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Source Test Protocol for Measurement of
Particulate Matter, Chromium, Manganese, Copper,
Lead, Zinc, Nickel, Cadmium, Nitrogen Oxides,
Carbon Monoxide and Hydrocarbons on
the Exhaust of a Pyrolytic Oxidation Unit at

California Steel Industries, Inc.
14000 San Bernardino Ave.
Fontana, CA

PACIFIC ENVIRONMENTAL SERVICES, INC.
WASHINGTON, D.C. ◦ RESEARCH TRIANGLE PARK, NC ◦ CINCINNATI, OH ◦ LOS ANGELES, CA

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Prepared For
Balboa Pacific Corporation
11240 Bloomfield Ave.
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PES Job Number 4768.001

S. Hugh Brown
4/20/95

FOREWORD

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

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

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

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

The project work was conducted by Siya Mokh, Neil Norcross, and Michael Kearney under the direction of S. Hugh Brown.

Approved: S Hugh Brown

S. Hugh Brown, Director
Air Quality Testing

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INTRODUCTION

California Steel Industries, Inc. operates a steel rolling mill at its Fontana, CA facility. In support of this operation, Balboa Pacific Corporation has installed a pyrolytic oxidation unit (BAL PAC 2000) which is utilized for the disposal of liquid and solid waste resulting from the milling process.

Research permit #287175 was issued by the South Coast Air Quality Management District (SCAQMD) for the installation of the pyrolytic oxidation unit. Permit conditions required that source tests be conducted on the exhaust of the afterburner, associated with the pyrolytic chamber, to provide air emissions data. The source tests determined the particulate matter, total chromium, cadmium, copper, nickel, lead, nitrogen oxides, carbon monoxide and nonmethane hydrocarbon mass emission rates from the unit.

Pacific Environmental Services (PES), a participant in CARB's Independent Contractor Program and certified by the SCAQMD for various source testing, was hired by Balboa Pacific Corporation to perform the requested source testing and data reduction. The testing was performed on March 9, 10, and 13, 1995. PES and its analytical laboratory, West Coast Analytical Service, Inc. qualify as independent testing laboratories under SCAQMD Rule 304 (l) - no conflict of interest.

EQUIPMENT AND PROCESS DESCRIPTION

California Steel Industries. Inc. operates a roll mill at its Fontana. CA facility. This process generates waste oil which consists mainly of animal tallow. This waste and the waste from three other less significant waste streams are disposed of utilizing a Bal Pac 2000 pyrolytic oxidation unit.

The waste is pumped into a pyrolytic chamber which maintains a low oxygen atmosphere and a temperature of at least 1200 degrees Fahrenheit. The waste is conveyed through the chamber screw transport system. The temperature of the chamber is maintained by two low NOx natural gas burners that vent directly to the atmosphere. The waste exits the chamber either as non-hazardous dry ash or gas that is ducted to a thermal oxidizer. The natural gas fired thermal oxidizer maintains a temperature of at least 1400 degrees Fahrenheit in order to destroy any hazardous gases. Emissions resulting from the thermal oxidation process are then vented directly to the atmosphere.

TESTING METHODOLOGY

The approximate sampling port locations are shown in Figure 1. The number of traverse points required (24) and their locations were determined by SCAQMD Method 1.1.

Particulate Matter

The total particulate matter emissions were determined by using SCAQMD Method 5.2. The sampling train is shown in Figure 2 and consisted of a unitized 3-foot quartz glass probe and nozzle, a Gelman type A/E glass fiber filter in a glass filter holder, a 6-foot Teflon hose from the probe to the first impinger, two Greenburg-Smith impingers each charged with 100 mls of distilled water, an empty impinger, an impinger filled with silica gel, a 30-foot umbilical line, a vacuum pump, a dry gas meter and a calibrated orifice connected to an inclined oil manometer. Since the stack gas temperaures were above 1000 degrees Fahrenheit, the probe and filter were unheated in order to cool the stack gas temperature down to below 600 degrees Fahrenheit before reaching the Teflon tubing.

Triplicate test runs were made and the sampling was conducted isokinetically for about 72 minutes (3 minutes per point) generating a sample size of about 40 cubic feet through the train. Field data was recorded on the data sheets shown in Appendix B, which also details the calculation sheets. As each traverse point was sampled, the velocity head of the corresponding traverse point at the flow measurement location was determined with an S-type Pitot tube connected to an inclined manometer, and the temperature will be measured with a chromel-alumel (type K) thermocouple and a digital potentiometer (SCAQMD Method 2.2).

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

After the test, the contents of each impinger were placed in a 1000-ml polyethylene container. The sampling train was then rinsed from the 3rd impinger to the nozzle with the distilled water and the rinse was added to the sample. The filter was placed in a plastic petri dish. The impinger solution was chilled to 68°F or less during the tests and kept refrigerated prior to the analyses in order to prevent degradation of the sample. Disposable vinyl gloves were worn during sample retrieval to help prevent contamination.

The particulate collections were evaporated to dryness at 100°C and desiccated to a constant weight along with the sample filters.

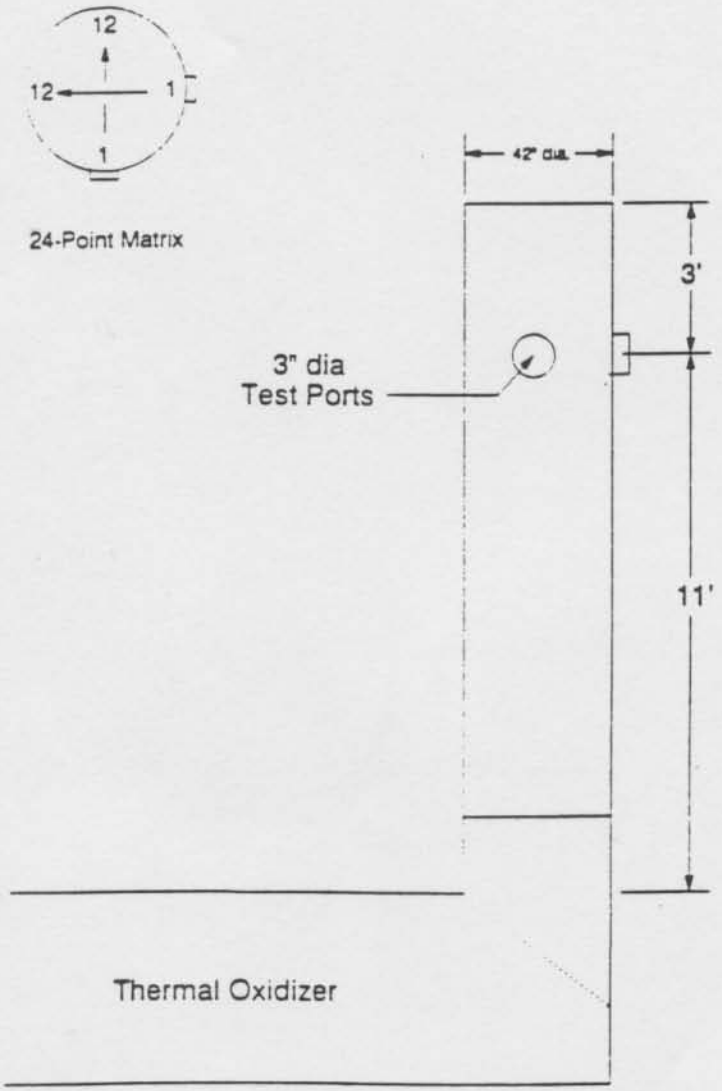
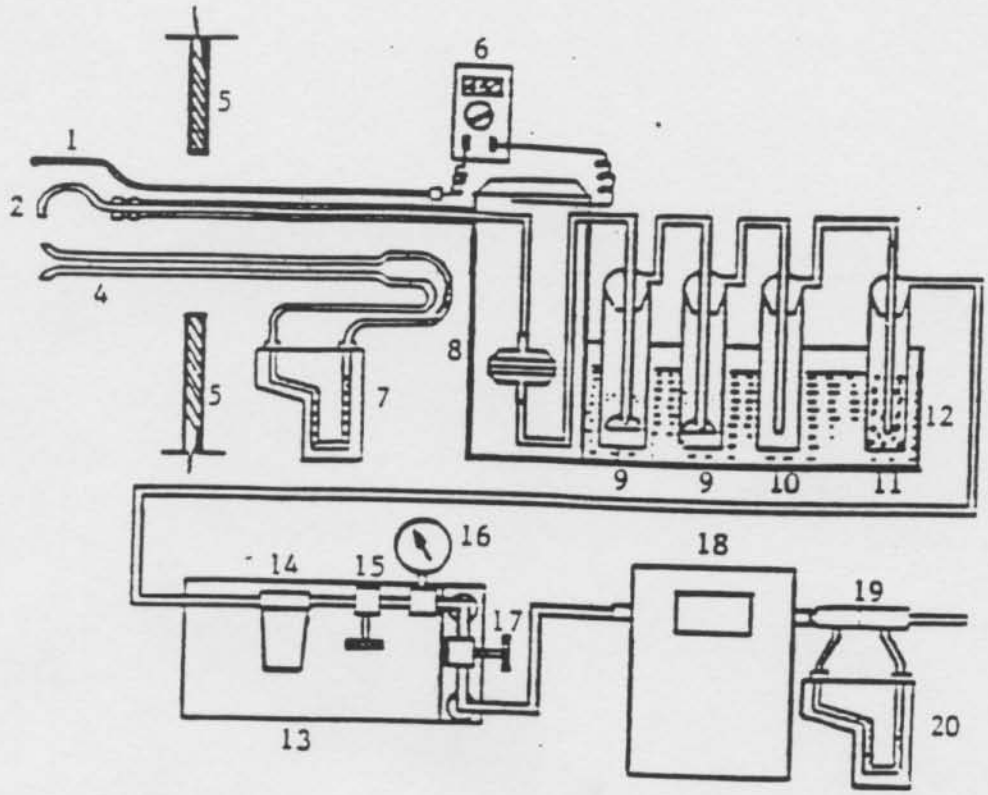


Figure 1
Sampling Location



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

Figure 2

Particulate Sampling Train Set-up with Non-Heated Probe and Heated Filter

SCAQMD 5.1

(MODIFIED)

Metals Sampling

The metals emissions of the oxidizer exhaust were determined by SCAQMD Method 12.1 modified to incorporate the analyses for total chromium, lead, manganese, copper, nickel, cadmium and zinc. The sampling train is shown in Figure 3 and consisted of a unitized quartz glass probe and nozzle, a Teflon union, a Gelman type A/E glass fiber filter in a glass filter holder, a 6-foot Teflon hose from the probe to the first impinger, two Greenburg-Smith impingers each charged with 100 mls of 0.1N nitric acid solution, an empty impinger, a glass filter holder, an impinger filled with silica gel, a 30-foot umbilical line, a vacuum pump, a dry gas meter and a calibrated orifice connected to an inclined oil manometer. Gelman A/E glass fiber filters will be used in the filter holders. Since the stack gas temperaures were above 1000 degrees Fahrenheit, the probe and filter were unheated in order to cool the stack gas temperature down to below 600 degrees Fahrenheit before reaching the Teflon tubing.

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

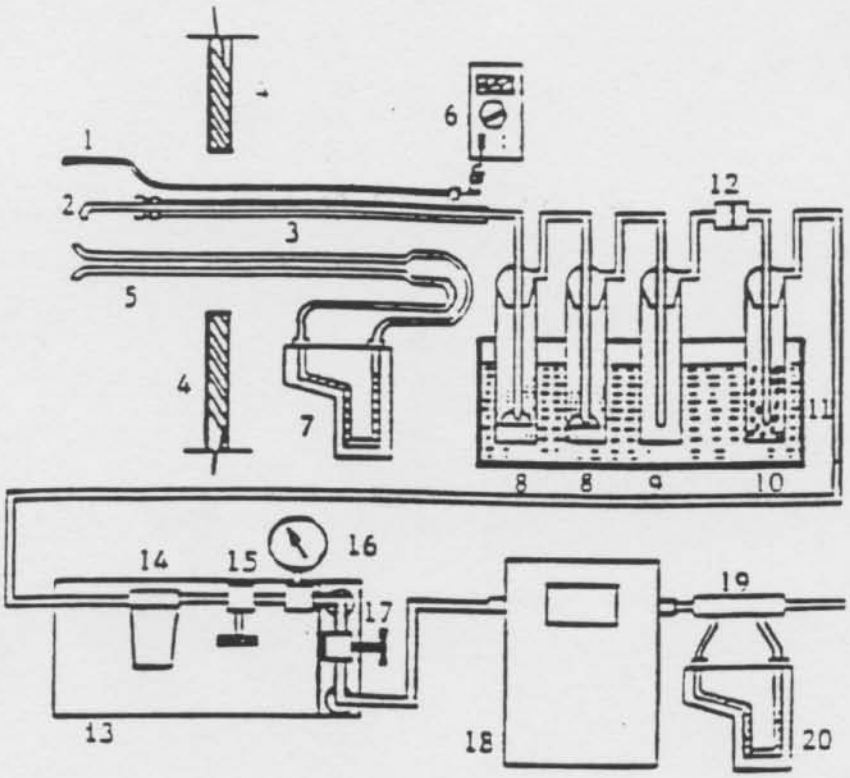
The weight of the impinger solution and the silica gel were recorded before and after the tests in order to obtain the moisture content of the stack gas stream. All sample weights were recorded immediately on sample recovery sheets (Appendix B) during charging and sample recovery. Leak checks were performed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

After the test, the contents of each impinger set were placed in a 1000 ml. polyethylene container. The sampling train was then rinsed from the 3rd impinger to the nozzle with the 0.1N nitric acid solution and the rinse was added to the sample. The filter was placed in a plastic petri dish. The impinger solution was chilled to 68°F or less during the tests and kept refrigerated along with the sample filters prior to the analyses in order to prevent degradation of the sample. Disposable vinyl gloves were worn during sample retrieval to help prevent contamination.

Laboratory analyses were conducted by West Coast Analytical Service, Inc. Copper, chromium, zinc, lead, nickel, cadmium, and manganese determinations were made by ICP/MS. The detection level of the analytical procedure was about 0.1 to 3 ug/sample depending on the type of metal.

Total Hydrocarbons

The total hydrocarbons were determined by SCAQMD Method 25.1. The sampling train is shown in Figure 4, and consisteed of a stainless condensate trap (with probe) packed in dry



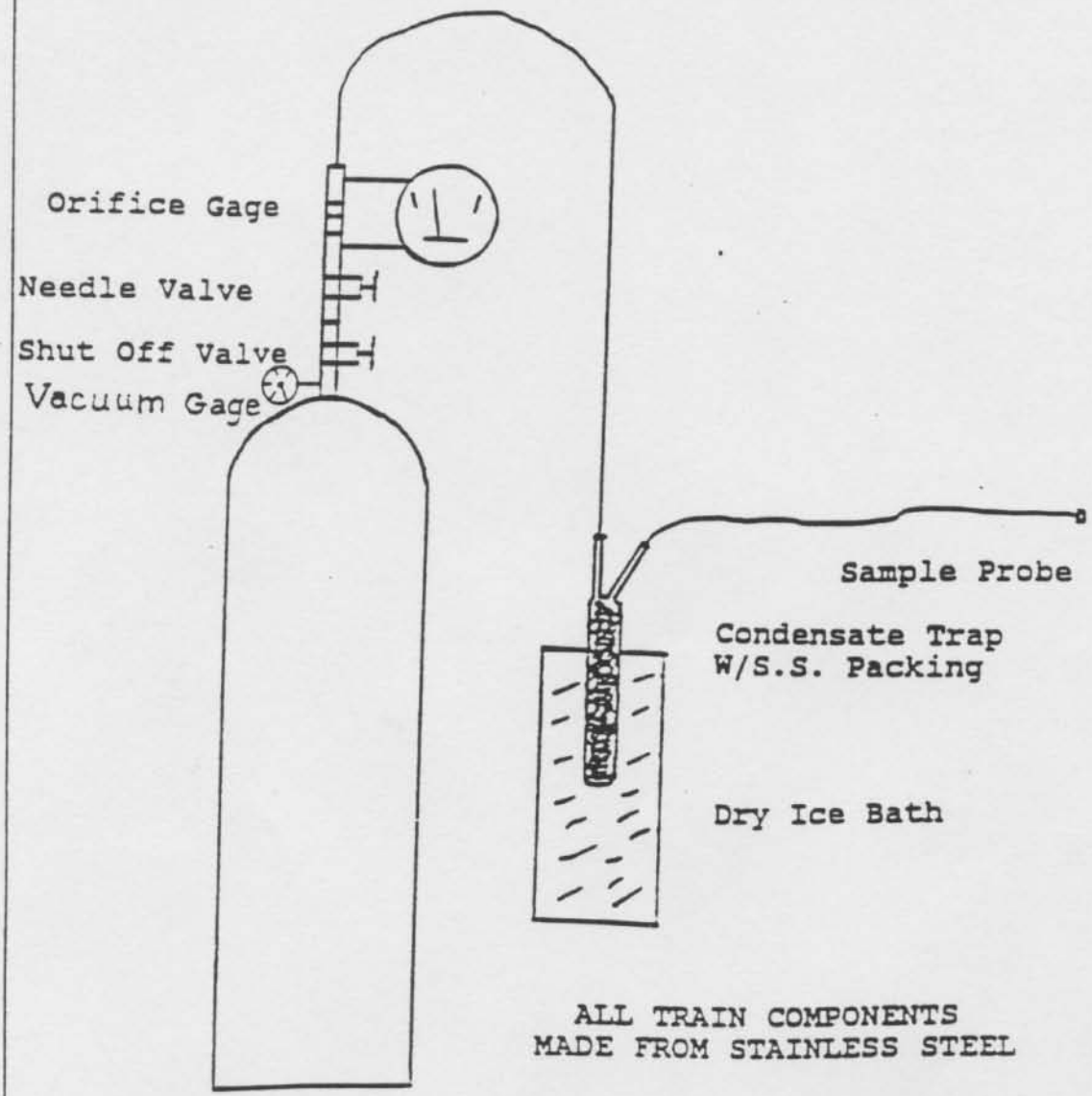
1. Temperature Sensor
2. Nozzle (GLASS)
3. Glass Lined Stainless Steel Probe
4. S-type Pitot Tube
5. Stack Wall
6. Temperature Sensor Meter
7. Pitot Tube Inclined Manometer
8. Impinger with 100 ml $0.1N HNO_3$
9. Empty Bubbler
10. Bubbler with Silica Gel
11. Ice Bath
12. Filter
13. Sealed Pump (Leak Free)
14. Filter for Pump
15. Metering Valve
16. Vacuum Gauge
17. By-pass Valve
18. [redacted]
    Dry Gas Meter
19. Orifice
20. Orifice Inclined Manometer

Figure 3

Metals Sampling Train Setup-Wet Impingement Method
SCAQMD Method 12.1 (modified)

SCAQMD

METHOD 25.1:



NOTE: Samples usually collected in duplicate or triplicate concurrently.

Figure 4

HYDROCARBON SAMPLING TRAIN

ice and connected through a flow control device (micro orifice disc meter) to an evacuated 12-liter stainless steel cylinder. The sampling was conducted at a single point near the center of the duct for 2 hours. Leak checks were performed on all sampling trains before and after testing.

Laboratory analyses for carbon monoxide (CO), methane (CH_4), carbon dioxide (CO_2), oxygen (O_2), and nonmethane hydrocarbons (as C_1) were performed on the hydrocarbon trains by Truesdail Laboratories, Inc., according to SCAQMD Method 25.1. A sample submittal/chain of custody sheet was completed and is included in Appendix B along with the field data and calculation sheets. The analytical procedures performed at Truesdail are detailed in Appendix C.

During the hydrocarbon test runs, the NOx emissions of the oxidizer exhaust were determined by collecting three grab samples of the flue gas at 15-minute intervals with evacuated 2-liter glass flasks containing an NOx-absorbing solution (SCAQMD Method 7.1). The samples were collected through a sampling manifold consisting of a short length of 1/4-inch stainless steel tubing connected to a shutoff/metering valve and a vacuum gauge (see Figure 5). The flask was attached to the sampling manifold and leak-checked with the vacuum gauge to ensure that at least 27 inches of vacuum existed in the flask. The control valve was then used to collect an integrated sample of the flue gas over a period of about 5 minutes.

