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AP-42 Section Number: 1.3

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Title: Emissions Inventory Testing at El
Segundo Generating Station 1

Southern California Edison Company

April 1990

11-27-90
119

**EMISSIONS INVENTORY
TESTING AT EL SEGUNDO
GENERATING STATION UNIT 1**

Prepared for:

SOUTHERN CALIFORNIA EDISON COMPANY
Rosemead, California

For Inclusion in:

**Air Toxics Hot Spots Inventory
required under
AB2588**

Prepared by:

**Arlene C. Bell
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CARNOT

formerly the California Division of
ENERGY SYSTEMS ASSOCIATES

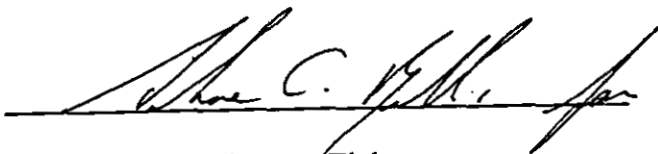
Tustin, California

APRIL, 1990

ESR 53304-2052

REPORT CERTIFICATION

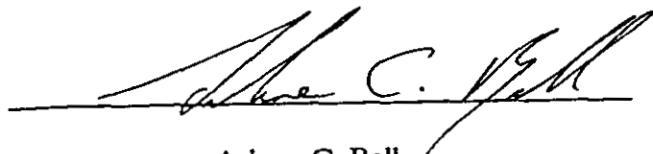
The sampling and analysis performed for this report was carried out under my direction and supervision.



Robert A. Finken
Director of Testing Services

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.



Arlene C. Bell
Director of Laboratory Services

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 source test report for the emissions tests that were conducted on SCE's El Segundo Generating Station Unit 1. 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 (The 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 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
- arsenic by CARB Method 423

Two residual 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 February 20-25, 1990. The Carnot test team members were Bob Finken, Kevin Hopkins, Bill Osborne, Jim Mulligan, Mike Schmitt, and Arlene Bell. Mr. Michael D. Escarcega of SCE coordinated all test activities.

Table 1-1 summarizes the results of the emissions tests while firing natural gas. Tables 1-2 through 1-4 summarize the results of the emissions tests while firing residual oil. Table 1-5 presents the results of the residual oil analyses. Detailed results are included in Section 4.0.

TABLE 1-1
SUMMARY OF AB2588 EMISSIONS TEST RESULTS
SCE/EL SEGUNDO UNIT 1
NATURAL GAS FUEL
February 25, 1990

Species	
Benzene:	
ppb	ND < 1
lb/hr	ND < 5.18×10^{-3}
lb/MMBtu	ND < 2.81×10^{-6}
Formaldehyde	
ppb	204
lb/hr	4.07×10^{-1}
lb/MMBtu	2.22×10^{-4}

TABLE 1-2
SUMMARY OF AB2588 EMISSIONS TEST RESULTS
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL
February 20-24, 1990

Species	
Benzene:	
ppb	ND < 1
lb/hr	ND < 5.78×10^{-3}
lb/MMBtu	ND < 3.00×10^{-6}
Formaldehyde	
ppb	ND < 12
lb/hr	ND < 2.60×10^{-2}
lb/MMBtu	ND < 1.48×10^{-5}
Total PAH	
$\mu\text{g}/\text{m}^3$	< 9.14
lb/hr	< 1.63×10^{-2}
lb/MMBtu	< 9.10×10^{-6}

TABLE 1-3
SUMMARY OF PAH EMISSION RESULTS
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL
February 20-24, 1990

Species	$\mu\text{g}/\text{m}^3$	lb/hr	lb/MMBtu
Acenaphthene	<0.02	$<4.12 \times 10^{-5}$	$<2.12 \times 10^{-8}$
Acenaphthylene	ND <0.01	ND $<1.31 \times 10^{-5}$	ND $<6.92 \times 10^{-9}$
Anthracene	<0.02	$<2.76 \times 10^{-5}$	$<1.43 \times 10^{-8}$
Benz[a]anthracene	<0.11	$<1.97 \times 10^{-4}$	$<1.02 \times 10^{-7}$
Benzo[b+k]fluoranthene	<0.04	$<6.52 \times 10^{-5}$	$<3.65 \times 10^{-8}$
Benzo[a]pyrene	ND <0.01	ND $<1.31 \times 10^{-5}$	ND $<6.92 \times 10^{-9}$
Benzo[g,h,i]perylene	<0.07	$<1.34 \times 10^{-4}$	$<6.95 \times 10^{-8}$
Chrysene	<0.05	$<8.87 \times 10^{-5}$	$<4.55 \times 10^{-8}$
Dibenz[a,h]anthracene	<0.03	$<4.78 \times 10^{-5}$	$<2.47 \times 10^{-8}$
Fluoranthene	<0.08	$<1.51 \times 10^{-4}$	$<7.78 \times 10^{-8}$
Fluorene	<0.01	$<2.16 \times 10^{-5}$	$<1.12 \times 10^{-8}$
Indeno[1,2,3-cd]pyrene	<0.07	$<1.20 \times 10^{-4}$	$<6.25 \times 10^{-8}$
Naphthalene	8.43	1.51×10^{-2}	8.44×10^{-6}
Phenanthrene	<0.12	$<2.06 \times 10^{-4}$	$<1.08 \times 10^{-7}$
Pyrene	<0.08	$<1.37 \times 10^{-4}$	$<7.07 \times 10^{-8}$
TOTAL PAH	<9.14	$<1.63 \times 10^{-2}$	$<9.10 \times 10^{-6}$

TABLE 1-4
SUMMARY OF METALS EMISSION RESULTS
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL
February 20-24, 1990

Species	$\mu\text{g}/\text{m}^3$	lb/hr	lb/MMBtu
Arsenic	10.55	1.82×10^{-2}	1.03×10^{-5}
Arsenic (CARB M 423)	1.76	2.98×10^{-3}	1.68×10^{-6}
Beryllium	<0.18	$<3.05 \times 10^{-4}$	$<1.71 \times 10^{-7}$
Cadmium	1.18	2.04×10^{-3}	1.16×10^{-6}
Chromium	6.74	1.19×10^{-2}	6.31×10^{-6}
Hexavalent Chromium	1.38	2.44×10^{-3}	1.31×10^{-6}
Copper	16.63	2.87×10^{-2}	1.65×10^{-5}
Lead	<2.56	$<4.43 \times 10^{-3}$	$<2.51 \times 10^{-6}$
Manganese	8.36	1.44×10^{-2}	8.11×10^{-6}
Mercury	ND <31.62	ND $<5.46 \times 10^{-2}$	ND $<3.08 \times 10^{-5}$
Nickel	346.5	5.99×10^{-1}	3.40×10^{-4}
Selenium	<4.12	$<7.12 \times 10^{-3}$	$<4.03 \times 10^{-6}$
Zinc*	29.68	5.13×10^{-2}	2.81×10^{-5}

* Duplicate sample: Test 7-Mtls excluded because of Zn contamination

TABLE 1-5
FUEL ANALYSIS SUMMARY
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL
February 20-24, 1990

Parameter	
Btu/lb (HHV)	19,166
Carbon, %	85.46
Hydrogen, %	12.58
Nitrogen, %	0.10
Oxygen, %	1.62
Sulfur, %	0.18
Ash, %	0.02
F factor, dscf/MMBtu @ 0% O ₂ and 60°F	9,039
Chlorine, mg/l	132
Arsenic, mg/l	ND <1.1
Beryllium, mg/l	ND <0.22
Cadmium mg/l	ND <0.22
Chromium, mg/l	0.22
Hexavalent Chromium, mg/l	ND <0.50
Copper, mg/l	0.44
Lead, mg/l	ND <1.1
Mercury, mg/l	ND <0.10
Manganese, mg/l	<0.43
Nickel, mg/l	10
Selenium, mg/l	ND <1.0
Zinc, mg/l	0.97

ND - not detected

SECTION 2.0

UNIT DESCRIPTION AND OPERATION

2.1 UNIT DESCRIPTION

Unit 1 at the El Segundo 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 175 megawatts. The boiler is capable of firing natural gas or residual fuel oil via 16 burners. The burners are arranged in a 4 x 4 face firing pattern. Gas flow through the boiler is provided by 2 forced and 2 induced draft fans. The gas flow is divided into two separate streams each with a set of fans and a vertical rotary air preheater. Figure 2-1 shows a cross sectional view of the boiler and related ductwork.

2.2 UNIT OPERATION

El Segundo Generating Station Unit 1 was operated at nominal full load while firing natural gas or residual oil. Table 2-1 summarizes unit operation during each test. Complete unit operation during each test. Complete unit operation data is in Appendix C.2.

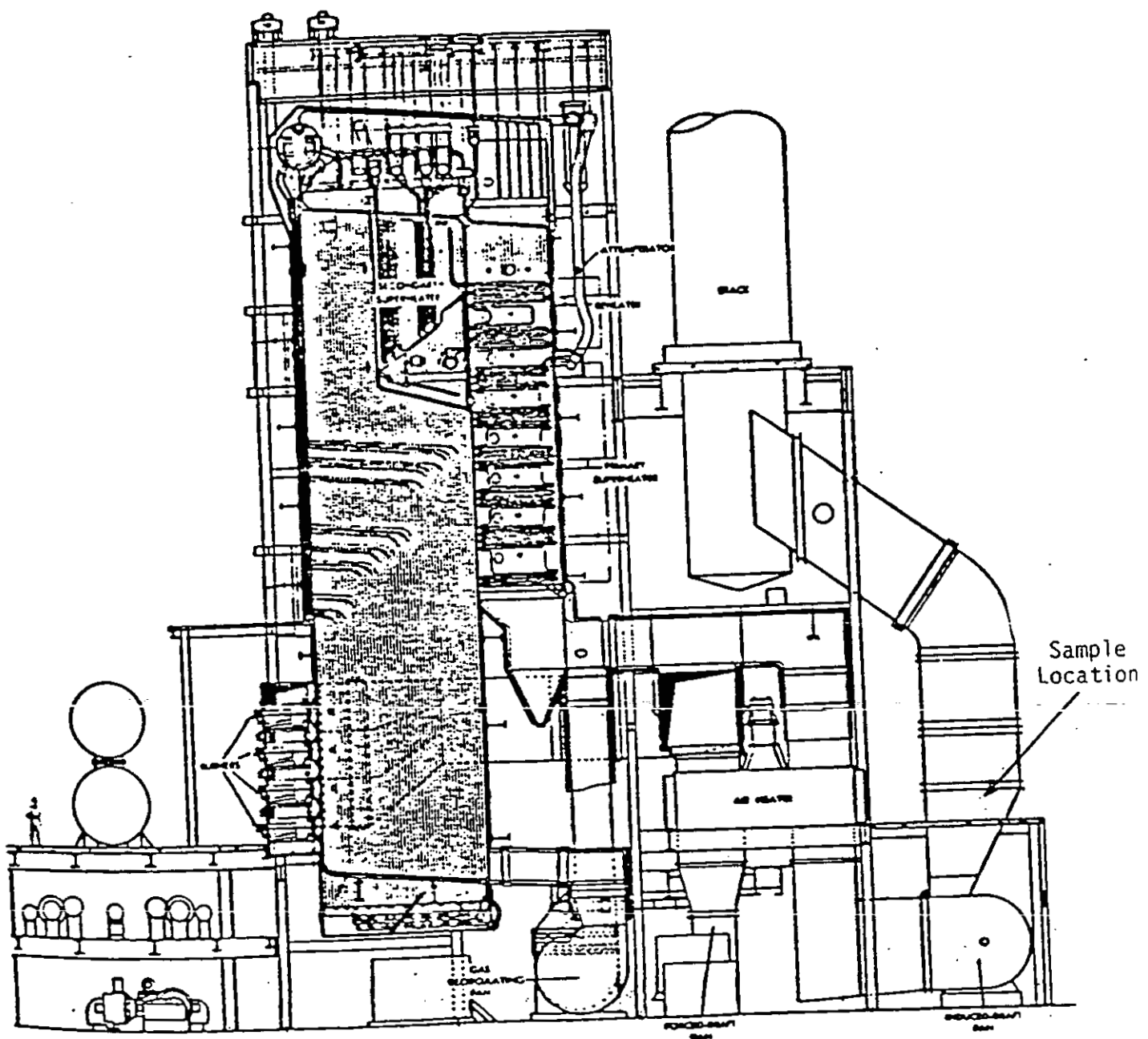


Figure 2-1. Cross-section of El Segundo Unit 1 showing sample location.

TABLE 2-1
SUMMARY OF UNIT OPERATION
SCE/EL SEGUNDO GENERATING STATION UNIT 1
February 22-25, 1990

Date	Test No.	Test Location	Fuel	Load (MW)	Fuel Flow	Steam Flow K lb/hr
2/22/90	2-Cr	South Duct	Oil	173	76 K lb/hr	1210
	3-Cr	South Duct	Oil	170	75 K lb/hr	1175
	2-PAH	North Duct	Oil	172	77 K lb/hr	1205
	3-PAH	North Duct	Oil	170	75 K lb/hr	1175
2/23/90	4-Mtls	North Duct	Oil	157	70 K lb/hr	1050
	5-Mtls	North Duct	Oil	158	73 K lb/hr	1050
	4-As	South Duct	Oil	157	70 K lb/hr	1050
	5-As	South Duct	Oil	158	73 K lb/hr	1050
2/24/90	6-Cr	North Duct	Oil	157	72 K lb/hr	1043
	6-PAH	South Duct	Oil	157	72 K lb/hr	1043
	7-Mtls	South Duct	Oil	157	71 K lb/hr	1045
	7-As	North Duct	Oil	157	71 K lb/hr	1045
2/25/90	8-Benzene	North Duct	Natural Gas	151	1543 KCFH	1003
	8-Formaldehyde	North Duct	Natural Gas	151	1543 KCFH	1003
	8-Benzene	South Duct	Natural Gas	151	1543 KCFH	1003
	8-Formaldehyde	South Duct	Natural Gas	151	1543 KCFH	1003

SECTION 3.0

TEST DESCRIPTION

3.1 TEST DESCRIPTION AND SCHEDULE

The tests on El Segundo Generating Station Unit 1 were conducted with the boiler firing at or near full normal load, at normal operating conditions. Testing was conducted with the boiler firing both residual oil and natural gas fuels. Table 3-1 presents the tests that were conducted for each fuel type. Table 3-2 is a summary of the tests performed.

TABLE 3-1
TEST SUMMARY

Fuel	Species to be Measured by Source Test
Residual Oil	Benzene, Formaldehyde, PAH, Full Set of Metals, Arsenic, Chromium Also fuel analysis for Metals, Chloride
Natural Gas	Benzene, Formaldehyde

3.2 SAMPLE LOCATIONS

Samples were collected from ports installed in the exhaust ducts 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. Samples were collected using ports located in each of the two ducts. To obtain triplicate tests of each type, two tests were performed in one duct and one test was performed in the other duct. The procedures used to obtain average emission rates for any test method are listed below:

TABLE 3-2
TEST SCHEDULE AB2588 EMISSIONS TESTING
SCE/EL SEGUNDO GENERATING STATION UNIT 1
February 22-25, 1990

Test No.	Location	Date	Time	Fuel	Type of Test
2-PAH	North Duct	2/22/90	1200-1531	Residual Oil	PAH
2-Cr	South Duct	2/22/90	1350-1615	Residual Oil	Chromium/Hexavalent Chromium
2-CEM	North Duct	2/22/90	1200-1615	Residual Oil	CEM (O ₂ , CO ₂)
3-PAH	North Duct	2/22/90	1706-2041	Residual Oil	PAH
3-Cr	South Duct	2/22/90	1702-1936	Residual Oil	Chromium/Hexavalent Chromium
3-CEM	North Duct	2/22/90	1702-2041	Residual Oil	CEM (O ₂ , CO ₂)
4-MtIs	North Duct	2/23/90	0945-1200	Residual Oil	Metals
4-As	South Duct	2/23/90	0944-1159	Residual Oil	Arsenic
4-CEM	North Duct	2/23/90	0944-1200	Residual Oil	CEM (O ₂ , CO ₂)
5-MtIs	North Duct	2/23/90	1531-1721	Residual Oil	Metals
5-As	South Duct	2/23/90	1530-1720	Residual Oil	Arsenic
5-CEM	North Duct	2/23/90	1530-1721	Residual Oil	CEM (O ₂ , CO ₂)
6-Cr	North Duct	2/24/90	0900-1129	Residual Oil	Chromium/Hexavalent Chromium
6-PAH	South Duct	2/24/90	0937-1322	Residual Oil	PAH
6-CEM	North Duct	2/24/90	0900-1419	Residual Oil	CEM (O ₂ , CO ₂)
6A-Benzene	North Duct	2/24/90	1017-1037	Residual Oil	Benzene
6B-Benzene	North Duct	2/24/90	1040-1100	Residual Oil	Benzene
6C-Benzene	South Duct	2/24/90	1122-1142	Residual Oil	Benzene
6A-Form	North Duct	2/24/90	1311-1341	Residual Oil	Formaldehyde
6B-Form	North Duct	2/24/90	1319-1419	Residual Oil	Formaldehyde
7-MtIs	South Duct	2/24/90	1508-1717	Residual Oil	Metals
7-As	North Duct	2/24/90	1507-1716	Residual Oil	Arsenic
7C-Form	South Duct	2/24/90	1736-1804	Residual Oil	Formaldehyde
7-CEM	North Duct	2/24/90	1508-1717	Residual Oil	CEM (O ₂ , CO ₂)
8-Vel/H ₂ O	North Duct	2/25/90	1055-1125	Natural Gas	Velocity Traverse & Moisture
8A-Benzene	North Duct	2/25/90	1100-1120	Natural Gas	Benzene
8B-Benzene	North Duct	2/25/90	1248-1308	Natural Gas	Benzene
8C-Benzene	South Duct	2/25/90	1400-1420	Natural Gas	Benzene
8A-Form	South Duct	2/25/90	1102-1132	Natural Gas	Formaldehyde
8B-Form	North Duct	2/25/90	1240-1310	Natural Gas	Formaldehyde
8C-Form	North Duct	2/25/90	1320-1350	Natural Gas	Formaldehyde
8-Vel/H ₂ O	South Duct	2/25/90	1309-1339	Natural Gas	Velocity Traverse & Moisture
8-CEM	North Duct	2/25/90	1055-1350	Natural Gas	CEM (O ₂ , CO ₂)

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.

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 for air emissions tests and related information that were used at El Segundo Unit 1 are listed in Table 3-3. Descriptions of standard procedures are included in Appendix A. Additional information and modifications to standard procedures are presented below.

3.3.1 Benzene

Triplicate samples for benzene analysis were collected in Tedlar bags and analyzed by gas chromatography according to CARB Method 410A by Truesdail Laboratories in Tustin, California.

3.3.2 Formaldehyde

Triplicate formaldehyde samples were collected non-isokinetically using midget impingers in acidic 2,4-dinitrophenylhydrazine solution. The analysis for formaldehyde was performed by reverse phase HPLC by Radian Laboratories, in Research Triangle Park, North Carolina.

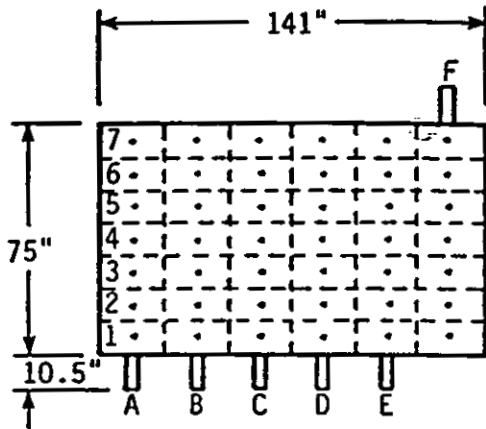
3.3.3 Polycyclic Aromatic Hydrocarbons (PAH)

Triplicate PAH samples were collected according to the sampling procedures of CARB Method 429. This method is known as 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 species that might pass through the resin.

TRAVERSE POINTS

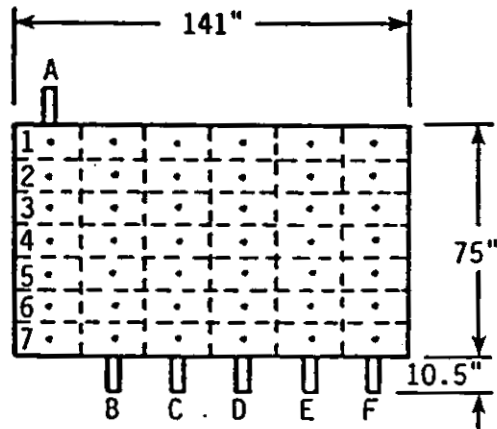
6 AXES
7 POINTS/AXIS
42 TOTAL POINTS

6 AXES
7 POINTS/AXIS
42 TOTAL POINTS



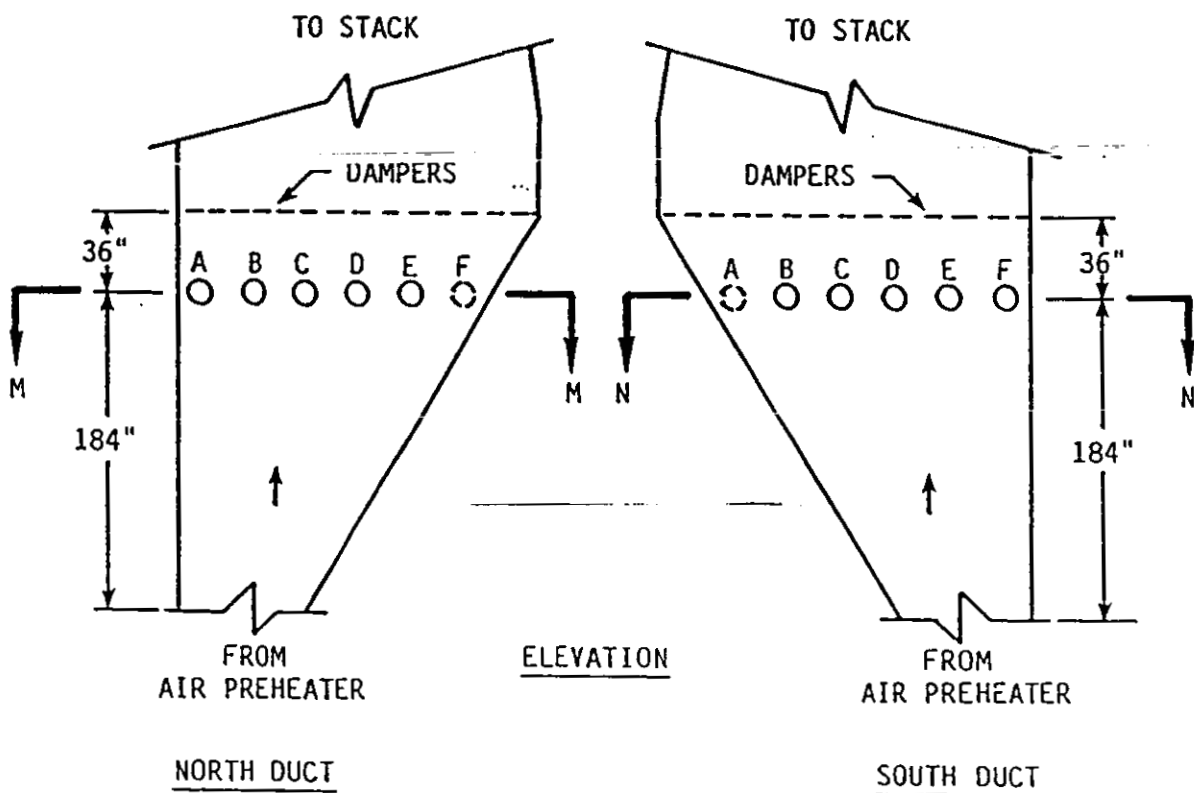
NORTH

SECTION M-M



SOUTH

SECTION N-N



ELEVATION

NORTH DUCT

SOUTH DUCT

Figure 3-1. El Segundo, Unit 1 North & South Air Preheater Outlet Duct Test Locations.

TABLE 3-3
TEST PROCEDURES FOR EL SEGUNDO UNIT 1
AIR EMISSIONS TESTS

Parameter	No. Replicates	Duration of Test (min.)	Sample Rate	Measurement Principle	Reference Method	Test Detection Limit
Benzene	3	20	0.5 l/min	GC/PID	CARB 410A	1 ppb
Formaldehyde	3	30	1 l/min	HPLC	CARB 430	0.1 µg/m ³
PAH	3	189	1 m ³ /hr	GC/MS	CARB 429	10 ng/m ³ per species*
Arsenic	3	84	1 m ³ /hr	AAS	CARB 423	0.3 µg/m ³
Total Chromium	3	126	1 m ³ /hr	AAS	CARB 425	0.3 µg/m ³
Hexavalent Chromium	3	126	1 m ³ /hr	Ion chromatography	CARB 425	0.3 µg/m ³
Full Set of Metals:	3	84	1 m ³ /hr		EPA Draft Metals Method	0.4-20 µg/m ³ per species excluding Hg
Arsenic						
Beryllium						
Cadmium						
Copper						
Lead						
Manganese						
Mercury						
Nickel						
Selenium						
Zinc						
Metals, Chloride	2	---	---	Fuel Analysis	---	---

* assume 3 m³ samples

TABLE 3-4
PAH TEST INFORMATION

Sampling Method	CARB 429
Analytical Method	GC/MS
Analytical Laboratory	Zenon Environmental
Expected Levels	Less than 10 ng/m ³ per species
Analytical Detection Limit	10-100 ng per species
Sample Volumes	3 m ³ (3-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. All sample portions recovered with water, acetone, and hexane rinses.
Glassware Cleaning	Acid cleaning followed by DI H ₂ O, acetone, and hexane rinses and high temperature bake

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 pre- and post-test laboratory spikes were introduced to the samples by Zenon and the percent recovery is reported along with the results.

PAH species were analyzed using GC/MS with selective ion monitoring. This procedure provides the lowest detection limits possible for these samples. PAH species to be quantitated are listed in Appendix C-1 of "Emission Inventory Criteria and Guidelines". These compounds are listed below:

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

In addition to the samples, 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 provides 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

TABLE 3-5
FULL SET OF METALS ANALYSIS

Metal	Sampling Method	Analytical Method	Method Detection Limit $\mu\text{g}/\text{m}^3$ *
Chromium	CARB 425	Graphite Furnace Atomic Absorption	0.3
Hexavalent Chromium	CARB 425 w/0.1 N NaOH	Ion Chromatography	0.3
Beryllium	EPA Draft Metals Method	ICP	0.08
Arsenic	EPA Draft Metals Method	Graphite Furnace Atomic Absorption	0.3
Arsenic	CARB 423	Graphite Furnace Atomic Absorption	0.2
Cadmium	EPA Draft Metals Method	ICP	0.03
Copper	EPA Draft Metals Method	ICP	0.8
Lead	EPA Draft Metals Method	ICP	2.2
Manganese	EPA Draft Metals Method	ICP	0.8
Mercury	EPA Draft Metals Method	Cold Vapor Atomic Absorption	34
Nickel	EPA Draft Metals Method	ICP	0.8
Selenium	EPA Draft Metals Method	ICP	2.2
Zinc	EPA Draft Metals Method	ICP	0.8

* Assumes 1.5 m³ samples for all metals except Chromium
Assumes 2 m³ samples for chromium train

selected arsenic tests to be performed by CARB Method 423 to support their metals method validation study. Arsenic tests were performed simultaneously with metals tests.

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 Full Set of 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.

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

3.3.4.2 Arsenic Train

The probe wash, filter, and impinger portions from a separate sample train were collected and analyzed for arsenic according to CARB Method 423. Arsenic analyses were performed according to CARB Method 423 using graphite furnace atomic absorption by Curtis and Tompkins in Los Angeles.

3.3.4.3 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.

3.3.5 Residual Oil Samples

Two residual 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 in Los Angeles.

3.3.6 Natural Gas Analysis

Duplicate samples for natural gas analysis were collected at the El Segundo facility. Truesdail Laboratories analyzed these sample for composition and higher heating value.

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

3.3.7 Gaseous Emissions

Gaseous emissions (O_2 and CO_2) were measured using Carnot's Continuous Emissions Monitor (CEM) described in Appendix A. This system meets EPA and CARB requirements for gaseous species. A preliminary traverse indicated that there was no significant stratification. Therefore, O_2 and CO_2 concentrations were determined at a single point.

O_2 and CO_2 were measured in conjunction with all tests according to EPA Method 3A to provide data for molecular weight and dilution calculations.

3.3.8 Velocity and Moisture

Velocity and moisture were determined in conjunction with all isokinetic tests according to EPA Methods 1, 2, and 4. For non-isokinetic single point tests, either separate velocity and moisture determinations were performed or the velocity measured during a simultaneous isokinetic test is used for emission calculations.

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 (see example form in Appendix B)

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 air emissions tests performed at El Segundo Unit 1. Air emissions are presented on a concentration, mass emissions and lb/MMBtu basis. 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 4-5. Table 4-6 summarizes test conditions. 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 Arsenic
- 4.7 Fuel Analysis
- 4.8 Test Summary and Isokinetics

TABLE 4-1
SUMMARY OF AB2588 EMISSIONS TEST RESULTS
SCE/EL SEGUNDO UNIT 1
NATURAL GAS FUEL
February 25, 1990

Species	
Benzene:	
ppb	ND < 1
lb/hr	ND < 5.18×10^{-3}
lb/MMBtu	ND < 2.81×10^{-6}
Formaldehyde	
ppb	204
lb/hr	4.07×10^{-1}
lb/MMBtu	2.22×10^{-4}

TABLE 4-2
SUMMARY OF AB2588 EMISSIONS TEST RESULTS
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL
February 20-24, 1990

Species	
Benzene:	
ppb	ND < 1
lb/hr	ND < 5.78×10^{-3}
lb/MMBtu	ND < 3.00×10^{-6}
Formaldehyde	
ppb	ND < 12
lb/hr	ND < 2.60×10^{-2}
lb/MMBtu	ND < 1.48×10^{-5}
Total PAH	
$\mu\text{g}/\text{m}^3$	< 9.14
lb/hr	< 1.63×10^{-2}
lb/MMBtu	< 9.10×10^{-6}

TABLE 4-3
SUMMARY OF PAH EMISSION RESULTS
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL
February 20-24, 1990

Species	$\mu\text{g}/\text{m}^3$	lb/hr	lb/MMBtu
Acenaphthene	<0.02	$<4.12 \times 10^{-5}$	$<2.12 \times 10^{-8}$
Acenaphthylene	ND <0.01	ND $<1.31 \times 10^{-5}$	ND $<6.92 \times 10^{-9}$
Anthracene	<0.02	$<2.76 \times 10^{-5}$	$<1.43 \times 10^{-8}$
Benz[a]anthracene	<0.11	$<1.97 \times 10^{-4}$	$<1.02 \times 10^{-7}$
Benzo[b+k]fluoranthene	<0.04	$<6.52 \times 10^{-5}$	$<3.65 \times 10^{-8}$
Benzo[a]pyrene	ND <0.01	ND $<1.31 \times 10^{-5}$	ND $<6.92 \times 10^{-9}$
Benzo[g,h,i]perylene	<0.07	$<1.34 \times 10^{-4}$	$<6.95 \times 10^{-8}$
Chrysene	<0.05	$<8.87 \times 10^{-5}$	$<4.55 \times 10^{-8}$
Dibenz[a,h]anthracene	<0.03	$<4.78 \times 10^{-5}$	$<2.47 \times 10^{-8}$
Fluoranthene	<0.08	$<1.51 \times 10^{-4}$	$<7.78 \times 10^{-8}$
Fluorene	<0.01	$<2.16 \times 10^{-5}$	$<1.12 \times 10^{-8}$
Indeno[1,2,3-cd]pyrene	<0.07	$<1.20 \times 10^{-4}$	$<6.25 \times 10^{-8}$
Naphthalene	8.43	1.51×10^{-2}	8.44×10^{-6}
Phenanthrene	<0.12	$<2.06 \times 10^{-4}$	$<1.08 \times 10^{-7}$
Pyrene	<0.08	$<1.37 \times 10^{-4}$	$<7.07 \times 10^{-8}$
TOTAL PAH	<9.14	$<1.63 \times 10^{-2}$	$<9.10 \times 10^{-6}$

TABLE 4-4
SUMMARY OF METALS EMISSION RESULTS
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL
February 20-24, 1990

Species	$\mu\text{g}/\text{m}^3$	lb/hr	lb/MMBtu
Arsenic	10.55	1.82×10^{-2}	1.03×10^{-5}
Arsenic (CARB M 423)	1.76	2.98×10^{-3}	1.68×10^{-6}
Beryllium	<0.18	$<3.05 \times 10^{-4}$	$<1.71 \times 10^{-7}$
Cadmium	1.18	2.04×10^{-3}	1.16×10^{-6}
Chromium	6.74	1.19×10^{-2}	6.31×10^{-6}
Hexavalent Chromium	1.38	2.44×10^{-3}	1.31×10^{-6}
Copper	16.63	2.87×10^{-2}	1.65×10^{-5}
Lead	<2.56	$<4.43 \times 10^{-3}$	$<2.51 \times 10^{-6}$
Manganese	8.36	1.44×10^{-2}	8.11×10^{-6}
Mercury	ND <31.62	ND $<5.46 \times 10^{-2}$	ND $<3.08 \times 10^{-5}$
Nickel	346.5	5.99×10^{-1}	3.40×10^{-4}
Selenium	<4.12	$<7.12 \times 10^{-3}$	$<4.03 \times 10^{-6}$
Zinc*	29.68	5.13×10^{-2}	2.81×10^{-5}

* Duplicate sample: Test 7-Mtls excluded because of Zn contamination

TABLE 4-5
FUEL ANALYSIS SUMMARY
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL
February 20-24, 1990

Parameter	
Btu/lb (HHV)	19,166
Carbon, %	85.46
Hydrogen, %	12.58
Nitrogen, %	0.10
Oxygen, %	1.62
Sulfur, %	0.18
Ash, %	0.02
F factor, dscf/MMBtu @ 0% O ₂ and 60°F	9,039
Chlorine, mg/l	132
Arsenic, mg/l	ND <1.1
Beryllium, mg/l	ND <0.22
Cadmium mg/l	ND <0.22
Chromium, mg/l	0.22
Hexavalent Chromium, mg/l	ND <0.50
Copper, mg/l	0.44
Lead, mg/l	ND <1.1
Mercury, mg/l	ND <0.10
Manganese, mg/l	<0.43
Nickel, mg/l	10
Selenium, mg/l	ND <1.0
Zinc, mg/l	0.97

ND - not detected

4.1 BENZENE

The results of the benzene sampling are presented in Table 4-6. Benzene was not detected in any of the samples. Appendix C.4 contains additional information. Benzene was not detectable at the 1 ppb level, corresponding to an emission rate of 5.18×10^{-3} while firing gas fuel or an emission rate of 5.78×10^{-3} while firing residual oil.

TABLE 4-6
BENZENE EMISSIONS
SCE/EL SEGUNDO UNIT 1

GAS FUEL				
Test No.	8A-Benzene	8B-Benzene	8C-Benzene	Average
Date:	2/25/90	2/25/90	2/25/90	
Flow rate, dscfm (stack)	419,098	419,098	419,098	
O ₂ , %	7.92	7.92	7.92	
ppb	ND <1	ND <1	ND <1	ND <1
lb/hr				ND <51.8 x 10 ⁻³
lb/MMBtu				ND <2.81 x 10 ⁻⁶

RESIDUAL OIL				
Test No.	6A-Benzene	6B-Benzene	6C-Benzene	Average
Date	2/24/90	2/24/90	2/24/90	
Flow rate, dscfm (stack)	467,928	467,928	467,928	
O ₂ , %	8.25	8.85	8.85	
ppb	ND <1	ND <1	ND <1	ND <1
lb/hr				5.78 x 10 ⁻³
lb/MMBtu				3.00 x 10 ⁻⁶

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4.2 FORMALDEHYDE

Formaldehyde results are presented in Table 4-7. Appendix C.5 presents additional data and Radian's Laboratory report. Both a field blank and field spike were collected and analyzed. Field spike recovery was 103% of nominal. Detectable formaldehyde levels were measured while firing natural gas. The average concentration was 204 ppb with an emission rate of 0.407 lb/hr. Formaldehyde was not detected while firing residual oil and a detection limit of 12 ppb.

TABLE 4-7
FORMALDEHYDE EMISSIONS
SCE/EL SEGUNDO UNIT 1

GAS FUEL				
Test No.	8A-Form	8B-Form	8C-Form	Average
Date:	2/25/90	2/25/90	2/25/90	
Flow rate, dscfm (stack)	419,098	419,098	419,098	
O ₂ , %	7.40	8.43	8.43	
ppb	280	198	135	204
lb/hr				4.07×10^{-1}
lb/MMBtu	2.92×10^{-4}	2.23×10^{-4}	1.51×10^{-4}	2.22×10^{-4}
RESIDUAL OIL				
Test No.	6A-Form	6B-Form	7C-Form	Average
Date	2/24/90	2/24/90	2/24/90	
Flow rate, dscfm (stack)	464,484	464,484	464,484	
O ₂ , %	8.83	8.83	9.54	
ppb	ND <10	ND <17	ND <9	ND <12
lb/hr				2.60×10^{-2}
lb/MMBtu	$ND <1.20 \times 10^{-5}$	$ND <2.08 \times 10^{-5}$	$ND <1.16 \times 10^{-5}$	$ND <1.48 \times 10^{-5}$

4.3 POLYCYCLIC AROMATIC HYDROCARBONS (PAH)

PAH results are presented in Table 4-8. Complete results are in Appendix C.6. The analysis for the fifteen target PAH compounds indicated that the 92% of the total PAH detected is Naphthalene. Naphthalene has been found to be a decomposition product of the XAD-2 resin. Field blank analysis indicated 29 $\mu\text{g}/\text{train}$ of Naphthalene. All species except Acenaphthylene and Benzo(a)pyrene were detected in at least one sample. The average concentration is 9.14 $\mu\text{g}/\text{m}^3$ and the average emission rate is 1.63×10^{-2} lb/hr.

TABLE 4-8
POLYCYCLIC AROMATIC HYDROCARBON EMISSIONS
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL

Test No.	2-PAH	3-PAH	6-PAH	Average		
Date	2/22/90	2/22/90	2/24/90			
Flow Rate, dscfm (stack)	478,051					
O ₂ , %	7.09	8.04				
Species	μg/m ³	μg/m ³	μg/m ³	μg/m ³	lb/hr	lb/MMBtu
Naphthalene	3.149	0.074	22.067	8.43	1.51 x 10 ⁻²	8.44 x 10 ⁻⁶
Acenaphthylene	ND <0.007	ND <0.007	ND <0.008	ND <0.01	ND <1.31 x 10 ⁻⁵	ND <6.92 x 10 ⁻⁹
Acenaphthene	0.054	ND <0.007	ND <0.008	<0.02	<4.12 x 10 ⁻⁵	<2.12 x 10 ⁻⁸
Fluorene	0.021	ND <0.007	ND <0.008	<0.01	<2.16 x 10 ⁻⁵	<1.12 x 10 ⁻⁸
Phenanthrene	0.240	ND <0.007	0.098	<0.12	<2.06 x 10 ⁻⁴	<1.08 x 10 ⁻⁷
Anthracene	0.031	ND <0.007	ND <0.008	<0.02	<2.76 x 10 ⁻⁵	<1.43 x 10 ⁻⁸
Fluoranthene	0.209	ND <0.007	0.037	<0.08	<1.51 x 10 ⁻⁴	<7.78 x 10 ⁻⁸
Pyrene	0.189	ND <0.007	0.034	<0.08	<1.37 x 10 ⁻⁴	<7.07 x 10 ⁻⁸
Benz(a)anthracene	0.278	ND <0.007	0.046	<0.11	<1.97 x 10 ⁻⁴	<1.02 x 10 ⁻⁷
Chrysene	0.126	ND <0.007	0.016	<0.05	<8.87 x 10 ⁻⁵	<4.55 x 10 ⁻⁸
Benzo(b+k)fluoranthene	ND <0.007	ND <0.007	0.095	<0.04	<6.52 x 10 ⁻⁵	<3.65 x 10 ⁻⁸
Benzo(a)pyrene	ND <0.007	ND <0.007	ND <0.008	ND <0.01	ND <1.31 x 10 ⁻⁵	ND <6.92 x 10 ⁻⁹
Indeno(1,2,3-cd)pyrene	0.152	ND <0.007	0.043	<0.07	<1.20 x 10 ⁻⁴	<6.25 x 10 ⁻⁸
Dibenzo(a,h)anthracene	0.060	ND <0.007	0.013	<0.03	<4.78 x 10 ⁻⁵	<2.47 x 10 ⁻⁸
Benzo(g,h,i)perylene	0.175	ND <0.007	0.043	<0.07	<1.34 x 10 ⁻⁴	<6.95 x 10 ⁻⁸
Total PAH						
μg/m ³	<4.706	<0.173	<22.53	<9.14		
lb/hr						<1.63 x 10 ⁻²
lb/MMBtu	<4.27 x 10 ⁻⁶	<1.59 x 10 ⁻⁷	<2.29 x 10 ⁻⁵	<9.10 x 10 ⁻⁶		

4.4 FULL SET OF METALS

Metals results obtained from the EPA Draft Metals Method are presented in Table 4-9. Results are in Appendix C.7. Metals distribution using the EPA metals train was:

Mercury: Not detected in any sample fraction. However, detection limits are high because aliquots analyzed from the digested nitric acid/peroxide impinger catches have a detection limit of 45 µg/train. Detection limits of the probe/filter and KMnO₄ impinger portion are 2 µg/train.

Beryllium, Lead and Selenium: Detected at levels approximately equal to the detection limit of the method. Emission rates are $<3.05 \times 10^{-4}$ lb/hr for beryllium, $<4.43 \times 10^{-3}$ lb/hr for lead and $<7.12 \times 10^{-3}$ lb/hr for selenium.

Arsenic, Cadmium, Copper, Manganese and Zinc: These species were detected in all samples. Emission rates are:

Arsenic	1.82×10^{-2} lb/hr
Cadmium	2.04×10^{-3} lb/hr
Copper	2.87×10^{-2} lb/hr
Manganese	1.44×10^{-2} lb/hr
Zinc	5.13×10^{-2} lb/hr

The zinc analysis for Test 7-Mtls was excluded from the average. Zinc contamination in the laboratory is possible because the reported value of 6,564 µg/train would be equivalent to one half of the total particulate catch for that test.

Nickel: Nickel was detected in all samples and had an emission rate of 0.599 lb/hr.

TABLE 4-9
METALS EMISSIONS RESULTS FROM EPA DRAFT METHOD
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL

Test No.	4-Mtls	5-Mtls	7-Mtls			
Date	2/23/90	2/23/90	2/24/90	Average		
Flow rate, dscfm (stack)				461,621		
O ₂ , %	8.51	8.45	9.54			
Species	µg/m ³	µg/m ³	µg/m ³	µg/m ³	lb/hr	lb/MMBtu
Arsenic	12.11	8.36	11.18	10.55	1.82 x 10 ⁻²	1.03 x 10 ⁻⁵
Beryllium	<0.19	<0.23	<0.11	<0.18	<3.05 x 10 ⁻⁴	<1.71 x 10 ⁻⁷
Cadmium	0.73	1.35	1.46	1.18	2.04 x 10 ⁻³	1.16 x 10 ⁻⁶
Copper	10.33	14.16	25.41	16.63	2.87 x 10 ⁻²	1.65 x 10 ⁻⁵
Lead	<2.58	<2.63	<2.48	<2.56	<4.43 x 10 ⁻³	<2.51 x 10 ⁻⁶
Manganese	9.33	9.85	5.91	8.36	1.44 x 10 ⁻²	8.11 x 10 ⁻⁶
Mercury	ND <32.90	ND <34.06	ND <27.89	ND <31.62	ND <5.4 x 10 ⁻²	ND <3.08 x 10 ⁻⁵
Nickel	311.1	331.9	396.4	346.5	5.99 x 10 ⁻¹	3.40 x 10 ⁻⁴
Selenium	<4.10	<4.32	<3.94	<4.12	<7.12 x 10 ⁻³	<4.03 x 10 ⁻⁶
Zinc*	24.96	34.40	4,170	29.68	5.13 x 10 ⁻²	2.81 x 10 ⁻⁵

* Average excludes Test 7-Mtls. Zinc contamination of this sample.

Chromium and hexavalent chromium results are presented in Table 4-10. Complete results are in Appendix C.8. Chromium and hexavalent chromium were detected in all samples. The average hexavalent chromium to total chromium ratio is 21%. The average hexavalent chromium emission rate is 0.00244 lb/hr. The average chromium emission rate is 0.019 lb/hr.

TABLE 4-10
CHROMIUM AND HEXAVALENT CHROMIUM EMISSIONS
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL

Test No.	2-Cr	3-Cr	6-Cr	Average
Date	2/22/90	2/22/90	2/24/90	
Flow rate, dscfm (stack)				473,279
O ₂ , %	7.63	9.27	8.40	
Species				
Chromium				
μg/m ³	9.96	6.12	4.14	6.74
lb/hr				1.19 x 10 ⁻²
lb/MMBtu	8.84 x 10 ⁻⁶	6.20 x 10 ⁻⁶	3.90 x 10 ⁻⁶	6.31 x 10 ⁻⁶
Hexavalent Chromium				
μg/m ³	1.60	1.76	0.77	1.38
lb/hr				2.44 x 10 ⁻³
lb/MMBtu	1.42 x 10 ⁻⁶	1.79 x 10 ⁻⁶	7.30 x 10 ⁻⁷	1.31 x 10 ⁻⁶

4.6 ARSENIC BY CARB METHOD 423

Arsenic results are presented in Table 4-11. Results are located in Appendix C.9. Results for the simultaneous arsenic tests are appreciably lower (6 times) than those obtained using the EPA draft metals method. The emission rate using CARB 423 is 2.98×10^{-3} lb/hr.

TABLE 4-11
ARSENIC EMISSIONS RESULTS FROM CARB METHOD 423
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL

Test No.	4-As	5-As	7-As	Average
Date	2/23/90	2/23/90	2/24/90	
Flow rate, dscfm				453,456
O ₂ , %	9.08	8.86	8.33	
Arsenic				
μg/m ³	0.54	1.79	2.94	1.76
lb/hr				2.98 x 10 ⁻³
lb/MMBtu	5.34 x 10 ⁻⁷	1.76 x 10 ⁻⁶	2.76 x 10 ⁻⁶	1.68 x 10 ⁻⁶

4.7 FUEL ANALYSIS

Residual oil analyses are presented in Table 4-12. Natural gas analysis is presented in Table 4-13. This analysis is used to calculate emissions as lb/MMBtu.

TABLE 4-12
SCE/EL SEGUNDO UNIT 1
RESIDUAL OIL ANALYSIS

Parameter	Sample No. 1 4/7/90	Sample No. 2 4/7/90	Average
Btu/lb (HHV)	19,189	19,142	19,166
Carbon, %	84.53	86.38	85.46
Hydrogen, %	12.40	12.75	12.58
Nitrogen, %	0.08	0.11	0.10
Oxygen, %	2.47	0.76	1.62
Sulfur, %	0.17	0.18	0.18
Ash, %	0.02	0.01	0.02
F factor, dscf/MMBtu @ 0% O ₂ and 60°F			9,039
Chlorine, mg/l	107	156	132
Arsenic, mg/l	ND <1.1	ND <1.1	ND <1.1
Beryllium, mg/l	ND <0.22	ND <0.22	ND <0.22
Cadmium, mg/l	ND <0.22	ND <0.22	ND <0.22
Chromium, mg/l	0.22	0.21	0.22
Hexavalent Chromium, mg/l	ND <0.50	ND <0.50	ND <0.50
Copper, mg/l	0.47	0.41	0.44
Lead, mg/l	ND <1.1	ND <1.1	ND <1.1
Mercury, mg/l	ND <0.1	ND <0.1	ND <0.1
Manganese, mg/l	ND <0.43	ND <0.43	ND <0.43
Nickel, mg/l	10	10	10
Selenium, mg/l	ND <1.0	ND <1.0	ND <1.0
Zinc, mg/l	0.96	0.97	0.97

TABLE 4-13
SCE/EL SEGUNDO UNIT 1
NATURAL GAS ANALYSIS

Parameter	Sample No. 1 4/7/90	Sample No. 2 4/7/90	Average
Methane, %	86.5	85.6	86.05
Ethane, %	3.8	3.8	3.8
Propane, %	0.8	0.6	0.7
Butane, %	0.1	ND <0.1	<0.1
Iso-butane, %	ND <0.1	ND <0.1	ND <0.1
Carbon dioxide, %	1.0	1.0	1.0
Nitrogen, %	3.1	4.1	3.6
Oxygen, %	1.7	1.8	1.75
Higher Heating Value, Btu/scf at 60°F	965	948	957
F factor, dscf/MMBtu @ 0% O ₂ and 60°F			8,487

4.8 TEST SUMMARY AND ISOKINETICS

A summary of the isokinetic tests performed is presented in Table 4-14. All tests were within the required range of 90-110% isokinetic.

TABLE 4-14
SUMMARY OF TEST CONDITIONS
SCE/EL SEGUNDO UNIT 1
February 22-25, 1990

Test No.	Stack Temp., °F	Stack O ₂ , %	Stack CO ₂ , %	Stack H ₂ O, %	Duct Flow Rate wacfm	Duct Flow Rate dscfm	Isokinetic %
2-PAH	327.2	7.27	10.1	8.8	419,941	256,245	91.08
2-Cr	323.0	7.5	10.0	8.8	378,736	233,608	104.88
3-PAH	328.9	7.66	9.77	8.2	400,676	246,762	94.96
3-Cr	329.6	7.7	9.73	8.6	375,788	230,188	99.25
4-Mtl	341.0	7.56	9.40	8.5	397,924	240,059	94.61
4-As	328.6	7.50	9.60	8.9	353,224	215,701	101.76
5-Mtl	347.0	7.36	9.86	8.8	397,006	236,977	94.06
5-As	323.0	7.36	9.86	9.5	356,910	218,118	103.02
6-PAH	336.5	7.45	9.7	8.4	373,450	226,547	96.23
6-Cr	343.5	7.55	9.0	7.4	397,058	241,381	93.39
7-As	342.0	7.70	9.68	8.6	393,398	236,546	94.08

APPENDIX A
MEASUREMENT PROCEDURES

Continuous Emissions Monitoring System
Oxygen (O₂) by Continuous Analyzer
Carbon Dioxide (CO₂) by Continuous Analyzer
Benzene by Gas Chromatography
Determination of Moisture in Stack Gases
Semi-Volatile Organic Sampling Train Procedures
Formaldehyde by HPLC
Arsenic by GFAAS
Total and Hexavalent Chromium by CARB Method 425
Determination of Metals by EPA Multi-metals Method

Continuous Emissions Monitoring System

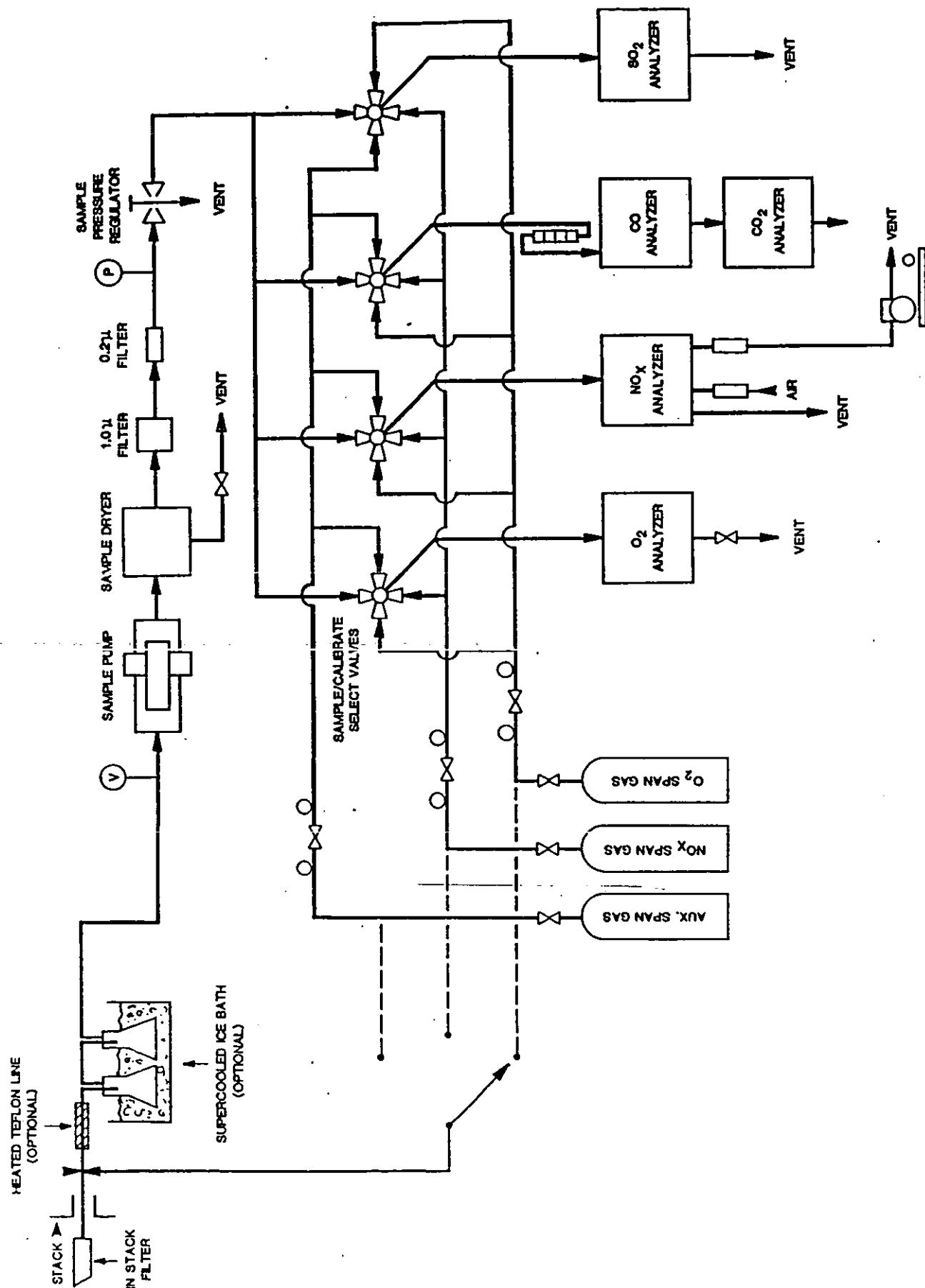
O₂, CO, CO₂, NO, NO_x, and SO₂ are measured using an extractive continuous emissions monitoring (CEM) package, shown in the following figure. This package is comprised of three basic subsystems. They are: (1) the sample acquisition and conditioning system, (2) the calibration gas system, and (3) the analyzers themselves. This section presents a description of the sampling and calibration systems. Descriptions of the analyzers used in this program and the corresponding reference test methods follow. Information regarding quality assurance information on the system, including calibration routines and system performance data follows.

