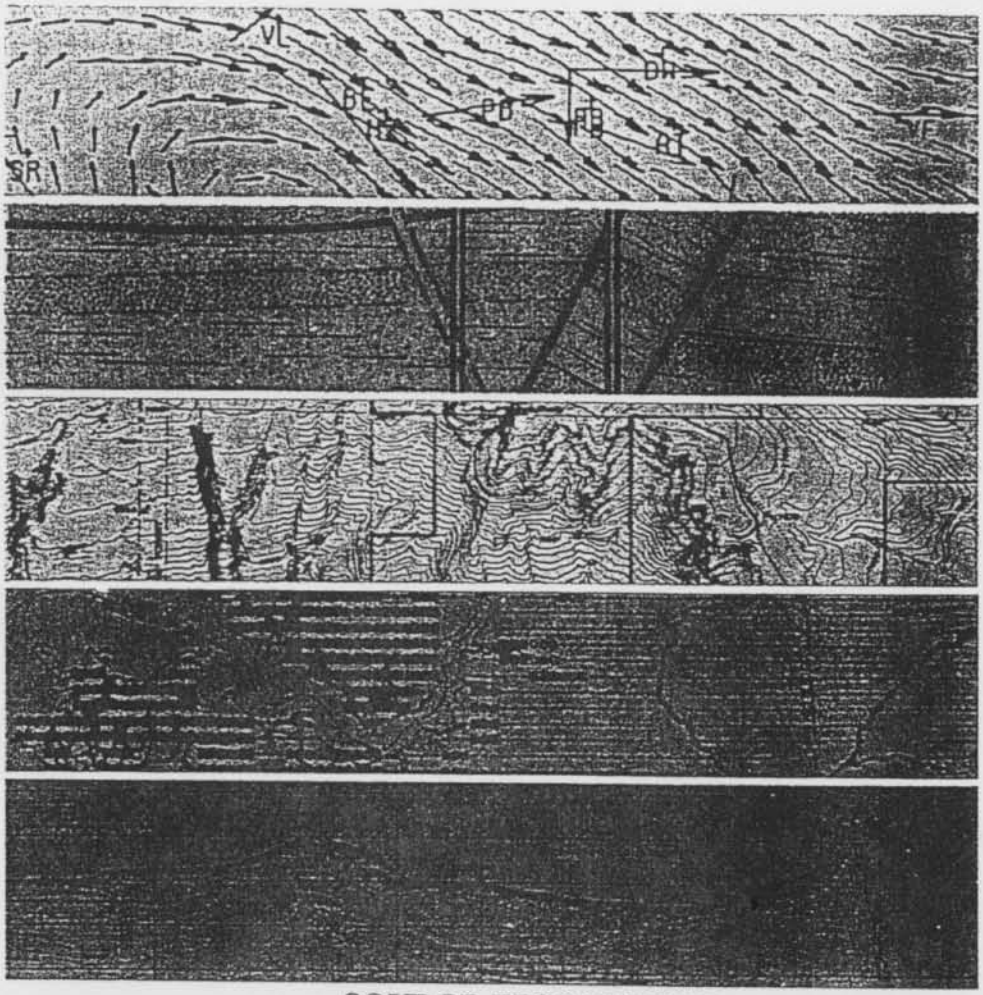

SOURCE TEST REPORT
PCB TREATABILITY DEMONSTRATION TEST
ON THE PYROLYTIC THERMAL CONVERSION UNIT
WITH A THERMAL OXIDIZER

PREPARED FOR:
BALBOA PACIFIC CORPORATION

No. 30990-002-131
February 1996

DAMES & MOORE

SOURCE TEST REPORT
PCB TREATABILITY DEMONSTRATION TEST
ON THE PYROLYTIC THERMAL CONVERSION UNIT
WITH A THERMAL OXIDIZER

--LIQUID AND SOLID FEED--

PREPARED FOR:
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February 1995

DAMES & MOORE

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

PREFACE

Firm Tested:	Balboa Pacific Corporation
Address	11240 Bloomfield Ave
City:	Santa Fe Springs, CA 90670
Contact:	Dr. Shapoor Hamid
Source:	BAL-PAC Exhaust

Date of Test:	November 21, 1995 & January 4,1996
Test Requested by:	Balboa Pacific Corporation
Contact:	Dr. Shapoor Hamid
Test Observed by:	Balboa Pacific Staff
Test Performed by:	Dames & Moore
Team Members:	Tony Host, Christopher J. Barth, Brian Satow, Jason Wirth
Test Objectives:	Demonstrate the PCB destruction efficiency of the BAL-PAC Pyrolytic Thermal Conversion Unit with a Thermal Oxidizer using liquid and solid feeds.
Test Methods:	EPA Method 23 "Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Municipal Waste Combustors"
	CARB Method 100 "Instrumental Methods for Gaseous Emissions"
	EPA Method 26 "Determination of Hydrogen Chloride Emissions From Stationary Sources"
	TGNMO - Determination of Total Gaseous Non-Methane Organics

EXECUTIVE SUMMARY

Balboa Pacific Corporation has developed the BAL-PAC Pyrolytic Conversion System for treatment of solid or liquid hazardous and non-hazardous waste. The basic principle of this system is the destruction and stabilization of the waste stream using high temperatures up to 2000 °F in an oxygen free environment during which the waste is converted into a stabilized ash and a combustible gas. The gas is further treated at up to 2250 °F and routed to a heat recovery boiler. Gas exits the boiler at approximately 350-500 °F and is fed through a wet scrubber system and then through an activated carbon bed where it exhausts to atmosphere at approximately 150 °F.

Dames & Moore was contracted by Balboa Pacific to conduct a PCB treatability demonstration study of the BAL-PAC Pyrolytic Conversion System. The primary goal of the treatability test was to determine the destrucion efficiency of the BAL-PAC system using a PCB contaminated transformer oil. The initial test plan consisted of using the PCB spiked oil as the feed and collecting samples from the feed, product ash and exhaust gas. However, the nature of the liquid feed matrix provided no product ash. Since the BAL-PAC System is designed to handle both solid and liquid feeds, it was desirable to obtain a destruction efficiency for both feed types. Therefore, a second test was conducted on the BAL-PAC System using a PCB contaminated sand feed in order to determine a solid feed destruction efficiency.

The liquid feed testing was conducted by Dames & Moore personnel on November 21, 1995. During the test, the PCB laced oil feed was fed into the system at a constant rate while both the liquid feed and exhaust gas exiting the carbon bed was sampled for PCB's. The results of this testing showed that there were no detectable quantities of PCB's in the exhaust gas of the BAL-PAC System. The liquid feed PCB destruction efficiency was calculated to be 99.999984% based on the detection limit of the exhaust gas PCB sampling technique.

In addition to the PCB testing, the following tests were conducted on the BAL-PAC exhaust:

- Dioxins and Furans
- Hydrogen chloride
- Hydrocarbons
- Oxygen
- Carbon dioxide
- Carbon monoxide
- Oxides of Nitrogen

The solid feed testing was conducted by Dames & Moore personnel on January 4, 1996. A PCB spiked sand matrix was fed into the BAL-PAC System at a constant rate. The contaminated feed and the ash waste product were sampled and analyzed for PCB's. Since the results of the previously conducted liquid feed testing indicated no detectable gaseous PCB exhaust emissions, the solid feed system destruction efficiency was based solely on the feed and ash compositions (the exhaust PCB concentrations were assumed negligible). Results of this analysis indicated a 99.969% PCB destruction efficiency for the solid feed based on a concentration of 121 mg/kg (ppm by wt.) for the feed and 0.000042 mg/kg (ppm by wt.) for the ash.

The U.S. Environmental Protection Agency in 40 CFR Part 761.70(b)(1) requires that the mass air emissions be no greater than 0.001 g PCB/kg of the PCB introduced, or 99.9999%. 40 CFR Part 761.125(c)(4)(v) requires that spill contaminated soil be decontaminated to 10 ppm PCBs by weight.

Testing was coordinated with Dr. Shapoor Hamid of Balboa Pacific Corporation (310-929-1633). Results of the liquid and solid feed testing are shown in the following Tables.

Table ES-1 BAL-PAC Exhaust Gas Data

Parameter	Units	BAL-PAC Exhaust
Temperature	°F	147
Velocity	ft/sec	11.5
Static Pressure	A H2O	-0.01
Stack Dimension	in.	16 x 21
Moisture	%	22.3
Flow Rate	ACFM	1,616
	DSCFM	1,085

Table ES-2 PCB Exhaust Emissions

Compound	Concentrations			Emissions
	ng/sample	DL	ng/dscf	ug/hr
Monochlorobiphenyl	ND	5.0	1.892	1.163
Dichlorobiphenyl	ND	5.0	1.892	1.163
Trichlorobiphenyl	ND	5.0	1.892	1.163
Tetrachlorobiphenyl	ND	5.0	1.892	1.163
Pentchlorobiphenyl	ND	5.0	1.892	1.163
Hexachlorobiphenyl	ND	5.0	1.892	1.163
Heptochlorobiphenyl	ND	5.0	1.892	1.163
Octachlorobiphenyl	ND	5.0	1.892	1.163
Nonachlorobiphenyl	ND	5.0	1.892	1.163
Decachlorobiphenyl	ND	5.0	1.892	1.163

ND = Not Detected
DL = Detection Limit
Note: ug/hr based on ½ the detection limit

Table ES-3 Liquid Feed PCB Destruction Removal Efficiency

Feed		
Flow Rate	gal/hr	2.56
PCB Concentration	g/gal	2.898
PCB Mass Flow Rate	g/hr	7.419
Exhaust		
Flow Rate	DSCFM	1,085
PCB Concentration	ng/DSCF	1.892
PCB Mass Flow Rate	µg/hr	1.163
Destruction Removal Efficiency	%	**99.999984**

Table ES-4 Dioxin/Furan Exhaust Emissions

Compound	Concentrations			Emissions
	pg/sample	DL	pg/dscf	ng/hr
2,3,7,8-TCDD	ND	9.2	0.000	0.000
Total TCDD	ND	9.2	0.000	0.000
1,2,3,7,8-PeCDD	ND	4.6	0.000	0.000
Total PeCDD	ND	4.6	0.000	0.000
1,2,3,4,7,8-HxCDD	ND	4.4	0.000	0.000
1,2,3,6,7,8-HxCDD	ND	4.7	0.000	0.000
1,2,3,7,8,9-HxCDD	ND	4.2	0.000	0.000
Total HxCDD	ND	4.7	0.000	0.000
1,2,3,4,6,7,8-HpCDD	ND	6.0	0.000	0.000
Total HpCDD	ND	6.0	0.000	0.000
OCDD	25		6.307	11.632
2,3,7,8-TCDF	ND	6.8	0.000	0.000
Total TCDF	160		40.367	74.445
1,2,3,7,8-PeCDF	ND	15	0.000	0.000
2,3,4,7,8-PeCDF	ND	12	0.000	0.000
Total PeCDF	63		15.895	29.313
1,2,3,4,7,8-HxCDF	ND	6.4	0.000	0.000
1,2,3,6,7,8-HxCDF	ND	7.5	0.000	0.000
2,3,4,6,7,8-HxCDF	ND	4.4	0.000	0.000
1,2,3,7,8,9-HxCDF	ND	3.1	0.000	0.000
Total HxCDF	19		4.794	8.840
1,2,3,4,6,7,8-HpCDF	ND	8.1	0.000	0.000
1,2,3,4,7,8,9-HpCDF	ND	5.0	0.000	0.000
Total HpCDF	ND	8.1	0.000	0.000
OCDF	18		4.541	83.375

ND = Not Detected

DL = Detection Limit

Table ES-5 Other Exhaust Emission Data

CONSTITUENT	CONCENTRATION	EMISSION RATE
Oxygen, O_2	11.4 %	NA
Carbon Dioxide, CO_2	4.4%	NA
Carbon Monoxide, CO	0.5 ppmv	0.002 lb/hr
Oxides of Nitrogen, NO_x	48.8 ppmv	0.39 lb/hr
Hydrogen Chloride, HCl	0.24 ppmv	0.002 lb/hr
Total Non-Methane Hydrocarbons	< 1 ppmv	< 0.002 lb/hr

Table ES-6 Solid PCB Concentrations

Compound	Units	Concentrations	
		Feed	Ash
Monochlorobiphenyl	ng/g	810	ND
Dichlorobiphenyl	ng/g	15000	2.3
Trichlorobiphenyl	ng/g	39000	12
Tetrachlorobiphenyl	ng/g	15000	5.7
Pentchlorobiphenyl	ng/g	23000	9.6
Hexachlorobiphenyl	ng/g	23000	12
Heptochlorobiphenyl	ng/g	4600	0.59
Octachlorobiphenyl	ng/g	250	ND
Nonachlorobiphenyl	ng/g	16	ND
Decachlorobiphenyl	ng/g	2.4	ND

ND = Not Detected

Table ES-7 Solid Feed PCB Destruction Removal Efficiency

Parameter	Units	Feed	Ash
Total PCB Concentration	ng/g	120,678	42.2
Net PCB Mass	g	5.474	1.723E-3
Destruction Removal Efficiency	%	**99.969**	

1.0 INTRODUCTION

Balboa Pacific Corporation (Balboa Pacific) 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.

Balboa Pacific has contracted Dames & Moore to conduct a treatability study for polychlorinated biphenyls (PCB's). The objectives of the treatability study are to meet the Department of Health Services, Title 22, Section 66261.4 (e) *Treatability Study Samples* and (f) *Samples Undergoing Treatability Studies at Laboratories and Testing Facilities* requirements and obtain data demonstrating the effectiveness and efficiency of the BAL-PAC system. This data will be presented to prospective clients to assure them of the feasibility of this technology. Any purchased units would have to meet the permitting and testing requirements of the area in which it would be installed.

On November 21, 1995, Dames & Moore personnel conducted testing on the feed and exhaust of the BAL-PAC system while using a contaminated PCB transformer oil as the feed. On January 4, 1996, testing was conducted on the feed and ash byproduct of the BAL-PAC system while using a contaminated PCB sand matrix as the feed. The following test methods were used:

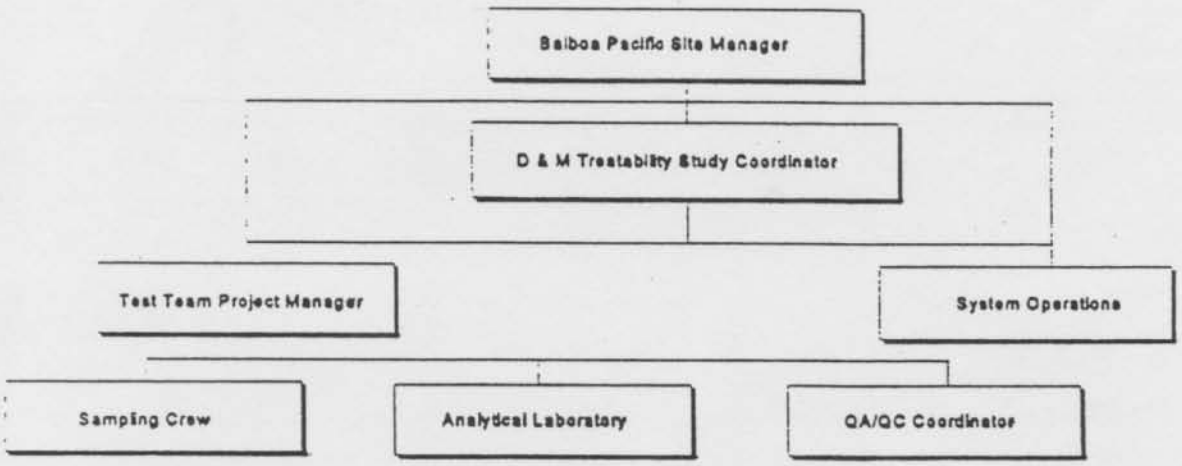
- **EPA Method 23** "Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzo Furans from Municipal Waste Combustors"
- **Modified EPA Method 680** Determination of PCB's using HRMS
- **SCAQMD Method 100.1** "Instrumental Methods for Gaseous Emissions"
- **EPA Method 26** "Determination of Hydrogen Chloride Emissions from Stationary Sources"
- **TGNMO** "Total Non-Methane Hydrocarbons"

The testing was conducted at Balboa Pacific, 11240 Bloomfield Avenue, Santa Fe Springs, California 90670. The BAL-PAC system has been granted a Research Permit (A/N 304641) under Rule 441 of the Rules and Regulations and the South Coast Air Quality Management District (SCAQMD).

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 PROJECT ORGANIZATION

An organization chart for the treatability study of the Balboa Pacific Pyrolytic Conversion System is presented in Figure 2-1. The Site Manager for Balboa Pacific was Mr. Shapoor Hamid. The Site Manager was responsible for the mechanical operation of the Pyrolytic Conversion System. The Treatability Study Coordinator was Mr. Tony Host of Dames & Moore. The Treatability Study Coordinator had the authority and responsibility of coordinating the activities of the



Pyrolytic Conversion System operational personnel and the Test Team Sampling Crew.

Under the direction of the Site Manager, the Coordinator assisted the operating personnel during start-up and optimization of the Pyrolytic Conversion System. The Coordinator monitored the operating conditions and ensured that the system was operated within the parameters established by the regulatory agencies. The Coordinator also insured that the spiked samples were correctly prepared and fed to the system.

Figure 2-1 Treatability Study Organization

The Sampling Team Project Manager was Mr. Chris Barth of Dames & Moore. He was responsible for the proper collection of all samples specified in the sampling and monitoring plan. He kept the Coordinator informed of overall progress and problems or potential problems on a timely basis and was responsible for the proper shipment of samples to the analytical laboratory as outlined in the project Quality Assurance Plan.

3.0 EQUIPMENT AND PROCESS ENGINEERING INFORMATION

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 subjected to high temperature (2250 °F) in a thermal oxidizer where the toxic gases are destroyed. There are four main subsystems to the BAL-PAC system described below. A diagram of the unit is shown in Figure 3-1.

- 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 is for the solid by-product produced after the pyrolytic retort. It is characterized by air locks implemented by synchronized valves that expel inert residual pyrolysis matter for post-pyrolytic processing.

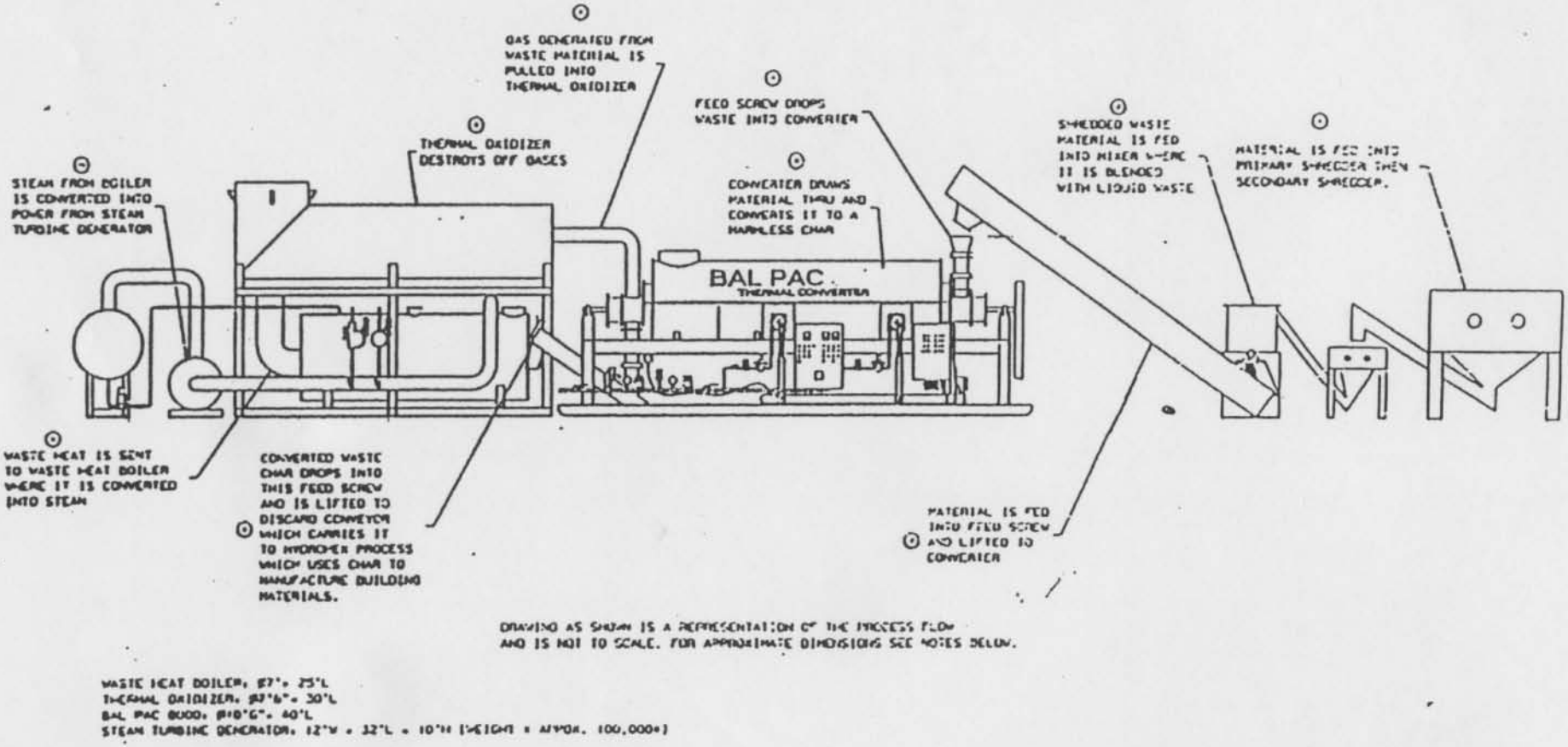


Figure 3-1 Diagram of BAL-PAC 200

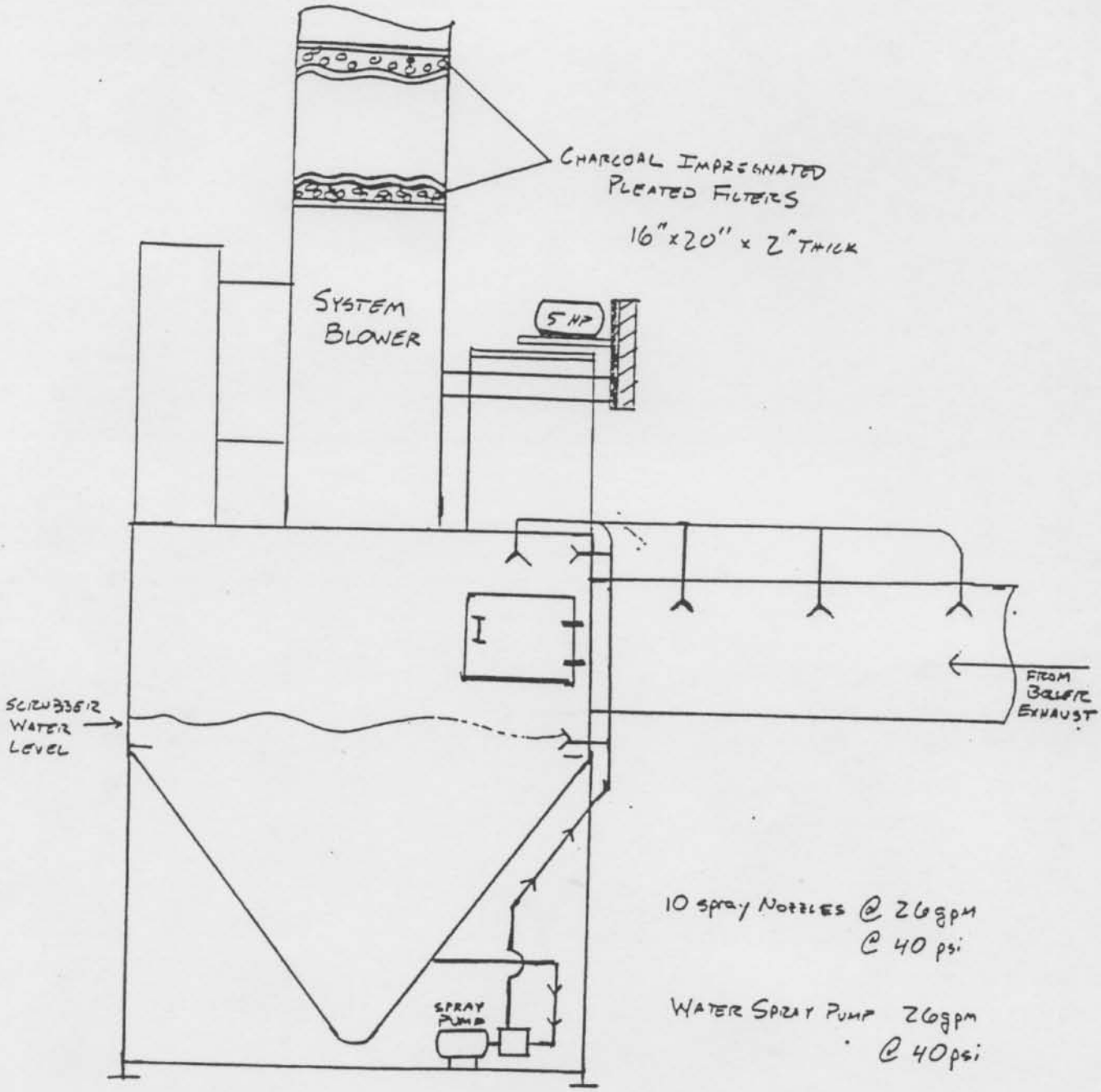


Figure 3-2 Diagram of BAL-PAC Scrubber and Carbon Bed

4.0 PROCESS OPERATION

The sampling and monitoring plan for the treatability study has been designed so that effective destruction of the PCB spiked mineral oil and PCB spiked sand can be verified. The test procedures were designed to consist of two pyrolytic conversion runs, the first run implemented a liquid feed (PCB spiked transformer oil) and the second run implemented a solid feed (PCB spike sand) at the specified operating conditions to assess system performance.

Liquid Feed

One day prior to the testing date, Balboa Pacific staff tuned the BAL-PAC system and adjusted the operating conditions to the proper test plan settings. During this period pure transformer oil (not PCB spiked), was used as the feed and the system was allowed to run overnight in order to maintain proper operating conditions during the testing date.

