure in Stack: -.02 "H2O
Pitot Factor: .84
Est. Moisture: 18
Est. MW: 26

[illegible] 0.1066

CHAIN OF CUSTODY INFO
Impingers Loaded By JRW
Impingers Recovered By
Filter Loaded By N/A
Filter No.
Filter Recovered By
Probe Wash By [illegible], JW

EQUIPMENT/CALIBRATION DATA
Pitot Tube No.: PT-003-1 (Cal:)
Potentiometer No.: MSB-2 (Cal: 3-4-97)
Thermocouple No.: [illegible] (Cal: 3-4-97)
Gas Meter No: 2962389 (Cal: 3-4-97)
Meter Corr. Factor: 1.0083
Delta H @: 1.84263

	Soln.	Final	Initial	Net
Impinger #1	DRY	749.8	-570.7	= 179.1
Impinger #2	DRY	[illegible]	-534.0	= 72.0
Impinger #3	5% HNO_3/10% H_2O_2	[illegible]	-691.2	= [illegible]
Impinger #4	" "	[illegible]	-778.5	= 8.2
Impinger #5	DRY	[illegible]	-625.1	= 2.1
Impinger #6	SILICA	[illegible]	-856.7	= [illegible]
Total Wt Gain:				302.3

(292.7)

POST TEST INFO
Filter Appearance: N/A
Impinger Appearance
Silica Gel Spent (%)

Recorded by: [signature] Date: 3-12-97
Checked by: [signature] Date: 4/8/97

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Y = 112.40

Note: [illegible] Readings [illegible] [illegible] [illegible] manometer

DAMES & MOORE
TRAVERSE SOURCE TEST DATA

Company: BALBOA
Sampling Location: BAL-PAC Exh
Test No. 7-SO_2 (TIRES)

Date: 3.12.97
Time Start: 0932
Time End: 1127

System Pre-Test Leak Check:
0.004 cfm @ — "Hg vac
(Pitot tube Leak Check: —)

System Post-Test Leak Check
0.002 cfm @ — "Hg vac
(Pitot tube Leak Check: —)

Time On	Source Point #	Gas Meter Reading (scf)	Stack Velocity Head ("H_2O)	Stack Temp °F	dH Calculated dH	dH Set dH	Probe Temp °F	Hot Box Temp °F	~~Dryer Temp °F~~ x ccf/m Rotameter	Meter Temp °F in	Meter Temp °F out	Vacuum "Hg
932	¢	0.61642	—	—	—	—	—	—	10	68	—	—
942		0.6255	—	—	—	—	—	—	11	71	—	—
956		0.6380	—	—	—	—	—	—	11	76	—	—
1020		0.6598	—	—	—	—	—	—	11	80	—	—
1033		0.6718	—	—	—	—	—	—	11	82	—	—
1052		0.6890	—	—	—	—	—	—	11	84	—	—
1118		0.7124	—	—	—	—	—	—	11	84	—	—
1127		0.72000	—	—	—	—	—	—	11	84	—	—
AVERAGES		0.10358 ft³ = 103.58 L	—	—	—	—	—	—	11	79	—	—

PRE-TEST DATA
Nozzle Diameter: NA
Barometric Pressure: 30.03 "Hg
Static Pressure in Stack: -.02 "H2O
Pitot Factor: NA
Est. Moisture: NA
Est. MW: NA

CHAIN OF CUSTODY INFO
Impingers Loaded By JRW
Impingers Recovered By JRW
Filter Loaded By NA
Filter No. ↓
Filter Recovered By ↓
Probe Wash By JRW

EQUIPMENT/CALIBRATION DATA
Pitot Tube No.: NA (Cal: —)
Potentiometer No.: ↓ (Cal: —)
Thermocouple No.: ↓ (Cal: —)
Gas Meter No: LMZ5B35B (Cal: 3.6.92)
Meter Corr. Factor: 1.03163
Delta H @: NA

	Soln.	Final	Initial	Net
Impinger #1	80% IPA	NA	NA	NA
Impinger #2	3% H_2O_2	↓	↓	↓
Impinger #3	3% H_2O_2	↓	↓	↓
Impinger #4	Silica	↓	↓	↓
Impinger #5				
Impinger #6				

Total Wt Gain:

POST TEST INFO
Filter Appearance NA
Impinger Appearance clear/colorless - no partic.
Silica Gel Spent (%)

Recorded by: C. Bazzy Date: 3.12.97
Checked by: [signature] Date: 4/8/97

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file	time	species	line	freq	(μg/acm)
Macintosh HD:L:	3/12/97 8:53	He	388.86	100	102.1
Macintosh HD:L:	3/12/97 8:54	He	388.86	95	97.1
Macintosh HD:L:	3/12/97 9:26	Fe	238.2	5.4	25.8
Macintosh HD:L:	3/12/97 9:35	Fe	238.2	3.2	19.5
Macintosh HD:L:	3/12/97 9:42	Fe	238.2	5.87	46.9
Macintosh HD:L:	3/12/97 9:47	Mn	257.6	1.6	6.2
Macintosh HD:L:	3/12/97 9:52	Mn	257.6	1.8	8.9
Macintosh HD:L:	3/12/97 9:56	Fe	238.2	6.27	65.7
Macintosh HD:L:	3/12/97 10:00	Fe	238.2	4.4	30.4
Macintosh HD:L:	3/12/97 10:05	Mn	257.6	1.4	4.5
Macintosh HD:L:	3/12/97 10:09	Mn	257.6	2.1	6.4
Macintosh HD:L:	3/12/97 10:15	Mn	257.6	2.7	8.6
Macintosh HD:L:	3/12/97 10:21	Fe	259.9	5	21.9
Macintosh HD:L:	3/12/97 10:25	Ni	243.8	8.62	9.9
Macintosh HD:L:	3/12/97 10:30	Ni	243.8	13.8	-13.2
Macintosh HD:L:	3/12/97 10:35	Fe	238.2	5.62	66.3
Macintosh HD:L:	3/12/97 10:39	Fe	238.2	6.38	51.8
Macintosh HD:L:	3/12/97 10:43	Fe	238.2	4	68.8
Macintosh HD:L:	3/12/97 10:48	Mn	257.6	2	6.4
Macintosh HD:L:	3/12/97 10:52	Mn	257.6	3.2	11.8
Macintosh HD:L:	3/12/97 10:58	Mn	257.6	3.1	8.1
Macintosh HD:L:	3/12/97 11:02	Fe	238.2	6.87	76.4
Macintosh HD:L:	3/12/97 11:05	Fe	238.2	5.38	46.7
Macintosh HD:L:	3/12/97 11:11	Cr	283.56	3.3	1.6
Macintosh HD:L:	3/12/97 11:15	Cr	283.56	2.5	2.1
Macintosh HD:L:	3/12/97 11:20	Cr	283.56	2.42	0.8
Macintosh HD:L:	3/12/97 11:26	Mn	257.6	4.2	16.2
Macintosh HD:L:	3/12/97 11:29	Mn	257.6	4.4	15.6
Macintosh HD:L:	3/12/97 11:33	Fe	238.2	5.6	49
Macintosh HD:L:	3/12/97 11:36	Fe	238.2	6.71	64.1

LCA 3/12/97 12pm

DAMES & MOORE
TRAVERSE SOURCE TEST DATA

Company: BALBOA
Sampling Location: BAL-PAC Exh.
Test No. Run-3 [illegible]

Date: 3.14.97
Time Start: [illegible]
Time End: [illegible]

System Pre-Test Leak Check:
.001 cfm @ 10 "Hg vac
(Pitot tube Leak Check: [illegible])

System Post-Test Leak Check
_____ cfm @ _____ "Hg vac
(Pitot tube Leak Check: _____)

Time On	Source Point #	Gas Meter Reading (scf)	Stack Velocity Head ("H_2O)	Stack Temp °F	dH Calculated dH	dH Set dH	Probe Temp °F	Hot Box Temp °F	Dryer Temp °F	Meter Temp °F in	Meter Temp °F out	Vacuum "Hg
0		[illegible]	—	—	—	—	—	—	—			
5	1	347.0	.015	133	1.66	1.7	250	250	43	73	70	1
10	2	—	.012	130	1.32	1.3	252	252	50	[illegible]	71	1
15	3	348.33	.012	135	1.32	1.2	249	250	41	79	71	1
20	4	351.85	.016	137	1.77	1.8	245	252	41	80	72	1
25	5	355.5	.020	140	2.72	2.2	[illegible]	249	41	81	73	1
30	6	359.4	.012	135	1.40	1.0	237	250	41	82	74	1
35	7	36[illegible]	.020	135	2.22	2.2	250	248	44	84	76	1
40	8	36[illegible]	[illegible]	135	2.12	[illegible]	251	251	44	85	77	1
		[illegible]	[illegible]	132		1.8	—	—	42	—	76	1
[illegible]	1	[illegible]	[illegible]	136	0.90	0.9	249	252	52	[illegible]	85	1
[illegible]	2	[illegible]	.008	135	[illegible]	[illegible]	249	252	43	87	85	1
[illegible]	3	376.1	.01	139	1.1	1.1	250	[illegible]	42	88	85	1
[illegible]	4	—	[illegible]	133	0.9	0.9	252	249	42	90	85	1
[illegible]	5	[illegible]	[illegible]	135	[illegible]	[illegible]	[illegible]	[illegible]	43	[illegible]	[illegible]	1
[illegible]	[illegible]	[illegible]	[illegible]	13[illegible]			[illegible]	[illegible]	45	[illegible]	[illegible]	1
[illegible]	7	[illegible]	[illegible]	135	[illegible]	[illegible]	252	253	45	[illegible]	[illegible]	1
[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	249	249	42	[illegible]	[illegible]	1
		[illegible]	[illegible]	136	—	[illegible]	—	—	45	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	.005	133	.57	.52	249	249	49	88	[illegible]	1
[illegible]	2	[illegible]	[illegible]	135	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1
[illegible]	3	[illegible]	[illegible]	[illegible]	.65	[illegible]	[illegible]	[illegible]	47	[illegible]	[illegible]	1
[illegible]	4	—	[illegible]	135	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1
[illegible]	5	—	.006	13[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	49	[illegible]	[illegible]	1
[illegible]	[illegible]	4[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1
—	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1
AVERAGES		[illegible]	.010[illegible]	13[illegible]	—	[illegible]	—	—	44	—	[illegible]	1

PRE-TEST DATA
Nozzle Diameter: [illegible]
Barometric Pressure: [illegible] "Hg
Static Pressure in Stack: -.01[illegible] "H2O
Pitot Factor: [illegible]
Est. Moisture: [illegible]
Est. MW: [illegible]

CHAIN OF CUSTODY INFO
Impingers Loaded By [illegible]
Impingers Recovered By [illegible]
Filter Loaded By [illegible]
Filter No. _____
Filter Recovered By [illegible]
Probe Wash By [illegible]

EQUIPMENT/CALIBRATION DATA
Pitot Tube No.: [illegible] (Cal: _____)
Potentiometer No.: [illegible] (Cal: [illegible])
Thermocouple No.: [illegible] (Cal: [illegible])
Gas Meter No: [illegible] (Cal: [illegible])
Meter Corr. Factor: [illegible]
Delta H @: [illegible]

	Soln.	Final	Initial	Net
Impinger #1		845.5	717.4	178.2
Impinger #2		874.7	662.[illegible]	107.3 287
Impinger #3		631.9	630.4	1.5
Impinger #4		754.1	738.9	15.2
Impinger #5				
Impinger #6				
Total Wt Gain:		[illegible]	[illegible]	30[illegible]

POST TEST INFO
Filter Appearance [illegible]
Impinger Appearance [illegible]
Silica Gel Spent (%) 30%

Recorded by: [illegible] Date: 3/14/97
Checked by: [illegible] Date: 11/6/97

d:\forms\FORMS.XLS

Note: Velocity head measured w/ extended range inclinometer.