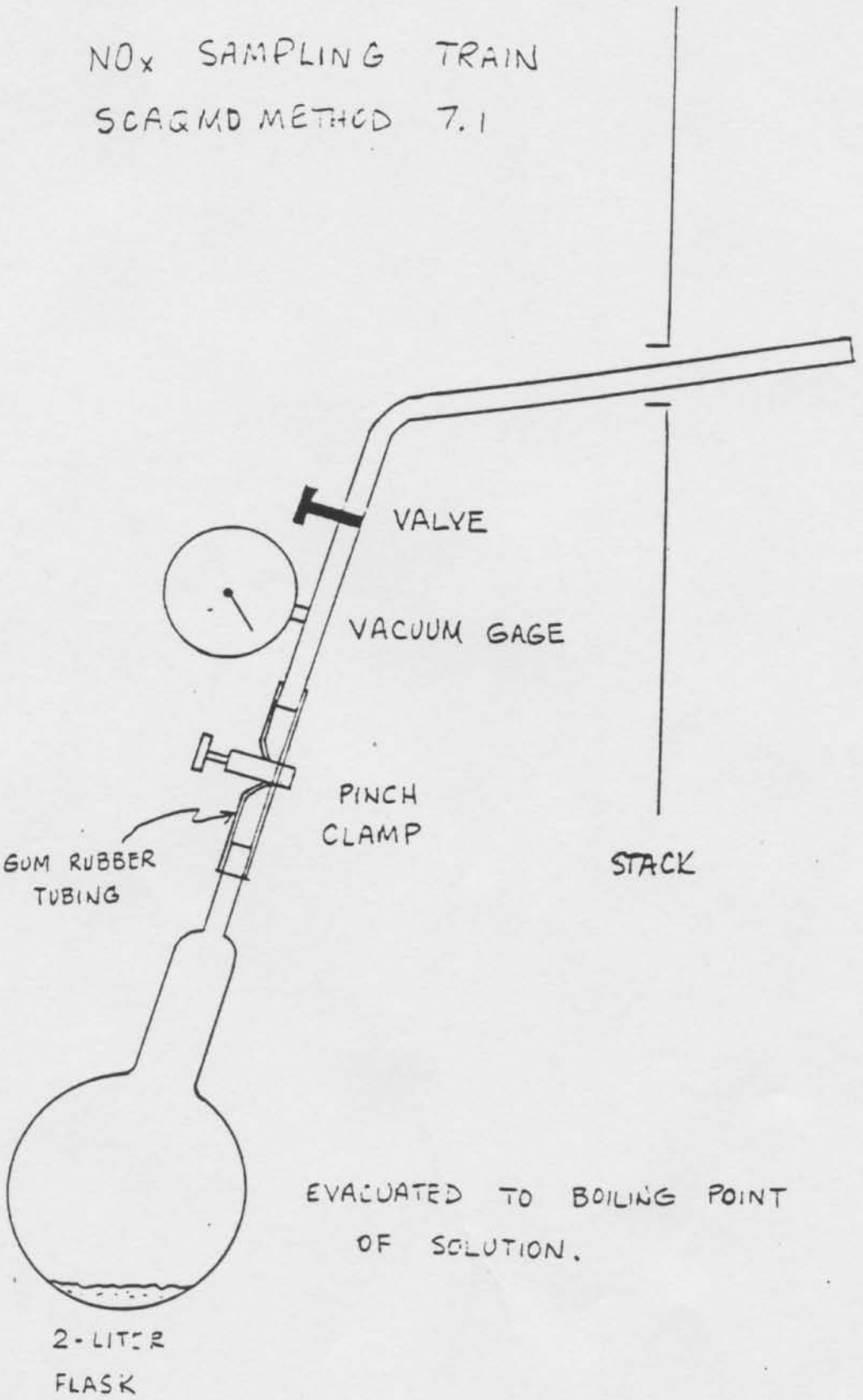

NOx SAMPLING TRAIN
SCAQMD METHOD 7.1
VALVE
VACUUM GAGE
PINCH CLAMP
GUM RUBBER TUBING
STACK
EVACUATED TO BOILING POINT OF SOLUTION.
2-LITER FLASK

Figure 5.

RESULTS

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

Table 1 summarizes the results of the source tests for particulates and total nonmethane hydrocarbons/carbon monoxide. The particulate concentrations for the three test runs were 0.0469, 0.0547, and 0.0329 grains/DSCF, respectively, for an average of 0.0448 grains/DSCF. The particulate emission rates for the three test runs were 0.69, 0.76, and 0.46 lbs/hr, respectively, for an average of 0.64 lbs/hr. The carbon monoxide concentrations for the three test runs were 14, 23, and <1 ppmv, respectively, for an average of 12 ppmv. The carbon monoxide emission rates for the three test runs were 0.10, 0.16, and <0.01 lbs/hr, respectively, for an average of 0.08 lbs/hr. The nitrogen oxides concentrations for the three test runs were 57, 56, and 60 ppmv, respectively, for an average of 58 ppmv. The nitrogen oxides emission rates for the three test runs were 0.70, 0.89, and 0.96 lbs/hr, respectively, for an average of 0.85 lbs/hr.

Table 2 summarizes the results of the source tests for metals. The copper concentrations for the three test runs were 0.080, 0.092, and 0.079 mg/m^3, respectively, for an average of 0.084 mg/m^3. The copper emission rates for the three test runs were 230, 250, and 220 mg/hr, respectively, for an average of 233 mg/hr. The chromium concentrations for the three test runs were 0.044, 0.038, and 0.033 mg/m^3, respectively, for an average of 0.038 mg/m^3. The chromium emission rates for the three test runs were 130, 100, and 94 mg/hr, respectively, for an average of 108 mg/hr. The lead concentrations for the three test runs were 0.034, 0.031, and 0.030 mg/m^3, respectively, for an average of 0.032 mg/m^3. The lead emission rates for the three test runs were 97, 83, and 85 mg/hr, respectively, for an average of 88 mg/hr. The zinc concentrations for the three test runs were 0.131, 0.158, and 0.117 mg/m^3, respectively, for an average of 0.135 mg/m^3. The zinc emission rates for the three test runs were 380, 420, and 330 mg/hr, respectively, for an average of 377 mg/hr. The manganese concentrations for the three test runs were 0.296, 0.297, and 0.234 mg/m^3, respectively, for an average of 0.276 mg/m^3. The manganese emission rates for the three test runs were 860, 790, and 660 mg/hr, respectively, for an average of 770 mg/hr. The nickel concentrations for the three test runs were 0.062, 0.061, and 0.050 mg/m^3, respectively, for an average of 0.058 mg/m^3. The nickel emission rates for the three test runs were 180, 160, and 140 mg/hr, respectively, for an average of 160 mg/hr. The cadmium concentrations for the three test runs were 0.014, 0.011, and 0.012 mg/m^3, respectively, for an average of 0.012 mg/m^3. The cadmium emission rates for the three test runs were 40, 29, and 34 mg/hr, respectively, for an average of 34 mg/hr.

TABLE 1

California Steel
Balboa Pacific Pyrolysis Unit
Oxidizer Exhaust
Particulate/Gases Emissions

Date:	3/9/95	3/10/95	3/13/95
Test Number:	1	2	3
Sample Number:	BP-3	BP-6	BP-8
Flue Gas			
Temperature, °F	1248	1215	1200
Velocity, ft/sec	10.7	9.9	9.9
Static Pressure, in. H_2O	-0.01	-0.01	-0.01
Duct Dimension, in.	42	42	42
Duct Area, sq. ft.	9.62	9.62	9.62
Flow Rate, ACFM	6,170	5,740	5,730
Flow Rate, DSCFM	1,710	1,620	1,620
Moisture, % v/v	7.1	7.0	8.4
Particulate Matter (M5.1)			
Sample Start	15:16	12:29	12:20
Sample Stop	16:33	14:21	13:36
Sampling Time, min.	72	72	72
Sample Volume, DSCF	42.2	39.0	44.8
Isokinetic Rate, %	103.3	101.0	115.9
Collection, grams			
Filter	0.1224	0.1320	0.1250
Impingers	0.1277	0.1378	0.0954
Total	0.2501	0.2698	0.2204
Concentration, grains/DSCF	0.0469	0.0547	0.0329
Emission Rate, lbs/hr	0.69	0.76	0.46
Total Hydrocarbons (M25.1)			
Sample Start	12:35	09:45	09:40
Sample Stop	14:47	11:55	11:50
Sampling Time, min.	120	120	120
Concentration, %			
Carbon Dioxide	2.9	4.1	3.3
Oxygen	16.6	15.2	16.3

TABLE 1 (cont'd)

California Steel
Balboa Pacific Pyrolysis Unit
Oxidizer Exhaust
Particulate/Gases Emissions

Total Hydrocarbons (cont'd)			
Concentration, ppmv			
Carbon Monoxide	14	23	< 1
Methane	< 1	< 1	< 1
Nonmethane HC (as C_1)	115	113	48
Emission Rate, lbs/hr			
Carbon Monoxide	0.10	0.16	< 0.01
Nonmethane HC (as C_1)	0.37	0.34	0.15
Nitrogen Oxides (M7.1)			
Concentration, %			
Carbon Dioxide	4.0	3.9	4.1
Oxygen	15.1	15.1	14.8
Concentration, ppmv			
Nitrogen Oxides	57	56	60
Emission Rate, lbs/hr			
Nitrogen Oxides (as NO_2)	0.70	0.89	0.96

Table 2

California Steel
Balboa Pacific Pyrolysis Unit
Oxidizer Exhaust
Metals Emissions

Date:	3/9/95	3/10/95	3/13/95
Test Number:	1	2	3
Sample Number:	BP-1	BP-5	BP-7
Flue Gas			
Temperature, °F	1272	1234	1238
Velocity, ft/sec	10.7	9.8	9.9
Static Pressure, in. H_2O	-0.01	-0.01	-0.01
Duct Dimension, in.	42	42	42
Duct Area, sq. ft.	9.62	9.62	9.62
Flow Rate, ACFM	6,170	5,670	5,680
Flow Rate, DSCFM	1,700	1,570	1,670
Moisture, % v/v	6.9	7.6	8.8
Metals (M12.1m)			
Sample Start	12:25	09:49	09:40
Sample Stop	14:50	12:10	11:50
Sampling Time, min.	120	120	120
Sample Volume, DSCF	66.9	64.5	75.5
Isokinetic Rate, %	96.5	100.6	111.3
Concentration, mg/m^3			
Copper	0.080	0.092	0.079
Chromium	0.044	0.038	0.033
Lead	0.034	0.031	0.030
Zinc	0.131	0.158	0.117
Manganese	0.296	0.297	0.234
Nickel	0.062	0.061	0.050
Cadmium	0.014	0.011	0.012
Emission Rate, mg/hr			
Copper	230	250	220
Chromium	130	100	94
Lead	97	83	85
Zinc	380	420	330
Manganese	860	790	660
Nickel	180	160	140
Cadmium	40	29	34

QUALITY ASSURANCE/QUALITY CONTROL

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

Use Of Standard Test Procedures

SCAQMD Methods 1.1 and 2.1 were utilized to determine the location and number of sampling points, and flow rate. SCAQMD Method 5.1 was used to determine the particulate emission rates, SCAQMD Method 12.1 (modified) was used to determine the metals emission rates, SCAQMD Method 7.1 was used to determine nitrogen oxides emission rates and SCAQMD Method 25.1 was used to determine the nonmethane hydrocarbon and carbon monoxide emission rates. A procedure must be thoroughly studied under various conditions in order to be designated as a SCAQMD Method. Results of many executions of the procedure are compared to demonstrate accuracy and repeatability before adoption of the procedure as a source testing method.

Use Of Trained Test Personnel

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

Knowledge Of Source's Operation

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

Equipment Maintenance and Calibration

Use of properly maintained and calibrated test equipment is essential for minimizing systematic errors in results. All sampling devices will be constructed, maintained, and calibrated as suggested in EPA documents APTD-0576, and APTD-0581 (These are

commonly accepted construction and maintenance manuals for source testing equipment). The dry gas meters were calibrated with a transfer gas meter with NBS traceability. All equipment calibrations are included in Appendix D.

The hydrocarbon analysis conducted at Truesdail Laboratories utilized gas chromatography (GC). After sample recovery, the analyses included replicate runs, blanks, and calibration runs that agreed within 5% (see Appendix B).

Sample Preparation

For hydrocarbon sampling, in order to guarantee that each sampling train was free of contamination from previous sampling, the sampling cylinders were evacuated three times with a high vacuum (0.1 micron) pump. The condensate traps were pre-burned in a manner identical to the sample recovery.

Field Leak Checks

The evacuated sample cylinders were maintained under vacuum for 24 hours prior to testing to ensure that no visible change occurred on the vacuum gauges. After sample train assembly, a leak check was performed on the non-tank components (with the sample valve closed) by applying 10 psi ultra pure nitrogen at the probe tip and observing the sample train flow meter drop to zero with the nitrogen supply on, and then again with it turned off.

A post-test leak check was performed by leaving at least 5 inches of vacuum in the cylinder at the end of sampling, capping the probe tip, turning on the sample valve and observing the flow meter drop to zero with little change in gauge vacuum over a 10-minute period (a slight drop in vacuum sometimes occurs due to the volume of the Magnehelic gauge).

Thorough Record Keeping

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

Proper Sample Handling Procedures

Inaccurate source test results can be caused by delays in retrieving samples, contamination of the samples, insufficient sample identification, tampering, and mishandling of samples. The chances of these errors are greatly increased when too many people are permitted to handle the samples. A chain-of-custody procedure was followed to document the change of possession for each sample and a copy can be found in Appendix B. The total hydrocarbon sample traps were kept on dry ice until analysis to minimize degradation. All other samples were retrieved and kept in secure areas until analysis.

All glassware and probe lines were cleaned prior to the tests with hot tap water and then with 40% nitric acid solution. The trains were then rinsed with distilled water, and then air dried and sealed until the tests.

Use Of Standardized Data Reduction Techniques

Data reduction was accomplished by the use of step by step calculation sheets and computer spread sheets. The calculations were systematic and easy to follow. The calculation spread sheets for the source test can be found in Appendix B.

Submission Of Blank Samples

During the metals, a sample from an unused charged sampling train was carried to the field (train blank), leak-tested, and submitted to the laboratory and analyzed with the other samples to detect any possible contamination of sampling media or equipment or problems with lab analyses.

For the particulate testing, a filter/reagent sample was analyzed along with the stack samples to detect any possible contamination of sampling media or problems with lab analyses.

No corrections were made to the measured concentrations of the collected samples, but the blank results were reported on the calculation sheets.

APPENDIX A

SCAQMD RESEARCH PERMIT

South Coast
AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (714) 396-2000

December 2, 1993
287175

Balboa/Pacific Corp.
11240 Bloomfied Ave.
Santa Fe Springs, Ca. 90670

Attention: Mr. William Walker
Vice President Engineering

Gentlemen:

EQUIPMENT DESCRIPTION

APPLICATION NO. 287175

PYROLYTIC WASTE PROCESSING AND TREATMENT SYSTEM CONSISTING OF:

1. PYROLYTIC CHAMBER, BALBOA PACIFIC, MODEL SERIES 2000, 5'-0" DIA.x 18'-0" L., WITH AN INTERNAL SCREW CONVEYOR, NATURAL GAS FIRED, WITH TWO LOW NOX BURNERS RATED AT 1,500,000 BTU/HR EACH.
2. THERMAL OXIDIZER, 5'-7" DIA.x 19'-0" L., NATURAL GAS FIRED, WITH ONE BURNER RATED AT 8,000,000 BTU/HR AND ONE 20 H.P. EXHAUST BLOWER.

TO BE LOCATED AT 14000 San Bernardino Ave., Fontana

This research permit is granted under Rule 441 of the Rules and Regulations of the South Coast Air Quality Management District. The operation of this equipment, during these research operations, is subject to the following conditions:

-CONDITIONS-

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.

3. THIS EXPERIMENTAL RESEARCH PERMIT WILL EXPIRE ON MARCH 15, 1994.

4. THE RESEARCH OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH PROVISIONS OF RULE 441.

5. THIS EQUIPMENT SHALL ONLY BE USED TO PROCESS WASTE STEEL ROLL OIL.

6. THE MAXIMUM AMOUNT OF WASTE STEEL ROLL OIL PROCESSED IN THIS EQUIPMENT SHALL NOT EXCEED 24 TONS IN ANY ONE DAY.

7. A TEMPERATURE INDICATOR SHALL BE INSTALLED TO MEASURE THE COMBUSTION CHAMBER TEMPERATURE OF THE THERMAL OXIDIZER.

8. A TEMPERATURE OF NOT LESS THAN 1400^{0}F SHALL BE MAINTAINED IN THE COMBUSTION CHAMBER OF THE THERMAL OXIDIZER WHEN THE EQUIPMENT IT SERVES IS IN OPERATION EXCLUDING A STARTUP PERIOD NOT TO EXCEED 30 MINUTES.

9. ASH FROM THE PYROLYTIC CHAMBER SHALL BE KEPT AND DISPOSED OF IN ENCLOSED CONTAINERS.

10. RECORDS SHALL BE MAINTAINED TO PROVE COMPLIANCE WITH CONDITION SIX. THE RECORDS SHALL MAINTAIN THE FOLLOWING GUIDELINES:

    A. AT LEAST ONE SET OF RECORDS SHALL BE MAINTAINED ON SITE AT THIS FACILITY LOCATION.

    B. RECORDS SHALL BE MAINTAINED FOR THE LATEST TWO YEARS.

    C. RECORDS SHALL BE MADE AVAILABLE TO DISTRICT PERSONNEL UPON REQUEST.

11. NO LATER THAN SIXTY DAYS AFTER THE RESEARCH PERMIT EXPIRES, RESULTS OF THE TESTING DONE ON THIS EQUIPMENT SHALL BE SUBMITTED TO THE DISTRICT ENGINEER IDENTIFIED ON THIS PERMIT.

It is your responsibility to comply with all laws, ordinances and regulations of other governmental agencies which are applicable to this equipment. This Research Permit will expire on March 15, 1994.

If you have any questions, please call Roy Olivares at (909) ~~420-7025~~.

Very truly yours,

Dixie Richards

Dixie Richards
Sr. Air Quality Engineer

South Coast
AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (909) 396-2000

March 14, 1994

I.D. 099612
A/N 287175

Balboa/Pacific Corp.
11240 Bloomfield Ave.
Santa Fe Springs, Ca. 90670

Attention : Mr. William C. Walker
Vice President Engineering

The District has received your request for extension. Please be advised that the Permit to Construct has been extended based on the information provided with your request. As a result, the Permit to Construct shall expire on 10/04/94. This Extension for Permit to Construct will become invalid if the Permit to Operate is denied or if this application is cancelled. You must notify the District in writing when the equipment is operational. Additional written extensions must be obtained if construction is to continue beyond the new expiration date above.

Please contact Roy Olivares at ~~(909) 420-7025~~ (619) 340-0697 if you have any questions regarding the permitting of this equipment.

