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**AP-42 Section Number:** 1.3

**Reference Number:** 69

**Title:** Emissions Inventory Testing at  
Alamitos Unit 5 for Southern  
California Edison Company

May 1990

**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**

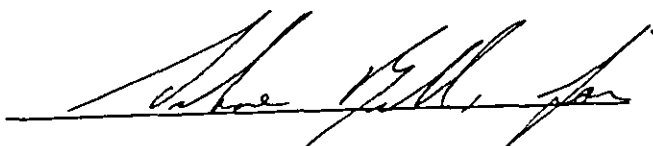
Tustin, California

MAY, 1990

ESR 53304-2053

## REPORT CERTIFICATION

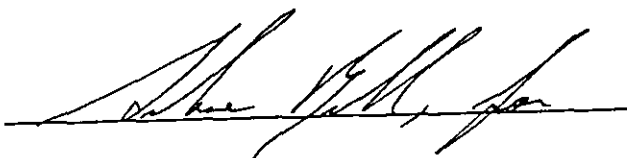
The sampling and analysis performed for this report was carried out under my direction and supervision.



Mark D. McDannel  
Vice President & General Manager

Date 5/30/90

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



Mark D. McDannel  
Vice President & General Manager

Date 5/30/90

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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 Alamos 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 x 10 <sup>-6</sup> |
| Formaldehyde |                            |
| ppb          | 47                         |
| lb/hr        | 0.24                       |
| lb/MMBtu     | 3.9 x 10 <sup>-5</sup>     |



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                |                           |
| $\mu\text{g}/\text{m}^3$ | 4.03                      |
| lb/hr                    | 0.0185                    |
| lb/MMBtu                 | $3.26 \times 10^{-6}$     |

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

| Metal                 | $\mu\text{g}/\text{m}^3$ | lb/hr                 | lb/MMBtu                  |
|-----------------------|--------------------------|-----------------------|---------------------------|
| Arsenic               | 25.3                     | 0.12                  | $2.0 \times 10^{-5}$      |
| 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                 | $6.4 \times 10^{-6}$      |
| Chromium (hexavalent) | 3.7                      | 0.018                 | $3.0 \times 10^{-6}$      |
| Copper                | 14.8                     | 0.068                 | $1.2 \times 10^{-5}$      |
| Lead                  | 27.1                     | 0.12                  | $2.2 \times 10^{-5}$      |
| Manganese             | 32.7                     | 0.14                  | $2.6 \times 10^{-5}$      |
| Mercury               | ND <5.0                  | ND <0.022             | ND < $4.0 \times 10^{-6}$ |
| Nickel                | 377                      | 1.70                  | $3.0 \times 10^{-4}$      |
| Selenium              | <4.2                     | <0.019                | $<3.4 \times 10^{-6}$     |
| Zinc                  | 566                      | 2.59                  | $4.5 \times 10^{-4}$      |

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 <sub>2</sub> 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<sub>x</sub> control. Figure 2-1 shows a cross sectional view of the boiler and related ductwork.

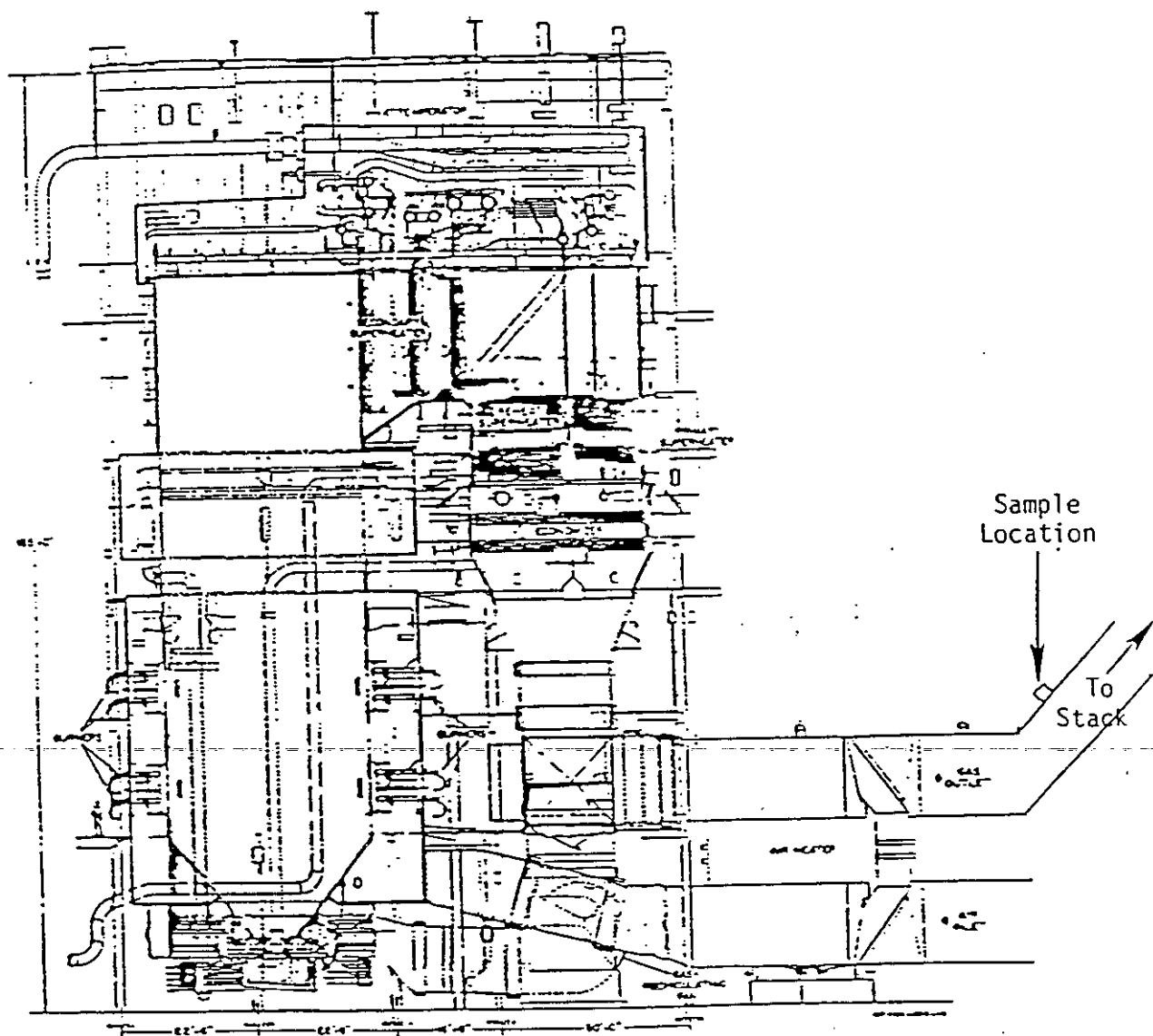


Figure 2-1. Alamos Unit 5 480 MW boiler, showing sample location.

## 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.

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 |              |              |            | -    | -           |

### 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.



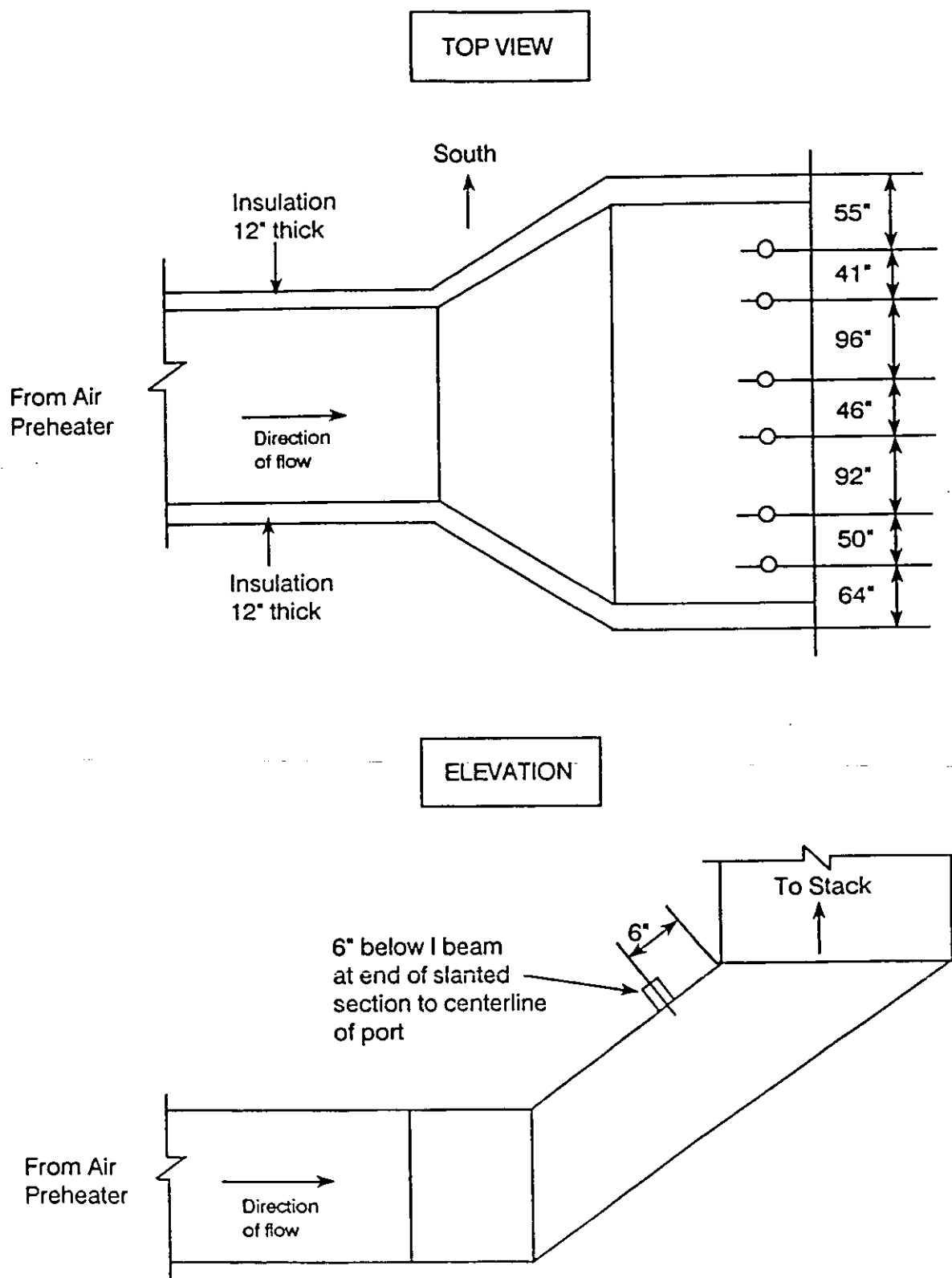


Figure 3-1. Sample Locations for Alamitos 5

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 µg/m <sup>3</sup>                           |
| PAH              | 3              | 189                     | 1 m <sup>3</sup> /hr | GC/MS                                                   | CARB 429                   | 10-100 ng/m <sup>3</sup> per species           |
| Chromium         | 3              | 126                     | 1 m <sup>3</sup> /hr | AA for total<br>Ion Chromatography for Cr <sup>6+</sup> | CARB 425                   | 1.3 µg/m <sup>3</sup><br>0.4 µg/m <sup>3</sup> |
| Metals           | 6**            | 126                     | 1 m <sup>3</sup> /hr | AA/ICP<br>(except Hg)                                   | EPA Draft<br>Metals Method | 0.4-4.2 µg/m <sup>3</sup>                      |
| 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 midjet 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 <sup>3</sup> per species                                                          |
| Analytical Lower Detection Limit   | 10-100 ng per species                                                                               |
| Sample Volumes                     | 2-3 m <sup>3</sup> (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 <sub>2</sub> O, 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<br>$\mu\text{g}/\text{m}^3$ |
|---------------------|--------------------------|---------------------|---------------------------------------------|
| Chromium            | CARB 425                 | Graphite Furnace AA | 1.3                                         |
| Hexavalent Chromium | CARB 425<br>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  $\text{KMnO}_4$  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, $\mu\text{g}/\text{train}$ | 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     | $3.9 \times 10^{-5}$      |

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                |                           |
| $\mu\text{g}/\text{m}^3$ | 4.03                      |
| lb/hr                    | 0.0185                    |
| lb/MMBtu                 | $3.26 \times 10^{-6}$     |

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

| Metal                 | $\mu\text{g}/\text{m}^3$ | lb/hr                 | lb/MMBtu                  |
|-----------------------|--------------------------|-----------------------|---------------------------|
| Arsenic               | 25.3                     | 0.12                  | $2.0 \times 10^{-5}$      |
| 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                 | $6.4 \times 10^{-6}$      |
| Chromium (hexavalent) | 3.7                      | 0.018                 | $3.0 \times 10^{-6}$      |
| Copper                | 14.8                     | 0.068                 | $1.2 \times 10^{-5}$      |
| Lead                  | 27.1                     | 0.12                  | $2.2 \times 10^{-5}$      |
| Manganese             | 32.7                     | 0.14                  | $2.6 \times 10^{-5}$      |
| Mercury               | ND <5.0                  | ND <0.022             | ND < $4.0 \times 10^{-6}$ |
| Nickel                | 377                      | 1.70                  | $3.0 \times 10^{-4}$      |
| Selenium              | <4.2                     | <0.019                | $<3.4 \times 10^{-6}$     |
| Zinc                  | 566                      | 2.59                  | $4.5 \times 10^{-4}$      |

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 <sup>-2**</sup> |
| lb/MMBtu | ND <8.3 x 10 <sup>-6</sup> | ND <1.1 x 10 <sup>-5</sup> | ND <1.2 x 10 <sup>-5</sup> | ND <1.1 x 10 <sup>-5</sup>   |

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 <sup>-5</sup> | 2.6 x 10 <sup>-5</sup> | 3.0 x 10 <sup>-5</sup> | 3.9 x 10 <sup>-5</sup> |

• 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, $\mu\text{g}/\text{dscm}$ | 4.03                  |
| Total PAH, $\text{lb}/\text{hr}$     | $1.85 \times 10^{-2}$ |
| Total PAH, $\text{lb}/\text{MMBtu}$  | $3.26 \times 10^{-6}$ |

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.

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 <sub>2</sub> 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 x 10 <sup>-6</sup> |

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 x 10 <sup>-6</sup> |

## 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  $3.9 \times 10^{-5}$  lb/MMBtu.

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                 |                          |                                         |                                         |
|                           | $\mu\text{g}/\text{m}^3$ | $\mu\text{g}/\text{m}^3$ | $\mu\text{g}/\text{m}^3$ | $\mu\text{g}/\text{m}^3$ | lb/hr                                   | lb/MMBtu                                |
| 1 Naphthalene             | 3.1                      | 2.0                      | 4.8                      | 3.29                     | $1.51 \times 10^{-2}$                   | $2.67 \times 10^{-6}$                   |
| 2 Acenaphthylene          | ND < .011                | ND < .008                | ND < .011                | ND < 0.01                | $\text{ND} < 4.63 \times 10^{-5}$       | $\text{ND} < 8.15 \times 10^{-9}$       |
| 3 Acenaphthene            | 1.02                     | 0.57                     | .12                      | 0.57                     | $2.60 \times 10^{-3}$                   | $4.55 \times 10^{-7}$                   |
| 4 Fluorene                | .044                     | .026                     | .025                     | 0.03                     | $1.45 \times 10^{-4}$                   | $2.55 \times 10^{-8}$                   |
| 5 Phenanthrene            | .040                     | .037                     | .015                     | 0.03                     | $1.40 \times 10^{-4}$                   | $2.45 \times 10^{-8}$                   |
| 6 Anthracene              | .013                     | ND < .008                | ND < .011                | 0.01                     | $4.96 \times 10^{-5}$                   | $8.73 \times 10^{-9}$                   |
| 7 Fluoranthene            | ND < .011                | .013                     | ND < .011                | < 0.01                   | $< 5.34 \times 10^{-5}$                 | $< 9.41 \times 10^{-9}$                 |
| 8 Pyrene                  | ND < .011                | .009                     | ND < .011                | < 0.01                   | $< 4.78 \times 10^{-5}$                 | $< 8.42 \times 10^{-9}$                 |
| 9 Benz(a)anthracene       | ND < .011                | ND < .009                | ND < .011                | ND < 0.01                | $\text{ND} < 4.63 \times 10^{-5}$       | $\text{ND} < 8.15 \times 10^{-9}$       |
| 10 Chrysene               | ND < .011                | ND < .008                | ND < .011                | ND < 0.01                | $\text{ND} < 4.63 \times 10^{-5}$       | $\text{ND} < 8.15 \times 10^{-9}$       |
| 11 Benzo(b+k)fluoranthene | ND < .011                | ND < .008                | ND < .011                | ND < 0.01                | $\text{ND} < 4.63 \times 10^{-5}$       | $\text{ND} < 8.15 \times 10^{-9}$       |
| 12 Benzo(a)pyrene         | ND < .011                | ND < .008                | ND < .011                | ND < 0.01                | $\text{ND} < 4.63 \times 10^{-5}$       | $\text{ND} < 8.15 \times 10^{-9}$       |
| 13 Indeno(1,2,3-cd)pyrene | ND < .011                | ND < .008                | ND < .011                | ND < 0.01                | $\text{ND} < 4.63 \times 10^{-5}$       | $\text{ND} < 8.15 \times 10^{-9}$       |
| 14 Dibenzo(a,h)anthracene | ND < .011                | ND < .008                | ND < .011                | ND < 0.01                | $\text{ND} < 4.63 \times 10^{-5}$       | $\text{ND} < 8.15 \times 10^{-9}$       |
| 15 Benzo(g,h,i)perylene   | ND < .011                | ND < .008                | ND < .011                | ND < 0.01                | $\text{ND} < 4.63 \times 10^{-5}$       | $\text{ND} < 8.15 \times 10^{-9}$       |
| <b>TOTAL PAH</b>          | <b>4.32</b>              | <b>2.73</b>              | <b>5.05</b>              | <b>4.03</b>              | <b><math>1.85 \times 10^{-2}</math></b> | <b><math>3.26 \times 10^{-6}</math></b> |

#### 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  $\text{KMnO}_4$  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 4-8  
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,<br>dscfm (stack) |                   |                   |                   |                   |                   |                   | 1,218,000         |                         |                            |
| O <sub>2</sub> , %          | 5.5               | 6.1               | 6.7               | 6.4               | 6.0               | 5.9               | 6.1               |                         |                            |
| Species                     | µg/m <sup>3</sup> | µg/m <sup>3</sup> | µg/m <sup>3</sup> | µg/m <sup>3</sup> | µg/m <sup>3</sup> | µg/m <sup>3</sup> | µg/m <sup>3</sup> | lb/hr                   | lb/MMBtu                   |
| Arsenic                     | 12.0              | <9.9              | 16.0              | <15.3             | 15.3              | 83.3              | 25.3              | 0.12                    | 2.0 x 10 <sup>-5</sup>     |
| Beryllium                   | <0.15             | <0.46             | <0.04             | <0.17             | <0.17             | <0.17             | <0.19             | <8.8 x 10 <sup>-4</sup> | <1.5 x 10 <sup>-7</sup>    |
| Cadmium                     | <2.1              | <1.8              | <3.1              | <1.2              | <1.4              | <0.8              | <1.8              | <7.9 x 10 <sup>-3</sup> | <1.4 x 10 <sup>-6</sup>    |
| Copper                      | 10.3              | 30.4              | 11.4              | 12.9              | 14.7              | 9.0               | 14.8              | 0.068                   | 1.2 x 10 <sup>-5</sup>     |
| Lead                        | 23.9              | 31.7              | 34.1              | 34.3              | 22.3              | 16.0              | 27.1              | 0.12                    | 2.2 x 10 <sup>-5</sup>     |
| Manganese                   | 81.1              | 19.2*             | 14.0              | 6.1*              | 17.2              | 58.3              | 32.7              | 0.14                    | 2.6 x 10 <sup>-5</sup>     |
| 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 x 10 <sup>-6</sup> |
| Nickel                      | 466               | 322               | 407               | 363               | 408               | 296               | 377               | 1.70                    | 3.0 x 10 <sup>-4</sup>     |
| Selenium                    | ND <2.7           | <2.4              | <11.4             | <3.3              | ND <2.0           | <3.5              | <4.2              | <0.019                  | <3.4 x 10 <sup>-6</sup>    |
| Zinc                        | 449               | 1,167             | 418               | 442               | 524               | 394               | 566               | 2.59                    | 4.5 x 10 <sup>-4</sup>     |

\* These samples include the filterable particulate fraction only - the impinger solutions were contaminated by KMnO<sub>4</sub>

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 <sub>2</sub> , %  | 6.20                   | 5.91                   | 6.21                   | 6.11                   |
| Chromium            |                        |                        |                        |                        |
| μg/m <sup>3</sup>   | 4.02                   | 3.16                   | 16.81                  | 8.0                    |
| lb/hr               | .0092*                 | .0068*                 | .040*                  | .038**                 |
| lb/MMBtu            | 3.2 x 10 <sup>-6</sup> | 2.5 x 10 <sup>-6</sup> | 1.4 x 10 <sup>-5</sup> | 6.4 x 10 <sup>-6</sup> |
| Hexavalent Chromium |                        |                        |                        |                        |
| μg/m <sup>3</sup>   | 0.98                   | 1.26                   | 8.94                   | 3.73                   |
| lb/hr               | .0022*                 | .0027*                 | .021*                  | .018**                 |
| lb/MMBtu            | 7.9 x 10 <sup>-7</sup> | 9.9 x 10 <sup>-7</sup> | 7.2 x 10 <sup>-6</sup> | 3.0 x 10 <sup>-6</sup> |

\* 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 <sub>2</sub> 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

---

|                                                      |       |
|------------------------------------------------------|-------|
| <u>Volume %</u>                                      |       |
| Methane                                              | 84.7  |
| Ethane                                               | 3.5   |
| Propane                                              | 0.7   |
| Butane                                               | 0.3   |
| CO <sub>2</sub>                                      | 1.2   |
| Nitrogen                                             | 5.2   |
| Oxygen                                               | 1.8   |
| Higher heating value, Btu/scf<br>at 60°F             | 947   |
| F factor, dscf/MMBtu @ 0% O <sub>2</sub><br>and 60°F | 8,449 |

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#### 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.

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

| Test     | Date | Time      | V <sub>m,td</sub> | Q <sub>td</sub> | O <sub>2</sub> | CO <sub>2</sub> | % 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            | —            |

APPENDIX A  
MEASUREMENT PROCEDURES

Oxygen (O<sub>2</sub>) by Continuous Analyzer  
Carbon Dioxide (CO<sub>2</sub>) by Continuous Analyzer  
Benzene by Gas Chromatography  
Semi-Volatile Organic Sampling Train Procedures  
Formaldehyde by HPLC

|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Method:                              | Oxygen (O <sub>2</sub> ) by Continuous Analyzer                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Applicable<br>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 <sub>2</sub> concentration.                                                                                                                                                                                                                                                                                                                     |
| Analyzer:                            | Teledyne Model 326A                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Measurement<br>Principle:            | Electrochemical cell                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Ranges:                              | 0-5, 0-10, 0-25% O <sub>2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 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<br>Time:                    | 90% <7 seconds                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Sampling<br>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<br>Procedure:             | An electrochemical cell is used to measure O <sub>2</sub> 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 <sub>2</sub> by volume. |
| Special<br>Calibration<br>Procedure: | The measurement cells used with the O <sub>2</sub> 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<sub>2</sub>) 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<sub>2</sub> 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

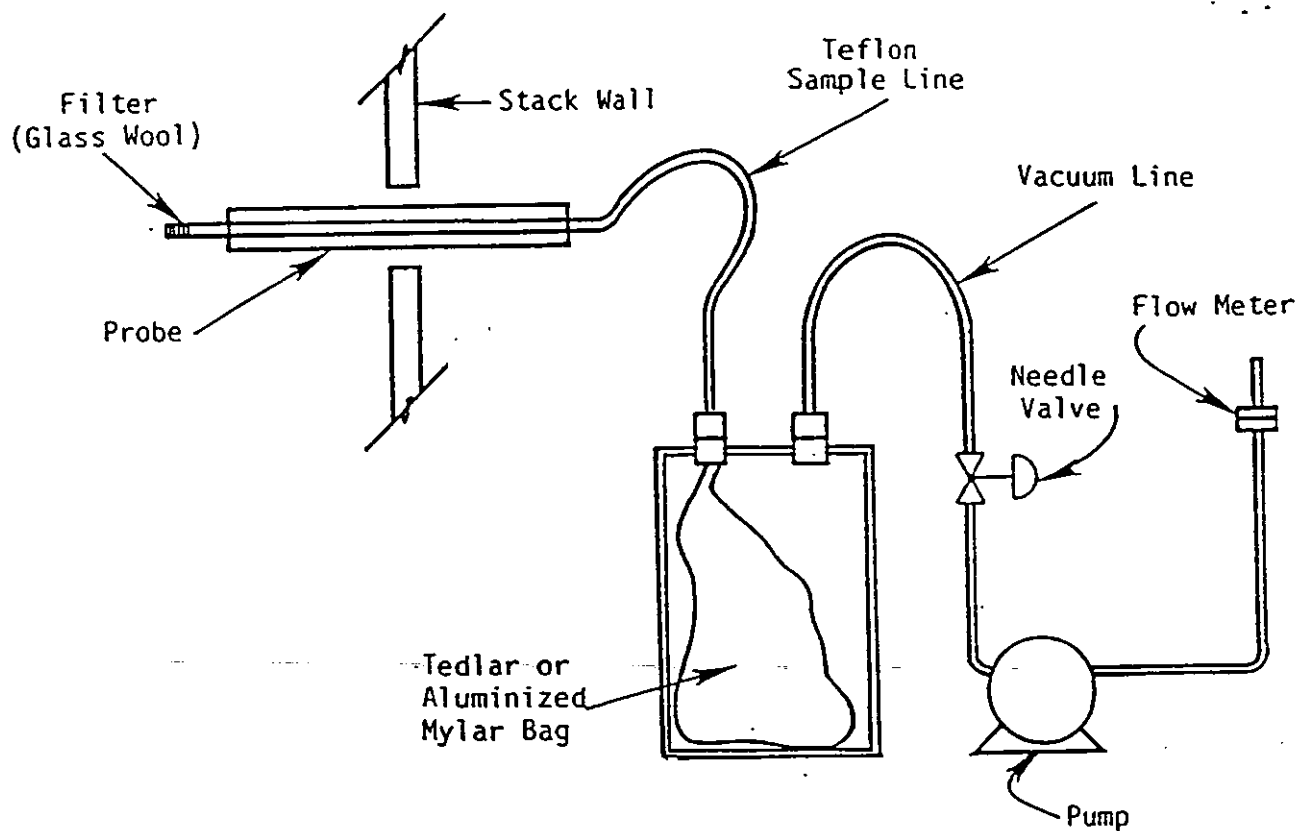
Reference: CARB Method 410, Modified EPA Method 601/602.

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.

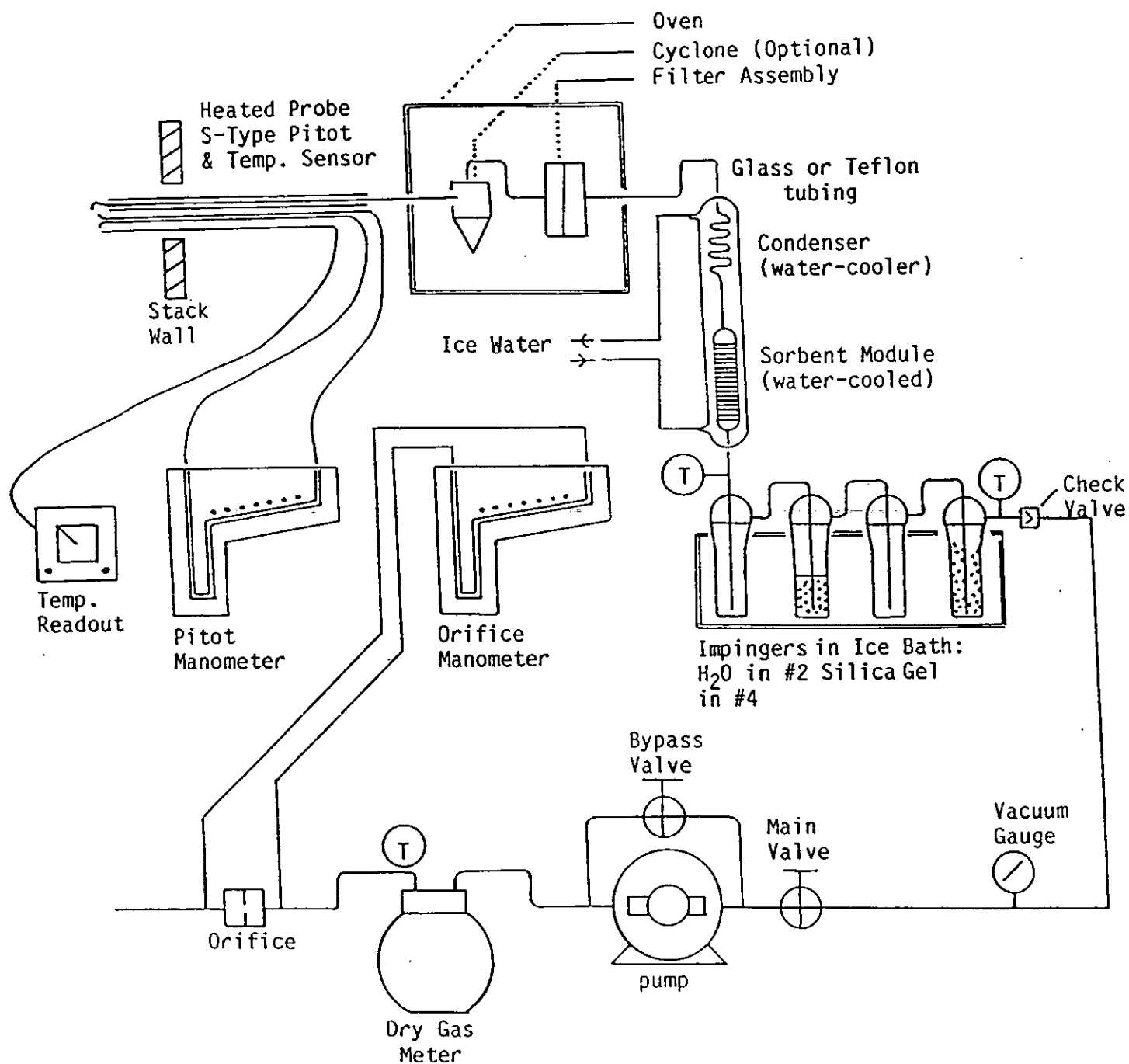
Sampling: The sample train is shown in the attached figure. Sample is pulled through the following components:

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<sub>2</sub>O
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 midjet 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.

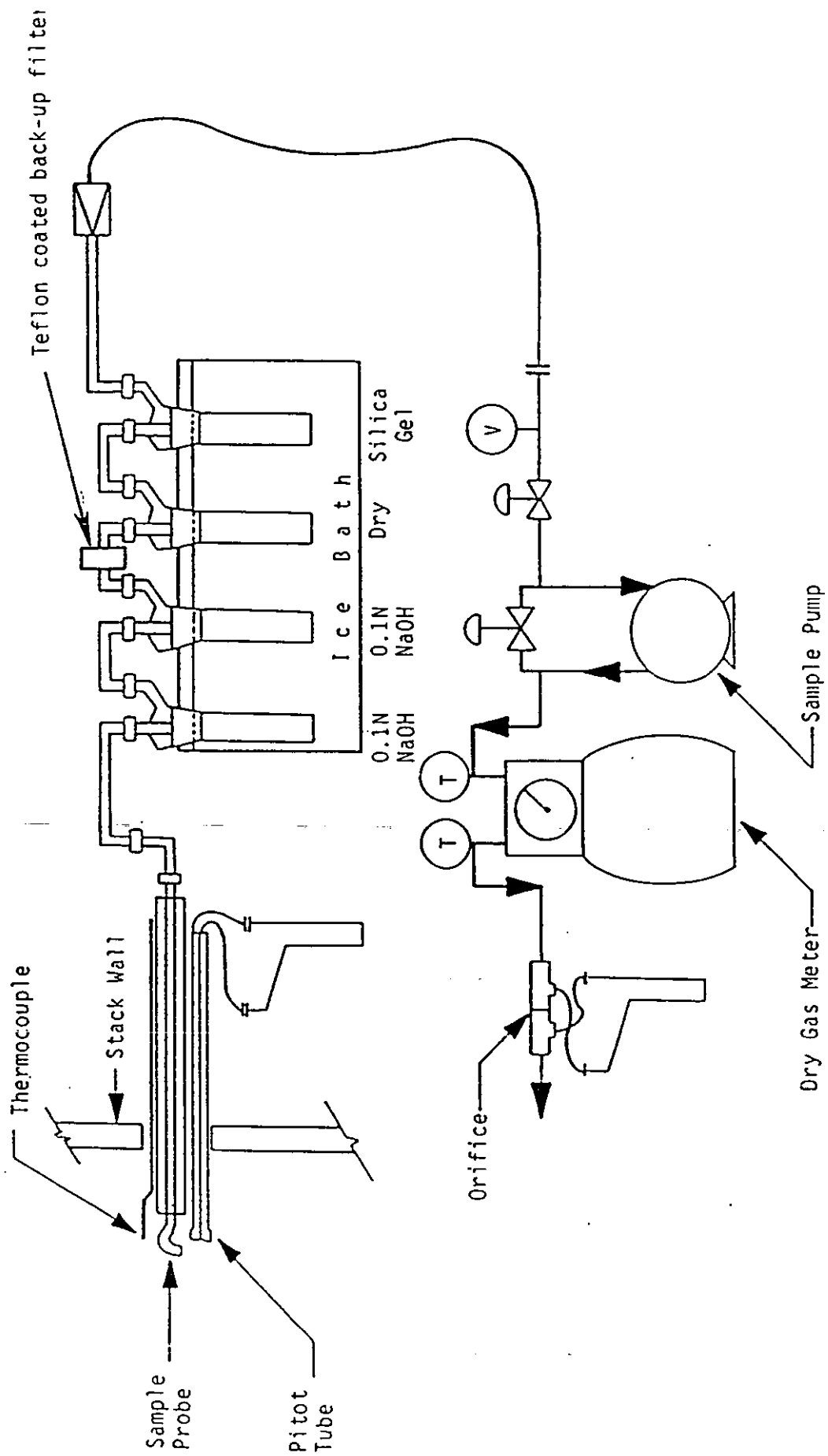
Sampling Procedure: The sample train used in the tests is shown in the following figure. The sample is drawn isokinetically through a glass nozzle and a glass probe, followed by two Smith-Greenburg impingers which each contain 100 ml of 0.1N sodium hydroxide solution, a teflon-coated back-up filter, 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

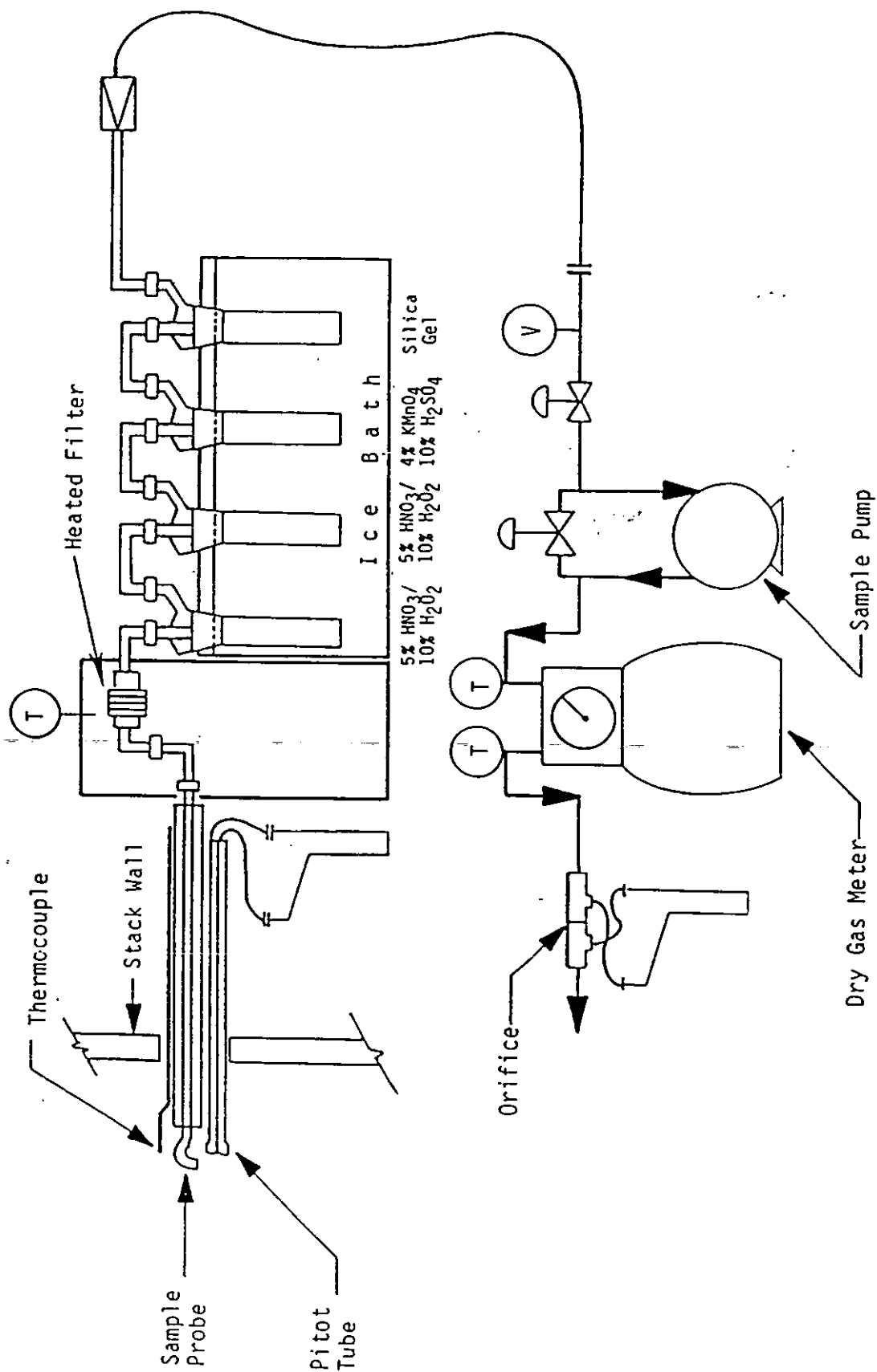
Half of each sample fraction is analyzed for hexavalent chromium by ion chromatography. The other half of the sample is composited and decomposed with nitric acid and hydrogen peroxide. The solution from the acidic decomposition is analyzed for total chromium by graphite furnace atomic absorption spectrophotometry. 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:           | <p>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% <math>\text{KMnO}_4</math>/10% <math>\text{H}_2\text{SO}_4</math> 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.</p> <p>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.</p>         |
| Sample Recovery and Analysis: | <p>Following testing, the impingers are weighed for moisture determination and the following sample fractions are recovered:</p> <ol style="list-style-type: none"> <li>1. Probe, nozzle, and front-half glassware - nitric acid/peroxide wash and brushing</li> <li>2. Filter</li> <li>3. Nitric acid containing impingers - nitric acid/peroxide wash</li> <li>4. Permanganate containing impinger - wash with 4% <math>\text{KMnO}_4</math>/10% <math>\text{H}_2\text{SO}_4</math></li> </ol> <p>The probe wash, filter and the nitric acid/peroxide impinger catch is decomposed using a nitric acid/hydrofluoric acid Parr bomb digestion.</p> <p>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.</p> <p>The permanganate impinger catch is decomposed with nitric acid and analyzed for mercury by cold vapor atomic absorption spectrophotometry.</p> <p>Analyses of reagent blanks, spikes and duplicates are performed for each metal species.</p> |



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                                                           | $\pm 2\%$ of volume measured                                                                                      |
| Dry Gas Meter                                       | 12 months or when repaired                 | Calibrated dry test meter                                                           | $\pm 2\%$ of volume measured                                                                                      |
| S-Type Pitot (for use with EPA type sampling train) | 6 months                                   | EPA Method 2                                                                        | Cp constant ( $+5\%$ ) over working range.<br>Difference between the average Cp for each leg must be less than 2% |
| Vacuum Gauges<br>Pressure Gauges                    | 6 months                                   | Manometer                                                                           | $\pm 3\%$                                                                                                         |
| Field Barometer                                     | 6 months                                   | Mercury barometer                                                                   | $\pm 0.2"$ Hg                                                                                                     |
| Temperature Measurement                             | 6 months                                   | NBS mercury thermometer or<br>NBS calibrated platinum RTD                           | $\pm 4$ F for $<400^{\circ}\text{F}$<br>$\pm 1.5\%$ for $>400^{\circ}\text{F}$                                    |
| Temperature Readout Devices                         | 6 months                                   | Precision potentiometer                                                             | $\pm 2\%$ full scale reading                                                                                      |
| Analytical Balance                                  | 12 months (checked prior to each use)      | Should be performed by manufacturer or qualified laboratory                         | $\pm 0.3$ mg of stated weight                                                                                     |
| Probe Nozzles                                       | 12 months                                  | Nozzle diameter check micrometer                                                    | Range $< \pm 0.10$ 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                       | <ol style="list-style-type: none"> <li>1. Absence of leaks</li> <li>2. Ability to draw mfr required vacuum and flow</li> </ol> | Every 500 hrs of operation or 6 months whichever is less                                                                                             | <ol style="list-style-type: none"> <li>1. Visual insp.</li> <li>2. Clean</li> <li>3. Replace worn parts</li> <li>4. Leak check</li> </ol>                          |
| Flow Measuring Device       | <ol style="list-style-type: none"> <li>1. Free mechanical movement</li> <li>2. Absence of malfunction</li> </ol>               | Every 500 hrs of operation or 6 months whichever is less<br><br>After each test, if used in H <sub>2</sub> S sampling or other corrosive atmospheres | <ol style="list-style-type: none"> <li>1. Visual insp.</li> <li>2. Clean</li> <li>3. Calibrate</li> </ol>                                                          |
| Sampling Instruments        | <ol style="list-style-type: none"> <li>1. Absence of malfunction</li> <li>2. Proper response to zero, span gas</li> </ol>      | As required by manufacturer                                                                                                                          | As recommended by manufacturer                                                                                                                                     |
| Integrated Sampling Tanks   | Absence of leaks                                                                                                               | - Depends on nature of use                                                                                                                           | <ol style="list-style-type: none"> <li>1. Steam clean</li> <li>2. Leak check</li> </ol>                                                                            |
| Mobile Van Sampling Systems | Absence of leaks                                                                                                               | Depends on nature of use                                                                                                                             | <ol style="list-style-type: none"> <li>1. Change filters</li> <li>2. Change gas dryer</li> <li>3. Leak check</li> <li>4. Check for system contamination</li> </ol> |
| Sampling Lines              | Sample degradation less than two percent                                                                                       | After each test or test series                                                                                                                       | Blow filtered air thru line until dry                                                                                                                              |



## 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 correspondence should be addressed to me at the post office box above.

Sincerely,

A handwritten signature in dark ink, appearing to read "J. Morgester", written over a horizontal line.