file	time	species	line	freq	(µg/acm)
Macintosh HD:L:	3/14/97 9:11	He	388.9	100.00	99.3
Macintosh HD:L:	3/14/97 9:13	He	388.9	98.50	97.5
Macintosh HD:L:	3/14/97 10:05	Fe	238.2	7.10	97.6
Macintosh HD:L:	3/14/97 10:08	Fe	238.2	8.43	84.9
Macintosh HD:L:	3/14/97 10:12	Mn	257.6	1.80	7.1
Macintosh HD:L:	3/14/97 10:16	Mn	257.6	1.70	5.5
Macintosh HD:L:	3/14/97 10:21	Ni	243.8	8.20	-4.3
Macintosh HD:L:	3/14/97 10:26	Ni	243.8	8.30	4.0
Macintosh HD:L:	3/14/97 10:31	Mn	257.6	1.70	7.6
Macintosh HD:L:	3/14/97 10:36	Mn	257.6	1.90	7.8

J. Ahr 3-14-97

10m

DAMES & MOORE
CEMS FIELD DATA

Client: Balboa Pacific
Location: Santa Fe Springs
Source: INCINERATOR

Date: 3-10-97
Engineers: BJS

		ANALYZERS					
		NOx	CO	O2	CO2	THC	
PRE-TEST INFORMATION							
INSTR	TECO 48-52479-291		0-100 PPM				
	TECO 42H-52914-294	0-100PPM					
	CAI 8300 N3124807				0-10%		
	SERVOMEX 1400 01420B/655			0-25%			
	TECO 51HT 5516G-302					0-25PPM	
GASSES	SA9772 10-2098			20.95	9.02		
	SA 7849 3/99					20.1 PPM	
	AAL7946 4-11-98		89.8				
	SA 7550 11-2198	90.5					
CALIBRATION INFORMATION							
	Span	90.5	89.8	20.95	9.02	20.1	
	High Mid						
	Low Mid						
TEST DATA							
LOCAL CAL "0"	LOG 0	.2	.4	.01	.01	0	
SPAN	"	90.4	89.4	20.91	9.07	20.0	
BIAS "0"	LOG 2	.3	.7	.02	.1	.5	
SPAN	"	88.7	88.9	20.81	9.04	19.8	
RUN 1 1114/1316	LOG 1						
BIAS "0"	LOG 3	.3	.4	.02	.4	.6	
SPAN	"	85.5	87.8	20.7	~~8.7~~ 9.5	20.7	
LOCAL "0"	"	.2	.2	0	.4		
SPAN		86.5	88.3	20.8	9.5		

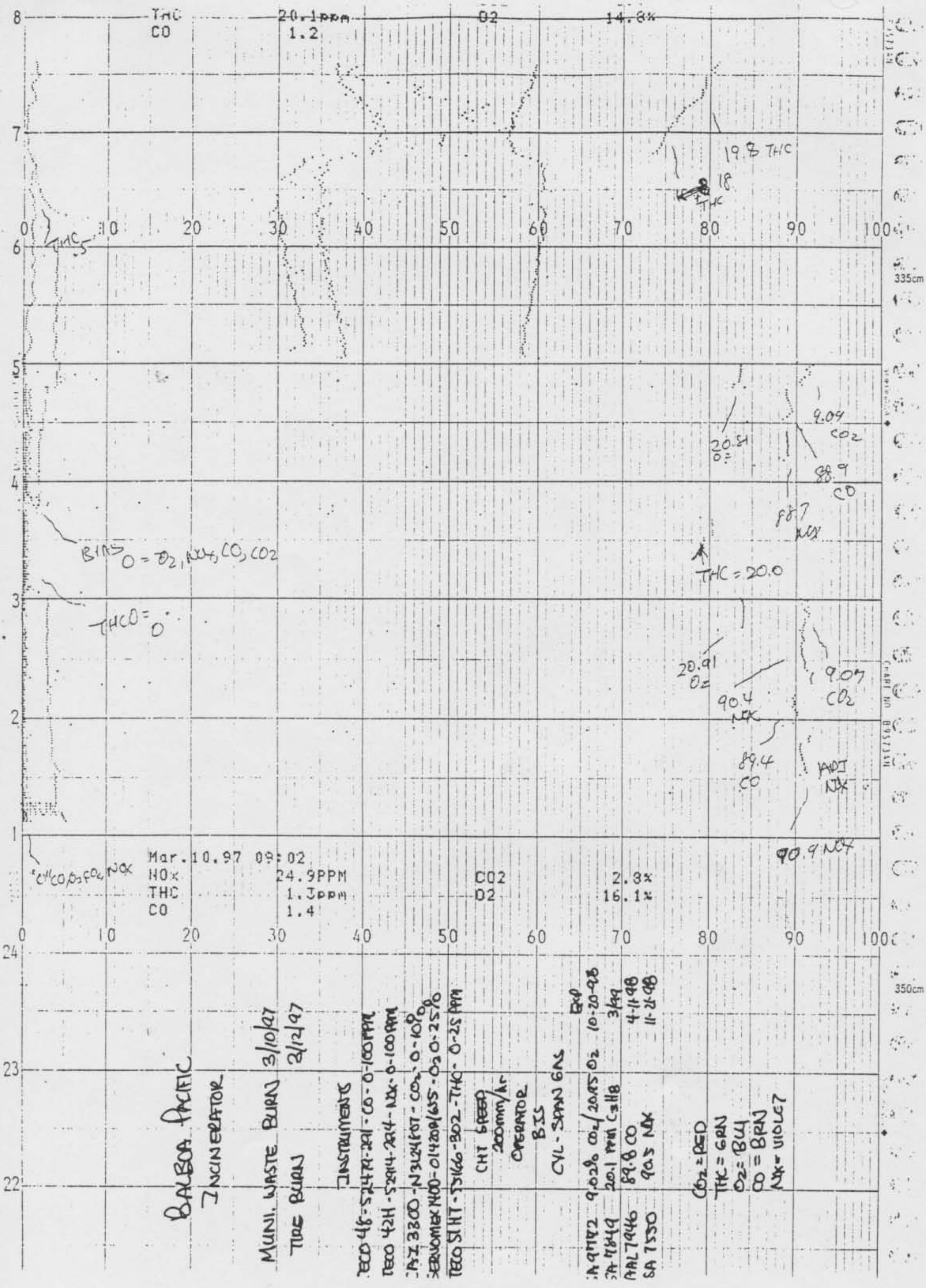
DAMES & MOORE
CEMS FIELD DATA

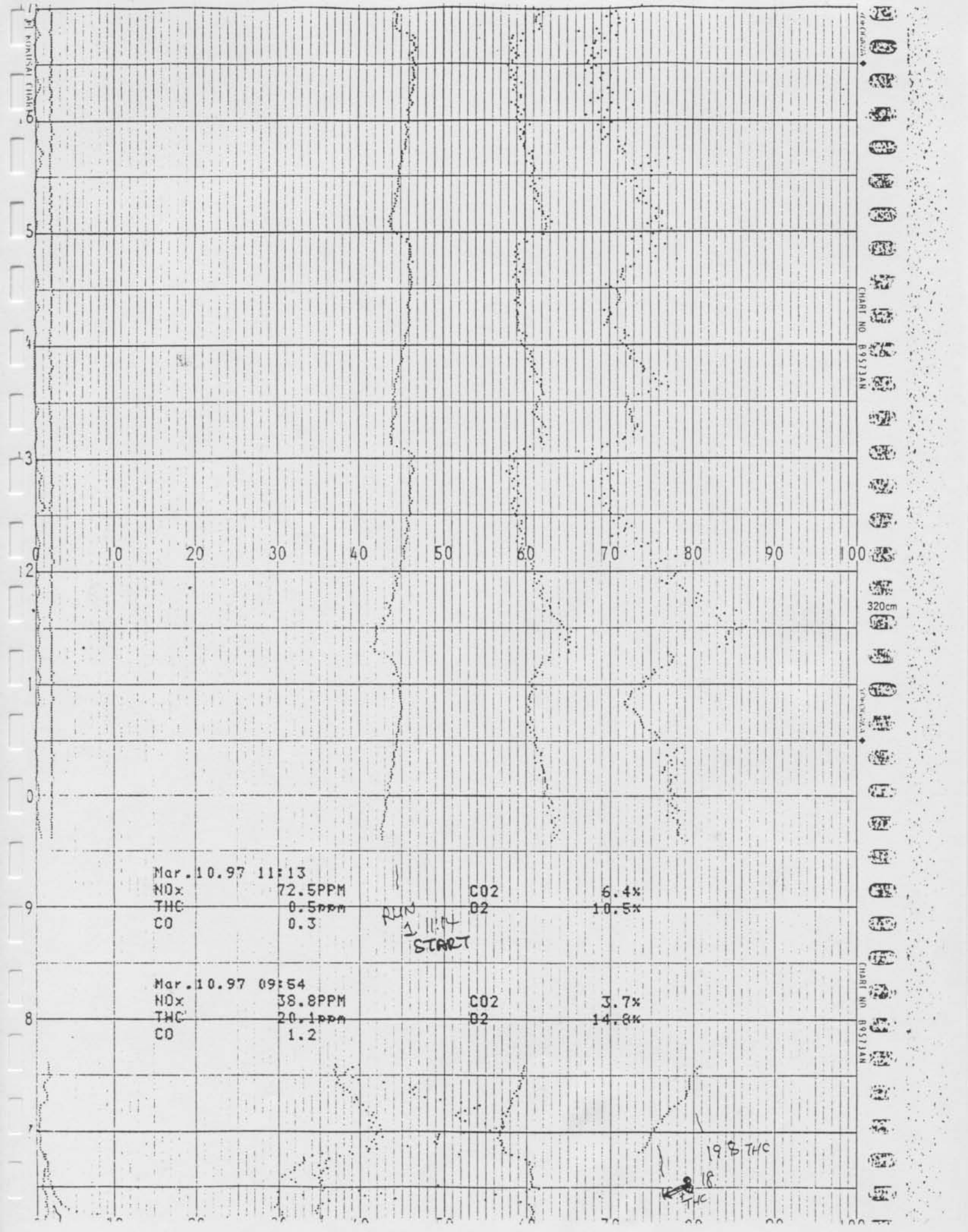
Client: Balboa Pacific
Location: Santa Fe Springs
Source: INCINERATOR