The sample acquisition and conditioning system contains components to extract a representative sample from the stack or flue, transport the sample to the analyzers, and remove moisture and particulate material from the sample. In addition to performing the tasks above, the system must preserve the measured species and deliver the sample for analysis intact. The sample acquisition system extracts the sample through a stainless steel probe. The probe is insulated or heated as necessary to avoid condensation. If the particulate loading in the stack is high, a sintered stainless steel filter is used on the end of the probe.

Where water soluble NO₂ and/or SO₂ are to be measured, the sample is drawn from the probe through a heated Teflon sample line into a supercooled (approximately -20 °C) water removal trap. The trap consists of stainless steel flasks in a bath of dry ice and antifreeze. If dry ice is not locally available, ice and rock salt are used. This design removes the water vapor by condensation and freezes the liquid quickly. The contact between the sample and liquid water is minimized. Since the solubility of the NO₂ and SO₂ in ice is negligible, these species are conserved. This system meets the requirements of EPA Method 20. The sample is then drawn through a Teflon transport line and particulate filter, into the sample pump. The pump is a dual head, diaphragm pump. All sample-wetted components of the pump are stainless steel or Teflon. The pressurized sample leaving the pump flows through a stainless steel refrigerated (38 °F) compressed air dryer for final moisture removal. A drain line and valve are provided to constantly expel any condensed moisture from the dryer. After the dryer, the sample is directed into a distribution manifold. Excess sample is vented through a back-pressure regulator, maintaining a constant pressure of 5-6 psig to the analyzers.

The calibration system is comprised of two parts: the analyzer calibration, and the system bias check (dynamic calibration). The analyzer calibration equipment includes pressurized cylinders of certified span gas. The gases used are, as a minimum, certified to 1% by the manufacturer where necessary, to comply with reference method requirements. EPA Protocol 1 gases are used. The cylinders are equipped with pressure regulators which supply the calibration gas to the analyzers at the same pressure and flow rate as the sample. The selection of zero, span, or sample gas directed to each analyzer is accomplished by operation of the sample/calibration selector valves.

The system bias check is accomplished by transporting the same gases used to zero and span the analyzers to the sample conditioner inlet (probe exit). The span gas is exposed to the same elements as the sample and the system response is documented. Where the supercooled moisture removal system is used, water is added to the knockout flasks before the pre-test check. The analyzer indications for the system calibration check must agree within 5% of the analyzer calibration. Values are adjusted and changes/repairs are made to the system to compensate for any difference in analyzer readings. Specific information on the analytical equipment and test methods used is provided in the following pages.



Continuous Emissions Monitoring System

Method: Oxygen (O₂) by Continuous Analyzer

Applicable
Ref. Methods: EPA 3A, EPA 20, ARB 100, BA ST-14

Principle: A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of O₂ concentration.

Analyzer: Teledyne Model 326A

Measurement
Principle: Electrochemical cell

Ranges: 0-5, 0-10, 0-25% O₂

Accuracy: 1% of full scale

Output: 0-100 mV, linear

Interferences: Halogens and halogenated compounds will cause a positive interference. Acid gases will consume the fuel cell and cause a slow calibration drift.

Response
Time: 90% <7 seconds

Sampling
Procedure: A representative flue gas sample is collected and conditioned using the CEM system described previously. If Method 20 is used, that method's specific procedures for selecting sample points are used. Otherwise, stratification checks are performed at the start of a test program to select single or multiple-point sample locations.

Analytical
Procedure: An electrochemical cell is used to measure O₂ 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 O₂ by volume.

Special
Calibration
Procedure: The measurement cells used with the O₂ 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 (CO₂) 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 CO₂ 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

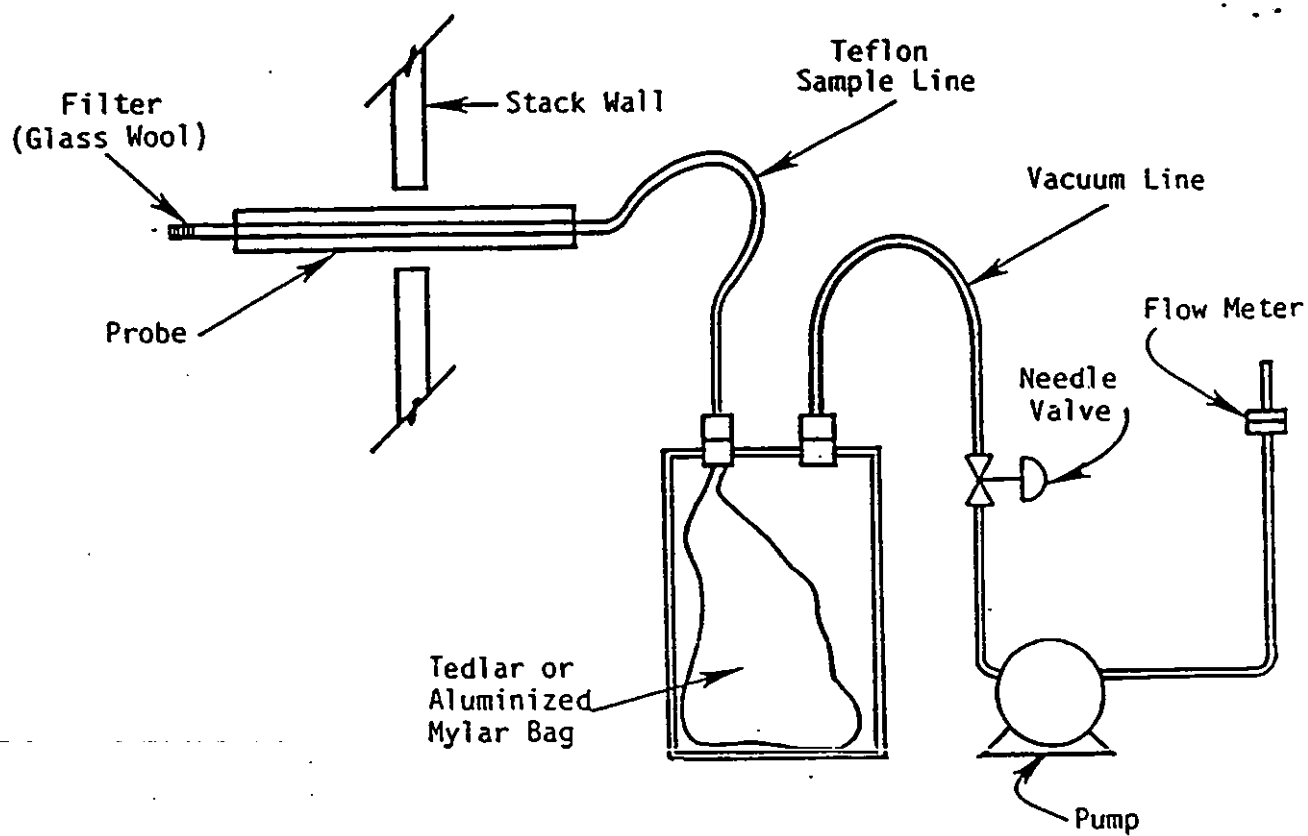
Reference: CARB Method 410, Modified EPA Method 601/602.

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

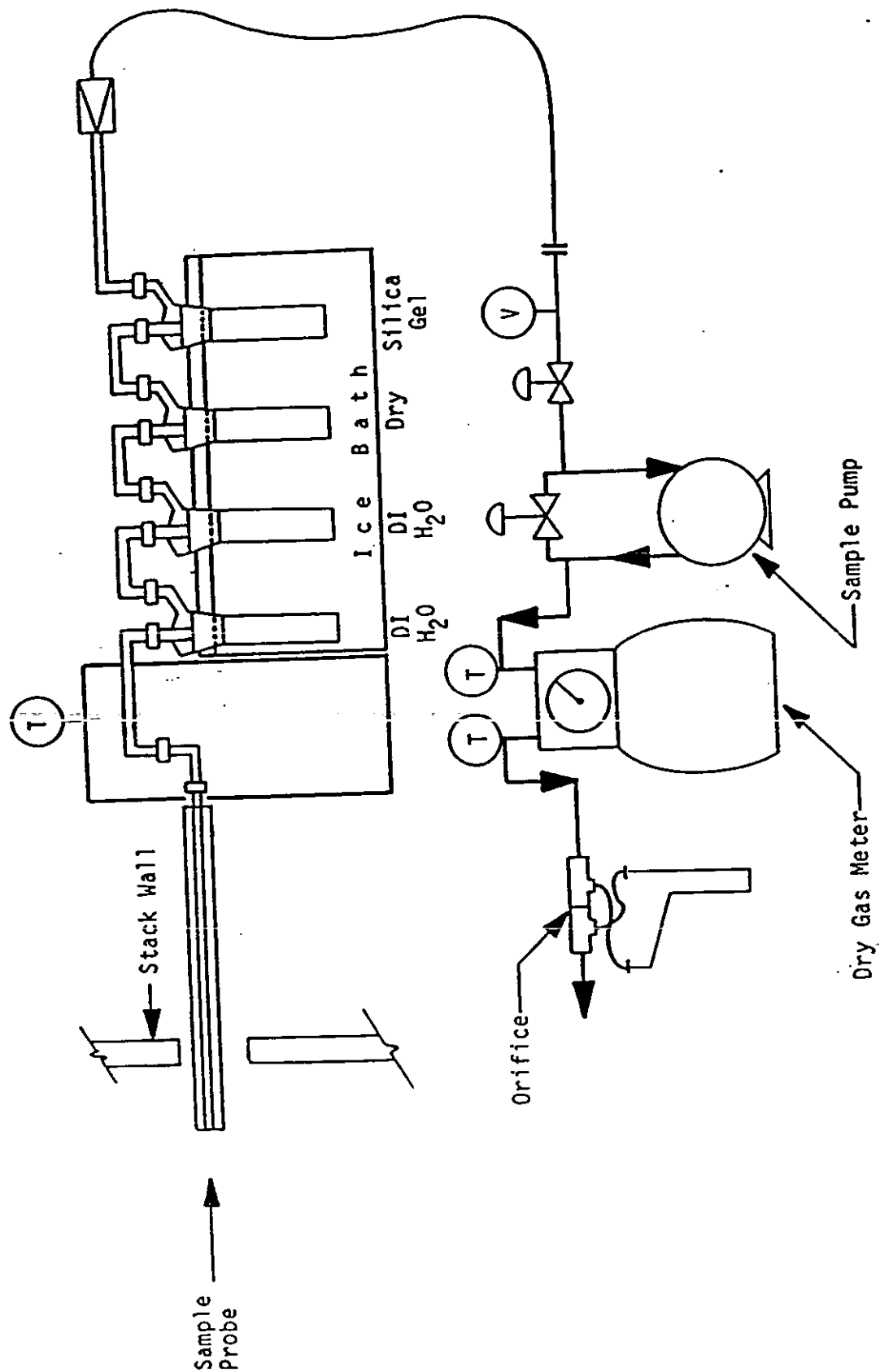
Method: Determination of Moisture in Stack Gases

Applicable Ref. Methods: EPA 4, ARB 1-4

Principle: A gas sample is extracted at a constant rate from the source; moisture is removed from the sample stream and determined volumetrically or gravimetrically.

Sampling Procedure: The sample train used in the tests is shown in the following figure. The sample is drawn at a constant rate through a stainless steel probe. The probe is connected to an impinger train by Teflon tubing. The train consists of two Smith-Greenburg impingers which contain 100 ml water, an empty impinger as a knockout, and an impinger containing silica gel to protect the pump from moisture.

Sample Recovery and Analysis: Following testing, moisture content is determined gravimetrically from initial and final impinger weights.



Sample Train for Determination of Moisture by EPA Method 4.

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.

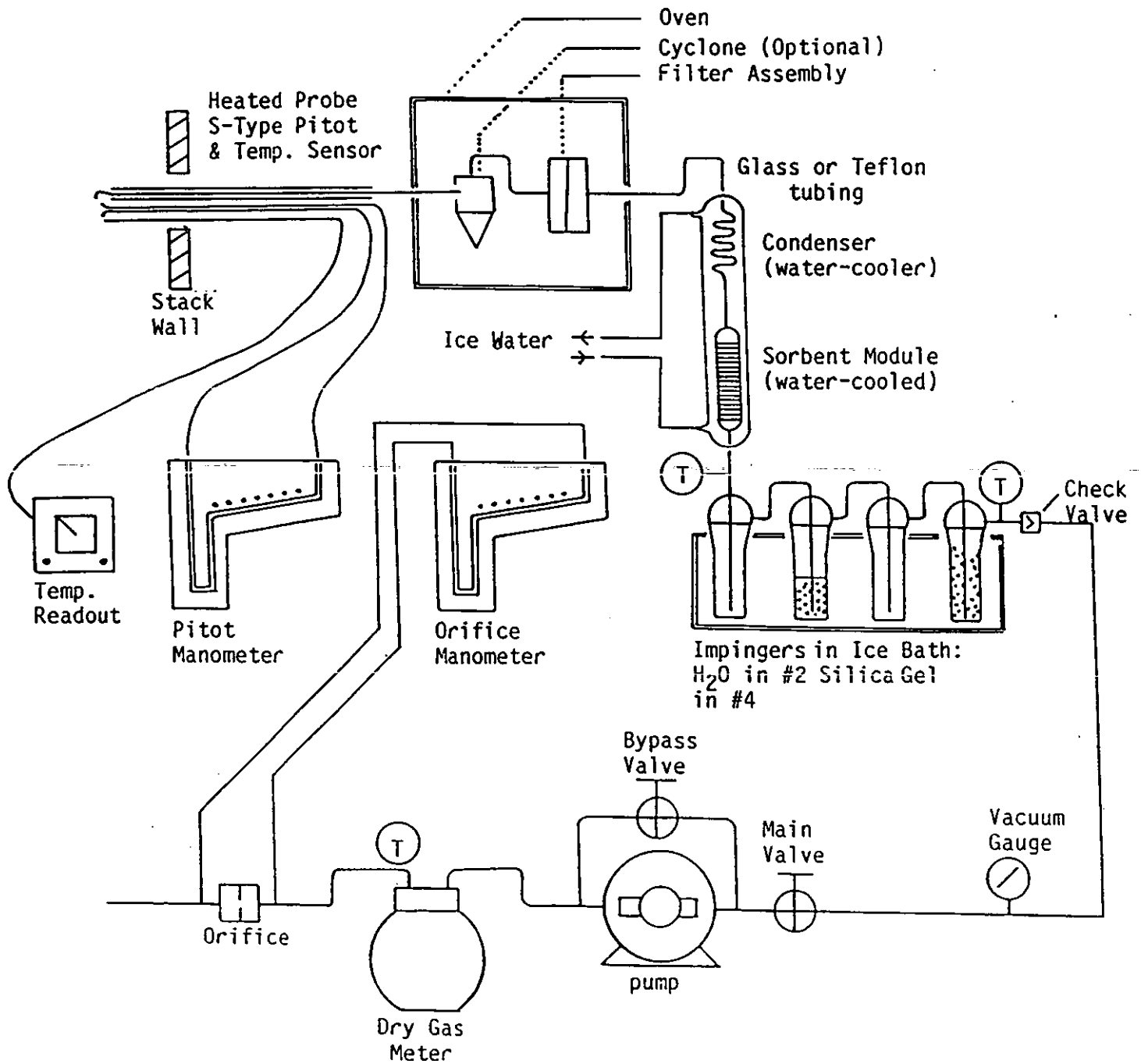
Sampling: The sample train is shown in the attached figure. Sample is pulled through the following components:

1. Glass or nickel-coated stainless steel nozzle
2. Heated glass probe (250 ± 15 F)
3. Optional cyclone in heated oven (250 ± 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 H₂O
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

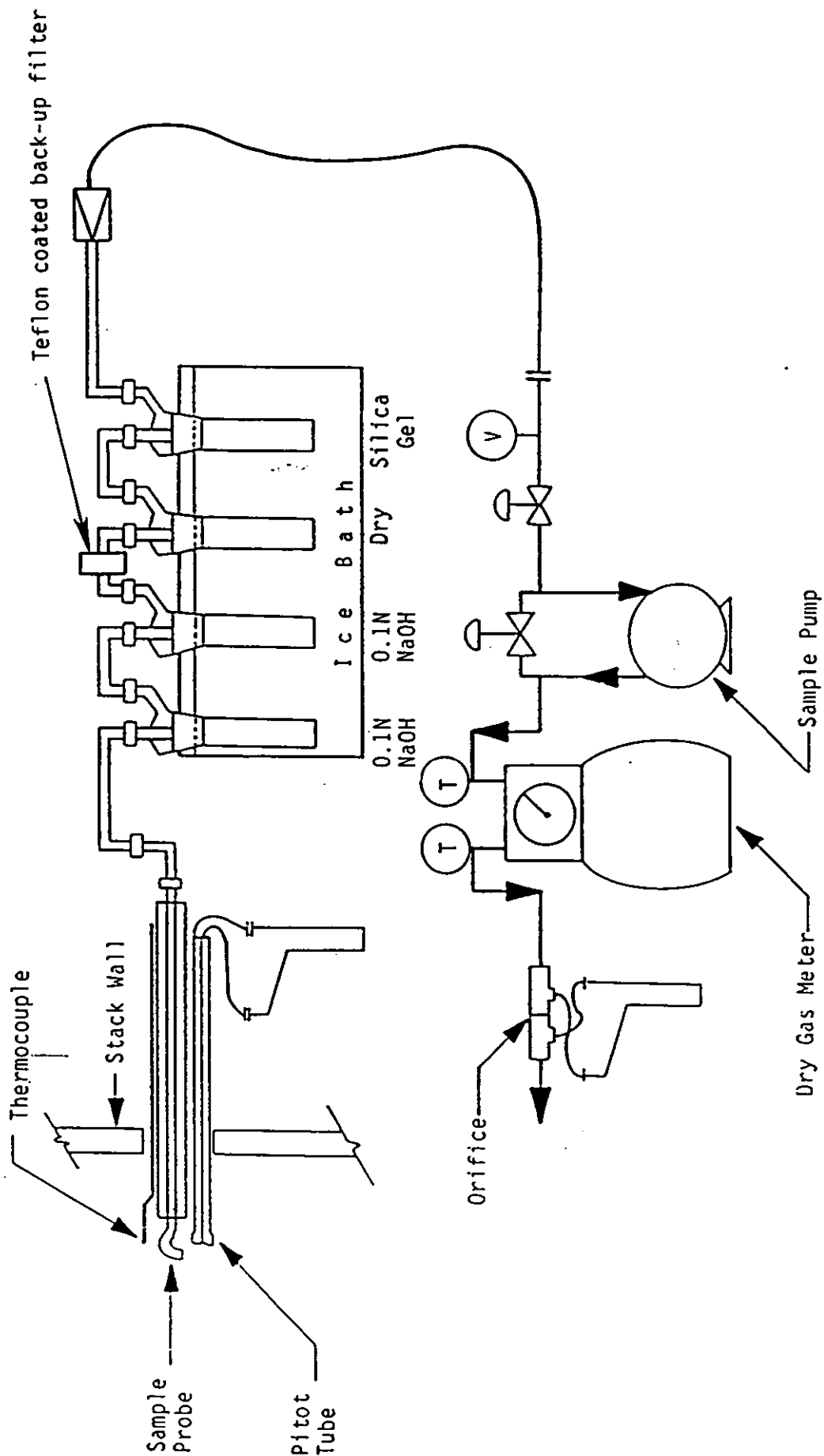
Reference: CARB Method 430

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.

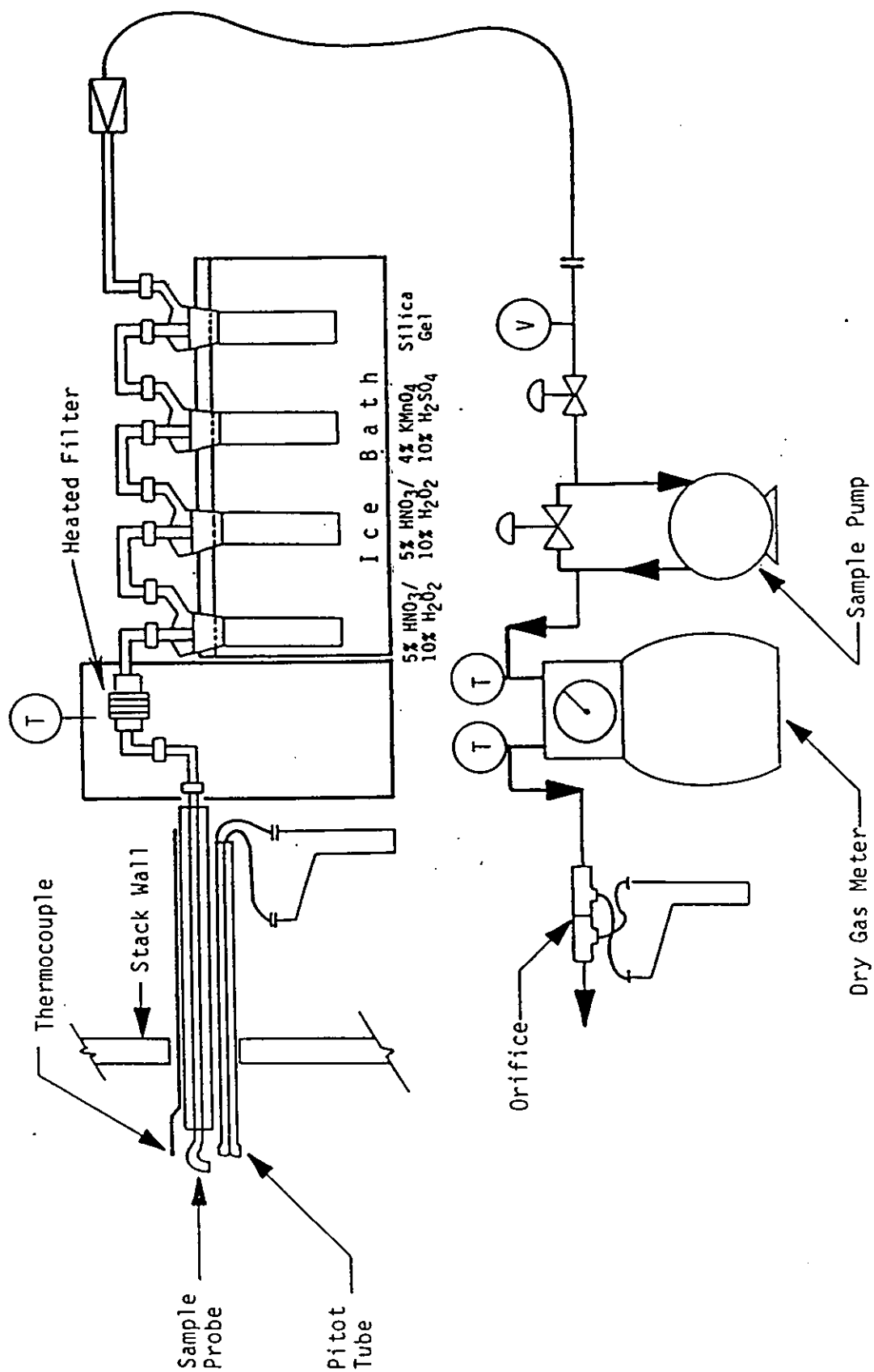
Analytical Procedure: The concentration of the resulting formaldehyde derivative is quantitated after organic solvent extraction using reverse phase HPLC with an ultraviolet absorption detector. Formaldehyde in the sample is identified and quantitated by comparison of peak retention times and peak areas with those of standard solutions.

Method:	Arsenic by Graphite Furnace Atomic Absorption Spectrophotometry
Reference:	CARB Method 423
Principle:	A metered flue gas sample is collected isokinetically and arsenic is collected on a heated filter followed by a series of water filled impingers.
Sample Procedure:	The sample train used in the tests is shown in the following figure. The sample is drawn isokinetically through a glass nozzle, a glass probe and a filter in a 250°F temperature-controlled oven. This is followed by two Smith-Greenburg impingers which contain 100 ml each of distilled water, an empty impinger as a knock-out 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, nozzle and front-half glassware - 0.1 N NaOH wash and brushing. 2. Filter 3. Impingers and connecting glassware - 0.1 N NaOH wash. The probe wash and impinger contents are evaporated, composited with the filter and decomposed in nitric acid and hydrogen peroxide. Aliquots of the final decomposed sample are analyzed for arsenic by graphite furnace atomic absorption spectrophotometry. Analyses of reagent blanks, spikes and duplicates are performed in addition to sample analyses.



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

Method:	Determination of Metals by EPA Multi-metals Method
Reference:	EPA Draft Publication 8/28/89 "Methodology for the Determination of Metals Emissions in Exhaust Gases From Hazardous Waste Incineration and Similar Combustion Processes"
Principle:	A metered flue gas sample is collected isokinetically and metal species are collected on a heated filter followed by a series of impingers.
Sampling Procedure:	The sample train used in the tests is shown in the following figure. The sample is drawn isokinetically through a glass nozzle, a glass probe, and a Teflon coated filter in a 250°F temperature-controlled oven. This is followed by two Smith-Greenburg impingers which each contain 100 ml of 5% nitric acid/10% hydrogen peroxide, an impinger containing 100 ml 4% KMnO_4/10% H_2SO_4 to absorb excess mercury, and an impinger containing silica-gel. The impingers collect gaseous species while the filter collects any existing as particulate at 250°F. All glassware has been previously cleaned in hydrochloric acid, nitric acid and distilled water. EPA Method 4 (moisture) and Methods 1 and 2 (velocity) are performed in conjunction with the test. Stack velocity is measured during the test to maintain isokinetic sampling and to measure stack flow rate. Moisture concentration is determined by weighing the impingers before and after sampling to determine the amount of moisture collected.
Sample Recovery and Analysis:	Following testing, the impingers are weighed for moisture determination and the following sample fractions are recovered: 1. Probe, nozzle, and front-half glassware - nitric acid/peroxide wash and brushing 2. Filter 3. Nitric acid containing impingers - nitric acid/peroxide wash 4. Permanganate containing impinger - wash with 4% KMnO_4/10% H_2SO_4 The probe wash, filter and the nitric acid/peroxide impinger catch is decomposed using a nitric acid/hydrofluoric acid Parr bomb digestion. Aliquots of the decomposed probe wash, filter and impinger catch are analyzed for metals of interest by graphite furnace atomic absorption, cold vapor atomic absorption and ICP. The permanganate impinger catch is decomposed with nitric acid and analyzed for mercury by cold vapor atomic absorption spectrophotometry. Analyses of reagent blanks, spikes and duplicates are performed for each metal species.



Sample Train for Determination of Metals by EPA Multimetals Method

APPENDIX B
QUALITY ASSURANCE

Appendix B.1

Quality Assurance Program Summary and ARB Certification

QUALITY ASSURANCE PROGRAM SUMMARY AND ARB CERTIFICATION

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

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

Each of these areas is discussed individually below.

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

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

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

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

Sample acquisition and conditioning system leak check.

2-point analyzer calibrations (all analyzers)

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

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

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

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

Instrument Type	Frequency of Calibration	Standard of Comparison or Method of Calibration	Acceptance Limits
Orifice Meter (large)	12 months	Calibrated dry test meter	$\pm 2\%$ 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. Difference between the average Cp for each leg must be less than 2%
Vacuum Gauges 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 NBS calibrated platinum RTD	± 4 F for $< 400^\circ\text{F}$ $\pm 1.5\%$ 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	± 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	1. Absence of leaks 2. Ability to draw mfr required vacuum and flow	Every 500 hrs of operation or 6 months whichever is less	1. Visual insp. 2. Clean 3. Replace worn parts 4. Leak check
Flow Measuring Device	1. Free mechanical movement 2. Absence of malfunction	Every 500 hrs of operation or 6 months whichever is less After each test, if used in H ₂ S sampling or other corrosive atmospheres	1. Visual insp. 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero, span gas	As required by manufacturer	As recommended by manufacturer
Integrated Sampling Tanks	Absence of leaks	Depends on nature of use	1. Steam clean 2. Leak check
Mobile Van Sampling Systems	Absence of leaks	Depends on nature of use	1. Change filters 2. Change gas dryer 3. Leak check 4. Check for system contamination
Sampling Lines	Sample degradation less than two percent	After each test or test series	Blow filtered air thru line until dry

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.

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".

James J. Morgester, Chief
Compliance Division

State of California
AIR RESOURCES BOARD

Executive Order 6-482

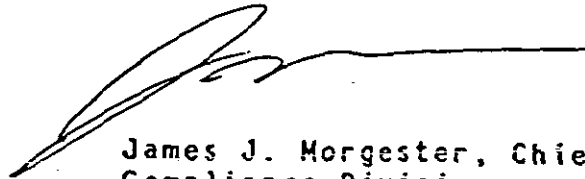
WHEREAS, the Air Resources Board ("Board"), pursuant to Section 41512 of the California Health and Safety Code, has established the procedures contained in Section 91200-91220, Title 17, California Code of Regulations, to allow the use of independent testers for compliance tests required by the Board;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

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

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

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

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



James J. Morgester, Chief
Compliance Division

Appendix B.2
Calibration Data

SPAN GAS RECORD

Client/Location SCE/EL SEGUNDO U-1

Date 2/22/90
By FINKEN

Gas	Span Cylinder		Aux. Span Cylinder	
	Cylinder No.	Concentration	Cylinder No.	Concentration
Zero	ALM 4242			
NOx	ALM 4242	223.5	1	
O2	AAZ 7594	5.00	ALM 5692	8.00
CO	↓	275.0	↓	422.2
CO2	↓	15.00	↓	22.5
SO2				

INSTRUMENT LINEARITY

	Analyzer				
	O2	CO2	CO	NOx	SO2
Analyzer Range					
Set to High STD (80-90% of Range)					
As-Found Low STD (50-60% of Range)					
Actual Value of Low STD					
Difference in % of Full Scale					

Allowable deviation is 2% of full scale (2 squares on strip chart).



Scott Specialty Gases

a division of
Scott Environmental Technology, Inc.

PLUMSTEADVILLE, PA 18949

PHONE: (215) 766-8861

TWX: 510-665-9344

ENERGY SYSTEMS
15991 REDHILL AVE #110
TUSTIN, CA 92680
ATTN: JIM MULLIGAN

Date: 6-8-89
Our Project No.: 01092
Your P.O. No.: 5118

Gentlemen:

Thank you for choosing Scott for your Specialty Gas needs. The analyses for the gases ordered, as reported by our laboratory, are listed below. Results are in volume percent, unless otherwise indicated.

ANALYTICAL REPORT

Cyl. No. AAL 13394 Analytical Accuracy ±1%*
Component Concentration
OXYGEN 4.997%
CARBON MONOXIDE 55.00 PPM
CARBON DIOXIDE 15.00%
*GRAVIMETRIC MASTER

NITROGEN BALANCE

Cyl. No. AAL 7594 Analytical Accuracy ±1%*
Component Concentration
OXYGEN 5.000%
CARBON MONOXIDE 275.0 PPM
CARBON DIOXIDE 15.00%
*GRAVIMETRIC MASTER

NITROGEN BALANCE

*Certified to have been blended against NBS certified weights and verified correct by independent analysis.

Analyst _____

Cyl. No. AAL 13326 Analytical Accuracy ±1%*
Component Concentration
OXYGEN 100%
CARBON MONOXIDE 55.01 PPM
CARBON DIOXIDE 15.00%
*GRAVIMETRIC MASTER

NITROGEN BALANCE

Cyl. No. AAL 11798 Analytical Accuracy ±1%*
Component Concentration
OXYGEN 12.50%
CARBON MONOXIDE 55.00 PPM
CARBON DIOXIDE 15.00%
*GRAVIMETRIC MASTER

NITROGEN BALANCE

Approved By R. Shady

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

CERTIFIED REFERENCE MATERIALS EPA PROTOCOL GASES
ACUBLEND® CALIBRATION & SPECIALTY GAS MIXTURES PURE GASES



Scott Specialty Gases

a division of

Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

AUG 23 1989

TELEX: 510-100-8831 (ScotGas)

FAX: 714-887-0549

PHONE: 714-887-2571

ENERGY SYSTEMS ASSOCIATES
15991 RED HILL AVE., SUITE 110
TUSTIN, CA 92680
ATTN: JIM MULLIGAN

Date: 8-9-89

Our Project No.: 01858

Your P.O. No.: 5264

Gentlemen:

Thank you for choosing Scott for your Specialty Gas needs. The analyses for the gases ordered, as reported by our laboratory, are listed below. Results are in volume percent, unless otherwise indicated.

ANALYTICAL REPORT

Cyl. No. ALM 5688 Analytical Accuracy ±2% *
Component Concentration

CARBON DIOXIDE	22.50%
CARBON MONOXIDE	422.6 PPM
OXYGEN	8.001%

*GRAVIMETRIC MASTER

NITROGEN	BALANCE
----------	---------

Cyl. No. ALM 5675 Analytical Accuracy ±2% *
Component Concentration

CARBON DIOXIDE	15.00%
CARBON MONOXIDE	54.56 PPM
OXYGEN	5.001%

*GRAVIMETRIC MASTER

NITROGEN	BALANCE
----------	---------

*Certified to have been blended against NBS certified weights and verified correct by independent analysis.

Analyst _____

Cyl. No. ALM 5692 Analytical Accuracy ±2% *
Component Concentration

CARBON DIOXIDE	22.50%
CARBON MONOXIDE	422.2 PPM
OXYGEN	8.000%

*GRAVIMETRIC MASTER

NITROGEN	BALANCE
----------	---------

Cyl. No. ALM 5598 Analytical Accuracy ±2% *
Component Concentration

CARBON DIOXIDE	15.00%
CARBON MONOXIDE	54.46 PPM
OXYGEN	5.000%

*GRAVIMETRIC MASTER

NITROGEN	BALANCE
----------	---------

Approved By [Signature]

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.



Scott Specialty Gases

Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405
ENERGY SYSTEMS ASSOCIATES
ATTN: MIKE SCHMIDT

TELEX: 510-100-8831 (ScolGas)
FAX: 714-887-0549
PHONE: 714-887-2571

a division of

Shipped From: Scott

Date Shipped: 3-6-89

Our Project No: 416136

Your P.O. No: 4734

Page 1 of 1

Expiration Date: 9-6-90

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES

Certified Per Traceability Protocol No. 1 Procedure No. G1

Cylinder No. ALM-4242

Cylinder Pressure 1900 psig

Certified Accuracy ± 1 % NBS Traceable

REFERENCE STD

COMPONENTS	CERTIFIED CONC	SRM/CRM NO.	CYL. NO.	CONC.
Nitric Oxide	221.7 PPM	CRM 1685 B	AAL-5248	237.9 PPM
NOX	223.5 PPM			

GAS ANALYZER

MAKE/MODEL/SERIAL NO. Thermo-Electron 10 AR S/N 14853-150
LAST CAL. DATE 2-2-89
ANALYTICAL PRINCIPLE Chemil-Luminescent

BALANCE GAS Nitrogen

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component	Nitric Oxide	Units	PPM
First Analysis Date	2-22-89		
Z	0.01	R	94.63
T	94.76	Z	0.01
R	0.02	T	88.15
Mean Test Assay	3-1-89		
Second Analysis Date	3-1-89		
Z	0.00	R	94.72
T	94.65	Z	0.02
R	0.02	T	88.27
Mean Test Assay			

Component	Date	Units	PPM
Z		R	88.27
R		Z	88.11
Z		T	94.58
Mean Test Assay			
Date		Units	
Z		R	88.18
R		Z	88.31
Z		T	94.73
Mean Test Assay			

Chronology: Date _____
Assay _____

Analyst Doug Grant

Approved By:

Component	Date	Units	PPM
Z		R	88.27
R		Z	88.11
Z		T	94.58
Mean Test Assay			
Date		Units	
Z		R	88.18
R		Z	88.31
Z		T	94.73
Mean Test Assay			

E/A

POST TEST DRY GAS METER CALIBRATION DATA

 Calibrated By J. Mulligan

 Test Meter ID ES-13

 Date 3/11/90

 Test Meter Y (Y₀) 1.0°

 Field Meter ID ES-8

 Test Meter Last Cal 12/14/89

 Barometric Press 30.00

Test Program Preceding Calibration Check _____

 Average ΔH from Test Runs _____

Maximum Vacuum from Test Runs _____

Field Meter							Test Meter					
ΔH	Final Volume	Initial Volume	Volume (V _{dg})	Temperature		Vacuum	Time (0)	Final Volume	Initial Volume	Volume (V _{cm})	Temperature	
				Inlet (t _i)	Outlet (t _o)						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	151.571	145.851	5.723	84	70	2	10:00	295.127	289.703	5.424	58	58
				92	73						58	58

1st run
for 10 minutes

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 cu.ft.	TEMP. IN	TEMP OUT	DELTA "H2O	TIME min.	VOLUM cu.ft	TEMP. 'F	Q 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

DRY GAS METER CALIBRATION

FIELD GAS METER I.D. ES-8 TEST METER ES-13
 DATE 1/22/90 TEST METER LAST CAL. 1.000 = Yt

BAROMETRIC PRESSURE 30.17

TEST METER										RESULTS			
FIELD METER										TEST METER			
VOLUME cu.ft.	TEMP. 'F	DELTA H "H2O	TIME min.	VOLUME cu.ft.	TEMP. 'F	PRESS. "H2O	Q cfm	Y	Hg	AVE.Y	AVG. Hg		
4.55	90.5	0.4	13	4.55	64	0	0.35	1.050	1.71	1.0069	1.68		
4.94	91.5	0.4	13	4.63	64	0	0.38	0.985	1.64				
4.91	93	0.4	13	4.59	64	0	0.38	0.986	1.67				
5.01	94	0.72	10	4.69	64.5	0	0.50	0.987	1.70	1.0046	1.63		
4.98	96	0.72	10	4.87	64.5	0	0.50	1.035	1.57				
5.14	97	0.72	10	4.81	64.5	0	0.51	0.992	1.61				
4.66	97	1	8	4.37	65.5	0	0.58	0.992	1.74	0.9915	1.75		
4.65	99	1	8	4.35	66.5	0	0.58	0.991	1.76				
4.68	100	1	8	4.38	67	0	0.59	0.992	1.73				
5.79	102	2	7	5.456	68	0	0.83	0.998	1.71	0.9981	1.71		
5.85	102.	2	7	5.511	68	0	0.84	0.999	1.68				
5.77	102.	2	7	5.426	68	0	0.82	0.997	1.73				
6.77	103	4	6	6.414	68	0	1.13	1.000	1.82	1.0026	1.80		
6.82	104.	4	6	6.459	68	0	1.14	1.003	1.79				
6.82	104.	4	6	6.468	68	0	1.14	1.004	1.78				
AVERAGE										1.0007	1.71		
										*****	*****		

E/A

DRY GAS METER CALIBRATION DATA

Date Jan 22, 1980 By SM Test Meter ID. ES-8

Field Dry Gas Meter ID ES-13 Test Meter Y_d 0.5900

Barometric Pressure (P_b) 30.67 (in. Hg) Date Last Calib. _____

Approx Flow Rate cfm	Field Dry Gas Meter						Time (θ)min.	Test Meter								
	Temperatures, °F			Pressure (ΔH) In. H ₂ O	Final Volume	Initial Volume		Volume (V _{dg}) ft ³	Temperatures, °F			Pressure In. H ₂ O	Actual Flow Rate (Q) cfm			
0.40	731.023	731.535	4.51	97	84	90.5	13	0.40	005.221	005.46	4.27	64	64	64	0.0	0.35
	741.020	741.085	4.94	77	86	91.5	13	0.40	012.851	012.221	4.63	64	64	64	0.0	0.31
	745.142	741.020	4.912	99	87	93.0	13	0.40	018.446	012.555	4.59	64	64	64	0.0	0.338
	756.014	751.027	5.01	100	88	94	10	0.22	026.580	022.210	4.69	65	64	64.5	0.0	0.501
0.60	761.021	756.014	4.98	103	89	96	10	0.72	031.541	026.630	4.87	65	64	64.5	0.0	0.498
	766.117	761.021	5.14	104	90	97	10	0.72	036.371	031.521	4.81	65	64	64.5	0.0	0.514
	771.517	766.117	4.66	104	90	97	8	1.0	041.116	036.045	4.37	66	65	65.5	0.0	0.522
	776.223	771.517	4.65	107	91	99	8	1.0	045.774	041.412	4.35	67	66	66.5	0.0	0.581
1.0	780.281	776.223	4.68	108	92	100	8	1.0	050.463	045.774	4.38	67	67	67	0.0	0.585
	787.101	781.505	5.75	111	93	102	7	2.0	056.017	050.521	5.456	68	68	68	0.0	0.827
	792.555	787.101	5.85	112	93	102.5	7	2.0	061.506	056.017	5.511	68	68	68	0.0	0.833
	795.126	792.555	5.767	113	94	102.5	7	2.0	066.954	061.528	5.426	68	68	68	0.0	0.823
1.6	807.345	800.510	6.82	113	93	103	6	4.0	075.116	068.458	6.414	68	68	68	0.0	1.129
	814.113	807.345	6.818	115	94	104.5	6	4.0	081.571	075.112	6.457	68	68	68	0.0	1.136
	820.908	814.113	6.819	115	94	104.5	6	4.0	088.039	081.571	6.416	68	68	68	0.0	1.136

$Y_d =$
 $\Delta H @ =$
 $CFM @ \Delta H = 1.0 = .570$

AHC min
 1.0 3.1
 1.0 3
 1.0 4
 Vol
 1.741
 1.741
 2.217

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 anometer setting, ΔH in. H ₂ O	Gas volume wet test meter V_w , ft ³	Gas volume dry gas meter V_d , ft ³	Temperature				Time θ , min	γ	ΔH_q
			Wet test Meter t_w , °R	Dry gas meter					
				Inlet t_{di} , °R	Outlet t_{do} , °R	Average t_d , °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

ΔH	$\frac{\Delta H}{13.6}$	γ	ΔH_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		

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

ΔH_q = Orifice pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H₂O. Tolerance = ± 0.15

Calibrated by: MDC

ENERGY SYSTEMS ASSOCIATES
POST TEST DRY GAS METER CALIBRATION CHECK

DATE	3/1/90	BAROMETRIC PRESSURE	30.17
FIELD GAS METER I.D.	ES-19	TEST METER	ES-13
INITIAL Yd	1.000	TEST METER Y (Yt)	1.000
INITIAL H _e	1.830	TEST METER LAST CAL.	12/14/89

FIELD METER					TEST METER		RESULTS		
VOLUME cu.ft.	TEMP. IN	TEMP OUT	DELTA "H ₂ O	TIME min.	VOLUM cu.ft	TEMP. 'F	Q cfm	Y	H _e
5.74	90	67	1.00	10	5.73	63	0.57	1.027	1.65
5.78	98	74	1.00	10	5.77	63	0.58	1.041	1.61
5.80	98	76	1.00	10	5.81	63	0.58	1.045	1.58
AVERAGES								1.038	1.62

PASS - INDIVIDUAL Yd VALUES ACCEPTABLE
 PASS - INDIVIDUAL DELTA H_e VALUES ACCEPTABLE
 PASS - POST TEST Yd WITHIN LIMITS

E/A

POST TEST DRY GAS METER CALIBRATION DATA

Calibrated By GWB
 Date 2/16/90
 Field Meter ID ES-19
 Barometric Press 30.17

Test Meter ID ES-13
 Test Meter Y (Y_i) 1.000
 Test Meter Last Cal 12/14/89

Test Program Preceding Calibration Check ORPIEN

Average ΔH from Test Runs _____

Maximum Vacuum from Test Runs _____

Field Meter								Test Meter					
Run	Final Volume	Initial Volume	Volume (V _{dg})	Temperature		Vacuum	Time (0)	Final Volume	Initial Volume	Volume (V _{tm})	Temperature		
				Inlet (t _i)	Outlet (t _o)						Inlet	Outlet	
.0	1000.35	993.905	6.345	94	70	5	10	101.978	95.830	6.148	62	64	
				94	70						62	64	
.0	6.623	0050	6.373	95	72	5	10	108.911	101.978	6.133	62	64	
				96	73						62	64	
.0	13.070	6.623	6.447	96	74	5	10	114.285	108.111	6.174	62	64	
				97	75						62	64	

E/A

DRY GAS METER CALIBRATION DATA

Date 1-19-90 By CFField Dry Gas Meter ID ES-17Barometric Pressure (P_b) 30.15 (In.Hg)Test Meter ID. ES-13Test Meter Y_d 1000Date Last Calib. 12-14-89

Barometric Pressure (P _B) 30.15 (In.Hg)															
Approx Flow Rate cfm	Field Dry Gas Meter							Test Meter							Actual Flow Rate (Q) cfm
	Final Volume	Initial Volume	Volume (V _{dg}) ft ³	Temperatures, °F		Pressure (ΔH) In. H ₂ O	Time (t) min.	Final Volume	Initial Volume	Volume (V _{tm}) ft ³	Temperatures, °F		Pressure In. H ₂ O		
				Inlet (t _i)	Outlet (t _o)						Average (t _d)	Inlet (t _i)		Outlet (t _o)	
0.40	20.521	74.577	6.007	94	75	84.5	15.5	80.944	74.785	5.759	65	65	65		
	25.712	80.524	5.208	97	79	88	13	85.509	80.544	4.965	65	65	65		
	109.62	25.712	5.176	101	82	91.5	13	90.416	85.504	4.907	65	65	65		
	20.188	14.786	6.102	102	75	88.5	12	18.888	13.002	5.886	66	66	66		
0.60	25.622	20.115	5.115	106	79	92.5	10	23.786	18.987	4.898	66	66	66		
	25.728	25.622	9.795	100	84	97	19	33.150	23.786	9.364	66	66	66		
	40.242	35.298	5.142	112	86	99.5	9	28.944	23.150	5.198	66	66	66		
	46.846	40.842	6.006	113	87	100	10	44.095	38.248	5.747	66	66	66		
0.80	52.556	46.846	5.710	113	87	100	9	49.242	44.095	5.153	66	66	66		
	58.055	52.556	5.499	115	87	101	7	54.791	49.248	5.543	66	66	66		
	63.028	58.055	4.972	117	88	101	6	59.521	54.791	4.730	66	66	66		
	70.418	63.028	7.290	117	87	99.5	9	66.521	59.521	7.005	66	66	66		
1.00	77.249	70.418	6.831	116	88	102	6	72.993	66.526		65	66	65.5		
	84.219	77.249	6.970	116	88	102	6	79.587	72.993		65	66	65.5		
	92.341			116	88	102	7	87.247			65	65			

ANDERSEN

SAMPLERS INCORPORATED

4215 WENDELL DRIVE ATLANTA, GEORGIA 30336

CONTROL UNIT CALIBRATION

Date 1-28-87

Unit Number 187-342 CES-19

Barometric pressure, $P_b = 29.98$ in Hg.

Model Number 90-800

Orifice manometer setting, ΔH in. H ₂ O	Gas volume, wet test meter V_w , ft ³	Gas volume, dry gas meter V_d , ft ³	Temperature				Time θ , min	γ	ΔH_g
			Wet test Meter t_w , °R	Dry gas meter					
				Inlet t_{di} , °R	Outlet t_{do} , °R	Average t_d , °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

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

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

ΔH_g = Orifice pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H₂O. Tolerance : ± 0.15

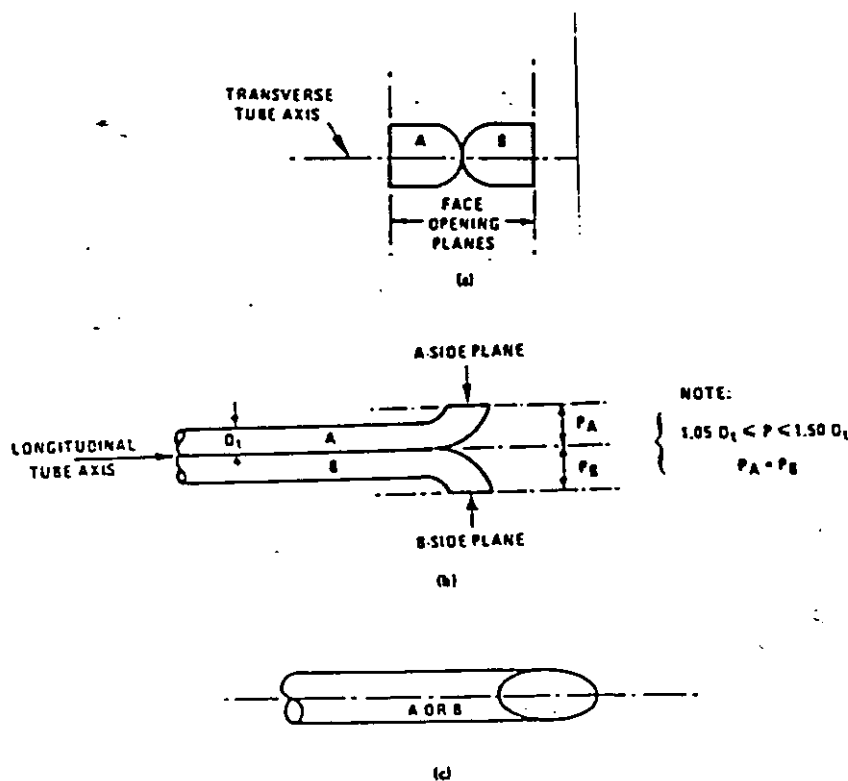
Calibrated by: *MDC*

E/A

PITOT TUBE DIMENSIONAL CALIBRATION

Pitot Tube I.D. A7 Date 2/21/90 By J. M. Liff
~~D_t 1.374~~ 374 P_A 510 P_B 570

- (a) Face opening plane angle = 90 deg (Y/N) A Y B Y
 (b) Face opening planes parallel to longitudinal axis (Y/N) A Y B Y
 (c) Both legs equal length and centerline coincident View (Y/N) A Y B Y



Properly constructed Type S pitot tube, shown in: (a) end view; face opening planes perpendicular to transverse axis; (b) top view; face opening planes parallel to longitudinal axis; (c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Base-line coefficient values of 0.84 may be assigned to pitot tubes constructed this way.

Pilot Tube ID 1 Date 2/25/90 By Finka
 D_t 1373 P_A .560 P_b .500

(a) y y

(b) y y

(c) y y

Appendix B.3
CEM Performance Data

E/A

CEM PERFORMANCE DATA

By FINKEN Location SLE EL SEGUNDO Date 2/22/90
u-1

System Configuration

Analyzers in Service O₂, CO₂, HORIBA CO
Probe: Length 8' Liner Material SS. Heated (Y/N) N
Sample Line: Length ~100' Material Poly
On-Stack Conditioner: In Service (Y/N) N Coolant N/A
System Flow Rate (from file): ~1 cfm cfm

System Leak Check

Pre-Test: 0.0 cfh Post-Test: _____ cfh

Leak Rate (%) = $\frac{\text{Post Test (cfh)}}{\text{System Flow Rate (cfm)} \times 60} \times 100 = \underline{\hspace{2cm}} \%$

System Response Time Check

Upscale

Downscale

1	2	3	Avg
<u>30</u> sec	<u>25</u> sec	<u>25</u> sec	<u>27</u> sec
<u>25</u> sec	<u>25</u> sec	<u>25</u> sec	<u>25</u> sec

APPENDIX C
DATA SHEETS, CALCULATIONS, AND LABORATORY REPORTS

Appendix C.1
Sample Location

EJA

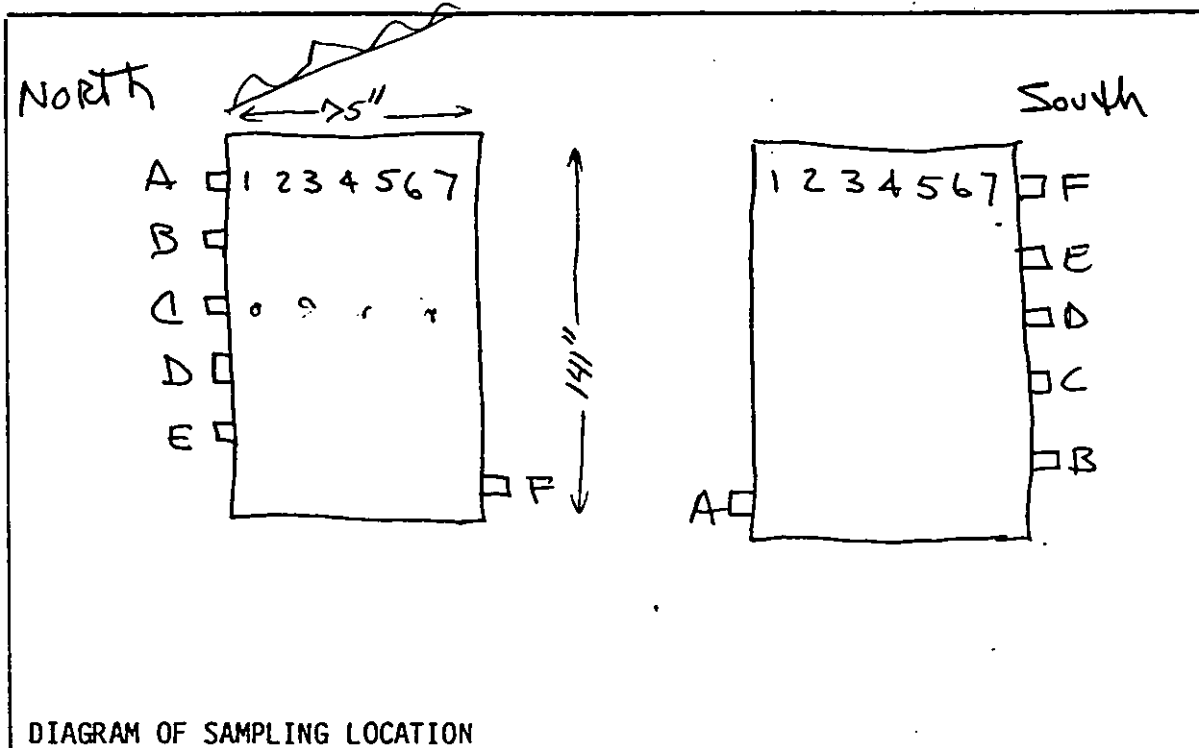
SAMPLING POINT LOCATION DATA
EPA Method 1

Plant SCE EH SGRNAD

Data by FINKEN

Date 2/20 →

Test Location PLAN View of Ducts



Upstream Dist./Dia.