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

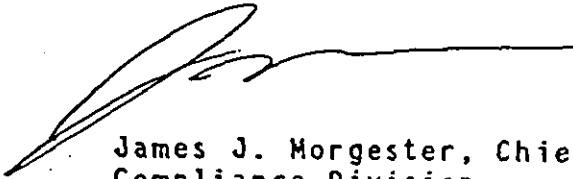
WHEREAS, the Air Resources Board ("Board"), pursuant to Section 41512 of the California Health and Safety Code, has established the procedures contained in Section 91200-91220, Title 17, California Code of Regulations, to allow the use of independent testers for compliance tests required by the Board; 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 19<sup>TH</sup> 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 DATA ENTRY BY JJM  
 DATE 03/21/90 BAROMETRIC PRESSURE 30.08  
 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<br>cu.ft. | TEMP.<br>IN | TEMP<br>OUT | DELTA<br>"H2O | TIME<br>min. | VOLUM<br>cu.ft | TEMP.<br>'F | Q<br>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. MulliganTest Meter ID ES-13Date 3/21/90Test Meter Y (Y<sub>i</sub>) 1.00Field Meter ID ES-8Test Meter Last Cal 12-14-89Barometric Press 20.08Test Program Preceding Calibration Check SCC / A/AmigosAverage  $\Delta H$  from Test Runs \_\_\_\_\_

Maximum Vacuum from Test Runs \_\_\_\_\_

| Field Meter |              |                |                           |                         |                          |        | Test Meter |              |                |                           |             |        |
|-------------|--------------|----------------|---------------------------|-------------------------|--------------------------|--------|------------|--------------|----------------|---------------------------|-------------|--------|
| $\Delta H$  | Final Volume | Initial Volume | Volume (V <sub>dg</sub> ) | Temperature             |                          | Vacuum | Time (0)   | Final Volume | Initial Volume | Volume (V <sub>tm</sub> ) | Temperature |        |
|             |              |                |                           | Inlet (t <sub>i</sub> ) | Outlet (t <sub>o</sub> ) |        |            |              |                |                           | Inlet       | Outlet |
| 1.5         | 597.287      | 530.045        | 7.242                     | 95                      | 84                       | 2      | 10.00      | 347.644      | 340.784        | 6.85                      | 68          | 65     |
|             |              |                |                           | 103                     | 88                       |        |            |              |                |                           | 64          | 68     |
| 1.5         | 604.481      | 597.287        | 7.194                     | 101                     | 89                       | 2      | 10.00      | 354.431      | 347.644        | 6.787                     | 68          | 65     |
|             |              |                |                           | 103                     | 91                       |        |            |              |                |                           | 68          | 68     |
| 1.5         | 611.654      | 604.481        | 7.203                     | 101                     | 91                       | 2      | 10.00      | 361.208      | 354.431        | 6.774                     | 68          | 65     |
|             |              |                |                           | 110                     | 92                       |        |            |              |                |                           | 68          | 66     |

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 Hg 1.920 TEST METER LAST CAL. 12/89

| FIELD METER      |             |             |               | TEST METER   |                |             | RESULTS  |       |      |
|------------------|-------------|-------------|---------------|--------------|----------------|-------------|----------|-------|------|
| VOLUME<br>cu.ft. | TEMP.<br>IN | TEMP<br>OUT | DELTA<br>"H2O | TIME<br>min. | VOLUM<br>cu.ft | TEMP.<br>'F | Q<br>cfm | Y     | Hg   |
| 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 Hg VALUES ACCEPTABLE  
 PASS - POST TEST Yd WITHIN LIMITS

# E/A

## POST TEST DRY GAS METER CALIBRATION DATA

Calibrated By L. Mull, SA-14

Test Meter ID ES-13

Date 3/11/80

Test Meter Y (Y<sub>t</sub>) 1.00

Field Meter ID ES-8

Test Meter Last Cal 12/14/89

Barometric Press 30.00

Test Program Preceding Calibration Check \_\_\_\_\_

Average  $\Delta H$  from Test Runs \_\_\_\_\_

Maximum Vacuum from Test Runs \_\_\_\_\_

| Field Meter |              |                |                           |                         |                          |        | Test Meter |              |                |                           |             |        |
|-------------|--------------|----------------|---------------------------|-------------------------|--------------------------|--------|------------|--------------|----------------|---------------------------|-------------|--------|
| $\Delta H$  | Final Volume | Initial Volume | Volume (V <sub>dg</sub> ) | Temperature             |                          | Vacuum | Time (t)   | Final Volume | Initial Volume | Volume (V <sub>cm</sub> ) | Temperature |        |
|             |              |                |                           | Inlet (t <sub>i</sub> ) | Outlet (t <sub>o</sub> ) |        |            |              |                |                           | Inlet       | Outlet |
| 1.0         | 140.153      | 134.465        | 5.688                     | 75                      | 61                       | 2      | 10:00      | 284.257      | 278.791        | 5.466                     | 58          | 55     |
|             |              |                |                           | 83                      | 64                       |        |            |              |                |                           | 58          | 55     |
| 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      | 289.703        | 5.424                     | 58          | 58     |
|             |              |                |                           | 92                      | 73                       |        |            |              |                |                           | 58          | 58     |

# 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<br>anometer<br>setting,<br>$\Delta H$<br>in. H <sub>2</sub> O | Gas volume<br>wet test<br>meter<br>$V_w$ ,<br>ft <sup>3</sup> | Gas volume<br>dry gas<br>meter<br>$V_d$ ,<br>ft <sup>3</sup> | Temperature            |                           |                            |                          | Time<br>$\theta$ ,<br>min | $\gamma$ | $\Delta H_g$ |
|-----------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------|------------------------|---------------------------|----------------------------|--------------------------|---------------------------|----------|--------------|
|                                                                       |                                                               |                                                              | Wet test               | Dry gas meter             |                            |                          |                           |          |              |
|                                                                       |                                                               |                                                              | Meter<br>$t_w$ ,<br>°R | Inlet<br>$t_{di}$ ,<br>°R | Outlet<br>$t_{do}$ ,<br>°R | Average<br>$t_d$ ,<br>°R |                           |          |              |
| 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

| $\Delta H$ | $\frac{\Delta H}{13.6}$ | $\gamma$                                                                     | $\Delta H_q$                                                                  |
|------------|-------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|            |                         | $\frac{V_w P_b (t_d)}{V_d \left( P_b + \frac{\Delta H}{13.6} \right) (t_w)}$ | $\frac{0.0317 \Delta H}{P_b (t_d)} \left[ \frac{(t_w) \theta}{V_w} \right]^2$ |
| 1.0        | 0.0735                  |                                                                              |                                                                               |
| 2.0        | 0.147                   |                                                                              |                                                                               |
| 4.0        | 0.294                   |                                                                              |                                                                               |

$\gamma$  = Ratio of accuracy of wet test meter to dry test meter. Tolerance =  $\pm 0.01$

$\Delta H_q$  = Orifice pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H<sub>2</sub>O. Tolerance =  $\pm 0.15$

Calibrated by: MDC



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<br>cu.ft. | TEMP.<br>IN | TEMP<br>OUT | DELTA<br>"H2O | TIME<br>min. | VOLUM<br>cu.ft | TEMP.<br>'F | Q<br>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 Test Meter ID ES-13  
 Date 3-18-90 Test Meter Y (Y<sub>i</sub>) \_\_\_\_\_  
 Field Meter ID ES-19 Test Meter Last Cal \_\_\_\_\_  
 Barometric Press 30.13

Test Program Preceding Calibration Check SCE / ALAMITOS  
 Average  $\Delta H$  from Test Runs .25  
 Maximum Vacuum from Test Runs 15

| Field Meter |              |                |                     |                 |                  |        |          | Test Meter         |                |                     |                |          |
|-------------|--------------|----------------|---------------------|-----------------|------------------|--------|----------|--------------------|----------------|---------------------|----------------|----------|
| $\Delta H$  | Final Volume | Initial Volume | Volume ( $V_{dg}$ ) | Temperature     |                  | Vacuum | Time (t) | Final Volume       | Initial Volume | Volume ( $V_{tm}$ ) | Temperature    |          |
|             |              |                |                     | Inlet ( $t_i$ ) | Outlet ( $t_o$ ) |        |          |                    |                |                     | Inlet          | Outlet   |
| .25         | 319.187      | 316.063        |                     | 70/82<br>87/    | 68/69<br>70/     | 15     | 10       | 325.537<br>322.499 |                |                     | 64/64<br>64/64 |          |
| .25         | 322.011      | 319.187        |                     | 87/91<br>94     | 72/72<br>74      | 15     | 9<br>10  | 328.243<br>325.532 |                |                     | 64<br>64       | 65<br>65 |
| .25         | 325.151      | 322.011        |                     | 84/91<br>96/    | 74/75<br>77/     | 15     | 10       | 331.716<br>328.243 |                |                     | 64<br>65       | 65<br>65 |

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-19 TEST METER ES-13  
 INITIAL Yd 1.000 TEST METER Y (Yt) 1.000  
 INITIAL Hg 1.830 TEST METER LAST CAL. 12/89

| FIELD METER      |             |             |               |              | TEST METER      |             | RESULTS  |       |      |
|------------------|-------------|-------------|---------------|--------------|-----------------|-------------|----------|-------|------|
| VOLUME<br>cu.ft. | TEMP.<br>IN | TEMP<br>OUT | DELTA<br>"H2O | TIME<br>min. | VOLUM<br>cu.ft. | TEMP.<br>'F | Q<br>cfm | Y     | Hg   |
| 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 Hg VALUES ACCEPTABLE  
 PASS - POST TEST Yd WITHIN LIMITS

# E/A

## POST TEST DRY GAS METER CALIBRATION DATA

 Calibrated By J. McVittie

 Test Meter ID ES-13

 Date 3/11/90

 Test Meter Y (Y<sub>t</sub>) 1.00

 Field Meter ID ES-19

 Test Meter Last Cal 12/14/89

 Barometric Press 30.60

Test Program Preceding Calibration Check \_\_\_\_\_

 Average  $\Delta H$  from Test Runs \_\_\_\_\_

Maximum Vacuum from Test Runs \_\_\_\_\_

| Field Meter |              |                |                           |                         |                          |        | Test Meter |              |                |                           |             |        |
|-------------|--------------|----------------|---------------------------|-------------------------|--------------------------|--------|------------|--------------|----------------|---------------------------|-------------|--------|
| $\Delta H$  | Final Volume | Initial Volume | Volume (V <sub>dg</sub> ) | Temperature             |                          | Vacuum | Time (t)   | Final Volume | Initial Volume | Volume (V <sub>tm</sub> ) | Temperature |        |
|             |              |                |                           | Inlet (t <sub>i</sub> ) | Outlet (t <sub>o</sub> ) |        |            |              |                |                           | Inlet       | Outlet |
| 1.0         | 908.732      | 902.845        | 5.887                     | 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      | 10.80      | 313.951      | 307.232        | 5.865                     | 58          | 58     |
|             |              |                |                           | 90                      | 68                       |        |            |              |                |                           | 58          | 58     |
| 1.0         | 920.650      | 914.653        | 5.997                     | 85                      | 78                       | 2      | 16.00      | 318.802      | 313.057        | 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-19)

Barometric pressure,  $P_b = 29.98$  in Hg.

Model Number 90-800

| Orifice<br>nanometer<br>setting,<br>$\Delta H$<br>in. H <sub>2</sub> O | Gas volume,<br>wet test<br>meter<br>$V_w$ ,<br>ft <sup>3</sup> | Gas volume,<br>dry gas<br>meter<br>$V_d$ ,<br>ft <sup>3</sup> | Temperature                        |                           |                            |                          | Time<br>$\theta$ ,<br>min | $\gamma$ | $\Delta H_g$ |
|------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------|------------------------------------|---------------------------|----------------------------|--------------------------|---------------------------|----------|--------------|
|                                                                        |                                                                |                                                               | Wet test<br>Meter<br>$t_w$ ,<br>°R | Dry gas meter             |                            |                          |                           |          |              |
|                                                                        |                                                                |                                                               |                                    | Inlet<br>$t_{di}$ ,<br>°R | Outlet<br>$t_{do}$ ,<br>°R | Average<br>$t_d$ ,<br>°R |                           |          |              |
| 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

| $\Delta H$ | $\frac{\Delta H}{13.6}$ | $\gamma$                                                                     |  | $\Delta H_g$                                                                     |  |
|------------|-------------------------|------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------|--|
|            |                         | $\frac{V_w P_b (t_d)}{V_d \left( P_b + \frac{\Delta H}{13.6} \right) (t_w)}$ |  | $\frac{0.0317 \Delta H}{P_b (t_{do})} \left[ \frac{(t_w) \theta}{V_w} \right]^2$ |  |
| 1.0        | 0.0735                  |                                                                              |  |                                                                                  |  |
| 2.0        | 0.147                   |                                                                              |  |                                                                                  |  |
| 4.0        | 0.294                   |                                                                              |  |                                                                                  |  |

$\gamma$  = Ratio of accuracy of wet test meter to dry test meter. Tolerance :  $\pm 0.01$

$\Delta H_g$  = Orifice pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H<sub>2</sub>O. Tolerance :  $\pm 0.15$

Calibrated by: PAC

## **APPENDIX C**

### **DATA SHEETS, LABORATORY REPORTS, AND SPECIFIC EMISSIONS CALCULATIONS**

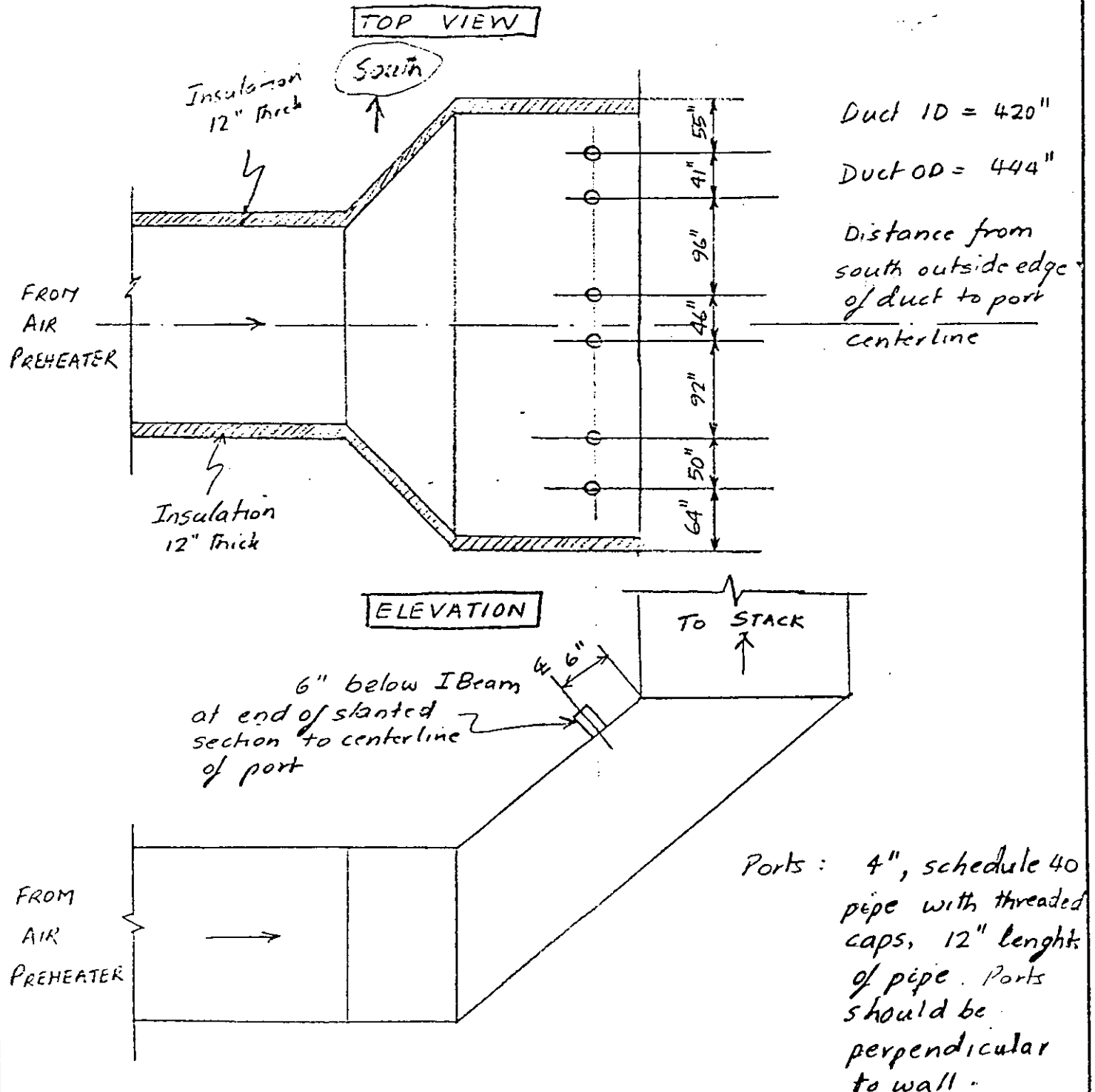
**Appendix C.1**  
**Sample Location**



FIGURE NO. ALAHITOS 5 NORTH AND SOUTH JOB NO. \_\_\_\_\_  
DUCT AIR PREHEATER OUTLET DUCT TEST LOCATIONS

SHEET NO. 1 of 1

DRAWN BY VR DATE 01-29-30 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_





## **Appendix C.2**

### **Unit Data**

\* Check with End re.  
fuel flow.

CONTROL ROOM DATA  
ALAMITOS UNITS 5 & 6

Page 1/4

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     | 0405    | 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        | 9        | 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             | "H <sub>2</sub> O   |                   | 28       | 29       | 31      | 31      | 31      | 31      |
| Furnace Pressure             | "H <sub>2</sub> O   |                   | 9.5      | 10       | 8.5     | 8       | 6       | 5       |
| Wb/Furn Differential         | "H <sub>2</sub> O   |                   | 18.5     | 19       | 22.5    | 23      | 25      | 26      |
| A.H. Diff.                   | N                   | "H <sub>2</sub> O | 5.0      | 5.1      | 5.5     | 5.5     | 5.2     | 5.0     |
| A.H. Diff.                   | S                   | "H <sub>2</sub> O | 3.8      | 3.9      | 3.3     | 3.3     | 3.8     | 4.1     |
| Econ. Diff. SH               | N                   | "H <sub>2</sub> O | 3.8      | 4.0      | 3.7     | 3.6     | 3.5     | 3.5     |
| Econ. Diff. RH               | S                   | "H <sub>2</sub> O | 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 <sup>4</sup> /hr |                   | 335      | 337      | 340     | 335     | 335     | 340     |
| Feedwater Flow               | 10 <sup>4</sup> /hr |                   | 325      | 330      | 340     | 335     | 325     | 330     |
| Steam Pressure               | psig                |                   | 3485     | 3487     | 3487    | 3488    | 3489    | 3486    |
| Total Fuel Flow              | %                   |                   | 77       | 78       | 79      | 78      | 77      | 79      |

RP. Pg 9  
INTER

Fuel  
GAS  
supply

WALL  
ABOVE  
DESK

V. X

chart

→

CONTROL ROOM DATA  
ALAMITOS UNITS 5 & 6

Page 2/4

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 <sub>2</sub> Adjuster | %  |        | 86    | 86    | 90    | 90    | 90    | 90    |
| O <sub>2</sub> 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     |

Line

MCS

[illegible]

Data By: M. ESPARCEGA

1179  
WALL  
UP  
INSOLE  
ON

CONTROL ROOM DATA  
ALAMITOS UNITS 5 & 6

Program TOXIC HOT SPOTSData By: M. ESARCEA

| 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    |         |         |         |         |
| O2                           | N                   | %                 | 3.7      | 3.7     | 3.3     | 3.3     | 3.4     | 3.4     |
| O2                           | S                   | %                 | 4.2      | 4.2     | 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 <sub>2</sub> O   |                   | 31       | 31      | 29      | 28      | 29      | 29      |
| Furnace Pressure             | "H <sub>2</sub> O   |                   | 11       | 10      | 2       | 3       | 2       | 3       |
| Wb/Furn Differential         | "H <sub>2</sub> O   |                   | 20       | 21      | 21      | 25      | 27      | 26      |
| A.H. Diff.                   | N                   | "H <sub>2</sub> O | 5.0      | 5.0     | 5.2     | 5.1     | 5.0     | 5.0     |
| A.H. Diff.                   | S                   | "H <sub>2</sub> O | 3.9      | 3.8     | 3.3     | 3.1     | 3.1     | 3.8     |
| Econ. Diff. SH               | N                   | "H <sub>2</sub> O | 3.6      | 3.5     | 3.8     | 3.5     | 3.5     | 3.5     |
| Econ. Diff. RH               | S                   | "H <sub>2</sub> O | 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 <sup>4</sup> /hr |                   | 340      | 340     | 335     | 335     | 335     | 335     |
| Feedwater Flow               | 10 <sup>4</sup> /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      |
|                              |                     |                   |          |         |         |         |         |         |
|                              |                     |                   |          |         |         |         |         |         |
|                              |                     |                   |          |         |         |         |         |         |
|                              |                     |                   |          |         |         |         |         |         |

EER - Blair Johnson (714) 859-8851 C.R. 493-7800

CONTROL ROOM DATA  
ALAMITOS UNITS 5 & 6

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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. Dwnmr         | °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 <sub>2</sub> Adjuster | %        | 90               | 90               | 86               | 87               | 87               | 87               |
| O <sub>2</sub> Bias     | %        | 0                | 0                | 0                | 0                | 0                | 0                |
| RH/SH Prop. Dampers     | %        | 52/90            | 50/88            | 60/18            | 60/19            | 60/19            | 60/19            |
| 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               | 12               | +2               |
| S.H. Temperature        | %        | 100 <sup>+</sup> | 100 <sup>+</sup> | 100 <sup>+</sup> | 100 <sup>+</sup> | 100 <sup>+</sup> | 100 <sup>+</sup> |
| 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                |

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01

[illegible]

CONTROL ROOM DATA  
ALAMITOS UNITS 5 & 6

493-7805

Program Toxic Hot SpotsData By: BTR/MESARCEGA

| 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    |         |         |         |
| O2                           | N | %   | 3.5                 | 3.7     | 3.6     | 3.6     | 3.6     | 3.6     |
| O2                           | 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      |
| Gas Burner Press             |   |     | psig                | 0       | 0       | 0       | 0       | 0       |
| Windbox Pressure             |   |     | "H <sub>2</sub> O   | 30      | 30      | 30.5    | 30      | 30      |
| Furnace Pressure             |   |     | "H <sub>2</sub> O   | 1       | 2       | 3       | 2       | 2       |
| Wb/Furn Differential         |   |     | "H <sub>2</sub> O   | 29      | 28      | 27      | 27.5    | 28      |
| A.H. Diff.                   |   |     | N "H <sub>2</sub> O | 4.9     | 5.2     | 5.0     | 5.1     | 5.0     |
| A.H. Diff.                   |   |     | S "H <sub>2</sub> O | 3.9     | 3.4     | 3.5     | 3.9     | 3.9     |
| Econ. Diff. SH               |   |     | E "H <sub>2</sub> O | 3.5     | 4.0     | 3.8     | 3.7     | 3.8     |
| Econ. Diff. RH               |   |     | W "H <sub>2</sub> O | 4.2     | 4.7     | 4.6     | 4.5     | 4.5     |
| Gas Flow                     |   |     | MCFH                | 0       | 0       | 0       | 0       | 0       |
| Aux. Steam Flow              |   |     | klb/hr              | 27      | 30      | 17      | 13      | 20      |
| Steam Flow                   |   |     | 10 <sup>4</sup> /hr | 335     | 340     | 340     | 340     | 340     |
| Feedwater Flow               |   |     | 10 <sup>4</sup> /hr | 332     | 335     | 335     | 335     | 335     |
| Steam Pressure               |   |     | psig                | 3485    | 3485    | 3482    | 3480    | 3482    |
| Total Fuel Flow              |   |     | %                   | 80      | 80      | 79      | 79      | 80      |
|                              |   |     |                     |         |         |         |         |         |
|                              |   |     |                     |         |         |         |         |         |
|                              |   |     |                     |         |         |         |         |         |
|                              |   |     |                     |         |         |         |         |         |

CONTROL ROOM DATA  
ALAMITOS UNITS 5 & 6

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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       | 935   | 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 <sub>2</sub> Adjuster | %        | 86    | 89    | 89    | 89    | 89    | 89    |
| O <sub>2</sub> 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     |

[illegible]

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[illegible]

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.               | 3 <sup>rd</sup> EL  |                   | 6 N 5 S |         |
| NOx Ports                    |                     |                   | CLOSED  | →       |
| O <sub>2</sub> Level         |                     |                   | AF      | →       |
| Gas Recirculation to Windbox |                     |                   | YES     | →       |
| Gas Recirculation to Hopper  |                     |                   | NO      | →       |
| Registers                    |                     |                   | OPEN    | →       |
| O <sub>2</sub>               | N                   | %                 | 1.8     | 1.8     |
| O <sub>2</sub>               | S                   | %                 | 1.5     | 1.7     |
| 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 <sub>2</sub> O | 30      | 29.2    |
| Furnace Pressure             |                     | "H <sub>2</sub> O | 1-      | -       |
| Wb/Furn Differential         |                     | "H <sub>2</sub> O | 29-     | -       |
| A.H. Diff.                   | N                   | "H <sub>2</sub> O | 4.9     | 4.8     |
| A.H. Diff.                   | S                   | "H <sub>2</sub> O | 3.2     | 3.3     |
| Econ. Diff. SH               | E                   | "H <sub>2</sub> O | 3.1     | 3.1     |
| Econ. Diff. RH               | W                   | "H <sub>2</sub> O | 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 <sup>4</sup> /hr |                   | 340     | 340     |
| Feedwater Flow               | 10 <sup>4</sup> /hr |                   | 330     | 330     |
| Steam Pressure               |                     | psig              | 348.4   | 348.5   |
| Total Fuel Flow              |                     | %                 | 79      | 80      |

CONTROL ROOM DATA  
ALAMITOS UNITS 5 & 6

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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 <sub>2</sub> Adjuster               | %  |        | 770   | 770   |  |  |  |  |
| O <sub>2</sub> 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     |  |  |  |  |

Data By: M. ESCAFREGA

[illegible]



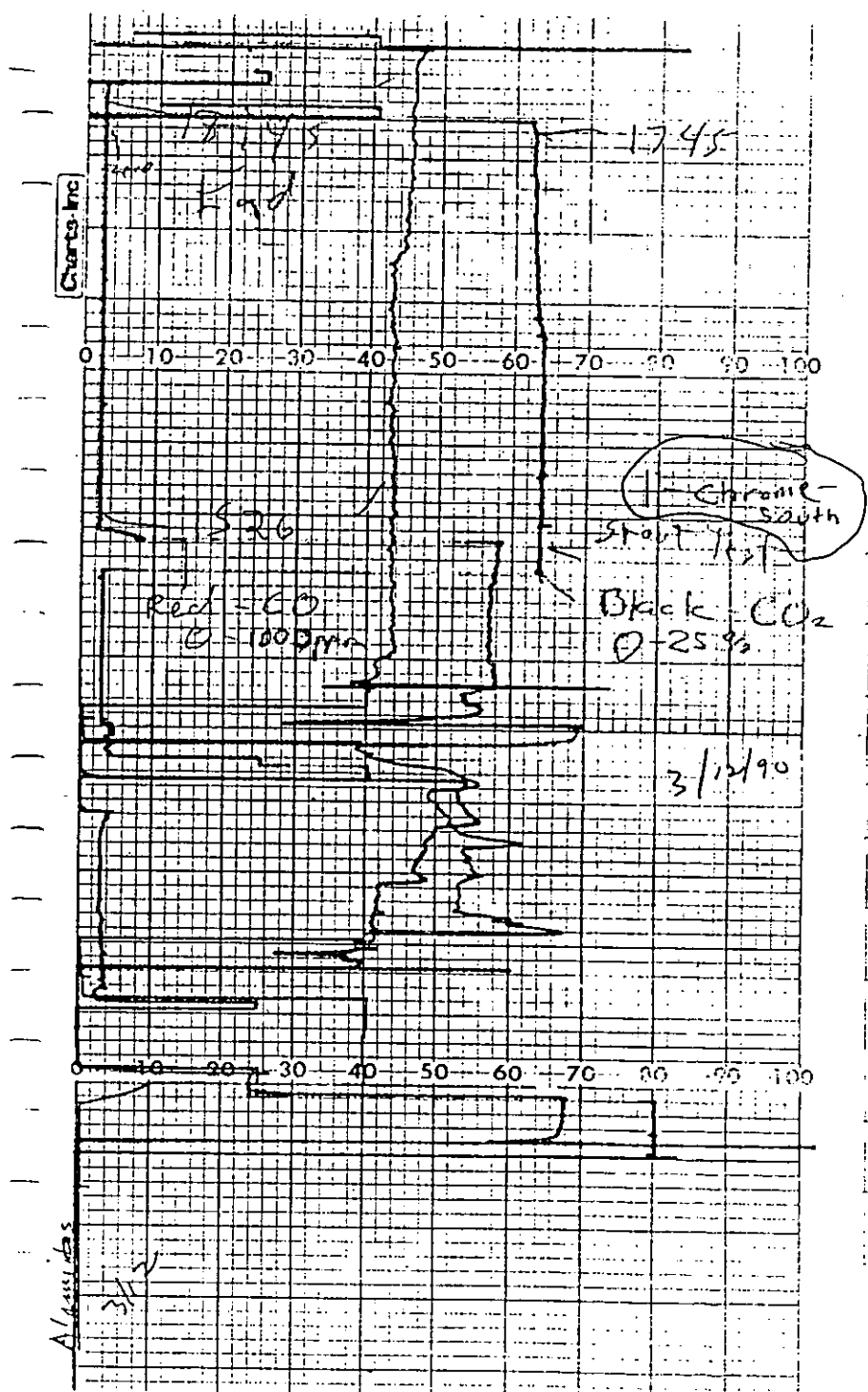
## Page 4/4

[illegible]

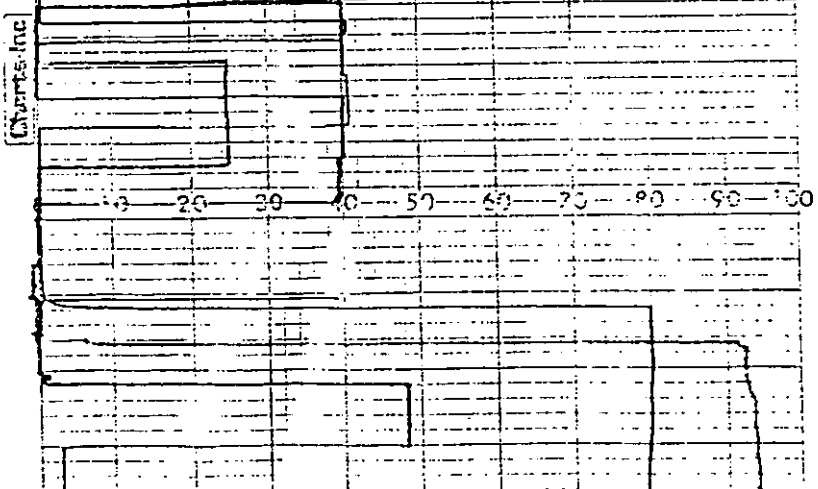
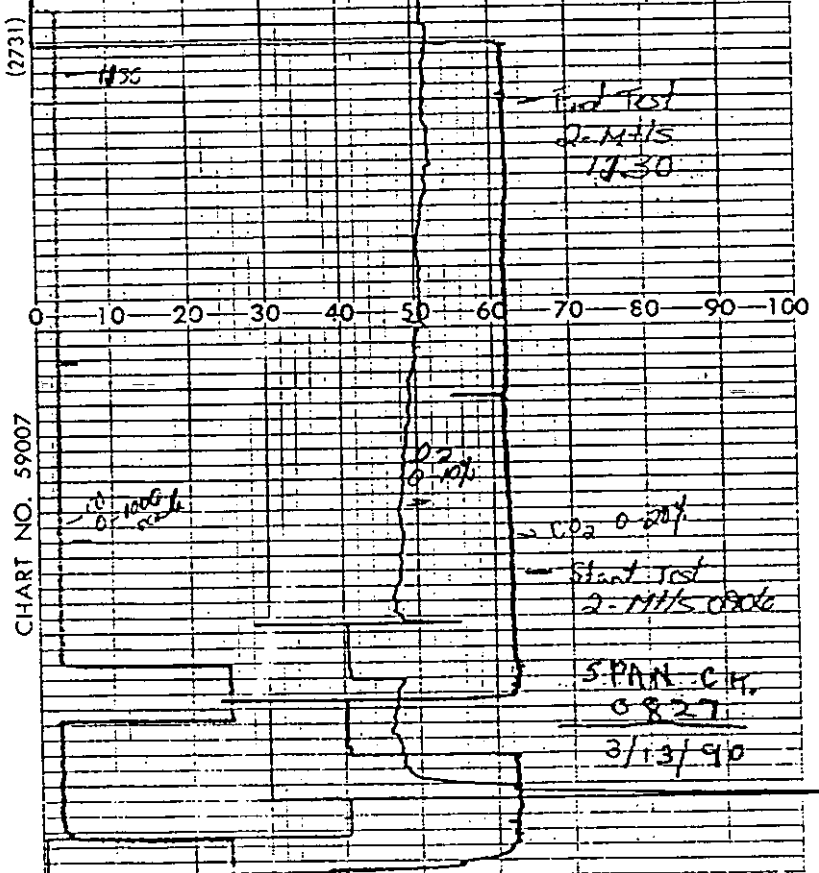
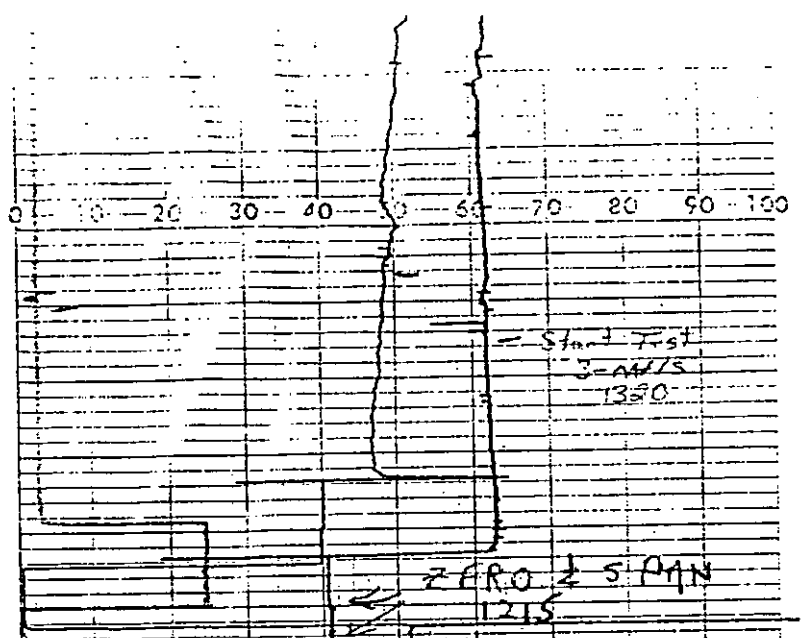
## Appendix C.3

### CEM Data

3/12/90



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Cont

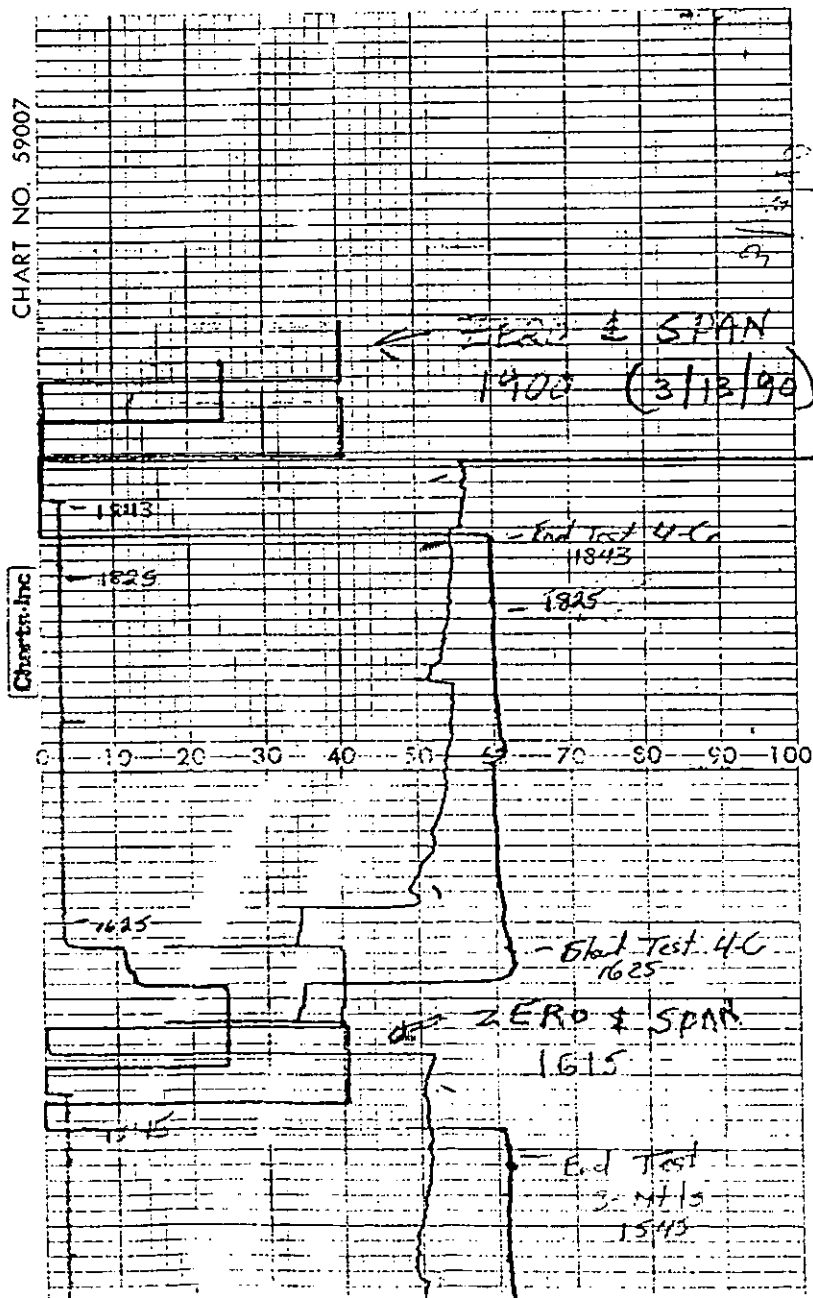
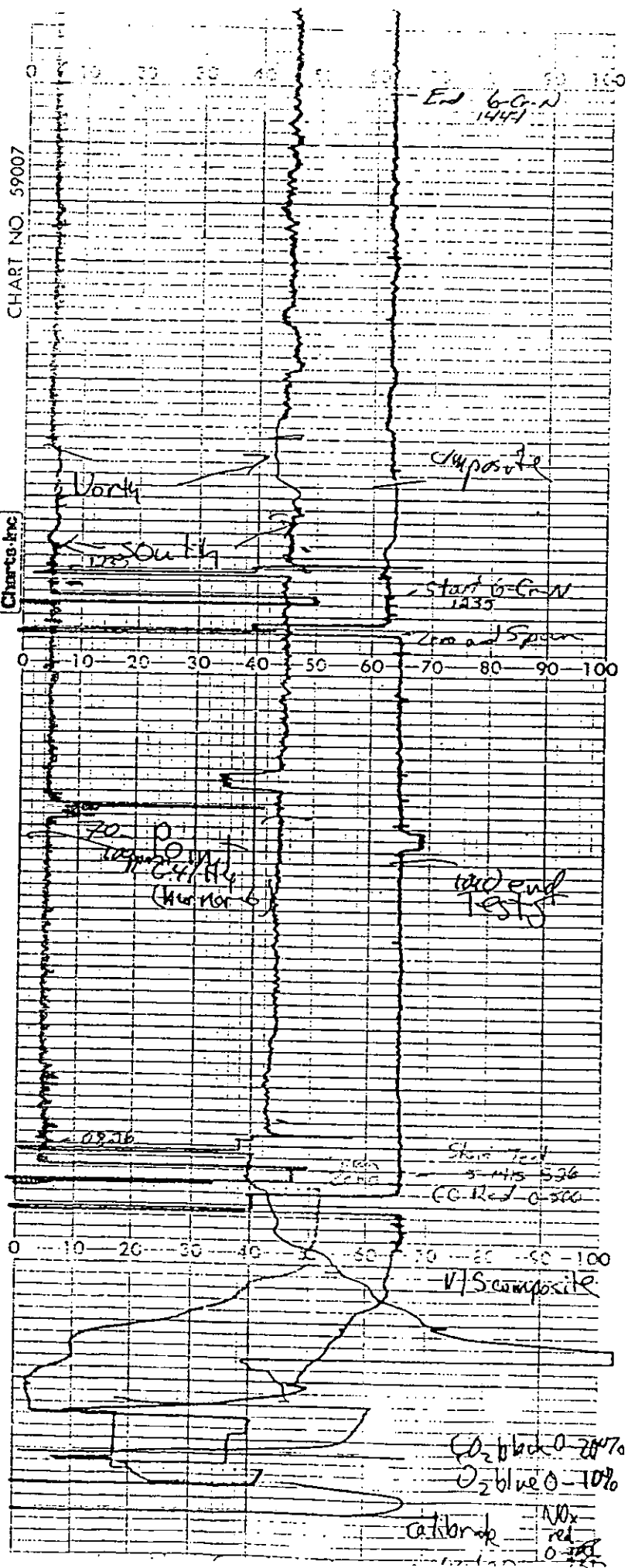


CHART NO. 59007

Chart-Rec



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cont.

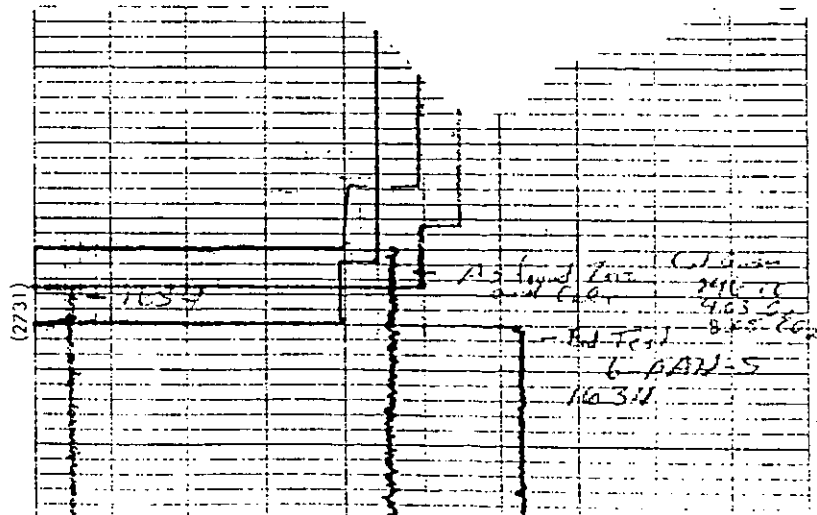
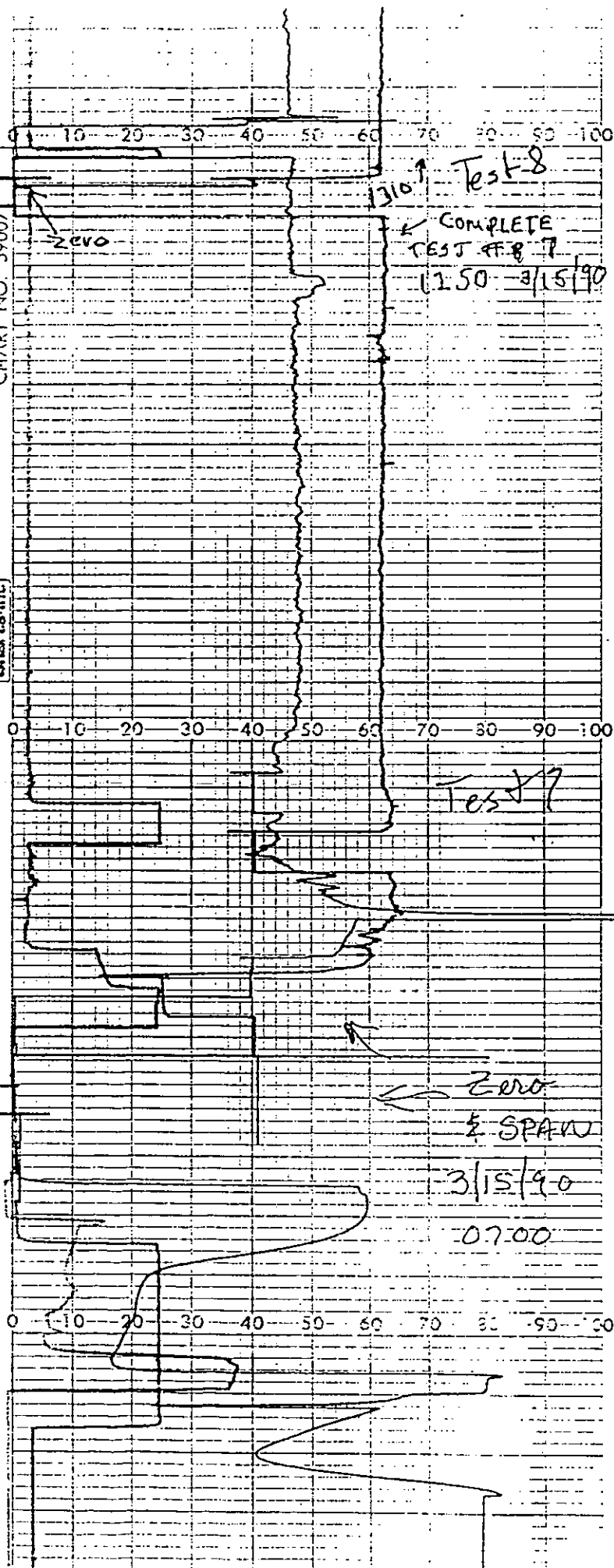


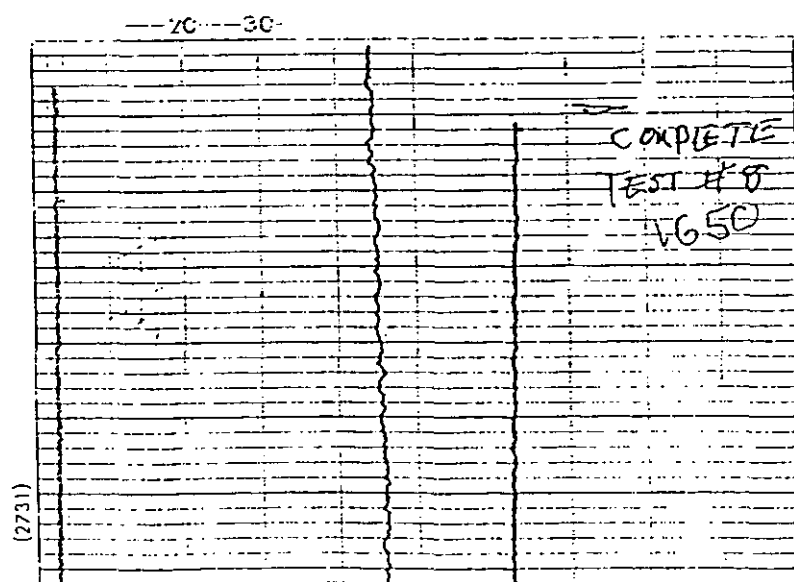
CHART NO. 59007

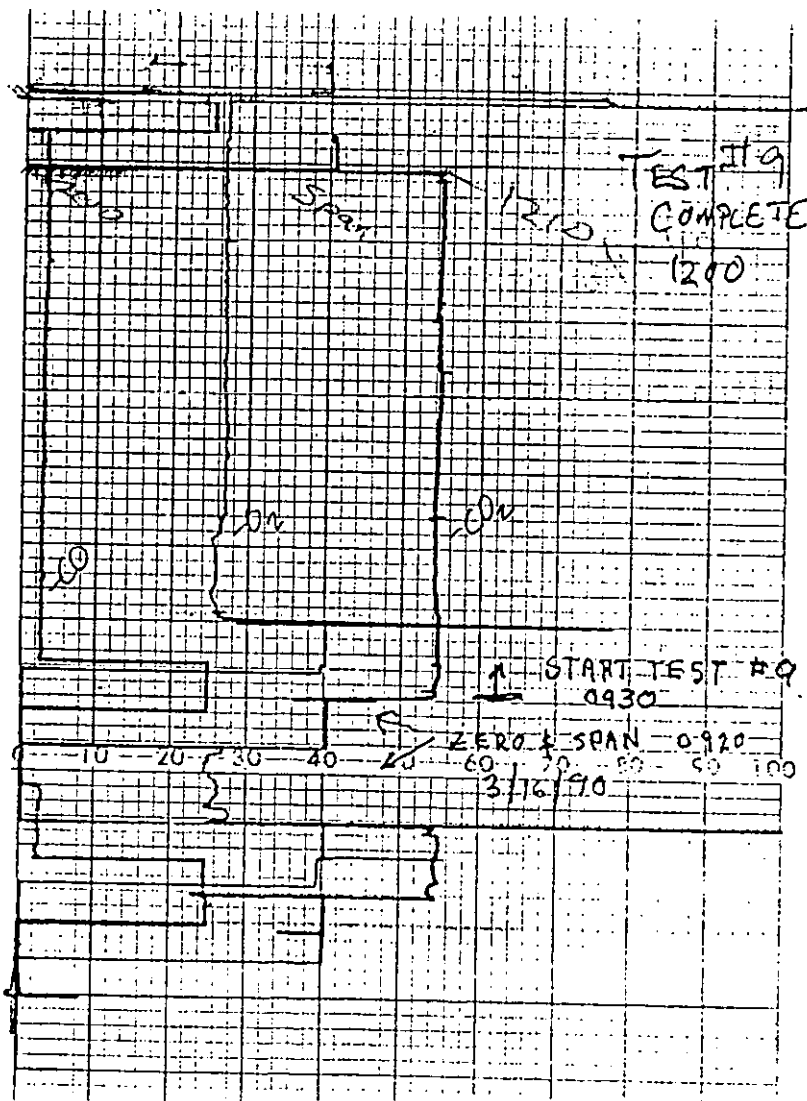
Charts, Inc.