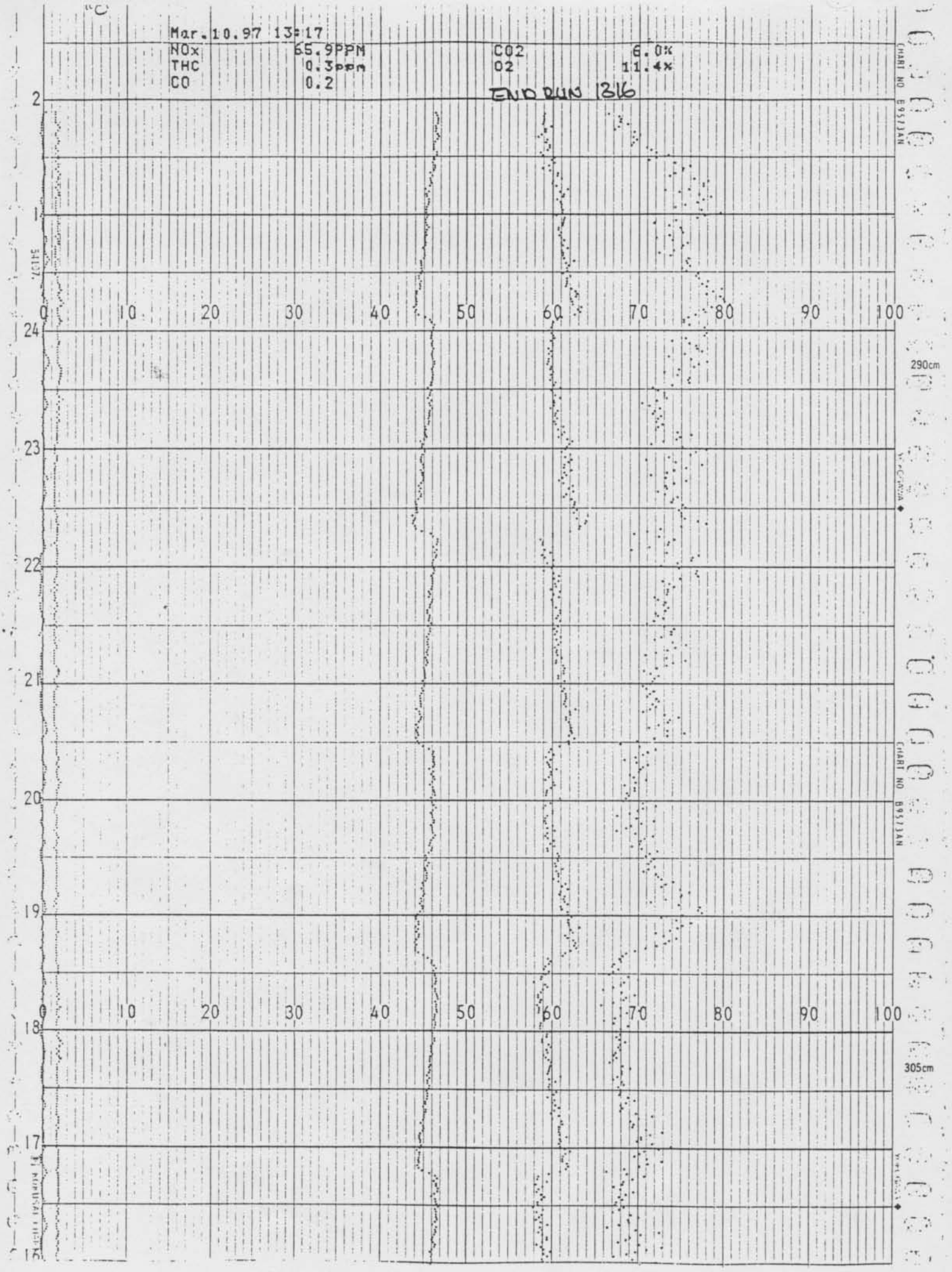
Date: 3-12-97
Engineers: BJS

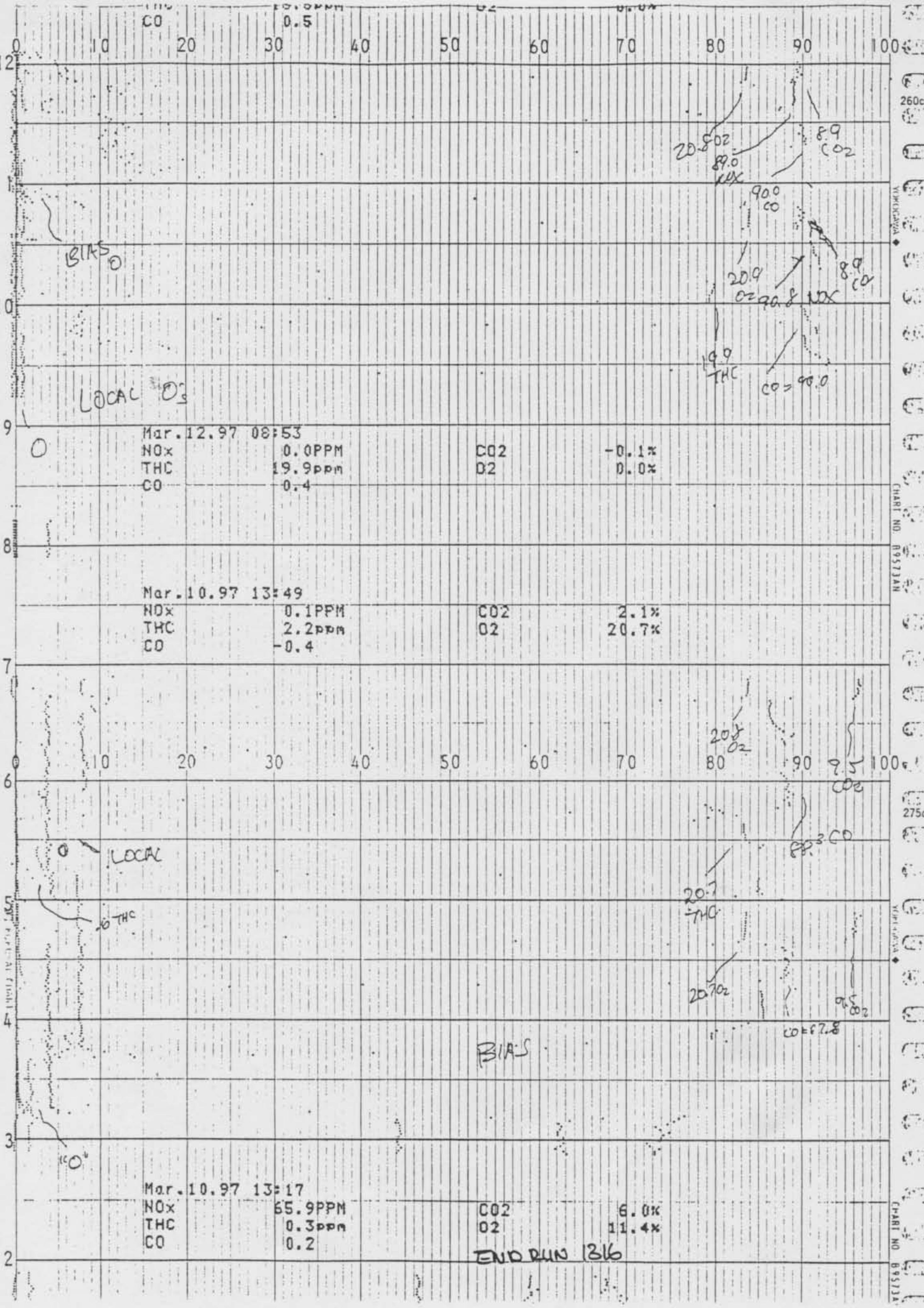
	ANALYZERS					
	NOx	CO	O2	CO2	THC	
PRE-TEST INFORMATION						
CALIBRATION INFORMATION						
Span						
High Mid						
Low Mid						
TEST DATA						
Local Cal "0" LOG 0	0	.7	.01	-.1	0	
SPAN "	90.8	90.0	20.9	8.9	19.9	
BIAS "0" "	.2	.4	.02	-.1		
SPAN "	89.0	90.0	20.8	8.9		
RUN 1 928/1138 LOG 1						
BIAS "0" LOG 2	.2	.2	.01	.15	.3	
SPAN "	89.3	87	20.8	9.19	20.3	
LOCAL 0 "	0	0	0	.15		
SPAN "	90.3	87.8	20.9	9.2		

SAME AS 3/10/97

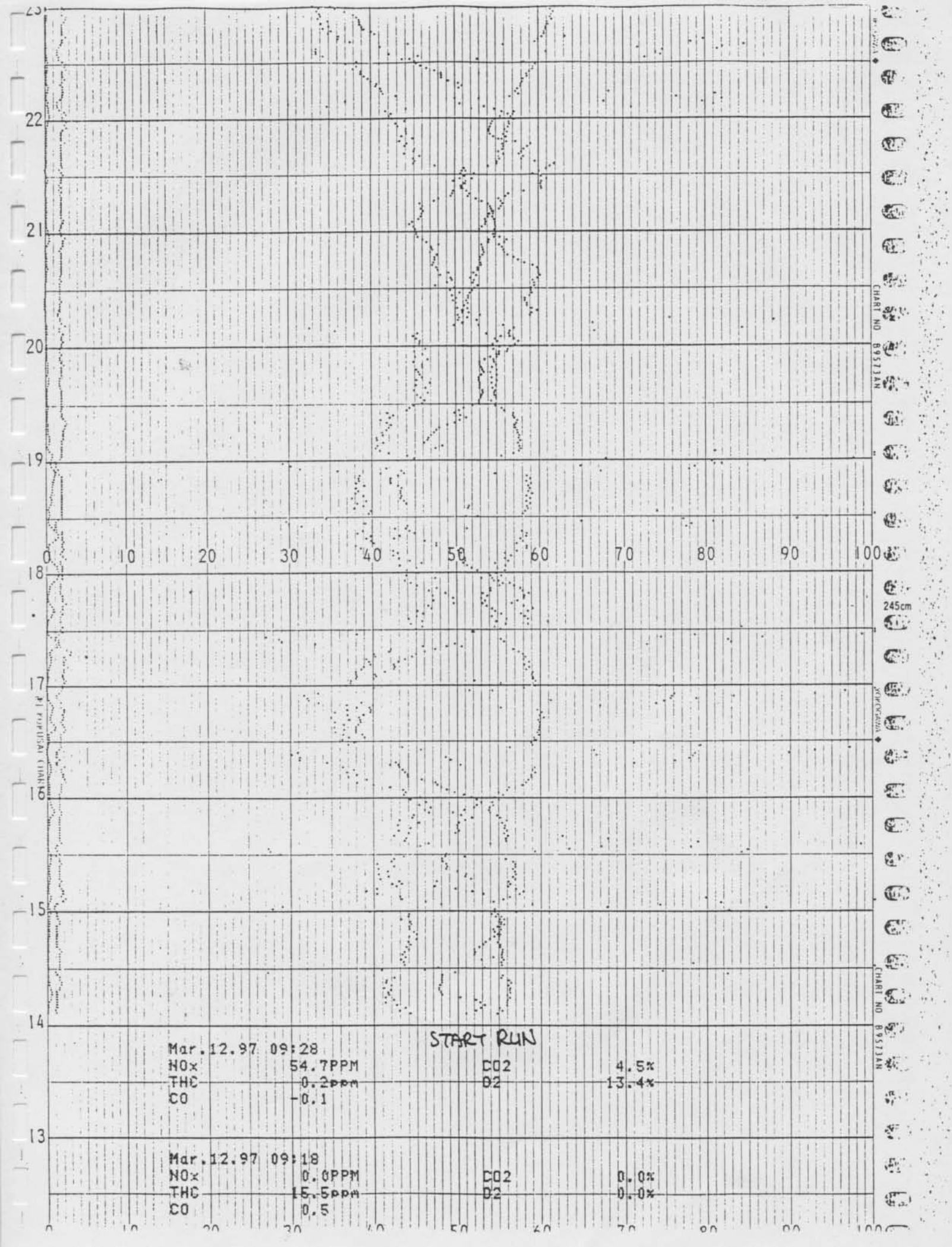

THC 20.1ppm O2 14.8%
CO 1.2
19.8 THC
18 THC
THC .5
20.81 O2
9.04 CO2
88.9 CO
88.7 NOX
BIAS 0 = O2, NOX, CO, CO2
THC = 20.0
THCO = 0
20.91 O2
90.4 NOX
9.07 CO2
89.4 CO
ADJ NOX
90.9 NOX
"0" CO, O2, CO2, NOX
Mar.10.97 09:02
NOx 24.9PPM CO2 2.3%
THC 1.3ppm O2 16.1%
CO 1.4
335cm
350cm
BALBOA PACIFIC
INCINERATOR
MUNI. WASTE BURN 3/10/97
TIRE BURN 2/12/97
INSTRUMENTS
TECO 48-52474-281-CO-0-100PPM
TECO 42H-52914-274-NOX-0-100PPM
CAI 3300-N3124PST-CO2-0-10%
SERVOMEX 1400-01420B/655-O2-0-25%
TECO 51HT-53166-302-THC-0-25PPM
CHT SPEED 200mm/hr
OPERATOR BIS
CYL - SPAN GAS EXP
AA9912 9.02% CO2/20.85 O2 10-20-98
SA 4849 20.1 PPM C3H8 3/99
AAL7946 89.8 CO 4-1-98
SA 7550 90.5 NOX 11-21-98
CO2 = RED
THC = GRN
O2 = BLU
CO = BRN
NOX = VIOLET

