

Note: This is a reference cited in AP 42, *Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources*. AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

REPORT OF AIR POLLUTION SOURCE TESTING FOR CALIFORNIA AB2588

Conducted on:

January 23-25, and 28-29, 1991

Conducted at:

**CALMAT (INDUSTRIAL ASPHALT)
PALA INDIAN RESERVATION, PALA, CALIFORNIA**

Submitted on:

March 18, 1991

Prepared by:

**Engineering-Science
6060 N. Irwindale Avenue Suite J
Irwindale, CA 91706
Telephone: (818) 969-5758**

**REPORT OF AIR POLLUTION SOURCE TESTING
FOR CALIFORNIA AB2588
AT CALMAT (INDUSTRIAL ASPHALT CORPORATION)
PALA INDIAN RESERVATION, PALA, CA**

INTRODUCTION

On January 23-25, and 28-29, 1991 Engineering-Science, (ES) Irwindale, CA, conducted air pollution source testing on an asphalt batch plant operated by Industrial Asphalt at Pala, California. The source tested was the rotary dryer baghouse exhaust stack. The unit is operated under Permit to Operate, No. 000117, granted by the San Diego Air Pollution Control District (SDAPCD).

Testing was conducted to determine the emission rates of trace metal elements (arsenic, beryllium, cadmium, hexavalent and total chromium, copper, mercury, manganese, nickel, lead, selenium, and zinc), poly-aromatic hydrocarbons (PAH's), formaldehyde (R-CHO), and organic analysis (Benzene). The audit trace element that was assigned for the AB2588 testing was cadmium (Cd). Hexavalent and total chromium were tested separate from the trace element wet impingement system. And as a requirement by the SDAPCD, Continuous Emission Monitoring (CEM) analyzers were used to measure the emission rates of nitrogen oxides (NO_x), sulfur dioxide (SO₂), and ozone (O₃) during the PAH testing.

Due to limited plant process production, the testing for trace elements, cadmium, hexavalent/total chromium, and PAH's required three test runs of at least three hours in duration. Oxygen and carbon dioxide were measured using Orsat Method (1/23-24/91) and CEM (1/25 and 28-29/91). All emissions testing for the facility were conducted at the baghouse stack outlet. The documentation of the plant operating conditions was performed by Dennis Bautista of ES.

The testing was coordinated by Mr. Dwight Beavers and Paul Mason of Industrial Asphalt. The testing was observed by Mr. Bob Yelonoski of SDAPCD. The ES testing team was comprised of Messrs. Dennis Bautista (team leader), Dwight J. Wieman (continuous emission monitoring), Micheal Edwards, Anthony King, Danny Kremer, and Nicky Nielsen

PROCESS DESCRIPTION

Industrial Asphalt, a division of CALMAT operates a Hot Mix Asphalt Batch Plant at the Pala Indian Reservation in Pala, California.

Aggregate supplied by the CALMAT quarry located adjacent to the plant is carried via belt conveyor to the batch plant. To remove moisture, it is heated and dried in a diesel oil fired rotary dryer. This hot aggregate is then mixed with hot liquid asphalt to form a "batch". This "batch" is either dropped into waiting trucks or stored in silos. The plant can produce a maximum of 225 tons per hour, but normal operating rates are about 200 tons per hour. Figure 1 is a representation of the facilities process diagram.

TESTING PROGRAM

The testing was conducted in accordance with San Diego Air Pollution Control District (SDAPCD), Environmental Protection Agency (EPA), and California Air Resource Board (CARB) test methods and are described in the following pages. The purpose of the testing program was to determine compliance as specified in the California Assembly Bill 2588.

TEST METHODOLOGY

LOCATION AND NUMBER OF TRAVERSE POINTS

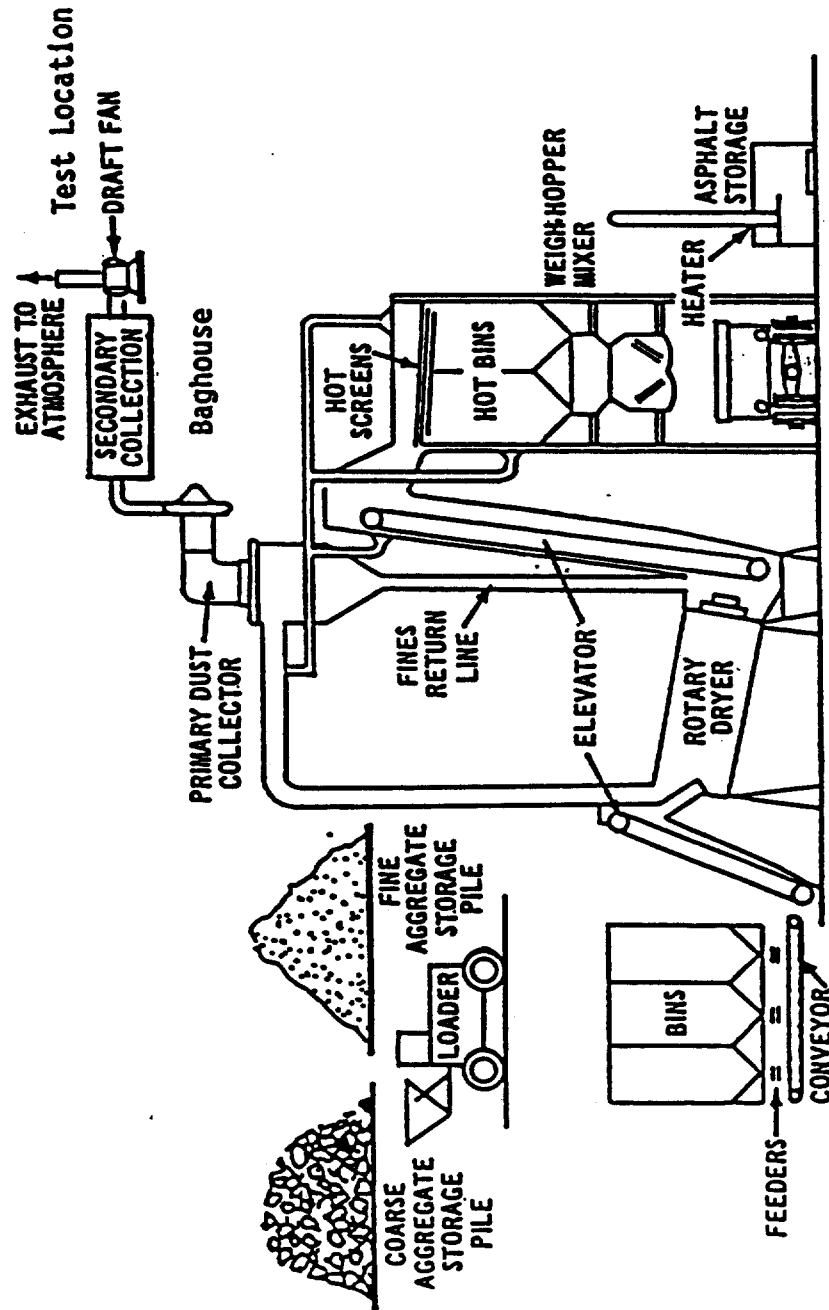
EPA Method 1 was used to determine the number and location of the traverse points. A 24 point traverse sampling was selected, utilizing two ports.

A cyclonic flow check was conducted at each traverse point. An S-type pitot tube connected to an inclined oil manometer was used for the determination. The pitot tube was positioned so the planes of the face openings were perpendicular to the stack cross-sectional plane. This was referred to as the "0°" reference position, the manometer should read zero to indicate no cyclonic flow. If the manometer did not read zero the pitot tube is rotated until a zero reading is obtained. The angle of rotation was measured to the nearest degree.

STACK VELOCITY AND TEMPERATURE TRAVERSE

EPA Method 2 was used to determine the velocity of the stack gas and stack gas temperature at the time of the testing. An S-type pitot tube connected to an inclined oil manometer and a K-type (chromel-alumel) thermocouple connected to a temperature read out device were used to traverse the 24 sampling points. The nozzle size required to achieve isokinetic sampling rates was calculated from these measurements.

PROCESS DIAGRAM



STACK GAS MOLECULAR WEIGHT

The carbon dioxide (CO₂) and oxygen (O₂) concentrations in the stack gas were determined from integrated bag samples collected in Tedlar bags and analyzed by Orsat in accordance with EPA Method 3 during January 23 and 24, 1991 testing. In addition to the Orsat Method, continuous emissions analyzers were also used in determining the concentrations of CO₂ and O₂ during January 25, 28 and 29, 1991 testing.

STACK GAS MOISTURE CONTENT

The moisture content of the stack gas was determined in conjunction with the sampling trains that were used during the AB2588 testing. The moisture was determined gravimetrically by the weight gain in each impinger in accordance with EPA Method 4.

TRACE ELEMENTS

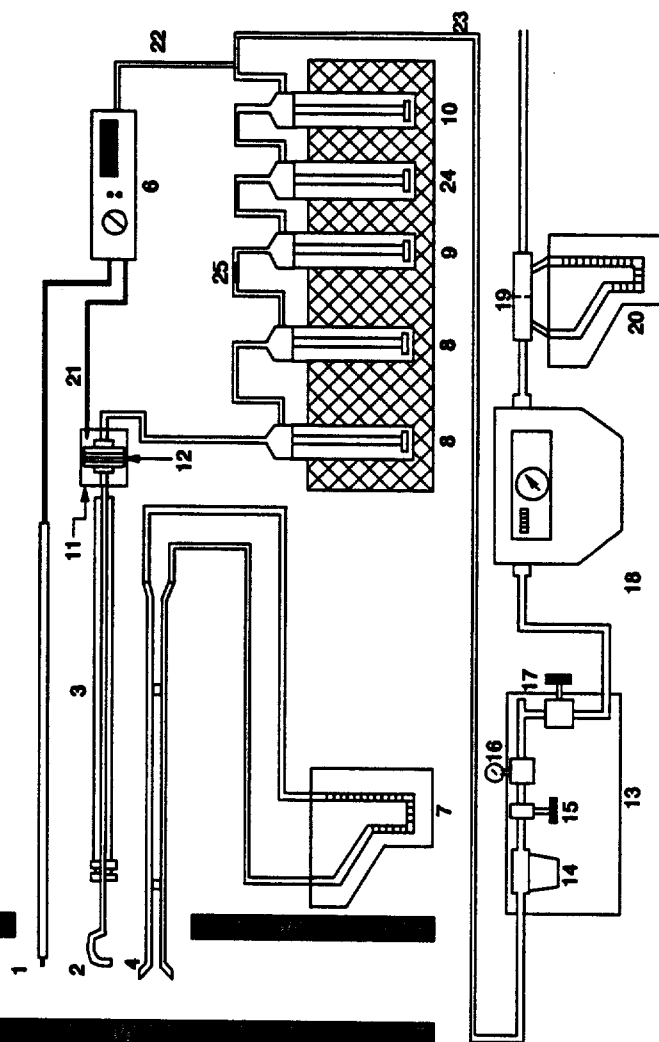
Trace elements that were analyzed included the determinations of As, Be, Cd, Cu, Hg, Mn, Ni, Pb, Se, and Zn.

In the determination of these trace elements, a sampling train configured in accordance with CARB Method 436 was used. The sample train was comprised of a heated quartz nozzle/probe and a heated fiberglass filter connected via Teflon tubing to a wet impingement train followed by a vacuum pump and dry gas meter. The filter temperature was maintained at 248 +/- 25 °F. The wet impingement train consisted of five Greenburg-Smith type impingers connected in series. The first and second impingers contained nitric acid (HNO₃) in a hydrogen peroxide (H₂O₂) solution. The third impinger was an empty modified Greenburg-Smith. The fourth impinger contained an acidified potassium permanganate (KMnO₄) solution. The fifth impinger contained approximately 400 grams of indicating silica gel. This train was operated for a period of 3 hours during each run and samples were collected using isokinetic sampling techniques. A schematic sampling system is presented in Figure 2. Sampling train components were recovered in separate HNO₃ and KMnO₄ fractions and were analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS).

HEXAVALENT AND TOTAL CHROMIUM

Three samples were collected isokinetically with a sampling train configured in accordance with CARB Method 425. The sample train was comprised of a heated quartz nozzle/probe and a heated teflon filter connected via Teflon tubing to a wet impingement train followed by a vacuum pump and dry gas meter. The filter

SAMPLING TRAIN FOR TRACE METAL ELEMENTS



- | | | |
|--|------------------------------|---------------------------------------|
| 1. TEMPERATURE SENSOR | 9. EMPTY IMPINGER | 18. DRY GAS METER |
| 2. NOZZLE | 10. IMPINGER WITH SILICA GEL | 19. ORIFICE |
| 3. QUARTZ PROBE | 11. FILTER HEATER | 20. INCLINED MANOMETER |
| 4. S - TYPE PITOT TUBE | 12. FILTER HOLDER | 21. FILTER TEMPERATURE THERMOCOUPLE |
| 5. STACK WALL | 13. SEALED LEAK FREE PUMP | 22. IMPINGER TEMPERATURE THERMOCOUPLE |
| 6. TEMPERATURE READOUT | 14. FILTER FOR PUMP | 23. VACUUM LINE |
| 7. INCLINED MANOMETER | 15. COARSE ADJUSTMENT | 24. KMnO ₄ |
| 8. HNO ₃ /H ₂ O ₂ | 16. VACUUM GAUGE | 25. GLASS WOOL FILTER |
| | 17. FINE ADJUSTMENT | |

FIGURE 2

temperature was maintained at 248 ± 25 °F. The wet impingement train consisted of four Greenburg-Smith type impingers connected in series. The first and second impingers contained 0.1N of NaOH solution. The third impinger was an empty modified Greenberg-Smith. The fourth impinger contained approximately 400 grams of indicating silica gel. This train was operated for a period of 3 hours for each test runs. A schematic diagram of the sampling system is presented in Figure 3. After the testing, the samples were analyzed for hexavalent chromium by EPA 7196/IC and for total chromium by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS).

SAMPLE AUDIT (CADMIUM)

When using CARB Method 436 (Determination of Trace Elements), CARB assigns a metal that serves as a quality control check for the trace element sampling method. The audit metal that was assigned for the AB2588 testing was cadmium.

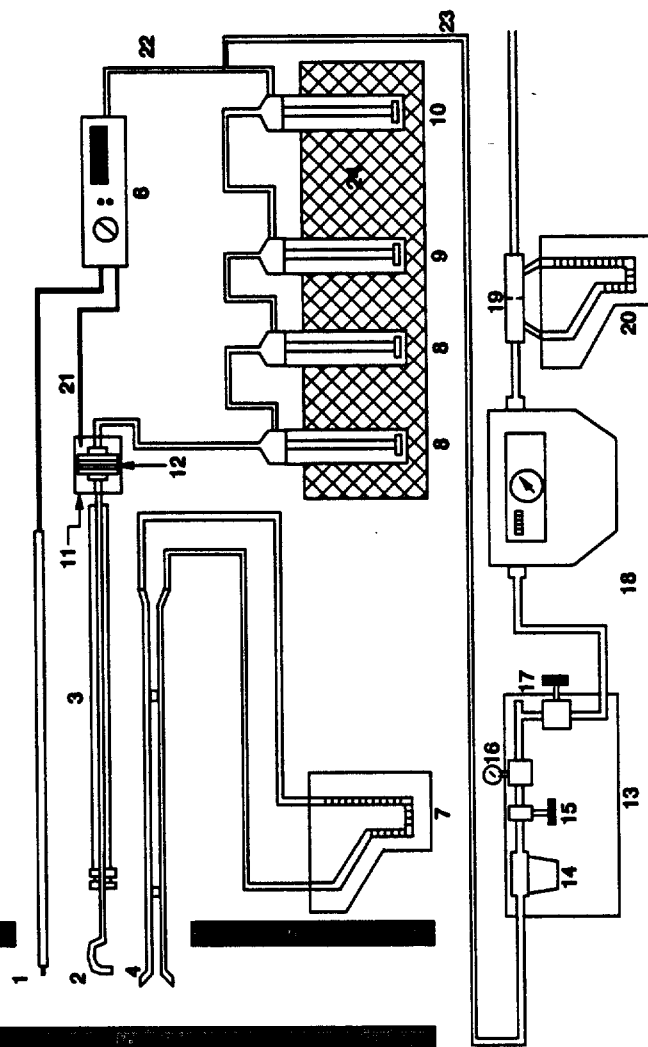
The audit samples for determining cadmium was collected isokinetically using sampling procedures as specified in CARB 424. The sample train was comprised of a heated quartz nozzle/probe and a heated teflon filter connected via Teflon tubing to a wet impingement train followed by a vacuum pump and dry gas meter. The filter temperature was maintained at 248 ± 25 °F. The wet impingement train consisted of four Greenburg Smith type impingers connected in series. The first and second impingers contained 0.1N HNO₃ solution. The third impinger was an empty modified Greenberg-Smith. The fourth impinger contained approximately 400 grams of indicating silica gel. This train was operated for a period of 3 hours during each. A schematic sampling system is presented in Figure 4. After the testing, the samples were analyzed for cadmium by Inductively Coupled Argon Plasma-Mass Spectrometry (ICAP-MS).

POLY-AROMATIC HYDROCARBONS

A modified EPA Reference Method 5 sampling train operated in accordance with CARB Method 429 was used for the determination of poly-aromatic hydrocarbons (PAH's).

The train design was based on an EPA validated emission collection system with the addition of an adsorbent cartridge of XAD-2 resin to collect vaporous emissions for semi-volatile organics. This train was operated for a period of 3 hours during each run and samples were collected using isokinetic sampling techniques. The train recovery was modified from Method 5 procedures to include sample washes of methanol, hexane, and methylene chloride.

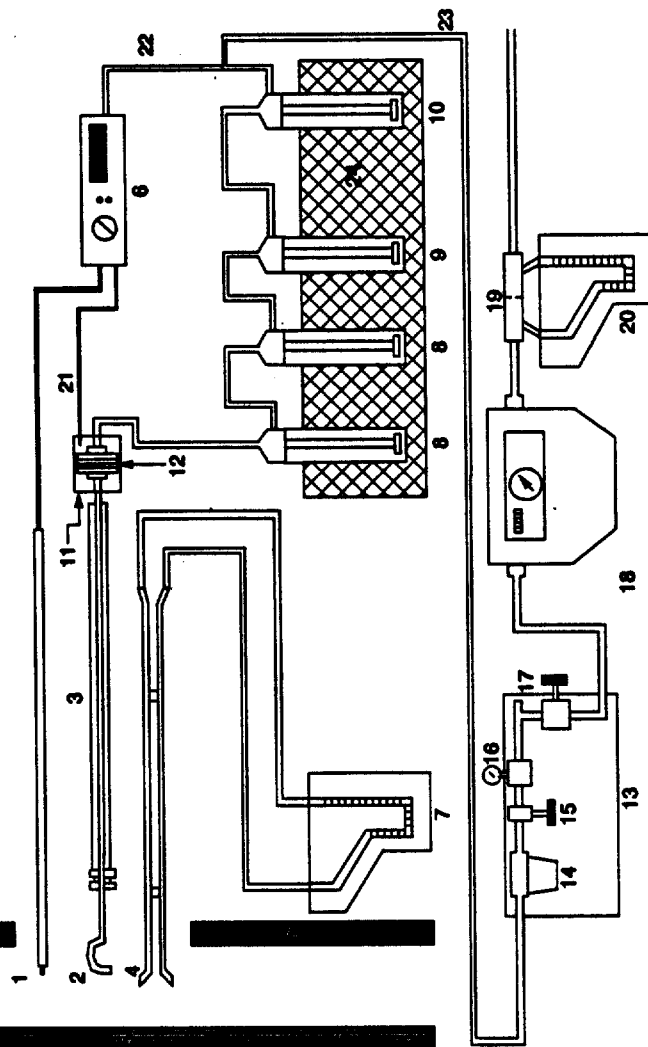
SAMPLING TRAIN FOR CHROMIUM



- | | | |
|------------------------|------------------------------|---------------------------------------|
| 1. TEMPERATURE SENSOR | 9. EMPTY IMPINGER | 18. DRY GAS METER |
| 2. NOZZLE | 10. IMPINGER WITH SILICA GEL | 19. ORIFICE |
| 3. QUARTZ PROBE | 11. FILTER HEATER | 20. INCLINED MANOMETER |
| 4. S - TYPE PITOT TUBE | 12. FILTER HOLDER | 21. FILTER TEMPERATURE THERMOCOUPLE |
| 5. STACK WALL | 13. SEALED LEAK FREE PUMP | 22. IMPINGER TEMPERATURE THERMOCOUPLE |
| 6. TEMPERATURE READOUT | 14. FILTER FOR PUMP | 23. VACUUM LINE |
| 7. INCLINED MANOMETER | 15. COARSE ADJUSTMENT | 24. ICE BATH |
| 8. 0.1N OF NaOH | 16. VACUUM GAUGE | |
| | 17. FINE ADJUSTMENT | |

FIGURE 3

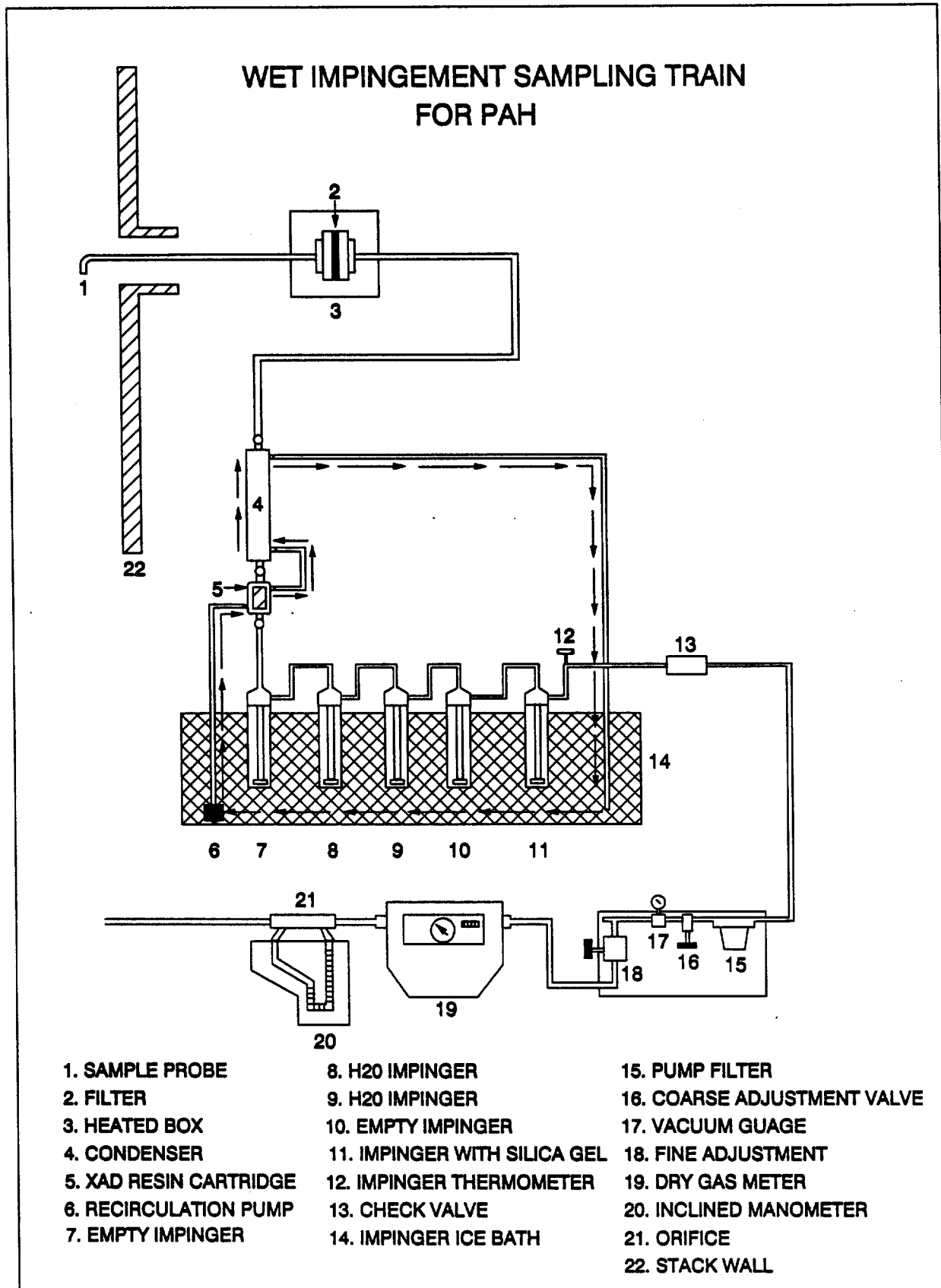
SAMPLING TRAIN FOR CADMIUM



- | | | |
|----------------------------|------------------------------|---------------------------------------|
| 1. TEMPERATURE SENSOR | 9. EMPTY IMPINGER | 18. DRY GAS METER |
| 2. NOZZLE | 10. IMPINGER WITH SILICA GEL | 19. ORIFICE |
| 3. QUARTZ PROBE | 11. FILTER HEATER | 20. INCLINED MANOMETER |
| 4. S - TYPE PITOT TUBE | 12. FILTER HOLDER | 21. FILTER TEMPERATURE THERMOCOUPLE |
| 5. STACK WALL | 13. SEALED LEAK FREE PUMP | 22. IMPINGER TEMPERATURE THERMOCOUPLE |
| 6. TEMPERATURE READOUT | 14. FILTER FOR PUMP | 23. VACUUM LINE |
| 7. INCLINED MANOMETER | 15. COARSE ADJUSTMENT | 24. ICE BATH |
| 8. 0.1 IN HNO ₃ | 16. VACUUM GAUGE | |
| | 17. FINE ADJUSTMENT | |

FIGURE 4

FIGURE 5



Fluorene
Phenathrene
Anthracene
Fluoranthene
Pyrene
Chrysene
Benz(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Benzo(g,h,i)perylene
Dibenzo(a,h)anthracene
Indeno[1,2,3-cd]pyrene

The samples that were submitted to the laboratory included a sample train blank which was collected on site. A sampling train was prepared as if it were to be used on the stack, but without being used, the train was washed with the appropriate solvents which were collected in the respective containers.

FORMALDEHYDE SAMPLING

Formaldehyde samples were collected in accordance with CARB Method 430. Three runs each 2 hours in duration were conducted at the baghouse stack.

The sampling train consisted of a Teflon lined probe connected to three midget impingers in series. The first two impingers contained 10mls of 2,4-dinitrophenylhydrazine (DNPH) and the third impinger was empty. A preweighed silica gel cartridge was attached between the third impinger and the pump to prevent moisture entering the pump and for use in determining the moisture content of the stack exhaust gas. Analysis of the samples were conducted with a high performance liquid chromatograph which is a modified CARB 430 method.

BENZENE SAMPLING

Benzene samples were collected in accordance with CARB Method 410A. Three integrated samples were collected over one hour periods into evacuated (30 "Hg) summa cannisters. The analysis were performed using a capillary gas chromatograph (GC) along with a Tekmar model 5010 desorber to concentrate the sample. The presence of benzene was detected by a flame ionization detector (FID).

FUEL ANALYSIS

Diesel fuel samples were collected in 500ml glass bottles and were analyzed for trace elements, total sulfur, and total chloride.

CONTINUOUS EMISSIONS MONITORING SYSTEM

Samples were collected through a stainless steel probe inserted into the stack through sample ports provided. Sample gas was passed through a sample conditioning and delivery system comprised of an insulated, heated, 0.25" OD Teflon sample line, condenser (for moisture removal), Balston filter (for particulate removal), and a pump, all located on the testing platform on the stack. A Teflon tube, 0.375" OD was used to deliver sample from the platform down to the testing van where a manifold system was used for sample distribution to the continuous analyzers. A schematic of the continuous emissions sampling and monitoring system is presented in Figure 6.

The gaseous parameters monitored through the use of the continuous monitors were NO_x, SO_x, CO₂, and O₂. The instruments were calibrated and operated in accordance with CARB Method 100. There is no established method for doing source testing for ozone (O₃).

Between each run, the monitoring system was checked for zero and span drift by introducing zero and calibration gas. If the analyzer drift was greater than 10% of the span value, or if the zero drift was greater than 3% of the chart, the run was repeated. At the conclusion of each test, a sampling bias check was conducted by routing the NO_x calibration gas through the entire sample delivery system using a three way valve installed on the probe. The sample delivery system was leak checked at the beginning and conclusion of each test.

The analyzers were each calibrated with three concentrations of span gas plus zero gas. At least one of the calibration gases for each parameter (i.e. NO_x, SO_x, CO₂, and O₂) was a currently certified EPA Protocol 1 gas.

Continuous monitoring for NO_x, SO_x, O₃, CO₂, and O₂

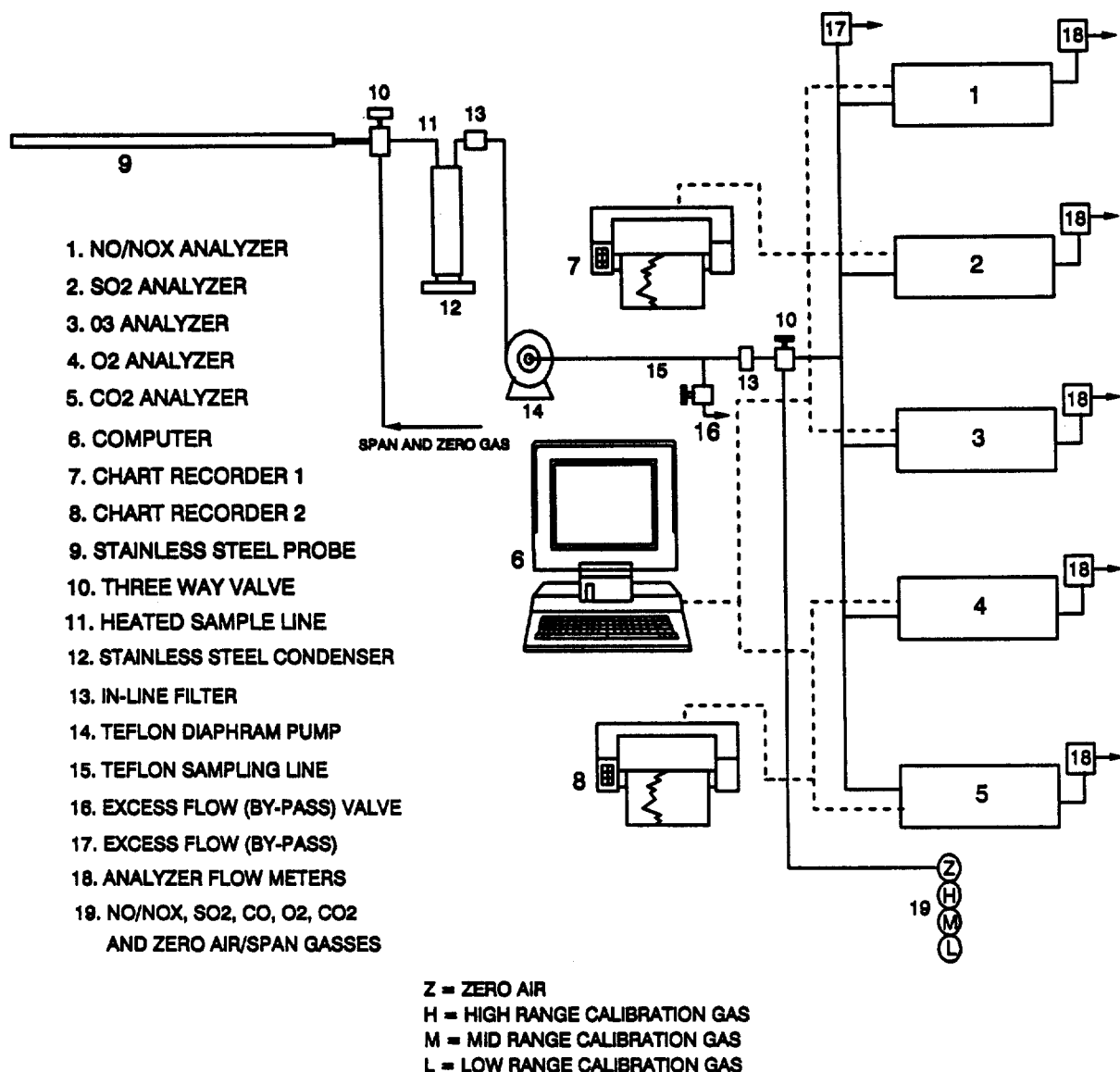
The instruments used for the continuous emissions monitoring for NO_x, SO_x, CO₂, and O₂ were operated in accordance with CARB Method 1-100.

Nitrogen oxides was monitored using a Monitor Labs, Model 8040 Chemiluminescent Analyzer. The analyzer was multipoint calibrated before and after the test runs. The following criteria was applied to instrument operation:

Zero drift	< 2% of full scale
Span drift	< 2% of span value
Response time	< 2 minutes
Sample residence time	< 2 minutes
NO _x to NO conversion	

FIGURE 6

CONTINUOUS EMISSIONS ANALYZER SAMPLING EQUIPMENT



A quartz nozzle and sampling probe liner were used. Vapor phase organics were collected by the adsorbent trap containing a precleaned cartridge of XAD-2 Resin. This glass trap was located in the sample line downstream of a heated filter holder and upstream of the first impinger. The module housing the trap was jacketed, with cold water circulating to maintain an outlet temperature below 60 °F. Aluminum foil wrapping of the XAD-2 cartridge eliminated any possible sample reactions caused by ultraviolet light. A glass Hempal-type condenser was located between the heated fiberglass filter (maintained at 248 +/- 25 °F) and the XAD-2 cartridge to ensure that cool stack gas was entering the adsorbent trap. The wet impingement train consisted of four Greenburg Smith type impingers connected in series. The first and second impingers were each charged with 100 ml of deionized water, the third impinger was empty, and the fourth impinger contained approximately 400 grams of indicating silica gel. A schematic sampling system is presented in Figure 5.

All solvents used for preparing the sampling train for testing and field sample recovery were stored in glass bottles and of spectrographic grade. All train components were free of all potential interfering materials, especially silicone grease.

The probe, sample line wash, and glass condenser were rinsed with methanol, hexane, and methylene chloride during each rinse. All probe, filter, connecting tubing, and impinger washings were collected in precleaned glass containers. The sample train was separated into front and back halves. The resin cartridges were precleaned by the Alta Analytical Laboratory Inc. in El Dorado Hills, California two weeks prior to the field testing. Field and sample blanks were collected during the testing program.

Three composite samples from each sampling run were submitted to the laboratory for analysis. A composite sample of the "front half" was comprised of the nozzle/probe wash, filter wash, and filter. The "back half" composite sample was comprised of the filter back half wash, condenser wash, flexible line wash and XAD-2 cartridge. Another composite consisted of the impinger contents and associated washes. The samples were sealed, labelled and shipped with Chain of Custody forms to Alta Analytical Laboratory Inc. The PAH's were analyzed by gas chromatography mass spectrometry (GC/MS) in accordance with EPA Method 8270.

The polynuclear-aromatic hydrocarbons (PAH's) included the following compounds:

PAH's

Naphthalene
Acenaphthylene
Acenaphthene

efficiency	> 95 %
Instrument full scale	0 - 250 ppm

Sulfur dioxide was determined using a Western Research Model 721 AD. The analyzer was multipoint calibrated before after each test run. The following criteria applied to instrument operation:

Zero drift	< 3 % of full scale
Span drift	< 2 % of span value
Response time	< 2 minutes
Sample residence time	< 2 minutes
Instrument full scale	0 - 100 ppm

Ozone was monitored with a Dasibi, Model 1003 instrument. The instrument was operated on a 0 to 1 ppm scale.

Carbon dioxide was measured with an Infrared Industries Model 732 Non-Dispersive analyzer. Operating conditions were as follows:

Zero drift	< 3 % of full scale
Span drift	< 2 % of span value
Response time	< 2 minutes
Sample residence time	< 2 minutes
Instrument full scale	20 %

Oxygen was continuously recorded using an MSA Model 4000 analyzer employing a micro-fuel cell detector. The analyzer was calibrated before and after the test runs. The following criteria covered instrument operation:

Zero drift	< 2 % of chart
Span drift	< 2 % of full scale
Response time	< 60 seconds
Instrument Full Scale	25 %

QUALITY ASSURANCE

The Quality Assurance procedures that were employed for this project were based on the guidelines published by the EPA in "Quality Assurance Handbooks for Air Pollution Measurement Systems", Volume III, EPA-600/4-77-0276.

FIELD TESTING QUALITY ASSURANCE

Prior to and at the conclusion of field sampling, each meter box dry gas meter and orifice was calibrated against a wet test meter. The results of orifice calibration were expressed as the delta H@ at various pressure drops (in inches of water) to

achieve 0.75 CFM, as specified in EPA publication APTD-0576. The dry gas meter accuracy was expressed as gamma (Y) and was determined as the ratio between the meter box dry gas meter and the wet test meter.

Exhaust gas, filter, meter and impinger temperatures were monitored using a type-K thermocouple connected to an Omega Model 601 digital readout.

Exhaust gas velocity was determined for establishing isokinetic sampling rates and volumetric flow using an S-type pitot tube attached to the probe as specified in EPA Method 2.

At the conclusion of each test run the sampling train was leak checked at a vacuum equal to or greater than the highest vacuum observed during the test runs. Each sampling train was considered leak free since the leak rate was less than 0.02 CFM.

At the beginning of the field testing program, a probe wash and flexible line wash were obtained and identified as field blanks. The probe wash technique, all sampling and recovery reagents, sample containers and sample handling used for the test runs were identical to those used to obtain the field blanks.

LABORATORY QUALITY ASSURANCE

All reagents for charging the sample train and sample recovery were ACS reagent grade materials. ES participates in the EPA inter-laboratory quality assurance program.

QUALITY ASSURANCE FOR CONTINUOUS EMISSIONS MONITORS

The analyzers employed for the continuous monitoring of NO_x, SO₂, O₃, CO₂ and O₂ were California Air Resources Board and EPA approved instruments. The instruments were calibrated at the beginning and conclusion of each day of testing. The zero and calibration gases were prepared by Scott Specialty Gases, San Bernardino, California, and MG Industries, Garden Grove, California.

SAMPLE CUSTODY

A specific Chain-of-Custody procedure was used for this project. The elements of this plan include:

- o Train component identification
- o Sample identification
- o Sample labels

- o Documentation
- o Chain of custody forms

The sequence of activities concerned with sample custody together with identification and tracking procedures are described below:

1. Sample train prepared by the laboratory including filter holders, impingers, and other sampling equipment identified by tags and codes.
2. Sample train issued to test team and master log filled out. Sample I.D. number stickers issued according to test identification code.
3. Train returned to recovery area when a valid sample is obtained. Sample train accompanied by all field data sheets.
4. Recovery team recovered samples using appropriate containers, affixed sample I.D. labels to sample containers, to master log, to field data sheet, and to train recovery sheet.
5. All samples returned to ES Pasadena laboratory with Chain-of-Custody form.
6. Samples transferred or shipped to appropriate laboratory with Chain-of-Custody form.
7. Samples examined at each transfer point for integrity (broken containers, loss in liquid, or seal integrity).

Upon completing the required analysis, the analyst returned the Chain-of-Custody form along with results to ES. All samples were accounted for by the ES laboratory supervisor and the project manager. Each laboratory identified samples in its own laboratory notebooks by the ES I.D. number as well as any internal

identification. Notebooks are retained by each laboratory according to usual laboratory practices.

RESULTS

The results of the AB2588 testing are presented in Tables 1 through 23. The average of all the rotation angles for cyclonic flow check were 4.0° . Additional supporting data are found in the appendix.

Table 1
Summary of Exhaust Gas Flow Data
During The Trace Element Testing

Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California

January 23-25, 1991

Parameter	Results			Average
	Run 1	Run 2	Run 3	
Date	1/23/91	1/24/91	1/24/91 1/25/91	
Time (hours)	0837-1200	0840-1152	1215-1445 0736-0813	
Stack Temp. (°F)	220	218	213	217
Moisture (%)	26.1	28.5	26.9	27.2
Oxygen (%)	13.5	13.5	13.5	13.5
Carbon Dioxide (%)	5.5	5.6	5.6	5.6
Molecular Wt. (dry)	29.42	29.44	29.44	29.43
Molecular Wt. (wet)	26.44	26.18	26.36	26.33
Velocity (fps)	49.03	50.84	50.68	50.18
Flow				
ACFM	27,964	28,999	28,905	28,623
DSCFM	15,560	15,695	16,113	15,789

Table 2**Summary of Exhaust Gas Flow Data
During The Audit Cadmium Testin****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 23-25, 1991**

Parameter	Results			Average
	Run 1	Run 2	Run 3	
Date	1/23/91	1/24/91	1/24/91 1/25/91	
Time (hours)	0838-1200	0838-1150	1215-1445 0736-0813	
Stack Temp. (°F)	224	225	223	224
Moisture (%)	26.1	28.4	26.8	27.1
Oxygen (%)	13.5	13.5	13.5	13.5
Carbon Dioxide (%)	5.5	5.6	5.6	5.6
Molecular Wt. (dry)	29.42	29.44	29.44	29.43
Molecular Wt. (wet)	26.44	26.19	26.37	26.33
Velocity (fps)	51.30	50.01	49.57	50.29
Flow				
ACFM	29,260	28,524	28,273	28,352
DSCFM	16,194	15,307	15,541	15,681

Table 3
Summary of Exhaust Gas Flow Data
During The Hexavalent and Total Chromium Testing

Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California

January 25, 28 and 29, 1991

Parameter	Results			Average
	Run 1	Run 2	Run 3	
Date	1/25/91	1/28/91	1/29/91	
Time (hours)	0945-1335	0900-1215	0740-1055	
Stack Temp. (°F)	214	220	216	217
Moisture (%)	22.6	24.8	25.7	24.4
Oxygen (%)	13.4	11.8	11.8	12.33
Carbon Dioxide (%)	5.7	6.7	6.6	6.3
Molecular Wt. (dry)	29.45	29.54	29.53	29.51
Molecular Wt. (wet)	26.86	26.68	26.57	26.70
Velocity (fps)	50.34	53.21	52.40	51.98
Flow				
ACFM	28,717	30,351	29,887	29,652
DSCFM	16,988	17,282	16,899	17,056

Table 4**Summary of Exhaust Gas Flow Data
During The Poly-Aromatic Hydrocarbon Testing****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 25, 28 and 29, 1991**

Parameter	Results			Average
	Run 1	Run 2	Run 3	
Date	1/25/91	1/28/91	1/29/91	
Time (hours)	0947-1335	0900-1215	0740-1055	
Stack Temp. (°F)	212	227	219	219
Moisture (%)	22.3	25.6	25.1	24.3
Oxygen (%)	13.4	11.8	11.8	12.33
Carbon Dioxide (%)	5.7	6.7	6.6	6.3
Molecular Wt. (dry)	29.45	29.54	29.53	29.51
Molecular Wt. (wet)	26.90	26.59	26.64	26.71
Velocity (fps)	50.31	47.81	53.44	50.52
Flow				
ACFM	28,697	27,272	30,480	28,816
DSCFM	17,078	15,202	17,307	16,529

Table 5**Summary of Exhaust Gas Flow Data
During The Formaldehyde Testing****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 23 and 24, 1991**

Parameter	Results			Average
	Run 1	Run 2	Run 3	
Date	1/23/91	1/24/91	1/24/91	
Time (hours)	1000-1200	0910-1110	1300-1500	
Stack Temp. (°F)	220	218	213	217
Moisture (%)	27.4	22.1	19.4	23.0
Oxygen (%)	13.5	13.5	13.5	13.5
Carbon Dioxide (%)	5.5	5.6	5.6	5.6
Molecular Wt. (dry)	29.42	29.44	29.44	29.43
Molecular Wt. (wet)	26.29	26.91	27.22	26.81
Velocity (fps)	50.44	50.41	49.28	50.04
Flow				
ACFM	28,771	28,752	28,110	28,544
DSCFM	15,743	16,959	17,273	16,658

Table 6
Summary of Trace Elements Emissions Data

**Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California**

January 23-25, 1991

Parameter	Results			
Run	1	2	3	Average
Date	1/23/91	1/24/91	1/24/91 1/25/91	
Time (hours)	0837-1200	0840-1152	1215-1445 0736-0813	
Arsenic lb/hr	2.5×10^{-5}	8.4×10^{-6}	5.3×10^{-6}	1.3×10^{-5}
lb/ton	1.2×10^{-7}	4.6×10^{-8}	3.2×10^{-8}	6.6×10^{-8}
Beryllium lb/hr	$< 2.8 \times 10^{-5}$	$< 2.8 \times 10^{-5}$	$< 2.7 \times 10^{-5}$	$< 2.8 \times 10^{-5}$
lb/ton	$< 1.4 \times 10^{-7}$	$< 1.5 \times 10^{-7}$	$< 1.6 \times 10^{-7}$	$< 1.6 \times 10^{-7}$
Cadmium lb/hr	3.3×10^{-5}	$< 1.7 \times 10^{-5}$	2.7×10^{-5}	$< 3.3 \times 10^{-5}$
lb/ton	1.6×10^{-7}	$< 9.2 \times 10^{-8}$	1.6×10^{-7}	$< 1.6 \times 10^{-7}$
Copper lb/hr	1.7×10^{-4}	2.0×10^{-4}	2.4×10^{-4}	2.0×10^{-4}
lb/ton	8.3×10^{-7}	1.1×10^{-6}	1.5×10^{-6}	1.1×10^{-6}
Manganese lb/hr	1.5×10^{-4}	1.7×10^{-4}	1.8×10^{-4}	1.7×10^{-4}
lb/ton	7.4×10^{-7}	9.2×10^{-7}	1.1×10^{-6}	9.2×10^{-7}
Mercury lb/hr	$< 1.3 \times 10^{-4}$	$< 1.3 \times 10^{-4}$	$< 1.3 \times 10^{-4}$	$< 1.3 \times 10^{-4}$
lb/ton	$< 6.4 \times 10^{-7}$	$< 7.1 \times 10^{-7}$	$< 7.9 \times 10^{-7}$	$< 7.9 \times 10^{-7}$
Lead lb/hr	8.4×10^{-4}	2.4×10^{-4}	2.4×10^{-4}	4.4×10^{-4}
lb/ton	4.1×10^{-6}	1.3×10^{-6}	1.5×10^{-6}	2.3×10^{-6}

Note: If non-detected values are reported for any parameter for all three test runs the value reported as an average is identified as "less than" (<) the highest non-detected value reported. If any parameter was detected among the three test runs along with non-detected values the average value reported is reported as "less than" for the highest value detected.

Table 6 (Continued)

Summary of Trace Elements Emissions Data

**Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California**

January 23-25, 1991

Parameter	Results			
Run	1	2	3	Average
Date	1/23/91	1/24/91	1/24/91 1/25/91	
Time (hours)	0837-1200	0840-1152	1215-1445 0736-0813	
Nickel				
lb/hr	8.8×10^{-5}	1.4×10^{-4}	6.9×10^{-5}	9.9×10^{-5}
lb/ton	4.3×10^{-7}	7.6×10^{-7}	4.2×10^{-7}	5.4×10^{-7}
Selenium				
lb/hr	$< 1.7 \times 10^{-4}$	$< 1.7 \times 10^{-4}$	2.9×10^{-4}	$< 2.9 \times 10^{-4}$
lb/ton	$< 8.3 \times 10^{-7}$	$< 9.2 \times 10^{-7}$	1.8×10^{-6}	$< 1.8 \times 10^{-6}$
Zinc				
lb/hr	2.9×10^{-3}	4.8×10^{-4}	5.9×10^{-4}	1.3×10^{-3}
lb/ton	1.4×10^{-5}	2.6×10^{-6}	3.6×10^{-6}	6.7×10^{-6}

Note: If non-detected values are reported for any parameter for all three test runs the value reported as an average is identified as "less than" (<) the highest non-detected value reported. If any parameter was detected among the three test runs along with non-detected values the average value reported is reported as "less than" for the highest value detected.

Table 7**Summary of Audit Cadmium missions Data****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 23-25, 1991**

Parameter	Results			
Run	1	2	3	Average
Date	1/23/91	1/24/91	1/24/91 1/25/91	
Time (hours)	0838-1200	0838-1150	1215-1445 0736-0813	
Cadmium				
lbs/hr	2.4×10^{-5}	4.0×10^{-5}	3.8×10^{-5}	3.4×10^{-5}
lb/ton	1.2×10^{-7}	2.2×10^{-7}	2.3×10^{-7}	1.9×10^{-7}

Table 8

Summary of Hexavalent and Total Chromium Emissions Data

**Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California**

January 25, 28 and 29, 1991

Parameter	Results			
Run	1	2	3	Average
Date	1/25/91	1/28/91	1/29/91	
Time (hours)	0945-1335	0900-1215	0740-1055	
Hexavalent Chromium				
lbs/hr	1.7×10^{-5} ✓	1.6×10^{-5} ✓	1.1×10^{-5} ✓	1.5×10^{-5} ✓
lb/ton	1.2×10^{-7} ✓	7.9×10^{-8} ✓	5.8×10^{-8} ✓	8.6×10^{-8} ✓
Total Chromium				
lbs/hr	1.3×10^{-4} ✓	6.6×10^{-5} ✓	6.2×10^{-5} ✓	8.6×10^{-5} ✓
lb/ton	8.9×10^{-7} ✓	3.3×10^{-7} ✓	3.3×10^{-7} ✓	5.2×10^{-7} ✓

Table 9

Summary of Polynuclear Aromatic Hydrocarbons (PAH) Emissions Data

Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California

January 25, 28 and 29, 1991

Parameter Run	1	Results 2	3	Average
Date	1/25/91	1/28/91	1/29/91	
Time (hours)	0947-1335	0900-1215	0740-1055	
Naphthalene				
lb/hr	1.9×10^{-3}	1.1×10^{-3}	2.6×10^{-3}	1.9×10^{-3}
lb/ton	1.3×10^{-5}	5.4×10^{-6}	1.4×10^{-5}	1.1×10^{-5}
Acenaphthylene				
lb/hr	1.9×10^{-6}	1.3×10^{-6}	7.8×10^{-6}	3.7×10^{-6}
lb/ton	1.3×10^{-8}	6.4×10^{-9}	4.1×10^{-8}	2.0×10^{-8}
Acenaphthene				
lb/hr	3.4×10^{-6}	1.9×10^{-6}	5.7×10^{-6}	3.7×10^{-6}
lb/ton	2.3×10^{-8}	9.4×10^{-9}	3.0×10^{-8}	2.1×10^{-8}
Fluorene				
lb/hr	4.0×10^{-5}	1.8×10^{-5}	8.8×10^{-5}	4.9×10^{-5}
lb/ton	2.7×10^{-7}	8.9×10^{-8}	4.6×10^{-7}	2.7×10^{-7}
Phenanthrene				
lb/hr	8.8×10^{-5}	1.0×10^{-4}	2.0×10^{-4}	1.3×10^{-4}
lb/ton	6.0×10^{-7}	4.9×10^{-7}	1.1×10^{-6}	7.3×10^{-7}
Anthracene				
lb/hr	2.1×10^{-6}	2.2×10^{-6}	4.7×10^{-6}	3.0×10^{-6}
lb/ton	1.4×10^{-8}	1.1×10^{-8}	2.5×10^{-8}	2.0×10^{-8}
Fluoranthene				
lb/hr	7.7×10^{-6}	1.6×10^{-5}	2.4×10^{-5}	1.6×10^{-5}
lb/ton	5.3×10^{-8}	7.9×10^{-8}	1.3×10^{-7}	8.7×10^{-8}
Pyrene				
lb/hr	5.1×10^{-6}	1.2×10^{-5}	1.6×10^{-5}	1.1×10^{-5}
lb/ton	3.5×10^{-8}	5.9×10^{-8}	8.4×10^{-8}	5.9×10^{-8}
Chrysene				
lb/hr	1.6×10^{-7}	2.0×10^{-7}	3.1×10^{-7}	2.2×10^{-7}
lb/ton	1.1×10^{-9}	9.9×10^{-10}	1.6×10^{-9}	1.2×10^{-9}
Benz(a)Anthracene				
lb/hr	8.8×10^{-7}	8.3×10^{-7}	1.7×10^{-6}	1.1×10^{-6}
lb/ton	6.0×10^{-9}	4.1×10^{-9}	8.9×10^{-9}	6.3×10^{-9}

Naphthalene	1.9×10^{-3}	1.1×10^{-3}	2.6×10^{-3}	1.9×10^{-3}
lb/hr				
% R	36	47	48	
Corrected lb/hr	2.97×10^{-3}	2.08×10^{-3}	5.0×10^{-3}	3.35×10^{-3}
lb/ton	1.3×10^{-5}	5.4×10^{-6}	1.4×10^{-5}	1.1×10^{-5}
Corrected lb/ton	2.03×10^{-5}	1.0×10^{-5}	2.69×10^{-5}	1.9×10^{-5}

Table 9 (Continued)

Summary of Polynuclear Aromatic Hydrocarbons (PAH) Emissions Data

Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California

January 25, 28 and 29, 1991

Parameter Run	1	Results 2	3	Average
Date	1/25/91	1/28/91	1/29/91	
Time (hours)	0947-1335	0900-1215	0740-1055	
Benzo(b)fluoranthene				
lb/hr	8.3×10^{-8}	1.6×10^{-7}	2.2×10^{-6}	8.1×10^{-7}
lb/ton	5.7×10^{-10}	7.9×10^{-10}	1.2×10^{-8}	4.5×10^{-9}
Benzo(k)fluoranthene				
lb/hr	5.1×10^{-8}	8.1×10^{-8}	4.9×10^{-7}	2.1×10^{-7}
lb/ton	3.5×10^{-10}	4.0×10^{-10}	2.6×10^{-9}	1.1×10^{-9}
Benzo(a)pyrene				
lb/hr	5.1×10^{-8}	6.9×10^{-8}	4.7×10^{-8}	5.6×10^{-8}
lb/ton	3.5×10^{-10}	3.4×10^{-10}	2.5×10^{-10}	3.1×10^{-10}
Benzo(g,h,i)perylene				
lb/hr	7.4×10^{-8}	9.6×10^{-8}	9.9×10^{-8}	9.0×10^{-8}
lb/ton	5.1×10^{-10}	4.7×10^{-10}	5.2×10^{-10}	5.0×10^{-10}
Dibenz(a,h)anthracene				
lb/hr	$< 4.6 \times 10^{-8}$	$< 2.7 \times 10^{-8}$	$< 2.3 \times 10^{-8}$	$< 4.6 \times 10^{-8}$
lb/ton	$< 3.2 \times 10^{-10}$	$< 1.3 \times 10^{-10}$	$< 1.2 \times 10^{-10}$	$< 3.2 \times 10^{-10}$
Indeno[1,2,3-cd]pyrene				
lb/hr	4.3×10^{-8}	6.1×10^{-8}	5.7×10^{-8}	5.4×10^{-8}
lb/ton	2.9×10^{-10}	3.0×10^{-10}	3.0×10^{-10}	3.0×10^{-10}

Note: If non-detected values are reported for any parameter for all three test runs the value reported as an average is identified as "less than" (<) the highest non-detected value reported. If any parameter was detected among the three test runs along with non-detected values the average value reported is reported as "less than" for the highest value detected.

Total PAH lb/hr
lb/ton

21.18×10^{-4}
 1.22×10^{-5}

Total PAH Naphthalene corrected
lb/hr
lb/ton

35.68×10^{-4}
 2.02×10^{-5}

Table 10

Summary of Continuous Emissions Monitoring Data

**Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California**

January 25, 28 and 29, 1991

Parameter		Results			
Run		1	2	3	Average
Date		1/25/91	1/25/91	No Test	
Time (hours)		1015-1115	1145-1245	No Test	
NOx	ppm	91.9	79.5	No Test	85.7
	lb/hr	11.4	9.8	No Test	10.6
SO ₂	ppm	20.4	22.1	No Test	21.2
	lb/hr	3.5	3.8	No Test	3.7
Time (hours)		1105-1205	1215-1300	No Test	
O ₃	ppm	0.261	0.225	No Test	0.243
	lb/hr	0.034	0.029	No Test	0.032
Date		1/28/91	1/28/91	1/28/91	
Time (hours)		0926-1030	1045-1145	1155-1225	
NOx	ppm	94.6	95.5	95.7	95.3
	lb/hr	11.2	11.3	11.3	11.2
SO ₂	ppm	12.8	15.8	16.4	15.0
	lb/hr	2.1	2.6	2.7	2.5
Time (hours)		0937-1030	1047-1145	1207-1225	
O ₃	ppm	0.146	0.178	0.205	0.176
	lb/hr	0.018	0.022	0.025	0.022
Date		1/29/91	1/29/91	1/29/91	
Time (hours)		0730-0830	0845-0945	1004-1100	
NOx	ppm	97.6	88.4	86.6	90.9
	lb/hr	12.1	11.0	10.8	11.3
SO ₂	ppm	34.0	28.3	30.1	30.8
	lb/hr	5.9	4.9	5.2	5.3
Time (hours)		0740-0830	0900-0945	1004-1100	
O ₃	ppm	0.327	0.292	0.257	0.292
	lb/hr	0.042	0.038	0.033	0.038

Table 11

Summary of Formaldehyde Emissions Data

**Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California**

January 23 and 24, 1991

Parameter	Results			
Run	1	2	3	Average
Date	1/23/91	1/24/91	1/24/91	
Time (hours)	1000-1200	0910-1110	1245-1445	
Formaldehyde				
ppm	5.9×10^{-1}	4.1×10^{-1}	7.4×10^{-1}	5.8×10^{-1}
lb/hr	4.4×10^{-2}	3.3×10^{-2}	6.1×10^{-2}	4.6×10^{-2}
lb/ton	2.2×10^{-4}	1.8×10^{-4}	3.3×10^{-4}	2.4×10^{-4}

Table 12
Summary of Gaseous Pollutant Emissions Data

**Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California**

January 23-25, 1991

Parameter	Results			
Run	1	2	3	Average
Date	1/23/91	1/24/91	1/25/91	
Benzene				
ppm (v/v)	<1.0	<1.0	<1.0	<1.0
lb/hr	$<2.0 \times 10^{-1}$	$<2.0 \times 10^{-1}$	$<2.0 \times 10^{-1}$	$<2.0 \times 10^{-1}$
lb/ton	$<9.8 \times 10^{-4}$	$<9.8 \times 10^{-4}$	$<9.8 \times 10^{-4}$	$<9.8 \times 10^{-4}$

The detection limit is 1.0 ppm.