Very truly yours,

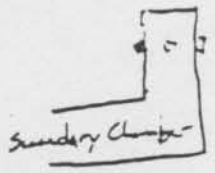
Roy Olivares
Air Quality Engineering II

APPENDIX B

FIELD DATA AND CALCULATION SHEETS

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Bellaire Coal Steel
DATE 3/10/94
SAMPLING LOCATION Outlet ~~to~~ Secondary Chamber
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE. (DISTANCE A) 49 1/2
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE. (DISTANCE B) 7 1/2
STACK I.D.. (DISTANCE A - DISTANCE B) 42
NEAREST UPSTREAM DISTURBANCE 11'
NEAREST DOWNSTREAM DISTURBANCE 3'
CALCULATOR NN



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	2.1	42"	* 1"	7.5	8 1/2
2	6.7		2.8		10 3/8
3	11.4		5.0		12 1/2
4	17.7		7.4		14 7/8
5	25.0		10.5		18
6	35.6		15.0		22.5
7	64.4		27.0		34 1/2
8	75.0		31.5		39
9	82.3		34.6		42
10	88.2		37.0		44 1/2
11	93.3		39.2		46 3/4
12	97.9		41.7		48 1/2

HYDROCARBON SAMPLING FIELD DATA

Project No. 4768.001

CLIENT: BALBOA PACIFIC Date: 3-9-95

Sampling Location: OXIDIZER EXHAUST

Time	#117 MR41 Sample A " Hg	#113 GF99 Sample B " Hg	NOx BULB ~~Sample C~~ " Hg
0 12:35	29.5 (0.20)	28.6 (0.20)	#3009
10 12:45	27.5 (0.20)	26.5 (0.21)	12:58 → 13:04
20 12:55	25.3 (0.20)	24.5 (0.20)	26" → 3"
30 13:05	23.5 (0.20)	22.5 (0.20)	
40 13:15	21.5 (0.20)	20.5 (0.20)	
50 13:25	19.5 (0.20)	18.5 (0.20)	#404
60 13:35*	17.5 (0.20	16.0 (0.20)	13:25 → 13:30
70 13:57*	16.0 (0.20)	14.0 (0.20)	25" → 3"
80 14:07	14.0 (0.20)	11.5 (0.20)	
90 14:17	12.5 (0.20)	10.0 (0.20)	
100 14:27	10.5 (0.20)	8.0 (0.20)	
110 14:37	8.5 (0.20)	6.0 (0.20)	#1493
120 14:47	5.0	4.5	14:31 → 14:36
			26" → 3"
14:56	5.0 (0.08)	4.5 (0.08)	
15:06	5.0	4.5	
*PORT CHANGE			

Pre Leak-check _____ Post Leak-check ✓

HYDROCARBON SAMPLING FIELD DATA

Project No. 478.001

CLIENT: BALBOA PACIFIC Date: 3-10-95

Sampling Location: OXIDIZER EXHAUST

Time	#110 MR36 Sample A " Hg	#112 MR19 Sample B " Hg	NO_x BULB ~~Sample C~~ " ~~Hg~~
0 9:45	29.0 (0.15)	29.0 (0.15)	#667
10 9:55	27.0 (0.15)	27.0 (0.15)	10:00 → 10:06
20 10:05	24.0 (0.10)	25.5 (0.16)	27" → 3"
35 10:15	22.0 (0.10)	23.0 (0.16)	
40 10:25	20. (0.10)	21.0 (0.16)	
50 10:35	18.0 (0.10)	19.0 (0.16)	#623
60 10:45*	16.0 (0.10)	17.0 (0.16)	10:25 → 10:30
70 11:05 [redacted]*	14.0 (0.10)	15.0 (0.16)	25" → 2"
80 11:15	12.5 (0.12)	13.5 (0.16)	
90 11:25	10.5 (0.12)	11.0 (0.16)	
100 11:35	8.5 (0.12)	9.0 (0.16)	#1569
110 11:45	7.0 (0.12)	7.5 (0.16)	11:15 → 11:20
120 11:55	5.0	5.5	25" → 2"
12:02	5.0 (0.10)	5.5 (0.12)	
12:12	5.0	5.0	
* PORT CHANGE			

Pre Leak-check _____ Post Leak-check _____

HYDROCARBON SAMPLING FIELD DATA

Project No. 4768.001

CLIENT: BALBOA PACIFIC Date: 3-13-95

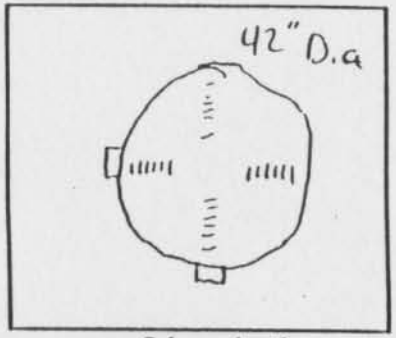
Sampling Location: OXIDIZER EXHAUST

Time		#101 GF99 Sample A " Hg	#103 MR 41 Sample B " Hg	NOx BULB ~~Sample C~~ ~~" Hg~~
0	9:40	29.0 (0.18)	29.0 (0.20)	#504
10	9:50	27.0 (0.18)	29.0 (0.20)	10:01 → 10:06
20	10:00	25.6 (0.18)	25.5 (0.22)	30" → 3"
30	10:10	23.0 (0.18)	24.0 (0.28)	
40	10:20	21.0 (0.18)	21.5 (0.28)	
50	10:30	19.0 (0.18)	19.5 (0.28)	#1183
60	10:41*	17.0 (0.18)	17.0 (0.28)	10:32 → 10:37
70	11:05*	15.0 (0.18)	15.0 (0.28)	29" → 2"
80	11:10	13.0 (0.18)	13.0 (0.28)	
90	11:20	11.0 (0.18)	11.0 (0.28)	
160	11:30	9.0 (0.18)	9.0 (0.28)	#3036
110	11:40	7.0 (0.18)	6.5 (0.24)	11:11 → 11:16
120	11:50	5.0	4.5	30" → 3"
	12:00	5.0 (0.00)	4.5 (0.01)	
	12:10	5.0	4.5	
*PORT CHANGE				

Pre Leak-check _____ Post Leak-check ✓

FIELD DATA

Plant Evraz-Cal Steel
Date 3/7/24
Sampling Location Outlet
Sample Type M.M.T.C.M CARB 13.1
Run Number BP-1
Operator JAJ
Ambient Temperature 81
Barometric Pressure 27.05
Static Pressure -0.01
Filter Number(s)
Pretest Leak Rate 0.033 CFM @ 4 in. Hg
Read And Record All Data Every 5 Minutes



Schematic of
Traverse Point Layout

Probe Length and Type 5' Quartz
Pitot Tube I.D. No. S-166
Nozzle I.D. No. And Diameter 0.324
Assumed Moisture, % 5
Meter Box Number 1A
Meter Delta H@ 1.971
C Factor -
Meter Gamma 1.000
Heater Box Setting -
Reference Delta P -
Post test Leak Rate 0.023 CFM @ 4 in. Hg
Impinger Box No. 5B Blank Box No. 8.5

Traverse Point Number	Sampling Time θ (minutes)	Clock Time (24 hr clock)	Gas Meter Reading Vm (cubic feet)	Velocity Head Ps (in. H20)	Orifice Pressure Differential (in. H20) ΔH Desired	ΔH Actual	Stack Temp. Ts (F)	Dry Gas Meter Temp. Inlet Tm in (F)	Dry Gas Meter Temp. Outlet Tm out (F)	Pump Vacuum (in. Hg)	Heated Probe Temp. (F)	Filter Box Temp. (F)	Impinger Temp. (F)
1	0	1200	329.568	0.01	1.06	1.06	1295	89	87	2.0	—	—	66
2	5	1230	332.424	0.01	1.09	1.09	1302	87	87	2.0	—	—	64
3	10	1235	335.285	0.01	1.09	1.09	1250	87	86	2.0	—	—	63
4	15	1240	338.070	0.01	1.04	1.04	1129	85	87	2.0	—	—	67
5	20	1245	340.905	0.01	1.04	1.04	1274	90	86	2.0	—	—	67
6	25	1250	343.871	0.01	1.21	1.21	1276	92	87	2.0	—	—	67
7	30	1255	346.622	0.01	1.21	1.21	1256	91	87	2.0	—	—	67
8	35	1300	349.618	0.01	1.21	1.21	1332	93	87	2.0	—	—	67
9	40	1305	352.671	0.01	1.21	1.21	1338	93	88	2.0	—	—	60
10	45	1310	355.571	0.01	1.17	1.17	1307	94	88	3.5	—	—	60
11	50	1315	358.513	0.01	1.17	1.17	1322	91	89	3.5	—	—	61
12	55	1320	361.369	0.01	1.17	1.17	1303	96	90	3.5	—	—	61
1	60	1324/1350	364.216	0.01	1.17	1.17	1310	84	84	3.5	—	—	63
2	65	1329	367.125	0.01	1.17	1.17	1270	94	87	3.5	—	—	67
3	70	1400	369.952	0.01	1.17	1.17	1272	91	86	3.5	—	—	64
4	75	1405	372.717	0.01	1.17	1.17	1272	92	84	4.0	—	—	61
5	80	1410	375.464	0.01	1.17	1.17	1285	95	89	4.0	—	—	62
6	85	1415	378.471	0.01	1.17	1.17	1272	97	92	4.0	—	—	63
7	90	1420	381.626	0.02	2.38	2.34	1226	95	90	5.0	—	—	63
8	95	1425	384.160	0.015	1.79	1.77	1256	92	91	7.0	—	—	63
9	100	1430	387.307	0.01	1.17	1.17	1245	97	90	5.0	—	—	64
10	105	1434	390.362	0.01	1.17	1.17	1262	96	90	5.0	—	—	66
11	110	1440	393.330	0.01	1.17	1.17	1253	96	91	5.0	—	—	64
12	115	1445	396.250	0.01	1.17	1.17	1263	96	91	5.5	—	—	63
	(120)	(1450)	401.190										

*Averaged filter and impinger with blank temp. = 91

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RETRIEVAL DATA

Plant: BALBOA PACIFIC
Date: 3-9-95
Sampling Location:
Sampling Type (Method): MULTIPLE METALS
Run Number: BF-1
Sample Box Number: 5B
Clean-up Man: MOKH
Job Number: 47tf 001
Comments: 1142.8 − 123.8 = 1169.0

Filter

Filter Number:			
Description of Filter:	BROWN / RED		

Moisture

Impingers:			
Final Volume:	556.0 mL	547.1 mL	490.8 mL
Initial Volume:	575.5 mL	545.8 mL	485.0 mL
Net Volume:	20.5 mL	1.3 mL	5.8 mL
Total H_2O:	mL	mL	mL

Silica Gel

Final Volume:	675.5 g	g	g
Initial Volume:	657.6 735.5 g	g	g
Net Volume:	17.9 g	g	105.5 g
Total Moisture:	g	g	g

Description of Inpinger catch: CLEAR

PES, Inc.
Multi-Metals Method Calculations (SCAQMD 12.1)

Plant	Balboa Pacific - Cal Steel
Project #	4768.001
Operation	Pyrolytic Oxidation Unit
Run	BP - 1
Location	Outlet
Date	3/9/95

Test Data

Vlc =	105.5	cc	Vol. of H2O collected (impingers)
Vm =	71.622	cf	Dry gas meter reading
Pb =	29.05	in. Hg	Barometric pressure
Ps =	29.05	in. Hg	Stack pressure
dP =	0.103		Average sq.rt delta P
dH =	1.215	in. H2O	Average draft gauge reading
Tm =	550.6	R	Average meter temperature
Ts =	1731.63	R	Average stack temperature
Dn =	0.774	in.	Nozzle diameter
Y =	1		Meter calibration factor
t =	120	min.	Duration of sampling time
A =	9.6211	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-	constant

Instrumentation Data

[O2] =	16.6	%
[CO2] =	2.9	%

CALCULATIONS

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

Vmstd =	66.87	cu.ft
	1.89	cu.m

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

Vw(std) =	4.97	scf

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

Bws = 0.069

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

Md = 28.36

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

vs = 10.69 ft/sec

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

Q = 6170.18 cfm
174.74 cmm

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

Qstd = 1700.35 dscfm
48.15 dscmm

8) Toxic metal concentrations and emission rates

Element	Sample Mass (ug)	Blank Mass (ug)	Conc. (mg/dscm)	Emission Rate (mg/hr)
Copper	152.00	3	8.03E-02	2.3E+02
Chromium	84.00	< 3	4.44E-02	1.3E+02
Lead	63.40	0.6	3.35E-02	9.7E+01
Zinc	248.00	12	1.31E-01	3.8E+02
Manganese	561.00	0.9	2.96E-01	8.6E+02
Nickel	117.00	< 0.8	6.18E-02	1.8E+02
Cadmium	26.50	< 0.1	1.40E-02	4.0E+01

9) Isokinecity

An = 0.003 ft^2 Area of nozzle orifice

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

% I = 96.54

SAMPLE RETRIEVAL DATA

Plant: BALBOA PACIFIC
Date: 3-7-95
Sampling Location: BLANK
Sampling Type (Method): MULTIPLE METALS
Run Number: BP-2
Sample Box Number: 8B
Clean-up Man: MDKH
Job Number: 4768 CC1
Comments: 721.8 − 124.3 = 597.5

Filter

Filter Number:			
Description of Filter:	CLEAN		

Moisture

Impingers:			
Final Volume:	620.8 mL	603.6 mL	487.2 mL
Initial Volume:	620.8 mL	603.6 mL	487.2 mL
Net Volume:	mL	mL	mL
Total H_2O:	mL	mL	mL

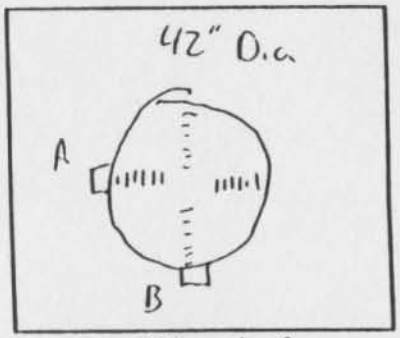
Silica Gel

Final Volume:	735.8 g	g	g
Initial Volume:	735.0 657.6 g	g	g
Net Volume:	g	g	g
Total Moisture:	g	g	g

Description of Impinger catch: CLEAR

FIELD DATA

Plant Bellog-Cal Steel
Date 3/12/15
Sampling Location Outlet
Sample Type CA SCAQMD 5.2
Run Number BP-3
Operator NNJ
Ambient Temperature 85
Barometric Pressure 24.95
Static Pressure -0.01
Filter Number(s)
Pretest Leak Rate 0.015 CFM @ 4 in. Hg
Read And Record All Data Every 3 Minutes



Schematic of
Traverse Point Layout

Probe Length and Type 5' Quartz
Pitot Tube I.D. No. S-171
Nozzle I.D. No. And Diameter 0.761
Assumed Moisture, % 5
Meter Box Number 1A
Meter Delta H@ 1.971
C Factor -
Meter Gamma 1.000
Heater Box Setting -
Reference Delta P -
Post test Leak Rate 0.02 CFM @ 5 in. Hg
Impinger Box No. 1B Blank Box No.

Traverse Point Number	Sampling Time θ (minutes)	Clock Time (24 hr clock)	Gas Meter Reading Vm (cubic feet)	Velocity Head Ps (in. H20)	Orifice Pressure Differential (in. H20) ΔH Desired	ΔH Actual	Stack Temp. Ts (F)	Dry Gas Meter Temp. Inlet Tm in (F)	Outlet Tm out (F)	Pump Vacuum (in. Hg)	Heated Probe Temp. (F)	Filter Box Temp. (F)	Impinger Temp. (F)
1	0	1516	401.875	0.01	1.17	1.17	1210	89	89	2.0	—	—	66
2	3		403.521	0.01	1.17	1.17	1154	88	89	2.0	—	—	63
3	6		405.326	0.02	2.34	2.34	1213	88	86	4.0	—	—	61
4	9		407.921	0.01	1.17	1.17	1253	91	88	3.0	—	—	59
5	12		409.406	0.01	1.17	1.17	1282	91	88	3.0	—	—	62
6	15		411.595	0.015	1.79	1.79	1280	92	88	4.0	—	—	62
7	18		413.717	0.01	1.17	1.17	1272	92	88	3.0	—	—	62
8	21		415.362	0.015	1.79	1.79	1240	93	88	4.0	—	—	62
9	24		417.733	0.01	1.17	1.17	1216	92	84	3.5	—	—	62
10	27		419.656	0.01	1.17	1.17	1290	92	144	3.5	—	—	62
11	30		421.515	0.01	1.17	1.17	1294	92	84	3.5	—	—	62
12	33		423.318	0.01	1.17	1.17	1281	92	84	3.5	—	—	61
1	36	1554/1557	425.136	0.01	1.17	1.17	1221	90	88	3.5	—	—	62
2	39		426.962	0.01	1.17	1.17	1143	89	87	3.5	—	—	62
3	42		428.971	0.01	1.17	1.17	1218	89	86	3.5	—	—	62
4	45		430.570	0.01	1.17	1.17	1241	90	87	3.5	—	—	61
5	48		432.321	0.01	1.17	1.17	1225	90	86	3.5	—	—	64
6	51		434.140	0.01	1.17	1.17	1236	90	86	3.5	—	—	62
7	54		436.013	0.015	1.79	1.79	1257	90	86	5.0	—	—	62
8	57		438.338	0.01	1.17	1.17	1283	91	86	4.0	—	—	61
9	60		439.956	0.01	1.17	1.17	1277	91	86	4.0	—	—	62
10	63		441.722	0.01	1.17	1.17	1262	91	86	4.0	—	—	63
11	66		443.497	0.01	1.17	1.17	1248	90	86	4.0	—	—	63
12	69		445.256	0.01	1.17	1.17	1252	90	86	4.0	—	—	62
	72	1633	447.032										

V_m = 115.157 $\overline{\sqrt{\Delta P}}$ = 0.10 $\overline{\Delta H}$ = 1.37 $\bar{T}_s$ = 1248 $\bar{T}_m$ = 501

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES Inc.
Calculations for : SCAQMD Method 2,3,4,10,25.1

Plant	Balboa Pacific - Cal Steel
Project #	4768.001
Operation	Pyrolytic Oxidation Unit
Run	BP-3
Location	Fontana, CA
Date	3/9/95

D A T A I N P U T

INPUT	Vlc =	68.8	cc	Vol. of H2O collected
INPUT	Vm =	45.157	cf	Dry gas meter reading
INPUT	Pb =	28.95	in. Hg	Barometric pressure
INPUT	Pg =	-0.01	in. H2O	Static pressure
INPUT	dP =	0.105		Avg. sq.rt delta P
INPUT	dH =	1.298	in. H2O	Avg. delta H
INPUT	Tm =	548.9	R	Avg. meter temp.
INPUT	Ts =	1708.3	R	Avg. stack temp.
INPUT	Y =	1		Meter calibration factor
INPUT	t =	72	min.	Duration of sampling time
INPUT	A =	9.6211	sq.ft.	Stack Area
INPUT	Cp =	0.84		Pitot tube coefficient
	Kp =	85.49		Pitot tube constant
	K1 =	17.64	R/in.Hg	constant
	K2 =	0.04707	cu.ft/ml	constant
	K3 =	0.002669	in.Hg-cf/	constant

Gas Analysis

INPUT	[O2] =	16.6	%
INPUT	[CO2] =	2.9	%
	[N2] =	80.5	%
INPUT	[TGNMO] =	115	ppmV
INPUT	[CO] =	14	ppmV
INPUT	[NOx] =	57.2	ppmV

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

01) Volume of gas sampled at standard conditions, Vmstd

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

Vmstd = 42.15 cu.ft
1.19 cu.m

02) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) 3.24 scf

03) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.071

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

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

Ms = 28.33

05) Average stack gas velocity.

Ps = 28.95 in. Hg

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

vs = 10.68 ft/sec

06) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 6165.20 cfm
174.60 cmm

07) Average stack gas dry volumetric flowrate.

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

Qstd = 1712.22 dscfm
48.49 dscmm

08) Carbon Monoxide Emission Data

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

[CO] = 14 ppmv (dry) Actual conc.
[CO] = 0.10 lbs/Hr

09) Total Gaseous non-Methane Organics Emission Data

lbs TGNMO/hr = ([TGNMO] * DSCFH * MW)/386*10^6

[TGNMO] =	115.0	ppmv	Actual Conc.
[TGNMO] =	0.37	lbs/Hr	

10) Nitrogen Oxides Emission Data

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

[NOx] =	57.2	ppmv (dry)	Actual conc.
[NOx] =	0.70	lbs/Hr	

PES, Inc.