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## Appendix C.4

### Benzene

# E/A

## TEDLAR BAG SAMPLE DATA

Client/Project SEE/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<br>PG. 3-3 | #5 SOUTH<br>PG. 4-3 | #5 NORTH<br>PG. 3-3 |

Date 3-16-90 Unit #5 By RP

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

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

CARNOT  
Benzene Emissions

Client/Location: SCE/ALAMITOS

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

| 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 |

# Tedlow Bay Data

SCE Alamitos 5

3-14-90

|          |                   |                   |
|----------|-------------------|-------------------|
| Test     | SA-Benz-N         | SB-Benz-N         |
| Time     | 902               | 919               |
|          | 912               | 928               |
| Location | Port 4-5<br>North | Port 3-5<br>North |

|      |                   |                   |
|------|-------------------|-------------------|
|      | SC-Benz-S         | SD-Benz-S         |
| Time | 946               | 1006              |
|      | 957               | 1020              |
|      | Port 3-5<br>South | Port 4-5<br>South |

Samples by Fry/Pence

[quit on oil LG 3/14/90]



Energy Systems Associates A CORPORATION

15991 RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

SUBJECT Benzene O<sub>2</sub>'s + Flow rates SCE/ALGS JOB NO. 53304

SHEET NO. 1 of 1

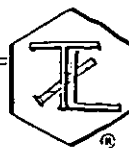
COMPUTED BY LC DATE 3-27-90 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

| <u>Benzene Tests</u> | <u>Comp Tests</u>    | <u>Fuel</u> | <u>Date</u> | <u>O<sub>2</sub></u> | <u>Flow rate</u>    | <u>Stack</u> |
|----------------------|----------------------|-------------|-------------|----------------------|---------------------|--------------|
| SA Benz N            | 5 mH <sub>2</sub> N  | oil         | 3/14        | 5.99                 | 630,082             | Total Flow   |
| SE Benz N            | 5 mH <sub>2</sub> S  | "           | "           | 5.85                 | 635,740             | 1265742      |
| SC Benz S            |                      |             |             |                      |                     |              |
| SD Benz S            |                      |             |             | $\bar{X} = 5.92$     | $\bar{X} = 632,871$ |              |
| 9A Benz (E)          | 9 H <sub>2</sub> O N | gas         | 3/14        | 4.83                 | 541965              | 1085840      |
| 9B Benz (S)          | 9 H <sub>2</sub> O S | "           | "           | 4.33                 | 543875              |              |
| 9C Benz (N)          |                      |             |             | $\bar{X} = 4.58$     | $\bar{X} = 542920$  |              |

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

# 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: TRU ELABS

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

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

INVESTIGATION **Edison P.O. No.: C0138903**

DATE April 6, 1990  
RECEIVED March 16, 1990  
LABORATORY NO. 44401

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, Manager  
Instrumental Methods

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from these Laboratories.



MAR 23 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

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

INVESTIGATION

DATE March 20, 1990  
RECEIVED March 15, 1990  
LABORATORY NO. 37998

Analyze for trace Benzene by modified EPA Method 602

## RESULTS

### MODIFIED EPA 602 (Benzene)

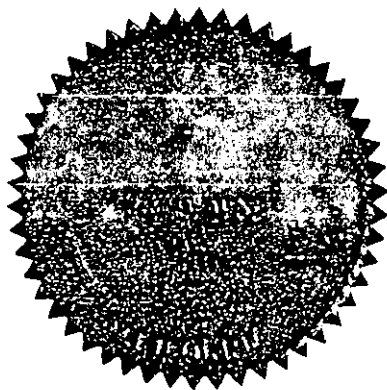
Received: 3/15/90  
Analyzed: 3/15/90

### 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

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter.

## Appendix C.5

### Formaldehyde

# 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 |

# 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 |          |

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.....         |
| Liquid Vol (ml).....           | * | from portable...              |
| Meter Press (iwg)..... 0.01    | * | CO2 (%): from CEM.....        |
|                                | * | calculated.....               |
|                                | * | Start/Stop Time.....1405/1435 |
| Std Sample Vol (SCF).....      |   | 1.63                          |

Client/Location SCF / Azamir Unit #5 Test No. 8A-Formulation Method \_\_\_\_\_ Page 1  
 Sample Location #5 NORTH Fuel OIL Ambient Temp., °F \_\_\_\_\_ of \_\_\_\_\_  
 Operators RL Meter Vol. (Start/End) 302.313 Date 3/15/90

Pre Test Data:  
 Barometric Press, in. Hg 30.3  
 Stack Area, sq. ft. \_\_\_\_\_  
 Sample Time/ Pt, min. 30 min Sample Pitot, Cp  
 Assumed Stack Press +2.5  
 Assumed Moisture 10%  
 Assumed Molecular Wt 29

Equipment Info:  
 Meter No. ES-19  
 Meter, Yd 1.00  
 CFM  $\Delta H = 1.0$  1.595  
 Probe I.D. 1/4" Teflon  
 Nozzle No./Dia \_\_\_\_\_  
 Filter No. \_\_\_\_\_

Imp. Matl Wt(End) (Start) (g)  
 #1 0.04 \_\_\_\_\_ \_\_\_\_\_  
 #2 0.04 \_\_\_\_\_ \_\_\_\_\_  
 #3 \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_  
 #4 \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_  
 Total \_\_\_\_\_  
 Impinger Box I.D. \_\_\_\_\_  
 Integrated Bag I.D. \_\_\_\_\_

Leak Check:  
 Pre-Test 0.01 7 EP \_\_\_\_\_  
 Post-Test \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

CFM Vac. Inlt. Pitot IBS  
 Sample Train  
 Pre-Test Calibration  
 Meter Meter Temp.  
 Time  $\Delta H$  Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |       |          |           | Static Press. $\Delta H$ | Vacuum | O <sub>2</sub> | Imp. Out |  | Test Summary                                                         |  |
|---------------|------|------------------|------------|---------------|------------------|-------|----------|-----------|--------------------------|--------|----------------|----------|--|----------------------------------------------------------------------|--|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Stack            | Probe | Meter In | Meter Out | Oven                     |        |                |          |  |                                                                      |  |
| 4-2           | 1405 | .01              | .01        | 302.313       |                  |       | 81       | 83        |                          |        |                |          |  | Initial                                                              |  |
|               | 1410 |                  | .01        | 302.615       |                  |       | 81       | 83        |                          |        |                |          |  | Sample Vol., c.f. <u>1.684</u>                                       |  |
|               | 1415 |                  | .01        | 302.889       |                  |       | 82       | 84        |                          |        |                |          |  | Stack Press, $\Delta H$ <u>80.7</u>                                  |  |
|               | 1420 | .01              | .01        | 303.177       |                  |       | 82       | 84        |                          |        |                |          |  | $\Delta P$ <u>2.01</u> $\Delta H$ <u>2.01</u> $\Delta H$ <u>2.01</u> |  |
|               | 1425 | .01              | .01        | 303.412       |                  |       | 82       | 84        |                          |        |                |          |  | Meter Temp., °F <u>82.7</u>                                          |  |
|               | 1430 | .01              | .01        | 303.731       |                  |       | 82       | 84        |                          |        |                |          |  | Stack Temp., °F <u>_____</u>                                         |  |
|               | 1435 |                  |            | 303.997       |                  |       |          |           |                          |        |                |          |  | Water Collected, g <u>_____</u>                                      |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | O <sub>2</sub> /CO <sub>2</sub> Method <u>_____</u>                  |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | Chain of Cust. Info (Inlt.): <u>_____</u>                            |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | Impingers Loaded <u>Real</u>                                         |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | Impingers Recovered <u>_____</u>                                     |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | Filter Loaded <u>_____</u>                                           |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | Filter Recovered <u>_____</u>                                        |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | Probe Wash <u>_____</u>                                              |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | Comments: <u>Field Blank</u>                                         |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | <u>Spice can</u>                                                     |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | <u>Small temporary with</u>                                          |  |
|               |      |                  |            |               |                  |       |          |           |                          |        |                |          |  | <u>bag test</u>                                                      |  |
| Total/Average |      |                  |            |               |                  |       |          |           |                          |        |                |          |  |                                                                      |  |

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.....         |
| Liquid Vol (ml).....           | * | from portable...              |
| Meter Press (iwg)..... 0.01    | * | CO2 (%): from CEM.....        |
|                                | * | calculated.....               |
|                                | * | Start/Stop Time.....1508/1608 |
| Std Sample Vol (SCF).....      |   | 1.19                          |

Client/Location SE / ALAMITOS Unit #5 Test No. 88-1000-01 Method 1 Page 1  
 Sample Location 45 South Fuel OL Ambient Temp., of 1  
 Operators RP Meter Vol. (Start/End) 305034 / 1306243 Date 2/13/90

Pre Test Data:  
 Barometric Press, in. Hg 30.3  
 Stack Area, sq. ft. 1.00  
 Sample Time/ Pt, min. 20.5  
 Assumed Stack Press +2.5  
 Assumed Moisture 106  
 Assumed Molecular Wt 29  
 Equipment Info:  
 Meter No. 88-19  
 Meter, Yd 1.00  
 Pitot, Cp 1.00  
 CFM  $\Delta H = 1.0$  1.595  
 Probe I.D. 6/16 in  
 Nozzle No./Dia ---  
 Filter No. ---  
 Leak Check:  
 Pre-Test 001 7 RP  
 Post-Test ---  
 Sample Train  
 CFM Vac. Init. Pitot IBS  
 Pre-Test 001 7 RP  
 Post-Test ---  
 Pre-Test Calibration  
 Meter Meter Temp.  
 Time  $\Delta H$  Reading In Out  
 Init. ---  
 Final ---

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, of |       |          |     |      | Static Press. twg | Test Summary |          |                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|------|------------------|------------|---------------|------------------|-------|----------|-----|------|-------------------|--------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Stack            | Probe | Meter In | Out | Oven |                   |              | Imp. Out | O <sub>2</sub>                                                                                                                                                                                                                                                                                                                                                                                                     |
| 3-3           | 1538 | 10               | .01        | 305.034       |                  |       | 75       | 77  |      |                   |              | 2        | Initial<br>Sample Vol., c.f. 1.209 ✓<br>Stack Press, twg<br>$\Delta P$ _____ twg $\Delta H$ 2.01 twg<br>Meter Temp., of 76.6 ✓<br>Stack Temp., of _____<br>Water Collected, g _____<br>O <sub>2</sub> /CO <sub>2</sub> Method _____<br>Chain of Cust. Info (Init.):<br>Impingers Loaded _____<br>Impingers Recovered _____<br>Filter Loaded _____<br>Filter Recovered _____<br>Probe Wash _____<br>Comments: _____ |
|               | 1543 |                  | .01        | 305.265       |                  |       | 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 |      |                  |            |               |                  |       |          |     |      |                   |              |          |                                                                                                                                                                                                                                                                                                                                                                                                                    |



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.....         |
| Liquid Vol (ml).....           | * | from portable...              |
| Meter Press (iwg)..... 0.01    | * | CO2 (%): from CEM.....        |
|                                | * | calculated.....               |
|                                | * | Start/Stop Time.....1614/1644 |
| Std Sample Vol (SCF).....      |   | 1.14                          |

Client/Location SEE/ALAMITOS Unit #5 Test No. 80-Form 100-1 Method \_\_\_\_\_ Page 1  
Sample Location #5 south Fuel OIL Ambient Temp., °F \_\_\_\_\_ of 1  
Operators RP Meter Vol. (Start/End) 340.23/ Date 3/15/90

| Pre Test Data:           |               |                |                 |                     |                     |
|--------------------------|---------------|----------------|-----------------|---------------------|---------------------|
| Barometric Press, in. Hg | <u>30.3</u>   | Meter No.      | <u>ES-19</u>    | Imp. Matl           | Wt(End) (Start) (g) |
| Stack Area, sq. ft.      |               | Meter, Yd      | <u>1.00</u>     | #1 DPH              | - 10 <u>und</u> =   |
| Sample Time/ Pt, min.    | <u>30 min</u> | Pitot, Cp      | <u>—</u>        | #2 DPH              | - 10 <u>und</u> =   |
| Assumed Stack Press      | <u>12.5</u>   | CFM @ ΔH = 1.0 | <u>595</u>      | #3 —                | - 0 =               |
| Assumed Moisture         | <u>10%</u>    | Probe I.D.     | <u>6" Felle</u> | #4 —                | - =                 |
| Assumed Molecular Wt     | <u>79</u>     | Nozzle No./Dia | <u>—</u>        | Total               | - =                 |
|                          |               | Filter No.     | <u>—</u>        | Impinger Box I.D.   | -                   |
|                          |               |                |                 | Integrated Bag I.D. | -                   |
| Equipment Info:          |               |                |                 |                     |                     |
| Leak Check:              |               |                |                 |                     |                     |
| Pre-Test :               |               |                |                 |                     |                     |
| Post-Test :              |               |                |                 |                     |                     |
| Pre-Test Calibration     |               |                |                 |                     |                     |
| Meter Meter Temp.        |               |                |                 |                     |                     |
| Time ΔH Reading In Out   |               |                |                 |                     |                     |
| Init.                    |               |                |                 |                     |                     |
| Final                    |               |                |                 |                     |                     |

[illegible]

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.....         |
| Liquid Vol (ml).....           | * | from portable...              |
| Meter Press (iwg)..... 0.01    | * | CO2 (%): from CEM.....        |
|                                | * | calculated.....               |
|                                | * | Start/Stop Time.....0937/1007 |
| Std Sample Vol (SCF).....      |   | 1.08                          |

# PARTICULATE TEST DATA

Client/Location SCE/ALAMITOS Unit 45 Test No. 9A-Form Method 1 Page 1  
 Sample Location 45 South Fuel GAS Ambient Temp., °F 88.24 of 1  
 Operators RP Meter Vol. (Start/End) 308.024 Date 3/16/90

## Pre Test Data:

Barometric Press, in. Hg 30.19 Equipment Info: Meter No. 11 Imp. Matl DNA Wt(End) (Start) (g) 0.00 Leak Check: Sample Train  
 Stack Area, sq. ft. 1.00 Meter, Yd 12 DNA 0.00 0.00 CFM Vac. Init. Pitot IBS  
 Sample Time/ Pt, min. 30 min S.P. Pitot, Cp 13 0.00 0.00 Pre-Test 001 7 RP  
 Assumed Stack Press 12.5 CFM  $\Delta H = 1.0$  14 0.00 0.00 Post-Test 001 7 RP  
 Assumed Moisture 10% Probe I.D. 6.75 Total 0.00 Pre-Test Calibration 0.00  
 Assumed Molecular Wt 29 Nozzle No./Dia 1 Impinger Box I.D. 1 Meter Meter Temp. 0.00  
 Filter No. 1 Integrated Bag I.D. 1 Time  $\Delta H$  Reading In Out  
 Init. 0.00 Final 0.00

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |       |          |           | Static Press. twg | Vacuum | O <sub>2</sub> | Imp. Out | Oven | Test Summary                                     |
|---------------|------|------------------|------------|---------------|------------------|-------|----------|-----------|-------------------|--------|----------------|----------|------|--------------------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Stack            | Probe | Meter In | Meter Out |                   |        |                |          |      |                                                  |
| 3-3           | 0437 | .01              | .01        | 308.024       |                  |       | 85       | 86        |                   | 1      |                |          |      | Initial <u>LC</u>                                |
|               | 0442 | .01              | .01        | 308.215       |                  |       | 85       | 87        |                   | 1      |                |          |      | Sample Vol., c.f. <u>1131</u>                    |
|               | 0447 | .01              | .01        | 308.291       |                  |       | 86       | 88        |                   | 1      |                |          |      | Stack Press, twg                                 |
|               | 0452 | .01              | .01        | 308.577       |                  |       | 86       | 88        |                   | 1      |                |          |      | $\Delta P$ <u>twg</u> $\Delta H$ <u>0.01</u> twg |
|               | 0457 | .01              | .01        | 308.769       |                  |       | 87       | 88        |                   | 1      |                |          |      | Meter Temp., °F <u>86.8</u>                      |
|               | 1002 | .01              | .01        | 308.162       |                  |       | 87       | 88        |                   | 1      |                |          |      | Stack Temp., °F                                  |
|               | 1007 | .01              | .01        | 309.155       |                  |       |          |           |                   |        |                |          |      | Water Collected, g                               |
|               |      |                  |            |               |                  |       |          |           |                   |        |                |          |      | O <sub>2</sub> /CO <sub>2</sub> Method           |
|               |      |                  |            |               |                  |       |          |           |                   |        |                |          |      | Chain of Cust. Info (init.):                     |
|               |      |                  |            |               |                  |       |          |           |                   |        |                |          |      | Impingers Loaded <u>RP</u>                       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                |          |      | Impingers Recovered                              |
|               |      |                  |            |               |                  |       |          |           |                   |        |                |          |      | Filter Loaded                                    |
|               |      |                  |            |               |                  |       |          |           |                   |        |                |          |      | Filter Recovered                                 |
|               |      |                  |            |               |                  |       |          |           |                   |        |                |          |      | Probe Wash                                       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                |          |      | Comments:                                        |
| Total/Average |      |                  |            |               |                  |       |          |           |                   |        |                |          |      |                                                  |

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.....         |
| Liquid Vol (ml).....           | * | from portable...              |
| Meter Press (iwg)..... 0.01    | * | CO2 (%): from CEM.....        |
|                                | * | calculated.....               |
|                                | * | Start/Stop Time.....1015/1045 |
| Std Sample Vol (SCF).....      | * | 1.04                          |

PARTICULATE TEST DATA

Client/Location SCE/ALAMITOS Unit 315 Test No. 98-Form Method 1 Page 1  
 Sample Location #5 South Fuel Gas Ambient Temp., °F 209.253/310.341 of 1  
 Operators RD Meter Vol. (Start/End) 209.253/310.341 Date 3/16/90

Pre Test Data:

Barometric Press, in. Hg 30.19 Equipment Info: Meter No. 11 DNP4 Weight (g) 104 Leak Check: Sample Train  
 Stack Area, sq. ft. 1.00 Meter, Yd 104 Wt(End) (Start) (g) 104 CFM Vac. Init. Pitot IBS  
 Sample Time/ Pt. min. 30.00 Pitot, Cp 104 Pre-Test 001 7 Post-Test 001 7  
 Assumed Stack Press 42.5 CFM  $\Delta H = 1.0$  Total 001 Pre-Test Calibration  
 Assumed Moisture 10% Probe I.D. 6.16 in Impinger Box I.D. 1 Meter Meter Temp.  
 Assumed Molecular Wt 29 Nozzle No./Dia 1 Integrated Bag I.D. 1 Time  $\Delta H$  Reading In Out  
 Filter No. 1 Init. 1 Final 1

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |       |          |           | Static Press. twg | Vacuum | O <sub>2</sub> | Test Summary                           |       |
|---------------|------|------------------|------------|---------------|------------------|-------|----------|-----------|-------------------|--------|----------------|----------------------------------------|-------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Stack            | Probe | Meter In | Meter Out |                   |        |                |                                        |       |
| 4-3           | 1015 |                  | .01        | 309.253       |                  |       | 88       | 90        |                   |        |                | Initial                                | u     |
|               | 1020 |                  | .01        | 309.425       |                  |       | 89       | 90        |                   |        |                | Sample Vol., c.f.                      | 1.088 |
|               | 1025 |                  | .01        | 309.612       |                  |       | 90       | 91        |                   |        |                | Stack Press, twg                       |       |
|               | 1030 |                  | .01        | 309.791       |                  |       | 91       | 92        |                   |        |                | $\Delta P$ twg $\Delta H$ twg          |       |
|               | 1035 |                  | .01        | 309.973       |                  |       | 91       | 93        |                   |        |                | Meter Temp., °F                        | 90.8  |
|               | 1040 |                  | .01        | 310.61        |                  |       | 91       | 93        |                   |        |                | Stack Temp., °F                        |       |
|               | 1045 |                  |            | 310.341       |                  |       |          |           |                   |        |                | Water Collected, g                     |       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                | O <sub>2</sub> /CO <sub>2</sub> Method |       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                | Chain of Cust. Info (init.):           |       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                | Impingers Loaded                       |       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                | Impingers Recovered                    |       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                | Filter Loaded                          |       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                | Filter Recovered                       |       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                | Probe Wash                             |       |
|               |      |                  |            |               |                  |       |          |           |                   |        |                | Comments:                              |       |
| Total/Average |      |                  |            |               |                  |       |          |           |                   |        |                |                                        |       |

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.....         |
| Liquid Vol (ml).....           | * | from portable...              |
| Meter Press (iwg)..... 0.01    | * | CO2 (%): from CEM.....        |
|                                | * | calculated.....               |
|                                | * | Start/Stop Time.....1112/1142 |
| Std Sample Vol (SCF).....      |   | 1.31                          |

# PARTICULATE TEST DATA

Client/Location SE/ACAMTUS Unit LS Test No. 9C-104M Method 1 Page 1  
 Sample Location 45 NORTH Fuel GAS Ambient Temp., of 1  
 Operators RP Meter Vol. (Start/End) 30896/312.277 Date 3/16/90

## Pre Test Data:

Barometric Press, in. Hg 30.0  
 Stack Area, sq. ft. 1.00  
 Sample Time/ Pt. min. 30 min 31.2  
 Assumed Stack Press +2.5  
 Assumed Moisture 10%  
 Assumed Molecular Wt 29

Equipment Info:  
 Meter No. 15-9  
 Meter, Yd 1.00  
 Pitot, Cp 1.00  
 CFM  $\Delta H = 1.0$  595  
 Probe I.D. 6.16 in  
 Nozzle No./Dia 1.0  
 Filter No. 1

Imp. Matl Wt(End) (Start) (g)  
 #1 DNP4 10.0  
 #2 DNP4 10.0  
 #3 10.0  
 #4 10.0  
 Total 40.0  
 Impinger Box I.D. 1.0  
 Integrated Bag I.D. 1.0

Leak Check: Sample Train  
 CFM Vac. Init. Pitot IBS  
 Pre-Test 100 7 RP  
 Post-Test 100 7 RP

Pre-Test Calibration  
 Meter Meter Temp.  
 Time  $\Delta H$  Reading In Out  
 Init. 100 7 RP  
 Final 100 7 RP

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |          |     |      | Static Press. $\Delta H$ | Vacuum | O <sub>2</sub> | Test Summary                                           |  |
|---------------|------|------------------|------------|---------------|------------------|----------|-----|------|--------------------------|--------|----------------|--------------------------------------------------------|--|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Probe            | Meter In | Out | Oven |                          |        |                |                                                        |  |
|               | 1112 | .01              | .01        | 310.896       |                  | 91       | 93  |      |                          |        |                | Initial                                                |  |
|               | 1117 | .01              | .01        | 311.151       |                  | 92       | 93  |      |                          |        |                | Sample Vol., c.f. <u>138.1</u>                         |  |
|               | 1122 | .01              | .01        | 311.378       |                  | 92       | 94  |      |                          |        |                | Stack Press, $\Delta H$                                |  |
|               | 1127 | .01              | .01        | 311.622       |                  | 93       | 94  |      |                          |        |                | $\Delta P$ <u>1wg</u> $\Delta H$ <u>0.1</u> <u>1wg</u> |  |
|               | 1132 | .01              | .01        | 311.845       |                  | 94       | 94  |      |                          |        |                | Meter Temp., °F                                        |  |
|               | 1137 | .01              | .01        | 312.081       |                  | 94       | 94  |      |                          |        |                | Stack Temp., °F                                        |  |
|               | 1142 |                  |            | 312.277       |                  |          |     |      |                          |        |                | Water Collected, g                                     |  |
|               |      |                  |            |               |                  |          |     |      |                          |        |                | O <sub>2</sub> /CO <sub>2</sub> Method                 |  |
|               |      |                  |            |               |                  |          |     |      |                          |        |                | Chain of Cust. Info (Init.):                           |  |
|               |      |                  |            |               |                  |          |     |      |                          |        |                | Impingers Loaded                                       |  |
|               |      |                  |            |               |                  |          |     |      |                          |        |                | Impingers Recovered                                    |  |
|               |      |                  |            |               |                  |          |     |      |                          |        |                | Filter Loaded                                          |  |
|               |      |                  |            |               |                  |          |     |      |                          |        |                | Filter Recovered                                       |  |
|               |      |                  |            |               |                  |          |     |      |                          |        |                | Probe Wash                                             |  |
|               |      |                  |            |               |                  |          |     |      |                          |        |                | Comments:                                              |  |
| Total/Average |      |                  |            |               |                  |          |     |      |                          |        |                |                                                        |  |





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

SUBJECT SCE/Alamitos Formaldehyde Calc JOB NO. 53304

COMPUTED BY L. Freeman DATE 4/16/90 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_ SHEET NO. 1 of 1

| Test    | Formaldehyde<br>Tot ug/sample | Blank<br>btug/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

$$\frac{\text{Field Spike}^{\text{tot (ug)}} - \text{Field Blank}^{\text{tot (ug)}}}{\text{nominal value}^{\text{tot (ug)}}} = \frac{8.96 - .51}{7.4} = 114\%$$

± 20% OK

UB



Energy Systems Associates A CORPORATION

15991 RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

SUBJECT Formaldehyde SCE/Alamitos JOB NO. 53704

SHEET NO. 1 of 1

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

|     | <u>Duct</u> | <u>Instd</u> | <u>% O<sub>2</sub></u> | <u>Qsd</u>         |                        |                                  |
|-----|-------------|--------------|------------------------|--------------------|------------------------|----------------------------------|
| 8-A | N           | 1.63         | 6.32                   | <del>574,523</del> | 7-PAH-N                | } checked<br>against<br>findings |
| 8-B | S           | 1.19         | 6.48                   | <del>543,875</del> | "                      |                                  |
| 8-C | S           | 1.14         | 6.48                   | "                  | 12-PAH-S               |                                  |
| 9-A | S           | 1.08         | 4.33                   | 543,875            | (9-H <sub>2</sub> O-S) |                                  |
| 9-B | S           | 1.04         | 4.33                   | 543,875            | "                      |                                  |
| 9-C | N           | 1.31         | 4.83                   | 541,965            | (9-H <sub>2</sub> O-N) |                                  |
|     |             | ↑<br>calc    |                        |                    | ← from other tests →   |                                  |

Energy Systems Associates

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

Arlene Bell

Customer Work Identification Project #4200 *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: *Dan J. Hylton*

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      |
| Matrix:     | 01A<br>AIR    | 02A<br>AIR    | 03A<br>AIR    | 04A<br>AIR    |

Formaldehyde

| Result | Det. Limit |
|--------|------------|
| ND     | 0.47       |

| Result | Det. Limit |
|--------|------------|
| ND     | 0.47       |

| Result | Det. Limit |
|--------|------------|
| ND     | 0.47       |

| Result | Det. Limit |
|--------|------------|
| 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.

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

*field  
 spike level = 7.4 ug*

Method: Aldehydes by HPLC (1)

List: ESA Analyte List

Sample ID: 98-FORM (A&amp;B)

9C-FORM (A&amp;B)

8-FORM-FIELD

8-FORM-FIELD

Factor: 0.53

0.53

0.53

0.53

Results in: total ug

total ug

total ug

total ug

Matrix: 05A

06A

07A

08A

Matrix: AIR

AIR

AIR

AIR

Formaldehyde

 Result Det. Limit  
 1.64 @ 0.47

 Result Det. Limit  
 2.19 @ 0.47

 Result Det. Limit  
 0.51 @ 0.47

 Result Det. Limit  
 8.96 @ 0.47

@ 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

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

Factor:

0.53

0.53

DUP

0.53

Results in:

total ug

%

%

Matrix:

AIR

AIR

11A

AIR

Formaldehyde

Result Det. Limit

ND

0.47

Result Det. Limit

107

Result Det. Limit

104

Result Det. Limit

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.

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                     | 03/20/90      | 03/20/90      | 03/20/90      | 03/20/90      | 03/20/90      | 03/20/90      |
| Date Received                    | AIR           | AIR           | AIR           | AIR           | AIR           | AIR           |
| Matrix                           | 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      |

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

## Sample Identifications and Dates

| Sample ID     | 8-FORM-FIELD<br>BLK | 8-FORM-FIELD<br>SPIKE | METHOD BLANK | MATRIX SPIKE | MATRIX SPIKE<br>DUP |
|---------------|---------------------|-----------------------|--------------|--------------|---------------------|
| Date Sampled  | 03/20/90            | 03/20/90              | 03/20/90     | 03/20/90     | 03/20/90            |
| Date Received | AIR                 | AIR                   | AIR          | AIR          | AIR                 |
| Matrix        | 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 |



Appendix A  
Comments, Notes and Definitions

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

**Q 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 CROLs (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; microSiemens/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     |
| PROJECT NO:  | 53304    | VMSTD(DSCF):   | 79.90  |
| TEST DATE:   | 3/14/90  | QSD(DSCF/MIN): | 649848 |
| TEST NUMBER: | 6-PAH-S  | CO2,%:         | 11.21  |
| T REF (F)    | 60       | O2,%:          | 6.05   |
| Fuel: oil    |          | F Factor       | 9063   |

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

| 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    |
| Liquid Vol (ml)..... 169.8            | * | from portable... 6.05         |
| Meter Press (iwg)..... 0.67           | * | CO2 (%): from CEM..... 12.30  |
|                                       | * | calculated..... 11.21         |
|                                       | * | 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 SEF / Ashland Unit 5 Test No. 6-99N-502 Method 415 Page 1  
 Sample Location South West Fuel 011 Ambient Temp., of \_\_\_\_\_ of \_\_\_\_\_  
 Operators L. Mulligan & R. Pearce Meter Vol. (Start/End) 360.266 / 414.351 Date 5/14/90

## Pre Test Data:

Barometric Press, in. Hg 30.3  
 Stack Area, sq. ft. 2.1  
 Sample Time/ Pt. min. 45/185  
 Assumed Stack Press 1/6  
 Assumed Moisture 25  
 Assumed Molecular Wt \_\_\_\_\_  
 Equipment Info:  
 Meter No. E5-8  
 Meter, Yd 1.00  
 Pitot, Cp .84  
 CFM  $\Delta H = 1.0$  576  
 Probe I.D. 1/8 in  
 Nozzle No./Dia 1/4 in  
 Filter No. 47-182  
47-179

## Leak Check:

Imp. Matl Wt(End) (Start) (g) Weight  
 #1 606.8 - 462.3 = 144.5  
 #2 629.0 - 643.8 = -14.8  
 #3 467.7 - 464.3 = 3.4  
 #4 744.7 - 208.0 = 536.7  
 Total 2448.2 - 2278.4 = 169.8  
 Impinger Box I.D. \_\_\_\_\_  
 Integrated Bag I.D. \_\_\_\_\_

Time  $\Delta H$  Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

1/2 H 2 2.2

| Sample Point  | Time   | Meter Conditions |      |               | Temperatures, °F |       |          |     |      | DO.I     |                | Static Press. twg | Vacuum | Test Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|--------|------------------|------|---------------|------------------|-------|----------|-----|------|----------|----------------|-------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |        | ΔP               | ΔH   | Meter Reading | Stack            | Probe | Meter In | Out | Oven | Imp. Out | O <sub>2</sub> |                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| START         | 1256   | .07              | .15  | 360.260       | 250              | N/A   | 50       | 50  | N/A  | 400      | 8.2            |                   | 4      | Initial<br>Sample Vol., c.f. <u>84.09</u><br>Stack Press. twg <u>2.70</u><br>ΔP, 2887 twg ΔH <u>34.5</u> twg<br>Meter Temp., of <u>92.8</u><br>Stack Temp., of <u>270.4</u><br>Water Collected, g <u>169.8</u><br>O <sub>2</sub> /CO <sub>2</sub> Method <u>0.00/6.05</u><br>Chain of Cust. Info (Init.):<br>Impingers Loaded<br>Impingers Recovered<br>Filter Loaded<br>Filter Recovered<br>Probe Wash<br>Comments:<br>CEM <u>O<sub>2</sub></u> = <u>4.6</u><br><u>CO<sub>2</sub></u> = <u>10.3</u> |
| 1             | 130050 | .10              | .22  | 361.418       | 285              |       | 52       | 50  |      | 53       | 6.4            |                   | 4      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 2             | 1305   | .15              | .41  | 362.815       | 296              |       | 54       | 50  |      | 54       | 5.6            |                   | 6      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 3             | 130530 | .27              | .55  | 364.2         | 297              |       | 98       | 85  |      | 58       | 5.5            |                   | 8      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4             | 1314   | .51              | 1.12 | 366.220       | 295              |       | 55       | 89  |      | 56       | 7.1            |                   | 14     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5             | 134820 | .56              | 1.23 | 368.890       | 296              |       | 105      | 85  |      | 54       |                |                   | 15     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 6             | 1328   | .30              | .66  | 370.670       | 276              |       | 99       | 86  |      | 55       |                |                   | 12     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| STOP          | 132730 |                  |      | 372.962       |                  |       |          |     |      |          |                |                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| START         | 1331   | .04              | .08  | 372.962       | 283              |       | 87       | 86  |      | 62       | 9.2            |                   | 4      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1             | 133530 | .09              | .15  | 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              | .68  | 378.426       | 300              |       | 55       | 87  |      | 43       | 4.5            |                   | 11     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5             | 134330 | .36              | .77  | 380.145       | 298              |       | 101      | 88  |      | 44       | 4.5            |                   | 15     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 6             | 1358   | .31              | .68  | 382.368       | 282              |       | 103      | 88  |      | 42       | 7.2            |                   | 15     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| STOP          | 140230 |                  |      | 384.530       |                  |       |          |     |      |          |                |                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| START         | 1405   | .25              | .57  | 384.530       | 275              |       | 56       | 87  |      | 57       | 7.5            |                   | 11     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 2             | 140930 | .25              | .63  | 386.128       | 278              |       | 102      | 88  |      | 48       | 6.6            |                   | 14     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Total/Average |        |                  |      |               |                  |       |          |     |      |          |                |                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

# PARTICULATE TEST DATA

Client/Location SCE / ALABAMA Unit 5 Test No. 6-PAH-S-27 Method 425 Page 2  
 Sample Location SOYLE ROSET Fuel 011 Ambient Temp., °F 3 of 3  
 Operators MULLIGAN & PENCE Meter Vol. (Start/End) 1 Date 1

## Pre Test Data:

Equipment Info: Meter No. 80 Weight (g) 11 Leak Check: OK  
 Barometric Press, in. Hg 30.1 Meter 011 Weight (Start) (g) 11  
 Stack Area, sq. ft. 1.0 Meter 011 Weight (Start) (g) 11  
 Sample Time/ Pt. min. 1.0 Meter 011 Weight (Start) (g) 11  
 Assumed Stack Press 1.0 Meter 011 Weight (Start) (g) 11  
 Assumed Moisture 1.0 Meter 011 Weight (Start) (g) 11  
 Assumed Molecular Wt 1.0 Meter 011 Weight (Start) (g) 11  
 Nozzle No./Dia 1.0 Meter 011 Weight (Start) (g) 11  
 Filter No. 1.0 Meter 011 Weight (Start) (g) 11  
 Impinger Box I.D. 1.0 Meter 011 Weight (Start) (g) 11  
 Integrated Bag I.D. 1.0 Meter 011 Weight (Start) (g) 11

Sample Train  
 CFM Vac. Init. Pitot 185  
 Pre-Test 0.1 / 1.5  
 Post-Test 0.1 / 1.5

## Pre-Test Calibration

Meter Meter Temp.  
 Time ΔH Reading In Out  
 Init. 0.1 / 1.5  
 Final 0.1 / 1.5

| Sample Point  | Time   | Meter Conditions |     |               | Temperatures, °F |          |           |      | Coil    |          | Vacuum | Static Press. twg | Test Summary                           |
|---------------|--------|------------------|-----|---------------|------------------|----------|-----------|------|---------|----------|--------|-------------------|----------------------------------------|
|               |        | ΔP               | ΔH  | Meter Reading | Probe            | Meter In | Meter Out | Oven | Imp. In | Imp. Out |        |                   |                                        |
| 3-2           | 1414   | .25              | .55 | 388.126       | N/A              | 103      | 88        | N/A  | 47      | 5.1      | 13     |                   | Initial                                |
| 1             | 141830 | .20              | .44 | 390.087       |                  | 103      | 85        |      | 48      | 4.9      | 12     |                   | Sample Vol., c.f.                      |
| 4             | 1423   | .21              | .46 | 391.876       |                  | 102      | 85        |      | 47      | 4.8      | 13     |                   | Stack Press, twg                       |
| 5             | 142730 | .24              | .52 | 393.700       |                  | 101      | 85        |      | 46      | 5.0      | 14     |                   | ΔP twg ΔH twg                          |
| 6             | 1432   | .23              | .50 | 395.642       |                  | 102      | 85        |      | 42      | 2.4      | 14     |                   | Meter Temp., °F                        |
| Stop 7        | 143630 |                  |     | 397.456       |                  |          |           |      |         |          |        |                   | Stack Temp., °F                        |
| Start         | 143930 | .29              | .63 | 397.456       |                  | 55       | 88        |      | 46      | 6.2      | 16     |                   | Water Collected, g                     |
| 4-1           | 1444   | .31              | .68 | 399.28        |                  | 101      | 88        |      | 43      | 5.1      | 18     |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 1             | 144830 | .27              | .59 | 401.596       |                  | 101      | 88        |      | 42      | 4.9      | 18     |                   | Chain of Cust. Info (init.):           |
| 3             | 1453   | .25              | .55 | 403.645       |                  | 101      | 88        |      | 42      | 4.9      | 17     |                   | Impingers Loaded                       |
| 4             | 145730 | .22              | .48 | 405.562       |                  | 100      | 87        |      | 41      | 4.5      | 16     |                   | Impingers Recovered                    |
| 5             | 1502   | .27              | .59 | 407.65        |                  | 181      | 87        |      | 40      | 4.5      | 18     |                   | Filter Loaded                          |
| 6             | 150630 | .15              | .41 | 409.692       |                  | 96       | 87        |      | 112     | 9.0      | 15     |                   | Filter Recovered                       |
| Stop 7        | 1511   |                  |     | 411.355       |                  |          |           |      |         |          |        |                   | Probe Wash                             |
| Start         | 1515   | .12              | .32 | 411.355       |                  |          |           |      |         |          |        |                   | Comments: 1515 H/C and 1515 H/C        |
| 5-1           | 1515   | .12              | .32 | 411.355       |                  | 94       | 87        |      | 43      |          | 22     |                   | 22" vac .009 CFM                       |
| 1             | 1515   | .12              | .32 | 411.355       |                  | 94       | 87        |      | 43      |          | 22     |                   | Subtract .009 CFM                      |
| 2             | 1531   | .45              | .99 | 416.827       |                  | 99       | 86        |      | 43      | 5.1      | 15     |                   |                                        |
| 3             | 154330 | .41              | .90 | 415.410       |                  | 104      | 86        |      | 43      | 5.1      | 14     |                   |                                        |
| Total/Average |        |                  |     |               |                  | 105      | 86        |      | 43      | 5.0      | 14     |                   |                                        |

413-876-414.175

# PARTICULATE TEST DATA

Client/Location SCE/Alamos Unit 5 Test No. 6-74115 Method 425 Page 3  
 Sample Location South Port Fuel Oil Ambient Temp., °F 52 of 3  
 Operators L.H. / R.P. Meter Vol. (Start/End) 1 Date

## Pre Test Data:

Barometric Press, in. Hg 30.1 Leak Check:   
 Stack Area, sq. ft. 12 Sample Train  
 Sample Time/ Pt, min. 10 CFM Vac. Init. Pictot IB  
 Assumed Stack Press 2.0 Pre-Test   
 Assumed Moisture 2.0 Post-Test   
 Assumed Molecular Wt 2.0 Pre-Test Calibration  
 Meter Meter Temp.  
 Nozzle No./Dia  Time ΔH Reading In Out  
 Filter No.  Init.   
 Integrated Bag I.D.  Final

| Sample Point  | Time     | Meter Conditions |      |               | Temperatures, °F |          |     |      | Static Press. lwg | Vacuum | Test Summary                           |  |
|---------------|----------|------------------|------|---------------|------------------|----------|-----|------|-------------------|--------|----------------------------------------|--|
|               |          | ΔP               | ΔH   | Meter Reading | Probe            | Meter In | Out | Oven |                   |        |                                        |  |
| 4             | 15:48    | 1.21             | 1.68 | 422.100       | N/A              | 101      | 86  | N/A  |                   |        | Initial                                |  |
| 5             | 15:52:30 | .59              | .85  | 424.240       |                  | 101      | 86  |      |                   |        | Sample Vol., c.f.                      |  |
| 6             | 15:57    | .79              | 1.73 | 426.687       |                  | 102      | 85  |      |                   |        | Stack Press, lwg                       |  |
| Stop 7        | 16:01:30 |                  |      | 428.899       |                  |          |     |      |                   |        | ΔP lwg ΔH lwg                          |  |
| Stop 8        | 16:03:30 | .20              | .44  | 428.899       |                  | 85       | 84  |      |                   |        | Meter Temp., °F                        |  |
| 6-1           | 16:08    | .26              | .57  | 430.591       |                  | 95       | 84  |      |                   |        | Stack Temp., °F                        |  |
| 2             | 16:12:50 | .39              | .85  | 432.728       |                  | 57       | 84  |      |                   |        | Water Collected, g                     |  |
| 3             | 16:17    | .59              | .88  | 434.887       |                  | 101      | 75  |      |                   |        | O <sub>2</sub> /CO <sub>2</sub> Method |  |
| 4             | 16:21:30 | .36              | .75  | 437.102       |                  | 100      | 84  |      |                   |        | Chain of Cust. Info (init.):           |  |
| 5             | 16:25    | .68              | 1.43 | 437.200       |                  | 101      | 84  |      |                   |        | Impingers Loaded                       |  |
| 6             | 16:29:30 | .39              | .85  | 441.921       |                  | 58       | 83  |      |                   |        | Impingers Recovered                    |  |
| Stop 7        | 16:34    |                  |      | 444.351       |                  |          |     |      |                   |        | Filter Loaded                          |  |
|               |          |                  |      |               |                  |          |     |      |                   |        | Filter Recovered                       |  |
|               |          |                  |      |               |                  |          |     |      |                   |        | Probe Wash                             |  |
|               |          |                  |      |               |                  |          |     |      |                   |        | Comments:                              |  |
| Total/Average |          |                  |      |               |                  |          |     |      |                   |        |                                        |  |

CARNOT

03/19/90

## 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     |
| <hr/>                                 |          |   |                         |           |
| 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 |
| <hr/>                                 |          |   |                         |           |
| 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/Alameda Unit 5 Test No. 7-PAH-N Method PAH Page 1  
 Sample Location No. 44 Fuel Oil Ambient Temp., of 3  
 Operators CF/RB Meter Vol. (Start/End) 27.74/30.07 Date 2-15-80

Pre Test Data:  
 Barometric Press, in. Hg 30.3  
 Stack Area, sq. ft. 4.5/4.2  
 Sample Time/ Pt, min. 4.5/4.2  
 Assumed Stack Press 1.0  
 Assumed Moisture 1.0  
 Assumed Molecular Wt 1.0

Equipment Info:  
 Meter No. ES-17  
 Meter, Yd 1.000  
 Pitot, Cp .84  
 CFM @ H = 1.0 1.595  
 Probe I.D. 1/8  
 Nozzle No./Dia 7-242  
 Filter No. T47-183

Weight Weight  
 Imp. Matl Wt(End) (Start) (g)  
 #1 610.7 - 464.1 = 146.6  
 #2 603.8 - 610.5 = -6.7  
 #3 440.75 - 582.6 = 141.85  
 #4 56.2 - 235.0 = 178.8  
 Total 2570.7 - 2297.2 = 273.5

Leak Check:  
 Sample Train  
 CFM Vac. Init. Pitot 18S  
 Pre-Test 0.15 16 CF  
 Post-Test 0.04 27 RP  
 Pre-Test Calibration  
 Meter Meter Temp.  
 Time  $\Delta$ H Reading In Out  
 Init. ---  
 Final ---