Table 13**Summary of Production and Operational Data****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 23, 1991**

Production Results							
Time Units	Baghouse Delta P (^o H ₂ O)	Material Temp. (^o F)	Baghouse Inlet Temp (^o F)	Damper Position (Deg.)	Exhaust Fan Ammeter (Amps)	Fuel Flow (GPM)	Fuel Pressure (PSIG)
0750			Start test/Production count.				
0910	4.8	295	230	63	85	4.0	27
1010	4.8	275	235	63	85	4.0	27
1110	4.7	239	245	63	85	4.8	26
1200			End test/Production count.				
1210	4.5	283	260	63	85	4.9	25
Avg.	4.8	288	237	63	85	4.3	27

Table 14**Summary of Production and Operational Data****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 24 and 25, 1991**

Production Results							
Time Units	Baghouse Delta P ("H2O)	Material Temp. (°F)	Baghouse Inlet Temp (°F)	Damper Position (Deg.)	Exhaust Fan Ammeter (Amps)	Fuel Flow (GPM)	Fuel Pressure (PSIG)
January 24, 1991							
0838	Start test/Production count.						
0935	5.2	300	240	64	85	4.7	26
1035	4.6	290	255	64	85	5.0	26
1135	4.6	300	255	64	85	5.0	26
1235	4.6	295	255	63	85	4.9	25
1335	4.6	300	240	64	85	4.8	25
1435	4.4	300	240	64	85	4.1	25
1445	End test/Production count.						
January 25, 1991							
0736	Start test/Production count.						
0740	4.9	300	240	60	85	4.2	28
0817	End test/Production count.						
Avg.	4.7	298	246	63	85	4.7	27

Table 15**Summary of Production and Operational Data****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 25, 1991**

Production Results							
Time Units	Baghouse Delta P (^o H ₂ O)	Material Temp. (^o F)	Baghouse Inlet Temp (^o F)	Damper Position (Deg.)	Exhaust Fan Ammeter (Amps)	Fuel Flow (GPM)	Fuel Pressure (PSIG)
0736	Start test/Production count.						
0740	4.9	300	240	60	85	4.2	28
0840	4.7	301	245	62	85	4.4	27
0940	4.7	280	245	63	85	4.9	25
1040	4.8	304	240	63	85	4.5	26
1140	4.8	300	245	63	85	4.5	26
1240	4.7	298	246	62	85	4.4	25
1315	End test/Production count.						
Avg.	4.8	297	244	62	85	4.5	26

Table 16**Summary of Production and Operational Data****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 28, 1991**

Production Results							
Time Units	Baghouse Delta P (^o H ₂ O)	Material Temp. (^o F)	Baghouse Inlet Temp (^o F)	Damper Position (Deg.)	Exhaust Fan Ammeter (Amps)	Fuel Flow (GPM)	Fuel Pressure (PSIG)
0900	Start test/Production count.						
1000	4.8	295	245	64	85	4.8	26
1100	4.8	297	245	64	85	4.5	25
1200	4.7	285	230	63	85	4.5	25
1215	End test/Production count.						
Avg.	4.8	292	240	64	85	4.6	25

Table 17

Summary of Production and Operational Data

**Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California**

January 29, 1991

Production Results							
Time Units	Baghouse Delta P (^o H ₂ O)	Material Temp. (^o F)	Baghouse Inlet Temp (^o F)	Damper Position (Deg.)	Exhaust Fan Ammeter (Amps)	Fuel Flow (GPM)	Fuel Pressure (PSIG)
0740	Start test/Production count.						
0840	4.9	295	240	62	85	4.5	25
0940	4.6	293	240	64	85	4.2	26
1040	4.6	290	245	63	85	4.8	25
1055	End test/Production count.						
Avg.	4.7	293	242	63	85	4.5	25

Table 18
Summary of Batch Mix
Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California
January 23, 1991

Type Units	Batch Results				
	3/8" (tons/day)	1/2" (tons/day)	3/4" (tons/day)	Berm (tons/day)	Total (tons/day)
3/8" rock	80.69	NA	9.68	1.88	92.25
1/2" rock	NA	1,587.11	NA	NA	1,587.11
3/4" rock	NA	NA	NA	NA	NA
Filler	NA	NA	NA	NA	NA
Oil AR 4000	5.14	94.15	0.52	NA	99.81
Oil AR 8000	NA	NA	NA	0.13	0.13
Total	85.83	1,681.26	10.20	2.01	1,779.30

Table 19**Summary of Batch Mix****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 24, 1991**

Type Units	Batch Results				
	3/8" (tons/day)	1/2" (tons/day)	3/4" (tons/day)	Berm (tons/day)	Total (tons/day)
3/8" rock	117.19	NA	NA	NA	117.19
1/2" rock	NA	1,130.59	NA	NA	1,130.59
3/4" rock	NA	NA	NA	NA	NA
Filler	0.02	NA	NA	NA	0.02
Oil AR 4000	7.55	67.07	NA	NA	74.62
Oil AR 8000	NA	NA	NA	NA	NA
Total	124.76	1,197.66	NA	NA1	1,322.42

Table 20

Summary of Batch Mix

**Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California**

January 25, 1991

Type Units	Batch Results				
	3/8" (tons/day)	1/2" (tons/day)	3/4" (tons/day)	Berm (tons/day)	Total (tons/day)
3/8" rock	33.18	NA	NA	NA	33.18
1/2" rock	NA	NA	NA	NA	NA
3/4" rock	NA	914.11	NA	NA	914.11
Filler	NA	NA	NA	NA	NA
Oil AR 4000	2.16	NA	49.13	NA	51.29
Oil AR 8000	NA	NA	NA	NA	NA
Total	35.34	914.11	49.13	NA	998.58

Table 21**Summary of Batch Mix****Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California****January 28, 1991**

Type Units	Batch Results				
	3/8" (tons/day)	1/2" (tons/day)	3/4" (tons/day)	Berm (tons/day)	Total (tons/day)
3/8" rock	135.47	NA	NA	NA	135.47
1/2" rock	NA	1,307.38	NA	NA	1,307.38
3/4" rock	NA	NA	35.95	NA	35.95
Filler	NA	NA	NA	NA	NA
Oil AR 4000	8.78	1.73	1.93	NA	12.44
Oil AR 8000	NA	77.24	NA	NA	77.24
Total	144.25	1,386.35	37.88	NA	1,568.48

Table 22

Summary of Batch Mix

**Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California**

January 29, 1991

Type Units	Batch Results				
	3/8" (tons/day)	1/2" (tons/day)	3/4" (tons/day)	Berm (tons/day)	Total (tons/day)
3/8" rock	136.78	NA	NA	NA	136.78
1/2" rock	NA	686.78	NA	NA	686.78
3/4" rock	NA	NA	NA	NA	NA
Filler	NA	NA	NA	NA	NA
Oil AR 4000	5.94	0.68	NA	NA	6.62
Oil AR 8000	NA	43.60	NA	NA	43.60
Total	142.72	731.06	NA	NA	873.78

Table 23
Summary of Fuel Analysis Data
Baghouse Exhaust Stack
Pala Asphalt Plant
Pala, California
January 23-25, 1991

Parameter	Results			Average
Run	1	2	3	
Date	1/23/91	1/24/91	1/25/91	
Arsenic				
ppm (w/w)	<0.50	<0.50	<0.50	<0.50
Beryllium				
ppm (w/w)	<0.64	<0.64	<0.64	<0.64
Cadmium				
ppm (w/w)	<0.58	<0.58	<0.58	<0.58
Chromium				
ppm (w/w)	<41.0	<41.0	<41.0	<41.0
Copper				
ppm (w/w)	10.0	21.1	44.3	25.1
Manganese				
ppm (w/w)	1.58	0.94	1.13	1.22
Mercury				
ppm (w/w)	0.68	<0.50	<0.50	<0.68
Lead				
ppm (w/w)	<3.67	<3.67	<3.67	<3.67
Nickel				
ppm (w/w)	102	324	337	254
Selenium				
ppm (w/w)	<0.50	<0.50	<0.50	<0.50
Zinc				
ppm (w/w)	28.8	13.9	12.3	18.3
Total Chloride				
% (wt. basis)	0.63	0.57	0.61	0.60
Total Sulfur				
% (wt. basis)	0.10	0.09	0.13	0.11

Note: If non-detected values are reported for any parameter for all three test runs the value reported as an average is identified as "less than" (<) the highest non-detected value reported. If any parameter was detected among the three test runs along with non-detected values the average value reported is reported as "less than" for the highest value detected.

APPENDIX

APPENDIX A
SUPPORTING DATA FOR TRACE METAL ELEMENTS

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/23/91
Run: 1 Metals 0837-1200
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.45
OXYGEN CONTENT (%)	13.5
CARBON DIOXIDE CONTENT (%)	5.5
MOISTURE CONTENT (%)	26.1
STACK TEMPERATURE (deg F)	220
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.42
VELOCITY PRESSURE (sq rt inches water)	0.73
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	49.03
EXHAUST GAS FLOW RATE (ACFM)	27,964
EXHAUST GAS FLOW RATE (DSCFM)	15,560

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	87.015
DRY GAS VOLUME SAMPLED (DSCF)	83.420
DRY GAS METER TEMPERATURE (deg F)	76
DRY GAS METER GAMMA	1.00
AVERAGE ORIFICE PRESSURE (inches water)	0.78
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	107.3

LABORATORY DATA

MOISTURE RECOVERED (mls)	635.00
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/24/91
Run: 2 Metals 0840-1152
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.50
OXYGEN CONTENT (%)	13.5
CARBON DIOXIDE CONTENT (%)	5.6
MOISTURE CONTENT (%)	28.5
STACK TEMPERATURE (deg F)	218
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.44
VELOCITY PRESSURE (sq rt inches water)	0.76
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	50.84
EXHAUST GAS FLOW RATE (ACFM)	28,999
EXHAUST GAS FLOW RATE (DSCFM)	15,695

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	88.205
DRY GAS VOLUME SAMPLED (DSCF)	84.873
DRY GAS METER TEMPERATURE (deg F)	75
DRY GAS METER GAMMA	1.00
AVERAGE ORIFICE PRESSURE (inches water)	0.83
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	108.2

LABORATORY DATA

MOISTURE RECOVERED (mls)	727.30
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/24/91
Run: 3 Metals 1215-1445 0736-0814
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.50
OXYGEN CONTENT (%)	13.5
CARBON DIOXIDE CONTENT (%)	5.6
MOISTURE CONTENT (%)	26.9
STACK TEMPERATURE (deg F)	213
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.44
VELOCITY PRESSURE (sq rt inches water)	0.76
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	50.68
EXHAUST GAS FLOW RATE (ACFM)	28,905
EXHAUST GAS FLOW RATE (DSCFM)	16,113

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	89.957
DRY GAS VOLUME SAMPLED (DSCF)	86.399
DRY GAS METER TEMPERATURE (deg F)	76
DRY GAS METER GAMMA	1.00
AVERAGE ORIFICE PRESSURE (inches water)	0.84
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	107.3

LABORATORY DATA

MOISTURE RECOVERED (mls)	683.50
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

$$K = 1.45$$

FIELD DATA

MIN 11 / TRACE METALS

PAGE 1 OF 2

Plant PALA

16-42-1074

Test Site BH Struck Overlet

Run Number 1 TRACE METALS

perator IK

Ambient Temp 55

Barometer 29.45

Stack Pressure. 39

Stack 1120 & 20
Stack 1120 & 20

Stack Dia 41.75

Meter 110 1.99

Peter Gamma 1.00Z

Meter Box BROWN III

Nozzle Diameter . 22

Probe Length 5

Probe Mat'l Quartz

Filter Number NO TAIZE

Samp Doc 1 N/A

PRE LEAK 0.013 @ 15"
POST LEAK 0.015 @ 15"

POST. LEAK Q. 013015

[illegible]

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V _m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		TEMPERATURES							PUMP VAC. "Hg
					Desired	Actual	STACK 3 (°Fs)	METER INLET 6	METER OUT 7	IMPINGER 5	FILTER 4			
1	90		992.887	.48	.696	.70	223	87	47	225	7	7		
2	97.5		996.4	.58	.841	.84	238	90	45	276	10	10		
3	105		000.0	.56	.812	.81	237	92	46	254	10	10		
4	112.5		003.7	.53	.769	.77	238	93	49	251	10	10		
5	120		007.4	.56	.812	.81	229	93	51	250	10	10		
6	127.5		011.2	.56	.812	.81	231	95	50	249	10	10		
7	135		014.9	.42	.609	.61	229	94	47	252	8	8		
8	142.5		018.3	.55	.798	.80	232	93	46	233	10	10		
9	150		022.0	.57	.827	.83	230	92	45	256	10	10		
10	157.5		025.7	.51	.740	.74	233	93	47	252	10	10		
11	165		029.4	.41	.595	.60	230	94	50	231	9	9		
12	172.5		032.7	.66	.957	.96	197	94	51	243	11	11		
	180	1200	036.812		END RUN #1									
AVERAGE /SUM	180		87.015	.7309		.78	220	76						

FIELD DATA

TRACE METALS PAGE 1 OF 2

Probe Mat'l QVAKTZ
Filter Number N/A
Samp Box # N/A
PRE LEAK 0.015 @ 10
POST. LEAK 0.016 @

Meter #110	1.99
Meter Gamma	1.002
Meter Box	BROWN
Nozzle Diameter	.22
Probe Length	5

Ambient Temp 40
Barometer 29.50
Stack Pressure 39
Stack 120 * 20
Stack Dia 41.75

Plant PALA
 Date 1-24-91
 Test site 13H STACK OUTLET
 Run Number 27M
 Operator TK

[illegible]

K = 1.45

KU "4
TRACE METALS

Plant PALA Page 2 of 2
Date 1-24-91 Run Number 27A
POST LEAK RATE 0.0000 Operator T.L.

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V _m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta II, "H ₂ O)		TEMPERATURES					PUMP VAC. "Hg
					Desired	Actual	STACK 3 (T _g)	METER INLET 6	METER OUT 7	TAPING 5	FILTER 4	
1	90	1021	079.909	.56	.812	.81	225	80	80	44	265	5
2	97.5	1026.5	082.8	.60	.870	.87	220	82	82	44	263	5
3	105	1034	086.4	.54	.783	.78	218	84	84	43	245	6
4	112.5	1043.5	090.1	.58	.841	.84	221	86	86	45	251	6
5	120	1051	093.8	.62	.899	.90	236	88	88	47	247	7
6	127.5	1058.5	097.8	.66	.957	.96	236	88	88	49	244	8
7	135	1107	101.9	.65	.943	.94	227	89	89	50	247	8
8	142.5	1114.5	105.8	.63	.914	.91	231	90	90	50	227	8
9	150	1122	109.8	.61	.885	.89	239	90	90	52	240	8
10	157.5	1129.5	112.6	.60	.885	.89	237	90	90	53	251	8
11	165	1137	116.2	.60	.870	.87	237	90	90	53	240	8
12	172.5	1144.5	120.1	.60	.870	.87	240	91	91	55	241	8
	180	1152	125.431		END	RUN#	2					
AVERAGE /SUM	180		88.205	.7562		.83	218	75				

UN, TRACE METALS

plant para

Ambient Temp 60.5

rate 1-24-91 at 1/25/91

1200 lbs 15.57 = 18684

Run Number 3 Tm

operator TK

meter 1.99

Pictet Gamma 1.002

Meter Box | Brown 75

Nozzle Diameter, 22

Probe Length 5'

Probe Mat'l QUARTZ

Filter Number _____

Samp Box 1 N/A

PRE LEAK 0.012 @ 10"

POST. LEAK 0.014 @ .10"

[illegible]

K=1.45

Plant PALM

Date 1-24-91

POST LEAK RATE 0.014 @ 10"

Page 2 of 2

Run Number 57A

Operator TZ

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V _m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		T E M P E R A T U R E S						PUMP VAC. "Hg
					Desired	Actual	STACK 3 (T _B)	METER INLET 6	METER OUT 7	IMPINGER 5	FILTER 4		
1	90	1400	170.355	.56	.812	.81	211	83		54	231	8	
2	97.5	1407.5	174.1	.58	.841	.84	211	85		45	244	8	
3	105	1415	177.8	.64	.928	.93	214	84		45	231	8	
4	112.5	1422.5	181.8	.64	.928	.93	212	83		46	234	9	
5	120	1430	185.8	.58	.841	.84	215	83		47	240	8	
6	127.5	1437.5	189.6	.58	.841	.84	213	83		46	241	8	
7	135	1445	193.4	.52	.754	.75	214	83		45	236	8	
8	142.5	0730	196.9	.62	.899	.90	185	37		47	241	8	
9	150	0743.5	200.6	.62	.899	.90	200	39		48	246	9	
10	157.5	0751	204.3	.61	.885	.89	197	42		49	260	9	
11	165	0758.5	208.0	.64	.928	.93	200	45		50	230	10	
12	172.5	0806	211.9	.60	.870	.87	203	47		50	230	8	
	180	0813.5	215.400		END	RUN #3	3						
AVERAGE /SUM	180		89.957	.7595		.84	213	76					

APPENDIX B
SUPPORTING DATA FOR AUDIT CADMIUM

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/23/91
Run: 1 Cd 838-1200
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.45
OXYGEN CONTENT (%)	13.5
CARBON DIOXIDE CONTENT (%)	5.5
MOISTURE CONTENT (%)	26.1
STACK TEMPERATURE (deg F)	224
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.42
VELOCITY PRESSURE (sq rt inches water)	0.76
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	51.30
EXHAUST GAS FLOW RATE (ACFM)	29,260
EXHAUST GAS FLOW RATE (DSCFM)	16,194

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	89.786
DRY GAS VOLUME SAMPLED (DSCF)	85.716
DRY GAS METER TEMPERATURE (deg F)	82
DRY GAS METER GAMMA	1.01
AVERAGE ORIFICE PRESSURE (inches water)	0.77
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	105.9

LABORATORY DATA

MOISTURE RECOVERED (mls)	651.20
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/24/91
Run: 2 Cd 838-1150
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.50
OXYGEN CONTENT (%)	13.5
CARBON DIOXIDE CONTENT (%)	5.6
MOISTURE CONTENT (%)	28.4
STACK TEMPERATURE (deg F)	225
STACK STATIC PRESSURE (inches water)	0.35
DRY STACK GAS MOLECULAR WEIGHT	29.44
VELOCITY PRESSURE (sq rt inches water)	0.74
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	50.01
EXHAUST GAS FLOW RATE (ACFM)	28,524
EXHAUST GAS FLOW RATE (DSCFM)	15,307

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	87.418
DRY GAS VOLUME SAMPLED (DSCF)	83.899
DRY GAS METER TEMPERATURE (deg F)	80
DRY GAS METER GAMMA	1.01
AVERAGE ORIFICE PRESSURE (inches water)	0.73
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	109.7

LABORATORY DATA

MOISTURE RECOVERED (mls)	714.20
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/24/91 1445 1125/91 0736-0913#
Run: 3 Cd 1215-1530
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.50
OXYGEN CONTENT (%)	13.5
CARBON DIOXIDE CONTENT (%)	5.6
MOISTURE CONTENT (%)	26.8
STACK TEMPERATURE (deg F)	223
STACK STATIC PRESSURE (inches water)	0.35
DRY STACK GAS MOLECULAR WEIGHT	29.44
VELOCITY PRESSURE (sq rt inches water)	0.74
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	49.57
EXHAUST GAS FLOW RATE (ACFM)	28,273
EXHAUST GAS FLOW RATE (DSCFM)	15,541

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	86.028
DRY GAS VOLUME SAMPLED (DSCF)	81.652
DRY GAS METER TEMPERATURE (deg F)	86
DRY GAS METER GAMMA	1.01
AVERAGE ORIFICE PRESSURE (inches water)	0.71
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	105.1

LABORATORY DATA

MOISTURE RECOVERED (mls)	644.00
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Plant PALA
Date 1/23/91
Test Site SMOKY MOUNTAIN
Run Number 1 Cd
Operator ME/TK/DB

Ambient Temp 60
Barometer 29.45
Stack Pressured. 0.39
Stack 1120 & ~ 20
Stack Dia 41 3/4

Meter size 1.8
Meter Gamma 1.009
Meter Dose Blue 3
Nozzle Diameter 0.22
Probe Length 5'

Probe Mat'l Quartz
Filter Number
Samp Box I —
PRE LEAK 0.015 e15
POST-LEAK 0.014 e8

[illegible]

Plant PALA

Date 1/23/91

POST LEAK RATE 0.014 cc/h

Page 2 of 2

Run Number CD #1

Operator ME

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V _m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		TEMPERATURES					PUMP VAC. "Hg
					Desired	Actual	STACK - (T _B)	METER INLET	METER OUT	IMPINGER	FILTER	
1	90	1030	543.623	.37	0.49	0.49	2204	90	90	50	206	3
2	97.5	1037	546.0	.40	0.53	0.53	225	96	94	55	244	4
3	105	1044	549.8	.45	0.59	0.59	227	98	95	55	271	4
4	112.5	1052	553.1	.49	0.65	0.65	227	99	96	55	264	5
5	120	1102	556.5	.56	0.74	0.74	224	100	97	60	255	5
6	127.5	1107	560.1	.56	0.74	0.74	227	100	98	60	250	5
7	136	1115	563.9	.65	0.84	0.84	231	101	98	62	253	6
8	142.5	1122	567.9	.65	0.84	0.84	234	101	99	62	249	6
9	150	1130	572.0	.65	0.84	0.84	233	101	99	60	243	6
10	157.5	1137.5	576.0	.65	0.84	0.84	234	100	99	60	258	6
11	165	1145	579.9	.60	0.79	0.79	232	100	98	60	255	5
12	172.5	1152.5	583.3	.50	0.66	0.66	237	98	97	60	256	5
	180	1200	587.30				END TEST					
AVERAGE /SUM	180		89.780	.7626		71	224					82

K= 132

FIELD DATA

PAGE 1 OF 2

Plant PALA
 Date 1/24/91
 Test Site SIN K. B. THAWAT
 Run Number 24
 Operator ME/rk/ob

Ambient Temp 35
 Barometer 29.50
 Stack Pressure .35
 Stack H2O 20
 Stack Dia 41 3/4"

Meter # 1.81
 Meter Gamma 1.009
 Meter Box 1
 Nozzle Diameter .220
 Probe Length 5'

Probe Mat'l GLASS
 Filter Number -
 Samp Box 1
 PRE LEAK < 0.001 @ 10
 POST LEAK 0.002 @ 10

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V _m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		TEMPERATURES					PUMP VAC. "Hg
					Desired	Actual	STACK (T _g)	METER INLET	METER OUT	IMPINGER	FILTER	
1	0	838	587.898	.63	0.83	0.83	192	43	42	45	241	4
2	7.5	845	590.5	.63	0.83	0.83	192	62	54	41	250	4
3	15	852	595.3	.63	0.83	0.83	192	63	55	41	253	5
4	22.5	900	598.9	.62	0.82	0.82	197	65	57	41	246	5
5	30	907	603.1	.62	0.82	0.82	209	68	60	44	253	5
6	37	914	606.6	.61	0.81	0.81	222	70	63	43	230	5
7	45	922	610.6	.63	0.83	0.83	225	71	63	42	243	5
8	52.5	930	614.9	.58	0.77	0.77	229	73	65	43	257	5
9	60	937	618.0	.50	0.66	0.66	230	85	69	44	250	5
10	67	944	621.9	.45	0.59	0.59	232	80	72	44	243	5
11	75	952	625.6	.40	0.53	0.53	234	83	74	45	258	5
12	82.5	959	629.0	.40	0.53	1.53	234	85	76	45	266	5
	90	1006	631.552					PART CHANGE				
AVERAGE /SUM	180		87.418	$\sqrt{DP} = .740$		.733	225		80			

K = 1.32

PALA

Plant

Date

POST LEAK RATE:

1/24/91

Page 2 of 2

Run Number 222

Operator ME/TK/DJS

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vn)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		T E M P E R A T U R E S						PUMP VAC. "Hg
					Desired	Actual	STACK - (T _b)	METER INLET	METER OUT	IMPINGER	FILTER		
1	90	1020	631.552	.53	0.70	0.70	228	87	85	47	270	4	
2	97.5	1027.5	635.4	.61	0.81	0.81	231	93	88	47	266	5	
3	105	1035	639.2	.64	0.85	0.85	236	94	89	46	246	6	
4	112.5	1042.5	643.1	.64	0.85	0.85	237	94	90	46	247	6	
5	120	1050	647.0	.64	0.85	0.85	239	96	92	46	249	6	
6	127.5	1057.5	651.5	.64	0.85	0.85	238	96	93	48	252	6	
7	135	1105	655.0	.60	0.79	0.79	236	96	93	48	257	5.5	
8	142.5	1112.5	658.9	.53	0.70	0.70	236	96	94	48	260	5.5	
9	150	1120	662.5	.51	0.67	0.67	238	97	94	51	261	5.0	
10	157.5	1127.5	666.0	.44	0.58	0.58	237	97	94	52	265	5.0	
11	165	1135	669.8	.40	0.53	0.58	234	97	95	53	251	5	
12	172.5	1142.5	672.7	.35	0.46	0.46	233	97	95	53	246	4	
	180	1150	675.36				END TEST						
AVERAGE /SUM	180		87.418	.740		.733	225	80					

11/24/91

Plant PACA Ambient Temp 75 Meter #110 1.81 Probe Mat'l Butter
 Date 1/24/91 Barometer 29.50 Meter Gamma 1.009 Filter Number ---
 Test Site EXHAWEN CREEK Stack Pressure 35 Meter Box 1 Samp Box 1
 Run Number 3 cd Stack #20 & 20 Nozzle Diameter 2.20 PRE LEAK 0.003 @ 10
 Operator MET/RS/AS Stack Dia 48.74 Probe Length 5' POST LEAK 0.005 @ 10

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V _m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		TEMPERATURES						PUMP VAC. "Hg
					Desired	Actual	STACK (T _{st})	METER INLET	METER OUT	IMPINGER	FILTER		
1	0	1215	676.295	.58	0.77	0.77	224	87	91	55	228	5	
2	7.5	1222.5	680.0	.60	0.79	0.79	226	89	90	54	248	5	
3	15	1230	683.0	.63	0.83	0.83	228	90	89	53	258	5	
4	22.5	1237.5	687.8	.63	0.83	0.83	230	90	88	53	260	5	
5	30	1245	691.9	.63	0.83	0.83	227	89	87	52	253	5	
6	37.5	1252.5	694.5	.63	0.83	0.83	225	89	86	52	249	5	
7	45	1300	699.0	.62	0.82	0.82	226	88	86	52	260	5	
8	52.5	1308	684.0	.58	0.77	0.77	227	88	85	52	253	5	
9	60	1315	708.0	.60	0.66	0.66	226	87	84	52	255	5	
10	67.5	1322	711.8	.45	0.59	0.59	224	87	84	52	251	5	
11	75	1330	715.7	.40	0.53	0.53	223	86	84	52	246	5	
12	82.5	1338	718.9	.35	0.46	0.46	221	86	83	52	248	5	
	90	1346	721.461				Port	CHANGE	CHANGE				
AVERAGE /SUM	180		86.028	57		707	223		86				

K = 1.32

PALA

Plant

Date

POST LEAK RATE: 0.005E-10

Page 2 of 2

Run Number 3584

Operator ME/TK/JAS

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V _m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		TEMPERATURES					PUMP VAC. "Hg
					Desired	Actual	STACK - (T _g)	METER INLET	METER OUT	DOPPINGER	FILTER	
1	90	1400	721.461	.53	0.70	0.70	221	85	85	57	251	5
2	97.5	1407	725.0	.61	0.81	0.81	223	86	85	53	256	5
3	105	1415	728.5	.64	0.85	0.85	222	87	85	53	249	5
4	112.5	1422	732.0	.64	0.85	0.85	222	87	84	52	261	6
5	120	1430	736.0	.65	0.65	0.65	221	87	84	52	253	6
6	127.5	1437	740.5	.65	0.65	0.65	223	86	84	51	255	6
7	135	1445	744.1	.60	0.79	0.79	222	86	83	51	251	5
8	142.5	1452	747.8	.53	0.70	0.70	220	86	83	51	260	5
9	150	1459	751.0	.51	0.67	0.67	220	86	83	51	263	5
10	157.5	1506	753.8	.45	0.59	0.59	220	85	83	50	259	5
11	165	1513	756.8	.40	0.53	0.53	221	85	82	50	255	5
12	172.5	1520	759.6	.35	0.46	0.46	219	85	82	49	249	5
180		1530	762.323					END		TEST		
AVERAGE /SUM	180		86.028	.737		.707	223	86				

APPENDIX C

SUPPORTING DATA FOR HEXAVALENT AND TOTAL CHROMIUM

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/25/91
Run: 1 Chrome 0945-1315
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.60
OXYGEN CONTENT (%)	13.4
CARBON DIOXIDE CONTENT (%)	5.7
MOISTURE CONTENT (%)	22.6
STACK TEMPERATURE (deg F)	214
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.45
VELOCITY PRESSURE (sq rt inches water)	0.76
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	50.34
EXHAUST GAS FLOW RATE (ACFM)	28,717
EXHAUST GAS FLOW RATE (DSCFM)	16,988

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	82.956
DRY GAS VOLUME SAMPLED (DSCF)	78.441
DRY GAS METER TEMPERATURE (deg F)	90
DRY GAS METER GAMMA	1.01
AVERAGE ORIFICE PRESSURE (inches water)	0.77
TOTAL RUN TIME (min)	166
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	100.2

LABORATORY DATA

MOISTURE RECOVERED (mls)	491.60
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/28/91
Run: 2 Chrome 0900-1215
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.60
OXYGEN CONTENT (%)	11.8
CARBON DIOXIDE CONTENT (%)	6.7
MOISTURE CONTENT (%)	24.8
STACK TEMPERATURE (deg F)	220
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.54
VELOCITY PRESSURE (sq rt inches water)	0.80
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	53.21
EXHAUST GAS FLOW RATE (ACFM)	30,351
EXHAUST GAS FLOW RATE (DSCFM)	17,282

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	92.877
DRY GAS VOLUME SAMPLED (DSCF)	91.847
DRY GAS METER TEMPERATURE (deg F)	66
DRY GAS METER GAMMA	1.01
AVERAGE ORIFICE PRESSURE (inches water)	0.85
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	106.3

LABORATORY DATA

MOISTURE RECOVERED (mls)	651.50
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/29/90
Run: 3 Chrome 0740-1055
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.57
OXYGEN CONTENT (%)	11.8
CARBON DIOXIDE CONTENT (%)	6.6
MOISTURE CONTENT (%)	25.7
STACK TEMPERATURE (deg F)	216
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.53
VELOCITY PRESSURE (sq rt inches water)	0.79
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	52.40
EXHAUST GAS FLOW RATE (ACFM)	29,887
EXHAUST GAS FLOW RATE (DSCFM)	16,899

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	94.750
DRY GAS VOLUME SAMPLED (DSCF)	93.070
DRY GAS METER TEMPERATURE (deg F)	69
DRY GAS METER GAMMA	1.01
AVERAGE ORIFICE PRESSURE (inches water)	0.84
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	110.2

LABORATORY DATA

MOISTURE RECOVERED (mls)	692.00
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Plant Cell MAT PACA
Date 1-25-91
Host Site Stock on Hand
Run Number 1, Chromosome
Operator N. Nielsen

Ambient Temp 70°F
Barometer 29.6
Stack Pressure 1.37
Stack 120 x 20
Stack Dia 41.75"

Meter size 1.81
Meter Gamma 1.009
Meter Box 1 D/L 2
Nozzle Diameter .22
Probe Length 6 ft

Probe Mat'l Quant
Filter Number THAN
Samp Box 1
PRE LEAK 0.008 @ 5" H₂O
POST-LEAK

[illegible]

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vn)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		T E M P E R A T U R E S					PUMP VAC. "Hg
					Desired	Actual	STACK - (Tb)	METER INLET	METER OUT	IMPINGER	FILTER	
1	90	1145	816.874	.49	.647	.65	207	97	94	64	262	4
2	97.5	1152.5	814.9	.56	.735	.74	210	96	95	62	258	4
3	105	1200	818.4	.67	.884	.89	211	97	96	61	261	4
4	112.5	1207.5	822.0	.66	.871	.87	212	98	97	62	254	4
5	120	1215	825.9	.68	.898	.90	216	99	98	64	249	5
6	127.5	1222.5	930.0	.66	.871	.87	215	96	97	62	251	5
7	135	1230	834.1	.68	.898	.90	217	95	94	61	242	5
8	142.5	1237.5	838.1	.61	.805	.81	212	96	95	61	241	5
9	150	1245	842.0	.48	.634	.63	209	96	94	62	238	5
10	157.5	1252.5	846.4	.45	.544	.54	209	95	93	62	242	5
11	165	1300	849.1	.39	.515	.52		95	73	62	244	5
12	172.5	1307.5										
13	180	1315			END							
14	187.5	1235	849.428									
15												
AVERAGE /SUM	105.9		82.956	.762		.771	214	90				

Meter #110 1.81
Meter Gamma 1.009
Meter Doh # blue #3
Nozzle Diameter .72"
Probe Length 6 ft

Probe Mat'l du. ct²
Filter Number Tat. 2
Samp Box 1 —
PRE LEAK 0.012 @ 15" Hg
POST-LEAK

[illegible]

$K = 1.32$

CHROME #2

Plant CHC MAT PACA

Date 1-28-91

POST LEAK RATE.

Page 2 of 2
Run Number 41 CHK
Operator N.N.

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vn)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H2O)		T E M P E R A T U R E S						PUMP VAC. "Hg
					Desired	Actual	STACK - (Ts)	METER INLET	METER OUT	IMPINGER	FILTER		
1	90	10:45	900.085	.35 221	.962 220	.96	220	72	70	51	246	7	
2	97.5	10:52.5	903.4	.44	.581	.58	219	74	71	51	245	7	
3	105	11:00	906.3	.49	.697	.65	220	75	71	51	251	7	
4	112.5	11:07.5	908.6	.55	.726	.72	220	75	65	51	261	7	
5	120	11:15	911.0	.84	1.11	1.1	219	75	65	57	258	12	
6	127.5		918.4	.90	1.19	1.2	221	74	64	52	260	12	
7	135	11:20	920.1	.92	1.21	1.2	220	73	63	52	258	14	
8	142.5		926.9	.88	1.16	1.2	219	75	64	52	261	14	
9	150	11:45	931.2	.73 221.73	1.964	.97	218	76	64	52	251	14	
10	157.5		935.5	.73	.964	.98	219	76	64	51	249	14	
11	165	12:00	939.7	.70	.94	.90	219	75	63	51	261	14	
12	172.5 180.5		943.6	.70	.94	.90	220	76	63	57	253	14	
	180	12:15	948.053	—	1.211	1.20							
AVERAGE /SUM	180		92877	.799		.853	220	66					

Meter #10 1.81
Meter Gamma 1.667
Meter Dax # 1
Nozzle Diameter 12"
Probe Length 6' 7"

Probe Mat'l Quartz
Filter Number 74604
Samp Box 1
PRE LEAK 0.006 @ 15" Hg
POST LEAK

[illegible]

K-1.32

CHROME #3

Plant LAI MAT PLCA

Date 1-19-91

POST LEAK RATE:

Page 2 of 2
Run Number #3 C
Operator

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vn)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		T E M P E R A T U R E S					PUMP VAC. "Hg
					Desired	Actual	STACK (Tb)	METER INLET	METER OUT	IMPINGER	FILTER	
1	90	0925	996.421	.88	.37	.37	224	76	876	55	257	3
2	97.5	0925	999.0	.137	.48	.45	223	77	75	57	254	4
3	105	0940	1002.0	.48	.54	.51	225	79	74	55	260	5
4	112.5	0947.5	1005.1	.46	.607	.61	224	78	74	56	253	5
5	120	0955	1008.7	.52	.686	.67	195	81	78	54	247	5
6	127.5	1002.5	1012.3	.51	.677	.67	208	86	81	54	249	5
7	135	091010	1015.9	.98	1.29	1.3	214	89	84	55	251	9
8	142.5	1012.5	1020.8	.97	1.28	1.3	212	89	85	55	248	9
9	150	1025	1025.8	.95	1.25	1.3	213	91	86	55	242	9
10	157.5	1032.5	1030.1	.98	1.21	1.2	212	92	84	56	251	8
11	165	1040	1035.0	.78	1.07	1.0	213	94	87	56	259	8
12	172.5	1042.5	1039.9	.61	.805	.81	211	95	86	55	251	8
	180	1055	1045.162	✓	END	RUN						
AVERAGE /SUM	180		94.750	.787		.836	216		69			

APPENDIX D
SUPPORTING DATA FOR POLY-AROMATIC HYDROCARBONS

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/25/91
Run: 1 PAH 0947-1335
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.60
OXYGEN CONTENT (%)	13.4
CARBON DIOXIDE CONTENT (%)	5.7
MOISTURE CONTENT (%)	22.3
STACK TEMPERATURE (deg F)	212
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.45
VELOCITY PRESSURE (sq rt inches water)	0.76
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	50.31
EXHAUST GAS FLOW RATE (ACFM)	28,697
EXHAUST GAS FLOW RATE (DSCFM)	17,078

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	83.778
DRY GAS VOLUME SAMPLED (DSCF)	79.260
DRY GAS METER TEMPERATURE (deg F)	86
DRY GAS METER GAMMA	1.00
AVERAGE ORIFICE PRESSURE (inches water)	0.85
TOTAL RUN TIME (min)	166
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	100.9

LABORATORY DATA

MOISTURE RECOVERED (mls)	490.20
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/28/91
Run: 2 PAH 0900-1215
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.60
OXYGEN CONTENT (%)	11.8
CARBON DIOXIDE CONTENT (%)	6.7
MOISTURE CONTENT (%)	25.6
STACK TEMPERATURE (deg F)	227
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.54
VELOCITY PRESSURE (sq rt inches water)	0.71
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	47.81
EXHAUST GAS FLOW RATE (ACFM)	27,272
EXHAUST GAS FLOW RATE (DSCFM)	15,202

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	84.042
DRY GAS VOLUME SAMPLED (DSCF)	81.890
DRY GAS METER TEMPERATURE (deg F)	70
DRY GAS METER GAMMA	1.00
AVERAGE ORIFICE PRESSURE (inches water)	0.75
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	107.8

LABORATORY DATA

MOISTURE RECOVERED (mls)	606.90
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/29/91
Run: 3 PAH 0740-1055
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.57
OXYGEN CONTENT (%)	11.8
CARBON DIOXIDE CONTENT (%)	6.6
MOISTURE CONTENT (%)	25.1
STACK TEMPERATURE (deg F)	219
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.53
VELOCITY PRESSURE (sq rt inches water)	0.80
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	53.44
EXHAUST GAS FLOW RATE (ACFM)	30,480
EXHAUST GAS FLOW RATE (DSCFM)	17,307

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	89.696
DRY GAS VOLUME SAMPLED (DSCF)	88.183
DRY GAS METER TEMPERATURE (deg F)	65
DRY GAS METER GAMMA	1.00
AVERAGE ORIFICE PRESSURE (inches water)	0.94
TOTAL RUN TIME (min)	180
NOZZLE DIAMETER (inches)	0.220
ISOKINETIC (%)	101.9

LABORATORY DATA

MOISTURE RECOVERED (mls)	633.70
PARTIC. FROM NOZ., PROBE & WASHES (mg)	0.00
PARTICULATE FROM FILTER (mg)	0.00

plant PALA

16-92-1

West Side BH Stack Outlet

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

operator TK

Ambient Temp 60S

Parameter 29.60

Stack Pressure .39

Stack 1120 & 20

Stack Dia 41.75"

1961

Meter 100

Victory Day! May 1, 1945

METER BOX / FLOWMETER
Water's Discolor 22

NOZZLE DIAMETER
Nozzle Length

Probe Mat'l QUARTZ

Filter Number

Sample Box 1 A/A

PRE LEAK 0.019 @ 16"

POST-LEAK!

TEMPERATURES

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vm)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		TEMPERATURES						VAC. "Hg
					Desired	Actual	STACK 3 (Tf)	METER INLET 6	METER OUT 7	IMPINGER 5	FILTER 4		
1	0	0947	218.415	.47	.682	.68	218	65	52	251	11		
2	7.5	0954.5	221.5	.45	.653	.65	220	79	42	248	11		
3	15	1002	224.7	.60	.870	.87	219	83	40	263	15		
4	22.5	1009.5	228.5	.62	.899	.90	227	88	40	256	15		
5	30	1017	232.3	.56	.812	.81	224	88	40	260	14		
6	37.5	1024.5	236.1	.56	.812	.81	224	89	41	258	14		
7	45	1032	239.8	.63	.914	.91	226	90	42	235	15		
8	52.5	1039.5	243.4	.68	.986	.99	204	86	43	225	16		
9	60	1047	247.7	.65	.943	.94	209	89	40	241	15		
10	67.5	1054.5	251.8	.65	.943	.94	207	88	44	244	16		
11	75	1102	255.9	.68	.986	.99	206	88	41	243	16		
12	82.5	1109.5	260.1	.66	.957	.96	208	88	42	237	17		
	90	1117	264.180		PORT CHANGE	CHANGE							
AVERAGE /SUM													

K=1.45

Plant PALA
Date 1-25-91
POST LEAK RATE

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vn)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		TEMPERATURES					PUMP VAC. "Hg
					Desired	Actual	STACK 3 (Tb)	METER INLET 6	METER OUT 7	IMPINGER 5	FILTER 4	
1	90	1145	264.180	.35	.508	.51	205	88		50	235	10
2	97.5	1152.5	267.1	.56	.812	.81	205	88		42	242	14
3	105	1160	270.7	.54	.783	.78	199	89		41	243	14
4	112.5	1207.5	274.4	.54	.783	.78	202	88		42	238	14
5	120	1215	278.1	.63	.914	.91	211	89		42	233	16
6	127.5	1222.5	282.0	.62	.899	.90	212	89		42	234	16
7	135	1230	285.9	.60	.870	.87	209	88		41	226	16
8	142.5	1237.5	289.9	.67	.972	.97	208	86		42	240	17
9	150	1245	293.9	.60	.870	.87	207	86		44	235	17
10	157.5	1252.5	297.8	.58	.841	.84	207	86		46	239	17
11	165	1300	302.0	.57	.827	.83	209	85		47	237	16
12	172.5	1307.5										
	180	1315			END	RUN#1						
STOP	165.6	1335	302.191									
AVERAGE /SUM	165.6		83.778	.763		.849	213	88				

Plant PALA
 Date 1-28-91
 Test Site BH STACK OUTLET
 Run Number 2-844
 Operator TK

Ambient Temp 50
 Barometer 29.60
 Stack Pressure .39
 Stack H₂O & Z₂
 Stack Dia 41.75"

Meter #10 1.99
 Meter Gamma 1.002
 Meter Box 1 BROWN II
 Nozzle Diameter .22
 Probe Length 5'

Probe Mat'l QUARTZ
 Filter Number 48
 Samp Box 1A
 PRE LEAK 0.014 @ 10" H₂O
 POST LEAK 0.015 @ 15" H₂O

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V _m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		T E M P E R A T U R E S						PUMP VAC. "Hg
					Desired	Actual	STACK g (T ₅)	METER INLET 6	METER OUT 7	IMPINGER 5	FILTER 4		
1	0	0900	310.639	.54	.783	.78	224	55		48	248	8	
2	7.5	0907	314.0	.65	.943	.94	222	60		43	251	12	
3	15	0915	317.7	.65	.943	.94	220	59		41	245	12	
4	22.5	0922	321.7	.78	1.13	1.1	220	61		42	243	14	
5	30	0930	326.0	.78	1.13	1.1	218	62		42	241	14	
6	37.5	0937	329.4	.70	1.02	1.0	218	63		42	245	14	
7	45	0945	333.3	.70	1.02	1.0	222	64		43	266	14	
8	52.5	0952	337.3	.31	.450	.45	223	67		43	242	7	
9	60	1000	340.8	.36	.522	.52	224	68		44	253	8	
10	67.5	1007	343.8	.36	.522	.52	227	70		45	269	8	
11	75	1014	346.7	.35	.508	.51	227	71		45	248	8	
12	82.5	1021	349.7	.36	.522	.52	228	71		45	250	8	
	90		352.659		PORT CHANGE								
AVERAGE /SUM				847									

HC-12-N

ES
ENGINEERING-SCIENCE
COMPANIES

Plant PALA

Date 1-28-91

POST LEAK RATE: 0.015 Q 15" Hg

Page 2 of 2Page 2 of 2
Run Number 2-PAK

Operator TK

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V _m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H ₂ O)		TEMPERATURES							RMP VAC. "Hg
					Desired	Actual	STACK ° (T _B)	METER INLET	METER OUT	IMPINGER	FILTER			
1	90	1045	352.659	.58	.841	.84	229	69	52	240	11			
2	97.5	1052	356.3	.55	.798	.80	227	73	43	246	12			
3	105	1100	359.9	.60	.870	.87	230	73	44	259	14			
4	112.5	1107.5	363.5	.60	.870	.87	228	73	43	246	14			
5	120	1115	367.0	.63	.914	.91	233	76	45	265	15			
6	127.5	1122.5	371.2	.62	.899	.90	232	77	45	245	15			
7	135	1130	375.1	.57	.827	.83	230	77	47	245	14			
8	142.5	1137.5	379.0	.34	.493	.49	232	79	46	240	10			
9	150	1145	382.7	.35	.508	.51	229	77	48	238	10			
10	157.5	1152.5	385.1	.37	.537	.54	231	78	48	241	10			
11	165	1200	388.8	.37	.537	.54	230	78	49	245	10			
12	172.5	1207.5	391.2	.35	.508	.51	232	79	50	251	10			
	180	1215	394.681		END RUN #2									
											</			

PAH

FIELD DATA

PAGE / OF 2

plant
PALA

16-62-1

Post Site BN STACK OUTLET

Run Number 3084

Operator ZZ

Ambient Temp 45

Barometer 29.57

Stack Pressure .39

Stack 1120 & 20

Stack Dia 41.75"

Water 1.99

Meter Gamma 1.002

Meter Box | BROWN II

Nozzle Diameter: 22

Probe Length 5,

Probe Mat'l Quartz

Filter Number No. 7412

Sample Box 1

PRE LEAK 0.016 @ 15" / 6

POST-LEAK

[illegible]

Plant WAL

Date 1-25-91

POST LEAK RATE

Page 2 of 2

Run Number 3 FOH

Operator TK

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vn)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta II, "H ₂ O)		TEMPERATURES					PUMP VAC. "Hg
					Desired	Actual	STACK 3 (T _S)	METER INLET 6	METER OUT 7	IMPINGER 5	FILTER 4	
1	90	0925	446.101	.58	.041	.04	212	69		50	262	13
2	97.5	0932.5	448.9	.61	.085	.09	227	70		46	266	15
3	105	0940	452.5	.62	.099	.90	227	73		46	266	16
4	112.5	0947.5	456.2	.64	.920	.93	233	75		47	257	16
5	120	0955	460.0	.64	.920	.93	202	75		45	252	16
6	127.5	1002.5	463.9	.69	1.00	1.0	207	77		46	235	17
7	135	1010	467.9	.72	1.04	1.0	206	78		47	255	18
8	142.5	1017.5	471.8	.64	.926	.93	218	79		48	247	17
9	150	1025	475.7	.52	.754	.75	227	78		48	240	14
10	157.5	1032.5	479.3	.52	.754	.75	227	78		48	245	14
11	165	1040	483.0	.50	.725	.73	228	78		48	256	14
12	172.5	1047.5	486.2	.48	.696	.70	227	78		49	255	14
	180	1055	489.574		END RUN# 3							
AVERAGE /SUM	180		89.696	.802		.935	219	65				

APPENDIX E
SUPPORTING DATA FOR FORMALDEHYDE

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/23/91
Run: 1 R-CHO 1000-1200
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.45
OXYGEN CONTENT (%)	13.5
CARBON DIOXIDE CONTENT (%)	5.5
MOISTURE CONTENT (%)	27.4
STACK TEMPERATURE (deg F)	220
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.42
VELOCITY PRESSURE (sq rt inches water)	0.75
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	50.44
EXHAUST GAS FLOW RATE (ACFM)	28,771
EXHAUST GAS FLOW RATE (DSCFM)	15,743

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	4.360
DRY GAS VOLUME SAMPLED (DSCF)	3.948
DRY GAS METER TEMPERATURE (deg F)	108
DRY GAS METER GAMMA	1.00
AVERAGE ORIFICE PRESSURE (inches water)	2.00

GASEOUS EMISSIONS RATE

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/24/91
Run: 2 R-CHO 0910-1110
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.50
OXYGEN CONTENT (%)	13.5
CARBON DIOXIDE CONTENT (%)	5.6
MOISTURE CONTENT (%)	22.1
STACK TEMPERATURE (deg F)	218
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.44
VELOCITY PRESSURE (sq rt inches water)	0.76
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	50.41
EXHAUST GAS FLOW RATE (ACFM)	28,752
EXHAUST GAS FLOW RATE (DSCFM)	16,959

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	4.190
DRY GAS VOLUME SAMPLED (DSCF)	3.990
DRY GAS METER TEMPERATURE (deg F)	81
DRY GAS METER GAMMA	1.00
AVERAGE ORIFICE PRESSURE (inches water)	1.90

GASEOUS EMISSIONS RATE

Engineering-Science, Pasadena, California

Plant: Pala
Source: BH Stack Outlet
Date: 1/24/91
Run: 3 R-CHO 1300-1500
Standard Temp = 60 deg F Standard Press = 29.92 in Hg

FLOW DATA

STACK DIAMETER (inches)	41.75
STACK CROSS-SECTIONAL AREA (sq feet)	9.51
BAROMETRIC PRESSURE (inches Hg)	29.50
OXYGEN CONTENT (%)	13.5
CARBON DIOXIDE CONTENT (%)	5.6
MOISTURE CONTENT (%)	19.4
STACK TEMPERATURE (deg F)	213
STACK STATIC PRESSURE (inches water)	0.39
DRY STACK GAS MOLECULAR WEIGHT	29.44
VELOCITY PRESSURE (sq rt inches water)	0.75
PITOT TUBE CORRECTION FACTOR	0.84
VELOCITY (ft per sec)	49.28
EXHAUST GAS FLOW RATE (ACFM)	28,110
EXHAUST GAS FLOW RATE (DSCFM)	17,273

SAMPLING DATA

DRY GAS VOLUME SAMPLED (DCF)	4.130
DRY GAS VOLUME SAMPLED (DSCF)	3.918
DRY GAS METER TEMPERATURE (deg F)	83
DRY GAS METER GAMMA	1.00
AVERAGE ORIFICE PRESSURE (inches water)	1.90

GASEOUS EMISSIONS RATE

R-C40 #1

Sampling time, min	Clock time, 24 h	Sample volume, l (ft^3)	Sample flow rate setting, $\frac{l}{min}$ (ft^3/min)	Sample volume metered (ΔV), l (ft^3)	Δ #	Dry gas meter temp, $^{\circ}C$ ($^{\circ}F$)	Impinger temp, $^{\circ}C$ ($^{\circ}F$)
0	1000		$\sim .95$	2913.29	2.0	42	55
30	1030			2944.0	2.0	42	55
60	1100			2975.2	2.0	42	55
90	1130			3005.6	2.0	42	55
120	1200			3036.72	2.0	42	55
Total		Total		ΔV avg 123.43	2.0	Avg 108 $^{\circ}F$	Max temp 55

$$123.432 \left[\frac{1 \mu^3}{28.317 \text{ g}} \right] = 4.36 \mu^3$$

SAMPLING DATA FORM FOR A-CH0 #2

Plant name Pala City Pala
 Sample location B Date 1/24/91
 Operator ME/TK/PM Sample number 2
 Barometric pressure, mm (in.) Hg 29.50 Probe length m (ft) 4
 Probe material SS/Tylen Probe heater setting _____
 Meter box number _____ Meter calibration factor (Y) _____
 Ambient temperature, °C (°F) 56 Sample point location _____
 Initial leak check _____ Sample purge time, min 5
 Final leak check _____

2x "Hg
 < 1.0
 < 1.0
 < 1.0
 < 1.0
 < 1.0

Sampling time, min	Clock time, 24 h	Sample volume, L (ft ³)	Sample flow rate setting, L/min (ft ³ /min)	Sample volume metered (ΔV _m), (L ft ³)	ΔH	Dry gas meter temp, °C (°F)	Impinger temp, °C (°F)
0	0910		~0.95	30.67.10	1.9	12	35
30	0940			30.96.6	1.9	22	40
60	1010			31.26.44	1.9	32	45
90	1040			31.56.1	1.9	33	45
120	1110			31.85.66	1.9	36	45
Total 120				ΔV _m avg 118.56	1.9	Avg 27.8 → 81.7	Max 42.8

< 1.0

$$118.56 \times \left[\frac{1.4^3}{28.3172} \right] = 4.19 \text{ ft}^3$$

1-C40 #3

City Palo
Date 11/24/91
Sample number #3
Probe length m (17) 4
Probe heater setting _____
Meter calibration factor (Y) _____
Sample point location _____
Sample purge time, min 5

2000
2010
2020
2030
2040

$$116.896 \left[\frac{(1.4)^3}{28.3172} \right] = 4.13 \text{ ft}^3$$

normal damper position:

Bag house pressure: 6.2 "H₂O
damper position: 67%

ENGINEERING SCIENCE
Pasadena, California

1-2

PRELIMINARY VELOCITY TRAVERSE DATA

Plant PAL # (Calmat)

Date 1/23/94

Location BH stack outlet

Stack I.D. ~~17.2~~ "41.75"

Barometric Pressure _____

Static Pres +0.39

Operators JMA & TK

normal damper position

A

TRAVERSE POINT NUMBER	VELOCITY HEAD	STACK TEMP.	CYCLONIC FLOW ANGLE
1	0.77	188	4
2	0.78	189	1
3	0.79	189	2
4	0.85	190	2
5	0.84	190	3
6	0.84	189	3
7	0.82	187	4
8	0.84	189	3
9	0.86	190	5
10	0.83	191	5
11	0.79	190	6
12	0.71	188	7
AVERAGE			

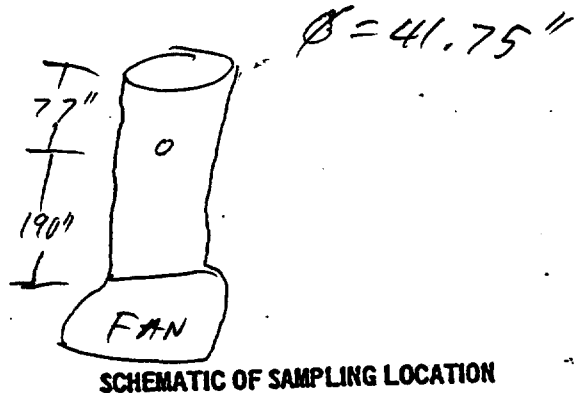
B

TRAVERSE POINT NUMBER	VELOCITY HEAD	STACK TEMP.	CYCLONIC FLOW ANGLE
1	0.83	190	2
2	0.87	191	2
3	0.93	195	3
4	0.90	196	3
5	0.90	195	4
6	0.85	194	3
7	0.82	192	5
8	0.80	192	5
9	0.75	188	6
10	0.79	189	5
11	0.69	190	6
12	0.61	191	6
AVERAGE			3.99

4.0

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

LANT Cabrera @ Palo
 ATE 1/23/90
 IMPLING LOCATION Bay House stack outlet
 DE OF FAR WALL TO
 OUTSIDE OF NIPPLE, (DISTANCE A) 46"
 INSIDE OF NEAR WALL TO
 OUTSIDE OF NIPPLE, (DISTANCE B) 4.25"
 TACK I.D., (DISTANCE A - DISTANCE B) 41.75"
 EAREST UPSTREAM DISTURBANCE ~ 77"
 NEAREST DOWNSTREAM DISTURBANCE ~ 190"
 CALCULATOR SLH

[illegible]

APPENDIX F
SUPPORTING DATA FOR LABORATORY ANALYSIS

Client: Engineering Science
 Job Number: 17728
 Date Analyzed: 02-07-91

Selected Metals
 Quantitative Analysis Report
 Inductively Coupled Plasma-Mass Spectrometry

Parts Per Billion (ug/L)

	^{A B} 910176 -300mL	^B 910155 -450mL	² 910157 -1150mL <i>1.19L</i>	¹ 910156 -1120mL <i>1.12L</i>	³ 910158 -1080mL <i>1.08L</i>	Blank DL
Beryllium	ND<1	ND<1	ND<1	ND<1	ND<1	1
Manganese	0.7	3.7	6	5.5	6.7	0.2
Nickel	2.6	2.5	5	3.2	2.6	0.5
Copper	19	5	7	6	9	2
Zinc	9	10	17	105	22	1
Arsenic	ND<0.1	ND<0.1	0.3	0.9	0.2	0.1
Selenium	ND<6	ND<6	ND<6	ND<6	11	6
Cadmium	ND<0.6	ND<0.6	ND<0.6	1.2	1	0.6
Mercury	0.4	ND<0.7	ND<0.8	ND<0.8	0.7	0.2
Lead	4.9	25.4	8.4	30.4	8.9	0.1

ND-Not Detected. The detection limit (DL) is stated above.
 Because of sample interferences, Sample DLs may differ from Blank DLs.

Client: Engineering Science
 Job Number: 17728
 Date Analyzed: 02-07-91
 Matrix: Liquid

Sample:

Selected Metals
 Quantitative Analysis Report
 Inductively Coupled Plasma-Mass Spectrometry

Parts Per Billion (ug/L)

	Sample		Spike	Spk Rslt		Detect.
	7728		Conc	7728	%	Limit
	301		ppm	311	Recovery	
Beryllium	ND<1		100	98	98	1
Manganese	6		NA	NA		0.2
Nickel	5		100	107	102	0.5
Copper	7		100	101	94	2
Zinc	17		100	109	92	1
Arsenic	0.3		100	87.5	87.2	0.1
Selenium	ND<6		100	96	96	6
Cadmium	ND<0.6		100	91.1	91.1	0.6
Mercury	ND<0.8		10	8.9	89	0.3
Lead	8.4		100	109	100.6	0.1

ND-Not Detected. The detection limit (DL) is stated above.
 Because of sample interferences, Sample DLs may differ from Blank DLs.
 NA-not available, not spiked.

WEST COAST ANALYTICAL SERVICE, INC.

ENGINEERING SCIENCE
Mr. Dennis Bautista

Job # 17728
February 14, 1991

LABORATORY REPORT

TABLE 5

Parts Per Billion (ug/L)

Sample ID

Mercury by ICPMS

910155-215mL
910156-285mL
910157-285mL
910158-244mL
910176-250mL
Detection Limit

ND
ND
ND
ND
ND
4

ND-Not Detected

Date Analyzed: 2-7-91

WEST COAST ANALYTICAL SERVICE, INC.

ENGINEERING SCIENCE
Mr. Dennis Bautista

Job # 17728
February 14, 1991

LABORATORY REPORT

TABLE 1

Parts Per Billion (ug/L)

Sample ID

Cadmium by ICPMS

910151-485mL	ND
910152-1208mL	0.8
910153-1268mL	1.3
910154-1265mL	1.2
910175-300mL	ND
Detection Limit	0.3

ND-Not Detected

Date Analyzed: 2-7-91

TABLE 2

Parts Per Billion (ug/L)

Sample ID

Hexavalent Chromium by EPA 7196/IC

910163-432mL	1.0
910164-1150mL	0.53
910169-1335mL	0.47
910170-1290mL	0.36
910174-300mL	1.1
Detection Limit	0.01

Date Analyzed: 1-31-91

WEST COAST ANALYTICAL SERVICE, INC.