Downstream Dist./Dia.

Coupling Length 10.5"

No. of Sampling Pts. 42

Stack Dimension 75" x 141"

Stack Area, ft² 7344[illegible]

*Inches from wall plus
coupling length

Appendix C2
Unit Operating Data

6269 TRAILER EL SEGUNDO (1) 2

Data by:

M. ESCARCEGA

TEST NUMBER		1	2	2	2	2, 3	2, 4
DATE		2/20/90	2/22/90	2/22/90	2/22/90	2/22/90	2/22/90
TIME			1100	1216	1330	1430	1530
FUEL		B	OIL	OIL	OIL	OIL	OIL
LOAD (Net)	Mw	L	173	171	172	174	174
AUX. LOAD	Mw	A	8.8	8.8	8.8	9.0	8.9
BURNERS O.O.S.		N	1,3,6,8	1,3,6,8	1,3,6,8	1,3,6,8	1,3,6
NOX PORTS		K	OPEN				
O ₂ LEVEL		S	NORMAL	NORMAL			
GAS RECIRCULATION			NORMAL	NORMAL			
REGISTERS North		T	OPEN	OPEN			
REGISTERS South		A	OPEN	OPEN			
OIL TANK		K	NORTH				
OIL TEMP.	°F	E	170				
EXCESS O ₂ (CH) N	%	N	1.2-2.0	1.2-2.0	2.9	2.9	3.0
EXCESS O ₂ (CH) S	%		0.5	2.0-2.2	2.4	2.6	2.5
COMBUSTIBLES N	%	A	0	0	0	0	0
COMBUSTIBLES S	%	L	0	0	0	0	0
CONDENSER VACUUM	In. Hg	L	2.1	1.8	2.0	1.50	1.50
FEEDWATER FLOW	Klb/hr		1325	1275	1275	1300	1310
STEAM FLOW	Klb/hr	D	1225	1175	1175	1225	1225
STEAM TEMP.	°F	A	920	930	960	980	920
STEAM PRESSURE	PSIG	Y	1840	1700	1850	1850	1825
OIL FLOW (CHART)	Klb/hr		80	78	76	76	75
AIR FLOW (CORRECTED)	%		77	77	77	77	77
TOTAL FUEL FLOW	%		73	72	71	70	70
ACTUAL AIR FLOW	%		80	82	82	82	82
GAS FLOW	KCFH		0	0	0	0	0
GAS BURNER PRESS.	PSIG		0	0	0	0	0
GAS HEADER PRESS.	PSIG		0	0	0	0	0
S.H. TEMP. N	°F		970	985	980	970	976
S.H. TEMP. S	°F		940	960	910	908	900
R.H. TEMP. N	°F		900	900	910	916	910
R.H. TEMP. S	°F		005	005	005	005	005
EXCESS O ₂ (DIAL) S	%		0.5	2.2	2.5	2.9	2.9
COMBUSTIBLES (DIAL) S	%		0	0	0	0	0
EXCESS O ₂ (DIAL) N	%		1.5	2.6	3.0	2.5	2.5
COMBUSTIBLES (DIAL) N	%		0	0	0	0	0

EL SEGUNDO (1) 2

Date by: M. ESCARCEGA

TEST NUMBER			1	2	2	2	2,3	2,3
SMOKE DENSITY				10	8	8	7	7
SMOKE DENSITY			B	—				
			L	—				
RMCS:			A					
MASTER STM. PRESS.	PSIG		N	27	27	26.5	26.5	26.5
MASTER AIR FLOW	PSIG		K	30	30	30	30	30
FUEL CONTROL (RET)	PSIG		S	20	19.5	19.0	19.0	19
FIRING RATIO	PSIG			7.6	7.6	7.6	7.6	7.6
FUEL SUPPLY	PSIG			26	24.2	23.1	23.0	23
FUEL GAS CONTROL	PSIG			0	0	0	0	0
S.H. ATTEMP.	S PSIG			0	0	0	0	0
S.H. ATTEMP.	N PSIG			0	0	0	0	0
GAS RECIRC. FAN	PSIG			0	0	0	0	0
R.H. ATTEMP.	S PSIG			0	0	0	0	0
R.H. ATTEMP.	N PSIG			0	0	0	0	0
I.D. FAN	S PSIG			28	28	27.8	28	28
I.D. FAN	N PSIG			29.5	29.5	29.2	29	29.5
F.D. FAN	S PSIG			26.8	26.9	26.5	26.9	26.8
F.D. FAN	N PSIG			27	27	27.0	27.1	27.0
RETRACTORS—ROW 4	PSIG							
RETRACTORS—ROW 3	PSIG							
RETRACTORS—ROW 2	PSIG							
RETRACTORS—ROW 1	PSIG							
EXCESS OXYGEN	PSIG							
OIL SUPPLY FLOW	Klb/hr			115	115	115	115	115
OIL RETURN FLOW	Klb/hr			22	22	22	22	22
OIL SUPPLY PRESS.	PSIG			850	850	850	840	840
OIL RETURN PRESS.	PSIG			650	650	650	640	640
IGNITION GAS PRESS.	PSIG			6.5	6.5	6.5	6.5	6.5
I.D. FAN	S AMPS			160	160	160	160	162
I.D. FAN	N AMPS			170	173	173	176	172
F.D. FAN	S AMPS			56	55	55	55	55
F.D. FAN	N AMPS			66	66	66	65	65
GAS RECIRC. FAN	AMPS			215	220	240	240	240
Excess O ₂	PSIG			21.4	21.7	21.7	21.7	21.5

NOx DATA SHEET "C"

EL SEGUNDO 1 2

Data by: M. ESCARCEGA

TEST NUMBER			1	2	2	2	2	2
MAIN STM. PRESS.	PSIG			1850	1850	1870	1856	1850
DRUM PRESSURE	PSIG			005				
		B						
RECIRC. FAN DIFF.	" H ₂ O	L		0	0	0	0	0
AIR HTR. GAS OUT S	" H ₂ O	A		-12	-12	-12	-12	-12
AIR HTR. GAS OUT N	"	N		-12	-12	-12	-12	-12
BLR OUTLET DRAFT	"	K		-6	-6	-6.1	-6.2	-6.1
R.H. GAS OUT	"	S		-2.7	-2.7	-2.7	-2.7	-2.7
S.H. GAS OUT	"			-0.4	-0.4	-0.3	-0.3	-0.4
FURNACE DRAFT	"			-0.06	-0.05	-0.05	-0.06	-0.06
W.B. TO FURNACE DIFF.	"			4.2	4.2	4.2	4.2	4.2
A.H. AIR OUT	"			4.8	4.8	4.8	4.8	4.8
F.D. FAN OUT S	"			4.5	4.5	4.5	4.5	4.5
F.D. FAN OUT N	"			11.5	11.5	11.2	11.5	11.5
BACK CHARTS:								
R.H. STEAM N	°F			1000	1010	1000	985	985
R.H. STEAM S	°F			990	1000	990	996	972
S.H. STEAM(sec) N	°F			960	975	972	960	960
S.H. STEAM(sec) S	°F			965	975	970	966	960
MASS GAS FLOW	%			94	94	94	94	94
SMOKE DENSITY	%			10.0	9.0	8.4	8.5	8.4
SMOKE DENSITY	%							
AUX. STEAM FLOW	Klb/hr			0	0	0	0	0
FUEL OIL TEMP.	°F							
AIR ENTR. A.H. N	°F			91	91	92	93	92
AIR ENTR. A.H. S	°F			86	88	88	88	88
AIR LEAVING A.H. N	°F							
AIR LEAVING A.H. S	°F			642	643	643	642	642
GAS ENTR. A.H. N	°F			739	740	739	737	738
GAS ENTR. A.H. S	°F			731	733	733	732	733
GAS LEAVING A.H. N	°F			336	336	337	337	336
GAS LEAVING A.H. S	°F			341	343	343	343	342
AVG. AIR IN-OUT N	°F			310	310	311	311	311
AVG. AIR IN-OUT S	°F			305	307	307	307	307
BLR. GAS RECIRC. DISCH.	°F							

V

TEST NUMBER		3	3	3	4	4
DATE		2/22/90	2/22/90	2/22/90	2/23/90	2/23/90
TIME		1730	1845	2000	1000	1130
FUEL		OIL	OIL	OIL	OIL	OIL
LOAD(Net)	Mw	170	170	170	158*	156*
AUX. LOAD	Mw	8.8	8.8	8.8	8.6	8.6
BURNERS O.O.S.		1,3,6,8	1,3,6,8	1,3,6,8	1,3,6,8	1,3,6,8
NOx PORTS		OPEN	OPEN	→	→	→
O ₂ LEVEL		NORMAL	NORMAL	—	—	→
GAS RECIRCULATION		NORMAL	NORMAL	—	—	→
REGISTERS North		OPEN	OPEN	—	—	→
REGISTERS South		OPEN	OPEN	—	—	→
OIL TANK		NORTH	NORTH	—	—	→
OIL TEMP.	°F	171	177	177	172	172
EXCESS O ₂ (CH) N	%	3.4	3.6	3.6	3.2-4.0	
EXCESS O ₂ (CH) S	%	3.0	3.0	3.0	4.0-4.4	
COMBUSTIBLES N	%	θ	θ	θ	θ	
COMBUSTIBLES S	%	θ	θ	θ	θ	
CONDENSER VACUUM	In.Hg	1.4	1.4	1.4	1.4	
FEEDWATER FLOW	Klb/hr	1250	1250	1260	1150	1150
STEAM FLOW	Klb/hr	1175	1175	1175	1050	1050
STEAM TEMP.	°F	920	920	920	925	925
STEAM PRESSURE	PSIG	1825	1825	1825	1810	1800
OIL FLOW	Klb/hr	75	75	75	70	70
AIR FLOW(CORRECTED)	%	76	76	76	72	71
TOTAL FUEL FLOW	%	68	68	68	65	64
ACTUAL AIR FLOW	%	82	82	81	76	75
GAS FLOW	KCFH	θ	θ	θ	θ	θ
GAS BURNER PRESS.	PSIG	θ	θ	θ	θ	θ
GAS HEADER PRESS.	PSIG	θ	θ	θ	θ	θ
S.H.TEMP. N	°F	990	995	995	950	950
S.H.TEMP. S	°F	005	005	005	005	005
R.H.TEMP. N	°F	910	910	910	900	900
R.H.TEMP. S	°F	910	915	915	900	900
EXCESS O ₂ (DIAL) S	%	3.2	3.2	3.3	4.0	4.0
COMBUSTIBLES(DIAL) S	%	θ	θ	θ	θ	θ
EXCESS O ₂ (DIAL) N	%	3.5	3.4	3.4	3.4	3.8
COMBUSTIBLES(DIAL) N	%	θ	θ	θ	θ	θ
*MAX. LOAD BECAUSE OF	3RD PT. FEEDWATER HEATER OUT OF SERVICE					

TEST NUMBER			3	3	3	4	4
SMOKE DENSITY			7	7	7	6	7
SMOKE DENSITY							
RMCS:							
MASTER STM. PRESS.	PSIG		26.1	26.1	26	23.8	23.5
MASTER AIR FLOW	PSIG		25.2	24.0	23.5	20.0	19
FUEL CONTROL (RET)	PSIG		18.9	18.9	18.8	18.1	18
FIRING RATIO	PSIG		7.6	7.6	7.6	7.1	7.1
FUEL SUPPLY	PSIG		22.0	22.0	21.9	17.5	17.6
FUEL GAS CONTROL	PSIG		0	0	0	0	0
S.H. ATTEMP.	S PSIG		0	0	0	12.5	12.5
S.H. ATTEMP.	N PSIG		0	0	0	9.5	9.5
GAS RECIRC. FAN	PSIG		0	0	0	12.0	12.0
R.H. ATTEMP.	S PSIG		0	0	0	0	0
R.H. ATTEMP.	N PSIG		0	0	0	0	0
I.D. FAN	S PSIG		28	28	28	28	28
I.D. FAN	N PSIG		29.5	29.5	29.5	29.5	29.5
F.D. FAN	S PSIG		26.9	26.8	26.5	23.9	23.2
F.D. FAN	N PSIG		25.9	24.0	23.5	21.2	21.0
RETRACTORS-ROW 4	PSIG		/		/	/	/
RETRACTORS-ROW 3	PSIG		/		/	/	/
RETRACTORS-ROW 2	PSIG		/		/	/	/
RETRACTORS-ROW 1	PSIG		/		/	/	/
EXCESS OXYGEN	PSIG		21.8	21.9	21.8	21.7	21.8
OIL SUPPLY FLOW	Klb/hr		112	112	112	105	105
OIL RETURN FLOW	Klb/hr		24	24	25	24	24
OIL SUPPLY PRESS.	PSIG		820	820	825	675	675
OIL RETURN PRESS.	PSIG		625	625	625	525	525
IGNITION GAS PRESS.	PSIG		6.5	6.5	6.5	6.5	6.5
I.D. FAN	S AMPS		160	160	160	150	150
I.D. FAN	N AMPS		170	170	170	160	160
F.D. FAN	S AMPS		56	56	56	50	50
F.D. FAN	N AMPS		65	64	64	54	54
GAS RECIRC. FAN	AMPS		225	225	225	300	300

NOX DATA SHEET "C"

EL SEGUNDO (1) 2

Data by:

M. ESCARCEGA

TEST NUMBER			3	3	3	4	4
RAIN STM. PRESS.	PSIG		1850	1850	1850	1850	1850
DRUM PRESSURE	PSIG		005	005	005	005	005
RECIRC. FAN DIFF.	" H ₂ O		0	0	0	0.2	0.2
AIR HTR. GAS OUT	S " H ₂ O		-12	-12	-12	-12	-12
AIR HTR. GAS OUT	N "		-12	-12	-12	-12	-11.5
BLR OUTLET DRAFT	"		-6.2	-6.0	-5.9	-6.5	-6.5
A.H. GAS OUT	"		-2.7	-2.8	-2.8	-2.9	-2.7
A.H. GAS OUT	"		-0.4	-0.4	-0.4	-0.4	-0.4
FURNACE DRAFT	"		-0.05	-0.10	-0.08	-0.11	-0.08
A.B. TO FURNACE DIFF.	"		4.2	4.2	4.0	3.6	3.8
A.H. AIR OUT	"		4.8	4.9	4.8	4.0	4.0
A.D. FAN OUT	S "		4.5	4.5	4.5	4.2	4.2
A.D. FAN OUT	N "		11.5	11.5	11.5	9.5	9.5
BACK CHARTS:							
A.H. STEAM	N °F		1000	1000	1000	980	980
A.H. STEAM	S °F		1000	1000	1000	975	980
A.H. STEAM(sec)	N °F		980	980	980	940	940
A.H. STEAM(sec)	S °F		980	980	980	980	980
MASS GAS FLOW	%		94	94	94	97	97
MOKE DENSITY	%		8.0	8.2	8.1	7.7	7.6
MOKE DENSITY	%		8.0	8.2	8.1	7.7	7.6
BLR. STEAM FLOW	Klb/hr		0	0	0	0	0
FUEL OIL TEMP.	°F		145	145	145	145	145
AIR ENTR. A.H.	N °F		92	92	91	95	92
AIR ENTR. A.H.	S °F		86	86	86	91	88
AIR LEAVING A.H.	N °F		—	—	—	—	—
AIR LEAVING A.H.	S °F		643	644	644	666	666
AS ENTR. A.H.	N °F		740	741	741	747	746
AS ENTR. A.H.	S °F		735	736	736	744	744
AS LEAVING A.H.	N °F		338	338	339	350	349
AS LEAVING A.H.	S °F		341	342	342	355	354
AVG. AIR IN-OUT	N °F		312	312	312	323	322
AVG. AIR IN-OUT	S °F		306	306	306	318	317
BLR. GAS RECIRC. DISCH.	°F		—	—	—	—	—

① 2

M. ESCARCEGA

TEST NUMBER			3	3	3	4	4
EDC NO		PPM					
AIR FLOW	N	%	/	/	/	/	/
AIR FLOW	S	%	/	/	/	/	/
STACK CONDITIONS							
KYB NO _x MONITOR							
LOAD	NMW		181	180	180	168	166
OIL FLOW	KLB/HR		77.0	77.0	76.9	71.6	71.1
O ₂	%		7.9	7.8	7.9	8.1	8.1
NO _x RAW	PPM		216.7	219.4	218.0	179.4	174.3
NO _x CORR.	PPM		297.2	300.7	300.1	250.1	244.3

EL SEGUNDO 1. 2.

Data by:-

M. ESCARCEGA

TEST NUMBER		5	5	6	6	6	6
DATE		2/23/90	2/23/90	2/24/90	2/24/90	2/24/90	2/24/90
TIME		1600	1700	0915	1045	1215	1330
FUEL		OIL	OIL	OIL	OIL	OIL	OIL
LOAD (Net)	Mw	158*	157*	156*	157*	157*	156
AUX. LOAD	Mw	8.8	8.6	8.4	8.4	8.5	8.4
BURNERS O.O.S.		1,3,6,8	1,3,6,8	1,3,6,8	1,3,6,8	1,3,6,8	→
NOx PORTS		OPEN	OPEN	OPEN	OPEN	→	→
O ₂ LEVEL		NORMAL	NORMAL	—	—	—	→
GAS RECIRCULATION		NORMAL	NORMAL	—	—	—	→
REGISTERS North		OPEN	OPEN	—	—	—	→
REGISTERS South		OPEN	OPEN	—	—	—	→
OIL TANK		NORTH	NORTH	—	—	—	→
OIL TEMP.	°F	172	172	178	—	—	→
EXCESS O ₂ (CH) N	%	3.2-3.4	3.2-3.6	3.4-3.9	3.3-3.8	3.4-3.9	3.4-3.9
EXCESS O ₂ (CH) S	%	3.0-3.3	3.2-3.6	3.8-4.2	3.8-4.2	3.8-4.2	3.9
COMBUSTIBLES N	%	0	0	0	0	0	0
COMBUSTIBLES S	%	0	0	0	0	0	0
CONDENSER VACUUM	In.Hg	1.4	1.4	1.5	1.4	1.4	1.4
FEEDWATER FLOW	Klb/hr	1125	1075	1050	1050	1050	1050
STEAM FLOW	Klb/hr	1050	1050	1050	1040	1040	1040
STEAM TEMP.	°F	950	930	940	940	940	950
STEAM PRESSURE	PSIG	1825	1830	1825	1825	1825	1825
OIL FLOW	Klb/hr	74	72	71	72	72	72
AIR FLOW (CORRECTED)	%	74	73	75	74	74	74
TOTAL FUEL FLOW	%	66	65	65	66	66	65
ACTUAL AIR FLOW	%	72	75	77	77	77	77
GAS FLOW	KCFH	0	0	0	0	0	0
GAS BURNER PRESS.	PSIG	0	0	0	0	0	0
GAS HEADER PRESS.	PSIG	0	0	0	0	0	0
S.H. TEMP. N	°F	990	980	995	1000	1000	1000
S.H. TEMP. S	°F	005	005	005	005	005	005
R.H. TEMP. N	°F	900	900	900	900	900	900
R.H. TEMP. S	°F	915	900	920	925	930	935
EXCESS O ₂ (DIAL) S	%	3.4	3.4	4.0	4.2	4.0	3.9
COMBUSTIBLES (DIAL) S	%	0	0	0	0	0	0
EXCESS O ₂ (DIAL) N	%	3.4	3.5	3.6	3.4	3.6	3.6
COMBUSTIBLES (DIAL) N	%	0	0	0	0	0	0
* MAX. LOAD BECAUSE OF 3 RD PT. FEEDWATER HEATER OUT OF SERVICE							

TEST NUMBER			5	5	6	6	6	6
SMOKE DENSITY			8	8	7	7	7	6
SMOKE DENSITY			-	-	-	-	-	-
RMCS:								
MASTER STM. PRESS.	PSIG		24.5	24	23.8	24	24	24
MASTER AIR FLOW	PSIG		19	18.5	20	20.5	20.6	20
FUEL CONTROL (RET)	PSIG		18.9	18.5	19	19.2	19.2	19.1
FIRING RATIO	PSIG		7.1	7.1	6.8	6.8	6.8	6.8
FUEL SUPPLY	PSIG		18	17.8	16.9	17	17	17
FUEL GAS CONTROL	PSIG		0	0	0	0	0	0
S.H. ATTEMP.	S	PSIG	12.5	12.5	11.8	11.9	12	12
S.H. ATTEMP.	N	PSIG	9.5	9.5	13	13	13	13
GAS RECIRC. FAN	PSIG		12.0	12	14	14	14	14
R.H. ATTEMP.	S	PSIG	0	0	0	0	0	0
R.H. ATTEMP.	N	PSIG	3.0	4.0	3.5	3.0	3	3
I.D. FAN	S	PSIG	28	28	28	28	28	28
I.D. FAN	N	PSIG	29.5	29.5	29.5	29.5	29.5	29.5
F.D. FAN	S	PSIG	21.8	21.8	21.6	22	22.3	21.9
F.D. FAN	N	PSIG	19.5	19.5	21.5	21.8	22	21.5
RETRACTORS-ROW 4	PSIG		/	/	/	/	/	/
RETRACTORS-ROW 3	PSIG		/	/	/	/	/	/
RETRACTORS-ROW 2	PSIG		/	/	/	/	/	/
RETRACTORS-ROW 1	PSIG		/	/	/	/	/	/
EXCESS OXYGEN	PSIG		21.2	21.2	21.5	21.5	21.5	21.5
OIL SUPPLY FLOW	Klb/hr		106	106	102	102	102	102
OIL RETURN FLOW	Klb/hr		24	24	20	20	20	20
OIL SUPPLY PRESS.	PSIG		690	690	650	660	660	660
OIL RETURN PRESS.	PSIG		540	540	510	520	520	520
IGNITION GAS PRESS.	PSIG		6.5	6.5	6.5	6.5	6.2	6.5
I.D. FAN	S	AMPS	150	152	150	155	155	155
I.D. FAN	N	AMPS	160	158	160	162	160	160
F.D. FAN	S	AMPS	50	50	50	50	50	50
F.D. FAN	N	AMPS	52	53	56	56	56	56
GAS RECIRC. FAN	AMPS		300	300	275	275	275	275

NOx DATA SHEET "C" . . .

EL SEGUNDO 1 2

Data by:

M. ESCARCEGA

[illegible]

Data by:

.

TEST NUMBER		7	7
DATE		2/24/90	2/24/90
TIME		1500	1700
FUEL		01L	011
LOAD (Net)	Mw	157*	157*
AUX. LOAD	Mw	8.4	8.4
BURNERS O.O.S.		1,3,6,8	→
NOx PORTS		OPEN	→
O ₂ LEVEL		NORMAL	→
GAS RECIRCULATION		NORMAL	→
REGISTERS North		OPEN	→
REGISTERS South		OPEN	→
OIL TANK		NORTH	→
OIL TEMP.	°F	176	→
EXCESS O ₂ (CH) N	%	3.4-3.8	3.4-3.9
EXCESS O ₂ (CH) S	%	3.6-4.0	3.6-4.0
COMBUSTIBLES N	%	0	0
COMBUSTIBLES S	%	0	0
CONDENSER VACUUM	In.Hg	1.4	1.3
FEEDWATER FLOW	Klb/hr	1060	1060
STEAM FLOW	Klb/hr	1040	1050
STEAM TEMP.	°F	960	955
STEAM PRESSURE	PSIG	1825	1825
OIL FLOW	Klb/hr	71	71
AIR FLOW (CGRP)	%	74	73
TOTAL FUEL FLOW	%	65	65
ACTUAL AIR FLOW	%	77	77
GAS FLOW	KCFH	0	0
GAS BURNER PRESS.	PSIG	0	0
GAS HEADER PRESS.	PSIG	0	0
S.H. TEMP. N	°F	1000	995
S.H. TEMP. S	°F	005	005
R.H. TEMP. N	°F	900	900
R.H. TEMP. S	°F	930	925
EXCESS O ₂ (DIAL) S	%	3.9	4.0
COMBUSTIBLES (DIAL) S	%	0	0
EXCESS O ₂ (DIAL) N	%	3.4	3.5
COMBUSTIBLES (DIAL) N	%	0	0
* MAX. LOAD BECAUSE OF 3RD PT. FEEDWATER HEATER OUT OF SERVICE			

EL SEGUNDO 1 2

Date by: M. ESCARCEGA

TEST NUMBER			7	7				
SMOKE DENSITY			7	7				
SMOKE DENSITY			—	—				
RMCS:								
MASTER STM.PRESS.	PSIG		24	24				
MASTER AIR FLOW	PSIG		20	20.1				
FUEL CONTROL (RET)	PSIG		19.2	19.2				
FIRING RATIO	PSIG		6.8	6.8				
FUEL SUPPLY	PSIG		17	17				
FUEL GAS CONTROL	PSIG		0	0				
S.H.ATTEMP.	S PSIG		12	12				
S.H.ATTEMP.	N PSIG		13	13				
GAS RECIRC. FAN	PSIG		14	14				
R.H.ATTEMP.	S PSIG		0	0				
R.H.ATTEMP.	N PSIG		3	3				
I.D.FAN	S PSIG		28	28				
I.D.FAN	N PSIG		29.5	29.5				
F.D.FAN	S PSIG		22	22				
F.D.FAN	N PSIG		21.8	21.8				
RETRACTORS—ROW 4	PSIG		/	/				
RETRACTORS—ROW 3	PSIG		/	/				
RETRACTORS—ROW 2	PSIG		/	/				
RETRACTORS—ROW 1	PSIG		/	/				
EXCESS OXYGEN	PSIG		21.5	21.5				
OIL SUPPLY FLOW	Klb/hr		102	102				
OIL RETURN FLOW	Klb/hr		20	20				
OIL SUPPLY PRESS.	PSIG		660	660				
OIL RETURN PRESS.	PSIG		520	525				
IGNITION GAS PRESS.	PSIG		6.5	6.5				
I.D.FAN	S AMPS		150	150				
I.D.FAN	N AMPS		162	160				
F.D.FAN	S AMPS		50	50				
F.D.FAN	N AMPS		57	57				
GAS RECIRC. FAN	AMPS		275	275				

NOX DATA SHEET "C"

EL SEGUNDO (1) 2

Data by:

M. ESCARCEGA

TEST NUMBER			7	7				
MAIN STM. PRESS.	PSIG		1050	1050				
DRUM PRESSURE	PSIG		—	—				
RECIRC. FAN DIFF.	" H ₂ O		1.1	1.1				
AIR HTR. GAS OUT S	" H ₂ O		-12	-12				
AIR HTR. GAS OUT N	"		-12	-12				
BLR OUTLET DRAFT	"		-6.5	-6.5				
L.H. GAS OUT	"		-2.8	-2.7				
L.H. GAS OUT	"		-0.3	-0.4				
FURNACE DRAFT	"		-0.07	-0.08				
L.B. TO FURNACE DIFF.	"		4.8	4.0				
L.H. AIR OUT	"		4.2	4.2				
L.D. FAN OUT S	"		4.2	4.0				
L.D. FAN OUT N	"		10.2	10				
BACK CHARTS:								
L.H. STEAM N	°F		990	990				
L.H. STEAM S	°F		990	990				
L.H. STEAM(sec) N	°F		995	995				
L.H. STEAM(sec) S	°F		980	980				
ASS GAS FLOW	%		96	97				
SMOKE DENSITY N	%		7.3	7.7				
SMOKE DENSITY S	%		—	—				
EX. STEAM FLOW	Klb/hr		0	0				
REL OIL TEMP.	°F		145	145				
R ENTR. A.H. N	°F		93	92				
R ENTR. A.H. S	°F		94	93				
R LEAVING A.H. N	°F		—	—				
R LEAVING A.H. S	°F		668	668				
S ENTR. A.H. N	°F		750	750				
S ENTR. A.H. S	°F		747	747				
S LEAVING A.H. N	°F		347	347				
S LEAVING A.H. S	°F		359	359				
G. AIR IN-OUT N	°F		321	321				
G. AIR IN-OUT S	°F		322	323				
G. GAS RECIRC. DISCH.	°F		579	579				

EL SEGUNDO 1-2

Data by:

M. ESCARCEGA

TEST NUMBER		8	8	8
DATE		2/25/90	—	→
TIME		1100	1230	1330
FUEL		GAS	GAS	GAS
LOAD (Net)	Mw	152	150	151
AUX. LOAD	Mw	8.5	8.3	8.4
BURNERS O.O.S.		14, 15	14, 15	14, 15
NOX PORTS		OPEN	OPEN	→
O ₂ LEVEL		NORMAL	NORMAL	→
GAS RECIRCULATION		NORMAL	NORMAL	→
REGISTERS North		OPEN	OPEN	→
REGISTERS South		OPEN	OPEN	→
OIL TANK		—	—	—
OIL TEMP.	°F	—	—	—
EXCESS O ₂ (CH) N	%	2.9-3.5	2.6-3.2	2.8-3.4
EXCESS O ₂ (CH) S	%	1.8-2.6	2.0-2.8	1.8-2.4
COMBUSTIBLES N	%	⊖	⊖	⊖
COMBUSTIBLES S	%	⊖	⊖	⊖
CONDENSER VACUUM	In.Hg	1.4	1.4	1.4
FEEDWATER FLOW	Klb/hr	950	950	950
STEAM FLOW	Klb/hr	1010	1000	1000
STEAM TEMP.	°F	960	960	960
STEAM PRESSURE	PSIG	1825	1825	1825
OIL FLOW	Klb/hr	⊖	⊖	⊖
AIR FLOW (CORR)	%	75	73	73
TOTAL FUEL FLOW	%	65	64	64
ACTUAL AIR FLOW	%	72	71	71
GAS FLOW	KCFH	1550	1540	1540
GAS BURNER PRESS.	PSIG	12	12	12
GAS HEADER PRESS.	PSIG	29	29	29
S.H.TEMP. N	°F	1005	1005	1010
S.H.TEMP. S	°F	005	005	005
R.H.TEMP. N	°F	900	900	900
R.H.TEMP. S	°F	950	930	930
EXCESS O ₂ (DIAL) S	%	2.4	2.6	2.5
COMBUSTIBLES (DIAL) S	%	⊖	⊖	⊖
EXCESS O ₂ (DIAL) N	%	2.9	3.0	3.1
COMBUSTIBLES (DIAL) N	%	⊖	⊖	⊖
*MAX. LOAD BECAUSE OF 3 RD & 4 TH PT. FEEDWATER HEATERS				

TEST NUMBER			8	8	8			
SMOKE DENSITY			6	4	5			
SMOKE DENSITY								
RMCS:								
MASTER STM. PRESS.	PSIG		23.5	23.2	23.0			
MASTER AIR FLOW	PSIG		21.5	21	21.4			
FUEL CONTROL (RET)	PSIG		15.5	15.5	15.5			
FIRING RATIO	PSIG		6.8	6.8	6.8			
FUEL SUPPLY	PSIG		9	9	9			
FUEL GAS CONTROL	PSIG		19.6	19.5	19.5			
S.H. ATTEMP.	S PSIG		7	7	7			
S.H. ATTEMP.	N PSIG		3	3	3			
GAS RECIRC. FAN	PSIG		8.8	8.8	8.8			
R.H. ATTEMP.	S PSIG		0	0	0			
R.H. ATTEMP.	N PSIG		8	8	8			
I.D. FAN	S PSIG		28.2	28.1	28.2			
I.D. FAN	N PSIG		29.5	29.5	29.5			
F.D. FAN	S PSIG		22	21	21.5			
F.D. FAN	N PSIG		19	18	18.8			
RETRACTORS-ROW 4	PSIG		/	/	/			
RETRACTORS-ROW 3	PSIG		/	/	/			
RETRACTORS-ROW 2	PSIG		/	/	/			
RETRACTORS-ROW 1	PSIG		/	/	/			
EXCESS OXYGEN	PSIG		20	20	20.2			
OIL SUPPLY FLOW	Klb/hr		—	—	—			
OIL RETURN FLOW	Klb/hr		—	—	—			
OIL SUPPLY PRESS.	PSIG		—	—	—			
OIL RETURN PRESS.	PSIG		—	—	—			
IGNITION GAS PRESS.	PSIG		6.5	6.5	6.5			
I.D. FAN	S AMPS		145	145	148			
I.D. FAN	N AMPS		150	150	152			
F.D. FAN	S AMPS		50	49	49			
F.D. FAN	N AMPS		51	50	50			
GAS RECIRC. FAN	AMPS		250	250	250			

NOX DATA SHEET "C"

EL SEGUNDO ① 2

Data by:

M. ESCARCEGA

TEST NUMBER			8	8	8			
MAIN STM. PRESS.	PSIG		18.50	18.50	18.50			
DRUM PRESSURE	PSIG		—	—				
RECIRC. FAN DIFF.	" H ₂ O		1.8	1.8	1.8			
AIR HTR. GAS OUT S	" H ₂ O		-12	-12	-12			
AIR HTR. GAS OUT N	"		-12	-12	-12			
BLR OUTLET DRAFT	"		-6.2	-6.0	-6.2			
R.H. GAS OUT	"		-2.7	-2.8	-2.6			
S.H. GAS OUT	"		-0.5	-0.6	-0.4			
FURNACE DRAFT	"		-0.10	-0.20	-0.12			
W.B. TO FURNACE DIFF.	"		3.7	3.5	3.5			
A.H. AIR OUT	"		4.2	4.0	4.2			
F.D. FAN OUT S	"		4.2	4.2	4.0			
F.D. FAN OUT N	"		9.0	8.8	9.0			
BACK CHARTS:								
R.H. STEAM N	°F		995	1010	995			
R.H. STEAM S	°F		1030	1000	1005			
S.H. STEAM(sec) N	°F		1000	1000	1000			
S.H. STEAM(sec) S	°F		1000	1000	995			
MASS GAS FLOW	%		93	93	93			
SMOKE DENSITY	%		6.8	6.6	6.4			
SMOKE DENSITY	%							
AUX. STEAM FLOW	Klb/hr		0	0	0			
FUEL OIL TEMP.	°F		—	—	—			
AIR ENTR. A.H. N	°F		89	90	91			
AIR ENTR. A.H. S	°F		97	98	99			
AIR LEAVING A.H. N	°F		—	—	—			
AIR LEAVING A.H. S	°F		672	671	671			
GAS ENTR. A.H. N	°F		748	749	748			
GAS ENTR. A.H. S	°F		752	747	750			
GAS LEAVING A.H. N	°F		366	376	371			
GAS LEAVING A.H. S	°F		365	369	368			
AVG. AIR IN-OUT N	°F		339	348	344			
AVG. AIR IN-OUT S	°F		328	332	331			
BLR. GAS RECIRC. DISCH.	°F		495	516	515			

Appendix C.3

CEM Data



CONTINUOUS EMISSIONS MEASUREMENTS

ient SCE
te 2/22/90
st Location EL SEGUNDO UNIT 1
bient Temperature, DB/WB ~ 68
erator FINKEN

Test No(s) 2-CEM-EL SEG - ~~SETH~~ North
Barometric Pressure 30.28
Duct Static Pressure _____
Fuel #6 oil

STRATIFICATION CHECK

Test No.	Sample Time	Point	Dry, Uncorrected							Corrected to % Dry		
			O ₂	CO ₂	CO	NOx	NO	NO ₂	SO ₂	CO	NOx	SO ₂
2	1032	North A-7	6.7	10.4	22							
		A-5	6.7	10.4	25							
		A-3	7.5	9.8	25							
	1043	A-1	8.4	9.1	30							
	1045	B-7	6.2	10.8	25							
		B-5	6.4	10.6	25							
		B-3	7.3	9.6	25							
	1057	B-1	8.4	9.0	30							
		C-7	6.2	10.8	25							
		C-5	6.3	10.8	25							
		C-3	7.8	9.5	25							
		C-1	8.3	9.1	30							
	1110	D-7	6.2	10.8	25							
		D-5	6.0	11.0	25							
n Gas Concentration												

ents: Lower unit Load slightly





CONTINUOUS EMISSIONS MEASUREMENTS

Client SCE
Date 2/22/90
Test Location EL SEGUNDO u-1
Ambient Temperature, DB/WB _____
Operator FINKEN

Test No(s) 2-CEM-El Seg North
Barometric Pressure _____
Duct Static Pressure _____
Fuel _____

Test No.	Sample Time	Point	Dry, Uncorrected							Corrected to % , Dry		
			O ₂	CO ₂	CO	NOx	NO	NO ₂	SO ₂	CO	NOx	SO ₂
2	1115	^{North} D-3	7.6	9.6	30							
		D-1	8.6	8.9	30							
		E-7	6.1	10.8	22							
		E-5	6.1	10.8	25							
		E-3	8.1	9.3	28							
		E-1	8.6	8.8	30							
		F-7	5.9	11.0	25							
		F-5	5.8	11.3	25							
		F-3	6.9	10.3	30							
	1200	F-1	8.6	8.8	30							
AVERAGE			7.1									
Span Gas Concentration												

Comments: Monitor unit AT Point F-3 or B-3



CONTINUOUS EMISSIONS MEASUREMENTS

Client SCE / EL SEGUNDO U-1Test No(s) 2-CEM-EL SEG- SouthDate 2/22/90Barometric Pressure 30.28

Test Location _____

Duct Static Pressure _____

Ambient Temperature, DB /WB _____

Fuel #6 Oil

Operator _____

Test No.	Sample Time	Point	Dry, Uncorrected							Corrected to % ____, Dry		
			O ₂	CO ₂	CO	NOx	NO	NO ₂	SO ₂	CO	NOx	SO ₂
2	1205	South										
		A - 1	6.0	11.0	30							
		A - 3	5.9	11.0	30							
		A - 5	6.7	10.3	35							
		A - 7	8.0	9.4	40							
		B - 1	6.2	10.9	32							
		B - 3	6.3	10.8	30							
		B - 5	7.3	10.0	35							
		B - 7	8.1	9.4	32							
		C - 1	6.5	10.5	28							
		C - 3	6.5	10.5	32							
		C - 5	7.3	10.0	35							
		C - 7	8.1	9.4	35							
		D - 1	6.7	10.5	25							
	1305	D - 3	6.7	10.5	25							
Span Gas Concentration												

Comments: _____



CONTINUOUS EMISSIONS MEASUREMENTS

Client SE
Date 2/22/90
Test Location EL SEGUNDO Unit 1
Ambient Temperature, DB/WB ~73
Operator FINKEN

Test No(s) 2-Cem-ELSEG-South
Barometric Pressure _____
Duct Static Pressure _____
Fuel #6 oil

Test No.	Sample Time	Point	Dry, Uncorrected							Corrected to % __, Dry		
			O ₂	CO ₂	CO	NOx	NO	NO ₂	SO ₂	CO	NOx	SO ₂
2	1305	South D-5	7.7	9.8	25							
		D-7	8.1	9.5	30							
		E-1	6.7	10.4	25							
		E-3	6.9	10.3	28							
		E-5	7.7	9.8	30							
		E-7	8.3	9.3	25							
		F-1	6.6	10.5	30							
		F-3	7.1	10.2	30							
		F-5	7.6	9.8	25							
	1325	F-7	8.1	9.4	25							
AVERAGE		South Duct	7.1									
Span Gas Concentration												

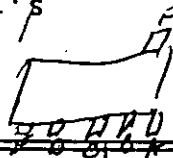
Comments: _____

E/A

VELOCITY TRAVERSE DATA

Plant SCF / E / Sec Date 2/21/90
 Boiler No. _____ Data Taken By J. MULLIGAN
 Fuel Type oil Test Description velocity Traverse
 Test No. 2-Velocity - North
 Baro. Press (in.Hg) 30.44 Pitot Tube Coefficient .84 Cp
 Abs. Static Press in Stack (in.Hg) -78 P_s

$$V_s = 2.90 C_p \sqrt{\Delta P T_s} \sqrt{\frac{29.92}{P_s} \times \frac{28.95}{MW}}$$



Time	Traverse Point		Velocity Head, in. H ₂ O, ΔP	Gas Temp °F	Gas Temp °R, T _s	Velocity, ft/sec	Comments	O ₂ %
	Port	Depth						
1330	A 7		1.1	327				
	6		1.2	331				
	5		1.4	333				
	4		1.2	333				
	3		1.3	333				
1333	2		1.4	332				
	1		2.1	329				
1335	E 7		0.76	340				
	6		1.7	341				
	5		2.1	339				
	4		2.6	334				
	3		2.4	327				
	2		2.4	322				
	1		1.4	321				

P_s , corrected _____ in.Hg Q _____ WACFM
 MW _____ lb/lb·mole Q_s _____ WSCFM
 A_s _____ ft² Q_{sd} _____ DSCFM

$$Avg X^2 = 1.5405$$

E/A

VELOCITY TRAVERSE DATA

Plant SCE/ELSEGDate 2/21/90Boiler No. 1Data Taken By J. McFEGHAN W. OSBORNFuel Type oil

Test Description

Test No. 2 - vel. - northvelocityBaro. Press (in.Hg) 30.44Pitot Tube Coefficient .84 CpAbs. Static Press in Stack (in.Hg) + 1.2 Ps

$$V_s = 2.90 C_p \sqrt{\Delta P T_s} \sqrt{\frac{29.92}{P_s} \times \frac{28.95}{MW}}$$

Time	Traverse Point		Velocity Head, in. H ₂ O, ΔP	Gas Temp °F	Gas Temp °R, T _s	Velocity, ft/sec	Comments	O ₂ , %
	Port	Depth						
1347	R	7	1.2	322				
		6	2.1	323				
		5	3.0	323			+4.2	
		4	4.2	321				
		3	2.5	340				
		2	1.1	340				
1354		1	.50	342				
1356	C	7	.76	312				
		6	.58	318				
		5	.96	325				
		4	1.6	330				
		3	1.7	327				
		2	1.1	326				
		1	1.0	322				

P_s, corrected _____ in.Hg

Q _____ WACFM

MW _____ lb/lb·mole

Q_s _____ WSCFMA_s _____ ft²Q_{sd} _____ DSCFM

Appendix C.4

Benzene

CARNOT
Benzene Emissions

Client/Location: SCE/EL SEGUNDO

Reference Temp (F)	60		
F Factor, Gas	8487	F Factor, Oil	9039
O2, % Gas	7.92	O2, % Oil	8.85
Stack Flow Rate, Gas fuel(dscfm)	419098	Stack Flow Rate, Oil(dscfm)	467928

GAS FUEL		Benzene	Oil Fuel		Benzene
8A-BENZ-N, ppb	ND<	1	6A-BENZ-N, ppb	ND<	1
8B-BENZ-N, ppb	ND<	1	6B-BENZ-N, ppb	ND<	1
8C-BENZ-S, ppb	ND<	1	6C-BENZ-S, ppb	ND<	1
AVG, ppb	ND<	1	AVG, ppb	ND<	1
STACK AVG, lb/hr	ND<	5.18E-03	STACK AVG, lb/hr	ND<	5.78E-03
AVG, lb/MMbtu	ND<	2.81E-06	AVG, lb/MMbtu	ND<	3.00E-06

E/A

TEDLAR BAG DATA

Client/Project ELS.Date 2/24/90 Unit 1 By W.D.

	Bag ID No.	Bag ID No.	Bag ID No.
Test No.	^{NORTH} 6A-BENZ-ELS	^{NORTH} 6B-BENZ-ELS	^{SOUTH} 6C-BENZ-ELS
Sample Rate	$\frac{1}{2}$ L/min	$\frac{1}{2}$ L/min	$\frac{1}{2}$ L/min
Start Time	8:32 10:17	10:40	11:22
Stop Time	8:52 10:37	11:00	11:42
Sample Location	PORT D 5m/pt Points 1,3,5,7	Port D 5m/pt Points 1,3,5,7	Port C 5m/pt Points 1,3,5,7

Date 2/25/90 Unit 1 By W.D.

	Bag ID No.	Bag ID No.	Bag ID No.
Test No.	^{NORTH} 8A-BENZ-ELS	^{NORTH} 8B-BENZ-ELS	^{SOUTH} 8C-BENZ-ELS
Sample Rate	$\frac{1}{2}$ L/min	$\frac{1}{2}$ L/min	$\frac{1}{2}$ L/min
Start Time	11:00 AM	12:48	
Stop Time	11:20 AM		
Sample Location	Port D 1,3,5,7 5m/pt		Port 1,3,5,7

Notes: _____

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

DATE April 6, 1990

RECEIVED February 26, 1990

SAMPLE **Six (6) Tedlar bags**
labeled 6A, 6B, 6C, 8A, 8B and 8C
P.O. No.: 53304
Edison P.O. No.: C0138903

LABORATORY NO. 37992

INVESTIGATION

Analyze for trace benzene by modified EPA Method 602

RESULTS

MODIFIED EPA 602 (Benzene)

Received: 2/26/90

Analyzed: 2/26/90

Nanoliters per Liter (ppb) Benzene

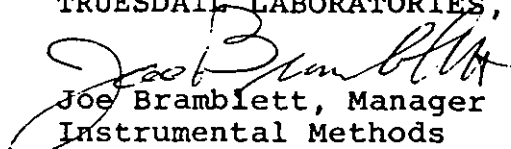
6A-ELS	ND < 1
6B-ELS	ND < 1
6C-ELS	ND < 1
8A-ELS	ND < 1
8B-ELS	ND < 1
8C-ELS	ND < 1
ND = Not detected.	

HIGHER HEAT VALUE (60 degrees fahrenheit)

BTU's per Cubic Foot

#1-ELS	965
#2-ELS	948

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.

CARNOT

05/01/90

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	SCE/ELS	*	Date.....	2/25/90
Test Number.....	8-VEL/H2O	*	Data By.....	AB
Test Method.....	1,4	*	Sample Location.....	N. DUCT
Fuel.....	GAS	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	
Bar Press (in Hg).....	30.23	*	Nozzle Diam (in).....	
Meter Vol (acf).....	18.130	*	Meter Temp (F).....	92.8
Stack Press (iwg).....	0.30	*	Stack Temp (F).....	368.7
Vel Head (iwg).....	1.6530	*	O2 (%): from CEM.....	8.60
Liquid Vol (ml).....	62.8	*	from portable...	8.43
Meter Press (iwg).....	1.00	*	CO2 (%): from CEM.....	6.75
		*	calculated.....	6.84
		*	Start/Stop Time.....	1055/1125
Std Sample Vol (SCF).....				17.09
Metric Sample Vol (cubic meters).....				0.48
Moisture Fraction.....				0.146
Stack Gas Mol Wt.....				27.76
Stack Gas Velocity (ft/sec).....				91.57
Stack Flow Rate (wacfm).....				403,486
Stack Flow Rate (dscfm).....				218,595

CARNOT

05/01/90

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	SCE/ELS	*	Date.....	2/25/90
Test Number.....	8-VEL/H2O	*	Data By.....	AB
Test Method.....	1,4	*	Sample Location.....	S. DUCT
Fuel.....	GAS	*	Reference Temp (F).....	60
Control Box #.....	ES-19	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	1.0000
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	
Bar Press (in Hg).....	30.23	*	Nozzle Diam (in).....	
Meter Vol (acf).....	18.233	*	Meter Temp (F).....	92.8
Stack Press (iwg).....	0.30	*	Stack Temp (F).....	348.5
Vel Head (iwg).....	1.3400	*	O2 (%): from CEM.....	8.60
Liquid Vol (ml).....	60.1	*	from portable...	7.40
Meter Press (iwg).....	1.00	*	CO2 (%): from CEM.....	6.75
		*	calculated.....	7.41
		*	Start/Stop Time.....	1309/1339
Std Sample Vol (SCF).....				17.36
Metric Sample Vol (cubic meters).....				0.49
Moisture Fraction.....				0.139
Stack Gas Mol Wt.....				27.89
Stack Gas Velocity (ft/sec).....				81.25
Stack Flow Rate (wacfm).....				358,019
Stack Flow Rate (dscfm).....				200,503

E/A

Y3

VELOCITY TRAVERSE DATA

Plant SCE/EL SEGUNDODate 2/25/96Boiler No. U-1Data Taken By FINKENFuel Type GASTest Description VelocityTest No. 8-VEL-ELSEGNorth DuctBaro. Press (in.Hg) 30.23Pitot Tube Coefficient .84 Cp

Abs. Static Press in Stack (in.Hg) _____

Ps # 1

$$V_s = 2.90 C_p \sqrt{\Delta P T_s} \sqrt{\frac{29.92}{P_s} \times \frac{28.95}{MW}}$$

Time	Traverse Point		Velocity Head, in. H ₂ O, ΔP	Gas Temp °F	Gas Temp °R, T _s	Velocity, ft/sec	Comments	O ₂ , %
	Port	Depth						
1156	A	1	3.0	361				
		2	2.6	364				
		3	2.5	368				
		4	1.7	370				
		5	1.5	375				
		6	1.4	365				
		7	.82	374				
1201	B	1	1.5	337				
		2	1.7	358				
		3	2.0	364				
		4	1.7	368				
		5	.70	374				
		6	.50	369				
		7	.90	378				

P_s, corrected _____ in.Hg

MW _____ lb/lb·mole

A_s _____ ft²

Q _____ WACFM

Q_s _____ WSCFMQ_{sd} _____ DSCFM

average ΔP = 1.653 ✓
T_{avg} = 368.7

E/A

2/3

VELOCITY TRAVERSE DATA

Plant SCE/EL Segundo Date 2/25/90
 Boiler No. 1 Data Taken By Finken
 Fuel Type GAS Test Description Velocity
 Test No. 8 North Duct
 Baro. Press (in.Hg) 30.23 Pitot Tube Coefficient _____ Cp
 Abs. Static Press in Stack (in.Hg) _____ P_s

$$V_s = 2.90 C_p \sqrt{\Delta P T_s} \sqrt{\frac{29.92}{P_s} \times \frac{28.95}{MW}}$$

Time	Traverse Point		Velocity Head, in. H ₂ O, ΔP	Gas Temp °F	Gas Temp °R, T _s	Velocity, ft/sec	Comments	O ₂ , %
	Port	Depth						
1204	C	1	1.0	331				
		2	1.3	362				
		3	2.6	366				
		4	1.7	371				
		5	1.95, 90	376				
		6	.42	380				
		7	.49	378				
	D	1	.85	345				
		2	1.2	364				
		3	2.6	363				
		4	2.7	372				
		5	1.8	380				
		6	1.3	381				
		7	1.4	382				

P_s, corrected _____ in.Hg Q _____ WACFM
 MW _____ lb/lb-mole Q_s _____ WSCFM
 A_s _____ ft² Q_{sd} _____ DSCFM

E/A

3/3

VELOCITY TRAVERSE DATA

Plant SE/EL SEGUNDO Date 2/25/90
Boiler No. Data Taken By FINKEN
Fuel Type GAS Test Description Velocity
Test No. 8-Vel-ELSEG North duct
Baro. Press (in.Hg) 30.23 Pitot Tube Coefficient .84 Cp
Abs. Static Press in Stack (in.Hg) P_s

$$V_s = 2.90 C_p \sqrt{\Delta P T_s} \sqrt{\frac{29.92}{P_s} \times \frac{28.95}{MW}}$$

Time	Traverse Point		Velocity Head, in. H ₂ O, ΔP	Gas Temp °F	Gas Temp °R, T _s	Velocity, ft/sec	Comments	O ₂ , %
	Port	Depth						
1210	E	1	1.5	339				
		2	2.1	363				
		3	3.3	364				
		4	3.6	370				
		5	2.5	379				
		6	2.6	389				
		7	1.6	383				
	F	17	1.85	375				
		26	1.6	382				
		35	1.8	385				
		44	3.2	378				
		53	2.3	370				
		62	2.6	368				
		71	1.9	364				

P_s, corrected in.Hg Q WACFM
MW lb/lb·mole Q_s WSCFM
A_s ft² Q_{sd} DSCFM

E/A

VELOCITY TRAVERSE DATA

Plant SCE/EL SEGUNDO Date 2/25/90
Boiler No. U-1 Data Taken By Finkert
Fuel Type GAS Test Description Velocity
Test No. 8 - Veloc - Elsec South Duct
Baro. Press (in.Hg) 30.23 Pitot Tube Coefficient .84 Cp
Abs. Static Press in Stack (in.Hg) _____ P_s

$$V_s = 2.90 C_p \sqrt{\Delta P T_s} \sqrt{\frac{29.92}{P_s} \times \frac{28.95}{MW}}$$

Time	Traverse Point		Velocity Head, in. H ₂ O, ΔP	Gas Temp °F	Gas Temp °R, T _s	Velocity, ft/sec	Comments	O ₂ , %
	Port	Depth						
1223	A	1	1.62	360				
		2	1.5	362				
		3	1.8	360				
		4	3.2	355				
		5	3.0	350				
		6	2.5	339				
		7	2.1	309				
	F	1	1.39	357				
		2	1.95	357				
		3	1.2	352				
		4	2.0	351				
		5	2.124	349				
		6	2.9	342				
		7	1.8	336				

P_s, corrected _____ in.Hg Q _____ WACFM
MW _____ lb/lb·mole Q_s _____ WSCFM
A_s _____ ft² Q_{sd} _____ DSCFM

average ΔP = 1.340 ✓
average T_{avg} = 348.5

E/A

VELOCITY TRAVERSE DATA

1²

Plant SCE/EI Segundo Date 2/25/90
 Boiler No. 1 Data Taken By BS/KF
 Fuel Type Gas Test Description Velocity
 Test No. 8-141-EI Seg South Duct
 Baro. Press (in.Hg) 30.23 Pitot Tube Coefficient .84 Cp
 Abs. Static Press in Stack (in.Hg) 28.35 Ps > close dg. ambient

$$V_s = 2.90 \text{ Cp} \sqrt{\Delta P T_s} \sqrt{\frac{29.92}{P_s} \times \frac{28.95}{\text{MW}}}$$

Time	Traverse Point		Velocity Head, in. H ₂ O, ΔP	Gas Temp °F	Gas Temp °R, T _s	Velocity, ft/sec	Comments	O ₂ , %
	Port	Depth						
	C	1	.20	357				
		2	.36	359				
		3	.65	360				
		4	2.3	353				
		5	2.6	344				
		6	1.7	342				
		7	.45	341				
	B	1	1.3	360				
		2	1.6	359				
		3	2.4	356				
		4	3.7	348				
		5	3.4	342				
		6	2.2	340				
		7	.95	329				

