Background Report Reference

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Title: Air Toxics Emissions Inventory Testing at Alamitos Unit 5

Carnot

Carnot

May 1990

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Section 1.4
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4

AIR TOXICS EMISSIONS INVENTORY TESTING AT ALAMITOS UNIT 5

Prepared for:

SOUTHERN CALIFORNIA EDISON COMPANY
Rosemead, California

For Inclusion in:

Air Toxics Hot Spots Inventory
required under
AB2588

Prepared by:

Mark D. McDannel, P.E.
Lisa A. Green

CARNOT

formerly the California Division of
ENERGY SYSTEMS ASSOCIATES

Tustin, California

MAY, 1990

ESR 53304-2053

REPORT CERTIFICATION

The sampling and analysis performed for this report was carried out under my direction and supervision.

Date 5/30/90

Mark D. McDannel
Vice President & General Manager

I have reviewed all testing details and results in this test report and hereby certify that the test report is authentic and accurate.

Date 5/30/90

Mark D. McDannel
Vice President & General Manager

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SECTION 1.0

INTRODUCTION

Carnot, formerly the California Division of Energy Systems Associates, was contracted by the Southern California Edison Company (SCE) to provide emissions measurement services in support of their preparation of emission inventory reports as required by the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588). AB 2588 requires any facility which meets certain criteria to submit an emission inventory report to local air pollution regulatory agencies. Data is compiled by a combination of source test emission measurements and estimations. These reports are prepared according to inventory plans approved by the Ventura County Air Pollution Control District and by the California Air Resources Board (ARB).

This document is the test report for the emissions tests conducted on SCE's Alamitos Generating Station Unit #5. The results of the tests on this unit were used to generate emissions data for it and other similar sources in the SCE power generating system. These results satisfy the requirements for measurements of substances that must be quantified by a source test as set forth in Appendix D of the Emission Inventory Criteria and Guidelines Regulation published by the ARB on June 2, 1989.

Triplicate emissions tests were conducted while firing gas fuel for:

- formaldehyde
- benzene

Triplicate emissions tests were conducted while firing residual fuel oil for

- formaldehyde
- benzene
- polycyclic aromatic hydrocarbons (PAH)
- full set of metals (arsenic, beryllium, cadmium, copper, lead manganese, mercury, nickel, selenium and zinc)
- chromium and hexavalent chromium
- additional full set of metals by EPA draft metals method for CARB validation study

Two residual fuel oil samples were also analyzed for:

- Btu/lb (HHV)
- carbon, hydrogen, oxygen, nitrogen
- sulfur
- ash content
- chloride
- full set of metals to include:
  arsenic, beryllium, cadmium, total and hexavalent chromium, copper, lead, manganese, mercury, nickel, selenium and zinc

Testing was conducted March 12 through March 16, 1990. The Carnot test team members were supervised by Mark McDannel. Additional test team members were Arlene Bell, Craig Fry, Jim Mulligan, Russell Pence, Paul Ewing, and Larry Farrington. Mike Escarcega and Bernie Rapan of SCE coordinated all test activities.

Table 1-1 summarizes the results of the emissions tests while firing natural gas. Tables 1-2 and 1-3 summarize the results of the emissions tests while firing residual fuel oil. Table 1-4 presents the results of the residual fuel oil analyses. Detailed results are included in Section 4.0.

TABLE 1-1
SUMMARY OF AB2588 EMISSIONS TEST RESULTS
SCE/ALAMITOS UNIT NO. 5
NATURAL GAS FUEL
March 12-16, 1990

Species	
Benzene:	
ppb	ND <1
lb/hr	ND <0.013
lb/MMBtu	ND $<2.2 \times 10^{-6}$
Formaldehyde	
ppb	47
lb/hr	0.24
lb/MMBtu	3.9×10^{-5}

TABLE 1-2
SUMMARY OF AB2588 EMISSIONS TEST RESULTS
SCE/ALAMITOS UNIT NO. 5
RESIDUAL FUEL OIL
March 12-16, 1990

Species	
Benzene:	
ppb	ND <1
lb/hr	ND <0.016
lb/MMBtu	ND $<2.4 \times 10^{-6}$
Formaldehyde	
ppb	ND <10
lb/hr	ND <0.059
lb/MMBtu	ND $<1.1 \times 10^{-5}$
Total PAH	
$\mu g/m^3$	4.03
lb/hr	0.0185
lb/MMBtu	3.26×10^{-6}

TABLE 1-3
SUMMARY OF TRACE METALS RESULTS
SCE/ALAMITOS UNIT NO. 5

Metal	μg/m³	lb/hr	lb/MMBtu
Arsenic	25.3	0.12	2.0×10^{-5}
Beryllium	<0.19	$<8.8 \times 10^{-4}$	$<1.5 \times 10^{-7}$
Cadmium	<1.8	$<7.9 \times 10^{-3}$	$<1.4 \times 10^{-6}$
Chromium (total)	8.0	0.038	6.4×10^{-6}
Chromium (hexavalent)	3.7	0.018	3.0×10^{-6}
Copper	14.8	0.068	1.2×10^{-5}
Lead	27.1	0.12	2.2×10^{-5}
Manganese	32.7	0.14	2.6×10^{-5}
Mercury	ND <5.0	ND <0.022	ND $<4.0 \times 10^{-6}$
Nickel	377	1.70	3.0×10^{-4}
Selenium	<4.2	<0.019	$<3.4 \times 10^{-6}$
Zinc	566	2.59	4.5×10^{-4}

TABLE 1-4
FUEL ANALYSIS SUMMARY
SCE/ALAMITOS UNIT NO. 5
RESIDUAL FUEL OIL
March 12-16, 1990

Parameter	
Btu/lb (HHV)	19,035
Carbon, %	85.22
Hydrogen, %	12.54
Nitrogen, %	0.01
Oxygen, %	2.06
Sulfur, %	0.15
F factor, dscf/MMBtu @ 0% O_2 and 60°F	9,063
Chlorine, mg/l	150
Arsenic, mg/l	ND <1.1
Beryllium, mg/l	ND <0.22
Cadmium mg/l	ND <0.22
Chromium, mg/l	0.41
Hexavalent Chromium, mg/l	ND <0.50
Copper, mg/l	2.9
Lead, mg/l	ND <1.1
Mercury, mg/l	ND <0.10
Manganese, mg/l	0.23
Nickel, mg/l	6.7
Selenium, mg/l	ND <1.0
Zinc, mg/l	0.94

ND - not detected

SECTION 2.0

UNIT DESCRIPTION

Unit 5 at the Alamitos Generating Station consists of a Babcock and Wilcox utility boiler and steam turbine electric generator. The boiler and generator have a full load rating of 480 megawatts. The boiler is capable of firing natural gas or residual fuel oil via 16 cells/32 burners. The cells are arranged in a 4 x 4 opposed firing pattern. Gas flow through the boiler is provided by 2 forced draft fans. The gas flow is divided into two separate streams each with a fan and a horizontal rotary air preheater. Flue gas recirculation is injected through the furnace hopper at lower loads for steam temperature control and to the windbox at higher loads for NO_x control. Figure 2-1 shows a cross sectional view of the boiler and related ductwork.

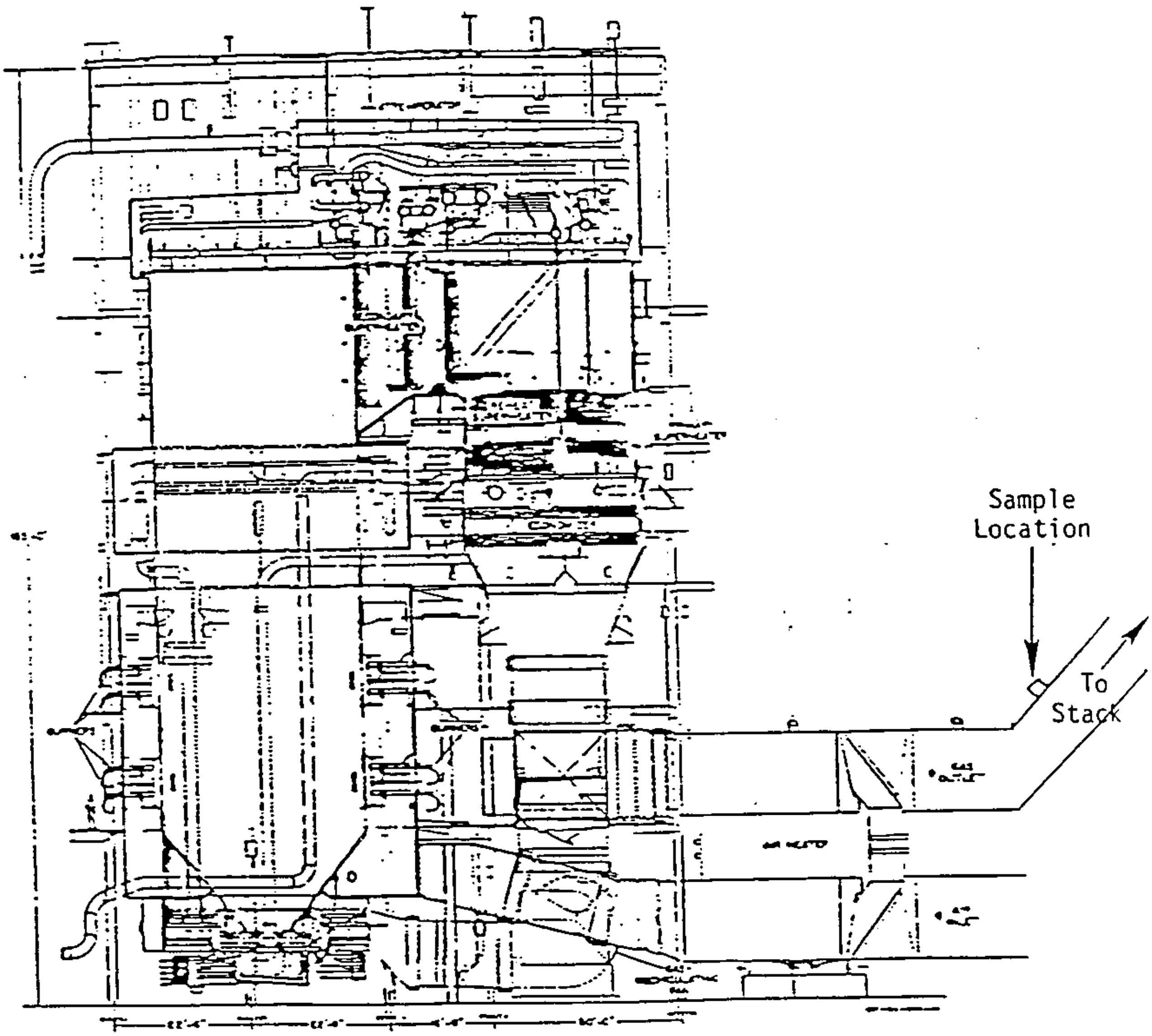


Figure 2-1. Alamitos Unit 5 480 MW boiler, showing sample location.

TABLE 3-2
UNIT OPERATION DURING AB2588 TESTING
SCE/ALAMITOS UNIT NO. 5
March 12-16, 1990

Test No.	Date	Time From/To	Method	Location	Fuel	Load MW Net
1-Chr-S	3/12	1526/1744	Chrome	South Duct	Oil	472
2-Mtls-N	3/13	0906/1124	Metals	North Duct	Oil	471
2-Mtls-S	3/13	0906/1130	Metals	South Duct	Oil	471
3-Mtls-N	3/13	1323/1546	Metals	North Duct	Oil	468
3-Mtls-S	3/13	1320/1547	Metals	South Duct	Oil	468
4-Cr-N	3/13	1622/1842	Chrome	North Duct	Oil	470
5-Mtls-N	3/14	0825/1057	Metals	North Duct	Oil	465
5-Mtls-S	3/14	0825/1045	Metals	South Duct	Oil	465
5A-Benz	3/14	0902/0912	Benzene	North Duct	Oil	465
5B-Benz	3/14	0919/0928	Benzene	North Duct	Oil	465
5C-Benz	3/14	0946/0957	Benzene	South Duct	Oil	465
5D-Benz	3/14	1006/1020	Benzene	South Duct	Oil	465
6-Cr-N	3/14	1223/1444	Chrome	North Duct	Oil	466
6-PAH-S	3/14	1256/1634	PAH	South Duct	Oil	466
Cr-Blank	3/15	~0900	Chrome	South Duct	Oil	–
PAH-Blank	3/15	~1100	PAH	South Duct	Oil	–
7-PAH-N	3/15	0902/1245	PAH	North Duct	Oil	471
8-PAH-S	3/15	1526/1744	PAH	South Duct	Oil	470
8A-Form	3/15	1405/1435	Formaldehyde	North 4-3	Oil	470
8B-Form	3/15	1538/1608	Formaldehyde	South 3-3	Oil	470
8C-Form	3/15	1614/1644	Formaldehyde	South 3-5	Oil	470
9-Vel-N	3/16	1054/1140	2/4	North Duct	Gas	476
9-Vel-S	3/16	0933/1017	2/4	South Duct	Gas	476
9A-Benz	3/16	0930/0950	410A	South 3-3	Gas	476
9B-Benz	3/16	0955/1015	410A	South 4-3	Gas	476
9C-Benz	3/16	1110/1130	410A	North 3-3	Gas	476
9A-Form	3/16	0937/1007	430	South 3-3	Gas	476
9B-Form	3/16	1015/1045	430	South 4-3	Gas	476
9C-Form	3/16	1112/1142	430	North 4-3	Gas	476
Metals Blank	3/16				–	–
Metals Blank	3/16				–	–

SECTION 3.0

TEST DESCRIPTION

3.1 TEST CONDITIONS AND TEST SCHEDULE

The tests on Alamitos Generating Station Unit No. 5 were conducted with the boiler firing at or near full normal load, under normal operating conditions except as noted below. Testing was conducted with the turbines firing both residual fuel oil and natural gas fuels. Table 3-1 gives the tests conducted for each fuel type, and Table 3-2 presents the test log for the program, including unit load and fuel type. Detailed unit data for each test are presented in Appendix C.

TABLE 3-1
TEST SUMMARY

Fuel	Species Measured by Source Test
Residual Fuel Oil	Benzene, Formaldehyde, PAH, metals, chromium (Also fuel analysis for metals, chloride)
Natural Gas	Benzene, Formaldehyde

There were no unusual or abnormal operating events during the tests which would impact interpretation of the results.

3.2 SAMPLE LOCATIONS

Samples were collected from ports installed in the exhaust ducts downstream of the air preheater and upstream of the exhaust stack. Figure 2-1 of Section 2 shows the location of the sample ports in the ducts in relationship to the boiler. Figure 3-1 shows a more detailed sketch of the sample location. Samples were collected using ports located in each of the two ducts. One run of each type of test consisted of one test in each duct. To obtain triplicate tests for PAH, chromium, benzene, and formaldehyde, two tests were performed in one duct and one test was performed in the other duct. The procedures used to obtain average emission rates are listed below:

1. Average concentration = arithmetic average of the concentrations from the three test runs.
2. Total unit exhaust flow = sum of the average flow from Duct A and the average flow from Duct B.
3. Average mass emission rate = average concentration x total exhaust flow.

Metals tests were run at both ducts simultaneously for a total of six metals tests in order to comply with CARB requirements for additional data for its metals method validation study. The average emission rates were obtained in a similar manner as above using all six metals tests. The average mass emission rate in lb/hr is equal to the average concentration times the average total stack exhaust flow.

Based on three dimensional flow tests performed on the identical unit Redondo 8, the sample port location meets the acceptability criteria given in EPA Method 1, Section 2.5 (alternate measurement site selection procedure). Figure 3-1 shows a diagram of the sample port location and sample point layout.

3.3 TEST PROCEDURES

The test procedures and related information used at Alamitos Unit No. 5 are listed in Table 3-3. Table 3-3 lists the test procedures for air emission tests. Descriptions of standard procedures are included in Appendix A. Additional information and modifications to standard procedures are presented below.

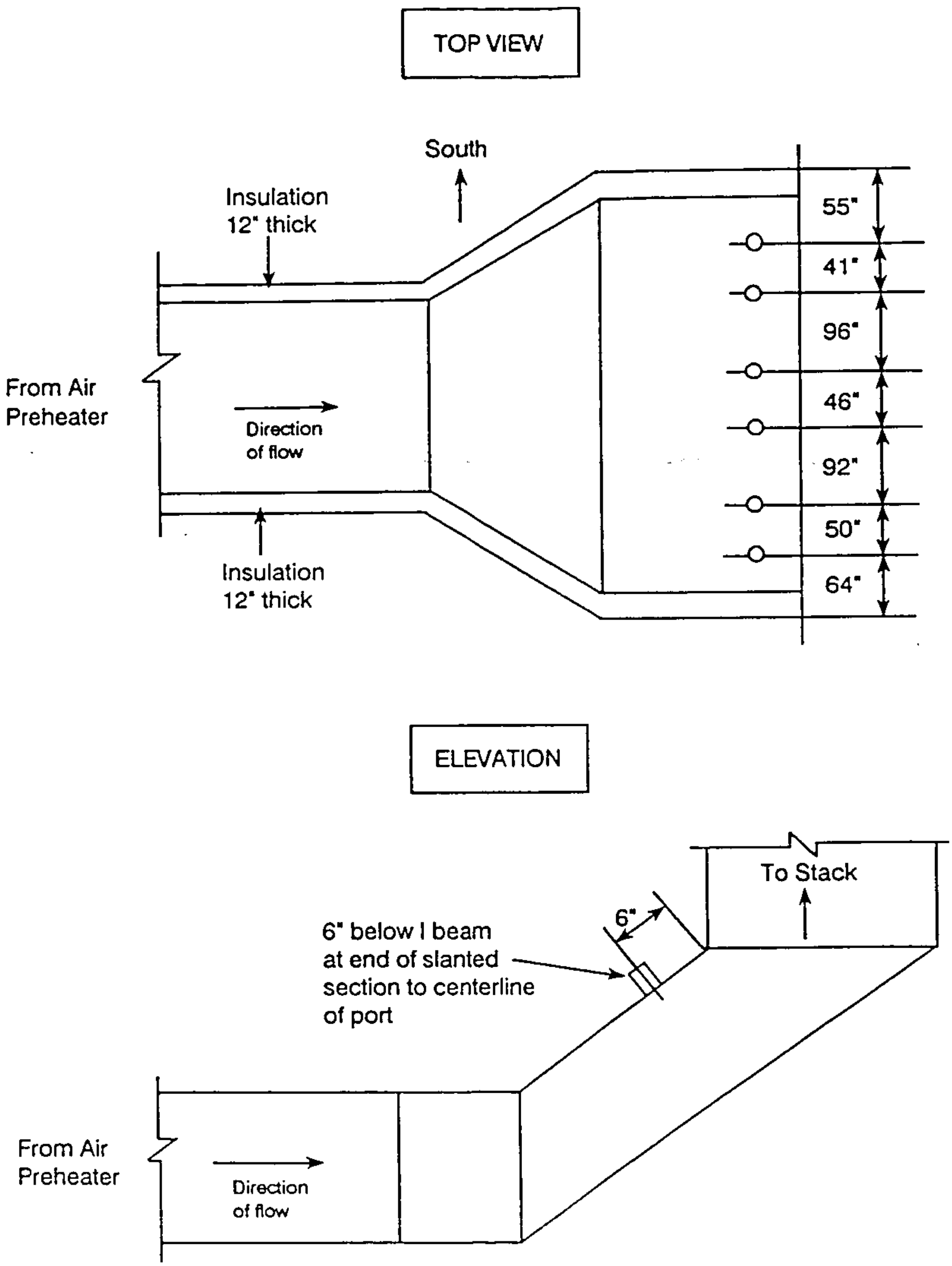


Figure 3-1. Sample Locations for Alamitos 5

TABLE 3-3
TEST PROCEDURES FOR ALAMITOS UNIT 5
AIR EMISSIONS TESTS

Parameter	No. Replicates	Duration of Test (min.)	Sample Rate	Measurement Principle	Reference Method	Method Detection Limit
Benzene	3*	20	.5 l/min	GC/PID	CARB 410A	1 ppb
Formaldehyde	3*	30	1 l/min	HPLC	CARB 430	16 $\mu g/m^3$
PAH	3	189	1 m^3/hr	GC/MS	CARB 429	10-100 ng/m^3 per species
Chromium	3	126	1 m^3/hr	AA for total Ion Chromatography for Cr^{6+}	CARB 425	1.3 $\mu g/m^3$ 0.4 $\mu g/m^3$
Metals	6**	126	1 m^3/hr	AA/ICP (except Hg)	EPA Draft Metals Method	0.4-4.2 $\mu g/m^3$
Metals, Chloride	2	--	--	Fuel Analysis	--	--

* 3 replicates on each fuel type
** 3 additional test required for CARB validation study

3.3.1 Benzene

Triplicate samples for benzene analysis were collected in Tedlar bags on each fuel type. The samples were analyzed by gas chromatography by Truesdail Laboratories in Tustin, California.

3.3.2 Formaldehyde

Triplicate formaldehyde samples on each fuel type were collected non-isokinetically using midget impingers in acidic 2,4-dinitrophenylhydrazine solution. The analyses for formaldehyde were performed by HPLC by Radian Laboratories, in Austin, Texas.

3.3.3 Polycyclic Aromatic Hydrocarbons (PAH)

Triplicate PAH samples were collected according to the sampling procedures of CARB Method 429 on oil fuel only. This method is known as the semi-VOST or "Modified Method 5". Table 3-4 summarizes the pertinent information for these tests. In this procedure, a sample is collected isokinetically and passed through a heated Method 5 filter followed by an XAD-2 sorbent module in a water-cooled jacket. The sorbent module is followed by an impinger train to collect moisture and any PAH that might pass through the resin.

Sample analysis was performed by Zenon Environmental in Burlington, Ontario. Zenon also prepared the resin, loaded the modules, and extracted the modules and other fractions according to CARB procedures. Appropriate laboratory spikes were introduced to the samples by Zenon and the percent recovery were reported along with the results.

GC/MS with selective ion monitoring was used to analyze PAH. This procedure provides the lowest detection limits possible for these samples. In accordance with Appendix C-1 of "Emission Inventory Criteria and Guidelines", the following PAH species were quantified:

Acenaphthene
Acenaphthylene
Anthracene
Benz[a]anthracene
Benzo[b]fluoranthene
Benzo[k]fluoranthene
Benzo[a]pyrene
Benzo[g,h,i]perylene
Chrysene
Dibenz[a,h]anthracene

TABLE 3-4
PAH TEST INFORMATION

Sampling Method	CARB 429
Analytical Method	GC/MS
Analytical Laboratory	Zenon Environmental
Expected Levels	Less than 10 ng/m^3 per species
Analytical Lower Detection Limit	10-100 ng per species
Sample Volumes	2-3 m^3 (2-hour sample)
Internal Standards	Added to post-test samples
Surrogate Standards	Added to resin prior to sampling
Blank	Full field blank train used
Fractions to be Analyzed	Probe wash, filter, sorbent module, connecting glassware rinse, and first impinger combined
Chain of Custody	Maintained by ESA and Zenon on all samples
Sample Train Assembly and Recovery	Performed in on-site clean room to minimize chance of contamination
Glassware Cleaning	Acid cleaning followed by DI H_2O, acetone, and hexane rinses and high temperature bake

Fluoranthene
Fluorene
Indeno[1,2,3,-cd]pyrene
Naphthalene
Phenanthrene
Pyrene

A full field blank was collected and analyzed for PAH. For a field blank, a separate sample train was assembled, transported, leak checked, rinsed, and recovered in the same way as the sample train. This provided a blank value not only for the analytical procedures but also for the reagents, filter, and any possible contamination introduced by sample handling.

3.3.4 Full Set of Metals

Table 3-5 summarizes the analytical methods and detection limits for trace metals tests. Reagent blanks and field blanks were analyzed for all trace metals. Per the Regulation, the full set of metals is defined as arsenic, beryllium, cadmium, total and hexavalent chromium, copper, lead, manganese, mercury, nickel, selenium and zinc. In addition, the California Air Resources Board selected duplicate multimetals tests to be performed to support their metals method validation study. Therefore, two multiple metals trains were run simultaneously in the north and south ducts.

Samples for all of the metals identified above were collected by three different sample trains, as discussed in the following subsections. Triplicate sampling using each of the three sample trains was performed.

3.3.4.1 Multiple Metals Train

Arsenic, beryllium, cadmium, copper, lead, manganese, mercury, nickel, selenium, and zinc were collected using the train proposed in the EPA Draft Metals Method. The sample train is of the same configuration as a CARB Method 5 train, with the following exceptions:

1. The filter is teflon-coated fiberglass to minimize interferences.

2. The first two impingers contain 5% nitric acid/10% hydrogen peroxide to collect any volatile metals which pass through the filter.

3. The third impinger contains an acidified potassium permanganate solution to collect any mercury that is not collected in the nitric acid impingers.

TABLE 3-5
FULL SET OF METALS ANALYSIS

Metal	Sampling Method	Analytical Method	Detection Limit µg/m^3
Chromium	CARB 425	Graphite Furnace AA	1.3
Hexavalent Chromium	CARB 425 w/0.1 N NaOH	Ion Chromatography	0.4
Beryllium	EPA Draft Metals Method	ICP	0.4
Arsenic	CARB Draft Metals Method	Graphite Furnace	0.5
Cadmium	EPA Draft Metals Method	ICP	0.6
Copper	EPA Draft Metals Method	ICP	0.8
Lead	EPA Draft Metals Method	ICP	4.2
Manganese	EPA Draft Metals Method	ICP	0.8
Mercury	EPA Draft Metals Method	Cold Vapor AA	2.1
Nickel	EPA Draft Metals Method	ICP	0.8
Selenium	EPA Draft Metals Method	ICP	4.2
Zinc	EPA Draft Metals Method	ICP	3.7

Analyses for these ten metals were performed by ICP, graphite furnace or cold vapor atomic absorption, depending upon the metal. Decomposition of each sample fraction is described in the EPA draft method. Whenever possible, decomposed sample portions were combined to achieve the lowest detection limits possible for these samples. Five percent of the decomposed probe wash/filter extract and 5% of the nitric acid/peroxide impinger catch was removed for mercury analysis. The remaining 95% of these sample portions was concentrated to a total volume of 50 ml and analyzed for metals. The probe wash/filter portion and the impinger catch portion of each train was analyzed separately. The $KMnO_4$ impinger portion was analyzed for mercury only. Curtis and Tompkins performed the analyses in their Los Angeles and Berkeley laboratories.

Since the California Air Resources Board required 3 additional identical multiple metals trains to be run for their metals validation study, the results of all six are included in the calculation of the final results.

3.3.4.2 Chromium Train

In order to achieve a lower detection limit for hexavalent chromium, it is necessary to use a separate sample train dedicated to collecting chromium.

Recently, CARB has accepted a proposed sample train configuration and an alternate procedure involving ion chromatography for analysis of hexavalent chromium. These changes to CARB Method 425 are summarized in Table 3-6.

The major differences of the modified method are use of a wet impingement train configuration, 0.1 N NaOH in the impingers to preserve the sample, and use of ion chromatography to measure hexavalent chromium. One half of the collected sample was analyzed for hexavalent chromium.

Total chromium was analyzed using the remaining half of the sample according to CARB Method 425. The analyses were performed by graphite furnace atomic absorption by Curtis and Tompkins in Los Angeles.

TABLE 3-6
HEXAVALENT CHROMIUM MEASUREMENT TECHNIQUES

Method	CARB 425
Train configuration	Wet impingement
Filter Material	Teflon-coated fiberglass backup filter
Impingers	0.01 N NaOH
Analytical method	Ion chromatography
Hexchrome detection limit, μg/train	0.3
Specified maximum sample storage time	None

3.3.5 Residual Fuel Oil Samples

Two residual fuel oil samples were collected by SCE and analyzed for:

- Btu/lb
- carbon, hydrogen, oxygen, nitrogen
- sulfur
- ash content
- chloride
- full set of metals to include:
  arsenic, beryllium, cadmium, total and hexavalent chromium, copper, lead, manganese, mercury, nickel, selenium and zinc.

These analyses were performed by Curtis and Tompkins.

3.4 QUALITY ASSURANCE

Carnot has a rigorous ongoing QA program to ensure that high-quality data is obtained and to ensure full documentation of test details. The QA program includes:

1. Appointment of a Quality Assurance Officer for Carnot's Source Test Division
2. Preparation of a QA manual for internal use
3. Standardization of reporting and review procedures
4. Implementation of chain of custody procedures on all samples and data sheets
5. Scheduling of internal QA and training meetings
6. Complete documentation of instrument calibration and CEM performance data
7. Adherence to method-specific QA procedures for all testing
8. Personnel training
9. Monitoring of new and emerging methods and technologies.

Specific QA data which will be included in the final report are:

1. Equipment calibration data
2. CEM calibration data
3. CEM performance data
4. Chain of custody on all samples

Carnot participates in EPA's audit programs for Methods 5, 6, and 7, and is certified by the California Air Resources Board under its Independent Source Tester's Approval program. Additional QA information is presented in Appendix B.

SECTION 4.0

RESULTS

This section presents the results of the emissions tests performed at SCE's Alamitos Generating Station Unit No. 5. All data sheets, calculations, laboratory reports and quality assurance information are included in the Appendices.

The results of the tests are summarized in Tables 4-1 through 4-4. Detailed results of the tests are presented in the following subsections.

- 4.1 Benzene
- 4.2 Formaldehyde
- 4.3 Polycyclic Aromatic Hydrocarbons (PAH)
- 4.4 Metals
- 4.5 Chromium and Hexavalent Chromium
- 4.6 Fuel Analysis
- 4.7 Test Summary and Isokinetics

TABLE 4-1
SUMMARY OF AB2588 EMISSIONS TEST RESULTS
SCE/ALAMITOS UNIT NO. 5
NATURAL GAS FUEL
March 12-16, 1990

Species	
Benzene:	
ppb	ND <1
lb/hr	ND <0.013
lb/MMBtu	ND $<2.2 \times 10^{-6}$
Formaldehyde	
ppb	47
lb/hr	0.24
lb/MMBtu	3.9×10^{-5}

TABLE 4-2
SUMMARY OF AB2588 EMISSIONS TEST RESULTS
SCE/ALAMITOS UNIT NO. 5
RESIDUAL FUEL OIL
March 12-16, 1990

Species	
Benzene:	
ppb	ND <1
lb/hr	ND <0.016
lb/MMBtu	ND $<2.4 \times 10^{-6}$
Formaldehyde	
ppb	ND <10
lb/hr	ND <0.059
lb/MMBtu	ND $<1.1 \times 10^{-5}$
Total PAH	
$\mu g/m^3$	4.03
lb/hr	0.0185
lb/MMBtu	3.26×10^{-6}

TABLE 4-3
SUMMARY OF TRACE METALS RESULTS
SCE/ALAMITOS UNIT NO. 5

Metal	μg/m³	lb/hr	lb/MMBtu
Arsenic	25.3	0.12	2.0×10^{-5}
Beryllium	<0.19	$<8.8 \times 10^{-4}$	$<1.5 \times 10^{-7}$
Cadmium	<1.8	$<7.9 \times 10^{-3}$	$<1.4 \times 10^{-6}$
Chromium (total)	8.0	0.038	6.4×10^{-6}
Chromium (hexavalent)	3.7	0.018	3.0×10^{-6}
Copper	14.8	0.068	1.2×10^{-5}
Lead	27.1	0.12	2.2×10^{-5}
Manganese	32.7	0.14	2.6×10^{-5}
Mercury	ND <5.0	ND <0.022	ND $<4.0 \times 10^{-6}$
Nickel	377	1.70	3.0×10^{-4}
Selenium	<4.2	<0.019	$<3.4 \times 10^{-6}$
Zinc	566	2.59	4.5×10^{-4}

TABLE 4-4
FUEL ANALYSIS SUMMARY
SCE/ALAMITOS UNIT NO. 5
RESIDUAL FUEL OIL
March 12-16, 1990

Parameter	
Btu/lb (HHV)	19,035
Carbon, %	85.22
Hydrogen, %	12.54
Nitrogen, %	0.01
Oxygen, %	2.06
Sulfur, %	0.15
F factor, dscf/MMBtu @ 0% O_2 and 60°F	9,063
Chlorine, mg/l	150
Arsenic, mg/l	ND <1.1
Beryllium, mg/l	ND <0.22
Cadmium mg/l	ND <0.22
Chromium, mg/l	0.41
Hexavalent Chromium, mg/l	ND <0.50
Copper, mg/l	2.9
Lead, mg/l	ND <1.1
Mercury, mg/l	ND <0.10
Manganese, mg/l	0.23
Nickel, mg/l	6.7
Selenium, mg/l	ND <1.0
Zinc, mg/l	0.94

ND - not detected

4.1 BENZENE

Triplicate samples for benzene analysis were collected in tedlar bags for each fuel type and analyzed by Truesdail Laboratories, Inc. in Tustin, CA. The results are summarized in Table 4-5. Detailed results are presented in Appendix C.4. Benzene was not detected in any sample, with a detection limit of 1 ppb.

TABLE 4-5
BENZENE RESULTS
SCE/ALAMITOS GENERATION STATION UNIT NO. 5
MARCH 1990

WITH UNIT ON FUEL OIL

Test No.	5A-Benz-N	5B-Benz-N	5C-Benz-S	Average
Date	03/14/90	03/14/90	03/14/90	
ppb	ND <1	ND <1	ND <1	ND <1
lb/hr				ND <0.016
lb/MMBtu				ND $<2.4 \times 10^{-6}$

WITH UNIT ON NATURAL GAS

Test No.	9A-Benz-S	9B-Benz-S	9C-Benz-N	Average
Date	03/16/90	03/16/90	03/16/90	
ppb	ND <1	ND <1	ND <1	ND <1
lb/hr				ND <0.013
lb/MMBtu				ND $<2.2 \times 10^{-6}$

4.2 FORMALDEHYDE

Formaldehyde samples were analyzed by Radian Corporation, Morrisville, N.C. The formaldehyde results are presented in Table 4-6. Detailed results are presented in Appendix C.5. No formaldehyde was detected on oil fuel.

Detectable levels were found on gas fuel. The average concentration was 47 ppb, and the average emission rate was 3.9×10^{-5} lb/MMBtu.

TABLE 4-6
FORMALDEHYDE RESULTS
SCE/ALAMITOS UNIT NO. 5
MARCH 1990

WITH UNIT ON FUEL OIL				
Test No.	8A-Form-N	8B-Form-S	8C-Form-S	Average
Date	03/15/90	03/15/90	03/15/90	
ppb	ND <8	ND <11	ND <11	ND <10
lb/hr	--	--	--	ND <5.9 x 10^{-2}**
lb/MMBtu	ND <8.3 x 10^{-6}	ND <1.1 x 10^{-5}	ND <1.2 x 10^{-5}	ND <1.1 x 10^{-5}

WITH UNIT ON NATURAL GAS				
Test No.	9A-Form-S	9B-Form-S	9C-Form-N	Average
Date	03/16/90	03/16/90	03/16/90	
ppb	75	30	36	47
lb/hr	0.193*	0.078*	0.092*	0.242**
lb/MMBtu	6.3 x 10^{-5}	2.6 x 10^{-5}	3.0 x 10^{-5}	3.9 x 10^{-5}

* lb/hr for individual test duct

** unit total lb/hr (both ducts)

NOTE: Results on gas fuel are blank corrected

4.3 PAH

PAH samples were analyzed by Zenon Environmental, Ontario, Canada. Results for the PAH tests are presented in Table 4-7. Detailed results, including test by test breakdowns and field blank results, are presented in Appendix C.6 The average total PAH values were:

Total PAH, μg/dscm	4.03
Total PAH, lb/hr	1.85×10^{-2}
Total PAH, lb/MMBtu	3.26×10^{-6}

The total PAH values reported above are comprised of the following components:

1. Detection limits for eight species not detected: 2%
2. Naphthalene: 82%
3. Other species detected: 16%

Naphthalene accounts for 82% of the total PAH measured. It should be noted that naphthalene is a decomposition product of XAD-2 resin. Although resin modules are stored in ice chests to minimize decomposition, it is still common to see measurable naphthalene levels in both PAH test samples and in blank samples. For this test series, there were 13 micrograms of naphthalene detected in the field blank, and 19 to 24 micrograms detected in the test samples. It is possible that much of the reported naphthalene emissions (after correction for field blank values) are due to resin decomposition and not to unit emissions.

4.4 METALS

The results of the metals tests from the multimetals train are summarized in Table 4-8. Detailed results are presented in Appendix C.7. The table shows that mercury was not detected in any sample. Beryllium was emitted at an average rate of 0.00088 lb/hr. Six metals were emitted at rates between 0.0079 and 0.14 lb/hr (arsenic, cadmium, copper, lead, manganese, selenium) and nickel and zinc were emitted at 1.7 to 2.6 lb/hr.

Each metals train was analyzed in two sample fractions: the probe and filter fraction, and the impinger fraction. The $KMnO_4$ impinger was analyzed for mercury only. On some tests, a metal was not detected in one of the two fractions. In this case, the detection limit was added to the result of the other fraction. This is noted by the "<" designation on some results. All detected results were blank corrected using the reagent blank.

TABLE 4-7
POLYCYCLIC AROMATIC HYDROCARBON EMISSIONS
SCE/ALAMITOS UNIT NO. 5
MARCH 1990

Test No.	6-PAH-S	7-PAH-N	8-PAH-N		Average	
Date:	03/14/89	03/15/89	03/15/89			
	µg/m³	µg/m³	µg/m³	µg/m³	lb/hr	lb/MMBtu
Naphthalene	3.1	2.0	4.8	3.29	1.51×10^{-2}	2.67×10^{-6}
Acenaphthylene	ND <.011	ND <.008	ND <.011	ND <0.01	ND $<4.63 \times 10^{-5}$	ND $<8.15 \times 10^{-9}$
Acenaphthene	1.02	0.57	.12	0.57	2.60×10^{-3}	4.55×10^{-7}
Fluorene	.044	.026	.025	0.03	1.45×10^{-4}	2.55×10^{-8}
Phenanthrene	.040	.037	.015	0.03	1.40×10^{-4}	2.45×10^{-8}
Anthracene	.013	ND <.008	ND <.011	0.01	4.96×10^{-5}	8.73×10^{-9}
Fluoranthene	ND <.011	.013	ND <.011	<0.01	$<5.34 \times 10^{-5}$	$<9.41 \times 10^{-9}$
Pyrene	ND <.011	.009	ND <.011	<0.01	$<4.78 \times 10^{-5}$	$<8.42 \times 10^{-9}$
Benz(a)anthracene	ND <.011	ND <.009	ND <.011	ND <0.01	ND $<4.63 \times 10^{-5}$	ND $<8.15 \times 10^{-9}$
Chrysene	ND <.011	ND <.008	ND <.011	ND <0.01	ND $<4.63 \times 10^{-5}$	ND $<8.15 \times 10^{-9}$
Benzo(b+k)fluoranthene	ND <.011	ND <.008	ND <.011	ND <0.01	ND $<4.63 \times 10^{-5}$	ND $<8.15 \times 10^{-9}$
Benzo(a)pyrene	ND <.011	ND <.008	ND <.011	ND <0.01	ND $<4.63 \times 10^{-5}$	ND $<8.15 \times 10^{-9}$
Indeno(1,2,3-cd)pyrene	ND <.011	ND <.008	ND <.011	ND <0.01	ND $<4.63 \times 10^{-5}$	ND $<8.15 \times 10^{-9}$
Dibenzo(a,h)anthracene	ND <.011	ND <.008	ND <.011	ND <0.01	ND $<4.63 \times 10^{-5}$	ND $<8.15 \times 10^{-9}$
Benzo(g,h,i)perylene	ND <.011	ND <.008	ND <.011	ND <0.01	ND $<4.63 \times 10^{-5}$	ND $<8.15 \times 10^{-9}$
TOTAL PAH	4.32	2.73	5.05	4.03	1.85×10^{-2}	3.26×10^{-6}

TABLE 4-8
METALS EMISSIONS RESULTS FROM EPA DRAFT METHOD
SCE/ALAMITOS UNIT NO. 5
RESIDUAL OIL

Test No.	2-North	2-South	3-North	3-South	5-North	5-South		Average	
Flow rate, dscfm (stack)								1,218,000	
O_2, %	5.5	6.1	6.7	6.4	6.0	5.9		6.1	
Species	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	lb/hr	lb/MMBtu
Arsenic	12.0	<9.9	16.0	<15.3	15.3	83.3	25.3	0.12	2.0×10^{-5}
Beryllium	<0.15	<0.46	<0.04	<0.17	<0.17	<0.17	<0.19	$<8.8 \times 10^{-4}$	$<1.5 \times 10^{-7}$
Cadmium	<2.1	<1.8	<3.1	<1.2	<1.4	<0.8	<1.8	$<7.9 \times 10^{-3}$	$<1.4 \times 10^{-6}$
Copper	10.3	30.4	11.4	12.9	14.7	9.0	14.8	0.068	1.2×10^{-5}
Lead	23.9	31.7	34.1	34.3	22.3	16.0	27.1	0.12	2.2×10^{-5}
Manganese	81.1	19.2•	14.0	6.1•	17.2	58.3	32.7	0.14	2.6×10^{-5}
Mercury	ND <7.7	ND <5.9	ND <4.0	ND <4.3	ND <3.8	ND <4.5	ND <5.0	ND <0.022	ND $<4.0 \times 10^{-6}$
Nickel	466	322	407	363	408	296	377	1.70	3.0×10^{-4}
Selenium	ND <2.7	<2.4	<11.4	<3.3	ND <2.0	<3.5	<4.2	<0.019	$<3.4 \times 10^{-6}$
Zinc	449	1,167	418	442	524	394	566	2.59	4.5×10^{-4}

• These samples include the filterable particulate fraction only - the impinger solutions were contaminated by $KMnO_4$

4.5 CHROMIUM AND HEXAVALENT CHROMIUM

The results of the chromium tests are presented in Table 4-9. Detailed results are presented in Appendix C.7. Chromium and hexavalent chrome were detected in all samples. Total chromium emissions averaged 0.038 lb/hr, while hexavalent chromium emissions averaged 0.018 lb/hr.

TABLE 4-9
CHROMIUM AND HEXAVALENT CHROMIUM EMISSIONS
SCE/ALAMITOS UNIT NO. 5
RESIDUAL OIL

Test No.	1-Cr-So	4-Cr-No	6-Cr-No	Average
Flow rate, dscfm	607,500*	578,400*	629,700*	1,211,555**
O_2, %	6.20	5.91	6.21	6.11
Chromium				
µg/m^3	4.02	3.16	16.81	8.0
lb/hr	.0092*	.0068*	.040*	.038**
lb/MMBtu	3.2×10^{-6}	2.5×10^{-6}	1.4×10^{-5}	6.4×10^{-6}
Hexavalent Chromium				
µg/m^3	0.98	1.26	8.94	3.73
lb/hr	.0022*	.0027*	.021*	.018**
lb/MMBtu	7.9×10^{-7}	9.9×10^{-7}	7.2×10^{-6}	3.0×10^{-6}

* Value for single test duct

** Value for total unit

4.6 FUEL ANALYSIS

The fuel oil analysis results are shown in Table 4-10 for oil fuel and Table 4-11 for gas fuel.

TABLE 4-10
FUEL ANALYSIS SUMMARY
SCE/ALAMITOS GENERATION STATION UNIT NO. 5
RESIDUAL FUEL OIL
March 12-15, 1990

Parameter	
Btu/lb (HHV)	19,035
Carbon, %	85.22
Hydrogen, %	12.54
Nitrogen, %	0.01
Oxygen, %	2.06
Sulfur, %	0.15
F factor, dscf/MMBtu @ 0% O_2 and 60°F	9,063
Chlorine, mg/l	150
Arsenic, mg/l	ND <1.1
Beryllium, mg/l	ND <0.22
Cadmium mg/l	ND <0.22
Chromium, mg/l	0.41
Hexavalent Chromium, mg/l	ND <0.50
Copper, mg/l	2.9
Lead, mg/l	ND <1.1
Mercury, mg/l	ND <0.10
Manganese, mg/l	0.23
Nickel, mg/l	6.7
Selenium, mg/l	ND <1.0
Zinc, mg/l	0.94

ND - not detected

TABLE 4-11
FUEL ANALYSIS SUMMARY
SCE/ALAMITOS GENERATION STATION UNIT NO. 5
NATURAL GAS FUEL
MARCH 16, 1990

Volume %	
Methane	84.7
Ethane	3.5
Propane	0.7
Butane	0.3
CO_2	1.2
Nitrogen	5.2
Oxygen	1.8
Higher heating value, Btu/scf at 60°F	947
F factor, dscf/MMBtu @ 0% O_2 and 60°F	8,449

TABLE 4-12
SUMMARY OF TEST CONDITIONS FOR ISOKINETIC AN VELOCITY TESTS
SCE/ALAMITOS UNIT NO. 5
MARCH 1990

Test	Date	Time	Vm_{std}	Q_{sd}	O_2	CO_2	% Isokinetic
1-Cr-S	3/12	1526/1744	52.67	607,522	6.20	10.83	97.56
2-Mtls-N	3/13	0906/1124	41.35	503,445	5.51	11.81	95.50
2-Mtls-S	3/13	0906/1130	53.47	627,634	6.09	11.36	95.87
3-Mtls-N	3/13	1323/1546	52.88	623,384	6.68	10.91	98.63
3-Mtls-S	3/13	1323/1547	57.62	633,724	6.44	11.10	102.30
4-Cr-N	3/13	1622/1842	50.34	578,386	5.91	11.46	101.20
5-Mtls-N	3/14	0825/1057	55.37	630,002	5.99	11.61	102.19
5-Mtls-S	3/14	0825/1045	55.14	635,740	5.85	11.72	97.60
6-Cr-N	3/14	1223/1444	56.49	629,680	6.21	11.09	104.31
6-PAH-S	3/14	1256/1634	79.90	649,848	6.05	11.21	92.23
7-PAH-N	3/15	0902-1245	78.61	574,573	6.32	11.01	106.05
8-PAH-S	3/15	1526/1744	81.35	653,537	6.48	10.80	95.65
9-Vel-N	3/16	1054/1140	21.61	541,965	4.83	9.54	–
9-Vel-S	3/16	0933/1017	22.01	543,875	4.33	9.83	–

4.7 TEST SUMMARY AND ISOKINETICS

A summary of the isokinetic and velocity tests performed is presented in Table 4-12. All tests were within the required range of 90 to 110% isokinetics.

APPENDIX A

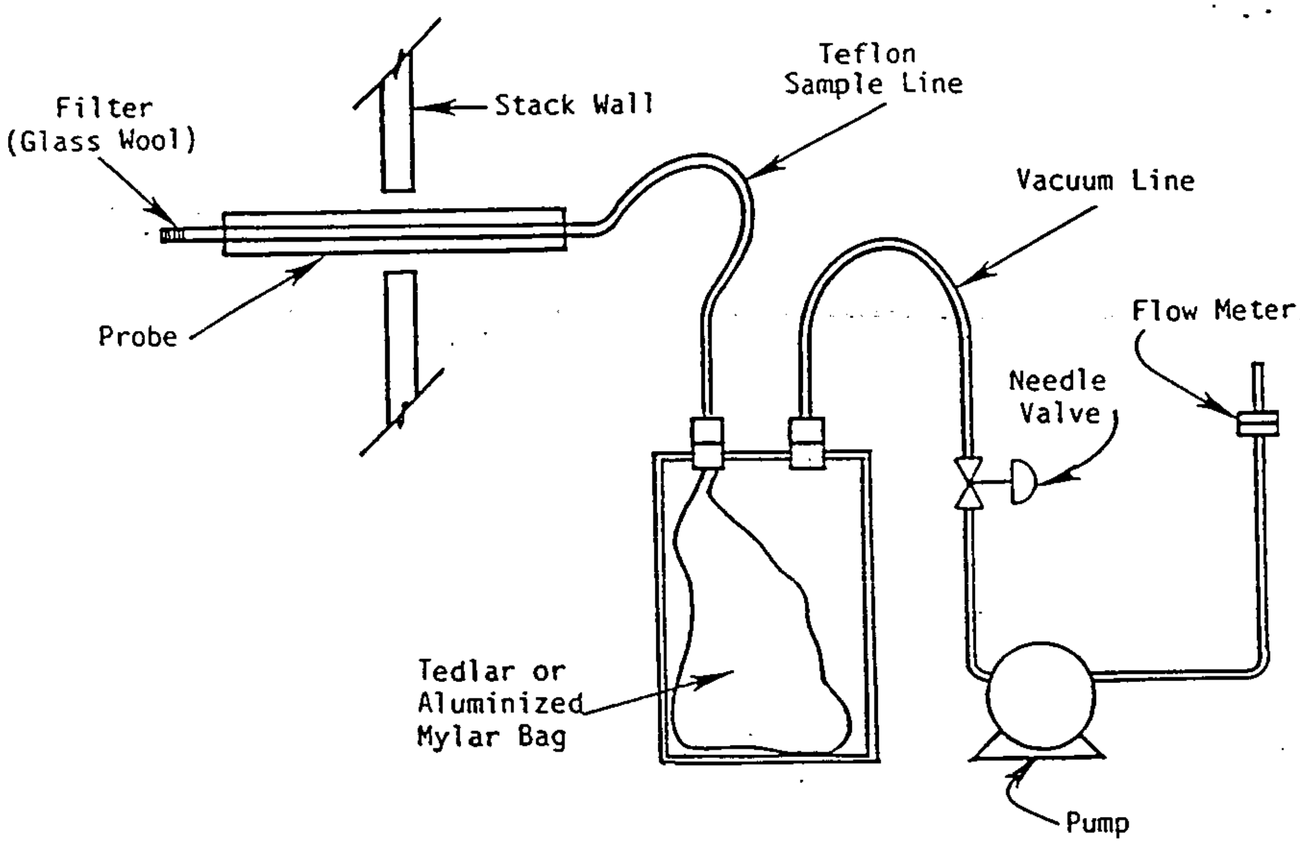
MEASUREMENT PROCEDURES

Oxygen (O_2) by Continuous Analyzer
Carbon Dioxide (CO_2) by Continuous Analyzer
Benzene by Gas Chromatography
Semi-Volatile Organic Sampling Train Procedures
Formaldehyde by HPLC

Method:	Oxygen (O_2) by Continuous Analyzer
Applicable Ref. Methods:	EPA 3A, EPA 20, ARB 100, BA ST-14
Principle:	A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of O_2 concentration.
Analyzer:	Teledyne Model 326A
Measurement Principle:	Electrochemical cell
Ranges:	0-5, 0-10, 0-25% O_2
Accuracy:	1% of full scale
Output:	0-100 mV, linear
Interferences:	Halogens and halogenated compounds will cause a positive interference. Acid gases will consume the fuel cell and cause a slow calibration drift.
Response Time:	90% <7 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. If Method 20 is used, that method's specific procedures for selecting sample points are used. Otherwise, stratification checks are performed at the start of a test program to select single or multiple-point sample locations.
Analytical Procedure:	An electrochemical cell is used to measure O_2 concentration. Oxygen in the flue gas diffuses through a Teflon membrane and is reduced on the surface of the cathode. A corresponding oxidation occurs at the anode internally, and an electric current is produced that is proportional to the concentration of oxygen. This current is measured and conditioned by the instrument's electronic circuitry to give an output in percent O_2 by volume.
Special Calibration Procedure:	The measurement cells used with the O_2 instrument have to be replaced on a regular basis. After extended use, the cell tend to produce a nonlinear response. Therefore, a three-point calibration is performed at the start of each test day to check for linearity. If the response is not linear ($\pm$ 2% of scale), the cell is replaced.