ENGINEERING SCIENCE
Mr. Dennis Bautista

Job # 17728
February 14, 1991

LABORATORY REPORT

TABLE 3

QC Summary by IC

	<u>Amt. Found</u>	<u>Matrix Spike</u>	<u>% Recovery</u>	<u>Dup Spike</u>	<u>% Recovery</u>	<u>Spike RPD</u>	<u>Spike Conc.</u>
Hexavalent Chromium	0.53	1.3	77	1.4	87	7	1

Detection Limit: 0.01

TABLE 4

Parts Per Billion (ug/L)

Sample ID

Total Chromium by ICPMS

910163-432mL	ND
910164-1150mL	4
910169-1335mL	2
910170-1290mL	2
910174-300mL	ND
Detection Limit	2

ND-Not Detected

Date Analyzed: 2-7-91

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

METHOD BLANK
Lab ID: 10192-MB
Matrix: MM5 Train

Date Received: NA
Date Extracted: 2/01/91
Sample Amount: Sample

ICAL ID: IPNA1
QC Lot: LC0201M
Units: ng/sample

<u>Compound</u>	<u>Conc.</u>	<u>D.L.</u>	<u>Qualifier</u>
Naphthalene	48		
Acenaphthylene	ND	2.0	
Acenaphthene	ND	2.7	
Fluorene	ND	4.0	
Phenanthrene	14		
Anthracene	ND	3.1	
Fluoranthene	ND	3.0	
Pyrene	2.7		
Chrysene	ND	0.98	
Benz(a)anthracene	ND	1.9	
Benzo(b)fluoranthene	ND	0.78	
Benzo(k)fluoranthene	ND	0.79	
Benzo(a)pyrene	ND	1.3	
Benzo(g,h,i)perylene	ND	1.2	
Dibenz(a,h)anthracene	ND	0.71	
Indeno[1,2,3-cd]pyrene	ND	1.9	

Analyst: 

Reviewer: 

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

METHOD BLANK

Lab ID: 10192-MB

Isotopic Recovery Results

<u>Internal Standard:</u>	<u>% R</u>	<u>Qualifier</u>
d₅-Naphthalene	42	H
d₅-Acenaphthylene	60	
d₁₀-Acenaphthene	58	
d₁₀-Fluorene	73	
d₁₀-Phenanthrene	78	
d₁₀-Anthracene	72	
d₁₀-Fluoranthene	94	
d₁₀-Pyrene	96	
d₁₂-Chrysene	88	
d₁₂-Benz(a)anthracene	98	
d₁₂-Benzo(b)fluoranthene	64	
d₁₂-Benzo(k)fluoranthene	82	
d₁₂-Benzo(a)pyrene	66	
d₁₂-Benzo(g,h,i)perylene	94	

Pre-spike Recovery Standard:

d₁₂-Benzo(e)pyrene	NA
d₄-Terphenyl	NA

Analyst: WJ

Reviewer: BSM

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

LCS RESULTS

Lab ID: 10192-LCS1/LCS2
Matrix: MM5

Date Received: NA
Date Extracted: 2/01/91
Sample Amount: Sample

ICAL ID: IPNA1
QC Lot: LC0201M
Units: NA

<u>COMPOUND</u>	<u>LCS1 % R</u>	<u>LCS2 % R</u>	<u>RPD %</u>
Naphthalene	86	97	12
Acenaphthylene	71	82	14
Acenaphthene	125	125	0.0
Fluorene	104	108	3.8
Phenanthrene	126	107	16
Anthracene	114	110	3.6
Fluoranthene	97	100	3.0
Pyrene	100	96	4.1
Chrysene	89	92	3.3
Benza(a)anthracene	89	89	0.0
Benzo(b)fluoranthene	92	117	14
Benzo(k)fluoranthene	99	108	8.7
Benzo(a)pyrene	98	104	5.9
Benzo(g,h,i)perylene	80	82	2.5
Dibenz(a,h)anthracene	69	64	7.5
Indeno[1,2,3-cd]pyrene	71	76	6.8

Analyst: W/Z

Reviewer: BSM

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

LCS RESULTS

Lab ID: 10192-LCS1/LCS2

Isotopic Recovery Results

<u>Internal Standard:</u>	<u>LCS1 % R</u>	<u>LCS2 % R</u>
d₅-Naphthalene	26	33
d₅-Acenaphthylene	52	55
d₁₀-Acenaphthene	48	52
d₁₀-Fluorene	66	66
d₁₀-Phenanthrene	80	79
d₁₀-Anthracene	72	70
d₁₀-Fluoranthene	98	94
d₁₀-Pyrene	98	100
d₁₂-Chrysene	94	98
d₁₂-Benz(a)anthracene	102	100
d₁₂-Benzo(b)fluoranthene	72	73
d₁₂-Benzo(k)fluoranthene	88	99
d₁₂-Benzo(a)pyrene	76	78
d₁₂-Benzo(g,h,i)perylene	96	106

Analyst: 

Reviewer: 

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

Sample ID: PAH BLK TRAIN
Lab ID: 10192-001-SA
Matrix: MM5 Train

Date Received: 2/01/91
Date Extracted: 2/01/91
Sample Amount: Sample

ICAL ID: IPNA1
QC Lot: LC0201M
Units: ng/sample

<u>Compound</u>	<u>Conc.</u>	<u>D.L.</u>	<u>Qualifier</u>
Naphthalene	1600		B
Acenaphthylene	7.0		
Acenaphthene	13		
Fluorene	37		
Phenanthrene	130		B
Anthracene	19		
Fluoranthene	21		
Pyrene	18		
Chrysene	1.2		
Benz(a)anthracene	3.2		
Benzo(b)fluoranthene	1.9		
Benzo(k)fluoranthene	ND	0.64	
Benzo(a)pyrene	ND	1.2	
Benzo(g,h,i)perylene	ND	0.71	
Dibenz(a,h)anthracene	ND	0.80	
Indeno[1,2,3-cd]pyrene	ND	1.2	

Analyst: U/Z

Page 1 of 2

Reviewer: BM

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

Sample ID: PAH BLK TRAIN
Lab ID: 10192-001-SA

Isotopic Recovery Results

<u>Internal Standard:</u>	<u>% R</u>	<u>Qualifier</u>
d ₈ -Naphthalene	52	
d ₈ -Acenaphthylene	55	
d ₁₀ -Acenaphthene	80	
d ₁₀ -Fluorene	90	
d ₁₀ -Phenanthrene	100	
d ₁₀ -Anthracene	86	
d ₁₀ -Fluoranthene	112	
d ₁₀ -Pyrene	114	
d ₁₂ -Chrysene	108	
d ₁₂ -Benz(a)anthracene	114	
d ₁₂ -Benzo(b)fluoranthene	84	
d ₁₂ -Benzo(k)fluoranthene	100	
d ₁₂ -Benzo(a)pyrene	96	
d ₁₂ -Benzo(g,h,i)perylene	100	

Pre-spike Recovery Standard:

d ₁₂ -Benzo(e)pyrene	85
d ₁₄ -Terphenyl	104

Analyst: CJT

Page 2 of 2

Reviewer: bm

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

Sample ID: PAH RUN 1 TRAIN Date Received: 2/01/91
Lab ID: 10192-002-SA Date Extracted: 2/01/91
Matrix: MM5 Train Sample Amount: Sample

ICAL ID: IPNA1
QC Lot: LC0201M
Units: ng/sample

<u>Compound</u>	<u>Conc.</u>	<u>D.L.</u>	<u>Qualifier</u>
Naphthalene	66000		B
Acenaphthylene	66		
Acenaphthene	120		
Fluorene	1400		
Phenanthrene	3100		B
Anthracene	72		
Fluoranthene	270		
Pyrene	180		
Chrysene	5.5		
Benz(a)anthracene	31		
Benzo(b)fluoranthene	2.9		
Benzo(k)fluoranthene	1.8		
Benzo(a)pyrene	1.8		
Benzo(g,h,i)perylene	2.6		
Dibenz(a,h)anthracene	ND	1.6	
Indeno[1,2,3-cd]pyrene	1.5		

Analyst: 

Page 1 of 2

Reviewer: 

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

Sample ID: PAH RUN 1 TRAIN

Lab ID: 10192-002-SA

Isotopic Recovery Results

<u>Internal Standard:</u>	<u>% R</u>	<u>Qualifier</u>
d₅-Naphthalene	36	H
d₅-Acenaphthylene	55	
d₁₀-Acenaphthene	50	
d₁₀-Fluorene	66	
d₁₀-Phenanthrene	70	
d₁₀-Anthracene	60	
d₁₀-Fluoranthene	90	
d₁₀-Pyrene	92	
d₁₂-Chrysene	102	
d₁₂-Benz(a)anthracene	76	
d₁₂-Benzo(b)fluoranthene	95	
d₁₂-Benzo(k)fluoranthene	82	
d₁₂-Benzo(a)pyrene	92	
d₁₂-Benzo(g,h,i)perylene	104	

Pre-spike Recovery Standard:

d₁₂-Benzo(e)pyrene	113
d₁₄-Terphenyl	115

Analyst: 

Page 2 of 2

Reviewer: 

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

Sample ID: PAH RUN 2 TRAIN Date Received: 2/01/91
Lab ID: 10192-003-SA Date Extracted: 2/01/91
Matrix: MM5 Train Sample Amount: Sample

ICAL ID: IPNA1
QC Lot: LC0201M
Units: ng/sample

<u>Compound</u>	<u>Conc.</u>	<u>D.L.</u>	<u>Qualifier</u>
Naphthalene	46000		B
Acenaphthylene	52		
Acenaphthene	78		
Fluorene	730		
Phenanthrene	4100		B
Anthracene	89		
Fluoranthene	670		
Pyrene	490		
Chrysene	8.0		
Benz(a)anthracene	34		
Benzo(b)fluoranthene	6.5		
Benzo(k)fluoranthene	3.3		
Benzo(a)pyrene	2.8		
Benzo(g,h,i)perylene	3.9		
Dibenz(a,h)anthracene	ND	1.1	
Indeno[1,2,3-cd]pyrene	2.5		

Analyst: 

Page 1 of 2

Reviewer: 

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

Sample ID: PAH RUN 2 TRAIN

Lab ID: 10192-003-SA

Isotopic Recovery Results

<u>Internal Standard:</u>	<u>% R</u>	<u>Qualifier</u>
d₆-Naphthalene	47	H
d₆-Acenaphthylene	71	
d₁₀-Acenaphthene	64	
d₁₀-Fluorene	73	
d₁₀-Phenanthrene	71	
d₁₀-Anthracene	67	
d₁₀-Fluoranthene	94	
d₁₀-Pyrene	94	
d₁₂-Chrysene	112	
d₁₂-Benz(a)anthracene	76	
d₁₂-Benzo(b)fluoranthene	98	
d₁₂-Benzo(k)fluoranthene	72	
d₁₂-Benzo(a)pyrene	110	
d₁₂-Benzo(g,h,i)perylene	116	

Pre-spike Recovery Standard:

d₁₂-Benzo(e)pyrene	112
d₁₄-Terphenyl	101

Analyst: 

Page 2 of 2

Reviewer: 

POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429

Sample ID: PAH RUN 3 TRAIN Date Received: 2/01/91
Lab ID: 10192-004-SA Date Extracted: 2/01/91
Matrix: MM5 Train Sample Amount: Sample

ICAL ID: IPNA1
QC Lot: LC0201M
Units: ng/sample

<u>Compound</u>	<u>Conc.</u>	<u>D.L.</u>	<u>Qualifier</u>
Naphthalene	100000		B
Acenaphthylene	300		
Acenaphthene	220		
Fluorene	3400		
Phenanthrene	7700		B
Anthracene	180		
Fluoranthene	920		
Pyrene	600		
Chrysene	12		
Benz(a)anthracene	64		
Benzo(b)fluoranthene	84		
Benzo(k)fluoranthene	19		
Benzo(a)pyrene	1.8		
Benzo(g,h,i)perylene	3.8		
Dibenz(a,h)anthracene	ND	0.89	
Indeno[1,2,3-cd]pyrene	2.2		

Analyst: 

Reviewer: 

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

Sample ID: PAH RUN 3 TRAIN

Lab ID: 10192-004-SA

Isotopic Recovery Results

<u>Internal Standard:</u>	<u>% R</u>	<u>Qualifier</u>
d ₅ -Naphthalene	48	H
d ₅ -Acenaphthylene	89	
d ₁₀ -Acenaphthene	66	
d ₁₀ -Fluorene	81	
d ₁₀ -Phenanthrene	84	
d ₁₀ -Anthracene	81	
d ₁₀ -Fluoranthene	94	
d ₁₀ -Pyrene	92	
d ₁₂ -Chrysene	115	
d ₁₂ -Benz(a)anthracene	82	
d ₁₂ -Benzo(b)fluoranthene	132	
d ₁₂ -Benzo(k)fluoranthene	100	
d ₁₂ -Benzo(a)pyrene	112	
d ₁₂ -Benzo(g,h,i)perylene	136	

Pre-spike Recovery Standard:

d ₁₂ -Benzo(e)pyrene	148
d ₁₄ -Terphenyl	115

Analyst: WJZ

Page 2 of 2

Reviewer: Gray

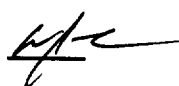
**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

Sample ID: REAGENT BLK
Lab ID: 10192-005SA
Matrix: MM5 Train

Date Received: 2/01/91
Date Extracted: 2/01/91
Sample Amount: Sample

ICAL ID: IPNA1
QC Lot: LC0201M
Units: ng/sample

<u>Compound</u>	<u>Conc.</u>	<u>D.L.</u>	<u>Qualifier</u>
Naphthalene	270		B
Acenaphthylene	3.1		
Acenaphthene	5.9		
Fluorene	25		
Phenanthrene	170		B
Anthracene	ND	5.6	
Fluoranthene	54		
Pyrene	33		
Chrysene	ND	1.5	
Benz(a)anthracene	1.3		
Benzo(b)fluoranthene	ND	1.1	
Benzo(k)fluoranthene	ND	0.88	
Benzo(a)pyrene	ND	2.7	
Benzo(g,h,i)perylene	ND	1.1	
Dibenz(a,h)anthracene	ND	1.1	
Indeno[1,2,3-cd]pyrene	ND	0.43	

Analyst: 

Reviewer: 

**POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
CALIFORNIA AIR RESOURCES BOARD METHOD 429**

Sample ID: REAGENT BLK

Lab ID: 10192-005-SA

Isotopic Recovery Results

<u>Internal Standard:</u>	<u>% R</u>	<u>Qualifier</u>
d ₅ -Naphthalene	30	H
d ₅ -Acenaphthylene	35	H
d ₁₀ -Acenaphthene	62	
d ₁₀ -Fluorene	54	
d ₁₀ -Phenanthrene	76	
d ₁₀ -Anthracene	38	H
d ₁₀ -Fluoranthene	84	
d ₁₀ -Pyrene	94	
d ₁₂ -Chrysene	63	
d ₁₂ -Benz(a)anthracene	96	
d ₁₂ -Benzo(b)fluoranthene	52	
d ₁₂ -Benzo(k)fluoranthene	70	
d ₁₂ -Benzo(a)pyrene	30	H
d ₁₂ -Benzo(g,h,i)perylene	86	

Pre-spike Recovery Standard:

d ₁₂ -Benzo(e)pyrene	NA
d ₄ -Terphenyl	NA

Analyst: 

Page 2 of 2

Reviewer: 

APPENDIX

DATA QUALIFIERS & ABBREVIATIONS

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



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE, INC./PALA
Request for Services # 10108-01

Client Sample I.D.: METHOD BLANK
Laboratory Sample I.D.: NA

Date Received: NA
Units: ug/ml

<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Detect. Limit(*)</u>	<u>Date Analyzed</u>	<u>Dil. Factor</u>
FORMALDEHYDE	MOD 430	ND	1	02/04/91	1

Method 430 detection limit 400 ng/sample

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

ND - Not detected at the corrected detection
limit.

Approved by:

Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE, INC./PALA
Request for Services # 10108-01

Client Sample I.D.: 910159
Laboratory Sample I.D.: 91000847

Date Received: 01/28/91
Units: ug/sample

<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Detect. Limit(*)</u>	<u>Date Analyzed</u>	<u>Dil. Factor</u>
FORMALDEHYDE	MOD 430	7	3	02/04/91	1

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".
ND - Not detected at the corrected detection
limit.

Approved by: Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE, INC./PALA
Request for Services # 10108-01

Client Sample I.D.: 910160 #1
Laboratory Sample I.D.: 91000848

Date Received: 01/28/91
Units: ug/sample

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
FORMALDEHYDE	MOD 430	93	18	02/04/91	1

*Range and Sensitivity
Method 430 Detection Limit 400 ng/sample*

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

ND - Not detected at the corrected detection
limit.

Approved by: Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE, INC./PALA
Request for Services # 10108-01

Client Sample I.D.: 910161 #2
Laboratory Sample I.D.: 91000849

Date Received: 01/28/91
Units: ug/sample

<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Detect. Limit(*)</u>	<u>Date Analyzed</u>	<u>Dil. Factor</u>
FORMALDEHYDE	MOD 430	62	7	02/04/91	1

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".

ND - Not detected at the corrected detection
limit.

Approved by: Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE, INC./PALA
Request for Services # 10108-01

Client Sample I.D.: 910162 #3
Laboratory Sample I.D.: 91000850

Date Received: 01/28/91
Units: ug/sample

<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Detect. Limit(*)</u>	<u>Date Analyzed</u>	<u>Dil. Factor</u>
FORMALDEHYDE	MOD 430	110	5	02/04/91	1

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".
ND - Not detected at the corrected detection
limit.

Approved by: Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE/PALA
Request for Services # 10108-01

Client Sample I.D.: METHOD BLANK
Laboratory Sample I.D.: NA

Date Received: NA
Units: ppm(v)

<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Detect. Limit(*)</u>	<u>Date Analyzed</u>	<u>Dil. Factor</u>
Benzene	CARB 430	ND	1.0	02/05/91	1

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".
ND - Not detected at the corrected detection
limit.

Approved by: Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE/PALA
Request for Services # 10108-01

Client Sample I.D.: 910147
Laboratory Sample I.D.: 91000843

Date Received: 01/28/91
Units: ppm(v)

<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Detect. Limit(*)</u>	<u>Date Analyzed</u>	<u>Dil. Factor</u>
Benzene	CARB 430 ?	ND	1.0	02/05/91	1

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".
ND - Not detected at the corrected detection
limit.

Approved by: Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE/PALA
Request for Services # 10108-01

Client Sample I.D.: 910148
Laboratory Sample I.D.: 91000844

Date Received: 01/28/91
Units: ppm(v)

<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Detect. Limit(*)</u>	<u>Date Analyzed</u>	<u>Dil. Factor</u>
Benzene	CARB 430 ?	ND	1.0	02/05/91	1

11/28

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".
ND - Not detected at the corrected detection
limit.

Approved by: Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE/PALA
Request for Services # 10108-01

Client Sample I.D.: 910149 #2
Laboratory Sample I.D.: 91000845

Date Received: 01/28/91
Units: ppm(v)

<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Detect. Limit(*)</u>	<u>Date Analyzed</u>	<u>Dil. Factor</u>
Benzene	CARB 430	ND	1.0	02/05/91	1

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".
ND - Not detected at the corrected detection
limit.

Approved by:

Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.



RESULTS OF CHEMICAL ANALYSIS
for ENGINEERING-SCIENCE/PALA
Request for Services # 10108-01

Client Sample I.D.: 910150
Laboratory Sample I.D.: 91000846

Date Received: 01/28/91
Units: ppm(v)

Analyte	Method	Result	Detect. Limit(*)	Date Analyzed	Dil. Factor
Benzene	CARB 430 ?	ND	1.0	02/05/91	1

* - To correct the Detection Limit for dilutions,
multiply this value by the "Dil. Factor".
ND - Not detected at the corrected detection
limit.

Approved by:

Ellen Jenkins

MISC.FRM

ABB Environmental Services, Inc.

ES Job No. ZA061
 Client MR. DAN KREMER, ES PASADENA
 Project PALA
 Date Collected 01/23/91
 Date Received 02/04/91

Laboratory Supervisor Approval:

Sample Matrix:
 / / Water
 / / Soil
 / X / Other

Daniel J.

PARAMETER	FIELD SAMPLE NUMBER: 910171 LABORATORY SAMPLE NUMBER: 91021049 1/23/91	910172 91021050 1/24/91	910173 91021051 1/25/91	EPA METHOD NO.	DATE OF ANALYSIS
ARSENIC, ug/g <i>ppm (w/w)</i>	<0.50	<0.50	<0.50	206.3	02/25/91
BERYLLIUM, ug/g	<0.64	<0.64	<0.64	210.1	02/26/91
CADMIUM, ug/g	<0.58	<0.58	<0.58	213.1	02/26/91
CHROMIUM, ug/g	<41.0	<41.0	<41.0	218.1	02/26/91
COPPER, ug/g	10.0	21.2	44.3	220.1	03/09/91
MERCURY, ug/g	0.68	<0.50	<0.50	245.1	03/08/91
MANGANESE, ug/g	1.58	0.94	1.13	243.1	02/28/91
NICKEL, ug/g	102	324	337	249.1	02/28/91
SELENIUM, ug/g	<0.50	<0.50	<0.50	270.3	02/26/91
ZINC, ug/g	28.8	13.9	12.3	289.1	02/27/91
LEAD, ug/g	<3.67	<3.67	<3.67	239.1	02/25/91
TOTAL CHLORIDE, %	0.63	0.57	0.61	ASTMD2861-85	02/06/91
TOTAL SULFUR, % <i>by wet gravim.</i>	0.10	0.09	0.13	ASTMD3177-84	02/06/91

APPENDIX G
SUPPORTING DATA FOR TRAIN RECOVERY SHEETS

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-23-71LOCALITY PALATECHNICIAN OKRUN# 1 METHOD _____TYPE TRAIN METALSIMP. SOLUTION HNO₃/H₂O₂
KMnO₄

NOZZLE-PROBE RINSE

UMBILICAL RINSE

IMPINGER # 1IMPINGER # 2IMPINGER # 3IMPINGER # 4

DESCRIPTION

IMPINGER RINSE

SOLUTION	VOL. (ml)	DESCRIPTION

	FINAL (g)	INITIAL (g)	NET (g)
HNO ₃ /H ₂ O ₂	450	100	350
HNO ₃ /H ₂ O ₂	360	100	260
MT	3	0	3
KMnO ₄	101	100	1

SILICA GEL
(DESCRIPTION)

	FINAL (g)	INITIAL (g)	
	807.1	786.1	21.0

FILTER#
(DESCRIPTION)

	TOTAL MOISTURE
--	----------------

FIELD BLANKS

635 (g)

DISPOSITION/COMMENTS

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-24-91RUN# 2 METHOD _____CITY PALATYPE TRACE METALS

TECHNICIAN _____

IMP. SOLUTION _____

NOZZLE-PROBE RINSE

UMBILICAL RINSE

SOLUTION	VOL. (ml)	DESCRIPTION

IMPINGER # 1IMPINGER # 2IMPINGER # 3IMPINGER # 4

DESCRIPTION

IMPINGER RINSE

	FINAL (g)	INITIAL(g)	NET(g)
HNO_3/H_2O_2	450	100	350
HNO_3/H_2O_2	455	100	355
MT	3	0	3
$KMnO_4$	102	100	2

SILICA GEL
(DESCRIPTION)

	FINAL (g)	INITIAL(g)	
	893.9	876.6	17.3

FILTER#
(DESCRIPTION)

	TOTAL MOISTURE	

FIELD BLANKS

727.3 ✓
(g)

DISPOSITION/COMMENTS

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-24-91LOCALITY PAKARUN# 3 METHOD _____TYPE TRACE METALIMP. SOLUTION H₂O₂/HNO₃
KMnO₄TECHNICIAN OB

NOZZLE-PROBE RINSE

UMBILICAL RINSE

IMPINGER # 1IMPINGER # 2IMPINGER # 3IMPINGER # 4

DESCRIPTION

IMPINGER RINSE

SILICA GEL
(DESCRIPTION)FILTER#
(DESCRIPTION)

FIELD BLANKS

DISPOSITION/COMMENTS

SOLUTION	VOL. (ml)	DESCRIPTION

	FINAL (g)	INITIAL (g)	NET (g)
HNO ₃ /H ₂ O ₂	460	100	360
HNO ₃ /H ₂ O ₂	400	100	300
MT	0	0	0
KMnO ₄	102	100	2

	FINAL (g)	INITIAL (g)	
	751.3	729.8	21.5
	TOTAL MOISTURE		

683.5 (g) ✓

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-23-91LOCALITY PALATECHNICIAN OKRUN# 1 METHOD _____TYPE CdIMP. SOLUTION 0.1 M HNO₃

NOZZLE-PROBE RINSE

UMBILICAL RINSE

SOLUTION	VOL. (ml)	DESCRIPTION

IMPINGER # 1IMPINGER # 2IMPINGER # 3

IMPINGER # _____

DESCRIPTION

IMPINGER RINSE

	FINAL (g)	INITIAL (g)	NET (g)
<u>HNO₃</u>	<u>510</u>	<u>100</u>	<u>410</u>
<u>HNO₃</u>	<u>305</u>	<u>100</u>	<u>205</u>
<u>MT</u>	<u>10</u>	<u>0</u>	<u>10</u>

SILICA GEL
(DESCRIPTION)

	FINAL (g)	INITIAL (g)	
	<u>866.0</u>	<u>839.8</u>	<u>36.2</u>

FILTER#
(DESCRIPTION)

	TOTAL MOISTURE

FIELD BLANKS

661.2 (g) ✓

DISPOSITION/COMMENTS

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-24-91LITY PALATECHNICIAN DBRUN# 2 METHOD _____TYPE CdIMP. SOLUTION 0.1 HNO₃

NOZZLE-PROBE RINSE

UMBILICAL RINSE

IMPINGER # 1IMPINGER # 2IMPINGER # 3

IMPINGER # _____

DESCRIPTION

IMPINGER RINSE

SILICA GEL
(DESCRIPTION)FILTER#
(DESCRIPTION)

FIELD BLANKS

DISPOSITION/COMMENTS

SOLUTION	VOL. (ml)	DESCRIPTION

	FINAL (g)	INITIAL (g)	NET (g)
HNO ₂	525	100	425
HNO ₃	365	100	265
MT	5	0	5

	FINAL (g)	INITIAL (g)	
	855.1	835.9	19.2
	TOTAL MOISTURE		

714.2 (g)

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-24-91RUN# 3 METHOD _____LITY PALATYPE CdTECHNICIAN DBIMP. SOLUTION 0.1 N HNO₃

SOLUTION	VOL. (ml)	DESCRIPTION

NOZZLE-PROBE RINSE

UMBILICAL RINSE

	FINAL (g)	INITIAL (g)	NET (g)
HNO ₃	540	100	440
HNO ₃	280	100	180
MT	3	0	3

IMPINGER # 1IMPINGER # 2IMPINGER # 3

IMPINGER # _____

DESCRIPTION

IMPINGER RINSE

SILICA GEL
(DESCRIPTION)

	FINAL (g)	INITIAL (g)	
	777.3	756.3	21.0
	TOTAL MOISTURE		

FILTER#
(DESCRIPTION)

FIELD BLANKS

644 (g) ✓

DISPOSITION/COMMENTS

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-25-91
CITY Pala
TECHNICIAN D. H

RUN# 1 METHOD Carb 425
TYPE Chrome
IMP. SOLUTION .1 N NaOH

NOZZLE-PROBE RINSE

UMBILICAL RINSE

IMPINGER #

IMPINGER #

IMPINGER #

IMPINGER #

DESCRIPTION

IMPINGER RINSE

SILICA GEL
(DESCRIPTION)

FILTER#
(DESCRIPTION)

FIELD BLANKS

DISPOSITION/COMMENTS

SOLUTION	VOL. (ml)	DESCRIPTION

	FINAL (g)	INITIAL (g)	NET (g)
.1 N NaOH	457	100	357
.1 N NaOH	206	100	106
M+	6	0	6

	FINAL (g)	INITIAL (g)	
	858.1	835.5	22.6
Teflon No-tare	TOTAL MOISTURE		

491.6 (g) ✓

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-29-91LITY AKATECHNICIAN DARUN# 2 METHOD _____TYPE CrIMP. SOLUTION H_2HCO_3
 H_2OH

NOZZLE-PROBE RINSE

UMBILICAL RINSE

SOLUTION	VOL. (ml)	DESCRIPTION

IMPINGER # 1IMPINGER # 2IMPINGER # 3

IMPINGER # _____

DESCRIPTION

IMPINGER RINSE

	FINAL (g)	INITIAL(g)	NET(g)
H_2OH	435	100	335
H_2OH	385	100	285
MT	0	0	0

SILICA GEL
(DESCRIPTION)

	FINAL (g)	INITIAL(g)	
	871.3	839.8	31.5

FILTER#
(DESCRIPTION)

	TOTAL MOISTURE
--	----------------

FIELD BLANKS

651.5 (g)

DISPOSITION/COMMENTS

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-29-91CITY ALARUN# 3 METHOD _____TYPE CTECHNICIAN OBIMP. SOLUTION NaOH

SOLUTION	VOL. (ml)	DESCRIPTION
NOZZLE-PROBE RINSE		
UMBILICAL RINSE		

	FINAL (g)	INITIAL (g)	NET (g)
IMPINGER # <u>1</u>			
	<u>NaOH</u>	<u>440</u>	<u>100</u>
IMPINGER # <u>2</u>			<u>340</u>
	<u>NaOH</u>	<u>425</u>	<u>100</u>
IMPINGER # <u>3</u>			<u>325</u>
	<u>MT</u>	<u>0</u>	<u>0</u>
IMPINGER # _____			
DESCRIPTION			
IMPINGER RINSE			

	FINAL (g)	INITIAL (g)	
SILICA GEL (DESCRIPTION)			
	<u>861.4</u>	<u>834.4</u>	<u>27.0</u>
FILTER# (DESCRIPTION)			
	TOTAL MOISTURE		

FIELD BLANKS

692 (g)

DISPOSITION/COMMENTS

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1-25-91LITY Pa laTECHNICIAN D. H.RUN# 1

METHOD

Carb 429.TYPE PAH

IMP. SOLUTION

D.I. H₂O

NOZZLE-PROBE RINSE

UMBILICAL RINSE

IMPINGER # 1IMPINGER # 2IMPINGER # 3IMPINGER #

DESCRIPTION

IMPINGER RINSE

SILICA GEL
(DESCRIPTION)FILTER#
(DESCRIPTION)

FIELD BLANKS

DISPOSITION/COMMENTS

SOLUTION	VOL. (ml)	DESCRIPTION

	FINAL (g)	INITIAL (g)	NET (g)
H ₂ O	416	100	316
H ₂ O	247	100	147
Mt.	2	0	2

	FINAL (g)	INITIAL (g)	
	864.7	839.5	25.2
No-tare	TOTAL MOISTURE		

490.2 (g)

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1/29/91RUN# 2 METHOD _____LOCALITY PAHATYPE PAHTECHNICIAN DBIMP. SOLUTION H₂O

SOLUTION	VOL. (ml)	DESCRIPTION
NOZZLE-PROBE RINSE		
UMBILICAL RINSE		

	FINAL (g)	INITIAL (g)	NET (g)
IMPINGER # <u>1</u>	<u>H₂O</u>	<u>470</u>	<u>100</u>
IMPINGER # <u>2</u>	<u>H₂O</u>	<u>310</u>	<u>100</u>
IMPINGER # <u>3</u>	<u>NT</u>	<u>3</u>	<u>0</u>
IMPINGER # _____			
DESCRIPTION			
IMPINGER RINSE			

	FINAL (g)	INITIAL (g)	NET (g)
SILICA GEL (DESCRIPTION)	<u>824.7</u>	<u>800.8</u>	<u>23.9</u>
FILTER# (DESCRIPTION)	TOTAL MOISTURE		

FIELD BLANKS

606.9 (g)

DISPOSITION/COMMENTS

ENGINEERING-SCIENCE, INC.

TRAIN RECOVERY SHEET

DATE 1/29/91RUN# 3 METHOD _____LITY PALATYPE PAHTECHNICIAN OBIMP. SOLUTION H₂O

SOLUTION	VOL. (ml)	DESCRIPTION
NOZZLE-PROBE RINSE		
UMBILICAL RINSE		

	FINAL (g)	INITIAL (g)	NET (g)
IMPINGER # <u>1</u>	<u>H₂O</u>	<u>485</u>	<u>100</u>
IMPINGER # <u>2</u>	<u>H₂O</u>	<u>325</u>	<u>100</u>
IMPINGER # <u>3</u>	<u>MT</u>	<u>0</u>	<u>0</u>
IMPINGER # _____			
DESCRIPTION			
IMPINGER RINSE			

	FINAL (g)	INITIAL (g)	
SILICA GEL (DESCRIPTION)	<u>873.8</u>	<u>850.1</u>	<u>23.7</u>
FILTER# (DESCRIPTION)	TOTAL MOISTURE		

FIELD BLANKS

633.7 (g)

DISPOSITION/COMMENTS

TRAIN RECOVERY SHEET

Date 1/23/91

Run # 1 Method # Card 470

Facility Pala

Type R-CH0

Technician D. Kremer

Imp. Solution DMTA

Nozzle- Probe Rinse

Umbilical Rinse

Impinger # 1

Impinger # 2

Impinger # 3

Description

Impinger Rinse

Silica Gel
(Description)

Filter #
(Description)

Field Blanks

Disposition/Comments

Solution	Vol. (ml)	Volume Marked?	
	Final (ml)	Initial (ml)	Net (ml)
	<u>41</u>	<u>10</u>	<u>31</u>
	<u>10</u>	<u>10</u>	<u>0</u>
	<u>0</u>	<u>0</u>	<u>0</u>
	Final (g)	Initial (g)	
	<u>46.2 g</u>	<u>45.2</u>	<u>1.0</u>
	Total Moisture		<u>32 ml</u>

TRAIN RECOVERY SHEET

Date 1/24/91

Run # 2 Method # Lab 430

Facility Data

Type A-CH-0

Technician DMJ

Imp. Solution ONPH

Solution	Vol. (ml)	Volume Marked?	
Nozzle- Probe Rinse			
Umbilical Rinse			
	Final (ml)	Initial (ml)	Net (ml)
Impinger # <u>1</u>	<u>33</u>	<u>10</u>	<u>23</u>
Impinger # <u>2</u>	<u>10</u>	<u>10</u>	<u>0</u>
Impinger # <u>3</u>	<u>0</u>	<u>0</u>	<u>0</u>
Description			
Impinger Rinse			
	Final (g)	Initial (g)	
Silica Gel (Description)	<u>48.3</u>	<u>47.0</u>	<u>1.3</u>
Filter # (Description)			
	Total Moisture		<u>24.3 ml</u>
Field Blanks			
Disposition/Comments			

TRAIN RECOVERY SHEET

Date 1/24/91
 Facility Palo
 Technician D. Prutista

Run # 3 Method # carb 430
 Type R-CH O
 Imp. Solution DNPA

Solution	Vol. (ml)	Volume Marked?	
Nozzle- Probe Rinse			
Umbilical Rinse			
	Final (ml)	Initial (ml)	Net
Impinger # <u>1</u>	<u>28</u>	<u>10</u>	<u>18</u>
Impinger # <u>2</u>	<u>11</u>	<u>10</u>	<u>1</u>
Impinger # <u>3</u>	<u>0</u>	<u>0</u>	<u>0</u>
Description			
Impinger Rinse			
	Final (g)	Initial (g)	
Silica Gel (Description)	<u>46.6</u>	<u>45.3</u>	<u>1.3</u>
Filter # (Description)			
	Total Moisture		<u>20.3 ml</u>
Field Blanks			
Disposition/Comments			

APPENDIX H
SUPPORTING DATA FOR CONTINUOUS EMISSIONS MONITORING

ENGINEERING SCIENCE, INC.
Pasadena, California

MOBILE SOURCE TEST VAN
CONTINUOUS EMISSIONS MONITORS DATA
CALIBRATION DRIFT CORRECTION

Project No. WA 220 Source Name PALA

Test Location BAGHOUSE STACK OUTLET Date 25 JAN. '91

Test No.	Parameter	$\bar{C}$	C_0	C_m	C_{ms}	C_{gas}
RUN #1	NOx	94.69	1.75	129.88	126.7	91.90
	SO ₂	20.38	-0.15	14.8	14.67	20.28
	O ₂	13.07	0.18	12.61	12.48	12.94
	CO ₂	6.02	0.08	10.32	10.42	6.04
RUN #2	NOx	80.44	1.50	127.38	126.7	79.45
	SO ₂	22.78	-0.20	15.05	14.67	22.11
	O ₂	13.89	0.20	12.49	12.48	13.90
	CO ₂	5.36	0.02	10.29	10.42	5.42

$$C_{gas} = (\bar{C} - C_0) (C_{ms} / (C_m - C_0))$$

C_{gas} - corrected gas concentration, ppm or %vol(dry)

$\bar{C}$ - analyzer gas concentration, ppm or % vol(dry)

C_0 - average of initial and final zero drift, ppm or % vol(dry)

C_m - average of initial and final span drift, ppm or %vol(dry)

C_{ms} - span gas cylinder concentration, ppm or %vol(dry)

EXAMPLE CALCULATION FOR CEM CALIBRATION DRIFT

1 of

Test No. PATA Run No. 1 Date 25 JAN. '91

$$C_{\text{gas}} = (C - C_0) \left(\frac{C_{\text{ma}}}{C_m - C_0} \right)$$

Where:

- C_{gas} = corrected sample gas concentration (ppm v/v)
 C = ave emissions data for the test run (ppm v/v)
 C_0 = ave of initial and final zero (ppm v/v)
 C_m = ave of initial and final span (ppm v/v)
 C_{ma} = span gas concentration (cylinder) (ppm v/v)

Sample Calculation:

Parameter NO_x Full Scale 0-250 Units ppm

$$C = \underline{94.69} \quad C_0 = \underline{1.75} \quad C_m = \underline{129.88} \quad C_{\text{ma}} = \underline{126.7}$$

$$C_{\text{gas}} = (94.69 - 1.75) \left(\frac{126.7}{129.88 - 1.75} \right)$$

$$C_{\text{gas}} = \underline{91.90}$$

Parameter CO₂ Full Scale 0-20 Units %

$$C = \underline{6.02} \quad C_0 = \underline{-0.08} \quad C_m = \underline{10.32} \quad C_{\text{ma}} = \underline{10.42}$$

$$C_{\text{gas}} = (6.02 - -0.08) \left(\frac{10.42}{10.32 - -0.08} \right)$$

$$C_{\text{gas}} = \underline{6.04}$$

Parameter SO₂ Full Scale 0-100 Units ppm

$$C = \underline{20.38} \quad C_0 = \underline{-0.15} \quad C_m = \underline{14.8} \quad C_{\text{ma}} = \underline{14.67}$$

$$C_{\text{gas}} = (20.38 - (-0.15)) \left(\frac{14.67}{14.8 - (-0.15)} \right)$$

$$C_{\text{gas}} = \underline{20.28}$$

Parameter O₂ Full Scale 0-25 Units %

$$C = \underline{13.07} \quad C_0 = \underline{0.18} \quad C_m = \underline{12.61} \quad C_{\text{ma}} = \underline{12.48}$$

$$C_{\text{gas}} = (13.07 - 0.18) \left(\frac{12.48}{12.61 - 0.18} \right)$$

$$C_{\text{gas}} = \underline{12.94}$$

ENGINEERING SCIENCE
Pasadena, California

ANALYZER CALIBRATION ERROR

Facility: PALA
Source: PALA
Location: BASTHOUSE STACK OUTLET

Date: 25 JAN. '91
Operator: DJW
Time: _____
Sheet 1 of 2

Run No.	Species	Full Scale	Cylinder Value	Analyzer Reading	Absolute Diff.	Diff. ± Span
Zero	NO ₂	0-100 ppm	0	0.2	0.2	0.2
Upscale	NO ₂	0-100 ppm	91.2	91.1	0.1	0.1
Zero	NO ₂	0-100 ppm	0	0.2	0.2	0.2
Upscale	NO ₂	0-100 ppm	45.6	46.6	1.0	1.0
Zero	NO ₂	0-100 ppm	0	0.2	0.2	0.2
Upscale	NO ₂	0-100 ppm	23.18	23.9	0.72	0.72
Zero	O ₂	0-25%	0	0.03	0.03	0.10
Upscale	O ₂	0-25%	20.9	20.75	0.15	0.60
Zero	O ₂	0-25%	0	0.03	0.03	0.10
Upscale	O ₂	0-25%	13.06	13.03	0.03	0.10
Zero	O ₂	0-25%	0	0.03	0.03	0.10
Upscale	O ₂	0-25%	12.48	12.48	0	0
Zero	O ₂	0-25%	0	0.03	0.03	0.10
Upscale	O ₂	0-25%	3.03	3.08	0.05	0.10

Run No.	Species	Full Scale	Cylinder Value	Analyzer Reading	Absolute Diff.	Diff. ± Span
Zero	CO ₂	0-20%	0	0.02	0.02	0.10
Upscale	CO ₂	0-20%	18.65	18.96	0.31	1.55
Zero	CO ₂	0-20%	0	0.02	0.02	0.10
Upscale	CO ₂	0-20%	10.42	10.54	0.12	0.60
Zero	CO ₂	0-20%	0	0.02	0.02	0.10
Upscale	CO ₂	0-20%	2.995	3.16	0.17	0.85
Zero	SO ₂	0-100 ppm	0	0.1	0.1	0.1
Upscale	SO ₂	0-100 ppm	89.1	89.0	0.1	0.1
Zero	SO ₂	0-100 ppm	0	0.1	0.1	0.1
Upscale	SO ₂	0-100 ppm	44.7	44.9	0.2	0.2
Zero	SO ₂	0-100 ppm	0	0.1	0.1	0.1
Upscale	SO ₂	0-100 ppm	14.67	14.5	0.17	0.17

Sheet 1 of 1

Date: 25 JAN. 191

Data Reduced By: CNM

Location: BAGHOUSE STACK OUTLET

[illegible]

Project: PA1-AData Reduced By: CNM

Date: 25 JAN. '91

Operator: DJW

Plant: ~~PLA~~

Location: ~~BAGHOUSE STACK OUTLET~~

[illegible]

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PALA
Source: PALA
Location: BAGHOUSE STACK OUTLET

Date: 25 JAN. '91
Operator: DJN
Time: 10:15 - 11:15 & 11:45 - 12:45
Sheet: 1 of 2

Run No. <u>1</u>	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero	NO ₂				
Upscale					
Zero	NO ₂	0-250 ppm	0.75	2.75	0.80
Upscale			127.75	132.0	1.70
Zero	CO				
Upscale					
Zero	SO ₂	0-100 ppm	0.10	-0.40	-0.50
Upscale			14.8	14.8	0
Zero	O ₂	0-25%	-0.05	0.40	1.80
Upscale			12.28	12.93	2.60
Zero	CO ₂	0-20%	0.02	0.14	0.60
Upscale			10.50	10.14	-1.80

Run No. <u>2</u>	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero	NO ₂				
Upscale					
Zero	NO ₂	0-250 ppm	2.75	0.25	-1.0
Upscale			127.25	127.50	0.10
Zero	CO				
Upscale					
Zero	SO ₂	0-100 ppm	-0.40	0	0.40
Upscale			14.8	15.3	0.50
Zero	O ₂	0-25%	0.40	0	-1.60
Upscale			12.70	12.28	-1.68
Zero	CO ₂	0-20%	0.14	-0.10	-1.20
Upscale			10.26	10.32	0.30

ENGINEERING SCIENCE, INC.
Pasadena, California

MOBILE SOURCE TEST VAN
CONTINUOUS EMISSIONS MONITORS DATA
CALIBRATION DRIFT CORRECTION

Project No. WA220 Source Name PA1A
Test Location STACK OUTLET Date 25 JAN. '91

Test No.	Parameter	$\bar{C}$	C_0	C_m	C_{ms}	C_{gas}
RUN # 1	O ₃	0.266	0	0.518	0.508	0.261
RUN # 2	O ₃	0.233	0	0.527	0.508	0.225

$$C_{gas} = (\bar{C} - C_0) (C_{ms} / (C_m - C_0))$$

C_{gas} - corrected gas concentration, ppm or %vol(dry)

$\bar{C}$ - analyzer gas concentration, ppm or % vol(dry)

C_0 - average of initial and final zero drift, ppm or % vol(dry)

C_m - average of initial and final span drift, ppm or %vol(dry)

C_{ms} - span gas cylinder concentration, ppm or %vol(dry)

ENGINEERING SCIENCE
Pasadena, California

SAMPLE SYSTEM BIAS TEST

Facility: PALA Date: 25 JAN. '91
 Source: PALA Operator: DJW
 Location: BACKHOUSE STACK OUTLET Time:
 Sheet 1 of 1

Run No. <u>POST-CAL</u>	Specie	Full Scale	Calib. Response	Initial Values		Final Values	
				Response	± Bias	Response	± Bias
Zero	CO						
Upscale							
Zero	SO ₂	0-100 ppm		0		0.5	0.50
Upscale				15.3		15.1	-0.20
Zero	NO _x	0-250 ppm		0.25		0	-0.10
Upscale				127.50		124.75	-1.10
Zero	O ₂						
Upscale							
Zero	CO ₂						
Upscale							

EXAMPLE CALCULATION FOR CEM CALIBRATION DRIFT

Test No. PALA Run No. 1 Date 25 JAN. '91

$$C_{\text{gas}} = (C - C_0) \left(\frac{C_{\text{ma}}}{C_m - C_0} \right)$$

Where:

- C_{gas} = corrected sample gas concentration (ppm v/v)
 C = ave emissions data for the test run (ppm v/v)
 C_0 = ave of initial and final zero (ppm v/v)
 C_m = ave of initial and final span (ppm v/v)
 C_{ma} = span gas concentration (cylinder) (ppm v/v)

Sample Calculation:

Parameter O₃ Full Scale 0-1 Units ppm

$$C = \underline{0.266} \quad C_0 = \underline{0} \quad C_m = \underline{0.518} \quad C_{\text{ma}} = \underline{0.508}$$

$$C_{\text{gas}} = (0.266 - 0) \left(\frac{0.508}{0.518 - 0} \right)$$

$$C_{\text{gas}} = \underline{0.261}$$

Parameter _____ Full Scale _____ Units _____

$$C = \underline{\quad} \quad C_0 = \underline{\quad} \quad C_m = \underline{\quad} \quad C_{\text{ma}} = \underline{\quad}$$

$$C_{\text{gas}} = (\quad - \quad) \left(\frac{\quad}{\quad - \quad} \right)$$

$$C_{\text{gas}} = \underline{\quad}$$

Parameter _____ Full Scale _____ Units _____

$$C = \underline{\quad} \quad C_0 = \underline{\quad} \quad C_m = \underline{\quad} \quad C_{\text{ma}} = \underline{\quad}$$

$$C_{\text{gas}} = (\quad - \quad) \left(\frac{\quad}{\quad - \quad} \right)$$

$$C_{\text{gas}} = \underline{\quad}$$

Parameter _____ Full Scale _____ Units _____

$$C = \underline{\quad} \quad C_0 = \underline{\quad} \quad C_m = \underline{\quad} \quad C_{\text{ma}} = \underline{\quad}$$

$$C_{\text{gas}} = (\quad - \quad) \left(\frac{\quad}{\quad - \quad} \right)$$

$$C_{\text{gas}} = \underline{\quad}$$

Sheet 1 of

Data Reduced By: *CHM*

Date: 25 JAN. 191

Location:

Operator: DTW

[illegible]

ENGINEERING SCIENCE
Pasadena, California

ANALYZER CALIBRATION ERROR

Facility: PALA
Source: PALA
Location: STACK OUTLET

Date: 29 JAN. 191
Operator: DJW
Time: _____
Sheet 1 of 1

Run No.	Specie	Full Scale	Cylinder Value	Analyzer Reading	Absolute Diff.	Diff. ± Span
PRE-CH						
Zero	O ₃	0-1 ppm	0	0	0	0
Upscale	O ₃	0-1 ppm	0.762	0.752	0.010	1.0
Zero	O ₃	0-1 ppm	0	0	0	0
Upscale	O ₃	0-1 ppm	0.508	0.513	0.005	0.50
Zero	O ₃	0-1 ppm	0	0	0	0
Upscale	O ₃	0-1 ppm	0.118	0.118	0	0
Zero	O ₂					
Upscale	O ₂					
Zero	O ₂					
Upscale	O ₂					
Zero	O ₂					
Upscale	O ₂					

Run No.	Specie	Full Scale	Cylinder Value	Analyzer Reading	Absolute Diff.	Diff. ± Span
Zero	CO					
Upscale	CO					
Zero	CO					
Upscale	CO					
Zero	SO ₂					
Upscale	SO ₂					
Zero	SO ₂					
Upscale	SO ₂					

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PA1A
Source: PA1A
Location: STACK OUTLET

Date: 25 JAN. 91
Operator: DJW
Time: 1105-1205 & 1245-1300
Sheet: 1 of 1

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	O ₃	0-1 ppm	0	0	0
Zero Upscale	O ₃	0-1 ppm	0.513	0.522	0.90
Zero Upscale	NO _x				
Zero Upscale	CO				
Zero Upscale	O				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	O ₃	0-1 ppm	0	0	0
Zero Upscale	O ₃	0-1 ppm	0.522	0.531	0.90
Zero Upscale	NO _x				
Zero Upscale	CO				
Zero Upscale	O				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

ENGINEERING SCIENCE, INC.
Pasadena, California

MOBILE SOURCE TEST VAN
CONTINUOUS EMISSIONS MONITORS DATA
CALIBRATION DRIFT CORRECTION

Project No. WA-683 WA 220

Source Name PALA ASPHALT

Test Location BH STACK OUTLET

Date 28 JAN. '91

Test No.	Parameter	$\bar{C}$	C_0	C_m	C_{ms}	C_{gas}
RUN #1	NO _x	93.38	0.75	89.0	90.1	94.57
	SO ₂	13.55	0.85	15.40	14.71	12.84
	O ₂	12.02	0.03	13.73	13.66	11.95
	CO ₂	6.66	0.02	9.39	9.37	6.64
RUN #2	NO _x	95.31	1.38	90.0	90.1	95.50
	SO ₂	16.10	0.65	15.0	14.71	15.84
	O ₂	11.91	0.02	13.81	13.66	11.78
	CO ₂	6.73	0.05	9.36	9.37	6.72
RUN #3	NO _x	95.38	1.88	89.88	90.1	95.73
	SO ₂	17.05	0.85	15.35	14.71	16.43
	O ₂	11.72	-0.02	13.78	13.66	11.62
	CO ₂	6.82	0.06	9.42	9.37	6.77

$$C_{gas} = (\bar{C} - C_0) (C_{ms} / (C_m - C_0))$$

C_{gas} - corrected gas concentration, ppm or %vol(dry)

$\bar{C}$ - analyzer gas concentration, ppm or % vol(dry)

C_0 - average of initial and final zero drift, ppm or % vol(dry)

C_m - average of initial and final span drift, ppm or %vol(dry)

C_{ms} - span gas cylinder concentration, ppm or %vol(dry)

EXAMPLE CALCULATION FOR
CEM CALIBRATION DRIFT

Test No. PALA Run No. 1 Date 28 JAN. '91

$$C_{\text{gas}} = (C - C_0) \left(\frac{C_{\text{ma}}}{C_m - C_0} \right)$$

Where:

C_{gas} = corrected sample gas concentration (ppm v/v)
 C = ave emissions data for the test run (ppm v/v)
 C_0 = ave of initial and final zero (ppm v/v)
 C_m = ave of initial and final span (ppm v/v)
 C_{ma} = span gas concentration (cylinder) (ppm v/v)

Sample Calculation:

Parameter NOx Full Scale 0-250 Units ppm

$$C = \underline{93.38} \quad C_0 = \underline{0.75} \quad C_m = \underline{89.0} \quad C_{\text{ma}} = \underline{90.1}$$

$$C_{\text{gas}} = (93.38 - 0.75) \left(\frac{90.1}{89.0 - 0.75} \right)$$

$$C_{\text{gas}} = \underline{94.57}$$

Parameter SO2 Full Scale 0-100 Units ppm

$$C = \underline{13.55} \quad C_0 = \underline{0.85} \quad C_m = \underline{15.40} \quad C_{\text{ma}} = \underline{14.71}$$

$$C_{\text{gas}} = (13.55 - 0.85) \left(\frac{14.71}{15.40 - 0.85} \right)$$

$$C_{\text{gas}} = \underline{12.84}$$

Parameter O2 Full Scale 0-25 Units %

$$C = \underline{12.02} \quad C_0 = \underline{0.03} \quad C_m = \underline{13.73} \quad C_{\text{ma}} = \underline{13.66}$$

$$C_{\text{gas}} = (12.02 - 0.03) \left(\frac{13.66}{13.73 - 0.03} \right)$$

$$C_{\text{gas}} = \underline{11.95}$$

Parameter CO2 Full Scale 0-20 Units %

$$C = \underline{6.66} \quad C_0 = \underline{0.02} \quad C_m = \underline{9.39} \quad C_{\text{ma}} = \underline{9.37}$$

$$C_{\text{gas}} = (6.66 - 0.02) \left(\frac{9.37}{9.39 - 0.02} \right)$$

$$C_{\text{gas}} = \underline{6.64}$$

**ENGINEERING-SCIENCE
SUMMARY OF CEM DATA**

Sheet 1 of 2

Project: PALA

Date: 28 JAN. '91

Data Reduced By: CNM

Plant: PALA ASPHALT

Operator: DJW

Location: BAGHOUSE STACK OUTLET

Date & Time	NOX		CO		SO2		O2		CO2			
	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (%)	% Chart	Conc.
PRE-CAL.	0.2	0			1.0	0	0.1	0	0	0		
	92.0	230.6			82.1	82.1	54.9	13.66	95.0	18.76		
	50.2	126.7			45.4	44.7	51.7	12.87	47.0	9.37		
	35.1	90.1			15.7	14.7	12.8	3.06	17.4	3.41		
	17.8	45.6			(0-100ppm F/S)	(0-100ppm F/S)	(0-25% F/S)	(0-20% F/S)				
	(0-250ppm F/S)											
RUN #1												
0926-0945	33.8	84.50			10.9	10.9	49.9	12.48	31.6	6.32		
0945-1000	36.5	91.25			12.9	12.9	48.7	12.18	32.9	6.58		
1000-1015	39.3	98.25			15.3	15.3	46.8	11.70	34.4	6.88		
1015-1030	39.8	99.50			15.1	15.1	46.9	11.73	34.2	6.84		
AVE		93.38			13.55	13.55		12.02	34.2	6.66		
MID-CAL.	0.4	0			0.7	0	0.1	0	0.2	0		
	51.1	126.7			15.1	14.7	54.9	13.66	46.2	9.37		
	36.1	90.1			(0-100ppm F/S)	(0-100ppm F/S)	(0-25% F/S)	(0-20% F/S)				
	(0-250ppm F/S)											
RUN #2												
1045-1100	38.2	95.50			14.2	14.2	46.9	11.73	34.0	6.80		
1100-1115	37.7	94.25			15.1	15.1	47.7	11.73	33.4	6.68		
1115-1130	37.5	93.75			15.9	15.9	48.4	12.18	33.3	6.66		
1130-1145	39.1	97.75			9.2	9.2	47.5	11.88	33.9	6.78		
AVE.		95.31			16.10	16.10		11.91		6.73		

Sheet 2 of 2

Date: 28 JAN. '91

Location: BAGHOUSE STACK OUTLET

Operator: DJW

[illegible]

ENGINEERING SCIENCE
Pasadena, California

ANALYZER CALIBRATION ERROR

Facility: PALA
Source: PALA ASPHALT
Location: BADHOUSE STACK OUTLET

Date: 28 JAN. 191
Operator: DJW
Time: _____
Sheet 1 of 1

Run No.	Species	Full Scale	Cylinder Value	Analyzer Reading	Absolute Diff.	Diff. ± Span
PRE-CAL						
Zero	NO _x	0-250 ppm	0	0.50	0.50	0.20
Upscale			230.6	230.0	0.60	0.24
Zero	NO _x	0-250 ppm	0	0.50	0.50	0.20
Upscale			126.7	125.5	1.20	0.48
Zero	NO _x	0-250 ppm	0	0.50	0.50	0.20
Upscale			90.1	87.75	2.35	0.94
Zero	NO _x	0-250 ppm	0	0.50	0.50	0.20
Upscale			45.6	44.50	1.10	0.44
Zero	O ₂	0-25%	0	0.03	0.03	0.12
Upscale			13.66	13.73	0.07	0.28
Zero	O ₂	0-25%	0	0.03	0.03	0.12
Upscale			12.87	12.93	0.06	0.24
Zero	O ₂	0-25%	0	0.03	0.03	0.12
Upscale			3.06	3.10	0.14	0.56

Run No.	Species	Full Scale	Cylinder Value	Analyzer Reading	Absolute Diff.	Diff. ± Span
Zero	CO ₂	0-20%	0	0	0	0
Upscale			18.76	19.0	0.24	1.20
Zero	CO ₂	0-20%	0	0	0	0
Upscale			9.37	9.40	0.03	0.15
Zero	CO ₂	0-20%	0	0	0	0
Upscale			3.41	3.48	0.07	0.35
Zero	SO ₂	0-100 ppm	0	1.0	1.0	1.0
Upscale			89.1	89.1	0	0
Zero	SO ₂	0-100 ppm	0	1.0	1.0	1.0
Upscale			44.7	45.4	0.70	0.70
Zero	SO ₂	0-100 ppm	0	1.0	1.0	1.0
Upscale			14.71	15.7	0.99	0.99

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PAA
Source: PAA ASHART
Location: BASELINE STACK OUTLET

Date: 28 JAN. 191
Operator: DJW
Time: 0926-1030 & 1045-1145
Sheet 1 of 2

Run No. <u>1</u>	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	NO ₂				
Zero Upscale	NO ₂	0-250 ppm	0.50 87.75	1.00 90.25	0.20 1.0
Zero Upscale	CO				
Zero Upscale	SO ₂	0-100 ppm	1.0 15.7	0.7 15.1	-0.3 -0.6
Zero Upscale	O ₂	0-25%	0.03 13.73	0.03 13.73	0 0
Zero Upscale	CO ₂	0-20%	0 9.40	0.04 9.38	0.20 -0.10

Run No. <u>2</u>	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	NO ₂				
Zero Upscale	NO ₂	0-250 ppm	1.00 90.25	1.75 89.75	0.30 -0.20
Zero Upscale	CO				
Zero Upscale	SO ₂	0-100 ppm	0.7 15.1	0.6 14.9	-0.10 -0.20
Zero Upscale	O ₂	0-25%	0.03 13.73	0 13.88	-0.12 0.10
Zero Upscale	CO ₂	0-20%	0.04 9.38	0.06 9.34	0.10 -0.20

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PAIA
Source: PAIA ASPHALT
Location: BASTHOUSE STACK OUTLET

Date: 28 JAN. 1991
Operator: DJW
Time: 1155 - 1225
Sheet 2 of 2

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	NO _x				
Zero Upscale	NO _x	0-450 ppm	1.75	2.0	0.10
Zero Upscale	NO _x		89.75	90.0	0.10
Zero Upscale	CO				
Zero Upscale	SO ₂	0-100 ppm	0.6	1.1	0.50
Zero Upscale	SO ₂		14.9	15.8	0.90
Zero Upscale	O ₂	0-25%	0	-0.03	-0.12
Zero Upscale	O ₂		13.63	13.93	1.20
Zero Upscale	CO ₂	0-20%	0.06	0.06	0
Zero Upscale	CO ₂		9.34	9.50	0.80

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	NO _x				
Zero Upscale	NO _x				
Zero Upscale	CO				
Zero Upscale	CO				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

ENGINEERING SCIENCE
Pasadena, California

SAMPLE SYSTEM BIAS TEST

Facility: PALA Date: 28 JAN. '91
 Source: PALA ASPHALT Operator: DJW
 Location: BAGHOUSE STACK OUTLET Time: _____
 Sheet 1 of 1

Run No.	Specie	Full Scale	Calib. Response	Initial Values		Final Values	
				Response	± Bias	Response	± Bias
Zero	CO						
Upscale							
Zero	SO ₂	0-100 ppm		1.1		0.7	-0.40
Upscale				15.8		15.1	-0.70
Zero	NO _x	0-250 ppm		2.0		2.0	0
Upscale				90.0		89.75	-0.10
Zero	O ₂						
Upscale							
Zero	CO ₂						
Upscale							