SCAQMD Methods 5.1 Calculations

Plant	Balboa Pacific - Cal Steel
Project #	4786
Operation	Pyrolytic Oxidation Unit
Run	BP-3
Location	Outlet
Date	3/9/95

Inlet Emission Data

Vlc =	68.8	cc	Vol. of H2O collected (impingers)
Vm =	45.157	cf	Dry gas meter reading
Pb =	28.95	in. Hg	Barometric pressure
Ps =	28.95	in. Hg	Stack pressure
dP =	0.105		Average sq.rt delta P
dH =	1.298	in. H2O	Average draft gauge reading
Tm =	548.9	R	Average meter temperature
Ts =	1708.25	R	Average stack temperature
Dn =	0.764	in.	Nozzle diameter
Y =	1		Meter calibration factor
t =	72	min.	Duration of sampling time
A =	9.6211	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

1) Volume of gas sampled at standard conditions, Vmstd

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

Vmstd =	42.15	cu.ft
	1.19	cu.m

2) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) =	3.24	scf

3) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws =	0.071

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

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

Md = 29.13

Instrumental gas analysis

% CO2	2.9
% O2	16.6
% N2	80.5

5) Average stack gas velocity.

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

vs = 10.68 ft/sec

6) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 6167.86 cfm
174.67 cmm

7) Average stack gas dry volumetric flowrate.

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

Qstd = 1712.97 dscfm
48.51 dscmm

8) Analytical data

a) Reagent blank

28.6868 g final wt
28.6876 g initial wt
-0.0008 g wash net wt
400 ml Final blank volume
400 ml aliquot

-0.0008 g soluble particulate

b) Water wash

28.2996 g final wt
28.1719 g initial wt

0.1277 g wash net wt
790.8 ml Final wash volume
790.8 ml aliquot

0.1277 g soluble particulate

c) Glass microfibre filter - Blank

0.4507 g final wt
0.4504 g initial wt
0.0003 g filter net wt

d) Glass microfibre filter

0.5747 g final wt
0.4523 g initial wt
0.1224 g filter net wt

9) Particulate concentrations

0.0469 grains/dscf

10) Particulate emission rate

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

W = 0.69 lbs/hr

11) Isokinecity

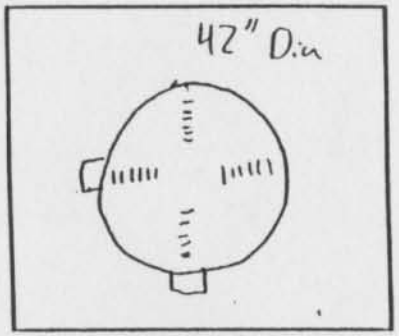
An = 0.003 ft^2 Area of nozzle orifice

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

% I = 103.34

FIELD DATA

Plant Dalbon Pacif. Co. Cal Steel
Date 3/10/95
Sampling Location Outlet
Sample Type Mod. CARB 12.1
Run Number BP-5
Operator NN
Ambient Temperature 58
Barometric Pressure 24.83
Static Pressure -0.01
Filter Number(s)
Pretest Leak Rate 0.013 CFM @ 3 in. Hg
Read And Record All Data Every 5 Minutes



Schematic of
Traverse Point Layout

Probe Length and Type 5' Quartz
Pitot Tube I.D. No. S-16A
Nozzle I.D. No. And Diameter 0.774
Assumed Moisture, % 5
Meter Box Number 1A
Meter Delta H@ 1.971
C Factor —
Meter Gamma 1.010
Heater Box Setting —
Reference Delta P —
Post test Leak Rate 0.012 CFM @ 6 in. Hg
Impinger Box No. 5B Blank Box No.

Traverse Point Number	Sampling Time θ (minutes)	Clock Time (24 hr clock)	Gas Meter Reading Vm (cubic feet)	Velocity Head Ps (in. H20)	Orifice Pressure Differential (in. H20) ΔH Desired	ΔH Actual	Stack Temp. Ts (F)	Dry Gas Meter Temp. Inlet Tm in (F)	Dry Gas Meter Temp. Outlet Tm out (F)	Pump Vacuum (in. Hg)	Heated Probe Temp. (F)	Filter Box Temp. (F)	Impinger Temp. (F)
1	0	0949	447.348	0.01	1.17	1.17	1180	60	59	3.0	—	—	54
2	5		450.496	0.01	1.17	1.17	1202	61	60	3.0	—	—	45
3	10		453.367	0.01	1.17	1.17	1220	65	61	3.0	—	—	45
4	15		456.231	0.005	0.59	0.59	1190	67	62	3.0	—	—	47
5	20		458.404	0.01	1.17	1.17	1187	68	62	3.0	—		46
6	25		461.262	0.01	1.17	1.17	1176	70	64	3.0	—	—	45
7	30		464.151	0.01	1.17	1.17	1209	72	65	3.0	—	—	46
8	35		467.035	0.01	1.17	1.17	1207	73	65	3.0	—	—	47
9	40		469.903	0.01	1.17	1.17	1204	73	66	3.0	—	—	47
10	45		472.792	0.01	1.17	1.17	1230	73	66	3.5	—	—	49
11	50		475.691	0.005	0.59	0.59	1245	74	67	3.0	—	—	47
12	55		477.703	0.005	0.59	0.59	1223	73	67	3.0	—	—	46
1	60	1047/1058	480.143	0.01	1.17	1.17	1180	69	67	4.0	—	—	54
2	65		483.125	0.005	0.55	0.55	1193	71	68	3.0	—	—	44
3	70		485.531	0.01	1.17	1.17	1159	73	69	4.5	—	—	45
4	75		488.252	0.01	1.17	1.17	1195	74	69	4.5	—	—	46
5	80		491.142	0.01	1.17	1.17	1239	75	69	4.5	—	—	45
6	85		494.072	0.01	1.17	1.17	1258	77	70	4.6	—	—	46
7	90		496.973	0.01	1.17	1.17	1301	76	70	4.5	—	—	48
8	95		499.915	0.01	1.17	1.17	1307	76	71	5.0	—	—	47
9	100		502.780	0.01	1.17	1.17	1342	77	71	5.0	—	—	48
10	105		505.710	0.01	1.17	1.17	1305	77	72	5.0	—	—	47
11	110		508.527	0.01	1.17	1.17	1316	77	72	5.0	—	—	49
12	115		511.454	001	1.17	1.17	1331	78	72	5.0	—	—	48
	120		514.280										

$\bar{V}_m = 66.132$ $\overline{\sqrt{\Delta P}} = 0.095$ $\bar{\Delta H} = 1.14$ $\bar{T}_s = 1238$, $\bar{T}_m = 69.$

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES, Inc.
Multi-Metals Method Calculations (SCAQMD 12.1)

Plant	Balboa Pacific - Cal Steel
Project #	4768.001
Operation	Pyrolytic Oxidation Unit
Run	BP - 5
Location	Outlet
Date	3/10/95

Test Data

Vlc =	112.8	cc	Vol. of H2O collected (impingers)
Vm =	66.932	cf	Dry gas meter reading
Pb =	28.83	in. Hg	Barometric pressure
Ps =	28.83	in. Hg	Stack pressure
dP =	0.095		Average sq.rt delta P
dH =	1.073	in. H2O	Average draft gauge reading
Tm =	529.4	R	Average meter temperature
Ts =	1693.63	R	Average stack temperature
Dn =	0.774	in.	Nozzle diameter
Y =	1		Meter calibration factor
t =	120	min.	Duration of sampling time
A =	9.6211	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-	constant

Instrumentation Data

[O2] =	15.2	%
[CO2] =	4.1	%

CALCULATIONS

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

Vmstd =	64.47	cu.ft
	1.83	cu.m

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

Vw(std) =	5.31	scf

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

Bws = 0.076

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

Md = 28.41

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

vs = 9.82 ft/sec

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

Q = 5670.42 cfm
160.59 cmm

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

Qstd = 1573.74 dscfm
44.57 dscmm

8) Toxic metal concentrations and emission rates

Element	Sample Mass (ug)	Blank Mass (ug)	Conc. (mg/dscm)	Emission Rate (mg/hr)
Copper	168.00	3	9.20E-02	2.5E+02
Chromium	70.00	< 3	3.83E-02	1.0E+02
Lead	56.70	0.6	3.11E-02	8.3E+01
Zinc	288.00	12	1.58E-01	4.2E+02
Manganese	542.00	0.9	2.97E-01	7.9E+02
Nickel	111.00	< 0.8	6.08E-02	1.6E+02
Cadmium	20.00	< 0.1	1.10E-02	2.9E+01

9) Isokinecity

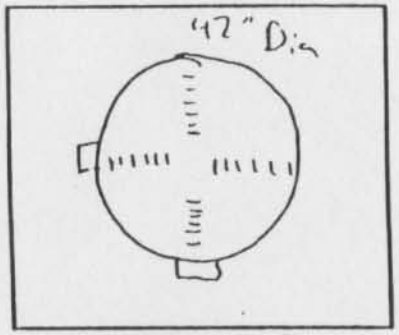
An = 0.003 ft^2 Area of nozzle orifice

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

% I = 100.56

FIELD DATA

Plant Dalbox - Cal Steel
Date 3/10/95
Sampling Location Outlet
Sample Type SCAQMD 5.1
Run Number BP-76
Operator NAJ
Ambient Temperature 60
Barometric Pressure 29.83
Static Pressure -0.01
Filter Number(s)
Pretest Leak Rate 0.015 CFM @ 4 in. Hg
Read And Record All Data Every 3 Minutes



Schematic of
Traverse Point Layout

Probe Length and Type 5' Quartz
Pitot Tube I.D. No. 517A
Nozzle I.D. No. And Diameter 0.761
Assumed Moisture, % 5
Meter Box Number 1A
Meter Delta H@ 1.971
C Factor ~
Meter Gamma 1.000
Heater Box Setting -
Reference Delta P -
Post test Leak Rate 0.03 CFM @ 5 in. Hg
Impinger Box No. 13 Blank Box No.

Traverse Point Number	Sampling Time θ (minutes)	Clock Time (24 hr clock)	Gas Meter Reading Vm (cubic feet)	Velocity Head Ps (in. H20)	Orifice Pressure Differential (in. H20) ΔH Desired	ΔH Actual	Stack Temp. Ts (F)	Dry Gas Meter Temp. Inlet Tm in (F)	Outlet Tm out (F)	Pump Vacuum (in. Hg)	Heated Probe Temp. (F)	Filter Box Temp. (F)	Impinger Temp. (F)
1	0	~~1215~~	515.015	0.01	1.14	1.14	1170	70	70	4.0	—	—	56
2	3	1223	516.716	0.01	1.14	1.14	1150	72	71	4.0	—	—	53
3	6		518.612	0.015	1.72	1.72	1195	73	71	3.0	—	—	25
4	9		521.005	0.015	1.72	1.72	1249	75	72	3.0	—	—	56
5	12		522.721	0.01	1.14	1.14	1265	76	71	3.0	—	—	57
6	15		524.413	0.01	1.14	1.14	1226	76	72	3.0	—	—	58
7	18		526.111	0.01	1.14	1.14	1222	77	72	3.0	—	—	58
8	21		527.840	0.01	1.14	1.14	1241	78	72	3.0	—	—	58
9	24		529.523	0.01	1.14	1.14	1270	77	72	3.0	—	—	56
10	27		531.205	0.01	1.14	1.14	1287	78	73	3.0	—	—	57
11	30		532.907	0.01	1.14	1.14	1299	78	72	3.0	—	—	57
12	33	~~1234~~	534.646	0.005	0.57	0.57	1312	79	73	3.0	—	—	47
1	36	1304/1309	535.944	0.005	0.57	0.57	1120	75	73	3.0	—	—	56
2	39		537.187	0.005	0.57	0.57	1135	76	73	3.0	—	—	51
3	42		538.405	0.01	1.14	1.14	1159	75	72	3.5	—	—	54
4	45		540.207	0.01	1.14	1.14	1145	77	73	3.5	—	—	54
5	48		542.001	0.01	1.14	1.14	1185	77	73	3.5	—	—	55
6	51		543.711	0.01	1.14	1.14	1177	77	73	3.5	—	—	56
7	54		545.431	0.01	1.14	1.14	1168	78	73	3.5	—	—	57
8	57		547.152	0.01	1.14	1.14	1202	78	73	3.5	—	—	57
9	60		548.883	0.01	1.14	1.14	1226	79	73	3.5	—	—	58
10	63		550.612	0.01	1.14	1.14	1241	78	73	3.5	—	—	57
11	66		552.347	0.01	1.14	1.11	1247	78	73	3.5	—	—	59
12	69		554.111	0.01	1.14	1.14	1259	78	73		—	—	58
	72		555.858										

$\bar{l}_m$: 40.843 $\overline{\sqrt{\Delta P}}$ = 0.018 $\overline{\Delta H}$ = 1.12 $\bar{T}_s$ = 1214 $\bar{T}_m$ = 74

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RETRIEVAL DATA

Plant: Balboa Pacific - Cal Steel
Date: 3/9/95
Sampling Location:
Sampling Type (Method): SCAQMD 5.1
Run Number: BP-6
Sample Box Number: 1B
Clean-up Man: NN
Job Number: 476.8.001
Comments: Sample Tare 124.5
Final 940.5

Filter

Filter Number:
Description of Filter: Dark Red Brown

Moisture

	#1		#2		#3	
Impingers:						
Final Volume:	636.7	mL	575.1	mL	504.1	mL
Initial Volume:	592.6	mL	572.3	mL	503.2	mL
Net Volume:	44.1	mL	2.8	mL	0.9	mL
Total H_2O:		mL		mL		mL

Silica Gel

Final Volume:	660.0	g		g		g
Initial Volume:	649.8	g		g		g
Net Volume:	10.2	g		g	6.2	g
Total Moisture:		g		g		g

Description of Impinger catch: Clear

PES Inc.
Calculations for : SCAQMD Method 2,3,4,10,25.1

Plant	Balboa Pacific - Cal Steel
Project #	4768.001
Operation	Pyrolytic Oxidation Unit
Run	BP-6
Location	Fontana, CA
Date	3/10/95

D A T A I N P U T

INPUT	Vlc =	62	cc	Vol. of H2O collected
INPUT	Vm =	40.843	cf	Dry gas meter reading
INPUT	Pb =	28.83	in. Hg	Barometric pressure
INPUT	Pg =	-0.01	in. H2O	Static pressure
INPUT	dP =	0.098		Avg. sq.rt delta P
INPUT	dH =	1.117	in. H2O	Avg. delta H
INPUT	Tm =	534.4	R	Avg. meter temp.
INPUT	Ts =	1675.0	R	Avg. stack temp.
INPUT	Y =	1		Meter calibration factor
INPUT	t =	72	min.	Duration of sampling time
INPUT	A =	9.6211	sq.ft.	Stack Area
INPUT	Cp =	0.84		Pitot tube coefficient
	Kp =	85.49		Pitot tube constant
	K1 =	17.64	R/in.Hg	constant
	K2 =	0.04707	cu.ft/ml	constant
	K3 =	0.002669	in.Hg-cf/	constant

Gas Analysis

INPUT	[O2] =	15.2	%
INPUT	[CO2] =	4.1	%
	[N2] =	80.7	%
INPUT	[TGNMO] =	113	ppmV
INPUT	[CO] =	23	ppmV
INPUT	[NOx] =	55.4	ppmV

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

01) Volume of gas sampled at standard conditions, Vmstd

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

Vmstd = 38.98 cu.ft
1.10 cu.m

02) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) 2.92 scf

03) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.070

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

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

Ms = 28.48

05) Average stack gas velocity.

Ps = 28.83 in. Hg

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

vs = 9.94 ft/sec

06) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 5738.02 cfm
162.50 cmm

07) Average stack gas dry volumetric flowrate.

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

Qstd = 1621.43 dscfm
45.92 dscmm

08) Carbon Monoxide Emission Data

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

[CO] = 23 ppmv (dry) Actual conc.
[CO] = 0.16 lbs/Hr

09) Total Gaseous non-Methane Organics Emission Data

lbs TGNMO/hr = ([TGNMO] * DSCFH * MW)/386*10^6

[TGNMO] =	113.0	ppmv	Actual Conc.
[TGNMO] =	0.34	lbs/Hr	

10) Nitrogen Oxides Emission Data

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

[NOx] =	55.4	ppmv (dry)	Actual conc.
[NOx] =	0.89	lbs/Hr	

PES, Inc.

SCAQMD Methods 5.1 Calculations

Plant	Balboa Pacific - Cal Steel
Project #	4786
Operation	Pyrolytic Oxidation Unit
Run	BP-6
Location	Outlet
Date	3/10/95

Inlet Emission Data

Vlc =	62	cc	Vol. of H2O collected (impingers)
Vm =	40.843	cf	Dry gas meter reading
Pb =	28.83	in. Hg	Barometric pressure
Ps =	28.83	in. Hg	Stack pressure
dP =	0.098		Average sq.rt delta P
dH =	1.117	in. H2O	Average draft gauge reading
Tm =	534.4	R	Average meter temperature
Ts =	1675.00	R	Average stack temperature
Dn =	0.764	in.	Nozzle diameter
Y =	1		Meter calibration factor
t =	72	min.	Duration of sampling time
A =	9.6211	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

1) Volume of gas sampled at standard conditions, Vmstd

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

Vmstd = 38.98 cu.ft
1.10 cu.m

2) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) = 2.92 scf

3) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.070

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

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

Md = 29.26

Instrumental gas analysis

% CO2	4.1
% O2	15.2
% N2	80.7

5) Average stack gas velocity.

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

vs = 9.94 ft/sec

6) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 5736.64 cfm
162.46 cmm

7) Average stack gas dry volumetric flowrate.

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

Qstd = 1621.04 dscfm
45.91 dscmm

8) Analytical data

a) Reagent blank

28.6868 g final wt
28.6876 g initial wt
-0.0008 g wash net wt
200 ml Final blank volume
200 ml aliquot

-0.0008 g soluble particulate

b) Water wash

28.4831 g final wt
28.3453 g initial wt

0.1378 g wash net wt
756 ml Final wash volume
756 ml aliquot

0.1378 g soluble particulate

c) Glass microfibre filter - Blank

0.4507 g final wt
0.4504 g initial wt
0.0003 g filter net wt

d) Glass microfibre filter

0.5838 g final wt
0.4518 g initial wt
0.132 g filter net wt

9) Particulate concentrations

0.0547 grains/dscf

10) Particulate emission rate

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

W = 0.76 lbs/hr

11) Isokinecity

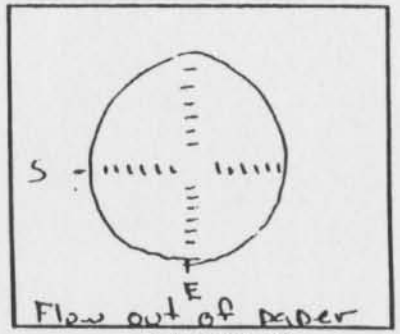
An = 0.003 ft^2 Area of nozzle orifice

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

% I = 100.98

FIELD DATA

Plant Bulbox Pacific
Date 3-13-95
Sampling Location
Sample Type Stack 12 1
Run Number BP-7
Operator Kenney
Ambient Temperature 63° F
Barometric Pressure 29.10
Static Pressure -0.010
Filter Number(s) —
Pretest Leak Rate 0.012 CFM @ 10.0 in. Hg
Read And Record All Data Every 10 Minutes



Schematic of
Traverse Point Layout

Probe Length and Type 6.0" glass lined S/S
Pitot Tube I.D. No. S 164
Nozzle I.D. No. And Diameter 3/8 0.374
Assumed Moisture, % 7
Meter Box Number 1A
Meter Delta H@ 1.771
C Factor 1.41
Meter Gamma Est 1.000
Heater Box Setting —
Reference Delta P 0.0115
Post test Leak Rate 0.012 CFM @ 10.0 in. Hg
Impinger Box No. BB Blank Box No.