Method:	Carbon Dioxide (CO_2) by Continuous Analyzer
Applicable Ref. Methods:	EPA 3A, ARB 100, BA ST-5
Principle:	A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of CO_2 concentration.
Analyzer:	Horiba PIR 2000
Measurement Principle:	Nondispersive infrared (NDIR)
Accuracy:	1% of full scale
Ranges:	0-5, 0-10, 0-25%
Output:	0-10 mV
Interferences:	A possible interference includes water. Since the instrument receives dried sample gas, this interference is not significant.
Response Time:	1.2 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously.
Analytical Procedure:	Carbon dioxide concentrations are measured by short pathlength nondispersive infrared analyzers. These instruments measure the differential in infrared energy absorbed from energy beams passed through a reference cell (containing a gas selected to have minimal absorption of infrared energy in the wavelength absorbed by the gas component of interest) and a sample cell through which the sample gas flows continuously. The differential absorption appears as a reading on a scale of 0 to 100%.

Method:	Benzene by Gas Chromatography
Reference:	CARB Method 410, Modified EPA Method 601/602.
Principle:	A Tedlar bag is filled with flue gas at a constant rate. The bag contents are analyzed by gas chromatography/photo ionization detection for volatile organic compounds.
Sample Procedure:	Samples are collected using a lung-type sampling system shown in the attached figure. In this system, a bag is placed in a sealed container and the container is evacuated. Flue gas enters the bag as it expands to fill the container. Sampling rate is monitored by a rotameter on the container exhaust. This system allows sample collection without exposing the sample to pumps, flowmeters, oils, etc.
Analytical Procedure:	In the analytical phase, the contents of the Tedlar bags are injected directly on a capillary chromatographic column. Column type, instrument conditions and sample volume are optimized to obtain complete separation of all compounds of interest and detection limits of no more than 10 ppb. Carnot subcontracts these analyses to qualified local laboratories experienced in these analytical procedures.



Sample Train for Determination of Volatile Organic
Compounds (VOC) by EPA 601/602

Method: Semi-volatile Organic Sampling Train (Semi-VOST)

References: CARB Method 429 (for PAH)
ASME Modified Method 5

Principle: A metered flue gas sample is collected isokinetically, and semi-volatile organic compounds are collected on a heated filter, on water-cooled XAD-2 resin module, and in an iced impinger bath. Depending upon the specific test requirements, the samples are then analyzed for polycyclic aromatic hydrocarbons (PAH) species. This section discusses the sampling and sample handling techniques for the semi-VOST method.

Sample Train Preparation: Because of the very low detection limits of the analytical techniques, thorough cleaning of sample train components prior to testing is vital. Prior to testing, all glassware is cleaned in Carnot's laboratory with high purity water, acetone, and hexane rinses, and then baked at high temperature. Resin modules are cleaned and loaded with purified resin by the contract laboratory within one week of the scheduled test date. Batches of Whatman 934AH fiberglass filters are toluene-rinsed and proofed by the contract laboratory. Individual filters are then tared and stored in petri dishes lined with hexane rinsed aluminum foil.

Sample train assembly is performed in an on-site clean room by experienced personnel.

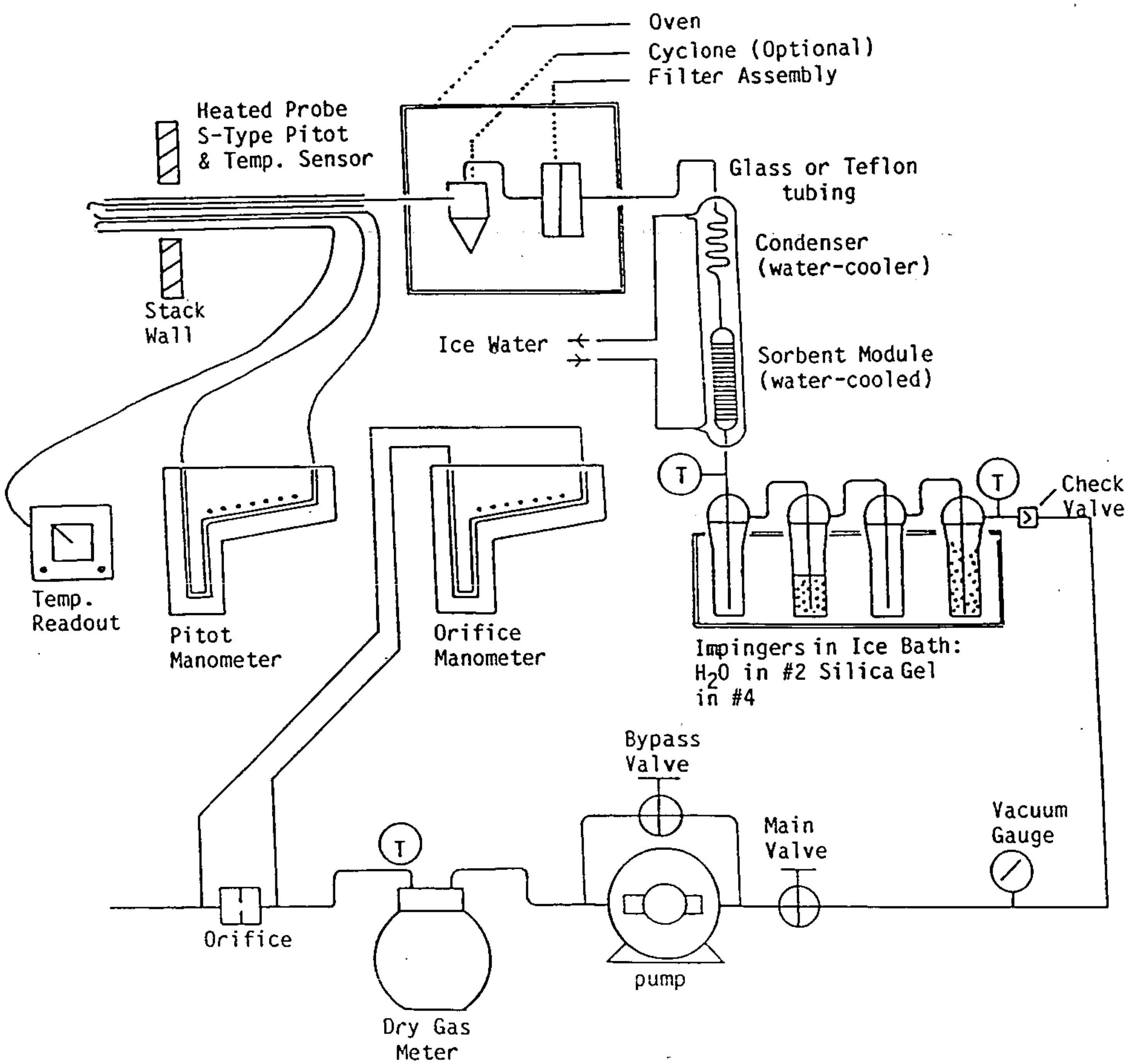
Sampling: The sample train is shown in the attached figure. Sample is pulled through the following components:

1. Glass or nickel-coated stainless steel nozzle
2. Heated glass probe (250 $\pm$ 15 F)
3. Optional cyclone in heated oven (250 $\pm$ 15 F)
4. Filter in heated oven
5. Glass or teflon tubing
6. Condenser/sorbent module cooled with circulating ice water from impinger bath
7. Dry impinger with stub stem
8. Smith-Greenburg impinger with 100 ml DI H_2O
9. Dry impinger as a knockout
10. Impinger containing silica gel
11. Leak-free vacuum pump
12. Calibrated dry gas meter

The pump, meter, manometers, and heater controllers are all contained in a single control box (Andersen Universal or equivalent).

During final sample train assembly and leak check procedures on the stack or duct, special precautions are taken to minimize the chance of contamination. Sample train components are open to the air for as short a time as possible; and during transport to and from the stack, all components are sealed with hexane rinsed aluminum foil.

Semi-VOST Sampling Train



Sample Recovery: All sample recovery is performed in Carnot's laboratory or an on-site clean room. Following sampling the resin module is sealed with glass caps and stored in a refrigerator or ice chest, the filter is placed in a light-proofed petri dish, and all glassware components are rinsed. The rinse consists of three rinses each of distilled water, acetone, hexane, and methylene chloride. All solvents are high purity GS/MC grade, the squirt bottles are teflon, and the sample bottles are amber glass with teflon-lined caps. Water fractions are placed in separate bottles from the solvent rinses to simplify extraction procedures for the contract laboratory.

Field Blank: At least once during each test series, a field blank sample is collected. This consists of assembling a sample train transporting it to and from the stack, leak checking it, and recovering it. This sample is analyzed using the same procedures as for the test samples.

Sample Custody: Full chain of custody is maintained on all reagents, sample trains, and samples by Carnot and by contract laboratories. In addition to formal documentation by the sample custodians, sample data sheets are initialed by the individuals who assemble and recover each sample train component.

Method:	Formaldehyde by HPLC
Reference:	CARB Method 430
Principle:	A metered gas sample is collected non-isokinetically in acidic 2,4-dinitrophenylhydrazine (DNPH) solution. Formaldehyde reacts with DNPH to form the 2,4-dinitrophenylhydrazone derivative. The concentration of this formaldehyde derivative is determined by reverse phase HPLC with an ultraviolet absorption detector.
Sampling Procedure:	A dry metered gas sample is collected through teflon tubing into an iced midget impinger train containing 20 ml of aqueous acidic DNPH solution. Samples are recovered with DNPH solution into precleaned glass bottles, refrigerated and analyzed within 7 days.
Analytical Procedure:	The concentration of the resulting formaldehyde derivative is quantitated after organic solvent extraction using reverse phase HPLC with an ultraviolet absorption detector. Formaldehyde in the sample is identified and quantitated by comparison of peak retention times and peak areas with those of standard solutions.

Method:	Total and Hexavalent Chromium by CARB Method 425
Reference:	CARB Method 425, including proposed changes, adopted 1990
Principle:	A metered flue gas sample is collected isokinetically and total and hexavalent chromium is collected on a heated filter followed by a series of impingers containing 0.1N sodium hydroxide solution.
Sampling Procedure:	The sample train used in the tests is shown in the following figure. The sample is drawn isokinetically through a glass nozzle and a glass probe, followed by two Smith-Greenburg impingers which each contain 100 ml of 0.1N sodium hydroxide solution, a teflon-coated back-up filter, an empty impinger, and an impinger containing silica-gel. All glassware has been previously cleaned in hydrochloric acid, nitric acid and distilled water.

EPA Method 4 (moisture) and Methods 1 and 2 (velocity) are performed in conjunction with the test. Stack velocity is measured during the test to maintain isokinetic sampling and to measure stack flow rate. Moisture concentration is determined by weighing the impingers before and after sampling to determine the amount of moisture collected.

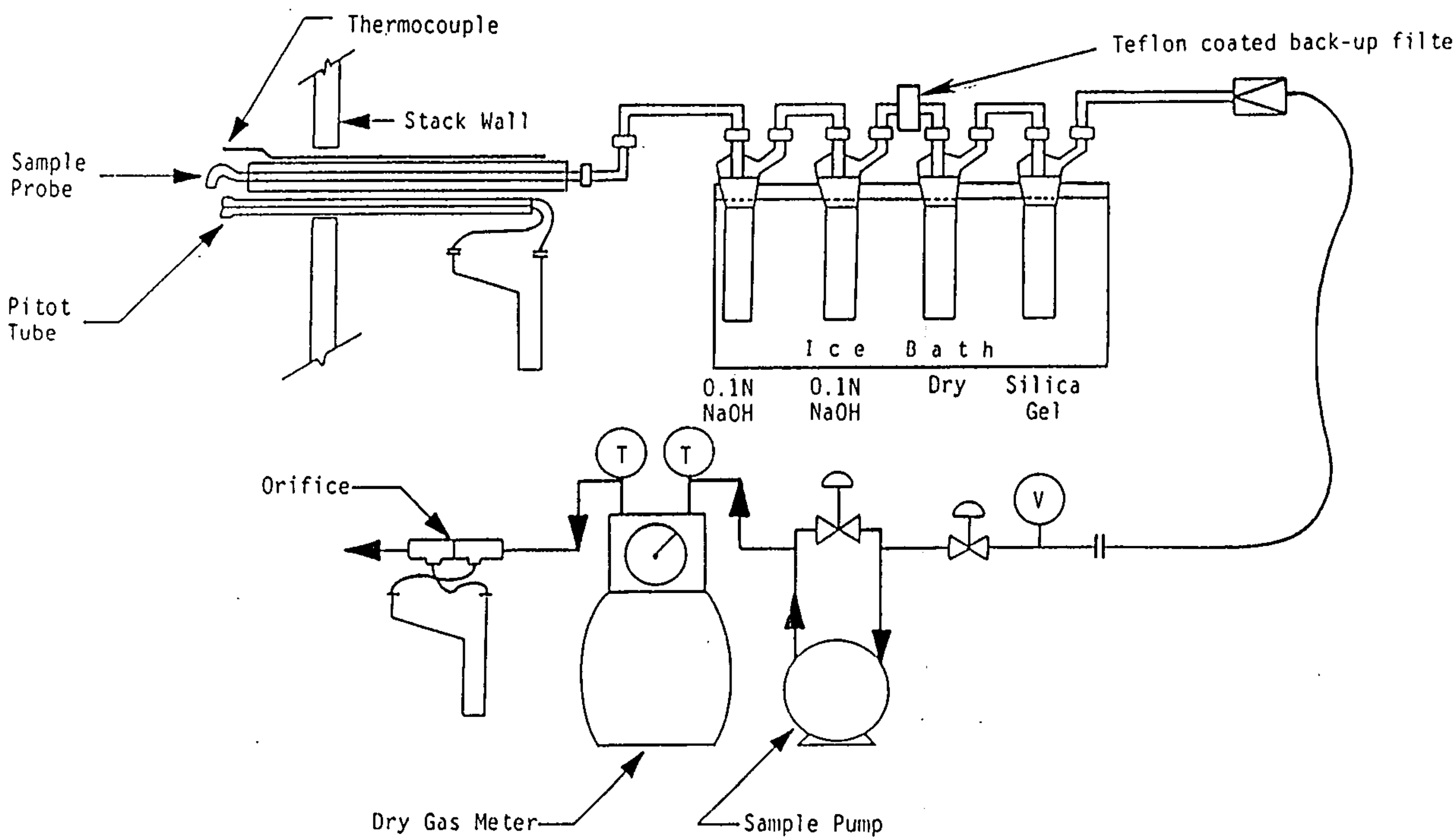
Sample Recovery and Analysis: Following testing, the impingers are weighed for moisture determination and the following sample fractions are recovered:

1. Probe and nozzle - 0.1N NaOH wash and brushing

2. Impingers and connecting glassware - 0.1N NaOH wash

3. Back-up filter - added to impinger catch on-site

Half of each sample fraction is analyzed for hexavalent chromium by ion chromatography. The other half of the sample is composited and decomposed with nitric acid and hydrogen peroxide. The solution from the acidic decomposition is analyzed for total chromium by graphite furnace atomic absorption spectrophotometry. Analyses of reagent blanks, spikes and duplicates are also performed.



Sample Train for Determination of Total and Hexavalent Chromium by Wet Impingement Method CARB Method 425

Method: Determination of Metals by EPA Multi-metals Method

Reference: EPA Draft Publication 8/28/89 "Methodology for the Determination of Metals Emissions in Exhaust Gases From Hazardous Waste Incineration and Similar Combustion Processes"

Principle: A metered flue gas sample is collected isokinetically and metal species are collected on a heated filter followed by a series of impingers.

Sampling Procedure: The sample train used in the tests is shown in the following figure. The sample is drawn isokinetically through a glass nozzle, a glass probe, and a Teflon coated filter in a 250°F temperature-controlled oven. This is followed by two Smith-Greenburg impingers which each contain 100 ml of 5% nitric acid/10% hydrogen peroxide, an impinger containing 100 ml 4% $KMnO_4$/10% H_2SO_4 to absorb excess mercury, and an impinger containing silica-gel. The impingers collect gaseous species while the filter collects any existing as particulate at 250°F. All glassware has been previously cleaned in hydrochloric acid, nitric acid and distilled water.

EPA Method 4 (moisture) and Methods 1 and 2 (velocity) are performed in conjunction with the test. Stack velocity is measured during the test to maintain isokinetic sampling and to measure stack flow rate. Moisture concentration is determined by weighing the impingers before and after sampling to determine the amount of moisture collected.

Sample Recovery and Analysis: Following testing, the impingers are weighed for moisture determination and the following sample fractions are recovered:

1. Probe, nozzle, and front-half glassware - nitric acid/peroxide wash and brushing

2. Filter

3. Nitric acid containing impingers - nitric acid/peroxide wash

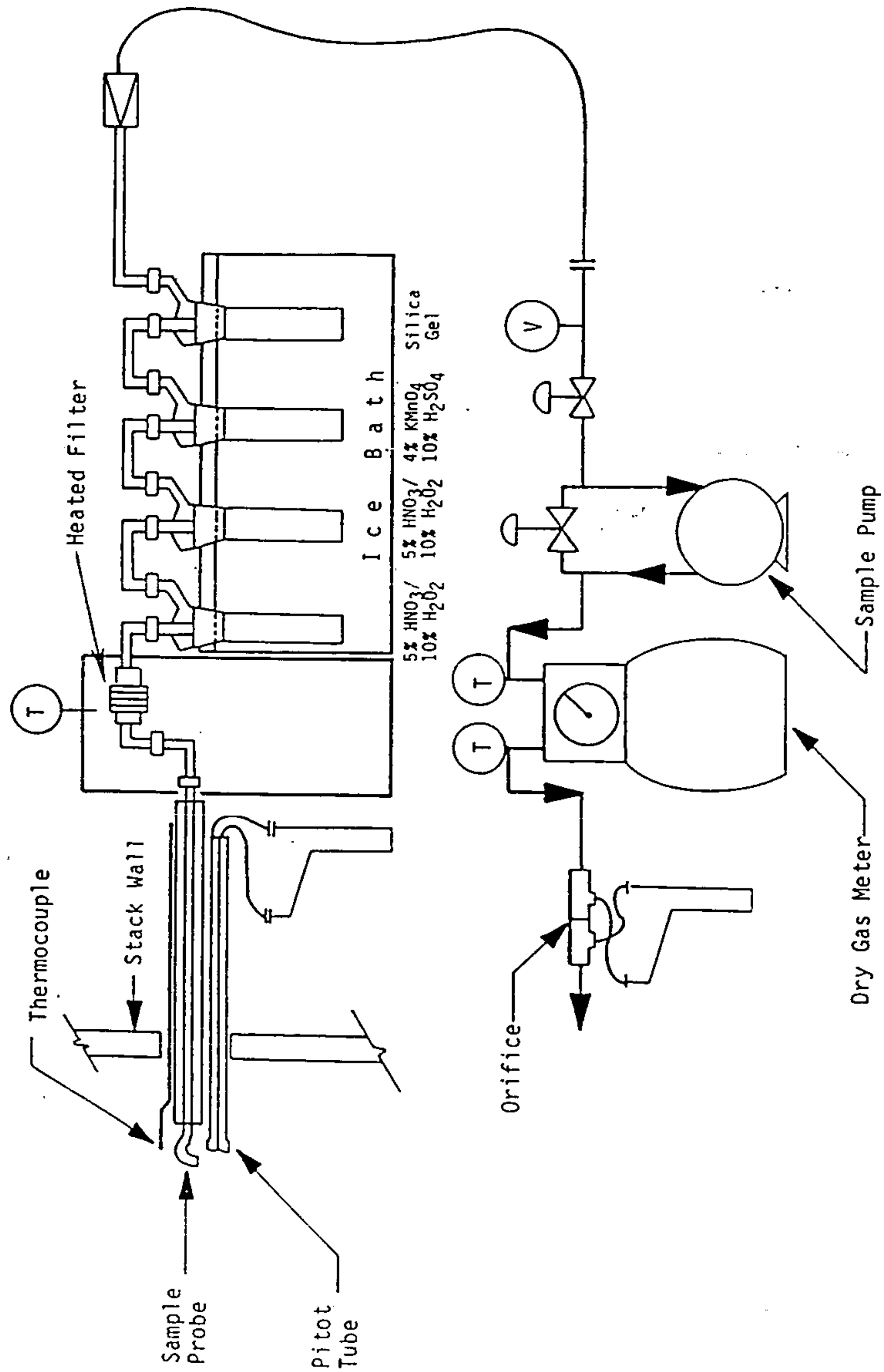
4. Permanganate containing impinger - wash with 4% $KMnO_4$/10% H_2SO_4

The probe wash, filter and the nitric acid/peroxide impinger catch is decomposed using a nitric acid/hydrofluoric acid Parr bomb digestion.

Aliquots of the decomposed probe wash, filter and impinger catch are analyzed for metals of interest by graphite furnace atomic absorption, cold vapor atomic absorption and ICP.

The permanganate impinger catch is decomposed with nitric acid and analyzed for mercury by cold vapor atomic absorption spectrophotometry.

Analyses of reagent blanks, spikes and duplicates are performed for each metal species.



Sample Train for Determination of Metals by EPA Multimetals Method

APPENDIX B

QUALITY ASSURANCE

Appendix B.1

Quality Assurance Program Summary and ARB Certification

QUALITY ASSURANCE PROGRAM SUMMARY AND ARB CERTIFICATION

Carnot ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by an internal QA Officer, and encompasses seven major areas:

1. Development and use of an internal QA manual.
2. QA reviews of reports, laboratory work, and field testing.
3. Equipment calibration and maintenance.
4. Chain of custody.
5. Training.
6. Knowledge of current test methods.
7. Agency certification.

Each of these areas is discussed individually below.

Quality Assurance Manual. Carnot has prepared a QA Manual according to EPA guidelines. The manual serves to document and formalize all of Carnot's QA efforts. The manual is constantly updated, and each member of the Source Test Division is required to read and understand its contents. The manual includes details on the other six QA areas discussed below.

QA Reviews. Carnot's review procedure includes review of each source test report by the QA Officer, and spot check reviews of laboratory and field work.

The most important review is the one that takes place before a test program begins. The QA Officer works closely with Source Test Division personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of any interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance. The equipment used to conduct the emissions measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined by the California Air Resources Board (CARB). The schedule for maintenance and calibrations are given in Tables B-1 and B-2. Quality control checks are also conducted in the field for each test program. The following is a partial list of checks made as part of each CEM system test series.

Sample acquisition and conditioning system leak check.

2-point analyzer calibrations (all analyzers)

3-point analyzer calibrations (analyzers with potential for linearity errors).

Complete system calibration check ("dynamic calibration" through entire sample system).

Periodic analyzer calibration checks (once per hour) are conducted at the start and end of each test run. Any change between pre- and post-test readings are recorded.

TABLE B-1.
SAMPLING INSTRUMENTS AND EQUIPMENT CALIBRATION SCHEDULE
As Specified by the CARB

Instrument Type	Frequency of Calibration	Standard of Comparison or Method of Calibration	Acceptance Limits
Orifice Meter (large)	12 months	Calibrated dry test meter	±2% of volume measured
Dry Gas Meter	12 months or when repaired	Calibrated dry test meter	±2% of volume measured
S-Type Pitot (for use with EPA type sampling train)	6 months	EPA Method 2	Cp constant (+5%) over working range. Difference between the average Cp for each leg must be less than 2%
Vacuum Gauges Pressure Gauges	6 months	Manometer	±3%
Field Barometer	6 months	Mercury barometer	± 0.2" Hg
Temperature Measurement	6 months	NBS mercury thermometer or NBS calibrated platinum RTD	± 4 F for <400°F ± 1.5% for >400°F
Temperature Readout Devices	6 months	Precision potentiometer	± 2% full scale reading
Analytical Balance	12 months (checked prior to each use)	Should be performed by manufacturer or qualified laboratory	± 0.3 mg of stated weight
Probe Nozzles	12 months	Nozzle diameter check micrometer	Range <± 0.10 mm for three measurements
Continuous Analyzers	Depends on use, frequency, and performance	As specified by manufacturers operating manuals, EPA NBS gases, and/ or ref. methods	Satisfy all limits specified in operating specifications

TABLE B-2.
EQUIPMENT MAINTENANCE SCHEDULE
Based on Manufacturer's Specifications
and Carnot Experience

Equipment	Performance Requirement	Maintenance Interval	Corrective Action
Pumps	1. Absence of leaks 2. Ability to draw mfr required vacuum and flow	Every 500 hrs of operation or 6 months whichever is less	1. Visual insp. 2. Clean 3. Replace worn parts 4. Leak check
Flow Measuring Device	1. Free mechanical movement 2. Absence of malfunction	Every 500 hrs of operation or 6 months whichever is less After each test, if used in H_2S sampling or other corrosive atmospheres	1. Visual insp. 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero, span gas	As required by manufacturer	As recommended by manufacturer
Integrated Sampling Tanks	Absence of leaks	Depends on nature of use	1. Steam clean 2. Leak check
Mobile Van Sampling Systems	Absence of leaks	Depends on nature of use	1. Change filters 2. Change gas dryer 3. Leak check 4. Check for system contamination
Sampling Lines	Sample degradation less than two percent	After each test or test series	Blow filtered air thru line until dry

STATE OF CALIFORNIA

George Deukmejian, Governor

AIR RESOURCES BOARD
1102 Q STREET
P.O. BOX 2815
SACRAMENTO, CA 95812

June 21, 1989

Robert A. Finken
Director, Testing Services
Energy Systems Associates
15991 Red Hill Ave., Suite 110
Tustin, CA 92680

Dear Mr. Finken:

Testing Approval

We are pleased to inform you that we have renewed your approval to conduct the types of testing listed in the enclosed Executive Order. This approval is valid until June 30, 1990 during which time a field audit of your company's testing ability may be conducted.

If you have any questions regarding the approvals or other tests, please contact Ms. Kathryn Gugeler at (916) 327-1521 or Mr. Raak Veblen at (916) 327-1519. All correspondance should be addressed to me at the post office box above.

Sincerely,

James J. Morgester, Chief
Compliance Division

All calibrations are conducted using gases certified by the manufacturer to be + 1% of label value (NBS traceable).

Calibration and CEM performance data are fully documented, and are included in each source test report.

Chain of Custody. Carnot maintains full chain of custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, Carnot documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.).

Samples are stored in a locked area to which only Source Test Division personnel have access. Neither other Carnot employees nor cleaning crews have keys to this area.

Data sheets are copied immediately upon return from the field, and this first generation copy is placed in locked storage. Any notes made on original sheets are initialed and dated.

Training. Personnel training is essential to ensure quality testing. Carnot has formal and informal training programs which include:

1. Attendance at EPA-sponsored training courses.
2. Enrollment in EPA correspondence courses.
3. A requirement for all technicians to read and understand Carnot's QA Manual.
4. In-house training and QA meetings on a regular basis.
5. Maintenance of training records.

Knowledge of Current Test Methods. With the constant updating of standard test methods and the wide variety of emerging test methods, it is essential that any qualified source tester keep abreast of new developments. Carnot subscribes to services which provide updates on EPA and CARB reference methods, and on EPA, CARB, and SCAQMD rules and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences. Carnot personnel maintain membership in the Air Pollution Control Association, the Source Evaluation Society, and the ASME Environmental Control Division.

AGENCY CERTIFICATION

Carnot is certified by the CARB as an independent source test contractor for gaseous and particulate measurements. Carnot also participates in EPA QA audit programs for Methods 5, 6, and 7.

Additionally, Carnot's QA Officer is actively participating on a Source Evaluation Society committee to develop a nationwide accreditation program for source testers.

State of California
AIR RESOURCES BOARD

Executive Order G-482

WHEREAS, the Air Resources Board ("Board"), pursuant to Section 41512 of the California Health and Safety Code, has established the procedures contained in Section 91200-91220, Title 17, California Code of Regulations, to allow the use of independent testers for compliance tests required by the Board; and

WHEREAS, pursuant to Sections 91200-91220, Title 17, California Code of Regulations, the Executive Officer has determined that Energy Systems Associates meets the requirements of the Board for conducting ARB Test Methods 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-8, 1-10, and 1-100 (NOx, and O2).

NOW, THEREFORE, BE IT ORDERED that Energy Systems Associates is granted an approval, from the date of execution of this order, until June 30, 1990 to conduct the tests listed above, subject to compliance with Section 91200-91220, Title 17, California Code of Regulations.

BE IT FURTHER ORDERED that during the approved period the Executive Officer or his or her authorized representative may field audit one or more tests conducted pursuant to this order for each type of testing listed above.

Executed at Sacramento, California, this 19TH day of June 1989.

James J. Morgester, Chief
Compliance Division

Appendix B.2

Calibration Data

ENERGY SYSTEMS ASSOCIATES POST TEST DRY GAS METER CALIBRATION CHECK

CALIBRATED BY JJM
DATE 03/21/90
FIELD GAS METER I.D. ES-8
INITIAL Yd 0.990
INITIAL H@ 1.920

DATA ENTRY BY JJM
BAROMETRIC PRESSURE 30.08
TEST METER ES-13
TEST METER Y (Yt) 1.000
TEST METER LAST CAL. 12/89

FIELD METER				TEST METER			RESULTS		
VOLUME cu.ft.	TEMP. IN	TEMP OUT	DELTA "H2O	TIME min.	VOLUM cu.ft	TEMP. 'F	Q cfm	Y	H@
7.24	99	86	1.50	10	6.85	68	0.72	0.986	1.72
7.19	102	90	1.50	10	6.78	68	0.72	0.990	1.73
7.20	105.	91.5	1.50	10	6.77	68	0.72	0.991	1.74
						AVERAGES		0.989	1.73

PASS - INDIVIDUAL Yd VALUES ACCEPTABLE
PASS - INDIVIDUAL DELTA H@ VALUES ACCEPTABLE
PASS - POST TEST Yd WITHIN LIMITS

E∫A

POST TEST DRY GAS METER CALIBRATION DATA

Calibrated By J. Mulligan

Date 3/21/90

Field Meter ID ES - 8

Barometric Press 30.05

Test Meter ID ES - 13

Test Meter Y (Y_t) 1.00

Test Meter Last Cal 12 - 14 - 89

Test Program Preceding Calibration Check SCC / Alamitos

Average ΔH from Test Runs

Maximum Vacuum from Test Runs

Field Meter								Test Meter				
				Temperature							Temperature	
ΔH	Final Volume	Initial Volume	Volume (V_{dg})	Inlet (t_i)	Outlet (t_o)	Vacuum	Time (Θ)	Final Volume	Initial Volume	Volume (V_{tm})	Inlet	Outlet
1.5	597.287	590.045	7.242	95	84	2	10.00	347.644	340.784	6.85	68	68
				103	88						68	68
1.5	604.481	597.287	7.194	101	85	2	10.00	354.431	347.644	6.787	68	68
				103	91						68	68
1.5	611.684	604.481	7.203	101	91	2	10.00	361.205	354.431	6.774	68	68
				110	92						68	68

ESA/MSC-165

DS-108
6/89

ENERGY SYSTEMS ASSOCIATES POST TEST DRY GAS METER CALIBRATION CHECK

CALIBRATED BY JJM — DATA ENTRY BY JJM

DATE 03/11/90 — BAROMETRIC PRESSURE 30

FIELD GAS METER I.D. ES-8 — TEST METER ES-13

INITIAL Yd 0.990 — TEST METER Y (Yt) 1.000

INITIAL H@ 1.920 — TEST METER LAST CAL. 12/89

FIELD METER				TEST METER			RESULTS		
VOLUME cu.ft.	TEMP. IN	TEMP OUT	DELTA "H2O	TIME min.	VOLUM cu.ft	TEMP. 'F	Q cfm	Y	H@
5.67	77	62.5	1.00	10	5.46	58	0.57	0.984	1.81
5.70	86	67.5	1.00	10	5.44	58	0.57	0.988	1.81
5.72	88	71.5	1.00	10	5.42	58	0.57	0.985	1.81
						AVERAGES		0.986	1.81

PASS - INDIVIDUAL Yd VALUES ACCEPTABLE

PASS - INDIVIDUAL DELTA H@ VALUES ACCEPTABLE

PASS - POST TEST Yd WITHIN LIMITS

E∫A

POST TEST DRY GAS METER CALIBRATION DATA

Calibrated By L. Mulligan

Date 3/11/90

Field Meter ID ES-8

Barometric Press 30.00

Test Meter ID ES-13

Test Meter Y (Y_t) 1.00

Test Meter Last Cal 12/14/89

Test Program Preceding Calibration Check ______

Average ΔH from Test Runs ______

Maximum Vacuum from Test Runs ______

Field Meter								Test Meter				
				Temperature							Temperature	
ΔH	Final Volume	Initial Volume	Volume (V_{dg})	Inlet (t_i)	Outlet (t_o)	Vacuum	Time (0)	Final Volume	Initial Volume	Volume (V_{tm})	Inlet	Outlet
1.0	140.153	134.485	5.668	75	61	2	10:00	284.357	278.791	5.466	58	58
				83	64						58	58
1.0	145.851	140.153	5.698	84	66	2	10.00	289.703	284.257	5.446	58	58
				88	69						58	58
1.0	151.574	145.851	5.723	84	70	2	10.00	295.127	285.703 ~~288.703~~	5.424	58	58
				92	73						58	58

ESA/MSC-165

DS-108
6/89

ANDERSEN
SAMPLERS INCORPORATED

4215 WENDELL DRIVE ▫ ATLANTA, GEORGIA 30336

CONTROL UNIT CALIBRATION

Date 1-20-84 Box No. 184-209 (ES-8)

Barometric pressure, P_b = 30.30 in. Hg Dry Gas Meter No. ______

Orifice manometer setting, ΔH in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Temperature: Wet test Meter t_w, °R	Temperature: Dry gas meter Inlet t_{di}, °R	Temperature: Dry gas meter Outlet t_{do}, °R	Temperature: Dry gas meter Average t_d, °R	Time θ, min	γ	ΔH@
1.0	5	5.43	71/531	120	92	106/566	9.5	.982	1.88
2.0	5	5.42	71/531	127	93	110/570	6.8	.990	1.91
4.0	5	5.41	71/531	134	94	114/574	4.9	.999	1.97
								.990	1.92

Calculations

ΔH	$\frac{\Delta H}{13.6}$	γ: $\frac{V_w P_b (t_d)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w)}$	ΔH@: $\frac{0.0317\ \Delta H}{P_b (t_d)} \left[\frac{(t_w)\ \theta}{V_w}\right]^2$
1.0	0.0735		
2.0	0.147		
4.0	0.294		

γ = Ratio of accuracy of wet test meter to dry test meter. Tolerance = ± 0.01

ΔH@ = Orifice pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O. Tolerance – ± 0.15

Calibrated by: [signature]

ENERGY SYSTEMS ASSOCIATES POST TEST DRY GAS METER CALIBRATION CHECK

CALIBRATED BY	RJP	DATA ENTRY BY	RJP
DATE	03/18/90	BAROMETRIC PRESSURE	30.13
FIELD GAS METER I.D.	ES-19	TEST METER	ES-13
INITIAL Yd	1.000	TEST METER Y (Yt)	1.000
INITIAL H@	1.830	TEST METER LAST CAL.	12/89

FIELD METER				TEST METER			RESULTS		
VOLUME cu.ft.	TEMP. IN	TEMP OUT	DELTA "H2O	TIME min.	VOLUM cu.ft	TEMP. 'F	Q cfm	Y	H@
3.12	79.6	69	0.25	10	3.03	64	0.31	0.989	1.48
2.82	91.3	71.3	0.25	9	2.73	64.5	0.31	0.997	1.47
3.14	89.6	75.3	0.25	10	3.03	64.75	0.31	0.998	1.47
						AVERAGES		0.995	1.48

PASS - INDIVIDUAL Yd VALUES ACCEPTABLE
PASS - INDIVIDUAL DELTA H@ VALUES ACCEPTABLE
PASS - POST TEST Yd WITHIN LIMITS

E/A

POST TEST DRY GAS METER CALIBRATION DATA

Calibrated By RJP

Date 3-18-90

Field Meter ID ES-19

Barometric Press 30.13

Test Meter ID ES-13

Test Meter Y (Y_t) ______

Test Meter Last Cal ______

Test Program Preceding Calibration Check SCE / ALAMITOS

Average ΔH from Test Runs .25

Maximum Vacuum from Test Runs 15

Field Meter								Test Meter				
				Temperature							Temperature	
ΔH	Final Volume	Initial Volume	Volume (V_{dg})	Inlet (t_i)	Outlet (t_o)	Vacuum	Time (0)	Final Volume	Initial Volume	Volume (V_{tm})	Inlet	Outlet
.25	319.187	316.063		70/82 87/	68/69 70/	15	10	325.532	322.499		64/64	64/64
.25	322.011	319.187		89/91 94	72/72 74	15	9	328.243	325.532		64 64	65 65
.25	325.151	322.011		84/91 96/	74/75 77/	15	10	331.296	328.243		64 65	65 65

ESA/MSC-165

DS-108
6/89

ENERGY SYSTEMS ASSOCIATES   POST TEST DRY GAS METER CALIBRATION CHECK

CALIBRATED BY JJM
DATE 03/11/90
FIELD GAS METER I.D. ES-19
INITIAL Yd 1.000
INITIAL H@ 1.830

DATA ENTRY BY JJM
BAROMETRIC PRESSURE 30
TEST METER ES-13
TEST METER Y (Yt) 1.000
TEST METER LAST CAL. 12/89

FIELD METER				TEST METER			RESULTS		
VOLUME cu.ft.	TEMP. IN	TEMP OUT	DELTA "H2O	TIME min.	VOLUM cu.ft	TEMP. 'F	Q cfm	Y	H@
5.91	79	63	1.00	10	5.80	58	0.59	1.005	1.60
5.92	86	65.5	1.00	10	5.86	58	0.59	1.022	1.56
6.00	89	69.5	1.00	10	5.70	58	0.60	0.988	1.64
							AVERAGES	1.005	1.61

PASS - INDIVIDUAL Yd VALUES ACCEPTABLE
PASS - INDIVIDUAL DELTA H@ VALUES ACCEPTABLE
PASS - POST TEST Yd WITHIN LIMITS

E∫A

POST TEST DRY GAS METER CALIBRATION DATA

Calibrated By J. McNaghton

Date 3/11/90

Field Meter ID ES-19

Barometric Press 30.60

Test Meter ID ES-13

Test Meter Y (Y_t) 1.00

Test Meter Last Cal 12/14/89

Test Program Preceding Calibration Check __________

Average ΔH from Test Runs __________

Maximum Vacuum from Test Runs __________

Field Meter								Test Meter				
				Temperature							Temperature	
ΔH	Final Volume	Initial Volume	Volume (V_{dg})	Inlet (t_i)	Outlet (t_o)	Vacuum	Time (O)	Final Volume	Initial Volume	Volume (V_{tm})	Inlet	Outlet
1.0	908.732	902.825	5.907	75	62	2	18.06	307.232	301.425	5.807	58	58
				83	64						58	58
1.0	914.653	908.732	5.921	82	64	2	10.00	313.097	307.232	5.865	58	58
				90	67						58	58
1.0	920.650	914.653	5.997	85	78	2	16.00	318.802	313.097	5.765	58	58
				93	71						58	58

ANDERSEN
SAMPLERS INCORPORATED

4215 WENDELL DRIVE ≡ ATLANTA, GEORGIA 30336

CONTROL UNIT CALIBRATION

Date 1-28-87 Unit Number 187-342 (ES-1?

Barometric pressure, P_b = 29.98 in Hg. Model Number 90-800

Orifice manometer setting, ΔH in. H_2O	Gas volume, wet test meter V_w, ft^3	Gas volume, dry gas meter V_d, ft^3	Temperature: Wet test Meter t_w, °R	Dry gas meter Inlet t_{di}, °R	Dry gas meter Outlet t_{do}, °R	Dry gas meter Average t_d, °R	Time θ, min	Y	$\Delta H@$
1.0	5	5.42	76/536	132	102/562	117/577	9.18	.99	1.82
2.0	5	5.40	76/536	136	104/564	120/580	6.52	1.00	1.83
4.0	5	5.38	76/536	141	105/565	123/583	4.64	1.00	1.85
								1.00	1.83

Calculations

ΔH	$\frac{\Delta H}{13.6}$	Y: $\dfrac{V_w P_b (t_d)}{V_d\left(P_b + \frac{\Delta H}{13.6}\right)(t_w)}$	$\Delta H@$: $\dfrac{0.0317 \Delta H}{P_b (t_{do})}\left[\dfrac{(t_w)\theta}{V_w}\right]^2$
1.0	0.0735		
2.0	0.147		
4.0	0.294		

Y = Ratio of accuracy of wet test meter to dry test meter. Tolerance : ± 0.01

$\Delta H@$ = Orifice pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O. Tolerance : ± 0.15

Calibrated by: [signature]

APPENDIX C

DATA SHEETS, LABORATORY REPORTS, AND SPECIFIC EMISSIONS CALCULATIONS

Appendix C.1

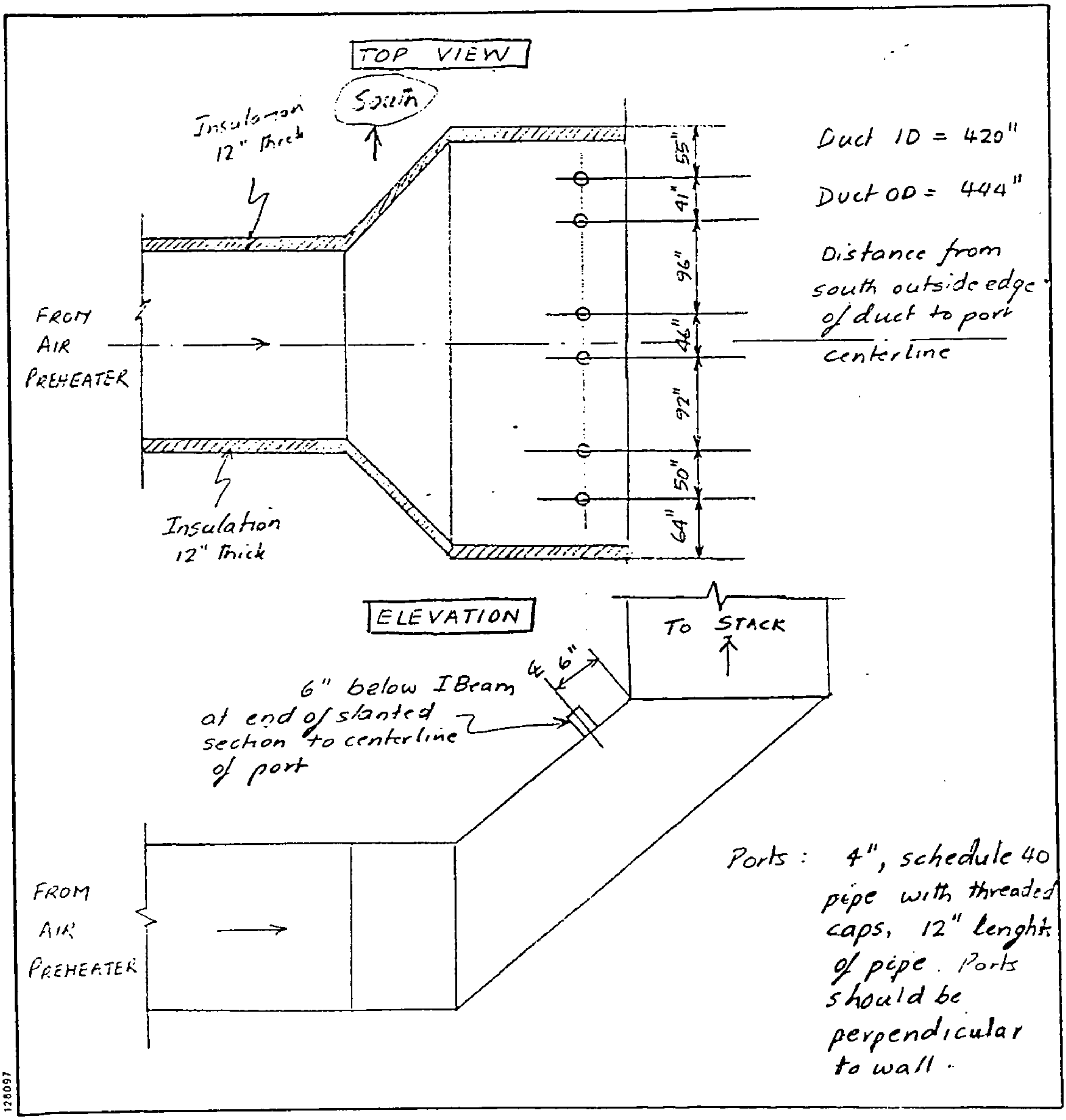
Sample Location

E/A [illegible] Systems Associates A CORPORATION
159[illegible] RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

FIGURE NO.: ALAMITOS 5 NORTH AND SOUTH DUCT AIR PREHEATER OUTLET DUCT TEST LOCATIONS JOB NO. ______

SHEET NO. 1 of 1

DRAWN BY VR DATE 01-29-90 CHECKED BY ______ DATE ______



128097

Appendix C.2

Unit Data

* Check with Eng re. fuel flow.