ENGINEERING SCIENCE, INC.
Pasadena, California

MOBILE SOURCE TEST VAN
CONTINUOUS EMISSIONS MONITORS DATA
CALIBRATION DRIFT CORRECTION

Project No. WA 220

Source Name ALA ASPHALT

Test Location BH STACK OUTLET

Date 18 JAN. 191

Test No.	Parameter	$\bar{C}$	C_0	C_m	C_{ms}	C_{gas}
RUN #1	O ₃	0.149	0.006	0.502	0.508	0.146
RUN #2	O ₃	0.179	0.006	0.500	0.508	0.178
RUN #3	O ₃	0.203	0.004	0.498	0.508	0.205

$$C_{gas} = (\bar{C} - C_0) (C_{ms} / (C_m - C_0))$$

C_{gas} - corrected gas concentration, ppm or %vol(dry)

$\bar{C}$ - analyzer gas concentration, ppm or % vol(dry)

C_0 - average of initial and final zero drift, ppm or % vol(dry)

C_m - average of initial and final span drift, ppm or %vol(dry)

C_{ms} - span gas cylinder concentration, ppm or %vol(dry)

EXAMPLE CALCULATION FOR
CEM CALIBRATION DRIFTTest No. DATA

Run No. _____

Date 28/Jan/91

$$C_{\text{gas}} = (C - C_0) \left(\frac{C_{\text{ma}}}{C_m - C_0} \right)$$

Where:

- C_{gas} = corrected sample gas concentration (ppm v/v)
 C = ave emissions data for the test run (ppm v/v)
 C_0 = ave of initial and final zero (ppm v/v)
 C_m = ave of initial and final span (ppm v/v)
 C_{ma} = span gas concentration (cylinder) (ppm v/v)

Sample Calculation:

Parameter O₃ Full Scale 0-1 Units ppm

$$C = \underline{0.149} \quad C_0 = \underline{0.006} \quad C_m = \underline{0.502} \quad C_{\text{ma}} = \underline{0.508}$$

$$C_{\text{gas}} = (0.149 - 0.006) \left(\frac{0.508}{0.502 - 0.006} \right)$$

$$C_{\text{gas}} = \underline{\hspace{2cm}}$$

Parameter _____ Full Scale _____ Units _____

$$C = \underline{\hspace{1cm}} \quad C_0 = \underline{\hspace{1cm}} \quad C_m = \underline{\hspace{1cm}} \quad C_{\text{ma}} = \underline{\hspace{1cm}}$$

$$C_{\text{gas}} = (\quad - \quad) \left(\frac{\quad}{\quad - \quad} \right)$$

$$C_{\text{gas}} = \underline{\hspace{2cm}}$$

Parameter _____ Full Scale _____ Units _____

$$C = \underline{\hspace{1cm}} \quad C_0 = \underline{\hspace{1cm}} \quad C_m = \underline{\hspace{1cm}} \quad C_{\text{ma}} = \underline{\hspace{1cm}}$$

$$C_{\text{gas}} = (\quad - \quad) \left(\frac{\quad}{\quad - \quad} \right)$$

$$C_{\text{gas}} = \underline{\hspace{2cm}}$$

Parameter _____ Full Scale _____ Units _____

$$C = \underline{\hspace{1cm}} \quad C_0 = \underline{\hspace{1cm}} \quad C_m = \underline{\hspace{1cm}} \quad C_{\text{ma}} = \underline{\hspace{1cm}}$$

$$C_{\text{gas}} = (\quad - \quad) \left(\frac{\quad}{\quad - \quad} \right)$$

$$C_{\text{gas}} = \underline{\hspace{2cm}}$$

Sheet 1 of 2

Date: 28 JAN. '91

Data Reduced By: CHM

Location: BAGHOUSE STACK OUTLET

[illegible]

Sheet 2 of 2

Date: 28 JAN. '91

Data Reduced By: CM

Operator: DJW

[illegible]

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PALA
Source: PALA ASPHALT
Location: BH STACK OUTLET

Date: 18 JAN. 1971
Operator: DJW
Time: 0937-1030 & 1047-1145
Sheet 1 of 2

Run No.	Species	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	O ₃	0-1 ppm	0.006 0.503	0.006 0.500	0 -0.30
Zero Upscale	NO _x				
Zero Upscale	CO				
Zero Upscale	CO				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

Run No.	Species	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	O ₃	0-1 ppm	0.006 0.500	0.005 0.499	-0.10 -0.10
Zero Upscale	NO _x				
Zero Upscale	CO				
Zero Upscale	CO				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PAMA
 Source: PAMA ASPHALT
 Location: BH STACK OUTLET

Date: 28 JAN. 91
 Operator: DJW
 Time: 1207-1225
 Sheet: 2 of 2

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	O	0-1 ppm	0.005	0.003	-0.20
Zero Upscale	NO _x		0.499	0.497	-0.20
Zero Upscale	CO				
Zero Upscale	CO				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	NO _x				
Zero Upscale	NO _x				
Zero Upscale	CO				
Zero Upscale	CO				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

ENGINEERING SCIENCE, INC.
Pasadena, California

MOBILE SOURCE TEST VAN
CONTINUOUS EMISSIONS MONITORS DATA
CALIBRATION DRIFT CORRECTION

Project No. WA 220 Source Name PALA ASPHALT
Test Location BH STACK OUTLET Date 29 JAN. '91

Test No.	Parameter	$\bar{C}$	C_0	C_m	C_{ms}	C_{gas}
RUN #1	NO _x	98.06	0.75	90.63	90.1	97.55
	SO ₂	32.88	0.45	14.50	14.71	33.95
	O ₂	10.62	0	13.46	13.66	10.78
	CO ₂	7.10	0.06	9.38	9.37	7.08
RUN #2	NO _x	89.19	0.75	90.88	90.1	88.41
	SO ₂	27.50	0.60	14.60	14.71	28.26
	O ₂	12.15	0	13.51	13.66	12.28
	CO ₂	6.48	0.08	9.38	9.37	6.45
RUN #3	NO _x	86.81	1.38	90.25	90.1	86.61
	SO ₂	30.63	0.9	45.1	44.7	30.07
	O ₂	12.27	-0.03	13.62	13.66	12.31
	CO ₂	6.35	0.08	9.38	9.37	6.32

$$C_{gas} = (\bar{C} - C_0) (C_{ms} / (C_m - C_0))$$

C_{gas} - corrected gas concentration, ppm or %vol(dry)

$\bar{C}$ - analyzer gas concentration, ppm or % vol(dry)

C_0 - average of initial and final zero drift, ppm or % vol(dry)

C_m - average of initial and final span drift, ppm or %vol(dry)

C_{ms} - span gas cylinder concentration, ppm or %vol(dry)

EXAMPLE CALCULATION FOR CEM CALIBRATION DRIFT

PALA

 Test No. _____ Run No. 1 Date 29 JAN, '91

$$C_{\text{gas}} = (C - C_0) \left(\frac{C_{\text{ma}}}{C_m - C_0} \right)$$

Where:

- C_{gas} = corrected sample gas concentration (ppm v/v)
 C = ave emissions data for the test run (ppm v/v)
 C_0 = ave of initial and final zero (ppm v/v)
 C_m = ave of initial and final span (ppm v/v)
 C_{ma} = span gas concentration (cylinder) (ppm v/v)

Sample Calculation:

 Parameter NO_x Full Scale 0-250 Units ppm

$$C = \underline{98.06} \quad C_0 = \underline{0.75} \quad C_m = \underline{90.63} \quad C_{\text{ma}} = \underline{90.1}$$

$$C_{\text{gas}} = (98.06 - 0.75) \left(\frac{90.1}{90.63 - 0.75} \right)$$

$$C_{\text{gas}} = \underline{97.55}$$

 Parameter SO₂ Full Scale 0-100 Units ppm

$$C = \underline{32.88} \quad C_0 = \underline{0.45} \quad C_m = \underline{14.50} \quad C_{\text{ma}} = \underline{14.71}$$

$$C_{\text{gas}} = (32.88 - 0.45) \left(\frac{14.71}{14.50 - 0.45} \right)$$

$$C_{\text{gas}} = \underline{33.95} \quad \checkmark$$

 Parameter O₂ Full Scale 0-25 Units %

$$C = \underline{10.62} \quad C_0 = \underline{0} \quad C_m = \underline{13.46} \quad C_{\text{ma}} = \underline{13.66}$$

$$C_{\text{gas}} = (10.62 - 0) \left(\frac{13.66}{13.46 - 0} \right)$$

$$C_{\text{gas}} = \underline{10.78} \quad \checkmark$$

 Parameter CO₂ Full Scale 0-20 Units %

$$C = \underline{7.10} \quad C_0 = \underline{0.06} \quad C_m = \underline{9.38} \quad C_{\text{ma}} = \underline{9.37}$$

$$C_{\text{gas}} = (7.10 - 0.06) \left(\frac{9.37}{9.38 - 0.06} \right)$$

$$C_{\text{gas}} = \underline{7.08}$$

ENGINEERING-SCIENCE
SUMMARY OF CEM DATA

Sheet 1 of 2
Date: 29 JAN. 91
Operator: DJW

Project: PALA Data Reduced By: CNM
Plant: PALA ASPHALT Location: BASHOUSE STACK OUTLET

Date & Time	NOX		CO		SO2		O2		CO2		Conc.	% Chart	Conc.	% Chart	Conc.	% Chart
	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (%)						
PRE-CAL.	0.4	0			8.6	0	0	0	0.2	0						
	50.7	126.7			14.9	14.7	54.7	13.66	46.9	9.37						
	35.7	90.1			(0-100 ppm FTS)		(0-25 % FTS)		(0-20 % FTS)							
	(0-250 ppm FTS)															
RUN #1																
0730-0745	27.9	94.75			24.9	24.9	46.1	11.53	34.9	6.98						
0745-0800	40.9	102.25			36.1	36.1	43.7	10.93	36.7	7.34						
0804-0815	42.1	105.25			39.2	39.2	42.9	10.73	37.5	7.50						
0815-0830	36.1	90.0			31.3	31.3	37.1	9.28	32.8	6.56						
AVE.		98.06			32.88			10.62		7.10						
MID-CAL.	0.2	0			0.3	0	0	0	0.4	0						
	52.0	126.7			44.0	44.7	52.9	13.66	46.9	9.37						
	36.8	90.1			14.1	14.7	54.1	3.66	(0-20 % FTS)							
	36.0	90.1			(0-100 ppm FTS)		(0-25 % FTS)									
	(0-250 ppm FTS)															
RUN #2																
0845-0900	29.3	73.25			19.9	19.9	52.9	13.23	28.5	5.70						
0900-0915	38.3	95.75			27.1	27.1	47.0	11.75	34.1	6.82						
0915-0930	38.9	97.25			32.8	32.8	46.4	11.60	34.2	6.84						
0930-0945	36.2	90.50			30.2	30.20	48.1	12.03	32.8	6.56						
AVE.		89.19				27.50		12.15		6.48						

* ADJUSTED

**ENGINEERING-SCIENCE
SUMMARY OF CEM DATA**

Sheet 2 of 2

Date: 29 JAN, 97

Operator: DJW

Project: PALA Data Reduced By: CNM

Plant: PALA ASPHALT Location: BAGHOUSE STACK OUTLET

Date & Time	NOX		CO		SO2		O2		CO2		% Chart	Conc.	% Chart	Conc.
	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (%)				
MID-CAL.	0.4	0			0.9	0	0	0	0.4	0				
	52.1	126.7			45.1	44.7	53.9	13.66	46.9	9.37				
	36.7	90.1			15.1	14.7	(0-25% FS)	(0-20% FS)	(0-20% FS)					
	35.9	90.1			(0-100 ppm FS)									
	(0-250 ppm FS)													
RUN # 3														
1004-1015	27.3	68.25			21.3	21.3	53.3	13.33	27.1	5.42				
1015-1030	28.8	72.0			22.2	22.2	53.5	13.38	27.9	5.58				
1030-1045	40.7	101.75			36.4	36.4	45.1	11.28	35.5	7.10				
1045-1100	42.1	105.25			42.6	42.6	44.4	11.10	36.4	7.28				
AVE.		86.81				30.63		12.07		6.35				
POST CAL.	0.7	0			0.9	0	-0.2	0	0.4	0				
	51.5	126.7			45.1	44.7	55.0	13.66	46.9	9.37				
	36.3	90.1			(0-100 ppm FS)	(0-250 ppm)	(0-25% FS)	(0-20% FS)	(0-20% FS)					
SAMPLE BIAS	0.7	0			0.5	0								
	51.1	126.7			45.0	44.7								
	36.1	90.1			(0-100 ppm FS)									
	(0-250 ppm FS)													

* ADJUSTED

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PALA
Source: PALA ASPHALT
Location: BT STACK OUTLET

Date: 29 JAN. 91
Operator: DJW
Time: 0730 - 0830 R0845-0945
Sheet 1 of 2

Run No. <u>1</u>	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero	NO _x				
Upscale	NO _x				
Zero	NO _x	0-250 ppm	1.0	0.50	-0.20
Upscale	NO _x	ppm	89.25	92.0	1.10
Zero	CO				
Upscale	CO				
Zero	SO ₂	0-100 ppm	0.6	0.3	-0.30
Upscale	SO ₂	ppm	14.9	14.1	-0.80
Zero	O ₂	0-25%	0	0	0
Upscale	O ₂	%	13.68	13.23	-1.80
Zero	CO ₂	0-20%	0.04	0.08	0.10
Upscale	CO ₂	%	9.38	9.38	0

Run No. <u>2</u>	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero	NO _x				
Upscale	NO _x				
Zero	NO _x	0-250 ppm	0.50	1.0	0.20
Upscale	NO _x	ppm	90.0	91.75	0.70
Zero	CO				
Upscale	CO				
Zero	SO ₂	0-100 ppm	0.3	0.9	0.6
Upscale	SO ₂	ppm	14.1	15.1	1.1
Zero	O ₂	0-25%	0	0	0
Upscale	O ₂	%	13.53	13.48	-0.20
Zero	CO ₂	0-20%	0.08	0.08	0
Upscale	CO ₂	%	9.38	9.38	0

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PALA
Source: PALA ASPHALT
Location: BH STACK OUTLET

Date: 29 JAN. 1971
Operator: DJW
Time: 1004-1100
Sheet 2 of 2

Run No.	Species	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	NO ₂				
Zero Upscale	NO ₂	0-250 ppm	1.0 89.75	1.75 90.75	0.30 0.40
Zero Upscale	CO				
Zero Upscale	SO ₂	0-100 ppm	0.9 45.1	0.9 45.1	0 0
Zero Upscale	O ₂	0-25%	0 13.48	-0.05 13.75	-0.20 1.08
Zero Upscale	CO ₂	0-20%	0.08 9.38	0.08 9.38	0 0

Run No.	Species	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	NO ₂				
Zero Upscale	NO ₂				
Zero Upscale	CO				
Zero Upscale	SO ₂				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

ENGINEERING SCIENCE
Pasadena, California

SAMPLE SYSTEM BIAS TEST

Facility: PAA Date: 29 JAN. '91
 Source: PAA ASPHALT Operator: DJW
 Location: BH STACK OUTLET Time: _____
 Sheet 1 of 1

Run No. <u>POST-CA</u>	Specie	Full Scale	Calib. Response	Initial Values		Final Values	
				Response	± Bias	Response	± Bias
Zero	CO						
Upscale							
Zero	SO ₂	0-60 ppm		0.90		0.50	-0.40
Upscale				45.1		45.0	-0.10
Zero	NO _x	0-250 ppm		1.75		1.75	0
Upscale				90.75		90.75	-0.20
Zero	O ₂						
Upscale							
Zero	CO ₂						
Upscale							

ENGINEERING SCIENCE, INC.
Pasadena, California

MOBILE SOURCE TEST VAN
CONTINUOUS EMISSIONS MONITORS DATA
CALIBRATION DRIFT CORRECTION

Project No. WA 220

Source Name PALA ASPHALT

Test Location BH STACK OUTLET

Date 29 JAN 1991

Test No.	Parameter	$\bar{C}$	C_0	C_m	C_{ms}	C_{gas}
RUN #1	O ₃	0.332	0.003	0.514	0.508	0.327
RUN #2	O ₃	0.297	0.003	0.514	0.508	0.292
RUN #3	O ₃	0.258	0.002	0.509	0.508	0.257

$$C_{gas} = (\bar{C} - C_0) (C_{ms} / (C_m - C_0))$$

C_{gas} - corrected gas concentration, ppm or %vol(dry)

$\bar{C}$ - analyzer gas concentration, ppm or % vol(dry)

C_0 - average of initial and final zero drift, ppm or % vol(dry)

C_m - average of initial and final span drift, ppm or %vol(dry)

C_{ms} - span gas cylinder concentration, ppm or %vol(dry)

EXAMPLE CALCULATION FOR CEM CALIBRATION DRIFT

Test No. PAVA Run No. 1 Date 29 JAN. '91

$$C_{\text{gas}} = (C - C_0) \left(\frac{C_{\text{ma}}}{C_m - C_0} \right)$$

Where:

- C_{gas} = corrected sample gas concentration (ppm v/v)
 C = ave emissions data for the test run (ppm v/v)
 C_0 = ave of initial and final zero (ppm v/v)
 C_m = ave of initial and final span (ppm v/v)
 C_{ma} = span gas concentration (cylinder) (ppm v/v)

Sample Calculation:

Parameter O₃ Full Scale 0-1 Units ppm

$$C = \underline{0.332} \quad C_0 = \underline{0.003} \quad C_m = \underline{0.514} \quad C_{\text{ma}} = \underline{0.508}$$

$$C_{\text{gas}} = (0.332 - 0.003) \left(\frac{0.508}{0.514 - 0.003} \right)$$

$$C_{\text{gas}} = \underline{0.327}$$

Parameter _____ Full Scale _____ Units _____

$$C = \underline{\quad} \quad C_0 = \underline{\quad} \quad C_m = \underline{\quad} \quad C_{\text{ma}} = \underline{\quad}$$

$$C_{\text{gas}} = (\quad - \quad) \left(\frac{\quad}{\quad - \quad} \right)$$

$$C_{\text{gas}} = \underline{\quad}$$

Parameter _____ Full Scale _____ Units _____

$$C = \underline{\quad} \quad C_0 = \underline{\quad} \quad C_m = \underline{\quad} \quad C_{\text{ma}} = \underline{\quad}$$

$$C_{\text{gas}} = (\quad - \quad) \left(\frac{\quad}{\quad - \quad} \right)$$

$$C_{\text{gas}} = \underline{\quad}$$

Parameter _____ Full Scale _____ Units _____

$$C = \underline{\quad} \quad C_0 = \underline{\quad} \quad C_m = \underline{\quad} \quad C_{\text{ma}} = \underline{\quad}$$

$$C_{\text{gas}} = (\quad - \quad) \left(\frac{\quad}{\quad - \quad} \right)$$

$$C_{\text{gas}} = \underline{\quad}$$

Sheet 1 of 2

Date: 29 JAN, 91

Operator: DJW

Location: RAGHOUSE STACK OUTLET

[illegible]

Sheet 2 of 2

Project: PMA

Data Reduced By: CLM

Plant: PALA ASPHALT

Location: BAGHOUSE STACK OUTLET

Date: 29 JAN. '91

Operator: DJW

[illegible]

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PALA
 Source: PALA ASPHALT
 Location: BH STACK OUTLET
 Date: 29 JAN. '91
 Operator: DJW
 Time: 0740-0830 & 0900-0915
 Sheet 1 of 2

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero	O	0-1 ppm	0.002	0.003	0.10
Upscale			0.520	0.520	1.20
Zero	NO ₂				
Upscale					
Zero	CO				
Upscale					
Zero	CO				
Upscale					
Zero	O ₂				
Upscale					
Zero	CO ₂				
Upscale					

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero	O	0-1 ppm	0.003	0.002	-0.10
Upscale			0.520	0.508	1.20
Zero	NO ₂				
Upscale					
Zero	CO				
Upscale					
Zero	CO				
Upscale					
Zero	O ₂				
Upscale					
Zero	CO ₂				
Upscale					

ENGINEERING SCIENCE
Pasadena, California

CALIBRATION DRIFT TEST

Facility: PMA
Source: PMA ASPALT
Location: BH STACK OUTLET

Date: 29 JAN. '91
Operator: DJN
Time: 1004 - 1100
Sheet 2 of 2

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	O	0-1ppm	0.002	0.002	0
Zero Upscale	NO ₂		0.508	0.509	0.10
Zero Upscale	CO				
Zero Upscale	CO				
Zero Upscale	CO				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

Run No.	Specie	Full Scale	Initial Response	Final Response	Drift ($\pm$ Span)
Zero Upscale	O				
Zero Upscale	NO ₂				
Zero Upscale	CO				
Zero Upscale	CO				
Zero Upscale	O ₂				
Zero Upscale	CO ₂				

21
 20.940 O₂ (200 AIR)
 (0.25% F.S.)

20
 2.995 O₂ (60 Span Gas)
 (0.200% F.S.)

12.457 O₂ (50 Span Gas)
 (0.25% F.S.)

13.46 O₂
 (0.25% F.S.)

3.036 O₂ (60 Span Gas)
 (0.25% F.S.)

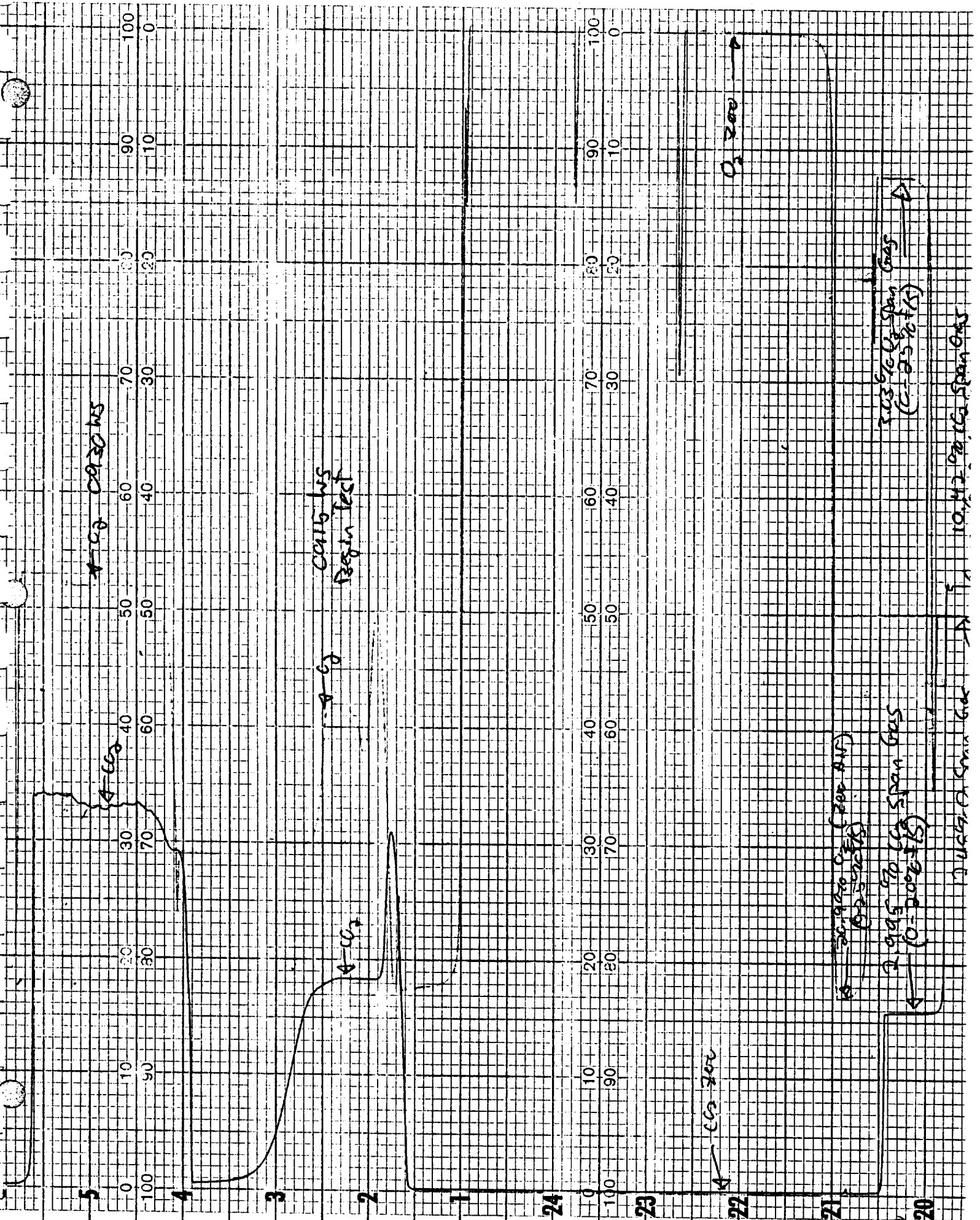
10.42 O₂ (60 Span Gas)
 (0.20% F.S.)

13.65 O₂ (60 Span Gas)
 (0.20% F.S.)

check speed = 2000 ft/min
 RP = 29.63 ft/min

PALA
 1-25-1991
 AR 588 Test

Green = O₂ 0.25% F.S.
 Violet = CO₂ 0.20% F.S.



14

13

12

11

10

9

8

7

6

5

4

1015 hrs
Pressure Test

0.00

12.48% CO₂ span gas
(0.25% ± 1%)
10.42% CO₂ span gas
(0.25% ± 1%)

80 90 100
20 10 0

60 70
40 30

50 50

40 60
30 70

20 50
10 90

100 0

Stop to change hex scale

0.00 0.25% CO₂

80 90 100
20 10 0

60 70
40 30

50 50

40 60
30 70

20 50
10 90

100 0

1115 WS

A-00

CG

1100 WS

A-02

CG

1045 WS

A-02

CG

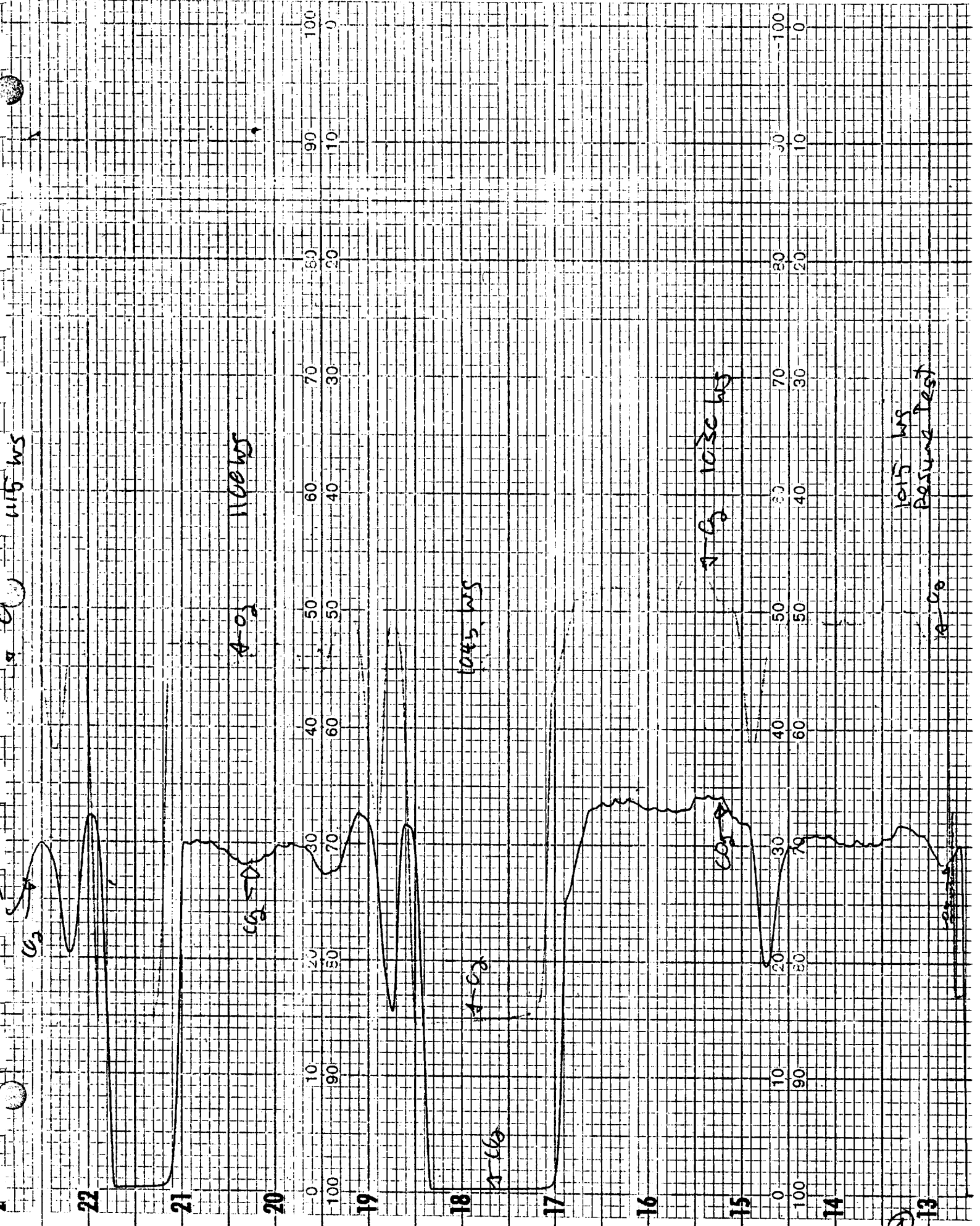
1030 WS

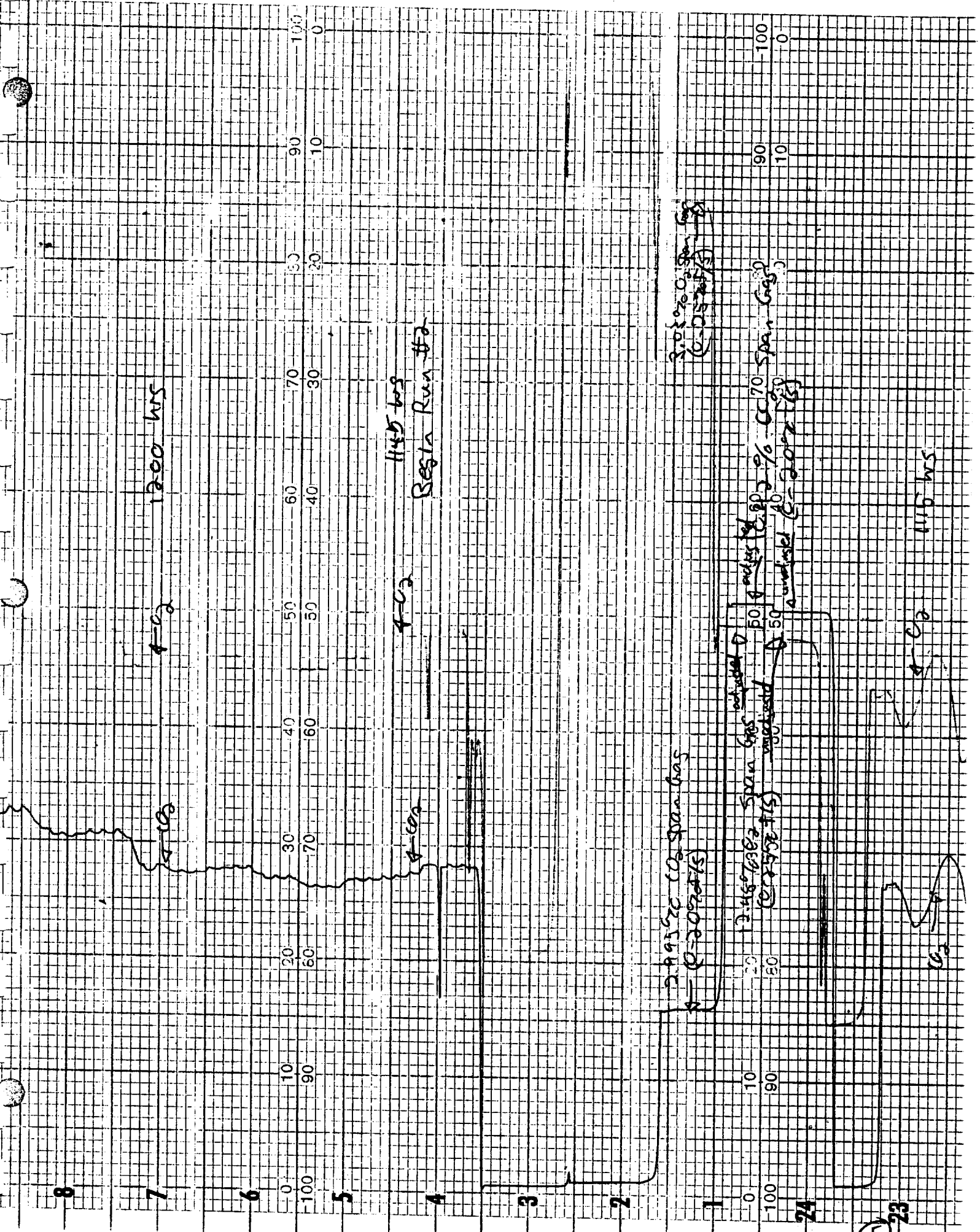
CG

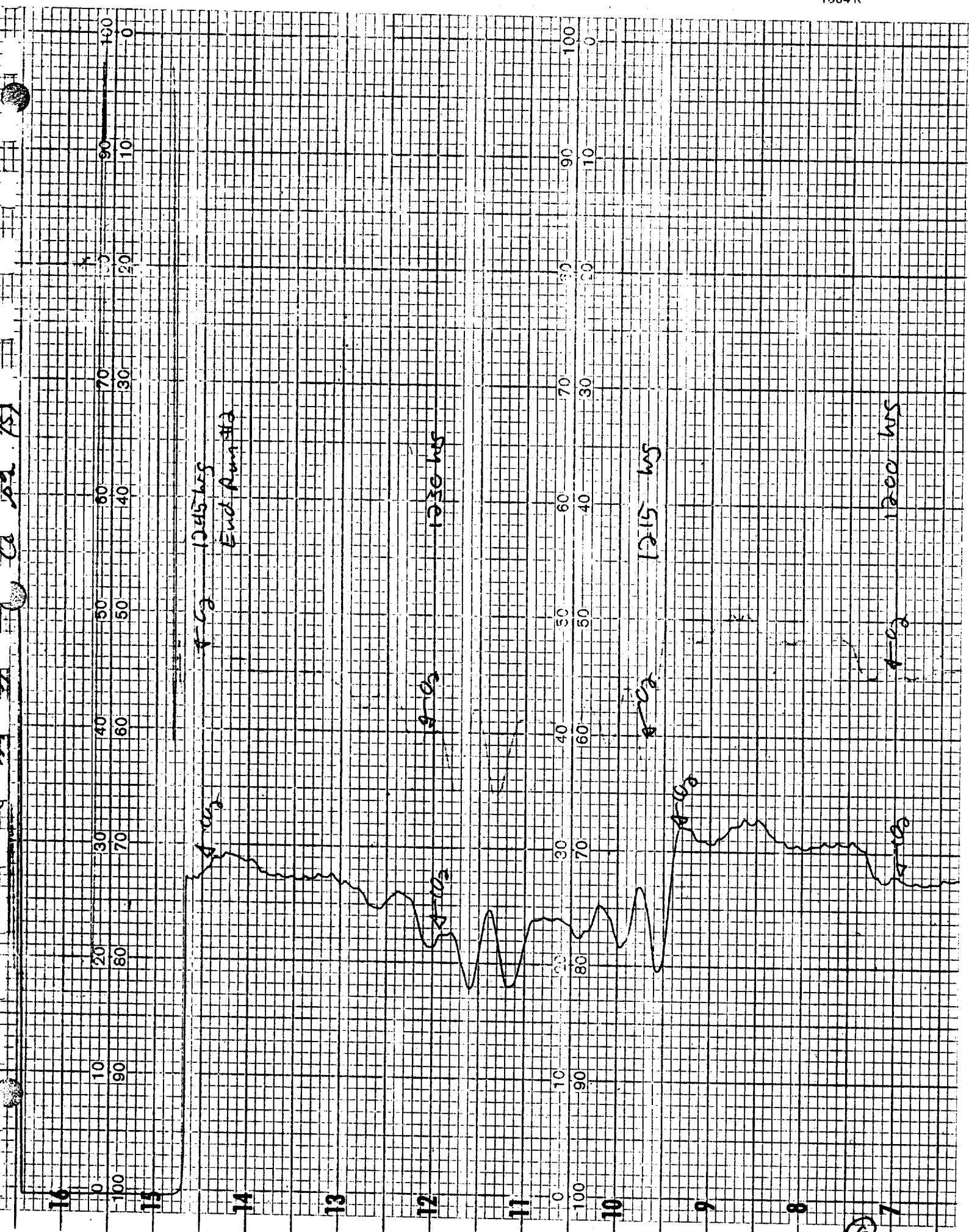
1015 WS
Resume Test

A-00

CG







22

21

20

19

18

17

16

15

14

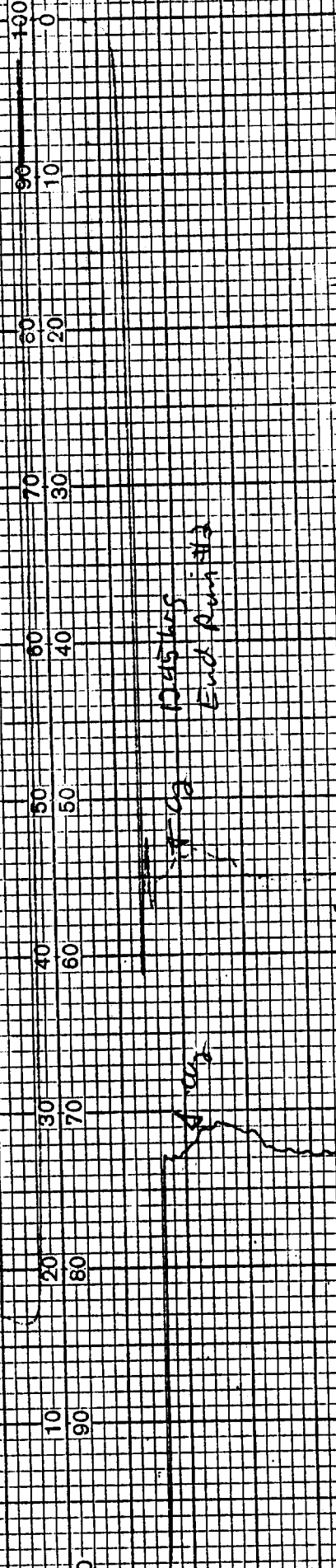


1300 WS Basin Run #3

8-02

5-00

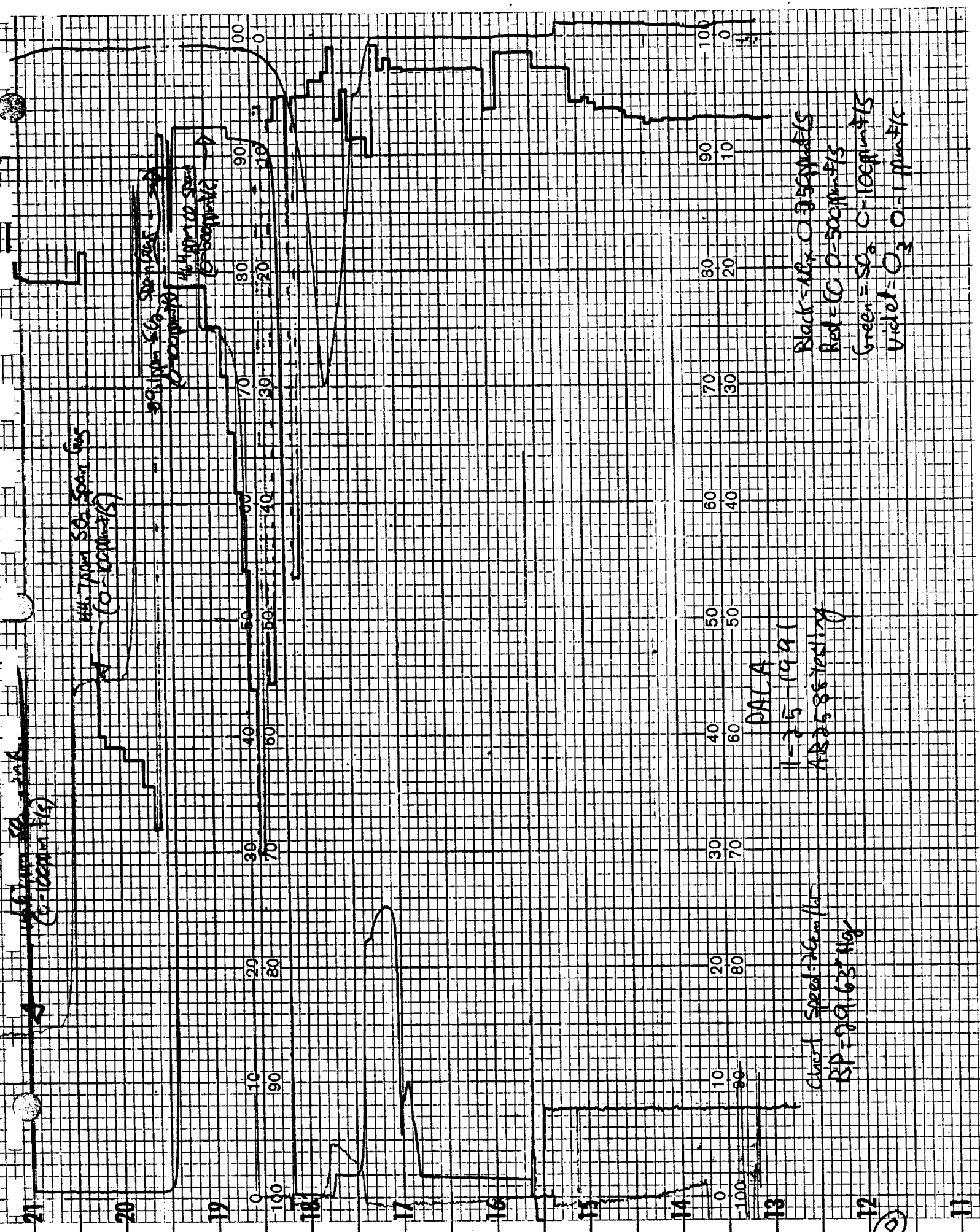
12-48-00 25 span gas
CO = 25% F(S)
12-48-00 25 COV span gas
CO = 20% F(S)



1245 hrs
End Run #3

8-02

8-02



DALA

1-25-1991

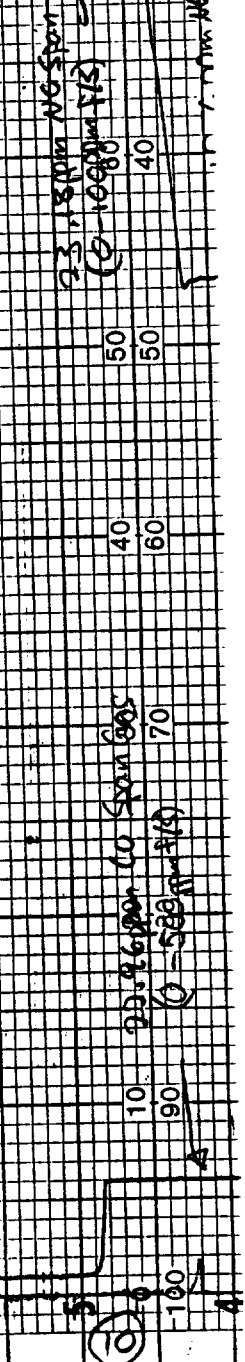
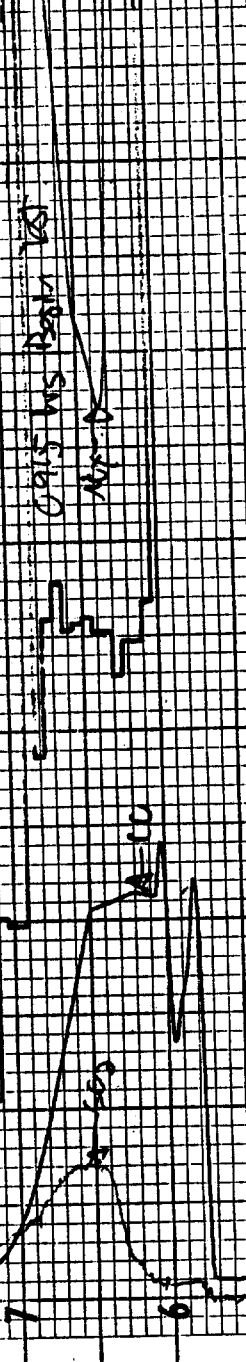
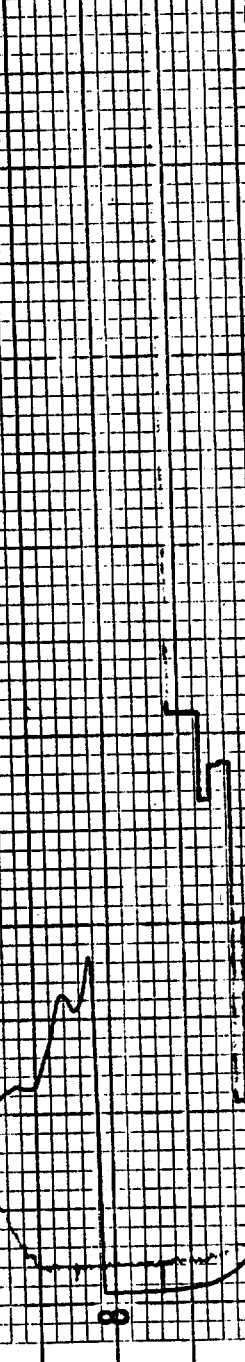
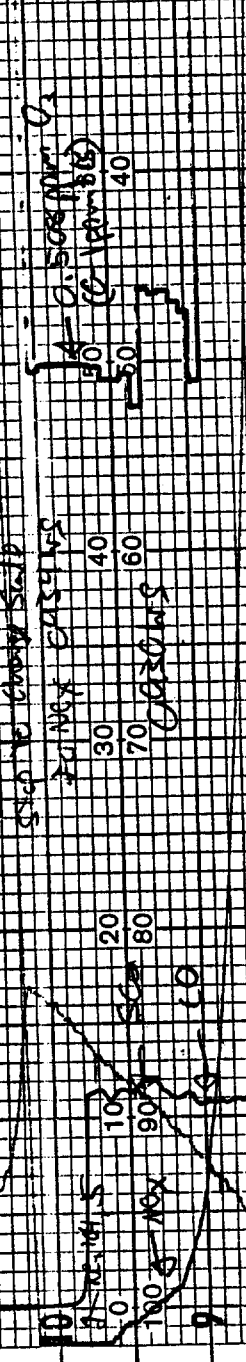
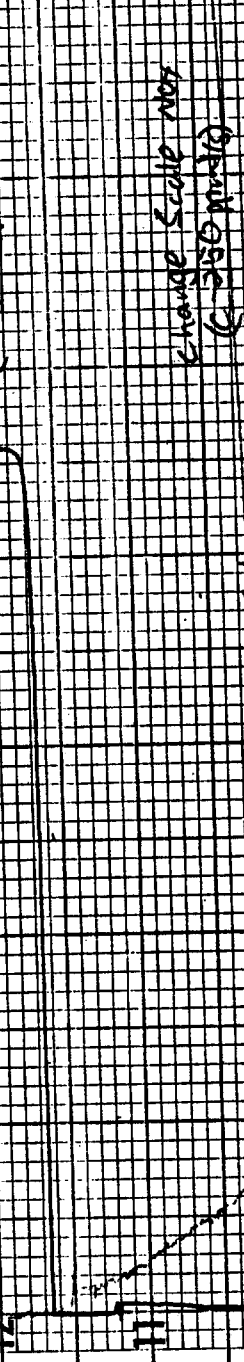
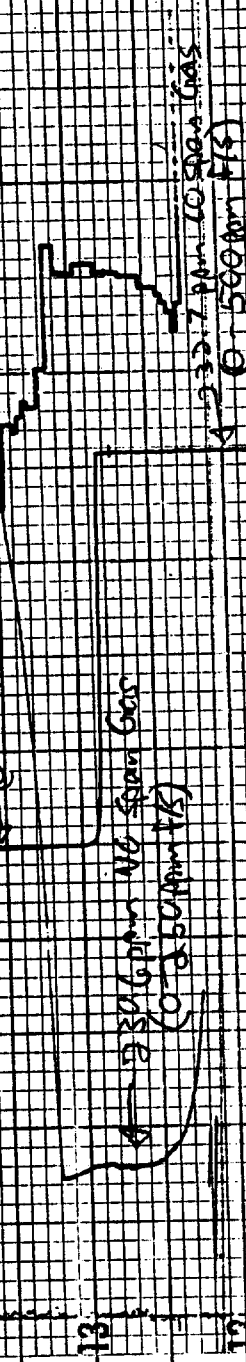
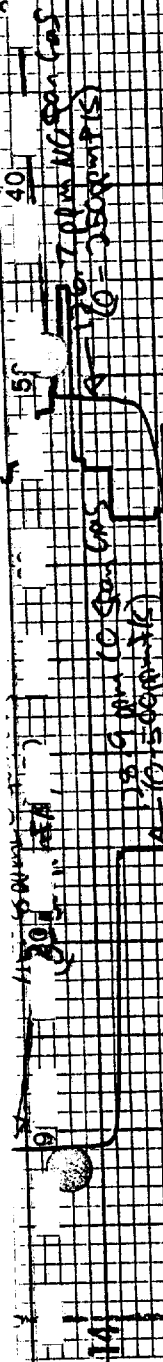
AR 2585 testing

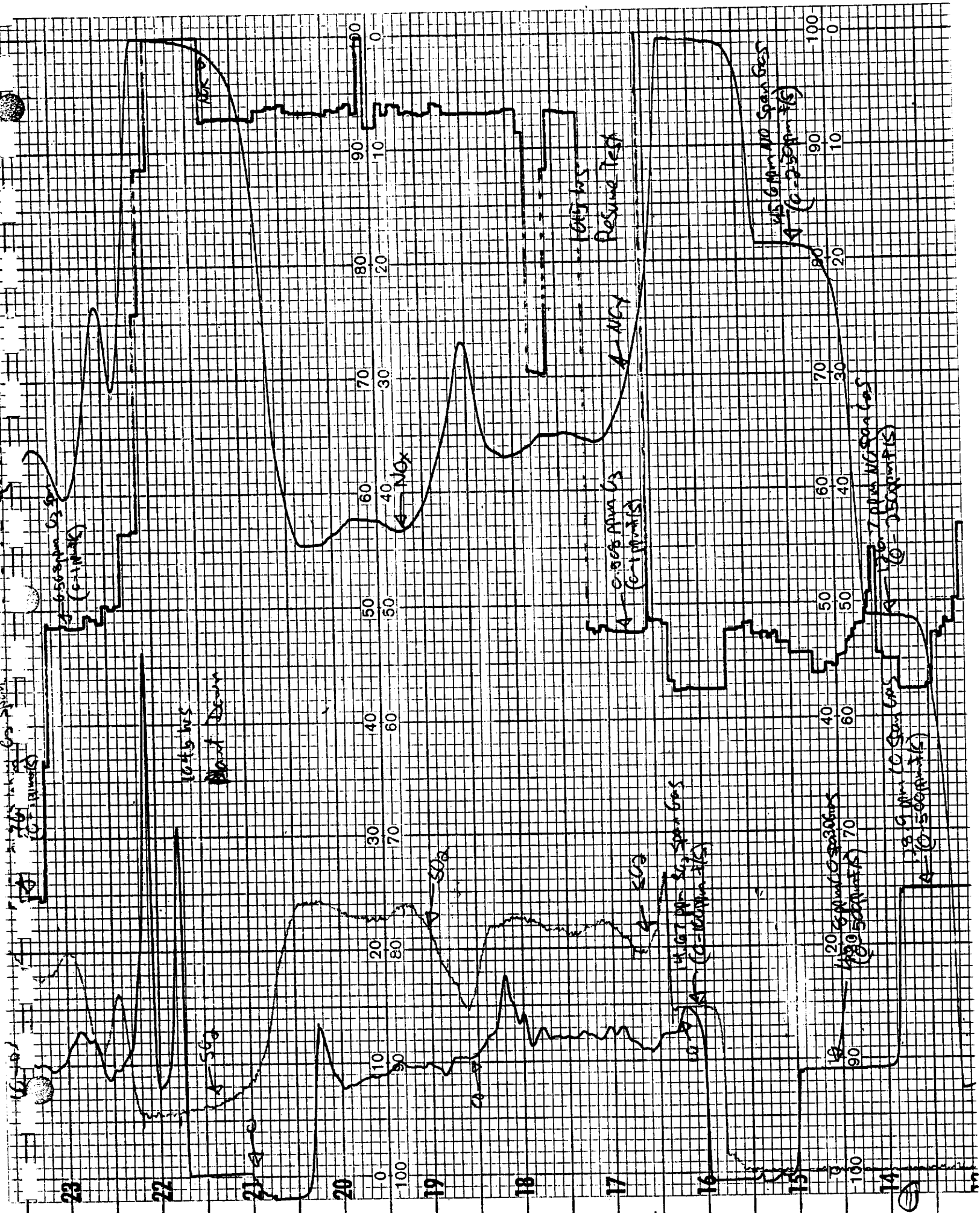
Chart Speed: 20cm/hr

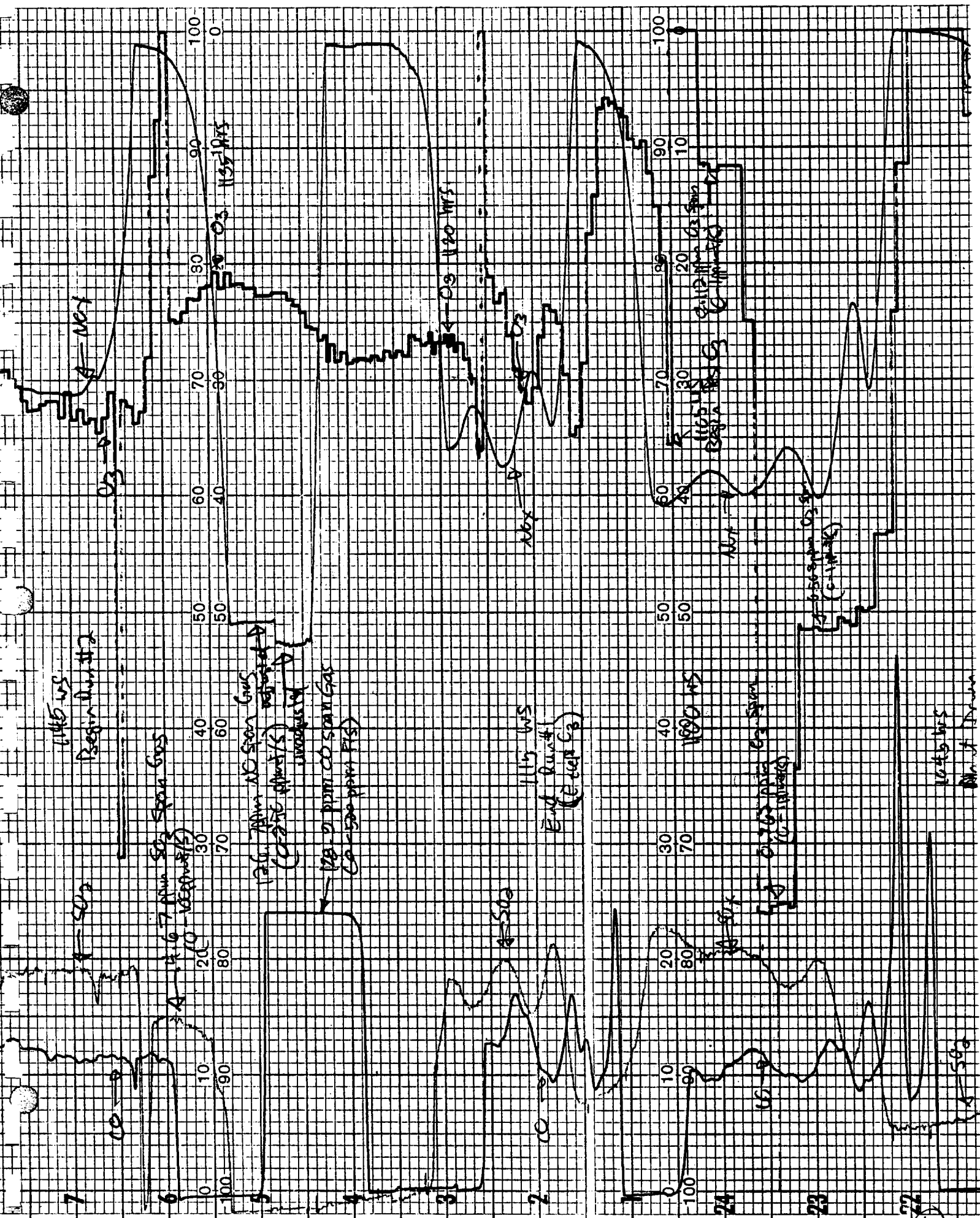
RP-29.63 kg

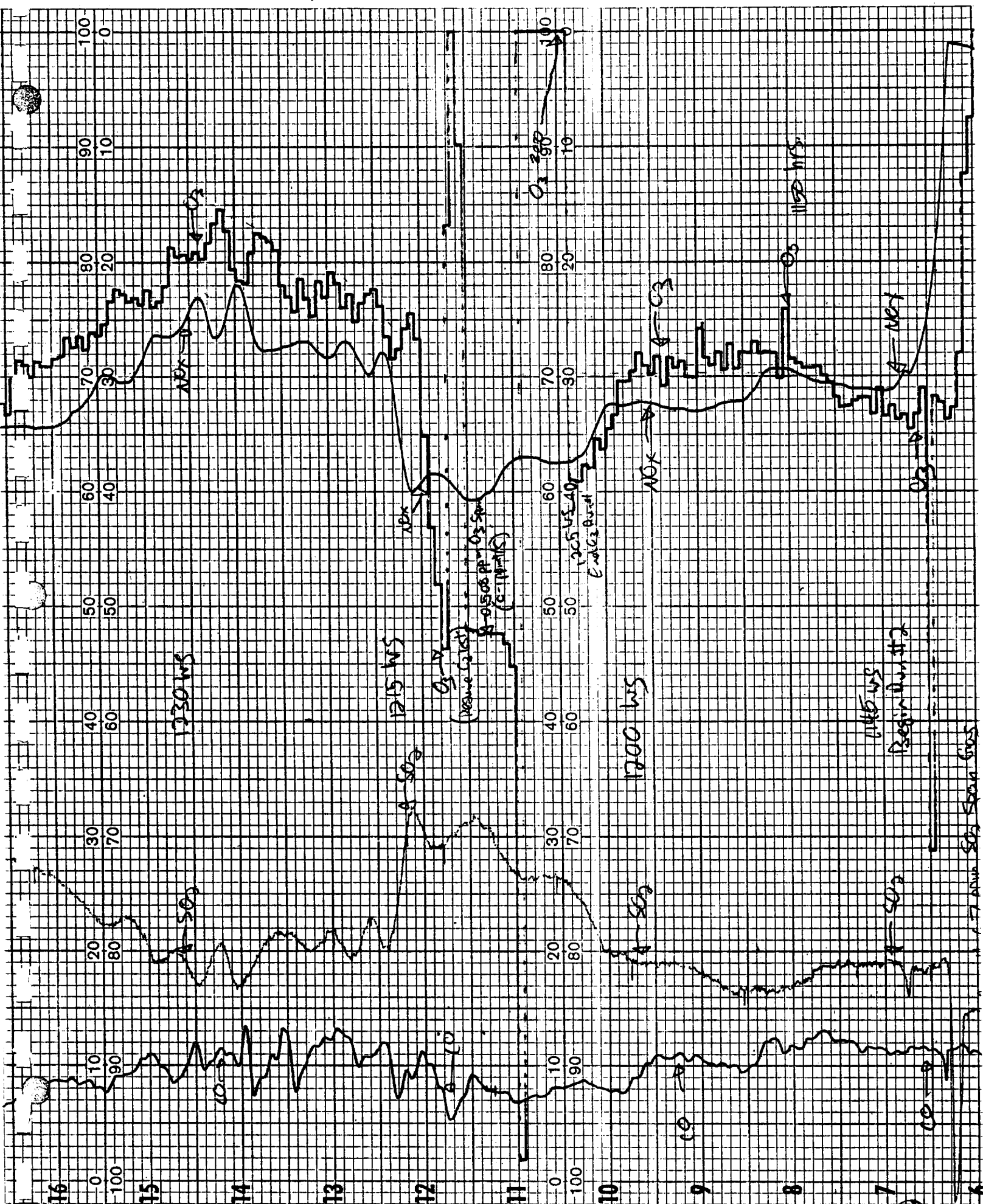
(80)