Twenty five (25) gallons of transformer oil were mixed with 200 grams of PCB's (Arochlor 1254) in a 55 gallon drum. Prior to the test run, the PCB spiked transformer oil was pumped into the BAL-PAC twenty-five gallon feed hopper. Upon transferring the oil to the hopper, the system was allowed to stabilize for approximately 90 minutes in order to ensure steady state conditions prior to conducting any testing.

Solid Feed

On the testing date, Dames & Moore personnel mixed fifteen grams of PCB's (Arochlor 1254) with ten pounds of transformer oil. This mixture was then added to ninety pounds of sand and fed into the BAL-PAC system via the solid feed hopper. The system was allowed to stabilize prior to conducting the sampling.

The system operations team, under the direction of the Balboa Pacific Site Manager, was responsible for monitoring and recording system process parameters, including feed rate, pyrolytic retort temperatures, thermal oxidizer temperatures and recovery boiler exit temperatures. A copy of the system parameters recorded during the testing period are included in Appendix A. Table 4-1 "BAL-PAC Operating Parameters" tabulates the system parameters during the course of the testing.

DAMES & MOORE
TRAVERSE SOURCE TEST DATA

Test No: 1
Sampling Location: 13E-13E IE-H

Date: 11/21/95
Sample Train: PC13/DILLON & TITAN

System Pre-Test Leak Check:
.005 cfm @ 10 "Hg vac
(Pitot tube Leak Check: ✓)

System Post-Test Leak Check
.005 cfm @ 10 "Hg vac
(Pitot tube Leak Check: ✓)

Time On	Source Point #	Gas Meter Reading (scf)	Stack Velocity Head (H2O)	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
0:00	—	577.615	—	—	—	—	—	—	—	68	70	—
:10	1	535.50	.110	149	4.3	4.3	246	223	50	69	81	5
:20	2	543.80	.110	150	4.3	4.3	249	254	49	77	78	5
:30	3	551.30	.095	150	3.7	3.7	251	258	53	74	83	6
:40	4	562.70	.075	150	3.0	3.0	251	251	51	75	85	5.5
:50	5	571.60	.060	150	2.4	2.4	251	252	50	76	86	5
1:00	6	582.10	.060	150	2.4	2.4	249	252	51	79	89	5
1:10	7	591.60	.065	150	3.0	3.2	246	258	53	80	90	5
1:20	8	602.81	.065	150	3.2	3.2	257	251	53	—	—	5
0:00	—	" "	—	—	—	—	—	—	—	[illegible]81	88	—
:10	1	606.30	.03	145	1.2	1.2	249	252	53	[illegible]81	84	3
:20	2	614.40	.025	145	1.0	1.0	246	251	55	[illegible]81	86	3.5
:30	3	620.10	.01	140	0.4	0.4	240	251	56	[illegible]81	86	3
:40	4	624.15	.01	149	0.4	0.4	247	252	57	[illegible]81	86	2
:50	5	628.30	.01	145	0.4	0.4	251	251	57	[illegible]81	86	
1:00	6	637.02	.01	150	0.4	0.4	249	251	55	[illegible]82	86	2
1:10	7	638.85	.005	150	0.2	0.2	249	252	57	[illegible]81	86	2
1:20	8	641.091	.005	149	0.2	0.2	249	251	55	[illegible]	—	2
0:00	—	" "	—	—	—	—	—	—	—	81	85	—
:10	1	644.60	.01	134	0.4	0.4	250	254	52	80	87	2.5
:20	2	646.75	.007	134	0.3	0.3	246	252	52	80	87	2.5
:30	3	652.60	.005	138	0.2	0.2	249	251	52	79	81	2.5
:40	4	655.50	.005	146	0.2	0.2	249	252	55	79	81	2
:50	5	659.30	.005	139	0.2	0.2	249	252	55	78	80	2
1:00	6	661.10	.005	147	0.2	0.2	249	251	56	79	80	2
1:10	7	663.75	.005	145	0.2	0.2	246	252	57	77	78	2
1:20	8	666.771	.005	145	0.2	0.2	249	252	57	—	—	—

Recorded by: E.B
Pitot Factor: 0.84

Nozzle #: N6-002 0.499-0.499-0.501 => Avg = 0.4997
Nozzle Diameter: _____
Barometric Pressure: 30.12 "HgA
Static Pressure in Stack: -0.01 "HgA (+/- _____ "H2O)

Calibration Data 11/30/95
Inclined Manometer: Extended (Cal: NA)
Pitot Tube No.: PT-003-1 (Cal: _____)
Potentiometer No.: 453-1 (Cal: _____)
Thermocouple No.: 443-1 (Cal: _____)
Gas Meter No: SA120660 (Cal: _____)
Meter Corr. Factor: 1.0062
DH@ = 1.9216

	Final	Initial	Net
Impinger #1	1783.2	446.3	
Impinger #2	618.5	621.0	
Impinger #3	669.0	668.5	
Impinger #4	554.4	551.9	
	748.6	763.8	
Total Wt Gain:			

Type Sampling Probe: Probe/Pitot/T.C. Assembly

NOTE: Lost Power @ 11:48
Back up @ 11:55

DAILY SYSTEM OPERATING PARAMETERS

JOB: BALDER / DAVIES & MOORE

Operators: Sam / Derek **Product:** PCO / AA OIL **Date:** 11/21/95

Time	Gas Meter/ PSI	Rate ~~#/Hr~~ %	Retort/ Temp	Retort RPM %	AB Temp	AB Fan	Temp INTERNAL	~~NOX~~ SYSTEM FAN %	~~SO₂~~ VAC	~~O₂~~ STACK TEMP (Inches)	~~CO~~ STACK TEMP SURFACE	~~CO₂~~	~~%~~ EFF	AB	Notes:
12:00 AM															
01:00 AM															
02:00 AM															
03:00 AM															
04:00 AM															
05:00 AM															
06:00 AM															
07:00 AM															
08:00 AM															
09:00 AM	65870.0 (10:21)				6588[illegible].8 (11:21)										
10:00 AM	[illegible]	45	1318 1450	24	2247	21.2	1374	36.8	0.3	580	150				
11:00 AM	65893.9	45	1316 1450	24	2252	21.2	1382	36.8	0.3	580	150	(Clear)			
12:00 PM	[illegible]	45	1319 1452	24	2270	21.2	1395	36.8	0.4	580	150				
01:00 PM	65919.0	45	1314 1450	24	2278	21.2	1397	36.8	0.4	580	150				
02:00 PM	65934.6	45	1319 1450	24	2262	21.4	1392	37.0	0.3	580	149				
03:00 PM	65957.5	45	1316 1450	24	2300	21.4	1370	37.0	0	580	149				
04:00 PM	65974.8	45	1320 1450	24	2264	21.4	1396	37.0	0	580	146				
05:00 PM															
06:00 PM															
07:00 PM															
08:00 PM															
09:00 PM															
10:00 PM															
11:00 PM															

STABLE

HOPPER FILLED WITH [illegible]

3:40 11" on about 11 3/4 gallons

4:25 13" on 9 1/3 gallons remaining - Test

Consumed 12 5/8 gallons

FEED PUMP TANK

CALIBRATION CHART

Gallons REMAINING	Inches FROM TOP LIP	Measured from NW Corner
1	27	
2	23 5/8	
3	21 1/2	
4	19 5/8	
5	18 1/4	
6	17	
7	15 7/8	
8	14 3/4	
9	13 7/8	
10	12 7/8	
11	12 1/8	
12	11 1/4	
13	10 1/2	
14	9 7/8	
15	9	
16	8 1/2	
17	7 7/8	
18	7 3/8	
19	6 3/4	
20	6 1/4	
21	5 3/4	
22	5 1/8	
23	4 5/8	
24	4 1/8	
25	3 1/2	

DAMES & MOORE

Sheet No.
Calc. No.
Rev. No.
By Date
Chk'd. Date

Job No. [illegible] Job [illegible]

Client [illegible] Subject Feed Sampling Log

TIME	ml sampled
11:45	2 ml
12:00	2 ml
12:15	2 ml
12:45	4 ml
13:08	4 ml
13:35	4 ml
14:05	4 ml
14:35	4 ml
15:05	4 ml
15:35	4 ml

DAMES & MOORE

Sheet No.
Calc. No.
Rev. No.
By Date
Chk'd. Date

Job No. 30990-001-0103-131 Job Baltic Ba... [illegible]
Client [illegible] Subject HCl Sampling Train

Impinger Weights

	final	initial	NET GAIN
1st	146.2	126.1	20.1
2nd	125.6	123.4	2.2
3rd	108.7	108.7	0
Silica	137.0	136.1	0.9
			23.2 g

Sampling Data

Rate: Initial Calibration: 2000 cc/min (Rotameter 25)
Final Calibration: 1920 cc/min
Average 1960 cc/min @ 70°F
30.12 "Hg

Time	Rotameter Setting
11:40	2.5
11:45	2.5
11:48	Down
11:55	up
12:00	2.25
12:05	2.25
12:10	2.25
12:15	2.75
12:20	2.25
12:25	2.75
12:30	2.25
12:35	2.25
12:40	2.25
12:45	2.75
12:48	STOP

Net Sampling Time = Elapsed - Pause
= 61 min

APPENDIX B

CALCULATIONS

DAMES & MOORE
TRAVERSE SOURCE TEST FIELD DATA

Test #: 30990-001-0103-131
Source: Balboa Pacific
Location: Santa Fe Springs
Stack ID: BAL-PAC Exhaust

Date: 11/21/95
Meter Box ID: SN 80660

Time On	Source Point #	Gas Meter Reading (scf)	Stack		dH		Probe Temp F	Hot Box Temp F	Dryer Temp F	Meter Temp F		Vacuum "Hg
			Velocity Head (H2O)	Temp F	Sqrt(dP) avg	Set dH				in	out	
0.0		523.515										
10.0	1	535.500	0.110	149	0.332	4.30	240	233	50	58	70	5.0
20.0	2	543.560	0.110	150	0.332	4.30	249	254	49	59	81	5.5
30.0	3	554.300	0.095	150	0.308	3.70	251	258	53	72	78	6.0
40.0	4	562.900	0.075	150	0.274	3.00	251	251	52	74	83	5.5
50.0	5	571.600	0.060	150	0.245	2.40	251	252	50	75	85	5.0
60.0	6	582.100	0.060	150	0.245	2.40	249	252	51	76	86	5.0
70.0	7	591.800	0.060	150	0.283	3.20	248	252	53	78	89	5.0
80.0	8	602.191	0.060	150	0.283	2.40	252	251	53	80	90	5.0
0.0		602.191										
10.0	1	606.300	0.030	145	0.173	1.20	249	252	53	81	88	3.0
20.0	2	614.400	0.025	145	0.158	1.00	249	251	55	81	84	3.5
30.0	3	620.100	0.010	148	0.100	0.40	250	251	56	81	86	3.0
40.0	4	624.150	0.010	149	0.100	0.40	247	252	57	81	86	2.0
50.0	5	628.300	0.010	149	0.100	0.40	251	251	57	81	86	2.0
60.0	6	632.020	0.010	150	0.100	0.40	249	251	55	81	86	2.0
70.0	7	636.850	0.005	150	0.071	0.20	249	252	52	82	86	2.0
80.0	8	641.091	0.005	149	0.071	0.20	249	251	55	81	86	2.0
0.0		641.091										
10.0	1	644.600	0.010	135	0.100	0.40	250	249	52	81	85	2.5
20.0	2	648.750	0.007	134	0.084	0.30	249	252	52	80	82	2.5
30.0	3	652.600	0.005	138	0.071	0.20	249	251	54	80	82	2.5
40.0	4	655.500	0.005	146	0.071	0.20	249	252	55	79	81	2.0
50.0	5	658.300	0.005	139	0.071	0.20	249	252	55	79	81	2.0
60.0	6	661.100	0.005	147	0.071	0.20	249	251	56	78	80	2.0
70.0	7	663.750	0.005	148	0.071	0.20	248	252	57	78	80	2.0
80.0	8	666.771	0.005	145	0.071	0.20	249	252	57	77	78	2.0
240.0		143.2	0.034	146.5	0.158	1.33	249	251	54		81	3.3

MOISTURE GAIN

	Final	Initial	Net
Impinger #1(Drop Out)	1283.2	446.3	836.9
Impinger #2	618.5	621.0	-2.5
Impinger #3	668.0	668.5	0.5
Impinger #4	554.4	551.9	2.5
Impinger #5	786.8	763.8	24.8

Total Wt Gain: **862.2**
(WWVol7): g

DAMES & MOORE
EPA METHOD 23 SAMPLING DATA

Source: Balboa Pacific — Date: 11/21/95
Location: Santa Fe Springs — Tester: C.B./T.W.
Test #: 30990-001-0103-13 — Checked by: AJH

Data Entry	SYMBOL	UNITS	DATA
Standard Temperature	td	deg F	60
Round Stack, Diameter	ds	inches	
Rectangular Stack, Length	L	inches	16.00
Width	W	inches	21.00
Nozzle Diameter	dn	inches	0.500
Average Stack Temperature	ts	deg F	146.5
Average Meter Temperature	tm	deg F	80.7
Barometric Pressure	Pbar	in. Hg	30.12
Stack Static Pressure	Pg	in. H2O	-0.01
Avg Delta H	dH	in. H2O	1.325
Avg Velocity Head	dP	in. H2O	0.034
Avg sqrt(dP) = sum(sqrt(dP))/N	sqrt(dP)	in. H2O	0.185
Pitot Coefficient	Cp	none	0.840
Gas Sample Volume	Vm	cuft	143.1560
Meter Calibration Factor	Yd	none	1.0062
Total Sampling Time	min	minutes	240
Stack Gas Oxygen Content	O2	%	11.38
Stack Gas Carbon Dioxide Content	CO2	%	4.44
Stack Gas Carbon Monoxide Content	Cco	ppmv	0.5
Stack Gas Oxides of Nitrogen Content	Cnox	ppmv	48.8
Net Weight Gain of Condenser Water (grams or milliliters)	Wwcg or Wwcm	g/ml	837.4
Net Weight Gain of Silica Gel	Wsg	g	24.8
Nozzle Area, An = 3.1416 * (dn/2)^2	An	sq. in.	0.1963
Stack Area, As = 3.1416*(ds)^2/576 (round) = L*W/144 (Rectangular)	As	sq. ft.	2.333
Avg Stack Temperature, Ts = ts + 460	Ts	deg R	606.5
Avg Meter Temperature, Tm = tm + 460	Tm	deg R	540.7
Standard Temperature, Tstd = td + 460	Tstd	deg R	520
Gas Sample Volume at Standard Conditions, Vm(std) = [Tstd/29.92]*Y*(Vm/Tm)*(Pbar+dH/13.6)	Vm(std)	cu.ft. cu.m.	139.915 3.962
Water Collected, Wwg = [Wwcg + Wsg or (Wwcm*0.9982 g/ml) + Wsg] - [(Wimp+Wsolv)/1000]	Wlc	g	862.200
Volume of Water Vapor, Vwc(std) = Wlc*21.85*Tstd/(29.92*18.0*454)	Vwc(std)	cu.ft.	40.066
Moisture Fraction, Bws = Vwc(std)/(Vm(std)+Vwc(std))	Bws	none	0.2226
Dry Stack Gas Molecular Weight, Md = (0.32*O2)+ (0.44*CO2)+(0.28*(100-O2+CO2))	Md	g/g-mole	29.17
Wet Stack Gas Molecular Weight, Mw = Md*(1-Bws) + 18.0*(Bws)	Mw	g/g-mole	26.68
Absolute Stack Pressure, Ps = Pbar + Pg/13.6	Ps	in. Hg	30.12
Stack Gas Velocity Vs = 85.49*Cp*sqrt(dP)*[sqrt(Ts/(Ps*Mw))] Vsm = 0.3048 * Vs	Vs Vsm	ft/sec m/sec	11.546 3.519
Actual Stack Gas Flow Rate, Q = 60*Vs*As	Q	acf/min	1,616
Dry Stack Gas Flow Rate (Dry, STP), Qsd = (Tstd/29.92)*Q*(1-Bws)*(Ps/Ts); Qsdm = Qsd/35.32	Qsd Qsdm	dscf/min dscm/min	1,085 30.7
Isokinetic Rate, I = 100 * As * Vm(std)/(min*(An/144)*Qsd)	I	%	92
Carbon Monoxide @ 3% O2	CO @ 3% O2	ppm	1
Oxides of Nitrogen @ 3% O2	NOx @ 3% O2	ppm	91.8
Carbon Monoxide Mass Emissions Eco = (Cco)*(3.836*10^-5)*(Qsd)*(60)/Tstd	Eco	lb/hr	0.00
Oxides of Nitrogen Mass Emissions (as NO2) Enox = (Cnox)*(6.302*10^-5)*(Qsd)*(60)/Tstd	Enox	lb/hr	0.39

Dioxin/Furan Data Page

Company	Balboa Pacific	Sampling Location	BAL-PAC Exh
Job Number	30990-1-103-131	Flow Rate (DSCFM)	1085
Test Date	11/21/95	Sample Volume (DSCF)	139.915
Test Number	1	Sample Time (min)	240

Compound	pg/sample	D.L.	pg/dscm	ng/hr
2,3,7,8-TCDD	ND	9.2	0.000	0.000
Total TCDD	ND	9.2	0.000	0.000
1,2,3,7,8-PeCDD	ND	4.6	0.000	0.000
Total PeCDD	ND	4.6	0.000	0.000
1,2,3,4,7,8-HxCDD	ND	4.4	0.000	0.000
1,2,3,6,7,8-HxCDD	ND	4.7	0.000	0.000
1,2,3,7,8,9-HxCDD	ND	4.2	0.000	0.000
Total HxCDD	ND	4.7	0.000	0.000
1,2,3,4,6,7,8-HpCDD	ND	6	0.000	0.000
Total HpCDD	ND	6	0.000	0.000
OCDD	25		6.307	11.632
2,3,7,8-TCDF	ND	6.8	0.000	0.000
Total TCDF	160		40.367	74.445
1,2,3,7,8-PeCDF	ND	15	0.000	0.000
2,3,4,7,8-PeCDF	ND	12	0.000	0.000
Total PeCDF	63		15.895	29.313
1,2,3,4,7,8-HxCDF	ND	6.4	0.000	0.000
1,2,3,6,7,8-HxCDF	ND	7.5	0.000	0.000
2,3,4,6,7,8-HxCDF	ND	4.4	0.000	0.000
1,2,3,7,8,9-HxCDF	ND	3.1	0.000	0.000
Total HxCDF	19		4.794	8.840
1,2,3,4,6,7,8-HpCDF	ND	8.1	0.000	0.000
1,2,3,4,7,8,9-HpCDF	ND	5	0.000	0.000
Total HpCDF	ND	8.1	0.000	0.000
OCDF	18		4.541	8.375

ng/hr = Total pg x Flow Rate (DSCFM) x 1/Sample Vol. (DSCF) x 60 min/hr x 1 ng/ 1000 pg

pg/dscm = Total pg x 1/Sample Volume (DSCF) x 35.3 ft^3/m^3

N.D. = Not Detected
D.L. = Detection Limit (pg/sample)

Entered By: Chris Barth Date: 12/15/95

DIOXIN.XLS

PCB Data Page

Company	Balboa Pacific	Sampling Location	BAL-PAC Exh
Lab Number	30990-1-103-131	Flow Rate (DSCFM)	1085
Test Date	11/21/95	Sample Volume (DSCF)	139.915
Test Number	1	Sample Time (min)	240

Compound	ng/sample	D.L.	ng/dscm	ug/hr
Monochlorobiphenyl	ND	5.0	1.892	1.163
Dichlorobiphenyl	ND	5.0	1.892	1.163
Trichlorobiphenyl	ND	5.0	1.892	1.163
Tetrachlorobiphenyl	ND	5.0	1.892	1.163
Pentachlorobiphenyl	ND	5.0	1.892	1.163
Hexachlorobiphenyl	ND	5.0	1.892	1.163
Heptochlorobiphenyl	ND	5.0	1.892	1.163
Octachlorobiphenyl	ND	5.0	1.892	1.163
Nonachlorobiphenyl	ND	5.0	1.892	1.163
Decachlorobiphenyl	ND	5.0	1.892	1.163
Total			18.922	11.632

ug/hr = Total ng x Flow Rate (DSCFM) x 1/Sample Vol. (DSCF) x 60 min/hr x 1 ug/1000 ng

ng/dscm = Total ng x 1/Sample Volume (DSCF) x 35.3 ft^3/m^3

N.D. = Not Detected
D.L. = Detection limit (ng/sample)

* - If Analyte is ND, 1/2 the detection limit is used for calculations.

Entered By: Chris Barth Date: 12/15/95

FILE ISALSON FACILITY
SUBJECT BALANCE EFFICIENCY CALCULATIONS
SHEET 1 OF 1

Feed & Efficiency Calc's

Feed Rate

Initial Vol	(11:30)	22.5 gall
Final Vol	(4:26)	9.875 gall
Net Time		296 min

$$\text{Feed Rate} = \frac{(22.5 - 9.875)\ \text{gall}}{296\ \text{min}} \times \frac{60\ \text{min}}{\text{hr}}$$

$$= 2.56\ \text{gall/hr}$$

Feed Composition

$$\text{Total PCB Concentration} = \frac{765{,}600\ \text{ng}}{\text{ml}} = \frac{0.7656\ \text{g}}{\text{L}} \times \frac{3.785\ \text{L}}{\text{gall}}$$

$$= 2.898\ \text{g/gallon}$$

PCB Feed Rate

$$\text{Concentration} \times \text{Feed Rate} = 2.898\ \text{g/gallon} \times 2.56\ \text{gallon/hr}$$

$$= 7.419\ \text{g/hr PCB's}$$

Exit Gas PCB Emissions

PCB concentrations all N.D.

Assume ½ D.L. for single PCB = 1.163 ng/hr = 1.163×10^{-6} g/hr

Efficiency

$$\left[1 - \frac{1.163 \times 10^{-6}\ \text{g/hr}}{7.419\ \text{g/hr}}\right] \times 100\% = 99.999984\ \%$$

DATE ____ TO EO ____
BY ____ DATE ____ TO EO ____
BY ____
SION
CHECKED BY ____
COPY TO EO ____

Dames & Moore

1 (12/88) PRINTED IN U.S.A.

BALBOA PACIFIC
HCl SAMPLING DATA

Source: Balboa Pacific Bal-Pac Exhaust
Date: 11/21/95
Sampled By: C.B. J.W.

Barometric Pressure ("Hg)	30.12
Ambient Temperature (°F)	75
Stack Gas Flow Rate (DSCFM)	1085

Field Sampling Data

Time	Rotameter Setting
11:40	2.5
11:45	2.5
11:48	Power Down
11:55	Power Up
12:00	2.25
12:05	2.25
12:10	2.25
12:15	2.25
12:20	2.25
12:25	2.25
12:30	2.25
12:35	2.25
12:40	2.25
12:48	Stop

Sampling Rate

Temperature (°F)	75
Pressure ("Hg)	30.12
Sampling Time (min)	61
Initial Calibration (cc/min)	2000
Final Calibration (cc/min)	1970
Average (cc/min)	1985

CALCULATIONS

Sample solution volume (mL)	60.0
Cl^- Sample Concentration (ppmw)	3.5
Cl^- Blank Concentration (ppmw)	ND
Sample Volume (DSCF) DSCF = Rate (cc/min) x Time (min) / 28317 x (T/T_{std}) x (P_{std}/P)	20.087
Stack HCl Concentration (ppmv) ppmv = Soln Vol (L) x ppmw x 836.86 x 1/DSCF x 1/M.W.	0.24
HCl Emission Rate (lb/hr) lbs/hr = ppmv x M.W. x 60 x DSCFM / 379×10^6	0.002

ND = Not Detected

APPENDIX C

CONTINUOUS EMISSION DATA

Client	Balboa Pacific
Job Number	
Date	11-21-95
Test Location	Incinerator
Engineers	BJS/JWJ/CB

Test Times

Start	
Stop	

Instrument	O_2	CO	NOx	CO_2		
Full Scale	25%	100PPM	100PPM	10%		
Mid Cal Value	9.991	50.32	45.8	5.05		
High Cal Value	19.97	89.1	89.5	9.11		
Bias Cal Value	19.97	89.1	89.5	9.11		

Time	Pre-Span Bias	19.79	89.7	87.76	9.04		
	Pre-Zero Bias	.07	.7	0	.01		
	Measured Conc.	11.2	1.58	47	2.8		
	Post-Span Bias	19.68	92.26	87.83	9.25		
	Post-Zero Bias	.06	2.6	.2	.10		
	Zero Cal **	-.02	.02	0	.01		
	High Cal **	19.94	89.1	89.3	9.11		
	Mid Cal	11.96	46.4	44.79	5.13		

** adjust instruments at this time if needed

Validation Tests

Cal Error 2% FS	-.15	0	-.2	0		
Bias Check 5% FS	-.8	.7	-1.9	-.8		
Bias Drift 3% FS	-.6	+2.9	.08	2.3		
Measure 20-95% FS						

Corrected Conc.						

Notes for Testing

1) If measured values fall within 10-20% Full Scale, a Cal gas 5% from the value, must be introduced after the test. This Cal must be within 1 ppm (or 2%) of the Cal gas value.
2) The pre-calibrations are entered on the previous test's sheet.

Field Notes: LOCAL, PRE & POST BIAS FOR RUN #1

CAL GAS:

SA 3184 10-20-98 O_2=19.97, CO_2=9.11
SA 8545 10-20-98 O_2=9.991, CO_2=5.05, CO=89.1
✓ALM 03495 4-12-98 CO=50.32
✓ALM 033681 4-7-97 NOx=45.8
✓ALM 045360 4-7-97 NOx=89.5

In accordance with SCAQMD Method 100.1

Customer	Burrell Recycle
Job Number	
Date	11-21-95
Test Location	Incinerator
Engineers	BSS/JKJ/CB

Test Times

Start	
Stop	

Instrument	O2	CO	NOX	CO2		
Full Scale	25%	100PPM	100PPM	10%		
Mid Cal Value						
High Cal Value	19.97	89.1	89.5	9.11		
Bias Cal Value						

Time						
Pre-Span Bias						
Pre-Zero Bias						
Measured Conc.						
Post-Span Bias						
Post-Zero Bias						
Zero Cal **	-.01	.01	0	.01		
High Cal **	19.90	89.7	89.7	9.12		
Mid Cal						

** adjust instruments at this time if needed

Validation Tests

Cal Error 2% FS	-.4	+.7	+.2	+.1		
Bias Check 5% FS						
Bias Drift 3% FS						
Measure 20-95% FS						

Corrected Conc.						