2.2

| Sample Point  | Time  | Meter Conditions |      |               | Temperatures, of |       |          |     |      | Col Temp |                | Static Press. twg | Test Summary                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|-------|------------------|------|---------------|------------------|-------|----------|-----|------|----------|----------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |       | ΔP               | ΔH   | Meter Reading | Stack            | Probe | Meter In | Out | Oven | Imp. Out | O <sub>2</sub> |                   |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 7-1           | 9:08  | 0.2              | 0.45 | 217.77        | 4                |       | 81       | 80  |      | 54       | 9.5            | 2                 | Initial<br>Sample Vol., c.f. 83.305<br>Stack Press, twg 2.90<br>ΔP 22.47 twg ΔP 22.47 twg<br>Meter Temp., of 98.4<br>Stack Temp., of 263.8<br>Water Collected, g 273.7<br>O <sub>2</sub> /CO <sub>2</sub> Method 0.32<br>Chain of Cust. Info (init.):<br>Impingers Loaded AB<br>Impingers Recovered<br>Filter Loaded AB<br>Filter Recovered<br>Probe Wash<br>Comments:<br>CEM O <sub>2</sub> : 4.75<br>CO <sub>2</sub> : 12.2 |
| 2             | 9:10  | 0.06             | 0.14 | 218.48        | 252              |       | 89       | 81  |      | 46       | 4.9            | 2                 |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3             | 9:11  | 0.15             | 0.36 | 219.65        | 242              |       | 93       | 82  |      | 44       | 4.4            | 7                 |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 4             | 9:15  | 0.22             | 0.49 | 221.40        | 230              |       | 101      | 82  |      | 39       | 7.6            | 17                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 5             | 9:20  | 0.31             | 0.60 | 223.12        | 240              |       | 105      | 83  |      | 46       | 8.4            | 10                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 6             | 9:24  | 0.27             | 0.48 | 225.80        | 212              |       | 105      | 84  |      | 43       | 8.0            | 8                 |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 7             | 9:29  | 0.19             | 0.40 | 227.42        | 208              |       | 105      | 85  |      |          |                |                   |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|               | 9:33  |                  |      | 228.85        |                  |       |          |     |      |          |                |                   |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 6-1           | 9:36  | 0.01             | 0.22 | 228.88        | 242              |       | 86       | 84  |      | 56       | 8.0            | 2                 |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2             | 9:41  | 0.14             | 0.31 | 229.67        | 258              |       | 97       | 86  |      | 48       | 6.1            | 9                 |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3             | 9:45  | 0.20             | 0.44 | 231.25        | 257              |       | 105      | 86  |      | 45       | 4.8            | 11                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 4             | 9:50  | 0.18             | 0.40 | 233.15        | 251              |       | 107      | 87  |      | 43       | 4.0            | 11                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 5             | 9:54  | 0.20             | 0.44 | 234.72        | 239              |       | 108      | 87  |      | 47       | 4.6            | 12                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 6             | 10:00 | 0.28             | 0.62 | 238.85        | 224              |       | 110      | 88  |      | 41       | 4.7            | 15                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 7             | 10:07 | 0.35             | 0.77 | 239.02        | 227              |       | 118      | 88  |      | 41       | 5.6            | 18                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|               | 10:08 |                  |      | 241.04        |                  |       |          |     |      |          |                |                   |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Total/Average |       |                  |      |               |                  |       |          |     |      |          |                |                   |                                                                                                                                                                                                                                                                                                                                                                                                                               |

Client/Location SCF A1m Unit S Test No. 7-PAH-N Method PAH Page 2  
 Sample Location North Fuel \_\_\_\_\_ Ambient Temp., °F \_\_\_\_\_ of \_\_\_\_\_  
 Operators CF Meter Vol. (Start/End) \_\_\_\_\_ 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  $\theta \Delta H = 1.0$  \_\_\_\_\_  
 Probe I.D. \_\_\_\_\_  
 Nozzle No./Dia \_\_\_\_\_  
 Filter No. \_\_\_\_\_  
 Weight \_\_\_\_\_  
 Leak Check: \_\_\_\_\_  
 Sample Train  
 CFM Vac. Init. Pitot IBS \_\_\_\_\_  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_  
 Pre-Test Calibration \_\_\_\_\_  
 Meter Meter Temp. \_\_\_\_\_  
 Time  $\Delta H$  Reading In Out \_\_\_\_\_  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |       |          |     | O <sub>2</sub> | Vacuum   | Static Press. twg | Test Summary                           |
|---------------|------|------------------|------------|---------------|------------------|-------|----------|-----|----------------|----------|-------------------|----------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Stack            | Probe | Meter In | Out | Oven           | Imp. Out |                   |                                        |
| 4-7           | 1010 | .16              | .35        | 241.046       | 237              |       | 100      | 88  |                | 49       | 8.0               | Initial                                |
| 6             | 1015 | .14              | .30        | 243.022       | 257              |       | 108      | 88  |                | 44       | 5.9               | Sample Vol., c.f.                      |
| 5             | 1019 | .16              | .35        | 244.158       | 264              |       | 101      | 88  |                | 44       | 5.8               | Stack Press, twg                       |
| 4             | 1024 | .16              | .35        | 246.132       | 255              |       | 105      | 88  |                | 45       | 5.5               | $\Delta P$ twg $\Delta H$ twg          |
| 3             | 1029 | .19              | .42        | 248.110       | 267              |       | 108      | 89  |                | 46       | 4.4               | Meter Temp., °F                        |
| 2             | 1032 | .22              | .48        | 249.87        | 270              |       | 111      | 89  |                | 45       | 4.2               | Stack Temp., °F                        |
| 1             | 1037 | .23              | .51        | 251.59        | 276              |       | 114      | 90  |                | 44       | 4.9               | Water Collected, g                     |
|               | 1040 |                  |            | 253.528       |                  |       | 107      | 91  |                | 52       |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 3-1           | 1046 | .29              | .64        | 252.528       | 287              |       | 107      | 91  |                | 52       | 5.5               | Chain of Cust. Info (Init.):           |
| 2             | 1051 | .28              | .62        | 256.25        | 279              |       | 116      | 92  |                | 46       | 4.8               | Impingers Loaded                       |
| 3             | 1055 | .26              | .57        | 251.831       | 279              |       | 117      | 94  |                | 45       | 4.6               | Impingers Recovered                    |
| 2             | 1100 | .19              | .42        | 260.049       | 271              |       | 115      | 94  |                | 46       | 4.8               | Filter Loaded                          |
| 5             | 1104 | .26              | .57        | 261.790       | 265              |       | 117      | 94  |                | 47       | 6.8               | Filter Recovered                       |
| 6             | 1109 | .16              | .35        | 264.077       | 271              |       | 115      | 94  |                | 17       | 15                | Probe Wash                             |
| 7             | 1113 | .17              | .37        | 268.915       | 265              |       | 113      | 94  |                | 49       | 8.6               | Comments:                              |
|               | 1118 |                  |            | 267.404       |                  |       |          |     |                |          |                   |                                        |
| Total/Average |      |                  |            |               |                  |       |          |     |                |          |                   |                                        |

Client/Location SCE/Argonne Unit A-5 Test No. 7-FAH-N Method FAH Page 3  
 Sample Location A-5 NORTH Fuel OLC Ambient Temp., °F      of 3  
 Operators CF/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.     

Leak Check:     

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

Pre-Test Calibration  
 Meter Meter Temp.       
 Time ΔH Reading In Out     

ΔH = 2.2 x DP

| Sample Point  | Time          | Meter Conditions |      |               | Temperatures, °F |          |     |      | Weight   |                | Static Press. lwg | Test Summary                           |
|---------------|---------------|------------------|------|---------------|------------------|----------|-----|------|----------|----------------|-------------------|----------------------------------------|
|               |               | ΔP               | ΔH   | Meter Reading | Probe            | Meter In | Out | Oven | Imp. Out | O <sub>2</sub> |                   |                                        |
| 2-7           | 1121          | 137              | .81  | 267.404       | 272              | 109      | 92  |      | 44       | 9.0            | 23                | Initial                                |
| -6            | 112530/114855 | 121              | .73  | 269.990       | 270              | 113      | 91  |      | 52       | 9.1            | 18                | Sample Vol., c.f.                      |
| -5            | 1148          | 155              | 1.24 | 273.692       | 284              | 120      | 91  |      | 48       | 6.9            | 18                | Stack Press, lwg                       |
| -4            | 115230        | 131              | .68  | 276.555       | 290              | 118      | 92  |      | 50       | 5.5            | 13                | ΔP lwg ΔH                              |
| -3            | 1157          | 133              | .73  | 278.900       | 297              | 118      | 92  |      | 52       | 5.0            | 13                | Meter Temp., °F                        |
| -2            | 120130        | 128              | .62  | 281.233       | 295              | 117      | 92  |      | 53       | 6.1            | 12                | Stack Temp., °F                        |
| -1            | 1206          | 118              | .40  | 283.381       | 299              | 112      | 92  |      | 54       | 8.3            | 9                 | Water Collected, g                     |
|               | 121030        |                  |      | 285.208       |                  |          |     |      |          |                |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 1-7           | 121330        | 115              | .33  | 285.208       | 276              | 100      | 92  |      | 58       | 9.3            | 8                 | Chain of Cust. Info (Init.):           |
| -6            | 1218          | 137              | .81  | 286.891       | 280              | 114      | 92  |      | 58       | 9.1            | 14                | Impingers Loaded                       |
| -5            | 122230        | 110              | .88  | 289.667       | 296              | 115      | 91  |      | 48       | 6.2            | 15                | Impingers Recovered                    |
| -4            | 1227          | 132              | .70  | 291.150       | 302              | 111      | 90  |      | 48       | 5.6            | 14                | Filter Loaded                          |
| -3            | 123130        | 128              | .62  | 294.390       | 299              | 114      | 90  |      | 48       | 5.2            | 13                | Filter Recovered                       |
| -2            | 1236          | 133              | .73  | 296.601       | 300              | 112      | 89  |      | 48       | 5.5            | 14                | Probe Wash                             |
| -1            | 124030        | 129              | .64  | 298.669       | 301              | 114      | 89  |      | 48       | 7.2            | 15                | Comments: Callmings                    |
|               | 1245          |                  |      | 301.079       |                  |          |     |      |          |                |                   | filter at Pl. 2-6                      |
| Total/Average |               |                  |      |               |                  |          |     |      |          |                |                   | as filter closed, leak                 |
|               |               |                  |      |               |                  |          |     |      |          |                |                   | Checked at 27" no w, 0246              |



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     |
| Liquid Vol (ml).....186.1             | * | from portable...6.48          |
| Meter Press (iwg).....0.69            | * | CO2 (%): from CEM.....12.25   |
|                                       | ● | calculated.....10.80          |
|                                       | * | 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).....          |   | 1,004,394 4.<br>1.00E+06      |
| Stack Flow Rate (dscfm).....          |   | 653,537                       |
| Isokinetic Ratio (%).....             |   | 95.65                         |

# PARTICULATE TEST DATA

Client/Location SCC / A/Ames, Tex Unit 5 Test No. 8-2AN-Sect Method 425 Page 1  
 Sample Location South West Fuel oil Ambient Temp., of 62 of 3  
 Operators W. Williams & M. Miller Meter Vol. (Start/End) 445.41-1531.572 Date 3/15/88

Pre Test Data:  
 Barometric Press, in. Hg 30.14 Equipment Info:  
 Stack Area, sq. ft. 480 Meter No. ES-8  
 Sample Time/ Pt, min. 45/105 Meter, Yd 1.00  
 Assumed Stack Press 2.7 Pitot, Cp .84  
 Assumed Moisture 9% CFH  $\Delta H = 1.0$  .558  
 Assumed Molecular Wt 29 Probe I.D. 7/16  
 Nozzle No./Dia 246 Impinger Box I.D. 246  
 Filter No. 47-213 Integrated Bag I.D. 47-213

Time  $\Delta H$  Reading In Out  
 Init. 47-213  
 Final 47-213

| Sample Point  | Time   | Meter Conditions |      |               | Temperatures, °F |       |          |     |      | Oil    |         | Static Press. twg | Test Summary |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|--------|------------------|------|---------------|------------------|-------|----------|-----|------|--------|---------|-------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |        | ΔP               | ΔH   | Meter Reading | Stack            | Probe | Meter In | Out | Over | Imp In | Imp Out |                   |              | Vacuum                                                                                                                                                                                                                                                                                                                                                                                                                           |
| START         | 1310   | .02              | .644 | 441.5         | 418              | 250   | N/A      | 53  | 80   | N/A    | 67      | 5.5               | 2            | Initial<br>Sample Vol., c.f. 86.04<br>Stack Press. twg 270<br>ΔP 297 twg ΔH 425 twg.<br>Meter Temp., °F 94.6<br>Stack Temp., °F 272.2<br>Water Collected, g 186.1<br>O <sub>2</sub> /CO <sub>2</sub> Method O <sub>2</sub> 6.48<br>Chain of Cust. Infr (Init.):<br>Impingers Loaded 2M<br>Impingers Recovered 9E<br>Filter Loaded 2M<br>Filter Recovered CF<br>Probe Wash JM/RP<br>Comments: CEMO204.85<br>CO <sub>2</sub> 12.25 |
| 1             | 1314   | .10              | .12  | 444.6         | 225              | 287   |          | 58  | 53   |        | 55      | 6.7               | 2            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2             | 1319   | .17              | .41  | 447.4         | 65               | 254   |          | 58  | 93   |        | 54      | 5.7               | 4            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3             | 1323   | .26              | .61  | 449.1         | 38               | 295   |          | 101 | 93   |        | 63      | 5.5               | 6            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4             | 1328   | .51              | .12  | 451.1         | 67               | 298   |          | 106 | 91   |        | 65      | 7.2               | 10           |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 5             | 1332   | .45              | .55  | 454.1         | 00               | 282   |          | 108 | 92   |        | 64      | 10.0              | 10           |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 6             | 1337   | .21              | .46  | 456.6         | 26               | 281   |          | 104 | 92   |        | 65      | 9.4               | 5            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| STOP          | 134130 |                  |      | 458.2         | 54               |       |          |     |      |        |         |                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| START         | 1345   | .38              | .83  | 458.3         | 51               | 289   |          | 93  | 91   |        | 58      | 8.4               | 8            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2             | 135330 | .43              | .94  | 460.6         | 81               | 286   |          | 102 | 91   |        | 50      | 6.4               | 7            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3             | 1358   | .26              | .57  | 462.1         | 87               | 302   |          | 103 | 91   |        | 47      | 5.5               | 8            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4             | 140230 | .71              | .41  | 465.0         | 30               | 300   |          | 99  | 90   |        | 48      | 5.6               | 5            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 5             | 1407   | .29              | .63  | 466.8         | 62               | 289   |          | 91  | 80   |        | 48      | 5.8               | 7            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 6             | 141130 | .16              | .35  | 468.9         | 50               | 286   |          | 98  | 89   |        | 48      | 5.0               | 3            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 7             | 1416   | .10              | .20  | 470.5         | 87               | 285   |          | 54  | 89   |        | 50      |                   | 3            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| STOP          | 142038 |                  |      | 471.6         | 45               |       |          |     |      |        |         |                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| START         | 142330 | .25              | .58  | 471.6         | 45               | 274   |          | 91  | 87   |        | 50      | 7.6               | 6            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3             | 1428   | .22              | .48  | 473.7         | 21               | 289   |          | 97  | 88   |        | 48      | 5.8               | 5            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Total/Average |        |                  |      |               |                  |       |          |     |      |        |         |                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                  |

EST DS-022

Initial  
 Sample Vol., c.f. 86.04  
 Stack Press, twg 270  
 $\Delta P$  297 twg  $\Delta H$  475 twg  
 Meter Temp., °F 94.6  
 Stack Temp., °F 272.2  
 Water Collected, g 186.1  
 O<sub>2</sub>/CO<sub>2</sub> Method O<sub>2</sub> 6.48  
 Chain of Cust. Init. (Init.):  
 Impingers Loaded AM  
 Impingers Recovered 9E  
 Filter Loaded AM  
 Filter Recovered CF  
 Probe Wash JM/RP  
 Comments: CEM O<sub>2</sub> 4.35  
CO<sub>2</sub> 12.25

# PARTICULATE TEST DATA

Client/Location SCE/Plamites Unit 5 Test No. 61 South Method 425 Page 2  
 Sample Location South West Fuel oil Ambient Temp., °F \_\_\_\_\_ of \_\_\_\_\_  
 Operators L.M. / C.E. Meter Vol. (Start/End) \_\_\_\_\_ Date 5/15/80

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. 11 Imp. Matl. Oil Weight (Start) (g) \_\_\_\_\_  
 Meter, Yd \_\_\_\_\_  
 Pilot, Cp \_\_\_\_\_  
 CFM 24.1 I.D. \_\_\_\_\_  
 Probe I.D. \_\_\_\_\_  
 Nozzle No./Dia \_\_\_\_\_  
 Filter No. \_\_\_\_\_

Leak Check:  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_

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

Pre-Test Calibration  
 Meter Meter Temp.  
 Time ΔH Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time   | Meter Conditions |      |               | Temperatures, °F |          |           |      | Coil     |                | Static Press. twg | Test Summary                           |
|---------------|--------|------------------|------|---------------|------------------|----------|-----------|------|----------|----------------|-------------------|----------------------------------------|
|               |        | ΔP               | ΔH   | Meter Reading | Probe            | Meter In | Meter Out | Aven | Imp. Out | O <sub>2</sub> |                   |                                        |
| 3-5           | 143230 | .24              | .52  | 475.587       | N/A              | 95       | 89        | N/A  | 48       | 5.2            |                   | Initial                                |
| 4             | 1437   | .22              | .48  | 477.38        |                  | 95       | 90        |      | 52       | 5.4            |                   | Sample Vol., c.f.                      |
| 3             | 144130 | .20              | .44  | 478.76        |                  | 95       | 90        |      | 45       | 5.6            |                   | Stack Press, twg                       |
| 2             | 1446   | .21              | .46  | 481.028       |                  | 95       | 90        |      | 50       | 6.1            |                   | ΔP twg ΔH twg                          |
| Start         | 145030 |                  |      | 482.801       |                  |          |           |      |          |                |                   | Meter Temp., °F                        |
| Start         | 1454   | .15              | .33  | 482.801       |                  | 90       | 85        |      | 54       | 8.1            |                   | Stack Temp., °F                        |
| 4-7           | 145830 | .20              | .44  | 483.86        |                  | 96       | 88        |      | 46       | 6.8            |                   | Water Collected, g                     |
| 1             | 1503   | .22              | .48  | 485.951       |                  | 97       | 88        |      | 46       | 5.9            |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 5             | 150730 | .26              | .57  | 487.761       |                  | 97       | 88        |      | 45       | 5.8            |                   | Chain of Cust. Info (Init.):           |
| 4             | 1512   | .31              | .68  | 489.804       |                  | 98       | 87        |      | 47       | 4.5            |                   | Impingers Loaded                       |
| 3             | 151630 | .25              | .71  | 491.910       |                  | 99       | 87        |      | 43       | 5.1            |                   | Impingers Recovered                    |
| 2             | 1521   | .25              | .55  | 494.151       |                  | 99       | 87        |      | 43       | 5.7            |                   | Filter Loaded                          |
| Stop          | 152520 |                  |      | 496.140       |                  |          |           |      |          |                |                   | Filter Recovered                       |
| Start         | 152930 | .20              | .76  | 496.140       |                  | 101      | 87        |      | 45       | 7.8            |                   | Probe Wash                             |
| 5-7           | 1534   | .50              | 1.1  | 499.151       |                  | 106      | 88        |      | 44       | 5.5            |                   | Comments:                              |
| 6             | 153850 | .45              | .99  | 502.208       |                  | 105      | 88        |      | 45       | 5.1            |                   |                                        |
| 5             | 1543   | .43              | .54  | 504.636       |                  | 105      | 86        |      | 48       | 4.8            |                   |                                        |
| 4             | 154730 | .47              | 1.03 | 507.125       |                  | 105      | 87        |      | 43       | 5.1            |                   |                                        |
| Total/Average |        |                  |      |               |                  |          |           |      |          |                |                   |                                        |

# PARTICULATE TEST DATA

Client/Location SCE/Aluminum Unit 5 Test No. 8-PAH-5 Method 427 Page 3  
 Sample Location South West Fuel Oil Ambient Temp., °F    of     
 Operators Sh/CP Meter Vol. (Start/End)    1 Date   

Pre Test Data: Equipment Info: Weight Weight  
 Barometric Press, in. Hg    Imp. Mat'l (Start) (g) Leak Check:     
 Stack Area, sq. ft.    Meter No. 1076  
 Sample Time/ Pt. min.    Meter, Yd     
 Assumed Stack Press    Pitot, in.    CPM Vac. Init. Pitot IBS  
 Assumed Moisture    CPM  $\Delta H$  1.0    Pre-Test     
 Assumed Molecular Wt    Probe I.D.    Post-Test     
 Nozzle No./Dia    Impinger Box I.D.    Pre-Test Calibration  
 Filter No.    Integrated Bag I.D.    Meter Meter Temp.  
 Time  $\Delta H$  Reading In Out  
 Init.    Final   

| Sample Point  | Meter Conditions |            |            | Temperatures, °F |       |       |          | Vacuum | Static Press. twg | Test Summary                           |
|---------------|------------------|------------|------------|------------------|-------|-------|----------|--------|-------------------|----------------------------------------|
|               | Time             | $\Delta P$ | $\Delta H$ | Meter Reading    | Stack | Probe | Meter In | Out    | Imp. Out          |                                        |
| 3             | 1552             | .52        | 11         | 509.688          | 265   | N/A   | 106      | 88     | 44                | Initial                                |
| 2             | 155420           | .41        | .61        | 512.198          | 261   |       | 106      | 88     | 44                | Sample Vol., c.f.                      |
| Stack 1       | 1601             |            |            | 514.364          |       |       |          |        |                   | Stack Press, twg                       |
| Stack 2       | 160320           | .59        | .85        | 514.364          | 218   |       | 97       | 87     | 47                | $\Delta P$ twg $\Delta H$ twg          |
| 7             | 1608             | .55        | 1.21       | 516.598          | 230   |       | 105      | 88     | 46                | Meter Temp., °F                        |
| 1             | 161230           | .44        | .96        | 515.305          | 250   |       | 105      | 89     | 46                | Stack Temp., °F                        |
| 5             | 1617             | .40        | .90        | 522.157          | 255   |       | 105      | 89     | 44                | Water Collected, g                     |
| 4             | 162130           | .50        | 1.1        | 524.651          | 258   |       | 105      | 88     | 47                | O <sub>2</sub> /CO <sub>2</sub> Method |
| 3             | 1626             | .55        | .77        | 527.110          | 254   |       | 104      | 89     | 47                | Chain of Cust. Info (Init.):           |
| 2             | 163030           | .24        | .62        | 529.538          | 248   |       | 103      | 88     | 46                | Impingers Loaded                       |
| Stack 1       | 1635             |            |            | 531.522          |       |       |          |        |                   | Impingers Recovered                    |
|               |                  |            |            |                  |       |       |          |        |                   | Filter Loaded                          |
|               |                  |            |            |                  |       |       |          |        |                   | Filter Recovered                       |
|               |                  |            |            |                  |       |       |          |        |                   | Probe Wash                             |
|               |                  |            |            |                  |       |       |          |        |                   | Comments:                              |
| Total/Average |                  |            |            |                  |       |       |          |        |                   |                                        |

# PARTICULATE TEST DATA

Client/Location SCE/Alamitos Unit 5 Test No. Field blank Method PAH Page 1  
 Sample Location \_\_\_\_\_ Fuel \_\_\_\_\_ Ambient Temp., °F \_\_\_\_\_ of \_\_\_\_\_  
 Operators \_\_\_\_\_ Meter Vol. (Start/End) 1 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  $\theta \Delta H = 1.0$  \_\_\_\_\_  
 Probe I.D. \_\_\_\_\_  
 Nozzle No./Dia .246 \_\_\_\_\_  
 Filter No. 47-181 \_\_\_\_\_  
Module - not numbered

Imp. Matl Wt(End) (Start) (g) \_\_\_\_\_  
 #1 \_\_\_\_\_  
 #2 \_\_\_\_\_  
 #3 \_\_\_\_\_  
 #4 \_\_\_\_\_  
 Total \_\_\_\_\_  
 Impinger Box I.D. \_\_\_\_\_  
 Integrated Bag I.D. \_\_\_\_\_

Weight Weight  
 Leak Check: \_\_\_\_\_  
 Sample Train  
 CFM Vac. Init. Pitot IDS  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_  
 Pre-Test Calibration  
 Meter Meter Temp.  
 Time  $\Delta H$  Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Meter Conditions |            |            | Temperatures, °F |       |       |          |     | O <sub>2</sub> | Vacuum   | Static Press. $\Delta H$ | Test Summary                           |
|---------------|------------------|------------|------------|------------------|-------|-------|----------|-----|----------------|----------|--------------------------|----------------------------------------|
|               | Time             | $\Delta P$ | $\Delta H$ | Meter Reading    | Stack | Probe | Meter In | Out | Oven           | Imp. Out |                          |                                        |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Initial                                |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Sample Vol., c.f.                      |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Stack Press, $\Delta H$                |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | $\Delta P$ $\Delta H$ $\Delta H$       |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Meter Temp., °F                        |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Stack Temp., °F                        |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Water Collected, g                     |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | O <sub>2</sub> /CO <sub>2</sub> Method |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Chain of Cust. Info (Init.):           |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Impingers Loaded <u>MM</u>             |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Impingers Recovered <u>AM</u>          |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Filter Loaded <u>AB</u>                |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Filter Recovered <u>JR</u>             |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Probe Wash                             |
|               |                  |            |            |                  |       |       |          |     |                |          |                          | Comments:                              |
| Total/Average |                  |            |            |                  |       |       |          |     |                |          |                          |                                        |

# CLIENT INFORMATION

Name: ENERGY SYSTEMS ASSOCIATES

## LAB INFORMATION

Contact: OC

Project: AN898506

Date: Apr. 30 1990

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

Client ID:  
 Lab ID:

| Component              | MDL   | Units |
|------------------------|-------|-------|
| Naphthalene            | 0.025 | ug    |
| Acenaphthylene         | 0.025 |       |
| Acenaphthene           | 0.025 |       |
| Fluorene               | 0.025 |       |
| Phenanthrene           | 0.025 |       |
| Anthracene             | 0.025 |       |
| Fluoranthene           | 0.025 |       |
| Pyrene                 | 0.025 |       |
| 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 |       |

## Surrogate Recoveries %

d10 Acenaphthene  
 d10 Anthracene  
 d12 Chrysene  
 d12 Benzo(a)pyrene

FIELD  
 BLANK  
 006451 90 006452 90 006453 90 006454 90

|       |       |       |       |
|-------|-------|-------|-------|
| 13    | 20    | 19    | 24    |
| <     | <     | <     | <     |
| <     | 2.3   | 1.7   | 0.27  |
| <     | 0.099 | 0.078 | 0.058 |
| 0.052 | 0.14  | 0.16  | 0.086 |
| 0.048 | 0.078 | 0.052 | 0.059 |
| <     | <     | 0.039 | <     |
| <     | <     | 0.028 | <     |
| <     | <     | <     | <     |
| <     | <     | <     | <     |
| <     | <     | <     | <     |
| <     | <     | <     | <     |
| <     | <     | <     | <     |
| 0.04  | <     | <     | <     |
| 110   | 95    | 87    | 49    |
| 98    | 67    | 18    | 64    |
| 130   | 130   | 150   | 98    |
| 100   | 71    | 10    | 71    |

Extra

## 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-MtIs-No | 12.00    | 41.35 | 5.51 | 503445  | 10.25 | 1.93E-02 | 7.87E-06 |
| 2-MtIs-So | 46.00    | 53.47 | 6.09 | 627634  | 30.38 | 7.14E-02 | 2.42E-05 |
| 3-MtIs-No | 17.00    | 52.88 | 6.68 | 623384  | 11.35 | 2.65E-02 | 9.43E-06 |
| 3-MtIs-So | 21.00    | 57.62 | 6.44 | 633724  | 12.87 | 3.05E-02 | 1.05E-05 |
| 5-MtIs-No | 23.00    | 55.37 | 5.99 | 630002  | 14.67 | 3.46E-02 | 1.16E-05 |
| 5-MtIs-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 |



Energy Systems Associates A CORPORATION

15991 RED HILL AVE., SUITE 110, TUSTIN, CALIFORNIA 92680

SUBJECT Metals Comparisons for CARB - Alamitos JOB NO. 53304SHEET NO. 1 of 1COMPUTED BY L. Green DATE 5-21-90 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

Stack 16/hr = avg of 3 duct tests X 2

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

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

|        |                  | <u>16/hr</u>     |                  |                  |                  |                  |      |                  |                                        |                  |      |
|--------|------------------|------------------|------------------|------------------|------------------|------------------|------|------------------|----------------------------------------|------------------|------|
|        |                  | As               | Be               | Cd               | Cu               | Pb               | Mn   | Hg               | Ni                                     | Se               | Zn   |
| Set #1 | 888              | 5.2              | 8.88             | 4.46             | 1.08             | 2.16             | 1.69 | 2.30             | 1.69                                   | 2.66             | 1.84 |
|        | <del>17.2</del>  | $\times 10^{-4}$ | $\times 10^{-3}$ | $\times 10^{-2}$ | $\times 10^{-1}$ | $\times 10^{-1}$ |      | $\times 10^{-2}$ | <del><math>\times 10^{-1}</math></del> | $\times 10^{-2}$ |      |
| Avg    | 17.2             |                  |                  |                  |                  |                  |      |                  |                                        |                  |      |
|        | $\times 10^{-2}$ |                  |                  |                  |                  |                  |      |                  |                                        |                  |      |
| Set #2 | 6.38             | 12.5             | 6.94             | 9.1              | 1.39             | 0.67             | 1.72 | 2.22             | 1.72                                   | 1.23             | 3.34 |
|        | $\times 10^{-2}$ | $\times 10^{-4}$ | $\times 10^{-3}$ | $\times 10^{-2}$ | $\times 10^{-1}$ | $\times 10^{-1}$ |      | $\times 10^{-2}$ | $\times 10^{-2}$                       | $\times 10^{-2}$ |      |
| Avg    |                  |                  |                  |                  |                  |                  |      |                  |                                        |                  |      |

\* Includes one abnormally high result

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



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SUBJECT Metals Summary SCE Alamos JOB NO. 53304

COMPUTED BY R. Green DATE 5/8/90 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

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

\* only front half value - back half contaminated



SUBJECT

Alamitos Metals Calculations  
Arsenic

JOB NO.

53304

SHEET NO.

1 of 1

COMPUTED BY

L. Green

DATE

5/8/90

CHECKED BY

DATE

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

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

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

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

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

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

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

Note: 5% of sample removed for Hg analysis.

1/10. L... it was sent to MSA - did <sup>EPA</sup> method 6010



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SUBJECT

Alamitas Metals Calculations  
Beryllium

JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY

L. Green

DATE

5/8/90

CHECKED BY

DATE

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

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

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

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

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

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

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

Note: 5% of sample removed for Hg analysis.



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SUBJECT

Alamitas Metals Calculations  
Cadmium

JOB NO.

53304

SHEET NO.

1 of 1

COMPUTED BY

L. Green

DATE

5/8/90

CHECKED BY

DATE

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

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

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

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

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

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

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

Note: 5% of sample removed for Hg analysis.



Energy Systems Associates A CORPORATION

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SUBJECT

Alamitas Metals Calculations  
— Copper —

JOB NO.

53304

SHEET NO.

1 of 1

COMPUTED BY

L. Green

DATE

5/8/90

CHECKED BY

DATE

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

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

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

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

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

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

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

Note: 5% of sample removed for Hg analysis.





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SUBJECT Alamitos Metals Calculations JOB NO. 53304  
Lead

COMPUTED BY L. Green DATE 5/8/90 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
SHEET NO. 1 of 1

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

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

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

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

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

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

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

Note: 5% of sample removed for Hg analysis.



Energy Systems Associates A CORPORATION

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SUBJECT

Alamitas Metals Calculations

JOB NO.

53304

SHEET NO.

1 of 1

COMPUTED BY

L. Green

DATE

5/8/90

CHECKED BY

DATE

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

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

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

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

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

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

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

Note: 5% of sample removed for Hg analysis.

\* Very high due to back-flush of KMnO<sub>4</sub> impinger

N → L 1 00 -- off rd. -- impinger not too usable



SUBJECT

SCE Alamitos Hg Calculation

JOB NO.

53304

SHEET NO.

1 of 1

COMPUTED BY

R. Green

DATE

5-8-90

CHECKED BY

DATE

$$Hg (ug/train) = (Probe + Filter - RB) + (Impinger - RB) + (KMnO_4 - RB)$$

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

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

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

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

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

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



SUBJECT

Alamitos Metals Calculations  
Nickel

JOB NO. 53304

SHEET NO. 1 of 1

COMPUTED BY

L. Green

DATE

5/8/90

CHECKED BY

DATE

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

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

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

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

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

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

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

Note: 5% of sample removed for Hg analysis.

SUBJECT Alamitas Metals Calculations JOB NO. 53304  
SeleniumCOMPUTED BY L. Green DATE 5/8/90 CHECKED BY \_\_\_\_\_ SHEET NO. 1 of 1 DATE \_\_\_\_\_

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

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

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

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

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

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

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

Note: 5% of sample removed for Hg analysis.



SUBJECT Alamitas Metals Calculations JOB NO. 53304  
Zinc

COMPUTED BY L. Green DATE 5/8/90 CHECKED BY \_\_\_\_\_ SHEET NO. 1 of 1 DATE \_\_\_\_\_

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

$$2\text{MHSN} = \frac{(1300 - 830) + (32 - 1.9)}{.95} = 526$$

$$2\text{MHS S} = \frac{(2500 - 830) + (12 - 1.9)}{.95} = \frac{1768}{.95} = 1861$$

$$3\text{MHSN} = \frac{(1400 - 830) + (27 - 1.9)}{.95} = 626$$

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

$$5\text{MHSN} = \frac{(1600 - 830) + (12 - 1.9)}{.95} = 821$$

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

Note: 5% of sample removed for Hg analysis.



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

SUBJECT Metal Detection Limits - Alamitos JOB NO. C3304

SHEET NO. 01

COMPUTED BY P. Green DATE 5-12-90 CHECKED BY                      DATE                     

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

|        | $\frac{\text{ug/train}}{.95}$                    | $\frac{\text{ug/m}^3 *}{0.5}$ |
|--------|--------------------------------------------------|-------------------------------|
| 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 Cu | $1.25 \text{ ug} \times 2 = 2.5$                 | 1.3                           |
| Hex Cu | $.0014 \text{ ug/ml} \times 290 \times 2 = 0.81$ | 0.4                           |

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      |
| Liquid Vol (ml).....95.0              | * | from portable...        | 5.51      |
| Meter Press (iwg).....0.43            | * | CO2 (%): from CEM.....  | 12.20     |
|                                       | * | calculated.....         | 11.81     |
|                                       | * | 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 Unit S Test No. 2-MT1-N Method Metals Page 1  
 Sample Location North Fuel Oil Ambient Temp., °F \_\_\_\_\_ of \_\_\_\_\_  
 Operators CE/RP Meter Vol. (Start/End) 51856 / 194322 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. E-5-8  
 Motor, Yd .990  
 Pitot, Cp .84  
 CFM @ ΔH = 1.0 1598  
 Probe I.D. 16  
 Nozzle No./Dia 7-242  
 Filter No. T47-229

Leak Check:

Imp. Matl Wt(End) (Start) (g)  
 #1 HN02 6223 - 5900 = 323  
 #2 HN02 6155 - 6155 = 0  
 #3 KM04 6121 - 6172 = -51  
 #4 KM04 5856 - 5852 = 4  
 Total 56 8076 - 8076 = 0  
 Impinger Box I.D. \_\_\_\_\_  
 Integrated Bag I.D. \_\_\_\_\_

Sample Train  
 CFM Vac. Init. Pitot INS  
 Pre-Test .018 20 CF CF  
 Post-Test .018 26 CF CF  
 Pre-Test Calibration

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

| Sample Point  | Time | Meter Conditions |      |               | Temperatures, °F |          |     |      | Static Press. fwg | Test Summary                                       |
|---------------|------|------------------|------|---------------|------------------|----------|-----|------|-------------------|----------------------------------------------------|
|               |      | ΔP               | ΔH   | Meter Reading | Probe            | Meter In | Out | Oven |                   |                                                    |
| 6-7           | 905  | .33              | .66  | 151.856       | 215              | 58       | 57  | -    | 45                | Initial                                            |
| 6             | 908  | .22              | .44  | 152.60        | 216              | 62       | 57  | -    | 46                | Sample Vol., c.f. <u>42.476</u>                    |
| 5             | 911  | .28              | .76  | 154.81        | 219              | 67       | 57  | -    | 46                | Stack Press. fwg <u>42.7</u>                       |
| 4             | 914  | .33              | .66  | 156.25        | 227              | 70       | 58  | -    | 46                | ΔP <u>1723</u> fwg ΔH <u>.43</u> fwg               |
| 3             | 917  | 0.01             | 0.02 | 157.45        | 242              | 64       | 59  | -    | 46                | Meter Temp., °F <u>76.6</u>                        |
| 2             | 920  | 0                | 0    | 157.54        |                  |          |     |      |                   | Stack Temp., °F <u>262.3257</u>                    |
| 1             | 920  | 0                | 0    | 157.54        |                  |          |     |      |                   | Water Collected, g <u>95.0</u>                     |
| 51            | 923  | 0                | 0    | 157.54        | 254              | 65       | 61  | -    | 46                | O <sub>2</sub> /CO <sub>2</sub> Method <u>5.51</u> |
| 2             | 923  | 0.04             | .08  | 158.54        | 252              | 68       | 62  | -    | 42                | Chain of Cust. Info (Init.):                       |
| 3             | 926  | .07              | .14  | 158.20        | 253              | 70       | 62  | -    | 41                | Impingers Loaded <u>CF</u>                         |
| 4             | 929  | .07              | .14  | 158.73        | 245              | 71       | 63  | -    | 42                | Impingers Recovered <u>CF</u>                      |
| 5             | 932  | 0.13             | .26  | 159.50        | 244              | 76       | 65  | -    | 46                | Filter Loaded <u>CF</u>                            |
| 6             | 935  | .17              | .34  | 160.52        | 236              | 78       | 66  | -    | 44                | Filter Recovered <u>1204</u>                       |
| 7             | 938  | .17              | .34  | 161.22        | 239              | 80       | 67  | -    | 43                | Probe Wash <u>CF/RP</u>                            |
|               | 941  |                  |      | 162.24        |                  |          |     |      |                   | Comments: <u>CEM: 0.50%</u>                        |
| Total/Average |      |                  |      |               |                  |          |     |      |                   | <u>CO<sub>2</sub> 12.2%</u>                        |

Client/Location SCE Alm Unit 5 Test No. 2-MH-N Method Metals Page 2  
 Sample Location #5 North Fuel 0.7 Ambient Temp., °F \_\_\_\_\_ of 3  
 Operators CE/RP Meter Vol. (Start/End) \_\_\_\_\_ Date 2-12-90

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  $\theta \Delta H = 1.0$  \_\_\_\_\_  
 Probe I.D. \_\_\_\_\_  
 Nozzle No./Dia \_\_\_\_\_  
 Filter No. \_\_\_\_\_  
 Imp. Matl \_\_\_\_\_  
 Wt(End) (Start) (g) \_\_\_\_\_  
 Leak Check: \_\_\_\_\_  
 Sample Train  
 CFM Vac. \_\_\_\_\_  
 Init. Pitot IBS \_\_\_\_\_  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_  
 Pre-Test Calibration \_\_\_\_\_  
 Meter Meter Temp. \_\_\_\_\_  
 Time  $\Delta H$  Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Meter Conditions |            |            | Temperatures, °F |       |       |          | O <sub>2</sub> |      | Vacuum   | Static Press. twg | Test Summary                           |
|---------------|------------------|------------|------------|------------------|-------|-------|----------|----------------|------|----------|-------------------|----------------------------------------|
|               | Time             | $\Delta P$ | $\Delta H$ | Meter Reading    | Stack | Probe | Meter In | Out            | Oven | Imp. Out |                   |                                        |
| 41            | 947              | .09        | .18        | 162.24           | 252   |       | 72       | 68             |      | 48       |                   | Initial                                |
| 2             | 950              | .09        | .18        | 163.05           | 251   |       | 76       | 69             |      | 49       |                   | Sample Vol., c.f.                      |
| 3             | 953              | .07        | .14        | 163.93           | 250   |       | 76       | 70             |      | 48       |                   | Stack Press, twg                       |
| 4             | 956              | .10        | .20        | 164.62           | 240   |       | 77       | 70             |      | 49       |                   | $\Delta P$ twg $\Delta H$ twg          |
| 5             | 959              | .02        | .04        | 165.62           | 239   |       | 77       | 70             |      | 51       |                   | Meter Temp., °F                        |
| 6             | 1022             | .02        | .04        | 165.80           | 226   |       | 72       | 71             |      | 51       |                   | Stack Temp., °F                        |
| 7             | 1004             | 0          | 0          | 166.027          |       |       | 71       | 68             |      | 51       |                   | Water Collected, g                     |
|               | 1004             |            |            | 166.027          |       |       |          |                |      |          |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 31            | 1012             | .06        | .12        | 166.027          | 266   |       | 72       | 71             |      | 50       |                   | Chain of Cust. Info (init.):           |
| 2             | 1015             | .28        | .56        | 166.65           | 266   |       | 76       | 72             |      | 47       |                   | Impingers Loaded                       |
| 3             | 1018             | .23        | .46        | 168.12           | 255   |       | 84       | 73             |      | 46       |                   | Impingers Recovered                    |
| 4             | 1021             | .20        | .40        | 169.14           | 252   |       | 83       | 72             |      | 45       |                   | Filter Loaded                          |
| 5             | 1024             | .36        | .72        | 170.38           | 256   |       | 85       | 72             |      | 47       |                   | Filter Recovered                       |
| 6             | 1027             | .47        | .94        | 171.85           | 255   |       | 88       | 72             |      | 48       |                   | Probe Wash                             |
| 7             | 1030             | .35        | .66        | 172.55           |       |       |          |                |      | 54       |                   | Comments:                              |
|               | 1032             |            |            | 174.855          |       |       |          |                |      |          |                   |                                        |
| Total/Average |                  |            |            |                  |       |       |          |                |      |          |                   |                                        |

Client/Location SCE Alm Unit S Test No. 2-MH-N Method Metals Page 2  
 Sample Location 45 No. 7h Fuel 0.1 Ambient Temp., °F 3 of 3  
 Operators CE/KP Meter Vol. (Start/End) 1 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  $\theta \Delta H = 1.0$  \_\_\_\_\_  
 Probe I.D. \_\_\_\_\_  
 Nozzle No./Dia \_\_\_\_\_  
 Filter No. \_\_\_\_\_  
 Imp. Matl \_\_\_\_\_  
 Wt(End) (Start) (g) \_\_\_\_\_  
 Weight \_\_\_\_\_  
 Leak Check: \_\_\_\_\_  
 Sample Train \_\_\_\_\_  
 CFM Vac. Inft. Pitot IBS \_\_\_\_\_  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_  
 Pre-Test Calibration \_\_\_\_\_  
 Meter Meter Temp. \_\_\_\_\_  
 Time  $\Delta H$  Reading In Out \_\_\_\_\_  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |          |     |      | Static Press. 1wg | Test Summary                           |
|---------------|------|------------------|------------|---------------|------------------|----------|-----|------|-------------------|----------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Probe            | Meter In | Out | Oven |                   |                                        |
| 2-1           | 1038 | .24              | .48        | 174.855       | 281              | 82       | 77  |      |                   | Initial                                |
| 2             | 1041 | .76              | .22        | 176.20        | 289              | 88       | 78  |      |                   | Sample Vol., c.f.                      |
| 3             | 1044 | .26              | .52        | 177.05        | 285              | 91       | 79  |      |                   | Stack Press, 1wg                       |
| 4             | 1047 | .28              | .54        | 178.20        | 285              | 92       | 79  |      |                   | $\Delta P$ 1wg $\Delta H$              |
| 5             | 1050 | .50              | 1.0        | 179.90        | 267              | 96       | 80  |      |                   | Meter Temp., °F                        |
| 6             | 1052 | .65              | 1.3        | 181.8         | 262              | 98       | 80  |      |                   | Stack Temp., °F                        |
| 7             | 1056 | .50              | 1.0        | 183.9         | 251              | 98       | 80  |      |                   | Water Collected, g                     |
|               | 1059 |                  |            | 184.775       |                  |          |     |      |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 1-1           | 1103 | .28              | .36        | 184.775       | 290              | 84       | 80  |      |                   | Chain of Cust. Info (Inft.):           |
| 2             | 1106 | .40              | .80        | 186.37        | 293              | 94       | 81  |      |                   | Impingers Loaded                       |
| 3             | 1109 | .32              | .64        | 187.65        | 292              | 96       | 81  |      |                   | Impingers Recovered                    |
| 4             | 1112 | .32              | .64        | 188.75        | 295              | 97       | 82  |      |                   | Filter Loaded                          |
| 5             | 1115 | .43              | .84        | 180.05        | 289              | 98       | 82  |      |                   | Filter Recovered                       |
| 6             | 1118 | .42              | .84        | 191.75        | 272              | 100      | 82  |      |                   | Probe Wash                             |
| 7             | 1121 | .18              | .36        | 193.42        | 278              | 96       | 83  |      |                   | Comments:                              |
| End           | 1124 |                  |            | 194.332       |                  |          |     |      |                   |                                        |
| Total/Average |      |                  |            |               |                  |          |     |      |                   |                                        |

CARNOT

03/19/90

## 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      |
| Liquid Vol (ml).....                  | 123.4    | from portable...        | 6.09      |
| Meter Press (iwg).....                | 0.58     | CO2 (%): from CEM.....  | 12.20     |
|                                       |          | calculated.....         | 11.36     |
|                                       |          | 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 SCF / Alamos Unit 5 Test No. 2-MH-5 Method 12/10/1A Page 1  
Sample Location South Fuel oil Ambient Temp., OF 50 of 3  
Operators C. Mulligan & L. Farrington Meter Vol. (Start/End) 229.1757-234.634 Date 4/13/60