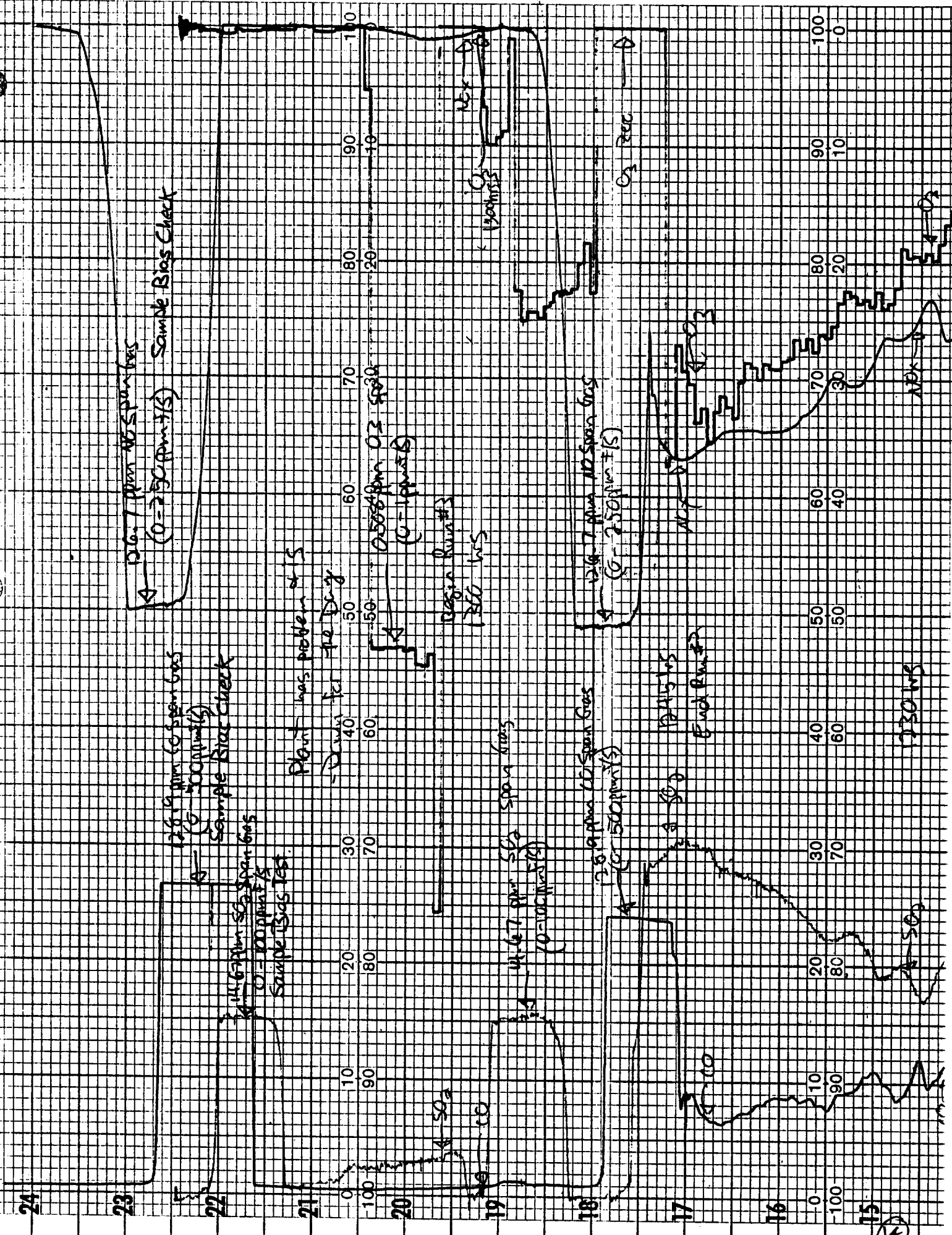




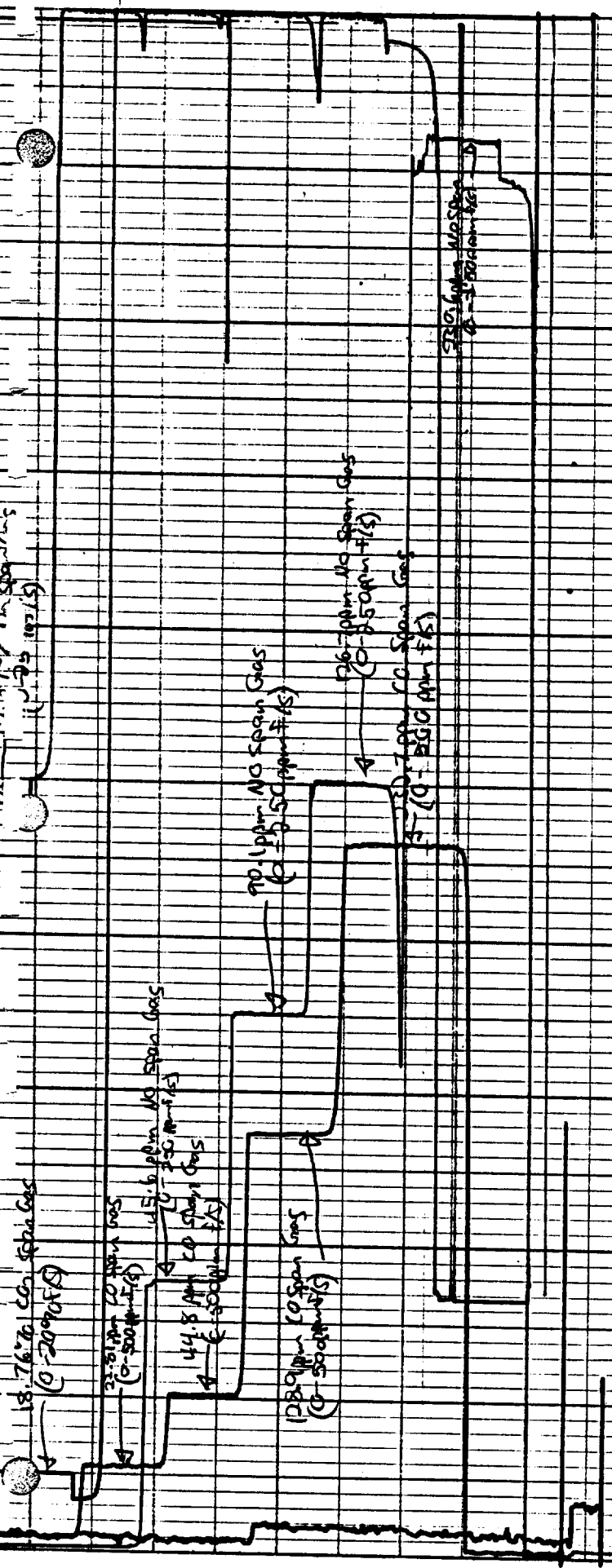








11-25 1972 (S)



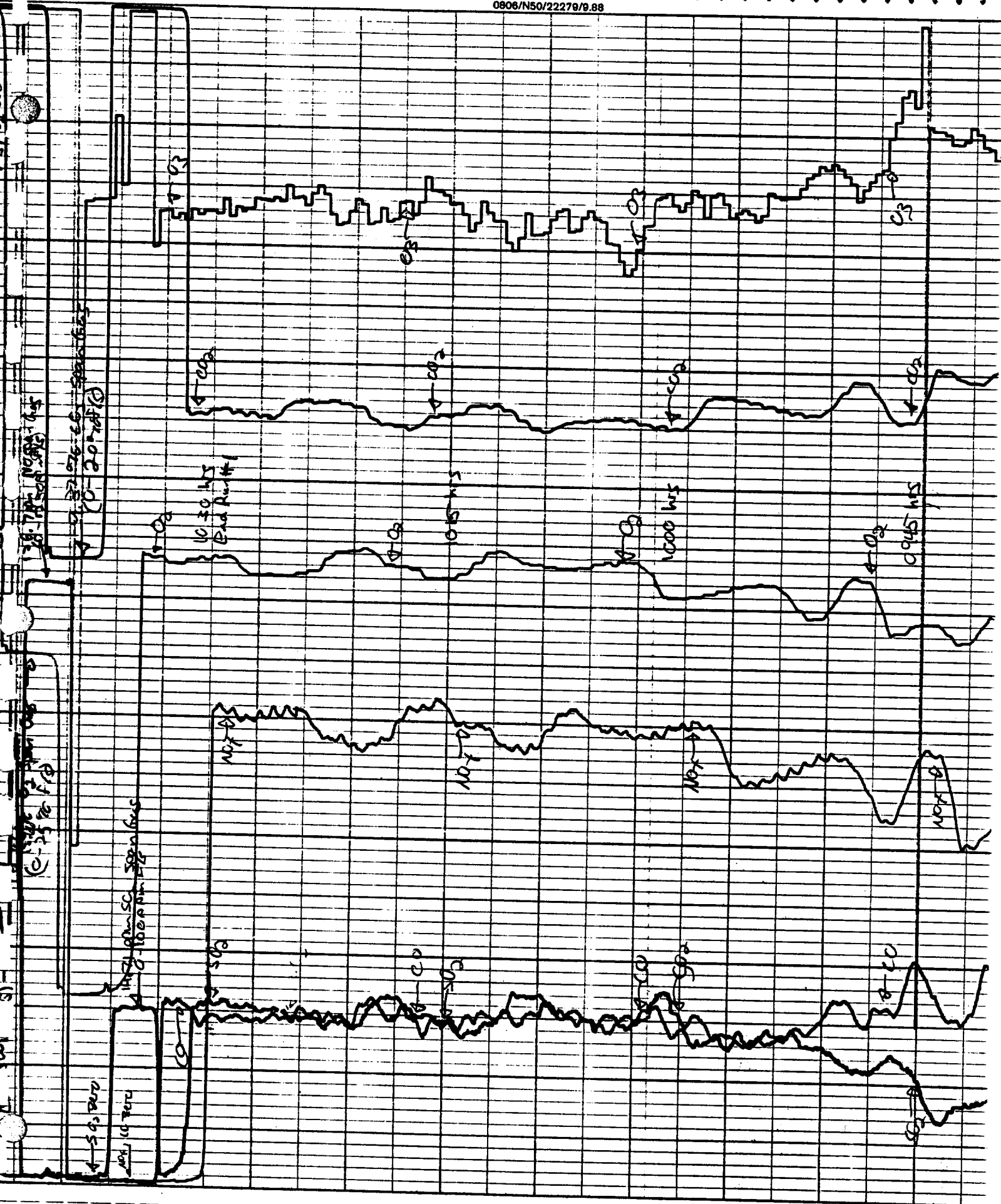
DATA Aqalit
1-28, 29, -91
AD 588 YC 447

Black = NO₂ 0-500 ppm F/S
Red = CO 0-500 ppm F/S
Violet = SO₂ 0-100 ppm F/S (zero-lat scale)
Purple = CO₂ 0-2000 F/S
Aqua = O₂ 0-25% F/S
Green = O₃ 0-100 ppm F/S

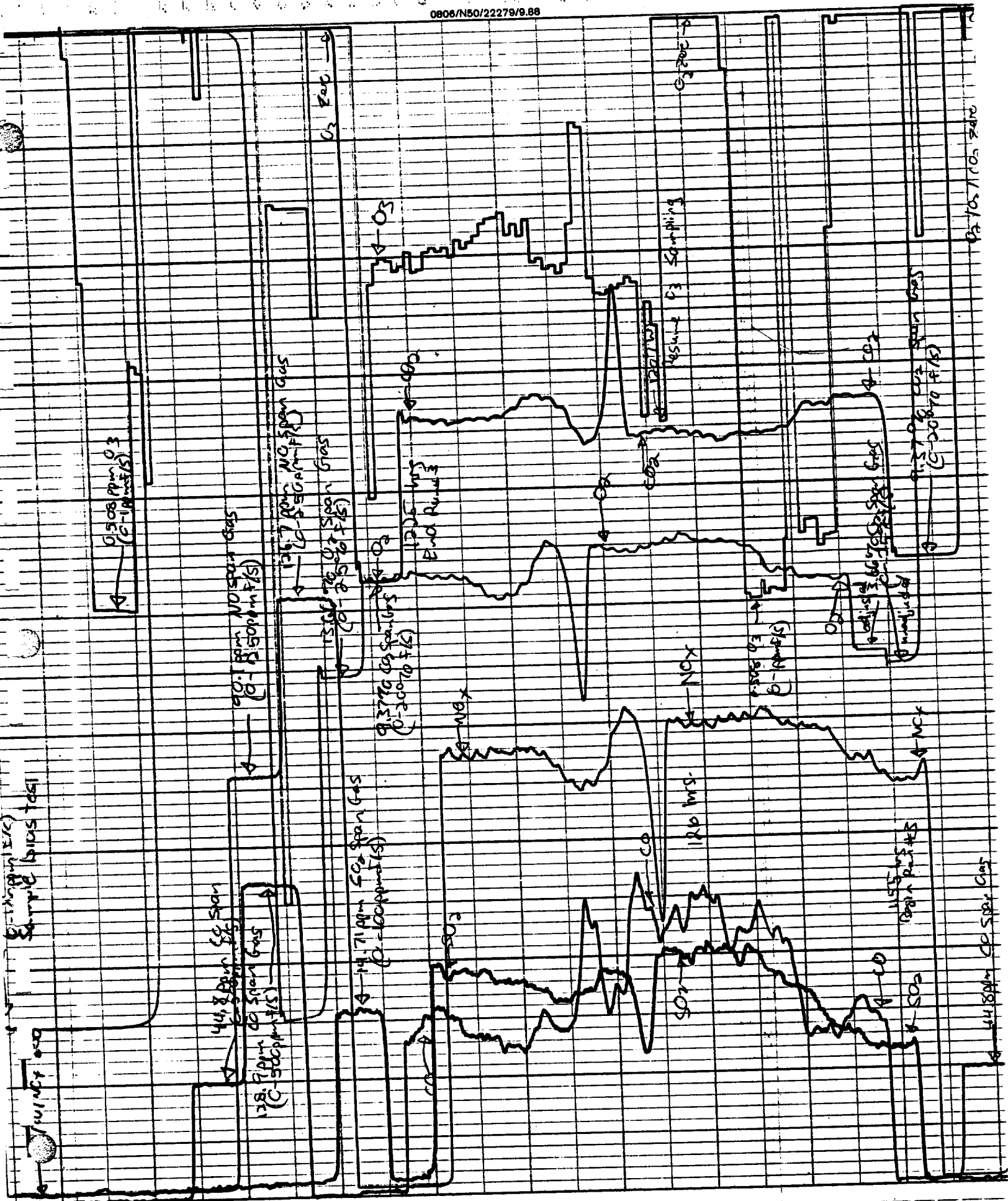
89 = 20.6 ± 1.4%

Chart Speed = 20 cm/hr
DYN

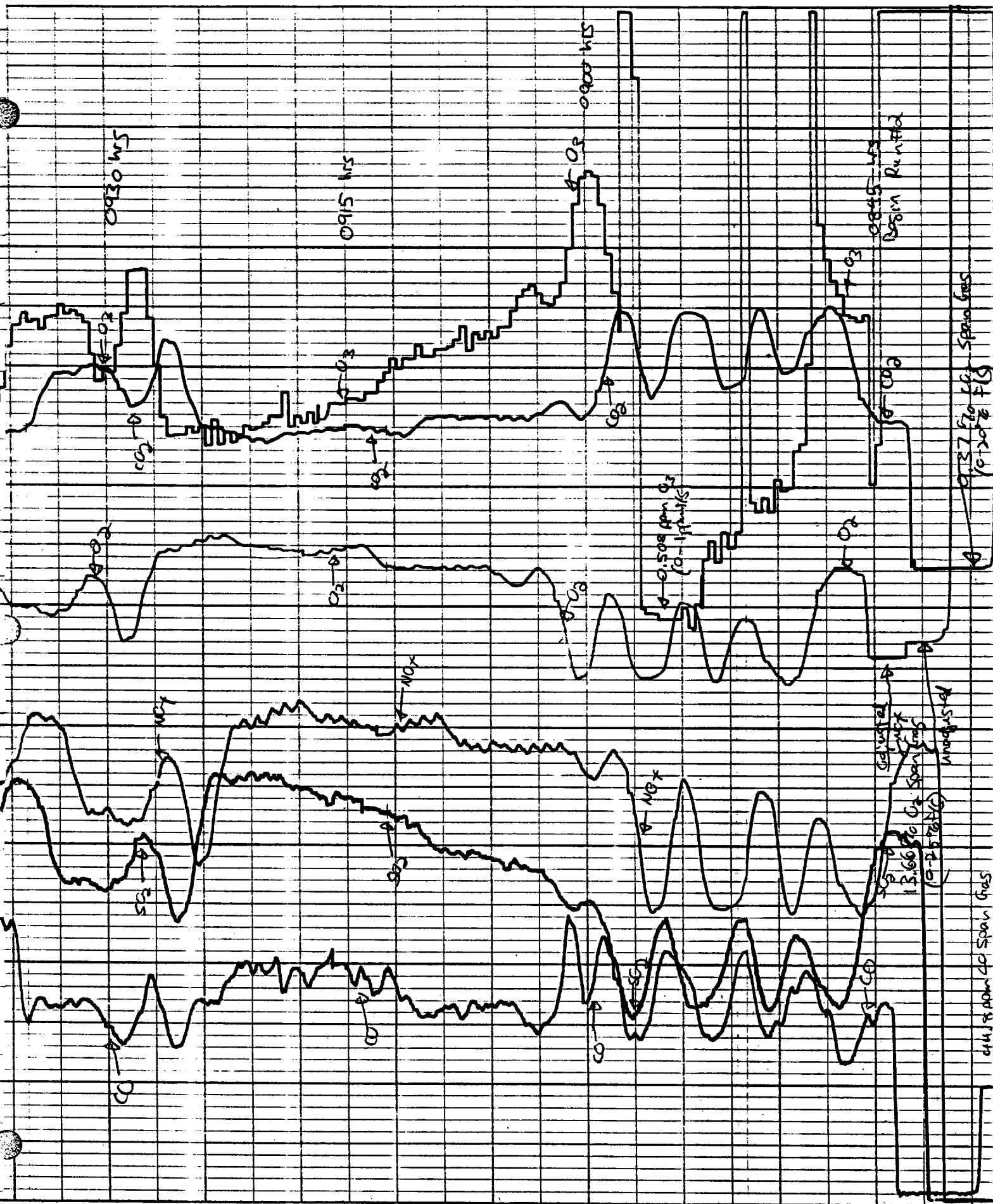


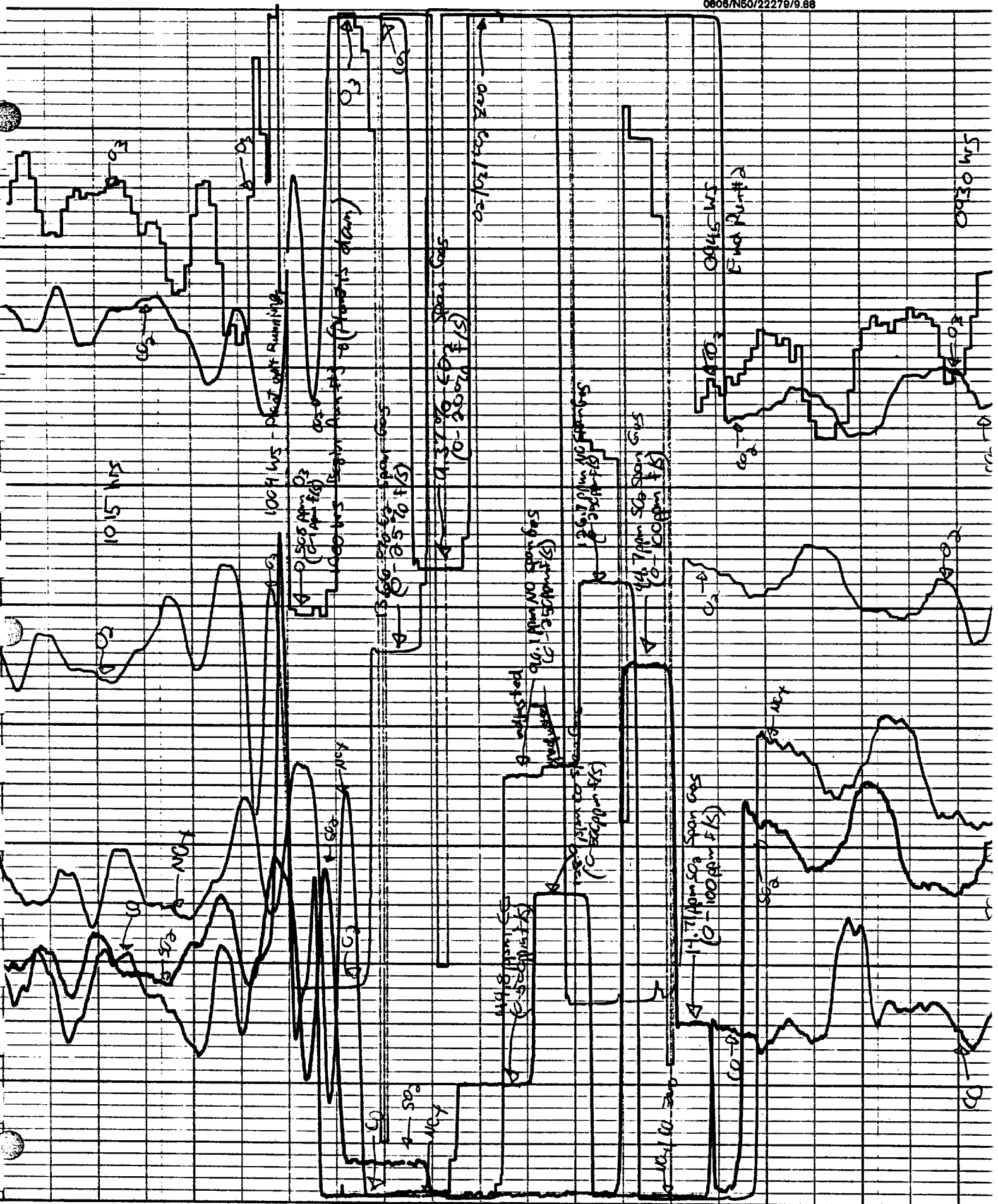


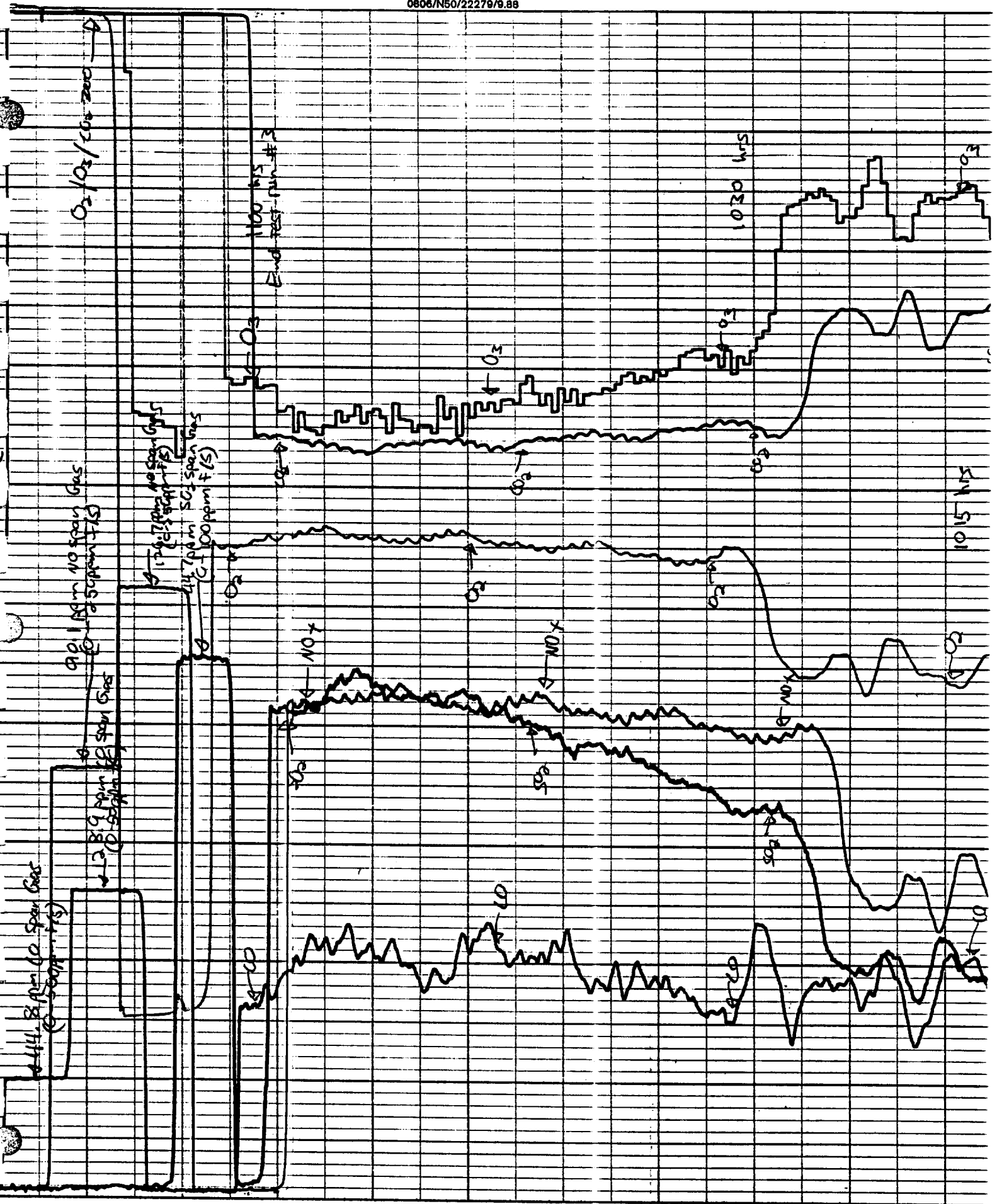


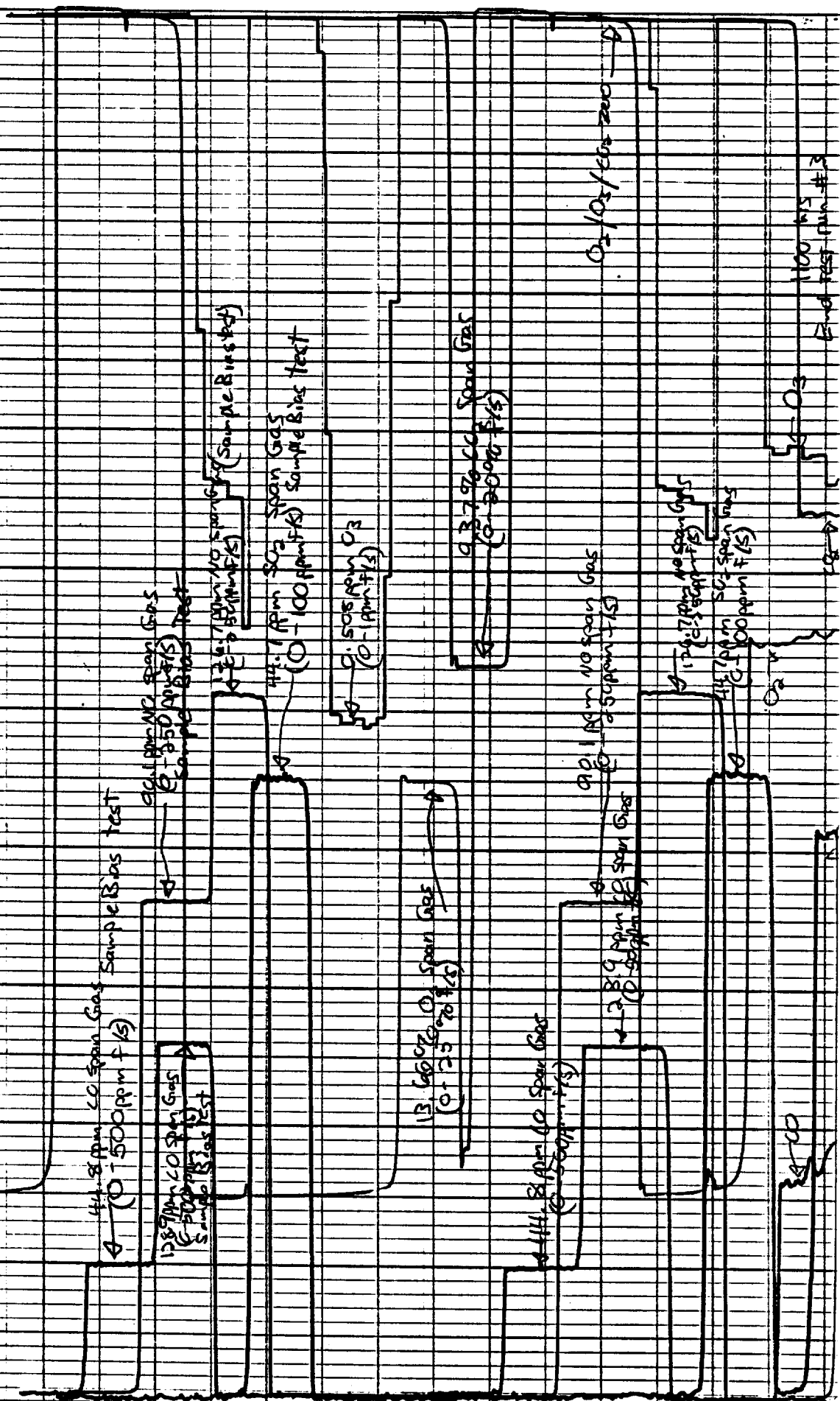












APPENDIX I
SUPPORTING DATA FOR QUALITY ASSURANCE AND CALIBRATIONS

ENGINEERING SCIENCE, INC.
75 N. Fair Oaks Ave.
Pasadena, CA 91109
(818) 440-6014

CHAIN OF CUSTODY RECORD

Project No. WA220	Project Name PALA	Project Manager Dennis Bantota	Samples Sent To: WCAS	Analysis Required	
Samples Collected By Dennis & crew	Regulatory Agency (EPA, CARB, SCAQMD, etc.)		By:	H	LS
ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Origin)	Sample Amount	Sample Medium	Comments
910155	1/23/91	Run# BLANK Trace metals HNO3/H2O2	450ul	0.1N HNO3	BLANK
910155	1/23/91	Run# BLK Trace metals KmnO4	215ul	KmnO4	BLANK
910156	1/23/91	Trace metals HNO3/H2O2	1120ul	0.1N HNO3	Run# 1
910156	1/23/91	Trace metals KmnO4	285ul	KmnO4	Run# 1
910157	1/24/91	Trace metals HNO3/H2O2	1150ul	0.1N HNO3	Run# 2
910157	1/24/91	Trace metals KmnO4	285ul	KmnO4	Run# 2
910158	1/24/91	Trace metals HNO3/H2O2	1080ul	0.1N HNO3	Run# 3
910158	1/24/91	Trace metals KmnO4	244ul	KmnO4	Run# 3
Relinquished By: Dan Hooker (Sign & Print)		Date/Time 1-30-91	Received By: April Richards (Sign & Print)		Comments:
Phone: (818) 969-5758		1430	Of: WCAS No 17728		
Relinquished By: Dan Hooker (Sign & Print)		Date/Time	Received By: Dennis Bantota (Sign & Print)		Comments:
Phone:			Of:		
Relinquished By: Dennis Bantota (Sign & Print)		Date/Time	Received By: Dennis Bantota (Sign & Print)		Comments:
Phone:			Of:		

AS, Be, Cd, Cu, Pb, Mn, Ni, Se, Zn.

CHAIN OF CUSTODY RECORD

CHAIN OF CUSTODY RECORD

*As, Be, Cd, Cu, ~~Bo~~, Mn, Ni, Se, Zn.

CHAIN OF CUSTODY RECORD

Project No.		Project Name		Project Manager		Samples Sent To:	Analysis Required	
WA 220		PALA		Dennis Bautista		WCAS.		
Samples Collected By				Regulatory Agency (EPA, CARB, SCAQMD, etc.)				
Dennis & Crew								
ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Origin)		Sample Amount	Sample Medium	Comments		
910151	1/23/91	Cadmium	Blank train	485ml	0.1N HNO ₃			
910152	1/23/91	Cadmium	run #1 train	1208ml	HNO ₃ 0.1N	mL { 1/1000 ml }	X	
910153	1/24/91	Cadmium	run #2 train	1268ml	HNO ₃ 0.1N		X	
910154	1/24/91	Cadmium	run #3 train	1265ml	HNO ₃ 0.1N		X	
910175	1/29/91	Reagent Blank		200ml	0.1N HNO ₃		X	
Relinquished By: (Sign & Print)		Date/Time		Received By: (Sign & Print)		Comments:		
Phone: (P) 818 969-5758 Dan Hooker		1-30-91 1430		Of: WCAS		APRIL RICHARDS m 17728		
Relinquished By: (Sign & Print)		Date/Time		Received By: (Sign & Print)		Comments:		
Phone:				Of:				
Relinquished By: (Sign & Print)		Date/Time		Received By: (Sign & Print)		Comments:		
Phone:				Of:				

CHAIN OF CUSTODY RECORD

[illegible]

Sec
K-100

2

Sec
K-1000

* As, Be, Cu, Pb, Mn, ~~Pb~~, Ni, Se, Zn, Cd, Hg,

ENGINEERING SCIENCE, INC.
 75 N. Fair Oaks Ave.
 Pasadena, CA 91109
 (818) 440-6014

10/3

CHAIN OF CUSTODY RECORD

Project No. <u>WA220</u>		Project Name <u>PAL A</u>		Project Manager <u>Dennis Bauliga</u>		Samples Sent To: <u>ALTA</u>		Analysis Required	
Samples Collected By <u>Dennis & Crew</u>		Regulatory Agency (EPA, CARB, SCAQMD, etc.)		By: <u>DK</u>					
ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Origin)	Sample Amount	Sample Medium	Comments				
910165	1/25/91	PAH Bulk train XAD	200g	Resin cartridge					
910165	1/25/91	PAH Bulk train filter	2g	Filter					
910165	1/25/91	PAH Bulk train DI H ₂ O	200ul	DI H ₂ O					
910165	1/25/91	PAH Bulk train solvent	115ul	Solvent					
910166	1/25/91	PAH Bulk train XAD	200g	Resin cartridge					
910166	1/25/91	PAH Bulk train filter	2g	Filter					
910166	1/25/91	PAH Bulk train DI H ₂ O	200ul	DI H ₂ O					
910166	1/25/91	PAH Bulk train solvent	430ul	Solvent					
Relinquished By: <u>[Signature]</u>		Date/Time <u>1/30/91</u>	Received By: <u>[Signature]</u>		Comments:				
Phone: <u>(818) 969-5758</u>			Of: <u>Locher S. MITTEL</u>						
Relinquished By: <u>[Signature]</u>		Date/Time <u>1/30</u>	Received By: <u>[Signature]</u>		Comments:				
Phone: <u>(818) 969-5758</u>			Of: <u>2/1/90</u>						
Relinquished By: <u>[Signature]</u>		Date/Time	Received By: <u>[Signature]</u>		Comments:				
Phone: <u>[Signature]</u>			Of: <u>1:15pm</u>						

ENGINEERING SCIENCE, INC.
75 N. Fair Oaks Ave.
Pasadena, CA 91109
(818) 440-6014

CHAIN OF CUSTODY RECORD

Project No. WA220	Project Name PALA	Project Manager Dennis Sauter	Samples Sent To: ALTA	Analysis Required	
Samples Collected By Dennis & Crew	Regulatory Agency (EPA, CARB, SCAQMD, etc.) CARB	By: DK			
ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Origin)	Sample Amount	Sample Medium	Comments
910167	1/28/91	PAH Mun# 2 Train XAD	200g	Cartridge	
910167	1/28/91	PAH Mun# 2 Train Filter	2g	Filter	one
910167	1/28/91	PAH Mun# 2 Train Solvent	790ml	2.1 H ₂ O	sample
910167	1/28/91	PAH Mun# 2 Train Solvent	580ml	Solvent	
910168	1/29/91	PAH Mun# 3 Train XAD	200g	Cartridge	
910168	1/29/91	PAH Mun# 3 Train Filter	2g	Filter	one
910168	1/29/91	PAH Mun# 3 Train Solvent	815ml	H ₂ O	sample
910168	1/29/91	PAH Mun# 3 Train Solvent	518ml	Solvent	
Relinquished By: (Sign & Print) <i>[Signature]</i> Phone: (818) 969-5758		Date/Time 1/30/91 1510	Received By: (Sign & Print) <i>[Signature]</i> Of: 2/28/91 1:15pm	Comments:	
Relinquished By: (Sign & Print)		Date/Time	Received By: (Sign & Print) Of:	Comments:	
Relinquished By: (Sign & Print)		Date/Time	Received By: (Sign & Print) Of:	Comments:	

243

[illegible]



CHAIN OF CUSTODY RECORD

9

SCOTT-MARRIN, INC.

2001 THIRD ST., UNIT 1

RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: ESO-9449-6056

CYLINDER NUMBER CC56884
 COMPONENT CONCENTRATION(v/v)
 Sulfur Dioxide 14.67 ± 0.29 ppm
 Air Balance
 Replicate 3/27/90 14.59 ppm
 Analysis 14.74 ppm
 Data On 14.64 ppm
 SO₂: Mean 14.66 ppm
 4/5/90 14.72 ppm
 14.54 ppm
 14.76 ppm
 14.67 ppm

Cylinder Pressure: 2000 psig

Expiration Date SO₂: 10/5/91

CYLINDER NUMBER CC56884
 COMPONENT CONCENTRATION(v/v)
 CYLINDER NUMBER _____
 COMPONENT CONCENTRATION(v/v)

(The above analysis was performed in accordance with Section 3.0.4 of the revised)
 (EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable)
 (to the National Institute of Standards & Technology by direct intercomparison with)
 (GMIS, cylinder number CC68683 at 49.2 ppm Sulfur Dioxide in Nitrogen. The)
 (analysis was performed using an Interscan Model RM2450P, S/N 72138 gas chromato-)
 (graph with electrochemical detection. The last multipoint calibration was)
 (performed 3/8/90.)

CYLINDER NUMBER CC56893
 COMPONENT CONCENTRATION(v/v)
 Sulfur Dioxide 44.7 ± 0.9 ppm
 Air Balance
 Replicate 4/3/90 44.9 ppm
 Analysis 44.7 ppm
 Data On 45.1 ppm
 SO₂: Mean 44.9 ppm
 4/10/90 44.2 ppm
 44.8 ppm
 44.5 ppm
 44.5 ppm

Cylinder Pressure: 2000 psig

Expiration Date SO₂: 10/10/91

CYLINDER NUMBER CC56893
 COMPONENT CONCENTRATION(v/v)
 CYLINDER NUMBER _____
 COMPONENT CONCENTRATION(v/v)

(The above analysis was performed in accordance with Section 3.0.4 of the revised)
 (EPA traceability protocol No.1 dated June 9, 1987. The analysis is traceable)
 (to the National Institute of Standards & Technology by direct intercomparison)
 (with GMIS, cylinder number CC68683 at 49.2 ppm Sulfur Dioxide in Nitrogen. The)
 (analysis was performed using an Interscan Model RM2450P, S/N 72138 gas chromato-)
 (graph with electrochemical detection. The last multipoint calibration was)
 (performed 3/8/90.)

SCOTT - MARRIN, INC.

2001 THIRD ST., UNIT H

RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: FI-1068-6056/Reanalysis

CYLINDER NUMBER CC37868

COMPONENT CONCENTRATION (v/v)

Carbon Monoxide 464 ± 5 ppm

Sulfur Dioxide 89.1 ± 1.8 ppm

Nitrogen* Balance

Cylinder Pressure: 1000 psig

*Oxygen-free.

Replicate 11/6/90 463 ppm

Analysis 462 ppm

Data On 466 ppm

CO: Mean 464 ppm

Expiration Date CO: 5/6/91

Replicate 11/9/90 89.4 ppm

Analysis 89.3 ppm

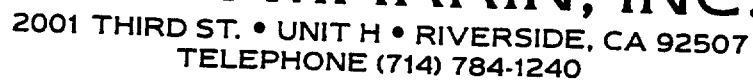
Data On 89.6 ppm

SO2: Mean 89.4 ppm

Expiration Date SO2: 5/9/91

(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the revised)
 (EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the)
 National Institute of Standards & Technology by direct intercomparison with GMIS, cylinder)
 number CC28362 at 495 ppm Carbon Monoxide in Ultrapure Air. The analysis was performed)
 using a Carle Model 8000 gas chromatograph with catalytic methanation/flame ionization)
 detection. The last multipoint calibration was performed 9/11/90.)

The Sulfur Dioxide analysis was performed in accordance with Section 3.0.4 of the revised)
 EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the)
 National Institute of Standards & Technology by direct intercomparison with GMIS, cylinder)
 number CC68658 at 102.4 ppm Sulfur Dioxide in Nitrogen. The analysis was performed using)
 an Interscan Model RM2450P, S/N 72138 gas chromatograph with electrochemical detection.)
 The last multipoint calibration was performed 10/11/90.)



STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: ESO96316056

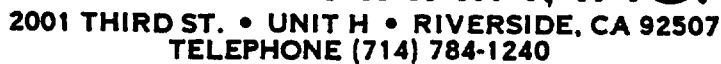
PAGE 2

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: CC42626						
Nitric Oxide	230.6 ± 2.3 ppm	GMIS	Monitor Labs Model 8440	04/30/91	10/22/90	10/30/90
		Cylinder #	S/N 136		230.2 ppm	231.2 ppm
		CC49697	Continuous		230.8 ppm	231.8 ppm
		0 254.5 ppm	Chemiluminescence		230.4 ppm	230.8 ppm
			Last Cal Date: 10/23/90		Mean: 230.2 ppm	231.0 ppm
Carbon Monoxide	232.7 ± 2.3 ppm	GMIS	Carle Insts Model 8800	05/01/91	10/24/90	11/01/90
		Cylinder #	S/N 8249		234.3 ppm	231.9 ppm
		FF16453	Methanation/FID		232.2 ppm	232.9 ppm
		0 260.8 ppm	Gas Chromatography		231.0 ppm	233.1 ppm
			Last Cal Date: 09/11/90		Mean: 232.8 ppm	232.6 ppm
CYLINDER NO.: CC28487						
Nitric Oxide	126.7 ± 1.3 ppm	GMIS	Monitor Labs Model 8440	04/30/91	10/22/90	10/30/90
		Cylinder #	S/N 136		126.7 ppm	126.9 ppm
		CC49697	Continuous		126.7 ppm	127.0 ppm
		0 254.5 ppm	Chemiluminescence		126.4 ppm	126.7 ppm
			Last Cal Date: 10/23/90		Mean: 126.6 ppm	126.8 ppm
Carbon Monoxide	128.9 ± 1.3 ppm	GMIS	Carle Insts Model 8800	05/01/91	10/24/90	11/01/90
		Cylinder #	S/N 8249		129.0 ppm	128.9 ppm
		FF16453	Methanation/FID		128.8 ppm	129.3 ppm
		0 260.8 ppm	Gas Chromatography		128.3 ppm	129.1 ppm
			Last Cal Date: 09/11/90		Mean: 128.7 ppm	129.1 ppm
CYLINDER NO.: CC68818						
Nitric Oxide	91.2 ± 0.9 ppm	GMIS	Monitor Labs Model 8440	05/01/91	10/22/90	11/01/90
		Cylinder #	S/N 136		91.2 ppm	90.9 ppm
		CC12643	Continuous		91.4 ppm	91.3 ppm
		0 99.3 ppm	Chemiluminescence		91.0 ppm	91.1 ppm
			Last Cal Date: 10/23/90		Mean: 91.2 ppm	91.1 ppm
Carbon Monoxide	93.3 ± 0.9 ppm	GMIS	Carle Insts Model 8800	05/01/91	10/23/90	11/01/90
		Cylinder #	S/N 8249		93.1 ppm	93.7 ppm
		CAL3714	Methanation/FID		93.2 ppm	93.6 ppm
		0 95.2 ppm	Gas Chromatography		93.2 ppm	93.0 ppm
			Last Cal Date: 09/11/90		Mean: 93.2 ppm	93.4 ppm
CYLINDER NO.: CC42848						
Nitric Oxide	45.6 ± 0.5 ppm	GMIS	Monitor Labs Model 8440	05/01/91	10/19/90	11/01/90
		Cylinder #	S/N 136		45.7 ppm	45.7 ppm
		CC88055	Continuous		45.7 ppm	45.5 ppm
		0 50.0 ppm	Chemiluminescence		45.6 ppm	45.7 ppm
			Last Cal Date: 10/23/90		Mean: 45.6 ppm	45.6 ppm

ppm = umole/mole

% = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.



STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS



SCOTT-MARRIN, INC.

2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507

TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

ENSI01

TO:

DATE: 08/08/90

ENGINEERING SCIENCE
75 N. FAIROAKS AVE.
PASADENA, CA 91103

IMPORTANT ANALYSIS
Please forward to user
of calibration gases.

CUSTOMER ORDER NUMBER: ESO-9601-6056

PAGE 1

XX			
CYLINDER NUMBER	COMPONENT	CONCENTRATION (v/v)	NIST TRACEABLE REFERENCE STANDARD

CC463	Oxygen	12.48 ± 0.12 %	SRM 2659
	Carbon Dioxide	10.42 ± 0.10 %	AAL138
	Nitrogen	Balance	

ppm = umole/mole

% = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.

Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP-232.09/202491.

Analyst:

J.W. Gay

Approved:

J.T. Marrin

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

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

ENGINEERING SCIENCE
Pasadena, California

POST TEST METER BOX CALIBRATION FORM

Meter Box No. BROWN TV Date 01-31-91 Calibrated by D MARSDEN.

Barometric Pressure 29.83 Ambient Temp 60 Pre Test Y_1 1.002

Project Name PALA. Project No. WA 220 Hum 1.2 Vac 20

Orifice Manometer (in. H ₂ O) H	Gas Volume		Temperatures		Time (min) T_1	Y_1	H ₂
	Wet Test Meter (ft ³) V_w	Dry Gas Meter (ft ³) V_d	Wet Test Meter (° F) T_w	Dry Gas Meter (° F) T_d			
1.2	8.195	8.182	62	63	15	1.000	—
1.2	8.394	8.346	62	64	15	1.003	—
1.2	8.482	8.428	62	65	15	1.009	—
Y_1 AVG 1.004							

METER BOX CALIBRATION HISTORY

Last Calibration Date 11-14-90 Calibrated by D MARSDEN.

H_2 of Calibration 1.99 Y_1 of Calibration 1.002.

ENGINEERING SCIENCE
Pasadena, California

POST TEST METER BOX CALIBRATION FORM

Meter Box No. BLUE 3 Date 01-31-91 Calibrated by D MARSDEN

Barometric Pressure 29.83 Ambient Temp 64 Pre Test Y_1 1.009

Project Name PALA Project No. WAZZO Hrun 1.3 Vac 14

Orifice Manometer (in. H ₂ O) H	Gas Volume		Temperatures		Time (min) T_1	Y_1	$H_{@}$
	Wet Test Meter (ft ³) V_w	Dry Gas Meter (ft ³) V_d	Wet Test Meter (° F) T_w	Dry Gas Meter (° F) T_d			
1.3	9.138	9.234	74	75	15	1.007	—
1.3	9.774	9.873	75	77	16	0.990	—
1.3	9.132	9.125	72	73	15	0.999	—
Y_1 AVG 0.999							

METER BOX CALIBRATION HISTORY

Last Calibration Date 10-12-90 Calibrated by D MARSDEN

H_0 of Calibration 1.81 Y_1 of Calibration 1.009

ENGINEERING SCIENCE
Pasadena, California

POST TEST METER BOX CALIBRATION FORM

Meter Box No. GREEN I Date 01-31-91 Calibrated by D MARSDEN

Barometric Pressure 29.83 Ambient Temp 67 Pre Test Y_1

Project Name PALA Project No. WA220 Hum. 75 Vac 0.5

Orifice Manometer (in. H ₂ O) H	Gas Volume		Temperatures		Time (min) T_1	Y_1	H_{G1}
	Wet Test Meter (ft ³) V_w	Dry Gas Meter (ft ³) V_d	Wet Test Meter (° F) T_w	Dry Gas Meter (° F) T_d			
1.95	0.452	0.494	66	82	15	0.938	—
1.95	0.462	0.494	64	79	15	0.958	—
1.95	0.475	0.495	65	80	15	0.982	—
						Y_1 AVG 0.959.	

METER BOX CALIBRATION HISTORY

Last Calibration Date NEW Box OCT. 90 Calibrated by

H_0 of Calibration Y_1 of Calibration

**ENGINEERING SCIENCE
Pasadena, California**

TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 09-17-90

Thermocouple No. B.

Barometric Pressure 29.15 in. Hg

Ambient Temperature 25 °C

Calibrated by D. MARSDEN.

Reference: Mercury in glass ASTM 26

Other _____

Reference Point Number	Source (Specify)	Reference Thermometer Temperature (°C)	Thermocouple Potentiometer Temperature (°C)	Difference %
	Muffle Furnace	250	478°F	
		249.5	477	
		249.5	477	
		249.7°C	477.3°F = 247.4°C	0.25%
0°C	ICE WATER.	1.0°C	32°F	
		1.0	22	
		1.0	33	
	Ave.	1.0	32.3°F = 0.17°C	0.3%
100°C	Boiling Water	100°C	211°F	
		100	211	
		100	211	
	Ave	100°C	211°F = 99.4°C	0.16%

$$\text{Diff.} = \frac{(\text{Ref. Temp} + 273) - (\text{Test Temp} + 273)}{(\text{Ref. Temp.} + 273)} \times 100$$

ENGINEERING SCIENCE
Pasadena, California

TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 01-05-91

Thermocouple No. A.

Barometric Pressure 29.85. in. Hg

Ambient Temperature 56°F °C

Calibrated by D MARSDEN.

Reference: Mercury in glass ASTM-3C

Other _____

Reference Point Number	Source (Specify)	Reference Thermometer Temperature (°C)	Thermocouple Potentiometer Temperature (°C)	Difference %
	HOT OIL	185°C	364°F	
		185	363	
		185.	363.	
	AVE.	185.	363.3°F = 184.1°C	0.2%
100°C	BOILING WATER	100	211°F	
		100	211	
		100	211	
	AVE	100°C	211°F = 99.4°C	0.16%
0.0°C.	ICE WATER	1.0°C		
		1.0		
		1.0		
	AVE.	1.0	38°F = 0.6°C	0.15%

Diff. =
$$\frac{(\text{Ref. Temp} + 273) - (\text{Test Temp} + 273)}{(\text{Ref. Temp} + 273)} \times 100$$

ENGINEERING SCIENCE
Pasadena, California

TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 09-14-90

Thermocouple No. 92

Barometric Pressure 29.19 in. Hg

Ambient Temperature 28° °C

Calibrated by D MARSDEN

Reference: Mercury in glass ASTM 7C

Other _____

Reference Point Number	Source (Specify)	Reference Thermometer Temperature (°C)	Thermocouple Potentiometer Temperature (°C)	Difference %
	Hot Oil	185°C	364°F	
		185	363	
		185	363	
	Ave	185°C	363.3°F = 184.1°C	0.2%
	Boiling Water	100°C	211°F	
		100	211	
		100	211	
	Ave	100°C	211°F = 99.4°C	0.16%
	Ice Water	1.0°C	33°F	
		1.0°	33	
		1.0°	33	
	Ave	1.0°C	33°F = 0.6°C	0.15%

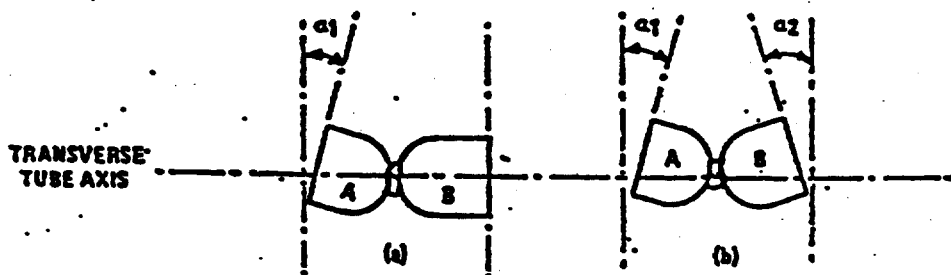
$$\text{Diff.} = \frac{(\text{Ref. Temp} + 273) - (\text{Test Temp} + 273)}{(\text{Ref. Temp.} + 273)} \times 100$$

PITOT TUBE CALIBRATION

PALA.
S/N: A

DATE: 11-27-90

CAL BY: DMARSDEN.

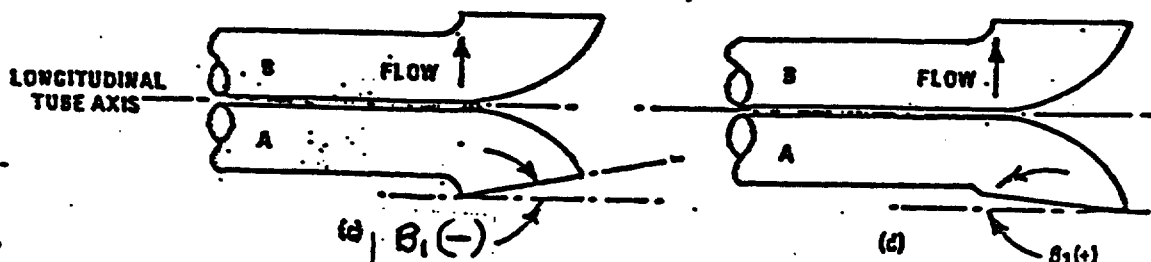


$$\alpha_1 = 2^\circ$$

$$(< 10^\circ)$$

$$\alpha_2 = 1^\circ$$

$$(< 10^\circ)$$



$$B_1 = 0^\circ$$

$$(< 5^\circ)$$

$$B_2 = 2^\circ$$

$$(< 5^\circ)$$

$$Z = .079$$

$$(< 0.32 \text{ cm})$$

$$W = .039$$

$$(< .008 \text{ cm})$$

$$D_t = .95$$

$$P_A + P_B = 2.262$$

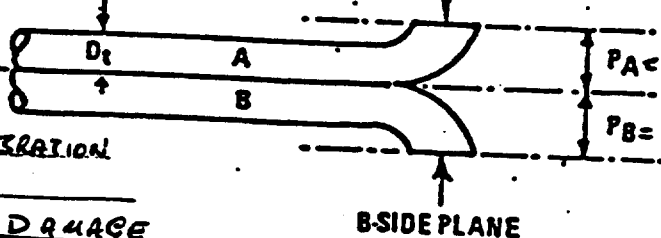
$$\frac{P_A + P_B}{2} = 1.131$$

$$1.05 D_t \leq P \leq 1.50 D_t$$

$$1.05 \times .95 \leq 1.131 \leq 1.50 \times .95$$

$$1.097 \leq 1.131 \leq 1.425$$

LONGITUDINAL
TUBE AXIS



NOTE:

$$1.05 D_t \leq P \leq 1.50 D_t$$

$$P_A = P_B$$

COMMENTS. CALIBRATION

RESULTS ARE TO

SPECIFICATION. NO DAMAGE

$$C_P = .74$$

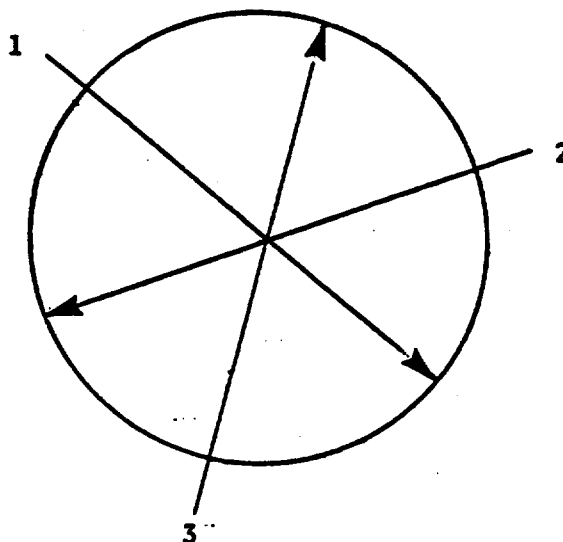
Defero

NOZZLE CALIBRATION

Source: PALA. PROBE "A"Date of Source Test: 01-21-91

Sampling Method: _____

Pollutant: _____



Nozzle Measurement Data:

Diameter #1 0.222 inchesDiameter #2 0.221 inchesDiameter #3 0.221 inchesAverage 0.221 inches

Note: (1) Measure nozzle to nearest 0.001 inches

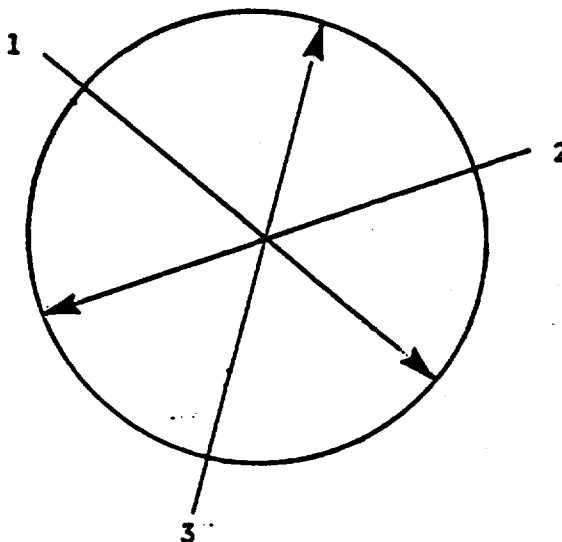
(2) The difference between minimum and maximum measurements shall be no greater than 0.004 inches

NOZZLE CALIBRATION

Source: PALA. PROBE "B"Date of Source Test: 01-21-91

Sampling Method: _____

Pollutant: _____



Nozzle Measurement Data:

Diameter #1 0.219 inchesDiameter #2 0.220 inchesDiameter #3 0.221 inchesAverage 0.220 inches

Note: (1) Measure nozzle to nearest 0.001 inches

(2) The difference between minimum and maximum measurements shall be no greater than 0.004 inches

APPENDIX J
SUPPORTING DATA FOR SAMPLE CALCULATIONS

Client Pala ADDS 88
 Subject trans metal sample values.

