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SOURCE TEST REPORT
PYROLYTIC THERMAL CONVERSION UNIT USING A MUNICIPAL WASTE FEED

Big Bear Area Regional Wastewater Agency
139 E. Big Bear Blvd.
Big Bear City, CA 92314

Prepared by:
Dames & Moore Emission Measurement Section
Submitted: April 14, 1997
Date of Test: March 10, 1997
Job No. 35773-001-131

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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

Date of Test:	March 10, 1997
Test Requested by:	Big Bear Area Regional Wastewater Agency
Contact:	Bob Colven (909) 585-2565
Test Performed by:	Dames & Moore
Team Members:	Christopher J. Barth, Brian Satow, Jason Wirth
Test Objectives:	Determine BAL-PAC exhaust emissions of multiple metals, SO_2, NO_x, CO, Total Hydrocarbons, O_2 and CO_2 during the pyrolytic destruction of a municipal waste/wastewater sludge feed.
Test Methods:	EPA Method 29 "Determination of Metals Emissions from Stationary Sources" CARB Method 6 "Determination of Sulfur Dioxide Emissions from Stationary Sources" CARB Method 100 "Instrumental Methods for Gaseous Emissions"

1.0 INTRODUCTION

Balboa Pacific Corporation (Balboa Pacific), Santa Fe Springs, CA has developed a BAL-PAC Pyrolytic Conversion System for treatment of hazardous and non-hazardous waste. This patented technology is based on destruction and stabilization of waste, using intense, indirect thermal energy in a controlled oxygen-free environment.

Dames & Moore was retained by Big Bear Area Regional Wastewater Agency (BBARWA) to conduct emissions testing on the BAL-PAC pyrolytic unit. The primary goal of the sampling project was to determine exhaust emissions of the BAL-PAC pyrolysis unit while using a municipal waste/wastewater sludge feed supplied by BBARWA. Exhaust emissions were tested for multiple metals, sulfur dioxide (SO_2), oxides of nitrogen (NO_x), carbon monoxide (CO), total hydrocarbons (THC), oxygen (O_2), and carbon dioxide (CO_2). Also, a sample of the ash byproduct was sampled and analyzed for target metals.

The following test methodologies were used:

- **EPA Method 29** "Determination of Multiple Metals Emissions from Stationary Sources"
- **CARB Method 6** "Determination of Sulfur Dioxide Emissions from Stationary Sources"
- **SCAQMD Method 100.1** "Instrumental Methods for Gaseous Emissions, NO_x, CO, THC, O_2 and CO_2"
- **EPA 6010A** - Soluble Threshold Limit Concentration analysis of byproduct ash
- **Proximate and Ultimate Analysis** - Waste feed compositions and BTU content

The testing was conducted on March 10, 1997 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 Equipment Description

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.

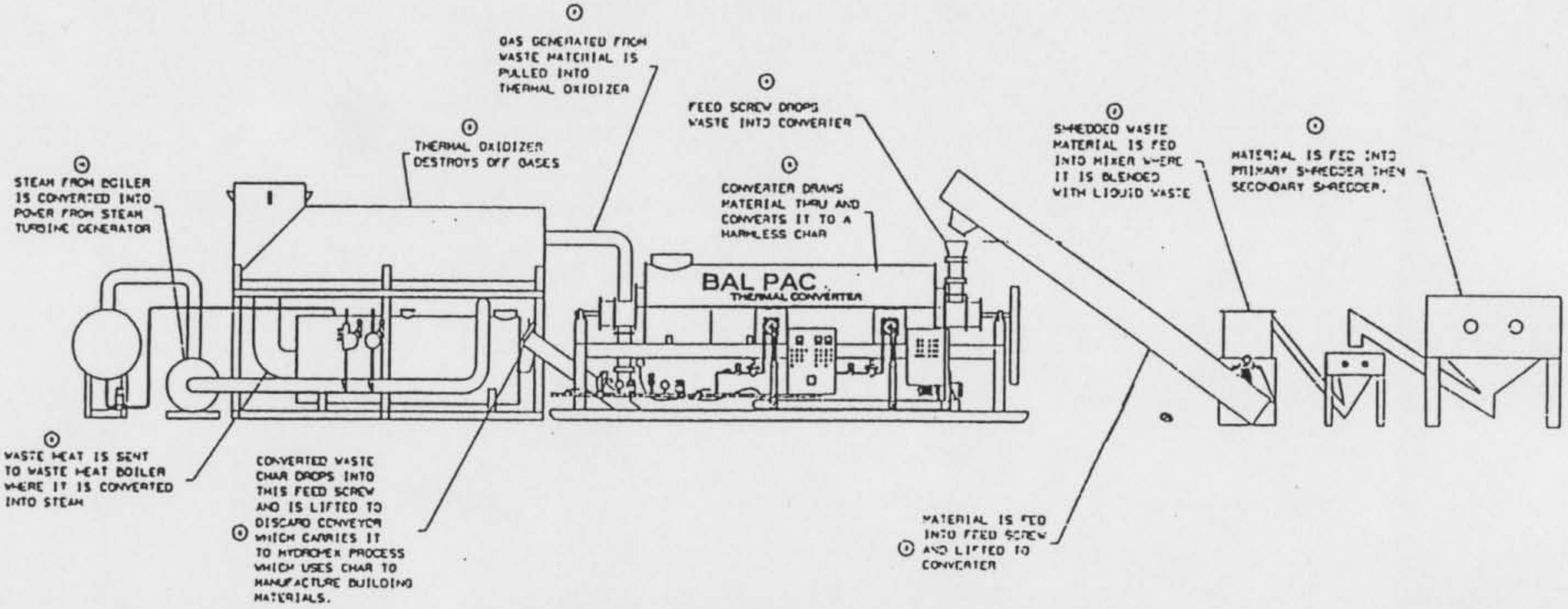
- Pyrolytic Conversion Chamber (retort): A thermally insulated outer housing surrounding a retort or pyrolytic chamber containing a rotary screw that conveys the waste through the retort as pyrolysis occurs. The space between the outer housing and the internal retort chamber contains a heat chamber, 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



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' x 25'L
THERMAL OXIDIZER, Ø7'6" x 30'L
BAL PAC 8000, Ø10'6" x 40'L
STEAM TURBINE GENERATOR, 12'W x 32'L x 10'H (WEIGHT = APPROX. 100,000#)

2.2 Process Information

BBARWA supplied Balboa Pacific with municipal waste and wastewater treatment sludge samples used for the feed during testing. Prior to testing, Balboa Pacific was responsible for shredding the waste in order to prepare a feed suitable for the BAL-PAC solid feed handling system. The municipal waste was mixed with the sludge to yield a mixture which was 80% municipal waste and 20% sludge. The combined feed was introduced into the BAL-PAC at a rate of 21 lb/hr.

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 2-1 "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 a Municipal Waste/Sludge Feed

Feed Rate lb/hr	Retort Temperature		Oxidizer Temp. °F	Boiler Exh. Temp. °F	Stack Temp. °F
	Inlet °F	Outlet °F			
21	1600	1589	1700	560	138

As part of the testing project, Sandia National Laboratories conducted experimental testing of their new multiple metal continuous emissions monitor (CEM). This testing was performed simultaneously with Dames & Moore's testing in order to compare Sandia's CEM results with a reference method. Upon Sandia's request, 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 Method 1: Sample and Velocity Traverses for Stationary Sources

The exhaust stack from the wet scrubber is 16 inches by 21 inches (18" equivalent diameter). Figure 3-1 shows the port locations on the exhaust stack. Three test ports are located on the 21 inch face, the ports being 4 inches in diameter and 1.5 inches in length. They were located 77" upstream and 92" downstream of the nearest flow disturbance, meeting EPA Method 1 requirements (4 duct diameters upstream and 1 duct diameter downstream of the nearest flow disturbance). Eight sampling points for each sample port were used for the multiple metals testing as shown in Figure 3-2. The SO_2, and Method 100 testing were all conducted at a single point located at the center of the stack approximately 12 inches upstream of the three 4-inch sampling ports.