Notes for Testing

1) If measured values fall within 10-20% Full Scale, a Cal gas 5% from the value, must be introduced after the test. This Cal must be within 1 ppm (or 2%) of the Cal gas value.
2) The pre-calibrations are entered on the previous test's sheet.

Field Notes:
LOCAL TEST AFTER POWER FAILURE AT 1148 PST

In accordance with SCAQMD Method 100.1

Continuous Emission Monitoring

Client	Balboa Pacific
Job Number	
Date	11-21-95
Test Location	Incinerator
Engineers	BJS/JW/CB

Test Times

Start	
Stop	

Instrument	O_2	CO	NOX	CO_2	CO_2	
Full Scale						
Mid Cal Value						
High Cal Value	19.97	89.1	89.5	9.11		
Bias Cal Value						

Time							
	Pre-Span Bias	19.65	92.4	88.46	~~9.01~~	9.01	
	Pre-Zero Bias	0.01	2.73	-.02	~~.01~~	.01	
	Measured Conc.						
	Post-Span Bias	19.59	92.9	88.25	~~9.02~~	9.02	
	Post-Zero Bias	.01	3.88	.08	~~.06~~	.06	
	Zero Cal **	-.05	-.29	-.12	.18	-.01	
	High Cal **	19.81	89.3	89.45	9.31	9.04*	
	Mid Cal						

** adjust instruments at this time if needed

Validation Tests

Cal Error 2% FS	-.8	+.2	-.6	+2.2	-.8	
Bias Check 5% FS	-.8	+3.47	-1.1		-.3	
Bias Drift 3% FS	-.3	.5	-.47		.1	
Measure 20-95% FS						

Corrected Conc.						

Notes for Testing

1) If measured values fall within 10-20% Full Scale, a Cal gas 5% from the value, must be introduced after the test. This Cal must be within 1 ppm (or 2%) of the Cal gas value.
2) The pre-calibrations are entered on the previous test's sheet.

Field Notes:
- LOCAL TEST AS IS PRIOR TO RUN #2
- PRE & POST BIAS FOR RUN #2

* LOCAL TEST AFTER ADJUSTING THE CO_2

In accordance with SCAQMD Method 100 1

Continuous Emissions Monitor...

Client	Balboa Pacific
Job Number	
Date	11-21-95
Test Location	2 incinerator
Engineers	RJS/JCW/CB

Test Times

Start	
Stop	

Instrument	O2	CO	NOX	CO2		
Full Scale						
Mid Cal Value						
High Cal Value	19.97	89.1	89.5	9.11		
Bias Cal Value						

Time							
	Pre-Span Bias						
	Pre-Zero Bias						
	Measured Conc.						
	Post-Span Bias						
	Post-Zero Bias						
	Zero Cal **	-.05	-.24	-.12	.05		
	High Cal **	19.79	89.5	89.37	9.09		
	Mid Cal						

** adjust instruments at this time if needed

Validation Tests

Cal Error 2% FS	-.9	.4	-.14	-.2		
Bias Check 5% FS						
Bias Drift 3% FS						
Measure 20-95% FS						

Corrected Conc.						

Notes for Testing

1) If measured values fall within 10-20% Full Scale, a Cal gas 5% from the value, must be introduced after the test. This Cal must be within 1 ppm (or 2%) of the Cal gas value.
2) The pre-calibrations are entered on the previous test's sheet.

Field Notes: FINAL LOCAL CHECK AFTER RUN #2

In accordance with SCAQMD Method 100.1

SUMMARY: TEST1.XLS

Client BALBOA PACIFIC
Unit UNIT 1
Test # 1

DATE: 11-21-1995
Begin 12:12:00
End 13:12:00

Type	Average Conc. ppm	Span Value	Zero Bias Pre	Zero Bias Post	Span Bias Pre	Span Bias Post	Corrected Conc. ppm	Corrected Conc. ppm @3% O2
O2	11.40	19.97	0.07	0.06	19.79	19.68	**11.51**	
NOx	47.10	89.50	0.00	0.20	87.76	87.83	**47.97**	**91.41**
CO	2.26	89.10	0.70	2.60	89.70	92.26	**0.61**	
CO2	2.95	9.11	0.01	0.10	9.04	9.25	**2.90**	

BALBOA PACIFIC
UNIT 1
DATE: 11-21-1995
TIME: 12:12:00.84
Test # 1

Time 1/(sec)	NOx ppm	CO2 %	CO ppm	O2 %
12:12:02	47.07	2.89	1.22	11.46
12:12:12	46.95	2.85	1.22	11.56
12:12:22	46.85	2.79	1.29	11.73
12:12:32	46.95	2.85	1.32	11.61
12:12:42	46.95	2.96	1.25	11.35
12:12:52	47.07	2.88	1.21	11.50
12:13:02	47.17	2.86	1.22	11.55
12:13:12	47.05	2.81	1.21	11.71
12:13:22	46.85	2.84	1.21	11.66
12:13:32	46.66	2.88	1.22	11.57
12:13:42	46.36	2.90	1.29	11.49
12:13:52	46.46	2.90	1.32	11.51
12:14:02	46.56	2.84	1.32	11.65
12:14:12	46.14	2.78	1.23	11.84
12:14:22	45.87	2.75	1.30	11.89
12:14:32	46.04	2.84	1.32	11.68
12:14:42	46.14	2.91	1.32	11.47
12:14:52	46.36	2.94	1.32	11.43
12:15:02	46.56	2.93	1.23	11.38
12:15:12	46.46	2.87	1.21	11.53
12:15:22	46.46	2.83	1.22	11.67
12:15:32	46.36	2.84	1.30	11.65
12:15:42	46.36	2.91	1.32	11.51
12:15:52	46.44	2.95	1.32	11.33
12:16:02	46.66	2.92	1.22	11.43
12:16:12	46.85	2.90	1.22	11.45
12:16:22	47.05	2.87	1.22	11.53
12:16:32	47.17	2.85	1.21	11.60
12:16:42	47.24	2.90	1.31	11.48
12:16:52	47.24	2.98	1.41	11.29
12:17:02	47.27	3.00	1.50	11.20
12:17:12	47.56	2.92	1.69	11.41
12:17:22	47.95	2.79	1.71	11.74
12:17:32	47.34	2.85	1.71	11.60
12:17:42	46.66	2.94	1.71	11.39
12:17:52	47.17	2.98	1.60	11.28
12:18:02	47.66	3.03	1.59	11.14
12:18:12	47.66	2.94	1.59	11.34
12:18:22	47.73	2.85	1.50	11.60
12:18:32	47.27	2.85	1.50	11.66
12:18:42	46.85	2.96	1.50	11.38
12:18:52	46.95	2.97	1.59	11.29
12:19:02	47.05	3.01	1.71	11.24
12:19:12	47.44	2.93	1.81	11.37
12:19:22	47.95	2.75	1.81	11.85
12:19:32	47.07	2.86	1.71	11.65
12:19:42	46.26	2.89	1.59	11.55
12:19:52	46.66	3.04	1.59	11.17
12:20:02	46.95	2.97	1.59	11.27
12:20:12	46.83	2.82	1.59	11.67
12:20:22	46.85	2.88	1.60	11.57
12:20:32	46.95	2.84	1.71	11.66
12:20:42	47.05	2.84	1.72	11.70
12:20:52	46.56	2.83	1.82	11.74
12:21:02	45.95	3.02	1.90	11.24
12:21:12	47.14	2.98	1.90	11.25
12:21:22	48.24	2.83	1.90	11.65
12:21:32	47.05	2.84	1.81	11.64
12:21:42	45.97	2.95	1.80	11.38
12:21:52	46.66	2.98	1.70	11.31

12:22:02	47.34	2.99	1.59	11.26
12:22:12	47.46	2.95	1.61	11.36
12:22:22	47.46	2.89	1.71	11.51
12:22:32	47.07	2.71	1.71	11.97
12:22:42	46.66	2.78	1.68	11.87
12:22:52	46.46	2.86	1.61	11.65
12:23:02	46.04	2.96	1.69	11.41
12:23:12	46.66	3.02	1.57	11.19
12:23:22	47.17	2.95	1.52	11.34
12:23:32	47.17	2.90	1.61	11.48
12:23:42	47.24	2.85	1.68	11.60
12:23:52	47.05	2.93	1.60	11.44
12:24:02	46.75	3.03	1.59	11.18
12:24:12	47.24	3.04	1.62	11.13
12:24:22	47.75	2.92	1.71	11.38
12:24:32	47.17	2.79	1.77	11.77
12:24:42	46.66	2.86	1.93	11.66
12:24:52	46.36	2.99	2.00	11.30
12:25:02	45.95	3.01	1.97	11.22
12:25:12	46.85	2.97	1.88	11.31
12:25:22	47.63	2.92	1.78	11.45
12:25:32	47.34	2.89	1.74	11.51
12:25:42	47.17	2.84	1.84	11.65
12:25:52	46.63	2.90	1.90	11.53
12:26:02	46.12	3.00	1.93	11.29
12:26:12	46.66	2.98	1.97	11.30
12:26:22	47.24	2.90	1.87	11.46
12:26:32	47.17	2.91	1.88	11.50
12:26:42	47.05	2.86	2.00	11.59
12:26:52	47.05	2.90	2.04	11.52
12:27:02	46.92	3.02	2.10	11.23
12:27:12	47.44	2.99	2.06	11.25
12:27:22	47.85	2.93	1.96	11.36
12:27:32	47.75	2.83	1.94	11.67
12:27:42	47.73	2.90	1.88	11.56
12:27:52	47.34	2.85	1.79	11.60
12:28:02	46.95	2.85	1.83	11.66
12:28:12	46.14	2.99	1.71	11.36
12:28:22	45.34	2.97	1.75	11.32
12:28:32	46.24	2.88	1.81	11.52
12:28:42	47.14	2.89	1.86	11.54
12:28:52	46.95	2.84	1.81	11.65
12:29:02	46.75	2.83	1.96	11.73
12:29:12	46.34	2.99	1.96	11.33
12:29:22	45.85	2.93	1.76	11.41
12:29:32	46.46	2.87	1.81	11.55
12:29:42	46.95	2.87	1.85	11.59
12:29:52	46.75	2.92	1.90	11.46
12:30:02	46.53	2.90	1.90	11.52
12:30:12	46.53	3.04	1.90	11.22
12:30:22	46.53	3.03	1.86	11.17
12:30:32	46.75	2.93	1.85	11.41
12:30:42	46.92	2.82	1.90	11.68
12:30:52	46.66	2.81	1.90	11.76
12:31:02	46.34	2.95	1.96	11.45
12:31:12	46.66	2.92	2.00	11.46
12:31:22	46.83	2.98	1.94	11.30
12:31:32	47.14	2.95	1.90	11.34
12:31:42	47.44	2.94	1.90	11.40
12:31:52	47.85	2.91	1.90	11.45
12:32:02	48.24	3.02	1.90	11.24
12:32:12	48.27	3.12	1.96	10.92
12:32:22	48.24	3.08	2.08	10.99
12:32:32	48.14	2.99	2.04	11.22
12:32:42	48.02	2.91	2.00	11.45
12:32:52	47.85	2.86	2.00	11.58
12:33:02	47.73	2.88	2.00	11.57

12:33:12	47.73	2.92	2.07	11.46
12:33:22	47.83	3.01	2.10	11.25
12:33:32	47.66	3.07	2.10	11.04
12:33:42	47.44	3.00	2.10	11.21
12:33:52	47.73	2.91	2.03	11.42
12:34:02	48.02	2.87	2.07	11.56
12:34:12	47.53	3.00	2.10	11.29
12:34:22	47.05	3.15	2.10	10.87
12:34:32	47.95	3.05	2.18	11.05
12:34:42	48.95	2.90	2.20	11.47
12:34:52	47.95	2.87	2.20	11.57
12:35:02	46.95	2.80	2.20	11.76
12:35:12	46.75	2.99	2.12	11.35
12:35:22	46.56	3.06	2.10	11.10
12:35:32	47.05	3.02	2.18	11.16
12:35:42	47.53	2.95	2.20	11.36
12:35:52	47.44	2.96	2.28	11.35
12:36:02	47.34	2.95	2.29	11.41
12:36:12	47.34	3.08	2.29	11.04
12:36:22	47.24	3.00	2.22	11.19
12:36:32	47.53	3.01	2.21	11.23
12:36:42	47.95	2.97	2.20	11.30
12:36:52	47.85	2.91	2.20	11.46
12:37:02	47.83	2.87	2.20	11.58
12:37:12	47.56	2.94	2.29	11.43
12:37:22	47.34	3.14	2.29	10.95
12:37:32	48.02	3.09	2.29	10.93
12:37:42	48.85	2.92	2.29	11.37
12:37:52	48.34	2.93	2.21	11.43
12:38:02	47.83	3.00	2.21	11.24
12:38:12	47.95	2.94	2.20	11.37
12:38:22	48.14	3.02	2.20	11.23
12:38:32	48.02	3.07	2.29	11.06
12:38:42	48.02	2.97	2.22	11.26
12:38:52	47.95	2.90	2.20	11.46
12:39:02	47.85	2.92	2.20	11.48
12:39:12	47.85	3.03	2.21	11.20
12:39:22	47.63	3.15	2.20	10.88
12:39:32	48.34	3.04	2.20	11.07
12:39:42	49.05	2.93	2.20	11.37
12:39:52	48.24	2.89	2.20	11.52
12:40:02	47.53	2.83	2.20	11.66
12:40:12	47.24	2.91	2.20	11.51
12:40:22	46.85	3.00	2.20	11.28
12:40:32	47.44	3.02	2.29	11.20
12:40:42	47.95	3.01	2.39	11.20
12:40:52	48.05	2.92	2.39	11.41
12:41:02	48.02	2.89	2.39	11.51
12:41:12	47.63	2.84	2.29	11.66
12:41:22	47.34	2.97	2.29	11.38
12:41:32	47.44	3.02	2.29	11.19
12:41:42	47.53	3.05	2.29	11.11
12:41:52	47.56	2.98	2.30	11.26
12:42:02	47.56	3.00	2.30	11.22
12:42:12	47.73	2.98	2.38	11.29
12:42:22	48.05	2.96	2.38	11.36
12:42:32	47.83	2.87	2.29	11.55
12:42:42	47.63	2.93	2.29	11.47
12:42:52	47.63	3.08	2.29	11.08
12:43:02	47.53	2.99	2.30	11.22
12:43:12	47.73	2.93	2.39	11.40
12:43:22	48.02	3.01	2.39	11.28
12:43:32	48.05	3.05	2.39	11.11
12:43:42	47.92	2.99	2.38	11.27
12:43:52	47.92	3.01	2.39	11.20
12:44:02	47.92	2.93	2.39	11.41
12:44:12	47.83	2.89	2.41	11.55

12:44:22	47.63	2.97	2.49	11.38
12:44:32	47.63	3.10	2.49	11.02
12:44:42	47.63	3.04	2.48	11.11
12:44:52	47.83	2.97	2.38	11.30
12:45:02	48.02	2.91	2.39	11.47
12:45:12	47.73	2.83	2.39	11.66
12:45:22	47.34	2.94	2.41	11.49
12:45:32	47.56	3.04	2.50	11.18
12:45:42	47.63	3.07	2.49	11.06
12:45:52	48.02	2.99	2.49	11.25
12:46:02	48.32	2.96	2.53	11.35
12:46:12	48.12	2.94	2.62	11.39
12:46:22	47.85	2.99	2.69	11.30
12:46:32	47.83	3.01	2.66	11.27
12:46:42	47.85	3.05	2.61	11.14
12:46:52	48.12	2.95	2.60	11.33
12:47:02	48.51	2.94	2.60	11.39
12:47:12	48.12	2.86	2.63	11.60
12:47:22	47.85	2.96	2.75	11.41
12:47:32	47.83	3.04	2.96	11.16
12:47:42	47.73	3.03	3.02	11.18
12:47:52	47.73	3.00	2.86	11.24
12:48:02	47.83	2.89	2.80	11.53
12:48:12	47.14	2.83	2.92	11.71
12:48:22	46.44	2.87	3.09	11.64
12:48:32	46.63	2.84	3.02	11.72
12:48:42	46.73	2.99	2.82	11.40
12:48:52	47.05	2.92	2.65	11.48
12:49:02	47.22	2.84	2.60	11.68
12:49:12	46.92	2.80	2.63	11.79
12:49:22	46.63	2.90	2.69	11.59
12:49:32	46.53	3.00	2.69	11.35
12:49:42	46.34	3.03	2.69	11.23
12:49:52	46.34	2.94	2.64	11.42
12:50:02	46.24	2.89	2.60	11.54
12:50:12	46.44	2.88	2.55	11.61
12:50:22	46.63	2.80	2.49	11.82
12:50:32	46.12	2.91	2.55	11.58
12:50:42	45.63	3.03	2.60	11.26
12:50:52	46.34	2.97	2.55	11.32
12:51:02	47.14	2.91	2.49	11.48
12:51:12	46.63	2.98	2.45	11.37
12:51:22	46.12	2.95	2.38	11.39
12:51:32	46.53	3.01	2.44	11.24
12:51:42	47.05	3.08	2.49	11.08
12:51:52	47.44	3.09	2.55	11.00
12:52:02	47.83	2.93	2.54	11.38
12:52:12	47.31	2.86	2.50	11.60
12:52:22	46.92	2.86	2.56	11.64
12:52:32	46.63	2.96	2.60	11.43
12:52:42	46.34	2.98	2.60	11.32
12:52:52	46.92	2.99	2.60	11.30
12:53:02	47.53	2.99	2.60	11.28
12:53:12	47.53	2.94	2.60	11.40
12:53:22	47.53	2.95	2.60	11.39
12:53:32	47.53	3.02	2.59	11.22
12:53:42	47.63	3.04	2.66	11.18
12:53:52	47.61	3.06	2.63	11.11
12:54:02	47.73	3.06	2.66	11.07
12:54:12	47.85	2.97	2.62	11.30
12:54:22	47.85	2.89	2.67	11.50
12:54:32	47.31	2.91	2.62	11.51
12:54:42	46.83	3.02	2.60	11.26
12:54:52	47.34	3.06	2.52	11.11
12:55:02	47.83	3.02	2.49	11.20
12:55:12	47.73	2.93	2.41	11.42
12:55:22	47.61	2.88	2.67	11.54

12:55:32	47.34	2.90	2.66	11.52
12:55:42	47.05	3.00	2.67	11.30
12:55:52	47.14	3.08	2.47	11.08
12:56:02	47.31	3.13	2.47	10.90
12:56:12	47.92	3.06	2.49	11.04
12:56:22	48.66	2.92	2.58	11.42
12:56:32	47.73	2.97	2.76	11.38
12:56:42	46.83	3.10	2.64	11.01
12:56:52	47.31	3.13	2.67	10.93
12:57:02	47.73	3.08	2.61	11.02
12:57:12	47.73	2.93	2.67	11.39
12:57:22	47.83	2.93	2.62	11.46
12:57:32	47.63	2.92	2.59	11.50
12:57:42	47.34	3.01	2.67	11.26
12:57:52	47.24	3.06	2.69	11.12
12:58:02	47.14	3.03	2.61	11.17
12:58:12	47.53	3.03	2.68	11.17
12:58:22	47.83	3.01	2.69	11.24
12:58:32	47.92	2.95	2.60	11.37
12:58:42	47.92	2.98	2.60	11.33
12:58:52	47.73	3.13	2.60	10.98
12:59:02	47.44	3.09	2.60	11.00
12:59:12	47.53	2.97	2.68	11.30
12:59:22	47.63	2.97	2.78	11.34
12:59:32	47.14	2.99	2.79	11.31
12:59:42	46.73	2.97	2.70	11.34
12:59:52	46.92	3.07	2.69	11.11
13:00:02	47.12	3.09	2.69	11.03
13:00:12	47.31	3.09	2.69	11.02
13:00:22	47.63	2.98	2.79	11.27
13:00:32	47.44	2.98	2.79	11.32
13:00:42	47.24	3.04	2.79	11.18
13:00:52	47.63	3.07	2.79	11.09
13:01:02	47.92	3.09	2.78	11.02
13:01:12	48.02	3.02	2.79	11.19
13:01:22	48.12	2.89	2.69	11.52
13:01:32	47.44	2.85	2.90	11.64
13:01:42	46.73	2.93	3.00	11.47
13:01:52	47.05	2.95	3.18	11.40
13:02:02	47.24	3.03	3.18	11.22
13:02:12	47.53	3.01	3.08	11.24
13:02:22	47.83	2.99	3.01	11.29
13:02:32	47.44	3.09	2.99	11.07
13:02:42	47.12	3.04	2.90	11.10
13:02:52	47.31	3.17	2.89	10.86
13:03:02	47.53	3.12	2.80	10.92
13:03:12	47.95	3.00	2.89	11.19
13:03:22	48.22	2.86	2.78	11.60
13:03:32	47.44	2.94	2.69	11.47
13:03:42	46.83	2.99	2.70	11.33
13:03:52	47.05	3.10	2.79	11.04
13:04:02	47.34	3.16	2.79	10.85
13:04:12	47.85	3.01	2.79	11.17
13:04:22	48.41	2.85	2.79	11.68
13:04:32	47.22	2.90	2.78	11.57
13:04:42	45.95	2.83	2.79	11.77
13:04:52	45.46	2.96	2.79	11.48
13:05:02	44.92	3.05	2.81	11.24
13:05:12	46.02	3.04	2.90	11.18
13:05:22	47.12	2.92	2.90	11.48
13:05:32	46.34	2.89	2.92	11.61
13:05:42	45.63	2.87	3.00	11.66
13:05:52	45.31	2.88	2.98	11.67
13:06:02	45.04	2.91	2.90	11.64
13:06:12	45.04	2.95	2.90	11.49
13:06:22	45.04	2.89	2.88	11.62
13:06:32	45.43	2.84	2.79	11.76

13:06:42	45.85	2.88	2.82	11.62
13:06:52	45.73	2.76	2.90	11.92
13:07:02	45.73	2.96	2.90	11.53
13:07:12	45.92	3.05	2.90	11.20
13:07:22	46.24	2.96	2.86	11.38
13:07:32	46.53	2.96	2.79	11.41
13:07:42	46.83	2.99	2.78	11.34
13:07:52	46.53	3.00	2.79	11.31
13:08:02	46.34	3.06	2.82	11.14
13:08:12	46.63	2.98	2.90	11.35
13:08:22	46.92	2.91	2.90	11.53
13:08:32	46.24	2.88	2.86	11.61
13:08:42	45.46	2.83	2.78	11.73
13:08:52	45.43	2.85	2.78	11.72
13:09:02	45.43	3.07	2.83	11.18
13:09:12	46.24	3.08	2.90	11.08
13:09:22	47.02	2.94	2.90	11.42
13:09:32	46.44	2.84	2.94	11.71
13:09:42	45.85	2.82	2.96	11.81
13:09:52	45.56	2.83	2.91	11.80
13:10:02	45.14	2.94	2.85	11.55
13:10:12	45.73	2.99	2.79	11.37
13:10:22	46.24	3.04	2.79	11.23
13:10:32	46.53	2.95	2.83	11.38
13:10:42	46.83	2.89	2.89	11.57
13:10:52	46.53	2.92	2.90	11.54
13:11:02	46.34	3.01	2.90	11.34
13:11:12	46.24	2.95	2.84	11.44
13:11:22	46.02	2.89	2.79	11.60
13:11:32	45.73	2.73	2.78	12.01
13:11:42	45.46	2.56	2.89	12.58
13:11:52	43.24	2.63	3.04	12.47
13:12:02	40.99	2.75	3.13	12.19

SUMMARY: TEST2.XLS

Client	BALBOA	DATE:	11/21/95
Unit	UNIT	Begin	13:56:15
Test #	2	End	15:58:00

Type	Average Conc. ppm	Span Value	Zero Bias Pre	Zero Bias Post	Span Bias Pre	Span Bias Post	Corrected Conc. ppm	Corrected Conc. ppm @3% O2
O2	11.05	19.97	0.01	0.01	19.65	19.59	**11.24**	
NOx	49.06	89.50	-0.02	0.08	88.46	88.25	**49.68**	**92.06**
CO	3.70	89.10	2.73	3.88	92.40	92.90	**0.39**	
CO2	5.92	9.11	0.01	0.06	9.01	9.02	**5.97**	

BALBOA PACIFIC
UNIT 1
DATE: 11/21/95
TIME: 13:56:15

Time 1/(sec)	NOx ppm	CO2 %	CO ppm	O2 %
13:56:16	48.73	5.57	2.98	11.55
13:56:26	48.1	5.65	2.99	11.43
13:56:36	48	5.89	2.98	11.13
13:56:46	47.8	5.87	2.99	11.09
13:56:56	47.9	5.81	3.07	11.15
13:57:06	48	5.83	3.08	11.15
13:57:16	48.32	5.74	3.08	11.25
13:57:26	48.61	5.93	3.08	11.05
13:57:36	48.39	5.94	3.08	11
13:57:46	48.32	5.88	3.08	11.06
13:57:56	48.22	6	3.17	10.95
13:58:06	48.29	6.06	3.17	10.82
13:58:16	48.71	5.89	3.19	11.01
13:58:26	49	6.27	3.3	10.6
13:58:36	49.29	6.22	3.38	10.58
13:58:46	49.51	6.05	3.38	10.79
13:58:56	49.29	5.86	3.4	11.03
13:59:06	49.19	5.9	3.5	11.04
13:59:16	48.71	5.91	3.6	10.99
13:59:26	48.32	6.07	3.71	10.84
13:59:36	48.61	6.09	3.76	10.75
13:59:46	48.9	6.08	3.71	10.79
13:59:56	49.1	5.9	3.78	10.99
14:00:06	49.41	5.8	3.78	11.14
14:00:16	48.8	5.85	3.78	11.11
14:00:26	48.19	5.96	3.75	10.97
14:00:36	48.49	6.14	3.69	10.71
14:00:46	48.8	5.99	3.69	10.88
14:00:56	48.9	5.79	3.72	11.13
14:01:06	49.12	5.75	3.75	11.22
14:01:16	48.71	5.78	3.72	11.22
14:01:26	48.32	5.92	3.75	11.03
14:01:36	48.39	6.17	3.65	10.71
14:01:46	48.49	6.18	3.58	10.65
14:01:56	49.02	6.03	3.62	10.81
14:02:06	49.61	5.86	3.72	11.04
14:02:16	49.19	5.83	3.75	11.11
14:02:26	48.93	5.79	3.69	11.18
14:02:36	48.71	5.92	3.69	11.05
14:02:46	48.61	5.92	3.69	11
14:02:56	48.49	5.82	3.65	11.33
14:03:06	48.39	5.46	3.58	11.59
14:03:16	48.1	5.85	3.58	11.18
14:03:26	47.8	5.94	3.57	11.02
14:03:36	48.32	6.07	3.58	10.83
14:03:46	48.8	6.02	3.63	10.86
14:03:56	48.9	5.94	3.68	10.97
14:04:06	48.9	5.86	3.69	11.09
14:04:16	48.9	5.88	3.73	11.07
14:04:26	48.9	5.87	3.78	11.06
14:04:36	48.9	5.91	3.83	11.05
14:04:46	48.9	6.06	3.87	10.84
14:04:56	49.19	5.92	3.83	10.98
14:05:06	49.41	5.67	3.78	11.28
14:05:16	49.12	5.56	3.74	11.52
14:05:26	48.8	5.86	3.68	11.17
14:05:36	48.73	5.84	3.69	11.12
14:05:46	48.49	6.01	3.69	10.94
14:05:56	48.71	6.16	3.64	10.71
14:06:06	48.9	6.08	3.58	10.78