Job No. W220
 By [Signature]
 Checked _____
 Sheet 1 of 1
 Date 1/23-25, 28, 29
 Rev. _____

	run #1	run #2	run #3	AVG
DSCF:	83.420	84.873	86.399	84.897
DSCFM:	15,960	15,695	16,113	15,789

$\mu\text{g/L} \rightarrow \text{lb/hr.}$

$$\frac{\text{lb}}{\text{hr}} = \frac{\mu\text{g/L} (L) \left[\frac{10^{-6} \text{ grams}}{1 \mu\text{g}} \right]}{\text{DSCF} (\text{ft}^3)} \times \text{DSCFM} (\text{ft}^3/\text{min}) \left[\frac{60 \text{ min}}{1 \text{ hr}} \right] \left[\frac{1 \text{ lb}}{453.59 \text{ gram}} \right]$$

ex: run #1 trans metal (Zinc):

$$\frac{105 \mu\text{g/L} (1.12 \text{ L}) \left[\frac{10^{-6} \text{ gram}}{1 \mu\text{g}} \right]}{83.420 \text{ ft}^3} \times 15,560 \text{ ft}^3/\text{min} \left[\frac{60 \text{ min}}{1 \text{ hr}} \right] \left[\frac{1 \text{ lb}}{453.59 \text{ gram}} \right]$$

$$= 2.9 \times 10^{-3} \text{ lb/hr} \checkmark$$

Parameter	lb/hr run #1	lb/hr run #2	lb/hr run #3	lb/hr average
Beryllium:	< 2.8×10^{-5} ✓	< 2.8×10^{-5} ✓	< 2.7×10^{-5} ✓	< 2.8×10^{-5}
Manganese:	1.5×10^{-4} ✓	1.7×10^{-4} ✓	1.8×10^{-4} ✓	1.7×10^{-4}
Nickel:	8.8×10^{-5} ✓	1.4×10^{-4} ✓	6.9×10^{-5} ✓	9.9×10^{-5}
Copper:	1.7×10^{-4} ✓	2.0×10^{-4} ✓	2.4×10^{-4} ✓	2.0×10^{-4}
Zinc:	2.9×10^{-3} ✓	4.8×10^{-4} ✓	5.9×10^{-4} ✓	1.3×10^{-3}
Arsenic:	2.5×10^{-5} ✓	8.4×10^{-6} ✓	5.3×10^{-6} ✓	1.3×10^{-5}
Selenium:	1.7×10^{-4} ✓	1.7×10^{-4} ✓	2.9×10^{-4} ✓	2.9×10^{-4}
Cadmium:	3.3×10^{-5} ✓	1.7×10^{-5} ✓	2.7×10^{-5} ✓	3.0×10^{-5}
Lead:	8.4×10^{-4} ✓	2.4×10^{-4} ✓	2.4×10^{-4} ✓	4.4×10^{-4}

Mercury (H ₂ O ₂) ^{+ filter} ^{LOR}	< 2.2×10^{-5} ✓	< 2.3×10^{-5} ✓	1.9×10^{-5} ✓	1.9×10^{-5}
Mercury (KMnO ₄)	< 1.1×10^{-4} ✓	< 1.1×10^{-4} ✓	< 1.1×10^{-4} ✓	< 1.1×10^{-4}
Mercury (total)	< 1.3×10^{-4} ✓	< 1.3×10^{-4} ✓	< 1.3×10^{-4} ✓	< 1.3×10^{-4}

NOTE: For "less than" values (<) the highest value is taken as the average.
 If real numbers are available the "less than" values are not included in the average.

Client Pala AB2588 Job No. MA 220 Sheet 1 of 1
 Subject Cadmium sample calc By DAB Date 1/23-25, -22
 Checked _____ Rev. 9/

	1.208L 910152	1.268L 910153	1.265L 910154	
	<u>RUN #1</u>	<u>RUN #2</u>	<u>RUN #3</u>	<u>avg</u>
DSCF :	85.716	83.899	81.652	83.756
DSCFM:	16,194	15,307	15,541	15,681

ug/L → lb/hr:

$$\text{lb/hr} = \frac{\text{ug/L (L)} \left[\frac{10^{-6} \text{ gram}}{1 \text{ ug}} \right]}{\text{DSCF (ft}^3\text{)}} \times \text{DSCFM (ft}^3\text{/min)} \left[\frac{60 \text{ min}}{1 \text{ hr}} \right] \left[\frac{1 \text{ lb}}{453.59 \text{ gram}} \right]$$

ex. run #1 Cadmium:

$$\frac{0.8 \text{ ug/L (1.208L)} \left[\frac{10^{-6} \text{ gram}}{1 \text{ ug}} \right]}{85.716 \text{ ft}^3} 16,194 \text{ ft}^3\text{/min} \left[\frac{60 \text{ min}}{1 \text{ hr}} \right] \left[\frac{1 \text{ lb}}{453.59 \text{ gram}} \right]$$

$$= 2.4 \times 10^{-5} \text{ lb/hr}$$

Parameters:	<u>lb/hr</u> <u>run #1</u>	<u>lb/hr</u> <u>run #2</u>	<u>lb/hr</u> <u>run #3</u>	<u>lb/hr</u> <u>average</u>
Cadmium :	2.4×10^{-5}	4.0×10^{-5}	3.8×10^{-5}	3.4×10^{-5}

Client Palo Alto 2588
 Subject Hex and total chromium

Job No. WA 220
 By 1/11
 Checked _____

Sheet 1 of 1
 Date 2/27-29-80
 Rev. _____

	910164 run #1	910169 run #2	910170 run #3	average
DSCF :	78.441	91.847	93.070	87.786
DSCFM :	16,988	17,282	16,899	17,056
volume(L)	1.150	1.335	1.290	

ug/L → lb/hr

$$\text{lb/hr} = \frac{\text{ug/L} (L) \left[\frac{10^{-6} \text{ gram}}{1 \text{ ug}} \right]}{\text{DSCF} (\text{ft}^3)} \quad \text{DSCFM} (\text{ft}^3/\text{min}) \left[\frac{60 \text{ min}}{1 \text{ hr}} \right] \left[\frac{1 \text{ lb}}{453.59 \text{ gram}} \right]$$

ex: run #1 Hexavalent Chromium

1. 0.53 ug/L
2. 0.44
3. 0.36

$$\frac{0.53 \text{ ug/L} (1.150 \text{ L}) \left[\frac{10^{-6} \text{ gram}}{1 \text{ ug}} \right]}{78.441 \text{ ft}^3} \quad 16,988 \text{ ft}^3/\text{min} \left[\frac{60 \text{ min}}{1 \text{ hr}} \right] \left[\frac{1 \text{ lb}}{453.59 \text{ gram}} \right]$$

$$= 1.7 \times 10^{-5} \text{ lb/hr}$$

Parameter	run #1	run #2	run #3	avg
Hex chromium:	1.7×10^{-5}	1.6×10^{-5}	1.1×10^{-5}	1.5×10^{-5}
Total chromium:	1.3×10^{-4}	6.6×10^{-5}	6.2×10^{-5}	8.6×10^{-5}

1 4 ug/L
 2 2
 2 1

Client Palo AB2589

Subject PAA sample calc

Job No. UM 220

By 0111

Checked _____

Sheet 1 of 1
Date Dec 23-25-2013

Rev. _____

	run #1	run #2	run #3	average
DSCF :	79.260	81.840	84.183	83.111
DSCFM:	17,078	15,202	17,307	16,529

mg → lb/hr

$$\text{lb/hr} = \frac{\text{mg} \left[\frac{10^{-9} \text{ gram}}{1 \text{ mg}} \right]}{\text{DSCF} (\text{ft}^3)} \text{DSCFM} (\text{ft}^3/\text{min}) \left[\frac{60 \text{ min}}{1 \text{ hr}} \right] \left[\frac{1 \text{ lb}}{453.59 \text{ gram}} \right]$$

ex:

run #1 naphthalene:

$$\frac{66,000 \text{ mg} \left[\frac{10^{-9} \text{ gram}}{1 \text{ mg}} \right]}{79.260 \text{ ft}^3} 17,078 \text{ ft}^3/\text{min} \left[\frac{60 \text{ min}}{1 \text{ hr}} \right] \left[\frac{1 \text{ lb}}{453.59 \text{ gram}} \right]$$

$$= 1.9 \times 10^{-5} \text{ lb/hr}$$

parameter	run #1	run #2	run #3	avg
Naphthalene	1.9×10^{-3}	1.1×10^{-3}	2.6×10^{-3}	1.9×10^{-3}
Acenaphthylene	1.9×10^{-6}	1.3×10^{-6}	7.8×10^{-6}	3.7×10^{-6}
Acenaphthen	3.4×10^{-6}	1.9×10^{-6}	5.7×10^{-6}	3.7×10^{-6}
Fluorene	4.0×10^{-5}	1.8×10^{-5}	8.8×10^{-5}	4.9×10^{-5}
Phenanthrene	8.8×10^{-5}	1.0×10^{-4}	2.0×10^{-4}	1.3×10^{-4}
Anthracene	2.1×10^{-6}	2.2×10^{-6}	4.7×10^{-6}	3.0×10^{-6}
Fluoranthene	7.7×10^{-6}	1.6×10^{-5}	2.4×10^{-5}	1.6×10^{-5}
Pyrene	5.1×10^{-6}	1.2×10^{-5}	1.6×10^{-5}	1.1×10^{-5}
Chrysene	1.6×10^{-7}	2.0×10^{-7}	3.1×10^{-7}	2.2×10^{-7}
Benz(a)anthracene	8.8×10^{-7}	8.3×10^{-7}	1.7×10^{-6}	1.1×10^{-6}
Benz(b)fluoranthene	8.3×10^{-8}	1.6×10^{-7}	2.2×10^{-6}	8.1×10^{-7}
Benz(k)fluoranthene	5.1×10^{-8}	8.1×10^{-8}	4.9×10^{-7}	2.1×10^{-7}
Benz(a)pyrene	5.1×10^{-8}	6.9×10^{-8}	4.7×10^{-8}	5.6×10^{-8}
Benz(g,h,i)perylene	7.4×10^{-8}	9.6×10^{-8}	9.9×10^{-8}	9.0×10^{-8}
Dibenz(a,h)anthracene	$< 4.6 \times 10^{-8}$	$< 2.7 \times 10^{-8}$	$< 2.3 \times 10^{-8}$	$< 4.6 \times 10^{-8}$
Indeno[1,2,3-cd]pyrene	4.3×10^{-8}	6.1×10^{-8}	5.7×10^{-8}	5.4×10^{-8}

Note: For "less than" values (<) the highest value is taken as the average. If real numbers are available the "less than" values are not included in the average.

Client Palo Alto 2588
 Subject sample rate for CEM

Job No. WA 220
 By JTB
 Checked _____

Sheet 1 of 1
 Date 2/25, 28, 29/91
 Rev. _____

	<u>2/25/91</u>	<u>2/28/91</u>	<u>2/29/91</u>
Chromium: (DS CFM)	16,988	17,282	16,899
PAH (DS CFM)	17,078	15,202	17,307
AVG: (DS CFM)	17,033	16,242	17,103

→ use for CEM rate: ★

MW of NO_x = 46
 SO₂ = 64
 O₃ = 48

ppm → lb/hr

$$\text{lb/hr} = \text{ppm} (1.58 \times 10^{-7}) (\text{MW}) (\text{DS CFM})$$

91.7 MW #1 NO_x 1/25/91

$$\text{lb/hr} = 91.90 \text{ ppm} (1.58 \times 10^{-7}) (46) (17,033) = 11.38$$

Client Pala AB2588
 Subject Formaldehyde
sample rate R-CHO

Job No. VA 220

By DAB

Checked _____

Sheet 1 of 1

Date 1/23-24/91

Rev. _____

	<u>910160</u> <u>run #1</u>	<u>910161</u> <u>run #2</u>	<u>910162</u> <u>run #3</u>	<u>average</u>
DSCFM	15,743	16,959	17,273	16,658
DSCF	3.948	3.990	3.918	3.952
vol(L)	0.138	0.050	0.039	0.076
gas sampled(L)	123.43	118.56	116.89	119.63

ug → ppb → ppm ^{note: 1 m³ @ 60°F std temp}

$$\frac{\text{ug}}{\text{M}^3} \left[\frac{23.69 \text{ ml/mililiter}}{\text{MW}} \right] = \text{ppb} \cdot \left[\frac{1}{1000} \right] = \text{ppm}$$

where $\text{M}^3 = \frac{\text{liters of gas sampled}}{1000}$ MW of RCHO = 30.03

rx: run #1 R-CHO

$$\frac{93 \text{ ug}}{0.12343 \text{ M}^3} \left[\frac{23.69 \text{ ml/mililiter}}{30.03} \right] = 594 \text{ ppb} \left[\frac{1}{1000} \right] = 0.594 \text{ ppm}$$

<u>units</u>	<u>run #1</u>	<u>run #2</u>	<u>run #3</u>	<u>average</u>
ppb	594 ✓	412 ✓	742 ✓	583 ✓
ppm	0.594	0.412	0.742	0.583
lb/hr	0.044 ✓	0.033 ✓	0.061 ✓	0.046 ✓

ppm → lb/hr $\text{lb/hr} = \text{ppm} \left(\frac{\text{MW}}{385.1 \times 10^6} \right) \text{DSCFM} \left(\frac{60 \text{ min}}{\text{hr}} \right)$

$$\begin{aligned} \text{lb/hr} &= \text{ppm} (1.58 \times 10^{-7}) (\text{MW}) (\text{DSCFM}) \\ &= 0.594 \text{ ppm} (1.58 \times 10^{-7}) (30.03) (15,743) \\ &= 0.044 \text{ lb/hr} \end{aligned}$$

$$1.558 \times 10^{-7} = \left(60 \times 1 \times 10^{-6} / 385.1 \right)$$

minutes (1/106)

1 lb in ft³ of 1 lb-mole of gas at std cond.

Client Palo Alto 102588

Subject sample rate Benzene

Job No. 10220

By WAB

Checked _____

Sheet 1 of 1

Date 1/23-25/91

Rev. _____

		<u>DSCF</u>	<u>DSCFM</u>	
1/23/91	trans metal #1	83.420	15,560	
	cadmium #1	85.716	16,194	
	AVG	84.568	15,877	} #1 Benzene 910148
1/24/91	trans metal #2	84.873	15,695	
	trans metal #3	86.399	16,113	
	cadmium #2	83.899	15,307	
	cadmium #3	81.652	15,541	
	AVG	84.206	15,664	} #2 Benzene 910149
1/25/91	chromium	78.441	16,988	
	PAH	79.260	17,078	
	AVG	78.851	17,033	} #3 Benzene 910150

AVG: 82.542 16,191

<u>parameter</u>	<u>run #1</u>	<u>run #2</u>	<u>run #3</u>
Benzene:	ND	ND	ND

ND = not detected

detection limit = 1.0 ppm

Benzene MW = 78.11

ppm → lb/hr

$$\begin{aligned}
 \text{lb/hr} &= (\text{ppm}) (1.58 \times 10^{-7}) (\text{MW}) (\text{DSCFM}) \\
 &= (1 \text{ ppm}) (1.58 \times 10^{-7}) (78.11) (16,191) \\
 \text{lb/hr} &= 0.200 \text{ or } 2.0 \times 10^{-1} \checkmark
 \end{aligned}$$

Client Palo 2588 1/23-28/91

Subject actual process time

Job No. 5765

By PR

Checked 3-14-91

Sheet 1 of 1

Date 3/14/91

Rev.

<u>date</u>	<u>times</u>		
1/23/91	0630-1530 = 540 min	projected process time	
	0825-0837 = - 12 min	delay	
	0852-0856 = - 4 min	delay	

$$524 \text{ min} \left[\frac{1 \text{ hr}}{60 \text{ min}} \right] = 8.73 \text{ hrs of actual process time}$$

1/24/91	0630-1445 = 495 min	projected process time
	0730-0835 = - 65 min	delay

$$430 \text{ min} \left[\frac{1 \text{ hr}}{60 \text{ min}} \right] = 7.17 \text{ hrs of actual process time}$$

1/25/91	0625-1340 = 435 min	projected process time
	0900-0910 = - 10 min	delay
	1040-1050 = - 10 min	delay
	1105-1110 = - 5 min	delay

$$410 \text{ min} \left[\frac{1 \text{ hr}}{60 \text{ min}} \right] = 6.83 \text{ hrs of actual process time}$$

1/28/91	0615-1400 = 465 min	projected process time
---------	---------------------	------------------------

$$465 \text{ min} \left[\frac{1 \text{ hr}}{60 \text{ min}} \right] = 7.75 \text{ hrs of actual process time}$$

1/29/91	0630-1145 = 315 min	projected process time
	0722-0728 = - 6 min	delay
	0954-1001 = - 7 min	delay
	1103-1130 = - 27 min	delay

$$275 \text{ min} \left[\frac{1 \text{ hr}}{60 \text{ min}} \right] = 4.58 \text{ hrs of actual process time}$$

Client Polo AB2588

Subject ton / hr

Job No. _____

By PHB

Checked PR 3-14-91

Sheet 1 of 1

Date 3/12/91

Rev. _____

date total ton/day (see Table 18-22) ton/day of Batch Mix

1/23/91	1,779.30	"
1/24/91	1,322.42	"
1/25/91	998.58	"
1/28/91	1,568.48	"
1/29/91	873.78	"

date actual process time per day

1/23/91	8.73 hrs/day
1/24/91	7.17 "
1/25/91	6.83 "
1/28/91	7.75 "
1/29/91	4.58 "

ex: 1/23/91

$$\text{ton/hr} = \frac{\text{total (ton/day)}}{\text{actual process time (hr/day)}} = \frac{1,779.30 \text{ ton/day}}{8.73 \text{ hr/day}} = 203.81 \text{ ton/hr}$$

<u>date</u>	<u>ton/hr</u>
1/23/91	203.81
1/24/91	184.44
1/25/91	146.20
1/28/91	202.38
1/29/91	190.78

165.32

NOTE: From trace elements + cadmium (credit) run #3 (1/24-25/91)
use 165.32 ton/hr for calculation in
lbs/ton.

Client PALM #2588 1/23-28/91

Subject lbs/hr → lbs/ton of product

Job No. _____

By W/AB

Checked PR 7-14-91

Sheet 1 of 2

Date 12/13/91

Rev. _____

lbs/hr → lbs. of toxic/ton of prod 22. run #1 Arsenic

$$\frac{\text{lbs/ton product}}{\text{tons/hr}} = \frac{\text{lbs/hr}}{\text{tons/hr}} = \frac{2.5 \times 10^{-5} \text{ lbs/hr}}{203.81 \text{ tons/hr}} = 1.2 \times 10^{-7} \text{ lbs/ton}$$

where:

$$\text{tons/hr} = \frac{\text{total tons/day}}{\text{nitro process time}} = \frac{1,779.30 \text{ tons/day}}{8.73 \text{ hr}} = 203.81 \text{ tons/hr}$$

parameter	1/23/91 lbs/ton run #1	1/24/91 lbs/ton run #2	1/24, 25/91 lbs/ton run #3	avg of 1/24+25/91 lbs/ton average
Arsenic	1.2×10^{-7} ✓	4.6×10^{-8}	3.2×10^{-8}	6.6×10^{-8}
Beryllium	$< 1.4 \times 10^{-7}$ ✓	$< 1.5 \times 10^{-7}$	$< 1.6 \times 10^{-7}$	$< 1.6 \times 10^{-7}$
Cadmium	1.6×10^{-7} ✓	$< 9.2 \times 10^{-8}$	1.6×10^{-7}	$< 1.6 \times 10^{-7}$
Copper	8.3×10^{-7} ✓	1.1×10^{-6}	1.5×10^{-6}	1.1×10^{-6}
Manganese	7.4×10^{-7} ✓	9.2×10^{-7}	1.1×10^{-6}	9.2×10^{-7}
Mercury	$< 6.4 \times 10^{-7}$ ✓	$< 7.1 \times 10^{-7}$	$< 7.9 \times 10^{-7}$	$< 7.9 \times 10^{-7}$
Lead	4.1×10^{-6} ✓	1.3×10^{-6}	1.5×10^{-6}	2.3×10^{-6}
Nickel	4.3×10^{-7} ✓	7.6×10^{-7}	4.2×10^{-7}	5.4×10^{-7}
Selenium	$< 8.3 \times 10^{-7}$ ✓	$< 9.2 \times 10^{-7}$	1.8×10^{-6}	$< 1.8 \times 10^{-6}$
Zinc	1.4×10^{-5} ✓	2.6×10^{-6}	3.6×10^{-6}	6.7×10^{-6}
Cadmium (audit)	1.2×10^{-7} ✓	2.2×10^{-7}	2.3×10^{-7}	1.9×10^{-7}

parameter	1/25/91 lbs/ton run #1	1/28/91 lbs/ton run #2	1/29/91 lbs/ton run #3	avg lbs/ton average
Chrom (Hex)	1.2×10^{-7} ✓	7.479×10^{-8} ✓	5.8×10^{-8}	8.1×10^{-8}
Chrom (Total)	8.9×10^{-7}	3.3×10^{-7} ✓	3.3×10^{-7}	5.2×10^{-7}

Client Palo Alto 132588 1/23-29/91

Subject 1044 → lb/ton of product

Job No. _____

By HP

Checked PR 2/14/91

Sheet 2 of 2

Date 12/13/91

Rev. _____

	1/25/91	1/28/91	1/29/91	
parameter	lb/ton	lb/ton	lb/ton	lb/ton
	run #1	run #2	run #3	average
Naphthalene	1.3×10^{-5} ✓	5.4×10^{-6}	1.4×10^{-5}	1.1×10^{-5}
Acenaphthylene	1.3×10^{-8}	6.4×10^{-9}	4.1×10^{-8}	2.0×10^{-8}
Acenaphthene	2.3×10^{-8}	9.4×10^{-9}	3.0×10^{-8}	2.1×10^{-8}
Fluorene	2.7×10^{-7}	8.9×10^{-8}	4.6×10^{-7}	2.7×10^{-7}
Phenanthrene	6.0×10^{-7} ✓	4.9×10^{-7}	1.1×10^{-6}	7.3×10^{-7}
Anthracene	1.4×10^{-8}	1.1×10^{-8}	2.5×10^{-8}	2.0×10^{-8}
Fluoranthene	5.3×10^{-8} ✓	7.9×10^{-8}	1.3×10^{-7}	8.7×10^{-8}
Pyrene	3.5×10^{-8}	5.9×10^{-8}	8.4×10^{-8}	5.9×10^{-8}
Chrysene	1.1×10^{-9}	9.9×10^{-10}	1.6×10^{-9}	1.2×10^{-9}
Benzo(a)anthracene	6.0×10^{-9} ✓	4.1×10^{-9}	8.9×10^{-9}	6.3×10^{-9}
Benzo(b)fluoranthene	5.7×10^{-10} ✓	7.9×10^{-10}	1.2×10^{-8}	4.5×10^{-9}
Benzo(k)fluoranthene	3.5×10^{-10} ✓	4.0×10^{-10}	2.6×10^{-9}	1.1×10^{-9}
Benzo(a)pyrene	3.5×10^{-10} ✓	3.4×10^{-10}	2.5×10^{-10}	3.1×10^{-10}
Benzo(g,h,i)perylene	5.1×10^{-10} ✓	4.7×10^{-10}	5.2×10^{-10}	5.0×10^{-10}
Dibenz(a,h)anthracene	$< 3.2 \times 10^{-10}$ ✓	$< 1.3 \times 10^{-10}$	$< 1.2 \times 10^{-10}$	$< 3.2 \times 10^{-10}$
Indeno(1,2,3-cd)pyrene	2.9×10^{-10} ✓	3.0×10^{-10}	3.0×10^{-10}	3.0×10^{-10}

	2/23/91	2/24/91	2/24/91	
Parameter	lb/ton	lb/ton	lb/ton	lb/ton
	run #1	run #2	run #3	average
Formaldehyde	2.2×10^{-4} ✓	1.8×10^{-4} ✓	3.3×10^{-4} ✓	2.4×10^{-4} ✓

	1/23/91	1/24/91	1/25/91	
parameter	lb/ton	lb/ton	lb/ton	lb/ton
	run #1	run #2	run #3	average
Benzene	$< 9.8 \times 10^{-4}$ ✓	$< 9.8 \times 10^{-4}$	$< 9.8 \times 10^{-4}$	$< 9.8 \times 10^{-4}$ ✓

APPENDIX K
SUPPORTING DATA FOR PLANT'S PROCESS DATA

LIQUID ASPHALT CONSUMPTION REPORT - FOR 01/23/91									
PALA									
ROCK TYPE	PROD CODE	TOTAL TONS	RECYCLE PERCENT	RECYCLE TONS	PRODUCED TONS	OIL PERCENT	OIL TONS	FILLER PERCENT	FILLER TONS
3/4"	E4	13.20	0.00	0.00	10.20	5.10	0.52	0.00	0.00
	TOTAL	10.20	0.00	0.00	10.20	5.10	0.52	0.00	0.00
1/2"	C4	1,631.04	0.00	0.00	1,631.04	5.60	91.34	0.00	0.00
1/2"	CAS	24.99	0.00	0.00	24.99	5.50	1.37	0.00	0.00
1/2"	EC4	23.23	0.00	0.00	23.23	5.70	1.44	0.00	0.00
	TOTAL	1,681.26	0.00	0.00	1,681.26	5.60	94.15	0.00	0.00
3/8"	BRM	2.01	0.00	0.00	2.01	6.60	0.13	0.00	0.00
3/8"	CM	12.02	0.00	0.00	12.02	5.70	0.69	0.00	0.00
3/8"	D4	53.72	0.00	0.00	53.72	6.00	3.22	0.00	0.00
3/8"	FDA	15.08	0.00	0.00	15.08	6.10	0.91	0.00	0.00
3/8"	SM4	5.01	0.00	0.00	5.01	6.30	0.32	0.00	0.00
	TOTAL	87.84	0.00	0.00	87.84	6.00	5.27	0.00	0.00
PRODUCED MATERIAL TOTAL		1,779.30	0.00	0.00	1,779.30	5.62	99.94	0.00	0.00
BUCKETS SOUP							0.00		
GRAND TOTAL							99.94		1,679.36

PAGE 1

REC'D BY D. L. YEE

AR4000 99.10
AR3000 .13
CM PRODUCT .03
99.26

* END -- OF -- REPORT*

RUN 01/29/91 AT 12:49

LIQUID ASPHALT CONSUMPTION REPORT - FOR 01/24/91

PAGE 1

ROCK TYPE	PROD CODE	TOTAL IONS	RECYCLE PERCENT	RECYCLE IONS	PRODUCED IONS	OIL PERCENT	OIL IONS	FILLER PERCENT	FILLER IONS	AGGREGATE IONS
1/2"	C4	1,197.66	-.00	-.00	1,197.66	5.60	67.07	-.00	-.00	1,130.59
	TOTAL	1,197.66	.00	.00	1,197.66	5.60	67.07	.00	.00	1,130.59
3/8"	D4	58.78	.00	.00	58.78	6.00	3.53	.00	.00	55.25
3/8"	D41	2.04	.00	.00	2.04	5.90	.12	1.00	.02	1.90
3/8"	ED4	63.24	-.00	-.00	63.24	6.10	3.90	-.00	-.00	60.04
	TOTAL	124.76	.00	.00	124.76	6.05	7.55	.02	.02	117.19
PRODUCED MATERIAL TOTAL		1,322.42	.00	.00	1,322.42	5.64	74.62	.00	.02	1,247.78
BUCKETS SOUP							.00			
GRAND TOTAL							74.62			

RECAP - BY OIL TYPE
AR4000 74.62
74.62

* END - OF - REPORT*

RUN 01/29/91 AT 12:49

LIQUID ASPHALT CONSUMPTION REPORT - FOR 01/25/91
PALA

PAGE 1

ROCK TYPE	PROD CODE	TOTAL IONS	RECYCLE PERCENT	RECYCLE IONS	PRODUCED IONS	OIL PERCENT	OIL IONS	FILLER PERCENT	FILLER IONS	AGGREGATE IONS
3/4"	BA TOTAL	963.24	.00	.00	963.24	5.10	49.13	.00	.00	914.11
3/8"	ED4 TOTAL	35.34	.00	.00	35.34	6.11	2.16	.00	.00	33.18
PRODUCED MATERIAL TOTAL		998.58	.00	.00	998.58	5.14	51.29	.00	.00	947.29
BUCKETS SOUP										
GRAND TOTAL										

RECAP - BY OIL TYPE
AR4000 51.29
51.29

* END - OF - REPORT*

RUN 01/29/91 AT 12:53

LIQUID ASPHALT CONSUMPTION REPORT - FOR 01/28/91
PALA

PAGE 1

ROCK TYPE	PROD CODE	TOTAL TONS	RECYCLE PERCENT	RECYCLE TONS	PRODUCED TONS	OIL PERCENT	OIL TONS	FILLER PERCENT	FILLER TONS	AGGREGATE TONS
3/4"	R4	37.88	.00	.00	37.88	5.10	1.93	.00	.00	35.95
	TOTAL	37.88	.00	.00	37.88	5.10	1.93	.00	.00	35.95
1/2"	C4S	24.23	.00	.00	24.23	5.50	1.33	.00	.00	22.90
1/2"	FC4	6.99	.00	.00	6.99	5.70	.40	.00	.00	6.59
	FC8	1,355.13	.00	.00	1,355.13	5.70	77.24	.00	.00	1,277.89
	TOTAL	1,386.35	.00	.00	1,386.35	5.70	78.97	.00	.00	1,307.38
3/8"	CM	12.04	.00	.00	12.04	5.70	.69	.00	.00	11.35
3/8"	D4	78.14	.00	.00	78.14	6.00	4.68	.00	.00	73.46
3/8"	FD4	1.00	.00	.00	1.00	6.10	.06	.00	.00	.94
	SM4	53.07	.00	.00	53.07	6.30	3.33	.00	.00	49.72
	TOTAL	144.25	.00	.00	144.25	6.09	8.78	.00	.00	135.47
PRODUCED MATERIAL TOTAL		1,568.48	.00	.00	1,568.48	5.72	89.68	.00	.00	1,478.80
BUCKETS SOUP							.00			
GRAND TOTAL							89.68			

RECAP - BY OIL TYPE
AR4000 11.75 tons
AR8000 77.24
CM PRODUCT .69
89.68

* END - OF - REPORT *

RUN 01/29/91 AT 12:59

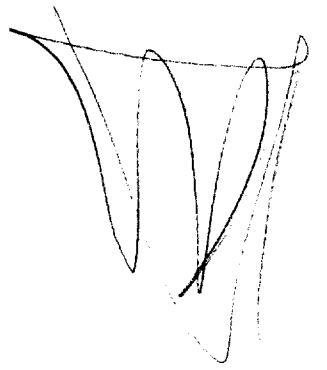
LIQUID ASPHALT CONSUMPTION REPORT - FOR 01/29/91
PALA

PAGE 1

ROCK TYPE	PROD CODE	TOTAL IONS	RECYCLE PERCENT	RECYCLE IONS	PRODUCED IONS	OIL PERCENT	OIL IONS	FILLER PERCENT	FILLER IONS	AGGREGATE IONS
1/2"	C4	12.06	.00	.00	12.06	5.60	.68	.00	.00	11.38
1/2"	EC8	716.22	.00	.00	716.22	5.70	40.82	.00	.00	675.40
	TOTAL	728.28	.00	.00	728.28	5.70	41.50	.00	.00	686.78
3/8"	CM	10.08	.00	.00	10.08	5.70	.57	.00	.00	9.51
3/8"	D4	78.98	.00	.00	78.98	6.00	4.75	.00	.00	74.23
3/8"	D8	46.40	.00	.00	46.40	6.00	2.78	.00	.00	43.62
3/8"	FD4	2.03	.00	.00	2.03	6.10	.12	.00	.00	1.91
3/8"	SM4	8.01	.00	.00	8.01	6.30	.50	.00	.00	7.51
	TOTAL	145.50	.00	.00	145.50	5.99	8.72	.00	.00	136.78
PRODUCED MATERIAL TOTAL		873.78	.00	.00	873.78	5.75	50.22	.00	.00	823.56
BUCKETS SOUP							.00			
GRAND TOTAL							50.22			

RECAP - BY OIL TYPE	
AR4000	6.05
AR8000	43.60
CM PRODUCT	.57
	50.22

* END - OF - REPORT*



7
D



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: _____

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC): _____

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: _____

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC): _____

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: _____

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC): _____

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: _____

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC): _____

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: SDAPCD

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC): _____

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: SDAPCD

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC): _____

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: SDAPCD

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC):

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date EPD 6/10/93

PRIMARY EMISSIONS TEST REPORT EVALUATION

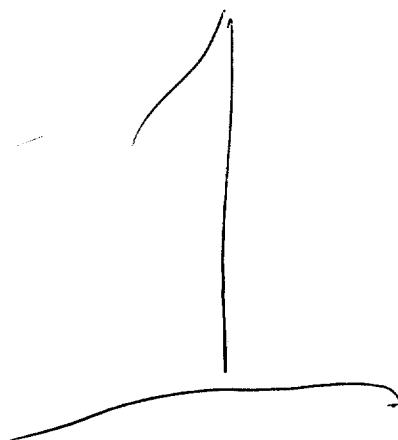
AGENCY: SDAPCD
FACILITY: _____
ADDRESS: _____

TEST DATE: _____
PROCESS(ES) TESTED (SCC):

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	

230 total
- take out markers
& put blank paxi
scanning-

103



5

2

30 pages

Appendix B
Protocol mail letter

116 pgs

2/

69



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: SDAPCD

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC):

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: SDAPCD

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC): _____

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: _____

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC): _____

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: SDAPCD

TEST DATE: _____

FACILITY: _____

PROCESS(ES) TESTED (SCC):

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	

APP E

C

11 PP
D

Equip Calibration

Appendix F

Process Data



Evaluator/Date _____

PRIMARY EMISSIONS TEST REPORT EVALUATION

AGENCY: SDAPCD

TEST DATE: _____

FACILITY: _____

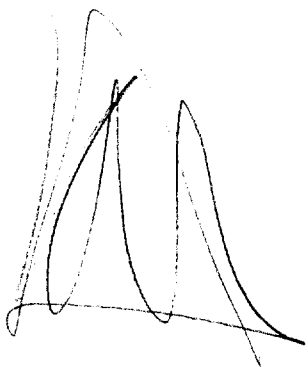
PROCESS(ES) TESTED (SCC):

ADDRESS: _____

Documentation of process rate during testing		Documentation of source or process tested	
Documentation of EPA Methods 1 through 4		Documentation of test/estimation method	
All calculations shown		Consistency of results	
Documentation of control equipment operating parameters during testing		Thorough field data on standard forms for at least 3 runs	
Documentation of type of control equipment		Laboratory analysis data for all samples	

2

4



**1992 AB2588 EMISSION INVENTORY REPORT
AS REQUIRED UNDER THE AIR TOXICS "HOT SPOTS"
INFORMATION AND ASSESSMENT ACT OF 1987**

**PREPARED FOR
INDUSTRIAL ASPHALT
SANGER FACILITY
FRESNO, CALIFORNIA**

JUNE 1, 1993

**SUBMITTED TO
SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL
DISTRICT
1999 TUOLUMNE STREET, SUITE 200
FRESNO, CALIFORNIA 93721**

**PREPARED BY
ENGINEERING-SCIENCE, INC.
199 South Los Robles Avenue
P.O. Box 7056
Pasadena, California 91109**

TABLE OF CONTENTS

SECTION 1	AB2588 REPORTING FORMS AND FLOW DIAGRAM
SECTION 2	DOCUMENTATION SUPPORTING EMISSION CALCULATIONS
SECTION 3	POOLED SOURCE TEST REPORT AND FUEL AND MATERIAL ANALYSIS

**AB2588 REPORTING FORMS AND FLOW
DIAGRAM**

EMISSION YEAR 1992	AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT FACILITY DESCRIPTION	FORM FAC
--------------------------	--	-------------

FACILITY DATA

COMPANY NAME

INDUSTRIAL ASPHALT

ADDRESS

17125 E. KINGS CANYON

CITY

FRESNO

ZIP CODE

93706

CONTACT PERSON

DWIGHT BEAVERS

TELEPHONE

818 - 781 - 6080

FACILITY SIC:

2951

NUMBER OF EMPLOYEES:

4

MAILING ADDRESS DATA

COMPANY NAME

INDUSTRIAL ASPHALT

ADDRESS

P.O. BOX 7607

CITY

VAN NUYS

ZIP CODE

91409

ATTENTION

DWIGHT BEAVERS

FOR OFFICE USE ONLY

COUNTY

ID:

FACILITY ID:

ACTION CODE:

DISTRICT:

AIR BASIN CODE:

CITY CODE

(OPTIONAL)

AOCR

(OPTIONAL)

SUBCOUNTY ID

FACD1 (OPTIONAL)

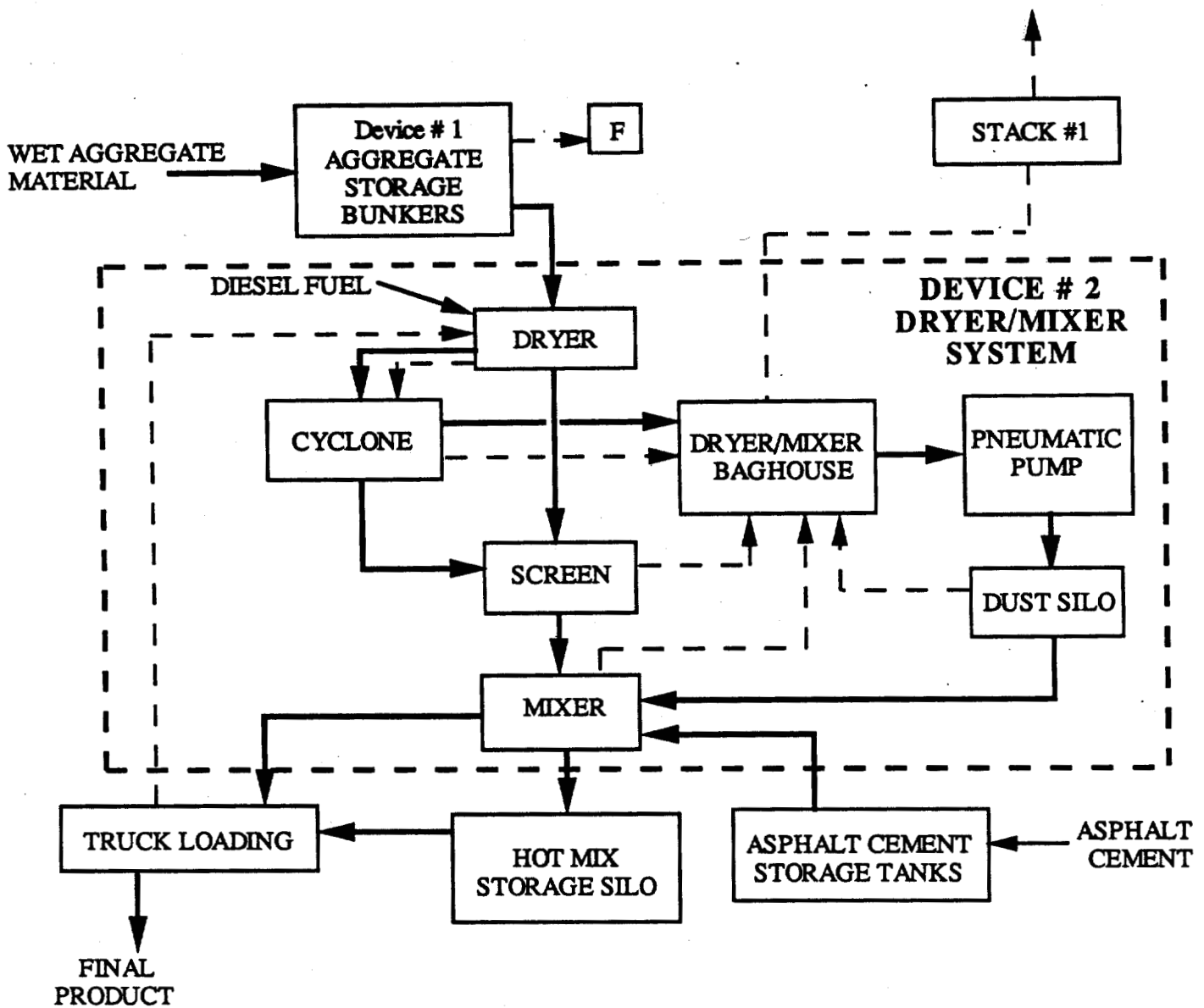
FACD2 (OPTIONAL)

UTM ZONE

UTM EAST

UTM NORTH

SANGER INDUSTRIAL ASPHALT PROCESS FLOW DIAGRAM



————— Process Material
 - - - - - Emissions

EMISSION

AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT

FORM

STK

YEAR

1992

STACK DATA

FOR OFFICE USE ONLY

COUNTY ID:

FACILITY ID:

DO NOT DELETE STACK IF IT SERVES OTHER DEVICES. SEE INSTRUCTIONS

DESC
CODE

STACK/VENT CATEGORY

REQUIRED INFORMATION

AMBIENT TEMP & LOW-VELOCITY EXHAUST (T W/IN 25 F OF AMBIENT & V LT 750 FPM)

- | | | |
|---|---|--------------------------------|
| 1 | RELEASE POINT (RP) AT GROUND-LEVEL | STACK ID & CODE ONLY |
| 2 | RELEASE FROM BLDG HVAC ONLY | STACK ID, CODE, & STACK HEIGHT |
| 3 | RP W/IN (2.5 X HB) ABOVE GROUND AND
W/IN (5 X HB) SIDEWAYS TO NEAREST BLDG | STACK ID, CODE, & STACK HEIGHT |
| 4 | OTHER STACK/VENT (LOW T,V) | STACK ID, CODE, & STACK HEIGHT |

OTHER TEMP & FLOW CONDITIONS

- | | | |
|---|---|-----------------------|
| 5 | RP W/IN (2.5 X HB) ABOVE GROUND AND
W/IN (5 X HB) SIDEWAYS TO NEAREST BLDG | ALL STACK INFORMATION |
| 6 | OTHER STACK/VENT (OTHER T,V) | ALL STACK INFORMATION |

WHERE HB = HEIGHT OF NEAREST BUILDING

AND HVAC = HEATING, VENTILATING AND AIR CONDITIONING

OFC USE

OFC USE ONLY

***** EXHAUST *****

ACTION
CODE

STACK ID	DESC CODE	HEIGHT ABOVE GROUND (FEET)	DIAMETER (FEET)	GAS TEMP (F)	GAS FLOW RATE (CFM)
1	6	24	4.25	180	44,500

UTM EAST
(KILOMETERS)

--	--	--	--	--

UTM NORTH
(KILOMETERS)

--	--	--	--	--

ACTION
CODE

STACK ID	DESC CODE	HEIGHT ABOVE GROUND (FEET)	DIAMETER (FEET)	GAS TEMP (F)	GAS FLOW RATE (CFM)

UTM EAST
(KILOMETERS)

--	--	--	--	--

UTM NORTH
(KILOMETERS)

--	--	--	--	--

ACTION
CODE

STACK ID	DESC CODE	HEIGHT ABOVE GROUND (FEET)	DIAMETER (FEET)	GAS TEMP (F)	GAS FLOW RATE (CFM)

UTM EAST
(KILOMETERS)

--	--	--	--	--

UTM NORTH
(KILOMETERS)

--	--	--	--	--

ACTION
CODE

STACK ID	DESC CODE	HEIGHT ABOVE GROUND (FEET)	DIAMETER (FEET)	GAS TEMP (F)	GAS FLOW RATE (CFM)

UTM EAST
(KILOMETERS)

--	--	--	--	--

UTM NORTH
(KILOMETERS)

--	--	--	--	--

NAME: ANTOINE ASSIOUN, ENGINEERING - SCIENCE, INC.

DATE: 5/25/93

EMISSION YEAR 1992	AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT DEVICE DESCRIPTION AND DEVICE-STACK RELATIONS	FORM DEV
--------------------------	---	-------------

FOR OFFICE USE ONLY		COUNTY ID:
		FACILITY ID:

OFC USE	**** OFFICE USE ONLY ****		
	** EACH ITEM IS OPTIONAL **		
ACTION CODE ☐	DEVICE ID 1	DEVICE NAME STORAGE BUNKERS	NBR OF DEV. 4
	STACK ID NONE	PERMIT ID (IF AVAILABLE) NONE	
		DEVD 1	DEVD 2
		DEVD 1	DEVD 2
ACTION CODE ☐	DEVICE ID 2	DEVICE NAME DRYER/MIXER SYSTEM	NBR OF DEV. 1
	STACK ID 1	PERMIT ID (IF AVAILABLE) 5010050101	
		DEVD 1	DEVD 2
		DEVD 1	DEVD 2
ACTION CODE ☐	DEVICE ID	DEVICE NAME	NBR OF DEV.
	STACK ID	PERMIT ID (IF AVAILABLE)	
		DEVD 1	DEVD 2
		DEVD 1	DEVD 2
ACTION CODE ☐	DEVICE ID	DEVICE NAME	NBR OF DEV.
	STACK ID	PERMIT ID (IF AVAILABLE)	
		DEVD 1	DEVD 2
		DEVD 1	DEVD 2
ACTION CODE ☐	DEVICE ID	DEVICE NAME	NBR OF DEV.
	STACK ID	PERMIT ID (IF AVAILABLE)	
		DEVD 1	DEVD 2
		DEVD 1	DEVD 2
ACTION CODE ☐	DEVICE ID	DEVICE NAME	NBR OF DEV.
	STACK ID	PERMIT ID (IF AVAILABLE)	
		DEVD 1	DEVD 2
		DEVD 1	DEVD 2

NAME: ANTOINE ASSIOUN - ENGINEERING SCIENCE, INC.

DATE: 5 / 25 / 93

EMISSION YEAR 1992	AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT PROCESS AND EMITTENTS DATA	FORM PRO SIDE A
---------------------------------	--	------------------------------

FOR OFFICE USE ONLY			
PROCESS DESCRIPTION 	SCC NO 	COUNTY ID: 	AIR BASIN
ACTION CODE 	PROD 1 (OPTIONAL) 	PROD 2 (OPTIONAL) 	FACILITY ID:

STOP FILL OUT ANY SUPPLEMENTAL PROCESS FORM(S) FOR THIS PROCESS FIRST. THEN FILL OUT THIS PAGE, SUBMITTING ONE FOR EACH EMITTING PROCESS IN YOUR FACILITY.

SECTION 1	DEVICE I.D. 1	SIC 2951	CONFIDENTIAL (Y/N) IF Y CHECK SMALL BOXES AS APPROPRIATE N
-----------	---	--	--

PROCESS EQUIPMENT DESCRIPTION 	FUEL TYPE/OTHER PROCESS INFO
--	---

NOTE USE ONE SPACE FOR EACH DECIMAL POINT

TOTAL YEARLY PROCESS RATE (UNITS/YR)	MAXIMUM HOURLY PROCESS RATE (UNITS/HR)	PROCESS UNITS	HRS/ DAY	DAYS/ WEEK	WKS/ YEAR
2.00E-01	3.06E-05	P 044	24	7	52

RELATIVE MONTHLY ACTIVITY (%)											
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1.3	3.1	2.7	3.1	10.2	13.9	15.5	20.3	14.9	4.8	5.6	4.6

OFC USE ONLY

SECTION 2

EMITTENT DATA

EMISSIONS

ACTION CODE 	EMITTENT ID 1175	EST METH 98	ACTUAL EMISSIONS FACTOR (LBS/UNIT) 3.95E+01	ANNUAL AVERAGE EMISSIONS (LBS/YR) 7.91E+00
ALLOWABLE EMIS LBS/YR (OPTIONAL) 	*CONTROL PRIMARY 036	EQPT CODES* SECONDARY 	OVERALL CONTROL EFF (%) 90.0	FULL/PART F
	HOURLY MAX EMISSIONS (LBS/HOUR) 1.21E-03			
ACTION CODE 	EMITTENT ID 1332214	EST METH 98	ACTUAL EMISSIONS FACTOR (LBS/UNIT) 6.28E-04	ANNUAL AVERAGE EMISSIONS (LBS/YR) 1.26E-04
ALLOWABLE EMIS LBS/YR (OPTIONAL) 	*CONTROL PRIMARY 036	EQPT CODES* SECONDARY 	OVERALL CONTROL EFF (%) 90.0	FULL/PART F
	HOURLY MAX EMISSIONS (LBS/HOUR) 1.92E-08			

EMISSION YEAR <i>1992</i>	AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT PROCESS AND EMITTENTS DATA	FORM <i>PRO</i> SIDE A
---------------------------------	--	------------------------------

AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT

PROCESS AND EMITTENTS DATA

FOR OFFICE USE ONLY

PROCESS DESCRIPTION		SCC NO	ID	BASIN
		3-05-002-01		
ACTION CODE	PROD 1 (OPTIONAL)	PROD 2 (OPTIONAL)	FACILITY ID:	

STOP FILL OUT ANY SUPPLEMENTAL PROCESS FORM(S) FOR THIS PROCESS FIRST. THEN FILL OUT THIS PAGE, SUBMITTING ONE FOR EACH EMITTING PROCESS IN YOUR FACILITY.

SECTION 1

NOTE USE ONE SPACE FOR EACH DECIMAL POINT

RELATIVE MONTHLY ACTIVITY (%)

OFC USE ONLY

**ALLOWABLE EMISSIONS
LBS/YR (OPTIONAL)**

**ACTION
CODE**

**ALLOWABLE EMIS
LBS/YR (OPTIONAL)**

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)	ANNUAL AVERAGE EMISSIONS (LBS/YR)	
7440382	1 ^C	6.60E-08 ^C	1.39E-02	
CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART	HOURLY MAX EMISSIONS (LBS/HOUR)
012 ^C	040 ^C	^C	F ^C	1.48E-05
EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)	ANNUAL AVERAGE EMISSIONS (LBS/YR)	
7440417	99 ^C	7.50E-08 ^C	1.58E-02	
CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART	HOURLY MAX EMISSIONS (LBS/HOUR)
012 ^C	040 ^C	^C	F ^C	1.69E-05

EMISSION
YEAR
1992

AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT
PROCESS AND EMITTENTS DATA
(ADDITIONAL EMITTENTS)

FORM
PRO
SIDE B

OFC USE ONLY

CO: _____
FACID: _____

ACTION
CODE

ALLOWABLE EMS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

DEVICE ID

2

DIESEL FUEL

EMITTENT DATA

EMISSIONS

EMITTENT ID

7440439

EST

98

C

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

1.20E-07

C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

2.52E-02

*CONTROL
PRIMARY

012

C

EQPT CODES*
SECONDARY

040

C

OVERALL
CONTROL EFF (%)

C

FULL/
PART

F

C

HOURLY MAX EMISSIONS
(LBS/HOUR)

2.70E-05

EMITTENT ID

7440473

EST

1

C

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

5.20E-07

C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

1.09E-01

*CONTROL
PRIMARY

012

C

EQPT CODES*
SECONDARY

040

C

OVERALL
CONTROL EFF (%)

C

FULL/
PART

F

C

HOURLY MAX EMISSIONS
(LBS/HOUR)

1.17E-04

EMITTENT ID

18540299

EST

1

C

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

8.60E-08

C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

1.81E-02

*CONTROL
PRIMARY

012

C

EQPT CODES*
SECONDARY

040

C

OVERALL
CONTROL EFF (%)

C

FULL/
PART

F

C

HOURLY MAX EMISSIONS
(LBS/HOUR)

1.93E-05

EMITTENT ID

7440508

EST

1

C

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

1.10E-06

C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

2.31E-01

*CONTROL
PRIMARY

012

C

EQPT CODES*
SECONDARY

040

C

OVERALL
CONTROL EFF (%)

C

FULL/
PART

F

C

HOURLY MAX EMISSIONS
(LBS/HOUR)

2.47E-04

EMITTENT ID

7439921

EST

1

C

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

2.30E-06

C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

4.84E-01

*CONTROL
PRIMARY

012

C

EQPT CODES*
SECONDARY

040

C

OVERALL
CONTROL EFF (%)

C

FULL/
PART

F

C

HOURLY MAX EMISSIONS
(LBS/HOUR)

5.17E-04

NAME: ANTOINE ASSIOUN, ENGINEERING - SCIENCE, INC.

DATE: 5 / 25 / 93

EMISSION
YEAR
1992

AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT
PROCESS AND EMITTENTS DATA
(ADDITIONAL EMITTENTS)

FORM
PRO
SIDE B

OFC USE ONLY

CO: _____
FACID: _____

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

DEVICE ID

2

DIESEL FUEL

EMITTENT DATA

EMISSIONS

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
7439965	1	9.20E-07

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

ANNUAL AVERAGE EMISSIONS (LBS/YR)
1.93E-01

HOURLY MAX EMISSIONS (LBS/HOUR)
2.07E-04

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
7439976	99	3.60E-07

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

ANNUAL AVERAGE EMISSIONS (LBS/YR)
7.57E-02

HOURLY MAX EMISSIONS (LBS/HOUR)
8.10E-05

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
7440020	1	5.40E-07

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

ANNUAL AVERAGE EMISSIONS (LBS/YR)
1.14E-01

HOURLY MAX EMISSIONS (LBS/HOUR)
1.21E-04

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
7782492	98	8.90E-07

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

ANNUAL AVERAGE EMISSIONS (LBS/YR)
1.87E-01

HOURLY MAX EMISSIONS (LBS/HOUR)
2.00E-04

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
7440666	1	6.70E-06

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

ANNUAL AVERAGE EMISSIONS (LBS/YR)
1.41E+00

HOURLY MAX EMISSIONS (LBS/HOUR)
1.51E-03

EMISSION
YEAR
1992

AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT
PROCESS AND EMITTENTS DATA
(ADDITIONAL EMITTENTS)

FORM
PRO
SIDE B

OFC USE ONLY

CO: _____
FACID: _____

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMISS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

DEVICE ID

2

DIESEL FUEL

EMITTENT DATA

EMISSIONS

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
AUDIT METAL 7440439	1	1.90E-07

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

4.00E-02

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

HOURLY MAX EMISSIONS
(LBS/HOUR)

4.28E-05

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
1150	1	1.22E-05

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

2.57E+00

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

HOURLY MAX EMISSIONS
(LBS/HOUR)

2.75E-03

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
56553	1	6.30E-09

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

1.32E-03

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

HOURLY MAX EMISSIONS
(LBS/HOUR)

1.42E-06

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
205992	1	4.50E-09

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

9.46E-04

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

HOURLY MAX EMISSIONS
(LBS/HOUR)

1.01E-06

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
207089	1	1.10E-09

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

2.31E-04

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		F

HOURLY MAX EMISSIONS
(LBS/HOUR)

2.47E-07

NAME: ANTOINE ASSIOUN, ENGINEERING - SCIENCE, INC.

DATE: 5 / 25 / 93

EMISSION
YEAR
1992

AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT
PROCESS AND EMITTENTS DATA
(ADDITIONAL EMITTENTS)

FORM
PRO
SIDE B

OFC USE ONLY

CO: _____
FACID: _____

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

DEVICE ID

2

DIESEL FUEL

EMITTENT DATA

EMISSIONS

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
50328	1 ☐ C	3.10E-10 ☐ C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

6.52E-05

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012 ☐ C	040 ☐ C	☐ C	F ☐ C

HOURLY MAX EMISSIONS
(LBS/HOUR)

6.97E-08

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
53703	99 ☐ C	9.50E-11 ☐ C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

2.00E-05

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012 ☐ C	040 ☐ C	☐ C	F ☐ C

HOURLY MAX EMISSIONS
(LBS/HOUR)

2.14E-08

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
193395	1 ☐ C	3.00E-10 ☐ C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

6.31E-05

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012 ☐ C	040 ☐ C	☐ C	F ☐ C

HOURLY MAX EMISSIONS
(LBS/HOUR)

6.75E-08

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
91203	1 ☐ C	1.10E-05 ☐ C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

2.31E+00

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012 ☐ C	040 ☐ C	☐ C	F ☐ C

HOURLY MAX EMISSIONS
(LBS/HOUR)

2.47E-03

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
50000	1 ☐ C	2.40E-04 ☐ C

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

5.05E+01

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012 ☐ C	040 ☐ C	☐ C	F ☐ C

HOURLY MAX EMISSIONS
(LBS/HOUR)

5.40E-02

EMISSION

YEAR

1992

AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT

PROCESS AND EMITTENTS DATA

(ADDITIONAL EMITTENTS)

FORM

PRO

SIDE B

OFC USE ONLY

CO:

FACID:

ACTION
CODEALLOWABLE EMISS
LBS/YR (OPTIONAL)ACTION
CODEALLOWABLE EMISS
LBS/YR (OPTIONAL)ACTION
CODEALLOWABLE EMISS
LBS/YR (OPTIONAL)ACTION
CODEALLOWABLE EMISS
LBS/YR (OPTIONAL)ACTION
CODEALLOWABLE EMISS
LBS/YR (OPTIONAL)

DEVICE ID

2

DIESEL FUEL

EMITTENT DATA

EMISSIONS

EMITTENT ID

EST

METH

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

71432

99

4.90E-04

*CONTROL
PRIMARYEQPT CODES*
SECONDARYOVERALL
CONTROL EFF (%)FULL/
PART

012

040

F

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

1.03E+02

HOURLY MAX EMISSIONS
(LBS/HOUR)

1.10E-01

EMITTENT ID

EST

METH

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

108883

6

7.12E-06

*CONTROL
PRIMARYEQPT CODES*
SECONDARYOVERALL
CONTROL EFF (%)FULL/
PART

012

040

F

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

1.50E+00

HOURLY MAX EMISSIONS
(LBS/HOUR)

1.60E-03

EMITTENT ID

EST

METH

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

1210

6

2.59E-06

*CONTROL
PRIMARYEQPT CODES*
SECONDARYOVERALL
CONTROL EFF (%)FULL/
PART

012

040

F

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

5.44E-01

HOURLY MAX EMISSIONS
(LBS/HOUR)

5.82E-04

EMITTENT ID

EST

METH

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

7782505

2

6.84E-03

*CONTROL
PRIMARYEQPT CODES*
SECONDARYOVERALL
CONTROL EFF (%)FULL/
PART

012

040

F

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

1.44E+03

HOURLY MAX EMISSIONS
(LBS/HOUR)

1.54E+00

EMITTENT ID

EST

METH

ACTUAL EMISSIONS
FACTOR (LBS/UNIT)

1175

98

1.17E-02

*CONTROL
PRIMARYEQPT CODES*
SECONDARYOVERALL
CONTROL EFF (%)FULL/
PART

012

040

F

ANNUAL AVERAGE
EMISSIONS (LBS/YR)

2.45E+03

HOURLY MAX EMISSIONS
(LBS/HOUR)

2.62E+00

NAME: ANTOINE ASSIOUN, ENGINEERING - SCIENCE, INC.