FIGURE 3-1

Exhaust Stack Diagram

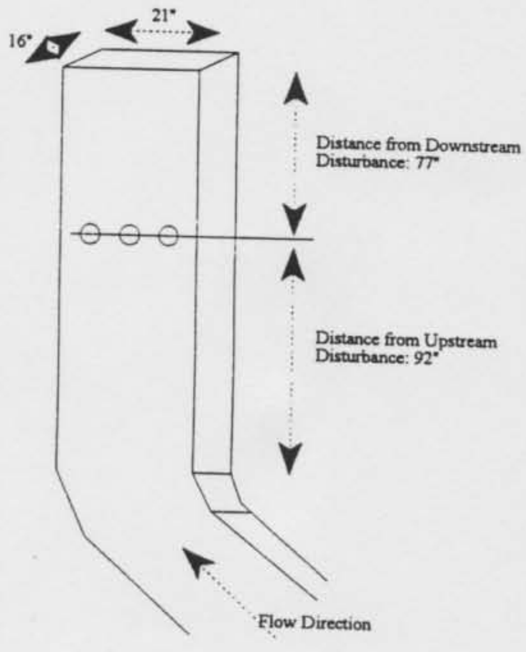
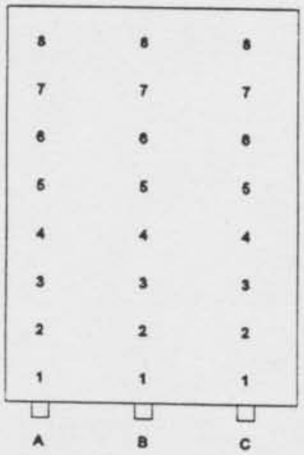


FIGURE 3-2

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

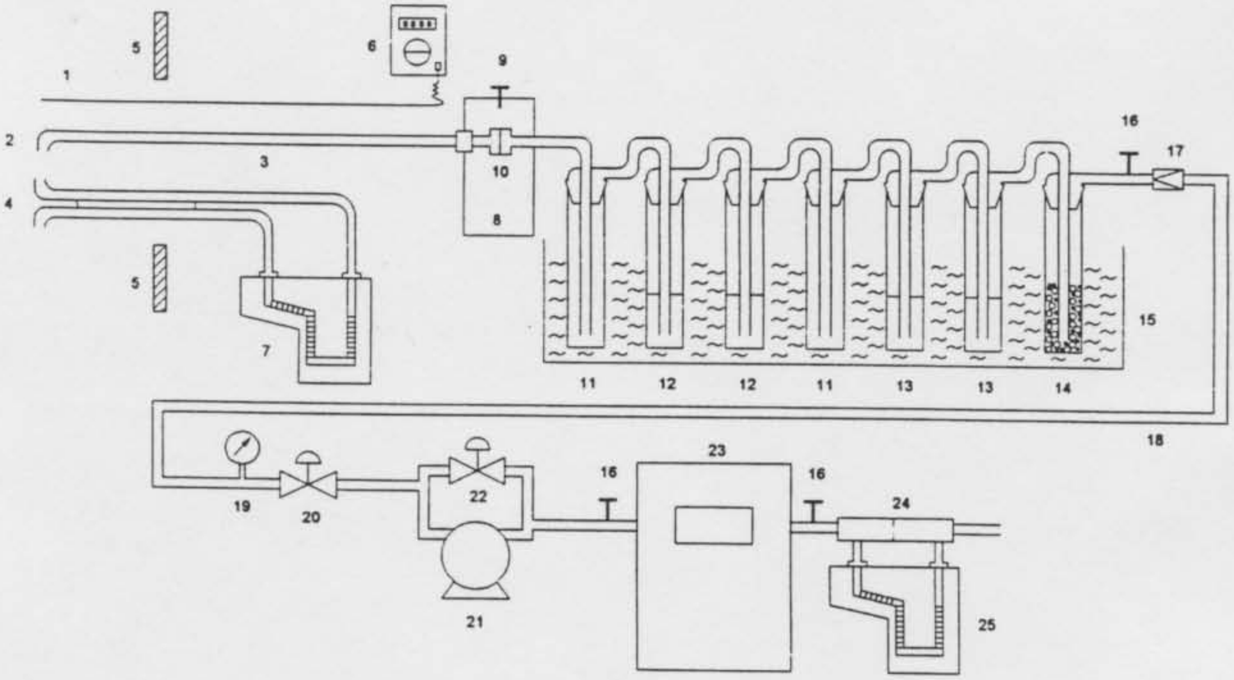
3.2 EPA Method 29: Determination of Metals Emissions from Stationary Sources

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 stainless steel, button hook nozzle with an attached thermocouple and pitot tube assembly. Figure 3-3 shows the Method 29 sampling apparatus. Due to low exhaust flow rates, an extended inclined monometer was used to measure the velocity heads.

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

3.3 CARB Method 6: Determination of Sulfur Dioxide Emissions from Stationary Sources

Sulfur Dioxide (SO_2) sampling was conducted according to CARB Method 6. SO_2 testing began at 11:15 and concluded at 1:17 for a total sampling time of 122 minutes. A 1/4" Teflon line was used as the sampling probe and was positioned at the center of the stack. The sampling rate was set at approximately 1.0 l/min for a total sample volume of 121.0 liters. The probe was connected to a set of five midget impingers. The first impinger contained 15 ml of 80% isopropyl alcohol. The second and third impinger each contained 15 ml of 3% hydrogen peroxide solution. The fourth impinger was left empty and the fifth impinger contained a known amount of silica gel. A rotameter, sampling pump, and a low flow dry gas meter followed the midget impinger train. All samples were analysed at the Dames & Moore Laboratory facility in Santa Ana, CA according to Method 6.

3.4 Municipal Waste and Ash Byproduct Sampling and Analysis

Prior to testing, a representative municipal waste sample was collected from the shredded waste supply. The sample was sent to Commercial Testing & Engineering Co., Denver, CO for proximate and ultimate analysis.

During the testing, the waste ash byproduct was collected in a 5-gallon bucket from the BAL-PAC's solid output system located at the end of the retort. The collected ash was mixed and approximately 100 grams was sampled and sent under chain-of-custody to Calscience Environmental Laboratories, Inc., Garden Grove, CA for soluble threshold limit analysis of target metals.

3.5 CARB Method 100: Continuous Emission Monitoring (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 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 dewpoint 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.

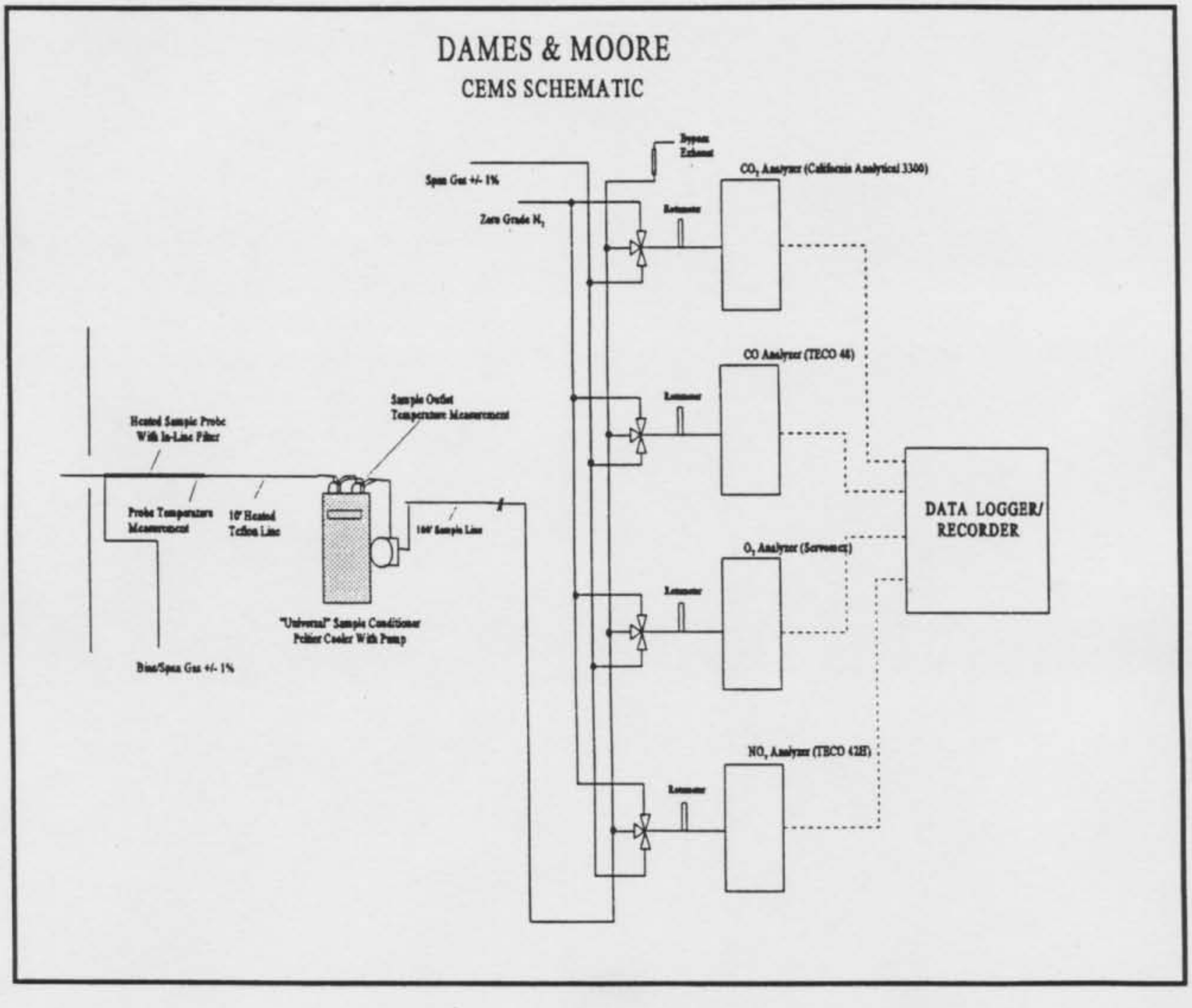
TABLE 3-1

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 Ionizztion (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 h
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

TABLE 4-1

EPA Method 29 - Metal Sampling and Stack Gas Data

Parameter	Units	BAL-PAC Exhaust
Sampling Time	min	120
Sample Volume	ft^3	70.356
Static Pressure	in H_2O	-0.02
Isokinetics	%	98.3
Stack Temperature	°F	138
Moisture	%	18.4
Stack Gas Velocity	ft/sec	6.4
Stack Gas Flow Rate	ACFM DSCFM	897 648