14:06:16	49.22	6.04	3.57	10.83
14:06:26	49.51	5.75	3.58	11.16
14:06:36	49.29	5.58	3.64	11.46
14:06:46	49.19	5.92	3.69	11.11
14:06:56	48.93	6.21	3.68	10.68
14:07:06	48.49	6.37	3.63	10.39
14:07:16	49.51	5.87	3.58	10.94
14:07:26	50.51	5.65	3.52	11.32
14:07:36	49.68	5.62	3.47	11.37
14:07:46	48.9	5.65	3.47	11.38
14:07:56	48.49	5.82	3.54	11.18
14:08:06	48	5.97	3.52	10.97
14:08:16	48.39	5.96	3.42	10.96
14:08:26	48.8	5.97	3.37	10.94
14:08:36	49.12	6.01	3.37	10.89
14:08:46	49.41	6.12	3.38	10.75
14:08:56	49.58	6.31	3.44	10.5
14:09:06	49.9	6.26	3.47	10.49
14:09:16	50.2	5.85	3.4	11.01
14:09:26	50.71	5.66	3.45	11.34
14:09:36	49.61	5.55	3.47	11.49
14:09:46	48.39	5.65	3.55	11.4
14:09:56	48.32	5.8	3.57	11.22
14:10:06	48.19	5.86	3.58	11.1
14:10:16	48.39	6.11	3.65	10.79
14:10:26	48.61	5.88	3.69	11.03
14:10:36	48.8	5.78	3.68	11.17
14:10:46	48.9	5.88	3.69	11.11
14:10:56	49	5.99	3.69	10.93
14:11:06	49.1	6.05	3.6	10.85
14:11:16	49.29	6.02	3.58	10.86
14:11:26	49.51	5.86	3.59	11.05
14:11:36	49.51	5.88	3.58	11.06
14:11:46	49.51	5.9	3.67	11.04
14:11:56	49.41	6.11	3.69	10.78
14:12:06	49.29	6.15	3.68	10.7
14:12:16	49.8	6.1	3.69	10.75
14:12:26	50.2	6.16	3.51	10.68
14:12:36	50.39	6.03	3.47	10.81
14:12:46	50.61	5.94	3.56	10.94
14:12:56	50.29	5.99	3.58	10.92
14:13:06	50.1	6.13	3.58	10.74
14:13:16	50.2	6.2	3.67	10.63
14:13:26	50.2	6.1	3.69	10.73
14:13:36	50.39	5.88	3.59	11
14:13:46	50.61	5.8	3.48	11.14
14:13:56	50.2	5.78	3.47	11.2
14:14:06	49.71	5.86	3.44	11.16
14:14:16	49.19	6.23	3.47	10.75
14:14:26	48.61	5.89	3.47	11
14:14:36	48.49	5.48	3.47	11.57
14:14:46	48.61	5.43	3.47	11.72
14:14:56	47.9	5.82	3.47	11.3
14:15:06	47.09	5.98	3.37	11.01
14:15:16	47.68	6.14	3.47	10.81
14:15:26	48.32	6	3.47	10.91
14:15:36	48.8	5.76	3.47	11.23
14:15:46	49.41	5.41	3.58	11.68
14:15:56	48.32	5.49	3.47	11.68
14:16:06	47.12	5.61	3.47	11.53
14:16:16	47	5.76	3.47	11.33
14:16:26	46.7	5.75	3.47	11.31
14:16:36	47	5.7	3.47	11.37
14:16:46	47.19	5.63	3.47	11.45
14:16:56	47.22	5.6	3.47	11.52
14:17:06	47.31	6.04	3.57	10.99
14:17:16	47.71	6.14	3.48	10.77

14:17:26	48	5.92	3.59	11.02
14:17:36	48.22	5.65	3.58	11.41
14:17:46	48.49	5.6	3.58	11.49
14:17:56	47.8	5.51	3.58	11.62
14:18:06	47	5.8	3.58	11.31
14:18:16	47.41	6.32	3.58	10.55
14:18:26	47.58	6.22	3.59	10.55
14:18:36	48.49	5.6	3.68	11.38
14:18:46	49.58	5.59	3.68	11.54
14:18:56	48.39	5.84	3.67	11.26
14:19:06	47.02	5.78	3.58	11.26
14:19:16	47.31	5.69	3.58	11.38
14:19:26	47.61	5.71	3.58	11.38
14:19:36	47.51	5.5	3.6	11.6
14:19:46	47.41	6.14	3.69	10.78
14:19:56	49.29	6.48	3.69	10.1
14:20:06	51.1	6.06	3.68	10.66
14:20:16	50.88	6.33	3.68	10.45
14:20:26	50.81	6.29	3.66	10.43
14:20:36	51	6.14	3.6	10.61
14:20:46	51.2	5.93	3.66	10.89
14:20:56	50.9	5.9	3.58	10.97
14:21:06	50.61	6.05	3.58	10.8
14:21:16	50.71	6.04	3.56	10.79
14:21:26	50.78	6.12	3.47	10.73
14:21:36	50.61	6.14	3.47	10.66
14:21:46	50.32	5.86	3.51	11.01
14:21:56	50.22	5.84	3.58	11.08
14:22:06	50.1	6.02	3.61	10.89
14:22:16	50.2	6.47	3.69	10.31
14:22:26	50.2	6.39	3.65	10.27
14:22:36	51.1	6.41	3.59	10.29
14:22:46	52	6.09	3.59	10.66
14:22:56	51.78	5.79	3.59	11.13
14:23:06	51.59	5.65	3.58	11.37
14:23:16	50.2	5.57	3.59	11.52
14:23:26	48.71	5.87	3.62	11.18
14:23:36	48.61	6	3.69	10.98
14:23:46	48.61	5.78	3.69	11.19
14:23:56	48.71	5.86	3.64	11.17
14:24:06	48.9	5.75	3.58	11.22
14:24:16	48.73	5.64	3.62	11.39
14:24:26	48.51	5.87	3.69	11.16
14:24:36	48.49	5.91	3.69	11.04
14:24:46	48.61	5.96	3.69	11
14:24:56	48.8	6.23	3.69	10.66
14:25:06	49.02	5.97	3.73	10.9
14:25:16	49.41	5.82	3.85	11.13
14:25:26	49.9	5.92	4.04	11.04
14:25:36	49.51	6.01	4.16	10.91
14:25:46	49	6.12	4.11	10.79
14:25:56	49.29	5.95	3.96	10.95
14:26:06	49.61	5.86	3.83	11.09
14:26:16	49.58	5.82	3.73	11.15
14:26:26	49.58	5.82	3.74	11.17
14:26:36	49.19	5.98	3.78	10.96
14:26:46	48.8	6.22	3.74	10.67
14:26:56	49.41	6.06	3.63	10.75
14:27:06	49.9	5.78	3.57	11.17
14:27:16	49.51	5.6	3.52	11.4
14:27:26	49.19	5.81	3.47	11.25
14:27:36	48.93	6.4	3.47	10.5
14:27:46	48.49	6.37	3.47	10.35
14:27:56	49.71	5.97	3.54	10.88
14:28:06	50.88	5.87	3.58	11.05
14:28:16	50.2	5.68	3.58	11.3
14:28:26	49.61	5.87	3.51	11.36

14:28:36	49.1	6.11	3.47	10.89
14:28:46	48.49	6.24	3.47	10.61
14:28:56	49.19	5.93	3.47	10.94
14:29:06	49.8	5.73	3.47	11.25
14:29:16	49.51	5.86	3.47	11.14
14:29:26	49.29	5.81	3.54	11.17
14:29:36	49.12	5.84	3.57	11.14
14:29:46	48.9	5.93	3.57	11.06
14:29:56	48.9	5.97	3.58	10.97
14:30:06	49	5.7	3.65	11.26
14:30:16	49.1	5.66	3.6	11.38
14:30:26	49.29	5.66	3.58	11.38
14:30:36	48.8	5.92	3.58	11.1
14:30:46	48.32	6.13	3.58	10.77
14:30:56	49	5.97	3.57	10.93
14:31:06	49.68	5.96	3.58	10.98
14:31:16	49.61	6.22	3.58	10.67
14:31:26	49.41	6.02	3.57	10.83
14:31:36	49.61	5.83	3.5	11.11
14:31:46	49.9	6.06	3.47	10.89
14:31:56	50	6.26	3.47	10.6
14:32:06	50.1	6.22	3.56	10.6
14:32:16	50.32	6.05	3.58	10.81
14:32:26	50.61	5.95	3.57	10.95
14:32:36	50.29	6.04	3.66	10.89
14:32:46	49.98	6.17	3.68	10.7
14:32:56	50.29	6.1	3.6	10.76
14:33:06	50.49	5.96	3.49	10.93
14:33:16	50.61	5.82	3.55	11.14
14:33:26	50.81	5.93	3.57	11.04
14:33:36	50.61	5.99	3.75	10.92
14:33:46	50.42	5.92	3.86	11
14:33:56	50.32	6.06	3.8	10.88
14:34:06	50.32	6.14	3.7	10.73
14:34:16	50.51	6	3.59	10.88
14:34:26	50.68	5.77	3.48	11.18
14:34:36	50.51	5.8	3.47	11.4
14:34:46	50.32	5.95	3.47	11.08
14:34:56	50.29	5.85	3.57	11.09
14:35:06	50.2	5.85	3.58	11.13
14:35:16	50	6.16	3.58	10.8
14:35:26	49.9	6.17	3.48	10.66
14:35:36	50.61	6.08	3.47	10.78
14:35:46	51.39	5.9	3.47	11.01
14:35:56	50.81	6.03	3.47	10.92
14:36:06	50.1	6.07	3.47	10.82
14:36:16	50.39	5.92	3.56	11.01
14:36:26	50.71	5.74	3.58	11.21
14:36:36	50.32	5.77	3.57	11.24
14:36:46	49.98	5.84	3.69	11.15
14:36:56	49.9	5.98	3.59	10.98
14:37:06	49.71	5.88	3.58	11.05
14:37:16	49.93	5.83	3.47	11.16
14:37:26	50.07	5.75	3.47	11.23
14:37:36	49.9	5.74	3.69	11.27
14:37:46	49.68	5.88	3.69	11.12
14:37:56	49.71	6.06	3.57	10.88
14:38:06	49.61	6.04	3.58	10.88
14:38:16	50	5.97	3.47	10.95
14:38:26	50.39	5.98	3.47	10.95
14:38:36	50.42	5.9	3.47	11.04
14:38:46	50.49	5.9	3.47	11.07
14:38:56	50.49	5.96	3.48	10.98
14:39:06	50.51	5.82	3.59	11.13
14:39:16	50.1	5.59	3.69	11.43
14:39:26	49.8	5.91	3.68	11.14
14:39:36	49.8	5.86	3.67	11.06

14:39:46	49.8	5.73	3.57	11.28
14:39:56	49.71	6.04	3.47	10.96
14:40:06	49.71	6.22	3.48	10.66
14:40:16	50.2	6.06	3.57	10.82
14:40:26	50.78	5.95	3.58	10.97
14:40:36	50.78	5.84	3.6	11.11
14:40:46	50.78	5.74	3.68	11.25
14:40:56	50.51	5.86	3.66	11.16
14:41:06	50.22	6.37	3.6	10.54
14:41:16	50.49	6.26	3.67	10.54
14:41:26	50.59	6.02	3.56	10.84
14:41:36	50.78	5.75	3.49	11.2
14:41:46	51	5.69	3.57	11.33
14:41:56	50.32	5.88	3.57	11.12
14:42:06	49.58	6.16	3.58	10.76
14:42:16	50.32	6.27	3.58	10.59
14:42:26	50.88	6.13	3.58	10.71
14:42:36	51.1	5.85	3.61	11.05
14:42:46	51.29	5.72	3.72	11.28
14:42:56	50.49	5.72	3.75	11.3
14:43:06	49.61	5.98	3.69	11.02
14:43:16	49.71	6.14	3.65	10.77
14:43:26	49.8	6.08	3.61	10.8
14:43:36	50.12	5.94	3.65	10.98
14:43:46	50.49	5.79	3.54	11.18
14:43:56	50.2	5.84	3.47	11.15
14:44:06	49.9	5.86	3.47	11.11
14:44:16	49.71	6.2	3.47	10.74
14:44:26	49.51	6.05	3.47	10.79
14:44:36	49.9	5.82	3.5	11.13
14:44:46	50.42	5.94	3.58	11.02
14:44:56	50.1	5.93	3.58	11.02
14:45:06	49.68	5.98	3.54	10.97
14:45:16	49.9	5.97	3.47	10.97
14:45:26	50	6.01	3.51	10.93
14:45:36	50	5.98	3.57	10.95
14:45:46	49.9	5.89	3.58	11.05
14:45:56	49.9	5.71	3.58	11.28
14:46:06	49.9	5.68	3.58	11.37
14:46:16	49.58	6.16	3.62	10.84
14:46:26	49.19	6.32	3.68	10.53
14:46:36	50	5.92	3.65	10.94
14:46:46	50.78	5.68	3.58	11.32
14:46:56	50	5.93	3.64	11.09
14:47:06	49.32	6	3.69	10.94
14:47:16	49.61	6.04	3.68	10.88
14:47:26	50	5.99	3.68	10.95
14:47:36	49.58	6.21	3.64	10.7
14:47:46	49.32	5.99	3.58	10.9
14:47:56	49.68	5.8	3.57	11.16
14:48:06	50.1	5.91	3.63	11.09
14:48:16	49.9	6.05	3.69	10.9
14:48:26	49.71	6.06	3.69	10.86
14:48:36	49.8	6.15	3.68	10.76
14:48:46	50	5.95	3.73	10.96
14:48:56	50	5.85	3.78	11.34
14:49:06	50.07	5.79	3.73	11.26
14:49:16	49.71	5.98	3.69	11
14:49:26	49.19	6.17	3.62	10.75
14:49:36	49.68	6.29	3.57	10.55
14:49:46	50.1	6.06	3.58	10.79
14:49:56	50.2	5.9	3.58	11.03
14:50:06	50.2	5.92	3.58	11.05
14:50:16	50.1	6.03	3.7	10.91
14:50:26	49.98	6.06	3.84	10.86
14:50:36	50	6.16	3.87	10.74
14:50:46	49.9	5.85	3.92	11.06

14:50:56	49.9	5.72	4.01	11.29
14:51:06	50	5.68	4.05	11.35
14:51:16	49.29	5.59	3.99	11.48
14:51:26	48.61	5.79	3.9	11.27
14:51:36	48.71	5.91	3.81	11.09
14:51:46	48.71	5.86	3.72	11.12
14:51:56	48.93	5.82	3.68	11.17
14:52:06	49.02	5.96	3.69	11.03
14:52:16	49.12	6.01	3.61	10.93
14:52:26	49.19	5.88	3.57	11.06
14:52:36	49.19	5.91	3.65	11.09
14:52:46	49.19	5.93	3.61	11.03
14:52:56	49.1	6.05	3.65	10.9
14:53:06	49	6.12	3.69	10.76
14:53:16	49.41	5.97	3.69	10.95
14:53:26	49.9	6.11	3.76	10.83
14:53:36	49.98	6.32	3.78	10.54
14:53:46	50.1	6.3	3.71	10.52
14:53:56	50.39	6.01	3.76	10.85
14:54:06	50.71	5.65	3.71	11.34
14:54:16	49.71	5.56	3.68	11.52
14:54:26	48.73	5.6	3.68	11.49
14:54:36	48.32	5.93	3.68	11.13
14:54:46	47.92	6.03	3.6	10.93
14:54:56	48.49	5.83	3.57	11.13
14:55:06	49	5.83	3.57	11.17
14:55:16	49	5.79	3.58	11.23
14:55:26	48.9	5.98	3.58	11.02
14:55:36	49.02	5.97	3.67	10.98
14:55:46	49.19	5.87	3.68	11.12
14:55:56	49	5.92	3.68	11.06
14:56:06	48.9	5.73	3.69	11.27
14:56:16	48.71	5.59	3.69	11.47
14:56:26	48.49	5.83	3.58	11.26
14:56:36	48.61	6.52	3.57	10.36
14:56:46	48.61	6.56	3.58	10.14
14:56:56	49.71	6.07	3.57	10.74
14:57:06	50.78	6.05	3.67	10.84
14:57:16	50.78	5.94	3.68	10.98
14:57:26	50.71	5.99	3.69	10.97
14:57:36	50	5.91	3.69	11.04
14:57:46	49.29	6.25	3.69	10.68
14:57:56	49.61	6.17	3.58	10.69
14:58:06	49.8	6.08	3.69	10.81
14:58:16	49.68	6.08	3.69	10.84
14:58:26	49.68	6.02	3.78	10.88
14:58:36	49.9	6.11	3.69	10.81
14:58:46	50.1	6.24	3.78	10.65
14:58:56	49.9	6.23	3.69	10.62
14:59:06	49.8	6.11	3.69	10.75
14:59:16	49.9	5.87	3.69	11.06
14:59:26	50.1	5.72	3.69	11.3
14:59:36	49.29	5.72	3.68	11.35
14:59:46	48.49	5.78	3.68	11.29
14:59:56	48	5.83	3.68	11.26
15:00:06	47.51	5.97	3.69	11.08
15:00:16	47.9	5.6	3.68	11.44
15:00:26	48.29	5.3	3.58	11.91
15:00:36	47.41	5.3	3.59	11.95
15:00:46	46.51	5.36	3.69	11.92
15:00:56	46.09	5.86	3.7	11.31
15:01:06	45.61	5.87	3.78	11.15
15:01:16	46.7	5.51	3.78	11.56
15:01:26	47.8	5.58	3.79	11.58
15:01:36	47.53	5.62	3.87	11.5
15:01:46	47.19	5.77	3.85	11.3
15:01:56	47.51	5.81	3.78	11.25

15:02:06	47.8	5.92	3.78	11.1
15:02:16	48.1	5.93	3.78	11.02
15:02:26	48.49	5.63	3.78	11.39
15:02:36	48.61	5.82	3.76	11.23
15:02:46	48.8	6.05	3.69	10.95
15:02:56	49.12	6.35	3.69	10.51
15:03:06	49.51	6.19	3.66	10.62
15:03:16	49.8	5.83	3.58	11.13
15:03:26	50.2	6.01	3.58	10.97
15:03:36	49.9	6.12	3.6	10.8
15:03:46	49.71	5.82	3.69	11.13
15:03:56	49.58	5.75	3.65	11.3
15:04:06	49.71	5.99	3.58	11.03
15:04:16	49.51	6.26	3.61	10.67
15:04:26	49.19	5.97	3.69	10.93
15:04:36	49.41	5.59	3.69	11.42
15:04:46	49.68	5.73	3.69	11.38
15:04:56	49.41	6.22	3.68	10.78
15:05:06	49	6.34	3.68	10.5
15:05:16	50	5.98	3.69	10.9
15:05:26	51	6.16	3.69	10.79
15:05:36	51	6.02	3.69	10.9
15:05:46	51	5.85	3.69	11.14
15:05:56	50.42	5.91	3.69	11.12
15:06:06	49.8	6.09	3.65	10.88
15:06:16	50.1	6.08	3.58	10.85
15:06:26	50.32	5.95	3.62	10.99
15:06:36	50.2	5.93	3.68	11.07
15:06:46	50.1	6.02	3.72	10.96
15:06:56	50.2	5.98	3.78	11.02
15:07:06	50.22	5.9	3.78	11.1
15:07:16	50	5.89	3.74	11.14
15:07:26	49.8	5.85	3.69	11.16
15:07:36	49.61	5.79	3.69	11.27
15:07:46	49.51	5.91	3.69	11.15
15:07:56	49.51	6.14	3.73	10.83
15:08:06	49.41	6.11	3.78	10.84
15:08:16	49.41	6.08	3.73	10.85
15:08:26	49.41	5.72	3.69	11.27
15:08:36	49.12	5.7	3.63	11.4
15:08:46	48.8	5.87	3.57	11.2
15:08:56	48.9	6.01	3.63	11.02
15:09:06	48.93	6	3.69	10.98
15:09:16	49	5.83	3.69	11.17
15:09:26	49.22	5.74	3.69	11.33
15:09:36	49.12	5.67	3.68	11.41
15:09:46	49.02	5.79	3.69	11.33
15:09:56	48.8	6.12	3.63	10.9
15:10:06	48.61	6.01	3.64	10.96
15:10:16	48.8	5.96	3.69	11.02
15:10:26	49.12	5.78	3.68	11.26
15:10:36	48.9	5.77	3.69	11.29
15:10:46	48.61	5.8	3.69	11.26
15:10:56	48.39	5.93	3.75	11.11
15:11:06	48.22	5.82	3.78	11.21
15:11:16	48	5.96	3.73	11.08
15:11:26	47.68	5.83	3.69	11.19
15:11:36	47.51	5.77	3.69	11.3
15:11:46	47.41	5.88	3.69	11.16
15:11:56	47.71	5.8	3.68	11.24
15:12:06	48	5.8	3.69	11.28
15:12:16	47.61	6.06	3.75	10.98
15:12:26	47.22	5.72	3.85	11.29
15:12:36	47.31	5.65	3.87	11.46
15:12:46	47.41	5.77	3.87	11.33
15:12:56	47.22	5.95	3.81	11.11
15:13:06	47	6.07	3.78	10.92

15:13:16	47.51	6.03	3.78	10.94
15:13:26	48	5.85	3.78	11.15
15:13:36	48.22	5.7	3.85	11.34
15:13:46	48.49	5.7	3.81	11.4
15:13:56	47.9	5.88	3.78	11.2
15:14:06	47.31	6.05	3.72	10.96
15:14:16	47.51	5.84	3.68	11.16
15:14:26	47.8	5.86	3.68	11.2
15:14:36	47.41	5.75	3.68	11.28
15:14:46	46.9	5.55	3.68	11.55
15:14:56	46.8	5.63	3.69	11.5
15:15:06	46.8	6.02	3.68	11.05
15:15:16	47.12	6.03	3.76	10.96
15:15:26	47.31	5.89	3.71	11.1
15:15:36	47.61	5.69	3.76	11.37
15:15:46	47.9	5.62	3.78	11.47
15:15:56	47.41	5.64	3.86	11.5
15:16:06	47.02	5.8	3.88	11.3
15:16:16	46.8	5.86	3.87	11.18
15:16:26	46.7	5.87	3.87	11.17
15:16:36	47.12	5.66	3.87	11.39
15:16:46	47.51	5.62	3.79	11.49
15:16:56	47.31	5.66	3.78	11.45
15:17:06	47.12	5.62	3.78	11.48
15:17:16	47	5.95	3.86	11.13
15:17:26	47	5.94	3.87	11.04
15:17:36	47.31	5.86	3.95	11.15
15:17:46	47.71	5.7	3.96	11.34
15:17:56	47.61	5.77	3.87	11.3
15:18:06	47.41	5.91	3.79	11.12
15:18:16	47.41	5.82	3.78	11.18
15:18:26	47.41	5.7	3.87	11.36
15:18:36	47	5.78	3.79	11.3
15:18:46	46.61	5.82	3.87	11.24
15:18:56	47	5.74	3.78	11.28
15:19:06	47.31	5.37	3.78	11.75
15:19:16	46.9	5.47	3.78	11.73
15:19:26	46.51	6.03	3.69	11.05
15:19:36	46.8	6.15	3.68	10.76
15:19:46	47.02	5.88	3.68	11.08
15:19:56	47.12	5.75	3.78	11.25
15:20:06	47.12	5.86	3.78	11.14
15:20:16	47.51	5.9	3.88	11.05
15:20:26	47.92	5.91	3.87	11.05
15:20:36	47.92	6.15	3.95	10.77
15:20:46	48	6.12	3.87	10.74
15:20:56	48.1	6.06	3.87	10.81
15:21:06	48.29	5.94	3.78	10.97
15:21:16	48.32	5.7	3.78	11.25
15:21:26	48.32	5.75	3.78	11.28
15:21:36	48.1	6.04	3.78	10.91
15:21:46	47.83	6.18	3.79	10.7
15:21:56	48.22	5.97	3.88	10.92
15:22:06	48.61	5.93	3.86	10.99
15:22:16	48.73	5.79	3.78	11.17
15:22:26	48.9	6.13	3.78	10.83
15:22:36	49.1	6.15	3.78	10.69
15:22:46	49.32	5.8	3.78	11.12
15:22:56	49.19	5.84	3.78	11.14
15:23:06	49.19	5.75	3.78	11.22
15:23:16	49.02	5.7	3.8	11.32
15:23:26	48.71	5.71	3.85	11.31
15:23:36	48.61	5.74	3.78	11.27
15:23:46	48.49	6	3.78	10.99
15:23:56	48.61	6.01	3.76	10.89
15:24:06	48.71	5.85	3.71	11.09
15:24:16	49.12	6.1	3.76	10.83