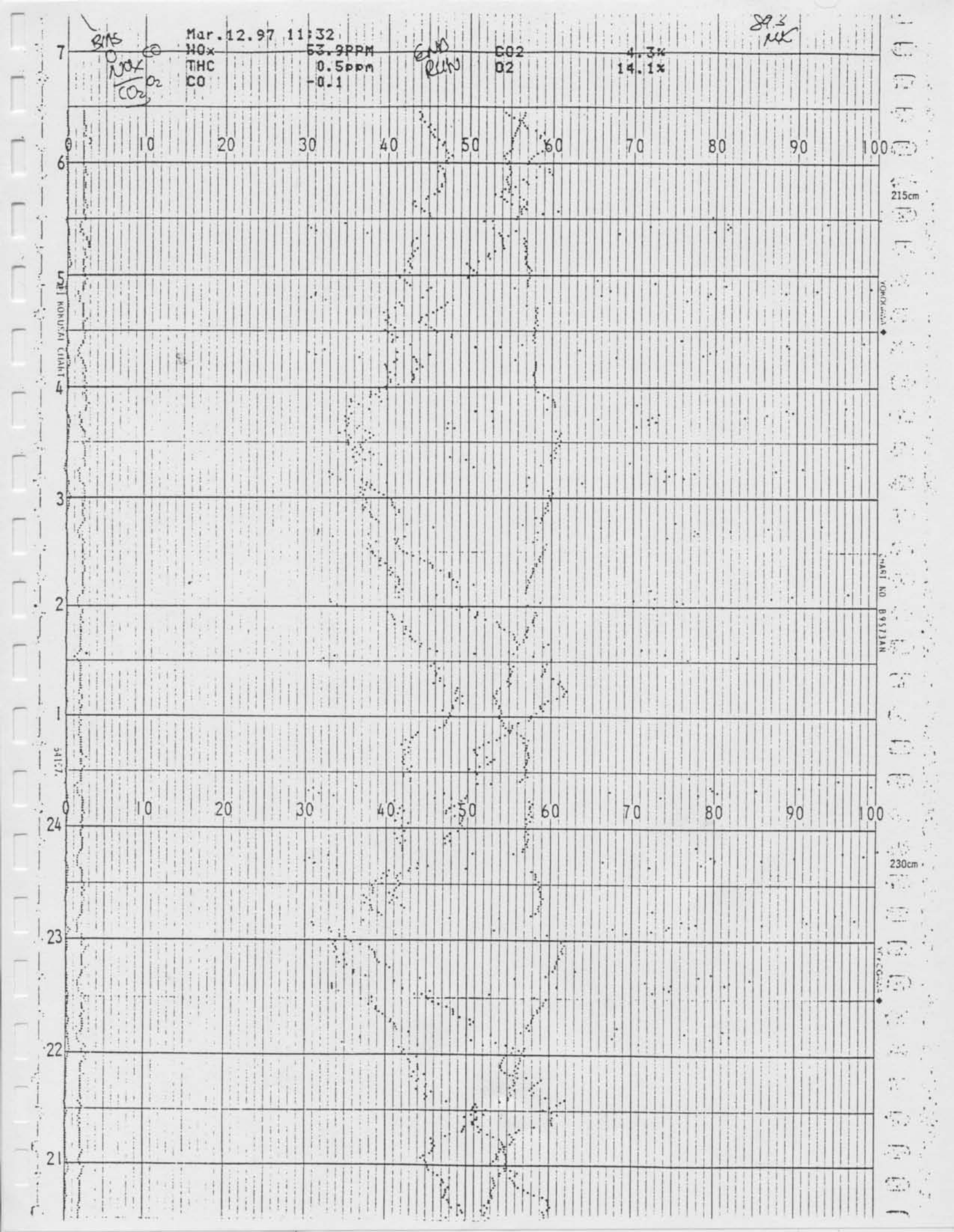

Mar.10.97 11:13
NOx 72.5PPM
THC 0.5ppm
CO 0.3
CO2 6.4%
O2 10.5%
RUN 1 11:14 START
Mar.10.97 09:54
NOx 38.8PPM
THC 20.1ppm
CO 1.2
CO2 3.7%
O2 14.8%
19.8 THC
18 THC
0
10
20
30
40
50
60
70
80
90
100
320cm

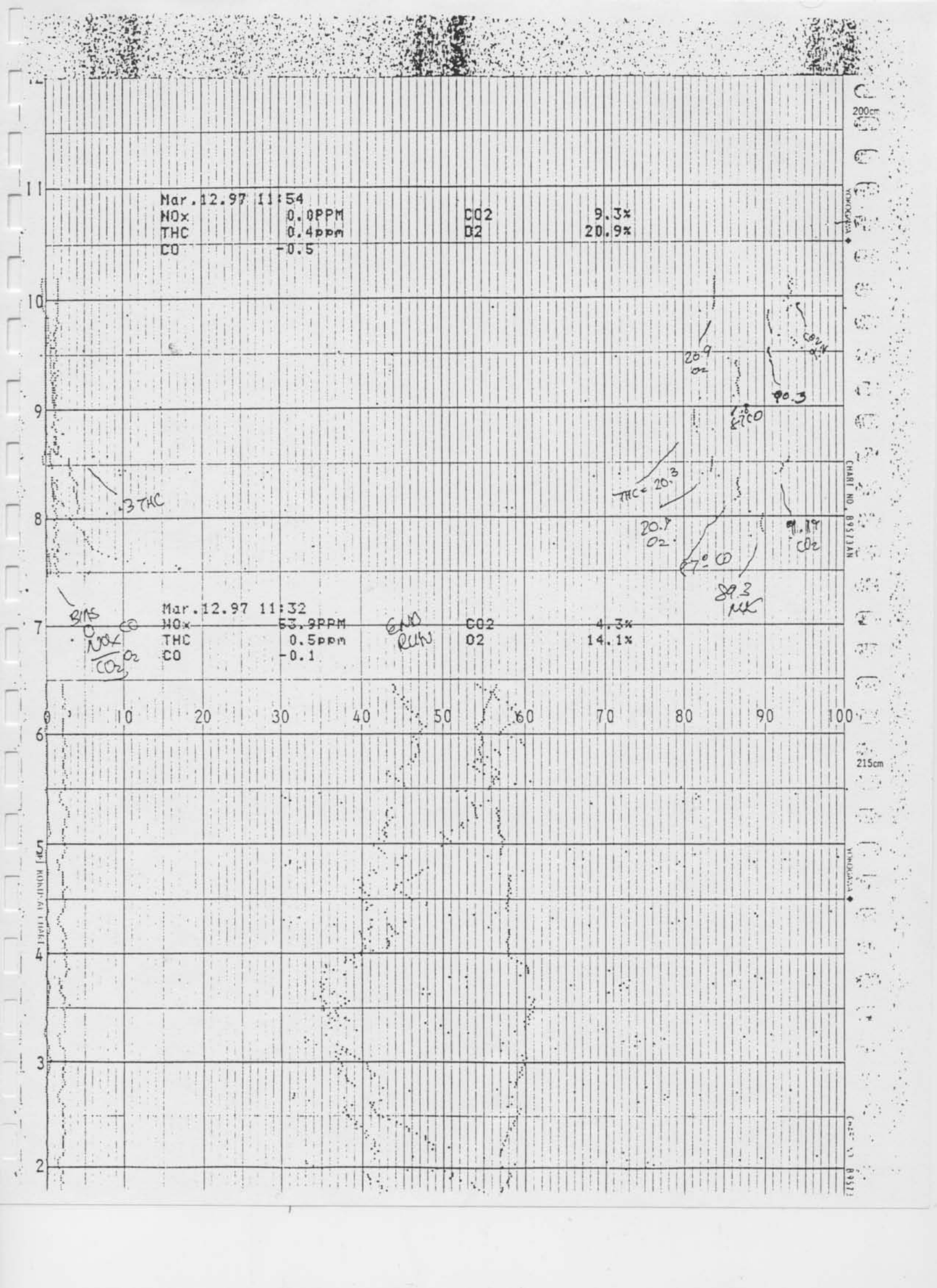

Mar.10.97 13:17
NOx 65.9PPM
THC 0.3ppm
CO 0.2
CO2 6.0%
O2 11.4%
END RUN 1816
CHART NO B95JAN
290cm
305cm



CO 0.5
0 10 20 30 40 50 60 70 80 90 100
260cm
BIAS
LOCAL
Mar.12.97 08:53
NOx 0.0PPM
THC 19.9ppm
CO 0.4
CO2 -0.1%
O2 0.0%
Mar.10.97 13:49
NOx 0.1PPM
THC 2.2ppm
CO -0.4
CO2 2.1%
O2 20.7%
275cm
LOCAL
BIAS
Mar.10.97 13:17
NOx 65.9PPM
THC 0.3ppm
CO 0.2
CO2 6.0%
O2 11.4%
END RUN 1316
CHART NO. B9573AN
YOKOGAWA


START RUN
Mar.12.97 09:28
NOx 54.7PPM
THC 0.2ppm
CO -0.1
CO2 4.5%
O2 13.4%
Mar.12.97 09:18
NOx 0.0PPM
THC 15.5ppm
CO 0.5
CO2 0.0%
O2 0.0%
245cm
CHART NO 89513AN


Mar.12.97 11:32
NOx 53.9PPM
THC 0.5ppm
CO -0.1
CO2 4.3%
O2 14.1%
0 10 20 30 40 50 60 70 80 90 100
215cm
230cm
CHART NO. B95JAN


Mar.12.97 11:54
NOx 0.0PPM
THC 0.4ppm
CO -0.5
CO2 9.3%
O2 20.9%
Mar.12.97 11:32
NOx 53.9PPM
THC 0.5ppm
CO -0.1
CO2 4.3%
O2 14.1%
END RUN
.3 THC
THC = 20.3
20.9 O2
20.9 O2
89.3
0 10 20 30 40 50 60 70 80 90 100
200cm
215cm
CHART NO. 8951JAN

APPENDIX B

CALCULATIONS

DAMES & MOORE

EPA METHOD 29 - "DETERMINATION OF METAL EMISSIONS FROM STATIONARY SOURCES"

LOCATION: Balboa Pacific Corp. - Santa Fe Springs, CA
SOURCE: BAL PAC Exhaust
TRAIN: EPA Method 29; Multi-Metals