Traverse Point Number	Sampling Time Θ (minutes)	Clock Time (24 hr clock)	Gas Meter Reading Vm (cubic feet)	Velocity Head Ps (in. H20)	Orifice Pressure Differential (in. H20) ΔH Desired	ΔH Actual	Stack Temp. Ts (F)	Dry Gas Meter Temp. Inlet Tm in (F)	Outlet Tm out (F)	Pump Vacuum (in. Hg)	Heated Probe Temp. (F)	Filter Box Temp. (F)	Impinger Temp. (F)
S-1	0	9:40	554.281	0.010	1.60	1.60	1040	73	69	4.0	—	—	60
S-2	5	9:45	559.649	0.010	1.60	1.60	1045	75	71	4.0	—	—	51
S-3	10	9:50	562.995	0.010	1.60	1.60	1130	79	73	4.0	—	—	49
S-4	15	9:55	566.346	0.008	1.30	1.30	1130	80	73	5.0	—	—	51
S-5	20	10:00	569.314	0.009	1.40	1.40	1132	83	75	3.0	—	—	53
S-6	25	10:05	572.492	0.010	1.60	1.60	1118	86	76	3.0	—	—	53
S-7	30	10:10	575.756	0.008	1.30	1.30	1120	88	79	3.0	—	—	53
S-8	35	10:15	578.885	0.010	1.60	1.60	1140	86	79	3.0	—	—	53
S-9	40	10:20	582.185	0.009	1.40	1.40	1179	86	80	3.0	—	—	51
S-10	45	10:25	585.353	0.010	1.60	1.60	1207	84	79	3.0	—	—	51
S-11	50	10:30	588.652	0.010	1.60	1.60	1236	84	80	4.0	—	—	51
S-12	55	10:35	592.000	0.010	1.60	1.60	1248	84	80	4.5	—	—	50
STP/E-1	60	10:46/10:50	595.390	0.010	1.60	1.60	1074	79	77	4.0	—	—	62
E-2	65	10:55	598.598	0.010	1.60	1.60	1060	79	78	4.0	—	—	48
E-3	70	11:00	602.282	0.008	1.30	1.30	1097	79	77	4.0	—	—	47
E-4	75	11:05	605.762	0.010	1.60	1.60	1053	79	77	4.0	—	—	49
E-5	80	11:10	608.601	0.010	1.60	1.60	1090	79	76	4.0	—	—	51
E-6	85	11:15	611.913	0.011	1.80	1.80	1071	78	75	5.0	—	—	49
E-7	90	11:20	615.496	0.011	1.80	1.80	1101	81	76	5.0	—	—	51
E-8	95	11:25	618.972	0.009	1.40	1.40	1138	81	77	4.5	—	—	52
E-9	100	11:30	622.143	0.009	1.40	1.40	1204	83	77	4.5	—	—	54
E-10	105	11:35	625.247	0.010	1.60	1.60	1235	82	78	5.0	—	—	55
E-11	110	11:40	628.589	0.010	1.60	1.60	1251	84	78	5.0	—	—	54
E-12	115	11:45	631.888	0.010	1.60	1.60	1254	84	78	5.0	—	—	52
E-13	120	11:50	635.248	—	—	—	—	—	—	—	—	—	—

$\overline{\sqrt{\Delta P}}$ = 0.994 $\overline{\Delta H}$ = 1.55 $\overline{T_s}$ = 1198 $\overline{T_m}$ = 559 Vm = 78.967

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES, Inc.
Multi-Metals Method Calculations (SCAQMD 12.1)

Plant	Balboa Pacific - Cal Steel
Project #	4768.001
Operation	Pyrolytic Oxidation Unit
Run	BP - 7
Location	Outlet
Date	3/13/95

Test Data

Vlc =	155.1	cc	Vol. of H2O collected (impingers)
Vm =	78.967	cf	Dry gas meter reading
Pb =	29.1	in. Hg	Barometric pressure
Ps =	29.10	in. Hg	Stack pressure
dP =	0.098		Average sq.rt delta P
dH =	1.546	in. H2O	Average draft gauge reading
Tm =	539.0	R	Average meter temperature
Ts =	1598.25	R	Average stack temperature
Dn =	0.774	in.	Nozzle diameter
Y =	1		Meter calibration factor
t =	120	min.	Duration of sampling time
A =	9.6211	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-	constant

Instrumentation Data

[O2] =	16.3	%
[CO2] =	3.3	%

CALCULATIONS

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

Vmstd =	75.50	cu.ft
	2.14	cu.m

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

Vw(std) =	7.30	scf

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

Bws = 0.088

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

Md = 28.19

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

vs = 9.85 ft/sec

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

Q = 5683.60 cfm
160.96 cmm

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

Qstd = 1665.12 dscfm
47.16 dscmm

8) Toxic metal concentrations and emission rates

Element	Sample Mass (ug)	Blank Mass (ug)	Conc. (mg/dscm)	Emission Rate (mg/hr)
Copper	169.00	3	7.90E-02	2.2E+02
Chromium	71.00	< 3	3.32E-02	9.4E+01
Lead	64.10	0.6	3.00E-02	8.5E+01
Zinc	251.00	12	1.17E-01	3.3E+02
Manganese	500.00	0.9	2.34E-01	6.6E+02
Nickel	107.00	< 0.8	5.00E-02	1.4E+02
Cadmium	25.90	< 0.1	1.21E-02	3.4E+01

9) Isokinecity

An = 0.003 ft^2 Area of nozzle orifice

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

% I = 111.31

FIELD DATA

Plant Fibrex Pacific
Date 3 13 15
Sampling Location
Sample Type EXAMD 5 1
Run Number BP-8
Operator Kearney
Ambient Temperature 74° F
Barometric Pressure 29.10
Static Pressure 0.10
Filter Number(s)
Pretest Leak Rate 0.008 CFM @ 10.0 in. Hg
Read And Record All Data Every 1955 3 Minutes

Same As BP-7
Schematic of Traverse Point Layout

Probe Length and Type 60" glass lined S type
Pitot Tube I.D. No. 111A
Nozzle I.D. No. And Diameter 0.764
Assumed Moisture, % 7
Meter Box Number 1A
Meter Delta H@ 1.971
C Factor 1.41
Meter Gamma 1.000
Heater Box Setting –
Reference Delta P ~~0.0187~~ 0.013
Post test Leak Rate 0.004 CFM @ 10.2 in. Hg
Impinger Box No. 1B Blank Box No.

Traverse Point Number	Sampling Time Θ (minutes)	Clock Time (24 hr clock)	Gas Meter Reading Vm (cubic feet)	Velocity Head Ps (in. H20)	Orifice Pressure Differential (in. H20) ΔH Desired	ΔH Actual	Stack Temp. Ts (F)	Dry Gas Meter Temp. Inlet Tm in (F)	Dry Gas Meter Temp. Outlet Tm out (F)	Pump Vacuum (in. Hg)	Heated Probe Temp. (F)	Filter Box Temp. (F)	Impinger Temp. (F)
E-1	0	12:26	635.615	0.010	1.55	1.55	1020	77	76	3.5	–	–	53
E-2	3	12:33	637.623	0.010	1.55	1.55	1216	77	76	3.5	–	–	48
E-3	6	12:38	639.586	0.010	1.55	1.55	1151	78	77	3.0	–	–	55
E-4	9	12:29	641.520	0.010	1.55	1.55	1208	79	77	3.0	–	–	55
E-5	12	12:32	643.480	0.010	1.55	1.55	1240	81	78	3.0	–	–	56
E-6	15	12:35	645.462	0.010	1.55	1.55	1220	81	77	3.0	–	–	58
E-7	18	12:38	647.391	0.010	1.55	1.55	1237	82	78	3.0	–	–	59
E-8	21	12:41	649.372	0.010	1.55	1.55	1284	81	77	3.0	–	–	60
E-9	24	12:44	651.289	0.010	1.55	1.55	1312	81	77	3.0	–	–	60
E-10	27	12:47	653.364	0.010	1.55	1.55	1304	80	76	3.0	–	–	60
E-11	~~34~~ 30	12:56	655.359	0.010	1.55	1.55	1309	80	76	3.0	–	–	58
E-12	33	12:53	657.200	0.010	1.55	1.55	1314	79	75	3.0	–	–	56
STEP 5-1	36	12:56/13:00	659.353	0.009	1.35	1.35	1098	77	76	3.0	–	–	63
S 2	39	13:03	661.115	0.009	1.35	1.35	1096	77	76	3.0	–	–	60
S 3	42	13:06	663.089	0.008	1.25	1.25	1072	78	75	3.0	–	–	58
S 4	45	13:09	664.843	0.010	1.55	1.55	1034	78	75	3.0	–	–	60
S 5	48	13:12	666.735	0.009	1.35	1.35	1121	81	76	3.0	–	–	60
S 6	51	13:15	668.625	0.010	1.55	1.55	1110	80	76	3.0	–	–	60
S 7	54	13:18	670.500	0.010	1.55	1.55	1144	80	76	3.0	–	–	61
S 8	57	13:21	672.485	0.010	1.55	1.55	1225	81	76	3.0	–	–	60
S 9	60	13:24	674.492	0.010	1.55	1.55	1262	82	77	3.0	–	–	60
S 10	63	13:27	676.495	0.010	1.55	1.55	1269	81	76	3.0	–	–	62
S 11	66	13:30	678.465	0.010	1.55	1.55	1273	81	76	3.0	–	–	61
S 12	69	13:33	680.445	0.010	1.55	1.55	1278	81	76	3.0	–	–	61
END	72	13:36	682.413	–	–	–	–	–	–	–	–	–	–

$V_m = 46.798$ $\overline{\sqrt{\Delta p}} = 0.009$ $\overline{\Delta H} = 1.51$ $\overline{T_s} = 1160$ $\overline{T_m} = 554$

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES

SAMPLE RETRIEVAL DATA

Plant: BALBOA PACIFIC
Date: 3-13-95
Sampling Location:
Sampling Type (Method): SCAQMD ~~5~~ 5.1
Run Number: BP-B
Sample Box Number: 1B
Clean-up Man: Kearney
Job Number: 471.4 C01
Comments: 855.4 -124.2

Filter

Filter Number:			
Description of Filter:	Brn/Red		

Moisture

Impingers:					
Final Volume:	623.8	mL	604.9	mL	502.4 mL
Initial Volume:	552.2	mL	601.3	mL	502.1 mL
Net Volume:	71.6	mL	3.6	mL	0.3 mL
Total H_2O:		mL		mL	mL

Silica Gel

Final Volume:	712.7	g		g	g
Initial Volume:	700.7	g		g	g
Net Volume:	12.0	g		g	875 g
Total Moisture:		g		g	g

Description of Impinger catch: clear

02) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) 4.12 scf

03) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws = 0.084

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

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

Ms = 28.24

05) Average stack gas velocity.

Ps = 29.10 in. Hg

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

vs = 9.93 ft/sec

06) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 5732.25 cfm
162.34 cmm

07) Average stack gas dry volumetric flowrate.

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

Qstd = 1624.15 dscfm
46.00 dscmm

08) Carbon Monoxide Emission Data

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

[CO] = < 1 ppmv (dry) Actual conc.
[CO] = < 0.01 lbs/Hr

09) Total Gaseous non-Methane Organics Emission Data

lbs TGNMO/hr = ([TGNMO] * DSCFH * MW)/386*10^6

[TGNMO] =	48.0	ppmv	Actual Conc.
[TGNMO] =	0.15	lbs/Hr	

10) Nitrogen Oxides Emission Data

lbs NOx/hr = ([NOx] * DSCFH * MW)/386*10^6

[NOx] =	59.6	ppmv	Actual Conc.
[NOx] =	0.96	lbs/Hr	

09) Total Gaseous non-Methane Organics Emission Data

lbs TGNMO/hr = ([TGNMO] * DSCFH * MW)/386*10^6

[TGNMO] =	48.0	ppmv	Actual Conc.
[TGNMO] =	0.15	lbs/Hr	

10) Nitrogen Oxides Emission Data

lbs NOx/hr = ([NOx] * DSCFH * MW)/386*10^6

[NOx] =	59.6	ppmv	Actual Conc.
[NOx] =	0.96	lbs/Hr	

PES, Inc.

SCAQMD Methods 5.1 Calculations

Plant	Balboa Pacific - Cal Steel
Project #	4786
Operation	Pyrolytic Oxidation Unit
Run	BP-8
Location	Outlet
Date	3/13/95

Inlet Emission Data

Vlc =	87.5	cc	Vol. of H2O collected (impingers)
Vm =	46.798	cf	Dry gas meter reading
Pb =	29.1	in. Hg	Barometric pressure
Ps =	29.10	in. Hg	Stack pressure
dP =	0.099		Average sq.rt delta P
dH =	1.513	in. H2O	Average draft gauge reading
Tm =	538.0	R	Average meter temperature
Ts =	1659.88	R	Average stack temperature
Dn =	0.764	in.	Nozzle diameter
Y =	1		Meter calibration factor
t =	72	min.	Duration of sampling time
A =	9.6211	sq.ft.	Cross sectional area of stack
Cp =	0.84		Pitot tube coefficient
Kp =	85.49		Pitot tube constant
K1 =	17.64	R/in.Hg	constant
K2 =	0.04707	cu.ft/ml	constant
K3 =	0.002669	in.Hg-cf/ml-R	constant

1) Volume of gas sampled at standard conditions, Vmstd

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

Vmstd =	44.82	cu.ft
	1.27	cu.m

2) Volume of water vapor collected at standard conditions.

Vw(std) = K2 * Vlc

Vw(std) =	4.12	scf

3) Decimal fraction of moisture by volume in stack gas

Bws = Vwstd/(Vmstd+Vwstd)

Bws =	0.084

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

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

Md = 29.18

Instrumental gas analysis

% CO2	3.3
% O2	16.3
% N2	80.4

5) Average stack gas velocity.

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

vs = 9.93 ft/sec

6) Average actual stack gas volumetric flowrate.

Q = 60 * vs * As

Q = 5733.28 cfm
162.37 cmm

7) Average stack gas dry volumetric flowrate.

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

Qstd = 1624.44 dscfm
46.00 dscmm

8) Analytical data

a) Reagent blank

28.6868 g final wt
28.6876 g initial wt
-0.0008 g wash net wt
400 ml Final blank volume
400 ml aliquot

-0.0008 g soluble particulate

b) Water wash

28.7336 g final wt
28.6382 g initial wt

0.0954 g wash net wt
731.2 ml Final wash volume
731.2 ml aliquot

0.0954 g soluble particulate

c) Glass microfibre filter - Blank

0.4507 g final wt
0.4504 g initial wt
0.0003 g filter net wt

d) Glass microfibre filter

0.5768 g final wt
0.4518 g initial wt
0.125 g filter net wt

9) Particulate concentrations

0.0329 grains/dscf

10) Particulate emission rate

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

W = 0.46 lbs/hr

11) Isokinecity

An = 0.003 ft^2 Area of nozzle orifice

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

% I = 115.87

PACIFIC ENVIRONMENTAL SERVICES, INC.

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

Prepared By	Date	Checked By	Date	Sheet Title
SID	3/27			PARTICULATES

	FILTER #	WEIGHT (g) (AFTER)	WEIGHT (g) (BEFORE)	TOTAL (g) (PARTICULATE)
	BP-3	0.5747	0.4523	0.1224
BLANK	BP-4	0.4507	0.4504	0.0003
	BP-6	0.5836	0.4518	0.1320
	BP-8	0.5768	0.4518	0.1250
(13)	BP-3	28.2996	28.1719	0.1277
(11)	BP-6	28.4831	28.3453	0.1378
(12)	BP-8	28.7336	28.6382	0.0954
	BP-4 (BLANK)	28.6868	28.6876	-0.0008

PACIFIC ENVIRONMENTAL SERVICES, INC.

Project No.	Page	of
4768.001	1	1

Client: BALBOA PACIFIC

Location: CALIFORNIA STEEL

Prepared By	Date	Checked By	Date	Sheet Title
SID	4/20			NOx SAMPLES

DATE	TIME*	FLASK #	CO_2, %	O_2, %	NO_x, PPMV
3-9-95	12:58-13:04	3009	4.1	14.8	66
	13:25-13:30	404	3.9	15.1	54
	14:31-14:36	1483	3.9	15.5	52
AVG			4.0	15.1	57
3-10-95	10:00-10:06	007	3.3	15.7	55
	10:25-10:30	623	3.8	15.3	49
	11:15-11:20	1369	4.5	14.4	63
AVG.			3.9	15.1	56
3-13-95	10:01-10:06	504	—	—	53
	10:32-10:37	1183	4.1	14.8	61
	11:11-11:16	3036	4.1	14.7	65
AVG.			4.1	14.8	60

* 5-MINUTE INTEGRATED SAMPLES.

P[illegible] RATORIES, INC.

14201 FRANKLIN AVENUE
TUSTIN, CALIF. 92680
(714) 730-6239

DATE 3/14/95 PAGE 1 OF

CHAIN-OF-CUSTODY RECORD

PROJECT NAME
COMPANY NAME PACIFIC ENVIRONMENTAL SERVICES
REFERENCE 4768.001
ADDRESS 13100 BROOKS DR, SUITE 100
BALDWIN PARK, CA 91706
SAMPLERS (SIGNATURE)

SAMPLE	DATE	TIME	LOCATION	METHODS: SCAQMD 25.1	NUMBER OF CONTAINERS	COMMENTS/ CONTAINER TYPE
OUTLET A1 117		3/9/95		✓		
OUTLET B1 113		3/9/95		✓		
OUTLET A2 110		3/10/95		✓		
OUTLET B2 112		3/10/95		✓		
OUTLET A3 101		3/13/95		✓		
OUTLET B3 103		3/13/95		✓		

1 RELINQUISHED BY
SIGNATURE Siya Mokh
PRINTED NAME SIYA MOKH
COMPANY PES
DATE 3/14/95
TIME 8.45 AM

2 RECEIVED BY
SIGNATURE Michael Shanahan
PRINTED NAME Michael Shanahan
COMPANY TRUESDAIL
DATE 3/14/95
TIME 8.45

3 RELINQUISHED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

4 RECEIVED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

5 RELINQUISHED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

6 RECEIVED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

TOTAL NUMBER OF CONTAINERS

SAMPLE CONDITIONS
RECEIVED ON ICE YES / NO
SEALED YES / NO

SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS

TRUESDAIL LABORATORIES, INC.

14201 FRANKLIN AVENUE
TUSTIN, CALIF. 92680
(714) 730-6239

DATE 3/14/95 PAGE 2 OF 3

CHAIN-OF-CUSTODY RECORD

PROJECT NAME
COMPANY NAME PACIFIC ENVIRONMENTAL SERVICES
REFERENCE 4768.001
ADDRESS 13100 BROOKS DR, SUITE 100
BALDWIN PARK, CA 91706
SAMPLERS (SIGNATURE)

SAMPLE	DATE	TIME	LOCATION	METHODS: SCAQMD 25.1	NUMBER OF CONTAINERS	COMMENTS/ CONTAINER TYPE
TRAP #15 (A1)	3/9/95			✓		
TRAP #6 (B1)	3/9/95			✓		
TRAP #9 (A2)	3/10/95			✓		
TRAP #4 (B2)	3/10/95			✓		
TRAP #7 (A3)	3/13/95			✓		
TRAP #10 (B3)	3/13/95			✓		

1 RELINQUISHED BY
SIGNATURE Siya Mokh
PRINTED NAME SIYA MOKH
COMPANY PES
DATE 3/14/95
TIME 8:45 AM

2 RECEIVED BY
SIGNATURE Michael Shanahan
PRINTED NAME Michael Shanahan
COMPANY Truesdail
DATE 3/14/95
TIME 6:45

3 RELINQUISHED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

4 RECEIVED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

5 RELINQUISHED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

6 RECEIVED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

TOTAL NUMBER OF CONTAINERS

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

SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS

[illegible] LABORATORIES, INC.