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Program: TOXIC HOT SPOTS

Data By: M. ESCARCEGA

Test Number		1	1	2	2	3	3
Date		3/12/90	3/12/90	3/13/90	3/13/90	3/13/90	3/13/90
Time		1530	1700	0905	1050	1320	1510
Fuel		OIL	OIL	OIL	OIL	OIL	OIL
Load (net)	Mw	470	474	471	470	468	468
Aux. load	Mw	12.1	12.2	12.8	12.9	12.8	12.8
Burners O.O.S.		3RD EL.	3RD EL	→	→	→	
NOx Ports		CLOSED	CLOSED	→	→	→	→
O2 Level		AS FOUND	AS FOUND	→	→	→	→
Gas Recirculation to Windbox		YES	YES	YES	YES	YES	YES
Gas Recirculation to Hopper		NO	NO	NO	NO	NO	NO
Registers		OPEN	OPEN	→	→	→	→
O2 FURN N	%	3.5	3.6	3.7	0.0	3.7	3.7
O2 S	%	4.2	4.1	4.2	4.3	4.4	4.3
CO N	ppm	0	4	0	0	0	0
CO S	ppm	14	12	15	12	15	6
Gas Hdr. Press	psig	66	66	66	66	66	66
Gas Burner Press	psig	0	0	0	0	0	0
Windbox Pressure	"H2O	28	29	31	31	31	31
Furnace Pressure	"H2O	9.5	10	8.5	8	6	5
Wb/Furn Differential	"H2O	18.5	19	22.5	23	25	26
A.H. Diff. N	"H2O	5.0	5.1	5.5	5.5	5.2	5.0
A.H. Diff. S	"H2O	3.8	3.9	3.3	3.3	3.8	4.1
Econ. Diff. SH N	"H2O	3.8	4.0	3.7	3.6	3.5	3.5
Econ. Diff. RH S	"H2O	4.2	4.5	4.3	4.3	4.1	4.1
Gas Flow	MCFH	0	0	0	0	0	0
Aux. Steam Flow	klb/hr	0	0	40	40	40	40
Steam Flow	10^4/hr	335	337	340	335	335	340
Feedwater Flow	10^4/hr	325	330	340	335	325	330
Steam Pressure (digital chart)	psig	3485	3487	3487	3488	3489	3486
Total Fuel Flow	%	77	78	79	78	77	79

PP. Pg 9 NTER

Fuel Gas supply

wall above desk

chart

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESCARCEGA

Test Number			1	1	2	2	3	3
Air Flow Total		%	91	92	95	95	94	94
Air Flow N/S			—	—	—	—	—	—
F.W. to Fuel Flow		%	74	74	76	76	75	75
Final S.H. Steam Temp.		°F	1010	1012	1000	1000	990	980
R.H. Temperature		°F	1015	1015	1010	1010	1000	1000
Pri. S.H. Dwncmr		°F	770	770	770	770	760	765
S.H. Attemp. Spray	N	klb/hr	0	0	0	0	0	0
S.H. Attemp. Spray	S	klb/hr	0	0	0	0	0	0
F.D. Fan Amps	N	Amps	395	400	430	430	430	430
F.D. Fan Amps	S	Amps	380	390	420	420	420	420
Recirc. Fan Amps	N	Amps	62	62	62	62	64	63
Recirc. Fan Amps	S	Amps	50	50	50	50	52	51
Boiler Master		%	78	78	80	80	80	80
Boiler Master Bias		%	48	48	48	48	48	48
Firing Rate		%	78	78	80	80	80	80
Fuel Gas		%	0	0	0	0	0	0
Base Fuel Setter		%	0	0	0	0	0	0
Base Fuel Setter Bias		%	0	0	0	0	0	- 0
O_2 Adjuster		%	86	86	90	90	90	90
O_2 Bias		%	0	0	0	0	0	0
RH/SH Prop. Dampers		%	65/70	65/70	55/80	55/85	55/88	55/88
Prop. Damper Bias		%	0	0	0	0	0	0
Gas Recirc.	N	%	80	80	81	82	81	81
Gas Recirc. Bias		%	7	7	7	7	7	7
Gas Recirc.	S	%	83	82	82	82	82	83
R.H. Spray		%	0	0	0	0	0	0
F.D. Fan Inlet	N	%	65	67	76	78	79	80
F.D. Fan Inlet	S	%	62	65	75	76	80	80
F.D. Fan Inlet Bias	S	%	-2	-2	-2	-2	-2	-2
S.H. Temperature		%	97	96	100+	100+	100+	100+
S.H. Temperature Bias		%	10	10	10	10	10	10
S.H. Spray	N	%	0	0	0	0	0	0
S.H. Spray Set Pt.	N	%	0	0	1	1	1	1
S.H. Spray	S	%	0	0	0	0	0	0
S.H. Spray Bias	S	%	2	2	3	3	3	3

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESCARCEGA

ND DP of CONSOLE

COMP SCREEN

Test Number			1	1	2	2	3	
O_2 In. Comb. Air	N	%	—	—	—			
O_2 In. Comb. Air	S	%	—	—	—			
Hopper Diff. Press	N	"H_2O	1.8	1.8	1.8	1.8	1.8	1.8
Air Foil Diff. Press	N	"H_2O	0.5	0.5	0.7	0.6	0.6	0.5
Booster Fan Amps	N	Amps	107	105	115	115	115	112
Booster Fan Amps	S	Amps	94	95	105	105	105	105
Air Foil Diff. Press	S	"H_2O	-5	-5	-5	-5	-5	-5
Hopper Diff. Press	S	"H_2O	+4	+4	+4	+4	+4	+4
Fuel Select	N	%	50	49	50	50	50	49
G.R. to Hopper	N	%	0	0	0	0	0	0
G.R. to Airfoil	N	%	52	52	60	60	60	60
G.R. to Airfoil	N	set pt	46	46	46	45	46	46
Tie Damper		%	0	0	0	0	0	0
G.R. to Airfoil	S	%	56	56	70	70	70	70
G.R. to Airfoil	S	set pt	50	50	50	50	50	50
G.R. to Hopper	S	%	0	0	0	0	0	0
Fuel Select	S	%	50	50	50	50	50	51
Feedwater 1st pt.	N	°F	—	—	—	—	—	—
Feedwater 1st pt.	S	°F	—	—	—	—	—	—
A.H. Air In	N	°F	56	59	51	56	58	58
A.H. Air Out	N	°F	567	566	571	572	573	572
A.H. Gas In	N	°F	707	716	725	726	727	726
A.H. Gas Out	N	°F	284	284	286	289	294	294
A.H. Air In	S	°F	OOS					
A.H. Air Out	S	°F	548	550	550	551	549	548
A.H. Gas In	S	°F	682	685	686	687	686	685
A.H. Gas Out	S	°F	247	248	244	241	246	248
Dvsn. Wall Out Temp.								
	#14		—					
	#22		—					

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESPARCEGA

Test Number		1	1	2	2	3	3
CEM Data:		1545	1645	0915	1045	1315	1500
Load, MW MLB		477	480	477	478	475	474
OIL ~~Gas~~ Flow, ~~mcfh~~ KLB/HR		236	238	240	239	238	239
Heat Rate: actual		—	—	—	—	—	
: expected		—	—	—	—	—	
NOx NOx: lb/hr		978	977	988	989	963	969
PPMC : ppm @ 3% O_2		167.9	166.1	166.6	167.3	164	164
O_2,%		6.1	6.1	6.4	6.4	6.4	6.4
PPM NO_x RAW		139.3	137	135	136	132	132
Test Data Summary:							
O_2,% N/S		—	—	—	—	—	—
NOxc, ppm N/S		—	—	—	—	—	—
CO, ppm N/S		—	—	—	—	—	—
Oil Tank		677	627	627	617	617	617
1179 Tank Level							
Oil Temperature	°F	180	180	175	175	170	170
WALL Fuel Oil Return (in)	psig	760	750	780	780	770	780
Fuel Oil Supply (in)	psig	1050	1000	1050	1060	1050	1060
UP INSIDE Fuel Oil Return (in)	klb/hr	66	60	70	70	70	65
Fuel Oil Supply (in)	klb/hr	285	280	288	290	270	285
TOT ON Fuel Oil Return	%	—	—	80	80	81	82
Oil Supply	%	—	—	100	100	95	97
OIL FLOW (CHART) ↑ GEN DEN	KLB/HR	233	235	237	235	235	235
Comments:							
CHART SUPPLIES							

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Program Toxic Hot Spots   Data By: M. Esparza

Test Number		4	4	5	5	6	6
Date		3/13/90	3/13/90	3/14/90	3/14/90	3/14/90	3/14/90
Time		1645		0825	1020	1245	1430
Fuel		OIL	OIL	OIL	OIL	OIL	OIL
Load (net)	Mw	470	469	468	466	467	464
Aux. load	Mw	12.8	12.9	12.2	12.3	12.2	12.3
Burners O.O.S.		3RD EL.					
NOx Ports		CLOSED					
O2 Level		AS FOUND					
Gas Recirculation to Windbox		YES	YES	YES	YES	YES	YES
Gas Recirculation to Hopper		NO	NO	NO	NO	NO	NO
Registers		OPEN	OPEN				
O_2 N	%	3.7	3.7	3.3	3.3	3.4	3.4
O_2 S	%	4.2	4.5	3.9	3.9	4.0	4.1
CO N	ppm	0	0	2	0	4	0
CO S	ppm	12	14	14	21	22	20
Gas Hdr. Press	psig	66	66	66	66	66	66
Gas Burner Press	psig	0	0	—	—		
Windbox Pressure	"H_2O	31	31	29	28	29	29
Furnace Pressure	"H_2O	11	10	2	3	2	3
Wb/Furn Differential	"H_2O	20	21	27	25	27	26
A.H. Diff. N	"H_2O	5.0	5.0	5.2	5.1	5.0	5.0
A.H. Diff. S	"H_2O	3.9	3.8	3.3	3.7	3.7	3.8
Econ. Diff. SH N	"H_2O	3.6	3.5	3.8	3.5	3.5	3.5
Econ. Diff. RH S	"H_2O	4.2	4.3	4.4	4.2	4.3	4.3
Gas Flow	MCFH	0	0	0	0	0	0
Aux. Steam Flow	klb/hr	41	41	27	27	25	25
Steam Flow	10^4/hr	340	340	335	335	335	335
Feedwater Flow	10^4/hr	335	335	330	330	330	330
Steam Pressure	psig	3487	3487	3484	3485	3486	3490
Total Fuel Flow	%	78	79	78	78	79	78

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CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESCARCEGA

Test Number			4	4	5	5	6/7	6/7
Air Flow Total		%	94	94	92	92	92	92
Air Flow N/S			—	—	—	—	—	—
F.W. to Fuel Flow		%	75	76	75	74	74	74
Final S.H. Steam Temp.		°F	1000	1000	1000	990	990	990
R.H. Temperature		°F	1000	1000	1000	990	990	990
Pri. S.H. Dwncmr		°F	765	765	765	765	765	765
S.H. Attemp. Spray	N	klb/hr	0	0	—	—	—	—
S.H. Attemp. Spray	S	klb/hr	0	0	—	—	—	—
F.D. Fan Amps	N	Amps	435	430	395	395	395	400
F.D. Fan Amps	S	Amps	420	420	390	390	395	400
Recirc. Fan Amps	N	Amps	62	62	61	61	61	61
Recirc. Fan Amps	S	Amps	51	51	50	51	50	50
Boiler Master		%	80	80	80	79	79	79
Boiler Master Bias		%	48	48	48	48	48	48
Firing Rate		%	79	79	79	78	78	79
Fuel Gas		%	0	0	0	0	0	0
Base Fuel Setter		%	0	0	0	0	0	0
Base Fuel Setter Bias		%	0	0	-0	-0	-0	-0
O_2 Adjuster		%	90	90	86	87	87	87
O_2 Bias		%	0	0	0	0	0	0
RH/SH Prop. Dampers		%	52/90	50/88	60/78	60/79	60/79	60/79
Prop. Damper Bias		%	0	0	0	0	0	0
Gas Recirc.	N	%	81	81	82	81	81	81
Gas Recirc. Bias		%	7	7	7	7	7	7
Gas Recirc.	S	%	82	82	82	82	82	83
R.H. Spray		%	0	0	0	0	0	0
F.D. Fan Inlet	N	%	78	78	63	64	65	65
F.D. Fan Inlet	S	%	78	78	64	66	67	70
F.D. Fan Inlet Bias	S	%	-2	-2	+2	+2	+2	+2
S.H. Temperature		%	100+	100+	100+	100+	100+	100+
S.H. Temperature Bias		%	10	10	10	9.9	10	10
S.H. Spray	N	%	0	0	0	0	0	0
S.H. Spray Set Pt.	N	%	0	0	1	1	1	1
S.H. Spray	S	%	0	0	0	0	0	0
S.H. Spray Bias	S	%	3	3	3	3	3	3

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESPARZEGA

Test Number			4	4	5	5	6/7	6/7
O_2 In. Comb. Air	N	%	—	—	—	—	—	—
O_2 In. Comb. Air	S	%	—	—	—	—	—	—
Hopper Diff. Press	N	"H_2O	1.8	1.8	1.8	1.8	1.8	1.8
Air Foil Diff. Press	N	"H_2O	0.6	0.5	0.4	0.4	0.4	0.3
Booster Fan Amps	N	Amps	112	113	105	110	105	105
Booster Fan Amps	S	Amps	103	105	100	100	100	100
Air Foil Diff. Press	S	"H_2O	-5	-5	-5+	-5+	-5+	-5+
Hopper Diff. Press	S	"H_2O	+4	+4	4+	4+	4+	4+
Fuel Select	N	%	49	49	49	49	50	50
G.R. to Hopper	N	%	0	0	0	0	0	0
G.R. to Airfoil	N	%	59	59	50	50	50	50
G.R. to Airfoil	N	set pt	46	46	46	46	46	45
Tie Damper		%	0	0	0	0	0	0
G.R. to Airfoil	S	%	70	70	60	60	60	60
G.R. to Airfoil	S	set pt	50	50	51	51	51	51
G.R. to Hopper	S	%	0	5	0	0	0	0
Fuel Select	S	%	50	50	50	50	50	50
Feedwater 1st pt.	N	°F	—	—	—	—	—	—
Feedwater 1st pt.	S	°F	—	—	—	—	—	—
A.H. Air In	N	°F	59	58	52	56	59	59
A.H. Air Out	N	°F	573	574	568	569	569	570
A.H. Gas In	N	°F	726	723	708	713	712	718
A.H. Gas Out	N	°F	294	292	282	288	289	292
A.H. Air In	S	°F	—	—	—	—	—	—
A.H. Air Out	S	°F	550	549	547	547	541	545
A.H. Gas In	S	°F	688	686	680	680	680	682
A.H. Gas Out	S	°F	248	249	239	244	245	245
Dvsn. Wall Out Temp.								
	#14		—	—				
	#22		—	—				

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESCARIEGA

Test Number		4	4	5	5	6/7	6/7
CEM Data:		1645	1800	~~0845~~	1015	1230	1415
Load, MW		475	476	471	474	471	471
OIL ~~Gas~~ Flow, ~~mcfh~~ KLB/HR		240	240	237	237	236	239
Heat Rate: actual		—	—	—	—	—	—
: expected		—	—	—	—	—	—
NOx: lb/hr		977	968	953	945	945	952
: ppm @ 3% O_2		164.4	163.5	163.3	161.3	161.9	161.2
O_2,%		6.4	6.4	6.1	6.1	6.1	6.3
NO_x RAW		133.3	132.8	135.0	132.9	133.6	131.9
Test Data Summary:							
O_2,% N/S		—	—	—	—	—	—
NOxc, ppm N/S		—	—	—	—	—	—
CO, ppm N/S		—	—	—	—	—	—
Oil Tank		687	687	687	687	687	687
Tank Level		—	—	—	—	—	—
Oil Temperature	°F	170	170	165	165	165	160
Fuel Oil Return (in)	psig	780	780	760	750	640	760
Fuel Oil Supply (in)	psig	1050	1050	1050	1040	950	1060
Fuel Oil Return (in)	klb/hr	65	67	70	70	50	70
Fuel Oil Supply (in)	klb/hr	285	286	285	285	270	290
Fuel Oil Return	%	82	82	81	82	86	80
Oil Supply	%	96	96	94	94	79	100
OIL FLOW (CHART)	KLB/HR	237	236	235	235	235	235
Comments:							
Test 5: CEM OOS		from	0800 to	0830			
Test 6 start ≈	1230						
Test 7 start ≈	1255						

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

493-7805

Program Toxic Hot Soak

Data By: BJK/M.ESCARCEGA

Test Number		6	7	7	8	8	8
Date		3/14/90	3/15/90	3/15/90	3/15/90	3/15/90	3/15/90
Time		1600	0900	1045	1310	1445	1600
Fuel		OIL	OIL	OIL	OIL	OIL	OIL
Load (net)	Mw	465	472	469	470	470	470
Aux. load	Mw	12.3	12.6	12.6	12.6	12.7	12.6
Burners O.O.S.		3RD EL					
NOx Ports		CLOSED					
O2 Level		AS FOUND					
Gas Recirculation to Windbox		YES	YES	YES			
Gas Recirculation to Hopper		NO	NO	NO			
Registers		OPEN	OPEN	OPEN			
O_2 N	%	3.5	3.7	3.6	3.6	3.6	3.6
O_2 S	%	4.2	4.4	4.3	4.4	4.3	4.2
CO N	ppm	0	2	0	0	0	0
CO S	ppm	12	14	18	13	11	10
Gas Hdr. Press	psig	66	66	66	66	66	66
Gas Burner Press	psig	—	0	0	0	0	0
Windbox Pressure	"H_2O	30	30	30	30.5	30	30
Furnace Pressure	"H_2O	1	2	3	2	2	2
Wb/Furn Differential	"H_2O	29	28	27	27.5	28	28
A.H. Diff. N	"H_2O	4.9	5.2	5.0	5.1	5.0	4.9
A.H. Diff. S	"H_2O	3.9	3.4	3.5	3.9	3.9	3.8
Econ. Diff. SH E	"H_2O	3.5	4.0	3.8	3.7	3.8	3.8
Econ. Diff. RH W	"H_2O	4.2	4.7	4.6	4.5	4.5	4.5
Gas Flow	MCFH	0	0	0	0	0	0
Aux. Steam Flow	klb/hr	27	30	17	13	20	20
Steam Flow	10^4/hr	335	340	340	340	340	340
Feedwater Flow	10^4/hr	332	335	335	335	335	335
Steam Pressure	psig	3485	3485	3482	3480	3482	3484
Total Fuel Flow	%	80	80	79	79	80	79

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESCARCEGA

Test Number			6	7	7	8	8	8
Air Flow Total		%	92	94	94	94	94	94
Air Flow N/S			—	—	—	—	—	—
F.W. to Fuel Flow		%	74	75	75	74	74	74
Final S.H. Steam Temp.		°F	995	1000	1000	1000	1000	1000
R.H. Temperature		°F	990	1000	1000	1000	1005	1000
Pri. S.H. Dwncmr		°F	765	765	765	765	765	765
S.H. Attemp. Spray	N	klb/hr	—	—	—	—	—	—
S.H. Attemp. Spray	S	klb/hr	—	—	—	—	—	—
F.D. Fan Amps	N	Amps	400	420	420	420	425	420
F.D. Fan Amps	S	Amps	400	420	420	420	420	420
Recirc. Fan Amps	N	Amps	60	60	61	60	60	60
Recirc. Fan Amps	S	Amps	50	50	50	50	50	50
Boiler Master		%	79	79	79	78	78	78
Boiler Master Bias		%	48	48	48	48	48	48
Firing Rate		%	80	79	79	79	79	79
Fuel Gas		%	0	0	0	0	0	0
Base Fuel Setter		%	0	0	0	0	0	0
Base Fuel Setter Bias		%	-0	0	0	0	0	0
O_2 Adjuster		%	86	89	89	89	89	89
O_2 Bias		%	0	0	0	0	0	0
RH/SH Prop. Dampers		%	60/80	65/75	65/75	65/75	65/75	65/75
Prop. Damper Bias		%	0	0	0	0	0	0
Gas Recirc.	N	%	81	80	80	80	80	80
Gas Recirc. Bias		%	7	6	6	6	6	6
Gas Recirc.	S	%	83	82	82	82	82	82
R.H. Spray		%	0	0	0	0	0	0
F.D. Fan Inlet	N	%	69	76	74	76	77	76
F.D. Fan Inlet	S	%	72	79	78	80	80	80
F.D. Fan Inlet Bias	S	%	2	2	2	2	2	2
S.H. Temperature		%	100+	100+	100+	100+	100+	100+
S.H. Temperature Bias		%	10	10	10	10	10	10
S.H. Spray	N	%	0	0	0	0	0	0
S.H. Spray Set Pt.	N	%	1	1	1	1	1	0
S.H. Spray	S	%	0	0	0	0	0	0
S.H. Spray Bias	S	%	3	3	3	3	3	2

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESCARCEGA

Test Number			6	7	7	8	8	8
O_2 In. Comb. Air	N	%	—	—	—	—	—	—
O_2 In. Comb. Air	S	%	—	—	—	—	—	—
Hopper Diff. Press	N	"H_2O	1.8	1.8	1.8	1.8	1.8	1.8
Air Foil Diff. Press	N	"H_2O	0.4	0.4	0.4	0.3	0.5	0.5
Booster Fan Amps	N	Amps	105	105	105	105	105	105
Booster Fan Amps	S	Amps	100	98	98	98	98	98
Air Foil Diff. Press	S	"H_2O	-5	-5	-5	-5	-5	-5
Hopper Diff. Press	S	"H_2O	4	+4	+4	+5	+5	+5
Fuel Select	N	%	49	49	49	49	49	49
G.R. to Hopper	N	%	0	0	0	0	0	0
G.R. to Airfoil	N	%	50	50	50	50	50	50
G.R. to Airfoil	N	set pt	46	46	46	46	46	46
Tie Damper		%	0	0	0	0	0	0
G.R. to Airfoil	S	%	52	60	60	60	60	60
G.R. to Airfoil	S	set pt	51	51	51	51	51	51
G.R. to Hopper	S	%	0	0	0	0	0	0
Fuel Select	S	%	50	50	50	50	50	50
Feedwater 1st pt.	N	°F	—	—	—	—	—	—
Feedwater 1st pt.	S	°F	—	—	—	—	—	—
A.H. Air In	N	°F	59	59	64	62	61	63
A.H. Air Out	N	°F	570	572	574	576	574	576
A.H. Gas In	N	°F	719	711	711	722	721	721
A.H. Gas Out	N	°F	293	291	297	299	299	299
A.H. Air In	S	°F	—	—	—	—	—	—
A.H. Air Out	S	°F	545	550	551	550	549	551
A.H. Gas In	S	°F	682	686	686	689	689	687
A.H. Gas Out	S	°F	246	248	251	251	251	250
Dvsn. Wall Out Temp.								
#14								
#22								

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESCARCEGA

Test Number		6	7	7	8	8	8
CEM Data:		1545	0900	1015	1315	1430	1600
Load, MW		470	478	477	476	477	476
Gas Flow, mcfh		240	240.5	239.2	240.1	241	240
Heat Rate: actual		–	–	–	–	–	–
: expected		–	–	–	–	–	–
NOx: lb/hr		967	970	954	930	934	916
: ppm @ 3% O_2		163	163.2	161.1	156.7	157.0	154.6
O_2,%		6.3	6.4	6.4	6.4	6.4	6.3
NOX (RAW)		133	132.5	130.5	127.2	127.3	125.7
Test Data Summary:							
O_2,% N/S							
NOxc, ppm N/S							
CO, ppm N/S							
Oil Tank		6&7	6&7	6&7	6&7	6&7	6&7
Tank Level							
Oil Temperature	°F	160	170	170	170	170	170
Fuel Oil Return (in)	psig	760	780	780	780	780	785
Fuel Oil Supply (in)	psig	1030	1050	1040	1050	1050	1045
Fuel Oil Return (in)	klb/hr	70	72	72	72	70	70
Fuel Oil Supply (in)	klb/hr	290	290	290	290	290	290
Fuel Oil Return	%	80	80	80	80	80	80
Oil Supply	%	100	100	100	100	100	100
OIL FLOW (Chart)	KLB/HR	235	238	237	238	238	237
Comments:							

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Program Toxic Hot Spots

Data By: M. ESCARCEGA

Test Number		9	9					
Date		3/16/90	3/16/90					
Time		0945	1110					
Fuel		GAS	Gas					
Load (net)	Mw	476	475					
Aux. load	Mw	12.6	12.4					
Burners O.O.S.	3rd EL.	6 N & S						
NOx Ports		CLOSED	→					
O_2 Level		AF	→					
Gas Recirculation to Windbox		YES	→					
Gas Recirculation to Hopper		NO	→					
Registers		OPEN	→					
O_2 N	%	1.8	1.8					
O_2 S	%	1.5	1.9					
CO N	ppm	5	5					
CO S	ppm	27	20					
Gas Hdr. Press	psig	63	63					
Gas Burner Press	psig	17	17					
Windbox Pressure	$''H_2O$	30	29.2					
Furnace Pressure	$''H_2O$	1	—					
Wb/Furn Differential	$''H_2O$	29						
A.H. Diff. N	$''H_2O$	4.9	4.8					
A.H. Diff. S	$''H_2O$	3.7	3.3					
Econ. Diff. SH E	$''H_2O$	3.1	3.1					
Econ. Diff. RH W	$''H_2O$	4.0	4.3					
GAS FLOW (ROSEMOUNT)		4.18	4.22					
Gas Flow (CHART)	MCFH	3.95	4.00					
Aux. Steam Flow	klb/hr	17	0					
Steam Flow	10^4/hr	340	340					
Feedwater Flow	10^4/hr	330	330					
Steam Pressure	psig	3484	3485					
Total Fuel Flow	%	79	80					

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESCARCEGA

Test Number			9	9				
Air Flow Total		%	87	87				
Air Flow N/S			—	—				
F.W. to Fuel Flow		%	74	74				
Final S.H. Steam Temp.		°F	1005	1000				
R.H. Temperature		°F	1015	1000				
Pri. S.H. Dwncmr		°F	750	750				
S.H. Attemp. Spray	N	klb/hr	—	—				
S.H. Attemp. Spray	S	klb/hr	—	—				
F.D. Fan Amps	N	Amps	385	385				
F.D. Fan Amps	S	Amps	380	380				
Recirc. Fan Amps	N	Amps	64	63				
Recirc. Fan Amps	S	Amps	51	51				
Boiler Master		%	78	80				
Boiler Master Bias		%	48	48				
Firing Rate		%	80	81				
Fuel Gas		%	93	94				
Base Fuel Setter		%	0	0				
Base Fuel Setter Bias		%	0	0				
O_2 Adjuster		%	70	70				
O_2 ~~Bias~~ ROSEMOUNT SET PT.		%	1.4	1.4				
RH/SH Prop. Dampers		%	55/80	55/80				
Prop. Damper Bias		%	0	0				
Gas Recirc.	N	%	80	81				
Gas Recirc. Bias		%	7	7				
Gas Recirc.	S	%	80	81				
R.H. Spray		%	15	21 M				
F.D. Fan Inlet	N	%	65	67				
F.D. Fan Inlet	S	%	64	66				
F.D. Fan Inlet Bias	S	%	0	0 M				
S.H. Temperature		%	100	100				
S.H. Temperature Bias		%	10	10				
S.H. Spray	N	%	0	0 M				
S.H. Spray Set Pt.	N	%	1	1				
S.H. Spray	S	%	0	0				
S.H. Spray Bias	S	%	3	3				

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

Data By: M. ESCAFREGA

Test Number			9	9				
O_2 In. Comb. Air	N	%	–	–				
O_2 In. Comb. Air	S	%	–	–				
Hopper Diff. Press	N	"H_2O	1.8	1.8				
Air Foil Diff. Press	N	"H_2O	1.8	1.8				
Booster Fan Amps	N	Amps	132	131				
Booster Fan Amps	S	Amps	104	109				
Air Foil Diff. Press	S	"H_2O	-5	-5				
Hopper Diff. Press	S	"H_2O	+4	+4				
Fuel Select	N	%	48	48				
G.R. to Hopper	N	%	0	0				
G.R. to Airfoil	N	%	82	82				
G.R. to Airfoil	N	set pt	46	46				
Tie Damper		%	0	0				
G.R. to Airfoil	S	%	80	81				
G.R. to Airfoil	S	set pt	51	51				
G.R. to Hopper	S	%	0	Ø				
Fuel Select	S	%	50	50				
Feedwater 1st pt.	N	°F	–	–				
Feedwater 1st pt.	S	°F	–	–				
A.H. Air In	N	°F	65	68				
A.H. Air Out	N	°F	583	585				
A.H. Gas In	N	°F	721	720				
A.H. Gas Out	N	°F	301	305				
A.H. Air In	S	°F	–					
A.H. Air Out	S	°F	564	563				
A.H. Gas In	S	°F	683	681				
A.H. Gas Out	S	°F	264	267				
Dvsn. Wall Out Temp.								
	#14		–					
	#22		–					

CONTROL ROOM DATA
ALAMITOS UNITS 5 & 6

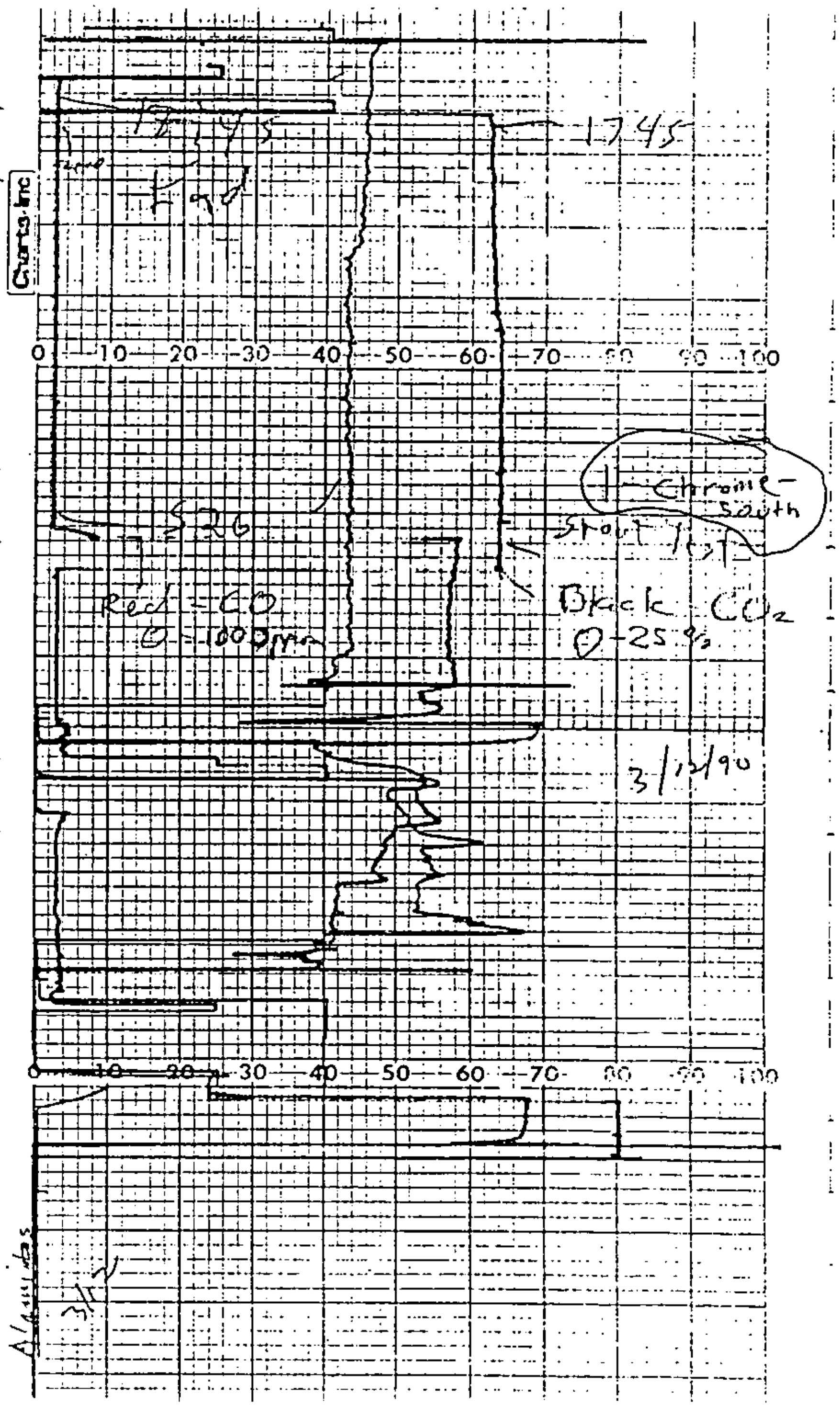
Data By: M. ESCARCEGA

Test Number		9	9				
CEM Data:		0945	1100				
Load, MW		486	486				
Gas Flow, mcfh		4017	4015				
Heat Rate: actual		—	8672				
: expected		—	9478				
NOx: lb/hr		548.4	565				
: ppm @ 3% O_2		106.8	110				
O_2,%		4.9	4.9				
NOx RAW		95.4	99				
Test Data Summary:							
O_2,% N/S		—	—				
NOxc, ppm N/S		—	—				
CO, ppm N/S		—	—				
Oil Tank							
Tank Level							
Oil Temperature	°F						
Fuel Oil Return (in)	psig						
Fuel Oil Supply (in)	psig						
Fuel Oil Return (in)	klb/hr						
Fuel Oil Supply (in)	klb/hr						
Fuel Oil Return	%						
Oil Supply	%						
Comments:							

Appendix C.3

CEM Data

3/12/90


Charts Inc
1745
End
1745
0 10 20 30 40 50 60 70 80 90 100
1 - Chrome - South
Start Test
1526
Red = CO
0-1000ppm
Black CO2
0-25%
3/13/90
0 10 20 30 40 50 60 70 80 90 100

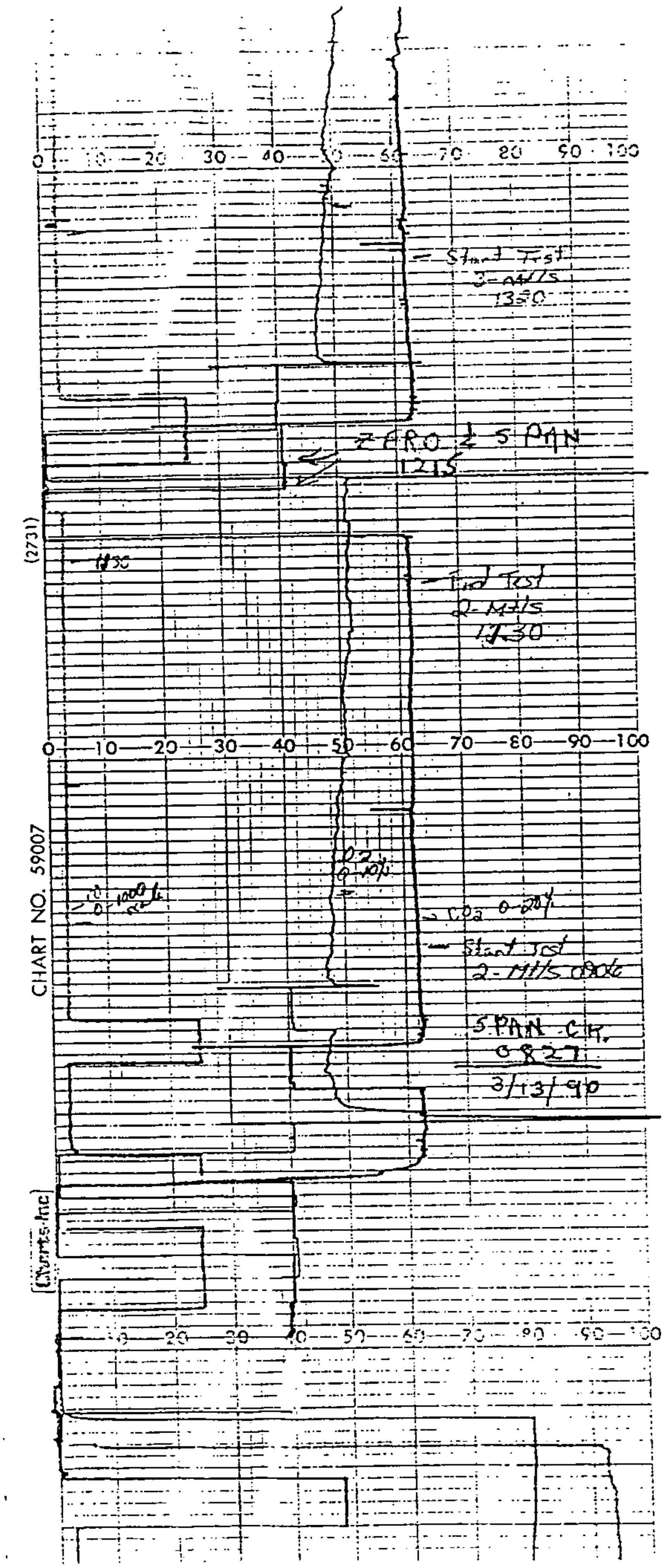


CHART NO. 59007
(2731)
Charts Inc
0 10 20 30 40 50 60 70 80 90 100
Start Test
ZERO & SPAN
1215
End Test
1230
Start Test
SPAN CK.
0827
3/13/90

3/13

3/13
Cont

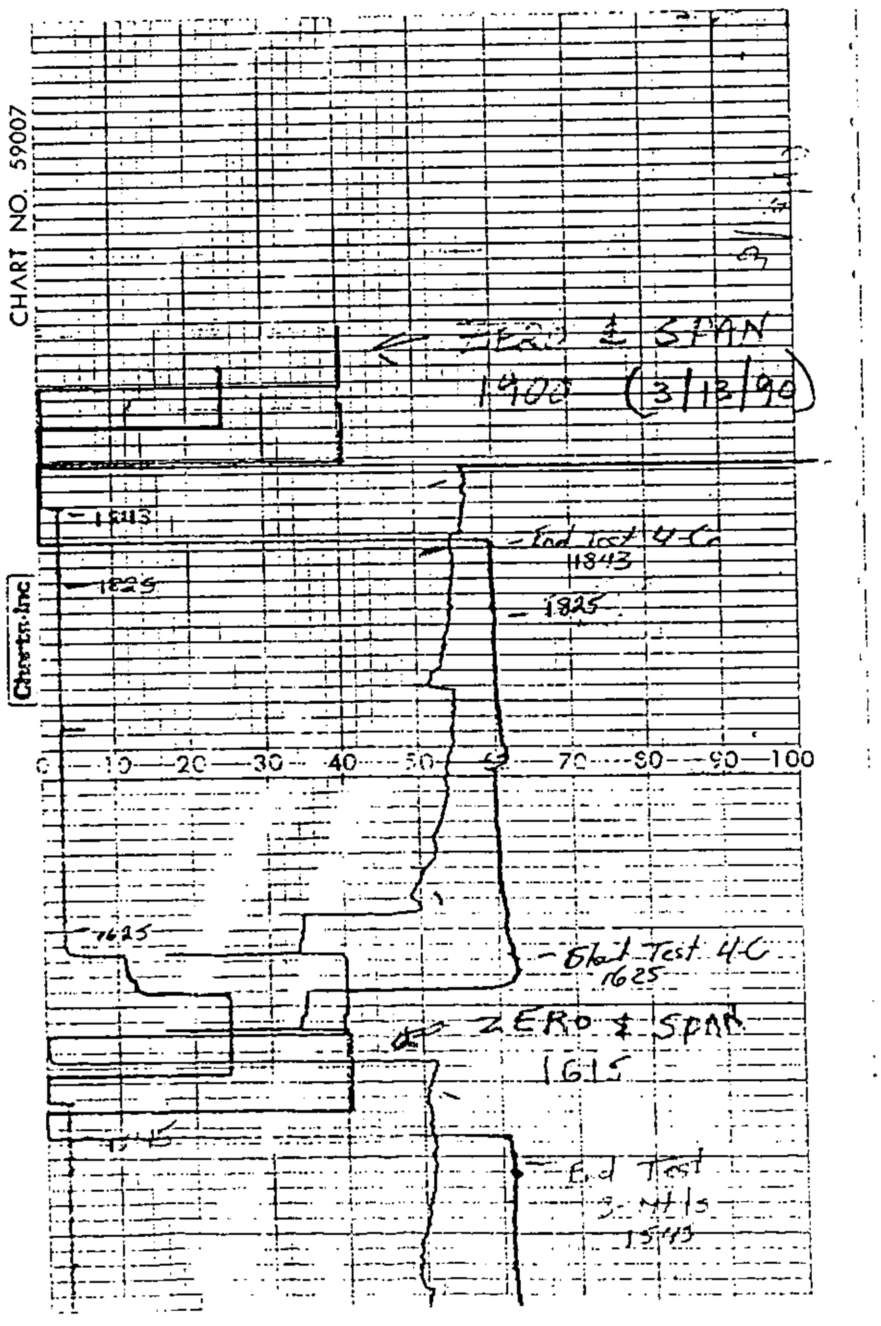


CHART NO. 59007
Chartex Inc
SPAN
1900 (3/13/90)
End Test 4-C
1843
1825
1825
0 10 20 30 40 50 60 70 80 90 100
Start Test 4-C
1625
1625
ZERO & SPAN
1615
End Test
3-Mtls
1543

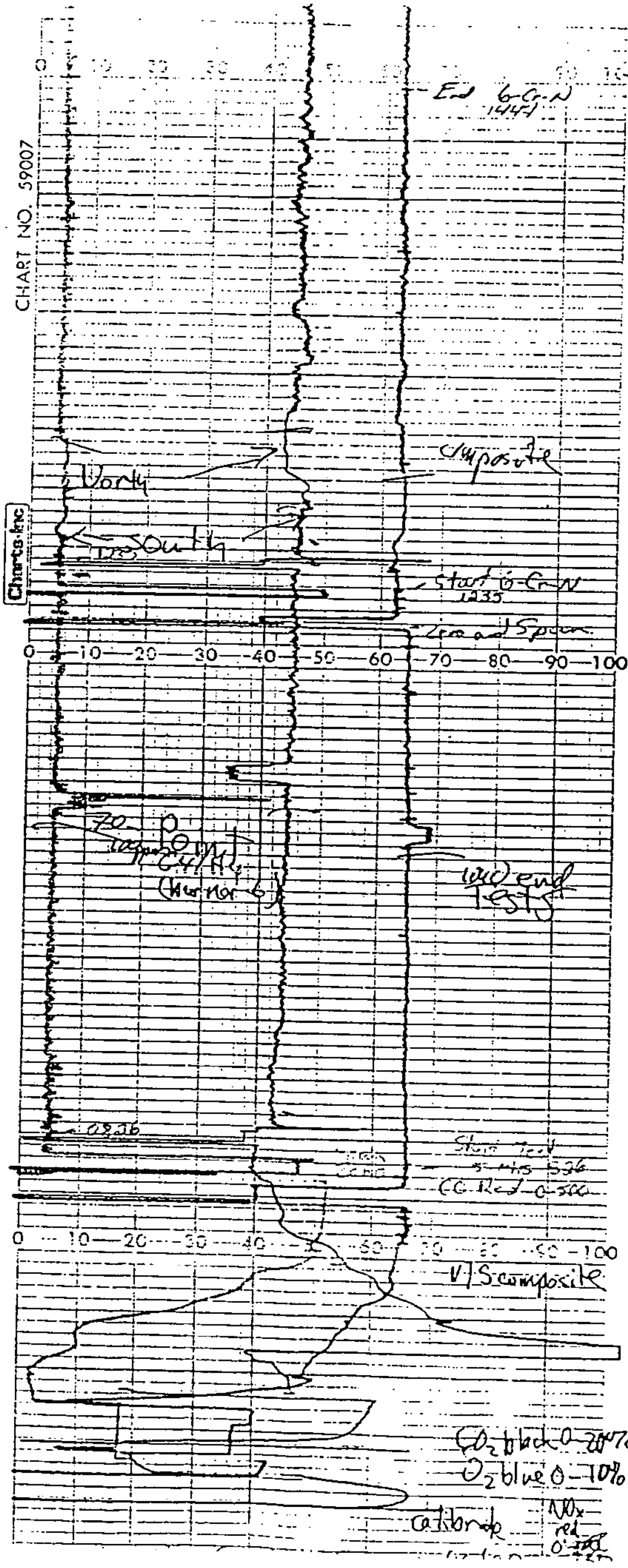
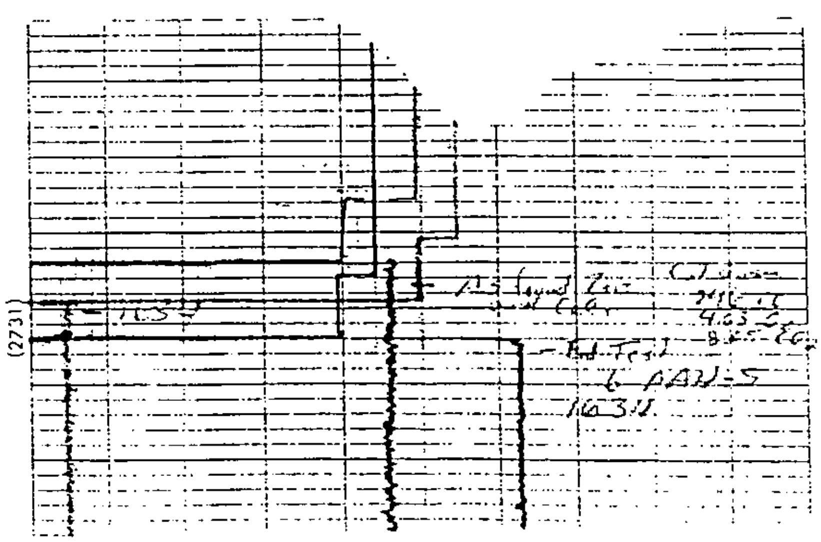


CHART NO. 59007
Charts-Inc
0 10 20 30 40 50 60 70 80 90 100
End 6-Cr-N
1444
composite
North
South
Start 6-Cr-N
1235
Zero and Span
0 10 20 30 40 50 60 70 80 90 100
end Test
0 10 20 30 40 50 60 70 80 90 100
V/S composite
CO_2 black 0-20%
O_2 blue 0-10%
calibrate

3/14

3/14
cont.



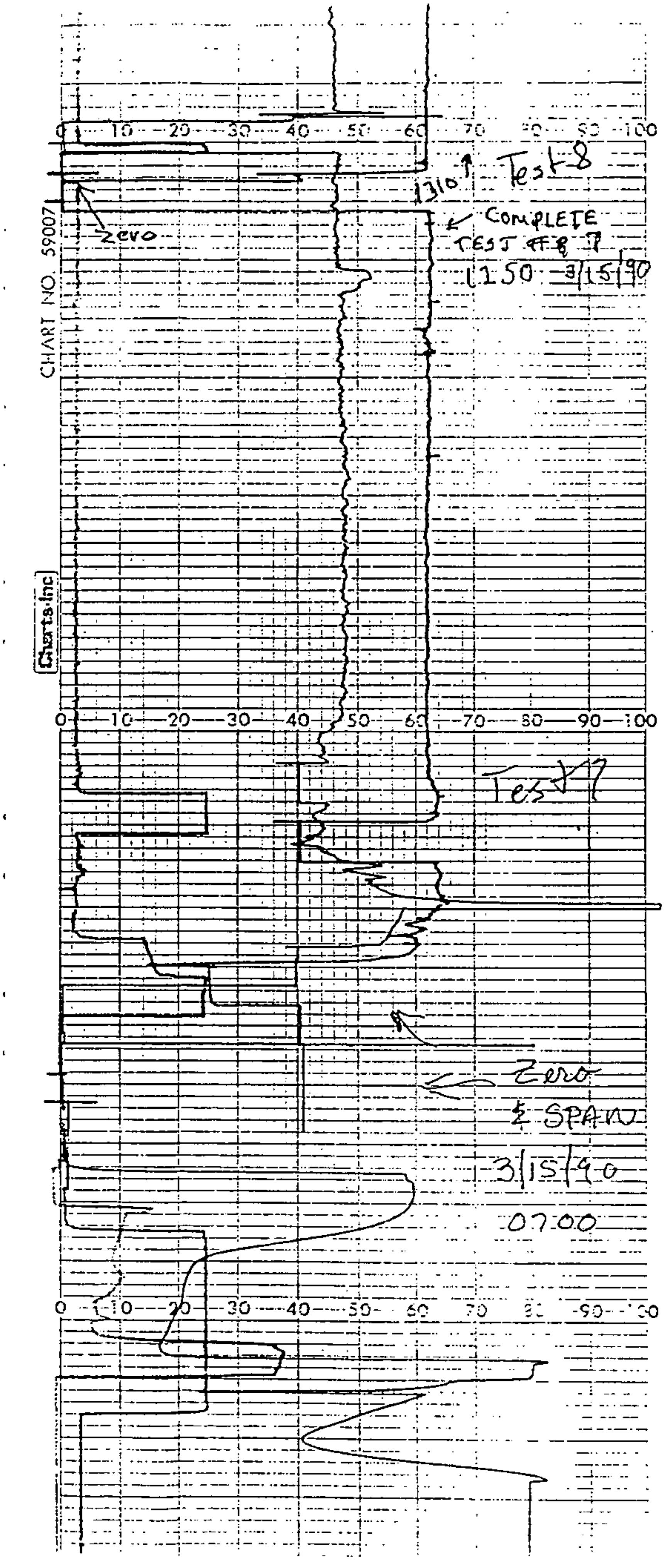
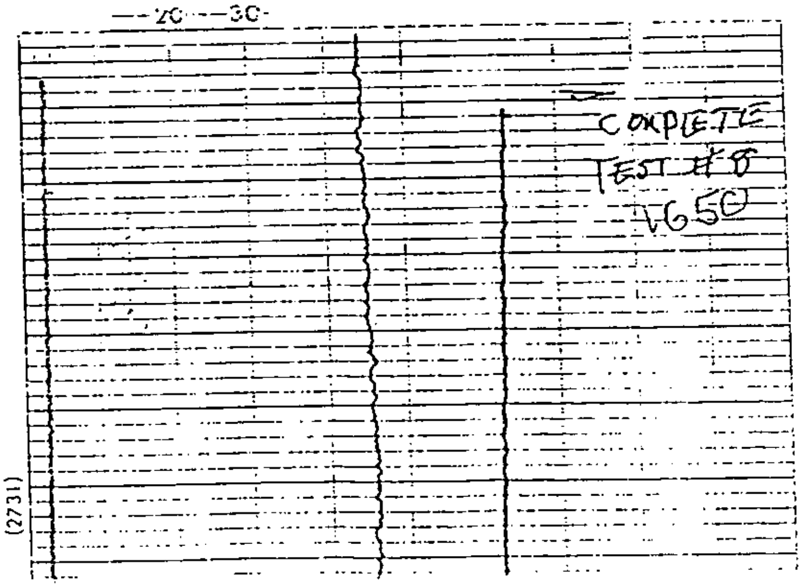
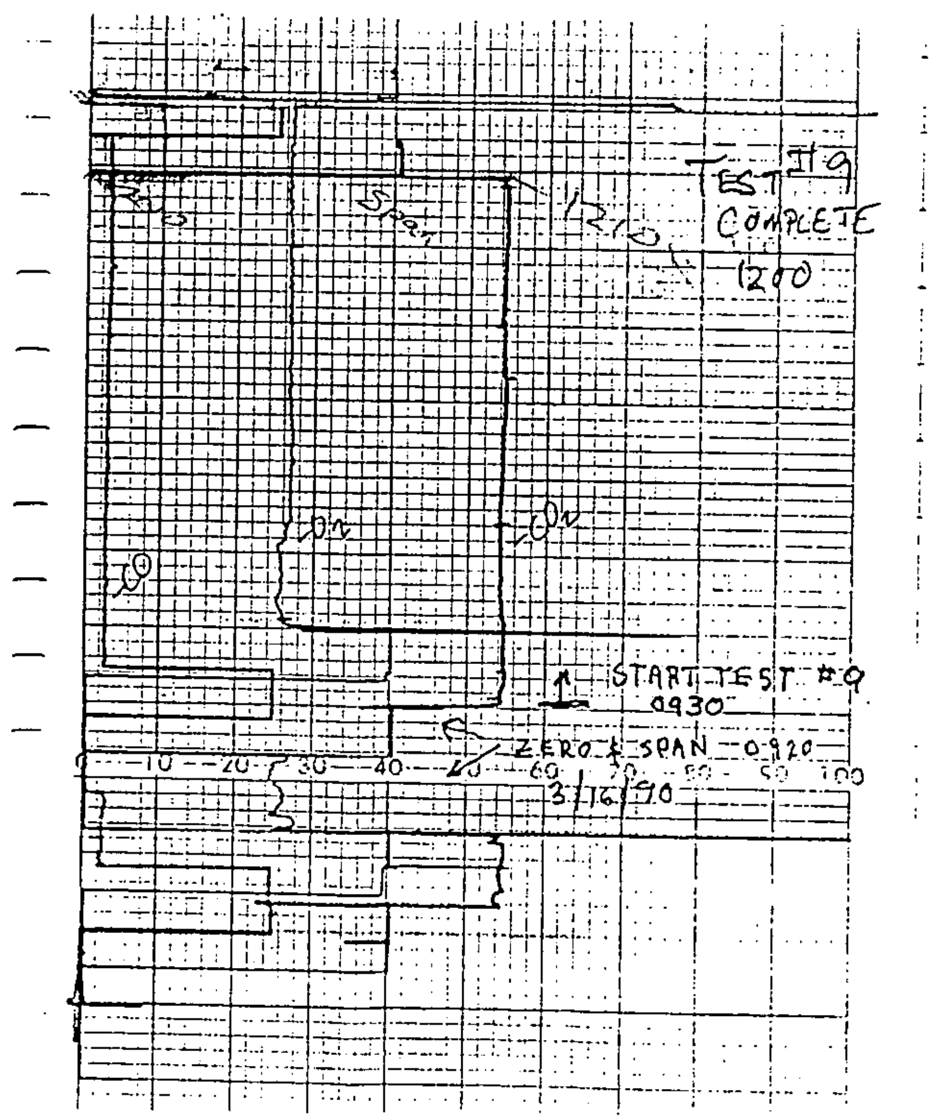


CHART NO. 59007
Charts Inc
0 10 20 30 40 50 60 70 80 90 100
1310 Test 8
zero
COMPLETE TEST #8 ?
1150 3/15/90
Test 7
Zero & SPAN
3/15/90
0700

3/15 cont




TEST #9
COMPLETE
1200
1210
Span
START TEST #9
0930
ZERO & SPAN 0920
3/16/90
0 10 20 30 40 50 60 70 80 90 100

Appendix C.4

Benzene

E/A

TEDLAR BAG SAMPLE DATA

Client/Project SCE / ALAMITOS

Date 3-16-90 Unit #5 By RP

	Bag ID No.	Bag ID No.	Bag ID No.
Test No.	9A-BENZ	9B-BENZ	9C-BENZ
Sample Rate	.5 l/min	.5 l/min	.5 l/min
Start Time	930	955	1110
Stop Time	950	1015	1130
Sample Location	#5 SOUTH PG. 3-3	#5 SOUTH PG. 4-3	#5 NORTH PG. 3-3

Date 3-16-90 Unit #5 By RP.