P_s, corrected _____ in.Hg Q _____ WACFM
 MW _____ lb/lb-mole Q_s _____ WSCFM
 A_s _____ ft² Q_{sd} _____ DSCFM

E/A

13

VELOCITY TRAVERSE DATA

Plant SEB/EL SEGUNDO Date 2/25/90
 Boiler No. U-1 Data Taken By FINKEN
 Fuel Type GAS Test Description velocity
 Test No. 8-vel-ELSEG at South
 Baro. Press (in.Hg) 30.23 Pitot Tube Coefficient .84 Cp
 Abs. Static Press in Stack (in.Hg) _____ P_s

$$V_s = 2.90 C_p \sqrt{\Delta P T_s} \sqrt{\frac{29.92}{P_s} \times \frac{28.95}{MW}}$$

Time	Traverse Point		Velocity Head, in. H ₂ O, ΔP	Gas Temp °F	Gas Temp °R, T _s	Velocity, ft/sec	Comments	O ₂ , %
	Port	Depth						
	E	1	.60	357				
		2	.44	353				
		3	.48	354				
		4	1.1	349				
		5	1.6	346				
		6	1.4	343				
		7	.99	317				
	D	1	.34	357				
		2	.20	356				
		3	.36	356				
		4	1.6	350				
		5	2.3	345				
		6	1.2	343				
		7	.55	342				

P_s, corrected _____ in.Hg
 MW _____ lb/lb·mole
 A_s _____ ft²

Q _____ WACFM
 Q_s _____ WSCFM
 Q_{sd} _____ DSCFM

EST DS-022

Client/Location El Segundo Unit 1 Test No. 9-1430-ELSG-6 Method 1 Page 1
 Sample Location Unit 1 South duct Fuel GAS Ambient Temp., of _____ of _____
 Operators W.O. Meter Vol. (Start/End) 487.5431 Date 8/25/92

Pre Test Data:

[illegible]

Init.	_____	_____	_____	_____
Final	_____	_____	_____	_____

[illegible]

Appendix C.5

Formaldehyde

FORMALDEHYDE EMISSION CALCULATIONS

CLIENT/LOCATION: SCE/EL SEGUNDO

FUEL: oil

F Factor: 9039

Reference Temp (F) 60

Test	ug/train	Vmstd	%O2	Qsd	ug/dscf	ug/m3	ppb	lb/hr	lb/MMbtu
6A-N	ND	0.47	1.35	8.83	241381 ND	0.3 ND	12.3 ND	ND 10	ND1.20E-05
68-N	ND	0.47	0.78	8.83	241381 ND	0.6 ND	21.3 ND	ND 17	ND2.08E-05
7C-S	ND	0.47	1.48	9.54	223103 ND	0.3 ND	11.2 ND	ND 9	ND1.16E-05
AVG					ND	0.4 ND	14.9 ND	ND 12	ND1.48E-05
STACK TOTAL					464484				ND2.60E-02

FORMALDEHYDE EMISSION CALCULATIONS

CLIENT/LOCATION: SCE/EL SEGUNDO

FUEL: gas

F Factor: 8487

Reference Temp (F) 60

Test	ug/train	Vmstd	%O2	Qsd	ug/dscf	ug/m3	ppb	lb/hr	lb/MMbtu
8A-S	13.9	1.38	7.4	200503	10.1	355.7	280	2.67E-01	2.92E-04
8B-N	7.4	1.04	8.43	218595	7.1	251.3	198	2.06E-01	2.23E-04
8C-N	7.3	1.51	8.43	218595	4.8	170.7	135	1.40E-01	1.51E-04
AVG					7.3	259.2	204		2.22E-04
STACK TOTAL				419098				4.07E-01	

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05/01/90

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	SCE/ELS	*	Date.....	2/24/90
Test Number.....	6A-FORM	*	Data By.....	AB
Test Method.....	430	*	Sample Location.....	N. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	
Bar Press (in Hg).....	30.34	*	Nozzle Diam (in).....	
Meter Vol (acf).....	1.390	*	Meter Temp (F).....	78.0
Stack Press (iwg).....		*	Stack Temp (F).....	
Vel Head (iwg).....		*	O2 (%): from CEM.....	
Liquid Vol (ml).....		*	from portable...	8.83
Meter Press (iwg).....	0.01	*	CO2 (%): from CEM.....	
		*	calculated.....	0.00
		*	Start/Stop Time.....	1311/1341
Std Sample Vol (SCF).....				1.35
Metric Sample Vol (cubic meters).....				0.04

Client/Location SEE EL SCANDCO Unit DL Test No. 6A-Form Method 1
 Sample Location North Duct #202 C Fuel DL Ambient Temp., °F 1 of 1
 Operators M. Schmitt Meter Vol. (Start/End) 1 Date 2/24/90

Pre Test Data:

Equipment Info:

Barometric Press, in. Hg 30.34
 Stack Area, sq. ft. ES-8
 Sample Time/ Pt, min. 1311
 Assumed Stack Press 1318.30
 Assumed Moisture 1326
 Assumed Molecular Wt 1333.30
 Meter No. ES-8
 Meter, Yd 1341
 Pitot, Cp 1341
 CFM @ $\Delta H = 1.0$ 1341
 Probe I.O. 1341
 Nozzle No./Dia 1341
 Filter No. 1341

Leak Check:

Imp. Matl Ht(End) (Start) (g)
 #1 DMH 10ML
 #2 DMH 10ML
 #3 DMH 10ML
 #4 DMH 10ML
 Total 10ML
 Impinger Box I.O. 10ML
 Integrated Bag I.O. 10ML

Sample Train

CFM Vac. Int. Pitot IBS
 Pre-Test 10ML
 Post-Test 10ML

Pre-Test Calibration

Meter Meter Temp.
 Time ΔH Reading In Out
 Init. 10ML
 Final 10ML

Sample Point	Time	Meter Conditions			Temperatures, °F				Static Press. ΔH	Vacuum	O ₂	Test Summary
		ΔP	ΔH	Meter Reading	Probe	Meter In	Out	Oven	Imp. Out			
-1	1311			826.785								Initial <u>KBB</u>
-2	1318.30			827.286								Sample Vol., c.f. <u>1.39</u>
-3	1326			827.770								Stack Press, ΔH <u>1.39</u>
-4	1333.30			827.995								ΔP <u>1wg</u> ΔH <u>0.1</u> <u>1wg</u>
-	1341			828.175								Meter Temp., °F <u>assumed 28.0</u>
												Stack Temp., °F
												Water Collected, g
												O ₂ /CO ₂ Method
												Chain of Cust. Info (Init.):
												Impingers Loaded
												Impingers Recovered
												Filter Loaded
												Filter Recovered
												Probe Wash
												Comments:
Total/Average												

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05/01/90

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	SCE/ELS	•	Date.....	2/24/90
Test Number.....	6B-FORM	*	Data By.....	AB
Test Method.....	430	*	Sample Location.....	N. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	•	Sample Time (Min).....	
Bar Press (in Hg).....	30.34	•	Nozzle Diam (in).....	
Meter Vol (acf).....	0.803	•	Meter Temp (F).....	78.0
Stack Press (iwg).....		•	Stack Temp (F).....	
Vel Head (iwg).....		•	O2 (%): from CEM.....	
Liquid Vol (ml).....		•	from portable... 8.83	
Meter Press (iwg).....	0.01	*	CO2 (%): from CEM.....	
		*	calculated..... 0.00	
		*	Start/Stop Time.....	1349/1419
Std Sample Vol (SCF).....				0.78
Metric Sample Vol (cubic meters).....				0.02

Client/Location SCE/EL SEGUNDO Unit _____ Test No. 6-B-FOA Method _____ Page 1
 Sample Location North Duct PORT E Fuel _____ Ambient Temp., °F _____ of 1
 Operators A. SCHMITT Meter Vol. (Start/End) 1 Date 2/24/90

Pre Test Data:
 Barometric Press, in. Hg 30.34
 Stack Area, sq. ft. _____
 Sample Time/ Pt, min. _____
 Assumed Stack Press _____
 Assumed Moisture _____
 Assumed Molecular Wt _____

Equipment Info:
 Meter No. ES-8
 Meter, Yd .990
 Pitot, Cp _____
 CFM $\theta \Delta H = 1.0$ 598
 Probe I.D. _____
 Nozzle No./Dia _____
 Filter No. _____

Imp. Matl Wt(End) (Start) (g)
 #1 NATH _____ DMV
 #2 NATH _____ DM
 #3 _____ _____ _____
 #4 _____ _____ _____
 Total _____
 Impinger, Box I.D. _____
 Integrated Bag I.D. _____

Weight Weight
 Leak Check: _____

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. ΔH	Vacuum	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Meter Out				
E-1	1349		101	828.175							Initial	
-2	1356.30		1	828.525							Sample Vol., c.f. <u>803</u>	
-3	1404		1	828.679							Stack Press, ΔH	
-4	1411.30		1	828.823							ΔP <u>1wg</u> ΔH <u>1wg</u>	
-	1419		✓	828.978							Meter Temp., °F <u>65.0</u>	
											Stack Temp., °F	
											Water Collected, g	
											O ₂ /CO ₂ Method	
											Chain of Cust. Info (Init.):	
											Impingers Loaded	
											Impingers Recovered	
											Filter Loaded	
											Filter Recovered	
											Probe Wash	
											Comments:	
Total/Average												

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05/01/90

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	SCE/ELS	*	Date.....	2/24/90
Test Number.....	7C-FORM	*	Data By.....	AB
Test Method.....	430	*	Sample Location.....	S. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-19	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	1.0000
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	
Bar Press (in Hg).....	30.37	*	Nozzle Diam (in).....	
Meter Vol (acf).....	1.507	*	Meter Temp (F).....	78.6
Stack Press (iwg).....		*	Stack Temp (F).....	
Vel Head (iwg).....		*	O2 (%): from CEM.....	
Liquid Vol (ml).....		*	from portable...	9.54
Meter Press (iwg).....	0.01	*	CO2 (%): from CEM.....	
		*	calculated.....	0.00
		*	Start/Stop Time.....	1735/1804
Std Sample Vol (SCF).....				1.48
Metric Sample Vol (cubic meters).....				0.04

Client/Location SCE/EL SEGUNDO Unit 1 Test No. 10-1000 Method 1 Page 1
 Sample Location SOX BQ FAN DUCT OUTLET Fuel oil Ambient Temp., °F 1 of 1
 Operators S. Mulligan Meter Vol. (Start/End) 484.52/486.032 Date 2-24

Pre Test Data:
 Barometric Press, in. Hg 30.37
 Stack Area, sq. ft. 73.44
 Sample Time/ Pt, min. 30
 Assumed Stack Press -.22
 Assumed Moisture 9%
 Assumed Molecular Wt 21
 Equipment Info:
 Meter No. FS-15
 Meter, Yd 1.00
 Pitot, Cp .84
 CFM @ ΔH = 1.0 515
 Probe I.D. 7/8
 Nozzle No./Dia 4/8
 Filter No. N/A
 Imp. Matl 1 Weight (Start) (g) 1042
 #1 1042
 #2 1042
 #3 0
 #4 0
 Total 0
 Impinger Box I.D. 0
 Integrated Bag I.D. 0
 Leak Check: Pre-Test
Post-Test
 Pre-Test Calibration
 Meter Meter Temp.
 Time ΔH Reading In Out
 Init. 0
 Final 0

Sample Point	Time	Meter Conditions				Temperatures, °F				Static Press. twg	Vacuum	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O ₂		
Start	17:35			484.522			78	81		2		Initial	RB
	17:43			484.912			77	80		2		Sample Vol., c.f. 1.507	
	17:46			485.271			77	79		2		Stack Press, twg	
	17:57			485.165			78	79				ΔP twg ΔH twg	
5102	18:04			486.032								Meter Temp., °F	78.62
												Stack Temp., °F	
												Water Collected, g	
												O ₂ /CO ₂ Method	
												Chain of Cust. Info (init.):	
												Impingers Loaded	
												Impingers Recovered	
												Filter Loaded	
												Filter Recovered	
												Probe Wash	
												Comments:	
Total/Average													

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05/01/90

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	SCE/ELS	*	Date.....	2/25/90
Test Number.....	8A-FORM	*	Data By.....	AB
Test Method.....	430	*	Sample Location.....	S. DUCT
Fuel.....	GAS	*	Reference Temp (F).....	60
Control Box #.....	ES-19	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	1.0000
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	
Bar Press (in Hg).....	30.23	*	Nozzle Diam (in).....	
Meter Vol (acf).....	1.414	*	Meter Temp (F).....	79.0
Stack Press (iwg).....		*	Stack Temp (F).....	
Vel Head (iwg).....		*	O2 (%): from CEM.....	
Liquid Vol (ml).....		*	from portable...	7.40
Meter Press (iwg).....	0.01	*	CO2 (%): from CEM.....	
		*	calculated.....	0.00
		*	Start/Stop Time.....	1102/1132
Std Sample Vol (SCF).....				1.38
Metric Sample Vol (cubic meters).....				0.04

Client/Location SCE/EL SEGUNDO Unit 1 Test No. 84 Form-B Method 1 Page 1
 Sample Location South Duct Ambient Temp., of 1 of 1
 Operators FINKEN/OSBORNE Meter Vol. (Start/End) 1 Date 2/25/80

Pre Test Data:
 Barometric Press, in. Hg 30.23
 Stack Area, sq. ft. 73.48
 Sample Time/ Pt, min. 7.5
 Assumed Stack Press .23
 Assumed Moisture 12
 Assumed Molecular Wt 28

Equipment Info:
 Meter No. ES-19
 Meter, Yd 1.0
 Pitot, Cp N/A
 CFM $\Delta H = 1.0$ 1595
 Probe I.D. Top
 Nozzle No./Dia N/A
 Filter No. N/A

Weight Weight
 Imp. Matl Wt(End) (Start) (g)
 #1 DNPH 10ml
 #2 DNPH 10ml
 #3 -
 #4 25
 Total -
 Impinger Box I.D. -
 Integrated Bag I.D. -

Leak Check:
 CFM Vac. Init. Pitot 1BS
 Pre-Test -
 Post-Test -
 Pre-Test Calibration
 Meter Meter Temp.
 Time ΔH Reading In Out
 Init. -
 Final -

Field Blank = 15 ml DNPH
 Field Spike = 15 ml DNPH + 1 ml 50,000X Pima White ash
 25.4 mg Pima White ash

Sample Point	Time	Meter Conditions			Temperatures, OF				Static Press. twg	Test Summary		
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Meter Out				
1-1	1102			486.000			79	79		Initial	Sample Vol., c.f.	1.414
3	1109:30			486.350			79	79		Stack Press, twg	ΔP twg	79
5	1117			486.710			79	79		Meter Temp., OF	Stack Temp., OF	
7	1124:30			487.10			79	79		Water Collected, g	O ₂ /CO ₂ Method	
1132				487.414						Chain of Cust. Info (init.):	Impingers Loaded	AB
										Impingers Recovered	Filter Loaded	
										Filter Recovered	Probe Wash	
										Comments:	O ₂ 8.5.41	
												28.3
												= 290
Total/Average												

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05/01/90

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	SCE/ELS	*	Date.....	2/25/90
Test Number.....	8B-FORM	*	Data By.....	AB
Test Method.....	430	*	Sample Location.....	N. DUCT
Fuel.....	GAS	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	
Bar Press (in Hg).....	30.23	*	Nozzle Diam (in).....	
Meter Vol (acf).....	1.103	*	Meter Temp (F).....	90.0
Stack Press (iwg).....		*	Stack Temp (F).....	
Vel Head (iwg).....		*	O2 (%): from CEM.....	
Liquid Vol (ml).....		*	from portable...	8.43
Meter Press (iwg).....	0.01	*	CO2 (%): from CEM.....	
		*	calculated.....	0.00
		*	Start/Stop Time.....	1240/1310
Std Sample Vol (SCF).....				1.04
Metric Sample Vol (cubic meters).....				0.03

Client/Location SAB EL Sea Unit 1 Test No. 813-Form-0003 Page 1
 Sample Location North Duct Fuel GAS Method 1 of 1
 Operators Finkler Ambient Temp., °F 70 Date 2/28/80
 Meter Vol. (Start/End) 1

Pre Test Data:
 Barometric Press, in. Hg 30.23
 Stack Area, sq. ft. 1.0
 Sample Time/ Pt. min. N/A
 Assumed Stack Press 598
 Assumed Moisture 100%
 Assumed Molecular Wt N/A

Equipment Info:
 Meter No. ES-8
 Meter, Yd 1.0
 Pitot, Cp N/A
 CFM $\Delta H = 1.0$ 598
 Probe I.D. 1/8"
 Nozzle No./Dia N/A
 Filter No. N/A

Imp. Matl Wt(End) (Start) (g)
 #1 DNPH 10.1
 #2 DNPH 10.1
 #3 DNPH 0
 #4 SG 0
 Total 0
 Impinger Box I.D. 0
 Integrated Bag I.D. 0

Leak Check:
 Pre-Test 0
 Post-Test 0

CFM Vac. Init. Pitot IBS
 Pre-Test 0
 Post-Test 0

Pre-Test Calibration
 Meter Meter Temp.
 Time ΔH Reading In Out
 Init. 0
 Final 0

Sample Point	Time	Meter Conditions			Temperatures, °F				Static Press. ΔH	Vacuum	O ₂	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out			
North C-7	1240			905.973			90	90				Initial	
5	1247:30			906.05			90	90				Sample Vol., c.f.: <u>1.103</u>	
3	1255			906.26			90	90				Stack Press, ΔH <u>90</u>	
1	1302:30			906.70			90	90				Meter Temp., °F <u>90</u>	
	1310			907.076			90	90				Stack Temp., °F <u>90</u>	
												Water Collected, g	
												O ₂ /CO ₂ Method	
												Chain of Cust. Info (Init.):	
												Impingers Loaded	
												Impingers Recovered	
												Filter Loaded	
												Filter Recovered	
												Probe Wash	
Comments:													
Total/Average													

CARNOT

05/01/90

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	SCE/ELS	*	Date.....	2/25/90
Test Number.....	8C-FORM	*	Data By.....	AB
Test Method.....	430	*	Sample Location.....	N. DUCT
Fuel.....	GAS	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	
Bar Press (in Hg).....	30.23	*	Nozzle Diam (in).....	
Meter Vol (acf).....	1.601	●	Meter Temp (F).....	90.0
Stack Press (iwg).....		*	Stack Temp (F).....	
Vel Head (iwg).....		*	O2 (%): from CEM.....	
Liquid Vol (ml).....		*	from portable...	8.43
Meter Press (iwg).....	0.01	●	CO2 (%): from CEM.....	
		*	calculated.....	0.00
		*	Start/Stop Time.....	1320/1350
Std Sample Vol (SCF).....				1.51
Metric Sample Vol (cubic meters).....				0.04

Client/Location SCE/El Segundo Unit 1 Test No. 8250-159 Method 430 Page 1
 Sample Location North Hill Fuel Gas Ambient Temp., °F 1 of 1
 Operators RE Meter Vol. (Start/End) 1 Date 7/25/90

Pre Test Data:
 Barometric Press, in. Hg 30.25
 Stack Area, sq. ft. _____
 Sample Time/ Pt, min. _____
 Assumed Stack Press _____
 Assumed Moisture _____
 Assumed Molecular Wt _____
Equipment Info:
 Meter No. ES-8
 Meter, Yd 10,990
 Pitot, Cp N/A
 CFM $\theta \Delta H = 1.0$ 598
 Probe I.D. TEKON
 Nozzle No./Dia N/A
 Filter No. N/A
Weight
 Imp. Matl WASH
 Wt(End) (Start) (g) 12.2 12.2
 Impinger Box I.D. _____
 Integrated Bag I.D. _____
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				O ₂	Vacuum	Static Press. $\frac{1}{2}$ wg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out		
07	1320		N/A	907.079			90	90				Initial <u>AB</u>
5	1327:30		N/A	907.600			90	90				Sample Vol., c.f. <u>1.601</u>
3	1335			908.15			90	90				Stack Press, $\frac{1}{2}$ wg <u>90</u>
1	1342:30			908.68								ΔP $\frac{1}{2}$ wg ΔH <u>90</u>
	1350											Meter Temp., °F
												Stack Temp., °F
												Water Collected, g
												O ₂ /CO ₂ Method
												Chain of Cust. Info (Init.):
												Impingers Loaded
												Impingers Recovered
												Filter Loaded
												Filter Recovered
												Probe Wash
												Comments:
Total/Average												

SCE/El Segundo Project # 53304

5/7/90
A. Bell

Formaldehyde calculations

Re: Radon laboratory report # PO-02-112

Formaldehyde field blank = $16.3 \mu\text{g}$

Field spike = $23.9 \mu\text{g} - 16.3 \mu\text{g} = 7.6 \mu\text{g}$

$7.6 \mu\text{g} = 103\%$ of nominal value of $7.4 \mu\text{g}$

For samples subtract field blank to detection limit

Test # $\mu\text{g}/\text{sample} - \mu\text{g in blank}$

6A-Form $< 0.47 \mu\text{g}$

6B-Form $< 0.47 \mu\text{g}$

6C-Form $< 0.47 \mu\text{g}$

8A-Form $13.9 \mu\text{g}$

8B-Form $7.4 \mu\text{g}$

8C-Form $7.3 \mu\text{g}$

Analytical Report
03/20/90

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

Customer Work Identification Energy Systems Associates Purchase Order Number 5772 5791
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Contents:	
1	Analytical Data Summary
2	Sample History
3	Comments Summary
4	Notes and Definitions

Radian Analytical Services
900 Perimeter Park
Morrisville, NC 27560

919-431-0212

Client Services Coordinator: JFMCGAUGHEY

Certified by: 

Previously Reported on 03/20/90.
First Reported on 03/19/90.

Energy Systems Associates
 Radian Work Order: PO-02-112

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

Sample ID:	TEST 6A-FORM--	TEST 6B-FORM--	TEST 6C-FORM--	TEST 8A-FORM--
	ELS (1&2)	ELS (1&2)	ELS (1&2)	ELS (A&B)
Factor:	0.53	0.53	0.53	0.53
Results in:	total ug	total ug	total ug	total ug
	01A	02A	03A	04A
Matrix:	AIR	AIR	AIR	AIR

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Formaldehyde	15.7	0.47	16.2	0.47	15.0	0.47	30.2	0.47

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

6A, 6B, 6C - residual air
 8A, 8B, 8C - gas fuel

Energy Systems Associates
 Radian Work Order: P0-02-112

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

Sample ID:	TEST 8B-FORM-- ELS (A&B)	TEST 8C-FORM-- ELS (A&B)	FIELD SPIKE	FORM BLANK
Factor:	0.53	0.53	0.53	0.53
Results in:	total ug	total ug	total ug	total ug
	05A	06A	07A	08A
Matrix:	AIR	AIR	AIR	AIR

Formaldehyde

Result	Det. Limit
23.7	0.47

Result	Det. Limit
23.6	0.47

Result	Det. Limit
23.9	0.47

Result	Det. Limit
16.3	0.47

(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-02-112

Method: Aldehydes by HPLC (1)

List: Aldehydes Analyte List

Sample ID:

MATRIX SPIKE

MATRIX SPIKE

METHOD BLANK

Factor:

0.53

DUP

0.53

1

Results in:

%

%

total ug

Matrix:

09A

10A

11A

AIR

AIR

AIR

Formaldehyde

Result Det. Limit

97

Result Det. Limit

116

Result Det. Limit

ND

0.89

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.

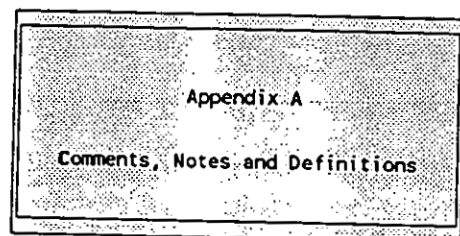
Energy Systems Associates
 Radian Work Order: P0-02-112

Sample Identifications and Dates

Sample ID	FIELD SPIKE	FORM BLANK	MATRIX SPIKE	MATRIX SPIKE DUP	METHOD BLANK
Date Sampled					
Date Received	02/28/90	02/28/90	02/28/90	02/28/90	02/28/90
Matrix	AIR	AIR	AIR	AIR	AIR
	07	08	09	10	11

Aldehydes by HPLC

Prepared	03/09/90	03/09/90	03/09/90	03/09/90	03/09/90
Analyzed	03/15/90	03/15/90	03/13/90	03/13/90	03/13/90
Analyst	JS	JS	JS	JS	JS
File ID	ESA8	ESA10	SUD19	SUD20	SVD14
Blank ID					
Instrument	V5000	V5000	V5000	V5000	V5000
Report as	received	received	received	received	received



Energy Systems Associates
Radian Work Order: P0-02-112

ND This flag (or <) is used to denote analytes which are not detected at or above the specified detection limit. The value to the right of the < symbol is the method specified detection limit for the sample.

Energy Systems Associates
Radian Work Order: PO-02-112

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. 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), 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		8.43	1.51E-02	8.44E-06
Acenaphthylene	ND<	0.01	ND< 1.31E-05	ND< 6.92E-09
Acenaphthene	<	0.02	< 4.12E-05	< 2.12E-08
Fluorene	<	0.01	< 2.16E-05	< 1.12E-08
Phenanthrene	<	0.12	< 2.06E-04	< 1.08E-07
Anthracene	<	0.02	< 2.76E-05	< 1.43E-08
Fluoranthene	<	0.08	< 1.51E-04	< 7.78E-08
Pyrene	<	0.08	< 1.37E-04	< 7.07E-08
Chrysene	<	0.05	< 8.87E-05	< 4.55E-08
Benz(a)anthracene	<	0.11	< 1.97E-04	< 1.02E-07
Benzo(b+k)fluoranthene	<	0.04	< 6.52E-05	< 3.65E-08
Benzo(a)pyrene	ND<	0.01	ND< 1.31E-05	ND< 6.92E-09
Indeno(1,2,3-cd)pyrene	<	0.07	< 1.20E-04	< 6.25E-08
Dibenzo(a,h)anthracene	<	0.03	< 4.78E-05	< 2.47E-08
Benzo(g,h,i)perylene	<	0.07	< 1.34E-04	< 6.95E-08

Average Total PAH (UNIT TOTAL)	<	9.14	< 1.63E-02	< 9.10E-06
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PAH CALCULATIONS

CLIENT:	SCE/EL SEGUNDO	INITIALS:	AB
PROJECT NO:	53304	VMSTD(DSCF):	123.34
TEST DATE:	2/22/90	QSD(DSCF/MIN):	256245
TEST NUMBER:	2-PAH-N	CO2,%:	9.63
T REF (F)	60	O2,%:	7.9
Fuel: oil		F factor	9039

SPECIES		ug/train		ug/dscm		lb/hr		lb/MMBtu
Naphthalene		11.000		3.149		3.02E-03		2.85E-06
Acenaphthylene	ND<	0.025	ND<	0.007	ND<	6.86E-06	ND<	6.49E-09
Acenaphthene		0.190		0.054		5.22E-05		4.93E-08
Fluorene		0.075		0.021		2.06E-05		1.95E-08
Phenanthrene		0.840		0.240		2.31E-04		2.18E-07
Anthracene		0.110		0.031		3.02E-05		2.85E-08
Fluoranthene		0.730		0.209		2.00E-04		1.89E-07
Pyrene		0.660		0.189		1.81E-04		1.71E-07
Chrysene		0.440		0.126		1.21E-04		1.14E-07
Benz(a)anthracene		0.970		0.278		2.66E-04		2.52E-07
Benzo(b+k)fluoranthene	ND<	0.025	ND<	0.007	ND<	6.86E-06	ND<	6.49E-09
Benzo(a)pyrene	ND<	0.025	ND<	0.007	ND<	6.86E-06	ND<	6.49E-09
Indeno(1,2,3-cd)pyrene		0.530		0.152		1.46E-04		1.38E-07
Dibenzo(a,h)anthracene		0.210		0.060		5.77E-05		5.45E-08
Benzo(g,h,i)perylene		0.610		0.175		1.67E-04		1.58E-07
TOTAL PAH	<	16.44	<	4.706	<	4.51E-03	<	4.27E-06

RESULTS ARE FOR ONE DUCT ONLY

PAH CALCULATIONS

CLIENT:	SCE/EL SEGUNDO	INITIALS:	AB
PROJECT NO:	53304	VMSTD(DSCF):	124.48
TEST DATE:	2/22/90	QSD(DSCF/MIN):	246762
TEST NUMBER:	3-PAH-N	CO2,%:	9.49
T REF (F)	60	O2,%:	8.04
Fuel: oil		F Factor	9039

SPECIES	ug/train	ug/dscm	lb/hr	lb/MMBtu
Naphthalene	0.260	0.074	6.81E-05	6.76E-08
Acenaphthylene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Acenaphthene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Fluorene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Phenanthrene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Anthracene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Fluoranthene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Pyrene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Chrysene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Benz(a)anthracene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Benzo(b+k)fluoranthene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Benzo(a)pyrene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Indeno(1,2,3-cd)pyrene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Dibenzo(a,h)anthracene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09
Benzo(g,h,i)perylene	ND< 0.025	ND< 0.007	ND< 6.55E-06	ND< 6.50E-09

TOTAL PAH	< 0.61	< 0.173	< 1.60E-04	< 1.59E-07
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RESULTS ARE FOR ONE DUCT ONLY

PAH CALCULATIONS

CLIENT:	SCE/EL SEGUNDO	INITIALS:	AB
PROJECT NO:	53304	VMSTD(DSCF):	115.21
TEST DATE:	2/24/90	QSD(DSCF/MIN):	226547
TEST NUMBER:	6-PAH-S	CO2, %:	8.37
T REF (F)	60	O2, %:	9.29
Fuel: oil		F Factor	9039

SPECIES	ug/train	ug/dscm	lb/hr	lb/MMbtu
Naphthalene	72.000	22.067	1.87E-02	2.24E-05
Acenaphthylene	ND< 0.025	ND< 0.008	ND< 6.50E-06	ND< 7.78E-09
Acenaphthene	ND< 0.025	ND< 0.008	ND< 6.50E-06	ND< 7.78E-09
Fluorene	ND< 0.025	ND< 0.008	ND< 6.50E-06	ND< 7.78E-09
Phenanthrene	0.320	0.098	8.32E-05	9.95E-08
Anthracene	ND< 0.025	ND< 0.008	ND< 6.50E-06	ND< 7.78E-09
Fluoranthene	0.120	0.037	3.12E-05	3.73E-08
Pyrene	0.110	0.034	2.86E-05	3.42E-08
Chrysene	0.051	0.016	1.33E-05	1.59E-08
Benz(a)anthracene	0.150	0.046	3.90E-05	4.67E-08
Benzo(b+k)fluoranthene	0.310	0.095	8.06E-05	9.64E-08
Benzo(a)pyrene	ND< 0.025	ND< 0.008	ND< 6.50E-06	ND< 7.78E-09
Indeno(1,2,3-cd)pyrene	0.140	0.043	3.64E-05	4.36E-08
Dibenzo(a,h)anthracene	0.042	0.013	1.09E-05	1.31E-08
Benzo(g,h,i)perylene	0.140	0.043	3.64E-05	4.36E-08

TOTAL PAH	< 73.508	< 22.529	< 1.91E-02	< 2.29E-05
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RESULTS ARE FOR ONE DUCT ONLY

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/22/90
Test Number.....	2-PAH	*	Data By.....	RBB
Test Method.....	429	*	Sample Location.....	N.DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	189
Bar Press (in Hg).....	30.28	*	Nozzle Diam (in).....	0.194
Meter Vol (acf).....	133.489	*	Meter Temp (F).....	105.8
Stack Press (iwg).....	0.40	*	Stack Temp (F).....	327.2
Vel Head (iwg).....	1.9600	*	O2 (%): from CEM.....	7.27
Liquid Vol (ml).....	255.8	*	from portable...	7.90
Meter Press (iwg).....	1.68	*	CO2 (%): from CEM.....	10.10
		*	calculated.....	9.63
		*	Start/Stop Time.....	1200/1531
Std Sample Vol (SCF).....				123.34
Metric Sample Vol (cubic meters).....				3.49
Moisture Fraction.....				0.088
Stack Gas Mol Wt.....				28.81
Stack Gas Velocity (ft/sec).....				95.30
Stack Flow Rate (wacfm).....				419,941
Stack Flow Rate (dscfm).....				256,245
Isokinetic Ratio (%).....				91.08

Client/Location S.L.F. / ELSC GUARD Unit 1 Test No. 2-PAH-ELS Method 429 Page 1
 Sample Location NORTH DOCT Fuel oil Ambient Temp., OF 63 of 3
 Operators M. Schwartz Meter Vol. (Start/End) 33724 / 340460 Date 2/22/90

Pre Test Data:
 Barometric Press, in. Hg 30.44
 Stack Area, sq. ft. 73.44
 Sample Time/ Pt. min. 4.5
 Assumed Stack Press 9.5
 Assumed Moisture 29
 Assumed Molecular Wt 29

Equipment Info:
 Meter No. ES-8
 Meter, Yd 1.990
 Pitot, Cp 1.84
 CFM @ $\Delta H = 1.0$ 598
 Probe I.D. 10' Glass
 Nozzle No./Dia 194 Impinger Box I.D.
 Filter No. 110-728
 Co./Jr ESA-107

Weight
 Imp. Matl Wt(End) (Start) (g)
 #1 0 683.8 - 484.8 = 219.0
 #2 16.0 611.3 - 614.2 = -2.9
 #3 0 490.8 - 489.0 = 1.8
 #4 gcl 824.5 - 786.6 = 37.9
 Total 46 = 255.8

Leak Check:
 Pre-Test OK Vac. Init. Pitot 185
 Post-Test OK 9" MS OK
 Pre-Test Calibration

Meter Meter Temp.
 Time ΔH Reading In Out
 Init. 8091
 Final 8091

Sample Point	Time	Meter Conditions			Temperatures			Coil		Static Press. twg	Test Summary
		ΔP	ΔH	Meter Reading	Probe	In	Out	Oven	Imp. Out		
A-7	1200	1.1	89	340.460	332	255	99	92	257	50	Initial
-6	1204.30	1.50	128	348.000	334	264	112	93	260	44	Sample Vol., c.f. 133.489
-5	1209	2.1	170	345.710	327	271	114	92	260	40	Stack Press, twg 1.4
-4	1213.30	2.4	198	348.800	327	286	117	92	263	40	ΔP 1.960 twg ΔH 1.68 twg
-3	1218	2.1	251	352.281	321	253	119	93	265	39	Meter Temp., OF 105.8
-2	1223.30	3.3	267	356.120	318	254	120	93	268	40	Stack Temp., OF 327.1
-1	1228	2.7	335	360.100	312	256	122	95	271	39	Water Collected, g 255.6
-	1232.30	1.0	281	363.982							O ₂ /CO ₂ Method
B-7	1240	1.0	81	363.982	334	241	104	96	275	49	Chain of Cust. Info (Init.):
-6	1244.30	1.53	43	366.310	336	242	111	97	276	46	Impingers Loaded 100
-5	1249	1.75	61	368.177	334	248	110	97	273	44	Impingers Recovered 100
-4	1253.30	2.1	17	370.100	328	247	120	97	270	46	Filter Loaded 100
-3	1258	2.0	162	373.402	321	252	123	97	274	46	Filter Recovered 100
-2	1302.30	1.7	138	376.655	318	254	124	98	271	45	Probe Wash
-1	1307	2.1	17	380.405	316	258	122	99	272	45	Comments:
-	1311.30			383.161							
C-7	1315	1.72	158	383.161	336	247	103	98	260	46	
-6	1319.30	1.45	136	384.950	338	236	109	97	253	51	
Total/Average											

checked by RB
 91.96 8.72 in.0
 EST DS-022 Rev. 9/89

Client/Location SCE EL SEGUNDO Unit 1 Test No. 2-PAH-ELG Method 129 Page 2
 Sample Location North Duct Fuel OIL Ambient Temp., OF 3 of 3
 Operators M. Schmitt Meter Vol. (Start/End) 1 Date 2/22/90

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) _____
 #1 _____
 #2 _____
 #3 _____
 #4 _____
 Total _____
 Impinger Box I.D. _____
 Integrated Bag I.D. _____
 Leak Check: _____
 Sample Train
 CFM Vac. _____
 Inft. 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, OF					COIL		Static Press. lwg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter		Oven	Temp. Out	O ₂		
							In	Out					
C-9	1324	.85	.69	386.647	337	269	110	96	248	53	7.3		Initial
C-9	1320.30	2.4	1.94	388.840	330	280	116	96	245	48	7.8		Sample Vol., c.f.
-3	1333	3.1	2.51	391.931	324	243	119	96	245	46	8.8		Stack Press, lwg
-2	1337.30	1.3	1.05	396.00	318	236	120	97	245	49	9.4		ΔP lwg ΔH lwg
-1	1348	1.0	.81	398.720	316	266	114	97	245	47	9.3		Meter Temp., OF
D-7	1346.30	1.7	1.38	401.048	334	254			240	54			Stack Temp., OF
-1	1349	1.7	1.38	401.048	334	254	110	96	240	54	7.4		Water Collected, g
-3	1353.30	2.0	1.67	404.100	336	245	116	97	241	46	6.8		O ₂ /CO ₂ Method
-5	1358	2.2	1.18	407.191	337	250	115	97	245	45	6.7		Chain of Cust. Info (Inft.):
-4	1402.30	2.9	2.35	410.100	333	255	117	97	246	47	7.0		Impingers Loaded
-3	1407	3.8	3.07	413.941	322	259	121	98	245	48	8.2		Impingers Recovered
-2	1411.30	1.7	1.38	419.133	318	257	122	98	246	48	9.0		Filter Loaded
-1	1416	1.0	.81	421.770	317	259	115	98	246	50			Filter Recovered
-	1420.30	2.9	2.35	424.143									Probe Wash
E-7	1423	2.9	2.35	424.143	338	258	105	96	246	53	6.7		Comments:
-6	1427.30	2.9	2.35	428.219	338	256	118	97	247	53	6.5		
-5	1432	2.7	2.18	431.455	340	255	118	98	248	47	6.8		
-4	1436.30	4.2	3.4	435.200	331	260	121	98	245	46			
Total/Average													

[illegible]

	Init.	Final
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	1	1
7	1	1
8	1	1
9	1	1
10	1	1
11	1	1
12	1	1
13	1	1
14	1	1
15	1	1
16	1	1
17	1	1
18	1	1
19	1	1
20	1	1
21	1	1
22	1	1
23	1	1
24	1	1
25	1	1
26	1	1
27	1	1
28	1	1
29	1	1
30	1	1
31	1	1
32	1	1
33	1	1
34	1	1
35	1	1
36	1	1
37	1	1
38	1	1
39	1	1
40	1	1
41	1	1
42	1	1
43	1	1
44	1	1
45	1	1
46	1	1
47	1	1
48	1	1
49	1	1
50	1	1
51	1	1
52	1	1
53	1	1
54	1	1
55	1	1
56	1	1
57	1	1
58	1	1
59	1	1
60	1	1
61	1	1
62	1	1
63	1	1
64	1	1
65	1	1
66	1	1
67	1	1
68	1	1
69	1	1
70	1	1
71	1	1
72	1	1
73	1	1
74	1	1
75	1	1
76	1	1
77	1	1
78	1	1
79	1	1
80	1	1
81	1	1
82	1	1
83	1	1
84	1	1
85	1	1
86	1	1
87	1	1
88	1	1
89	1	1
90	1	1
91	1	1
92	1	1
93	1	1
94	1	1
95	1	1
96	1	1
97	1	1
98	1	1
99	1	1
100	1	1

105-8

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/22/90
Test Number.....	3-PAH	*	Data By.....	RBB
Test Method.....	429	*	Sample Location.....	N. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	190
Bar Press (in Hg).....	30.44	*	Nozzle Diam (in).....	0.194
Meter Vol (acf).....	132.500	*	Meter Temp (F).....	99.3
Stack Press (iwg).....	0.40	*	Stack Temp (F).....	328.9
Vel Head (iwg).....	1.7930	*	O2 (%): from CEM.....	7.66
Liquid Vol (ml).....	240.2	*	from portable...	8.04
Meter Press (iwg).....	1.63	*	CO2 (%): from CEM.....	9.77
		*	calculated.....	9.49
		*	Start/Stop Time.....	1706/2041
Std Sample Vol (SCF).....				124.48
Metric Sample Vol (cubic meters).....				3.53
Moisture Fraction.....				0.082
Stack Gas Mol Wt.....				28.87
Stack Gas Velocity (ft/sec).....				90.93
Stack Flow Rate (wacfm).....				400,676
Stack Flow Rate (dscfm).....				246,762
Isokinetic Ratio (%).....				94.96

Client/Location SCE EL SEGUNDO Unit 1 Test No. 3-PAH-ELS Method 429 Page 1
 Sample Location NORTH DUCT Fuel OIL Ambient Temp., °F 1 of 3
 Operators M. SCHMITT Meter Vol. (Start/End) 1 Date 2/22/90

Pre Test Data:
 Barometric Press, in. Hg 30.44
 Stack Area, sq. ft. 13.44
 Sample Time/ Pt. min. 4 1/2
 Assumed Stack Press + .5
 Assumed Moisture 9
 Assumed Molecular Wt 28
 Equipment Info:
 Meter No. ES-8
 Meter, Yd 990
 Pitot, Cp .84
 CFM $\Delta H = 1.0$ 598
 Probe I.D. 10.6/AS
 Nozzle No./Dia 1.94
 Filter No. 110-729
 Impinger Box I.D. 110-729
 Integrated Bag I.D. 110-729

Weight Weight
 Imp. Matl Wt(End) (Start) (g) Leak Check:
 #1 66.6 - 460.6 = 204.0
 #2 62.1 - 626.2 = -4.9
 #3 46.4 - 464.6 = -18
 #4 797.5 - 758.2 = 39.3
 Total - = 200.2
 Pre-Test Calibration
 Pre-Test OK VAC. Init. Pitot 18 M.S.
 Post-Test OK 7.11 M.S. OK
 Time ΔH Reading In Out
 Init. - Final -
 Meter Meter Temp.
 Sample Train
 CFM OK VAC. Init. Pitot 18 M.S.
 Pre-Test OK 7.11 M.S. OK
 Post-Test OK 7.11 M.S. OK

Sample Point	Meter Conditions		Temperatures, °F				Static Press. twg		Vacuum		Test Summary	
	Time	ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O ₂	Initial
F-7	1706	1.8	1.46	474.985	322	244	90	91	285	66	8	0.4
-6	1710.30	2.4	1.94	477.900	321	252	114	92	236	43	9.5	12
-5	1715	2.5	2.02	481.520	325	253	115	92	240	46	9.1	12
-4	1719.30	3.2	2.59	484.741	332	251	116	92	243	42	8.1	12
-3	1724	2.8	2.27	489.321	335	256	116	91	249	41	7.5	12
-2	1728.30	1.3	1.05	492.779	343	247	113	92	253	45	7.0	8
-1	1733	.70	.57	495.480	342	249	107	91	255	45	5	5
-	1737.30	2.3		497.484		231						
E-7	1746	2.3	1.86	497.484	340	231	101	88	240	47	7.3	12
-6	1750.30	2.8	2.27	500.800	340	256	111	89	254	48	7.2	12
-5	1755	2.5	2.02	504.500	341	267	112	89	257	49	7.2	12
-4	1759.30	4.0	3.24	507.976	330	258	114	89	259	48	7.0	14
-3	1804	3.3	2.67	512.210	322	253	112	89	262	52	9.2	14
-2	1808.30	2.7	2.26	516.005	318	246	111	89	265	54	9.3	14
-1	1813	1.2	1.0	520.682	315	234	112	89	262	40	9.4	8
-	1818.30	4.5	1	523.996								
D-7	18:22:30	1.5	1.26	523.996	333	236	104	89	265	41	7.6	9
-6	18:27	2.2	1.84	527.000	335	238	110	89	266	40	7.4	12
Total/Average												

Chain of Cust. Info (Init.):
 Impingers Loaded BF
 Impingers Recovered BF
 Filter Loaded BF
 Filter Recovered BF
 Probe Wash BF
 Comments: -
 Sample Vol., c.f. 132.500
 Stack Press, twg 0.4
 ΔP 1.793 twg ΔH 1.63 twg
 Meter Temp., °F 99.29
 Stack Temp., °F 328.9
 Water Collected, g 240.2
 O₂/CO₂ Method -
 EST DS-022 96.39 8.281120 Rev. 9/89

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SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/24/90
Test Number.....	6-PAH	*	Data By.....	RBB
Test Method.....	429	*	Sample Location.....	S. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-19	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	1.0000
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	189
Bar Press (in Hg).....	30.34	*	Nozzle Diam (in).....	0.194
Meter Vol (acf).....	121.777	*	Meter Temp (F).....	98.9
Stack Press (iwg).....	0.35	*	Stack Temp (F).....	336.5
Vel Head (iwg).....	1.5300	*	O2 (%): from CEM.....	7.45
Liquid Vol (ml).....	228.0	*	from portable...	9.29
Meter Press (iwg).....	1.43	*	CO2 (%): from CEM.....	9.70
		*	calculated.....	8.37
		*	Start/Stop Time.....	0937/1322
Std Sample Vol (SCF).....				115.21
Metric Sample Vol (cubic meters).....				3.26
Moisture Fraction.....				0.084
Stack Gas Mol Wt.....				28.72
Stack Gas Velocity (ft/sec).....				84.75
Stack Flow Rate (wacfm).....				373,450
Stack Flow Rate (dscfm).....				226,547
Isokinetic Ratio (%).....				96.23

Client/Lo. on 2651 - - - - - Unit 1 Test No. 0-YAH-45 Method 41 Page 3
 Sample Location South I.D. FA4 Oct out 1st Fuel #6 oil Ambient Temp., OF 61 of 3
 Operators Li Mulligan Meter Vol. (Start/End) 301.68-1423.75 Date 2/24/90

Pre Test Data:
 Barometric Press, in. Hg 29.24
 Stack Area, sq. ft. 73.44
 Sample Time/ Pt, min. 4.5/
 Assumed Stack Press -2.5
 Assumed Moisture 9%
 Assumed Molecular Wt 27
 Equipment Info:
 Meter No. ES-15
 Meter, Yd 1.00
 Pitot, Cp .84
 CFM @ H = 1.0 .595
 Probe I.D. 9/16"/2.03
 Nozzle No./Dia 1/8"
 Filter No. 110-732
 Imp. Matl 0
 Wt(End) (Start) (g) 465.5 - 195.1
 Leak Check: ✓
 #1 ✓
 #2 ✓
 #3 ✓
 #4 ✓
 Total ✓
 Impinger Box I.D. 1.94
 Integrated Bag I.D. 110-732
 Pre-Test Calibration
 Pre-Test 0.18
 Post-Test 0.20
 Sample Train
 CFM Vac. Init. Pitot IB: 8 1M 2K
 Pre-Test 0.18
 Post-Test 0.20
 Meter Meter Temp.
 Time ΔH Reading In Out
 Init. Final

AH = .87C
NAI NOBLE EGA-105

Sample Point	Time	Meter Conditions			Temperatures, OF				6.01		Static Press. twg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out		
START	9:37	1.1	1.963	301.682	346	266	98	83	242	100	8.9	Initial
1	9:46	1.6	1.4	303.421	344	258	107	82	241	50	8.9	Sample Vol., c.f. <u>121.777</u>
2	9:50	2.6	2.2	309.187	346	253	116	86	240	51	8.7	Stack Press, twg <u>.35</u>
3	9:54	3.5	3.0	310.563	340	257	116	87	241	53	8.9	ΔP <u>1.53</u> twg <u>143.1W</u>
4	9:57	3.1	2.7	314.063	330	263	116	88	241	55	9.7	Meter Temp., OF <u>98.9</u>
5	10:03	2.0	1.75	317.843	326	262	117	89	240	56	10.0	Stack Temp., OF <u>336.5</u>
6	10:08	.92	.80	320.987	327	261	116	90	240	59	10.0	Water Collected, g <u>228</u>
7	10:11	.50	.40	323.777	344	240	104	88	237	67	9.4	O ₂ /CO ₂ Method
8	10:15	.75	.65	325.465	345	239	107	88	236	63	9.1	Chain of Cust. Info (Init.):
9	10:20	1.2	1.05	327.435	343	233	107	88	234	54	9.1	Impingers Loaded <u>BF</u>
10	10:24	2.6	2.2	330.098	339	238	114	88	234	46	9.0	Impingers Recovered
11	10:29	3.0	2.6	333.856	334	238	115	89	232	45	9.6	Filter Loaded <u>W.D</u>
12	10:33	2.8	2.4	337.873	329	235	116	89	238	46	9.5	Filter Recovered
13	10:38	.71	.62	341.485	326	235	111	90	241	50	10.0	Probe Wash
Stop	10:43			343.648								Comments:
Total/Average				41.966								

checked by RB

Client/Location PG&E EL SEGUNDO Unit 1 Test No. 3-PAT-ELS Method 421 Page 2
 Sample Location No. 100T Fuel OIL Ambient Temp., °F 3 of 3
 Operators SCHMITT Meter Vol. (Start/End) 1 Date 2/2/89

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: _____
 Weight _____
 Sample Train
 CFM Vac. Int. 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. twg	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out			O ₂
D-5	1831.30	2.3	1.93	531.100	337	280	113	91	273	46		14	Initial Sample Vol., c.f. Stack Press, twg ΔP twg ΔH twg Meter Temp., °F Stack Temp., °F Water Collected, g O ₂ /CO ₂ Method Chain of Cust. Info (Init.): Impingers Loaded Impingers Recovered Filter Loaded Filter Recovered Probe Wash Comments:
-4	1836	2.5	2.09	534.297	333	243	112	89	270	43		14	
-3	1840.30	3.4	2.28	537.205	323	240	112	89	270	42		18	
-2	1845	1.6	1.34	541.123	315	239	109	89	267	46		15	
-1	1849.30	1.1	.92	544.150	317	231	107	89	266	47		7	
-	1854			546.627									
C-7	1856	.71	.59	546.627	335	250	97	87	267	48		6	
-4	1900.30	.53	.44	548.630	336	252	99	87	267	48		5	
-5	1905	1.0	.84	549.971	335	265	100	87	268	50		7	
-7	1909.30	2.0	1.67	552.800	331	265	106	88	267	50		12	
-3	1914	2.6	2.18	556.000	322	271	110	88	269	51		16	
-2	1918.30	1.1	.92	560.613	319	267	106	89	265	46		7	
-1	1923	1.1	.92	563.911	319	266	107	88	261	45		7	
-	1928.30			565.133									
A-7	1933	1.6	1.34	565.142	333	267	99	88	260	47		10	
-6	1937.30	1.2	1.0	568.251	332	266	110	88	262	49		8	
-5	1942	1.9	1.59	570.733	333	265	111	88	261	48		11	
-4	1946.30	2.3	1.93	573.986	327	264	113	89	263	42		13	
Total/Average													

Chain of Cust. Info (Init.):
 Impingers Loaded _____
 Impingers Recovered _____
 Filter Loaded _____
 Filter Recovered _____
 Probe Wash _____
 Comments: _____

Client/Location SCE EL SEGUNDO Unit 1 Test No. 3-AH-ELS Method 429 Page 3
 Sample Location North DOCT Fuel OIL Ambient Temp., of 3
 Operators Schmitt Meter Vol. (Start/End) 1 Date 2/22/90

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 Weight
 Imp. Matl Wt(End) (Start) (g) Leak Check:
 #1 _____
 #2 _____
 #3 _____
 #4 _____
 Total _____
 Impinger Box I.D. _____
 Integrated Bag I.D. _____

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, of							Static Press. fwg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O ₂		
A-3	1951	2.7	226	577.682	326	264	115	90	264	43	8.3	15	Initial Sample Vol., c.f. Stack Press. fwg ΔP _____ fwg ΔH _____ fwg Meter Temp., of _____ Stack Temp., of _____ Water Collected, g _____ O ₂ /CO ₂ Method _____ Chain of Cust. Info (init.): Impingers Loaded _____ Impingers Recovered _____ Filter Loaded _____ Filter Recovered _____ Probe Wash _____ Comments: _____
-2	1955.30	3.0	251	580.973	320	260	113	90	262	41	8.2	16	
-1	2000	2.9	243	584.745	319	260	112	91	261	44	9.0	16	
-	2004.30			588.430									
B-7	2010	1.0	84	588.430	336	261	95	90	261	49	7.4	7	
-6	2014.30	5.0	42	590.910	338	266	106	90	258	45	7.0	5	
-5	2019	6.7	56	592.538	336	267	106	91	258	44	7.2	4	
7	2023.30	2.0	167	594.454	331	264	114	91	261	42	7.8	11	
-3	2028	6.8	151	597.910	324	272	119	92	268	44	8.4	11	
2	2030.30	2.0	167	600.831	320	272	118	93	262	44	8.8	11	
-1	2039	2.2	184	604.090	319	266	119	93	263	46	8.9	13	
-	2041.30			607.485									

Client/Location SCF/E/Safemud Unit 1 Test No. 6-PAH-EISy Method 429 Page 2
 Sample Location Saw IP Fan port outlet Fuel #6 oil Ambient Temp., of 61 of 5
 Operators A. Mulligan Meter Vol. (Start/End) 1 Date 2/24/80

Pre Test Data: Barometric Press, in. Hg _____ Leak Check: _____
 Stack Area, sq. ft. _____
 Sample Time/ Pt. min. _____
 Assumed Stack Press _____
 Assumed Moisture _____
 Assumed Molecular Wt _____
 Equipment Info: Meter No. _____
 Meter, Yd _____
 Pitot, Cp _____
 CFM @ ΔH 1.0 _____
 Probe I.D. _____
 Nozzle No./Dia _____
 Filter No. _____
 Imp. Matl _____
 Wt(End) _____
 Weight _____
 (Start) _____
 (g) _____
 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				O ₂		Vacuum	Static Press. twg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out			
Start	1047	.45	.37	343.648	341	265	92	88	246	66	4		Initial
Q - 7	105030	.35	.34	344.851	340	238	102	90	247	57	5		Sample Vol., c.f.
1	1055	.75	.65	346.572	342	230	102	89	247	56	7		Stack Press, twg
5	105730	2.0	1.25	348.421	338	238	111	89	248	54	15		ΔP twg ΔH
4	1104	2.2	1.9	351.77	339	242	117	87	247	51	18		Meter Temp., °F
3	110830	1.1	.96	355.525	329	244	114	90	244	49	5		Stack Temp., °F
2	1113	.85	.74	358.218	328	233	110	90	247	52	8		Water Collected, g
Start	111730			360.509									O ₂ /CO ₂ Method
Start	1122	.78	.87	360.505	341	229	97	87	250	59	9		Chain of Cust. Info (Init.):
K - 7	112630	.60	.52	362.931	340	239	105	86	252	53	7		Impingers Loaded
1	1131	.62	.54	365.050	330	242	104	86	254	54	7		Impingers Recovered
5	113530	1.1	.96	367.150	337	244	106	85	254	54	10		Filter Loaded
4	1140	1.7	1.4	369.780	332	247	110	85	254	52	14		Filter Recovered
3	114430	1.4	1.2	372.948	330	252	113	86	256	53	15		Probe Wash
2	1149	.98	.85	374.115	321	254	115	86	258	55	14		Comments: out of the lead
Start	115330			379.222									SSdy E Have seen
Total/Average				35.674									off 12-

Client/Location 3CE / El Segundo Unit 1 Test No. 66144-5754 Method 429 Page 3
 Sample Location South I.D. Paved outside Fuel 56.01 Ambient Temp., of 61 of 3
 Operators L. Mulligan Meter Vol. (Start/End) 1425.457 Date 2/24/90

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. 01
 Meter, Yd 12
 Pitotg Cyl 12
 CFM/80 11.16
 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
 Init. _____
 Final _____

Sample Point	Time	Meter Conditions			Temperatures, of					Weight		Static Press. 1wg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O ₂	Vacuum	
Start	1210	1.81	1.70	379.322	342	228	96	85	253	68	9.1	7	Initial
P-7	121430	1.3	1.13	381.957	343	225	108	84	253	62		11	Sample Vol., c.f.
6	1215	1.7	1.4	383.782	339	242	111	86	255	41	9.3	14	Stack Press, 1wg
5	122330	1.9	1.66	387.434	338	244	115	87	254	63	9.4	12	ΔP 1wg ΔH 1wg
4	1228	2.6	2.27	390.821	336	245	117	87	252	55	9.0	18	Meter Temp., of
12	123230	3.0	2.62	394.585	331	240	115	88	250	47	9.8	18	Stack Temp., of
2	1237	2.3	2.0	398.442	330	247	115	89	245	47	10	18	Water Collected, g
1	124130			402.165									O ₂ /CO ₂ Method
Stand	125030	1.6	1.4	402.165	330	243	107	88	250	50	10.5	13	Chain of Cust. Info (Init.):
A-7	1255	2.6	2.27	405.187	332	251	114	89	238	48		13	Impingers Loaded
6	125930	3.1	2.71	408.241	327	266	115	85	245	50	9.5	13	Impingers Recovered
5	1304	2.8	2.45	411.095	341	262	116	88	275	51	8.6	14	Filter Loaded
4	130830	1.8	1.57	414.138	345	261	116	90	265	52	7.6	15	Filter Recovered
3	1313	1.6	1.40	417.585	340	256	119	91	263	55	8.0	15	Probe Wash
2	131730	1.75	1.6	420.621	347	256	115	92	253	60	8.2	8	Comments:
1	1322			423.459									
Total/Average				34.137									

Client/Loc on SCS/El Segundo Sample Location North IP fan Bait Duct Unit N/A Ambient Temp., °F 1 of 1 Pa. 1
Operators Schwitt/mulligan Fuel N/A Method DMV 1021 Date 2/20/92
Test No. 1021 Meter Vol. (Start/End) 1

Pre Test Data:

Barometric Press, in. Hg Equipment Info: Meter No. Weight Leak Check:
Stack Area, sq. ft. Meter, Yd Wt(End) (Start) (g)
Sample Time/ Pt, min. Pitot, Cp #1 464.0 - 464.0
Assumed Stack Press CFM @ H = 1.0 #2 585.2 - 585.2
Assumed Moisture Probe I.D. #3 488.4 - 488.4
Assumed Molecular Wt Nozzle No./Dia #4 786.6 - 786.6
Filter No. 110-727 Total

Time ΔH Reading In Out
Init. Final

Sample Point	Time	Meter Conditions			Temperatures, °F				O ₂	Vacuum	Static Press. 1wg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out		
												Initial
												Sample Vol., c.f.
												Stack Press, 1wg
												ΔP 1wg ΔH 1wg
												Meter Temp., °F
												Stack Temp., °F
												Water Collected, g
												O ₂ /CO ₂ Method
												Chain of Cust. Info (Init.):
												Impingers Loaded <u>WD</u>
												Impingers Recovered <u>W.C</u>
												Filter Loaded <u>W.C</u>
												Filter Recovered <u>W.C</u>
												Probe Wash <u>MSJ</u>
												Comments: <u>XAD CARTRIDGE-1-PAN-</u>
Total/Average												

ANALYTICAL RESULTS REPORT

CLIENT INFORMATION

Name: ENERGY SYSTEMS ASSOCIATES

LAB INFORMATION

Contact: HH

Project: AN898506

Date: Apr.09 1990

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

*
FIELD
BLANK

Client ID:	(1-PAH)	2-PAH-ELS	3-PAH-ELS	6-PAH-ELS
Lab ID:	004352 90	004853 90	004854 90	004855 90

Component	MDL	Units				
Naphthalene	0.025	ug	29	11	0.26	72
Acenaphthylene	0.025		<	<	<	<
Acenaphthene	0.025		0.48	0.19	<	<
Fluorene	0.025		0.07	0.075	<	<
Phenanthrene	0.025		0.11	0.84	<	0.32
Anthracene	0.025		0.058	0.11	<	<
Fluoranthene	0.025		0.057	0.73	<	0.12
Pyrene	0.025		0.055	0.66	<	0.11
Chrysene	0.025		<	0.44	<	0.051
Benz(a)anthracene	0.025		<	0.97	<	0.15
Benzo(b+k)fluoranthene	0.025		<	<	<	0.31
Benzo(a)pyrene	0.025		<	<	<	<
Indeno(1,2,3-cd)pyrene	0.025		0.31	0.53	<	0.14
Dibenzo(ah)anthracene	0.025		0.15	0.21	<	0.042
Benzo(ghi)perylene	0.025		0.36	0.61	<	0.14

Surrogate Recoveries %

d10 Acenaphthene	17	7	<	40
d10 Anthracene	110	24	<	23
d12 Chrysene	84	95	1	100
d12 Benzo(a)pyrene	<	<	20	<

* Field blank values for many species greater than or same order of magnitude as samples. Do not subtract these blanks.