14201 FRANKLIN AVENUE
TUSTIN, CALIF. 92680
(714) 730-6239

DATE 3/14/95 PAGE 3 OF 3

CHAIN-OF-CUSTODY RECORD

PROJECT NAME
COMPANY NAME PACIFIC ENVIRONMENTAL SERVICES
REFERENCE 4768.001
ADDRESS 13100 BROOKS DR, SUITE 100
BALDWIN PARK, CA 91706.
SAMPLERS (SIGNATURE)

SAMPLE	DATE	TIME	LOCATION	METHODS: SCAQMD 7.1	NUMBER OF CONTAINERS	COMMENTS/ CONTAINER TYPE
NO$_x$ BULB 1369				✓		
" 623				✓		
" 1483				✓		
" 404				✓		
" 1183				✓		
" C07				✓		
" 504				✓		
" 3036				✓		
" 3069				✓		
" 1309				✓		

1 RELINQUISHED BY
SIGNATURE
PRINTED NAME SIYA MISCH
COMPANY PES
DATE 3/14/95
TIME 8.45 AM

2 RECEIVED BY
SIGNATURE
PRINTED NAME Michael Shanahan
COMPANY
DATE 3/14/95
TIME 845

3 RELINQUISHED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

4 RECEIVED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

5 RELINQUISHED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

6 RECEIVED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

TOTAL NUMBER OF CONTAINERS

SAMPLE CONDITIONS
RECEIVED ON ICE YES / NO
SEALED YES / NO

SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS

CHAIN OF CUSTODY RECORD

COMPANY PACIFIC ENVIRONMENTAL SERVICES
ADDRESS 13100 PARIS DR. SUITE 100
PHONE NO. (818) 756-1400 FAX (818) 814-0820
MAIL REPORT TO: S. HUGH BROWN

PROJECT MANAGER H. BROWN
PROJECT NAME CAL STEEL
PROJECT NO. 4768.001
PURCHASE ORDER NO. SAME AS ABOVE

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

COMMENTS:
SPIKE SAMPLE BP-5

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

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

Sample I.D. #	Date Sampled	Time Sampled	Preservative	MATRIX: soil	water	air	other	# of containers	8015 Modified Gas Diesel	Total Petroleum Hydrocarbons 418.1	Halo. Volatiles 601/8010	Aromatic Volatiles 602/8020	Volatile Organics 624/8260	Semi-Volatile Org 625/8270	Chlor Pest/PCB 608/8080	Herbicides 615/8150	CAM (17) Metals	TCLP Metals	STLC Metals	Hex Chrome EPA 218.6	CARB 425/Total & Hex Chrome	CARB 435 Multi-metals	Cu, Ni, Zn, Cd, Mn, Pb, Cr By ICAP	RUSH	Remarks
BP-1	3/11	--	--				X	2															X		0.1N HNO_3 + FILTER
BP-2 BLANK	3/9	--	--				X	2															X		0.1N HNO_3 + FILTER
BP-5	3/10	--	--				X	2															X		0.1N HNO_3 + FILTER
BP-7	3/13	--	--				X	2															X		0.1N HNO_3 + FILTER

I029005

	Company	Date/Time		Company	Date/Time
Relinquished by:	PES	3/16/93 5P	Received by:	WCAS	3/15/93 11
Relinquished by:	Company	Date/Time	Received by:	Company	Date/Time
Relinquished by:	Company	Date/Time	Received by:	Company	Date/Time

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

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

WCAS Job No. I29005

APPENDIX C

ANALYTICAL METHODS - SCAQMD METHODS 7.1 AND 25.1

WCAS

WEST COAST ANALYTICAL SERVICE, INC.

ANALYTICAL CHEMISTS

March 31, 1995

PACIFIC ENVIRONMENTAL SERVICES
13100 Brooks Drive
Baldwin Park, CA 91706

Attn: S. Hugh Brown

JOB NO. 29005 S

LABORATORY REPORT

Samples Received: Four (4) Waters & Four (4) Filters
Date Received: 3-22-95
Project: #4768.001/Cal Steel

The samples were analyzed as follows:

Samples Analyzed	Analysis	Page
Four (4) samples	Selected Metals by ICPMS	2 - 3

Michael Shelton
Technical Director

D. J. Northington, Ph.D.
President

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

WEST COAST ANALYTICAL SERVICE, INC.

PACIFIC ENVIRONMENTAL SERVICES
Mr. S. Hugh Brown

Job # 29005
March 31, 1995

LABORATORY REPORT

Selected Metals
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Total Micrograms in Impinger Train

	BP-2 Blank	BP-1	BP-5	BP-7	Blank Detect. Limit
Cadmium	ND<0.1	26.5	20	25.9	0.1
Chromium	ND<3	84	70	71	3
Copper	3	152	168	169	1
Lead	0.6	63.4	56.7	64.1	0.2
Manganese	0.9	561	542	500	0.6
Nickel	ND<0.8	117	111	107	0.8
Zinc	12	248	288	251	2

Date Analyzed: 3-30-95

WEST COAST ANALYTICAL SERVICE, INC.

PACIFIC ENVIRONMENTAL SERVICES
Mr. S. Hugh Brown

Job # 29005
March 31, 1995

LABORATORY REPORT

Sample: BP-5
Matrix: Impinger & Filter

Total Micrograms in Impinger Train

	Sample	MS		MSD		
	Spike Conc ppm		% Recovery		% Recovery	% RPD
Cadmium	20	125	151	104.8	155	108	2.6
Chromium	70	125	207	109.6	203	106.4	2
Copper	168	125	305		306		0.3
Lead	56.7	125	184	101.8	191	107.4	3.7
Manganese	542	125	635		646		1.7
Nickel	111	125	246	108	250	111.2	1.6
Zinc	288	125	436		440		0.9

Date Analyzed: 3-30-95

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.

REPORT

TRUESDAIL LABORATORIES, INC.

CHEMISTS - MICROBIOLOGISTS - ENGINEERS
RESEARCH - DEVELOPMENT - TESTING

14201 FRANKLIN AVENUE
TUSTIN, CALIF. 92680
AREA CODE 714 • 730-6239
AREA CODE 213 • 625-1554
FAX 714 • 730-6462

CLIENT **PACIFIC ENVIRONMENTAL SERVICES, INC.**
13100 Brooks Drive
Baldwin Park, CA 91706
Attn: S. Hugh Brown

DATE March 31, 1995

RECEIVED March 14, 1995

LABORATORY NO 53894

SAMPLE

6 tanks with traps
5 NOx samples

INVESTIGATION

Total hydrocarbon analysis (SCAQMD Method 25.1)
Oxides of Nitrogen analysis (SCAQMD Method 7.1)

RESULTS

The submitted tanks and traps were analyzed for CH_4, CO, CO_2 and nonmethane hydrocarbons (as C_1) according to SCAQMD Method 25.1. Oxygen concentrations were determined by Orsat analysis.

Truesdail Laboratories prepared 2-liter glass flasks according to SCAQMD Method 7.1 for NOx sample collection. These samples were returned to Truesdail and the NO_x concentrations were determined by allowing the collected grab samples to react with the absorbing solution for a minimum 72 hour period and then transferring the resulting solution to a 100 ml volumetric flask and bringing it to volume with double-distilled water. The absorbing solution was analyzed for total nitrates by ion chromatography. In addition, the gaseous contents of the sample flask were analyzed for oxygen and carbon dioxide content by Orsat.

The results obtained are as follows:

PACIFIC ENVIRONMENTAL SERVICES, INC.
LN 53894

TABLE I - Method 25.1

SAMPLE	ID	NMVHC ppmvC$_1$	CHC ppmvC$_1$	TOTAL ppmvC$_1$	CH_4 ppmv	CO ppmv	CO_2 %v	O_2 %v
Out-A1	117	5	99	104	<1	12	2.7	16.7
Out-B1	113	6	119	125	<1	15	3.0	16.5
Out-A2	110	8	128	136	<1	25	4.4	15.4
Out-B2	112	7	83	90	<1	21	3.7	15.0
Out-A3	101	7	56	63	<1	<1	3.2	16.1
Out-B3	103	6	27	33	<1	<1	3.3	16.5
Detection limit		3	1	3	1	1	0.1	0.1

TABLE II - Method 7.1

SAMPLE	Residual Vacuum in. Hg	Sample Volume Liters	NOx ppmv	Orsat, % O2	Orsat, % CO2
1369	- 3.0	1.72	62.8	14.4	4.5
623	- 3.0	1.73	48.9	15.3	3.8
1483	- 5.7	1.56	51.6	15.5	3.9
404	- 4.1	1.69	54.4	15.1	3.9
1183	- 1.8	1.84	60.5	14.8	4.1
7	- 4.6	1.65	54.5	15.7	3.3
504	- 1.6	1.84	53.2	NA	NA
3036	- 2.2	1.74	65.1	14.7	4.1
3009	- 5.0	1.61	65.7	14.8	4.1
1309 (blank)			ND		

ND Not detected
NA Flask compromised prior to Orsat analysis

TRUESDAIL LABORATORIES, INC.

Prepared by:

Chris Barth
Analytical Chemist
Air Pollution Testing

Reviewed by:

Charles M. Figueroa
Project Manager
Air Pollution Testing

TRUESDAIL LABORATORIES, INC.

OXIDES OF NITROGEN CALCULATIONS

Company	PES	Barometric Pressure (inHg)	29.91
Test Date	3/31/95	Room Temperature (F)	75
Lab Number	53894	Vapor Pressure of H2O (inHg)	0.875
Location	NA	Flow Rate (DSCFM)	NA

LV(ml) 25 DV(ml 100

Flask I.D.	NV (L)	RV (inHg)	Cp (inHg)	Vol. (Std L)	NO3- (ppmm	NOx (ppmv)	NOx (lbs/hr)	<--Orsat--> O2%	CO2
1369	2.029	-3.00	26.04	1.716	2.82	62.79	N/A	14.4	4.5
623	2.050	-3.00	26.04	1.734	2.22	48.93	N/A	15.3	3.8
1483	2.061	-5.70	23.34	1.562	2.11	51.61	N/A	15.5	3.9
404	2.082	-4.10	24.94	1.686	2.40	54.38	N/A	15.1	3.9
1183	2.076	-1.80	27.24	1.837	2.91	60.54	N/A	14.8	4.1
7	2.083	-4.60	24.44	1.653	2.36	54.54	N/A	15.7	3.3
504	2.062	-1.60	27.44	1.838	2.56	53.23	N/A	NA	NA
3036	2.000	-2.20	26.84	1.743	2.97	65.09	N/A	14.7	4.1
3009	2.057	-5.00	24.04	1.606	2.76	65.66	N/A	14.8	4.1

Blank:

1309	2.026	NA	29.04	1.911	ND

*Standard Conditions are 29.92 inHg and 60 F

In accordance with SCAQMD Chapter V, Method 7.1

[illegible] LABORATORIES, INC.
14201 FRANKLIN AVENUE
TUSTIN, CALIF. 92680
(714) 730-6239

DATE 3/14/95 PAGE 1 OF 3

CHAIN-OF-CUSTODY RECORD

PROJECT NAME
COMPANY NAME PACIFIC ENVIRONMENTAL SERVICES
REFERENCE 4768.001
ADDRESS 13100 BROOKS DR, SUITE 100
BALDWIN PARK, CA 91706
SAMPLERS (SIGNATURE)

SAMPLE	DATE	TIME	LOCATION	METHODS: SCAQMD 25.1	NUMBER OF CONTAINERS	COMMENTS/ CONTAINER TYPE
OUTLET A1 117		3/9/95		✓		
OUTLET B1 113		3/9/95		✓		
OUTLET A2 110		3/10/95		✓		
OUTLET B2 112		3/10/95		✓		
OUTLET A3 101		3/13/95		✓		
OUTLET B3 103		3/13/95		✓		

1 RELINQUISHED BY SIGNATURE Siya Mokh PRINTED NAME SIYA MOKH COMPANY PES	DATE 3/14/95 TIME 8.45 AM	3 RELINQUISHED BY SIGNATURE PRINTED NAME COMPANY	DATE TIME	5 RELINQUISHED BY SIGNATURE PRINTED NAME COMPANY	DATE TIME
2 RECEIVED BY SIGNATURE Michael Shanahan PRINTED NAME Truesdail COMPANY	DATE 3/14/95 TIME 8:45	4 RECEIVED BY SIGNATURE PRINTED NAME COMPANY	DATE TIME	6 RECEIVED BY SIGNATURE PRINTED NAME COMPANY	DATE TIME

TOTAL NUMBER OF CONTAINERS

SAMPLE CONDITIONS
RECEIVED ON ICE YES / NO
SEALED YES / NO

SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS

TRUESDAIL LABORATORIES, INC.

14201 FRANKLIN AVENUE
TUSTIN, CALIF. 92680
(714) 730-6239

DATE 3/14/95 PAGE 2 OF 3

CHAIN-OF-CUSTODY RECORD

PROJECT NAME
COMPANY NAME PACIFIC ENVIRONMENTAL SERVICES
REFERENCE 4768.001
ADDRESS 13100 BROOKS DR, SUITE 100
BALDWIN PARK, CA 91706
SAMPLERS (SIGNATURE)

SAMPLE	DATE	TIME	LOCATION	METHODS: SCAQMD 25.1	NUMBER OF CONTAINERS	COMMENTS/ CONTAINER TYPE
TRAP #5 (A1)	3/9/95			✓		
TRAP #6 (B1)	3/9/95			✓		
TRAP #9 (A2)	3/10/95			✓		
TRAP #4 (B2)	3/10/95			✓		
TRAP #7 (A3)	3/13/95			✓		
TRAP #10 (B3)	3/13/95			✓		

1 RELINQUISHED BY SIGNATURE: Siya Mokh PRINTED NAME: SIYA MOKH COMPANY: PES	DATE: 3/14/95 TIME: 8:45 AM	3 RELINQUISHED BY SIGNATURE: PRINTED NAME: COMPANY:	DATE: TIME:	5 RELINQUISHED BY SIGNATURE: PRINTED NAME: COMPANY:	DATE: TIME:
2 RECEIVED BY SIGNATURE: PRINTED NAME: Michael Shanahan COMPANY: Truesdail	DATE: 3/14/95 TIME: 845	4 RECEIVED BY SIGNATURE: PRINTED NAME: COMPANY:	DATE: TIME:	6 RECEIVED BY SIGNATURE: PRINTED NAME: COMPANY:	DATE: TIME:

TOTAL NUMBER OF CONTAINERS

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

SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS

.U. DATA LABORATORIES, INC.
14201 FRANKLIN AVENUE
TUSTIN, CALIF. 92680
(714) 730-6239

DATE 3/14/95 PAGE 3 OF 3

CHAIN-OF-CUSTODY RECORD

PROJECT NAME
COMPANY NAME PACIFIC ENVIRONMENTAL SERVICES
REFERENCE 4768.001
ADDRESS 13100 BROOKS DR, SUITE 100
BALDWIN PARK, CA 91706
SAMPLERS (SIGNATURE)

SAMPLE	DATE	TIME	LOCATION	METHODS: SCAQMD 7.1	NUMBER OF CONTAINERS	COMMENTS/ CONTAINER TYPE
NO_x BULB 1369				✓		
" 623				✓		
" 1483				✓		
" 404				✓		
" 1183				✓		
" 007				✓		
" 504				✓		
" 3036				✓		
" 3069				✓		
" 1309				✓		

1 RELINQUISHED BY	DATE 3/14/95	3 RELINQUISHED BY	DATE	5 RELINQUISHED BY	DATE	TOTAL NUMBER OF CONTAINERS	
SIGNATURE Siya Moch	TIME 8:45 AM	SIGNATURE	TIME	SIGNATURE	TIME	SAMPLE CONDITIONS	
PRINTED NAME SIYA MOCH		PRINTED NAME		PRINTED NAME		RECEIVED ON ICE YES / NO	
COMPANY PES		COMPANY		COMPANY		SEALED YES / NO	
2 RECEIVED BY	DATE 3/14/95	4 RECEIVED BY	DATE	6 RECEIVED BY	DATE	SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS	
SIGNATURE Michael Shanahan	TIME 845	SIGNATURE	TIME	SIGNATURE	TIME		
PRINTED NAME		PRINTED NAME		PRINTED NAME			
COMPANY		COMPANY		COMPANY			

DETERMINATION OF HYDROCARBON EMISSIONS BY TOTAL COMBUSTION ANALYSIS (TCA) METHOD

Table of Contents

Method

This method is based on SCAQMD METHOD 25.1

1.0 Summary of Method

This procedure uses a sampling train comprising a stainless steel probe and a freeze-out trap connected to an evacuated seven-liter tank via a Magnehelic pressure differential gauge. The trap is used for collecting the condensable organic matter while the non-condensable gases are being collected in the tank.

2.0 Equipment list

2.1 7-liter tank with vacuum gauge
2.2 Stainless steel condensate trap and probe
2.3 Magnehelic gauge
2.4 Metal Dewar flask with dry ice
2.5 Tank holder

3.0 Preparation of sampling train

3.1 Determine the number of tanks and traps required, and match only outlet tanks with outlet traps for sampling at an outlet location. Similarly, the principle applies to inlets.

3.2 Using a high-vclume vacuum pump, evacuate the 7-liter tanks to a pressure of 1 Torr or less three times, filling the tanks to one atmosphere between evacuations.

3.3 After the third evacuation, turn off the valves and check for leaks by allowing the tanks to stand for at least 16 hours, after which period any leaks will become apparent by a change in the vacuum gauge readings.

3.4 For convenience in transporting as well as ease of handling at the test site, two tanks can be placed in a wooden holder.

3.5 Set up each train in the following sequence: tank, Magnehelic gauge, trap, and probe. Be sure to determine the proper torque required to tighten these crucial connections, as too much torque will spoil the fittings for future conections while too little torque will result in leakage.

3.6 Perform a leak check on each train by introducing nitrogen into the connections at the probe tip. Magnehelic needle will deflect and should return to the same "zero" point after a short while. This signifies a good leak check.

3.7 The assembly is now ready for transport to the test site. It should be noted that triplicate samples are usually taken at the inlet locations and duplicates for outlets.

4.0 Sampling at test site

4.1 Conduct pre-test flow and temperature measurements according to method described in Truesdail Laboratories, Inc. S.O.P. Before the stack traverse, make sure that both the air pollution control unit and the production line is running at the conditions in the test protocol or on the AQMD's "Permit to Construct."

4.2 Immerse the traps into the metal Dewar flask filled with crushed dry ice to a depth of four inches. Maintain the dry ice level for the whole duration of the test.

4.3 Uncap the probe tips and wrap the tips as close as possible to each other in order to satisfy duplicate or triplicate sampling. Avoid touching the tips to prevent contamination.

4.4 Insert the probes into the sampling port carefully so as not to scrape the port walls on the way in. Position the tips near the center of the duct. The port should then be sealed off with duct tape.

4.5 Coordinate all sampling stations, i.e., begin and end the test simultaneously. Integration times will vary from 30 to 120 minutes.

4.6 During the sampling period, record the vacuum gauge reading at 5-minute intervals and make field notes regarding any unusual events which may affect subsequent analytical results. Examples being: (1) the plugging of flow due to a frozen line, and (2) problems associated with the production line.

4.7 Adjust the flow into the tanks such that between 5 to 10 inches of vacuum remain at the end of the sampling period. Close all valves at the end of the test.

4.8 Remove the probes from the duct carefully and cap off the probe tips.

4.9 Perform a post-test leak check by opening the valves. The Magnehelic needle will deflect and will settle down to its original position if there are no leaks. Make a note otherwise.

4.10 Label all tanks and traps accordingly, i.e., include the name of client, sampling date and location, and test and tank number.

4.11 For verification and quality control purposes, conduct a post-test flow and temperature measurement.

4.12 Transport the assemblies to the laboratory for analysis.

4.13 Disconnect the sampling trains and plug the open end of the traps. Store the traps in a dry ice or household freezer until they can be processed.

4.14 Measure the pressure in the tanks with a manometer and add pre-purified dry nitrogen to an absolute pressure of at least 860 Torr.

4.15 Record these pressures as they will be needed for further analytical computations. The corrected barometric pressure and temperature are to be recorded as well.

5.0 Analytical description

This involves the separate determinations of carbon monoxide, methane and carbon dioxide, and the combined determination of $C_2$and higher molecular weight hydrocarbons. Results are reported as parts per million (ppm) and pounds per hour (lb/hr) as carbon.

The gaseous portion and condensables portion are analyzed separately. The analysis of the gaseous portion requires a gas chromatographic column to separate and elute, in order, carbon monoxide, methane and carbon dioxide in the sample. The separated components are then methanized and detected by a flame ionization detector (FID). The amount of methane measured by the FID is recorded on a chromatogram strip chart.