DATE: 5 / 25 / 93

EMISSION
YEAR
1992

AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT
PROCESS AND EMITTENTS DATA
(ADDITIONAL EMITTENTS)

FORM
PRO
SIDE B

OFC USE ONLY

CO: _____
FACID: _____

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

ACTION
CODE

ALLOWABLE EMIS
LBS/YR (OPTIONAL)

--	--	--	--	--	--	--	--	--	--

DEVICE ID

2

DIESEL FUEL

EMITTENT DATA

EMISSIONS

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)
1332214	98	1.85E-07

ANNUAL AVERAGE EMISSIONS (LBS/YR)
3.89E-02

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		

HOURLY MAX EMISSIONS (LBS/HOUR)
4.17E-05

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (CUR/UNIT)
1165	4	1.61E-09

ANNUAL AVERAGE EMISSIONS (CUR/YR)
3.38E-04

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART
012	040		

HOURLY MAX EMISSIONS (CUR/HOUR)
3.62E-07

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)

ANNUAL AVERAGE EMISSIONS (LBS/YR)

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART

HOURLY MAX EMISSIONS (LBS/HOUR)

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)

ANNUAL AVERAGE EMISSIONS (LBS/YR)

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART

HOURLY MAX EMISSIONS (LBS/HOUR)

EMITTENT ID	EST METH	ACTUAL EMISSIONS FACTOR (LBS/UNIT)

ANNUAL AVERAGE EMISSIONS (LBS/YR)

CONTROL PRIMARY	EQPT CODES SECONDARY	OVERALL CONTROL EFF (%)	FULL/ PART

HOURLY MAX EMISSIONS (LBS/HOUR)

EMISSION YEAR 1992	AIR TOXICS EMISSION DATA SYSTEM REVIEW AND UPDATE REPORT		FORM S-CMB
	SUPPLEMENTAL PROCESS PARAMETER FORM		
	STATIONARY COMBUSTION		

COMPANY NAME INDUSTRIAL ASPHALT

DEVICE ID: 2

PLEASE COPY THIS FORM AS MANY TIMES AS NECESSARY FOR YOUR FACILITY.
PLEASE READ THE INSTRUCTIONS BEFORE COMPLETING THIS FORM.

FOR OFFICE USE ONLY

CO: AB:

FACID:

BOG:

FUEL & FEEDSTOCK COMPOSITION

UNCONVENTIONAL FUELS & FEEDSTOCKS:

INDICATE WITH A CHECKMARK ANY UNCONVENTIONAL FUELS OR FEEDSTOCKS USED IN YOUR FACILITY AT THE DEVICE ID INDICATED ABOVE. DESCRIBE BRIEFLY THE NATURE OF SUCH FUEL OR FEEDSTOCK IN THE SPACE PROVIDED.
ALSO SUMMARIZE THIS FEEDSTOCK INFORMATION IN THE DATA FIELD, "FUEL TYPE/OTHER PROCESS INFO" ON CORE FORM PRO.

 MUNICIPAL WASTE

 HOSPITAL WASTE

 HAZARDOUS WASTE

 WASTE OIL

 WASTE SOLVENT

 AGRICULTURAL DEBRIS

 TIRES

☒ OTHER (PLEASE SPECIFY): DIESEL FUEL

REPORT USE OF AUXILIARY FUEL WITH THESE FEEDSTOCKS IN ACCORDANCE WITH THE STATIONARY COMBUSTION REPORTING INSTRUCTIONS FOR THIS FORM, S-CMB.

FUEL & FEEDSTOCK ANALYSIS

COMPLETE THIS PART FOR EACH FUEL AND FEEDSTOCK USED AT THE DEVICE ID INDICATED ABOVE FOR WHICH A FUEL ANALYSIS WAS PERFORMED.

(IN WEIGHT %):

SULFUR: 0.11

(IN PARTS-PER-MILLION BY WEIGHT (PPMW) OR (MG/KG):

ARSENIC: <u><0.25</u>	CHROMIUM VI: <u><20.5</u>	PHOSPHORUS: <u> </u>
BERYLLIUM: <u><0.32</u>	COPPER: <u>25.1</u>	RADIONUCLIDES: <u> </u>
BROMINE: <u> </u>	FLUORINE: <u> </u>	SELENIUM: <u><0.25</u>
CADMIUM: <u><0.29</u>	LEAD: <u><1.84</u>	ZINC: <u>18.3</u>
CHLORINE: <u>0.06%</u>	MANGANESE: <u>1.22</u>	
	MERCURY: <u><0.39</u>	
	NICKEL: <u>254</u>	

REPORT EMISSIONS IN SECTION 2 OF CORE FORM PRO

NAME: ANTOINE ASSIOUN, ENGINEERING - SCIENCE, INC.

DATE: 5 / 25 / 93

**DOCUMENTATION SUPPORTING EMISSION
CALCULATIONS**

Device Number: 1
 Device Name: STORAGE BUNKERS
 No. of Devices: 4
 Permit to Operate: NONE

~~~~~  
 ~~~~~

Control Equipment: Wet Suppression
 Estimation Method: Emission Factor
 Gnrl Subst Quantd: Particulate
 Yearly Emis Est Equatn: $[(F1 \cdot Da) + (F2 \cdot Di)] \cdot (1 - CE) \cdot A \cdot Mr$
 Hourly Emis Est Equatn: $F1 \cdot (1 - CE) \cdot A \cdot Mr / 24$

 Parameter Symbols/Names

 Values

Da = Total Yearly Active Days	238 days/yr
Di = Total Yearly Inactive Days	127 days/yr
A = Number of Acres	0.2 Acres
F1 = Storage Bunker Emis. Factor for Active Days	6.3 lbs/acre/day
F2 = Storage Bunker Emis. Factor for Inactive Days	1.7 lbs/acre/day
CE = Control Eff	90%
Mr = Speciation Factor	(see below) lbs/lb

Emittent Species Name and CAS #	Speciation Factor (lbs/lb)	Emission Factor (lbs/acre/yr)	Annual Avg Emissions (lbs/yr)	Hourly Max Emissions (lbs/hr)
Crystalline Silica 1175	98< 2.31E-01	3.95E+01	7.91E+00	1.21E-03
Asbestos 1332214	98< 3.66E-06	6.28E-04	1.26E-04	1.92E-08

Device Number:	2			
Device Name:	DRYER/MIXER SYSTEM		DIESEL FUEL	
No. of Devices:	1			
Permit to Operate:	5010050101			
~~~~~	~~~~~	~~~~~	~~~~~	~~~~~
~~~~~	~~~~~	~~~~~	~~~~~	~~~~~
Control Equipment:	Cyclone + Baghouse			
Estimation Method:	Source Test			
Yearly Emis Est Equatn:	P*Efi			
Hourly Emis Est Equatn:	M*Efi			
=====				
Parameter Symbols/Names			Values	
P = Sanger Yrly Asphalt Prod. Rate			2.10E+05	tons/yr
M = Sanger Max Hrly Production Rate			225	tons/hr
Efi = Pala Actual Tested Emission Factor			(see below)	lbs/ton
=====				
Emittent Species Name and CAS #		Emission Factor (lbs/ton)	Annual Avg Emissions (lbs/yr)	Hourly Max Emissions (lbs/hr)

Heavy Metals:				
Arsenic 7440382		6.60E-08	1.39E-02	1.48E-05
Beryllium 7440417	99<	7.50E-08	1.58E-02	1.69E-05
Cadmium 7440439	98<	1.20E-07	2.52E-02	2.70E-05
Chromium (total) 7440473		5.20E-07	1.09E-01	1.17E-04
Chromium (hex.) 18540299		8.60E-08	1.81E-02	1.93E-05
Copper 7440508		1.10E-06	2.31E-01	2.47E-04
Lead 7439921		2.30E-06	4.84E-01	5.17E-04
Manganese 7439965		9.20E-07	1.93E-01	2.07E-04
Mercury 7439976	99<	3.60E-07	7.57E-02	8.10E-05
Nickel 7440020		5.40E-07	1.14E-01	1.21E-04
Selenium 7782492	98<	8.90E-07	1.87E-01	2.00E-04
Zinc 7440666		6.70E-06	1.41E+00	1.51E-03
Cadmium (Audit) 7440439		1.90E-07	4.00E-02	4.28E-05
PAHs:				
Total 1150		1.22E-05	2.57E+00	2.75E-03
Benz[a]anthracene 56553		6.30E-09	1.32E-03	1.42E-06
Benzo[b]fluoranthene 205992		4.50E-09	9.46E-04	1.01E-06
Benzo[k]fluoranthene 207089		1.10E-09	2.31E-04	2.47E-07
Benzo[a]pyrene 50328		3.10E-10	6.52E-05	6.97E-08

Dibenzo[a,h]anth. 53703	99<	9.50E-11	2.00E-05	2.14E-08
Indeno[1,2,3,-cd]pyrene 193395		3.00E-10	6.31E-05	6.75E-08
Naphthalene 91203		1.10E-05	2.31E+00	2.47E-03
Formaldehyde 50000		2.40E-04	5.05E+01	5.40E-02
Benzene 71432	99<	4.90E-04	1.03E+02	1.10E-01

~~~~~  
~~~~~

Estimation Method: Emission Factor
 Yearly Emis Est Equatn: $P \cdot EF_i$
 Hourly Emis Est Equatn: $M \cdot EF_i$
 Emission Factor: $EF_i = EF_v \cdot F/P$

 Parameter Symbols/Names

 Values

F = Yearly Diesel Fuel Burned

340.2 1000 gal/yr

EFv = Ventura County Emission Factors

(see below) lbs/1000 gal

Emittent Species Name and CAS #	Ventura Co. Emis. Factor (lbs/1000 gla)	Emission Factor (lbs/ton)	Annual Avg Emissions (lbs/yr)	Hourly Max Emissions (lbs/hr)
Toluene 108883	4.40E-03	7.12E-06	1.50E+00	1.60E-03
Xylenes 1210	1.60E-03	2.59E-06	5.44E-01	5.82E-04

~~~~~

~~~~~  
 Estimation Method: Fuel Analysis
 Yearly Emis Est Equatn: $k \cdot F \cdot C$
 Hourly Emis Est Equatn: $K \cdot F_m \cdot C$
 Max. Hrlly Fuel Usage: $F_m = F \cdot M/P$
 Emission Factor: $E_f = (\text{Yearly Emissions})/P$

Parameter Symbols/Names	Values
k = Weight of Diesel Fuel	7.05 lb/gal
F = Yearly Diesel Fuel Burned	340200 gal/yr
F _m = Max. Hourly Diesel Fuel Burned	363.9782977 gal/hr
C = Concentration in fuel	(see below) % (wt.)
E _f = (Yearly Emissions)/P = Emission Factor	