TEST DATE: 3/10/97 - 3/14/97
SAMPLED BY: CB/TW
CHECKED BY: AJH

Data Entry	SYMBOL	UNITS	DATA		
Test Number	--	--	R-1 - Munic. Waste	R-2 - Tires	R-3 - Moly. Cat.
Time	--	--	1115-1325	0930-1200	1002-1430
Standard Temperature	tsd	--	68	68	68
Round Stack, Diameter	ds	inches			
Rectangular Stack, Length	L	inches	16.00	16.00	16.00
Width	W	inches	21.00	21.00	21.00
Nozzle Diameter	dn	inches	0.626	0.626	0.626
Average Stack Temperature	ts	deg F	138.0	138.0	136.0
Average Meter Temperature	tm	deg F	99.0	81.0	84.0
Barometric Pressure	Pbar	in. Hg	29.99	30.03	29.99
Stack Static Pressure	Pg	in. H2O	-0.025	-0.025	-0.025
Avg Delta H	dH	in. H2O	1.240	1.160	1.140
Avg Velocity Head	dP	in. H2O	0.011	0.011	0.010
Avg sqrt(dP) = sum(sqrt dP1))/N	sqrt(dP)	in. H2O	0.104	0.101	0.098
Pitot Coefficient	Cp	none	0.84	0.84	0.84
Gas Sample Volume	Vm	cuft	73.478	69.965	69.932
Meter Calibration Factor	Y	none	1.0083	1.0083	1.0083
Total Sampling Time	min	minutes	120.5	119	120
Stack Gas Oxygen Content	O2	%	11.3	13.4	10.5
Stack Gas Carbon Dioxide Content	CO2	%	5.8	4.6	4.0
NOx Concentration	Cnox	ppmv	75.5	59.1	NA
CO Concentration	Cco	ppmv	-0.7	-0.3	NA
Net Weight Gain of Condenser Water (grams or milliliters) g	Wwcg or Wwcm	g/ml	323.7	292.7	287.0
Net Weight Gain of Silica Gel	Wsg	g	11.3	14.6	15.2
Calculated Data					
Nozzle Area, An = 3.14*(dn/2)^2	An	sq. in.	0.3078	0.3078	0.3078
Stack Area, As = 3.1416*(ds)^2/576 (round) = L*W/144 (Rectangular)	As	sq. ft.	2.333	2.333	2.333
Avg Stack Temperature, Ts = ts + 460	Ts	deg R	598.0	598.0	596.0
Avg Meter Temperature, Tm = tm + 460	Tm	deg R	559.0	541.0	544.0
Standard Temperature, Tsd = tsd + 460	Tsd	deg R	528.0	528.0	528.0
Gas Sample Volume, Vm(std)=standard conditions, Vm(stack)=stack conditions	Vm(std)	cu.ft.	70.356	69.300	68.790
Vm(std) = [Tstd/29.92]*Y*(Vm/Tm)*(Pbar+dH/13.6)	Vm(stack)	cu.ft.	97.364	94.568	93.532
Vm(stack) = (Vm(std) + Vwc(std)) * (Ts/Tsd) * (29.92/Ps)		cu.m.	1.992	1.962	1.948
Water Collected, Wwg = [Wwcg + Wsg or (Wwcm*0.9982 g/ml) + Wsg]	Wlc	g	335.0	307.3	302.2
Volume of Water Vapor, Vwc(std) = Wlc*21.85*Tstd/(29.92*18.0*454)	Vwc(std)	cu.ft	15.807	14.500	14.259
Moisture Fraction, Bws = Vwc(std)/(Vm(std)+Vwc(std))	Bws	none	0.1835	0.1730	0.1717
Dry Stack Gas Molecular Weight, Md =(0.32*O2)+(0.44*CO2)+(0.28*(100-O2-CO2))	Md	g/g-mole	29.37318506	29.28	29.06
Wet Stack Gas Molecular Weight, Mw = Md*(1-Bws) + 18.0*(Bws)	Mw	g/g-mole	27.287	27.33	27.16
Absolute Stack Pressure, Ps = Pbar + Pg/13.6	Ps	in. Hg	29.99	30.03	29.99
Stack Gas Velocity, vs = 85.49*Cp*sqrt(dP)*[sqrt(Ts/(Ps*Mw))] vsm = 0.3048 * vs	vs vsm	ft/sec m/sec	6.409 1.953	6.167 1.880	6.045 1.843
Actual Stack Gas Flow Rate, Q = 60*vs*As	Q	acf/min	897	863	846
Dry Stack Gas Flow Rate (Dry, STP), Qsd = 17.647*Q*(1-Bws)*(Ps/Ts) Qsdm = Qsd/35.32	Qsd Qsdm	dscf/min dscm/min	648 18.4	633 17.9	622 17.6
Isokinetic Rate, I = 100*As*Vm(std)/(min*(An/144)*Qsd)	I	%	98.31	100.48	100.54
NOx Emissions, as NO2 Enox = Cnox * 46 / 385.3 * Qsd * 60 * 1E-6 (@68 °F)	Enox	lb/hr	0.35	0.27	NA
CO Emissions Eco = Cco * 28 / 385.3 * Qsd * 60 * 1E-6 (@68 °F)	Cco	lb/hr	0.00	0.00	NA

DAMES & MOORE SOURCE TESTING

EPA Method 29 - Multi Metal Data Page

Company	Balboa Pacific	
Test Location	Santa Fe Springs, CA - BAL PAC	
	start	finish
Sampling Time	11:15	13:25

Test Date	3/10/97
Test No.	Run-1, Municipal Waste
Flow Rate, dscfm	648.37
Sample Volume, dscf	70.36
Sample Volume, stack	97.36

Metal	Molecular Weight	Detected Mass ug	Detection Limit ug	Detection Method	mg/hr	(in stack) ug/m^3	(in stack) ppbw
Aluminum (Al)	26.98	50.00	2.94	ICP-MS	23.67	15.52	13.84
Antimony (Sb)	121.75	1.40	0.10	ICP-MS	0.77	0.51	0.10
Arsenic (As)	74.92	ND	3.92	ICP-MS	1.08	1.42	0.46
Barium (Ba)	137.33	2.60	0.20	ICP-MS	1.44	0.94	0.17
Beryllium (Be)	9.01	ND	0.10	ICP-MS	0.03	0.04	0.09
Cadmium (Cd)	112.41	3.80	0.10	ICP-MS	2.10	1.38	0.29
Chromium (Cr)	52.00	8.00	1.96	ICP-MS	4.42	2.90	1.34
Copper (Cu)	63.55	15.00	0.39	ICP-MS	8.07	5.29	2.00
Lead (Pb)	207.20	29.00	0.10	ICP-MS	16.04	10.52	1.22
Iron (Fe)	55.85	110.00	29.40	ICP-MS	60.82	39.90	17.18
Manganese (Mn)	54.94	9.00	0.98	ICP-MS	4.98	3.26	1.43
Molybdenum (Mo)	95.94	210.00	0.10	ICP-MS	116.08	76.15	19.09
Nickel (Ni)	58.69	3.70	0.10	ICP-MS	2.05	1.34	0.55
Phosphorus (P)	30.97	67.00	29.40	ICP-MS	23.78	15.60	12.11
Selenium (Se)	78.96	ND	1.96	ICP-MS	0.54	0.71	0.22
Silver (Ag)	107.87	0.70	0.10	ICP-MS	0.39	0.25	0.06
Thallium (Tl)	204.38	ND	0.10	ICP-MS	0.03	0.04	0.00
Zinc (Zn)	65.39	50.00	1.96	ICP-MS	27.65	18.14	6.67

Mercury (Hg) M.W. = 200.59	Detected Mass ug	Detection Limit ug	Detection Method	mg/hr	ug/m^3	ppbw
Mercury Fraction # 1	NA	NA		0.00	0.00	0.0
Mercury Fraction # 2	NA	NA				
Mercury Fraction # 3	NA	NA				

* If the metal was not detected, 1/2 the detection limit was used for emission calculations.

* Emissions are blank corrected

Calculations

mg/hr = (Total ug) x (1 / Sample Vol) x (Flow Rate) x (60 min/hr) x (1 mg / 1000 ug)

mg/m^3 = (Total ug) x (1 / Sample Vol (at stack conditions)) x (35.3 ft^3 / 1 m^3)

ppbw = (ug/m^3) x (0.02405 m^3/g-mol) x (1/MW) x (1g/1E6ug) x 1E9 ppbw

DAMES & MOORE SOURCE TESTING

EPA Method 29 - Multi Metal Data Page

Company	Balboa Pacific		Test Date	3/12/97	
Test Location	Santa Fe Springs, CA - BAL PAC		Test No.	Run-2, Shredded Tires	
	start	finish	Flow Rate, dscfm	632.72	
Sampling Time	09:30	12:00	Sample Volume, dscf	69.30	
			Sample Volume, stack	94.57	

Metal	Molecular Weight	Detected Mass ug	Detection Limit ug	Detection Method	mg/hr	(in stack) ug/m^3	(in stack) ppbw
Aluminum (Al)	26.98	68.00	2.94	ICP-MS	33.31	22.70	20.24
Antimony (Sb)	121.75	0.90	0.10	ICP-MS	0.49	0.34	0.07
Arsenic (As)	74.92	ND	3.92	ICP-MS	1.07	1.46	0.47
Barium (Ba)	137.33	4.30	0.20	ICP-MS	2.36	1.61	0.28
Beryllium (Be)	9.01	ND	0.10	ICP-MS	0.03	0.04	0.10
Cadmium (Cd)	112.41	4.40	0.10	ICP-MS	2.41	1.64	0.35
Chromium (Cr)	52.00	5.20	1.96	ICP-MS	2.85	1.94	0.90
Copper (Cu)	63.55	18.00	0.39	ICP-MS	9.64	6.57	2.49
Lead (Pb)	207.20	9.80	0.10	ICP-MS	5.37	3.66	0.42
Iron (Fe)	55.85	220.00	29.40	ICP-MS	120.52	82.15	35.38
Manganese (Mn)	54.94	13.00	0.98	ICP-MS	7.12	4.85	2.13
Molybdenum (Mo)	95.94	54.00	0.10	ICP-MS	29.55	20.14	5.05
Nickel (Ni)	58.69	4.70	0.10	ICP-MS	2.57	1.76	0.72
Phosphorus (P)	30.97	55.00	29.40	ICP-MS	16.98	11.58	8.99
Selenium (Se)	78.96	ND	1.96	ICP-MS	0.54	0.73	0.22
Silver (Ag)	107.87	0.50	0.10	ICP-MS	0.27	0.19	0.04
Thallium (Tl)	204.38	ND	0.10	ICP-MS	0.03	0.04	0.00
Zinc (Zn)	65.39	500.00	1.96	ICP-MS	273.91	186.71	68.67

Mercury (Hg) M.W. = 200.59	Detected Mass ug	Detection Limit ug	Detection Method	mg/hr	ug/m^3	ppbw
Mercury Fraction # 1	NA	NA		0.00	0.00	0.00
Mercury Fraction # 2	NA	NA				
Mercury Fraction # 3	NA	NA				

* If the metal was not detected, 1/2 the detection limit was used for emission calculations.

* Emissions are blank corrected

Calculations

mg/hr = (Total ug) x (1 / Sample Vol) x (Flow Rate) x (60 min/hr) x (1 mg / 1000 ug)

mg/m^3 = (Total ug) x (1 / Sample Vol (at stack conditions)) x (35.3 ft^3 / 1 m^3)

ppbw = (ug/m^3) x (0.02405 m^3/g-mol) x (1/MW) x (1g/1E6ug) x 1E9 ppbw

DAMES & MOORE SOURCE TESTING

EPA Method 29 - Multi Metal Data Page

Company	Balboa Pacific		Test Date	3/14/97	
Test Location	Santa Fe Springs, CA - BAL PAC		Test No.	Run-3, Catalyst	
	start	finish	Flow Rate, dscfm	622.45	
Sampling Time	10:02	14:30	Sample Volume, dscf	68.79	
			Sample Volume, stack	93.53	

Metal	Molecular Weight	Detected Mass ug	Detection Limit ug	Detection Method	mg/hr	(in stack) ug/m^3	(in stack) ppbw
Aluminum (Al)	26.98	25.00	2.94	ICP-MS	9.66	6.72	5.99
Antimony (Sb)	121.75	0.20	0.10	ICP-MS	0.11	0.08	0.01
Arsenic (As)	74.92	ND	3.92	ICP-MS	1.06	1.48	0.48
Barium (Ba)	137.33	1.30	0.20	ICP-MS	0.71	0.49	0.09
Beryllium (Be)	9.01	ND	0.10	ICP-MS	0.03	0.04	0.10
Cadmium (Cd)	112.41	1.50	0.10	ICP-MS	0.81	0.57	0.12
Chromium (Cr)	52.00	2.70	1.96	ICP-MS	1.47	1.02	0.47
Copper (Cu)	63.55	8.60	0.39	ICP-MS	4.45	3.09	1.17
Lead (Pb)	207.20	4.00	0.10	ICP-MS	2.17	1.51	0.18
Iron (Fe)	55.85	370.00	29.40	ICP-MS	200.88	139.70	60.16
Manganese (Mn)	54.94	12.00	0.98	ICP-MS	6.51	4.53	1.98
Molybdenum (Mo)	95.94	44.00	0.10	ICP-MS	23.86	16.59	4.16
Nickel (Ni)	58.69	3.50	0.10	ICP-MS	1.90	1.32	0.54
Phosphorus (P)	30.97	42.00	29.40	ICP-MS	9.77	6.80	5.28
Selenium (Se)	78.96	ND	1.96	ICP-MS	0.53	0.74	0.23
Silver (Ag)	107.87	0.30	0.10	ICP-MS	0.16	0.11	0.03
Thallium (Tl)	204.38	ND	0.10	ICP-MS	0.03	0.04	0.00
Zinc (Zn)	65.39	74.00	1.96	ICP-MS	40.18	27.94	10.28

Mercury (Hg) M.W. = 200.59	Detected Mass ug	Detection Limit ug	Detection Method	mg/hr	ug/m^3	ppbw
Mercury Fraction # 1	NA	NA		0.00	0.00	0.00
Mercury Fraction # 2	NA	NA				
Mercury Fraction # 3	NA	NA				