TABLE 4-2

EPA Method 29 - Multiple Metals Results

Metal	**Concentrations**			**Emissions**
	µg/sample	**DL, µg**	**µg/m^3**	**mg/hr**
Aluminum (Al)	50.0	2.9	21.48	23.7
Antimony (Sb)	1.4	0.1	0.7	0.8
Arsenic (As)	ND	3.9	2.0	1.1
Barium (Ba)	2.6	0.2	1.3	1.4
Beryllium (Be)	ND	0.1	0.05	.03
Cadmium (Cd)	3.8	0.1	1.9	2.1
Chromium (Cr)	8.0	2.0	4.0	4.4
Copper (Cu)	15.0	0.4	7.3	8.1
Lead (Pb)	29.0	0.1	14.6	16.0
Iron (Fe)	110.0	29.4	55.2	60.8
Manganese (Mn)	9.0	1.0	4.5	5.0
Molybdenum (Mo)	210.0	0.1	105.4	116.1
Nickel (Ni)	3.7	0.1	1.9	2.1
Phosphorous (P)	37.0	29.4	21.6	23.8
Selenium (Se)	ND	2.0	1.0	0.5
Silver (Ag)	0.7	0.1	0.4	0.4
Thallium (Tl)	ND	0.1	0.05	0.03
Zinc (Zn)	50.0	2.0	25.1	27.65

ND = Not Detected

DL = Detection Limit

Note: if ND then mg/hr and ug/m^3 based on ½ the detection limit

Emissions are blank corrected

TABLE 4-3

Sulfur Dioxide Sampling Results

Parameter	Units	BAL-PAC EXHAUST
Sampling Time	min	122
Sampling Rate	L/min	1.0
Sample Volume	L	121.0
SO_2 Concentration	ppmv	0.2
SO_2 Emissions	lb/hr	0.001

Note: SO_2 not detected - Emissions based on ½ the detection limit

TABLE 4-4

Continuous Emissions and Hydrocarbon Data

CONSTITUENT	CONCENTRATION	EMISSION RATE, lb/hr
Oxygen, O_2	11.3 %	NA
Carbon Dioxide, CO_2	5.8%	NA
Carbon Monoxide, CO	< 1 ppm	< 0.002
Oxides of Nitrogen, NO_x as NO_2	75.5 ppm	0.35
Total Hydrocarbons, THC as C_3	< 1 ppm	< 0.002

TABLE 4-5

Municipal Waste Feed
Proximate/Ultimate Analysis

Municipal Waste Feed	Units	Composition
Moisture	%	28.56
Sulfur	%	0.10
Carbon	%	26.12
Hydrogen	%	3.40
Nitrogen	%	0.57
Ash	%	26.93
Oxygen	%	14.32
Btu Content	Btu/lb	5,124

TABLE 4-6

Municipal Waste/Sewage Sludge Ash Byproduct
STLC Analysis

Metal	Concentration, mg/L	Detection Limit
Antimony, (Sb)	ND	1.0
Arsenic, (As)	2.0	1.0
Barium, (Ba)	ND	0.2
Beryllium, (Be)	1.0	0.1
Cadmium, (Cd)	ND	0.2
Chromium, (Cr)	0.5	0.3
Copper, (Cu)	8.1	0.5
Lead, (Pb)	ND	1.2
Manganese, (Mn)	32.8	0.5
Nickel, (Ni)	29.0	0.4
Phosphorous, (P)	ND	5.0
Selenium, (Se)	ND	1.0
Silver, (Ag)	ND	0.2
Thallium, (Tl)	4.1	1.6
Zinc, (Zn)	78.7	0.3

5.0 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

5.1 Sampling Protocols

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 and Maintenance

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 ± 2 percent of the range of the zero, mid-range, and high-range calibration gases.

- Sampling System Bias less than ± 5 percent of the range for the zero, and mid-or high range calibration gases.

- Zero Drift less than ± 3 percent of the range over the period of each run.

- Calibration Drift less than ± 3 percent of the range over the period of each run.

- Linearity less than ± 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 ± 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 ± 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 ± 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 ± 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.B., 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		0.015	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	

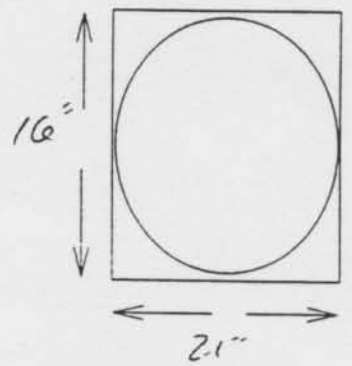
TRAVERSE POINT NUMBER	VELOCITY HEAD IN. H20	STACK TEMP DEG F.	SWIRL ANGLE DEG
AVG:			

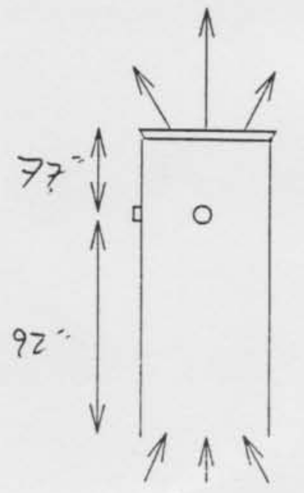
Equipment

Pressure Gauge	1/4" MAGGY
T/C Potentiometer	ATKINS
Pitot Tube	5"-PT-005 3
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: Balsca 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)

3154
0.01525
139

0.011
138

Time On	Source Point #	Gas Meter Reading (scf)	Stack Velocity Head ("H$_2$O)	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	98	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)	(.0110)	(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

PRE-TEST DATA [illegible]

Nozzle Diameter: 0.626
Barometric Pressure: 29.99 "Hg
Static Pressure in Stack: -.025 "H2O
Pitot Factor: .84
Est. Moisture: ~~22%~~ 70%, sat'd @ 140°F
Est. MW: ~~28~~ 26

CHAIN OF CUSTODY INFO

Impingers Loaded By CB
Impingers Recovered By CB
Filter Loaded By NA
Filter No.
Filter Recovered By
Probe Wash By CB, JW.

EQUIPMENT/CALIBRATION DATA

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

18
20
36

64

27.4

1 =

	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$_2$O$_2$	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
Total Wt Gain:				335.0g

323.7g

POST TEST INFO

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

Recorded by: Chris Bert Date: 3-10-97
Checked by: Date:

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NOTE: VELOCITY HEAD MEASURED AT THE EXHAUST [illegible]

DAMES & MOORE
TRAVERSE SOURCE TEST DATA

Company: Balboa Pacific
Sampling Location: Bal-Pac Exhaust
Test No. SO2 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	Source	Gas Meter	Stack		dH		Probe	Hot Box	Dryer	Meter Temp		Vacuum
On	Point #	Reading ~~(scf)~~ M³	Velocity Head ("H₂O)	Temp °F	Calculated dH	Set dH	Temp °F	Temp °F	~~Temp~~ ~~°F~~ Rotameter	°F in	°F out	"Hg
1115	t	0.47215	—	—	—	—	—	—	1.5	83	—	—
1128		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 M³ (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 C.B.
Impingers Recovered By C.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: CM2583583
Delta H @: NA

	Soln.	Final	-	Initial	=	Net
Impinger #1	80% IPA	NA	-	NA	=	NA
Impinger #2	3% H2O2		-		=	
Impinger #3	3% H2O2		-		=	
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: Carl Baker Date: 3·10·97
Checked by: ____ Date: ____

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APPENDIX B

CALCULATIONS

DAMES & MOORE

EPA METHOD 6 - "DETERMINATION OF SULFUR DIOXIDE EMISSIONS FROM STATIONARY SOURCES"