The analysis of the volatile hydrocarbons in the gaseous portion requires a gas chromatographic column preceded by a 7-inch loop of Tenax material placed in an ice bath (0°C) which absorbs the C_3 and higher hydrocarbons. The C_2 hydrocarbons are separated from carbon monoxide, methane and carbon dioxide in the sample (which elute together) by the chromatographic column. After C_2 is eluted, the carrier gas flow direction is reversed and the Tenax loop is heated with boiling water (100°C) to desorb the remaining hydrocarbons. As each component is eluted, it passes through a catalytic oxidizer which converts it to carbon dioxide. Each carbon dioxide peak is measured by a non-dispersive infrared (NDIR) spectrophotometer, utilizing a carbon dioxide detector, and quantified by a computing integrator (GC/NDIR).

The condensable portion of the sample is analyzed for total hydrocarbons as carbon by volatilizing the trap contents and catalytically oxidizing everything to carbon dioxide which is then collected in an evacuated vessel and quantitatively determined by the FID as mentioned in 5.2.

In order to obtain meaningful analytical data, it is necessary to procure accurate reference standards and to calibrate the instruments with these standards at frequent intervals. Known concentrations of carbon monoxide, methane, carbon dioxide and propane in dry nitrogen are purchased from a vendor and are NBS traceable (+/-2%).

6.0 Gaseous sample analysis

6.1 Record the room temperature and barometric pressure.

6.2 After the sample tanks have settled down to room temperature, the absolute pressure is measured with a mercury manometer. The tanks are then pressurized with dry nitrogen to at least 32 inches of mercury (absolute), re-equilibrated, and measured again. The measurements are recorded and a dilution factor calculated.

6.3 The GC/FID instrument is calibrated with a standard gas sample.

6.4 The pressurized sample is used to flush the sample loop on the gas chromatograph with sample and the injection valve actuated to place the loop into the carrier circuit.

6.5 The sample fractions are eluted in order - methane, carbon monoxide, and carbon dioxide - and plotted on a strip chart chromatogram.

6.6 A computer instantaneously integrates and calculates each sample peak with the appropriate constants and correction factors, and reports these values at the end of the chromatogram. Replicate runs are made until ± 5% maximum deviation is obtained.

6.7 The GC/NDIR instrument is standardized with a standard gas sample.

6.8 The pressurized sample is used to flush the sample loop on the gas chromatograph with sample.

6.9 The injection valve is actuated, placing the sample loop into the carrier circuit with the Tenax loop immersed in an ice bath.

6.10 When the C_2 hydrocarbons have been eluted or their retention time passed, the carrier gas flow through the Tenax and GC column is reversed and the Tenax loop immersed in boiling water. The C_3 and higher molecular weight hydrocarbons are eluted together and plotted with the previous peaks on a strip chart chromatogram after detection by the NDIR analyzer.

6.11 A computer instantaneously integrates and calculates each sample peak with the appropriate constants and correction factors and reports these values at the end of the chromatogram. Replicate runs are made until ± 5% maximum deviation is achieved.

6.12 In the event that any of the hydrocarbon peaks are high enough to make the analyzer off scale, the sample is re-analyzed using a smaller loop and an appropriate standard.

7.0 Condensate trap recovery

7.1 Place the trap in a dry ice cooling bath and then heat the ends of the trap with a Bunsen burner to drive the hydrocarbons into the cold section of the trap away from the plugs.

7.2 After a minimum of five minutes in the cooling bath, the plugs are removed from the trap and the trap is then connected to the carrier gas on one end and a 1.8-liter evacuated vessel on the other end. The trap is purged at a rate similar to the sampling rate until at least 1 liter of purged gases are collected for at least six minutes.

7.3 Remove the purge gas vessel. Another evacuated collection vessel is the attached to the NDIR effluent and flow re-established in a push-pull fashion.
The trap is connected to the oxidizer, followed by a sulfuric acid bubbler to remove moisture and a NDIR carbon dioxide analyzer to indicate how much hydrocarbon is left in the trap.

7.4 The cooling bath is removed and the trap is slowly heated with a Bunsen burner until the stainless steel trap reaches a dull red glow and the sample is eluted from the trap as indicated by the NDIR.

7.5 The collection vessel is analyzed for carbon dioxide by GC/FID as in 6.1 thru 6.6.

7.6 The purge gas vessel is analyzed for volatile hydrocarbons by GC/NDIR as in 6.7 thru 6.12.

7.7 For traps where low condensables are expected, especially outlet ones, with the possibility of high moisture and carbon dioxide in the samples, the trap is placed in a water bath at room temperature and connected to a short loop of stainless steel (1/4-inch O.D.) packed with quartz wool and placed in a dry ice bath. The purge step is then performed and the purge loop incorporated into the trap analysis as in 7.3. This alternative procedure will minimize the amount of unpurged stack carbon dioxide which may have dissolved in the trap condensate.

8.0 Calculations

8.1 Condensable hydrocarbons:

(a) Integrate the area of the standard.

(b) Integrate the area of the sample.

(c) Calculate the concentration in ppm of carbon equivalent as follows:

$$C_{smpl} = \frac{C_{std} \times A_{smpl} \times V_{ves} \times \frac{P_{tank}}{29.9} \times \frac{520}{460+T}}{A_{std} \times V_{tank} \times \frac{P_{tank}}{29.9} \times \frac{520}{460+T}}$$

where C_{smpl} = concentration of the sample in ppm,
C_{std} = concentration of the standard in ppm,
A_{smpl} = area of the sample,
A_{std} = area of the standard,
V_{tank} = volume of the sample tank in liter,
V_{ves} = volume of the collection vessel in liter,
P_{tank} = pressure (absolute) of the tank in inches of mercury, and
T = room temperature in °F.

8.2 Volatile hydrocarbons and gaseous components:

(a) Integrate the area of the standard.

(b) Integrate the area of the standard components.

(c) Calculate the concentration in ppm of carbon equivalent as follows:

$$C_{smpl} = \frac{C_{std} \times A_{smpl} \times \frac{P_B + P_f}{P_B + P_i}}{A_{std}}$$

where P_B = barometric pressure (net) in inches of mercury,
P_i = residual pressure of sample tank, and
P_f = final pressure of sample tank after N_2 addition.

8.3 The following formula is used for the computation of the emission rate in lb/hr carbon:

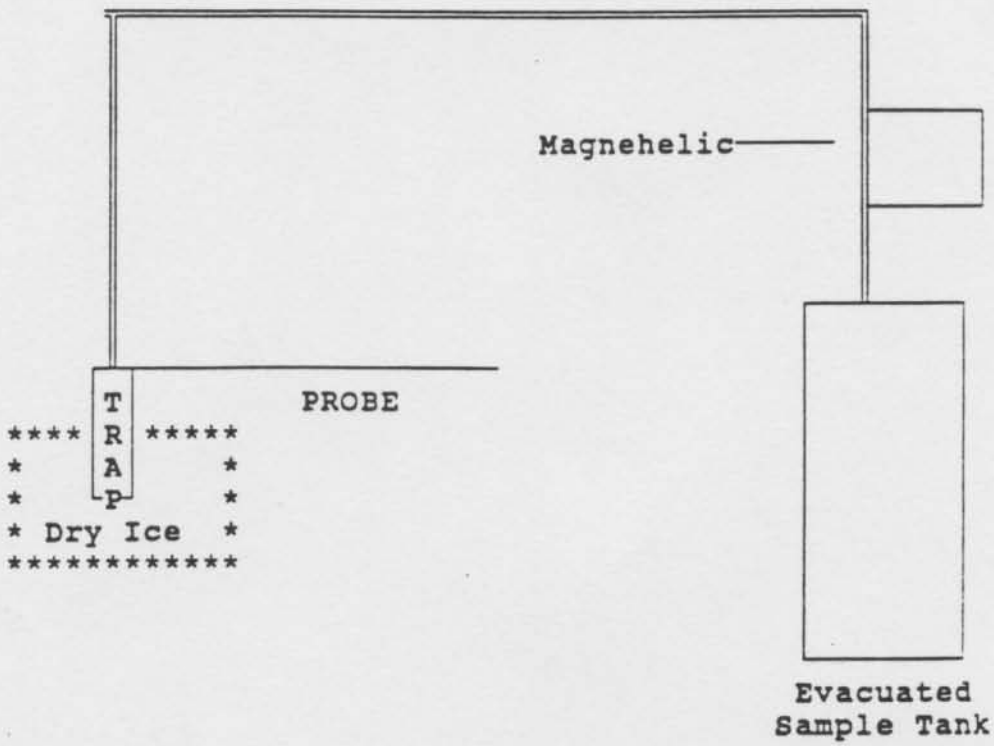
$$\frac{C \times 12\ lb/mole \times Q_{sd}}{3.79 \times 10^6\ ft^3/lb.mole}$$

where C = total concentration of hydrocarbons present in ppm, and
Q_{sd} = flow rate in standard ft^3/hr (dry).

9.0 Diagrams

Diagrams of the assembly is shown on the following page. Note that the distance between the dry ice top surface and the sampling probe of the trap should be at least one inch so that water will not freeze in the narrow sampling tube.

TCA Sampling Train Setup



Revision: Draft
Date: 11/91
Prepared by: XHD
Approved by: PDM
QA Approval: TJP
Page: 1 of 8

STANDARD OPERATING PROCEDURE FOR: TOTAL HYDROCARBON ANALYSIS BY SCAQMD 25.1

Table of Contents

STANDARD OPERATING PROCEDURE FOR: TOTAL HYDROCARBON ANALYSIS BY SCAQMD 25.1

Method
This method is based on SCAQMD METHOD 25.1. It is intended for the determination of total hydrocarbons in source emissions.

1.0 Principle

Samples are collected in two fractions by using an evacuated tank to draw gases through a condensate trap chilled in dry ice. In this modificaton of the method, both fractions are separately analyzed for carbon monoxide, methane and carbon dioxide, in addition to a combined determination of C2 and higher molecular weight hydrocarbons. Results are reported as parts per million (PPM) in the sample, and as pounds of carbon per hour from the source.

Applicability

This method is applicable to determination of stationary source emmisions including incinerators, boilers and absorbers.

2.0 Equipment Required

2.1 GC/FID

2.2 GC/NDIR

2.3 Ice water bath: 1000ml Beaker filled with ice and deionized water.

2.4 Boiling water bath: 1000 ml Beaker filled with deionized water, wire gauze, tripod and Bunsen burner.

2.5 Dry ice.

2.6 Evacuated 1.8 liter vessel.

2.7 Condensate trap

3.0 Reagents Required

See 3.1 and 3.2 of SOP titled TCA 25.2/SOP

4.0 Procedure

This method requires the use of two different instruments, GC/FID and GC/NDIR and Orsat equipment. The samples are collected in two fractions, a gaseous fraction and a condensible fraction. Each fraction must be analyzed separately using both instruments.

4.1 Preparation of Gaseous Fraction of Sample

4.1.1 Record room temperature and barometric pressure.

4.1.2 When the sample has equilibrated to room temperature, measure the absolute pressure in the sample cylinder with a mercury manometer, and record the result as residual vacuum (R.V.).

4.1.3 Pressurize the sample cylinder with ultra-pure nitrogen to at least 6 inches of mercury (absolute), then allow to equilibrate to room temperature (about 5 minutes).

4.1.4 Repeat the measurement of absolute pressure, and record the result as pressure of nitrogen (PN_2).

4.1.5 Calculation for dilution factor (XF) and sample amount (SA)(see 5.1).

4.2 Preparation of Condensable Fraction of Sample

Note: Inlet traps and outlet traps differ substantially in the level of hydrocarbons present, and so require slightly different handling. Several of the steps below will contain alternative instructions for onlet and outlet traps. Inlet traps and outlet traps are kept separate; inlet traps are not used to sample outlets, and vice versa in order to avoid sample carry-over problems.

4.2.1 Evacuate two 2 liter tanks to -30" Hg. Prepare a solution of 0.1N H_2SO_2 for the knock-out which is connected between the catalyst and the NDIR. The water knock-out also requires an ice bath.

4.2.2 Determine the baseline for the NDIR. On range 3, the baseline will usually be between 10 and 15 at room temperature.

4.2.3 Remove the trap from the freezer. Inlet traps: immerse the trap in a dry ice bath, connect one side of the trap to the carrier gas, and the other to an evacuated tank. Outlet traps: connect one side of the trap to the carrier gas, and the other side to a cold finger which is immersed in a dry ice bath (the trap itself is allowed to warm to room temperature). The other side of the cold finger is connected to an evacuted tank.

4.2.4 Start the carrier gas flowing through the trap for 5 minutes, until the pressure the pressure in the tank is about -10" Hg. This tank is then analyzed and added to the sample collected in the trap.

4.2.5 Connect the trap to the catalyst column. Attach a second evacuated cylinder to the outlet of the NDIR. If a inlet is being burned, use an eight liter cylinder. If an inlet is being burned, use a two liter flask. Perform a leak check by turning on the carrier gas flow briefly. Watch the bubbles in the water knock-out. When the bubbles stop with the system pressurized and the carrier gas is turned off,there should be a complete equlibrium in the drop-out. The presence of water moving backwards in the drop-out signifies a leak in the trap or catylist. If bubbles continue to flow, there is a leak in the NDIR or tank connection.

4.2.6 Start the carrier gas flow, remove the dry ice bath and begin heating the trap with the burners. For inlet traps, set the supplemental oxygen flow to match the carrier gas flow. For outlet traps, burn the cold finger along with the trap: supplemental oxygen is not needed in most cases. Observe the reading on the NDIR. It should quickly begin to rise.

4.2.7 Continue burning the trap until the NDIR reading falls to near the blank value. The trap is allowed to cool to room temperature, and then is briefly heated again to determine whether all the condensable hydrocarbons have been driven off. If the NDIR reading does not increase during this final check the trap is clean. It is important that hydrocarbons will condense in the tubing and

that it must be burned out with the trap. Also any place there is a connector, it must be heated to make sure that the inside is cleaned.

4.2.8 The tank from the burn and the purge are pressurized and analyzed (see above for gas sample portion).

4.3 GC/FID Analysis of Samples

4.3.1 Check carrier gas (UP He), if low, change the gas tank.

4.3.2 Change the output from "test" to "1", change the range from "Bal" to "10".

4.3.3 Increase He to 50 psi.

4.3.4 Turn on H_2 to 30 psi.

4.3.5 Ignite the FID.

4.3.6 Turn on Air to 20 psi.

4.3.7 Increase He to 80 psi.

4.3.8 Turn FID Zero Suppression on, and switch detector Output from "1" to "2".

4.3.9 Let the instrument warm up for 20 minutes.

4.3.10 Start the Maxima program of the Dynamic Solutions system, and set up the automatic data acquisition according to the manual Maxima 820.

4.3.11 Standard Calibration - Calibration standards are commercial stock standard mixtures made from certified gas company.

(a) Inject a standard sample through a sample loop on the GC.

(b) Press "Run" on the GC to place the loop into the carrier gas circuit.

(c) The calibration standards are run in replicate until +/- 2% maximum deviation is obtained.

4.3.12 The sample is injected in the same manner as the standard, steps 4.3.11: a, b, and c.

4.4 GC/NDIR Analysis of Samples

4.4.1 Turn on the instrument and allow the GC oven to reach analysis temperature (approximately about 800 F).

4.4.2 Start Nitrogen flow.

4.4.3 Turn on the integrator: change the RANGE from "Tune" to "1", set GAIN from "0" to "5".

4.4.4 When the GC oven reaches 800 F, turn the ZERO tune all the way to the right, and then adjust the SOURCE BALABCE until it reads between 35-40.

4.4.5 Adjust the ZERO tune until the display reads "2" by turning it to the left.

4.4.6 Equilibrate the Tenax loop in the ice water bath.

4.4.7 Run a blank sample to check for carry-over prior to running standard.

4.4.8 Standard Calibration - Calibration standards are commercial stock standard from certified gas company.

(a) Flush the sample loop with the pressurized standard, then switch the injection valve to inject the sample.

(b) Press "Start" on the integrator.

(c) When the C_2 has been eluted or their expected retention time has passed, the carrier gas flow direction is reversed, and the Tenax loop is immersed in boiling water to desorb the remaining hydrocarbons.

(d) The calibration standards are repeated until +/- 5% maximum deviation is obtained.

4.4.9 Inject the sample in the same manner as the standard, steps 4.4.8: a, b, and c

4.4.10 Repeat the analysis of samples until +/-5% maximum deviation is obtained. If any of the hydrocarbons peaks are off scale, recalibrate the GC using a new standard that is closer to the concentration of the sample and then reanalyze the sample.

4.5 Dilution

See 4.5 of the SOP titled TCA 25.2

4.6 Orsat analysis of samples

See SOP titled 7.1

5.0 Calculations

5.1 Condensable Hydrocarbons

5.1.1 The intergrated area for the standard and the sample are available directly from the chart recorder.

5.1.2 Calculate the concentration in ppm of carbon equivalent as follows:

$$C_{smpl} = \frac{C_{std} \times A_{smpl} \times V_{ves} \times \frac{P_{tank}}{29.9} \times \frac{520}{460+T}}{A_{std} \times V_{tank} \times \frac{P_{tank}}{29.9} \times \frac{520}{460+T}}$$

where

C_{smpl} = concentration of the sample in ppm,
C_{std} = concentration of the standard in ppm,
A_{smpl} = area of the sample,
A_{std} = area of the standard,
V_{tank} = volume of the sample tank in liter,
V_{ves} = volume of the collection vessel in liter,
P_{tank} = pressure (absolute) of the tank in inches of mercury,
T = room temperature in F.

5.2 Volatile hydrocarbons and gaseous components

5.2.1 The integrated area for the standard and the sample are available directly from the chart recorder.

5.2.2 Calculate the concentration in ppm of carbon equivalent as follows:

$$C_{smpl} = \frac{C_{std} \times A_{smpl} \times \frac{(P_B - P_f)}{(P_B - P_i)}}{A_{std}}$$

where:

P_B = barometric pressure (net) in inches of mercury,
P_i = residual pressure of sample tank,
P_f = final pressure of sample tank after N2 addition.

The following formula is used for the computation of the emission rate in lb/hr carbon:

$$\frac{C \times 12 lb/mole \times Q_{sd}}{3.79 \times 10^6 ft^3/lb.mole}$$

where:

C = total concentration of hydrocarbons present in ppm,
Q_{sd} = flow rate in standard cubic feet per hour (dry).

TRUESDAIL LABORATORIES, INC.

Laboratory Procedure for NO_x (nitrogen oxides) Analysis.

Preparation of the sample flasks

1. Clean flasks are charged with 25.0 ml of 0.1 N. H_2SO_4 (containing 25 ml of 3% H_2O per 2000 ml).

2. Evacuate sample flask to the boiling point of charged absorbing solution and let it boil for 10 seconds, then close the flask with a screw clamp.

3. Place in the container for transport to the sampling site.

Analysis of returned sample flasks

Note: Usually the flasks are shaken enough during transportation and does not require more shaking in the laboratory.

1. Make sure that the sample residence time in the flasks exceeds 16 hours.

2. Allow to equilibrate to room temperature. Usually the samples are left for 2 hours (or overnight).

3. Record barometric pressure and ambient temperature in the laboratory.

4. Subtract water vapor pressure at laboratory temperature from the barometric pressure. The sample inside of the flask is saturated by water vapor at room temperature. To report dry volume this has to be taken into account.

5. Measure the residual vacuum inside the flask. Use 10 inch mercury monometer. Close the flask again with a screw clamp without exposing the sample to the air.

6. Make CO_2 and O_2 measurements by an Orsat analysis. Use the procedure given in the appendix.

7. Transfer the liquid from the flask into 100 ml volumetric flask. Use minimum of 3 rinsings with distilled water to transfer the sample liquid quantitatively. Total volume of liquid in the volumetric flask should not be more than 90 ml.

8. Neutralize the sample in the volumetric flask with 2N NaOH, just alkaline to litmus paper. Use reagent blank to determine the amount of NaOH required to neutralize the 25 ml of absorbing reagent.

Note: Too high alkalinity etches glass on evaporation and causes contamination with silica on further analysis.