Name _____ Affiliation _____

Signature _____

Sample Storage _____

Comments _____

Name _____ Affiliation _____

Signature _____

Sample Storage _____

Comments _____

Custody Relinquished by _____	Date/Time _____
Received by _____	Affiliation _____
Sample Storage _____	

Custody Relinquished by _____ Date/Time _____
Received by _____ Affiliation _____
Sample Storage _____

Address:

Appendix C.7

Metals

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: ARSENIC

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMBtu
4-MTSL-N	18.3	53.34	8.51	240059	12.11	1.09E-02	1.15E-05
5-MTSL-N	12.4	52.35	8.45	236977	8.36	7.42E-03	7.92E-06
7-MTSL-S	17.6	55.58	9.54	223103	11.18	9.34E-03	1.16E-05
AVG					10.55		1.03E-05
STACK TOTAL, WEIGHTED				461621		1.82E-02	

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: BERYLLIUM

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-MTSL-N <	0.29	53.34	8.51	240059 <	0.19 <	1.72E-04 <	1.83E-07
5-MTSL-N <	0.34	52.35	8.45	236977 <	0.23 <	2.03E-04 <	2.17E-07
7-MTSL-S <	0.17	55.58	9.54	223103 <	0.11 <	9.02E-05 <	1.12E-07
AVG					<	0.18	< 1.71E-07
STACK TOTAL, WEIGHTED				461621		< 3.05E-04	

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: CADMIUM

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-MTSL-N	1.1	53.34	8.51	240059	0.73	6.54E-04	6.93E-07
5-MTSL-N	2.0	52.35	8.45	236977	1.35	1.20E-03	1.28E-06
7-MTSL-S	2.3	55.58	9.54	223103	1.46	1.22E-03	1.52E-06
AVG					1.18		1.16E-06
STACK TOTAL, WEIGHTED				461621		2.04E-03	

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: COPPER

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-MTSL-N	15.6	53.34	8.51	240059	10.33	9.28E-03	9.82E-06
5-MTSL-N	21.0	52.35	8.45	236977	14.16	1.26E-02	1.34E-05
7-MTSL-S	40.0	55.58	9.54	223103	25.41	2.12E-02	2.64E-05
AVG					16.63		1.65E-05
STACK TOTAL, WEIGHTED				461621		2.87E-02	

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: LEAD

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-MTSL-N <	3.9	53.34	8.51	240059 <	2.58 < 2.32E-03 <		2.46E-06
5-MTSL-N <	3.9	52.35	8.45	236977 <	2.63 < 2.33E-03 <		2.49E-06
7-MTSL-S <	3.9	55.58	9.54	223103 <	2.48 < 2.07E-03 <		2.57E-06
AVG				<	2.56		< 2.51E-06
STACK TOTAL, WEIGHTED				461621			< 4.43E-03

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: MANGANESE

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-MTSL-W	14.1	53.34	8.51	240059	9.33	8.39E-03	8.88E-06
5-MTSL-W	14.6	52.35	8.45	236977	9.85	8.73E-03	9.32E-06
7-MTSL-S	9.3	55.58	9.54	223103	5.91	4.93E-03	6.13E-06
AVG					8.36		8.11E-06
STACK TOTAL, WEIGHTED				461621		1.44E-02	

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: MERCURY

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-MTLS-N ND	49.7	53.34	8.51	240059 ND	32.90 ND	2.96E-02 ND	3.13E-05
5-MTLS-N ND	50.5	52.35	8.45	236977 ND	34.06 ND	3.02E-02 ND	3.22E-05
7-MTLS-S ND	43.9	55.58	9.54	223103 ND	27.89 ND	2.33E-02 ND	2.89E-05
AVG				ND	31.62		ND 3.08E-05
STACK TOTAL, WEIGHTED				461621		ND	5.46E-02

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: NICKEL BY CARB 433

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-MTSL-N	470	53.34	8.51	240059	311.13	2.80E-01	2.96E-04
5-MTSL-N	492	52.35	8.45	236977	331.85	2.94E-01	3.14E-04
7-MTSL-S	624	55.58	9.54	223103	396.43	3.31E-01	4.11E-04
AVG					346.47		3.40E-04
STACK TOTAL, WEIGHTED				461621		5.99E-01	

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: SELENIUM

Test	ug/train	Vmstd	XO2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-MTSL-N <	6.2	53.34	8.51	240059 <	4.10 <	3.69E-03 <	3.90E-06
5-MTSL-N <	6.4	52.35	8.45	236977 <	4.32 <	3.83E-03 <	4.09E-06
7-MTSL-S <	6.2	55.58	9.54	223103 <	3.94 <	3.29E-03 <	4.09E-06
AVG				<	4.12	<	4.03E-06
STACK TOTAL, WEIGHTED				461621		<	7.12E-03

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: ZINC

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-MTLS-W	37.7	53.34	8.51	240059	24.96	2.24E-02	2.37E-05
5-MTLS-W	51.0	52.35	8.45	236977	34.40	3.05E-02	3.26E-05
7-MTLS-S	6564.0	55.58	9.54	223103	4170.11	3.48E+00	4.33E-03
AVG					1409.82		1.46E-03
STACK TOTAL, WEIGHTED				461621		2.44E+00	
					29.68		2.81E-05
STACK TOTAL EXCLUDING 7-MTLS				461621		5.13E-02	

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/23/90
Test Number.....	4-MTL	*	Data By.....	RBB
Test Method.....	EPA DRAFT	*	Sample Location.....	N. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	84
Bar Press (in Hg).....	30.38	*	Nozzle Diam (in).....	0.194
Meter Vol (acf).....	56.650	*	Meter Temp (F).....	96.8
Stack Press (iwg).....	0.25	*	Stack Temp (F).....	341.0
Vel Head (iwg).....	1.7300	*	O2 (%): from CEM.....	7.56
Liquid Vol (ml).....	106.8	*	from portable...	8.51
Meter Press (iwg).....	1.54	*	CO2 (%): from CEM.....	9.40
		*	calculated.....	8.73
		*	Start/Stop Time.....	0945/1200
Std Sample Vol (SCF).....				53.34
Metric Sample Vol (cubic meters).....				1.51
Moisture Fraction.....				0.085
Stack Gas Mol Wt.....				28.74
Stack Gas Velocity (ft/sec).....				90.31
Stack Flow Rate (wacfm).....				397,924
Stack Flow Rate (dscfm).....				240,059
Isokinetic Ratio (%).....				94.61

Client/Location SCE / EL SEGUNDO Unit 1 Test No. 4-MH Method BAA DATA Page 1
 Sample Location NORTH DUCT Fuel DIL Ambient Temp., of 3 of 3
 Operators M. SETHI Meter Vol. (Start/End) 624.383 Date 2/23/90

Pre Test Data:
 Barometric Press, in. Hg 30.39
 Stack Area, sq. ft. 73.94
 Sample Time/ Pt, min. 8
 Assumed Stack Press 1.5
 Assumed Moisture 8.1
 Assumed Molecular Wt 28

Equipment Info:
 Meter No. ES-8
 Meter, Yd 1.990
 Pitot, Cp .84
 CFM $\Delta H = 1.0$ 598
 Probe I.D. 10' GLASS
 Nozzle No./Dia .194
 Filter No. 7/11-83

Weight Weight
 Imp. Matl Wt(End) (Start) (g)
 #1 114/142 687.5 - 628.7 = 58.8
 #2 114/142 625.3 - 595.9 = 29.4
 #3 114/142 630.8 - 611.4 = 19.4
 #4 114/142 702.8 - 690.7 = 11.5
 Total 106.8
 Impinger Box I.D. 623.7
 Integrated Bag I.D. 623.7

Leak Check:
 CFM Vac. Init. Pitot IBS
 Pre-Test 1020 7" MS OK
 Post-Test 017 1 MS BF
 Pre-Test Calibration

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

$\Delta H = .846 \Delta P$

Final

$\Delta 4 = .846 \Delta P$

Sample Point	Time	Meter Conditions			Temperatures, of						Static Press. twg	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out			Vacuum
B-7	945	.97	.82	624.383	347	240	82	83	241	59	0	+ .75	Initial Sample Vol., c.f. <u>526.52</u> Stack Press, twg <u>1.25</u> ΔP <u>672</u> twg ΔH <u>1.57</u> twg Meter Temp., of <u>46.82</u> Stack Temp., of <u>341.0</u> Water Collected, g <u>106.8</u> O ₂ /CO ₂ Method Chain of Cust. Info (Init.): Impingers Loaded <u>W.D</u> Impingers Recovered <u>MS</u> Filter Loaded <u>W.D</u> Filter Recovered <u>MS</u> Probe Wash <u>BF</u> Comments:
-6	947	.56	.43	625.250	345	228	96	85	250	47	0		
-5	949	.70	.59	626.300	345	233	98	85	250	47	0		
-4	951	.10	.85	627.710	342	238	98	84	252	48	0		
-3	953	1.1	.93	628.160	337	239	102	85	253	49	0		
-2	955	1.8	1.52	629.273	334	239	105	86	253	50	0		
-1	957	2.2	1.16	630.600	331	239	109	86	254	51	2		
-	959			632.118									
A-7	1007	.60	.51	632.118	347	232	86	86	260	61	0		
B	1009	.35	.30	632.701	348	236	99	87	262	53	0		
5	1011	.71	.60	633.610	357	239	100	88	259	53	0		
4	1013	2.0	1.69	634.492	342	238	105	88	265	52	0		
3	1015	2.2	1.86	635.871	335	249	113	89	266	52	2		
2	1017	1.1	.93	637.390	329	252	116	90	269	53	0		
1	1019	1.3	1.10	638.633	329	257	112	90	270	54	0		
-	1021			639.682									
C-7	1043	1.4	1.18	639.682	349	225	88	89	269	62	0.2		
-6	1045	1.6	1.35	641.000	347	225	106	91	271	44	0.0		
Total/Average													

Checked by RB

96.02 8.4%

Client/Location SCE / EC SCANDIA Unit 1 Test No. 4-MTLS Method 2
 Sample Location NORTH DOCT Fuel DIL Ambient Temp., °F 3
 Operators M. Schmitt Meter Vol. (Start/End) 1 Date 2/23/90

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

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

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

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. 1wg	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter		Oven	Imp. Out	O ₂			Vacuum
							In	Out						
C-5	1047	1.7	1.41	642.278	350	246	111	91	272	46	7.9	0	Initial Sample Vol., c.f. Stack Press, 1wg ΔP _____ 1wg ΔH _____ 1wg Meter Temp., °F Stack Temp., °F Water Collected, g O ₂ /CO ₂ Method Chain of Cust. Info (Init.): Impingers Loaded Impingers Recovered Filter Loaded Filter Recovered Probe Wash Comments:	
-4	1049	2.6	2.16	643.573	348	251	112	92	271	44	7.9	2		
-3	1051	3.5	2.9	645.153	337	256	114	92	271	46	9.2	3		
-2	1053	1.6	1.33	646.482	333	262	114	92	271	48	9.8	0		
-1	1055	.95	.75	648.423	329	268	111	92	271	48	10.6	0		
-	1057			649.422										
E-7	1102	2.0	1.66	649.422	350	241	89	88	268	51	8.2	0		
6	1104	2.6	2.16	650.867	349	266	106	91	268	47	7.8	3		
5	1106	3.3	1.91	652.507	349	269	110	91	269	43	7.6	3		
4	1108	3.8	3.15	654.091	342	271	110	92	269	45	8.2	3		
3	1110	2.9	2.40	655.621	337	271	110	92	270	49	9.2	3		
2	1112	2.5	2.07	657.493	327	272	114	92	269	49	9.4	2		
1	1114	.83	.69	659.166	328	260	112	92	268	50	10.2	0		
-	1116			660.178										
A-7	1121	1.7	1.41	660.178	344	244	90	90	266	52	8.2	0		
-6	1123	1.7	1.41	661.491	344	245	105	92	266	44	8.2	0		
-5	1125	2.9	1.99	662.580	344	243	109	92	268	48	8.3	2		
-4	1127	3.0	2.49	664.483	338	245	111	92	267	48	8.7	3		
Total/Average														

EST DS-022
Rev. 9/89

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/23/90
Test Number.....	5-MTL	*	Data By.....	RBB
Test Method.....	EPA DRAFT	*	Sample Location.....	N. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	84
Bar Press (in Hg).....	30.38	*	Nozzle Diam (in).....	0.194
Meter Vol (acf).....	56.321	*	Meter Temp (F).....	104.0
Stack Press (iwg).....	0.25	*	Stack Temp (F).....	347.0
Vel Head (iwg).....	1.7100	*	O2 (%): from CEM.....	7.36
Liquid Vol (ml).....	108.7	*	from portable...	8.45
Meter Press (iwg).....	1.51	*	CO2 (%): from CEM.....	9.86
		*	calculated.....	9.07
		*	Start/Stop Time.....	1531/1721
Std Sample Vol (SCF).....				52.35
Metric Sample Vol (cubic meters).....				1.48
Moisture Fraction.....				0.088
Stack Gas Mol Wt.....				28.75
Stack Gas Velocity (ft/sec).....				90.10
Stack Flow Rate (wacfm).....				397,006
Stack Flow Rate (dscfm).....				236,977
Isokinetic Ratio (%).....				94.06

Client/Location SCE EL SEGUNDO Unit 1 Test No. 5-MTL Method EP4 DEPT Page 1
 Sample Location NORTH Fuel DIC Ambient Temp., of 3
 Operators M. SCHMITT Meter Vol. (Start/End) 1 Date 2/23/90

Pre Test Data:
 Barometric Press, in. Hg 30.38
 Stack Area, sq. ft. 73.44
 Sample Time/ Pt, min. 2
 Assumed Stack Press 0.3
 Assumed Moisture 9.8
 Assumed Molecular Wt 28

Equipment Info:
 Meter No. ES-8
 Meter, Yd 996
 Pitot, Cp .84
 CFM $\Delta H = 1.0$ 598
 Probe I.D. 10' 6" SS
 Nozzle No./Dia 194
 Filter No. T-110-132

Weight Weight
 Imp. Matl Wt(End) (Start) (g)
 #1. HNO₃/H₂O 61.9 - 573.0 - 38.9
 #2 " 655.2 - 613.0 - 42.2
 #3 K₂(NO₃)₂ 762.1 - 748.0 - 14.1
 #4 SGA 806.5 - 793.0 - 13.5
 Total 108.7

Leak Check:
 CPM Vac. Init. Pitot IBS
 Pre-Test OK 7" KH OK
 Post-Test 020 7" MS

Pre-Test Calibration
 Meter Meter Temp.
 Time ΔH Reading In Out
 Init. 108.7
 Final 108.7

9304

Sample Point	Time	Meter Conditions			Temperatures, of				Static Press. fwg	Test Summary
		ΔP	ΔH	Meter Reading	Probe	Meter In	Out	Oven		
E-7	1531	2.3	1.91	681.664	276	93	94	281	0	Initial
6	1533	3.1	2.57	683.250	273	115	95	270	46	Sample Vol., c.f. <u>56.32</u>
5	1535	2.8	2.32	685.000	270	117	97	285	46	Stack Press, fwg <u>.25</u>
4	1537	3.2	2.65	686.700	276	119	97	273	44	ΔP <u>171</u> / fwg ΔH <u>1.51</u> fwg
3	1539	3.0	2.49	688.481	272	119	97	258	48	Meter Temp., of <u>104</u>
2	1541	1.5	1.24	690.257	268	120	98	253	47	Stack Temp., of <u>347.0</u>
1	1543	.98	.81	691.670	265	116	98	259	53	Water Collected, g <u>108.7</u>
-	1545			692.735						O ₂ /CO ₂ Method
E-7	1551	1.8	1.95	692.735	262	95	96	245	57	Chain of Cust. Info (Init.):
4	1553	2.2	1.82	694.150	244	117	98	244	57	Impingers Loaded <u>OK</u>
5	1555	2.1	1.74	695.821	245	119	99	243	57	Impingers Recovered <u>OK</u>
4	1557	3.5	2.90	697.211	246	120	99	243	59	Filter Loaded <u>OK</u>
3	1559	2.7	2.24	698.581	243	120	100	242	61	Filter Recovered <u>OK</u>
2	1601	2.0	1.66	700.237	240	123	100	242	61	Probe Wash <u>OK</u>
1	1603	1.0	.83	701.728	243	121	101	240	64	Comments:
-	1605			702.807						
D-7	1611	1.0	.93	702.807	227	98	98	234	57	
-6	1613	1.9	1.58	703.810	228	112	99	231	55	
Total/Average										

checked by ERS

(95.3) 8.7

Client/Location SCE / EL SURGO Unit 1 Test No. 5-MTUS Method MTUS Page 2
 Sample Location NORTH DUCT Fuel DIC Ambient Temp., °F 3 of 3
 Operators M. SCHWARTZ Meter Vol. (Start/End) 1 Date 2/23/70

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. Meter, Yd Pitot, Cp CFM $\theta \Delta H = 1.0$ Pre-Test Post-Test
 Assumed Stack Press Probe I.D. Impinger Box I.D. Pre-Test Calibration
 Assumed Moisture Nozzle No. Integrated Bag I.D. Meter Meter Temp.
 Assumed Molecular Wt Filter No. Time ΔH Reading In Out Init. Final

Sample Point	Time	Meter Conditions		Temperatures, °F						Static Press. 1wg	Vacuum	O ₂	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven				
D-5	1615	2.8	2.32	705.180	351	254	117	98	234	50	7.6	3	Initial Sample Vol., c.f. Stack Press, 1wg ΔP 1wg ΔH 1wg Meter Temp., °F Stack Temp., °F Water Collected, g O ₂ /CO ₂ Method Chain of Cust. Info (Init.): Impingers Loaded Impingers Recovered Filter Loaded Filter Recovered Probe Wash Comments:
-4	1617	3.0	2.49	706.885	341	265	120	98	241	51	8.8	3	
-3	1619	1.2	.55	708.683	336	273	122	99	245	51	9.4	2	
-2	1621	.85	.70	709.880	338	268	116	98	248	52	10.1	2	
-1	1623	1.80	.66	710.900	337	265	113	98	249	54	10.1	2	
—	1625			711.853									
-7	1629	.66	.55	711.853	351	255	95	95	255	65	8.3	2	
-6	1631	.47	.39	712.760	354	254	107	96	253	53	8.9	0	
-5	1633	.87	.72	713.550	354	257	107	96	253	51	8.3	0	
-4	1635	2.4	1.99	714.478	353	259	110	96	254	49	8.0	2	
-3	1637	2.4	1.99	716.030	344	261	116	96	256	49	7.9	2	
-2	1639	1.2	.99	717.593	339	262	117	96	257	51	9.3	2	
-1	1641	1.0	.83	718.800	338	264	112	96	257	53	9.8	0	
—	1643			719.880									
4-7	1647	1.1	.91	719.880	351	260	93	93	259	65	9.2	0	
-6	1649	1.5	1.24	721.100	353	260	108	95	261	53	8.0	0	
-5	1651	1.2	.99	722.214	355	261	112	95	261	53	8.0	0	
-4	1653	2.1	1.74	723.417	354	264	111	95	261	52	8.2	0	
Total/Average													

WASH DC

Client/Location SLC EL SEGUNDO Unit MTL Test No. 5-MTL Method 3
Sample Location NORTH DUCT Fuel OIL Ambient Temp., of 3
Operators M. SCHMITT Meter Vol. (Start/End) 1 Date 2/23/80

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. #1 Weight _____
Meter, Yd _____
Pitot, Cp _____
CFM $\theta \Delta H = 1.0$ _____
Probe I.D. _____
Nozzle No./Dia _____
Filter No. _____
Leak Check: _____
Pre-Test _____
Post-Test _____
Pre-Test Calibration _____
Meter Meter Temp. _____
Time ΔH Reading In Out _____
Init. _____
Final _____

Sample Point	Meter Conditions				Temperatures, °F				Vacuum		Static Press. twg	Test Summary
	Time	ΔP	ΔH	Meter Reading	Probe	Meter In	Out	Oven	Imp. Out	O ₂		
A-3	1655	2.7	2.24	724.900	262	115	95	261	53	8.8		Initial
-2	1657	3.0	2.49	726.561	265	118	95	262	53	9.0		Sample Vol., c.f.
-1	1659	2.6	2.16	728.335	265	120	95	263	56	9.2		Stack Press. twg
-	1701			730.095								ΔP twg ΔH twg
B-7	1707	.95	.79	730.095	258	91	91	264	68	9.0		Meter Temp., of
-6	1709	.55	.46	731.046	260	107	94	257	59	8.6		Stack Temp., of
-5	1711	.80	.66	731.890	259	107	94	254	55	8.6		Water Collected, g
-4	1713	2.0	1.66	732.735	257	107	94	252	54	8.1		O ₂ /CO ₂ Method
-3	1715	2.0	1.06	733.640	256	107	94	249	54	8.2		Chain of Cust. Info (Init.):
-2	1717	1.5	1.24	735.200	242	120	94	248	52	9.4		Impingers Loaded
-1	1719	1.7	1.41	736.650	242	116	94	245	53	9.4		Impingers Recovered
-	1721			738.985								Filter Loaded
												Filter Recovered
												Probe Wash
												Comments:
Total/Average											112.0°	

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/24/90
Test Number.....	7-MTL	*	Data By.....	RBB
Test Method.....	EPA DRAFT	*	Sample Location.....	S. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-19	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	1.0000
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	84
Bar Press (in Hg).....	30.34	*	Nozzle Diam (in).....	0.194
Meter Vol (acf).....	58.390	*	Meter Temp (F).....	95.5
Stack Press (iwg).....	0.32	*	Stack Temp (F).....	340.0
Vel Head (iwg).....	1.5100	*	O2 (%): from CEM.....	7.70
Liquid Vol (ml).....	120.4	*	from portable...	9.54
Meter Press (iwg).....	1.43	*	CO2 (%): from CEM.....	9.68
		*	calculated.....	8.33
		*	Start/Stop Time.....	1508/1717
Std Sample Vol (SCF).....				55.58
Metric Sample Vol (cubic meters).....				1.57
Moisture Fraction.....				0.091
Stack Gas Mol Wt.....				28.64
Stack Gas Velocity (ft/sec).....				84.50
Stack Flow Rate (wacfm).....				372,360
Stack Flow Rate (dscfm).....				223,103
Isokinetic Ratio (%).....				106.07

Client/Loc on SCF / E / Segundo Unit 1 Test No. 7-MTL-ELSCG Method EPA Draft 1
Sample Location South ID Fan Out outlet Fuel #6 oil Ambient Temp., of 70 of 3
Operators L. Mulligan Meter Vol. (Start/End) 425.194/484.345 Date 2/24/90

Pre Test Data:

Barometric Press, in. Hg 29.34
Stack Area, sq. ft. 23.44
Sample Time/ Pt, min. 8/86
Assumed Stack Press -25
Assumed Moisture 9
Assumed Molecular Wt 27

Equipment Info:

Meter No. ES-15
Meter, Yd 1.00
Pitot, Cp .84
CFM @ H = 1.0 .575
Probe I.D. 5.21/1.25
Nozzle No./Dia 194
Filter No. T-110-139

Weight

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

#1 100% 628.0 - 595.2 = 32.8 ✓
#2 100% 664.9 - 614.0 = 50.9 ✓
#3 100% 741.2 - 724.0 = 17.2 ✓
#4 576 786.1 - 766.6 = 19.5 ✓
Total - = 120.4 ✓

Impinger Box I.D.

Integrated Bag I.D.

Pre-Test Calibration

Meter Meter Temp.

Time ΔH Reading In Out

Init.

Final

AH = 876

Sample Point	Time	Meter Conditions			Temperatures, OF						Static Press. twg	Test Summary		
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter		Oven	Imp. Out			O ₂	Vacuum
							In	Out						
Start	15 08	1.1	.96	425.992	348	243	94	82	261	55	10.4	4	32	Initial Sample Vol.. c.f. 58.39 Stack Press. twg .32 ΔP 1.5/twg ΔH 1.43 twg Meter Temp.. OF 95.5 Stack Temp.. OF 340 Water Collected, g 120.4 O ₂ /CO ₂ Method Chain of Cust. Info (Intl.): Impingers Loaded BF Impingers Recovered Filter Loaded BF Filter Recovered Probe Wash Comments: Heat 2 site Watch the meter Go Ahead.
A-7	15 10	1.4	1.40	427.690	347	238	107	87	258	54	8.9	6		
1	15 12	2.1	1.83	428.654	350	240	111	87	256	52	8.7	7		
1	15 14	3.4	2.5	430.125	345	239	114	84	256	52	8.4	9		
11	15 16	3.2	2.8	432.020	345	241	116	88	256	51	9.4	9		
15	15 18	2.7	2.3	434.000	330	249	117	88	257	55	10.4	9		
6	15 20	2.1	1.8	435.895	328	256	117	85	257	65	10.2	8		
Stop 7	15 22			437.865										
Start	15 27	1.7	.78	437.865	345	246	90	86	255	62	9.5	2		
F-7	15 31	1.2	1.05	438.835	342	253	104	87	254	60	8.9	4		
1	15 33	1.5	1.3	440.015	343	258	108	87	257	58	9.1	5		
5	15 35	2.1	1.80	441.392	338	257	111	87	257	55	9.3	5		
4	15 37	2.5	2.15	442.975	327	257	113	87	255	61	9.5	8		
3	15 39	2.1	2.5	444.715	323	258	113	87	253	61	9.8	10		
2	15 41	1.9	1.66	446.568	331	253	114	87	254	62	10.1	8		
Stop 1	15 43			448.1342										
Total/Average				22.35										

Initial

Sample Vol., c.f. 58.39 ✓

Stack Press, twg .32 ✓

ΔP 1.5 twg ΔH 1.43 twg

Meter Temp., of 75.5 ✓

Stack Temp., of 340 ✓

Water Collected, g 120.4 ✓

O₂/CO₂ Method

Chain of Cust. Info (Init.):

Impingers Loaded BF

Impingers Recovered

Filter Loaded BF

Filter Recovered

Probe Wash

Comments: Heard 2 site

watch the meter

go ahead

Client/Location SCC/F-1 Segment Unit 1 Test No. 7-111-0157 Method ETA-DASH Page 2
 Sample Location South ID Fan duct outlet Fuel #6 Oil Ambient Temp., °F 8 of 3
 Operators D. Mulligan Meter Vol. (Start/End) 1 Date 3/24/82

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 84 H 1.0
 Probe I.D. _____
 Nozzle No./Dia _____
 Filter No. _____
 Imp. Matl _____
 Wt(End) (Start) _____
 Leak Check: _____
 Weight _____
 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. 1wg	Vacuum	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O ₂	
START	1607	.88	.77	448.242	345	228	87	83	253	11	10.5	Initial
E-7	1609	.65	.51	449.452	344	228	103	84	250	52	9.4	Sample Vol., c.f.
1	1611	.90	.78	450.352	344	244	104	84	249	55	9.6	Stack Press, 1wg
3	1613	.62	.50	451.340	339	247	106	84	249	55	9.6	ΔP 1wg ΔH 1wg
4	1615	1.1	1.4	452.510	338	250	107	85	249	55	9.7	Meter Temp., °F
2	1617	1.3	1.3	453.849	333	251	108	85	250	57	10.1	Stack Temp., °F
2	1619	1.4	1.22	455.195	324	251	107	85	248	61	10.2	Water Collected, g
START	1621			456.568								O ₂ /CO ₂ Method
P-7	1625	.52	.45	456.568	344	251	58	84	250	60	10.0	Chain of Cust. Info (Init.):
1	1627	.43	.37	457.361	347	256	97	85	249	59	9.1	Impingers Loaded
5	1629	.81	.70	458.128	346	257	100	85	251	59	8.9	Impingers Recovered
3	1631	2.2	1.9	459.155	348	260	102	85	252	59	9.2	Filter Loaded
4	1633	1.7	1.18	460.698	335	258	108	85	251	57	9.7	Filter Recovered
3	1635	1.1	.96	462.218	336	262	107	86	251	63	10.0	Probe Wash
2	1637	.90	.78	463.402	331	263	104	85	250	64		Comments:
START	1639			464.457								
Total/Average				16.11								

Client/Location SCC/F-1 Sejourne Unit 1 Test No. 7-mil-2134 Method ERA-ANAL Page 2
 Sample Location South I.D. Fan Duct outlet Fuel oil Ambient Temp., of 5
 Operators J. Mulligan Meter Vol. (Start/End) 1 Date 2/24/88

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 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. _____
Leak Check:
 Pre-Test _____
 Post-Test _____
Sample Train
 CFM Vac. Int. Pitot IBS _____
Pre-Test Calibration
 Meter Meter Temp. _____
 Time Δ H Reading In Out _____
 Init. _____
 Final _____

Sample Point	Time	Meter Conditions			Temperatures, °F				O ₂		Vacuum	Static Press. twg	Test Summary
		Δ P	Δ H	Meter Reading	Stack	Probe	Meter In	Meter Out	Oven	Imp. Out			
Start	16 43	1.57	1.44	414.157	345	266	86	84	252	65	9.6		Initial
1	16 45	.67	.58	415.298	348	262	98	85	263	63	8.6		
2	16 47	1.3	1.13	416.228	349	256	104	85	254	64	9.0		
3	16 49	2.9	2.54	417.150	341	217	106	85	254	65	8.6		Sample Vol., c.f.
4	16 51	3.12	2.80	418.330	358	261	110	86	254	67	9.6		Stack Press, twg
5	16 53	1.2	1.05	417.286	331	236	110	85	254	65	10.0		Δ P twg Δ H twg
6	16 55	.98	.88	417.267	331	236	106	86	254	65	10.0		Meter Temp., °F
Stop 1	16 57			417.31776									Stack Temp., °F
Start	17 03	1.12	1.05	417.31776	346	236	86	84	254	65	9.4		Water Collected, g
1	17 05	1.9	1.66	417.41876	350	257	100	85	254	66	8.5		O ₂ /CO ₂ Method
2	17 07	2.3	2.01	417.5267	345	255	108	87	254	66	8.7		Chain of Cust. Info (Inft.):
3	17 09	2.8	2.4	417.7875	345	263	111	85	255	68	9.4		Impingers Loaded
4	17 11	2.6	2.2	419.763	333	269	113	86	253	69	10.0		Impingers Recovered
5	17 13	1.9	1.66	418.443	329	263	113	86	254	67	10.2		Filter Loaded
6	17 15	.95	.83	418.2168	329	260	109	86	253		10.4		Filter Recovered
Stop 1	17 17			418.2385									Probe Wash
Total/Average													Comments: This is the END

Client/Lt on 2001 EL-285 VMD 80 UNIT 1 TEST NO. 1-1111-542 SECTION 1
Sample Location South Jet Fuel N/A Ambient Temp., °F 1 of 1
Operators Schwartz/mulligan Meter Vol. (Start/End) 1 Date 2/20/90

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 @ H = 1.0 _____
Probe I.D. _____
Nozzle No./Dia _____
Filter No. 7110-81
Imp., Matl Wt(End) (Start) (g) _____
#1 638.5 - 638.5 _____
#2 621.3 - 621.3 _____
#3 628.9 - 628.9 _____
#4 656.2 - 656.2 _____
Total _____
Impinger Box I.D. _____
Integrated Bag I.D. _____
Leak Check: _____
Sample Intrain
CFM Vac. Init. Pitot IBS
Pre-Test 020 17 AS
Post-Test _____
Pre-Test Calibration
Meter Meter Temp.
Time ΔH Reading In Out
Init. _____
Final _____

Sample Point	Meter Conditions			Temperatures, °F				O ₂	Vacuum	Static Press. twg	Test Summary
	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 ₂ /CO ₂ Method
											Chain of Cust. Info (init.):
											Impingers Loaded <u>W.D.</u>
											Impingers Recovered <u>W.D.</u>
											Filter Loaded <u>B.F.</u>
											Filter Recovered <u>B.F.</u>
											Probe Wash <u>A.S.</u>
											Comments: _____
Total/Average											

SCE/EI Segundo Project # 53304

5/9/90
A. Bell

Metals by EPA Draft Multimetals Method

Re: Curtis and Tompkins lab # 25563
5% of decomposed aliquots removed for mercury analysis
values reported for all metals except mercury represent
95% of sample.

$$\text{Total } \mu\text{g} = \frac{(\mu\text{g, pickle \& filter} - \text{blank}) + (\mu\text{g impregn} - \text{blank})}{.75}$$

Arsenic: by graphite furnace

<u>Test</u>	<u>$\mu\text{g pickle \& filter}$</u>	<u>$\mu\text{g impregn}$</u>	<u>total μg</u>
4-Mils	14.32	3.94	18.3
5-Mils	10.11	2.25	12.4
7-Mils	13.26	4.36	17.6

Beryllium: by ICP

4-Mils	0.23	ND < 0.06	< 0.29
5-Mils	0.28	ND < 0.06	< 0.34
7-Mils	0.11	ND < 0.06	< 0.17

Cadmium: by ICP

4-Mils	0.85	0.29	1.1
5-Mils	0.93	1.14	2.0
7-Mils	1.79	0.55	2.3

SCE/EI Segundo Metals, p. 2

Test		ug probe & filler	ug impurities	ug, total
Copper : by ICP				
	4-Mils	12.0	3.58	15.6
	5-Mils	16.2	4.84	21.0
	7-Mils	34.6	5.37	40.0
Lead : graphite furnace and ICP				
	4-Mils	< 3.3	< 0.6	< 3.9
	5-Mils	< 3.3	< 0.6	< 3.9
	7-Mils	< 3.3	< 0.6	< 3.9
Manganese : by ICP				
	4-Mils	9.8	4.3	14.1
	5-Mils	14.0	< 0.6	< 14.6
	7-Mils	8.7	< 0.6	< 9.3
Nickel : by ICP				
	4-Mils	447.6	22.1	470
	5-Mils	489.7	2.5	492
	7-Mils	621.3	2.4	624
Selenium : by ICP				
	4-Mils	< 3.3	ND < 2.9	< 6.2
	5-Mils	< 3.3	3.1	< 6.4
	7-Mils	< 3.3	ND < 2.9	< 6.2
Zinc : by ICP				
	4-Mils	31.6	6.1	37.7
	5-Mils	44.2	6.8	51.0
	7-Mils	6,558	6.5	6,564

SCT/EI Segundo 7.3
Metals

Mercury by cold vapor a.a.

<u>Test</u>	<u>µg, probe & filter</u>	<u>µg HNO₃/H₂O₂ impinger 15</u>	<u>µg KMnO₄ impinger</u>	<u>total µg Hg</u>
4-Mt/s	ND < 2.1	ND < 46	ND < 1.6	ND < 49.7
5-Mt/s	ND < 2.7	ND < 45	ND < 2.8	ND < 50.5
7-Mt/s	ND < 3.2	ND < 38	ND < 2.7	ND < 43.9



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: 03/07/90

DATE REPORTED: 04/17/90

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LAB NUMBER: 25563

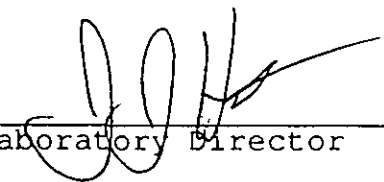
CLIENT: CARNOT

REPORT ON: FIVE SOURCE SAMPLES

PROJECT #: 5787

LOCATION: SUBMITTED BY CLIENT

RESULTS: SEE ATTACHED


Laboratory Director



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/02/90
DATE REPORTED: 04/17/90
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 ug/SAMPLE
1	REAGENT BLANK	BLANK 0.0272	0.36
		STD1 0.0283	
		STD2 0.0922	
		STD3 0.1848	
		INSTRUMENT FACTOR: 1	
		CORRELATION FACTOR: 0.9944	
		SAMPLE VOLUME 0.05	
2	FIELD BLANK	BLANK 0.0272	0.65
		STD1 0.0316	
		STD2 0.1006	
		STD3 0.1594	
		INSTRUMENT FACTOR: 1	
		CORRELATION FACTOR: 0.9989	
		SAMPLE VOLUME 0.05	
3	4-MTLS	BLANK 0.0272	4.1
		STD1 0.0243	
		STD2 0.0344	
		STD3 0.0387	
		INSTRUMENT FACTOR: 1	
		CORRELATION FACTOR: 0.9740	
		DILUTION FACTOR: 0.05	
4	5-MTLS	BLANK 0.0272	2.5
		STD1 0.0291	
		STD2 0.0392	
		STD3 0.0558	
		INSTRUMENT FACTOR: 1	
		CORRELATION FACTOR: 0.9903	
		DILUTION FACTOR: 0.05	



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/02/90
DATE REPORTED: 04/17/90
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
5	7-MTSL	BLANK	4.5
		STD1	
		STD2	
		STD3	

INSTRUMENT FACTOR: 1
CORRELATION FACTOR: 0.9888
SAMPLE VOLUME 0.05

LABORATORY NUMBER: 25563
 CLIENT: CARNOT
 PROJECT #: 5787
 LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
 DATE DIGESTED: 03/29/90
 DATE ANALYZED: 04/03/90
 DATE REPORTED: 04/17/90
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METAL: ARSENIC FRONT FILTER AND PROBE/NOZZLE WASH
 METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
 EPA METHOD 7060

C&T ID	SAMPLE ID	SAMPLE VOLUME	ARSENIC ug/SAMPLE
1	REAGENT BLANK	50	1.4
2	FIELD BLANK	50	2.9
3	4-MTLS	50	16
3D	4-MTLS	50	14
3S	4-MTLS	50	88%
4	5-MTLS	50	11
5	7-MTLS	50	14

use average

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 9
 SPIKE % RECOVERY: 88



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/02/90
DATE REPORTED: 04/17/90
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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

C&T ID	SAMPLE ID	SAMPLE VOLUME	BERYLLIUM ug/SAMPLE
1	REAGENT BLANK	50	ND (0.06)
2	FIELD BLANK	50	ND (0.06)
3	4-MTLS	50	ND (0.06)
4	5-MTLS	50	ND (0.06)
5	7-MTLS	50	ND (0.06)
5D	7-MTLS	50	ND (0.06)
5S	7-MTLS	50	89%

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1
SPIKE % RECOVERY: 89

LABORATORY NUMBER: 25563
 CLIENT: CARNOT
 PROJECT #: 5787
 LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
 DATE DIGESTED: 03/22/90
 DATE ANALYZED: 04/10/90
 DATE REPORTED: 04/17/90
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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 ug/SAMPLE
1	REAGENT BLANK	50	0.28* <i>do not subtract</i>
2	FIELD BLANK	50	0.15
3	4-MTLS	50	0.22
4	5-MTLS	50	0.27
5	7-MTLS	50	0.10
5D	7-MTLS	50	0.10
5S	7-MTLS	50	80%

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1
 SPIKE % RECOVERY: 80



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/29/90
DATE ANALYZED: 04/05/90
DATE REPORTED: 04/17/90
PAGE 7 OF 24

METAL: CADMIUM IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010

C&T ID	SAMPLE ID	SAMPLE VOLUME	CADMIUM ug/SAMPLE
1	REAGENT BLANK	50	0.02
2	FIELD BLANK	50	1.2
3	4-MTLS	50	0.31
3D	4-MTLS	50	0.29
3S	4-MTLS	50	77%
4	5-MTLS	50	1.1
5	7-MTLS	50	0.54

> Use average

METHOD DETECTION LIMIT = 0.02 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 8
SPIKE % RECOVERY: 77

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/22/90
DATE ANALYZED: 04/10/90
DATE REPORTED: 04/17/90
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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

C&T ID	SAMPLE ID	SAMPLE VOLUME	CADMIUM ug/SAMPLE
1	REAGENT BLANK	50	ND (0.32)
2	FIELD BLANK	50	ND (0.36)
3	4-MTLS	50	0.81
4	5-MTLS	50	0.88
5	7-MTLS	50	1.7
5D	7-MTLS	50	1.7
5S	7-MTLS	50	73%

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 3
SPIKE % RECOVERY: 73

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/02/90
DATE REPORTED: 04/17/90
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METAL: COPPER IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010 - ELEMENT NOT RESPONSIVE BY GFAAS/STD ADD METHOD

C&T ID	SAMPLE ID	SAMPLE VOLUME	COPPER ug/SAMPLE
1	REAGENT BLANK	50	1.6
2	FIELD BLANK	50	14
3	4-MTLS	50	5.0
4	5-MTLS	50	6.2
5	7-MTLS	50	6.7
5	7-MTLS	50	6.6
5	7-MTLS	50	89%

METHOD DETECTION LIMIT = 0.55 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1
SPIKE % RECOVERY: 89

LABORATORY NUMBER: 25563
 CLIENT: CARNOT
 PROJECT #: 5787
 LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
 DATE DIGESTED: 03/22/90
 DATE ANALYZED: 04/10/90
 DATE REPORTED: 04/17/90
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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 ug/SAMPLE
1	REAGENT BLANK	50	7.6
2	FIELD BLANK	50	120
3	4-MTLS	50	19
4	5-MTLS	50	23
5	7-MTLS	50	40
5	7-MTLS	50	41
5	7-MTLS	50	96%

> Use average

METHOD DETECTION LIMIT = 0.60 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 3
 SPIKE % RECOVERY: 96



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/03/90
DATE REPORTED: 04/17/90
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METAL: LEAD IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
METHOD OF STANDARD ADDITIONS - EPA 7421

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

LEAD
ug/SAMPLE

1 REAGENT BLANK BLANK 0.007
STD1 0.1063
STD2 0.2284
STD3 0.3011

14 "subtracted to d.d.
of 0.6 ug/l
4/min

INSTRUMENT FACTOR: 10
CORRELATION FACTOR: 0.9895
SAMPLE VOLUME 0.05

2 FIELD BLANK BLANK 0.0070
STD1 0.0687
STD2 0.2113
STD3 0.3186

7.3

INSTRUMENT FACTOR: 10
CORRELATION FACTOR: 0.9967
SAMPLE VOLUME 0.05

3 4-MTLS BLANK 0.0070
STD1 0.0154
STD2 0.0270
STD3 0.0364

1.9

INSTRUMENT FACTOR: 1
CORRELATION FACTOR: 0.9982
DILUTION FACTOR: 0.05

4 5-MTLS BLANK 0.0070
STD1 0.1210
STD2 0.2615
STD3 0.3667

13

INSTRUMENT FACTOR: 10
CORRELATION FACTOR: 0.9966
DILUTION FACTOR: 0.05



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/03/90
DATE REPORTED: 04/17/90
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METAL: LEAD IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
METHOD OF STANDARD ADDITIONS - EPA 7421

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		LEAD ug/SAMPLE
5	7-MTLS	BLANK	0.0070
		STD1	0.0693
		STD2	0.1011
		STD3	0.1235

INSTRUMENT FACTOR: 1
CORRELATION FACTOR: 0.9950
SAMPLE VOLUME 0.05



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/22/90
DATE ANALYZED: 04/10/90
DATE REPORTED: 04/17/90
PAGE 13 OF 24

METAL: LEAD FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010

C&T ID	SAMPLE ID	SAMPLE VOLUME	LEAD ug/SAMPLE
1	REAGENT BLANK	50	46 * subject to d.l.
2	FIELD BLANK	50	47
3	4-MTLS	50	43
4	5-MTLS	50	41
5	7-MTLS	50	46
5	7-MTLS	50	48
5	7-MTLS	50	84%

METHOD DETECTION LIMIT = 3.1 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 4
SPIKE % RECOVERY: 84

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/02/90
DATE REPORTED: 04/17/90
PAGE 14 OF 24

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

C&T ID	SAMPLE ID	SAMPLE VOLUME	MANGANESE ug/SAMPLE
1	REAGENT BLANK	50	1.2
2	FIELD BLANK	50	1.6
3	4-MTLS	50	5.3
4	5-MTLS	50	0.7
5	7-MTLS	50	1.1
5D	7-MTLS	50	1.1
5S	7-MTLS	50	86%

METHOD DETECTION LIMIT = 0.55 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1
SPIKE % RECOVERY: 86



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/02/90
DATE REPORTED: 04/17/90
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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 ug/SAMPLE
1	REAGENT BLANK	50	6.7
2	FIELD BLANK	50	6.6
3	4-MTLS	50	16
4	5-MTLS	50	20
5	7-MTLS	50	15
5D	7-MTLS	50	15
5S	7-MTLS	50	83%

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 2
SPIKE % RECOVERY: 83



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/29/90
DATE ANALYZED: 03/29/90
DATE REPORTED: 04/17/90
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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 ug/ALiquot *
1	REAGENT BLANK	SEE NOTE	ND (20)
2	FIELD BLANK	SEE NOTE	ND (41)
3	4-MTLS	SEE NOTE	ND (46)
3D	4-MTLS	SEE NOTE	ND (46)
3S	4-MTLS	SEE NOTE	98%
4	5-MTLS	SEE NOTE	ND (45)
5	7-MTLS	SEE NOTE	ND (38)

* NOTE: 5% v/v REMOVED AT 100 MLS FOR MERCURY; REMAINING 95 MLS
REDUCED TO 50 ML FOR OTHER METAL ANALYSES.