15:24:26	49.41	6.12	3.71	10.72
15:24:36	49.9	5.99	3.78	10.89
15:24:46	50.32	5.86	3.76	11.08
15:24:56	50.22	5.69	3.69	11.28
15:25:06	50.07	5.66	3.68	11.37
15:25:16	49.8	5.88	3.72	11.13
15:25:26	49.58	6.05	3.78	10.88
15:25:36	50.1	6.1	3.78	10.78
15:25:46	50.51	6.01	3.78	10.88
15:25:56	50.49	5.86	3.78	11.04
15:26:06	50.49	5.67	3.78	11.33
15:26:16	50.39	5.78	3.81	11.21
15:26:26	50.32	5.73	3.87	11.25
15:26:36	49.61	6.15	3.87	10.82
15:26:46	48.93	6.54	3.87	10.23
15:26:56	49.93	6.44	3.87	10.24
15:27:06	51	6.03	3.84	10.78
15:27:16	50.61	5.9	3.78	10.99
15:27:26	50.32	5.93	3.82	11.01
15:27:36	49.9	6.08	3.87	10.82
15:27:46	49.51	6.28	3.87	10.59
15:27:56	50	6.14	3.84	10.64
15:28:06	50.39	6.04	3.78	10.84
15:28:16	50	6.27	3.82	10.58
15:28:26	49.58	6.12	3.84	10.67
15:28:36	50	5.78	3.78	11.12
15:28:46	50.42	5.8	3.78	11.22
15:28:56	49.8	6.03	3.78	10.91
15:29:06	49.19	6.04	3.74	10.87
15:29:16	49.51	5.82	3.74	11.1
15:29:26	49.8	5.75	3.78	11.24
15:29:36	49.41	5.82	3.83	11.17
15:29:46	48.9	5.92	3.83	11.05
15:29:56	48.9	6.07	3.78	10.84
15:30:06	48.93	5.93	3.78	10.98
15:30:16	49.02	6.01	3.78	10.9
15:30:26	49.12	5.95	3.74	10.97
15:30:36	49.41	5.95	3.73	10.97
15:30:46	49.71	5.97	3.78	10.97
15:30:56	49.51	6.2	3.83	10.7
15:31:06	49.29	6.11	3.92	10.72
15:31:16	49.83	5.9	4.01	11.01
15:31:26	50.22	6.06	3.99	10.86
15:31:36	50.1	5.98	3.91	10.91
15:31:46	50	5.82	3.82	11.13
15:31:56	49.8	6.19	3.78	10.75
15:32:06	49.71	6.21	3.78	10.62
15:32:16	50	5.93	3.84	10.94
15:32:26	50.32	5.73	3.88	11.21
15:32:36	50	5.82	3.88	11.16
15:32:46	49.61	5.89	3.88	11.08
15:32:56	49.29	6.14	3.92	10.77
15:33:06	48.93	6.15	3.91	10.7
15:33:16	49.41	6.03	3.88	10.86
15:33:26	49.8	5.88	3.93	11.03
15:33:36	49.61	5.85	3.96	11.11
15:33:46	49.29	5.74	3.96	11.21
15:33:56	48.93	5.72	3.97	11.32
15:34:06	48.51	5.76	3.96	11.28
15:34:16	48.02	5.79	3.9	11.19
15:34:26	47.41	5.74	3.87	11.27
15:34:36	47.61	5.63	3.81	11.38
15:34:46	47.83	5.56	3.85	11.49
15:34:56	47.71	5.73	3.94	11.34
15:35:06	47.61	5.91	3.96	11.09
15:35:16	47.71	6.22	3.9	10.71
15:35:26	47.71	6.06	3.88	10.8

15:35:36	48.49	5.88	3.88	11.05
15:35:46	49.41	5.66	3.8	11.35
15:35:56	48.9	5.94	3.78	11.08
15:36:06	48.39	6.16	3.78	10.75
15:36:16	49.02	6.11	3.85	10.75
15:36:26	49.61	5.95	3.87	10.97
15:36:36	49.29	5.84	3.87	11.09
15:36:46	49.02	5.76	3.87	11.25
15:36:56	49.02	5.66	3.87	11.35
15:37:06	49.02	5.62	3.88	11.42
15:37:16	48.49	6.06	3.87	10.93
15:37:26	48	6.12	3.87	10.76
15:37:36	48.73	5.88	3.88	11.02
15:37:46	49.51	5.8	3.96	11.18
15:37:56	49.29	5.78	4.04	11.2
15:38:06	49.19	5.87	4.05	11.14
15:38:16	49.12	6.03	3.96	10.93
15:38:26	49.02	6	3.88	10.91
15:38:36	49.12	5.99	3.88	10.92
15:38:46	49.19	5.79	3.87	11.14
15:38:56	49.29	5.52	3.87	11.52
15:39:06	49.41	5.79	3.87	11.25
15:39:16	49.02	5.88	3.88	11.1
15:39:26	48.51	5.81	3.88	11.16
15:39:36	48.71	5.59	3.95	11.43
15:39:46	48.9	5.81	3.96	11.23
15:39:56	48.9	5.99	3.88	10.99
15:40:06	48.8	5.94	3.87	10.99
15:40:16	49.51	5.99	3.96	10.96
15:40:26	50.2	6.13	3.96	10.77
15:40:36	50.2	5.92	4.05	10.98
15:40:46	50.1	5.82	4.05	11.16
15:40:56	50.1	5.91	3.96	11.07
15:41:06	50.1	5.87	3.96	11.1
15:41:16	50.22	6.18	3.96	10.76
15:41:26	50.32	6.26	3.96	10.57
15:41:36	50.81	6.01	3.96	10.84
15:41:46	51.29	5.92	3.96	11.02
15:41:56	50.81	5.9	3.96	11.04
15:42:06	50.42	6.08	3.96	10.87
15:42:16	50.22	5.98	3.96	10.93
15:42:26	50	6.08	4.06	10.85
15:42:36	49.9	6.14	4.04	10.76
15:42:46	49.83	6.28	3.96	10.55
15:42:56	50.2	6.13	3.88	10.68
15:43:06	50.71	5.99	3.88	10.89
15:43:16	50.39	5.96	3.87	10.98
15:43:26	50.22	6.23	3.78	10.68
15:43:36	49.93	6.19	3.78	10.65
15:43:46	49.61	6.01	3.77	10.88
15:43:56	49.51	5.81	3.69	11.12
15:44:06	49.41	5.66	3.71	11.36
15:44:16	49	5.91	3.78	11.11
15:44:26	48.83	6.21	3.8	10.69
15:44:36	48.71	6.47	3.88	10.32
15:44:46	48.73	6.42	3.88	10.31
15:44:56	49.29	6.08	3.88	10.73
15:45:06	49.93	5.59	3.86	11.36
15:45:16	49.41	5.73	3.78	11.33
15:45:26	48.83	6.08	3.8	10.9
15:45:36	48.71	6.22	3.89	10.65
15:45:46	48.51	6.06	3.96	10.79
15:45:56	48.93	5.75	3.96	11.2
15:46:06	49.32	5.71	3.93	11.33
15:46:16	49.02	5.73	3.85	11.27
15:46:26	48.61	6.09	3.78	10.9
15:46:36	48.93	6.3	3.79	10.55

15:46:46	49.12	6.2	3.78	10.64
15:46:56	49.12	6.18	3.78	10.68
15:47:06	49.19	5.9	3.82	11.01
15:47:16	49.12	5.97	3.85	11
15:47:26	49.02	6.15	3.78	10.77
15:47:36	49.12	6.07	3.78	10.86
15:47:46	49.19	6.1	3.78	10.81
15:47:56	49.32	6.03	3.78	10.88
15:48:06	49.41	6.05	3.78	10.86
15:48:16	49.71	5.98	3.82	10.91
15:48:26	49.93	5.82	3.88	11.13
15:48:36	49.51	5.91	3.88	11.08
15:48:46	49.12	5.87	3.88	11.19
15:48:56	48	5.83	3.84	11.23
15:49:06	46.92	5.66	3.78	11.45
15:49:16	46.83	5.49	3.79	11.65
15:49:26	46.61	5.44	3.82	11.79
15:49:36	46.12	5.82	3.88	11.36
15:49:46	45.56	5.93	3.84	11.13
15:49:56	46.02	5.88	3.78	11.17
15:50:06	46.51	5.74	3.78	11.35
15:50:16	46.63	5.48	3.78	11.68
15:50:26	46.61	5.53	3.83	11.68
15:50:36	46.22	5.65	3.92	11.53
15:50:46	45.83	5.88	3.96	11.19
15:50:56	46.73	5.74	3.97	11.26
15:51:06	47.61	5.42	3.96	11.66
15:51:16	47.53	5.51	3.92	11.63
15:51:26	47.41	6.01	3.87	11.06
15:51:36	47.71	6.11	3.88	10.81
15:51:46	47.92	6.07	3.88	10.83
15:51:56	48.22	5.92	3.92	11.03
15:52:06	48.61	5.74	4.01	11.26
15:52:16	48.12	5.65	4.06	11.4
15:52:26	47.71	5.65	4	11.41
15:52:36	47.71	5.64	3.96	11.44
15:52:46	47.71	5.66	3.91	11.42
15:52:56	47.53	5.55	3.88	11.54
15:53:06	47.41	5.78	3.82	11.32
15:53:16	47.61	5.89	3.78	11.12
15:53:26	47.71	5.64	3.78	11.39
15:53:36	47.71	5.28	3.78	11.81
15:53:46	47.83	5.46	3.84	11.73
15:53:56	47.41	6.03	3.88	10.99
15:54:06	46.8	6	3.88	10.93
15:54:16	47.19	5.87	3.88	11.06
15:54:26	47.73	5.63	3.82	11.44
15:54:36	47.31	6.17	3.78	10.84
15:54:46	46.9	6.04	3.85	10.85
15:54:56	47.51	5.73	3.81	11.25
15:55:06	48.22	5.76	3.79	11.31
15:55:16	47.8	5.7	3.78	11.36
15:55:26	47.41	5.67	3.78	11.39
15:55:36	47.02	5.71	3.72	11.38
15:55:46	46.73	5.87	3.69	11.2
15:55:56	46.9	6.04	3.75	10.94
15:56:06	47.12	5.93	3.9	11.02
15:56:16	47.31	5.93	4.03	11.05
15:56:26	47.53	5.97	4.06	11

APPENDIX D

CALIBRATION DATA

Stausscheibe Type Pitot Tube Semi-Annual Measurement

Measured On: 11/8/95 By: B.J.S.

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-008-1	0.375	95	0.827	0.930	7.250	0.456	0.456	3	2	2	2	0.000	0.025
PT-003-1	0.374	39.25	0.915	0.885	6.750	0.411	0.411	6	1	0	0	0.000	0.010
9010	0.373	37	0.905	0.920	7.000	0.464	0.464	2	2	0	3	0.000	0.000
PT050-1	0.253	58.5	0.800	0.903	7.000	0.308	0.308	1	0	1	3	0.040	0.010

Type S Criteria

Pitot ID	Dt	Assembly			Face Opening Planes				
		dN	dT	dW	P	Alpha	Beta	z	w
	<3/8	>3/4	>3/4	>3	<1.5Dt	<10	<5	<1/8	<1/32
PT-008-1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
PT-003-1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
9010	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
PT050-1	PASS	PASS	PASS	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

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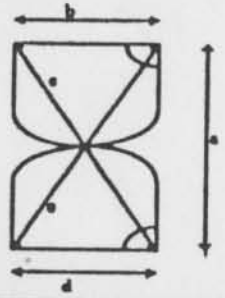
[illegible]OT [illegible]ASU[illegible]ME[illegible]

	Measured On			11/8/95		By	B.J.S.	
	L	P (A)	P (B)	dN	dT	dW	z	w
PT-008-1	95	0.456	0.456	0.827	0.93	7.25	0	0.025
PT-003-1	39.25	0.411	0.411	0.915	0.885	6.75	0	0.01
9010	37	0.464	0.464	0.905	0.92	7	0	0
PT050-1	58.5	0.308	0.308	0.8	0.903	7	0.04	0.01

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

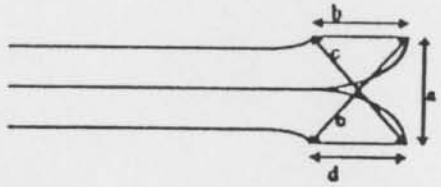
ANGLE CALCULATION MEASUREMENTS

Transverse Axis



	a	b	c	d	e
PT-008-1	0.927	0.375	0.979	0.375	0.99
PT-003-1	0.832	0.374	0.876	0.374	0.905
9010	0.928	0.373	0.99	0.372	0.99
PT050-1	0.615	0.253	0.66	0.252	0.663

Longitudinal Axis



	a	b	c	d	e
PT-008-1	0.927	0.693	1.138	0.75	1.173
PT-003-1	0.821	0.682	1.069	0.766	1.121
9010	0.928	0.552	1.079	0.564	1.058
PT050-1	0.615	0.248	0.658	0.256	0.655

BI-MONTHLY DRY GAS METER CALIBRATION

Meter ID	SN 80860
Date	11/13/95
Cal. By	C.B.

Ambient Temperature	68	F
Corrected Barometric Pressure	30.130	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 @
0.60	0.00	469.65	0.60	0.60	66	69	751.35	0.08	0.00	67	67				
inH2O	10.00	473.93	0.60	0.60	66	71	755.59	0.08	0.00	67	67	1.00386		1.84700	
0.42	19.00	477.78	0.60	0.60	68	72	759.40	0.08	0.00	68	68	1.00553	1.00599	1.85196	1.84837
scfm	29.00	482.05	0.60	0.60	69	72	763.64	0.08	0.00	68	68	1.00858		1.84615	
1.40	0.00	484.49	1.80	1.80	69	72	766.20	0.09	0.00	68	68				
inH2O	9.27	490.41	1.80	1.80	70	75	772.05	0.09	0.00	68	68	1.00749		1.93999	
0.62	20.30	497.35	1.80	1.80	71	77	778.90	0.09	0.00	69	69	1.00932	1.00648	2.00040	1.99484
scfm	28.20	502.30	1.80	1.80	71	77	783.75	0.09	0.00	68	68	1.00264		2.04413	

* Standard Conditions are 29.92 inHg and 60 F

Ave Y of Reference Meter	1.0039
Semi-Annual Double Ave Y	0.9980
Bi-Monthly Double Ave Y	1.0062
Average Delta H @	1.921604

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

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PROBE NOZZLE CALIBRATIONS

Date: 11/14/95 Calibrated By: C.B.

Nozzle I.D.	D_1	D_2	D_3	D_{max}	D_{avg}
NG-001	0.627	0.628	0.627	0.0010	0.6273
NG-002	0.499	0.499	0.501	0.0020	0.4997

D_1, D_2, D_3 = Nozzle diameter measured at different diameters. Tolerance is 0.001 in.

D_{max} = maximum difference (<0.004 in.)

D_{avg} = Average of D1, D2, D3

Stack Temperature Sensor Calibration Data Form

Calibration Date	11/7/95	Calibrator	JRW
Thermometer Model	Atkins #39658-K	Reference	Extech #43141K
Umbilical Cord #	50ft.-#2		Serial #T793272
Method 5 Box S/N	80860		

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	99.4	0.16	PASS
1	260	261.7	0.32	PASS
2	0	1.7	0.62	PASS
2	100	101.1	0.29	PASS
2	260	262.8	0.53	PASS
3	0	1.7	0.62	PASS
3	100	100.6	0.16	PASS
3	260	262.2	0.41	PASS
4	0	0	0.00	PASS
4	100	99.4	0.16	PASS
4	260	261.1	0.21	PASS
5	0	2	0.73	PASS
5	100	99.4	0.16	PASS
5	260	261.7	0.32	PASS
6	0	-2.8	1.03	PASS
6	100	96.7	0.88	PASS
6	260	258.3	0.32	PASS
7	0	-1.1	0.40	PASS
7	100	98.3	0.46	PASS
7	260	260	0.00	PASS

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

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

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HOMER R. DULIN CO.

729 EAST WILLOW STREET
LONG BEACH, CALIFORNIA 90806
(310) 424-8533 (213) 636-4096 FAX (310) 426-7707

CERT. NO. 12-288-4

CALIBRATION CERTIFICATION

SUBMITTED BY: DAMES & MOORE

FLOWMETER SERIAL No. _____

MANUFACTURER EQUIMETER MFG. SERIAL No. 2656207

TUBE No. _____ FLOAT No. _____

MODEL NO.: R-275

REMARKS: CALIBRATED IN CFH AIR @ 14.7 PSIA & 70 DEG F

ACCURACY: SEE DATA

INDICATED		ACTUAL	
SCFM		SCFM	
275.1		275.4	
246.0		246.8	
221.0		219.4	
190.8		191.5	
164.5		164.3	
136.6		136.6	
110.1		110.1	
82.6		82.4	
55.3		55.4	
24.9		25.9	

Flowmeter Certified with HOMER R. DULIN CO.

Equipment No. 12400 Accuracy 0.2% Calib. Due 5-26-96

Procedure No. 101G

NIST Cert. No. 737/202491

Our standards are certified by or are traceable to the National Institute of Standards and Technology and comply with MIL-STD-45662A.

P.O. No. VERBAL Shipper No. _____

12-12-94	12-12-95	B Haynes
CALIBRATION DATE	RECALIBRATION DATE	CALIBRATION TECHNICIAN B. HAYNES

Scott Specialty Gases, Inc.

2800 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer	Assay Laboratory		
DAMES & MOORE	Scott Specialty Gases	Purchase Order	TONY
6 HUTTON CENTER DRIVE SUITE 700	2600 Cajon Boulevard	Project #	37304.003
SANTA ANA, CA 92707	San Bernardino, CA 92411		

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 ALM054957 Certification Date 04/11/95 Exp. Date 04/11/98
Cylinder Pressure+ 2000 PSIG

APPROVED FOR PAYMENT
BY: OFFICE
CHARGE NO: W/A
JOB RISK
DATE
AMOUNT

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(CARBON MONOXIDE)	50.32 PPM	±1% NIST TRACEABLE
(OXYGEN)	9.991%	±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 CO IN N2
NTRM 2659	10/96	ALM017555	20.63% 02 IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Horiba / OPE-135D / 56565502	03/23/95	NDIR
Horiba / OPE-335 / 850557042	03/13/95	Magnetopneumatic

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

CARBON MONOXIDE

First Triad Analysis — Date: 04/04/95 — Response Units: mv

Z1=	0.00	R1=	42.0	T1=	22.6
R2=	42.0	Z2=	0.00	T2=	22.5
Z3=	0.00	T3=	22.6	R3=	42.0

Avg. Conc. of Cust Cyl. 50.32 PPM

Second Triad Analysis — Date: 04/11/95 — Response Units: mv

Z1=	0.00	R1=	42.0	T1=	22.6
R2=	42.0	Z2=	0.00	T2=	22.5
Z3=	0.00	T3=	22.6	R3=	42.0

Avg. Conc. of Cust Cyl. 50.32 PPM

Calibration Curve — Concentration= Ax^2+Bx+C
A = Ax^2+Bx+C
B = 0.9397
C = -0.01058

OXYGEN

First Triad Analysis — Date: 04/04/95 — Response Units: mv

Z1=	0.00	R1=	82.5	T1=	39.9
R2=	82.5	Z2=	0.00	T2=	40.0
Z3=	0.00	T3=	40.0	R3=	82.5

Avg. Conc. of Cust Cyl. 9.991%

Second Triad Analysis — Date: — Response Units: mv

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

Avg. Conc. of Cust Cyl.

Calibration Curve — Concentration= Ax + B
A = 0.2500
B = -0.003409

Date: — Response Units: mv

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

Avg. Conc. of Cust Cyl.

Second Triad Analysis — Date: — Response Units: mv

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

Avg. Conc. of Cust Cyl.

Concentration=

Special Notes:

Analyst:

Scott Specialty Gases

500 WEAVER PARK ROAD, LONGMONT, CO 80501 (303) 442-4700, (303) 651-3094 FAX: (303) 772-7873

CERTIFICATE OF ANALYSIS: Interference-Free ™ Multi-Component Protocol Gas

Customer
DAMES & MOORE
6 HUTTON CENTER DRIVE
SUITE 700
SANTA ANA CA 92707-1351

Assay Laboratory
Scott Specialty Gases, Inc.
500 Weaver Park Road
Longmont, CO 80501

Purchase Order	TONY
Scott Project #	0818601
CGA Fitting	660
QC Number	14079504
File Number	18601-02

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	ALM-045360	Certification Date	04/07/95	Expiration Date	04/07/97
Cylinder Pressure	1897 psig	Previous Certification Dates	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(Carbon Dioxide)	12.5 %	±1% Directly NIST Traceable
(Nitric Oxide)	89.5 ppm	±1% Directly NIST Traceable
(Nitrogen Oxides)	89.5 ppm	Reference Value Only
(Nitrogen)	Balance	

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

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM 18000	12/21/96	ALM-047759	17.95 % CO2 / N2
NTRM 1684	10/07/96	ALM-024690	95.22 ppm NO / N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Nicolet FTIR / 8220 / AAB9400251	03/31/95	Scott Enhanced FTIR TM
Nicolet FTIR / 8220 / AAB9400251	03/31/95	Scott Enhanced FTIR TM

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

(Carbon Dioxide)

First Triad Analysis

Date 03/31/95	Response Units: %	
Z1 = 0.015	R1 = 17.980	T1 = 12.469
R2 = 17.979	Z2 = 0.014	T2 = 12.511
Z3 = 0.014	T3 = 12.507	R3 = 17.972
Avg. Conc. of Cyl. =	12.80 %	

Second Triad Analysis

Calibration Curve

Concentration =	A+Bx+Cx2+Dx3+Ex4
r = 0.99999	
Constants:	A = 0.018881
B = 8.488108-03	C = 1.554485-10
D = 8.728108-17	E = 0

(Nitric Oxide)

First Triad Analysis

Date 03/31/95	Response Units: ppm	
Z1 = -0.344	R1 = 88.220	T1 = 88.868
R2 = 88.429	Z2 = 0.088	T2 = 88.838
Z3 = 0.048	T3 = 88.339	R3 = 88.830
Avg. Conc. of Cyl. =	88.48 ppm	

Second Triad Analysis

Date 04/07/95	Response Units: ppm	
Z1 = 0.233	R1 = 88.742	T1 = 88.418
R2 = 88.841	Z2 = 0.167	T2 = 88.515
Z3 = 0.293	T3 = 88.754	R3 = 88.999
Avg. Conc. of Cyl. =	88.89 ppm	

Calibration Curve

Concentration =	A+Bx+Cx2+Dx3+Ex4
r = 0.99999	
Constants:	A = -0.088272
B = 0.73515	C = 0.000108881
D = 7.142585-07	E = -3.0715-10

Special Notes Do not use when cylinder pressure is below 150 psig.

Analyst: Tanya Bayha
Tanya Bayha

Scott Specialty Gases

500 WEAVER PARK ROAD, LONGMONT, CO 80501 (303) 442-4700, (303) 651-3094 FAX: (303) 772-7873

CERTIFICATE OF ANALYSIS: Interference-Free ™ Multi-Component Protocol Gas

Customer
DAMES & MOORE
6 HUTTON CENTER DRIVE
SUITE 700
SANTA ANA CA 92707-1351

Assay Laboratory
Scott Specialty Gases, Inc.
500 Weaver Park Road
Longmont, CO 80501

Purchase Order TONY
Scott Project # 0818601
CGA Fitting 660
QC Number 14079503
File Number 18601-03

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 ALM-033681
Cylinder Pressure 1893 psig
Certification Date 04/07/95
Previous Certification Dates None
Expiration Date 04/07/97

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(Carbon Dioxide)	12.5 %	±1% Directly NIST Traceable
(Nitric Oxide)	45.8 ppm	±1% Directly NIST Traceable
(Nitrogen Oxides)	45.8 ppm	Reference Value Only
(Nitrogen)	Balance	

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

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM 18000	12/21/96	ALM-047759	17.95 % CO2 / N2
NTRM 1684	10/07/96	ALM-024690	95.22 ppm NO / N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Nicolet FTIR / 8220 / AAB9400251	03/31/95	Scott Enhanced FTIR TM
Nicolet FTIR / 8220 / AAB9400251	03/31/95	Scott Enhanced FTIR TM

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

(Carbon Dioxide)

First Triad Analysis

Date 03/31/95	Response Units: %	
Z1 = 0.015	R1 = 17.980	T1 = 12.469
R2 = 17.979	Z2 = 0.014	T2 = 12.509
Z3 = 0.014	T3 = 12.505	R3 = 17.972
Avg. Conc. of Cyl. = 12.50 %		

Second Triad Analysis

Calibration Curve

Concentration =	A+Bx+Cx2+Dx3+Ex4
r = 0.99999	
Constants:	A = 0.018991
B = 8.498168-05	C = 1.364445-10
D = 9.728168-17	E = 0

(Nitric Oxide)

First Triad Analysis

Date 03/31/95	Response Units: ppm	
Z1 = -0.344	R1 = 86.220	T1 = 46.698
R2 = 86.429	Z2 = 0.089	T2 = 46.762
Z3 = 0.049	T3 = 46.893	R3 = 86.830
Avg. Conc. of Cyl. = 46.70 ppm		

Second Triad Analysis

Date 04/07/95	Response Units: ppm	
Z1 = 0.233	R1 = 86.742	T1 = 46.840
R2 = 86.841	Z2 = 0.167	T2 = 46.822
Z3 = 0.269	T3 = 46.813	R3 = 86.866
Avg. Conc. of Cyl. = 46.83 ppm		

Calibration Curve

Concentration =	A+Bx+Cx2+Dx3+Ex4
r = 0.99999	
Constants:	A = -0.099272
B = 0.73615	C = 0.0001109961
D = 7.142568-07	E = -3.0715-10

Special Notes Do not use when cylinder pressure is below 150 psig.