Pre Test Data:  
Barometric Press, in. Hg 30.35  
Stack Area, sq. ft. 1  
Sample Time/ Pt, min. 3/  
Assumed Stack Press 38  
Assumed Moisture 28  
Assumed Molecular Wt 29

Equipment Info:  
Meter No. 45-19  
Meter, Yd 1.00  
Pitot, Cp .84  
CFM @  $\Delta H = 1.0$  555  
Probe I.D. 1.246  
Nozzle No./Dia 1246  
Filter No. 147-228

Weight Weight  
Imp. Matl Mt.(End) (Start) (g)  
#1 AN<sub>2</sub> 206.6 - 602.7 = 103.7  
#2 HNO<sub>3</sub> 208.3 - 459.3 = 126.0  
#3 KMnO<sub>4</sub> 547.0 - 626.8 = 79.8  
#4 KMnO<sub>4</sub> 553.0 - 555.2 = 42.2  
Total SG 226.8 - 811.2 = 15.6  
Impinger Box I.D. \_\_\_\_\_  
Integrated Bag I.D. \_\_\_\_\_

Leak Check:  
CFM Vac. Init. Pitot 195  
Pre-Test .015 15 14 OK  
Post-Test .015 20 14 OK

Pre-Test Calibration  
Meter Meter Temp.  
Time  $\Delta H$  Reading In Out  
Init. \_\_\_\_\_  
Final \_\_\_\_\_

$\Delta H = 2.06$

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, OF |          |     |      | Static Press. 1wg | Test Summary                                       |
|---------------|------|------------------|------------|---------------|------------------|----------|-----|------|-------------------|----------------------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Probe            | Meter In | Out | Aven |                   |                                                    |
| Start         | 9:06 | .07              | .14        | 979.375       | 276              | 70       | 86  | 142  |                   | Initial                                            |
| 1-7           | 9:08 | .44              | .50        | 980.068       | 281              | 93       | 68  | 51   |                   | Sample Vol., c.f. <u>55.25</u>                     |
| 2             | 9:12 | .45              | .10        | 981.612       | 284              | 96       | 65  | 50   |                   | Stack Press. 1wg <u>2.7</u>                        |
| 3             | 9:15 | .27              | .55        | 983.351       | 298              | 95       | 70  | 51   |                   | $\Delta P$ <u>278</u> 1wg $\Delta H$ <u>58</u> 1wg |
| 4             | 9:18 | .19              | .39        | 984.876       | 298              | 83       | 70  | 51   |                   | Meter Temp., OF <u>85.5</u>                        |
| 5             | 9:21 | .12              | .27        | 985.832       | 291              | 87       | 71  | 52   |                   | Stack Temp., OF <u>271.3</u>                       |
| 6             | 9:24 | .05              | .10        | 986.792       | 294              | 89       | 72  | 52   |                   | Water Collected, g <u>123.4</u>                    |
| Stop 1        | 9:27 |                  |            | 987.332       |                  |          |     |      |                   | O <sub>2</sub> /CO <sub>2</sub> Method <u>6.19</u> |
| Start         | 9:29 | .06              | .12        | 987.332       | 282              | 74       | 71  | 54   |                   | Chain of Cust. Info (Init.):                       |
| 2-7           | 9:32 | .17              | .35        | 988.021       | 284              | 83       | 72  | 54   |                   | Impingers Loaded <u>65</u>                         |
| 1             | 9:35 | .21              | .43        | 989.012       | 289              | 86       | 72  | 53   |                   | Impingers Recovered <u>65</u>                      |
| 2             | 9:38 | .18              | .37        | 990.257       | 296              | 90       | 73  | 52   |                   | Filter Loaded <u>65</u>                            |
| 3             | 9:41 | .22              | .45        | 991.283       | 302              | 89       | 73  | 52   |                   | Filter Recovered <u>60M</u>                        |
| 4             | 9:44 | .42              | .86        | 992.465       | 300              | 94       | 74  | 52   |                   | Probe Wash <u>17/15</u>                            |
| 5             | 9:47 | .25              | .51        | 993.561       | 286              | 92       | 73  | 51   |                   | Comments: <u>CEM<sub>02</sub> 5.0%</u>             |
| 6             | 9:50 |                  |            | 994.857       |                  |          |     |      |                   | <u>CO<sub>2</sub> 12.2%</u>                        |
| Stop 2        | 9:55 | .19              | .37        | 994.857       | 287              | 79       | 73  | 56   |                   |                                                    |
| 1             | 9:58 | .22              | .45        | 996.085       | 290              | 86       | 73  | 54   |                   |                                                    |
| Total/Average |      |                  |            |               |                  |          |     |      |                   |                                                    |

# PARTICULATE TEST DATA

Client/Location SE/Blainville Unit 5 Test No. 1116 Method Blank Page 1  
 Sample Location LS North Fuel Oil Ambient Temp., °F 1 of 1  
 Operators RP Meter Vol. (Start/End) 1 Date 2/5/90

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. \_\_\_\_\_

Weight Weight  
 Imp. Matl Wt(End) (Start) (q) \_\_\_\_\_  
 11 1116/169 6182 - 6127 = \_\_\_\_\_  
 12 1116/169 6138 - 7130 = \_\_\_\_\_  
 13 1116/169 5424 - 5654 = \_\_\_\_\_  
 14 \_\_\_\_\_  
 Total \_\_\_\_\_  
 Impinger Box I.D. \_\_\_\_\_  
 Integrated Bag I.D. \_\_\_\_\_

Leak Check:  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_

Sample Train  
 CFM Vac. Inlet Pitot ID: \_\_\_\_\_  
 005 15 \_\_\_\_\_  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_

Pre-Test Calibration  
 Meter Meter Temp.  
 Time ΔH Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |    |               | Temperatures, °F |       |          |     | O <sub>2</sub> | Vacuum   | Static Press. fwg | Test Summary                           |
|---------------|------|------------------|----|---------------|------------------|-------|----------|-----|----------------|----------|-------------------|----------------------------------------|
|               |      | ΔP               | ΔH | Meter Reading | Stack            | Probe | Meter In | Out | Oven           | Imp. Out |                   |                                        |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Initial                                |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Sample Vol., c.f.                      |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Stack Press, fwg                       |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | ΔP fwg ΔH fwg                          |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Meter Temp., °F                        |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Stack Temp., °F                        |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Water Collected, g                     |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Chain of Cust. Info (Init.):           |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Impingers Loaded                       |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Impingers Recovered                    |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Filter Loaded                          |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Filter Recovered                       |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Probe Wash                             |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Comments:                              |
| Total/Average |      |                  |    |               |                  |       |          |     |                |          |                   |                                        |

Client/Location SCF / R/mto Unit S Test No. 2-MHs-5 Method 2  
 Sample Location South Fuel Oil Ambient Temp., of 3  
 Operators J. McMilligan & 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. 11  
 Meter, 12  
13  
14  
 CFM @ 1.0 \_\_\_\_\_  
 Probe I.D. \_\_\_\_\_  
 Nozzle No./Dia \_\_\_\_\_  
 Filter No. \_\_\_\_\_  
 Leak Check:  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_  
 Sample Train  
 CFM Vac. Init. Pitot IBS \_\_\_\_\_  
 Pre-Test Calibration  
 Meter Meter Temp. \_\_\_\_\_  
 Time ΔH Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |     |               | Temperatures, °F |       |          |           | Static Press. lwg | Test Summary                           |
|---------------|------|------------------|-----|---------------|------------------|-------|----------|-----------|-------------------|----------------------------------------|
|               |      | ΔP               | ΔH  | Meter Reading | Stack            | Probe | Meter In | Meter Out |                   |                                        |
| 3-1           | 1001 | .23              | .47 | 957           | 287              | N/A   | 91       | 74        | 5.0               | Initial                                |
| 3-5           | 1004 | .20              | .40 | 918.428       | 287              |       | 91       | 74        | 5.2               | Sample Vol., c.f.                      |
| 4             | 1007 | .25              | .51 | 975.638       | 287              |       | 92       | 74        | 5.4               | Stack Press, lwg                       |
| 3             | 1010 | .28              | .57 | 900.815       | 280              |       | 93       | 74        | 6.2               | ΔP lwg ΔH lwg                          |
| 2             | 1013 | .24              | .45 | 862.108       | 275              |       | 95       | 75        | 6.4               | Meter Temp., °F                        |
| Stack         | 1016 |                  |     | 803.390       |                  |       |          |           |                   | Stack Temp., °F                        |
| 4-7           | 1021 | .17              | .35 | 802.390       | 244              |       | 85       | 75        | 7                 | Water Collected, g                     |
| 6             | 1024 | .23              | .47 | 804.356       | 265              |       | 94       | 76        | 6.5               | O <sub>2</sub> /CO <sub>2</sub> Method |
| 5             | 1027 | .21              | .43 | 805.548       | 244              |       | 94       | 77        | 6.6               | Chain of Cust. Info (init.):           |
| 4             | 1030 | .21              | .45 | 806.863       | 244              |       | 95       | 77        | 6.7               | Impingers Loaded                       |
| 3             | 1033 | .26              | .53 | 809.095       | 280              |       | 96       | 77        | 5.7               | Impingers Recovered                    |
| 2             | 1036 | .21              | .55 | 810.346       | 241              |       | 96       | 78        | 4.7               | Filter Loaded                          |
| Stack         | 1039 |                  |     | 811.918       |                  |       |          |           | 4.8               | Filter Recovered                       |
| Stack         | 1044 | .64              | .13 | 811.718       | 281              |       | 97       | 78        | 14                | Probe Wash                             |
| 5-7           | 1047 | .10              | .82 | 813.865       | 285              |       | 104      | 78        | 5.2               | Comments:                              |
| 6             | 1050 | .25              | .10 | 815.954       | 259              |       | 106      | 75        | 4.8               |                                        |
| 4             | 1053 | .40              | .82 | 817.187       | 269              |       | 106      | 75        | 4.8               |                                        |
| Total/Average |      |                  |     |               |                  |       |          |           | 16                |                                        |

# PARTICULATE TEST DATA

Client/Location SCLE / H/Amto Unit 5 Test No. 2411-504 Method 3 Page 3  
 Sample Location Santa Fuel oil Ambient Temp., of 1 of 1  
 Operators J. McMillan & L. Fanning Meter Vol. (Start/End) 1 Date 1

Pre Test Data: Equipment Info: Leak Check: Sample Train  
 Barometric Press, in. Hg 29.8 Meter No. 11 CFM Vac. Init. Pitot 18S  
 Stack Area, sq. ft. 12 Meter, Yd 12 Pre-Test  
 Sample Time/ Pt, min. 13 Pitot Co. 13 Post-Test  
 Assumed Stack Press 14 Total Pre-Test Calibration  
 Assumed Moisture Probe I.D. Impinger Box I.D. Meter Meter Temp.  
 Assumed Molecular Wt. Nozzle No./Dia Integrated Bag I.D. Time ΔH Reading In Out  
Filter No. Init. Final

| Sample Point  | Time | Meter Conditions |     |               | Temperatures, °F |       |          |     |      | Static Press. twg | Test Summary |          |                                                                                                                                                                                                                                                                                                                    |
|---------------|------|------------------|-----|---------------|------------------|-------|----------|-----|------|-------------------|--------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |      | ΔP               | ΔH  | Meter Reading | Stack            | Probe | Meter In | Out | Oven |                   |              | Imp. Out | O <sub>2</sub>                                                                                                                                                                                                                                                                                                     |
| 5-4           | 1054 | 44               | 50  | 018.631       | 264              | N/A   | 107      | 75  | N/A  | 55                | 4.3          | 16       | Initial<br>Sample Vol., c.f.<br>Stack Press, twg<br>ΔP twg ΔH twg<br>Meter Temp., °F<br>Stack Temp., °F<br>Water Collected, g<br>O <sub>2</sub> /CO <sub>2</sub> Method<br>Chain of Cust. Info (Init.):<br>Impingers Loaded<br>Impingers Recovered<br>Filter Loaded<br>Filter Recovered<br>Probe Wash<br>Comments: |
| 3             | 1059 | 44               | 50  | 020.247       | 263              |       | 108      | 80  |      | 63                | 5.2          | 18       |                                                                                                                                                                                                                                                                                                                    |
| 2             | 1102 | 37               | 76  | 021.435       | 261              |       | 108      | 80  |      | 63                | 5.4          | 18       |                                                                                                                                                                                                                                                                                                                    |
| Start         | 1105 | 36               | 74  | 023.531       | 200              |       | 55       | 82  |      | 65                |              | 15       |                                                                                                                                                                                                                                                                                                                    |
| Start         | 1109 | 60               | 120 | 025.131       | 228              |       | 110      | 82  |      | 65                | 7.8          | 18       | O <sub>2</sub> /CO <sub>2</sub> Method<br>Chain of Cust. Info (Init.):<br>Impingers Loaded<br>Impingers Recovered<br>Filter Loaded<br>Filter Recovered<br>Probe Wash<br>Comments:                                                                                                                                  |
| 4-7           | 1112 | 60               | 120 | 026.923       | 244              |       | 105      | 82  |      | 65                | 5.1          | 18       |                                                                                                                                                                                                                                                                                                                    |
| 1             | 1115 | 34               | 70  | 028.652       | 251              |       | 107      | 83  |      | 66                |              | 18       |                                                                                                                                                                                                                                                                                                                    |
| 5             | 1118 | 31               | 72  | 028.652       | 251              |       | 107      | 83  |      | 66                | 5.6          | 18       |                                                                                                                                                                                                                                                                                                                    |
| 4             | 1121 | 45               | 62  | 030.128       | 259              |       | 108      | 83  |      | 66                | 6.1          | 15       | O <sub>2</sub> /CO <sub>2</sub> Method<br>Chain of Cust. Info (Init.):<br>Impingers Loaded<br>Impingers Recovered<br>Filter Loaded<br>Filter Recovered<br>Probe Wash<br>Comments:                                                                                                                                  |
| 3             | 1124 | 40               | 62  | 031.540       | 252              |       | 108      | 83  |      | 67                | 8.6          | 15       |                                                                                                                                                                                                                                                                                                                    |
| 2             | 1127 | 40               | 62  | 033.286       | 246              |       | 107      | 83  |      | 67                |              |          |                                                                                                                                                                                                                                                                                                                    |
| Start         | 1130 |                  |     | 034.134       |                  |       |          |     |      |                   |              |          |                                                                                                                                                                                                                                                                                                                    |
| Total/Average |      |                  |     |               |                  |       |          |     |      |                   |              |          |                                                                                                                                                                                                                                                                                                                    |

EST DS-022



CARNOT

03/19/90

## 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      |
| Liquid Vol (ml).....113.1             | * | from portable...        | 6.68      |
| Meter Press (iwg).....0.61            | * | CO2 (%): from CEM.....  | 12.20     |
|                                       | * | calculated.....         | 10.91     |
|                                       | * | 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/Alamogordo Unit 5 Test No. 3-176-N Method EPH Page 1  
 Sample Location BR/ST DUCT Fuel Oil Ambient Temp., of 66 of 3  
 Operators RP/CF Meter Vol. (Start/End) 194.7324 249.025 Date 3/13/88

Pre Test Data: Barometric Press, in. Hg 30.35 Equipment Info: Imp. Matl 1149/149 Wt(End) (Start) (g) 212.2 - 622.2 = 100.0  
 Stack Area, sq. ft. 99 Meter No. ES-8 12 1149/149 634.3 - 631.0 = 3.3  
 Sample Time/ Pt, min. 12 min / 3 min Pitot, Cp 1.84 13 1149/149 622.1 - 621.8 = -1.7  
 Assumed Stack Press +2.5 CFM @ H = 1.0 598 14 56 242.2 - 236.4 = 11.5  
 Assumed Moisture 9% Probe I.D. 11.6 Total 56 = 113.1  
 Assumed Molecular Wt 29.16 Nozzle No./Dia 242 (37) Impinger Box I.D. \_\_\_\_\_  
 Filter No. 747-239 Integrated Bag I.D. \_\_\_\_\_

Leak Check: \_\_\_\_\_  
 Time  $\Delta H$  Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

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

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |          |     |      | O <sub>2</sub> | Vacuum | Static Press. twg | Test Summary                                |
|---------------|------|------------------|------------|---------------|------------------|----------|-----|------|----------------|--------|-------------------|---------------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Probe            | Meter In | Out | Oven |                |        |                   |                                             |
| 1-1           | 1323 | 29.64            | 194.732    | 300           |                  | 84       | 73  |      | 5.4            | 3      |                   | Initial MM/MM                               |
| -2            | 1326 | 1.35             | 1.77       | 196.333       | 300              | 87       | 73  |      | 5.4            | 4      |                   | Sample Vol., c.f. 54.243                    |
| -3            | 1329 | 1.37             | .81        | 191.510       | 298              | 92       | 74  |      | 5.4            | 6      |                   | Stack Press, twg +2.6                       |
| -4            | 1332 | 1.31             | .68        | 198.999       | 294              | 93       | 74  |      | 5.3            | 7      |                   | $\Delta P$ 2606 twg $\Delta H$ .61 twg      |
| -5            | 1335 | .41              | .90        | 200.412       | 283              | 96       | 77  |      | 8.8            | 10     |                   | Meter Temp., °F 87.7                        |
| -6            | 1338 | .43              | .95        | 202.091       | 266              | 99       | 78  |      | 9.5            | 10     |                   | Stack Temp., °F 262.7                       |
| -7            | 1341 | .20              | .44        | 203.667       | 270              | 94       | 78  |      |                | 6      |                   | Water Collected, g 113.1                    |
|               | 1343 |                  |            | 204.807       |                  |          |     |      |                |        |                   | O <sub>2</sub> /CO <sub>2</sub> Method 6.68 |
| 2-7           | 1347 | .11              | .24        | 204.807       | 297              | 85       | 79  |      | 8.4            | 4.5    |                   | Chain of Cust. Info (Init.):                |
| -6            | 1350 | .32              | .70        | 205.460       | 296              | 89       | 80  |      |                | 9      |                   | Impingers Loaded                            |
| -5            | 1353 | .36              | .79        | 206.981       | 298              | 98       | 81  |      |                | 11     |                   | Impingers Recovered                         |
| -4            | 1356 | .31              | .68        | 208.355       | 298              | 102      | 82  |      |                | 10     |                   | Filter Loaded                               |
| -3            | 1359 | .40              | .88        | 209.770       | 281              | 103      | 82  |      |                | 14     |                   | Filter Recovered                            |
| -2            | 1402 | .62              | 1.36       | 211.620       | 268              | 104      | 82  |      |                | 16     |                   | Probe Wash R/CF                             |
| -1            | 1405 | .33              | .72        | 213.570       | 264              | 104      | 82  |      |                | 12     |                   | Comments:                                   |
|               | 1408 |                  |            | 215.475       |                  |          |     |      |                |        |                   | CEM O <sub>2</sub> = 5.0                    |
|               |      |                  |            |               |                  |          |     |      |                |        |                   | CO <sub>2</sub> 12.2                        |
| Total/Average |      |                  |            |               |                  |          |     |      |                |        |                   |                                             |

# PARTICULATE TEST DATA

Client/Location SE/Alamo Unit #5 Test No. 3-115-2 Method Direct Page 3  
 Sample Location Exhaust Pipe Fuel DLC Ambient Temp., of 66 of 3  
 Operators RJCF Meter Vol. (Start/End) 1 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. 41  
 Meter, Yd 12  
 Pitot, Cp 13  
 CFM @ 1.0 14  
 Probe I.D. Total  
 Nozzle No./Dia Impinger Box I.D.  
 Filter No. Integrated Bag I.D.

## Leak Check:

Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_

## Sample Train

CFM Vac. Init. Pitot lbs \_\_\_\_\_  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_

## Pre-Test Calibration

Meter Meter Temp. \_\_\_\_\_  
 Time  $\Delta$ H Reading In Out \_\_\_\_\_  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |          |     |      | Vacuum | Static Press. twg | Test Summary                           |
|---------------|------|------------------|------------|---------------|------------------|----------|-----|------|--------|-------------------|----------------------------------------|
|               |      | $\Delta$ P       | $\Delta$ H | Meter Reading | Probe            | Meter In | Out | Oven |        |                   |                                        |
| 3-7           | 1413 | .32              | .70        | 215.475       | 283              | 94       | 82  |      | 6.0    | 11                | Initial                                |
| -6            | 1416 | .34              | .75        | 217.050       | 282              | 100      | 83  |      | 5.8    | 12                | Sample Vol., c.f.                      |
| -5            | 1419 | .30              | .46        | 218.415       | 280              | 101      | 83  |      | 6.1    | 12                | Stack Press, twg                       |
| -4            | 1422 | .25              | .55        | 220.091       | 278              | 100      | 83  |      | 6.2    | 10                | $\Delta$ P twg $\Delta$ H twg          |
| -3            | 1425 | .25              | .55        | 221.043       | 279              | 100      | 83  |      | 6.3    | 10                | Meter Temp., °F                        |
| -2            | 1428 | .2               | .44        | 222.415       | 240              | 98       | 82  |      | 6.3    | 9                 | Stack Temp., °F                        |
| -1            | 1431 | .16              | .35        | 223.482       | 236              | 96       | 82  |      | 6.3    | 8                 | Water Collected, g                     |
|               | 1434 |                  |            | 224.515       |                  |          |     |      |        |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 1-7           | 1439 | .15              | .33        | 224.510       | 278              | 87       | 82  |      | 6.2    | 7                 | Chain of Cust. Info (init.):           |
| -10           | 1442 | .22              | .48        | 225.555       | 282              | 93       | 82  |      | 6.2    | 10                | Impingers Loaded                       |
| -5            | 1445 | .24              | .53        | 226.90        | 289              | 95       | 82  |      | 6.2    | 11                | Impingers Recovered                    |
| -4            | 1448 | .28              | .62        | 228.31        | 283              | 97       | 82  |      | 6.2    | 12                | Filter Loaded                          |
| -3            | 1451 | .23              | .58        | 229.44        | 281              | 97       | 82  |      | 6.2    | 11                | Filter Recovered                       |
| -2            | 1454 | .20              | .44        | 230.775       | 285              | 93       | 81  |      | 5.9    | 10                | Probe Wash                             |
| -1            | 1457 | .15              | .33        | 231.972       | 225              | 92       | 81  |      | 6.1    | 8                 | Comments: <u>Suspect</u>               |
|               | 1500 |                  |            | 232.804       |                  |          |     |      |        |                   | INCORRECT ALLS DUE TO                  |
| Total/Average |      |                  |            |               |                  |          |     |      |        |                   | SHORT W T.C. WIRE, R/L                 |

PARTICULATE TEST DATA

Client/Location SCE/ALAMO Unit 415 Test No. 3-ATLS-N Method GRAFI Page 3  
 Sample Location 2nd ID Unit Fuel AL Ambient Temp., °F 60 of 3  
 Operators RL/CF Meter Vol. (Start/End) 1 Date 2/13/90

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. 1  
 Meter, Yd \_\_\_\_\_  
 Pitot, Cp \_\_\_\_\_  
 CFM @ ΔH = 1.0 \_\_\_\_\_  
 Probe I.D. \_\_\_\_\_  
 Nozzle No./Dia \_\_\_\_\_  
 Filter No. \_\_\_\_\_

Weight Weight  
 Imp. Matl Ht(End) (Start) (g)  
 #1 \_\_\_\_\_  
 #2 \_\_\_\_\_  
 #3 \_\_\_\_\_  
 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 \_\_\_\_\_  
 Meter Meter Temp. \_\_\_\_\_  
 Time ΔH Reading In Out \_\_\_\_\_  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |     |               | Temperatures, °F |          |     |      |          | Vacuum | Static Press. fwg | Test Summary                           |
|---------------|------|------------------|-----|---------------|------------------|----------|-----|------|----------|--------|-------------------|----------------------------------------|
|               |      | ΔP               | ΔH  | Meter Reading | Probe            | Meter In | Out | Oven | Imp. Out |        |                   |                                        |
| 2-7           | 1503 | .16              | .35 | 232.804       | 240              | 85       | 79  |      | 60       | 9      |                   | Initial                                |
| -6            | 1506 | .20              | .44 | 233.900       | 261              | 92       | 80  |      | 61       | 5.9    | 10                | Sample Vol., c.f.                      |
| -5            | 1509 | .30              | .66 | 235.157       | 259              | 96       | 80  |      | 61       | 4.5    | 14                | Stack Press, fwg                       |
| -4            | 1512 | .26              | .57 | 236.422       | 242              | 98       | 80  |      | 60       | 1.4    | 13                | ΔP fwg ΔH                              |
| -3            | 1515 | .28              | .62 | 237.620       | 235              | 97       | 80  |      | 63       | 2.0    |                   | Meter Temp., °F                        |
| -2            | 1518 | .50              | 1.1 | 239.375       | 215              | 100      | 80  |      | 65       | 1.9    |                   | Stack Temp., °F                        |
| -1            | 1521 | .45              | .99 | 240.598       | 209              | 100      | 81  |      | 65       |        |                   | Water Collected, g                     |
|               | 1524 |                  |     | 241.715       |                  |          |     |      |          |        |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 1-7           | 1525 | .03              | .11 | 241.775       | 232              | 83       | 80  |      | 61       | 4      |                   | Chain of Cust. Info (Init.):           |
| -6            | 1528 | 0                | 0   | 242.524       | 244              |          |     |      | 62       |        |                   | Impingers Loaded                       |
| -5            | 1531 | .2               | .24 | 242.524       | 249              | 87       | 80  |      | 62       | 4.5    | 10                | Impingers Recovered                    |
| -4            | 1534 | .35              | .71 | 243.665       | 228              | 97       | 80  |      | 63       | 7.0    | 15                | Filter Loaded                          |
| -3            | 1537 | .36              | .79 | 245.122       | 215              | 99       | 81  |      | 64       | 7.7    | 16                | Filter Recovered                       |
| -2            | 1540 | .20              | .44 | 246.650       | 210              | 97       | 81  |      | 65       | 8.2    | 11                | Probe Wash                             |
| -1            | 1543 | .25              | .55 | 247.773       | 210              | 97       | 81  |      | 65       | 13     |                   | Comments:                              |
|               | 1546 |                  |     | 249.025       |                  |          |     |      |          |        |                   |                                        |
| Total/Average |      |                  |     |               |                  |          |     |      |          |        |                   |                                        |

CARNOT

03/19/90

## SAMPLE TRAIN TEST SUMMARY

|                                       |   |                         |           |
|---------------------------------------|---|-------------------------|-----------|
| Client/Location.....SCE/ALGS          | * | Date.....               | 3/13/90   |
| Test Number.....3-Mt1s-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      |
| Liquid Vol (ml).....119.0             | * | from portable...        | 6.44      |
| Meter Press (iwg).....0.66            | * | CO2 (%): from CEM.....  | 12.20     |
|                                       | • | calculated.....         | 11.10     |
|                                       | • | 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 SCF / Alameda Unit 5 Test No. 3-1116-S Method 3-1116-S Page 1  
 Sample Location South Port Fuel Oil Ambient Temp., °F 63.5 of 3  
 Operators JM/LE Meter Vol. (Start/End) 0355/6 1945 Date 3/13/96

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

Equipment Info:  
 Meter No. ES-15  
 Meter, Yd 1.00  
 Pitot, Cp 1.0  
 CFM @ H = 1.0 555  
 Probe I.D. 7.810/14  
 Nozzle No./Dia 147/230  
 Filter No. 147/230

Imp. Matl Wt(End) (Start) (g) Leak Check:  
 #1 100.40 288.3 - 631.8 = 100.5 ✓  
 #2 100.40 662.0 - 618.3 = 43.7 ✓  
 #3 100.40 512.4 - 561.0 = -48.6 ✓  
 #4 56 447.1 - 288.7 = 158.4 ✓  
 Total 349.2  
 Impinger Box I.D. 147/230  
 Integrated Bag I.D. 147/230

Weight Weight  
 Sample Train  
 CFM Vac. Init. Pitot IBS  
 Pre-Test 0.0 16 15 0.15  
 Post-Test 0.03 22 10  
 Pre-Test Calibration  
 Meter Meter Temp.  
 Time ΔH Reading In Out  
 Initial MM 119  
 Sample Vol., c.f. 60.19  
 Stack Press, twg 12.5  
 ΔP 0.16 twg ΔH 0.66 twg  
 Meter Temp., °F 90.9  
 Stack Temp., °F 364  
 Water Collected, g 119.0  
 O<sub>2</sub>/CO<sub>2</sub> Method 6.4 10.3  
 Chain of Cust. Info (init.):  
 Impingers Loaded 15  
 Impingers Recovered 15  
 Filter Loaded 15  
 Filter Recovered 15  
 Probe Wash 114/LE  
 Comments: CEM O<sub>2</sub> = 8.0  
CO<sub>2</sub> = 12.20

| Sample Point  | Time | Meter Conditions |      |               | Temperatures, °F |       |          |     |      | Static Press. twg | Vacuum | O <sub>2</sub> | Imp. Out |    | Test Summary                                    |     |
|---------------|------|------------------|------|---------------|------------------|-------|----------|-----|------|-------------------|--------|----------------|----------|----|-------------------------------------------------|-----|
|               |      | ΔP               | ΔH   | Meter Reading | Stack            | Probe | Meter In | Out | Over |                   |        |                |          |    |                                                 |     |
| Start         | 1320 | 1.21             | 4.7  | 0355.516      | 275              | 1.0   | 86       | 84  | N/A  | 60                | 2      | 2              | 54       | 54 | MM                                              | 119 |
| 1 - 7         | 1223 | 1.45             | 1.0  | 0367.710      | 285              | 1.0   | 100      | 85  | 85   | 54                | 2      | 2              | 54       | 54 | Sample Vol., c.f. 60.19                         |     |
| 1             | 1306 | 1.6              | 8.1  | 0388.202      | 278              | 1.0   | 104      | 85  | 85   | 54                | 2      | 2              | 54       | 54 | Stack Press, twg 12.5                           |     |
| 5             | 1325 | 1.47             | 1.05 | 0401.078      | 304              | 1.0   | 102      | 85  | 85   | 54                | 2      | 2              | 54       | 54 | ΔP 0.16 twg ΔH 0.66 twg                         |     |
| 4             | 1332 | 1.41             | 3.1  | 0411.876      | 298              | 1.0   | 98       | 87  | 87   | 54                | 2      | 2              | 54       | 54 | Meter Temp., °F 90.9                            |     |
| 3             | 1335 | 1.07             | 1.5  | 0423.261      | 298              | 1.0   | 94       | 85  | 85   | 54                | 2      | 2              | 54       | 54 | Stack Temp., °F 364                             |     |
| 2             | 1338 | 1.17             | 1.5  | 0443.370      | 296              | 1.0   | 92       | 84  | 84   | 54                | 2      | 2              | 54       | 54 | Water Collected, g 119.0                        |     |
| Stop 1        | 1341 |                  |      | 045.091       |                  |       |          |     |      |                   |        |                |          |    | O <sub>2</sub> /CO <sub>2</sub> Method 6.4 10.3 |     |
| Start         | 1345 | 1.31             | 6.5  | 045.091       | 290              | 1.0   | 92       | 82  | 82   | 54                | 2      | 2              | 54       | 54 | Chain of Cust. Info (init.):                    |     |
| 2 - 7         | 1352 | 1.41             | 9.2  | 046.812       | 303              | 1.0   | 101      | 82  | 82   | 54                | 2      | 2              | 54       | 54 | Impingers Loaded 15                             |     |
| 1             | 1355 | 1.21             | 4.7  | 048.487       | 303              | 1.0   | 101      | 83  | 83   | 54                | 2      | 2              | 54       | 54 | Impingers Recovered 15                          |     |
| 5             | 1358 | 1.5              | 3.3  | 049.780       | 307              | 1.0   | 97       | 83  | 83   | 54                | 2      | 2              | 54       | 54 | Filter Loaded 15                                |     |
| 4             | 1401 | 1.21             | 4.7  | 050.872       | 297              | 1.0   | 96       | 83  | 83   | 54                | 2      | 2              | 54       | 54 | Filter Recovered 15                             |     |
| 3             | 1404 | 1.10             | 2.0  | 052.071       | 285              | 1.0   | 94       | 82  | 82   | 54                | 2      | 2              | 54       | 54 | Probe Wash 114/LE                               |     |
| 2             | 1407 | 1.01             | 1.5  | 053.197       | 290              | 1.0   | 91       | 82  | 82   | 54                | 2      | 2              | 54       | 54 | Comments: CEM O <sub>2</sub> = 8.0              |     |
| Stop 1        | 1410 |                  |      | 053.845       |                  |       |          |     |      |                   |        |                |          |    | CO <sub>2</sub> = 12.20                         |     |
| Start         | 1415 | 1.23             | 5.1  | 053.845       | 284              | 1.0   | 87       | 81  | 81   | 54                | 2      | 2              | 54       | 54 |                                                 |     |
| 3 - 7         | 1416 | 1.24             | 5.1  | 055.065       | 291              | 1.0   | 95       | 82  | 82   | 54                | 2      | 2              | 54       | 54 |                                                 |     |
| Total/Average |      |                  |      |               |                  |       |          |     |      |                   |        |                |          |    |                                                 |     |

# PARTICULATE TEST DATA

Client/Location SCC/ALABAMA Unit 5 Test No. 34415 Method Direct Page 3  
 Sample Location South West Fuel oil Ambient Temp., °F 5 of 3  
 Operators J. M. L. L. F. Meter Vol. (Start/End) 1 Date 5/13/80

Pre Test Data: Equipment Info: Weight Weight  
 Barometric Press, in. Hg 30.1 Imp. Matl Wt(End) (Start) (g)  
 Stack Area, sq. ft. 0.12 Meter No. 11  
 Sample Time/ Pl. min. 0.12 Meter, Yd 0.12  
 Assumed Stack Press 0.12 Pitot Coe 0.12  
 Assumed Moisture 0.12 CFM 1.0  
 Assumed Molecular Wt 0.12 Probe I.D. 0.12  
 Nozzle No./Dia 0.12  
 Filter No. 0.12

Leak Check: Pre-Test Post-Test  
 Sample Train CFM Vac. Init. Pitot IDS  
 Pre-Test Calibration Pre-Test  
 Meter Meter Temp. Init. Final  
 Time ΔH Reading In Out

| Sample Point  | Time  | Meter Conditions |     |               | Temperatures, °F |     |     |      | O <sub>2</sub> | Vacuum | Static Press. iwg | Test Summary                           |
|---------------|-------|------------------|-----|---------------|------------------|-----|-----|------|----------------|--------|-------------------|----------------------------------------|
|               |       | ΔP               | ΔH  | Meter Reading | Probe            | In  | Out | Over |                |        |                   |                                        |
| 3             | 14:15 | .20              | .45 | 056.420       | N/A              | 97  | 92  | N/A  | 5.3            | 9      |                   | Initial                                |
| 4             | 14:22 | .18              | .40 | 057.621       |                  | 96  | 82  |      | 5.3            | 9      |                   | Sample Vol., c.f.                      |
| 5             | 14:25 | .21              | .47 | 058.825       |                  | 94  | 82  |      | 5.3            | 9      |                   | Stack Press, iwg                       |
| 6             | 14:28 | .22              | .60 | 60.0          |                  | 98  | 82  |      | 5.6            | 11     |                   | ΔP iwg ΔH iwg                          |
| 7             | 14:31 | .18              | .40 | 61.4          |                  | 96  | 82  |      | 5.7            | 8      |                   | Meter Temp., °F                        |
| 8             | 14:34 |                  |     | 62.5          |                  |     |     |      |                |        |                   | Stack Temp., °F                        |
| 9             | 14:37 | .24              | .54 | 62.5          |                  | 92  | 87  |      | 5.6            | 10     |                   | Water Collected, g                     |
| 10            | 14:42 | .27              | .60 | 66.4.085      |                  | 94  | 82  |      | 5.6            | 16     |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 11            | 14:45 | .24              | .54 | 66.5.472      |                  | 100 | 82  |      | 5.6            | 11     |                   | Chain of Cust. Info (Init.):           |
| 12            | 14:48 | .20              | .45 | 66.6.842      |                  | 100 | 82  |      | 5.6            | 10     |                   | Impingers Loaded                       |
| 13            | 14:51 | .27              | .60 | 66.8.120      |                  | 93  | 82  |      | 5.6            | 10     |                   | Impingers Recovered                    |
| 14            | 14:54 | .23              | .74 | 67.521        |                  | 100 | 82  |      | 5.6            | 13     |                   | Filter Loaded                          |
| 15            | 14:57 | .34              | .76 | 67.1.04       |                  | 103 | 82  |      | 5.6            | 15     |                   | Filter Recovered                       |
| 16            | 15:00 |                  |     | 67.2.518      |                  |     |     |      |                |        |                   | Probe Wash                             |
| 17            | 15:04 | .65              | .96 | 67.2.518      |                  | 96  | 81  |      | 5.7            | 22     | +2.5              | Comments:                              |
| 18            | 15:07 | .40              | .90 | 67.4.413      |                  | 102 | 82  |      | 5.7            | 20     |                   |                                        |
| 19            | 15:10 | .34              | .85 | 67.6.205      |                  | 103 | 82  |      | 5.8            | 20     |                   |                                        |
| 20            | 15:13 | .30              | .78 | 67.7.952      |                  | 105 | 85  |      | 6.0            | 20     |                   |                                        |
| Total/Average |       |                  |     |               |                  |     |     |      |                |        |                   |                                        |

**PARTICULATE TEST DATA**

Client/Location SCE / Alameda Unit 5 Test No. 3/m<sup>2</sup>/South Method 3 Page 3  
 Sample Location SOCK DOCK Fuel 0.1 Ambient Temp., °F 5 of 5  
 Operators 181 / LF Meter Vol. (Start/End) 1 Date     

**Pre Test Data:**  
 Barometric Press, in. Hg      Equipment Info: Imp. Matl      Wt(End) (Start) (g)      Leak Check:       
 Stack Area, sq. ft.      Meter No.      #1      #2      #3      #4      Total      Sample Train  
 Sample Time/ Pt, min.      Meter, Yd      CFM Vac. Init. Pitot IBS  
 Assumed Stack Press      CFM       $\Delta H$  1.0      Pre-Test      Post-Test       
 Assumed Moisture      Probe I.D.      Impinger Box I.D.      Pre-Test Calibration      Meter Meter Temp.  
 Assumed Moisture      Nozzle No./Dia      Integrated Bag I.D.      Time  $\Delta H$  Reading In Out  
 Filter No.      Init.      Final     

| Sample Point  | Time  | Meter Conditions |            |               | Temperatures, °F |       |          |     |      | Static Press. twg | Vacuum         | Test Summary                           |
|---------------|-------|------------------|------------|---------------|------------------|-------|----------|-----|------|-------------------|----------------|----------------------------------------|
|               |       | $\Delta P$       | $\Delta H$ | Meter Reading | Stack            | Probe | Meter In | Out | Oven | Imp. Out          | O <sub>2</sub> |                                        |
| 5-4           | 15-16 | .45              | 1.0        | 079.642       | 264              |       | 106      | 82  |      | 65                | 4.5            | Initial                                |
| 1-3           | 15-15 | .45              | 1.1        | 081.          | 261              |       | 104      | 82  |      | 65                | 4.5            | Sample Vol., c.f.                      |
| 2-6           | 15-22 | .47              | 1.05       | 082.83        | 263              |       | 104      | 83  |      | 66                | 5.4            | Stack Press, twg                       |
| 5-1           | 15-25 |                  |            | 084.705       |                  |       |          |     |      |                   |                | $\Delta P$ twg $\Delta H$ twg          |
| 5-1           | 15-26 | .54              | .76        | 084.705       | 219              |       | 98       | 83  |      | 100               | 8.4            | Meter Temp., °F                        |
| 6-1           | 15-27 | .54              | 1.21       | 086.13        | 230              |       | 107      | 84  |      | 60                | 7.4            | Stack Temp., °F                        |
| 1-6           | 15-32 | .40              | .90        | 088.063       | 250              |       | 105      | 84  |      | 61                | 22             | Water Collected, g                     |
| 5             | 15-35 | .36              | .81        | 089.8         | 256              |       | 103      | 84  |      | 62                | 22             | O <sub>2</sub> /CO <sub>2</sub> Method |
| 4             | 15-38 | .37              | .87        | 091.500       | 259              |       | 103      | 84  |      | 64                | 22             | Chain of Cust. Info (Init.):           |
| 3             | 15-41 | .20              | .45        | 093.08        | 253              |       | 101      | 85  |      | 64                | 7.4            | Impingers Loaded                       |
| 2             | 15-44 | .18              | .40        | 094.452       | 243              |       | 103      | 85  |      | 64                | 8.8            | Impingers Recovered                    |
| 1             | 15-47 |                  |            | 095.635       |                  |       |          |     |      |                   |                | Filter Loaded                          |
|               |       |                  |            |               |                  |       |          |     |      |                   |                | Filter Recovered                       |
|               |       |                  |            |               |                  |       |          |     |      |                   |                | Probe Wash                             |
|               |       |                  |            |               |                  |       |          |     |      |                   |                | Comments:                              |
| Total/Average |       |                  |            |               |                  |       |          |     |      |                   |                |                                        |



CARNOT

03/19/90

## 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      |
| Liquid Vol (ml).....111.6             | * | from portable...        | 5.99      |
| Meter Press (iwg).....0.60            | * | CO2 (%): from CEM.....  | 13.00     |
|                                       | * | calculated.....         | 11.61     |
|                                       | * | 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 / Alameda Unit 5 Test No. 5-MIS-N Method EPA Draft Page 1  
 Sample Location North Port Fuel oil Ambient Temp., of 96.60 of 3  
 Operators CE / R.T. Meter Vol. (Start/End) 154.376 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 1595  
 Probe I.D. 1.6  
 Nozzle No./Dia .242  
 Filter No. 742-238

## Leak Check:

Imp. Matl Wt(End) (Start) (g)  
 #1 140.116 210.6 616.3 94.3  
 #2 140.116 644.8 641.3 3.5  
 #3 140.116 591.8 582.1 0.9  
 #4 56 253.0 238.3 14.7  
 Total \_\_\_\_\_  
 Impinger Box I.D. \_\_\_\_\_  
 Integrated Bag I.D. \_\_\_\_\_

## Sample Train

CFM Vac. Init. Pitot IBS  
 Pre-Test 100 15 RP OK  
 Post-Test 100 25 C/E C/E

## Pre-Test Calibration

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

2.2

| Sample Point  | Time | Meter Conditions |      |               | Temperatures, °F |       |          |           | Static Press. lwg | Vacuum | O <sub>2</sub> | Imp. |          | Test Summary                                      |
|---------------|------|------------------|------|---------------|------------------|-------|----------|-----------|-------------------|--------|----------------|------|----------|---------------------------------------------------|
|               |      | ΔP               | ΔH   | Meter Reading | Stack            | Probe | Meter In | Meter Out |                   |        |                | Oven | Imp. Out |                                                   |
| 1-1           | 825  | .24              | .52  | 096.60        | 4                | 285   | 73       | 61        |                   | 2      |                |      | 51       | Initial                                           |
| 2             | 828  | .28              | .62  | 98.02         | 2                | 276   | 83       | 63        |                   |        | 5.2            |      | 52       | Sample Vol., c.f. <u>57.772</u>                   |
| 3             | 831  | .26              | .79  | 99.62         |                  | 270   | 89       | 65        |                   |        | 4.5            |      | 52       | Stack Press, lwg <u>2.5</u>                       |
| 4             | 834  | .40              | .88  | 100.90        |                  | 272   | 92       | 67        |                   |        | 4.6            |      | 51       | ΔP <u>26.6</u> lwg ΔH <u>60</u> lwg               |
| 5             | 837  | .44              | .97  | 102.75        |                  | 272   | 95       | 68        |                   |        | 6.1            |      | 52       | Meter Temp., of <u>89.9</u>                       |
| 6             | 840  | .46              | 1.01 | 104.40        |                  | 254   | 97       | 70        |                   |        | 8.0            |      | 53       | Stack Temp., of <u>247.8</u>                      |
| 7             | 843  | .26              | .74  | 106.05        |                  | 214   | 99       | 71        |                   |        | 8.9            |      | 55       | Water Collected, g <u>1116</u>                    |
| 8             | 846  |                  |      | 107.39        |                  |       |          |           |                   |        |                |      |          | O <sub>2</sub> /CO <sub>2</sub> Method <u>599</u> |
| 2-1           | 850  | .20              | .44  | 107.39        |                  | 282   | 83       | 73        |                   |        | 8.0            |      | 57       | Chain of Cust. Info (init.):                      |
| 3             | 852  | .28              | .62  | 108.75        |                  | 282   | 101      | 74        |                   |        | 6.2            |      | 57       | Impingers Loaded <u>13</u>                        |
| 4             | 856  | .32              | .70  | 110.38        |                  | 265   | 94       | 75        |                   |        | 7              |      | 57       | Impingers Recovered <u>AB</u>                     |
| 5             | 859  | .34              | .74  | 111.32        |                  | 262   | 100      | 75        |                   |        | 4.6            |      | 58       | Filter Loaded <u>13</u>                           |
| 6             | 902  | .42              | .92  | 112.57        |                  | 256   | 103      | 77        |                   |        | 6.4            |      | 58       | Filter Recovered <u>AB</u>                        |
| 7             | 905  | .60              | 1.22 | 114.75        |                  | 241   | 107      | 79        |                   |        | 8.6            |      | 58       | Probe Wash <u>CFRP</u>                            |
| 8             | 908  | .52              | 1.19 | 117.12        |                  | 250   | 108      | 79        |                   |        | 16             |      | 60       | Comments: <u>CEM 02:4.2</u>                       |
| 9             | 911  |                  |      | 116.66        |                  |       |          |           |                   |        |                |      |          | <u>CO<sub>2</sub> 13.0</u>                        |
| Total/Average |      |                  |      |               |                  |       |          |           |                   |        |                |      |          |                                                   |