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

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

Data Entry	SYMBOL	UNITS	TEST DATA	
Date of Test			3/10/97	3/12/97
Standard Temperature	tsd	deg F	68	68
Round Stack, Diameter	ds	inches		
Rectangular Stack, Length	L	inches	16.00	16.00
Width	W	inches	21.00	21.00
Nozzle Diameter	dn	inches	NA	NA
Average Stack Temperature	ts	deg F	138.0	138.0
Average Meter Temperature	tm	deg F	93.0	79.0
Barometric Pressure	Pbar	in. Hg	29.99	30.03
Stack Static Pressure	Pg	in. H2O	-0.03	-0.03
Avg Delta H	dH	in. H2O		
Avg Velocity Head	dP	in. H2O	0.011	0.011
Avg sqrt(dP) = sum(sqrt(dP))/N	sqrt(dP)	in. H2O	0.104	0.101
Pitot Coefficient	Cp	none	0.840	0.840
Gas Sample Volume	Vm	cuft	4.2730	3.6580
Meter Calibration Factor	Yd	none	1.0316	1.0316
Total Sampling Time	min	minutes	122	115
Sulfate gain, mg as SO2	SO2	mg	0.07	2.52
Stack Gas Oxygen Content	O2	%	11.27	13.42
Stack Gas Carbon Dioxide Content	CO2	%	5.77	4.62
Net Weight Gain of Condenser Water (grams or milliliters) g	Wwcg or Wwcm	g/ml	NA	NA
Net Weight Gain of Silica Gel	Wsg	g	NA	NA
Nozzle Area, An = 3.1416 * (dn/2)^2	An	sq. in.		
Stack Area, As = 3.1416*(ds)^2/576 (round) = L*W/144 (Rectangular)	As	sq. ft.	2.333	2.333
Avg Stack Temperature, Ts = ts + 460	Ts	deg R	598	598
Avg Meter Temperature, Tm = tm + 460	Tm	deg R	553.0	539.0
Standard Temperature, Tsd = tsd + 460	Tstd	deg R	528	528
Gas Sample Volume at Standard Conditions,	Vm(std)	cu.ft.	4.219	3.710
Vm(std) = [Tstd/29.92]*Y*(Vm/Tm)*(Pbar+dH/13.6)		cu.m.	0.119	0.105
Water Collected, Wwg = [Wwcg + Wsg or (Wwcm*0.9982 g/ml) + Wsg]	Wlc	g		
Volume of Water Vapor, Vwc(std) = Wlc*21.85*Tstd/(29.92*18.0*454)	Vwc(std)	cu.ft.		
Moisture Fraction, Bws = Vwc(std)/(Vm(std)+Vwc(std))	Bws	none	0.1835	0.1730
Dry Stack Gas Molecular Weight, Md = (0.32*O2)+ (0.44*CO2)+(0.28*(100-O2+CO2))	Md	g/g-mole	29.37	29.28
Wet Stack Gas Molecular Weight, Mw = Md*(1-Bws) + 18.0*(Bws)	Mw	g/g-mole	27.29	27.33
Absolute Stack Pressure, Ps = Pbar + Pg/13.6	Ps	in. Hg	29.99	30.03
Stack Gas Velocity	Vs	ft/sec	6.409	6.167
Vs = 85.49*Cp*sqrt(dP)*[sqrt(Ts/(Ps*Mw))] Vsm = 0.3048 * Vs	Vsm	m/sec	1.953	1.880
Actual Stack Gas Flow Rate, Q = 60*Vs*As	Q	acf/min	897	863
Dry Stack Gas Flow Rate (Dry, STP),	Qsd	dscf/min	648	633
Qsd = (Tstd/29.92)*Q*(1-Bws)*(Ps/Ts); Qsdm = Qsd/35.32	Qsdm	dscm/min	18.4	17.9
SO2 Concentration as SO2 Cso2 = SO2/64.07*0.8495/Vmstd*1000	Cso2	ppmv	0.2	9.0
SO2 Emissions SO2 Eso2 = Cso2 * 64.06 / 385.3 * Qsd * 60 * 10^{6}	Eso2	lb/hr	0.001	0.057

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/JW
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(dP))/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 Moleular 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	ft/sec	6.409	6.167	6.045
vs = 85.49*Cp*sqrt(dP)*[sqrt(Ts/(Ps*Mw))] vsm = 0.3048 * vs	vsm	m/sec	1.953	1.880	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	dscf/min	648	633	622
Qsd = 17.647*Q*(1-Bws)*(Ps/Ts) Qsdm = Qsd/35.32	Qsdm	dscm/min	18.4	17.9	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 Date	3/10/97
Test Location	Santa Fe Springs, CA - BAL PAC		Test No.	Run-1, Municipal Waste
	start	finish	Flow Rate, dscfm	648.37
Sampling Time	11:15	13:25	Sample Volume, dscf	70.36

Metal	Molecular Weight	Detected Mass, ug	Detection Limit ug	Detection Method	mg/hr	ug/m^3	ppbw
Aluminum (Al)	26.98	50.00	2.94	ICP-MS	23.67	21.48	19.15
Antimony (Sb)	121.75	1.40	0.10	ICP-MS	0.77	0.70	0.14
Arsenic (As)	74.92	ND	3.92	ICP-MS	1.08	1.97	0.63
Barium (Ba)	137.33	2.60	0.20	ICP-MS	1.44	1.31	0.23
Beryllium (Be)	9.01	ND	0.10	ICP-MS	0.03	0.05	0.13
Cadmium (Cd)	112.41	3.80	0.10	ICP-MS	2.10	1.91	0.41
Chromium (Cr)	52.00	8.00	1.96	ICP-MS	4.42	4.02	1.86
Copper (Cu)	63.55	15.00	0.39	ICP-MS	8.07	7.32	2.77
Lead (Pb)	207.20	29.00	0.10	ICP-MS	16.04	14.56	1.69
Iron (Fe)	55.85	110.00	29.40	ICP-MS	60.82	55.21	23.78
Manganese (Mn)	54.94	9.00	0.98	ICP-MS	4.98	4.52	1.98
Molybdenum (Mo)	95.94	210.00	0.10	ICP-MS	116.08	105.38	26.42
Nickel (Ni)	58.69	3.70	0.10	ICP-MS	2.05	1.86	0.76
Phosphorus (P)	30.97	67.00	29.40	ICP-MS	23.78	21.58	16.76
Selenium (Se)	78.96	ND	1.96	ICP-MS	0.54	0.98	0.30
Silver (Ag)	107.87	0.70	0.10	ICP-MS	0.39	0.35	0.08
Thallium (Tl)	204.38	ND	0.10	ICP-MS	0.03	0.05	0.01
Zinc (Zn)	65.39	50.00	1.96	ICP-MS	27.65	25.10	9.23

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) 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 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

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: 3/10/97
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	0.2	0.20	0.20%		0.2	0.20	0.20%
Mid Range			90.5	90	0.5	0.50%		87	3.50	3.50%
High Range	SA7550				0.00	0.00%			0.00	0.00%
Zero	CO	100	0	0.4	0.40	0.40%		0.2	0.20	0.20%
Mid Range			89.8	89	0.8	0.80%		88	1.80	1.80%
High Range	AAL7946				0.00	0.00%			0.00	0.00%
Zero	O2	25	0.01	0.02	0.01	0.04%		0.02	0.01	0.04%
Mid Range			20.95	20.91	0.04	0.16%		20.80	0.15	0.60%
High Range	SA9772				0.00	0.00%			0.00	0.00%
Zero	CO2	10	0	0.01	0.01	0.04%		0.40	0.40	1.60%
Mid Range			9.02	9.04	0.02	0.08%		9.50	0.48	1.92%
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: 3/10/97
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	0.3	0.10%		0.3	0.10%	0.00%
High Range			90	88.7	-1.30%		85.5	-4.50%	-3.20%
Zero	CO	100	0.4	0.7	0.30%		0.4	0.00%	-0.30%
High Range			89	89	-0.10%		88	-1.20%	-1.10%
Zero	O2	25	0.02	0.02	0.00%		0.02	0.00%	0.00%
High Range			20.91	20.81	-0.40%		20.70	-0.84%	-0.44%
Zero	CO2	10	0.01	0.10	0.36%		0.40	1.56%	1.20%
High Range			9.04	9.04	0.00%		9.50	1.84%	1.84%

Comments:

	Uncorrected	**Corrected**
NOx	72.70	**75.49**
CO	-0.11	**-0.68**
O2	11.17	**11.27**
CO2	6.02	**5.77**