* values are *ug/train*

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1
SPIKE % RECOVERY: 98



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 04/05/90
DATE ANALYZED: 04/05/90
DATE REPORTED: 04/16/90
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 ug/ALIQUOT %
1	REAGENT BLANK	SEE NOTE	ND (2.2)
2	FIELD BLANK	SEE NOTE	ND (1.7)
3	4-MTSL	SEE NOTE	ND (2.1)
4	5-MTSL	SEE NOTE	ND (2.7)
5	7-MTSL	SEE NOTE	ND (3.2)
5D	7-MTSL	SEE NOTE	ND (3.2)
5S	7-MTSL	SEE NOTE	93%

* NOTE: 5% v/v REMOVED AT 100 MLS FOR MERCURY; REMAINING 95 MLS
REDUCED TO 50 ML FOR OTHER METAL ANALYSES.

values are ug/gain

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1
SPIKE % RECOVERY: 93



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/29/90
DATE ANALYZED: 03/29/90
DATE REPORTED: 04/16/90
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METAL: MERCURY POTASSIUM PERMANGANATE IMPINGER
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 7471

C&T ID	SAMPLE ID	SAMPLE VOLUME	MERCURY ug/SAMPLE *
1	REAGENT BLANK	200	ND (2.0)
2	FIELD BLANK	100	ND (1.0)
3	4-MTLS	160	ND (1.6)
4	5-MTLS	275	ND (2.8)
4D	5-MTLS	275	ND (2.8)
4S	5-MTLS	275	99%
5	7-MTLS	270	ND (2.7)

* values are $\mu\text{g}/\text{train}$

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1
SPIKE % RECOVERY: 99



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/02/90
DATE REPORTED: 04/17/90
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METAL: NICKEL IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010

C&T ID	SAMPLE ID	SAMPLE VOLUME	NICKEL ug/SAMPLE
1	REAGENT BLANK	50	ND (0.63)
2	FIELD BLANK	50	2.9
3	4-MTLS	50	21
4	5-MTLS	50	2.4
5	7-MTLS	50	2.3
5D	7-MTLS	50	2.2
5S	7-MTLS	50	85%

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 4
SPIKE % RECOVERY: 85



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/22/90
DATE ANALYZED: 04/10/90
DATE REPORTED: 04/17/90
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METAL: NICKEL FRONT FILTER AND PROBE/NOZZLE WASH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010

C&T ID	SAMPLE ID	SAMPLE VOLUME	NICKEL ug/SAMPLE
1	REAGENT BLANK	50	4.8
2	FIELD BLANK	50	6.9
3	4-MTLS	50	430
4	5-MTLS	50	470
5	7-MTLS	50	590
5D	7-MTLS	50	600
5S	7-MTLS	50	99%

> Use average

METHOD DETECTION LIMIT = 0.60 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 1
SPIKE % RECOVERY: 99



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/02/90
DATE REPORTED: 04/17/90
PAGE 21 OF 24

METAL: SELENIUM IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010

C&T ID	SAMPLE ID	SAMPLE VOLUME	SELENIUM ug/SAMPLE
1	REAGENT BLANK	50	ND (3.1)
2	FIELD BLANK	50	ND (2.8)
3	4-MTLS	50	ND (2.8)
4	5-MTLS	50	2.9
5	7-MTLS	50	ND (2.8)
5D	7-MTLS	50	ND (2.8)
5S	7-MTLS	50	98%

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1
SPIKE % RECOVERY: 98



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/22/90
DATE ANALYZED: 04/10/90
DATE REPORTED: 04/17/90
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

C&T ID	SAMPLE ID	SAMPLE VOLUME	SELENIUM ug/SAMPLE
1	REAGENT BLANK	50	7.9 * <i>subjected to 22 of 3.3ug/train</i>
2	FIELD BLANK	50	15
3	4-MTLS	50	8.5
4	5-MTLS	50	5.7
5	7-MTLS	50	5.0
5	7-MTLS	50	5.1
5	7-MTLS	50	80%

METHOD DETECTION LIMIT = 3.1 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: <1
SPIKE % RECOVERY: 80



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/19/90
DATE ANALYZED: 04/02/90
DATE REPORTED: 04/17/90
PAGE 23 OF 24

METAL: ZINC IMPINGER CATCH
METHOD: METALS EMISSIONS IN EXHAUST GAS PROCEDURE DATED 8/28/89
EPA METHOD 6010

C&T ID	SAMPLE ID	SAMPLE VOLUME	ZINC ug/SAMPLE
1	REAGENT BLANK	50	2.3
2	FIELD BLANK	50	22
3	4-MTLS	50	8.1
4	5-MTLS	50	8.8
5	7-MTLS	50	8.5
5D	7-MTLS	50	8.4
5S	7-MTLS	50	79%

METHOD DETECTION LIMIT = 0.56 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 2
SPIKE % RECOVERY: 79

Appendix C.8
Chromium and Hexavalent Chromium

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: CHROMIUM BY CARB 425

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-CR-S	23.6	83.67	7.63	233608	9.96	8.71E-03	8.84E-06
3-CR-S	13.8	79.66	9.27	230188	6.12	5.27E-03	6.20E-06
6-CR-N	9.4	80.24	8.40	241381	4.14	3.74E-03	3.90E-06
AVG					6.74		6.31E-06
STACK TOTAL, WEIGHTED				473279		1.19E-02	

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 05/09/90

ELEMENT: HEXAVALENT CHROMIUM

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
2-CR-S	3.79	83.67	7.63	233608	1.60	1.40E-03	1.42E-06
3-CR-S	3.98	79.66	9.27	230188	1.76	1.52E-03	1.79E-06
6-CR-W	1.76	80.24	8.40	241381	0.77	7.00E-04	7.30E-07
AVG					1.38		1.31E-06
STACK TOTAL, WEIGHTED				473279		2.44E-03	

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/22/90
Test Number.....	2-CR	*	Data By.....	RBB
Test Method.....	425	*	Sample Location.....	S.DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-19	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	1.0000
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	126
Bar Press (in Hg).....	30.44	*	Nozzle Diam (in).....	0.191
Meter Vol (acf).....	87.846	*	Meter Temp (F).....	97.0
Stack Press (iwg).....	0.40	*	Stack Temp (F).....	323.0
Vel Head (iwg).....	1.6130	*	O2 (%): from CEM.....	7.50
Liquid Vol (ml).....	173.2	*	from portable...	7.63
Meter Press (iwg).....	1.42	*	CO2 (%): from CEM.....	10.00
		*	calculated.....	9.90
		*	Start/Stop Time.....	1350/1615
Std Sample Vol (SCF).....				83.67
Metric Sample Vol (cubic meters).....				2.37
Moisture Fraction.....				0.088
Stack Gas Mol Wt.....				28.85
Stack Gas Velocity (ft/sec).....				85.95
Stack Flow Rate (wacfm).....				378,736
Stack Flow Rate (dscfm).....				233,608
Isokinetic Ratio (%).....				104.88

Sample Location 10 Kan Office South Fuel Oil Ambient Temp., of 67 of 3 Date 2/29/90
Operators L. Maffigian Meter Vol. (Start/End) 017.53/105.565 Method AP Pay 18

Pre Test Data:

Barometric Press. in. Hg 30.84
Stack Area, sq. ft. 13.44
Sample Time/ Pt. min. 3
Assumed Stack Press 1.5
Assumed Moisture 5%
Assumed Molecular Wt 29

Equipment Info:

Meter No. ES-19
Meter, Yd 1.00
Pitot, Cp 1.84
CFM @ H = 1.0 6598
Probe I.D. 9.611 in
Nozzle No./Dia 12 1/2
Filter No. 2-1912

Weight

Imp. Matl Wt(End) (Start) (g) Leak Check:
#1 111 NaOH 720.9 - 596.2 = 132.7
#2 111 NaOH 619.6 - 606.4 = 13.2
#3 --- 501.6 - 495.6 = 6
#4 gel 719.7 - 698.4 = 21.3
Total --- = 173.2

Impinger Box I.D. ---

Integrated Bag I.D. ---

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

South
8.8884

$\Delta H = 817262$ 63

Sample Point	Time	Meter Conditions			Temperatures, OF				Vacuum		Static Press. twg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O ₂	
Start	1350	1.9	1.5	617.523	311	268	83	83	N/A	---	---	Initial
A-7	1353	2.3	1.87	619.762	313	275	108	84	---	---	---	Sample Vol., c.f. <u>87.846</u>
C	1356	3.0	2.4	622.028	314	288	112	84	---	---	---	Stack Press. twg <u>4</u>
S	1359	3.1	2.53	624.905	318	292	112	86	---	---	---	ΔP <u>1.613</u> twg ΔH <u>1.421</u> wg
H	1402	3.2	2.6	627.489	319	293	112	87	---	---	---	Meter Temp., OF <u>96.90</u>
J	1405	2.0	1.6	630.387	321	297	112	88	---	---	---	Stack Temp., OF <u>323</u>
2	1408	1.5	1.2	632.799	324	297	110	89	---	---	---	Water Collected, g <u>173.2</u>
Pop 1	1411	---	---	634.925	---	---	---	---	---	---	---	O ₂ /CO ₂ Method <u>---</u>
Sample	1417	1.2	1.98	634.925	334	275	83	87	---	---	---	Chain of Cust. Info (Init.): <u>---</u>
Q-7	1420	2.7	2.2	636.719	336	275	109	88	---	---	---	Impingers Loaded <u>80/8F</u>
C	1423	2.4	1.96	639.510	335	260	112	88	---	---	---	Impingers Recovered <u>KH</u>
S	1426	3.5	2.8	641.891	329	275	112	89	---	---	---	Filter Loaded <u>8F</u>
H	1427	3.8	3.1	644	329	264	114	89	---	---	---	Filter Recovered <u>KH</u>
J	1432	2.5	2.0	647.968	317	259	114	89	---	---	---	Probe Wash <u>8F</u>
2	1435	0.85	1.69	651.432	315	---	110	90	---	---	---	Comments: <u>---</u>
Step 1	1438	---	---	652.621	---	---	---	---	---	---	---	---
Total/Average		---	---	---	---	---	---	---	---	---	---	---

CHECKED BY: RB

Client/Location SCE / E1 S4 Unit 1 Test No. 244 Method 2 Page 2
 Sample Location South I.R. Fuel Rest Exit Fuel #6 Oil Ambient Temp., °F 71 of 3
 Operators Mulligan & W. Osborn Meter Vol. (Start/End) 1 Date 2/22/50

Pre Test Data:
 Barometric Press, in. Hg _____
 Stack Area, sq. ft. _____
 Sample Time/ Pt, min. _____
 Assumed Stack Press 0.53
 Assumed Moisture _____
 Assumed Molecular Wt _____
 Equipment Info:
 Meter No. _____
 Meter, Yd _____
 Pitot, CF _____
 CFM @ 18.0 _____
 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 _____
 Init. _____
 Final _____

Sample Point	Time	Meter Conditions			Temperatures, °F				O ₂	Vacuum	Static Press. 1wg	Test Summary
		ΔP	ΔH	Meter Reading	Probe	Meter In	Out	Oven	Imp. Out			
Start	14 44	0.44	.35	052.621	248	97	81		100	2		Initial
1	14 44	0.61	0.49	053.681	336	100	89		69	2	1.2	Sample Vol., c.f.
2	14 44	1.0	0.81	054.915	337	105	85		69	2		Stack Press, 1wg
3	14 50	2.2	2.2	056.612	334	110	89		68	4		ΔP 1wg ΔH 1wg
4	14 53	3.2	2.6	057.623	327	112	89		65	4		Meter Temp., °F
5	14 55	2.0	1.6	061.681	322	112	90		65	3		Stack Temp., °F
6	14 57	1.6	.55	064.187	316	109	90		64	2		Water Collected, g
Stop 1	15 02			065.651								O ₂ /CO ₂ Method
Start	15 05	1.0	.49	066.651	327	92	88		62	2		Chain of Cust. Info (Init.):
1	15 08	.58	.31	066.915	331	102	89		62	2		Impingers Loaded
2	15 11	.85	.69	068.138	332	102	89		63	2		Impingers Recovered
3	15 14	1.8	1.47	069.513	330	107	90		63	2		Filter Loaded
4	15 17	2.2	1.79	071.876	325	111	90		64	3		Filter Recovered
5	15 20	1.1	.85	074.265	321	110	90		64	2		Probe Wash
6	15 23	.95	.77	075.984	320	106	90		64	2		Comments:
Stop 1	15 24			077.589								
Total/Average												

Client/Location SCF F1524 Unit 1 Test No. 201/163 Method 3
 Sample Location South F.D. Can dust out 14 Fuel SC 0.1 Ambient Temp., of 3
 Operators J. Mulligan & W. Osborn Meter Vol. (Start/End) 1 Date 2/2/70

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, 1
 Pitot, 1
 CFM $\Delta H = 1.0$
 Probe I.D. _____
 Nozzle No./Dia _____
 Filter No. _____
Weight
 Imp. Meter Wt (End) (Start) (g) _____
 #1 _____
 #2 _____
 #3 _____
 #4 _____
 Total _____
 Impinger Box I.D. _____
 Integrated Bag I.D. _____
Leak Check:
 Pre-Test _____
 Post-Test _____
Sample Train
 CFM Vac. _____
 Int. Pitot _____
 Int. Pitot _____
Pre-Test Calibration
 Meter Meter Temp. _____
 Time ΔH Reading In Out _____
 Init. _____
 Final _____

Sample Point	Time	Meter Conditions			Temperatures, of					Static Press. 1wg	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven			Imp. Out
START	15:29	1.1	.89	077.589	334		94	88		500	7.6	2
F	15:32	1.0	.41	079.215	334		104	89		64	7.5	2
	15:35	1.4	.52	080.612	331		102	88		63	7.0	2
	15:36	1.2	1.06	081.892	331		104	88		63	7.8	2
	15:41	1.2	.98	083.667	323		106	89		63	7.4	2
	15:44	1.4	1.14	085.215	321		107	88		63	8.6	2
	15:47	1.1	.89	087.563	318		107	88		63	8.7	2
Stop 1	15:50			089.259								
START	15:54	1.0	.81	089.359	322		89	86		65	7.5	2
F	15:57	1.5	1.22	091.025	351		105	87		65	7.6	2
	16:00	1.8	1.47	093.122	331		107	87		65	7.6	3
	16:03	2.1	1.71	095.341	330		108	87		65	7.9	3
	16:06	2.6	2.12	097.698	328		110	87		62	8.0	4
	16:09	2.9	2.36	100.212	324		111	88		62	8.0	4
	16:12	1.9	1.55	103.087	318		110	89		62	8.6	3
Stop 1	16:15			105.369								
												</

Comments: _____
 Impingers Loaded _____
 Impingers Recovered _____
 Filter Loaded _____
 Filter Recovered _____
 Probe Wash _____
 EST DS-022 Rev. 9/89

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/22/90
Test Number.....	3-CR	*	Data By.....	RBB
Test Method.....	425	*	Sample Location.....	S.DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-19	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	1.0000
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	126
Bar Press (in Hg).....	30.44	*	Nozzle Diam (in).....	0.193
Meter Vol (acf).....	83.161	*	Meter Temp (F).....	93.7
Stack Press (iwg).....	0.30	*	Stack Temp (F).....	329.6
Vel Head (iwg).....	1.5680	*	O2 (%): from CEM.....	7.70
Liquid Vol (ml).....	161.7	*	from portable...	9.27
Meter Press (iwg).....	1.30	*	CO2 (%): from CEM.....	9.73
		*	calculated.....	8.57
		*	Start/Stop Time.....	1702/1936
Std Sample Vol (SCF).....				79.66
Metric Sample Vol (cubic meters).....				2.26
Moisture Fraction.....				0.086
Stack Gas Mol Wt.....				28.73
Stack Gas Velocity (ft/sec).....				85.28
Stack Flow Rate (wacfm).....				375,788
Stack Flow Rate (dscfm).....				230,188
Isokinetic Ratio (%).....				99.25

Pre Test Data:
Barometric Press, in. Hg 30.44
Stack Area, sq. ft. 73.44
Sample Time/ Pt, min. 3/126
Assumed Stack Press 9%
Assumed Moisture 29
Assumed Molecular Wt 29

Equipment Info:
Meter No. 15-19
Meter, Yd 1.00
Pitot, Cp .84
CFM $\Delta H = 1.0$.555
Probe I.D. 9.21/34.2
Nozzle No./Dia 193
Filter No. 763-111

Imp. Matl 11.14/10.11 Weight 742.2 (Start) 610.5 (g) 131.7
Imp. Matl 12.14/10.11 Weight 608.0 (Start) 596.7 (g) 9.3
Imp. Matl 13 Weight 498.3 (Start) 455.9 (g) 2.4
Imp. Matl 14 Weight 226.0 (Start) 757.7 (g) 18.3
Total 161.7

Leak Check: -
Pre-Test 0.18 8 SM at
Post-Test 0.14 7 SM at
Pre-Test Calibration

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

11768

Sample Point	Time	Meter Conditions			Temperatures, OF					Imp. Out	Oven	Static Press. twg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Meter Out	O ₂				
Start	1702	0.24	.18	105.883	328	0	91	86					Initial BF. Sample Vol., c.f. <u>83.161</u> Stack Press, twg <u>.3</u> ΔP <u>1.588</u> twg ΔH <u>1.3</u> twg Meter Temp., OF <u>93.67</u> Stack Temp., OF <u>329.6</u> Water Collected, g <u>161.7</u> O ₂ /CO ₂ Method Chain of Cust. Info (init.): Impingers Loaded <u>none</u> Impingers Recovered <u>200.0</u> Filter Loaded <u>none</u> Filter Recovered <u>200.0</u> Probe Wash <u>BF.</u> Comments:
1	1705	1.20	.92	106.921	331		103	86					
2	1708	1.40	1.07	108.263	330		105	87					
3	1711	2.2	1.68	110.198	328		107	87					
4	1714	2.8	2.15	112.225	326		109	86					
5	1717	3.1	2.38	114.876	323		110	87					
6	1720	2.0	1.0	117.258	323		111	87					
7	1723			119.927									
8	1726	0.89	.68	119.923	335		83	86					
9	1729	6.35	.43	121.585	334		100	86					
10	1732	.68	.52	122.863	332		98	86					
11	1735	1.2	.92	124.165	329		100	85					
12	1738	1.4	1.07	125.776	328		102	85					
13	1741	1.1	.84	127.598	322		103	83					
14	1744	1.5	1.15	129.382	326		102	85					
15	1747			131.265									
all/Average													

Client/Location SCE / E-1 S-3 Unit 1 Test No. 3 Ch-South Method 2
 Sample Location South I.D. Handout with Fuel #2 oil Ambient Temp., OF 3
 Operators d. Mulligan Meter Vol. (Start/End) 1 Date 2/22/80

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. _____
 Meter, YA _____
 Pilot, _____
 CFM $\Delta H = 1.0$ _____
 Probe I.D. _____
 Nozzle No./Dia _____
 Filter No. _____
 Imp. Matl _____
 Wt(End) (Start) (g) _____
 Weight _____
 Leak Check: _____
 Sample Train
 CFM Vac. 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, OF				O ₂	Vacuum	Static Press. twg	Test Summary
		ΔP	ΔH	Meter Reading	Probe	Meter In	Out	Oven				
Start	1750	.48	.26	131.265		90	84		57	2		Initial
1	1753	.34	.26	132.487		93	84		59	2		Sample Vol., c.f.
2	1756	.67	.52	133.328		95	84		58	2		Stack Press, twg
3	1759	1.15	1.15	134.632		100	83		56	3		ΔP twg ΔH twg
4	1802	1.19	1.45	136.350		103	83		55	3		Meter Temp., OF
5	1805	1.2	.92	138.345		103	83		55	3		Stack Temp., OF
6	1808	.98	.75	140.132		101	83		56	3		Water Collected, g
7	1811			141.655								O ₂ /CO ₂ Method
8	1824	.82	.62	141.735		95	82		57	3		Chain of Cust. Info (init.):
9	1827	.91	.69	143.822		100	83		54	2		Impingers Loaded
10	1830	1.6	1.22	144.738		101	83		55	2		Impingers Recovered
11	1833	2.4	1.92	147.187		106	83		54	5		Filter Loaded
12	1836	2.7	2.0	149.263		107	83		54	5		Filter Recovered
13	1839	1.9	1.45	151.738		107	84		56	5		Probe Wash
14	1842	.62	.47	154.053		105	84		57	5		Comments: - 80 from final
15	1845			155.341								Vol Probe Nozel
16												1/2 .0058" VAV
Cal/Average												

Client/Location SCC/E/Sr Unit 1 Test No. 3 CR/E/Sr Method 3 Page 3
 Sample Location South I.A. FAN Rect Outlet Fuel Oil Ambient Temp., OF 189.044 Date 2/22/90
 Operators S. M. C. 11/3/89 Meter Vol. (Start/End) 189.044

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. _____
 Weight _____
 Weight (Start) _____
 Weight (End) _____
 Leak Check: _____
 Sample Train
 CFM Vac. Inlt. 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, OF				O ₂	Vacuum	Static Press. twg	Test Summary
		ΔP	ΔH	Meter Reading	Probe	Meter In	Out	Oven				
Start	1849	1.9	1.45	155.341		89	82		59	8.9	4	Initial
1	1852	2.1	1.51	157.624		106	83		57	8.1	5	Sample Vol., c.f.
2	1855	2.5	2.15	159.873		107	84		57	8.4	5	Stack Press, twg
3	1858	3.7	2.8	162.287		109	84		58	9.0	7	ΔP twg ΔH twg
4	1901	3.3	2.5	165.175		111	85		59	10.0	7	Meter Temp., OF
5	1904	2.0	1.5	167.983		111	85		62	10.1	4	Stack Temp., OF
6	1907	0.90	.65	170.483		108	85		62	10.1	2	Water Collected, g
Stop	1910			171.962								O ₂ /CO ₂ Method
Start	1915	2.8	2.4	171.962		95	83		60	10.0	6	Chain of Cust. Info (Inlt.):
1	1918	2.5	1.92	175.289		109	85		58	10.1	6	Impingers Loaded
2	1921	3.1	2.3	177.681		108	85		59	10.1	4	Impingers Recovered
3	1924	3.3	2.5	179.812		109	85		59	9.5	6	Filter Loaded
4	1927	2.1	1.67	182.237		110	86		61	8.5	4	Filter Recovered
5	1930	1.5	1.15	185.3		106	87		63	8.4	4	Probe Wash
6	1933	.97	.74	187.328		104	85		63	8.1	3	Comments:
Stop	1936			189.044								
Total/Average												

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/24/90
Test Number.....	6-CR	*	Data By.....	RBB
Test Method.....	CHROME	*	Sample Location.....	N. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	•	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	126
Bar Press (in Hg).....	30.34	*	Nozzle Diam (in).....	0.195
Meter Vol (acf).....	85.430	*	Meter Temp (F).....	97.5
Stack Press (iwg).....	0.35	*	Stack Temp (F).....	343.5
Vel Head (iwg).....	1.7200	*	O2 (%): from CEM.....	7.55
Liquid Vol (ml).....	138.4	*	from portable...	8.40
Meter Press (iwg).....	1.54	*	CO2 (%): from CEM.....	9.00
		*	calculated.....	8.43
		*	Start/Stop Time.....	0900/1129
Std Sample Vol (SCF).....				80.24
Metric Sample Vol (cubic meters).....				2.27
Moisture Fraction.....				0.074
Stack Gas Mol Wt.....				28.82
Stack Gas Velocity (ft/sec).....				90.11
Stack Flow Rate (wacfm).....				397,058
Stack Flow Rate (dscfm).....				241,381
Isokinetic Ratio (%).....				93.39

$\Delta \# = .846, \Delta P$				
	Init.	—	—	—
	Final	20	—	—

$$\Delta_{\#} = .846 \cdot \Delta p$$

[illegible]

1. duly OB

Client/Location SCE / EL Segundo Unit 1 Test No. 6-CP Method CHRONIC Page 2
 Sample Location NORTH Duct Fuel OIL Ambient Temp., °F 3
 Operators M. Schmitt Meter Vol. (Start/End) 1 Date 2/24/90

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. 0.195
 Filter No. _____

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

Leak Check: _____
 Pre-Test _____
 Post-Test _____

CFM Vac. Init. Pitot IBS _____
 Sample Train _____

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	Out	Oven			Imp. Out
C-5	953	1.8	.66	770.881	348	—	103	90	—		7.6	2
-4	951	2.2	1.86	772.350	340		113	90			7.9	7
-3	959	2.5	2.12	774.600	342		116	91			8.5	7
-2	1002	1.1	.93	776.936	335		111	92			9.2	3
-1	1005	.96	.81	778.627	334		108	91			9.4	3
-	1008			780.216								
D-7	1010	1.0	.85	780.216	348		99	91			8.1	3
-6	1013	1.4	1.18	781.884	348		106	91			7.6	4
-5	1016	1.8	1.52	783.710	353		107	91			7.6	4
-4	1019	2.3	1.95	785.600	349		108	90			7.8	7
-3	1028	2.9	2.45	787.880	341		114	90			8.5	10
-2	1028	1.8	1.52	790.771	335		113	90			9.4	5
-1	1028	.66	.73	793.010	334		106	91			9.5	3
-	1034			794.484								
E-7	1036	1.7	1.44	794.484	353		97	89			7.9	5
-6	1039	2.5	2.12	796.542	351		107	89			7.6	8
-5	1042	2.1	1.78	798.940	354		110	90			7.5	6
-4	1045	3.50	2.96	801.300	345		111	90			7.7	10
Total/Average												
Chain of Cust. Info (Init.):												
Impingers Loaded												
Impingers Recovered												
Filter Loaded												
Filter Recovered												
Probe Wash												
Comments:												

Client/Location SCE / EL 966WDD Unit 1 Test No. 6-CR Method CHROMA Page 3
 Sample Location Norath Duct Fuel DIL Ambient Temp., of 3
 Operators M. Schmitt Meter Vol. (Start/End) 1 Date 2/24/90

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 Weight _____
 Meter, Yd #2 Wt(End) (Start) (g) _____
 Pitot, Cp #3 Leak Check: _____
 CFM $\theta \Delta H = 1.0$ _____
 Probe I.D. _____
 Nozzle No./Dia _____
 Filter No. _____
 Impinger Box I.D. _____
 Integrated Bag I.D. _____
 Pre-Test Calibration
 Pre-Test _____
 Post-Test _____
 Meter Meter Temp.
 Time ΔH Reading In Out
 Init. _____
 Final _____

Sample Point	Time	Meter Conditions			Temperatures, of				O ₂	Vacuum	Static Press. twg	Test Summary
		ΔP	ΔH	Meter Reading	Probe	Meter In	Out	Oven				
E-3	1048	3.0	2.54	804.201	—	113	90	—	8.9	9	35	Initial
-4	1051	2.3	1.95	806.780		111	90		9.4	7		Sample Vol., c.f.
-3	1054	2.3	1.95	809.651		111	91		9.5	7		Stack Press, twg
-2	1057			811.554								ΔP twg ΔH twg
E-1	1108	1.5	1.27	811.554		98	88		10	4		Meter Temp., of
-6	1111	2.5	2.12	813.210		108	88		9.8	4		Stack Temp., of
-5	1114	2.1	1.78	815.506		104	88		7.5	6		Water Collected, g
-4	1117	3.2	2.71	817.713		110	88		8.4	10		O ₂ /CO ₂ Method
-3	1120	2.3	1.95	820.470		112	89		7.7	7		Chain of Cust. Info (Init.):
-2	1123	1.7	1.44	822.813		110	89		7.2	5		Impingers Loaded
-1	1126	.90	.76	824.910		105	88		7.2	3		Impingers Recovered
-	1129			826.432								Filter Loaded
												Filter Recovered
												Probe Wash
												Comments:
Total/Average									8.4			

SCE/El Segundo Project # 53304

5/7/90
A. Bell

Total Chromium by CARB 405

Curtis and Tompkins Laboratory Report # 25560

Method: Atomic absorption using standard additions

- Values represent $\frac{1}{2}$ train

Reagent Blank = $1.53 \mu\text{g}$: subtract reagent
blank from each sample

Method d.l. = $.25 \mu\text{g}/\frac{1}{2}$ train

Test No	$\mu\text{g}/\frac{1}{2}$ train	$\mu\text{g}/\frac{1}{2}$ train - blank	$\mu\text{g}/\text{train}$
2-Cr	13.34	11.81	23.6
3-Cr	8.44	6.91	13.8
6-Cr	6.22	4.69	9.4



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: 03/07/90

DATE REPORTED: 03/21/90

PAGE 1 OF 2

LAB NUMBER: 25560

CLIENT: CARNOT

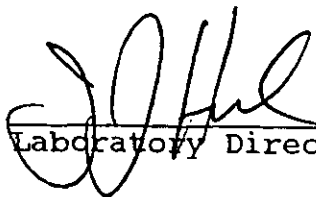
REPORT ON: FOUR SOURCE TEST SAMPLES

PROJECT #: 53304-ELS

LOCATION: SUBMITTED BY CLIENT

RESULTS: SEE ATTACHED

NOTE: METHOD OF STANDARD ADDITIONS HAD TO BE RUN AS SPIKE RECOVERY
ON INITIAL RUN WAS 60%.


Laboratory Director

LABORATORY NUMBER: 25560
 CLIENT: CARNOT
 PROJECT #: 53304-ELS
 LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
 DATE DIGESTED: 03/15/90
 DATE ANALYZED: 03/19/90
 DATE REPORTED: 03/21/90
 PAGE 2 OF 2

METAL: CHROMIUM IMPINGER CATCH
 METHOD: CARB 425
 METHOD OF STANDARD ADDITIONS - EPA 7191

STANDARD INFORMATION BLANK
 STD1 = 10 ul SAMPLE + 10 ul 0.00 STD
 STD2 = 10 ul SAMPLE + 10 ul 12.50 STD
 STD3 = 10 ul SAMPLE + 10 ul 25.00 STD

C&T ID	SAMPLE ID			CHROMIUM ug/1/2 TRAIN
1	REAGENT BLANK	BLANK	0.0004	1.53
		STD1	0.0651	
		STD2	0.2029	
		STD3	0.3344	
		INSTRUMENT FACTOR:	10	
		CORRELATION FACTOR:	0.9999	
		SAMPLE VOLUME	0.025	
2	2-Cr-ELS	BLANK	0.0004	13.34
		STD1	0.1898	
		STD2	0.3251	
		STD3	0.4161	
		INSTRUMENT FACTOR:	25	
		CORRELATION FACTOR:	0.9937	
		SAMPLE VOLUME	0.025	
3	3-Cr-ELS	BLANK	0.0004	8.44
		STD1	0.1642	
		STD2	0.2938	
		STD3	0.4102	
		INSTRUMENT FACTOR:	20	
		CORRELATION FACTOR:	0.9995	
		DILUTION FACTOR:	0.025	
4	6-Cr-ELS	BLANK	0.0004	6.22
		STD1	0.2286	
		STD2	0.3385	
		STD3	0.4568	
		INSTRUMENT FACTOR:	10	
		CORRELATION FACTOR:	0.9998	
		DILUTION FACTOR:	0.025	

MDL = 0.25 ug/SAMPLE

SCE / El Segundo Project # 53304

5/2/90
N. Bell

Hexavalent Chromium by CARB 425

Re: RTI lab report # 2984

Reagent Blank ND at $.0014 \mu\text{g}/\text{ml} = .28 \mu\text{g}/\text{train}$

Test No	$\mu\text{g}/\text{probe wash}$	$\mu\text{g}/\text{impinger}$ 5.1 liter	$\mu\text{g}/\frac{1}{2} \text{ train}$	total $\mu\text{g}/\text{train}$
2-Cr	0.243	1.65	1.89	3.79
3-Cr	ND < 0.14	1.85	1.99	3.98
6-Cr	0.88		0.88	1.76

* probe wash, impinger catch and filter combined on test 6-Cr

RESEARCH TRIANGLE INSTITUTE



Center for Environmental Measurements

March 13, 1990

Ms. Arlene C. Bell
Director, Laboratory Services
15991 Red Hill Avenue, Suite 110
Tustin, CA 92680-7388

Dear Ms. Bell,

Enclosed are the Cr(VI) analysis results as determined by ion chromatography for one spike sample and six impinger/probe rinse samples received on February 28, 1990 for RTI Project No. 2984, ESA Project No. 53304-ELS.

If you have any questions, please call me at 919-541-6569 or Peter Grohse at 919-541-6897.

Sincerely,

A handwritten signature in cursive script that reads "Kate K. Luk".

Kate K. Luk, Ph.D.

Ref: 2984
cc: W. Gutknecht
P. Grohse
J. Merricks

RTI Project No. : 2984
 Company : ESA
 ETS Project No. : 53304-ELS
 Samples : Probe wash and impinger samples
 Analyte : Cr(VI)
 Method of Analysis : IC
 Sample received : 2-28-1990
 Report Date : 3-13-1990

Sample *	Total Vol.(mL)	Cr(VI) ug/mL	Cr(VI) Tot.ug	Cr(VI) Spike Tot.ug Expected	Cr(VI) Spike Tot.ug Found	Cr(VI) % Spike Recovery
Reag.Blk	100	ND	ND			
2-Cr-ELS Probe	165	0.00147	0.243			
2-Cr-ELS Probe Spike				0.0100	0.00903	90.3
2-Cr-ELS Imp/Fil	350	0.00470	1.65			
3-Cr-ELS Probe	100	ND	ND			
3-Cr-ELS Imp/Fil	260	0.00711	1.85			
6-Cr-ELS Pro/Imp/Fil	310	0.00285	0.884			

Detection Limit 0.0014

ND : Non-detectable; less than detection limit

* Represents 1/2 of train

Appendix C.9

Arsenic

METALS EMISSION CALCULATIONS

Client/Location: SCE/EL SEGUNDO UNIT 1
 F Factor: 9039
 Reference Temp (F): 60
 Fuel: Oil

BY: AB
 DATE: 5/9/90

ELEMENT: ARSENIC FOR CARB METALS VALIDATION STUDY

Test	ug/train	Vmstd	%O2	Qsd	ug/m3	lb/hr	lb/MMbtu
4-AS-S	0.8	52.78	9.08	215701	0.54	4.32E-04	5.34E-07
5-AS-S	2.6	51.16	8.86	218118	1.79	1.46E-03	1.76E-06
7-AS-W	4.4	52.81	8.33	236546	2.94	2.60E-03	2.76E-06
AVG					1.76		1.68E-06
STACK TOTAL, WEIGHTED				453456		2.98E-03	

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/23/90
Test Number.....	4-AS	*	Data By.....	RBB
Test Method.....	423	*	Sample Location.....	S. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-19	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	1.0000
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	86
Bar Press (in Hg).....	30.38	*	Nozzle Diam (in).....	0.194
Meter Vol (acf).....	55.263	*	Meter Temp (F).....	94.2
Stack Press (iwg).....	0.50	*	Stack Temp (F).....	328.6
Vel Head (iwg).....	1.3825	*	O2 (%): from CEM.....	7.50
		*	from portable...	9.08
Liquid Vol (ml).....	110.7	*	CO2 (%): from CEM.....	9.60
		*	calculated.....	8.47
Meter Press (iwg).....	1.28	*	Start/Stop Time.....	0944/1159
Std Sample Vol (SCF).....				52.78
Metric Sample Vol (cubic meters).....				1.49
Moisture Fraction.....				0.089
Stack Gas Mol Wt.....				28.68
Stack Gas Velocity (ft/sec).....				80.16
Stack Flow Rate (wacfm).....				353,224
Stack Flow Rate (dscfm).....				215,701
Isokinetic Ratio (%).....				101.76

Client/Location SCE/EI Second Unit 1 Test No. 4-As Method A23 Page 1
 Sample Location South ID Fan duct outlet Fuel #6 oil Ambient Temp., OF 66 of 3
 Operators A. Mullipati Meter Vol. (Start/End) 190.548/1945.611 Date 2/23/90

Pre Test Data:
 Barometric Press, In. Hg 30.38
 Stack Area, sq. ft. 73.44
 Sample Time/ Pt, min. 2/84
 Assumed Stack Press 2.5
 Assumed Moisture 9%
 Assumed Molecular Wt 29

Equipment Info:
 Meter No. E-5-19
 Meter, Yd 1.00
 Pitot, Cp .84
 CFM $\theta \Delta H = 1.0$
 Probe I.D. 76.111/11.55
 Nozzle No./Dia 194
 Filter No. 7118-84

Weight Weight
 Imp. Matl Wt(End) (Start) (g) Leak Check:
 11 1016.0 175.8 - 634.3 = 141.5
 12 1016.0 541.0 - 589.3 = -48.3
 13 1016.0 498.5 - 415.3 = 41.2
 14 1016.0 698.5 - 685.2 = 13.3
 Total - = 110.7

CFM Vac. Init. Pitot IBS
120 7 1M OK
 Pre-Test 019 7 1M
 Post-Test 019 7 1M

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

AH, 856

Sample Point	Time	Meter Conditions			Temperatures, OF							Static Press. lwg	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	O ₂			Vacuum
Start	944	2.0	1.71	190.348	320	245	93	79	239	63	10.2	3	1.50	Initial
A - 7	746	3.8	2.40	192.287	328	264	107	80	232	60	10.1	4		BF "
1	948	3.5	3.0	193.941	327	274	110	81	245	58	9.6	5		Sample Vol., c.f.: 55.26
5	956	3.3	2.8	195.923	326	248	111	82	265	60	8.9	5		Stack Press, lwg 1.50
4	952	1.9	1.6	197.836	331	262	110	80	270	61	8.1	3		ΔP 128.5 lwg ΔH 127.6 lwg
3	957	1.6	1.3	199.418	330	255	108	84	270	66	8.1	3		Meter Temp., OF 94.15
2	952	1.1	.94	200.921	318	249	105	84	266	67	8.1	2		Stack Temp., OF 328.6
Stop 1	958			202.120										Water Collected, g 110.7
Start	1006	.79	.67	202.130	324	241	90	83	257	62	8.5	2		O ₂ /CO ₂ Method
E - 7	1008	1.1	.94	203.101	325	250	99	83	257	62	8.4	2		Chain of Cust. Info (Init.):
6	1010	1.3	1.11	204.245	335	251	105	83	258	63	9.0	2		Impingers Loaded W.O.
5	1012	1.9	1.63	205.523	330	257	107	84	258	61	9.2	3		Impingers Recovered KH
4	1014	2.2	1.84	207.038	328	256	109	84	259	61	9.5	3		Filter Loaded W.O.
3	1016	2.7	2.3	208.623	318	247	110	85	259	61	9.7	4		Filter Recovered BF
2	1018	1.9	1.63	210.445	319	242	111	86	258	63	10.1	3		Probe Wash BF
Stop 1	1020			212.074										Comments:
Total/Average														

Unit 1 Test No. 475 Method 2 Page 2
 Sample Location South I.D. Fan Dust outlet Fuel AC oil Ambient Temp., °F 3
 Operators J. C. Mulligan Meter Vol. (Start/End) 1 Date 3/23/82

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 @ 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 ΔH Reading In Out
 Init. _____
 Final _____

Sample Point	Time	Meter Conditions			Temperatures, °F					Static Press. 1wg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out	
Start	70420	1.0	.35	212.074	335	225	93	85	253	62	Initial
1	1044	.75	.64	213.172	335	228	102	85	253	57	Sample Vol., c.f.
2	1046	.70	.60	214.129	335	226	103	86	251	56	Stack Press, 1wg
3	1048	1.1	.94	215.073	331	236	104	86	250	54	ΔP 1wg ΔH 1wg
4	1050	1.5	1.24	216.218	329	244	106	86	247	53	Meter Temp., °F
5	1052	1.6	1.37	217.621	325	245	108	86	248	52	Stack Temp., °F
6	1054	1.1	.94	219.081	320	244	106	86	242	53	Water Collected, g
Stop	1101			220.222							O ₂ /CO ₂ Method
1	1103	.34	.29	221.049	336	236	76	85	242	57	Chain of Cust. Info (Init.):
2	1105	.74	.63	221.768	335	239	99	85	243	57	Impingers Loaded
3	1107	1.5	1.28	222.405	332	245	100	85	243	56	Impingers Recovered
4	1109	1.9	1.63	223.768	227	248	104	85	241	52	Filter Loaded
5	1111	1.1	.94	225.338	319	256	107	85	240	52	Filter Recovered
6	1113	0.80	.68	226.442	322	253	105	85	242	55	Probe Wash
Stop	1115			227.692							Comments:
Total/Average											

Client/Location SCE / E1 Seyundo Unit 1 Test No. 7 AS Method AS Page 2
 Sample Location South I.A Fan Out outlet Fuel EL oil Ambient Temp., °F 85 of 2
 Operators Li Mulligan Meter Vol. (Start/End) 10500/11 Date 2/21/88

Pre Test Data:
 Barometric Press, in. Hg _____
 Stack Area, sq. ft. _____
 Sample Time/ Pt, min. _____
 Assumed Stack Press _____
 Assumed Moisture _____
 Assumed Molecular Wt 28.9
 Equipment Info:
 Meter No. _____
 Meter ID _____
 Orifice, 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 _____
 Post-Test _____
 Pre-Test Calibration
 Meter Meter Temp.
 Time ΔH Reading In Out
 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			Vacuum
Start	11 20	0.25	2.1	227.692	336	240	89	85	243	64	9.3	2	Initial Sample Vol., c.f. Stack Press, twg ΔP twg ΔH twg Meter Temp., °F Stack Temp., °F Water Collected, g O ₂ /CO ₂ Method Chain of Cust. Info (inft.): Impingers Loaded Impingers Recovered Filter Loaded Filter Recovered Probe Wash Comments: _____
1	11 22	0.41	3.5	228.387	338	250	96	85	247	61	8.9	2	
2	11 24	0.85	7.2	229.081	337	257	100	85	245	59	9.8	2	
3	11 26	2.2	1.8	230.050	321	261	106	85	245	58	8.9	2	
4	11 28	2.7	2.3	231.153	318	264	110	86	246	55	9.4	4	
5	11 30	1.1	9.4	233.836	323	258	108	86	276	56	9.6	2	
6	11 32	0.50	1.5	234.769	328	254	104	86	246	58	9.8	2	
Stop 1	11 34			235.664									
Start	11 45	0.85	7.2	235.665	338	232	92	86	251	68	9.0	2	
1	11 47	1.7	1.45	236.623	329	236	106	86	252	61	8.9	3	
2	11 49	2.0	1.71	238.040	340	244	109	87	253	57	8.9	3	
3	11 51	2.9	2.18	239.587	336	249	110	87	253	57	8.6	3	
4	11 53	2.5	2.14	241.400	325	248	113	87	254	58	9.4	5	
5	11 55	1.7	1.48	243.218	321	249	111	87	254	59	9.8	3	
6	11 57	0.65	.55	244.198	226	248	107	87	255	61	9.6	2	
Stop 1	11 59			245.611									
Total/Average												103.7	

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	•	Date.....	2/23/90
Test Number.....	5-AS	*	Data By.....	RBB
Test Method.....	423	*	Sample Location.....	S. DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-19	•	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	1.0000
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	84
Bar Press (in Hg).....	30.38	•	Nozzle Diam (in).....	0.191
Meter Vol (acf).....	53.950	*	Meter Temp (F).....	98.0
Stack Press (iwg).....	0.50	*	Stack Temp (F).....	323.0
Vel Head (iwg).....	1.4200	•	O2 (%): from CEM.....	7.36
Liquid Vol (ml).....	115.0	*	from portable...	8.86
Meter Press (iwg).....	1.15	*	CO2 (%): from CEM.....	9.86
		*	calculated.....	8.77
		*	Start/Stop Time.....	1530/1720
Std Sample Vol (SCF).....				51.16
Metric Sample Vol (cubic meters).....				1.45
Moisture Fraction.....				0.095
Stack Gas Mol Wt.....				28.64
Stack Gas Velocity (ft/sec).....				81.00
Stack Flow Rate (wacfm).....				356,910
Stack Flow Rate (dscfm).....				218,118
Isokinetic Ratio (%).....				103.02

Client/Location SCE/EL SEGUNDO Unit 1 Test No. 5-ABS. Method 423 Page 1
 Sample Location South ID PAN Outlet Fuel IL oil Ambient Temp., °F 78 of 3
 Operators J. Mulligan Meter Vol. (Start/End) 246.55/300.80 Date 2/25/88

Pre Test Data: Barometric Press, in. Hg 30.196 Equipment Info: Meter No. 45-17 Weight (Start) (g) 582.8 Leak Check: Sample Intrain
 Stack Area, sq. ft. 73.44 Meter, Yd 1.00 Weight (End) (g) 626.3 CFM Vac. Inlt. Pitot IBS 0.27
 Sample Time/ Pt, min. 2/84 Pitot, Cp .84 503.0-496.9 Pre-Test 0.20 Post-Test 0.20
 Assumed Stack Press 1.25 CFM $\Delta H = 1.0$ 774.7-763.0 Pre-Test Calibration 141
 Assumed Moisture 8.8% Probe I.D. 9/16/425 Total 115.0
 Assumed Molecular Ht 27 Nozzle No./Dia 1.91 Impinger Box I.D. 110-122 Meter Meter Temp.
 Filter No. 110-122 Integrated Bag I.D. 110-122 Time ΔH Reading In Out
 Init. --- Final ---

AH 806

Sample Point	Time	Meter Conditions			Temperatures, °F				O ₂	Vacuum	Static Press. (in. Hg)	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out		
START	15:20	1.1	.86	246.853	337	243	95	83	275	64	6.5	Initial
1	15:32	1.6	1.2	248.065	330	251	104	89	254	61	8.0	Sample Vol., c.f. <u>53.950</u>
1	15:34	2.0	1.6	249.569	333	254	112	90	249	57	8.1	Stack Press, in. Hg <u>1.5</u>
1	15:36	2.9	2.33	250.861	328	256	114	90	262	56	8.0	ΔP <u>142.07</u> in. Hg <u>14.5</u> in. Hg
1	15:38	3.2	2.57	252.658	321	261	115	90	266	56	9.0	Meter Temp., °F <u>98.0</u>
1	15:40	2.0	1.6	254.535	320	264	115	91	266	58	9.4	Stack Temp., °F <u>323.0</u>
2	15:42	.94	.75	256.148	318	260	111	91	261	62	9.6	Water Collected, g <u>115.0</u>
Stop 1	15:44			257.244								O ₂ /CO ₂ Method <u>88/</u>
START	15:50	.40	.32	257.244	307	240	91	89	249	62	8.9	Chain of Cust. Info (Inlt.):
C-7	15:52	.48	.38	257.976	325	244	101	96	246	63	8.0	Impingers Loaded <u>KLH</u>
1	15:54	1.0	.80	258.718	333	245	105	90	246	63	8.3	Impingers Recovered <u>BF</u>
1	15:56	2.2	1.7	259.823	330	247	110	90	241	64	8.5	Filter Loaded <u>KLH</u>
1	15:58	2.9	2.33	261.365	320	250	113	91	238	64	8.9	Filter Recovered <u>BF</u>
1	16:00	1.4	1.12	263.238	318	247	113	91	236	65	9.4	Probe Wash <u>BF</u>
2	16:02	.62	.49	264.611	320	243	109	91	235	66	9.5	Comments: <u>---</u>
Stop 1	16:04			265.527								
Total/Average												

9.50 1032.7 EST DS-022 Rev. 9/89

Unit 5-ARS Test No. 5-ARS Method 2
 Fuel EC Oil Ambient Temp., of 1
 Meter Vol. (Start/End) 1 Date 3/23/80

Sample Location South I.D. Fan just outlet
 Operators Mulligan

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 ID, A/G _____
 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:
 Pre-Test _____
 Post-Test _____
 Pre-Test Calibration _____
 Meter Meter Temp.
 Time ΔH Reading In Out
 Init. _____
 Final _____

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. twg	Test Summary
		ΔP	ΔH	Meter Reading	Probe	Meter In	Out	Oven		
START	1610	.39	.11	265.527	227	92	89	232	212	Initial
0-7	1612	.35	.28	266.238	248	99	89	235	45	Sample Vol., c.f.
1	1614	.68	.54	266.936	258	101	89	236	63	Stack Press, twg
5	1616	1.8	1.45	267.601	267	107	89	237	62	ΔP twg ΔH twg
4	1618	2.2	1.77	269.045	265	111	90	237	58	Meter Temp., °F
3	1620	1.1	.88	270.637	265	110	90	237	58	Stack Temp., °F
2	1622	.75	.60	271.798	263	107	90	237	58	Water Collected, g
stop 1	1624			272.740						O ₂ /CO ₂ Method
stop 2	1626	.68	.54	272.740	250	93	89	240	68	Chain of Cust. Info (Int.):
E-7	1630	.53	.42	273.768	239	102	89	240	64	Impingers Loaded
6	1632	.59	.47	274.420	245	103	89	240	63	Impingers Recovered
5	1634	1.3	1.04	275.290	246	106	89	241	61	Filter Loaded
4	1636	1.7	1.37	276.480	252	110	90	240	56	Filter Recovered
3	1638	1.3	1.04	277.965	256	110	90	239	55	Probe Wash
2	1640	1.1	.88	279.174	257	108	90	239	57	Comments:
stop 1	1642			280.329						
Total/Average										

EST 05-022
 Rev. 9/89

Client/Location SCE / E / Segundo Unit 1 Test No. 548-050 Method 3 Page 3
 Sample Location Stack I.D. Fan duct outlet Fuel #6 oil Ambient Temp., of 3
 Operators J. Mulligan Meter Vol. (Start/End) 1 Date 2/21/80

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. #1
 Meter, Yd 0
 Pitot, Gp 0
 CFM 0
 Probe I.D. 0
 Nozzle No./Dia _____
 Filter No. _____
 Leak Check: _____
 Sample Train
 CFM Vac. Inft. Pitot IBS _____
 Pre-Test _____
 Post-Test _____
 Pre-Test Calibration
 Meter Meter Temp. _____
 Time Δ H Reading In Out
 Init. _____
 Final _____

Sample Point	Time	Meter Conditions			Temperatures, of						Static Press. twg	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out			O ₂
Start	16 46	1.41	1.37	280.325	330	249	91	89	237	59	9.1	2	Initial Sample Vol., c.f. _____ Stack Press, twg _____ ΔP _____ twg ΔH _____ twg Meter Temp., of _____ Stack Temp., of _____ Water Collected, g _____ O ₂ /CO ₂ Method _____ Chain of Cust. Info (Init.): _____ Impingers Loaded _____ Impingers Recovered _____ Filter Loaded _____ Filter Recovered _____ Probe Wash _____ Comments: _____
F-7	16 48	0.91	1.71	281.152	331	247	99	89	234	59	8.7	2	
6	16 50	1.6	1.28	281.775	331	252	105	89	235	60	8.6	2	
5	16 52	2.1	1.68	283.125	330	256	110	87	233	60	8.9	3	
4	16 54	2.4	2.09	284.687	321	257	112	85	231	60	9.0	3	
3	16 56	2.9	2.31	286.371	318	256	113	90	230	60	9.4	4	
2	16 58	1.7	1.52	288.189	303	254	112	96	233	61	9.5	3	
Stop	17 00			289.771									
Start	17 06	1.9	1.5	289.771	316	253	94	88	242	67	10.0	2	
A-7	17 08	2.6	2.09	291.285	308	260	110	89	241	57	9.8	2	
6	17 10	3.4	2.72	293.44	326	261	111	89	244	58	10.3	4	
5	17 12	2.9	2.33	294.831	331	263	113	90	244	58	8.9	4	
4	17 14	2.1	1.68	296.105	305	258	113	90	244	59	8.1	3	
3	17 16	1.5	1.2	298.355	314	249	116	90	245	55	8.0	2	
2	17 18	.89	1.17	299.974	321	242	107	90	245	61	8.0		
Stop	17 20			300.803									
Total/Average							106.4						

Chain of Cust. Info (Init.):
 Impingers Loaded _____
 Impingers Recovered _____
 Filter Loaded _____
 Filter Recovered _____
 Probe Wash _____
 Comments: _____

CARNOT

SAMPLE TRAIN TEST SUMMARY

Client/Location.....	ELSEG	*	Date.....	2/24/90
Test Number.....	7-AS	*	Data By.....	RBB
Test Method.....	423	*	Sample Location.....	N.DUCT
Fuel.....	OIL	*	Reference Temp (F).....	60
Control Box #.....	ES-8	*	Unit.....	1
Pitot Factor	0.840	*	Meter Cal Factor.....	0.9900
Stack Area (sq ft).....	73.44	*	Sample Time (Min).....	84
Bar Press (in Hg).....	30.34	*	Nozzle Diam (in).....	0.195
Meter Vol (acf).....	56.957	*	Meter Temp (F).....	104.7
Stack Press (iwg).....	0.30	*	Stack Temp (F).....	342.0
Vel Head (iwg).....	1.6900	*	O2 (%): from CEM.....	7.70
		*	from portable...	8.33
Liquid Vol (ml).....	106.8	*	CO2 (%): from CEM.....	9.68
		*	calculated.....	9.22
Meter Press (iwg).....	1.50	*	Start/Stop Time.....	1507/1716
Std Sample Vol (SCF).....				52.81
Metric Sample Vol (cubic meters).....				1.50
Moisture Fraction.....				0.086
Stack Gas Mol Wt.....				28.79
Stack Gas Velocity (ft/sec).....				89.28
Stack Flow Rate (wacfm).....				393,398
Stack Flow Rate (dscfm).....				236,546
Isokinetic Ratio (%).....				94.08

Client/Lc on SCE / EL SEA UNDO Unit 1 Test No. 7-As ELSEA Method ARSAC
Sample Location North Duct Fuel OIL Ambient Temp., OF 3
Operators M. Schmitt Meter Vol. (Start/End) 1 Date 2/24/90

Pre Test Data:
Barometric Press, In. Hg 30.34
Stack Area, sq. ft. 23.44
Sample Time/ Pt, min. 2
Assumed Stack Press 2.25
Assumed Moisture 8.8
Assumed Molecular Wt 78

Equipment Info:
Meter No. ES-Y
Meter, Yd 990
Pitot, Cp 84
CFM @ H = 1.0 598
Probe I.D. 10.6/ass
Nozzle No./Dia 195
Filter No. 1-110-140

Weight Weight
Imp. Matl Wt(End) (Start) (g) Leak Check:
#1 H2O 658.2-596.7 = 62.5
#2 H2O 627.0-602.7 = 24.3
#3 8 501.5-520.0 = 18.5
#4 56 781.2-767.7 = 13.5
Total - - = 106.8

Impinger Box I.D. Meter Meter Temp.
Integrated Bag I.D. Time ΔH Reading In Out
Init. Final

Pre-Test Calibration
Sample Train
CFM Vac. Init. Pitot IBS
Pre-Test OK 7" MS
Post-Test 020 20 MS

ΔH = 846 ΔP

Sample Point	Time	Meter Conditions			Temperatures, °F				O ₂	Vacuum	Static Press. twg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter In	Out	Oven	Imp. Out		
E-7	1507	1.6	1.35	829.207	328	245	92	93	225	68	30	Initial
-6	1509	2.3	1.95	830.500	329	246	112	96	229	48		Sample Vol., c.f. 56.957
-5	1511	2.3	1.95	832.050	334	253	115	96	232	47		Stack Press, twg .30
-4	1513	3.1	2.62	833.901	336	236	117	96	234	43		ΔP 1.69 twg ΔH 1.5 twg
-3	1515	2.1	1.18	835.364	340	252	118	97	239	45		Meter Temp., OF 104.7
-2	1517	1.5	1.27	836.920	341	247	119	97	241	46		Stack Temp., OF 342
-1	1519	.85	.72	838.223	340	244	118	97	242	47		Water Collected, g 106.8
-	1521			839.283								O ₂ /CO ₂ Method
E-7	1528	1.6	1.34	839.283	347	228	109	97	249	48		Chain of Cust. Info (Init.):
-6	1530	2.1	1.78	840.644	346	230	116	97	251	47		Impingers Loaded 8F
-5	1532	2.1	1.78	842.053	343	235	121	98	252	44		Impingers Recovered 8F
-4	1534	3.0	2.8	843.871	341	248	121	98	249	43		Filter Loaded 8F
-3	1536	3.2	2.71	844.870	338	240	122	98	248	44		Filter Recovered 8F
-2	1538	2.3	1.95	846.548		241	122	98	247	45		Probe Wash
-1	1540	1.2	.78	848.165		240	122	98	246	44		Comments:
-	1542			849.248								
D-7	1606	1.1	.93	849.248	348	230	93	94	249	69		
-6	1608	1.5	1.27	850.431	353	240	113	96	248	46		
Total/Average												

Client/Location SCE/EL SEGUNDO Unit 1 Test No. 7-AS-EL Method AREVIC Page 2
 Sample Location NORTH DUCT Fuel OIL Ambient Temp., °F 3 of 3
 Operators W. SCHWARTZ Meter Vol. (Start/End) 1 Date 2/24/90