Analyst Tanya Bayha

213-585-2154
FAX# 213-585-0582

LIQUID CARBONIC

CYLINDER GAS PRODUCTS

5700 SOUTH ALAMEDA STREET • LOS ANGELES, CALIFORNIA 90058

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER DAMES & MOORE

P.O NUMBER 9496

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON MONOXIDE GMIS	vs 2636a	SGAL 2276	248 ppm
CARBON DIOXIDE GMIS	vs 2745	SA 7091	13.97%
OXYGEN GMIS	vs 2659a	435369	21.07 %

ANALYZER READINGS

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

COMPONENT CARBON MONOXIDE GMIS ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N A12-729

ANALYTICAL PRINCIPLE NDIR

FIRST ANALYSIS DATE 10/13/95 LAST CALIBRATION DATE 10/15/95

SECOND ANALYSIS DATE 10/20/95

Z 0	R 248	C 178	CONC.	178 ppm	Z 0	R 248	C 178	CONC.	178 ppm
R 248	Z 0	C 178	CONC.	178 ppm	R 248	Z 0	C 178	CONC.	178 ppm
Z 0	C 178	R 248	CONC.	178 ppm	Z 0	C 178	R 248	CONC.	178 ppm
U/M ppm		MEAN TEST ASSAY		178 ppm	U/M ppm		MEAN TEST ASSAY		178 ppm

COMPONENT CARBON DIOXIDE GMIS ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N A12-730

ANALYTICAL PRINCIPLE NDIR

FIRST ANALYSIS DATE 10/20/95 LAST CALIBRATION DATE 10/15/95

SECOND ANALYSIS DATE

Z 0.00	R 13.96	C 9.10	CONC.	9.11 %	Z	R	C	CONC.	
R 13.96	Z 0.00	C 9.10	CONC.	9.11 %	R	Z	C	CONC.	
Z 0.00	C 9.10	R 13.96	CONC.	9.11 %	Z	C	R	CONC.	
U/M %		MEAN TEST ASSAY		9.11 %	U/M %		MEAN TEST ASSAY		

COMPONENT OXYGEN GMIS ANALYZER MAKE-MODEL-S/N Siemens Oxymat 5E S/N A12-839

ANALYTICAL PRINCIPLE Paramagnetic

FIRST ANALYSIS DATE 10/20/95 LAST CALIBRATION DATE 10/15/95

SECOND ANALYSIS DATE

Z 0.00	R 21.05	C 19.95	CONC.	19.97 %	Z	R	C	CONC.	
R 21.05	Z 0.00	C 19.95	CONC.	19.97 %	R	Z	C	CONC.	
Z 0.00	C 19.95	R 21.05	CONC.	19.97 %	Z	C	R	CONC.	
U/M %		MEAN TEST ASSAY		19.97 %	U/M %		MEAN TEST ASSAY		

THIS CYLINDER NO. SA 3184

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 1650 PSIG

CERTIFICATION DATE 10/20/95

EXPIRATION DATE 10/20/98 TERM 36 MONTHS

CERTIFIED CONCENTRATION

CARBON MONOXIDE	178 ppm
CARBON DIOXIDE	9.11 %
OXYGEN	19.97 %
NITROGEN	BALANCE

Values not valid below 150 psig

ANALYZED BY MARIA KUCHON

CERTIFIED BY KWAN YOUNG

APPENDIX E

OUTSIDE LABORATORY DATA

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Selected Components Analysis in Tedlar Bag Samples

Report Date: November 29, 1995
Client: Dames & Moore
Project No.: 30990-001-0103-131
Date Received: November 22, 1995
Date Analyzed: November 27, 1995

ANALYSES DESCRIPTION

Methane, total gaseous non-methane organics (TGNMO), and carbon dioxide were analyzed by flame ionization detection/total combustion analyses (FID/TCA). Oxygen was analyzed by thermal conductivity detection/gas chromatography (TCD/GC).

AtmAA Lab No.: 93265-48
Sample I.D.: Balboa
Tedlar

Components	(Concentration in %, v)
Oxygen	12.6
Carbon Dioxide	5.24
	(Concentration in ppmv)
Methane	<1
TGNMO	<1

The reported oxygen concentration includes any argon present in the sample, calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.
TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analysis)

Project No.: 30990-001-0103-131
Date Received: November 22, 1995
Date Analyzed: November 27, 1995

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in %,v)			
Oxygen	Balboa Tedlar	12.7	12.5	12.6	0.79
Carbon Dioxide	Balboa Tedlar	5.07	5.40	5.24	3.2
		(Concentration in ppmv)			
Methane	Balboa Tedlar	<1	<1	—	—
TGNMO	Balboa Tedlar	<1	<1	—	—

One Tedlar bag sample, laboratory number 93265-46, was analyzed for oxygen, carbon dioxide, methane, total gaseous non-methane organics (TGNMO). Agreement between repeat analyses is a measure of precision and is shown above in the column % Difference from Mean." Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 2 repeat measurements from one Tedlar bag sample is 2.0%.

APPENDIX

DATA QUALIFIERS & ABBREVIATIONS

A	The amount detected is below the Method Quantitation Limit.
B	This compound was also detected in the blank.
C	The amount detected is less than five times the Method Calibration Limit.
D	The amount reported is the maximum possible concentration.
E	The detection limit was raised above the Method Calibration Limit due to chemical interferences.
F	This result has been confirmed on the DB-225 column.
G	This resulted has been confirmed on the SP-2331 column.
H	The signal-to-noise ratio is greater than 10:1.
I	Chemical Interference
Conc.	Concentration
D.L.	Detection Limit
NA	Not applicable
S/N	Signal-to-noise
MPC	Maximum Possible Concentration
*	See Cover Letter
R.L.	Reporting Limit

DAMES & MOORE
CHAIN-OF-CUSTODY

PROJECT # 30990-001-0103-131

SAMPLE I.D.	DATE SAMPLED	TIME SAMPLED	Meth. 23 PCB's	PCB's by high res. mass spec			FIELD COMMENTS
STSNA-1001-1 (Meth. 23 Filter)	11/21/95	11:30-4:30	X				Filter - slight discoloration (tan)
STSNA-1001-2 (Meth. 23 Rinse)	11/21/95	11:30-4:30	X				Rinses - Toluene/Acetone - colorless/clear
STSNA-1001-3 (RAD RESIN TRAP)	11/21/95	11:30-4:30	X				
STSNA-1003-1	11/21/95			X			Composite sample over Duration of Test

Relinquished By:

		Date	Received By:	
Name	Anthony V Hoff	11/24/95	Name	KENFATT
Company	Dames + Moore	Time	Company	ACTA ANALYTICAL
Signature	Anthony V Hoff	1630	Signature	11-25-95 @ 1000

@ PAC 11-27-95

Relinquished By:

		Date	Received By:	
Name			Name	
Company		Time	Company	
Signature			Signature	

ALTA Analytical Laboratory

Project No.: 1945

Sample Log-In Checklist	Yes	No
1. Date Samples Arrived: 11.25.05 Initials:		
2. Samples Arrived By: (circle one) Airborne Express ~~Federal Express~~ UPS Emery Freezer Truck Company Courier Other		
3. Shipping Documentation Present? (circle one) Shipping Label (Airbill) Tracking Number 794123078	X	
4. Shipping Container(s) Intact? If no, describe condition below.	X	
5. Custody Seals Present and Intact? If not intact, describe condition below. No. of Seals _____ or Seal No. _____ Type:(circle) Bottle or Container		X
6. Sample Container Intact? If no, indicate sample condition below.	X	
7. Shipping Preservation: (circle) Ice / Blue Ice / Dry Ice / Ambient / None Temp(°C) -1°		
8. Chain of Custody (COC) or other Sample Documentation Present?	X	
9. COC/Documentation Acceptable? If no, complete COC Anomaly Form.	X	
10. Shipping Container: (circle) ALTA or Client / Return or Retain		
11. Container and/or Bottles Requested?		X
12. Sample Control Check In/Out Log Completed?	X	
*13. Drinking Water Sample? If yes, Acceptable Preservation? (circle) Y or N		X

*Required for HRMS

Name: _____ Date Samples Reconciled: _____
(Signature Required for LCMS Only)

Comments:

DIOXIN/FURAN RESULTS

ALTA

PCDD & PCDF
EPA METHOD 23

METHOD BLANK
Lab ID: 2071-0002-MB
Matrix: Sand

Date Received: NA
Date Extracted: 1/15/96
Sample Amount: 10.00 g

ICAL ID: ICARB
QC Lot: LC0115S
Units: pg/g

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	0.85			
Total TCDD	ND	0.85			
1,2,3,7,8-PeCDD	ND	1.0			
Total PeCDD	ND	10			I
1,2,3,4,7,8-HxCDD	ND	0.84			
1,2,3,6,7,8-HxCDD	ND	0.82			
1,2,3,7,8,9-HxCDD	ND	0.78			
Total HxCDD	ND	0.84			
1,2,3,4,6,7,8-HpCDD	ND	1.8			
Total HpCDD	ND	1.8			
OCDD	12		0.90	>10:1	
2,3,7,8-TCDF	ND	0.39			
Total TCDF	ND	0.39			
1,2,3,7,8-PeCDF	ND	1.3			
2,3,4,7,8-PeCDF	ND	1.2			
Total PeCDF	ND	1.3			
1,2,3,4,7,8-HxCDF	ND	0.37			
1,2,3,6,7,8-HxCDF	ND	0.34			
2,3,4,6,7,8-HxCDF	ND	0.39			
1,2,3,7,8,9-HxCDF	ND	0.43			
Total HxCDF	ND	0.43			
1,2,3,4,6,7,8-HpCDF	ND	0.45			
1,2,3,4,7,8,9-HpCDF	ND	0.52			
Total HpCDF	ND	0.52			
OCDF	3.5		0.80	>10:1	A

Analyst: SLy

Reviewer: KJ

ALTA

PCDD & PCDF
EPA METHOD 23

METHOD BLANK
Lab ID: 2071-0002-MB

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	93	0.81	
^{13}C-1,2,3,7,8-PeCDD	131	NA	
^{13}C-1,2,3,6,7,8-HxCDD	104	1.29	
^{13}C-1,2,3,4,6,7,8-HpCDD	109	1.07	
^{13}C-OCDD	87	0.91	
^{13}C-2,3,7,8-TCDF	93	0.81	
^{13}C-1,2,3,7,8-PeCDF	114	1.64	
^{13}C-1,2,3,6,7,8-HxCDF	98	0.53	
^{13}C-1,2,3,4,6,7,8-HpCDF	128	0.44	
Pre-spike Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	NA	NA	
^{13}C-2,3,4,7,8-PeCDF	NA	NA	
^{13}C-1,2,3,4,7,8-HxCDD	NA	NA	
^{13}C-1,2,3,4,7,8-HxCDF	NA	NA	
^{13}C-1,2,3,4,7,8,9-HpCDF	NA	NA	
Alternate Recovery Standard:			
^{13}C-1,2,3,7,8,9-HxCDF	115	0.53	

Dates Analyzed:

DB-5: 1/21/96 DB-225: NA SP-2331: NA

Analyst: [signature] Reviewer: [signature]

Feed Rate	Retort Temperature		Oxidizer	Boiler Exh.	Stack
gal/hr	Inlet °F	Outlet °F	Temp. °F	Temp. °F	Temp. °F
2.56	1314	1450	2250	580	149

Table 4-1 BAL-PAC Operating Parameters

The Pyrolytic Conversion System was operated at an average temperature of 1382 °F in an oxygen free environment. The gases produced were then introduced to the thermal oxidizer operating at an average temperature of 2250 °F. Following the oxidizer, the gas entered the boiler and was subsequently cooled to 580 °F. Excess steam produced from the boiler was vented to atmosphere. Following the boiler was a wet scrubber and a carbon bed which further cooled the gas stream down to an average exhaust stack temperature of 149 °F.

5.0 SAMPLING AND MONITORING

The sampling and monitoring plan for the treatability study was designed so that effective destruction of the impoundment material could be verified. As only preliminary data was desired in order to demonstrate the technology to potential clients, only one test run was performed for each feed: PCB concentrations were measured at the inlet to the system, at the solid output of the system and at the stack exhaust. In addition, the following stack gas constituent concentrations were determined:

- Dioxins and Furans
- Carbon Monoxide
- Oxygen
- Carbon Dioxide
- Total Gaseous Non-Methane Hydrocarbons
- Hydrogen Chloride

Due to the nature of the liquid feed matrix, no product ash was observed during the liquid feed testing.

The system was monitored during the testing to record specific process parameters, including feed rate, pyrolytic retort temperatures, thermal oxidizer temperatures and recovery boiler exit temperatures.

5.1 TEST OVERVIEW

On Friday, November 17, Dames and Moore field crew performed a preliminary moisture determination and flow rate traverse of the stack gas. In addition, the flue gas molecular weight was determined by analyzing for oxygen and carbon dioxide using a Fyrite Gas Analyzer. These preliminary measurements were needed in order to determine the optimum sampling nozzle diameter and to perform the isokinetic calculations required for the Method 23 "PCB" exhaust testing.

On Monday, November 20, Dames and Moore personnel setup for the testing to be conducted on the following day. The necessary hardware and rail traverse system was installed on the stack sampling ports and the Dames & Moore Mobile Laboratory and analyzers were tuned and warmed up.

On Tuesday, November 21, the system monitoring, alarm and interlock units were checked out and the system was brought to optimum operating conditions. During this time period, the field test crew was responsible for equipment set up and conducting preliminary measurements and calibrations of their equipment. Upon confirmation that the system was stabilized, the Site Manager informed the Treatability Study Coordinator that sampling could begin.

Dames & Moore personnel, who have received special training for working around PCB spiked mineral oil, were responsible for sampling of the feed to the treatment system. Dames & Moore personnel were also responsible for providing the necessary equipment to measure the gaseous and semi-volatile organic emissions from the exhaust stack.

When all sampling was completed, the Sampling Team Leader informed the Site Manager to record the total amount of feed material processed during the sampling run. At this point, clean mineral oil was processed to clean the feed system of the PCB spiked feed.

On January 4, 1996, the BAL-PAC system was stabilized using a sand feed saturated with transformer oil. Dames & Moore personnel then prepared a PCB contaminated sand feed and began feeding it into the system. Once the system was stabilized, composite samples of the feed and solid ash byproduct were collected over a three hour period.

Table 5-1 summarizes the Dames & Moore field activities during the course of the BAL-PAC System treatability testing.

Table 5-1 Dames & Moore Activity Schedule

Activity	Nov. 13	Nov. 17	Nov. 20	Nov. 21	Jan. 6
Prepare 25 gallons of PCB spiked oil feed	X				
Preliminary Measurements - Exhaust Flow Rate, Moisture Content, Gas Density		X			
Field Setup - Warm-up Mobile Laboratory, Install Meth. 23 Traverse Hardware, Calibration Checks			X		
Liquid Feed Testing - PCB's, Dioxins and Furans, HCl, TGNMO, Oxygen, Carbon Dioxide, Carbon Monoxide, Oxides of Nitrogen				X	
Solid Feed Testing - Solid feed and ash byproduct				X	

5.2 FEED MATERIAL

5.2.1 Liquid Feed

The feed material used during the treatability study program was transformer oil (Shell Diala AX Oil) spiked with Arochlor 1254 (PCB). A fifty-five gallon drum was used to spike twenty-five gallons of transformer oil with 200 grams of Arochlor 1254.

The feed rate was measured volumetrically. Prior to the testing date, Balboa Pacific staff performed a volumetric calibration of the twenty-five gallon feed hopper in order to get an accurate feed rate. During this procedure, known volumes of oil were transferred to the hopper and the liquid level was measured giving a chart of volume versus liquid level. This chart was used to determine the PCB spiked oil feed rate during the testing period. The spiked transformer oil was fed from the hopper to the system at a rate of 18.9 pounds per hour during the testing period. The feed hopper calibration chart is included in Appendix A.

A four milliliter feed sample was collected every thirty minutes during periods of stack sampling in order to produce a composite feed sample. These samples were withdrawn from the bottom of the feed hopper and collected in a wide-mouth glass jar, sealed with a Teflon-lined screw cap. This sample was subsequently sent to ALTA Analytical, El Dorado, CA for PCB analysis.

5.2.2 Solid Feed

The solid feed matrix consisted of a PCB spiked sand. Fifteen grams of PCB's were thoroughly mixed with ten pounds of transformer oil. This mixture was then mixed with ninety pounds of sand to ensure a saturated and homogenous feed. The contaminated feed was then placed into the BAL-PAC solid feed hopper and fed into the pyrolytic retort chamber at a constant rate.

Composite samples of the feed and were collected at fifteen minute intervals using a wide-mouth glass jar, sealed with a Teflon-lined screw cap. The samples were sent to ALTA Analytical, El Dorado, CA for PCB analysis.

5.3 PRODUCT (ASH)

5.3.1 Liquid Feed Testing

Due to the nature of the feed matrix, no product ash was observed during the testing period.

5.3.2 Solid Feed Testing

The solid ash byproduct was consisted of a "dry" sand material. Samples were taken at fifteen minute intervals at the solid output of the BAL-PAC system. The sample was collected in a wide-mouth jar sealed with a Teflon lined screw cap. The sample was sent with the feed sample to ALTA Analytical for PCB analysis.

5.4 EXHAUST GAS SAMPLING

Exhaust gas sampling was conducted during the liquid feed testing only. During the four hour sample run, exhaust gas emissions were sampled for subsequent determination of PCB's, Dioxins and Furans, Hydrocarbons, HCl, O_2, CO_2, CO and NOx.

5.4.1 Sampling Traverse Locations

The exhaust stack from the wet scrubber exhaust is 16 inches by 21 inches (18" equivalent diameter). Figure 5-1 shows the port locations on the exhaust stack. Three test ports are located in the 21 inch face, the ports being 4 inches in diameter and 1.5 inches in length. For the PCB sampling, eight sampling points for each sample port were used as shown in Figure 5-2 and Table 5-2. The HCl, hydrocarbon and Method 100.1 testing were all conducted at a single point located at the center of the stack. The ports were located 30" upstream and 92" downstream of the nearest flow disturbance, meeting EPA Method 1 requirements (2 duct diameters upstream and ½ duct diameter downstream of the nearest flow disturbance).

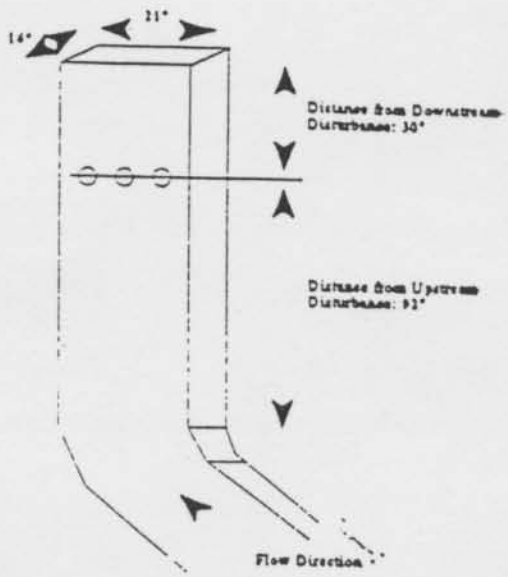

Figure 5-1 Exhaust Stack Diagram

Figure 5-2 Port Locations

Traverse Point	Inside of Near Wall to Traverse Point	Traverse Point Location from Outside of Nipple
1	1	2.5
2	3	4.5
3	5	6.5
4	7	8.5
5	9	10.5
6	11	12.5
7	13	14.5
8	15	16.5

Table 5-2 Traverse Point Locations

5.4.2 Sampling for PCB's and Dioxins and Furans

EPA Method 23 was used to collect samples for polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and PCB's. Multi-point isokinetic sampling was conducted at ten minutes per traverse point for a total of four hours. Testing began at 11:30 and concluded at 16:30. 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. A glass fiber filter heated to 248 (± 25) °F, a water-cooled condenser, and sorbent module containing pre-cleaned XAD-2 resin, maintained at < 68 °F are located downstream of the probe assembly. The organic module components were oriented to direct the flow of condensate formed vertically downward from the conditioning section, through the adsorbent media, and into the condensate knockout trap. The adsorbent media collects any PCB's, Dioxins or Furans. The knockout trap consisted of an oversized impinger (approximately one liter in volume) similar in appearance to an empty impinger directly underneath the sorbent module, it had a shortened center stem to collect a large volume of condensate without bubbling and overflowing into the impinger train. All surfaces of the sampling train contacted by the gas sample, including nozzle, probe, filter holder, connecting glassware and O-rings, were fabricated of borosilicate glass or Teflon.

To determine the stack-gas moisture content, four 500-ml impingers connected in series with leak-free ground-glass joints, followed the knockout trap. The first, third, and fourth impingers were of the Greenburg-Smith design, modified by replacing the tip with a 1.3 cm (½ inch) I.D. glass tube extending about 1.3 cm (½ inch) from the bottom of the outer cylinder. The second impinger was of the Greenburg-Smith design with the standard tip. The first and second impingers contained approximately 100 mls of distilled water and the fourth contained a known weight of silica gel. Purification of the XAD-2 resin used for the collection of the sample was performed by ALTA Analytical. A schematic of the sampling train used in this method is shown in Figure 5-3. The majority of the required equipment is identical to that used in an EPA Method 5 determination. The new components required are a condenser coil and a sorbent module. Due to expected low concentrations, a minimum of 3 dry standard cubic meters (105.9 dscf) of sample volume was required. Special field sample recovery procedures were followed to recover the organic material. Analysis of PCB's, Dioxins and Furans was conducted by high resolution gas chromatography/mass spectroscopy using fused-silica capillary GC column.

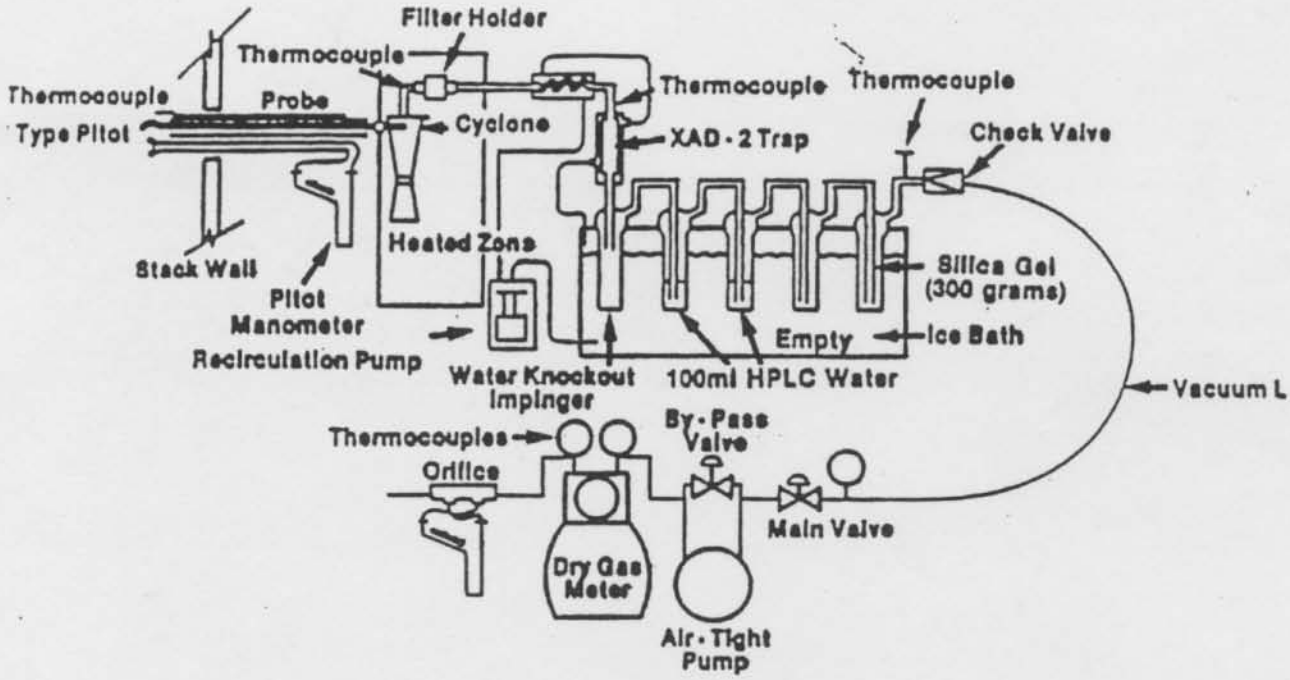

Figure 5-1. CDD/CDF Sampling Train Configuration

5.4.3 Sampling for Hydrogen Chloride

Hydrogen Chloride (HCl) sampling was conducted according to a modified EPA Method 26 testing setup. HCl testing began 11:40. At 11:48, the sampling pump lost power and the sampling train was down for a total of eight minutes. Sampling commenced at 11:55 and concluded at 12:48 for a total of one hour of sampling time..

A 1/4" Teflon line was used as the sampling probe and was placed at the center of the stack. The total sampling time was one hour at a rate of 1,985 cc/min. The probe was connected to a set of 4-midget impingers. The first two contained a known amount of 0.1 N H_2SO_4 absorbing solution, the third was left empty and the fourth contained a known amount of silica gel. A rotameter and a sampling pump followed the midget impinger train. The volumetric flow rate of the entire sampling system was calibrated with a M5 mini-BUC Calibrator.

System calibrations were conducted prior to and immediately following the test in order to quantify the volumetric flow rate during the test. System leak checks were conducted before and after testing. No leaks were found.

Upon completion of the test and calibration checks, the sample was transported to the Dames & Moore Laboratory facility. The impinger solution along with the rinses of the connecting glassware were measured and transferred to a polyethylene sample container. A blank sample, containing the absorbing solution was also prepared. Both samples were sent to West Coast Analytical Services Inc. for subsequent chloride determination. Ion Chromatography was used as the instrumental method.

5.4.4 Sampling for Total Non-Methane Hydrocarbons

Hydrocarbon sampling began at 14:00 and concluded at 16:00 for a total of two hours of sampling.

Total non-methane hydrocarbons were sampled using a 1/4" Teflon line located at the center of the stack. The line was connected to a lung-sampler, containing a ten-liter Tedlar bag, followed by a sample pump. Approximately 8-liters of sample were collected over a two hour period. Upon completion of the hydrocarbon sampling, the Tedlar bag was removed from the lung-sampler and transported to the Dames & Moore laboratory.

Due to the 72-hour holding time of Tedlar bag samples, the bag was shipped out that night, November 21, to ATMAA Inc. for hydrocarbon analysis on the following day. In addition to hydrocarbon analysis, the bag was also analyzed for oxygen and carbon dioxide content in order to confirm there were no system leaks.

5.4.5 Continuous Emission Monitoring

Oxygen, oxides of nitrogen (NOx), carbon dioxide, and carbon monoxide gas concentrations in the flue gas were measured using an extractive Continuous Emissions Monitoring System (CEMS) in Dames & Moore's Mobile Laboratory. Two sequential Continuous Emission Tests were conducted on the exhaust stack. The first of the two tests was conducted for one hour, 12:12 - 13:12. The second test was conducted for two hours, 1:56 - 3:56.

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.

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 will be 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 5.3.