BALBOA
DAMES & MOORE CEMS DATA MUNICIPAL WASTE
DATE: 3-10-1997
TIME: 11:14:03.83

Time	NOX ppm	CO ppm	O2 %	CO2 %	THC ppm
11:14:04	75.05	0.20	10.50	6.34	0.53
11:16:04	77.68	0.20	10.57	6.29	0.45
11:18:04	76.71	0.20	10.71	6.23	0.46
11:20:04	75.98	-0.09	10.83	6.16	0.46
11:22:04	74.77	-0.29	11.01	6.05	0.46
11:24:04	72.43	0.01	11.15	5.97	0.46
11:26:04	73.93	0.39	11.11	6.03	0.46
11:28:04	78.37	0.13	10.34	6.46	0.46
11:30:04	82.71	0.16	10.64	6.33	0.41
11:32:04	78.31	0.15	10.91	6.18	0.46
11:34:04	75.89	-0.10	11.22	5.95	0.48
11:36:04	71.26	-0.16	11.32	5.88	0.46
11:38:04	68.91	0.33	11.40	5.83	0.46
11:40:04	70.06	0.02	11.51	5.77	0.46
11:42:04	70.76	-0.11	10.87	6.17	0.46
11:44:04	72.06	0.20	11.00	6.07	0.41
11:46:04	74.74	-0.39	11.00	6.12	0.43
11:48:04	71.95	-0.39	11.21	5.97	0.41
11:50:04	69.35	-0.26	11.39	5.87	0.46
11:52:04	70.06	0.04	11.45	5.84	0.46
11:54:04	76.29	-0.34	11.43	5.86	0.45
11:56:04	76.35	-0.04	10.84	6.20	0.44
11:58:04	73.27	-0.29	11.03	6.08	0.43
12:00:04	72.81	0.35	11.10	6.07	0.41
12:02:04	68.87	-0.09	11.34	5.91	0.46
12:04:04	69.91	-0.39	11.39	5.87	0.44
12:06:04	68.46	-0.11	11.54	5.78	0.42
12:08:04	68.28	-0.29	11.57	5.76	0.44
12:10:04	71.46	-0.33	11.01	6.09	0.45
12:12:04	71.46	-0.16	11.14	6.01	0.41
12:14:04	68.71	-0.20	11.25	5.95	0.41
12:16:04	68.17	-0.19	11.34	5.91	0.45
12:18:04	67.23	-0.39	11.38	5.91	0.42
12:20:04	65.93	-0.26	11.51	5.83	0.46
12:22:04	66.38	-0.27	11.44	5.90	0.46
12:24:04	72.91	-0.11	10.93	6.19	0.41
12:26:04	76.65	0.20	11.10	6.07	0.37
12:28:04	72.92	0.00	11.23	6.00	0.41
12:30:04	70.81	-0.04	11.38	5.90	0.41
12:32:04	70.26	-0.20	11.42	5.89	0.41
12:34:04	69.00	-0.02	11.40	5.93	0.46
12:36:04	68.46	-0.20	11.42	5.90	0.41
12:38:04	71.27	0.29	10.93	6.17	0.34
12:40:04	70.66	-0.39	11.05	6.11	0.33
12:42:04	73.08	-0.29	11.24	6.00	0.34
12:44:04	73.23	-0.30	11.30	5.96	0.35
12:46:04	72.27	-0.29	11.37	5.92	0.35
12:48:04	75.30	-0.40	11.43	5.90	0.39
12:50:04	72.91	-0.20	11.42	5.94	0.41
12:52:04	74.75	-0.17	10.92	6.21	0.34
12:54:04	71.64	-0.04	11.07	6.10	0.35
12:56:04	71.48	-0.10	11.05	6.14	0.41
12:58:04	71.20	0.02	11.29	6.00	0.46
13:00:04	75.23	-0.16	11.38	5.93	0.50
13:02:04	76.53	-0.07	11.41	5.91	0.41
13:04:04	74.87	0.25	11.19	6.02	0.41
13:06:04	78.34	-0.51	11.02	6.12	0.46
13:08:04	74.35	0.10	11.14	6.06	0.34
13:10:04	73.69	-0.39	11.20	6.03	0.41
13:12:04	77.19	-0.31	11.19	6.07	0.41
13:14:04	74.66	-0.22	11.38	5.93	0.37

	13:16:04	69.23	-0.57	11.46	5.87	0.38
		NOX ppm	**CO ppm**	**O2 %**	**CO2 %**	**THC ppm**
Average		72.70	-0.11	11.17	6.02	0.42

Page 1 of 2

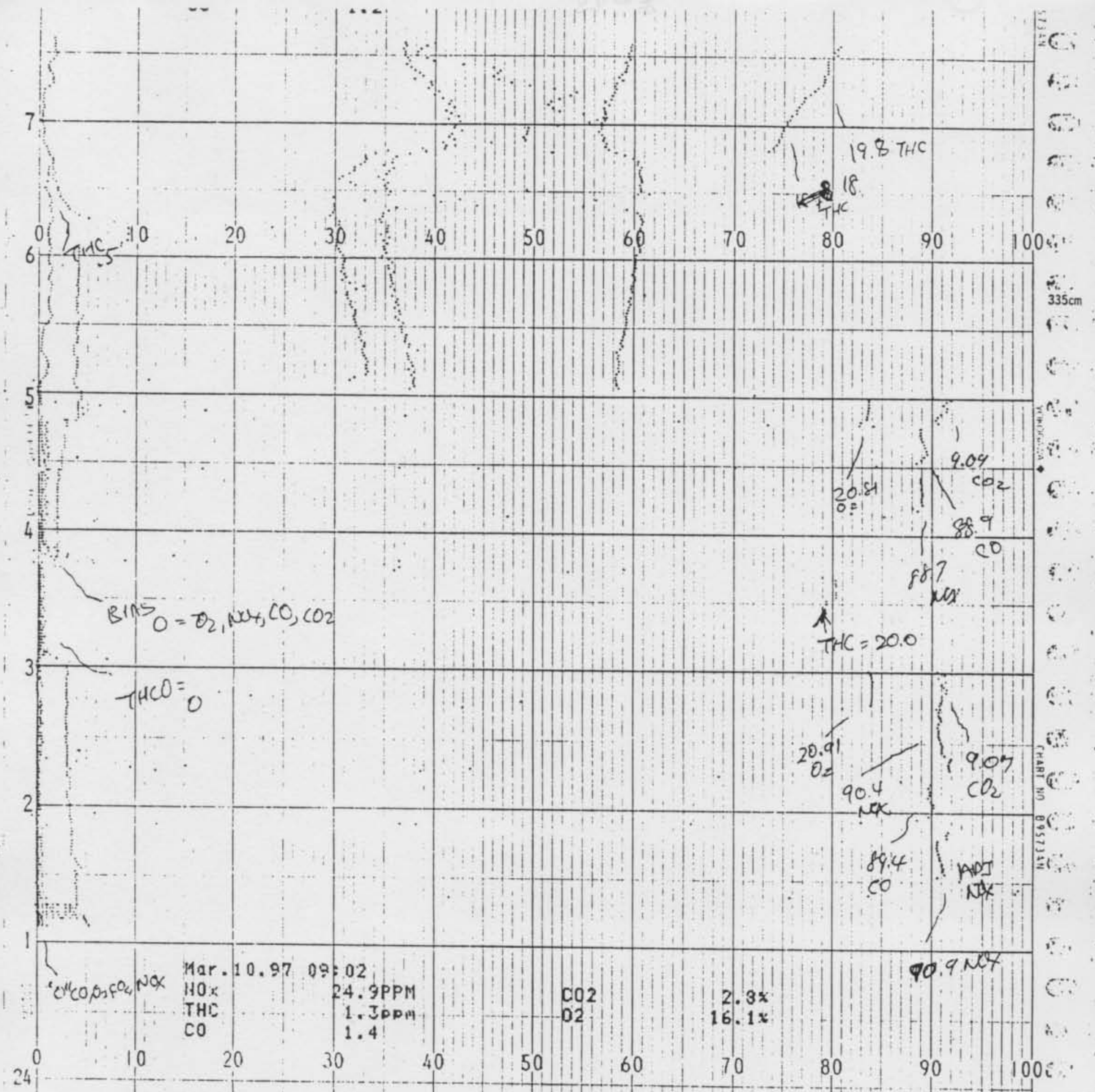
DAMES & MOORE

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						
.NSTR	TECO 48-52479-291		0-100PPM				
	TECO 42H-52914-294	0-100PPM					
	CAI 3300 N3L24807				0-10%		
	SERVOMEX 1400 014 20B/655			0-25%			
	TECO 51HT 55166-302					0-25PPM	
.ASSES	SA9772 10-20-98			20.95	9.02		
	SA 7849 3/99					20.1 PPM	
	AAL7946 4-11-98		89.8				
	SA 7550 11-21-98	90.5					
	CALIBRATION INFORMATION						
	Span	90.5	89.8	20.95	9.02	20.1	
	High Mid						
	Low Mid						
	TEST DATA						
	LOCAL CAL "O" LOG 0	.2	.4	.01	.01	0	
	SPAN "	90.4	89.4	20.91	9.07	20.0	
	BIAS "O" LOG 0	.3	.7	.02	.1	.5	
	SPAN "	88.7	88.9	20.81	9.04	19.8	
	RUN 1 1114/1316 LOG 1						
	BIAS "O" LOG 2	.3	.4	.02	.4	.6	
	SPAN "	85.5	87.8	20.7	~~8.7~~ 9.5	20.7	
	LOCAL "O" "	.2	.2	0	.4		
	SPAN	86.5	88.3	20.8	9.5		



```
Mar.10.97 09:02
NOx              24.9PPM         CO2          2.3%
THC               1.3ppm         O2          16.1%
CO                1.4
```