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. _____
 Impinger Box I.D. _____
 Integrated Bag I.D. _____
 Leak Check: _____
 Sample Train
 CFM Vac. Init. Pitot 18S
 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. twg	Test Summary
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter		Oven	Imp. Out			
							In	Out					
D-5	1610	1.6	1.35	851.649	352	280	118	96	237	45			Initial Sample Vol., c.f. Stack Press, twg ΔP _____ twg ΔH _____ twg Meter Temp., °F Stack Temp., °F Water Collected, g O ₂ /CO ₂ Method Chain of Cust. Info (Init.): Impingers Loaded Impingers Recovered Filter Loaded Filter Recovered Probe Wash Comments: _____
-4	1612	2.8	2.37	852.950	350	270	119	96	241	44		8	
-3	1614	3.1	2.62	854.550	340	265	122	96	244	41	8.0	15	
-2	1616	1.5	1.27	856.351	334	263	122	97	245	40	9.0	19	
-1	1618	1.81	1.69	857.691	331	260	119	97	247	42	9.4	15	
-	1620			859.016							9.7	9	
C-7	1624	1.62	1.52	859.016	348	235	96	95	246	54			
-6	1626	1.45	1.38	859.900	351	247	108	97	247	51	8.6	4	
-5	1628	1.92	1.78	860.651	349	247	111	97	247	49	7.9	3	
-4	1630	2.6	2.2	861.647	346	250	113	97	247	48	8.1	5	
-3	1632	2.5	2.12	863.264	341	248	120	97	246	43	8.1	15	
-2	1634	1.5	1.27	864.890	334	248	121	97	246	44	8.7	15	
-1	1636	1.2	1.02	866.190	332	260	117	97	246	44	9.4	12	
-	1638			867.437					245	44		8	
A-7	1642	1.1	1.43	867.437	345	241	95	94	245	54			
6	1644	1.6	1.35	868.600	350	249	110	96	244	49	8.5	7	
5	1646	1.5	1.27	869.892	346	248	113	96	244	49	7.8	8	
4	1648	2.0	1.69	871.183	344	246	114	96	244	50	7.8	8	
Total/Average									243	48		11	

Client/Location SCE / EL SEGUNDO Unit 1 Test No. 7-AS-5 Method ARSAIC Page 3
 Sample Location NORTH DUCT Fuel OIL Ambient Temp., of 3
 Operators M. Schmitt Meter Vol. (Start/End) 1 Date 2/24/90

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. _____
 Leak Check: _____
 Sample Train
 CFM Vac. Init. Pitot JBS _____
 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. fwg	Test Summary	
		ΔP	ΔH	Meter Reading	Stack	Probe	Meter		Oven	Imp. Out	O ₂			Vacuum
							In	Out						
A-3	1650	2.2	1.86	872.866	346	246	116	96	244	47	8.3	13	Initial	
-2	1652	3.1	2.62	874.110	339	245	116	96	243	45		20		
-1	1654	2.5	2.12	876.213	335	267	117	96	244	48	8.2	17		
-	1656			877.600										
B-7	1702	1.2	1.02	877.600	351	250	91	93	244	53	8.1	8	Sample Vol., c.f.	
-6	1704	1.60	.51	878.841	350	255	109	94	243	51	7.8	4		
-5	1706	1.71	1.60	879.748	348	261	106	94	242	50	7.7	5		
-4	1708	1.3	1.1	880.683	344	265	111	94	242	50	8.2	8		
-3	1710	2.3	1.95	881.840	339	265	114	94	241	48	8.1	13	Stack Temp., °F	
-2	1712	1.7	1.49	883.360	335	263	119	94	240	46	9.3	12		
-1	1714	1.7	1.49	884.813	334	265	118	95	240	48	9.2	12		
-	1716			886.164										
													Water Collected, g	
													O ₂ /CO ₂ Method	
													Chain of Cust. Info (Init.):	
													Impingers Loaded	
													Impingers Recovered	
													Filter Loaded	
													Filter Recovered	
													Probe Wash	
													Comments:	
Total/Average														

Initial _____
 Sample Vol., c.f. _____
 Stack Press, fwg _____
 ΔP _____ fwg ΔH _____
 Meter Temp., of _____
 Stack Temp., of _____
 Water Collected, g _____
 O₂/CO₂ Method _____
 Chain of Cust. Info (Init.):
 Impingers Loaded _____
 Impingers Recovered _____
 Filter Loaded _____
 Filter Recovered _____
 Probe Wash _____
 Comments: _____

SCF/E1 Segundo Project # 53304

5/7/90
A. Bell

Arsenic by CARB 423

Re: Curtis and Tompkins laboratory report # 25562

Method: graphite furnace a.a. using method of
standard additions

Detection limit: $0.25 \mu\text{g}/\text{sample}$

Reagent blank = $0.48 \mu\text{g}/\text{sample}$

Field blank = $0.42 \mu\text{g}/\text{sample}$

<u>Test No.</u>	<u>$\mu\text{g}/\text{sample}$</u>	<u>$\mu\text{g}/\text{sample} - \text{reagent blank}$</u>
4-As	1.3	0.8
5-As	3.1	2.6
7-As	4.9	4.4



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: 03/07/90

DATE REPORTED: 04/18/90

PAGE 1 OF 3

LAB NUMBER: 25562

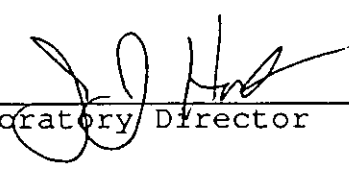
CLIENT: CARNOT

REPORT ON: FIVE SOURCE SAMPLES

PROJECT #: 5788

LOCATION: SUBMITTED BY CLIENT

RESULTS: SEE ATTACHED


Laboratory Director

LABORATORY NUMBER: 25562
 CLIENT: CARNOT
 PROJECT #: 5788
 LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
 DATE DIGESTED: 03/30/90
 DATE ANALYZED: 04/09/90
 DATE REPORTED: 04/18/90
 PAGE 2 OF 3

METAL: ARSENIC
 METHOD: CARB 423
 METHOD OF STANDARD ADDITIONS - EPA 7060

STANDARD INFORMATION BLANK
 STD1 = 10 ul SAMPLE + 10 ul 0.00 STD
 STD2 = 10 ul SAMPLE + 10 ul 50.00 STD
 STD3 = 10 ul SAMPLE + 10 ul 100.00 STD

C&T ID	SAMPLE ID			ARSENIC ug/SAMPLE
1	REAGENT BLANK	BLANK	0.0190	0.48
		STD1	0.0345	
		STD2	0.2072	
		STD3	0.3837	

INSTRUMENT FACTOR: 1
 CORRELATION FACTOR: 1.0000
 SAMPLE VOLUME 0.05

2	FIELD BLANK	BLANK	0.0190	0.42
		STD1	0.0297	
		STD2	0.1887	
		STD3	0.3589	

INSTRUMENT FACTOR: 1
 CORRELATION FACTOR: 0.9998
 SAMPLE VOLUME 0.05

3	4-As	BLANK	0.0190	1.3
		STD1	0.0306	
		STD2	0.0719	
		STD3	0.1326	

INSTRUMENT FACTOR: 1
 CORRELATION FACTOR: 0.9940
 DILUTION FACTOR: 0.05

4	5-As	BLANK	0.0190	3.1
		STD1	0.0345	
		STD2	0.0657	
		STD3	0.1235	

INSTRUMENT FACTOR: 2
 CORRELATION FACTOR: 0.9854
 DILUTION FACTOR: 0.05



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25562
CLIENT: CARNOT
PROJECT #: 5788
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/30/90
DATE ANALYZED: 04/09/90
DATE REPORTED: 04/18/90
PAGE 3 OF 3

METAL: ARSENIC
METHOD: CARB 423
METHOD OF STANDARD ADDITIONS - EPA 7060

STANDARD INFORMATION
BLANK
STD1 = 10 ul SAMPLE + 10 ul 0.00 STD
STD2 = 10 ul SAMPLE + 10 ul 50.00 STD
STD3 = 10 ul SAMPLE + 10 ul 100.00 STD

C&T ID	SAMPLE ID	ARSENIC ug/SAMPLE
5	7-As	4.9
	BLANK	0.0190
	STD1	0.0259
	STD2	0.0459
	STD3	0.0746

INSTRUMENT FACTOR: 2
CORRELATION FACTOR: 0.9947
SAMPLE VOLUME 0.05

LIMIT OF DETECTION = 0.25 ug/SAMPLE

Appendix C.10

Fuel Analysis

EPA Fuel "F" factor calculations: El Segundo Unit 1

Reference temp, F: 60

Composition by wt, %:

Carbon	85.46
Hydrogen	12.58
Nitrogen	0.10
Sulfur	0.18
Oxygen	1.62
Ash	0.02

Heating value, btu/lb: 19,166

F factor, dscf/mmbtu @ 0% O₂: 9,039

Ash content, lb/mmbtu: 0.010



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: 03/07/90
DATE REPORTED: 04/18/90
PAGE 1 OF 5

LAB NUMBER: 25559

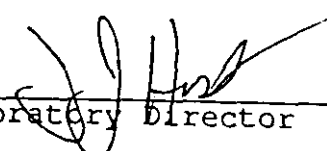
CLIENT: CARNOT

REPORT ON: TWO OIL SAMPLES

PROJECT #: 5789

LOCATION: SUBMITTED BY CLIENT

RESULTS: SEE ATTACHED


Laboratory Director

LABORATORY NUMBER: 25559-1
 CLIENT: CARNOT
 PROJECT #: 5789
 LOCATION: 53304-ELS
 SAMPLE ID: 1-FO

DATE RECEIVED: 03/07/90
 DATE ANALYZED: 03/09/90
 DATE REPORTED: 04/18/90
 PAGE 2 OF 5

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

METAL	RESULT	REGULATORY LIMITS STLC
--mg/L--		
Arsenic	ND (1.1)	5
Beryllium	ND (0.22)	0.75
Cadmium	ND (0.22)	1
Chromium (total)	0.22	560
Chromium (VI)	ND (0.50)	--
Copper	0.47	25
Lead	ND (1.1)	5
Mercury	ND (0.10)	0.2
Manganese	ND (0.43)	350
Nickel	10	20
Selenium	ND (1.0)	1
Zinc	0.96	250

ND = NOT DETECTED; LIMIT OF DETECTION IN PARENTHESES.

QA/QC DATA SUMMARY:

	RPD	SPIKE		RPD	SPIKE
Arsenic	10	83	Mercury	6	102
Beryllium	<1	88	Manganese	9	85
Cadmium	<1	88	Nickel	10	94
Chromium	2	84	Selenium	3	98
Copper	<1	88	Zinc	5	81
Lead	9	76			



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25559-2
CLIENT: CARNOT
PROJECT #: 5789
LOCATION: 53304-ELS
SAMPLE ID: 2-FO

DATE RECEIVED: 03/07/90
DATE ANALYZED: 03/09/90
DATE REPORTED: 04/18/90
PAGE 3 OF 5

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

METAL	RESULT	REGULATORY LIMITS STLC
--mg/L--		
Arsenic	ND (1.1)	5
Beryllium	ND (0.22)	0.75
Cadmium	ND (0.22)	1
Chromium (total)	0.21	560
Chromium (VI)	ND (0.50)	--
Copper	0.41	25
Lead	ND (1.1)	5
Mercury	ND (0.10)	0.2
Manganese	ND (0.43)	350
Nickel	10	20
Selenium	ND (1.0)	1
Zinc	0.97	250

ND = NOT DETECTED; LIMIT OF DETECTION IN PARENTHESES.

QA/QC DATA SUMMARY:

	RPD	SPIKE		RPD	SPIKE
Arsenic	10	83	Mercury	6	102
Beryllium	<1	88	Manganese	9	85
Cadmium	<1	88	Nickel	10	94
Chromium	2	84	Selenium	3	98
Copper	<1	88	Zinc	5	81
Lead	9	76			



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25559-1
CLIENT: CARNOT
PROJECT #: 5789
LOCATION: #53304-ELS
SAMPLE ID: 1-FO

DATE RECEIVED: 03/07/90
DATE ANALYZED: 04/09/90
DATE REPORTED: 04/18/90
PAGE 4 OF 5

ULTIMATE AND PROXIMATE ANALYSIS

PARAMETER	AS RECEIVED BASIS (% by Weight)
ASH CONTENT	0.02
CARBON	84.53
HYDROGEN	12.40
NITROGEN	0.08
OXYGEN	2.47
SULFUR	0.17
CHLORINE BY X-RAY DIFF. (mg/L)	107
BTU/LB.	19,189



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25559-2
CLIENT: CARNOT
PROJECT #: 5789
LOCATION: #53304-ELS
SAMPLE ID: 2-FO

DATE RECEIVED: 03/07/90
DATE ANALYZED: 04/09/90
DATE REPORTED: 04/18/90
PAGE 5 OF 5

ULTIMATE AND PROXIMATE ANALYSIS

PARAMETER	AS RECEIVED BASIS (% by Weight)
ASH CONTENT	0.01
CARBON	86.38
HYDROGEN	12.75
NITROGEN	0.11
OXYGEN	0.76
SULFUR	0.18
CHLORINE BY X-RAY DIFF. (mg/L)	156
BTU/LB.	19,142

Subject : SCE/El Segundo Unit 1

5/6/90

Calculation of F factor from natural gas analysis

A. Bell

Re: Truesdail Laboratories report # 37992

Use average composition of two samples

Component	Composition by volume or Mole %	LHV %			
		C	H	N	O
CH ₄	86.05	10.33	3.47		
C ₂ H ₆	3.8	0.91	0.23		
C ₃ H ₈	0.7	0.25	0.06		
n-C ₄ H ₁₀	0.1	0.05	0.01		
i-C ₄ H ₁₀	Ø	0	0		
CO ₂	1.0	0.12			0.32
N ₂	3.6			1.01	
O ₂	1.75				0.56

$$\begin{aligned} \text{MW} &= 11.66 + 3.77 + 1.01 + 0.88 = 17.32 \\ \% \text{ by wt} &= 67.32 \quad 21.77 \quad 5.83 \quad 5.08 \end{aligned}$$

$$\begin{aligned} Btu/lb &= 957.310 / ft^3 \times \frac{379.5 ft^3}{16 \text{ mole}} \times \frac{16 \text{ mole}}{17.3216} \\ &= 20,969 \end{aligned}$$

$$F_{68} = 10^6 \left[\frac{3.64(21.77) + 1.53(67.32) + .14(5.83) - .46(5.08)}{20,969} \right]$$

$$= 8618 \text{ dscf} / 10^6 \text{ Btu}$$

$$F_{60} = (8,618)(520/528) = 8487 \text{ dscf} / 10^6 \text{ Btu}$$

APR 17 1990

REPORT

RUESDAIL LABORATORIES, INC.



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

CHEMISTS - MICROBIOLOGISTS - ENGINEERS
RESEARCH - DEVELOPMENT - TESTING

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

DATE April 6, 1990

RECEIVED February 26, 1990

SAMPLE **Six (6) Tedlar bags**
labeled 6A, 6B, 6C, 8A, 8B and 8C
P.O. No. 53304
Edison P.O.: C0138903

LABORATORY NO. 37992

INVESTIGATION

Analyze for trace benzene by modified EPA Method 602

RESULTS

MODIFIED EPA 602 (Benzene)

Received: 2/26/90

Analyzed: 2/26/90

Nanoliters per Liter (ppb)
Benzene

6A-ELS	ND < 1
6B-ELS	ND < 1
6C-ELS	ND < 1
8A-ELS	ND < 1
8B-ELS	ND < 1
8C-ELS	ND < 1
ND = Not detected.	

COMPOSITION AND HEAT CONTENT (60 Degrees Fahrenheit)

#1-ELS	Volume Percent (v/v)	Specific Gravity
Oxygen	1.7	0.019
Nitrogen	3.1	0.030
Methane	86.5	0.479
Carbon dioxide	1.0	0.015
Ethane	3.8	0.039
Propane	0.8	0.012
n-Butane	0.1	0.002
iso-Butane	ND < 0.1	NA

Total	97.0	Total	0.596
-------	------	-------	-------

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.

Energy Systems Associates
Laboratory Number 37992
April 6, 1990
Page Two

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

#1-ELS

BTU's per Cubic Foot

BTU's High	965
BTU's Low	872

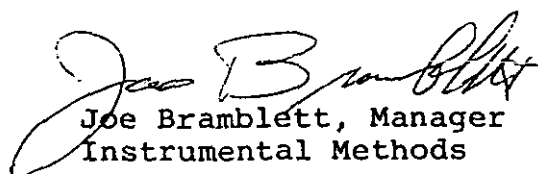
#2-ELS

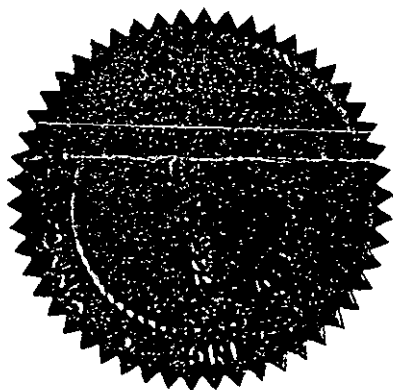
	Volume Percent (v/v)	Specific Gravity
Oxygen	1.8	0.020
Nitrogen	4.1	0.040
Methane	85.6	0.474
Carbon dioxide	1.0	0.002
Ethane	3.8	0.039
Propane	0.6	0.009
n-Butane	ND< 0.1	NA
iso-Butane	ND< 0.1	NA
Total	96.9	Total 0.584

BTU's per Cubic Foot

BTU's High	948
BTU's Low	856

Respectfully submitted,
TRUESDAIL LABORATORIES, INC.


Joe Bramblett, Manager
Instrumental Methods



APPENDIX D
CALCULATIONS

Q

Appendix D.1

General Emission 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

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

- f. Stack velocity, ft/sec

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

- 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

$$I = \frac{17.32 \times T_s (V_{m \text{ std}})}{(1 - B_{wo}) \theta \times V_s \times P_s \times D_n^2} \times \frac{528^{\circ}\text{R}}{T_{\text{ref}}}$$

2. Particulate Emissions

- a. Grain loading, gr/dscf

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

- b. Grain loading at 12% CO
- ₂
- , 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

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

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/10⁶ Btu

a. Fuel factor at 68 °F, dscf/10⁶ Btu at 0% O₂

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

b. Fuel factor at 60 °F

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

c. Gaseous emission factor

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

d. Particulate emission factor

$$\text{lb/10}^6 \text{ Btu} = C \times \frac{1 \text{ lb}}{7000 \text{ gr}} \times F \times \frac{20.9}{20.9 - \%O_2}$$

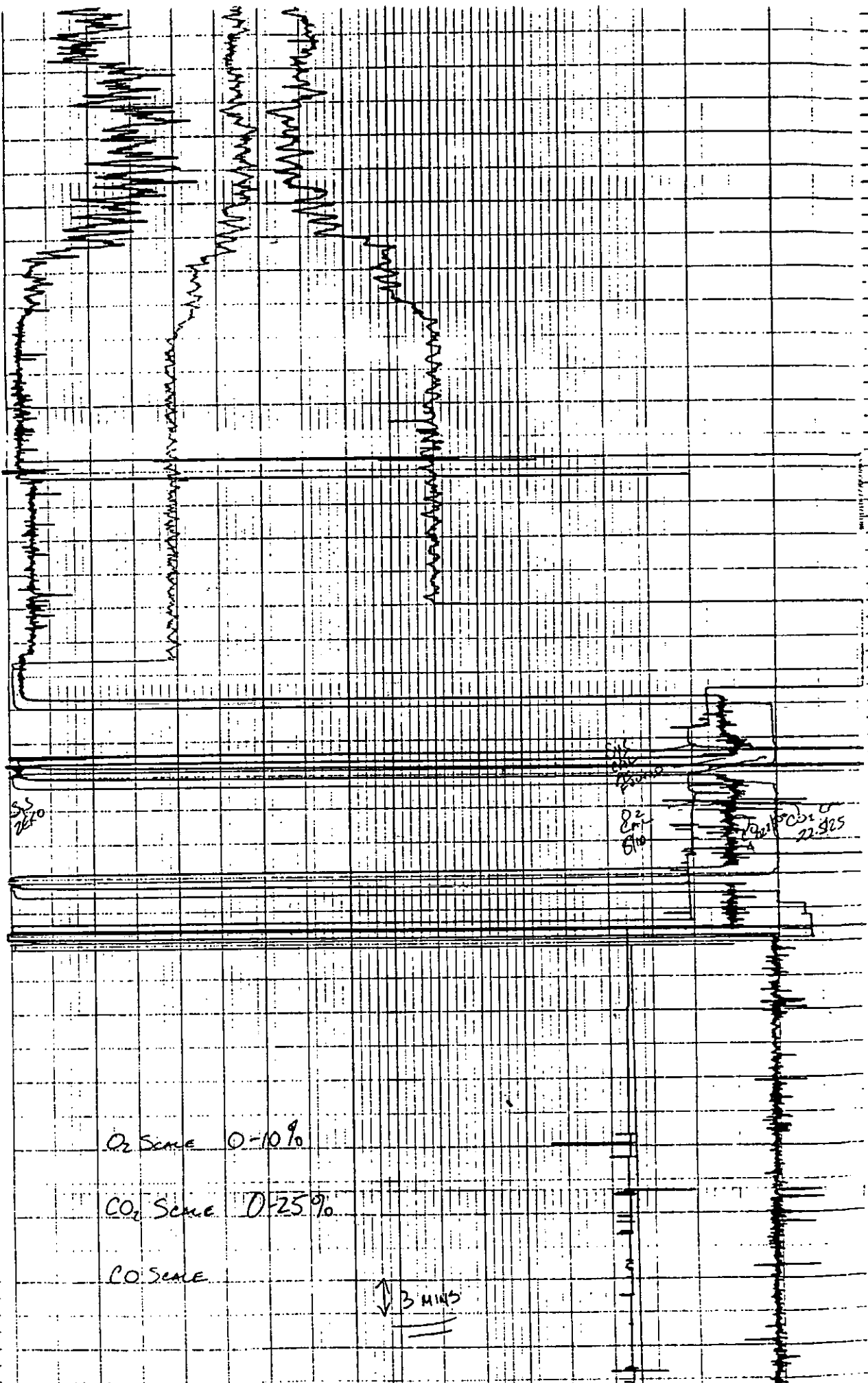
These calculations are routinely performed on ESA's computer.

Nomenclature:

A_s	=	stack area, ft ²
B_{wo}	=	flue gas moisture content
$C_{12\% CO_2}$	=	particulate grain loading, gr/dscf corrected to 12% CO ₂
C	=	particulate grain loading, gr/dscf
C_p	=	pitot calibration factor, dimensionless
D_n	=	nozzle diameter, in.
F	=	fuel F factor, dscf/10 ⁶ Btu at 0% O ₂
H	=	orifice pressure differential, iwg
I	=	% isokinetics
M_n	=	mass of collected particulate, mg
M_i	=	mass emissions of species i, lb/hr
MW	=	molecular weight of flue gas
MW_i	=	molecular weight of species i:
		NO _x : 46
		CO: 28
		SO ₂ : 64
		HC: 16
θ	=	sample time, min.
ΔP	=	average velocity head; iwg $= \left(\sqrt{\Delta P} \right)^2$
P_{bar}	=	barometric pressure, in.Hg
P_s	=	stack absolute pressure, in.Hg.
P_{sg}	=	stack static pressure, iwg
Q	=	wet stack gas flow rate at actual conditions, wacfm
Q_{sd}	=	dry stack gas flow rate at standard conditions, dscfm
SV	=	specific molar volume of an ideal gas at std conditions, ft ³ /lb mole
T_m	=	meter temperature, °R
T_{ref}	=	reference temperature, °R
T_s	=	stack temperature, °R
V_s	=	stack velocity, ft/sec
V_{lc}	=	volume of liquid collected in impingers, ml
V_m	=	dry meter volume uncorrected, dcf
$V_{m \text{ std}}$	=	dry meter volume at standard conditions, dscf
$V_{w \text{ std}}$	=	volume of water vapor at standard conditons, scf
Y	=	meter calibration coefficient

APPENDIX E
INSTRUMENT STRIP CHARTS

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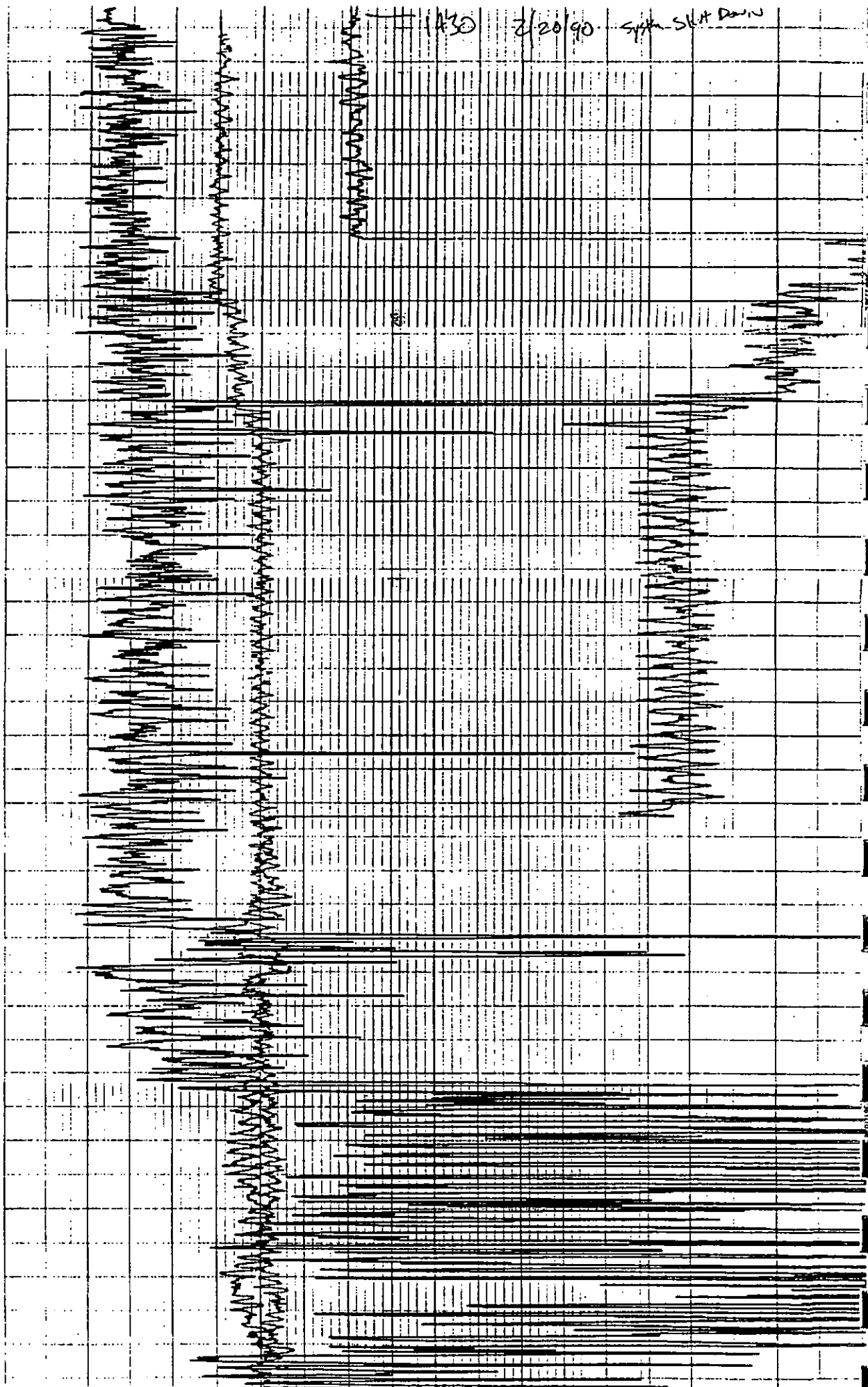


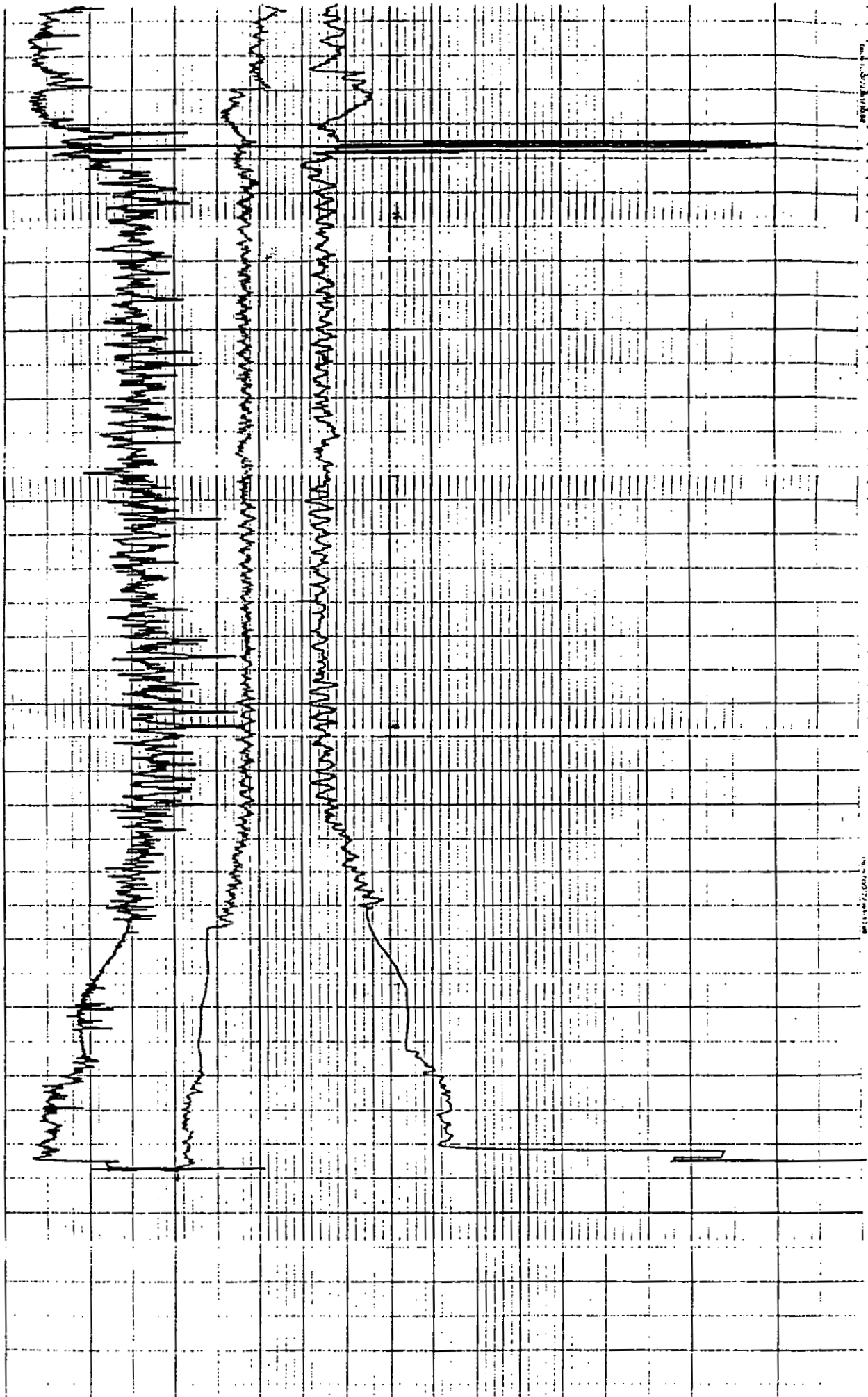
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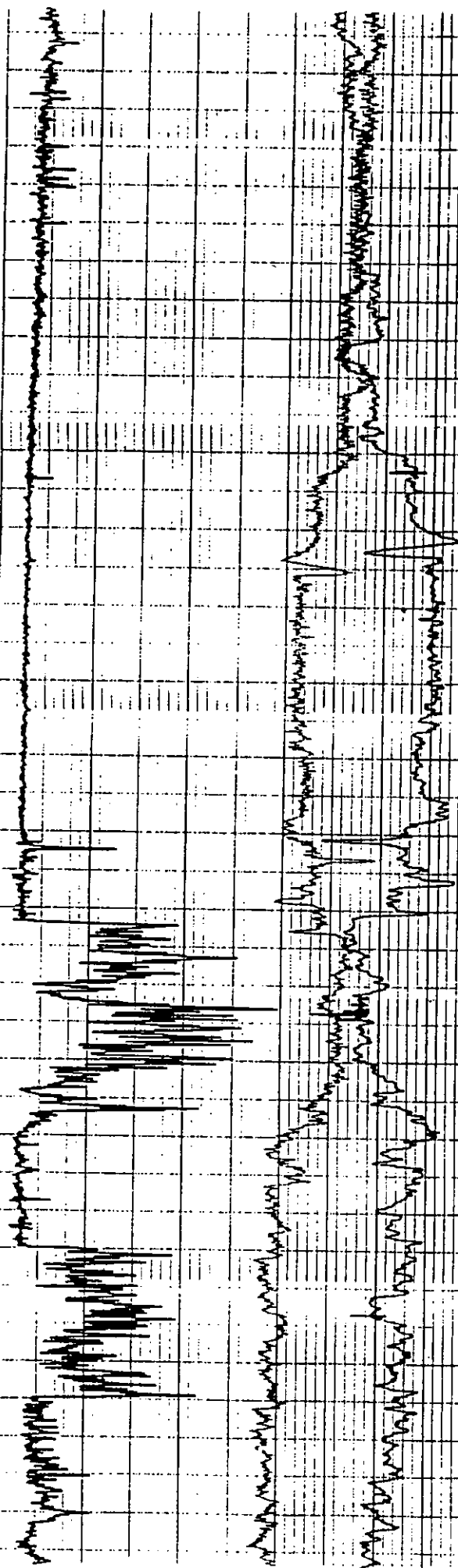
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SOITEC CHART NO. ZOI-01-25-20M

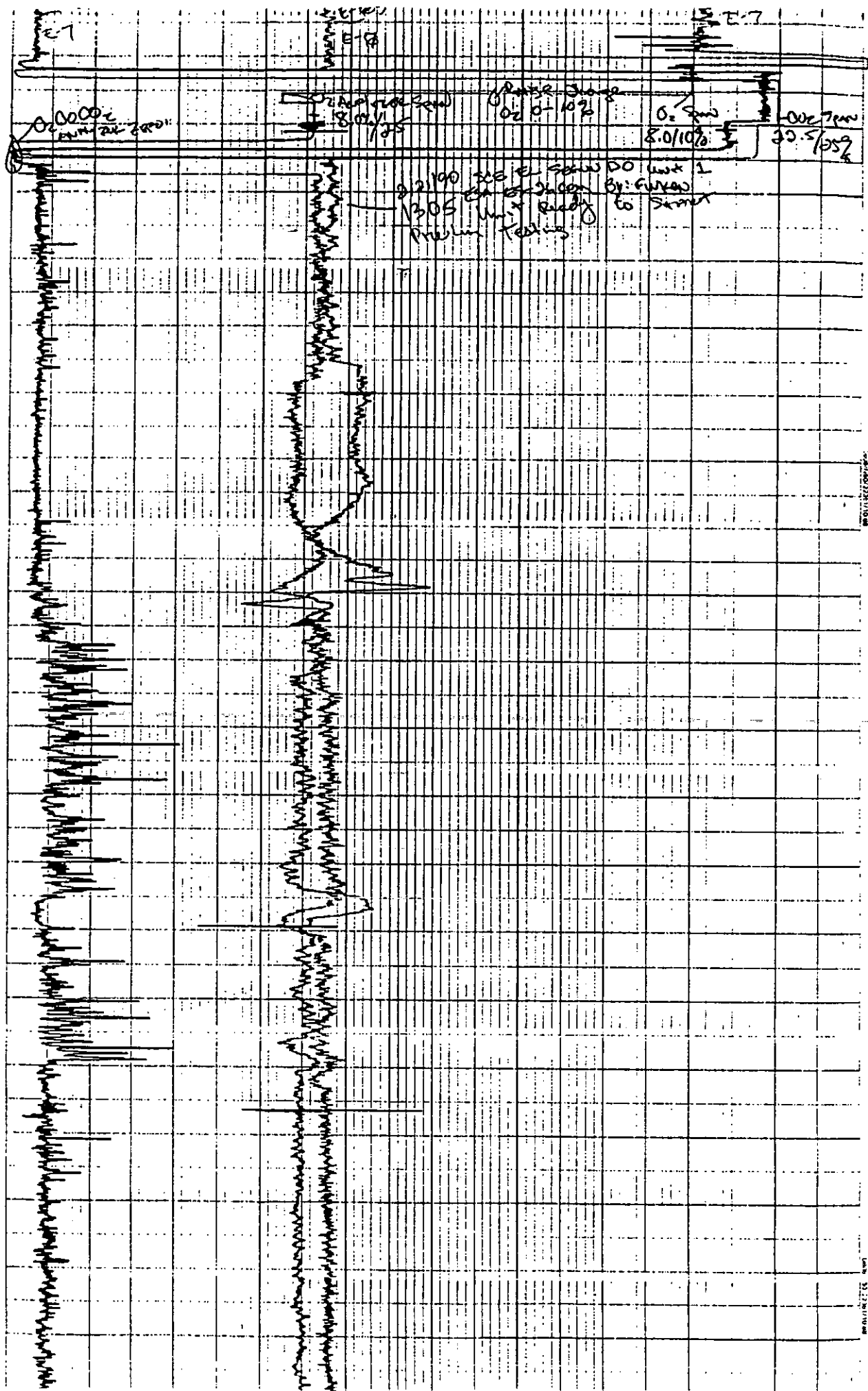






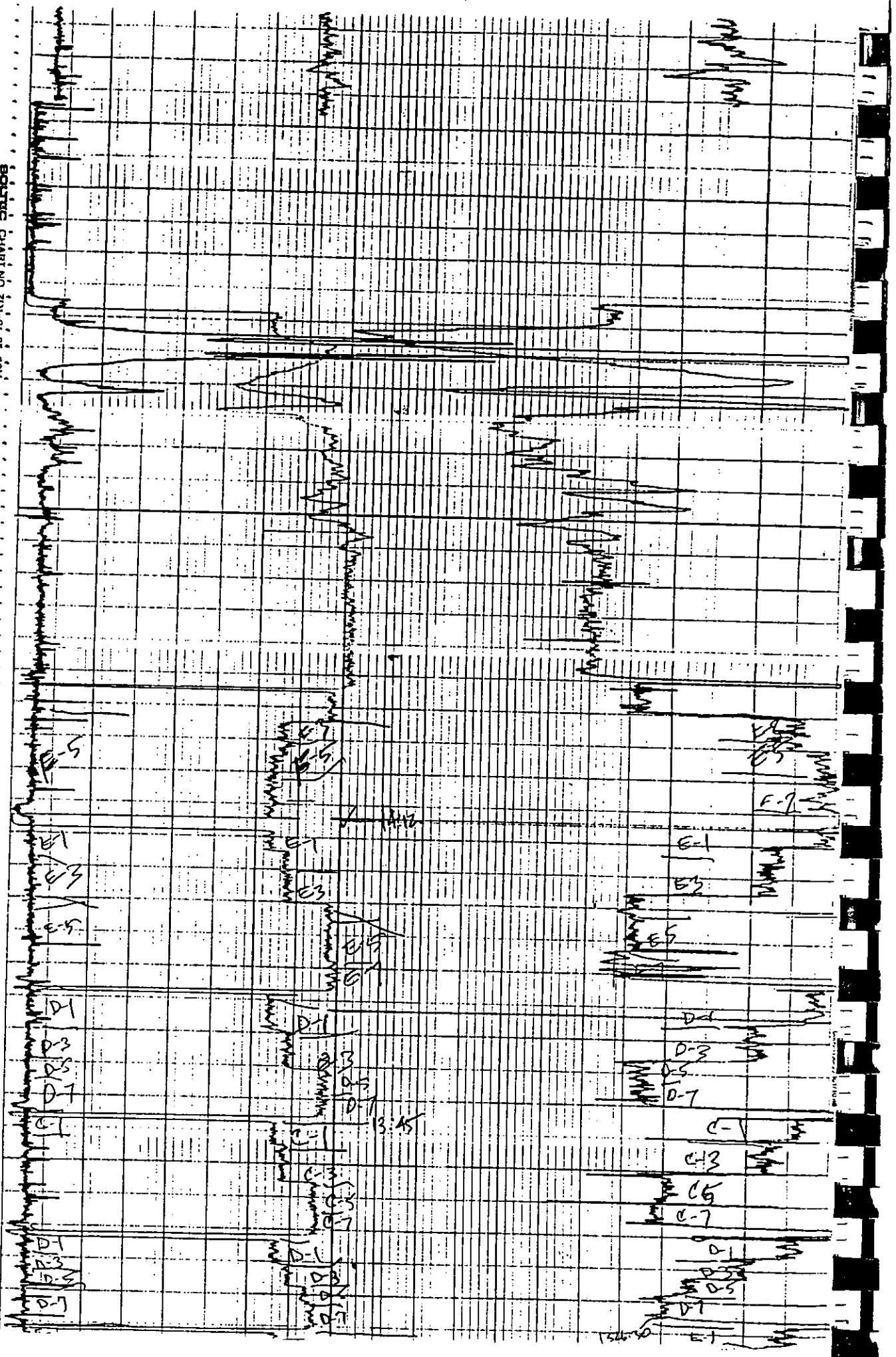
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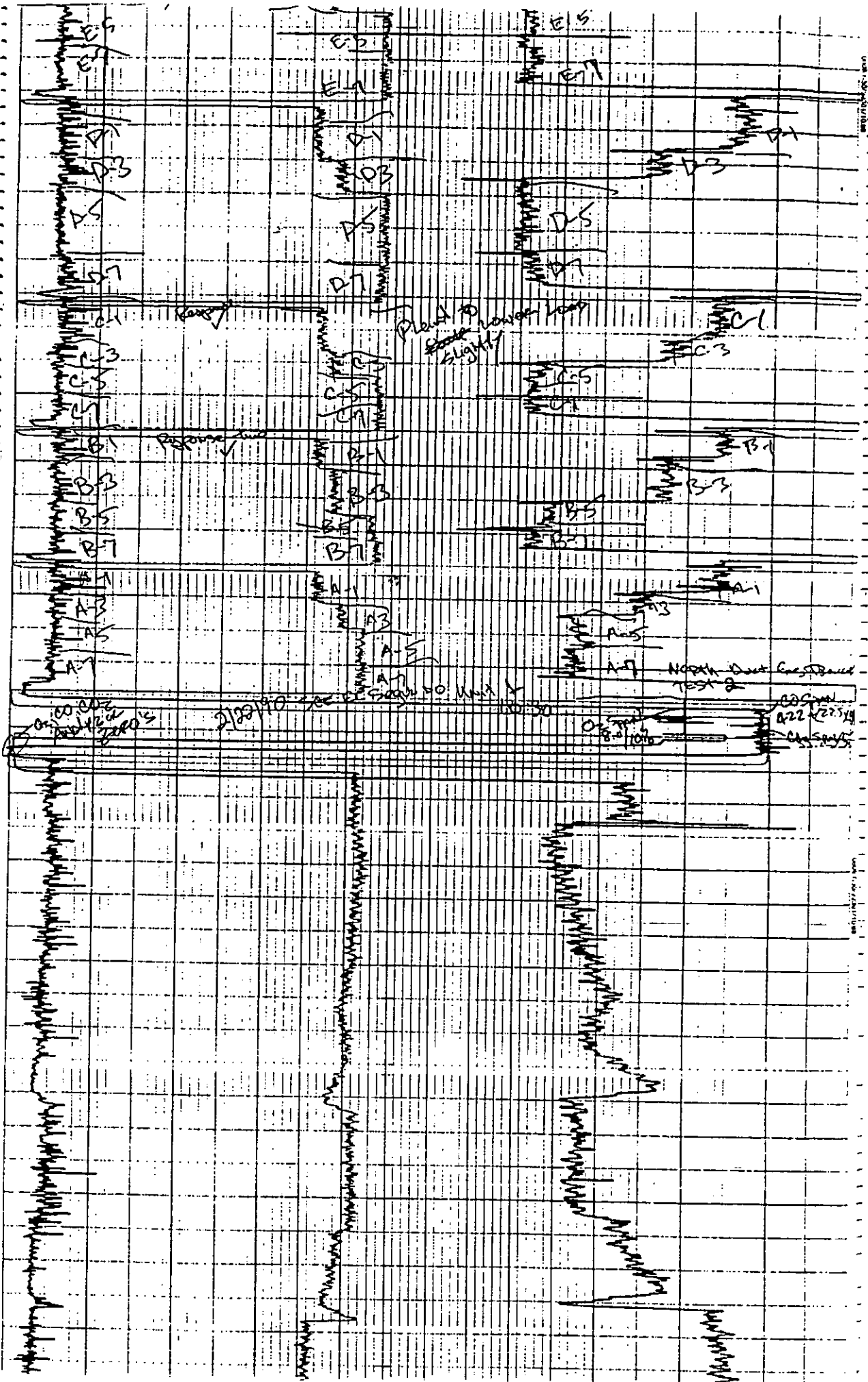
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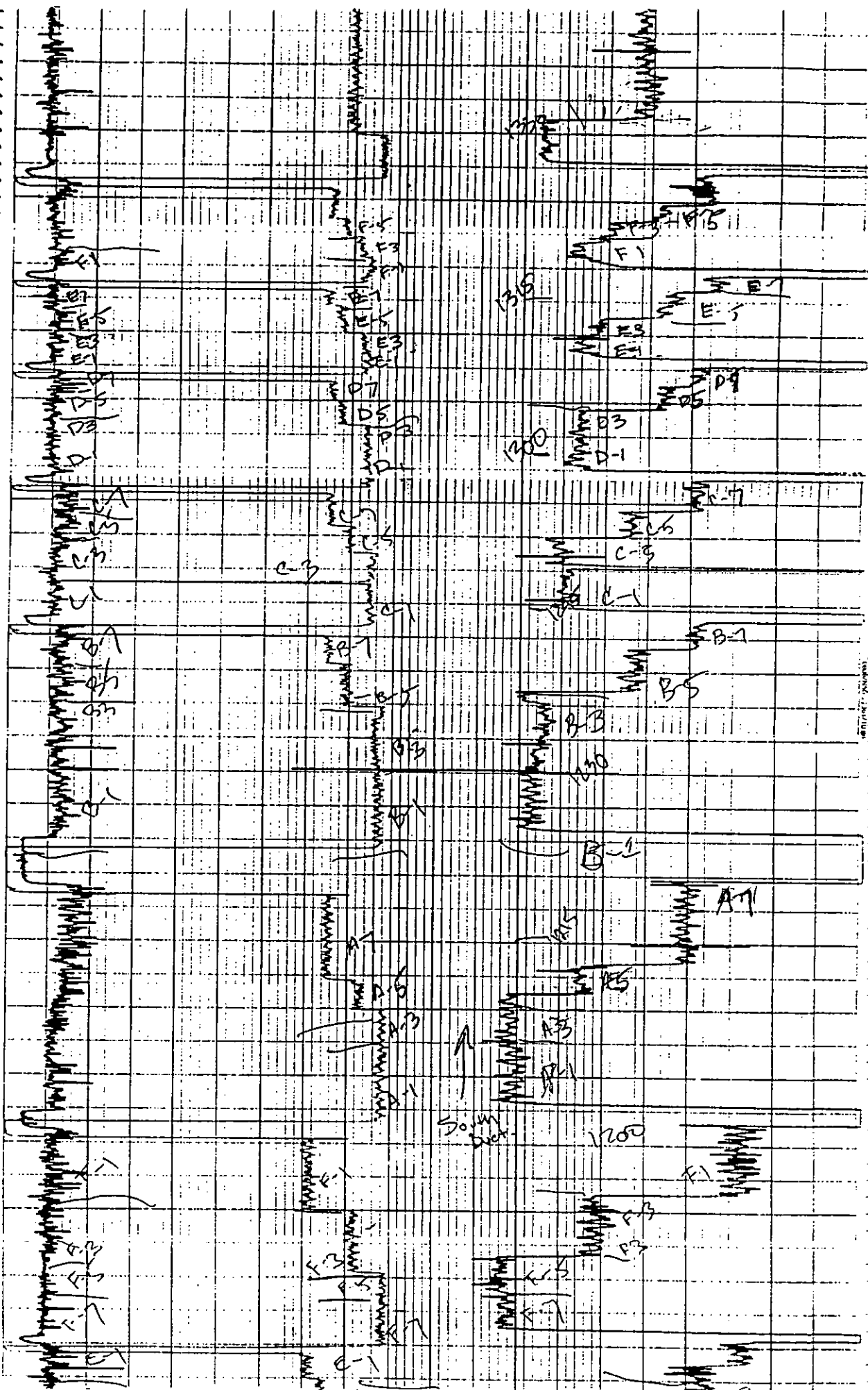


BOLTEC CIRCUIT NO. ZD1-01-25-20M

BOLTEC CIRCUIT NO. ZD1-01-25-20M







SOLTEC CHART NO. ZD1-01-25-20M

BOLTEC CHART NO. ZD1-01-25-2

1530
END

North B-3

[illegible]

450

507 Spm 8.0/25
Mac Canna 0.1/25

10/20
5pm

110

Street 2-CL-800

North F-3

SOLVED CHART NO. 201-01-25-20M

SOLVED CHART NO. 201-01-25-20M

1706

B-3
North

END
1615-02-2500

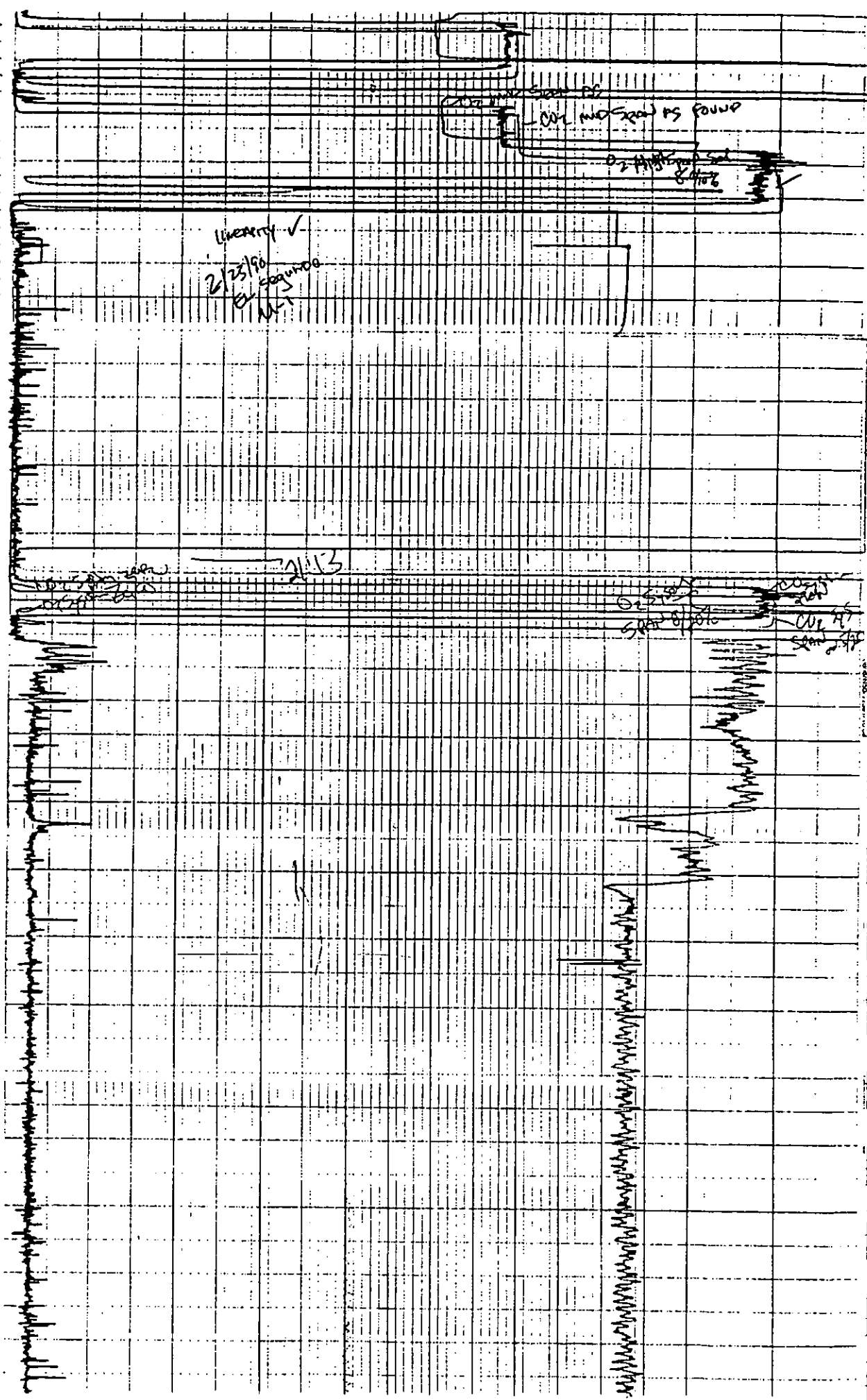
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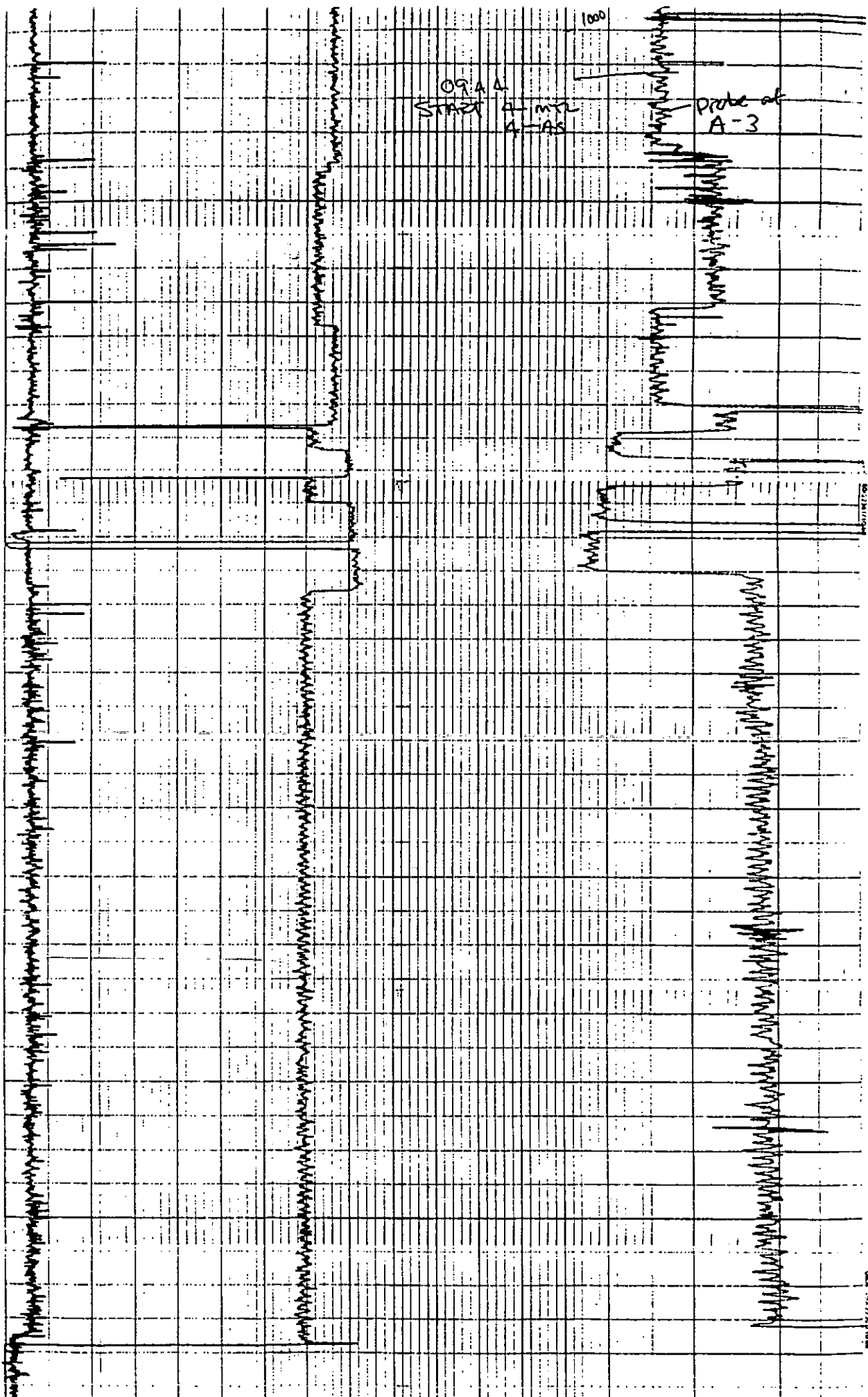
3427