* If the metal was not detected, 1/2 the detection limit was used for emission calculations.
* Emissions are blank corrected

Calculations

mg/hr = (Total ug) x (1 / Sample Vol) x (Flow Rate) x (60 min/hr) x (1 mg / 1000 ug)

mg/m^3 = (Total ug) x (1 / Sample Vol (at stack conditions)) x (35.3 ft^3 / 1 m^3)

ppbw = (ug/m^3) x (0.02405 m^3/g-mol) x (1/MW) x (1g/1E6ug) x 1E9 ppbw

APPENDIX C

CONTINUOUS EMISSION DATA

DAMES & MOORE
CEMS GAS DATA FORM

LOCATION: Balboa Pacific Corp. - Santa Fe Springs, CA
SOURCE: BAL PAC Exhaust

TEST DATE: 3/12/97
Operator: CB

Test #	Gas	Full Scale	Cylinder Value	Analyzer Reading	Absolute Diff.	Diff. % Span	post	Analyzer Reading	Absolute Diff.	Diff. % Span
Zero	NOx	100	0	0.0	0.00	0.00%		0.0	0.00	0.00%
Mid Range			90.5	91	0.3	0.30%		90	0.20	0.20%
High Range	SA7550				0.00	0.00%			0.00	0.00%
Zero	CO	100	0	0.7	0.70	0.70%		0.0	0.00	0.00%
Mid Range			89.8	90	0.2	0.20%		88	2.00	2.00%
High Range	AAL7946				0.00	0.00%			0.00	0.00%
Zero	O2	25	0.01	0.01	0.00	0.00%		0.00	0.01	0.04%
Mid Range			20.95	20.90	0.05	0.20%		20.90	0.05	0.20%
High Range	SA9772				0.00	0.00%			0.00	0.00%
Zero	CO2	10	0	-0.10	0.10	0.40%		0.15	0.15	0.60%
Mid Range			9.02	8.90	0.12	0.48%		9.20	0.18	0.72%
High Range	SA9772				0.00	0.00%			0.00	0.00%

Pre Linearit	NOx	#DIV/0!	CO	#DIV/0!	O2	84.0% CO2	#DIV/0!
Post Lineari	NOx	#DIV/0!	CO	#DIV/0!	O2	84.4% CO2	#DIV/0!

DAMES & MOORE
CEMS BIAS DATA FORM

LOCATION: Balboa Pacific Corp. - Santa Fe Springs, CA
SOURCE: BAL PAC Exhaust

TEST DATE: 3/12/97
Operator: CB

Test #	Gas	Full Scale	Initial Cal Response	Initial Response	System Cal Bias	post	Final Response	System Cal Bias	Drift % of Range
Zero	NOx	100	0.20	0.2	0.00%		0.2	0.00%	0.00%
High Range			91	89	-1.80%		89.3	-1.50%	0.30%
Zero	CO	100	0.4	0.4	0.00%		0.2	-0.20%	-0.20%
High Range			90	90	0.00%		87	-3.00%	-3.00%
Zero	O2	25	0.02	0.02	0.00%		0.01	-0.04%	-0.04%
High Range			20.90	20.80	-0.40%		20.80	-0.40%	0.00%
Zero	CO2	10	0.01	-0.10	-0.44%		0.15	0.56%	1.00%
High Range			8.90	8.90	0.00%		9.19	1.16%	1.16%

Comments:

	Uncorrected	**Corrected**
NOx	58.25	**59.06**
CO	0.03	**-0.28**
O2	13.33	**13.42**
CO2	4.65	**4.62**

BALBOA PACIFIC
DAMES & MOORE CEMS DATA - TIRE BURN
DATE: 3-12-1997
TIME: 09:28:37.79

Time	NOX ppm	CO ppm	O2 %	CO2 %	THC ppm
9:28:38	54.13	-0.02	13.52	4.47	0.22
9:30:38	48.79	0.34	13.96	4.13	0.27
9:32:38	89.28	-0.09	13.58	4.44	0.34
9:34:38	54.48	0.07	13.70	4.42	0.27
9:36:38	71.55	-0.11	9.55	7.52	0.25
9:38:38	50.78	0.17	14.18	4.11	0.34
9:40:38	90.15	-0.13	12.55	5.34	0.40
9:42:38	49.63	0.50	13.50	4.51	0.39
9:44:38	47.15	0.04	14.51	3.87	0.44
9:46:38	80.29	-0.22	7.51	7.85	0.27
9:48:38	38.19	0.51	14.95	3.55	0.43
9:50:38	87.84	-0.14	7.90	7.63	0.32
9:52:38	42.16	0.24	14.56	3.85	0.60
9:54:38	86.35	0.13	7.42	8.41	0.29
9:56:38	57.10	0.29	13.20	4.79	0.54
9:58:38	53.81	1.27	13.68	4.43	0.44
10:00:38	47.30	0.08	14.42	3.88	0.47
10:02:38	97.06	0.19	13.88	4.36	0.44
10:04:38	42.29	0.59	14.63	3.83	0.44
10:06:38	100.07	0.56	14.02	4.20	0.41
10:08:38	49.14	0.07	14.21	4.17	0.55
10:10:38	53.01	-0.09	13.56	4.55	0.44
10:12:38	52.70	0.07	13.69	4.49	0.47
10:14:38	56.24	-0.02	11.78	5.09	0.48
10:16:38	58.19	-0.33	12.81	4.96	0.40
10:18:38	59.69	-0.15	13.07	4.84	0.44
10:20:38	55.84	0.17	13.46	4.57	0.53
10:22:38	54.76	-0.04	13.56	4.54	0.44
10:24:38	60.40	0.07	12.63	5.05	0.44
10:26:38	57.85	-0.08	13.78	4.47	0.44
10:28:38	54.47	0.21	14.13	4.26	0.59
10:30:38	59.12	0.12	14.24	4.14	0.51
10:32:38	44.53	0.11	13.39	4.13	0.45
10:34:38	39.45	-0.12	15.14	3.47	0.51
10:36:38	33.64	0.34	9.61	6.55	0.34
10:38:38	40.91	-0.21	14.66	3.77	0.52
10:40:38	41.31	0.06	14.53	3.90	0.51
10:42:38	62.31	-0.15	14.23	4.11	0.51
10:44:38	47.63	-0.05	14.36	4.06	0.54
10:46:38	94.68	-0.31	10.92	6.71	0.39
10:48:38	51.49	-0.15	14.25	4.17	0.49
10:50:38	55.19	-0.15	13.52	4.65	0.41
10:52:38	60.88	-0.15	13.23	4.87	0.45
10:54:38	58.92	-0.05	13.76	4.58	0.44
10:56:38	55.43	-0.17	14.14	4.29	0.44
10:58:38	49.45	0.03	10.44	5.86	0.35
11:00:38	47.72	-0.23	14.25	4.10	0.51
11:02:38	41.50	-0.05	14.71	3.79	0.51
11:04:38	71.68	-0.15	14.61	3.82	0.56
11:06:38	38.58	0.03	14.95	3.60	0.55
11:08:38	61.34	-0.21	14.90	3.62	0.56
11:10:38	37.39	0.05	15.19	3.45	0.53
11:12:38	57.74	-0.15	15.03	3.58	0.65
11:14:38	42.89	-0.05	14.41	4.01	0.55
11:16:38	92.30	0.08	14.21	4.16	0.51
11:18:38	44.90	-0.05	14.49	4.00	0.51
11:20:38	77.58	-0.24	14.23	4.17	0.56
11:22:38	52.14	0.16	14.14	4.30	0.60
11:24:38	80.48	-0.16	7.55	8.17	0.39
11:26:38	53.32	-0.24	13.89	4.45	0.51
11:28:38	57.61	-0.24	13.60	4.63	0.51

□	11:30:38	58.43	-0.15	13.80	4.53	0.56
		NOX ppm	**CO ppm**	**O2 %**	**CO2 %**	**THC ppm**
Average		58.25	0.03	13.33	4.65	0.46

APPENDIX D

CALIBRATION DATA

S-Type Pitot e Semi-Annual Calibration Sheet

Calibration Date: 11/15/96 Calibrated By: JRW

Pitot ID	Dt (in)	L (in)	dN (in)	dT (in)	dW (in)	P		Alpha		Beta		z (in)	w (in)
						A (in)	B (in)	A (d)	B (d)	A (d)	B (d)		
PT-003-1	0.374	95	0.827	0.885	6.750	0.456	0.456	6	1	0	0	0.000	0.010
PT-003-2	0.374	39	0.915	0.956	7.000	0.410	0.410	1	1	0	4	0.050	0.000
PT-005-1	0.253	58.5	0.800	0.903	7.000	0.308	0.308	1	0	1	3	0.040	0.010
PT-005-2	0.370	58.5	0.800	1.000	7.000	0.390	0.390	4	4	4	3	0.040	0.000
PT-008-1	0.375	95	0.827	0.930	7.250	0.456	0.456	3	2	2	2	0.000	0.025
PT-005-3	0.374	60	NA	0.775	60.00	0.472	0.472	3	2	1	0	0.030	0.015
PT-006-1	0.373	72	NA	NA	72.00	0.440	0.440	2	1	1	1	0.030	0.010

S-Type Criteria

		Assembly			Face Opening Planes				
Pitot ID	Dt <3/8	dN >3/4	dT >3/4	dW >3	P <1.5Dt	Alpha <10	Beta <5	z <1/8	w <1/32
PT-003-1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
PT-003-2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
PT-005-1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
PT-005-2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
PT-008-1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
PT-005-3	PASS	NA	PASS	PASS	PASS	PASS	PASS	PASS	PASS
PT-006-1	PASS	NA	NA	PASS	PASS	PASS	PASS	PASS	PASS

Dt - External Tubing Diameter
L - Usable Length
P - Distance from Long. Axis to Opening Plane
dN - Distance from Pitot to Nozzle
dT - Distance from Tubes to Thermocouple
dW - Distance from End to First Obstruction
Alpha - Opening Plane angle from Trans. Axis
Beta - Opening Plane angle from Long. Axis
z - Tube Ends Difference
w - Tube Skew Separation

In accordance with 40 CFR Part 60, App. A, Meth. 2, Section 2.1 and SCAQMD Chapter III, Section 2

S-Type Pitot Tu[illegible] Semi-Annual Calibration Sheet

Calibration Date: 11/15/96 Calibrated By: JRW

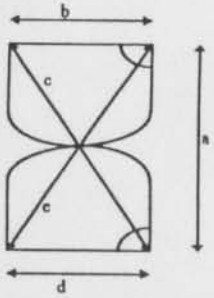
Pitot ID	L	P (A)	P (B)	dN	dT	dW	z	w
PT-003-1	95	0.456	0.456	0.827	0.885	6.75	0	0.01
PT-003-2	39	0.41	0.41	0.915	0.956	7	0.05	0
PT-005-1	58.5	0.308	0.308	0.8	0.903	7	0.04	0.01
PT-005-2	58.5	0.39	0.39	0.8	1	7	0.04	0
PT-008-1	95	0.456	0.456	0.827	0.93	7.25	0	0.025
PT-005-3	60	0.453	0.441	NA	0.775	60	0	0

PITOT MEASUREMENTS

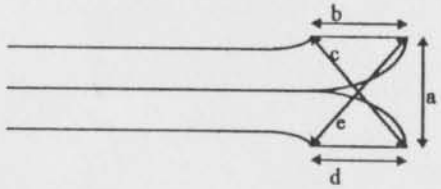
L - Usable Length
P - Distance from Long. Axis to Opening Plane
dN - Distance from Pitot to Nozzle
dT - Distance from Tubes to Thermocouple
dW - Distance from End to First Obstruction
z - Tube Ends Difference
w - Tube Skew Separation

ANGLE CALCULATION MEASUREMENTS

Transverse Axis



Longitudinal Axis



Pitot ID	a	b	c	d	e
PT-003-1	0.832	0.374	0.876	0.374	0.905
PT-003-2	0.918	0.374	0.988	0.378	0.988
PT-005-1	0.615	0.253	0.66	0.252	0.663
PT-005-2	0.902	0.37	0.95	0.37	0.95
PT-008-1	0.927	0.375	0.979	0.375	0.99
PT-005-3	0.954	0.379	1.005	0.375	1.022