	Bag ID No.	Bag ID No.	Bag ID No.
Test No.	~~9D-BENZ~~		
Sample Rate	~~.5 l/min~~		
Start Time			
Stop Time			
Sample Location	~~#5 NORTH PG. 4-3~~		

Notes: Test 9D-BENZ WAS NOT PERFORMED AS THERE WAS NOT ENOUGH BAGS.
UNIT ON GAS.

ESA DS-070

CARNOT
Benzene Emissions

Client/Location: SCE/ALAMITOS

Reference Temp (F)	60		
F Factor, Gas	8449	F Factor, Oil	9063
O2,% Gas	4.58	O2,% Oil	5.92
Stack Flow Rate,Gas fuel(dscfm)	1085840	Stack Flow Rate,Oil(dscfm)	1265742

GAS FUEL		Benzene	Oil Fuel		Benzene
9A-BENZ-S,ppb	ND<	1	5A-BENZ-N,ppb	ND<	1
9B-BENZ-S,ppb	ND<	1	5B-BENZ-N,ppb	ND<	1
9C-BENZ-N,ppb	ND<	1	5C-BENZ-S,ppb	ND<	1
AVG, ppb	ND<	1	AVG, ppb	ND<	1
STACK AVG,lb/hr	ND<	1.34E-02	STACK AVG, lb/hr	ND<	1.56E-02
AVG, lb/MMbtu	ND<	2.23E-06	AVG, lb/MMbtu	ND<	2.39E-06

Tedlar Bag Data

3-14-90

SCE Alamitos 5

Test	5A-Benz-N	5B-Benz-N
Time	902 912	919 928
Location	Port 4-5 North	Port 3-5 North

	5C-Benz-S	5D-Benz-S
Time	946 957	1006 1020
	Port 3-5 SOUTH	Port 4-5 SOUTH

samples by Fry / Pence

[unit on oil LG 3/27/90]

E/A Energy Systems Associates A CORPORATION
15991 RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

SUBJECT Benzene O_2's + Flow rates SCE/ALGS JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY LG DATE 3-27-90 CHECKED BY ______ DATE ______

Benzene Tests	Comp Tests	Fuel	Date	O_2	Flow rate	Stack Total Flow
5A Benz N	5MHs N	oil	3/14	5.99	630,002	
5B Benz N	5MHs S	"	"	5.85	635,740	1265742
5C Benz S						
5D Benz S				$\bar{x}$ = 5.92	$\bar{x}$ 632,871	
9A Benz (S)	9 H_2O N	gas	3/16	4.83	541965	
9B Benz (S)	9 H_2O S	"	"	4.33	543875	1085840
9C Benz (N)				$\bar{x}$ = 4.58	$\bar{x}$ 542920	

Total Stack Flow rate used for oil tests: 1265742 dscfm
" " " " " gas " : 1085840 "

128097

REPORT

TRUESDAIL LABORATORIES, INC.

CHEMISTS - MICROBIOLOGISTS - ENGINEERS

RESEARCH - DEVELOPMENT - TESTING

14201 FRANKLIN AVENUE
TUSTIN, CALIFORNIA 92680
AREA CODE 714 • 730-6239
AREA CODE 213 • 225-1564
CABLE: TRUELABS

CLIENT Energy Systems Associates
15991 Red Hill Ave., Suite 110
Tustin, California 92680-7388
Attention: Arlene Bell

DATE April 6, 1990

RECEIVED March 16, 1990

LABORATORY NO. 44401

SAMPLE **Three (3) Tedlar bags labeled 9A, 9B, and 9C**
P.O. No.: 53304
Edison P.O. No.: C0138903

INVESTIGATION

Analyze for trace benzene by modified EPA Method 602

RESULTS

MODIFIED EPA 602 (Benzene)

Received: 3/16/90
Analyzed: 3/16/90

	Nanoliters per Liter (ppb) Benzene
9A-AL	ND< 1
9B-AL	ND< 1
9C-AL	ND< 1

ND = Not detected.

HIGHER HEAT VALUE (60 degrees fahrenheit)

	BTU's per Cubic Foot
#1-AL	947

Respectfully submitted,
TRUESDAIL LABORATORIES, INC.

Joe Bramblett

Joe Bramblett, Manager
Instrumental Methods

MAR 2 3 1990

REPORT

TRUESDAIL LABORATORIES, INC.

CHEMISTS - MICROBIOLOGISTS - ENGINEERS

RESEARCH — DEVELOPMENT — TESTING

14201 FRANKLIN AVENUE
TUSTIN, CALIFORNIA 92680
AREA CODE 714 • 730-6239
AREA CODE 213 • 225-1564
CABLE: TRUELABS

CLIENT Energy Systems Associates
15991 Red Hill Avenue, Suite 110
Tustin, California 92680-7388
Attention: Arlene Bell/Craig Fry

DATE March 20, 1990

RECEIVED March 15, 1990

LABORATORY NO. 37998

SAMPLE Three (3) Tedlar bags
labeled 5A-N, 5C-S, 5D-S
Project No.: ESA 53304-AL
P.O. No.: SCE #C0138903

INVESTIGATION

Analyze for trace Benzene by modified EPA Method 602

RESULTS

MODIFIED EPA 602 (Benzene)

Received: 3/15/90
Analyzed: 3/15/90

	Nanoliters per Liter (ppb)
	Benzene
5A-N	ND< 1
5C-S	ND< 1
5D-S	ND< 1

ND=Not detected

Respectfully submitted,
TRUESDAIL LABORATORIES, INC.

Joe Bramblett, Manager
Instrumental Methods

Appendix C.5

Formaldehyde

FORMALDEHYDE EMISSION CALCULATIONS

CLIENT/LOCATION: SCE/ALAMITOS
FUEL: gas
F Factor: 8449
Reference Temp (F) 60

Test	ug/train	Vmstd	%O2	Qsd	ug/dscf	ug/m3	ppb	lb/hr	lb/MMbtu
9-A-FORM	2.9	1.08	4.33	543875	2.7	94.8	75	1.93E-01	6.30E-05
9-B-FORM	1.1	1.04	4.33	543875	1.1	38.4	30	7.81E-02	2.55E-05
9-C-FORM	1.7	1.31	4.33	541965	1.3	45.3	36	9.19E-02	3.01E-05
AVG					1.7	59.5	47		3.95E-05
STACK TOTAL				1085840				2.42E-01	

FORMALDEHYDE EMISSION CALCULATIONS

CLIENT/LOCATION: SCE/ALAMITOS
FUEL: oil
F Factor: 9063
Reference Temp (F) 60

Test	ug/train	Vmstd	%O2	Qsd	ug/dscf	ug/m3	ppb	lb/hr	lb/MMbtu
8-A-FORM	ND 0.47	1.63	6.32	574573	ND 0.3	ND 10.2	ND 8		ND8.25E-06
8-B-FORM	ND 0.47	1.19	6.48	653537	ND 0.4	ND 13.9	ND 11		ND1.14E-05
8-C-FORM	ND 0.47	1.14	6.48	653537	ND 0.4	ND 14.6	ND 11		ND1.19E-05
AVG					ND 0.4	ND 12.9	ND 10		ND1.05E-05
STACK TOTAL				1228110				ND5.93E-02	

CARNOT 03/27/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	03/15/90
Test Number	8-A-FORM	Data By	LG
Test Method	FORM	Sample Location	NO DUCT
Fuel	OIL	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor		Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	30
Bar Press (in Hg)	30.30	Nozzle Diam (in)	
Meter Vol (acf)	1.684	Meter Temp (F)	82.7
Stack Press (iwg)		Stack Temp (F)	
Vel Head (iwg)		O2 (%): from CEM	
		from portable	
Liquid Vol (ml)		CO2 (%): from CEM	
		calculated	
Meter Press (iwg)	0.01	Start/Stop Time	1405/1435

Std Sample Vol (SCF) 1.63

PARTICULATE TEST DATA

Client/Location SCF / ALAMITOS
Sample Location #5 NORTH
Operators RP.

Unit #5
Fuel OIL

Test No. 8A-Formaldehyde Method
Ambient Temp., °F
Meter Vol. (Start/End) 302.313/

Page 1 of 1
Date 3/15/90

Pre Test Data:

Barometric Press, in. Hg 30.3
Stack Area, sq. ft.
Sample Time/ Pt, min. 30min, Sngl Pt
Assumed Stack Press +2.5
Assumed Moisture 10%
Assumed Molecular Wt 29

Equipment Info:

Meter No. ES-19
Meter, Yd 1.00
Pitot, Cp - NA -
CFM @ΔH = 1.0 .595
Probe I.D. 6' Teflon
Nozzle No./Dia —
Filter No. —

Imp.	Matl	Wt(End)		Weight (Start)		Weight (g)
#1	DNPH		-	0ml	=	
#2	DNPH		-	10ml	=	
#3	—		-	0ml	=	
#4			-		=	
Total			-		=	

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.001	7	RP	—	—
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
4-2	1405	.01	.01	302.313			81	83				2	
	1410		.01	302.615			81	83				2	
	1415		.01	302.899			82	84				2	
	1420		.01	303.177			82	84				2	
	1425		.01	303.412			82	84				2	
	1430		.01	303.731			82	84				2	
	1435			303.997									
Total/Average													

Test Summary

Initial RG
Sample Vol., c.f. 1.684
Stack Press, iwg ~~82.7~~
ΔP .01 iwg ΔH .01 iwg
Meter Temp., °F 82.7
Stack Temp., °F
Water Collected, g
O_2/CO_2 Method
Chain of Cust. Info (init.):
Impingers Loaded RJ
Impingers Recovered
Filter Loaded
Filter Recovered
Probe Wash
Comments: field blank and spike run simultaneously with this test

EST DS-022
Rev. 9/89

CARNOT 03/27/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	03/15/90
Test Number	8-B-FORM	Data By	LG
Test Method	FORM	Sample Location	SO DUCT
Fuel	OIL	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor		Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	30
Bar Press (in Hg)	30.30	Nozzle Diam (in)	
Meter Vol (acf)	1.209	Meter Temp (F)	76.6
Stack Press (iwg)		Stack Temp (F)	
Vel Head (iwg)		O2 (%): from CEM	
		from portable	
Liquid Vol (ml)		CO2 (%): from CEM	
		calculated	
Meter Press (iwg)	0.01	Start/Stop Time	1508/1608

Std Sample Vol (SCF).................................... 1.19

Client/Location SCE/ALAMITOS
Sample Location #5 SOUTH
Operators RP

Unit #5
Fuel OIL

Test No. 8B-FORMALDEHYDE Method
Ambient Temp., °F
Meter Vol. (Start/End) 305.034 / 306.243

Page 1 of 1
Date 3/15/90

Pre Test Data:

- Barometric Press, in. Hg 30.3
- Stack Area, sq. ft.
- Sample Time/ Pt, min. 30 min Sngl Pt.
- Assumed Stack Press +2.5
- Assumed Moisture 10%
- Assumed Molecular Wt 29

Equipment Info:

- Meter No. ES-19
- Meter, Yd 1.00
- Pitot, Cp —
- CFM @ΔH = 1.0 .895
- Probe I.D. 6' Teflon
- Nozzle No./Dia —
- Filter No. —

Imp.	Mat'l	Wt(End)		Weight (Start)		Weight (g)
#1	DNPH		-	10ml	=	
#2	DNPH		-	10ml	=	
#3	—		-	Ø	=	
#4			-		=	
Total			-		=	

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

	Sample Train CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.001	7	RP	—	
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
3-3	1538	0	.01	305.034			75	77				2	
	1543		.01	305.205			75	77				2	
	1548		.01	305.378			75	77				2	
	1553		.01	305.601			75	77				2	
	1558		.01	305.822			76	79				2	
	1603		.01	306.033			77	79				2	
	1608			306.243									
Total/Average													

Test Summary

- Initial
- Sample Vol., c.f. 1.209
- Stack Press, iwg
- ΔP ___ iwg ΔH .01 iwg
- Meter Temp., °F 76.6
- Stack Temp., °F
- Water Collected, g
- O_2/CO_2 Method
- Chain of Cust. Info (init.):
  - Impingers Loaded
  - Impingers Recovered
  - Filter Loaded
  - Filter Recovered
  - Probe Wash
- Comments:

CARNOT 03/27/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	03/15/90
Test Number	8-C-FORM	Data By	LG
Test Method	FORM	Sample Location	SO DUCT
Fuel	OIL	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor		Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	30
Bar Press (in Hg)	30.30	Nozzle Diam (in)	
Meter Vol (acf)	1.164	Meter Temp (F)	79.3
Stack Press (iwg)		Stack Temp (F)	
Vel Head (iwg)		O2 (%): from CEM	
		from portable	
Liquid Vol (ml)		CO2 (%): from CEM	
		calculated	
Meter Press (iwg)	0.01	Start/Stop Time	1614/1644

Std Sample Vol (SCF) 1.14

PARTICULATE TEST DATA

Client/Location SCE/ALAMITOS Unit #5 Test No. BC-FORMALDEHYDE Method ____ Page 1
Sample Location #5 South Fuel OIL Ambient Temp., °F ____ of 1
Operators RP. Meter Vol. (Start/End) 306.343/ Date 3/15/90

Pre Test Data:
- Barometric Press, in. Hg 30.3
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. 30min 3P.
- Assumed Stack Press +2.5
- Assumed Moisture 10%
- Assumed Molecular Wt 29

Equipment Info:
- Meter No. ES-19
- Meter, Yd 1.00
- Pitot, Cp —
- CFM @ΔH = 1.0 .595
- Probe I.D. 6' Teflon
- Nozzle No./Dia —
- Filter No. —

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	DNPH	-	10ml	=
#2	DNPH	-	10ml	=
#3	—	-	Ø	=
#4		-		=
Total		-		=

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.001	7	RP		
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
3-3	1614		.01	306.343			77	80				2	
	1619		.01	306.439			78	80				2	
	1624		.01	306.652			78	80				2	
	1629		.01	306.987			78	81				2	
	1634		.01	307.081			79	81				2	
	1639		.01	307.312			79	81				2	
	1644			307.567									
Total/Average													

Test Summary
- Initial W
- Sample Vol., c.f. 1.164
- Stack Press, iwg ____
- ΔP ____ iwg ΔH .01 iwg
- Meter Temp., °F 79.3
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded Paul
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

PARTICULATE TEST DATA

Client/Location SCE/ALAMITOS Unit #5 Test No. 9A-FORM Method ____ Page 1

Sample Location #5 SOUTH Fuel GAS Ambient Temp., °F ____ of 1

Operators RP Meter Vol. (Start/End) 308.024/ Date 3/16/90

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. 30 min S.P.
- Assumed Stack Press +2.5
- Assumed Moisture 10%
- Assumed Molecular Wt 29

Equipment Info:
- Meter No. ES-19
- Meter, Yd 1.00
- Pitot, Cp —
- CFM @ΔH = 1.0 .595
- Probe I.D. 6' teflon
- Nozzle No./Dia —
- Filter No. —

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	DNPH	-	10ml	=
#2	DNPH	-	10ml	=
#3	—	-	0ml	=
#4		-		=
Total		-		=

Impinger Box I.D. ____

Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.001	7	RP	—	
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
3-3	937		.01	308.024			85	86				1	
	942		.01	308.215			85	87				1	
	947		.01	308.391			86	88				1	
	952		.01	308.577			86	88				1	
	957		.01	308.769			87	88				1	
	1002		.01	308.962			87	88				1	
	1007			309.155									
Total/Average													

Test Summary

Initial LC

Sample Vol., c.f. 1.131

Stack Press, iwg ____

ΔP ____ iwg ΔH .01 iwg

Meter Temp., °F 86.8

Stack Temp., °F ____

Water Collected, g ____

O_2/CO_2 Method ____

Chain of Cust. Info (init.):
- Impingers Loaded RW
- Impingers Recovered ____
- Filter Loaded ____
- Filter Recovered ____
- Probe Wash ____

Comments: ____

CARNOT 03/27/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	03/16/90
Test Number	9-A-FORM	Data By	LG
Test Method	FORM	Sample Location	SO DUCT
Fuel	GAS	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor		Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	30
Bar Press (in Hg)	30.20	Nozzle Diam (in)	

Meter Vol (acf)	1.131	Meter Temp (F)	86.8
Stack Press (iwg)		Stack Temp (F)	
Vel Head (iwg)		O2 (%): from CEM	
		from portable	
Liquid Vol (ml)		CO2 (%): from CEM	
		calculated	
Meter Press (iwg)	0.01	Start/Stop Time	0937/1007

Std Sample Vol (SCF) 1.08

CARNOT 03/27/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	03/16/90
Test Number	9-B-FORM	Data By	LG
Test Method	FORM	Sample Location	SO DUCT
Fuel	GAS	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor		Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	30
Bar Press (in Hg)	30.20	Nozzle Diam (in)	
Meter Vol (acf)	1.088	Meter Temp (F)	90.8
Stack Press (iwg)		Stack Temp (F)	
Vel Head (iwg)		O2 (%): from CEM	
		from portable	
Liquid Vol (ml)		CO2 (%): from CEM	
		calculated	
Meter Press (iwg)	0.01	Start/Stop Time	1015/1045

Std Sample Vol (SCF) 1.04

PARTICULATE TEST DATA

Client/Location SCE/ALAMITOS
Sample Location #5 South
Operators RD.
Unit #5
Fuel GAS
Test No. QB-FORM
Method ______
Ambient Temp., °F ______
Meter Vol. (Start/End) 309.253/310.341
Page 1 of 1
Date 3/16/90

Pre Test Data:

Barometric Press, in. Hg	
Stack Area, sq. ft.	
Sample Time/ Pt, min.	30 min SP
Assumed Stack Press	+2.5
Assumed Moisture	10%
Assumed Molecular Wt	29

Equipment Info:

Meter No.	ES-19
Meter, Yd	1.00
Pitot, Cp	—
CFM @ΔH = 1.0	.595
Probe I.D.	6' Teflon
Nozzle No./Dia	—
Filter No.	—

Imp.	Matl	Wt(End)	-	Weight (Start)	=	Weight (g)
#1	DNPH		-	10ml	=	
#2	DNPH		-	10ml	=	
#3	—		-	Ø ml	=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ______
Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.001	7	RP	—	
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
4-3	1015		.01	309.253			88	90				1	
	1020		.01	309.425			89	90				1	
	1025		.01	309.612			90	91				1	
	1030		.01	309.791			91	92				1	
	1035		.01	309.973			91	93				1	
	1040		.01	310.161			91	93				1	
	1045			310.341									
Total/Average													

Test Summary

Initial ul
Sample Vol., c.f. 1.088
Stack Press, iwg ______
ΔP ______ iwg ΔH .01 iwg
Meter Temp., °F 90.8
Stack Temp., °F ______
Water Collected, g ______
O_2/CO_2 Method ______
Chain of Cust. Info (init.):
Impingers Loaded RW
Impingers Recovered ______
Filter Loaded ______
Filter Recovered ______
Probe Wash ______
Comments: ______

EST DS-022
Rev. 9/89

CARNOT 03/27/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	03/16/90
Test Number	9-C-FORM	Data By	LG
Test Method	FORM	Sample Location	NO DUCT
Fuel	GAS	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor		Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	30
Bar Press (in Hg)	30.20	Nozzle Diam (in)	
Meter Vol (acf)	1.381	Meter Temp (F)	93.5
Stack Press (iwg)		Stack Temp (F)	
Vel Head (iwg)	0.0100	O2 (%): from CEM	
		from portable	
Liquid Vol (ml)		CO2 (%): from CEM	
		calculated	
Meter Press (iwg)	0.01	Start/Stop Time	1112/1142

Std Sample Vol (SCF).. 1.31

PARTICULATE TEST DATA

Client/Location SCE/ALAMITOS — Unit #5 — Test No. 9C-FORM — Method ____ — Page 1

Sample Location #5 NORTH — Fuel GAS — Ambient Temp., °F ____ — of 1

Operators RP — Meter Vol. (Start/End) 310.896/312.277 — Date 3/16/90

Pre Test Data:

- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. 30min 3Pt.
- Assumed Stack Press +2.5
- Assumed Moisture 10%
- Assumed Molecular Wt 29

Equipment Info:

- Meter No. E5-19
- Meter, Yd 1.00
- Pitot, Cp —
- CFM @ ΔH = 1.0 .595
- Probe I.D. 6' Teflon
- Nozzle No./Dia —
- Filter No. —

Imp.	Matl	Wt(End)		Weight (Start)		Weight (g)
#1	DNPH		-	10ml	=	
#2	DNPH		-	10ml	=	
#3	—		-	0ml	=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ____

Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.001	7	RP	—	
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
	1112		.01	310.896			91	93				1	
	1117		.01	311.151			92	93				1	
	1122		.01	311.378			92	94				1	
	1127		.01	311.622			93	94				1	
	1132		.01	311.845			94	94				1	
	1137		.01	312.081			94	96				1	
	1142			312.277								1	
Total/Average													

Test Summary

- Initial RP
- Sample Vol., c.f. 1.381
- Stack Press, iwg ____
- ΔP ____ iwg ΔH .01 iwg
- Meter Temp., °F 93.5
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

EST DS-022 Rev. 9/89

E/A **Energy Systems Associates** A CORPORATION
15991 RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

SUBJECT: SCE/Alamitos Formaldehyde Calc JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY [signature] DATE 4/16/96 CHECKED BY ________ DATE ________

Test	Formaldehyde Tot ug/sample	Blank tot ug/sample	Final
8A Form	ND <.47	.51	ND <.47
8B Form	ND <.47	"	"
8C Form	ND <.47	"	"
9A Form	3.41	.51	2.90
9B Form	1.64	"	1.13
9C Form	2.19	"	1.68

QC calc

$$\frac{\text{Field Spike}\left(\overset{tot}{ug}\right) - \text{Field Blank}\left(\overset{tot}{ug}\right)}{\text{nominal Value}\left(\overset{tot}{ug}\right)} = \frac{8.96 - .51}{7.4} = 114\%$$

±20% OK

[initials]

128097

Energy Systems Associates A CORPORATION
15991 RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

SUBJECT Formaldehyde SCE/Alamitos JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY LG DATE 3-27-90 CHECKED BY LG DATE 3-27-90

	Duct	$V_{m\,std}$	% O_2	Qsd		
8-A	N	1.63	6.32	~~541,~~ 574,573	(7-PAH-N)	Changed original final Test
8-B	S	1.19	6.48	~~543,275~~ 653537	"	
8-C	S	1.14	6.48	"	(8-PAH-S)	
9-A	S	1.08	4.33	543,275	(9-H_2O-S)	
9-B	S	1.04	4.33	543,875	"	
9-C	N	1.31	4.83	541,965	(9-H_2O-N)	

calc

from other tests

128097

RADIAN
CORPORATION

Radian Work Order P0-03-093

Analytical Report
04/02/90

Energy Systems Associates

Energy Systems Associates
15991 Red Hill Ave, Suite 110
Tustin, CA 92680-7388

Arlene Bell

Customer Work Identification Project #~~74200~~ 53304-AL
Purchase Order Number 5853

Contents:

1. Analytical Data Summary
2. Sample History
3. Comments Summary
4. Notes and Definitions

Radian Analytical Services
900 Perimeter Park
Morrisville, NC 27560

919-481-0212

Client Services Coordinator: TPHEIL

Certified by: [signature]

RADIAN CORPORATION

Analytical Data Summary

Energy Systems Associates
Radian Work Order: P0-03-093

Method:Aldehydes by HPLC (1)
List:ESA Analyte List

Sample ID:	8A-FORM (A&B)		8B-FORM (A&B)		8C-FORM (A&B)		9A-FORM (A&B)	
Factor:	0.53		0.53		0.53		0.53	
Results in:	total ug		total ug		total ug		total ug	
	01A		02A		03A		04A	
Matrix:	AIR		AIR		AIR		AIR	
	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Formaldehyde	ND	0.47	ND	0.47	ND	0.47	3.41	0.47

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

RADIAN CORPORATION

Analytical Data Summary

Energy Systems Associates
Radian Work Order: P0-03-093

field
spike level = 7.4 ug

Method: Aldehydes by HPLC (1) List: ESA Analyte List Sample ID:	9B-FORM (A&B)		9C-FORM (A&B)		8-FORM-FIELD BLK		8-FORM-FIELD SPIKE	
Factor:	0.53		0.53		0.53		0.53	
Results in:	total ug		total ug		total ug		total ug	
	05A		06A		07A		08A	
Matrix:	AIR		AIR		AIR		AIR	
	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Formaldehyde	1.64 a	0.47	2.19 a	0.47	0.51 a	0.47	8.96	0.47

a Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

8.96 - .51 (blank)
= 8.45
8.45/7.4 = 114%
OK
LG

RADIAN CORPORATION

Energy Systems Associates
Radian Work Order: PO-03-093

Method: Aldehydes by HPLC (1)			
List: ESA Analyte List			
Sample ID:	METHOD BLANK	MATRIX SPIKE	MATRIX SPIKE DUP
Factor:	0.53	0.53	0.53
Results in:	total ug	%	%
	09A	10A	11A
Matrix:	AIR	AIR	AIR

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Formaldehyde	ND	0.47	107		104			

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

RADIAN CORPORATION

Sample History

Energy Systems Associates
Radian Work Order: P0-03-093

Sample Identifications and Dates

Sample ID	8A-FORM (A&B)	8B-FORM (A&B)	8C-FORM (A&B)	9A-FORM (A&B)	9B-FORM (A&B)	9C-FORM (A&B)
Date Sampled						
Date Received	03/20/90	03/20/90	03/20/90	03/20/90	03/20/90	03/20/90
Matrix	AIR	AIR	AIR	AIR	AIR	AIR
	01	02	03	04	05	06
Aldehydes by HPLC						
Prepared	03/22/90	03/22/90	03/22/90	03/22/90	03/22/90	03/22/90
Analyzed	03/26/90	03/26/90	03/26/90	03/26/90	03/26/90	03/26/90
Analyst	LK	LK	LK	LK	LK	LK
File ID	ESA105	ESA106	ESA107	ESA109	ESA110	ESA111
Blank ID	ESA104	ESA104	ESA104	ESA104	ESA104	ESA104
Instrument	V5000	V5000	V5000	V5000	V5000	V5000
Report as	received	received	received	received	received	received

RADIAN CORPORATION

Sample History

Energy Systems Associates
Radian Work Order: P0-03-093

Sample Identifications and Dates					
Sample ID	8-FORM-FIELD BLK	8-FORM-FIELD SPIKE	METHOD BLANK	MATRIX SPIKE	MATRIX SPIKE DUP
Date Sampled					
Date Received	03/20/90	03/20/90	03/20/90	03/20/90	03/20/90
Matrix	AIR	AIR	AIR	AIR	AIR
	07	08	09	10	11
Aldehydes by HPLC					
Prepared	03/22/90	03/22/90	03/22/90	03/22/90	03/22/90
Analyzed	03/26/90	03/27/90	03/26/90	03/27/90	03/26/90
Analyst	LK	LK	LK	LK	LK
File ID	ESA112	ESA113	ESA104	ESA114	ESA116
Blank ID	ESA104	ESA104	ESA104	ESA104	ESA104
Instrument	V5000	V5000	V5000	V5000	V5000
Report as	received	received	received	received	received

RADIAN
CORPORATION

Appendix A

Comments, Notes and Definitions

a ALL METHODS EXCEPT CLP
The results which are less than five times the method specified detection limit.
EXPLANATION
Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

ND ALL METHODS EXCEPT CLP
This flag is used to denote analytes which are not detected at or above the specified detection limit.
EXPLANATION
The value to the right of the < symbol is the method specified detection limit for the analyte.

Energy Systems Associates
Radian Work Order: P0-03-093

TERMS USED IN THIS REPORT:
Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units -	ug/L	micrograms per liter (parts per billion); liquids/water
	ug/kg	micrograms per kilogram (parts per billion); soils/solids
	ug/M3	micrograms per cubic meter; air samples
	mg/L	milligrams per liter (parts per million); liquids/water
	mg/kg	milligrams per kilogram (parts per million); soils/solids
	%	percent; usually used for percent recovery of QC standards
	uS/cm	conductance unit; microSiemans/centimeter
	mL/hr	milliliters per hour; rate of settlement of matter in water
	NTU	turbidity unit; nephelometric turbidity unit
	CU	color unit; equal to 1 mg/L of chloroplatinate salt

Appendix C.6

PAH

AVERAGE STACK PAH EMISSIONS

SPECIES		ug/dscm	lb/hr	lb/MMbtu
Naphthalene		3.29	1.51E-02	2.67E-06
Acenaphthylene	ND<	0.01	ND< 4.63E-05	ND< 8.15E-09
Acenaphthene		0.57	2.60E-03	4.55E-07
Fluorene		0.03	1.45E-04	2.55E-08
Phenanthrene		0.03	1.40E-04	2.45E-08
Anthracene		0.01	4.96E-05	8.73E-09
Fluoranthene	<	0.01	< 5.34E-05	< 9.41E-09
Pyrene	<	0.01	< 4.78E-05	< 8.42E-09
Chrysene	ND<	0.01	ND< 4.63E-05	ND< 8.15E-09
Benz(a)anthracene	ND<	0.01	ND< 4.63E-05	ND< 8.15E-09
Benzo(b+k)fluorant	ND<	0.01	ND< 4.63E-05	ND< 8.15E-09
Benzo(a)pyrene	ND<	0.01	ND< 4.63E-05	ND< 8.15E-09
Indeno(1,2,3-cd)py	ND<	0.01	ND< 4.63E-05	ND< 8.15E-09
Dibenzo(a,h)anthra	ND<	0.01	ND< 4.63E-05	ND< 8.15E-09
Benzo(g,h,i)peryle	ND<	0.01	ND< 4.63E-05	ND< 8.15E-09
Average Total PAH	<	4.03	< 1.85E-02	< 3.26E-06

PAH CALCULATIONS

CLIENT:	SCE/ALGS	INITIALS:	LG
		VMSTD(DSCF):	79.90
PROJECT NO:	53304	QSD(DSCF/MIN):	649848
TEST DATE:	3/14/90	CO2,%:	11.21
TEST NUMBER:	6-PAH-S	O2,%:	6.05
T REF (F)	60	F Factor	9063
Fuel: oil			

SPECIES		ug/train		ug/dscm		lb/hr		lb/MMbtu
Naphthalene		7.000		3.093		7.52E-03		2.46E-06
Acenaphthylene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
Acenaphthene		2.300		1.016		2.47E-03		8.09E-07
Fluorene		0.099		0.044		1.06E-04		3.48E-08
Phenanthrene		0.090		0.040		9.67E-05		3.16E-08
Anthracene		0.030		0.013		3.22E-05		1.05E-08
Fluoranthene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
Pyrene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
Chrysene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
Benz(a)anthracene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
Benzo(b+k)fluoranthene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
Benzo(a)pyrene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
Indeno(1,2,3-cd)pyrene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
Dibenzo(a,h)anthracene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
Benzo(g,h,i)perylene	ND<	0.025	ND<	0.011	ND<	2.69E-05	ND<	8.79E-09
TOTAL PAH	<	9.769	<	4.317	<	1.05E-02		3.44E-06

Corrected for Field Blank
RESULTS ARE FOR ONE DUCT ONLY

PAH CALCULATIONS

CLIENT:	SCE/ALGS	INITIALS:	LG
		VMSTD(DSCF):	105.84
PROJECT NO:	53304	QSD(DSCF/MIN):	574573
TEST DATE:	03/15/90	CO2,%:	11.01
TEST NUMBER:	7-PAH-N	O2,%:	6.32
T REF (F)	60	F Factor	9063
Fuel: oil			

SPECIES		ug/train		ug/dscm		lb/hr		lb/MMbtu
Naphthalene		6.000		2.002		4.30E-03		1.62E-06
Acenaphthylene	ND<	0.025	ND<	0.008	ND<	1.79E-05	ND<	6.76E-09
Acenaphthene		1.700		0.567		1.22E-03		4.60E-07
Fluorene		0.078		0.026		5.60E-05		2.11E-08
Phenanthrene		0.110		0.037		7.89E-05		2.97E-08
Anthracene	<	0.025	<	0.008	<	1.79E-05	<	6.76E-09
Fluoranthene		0.039		0.013		2.80E-05		1.05E-08
Pyrene		0.028		0.009		2.01E-05		7.57E-09
Chrysene	ND<	0.025	ND<	0.008	ND<	1.79E-05	ND<	6.76E-09
Benz(a)anthracene	ND<	0.025	ND<	0.008	ND<	1.79E-05	ND<	6.76E-09
Benzo(b+k)fluoranthene	ND<	0.025	ND<	0.008	ND<	1.79E-05	ND<	6.76E-09
Benzo(a)pyrene	ND<	0.025	ND<	0.008	ND<	1.79E-05	ND<	6.76E-09
Indeno(1,2,3-cd)pyrene	ND<	0.025	ND<	0.008	ND<	1.79E-05	ND<	6.76E-09
Dibenzo(a,h)anthracene	ND<	0.025	ND<	0.008	ND<	1.79E-05	ND<	6.76E-09
Benzo(g,h,i)perylene	ND<	0.025	ND<	0.008	ND<	1.79E-05	ND<	6.76E-09
TOTAL PAH	<	8.18	<	2.729	<	5.87E-03		2.21E-06

Corrected for Field Blank
RESULTS ARE FOR ONE DUCT ONLY

PAH CALCULATIONS

CLIENT:	SCE/ALGS	INITIALS:	LG
		VMSTD(DSCF):	81.35
PROJECT NO:	53304	QSD(DSCF/MIN):	653537
TEST DATE:	03/15/90	CO2,%:	10.8
TEST NUMBER:	8-PAH-S	O2,%:	6.48
T REF (F)	60	F Factor	9063
Fuel: oil			

SPECIES		ug/train		ug/dscm	lb/hr	lb/MMbtu
Naphthalene		11.000		4.775	1.17E-02	3.91E-06
Acenaphthylene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
Acenaphthene		0.270		0.117	2.87E-04	9.60E-08
Fluorene		0.058		0.025	6.16E-05	2.06E-08
Phenanthrene		0.034		0.015	3.61E-05	1.21E-08
Anthracene	<	0.025	<	0.011	< 2.65E-05	< 8.89E-09
Fluoranthene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
Pyrene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
Chrysene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
Benz(a)anthracene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
Benzo(b+k)fluoranthene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
Benzo(a)pyrene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
Indeno(1,2,3-cd)pyrene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
Dibenzo(a,h)anthracene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
Benzo(g,h,i)perylene	ND<	0.025	ND<	0.011	ND< 2.65E-05	ND< 8.89E-09
TOTAL PAH	<	11.637	<	5.051	< 1.24E-02	4.14E-06

Corrected for Field Blank
RESULTS ARE FOR ONE DUCT ONLY

CARNOT 04/02/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	03/14/90
Test Number	6-PAH-S	Data By	LG
Test Method	PAH	Sample Location	SO DUCT
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-8	Unit	5
Pitot Factor	0.840	Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	189
Bar Press (in Hg)	30.30	Nozzle Diam (in)	0.246

Meter Vol (acf)	83.792	Meter Temp (F)	92.8
Stack Press (iwg)	2.70	Stack Temp (F)	270.4
Vel Head (iwg)	0.2887	O2 (%): from CEM	4.60
		from portable	6.05
Liquid Vol (ml)	169.8	CO2 (%): from CEM	12.30
		calculated	11.21
Meter Press (iwg)	0.67	Start/Stop Time	1256/1634

Std Sample Vol (SCF)	79.90
Metric Sample Vol (cubic meters)	2.26
Moisture Fraction	0.090
Stack Gas Mol Wt	28.95
Stack Gas Velocity (ft/sec)	35.04
Stack Flow Rate (wacfm)	984,149
Stack Flow Rate (dscfm)	649,848
Isokinetic Ratio (%)	92.23

PARTICULATE TEST DATA

Client/Location SCE / Alamitos Unit 5 Test No. 6-AAN-SO3 Method 425 Page 1
Sample Location South Duct Fuel Oil Ambient Temp., °F ____ of 3
Operators J. Mulligan & R Pearce Meter Vol. (Start/End) 360.266 / 444.351 Date 3/14/90

Pre Test Data:
- Barometric Press., in. Hg 30.3
- Stack Area, sq. ft. 2.1
- Sample Time/ Pt, min. 4.5/189
- Assumed Stack Press ____
- Assumed Moisture 9%
- Assumed Molecular Wt 29

Equipment Info:
- Meter No. ES-8
- Meter, Yd 1.00
- Pitot, Cp .84
- CFM @ΔH = 1.0 .578
- Probe I.D. Teflon
- Nozzle No./Dia .246
- Filter No. 47-182, 47-179

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	—	606.8	- 462.3	= 144.5
#2	160	639.0	- 643.8	= -4.8
#3	—	467.7	- 464.3	= 3.4
#4	SG	734.7	- 708.0	= 26.7
Total		2448.2	- 2278.4	= 169.8

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.002	16	Jm	OK	
Post-Test	.003	24	Jm		

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

ΔH ≈ 2.2

Sample Point	Time	ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp Out (do.1)	O_2	Vacuum	Static Press. iwg
Start	1256	.07	.15	360.260	290	N/A	90	90	N/A	Ice	8.2	4	
1— 1	130030	.10	.22	361.468	289		92	90		53	6.4	4	
2	1305	.15	.41	362.815	286		94	90		54	5.6	6	
3	130930	.27	.59	364.2	297		98	89		58	5.9	8	
4	1314	.51	1.12	366.220	295		55	89		56	7.1	14	
5	131830	.56	1.23	368.890	296		105	85		54		15	
6	1323	.30	.66	370.670	276		99	86		55		12	
stop 7	132730			372.562									
Start	1331	.04	.08	372.562	283		87	86		62	9.2	4	
2— 1	133530	.09	.19	373.5	278		91	86		56	8.0	6	
2	1340	.23	.50	374.8	286		92	86		56	5.4	10	
3	134430	.19	.41	376.692	296		95	87		44	5.1	5	
4	1349	.22	.48	378.426	300		55	87		43	4.5	11	
5	135330	.36	.77	380.149	298		101	88		44	4.5	15	
6	1358	.31	.68	382.368	283		103	88		41	7.2	15	
Stop 7	140230			384.530									
Start	1405	.26	.57	384.530	275		56	87		57	7.5	11	
3— 1	140930	.21	.63	386.128	278		102	88		48	6.6	14	
Total/Average													

Test Summary

- Initial 66 83
- Sample Vol., c.f. 84.091
- Stack Press, iwg 2.70
- ΔP .2887 iwg ΔH .445 iwg
- Meter Temp., °F 92.8
- Stack Temp., °F 270.4
- Water Collected, g 169.8
- O_2/CO_2 Method O_2 pt / CO2
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: CEM O_2 = 4.6, CO_2 = 12.3

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PARTICULATE TEST DATA

Client/Location: SCE / Alamitos   Unit: 5   Test No.: 6-PAH-5-? Method: 425   Page: 2 of 3
Sample Location: South Duct   Fuel: Oil   Ambient Temp., °F: ____   Date: ____
Operators: Mulligan & Pearce   Meter Vol. (Start/End): /

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

See

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CEM-@ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

N/A Page

Imp.	Mat'l	Wt (End)	Weight (Start)	Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.003	15	JR		
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Coil Imp. Out	O_2	Vacuum	Static Press. iwg
3 - 2	14 14	.25	.55	388.126	285	N/A	103	88	N/A	47	5.1	13	
3	14 18 30	.20	.44	390.087	285		103	85		48	4.9	12	
4	14 23	.21	.46	391.876	288		102	85		47	4.8	13	
5	14 27 30	.24	.52	393.700	285		101	85		46	5.0	14	
6	14 32	.23	.50	395.642	290		102	85		42	7.4	14	
Stop 7	14 36 30			397.456									
Start	14 39 30	.29	.63	397.456	273		55	88		46	6.2	16	
4 - 1	14 44	.31	.68	399.28	274		101	88		43	5.1	18	
2	14 48 30	.27	.59	401.552	274		101	88		42	4.5	18	
3	14 53	.25	.55	403.645	278		101	88		42	4.6	17	
4	14 57 30	.22	.48	405.562	273		100	87		41	4.5	16	
5	15 02	.27	.55	407.65	260		181	87		40	4.5	18	
6	15 06 30	.15	.41	409.192	241		96	87		42	5.0	15	
Stop 7	15 11			411.355									
Start	15 15	.42	.92	411.355	268		94	87		43		22	
5 - 1	1519 30 / 1524 30	.54	1.18	413.876/414.175	259		99	86		43	5.1	15	
2	1539	.45	.99	416.827	260		104	86		43	5.1	14	
3	1543 30	.41	.90	415.410	257		105	86		43	5.0	14	
Total/Average													

413.876 - 414.175

Test Summary
- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____

Comments: Filter plugged @ 1519 L/C and change filter
22" vac .009 CFM
Subtract .299 CF

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PARTICULATE TEST DATA

Client/Location SCE/Alamitos Unit 5 Test No. 6-TAHS Method 425 Page 3
Sample Location South Duct Fuel Oil Ambient Temp., °F 52 of 3
Operators LMN/LRP Meter Vol. (Start/End) / Date

Pre Test Data:
Barometric Press, in. Hg 3
Stack Area, sq. ft.
Sample Time/ Pt, min.
Assumed Stack Press
Assumed Moisture
Assumed Molecular Wt

Equipment Info:
Meter No.
Meter Yd
Pitot Cp
CFM@ΔH = 1.0
Probe I.D.
Nozzle No./Dia
Filter No.

Imp. / Mat	Wt(End)	Weight (Start)	Weight (g)
#1			
#2			
#3			
#4			
Total			

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IB
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	~~Probe~~	Meter In	Out	~~Oven~~	Coil Imp. ~~Out~~	O_2	Vacuum	Static Press. iwg
4	1548	.31	.68	422.100	246	N/A	101	86	N/A	45	5.2	10	
5	155230	.39	.85	424.240	245		101	86		43	5.1	15	
6	1557	.79	1.73	426.687	243		102	85		45	6.6	22	
Stop 7	160130			428.899									
Start	160330	.20	.44	428.899	245		89	84		46	8.5	8	
C-1	1608	.26	.57	430.591	248		95	84		48	7.7	12	
2	161230	.39	.85	432.778	253		97	84		46	5.3	16	
3	1617	.39	.85	434.887	251		101	75		45	4.4	16	
4	162130	.36	.75	437.102	243		100	84		46	5.2	16	
5	1625	.68	1.43	437.200	225		101	84		45	7.0	22	
6	162930	.39	.85	441.921	212		98	83		45		20	2.7
Stop 7	1634			444.351									
Total/Average													

Test Summary
Initial
Sample Vol., c.f.
Stack Press, iwg
ΔP ____ iwg ΔH ____ iwg
Meter Temp., °F
Stack Temp., °F
Water Collected, g
O_2/CO_2 Method
Chain of Cust. Info (init.):
Impingers Loaded
Impingers Recovered
Filter Loaded
Filter Recovered
Probe Wash
Comments:

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SAMPLE TRAIN TEST SUMMARY

Client/Location..........	SCE/ALGS	Date....................	03-15-90
Test Number..............	7-PAH-N	Data By..................	LG
Test Method..............	PAH	Sample Location..........	No Duct
Fuel.....................	Oil	Reference Temp (F).......	60
Control Box #............	ES-19	Unit.....................	5
Pitot Factor	0.840	Meter Cal Factor.........	1.0000
Stack Area (sq ft).......	468.13	Sample Time (Min)........	189
Bar Press (in Hg)........	30.30	Nozzle Diam (in).........	0.242
Meter Vol (acf)..........	83.305	Meter Temp (F)...........	98.4
Stack Press (iwg)........	2.90	Stack Temp (F)...........	263.8
Vel Head (iwg)...........	0.2247	O2 (%): from CEM........	4.75
		from portable...	6.32
Liquid Vol (ml)..........	173.7	CO2 (%): from CEM........	12.20
		calculated......	11.01
Meter Press (iwg)........	0.53	Start/Stop Time..........	0902/1245

Std Sample Vol (SCF)..	78.61
Metric Sample Vol (cubic meters)............................	2.23
Moisture Fraction...	0.093
Stack Gas Mol Wt..	28.90
Stack Gas Velocity (ft/sec).................................	30.79
Stack Flow Rate (wacfm).....................................	864,950
Stack Flow Rate (dscfm).....................................	574,573
Isokinetic Ratio (%)..	106.05

PARTICULATE TEST DATA

Client/Location: SCE/Alamitos
Sample Location: North
Operators: CF/RR
Unit: 5
Fuel: Oil
Test No.: 7-AAH-N
Method: PAH
Ambient Temp., °F:
Meter Vol. (Start/End): 217.774 / 301.079
Page 1 of 3
Date: 2-15-90

Pre Test Data:

- Barometric Press, in. Hg: 30.3
- Stack Area, sq. ft.:
- Sample Time/ Pt, min.: 4.5/42
- Assumed Stack Press:
- Assumed Moisture:
- Assumed Molecular Wt:

Equipment Info:

- Meter No.: ES-17
- Meter, Yd: 1.000
- Pitot, Cp: .84
- CFM @ΔH = 1.0: .595
- Probe I.D.: 16'
- Nozzle No./Dia: 7 .242
- Filter No.: T47-183 T47-177

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	–	610.7	464.1	146.6
#2	46	603.8	610.5	-6.7
#3	-40.7	590.1	487.6	103.1
#4	56	266.1	235.0	30.7
Total		2570.9	2297.2	273.7

3.1

Impinger Box I.D.:
Integrated Bag I.D.:

Leak Check:

Sample Train	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.015	16	CF	CF	
Post-Test	.004	27	RP	OK	

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

2.2

	Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Col Temp ~~Imp. Out~~	O_2	Vacuum	Static Press. iwg
0	7-1	908	.02	.045	217.774	252		81	80					
4.5	2	9:08:30	.06	.14	218.48	252		89	81		54	9.5	2	
9	3	911	.15	.36	219.652	242		98	81		46	4.9	2	
13.5	4	9:15:30	.22	.49	221.410	230		101	82		44	4.4	7	
18.0	5	9:20	.31	.60	223.129	210		101	82		41		8	
22.5	6	9:24.3	.27	.48	225.80	212		105	83		39	7.6	12	
27.0	7	9:29	.19	.40	227.42	208		105	84		46	8.4	10	
31.5		9:33.3			228.885			105	85		43	8.0	8	
	6-1	936	.01	.022	228.885	243		86	84		56	8.0	2	
	2	941	.14	.31	229.67	258		97	86		48	6.1	9	
	3	945	.20	.44	231.25	257		105	86		45	4.8	11	
	4	950	.18	.40	233.15	251		107	87		43	4.3	11	
	5	954	.20	.44	234.7.2	239		108	87		43	4.6	12	+2.9
	6	1000	.28	.62	236.83	224		110	88		41	4.7	15	
	7	1003	.35	.77	239.02	227		113	88		41	5.6	18	
		1608			241.046									
	Total/Average													

Test Summary

- Initial: CF/CF
- Sample Vol., c.f.: 83.305
- Stack Press, iwg: 2.90
- ΔP .2247 iwg ΔH .428 iwg
- Meter Temp., °F: 98.4
- Stack Temp., °F: 263.8
- Water Collected, g: 273.7
- O_2/CO_2 Method O_2: 6.32
- Chain of Cust. Info (init.):
  - Impingers Loaded: AB
  - Impingers Recovered:
  - Filter Loaded: AB
  - Filter Recovered:
  - Probe Wash:
- Comments: CEM O_2: 4.75 CO_2: 12.2

187 min

EST DS-022

Client/Location SCE Alm
Sample Location North
Operators CT

Unit 5
Fuel
Test No. 7-PAH-N
Method PAH
Ambient Temp., °F
Meter Vol. (Start/End) /

Date 3-15-90

Pre Test Data:
- Barometric Press, in. Hg
- Stack Area, sq. ft.
- Sample Time/ Pt, min.
- Assumed Stack Press
- Assumed Moisture
- Assumed Molecular Wt

Equipment Info:
- Meter No.
- Meter, Yd
- Pitot, Cp
- CFM @ΔH = 1.0
- Probe I.D.
- Nozzle No./Dia
- Filter No.

Imp.	Matl	Wt(End)	-	Weight (Start)	=	Weight (g)
#1			-		=	
#2			-		=	
#3			-		=	
#4			-		=	
Total			-		=	

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
4-7	1010	.16	.35	241,046	237		100	88		49	8.0	11	
6	1015	.14	.30	243,02	257		107	88		44	5.9	10	
5	1019	.16	.35	244,58	264		101	88		44	5.8	12	
4	1024	.16	.35	246,32	255		105	88		45	5.5	12	
3	1029	.19	.42	248,10	267		108	89		46	4.4	14	
2	1033	.22	.48	249,87	270		111	89		45	4.2	15	
1	1037	.23	.51	251.58	276		114	90		44	4.9	16	
	1040			253.528			~~107~~	~~91~~		~~52~~			
3-1	1046	.29	.64	253.528	282		107	91		52	5.5	15	
2	1051	.28	.62	256.25	279		116	92		46	4.8	16	
3	1055	.26	.57	257,831	279		117	94		45	4.6	17	
4	1100	.19	.42	260.049	271		115	94		46	4.8	15	
5	1104	.26	.57	261.790	265		117	94		47	6.8	17	
6	1109	.16	.35	264.077	271		115	94		47		15	
7	1113 30	.17	.37	265.915	265		113	94		49	8.6	14	
	1118			267.404									
Total/Average													

Test Summary

- Initial
- Sample Vol., c.f.
- Stack Press, iwg
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F
- Stack Temp., °F
- Water Collected, g
- O_2/CO_2 Method
- Chain of Cust. Info (init.):
  - Impingers Loaded
  - Impingers Recovered
  - Filter Loaded
  - Filter Recovered
  - Probe Wash
- Comments:

Client/Location SCE/ALAMITOS
Sample Location A-5 NORTH
Operators CF/RP

Unit #5 Fuel OIL
Test No. 2-PAH-N Method PAH
Ambient Temp., °F
Meter Vol. (Start/End) /
Page 3 of 3
Date 3-15-90

Pre Test Data:
- Barometric Press, in. Hg
- Stack Area, sq. ft.
- Sample Time/ Pt, min.
- Assumed Stack Press
- Assumed Moisture
- Assumed Molecular Wt

~~Equipment Info:~~
- Meter No.
- Meter, Yd
- Pitot, Cp
- CFM @ΔH = 1.0
- Probe I.D.
- Nozzle No./Dia
- Filter No.