PARTICULATE TEST DATA

Client/Location SCE Alameda Unit S Test No. S-MH-1-N Method Meth Page 2  
Sample Location North Fuel \_\_\_\_\_ Ambient Temp., °F \_\_\_\_\_ of \_\_\_\_\_  
Operators \_\_\_\_\_ Meter Vol. (Start/End) \_\_\_\_\_ / \_\_\_\_\_ Date 3-14-70

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  $\Delta H$  1.0  
Probe I.D. \_\_\_\_\_  
Nozzle No./Dia \_\_\_\_\_  
Filter No. \_\_\_\_\_

Imp. Matl Wt(End) (Start) (g) \_\_\_\_\_  
#1 \_\_\_\_\_  
#2 \_\_\_\_\_  
#3 \_\_\_\_\_  
#4 \_\_\_\_\_  
Total \_\_\_\_\_  
Impinger Box I.D. \_\_\_\_\_  
Integrated Bag I.D. \_\_\_\_\_

Weight Weight \_\_\_\_\_  
Leak Check: \_\_\_\_\_  
Pre-Test \_\_\_\_\_  
Post-Test \_\_\_\_\_  
Pre-Test Calibration \_\_\_\_\_  
Meter Meter Temp. \_\_\_\_\_  
Time  $\Delta H$  Reading In Out \_\_\_\_\_  
Init. \_\_\_\_\_  
Final \_\_\_\_\_

Sample Train  
CFM Vac. Init. Pitot IBS

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |          |     |      | Static Press. $\Delta H$ | Test Summary                           |
|---------------|------|------------------|------------|---------------|------------------|----------|-----|------|--------------------------|----------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Probe            | Meter In | Out | Oven |                          |                                        |
| 3-7           | 914  | .20              | .48        | 118.664       | 267              | 96       | 79  |      |                          | Initial                                |
| 6             | 917  | .29              | .63        | 120.48        | 272              | 102      | 79  |      |                          | Sample Vol., c.f.                      |
| 5             | 920  | .25              | .53        | 121.70        | 258              | 105      | 80  |      |                          | Stack Press, $\Delta H$                |
| 4             | 923  | .22              | .48        | 123.00        | 261              | 104      | 80  |      |                          | $\Delta P$ $\Delta H$                  |
| 3             | 926  | .18              | .40        | 124.03        | 243              | 104      | 80  |      |                          | Meter Temp., °F                        |
| 2             | 929  | .18              | .40        | 125.40        | 215              | 104      | 81  |      |                          | Stack Temp., °F                        |
| 1             | 922  | .14              | .30        | 126.61        | 220              | 103      | 81  |      |                          | Water Collected, g                     |
|               | 925  |                  |            | 127.42        |                  |          |     |      |                          | O <sub>2</sub> /CO <sub>2</sub> Method |
| 4-7           | 940  | .14              | .30        | 127.42        | 227              | 90       | 80  |      |                          | Chain of Cust. Info (Init.):           |
| 6             | 943  | .14              | .30        | 128.20        | 244              | 102      | 82  |      |                          | Impingers Loaded                       |
| 5             | 946  | .23              | .51        | 130.00        | 246              | 106      | 82  |      |                          | Impingers Recovered                    |
| 4             | 949  | .21              | .46        | 130.95        | 244              | 107      | 82  |      |                          | Filter Loaded                          |
| 3             | 952  | .19              | .41        | 132.21        | 204              | 106      | 82  |      |                          | Filter Recovered                       |
| 2             | 955  | .20              | .45        | 134.05        | 208              | 105      | 83  |      |                          | Probe Wash                             |
| 1             | 958  | .20              | .45        | 134.75        | 205              | 106      | 82  |      |                          | Comments:                              |
|               | 1001 |                  |            | 135.720       |                  |          |     |      |                          |                                        |
| Total/Average |      |                  |            |               |                  |          |     |      |                          |                                        |

**PARTICULATE TEST DATA**

Client/Location SGE Alarbus Unit S Test No. S-MT1-N Method Motals Page 3  
 Sample Location North Fuel \_\_\_\_\_ Ambient Temp., °F \_\_\_\_\_ of \_\_\_\_\_  
 Operators CF Meter Vol. (Start/End) 1 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. \_\_\_\_\_

**Weight**  
 Imp. Matl \_\_\_\_\_  
 Wt(End) (Start) (g) \_\_\_\_\_  
 Total \_\_\_\_\_  
 Impinger Box I.D. \_\_\_\_\_  
 Integrated Bag I.D. \_\_\_\_\_

**Leak Check:**  
 #1 \_\_\_\_\_  
 #2 \_\_\_\_\_  
 #3 \_\_\_\_\_  
 #4 \_\_\_\_\_

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

**Pre-Test Calibration**  
 Meter \_\_\_\_\_  
 Meter Temp. \_\_\_\_\_  
 Time ΔH Reading In Out \_\_\_\_\_  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time  | Meter Conditions |     |               | Temperatures, °F |          |     |      | Vacuum   |                | Static Press. iwg | Test Summary                           |
|---------------|-------|------------------|-----|---------------|------------------|----------|-----|------|----------|----------------|-------------------|----------------------------------------|
|               |       | ΔP               | ΔH  | Meter Reading | Probe            | Meter In | Out | Oven | Imp. Out | O <sub>2</sub> |                   |                                        |
| 2-7           | 10:12 | .33              | .77 | 175720        |                  | 91       | 80  |      | 59       | 6.1            |                   | Initial                                |
| 6             | 10:15 | .30              | .66 | 177620        |                  | 108      | 81  |      | 57       | 5.5            |                   | Sample Vol., c.f.                      |
| 3             | 10:18 | .23              | .55 | 179020        |                  | 109      | 82  |      | 60       | 4.5            |                   | Stack Press, iwg                       |
| 4             | 10:21 | .16              | .35 | 140154        |                  | 107      | 82  |      | 61       | 4.6            |                   | ΔP iwg ΔH iwg                          |
| 3             | 10:24 | .22              | .48 | 142055        |                  | 108      | 83  |      | 61       |                |                   | Meter Temp., °F                        |
| 2             | 10:27 | .19              | .42 | 143335        |                  | 102      | 84  |      | 62       | 10             |                   | Stack Temp., °F                        |
| 1             | 10:30 | .03              | .11 | 1440          |                  | 102      | 83  |      | 63       | 5              |                   | Water Collected, g                     |
|               | 10:33 |                  |     | 144405        |                  |          |     |      |          |                |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 6-7           | 10:36 | .30              | .66 | 144405        |                  | 101      | 84  |      | 61       | 7.7            |                   | Chain of Cust. Info (init.):           |
| 6             | 10:39 | .20              | .44 | 14620         |                  | 106      | 82  |      | 61       | 7.4            |                   | Impingers Loaded                       |
| 5             | 10:42 | .35              | .77 | 14721         |                  | 110      | 84  |      | 61       | 8.0            |                   | Impingers Recovered                    |
| 4             | 10:45 | .35              | .77 | 14870         |                  | 112      | 84  |      | 61       | 6.1            |                   | Filter Loaded                          |
| 3             | 10:48 | .45              | .99 | 150772        |                  | 113      | 84  |      | 63       | 4.1            |                   | Filter Recovered                       |
| 2             | 10:51 | .24              | .52 | 152748        |                  | 107      | 84  |      | 62       | 4.5            |                   | Probe Wash                             |
| 1             | 10:54 | .10              | .22 | 152710        |                  | 104      | 84  |      | 62       | 5.7            |                   | Comments:                              |
| End           | 10:57 |                  |     | 154376        |                  |          |     |      |          |                |                   |                                        |
| Total/Average |       |                  |     |               |                  |          |     |      |          |                |                   |                                        |

CARNOT

03/19/90

## SAMPLE TRAIN TEST SUMMARY

|                                       |   |                         |          |
|---------------------------------------|---|-------------------------|----------|
| Client/Location.....SCE/ALGS          | * | Date.....               | 3/14/90  |
| Test Number.....5-Mtls-S              | * | Data By.....            | MDI      |
| Test Method.....Metals                | * | Sample Location.....    | So 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).....   | 0.246    |
| Meter Vol (acf).....57.699            | * | Meter Temp (F).....     | 86.9     |
| Stack Press (iwg).....2.50            | * | Stack Temp (F).....     | 269.9    |
| Vel Head (iwg).....0.2764             | * | O2 (%): from CEM.....   | 4.20     |
| Liquid Vol (ml).....117.1             | * | from portable...        | 5.85     |
| Meter Press (iwg).....0.64            | * | CO2 (%): from CEM.....  | 13.00    |
|                                       | * | calculated.....         | 11.72    |
|                                       | * | 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 S Test No. 5441-5 Method 1  
 Sample Location South Oct Fuel Oil Ambient Temp., of 56 of 3  
 Operators J. Mulligan & L. Fanning Meter Vol. (Start/End) 302.0457-359.744 Date 5/14/90

## Pre Test Data:

Barometric Press, in. Hg 30.2  
 Stack Area, sq. ft. 3.125  
 Sample Time/ Pt, min. 5%  
 Assumed Stack Press 29  
 Assumed Moisture 5%  
 Assumed Molecular Wt 29

## Equipment Info:

Meter No. F-5-8  
 Meter, Yd 1.00  
 Pitot, Cp .84  
 CFM  $\Delta H = 1.0$  .592  
 Probe I.D. 1/4" ID  
 Nozzle No./Dia 746  
 Filter No. 742-226

## Weight

Imp. Matl Ht(End) (Start) (g)  
 #1 143/149 220.6 615.4 105.2  
 #2 143/149 620.0 612.2 7.8  
 #3 140.9 548.5 542.8 0.7  
 #4 56 382.0 223.6 158.4  
 Total 1171.1

## Leak Check:

CFM Vac. Init. Pitot IBS  
 Pre-Test .003 16 JA 04  
 Post-Test .003 13 JA  
 Sample Train

## Pre-Test Calibration

Meter Meter Temp.  
 Time  $\Delta H$  Reading In Out  
 Init.           
 Final         

| Sample Point  | Time | Meter Conditions |     |               | Temperatures, of |          |     |       |          |                | Static Press. twg | Test Summary                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|------|------------------|-----|---------------|------------------|----------|-----|-------|----------|----------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |      | ΔP               | ΔH  | Meter Reading | Probe            | Meter In | Out | Open  | Imp. Out | O <sub>2</sub> |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Start         | 8:25 | .26              | .27 | 302.045       | 14/16            | 75       | 68  | 14/16 | 56       | 5.0            | 7                 | Initial<br>MMJ/MJA<br>Sample Vol., c.f. 57.699 ✓<br>Stack Press. twg 2.5 ✓<br>ΔP 2764 twg ΔH .64 ✓ twg<br>Meter Temp., °F 86.9 ✓<br>Stack Temp., °F 285.0 ✓<br>Water Collected, g 117 ✓<br>O <sub>2</sub> /CO <sub>2</sub> Method 5185 ✓<br>Chain of Cust. Info (init.):<br>Impingers Loaded<br>Impingers Recovered<br>Filter Loaded<br>Filter Recovered<br>Probe Wash JM/LE<br>Comments: CEMO <sub>2</sub> : 4.2<br>CO <sub>2</sub> : 13.0 |
| 1 - 1         | 8:28 | .51              | .11 | 303.75        |                  | 63       | 70  |       | 53       | 4.8            | 6                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2             | 8:31 | .45              | .89 | 305.84        |                  | 95       | 72  |       | 51       | 4.2            | 4                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3             | 8:34 | .18              | .35 | 307.586       |                  | 96       | 73  |       | 58       | 5.1            | 2                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 4             | 8:37 | .14              | .30 | 308.605       |                  | 90       | 74  |       | 62       | 5.2            | 2                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 5             | 8:40 | .13              | .28 | 309.75        |                  | 88       | 75  |       | 63       | 5.4            | 2                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 6             | 8:43 | .06              | .13 | 310.70        |                  | 84       | 76  |       | 60       | 6.4            | 2                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Stop          | 8:46 |                  |     | 311.341       |                  |          |     |       |          |                |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Start         | 8:49 | .09              | .19 | 311.341       |                  | 78       | 76  |       | 62       | 5.6            | 2                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1 - 1         | 8:52 | .12              | .26 | 312.067       |                  | 95       | 77  |       | 57       | 8.0            | 3                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2             | 8:55 | .19              | .41 | 312.730       |                  | 90       | 79  |       | 56       | 5.7            | 4                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3             | 8:58 | .24              | .52 | 313.515       |                  | 92       | 75  |       | 54       | 5.4            | 4                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 4             | 9:01 | .20              | .44 | 315.106       |                  | 92       | 80  |       | 56       | 4.8            | 4                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 5             | 9:04 | .35              | .77 | 316.3         |                  | 94       | 75  |       | 52       | 6.2            | 7                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 6             | 9:07 | .27              | .59 | 317.728       |                  | 93       | 80  |       | 56       | 7.6            | 4                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Stop          | 9:10 |                  |     | 318.590       |                  |          |     |       |          |                |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Start         | 9:14 | .22              | .44 | 318.590       |                  | 85       | 80  |       | 63       | 6.4            | 4                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1 - 1         | 9:17 | .24              | .57 | 320.38        |                  | 94       | 82  |       | 60       | 5.8            | 4                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Total/Average |      |                  |     |               |                  |          |     |       |          |                |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## Initial

Sample Vol., c.f. 57.69 MM MM  
 Stack Press, twg 2.5 MM MM  
 $\Delta P$  2764 twg  $\Delta H$  164 MM MM  
 Meter Temp., of 86.9 MM MM  
 Stack Temp., of 285.02 MM MM  
 Water Collected, g 117.1 MM MM  
 O<sub>2</sub>/CO<sub>2</sub> Method 5185 MM MM  
 Chain of Cust. Info (Init.):  
 Impingers Loaded JS  
 Impingers Recovered JS  
 Filter Loaded JS  
 Filter Recovered JS  
 Probe Wash JA JE  
 Comments: CEM O<sub>2</sub>: 4.2  
CO<sub>2</sub>: 13.0

# PARTICULATE TEST DATA

Client/Location SCC / Alameda Unit 5 Test No. 5-1113-5 Method 5-1113 Page 2  
 Sample Location South Beach Fuel Oil Ambient Temp., °F 1 of 3  
 Operators \_\_\_\_\_ Meter Vol. (Start/End) \_\_\_\_\_ / \_\_\_\_\_ Date \_\_\_\_\_

Pre Test Data: Equipment Info: Imp. Matl Alum Weight (Start) (g) \_\_\_\_\_ Leak Check: \_\_\_\_\_  
 Barometric Press, in. Hg \_\_\_\_\_ Meter No. #1 \_\_\_\_\_  
 Stack Area, sq. ft. \_\_\_\_\_ Meter, Yd. #2 \_\_\_\_\_  
 Sample Time/ Pt, min. \_\_\_\_\_ Pitot, Yd. #3 \_\_\_\_\_  
 Assumed Stack Press \_\_\_\_\_ CFM @ H = 1.0 #4 \_\_\_\_\_  
 Assumed Moisture \_\_\_\_\_ Probe I.D. \_\_\_\_\_  
 Assumed Molecular Wt \_\_\_\_\_ Nozzle No./Dia \_\_\_\_\_  
 Filter No. \_\_\_\_\_

Time \_\_\_\_\_ ΔH \_\_\_\_\_ Reading \_\_\_\_\_ In \_\_\_\_\_ Out \_\_\_\_\_  
 Init. \_\_\_\_\_ Final \_\_\_\_\_

| Sample Point  | Time  | Meter Conditions |     |               | Temperatures, °F |       |          |           | Vacuum | Static Press. lwg | Test Summary                           |
|---------------|-------|------------------|-----|---------------|------------------|-------|----------|-----------|--------|-------------------|----------------------------------------|
|               |       | ΔP               | ΔH  | Meter Reading | Stack            | Probe | Meter In | Meter Out |        |                   |                                        |
| 3-1           | 9:20  | 120              | 44  | 321.728       | 284              | N/A   | 94       | 83        | 4.6    |                   | Initial                                |
| 5             | 9:23  | 121              | 46  | 323.00        | 283              |       | 95       | 83        | 4.6    |                   | Sample Vol., c.f.                      |
| 4             | 9:26  | 123              | 50  | 324.045       | 284              |       | 95       | 84        | 4.8    |                   | Stack Press, lwg                       |
| 3             | 9:27  | 126              | 57  | 325.219       | 276              |       | 96       | 83        | 4.6    |                   | ΔP lwg ΔH lwg                          |
| 2             | 9:32  | 114              | 30  | 326.765       | 278              |       | 94       | 83        | 3      |                   | Meter Temp., °F                        |
| 5-1           | 9:35  |                  |     | 327.731       |                  |       |          |           |        |                   | Stack Temp., °F                        |
| 5-2           | 9:37  | 120              | 44  | 327.731       | 284              |       | 94       | 83        | 4.6    |                   | Water Collected, g                     |
| 11-7          | 9:40  | 126              | 57  | 328.918       | 268              |       | 95       | 84        | 5      |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 6             | 9:43  | 124              | 52  | 330.118       | 269              |       | 95       | 84        | 5      |                   | Chain of Cust. Info (init.):           |
| 5             | 9:46  | 122              | 44  | 331.432       | 277              |       | 94       | 83        | 4      |                   | Impingers Loaded                       |
| 11            | 9:49  | 128              | 61  | 332.628       | 276              |       | 95       | 83        | 5      |                   | Impingers Recovered                    |
| 3             | 9:52  | 131              | 68  | 334.742       | 273              |       | 96       | 84        | 5      |                   | Filter Loaded                          |
| 2             | 9:55  | 128              | 61  | 335.448       | 272              |       | 96       | 84        | 5      |                   | Filter Recovered                       |
| 5-1           | 9:58  |                  |     | 336.911       |                  |       |          |           |        |                   | Probe Wash                             |
| 5-2           | 10:00 | 136              | 79  | 336.911       | 268              |       | 85       | 83        | 5.4    |                   | Comments:                              |
| 5-1           | 10:03 | 146              | 101 | 338.328       | 257              |       | 96       | 83        | 5.0    |                   |                                        |
| 2             | 10:06 | 151              | 112 | 340.220       | 260              |       | 98       | 83        | 4.7    |                   |                                        |
| 3             | 10:09 | 135              | 77  | 342.681       | 254              |       | 97       | 82        | 4.6    |                   |                                        |
| Total/Average |       |                  |     |               |                  |       |          |           |        |                   |                                        |

ΔH = 2.2

Client/Location \_\_\_\_\_ Unit \_\_\_\_\_ Test No. \_\_\_\_\_ Method \_\_\_\_\_ Page 3  
Sample Location \_\_\_\_\_ Fuel \_\_\_\_\_ Ambient Temp., °F \_\_\_\_\_ of 3  
Operators \_\_\_\_\_ Meter Vol. (Start/End) \_\_\_\_\_ / \_\_\_\_\_ Date \_\_\_\_\_

| Barometric Press, in. Hg | Meter No.            | #1                  | Sample Train             |
|--------------------------|----------------------|---------------------|--------------------------|
| Stack Area, sq. ft.      | Meter, Yd            | #2                  | CFM Vac. Init. Pitot IDS |
| Sample Time/ Pt, min.    | Pitot, Cp            | #3                  | Pre-Test                 |
| Assumed Stack Press      | CFM $\Delta H = 1.0$ | #4                  | Post-Test                |
| Assumed Moisture         | Probe I.D.           | Total               | Pre-Test Calibration     |
| Assumed Molecular Wt     | Nozzle No./Dia       | Impinger Box I.D.   | Meter Meter Temp.        |
|                          | Filter No.           | Integrated Bag I.D. |                          |

[illegible]



PARTICULATE TEST DATA

Client/Location SCF/Blanton Unit 5 Test No. HA-88-22 Method DRIFT Page 1  
Sample Location #5 North Fuel GL Ambient Temp., °F      of 1  
Operators RD Meter Vol. (Start/End) 1 Date 3/5/90

Pre Test Data: Equipment Info: Weight Weight  
Barometric Press, in. Hg      Meter No.      Imp. Matl Wt(End) (Start) (g) Leak Check:       
Stack Area, sq. ft.      Meter, Yd      #1 HA-88-22 614.8 - 611.5 = 3.3  
Sample Time/ Pt, min.      Pitot, Cp      #2 HA-88-22 614.8 - 611.5 = 4.9  
Assumed Stack Press      CFM @ ΔH = 1.0      #3 HA-88-22 614.8 - 611.5 = 21.9  
Assumed Moisture      Probe I.D.      #4 SC 614.8 - 611.5 =       
Assumed Molecular Wt      Nozzle No./Dia      Total       
Filter No.      Impinger Box I.D.       
Integrated Bag I.D.     

Sample Train  
CFM Vac. Init. Pitot IDS  
Pre-Test 1001 15 RD  
Post-Test       
Pre-Test Calibration  
Meter Meter Temp.  
Time ΔH Reading In Out  
Init.       
Final     

| Sample Point  | Meter Conditions |    |    | Temperatures, °F |       |       |              | Static Press. twg | Vacuum   | O <sub>2</sub> | Imp. |  | Test Summary                           |
|---------------|------------------|----|----|------------------|-------|-------|--------------|-------------------|----------|----------------|------|--|----------------------------------------|
|               | Time             | ΔP | ΔH | Meter Reading    | Stack | Probe | Meter In Out | Oven              | Imp. Out |                |      |  |                                        |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Initial                                |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Sample Vol., c.f.                      |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Stack Press, twg                       |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | ΔP twg ΔH twg                          |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Meter Temp., °F                        |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Stack Temp., °F                        |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Water Collected, g                     |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | O <sub>2</sub> /CO <sub>2</sub> Method |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Chain of Cust. Info (init.):           |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Impingers Loaded <u>IM</u>             |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Impingers Recovered <u>IM</u>          |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Filter Loaded <u>IM</u>                |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Filter Recovered <u>IM</u>             |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Probe Wash <u>IM</u>                   |
|               |                  |    |    |                  |       |       |              |                   |          |                |      |  | Comments: <u>    </u>                  |
| Total/Average |                  |    |    |                  |       |       |              |                   |          |                |      |  |                                        |



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

PAGE 1 OF 24

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LAB NUMBER: 25653

CLIENT: CARNOT

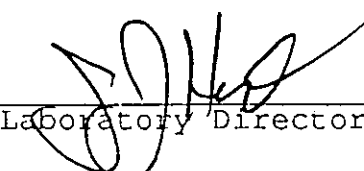
REPORT ON: NINE SOURCE SAMPLES

PROJECT #: 5863

LOCATION: SUBMITTED BY CLIENT

RESULTS: SEE ATTACHED

---

  
Laboratory Director



Curtis &amp; 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  
PAGE 2 OF 24

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<br>ug/SAMPLE |
|--------|---------------|---------------------|----------------------|
| 1      | REAGENT BLANK | BLANK               | 0.0199               |
|        |               | 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               |
|        |               | 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               |
|        |               | 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               |
|        |               | STD1                | 0.0227               |
|        |               | STD2                | 0.0371               |
|        |               | STD3                | 0.0619               |
|        |               | INSTRUMENT FACTOR:  | 1                    |
|        |               | CORRELATION FACTOR: | 0.9885               |
|        |               | DILUTION FACTOR:    | 0.05                 |



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  
PAGE 3 OF 24

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  
STD1 0.0197  
STD2 0.0311  
STD3 0.0385

2.6

INSTRUMENT FACTOR: 1  
CORRELATION FACTOR: 0.9925  
SAMPLE VOLUME 0.05

8 5-MTLS-S

BLANK 0.0199  
STD1 0.0198  
STD2 0.0327  
STD3 0.0414

2.3

INSTRUMENT FACTOR: 1  
CORRELATION FACTOR: 0.9938  
SAMPLE VOLUME 0.05

9 2-MTLS-N

BLANK 0.0176  
STD1 0.019  
STD2 0.0483  
STD3 0.0625

1.1

INSTRUMENT FACTOR: 1  
CORRELATION FACTOR: 0.9805  
SAMPLE VOLUME 0.05



Curtis &amp; 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  
PAGE 4 OF 24

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<br>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  
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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<br>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.

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  
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METAL: BERYLLIUM IMPINGER CATCH  
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89  
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

| TEST ID | SAMPLE ID     | SAMPLE VOLUME | BERYLLIUM<br>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)              |

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1  
SPIKE % RECOVERY: 96



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  
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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<br>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 &amp; 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  
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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<br>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 &amp; 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  
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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<br>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 &amp; 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  
PAGE 10 OF 24

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<br>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



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  
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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<br>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 &amp; 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  
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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<br>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 &amp; 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  
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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<br>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 &amp; 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  
PAGE 14 OF 24

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<br>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 cannot



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  
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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<br>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 &amp; 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  
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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<br>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 &amp; 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  
PAGE 17 OF 24

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<br>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 &amp; 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  
PAGE 18 OF 24

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<br>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



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  
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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<br>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  
PAGE 20 OF 24

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<br>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



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  
PAGE 21 OF 24

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<br>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 &amp; 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  
PAGE 22 OF 24

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<br>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:  
SPIKE % RECOVERY:

4  
85



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  
PAGE 23 OF 24

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<br>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 &amp; 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  
PAGE 24 OF 24

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<br>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

7/1 of 2

CERTIFICATION OF SAMPLE RECEIPT

Samples: Project # 53304-AL

Sample No.  
(Project No.)  
Test No.

Complete Description

| Sample No.<br>(Project No.)<br>Test No. | Complete Description                                                          |
|-----------------------------------------|-------------------------------------------------------------------------------|
| Reagent Blank                           | Litken T47-235, 200ml $HNO_3/H_2O_2$ , 100ml $KMnO_4$                         |
| MHS Blank #1                            | Litken T47-237, Probe Wash, Tupperware Catch<br>2 $KMnO_4$ Tupperware (132ml) |
| MHS Blank #2                            | Litken T47-234, Probe Wash, Tupperware Catch<br>2 $KMnO_4$ Tupperware (118ml) |
| 2-MHS-N                                 | Litken T47-229, Probe Wash, Tupperware Catch,<br>2 $KMnO_4$ Tupperware (354)  |
| 2-MHS-S                                 | Litken T47-228, Probe Wash, Tupperware Catch,<br>2 $KMnO_4$ Tupperware (30ml) |
| 3-MHS-N                                 | Litken T47-239, Probe Wash, Tupperware Catch<br>2 $KMnO_4$ Tupperware (166)   |

Chain of Custody Prior to Shipment:

(see next page)

| Released by        | Time and Date | Received by | Time and Date |
|--------------------|---------------|-------------|---------------|
| <i>[Signature]</i> | 1500 3/13/90  |             |               |
|                    |               |             |               |
|                    |               |             |               |

Samples shipped to:

Curtis & Tompkins

Samples shipped from ESA by:

C&T

Date 3/21/90

Carrier:

Acadamed

Air Bill No. \_\_\_\_\_

Samples received by:

Paul Myers

Date 3/21/90

Company:

Curtis & Tompkins



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. # 53304-AL  
(Project No.)  
Test No. Complete Description  
3-MAL-S Likn T47-230, Probe Wash, Tupperware Cate  
& KMO, impinger (88 ml)  
5-MAL-N Likn T47-238, Probe Wash, Tupperware Cate  
& KMO, impinger (148)  
5-MAL-S Likn T47-226, Probe Wash, Tupperware Cate  
& KMO, impinger (110 ml)

Chain of Custody Prior to Shipment:

| Released by        | Time and Date       | Received by | Time and Date |
|--------------------|---------------------|-------------|---------------|
| <u>[Signature]</u> | <u>1900 3/19/90</u> |             |               |
|                    |                     |             |               |
|                    |                     |             |               |

Samples shipped to: Curtis & Tupperware

Samples shipped from ESA by: C&T Date 3/21/90  
Carrier: handcarried Air Bill No. \_\_\_\_\_  
Samples received by: Paul M. [Signature] Date 3/21/90  
Company: Curtis & Tupperware



# 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 Thompson

P.O. Number 5863

Charge Number 53304-AL

Date 3/79/90

Phone: ( )

Code:                     

California Resale No: SR EA 24-816623

|                                |         |          |                        |                                                                                                       |
|--------------------------------|---------|----------|------------------------|-------------------------------------------------------------------------------------------------------|
| Date Required<br><u>4/7/90</u> | Contact | Ship via | Terms<br><u>net 30</u> | <input type="checkbox"/> Resale - Non Taxable<br><input checked="" type="checkbox"/> Co Use - Taxable |
|--------------------------------|---------|----------|------------------------|-------------------------------------------------------------------------------------------------------|

| ITEM NO. | DESCRIPTION                                                                                                                                                                              | QUANTITY | PRICE | TOTAL |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|-------|
|          | Analyse 7 NIS drain<br>by EPA draft method<br>for:<br>Be Mn<br>As Hg<br>Cu Ni<br>Cd Se<br>Pb Zn<br>Use complete package as a whole<br>per lot<br>- Lead II GA/QC<br>- signed as total mg |          |       |       |

|                                                                             |           |                 |
|-----------------------------------------------------------------------------|-----------|-----------------|
| <u>Curtis and Thompson</u><br><u>Energy Associates</u><br><u>California</u> | Sub Total | \$ <u>5,505</u> |
|                                                                             | Sales Tax | \$ <u>-</u>     |
|                                                                             | Freight   | \$ <u>-</u>     |
|                                                                             | TOTAL     | \$ <u>5,505</u> |

**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  
 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. 53304COMPUTED BY A. Green DATE 4/16/90 CHECKED BY \_\_\_\_\_ SHEET NO. \_\_\_\_\_ of \_\_\_\_\_ DATE \_\_\_\_\_Hex Chrom

| <u>Test</u> | <u>ug/ml</u> | <u>ug/ml</u><br><u>Blank</u> | <u>Tot</u><br><u>Vol</u> | <u>Aliq</u><br><u>factor</u> | <u>Tot ug / train</u> |
|-------------|--------------|------------------------------|--------------------------|------------------------------|-----------------------|
| 1-C-S       | .00206       | ND *                         | 355                      | x 2                          | 1.46 <del>34</del>    |
| 4-C-S       | .00313       | ND *                         | 287                      | x 2                          | 1.80                  |
| 6-C-N       | .0248        | ND *                         | 289                      | x 2                          | 14.3                  |

\* ND @ .0014 ug/ml

Total Chromium

| <u>Test</u> | <u>ug/sample</u> | <u>blank</u><br><u>(ug)</u> | <u>Aliq factor</u> | <u>Tot ug / train</u> |
|-------------|------------------|-----------------------------|--------------------|-----------------------|
| 1-C-S       | 4.75             | 1.75                        | x 2                | 6.00                  |
| 4-C-S       | 4.00             | 1.75                        | x 2                | 4.50                  |
| 6-C-N       | 15.2             | 1.75                        | x 2                | 26.9                  |

\* Volume for samples + blanks = 25 ml



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      |
| Liquid Vol (ml).....129.9             | * | from portable...        | 6.20      |
| Meter Press (iwg).....0.58            | * | CO2 (%): from CEM.....  | 12.30     |
|                                       | * | calculated.....         | 10.83     |
|                                       | * | 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 SOE / MAMO Unit 45 Test No. 1-CHR-5 Method 425 Page 1  
 Sample Location Exhaust duct Fuel Oil Ambient Temp., OF 92.3 of 3  
 Operators RD / JAL Meter Vol. (Start/End) 923.124-977.708 Date 3/12/91

Pre Test Data:  
 Barometric Press, in. Hg 30.26  
 Stack Area, sq. ft. 100  
 Sample Time/ Pt, min. 129 / 3  
 Assumed Stack Press 5%  
 Assumed Moisture 2%  
 Assumed Molecular Wt 28

Equipment Info:  
 Meter No. ES-19  
 Meter, Yd 100  
 Pitot, Cp .84  
 CFM @ ΔH = 1.0 5945  
 Probe I.D. 1/2" / 1.041" / 2.43  
 Nozzle No./Dia 12.43  
 Filter No. T 42 - 218  
 T 63-218

Imp. Matl 14 SG Weight (g)  
 #1 140H 689.5 - 5794 = 110.1  
 #2 140H 588.2 - 583.1 = 5.1  
 #3 0 497.5 - 496.4 = 1.1  
 #4 SG 822.0 - 808.4 = 13.6  
 Total 2577.2 - 2467.3 = 129.9

Leak Check:  
 Impinger Box I.D. ✓  
 Integrated Bag I.D. ✓

Sample Train  
 CFM Vac. 119 Pitot 1BS  
 Pre-Test, 019 7 OK  
 Post-Test 020 17 OK  
 Pre-Test Calibration

Time ΔH Reading In Out  
 Init. ---  
 Final ---

| Sample Point  | Time      | Meter Conditions |     |               | Temperatures, °F |       |          |     | Static Press. lwg | Test Summary |                                                                  |          |
|---------------|-----------|------------------|-----|---------------|------------------|-------|----------|-----|-------------------|--------------|------------------------------------------------------------------|----------|
|               |           | ΔP               | ΔH  | Meter Reading | Stack            | Probe | Meter In | Out |                   |              | Oven                                                             | Imp. Out |
| 1-7           | 1526      | 13               | .6  | 923.112       | 202              |       | 87       | 78  |                   | 57           | 8                                                                | 3        |
| -4            | 1529      | 13.5             | .7  | 924.676       | 278              |       | 95       | 79  |                   | 54           | 9                                                                | 3        |
| -5            | 1532      | 15               | 1.0 | 926.152       | 291              |       | 98       | 79  |                   | 53           | 6.0                                                              | 4        |
| -4            | 1535      | 12.5             | .5  | 927.775       | 301              |       | 98       | 79  |                   | 52           | 5.5                                                              | 3        |
| -3            | 1538      | 11.8             | .36 | 929.110       | 302              |       | 94       | 79  |                   | 53           | 5.0                                                              | 3        |
| -2            | 1541      | 10.5             | .1  | 930.222       | 293              |       | 89       | 79  |                   | 54           | 6.1                                                              | 2        |
| -1            | 1544/1548 | 10.0             | 0   | 930.824       | 292              |       |          |     |                   | 54           |                                                                  | 0        |
| 2-7           | 1547      | 13.3             | .66 | 930.824       | 286              |       | 84       | 78  |                   | 55           | 7.2                                                              | 3.5      |
| -6            | 1550      | 13.5             | .70 | 932.199       | 303              |       | 95       | 79  |                   | 52           | 5.2                                                              | 5        |
| -5            | 1553      | 12.5             | .50 | 933.620       | 305              |       | 94       | 79  |                   | 52           | 4.6                                                              | 6        |
| -4            | 1556      | 11.6             | .32 | 935.001       | 302              |       | 95       | 78  |                   | 52           | 4.8                                                              | 5.5      |
| -3            | 1559      | 12.2             | .44 | 936.098       | 294              |       | 93       | 78  |                   | 52           | 5.6                                                              | 7        |
| -2            | 1602      | 11.4             | .28 | 937.288       | 286              |       | 91       | 79  |                   | 52           | 7.6                                                              | 6        |
| -1            | 1605/1608 | 10.5             | .1  | 938.186       | 284              |       | 88       | 78  |                   | 53           | 8.2                                                              | 3.5      |
| 3-7           | 1610      | 12.1             | .44 | 938.649       | 279              |       | 82       | 77  |                   | 55           | 6.0                                                              | 4        |
| -6            | 1613      | 12.0             | .42 | 939.871       | 296              |       | 91       | 78  |                   | 53           | 4.4                                                              | 4        |
| -5            | 1616      | 11.5             | .37 | 941.122       | 292              |       | 91       | 77  |                   | 53           | 4.6                                                              | 4.5      |
| -4            | 1619      | 11.4             | .40 | 941.955       | 297              |       | 91       | 77  |                   | 52           | 4.4                                                              | 5.5      |
| Total/Average |           |                  |     |               |                  |       |          |     |                   |              |                                                                  |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Initial <u>MM/M</u>                                              |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Sample Vol., c.f. <u>54.596</u>                                  |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Stack Press. lwg <u>12.5</u>                                     |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | ΔP <u>12.593</u> lwg ΔH <u>0.58</u> lwg                          |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Meter Temp., °F <u>99.585</u>                                    |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Stack Temp., °F <u>163.2</u>                                     |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Water Collected, <u>92.81</u> lb                                 |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | O <sub>2</sub> /CO <sub>2</sub> Method <u>O<sub>2</sub> 6.20</u> |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Chain of Cust. Info (init.):                                     |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Impingers Loaded <u>OF</u>                                       |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Impingers Recovered <u>62</u>                                    |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Filter Loaded <u>62</u>                                          |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Filter Recovered <u>62</u>                                       |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Probe Wash                                                       |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | Comments: <u>CEM: O<sub>2</sub> = 4.2</u>                        |          |
|               |           |                  |     |               |                  |       |          |     |                   |              | <u>CO<sub>2</sub> = 6.2</u>                                      |          |

Initial MM ✓  
 Sample Vol., c.f. 54.596  
 Stack Press, lwg 12.5 ✓  
 ΔP 2593 lwg ΔH 0.58 lwg  
 Meter Temp., OF 98.5  
 Stack Temp., OF 103.5  
 Water Collected, g 12.8  
 O<sub>2</sub>/CO<sub>2</sub> Method 0.2  
 Chain of Cust. Info (Init.):  
 Impingers Loaded OK  
 Impingers Recovered OK  
 Filter Loaded OK  
 Filter Recovered OK  
 Probe Wash  
 Comments: CEM: O<sub>2</sub> = 4.2  
CO<sub>2</sub> = 16.4

# PARTICULATE TEST DATA

Client/Location SCE/ALAMO Unit 45 Test No. 1-05-3 Method 425 Page 2  
 Sample Location Exhaust Duct Fuel Oil Ambient Temp., of 1 of 312/92  
 Operators RP/JM Meter Vol. (Start/End) 1 Date 3/12/92

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. 1  
 Meter, Yd \_\_\_\_\_  
 Pitot, Cp \_\_\_\_\_  
 CFM @ ΔH = 1.0 \_\_\_\_\_  
 Probe I.D. \_\_\_\_\_  
 Nozzle No./Dia \_\_\_\_\_  
 Filter No. \_\_\_\_\_

Weight Weight  
 Imp. Matl Wt(End) (Start) (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 Calibration  
 Meter Meter Temp. \_\_\_\_\_  
 Time ΔH Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time        | Meter Conditions |     |               | Temperatures, °F |          |           | O <sub>2</sub> | Vacuum | Static Press. lwg | Test Summary                           |
|---------------|-------------|------------------|-----|---------------|------------------|----------|-----------|----------------|--------|-------------------|----------------------------------------|
|               |             | ΔP               | ΔH  | Meter Reading | Probe            | Meter In | Meter Out |                |        |                   |                                        |
| 3-3           | 11022       | 120              | 142 | 943.201       | 2910             | 93       | 70        | 52             | 6      |                   | Initial                                |
| -2            | 11025       | 122              | 146 | 944.501       | 284              | 92       | 70        | 51             | 7      |                   | Sample Vol., c.f.                      |
| -1            | 11028/11031 | 125              | 153 | 945.008       | 282              | 95       | 76        | 51             | 7.7    |                   | Stack Press, lwg                       |
| 4-7           | 11037       | 117              | 130 | 946.050       | 248              | 81       | 74        | 53             | 11     |                   | ΔP 1wg ΔH 1wg                          |
| -6            | 11030       | 123              | 148 | 948.008       | 273              | 89       | 75        | 50             | 10     |                   | Meter Temp., °F                        |
| -5            | 11039       | 126              | 155 | 949.250       | 219              | 93       | 75        | 49             | 8      |                   | Stack Temp., °F                        |
| -4            | 11042       | 124              | 150 | 950.412       | 202              | 92       | 75        | 49             | 10     |                   | Water Collected, g                     |
| -3            | 11045       | 121              | 157 | 951.998       | 200              | 94       | 74        | 50             | 10     |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| -2            | 11048       | 132              | 167 | 953.182       | 278              | 97       | 75        | 50             | 10     |                   | Chain of Cust. Info (init.):           |
| -1            | 11051/11054 | 130              | 163 | 954.434       | 278              | 98       | 74        | 53             | 5      |                   | Impingers Loaded                       |
| 5-7           | 11058       | 155              | 116 | 955.833       | 231              | 90       | 74        | 50             | 6.8    |                   | Impingers Recovered                    |
| -6            | 1701        | 137              | 178 | 957.777       | 244              | 97       | 74        | 50             | 13     | 42.5              | Filter Loaded                          |
| -5            | 1704        | 135              | 174 | 959.256       | 245              | 100      | 75        | 51             | 13     |                   | Filter Recovered                       |
| -4            | 1707        | 132              | 171 | 960.617       | 259              | 102      | 75        | 51             | 14     |                   | Probe Wash                             |
| -3            | 1710        | 136              | 176 | 962.199       | 262              | 101      | 75        | 51             | 15     |                   | Comments:                              |
| -2            | 1713        | 134              | 182 | 963.701       | 263              | 102      | 75        | 51             | 15     |                   |                                        |
| -1            | 1716/1719   | 132              | 167 | 965.444       | 242              | 98       | 76        | 52             | 16     |                   |                                        |
| Total/Average |             |                  |     | 946.288       |                  |          |           |                |        |                   |                                        |

### PARTICULATE TEST DATA

|                 |             |      |     |            |             |                   |     |      |         |
|-----------------|-------------|------|-----|------------|-------------|-------------------|-----|------|---------|
| Client/Location | SGR / ARAND | Unit | #5  | Test No.   | 1-CHR-5     | Method            | 423 | Page | 3       |
| Sample Location | BEAVER BOX  | Fuel | OIL |            |             | Ambient Temp., °F |     | of   | 3       |
| Operators       | RP/JM       |      |     | Meter Vol. | (Start/End) |                   | 1   | Date | 3/12/90 |

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

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

| Imp.           | Matl | Wt(End) | (Start) | (g) | Weight |
|----------------|------|---------|---------|-----|--------|
| #1             | A    | -       | -       | =   |        |
| #2             |      | -       | -       | =   |        |
| #3             |      | -       | -       | =   |        |
| #4             |      | -       | -       | =   |        |
| Total          |      | -       | -       | =   |        |
| Impinger Box   | I.D. |         |         |     |        |
| Integrated Bag | I.D. |         |         |     |        |

|                      |       |  |  |  |  |
|----------------------|-------|--|--|--|--|
| <b>Leak Check:</b>   |       |  |  |  |  |
| Sample Inlet         | _____ |  |  |  |  |
| CFM Vac.             | _____ |  |  |  |  |
| Inlet Pitot          | _____ |  |  |  |  |
| Pre-Test             | _____ |  |  |  |  |
| Post-Test            | _____ |  |  |  |  |
| Pre-Test Calibration | _____ |  |  |  |  |
| Meter Meter Temp.    | _____ |  |  |  |  |
| Time ΔH              | _____ |  |  |  |  |
| Reading In Out       | _____ |  |  |  |  |
| Init.                | _____ |  |  |  |  |
| Final                | _____ |  |  |  |  |

[illegible]

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      |
| Liquid Vol (ml).....129.3             | * | from portable...        | 5.91      |
| Meter Press (iwg).....0.52            | * | CO2 (%): from CEM.....  | 12.00     |
|                                       | * | calculated.....         | 11.46     |
|                                       | * | 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. 41-C-N Method 425 Page 1  
 Sample Location th S North Fuel 0.7 Ambient Temp., of 5 of 5  
 Operators CF/RP Meter Vol. (Start/End) 249.584301280 Date 3/18/90

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: ES-8  
 Meter No. 990  
 Meter, Yd 84  
 Pitot, Cp 1.0  
 CFM @ ΔH = 1.0 598  
 Probe I.D. 16  
 Nozzle No./Dia 7.242  
 Filter No. 763-219

Weight Weight  
 Imp, Matl Ht(End) (Start) (g)  
 #1 1.123011 708.1 - 598.1 = 110.0  
 #2 1.123011 601.1 - 596.9 = 4.2  
 #3 1.123011 492.2 - 2.1  
 #4 1.123011 232.2 - 200.9 = 131.0  
 Total 252.2 - 232.9 = 129.3

Leak Check: \_\_\_\_\_  
 Sample Train  
 CFM Vac. Inft. Pitot IBS  
 Pre-Test 0.05 15 CF OK  
 Post-Test 0.07 15 CF OK  
 Pre-Test Calibration

Time ΔH Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |     |               | Temperatures, of |          |     |      | Vacuum | Static Press. twg | Test Summary                                |
|---------------|------|------------------|-----|---------------|------------------|----------|-----|------|--------|-------------------|---------------------------------------------|
|               |      | ΔP               | ΔH  | Meter Reading | Probe            | Meter In | Out | Oven |        |                   |                                             |
| 6-1           | 1622 | .03              | .06 | 249.582       | 262              | 80       | 79  |      | 5      |                   | Initial M.M. MN                             |
| 2             | 1626 | .1               | .21 | 250.30        | 259              | 86       | 79  |      | 5      |                   | Sample Vol., c.f. 51.688                    |
| 3             | 1628 | .19              | .40 | 251.31        | 249              | 92       | 80  |      | 2      |                   | Stack Press, twg 2.6                        |
| 4             | 1631 | .19              | .40 | 252.15        | 224              | 96       | 81  |      | 0      |                   | ΔP 234 twg ΔH 152 twg                       |
| 5             | 1634 | .21              | .65 | 252.31        | 214              | 98       | 81  |      | 3      |                   | Meter Temp., of 88.5                        |
| 6             | 1637 | .24              | .50 | 254.81        | 206              | 98       | 82  |      | 3      |                   | Stack Temp., of 261.2                       |
| 7             | 1640 | .26              | .55 | 256.2         | 204              | 98       | 83  |      | 3      |                   | Water Collected, g 129.3                    |
|               | 1643 |                  |     | 257.11        |                  |          |     |      |        |                   | O <sub>2</sub> /CO <sub>2</sub> Method 5.91 |
| 51            | 1647 | .04              | .09 | 257.11        | 245              | 85       | 82  |      | 0      | 72.6              | Chain of Cust. Info (Init):                 |
| 2             | 1650 | .18              | .38 | 257.81        | 251              | 91       | 82  |      | 3      |                   | Impingers Loaded                            |
| 3             | 1652 | .21              | .45 | 258.72        | 249              | 94       | 83  |      | 4      |                   | Impingers Recovered                         |
| 4             | 1656 | .18              | .28 | 260.00        | 248              | 95       | 83  |      | 4      |                   | Filter Loaded                               |
| 5             | 1659 | .23              | .51 | 260.95        | 233              | 96       | 83  |      | 4      |                   | Filter Recovered                            |
| 6             | 1702 | .29              | .61 | 262.45        | 216              | 97       | 84  |      | 4      |                   | Probe Wash CF/RP                            |
| 7             | 1705 | .26              | .55 | 263.80        | 211              | 97       | 83  |      | 5      |                   | Comments: CEM 0.52                          |
|               | 1708 |                  |     | 264.893       |                  |          |     |      |        |                   | CO <sub>2</sub> 12.0                        |
| Total/Average |      |                  |     |               |                  |          |     |      |        |                   |                                             |