BALBOA PACIFIC
INCINERATOR

MUNI. WASTE BURN 3/10/97
TIRE BURN 2/12/97

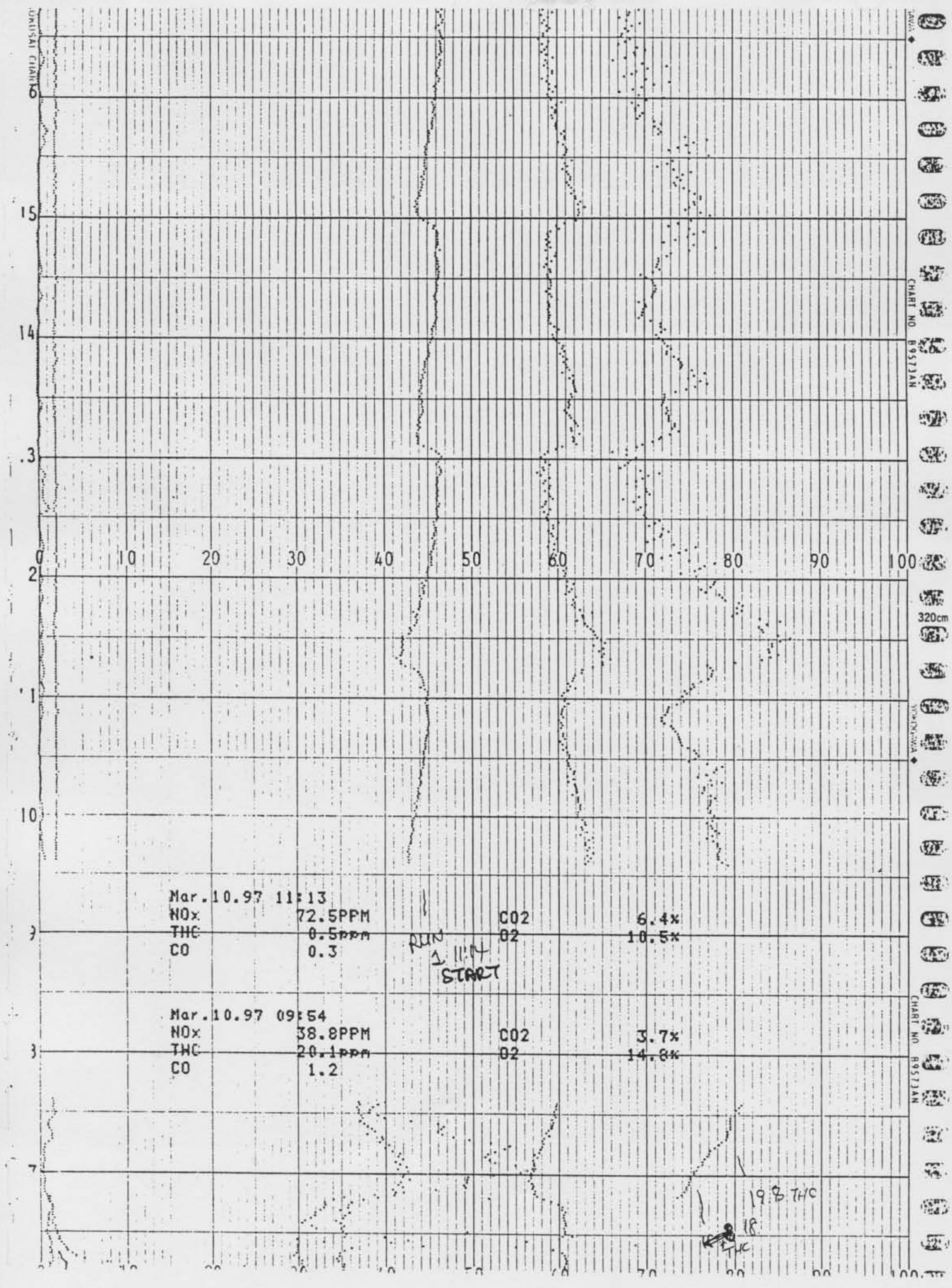
INSTRUMENTS
TECO 48-52478-281-CO-0-100PPM
TECO 42H-52814-284-NOx-0-100PPM
CAI 3300-N3124F07-CO_2-0-10%
SERVOMEX 1400-01420A/655-O_2 0-25%
TECO 51HT-53166-302-THC-0-25PPM

CHT SPEED
200mm/hr

OPERATOR
BJS

CYL-SPAN GAS EXP
A9172 9.02% CO_2/20.85 O_2 10-20-98
SA 15849 20.1 PPM C_3H_8 3/99
AAL 7946 89.8 CO 4-11-98
SA 7550 90.5 NOx 11-21-98

CO_2 = RED
THC = GRN
O_2 = BLU
CO = BRN
NOx = VIOLET



```
Mar.10.97 11:13
NOx          72.5PPM        CO2         6.4%
THC           0.5ppm        O2         10.5%
CO            0.3
```

RUN 1 11:14 START

```
Mar.10.97 09:54
NOx          38.8PPM        CO2         3.7%
THC          20.1ppm        O2         14.8%
CO            1.2
```