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

$\Delta H = 2.2 \times \Delta P$

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
2-7	1121	.37	.81	267.404	272		109	92		44	9.0	23	
-6	112530/1135	.55	1.21	269.990	270		113	91		52	9.1	18	
-5	1148	.55	1.21	273.692	284		120	91		48	6.9	18	
-4	115230	.31	.68	276.555	290		118	92		50	5.5	13	
-3	1157	.33	.73	278.900	291		118	92		52	5.0	13	
-2	120130	.28	.62	281.233	295		117	92		53	6.1	12	
-1	1206	.18	.40	283.381	299		112	92		54	8.3	9	
	121030			285.208									
1-7	121330	.15	.33	285.208	276		100	92		58	9.3	8	
-6	1218	.37	.81	286.891	280		114	92		58	9.1	14	
-5	122230	.40	.88	289.667	296		115	91		48	6.2	15	
-4	1227	.32	.70	291.950	302		111	90		48	5.6	14	
-3	123130	.28	.62	294.390	299		114	90		48	5.2	13	
-2	1236	.33	.73	296.601	300		112	89		48	5.5	14	
-1	124030	.29	.64	298.669	301		114	89		48	7.2	15	
	1245			301.079									
Total/Average													

Test Summary
- Initial
- Sample Vol., c.f.
- Stack Press, iwg
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F
- Stack Temp., °F
- Water Collected, g
- O_2/CO_2 Method
- Chain of Cust. Info (init.):
  - Impingers Loaded
  - Impingers Recovered
  - Filter Loaded
  - Filter Recovered
  - Probe Wash

Comments: CHANGED filter at Pt. 2-6 as filter clogged, leak checked at 27" Hg w/o catch

Post test leak check @ 20" Hg

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CARNOT 03/19/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	03/15/90
Test Number	8-PAH-S	Data By	LG
Test Method	PAH	Sample Location	So Duct
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-8	Unit	5
Pitot Factor	0.840	Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	185
Bar Press (in Hg)	30.14	Nozzle Diam (in)	0.246
Meter Vol (acf)	86.040	Meter Temp (F)	94.6
Stack Press (iwg)	2.70	Stack Temp (F)	272.2
Vel Head (iwg)	0.2971	O2 (%): from CEM	4.55
		from portable	6.48
Liquid Vol (ml)	186.1	CO2 (%): from CEM	12.25
		calculated	10.80
Meter Press (iwg)	0.69	Start/Stop Time	1526/1744

Std Sample Vol (SCF)	81.35
Metric Sample Vol (cubic meters)	2.30
Moisture Fraction	0.096
Stack Gas Mol Wt	28.84
Stack Gas Velocity (ft/sec)	35.75
Stack Flow Rate (wacfm)	1.00E+06 (1,004,394)
Stack Flow Rate (dscfm)	653,537
Isokinetic Ratio (%)	95.65

PARTICULATE TEST DATA

Client/Location SCE / Alamitos Unit 5 Test No. S-PAH-South Method 425 Page 1
Sample Location South Duct Fuel oil Ambient Temp., °F 62 of 3
Operators J. Mulligan & M. McD. Meter Vol. (Start/End) 445.48 - 1531.522 Date 3/15/90

Pre Test Data:
- Barometric Press., in. Hg 30.14
- Stack Area, sq. ft. 480 Area
- Sample Time/ Pt, min. 4.5/1.85
- Assumed Stack Press 2.7
- Assumed Moisture 8%
- Assumed Molecular Wt 29

Equipment Info:
- Meter No. ES-8
- Meter, Yd 1.00
- Pitot, Cp .84
- CFM @ΔH = 1.0 .558
- Probe I.D. Teflon
- Nozzle No./Dia .246
- Filter No. 47-213

47-216

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	—	620.5 -	464.7 =	~~620.6~~ 155.8
#2	H2O	624.7 -	626.1 =	~~624.7~~ -1.4
#3		463.7 -	467.5 =	-3.8
#4	S/G	765.9 -	730.4 =	35.5
Total		2474.8 -	2288.7 =	186.1

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.003	15	JM	OK	
Post-Test	.009	22	JM		

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Out
Init.					
Final					

Sample Point	Time	ΔP	ΔH	Meter Reading	Stack	~~Probe~~	Meter In	Out	~~Oven~~	Imp. Out (coil)	O_2	Vacuum	Static Press. iwg
Start	1310	.02	.644	445.48	250	N/A	53	80	N/A	67	5.5	2	
1 — 1	1314 30	.10	.22	446.225	287		58	53		65	6.7	2	
2	1319	.17	.41	447.465	254		58	53		54	5.7	4	
3	1323 30	.26	.61	449.138	295		101	53		63	5.5	6	
4	1328	.51	1.12	451.167	298		106	51		65	7.2	10	
5	1332 30	.45	.95	454.00	282		108	42		64	10.0	10	
6	1337	.21	.46	456.628	281		104	52		65	5.4	5	
Stop 7	1341 30			458.354									
Start	1345	.38	.83	458.357	281		53	51		58	8.4	8	
2 — 7	1353 30	.43	.94	460.687	286		102	51		50	6.4	7	
6	1358	.26	.57	462.187	302		103	51		47	5.5	8	
5	1402 30	.19	.41	465.030	300		95	90		48	5.6	5	
4	1407	.25	.63	466.860	285		51	50		48	5.8	7	
3	1411 30	.16	.35	468.950	286		98	85		48	5.0	5	
2	1416	.10	.22	470.587	285		54	85		50		3	
Stop 1	1420 30			471.645									
Start	1423 30	.25	.58	471.645	274		91	87		50	7.6	6	
3 — 7	1428	.22	.48	473.721	289		97	88		48	5.8	5	
Total/Average													

71.50

71.50

Test Summary
- Initial JLG
- Sample Vol., c.f. 86.048
- Stack Press, iwg 2.70
- ΔP .2971 iwg ΔH .4796 iwg
- Meter Temp., °F 94.6
- Stack Temp., °F 272.2
- Water Collected, g 186.1
- O_2/CO_2 Method O_2 orts=6.48
- Chain of Cust. Info (Init.):
  - Impingers Loaded JM
  - Impingers Recovered RE
  - Filter Loaded JM
  - Filter Recovered CF
  - Probe Wash JM/RP
- Comments: CEM O_2 4.85, CO_2 12.25

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PARTICULATE TEST DATA

Client/Location SCE / Alamitos
Unit 5
Test No. 8/Part/South
Method 425
Page 2 of 3
Sample Location South Duct
Fuel Oil
Ambient Temp., °F
Date 3/13/90
Operators J. M / CF
Meter Vol. (Start/End) /

Pre Test Data:
- Barometric Press, in. Hg
- Stack Area, sq. ft.
- Sample Time/ Pt, min.
- Assumed Stack Press
- Assumed Moisture
- Assumed Molecular Wt

Equipment Info:
- Meter No.
- Meter, Yd
- Pitot, Cp
- CFM @ΔH = 1.0
- Probe I.D.
- Nozzle No./Dia
- Filter No.

Imp.	(Matl.)	Wt (End)	- Weight (Start)	= Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	~~Probe~~	Meter In	Out	~~Oven~~	Coil Imp. ~~Out~~	O_2	Vacuum	Static Press. iwg
3 - 5	1432 30	.24	.52	475.587	250	N/A	95	89	N/A	48	5.2	1	
4	1437	.22	.48	477.38	255		95	90		52	5.4	6	
3	1441 30	.20	.44	478.76	250		59	90		45	5.6	6	
2	1446	.21	.46	481.028	250		95	90		50	6.4	7	
Stop 1	1450 30			482.801									
Start	1454	.15	.33	482.801	254		90	85		54	8.1	4	
4 - 7	1458 30	.20	.44	483.86	264		96	88		42	6.8	8	
6	1503	.22	.48	485.956	270		97	88		46	5.9	6	
5	1507 30	.26	.57	487.761	277		97	88		45	5.8	7	
4	1512	.31	.68	489.804	278		98	87		41	4.9	8	
3	1516 30	.35	.77	491.910	279		99	87		43	5.1	10	
2	1521	.25	.55	494.191	277		99	87		43	5.7	8	
Stop 1	1525 30			496.140									
Start	1529 30	.80	1.76	451.166	225		101	87		45	7.8	14	
5 - 7	1534	.50	1.1	499.156	249		106	88		44	5.5	14	
6	1538 30	.45	.99	502.208	256		105	88		45	5.1	13	
5	1543	.43	.54	504.631	258		105	86		48	4.8	14	
4	1547 30	.47	1.03	507.125	264		105	87		45	5.1	15	
Total/Average													

Test Summary

Initial
- Sample Vol., c.f.
- Stack Press, iwg
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F
- Stack Temp., °F
- Water Collected, g
- O_2/CO_2 Method
- Chain of Cust. Info (Init.):
  - Impingers Loaded
  - Impingers Recovered
  - Filter Loaded
  - Filter Recovered
  - Probe Wash
- Comments:

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PARTICULATE TEST DATA

Client/Location SCE/Alamitos Unit 5 Test No. 8-PAH-5 Method 429 Page 3
Sample Location South Duct Fuel Oil Ambient Temp., °F ____ of 3
Operators JM/CP Meter Vol. (Start/End) ____ / ____ Date ____

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Mat'l	Wt (End)	Weight (Start)	Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	~~Probe~~	Meter In	Out	~~Oven~~	Imp. Out	O_2	Vacuum	Static Press. iwg
3	1552	.52	1.1	509.683	215	N/A	106	88	N/A	44	5.1	17	
2	155430	.28	.61	512.198	261		106	88		44	6.0	12	
Stop 1	1601			514.364									
Start	160330	.59	.85	514.364	218		97	87		47	6.4	12	
7	1608	.55	1.21	516.598	230		105	88		46	7.6	18	2.7
1	161230	.44	.96	519.305	250		105	89		46	5.6	18	
5	1617	.40	.90	522.107	255		105	89		44	5.2	17	
4	162130	.50	1.1	524.631	258		105	88		47	4.2	18	
3	1626	.35	.77	527.110	254		104	89		47	7.3	17	
2	163030	.24	.52	529.538	248		103	89		46	8.7	13	
Stop 1	1635			531.522									
Total/Average													

Test Summary

Initial ____
Sample Vol., c.f. ____
Stack Press, iwg ____
ΔP ____ iwg ΔH ____ iwg
Meter Temp., °F ____
Stack Temp., °F ____
Water Collected, g ____
O_2/CO_2 Method ____
Chain of Cust. Info (init.):
- Impingers Loaded ____
- Impingers Recovered ____
- Filter Loaded ____
- Filter Recovered ____
- Probe Wash ____

Comments: ____

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PARTICULATE TEST DATA

Client/Location SCE/Alamitos Unit 5 Test No. Field blank Method PAH Page 1

Sample Location ______ Fuel ______ Ambient Temp., °F ______ of 1

Operators ______ Meter Vol. (Start/End) ___/___ Date 3/15/90

Pre Test Data:

- Barometric Press, in. Hg ______
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ______
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:

- Meter No. ______
- Meter, Yd ______
- Pitot, Cp ______
- CFM @ΔH = 1.0 ______
- Probe I.D. ______
- Nozzle No./Dia .246
- Filter No. 47-181

Module - not numbered

Imp.	Matl	Wt(End)	-	Weight (Start)	=	Weight (g)
#1			-		=	
#2			-		=	
#3			-		=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ______

Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
Total/Average													

Test Summary

- Initial ______
- Sample Vol., c.f. ______
- Stack Press, iwg ______
- ΔP ______ iwg ΔH ______ iwg
- Meter Temp., °F ______
- Stack Temp., °F ______
- Water Collected, g ______
- O_2/CO_2 Method ______
- Chain of Cust. Info (init.):
  - Impingers Loaded MM
  - Impingers Recovered JM
  - Filter Loaded AB
  - Filter Recovered JR
  - Probe Wash ______
- Comments: ______

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CLIENT INFORMATION
Name: ENERGY SYSTEMS ASSOCIATES

LAB INFORMATION
Contact: OC
Project: AN898506
Date: Apr.30 1990

Notes: "-" = Not Analysed
"<" = Less than MDL

Alamitos

Component	MDL	Units	FIELD BLANK	6-PAH-S	7-PAH-N	8-PAH-S
Client ID:			FIELD BLANK	6-PAH-S	7-PAH-N	8-PAH-S
Lab ID:			006451 90	006452 90	006453 90	006454 90
Naphthalene	0.025	ug	13	20	19	24
Acenaphthylene	0.025		<	<	<	<
Acenaphthene	0.025		<	2.3	1.7	0.27
Fluorene	0.025		<	0.099	0.078	0.058
Phenanthrene	0.025		0.052	0.14	0.16	0.086
Anthracene	0.025		0.048	0.078	0.052	0.059
Fluoranthene	0.025		<	<	0.039	<
Pyrene	0.025		<	<	0.028	<
Chrysene	0.025		<	<	<	<
Benz(a)anthracene	0.025		<	<	<	<
Benzo(b+k)fluoranthene	0.025		<	<	<	<
Benzo(a)pyrene	0.025		<	<	<	<
Indeno(1,2,3-cd)pyrene	0.025		<	<	<	<
Dibenzo(ah)anthracene	0.025		<	<	<	<
Benzo(ghi)perylene	0.025		0.04	<	<	<
Surrogate Recoveries %						
d10 Acenaphthene			110	95	87	49
d10 Anthracene			98	67	18	64
d12 Chysene			130	130	150	98
d12 Benzo(a)pyrene			100	71	10	71

EXTRA

Prepared by ZENON Environmental Inc.

Appendix C.7

Metals Tests

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: ARSENIC

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No	14.00	41.35	5.51	503445	11.96	2.25E-02	9.18E-06
2-Mtls-So<	15.00	53.47	6.09	627634	9.91	2.33E-02	7.90E-06
3-Mtls-No	24.00	52.88	6.68	623384	16.03	3.74E-02	1.33E-05
3-Mtls-So<	25.00	57.62	6.44	633724	15.32	3.63E-02	1.25E-05
5-Mtls-No	24.00	55.37	5.99	630002	15.31	3.61E-02	1.21E-05
5-Mtls-So	130.00	55.14	5.85	635740	83.25	1.98E-01	6.54E-05
Avg/total	38.67	52.64	6.09	1217976	25.29	1.18E-01	2.01E-05

METALS EMISSION CALCULATIONS

Client/Location:	SCE Alamitos 5
F Factor:	9063
Reference Temp (F):	60
Fuel:	Oil

ELEMENT: BERYLLIUM

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No<	0.17	41.35	5.51	503445 <	0.15 <	2.74E-04 <	1.11E-07
2-Mtls-So<	0.69	53.47	6.09	627634 <	0.46 <	1.07E-03 <	3.64E-07
3-Mtls-No<	0.06	52.88	6.68	623384 <	0.04 <	9.35E-05 <	3.33E-08
3-Mtls-So<	0.27	57.62	6.44	633724 <	0.17 <	3.92E-04 <	1.35E-07
5-Mtls-No<	0.27	55.37	5.99	630002 <	0.17 <	4.06E-04 <	1.36E-07
5-Mtls-So<	0.27	55.14	5.85	635740 <	0.17 <	4.11E-04 <	1.36E-07
Avg/total<	0.29	52.64	6.09	1217976 <	0.19 <	8.82E-04 <	1.53E-07

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: CADMIUM

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No<	2.50	41.35	5.51	503445	< 2.13	< 4.02E-03	< 1.64E-06
2-Mtls-So<	2.70	53.47	6.09	627634	< 1.78	< 4.19E-03	< 1.42E-06
3-Mtls-No<	4.70	52.88	6.68	623384	< 3.14	< 7.32E-03	< 2.61E-06
3-Mtls-So<	2.00	57.62	6.44	633724	< 1.23	< 2.91E-03	< 1.00E-06
5-Mtls-No<	2.20	55.37	5.99	630002	< 1.40	< 3.31E-03	< 1.11E-06
5-Mtls-So<	1.30	55.14	5.85	635740	< 0.83	< 1.98E-03	< 6.54E-07
Avg/total<	2.57	52.64	6.09	1217976	< 1.75	< 7.85E-03	< 1.41E-06

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: COPPER

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No	12.00	41.35	5.51	503445	10.25	1.93E-02	7.87E-06
2-Mtls-So	46.00	53.47	6.09	627634	30.38	7.14E-02	2.42E-05
3-Mtls-No	17.00	52.88	6.68	623384	11.35	2.65E-02	9.43E-06
3-Mtls-So	21.00	57.62	6.44	633724	12.87	3.05E-02	1.05E-05
5-Mtls-No	23.00	55.37	5.99	630002	14.67	3.46E-02	1.16E-05
5-Mtls-So	14.00	55.14	5.85	635740	8.97	2.13E-02	7.04E-06
Avg/total	22.17	52.64	6.09	1217976	14.75	6.78E-02	1.18E-05

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: LEAD

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No	28.00	41.35	5.51	503445	23.91	4.51E-02	1.84E-05
2-Mtls-So	48.00	53.47	6.09	627634	31.70	7.45E-02	2.53E-05
3-Mtls-No	51.00	52.88	6.68	623384	34.05	7.95E-02	2.83E-05
3-Mtls-So	56.00	57.62	6.44	633724	34.32	8.14E-02	2.80E-05
5-Mtls-No	35.00	55.37	5.99	630002	22.32	5.26E-02	1.77E-05
5-Mtls-So	25.00	55.14	5.85	635740	16.01	3.81E-02	1.26E-05
Avg/total	40.50	52.64	6.09	1217976	27.05	1.24E-01	2.17E-05

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: LEAD

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No	28.00	41.35	5.51	503445	23.91	4.51E-02	1.84E-05
2-Mtls-So	48.00	53.47	6.09	627634	31.70	7.45E-02	2.53E-05
3-Mtls-No	51.00	52.88	6.68	623384	34.05	7.95E-02	2.83E-05
3-Mtls-So	56.00	57.62	6.44	633724	34.32	8.14E-02	2.80E-05
5-Mtls-No	35.00	55.37	5.99	630002	22.32	5.26E-02	1.77E-05
5-Mtls-So	25.00	55.14	5.85	635740	16.01	3.81E-02	1.26E-05
Avg/total	40.50	52.64	6.09	1217976	27.05	1.24E-01	2.17E-05

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: MANGANESE

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No	95.00	41.35	5.51	503445	81.12	1.53E-01	6.23E-05
2-Mtls-So	29.00	53.47	6.09	627634	19.15	4.50E-02	1.53E-05
3-Mtls-No	21.00	52.88	6.68	623384	14.02	3.27E-02	1.17E-05
3-Mtls-So	10.00	57.62	6.44	633724	6.13	1.45E-02	5.01E-06
5-Mtls-No	27.00	55.37	5.99	630002	17.22	4.06E-02	1.36E-05
5-Mtls-So	91.00	55.14	5.85	635740	58.27	1.39E-01	4.58E-05
Avg/total	45.50	52.64	6.09	1217976	32.65	1.39E-01	2.56E-05

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: MERCURY

Test	ug/train	Vmstd	%O2	Qsd		ug/m3		lb/hr		lb/MMbtu
2-Mtls-No<	9.00	41.35	5.51	503445	<	7.69	<	1.45E-02	<	5.90E-06
2-Mtls-So<	9.00	53.47	6.09	627634	<	5.94	<	1.40E-02	<	4.74E-06
3-Mtls-No<	6.00	52.88	6.68	623384	<	4.01	<	9.35E-03	<	3.33E-06
3-Mtls-So<	7.00	57.62	6.44	633724	<	4.29	<	1.02E-02	<	3.51E-06
5-Mtls-No<	6.00	55.37	5.99	630002	<	3.83	<	9.02E-03	<	3.03E-06
5-Mtls-So<	7.00	55.14	5.85	635740	<	4.48	<	1.07E-02	<	3.52E-06
Avg/total<	7.33	52.64	6.09	1217976	<	5.04	<	2.24E-02	<	4.00E-06

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: NICKEL

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No	546.00	41.35	5.51	503445	466.25	8.79E-01	3.58E-04
2-Mtls-So	487.00	53.47	6.09	627634	321.60	7.55E-01	2.57E-04
3-Mtls-No	609.00	52.88	6.68	623384	406.65	9.49E-01	3.38E-04
3-Mtls-So	592.00	57.62	6.44	633724	362.78	8.60E-01	2.96E-04
5-Mtls-No	639.00	55.37	5.99	630002	407.50	9.61E-01	3.23E-04
5-Mtls-So	462.00	55.14	5.85	635740	295.85	7.04E-01	2.32E-04
Avg/total	555.83	52.64	6.09	1217976	376.77	1.70E+00	3.01E-04

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: SELENIUM

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No<	3.20	41.35	5.51	503445 <	2.73 <	5.15E-03 <	2.10E-06
2-Mtls-So<	3.70	53.47	6.09	627634 <	2.44 <	5.74E-03 <	1.95E-06
3-Mtls-No<	17.00	52.88	6.68	623384 <	11.35 <	2.65E-02 <	9.43E-06
3-Mtls-So<	5.40	57.62	6.44	633724 <	3.31 <	7.85E-03 <	2.70E-06
5-Mtls-No<	3.20	55.37	5.99	630002 <	2.04 <	4.81E-03 <	1.62E-06
5-Mtls-So<	5.40	55.14	5.85	635740 <	3.46 <	8.23E-03 <	2.71E-06
Avg/total<	6.32	52.64	6.09	1217976 <	4.22 <	1.93E-02 <	3.42E-06

Average ug/m3

5.51

Average lb/hr

1.25E-02

Average lb/MMbtu

4.49E-06

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: ZINC

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-Mtls-No	526.00	41.35	5.51	503445	449.17	8.46E-01	3.45E-04
2-Mtls-So	1768.00	53.47	6.09	627634	1167.53	2.74E+00	9.31E-04
3-Mtls-No	626.00	52.88	6.68	623384	418.00	9.75E-01	3.47E-04
3-Mtls-So	721.00	57.62	6.44	633724	441.83	1.05E+00	3.61E-04
5-Mtls-No	821.00	55.37	5.99	630002	523.56	1.23E+00	4.15E-04
5-Mtls-So	615.00	55.14	5.85	635740	393.83	9.37E-01	3.09E-04
Avg/total	846.17	52.64	6.09	1217976	565.65	2.59E+00	4.51E-04

E/A Energy Systems Associates A CORPORATION
15991 RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

SUBJECT: Metals Comparisons for CARB - Alamitos JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY: L. Green DATE: 5-21-90 CHECKED BY: ______ DATE: ______

Stack lb/hr = avg of 3 duct tests X 2

Set #1 = 2 Mtls No, 3 Mtls No, 5 Mtls S

Set #2 = 2 Mtls S, 3 Mtls S, 5 Mtls N

lb/hr

	As	Be	Cd	Cu	Pb	Mn	Hg	Ni	Se	Zn
Set #1 Avg	17.2×10^{-2}	5.2×10^{-4}	8.88×10^{-3}	4.46×10^{-2}	1.08×10^{-1}	2.16×10^{-1}	$<2.30 \times 10^{-2}$	1.69	2.66×10^{-2}	1.84
Set #2 Avg	6.38×10^{-2}	12.5×10^{-4}	6.94×10^{-3}	9.1×10^{-2}	1.39×10^{-1}	$0.67^{**} \times 10^{-1}$	2.22×10^{-2}	1.72	1.23×10^{-2}	3.34

* Includes one abnormally high result

** Includes 2 tests where impinger results were deleted due to contamination

126097

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SUBJECT Metals Summary SCE Alamitos JOB NO. S3304

SHEET NO. 1 of 1

COMPUTED BY R. Green DATE 5/8/90 CHECKED BY ______ DATE ______

ug/train

	As	Be	Cd	Cu	Pb	Mn	Hg	Ni	Se	Zn
2 mths N	14	<0.17	<2.5	12	28	95	ND<9.0	546	ND<3.2	526
2 mths S	<15	<0.69	<2.7	46	48	29*	ND<9.0	487	<3.7	1768
3 mths N	24	<0.06	<4.7	17	51	21	ND<6.0	609	<17	626
3 mths S	<25	<0.27	<2.0	21	56	10*	ND<7.0	592	<5.4	721
5 mths N	24	<0.27	<2.2	23	35	27	ND<6.0	639	ND<3.2	128
5 mths S	130	<0.27	ND<1.3	14	25	91	ND<7.0	462	<5.4	519

* only front half value - back half contaminated

128097

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SUBJECT: Alamitos Metals Calculations — Arsenic JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY L. Green DATE 5/8/90 CHECKED BY ______ DATE ______

$$\text{As ug/train} = \frac{(\text{Probe+filter} - RB) + (\text{Impinger} - RB)}{.95}$$

$$\text{2-MHS-N} = \frac{(15 - 1.7) + (1.1 - 1.1)}{.95} = 14$$

$$\text{2MHs S} = \frac{(14 - 1.7) + (ND<3.0 - 1.1)^{*}}{.95} = <15$$

$$\text{3MHs N} = \frac{(\cancel{13}\ 24 - \cancel{11}\ 1.7) + (1.3 - 1.1)}{.95} = 24$$

$$\text{3Hs S} = \frac{(23 - 1.7) + (ND<3.0\ 1.1)^{*}}{.95} = <25$$

$$\text{5MHs N} = \frac{(24 - 1.7) + (2.6 - 1.1)}{.95} = 24$$

$$\text{5MHs S} = \frac{(130 - 1.7) + (2.3 - 1.1)}{.95} = 130$$

Note: 5% of sample removed for Hg analysis.

* [illegible] to MSA - did EPA method 6010

126007

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SUBJECT: Alamitos Metals Calculations — Beryllium JOB NO. 53304
SHEET NO. 1 of 1
COMPUTED BY L. Green DATE 5/8/90 CHECKED BY ______ DATE ______

$$\text{Be ug/train} = \frac{(\text{Probe+filter} - RB) + (\text{Impinger} - RB)}{.95}$$

$$2\text{ MHs-N} = \frac{(\overset{0.5}{\cancel{1.0}} - 0.4) + (ND<.06 - ND)}{.95} = <0.17$$

$$2\text{ MHs-S} = \frac{(1.0 - 0.4) + (ND<.06 - ND)}{.95} = <0.69$$

$$3\text{ MHs N} = \frac{(0.4 - 0.4) + (ND<.06 - ND)}{.95} = <0.06$$

$$3\text{ MHs S} = \frac{(0.6 - 0.4) + (ND<.06 - ND)}{.95} = <0.27$$

$$5\text{ MHs N} = \frac{(0.6 - 0.4) + (ND<.06 - ND)}{.95} = <0.27$$

$$5\text{ MHs S} = \frac{(0.5 - 0.4) + (ND<.06 - ND)}{.95} = <0.27$$

Note: 5% of sample removed for Hg analysis.

128007

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SUBJECT Alamitos Metals Calculations Cadmium JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY L. Green DATE 5/8/90 CHECKED BY ______ DATE ______

$$Cd\ ug/train = \frac{(Probe+filter - RB) + (Impinger - RB)}{.95}$$

$$2\ Mtls\text{-}N = \frac{(ND<0.9 - ND) + (1.5 - ND)}{.95} = <2.5$$

$$2\ Mtls\ S = \frac{(ND<0.9 - ND) + (1.7 - ND)}{.95} = <2.7$$

$$3\ Mtls\ N = \frac{(ND<0.9 - ND) + (3.6 - ND)}{.95} = <4.7$$

$$3\ Mtls\ S = \frac{(ND<0.9 - ND) + (0.99 - ND)}{.95} = <2.0$$

$$5\ Mtls\ N = \frac{(ND<0.9 - ND) + (1.2 - ND)}{.95} = <2.2$$

$$5\ Mtls\ S = \frac{(ND<0.9 - ND) + (ND<0.3 - ND)}{.95} = ND<1.3$$

Note: 5% of sample removed for Hg analysis.

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SUBJECT: Alamitos Metals Calculations — Copper   JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY: L. Green   DATE: 5/8/90   CHECKED BY: ______   DATE: ______

$$\text{Cu ug/train} = \frac{(\text{Probe+filter} - RB) + (\text{Impinger} - RB)}{.95}$$

$$\text{2MHSN} = \frac{(19 - 7.5) + \cancel{(7.5 - 8.4)}}{.95} = 12$$

$$\text{2MHSS} = \frac{(43 - 7.5) + (17 - 8.4)}{.95} = 46$$

$$\text{3MHSN} = \frac{(24 - 7.5) + \cancel{(4.9 - 8.4)}}{.95} = \cancel{13.7}\ 17\text{ ug}$$

$$\text{3MHSS} = \frac{(27 - 7.5) + \cancel{(5.3 - 8.4)}}{.95} = \cancel{20}\ 21\text{ ug}$$

$$\text{5MHSN} = \frac{(26 - 7.5) + (12 - 8.4)}{.95} = 23$$

$$\text{5MHSS} = \frac{(21 - 7.5) + \cancel{(8.0 - 8.4)}}{.95} = 14$$

Note: 5% of sample removed for Hg analysis.

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SUBJECT Alamitos Metals Calculations Lead JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY L. Green DATE 5/8/90 CHECKED BY ______ DATE ______

$$Pb\ ug/train = \frac{(Probe+filter - RB) + (Impinger - RB)}{.95}$$

$$2\,mths\,N = \frac{(48 - 26) + (4.7 - ND)}{.95} = 28$$

$$2\,mths\,S = \frac{(72 - 26) + (ND<3.0 - ND)}{.95} = 48$$

$$3\,mths\,N = \frac{(61 - 26) + (13 - ND)}{.95} = 51$$

$$3\,mths\,S = \frac{(59 - 26) + (20 - ND)}{.95} = 56$$

$$5\,mths\,N = \frac{(53 - 26) + (5.9 - ND)}{.95} = 35$$

$$5\,mths\,S = \frac{(44 - 26) + (6.0 - ND)}{.95} = 25$$

Note: 5% of sample removed for Hg analysis.

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SUBJECT Alamitos Metals Calculations JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY L. Green DATE 5/8/90 CHECKED BY ______ DATE ______

$$Mn\ ug/train = \frac{(Probe + filter - RB) + (Impinger - RB)}{.95}$$

$$2MHsN = \frac{(58 - 2.7) + (36 - 0.8)}{.95} = 95$$

$$2MHsS = \frac{(30 - 2.7) + (* - 0.8)}{.95} = 29^{**}$$

$$3MHsN = \frac{(12 - 2.7) + (11 - 0.8)}{.95} = 21$$

$$3MHsS = \frac{(12 - 2.7) + (* - 0.8)}{.95} = 10^{**}$$

$$5MHsN = \frac{(24 - 2.7) + (5.3 - 0.8)}{.95} = 27$$

$$5MHsS = \frac{(12 - 2.7) + (78 - 0.8)}{.95} = 91$$

Note: 5% of sample removed for Hg analysis

* Very high due to back-flush of KMnO4 impinger

** ... impinger value unusable

128007

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SUBJECT: SCE Alamitos Hg Calculation JOB NO. 53304
SHEET NO. 1 of 1
COMPUTED BY: R. Green DATE: 5-8-90 CHECKED BY: ______ DATE: ______

Hg (ug/train) = (Probe + Filter - RB) + (Impinger - RB) + (KMnO4 - RB)

2 Mtls N = (ND<5.0 - ND) + (ND<1.0 - ND) + (ND<3.0 - ND) = ND< 9.0

2 Mtls S = (ND<6.0 - ND) + (ND<1.0 - ND) + (ND<2.0 - ND) = ND<9.0

3 Mtls N = (ND<4.0 - ND) + (ND<1.0 - ND) + (ND<1.0 - ND) = ND<6.0

3 Mtls S = (ND<5.0 - ND) + (ND<1.0 - ND) + (ND<1.0 - ND) = ND<7.0

5 Mtls N = (ND<4.0 - ND) + (ND<1.0 - ND) + (ND<1.0 - ND) = ND<6.0

5 Mtls S = (ND<5.0 - ND) + (ND<1.0 - ND) + (ND<1.0 - ND) = ND<7.0

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SUBJECT: Alamitos Metals Calculations — Nickel JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY L. Green DATE 5/8/90 CHECKED BY ______ DATE ______

$$Ni\ ug/train = \frac{(Probe + filter - RB) + (Impinger - RB)}{.95}$$

$$2\ MHSN = \frac{(390 - ND) + (130 - 0.8)}{.95} = 546$$

$$2\ MHSS = \frac{(450 - ND) + (13 - 0.8)}{.95} = 487$$

$$3\ MHSN = \frac{(560 - ND) + (20 - 0.8)}{.95} = 609$$

$$3\ MHSS = \frac{(550 - ND) + (12 - 0.8)}{.95} = 592$$

$$5\ MHSN = \frac{(600 - ND) + (7.5 - 0.8)}{.95} = 639$$

$$5\ MHSS = \frac{(290 - ND) + (150 - 0.8)}{.95} = 462$$

Note: 5% of sample removed for Hg analysis.

128097

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SUBJECT: Alamitos Metals Calculations — Selenium   JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY: L. Green   DATE: 5/8/90   CHECKED BY: ______   DATE: ______

$$\text{Selenium } \mu g/\text{train} = \frac{(\text{Probe+Filter} - RB) + (\text{Impinger} - RB)}{.95}$$

$$2MHsN = \frac{(\cancel{8.5}\ 5.6 - \cancel{6.4}) + (ND<3.0 - ND)}{.95} = ND<3.2$$

$$2MHsS = \frac{(6.9 - 6.4) + (ND<3.0 - ND)}{.95} = <3.7$$

$$3MHsN = \frac{(20 - 6.4) + (ND<3.0 - ND)}{.95} = <17$$

$$3MHsS = \frac{(8.5 - 6.4) + (ND<3.0 - ND)}{.95} = <5.4$$

$$5MHsN = \frac{(\cancel{ND<5.0 - 6.4}) + (ND<3.0 - ND)}{.95} = ND<3.2$$

$$5MHsS = \frac{(8.5 - 6.4) + (ND<3.0 - ND)}{.95} = <5.4$$

Note: 5% of sample removed for Hg analysis.

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SUBJECT Alamitos Metals Calculations JOB NO. 53304
Zinc
SHEET NO. 1 of 1
COMPUTED BY L. Green DATE 5/8/90 CHECKED BY ____ DATE ____

$$Zn\ ug/train = \frac{(Probe+filter-RB) + (Impinger-RB)}{.95}$$

$$2\,Mtls\,N = \frac{(1300-830)+(32-1.9)}{.95} = 526$$

$$2\,Mtls\,S = \frac{(2500-830)+(12-1.9)}{.95} = \cancel{1680}\ 1768$$

$$3\,Mtls\,N = \frac{(1400-830)+(27-1.9)}{.95} = 626$$

$$3\,Mtls\,S = \frac{(1500-830)+(17-1.9)}{.95} = 721$$

$$\cancel{3}\,Mtls\,N = \frac{(1600-830)+(12-1.9)}{.95} = 821$$

$$5\,Mtls\,S = \frac{(1400-830)+(16-1.9)}{.95} = 615$$

Note: 5% of sample removed for Hg analysis.

128097

E/A Energy Systems Associates A CORPORATION
15991 RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

SUBJECT Metal Detection Limits - Alamitos JOB NO. C3304

SHEET NO. ___ of ___

COMPUTED BY L Green DATE 5-12-90 CHECKED BY ___ DATE ___

Detection Limit = $\frac{\text{DL probe/filter + DL impinger}}{.95}$ = DL in ug/train

		ug/train	ug/m³*	
As	$\frac{.05 + .05}{.95}$ =	1.05	0.5	
Be	$\frac{.10 + .06}{.95}$ =	0.74	0.4	
Cd	$\frac{0.9 + 0.3}{.95}$ =	1.26	0.6	
Cu	$\frac{1.0 + 0.6}{.95}$ =	1.68	0.8	
Pb	$\frac{5.0 + 3.0}{.95}$ =	8.42	4.2	
Mn	$\frac{1.0 + 0.6}{.95}$ =	1.68	.8	
Hg	1.0 + 2.0 + 1.0 =	4.0	2.0	(3 fractions)
Ni	$\frac{1.0 + 0.6}{.95}$ =	1.68	0.8	
Se	$\frac{5.0 + 3.0}{.95}$ =	8.42	4.2	
Zn	$\frac{1.0 + .60}{.95}$ =	7.37	3.7	
Tot Cr	1.25 ug × 2 =	2.5	1.3	
Hex Cr	.0014 ug/ml × 290 ml × 2 =	0.81	0.4	

126097

* ... 2 m³/train

CARNOT 03/19/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	3/13/90
Test Number	2-Mtls-N	Data By	MDM
Test Method	Metals	Sample Location	No Duct
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-8	Unit	5
Pitot Factor	0.840	Meter Cal Factor	0.9900
Stack Area (sq ft)	468.13	Sample Time (Min)	126
Bar Press (in Hg)	30.35	Nozzle Diam (in)	0.242

Meter Vol (acf)	42.476	Meter Temp (F)	76.6
Stack Press (iwg)	2.70	Stack Temp (F)	257.3
Vel Head (iwg)	0.1723	O2 (%): from CEM	5.00
		from portable	5.51
Liquid Vol (ml)	95.0	CO2 (%): from CEM	12.20
		calculated	11.81
Meter Press (iwg)	0.43	Start/Stop Time	0905/1124

Std Sample Vol (SCF)	41.35
Metric Sample Vol (cubic meters)	1.17
Moisture Fraction	0.096
Stack Gas Mol Wt	28.94
Stack Gas Velocity (ft/sec)	26.81
Stack Flow Rate (wacfm)	752,976
Stack Flow Rate (dscfm)	503,445
Isokinetic Ratio (%)	95.50

PARTICULATE TEST DATA

Client/Location: SCE Alamitos
Sample Location: North
Operators: CE / RP
Unit: 5
Fuel: Oil
Test No. 2-MT-N
Method: Metals
Ambient Temp., °F:
Meter Vol. (Start/End): 151.856 / 194.332
Page 1 of 3
Date: 3-13-90

Pre Test Data:
- Barometric Press, in. Hg: 30.35
- Stack Area, sq. ft.:
- Sample Time/ Pt, min.:
- Assumed Stack Press:
- Assumed Moisture:
- Assumed Molecular Wt:

Equipment Info:
- Meter No.: ES-8
- Meter, Yd: .990
- Pitot, Cp: .84
- CFM @ΔH = 1.0: .598
- Probe I.D.: 16'
- Nozzle No./Dia: 7: .242
- Filter No.: T47-229

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	HNO_3	672.3	590.0	82.3
#2	HNO_3	615.9	615.5	0.4
#3	$KMnO_4$	619.1	617.2	1.9
#4	$KMnO_4$	585.6	585.2	0.4
Total	SG	817.6	807.6	10.0

Impinger Box I.D.:
Integrated Bag I.D.:

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.018	20	CF	CF	
Post-Test	.018	26	CF	CF	

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
6-7	905	.33	.66	151.856	215	–	58	57	–	45		4	
6	908	.22	.44	153.60	216		62	57		46	7.0	4	
5	911	.38	.76	154.81	219		67	57		46		6	
4	914	.33	.66	156.25	227		70	58		46	7.2	6	
3	917	0.01	0.02	157.45	242		64	59		46		0	
2	920	0	0	157.53									
1	920	0	0	157.54									
	920			157.54									
5 1	923	0	0	157.54	254		~~65~~	~~64~~		46	4.8	0	
2	923	0.04	.08	157.54	250		68	62		42	4.9	0	
3	926	.07	.14	158.20	253		70	63		41	4.8	1	
4	929	.07	.14	158.73	245		71	63		42		1	+2.7
5	932	0.13	.26	159.50	244		76	65		46	4.8	4	
6	935	.17	.34	160.53	236		78	66		44		5	
7	938	.17	.34	161.22	229		80	67		43	6.3	5	
	941			162.24									
Total/Average													

Test Summary

- Initial: MM / MM
- Sample Vol., c.f.: 42.476
- Stack Press, iwg: +2.7
- ΔP .1723 iwg ΔH .43 iwg
- Meter Temp., °F: 76.6
- Stack Temp., °F: ~~262.3~~ 257
- Water Collected, g: 95.0
- O_2/CO_2 Method: 5.51
- Chain of Cust. Info (init.):
  - Impingers Loaded: CF
  - Impingers Recovered: RP
  - Filter Loaded: CF
  - Filter Recovered: MM
  - Probe Wash: CF/RP

Comments: CEM: O_2 5.0% CO_2 12.2%

Client/Location SCE Alm | Unit 5 | Test No. 2-MH-N | Method Metals | Page 2
Sample Location #5 North | Fuel Oil | Ambient Temp., °F ____ | of 3
Operators CE/RP | Meter Vol. (Start/End) / | Date 2-13-96

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt(End)	- Weight (Start)	= Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
4 1	947	.09	.18	162.24	252		72	68		48		2	
2	950	.09	.18	163.05	251		76	69		49	5.0	3	
3	953	.07	.14	163.93	250		76	70		48		3	
4	956	.10	.20	164.62	240		77	70		49	5.8	4	
5	959	.02	.04	165.62	239		77	70		51	6.2	0	
6	1002	.02	.04	165.80	226		72	71		51		0	
7	1004	0	0	166.027			~~71~~	~~69~~		51		0	
	1004			166.027									
3 1	1012	.06	.12	166.027	266		72	71		50		2	
2	1015	.28	.56	166.65	266		76	72		47	5.2	7	
3	1018	.23	.46	168.12	265		84	73		46	5.3	6	
4	1021	.20	.40	169.14	252		83	73		45	5.3	6	
5	1024	.36	.72	170.38	256		85	73		47		10	
6	1027	.47	.94	171.85	255		88	73		48	6.2	14	
7	1030	.33	.66	173.55						54			
	1033			174.855									
Total/Average													

Test Summary
- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

Client/Location SCE Alm
Sample Location #5 North
Operators CF/KP

Unit 5
Fuel Oil

Test No. 2-MH-N
Method Metals
Ambient Temp., °F ______
Meter Vol. (Start/End) ______ / ______

Page 3
of 3
Date 3-12-90

Pre Test Data:
- Barometric Press, in. Hg ______
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ______
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:
- Meter No. ______
- Meter, Yd ______
- Pitot, Cp ______
- CFM @ΔH = 1.0 ______
- Probe I.D. ______
- Nozzle No./Dia ______
- Filter No. ______

Imp.	Matl	Wt(End)	- Weight (Start)	= Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D. ______
Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
2-1	1038	.24	.48	174.855	281		83	77		54	5.0	9	
2	1041	.76	.52	176.20	289		88	78		55		7	
3	1044	.26	.52	177.05	285		91	79		55	5.0	10	
4	1047	.28	.54	178.30	285		97	79		55	4.9	10	
5	1050	.50	1.0	179.90	267		96	80		54		20	
6	1053	.65	1.3	181.8	262		98	80		55	5.0	20	
7	1056	.50	1.0	183.9	251		98	80		57		20	
	1059			184.775									
1-1	1103	.28	.36	184.775	290		84	80		58	4.9	7	
2	1106	.40	.80	186.37	293		94	81		59		14	
3	1109	.32	.64	187.65	292		96	81		59	4.8	15	
4	1112	.32	.64	188.75	295		97	82		59	4.8	13	
5	1115	.42	.84	180.09	289		98	82		60		16	
6	1118	.42	.84	191.75	272		100	83		60	8.0	16	
7	1121	.18	.36	193.42	278		96	83		61		29	
End	1124			194.332									
Total/Average													

Test Summary

Initial ______
Sample Vol., c.f. ______
Stack Press, iwg ______
ΔP ______ iwg ΔH ______ iwg
Meter Temp., °F ______
Stack Temp., °F ______
Water Collected, g ______
O_2/CO_2 Method ______
Chain of Cust. Info (Init.):
- Impingers Loaded ______
- Impingers Recovered ______
- Filter Loaded ______
- Filter Recovered ______
- Probe Wash ______

Comments: ______

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SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	3/13/90
Test Number	2-Mtls-S	Data By	MDM
Test Method	Metals	Sample Location	So Duct
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor	0.840	Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	126
Bar Press (in Hg)	30.35	Nozzle Diam (in)	0.246

Meter Vol (acf)	55.259	Meter Temp (F)	85.5
Stack Press (iwg)	2.70	Stack Temp (F)	271.3
Vel Head (iwg)	0.2728	O2 (%): from CEM	5.00
		from portable	6.09
Liquid Vol (ml)	123.4	CO2 (%): from CEM	12.20
		calculated	11.36
Meter Press (iwg)	0.58	Start/Stop Time	0906/1130

Std Sample Vol (SCF)	53.47
Metric Sample Vol (cubic meters)	1.51
Moisture Fraction	0.097
Stack Gas Mol Wt	28.89
Stack Gas Velocity (ft/sec)	34.09
Stack Flow Rate (wacfm)	957,457
Stack Flow Rate (dscfm)	627,634
Isokinetic Ratio (%)	95.87

PARTICULATE TEST DATA

Client/Location SCE / Alamitos Unit 5 Test No. 2-MH-5 Method 12/101A Page 1
Sample Location South Fuel oil Ambient Temp., °F 50 of 3
Operators J. Mulligan & L. Farrington Meter Vol. (Start/End) 979.375/1034.634 Date 3/13/90

Pre Test Data:

Barometric Press, in. Hg	30.35
Stack Area, sq. ft.	1
Sample Time/ Pt, min.	3
Assumed Stack Press	
Assumed Moisture	9%
Assumed Molecular Wt	29

Equipment Info:

Meter No.	ES-19
Meter, Yd	1.00
Pitot, Cp	.84
CFM @ΔH = 1.0	.555
Probe I.D.	Teflon
Nozzle No./Dia	.246
Filter No.	147-228

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	HNO_3	706.6	602.7	103.7
#2	HNO_3	725.3	599.3	126.0
#3	$KMnO_4$	547.0	626.8	-79.8
#4	$KMnO_4$	513.0	555.2	-42.2
Total	SG	826.8	811.2	15.6

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.015	15	JM	OK	
Post-Test	.015	20	JM		

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

ΔH = 2.06

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	~~Probe~~	Meter In	Out	~~Oven~~	Imp. Out	O_2	Vacuum	Static Press. iwg
Start	9:06	.07	.14	979.375	276	N/A	70	66	N/A	Etc		2	
1-7	9:09	.44	.50	980.068	281		53	68		51	9.8	5	
6	9:12	.49	1.0	981.612	294		56	69		50		5	
5	9:15	.27	.55	983.351	298		55	70		50		3	
4	9:18	.19	.39	984.876	298		53	70		51	5.8	4	
3	9:21	.12	.27	985.852	291		87	71		52		3	
2	9:24	.05	.10	986.752	294		89	72		52	7.1	2	
Stop 1	9:27			987.332									
Start	9:29	.06	.12	987.332	282		74	71		54	8.4	2	
2-1	9:32	.17	.35	988.021	284		83	72		54	5.2	4	
2	9:35	.21	.43	989.012	289		86	72		53	5.8	6	
3	9:38	.18	.37	990.287	296		90	73		52	5.4	6	
4	9:41	.22	.45	991.285	302		85	73		52		6	
5	9:44	.42	.86	992.465	300		94	74		52	5.6	10	
6	9:47	.25	.51	993.561	286		92	73		51	6.2	8	
Stop 7	9:50			994.851									
Start	9:55	.19	.39	994.858	267		75	73		56	8.0	6	
3-1	9:58	.22	.45	996.085	270		84	73		54		6	
Total/Average													

Test Summary

Initial	MA/MM
Sample Vol., c.f.	55.259
Stack Press, iwg	2.7
ΔP .2728 iwg	ΔH .584 iwg
Meter Temp., °F	85.5
Stack Temp., °F	271.3
Water Collected, g	123.4
O_2/CO_2 Method	6.0
Chain of Cust. Info (init.):	
Impingers Loaded	CC
Impingers Recovered	AS
Filter Loaded	CC
Filter Recovered	BOM
Probe Wash	JM/LF
Comments:	CEM O_2 5.0%
	CO_2 12.2%

PARTICULATE TEST DATA

Client/Location SCE/Alamitos Unit 5 Test No. Mlk Blank II Method ____ Page 1
Sample Location ES North Fuel Oil Ambient Temp., °F ____ of 1
Operators RP Meter Vol. (Start/End) ____/____ Date 3/15/90

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt(End)		Weight (Start)		Weight (g)
#1	HNO_3/H_2O_2	618.2	-	610.7	=	
#2	HNO_3/H_2O_2	613.8	-	713.0	=	
#3	$KMnO_4$	542.4	-	565.4	=	
#4		615.3	-		=	
Total			-		=	

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.005	15	EP		
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
Total/Average													

Test Summary

- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (Init.):
  - Impingers Loaded JM
  - Impingers Recovered PG
  - Filter Loaded CF
  - Filter Recovered CF
  - Probe Wash CF
- Comments: ____

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PARTICULATE TEST DATA

Client/Location SCE / Alamito   Unit 5   Test No. 2-MHS-5   Method ______   Page 2
Sample Location South   Fuel Oil   Ambient Temp., °F ______   of 3
Operators S. Mulligan & L Farrington   Meter Vol. (Start/End) ______ / ______   Date ______

Pre Test Data:
- Barometric Press, in. Hg ______
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ______
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:
- Meter No. ______
- Meter, Yd ______
- Pitot, Cp ______
- CFM @ΔH = 1.0 ______
- Probe I.D. ______
- Nozzle No./Dia ______
- Filter No. ______

Imp.	Matl	Wt(End)		Weight (Start)		Weight (g)
#1			-		=	
#2			-		=	
#3			-		=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ______
Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	~~Probe~~	Meter In	Out	~~Oven~~	Imp. Out	O_2	Vacuum	Static Press. iwg
3 - 1	1001	.23	.47	997.	281	N/A	91	74	N/A	53	5.0	8	
5	1004	.20	.40	998.428	288		91	74		53	4.9	8	
4	1007	.25	.51	999.638	287		92	74		54		9	
3	1010	.28	.57	000.815	280		93	74		55	6.2	9	
2	1013	.24	.49	002.108	275		95	75		55	6.4	9	
Stop 1	1016			003.390									
Start	1018	.17	.35	003.390	244		85	75		58		7	
4 - 7	1021	.23	.47	004.356	265		94	76		57	6.5	8	
6	1024	.21	.43	005.548	268		94	77		56	6.6	8	
5	1027	.24	.45	006.863	264		95	77		56	6.7	9	
4	1030	.21	.43	007.976	276		96	77		57		9	
3	1033	.26	.53	009.095	280		96	78		58	4.7	10	
2	1036	.21	.55	010.342	281		98	78		57	4.8	11	
Stop 1	1039			011.718									
Start	1044	.64	1.3	011.718	281		87	78		58		14	
5 - 7	1047	.40	.82	013.865	285		104	78		57	5.2	15	
6	1050	.35	.80	015.984	254		106	75		58	4.8	15	
5	1053	.40	.82	017.189	259		106	75		57	4.8	16	
Total/Average													

Test Summary

Initial ______
Sample Vol., c.f. ______
Stack Press, iwg ______
ΔP ______ iwg ΔH ______ iwg
Meter Temp., °F ______
Stack Temp., °F ______
Water Collected, g ______
O_2/CO_2 Method ______
Chain of Cust. Info (init.):
- Impingers Loaded ______
- Impingers Recovered ______
- Filter Loaded ______
- Filter Recovered ______
- Probe Wash ______

Comments: ______

PARTICULATE TEST DATA

Client/Location SCE / Alamito Unit 5 Test No. 241-South Method ____ Page 3
Sample Location South Fuel Oil Ambient Temp., °F ____ of 3
Operators J. McAllister & L Farrington Meter Vol. (Start/End) ____ / ____ Date ____

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1		-	=	
#2		-	=	
#3		-	=	
#4		-	=	
Total		-	=	

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IDS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
S-4	1054	.44	.50	018.631	264	N/A	107	79	N/A	59	4.9	16	
3	1059	.48	.58	020.257	263		108	80		63	5.2	18	
2	1102	.37	.72	021.895	261		108	80		63	5.4	18	
Stop 1	1105			023.537									
Start	1109	.36	.74	023.537	200		55	82		65		15	
4-7	1112	.60	1.23	025.137	228		110	82		65	7.8	18	
6	1115	.34	.70	026.523	248		105	82		65	5.1	18	
5	1118	.31	.72	028.152	257		107	83		66		18	
4	1121	.45	.62	030.128	259		108	83		66	5.6	18	
3	1124	.40	.82	031.542	252		108	83		67	6.1	15	
2	1127	.20	.41	033.286	246		107	83		67	8.6	15	
Stop 1	1130			034.134									
Total/Average													

Test Summary
- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

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SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	3/13/90
Test Number	3-Mtls-N	Data By	MDM
Test Method	Metals	Sample Location	No Duct
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-8	Unit	5
Pitot Factor	0.840	Meter Cal Factor	0.9900
Stack Area (sq ft)	468.13	Sample Time (Min)	126
Bar Press (in Hg)	30.35	Nozzle Diam (in)	0.242
Meter Vol (acf)	54.293	Meter Temp (F)	76.6
Stack Press (iwg)	2.60	Stack Temp (F)	257.3
Vel Head (iwg)	0.2606	O2 (%): from CEM	5.00
		from portable	6.68
Liquid Vol (ml)	113.1	CO2 (%): from CEM	12.20
		calculated	10.91
Meter Press (iwg)	0.61	Start/Stop Time	1323/1546

Std Sample Vol (SCF)	52.88
Metric Sample Vol (cubic meters)	1.50
Moisture Fraction	0.090
Stack Gas Mol Wt	28.93
Stack Gas Velocity (ft/sec)	32.98
Stack Flow Rate (wacfm)	926,379
Stack Flow Rate (dscfm)	623,384
Isokinetic Ratio (%)	98.63

PARTICULATE TEST DATA

Client/Location SCE/Alamitos
Unit 5
Test No. 3-Mhb N
Method EPA Draft
Page 1 of 3

Sample Location Exhaust Duct
Fuel Oil
Ambient Temp., °F 66

Operators RP/CF
Meter Vol. (Start/End) 194.732 / 249.025
Date 3/13/89

Pre Test Data:
- Barometric Press, in. Hg 30.35
- Stack Area, sq. ft.
- Sample Time/ Pt, min. 126min/3min
- Assumed Stack Press +2.5
- Assumed Moisture 9%
- Assumed Molecular Wt 29.6

Equipment Info:
- Meter No. ES-8
- Meter, Yd .99
- Pitot, Cp .84
- CFM @ΔH = 1.0 .598
- Probe I.D. 16' Teflon
- Nozzle No./Dia .242 (#7)
- Filter No. T47-239

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	HNO_3/H_2O_2	712.7	612.7	100.0
#2	HNO_3/H_2O_2	634.3	631.0	3.3
#3	$KMnO_4$	600.1	601.8	-1.7
#4	SG	747.9	736.4	11.5
Total				113.1

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.010	15	RP.	OK	
Post-Test	.011	24	RP.	OK	

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

$\Delta H = 2.2 \times \Delta P$

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
1-1	1323	.29	.64	194.732	300		84	73		50		3	
-2	1326	.35	.77	196.333	300		89	73		63	5.4	4	
-3	1329	.37	.81	197.510	298		92	74		59	5.4	6	
-4	1332	.31	.68	198.999	294		93	74		59	6.3	7	
-5	1335	.41	.90	200.412	283		96	77		58		10	
-6	1338	.43	.95	202.091	266		99	78		58	8.8	10	
-7	1341	.20	.44	203.667	270		94	78		59	9.5	6	
	1343			204.807									
2-7	1347	.11	.24	204.807	297		85	79		60	8.4	4.5	
-6	1350	.32	.70	205.660	296		89	80		58		9	
-5	1353	.36	.79	206.981	298		98	81		59		11	
-4	1356	.31	.68	208.355	298		102	82		54		10	
-3	1359	.40	.88	209.770	281		103	82		59	6.8	14	
-2	1402	.62	1.36	211.600	268		104	82		54	9.0	16	
-1	1405	.33	.72	213.570	264		104	83		60	9.4	12	
	1408			215.475									
Total/Average													

Test Summary
- Initial MM/MM
- Sample Vol., c.f. 54.293
- Stack Press, iwg +2.6
- ΔP .2606 iwg ΔH .61 iwg
- Meter Temp., °F 87.7
- Stack Temp., °F 262.7
- Water Collected, g 113.1
- O_2/CO_2 Method 6.68
- Chain of Cust. Info (init.):
  - Impingers Loaded RB
  - Impingers Recovered RB
  - Filter Loaded RB
  - Filter Recovered RB
  - Probe Wash RP/CF
- Comments: CEM O_2 = 5.0, CO_2 12.2

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PARTICULATE TEST DATA

Client/Location SCE/ALAMO
Sample Location EXHAUST PCI
Operators RP./CF

Unit #5
Fuel OIL

Test No. 3-NTLS-A
Method EPA DRAFT
Ambient Temp., °F 66
Meter Vol. (Start/End) /

Page 2 of 3
Date 3/13/90

Pre Test Data:
- Barometric Press., in. Hg
- Stack Area, sq. ft.
- Sample Time/ Pt, min.
- Assumed Stack Press
- Assumed Moisture
- Assumed Molecular Wt

Equipment Info:
- Meter No.
- Meter, Yd
- Pitot, Cp
- CFM @ΔH = 1.0
- Probe I.D.
- Nozzle No./Dia
- Filter No.