Pitot ID	a	b	c	d	e
PT-003-1	0.821	0.682	1.069	0.766	1.121
PT-003-2	0.915	0.615	1.099	0.617	1.067
PT-005-1	0.615	0.248	0.658	0.256	0.655
PT-005-2	0.883	0.643	1.049	0.62	1.048
PT-008-1	0.927	0.693	1.138	0.75	1.173
PT-005-3	0.954	0.611	1.118	0.562	1.117

In accordance with 40 CFR Part 60, App. A, Meth. 2, Section 2.1 and SCAQMD Chapter III, Section 2

Stack Temperature Sensor Calibration Data Form

Calibration Date	3/4/97
Thermometer Model	MicroComputer 7000P
Umbilical Cord #	UMB-003
Method 5 Box ID	M5B-1

Calibrator	JRW
Reference	Extech #43141K
	Serial #T793272

Thermocouple Line #	Reference Thermometer Temp. (°C)[a]	Thermocouple Thermometer Temp. (°C)	Temperature Difference (%)[b]	Criteria ≤1.5%
1	0	0	0.00	PASS
1	100	100	0.00	PASS
1	260	260	0.00	PASS
2	0	0	0.00	PASS
2	100	100	0.00	PASS
2	260	262	0.38	PASS
3	0	0	0.00	PASS
3	100	100	0.00	PASS
3	260	262	0.38	PASS
4	0	0	0.00	PASS
4	100	98	0.54	PASS
4	260	260	0.00	PASS
5	0	0	0.00	PASS
5	100	100	0.00	PASS
5	260	260	0.00	PASS
6	0	0	0.00	PASS
6	100	100	0.00	PASS
6	260	260	0.00	PASS
7	0	0	0.00	PASS
7	100	100	0.00	PASS
7	260	262	0.38	PASS

[a] Every 30° C for each reference point.

[b] $\frac{(\text{ref temp } °C + 273) - (\text{test thermo temp } °C + 273)}{(\text{ref temp } °C + 273)} \times 100$

BI-MONTHLY DRY GAS METER CALIBRATION

Meter ID	2962389
Box ID	M5B-2
Date	3/4/97
Cal. By	JRW

Ambient Temperature	70	F
Corrected Barometric Pressure	30.000	inHg

		DRY GAS METER					REFERENCE METER # 2656207								
Flow	Time (min)	Volume (acf)	P-in (inH2O)	P-out (inH2O)	T-in (F)	T-out (F)	Volume (acf)	P-in (inH2O)	P-out (inH2O)	T-in (F)	T-out (F)	Y	Ave Y	Delta H @	Avg Delta H @
0.81	0.00	897.00	0.81	0.73	65	64	590.98	0.07	0.00	71	71				
inH2O	10.46	902.20	0.81	0.73	68	65	596.24	0.07	0.00	72	72	1.01495		1.81949	
0.49	20.48	907.20	0.81	0.73	70	66	601.26	0.07	0.00	72	72	1.00979	1.01065	1.83045	1.82511
scfm	30.05	912.00	0.81	0.73	71	67	606.06	0.07	0.00	73	73	1.00720		1.82540	
2.00	0.00	921.80	2.00	1.96	76	68	615.88	0.04	0.00	74	74				
inH2O	5.40	926.00	2.00	1.96	77	69	620.09	0.04	0.00	74	74	1.00805		1.86189	
0.76	10.13	929.70	2.00	1.96	78	70	623.77	0.04	0.00	74	74	1.00210	1.00590	1.86613	1.86015
scfm	15.25	933.70	2.00	1.96	78	70	627.77	0.04	0.00	75	75	1.00755		1.85243	

* Standard Conditions are 29.92 inHg and 60 F

Ave Y of Reference Meter	0.9981
Semi-Annual Double Ave Y	1.0075
Bi-Monthly Double Ave Y	1.0083
Average Delta H @	1.842632

Validation Tests

[1-Y]<0.05	PASS
[Ymax-Ymin]<=0.01	PASS
Ave Y < 2% Double Ave Y	PASS
Bi-Monthly < 2% Semi-Annual	PASS
[H@avg-Hmax,min]<=0.15	PASS

In accordance with SCAQMD Chapter III, Method 7.6

c:\excel\calibrat\397M5B-2.XLS

213-585-2154
FAX= 213-585-0582

LIQUID CARBONIC
CYLINDER GAS PRODUCTS
5700 SOUTH ALAMEDA STREET • LOS ANGELES, CA 90058

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER DAMES & MOORE P.O NUMBER AIR 0049

REFERENCE STANDARD

COMPONENT		NIST SRM NO.	CYLINDER NO.	CONCENTRATION
PROPANE	GMIS	vs. 1667b	SA 5183	49.7 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT PROPANE GMIS ANALYZER MAKE-MODEL-S/N HORIBA, FIA-510, 851135122
ANALYTICAL PRINCIPLE Flame Ionization Detector LAST CALIBRATION DATE 02/01/96
FIRST ANALYSIS DATE 02/29/96 SECOND ANALYSIS DATE

Z 0	R 212049	C 85805	CONC. 20.1 ppm	Z	R	C	CONC.		
R 212017	Z 0	C 85650	CONC. 20.1 ppm	R	Z	C	CONC.		
Z 0	C 85557	R 211744	CONC. 20.1 ppm	Z	C	R	CONC.		
U/M mV		MEAN TEST ASSAY	20.1 ppm	U/M mV			MEAN TEST ASSAY		

Values not valid below 150 psig

THIS CYLINDER NO. SA 7847
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R93/224
OF TRACEABILITY PROTOCOL NO. Rev. 9/93
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 02/29/96
EXPIRATION DATE 02/29/99 TERM 36 MONTHS

CERTIFIED CONCENTRATION

PROPANE	20.1 ppm
NITROGEN	BALANCE

ANALYZED BY MARIA E. ROCHON

CERTIFIED BY KWAN T. YOUNG

2678 Bishop Drive, Suite 200
Caller Service 5161
San Ramon, California 94583-5161
Telephone: (510 277-2100
Facsimile: (510) 866-8618

ALTAIR
Gases and Equipment, Inc.

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER AIR QUALITY ENGINEERING P.O NUMBER 545492-00

REFERENCE STANDARD

COMPONENT		NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON DIOXIDE	GMIS	vs 1675b	SA 4193	9.02 %
OXYGEN	GMIS	vs 2659a	SA 19971	20.89 %

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT CARBON DIOXIDE GMIS ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N A12-730
   ANALYTICAL PRINCIPLE NDIR LAST CALIBRATION DATE 07/15/96
   FIRST ANALYSIS DATE 08/14/96 SECOND ANALYSIS DATE

Z 0.00	R 9.02	C 9.02	CONC. 9.02 %	Z		R	C	CONC.
R 9.02	Z 0.00	C 9.02	CONC. 9.02 %	R		Z	C	CONC.
Z 0.00	C 9.02	R 9.02	CONC. 9.02 %	Z		C	R	CONC.
U/M %		MEAN TEST ASSAY	9.02 %	U/M %			MEAN TEST ASSAY	

2. COMPONENT OXYGEN GMIS ANALYZER MAKE-MODEL-S/N Siemens Oxymat 5E S/N A12-839
   ANALYTICAL PRINCIPLE Paramagnetic LAST CALIBRATION DATE 07/15/96
   FIRST ANALYSIS DATE 08/14/96 SECOND ANALYSIS DATE

Z 0.00	R 20.90	C 20.96	CONC. 20.95 %	Z		R	C	CONC.
R 20.90	Z 0.00	C 20.96	CONC. 20.95 %	R		Z	C	CONC.
Z 0.00	C 20.96	R 20.90	CONC. 20.95 %	Z		C	R	CONC.
U/M %		MEAN TEST ASSAY	20.95 %	U/M %			MEAN TEST ASSAY	

Values not valid below 150 psig

THIS CYLINDER NO. SA 9772
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R93/224
OF TRACEABILITY PROTOCOL NO. Rev. 9/93
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 08/14/96
EXPIRATION DATE 08/14/99 TERM 36 MONTHS

CERTIFIED CONCENTRATION

CARBON DIOXIDE	9.02 %
OXYGEN	20.95 %
NITROGEN	BALANCE

ANALYZED BY [signature] CERTIFIED BY [signature] DOUG GRANT

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
DAMES & MOORE
6 HUTTON CENTER DRIVE SUITE 700
SANTA ANA, CA 92707

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

Purchase Order TONY
Project # 37304.004

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 AAL7946
Cylinder Pressure+ 2000 PSIG
Certification Date 04/11/95
Exp. Date 04/11/98

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(CARBON MONOXIDE)	89.80 PPM	±1% NIST TRACEABLE
(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 1679	03/96	ALM024790	96.20 PPM C0 IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Horiba / OPE-135D / 56565502	03/23/95	NDIR

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

Components: CARBON MONOXIDE

First Triad Analysis

Date: 04/04/95 Response Units: mv

Z1= 0.00	R1= 42.0	T1= 39.2
R2= 42.0	Z2= 0.00	T2= 39.2
Z3= 0.00	T3= 39.2	R3= 42.0

Avg. Conc. of Cust Cyl. 89.76 PPM

Second Triad Analysis

Date: 04/11/95 Response Units: mv

Z1= 0.00	R1= 42.0	T1= 39.2
R2= 42.0	Z2= 0.00	T2= 39.3
Z3= 0.00	T3= 39.2	R3= 42.0

Avg. Conc. of Cust Cyl. 89.84 PPM

Calibration Curve

Concentration= Ax^2+Bx+C
A = 0.0005612
B = 0.9397
C = -0.01058

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: _____

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (213) 585-2154
Fax: (714) 542-6689

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER DAMES & MOORE

P.O NUMBER

REFERENCE STANDARD

COMPONENT		NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NITRIC OXIDE	GMIS	vs. 1684b	SA 10284	85.0 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT NITRIC OXIDE GMIS ANALYZER MAKE-MODEL-S/N Beckman 951A S/N 0101354
   ANALYTICAL PRINCIPLE Chemiluminescence LAST CALIBRATION DATE 10/29/96
   FIRST ANALYSIS DATE 11/14/96 SECOND ANALYSIS DATE 11/21/96

Z 0	R 770	C 820	CONC. 90.5 ppm	Z 0	R 762	C 812	CONC. 90.6 ppm	
R 771	Z 0	C 820	CONC. 90.4 ppm	R 764	Z 1	C 813	CONC. 90.5 ppm	
Z 0	C 822	R 771	CONC. 90.6 ppm	Z 1	C 807	R 758	CONC. 90.5 ppm	
U/M mV		MEAN TEST ASSAY	90.5 ppm	U/M mV		MEAN TEST ASSAY	90.5 ppm	

Values not valid below 150 psig
NOx values for reference only

THIS CYLINDER NO. SA 7550
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R93/224
OF TRACEABILITY PROTOCOL NO. Rev. 9/93
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 11/21/96
EXPIRATION DATE 11/21/98 TERM 24 MONTHS

CERTIFIED CONCENTRATION

NITRIC OXIDE	90.5 ppm
NITROGEN	BALANCE
NOx	91.1 ppm

ANALYZED BY KWAN YOUNG

CERTIFIED BY PHU-TIEN NGUYEN

Making Our Planet More Productive

APPENDIX E

LABORATORY DATA

WEST COAST
ANALYTICAL
SERVICE, INC.
Analytical Chemists

March 27, 1997

DAMES & MOORE
6 Hutton Centre Drive
Suite 700
Santa Ana, CA 92707

Attn: Chris Barth

Job No: 34399 S

LABORATORY REPORT

Samples Received: Three (3) Impinger Samples
Date Received: 3-18-97
Purchase Order No: Proj. No: Sandia (Balboa Pacific)

The samples were analyzed as follows:

Samples Analyzed	Analysis	Page
Three (3) samples	Selected Metals by ICPMS	2 - 5

Michael Shelton
Technical Director

B. Michael Hovanec
Senior Staff Chemist

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

WEST COAST ANALYTICAL SERVICE, INC.