Table 5-3 Description of Continuous Monitoring Instrumentation

Gas	Carbon Monoxide (CO)	Oxygen O_2	Carbon Dioxide CO_2
Instrument Manufacturer and Model Number	TECO Model 48	Servomex Model 1400	California Analytical Model 3300
Detection Principle	Gas filter Correlation Analyzer	Magneto-Dynamic Paramagnetic Analyzer	Nondispersive Infrared Absorption (NDIR)
Drift: Zero Span	± 0.2 ppm ± 1 percent full scale	<1 percent full scale/24 hr <1 percent full scale/24 hr	± 1 percent full scale/ 24 hr ±1 percent full scale/24 hr
Output	0-1V	0-1V	0-1V
Ranges	0-1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 ppm	0-25 percent 0-100 percent	0-10 percent 0-20 percent
Response Time	30 sec	30 sec	30 sec

Microprocessor Hybrid Recorder: Yokogawa Model 2300

6.0 ANALYTICAL PROCEDURES

6.1 FEED MATERIALS

In order to determine the destruction efficiency of the PCB spiked liquid and solid feeds, the feed composition as well as the feed rate was accurately measured.

Since the feed material contained a known amount of Arochlor 1254, the EPA procedure for analysis of PCBs in transformer oils and waste oils (USEPA 1981, Bellar and Lichtenberg 1981) was used as the analytical method. This procedure provides recommendations for several cleanup techniques. For the instrumental analysis, GC with halogen specific, electron capture, or mass spectrometer detectors are all allowed. Alta Analytical of El Dorado Hills, California, performed the analysis.

6.2 STACK GAS SAMPLES

6.2.1 PCB's and Dioxins and Furans

Stack gas samples for PCB's and dioxins and furans collected by modified the Method 5 trains were extracted, cleaned up and analyzed by high resolution gas chromatography. The filter and the sorbent cartridge (XAD-2) were cleaned and checked by the laboratory prior to usage in the field. The sorbent cartridge was spiked with an appropriate internal standard prior to sampling. All glass components of the train upstream of and including the adsorbent module, were cleaned as described in Section 3A of the "Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples." Special care was devoted to the removal of residual silicone grease sealants on ground glass connections of used glassware.

Sample recovery began as soon as the probe was removed from the stack at the end of the sampling period. The nozzle end of the sampling probe was sealed with acetone washed aluminum foil. External particulate matter was wiped off near the tip of the probe. The probe was removed from the train and closed off at both ends with aluminum foil.

The probe and impinger assembly was transferred to the Dames & Moore laboratory facility. No smoking, which could contaminate the sample, was allowed in the cleanup area. The

filter was carefully removed from the filter holder and placed in its identified container using Teflon forceps.

The sorbent module was removed from the train, tightly caped on both ends, labeled, and stored on ice for transport to the laboratory.

Material deposited in the nozzle, probe transfer lines, and the front half of the filter holder was recovered by brushing while rinsing three times with acetone and then, by rinsing the probe three times with toluene. All the rinses were collected in container No. 2.

The back half of the filter holder was rinsed three times with acetone. The connecting line between the filter and the condenser was also rinsed three times with acetone. The condenser was treated in the same manner as the connecting line. All the rinses were collected in Container No. 2 and the level of the liquid marked on the container.

The liquid gain in the first four impingers was measured to within 1 ml by using a top loading balance and weighing it to within 0.5 g. The weight of liquid present was recorded. The color of the indicating silica gel was noted to determine if it has been completely spent. The silica gel weight was also determined and recorded to calculate stack gas moisture.

The samples were sent by Federal Express to Alta Analytical, El Dorado, California, under chain of custody procedures for extraction and analysis. EPA Method 23 procedures were followed. Laboratory analysis data is included in Appendix E.

6.2.2 Hydrogen Chloride

Hydrogen Chloride sampling was conducted at a single point located at the center of the duct for a total of one hour. Sample was bubbled through a series of midget impingers containing 0.1 N H_2SO_4 solution.

Upon completion of the hydrogen chloride testing and field calibration procedures, the sample was transported to the Dames & Moore laboratory facility. The impinger solution along with the rinses of the connecting glassware were measured and transferred to a polyethylene sample container. A blank sample, for quality control, containing the absorbing solution was also prepared. Both samples were sent to West Coast Analytical Services Inc., Santa Fe Springs, for

subsequent chloride determination. Ion Chromatography was used as the instrumental method. Laboratory analysis data can be found in Appendix E.

6.2.3 Total Non-Methane Hydrocarbons

Total Non-Methane Hydrocarbon (TGNMO) sampling was conducted at a single point located at the center of the duct for a total of two hours. Approximately 8-liters of sample were collected in a Tedlar sample bag.

Due to the 72-hour holding time of Tedlar bag samples, the bag was shipped out that night, November 21, to ATMAA Inc. for hydrocarbon analysis on the following day. In addition to hydrocarbon analysis, the bag was also analyzed for oxygen and carbon dioxide content in order to confirm there were no system leaks. TGNMO, methane and carbon dioxide were analyzed by flame ionization detection/total combustion analyses. Oxygen was analyzed by thermal conductivity detection/gas chromatography. Laboratory analysis data can be found in Appendix E.

7.0 TEST RESULTS

The following tables show the test results of the liquid and solid feed testing. The liquid feed testing was conducted on November 21, 1995. The solid feed testing was conducted on January 6,1996.

7.1 LIQUID FEED TESTING

Table 7.1 Liquid Feed Data

Matrix	Shell Daila Oil AX
PCB	Arochlor 1254
PCB Concentration, g/gal	2.898
Oil Feed Rate, gal/hr	2.56
PCB Feed Rate, g/hr	7.419

Table 7.2 Exhaust Stack Sampling Summary

Parameter	Units	BAL-PAC Exhaust
Start Time	Time	11:30
End Time	Time	4:25
Total Sampling Time	min	240
Sample Volume	DSCF	139.92
Isokinetics	%	92
Stack Temperature	°F	146.5
Stack Gas Velocity	ft/s	11.5
Static Pressure	"H_2O	-0.01
Stack Dimensions	in.	21 x 16
Moisture	%	22.3
Flow Rate	ACFM	1,616
	DSCFM	1,085

Table 7.3 PCB Exhaust Results

Compound	Concentrations			Emissions
	ng/sample	DL	ng/dscf	ug/hr
Monochlorobiphenyl	ND	5.0	1.892	1.163
Dichlorobiphenyl	ND	5.0	1.892	1.163
Trichlorobiphenyl	ND	5.0	1.892	1.163
Tetrachlorobiphenyl	ND	5.0	1.892	1.163
Pentchlorobiphenyl	ND	5.0	1.892	1.163
Hexachlorobiphenyl	ND	5.0	1.892	1.163
Heptochlorobiphenyl	ND	5.0	1.892	1.163
Octachlorobiphenyl	ND	5.0	1.892	1.163
Nonachlorobiphenyl	ND	5.0	1.892	1.163
Decachlorobiphenyl	ND	5.0	1.892	1.163

ND = Not Detected

DL = Detection Limit

Note: ug/hr based on ½ the detection limit

Table 7.4 Dioxin/Furan Exhaust Results

Compound	Concentrations			Emissions
	pg/sample	DL	pg/dscf	ng/hr
2,3,7,8-TCDD	ND	9.2	0.000	0.000
Total TCDD	ND	9.2	0.000	0.000
1,2,3,7,8-PeCDD	ND	4.6	0.000	0.000
Total PeCDD	ND	4.6	0.000	0.000
1,2,3,4,7,8-HxCDD	ND	4.4	0.000	0.000
1,2,3,6,7,8-HxCDD	ND	4.7	0.000	0.000
1,2,3,7,8,9-HxCDD	ND	4.2	0.000	0.000
Total HxCDD	ND	4.7	0.000	0.000
1,2,3,4,6,7,8-HpCDD	ND	6.0	0.000	0.000
Total HpCDD	ND	6.0	0.000	0.000
OCDD	25		6.307	11.632
2,3,7,8-TCDF	ND	6.8	0.000	0.000
Total TCDF	160		40.367	74.445
1,2,3,7,8-PeCDF	ND	15	0.000	0.000
2,3,4,7,8-PeCDF	ND	12	0.000	0.000
Total PeCDF	63		15.895	29.313
1,2,3,4,7,8-HxCDF	ND	6.4	0.000	0.000
1,2,3,6,7,8-HxCDF	ND	7.5	0.000	0.000
2,3,4,6,7,8-HxCDF	ND	4.4	0.000	0.000
1,2,3,7,8,9-HxCDF	ND	3.1	0.000	0.000
Total HxCDF	19		4.794	8.840
1,2,3,4,6,7,8-HpCDF	ND	8.1	0.000	0.000
1,2,3,4,7,8,9-HpCDF	ND	5.0	0.000	0.000
Total HpCDF	ND	8.1	0.000	0.000
OCDF	18		4.541	83.375

ND = Not Detected

DL = Detection Limit

Table 7.5 Hydrogen Chloride Sampling

Parameter	Units	BAL-PAC EXHAUST
Start Time	Time	11:40
End Time	Time	12:48
Sampling Time	min	61.0
Sample Volume	DSCF	20.087
HCl Stack Concentration	ppmv	0.24
HCl Emissions, lb/hr	lb/hr	0.002

Table 7.5 Continuous Emissions and Hydrocarbon Data

CONSTITUENT	CONCENTRATION	EMISSION RATE
Oxygen, O2	11.4 %	NA
Carbon Dioxide, CO2	4.4%	NA
Carbon Monoxide, CO	0.5 ppm	NA
Oxides of Nitrogen, NOx	48.8 ppm	0.39 lb/hr
Total Non-Methane Hydrocarbons	< 1 ppm	< 0.002

7.2 SOLID FEED TESTING

Table 7.6 Solid Feed Data

Matrix	Sand
PCB	Arochlor 1254
PCB Concentration, ng/g	120,678
Mass of Feed Processed, lb	100

Table 7.7 Solid Feed and Ash Byproduct PCB Results

Compound	Units	Concentrations	
		Feed	Ash
Monochlorobiphen	ng/g	810	ND
Dichlorobiphenyl	ng/g	15000	2.3
Trichlorobiphenyl	ng/g	39000	12
Tetrachlorobiphenyl	ng/g	15000	5.7
Pentchlorobiphenyl	ng/g	23000	9.6
Hexachlorobiphenyl	ng/g	23000	12
Heptochlorobiphen	ng/g	4600	0.59
Octachlorobiphenyl	ng/g	250	ND
Nonachlorobipheny	ng/g	16	ND
Decachlorobiphenyl	ng/g	2.4	ND

ND = Not Detected

8.0 QUALITY ASSURANCE PLAN

It is required by 40 CFR Part 266 that every monitoring and measurement project must have written and approved Quality Assurance (QA) Project Plan. The Quality Assurance Project Plan (QAPP) is a written document, which presents , in specific terms, the policies, organization (where applicable), objectives, functional activities, and specific Quality Assurance and Quality Control (QA/QC) activities designed to achieve the data quality goals of the project. The mandatory QAPP acts as a total integrated program for assuring the reliability of monitoring and measurement data. The mandatory QAPP acts as a system for integrating the quality planning, quality assessment, and quality improvement efforts to meet user requirements. The mandatory QAPP will consist of the sampling and analytical methods for pre-test and post-test equipment calculations, calibration of GC, and other instruments before and after sample analysis. It will specify methods and requirements for background runs and for the verification of reagents and collection media. Surrogate and blind spikes will be explained in the QAPP as well as chain of custody procedures.

It is policy that precision and accuracy of data shall be assessed routinely and reported on all environmental monitoring and measurement data. Therefore specific procedures to assess precision and accuracy on a routine basis are described in the QAPP.

EPA-600/4-83-004 "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans" list sixteen (16) essential elements which must be considered and included in each QAPP. If a particular element is not relevant to the project under consideration, a brief explanation of why the element is not relevant must be included.

The following are the 16 essential elements which must be considered for inclusion in every QAPP:

1. Title page with provision for approval signatures.
2. Table of contents.
3. Project description.
4. Project organization and responsibility.
5. QA/QC objectives for measurement data in terms of precision, accuracy, completeness, representativeness and comparability
6. Sampling and monitoring procedures.
7. Sample custody, traceability, and holding times.

8. Calibration procedures and frequency.
9. Analytical procedures.
10. Data reduction, validation and reporting.
11. Internal quality control checks and frequency.
12. Performance and system audits and frequency.
13. Preventive/routine maintenance procedures and schedules.
14. Assessment procedures for accuracy, precision and completeness.
15. Corrective action.
16. Quality Assurance reporting.

APPENDIX A

FIELD DATA SHEETS

DAMES & MOORE
METHOD 5 PRELIMINARY CALCULATIONS

Source: Balboa Pacific
Date: 11/21/95
Pitot ID: PT003-1
Tester: C.B./J.W.
Test #: 30990-001-0103-131

Location: Santa Fe Springs
Stack ID: BAL-PAC Exhaust
Meter Box ID: SN 80860

Initial Calculations

Data Entry:	ds:		
	L:	16.00	
	W:	21.00	
	ts:	150.0	deg. F.
	Square(delta P) avg:	0.1000	
	delta P avg:	0.0100	in. H2O
	tm(est):	75	deg. F.
	Bws(est):	0.25	
	Md:	29.00	
	Pbar:	30.12	in. Hg.
	ps(est):	-0.01	in. H2O
	Cp (0.84):	0.84	
	theta:	240	minutes
	delta H @:	1.9216	
	Y:	1.0062	
	Yaw Angle:		degrees

Calculations:

Ps = Pbar + (ps(est)/13.6)
Ps = 30.12

Ms = Md(1-Bws(est.)) + 18 (BWS(est.)
Ms = 26.25

vs = 85.49*(Cp)*(Square(delta P)avg)*[(ts + 460)/Ps*Ms)]^.5
vs = 6.31

Dn(ideal) = 9.5618 * [37.5*(ts + 460)/(vs*theta*Ps*(1-Bws(est))*520)]^.5
dn(ideal) = 0.343

Dn(act.) = 0.500
Nozzle ID: NOZ 600

An(actual) = (Dn^2*pi)/(4*144) = 1.3635E-03

K = 846.72 * (Dn)^4 * (delta H@) * (Cp)^2 * (1-Bws(est))^2 * Md/Ms * (tm+460)/(ts+460) * Ps/Pm
K = 38.980

for isokinetic sampling: delta H = delta P * K
avg delta H= 0.390

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

Sample ID: STSNA-1001-1
Lab ID: 1945-0001-PCB
Matrix: M23

Date Received: 11/25/95
Date Extracted: 12/12/95
Sample Amount: Sample

ICAL ID: IPCB
QC Lot: LC1212M
Units: ng/sample

COMPOUND	CONC.	R.L.	QUALIFIER
TOTALS			
Monochlorobiphenyl	ND	5.0	
Dichlorobiphenyl	ND	5.0	
Trichlorobiphenyl	ND	5.0	
Tetrachlorobiphenyl	ND	5.0	
Pentachlorobiphenyl	ND	5.0	
Hexachlorobiphenyl	ND	5.0	
Heptachlorobiphenyl	ND	5.0	
Octachlorobiphenyl	ND	5.0	
Nonachlorobiphenyl	ND	5.0	
Decachlorobiphenyl	ND	5.0	

Analyst: _____

Reveiwer: _____

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

Sample ID: STSNA-1001-1
Lab ID: 1945-0001-PCB

Isotopic Recovery Results

Internal Standard

COMPOUND	% REC.	QUALIFIER
^{13}C-Monochlorobiphenyl	67	
^{13}C-Trichlorobiphenyl	86	
^{13}C-Tetrachlorobiphenyl	83	
^{13}C-Pentachlorobiphenyl	76	
^{13}C-Hexachlorobiphenyl	88	
^{13}C-Heptachlorobiphenyl	77	
^{13}C-Octachlorobiphenyl	76	
^{13}C-Nonachlorobiphenyl	85	
^{13}C-Decachlorobiphenyl	60	

Date Analyzed: 12/14/95

Analyst: [signature]

Reveiwer: [signature]

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

METHOD BLANK
Lab ID: 1945-0002-MBP
Matrix: Oil

Date Received: NA
Date Extracted: 12/15/95
Sample Amount: 0.100 ml

ICAL ID: IPCB
QC Lot: LC1212M
Units: ng/ml

COMPOUND	CONC.	R.L.	QUALIFIER
TOTALS			
Monochlorobiphenyl	ND	50	
Dichlorobiphenyl	ND	50	
Trichlorobiphenyl	ND	50	
Tetrachlorobiphenyl	ND	50	
Pentachlorobiphenyl	ND	50	
Hexachlorobiphenyl	ND	50	
Heptachlorobiphenyl	ND	50	
Octachlorobiphenyl	ND	50	
Nonachlorobiphenyl	ND	50	
Decachlorobiphenyl	ND	50	

Analyst: JSH1

Reveiwer: M

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

METHOD BLANK
Lab ID: 1945-0002-MBP

Isotopic Recovery Results

Internal Standard

COMPOUND	% REC.	QUALIFIER
^{13}C-Monochlorobiphenyl	101	
^{13}C-Trichlorobiphenyl	106	
^{13}C-Tetrachlorobiphenyl	52	
^{13}C-Pentachlorobiphenyl	46	
^{13}C-Hexachlorobiphenyl	49	
^{13}C-Heptachlorobiphenyl	66	
^{13}C-Octachlorobiphenyl	85	
^{13}C-Nonachlorobiphenyl	63	
^{13}C-Decachlorobiphenyl	59	

Date Analyzed: 12/20/95

Analyst: [signature]

Reveiwer: [signature]

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

Sample ID: STSNA-1003-1
Lab ID: 1945-0002-PCB
Matrix: Oil

Date Received: 11/25/95
Date Extracted: 12/15/95
Sample Amount: 0.100 ml

ICAL ID: IPCB
QC Lot: LC1212M
Units: ng/ml

COMPOUND	CONC.	R.L.	QUALIFIER
TOTALS			
Monochlorobiphenyl	5100	50	
Dichlorobiphenyl	78000	50	
Trichlorobiphenyl	240000	50	
Tetrachlorobiphenyl	92000	50	
Pentachlorobiphenyl	150000	50	
Hexachlorobiphenyl	170000	50	
Heptachlorobiphenyl	30000	50	
Octachlorobiphenyl	500	50	
Nonachlorobiphenyl	ND	50	
Decachlorobiphenyl	ND	50	

Analyst: _____

Reveiwer: _____

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

Sample ID: STSNA-1003-1
Lab ID: 1945-0002-PCB

Isotopic Recovery Results

Internal Standard

COMPOUND	% REC.	QUALIFIER
^{13}C-Monochlorobiphenyl	145	
^{13}C-Trichlorobiphenyl	112	
^{13}C-Tetrachlorobiphenyl	61	
^{13}C-Pentachlorobiphenyl	57	
^{13}C-Hexachlorobiphenyl	100	
^{13}C-Heptachlorobiphenyl	117	
^{13}C-Octachlorobiphenyl	149	
^{13}C-Nonachlorobiphenyl	88	
^{13}C-Decachlorobiphenyl	89	

Date Analyzed: 12/20/95

Analyst: [signature]

Reveiwer: [signature]

HYDROGEN CHLORIDE ANALYSIS

WCAS
WEST COAST
ANALYTICAL
SERVICE, INC.
ANALYTICAL CHEMISTS

November 30, 1995

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

Attn: Chris Barth

JOB NO. 30878 S

LABORATORY REPORT

Samples Received: Two (2) Water Samples
Date Received: 11-28-95
Project: #30990-001-0103-131

The samples were analyzed as follows:

Samples Analyzed	Analysis	Page
Two (2) samples	Chloride by IC	2

Michael Shelton
Technical Director

D. J. Northington, Ph.D.
President

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

WEST COAST ANALYTICAL SERVICE, INC.

DAMES & MOORE
Mr. Chris Barth

Job # 30878
November 30, 1995

LABORATORY REPORT

Chloride by IC

Sample ID	Parts Per Million (mg/l)
STSNA-1002-1	3.5
STSNA-1002-2	11
Detection Limit	2

Date Analyzed: 11-29-95

Matrix Spike/Matrix Spike Duplicate Recovery Summary

Sample: Batch QC
Units: ppm (mg/l)

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
Chloride	5.3	10.0	16.1	108	15.9	106	1

QC Limits

Analyte	RPD Control	% Recovery Warning	% Recovery Control
Chloride	10	73-111	63-121

WCAS

DAMES & MOORE
CHAIN-OF-CUSTODY

PROJECT # 30990-001-0103-131

	SAMPLE I.D.	DATE SAMPLED	TIME SAMPLED	Chloride by I.C.				FIELD COMMENTS
✓	(STSNA-1002-1)	11/21/95	11:40-12:50	X				Clear colorless (61 ml)
✓	(STSNA-1002-2)	11/21/95	—	X				Sample Blank - 0.1N HgSO4 absorbing soln. (60ml)

Relinquished By:

Name	Date	Name	Received By:
CHRIS BARRETT	11/27/95	Karen Granda	
Company DAMES & MOORE	Time	Company WCAS	E30878
Signature	1:30	Signature Karen M. Granda	

Relinquished By:

Name	Date	Name	Received By:
Company	Time	Company	
Signature		Signature	

Abbreviations Summary

General Reporting Abbreviations:

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

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

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

J Indicates that the value is an estimate.

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

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

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

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

QC Abbreviations:

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

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

WEST COAST
ANALYTICAL
SERVICE, INC.
ANALYTICAL CHEMISTS

December 14, 1995

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

Attn: Chris Barth

JOB NO. 30985

S

LABORATORY REPORT

Samples Received: One (1) Water Sample
Date Received: 12-8-95
Project: #30990-001-0103-131

The sample was analyzed as follows:

Samples Analyzed	Analysis	Page
One (1) sample	Chloride by IC	2

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
Mr. Chris Barth

Job # 30985
December 14, 1995

LABORATORY REPORT

Chloride by IC

Sample ID	Parts Per Million (mg/l)
STSNA-1004	ND
Detection Limit	2

Date Analyzed: 12-13-95

Matrix Spike/Matrix Spike Duplicate Recovery Summary

Sample: Batch QC
Matrix: Water

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
Chloride	0.62	10.0	10.8	102	11.0	104	2

QC Limits

Analyte	RPD Control	% Recovery Warning	% Recovery Control
Chloride	10	73-111	63-121

WCAS

Abbreviations Summary

General Reporting Abbreviations:

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

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

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

J Indicates that the value is an estimate.

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

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

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

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

QC Abbreviations:

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

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

DAMES & MOORE
CHAIN-OF-CUSTODY

PROJECT # 30990-001-0103-131

SAMPLE I.D.	DATE SAMPLED	TIME SAMPLED	Hydrocarbons / CO_3/CO_2				FIELD COMMENTS
BALBOA - TEDLAR	11/21/95	2:70-4:10	X				Bag Sample Contains high moisture content Appx 3/4 Full

Relinquished By:

Name	Date	Name
CHRIS BARTH	11/24/95	
Company: DAMES + MOORE	Time: 6:20 pm	Company
Signature		Signature

Relinquished By:

Name	Date	Name
Company	Time	Company
Signature		Signature

DAMES & MOORE
CHAIN-OF-CUSTODY

PROJECT # 30990-001-0103-131

SAMPLE I.D.	DATE SAMPLED	TIME SAMPLED	Chloride by I.C.				FIELD COMMENTS
STSNA-1004	12/7/95	N/A	X				

Relinquished By:

Name	Date	Received By: Name
CHRIS BARTH	12/7/95	Mary Mulcahey
Company: DAMES & MOORE	Time: 1:30 PM	Company: WCAS 12-8-95
Signature		Signature: Mary Mulcahey 12:50 p.m.