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1			-	=
#2			-	=
#3			-	=
#4			-	=
Total			-	=

Impinger Box I.D.
Integrated Bag I.D.

SRG

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
3-7	1413	.32	.70	215.475	283		94	82		60	6.0	11	
-6	1416	.34	.75	217.050	282		100	83		59	5.8	12	
-5	1419	.30	.66	218.415	280		101	83		61		12	+2.6
-4	1422	.25	.55	220.091	278		100	83		62		10	
-3	1425	.25	.55	221.043	279		100	83		63	5.8	10	
-2	1428	.2	.44	222.415	240		98	82		63	7.5	9	
-1	1431	.16	.35	223.482	236		96	82		63	8.2	8	
	1434			224.515									
1-7	1439	.15	.33	224.515	278		87	82		62	7.2	7	
-6	1442	.22	.48	225.555	292		93	82		62		10	
-5	1445	.24	.53	226.90	289		95	82		62	4.9	11	
-4	1448	.28	.62	228.31	283		97	82		62	4.6	12	
-3	1451	.23	.50	229.42	324*		97	82		62	4.8	11	
-2	1454	.20	.44	230.775	355*		93	81		59		10	
-1	1457	.15	.33	231.972	225		92	81		61		8	
	1500			232.804									
Total/Average													

Test Summary

Initial
- Sample Vol., c.f.
- Stack Press, iwg
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F
- Stack Temp., °F
- Water Collected, g
- O_2/CO_2 Method
- Chain of Cust. Info (Init.):
  - Impingers Loaded
  - Impingers Recovered
  - Filter Loaded
  - Filter Recovered
  - Probe Wash

Comments: * SUSPECT INCORRECT #'S DUE TO SHORT W T.C. WIRE. RP

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PARTICULATE TEST DATA

Client/Location SCE/ALAMO Unit #5 Test No. 3-MTLS-N Method EPA DRAFT Page 3
Sample Location EXHAUST DUCT Fuel OIL Ambient Temp., °F 66 of 3
Operators RD/CF Meter Vol. (Start/End) / Date 3/13/90

Pre Test Data:
- Barometric Press, in. Hg
- Stack Area, sq. ft.
- Sample Time/ Pt, min.
- Assumed Stack Press
- Assumed Moisture
- Assumed Molecular Wt

Equipment Info:
- ~~Meter No.~~
- ~~Meter, Yd~~
- Pitot, Cp
- CFM @ΔH = 1.0
- Probe I.D.
- Nozzle No./Dia
- Filter No.

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1			-	=
#2			-	=
#3			-	=
#4			-	=
Total			-	=

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
2-7	1503	.16	.35	232.804	240		85	79		60		9	
-6	1506	.20	.44	233900	261		92	80		61	5.9	10	
-5	1509	.30	.66	235.157	259		96	80		60	4.25	14	
-4	1512	.26	.57	236422	242		98	80		61		13	
-3	1515	.28	.62	237.620	235		97	80		60		14	
-2	1518	.50	1.1	239.375	215		100	80		63		20	
-1	1521	.45	.99	240.598	209		100	81		65		19	
	1524			241.775									
1-7	1525	.05	.11	241.775	232		83	80		61		4	
-6	1528	0	0	242.524	244					62			
-5	1531	.2	.44	242.524	249		87	80		62	4.5	10	
-4	1534	.35	.77	243.665	228		97	80		63	7.0	15	
3	1537	.36	.79	245.422	215		99	81		64	7.7	16	
-2	1540	.20	.44	246.650	210		97	81		65	8.2	11	
1	1543	.25	.55	247.773	210		97	81		65	r	13	
	1546			249.025									
Total/Average													

Test Summary
- Initial
- Sample Vol., c.f.
- Stack Press, iwg
- ΔP ___ iwg ΔH ___ iwg
- Meter Temp., °F
- Stack Temp., °F
- Water Collected, g
- O_2/CO_2 Method
- Chain of Cust. Info (init.):
  - Impingers Loaded
  - Impingers Recovered
  - Filter Loaded
  - Filter Recovered
  - Probe Wash
- Comments:

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SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	3/13/90
Test Number	3-Mtls-S	Data By	MDM
Test Method	Metals	Sample Location	So Duct
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor	0.840	Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	126
Bar Press (in Hg)	30.35	Nozzle Diam (in)	0.246

Meter Vol (acf)	60.119	Meter Temp (F)	90.9
Stack Press (iwg)	2.50	Stack Temp (F)	273.9
Vel Head (iwg)	0.2744	O2 (%): from CEM	5.00
		from portable	6.44
Liquid Vol (ml)	119.0	CO2 (%): from CEM	12.20
		calculated	11.10
Meter Press (iwg)	0.66	Start/Stop Time	1323/1547

Std Sample Vol (SCF)	57.62
Metric Sample Vol (cubic meters)	1.63
Moisture Fraction	0.088
Stack Gas Mol Wt.	28.98
Stack Gas Velocity (ft/sec)	34.21
Stack Flow Rate (wacfm)	960,777
Stack Flow Rate (dscfm)	633,724
Isokinetic Ratio (%)	102.30

PARTICULATE TEST DATA

Client/Location SCE / Alamitos Unit 5 Test No. 3-M15-5 Method EPA 4 Page 1
Sample Location South Duct Fuel Oil Ambient Temp., °F ____ of 3
Operators JM / LF Meter Vol. (Start/End) 035.516 / 095.635 Date 3/13/96

Pre Test Data:

- Barometric Press, in. Hg 30.35
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. 3/115
- Assumed Stack Press ____
- Assumed Moisture 5%
- Assumed Molecular Wt 25

Equipment Info:

- Meter No. ES-15
- Meter, Yd 1.00
- Pitot, Cp .84
- CFM @ΔH = 1.0 .555
- Probe I.D. T-F1014
- ~~Nozzle No./Dia~~ Nozzle #C1-246 147-230
- Filter No. ____

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	HNO_3/H_2O_2	732.3 -	631.8 =	100.5 ✓
#2	HNO_3/H_2O_2	662.0 -	618.3 =	43.7 ✓
#3	$KMnO_4$	517.4 -	561.0 =	-43.6 ✓
#4	SG	747.1 -	728.7 =	18.4 ✓
Total		-	=	

Impinger Box I.D. ____
Integrated Bag I.D. ____

Note: Back flush $KMnO_4$ Impinger

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.001	16	JF	OK	
Post-Test	.003	22	JB		

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

ΔH = 2.23

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	~~Probe~~	Meter In	Out	~~Oven~~	Imp. Out	O_2	Vacuum	Static Press. iwg
Start	1320	.21	.47	035.516	275	N/A	86	84	N/A	60		2	
1 - 7	1323	.45	1.0	036.710	285		100	85		54		2	
6	1326	.36	.81	038.602	276		104	85		56	6.4	7	
5	1329	.47	1.05	040.678	304		102	85		57	5.6	2	
4	1332	1.4	.31	041.876	298		58	87		60		2	
3	1335	.07	.15	043.261	258		54	85		60	1.2	4	
2	1338	.17	.36	044.310	256		52	84		61		4	
Stop 1	1341			045.091									
Start	1349	.31	.69	045.091	290		56	82		65	7.4	6	
2 - 7	1352	.41	.92	046.812	303		101	82		60	5.8	10	
6	1355	.21	.47	048.487	303		101	83		59	5.4	7	
5	1358	.15	.33	049.780	301		97	83		57	5.1	6	
4	1401	.21	.47	050.872	297		96	83		59	6.2	7	
3	1404	.10	.22	052.091	285		54	82		59	8.8	5	
2	1407	.01	.15	053.147	290		91	82		60		4	
Stop 1	1410			053.845									
Start	1413	.23	.51	053.845	284		87	81		59	6.6	5	
3 - 7	1416	.24	.54	055.065	291		95	82		58	6.0	5	
Total/Average													

Test Summary

- Initial MM / JB
- Sample Vol., c.f. 60.119 ✓
- Stack Press, iwg +2.5 ✓
- ΔP ~~.2785~~ iwg ΔH 0.66 ✓ iwg
- Meter Temp., °F 90.9
- Stack Temp., °F ~~260.4~~ 285
- Water Collected, g 119.0 ✓
- O_2/CO_2 Method 6.49 / O_2 probe
- Chain of Cust. Info (init.):
  - Impingers Loaded JB
  - Impingers Recovered JB
  - Filter Loaded JB
  - Filter Recovered JB
  - Probe Wash JM/LF
- Comments: CEM O_2 = 8.0
  CO_2 = 12.20

% Iso = 107.3
% H_2O = 8.8

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PARTICULATE TEST DATA

Client/Location SCE / Alamitos   Unit 5   Test No. 5/4/1/5   Method EPA 5   Page 3

Sample Location South duct   Fuel oil   Ambient Temp., °F ______   of 3

Operators J.M / LF   Meter Vol. (Start/End) ______ / ______   Date 3/13/90

Pre Test Data:

- Barometric Press, in. Hg ______
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ______
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:

- Meter No. ______
- Meter, Yd ______
- Pitot Cal ______
- CFM @ ΔH = 1.0 ______
- Probe I.D. ______
- Nozzle No./Dia ______
- Filter No. ______

see cal file   OK

Imp.	Matl	Wt(End)	-	Weight (Start)	=	Weight (g)
#1	C		-		=	
#2			-		=	
#3			-		=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ______

Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	~~Probe~~	Meter In	Out	~~Oven~~	Imp. Out	O_2	Vacuum	Static Press. iwg
3 - 6	14 15	.20	.45	056.420	290	N/A	57	82	N/A	58	5.3	9	
5	14 22	.18	.40	057.621	288		96	82		58	5.3	9	
4	14 25	.21	.47	058.825	289		94	82		58		9	
3	14 28	.27	.60	60.0	283		98	82		56		11	
2	14 31	.18	.40	61.4	285		96	82		57	7.9	8	
Stop 1	14 34			62.5									
start	14 37	.24	.54	62.5	254		92	87		56	8.8	10	
4 7	14 42	.27	.60	064.085	266		98	82		56	6.2	10	
6	14 45	.24	.54	065.472	273		100	82		56	5.2	11	
5	14 48	.20	.45	066.842	278		100	82		56		10	
4	14 51	.27	.60	068.130	283		99	82		56	4.1	10	
3	14 54	.33	.74	069.521	276		100	82		56	5.2	13	
2	14 57	.34	.76	071.04	275		103	82		56	6.2	15	
stop 1	15 00			072.518									
start	15 04	.65	1.46	072.518	230		96	81		57	7.2	22	+2.5
5 7	15 07	.40	.90	074.413	245		102	82		57		20	
6	15 10	.38	.85	076.205	256		103	82		58	6.6	20	
5	15 13	.35	.78	077.952	260		105	83		60	5.2	20	
Total/Average													

Test Summary

- Initial ______
- Sample Vol., c.f. ______
- Stack Press, iwg ______
- ΔP ______ iwg   ΔH ______ iwg
- Meter Temp., °F ______
- Stack Temp., °F ______
- Water Collected, g ______
- O_2/CO_2 Method ______
- Chain of Cust. Info (init.):
  - Impingers Loaded ______
  - Impingers Recovered ______
  - Filter Loaded ______
  - Filter Recovered ______
  - Probe Wash ______
- Comments: ______

PARTICULATE TEST DATA

Client/Location SCC / Alamitos　Unit 5　Test No. 3/m-4/South　Method ______　Page 3
Sample Location South Duct　Fuel 0.1　Ambient Temp., °F ______　of 3
Operators SM / LF　Meter Vol. (Start/End) ______ / ______　Date ______

Pre Test Data:
- Barometric Press, in. Hg ______
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ______
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:
- Meter No. ______
- Meter, Yd ______
- Pitot, Cp ______
- CFM @ΔH = 1.0 ______
- Probe I.D. ______
- Nozzle No./Dia ______
- Filter No. ______

NTC

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D. ______
Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	Meter Conditions ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
5-4	1516	.45	1.0	079.642	264		106	82		65	4.5	22	
3	1519	.45	1.1	081.	261		104	82		65		22	
2	1522	.47	1.05	082.69	263		104	83		66	5.4	22	
stop 1	1525			084.705									
start	1526	.34	.76	084.705	219		98	83		Ice	8.8	16	
6-1	1529	.54	1.21	086.3	230		107	84		60	7.4	22	
6	15 32	.40	.90	088.063	250		105	84		61		22	
5	15 35	.36	.81	089.8	256		103	84		62		22	
4	15 38	.37	.87	091.500	259		103	84		64		22	
3	15 41	.20	.45	093.08	253		101	85		64	7.4	14	
2	15 44	.18	.40	094.453	243		103	85		64	8.8	13	
stop 1	15 47			095.635									
Total/Average													

Test Summary
- Initial ______
- Sample Vol., c.f. ______
- Stack Press, iwg ______
- ΔP ______ iwg　ΔH ______ iwg
- Meter Temp., °F ______
- Stack Temp., °F ______
- Water Collected, g ______
- O_2/CO_2 Method ______
- Chain of Cust. Info (init.):
  - Impingers Loaded ______
  - Impingers Recovered ______
  - Filter Loaded ______
  - Filter Recovered ______
  - Probe Wash ______
- Comments: ______

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SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	3/14/90
Test Number	5-Mtls-N	Data By	MDM
Test Method	Metals	Sample Location	No Duct
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor	0.840	Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	126
Bar Press (in Hg)	30.30	Nozzle Diam (in)	0.242

Meter Vol (acf)	57.772	Meter Temp (F)	89.9
Stack Press (iwg)	2.50	Stack Temp (F)	247.8
Vel Head (iwg)	0.2616	O2 (%): from CEM	4.20
		from portable	5.99
Liquid Vol (ml)	111.6	CO2 (%): from CEM	13.00
		calculated	11.61
Meter Press (iwg)	0.60	Start/Stop Time	0825/1057

Std Sample Vol (SCF)	55.37
Metric Sample Vol (cubic meters)	1.57
Moisture Fraction	0.086
Stack Gas Mol Wt	29.06
Stack Gas Velocity (ft/sec)	32.78
Stack Flow Rate (wacfm)	920,728
Stack Flow Rate (dscfm)	630,002
Isokinetic Ratio (%)	102.19

PARTICULATE TEST DATA

Client/Location SCE / Alamitos
Sample Location North Duct
Operators CF / RY

Unit 5
Fuel Oil

Test No. 5-M/5-N
Ambient Temp., °F
Meter Vol. (Start/End) 96.604 / 154.376

Method EPA Draft
Page 1 of 3
Date 3-14-90

Pre Test Data:

Barometric Press, in. Hg	30.3
Stack Area, sq. ft.	
Sample Time/ Pt, min.	
Assumed Stack Press	
Assumed Moisture	
Assumed Molecular Wt	

Equipment Info:

Meter No.	ES-19
Meter, Yd	1.000
Pitot, Cp	.84
CFM @ΔH = 1.0	.595
Probe I.D.	16
Nozzle No./Dia	.242
Filter No.	~~742~~-238

2.2

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	HNO_3/H_2O_2	710.6 -	616.3 =	94.3
#2	HNO_3/H_2O_2	644.8 -	641.3 =	3.5
#3	$KMnO_4$	591.2 -	592.1 =	-0.9
#4	SG	253.0 -	238.3 =	14.7
Total		-	=	

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.010	15	RP.	OK	
Post-Test	.010	25	CF	CF	

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
1-1	825	.24	.52	096.604	285		73	61		51		2	
2	828	.28	.62	98.02	276		85	63		52	5.2	3	
3	831	.36	.79	99.62	270		89	65		52	4.5	6	
4	834	.40	.88	100.90	272		92	67		51	4.6	9	
5	837	.44	.97	102.75	272		95	68		52	6.1	10	
6	840	.46	1.01	104.40	254		97	70		53	8.0	11	
7	843	.36	.79	106.05	214		99	71		55	8.9	9	
	846			107.394									
2-1	850	.20	.44	107.344	282		83	73		57	8.0	6	
2	853	.28	.62	108.75	282		101	74		57	6.2	7	
3	856	.32	.70	110.38	265		99	75		57		10	
4	859	.34	.74	111.32	262		100	75		58	4.6	10	
5	902	.42	.92	112.59	256		103	77		58	6.4	13	
6	905	.60	1.32	114.75	241		107	79		58	8.6	17	
7	908	.52	1.14	117.12	230		108	79		60		16	
	911			116.664									
Total/Average													

Test Summary

Initial	MM / MM
Sample Vol., c.f.	57.772
Stack Press, iwg	2.5
ΔP .2616 iwg	ΔH .60 iwg
Meter Temp., °F	89.9
Stack Temp., °F	247.8
Water Collected, g	111.6
O_2/CO_2 Method	5.99
Chain of Cust. Info (init.):	
Impingers Loaded	TS
Impingers Recovered	AB
Filter Loaded	TS
Filter Recovered	AB
Probe Wash	CF/RP
Comments:	CEM O_2: 4.2 CO_2: 13.0

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PARTICULATE TEST DATA

Client/Location SCE Alamitos Unit S Test No. S-Mtl-N Method Metals Page 2
Sample Location North Fuel ____ Ambient Temp., °F ____ of 3
Operators ____ Meter Vol. (Start/End) / Date 3-14-90

Pre Test Data:
- Barometric Press, in. Hg 30.3
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt(End)	-	Weight (Start)	=	Weight (g)
#1			-		=	
#2			-		=	
#3			-		=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
3-7	914	.22	.48	118.664	267		96	79		60		9	
6	917	.29	.63	120.48	272		103	79		61	5.0	11	
5	920	.25	.55	121.70	258		105	80		61	4.8	10	
4	923	.22	.48	123.00	261		104	80		60	4.6	9	
3	926	.18	.40	124.03	243		104	80		60	5.1	9	
2	929	.18	.40	125.40	215		104	81		60	6.5	9	
1	932	.14	.30	126.61	220		103	81		60	4.5	7	
	935			127.42									
4-7	940	.14	.30	127.42	227		90	80		62	7.0	6	
6	943	.14	.31	128.70	244		103	82		59	4.2	6	
5	946	.23	.51	130.00	246		106	82		58	4.2	10	
4	949	.21	.46	130.95	244		107	82		59	5.2	10	
3	952	.19	.41	132.21	204		106	83		59	7.9	9	
2	955	.20	.45	134.05	208		105	83		59	6.6	9	
1	958	.20	.45	134.75	205		106	83		60		9	
	1001			135.720									
Total/Average													

Test Summary
- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

PARTICULATE TEST DATA

Client/Location: SCE Alamitos | Unit: 5 | Test No. 5-MT1-N | Method: Metals | Page 3 of 3
Sample Location: North | Fuel: | Ambient Temp., °F:
Operators: CE | Meter Vol. (Start/End): / | Date: 3-14-90

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt(End)		Weight (Start)		Weight (g)
#1			-		=	
#2			-		=	
#3			-		=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
		Meter Conditions			Temperatures, °F								
2-7	10:12	.33	.72	135.720	223		91	80		59	6.1	14	
6	10:15	.30	.66	137.62	230		108	81		57	5.5	13	
5	10:18	.25	.55	139.02	243		109	82		60	4.5	13	
4	10:21	.16	.35	140.54	234		107	82		61	4.6	10	
3	1024	.22	.48	142.05	250		108	83		61		12	
2	1027	.19	.42	143.35	254		107	84		63		10	
1	1030	.05	.11	144.0	297		102	83		63	6.8	5	
	1033			144.405									
6-7	1036	.30	.66	144.405	235		101	84		61	7.2	14	
6	1039	.20	.44	146.20	258		106	82		61	7.4	12	
5	1042	.35	.77	147.31	218		110	84		61	8.0	15	
4	1045	.35	.77	148.90	233		112	84		61	6.1	15	
3	1048	.45	.99	150.72	251		113	84		63	4.1	20	
2	1051	.24	.52	152.48	246		107	84		62	4.5	15	
1	1054	.10	.22	153.70	231		104	84		63	5.7	9	
End	1057			154.376									
Total/Average													

Test Summary

Initial ____
Sample Vol., c.f. ____
Stack Press, iwg ____
ΔP ____ iwg ΔH ____ iwg
Meter Temp., °F ____
Stack Temp., °F ____
Water Collected, g ____
O_2/CO_2 Method ____
Chain of Cust. Info (init.):
- Impingers Loaded ____
- Impingers Recovered ____
- Filter Loaded ____
- Filter Recovered ____
- Probe Wash ____

Comments: ____

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CARNOT 03/19/9

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	3/14/9
Test Number	5-Mtls-S	Data By	MDI
Test Method	Metals	Sample Location	So Duc
Fuel	Oil	Reference Temp (F)	6
Control Box #	ES-8	Unit	
Pitot Factor	0.840	Meter Cal Factor	0.990
Stack Area (sq ft)	468.13	Sample Time (Min)	12
Bar Press (in Hg)	30.35	Nozzle Diam (in)	0.24

Meter Vol (acf)	57.699	Meter Temp (F)	86.
Stack Press (iwg)	2.50	Stack Temp (F)	269.
Vel Head (iwg)	0.2764	O2 (%): from CEM	4.20
		from portable	5.85
Liquid Vol (ml)	117.1	CO2 (%): from CEM	13.00
		calculated	11.72
Meter Press (iwg)	0.64	Start/Stop Time	0825/104

Std Sample Vol (SCF)	55.14
Metric Sample Vol (cubic meters)	1.56
Moisture Fraction	0.090
Stack Gas Mol Wt	29.02
Stack Gas Velocity (ft/sec)	34.21
Stack Flow Rate (wacfm)	960,947
Stack Flow Rate (dscfm)	635,740
Isokinetic Ratio (%)	97.60

PARTICULATE TEST DATA

Client/Location SCE / Alamitos Unit 5 Test No. 5-Hl-5 Method ____ Page 1
Sample Location South Rcl. Fuel Oil Ambient Temp., °F 56 of 3
Operators J. Mulligan E L Farrington Meter Vol. (Start/End) 302.045 / 359.744 Date 5/14/90

Pre Test Data:

Barometric Press, in. Hg	30.3
Stack Area, sq. ft.	
Sample Time/ Pt, min.	3/125
Assumed Stack Press	
Assumed Moisture	5%
Assumed Molecular Wt	29

Equipment Info:

Meter No.	ES-8
Meter, Yd	1.00
Pitot, Cp	.84
CFM @ΔH = 1.0	.598
Probe I.D.	Teflon
Nozzle No./Dia	.246
Filter No.	742-226

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	~~HNO3~~/H2O	720.6	615.4	105.2
#2	HNO3/H2O	620.0	617.2	2.8
#3	KMnO4	548.5	547.8	0.7
#4	SG	232.0	223.6	8.4
Total				117.1

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.003	16	JM	OK	
Post-Test	.003	13	JM		

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	~~Probe~~	Meter In	Out	~~Oven~~	Imp. Out	O_2	Vacuum	Static Press. iwg
Stand	825	.26	.57	302.045	275	N/A	75	68	N/A	56	5.0	7	
1 - 7	828	.51	1.1	303.75	275		93	70		53	4.8	6	
6	831	.45	.99	305.84	292		95	72		56	4.2	4	
5	834	.18	.35	307.586	298		96	73		58	5.1	2	
4	837	.14	.30	308.605	298		90	74		62	5.2	2	
3	840	.13	.28	309.75	294		88	75		63	5.4	2	
2	843	.06	.13	310.70	281		84	76		60	6.4	2	
Stop 1	846			311.341									
Start	849	.09	.15	311.341	281		78	76		62	5.6	2	
2 - 1	852	.12	.26	312.059	278		95	77		57	8.0	3	
2	855	.19	.41	312.730	286		90	73		56	5.7	4	
3	858	.24	.57	313.515	292		92	75		54	5.4	4	
4	901	.20	.44	315.108	258		92	80		56	4.8	4	
5	904	.35	.77	316.3	293		94	75		52	6.2	2	
6	907	.27	.59	317.728	277		93	80		54	7.6	4	
Stop - 7	910			318.590									
Start	914	.22	.44	318.590	278		85	80		63	6.4	4	
3 - 7	917	.26	.57	320.38	278		94	82		60	5.9	4	
Total/Average													

Test Summary

Initial	MM / MM
Sample Vol., c.f.	57.699
Stack Press, iwg	2.5
ΔP .2764 iwg	ΔH .64 iwg
Meter Temp., °F	86.9
Stack Temp., °F	285.02
Water Collected, g	117.1
O_2/CO_2 Method	5.85

Chain of Cust. Info (init.):

Impingers Loaded	JS
Impingers Recovered	JS
Filter Loaded	JS
Filter Recovered	JS
Probe Wash	JM / LE

Comments: CEM O_2: 4.2 CO_2: 13.0

PARTICULATE TEST DATA

Client/Location SCE / Alamitos Unit 5 Test No. 5-M/S-5 Method EPA Page 2
Sample Location South Duct Fuel Oil Ambient Temp., °F ____ of 3
Operators ____ Meter Vol. (Start/End) ____ Date ____

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt (End)	-	Weight (Start)	=	Weight (g)
#1			-		=	
#2			-		=	
#3			-		=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

ΔH = 2.2

Sample Point	Time	ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
3 - 6	920	.20	.44	321.728	264	N/A	94	52	N/A	48	4.6	4	
5	923	.21	.46	323.00	283		95	83		51	4.6	4	
4	926	.23	.50	324.045	284		95	84		58	4.8	4	
3	927	.26	.57	325.218	276		96	83		60	6.6	5	
2	932	.14	.30	326.765	276		94	83		55	7.8	3	
stop 1	935			327.731									
start	937	.20	.44	327.731	284		91	83		61	7.5	5	
4 - 7	940	.26	.57	328.518	268		94	80		56	6.0	5	
6	943	.24	.52	330.118	269		95	84		57	4.7	5	
5	946	.22	.44	331.432	277		94	83		55	4.2	4	
4	949	.28	.61	332.628	276		95	83		58	4.2	5	
3	952	.31	.68	334.142	275		96	84		62	4.6	5	
2	955	.28	.61	335.468	272		96	84		61	5.6	5	
Stop 1	958			336.911									
Start	1000	.36	.79	336.911	268		85	83		55	5.4	7	
5 - 1	1003	.46	1.01	338.328	257		96	83		51	5.0	8	
2	1006	.51	1.12	340.220	260		98	83		50	4.7	9	
3	1009	.35	.77	342.687	254		97	82		52	4.6	6	
Total/Average													

Test Summary
- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

PARTICULATE TEST DATA

Client/Location ______ Unit ______ Test No. ______ Method ______ Page 3
Sample Location ______ Fuel ______ Ambient Temp., ^oF ______ of 3
Operators ______ Meter Vol. (Start/End) ______ / ______ Date ______

Pre Test Data:
- Barometric Press, in. Hg ______
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ______
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:
- Meter No. ______
- Meter, Yd ______
- Pitot, Cp ______
- CFM @ΔH = 1.0 ______
- Probe I.D. ______
- Nozzle No./Dia ______
- Filter No. ______

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D. ______
Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, ^oF Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
5 – 4	1012	.39	.37	343.48	250	N/A	97	82	N/A	47	4.6	7	
5	1015	.45	.59	345.168	241		98	82		53	5.2	9	
6	1018	.19	1.51	346.520	225		100	82		51	7.2	13	
Stop 7	1021			348.958									
Start	1024	.20	.44	348.558	242		91	82		53	8.6	4	
6 – 7	1027	.24	.52	350.187	243		93	82		51	7.3	5	
6	1030	.35	.85	351.471	248		97	82		51	5.4	7	
5	1033	.48	.88	353.228	245		98	83		49	4.8	7	
4	1036	.36	.75	354.761	240		98	83		49	5.0	7	
3	1039	.57	1.25	356.182	248		98	83		51	6.8	10	
2	1042	.38	.83	358.087	210		102	83		49	5.0	8	
Stop 1	1045			359.744									
Total/Average													

Test Summary

Initial ______
Sample Vol., c.f. ______
Stack Press, iwg ______
ΔP ______ iwg ΔH ______ iwg
Meter Temp., ^oF ______
Stack Temp., ^oF ______
Water Collected, g ______
O_2/CO_2 Method ______
Chain of Cust. Info (init.):
- Impingers Loaded ______
- Impingers Recovered ______
- Filter Loaded ______
- Filter Recovered ______
- Probe Wash ______

Comments: ______

PARTICULATE TEST DATA

Client/Location SCE / Alamitos　　Unit 5　　Test No. MA-[illegible]-II /　　Method EPA DRAFT　　Page 1
Sample Location #5 NORTH　　Fuel Oil　　Ambient Temp., °F ______　　of 1
Operators RD,　　Meter Vol. (Start/End) ____ / ____　　Date 3/15/90

Pre Test Data:

- Barometric Press, in. Hg ______
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ______
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:

- Meter No. ______
- Meter, Yd ______
- Pitot, Cp ______
- CFM @ΔH = 1.0 ______
- Probe I.D. ______
- Nozzle No./Dia ______
- Filter No. ______

Imp.	Matl	Wt(End)		Weight (Start)		Weight (g)
#1	HNO_3/H_2O_2	614.8	-	611.5	=	3.3
#2	HNO_3/H_2O_2	640.8	-	635.9	=	4.9
#3	$KMnO_4$	561.0	-	582.9	=	-21.9
#4	SG		-	614.5	=	
Total			-		=	

Impinger Box I.D. ______
Integrated Bag I.D. ______

?

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.001	15	RD		
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	Meter Conditions ΔH	Meter Conditions Meter Reading	Temperatures, °F Stack	Temperatures, °F Probe	Temperatures, °F Meter In	Temperatures, °F Out	Temperatures, °F Oven	Temperatures, °F Imp. Out	O_2	Vacuum	Static Press. iwg
Total/Average													

Test Summary

- Initial ______
- Sample Vol., c.f. ______
- Stack Press, iwg ______
- ΔP ____ iwg　ΔH ____ iwg
- Meter Temp., °F ______
- Stack Temp., °F ______
- Water Collected, g ______
- O_2/CO_2 Method ______
- Chain of Cust. Info (init.):
  - Impingers Loaded JM
  - Impingers Recovered RD
  - Filter Loaded CF
  - Filter Recovered CF
  - Probe Wash CF
- Comments: ______

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
1250 S. Boyle Ave., Los Angeles, CA 90023, Phone (213) 269-7421, Fax (213) 268-5328

DATE RECEIVED: 03/21/90
DATE REPORTED: 04/26/90

LAB NUMBER: 25653

CLIENT: CARNOT

REPORT ON: NINE SOURCE SAMPLES

PROJECT #: 5863

LOCATION: SUBMITTED BY CLIENT

RESULTS: SEE ATTACHED

Laboratory Director

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: ARSENIC IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
METHOD OF STANDARD ADDITIONS - EPA 7060

STANDARD INFORMATION

BLANK
STD1 = 10 ul SAMPLE + 10 ul 0.00 STD
STD2 = 10 ul SAMPLE + 10 ul 25.00 STD
STD3 = 10 ul SAMPLE + 10 ul 50.00 STD

C&T ID	SAMPLE ID			ARSENIC ug/SAMPLE
1	REAGENT BLANK	BLANK	0.0199	1.1
		STD1	0.0240	
		STD2	0.0493	
		STD3	0.0778	
	INSTRUMENT FACTOR:		1	
	CORRELATION FACTOR:		0.9994	
	SAMPLE VOLUME		0.05	
2	MTLS BLANK #1	BLANK	0.0199	0.77
		STD1	0.0230	
		STD2	0.0524	
		STD3	0.0912	
	INSTRUMENT FACTOR:		1	
	CORRELATION FACTOR:		0.9968	
	SAMPLE VOLUME		0.05	
3	MTLS BLANK #2	BLANK	0.0199	0.73
		STD1	0.0199	
		STD2	0.0436	
		STD3	0.0792	
	INSTRUMENT FACTOR:		1	
	CORRELATION FACTOR:		0.9934	
	DILUTION FACTOR:		0.05	
5	3-MTLS-N	BLANK	0.0176	1.3
		STD1	0.0227	
		STD2	0.0371	
		STD3	0.0619	
	INSTRUMENT FACTOR:		1	
	CORRELATION FACTOR:		0.9885	
	DILUTION FACTOR:		0.05	

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: ARSENIC IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
METHOD OF STANDARD ADDITIONS - EPA 7060

STANDARD INFORMATION
BLANK
STD1 = 10 ul SAMPLE + 10 ul 0.00 STD
STD2 = 10 ul SAMPLE + 10 ul 25.00 STD
STD3 = 10 ul SAMPLE + 10 ul 50.00 STD

C&T ID	SAMPLE ID			ARSENIC ug/SAMPLE
7	5-MTLS-N	BLANK	0.0199	2.6
		STD1	0.0197	
		STD2	0.0311	
		STD3	0.0385	
		INSTRUMENT FACTOR:	1	
		CORRELATION FACTOR:	0.9925	
		SAMPLE VOLUME	0.05	
8	5-MTLS-S	BLANK	0.0199	2.3
		STD1	0.0198	
		STD2	0.0327	
		STD3	0.0414	
		INSTRUMENT FACTOR:	1	
		CORRELATION FACTOR:	0.9938	
		SAMPLE VOLUME	0.05	
9	2-MTLS-N	BLANK	0.0176	1.1
		STD1	0.019	
		STD2	0.0483	
		STD3	0.0625	
		INSTRUMENT FACTOR:	1	
		CORRELATION FACTOR:	0.9805	
		SAMPLE VOLUME	0.05	

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/09/90
DATE ANALYZED: 04/17/90
DATE REPORTED: 04/26/90

METAL: ARSENIC FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 7060

C&T ID	SAMPLE ID	SAMPLE VOLUME	ARSENIC ug/SAMPLE
1	REAGENT BLANK	50	1.7
2	MTLS BLANK #1	50	4.0
3	MTLS BLANK #2	50	3.8
4	2-MTLS-S	50	14
5	3-MTLS-N	50	24
6	3-MTLS-S	50	23
7	5-MTLS-N	50	24
7D	5-MTLS-N	50	20
7S	5-MTLS-N	50	112 %
8	5-MTLS-S	50	130
9	2-MTLS-N	50	15

METHOD DETECTION LIMIT = 0.50 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	20
SPIKE % RECOVERY:	112

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/09/90
DATE ANALYZED: 04/17/90
DATE REPORTED: 04/26/90

METAL: ARSENIC IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY MSA

C&T ID	SAMPLE ID	SAMPLE VOLUME	ARSENIC ug/SAMPLE
4	2-MTLS-S	50	ND (3.0)
6	3-MTLS-S	50	ND (3.0)

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	90

Curtis & Tompkins, Ltd.

ABORATORY NUMBER: 25653
LIENT: CARNOT
ROJECT #: 5863
OCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

ETAL: BERYLLIUM IMPINGER CATCH
ETHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

&T ID	SAMPLE ID	SAMPLE VOLUME	BERYLLIUM ug/SAMPLE
1	REAGENT BLANK	50	ND (0.06)
2	MTLS BLANK #1	50	ND (0.06)
3	MTLS BLANK #2	50	ND (0.06)
4	2-MTLS-S	50	ND (0.06)
5	3-MTLS-N	50	ND (0.06)
6	3-MTLS-S	50	ND (0.06)
7	5-MTLS-N	50	ND (0.06)
8	5-MTLS-S	50	ND (0.06)
8D	5-MTLS-S	50	ND (0.06)
8S	5-MTLS-S	50	96 %
9	2-MTLS-N	50	ND (0.06)

A/QC DATA INFORMATION:

ELATIVE % DIFFERENCE:	<1
PIKE % RECOVERY:	96

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: BERYLLIUM FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	BERYLLIUM ug/SAMPLE
1	REAGENT BLANK	50	0.4
2	MTLS BLANK #1	50	0.7
3	MTLS BLANK #2	50	0.4
4	2-MTLS-S	50	1.0
5	3-MTLS-N	50	0.4
6	3-MTLS-S	50	0.6
7	5-MTLS-N	50	0.6
8	5-MTLS-S	50	0.5
9	2-MTLS-N	50	0.5
9D	2-MTLS-N	50	0.5
9S	2-MTLS-N	50	94 %

METHOD DETECTION LIMIT = 0.10 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	94

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: CADMIUM IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	CADMIUM ug/SAMPLE
1	REAGENT BLANK	50	ND (0.3)
2	MTLS BLANK #1	50	ND (0.3)
3	MTLS BLANK #2	50	ND (0.3)
4	2-MTLS-S	50	1.7
5	3-MTLS-N	50	3.6
6	3-MTLS-S	50	0.99
7	5-MTLS-N	50	1.2
8	5-MTLS-S	50	ND (0.3)
8D	5-MTLS-S	50	ND (0.3)
8S	5-MTLS-S	50	77 %
9	2-MTLS-N	50	1.5

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	77

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: CADMIUM FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	CADMIUM ug/SAMPLE
1	REAGENT BLANK	50	ND (0.9)
2	MTLS BLANK #1	50	ND (0.9)
3	MTLS BLANK #2	50	ND (0.9)
4	2-MTLS-S	50	ND (0.9)
5	3-MTLS-N	50	ND (0.9)
6	3-MTLS-S	50	ND (0.9)
7	5-MTLS-N	50	ND (0.9)
8	5-MTLS-S	50	ND (0.9)
9	2-MTLS-N	50	ND (0.9)
9D	2-MTLS-N	50	ND (0.9)
9S	2-MTLS-N	50	100 %

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	100

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: COPPER IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	COPPER ug/SAMPLE
1	REAGENT BLANK	50	8.4
2	MTLS BLANK #1	50	19
3	MTLS BLANK #2	50	8.6
4	2-MTLS-S	50	17
5	3-MTLS-N	50	4.9
6	3-MTLS-S	50	5.3
7	5-MTLS-N	50	12
8	5-MTLS-S	50	8.0
8D	5-MTLS-S	50	7.8
8S	5-MTLS-S	50	95 %
9	2-MTLS-N	50	7.5

METHOD DETECTION LIMIT = 0.60 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	3
SPIKE % RECOVERY:	95

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: COPPER FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	COPPER ug/SAMPLE
1	REAGENT BLANK	50	7.5
2	MTLS BLANK #1	50	16
3	MTLS BLANK #2	50	9.8
4	2-MTLS-S	50	43
5	3-MTLS-N	50	24
6	3-MTLS-S	50	27
7	5-MTLS-N	50	26
8	5-MTLS-S	50	21
9	2-MTLS-N	50	19
9D	2-MTLS-N	50	19
9S	2-MTLS-N	50	101 %

METHOD DETECTION LIMIT = 1.0 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	101

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: LEAD IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	LEAD ug/SAMPLE
1	REAGENT BLANK	50	ND (3.0)
2	MTLS BLANK #1	50	ND (3.0)
3	MTLS BLANK #2	50	ND (3.0)
4	2-MTLS-S	50	ND (3.0)
5	3-MTLS-N	50	13
6	3-MTLS-S	50	20
7	5-MTLS-N	50	5.9
8	5-MTLS-S	50	6.0
8D	5-MTLS-S	50	6.5
8S	5-MTLS-S	50	81 %
9	2-MTLS-N	50	4.7

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	8
SPIKE % RECOVERY:	81

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: LEAD FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	LEAD ug/SAMPLE
1	REAGENT BLANK	50	26
2	MTLS BLANK #1	50	46
3	MTLS BLANK #2	50	28
4	2-MTLS-S	50	72
5	3-MTLS-N	50	61
6	3-MTLS-S	50	59
7	5-MTLS-N	50	53
8	5-MTLS-S	50	44
9	2-MTLS-N	50	48
9D	2-MTLS-N	50	47
9S	2-MTLS-N	50	92 %

METHOD DETECTION LIMIT = 5.0 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	3
SPIKE % RECOVERY:	92

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: MANGANESE IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	MANGANESE ug/SAMPLE
1	REAGENT BLANK	50	0.8
2	MTLS BLANK #1	50	1.2
3	MTLS BLANK #2	50	33
4	2-MTLS-S	50	170,000 *
5	3-MTLS-N	50	11
6	3-MTLS-S	50	49,000 *
7	5-MTLS-N	50	5.3
8	5-MTLS-S	50	78
8D	5-MTLS-S	50	77
8S	5-MTLS-S	50	92 %
9	2-MTLS-N	50	36

METHOD DETECTION LIMIT = 0.60 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	2
SPIKE % RECOVERY:	92

* Back up of $KMnO_4$ into earlier impinger - LG Carnot

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: MANGANESE FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	MANGANESE ug/SAMPLE
1	REAGENT BLANK	50	2.7
2	MTLS BLANK #1	50	5.3
3	MTLS BLANK #2	50	11
4	2-MTLS-S	50	30
5	3-MTLS-N	50	12
6	3-MTLS-S	50	12
7	5-MTLS-N	50	24
8	5-MTLS-S	50	12
9	2-MTLS-N	50	58
9D	2-MTLS-N	50	59
9S	2-MTLS-N	50	96 %

METHOD DETECTION LIMIT = 1.0 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	96

Curtis & Tompkins, Ltd

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/16/90
DATE ANALYZED: 04/16/90
DATE REPORTED: 04/26/90

METAL: MERCURY IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 7471

C&T ID	SAMPLE ID	SAMPLE VOLUME *	MERCURY ug/SAMPLE
1	REAGENT BLANK	SEE NOTE	ND (2.0)
2	MTLS BLANK #1	SEE NOTE	ND (3.0)
3	MTLS BLANK #2	SEE NOTE	ND (3.0)
4	2-MTLS-S	SEE NOTE	ND (6.0)
5	3-MTLS-N	SEE NOTE	ND (4.0)
6	3-MTLS-S	SEE NOTE	ND (5.0)
7	5-MTLS-N	SEE NOTE	ND (4.0)
8	5-MTLS-S	SEE NOTE	ND (5.0)
8D	5-MTLS-S	SEE NOTE	ND (5.0)
8S	5-MTLS-S	SEE NOTE	94 %
9	2-MTLS-N	SEE NOTE	ND (5.0)

* NOTE: 5% v/v REMOVED AT 100 MLS FOR MERCURY; REMAINING 95 MLS REDUCED TO 50 ML FOR OTHER METAL ANALYSES. REPORTED AS ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	94

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/16/90
DATE ANALYZED: 04/16/90
DATE REPORTED: 04/26/90

METAL: MERCURY FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 7471

C&T ID	SAMPLE ID	SAMPLE VOLUME *	MERCURY ug/SAMPLE
1	REAGENT BLANK	SEE NOTE	ND (1.0)
2	MTLS BLANK #1	SEE NOTE	ND (1.0)
3	MTLS BLANK #2	SEE NOTE	ND (1.0)
4	2-MTLS-S	SEE NOTE	ND (1.0)
5	3-MTLS-N	SEE NOTE	ND (1.0)
6	3-MTLS-S	SEE NOTE	ND (1.0)
7	5-MTLS-N	SEE NOTE	ND (1.0)
8	5-MTLS-S	SEE NOTE	ND (1.0)
8D	5-MTLS-S	SEE NOTE	ND (1.0)
8S	5-MTLS-S	SEE NOTE	109 %
9	2-MTLS-N	SEE NOTE	ND (1.0)

* NOTE: 5% v/v REMOVED AT 100 MLS FOR MERCURY; REMAINING 95 MLS REDUCED TO 50 ML FOR OTHER METAL ANALYSES. REPORTED AS ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	109

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/16/90
DATE ANALYZED: 04/16/90
DATE REPORTED: 04/26/90

METAL: MERCURY POTASSIUM PERMANGANATE IMPINGER
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 7471

C&T ID	SAMPLE ID	SAMPLE VOLUME	MERCURY ug/SAMPLE
1	REAGENT BLANK	100	ND (1.0)
2	MTLS BLANK #1	190	14
3	MTLS BLANK #2	170	ND (2.0)
4	2-MTLS-S	240	ND (2.0)
5	3-MTLS-N	120	ND (1.0)
6	3-MTLS-S	90	ND (1.0)
7	5-MTLS-N	150	ND (1.0)
8	5-MTLS-S	120	ND (1.0)
9	2-MTLS-N	310	ND (3.0)
9D	2-MTLS-N	310	ND (3.0)
9S	2-MTLS-N	310	100 %

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	100

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: NICKEL IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	NICKEL ug/SAMPLE
1	REAGENT BLANK	50	0.8
2	MTLS BLANK #1	50	1.2
3	MTLS BLANK #2	50	6.1
4	2-MTLS-S	50	13
5	3-MTLS-N	50	20
6	3-MTLS-S	50	12
7	5-MTLS-N	50	7.5
8	5-MTLS-S	50	150
8D	5-MTLS-S	50	150
8S	5-MTLS-S	50	97 %
9	2-MTLS-N	50	130

METHOD DETECTION LIMIT = 0.60 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	1
SPIKE % RECOVERY:	97

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: NICKEL FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	NICKEL ug/SAMPLE
1	REAGENT BLANK	50	ND (1.0)
2	MTLS BLANK #1	50	5.8
3	MTLS BLANK #2	50	22
4	2-MTLS-S	50	450
5	3-MTLS-N	50	560
6	3-MTLS-S	50	550
7	5-MTLS-N	50	600
8	5-MTLS-S	50	290
9	2-MTLS-N	50	390
9D	2-MTLS-N	50	390
9S	2-MTLS-N	50	101 %

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	101

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: SELENIUM IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	SELENIUM ug/SAMPLE
1	REAGENT BLANK	50	ND (3.0)
2	MTLS BLANK #1	50	ND (3.0)
3	MTLS BLANK #2	50	ND (3.0)
4	2-MTLS-S	50	ND (3.0)
5	3-MTLS-N	50	ND (3.0)
6	3-MTLS-S	50	ND (3.0)
7	5-MTLS-N	50	ND (3.0)
8	5-MTLS-S	50	ND (3.0)
8D	5-MTLS-S	50	ND (3.0)
8S	5-MTLS-S	50	109 %
9	2-MTLS-N	50	4.1

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	109

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: SELENIUM FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	SELENIUM ug/SAMPLE
1	REAGENT BLANK	50	6.4
2	MTLS BLANK #1	50	7.1
3	MTLS BLANK #2	50	11
4	2-MTLS-S	50	6.9
5	3-MTLS-N	50	20
6	3-MTLS-S	50	8.5
7	5-MTLS-N	50	ND (5.0)
8	5-MTLS-S	50	8.5
9	2-MTLS-N	50	5.8
9D	2-MTLS-N	50	5.6
9S	2-MTLS-N	50	85 %

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	4
SPIKE % RECOVERY:	85

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: ZINC IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	ZINC ug/SAMPLE
1	REAGENT BLANK	50	1.9
2	MTLS BLANK #1	50	18
3	MTLS BLANK #2	50	5.7
4	2-MTLS-S	50	12
5	3-MTLS-N	50	27
6	3-MTLS-S	50	17
7	5-MTLS-N	50	12
8	5-MTLS-S	50	16
8D	5-MTLS-S	50	16
8S	5-MTLS-S	50	88 %
9	2-MTLS-N	50	32

METHOD DETECTION LIMIT = 0.60 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	4
SPIKE % RECOVERY:	88

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25653
CLIENT: CARNOT
PROJECT #: 5863
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 04/10/90
DATE ANALYZED: 04/13/90
DATE REPORTED: 04/26/90

METAL: ZINC FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	ZINC ug/SAMPLE
1	REAGENT BLANK	50	830
2	MTLS BLANK #1	50	1,600
3	MTLS BLANK #2	50	910
4	2-MTLS-S	50	2,500
5	3-MTLS-N	50	1,400
6	3-MTLS-S	50	1,500
7	5-MTLS-N	50	1,600
8	5-MTLS-S	50	1,400
9	2-MTLS-N	50	1,300
9D	2-MTLS-N	50	1,300
9S	2-MTLS-N	50	100 %

METHOD DETECTION LIMIT = 1.0 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	<1
SPIKE % RECOVERY:	100

Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples: Project # 53304-AL

Sample No. (Project No. Test No.	Complete Description
Reagent Blank	Filter T42-235, 200 ml HNO_3/H_2O_2, 100 ml $KMnO_4$
MHs Blank #1	Filter T42-237, Probe Wash, Impinger Catch
	& $KMnO_4$ Impinger (132 ml)
MHs Blank #2	Filter T42-234, Probe Wash, Impinger Catch
	& $KMnO_4$ Impinger (118 ml)
2-MHs-N	Filter T42-229, Probe Wash, Impinger Catch,
	& $KMnO_4$ Impinger (354)
2-MHs-S	Filter T42-228, Probe Wash, Impinger Catch,
	& $KMnO_4$ Impinger (30 ml)
3-MHs-N	Filter T42-239, Probe Wash, Impinger Catch
	& $KMnO_4$ Impinger (166)

(see next page)

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[signature]	1500 3/19/90		

Samples shipped to: Curtis & Tompkins

Samples shipped from ESA by: C&T Date 3/21/90

Carrier: hand carried Air Bill No.