DAMES & MOORE
Attn: Chris Barth

Job No: 34399
March 27, 1997

LABORATORY REPORT

Selected Metals
Quantitative Analysis Report
Inductively Coupled Plasma - Mass Spectrometry

Element	BALPAC-M29-R1 (ug/l)	Detection Limit (ug/l)	Impinger Vol (l)	BALPAC-M29-R1 (ug/sample)
Aluminum	51	3	0.98	50
Antimony	1.4	0.1	0.98	1.4
Arsenic	ND	4	0.98	ND<4
Barium	2.7	0.2	0.98	2.6
Beryllium	ND	0.1	0.98	ND<0.1
Cadmium	3.9	0.1	0.98	3.8
Chromium	8	2	0.98	8
Copper	14.6	0.4	0.98	15
Lead	29.5	0.1	0.98	29
Iron	111	30	0.98	110
Manganese	9	1	0.98	9
Molybdenum	214	0.1	0.98	210
Nickel	3.8	0.1	0.98	3.7
Phosphorus	68	30	0.98	67
Selenium	ND	2	0.98	ND<2
Silver	0.7	0.1	0.98	0.7
Thallium	ND	0.1	0.98	ND<0.1
Zinc	51	2	0.98	50

Date Analyzed: 3-20-97

WCAS

WEST COAST ANALYTICAL SERVICE, INC.

DAMES & MOORE
Attn: Chris Barth

Job No: 34399
March 27, 1997

LABORATORY REPORT

Selected Metals
Quantitative Analysis Report
Inductively Coupled Plasma - Mass Spectrometry

Element	BALPAC-M29-R2 (ug/l)	Detection Limit (ug/l)	Impinger Vol (l)	BALPAC-M29-R2 (ug/sample)
Aluminum	70	3	0.97	68
Antimony	0.9	0.1	0.97	0.9
Arsenic	ND	4	0.97	ND<4
Barium	4.4	0.2	0.97	4.3
Beryllium	ND	0.1	0.97	ND<0.1
Cadmium	4.5	0.1	0.97	4.4
Chromium	5.4	2	0.97	5.2
Copper	18.3	0.4	0.97	18
Iron	231	30	0.97	220
Lead	10.1	0.1	0.97	9.8
Manganese	13.6	1	0.97	13
Molybdenum	56	0.1	0.97	54
Nickel	4.8	0.1	0.97	4.7
Phosphorus	57	30	0.97	55
Selenium	ND	2	0.97	ND<2
Silver	0.5	0.1	0.97	0.5
Thallium	ND	0.1	0.97	ND<0.1
Zinc	520	2	0.97	500

Date Analyzed: 3-20-97

WCAS

WEST COAST ANALYTICAL SERVICE, INC.

DAMES & MOORE
Attn: Chris Barth

Job No: 34399
March 27, 1997

LABORATORY REPORT

Selected Metals
Quantitative Analysis Report
Inductively Coupled Plasma - Mass Spectrometry

Element	BALPAC-M29-R3 (ug/l)	Detection Limit (ug/l)	Impinger Vol (l)	BALPAC-M29-R3 (ug/sample)
Aluminum	37	3	0.67	25
Antimony	0.3	0.1	0.67	0.2
Arsenic	ND	4	0.67	ND<3
Barium	2	0.2	0.67	1.3
Beryllium	ND	0.1	0.67	ND<0.1
Cadmium	2.2	0.1	0.67	1.5
Chromium	4	2	0.67	2.7
Copper	12.8	0.4	0.67	8.6
Iron	550	30	0.67	370
Lead	6	0.1	0.67	4.0
Manganese	18	1	0.67	12
Molybdenum	65	0.1	0.67	44
Nickel	5.2	0.1	0.67	3.5
Phosphorus	63	30	0.67	42
Selenium	ND	2	0.67	ND<1
Silver	0.5	0.1	0.67	0.3
Thallium	ND	0.1	0.67	ND<0.1
Zinc	110	2	0.67	74

Date Analyzed: 3-20-97

WCAS

WEST COAST ANALYTICAL SERVICE, INC.

DAMES & MOORE
Attn: Chris Barth

Job No: 34399
March 27, 1997

LABORATORY REPORT

Quality Control Summary

Sample: BALPAC-M29-R1 (Quality Control)
Matrix: Impinger

Parts Per Billion (ug/l)

	Sample	Duplicate	Avg	RPD %	Spike Conc.	MS	% Recovery
Aluminum	51	49	50	4.0	100	146	96
Antimony	1.37	1.48	1.43		100	86	85
Arsenic	ND	ND	ND		100	86	86
Barium	2.73	2.96	2.85		100	98	95
Beryllium	ND	ND	ND		100	96	96
Cadmium	3.9	4.2	4.05	7.4	100	93	89
Chromium	8.1	8.1	8.1		100	108	100
Copper	14.6	14.3	14.5	2.1	100	114	100
Iron	111	110	110.5		10000	10400	103
Lead	29.5	30.3	29.9	2.7	100	123	93
Manganese	8.6	8.7	8.65		100	108	98
Molybdenum	214	226	220	5.5	100	310	
Nickel	3.8	3.8	3.8		100	106	102
Selenium	ND	ND	ND		1000	780	78
Silver	0.68	0.73	0.71		100	96	96
Phosphorus	68	66	67		10000	8900	88
Thallium	ND	ND	ND		100	99	99
Zinc	51	50	50.5	2.0	100	136	86

Date Analyzed: 3-20-97

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
ppb — Parts per million (billion) in liquids is usually equivalent 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 & Warning Limits — QC Limits are determined from historical data. The test value must be within the Control Limits for the test to be considered valid. Based on historical data, the confidence intervals are 95% for warning limits and 99% for control limits.

% 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.

CHAIN-OF-CUSTODY #34399

WHITE COPY - Original (Accompanies Samples) YELLOW COPY - Collector PINK COPY - Project Manager

	Sample ID	Date	Time	Container Type	ANALYSES: METALS (MTS) (See List)	Field Notes	Number of Containers
✓	BALPAC-M29-R1	3.10.97	1000	1L GLASS	X	Municipal Waste Feed	1
✓	BALPAC-M29-R2	3.12.97	1000	↓	X	Shredded Tire Feed	1
✓	BALPAC-M29-R3	3.14.97	1000	↓	X	Moly. Catalyst Feed	1

RELINQUISHED BY: DATE/TIME: 3/5/97 1100 RECEIVED BY: WCAS Karen M. Glanda 3-18-97 10:30AM

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

ANALYTICAL LABORATORY: WEST COAST ANALYTICAL

LABORATORY CONTACT: BOB OLSON PHONE: 310-948-2225

D&M CONTACT: CHRIS BARTH PHONE: 714-433-2000 x419

#34399

DAMES & MOORE
6 HUTTON CENTRE DRIVE, SUITE 700
SANTA ANA, CALIFORNIA 92707
(714) 433-2000 FAX (714) 433-2364

LABORATORY NOTES:

#34399

METALS LIST:

Sb	Be	Se	Fe		
Al	Cu	Ag	Mn		
As	Pb	Tl	Mo		
Ba	P	Zn	Cr		
			Ni		
			Cd		

Analyze by ICPMS for Lowest Possible Detection Limit

JOB NO.:

PROJECT: SANDIA (BALBOA PACIFIC)

LOCATION: SANTA FE SPRINGS, CA

COLLECTOR: C. BARTH DATE OF COLLECTION: 3.10 → 3.14.97

WEST COAST
ANALYTICAL
SERVICE, INC.
Analytical Chemists

April 9, 1997

DAMES & MOORE
6 Hutton Centre Drive
Suite 700
Santa Ana, CA 92707

Attn: Chris Barth

Job No: 34519 S

LABORATORY REPORT

Samples Received: One (1) Liquid Sample
Date Received: 4-1-97
Project No: 08040-131/QC-Balboa/Sandia

The sample was analyzed as follows:

Samples Analyzed	Analysis	Page
One (1) sample	Selected Metals by ICPMS	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

Client: DAMES & MOORE
Job No: 34519

Selected Metals
Quantitative Analysis Report
Inductively Coupled Plasma - Mass Spectrometry

Element	BAL-001 (ug/l)	Detection Limit (ug/l)	Impinger Vol (l)	BAL-001 (ug/sample)
Aluminum	35	3	0.207	7.2
Antimony	ND	0.1	0.207	ND<0.02
Arsenic	ND	4	0.207	ND<0.83
Barium	ND	2	0.207	ND<0.41
Beryllium	ND	0.1	0.207	ND<0.02
Cadmium	ND	0.1	0.207	ND<0.02
Chromium	ND	1	0.207	ND<0.21
Copper	2	0.2	0.207	0.41
Lead	ND	0.1	0.207	ND<0.02
Iron	ND	30	0.207	ND<6.2
Manganese	ND	0.2	0.207	ND<0.04
Molybdenum	0.3	0.1	0.207	0.06
Nickel	ND	0.7	0.207	ND<0.14
Phosphorus	115	30	0.207	24
Selenium	ND	2	0.207	ND<0.41
Silver	ND	0.1	0.207	ND<0.02
Tellurium	ND	0.1	0.207	ND<0.02
Thallium	ND	0.1	0.207	ND<0.02
Vanadium	ND	3	0.207	ND<0.62
Zinc	ND	4	0.207	ND<1.4

Date Analyzed: 4-3-97

WCAS

Client: DAMES & MOORE
Job No: 34519

Quality Control Summary

Sample: Batch QC
Matrix: Impinger

Parts Per Billion (ug/l)

	Sample	Duplicate	Avg	RPD %	Spike Conc.	MS	% Recovery
Aluminum	51	49	50	4.0	100	146	96
Antimony	1.37	1.48	1.43		100	86	85
Arsenic	ND	ND	ND		100	86	86
Barium	2.73	2.96	2.85		100	98	95
Beryllium	ND	ND	ND		100	96	96
Cadmium	3.9	4.2	4.05	7.4	100	93	89
Chromium	8.1	8.1	8.1		100	108	100
Copper	14.6	14.3	14.5	2.1	100	114	100
Iron	111	110	110.5		10000	10400	103
Lead	29.5	30.3	29.9	2.7	100	123	93
Manganese	8.6	8.7	8.65		100	108	98
Molybdenum	214	226	220	5.5	100	310	
Nickel	3.8	3.8	3.8		100	106	102
Selenium	ND	ND	ND		1000	780	78
Silver	0.68	0.73	0.71		100	96	96
Phosphorus	68	66	67		10000	8900	88
Thallium	ND	ND	ND		100	99	99
Vanadium	ND	ND	ND		100	128	128
Zinc	51	50	50.5	2.0	100	136	86

Date Analyzed: 3-20-97

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
ppb — Parts per million (billion) in liquids is usually equivalent 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
g	gram	ug	microgram	ul	microliter
m	meter				

QC Abbreviations:

Control & Warning Limits — QC Limits are determined from historical data. The test value must be within the Control Limits for the test to be considered valid. Based on historical data, the confidence intervals are 95% for warning limits and 99% for control limits.

% 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.

CHAIN-OF-CUSTODY #34519

WHITE COPY - Original (Accompanies Samples) YELLOW COPY - Collector PINK COPY - Project Manager

Sample ID	Date	Time	Container Type	ANALYSES Metals (ICP-MS) (see list)	Field Notes	Number of Containers
✓ BAL-001	7/31/97		1L, glass	X	~~HNO3~~ HNO_3/H_2O_2 Soln. Blank (200.41)	1

RELINQUISHED BY: DATE/TIME: RECEIVED BY: WCAS 4-1-97

3-31-97/1400 Karen M. Granda 10:40AM

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

LABORATORY NOTES:

Metals List:

Al	Mo
Sb	Ni
As	P
Ba	Se
Be	Ag
Cd	Te
Cr	Tl
Cu	V
Pb	Zn
Fe	
Mn	

#34519

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JOB NO.: 08040-131

PROJECT: QC - Balboa/Sandia

LOCATION: Santa Ana, CA

COLLECTOR: Chris Barth DATE OF COLLECTION: 7/31/97