W30985

Relinquished By:

Name	Date	Received By: Name
Company	Time	Company
Signature		Signature

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

METHOD BLANK
Lab ID: 2071-0001-MBP

Isotopic Recovery Results

Internal Standard

COMPOUND	% REC.	QUALIFIER
^{13}C-Monochlorobiphenyl	67	
^{13}C-Trichlorobiphenyl	34	
^{13}C-Tetrachlorobiphenyl	82	
^{13}C-Pentachlorobiphenyl	53	
^{13}C-Hexachlorobiphenyl	67	
^{13}C-Heptachlorobiphenyl	72	
^{13}C-Octachlorobiphenyl	56	
^{13}C-Nonachlorobiphenyl	62	
^{13}C-Decachlorobiphenyl	81	

Date Analyzed: 1/25/96

Analyst: _____ **Reveiwer:** _____

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

LCS RESULTS
Lab ID: 2071-0001-PLCS1/LCS2
Matrix: Sand

Date Received: NA
Date Extracted: 1/15/96
Sample Amount: 10.00 g

ICAL ID: IPCB
QC Lot: LC0115S
Units: NA

COMPOUND	LCS1 %R	LCS2 %R	RPD %
Monochlorobiphenyl	111	110	0.90
Dichlorobiphenyl	136	127	6.8
Trichlorobiphenyl	103	110	6.6
Tetrachlorobiphenyl	111	115	3.5
Pentachlorobiphenyl	116	116	0.0
Hexachlorobiphenyl	108	111	2.7
Heptachlorobiphenyl	107	106	0.94
Octachlorobiphenyl	108	113	4.5
Nonachlorobiphenyl	98	105	6.9
Decachlorobiphenyl	86	90	4.5

Analyst: _____

Reviewer: _____

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

Sample ID: Inlet
Lab ID: 2071-0001-PCB
Matrix: Sand
% Solid: 97

Date Received: 1/5/96
Date Extracted: 1/15/96
Sample Amount: 10.07 g

ICAL ID: IPCB
QC Lot: LC0115S
Units: ng/g

COMPOUND	CONC.	R.L.	QUALIFIER
TOTALS			
Monochlorobiphenyl	810	5.0	*
Dichlorobiphenyl	15000	5.0	*
Trichlorobiphenyl	39000	5.0	*
Tetrachlorobiphenyl	15000	5.0	*
Pentachlorobiphenyl	23000	5.0	*
Hexachlorobiphenyl	23000	5.0	*
Heptachlorobiphenyl	4600	5.0	*
Octachlorobiphenyl	250	5.0	*
Nonachlorobiphenyl	16	5.0	*
Decachlorobiphenyl	2.4	5.0	*

Analyst: [signature]

Reveiwer: [signature]

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

Sample ID: Inlet
Lab ID: 2071-0001-PCB

Isotopic Recovery Results

Internal Standard

COMPOUND	% REC.	QUALIFIER
^{13}C-Monochlorobiphenyl	89	*
^{13}C-Trichlorobiphenyl	98	*
^{13}C-Tetrachlorobiphenyl	71	*
^{13}C-Pentachlorobiphenyl	69	*
^{13}C-Hexachlorobiphenyl	114	*
^{13}C-Heptachlorobiphenyl	111	*
^{13}C-Octachlorobiphenyl	115	*
^{13}C-Nonachlorobiphenyl	140	*
^{13}C-Decachlorobiphenyl	354	*,I

Date Analyzed: 1/25/96 & 1/29/96

Analyst: BY

Reveiwer:

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

Sample ID: Outlet
Lab ID: 2071-0002-PCB
Matrix: Sand
% Solid: 100

Date Received: 1/5/96
Date Extracted: 1/15/96
Sample Amount: 10.01 g

ICAL ID: IPCB
QC Lot: LC0115S
Units: ng/g

COMPOUND	CONC.	R.L.	QUALIFIER
TOTALS			
Monochlorobiphenyl	ND	0.5	
Dichlorobiphenyl	2.3	0.5	
Trichlorobiphenyl	12	0.5	
Tetrachlorobiphenyl	5.7	0.5	
Pentachlorobiphenyl	9.6	0.5	
Hexachlorobiphenyl	12	0.5	
Heptachlorobiphenyl	0.59	0.5	
Octachlorobiphenyl	ND	0.5	
Nonachlorobiphenyl	ND	0.5	
Decachlorobiphenyl	ND	0.5	

Analyst: [signature]

Reveiwer: [signature]

HYDROCARBON ANALYSIS

From Skyfresh:

- Detail of Blower & Motor above Carbon Bed

* Charcoal impregnated -----
  Pleated filters
  16" x 20" 2" thick

*

APPENDIX

ALTA

DATA QUALIFIERS & ABBREVIATIONS

A	The amount detected is below the Method Quantitation Limit.
B	This compound was also detected in the blank.
C	The amount detected is less than five times the Method Calibration Limit.
D	The amount reported is the maximum possible concentration.
E	The detection limit was raised above the Method Calibration Limit due to chemical interferences.
F	This result has been confirmed on the DB-225 column.
G	This resulted has been confirmed on the SP-2331 column.
H	The signal-to-noise ratio is greater than 10:1.
I	Chemical Interference

Conc.	Concentration
D.L.	Detection Limit
NA	Not applicable
S/N	Signal-to-noise
MPC	Maximum Possible Concentration
*	See Cover Letter
R.L.	Reporting Limit

CHAIN-OF-CUSTODY RECORD

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

Boring or Well Number	Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (M)	TITLE 22 METALS	WET Test	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TCLP	pH	ASBESTOS	PCB	M23	FIELD NOTES:	Total Number Of Containers	Laboratory Note Number
			1⁰⁰ pm	Sand	glass															X			Inlet		
			245- 345 pm	Sand	glass															X	X		Outlet		

RELINQUISHED BY: (Signature) [signature] DATE/TIME 4:30 pm 1/4/96 RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature) DATE/TIME RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature) DATE/TIME 1-5-96 [illegible] RECEIVED BY: (Signature) [signature] ATA

ANALYTICAL LABORATORY: Alta Analytical

LABORATORY CONTACT: Bob Mitzel

D&M CONTACT: Tony Host PHONE: X 385

LABORATORY NOTES:

30990-002-131

JOB NO.: SHEET 1 OF 1

PROJECT Belbon Pacific

LOCATION Santa Fe Springs

COLLECTOR APH / JW DATE OF COLLECTION 1/4/96

DAMES & MOORE

6 HUTTON CENTRE DRIVE
SUITE 700
SANTA ANA, CALIFORNIA 92707
(714) 433-2000 FAX: (714) 433-2364 (714) 433-2365

ALTA Analytical Laboratory

Project No.: 2071

Sample Log-In Checklist	Yes	No
1. Date Samples Arrived: 1-5-96 Initials: RHR		
2. Samples Arrived By: (circle one) Airborne Express Federal Express (UPS) Emery Freezer Truck Company Courier Other _____		
3. Shipping Documentation Present? (circle one) Shipping Label (Airbill) Tracking Number 086430764	X	
4. Shipping Container(s) Intact? If no, describe condition below.	X	
5. Custody Seals Present and Intact? If not intact, describe condition below. No. of Seals _____ or Seal No. _____ Type:(circle) Bottle or Container		X
6. Sample Container Intact? If no, indicate sample condition below.	X	
7. Shipping Preservation: (circle) Ice / Blue Ice / Dry Ice / Ambient / (None) Temp(°C) 17		
8. Chain of Custody (COC) or other Sample Documentation Present?	X	
9. COC/Documentation Acceptable? If no, complete COC Anomaly Form.	X	
10. Shipping Container: (circle) ALTA or (Client) / Return or (Retain)		
11. Container and/or Bottles Requested?		X
12. Sample Control Check In/Out Log Completed?	X	
*13. Drinking Water Sample? If yes, Acceptable Preservation? (circle) Y or N		X

*Required for HRMS

Name: _____ Date Samples Reconciled: _____
(Signature Required for LCMS Only)

Comments:

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

November 29, 1995

LTR/510/95

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

re: 30990-001-0103-131

Dear Chris:

Please find enclosed the laboratory analysis report, quality assurance summary, and the original chain of custody form for one Tedlar bag sample received on November 22, 1995.

The samples were analyzed for oxygen, carbon dioxide, methane, and total gaseous non-methane organics (TGNMO) per the chain of custody.

Also enclosed is an invoice for laboratory analysis work performed.

AtmAA, Inc.

Michael L. Porter
Laboratory Director

Encl.
MLP/spm

LIQUID FEED AND EXHAUST GAS PCB ANALYSIS

ALTA

December 15, 1995

Alta Batch I.D.: 1945

Mr. Tony Host
Dames and Moore
6 Hutton Center Drive Suite 700
Santa Ana, CA 92707

Dear Mr. Host,

Enclosed are the results for one M23 train and one transformer oil received at Alta Analytical Laboratory on November 25, 1995. The M23 train was extracted and analyzed using EPA Method 23 for tetra thru octa chlorinated dioxins and furans using High Resolution Mass Spectrometry (HRMS) and Modified EPA Method 680 for PCB's using HRMS. The transformer oil was analyzed using Modified EPA Method 680 for PCB's using HRMS. A standard turnaround time was requested for this work.

The following report consists of a Sample Inventory (Section I), Analytical Results (Section II) and the Appendix. The Appendix contains a copy of the chain-of-custody, a list of data qualifiers and abbreviations and copies of the raw data (if requested).

If you have any questions regarding this report please feel free to contact me.

Sincerely,

Robert S. Mitzel
Director of Air Toxics

Alta Analytical Laboratory Inc.
5070 Robert J. Mathews Parkway
El Dorado Hills, CA 95762
FAX (916) 933-0940
(916) 933-1640

ALTA

Sample Inventory Report

Project No.: 1945 Project Name: General Analytical AIR
Date Rec.: 11/25/95

Lab. Sample ID	Client Sample ID	SGI Component Type
0001	STSNA-1001-1	Filter
0001	STSNA-1001-2	Solvent Rinse
0001	STSNA-1001-3	XAD
0002	STSNA-1003-1	Composite Sample

SECTION II.

DIOXIN/FURAN RESULTS

ALTA

PCDD & PCDF
EPA METHOD 23

METHOD BLANK
Lab ID: 1945-0001-MB
Matrix: M23

Date Received: NA
Date Extracted: 12/12/95
Sample Amount: Sample

ICAL ID: ICARB
QC Lot: LC1212M
Units: pg/sample

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	4.1			
Total TCDD	ND	4.1			
1,2,3,7,8-PeCDD	ND	3.9			
Total PeCDD	ND	3.9			
1,2,3,4,7,8-HxCDD	ND	6.7			
1,2,3,6,7,8-HxCDD	ND	7.2			
1,2,3,7,8,9-HxCDD	ND	6.4			
Total HxCDD	ND	7.2			
1,2,3,4,6,7,8-HpCDD	ND	8.5			
Total HpCDD	ND	8.5			
OCDD	ND	11			
2,3,7,8-TCDF	ND	3.2			
Total TCDF	ND	3.2			
1,2,3,7,8-PeCDF	ND	3.2			
2,3,4,7,8-PeCDF	ND	3.3			
Total PeCDF	ND	3.3			
1,2,3,4,7,8-HxCDF	ND	3.5			
1,2,3,6,7,8-HxCDF	ND	3.2			
2,3,4,6,7,8-HxCDF	ND	3.6			
1,2,3,7,8,9-HxCDF	ND	4.0			
Total HxCDF	ND	4.0			
1,2,3,4,6,7,8-HpCDF	ND	5.1			
1,2,3,4,7,8,9-HpCDF	ND	5.6			
Total HpCDF	ND	5.6			
OCDF	ND	14			I

Analyst: jh

Reviewer: JHW

ALTA

PCDD & PCDF
EPA METHOD 23

METHOD BLANK
Lab ID: 1945-0001-MB

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	93	0.75	
^{13}C-1,2,3,7,8-PeCDD	123	NA	
^{13}C-1,2,3,6,7,8-HxCDD	103	1.26	
^{13}C-1,2,3,4,6,7,8-HpCDD	91	1.08	
^{13}C-OCDD	98	0.92	
^{13}C-2,3,7,8-TCDF	93	0.79	
^{13}C-1,2,3,7,8-PeCDF	84	1.67	
^{13}C-1,2,3,6,7,8-HxCDF	79	0.54	
^{13}C-1,2,3,4,6,7,8-HpCDF	99	0.46	
Pre-spike Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	NA	NA	
^{13}C-2,3,4,7,8-PeCDF	NA	NA	
^{13}C-1,2,3,4,7,8-HxCDD	NA	NA	
^{13}C-1,2,3,4,7,8-HxCDF	NA	NA	
^{13}C-1,2,3,4,7,8,9-HpCDF	NA	NA	
Alternate Recovery Standard:			
^{13}C-1,2,3,7,8,9-HxCDF	110	0.53	

Dates Analyzed:

DB-5: 12/14/95 DB-225: NA SP-2331: NA

Analyst: [signature] Reviewer: [signature]

ALTA

PCDD & PCDF
EPA METHOD 23

LCS RESULTS
Lab ID: 1945-LCS1/LCS2
Matrix: M23

Date Received: NA
Date Extracted: 12/12/95
Sample Amount: Sample

ICAL ID: ICARB
QC Lot: LC1212M
Units: NA

Compound	LCS1 % R	LCS2 % R	RPD %
2,3,7,8-TCDD	104	87	18
1,2,3,7,8-PeCDD	102	82	22
1,2,3,4,7,8-HxCDD	91	77	17
1,2,3,6,7,8-HxCDD	113	92	20
1,2,3,7,8,9-HxCDD	99	80	21
1,2,3,4,6,7,8-HpCDD	113	97	15
OCDD	104	87	18
2,3,7,8-TCDF	111	110	0.90
1,2,3,7,8-PeCDF	114	103	10
2,3,4,7,8-PeCDF	105	102	2.9
1,2,3,4,7,8-HxCDF	115	106	8.1
1,2,3,6,7,8-HxCDF	117	106	9.9
2,3,4,6,7,8-HxCDF	113	109	3.6
1,2,3,7,8,9-HxCDF	149	131	13
1,2,3,4,6,7,8-HpCDF	116	105	10
1,2,3,4,7,8,9-HpCDF	139	127	9.0
OCDF	117	96	20

Analyst: [signature]

Reviewer: [signature]

PCDD & PCDF
EPA METHOD 23

LCS RESULTS
Lab ID: 1945-LCS1/LCS2

Isotopic Recovery Results

Internal Standard:	LCS1 % R	LCS2 % R
^{13}C-2,3,7,8-TCDD	75	84
^{13}C-1,2,3,7,8-PeCDD	94	116
^{13}C-1,2,3,6,7,8-HxCDD	81	94
^{13}C-1,2,3,4,6,7,8-HpCDD	77	88
^{13}C-OCDD	88	98
^{13}C-2,3,7,8-TCDF	76	78
^{13}C-1,2,3,7,8-PeCDF	70	76
^{13}C-1,2,3,6,7,8-HxCDF	67	71
^{13}C-1,2,3,4,6,7,8-HpCDF	78	84

Dates Analyzed:

DB-5: 12/14/95 DB-225: NA SP-2331:NA

Analyst: _____

Reviewer: _____

ALTA

PCDD & PCDF
EPA METHOD 23

Sample ID: STSNA-1001-1
Lab ID: 1945-0001-SA
Matrix: M23

Date Received: 11/25/95
Date Extracted: 12/12/95
Sample Amount: Sample

ICAL ID: ICARB
QC Lot: LC1212M
Units: pg/sample

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	9.2			
Total TCDD	ND	9.2			
1,2,3,7,8-PeCDD	ND	4.6			
Total PeCDD	ND	4.6			
1,2,3,4,7,8-HxCDD	ND	4.4			
1,2,3,6,7,8-HxCDD	ND	4.7			
1,2,3,7,8,9-HxCDD	ND	4.2			
Total HxCDD	ND	4.7			
1,2,3,4,6,7,8-HpCDD	ND	6.0			
Total HpCDD	ND	6.0			
OCDD	25		0.86	>10:1	A
2,3,7,8-TCDF	ND	6.8			
Total TCDF	160		0.73	>10:1	
1,2,3,7,8-PeCDF	ND	15			
2,3,4,7,8-PeCDF	ND	12			
Total PeCDF	63		1.46	>10:1	
1,2,3,4,7,8-HxCDF	ND	6.4			
1,2,3,6,7,8-HxCDF	ND	7.5			
2,3,4,6,7,8-HxCDF	ND	4.4			
1,2,3,7,8,9-HxCDF	ND	3.1			
Total HxCDF	19		1.38	6:1	A
1,2,3,4,6,7,8-HpCDF	ND	8.1			
1,2,3,4,7,8,9-HpCDF	ND	5.0			
Total HpCDF	ND	8.1			
OCDF	18		0.83	5:1	A

Analyst: [signature]

Reviewer: [signature]

ALTA

PCDD & PCDF
EPA METHOD 23

Sample ID: STSNA-1001-1
Lab ID: 1945-0001-SA

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	100	0.76	
^{13}C-1,2,3,7,8-PeCDD	126	NA	
^{13}C-1,2,3,6,7,8-HxCDD	105	1.33	
^{13}C-1,2,3,4,6,7,8-HpCDD	100	1:05	
^{13}C-OCDD	111	0.90	
^{13}C-2,3,7,8-TCDF	102	0.79	
^{13}C-1,2,3,7,8-PeCDF	98	1.62	
^{13}C-1,2,3,6,7,8-HxCDF	85	0.54	
^{13}C-1,2,3,4,6,7,8-HpCDF	112	0.47	
Pre-spike Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	98	NA	
^{13}C-2,3,4,7,8-PeCDF	98	1.63	
^{13}C-1,2,3,4,7,8-HxCDD	80	1.19	
^{13}C-1,2,3,4,7,8-HxCDF	92	0.56	
^{13}C-1,2,3,4,7,8,9-HpCDF	105	0.47	
Alternate Recovery Standard:			
^{13}C-1,2,3,7,8,9-HxCDF	122	0.51	

Dates Analyzed:

DB-5: 12/14/95 DB-225: NA SP-2331: NA

Analyst: [signature]

Reviewer: [signature]

PCB RESULTS

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

METHOD BLANK
Lab ID: 1945-0001-MBP
Matrix: M23

Date Received: NA
Date Extracted: 12/12/95
Sample Amount: Sample

ICAL ID: IPCB
QC Lot: LC1212M
Units: ng/sample

COMPOUND	CONC.	R.L.	QUALIFIER
TOTALS			
Monochlorobiphenyl	ND	5.0	
Dichlorobiphenyl	ND	5.0	
Trichlorobiphenyl	ND	5.0	
Tetrachlorobiphenyl	ND	5.0	
Pentachlorobiphenyl	ND	5.0	
Hexachlorobiphenyl	ND	5.0	
Heptachlorobiphenyl	ND	5.0	
Octachlorobiphenyl	ND	5.0	
Nonachlorobiphenyl	ND	5.0	
Decachlorobiphenyl	ND	5.0	

Analyst: _____

Reveiwer: _____

SOLID FEED
PCB ANALYSIS

ALTA

January 30, 1996

Alta Batch I.D.: 2071

Mr. Tony Host
Dames and Moore
6 Hutton Center Drive Suite 700
Santa Ana, CA 92707

Dear Mr. Host,

Enclosed are the results for two sand samples received at Alta Analytical Laboratory on January 5, 1996. The inlet sample was extracted and analyzed using Modified EPA Method 680 for PCB's using HRMS. The outlet sample was analyzed using EPA Method 23/8290 for tetra to octa chlorinated dioxins/furans and Modified EPA Method 680 for PCB's using HRMS. A standard turnaround time was requested for this work.

The inlet sample for the PCB analysis required re-analysis at 1:10 dilution due to high levels of PCB's and matrix interferences. This is designated on the data sheet qualifier with an " * ". The labelled decachlorobiphenyl internal standard was high on both injections due to the matrix of the sample. This had no affect on the native decachlorobiphenyl compound.

The following report consists of a Sample Inventory (Section I), Analytical Results (Section II) and the Appendix. The Appendix contains a copy of the chain-of-custody, a list of data qualifiers and abbreviations and copies of the raw data (if requested).

If you have any questions regarding this report please feel free to contact me.

Sincerely,

Robert S. Mitzel
Director of Air Toxics

Alta Analytical Laboratory Inc.
5070 Robert J. Mathews Parkway
El Dorado Hills, CA 95762
FAX (916) 933-0940

ALTA

Section I: Sample Inventory Report

Date Received: 1/ 5/96

Alta Lab. ID	Client Sample ID
2071-0001-SA	INLET
2071-0002-SA	OUTLET

SECTION II.

PCB RESULTS

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

METHOD BLANK
Lab ID: 2071-0001-MBP
Matrix: Sand

Date Received: NA
Date Extracted: 1/15/96
Sample Amount: 10.00 g

ICAL ID: IPCB
QC Lot: LC0115S
Units: ng/g

COMPOUND	CONC.	R.L.	QUALIFIER
TOTALS			
Monochlorobiphenyl	ND	0.5	
Dichlorobiphenyl	ND	0.5	
Trichlorobiphenyl	ND	0.5	
Tetrachlorobiphenyl	ND	0.5	
Pentachlorobiphenyl	ND	0.5	
Hexachlorobiphenyl	ND	0.5	
Heptachlorobiphenyl	ND	0.5	
Octachlorobiphenyl	ND	0.5	
Nonachlorobiphenyl	ND	0.5	
Decachlorobiphenyl	ND	0.5	

Analyst: _____

Reveiwer: _____

ALTA

PCDD & PCDF
EPA METHOD 23

LCS RESULTS
Lab ID: 2071-0002-LCS1/LCS2
Matrix: Sand

Date Received: NA
Date Extracted: 1/15/96
Sample Amount: 10.00 g

ICAL ID: ICARB
QC Lot: LC0115S
Units: NA

Compound	LCS1 % R	LCS2 % R	RPD %
2,3,7,8-TCDD	126	125	0.80
1,2,3,7,8-PeCDD	124	129	4.0
1,2,3,4,7,8-HxCDD	102	115	12
1,2,3,6,7,8-HxCDD	118	112	5.2
1,2,3,7,8,9-HxCDD	103	107	3.8
1,2,3,4,6,7,8-HpCDD	115	114	0.87
OCDD	109	119	8.8
2,3,7,8-TCDF	127	128	0.78
1,2,3,7,8-PeCDF	124	125	0.80
2,3,4,7,8-PeCDF	103	102	0.98
1,2,3,4,7,8-HxCDF	121	122	0.82
1,2,3,6,7,8-HxCDF	123	120	2.5
2,3,4,6,7,8-HxCDF	120	118	1.7
1,2,3,7,8,9-HxCDF	148	106	33
1,2,3,4,6,7,8-HpCDF	115	118	2.6
1,2,3,4,7,8,9-HpCDF	97	77	23
OCDF	120	88	31

Analyst: [signature]

Reviewer: [signature]

ALTA

PCDD & PCDF
EPA METHOD 23

LCS RESULTS
Lab ID: 2071-0002-LCS1/LCS2

Isotopic Recovery Results

Internal Standard:	LCS1 % R	LCS2 % R
^{13}C-2,3,7,8-TCDD	97	95
^{13}C-1,2,3,7,8-PeCDD	150	146
^{13}C-1,2,3,6,7,8-HxCDD	106	102
^{13}C-1,2,3,4,6,7,8-HpCDD	106	95
^{13}C-OCDD	88	57
^{13}C-2,3,7,8-TCDF	93	96
^{13}C-1,2,3,7,8-PeCDF	118	121
^{13}C-1,2,3,6,7,8-HxCDF	91	96
^{13}C-1,2,3,4,6,7,8-HpCDF	134	108

Dates Analyzed:

DB-5: 1/22/96 DB-225: NA SP-2331:NA

Analyst: [illegible]

Reviewer: [illegible]

ALTA

PCDD & PCDF
EPA METHOD 23

Sample ID: Outlet
Lab ID: 2071-0002-SA
Matrix: Sand

Date Received: 1/5/96
Date Extracted: 1/15/96
Sample Amount: 10.01 g

ICAL ID: ICARB
QC Lot: LC0115S
Units: pg/g

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	1.3		0.74	3:1	
Total TCDD	27		0.81	>10:1	
1,2,3,7,8-PeCDD	0.24		1.63	5:1	A
Total PeCDD	4.0		1.42	>10:1	
1,2,3,4,7,8-HxCDD	2.5		1.06	3:1	A
1,2,3,6,7,8-HxCDD	3.7		1.16	5:1	A
1,2,3,7,8,9-HxCDD	2.8		1.30	5:1	A
Total HxCDD	53		1.29	>10:1	
1,2,3,4,6,7,8-HpCDD	17		1.07	>10:1	
Total HpCDD	37		1.05	>10:1	
OCDD	35		0.84	>10:1	B
2,3,7,8-TCDF	8.2		0.82	>10:1	
Total TCDF	180		0.81	>10:1	
1,2,3,7,8-PeCDF	5.7		1.51	>10:1	
2,3,4,7,8-PeCDF	9.8		1.50	>10:1	
Total PeCDF	110		1.53	>10:1	
1,2,3,4,7,8-HxCDF	10		1.19	>10:1	
1,2,3,6,7,8-HxCDF	9.2		1.16	>10:1	
2,3,4,6,7,8-HxCDF	14		1.30	>10:1	
1,2,3,7,8,9-HxCDF	3.1		1.08	>10:1	A
Total HxCDF	100		1.28	>10:1	
1,2,3,4,6,7,8-HpCDF	42		1.03	>10:1	
1,2,3,4,7,8,9-HpCDF	2.4		1.01	>10:1	A
Total HpCDF	54		1.03	>10:1	
OCDF	15		0.86	>10:1	B

Analyst: KP

Reviewer: BH

ALTA

PCDD & PCDF
EPA METHOD 23

Sample ID: Outlet
Lab ID: 2071-0002-SA

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	92	0.81	
^{13}C-1,2,3,7,8-PeCDD	120	NA	
^{13}C-1,2,3,6,7,8-HxCDD	89	1.34	
^{13}C-1,2,3,4,6,7,8-HpCDD	96	1.07	
^{13}C-OCDD	77	0.92	
^{13}C-2,3,7,8-TCDF	96	0.81	
^{13}C-1,2,3,7,8-PeCDF	112	1.66	
^{13}C-1,2,3,6,7,8-HxCDF	84	0.53	
^{13}C-1,2,3,4,6,7,8-HpCDF	110	0.44	
Pre-spike Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	NA	NA	
^{13}C-2,3,4,7,8-PeCDF	NA	NA	
^{13}C-1,2,3,4,7,8-HxCDD	NA	NA	
^{13}C-1,2,3,4,7,8-HxCDF	NA	NA	
^{13}C-1,2,3,4,7,8,9-HpCDF	NA	NA	
Alternate Recovery Standard:			
^{13}C-1,2,3,7,8,9-HxCDF	94	0.52	

Dates Analyzed:

DB-5: 1/21/96 DB-225: 1/24/96 SP-2331: NA

Analyst: [signature] Reviewer: [signature]

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

METHOD BLANK
Lab ID: 1945-0001-MBP

Isotopic Recovery Results

Internal Standard

COMPOUND	% REC.	QUALIFIER
^{13}C-Monochlorobiphenyl	57	
^{13}C-Trichlorobiphenyl	84	
^{13}C-Tetrachlorobiphenyl	64	
^{13}C-Pentachlorobiphenyl	70	
^{13}C-Hexachlorobiphenyl	71	
^{13}C-Heptachlorobiphenyl	68	
^{13}C-Octachlorobiphenyl	76	
^{13}C-Nonachlorobiphenyl	83	
^{13}C-Decachlorobiphenyl	58	

Date Analyzed: 12/14/95

Analyst: _____ **Reveiwer:** _____

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

LCS RESULTS
Lab ID: 1991-0001-PLCS1/LCS2
Matrix: M23

Date Received: NA
Date Extracted: 12/12/95
Sample Amount: Sample

ICAL ID: IPCB
QC Lot: LC1212M
Units: NA

COMPOUND	LCS1 % R	LCS2 % R	RPD %
Monochlorobiphenyl	103	104	0.97
Dichlorobiphenyl	111	109	1.8
Trichlorobiphenyl	110	102	7.5
Tetrachlorobiphenyl	99	100	1.0
Pentachlorobiphenyl	107	105	1.9
Hexachlorobiphenyl	99	102	3.0
Heptachlorobiphenyl	114	109	4.5
Octachlorobiphenyl	98	95	3.1
Nonachlorobiphenyl	94	94	0.0
Decachlorobiphenyl	108	106	1.9

Analyst: GZr

Reviewer: M

ALTA

MODIFIED EPA METHOD 680
PCB RESULTS

LCS RESULTS
Lab ID: 1945-0001-PLCS1/LCS2

Isotopic Recovery Results

Internal Standard

COMPOUND	% LCS1	% LCS2
^{13}C-Monochlorobiphenyl	74	87
^{13}C-Trichlorobiphenyl	85	98
^{13}C-Tetrachlorobiphenyl	70	81
^{13}C-Pentachlorobiphenyl	73	84
^{13}C-Hexachlorobiphenyl	81	93
^{13}C-Heptachlorobipheny	69	84
^{13}C-Octachlorobiphenyl	83	96
^{13}C-Nonachlorobiphenyl	83	95
^{13}C-Decachlorobiphenyl	61	64

Date Analyzed: 12/14/95

Analyst: _____ **Reviewer:** _____