Samples received by: [signature] Date 3/21/90

Company: Curtis & Tompkins

15991 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388 / (714) 259-9520 / Telecopy: (714) 259-0372

E∫A Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. (Project No. Test No.	Complete Description
# 53304-AL	
3-Mtls-S	Filter T47-230, Probe Wash, Impinger Catch & $KMnO_4$ impinger (88 ml)
5-Mtls-N	Filter T47-238, Probe Wash, Impinger Catch & $KMnO_4$ impinger (148)
5-Mtls-S	Filter T47-226, Probe Wash, Impinger Catch & $KMnO_4$ impinger (110 ml)

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[signature]	1900 3/19/90		

Samples shipped to: Curtis & Tompkins

Samples shipped from ESA by: C&T Date 3/21/90

Carrier: handcarried Air Bill No. ______

Samples received by: [signature] Date 3/21/90

Company: Curtis & Tompkins

15991 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388 / (714) 259-9520 / Telecopy: (714) 259-0372

E/A ENERGY SYSTEMS ASSOCIATES

15991 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388
(714) 259-9520 / Telecopy: (714) 259-0372

Purchase Order

Vendor: Curtis and Tompkins

Phone: (   )

Code:

P.O. Number 5863

Charge Number 5336-AL

Date 3/29/90

California Resale No: SR EA 24-816623

Date Required	Contact	Ship via	Terms	
4/7/90			net 30	___ Resale — Non Taxable ✓ Co Use — Taxable

ITEM NO.	DESCRIPTION	QUANTITY	PRICE	TOTAL
	Analyze 9 NS [illegible] by EPA draft method for: Be Mn As Hg Cu Ni Cd Se Pb Zn Use graphite furnace [illegible] where possible — Level II QA/QC — [illegible]			

[illegible]

Sub Total $ 5,505

Sales Tax $ —

Freight $ —

TOTAL $ 5,505

[illegible]

PURCHASE ORDER NUMBER MUST APPEAR ON ALL INVOICES, SHIPPING MEMOS, BILLS OF LADING AND PACKAGES.

Appendix C.8

Chromium Tests

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: CHROMIUM

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
1-Cr-So	6.00	52.67	6.2	607522	4.02	9.15E-03	3.23E-06
4-Cr-No	4.50	50.34	5.91	578386	3.16	6.83E-03	2.49E-06
6-Cr-No	26.90	56.49	6.21	629680	16.81	3.96E-02	1.35E-05
Avg/tot	12.47	53.17	6.11	1211555	8.00	3.75E-02	6.42E-06

METALS EMISSION CALCULATIONS

Client/Location: SCE Alamitos 5
F Factor: 9063
Reference Temp (F): 60
Fuel: Oil

ELEMENT: HEXAVALENT CHROMIUM

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
1-Cr-So	1.46	52.67	6.2	607522	0.98	2.23E-03	7.87E-07
4-Cr-No	1.80	50.34	5.91	578386	1.26	2.73E-03	9.95E-07
6-Cr-No	14.30	56.49	6.21	629680	8.94	2.11E-02	7.19E-06
Avg/tot	5.85	53.17	6.11	1211555	3.73	1.76E-02	2.99E-06

Energy Systems Associates A CORPORATION
15991 RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

SUBJECT SCE Alamitos Chromium Calculations JOB NO. 53304

SHEET NO. ___ of ___

COMPUTED BY [signature] DATE 4/16/90 CHECKED BY ________ DATE ________

Hex Chrom

Test	ug/ml	ug/ml Blank	Tot Vol	Alig factor	Tot ug/train
1-Cr-S	.00206	ND *	355	x 2	1.46
4-Cr-S	.00313	ND *	287	x 2	1.80
6-Cr-N	.0248	ND *	289	x 2	14.3

* ND @ .0014 ug/ml

Total Chromium

Test	ug/sample	blank (ug)	Alig factor	Tot ug/train
1-Cr-S	4.75	1.75	x 2	6.00
4-Cr-S	4.00	1.75	x 2	4.50
6-Cr-N	15.2	1.75	x 2	26.9

* Volume for samples + blanks = 25 ml

128097

CARNOT 03/19/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	3/12/90
Test Number	1-Cr-S	Data By	MDM
Test Method	Chrome	Sample Location	So Duct
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor	0.840	Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	126
Bar Press (in Hg)	30.26	Nozzle Diam (in)	0.246

Meter Vol (acf)	54.596	Meter Temp (F)	85.5
Stack Press (iwg)	2.50	Stack Temp (F)	273.3
Vel Head (iwg)	0.2593	O2 (%): from CEM	4.20
		from portable	6.20
Liquid Vol (ml)	129.9	CO2 (%): from CEM	12.30
		calculated	10.83
Meter Press (iwg)	0.58	Start/Stop Time	1526/1744

Std Sample Vol (SCF)	52.67
Metric Sample Vol (cubic meters)	1.49
Moisture Fraction	0.103
Stack Gas Mol Wt	28.75
Stack Gas Velocity (ft/sec)	33.42
Stack Flow Rate (wacfm)	938,706
Stack Flow Rate (dscfm)	607,522
Isokinetic Ratio (%)	97.56

PARTICULATE TEST DATA

Client/Location SCE / MOHAVE
Unit #5
Test No. 1-Chr-5
Method 425
Page 1 of 3
Sample Location Exhaust Duct
Fuel Oil
Ambient Temp., °F
Operators RP / JM.
Meter Vol. (Start/End) 923.112 - 977.708
Date 3/12/91

Pre Test Data:
- Barometric Press., in. Hg 30.26
- Stack Area, sq. ft.
- Sample Time/ Pt, min. 129 min / 3 min
- Assumed Stack Press
- Assumed Moisture 5%
- Assumed Molecular Wt 28

Equipment Info:
- Meter No. ES-19
- Meter, Yd 1.00
- Pitot, Cp .84
- CFM @ΔH = 1.0 .595
- Probe I.D. 12'/TAF/...
- Nozzle No./Dia #21/.246
- Filter No. T42-218, T63-218

2.1
2.04

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	NaOH	689.5	- 579.4	= 110.1
#2	NaOH	588.2	- 583.1	= 5.1
#3	Ø	497.5	- 496.4	= 1.1
#4	SG	822.0	- 808.4	= 13.6
Total		2597.2	- 2467.3	= 129.9

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.019	7	RP	OK	
Post-Test	.020	17	RP	OK	

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp In	Meter Temp Out
Init.					
Final					

Sample Point	Time	ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
1-7	1526	.3	.6	923.112	282		87	78		57	8	3	
-6	1529	.35	.7	924.676	278		95	79		54	9	3	
-5	1532	.5	1.0	926.152	291		98	79		53	6.0	4	
-4	1535	.25	.5	927.775	301		98	79		52	5.5	3	
-3	1538	.18	.36	929.110	302		94	79		53	5.0	3	
-2	1541	.05	.1	930.222	293		89	79		54	6.1	2	
-1	1544/1547	0.0	0	930.824	292					54		0	
2-7	1547	.33	.66	930.824	286		84	78		55	7.2	3.5	
-6	1550	.35	.70	932.199	303		95	79		52	5.2	5	
-5	1553	.25	.50	933.620	305		94	79		52	4.6	6	
-4	1556	.16	.32	935.001	302		95	78		52	4.8	5.5	
-3	1559	.22	.44	936.098	294		93	78		52	5.6	7	
-2	1602	.14	.28	937.288	286		91	79		52	7.6	6	
-1	1605/1608	.05	.1	938.186	284		88	78		53	8.2	3.5	
3-7	1610	.21	.44	938.649	279		82	77		55	6.0	4	
-6	1613	.20	.42	939.871	296		91	78		53	4.4	4	
-5	1616	.175	.37	941.122	292		91	77		53	4.6	4.5	
-4	1619	.19	.40	941.955	292		91	77		52	4.4	5.5	
Total/Average													

Test Summary
- Initial MM/N...
- Sample Vol., c.f. 54.596
- Stack Press, iwg +2.5
- ΔP .2593 iwg ΔH 0.58 iwg
- Meter Temp., °F 85
- Stack Temp., °F 293
- Water Collected, g 129.9
- O_2/CO_2 Method O_2 6.20
- Chain of Cust. Info (init.):
  - Impingers Loaded CF
  - Impingers Recovered CF
  - Filter Loaded CF
  - Filter Recovered CF
  - Probe Wash
- Comments: CEM: O_2 = 4.2
  CO_2 =

EST DS-022
Rev. 9/89

PARTICULATE TEST DATA

Client/Location SCE / ALAMO
Sample Location EXHAUST DUCT
Operators PP/JM

Unit 45 Fuel OIL
Test No. 1-Ar-3 Method 425 Page 2 of ~~2~~ 3
Ambient Temp., °F ____ Date 3/12/92
Meter Vol. (Start/End) ____ / ____

Pre Test Data:
Barometric Press, in. Hg ____
Stack Area, sq. ft. ____
Sample Time/ Pt, min. ____
Assumed Stack Press ____
Assumed Moisture ____
Assumed Molecular Wt ____

Equipment Info:
Meter ~~No.~~ ____
Meter, Yd ____
Pitot, Cp ____
CFM @ΔH = 1.0 ____
Probe I.D. ____
Nozzle No./Dia ____
Filter No. ____

See Pg 1

Imp.	Matl	Wt(End)	-	Weight (Start)	=	Weight (g)
#1			-		=	
#2			-		=	
#3			-		=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init. Pitot	IBS
Pre-Test				
Post-Test				

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
3-3	1622	.20	.42	943.201	290		93	70		52		6	
-2	1625	.22	.46	944.501	284		92	76		51	5.6	7	
-1	1628/1631	.25	.53	945.888	282		95	76		51	7.2	8	
H-7	1633	.17	.30	946.852	248		81	74		53	11	3.5	
-6	1636	.23	.48	948.008	273		89	75		50		6	
-5	1639	.26	.55	949.250	279		93	75		49	4.6	8	
-4	1642	.24	.50	950.412	282		92	75		49	4.0	8	
-3	1645	.21	.51	951.798	280		94	74		50	4.8	8	
-2	1648	.32	.67	953.182	278		97	75		50	4.8	10	
-1	1651/1654	.30	.63	954.434	278		98	75		49	4.9	10	
5-7	1658	.55	1.16	955.873	231		96	74		53	9.5	5	
-6	1701	.37	.78	957.777	244		97	74		50	6.8	11	
-5	1704	.35	.74	959.256	245		100	75		50		13	+2.5
-4	1707	.32	.67	960.617	259		102	75		51	4.5	13	
-3	1710	.36	.76	962.199	262		101	75		51	4.7	14	
-2	1713	.39	.82	963.701	263		102	75		51	5.0	15	
-1	1716/1719	.32	.67	965.444	262		98	76		52	9.7	16	
				966.788									
Total/Average													

Test Summary

Initial ____
Sample Vol., c.f. ____
Stack Press, iwg ____
ΔP ____ iwg ΔH ____ iwg
Meter Temp., °F ____
Stack Temp., °F ____
Water Collected, g ____
O_2/CO_2 Method ____
Chain of Cust. Info (init.):
Impingers Loaded ____
Impingers Recovered ____
Filter Loaded ____
Filter Recovered ____
Probe Wash ____
Comments: ____

EST DS-022 9/8

PARTICULATE TEST DATA

Client/Location SCE/ALAMO
Sample Location ~~Exhaust~~ Duct
Operators RP/JM

Unit #5 Test No. 1-Chr-5 Method 425 Page 3 of 3
Fuel OIL Ambient Temp., °F ___
Meter Vol. (Start/End) /
Date 3/12/90

Pre Test Data:
- Barometric Press, in. Hg ___
- Stack Area, sq. ft. ___
- Sample Time/ Pt, min. ___
- Assumed Stack Press ___
- Assumed Moisture ___
- Assumed Molecular Wt ___

Equipment Info:
- Meter No. ___
- Meter, Yd ___
- Pitot, Cp ___
- CFM @ ΔH = 1.0 ___
- Probe I.D. ___
- Nozzle No./Dia ___
- Filter No. ___

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1			-	-
#2			-	-
#3			-	-
#4			-	-
Total				

Impinger Box I.D. ___
Integrated Bag I.D. ___

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IDS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
6-7	1723	.38	.80	966.788	218		90	75		53		12	
-6	1726	.51	1.07	968.720	228		99	76		51	8.0	16	
-5	1729	.41	.84	970.522	229		100	77		53	5.4	17	
-4	1732	.36	.76	971.980	251		100	77		53	8.0	16	
-3	1735	.40	.84	973.442	253		102	77		54	4.95	17	
-2	1738	.31	.65	974.815	252		102	78		55	6.6	16	
-1	1741/1744	.26	.55	976.229	248		102	78		56		14	
				977.708									
Total/Average													

Test Summary

Initial ___
Sample Vol., c.f. ___
Stack Press, iwg ___
ΔP ___ iwg ΔH ___ iwg
Meter Temp., °F ___
Stack Temp., °F ___
Water Collected, g ___
O_2/CO_2 Method ___
Chain of Cust. Info (init.):
- Impingers Loaded ___
- Impingers Recovered ___
- Filter Loaded ___
- Filter Recovered ___
- Probe Wash ___

Comments: ___

EST DS-02
Rev. 0

CARNOT 03/19/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	3/13/90
Test Number	4-Cr-N	Data By	MDM
Test Method	Chrome	Sample Location	No Duct
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-8	Unit	5
Pitot Factor	0.840	Meter Cal Factor	0.9900
Stack Area (sq ft)	468.13	Sample Time (Min)	126
Bar Press (in Hg)	30.35	Nozzle Diam (in)	0.242

Meter Vol (acf)	51.698	Meter Temp (F)	76.6
Stack Press (iwg)	2.60	Stack Temp (F)	257.3
Vel Head (iwg)	0.2314	O2 (%): from CEM	5.20
		from portable	5.91
Liquid Vol (ml)	129.3	CO2 (%): from CEM	12.00
		calculated	11.46
Meter Press (iwg)	0.52	Start/Stop Time	1622/1812

Std Sample Vol (SCF)	50.34
Metric Sample Vol (cubic meters)	1.43
Moisture Fraction	0.107
Stack Gas Mol Wt	28.78
Stack Gas Velocity (ft/sec)	31.16
Stack Flow Rate (wacfm)	875,124
Stack Flow Rate (dscfm)	578,386
Isokinetic Ratio (%)	101.20

PARTICULATE TEST DATA

Client/Location SCE/ Alamitos Unit 5 Test No. 3-C-N Method 425 Page 1
Sample Location #5 North Fuel Oil Ambient Temp., °F of 3
Operators CF/RP Meter Vol. (Start/End) 249.582 / 301.280 Date 3/13/90

Pre Test Data:
- Barometric Press, in. Hg 30.35
- Stack Area, sq. ft.
- Sample Time/ Pt, min.
- Assumed Stack Press
- Assumed Moisture
- Assumed Molecular Wt

Equipment Info:
- Meter No. ES-8
- Meter, Yd .990
- Pitot, Cp .84
- CFM @ΔH = 1.0 .598
- Probe I.D. 16'
- Nozzle No./Dia 7 .242
- Filter No. 763-219 / 747-

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	1N NaOH	708.1	598.1	110.0
#2	1N NaOH	601.1	596.9	4.2
#3	—	499.3	497.2	2.1
#4	SG	213.2	200.2	13.0
Total		2522.2	2392.9	129.3

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.015	15	CF	CF	
Post-Test	.07	15	RP	OK	

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
6-1	1622	.03	.06	249.582	262		80	79		60		5	
2	1626	.1	.21	250.30	259		86	79		60	5.3	5	
3	1628	.19	.40	251.31	249		93	80		68	4.6	2	
4	1631	.19	.40	252.15	224		96	81		57	5.7	0	
5	1634	.31	.65	253.31	214		98	81		55	7.6	3	
6	1637	.24	.50	254.81	206		98	82		56		3	
7	1640	.26	.55	256.2	204		98	83		52	7.8	2	
	1643			257.11						6			
5-1	1647	.04	.09	257.11	245		81	82		60		0	+2.6
2	1650	.18	.38	257.81	251		91	83		60	6.6	3	
3	1653	.21	.45	258.72	249		94	83		60	4.4	4	
4	1656	.18	.38	260.00	248		95	83		60	4.9	4	
5	1659	.23	.51	260.95	233		96	83		59	4.7	4	
6	1702	.29	.61	262.45	216		97	84		59	4.9	4	
7	1705	.26	.55	263.80	211		97	83		57	6.1	5	
	1708			264.893									
Total/Average													

Test Summary
- Initial MM/MM
- Sample Vol., c.f. 51.698
- Stack Press, iwg 2.6
- ΔP .2314 iwg ΔH .52 iwg
- Meter Temp., °F 88.5
- Stack Temp., °F 261.2
- Water Collected, g 129.3
- O_2/CO_2 Method 5.91
- Chain of Cust. Info (init.):
  - Impingers Loaded [illegible]
  - Impingers Recovered [illegible]
  - Filter Loaded [illegible]
  - Filter Recovered [illegible]
  - Probe Wash CF/RP
- Comments: CEM O_2 5.2 / CO_2 12.0

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PARTICULATE TEST DATA

Client/Location SCE Alm Unit S Test No. 4-Chr-N Method Chrome Page 2 of 3

Sample Location #5 North Fuel Oil Ambient Temp., °F ____ Meter Vol. (Start/End) ____ / ____ Date 3-13-90

Operators CE/RP

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D. ____

Integrated Bag I.D. ____

Leak Check:

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Sample Train

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

ΔP x 2.15

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
4-7	1712	.19	.42	264.897	242		87	83		60	8.2	5	
-6	1715	.21	.45	266.25	262		92	83		60		5	
5	1718	.25	.54	267.35	268		94	83		58	6.2	5	
4	1721	.27	.58	268.71	266		96	82		59	4.6	6	
3	1724	.21	.45	269.95	269		94	82		59		5	
2	1727	.20	.42	270.93	274		94	82		60	5.4	5	
1	1730	.38	.71	272.35	268		96	82		61	5.1	6	
	1733			273.606			88	82		61		3	
3-7	1735	.15	.32	273.606	213		92	82		60	66	4	
-6	1738	.19	.41	274.620	264		93	82		58	52	5	
-5	1741	.20	.43	275.829	275		93	82		59	5.2	4	
-4	1744	.17	.37	276.890	276		95	82		60	5.3	5	
-3	1747	.24	.52	277.916	280		97	82		61	5.8	6	
-2	1750	.28	.60	279.225	284		97	82		62		5	
-1	1753	.24	.52	280.605	280								
	1756			281.852									
Total/Average													

Test Summary
- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

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Client/Location SCE | Unit #5 | Test No. 4-Cr-N | Method 425 | Page 3
Sample Location #5 North | Fuel Oil | Ambient Temp., °F ____ | of 3
Operators RP/CF/JM | Meter Vol. (Start/End) ____ / ____ | Date 3/13/90

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1				
#2				
#3				
#4				
Total				

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
2-1	1758	.10	.215	281.852			88	82		61		3	
-2	1801	.18	.39	282.678	293		92	82		62	7.1	5	
-3	1803	.26	.56	283.810	288		96	82		62	5.5	6	
-4	1807	.30	.65	285.315	277		97	82		61	54	7	
-5	1810	.31	.67	286.701	265		98	82		62		8	
-6	1813	.37	1.23	287.822	261		103	83		62	84	12	
-7	1816	.35	.75	289.680	263		103	83		63		9	
	1819			291.229									
1-7	1824	.17	.37	291.229	283		78	82		62		8	
-6	1824	.40	.86	292.411	286		97	83		63	84	10	
-5	1827	.32	.68	293.898	296		100	83		63	6.5	8	
-4	1830	.35	.75	295.250	298		99	83		63	4.9	10	
-3	1833	.35	.75	296.771	292		100	83		63	5.0	10	
-2	1836	.39	.89	298.221	298		99	83		63		11	
-1	1839	.30	.65	299.815	284		98	83		63		8	
	1842			301.280									
Total/Average													

Test Summary
- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

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CARNOT 03/19/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	3/14/90
Test Number	6-Cr-N	Data By	MDM
Test Method	Chrome	Sample Location	No Duct
Fuel	Oil	Reference Temp (F)	60
Control Box #	ES-19	Unit	5
Pitot Factor	0.840	Meter Cal Factor	1.0000
Stack Area (sq ft)	468.13	Sample Time (Min)	126
Bar Press (in Hg)	30.30	Nozzle Diam (in)	0.242

Meter Vol (acf)	59.357	Meter Temp (F)	93.8
Stack Press (iwg)	2.60	Stack Temp (F)	252.9
Vel Head (iwg)	0.2665	O2 (%): from CEM	4.60
		from portable	6.21
Liquid Vol (ml)	126.2	CO2 (%): from CEM	12.30
		calculated	11.09
Meter Press (iwg)	0.61	Start/Stop Time	1223/1444

Std Sample Vol (SCF)	56.49
Metric Sample Vol (cubic meters)	1.60
Moisture Fraction	0.094
Stack Gas Mol Wt	28.89
Stack Gas Velocity (ft/sec)	33.30
Stack Flow Rate (wacfm)	935,270
Stack Flow Rate (dscfm)	629,680
Isokinetic Ratio (%)	104.31

PARTICULATE TEST DATA

Client/Location SCE / Alamitos　Unit 5　Test No. 6-Cr-N　Method Chrome　Page 1
Sample Location North　Fuel Oil　Ambient Temp., °F ____　of 3
Operators CF / LF　Meter Vol. (Start/End) / 　Date 3/14/90

Pre Test Data:
- Barometric Press, in. Hg 30.3
- Stack Area, sq. ft. 468.13
- Sample Time/ Pt, min. 3 min/42 points
- Assumed Stack Press -2.5
- Assumed Moisture 9
- Assumed Molecular Wt 29

Equipment Info:
- Meter No. ES-19
- Meter, Yd 1.000
- Pitot, Cp .84
- CFM @ΔH = 1.0 .595
- Probe I.D. 16'
- Nozzle No./Dia No 7 .242
- Filter No. 763-217 747-240

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	NaOH	720.1	611.6	108.5
#2	NaOH	612.3	613.7	3.6
#3	-	513.9	512.2	1.7
#4	SG	704.5	692.1	12.4
Total				

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.010	21	CF	CF	
Post-Test	.010	25	CF	CF	

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
1-1	1223	.28	.62	154.688	238	—	89	73	—	62	5.9	9	
2	1226	.34	.75	156.61	268		100	74		58		5	
3	1229	.34	.75	157.80	265		103	75		56	4.6	6	
4	1232	.46	1.01	159.21	248		107	76		57	4.1	10	
5	1235	.42	.92	161.31	227		109	78		58	8.0	9	
6	1238	.46	1.01	163.47	235		109	80		59	8.1	10	
7	1241	.22	.48	165.50	276		107	81		57		6	
	1244			166.105									
2-1	1247	.34	.75	166.105	252		97	81		59		9	
2	1250	.32	.70	168.35	262		110	82		60	9.4	9	
3	1253	.60	1.31	170.01	281		114	82		60	6.5	15	
4	1256	.42	.92	172.05	280		113	83		62	6.3	12	
5	1259	.35	.77	173.01	287		112	83		62	5.1	11	
6	1302	.34	.75	174.03	291		102	83		64	4.8	12	
7	1305	.25	.55	176.22	295		110	83		64	6.4	10	
	1308			177.440									
Total/Average													

Test Summary
- Initial BJMM
- Sample Vol., c.f. 59.35
- Stack Press, iwg 2.6
- ΔP .2665 iwg　ΔH .61 iwg
- Meter Temp., °F 93.8
- Stack Temp., °F 252.9
- Water Collected, g 126.2
- O_2/CO_2 Method 6.21
- Chain of Cust. Info (init.):
  - Impingers Loaded BJ
  - Impingers Recovered BJ
  - Filter Loaded BJ
  - Filter Recovered BJ
  - Probe Wash CF/LF
- Comments: CEM O_2 = 4.6%　CO_2 = 12.3%

Preliminary　% ISO = 104.3　% H_2O = 9.4%　Q_{SD} = 629,680

EST DS-0? Rev 9/8?

PARTICULATE TEST DATA

Client/Location SCE Alamitos | Unit 5 | Test No. 6-Cr-N | Method Chrome | Page 2 of 3
Sample Location North | Fuel | Ambient Temp., °F | Date
Operators CF | Meter Vol. (Start/End) /

Pre Test Data:
- Barometric Press, in. Hg
- Stack Area, sq. ft.
- Sample Time/ Pt, min.
- Assumed Stack Press
- Assumed Moisture
- Assumed Molecular Wt

Equipment Info:
- Meter No.
- Meter, Yd
- Pitot, Cp
- CFM @ΔH = 1.0
- Probe I.D.
- Nozzle No./Dia
- Filter No.

Imp.	Matl	Wt(End)	- Weight (Start)	= Weight (g)
#1				
#2				
#3				
#4				
Total				
Impinger Box I.D.				
Integrated Bag I.D.				

Leak Check:

Sample Train	CFM	Vac.	Init. Pitot	IBS
Pre-Test				
Post-Test				

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
				177.440	280		99	83		63	5.9	10	-12.6
3-1	13:11	.30	.66										
2	13:14	.39	.84	179.25	275		105	83		62	5.2	12	
3	13:17	.35	.77	180.95	273		105	84		62	5.0	12	
4	1320	.29	.64	182.49	275		107	84		63	4.9	11	
5	1323	.24	.52	184.21	260		110	84		64		10	
6	1326	.24	.52	185.04	253		110	84		64	7.1	10	
7	1329	.21	.46	186.78	233		104	84		64	8.2	8	
	1332			187.635									
4-7	1335	.18	.40	187.635	226		97	84		63	8.4	8	
6	1338	.20	.45	189.21	242		108	84		65	6.9	9	
5	1341	.20	.45	190.35	252		108	85		63	5.5	9	
4	1344	.21	.46	191.62	262		109	85		62	4.5	10	
3	1347	.23	.51	193.25	263		110	85		62	4.6	11	
2	1350	.25	.55	194.42	270		110	85		62	5.2	11	
1	1353	.16	.35	195.53	250		107	85		62	6.9	9	
Total/Average													

Test Summary
- Initial
- Sample Vol., c.f.
- Stack Press, iwg
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F
- Stack Temp., °F
- Water Collected, g
- O_2/CO_2 Method
- Chain of Cust. Info (init.):
  - Impingers Loaded
  - Impingers Recovered
  - Filter Loaded
  - Filter Recovered
  - Probe Wash
- Comments:

PARTICULATE TEST DATA

Client/Location: SCE Alm
Unit: 5
Test No.: 6-Cr-N
Method: Chrome
Page: 3 of 3

Sample Location: North
Fuel:
Ambient Temp., °F:

Operators: CE
Meter Vol. (Start/End): /
Date: 3-14-90

Pre Test Data:		Equipment Info:		Imp.	Matl	Wt(End)	-	Weight (Start)	=	Weight (g)
Barometric Press, in. Hg		Meter No.		#1			-		=	
Stack Area, sq. ft.		Meter, Yd		#2			-		=	
Sample Time/ Pt, min.		Pitot, Cp		#3			-		=	
Assumed Stack Press		CFM @ΔH = 1.0		#4			-		=	
Assumed Moisture		Probe I.D.		Total			-		=	
Assumed Molecular Wt		Nozzle No./Dia		Impinger Box I.D.						
		Filter No.		Integrated Bag I.D.						

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	Meter Conditions ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
5-1	1358	.05	.11	196.395	252		70	82		62		4	
2	1402	.10	.29	197.15	254		94	82		59	6.0	7	
3	1405	.23	.51	198.05	254		101	83		59	4.4	10	
4	1408	.20	.44	199.42	246		105	83		59	4.7	10	
5	1411	.18	.40	200.62	235		104	83		60	5.1	10	
6	1414	.29	.64	202.10	220		106	84		61	7.5	13	
7	1417	.34	.75	203.75	200		108	84		62	8.9	15	
	1420			205.04									
6-7	1423	.24	.53	205.04	210		97	84		63	8.3	11	
6	1426	.23	.50	206.70	216		105	84		64	7.8	11	
5	1429	.30	.66	208.20	223		109	84		64	7.9	14	
4	1432	.40	.88	209.72	233		110	84		63	6.5	16	
3	1435	.20	.44	211.00	254		107	84		64	4.6	11	
2	1438	.16	.35	212.10	257		104	83		65	5.0	10	
1	1441	.10	.22	213.60	252		102	83		65	5.6	6	
	1444			214.045									
Total/Average													

Test Summary

Initial
Sample Vol., c.f.
Stack Press, iwg
ΔP ____ iwg ΔH ____ iwg
Meter Temp., °F
Stack Temp., °F
Water Collected, g
O_2/CO_2 Method
Chain of Cust. Info (Init.):
Impingers Loaded
Impingers Recovered
Filter Loaded
Filter Recovered
Probe Wash
Comments:

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PARTICULATE TEST DATA

Client/Location SCE / Alamitos Unit 5 Test No. Field Bl Method 425 Page 1

Sample Location ______ Fuel ______ Ambient Temp., ^oF ______ of ______

Operators J. Mullizzo Meter Vol. (Start/End) ______ / ______ Date ______

Pre Test Data:

- Barometric Press, in. Hg ______
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ______
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:

- Meter No. ______
- Meter, Yd ______
- Pitot, Cp ______
- CFM @ΔH = 1.0 ______
- Probe I.D. ______
- Nozzle No./Dia ______
- Filter No. ______

Imp.	Mat'l	Wt(End)		Weight (Start)		Weight (g)
#1	NaOH		-	610.7	=	
#2	NaOH		-	604.8	=	
#3	–		-	510.0	=	
#4	SG		-	592.6	=	
Total			-		=	

Impinger Box I.D. ______

Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, ^oF Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
Total/Average													

Test Summary

- Initial ______
- Sample Vol., c.f. ______
- Stack Press, iwg ______
- ΔP ______ iwg ΔH ______ iwg
- Meter Temp., ^oF ______
- Stack Temp., ^oF ______
- Water Collected, g ______
- O_2/CO_2 Method ______
- Chain of Cust. Info (init.):
  - Impingers Loaded ______
  - Impingers Recovered ______
  - Filter Loaded ______
  - Filter Recovered ______
  - Probe Wash ______
- Comments: ______

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RTI Project No. : 2984

Samples : Probe Rinse, Filter and Impinger Samples
Company : ESA (P.O.# 5865)
Analyte : Cr(VI)
Method of Analysis : Ion Chromatography
Samples received : 3-21-90
Report Date : 4-4-90

Sample	Total Vol.(mL)	Cr(VI) ug/mL	Cr(VI) ug	Cr(VI) Spike ug	Cr(VI) Spike % Recovery
Reagent Blank	100	ND	ND		
Field Blank	215	ND	ND		
1-Cr-S	355	0.00206	0.731		
1-Cr-S Spk				0.0100	96.4
4-Cr-N	287	0.00313	0.898		
6-Cr-N	~~?~~ 289*	0.0248			

Detection Limit 0.0014

ND : Non-detectable; less than detection limit
? : Volume was not given
* As per label on bottle by A. Bell

* represents ½ of train

RTI Project No. : 2984

Samples : QC for Probe Rinse, Filter and Impinger Samples
Company : ESA (P.O.# 5865)
Analyte : Cr(VI)
Method of Analysis : Ion Chromatography
Samples received : 3-21-90
Report Date : 4-4-90

Sample	Cr(VI) ug/mL Found	Cr(VI) ug/mL Expected
QC	0.0102	0.0100

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
1250 S. Boyle Ave., Los Angeles, CA 90023, Phone (213) 269-7421, Fax (213) 268-5328

DATE RECEIVED: 03/21/90
DATE REPORTED: 04/10/90

LAB NUMBER: 25655

CLIENT: CARNOT

REPORT ON: FIVE SOURCE SAMPLES

PROJECT #: 5866

LOCATION: SUBMITTED BY CLIENT

RESULTS: SEE ATTACHED

Laboratory Director

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25655
CLIENT: CARNOT
PROJECT #: 5866
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/21/90
DATE DIGESTED: 03/30/90
DATE ANALYZED: 04/05/90
DATE REPORTED: 04/10/90

METAL: CHROMIUM
METHOD: CARB 425
EPA METHOD 7190

C&T ID	SAMPLE ID	SAMPLE VOLUME	CHROMIUM ug/FRACTION
1	REAGENT BLANK	25	ND (1.25)
2	FIELD BLANK	25	1.75
3	1-Cr-S	25	4.75
4	4-Cr-N	25	4.00
5	6-Cr-N	25	15.2
5D	6-Cr-N DUPLICATE	25	16.2
5S	6-Cr-N SPIKE	(10 ug/fraction spike)	23.6

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE:	6
SPIKE % RECOVERY:	79

Appendix C.9

Velocity and Moisture

ESR 53304-2053

CARNOT 03/19/90

SAMPLE TRAIN TEST SUMMARY

Client/Location	SCE/ALGS	Date	03/16/90
Test Number	9-H20-N	Data By	LG
Test Method	VELOCITY	Sample Location	No Duct
Fuel	GAS	Reference Temp (F)	60
Control Box #	ES-8	Unit	5
Pitot Factor	0.840	Meter Cal Factor	0.9900
Stack Area (sq ft)	468.13	Sample Time (Min)	36
Bar Press (in Hg)	30.20	Nozzle Diam (in)	

Meter Vol (acf)	23.539	Meter Temp (F)	107.7
Stack Press (iwg)	2.50	Stack Temp (F)	266.4
Vel Head (iwg)	0.2217	O2 (%): from CEM	2.70
		from portable	4.83
Liquid Vol (ml)	81.7	CO2 (%): from CEM	10.80
		calculated	9.54
Meter Press (iwg)	1.50	Start/Stop Time	1054/1140

Std Sample Vol (SCF)	21.61
Metric Sample Vol (cubic meters)	0.61
Moisture Fraction	0.149
Stack Gas Mol Wt	27.97
Stack Gas Velocity (ft/sec)	31.21
Stack Flow Rate (wacfm)	876,731
Stack Flow Rate (dscfm)	541,965
Isokinetic Ratio (%)	

PARTICULATE TEST DATA

Client/Location SCE   Unit S   Test No. 9-H2O-N   Method H_2O Page 1
Sample Location North   Fuel Gas   Ambient Temp., °F ______   of 3
Operators CF / JM   Meter Vol. (Start/End) ______ / ______   Date 3-16-90

Pre Test Data:
- Barometric Press, in. Hg 30.20
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ~45sec/42
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:
- Meter No. ES-8
- Meter, Yd .990
- Pitot, Cp .84
- CFM @ΔH = 1.0 ______
- Probe I.D. 16'
- Nozzle No./Dia —
- Filter No. —

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	H_2O	671.8	600.2	71.6
#2	H_2O	609.3	606.7	2.6
#3	0	493.5	492.8	0.7
#4	SG	794.4	787.6	6.8
Total		2569	2487.3	81.7

Impinger Box I.D. ______
Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	.005	11	CF	CF	
Post-Test	.005	11	CF	CF	

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

In vacuum form (or) votes

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
4-7	1054	.13	1.5	555998	250		105	96		Ice	6.3	5	
6		.13			262						5.1		
5		.16			268						3.8		
4		.18			272						3.5		+2.5
3		.22			275						3.2		
2		.22			277						4.3		
1		.16			262		117	98			5.5		
	1100			560.170									
3-7	1104	.12	.15	560.170	232		113	98			6.6	5	
6		.13			245						6.2		
5		.18			248						3.8		
4		.17			256						2.8		
3		.25			259						3.7		
2		.30			267						3.5		
1		.31			274		117	99			4.3		
	1140			563 964									
Total/Average													

Test Summary
- Initial LG
- Sample Vol., c.f. 23.539
- Stack Press, iwg 2.5
- ΔP, ~~.18~~ iwg   ΔH 1.5 iwg
- Meter Temp., °F 107.66
- Stack Temp., °F 266.4
- Water Collected, g 81.7
- O_2/CO_2 Method O_2 port=4.83
- Chain of Cust. Info (init.):
  - Impingers Loaded ______
  - Impingers Recovered ______
  - Filter Loaded ______
  - Filter Recovered ______
  - Probe Wash ______
- Comments: CEM O_2 2.7
  CO_2 10.8

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PARTICULATE TEST DATA

Client/Location SCE Alm　Unit 5　Test No. 9-H2O-N　Method H2O　Page 2
Sample Location North　Fuel Gas　Ambient Temp., °F ____　of 23 Ur
Operators CE/JM　Meter Vol. (Start/End) /　Date 3-16-90

Pre Test Data:		Equipment Info:	
Barometric Press, in. Hg		Meter No.	
Stack Area, sq. ft.		Meter, Yd	
Sample Time/ Pt, min.		Pitot, Cp	
Assumed Stack Press		CFM @ΔH = 1.0	
Assumed Moisture		Probe I.D.	
Assumed Molecular Wt		Nozzle No./Dia	
		Filter No.	

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1		-	=	
#2		-	=	
#3		-	=	
#4		-	=	
Total		-	=	
Impinger Box I.D.				
Integrated Bag I.D.				

Leak Check:

Sample Train	CFM	Vac.	Init.	Pitot	IDS
Pre-Test	.005	11	CE	CE	
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
2-7	1111	.40	1.5	563.964	261		109	98		58	7.8	5	
6		.53			261						6.9		
5		.43			283						5.6		
4		.38			290						4.5		
3		.30			294						5.0		
2		.30			296						3.7		
1	1117	.20		568.060	296		118	100			5.9		
1-7	1119	.19	1.5	568.060	286		112	99		60	4.8	5	
6		.36			287						6.1		
5		.45			298						4.3		
4		.26			302						4.2		
3		.29			300						3.4		
2		.38			302						4.1		
1	1125	.25		571.926	300		120	101			4.2		
Total/Average													

Test Summary

Initial ____
Sample Vol., c.f. ____
Stack Press, iwg ____
ΔP ____ iwg ΔH ____ iwg
Meter Temp., °F ____
Stack Temp., °F ____
Water Collected, g ____
O_2/CO_2 Method ____
Chain of Cust. Info (init.):
Impingers Loaded ____
Impingers Recovered ____
Filter Loaded ____
Filter Recovered ____
Probe Wash ____
Comments: ____

PARTICULATE TEST DATA

Client/Location SCE Alm
Sample Location North
Operators CF/JM

Unit 5
Fuel Gas

Test No. 9-H_2O-N Method H_2O Page 3 of 3
Ambient Temp., °F ____
Meter Vol. (Start/End) ____ / ____
Date 3-16-90

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1		-	=	
#2		-	=	
#3		-	=	
#4		-	=	
Total		-	=	

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
5-7	1126	.29	1.5	571.926	236		113	101		58	4.4	5	
6		.26			248						3.7		
5		.18			255						3.5		
4		.14			261						3.2		
3		.19			265						3.2		
2		.19			270						5.3		
1	1132	.07		575.780	266		121	102			5.4		
6 7		.19	1.5	575.780	231		119	103			7.9		
6		.17			232						7.6		
5		.31			235						6.8		
4		.32			242						5.5		
3		.15			266						4.2		
2		.05			263						3.8		
1		.05		579.537	256		121	103			4.6		
Total/Average													

Test Summary
- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

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CARNOT 03/19/90

SAMPLE TRAIN TEST SUMMARY

Client/Location..........SCE/ALGS	Date...................... 3/16/90
Test Number.............. 9-H20-S	Data By.................. LG
Test Method..............VELOCITY	Sample Location.......... So Duct
Fuel..................... GAS	Reference Temp (F)....... 60
Control Box #............ ES-8	Unit..................... 5
Pitot Factor 0.840	Meter Cal Factor......... 1.0000
Stack Area (sq ft)....... 468.13	Sample Time (Min)........ 36
Bar Press (in Hg)........ 30.20	Nozzle Diam (in)..........

Meter Vol (acf).......... 23.544	Meter Temp (F)........... 103.2
Stack Press (iwg)........ 2.80	Stack Temp (F)........... 286.3
Vel Head (iwg)........... 0.2352	O2 (%): from CEM......... 2.70
	from portable... 4.33
Liquid Vol (ml).......... 91.7	CO2 (%): from CEM........ 10.80
	calculated...... 9.83
Meter Press (iwg)........ 1.50	Start/Stop Time..........0933/1017

Std Sample Vol (SCF)..	22.01
Metric Sample Vol (cubic meters)............................	0.62
Moisture Fraction...	0.162
Stack Gas Mol Wt..	27.84
Stack Gas Velocity (ft/sec).................................	32.65
Stack Flow Rate (wacfm).....................................	917,068
Stack Flow Rate (dscfm).....................................	543,875
Isokinetic Ratio (%)..	

PARTICULATE TEST DATA

Client/Location SCE / [illegible]   Unit 5   Test No. 9-H2O-[illegible] Method 4   Page —
Sample Location [illegible] duct   Fuel Gas   Ambient Temp., °F 67   of 3
Operators S. M & CF   Meter Vol. (Start/End) /   Date 3/14/[illegible]

Pre Test Data:
- Barometric Press, in. Hg 30.20
- Stack Area, sq. ft.
- Sample Time/ Pt, min. ~45 sec / 42 pts
- Assumed Stack Press
- Assumed Moisture
- Assumed Molecular Wt 29.

Equipment Info:
- Meter No. ES-8
- Meter, Yd 1.00
- Pitot, Cp .84
- CFM @ΔH = 1.0 .598
- Probe I.D. TCP/OH
- Nozzle No./Dia N/A
- Filter No. N/A

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1	H_2O	703.4	- 626.3	= 77.1
#2	H_2O	610.5	- 608.0	= 2.5
#3		510.6	- 510.0	= 0.6
#4		762.0	- 750.5	= 11.5
Total		2586.5	- 2494.8	= 91.7

Impinger Box I.D.
Integrated Bag I.D.

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test	~~.00~~	7	[illegible]	OK	
Post-Test	.008	10	CF	CF	

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
1-7	933	.24	1.5	531.916	294	—	90	90	—		7.5	7	
6		.56			292						7.5		
5		.43			310		111	92			4.8		
4		.22			312		111	93			4.3		
3		.16			308		112	93			4.5		
2		.08			299		113	93		58	5.1		
1		.00			300		114	93		58	5.7		
	939			536.792									
2-7	941	.35	1.5	536.792	302		109	94			5.3	6	
6		.36			308						3.7		
5		.20			315						3.4		
4		.16			309						3.3		
3		.19			301		113	95			3.5		
2		.16			295						6.4		
1		.00			300		114	95			6.8		
	947			540.508									
Total/Average													

Test Summary
- Initial [illegible]
- Sample Vol., c.f. 23.544
- Stack Press, iwg 2.8
- ΔP .2352 iwg ΔH 1.5 iwg
- Meter Temp., °F 103.2
- Stack Temp., °F 286.3
- Water Collected, g 91.7
- O_2/CO_2 Method O_2 [illegible] = 4.3
- Chain of Cust. Info (init.):
  - Impingers Loaded [illegible]
  - Impingers Recovered [illegible]
  - Filter Loaded
  - Filter Recovered
  - Probe Wash
- Comments: CEM O_2 2.7, CO_2 10.8

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PARTICULATE TEST DATA

Client/Location ICE A/m Unit 5 Test No. 9-H,O -5 Method H,O Page 2
Sample Location South Fuel Gas Ambient Temp., °F ____ of 2
Operators CE/JM Meter Vol. (Start/End) / Date 3-16-90

Pre Test Data:
- Barometric Press, in. Hg ____
- Stack Area, sq. ft. ____
- Sample Time/ Pt, min. ____
- Assumed Stack Press ____
- Assumed Moisture ____
- Assumed Molecular Wt ____

Equipment Info:
- Meter No. ____
- Meter, Yd ____
- Pitot, Cp ____
- CFM @ΔH = 1.0 ____
- Probe I.D. ____
- Nozzle No./Dia ____
- Filter No. ____

Imp.	Matl	Wt(End)	-	Weight (Start)	=	Weight (g)
#1			-		=	
#2			-		=	
#3			-		=	
#4			-		=	
Total			-		=	

Impinger Box I.D. ____
Integrated Bag I.D. ____

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
4-7	947	.16	1.5	540.508	261		110	96			6.6	6	
6		.21			278						4.3		
5		.24			286						3.8		
4		.25			291						3.1		
3		.29			292						3.5		+2.8
2		.32			292						2.8		
1		.26			288		113	96			5.0		
	953			544.613									
5-7	957	.68	1.5	544.613	252		110	97			4.6	6	
6		.44			267						4.0		
5		.35			274						3.2		
4		.32			276						2.9		
3		.33			275						2.8		
2		.40			274						2.9		
1		.40			278		116	97			3.2		
	1002			548.095									
Total/Average													

Test Summary
- Initial ____
- Sample Vol., c.f. ____
- Stack Press, iwg ____
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ____
- Stack Temp., °F ____
- Water Collected, g ____
- O_2/CO_2 Method ____
- Chain of Cust. Info (Init.):
  - Impingers Loaded ____
  - Impingers Recovered ____
  - Filter Loaded ____
  - Filter Recovered ____
  - Probe Wash ____
- Comments: ____

PARTICULATE TEST DATA

Client/Location: SCIE A&M | Unit: S | Test No. 9-H_2O-5 | Method: H_2O | Page 3
Sample Location: #South | Fuel: ______ | Ambient Temp., °F: ______ | of 3
Operators: CE/JJm | Meter Vol. (Start/End): / | Date 3-15

Pre Test Data:
- Barometric Press, in. Hg ______
- Stack Area, sq. ft. ______
- Sample Time/ Pt, min. ______
- Assumed Stack Press ______
- Assumed Moisture ______
- Assumed Molecular Wt ______

Equipment Info:
- Meter No. ______
- Meter, Yd ______
- Pitot, Cp ______
- CFM @ΔH = 1.0 ______
- Probe I.D. ______
- Nozzle No./Dia ______
- Filter No. ______

Imp.	Matl	Wt(End)	Weight (Start)	Weight (g)
#1		-		=
#2		-		=
#3		-		=
#4		-		=
Total		-		=

Impinger Box I.D. ______
Integrated Bag I.D. ______

Leak Check:

Sample Train

	CFM	Vac.	Init.	Pitot	IBS
Pre-Test					
Post-Test					

Pre-Test Calibration

	Time	ΔH	Meter Reading	Meter Temp. In	Meter Temp. Out
Init.					
Final					

Sample Point	Time	Meter Conditions ΔP	ΔH	Meter Reading	Temperatures, °F Stack	Probe	Meter In	Out	Oven	Imp. Out	O_2	Vacuum	Static Press. iwg
7-7	1604	.36	1.5	548095	232		111	98		62	6.3	7	
6		.61			248						4.2		
5		.36			260						3.1		
4		.36			266						2.8		
3		.35			267						3.3		
2		.22			264						3.7		
1		.18			262		116	98			6.3		
	1010			551.855									
3-7	10:11	.10	1.5	551,855	304		114	99			4.6	7	
6		.13			305						3.7		
5		.14			307						3.2		
4		.12			304						2.9		
3		.13			301						2.9		
2		.14			297						4.0		
1		.10			296		116	99			6.2		
	1017			555.460									
Total/Average													

Test Summary
- Initial ______
- Sample Vol., c.f. ______
- Stack Press, iwg ______
- ΔP ____ iwg ΔH ____ iwg
- Meter Temp., °F ______
- Stack Temp., °F ______
- Water Collected, g ______
- O_2/CO_2 Method ______
- Chain of Cust. Info (init.):
  - Impingers Loaded ______
  - Impingers Recovered ______
  - Filter Loaded ______
  - Filter Recovered ______
  - Probe Wash ______
- Comments: ______

Appendix C.10

Fuel Analysis

Alamitos

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
1250 S. Boyle Ave., Los Angeles, CA 90023, Phone (213) 269-7421, Fax (213) 268-5328

DATE RECEIVED: 03/21/90
DATE REPORTED: 04/18/90

LAB NUMBER: 25657

CLIENT: CARNOT

REPORT ON: ONE OIL SAMPLE IN DUPLICATE

PROJECT #: 5864

LOCATION: SUBMITTED BY CLIENT

RESULTS: SEE ATTACHED

Laboratory Director

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25657-1
CLIENT: CARNOT
PROJECT #: 5864
LOCATION: SUBMITTED BY CLIENT
SAMPLE ID: 3/13/90 FUEL OIL

DATE RECEIVED: 03/21/90
DATE ANALYZED: 03/26/90
DATE REPORTED: 04/18/90

METHODS: EPA 6010/7000
CAC TITLE 22 METALS IN AQUEOUS SOLUTIONS

METAL	RESULT	REGULATORY LIMITS STLC
	--mg/L--	
Arsenic	ND (1.1)	5
Beryllium	ND (0.22)	0.75
Cadmium	ND (0.22)	1
Chromium (total)	0.47	560
Chromium (VI)	ND (0.50)	--
Copper	0.58	25
Lead	ND (1.1)	5
Mercury	ND (0.10)	0.2
Manganese	0.11	350
Nickel	4.2	20
Selenium	ND (1.0)	1
Zinc	0.88	250

ND = NOT DETECTED; LIMIT OF DETECTION IN PARENTHESES.