Client/Location SCS Almy Test No. 4-chr-N Method Chromic Page 2  
Sample Location HS North Unit S Ambient Temp., OF 011 of 3  
Operators CF/RP Meter Vol. (Start/End) 1 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 @  $\Delta H = 1.0$  \_\_\_\_\_  
Probe I.D. \_\_\_\_\_  
Nozzle No./Dia \_\_\_\_\_  
Filter No. \_\_\_\_\_  
Imp. Matl \_\_\_\_\_  
Wt(End) (Start) (g) \_\_\_\_\_  
Leak Check: \_\_\_\_\_  
Sample Train  
CEM Vac. \_\_\_\_\_ Init. Pitot IDS \_\_\_\_\_  
Pre-Test \_\_\_\_\_  
Post-Test \_\_\_\_\_  
Pre-Test Calibration \_\_\_\_\_  
Meter Meter Temp. \_\_\_\_\_  
Time  $\Delta H$  Reading In Out  
Init. \_\_\_\_\_  
Final \_\_\_\_\_

DP X 2.15

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, OF |          |     |      | O <sub>2</sub> | Vacuum | Static Press. twg | Test Summary                           |
|---------------|------|------------------|------------|---------------|------------------|----------|-----|------|----------------|--------|-------------------|----------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Probe            | Meter In | Out | Oven |                |        |                   |                                        |
| 4-7           | 1712 | .19              | .42        | 264.892       | 242              | 87       | 87  |      | 8.2            | 5      |                   | Initial                                |
| -6            | 1715 | .21              | .45        | 266.25        | 262              | 92       | 83  |      | 6.2            | 5      |                   | Sample Vol., c.f.                      |
| 5             | 1718 | .25              | .54        | 267.25        | 268              | 94       | 82  |      | 4.6            | 6      |                   | Stack Press, twg                       |
| 4             | 1721 | .27              | .58        | 268.71        | 260              | 96       | 82  |      | 5              | 5      |                   | $\Delta P$ twg $\Delta H$ twg          |
| 3             | 1724 | .21              | .45        | 269.95        | 269              | 94       | 82  |      | 5.4            | 5      |                   | Meter Temp., OF                        |
| 2             | 1727 | .20              | .43        | 270.93        | 279              | 94       | 82  |      | 5.1            | 6      |                   | Stack Temp., OF                        |
| 1             | 1730 | .29              | .71        | 272.35        | 268              | 96       | 82  |      |                |        |                   | Water Collected, g                     |
|               | 1733 |                  |            | 273.606       |                  |          |     |      |                |        |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 3-7           | 1735 | .15              | .32        | 273.606       | 213              | 88       | 82  |      | 6              | 3      |                   | Chain of Cust. Info (init.):           |
| -6            | 1738 | .19              | .41        | 274.620       | 264              | 92       | 82  |      | 6.6            | 4      |                   | Impingers Loaded                       |
| -5            | 1741 | .20              | .43        | 275.829       | 275              | 93       | 82  |      | 5.8            | 5      |                   | Impingers Recovered                    |
| -4            | 1744 | .17              | .37        | 276.810       | 276              | 93       | 82  |      | 5.2            | 4      |                   | Filter Loaded                          |
| -3            | 1747 | .24              | .52        | 277.944       | 280              | 95       | 82  |      | 5.3            | 5      |                   | Filter Recovered                       |
| -2            | 1750 | .28              | .60        | 279.225       | 284              | 97       | 82  |      | 5.8            | 6      |                   | Probe Wash                             |
| -1            | 1753 | .24              | .52        | 280.005       | 280              | 97       | 82  |      |                | 5      |                   | Comments:                              |
|               | 1756 |                  |            | 281.852       |                  |          |     |      |                |        |                   |                                        |
| Total/Average |      |                  |            |               |                  |          |     |      |                |        |                   |                                        |

PARTICULATE TEST DATA

Client/Location SCF Unit #5 Test No. 4C-N Method 425 Page 3  
Sample Location #5 NORTH Fuel OK Ambient Temp., OF 1 of 3  
Operators R.D.C.F./J.M. Meter Vol. (Start/End) 1 Date 3/13/90

Pre Test Data: Barometric Press, in. Hg 29.8 Equipment Info: Meter No. 1  
Stack Area, sq. ft. 1.0 Meter, Yd 1 Imp. Matl 1 Ht(End) (Start) (g) 1 Leak Check: 1  
Sample Time/ Pt, min. 1 Pitot, Cp 1 #1 1 #2 1 #3 1 #4 1 Total 1  
Assumed Stack Press 1 CFM @  $\Delta H = 1.0$  1 Impinger Box I.D. 1 Integrated Bag I.D. 1  
Assumed Moisture 1 Probe I.D. 1 Nozzle No./Dia 1 Filter No. 1  
Assumed Molecular Wt 1

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |          |     |     | Imp. Out | Oven | O <sub>2</sub> | Vacuum | Static Press. twg | Test Summary                           |
|---------------|------|------------------|------------|---------------|------------------|----------|-----|-----|----------|------|----------------|--------|-------------------|----------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Probe            | Meter In | Out | Out |          |      |                |        |                   |                                        |
| 1-1           | 1758 | .10              | .215       | 781.552       |                  | 88       | 82  |     | 61       |      |                | 3      |                   | Initial                                |
| -2            | 1801 | .18              | .39        | 282.678       |                  | 92       | 82  |     | 62       |      | 7.1            | 3      |                   | Sample Vol., c.f.                      |
| -3            | 1804 | .26              | .56        | 283.810       |                  | 96       | 82  |     | 62       |      | 5.5            | 4      |                   | Stack Press, twg                       |
| -4            | 1807 | .30              | .65        | 285.315       |                  | 97       | 82  |     | 61       |      | 5.4            | 7      |                   | $\Delta P$ twg $\Delta H$ twg          |
| -5            | 1810 | .31              | .61        | 286.701       |                  | 98       | 82  |     | 62       |      | 8.4            | 8      |                   | Meter Temp., OF                        |
| -6            | 1813 | .57              | 1.23       | 287.822       |                  | 103      | 83  |     | 62       |      | 8.4            | 12     |                   | Stack Temp., OF                        |
| -7            | 1816 | .35              | .75        | 287.680       |                  | 103      | 83  |     | 63       |      |                | 9      |                   | Water Collected, g                     |
|               | 1819 |                  | .37        | 291.229       |                  | 78       | 82  |     | 62       |      |                | 8      |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 1-7           | 1824 | .17              | .37        | 291.229       |                  | 97       | 83  |     | 63       |      | 8.4            | 10     |                   | Chain of Cust. Info (Init.):           |
| -8            | 1824 | .40              | .86        | 292.411       |                  | 100      | 83  |     | 63       |      | 6.5            | 8      |                   | Impingers Loaded                       |
| -9            | 1827 | .32              | .69        | 293.898       |                  | 99       | 83  |     | 63       |      | 4.9            | 10     |                   | Impingers Recovered                    |
| -4            | 1820 | .35              | .75        | 295.250       |                  | 100      | 83  |     | 63       |      | 5.0            | 10     |                   | Filter Loaded                          |
| -3            | 1833 | .33              | .75        | 296.771       |                  | 99       | 83  |     | 63       |      |                | 11     |                   | Filter Recovered                       |
| -2            | 1836 | .34              | .89        | 298.221       |                  | 98       | 83  |     | 63       |      |                | 8      |                   | Probe Wash                             |
| -1            | 1839 | .30              | .65        | 299.815       |                  |          |     |     |          |      |                |        |                   | Comments:                              |
|               | 1842 |                  |            | 291.280       |                  |          |     |     |          |      |                |        |                   |                                        |
| Total/Average |      |                  |            |               |                  |          |     |     |          |      |                |        |                   |                                        |



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      |
| Liquid Vol (ml).....126.2             | * | from portable...        | 6.21      |
| Meter Press (iwg).....0.61            | * | CO2 (%): from CEM.....  | 12.30     |
|                                       | * | calculated.....         | 11.09     |
|                                       | * | 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 / Rhineland Unit S Test No. 6-C-N Method Chrome Page 1  
 Sample Location North Fuel 0:1 Ambient Temp., °F 1 of 3  
 Operators CE / LE Meter Vol. (Start/End) 1 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. FS-19  
 Meter, Yd 1.000  
 Pitot, Cp .84  
 CFM @ ΔH = 1.0 595  
 Probe I.D. 1/4  
 Nozzle No./Dia N#7 .842  
 Filter No. 763-212  
797-240

## Weight Weight

Imp. Matl Ht(End) (Start) (g) Leak Check:

#1 12011 220.1 - 61.6 = 108.5  
 #2 12024 612.3 - 63.7 = 3.6  
 #3 - 513.9 - 512.8 = 1.7  
 #4 88 204.5 - 892.1 = 12.4  
 Total - - - = -  
 Impinger Box I.D. -  
 Integrated Bag I.D. -

Init. -  
 Final -

Sample Train  
 CFM Vac. Init. Pitot IBS  
 Pre-Test 0.0 2.1 CF CF  
 Post-Test 0.0 2.5 CF CF

## Pre-Test Calibration

Meter Meter Temp.

Time ΔH Reading In Out

| Sample Point  | Time | Meter Conditions |      |               | Temperatures, °F |          |     |      | Static Press. iwg | Test Summary |
|---------------|------|------------------|------|---------------|------------------|----------|-----|------|-------------------|--------------|
|               |      | ΔP               | ΔH   | Meter Reading | Probe            | Meter In | Out | Oven |                   |              |
| 1-1           | 1222 | .28              | .62  | 154.688       | 238              | 89       | 73  | -    | 62                | 59           |
| 2             | 1226 | .34              | .75  | 154.61        | 268              | 100      | 74  | -    | 58                | 5            |
| 3             | 1229 | .34              | .75  | 157.80        | 265              | 103      | 75  | -    | 56                | 4.6          |
| 4             | 1232 | .46              | 1.01 | 159.21        | 248              | 107      | 76  | -    | 57                | 4.1          |
| 5             | 1235 | .42              | .92  | 161.21        | 227              | 109      | 78  | -    | 58                | 8.0          |
| 6             | 1238 | .46              | 1.01 | 163.47        | 235              | 109      | 80  | -    | 59                | 8.1          |
| 7             | 1241 | .22              | .48  | 165.50        | 276              | 107      | 81  | -    | 59                | 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          |
| 3             | 1253 | .60              | 1.51 | 170.01        | 281              | 114      | 82  | -    | 60                | 6.5          |
| 4             | 1256 | .42              | .92  | 172.05        | 280              | 113      | 83  | -    | 62                | 6.3          |
| 5             | 1259 | .35              | .77  | 173.01        | 287              | 112      | 83  | -    | 62                | 5.1          |
| 6             | 1302 | .34              | .75  | 174.03        | 291              | 102      | 83  | -    | 64                | 4.8          |
| 7             | 1305 | .25              | .55  | 176.22        | 295              | 110      | 83  | -    | 64                | 6.4          |
| 1308          |      |                  |      | 177.440       |                  |          |     |      |                   | 10           |
| Total/Average |      |                  |      |               |                  |          |     |      |                   |              |

## Initial

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 126.0  
 O<sub>2</sub>/CO<sub>2</sub> Method 6.21  
 Chain of Cust. Info (Init.):  
 Impingers Loaded 13  
 Impingers Recovered 13  
 Filter Loaded 13  
 Filter Recovered 13  
 Probe Wash CF/LL

## Comments:

CFM Q<sub>2</sub> = 46%  
Q<sub>2</sub> = 12.3%

## Total/Average

Preliminary 16.250 = 104.3  
9.129 = 9.4% Q<sub>20</sub> = 6.29, 6.88  
 EST DS-07  
 Rev 8/8

PARTICULATE TEST DATA

Client/Location SCS Alameda Unit S Test No. 0-6-N Method Chrom Page 2  
 Sample Location North Fuel    Ambient Temp., °F    of 3  
 Operators CF 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, Co     
 CFM @ 4H = 1.0     
 Probe I.D.     
 Nozzle No./Dia     
 Filter No.     
 Impinger Box I.D.     
 Integrated Bag I.B.     
 Weight     
 Leak Check:     
 Sample Train  
 CFM Vac. Init. Pitot 185     
 Pre-Test     
 Post-Test     
 Pre-Test Calibration  
 Meter Meter Temp.  
 Time ΔH Reading In Out  
 Init.     
 Final   

| Sample Point  | Time  | Meter Conditions |     |               | Temperatures, °F |       |          |     | O <sub>2</sub> | Vacuum | Static Press. twg | Test Summary                           |
|---------------|-------|------------------|-----|---------------|------------------|-------|----------|-----|----------------|--------|-------------------|----------------------------------------|
|               |       | ΔP               | ΔH  | Meter Reading | Stack            | Probe | Meter In | Out |                |        |                   |                                        |
| 3-1           | 13:11 | .30              | .66 | 177.440       | 280              |       | 99       | 83  | 5.7            | 10     | -2.6              | Initial                                |
| 2             | 13:14 | .29              | .84 | 178.25        | 275              |       | 105      | 83  | 5.2            | 12     |                   | Sample Vol., c.f.                      |
| 3             | 13:17 | .35              | .77 | 186.95        | 273              |       | 105      | 84  | 5.0            | 12     |                   | Stack Press, twg                       |
| 4             | 13:20 | .29              | .64 | 182.49        | 275              |       | 107      | 84  | 4.9            | 11     |                   | ΔP twg ΔH twg                          |
| 5             | 13:23 | .24              | .52 | 184.21        | 260              |       | 110      | 84  |                | 10     |                   | Meter Temp., °F                        |
| 6             | 13:26 | .24              | .52 | 185.64        | 257              |       | 110      | 84  | 7.1            | 10     |                   | Stack Temp., °F                        |
| 7             | 13:29 | .21              | .46 | 186.78        | 227              |       | 109      | 84  | 8.2            | 8      |                   | Water Collected, g                     |
|               | 13:32 |                  |     | 181.635       |                  |       |          |     |                |        |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 4-7           | 13:35 | .18              | .40 | 187.635       | 226              |       | 97       | 84  | 8.4            | 8      |                   | Chain of Cust. Info (Init.):           |
| 6             | 13:38 | .20              | .45 | 189.21        | 242              |       | 108      | 84  | 6.9            | 9      |                   | Impingers Loaded                       |
| 5             | 13:41 | .20              | .45 | 190.35        | 252              |       | 108      | 85  | 5.5            | 9      |                   | Impingers Recovered                    |
| 4             | 13:44 | .21              | .46 | 191.62        | 262              |       | 109      | 85  | 4.5            | 10     |                   | Filter Loaded                          |
| 3             | 13:47 | .23              | .51 | 193.25        | 263              |       | 110      | 85  | 4.6            | 11     |                   | Filter Recovered                       |
| 2             | 13:50 | .25              | .55 | 194.42        | 270              |       | 110      | 85  | 5.2            | 11     |                   | Probe Wash                             |
| 1             | 13:53 | .16              | .35 | 195.53        | 250              |       | 107      | 85  | 6.9            | 9      |                   | Comments:                              |
| Total/Average |       |                  |     |               |                  |       |          |     |                |        |                   |                                        |

# PARTICULATE TEST DATA

Client/Location SCC Alm Unit 5 Test No. 6-CV-N Method Chronic Page 3  
 Sample Location North Fuel    Ambient Temp., °F    of 3  
 Operators CE Meter Vol. (Start/End) 1 Date 3-14-70

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

Equipment Info:  
 Meter No.    Imp. Matl    Ht(End) (Start) (g)     
 Meter, Yd    #1        
 Pitot, Cp    #2        
 CFM @ ΔH = 1.0    #3        
 Probe I.D.    #4        
 Nozzle No./Dia    Total        
 Filter No.    Impinger Box I.D.        
 Integrated Bag I.D.      

Static Press.        
 Vacuum        
 O<sub>2</sub>        
 Imp. Out        
 Oven        
 Meter In        
 Out        
 Stack        
 Meter Reading        
 ΔP        
 ΔH      

Sample Train  
 CFM Vac. Init. Pitot IBS  
 Pre-Test        
 Post-Test        
 Pre-Test Calibration        
 Meter Meter Temp.  
 Time ΔH Reading In Out  
 Init.        
 Final      

| Sample Point  | Time | Meter Conditions |     |               | Temperatures, °F |       |          |           | Static Press. <u>iwg</u> | Test Summary                                    |
|---------------|------|------------------|-----|---------------|------------------|-------|----------|-----------|--------------------------|-------------------------------------------------|
|               |      | ΔP               | ΔH  | Meter Reading | Stack            | Probe | Meter In | Meter Out |                          |                                                 |
| 5-1           | 1358 | .05              | .11 | 196.395       | 252              |       | 90       | 82        |                          | Initial                                         |
| 2             | 1402 | .10              | .29 | 197.15        | 254              |       | 94       | 82        |                          | Sample Vol., c.f.                               |
| 3             | 1405 | .23              | .51 | 198.05        | 254              |       | 101      | 83        |                          | Stack Press, <u>iwg</u>                         |
| 4             | 1408 | .20              | .44 | 199.42        | 246              |       | 105      | 83        |                          | ΔP <u>  </u> <u>iwg</u> ΔH <u>  </u> <u>iwg</u> |
| 5             | 1411 | .18              | .40 | 200.62        | 235              |       | 104      | 83        |                          | Meter Temp., °F                                 |
| 6             | 1414 | .29              | .64 | 202.10        | 220              |       | 106      | 84        |                          | Stack Temp., °F                                 |
| 7             | 1417 | .34              | .75 | 203.23        | 200              |       | 108      | 84        |                          | Water Collected, g                              |
|               | 1420 |                  |     | 205.04        |                  |       |          |           |                          | O <sub>2</sub> /CO <sub>2</sub> Method          |
| 6-7           | 1423 | .24              | .53 | 205.04        | 210              |       | 97       | 84        |                          | Chain of Cust. Info (init.):                    |
| 8             | 1426 | .23              | .50 | 206.70        | 216              |       | 105      | 84        |                          | Impingers Loaded                                |
| 9             | 1429 | .30              | .66 | 208.20        | 223              |       | 109      | 84        |                          | Impingers Recovered                             |
| 4             | 1432 | .40              | .88 | 209.72        | 233              |       | 110      | 84        |                          | Filter Loaded                                   |
| 3             | 1435 | .20              | .44 | 211.00        | 254              |       | 107      | 84        |                          | Filter Recovered                                |
| 2             | 1438 | .16              | .35 | 212.10        | 257              |       | 104      | 83        |                          | Probe Wash                                      |
| 1             | 1441 | .10              | .22 | 213.60        | 257              |       | 102      | 83        |                          | Comments:                                       |
|               | 1444 |                  |     | 214.045       |                  |       |          |           |                          |                                                 |
| Total/Average |      |                  |     |               |                  |       |          |           |                          |                                                 |

Client/Location SCE/Alamogordo Unit 5 Test No. 541188 Method 425 Page 1  
 Sample Location \_\_\_\_\_ Fuel \_\_\_\_\_ Ambient Temp., °F \_\_\_\_\_ of \_\_\_\_\_  
 Operators Myahya Meter Vol. (Start/End) \_\_\_\_\_ / \_\_\_\_\_ Date \_\_\_\_\_

Pre Test Data: Barometric Press, in. Hg \_\_\_\_\_ Equipment Info: 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. \_\_\_\_\_

Leak Check: \_\_\_\_\_  
 Sample Train: CFM Vac, Init. Pitot lbs \_\_\_\_\_  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_  
 Pre-Test Calibration: \_\_\_\_\_  
 Meter Meter Temp. \_\_\_\_\_  
 Time ΔH Reading In Out \_\_\_\_\_  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |    |               | Temperatures, °F |       |          |     | O <sub>2</sub> | Vacuum   | Static Press. lwg | Test Summary                           |
|---------------|------|------------------|----|---------------|------------------|-------|----------|-----|----------------|----------|-------------------|----------------------------------------|
|               |      | ΔP               | ΔH | Meter Reading | Stack            | Probe | Meter In | Out | Oven           | Imp. Out |                   |                                        |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Initial                                |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Sample Vol., c.f.                      |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Stack Press, lwg                       |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | ΔP lwg ΔH lwg                          |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Meter Temp., °F                        |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Stack Temp., °F                        |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Water Collected, g                     |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Chain of Cust. Info (Init.):           |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Impingers Loaded                       |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Impingers Recovered                    |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Filter Loaded                          |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Filter Recovered                       |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Probe Wash                             |
|               |      |                  |    |               |                  |       |          |     |                |          |                   | Comments:                              |
| Total/Average |      |                  |    |               |                  |       |          |     |                |          |                   |                                        |

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<br>Vol.(mL)    | Cr(VI)<br>ug/mL | Cr(VI)<br>ug | Cr(VI)<br>Spike<br>ug | Cr(VI)<br>Spike<br>% 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        | <del>2</del><br>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 1/2 of drain  
cost as i ;

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)<br>ug/mL<br>Found | Cr(VI)<br>ug/mL<br>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

PAGE 1 OF 2

---

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  
PAGE 2 OF 2

METAL: CHROMIUM  
METHOD: CARB 425  
EPA METHOD 7190

| C&T ID | SAMPLE ID        | SAMPLE VOLUME          | CHROMIUM<br>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

CARNOT

03/19/90

## SAMPLE TRAIN TEST SUMMARY

|                                       |   |                               |
|---------------------------------------|---|-------------------------------|
| Client/Location.....SCE/ALGS          | * | Date.....03/16/90             |
| Test Number..... 9-H2O-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    |
| Liquid Vol (ml)..... 81.7             | * | from portable... 4.83         |
| Meter Press (iwg)..... 1.50           | * | CO2 (%): from CEM..... 10.80  |
|                                       | * | calculated..... 9.54          |
|                                       | * | 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-H.O-N Method H2O Page 1  
 Sample Location North Fuel Gas Ambient Temp., °F 3 of 3  
 Operators CE/SM Meter Vol. (Start/End) 1 Date 3-16-90

Pre Test Data:  
 Barometric Press, in. Hg 30.20  
 Stack Area, sq. ft. 1.940  
 Sample Time/ Pt, min. 45sec/42  
 Assumed Stack Press 1.84  
 Assumed Moisture 1.0  
 Assumed Molecular Wt 16  
 Equipment Info:  
 Meter No. ES-8  
 Meter, Yd 1.940  
 Pitot, Cp 1.84  
 CFM @ ΔH = 1.0 16  
 Probe I.D. 16  
 Nozzle No./Dia 16  
 Filter No. 16

Leak Check:  
 Imp. Matl Wt(End) (Start) (g)  
 #1 671.8 - 600.2 = 71.6  
 #2 609.3 - 606.7 = 2.6  
 #3 493.8 - 492.8 = 1.0  
 #4 794.4 - 787.6 = 6.8  
 Total 2510.9 - 2487.3 = 23.6  
 Impinger Box I.D. 16  
 Integrated Bag I.D. 16

Pre-Test Calibration  
 CFM Vac. Inlt. Pitot IDS 0.05 11 CF CF  
 Pre-Test 0.05 11 CF CF  
 Post-Test 0.05 11 CF CF  
 Meter Temp. 107.66  
 Time ΔH Reading In Out  
 Init. ---  
 Final ---

| Sample Point  | Time | Meter Conditions |      |               | Temperatures, °F |       |          |     | O <sub>2</sub> | Vacuum   | Static Press. twg | Test Summary                                                           |
|---------------|------|------------------|------|---------------|------------------|-------|----------|-----|----------------|----------|-------------------|------------------------------------------------------------------------|
|               |      | ΔP               | ΔH   | Meter Reading | Stack            | Probe | Meter In | Out | Oven           | Imp. Out |                   |                                                                        |
| 4-7           | 1054 | .13              | 1.5  | 555.998       | 250              |       | 105      | 96  |                | Ice      |                   | Initial                                                                |
| 6             |      | .17              |      |               | 262              |       |          |     |                |          |                   | Sample Vol., c.f. 23.539                                               |
| 5             |      | .16              |      |               | 268              |       |          |     |                |          |                   | Stack Press. twg 2.5                                                   |
| 4             |      | .18              |      |               | 272              |       |          |     |                |          |                   | ΔP <u>2.5</u> twg ΔH <u>1.5</u> twg                                    |
| 3             |      | .22              |      |               | 275              |       |          |     |                |          |                   | Meter Temp., °F <u>107.66</u>                                          |
| 2             |      | .22              |      |               | 277              |       |          |     |                |          |                   | Stack Temp., °F <u>266.4</u>                                           |
| 1             |      | .16              |      |               | 262              |       | 117      | 98  |                |          |                   | Water Collected, g <u>21.7</u>                                         |
|               | 1100 |                  |      | 560.170       |                  |       |          |     |                |          |                   | O <sub>2</sub> /CO <sub>2</sub> Method <u>O<sub>2</sub> pot = 4.83</u> |
| 3-7           | 1104 | .12              | 1.65 | 560.170       | 232              |       | 113      | 98  |                |          |                   | Chain of Cust. Info (Inlt.):                                           |
| 6             |      | .13              |      |               | 245              |       |          |     |                |          |                   | Impingers Loaded                                                       |
| 5             |      | .18              |      |               | 248              |       |          |     |                |          |                   | Impingers Recovered                                                    |
| 4             |      | .17              |      |               | 256              |       |          |     |                |          |                   | Filter Loaded                                                          |
| 3             |      | .25              |      |               | 259              |       |          |     |                |          |                   | Filter Recovered                                                       |
| 2             |      | .30              |      |               | 267              |       |          |     |                |          |                   | Probe Wash                                                             |
| 1             |      | .31              |      |               | 274              |       | 117      | 99  |                |          |                   | Comments: <u>CEM 0227</u>                                              |
|               | 1100 |                  |      | 563.964       |                  |       |          |     |                |          |                   | <u>CO<sub>2</sub> 10.8</u>                                             |
| Total/Average |      |                  |      |               |                  |       |          |     |                |          |                   |                                                                        |

# PARTICULATE TEST DATA

Client/Location SCE Alton Unit S Test No. 9-H2O-N Method 170 Page 2  
 Sample Location North Fuel Gas Ambient Temp., °F \_\_\_\_\_ of 236  
 Operators CF/JM Meter Vol. (Start/End) \_\_\_\_\_ 1 Date 3-16-90

Pre Test Data: Equipment Info: Imp. Matl Wt(End) (Start) (g) Leak Check: \_\_\_\_\_  
 Barometric Press, in. Hg \_\_\_\_\_ #1 \_\_\_\_\_ #2 \_\_\_\_\_ #3 \_\_\_\_\_ #4 \_\_\_\_\_ Total \_\_\_\_\_  
 Stack Area, sq. ft. \_\_\_\_\_ Meter No. \_\_\_\_\_ 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. \_\_\_\_\_  
 Impinger Box I.D. \_\_\_\_\_  
 Integrated Bag I.D. \_\_\_\_\_  
 Sample Train  
 CPM Vac. Init. Pitot IDS  
 Pre-Test 005 11 C/F C/F  
 Post-Test \_\_\_\_\_  
 Pre-Test Calibration \_\_\_\_\_  
 Meter Meter Temp.  
 Time ΔH Reading In Out  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |     |               | Temperatures, °F |       |          |           | Imp. Out | O <sub>2</sub> | Vacuum | Static Press. 1wg | Test Summary                           |
|---------------|------|------------------|-----|---------------|------------------|-------|----------|-----------|----------|----------------|--------|-------------------|----------------------------------------|
|               |      | ΔP               | ΔH  | Meter Reading | Stack            | Probe | Meter In | Meter Out | Oven     |                |        |                   |                                        |
| 2-7           | 1117 | 140              | 1.5 | 563.964       | 261              |       | 109      | 98        |          | 58             | 7.8    |                   | Initial                                |
| 6             |      | .53              |     |               | 261              |       |          |           |          |                | 6.9    |                   | Sample Vol., c.f.                      |
| 3             |      | .43              |     |               | 283              |       |          |           |          |                | 5.6    |                   | Stack Press, 1wg                       |
| 4             |      | .38              |     |               | 290              |       |          |           |          |                | 4.5    |                   | ΔP 1wg ΔH 1wg                          |
| 5             |      | .30              |     |               | 294              |       |          |           |          |                | 5.0    |                   | Meter Temp., °F                        |
| 2             |      | .30              |     |               | 296              |       |          |           |          |                | 3.7    |                   | Stack Temp., °F                        |
| 1             | 1117 | .20              |     | 568.060       | 296              |       | 118      | 100       |          |                | 5.9    |                   | Water Collected, g                     |
|               |      |                  |     |               |                  |       |          |           |          |                |        |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 1-7           | 1119 | .19              | 1.5 | 568.060       | 286              |       | 113      | 99        |          | 60             | 4.8    |                   | Chain of Cust. Info (init.):           |
| 6             |      | .36              |     |               | 287              |       |          |           |          |                | 6.1    |                   | Impingers Loaded                       |
| 3             |      | .45              |     |               | 298              |       |          |           |          |                | 4.3    |                   | Impingers Recovered                    |
| 4             |      | .26              |     |               | 302              |       |          |           |          |                | 4.2    |                   | Filter Loaded                          |
| 2             |      | .29              |     |               | 300              |       |          |           |          |                | 3.4    |                   | Filter Recovered                       |
| 2             |      | .38              |     |               | 302              |       |          |           |          |                | 4.1    |                   | Probe Wash                             |
| 1             | 1125 | .25              |     | 571.926       | 300              |       | 120      | 101       |          |                | 4.2    |                   | Comments:                              |
| Total/Average |      |                  |     |               |                  |       |          |           |          |                |        |                   |                                        |

# PARTICULATE TEST DATA

Client/Location SCE Alm Unit S Test No. 9-H<sub>2</sub>O-N Method 14-0 Page 3  
 Sample Location Nortc Fuel S<sub>2</sub> Ambient Temp., °F      of       
 Operators CF 1.5m Meter Vol. (Start/End) 1 Date 3-16-90

Pre Test Data:  
 Barometric Press, in. Hg      Equipment Info: Imp. Matl Wt(End) (Start) (g) Leak Check:       
 Stack Area, sq. ft.      Meter No.      #1      #2      #3      #4      Total       
 Sample Time/ Pt, min.      Pitot, Cp      CFM  $\Delta H = 1.0$       Pre-Test      Post-Test       
 Assumed Stack Press      Probe I.D.      Impinger Box I.D.      Time  $\Delta H$  Reading In Out  
 Assumed Moisture      Nozzle No./Dia      Integrated Bag I.D.      Init.      Final       
 Assumed Molecular Wt      Filter No.     

| Sample Point | Time | Meter Conditions |     |               | Temperatures, °F |       |       |     |      |          | Static Press. iwg | Test Summary |                                        |        |
|--------------|------|------------------|-----|---------------|------------------|-------|-------|-----|------|----------|-------------------|--------------|----------------------------------------|--------|
|              |      | ΔP               | ΔH  | Meter Reading | Stack            | Probe | Meter |     | Oven | Imp. Out |                   |              | O <sub>2</sub>                         | Vacuum |
|              |      |                  |     |               |                  |       | In    | Out |      |          |                   |              |                                        |        |
| 5-7          | 1126 | .29              | 1.5 | 571.926       | 236              |       | 112   | 101 |      | 58       | 4.4               | 5            | Initial                                |        |
| 6            |      | .26              |     |               | 248              |       |       |     |      |          | 3.7               |              | Sample Vol., c.f.                      |        |
| 3            |      | .18              |     |               | 235              |       |       |     |      |          | 3.5               |              | Stack Press, iwg                       |        |
| 4            |      | .14              |     |               | 261              |       |       |     |      |          | 3.2               |              | ΔP iwg ΔH iwg                          |        |
| 2            |      | .19              |     |               | 265              |       |       |     |      |          | 3.2               |              | Meter Temp., °F                        |        |
| 2            |      | .19              |     |               | 270              |       |       |     |      |          | 5.3               |              | Stack Temp., °F                        |        |
| 1            | 1122 | .07              |     | 575.780       | 266              |       | 121   | 102 |      |          | 5.4               |              | Water Collected, g                     |        |
| 6-7          |      | .19              | 1.5 | 575.780       | 231              |       | 119   | 103 |      |          | 7.9               |              | O <sub>2</sub> /CO <sub>2</sub> Method |        |
| 6            |      | .17              |     |               | 232              |       |       |     |      |          | 7.6               |              | Chain of Cust. Info (init.):           |        |
| 3            |      | .31              |     |               | 235              |       |       |     |      |          | 6.8               |              | Impingers Loaded                       |        |
| 4            |      | .32              |     |               | 242              |       |       |     |      |          | 5.5               |              | Impingers Recovered                    |        |
| 2            |      | .15              |     |               | 266              |       |       |     |      |          | 4.2               |              | Filter Loaded                          |        |
| 2            |      | .05              |     |               | 263              |       |       |     |      |          | 3.8               |              | Filter Recovered                       |        |
| 1            |      | .05              |     | 579.537       | 256              |       | 121   | 103 |      |          | 4.6               |              | Probe Wash                             |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              | Comments:                              |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |
|              |      |                  |     |               |                  |       |       |     |      |          |                   |              |                                        |        |

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      |
| Liquid Vol (ml)..... 91.7             |  | * | from portable...        | 4.33      |
| Meter Press (iwg)..... 1.50           |  | * | CO2 (%): from CEM.....  | 10.80     |
|                                       |  | * | calculated.....         | 9.83      |
|                                       |  | * | 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 SCF / Manders Unit 5 Test No. 9-H10-Sand Method Page 4  
 Sample Location South Duck Fuel gas Ambient Temp., °F 67 of 3  
 Operators L. M. G. R.P. Meter Vol. (Start/End) 1 Date 3/14/80

Pre Test Data: Barometric Press, in. Hg 30.20 Equipment Info: Meter No. ES-8 Weight (g) 77.1  
 Stack Area, sq. ft. 1.00 Meter, Yd 1.00 Leak Check: OK  
 Sample Time/ Pt, min. 45 sec / 42 pts Pitot, Cp .84 CFM Vac. Init. Pitot IBS Pre-Test 0087 14 OK  
 Assumed Stack Press 1.558 CFM  $\Delta H = 1.0$  510.6 - 510.0 = 0.6 Post-Test 00810 CF (1F)  
 Assumed Moisture 100/107 Probe I.D. 162.0 - 750.5 = 11.5 Pre-Test Calibration  
 Assumed Molecular Wt 29 Nozzle No./Dia N/A Impinger Box I.D. 2586.5 - 2494.8 = 91.7 Meter Meter Temp.

Time  $\Delta H$  Reading In Out  
 Init.           
 Final         

| Sample Point  | Time | Meter Conditions |            |               | Temperatures, °F |       |          |           | Static Press. $\Delta H$ | Vacuum | Test Summary                                                          |
|---------------|------|------------------|------------|---------------|------------------|-------|----------|-----------|--------------------------|--------|-----------------------------------------------------------------------|
|               |      | $\Delta P$       | $\Delta H$ | Meter Reading | Stack            | Probe | Meter In | Meter Out |                          |        |                                                                       |
| 1-7           | 933  | .24              | 1.5        | 531.916       | 294              | -     | 90       | 90        |                          | 7.5    | Initial                                                               |
| 6             |      | .56              |            |               | 292              |       |          |           |                          | 7.5    | Sample Vol., c.f. <u>23.544</u>                                       |
| 5             |      | .43              |            |               | 310              |       | 111      | 92        |                          | 4.8    | Stack Press, $\Delta H$ <u>2.8</u>                                    |
| 4             |      | .22              |            |               | 312              |       | 111      | 93        |                          | 4.3    | $\Delta P$ <u>423521wg</u> $\Delta H$ <u>1.5</u> $\Delta H$           |
| 3             |      | .16              |            |               | 308              |       | 112      | 92        |                          | 9.5    | Meter Temp., °F <u>103.2</u>                                          |
| 2             |      | .08              |            |               | 399              |       | 113      | 92        |                          | 5.1    | Stack Temp., °F <u>286.3</u>                                          |
| 1             |      | .00              |            |               | 300              |       | 114      | 92        |                          | 5.7    | Water Collected, g <u>91.7</u>                                        |
|               | 939  |                  |            | 536.792       |                  |       |          |           |                          |        | O <sub>2</sub> /CO <sub>2</sub> Method <u>O<sub>2</sub> not = 4.3</u> |
| 2-7           | 941  | .35              | 1.5        | 536.772       | 302              |       | 109      | 94        |                          | 5.3    | Chain of Cust. Info (init.):                                          |
| 6             |      | .36              |            |               | 308              |       |          |           |                          |        | Impingers Loaded                                                      |
| 5             |      | .20              |            |               | 315              |       |          |           |                          | 3.7    | Impingers Recovered                                                   |
| 4             |      | .16              |            |               | 309              |       |          |           |                          | 3.4    | Filter Loaded                                                         |
| 3             |      | .19              |            |               | 301              |       | 113      | 95        |                          | 3.3    | Filter Recovered                                                      |
| 2             |      | .16              |            |               | 295              |       |          |           |                          | 3.5    | Probe Wash                                                            |
| 1             |      | .00              |            |               | 300              |       | 114      | 95        |                          | 6.4    | Comments: <u>CEM O<sub>2</sub> 2.7</u>                                |
|               | 947  |                  |            | 540.508       |                  |       |          |           |                          | 6.8    | <u>CO<sub>2</sub> 10.8</u>                                            |
| Total/Average |      |                  |            |               |                  |       |          |           |                          |        |                                                                       |



# PARTICULATE TEST DATA

Client/Location: SCF Alm Unit: 5 Test No. 9-H,0-3 Method H,0 Page 3  
 Sample Location: South Fuel: Gas Ambient Temp., °F \_\_\_\_\_ of \_\_\_\_\_  
 Operators: CE/TM Meter Vol. (Start/End) 1 Date 3-16-90

Pre Test Data: Barometric Press, in. Hg \_\_\_\_\_ Equipment Info: Imp. Matl \_\_\_\_\_ Wt(End) (Start) (g) \_\_\_\_\_ Weight \_\_\_\_\_  
 Stack Area, sq. ft. \_\_\_\_\_ Meter No. \_\_\_\_\_ #1 \_\_\_\_\_ #2 \_\_\_\_\_ #3 \_\_\_\_\_ #4 \_\_\_\_\_ Total \_\_\_\_\_  
 Sample Time/ Pt, min. \_\_\_\_\_ Pitot, Cp \_\_\_\_\_ CFM @ ΔH = 1.0 \_\_\_\_\_ Impinger Box I.D. \_\_\_\_\_  
 Assumed Stack Press \_\_\_\_\_ Probe I.D. \_\_\_\_\_ Integrated-Bag I.D. \_\_\_\_\_  
 Assumed Moisture \_\_\_\_\_ Nozzle No./Dia \_\_\_\_\_  
 Assumed Molecular Wt \_\_\_\_\_ Filter No. \_\_\_\_\_  
 Leak Check: \_\_\_\_\_  
 Sample Train: CFM Vac. Inft. Pitot IBS \_\_\_\_\_  
 Pre-Test \_\_\_\_\_ Post-Test \_\_\_\_\_  
 Pre-Test Calibration: \_\_\_\_\_  
 Meter Meter Temp. \_\_\_\_\_  
 Time ΔH Reading In Out \_\_\_\_\_  
 Inft. \_\_\_\_\_ Final \_\_\_\_\_

| Sample Point  | Time | Meter Conditions |     |               | Temperatures, °F |       |          |     | O <sub>2</sub> | Vacuum   | Static Press. twg | Test Summary                           |
|---------------|------|------------------|-----|---------------|------------------|-------|----------|-----|----------------|----------|-------------------|----------------------------------------|
|               |      | ΔP               | ΔH  | Meter Reading | Stack            | Probe | Meter In | Out | Oven           | Imp. Out |                   |                                        |
| 4-7           | 947  | .16              | 1.5 | 540.508       | 261              |       | 110      | 96  |                |          |                   | Initial                                |
| 6             |      | .21              |     |               | 278              |       |          |     |                |          | 6                 | Sample Vol., c.f. .                    |
| 5             |      | .24              |     |               | 286              |       |          |     |                |          |                   | Stack Press, twg                       |
| 4             |      | .25              |     |               | 291              |       |          |     |                |          |                   | ΔP twg ΔH twg                          |
| 3             |      | .29              |     |               | 292              |       |          |     |                |          | 42.8              | Meter Temp., °F                        |
| 2             |      | .32              |     |               | 292              |       |          |     |                |          |                   | Stack Temp., °F                        |
| 1             | 953  | .25              |     | 544.613       | 288              |       | 113      | 96  |                |          |                   | Water Collected, g                     |
| 5-7           | 957  | .68              | 1.5 | 544.613       | 252              |       | 110      | 97  |                |          |                   | O <sub>2</sub> /CO <sub>2</sub> Method |
| 6             |      | .44              |     |               | 267              |       |          |     |                |          | 6                 | Chain of Cust. Info (Inft.):           |
| 5             |      | .35              |     |               | 274              |       |          |     |                |          |                   | Impingers Loaded                       |
| 4             |      | .32              |     |               | 276              |       |          |     |                |          |                   | Impingers Recovered                    |
| 3             |      | .33              |     |               | 275              |       |          |     |                |          |                   | Filter Loaded                          |
| 2             |      | .40              |     |               | 274              |       |          |     |                |          |                   | Filter Recovered                       |
| 1             |      | .40              |     |               | 278              |       | 116      | 97  |                |          |                   | Probe Wash                             |
|               | 1002 |                  |     | 548.095       |                  |       |          |     |                |          |                   | Comments:                              |
| Total/Average |      |                  |     |               |                  |       |          |     |                |          |                   |                                        |

# PARTICULATE TEST DATA

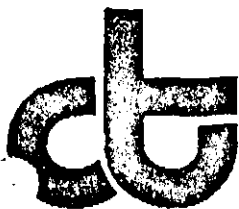
Client/Location SCIE A-4M Unit S Test No. 9-H<sub>2</sub>O-5 Method H<sub>2</sub>O Page 3  
 Sample Location SPOUTH Fuel CE Ambient Temp., °F 1 of 3  
 Operators CE Meter Vol. (Start/End) 1 Date 3-15

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. \_\_\_\_\_  
 Weight \_\_\_\_\_  
 Leak Check: \_\_\_\_\_  
 Sample Train  
 CFM Vac. Init. Pitot IDS \_\_\_\_\_  
 Pre-Test \_\_\_\_\_  
 Post-Test \_\_\_\_\_  
 Pre-Test Calibration \_\_\_\_\_  
 Meter Meter Temp. \_\_\_\_\_  
 Time ΔH Reading In Out \_\_\_\_\_  
 Init. \_\_\_\_\_  
 Final \_\_\_\_\_

| Sample Point  | Time  | Meter Conditions |     |               | Temperatures, °F |          |     |      | Vacuum | Static Press. twg | Test Summary                           |
|---------------|-------|------------------|-----|---------------|------------------|----------|-----|------|--------|-------------------|----------------------------------------|
|               |       | ΔP               | ΔH  | Meter Reading | Probe            | Meter In | Out | Oven |        |                   |                                        |
| 7-7           | 1004  | .36              | 1.5 | 548.095       |                  | 111      | 98  |      | 62     | 6.3               | Initial                                |
| 6             |       | .61              |     |               |                  |          |     |      |        | 4.2               | Sample Vol., c.f.                      |
| 5             |       | .36              |     |               |                  |          |     |      |        | 3.1               | Stack Press, twg                       |
| 4             |       | .36              |     |               |                  |          |     |      |        | 2.8               | ΔP twg ΔH twg                          |
| 3             |       | .35              |     |               |                  |          |     |      |        | 3.3               | Meter Temp., °F                        |
| 2             |       | .22              |     |               |                  | 116      | 98  |      |        | 6.3               | Stack Temp., °F                        |
| 1             | 1010  | .18              |     | 551.855       |                  |          |     |      |        |                   | Water Collected, g                     |
| 3-7           | 10:11 | .10              | 1.5 | 551.855       |                  | 114      | 99  |      |        | 4.6               | O <sub>2</sub> /CO <sub>2</sub> Method |
| 6             |       | .13              |     |               |                  |          |     |      |        | 3.7               | Chain of Cust. Info (init.):           |
| 5             |       | .14              |     |               |                  |          |     |      |        | 3.2               | Impingers Loaded                       |
| 4             |       | .12              |     |               |                  |          |     |      |        | 2.9               | Impingers Recovered                    |
| 3             |       | .13              |     |               |                  |          |     |      |        | 2.7               | Filter Loaded                          |
| 2             |       | .14              |     |               |                  |          |     |      |        | 4.0               | Filter Recovered                       |
| 1             | 1017  | .10              |     | 555.460       |                  | 116      | 99  |      |        | 6.2               | Probe Wash                             |
| Total/Average |       |                  |     |               |                  |          |     |      |        |                   | Comments:                              |

Appendix C.10

Fuel Analysis



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

1250 S. Boyle Ave., Los Angeles, CA 90023, Phone (213) 269-7421, Fax (213) 268-5328

*Alamitos*

DATE RECEIVED: 03/21/90

DATE REPORTED: 04/18/90

PAGE 1 OF 5

LAB NUMBER: 25657

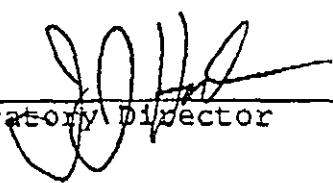
CLIENT: CARNOT

REPORT ON: ONE OIL SAMPLE IN DUPLICATE

PROJECT #: 5864

LOCATION: SUBMITTED BY CLIENT

RESULTS: SEE ATTACHED

  
Laboratory Director



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  
PAGE 2 OF 5

METHODS: EPA 6010/7000  
CAC TITLE 22 METALS IN AQUEOUS SOLUTIONS

| METAL            | RESULT    | REGULATORY LIMITS<br>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    |           |     |       |



LABORATORY 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  
PAGE 3 OF 5

METHODS: EPA 6010/7000  
CAC TITLE 22 METALS IN AQUEOUS SOLUTIONS

| METAL            | RESULT    | REGULATORY LIMITS<br>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    |           |     |       |



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  
PAGE 4 OF 5

-----  
ULTIMATE AND PROXIMATE ANALYSIS  
-----

| PARAMETER                      | AS RECEIVED BASIS<br>(% 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                             |



**Samples:**

Sample No.  
(Project No.  
Test No.