19.8 THC

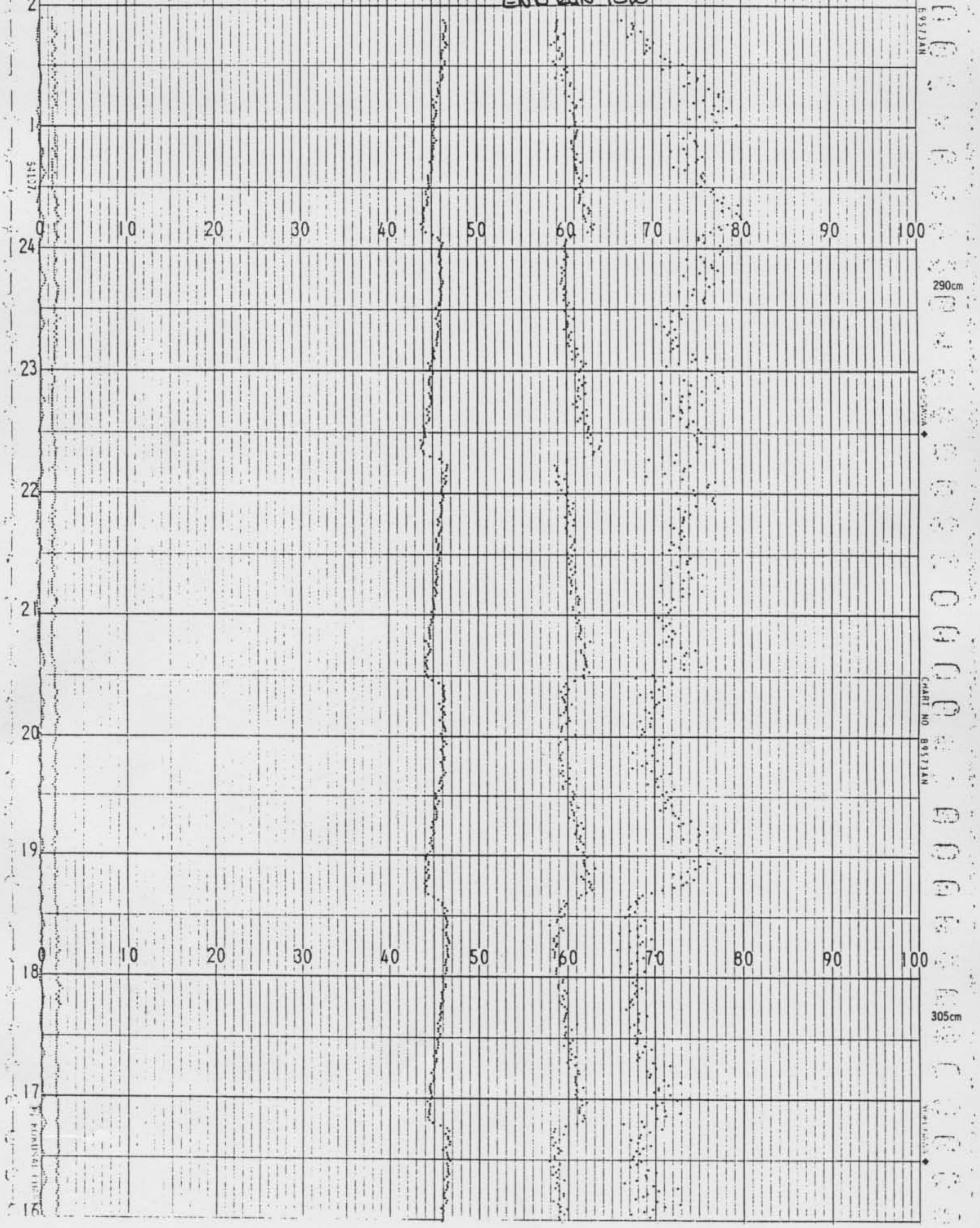
18

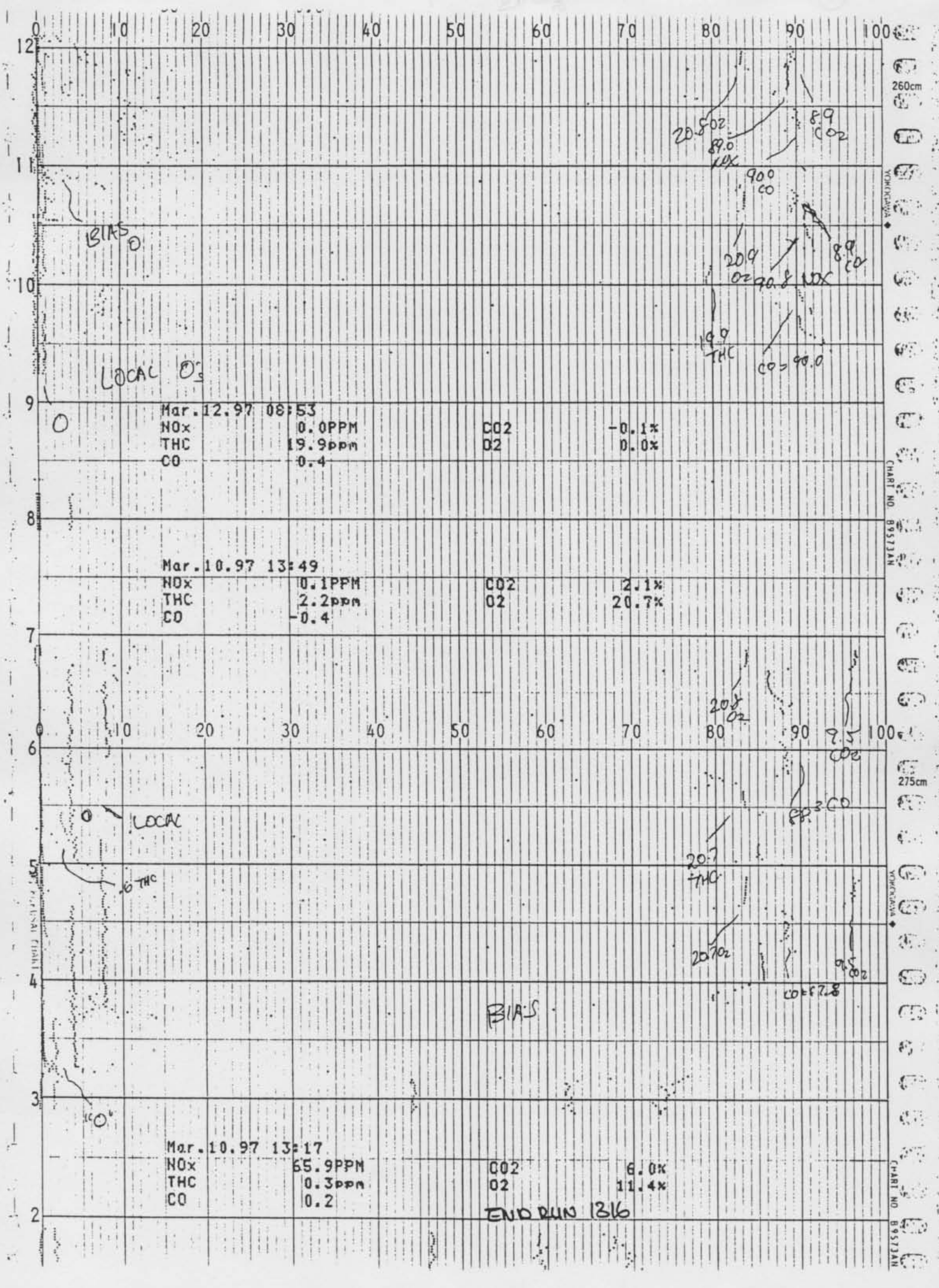
THC

Mar.10.97 13:17

NOx 65.9PPM
THC 0.3ppm
CO 0.2
CO2 6.0%
O2 11.4%

END RUN 1816





```
Mar.12.97 08:53
NOx          0.0PPM          CO2          -0.1%
THC         19.9ppm          O2            0.0%
CO           0.4
```

```
Mar.10.97 13:49
NOx          0.1PPM          CO2           2.1%
THC          2.2ppm          O2           20.7%
CO          -0.4
```

```
Mar.10.97 13:17
NOx         65.9PPM          CO2           6.0%
THC          0.3ppm          O2           11.4%
CO           0.2
```

END RUN 1316

APPENDIX D

CALIBRATION DATA

BI-MONTHLY DRY GAS METER CALIBRATION

Meter ID	2962389			
Box ID	M5B-2	Ambient Temperature	70	F
Date	3/4/97	Corrected Barometric Pressure	30.000	inHg
Cal. By	JRW			

		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

		Validation Tests	
Ave Y of Reference Meter	0.9981	[1-Y]<0.05	PASS
Semi-Annual Double Ave Y	1.0075	[Ymax-Ymin]<=0.01	PASS
		Ave Y < 2% Double Ave Y	PASS
Bi-Monthly Double Ave Y	1.0083	Bi-Monthly < 2% Semi-Annual	PASS
		[H@avg-Hmax,min]<=0.15	PASS
Average Delta H @	1.842632		

In accordance with SCAQMD Chapter III, Method 7.6

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

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 A (in)	P B (in)	Alpha A (d)	Alpha B (d)	Beta A (d)	Beta B (d)	z (in)	w (in)
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

S-Type Pitot Tube - Semi-Annual
Calibration Sheet

Calibration Date 11/15/96 Calibrated By JRW

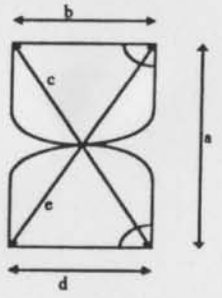
Pitot ID	L	P (A)	P (B)	dN	dT	dW	z	w
PT-003-1	95	0.456	0.456	0.827	0.885	6.75	0	0.01
PT-003-2	39	0.41	0.41	0.915	0.956	7	0.05	0
PT-005-1	58.5	0.308	0.308	0.8	0.903	7	0.04	0.01
PT-005-2	58.5	0.39	0.39	0.8	1	7	0.04	0
PT-008-1	95	0.456	0.456	0.827	0.93	7.25	0	0.025
PT-005-3	60	0.453	0.441	NA	0.775	60	0	0

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

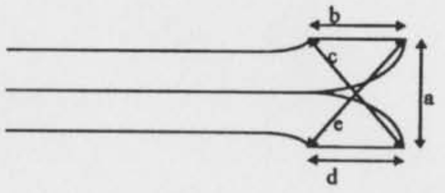
ANGLE CALCULATION MEASUREMENTS

Transverse Axis



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

Longitudinal Axis



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

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] $$\frac{(\text{ref temp }^\circ\text{C} + 273) - (\text{test thermo temp }^\circ\text{C} + 273)}{(\text{ref temp }^\circ\text{C} + 273)} \times 100$$

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] $\frac{(\text{ref temp } ^{\circ}\text{C} + 273) - (\text{test thermo temp } ^{\circ}\text{C} + 273)}{(\text{ref temp } ^{\circ}\text{C} + 273)} \times 100$

APPENDIX E

LABORATORY DATA

Calscience
Environmental
Laboratories, Inc.

March 26, 1997

Chris Barth
Dames & Moore, Inc.
6 Hutton Centre Drive, Suite 700
Santa Ana, CA 92707

Subject:	**Calscience Work Order Number:**	**97-03-230**
	Client Reference:	**Balboa Pacific/35746 001 0108**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 03/18/97 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested, and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,

Will H Christensen

Calscience Environmental
Laboratories, Inc.
William H. Christensen
Deliverables Manager

Will H Christensen for
Steven L. Lane
Laboratory Director

Calscience
Environmental
Laboratories, Inc.

ANALYTICAL REPORT

ACCREDITED

Dames & Moore, Inc.
6 Hutton Centre Drive, Suite 700
Santa Ana, CA 92707

Attn: Chris Barth
RE: Balboa Pacific/35746 001 0108

Date Sampled: 03/10/97
Date Received: 03/18/97
Date Extracted: 03/18/97
Date Analyzed: 03/22-24/97
Work Order No.: 97-03-230

Page 1 of 3

All concentrations are reported in mg/L (ppm). Analyses for metals were conducted on a WET extract.

Sample Number: Municipal Waste Ash

Analyte	Method	Concentration	Detection Limit
Antimony	EPA 6010A	ND	1.0
Arsenic	EPA 6010A	2.0	1.0
Barium	EPA 6010A	ND	0.2
Beryllium	EPA 6010A	1.0	0.1
Cadmium	EPA 6010A	ND	0.2
Chromium	EPA 6010A	0.5	0.3
Copper	EPA 6010A	8.1	0.5
Lead	EPA 6010A	ND	1.2
Nickel	EPA 6010A	29.0	0.4
Selenium	EPA 6010A	ND	1.0
Silver	EPA 6010A	ND	0.2
Thallium	EPA 6010A	4.1	1.6
Zinc	EPA 6010A	78.7	0.3
Manganese	EPA 6010A	32.8	0.5
Phosphorus	EPA 6010A	ND	5.0

Calscience
Environmental
Laboratories, Inc.

ANALYTICAL REPORT

Dames & Moore, Inc.		Date Sampled:	03/10/97
6 Hutton Centre Drive, Suite 700		Date Received:	03/18/97
Santa Ana, CA 92707		Date Extracted:	03/18/97
		Date Analyzed:	03/22-24/97
		Work Order No.:	97-03-230

Attn: Chris Barth
RE: Balboa Pacific/35746 001 0108

All concentrations are reported in mg/L (ppm). Analyses for metals were conducted on a WET extract.

Sample Number: Method Blank

Analyte	Method	Concentration	Detection Limit
Antimony	EPA 6010A	ND	1.0
Arsenic	EPA 6010A	ND	1.0
Barium	EPA 6010A	ND	0.2
Beryllium	EPA 6010A	ND	0.1
Cadmium	EPA 6010A	ND	0.2
Chromium	EPA 6010A	ND	0.3
Copper	EPA 6010A	ND	0.5
Lead	EPA 6010A	ND	1.2
Nickel	EPA 6010A	ND	0.4
Selenium	EPA 6010A	ND	1.0
Silver	EPA 6010A	ND	0.2
Thallium	EPA 6010A	ND	1.6
Zinc	EPA 6010A	ND	0.3
Manganese	EPA 6010A	ND	0.5
Phosphorus	EPA 6010A	ND	5.0

Calscience
Environmental
Laboratories, Inc.

ANALYTICAL REPORT

ACCREDITED

Dames & Moore, Inc.
6 Hutton Centre Drive, Suite 700
Santa Ana, CA 92707

Date Sampled:	03/10/97
Date Received:	03/18/97
Date Extracted:	03/18/97
Date Analyzed:	03/22-24/97
Work Order No.:	97-03-230

Attn: Chris Barth
RE: Balboa Pacific/35746 001 0108

Page 3 of 3

All concentrations are reported in mg/L (ppm). Analyses for metals were conducted on a WET extract.