QA/QC DATA SUMMARY:

	RPD	SPIKE		RPD	SPIKE
Arsenic	<1	97	Mercury	2	88
Beryllium	<1	89	Manganese	2	87
Cadmium	<1	91	Nickel	1	103
Chromium	5	88	Selenium	7	96
Copper	14	91	Zinc	5	79
Lead	2	99			

Curtis & Tompkins, Ltd.

ABORATORY NUMBER: 25657-1D
CLIENT: CARNOT
PROJECT #: 5864
LOCATION: SUBMITTED BY CLIENT
SAMPLE ID: 3/13/90 FUEL OIL

DATE RECEIVED: 03/21/90
DATE ANALYZED: 04/12/90
DATE REPORTED: 04/18/90

METHODS: EPA 6010/7000
CAC TITLE 22 METALS IN AQUEOUS SOLUTIONS

METAL	RESULT	REGULATORY LIMITS STLC
	--mg/L--	
Arsenic	ND (1.1)	5
Beryllium	ND (0.22)	0.75
Cadmium	ND (0.22)	1
Chromium (total)	0.34	560
Chromium (VI)	ND (0.50)	--
Copper	5.3	25
Lead	ND (1.1)	5
Mercury	ND (0.10)	0.2
Manganese	0.34	350
Nickel	8.5	20
Selenium	ND (1.0)	1
Zinc	1.6	250

ND = NOT DETECTED; LIMIT OF DETECTION IN PARENTHESES.

QA/QC DATA SUMMARY:

	RPD	SPIKE		RPD	SPIKE
Arsenic	3	103	Mercury	2	96
Beryllium	<1	95	Manganese	18	92
Cadmium	5	76	Nickel	3	101
Chromium	8	95	Selenium	5	107
Copper	17	79	Zinc	3	79
Lead	4	97			

Curtis & Tompkins, Ltd

LABORATORY NUMBER: 25657-1
CLIENT: CARNOT
PROJECT #: 5864
LOCATION: SUBMITTED BY CLIENT
SAMPLE ID: 3/13/90 FUEL OIL

DATE RECEIVED: 03/21/90
DATE ANALYZED: 04/09/90
DATE REPORTED: 04/18/90

ULTIMATE AND PROXIMATE ANALYSIS

PARAMETER	AS RECEIVED BASIS (% by Weight)
ASH CONTENT	0.02
CARBON	85.22
HYDROGEN	12.54
NITROGEN	0.01
OXYGEN	2.06
SULFUR	0.15
CHLORINE BY X-RAY DIFF. (mg/L)	150
BTU/LB.	19,035

E∫A Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. (Project No. Test No.	Complete Description
53304-AL	
	[illegible] sample 3/13/90

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[signature]	1900 3/13/90		

Samples shipped to: Curtis and Tompkins

Samples shipped from ESA by: C & T Date 3/21/90

Carrier: [illegible] Air Bill No. ____

Samples received by: [signature] Date 3/21/90

Company: Curtis & Tompkins, Ltd.

15991 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388 / (714) 259-9520 / Telecopy: (714) 259-0372

ESA DS-057

EPA Fuel "F" factor calculations: Alamitos 5 AB2588

Reference temp, F:	60
Composition by wt, %:	
Carbon	85.22
Hydrogen	12.54
Nitrogen	0.01
Sulfur	0.15
Oxygen	2.06
Ash	0.02
Heating value, btu/lb:	19,035
F factor, dscf/mmbtu @ 0% O2:	9,063
Ash content, lb/mmbtu:	0.011

Gas Fuel F Factor Calculation

Species	Vol %	Pounds per mole C	H	N	O
Methane	84.7	10.16	3.39		
Ethane	3.5	0.84	0.21		
Propane	0.7	0.25	0.06		
Butane +	0.3	0.14	0.03		
Carbon dioxide	1.2	0.14			0.38
Carbon monoxide	0	0.00			0.00
Nitrogen	5.2			1.46	
Oxygen	1.8				0.58
Hydrogen	0		0.00		
Total		11.54	3.68	1.46	0.96
Molecular weight		17.64			
Weight percent		65.43	20.88	8.25	5.44

EPA Fuel "F" factor calculations: Alamitos 5 AB2588
Natural gas fuel

Reference temp, F:	60
Composition by wt, %:	
Carbon	65.43
Hydrogen	20.88
Nitrogen	8.25
Sulfur	0.00
Oxygen	5.44
Heating value, btu/scf:	947
Heating value, btu/lb:	20,371
F factor, dscf/mmbtu @ 0% O2:	8,449
Ash content, lb/mmbtu:	0.000

REPORT

TRUESDAIL LABORATORIES, INC.

CHEMISTS - MICROBIOLOGISTS - ENGINEERS

RESEARCH — DEVELOPMENT — TESTING

14201 FRANKLIN AVENUE
TUSTIN, CALIFORNIA 92680
AREA CODE 714 • 730-6239
AREA CODE 213 • 225-1564
CABLE: TRUELABS

CLIENT Energy Systems Associates
15991 Red Hill Ave., Suite 110
Tustin, California 92680-7388
Attention: Arlene Bell

DATE April 6, 199(

RECEIVED March 16, 199

LABORATORY NO. 4440

SAMPLE Three (3) Tedlar bags
labeled 9A, 9B, and 9C
P.O. No.: 53304
Edison P.O. No.: C0138903

INVESTIGATION

Analyze for trace benzene by modified EPA Method 602

RESULTS

MODIFIED EPA 602 (Benzene)

Received: 3/16/90
Analyzed: 3/16/90

	Nanoliters per Liter (ppb) Benzene
9A-AL	ND< 1
9B-AL	ND< 1
9C-AL	ND< 1

ND = Not detected.

COMPOSITION AND HEAT CONTENT (60 Degrees Fahrenheit)

#1-AL Natural Gas Sample

	Volume Percent (v/v)	Specific Gravity
Oxygen	1.8	0.020
Nitrogen	5.2	0.05
Methane	84.7	0.469
Carbon dioxide	1.2	0.018
Ethane	3.5	0.036
Propane	0.7	0.011
n-Butane	0.2	0.004
iso-Butane	0.1	0.002
Total	97.4	Total 0.590

TRUESDAIL LABORATORIES, INC.

Energy Systems Associates
Laboratory Number 44401
April 6, 1990
Page Two

COMPOSITION AND HEAT CONTENT (60 Degrees Fahrenheit) (cont.)

#1-AL

	BTU's per Cubic Foot
BTU's High	947
BTU's Low	854

Respectfully submitted,

TRUESDAIL LABORATORIES, INC.

Joe Bramblett, Manager
Instrumental Methods

APPENDIX D

CALCULATIONS

E/A

EMISSION CALCULATIONS

1. Sample Volume and Isokinetics

a. Sample gas volume, dscf

$$V_{m\ std} = 0.03342 V_m [P_{bar} + (H/13.6)](T_{ref}/T_m)(Y)$$

b. Water vapor volume, scf

$$V_{w\ std} = 0.0472\ V_{1c}\ (T_{ref}/528°R)$$

c. Moisture content, nondimensional

$$Bwo = V_{w\ std}/(V_{m\ std} + V_{w\ std})$$

d. Stack gas molecular weight, lb/lb mole

$$MW_{dry} = 0.44(\%\ CO_2) + 0.32(\%\ O_2) + 0.28(\%\ N_2)$$

$$MW_{wet} = MW_{dry}\ (1 - B_{wo}) + 18\ (B_{wo})$$

e. Absolute stack pressure, iwg

$$Ps = P_{bar} + P_{sg}/13.6$$

f. Stack velocity, ft/sec

$$V_s = 2.90\ C_p \sqrt{\Delta P T s} \sqrt{\frac{29.92}{Ps} \times \frac{28.95}{MW_{wet}}}$$

g. Actual stack gas flow rate, wacfm

$$Q = (V_s)(A_s)(60)$$

h. Standard stack gas flow rate, dscfm

$$Q_{sd} = Q\ (1 - Bwo)(T_{ref}/Ts)(Ps/29.92)$$

i. Percent isokinetic

$$I = \frac{17.32 \times T_s\ (V_{m\ std})}{(1\text{-}Bwo)\theta \times V_s \times Ps \times Dn^2} \times \frac{528\ °R}{T_{ref}}$$

2. Particulate Emissions

a. Grain loading, gr/dscf

$$C = 0.01543\ (M_n/V_{m\ std})$$

b. Grain loading at 12% CO_2, gr/dscf

$$C_{12\%\ CO_2} = C\ (12/\%\ CO_2)$$

c. Mass emissions, lb/hr

$$M = C \times Qsd \times (60\ \text{min/hr})/(7000\ \text{gr/lb})$$

3. Gaseous Emissions, lb/hr

$$M = ppm \times 10^{-6}\ \frac{MW_i\ \text{lb/lb mole}}{SV} \times Qsd \times 60\ \text{min/hr}$$

where SV = specific molar volume of an ideal gas:

$385.3\ ft^3$/lb mole for T_{ref} = 528 °R
$379.5\ ft^3$/lb mole for T_{ref} = 520 °R

4. Emissions Rates, lb/10^6 Btu

a. Fuel factor at 68 °F, dscf/10^6 Btu at 0% O_2

$$F_{68} = \frac{10^6[3.64(\%H) + 1.53(\%C) + 0.14(\%N) + 0.57(\%S) - 0.46(\%O_2,\ \text{fuel})]}{\text{HHV, Btu/lb}}$$

b. Fuel factor at 60 °F

$$F_{60} = F_{68}\ (520\ °R/528\ °R)$$

c. Gaseous emission factor

$$\text{lb}/10^6\ \text{Btu}_i = ppm_i \times 10^{-6} \times \frac{MW_i\ \text{lb}}{\text{lb mole}} \times \frac{1}{SV} \times F \times \frac{20.9}{20.9-\%O_2}$$

d. Particulate emission factor

$$\text{lb}/10^6\ \text{Btu} = C \times \frac{1\ \text{lb}}{7000\ \text{gr}} \times F \times \frac{20.9}{20.9-\%O_2}$$

These calculations are routinely performed on ESA's computer.

Nomenclature:

A_s	=	stack area, ft^2
Bwo	=	flue gas moisture content
$C_{12\%\ CO_2}$	=	particulate grain loading, gr/dscf corrected to 12% CO_2
C	=	particulate grain loading, gr/dscf
C_p	=	pitot calibration factor, dimensionless
Dn	=	nozzle diameter, in.
F	=	fuel F factor, dscf/10^6 Btu at 0% O_2
H	=	orifice pressure differential, iwg
I	=	% isokinetics
M_n	=	mass of collected particulate, mg
M_i	=	mass emissions of species i, lb/hr
MW	=	molecular weight of flue gas
MW_i	=	molecular weight of species i:

NOx: 46
CO: 28
SO_2: 64
HC: 16

θ	=	sample time, min.
ΔP	=	average velocity head, iwg $=\left(\overline{\sqrt{\Delta P}}\right)^2$
P_{bar}	=	barometric pressure, in.Hg
Ps	=	stack absolute pressure, in.Hg.
Psg	=	stack static pressure, iwg
Q	=	wet stack gas flow rate at actual conditions, wacfm
Qsd	=	dry stack gas flow rate at standard conditions, dscfm
SV	=	specific molar volume of an ideal gas at std conditions, ft^3/lb mole
Tm	=	meter temperature, °R
T_{ref}	=	reference temperature, °R
Ts	=	stack temperature, °R
V_s	=	stack velocity, ft/sec
V_{lc}	=	volume of liquid collected in impingers, ml
Vm	=	dry meter volume uncorrected, dcf
$V_{m\ std}$	=	dry meter volume at standard conditions, dscf
$V_{w\ std}$	=	volume of water vapor at standard conditons, scf
Y	=	meter calibration coefficient

E∫A

TRACE SPECIES CALCULATIONS

a. ng/sample train = (ng detected) - (ng in field blank)*

b. ng/dscm = ng/sample train x $(35.31/V_{m\ std})$

c. ng/Nm^3 at 12% CO_2 = ng/dscm x $[T_{ref}(°R)/492\ °R)]$ x $(12\%\ CO_2/\%\ CO_2)$

d. lb/hr = ng/dscm x $(1\ g/10^9\ ng)$ x (1 lb/454 g) x $(1\ m^3/35.31\ ft^3)$

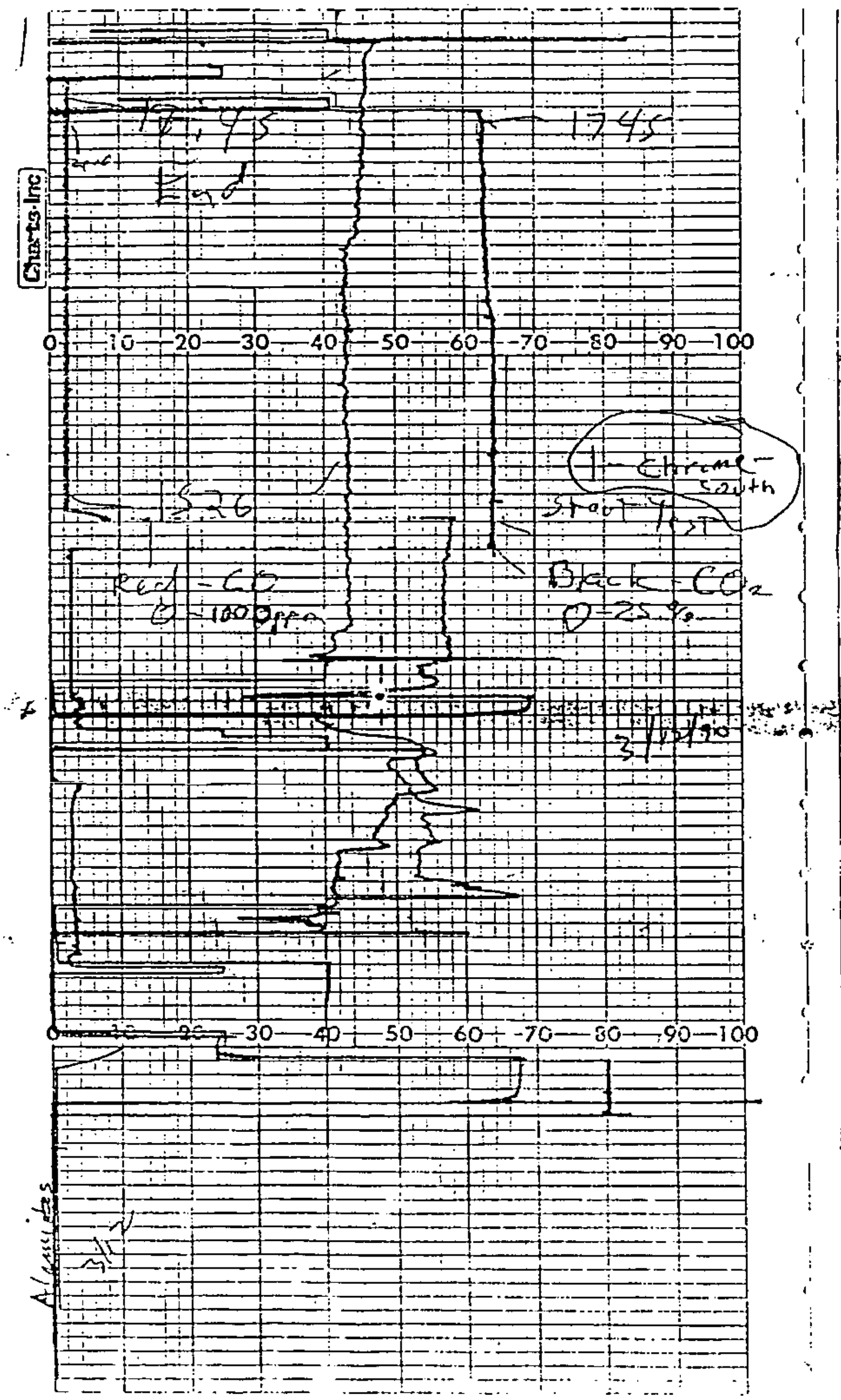
x Q_{sd} x (60 min/hr)

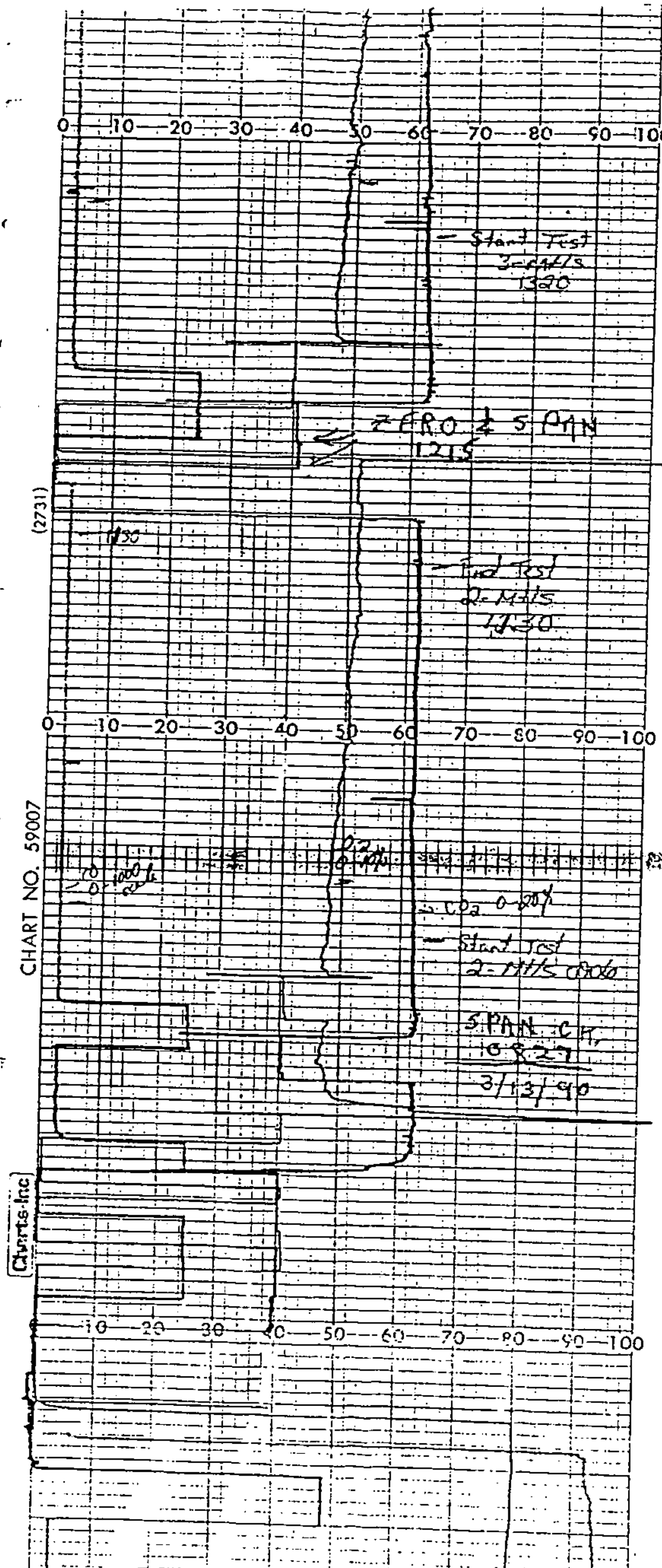
(where Q_{sd} = standard gas flow rate, dscfm)

*This formula should be used with discretion. For example, very low blanks may merely indicate "noise", and might be disregarded. On the other hand, very high blank values may indicate sampling or analysis problems which should be investigated. It may not be acceptable to use a blank correction on some projects.

APPENDIX E

INSTRUMENT STRIP CHARTS


Charts-Inc
1745
End
0—10—20—30—40—50—60—70—80—90—100
1 - Chrome South
1526
Start Test
Red - CO
0-1000ppm
Black - CO2
0-25%
0—10—20—30—40—50—60—70—80—90—100


0 10 20 30 40 50 60 70 80 90 100
Start Test
1320
ZERO & SPAN
1215
(2731)
1130
End Test
1130
0 10 20 30 40 50 60 70 80 90 100
CHART NO. 59007
CO_2 0-20%
Start Test
SPAN CK
0827
3/13/90
Charts-Inc
10 20 30 40 50 60 70 80 90 100

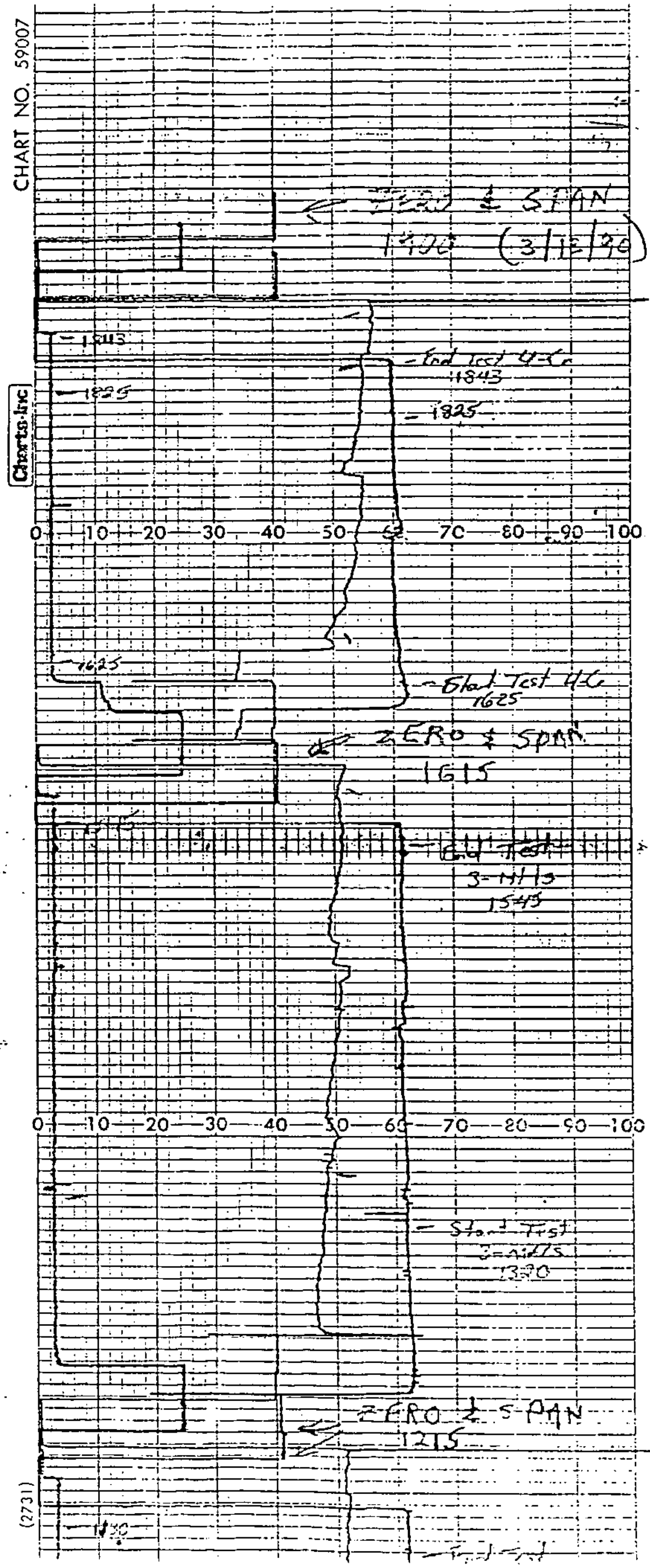


CHART NO. 59007
Charts-Inc
ZERO & SPAN
1843
1825
End Test
1843
1825
0 10 20 30 40 50 60 70 80 90 100
1625
Start Test
1625
ZERO & SPAN
1615
1545
0 10 20 30 40 50 60 70 80 90 100
Start Test
ZERO & SPAN
1215
(2731)

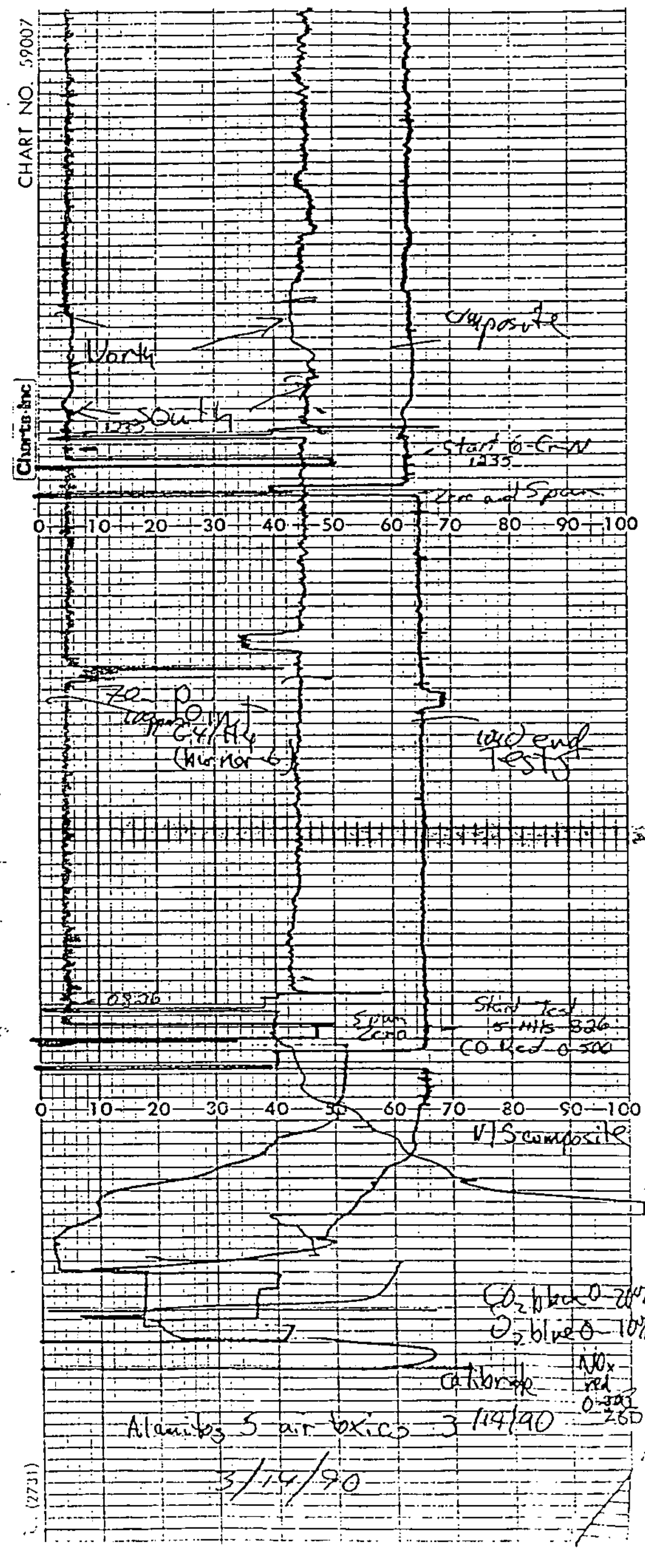
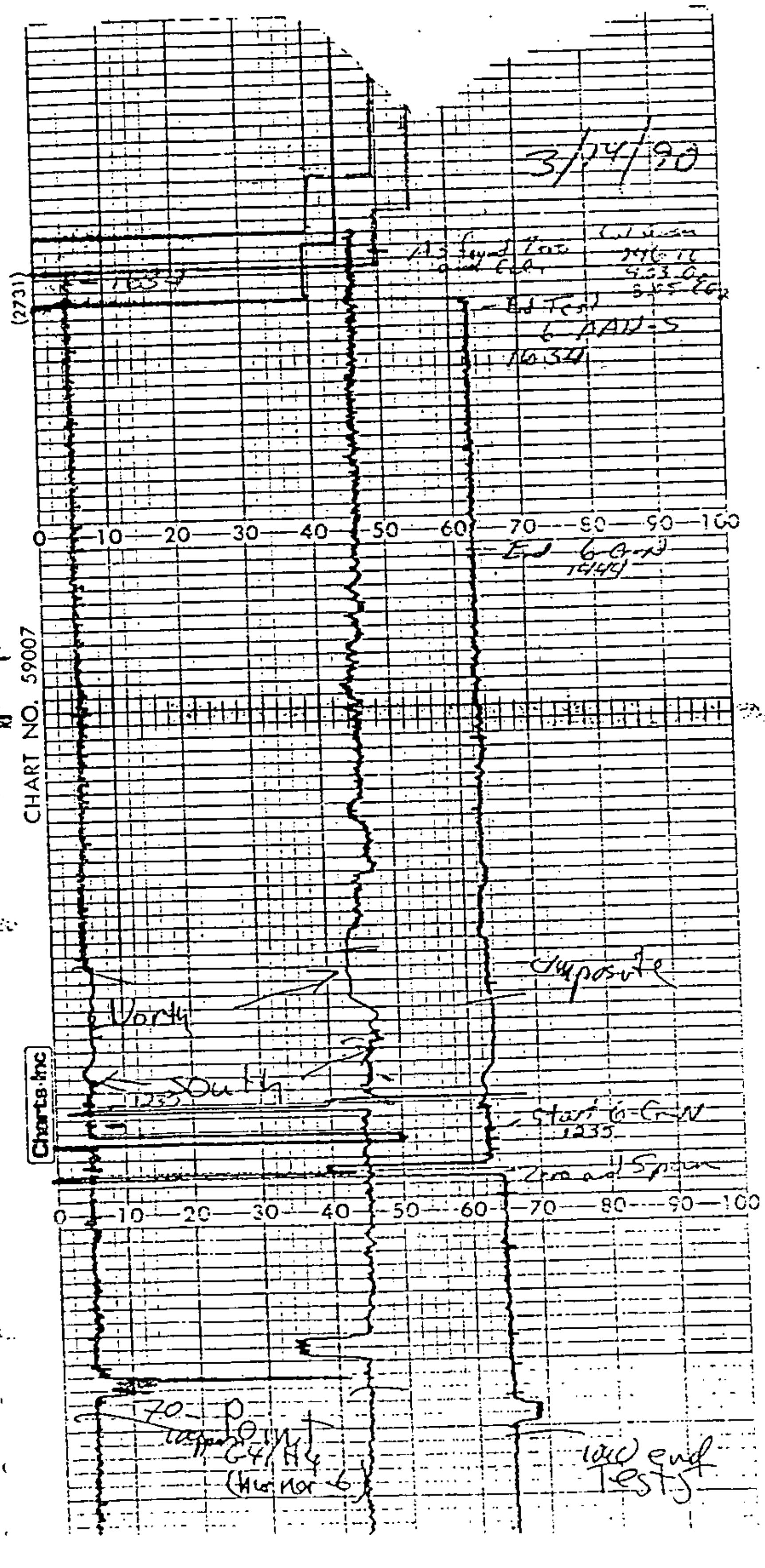
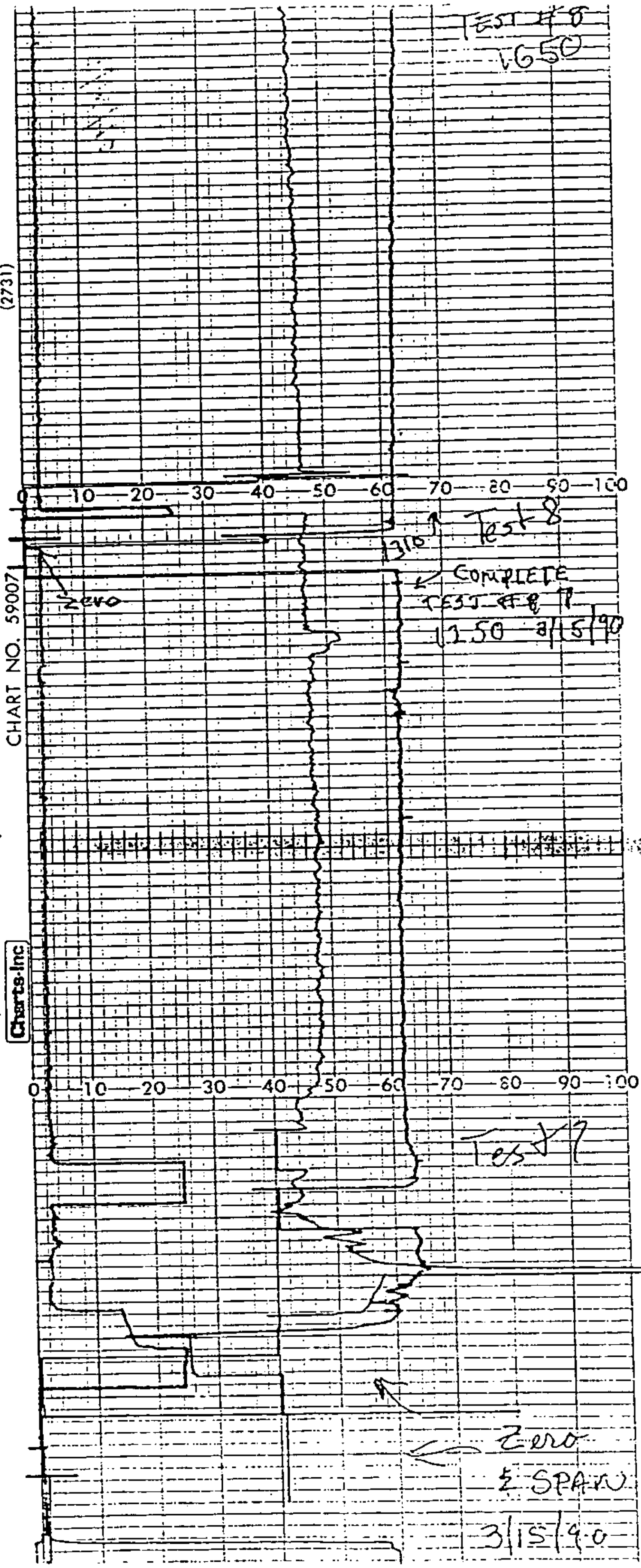
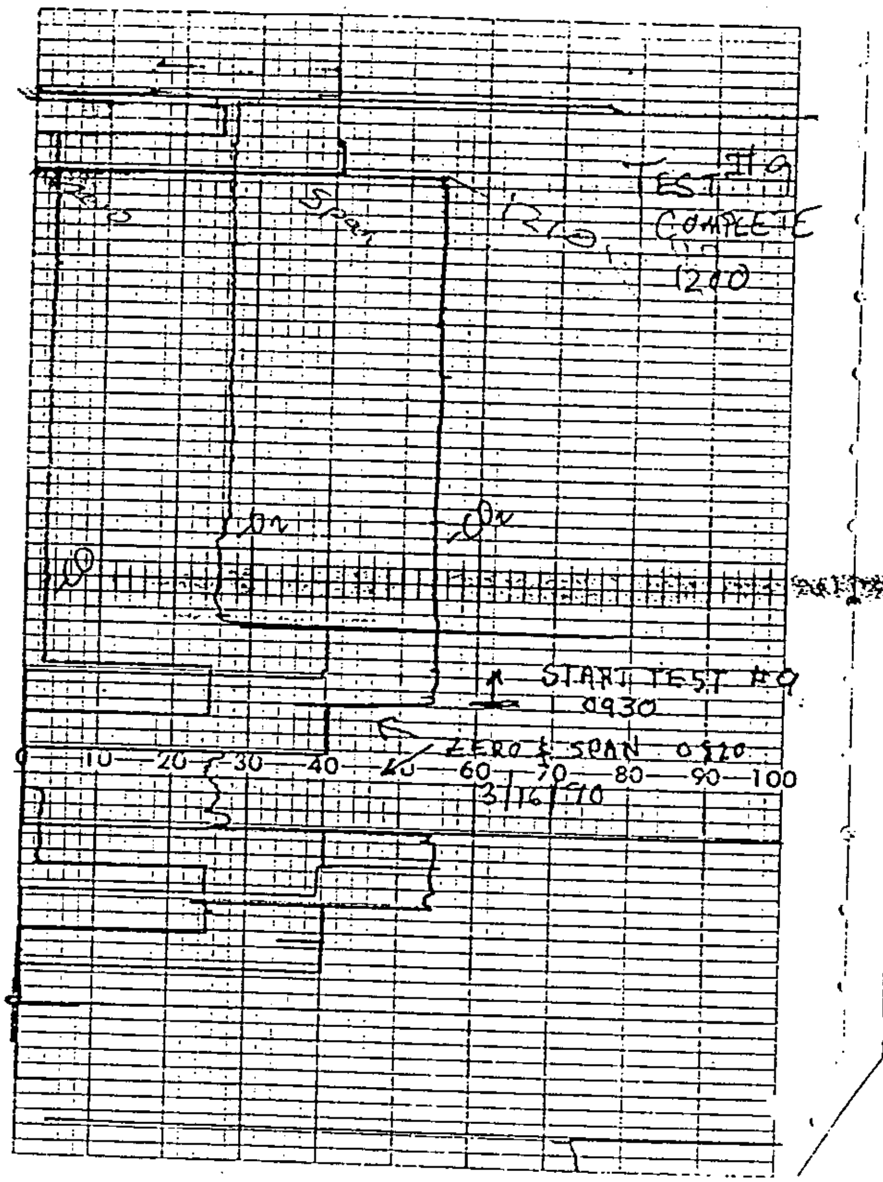


CHART NO. 59007
Charts Inc
North
South
composite
1235
Start 0-CrW
1235
Zero and Span
0 10 20 30 40 50 60 70 80 90 100
end Test
0826
Start Test
Span
Zero
CO Red 0-500
0 10 20 30 40 50 60 70 80 90 100
V/S composite
CO_2 black 0-20%
O_2 blue 0-10%
calibrate
NOx
red
Alamitos 5 air toxics 3/14/90
3/14/90
(2731)


3/24/90
(2731)
0 10 20 30 40 50 60 70 80 90 100
CHART NO. 59007
Composite
North
South
Start 6 CEM
1235
Charts-Inc
Zero and Span
0 10 20 30 40 50 60 70 80 90 100
100 end Test


TEST #8
1650
(2731)
0 10 20 30 40 50 60 70 80 90 100
Test 8
1310
Zero
COMPLETE
1150 3/15/90
CHART NO. 59007
Charts-Inc
0 10 20 30 40 50 60 70 80 90 100
Test 7
Zero
& SPAN
3/15/90


TEST #9
COMPLETE
1200
START TEST #9
0930
ZERO & SPAN 0920
3/16/90
0 10 20 30 40 50 60 70 80 90 100

APPENDIX F

CHAIN OF CUSTODY

extra

E∫A Energy Systems Associates A CORPORATION

Total Cr

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. II 53304-AL
(Project No.

Test No.	Complete Description
* Reagent Blank	47 & 63 mm filter, DI / .1N NaOH
Field Blank	47 & 63 mm filter, probe wash, impinger catch
1-Cr-S	47 & 63 mm filter, probe wash & impinger catch
4-Cr-N	47 & 63 mm filter, probe wash & impinger catch
6-Cr-N	47 & 63 mm filter, probe wash & impinger catch

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[signature]	3/19/90 1900		

Samples shipped to: C&T

Samples shipped from ESA by: C&T Date 3/21/90
Carrier: hand carried Air Bill No.

Samples received by: Date 3/21/90
Company: C&T

15991 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7386 / (714) 259-9520 · Telecopy: (714) 259-0372

ESA DS-057

* Represents 1/2 of train

e Y tu

Energy Systems Associates A CORPORATION

Total Cr

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. II 53304-AL
(Project No.
Test No. — Complete Description

Test No.	Complete Description
* Reagent Blank	47 & 63 mm filter, DI & NaOH
Field Blank	47 & 63 mm filter, probe wash & impinger c
1-Cr-5	47 & 63 mm filter, probe wash & impinger ca
4-Cr-N	47 & 63 mm filter, probe wash & impinger catch
6-Cr-N	47 & 63 mm filter, probe wash & impinger catch

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[illegible signature]	3/19/90 1900		

Samples shipped to: C&T

Samples shipped from ESA by: C&T — Date 3/21/90

Carrier: [illegible] — Air Bill No.

Samples received by: — Date

Company:

15891 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7355 / (714) 259-9520 / Telecopy: (714) 259-0372

* Represents 1/2 of drain

ESA DS-057

EXTRA [illegible]

Energy Systems Associates A CORPORATION

Cr 6+

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. (Project No. Test No.	Complete Description
	# 53304 - AL
(A) * Reagent Blank	47mm filter, 63mm filter, 100ml NaOH (47-222) (63-220) ✓
(B) Field Blank	47 & 63 mm filter, probe wash, impinger catch (TV= 215) (63-221)
(C) 1-Cr-S	47 & 63 mm filter, probe wash, impinger catch (TV= 355) (47-218) (63-218)
(D) 4-Cr-N	47 & 63 mm filters, probe wash, impinger catch (TV= 287) (47-231) (63-219)
(E) 6-Cr-N	47 & 63 mm filter, probe wash, impinger catch (TV= ✓ (47-240) (63-217)

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[signature]	1900 3/19/90		

Samples shipped to: KTI
Research Triangle Park
N.C

Samples shipped from ESA by: USA transfer Date 3/20/90

Carrier: Air Bill No.

Samples received by: [signature] Date 3/21/90

Company:

15991 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388 / (714) 259-9520 / Telecopy: (714) 259-0372

ESA DS-057

* Represents 1/2 of Train

extra

Energy Systems Associates A CORPORATION

Total Cr

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. II 53304-AL
(Project No.

Test No.	Complete Description
* Reagent Blank	47 & 63 mm filter, DI / 1N NaOH
Field Blank	47 & 63 mm filter, probe wash, impinger catch
1-Cr-S	47 & 63 mm filter, probe wash & impinger catch
4-Cr-N	47 & 63 mm filter, probe wash & impinger catch
6-Cr-N	47 & 63 mm filter, probe wash & impinger catch

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[signature]	3/19/90 1900		

Samples shipped to: C&T

Samples shipped from ESA by: C&T   Date 3/21/90

Carrier: Land carried   Air Bill No.

Samples received by: Date 3/21/90

Company: C&T

15991 RED HILL AVENUE, SUITE 110 TUSTIN, CA 92680-7388 / (714) 259-9520 / Telecopy: (714) 259-0372

* Represents 1/2 of train

ESA DS-057

E∫A Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. (Project No. Test No.	Complete Description
	Project # 53304
451 3/15 Field Blank	XAD-2 (module) (1), filter # 47-181 H_2O fraction (1), Organic (1)
452 3/14 6-PAH-S	XAD-2 module (1), filter # 47-182 and 47-179, H_2O fraction (2), Organic (1)
453 3/15 7-PAH-N	XAD-2 module (1), filter # 47-183, 47-177, H_2O fraction (2), Organic (1)
6454 3/15 8-PAH-S	XAD-2 module (1), filter 47-213, H_2O fraction (1), Organic (1)

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[signature]	0900 3/19/90		

Samples shipped to: Zenon Environmental

Samples shipped from ESA by: Fed-Ex Date 3/19/90

Carrier: Air Bill No. 400-2914-956

Samples received by: [signature] Date

Company: ZENON

E∫A Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. 53304-AL

(Project No. Test No.	Complete Description
NG	natural gas fuel sample 1 bag in tedlar bag

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
Paul Ewing	3/16/90		

Samples shipped to: TRUESDAIL

Samples shipped from ESA by: Hand carried Date 3/16/90

Carrier: Paul Ewing Air Bill No.

Samples received by: Date 3/16/90

Company: TRUESDAIL

15991 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388 / (714) 259-9520 / Telecopy (714) 259-0372

ESA DS-057

E/A Energy Systems Associates A CORPORATION

Total Cr

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. # 53304-AL
(Project No.

Test No.	Complete Description
* Reagent Blank	47 & 63 mm filter, DI / 0.1 N NaOH
Field Blank	47 & 63 mm filter, probe wash, impinger catch
1-Cr-S	47 & 63 mm filters, probe wash & impinger catch
4-Cr-N	47 & 63 mm filter, probe wash & impinger catch
6-Cr-N	47 & 63 mm filter, probe wash & impinger catch

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[signature]	3/19/90 1900		

Samples shipped to: C&T

Samples shipped from ESA by: C&T Date 3/21/90

Carrier: Landcarried Air Bill No.

Samples received by: [signature] Date 3/21/90

Company: C&T

15901 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388 / (714) 259-3520 / Telecopy: (714) 259-0372

* Represents 1/2 of train

ESA DS-057

E∫A Energy Systems Associates A CORPORATION

C 6+

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. (Project No. Test No.): # 53304 - AL

Complete Description

(A) * Reagent Blank, 47 mm filter, 63 mm filter, 100 ml NaOH
(47-222) (63-220)

(B) Field Blank 47 & 63 mm filter, probe wash, impinger catch
(63-221)

(C) 1-Cr-S 47 & 63 mm filters, probe wash, impinger catch (TV=
(47-218) (63-218)

(D) 4-Cr-N 47 & 63 mm filters, probe wash, impinger catch (TV=
(47-231) (63-219)

(E) 6-Cr-N 47 & 63 mm filter, probe wash, impinger catch (TV=
(47-240) (63-217)

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[illegible]	1900 3/19/90		

Samples shipped to: KTI
Research Triangle Park
N.C

Samples shipped from ESA by: [illegible] Date 3/20/90

Carrier: Air Bill No.

Samples received by: [illegible] Date 3/21/90

Company:

15991 RED HILL AVENUE, SUITE 110, TUSTIN CA 92680-7388 / (714) 259-9520 / Telecopy (714) 259-0372

ESA DS-057

* Represents 1/2 of Train

P003093 MAR 2 6 1990

E/A Energy Systems Associates A CORPORATION

analyze for
Formaldehyde
Benzaldehyde
acetaldehyde

CERTIFICATION OF SAMPLE RECEIPT

Samples:
Sample No. # 53304 – AL
(Project No.

Test No.	Complete Description
8a-Form	combine vials a + B for analysis
8 b-Form	"
8c - Form	"
8-Form-Field Blk	analyze one, hold other
8-Form-Field Spike	
9a-Form	combine vials a + B for analysis
9B-Form	"
9c - Form	"
	→ report as total mg

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[signature]	3/19/90		

Samples shipped to: Radian
N.C

Samples shipped from ESA by: Fed ex Date 3/19/90
Carrier: Fedex Air Bill 3082018763
Samples received by: [signature] Date
Company: Radian 3-20-90 10:10
Temp Ambient

ESA US-057

Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. 53304
(Project No.

Test No.	Complete Description
9A-Benz	South 1 bag
9B-Benz	South Tedlar Bags 1 bag
9C-Benz	North for Benzine analysis 1 bag

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
Paul Ewing	3/16/90		

Samples shipped to: TRUESDAIL

Samples shipped from ESA by: Hand carried Date 3/16/90

Carrier: PAUL EWING Air Bill No.

Samples received by: Date 3/16/90

Company: TRUESDAIL

Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples: Project # 53304/AL

Sample No. (Project No. Test No.	Complete Description
5A- Benzene-N	Tedlar Bag
5C - Benzene-S	
5D- Benzene-S	

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
[illegible]	0800 3/6/90		

Samples shipped to: Truesdail Labs. Tustin, CA.

Samples shipped from ESA by: [illegible] Date 3/15/90

Carrier: ESA Air Bill No.

Samples received by: [illegible] Date

Company: Truesdail

15991 RED HILL AVENUE, SUITE 110 TUSTIN CA 92680-7388 (714) 259-9520 Telecopy (714) 259-0372

ESA DS-057

REAGENT CHAIN OF CUSTODY

Client: SCE / Alamitos

Charge No.: 53304

Project Manager: B / MDM

REGENTS - Enter quantity and circle description

✓	Water	DI B&J 2	Lot # ______
✓	Acetone	ACS GC2 2	Lot # ______
✓	Hexane	ACS GC2 2	Lot # ______
______	IPA	ACS	Lot # ______
______	H_2O_2	30% Other	Lot # ______
______	$MeCl_2$	ACS GC2	Lot # ______

4l 0.1 N NaOH

8l 5% HNO_3 / 10% H_2O_2

3l $KMnO_4$

500 ml DNPH soln

FILTERS - Quantity and Description

______ Glass Fiber 110mm 63mm 47mm 45mm 37mm

______ Teflon 110mm 63mm T63-216 through T63-223

T47-218 through T47-226

✓ Hexane Rinsed

47-181 through 47-212 . T47-227 through T241

8 Tedlar bags

6 XAD-2 modules

______

BOTTLES - Quantity

_______ 1000ml Nalgene

_______ 500ml Nalgene

_______ 250ml Nalgene

_______ 500ml I-chem

2cs 1000ml Acid Washed

2cs 500ml Acid Washed

_______ 250ml Acid Washed

LAB SUPPLY CHECK LIST

✓ Silica Gel

✓ Gloves (small and large)

✓ Wash Bottles

✓ Foil

✓ Baggies

✓ Sample Labels

✓ Pens

✓ Paper Towels

— ~~Scissors~~

✓ Tweezers

— Brushes

✓ Teflon tape

— Parafilm

~~50~~ 1,000 X formaldehyde sol

2-10ml pipetter

2-5ml pipetter

2-1ml pipetter

Released By [signature] Date 3/9/90

Received By _______________ Date _______

Returned By _______________ Date _______