53304-AL

### Complete Description

Retained sample 3/13/90

Chain of Custody Prior to Shipment:

|                    |               |             |               |
|--------------------|---------------|-------------|---------------|
| Released by        | Time and Date | Received by | Time and Date |
| <i>[Signature]</i> | 1900 3/12/70  |             |               |

Samples shipped to: Carls and Taylor

Samples shipped from ESA by: CAT  
Carrier: Paragon  
Samples received by: Paul [Signature]  
Company: Curtis & Tamm, Ltd.

Date 2/21/90  
Air Bill No. \_\_\_\_\_  
Date 3/2/90



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% O<sub>2</sub>: 9,063

Ash content, lb/mmbtu: 0.011

# Gas Fuel F Factor Calculation

| Species          | Vol % | Pounds per mole |       | N    | O    |
|------------------|-------|-----------------|-------|------|------|
|                  |       | C               | H     |      |      |
| 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  |

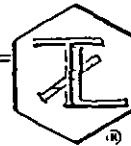
|                         |        |
|-------------------------|--------|
| Heating value, btu/scf: | 947    |
| Heating value, btu/lb:  | 20,371 |

F factor, dscf/mmbtu @ 0% O2: 8,449

Ash content, lb/mmbtu: 0.000

# REPORT

TRUESDAIL LABORATORIES, INC.



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

CHEMISTS - MICROBIOLOGISTS - ENGINEERS  
RESEARCH - DEVELOPMENT - TESTING

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

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

INVESTIGATION **Edison P.O. No.: C0138903**

DATE **April 6, 199**

RECEIVED **March 16, 199**

LABORATORY NO. **4440**

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      |

Energy Systems Associates  
Laboratory Number 44401  
April 6, 1990  
Page Two

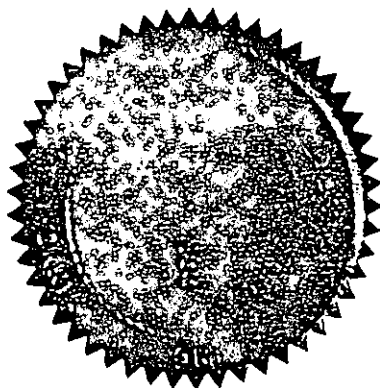
COMPOSITION AND HEAT CONTENT (60 Degrees Fahrenheit) (cont.)

#1-AL

BTU's per Cubic Foot

BTU's High  
BTU's Low

947  
854



Respectfully submitted,

TRUESDAIL LABORATORIES, INC.

  
Joe Bramblett, Manager  
Instrumental Methods

APPENDIX D  
CALCULATIONS

## EMISSION CALCULATIONS

1. Sample Volume and Isokinetics

- a. Sample gas volume, dscf

$$V_{m \text{ std}} = 0.03342 V_m [P_{\text{bar}} + (H/13.6)] (T_{\text{ref}}/T_m)(Y)$$

- b. Water vapor volume, scf

$$V_{w \text{ std}} = 0.0472 V_{lc} (T_{\text{ref}}/528^{\circ}\text{R})$$

- c. Moisture content, nondimensional

$$B_{wo} = V_{w \text{ std}} / (V_{m \text{ std}} + V_{w \text{ std}})$$

- d. Stack gas molecular weight, lb/lb mole

$$MW_{\text{dry}} = 0.44(\% \text{ CO}_2) + 0.32(\% \text{ O}_2) + 0.28(\% \text{ N}_2)$$

$$MW_{\text{wet}} = MW_{\text{dry}} (1 - B_{wo}) + 18 (B_{wo})$$

- e. Absolute stack pressure, iwg

$$P_s = P_{\text{bar}} + P_{\text{sg}}/13.6$$

- f. Stack velocity, ft/sec

$$V_s = 2.90 C_p \sqrt{\Delta P T_s} \sqrt{\frac{29.92}{P_s} \frac{28.95}{MW_{\text{wet}}}}$$

- g. Actual stack gas flow rate, wacfm

$$Q = (V_s)(A_s)(60)$$

- h. Standard stack gas flow rate, dscfm

$$Q_{sd} = Q (1 - B_{wo})(T_{\text{ref}}/T_s)(P_s/29.92)$$

- i. Percent isokinetic

$$I = \frac{.1732 \times T_s (V_{m \text{ std}})}{(1 - B_{wo}) \theta \times V_s \times P_s \times D_n^2} \times \frac{528^{\circ}\text{R}}{T_{\text{ref}}}$$

2. Particulate Emissions

- a. Grain loading, gr/dscf

$$C = 0.01543 (M_n/V_{m \text{ std}})$$

- b. Grain loading at 12% CO
- <sub>2</sub>
- , gr/dscf

$$C_{12\% \text{ CO}_2} = C (12/\% \text{ CO}_2)$$

c. Mass emissions, lb/hr

$$M = C \times Q_{sd} \times (60 \text{ min/hr}) / (7000 \text{ gr/lb})$$

3. Gaseous Emissions, lb/hr

$$M = \text{ppm} \times 10^{-6} \frac{MW_i \text{ lb/lb mole}}{SV} \times Q_{sd} \times 60 \text{ min/hr}$$

where SV = specific molar volume of an ideal gas:

$$\begin{aligned} 385.3 \text{ ft}^3/\text{lb mole for } T_{\text{ref}} &= 528 \text{ }^\circ\text{R} \\ 379.5 \text{ ft}^3/\text{lb mole for } T_{\text{ref}} &= 520 \text{ }^\circ\text{R} \end{aligned}$$

4. Emissions Rates, lb/10<sup>6</sup> Btu

a. Fuel factor at 68 °F, dscf/10<sup>6</sup> Btu at 0% O<sub>2</sub>

$$F_{68} = \frac{10^6 [3.64(\%H) + 1.53(\%C) + 0.14(\%N) + 0.57(\%S) - 0.46(\%O_2, \text{fuel})]}{HHV, \text{ Btu/lb}}$$

b. Fuel factor at 60 °F

$$F_{60} = F_{68} (520 \text{ }^\circ\text{R} / 528 \text{ }^\circ\text{R})$$

c. Gaseous emission factor

$$\text{lb/10}^6 \text{ Btu}_i = \text{ppm}_i \times 10^{-6} \times \frac{MW_i \text{ lb}}{\text{lb mole}} \times \frac{1}{SV} \times F \times \frac{20.9}{20.9 - \%O_2}$$

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, $\text{ft}^2$                                                             |
| $B_{wo}$                | = | flue gas moisture content                                                             |
| $C_{12\% \text{ CO}_2}$ | = | particulate grain loading, $\text{gr/dscf}$ corrected to 12% $\text{CO}_2$            |
| $C$                     | = | particulate grain loading, $\text{gr/dscf}$                                           |
| $C_p$                   | = | pitot calibration factor, dimensionless                                               |
| $D_n$                   | = | nozzle diameter, in.                                                                  |
| $F$                     | = | fuel F factor, $\text{dscf}/10^6 \text{ Btu}$ at 0% $\text{O}_2$                      |
| $H$                     | = | orifice pressure differential, $\text{iwg}$                                           |
| $I$                     | = | % isokinetics                                                                         |
| $M_n$                   | = | mass of collected particulate, $\text{mg}$                                            |
| $M_i$                   | = | mass emissions of species $i$ , $\text{lb/hr}$                                        |
| $MW$                    | = | molecular weight of flue gas                                                          |
| $MW_i$                  | = | molecular weight of species $i$ :                                                     |
|                         |   | NO <sub>x</sub> : 46                                                                  |
|                         |   | CO: 28                                                                                |
|                         |   | SO <sub>2</sub> : 64                                                                  |
|                         |   | HC: 16                                                                                |
| $\theta$                | = | sample time, min.                                                                     |
| $\Delta P$              | = | average velocity head, $\text{iwg} = \left( \sqrt{\Delta P} \right)^2$                |
| $P_{\text{bar}}$        | = | barometric pressure, in.Hg                                                            |
| $P_s$                   | = | stack absolute pressure, in.Hg.                                                       |
| $P_{\text{sg}}$         | = | stack static pressure, $\text{iwg}$                                                   |
| $Q$                     | = | wet stack gas flow rate at actual conditions, $\text{wacfm}$                          |
| $Q_{\text{sd}}$         | = | dry stack gas flow rate at standard conditions, $\text{dscfm}$                        |
| $SV$                    | = | specific molar volume of an ideal gas at std conditions, $\text{ft}^3/\text{lb mole}$ |
| $T_m$                   | = | meter temperature, $^{\circ}\text{R}$                                                 |
| $T_{\text{ref}}$        | = | reference temperature, $^{\circ}\text{R}$                                             |
| $T_s$                   | = | stack temperature, $^{\circ}\text{R}$                                                 |
| $V_s$                   | = | stack velocity, $\text{ft/sec}$                                                       |
| $V_{\text{lc}}$         | = | volume of liquid collected in impingers, $\text{ml}$                                  |
| $V_m$                   | = | dry meter volume uncorrected, $\text{dcf}$                                            |
| $V_{m \text{ std}}$     | = | dry meter volume at standard conditions, $\text{dscf}$                                |
| $V_{w \text{ std}}$     | = | volume of water vapor at standard conditons, $\text{scf}$                             |
| $Y$                     | = | meter calibration coefficient                                                         |



E/A

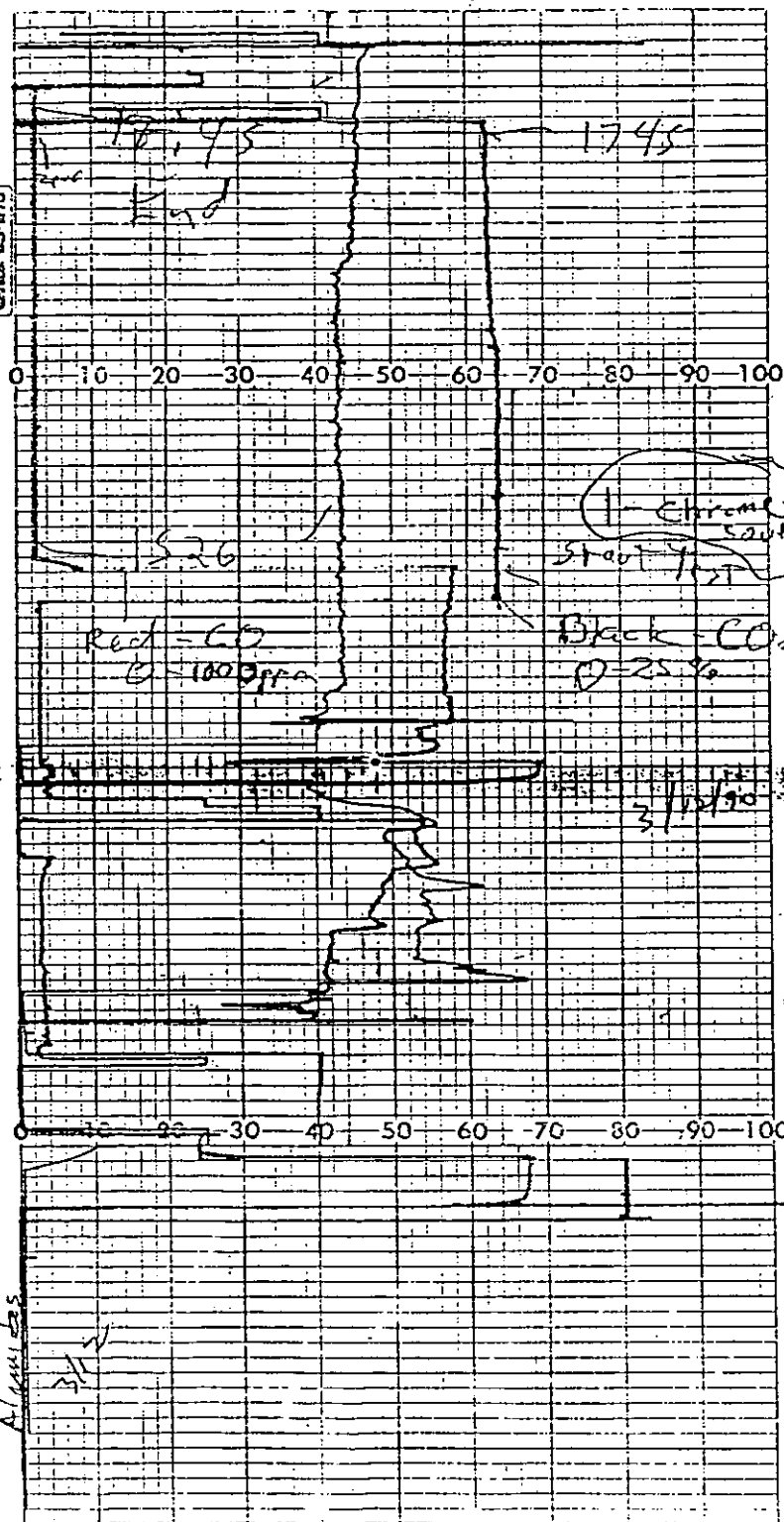
#### TRACE SPECIES CALCULATIONS

- a.  $\text{ng/sample train} = (\text{ng detected}) - (\text{ng in field blank})^*$
- b.  $\text{ng/dscm} = \text{ng/sample train} \times (35.31/V_m \text{ std})$
- c.  $\text{ng/Nm}^3 \text{ at } 12\% \text{ CO}_2 = \text{ng/dscm} \times [T_{\text{ref}}(^{\circ}\text{R})/492^{\circ}\text{R}] \times (12\% \text{ CO}_2/\% \text{ CO}_2)$
- d.  $\text{lb/hr} = \text{ng/dscm} \times (1 \text{ g}/10^9 \text{ ng}) \times (1 \text{ lb}/454 \text{ g}) \times (1 \text{ m}^3/35.31 \text{ ft}^3)$   
 $\times Q_{\text{sd}} \times (60 \text{ min/hr})$   
(where  $Q_{\text{sd}}$  = 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



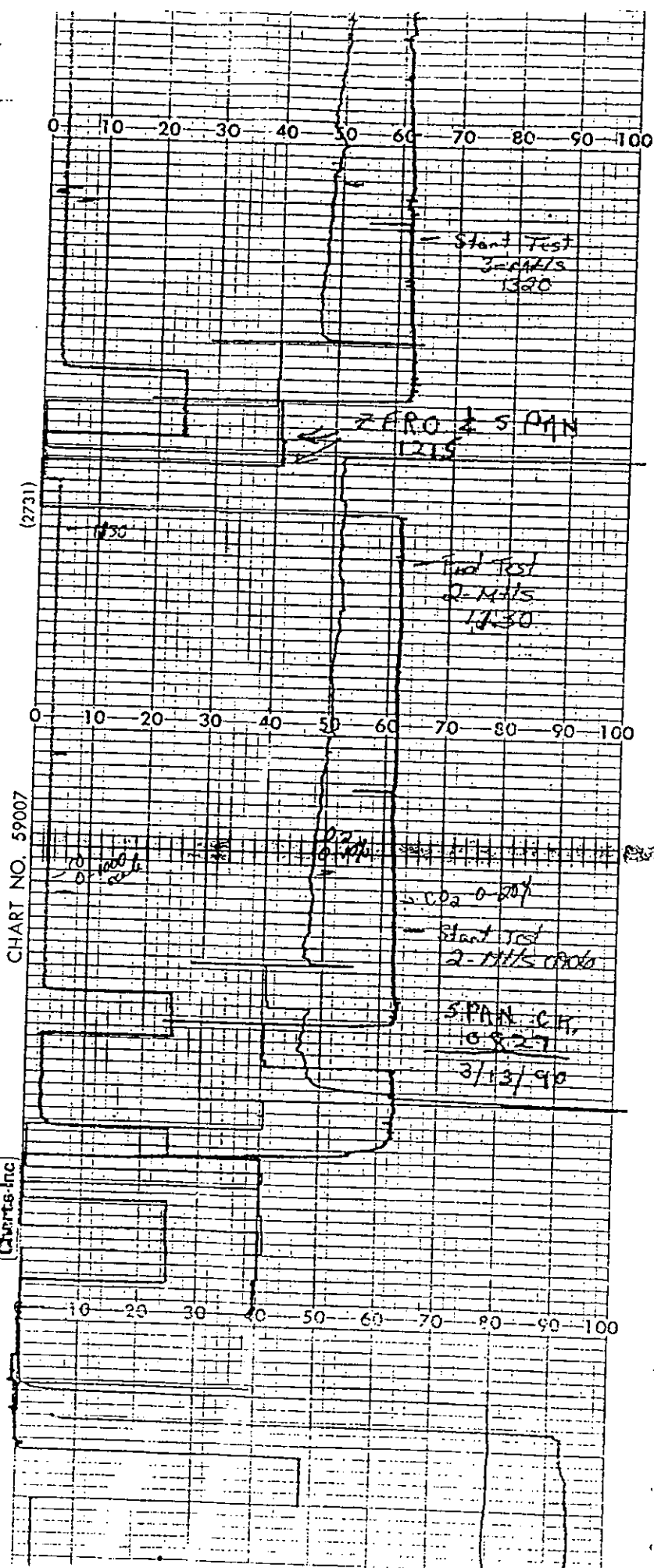


CHART NO. 59007

Charts-hrc

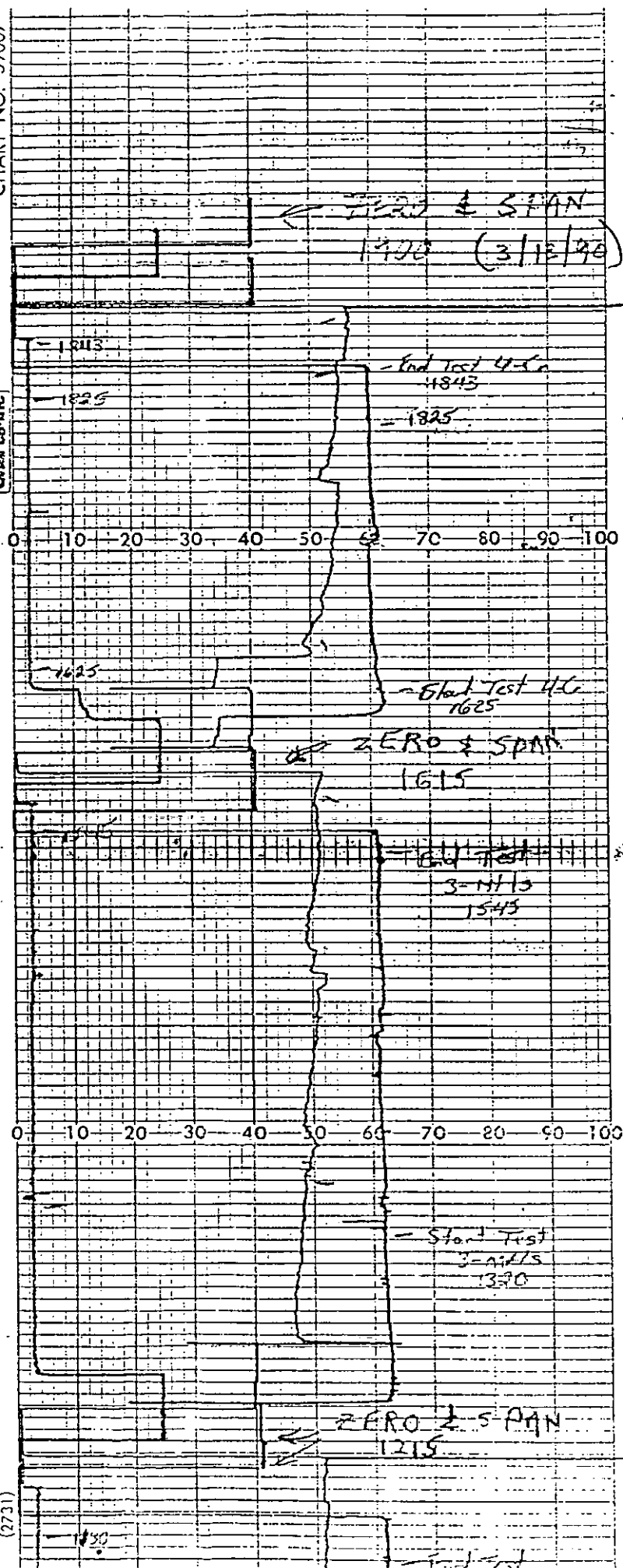
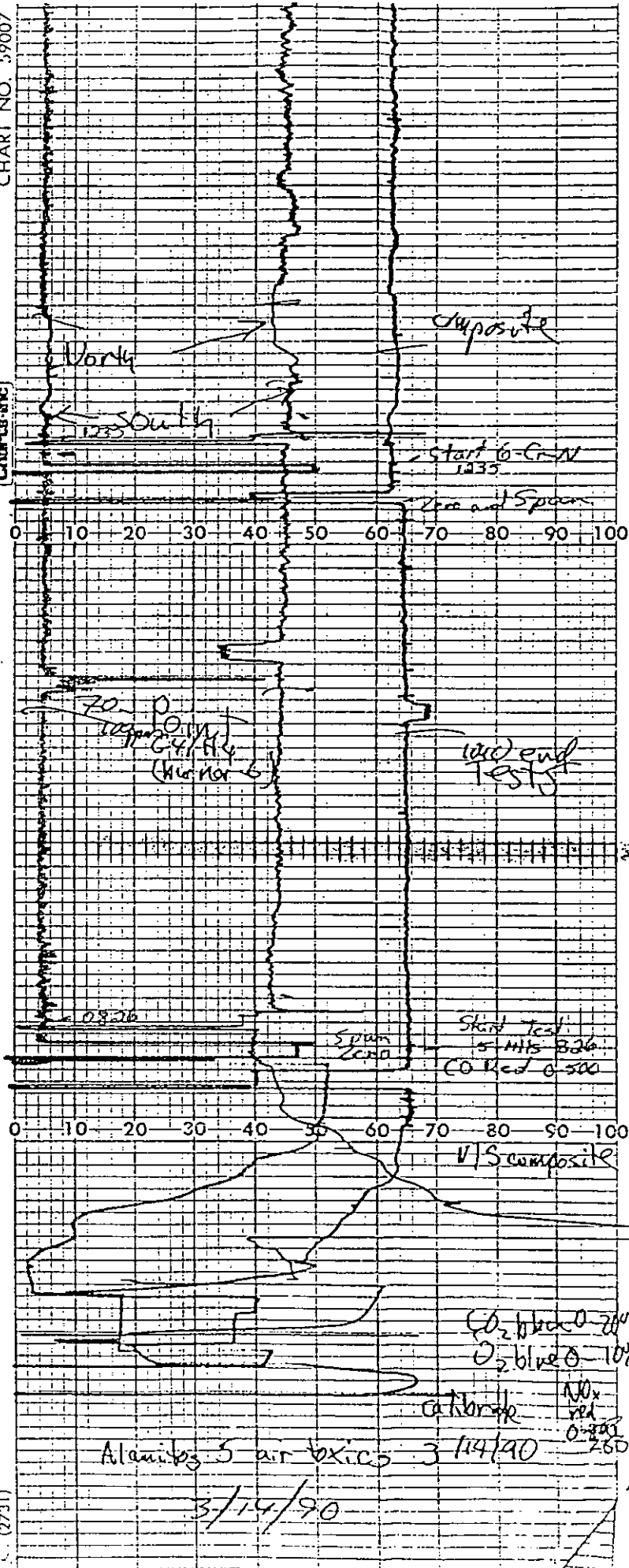
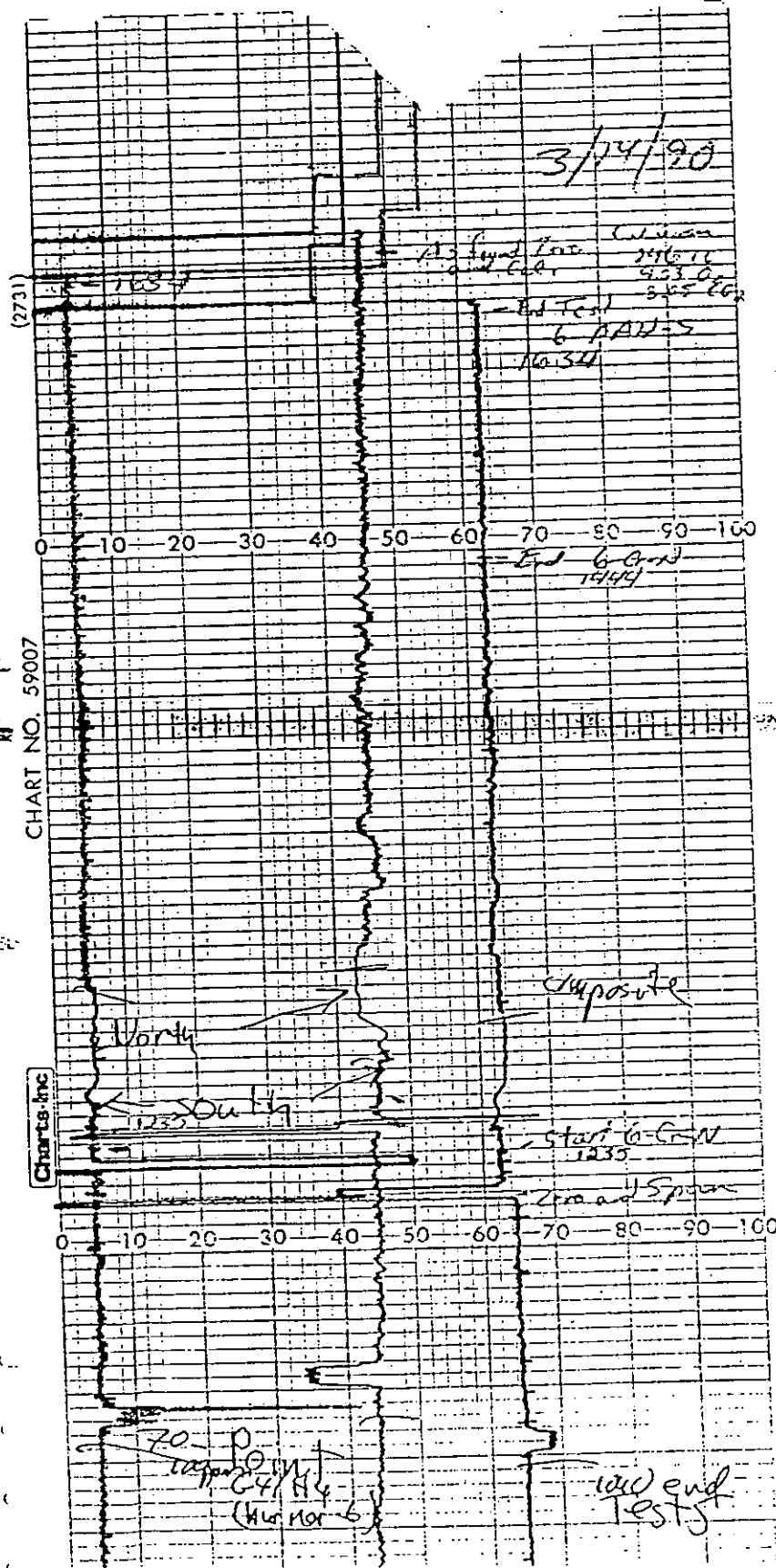


CHART NO. 59007

Charts Inc



3/14/90



(2731)

CHART NO. 59007

Charts Inc.

0 10 20 30 40 50 60 70 80 90 100

0 10 20 30 40 50 60 70 80 90 100

13 Fixed Test  
End Test

6 AAW-5  
10.34

End 6-Grn  
10.34

Composite

Vorty

South

Start 6-Grn  
12.35

Zero and Span

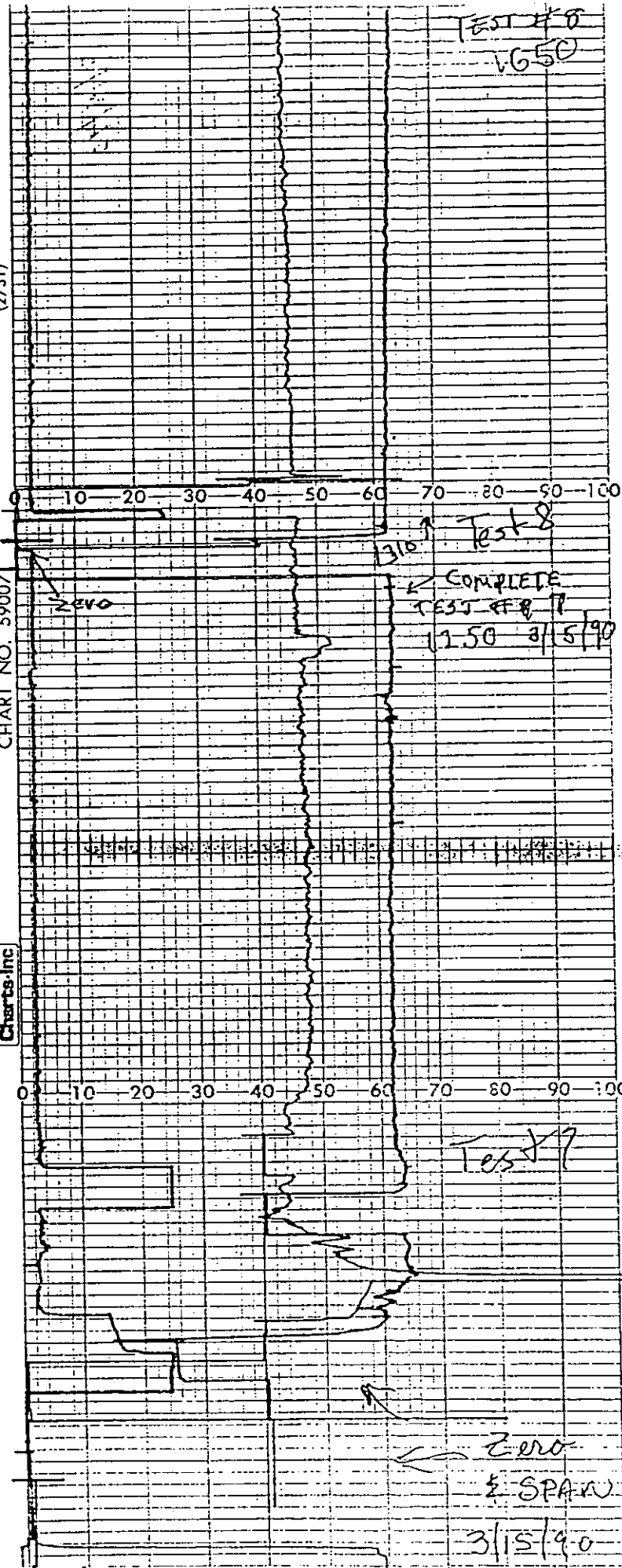
70-Point  
C4/H4  
(Humor 6)

End Test

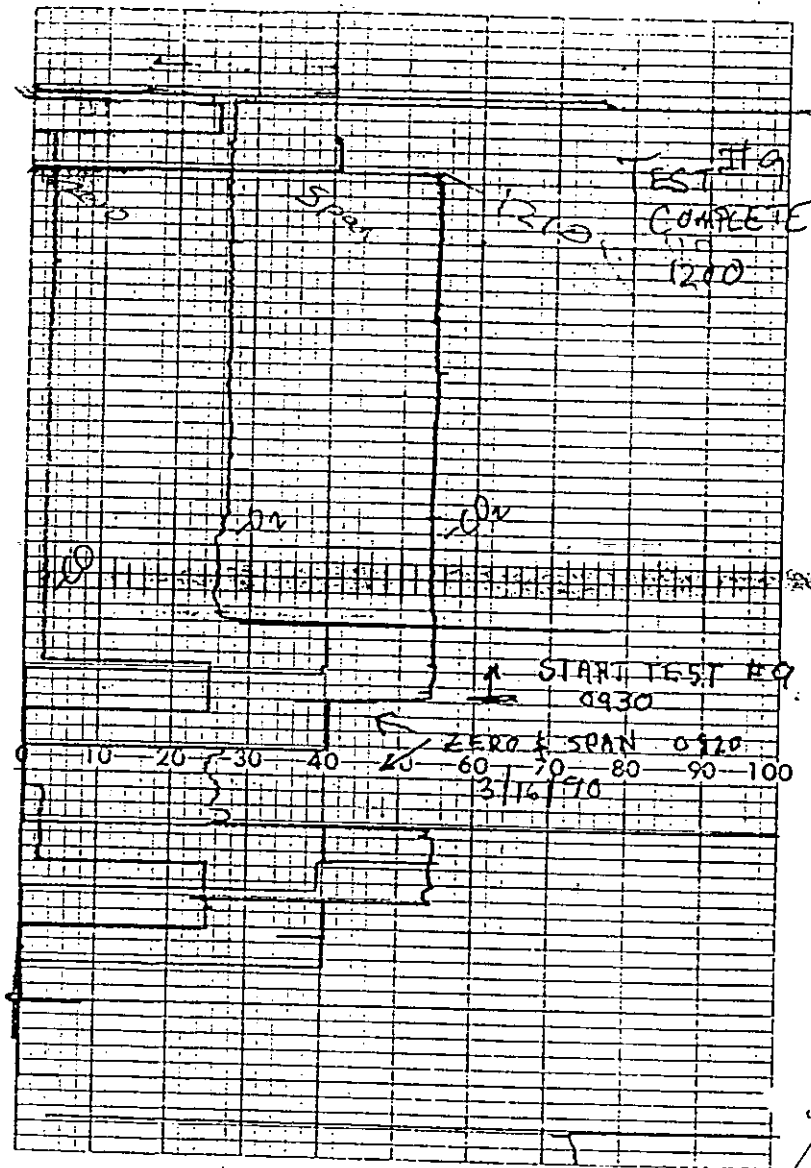
(2731)

CHART NO. 59007

Charts Inc







APPENDIX F  
CHAIN OF CUSTODY



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

extra

Total Cr

Samples:

Sample No. HS3304-AL

(Project No.

Test No.

Complete Description

\* Reagent Blank 47\*63 mm filter, D1 N 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 |
|--------------------|---------------------|-------------|---------------|
| <u>[Signature]</u> | <u>3/19/90 1900</u> |             |               |
|                    |                     |             |               |
|                    |                     |             |               |

Samples shipped to: C&T

Samples shipped from ESA by: C&T

Carrier: handcarried

Date 3/21/90

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

\* Represent 1/2 of train

ESA 05-057

elytu



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Total Cr

Samples:

Sample No. 53304-AL

(Project No.)

Test No.

Complete Description

\* Reagent Blank 47 & 63 mm filters, DIN 1200

Field Blank 47 & 63 mm filters, probe wash, impinger

1-Cr-S 47 & 63 mm filters, probe wash & impinger cat

4-Cr-N 47 & 63 mm filters, probe wash & impinger cat

6-Cr-N 47 & 63 mm filters, probe wash & impinger cat

Chain of Custody Prior to Shipment:

| Released by        | Time and Date       | Received by | Time and Date |
|--------------------|---------------------|-------------|---------------|
| <u>[Signature]</u> | <u>3/19/90 1200</u> |             |               |
|                    |                     |             |               |
|                    |                     |             |               |

Samples shipped to: C&T

Samples shipped from: ESA by: C&T

Carrier: Landair

Date 3/21/90

Air Bill No. \_\_\_\_\_

Samples received by: \_\_\_\_\_

Date \_\_\_\_\_

Company: \_\_\_\_\_

25 Represent 1/2 of train



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. # 53304 - AL

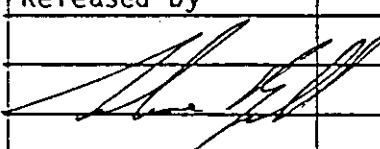
(Project No.)

Test No.

Complete Description

- (A) \* Reagent Blank, 47mm filter, 63mm filter, 100ml NaOH ✓  
(47-222) (63-220)
- (B) Field Blank 47 & 63 mm filters, probe wash, impinger catch (TV=215)  
(63-221)
- (C) 1-Cr-S 47 & 63 mm filters, probe wash, impinger catch (TV=355)  
(47-218) (63-218)
- (D) 4-Cr-N 47 & 63 mm filters, probe wash, impinger catch (TV=287)  
(47-219) (63-219)
- (E) 6-Cr-N 47 & 63 mm filters, probe wash, impinger catch (TV=) ✓  
(47-210) (63-217)

Chain of Custody Prior to Shipment:

| Released by                                                                         | Time and Date | Received by | Time and Date |
|-------------------------------------------------------------------------------------|---------------|-------------|---------------|
|  | 1900 3/17/90  |             |               |
|                                                                                     |               |             |               |

Samples shipped to:

KTH  
Research Triangle Park  
N.C.

Samples shipped from ESA by: USA transcon

Date 3/20/90

Carrier:

Air Bill No.

Samples received by:

Kathie Link

Date 3/21/90

Company:

\* Represents 1/2 of Train



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

extra  
Total C

Samples:

Sample No. #53304-AL

(Project No.)

Test No.

Complete Description

\* Reagent Blank 47 & 63 mm filter, D1 N NO<sub>2</sub>

Field Blank 47 & 63 mm filter, probe wash, impinger catch

1-C-S 47 & 63 mm filter, probe wash & impinger catch

4-C-N 47 & 63 mm filter, probe wash & impinger catch

6-C-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 |
|--------------------|---------------------|-------------|---------------|
| <u>[Signature]</u> | <u>3/19/90 1900</u> |             |               |
|                    |                     |             |               |
|                    |                     |             |               |

Samples shipped to:

C & T

Samples shipped from ESA by:

C & T

Date 3/21/90

Carrier:

Landair

Air Bill No. \_\_\_\_\_

Samples received by:

Date 3/21/90

Company:

C & T

\* Represent 1/2 of train



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. Project # 53304

(Project No.)

Test No.

Complete Description

451 3115

Field Blank XAD-2 (module) (1), filter # 47-181  
1/20 fraction (1), Organic (1)

452 3114

6-PAH-S XAD-2 module (1), filter # 47-182  
and 47-179, 1/20 fraction (2), Organic (1)

453

3115

2-PAH-N XAD-2 module (1), filter # 47-183,  
47-177, 1/20 fraction (2), Organic (1)

6454

3115

8-PAH-S XAD-2 module (1), filter 47-213,  
1/20 fraction (1), Organic (1)

Chain of Custody Prior to Shipment:

| Released by        | Time and Date       | Received by | Time and Date |
|--------------------|---------------------|-------------|---------------|
| <u>[Signature]</u> | <u>0900 3/19/90</u> |             |               |
|                    |                     |             |               |
|                    |                     |             |               |

Samples shipped to:

Zenon Environmental

Samples shipped from ESA by:

Fed-Ex

Date 3/18/90

Carrier:

Air Bill No. 400-7914-946

Samples received by:

H. Miles

Date

Company:

ZENON



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 trailer bag

Chain of Custody Prior to Shipment:

| Released by       | Time and Date  | Received by | Time and Date |
|-------------------|----------------|-------------|---------------|
| <u>Paul Ewing</u> | <u>3/16/90</u> |             |               |
|                   |                |             |               |
|                   |                |             |               |

Samples shipped to: TRUESDALE

Samples shipped from ESA by: Hand Carried

Carrier: Paul Ewing

Date 3/16/90

Air Bill No. \_\_\_\_\_

Samples received by: \_\_\_\_\_

Company: TRUESDALE

Date 3/16/90





Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Total C

Samples:

Sample No. HS3304-AK

Project No.

Test No.

Complete Description

\* Reagent Blank 47 x 63 mm filter, D1 N 100%

Field Blank 47 x 63 mm filter, probe wash & impinger catch

1-C-S 47 x 63 mm filter, probe wash & impinger catch

4-C-N 47 x 63 mm filter, probe wash & impinger catch

6-C-N 47 x 63 mm filter, probe wash & impinger catch

Chain of Custody Prior to Shipment:

| Released by        | Time and Date       | Received by | Time and Date |
|--------------------|---------------------|-------------|---------------|
| <u>[Signature]</u> | <u>2/19/90 1900</u> |             |               |
|                    |                     |             |               |
|                    |                     |             |               |

Samples shipped to: C&T

Samples shipped from ESA by: C&T

Carrier: La Guardia

Date 3/21/90

Air Bill No. \_\_\_\_\_

Samples received by: [Signature]

Date 3/21/90

Company: [Signature]

15901 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388 / (714) 259-3520 / Telecopy: (714) 259-0372

\* Reagent 1/2 of train

ESA DS-057



Energy Systems Associates A CORPORATION

C 6+

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. # 53304 - AL

(Project No.)

Test No.

Complete Description

- (A) \* Reagent Blank, 47 mm filter, 63 mm filter, 100 ml NaOH,  
(47-222) (63-220)
- (B) Field Blank 47 & 63 mm filters, 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=)  
(47-219) (63-219)
- (E) 6-Cr-N 47 & 63 mm filters, probe wash, impinger catch (TV=)  
(47-210) (63-217)

Chain of Custody Prior to Shipment:

| Released by | Time and Date | Received by | Time and Date |
|-------------|---------------|-------------|---------------|
|             | 1700 3/17/90  |             |               |
|             |               |             |               |
|             |               |             |               |

Samples shipped to:

KTI  
Research Triangle Park  
N.C.

Samples shipped from ESA by: USA dronster

Carrier:

Date 3/20/90

Air Bill No. \_\_\_\_\_

Samples received by: Kate Link

Company:

Date 3/21/90

\* Represents 1/2 of Train



Energy Systems Associates A CORPORATION

## CERTIFICATION OF SAMPLE RECEIPT

analyzed for  
Formaldehyde  
Benzaldehyde  
acetaldehyde

Samples:

Sample No. #  
(Project No.)  
Test No.

53304 - AL

Complete Description

8a-Form combine vials a + B for analysis  
 8b-Form "  
 8c-Form "  
 8-Form-Field B/K 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 |
|-------------|---------------|-------------|---------------|
| Tailoring   | 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:

Candy Hester

Date

Company:

Radian

3-20-90

10:10

Temp Ambient



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 Benzene analysis 1 bag |
|         |       |                            |
|         |       |                            |
|         |       |                            |
|         |       |                            |
|         |       |                            |
|         |       |                            |
|         |       |                            |
|         |       |                            |

Chain of Custody Prior to Shipment:

| Released by | Time and Date | Received by | Time and Date |
|-------------|---------------|-------------|---------------|
| K. Williams | 3/16/90       |             |               |
|             |               |             |               |
|             |               |             |               |

Samples shipped to: TRUESDAIL

Samples shipped from ESA by: Hand carried Date 3/16/90  
Carrier: GAIL BOWEN 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

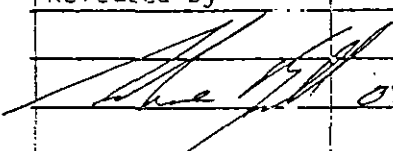
Tedlar Bag

5C- Benzene-S

5D- Benzene-S



Chain of Custody Prior to Shipment:

| Released by                                                                         | Time and Date | Received by | Time and Date |
|-------------------------------------------------------------------------------------|---------------|-------------|---------------|
|  | 0800 3/5/90   |             |               |
|                                                                                     |               |             |               |

Samples shipped to:

Tredwell Labs.

West, CA.

Samples shipped from ESA by:

Landcamer

Date

3/15/90

Carrier:

ESA

Air Bill No.

Samples received by:

John K. Kuehl

Date

Company:

Truethill

# REAGENT CHAIN OF CUSTODY

Client: SCE / Alamitos

Charge No.: 53304

Project Manager: BS / MDM

## REAGENTS - Enter quantity and circle description

|                                                        |                     |             |
|--------------------------------------------------------|---------------------|-------------|
| <input checked="" type="checkbox"/> Water              | DI <u>B&amp;J</u> 2 | Lot # _____ |
| <input checked="" type="checkbox"/> Acetone            | ACS <u>GC2</u> 2    | Lot # _____ |
| <input checked="" type="checkbox"/> Hexane             | ACS <u>GC2</u> 2    | Lot # _____ |
| <input type="checkbox"/> IPA                           | ACS                 | Lot # _____ |
| <input type="checkbox"/> H <sub>2</sub> O <sub>2</sub> | 30% Other           | Lot # _____ |
| <input type="checkbox"/> MeCl <sub>2</sub>             | ACS GC2             | Lot # _____ |

4L 0.1 N NaOH  
8L 5% HNO<sub>3</sub> / 10% H<sub>2</sub>O<sub>2</sub>  
3L KMnO<sub>4</sub>  
500 mL HNPIT soln

## FILTERS - Quantity and Description

☐ Glass Fiber 110mm 63mm 47mm 45mm 37mm

☐ Teflon 110mm 63mm T63-216 through T63-223

☒ Hexane Rinsed 47-181 through 47-212 T47-218 through T47-226

☐ 8 Tedlar bags

☐ 6 XAD-2 modulen

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

~~50~~  
1,000 X formaldehyde soln  
2- 10ml pyrex  
2- 5ml pyrex  
2- 1ml pyrex

☒ Teddon top  
☒ Parafilm

Released By \_\_\_\_\_  
Received By \_\_\_\_\_  
Returned By \_\_\_\_\_

Date 3/9/90  
Date \_\_\_\_\_  
Date \_\_\_\_\_