QA/QC

Sample Number: Method Blank

Analyte	Method	Conc. Added	Conc. Rec.	%REC	Control Limits (%)
Barium	EPA 6010A	1.00	0.93	93	80 - 120
Zinc	EPA 6010A	1.00	1.10	110	80 - 120
Phosphorus	EPA 6010A	1.00	1.12	112	80 - 120

ND denotes not detected at indicated detection limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

Calscience
Environmental
Laboratories, Inc.

ACCREDITED

QUALITY ASSURANCE SUMMARY

ICP / GF Metals (Solids) - STLC

Dames & Moore, Inc.	Work Order No.:	97-03-230
Page 1 of 1	Date Analyzed:	03/18-22/97

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: 97-03-255-8

Analyte	Method	MS%REC	MSD%REC	Control Limits	%RPD	Control Limits
Antimony	EPA 6010A	96	89	80 - 120	7	0 - 20
Arsenic	EPA 6010A	90	95	80 - 120	5	0 - 20
Barium	EPA 6010A	80	78[Note 1]	80 - 120	3	0 - 20
Beryllium	EPA 6010A	91	90	80 - 120	2	0 - 20
Cadmium	EPA 6010A	87	85	80 - 120	2	0 - 20
Chromium	EPA 6010A	95	93	80 - 120	2	0 - 20
Copper	EPA 6010A	97	95	80 - 120	2	0 - 20
Lead	EPA 6010A	105	102	80 - 120	3	0 - 20
Nickel	EPA 6010A	97	97	80 - 120	0	0 - 20
Selenium	EPA 6010A	89	89	80 - 120	0	0 - 20
Silver	EPA 6010A	89	88	80 - 120	2	0 - 20
Thallium	EPA 6010A	87	84	80 - 120	4	0 - 20
Zinc	EPA 6010A	145[Note 1]	120	80 - 120	2	0 - 20
Manganese	EPA 6010A	92	87	80 - 120	3	0 - 20

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: Municipal Waste Ash

Analyte	Method	MS%REC	MSD%REC	Control Limits	%RPD	Control Limits
Phosphorus	EPA 6010A	123[Note 1]	112	80 - 120	10	0 - 20

1. The MS/MSD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS was in control and, hence, the associated sample data was reported with no further corrective action required.

(23U)

CHAIN-OF-CUSTODY

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

Sample ID	Date	Time	Container Type	ANALYSES CTLC Metals [illegible]								Field Notes	Number of Containers
Municipal Waste Ash	3.10.97	1200	[illegible]	✓								Municipal Waste Ash	1

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
	3.15.97/1200	
RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
	03-18-97 1020	V. Buckman

ANALYTICAL LABORATORY: Calscience Environmental

LABORATORY CONTACT: Jody McInerney PHONE: 714-895-5494

D&M CONTACT: Chris Barth PHONE: 714-433-2000 x419

LABORATORY NOTES:

DAMES & MOORE

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

JOB NO.: 35746 001 0108

PROJECT: Bimm Pacific

LOCATION: Santa Fe Springs, CA

COLLECTOR: C. Barth

DATE OF COLLECTION: 3.10.97

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • TEL: 708-953-9300 FAX: 708-953-9306
SINCE 1908
SGS Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
4665 PARIS STREET
SUITE B-200
DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

March 21, 1997

DAMES & MOORE
6 HUTTON CENTRE DR. SUITE 700
SANTA ANA CA 92707
CHRIS BARTH

Sample identification by
DAMES & MOORE

SAMPLE ID : BALBOA-MUN. WASTE
SAMPLE TIME: 12:00

Kind of sample MUNICIPAL WASTE FEED

Sample taken by DAMES & MOORE

Date sampled March 10, 1997

Date received March 18, 1997

Analysis report no. 72-355488

PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	28.56	xxxxxx
% Ash	26.93	37.69
% Volatile	40.89	57.24
% Fixed Carbon	3.62	5.07
	100.00	100.00
Btu/lb	5124	7172
% Sulfur	0.10	0.14
MAF Btu/lb		11510
% MAF Volatile		91.86
% MAF Fixed Carbon		8.14
lb SO_2/mm Btu		0.39
% Air Dry Loss		26.35

ULTIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	28.56	xxxxx
% Carbon	26.12	36.56
% Hydrogen	3.40	4.76
% Nitrogen	0.57	0.80
% Sulfur	0.10	0.14
% Ash	26.93	37.69
% Oxygen (diff)	14.32	20.05
	100.00	100.00
lb Sulfur/mm Btu		0.20
As Received Net Sample Wt.		65.10 g

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Denver Laboratory

CHAIN-OF-CUSTODY

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

[illegible] 18 1997

P

Sample ID	Date	Time	Container Type	ANALYSES HHV	[illegible]							Field Notes	Number of Containers
Balboa - Mun. Waste	3.10.97	1200	500ml Glass	X	355488							Municipal Waste Feed	1

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
	3/15/97/1100	
SEAN THOMAS	3-18-97	Sean Thomas

LABORATORY NOTES:

ANALYTICAL LABORATORY: Commercial Testing and Engineering

LABORATORY CONTACT: PHONE: 303-373-4772

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

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

JOB NO.: 35746 001 0108
PROJECT: Balboa Pacific
LOCATION: Santa Fe Springs
COLLECTOR: C. BARTH DATE OF COLLECTION: 3/10/97

Dames & Moore

EPA Method 8 - SO2 Analysis Calculations

Client: [illegible]

Location: [illegible]

Source: [illegible]

Date: [illegible]

Analyst: [illegible]

Sample ID	$BaCl_2$ Normality	Sample Volume, ml	Aliquot Volume, ml	Titrant Volume, ml	SO_2 mg
Blank	NA	NA	NA	[illegible]	NA
[illegible] - Day 1 - ([illegible])	[illegible]	[illegible]	25	ND (<[illegible])	[illegible]
[illegible]	[illegible]	[illegible]	25	3.51	[illegible]

Calculations:

Sulfate as SO_2 (mg) = (Tit. Vol. - Blank Vol.) * N_{BaCl2} * 64.08/2 * Sample Vol. / Aliquot Vol.

Notes:

Blank

Day-1

Day-2

3.49

3.53

Dames & Moore
EPA Method 6 - SO2 Analysis Calculations

Client:	Balboa Pacific Corporation	Date:	3/24/97
Location:	Santa Fe Springs, CA	Analyst:	CJB
Source:	BAL-PAC Exhaust		

Sample ID	$BaCl_2$ Normality	Sample Volume, ml	Aliquot Volume, ml	Titrant Volume, ml	SO_2 mg
Blank	NA	NA	NA	0.1	NA
Balboa Day-1 (Mun. Waste	0.01153	90	25	ND	0.07
Balboa Day-2 (Tires)	0.01153	50	25	3.51	2.52

Note: If ND, 1/2 detection limit used to calculate mg SO2

Calculations:

Sulfate as SO_2 (mg) = (Tit. Vol. - Blank Vol.) * N_{BaCl2} * 64.06/2 * Sample Vol. / Aliquot Vol.

Notes:

EPA SO_2 AUDIT ANALYSIS

AUDIT SAMPLE LOT No. 0594

$BaCl_2$ Normality: 0.01153

$BaCl_2$ Prepared By: C. Barth 2/27/97

ANALYST: C. Barth

DATE: 3.20.97

CHECKED BY: ______

BaCl2 TITRATIONS

		Sample ID 2594 Conc. 350 $\mathrm{mg/m^3}$	Sample ID 5594 Conc. 700 $\mathrm{mg/m^3}$	Sample ID BLANK Conc. —	Sample ID ______ Conc. ______
Run #1	Final	2.50	$\overset{3}{4}.\overset{9}{0}1$	0	
	Initial	0.52	0.09		
	Net	1.98	3.92		
Run #2	Final	4.50	$7.\overset{8}{9}0$		
	Initial	2.53	4.01		
	Net	1.97	3.89		
Run #3	Final				
	Initial				
	Net				

$$C_{SO2} = K_3 * (V_t - V_{tb}) * N * V_{soln} / (V_a * V_{m(std)})$$

K_3 = 32.03 mg/meq

V_t = $BaCl_2$ sample titrant volume

V_{tb} = $BaCl_2$ blank titrant volume

N = $BaCl_2$ Normality

V_{soln} = Sample volume (100 ml)

V_a = aliquot volume (20ml)

$V_{m(std)}$ = 21×10^{-3} dscm

Calculations:

No. 2594 Avg $V_t = 1.975$

No. 5594 Avg $V_t = 3.915$

% Diff

$$C_{SO_2[2594]} = 32.03 \times 1.975 \times 0.01153 \times \frac{100\,ml}{10\,ml} \times \frac{1}{21 \times 10^{-3}} = 347 \quad -0.9\%$$

$$C_{SO_2[5594]} = 32.03 \times \underset{3.915}{\cancel{1.975}} \times .01153 \times \frac{100}{10} \times \frac{1}{21 \times 10^{-3}} = 688 \quad -1.7\%$$

WCAS
WEST COAST
ANALYTICAL
SERVICE, INC.
An [illegible]

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

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

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

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

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

This report is to be reproduced in its entirety.

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

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 (MS) (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 31597/1100 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 (Balzca Pacific)

LOCATION: SANTA FE SPRINGS, CA

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

Liquid ®

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