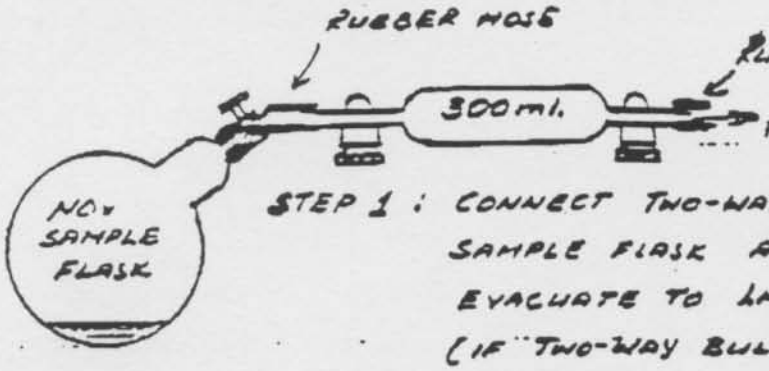
9. Dilute to volume with distilled water and mix.

10. Analyze by I.C.

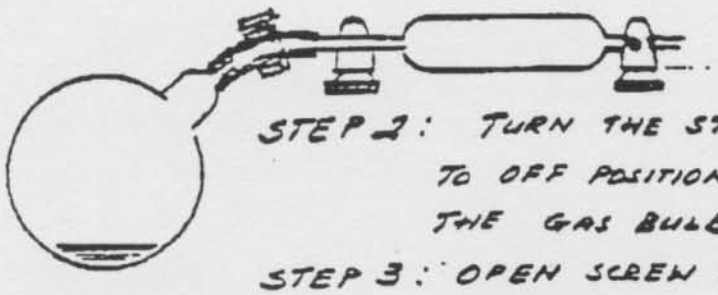
TRUESDAIL LABORATORIES, INC.

ORSAT ANALYSIS ON THE GAS PHASE OF THE NO_x SAMPLE FLASKS (PDSA METHOD)

TOTAL 10 STEPS

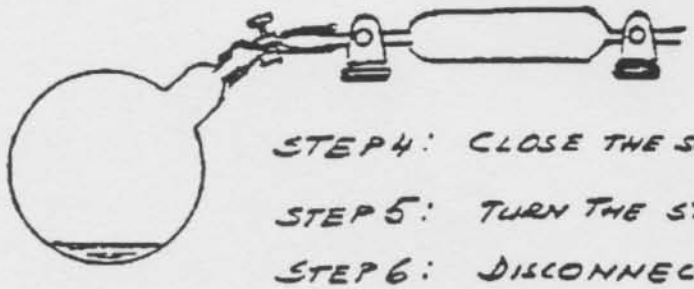


STEP 1 : CONNECT TWO-WAY GAS BULB TO THE NO_x SAMPLE FLASK AND A HIGH VACUUM PUMP EVACUATE TO 1MM. Hg PRESSURE (IF TWO-WAY BULB IS WET, EVACUATE TO THE WATER BOILING POINT)



STEP 2 : TURN THE STOPCOCK FROM THE VACUUM PUMP TO OFF POSITION; DISCONNECT RUBBER HOSE FROM THE GAS BULB

STEP 3 : OPEN SCREW CLAMP FROM THE NO_x FLASK AND LET THE GAS SAMPLE TO RUSH-IN INTO THE TWO-WAY BULB.



STEP 4 : CLOSE THE SCREW CLAMP ON THE NO_x FLASK

STEP 5 : TURN THE STOPCOCK IN THE OFF POSITION

STEP 6 : DISCONNECT TWO-WAY GAS BULB FROM THE NO_x FLASK

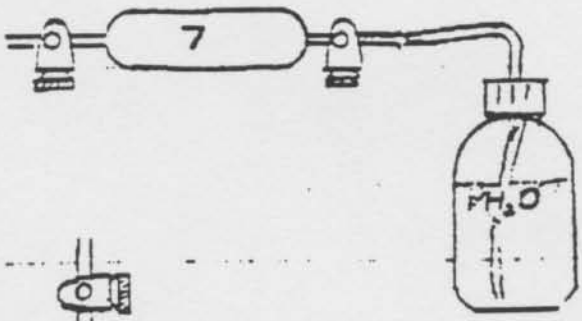
NOTE : NO_x FLASK MUST BE IN THE POSITION SHOWN IN THE DIAGRAM, SO THAT THE ABSORPTION LIQUID WOULD NOT BE SUCKED IN THE TWO-WAY SAMPLE BULB.

CONT'D

TRUESDAIL LABORATORIES, INC.

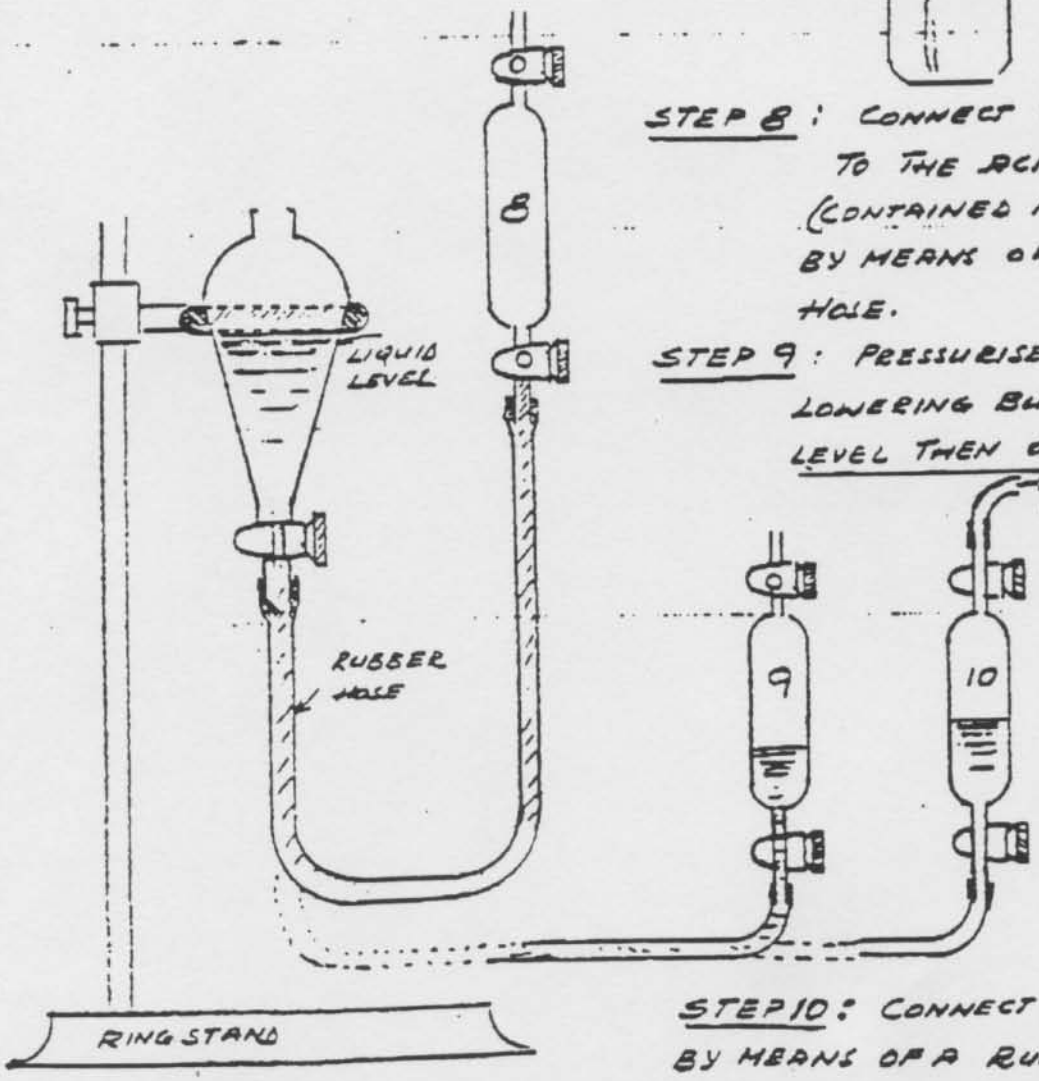
ORSAT ANALYSIS (CONT'D)

STEP 7 : FILL UP ONE OF THE SAMPLE BULB ARMS WITH DIST. WATER



STEP 8 : CONNECT THE WATER FILLED ARM TO THE ACIDIFIED WATER RESERVOIR (CONTAINED IN EXTRACTION FUNNEL) BY MEANS OF WATER FILLED RUBBER HOSE.

STEP 9 : PRESSURISE GAS IN THE BULB BY LOWERING BULB BELOW RESERVOIR LEVEL THEN OPENING BOTTOM STOPCOCK



STEP 10 : CONNECT OTHER BULB'S ARM BY MEANS OF A RUBBER HOSE TO THE ORSAT ANALYSER. FORCE GAS SAMPLE OUT FROM THE BULB WITH THE HELP OF WATER PRESSURE, FLUSH THE LINE WITH THE SAMPLE GAS AND THEN FILL UP THE MEASURING ORSAT BURETTE.

STANDARD OPERATING PROCEDURE
ANIONS BY ION CHROMATOGRAPHY
EPA METHOD 300.0

Scope and Application

This is an ion chromatographic (IC) method applicable to the determination of anions in drinking water, surface water and mixed domestic and industrial wastewater. This method covers the determination of the following inorganic anions.

Chloride	Fluoride
Nitrate-N	Nitrite-N
Sulfate	

In this method a small amount of sample, typically 2 to 3 ml is introduced into an ion chromatograph. The anions of interest are separated and measured using a system comprised of a guard column, separator column and conductivity detector.

This method is intended to be used only by, or under the supervision of, analysts experienced in the use of ion chromatography and the interpretation of the resulting chromatograms.

Safety Considerations

Normal, accepted laboratory safety practices should be followed during reagent preparation and instrument operation. No known carcinogenic materials are used in this method.

Sample Collection, Preservation and Storage

Samples should be collected in scrupulously clean glass or polyethylene bottles. Sample preservation and holding times for the anions that can be determined by this method are as follows:

ANALYTE	PRESERVATION	HOLDING TIME
Chloride	None Required	28 days
Fluoride	None Required	28 days
Nitrate-N	Cool to 4 C	48 hours
Nitrite-N	Cool to 4 C	48 hours
Sulfate	Cool to 4 C	28 days

The method of preservation and the holding time for samples to be analyzed by this method are determined by the anions of interest. In a given sample , the anion which requires the most preservation treatment and the shortest holding time will determine the preservation treatment and holding time for the total sample.

APPARATUS and MATERIALS

Balance: Analytical balance capable of accurately weighing to the nearest 0.1 mg.

Ion Chromatograph: Dionex 4000i analytical system complete with all required accessories including syringes, analytical columns, compressed gas and conductivity detector.

Autosampler: Dionex Autosampler with an AI-100 controller.

Integrator: Shimadzu C-R3A

Columns: Dionex AG4A Guard Column, Dionex AS4A Separator Column and Dionex CMMS Suppressor.

REAGENTS and CONSUMABLE MATERIALS

Reagent Water: Deionized water, free of the anions of interest. Water should contain particles no larger than 0.20 microns.

Eluant Solution: Sodium Bicarbonate/Sodium Carbonate

Stock Standard Solutions: 1000mg/L. These may be purchased as certified solutions or they may be prepared from ACS reagent grade materials which have been dried at 105 C for 30 minutes.

a. Chloride (Cl) 1000mg/L - Buy or prepare by dissolving sodium chloride in deionized water.
b. Fluoride (F) 1000mg/L - Buy or prepare by dissolving sodium fluoride in deionized water.
c. Nitrate (NO_3-N) 1000mg/L - Buy or prepare by dissolving sodium nitrate in deionized water.
d. Nitrite (NO_2-N) 1000mg/L - Buy or prepare by dissolving sodium nitrite in deionized water.
e. Sulfate (SO_4) 1000mg/L - Buy or prepare by dissolving potassium sulfate in deionized water.

These stock standards are stable for at least one month when stored at 4 C. Dilute working standards should be prepared weekly, except those that contain nitrite or phosphate. These should be prepared fresh daily.

CALIBRATION and STANDARDIZATION

The ion chromatograph is set up with the parameters given below:

Guard Column -	Dionex AG4A
Separator Column -	Dionex AS4A
Detector -	Conductivity
Eluant -	0.003M sodium bicarbonate/ 0.0024M sodium carbonate
Sample Loop	0.050ml
Pump Flow Rate	2.0ml/min.
Sensitivity Range	30 uS

For each analyte of interest prepare calibration standards at five different concentration levels and a blank. These should be prepared by pipetting appropriate aliquots of the stock standards into a volumetric flask and diluting to volume with deionized water. The concentrations of the anion standards normally used are given below:

ANION	STANDARD CONCENTRATION, MG/L				
Fluoride	1.0	2.0	3.0	4.0	5.0
Chloride	1.0	2.0	3.0	4.0	5.0
Nitrite-N	2.0	4.0	6.0	8.0	10.0
Nitrate-N	1.0	2.0	3.0	4.0	5.0
Sulfate	5.0	10.0	15.0	20.0	25.0

Using a minimum of four out of the five calibration standards for each of the anions, make injections of 0.05 ml (determined by the volume of the sample loop) of each standard and tabulate the peakheight versus concentration and the retention time for each. Use the data obtained to prepare a calibration curve for each of the analytes.

SAMPLE ANALYSIS

Check the system calibration each day with one or more standards. If the response of a standard changes by more than 5% a recalibration should be performed as described previously.

Once the calibration has been checked and found to be acceptable the analysis of the samples may be done. Samples (and standards) which have been refrigerated should be allowed to come to room temperature before analysis. Any sample which contains visible particulate matter should be filtered. Simple gravity filtration through a medium porosity filter paper is normally adequate. Once the sample is equilibrated to ambient conditions and is free from solid impurities it is ready to be injected into the instrument.

The injections are made the same as with the standards wherein 1 or 2 ml are injected from a syringe into the instrument. The fixed sample loop then injects 0.05 ml of the sample into the column for analysis. A minimum of two separate 0.05 ml replicate injections are made with each sample. Record the resulting peak heights and retention times.

If the response for any peak exceeds the working range of the system, dilute the sample with an appropriate amount of deionized water and reanalyze. If the resulting chromatogram fails to produce adequate resolution, or if identification of specific anions is questionable, spike the sample with an appropriate amount of standard and reanalyze.

CALCULATIONS

Prepare separate calibration curves for each anion by plotting the peak heights of the standards against the corresponding concentrations. The concentration of the samples are then computed by comparing the peak heights from the samples with the standard curve. Report the results in mg/L.

APPENDIX D

CALIBRATION DATA

Pitot Tube Calibration Data Sheet

Calibrated by: [illegible]

Date: 8-9-94

Pitot Tube I.D. S-17.1

Effective Length: 5'

Pitot Tube Assembly Level ? ☑ Yes ☐ No

Pitot Tube Openings Damaged ? ☐ Yes ☒ No

If Yes, Explain _____

α_1 = Ø °(<10°) α_2 = Ø °(<10°)

β_1 = Ø °(<10°) β_2 = Ø °(<10°)

γ = Ø ° θ = Ø ° A = 0.954" °

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

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

P_A = 0.476 cm (in.)

P_B = 0.476 cm (in.)

D_t = 0.376 cm (in.)

Comments: _____

Calibration Required ? ☐ Yes ☑ No

Pitot Tube Calibration Data Sheet

Calibrated by: Eilenk

Date: 8-9-94

Pitot Tube I.D. S' - 16A

Effective Length: 5'

Pitot Tube Assembly Level ? ☑ Yes ☐ No

Pitot Tube Openings Damaged ? ☐ Yes ☑ No

If Yes, Explain _____

α_1 = Ø °(<10°) α_2 = Ø °(<10°)

β_1 = Ø °(<10°) β_2 = Ø °(<10°)

γ = Ø ° θ = Ø ° A = 0.955 "

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

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

P_A = 0.477 cm (in.)

P_B = 0.478 cm (in.)

D_t = 0.377 cm (in.)

Comments: _____

Calibration Required ? ☐ Yes ☑ No

THERMOCOUPLE CALIBRATION

CALIBRATED BY: SOLANKI

DATE: 8-30-94

Thermocouple number	Thermocouple reading (°F)	Thermometer reading (°F)
	37.4	39.8
TC-1	75.2	77.8
	208.4	210.4
	34.0	35.0
TC-2	77.6	77.0
	212.8	213.8
	38.4	40.8
TC-3	75.2	75.2
(D-5)	206.6	205.4
TC-4	37.4	38.8
(D-6)	75.2	75.4
	212.2	211.6
TC-5	37.4	38.8
(D-3)	75.2	75.8
	208.4	209.6
TC-6	35.6	34.8
	75.2	75.2
	210.2	211.0
	36.0	34.0
TC-7	74.0	74.0
(BLUE)	214.0	214.0
TC-8	37.4	39.2
	77.4	77.7
	213.6	216.6

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

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

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

METER BOX TEMPRATURE READOUT CALIBRATION

CALIBRATED BY: SOLANKI

DATE: 09-14-94

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

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

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

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

LIQUID-IN-GLASS-THERMOMETER

CALIBRATED BY EVER READY THERMOMETER CO.

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

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

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

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

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

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

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

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

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

EVER READY THERMOMETER CO.

DICK MUNNS COMPANY

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

CERTIFICATE OF CALIBRATION

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

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

Comments:

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

Calibration Performed By:

RALPH AWAD

Approved By:

MICHAEL MUNNS

Form CERT1

DRY GAS METER AND ORIFICE CALIBRATION

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

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

Orifice Manometer Setting H = "H2O	Initial Reference DGM Reading V = ft3	Final Reference DGM Reading V = ft3	Reference Gas Volume Vr = ft3	Initial DGM Reading V = ft3	Final DGM Reading V = ft3	Test DGM Volume Vd = ft3	Temperature				Run Time minutes	Flow Rate Q = cfm	Meter Gamma	Delta H @
							Reference DGM tr = F	DGM Inlet t = F	DGM Outlet t = F	DGM Average td				
0.5	974.030	983.943	9.913	868.905	878.906	10.001	79	83	79	81	25.4	0.38	0.994	1.894
1.0	984.349	994.353	10.004	879.330	889.463	10.133	78	90	83	87	18.9	0.51	1.000	2.031
2.0	994.768	1004.777	10.009	889.883	900.036	10.153	78	94	86	90	13.3	0.73	1.003	1.997
4.0	5.536	15.580	10.044	900.812	911.010	10.198	77	98	88	93	9.4	1.04	1.004	1.963

Average	1.000	1.971

MAGNEHELIC CALIBRATION CHECK

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

Readings in " H_2O

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

HYDROCARBON CYLINDERS
VOLUME CALIBRATION
08-20-90

Cylinder #	Full, lbs	Tare, lbs	Net, lbs	Volume, L
101	31.33	4.45	26.88	12.22
102	32.65	5.83	26.82	12.19
103	31.60	4.69	26.91	12.23
104	31.65	4.68	26.97	12.26
105	31.42	4.47	26.95	12.25
106	32.62	5.82	26.80	12.18
107	31.14	4.50	26.64	12.11
108	32.45	5.98	26.47	12.03
109	31.22	4.69	26.53	12.06
110	31.15	4.68	26.47	12.03
Supplemental Set 07-29-92				
111	31.42	4.86	26.56	12.07
112	32.44	5.86	26.58	12.08
113	32.44	5.96	26.48	12.03
114	31.50	4.48	27.02	12.28
115	32.45	5.90	26.55	12.06
116	31.55	4.45	27.10	12.31
117	31.35	4.71	26.64	12.10
118	32.62	6.04	26.58	12.08
119	31.40	4.73	26.67	12.12
120	31.50	4.78	26.72	12.14

Note: Cylinders were filled to the rim (not including fittings) with water and weighed on a 125-lb capacity platform balance.

Water density at room temperature = 0.997 gm/cc or 0.0022 lbs/cc.

SOURCE SAMPLING NOZZLE CALIBRATION

CALIBRATED/UPDATED BY: _____

DATE: 8/31/94

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

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

PRECISION INSTRUMENT REPAIR

Certification Report
Of
Precision Balances and Scales

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

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

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

SERIAL NUMBER OF STANDARD: L233

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

CALIBRATION AS FOUND: 100 mg = 103.3 mg

CALIBRATED TO: 100 mg = 100.0 mg

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

Date of Calibration 11-23-94 Technician TD Tom Benson Cert. # 1-0903