BOJEC CHART NO. ZOI-01-25-20M

3427

Pike Relocated
to F-3
North



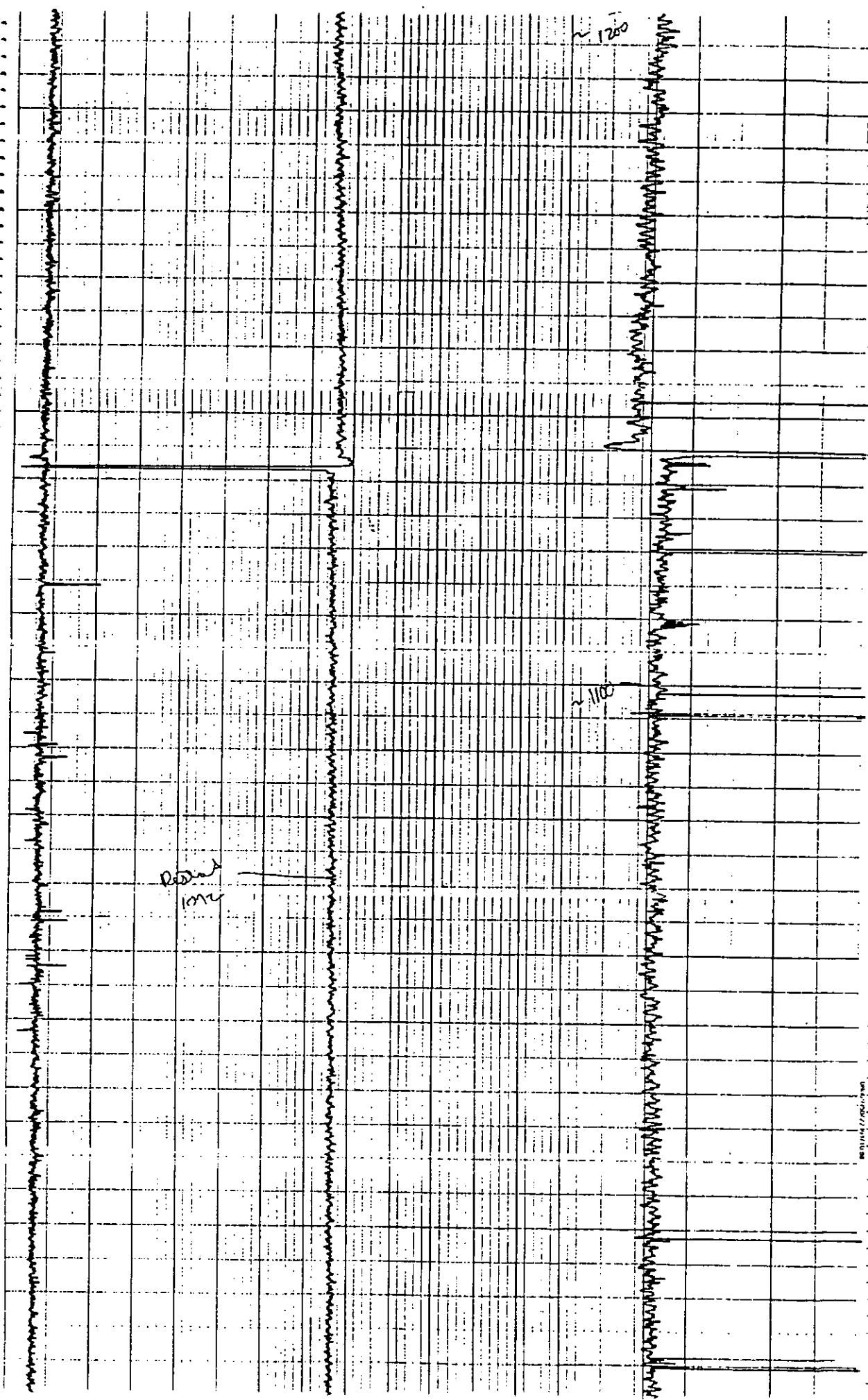


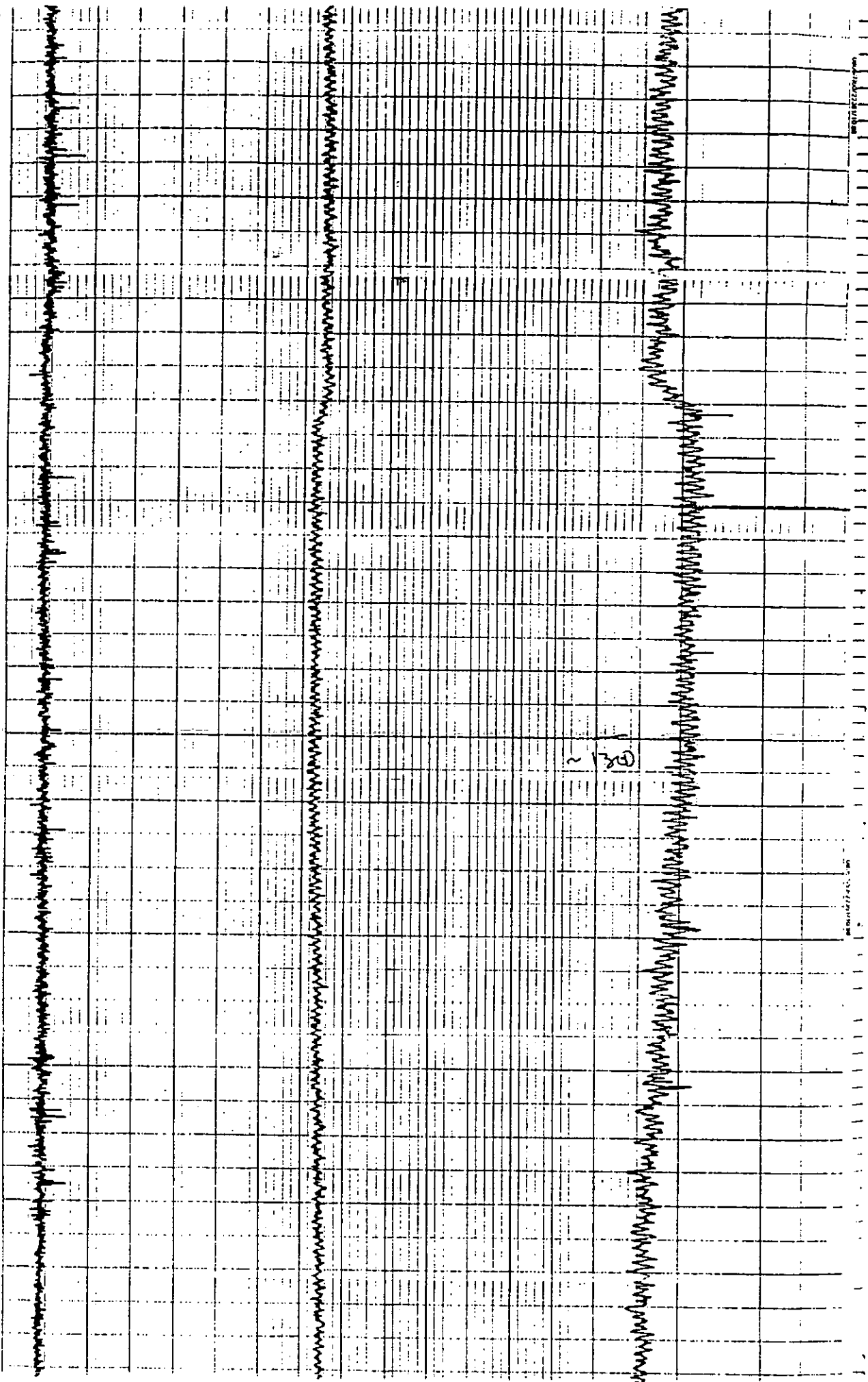
NO. 1130 7/24/11 11 AM

NO. 1130 7/24/11 11 AM

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SOLTEC CHART NO. ZOI-01-25-20M 3437



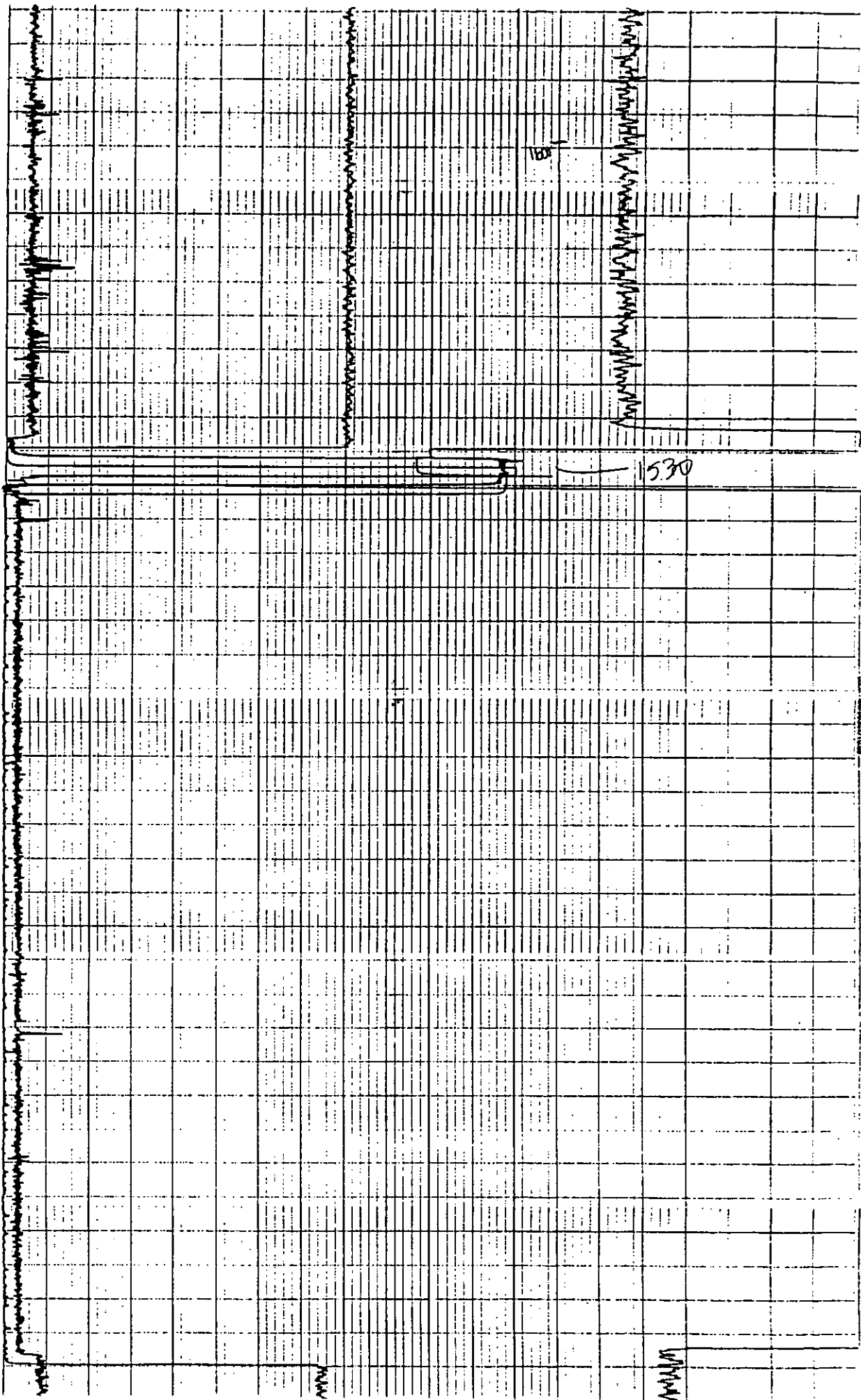


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9422

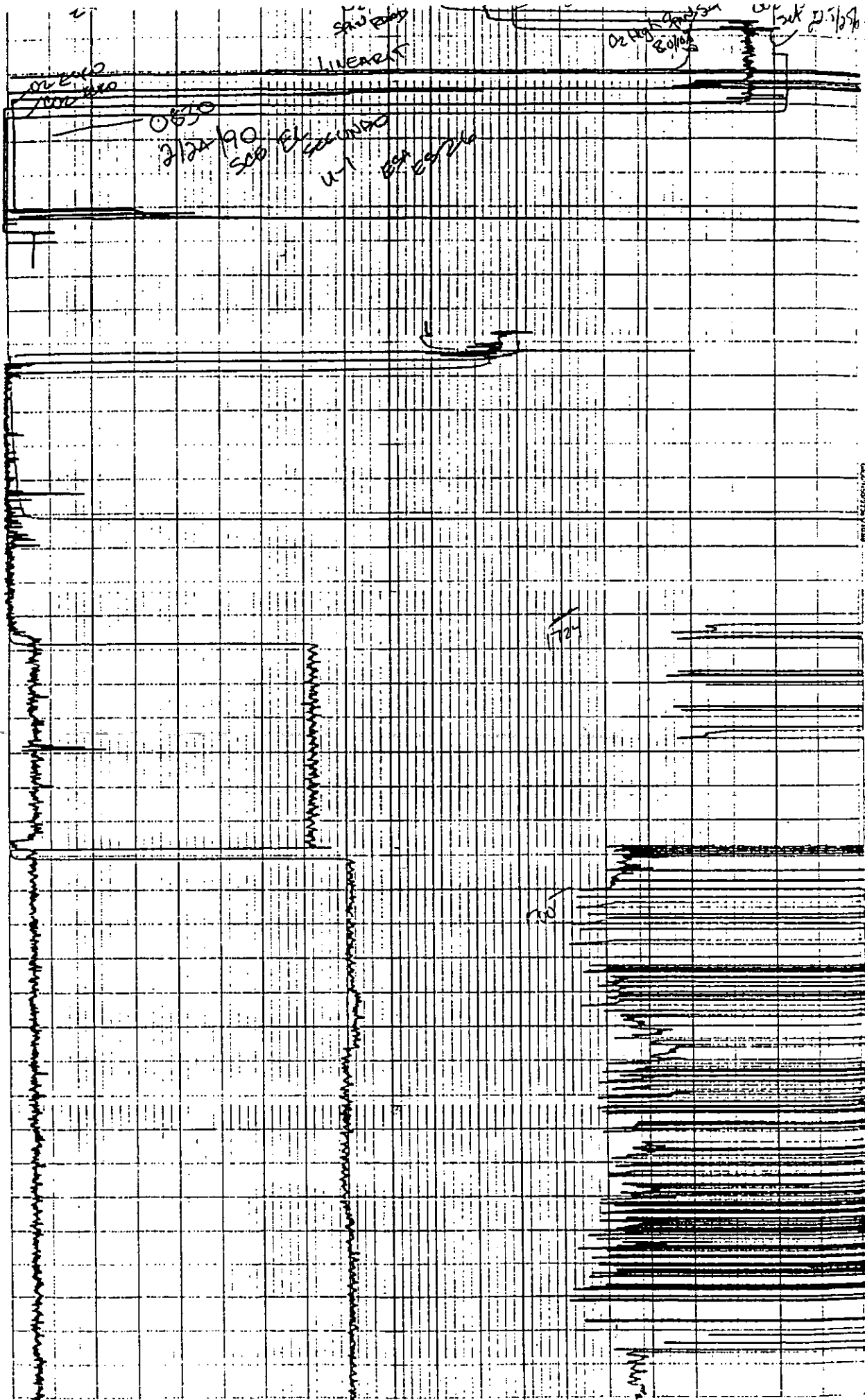
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9423



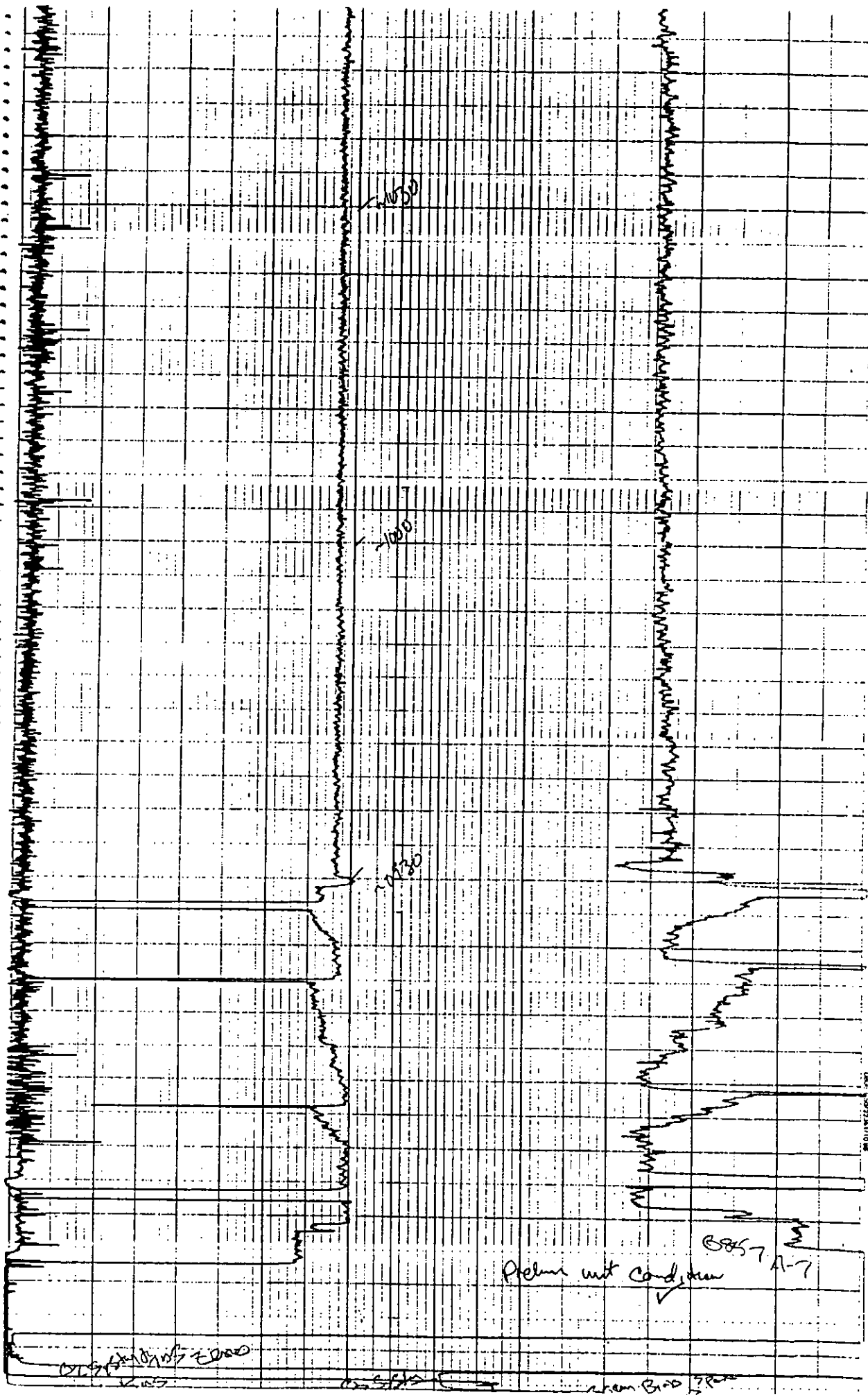
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SOLTEC CHART NO. ZD1-01-25



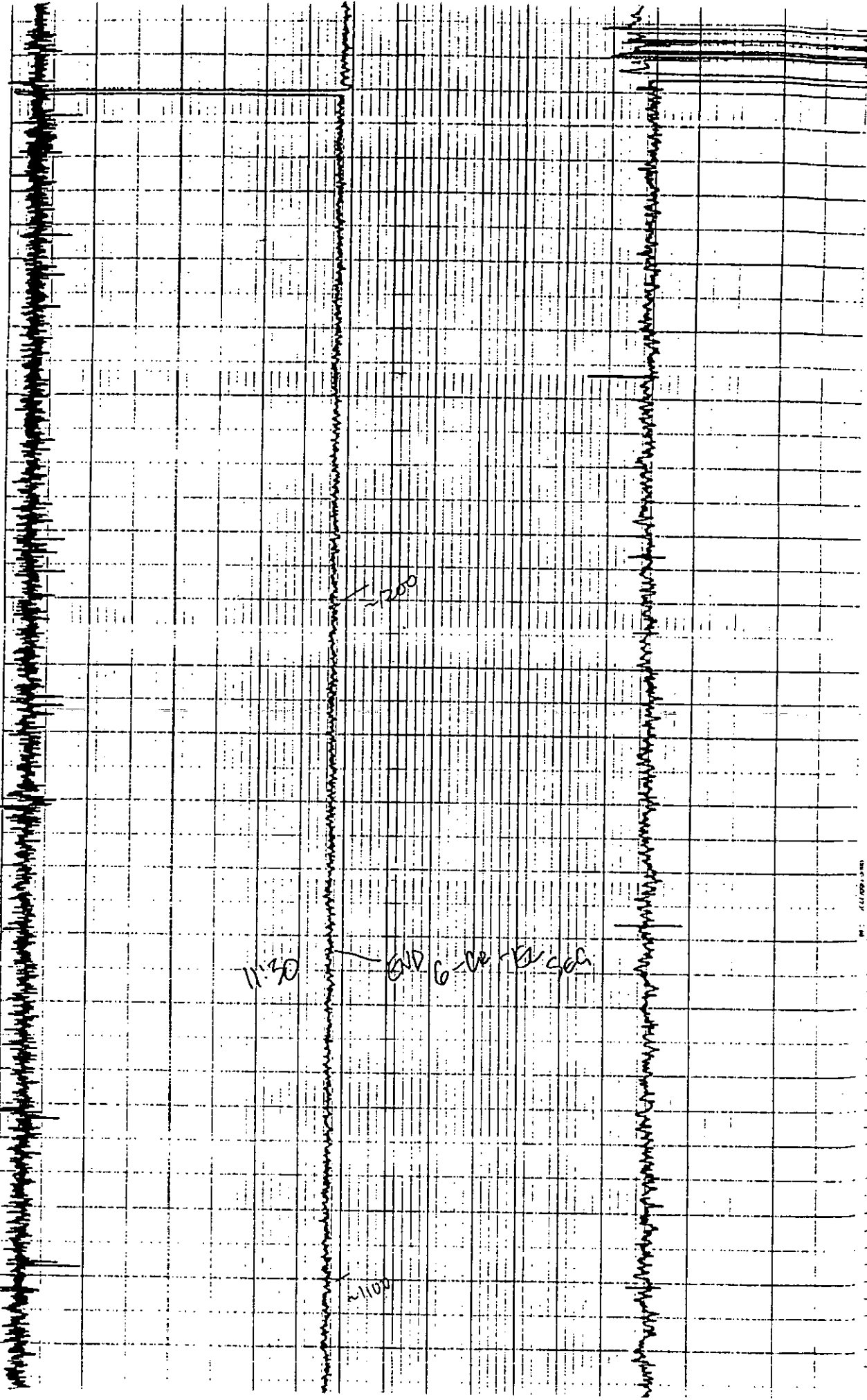
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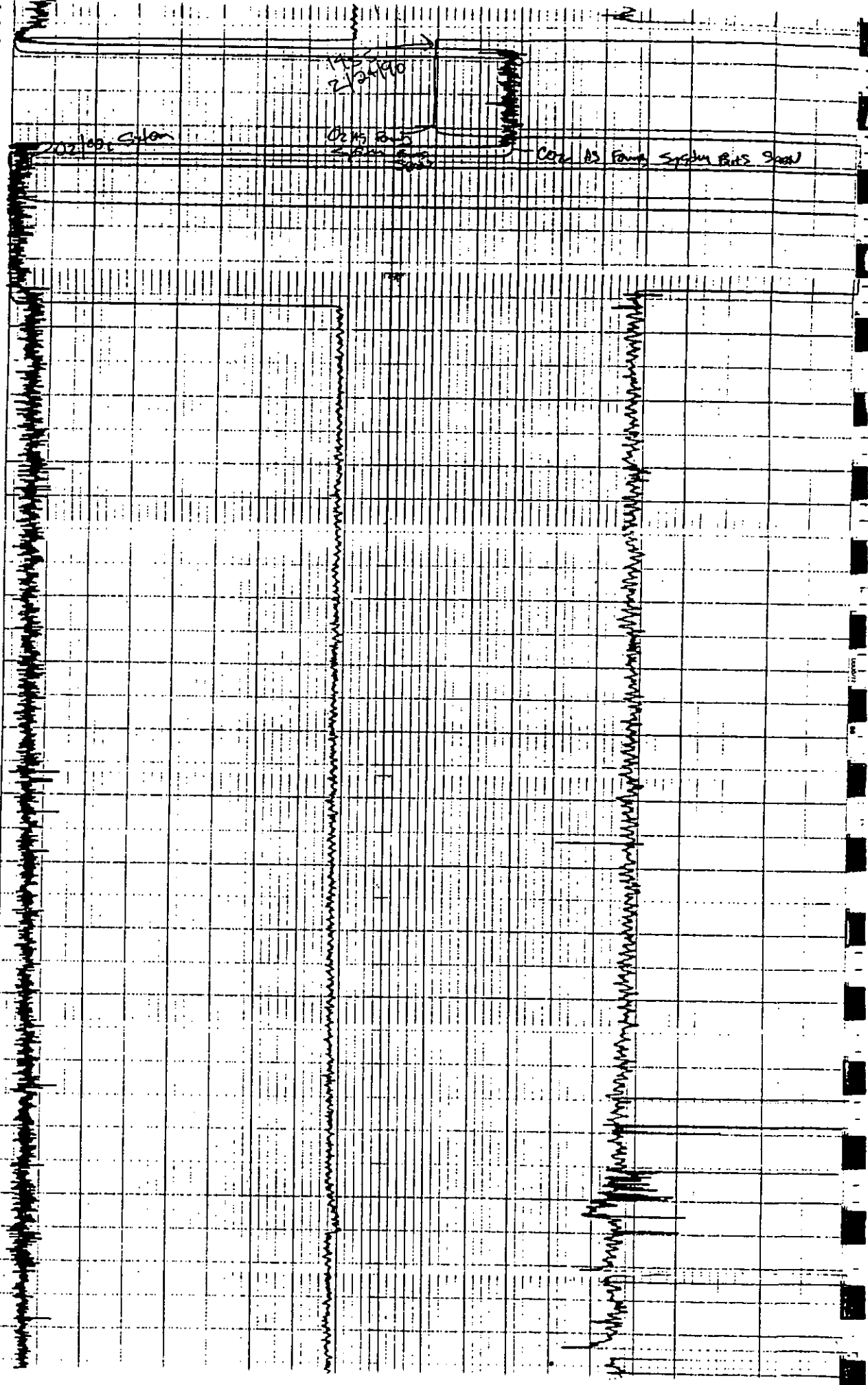
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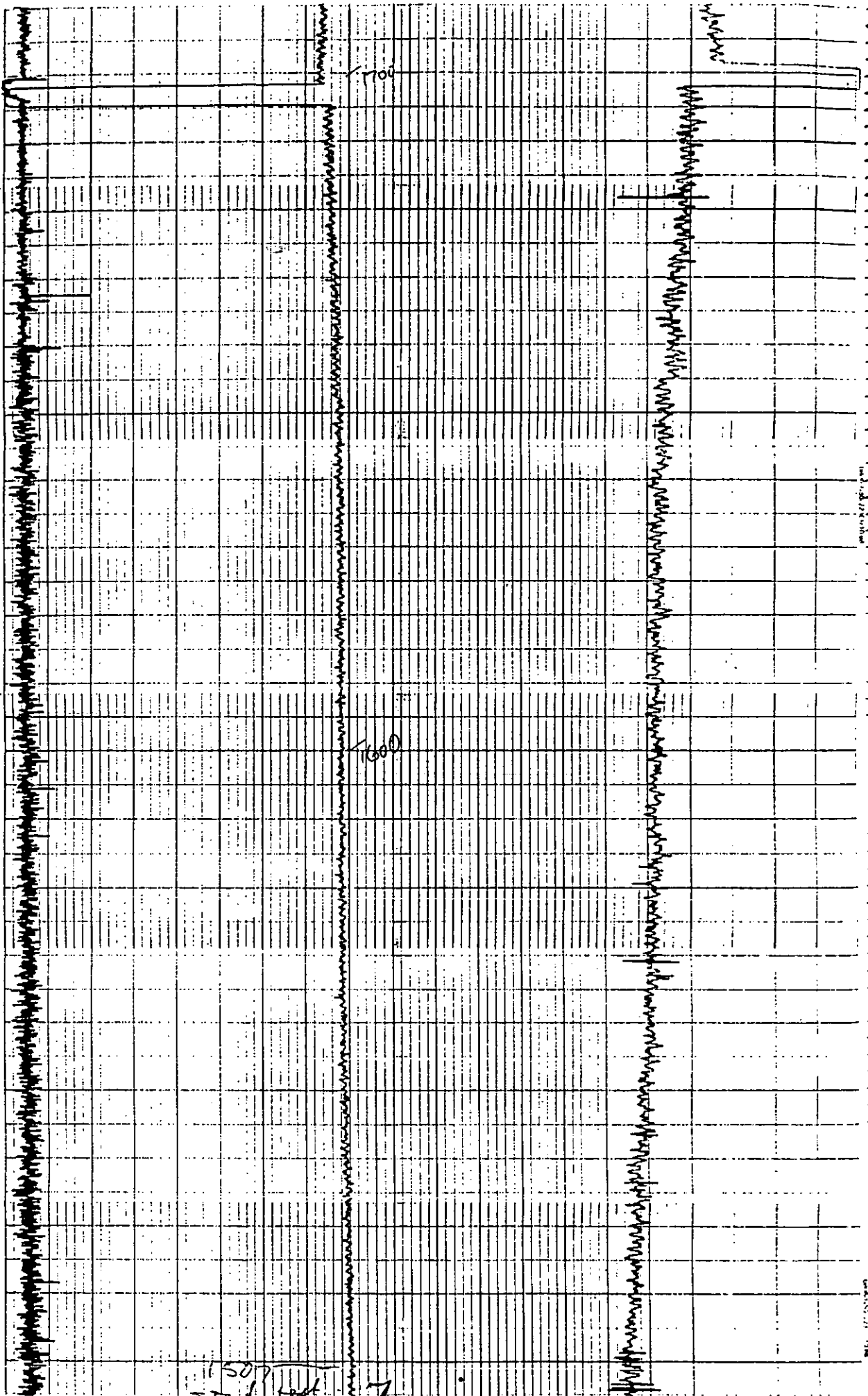


EC CHART NO. 201-01-25-20M

SOLETC CHART NO. 201-01-25-20M

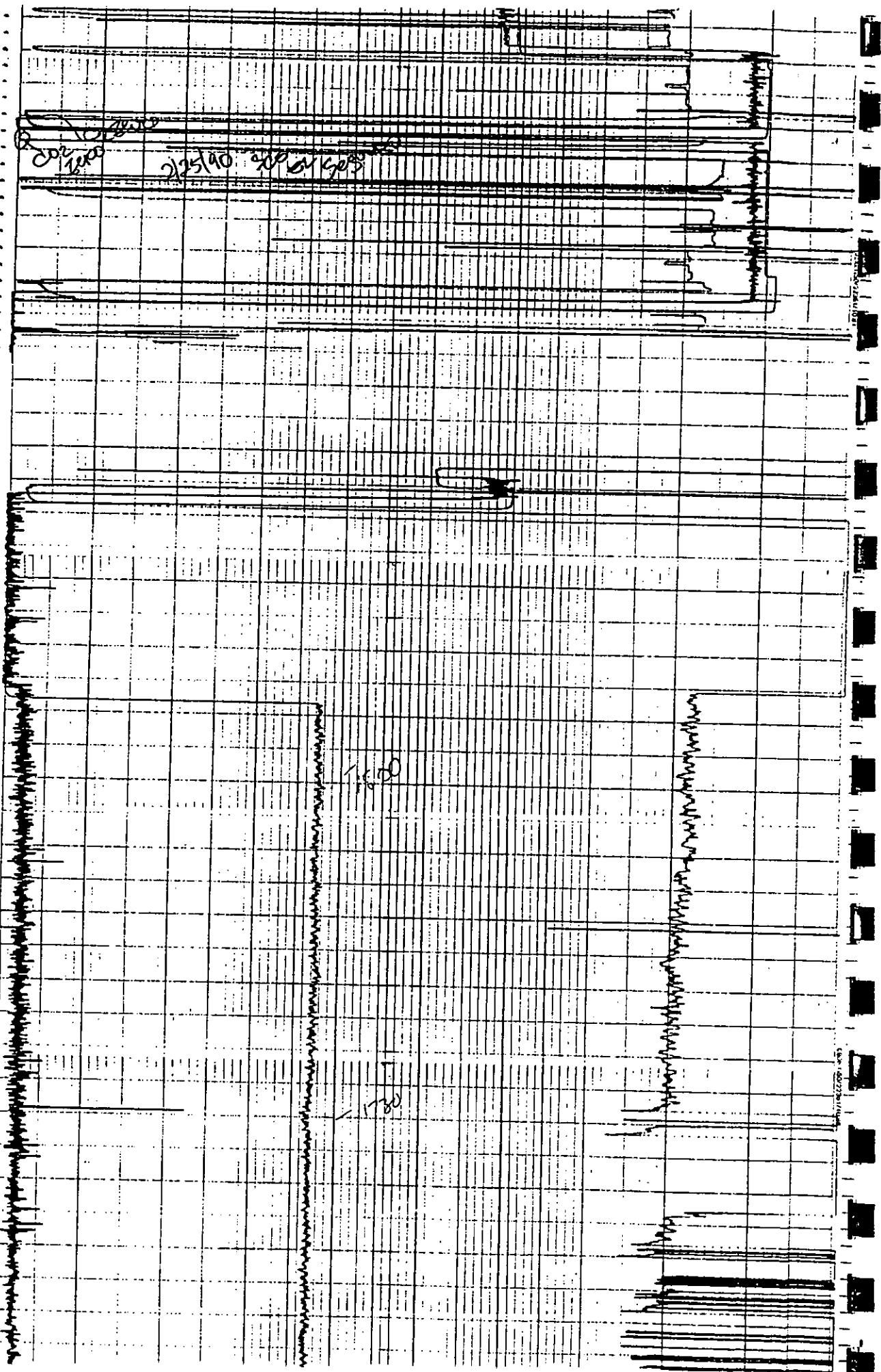


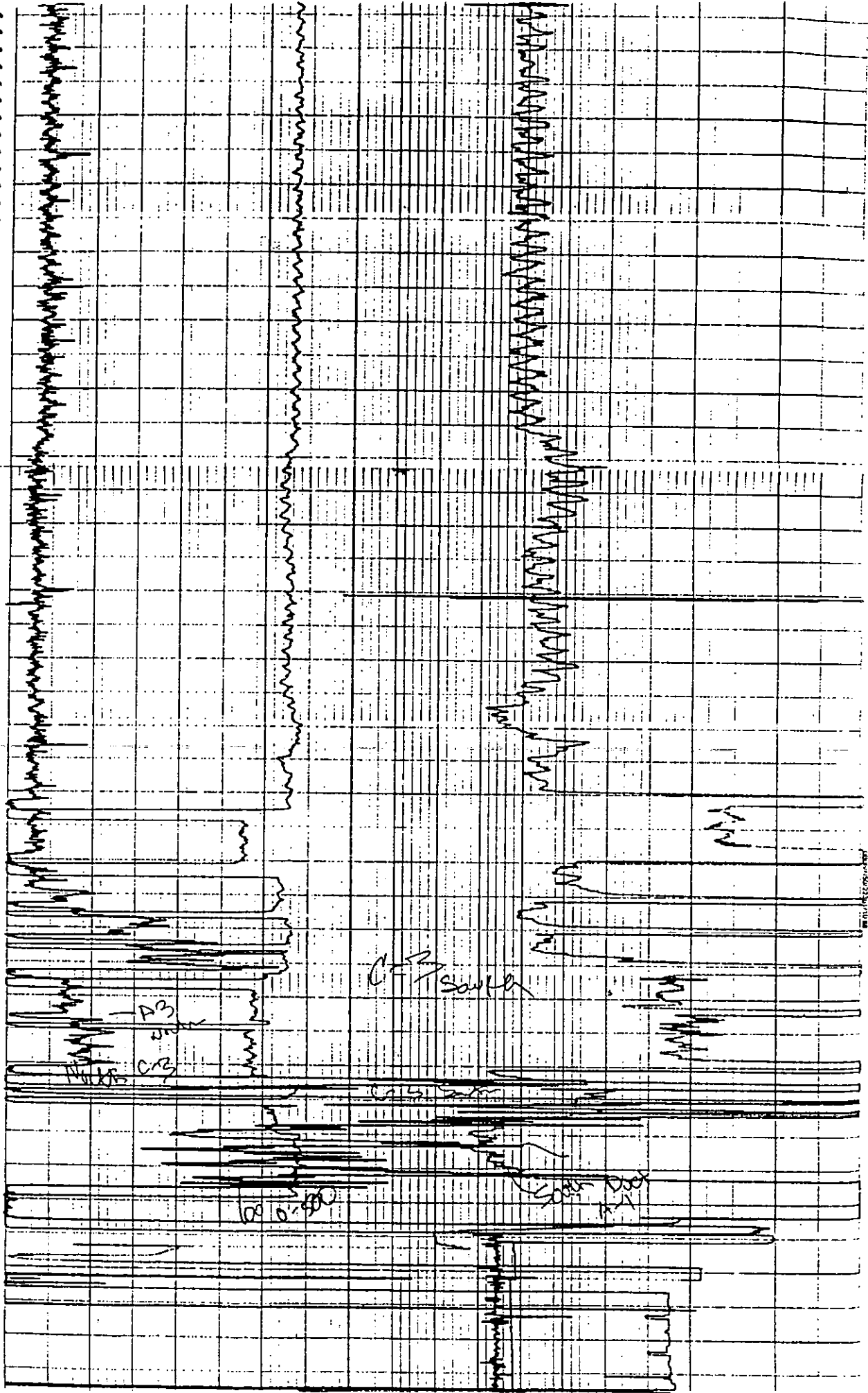


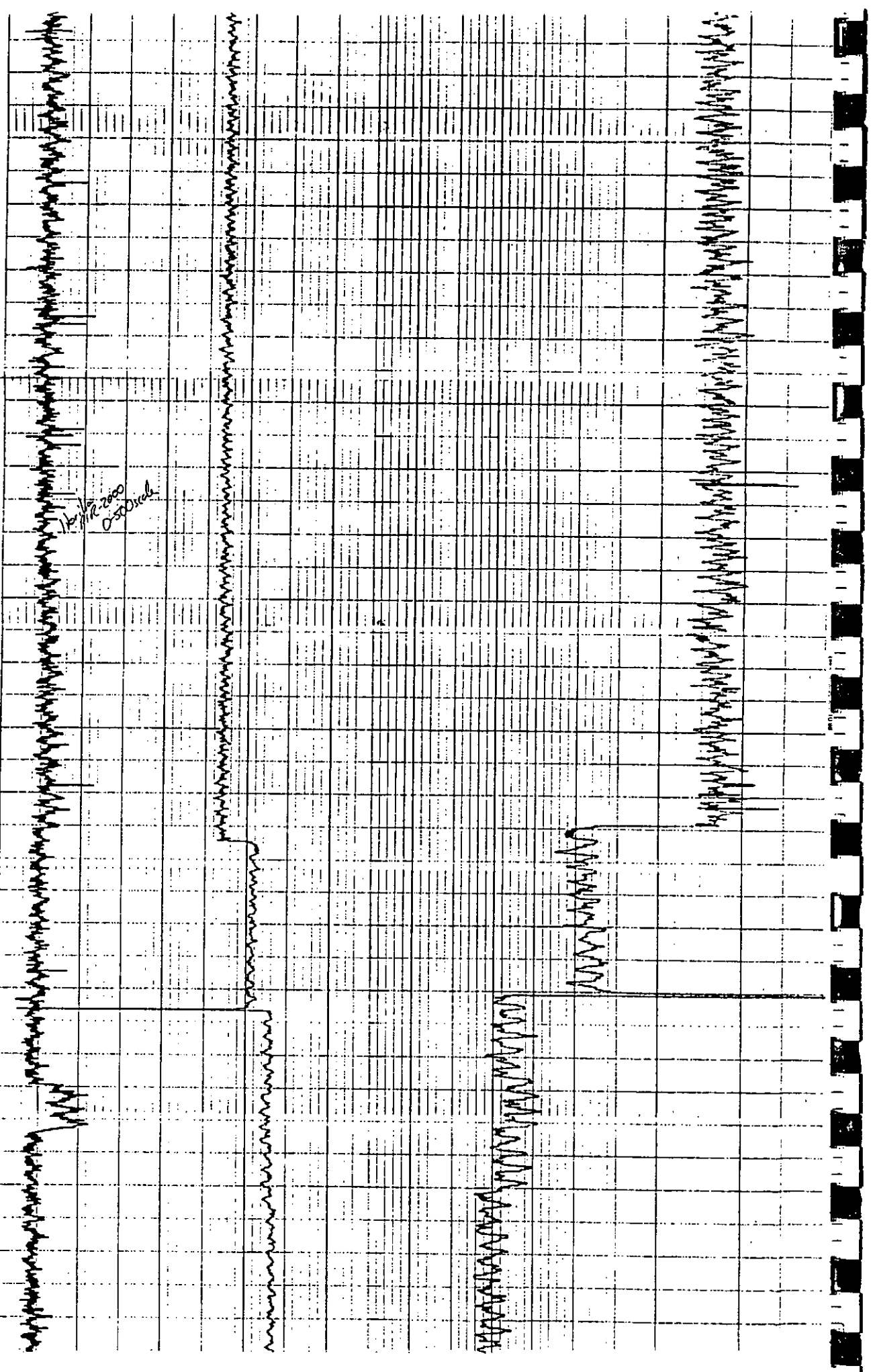


SOLTEC CHART NO. ZDI-01-25-20M

SOLTEC CHART NO. ZDI-01-25-20M







A hand-drawn graph on a grid. The curve starts at a high value on the left, drops sharply, and then levels off. The curve is labeled "CO₂" at its end. There are also some handwritten notes and a signature at the bottom.

GA

APPENDIX F
CHAIN OF CUSTODY



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No.
(Project No.)
Test No.

53304- ELS

Total Chromium
by CAXIS 475
w/ modification 1/90

Complete Description

Reagent Blank 0.1 N NaOH (100-ml) T F/Lb T63-200
2-Cr-ELS Probe Wash (1) Trough Catch w/ Filter T63-197(1)
3-Cr-ELS Probe Wash (1) Trough Catch w/ Filter T63-198(1)
6-Cr-ELS Probe Wash Trough Catch Filter T63-199 (all combined)

→ Represents 1/2 of Cr down

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
<i>[Signature]</i>	0800 2/27/90		

Samples shipped to:

Coxis and Tompkins
Los Angeles

Samples shipped from ESA by:

Carrier:

Handcarried

Date 2/27/90

Air Bill No.

Samples received by:

Company:

[Signature]
Coxis & Tompkins

Date 2/28/90



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. #53304-ELS
(Project No.)
Test No. _____ Complete Description _____

- ✓ Reagent Blank TV = 100 ml
- ✓ 2-Cr-ELS Probe Wash (TV = 165 ml)
- ✓ 2-Cr-ELS Timpign catch w/ A/B/L T63-197 (TV = 350 ml)
- ✓ 3-Cr-ELS Probe Wash (TV = 100 ml)
- ✓ 3-Cr-ELS Timpign catch w/ A/B/L T63-198 (TV = 260 ml)
- ✓ 6-Cr-ELS Probe Wash, Timpign catch w/ A/B/L T63-199
all portions combined TV = 310 ml

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
<u>[Signature]</u>	<u>0900 2/27/90</u>	<u>[Signature]</u>	<u>2:44pm 2/28/90</u>

Samples shipped to: RTI
Research Triangle Park
North Carolina

Samples shipped from ESA by: USA Transport Date 2/27/90
Carrier: _____ Air Bill No. _____

Samples received by: _____ Date _____
Company: _____



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. #53304-ELS Armenia (CAXB 423)
(Project No.)
Test No.

Complete Description

Reagent Blank Filber # T110-134, 200 ml NaOH (.1 N)

Field Blank Filber # T110-69, Front 1/2 (1), Back 1/2 (1)

4-AS Filber # T110-84, Front 1/2 (1), Back 1/2 (1)

5-AS Filber # T110-122, Front 1/2 (1), Back 1/2 (1)

7-AS Filber # T110-140, Front 1/2 (1), Back 1/2 (1)

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
<u>[Signature]</u>	<u>0800 2/27/90</u>		

Samples shipped to:

Curtis and Tangherlin

Samples shipped from ESA by:

Handcarried

Date 2/20/90

Carrier:

C & T

Air Bill No. _____

Samples received by:

Paul Maciel

Date 2/20/90

Company:

CURTIS & TANGHERLIN



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No. #53304-ELS

(Project No.)

Test No.

Complete Description

1-FO

Fuel Oil Sample

2-FO

↓

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
<u>[Signature]</u>	<u>0800 2/22/80</u>		

Samples shipped to:

Curtis and Tangherlin

Samples shipped from ESA by:

Handcarried

Date 2/22/80

Carrier:

C&T

Air Bill No. _____

Samples received by:

[Signature]

Date 2/28/80

Company:

Curtis & Tangherlin



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples: # 53304-ELS

EPA Draft Metals Method

Sample No.
(Project No.)
Test No.

Complete Description

Reagent Bl.	Filler T110-133, HNO_3/H_2O soln (200 ml) $KMnO_4$ soln (200 ml)
Field Bl.	Filler T110-81, Probe Wash (1) Impinger Catch (1) $KMnO_4$ soln (100 ml)
4-MALS	Filler T110-83, Probe Wash (1) Impinger Catch (1) $KMnO_4$ soln (160 ml)
5-MALS	Filler T110-132, Probe Wash (1), Impinger Catch (1) $KMnO_4$ soln (275 ml)
7-MALS	Filler T110-139, Probe Wash (1), Impinger Catch (1) $KMnO_4$ soln (270 ml)

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
<i>[Signature]</i>	0800 2/27/90		

Samples shipped to: Curtis and Tompkins

Samples shipped from ESA by: Handwritten

Carrier: CA

Date 2/27/90

Air Bill No. _____

Samples received by: Paul Ward

Date 2/28/90

Company: CURTIS & TOMPKINS



Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

Sample No.
(Project No.)
Test No.

Complete Description

Field Blank XAD-2 module, Filter # 110-727
(1-PAN) 140 Ltr (1), Organic Ltr (1) *
2-PAN-ELS XAD-2 module, Filter # 110-728
140 Ltr (2), Organic Ltr (2) *
3-PAN-ELS XAD-2 module, Filter # 110-729
one H₂O sample broken 140 Ltr (2), Organic Ltr (2) *
6-PAN-ELS XAD-2 module, Filter # 110-732
140 Ltr (2), Organic Ltr (2) *

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
<i>[Signature]</i>	1400 2/27/90		

Samples shipped to: Zenon Environmental

Samples shipped from ESA by: Fed-Ex

Carrier: _____

Date 2/28/90

Air Bill No. 400-2914-941
400-2914-942
Logan

Samples received by: [Signature]

Company: Zenon Environmental Inc.

Date _____

15991 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388 / (714) 259-9520 / Telecopy: (714) 259-0372

+ Organic portion arrived next afternoon as

ESA DS-057

MAR 3 1990



Analysis by CARB 430 for
Formaldehyde, Acetaldehyde, Benzaldehyde
Energy Systems Associates A CORPORATION

CERTIFICATION OF SAMPLE RECEIPT

Samples:

53304- ELS

Sample No.

(Project No.)

Test No.

Complete Description

✓ Test 6A-Form-ELS
 ✓ 6B-Form-ELS
 ✓ 6C-Form-ELS
 } Vial #'s 1 and 2 } combine
 oil for

 ✓ Test 8A-Form-ELS
 ✓ 8B-Form-ELS
 ✓ 8C-Form-ELS
 } Vials A and B } combine
 gas for

 ✓ field spike Use one, save other for backup
 * field blank Use one, save other for backup

Chain of Custody Prior to Shipment:

Released by	Time and Date	Received by	Time and Date
<i>[Signature]</i>	1000 2/27/90		

Samples shipped to:

Radon

North Carolina

Samples shipped from ESA by:

Fed-Ex

Date 2/27/90

Carrier:

4969940091

Air Bill No. 4969940091

Samples received by:

Randy Harrington

Date 2-28-90

Company:

Radon RE

* RECE'D two SAMPLES Labeled FORM blank. RH

**ENERGY SYSTEMS ASSOCIATES**15991 RED HILL AVENUE, SUITE 110, TUSTIN, CA 92680-7388
(714) 259-9520 / Telecopy: (714) 259-0372**Purchase Order**Vendor: Truesdale LabsP.O. Number Charge S.C.E.Charge Number 53304 - ELSDate 5-20-90

Phone: ()

Code: _____

California Resale No: SR EA 24-816623

Date Required	Contact <u>Joe Bramble</u>	Ship via	Terms	☐ Resale — Non Taxable ☐ Co Use — Taxable
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ITEM NO.	DESCRIPTION	QUANTITY	PRICE	TOTAL
	<u>6 Tedlar Bags for</u> <u>Benzene Analysis</u> <u>Need 1 ppb detection</u> <u>limits</u> <u>(BA,60,6C,8A,8D,8C-Ben-ELS)</u>	<u>6</u>	<u>120.00</u>	<u>720.00</u>
	<u>2 Natural Gas Amplifier</u> <u>Full Breakdown, Higher H.V.</u> <u>W/300-2100-13-25-90</u>	<u>2</u>	<u>225.00</u>	
	<u>Send Original report to</u> <u>Mike Escobedo 30EL and</u> <u>copy of report to Arlene</u> <u>Bell E.S.A.</u>			

Process within 48 hrs.

Sub Total \$ _____

Sales Tax \$ _____

Freight \$ _____

TOTAL \$ _____

Lin J.

REAGENT CHAIN OF CUSTODY

Client: SCE/AB2588

Charge No.: 53304

Project Manager: B/RF

REAGENTS - Enter quantity and circle description

☒ Water	<u>DI</u> <u>B&J</u> <u>2</u>	Lot # _____
☒ Acetone	<u>ACS</u> <u>GC2</u> <u>2</u>	Lot # _____
☒ Hexane	ACS <u>GC2 - Optima</u> <u>2</u>	Lot # _____
IPA	ACS	Lot # _____
H ₂ O ₂	30% Other	Lot # _____
MeCl ₂	ACS GC2	Lot # _____

4L 5% HNO₃/10% H₂O₂

2L 4% KMnO₄/10% H₂SO₄

6L 0.1 N NaOH (for Cr train and As rinses)

500 ml DNPH 50% in toluene
50,000X formaldehyde solution

FILTERS - Quantity and Description

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

_____ Teflon 110mm 7110 - 68, 69, 81, 83, 84, 104, 122, 132-134

_____ ~~Toluene~~ Hexane Rinsed 138-141
727, 729, 732-733, 901

_____ 6 XAD2 Resin modules

BOTTLES - Quantity

2 1000ml Nalgene
 _____ 500ml Nalgene
 _____ 250ml Nalgene
4cs 500ml I-chem
 _____ 1000ml Acid Washed
2cs 500ml Acid Washed
2cs 250ml Acid Washed

LAB SUPPLY CHECK LIST

4 Silica Gel
☒ Gloves (small and large)
4 Wash Bottles
☒ Foil
☒ Baggies
 _____ Sample Labels
☒ Pens
☒ Paper Towels
☒ Scissors
1 deltan
1 metal Tweezers
☒ Brushes

8 Teflon bags
3 Teflon wash bottles

Released By [Signature]
 Received By _____
 Returned By _____

Teflon bags
 Parafilm
 2 10 ml pipettes
 1 1 ml pipette
 1 Pipette bulb
 Wheaten bottle
 w/ cap
 4 midge impinger
 w/ fillings
 Hexane rinsed bail
 Tape

Date 2/15/80
 Date _____
 Date _____



Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 25563
CLIENT: CARNOT
PROJECT #: 5787
LOCATION: SUBMITTED BY CLIENT

DATE RECEIVED: 03/07/90
DATE DIGESTED: 03/22/90
DATE ANALYZED: 04/10/90
DATE REPORTED: 04/17/90
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

C&T ID	SAMPLE ID	SAMPLE VOLUME	ZINC ug/SAMPLE
1	REAGENT BLANK	50	20
2	<i>Field</i> TRIP BLANK	50	63
3	4-MTLS	50	50
4	5-MTLS	50	62
5	7-MTLS	50	6,200
5D	7-MTLS	50	6,300
5S	7-MTLS	50	102%

*possible contamination
use average*

METHOD DETECTION LIMIT = 0.61 ug/SAMPLE.

QA/QC DATA INFORMATION:

RELATIVE % DIFFERENCE: 2
SPIKE % RECOVERY: 102