Emittent Species Name and CAS #	Concentratn in Fuel	Emission Factor (lbs/ton)	Annual Avg Emissions (lbs/yr)	Hourly Max Emissions (lbs/hr)
Chlorine 7782505	6.00E-04	6.84E-03	1.44E+03	1.54E+00

~~~~~  
 Estimation Method: Emission Factor + Analysis of Fugitive Dust Sample  
 Yearly Emis Est Equatn:  $P \cdot E_f \cdot S_{fi}$   
 Hourly Emis Est Equatn:  $M \cdot E_f \cdot S_{fi}$

| Parameter Symbols/Names | Values |
|-------------------------|--------|
|-------------------------|--------|

E<sub>f</sub> = Particulate Emission Factor\* 0.0506 lbs/ton  
 S<sub>fi</sub> = Speciation Factor (see below) ppm

\* Sanger particulate compliance test result performed in July, 1987 and EPA AP-42  
 App. C2-10, 10/86

| Emittent<br>Species Name<br>and CAS # | Speciation<br>Factor<br>(lbs/lb) | Emission<br>Factor<br>(lbs/ton) | Annual Avg<br>Emissions<br>(lbs/yr) | Hourly Max<br>Emissions<br>(lbs/hr) |
|---------------------------------------|----------------------------------|---------------------------------|-------------------------------------|-------------------------------------|
| Crystalline Silica 1175               | 98< 2.31E-01                     | 1.17E-02                        | 2.45E+03                            | 2.62E+00                            |
| Asbestos 1332214                      | 98< 3.66E-06                     | 1.85E-07                        | 3.89E-02                            | 4.17E-05                            |

=====

Estimation Method: Emission Factor + Analysis of Fugitive Dust Sample

Yearly Emis Est Equatn:  $P * E_f * S_f$

Hourly Emis Est Equatn:  $M * E_f * S_f$

=====

Parameter Symbols/Names

Values

$E_f$  = Particulate Emission Factor\*

0.0506 lbs/ton

$S_f$  = Speciation Factor

(see below) Curi/lb

\* Sanger particulate compliance test result performed in July, 1987 and EPA AP-42

App. C2-10, 10/86

=====

| Species Name<br>and CAS # | Factor<br>(Curi/lb) | Factor<br>(Curi/ton) | Emissions<br>(Curi/yr) | Emissions<br>(Curi/hr) |
|---------------------------|---------------------|----------------------|------------------------|------------------------|
| Radionuclides 1165        | 3.18E-08            | 1.61E-09             | 3.38E-04               | 3.62E-07               |

\*\*\*\*\*

\*\*\*\*\*

## SUMMARY OF PLANT EMISSIONS:

| Emittent<br>Species Name | Degree<br>of Accuracy<br>(lbs/yr) | Annual Avg<br>Emissions<br>(lbs/yr) | Hourly Max<br>Emissions<br>(lbs/hr) |
|--------------------------|-----------------------------------|-------------------------------------|-------------------------------------|
| Crystalline Silica       | 100                               | 2.46E+03                            | 2.63E+00                            |
| Asbestos                 | 100                               | 3.91E-02                            | 4.17E-05                            |
| Arsenic                  | 1                                 | 1.39E-02                            | 1.48E-05                            |
| Beryllium                | 1                                 | 1.58E-02                            | 1.69E-05                            |
| Cadmium                  | 1                                 | 2.52E-02                            | 2.70E-05                            |
| Chromium (total)         | 100                               | 1.09E-01                            | 1.17E-04                            |
| Chromium (hexavalent)    | 0.1                               | 1.81E-02                            | 1.93E-05                            |
| Copper                   | 100                               | 2.31E-01                            | 2.47E-04                            |
| Lead                     | 10                                | 4.84E-01                            | 5.17E-04                            |
| Manganese                | 100                               | 1.93E-01                            | 2.07E-04                            |
| Mercury                  | 10                                | 7.57E-02                            | 8.10E-05                            |
| Nickel                   | 1                                 | 1.14E-01                            | 1.21E-04                            |
| Selenium                 | 100                               | 1.87E-01                            | 2.00E-04                            |
| Zinc                     | 100                               | 1.41E+00                            | 1.51E-03                            |
| PAHs:                    |                                   |                                     |                                     |
| Total                    | 100                               | 2.57E+00                            | 2.75E-03                            |
| Benz[a]anthracene        | 100                               | 1.32E-03                            | 1.42E-06                            |
| Benzo[b]fluranthene      | 100                               | 9.46E-04                            | 1.01E-06                            |
| Benzo[k]fluoranthene     | 100                               | 2.31E-04                            | 2.47E-07                            |
| Benzo[a]pyrene           | 1                                 | 6.52E-05                            | 6.97E-08                            |
| Dibenzo[a,h]anthracene   | 100                               | 2.00E-05                            | 2.14E-08                            |
| Indeno[1,2,3,-cd]pyrene  | 100                               | 6.31E-05                            | 6.75E-08                            |
| Naphthalene              | 100                               | 2.31E+00                            | 2.47E-03                            |
| Formaldehyde             | 100                               | 5.05E+01                            | 5.40E-02                            |
| Benzene                  | 10                                | 1.03E+02                            | 1.10E-01                            |
| Toluene                  | 100                               | 1.50E+00                            | 1.60E-03                            |
| Xylene                   | 100                               | 5.44E-01                            | 5.82E-04                            |
| Chlorine                 | 10                                | 1.44E+03                            | 1.54E+00                            |
| Radionuclides            | 100                               | 3.38E-04                            | 3.62E-07                            |

SANGER-SS.WK1

**POOLED SOURCE TEST REPORT AND FUEL AND  
MATERIAL ANALYSIS**

40

**REPORT OF AIR POLLUTION SOURCE  
TESTING FOR CALIFORNIA AB2588**

**Conducted on:**

**January 23-25, and 28-29, 1991**

**Conducted at:**

**CALMAT (INDUSTRIAL ASPHALT)  
PALA INDIAN RESERVATION, PALA, CALIFORNIA**

**Submitted on:**

**March 18, 1991**

**Prepared by:**

**Engineering-Science  
6060 N. Irwindale Avenue Suite J  
Irwindale, CA 91706  
Telephone: (818) 969-5758**

**REPORT OF AIR POLLUTION SOURCE TESTING  
FOR CALIFORNIA AB2588  
AT CALMAT (INDUSTRIAL ASPHALT CORPORATION)  
PALA INDIAN RESERVATION, PALA, CA**

**INTRODUCTION**

On January 23-25, and 28-29, 1991 Engineering-Science, (ES) Irwindale, CA, conducted air pollution source testing on an asphalt batch plant operated by Industrial Asphalt at Pala, California. The source tested was the rotary dryer baghouse exhaust stack. The unit is operated under Permit to Operate, No. 000117, granted by the San Diego Air Pollution Control District (SDAPCD).

Testing was conducted to determine the emission rates of trace metal elements (arsenic, beryllium, cadmium, hexavalent and total chromium, copper, mercury, manganese, nickel, lead, selenium, and zinc), poly-aromatic hydrocarbons (PAH's), formaldehyde (R-CHO), and organic analysis (Benzene). The audit trace element that was assigned for the AB2588 testing was cadmium (Cd). Hexavalent and total chromium were tested separate from the trace element wet impingement system. And as a requirement by the SDAPCD, Continuous Emission Monitoring (CEM) analyzers were used to measure the emission rates of nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), and ozone (O<sub>3</sub>) during the PAH testing.

Due to limited plant process production, the testing for trace elements, cadmium, hexavalent/total chromium, and PAH's required three test runs of at least three hours in duration. Oxygen and carbon dioxide were measured using Orsat Method (1/23-24/91) and CEM (1/25 and 28-29/91). All emissions testing for the facility were conducted at the baghouse stack outlet. The documentation of the plant operating conditions was performed by Dennis Bautista of ES.

The testing was coordinated by Mr. Dwight Beavers and Paul Mason of Industrial Asphalt. The testing was observed by Mr. Bob Yelonoski of SDAPCD. The ES testing team was comprised of Messrs. Dennis Bautista (team leader), Dwight J. Wieman (continuous emission monitoring), Micheal Edwards, Anthony King, Danny Kremer, and Nicky Nielsen

**PROCESS DESCRIPTION**

Industrial Asphalt, a division of CALMAT operates a Hot Mix Asphalt Batch Plant at the Pala Indian Reservation in Pala, California.



Aggregate supplied by the CALMAT quarry located adjacent to the plant is carried via belt conveyor to the batch plant. To remove moisture, it is heated and dried in a diesel oil fired rotary dryer. This hot aggregate is then mixed with hot liquid asphalt to form a "batch". This "batch" is either dropped into waiting trucks or stored in silos. The plant can produce a maximum of 225 tons per hour, but normal operating rates are about 200 tons per hour. Figure 1 is a representation of the facilities process diagram.

## **TESTING PROGRAM**

The testing was conducted in accordance with San Diego Air Pollution Control District (SDAPCD), Environmental Protection Agency (EPA), and California Air Resource Board (CARB) test methods and are described in the following pages. The purpose of the testing program was to determine compliance as specified in the California Assembly Bill 2588.

## **TEST METHODOLOGY**

### **LOCATION AND NUMBER OF TRAVERSE POINTS**

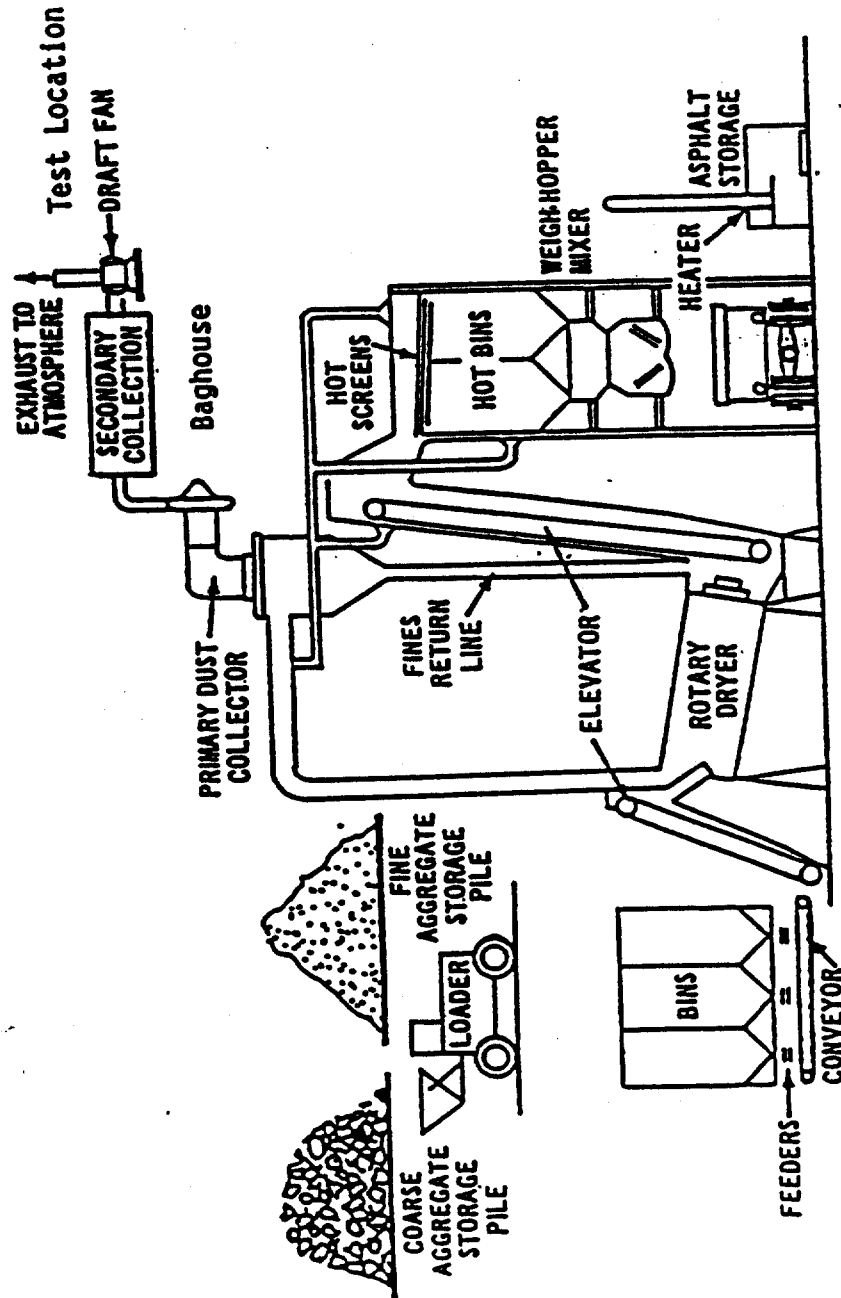
EPA Method 1 was used to determine the number and location of the traverse points. A 24 point traverse sampling was selected, utilizing two ports.

A cyclonic flow check was conducted at each traverse point. An S-type pitot tube connected to an inclined oil manometer was used for the determination. The pitot tube was positioned so the planes of the face openings were perpendicular to the stack cross-sectional plane. This was referred to as the "0°" reference position, the manometer should read zero to indicate no cyclonic flow. If the manometer did not read zero the pitot tube is rotated until a zero reading is obtained. The angle of rotation was measured to the nearest degree.

### **STACK VELOCITY AND TEMPERATURE TRAVERSE**

EPA Method 2 was used to determine the velocity of the stack gas and stack gas temperature at the time of the testing. An S-type pitot tube connected to an inclined oil manometer and a K-type (chromel-alumel) thermocouple connected to a temperature read out device were used to traverse the 24 sampling points. The nozzle size required to achieve isokinetic sampling rates was calculated from these measurements.

# PROCESS DIAGRAM



### STACK GAS MOLECULAR WEIGHT

The carbon dioxide (CO<sub>2</sub>) and oxygen (O<sub>2</sub>) concentrations in the stack gas were determined from integrated bag samples collected in Tedlar bags and analyzed by Orsat in accordance with EPA Method 3 during January 23 and 24, 1991 testing. In addition to the Orsat Method, continuous emissions analyzers were also used in determining the concentrations of CO<sub>2</sub> and O<sub>2</sub> during January 25, 28 and 29, 1991 testing.

### STACK GAS MOISTURE CONTENT

The moisture content of the stack gas was determined in conjunction with the sampling trains that were used during the AB2588 testing. The moisture was determined gravimetrically by the weight gain in each impinger in accordance with EPA Method 4.

### TRACE ELEMENTS

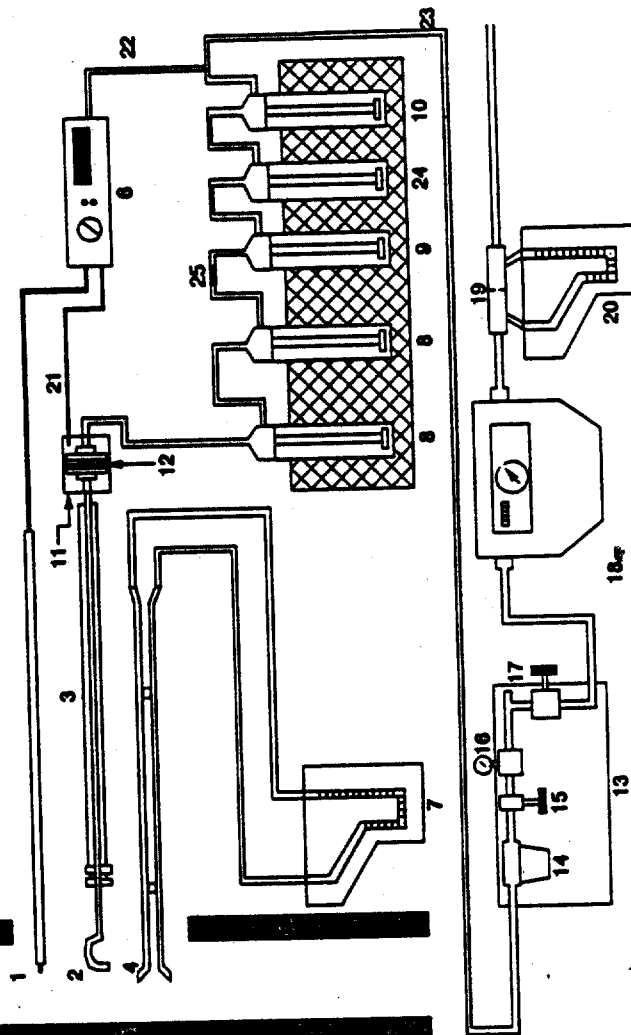
Trace elements that were analyzed included the determinations of As, Be, Cd, Cu, Hg, Mn, Ni, Pb, Se, and Zn.

In the determination of these trace elements, a sampling train configured in accordance with CARB Method 436 was used. The sample train was comprised of a heated quartz nozzle/probe and a heated fiberglass filter connected via Teflon tubing to a wet impingement train followed by a vacuum pump and dry gas meter. The filter temperature was maintained at 248 +/- 25 °F. The wet impingement train consisted of five Greenburg-Smith type impingers connected in series. The first and second impingers contained nitric acid (HNO<sub>3</sub>) in a hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) solution. The third impinger was an empty modified Greenberg-Smith. The fourth impinger contained an acidified potassium permanganate (KMnO<sub>4</sub>) solution. The fifth impinger contained approximately 400 grams of indicating silica gel. This train was operated for a period of 3 hours during each run and samples were collected using isokinetic sampling techniques. A schematic sampling system is presented in Figure 2. Sampling train components were recovered in separate HNO<sub>3</sub> and KMnO<sub>4</sub> fractions and were analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS).

### HEXAVALENT AND TOTAL CHROMIUM

Three samples were collected isokinetically with a sampling train configured in accordance with CARB Method 425. The sample train was comprised of a heated quartz nozzle/probe and a heated teflon filter connected via Teflon tubing to a wet impingement train followed by a vacuum pump and dry gas meter. The filter

# SAMPLING TRAIN FOR TRACE METAL ELEMENTS



1. TEMPERATURE SENSOR
2. NOZZLE
3. QUARTZ PROBE
4. S - TYPE PITOT TUBE
5. STACK WALL
6. TEMPERATURE READOUT
7. INCLINED MANOMETER
8. HNO<sub>3</sub>/H<sub>2</sub>O<sub>2</sub>

9. EMPTY IMPINGER
10. IMPINGER WITH SILICA GEL
11. FILTER HEATER
12. FILTER HOLDER
13. SEALED LEAK FREE PUMP
14. FILTER FOR PUMP
15. COARSE ADJUSTMENT
16. VACUUM GAUGE
17. FINE ADJUSTMENT

18. DRY GAS METER
19. ORIFICE
20. INCLINED MANOMETER
21. FILTER TEMPERATURE THERMOCOUPLE
22. IMPINGER TEMPERATURE THERMOCOUPLE
23. VACUUM LINE
24. KMnO<sub>4</sub>
25. GLASS WOOL FILTER

FIGURE 2

temperature was maintained at  $248 \pm 25$  °F. The wet impingement train consisted of four Greenburg-Smith type impingers connected in series. The first and second impingers contained 0.1N of NaOH solution. The third impinger was an empty modified Greenburg-Smith. The fourth impinger contained approximately 400 grams of indicating silica gel. This train was operated for a period of 3 hours for each test runs. A schematic diagram of the sampling system is presented in Figure 3. After the testing, the samples were analyzed for hexavalent chromium by EPA 7196/IC and for total chromium by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS).

#### SAMPLE AUDIT (CADMIUM)

When using CARB Method 436 (Determination of Trace Elements), CARB assigns a metal that serves as a quality control check for the trace element sampling method. The audit metal that was assigned for the AB2588 testing was cadmium.

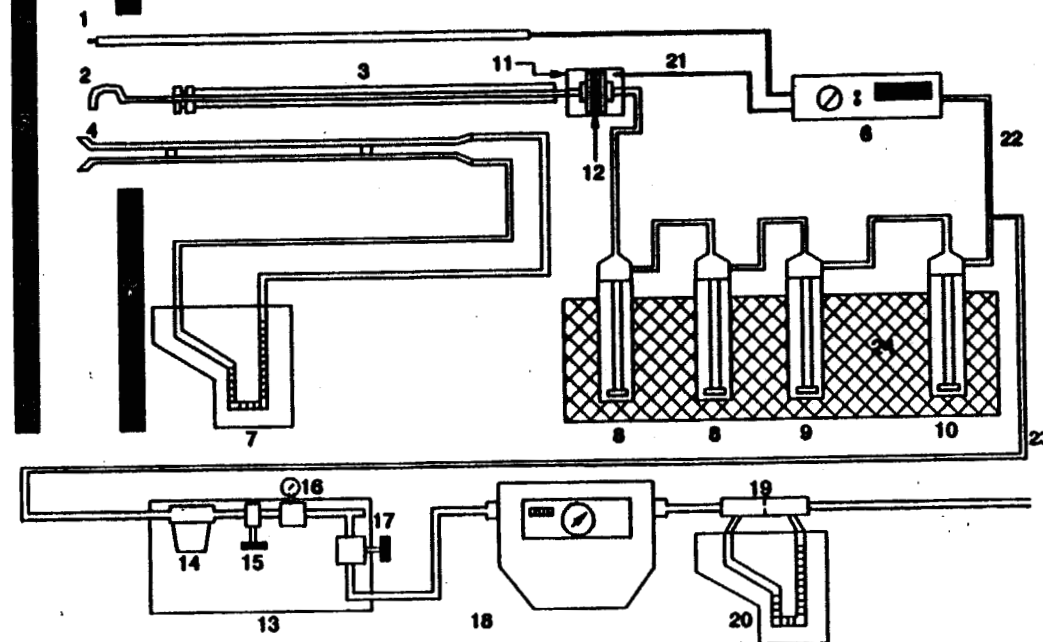
The audit samples for determining cadmium was collected isokinetically using sampling procedures as specified in CARB 424. The sample train was comprised of a heated quartz nozzle/probe and a heated teflon filter connected via Teflon tubing to a wet impingement train followed by a vacuum pump and dry gas meter. The filter temperature was maintained at  $248 \pm 25$  °F. The wet impingement train consisted of four Greenburg Smith type impingers connected in series. The first and second impingers contained 0.1N HNO<sub>3</sub> solution. The third impinger was an empty modified Greenburg-Smith. The fourth impinger contained approximately 400 grams of indicating silica gel. This train was operated for a period of 3 hours during each. A schematic sampling system is presented in Figure 4. After the testing, the samples were analyzed for cadmium by Inductively Coupled Argon Plasma-Mass Spectrometry (ICAP-MS).

#### POLY-AROMATIC HYDROCARBONS

A modified EPA Reference Method 5 sampling train operated in accordance with CARB Method 429 was used for the determination of poly-aromatic hydrocarbons (PAH's).

The train design was based on an EPA validated emission collection system with the addition of an adsorbent cartridge of XAD-2 resin to collect vaporous emissions for semi-volatile organics. This train was operated for a period of 3 hours during each run and samples were collected using isokinetic sampling techniques. The train recovery was modified from Method 5 procedures to include sample washes of methanol, hexane, and methylene chloride.

# **SAMPLING TRAIN FOR CHROMIUM**



1. TEMPERATURE SENSOR  
2. NOZZLE  
3. QUARTZ PROBE  
4. S - TYPE PITOT TUBE  
5. STACK WALL  
6. TEMPERATURE READOUT  
7. INCLINED MANOMETER  
8. 0.1N OF NaOH

9. EMPTY IMPINGER  
10. IMPINGER WITH SILICA GEL  
11. FILTER HEATER  
12. FILTER HOLDER  
13. SEALED LEAK FREE PUMP  
14. FILTER FOR PUMP  
15. COARSE ADJUSTMENT  
16. VACUUM GAUGE  
17. FINE ADJUSTMENT

18. DRY GAS METER  
19. ORIFICE  
20. INCLINED MANOMETER  
21. FILTER TEMPERATURE THERMOCOUPLE  
22. IMPINGER TEMPERATURE THERMOCOUPLE  
23. VACUUM LINE  
24. ICE BATH

**FIGURE 3**

A quartz nozzle and sampling probe liner were used. Vapor phase organics were collected by the adsorbent trap containing a precleaned cartridge of XAD-2 Resin. This glass trap was located in the sample line downstream of a heated filter holder and upstream of the first impinger. The module housing the trap was jacketed, with cold water circulating to maintain an outlet temperature below 60 °F. Aluminum foil wrapping of the XAD-2 cartridge eliminated any possible sample reactions caused by ultraviolet light. A glass Hempal-type condenser was located between the heated fiberglass filter (maintained at 248 +/- 25 °F) and the XAD-2 cartridge to ensure that cool stack gas was entering the adsorbent trap. The wet impingement train consisted of four Greenburg Smith type impingers connected in series. The first and second impingers were each charged with 100 ml of deionized water, the third impinger was empty, and the fourth impinger contained approximately 400 grams of indicating silica gel. A schematic sampling system is presented in Figure 5.

All solvents used for preparing the sampling train for testing and field sample recovery were stored in glass bottles and of spectrographic grade. All train components were free of all potential interfering materials, especially silicone grease.

The probe, sample line wash, and glass condenser were rinsed with methanol, hexane, and methylene chloride during each rinse. All probe, filter, connecting tubing, and impinger washings were collected in precleaned glass containers. The sample train was separated into front and back halves. The resin cartridges were precleaned by the Alta Analytical Laboratory Inc. in El Dorado Hills, California two weeks prior to the field testing. Field and sample blanks were collected during the testing program.

Three composite samples from each sampling run were submitted to the laboratory for analysis. A composite sample of the "front half" was comprised of the nozzle/probe wash, filter wash, and filter. The "back half" composite sample was comprised of the filter back half wash, condenser wash, flexible line wash and XAD-2 cartridge. Another composite consisted of the impinger contents and associated washes. The samples were sealed, labelled and shipped with Chain of Custody forms to Alta Analytical Laboratory Inc. The PAH's were analyzed by gas chromatography mass spectrometry (GC/MS) in accordance with EPA Method 8270.

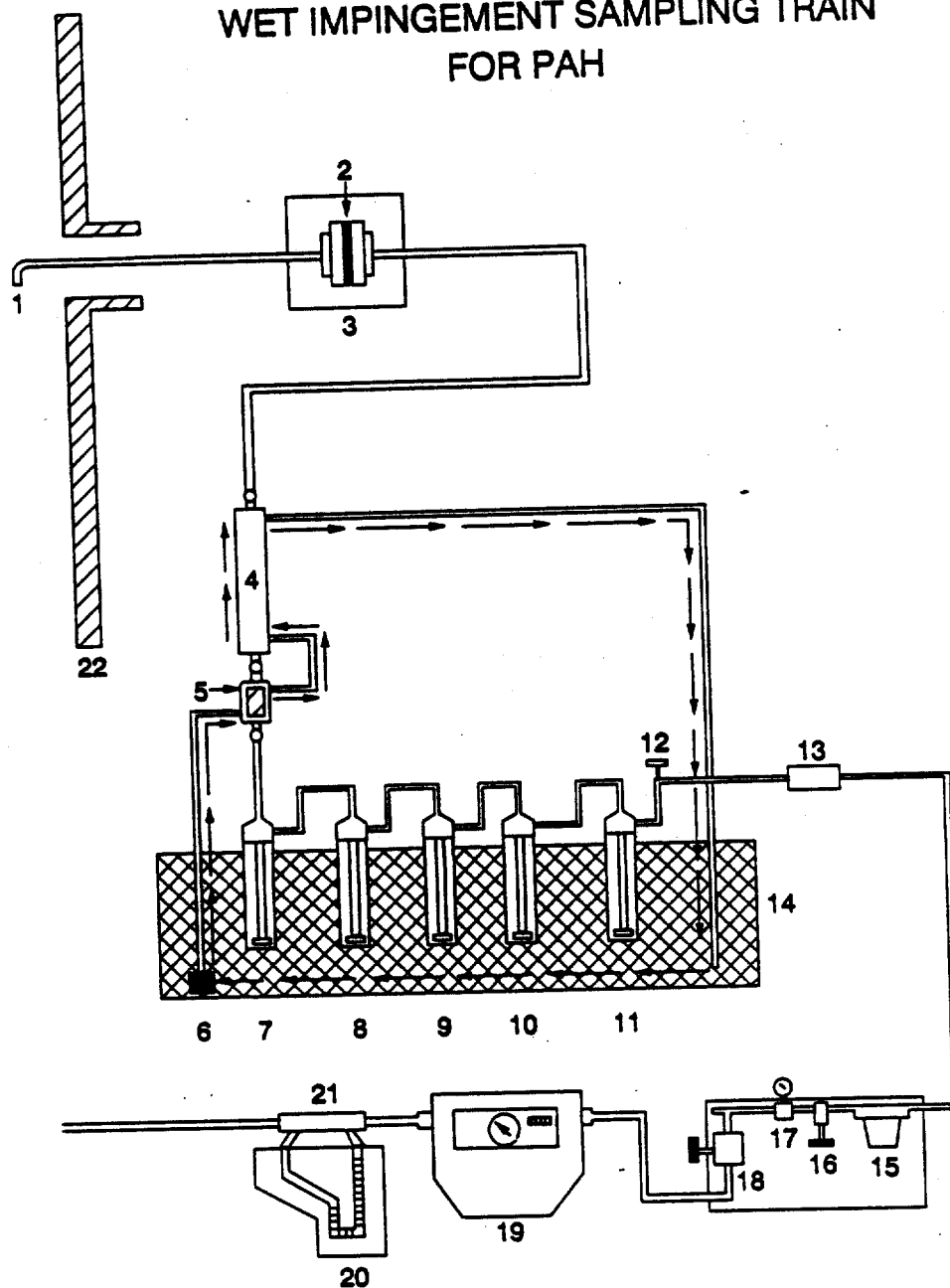
The polynuclear-aromatic hydrocarbons (PAH's) included the following compounds:

**PAH's**

Naphthalene  
Acenaphthylene  
Acenaphthene

FIGURE 5

# WET IMPINGEMENT SAMPLING TRAIN FOR PAH



- |                        |                              |                             |
|------------------------|------------------------------|-----------------------------|
| 1. SAMPLE PROBE        | 8. H <sub>2</sub> O IMPINGER | 15. PUMP FILTER             |
| 2. FILTER              | 9. H <sub>2</sub> O IMPINGER | 16. COARSE ADJUSTMENT VALVE |
| 3. HEATED BOX          | 10. EMPTY IMPINGER           | 17. VACUUM GAUGE            |
| 4. CONDENSER           | 11. IMPINGER WITH SILICA GEL | 18. FINE ADJUSTMENT         |
| 5. XAD RESIN CARTRIDGE | 12. IMPINGER THERMOMETER     | 19. DRY GAS METER           |
| 6. RECIRCULATION PUMP  | 13. CHECK VALVE              | 20. INCLINED MANOMETER      |
| 7. EMPTY IMPINGER      | 14. IMPINGER ICE BATH        | 21. ORIFICE                 |
|                        |                              | 22. STACK WALL              |



Fluorene  
Phenanthrene  
Anthracene  
Fluoranthene  
Pyrene  
Chrysene  
Benz(a)anthracene  
Benzo(b)fluoranthene  
Benzo(k)fluoranthene  
Benzo(a)pyrene  
Benzo(g,h,i)perylene  
Dibenzo(a,h)anthracene  
Indeno[1,2,3-cd]pyrene

The samples that were submitted to the laboratory included a sample train blank which was collected on site. A sampling train was prepared as if it were to be used on the stack, but without being used, the train was washed with the appropriate solvents which were collected in the respective containers.

#### **FORMALDEHYDE SAMPLING**

Formaldehyde samples were collected in accordance with CARB Method 430. Three runs each 2 hours in duration were conducted at the baghouse stack.

The sampling train consisted of a Teflon lined probe connected to three midjet impingers in series. The first two impingers contained 10mls of 2,4-dinitrophenylhydrazine (DNPH) and the third impinger was empty. A preweighed silica gel cartridge was attached between the third impinger and the pump to prevent moisture entering the pump and for use in determining the moisture content of the stack exhaust gas. Analysis of the samples were conducted with a high performance liquid chromatograph which is a modified CARB 430 method.

#### **BENZENE SAMPLING**

Benzene samples were collected in accordance with CARB Method 410A. Three integrated samples were collected over one hour periods into evacuated (30 "Hg) summa cannisters. The analysis were performed using a capillary gas chromatograph (GC) along with a Tekmar model 5010 desorber to concentrate the sample. The presence of benzene was detected by a flame ionization detector (FID).

#### **FUEL ANALYSIS**

Diesel fuel samples were collected in 500ml glass bottles and were analyzed for trace elements, total sulfur, and total chloride.

## CONTINUOUS EMISSIONS MONITORING SYSTEM

Samples were collected through a stainless steel probe inserted into the stack through sample ports provided. Sample gas was passed through a sample conditioning and delivery system comprised of an insulated, heated, 0.25" OD Teflon sample line, condenser (for moisture removal), Balston filter (for particulate removal), and a pump, all located on the testing platform on the stack. A Teflon tube, 0.375" OD was used to deliver sample from the platform down to the testing van where a manifold system was used for sample distribution to the continuous analyzers. A schematic of the continuous emissions sampling and monitoring system is presented in Figure 6.

The gaseous parameters monitored through the use of the continuous monitors were NO<sub>x</sub>, SO<sub>x</sub>, CO<sub>2</sub>, and O<sub>2</sub>. The instruments were calibrated and operated in accordance with CARB Method 100. There is no established method for doing source testing for ozone (O<sub>3</sub>).

Between each run, the monitoring system was checked for zero and span drift by introducing zero and calibration gas. If the analyzer drift was greater than 10% of the span value, or if the zero drift was greater than 3% of the chart, the run was repeated. At the conclusion of each test, a sampling bias check was conducted by routing the NO<sub>x</sub> calibration gas through the entire sample delivery system using a three way valve installed on the probe. The sample delivery system was leak checked at the beginning and conclusion of each test.

The analyzers were each calibrated with three concentrations of span gas plus zero gas. At least one of the calibration gases for each parameter (i.e. NO<sub>x</sub>, SO<sub>x</sub>, CO<sub>2</sub>, and O<sub>2</sub>) was a currently certified EPA Protocol 1 gas.

### Continuous monitoring for NO<sub>x</sub>, SO<sub>x</sub>, O<sub>3</sub>, CO<sub>2</sub>, and O<sub>2</sub>

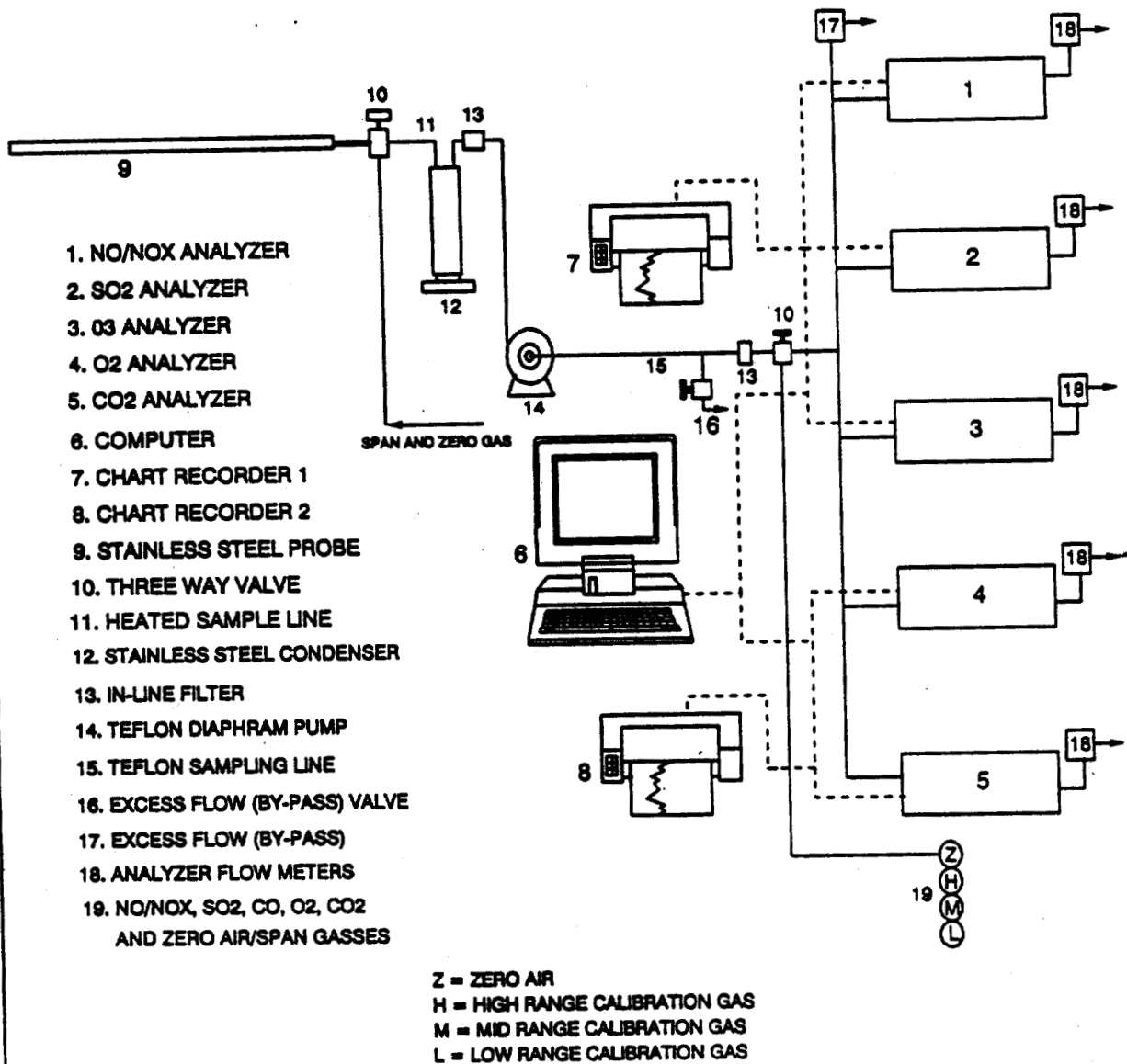
The instruments used for the continuous emissions monitoring for NO<sub>x</sub>, SO<sub>x</sub>, CO<sub>2</sub>, and O<sub>2</sub> were operated in accordance with CARB Method 1-100.

Nitrogen oxides was monitored using a Monitor Labs, Model 8040 Chemiluminescent Analyzer. The analyzer was multipoint calibrated before and after the test runs. The following criteria was applied to instrument operation:

|                                  |                    |
|----------------------------------|--------------------|
| Zero drift                       | < 2% of full scale |
| Span drift                       | < 2% of span value |
| Response time                    | < 2 minutes        |
| Sample residence time            | < 2 minutes        |
| NO <sub>x</sub> to NO conversion |                    |

**FIGURE 6**

## CONTINUOUS EMISSIONS ANALYZER SAMPLING EQUIPMENT



|                       |             |
|-----------------------|-------------|
| efficiency            | > 95 %      |
| Instrument full scale | 0 - 250 ppm |

Sulfur dioxide was determined using a Western Research Model 721 AD. The analyzer was multipoint calibrated before after each test run. The following criteria applied to instrument operation:

|                       |                     |
|-----------------------|---------------------|
| Zero drift            | < 3 % of full scale |
| Span drift            | < 2 % of span value |
| Response time         | < 2 minutes         |
| Sample residence time | < 2 minutes         |
| Instrument full scale | 0 - 100 ppm         |

Ozone was monitored with a Dasibi, Model 1003 instrument. The instrument was operated on a 0 to 1 ppm scale.

Carbon dioxide was measured with an Infrared Industries Model 732 Non-Dispersive analyzer. Operating conditions were as follows:

|                       |                     |
|-----------------------|---------------------|
| Zero drift            | < 3 % of full scale |
| Span drift            | < 2 % of span value |
| Response time         | < 2 minutes         |
| Sample residence time | < 2 minutes         |
| Instrument full scale | 20 %                |

Oxygen was continuously recorded using an MSA Model 4000 analyzer employing a micro-fuel cell detector. The analyzer was calibrated before and after the test runs. The following criteria covered instrument operation:

|                       |                     |
|-----------------------|---------------------|
| Zero drift            | < 2 % of chart      |
| Span drift            | < 2 % of full scale |
| Response time         | < 60 seconds        |
| Instrument Full Scale | 25 %                |

## **QUALITY ASSURANCE**

The Quality Assurance procedures that were employed for this project were based on the guidelines published by the EPA in "Quality Assurance Handbooks for Air Pollution Measurement Systems", Volume III, EPA-600/4-77-0276.

## **FIELD TESTING QUALITY ASSURANCE**

Prior to and at the conclusion of field sampling, each meter box dry gas meter and orifice was calibrated against a wet test meter. The results of orifice calibration were expressed as the delta H@ at various pressure drops (in inches of water) to

achieve 0.75 CFM, as specified in EPA publication APTD-0576. The dry gas meter accuracy was expressed as gamma (Y) and was determined as the ratio between the meter box dry gas meter and the wet test meter.

Exhaust gas, filter, meter and impinger temperatures were monitored using a type-K thermocouple connected to an Omega Model 601 digital readout.

Exhaust gas velocity was determined for establishing isokinetic sampling rates and volumetric flow using an S-type pitot tube attached to the probe as specified in EPA Method 2.

At the conclusion of each test run the sampling train was leak checked at a vacuum equal to or greater than the highest vacuum observed during the test runs. Each sampling train was considered leak free since the leak rate was less than 0.02 CFM.

At the beginning of the field testing program, a probe wash and flexible line wash were obtained and identified as field blanks. The probe wash technique, all sampling and recovery reagents, sample containers and sample handling used for the test runs were identical to those used to obtain the field blanks.

#### **LABORATORY QUALITY ASSURANCE**

All reagents for charging the sample train and sample recovery were ACS reagent grade materials. ES participates in the EPA inter-laboratory quality assurance program.

#### **QUALITY ASSURANCE FOR CONTINUOUS EMISSIONS MONITORS**

The analyzers employed for the continuous monitoring of NO<sub>x</sub>, SO<sub>2</sub>, O<sub>3</sub>, CO<sub>2</sub> and O<sub>2</sub> were California Air Resources Board and EPA approved instruments. The instruments were calibrated at the beginning and conclusion of each day of testing. The zero and calibration gases were prepared by Scott Specialty Gases, San Bernardino, California, and MG Industries, Garden Grove, California.

#### **SAMPLE CUSTODY**

A specific Chain-of-Custody procedure was used for this project. The elements of this plan include:

- o Train component identification
- o Sample identification
- o Sample labels

- o Documentation
- o Chain of custody forms

The sequence of activities concerned with sample custody together with identification and tracking procedures are described below:

1. Sample train prepared by the laboratory including filter holders, impingers, and other sampling equipment identified by tags and codes.
2. Sample train issued to test team and master log filled out. Sample I.D. number stickers issued according to test identification code.
3. Train returned to recovery area when a valid sample is obtained. Sample train accompanied by all field data sheets.
4. Recovery team recoved samples using appropriate containers, affixed sample I.D. labels to sample containers, to master log, to field data sheet, and to train recovery sheet.
5. All samples returned to ES Pasadena laboratory with Chain-of-Custody form.
6. Samples transferred or shipped to appropriate laboratory with Chain-of-Custody form.
7. Samples examined at each transfer point for integrity (broken containers, loss in liquid, or seal integrity).

Upon completing the required analysis, the analyst returned the Chain-of-Custody form along with results to ES. All samples were accounted for by the ES laboratory supervisor and the project manager. Each laboratory identified samples in its own laboratory notebooks by the ES I.D. number as well as any internal

identification. Notebooks are retained by each laboratory according to usual laboratory practices.

## **RESULTS**

The results of the AB2588 testing are presented in Tables 1 through 23. The average of all the rotation angles for cyclonic flow check were  $4.0^{\circ}$ . Additional supporting data are found in the appendix.

**Table 1**  
**Summary of Exhaust Gas Flow Data**  
**During The Trace Element Testing**

**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**

**January 23-25, 1991**

| Parameter           | Results   |           |                        | Average |
|---------------------|-----------|-----------|------------------------|---------|
|                     | Run 1     | Run 2     | Run 3                  |         |
| Date                | 1/23/91   | 1/24/91   | 1/24/91<br>1/25/91     |         |
| Time (hours)        | 0837-1200 | 0840-1152 | 1215-1445<br>0736-0813 |         |
| Stack Temp. (°F)    | 220       | 218       | 213                    | 217     |
| Moisture (%)        | 26.1      | 28.5      | 26.9                   | 27.2    |
| Oxygen (%)          | 13.5      | 13.5      | 13.5                   | 13.5    |
| Carbon Dioxide (%)  | 5.5       | 5.6       | 5.6                    | 5.6     |
| Molecular Wt. (dry) | 29.42     | 29.44     | 29.44                  | 29.43   |
| Molecular Wt. (wet) | 26.44     | 26.18     | 26.36                  | 26.33   |
| Velocity (fps)      | 49.03     | 50.84     | 50.68                  | 50.18   |
| Flow                |           |           |                        |         |
| ACFM                | 27,964    | 28,999    | 28,905                 | 28,623  |
| DSCFM               | 15,560    | 15,695    | 16,113                 | 15,789  |



**Table 2**  
**Summary of Exhaust Gas Flow Data**  
**During The Audit Cadmium Testin**

**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**

**January 23-25, 1991**

| Parameter           | Results   |           |                        | Average |
|---------------------|-----------|-----------|------------------------|---------|
|                     | Run 1     | Run 2     | Run 3                  |         |
| Date                | 1/23/91   | 1/24/91   | 1/24/91<br>1/25/91     |         |
| Time (hours)        | 0838-1200 | 0838-1150 | 1215-1445<br>0736-0813 |         |
| Stack Temp. (°F)    | 224       | 225       | 223                    | 224     |
| Moisture (%)        | 26.1      | 28.4      | 26.8                   | 27.1    |
| Oxygen (%)          | 13.5      | 13.5      | 13.5                   | 13.5    |
| Carbon Dioxide (%)  | 5.5       | 5.6       | 5.6                    | 5.6     |
| Molecular Wt. (dry) | 29.42     | 29.44     | 29.44                  | 29.43   |
| Molecular Wt. (wet) | 26.44     | 26.19     | 26.37                  | 26.33   |
| Velocity (fps)      | 51.30     | 50.01     | 49.57                  | 50.29   |
| Flow                |           |           |                        |         |
| ACFM                | 29,260    | 28,524    | 28,273                 | 28,352  |
| DSCFM               | 16,194    | 15,307    | 15,541                 | 15,681  |

**Table 3**  
**Summary of Exhaust Gas Flow Data**  
**During The Hexavalent and Total Chromium Testing**

**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**

**January 25, 28 and 29, 1991**

| Parameter           | Results   |           |           | Average |
|---------------------|-----------|-----------|-----------|---------|
|                     | Run 1     | Run 2     | * Run 3   |         |
| Date                | 1/25/91   | 1/28/91   | 1/29/91   |         |
| Time (hours)        | 0945-1335 | 0900-1215 | 0740-1055 |         |
| Stack Temp. (°F)    | 214       | 220       | 216       | 217     |
| Moisture (%)        | 22.6      | 24.8      | 25.7      | 24.4    |
| Oxygen (%)          | 13.4      | 11.8      | 11.8      | 12.33   |
| Carbon Dioxide (%)  | 5.7       | 6.7       | 6.6       | 6.3     |
| Molecular Wt. (dry) | 29.45     | 29.54     | 29.53     | 29.51   |
| Molecular Wt. (wet) | 26.86     | 26.68     | 26.57     | 26.70   |
| Velocity (fps)      | 50.34     | 53.21     | 52.40     | 51.98   |
| Flow                |           |           |           |         |
| ACFM                | 28,717    | 30,351    | 29,887    | 29,652  |
| DSCFM               | 16,988    | 17,282    | 16,899    | 17,056  |

Table 4

**Summary of Exhaust Gas Flow Data  
During The Poly-Aromatic Hydrocarbon Testing**

**Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California**

**January 25, 28 and 29, 1991**

| Parameter           | Results   |           |           | Average |
|---------------------|-----------|-----------|-----------|---------|
|                     | Run 1     | Run 2     | Run 3     |         |
| Date                | 1/25/91   | 1/28/91   | 1/29/91   |         |
| Time (hours)        | 0947-1335 | 0900-1215 | 0740-1055 |         |
| Stack Temp. (°F)    | 212       | 227       | 219       | 219     |
| Moisture (%)        | 22.3      | 25.6      | 25.1      | 24.3    |
| Oxygen (%)          | 13.4      | 11.8      | 11.8      | 12.33   |
| Carbon Dioxide (%)  | 5.7       | 6.7       | 6.6       | 6.3     |
| Molecular Wt. (dry) | 29.45     | 29.54     | 29.53     | 29.51   |
| Molecular Wt. (wet) | 26.90     | 26.59     | 26.64     | 26.71   |
| Velocity (fps)      | 50.31     | 47.81     | 53.44     | 50.52   |
| Flow                |           |           |           |         |
| ACFM                | 28,697    | 27,272    | 30,480    | 28,816  |
| DSCFM               | 17,078    | 15,202    | 17,307    | 16,529  |

**Table 5**  
**Summary of Exhaust Gas Flow Data**  
**During The Formaldehyde Testing**

**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**

**January 23 and 24, 1991**

| Parameter           | Results   |           |           | Average |
|---------------------|-----------|-----------|-----------|---------|
|                     | Run 1     | Run 2     | Run 3     |         |
| Date                | 1/23/91   | 1/24/91   | 1/24/91   |         |
| Time (hours)        | 1000-1200 | 0910-1110 | 1300-1500 |         |
| Stack Temp. (°F)    | 220       | 218       | 213       | 217     |
| Moisture (%)        | 27.4      | 22.1      | 19.4      | 23.0    |
| Oxygen (%)          | 13.5      | 13.5      | 13.5      | 13.5    |
| Carbon Dioxide (%)  | 5.5       | 5.6       | 5.6       | 5.6     |
| Molecular Wt. (dry) | 29.42     | 29.44     | 29.44     | 29.43   |
| Molecular Wt. (wet) | 26.29     | 26.91     | 27.22     | 26.81   |
| Velocity (fps)      | 50.44     | 50.41     | 49.28     | 50.04   |
| Flow                |           |           |           |         |
| ACFM                | 28,771    | 28,752    | 28,110    | 28,544  |
| DSCFM               | 15,743    | 16,959    | 17,273    | 16,658  |

**Table 6**  
**Summary of Trace Elements Emissions Data**

**Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California**

**January 23-25, 1991**

| Parameter    | Results                |                        |                        |                            |
|--------------|------------------------|------------------------|------------------------|----------------------------|
| Run          | 1                      | 2                      | 3                      | Average                    |
| Date         | 1/23/91                | 1/24/91                | 1/24/91<br>1/25/91     |                            |
| Time (hours) | 0837-1200              | 0840-1152              | 1215-1445<br>0736-0813 |                            |
| Arsenic      |                        |                        |                        |                            |
| lb/hr        | $2.5 \times 10^{-5}$   | $8.4 \times 10^{-6}$   | $5.3 \times 10^{-6}$   | $1.3 \times 10^{-5}$       |
| lb/ton       | $1.2 \times 10^{-7}$   | $4.6 \times 10^{-8}$   | $3.2 \times 10^{-8}$   | $6.6 \times 10^{-8}$       |
| Beryllium    |                        |                        |                        |                            |
| lb/hr        | $< 2.8 \times 10^{-5}$ | $< 2.8 \times 10^{-5}$ | $< 2.7 \times 10^{-5}$ | $1.4 \times 10^{-5}^{***}$ |
| lb/ton       | $< 1.4 \times 10^{-7}$ | $< 1.5 \times 10^{-7}$ | $< 1.6 \times 10^{-7}$ | $7.5 \times 10^{-8}^{***}$ |
| Cadmium      |                        |                        |                        |                            |
| lb/hr        | $3.3 \times 10^{-5}$   | $< 1.7 \times 10^{-5}$ | $2.7 \times 10^{-5}$   | $2.3 \times 10^{-5}^*$     |
| lb/ton       | $1.6 \times 10^{-7}$   | $< 9.2 \times 10^{-8}$ | $1.6 \times 10^{-7}$   | $1.2 \times 10^{-7}^*$     |
| Copper       |                        |                        |                        |                            |
| lb/hr        | $1.7 \times 10^{-4}$   | $2.0 \times 10^{-4}$   | $2.4 \times 10^{-4}$   | $2.0 \times 10^{-4}$       |
| lb/ton       | $8.3 \times 10^{-7}$   | $1.1 \times 10^{-6}$   | $1.5 \times 10^{-6}$   | $1.1 \times 10^{-6}$       |
| Manganese    |                        |                        |                        |                            |
| lb/hr        | $1.5 \times 10^{-4}$   | $1.7 \times 10^{-4}$   | $1.8 \times 10^{-4}$   | $1.7 \times 10^{-4}$       |
| lb/ton       | $7.4 \times 10^{-7}$   | $9.2 \times 10^{-7}$   | $1.1 \times 10^{-6}$   | $9.2 \times 10^{-7}$       |
| Mercury      |                        |                        |                        |                            |
| lb/hr        | $< 1.3 \times 10^{-4}$ | $< 1.3 \times 10^{-4}$ | $< 1.3 \times 10^{-4}$ | $6.5 \times 10^{-5}^{***}$ |
| lb/ton       | $< 6.4 \times 10^{-7}$ | $< 7.1 \times 10^{-7}$ | $< 7.9 \times 10^{-7}$ | $3.6 \times 10^{-7}^{***}$ |
| Lead         |                        |                        |                        |                            |
| lb/hr        | $8.4 \times 10^{-4}$   | $2.4 \times 10^{-4}$   | $2.4 \times 10^{-4}$   | $4.4 \times 10^{-4}$       |
| lb/ton       | $4.1 \times 10^{-6}$   | $1.3 \times 10^{-6}$   | $1.5 \times 10^{-6}$   | $2.3 \times 10^{-6}$       |

**Note:** " < " SYMBOL IDENTIFIES THE NUMBER AS THE VALUE OF THE LABORATORY'S REPORTED MINIMUM DETECTION LEVEL (MDL) FOR THE LABORATORY ANALYTICAL METHOD.

\* Average was calculated using 1/2 MDL for one run.

\*\*\* Average was calculated using 1/2 MDL for three runs.

**Table 6 (Continued)**  
**Summary of Trace Elements Emissions Data**  
**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**  
**January 23-25, 1991**

| Parameter    | Results                |                        |                        |                        |
|--------------|------------------------|------------------------|------------------------|------------------------|
| Run          | 1                      | 2                      | 3                      | Average                |
| Date         | 1/23/91                | 1/24/91                | 1/24/91<br>1/25/91     |                        |
| Time (hours) | 0837-1200              | 0840-1152              | 1215-1445<br>0736-0813 |                        |
| Nickel       |                        |                        |                        |                        |
| lb/hr        | $8.8 \times 10^{-5}$   | $1.4 \times 10^{-4}$   | $6.9 \times 10^{-5}$   | $9.9 \times 10^{-5}$   |
| lb/ton       | $4.3 \times 10^{-7}$   | $7.6 \times 10^{-7}$   | $4.2 \times 10^{-7}$   | $5.4 \times 10^{-7}$   |
| Selenium     |                        |                        |                        |                        |
| lb/hr        | $< 1.7 \times 10^{-4}$ | $< 1.7 \times 10^{-4}$ | $2.9 \times 10^{-4}$   | $1.5 \times 10^{-4**}$ |
| lb/ton       | $< 8.3 \times 10^{-7}$ | $< 9.2 \times 10^{-7}$ | $1.8 \times 10^{-6}$   | $8.9 \times 10^{-7**}$ |
| Zinc         |                        |                        |                        |                        |
| lb/hr        | $2.9 \times 10^{-3}$   | $4.8 \times 10^{-4}$   | $5.9 \times 10^{-4}$   | $1.3 \times 10^{-3}$   |
| lb/ton       | $1.4 \times 10^{-5}$   | $2.6 \times 10^{-6}$   | $3.6 \times 10^{-6}$   | $6.7 \times 10^{-6}$   |

**Note:**   " < " SYMBOL IDENTIFIES THE NUMBER AS THE VALUE OF THE  
 LABORATORY'S REPORTED MINIMUM DETECTION LEVEL (MDL)  
 FOR THE LABORATORY ANALYTICAL METHOD.

**\*\***   Average was calculated using 1/2 MDL for two runs.

**Table 7**  
**Summary of Audit Cadmium missions Data**  
**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**  
**January 23-25, 1991**

| Parameter    | Results              |                      |                        |                      |
|--------------|----------------------|----------------------|------------------------|----------------------|
| Run          | 1                    | 2                    | 3                      | Average              |
| Date         | 1/23/91              | 1/24/91              | 1/24/91<br>1/25/91     |                      |
| Time (hours) | 0838-1200            | 0838-1150            | 1215-1445<br>0736-0813 |                      |
| Cadmium      |                      |                      |                        |                      |
| lbs/hr       | $2.4 \times 10^{-5}$ | $4.0 \times 10^{-5}$ | $3.8 \times 10^{-5}$   | $3.4 \times 10^{-5}$ |
| lb/ton       | $1.2 \times 10^{-7}$ | $2.2 \times 10^{-7}$ | $2.3 \times 10^{-7}$   | $1.9 \times 10^{-7}$ |

Table 8

## Summary of Hexavalent and Total Chromium Emissions Data

Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California

January 25, 28 and 29, 1991

| Parameter           | Results              |                      |                      |                      |
|---------------------|----------------------|----------------------|----------------------|----------------------|
| Run                 | 1                    | 2                    | 3                    | Average              |
| Date                | 1/25/91              | 1/28/91              | 1/29/91              |                      |
| Time (hours)        | 0945-1335            | 0900-1215            | 0740-1055            |                      |
| Hexavalent Chromium |                      |                      |                      |                      |
| lbs/hr              | $1.7 \times 10^{-5}$ | $1.6 \times 10^{-5}$ | $1.1 \times 10^{-5}$ | $1.5 \times 10^{-5}$ |
| lb/ton              | $1.2 \times 10^{-7}$ | $7.9 \times 10^{-8}$ | $5.8 \times 10^{-8}$ | $8.6 \times 10^{-8}$ |
| Total Chromium      |                      |                      |                      |                      |
| lbs/hr              | $1.3 \times 10^{-4}$ | $6.6 \times 10^{-5}$ | $6.2 \times 10^{-5}$ | $8.6 \times 10^{-5}$ |
| lb/ton              | $8.9 \times 10^{-7}$ | $3.3 \times 10^{-7}$ | $3.3 \times 10^{-7}$ | $5.2 \times 10^{-7}$ |



Table 9

## Summary of Polynuclear Aromatic Hydrocarbons (PAH) Emissions Data

Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California

January 25, 28 and 29, 1991

| Parameter Run     | 1                    | Results<br>2          | 3                    | Average              |
|-------------------|----------------------|-----------------------|----------------------|----------------------|
| Date              | 1/25/91              | 1/28/91               | 1/29/91              |                      |
| Time (hours)      | 0947-1335            | 0900-1215             | 0740-1055            |                      |
| Naphthalene       |                      |                       |                      |                      |
| lb/hr             | $1.9 \times 10^{-3}$ | $1.1 \times 10^{-3}$  | $2.6 \times 10^{-3}$ | $1.9 \times 10^{-3}$ |
| lb/ton            | $1.3 \times 10^{-5}$ | $5.4 \times 10^{-6}$  | $1.4 \times 10^{-5}$ | $1.1 \times 10^{-5}$ |
| Acenaphthylene    |                      |                       |                      |                      |
| lb/hr             | $1.9 \times 10^{-6}$ | $1.3 \times 10^{-6}$  | $7.8 \times 10^{-6}$ | $3.7 \times 10^{-6}$ |
| lb/ton            | $1.3 \times 10^{-8}$ | $6.4 \times 10^{-9}$  | $4.1 \times 10^{-8}$ | $2.0 \times 10^{-8}$ |
| Acenaphthene      |                      |                       |                      |                      |
| lb/hr             | $3.4 \times 10^{-6}$ | $1.9 \times 10^{-6}$  | $5.7 \times 10^{-6}$ | $3.7 \times 10^{-6}$ |
| lb/ton            | $2.3 \times 10^{-8}$ | $9.4 \times 10^{-9}$  | $3.0 \times 10^{-8}$ | $2.1 \times 10^{-8}$ |
| Fluorene          |                      |                       |                      |                      |
| lb/hr             | $4.0 \times 10^{-5}$ | $1.8 \times 10^{-5}$  | $8.8 \times 10^{-5}$ | $4.9 \times 10^{-5}$ |
| lb/ton            | $2.7 \times 10^{-7}$ | $8.9 \times 10^{-8}$  | $4.6 \times 10^{-7}$ | $2.7 \times 10^{-7}$ |
| Phenanthrene      |                      |                       |                      |                      |
| lb/hr             | $8.8 \times 10^{-5}$ | $1.0 \times 10^{-4}$  | $2.0 \times 10^{-4}$ | $1.3 \times 10^{-4}$ |
| lb/ton            | $6.0 \times 10^{-7}$ | $4.9 \times 10^{-7}$  | $1.1 \times 10^{-6}$ | $7.3 \times 10^{-7}$ |
| Anthracene        |                      |                       |                      |                      |
| lb/hr             | $2.1 \times 10^{-6}$ | $2.2 \times 10^{-6}$  | $4.7 \times 10^{-6}$ | $3.0 \times 10^{-6}$ |
| lb/ton            | $1.4 \times 10^{-8}$ | $1.1 \times 10^{-8}$  | $2.5 \times 10^{-8}$ | $2.0 \times 10^{-8}$ |
| Fluoranthene      |                      |                       |                      |                      |
| lb/hr             | $7.7 \times 10^{-6}$ | $1.6 \times 10^{-5}$  | $2.4 \times 10^{-5}$ | $1.6 \times 10^{-5}$ |
| lb/ton            | $5.3 \times 10^{-8}$ | $7.9 \times 10^{-8}$  | $1.3 \times 10^{-7}$ | $8.7 \times 10^{-8}$ |
| Pyrene            |                      |                       |                      |                      |
| lb/hr             | $5.1 \times 10^{-6}$ | $1.2 \times 10^{-5}$  | $1.6 \times 10^{-5}$ | $1.1 \times 10^{-5}$ |
| lb/ton            | $3.5 \times 10^{-8}$ | $5.9 \times 10^{-8}$  | $8.4 \times 10^{-8}$ | $5.9 \times 10^{-8}$ |
| Chrysene          |                      |                       |                      |                      |
| lb/hr             | $1.6 \times 10^{-7}$ | $2.0 \times 10^{-7}$  | $3.1 \times 10^{-7}$ | $2.2 \times 10^{-7}$ |
| lb/ton            | $1.1 \times 10^{-9}$ | $9.9 \times 10^{-10}$ | $1.6 \times 10^{-9}$ | $1.2 \times 10^{-9}$ |
| Benz(a)Anthracene |                      |                       |                      |                      |
| lb/hr             | $8.8 \times 10^{-7}$ | $8.3 \times 10^{-7}$  | $1.7 \times 10^{-6}$ | $1.1 \times 10^{-6}$ |
| lb/ton            | $6.0 \times 10^{-9}$ | $4.1 \times 10^{-9}$  | $8.9 \times 10^{-9}$ | $6.3 \times 10^{-9}$ |

Table 9 (Continued)

## Summary of Polynuclear Aromatic Hydrocarbons (PAH) Emissions Data

Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California

January 25, 28 and 29, 1991

| Parameter Run          | 1                       | Results<br>2            | 3                       | Average                     |
|------------------------|-------------------------|-------------------------|-------------------------|-----------------------------|
| Date                   | 1/25/91                 | 1/28/91                 | 1/29/91                 |                             |
| Time (hours)           | 0947-1335               | 0900-1215               | 0740-1055               |                             |
| Benzo(b)fluoranthene   |                         |                         |                         |                             |
| lb/hr                  | $8.3 \times 10^{-8}$    | $1.6 \times 10^{-7}$    | $2.2 \times 10^{-6}$    | $8.1 \times 10^{-7}$        |
| lb/ton                 | $5.7 \times 10^{-10}$   | $7.9 \times 10^{-10}$   | $1.2 \times 10^{-8}$    | $4.5 \times 10^{-9}$        |
| Benzo(k)fluoranthene   |                         |                         |                         |                             |
| lb/hr                  | $5.1 \times 10^{-8}$    | $8.1 \times 10^{-8}$    | $4.9 \times 10^{-7}$    | $2.1 \times 10^{-7}$        |
| lb/ton                 | $3.5 \times 10^{-10}$   | $4.0 \times 10^{-10}$   | $2.6 \times 10^{-9}$    | $1.1 \times 10^{-9}$        |
| Benzo(a)pyrene         |                         |                         |                         |                             |
| lb/hr                  | $5.1 \times 10^{-8}$    | $6.9 \times 10^{-8}$    | $4.7 \times 10^{-8}$    | $5.6 \times 10^{-8}$        |
| lb/ton                 | $3.5 \times 10^{-10}$   | $3.4 \times 10^{-10}$   | $2.5 \times 10^{-10}$   | $3.1 \times 10^{-10}$       |
| Benzo(g,h,i)perylene   |                         |                         |                         |                             |
| lb/hr                  | $7.4 \times 10^{-8}$    | $9.6 \times 10^{-8}$    | $9.9 \times 10^{-8}$    | $9.0 \times 10^{-8}$        |
| lb/ton                 | $5.1 \times 10^{-10}$   | $4.7 \times 10^{-10}$   | $5.2 \times 10^{-10}$   | $5.0 \times 10^{-10}$       |
| Dibenz(a,h)anthracene  |                         |                         |                         |                             |
| lb/hr                  | $< 4.6 \times 10^{-8}$  | $< 2.7 \times 10^{-8}$  | $< 2.3 \times 10^{-8}$  | $1.6 \times 10^{-8}^{***}$  |
| lb/ton                 | $< 3.2 \times 10^{-10}$ | $< 1.3 \times 10^{-10}$ | $< 1.2 \times 10^{-10}$ | $9.5 \times 10^{-11}^{***}$ |
| Indeno[1,2,3-cd]pyrene |                         |                         |                         |                             |
| lb/hr                  | $4.3 \times 10^{-8}$    | $6.1 \times 10^{-8}$    | $5.7 \times 10^{-8}$    | $5.4 \times 10^{-8}$        |
| lb/ton                 | $2.9 \times 10^{-10}$   | $3.0 \times 10^{-10}$   | $3.0 \times 10^{-10}$   | $3.0 \times 10^{-10}$       |

Note: "<" SYMBOL IDENTIFIES THE NUMBER AS THE VALUE OF THE LABORATORY'S REPORTED MINIMUM DETECTION LEVEL (MDL) FOR THE LABORATORY ANALYTICAL METHOD.

\*\*\* Average was calculated using 1/2 MDL for three runs.

**Table 10**  
**Summary of Continuous Emissions Monitoring Data**

**Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California**

**January 25, 28 and 29, 1991**

| Parameter       |       | Results   |           |           |         |
|-----------------|-------|-----------|-----------|-----------|---------|
| Run             |       | 1         | 2         | 3         | Average |
| Date            |       | 1/25/91   | 1/25/91   | No Test   |         |
| Time (hours)    |       | 1015-1115 | 1145-1245 | No Test   |         |
| NOx             | ppm   | 91.9      | 79.5      | No Test   | 85.7    |
|                 | lb/hr | 11.4      | 9.8       | No Test   | 10.6    |
| SO <sub>2</sub> | ppm   | 20.4      | 22.1      | No Test   | 21.2    |
|                 | lb/hr | 3.5       | 3.8       | No Test   | 3.7     |
| Time (hours)    |       | 1105-1205 | 1215-1300 | No Test   |         |
| O <sub>3</sub>  | ppm   | 0.261     | 0.225     | No Test   | 0.243   |
|                 | lb/hr | 0.034     | 0.029     | No Test   | 0.032   |
| Date            |       | 1/28/91   | 1/28/91   | 1/28/91   |         |
| Time (hours)    |       | 0926-1030 | 1045-1145 | 1155-1225 |         |
| NOx             | ppm   | 94.6      | 95.5      | 95.7      | 95.3    |
|                 | lb/hr | 11.2      | 11.3      | 11.3      | 11.2    |
| SO <sub>2</sub> | ppm   | 12.8      | 15.8      | 16.4      | 15.0    |
|                 | lb/hr | 2.1       | 2.6       | 2.7       | 2.5     |
| Time (hours)    |       | 0937-1030 | 1047-1145 | 1207-1225 |         |
| O <sub>3</sub>  | ppm   | 0.146     | 0.178     | 0.205     | 0.176   |
|                 | lb/hr | 0.018     | 0.022     | 0.025     | 0.022   |
| Date            |       | 1/29/91   | 1/29/91   | 1/29/91   |         |
| Time (hours)    |       | 0730-0830 | 0845-0945 | 1004-1100 |         |
| NOx             | ppm   | 97.6      | 88.4      | 86.6      | 90.9    |
|                 | lb/hr | 12.1      | 11.0      | 10.8      | 11.3    |
| SO <sub>2</sub> | ppm   | 34.0      | 28.3      | 30.1      | 30.8    |
|                 | lb/hr | 5.9       | 4.9       | 5.2       | 5.3     |
| Time (hours)    |       | 0740-0830 | 0900-0945 | 1004-1100 |         |
| O <sub>3</sub>  | ppm   | 0.327     | 0.292     | 0.257     | 0.292   |
|                 | lb/hr | 0.042     | 0.038     | 0.033     | 0.038   |

**Table 11**  
**Summary of Formaldehyde Emissions Data**  
**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**  
**January 23 and 24, 1991**

| Parameter    | Results              |                      |                      |                      |
|--------------|----------------------|----------------------|----------------------|----------------------|
| Run          | 1                    | 2                    | 3                    | Average              |
| Date         | 1/23/91              | 1/24/91              | 1/24/91              |                      |
| Time (hours) | 1000-1200            | 0910-1110            | 1245-1445            |                      |
| Formaldehyde |                      |                      |                      |                      |
| ppm          | $5.9 \times 10^{-1}$ | $4.1 \times 10^{-1}$ | $7.4 \times 10^{-1}$ | $5.8 \times 10^{-1}$ |
| lb/hr        | $4.4 \times 10^{-2}$ | $3.3 \times 10^{-2}$ | $6.1 \times 10^{-2}$ | $4.6 \times 10^{-2}$ |
| lb/ton       | $2.2 \times 10^{-4}$ | $1.8 \times 10^{-4}$ | $3.3 \times 10^{-4}$ | $2.4 \times 10^{-4}$ |

**Table 12**  
**Summary of Gaseous Pollutant Emissions Data**  
**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**  
**January 23-25, 1991**

| Parameter | Results               |                       |                       |                                     |
|-----------|-----------------------|-----------------------|-----------------------|-------------------------------------|
| Run       | 1                     | 2                     | 3                     | Average                             |
| Date      | 1/23/91               | 1/24/91               | 1/25/91               |                                     |
| Benzene   |                       |                       |                       |                                     |
| ppm (v/v) | <1.0                  | <1.0                  | <1.0                  | 0.5 <sup>***</sup>                  |
| lb/hr     | $<2.0 \times 10^{-1}$ | $<2.0 \times 10^{-1}$ | $<2.0 \times 10^{-1}$ | $1.0 \times 10^{-1}$ <sup>***</sup> |
| lb/ton    | $<9.8 \times 10^{-4}$ | $<9.8 \times 10^{-4}$ | $<9.8 \times 10^{-4}$ | $4.9 \times 10^{-4}$ <sup>***</sup> |

**Note:** " < " SYMBOL IDENTIFIES THE NUMBER AS THE VALUE OF THE LABORATORY'S REPORTED MINIMUM DETECTION LEVEL (MDL) FOR THE LABORATORY ANALYTICAL METHOD.

**\*\*\*** Average was calculated using 1/2 MDL for three runs.

**Table 13**  
**Summary of Production and Operational Data**

**Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California**

**January 23, 1991**

| Production Results |                                                         |                                        |                                             |                              |                                  |                       |                            |
|--------------------|---------------------------------------------------------|----------------------------------------|---------------------------------------------|------------------------------|----------------------------------|-----------------------|----------------------------|
| Time<br>Units      | Baghouse<br>Delta P<br>( <sup>o</sup> H <sub>2</sub> O) | Material<br>Temp.<br>( <sup>o</sup> F) | Baghouse<br>Inlet Temp<br>( <sup>o</sup> F) | Damper<br>Position<br>(Deg.) | Exhaust Fan<br>Ammeter<br>(Amps) | Fuel<br>Flow<br>(GPM) | Fuel<br>Pressure<br>(PSIG) |
| 0750               |                                                         |                                        | Start test/Production count.                |                              |                                  |                       |                            |
| 0910               | 4.8                                                     | 295                                    | 230                                         | 63                           | 85                               | 4.0                   | 27                         |
| 1010               | 4.8                                                     | 275                                    | 235                                         | 63                           | 85                               | 4.0                   | 27                         |
| 1110               | 4.7                                                     | 239                                    | 245                                         | 63                           | 85                               | 4.8                   | 26                         |
| 1200               |                                                         |                                        | End test/Production count.                  |                              |                                  |                       |                            |
| 1210               | 4.5                                                     | 283                                    | 260                                         | 63                           | 85                               | 4.9                   | 25                         |
| Avg.               | 4.8                                                     | 288                                    | 237                                         | 63                           | 85                               | 4.3                   | 27                         |

**Table 14**  
**Summary of Production and Operational Data**

**Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California**

**January 24 and 25, 1991**

| Production Results |                                            |                                        |                                             |                              |                                  |                       |                            |
|--------------------|--------------------------------------------|----------------------------------------|---------------------------------------------|------------------------------|----------------------------------|-----------------------|----------------------------|
| Time<br>Units      | Baghouse<br>Delta P<br>( <sup>o</sup> H2O) | Material<br>Temp.<br>( <sup>o</sup> F) | Baghouse<br>Inlet Temp<br>( <sup>o</sup> F) | Damper<br>Position<br>(Deg.) | Exhaust Fan<br>Ammeter<br>(Amps) | Fuel<br>Flow<br>(GPM) | Fuel<br>Pressure<br>(PSIG) |
| January 24, 1991   |                                            |                                        |                                             |                              |                                  |                       |                            |
| 0838               | Start test/Production count.               |                                        |                                             |                              |                                  |                       |                            |
| 0935               | 5.2                                        | 300                                    | 240                                         | 64                           | 85                               | 4.7                   | 26                         |
| 1035               | 4.6                                        | 290                                    | 255                                         | 64                           | 85                               | 5.0                   | 26                         |
| 1135               | 4.6                                        | 300                                    | 255                                         | 64                           | 85                               | 5.0                   | 26                         |
| 1235               | 4.6                                        | 295                                    | 255                                         | 63                           | 85                               | 4.9                   | 25                         |
| 1335               | 4.6                                        | 300                                    | 240                                         | 64                           | 85                               | 4.8                   | 25                         |
| 1435               | 4.4                                        | 300                                    | 240                                         | 64                           | 85                               | 4.1                   | 25                         |
| 1445               | End test/Production count.                 |                                        |                                             |                              |                                  |                       |                            |
| January 25, 1991   |                                            |                                        |                                             |                              |                                  |                       |                            |
| 0736               | Start test/Production count.               |                                        |                                             |                              |                                  |                       |                            |
| 0740               | 4.9                                        | 300                                    | 240                                         | 60                           | 85                               | 4.2                   | 28                         |
| 0817               | End test/Production count.                 |                                        |                                             |                              |                                  |                       |                            |
| Avg.               | 4.7                                        | 298                                    | 246                                         | 63                           | 85                               | 4.7                   | 27                         |

**Table 15**  
**Summary of Production and Operational Data**

**Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California**

**January 25, 1991**

| Production Results |                                                         |                                        |                                             |                              |                                  |                       |                            |
|--------------------|---------------------------------------------------------|----------------------------------------|---------------------------------------------|------------------------------|----------------------------------|-----------------------|----------------------------|
| Time<br>Units      | Baghouse<br>Delta P<br>( <sup>o</sup> H <sub>2</sub> O) | Material<br>Temp.<br>( <sup>o</sup> F) | Baghouse<br>Inlet Temp<br>( <sup>o</sup> F) | Damper<br>Position<br>(Deg.) | Exhaust Fan<br>Ammeter<br>(Amps) | Fuel<br>Flow<br>(GPM) | Fuel<br>Pressure<br>(PSIG) |
| 0736               | Start test/Production count.                            |                                        |                                             |                              |                                  |                       |                            |
| 0740               | 4.9                                                     | 300                                    | 240                                         | 60                           | 85                               | 4.2                   | 28                         |
| 0840               | 4.7                                                     | 301                                    | 245                                         | 62                           | 85                               | 4.4                   | 27                         |
| 0940               | 4.7                                                     | 280                                    | 245                                         | 63                           | 85                               | 4.9                   | 25                         |
| 1040               | 4.8                                                     | 304                                    | 240                                         | 63                           | 85                               | 4.5                   | 26                         |
| 1140               | 4.8                                                     | 300                                    | 245                                         | 63                           | 85                               | 4.5                   | 26                         |
| 1240               | 4.7                                                     | 298                                    | 246                                         | 62                           | 85                               | 4.4                   | 25                         |
| 1315               | End test/Production count.                              |                                        |                                             |                              |                                  |                       |                            |
| Avg.               | 4.8                                                     | 297                                    | 244                                         | 62                           | 85                               | 4.5                   | 26                         |



**Table 16**  
**Summary of Production and Operational Data**

**Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California**

**January 28, 1991**

| Production Results |                                            |                           |                                |                              |                                  |                       |                            |
|--------------------|--------------------------------------------|---------------------------|--------------------------------|------------------------------|----------------------------------|-----------------------|----------------------------|
| Time<br>Units      | Baghouse<br>Delta P<br>("H <sub>2</sub> O) | Material<br>Temp.<br>(°F) | Baghouse<br>Inlet Temp<br>(°F) | Damper<br>Position<br>(Deg.) | Exhaust Fan<br>Ammeter<br>(Amps) | Fuel<br>Flow<br>(GPM) | Fuel<br>Pressure<br>(PSIG) |
| 0900               | Start test/Production count.               |                           |                                |                              |                                  |                       |                            |
| 1000               | 4.8                                        | 295                       | 245                            | 64                           | 85                               | 4.8                   | 26                         |
| 1100               | 4.8                                        | 297                       | 245                            | 64                           | 85                               | 4.5                   | 25                         |
| 1200               | 4.7                                        | 285                       | 230                            | 63                           | 85                               | 4.5                   | 25                         |
| 1215               | End test/Production count.                 |                           |                                |                              |                                  |                       |                            |
| Avg.               | 4.8                                        | 292                       | 240                            | 64                           | 85                               | 4.6                   | 25                         |

**Table 17**  
**Summary of Production and Operational Data**

**Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California**

**January 29, 1991**

| Production Results |                                                         |                                        |                                             |                              |                                  |                       |                            |
|--------------------|---------------------------------------------------------|----------------------------------------|---------------------------------------------|------------------------------|----------------------------------|-----------------------|----------------------------|
| Time<br>Units      | Baghouse<br>Delta P<br>( <sup>o</sup> H <sub>2</sub> O) | Material<br>Temp.<br>( <sup>o</sup> F) | Baghouse<br>Inlet Temp<br>( <sup>o</sup> F) | Damper<br>Position<br>(Deg.) | Exhaust Fan<br>Ammeter<br>(Amps) | Fuel<br>Flow<br>(GPM) | Fuel<br>Pressure<br>(PSIG) |
| 0740               | Start test/Production count.                            |                                        |                                             |                              |                                  |                       |                            |
| 0840               | 4.9                                                     | 295                                    | 240                                         | 62                           | 85                               | 4.5                   | 25                         |
| 0940               | 4.6                                                     | 293                                    | 240                                         | 64                           | 85                               | 4.2                   | 26                         |
| 1040               | 4.6                                                     | 290                                    | 245                                         | 63                           | 85                               | 4.8                   | 25                         |
| 1055               | End test/Production count.                              |                                        |                                             |                              |                                  |                       |                            |
| Avg.               | 4.7                                                     | 293                                    | 242                                         | 63                           | 85                               | 4.5                   | 25                         |

**Table 18**  
**Summary of Batch Mix**  
**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**  
**January 23, 1991**

| Batch Results |                    |                    |                    |                    |                     |
|---------------|--------------------|--------------------|--------------------|--------------------|---------------------|
| Type<br>Units | 3/8"<br>(tons/day) | 1/2"<br>(tons/day) | 3/4"<br>(tons/day) | Berm<br>(tons/day) | Total<br>(tons/day) |
| 3/8" rock     | 80.69              | NA                 | 9.68               | 1.88               | 92.25               |
| 1/2" rock     | NA                 | 1,587.11           | NA                 | NA                 | 1,587.11            |
| 3/4" rock     | NA                 | NA                 | NA                 | NA                 | NA                  |
| Filler        | NA                 | NA                 | NA                 | NA                 | NA                  |
| Oil AR 4000   | 5.14               | 94.15              | 0.52               | NA                 | 99.81               |
| Oil AR 8000   | NA                 | NA                 | NA                 | 0.13               | 0.13                |
| Total         | 85.83              | 1,681.26           | 10.20              | 2.01               | 1,779.30            |

**Table 19**  
**Summary of Batch Mix**  
**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**  
**January 24, 1991**

| Batch Results |                    |                    |                    |                    |                     |
|---------------|--------------------|--------------------|--------------------|--------------------|---------------------|
| Type<br>Units | 3/8"<br>(tons/day) | 1/2"<br>(tons/day) | 3/4"<br>(tons/day) | Berm<br>(tons/day) | Total<br>(tons/day) |
| 3/8" rock     | 117.19             | NA                 | NA                 | NA                 | 117.19              |
| 1/2" rock     | NA                 | 1,130.59           | NA                 | NA                 | 1,130.59            |
| 3/4" rock     | NA                 | NA                 | NA                 | NA                 | NA                  |
| Filler        | 0.02               | NA                 | NA                 | NA                 | 0.02                |
| Oil AR 4000   | 7.55               | 67.07              | NA                 | NA                 | 74.62               |
| Oil AR 8000   | NA                 | NA                 | NA                 | NA                 | NA                  |
| Total         | 124.76             | 1,197.66           | NA                 | NA1                | 1,322.42            |

**Table 20**  
**Summary of Batch Mix**  
**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**  
**January 25, 1991**

| Batch Results |                    |                    |                    |                    |                     |
|---------------|--------------------|--------------------|--------------------|--------------------|---------------------|
| Type<br>Units | 3/8"<br>(tons/day) | 1/2"<br>(tons/day) | 3/4"<br>(tons/day) | Berm<br>(tons/day) | Total<br>(tons/day) |
| 3/8" rock     | 33.18              | NA                 | NA                 | NA                 | 33.18               |
| 1/2" rock     | NA                 | NA                 | NA                 | NA                 | NA                  |
| 3/4" rock     | NA                 | 914.11             | NA                 | NA                 | 914.11              |
| Filler        | NA                 | NA                 | NA                 | NA                 | NA                  |
| Oil AR 4000   | 2.16               | NA                 | 49.13              | NA                 | 51.29               |
| Oil AR 8000   | NA                 | NA                 | NA                 | NA                 | NA                  |
| Total         | 35.34              | 914.11             | 49.13              | NA                 | 998.58              |

**Table 21**  
**Summary of Batch Mix**  
**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**  
**January 28, 1991**

| Batch Results |                    |                    |                    |                    |                     |
|---------------|--------------------|--------------------|--------------------|--------------------|---------------------|
| Type<br>Units | 3/8"<br>(tons/day) | 1/2"<br>(tons/day) | 3/4"<br>(tons/day) | Berm<br>(tons/day) | Total<br>(tons/day) |
| 3/8" rock     | 135.47             | NA                 | NA                 | NA                 | 135.47              |
| 1/2" rock     | NA                 | 1,307.38           | NA                 | NA                 | 1,307.38            |
| 3/4" rock     | NA                 | NA                 | 35.95              | NA                 | 35.95               |
| Filler        | NA                 | NA                 | NA                 | NA                 | NA                  |
| Oil AR 4000   | 8.78               | 1.73               | 1.93               | NA                 | 12.44               |
| Oil AR 8000   | NA                 | 77.24              | NA                 | NA                 | 77.24               |
| Total         | 144.25             | 1,386.35           | 37.88              | NA                 | 1,568.48            |

**Table 22**  
**Summary of Batch Mix**  
**Baghouse Exhaust Stack**  
**Pala Asphalt Plant**  
**Pala, California**  
**January 29, 1991**

| Type<br>Units | Batch Results      |                    |                    |                    |                     |
|---------------|--------------------|--------------------|--------------------|--------------------|---------------------|
|               | 3/8"<br>(tons/day) | 1/2"<br>(tons/day) | 3/4"<br>(tons/day) | Berm<br>(tons/day) | Total<br>(tons/day) |
| 3/8" rock     | 136.78             | NA                 | NA                 | NA                 | 136.78              |
| 1/2" rock     | NA                 | 686.78             | NA                 | NA                 | 686.78              |
| 3/4" rock     | NA                 | NA                 | NA                 | NA                 | NA                  |
| Filler        | NA                 | NA                 | NA                 | NA                 | NA                  |
| Oil AR 4000   | 5.94               | 0.68               | NA                 | NA                 | 6.62                |
| Oil AR 8000   | NA                 | 43.60              | NA                 | NA                 | 43.60               |
| Total         | 142.72             | 731.06             | NA                 | NA                 | 873.78              |

**Table 23**  
**Summary of Fuel Analysis Data**

**Baghouse Exhaust Stack  
Pala Asphalt Plant  
Pala, California**

**January 23-25, 1991**

| Parameter                       | Results |         |         | Average |
|---------------------------------|---------|---------|---------|---------|
| Run                             | 1       | 2       | 3       |         |
| Date                            | 1/23/91 | 1/24/91 | 1/25/91 |         |
| Arsenic<br>ppm (w/w)            | <0.50   | <0.50   | <0.50   | 0.25*** |
| Beryllium<br>ppm (w/w)          | <0.64   | <0.64   | <0.64   | 0.32*** |
| Cadmium<br>ppm (w/w)            | <0.58   | <0.58   | <0.58   | 0.29*** |
| Chromium<br>ppm (w/w)           | <41.0   | <41.0   | <41.0   | 20.5*** |
| Copper<br>ppm (w/w)             | 10.0    | 21.1    | 44.3    | 25.1    |
| Manganese<br>ppm (w/w)          | 1.58    | 0.94    | 1.13    | 1.22    |
| Mercury<br>ppm (w/w)            | 0.68    | <0.50   | <0.50   | 0.39**  |
| Lead<br>ppm (w/w)               | <3.67   | <3.67   | <3.67   | 1.84*** |
| Nickel<br>ppm (w/w)             | 102     | 324     | 337     | 254     |
| Selenium<br>ppm (w/w)           | <0.50   | <0.50   | <0.50   | 0.25*** |
| Zinc<br>ppm (w/w)               | 28.8    | 13.9    | 12.3    | 18.3    |
| Total Chloride<br>% (wt. basis) | 0.063   | 0.057   | 0.061   | 0.060   |
| Total Sulfur<br>% (wt. basis)   | 0.10    | 0.09    | 0.13    | 0.11    |

Note: \* < " SYMBOL IDENTIFIES THE NUMBER AS THE VALUE OF THE LABORATORY'S REPORTED MINIMUM DETECTION LEVEL (MDL) FOR THE LABORATORY ANALYTICAL METHOD.

\*\* Average was calculated using 1/2 MDL for two run.

\*\*\* Average was calculated using 1/2 MDL for three runs.



SOURCE TEST OF PARTICULATE EMISSIONS TO THE ATMOSPHERE

TEST SITE: Calmat-Pala  
Pala Indian Reservation  
Pala, CA 92059

ERRATA

TEST #: 91301

P.O.# 117

TEST DATE: 10/28/91

Type of plant (Asphalt /Perlite / Combustion) :

asphalt

UNIT TESTED: Asphalt plant

EQUIPMENT: baghouse

TESTED BY: David Shina, Linda Twaddle, Gary Smith, & Andy Fuchs

DATE: 10/28/91

SITE PERSONNEL: Paul Mason

DATE: 10/28/91

APCD ENGINEER: Earnest Davis

DATE: 10/28/91

LAB ANALYSIS BY: David Shina

DATE: 11/6/91

REPORT BY: David Shina

DATE: 11/6/91

REVIEWED BY: Linda Twaddle

DATE:

APPROVED BY:

DATE:

ROBERT YELENOSKY, ACTING SENIOR AIR POLLUTION CHEMIST

This report has been reviewed and found to be representative of the testing that was performed.

| TEST                 | PERMIT LIMIT | MEASURED    | PERFORMANCE |
|----------------------|--------------|-------------|-------------|
| RULE 54 DUST & FUMES | 40 lbs/hr    | 4.03 lbs/hr | PASSED      |

SUMMARY:

| ITEM  | Vm              | Bws   | Cs      | E      | I   | Qstd     | ts  | PROD RATE |
|-------|-----------------|-------|---------|--------|-----|----------|-----|-----------|
| UNITS | ft <sup>3</sup> | %     | gr/dscf | lbs/hr | %   | dscfm    | °F  | tons/hr   |
| VALUE | 51.167          | 31.27 | 0.035   | 4.031  | 108 | 1.34E+04 | 248 | 240.50    |

**SYSTEM DESCRIPTION:**

This asphalt plant combines crushed rock and sand with asphalt oil in batch loads of varying sizes. The rock and sand are heated in a rotary drum to dry them. The exhaust from this dryer is routed through a baghouse and finally to a stack. It is the emissions from this stack that are the subject of this report.

**PROCEDURES:**

The procedures and equipment utilized in these tests are based on EPA New Source Performance Standards Method 5. The sampling train was modified to utilize a back-end filter and 5th impinger filled with silica gel (fig. 1), as outlined by the SDAPCD QA manual.

**CALCULATIONS**

All preliminary assumptions and calculations are based on data obtained from previous tests. All equations are from EPA CFR 40, July 1, 1990, Parts 53-60, Appendix A, Methods 1-5 inclusive.

**PARTICULATE SAMPLING:**

The test consisted of sampling at 24 traverse points, 12 from each of 2 sample ports (fig.2), collected from 77 inches below the stack (fig.3). All field data was transferred to the computer printout. All calculations were done by the computer and the emissions were compared to rule 54 of the SDAPCD.

**ANALYSES:**

**Gas:** An integrated bag sample was collected during the test and analyzed at the APCD lab.

**Particulate:** All procedures follow EPA guidelines, except where noted in the SDAPCD QA manual.

**EQUIPMENT:**

All testing and analysis equipment was calibrated according to EPA guidelines.

**Analysis:**

CO2-Anarad AR400  
O2-Teledyne Ryan 320 P4  
Macrobalance-Sargent Welch  
Microbalance-Sartorius  
ver.4 APCD P/M-ISOS 9/10/91 by DNS

**Collection:**

Filter-Gelman  
Holder-Gelman  
Beakers-Pyrex  
Impingers-Ace

**Sampling:**

L/S Box-Napp  
Umbilical cord-Napp  
Cold/Hot box-Napp  
Pitobe tube-Napp

**Temp./Press.:**

Thermocouples-Omega  
Read out-Omega  
Barometric-calc. by APCD  
L/S box-Dwyer magnehelic

| Trav. Pt   | Vm (ft <sup>3</sup> ) | ΔP                    | ΔH                    | t 1(unc) | t 2(unc) | Stack Temp | Imp Temp | velocity |
|------------|-----------------------|-----------------------|-----------------------|----------|----------|------------|----------|----------|
|            | 506.861               | (in H <sub>2</sub> O) | (in H <sub>2</sub> O) | (°F)     | (°F)     | (°F)       | (°F)     | (ft/sec) |
| †† East 12 |                       | 0.350                 | 2.700                 | 66.00    | 82.00    | 247.00     | 50       | 41.34    |
| 11         |                       | 0.350                 | 2.700                 | 64.00    | 84.00    | 249.00     | 48       | 41.40    |
| 10         |                       | 0.390                 | 3.000                 | 65.50    | 98.00    | 254.00     | 48       | 43.86    |
| 9          |                       | 0.420                 | 3.200                 | 66.00    | 100.00   | 254.00     | 51       | 45.51    |
| 8          |                       | 0.450                 | 3.500                 | 67.00    | 102.00   | 256.00     | 56       | 47.18    |
| 7          |                       | 0.470                 | 3.600                 | 67.00    | 104.00   | 258.00     | 58       | 48.28    |
| 6          |                       | 0.520                 | 4.000                 | 68.00    | 105.00   | 259.00     |          | 50.82    |
| 5          |                       | 0.520                 | 4.000                 | 69.00    | 106.00   | 260.00     | 61       | 50.86    |
| 4          |                       | 0.510                 | 3.900                 | 69.50    | 107.00   | 258.00     | 59       | 50.29    |
| 3          |                       | 0.520                 | 4.000                 | 70.00    | 108.00   | 255.00     | 56       | 50.68    |
| 2          |                       | 0.470                 | 3.600                 | 70.00    | 108.00   | 255.00     | 55       | 48.18    |
| East 1     |                       | 0.470                 | 3.600                 | 71.00    | 109.00   | 254.00     | 54       | 48.15    |
| South 12   |                       | 0.250                 | 1.900                 | 74.00    | 71.00    | 149.00     | 53       | 32.43    |
| 11         |                       | 0.370                 | 2.900                 | 74.00    | 102.00   | 190.00     | 48       | 40.76    |
| 10         |                       | 0.420                 | 3.200                 | 73.00    | 106.00   | 242.00     | 47       | 45.13    |
| 9          |                       | 0.450                 | 3.500                 | 73.00    | 108.00   | 259.00     | 46       | 47.28    |
| 8          |                       | 0.500                 | 3.900                 | 74.00    | 110.00   | 260.00     | 47       | 49.87    |
| 7          |                       | 0.500                 | 3.900                 | 74.00    | 110.00   | 261.00     | 47       | 49.90    |
| 6          |                       | 0.510                 | 3.900                 | 74.00    | 111.00   | 260.00     | 48       | 50.36    |
| 5          |                       | 0.510                 | 3.900                 | 75.00    | 112.00   | 258.00     | 48       | 50.29    |
| 4          |                       | 0.480                 | 3.700                 | 75.50    | 113.00   | 258.00     | 48       | 48.79    |
| 3          |                       | 0.430                 | 3.300                 | 76.00    | 114.00   | 257.00     | 50       | 46.15    |
| 2          |                       | 0.460                 | 3.500                 | 77.00    | 114.50   | 256.00     | 50       | 47.70    |
| South 1    | 558.028               | 0.430                 | 3.300                 | 78.00    | 116.00   | 253.00     | 51       | 46.02    |

|          | Vm (ft <sup>3</sup> ) | ΔP (in H <sub>2</sub> O) | ΔH (in H <sub>2</sub> O) | t 1 (°F) | t 2 (°F) | ts (°F) | ti (°F) | vs (ft/sec) |
|----------|-----------------------|--------------------------|--------------------------|----------|----------|---------|---------|-------------|
| Average: | 51.167                | 0.445                    | 3.446                    | 71.27    | 104.19   | 248     | 51      | 46.72       |

**MISCELLANEOUS:**

Ø = 60.0 min  
 tn = 24 points  
 ø = 2.5 min

**NOZZLE & PROBE:**

Dn = 0.310 in  
 An = 0.0755 in<sup>2</sup>  
 Cp = 0.846

**METER BOX PARAMETERS:**

ΔH@ = 2.7254  
 Y = 0.9782  
 Box ID = D-337

**PRESSURES:**

Pbar = 29.46 in Hg  
 Pg = -0.38 in H<sub>2</sub>O  
 Silica gel(yes/no) yes  
 Vpw @ ts = 58.63 in Hg  
 Vpw @ ti = 0.0000 in Hg

**VOLUME:**

start leak rate = 0.010 cfm  
 Pass/Fail PASS  
 final leak rate = 0.000 cfm  
 Pass/Fail PASS  
 Vm 51.167 ft<sup>3</sup>

**TEMPERATURES:**

t1 corr = 0.40 °F  
 t2 corr = 0.10 °F  
 tm = 88 °F  
 ts = 248 °F  
 ti = 51 °F

**STACK PARAMETERS:**

circular (yes/no) yes  
 Ds = 3.48 f t  
 Length = N/A f t  
 As = 9.51 ft<sup>2</sup>

**LAB DATA:**

mn(front) = 0.02492 g  
 mn(back) = 0.08385 g  
 mn(total) = 0.10877 g  
 Vlc 461.69 ml

**STACK GAS MEASUREMENTS:**

CO<sub>2</sub> = 3.20 %  
 O<sub>2</sub> = 17.40 %  
 CO = 0.00 %  
 N<sub>2</sub> = 79.40 %

†† The stack has 2-5 inch ports, so we had to adapt a impinger train support at the site, because we do not have 5"-3" scale down unirlat port adapters. Our impinger train support forced me to combine points 12 & 11 on the east port. We could sample all the points on the south port.

**TEMPERATURES:**

|     |                                                |        |
|-----|------------------------------------------------|--------|
| 01) | $ts = (\sum ts(n))/total\ n's$                 | 248 °F |
| 02) | $Ts = ts + 460$                                | 708 °R |
| 03) | $tm = (\sum \{t_1(n) + t_2(n)\}/2)/total\ n's$ | 88 °F  |
| 04) | $Tm = (t_1 + t_2)/2 + 460$                     | 548 °R |
| 05) | $ti = (\sum ti(n))/total\ n's$                 | 51 °F  |
| 06) | $Tstd$                                         | 528 °R |

**PRESSURES:**

|     |                                                                 |                           |
|-----|-----------------------------------------------------------------|---------------------------|
| 07) | $Pbar = \{(P @ S.L.) + [ft. above S.L. * (-0.1 in Hg/100ft)]\}$ | 29.46 in Hg               |
| 08) | $Pg = \text{read from pressure sensing device}$                 | -0.38 in H <sub>2</sub> O |
| 09) | $Ps = Pbar + (Pg/13.6)$                                         | 29.43 in Hg               |
| 10) | $\Delta H$                                                      | 3.45 in H <sub>2</sub> O  |
| 11) | $Pm = Pbar + (\Delta H/13.6)$                                   | 29.71 in Hg               |
| 12) | $Pstd$                                                          | 29.92 in Hg               |

**VOLUME:**

|     |                                                                             |                                    |
|-----|-----------------------------------------------------------------------------|------------------------------------|
| 13) | $Vm = Vm(end) - Vm(begin)$                                                  | 51.167 ft <sup>3</sup>             |
| 14) | $Y$                                                                         | 0.9782                             |
| 15) | $Vm' = Vm * Y$                                                              | 50.052 ft <sup>3</sup>             |
| 16) | $Vpw @ ti = \text{from appendix}$                                           | 0.0000                             |
| 17) | $corr\ Vwm = \{[(Vm' * Vpw @ imp / Ps) * Pm * Tstd] / (Tm * Pstd)\}$        | 0.0000 ft <sup>3</sup>             |
| 18) | $Vm\ std = \{[Vm' * (Tstd / Tm) * (Pm / Pstd)] - corr\ Vwm\}$               | 47.894 ft <sup>3</sup>             |
| 19) | $Vlc = (\sum \text{Volume of impingers})$                                   | 461.69 ml                          |
| 20) | $\partial$                                                                  | 0.002201 lb/ml                     |
| 21) | $R$                                                                         | 21.85 Hg-ft <sup>3</sup> /°R-lb-mo |
| 22) | $MwH_2O$                                                                    | 18.00 g/g-mo                       |
| 23) | $Vw\ std = \{[(Vlc * \partial * R * Tstd) / (Pstd * MwH_2O)] + corr\ Vwm\}$ | 21.7918 ft <sup>3</sup>            |

**CALCULATIONS:****MOISTURE-**

|     |                                                  |             |
|-----|--------------------------------------------------|-------------|
| 24) | $Bws(1) = (Vw\ std) / (Vw\ std + Vm\ std) * 100$ | 31.27 %     |
| 25) | $Vpw @ ts = \text{from appendix}$                | 58.63 in Hg |
| 26) | $Bws(2) = [(Vpw @ ts) / Ps] * 100$               | 199.20 %    |
| 27) | $Bws = \text{lower value of equation 24 or 26}$  | 31.27 %     |

**MOLECULAR WEIGHT-**

|     |                                                                                 |                |
|-----|---------------------------------------------------------------------------------|----------------|
| 28) | $\%O_2$                                                                         | 17.40 %        |
| 29) | $\%CO_2$                                                                        | 3.20 %         |
| 30) | $\%N_2 + \text{inerts} + \%CO$                                                  | 79.40 %        |
| 31) | $Md = [0.440(\%CO_2)] + [0.320(\%O_2)] + [0.280(\%N_2 + \text{inerts} + \%CO)]$ | 29.21 g/g*mole |
| 32) | $Ms = Md * (1 - Bws) + 18.0 * (Bws)$                                            | 25.70 g/g*mole |

**FLOW-**

|     |                                                        |                           |
|-----|--------------------------------------------------------|---------------------------|
| 33) | $\Delta P$                                             | 0.445 in H <sub>2</sub> O |
| 34) | $Cp$                                                   | 0.846                     |
| 35) | $vs = 85.49 * Cp * [(Ts * \Delta P) / (Ps * Ms)]^{.5}$ | 46.719 ft/s               |
| 36) | $As = 3.14 * [(Ds)^2 / 4]$                             | 9.51 ft <sup>2</sup>      |
| 37) | $Qs = (vs) * As * 60$                                  | 2.66E+04 acfm             |
| 38) | $Qstd = 17.64 * Qs * (1 - Bws) * Ps / Ts$              | 1.34E+04 dscfm            |

**EMISSIONS-****FRONT HALF**

|     |                                                 |                          |
|-----|-------------------------------------------------|--------------------------|
| 39) | $mn\ (front)$                                   | 0.02492 g                |
| 40) | $Cs\ (front) = 15.43 * mn(front) / Vm\ std$     | 0.0080 0.008 grains/dscf |
| 41) | $E\ (front) = (0.00857) * (Qstd) * Cs\ (front)$ | 0.92 lbs/hr              |

**BACK HALF**

|     |                                               |                          |
|-----|-----------------------------------------------|--------------------------|
| 42) | $mn\ (back)$                                  | 0.08385 g                |
| 43) | $Cs\ (back) = 15.43 * mn(back) / Vm\ std$     | 0.0270 0.027 grains/dscf |
| 44) | $E\ (back) = (0.00857) * (Qstd) * Cs\ (back)$ | 3.11 lbs/hr              |

**TOTAL**

|     |                                                 |                          |
|-----|-------------------------------------------------|--------------------------|
| 45) | $mn\ (total) = mn(front) + mn(back)$            | 0.10877 g                |
| 46) | $Cs\ (total) = 15.43 * mn(total) / Vm\ std$     | 0.0350 0.035 grains/dscf |
| 47) | $E\ (total) = (0.00857) * (Qstd) * Cs\ (total)$ | 4.03 lbs/hr              |

**ISOKINETICS:**

|     |                                                                     |                        |
|-----|---------------------------------------------------------------------|------------------------|
| 48) | $An = 3.14 * [(Dn)^2 / 4]$                                          | 0.0755 in <sup>2</sup> |
| 49) | $l = .09450 * (Ts * Vm\ std) / Ps * vs * An * \partial * (1 - Bws)$ | 107.88 % = 108 %       |

SOURCE TEST OF PARTICULATE EMISSIONS TO THE ATMOSPHERE

TEST SITE: Calmat-Pala  
Pala Indian Reservation  
Pala, CA 92059

TEST #: 91301

P.O.# 117

TEST DATE: 10/28/91

Type of plant (Asphalt /Perlite / Combustion) :

asphalt

UNIT TESTED: Asphalt plant

EQUIPMENT: baghouse

TESTED BY: David Shina, Linda Twaddle, Gary Smith, & Andy Fuchs

DATE: 10/28/91

SITE PERSONNEL: Paul Mason

DATE: 10/28/91

APCD ENGINEER: Earnest Davis

DATE: 10/28/91

LAB ANALYSIS BY: David Shina

DATE: 11/6/91

REPORT BY: David Shina

DATE: 11/6/91

REVIEWED BY: Linda Twaddle

DATE: 11/21/91

APPROVED BY: Robert Yelenosky

DATE: 11/26/91

ROBERT YELENOSKY, ACTING SENIOR AIR POLLUTION CHEMIST

This report has been reviewed and found to be representative of the testing that was performed.

| TEST                 | PERMIT LIMIT | MEASURED    | PERFORMANCE |
|----------------------|--------------|-------------|-------------|
| RULE 54 DUST & FUMES | 40 lbs/hr    | 4.03 lbs/hr | PASSED      |

SUMMARY:

| ITEM  | Vm              | Bws   | Cs      | E      | I   | Qstd     | ts  | PROD RATE |
|-------|-----------------|-------|---------|--------|-----|----------|-----|-----------|
| UNITS | ft <sup>3</sup> | %     | gr/dscf | lbs/hr | %   | dscfm    | °F  | tons/hr   |
| VALUE | 51.167          | 31.27 | 0.035   | 4.031  | 108 | 1.34E+04 | 248 | 240.50    |

**SYSTEM DESCRIPTION:**

This asphalt plant combines crushed rock and sand with asphalt oil in batch loads of varying sizes. The rock and sand are heated in a rotary drum to dry them. The exhaust from this dryer is routed through a baghouse and finally to a stack. It is the emissions from this stack that are the subject of this report.

**PROCEDURES:**

The procedures and equipment utilized in these tests are based on EPA New Source Performance Standards Method 5. The sampling train was modified to utilize a back-end filter and 5th impinger filled with silica gel (fig. 1), as outlined by the SDAPCD QA manual.

**CALCULATIONS**

All preliminary assumptions and calculations are based on data obtained from previous tests. All equations are from EPA CFR 40, July 1, 1990, Parts 53-60, Appendix A, Methods 1-5 inclusive.

**PARTICULATE SAMPLING:**

The test consisted of sampling at 24 traverse points, 12 from each of 2 sample ports (fig.2), collected from 77 inches below the stack (fig.3). All field data was transferred to the computer printout. All calculations were done by the computer and the emissions were compared to rule 54 of the SDAPCD.

**ANALYSES:**

**Gas:** An integrated bag sample was collected during the test and analyzed at the APCD lab.

**Particulate:** All procedures follow EPA guidelines, except where noted in the SDAPCD QA manual.

**EQUIPMENT:**

All testing and analysis equipment was calibrated according to EPA guidelines.

**Analysis:**

CO2-Anarad AR400  
O2-Teledyne Ryan 320 P4  
Macrobalance-Sargent Welch  
Microbalance-Sartorius  
ver.4 APCD P/M-ISOS 9/10/91 by DNS

**Collection:**

Filter-Gelman  
Holder-Gelman  
Beakers-Pyrex  
Impingers-Ace

**Sampling:**

L/S Box-Napp  
Umbilical cord-Napp  
Cold/Hot box-Napp  
Pitobe tube-Napp

**Temp./Press.:**

Thermocouples-Omega  
Read out-Omega  
Barometric-calc. by APCD  
L/S box-Dwyer magnehelic

| Trav. Pt   | Vm (ft <sup>3</sup> ) | ΔP                    | ΔH                    | t 1(unc) | t 2(unc) | Stack Temp | Imp Temp | velocity |
|------------|-----------------------|-----------------------|-----------------------|----------|----------|------------|----------|----------|
|            | 506.861               | (in H <sub>2</sub> O) | (in H <sub>2</sub> O) | (°F)     | (°F)     | (°F)       | (°F)     | (ft/sec) |
| †† East 12 |                       | 0.350                 | 2.700                 | 68.00    | 82.00    | 247.00     | 50       | 41.34    |
| 11         |                       | 0.350                 | 2.700                 | 64.00    | 84.00    | 249.00     | 48       | 41.40    |
| 10         |                       | 0.390                 | 3.000                 | 65.50    | 98.00    | 254.00     | 48       | 43.86    |
| 9          |                       | 0.420                 | 3.200                 | 66.00    | 100.00   | 254.00     | 51       | 45.51    |
| 8          |                       | 0.450                 | 3.500                 | 67.00    | 102.00   | 256.00     | 56       | 47.18    |
| 7          |                       | 0.470                 | 3.600                 | 67.00    | 104.00   | 258.00     | 58       | 48.28    |
| 6          |                       | 0.520                 | 4.000                 | 68.00    | 105.00   | 259.00     |          | 50.82    |
| 5          |                       | 0.520                 | 4.000                 | 69.00    | 106.00   | 260.00     | 61       | 50.86    |
| 4          |                       | 0.510                 | 3.900                 | 69.50    | 107.00   | 258.00     | 59       | 50.29    |
| 3          |                       | 0.520                 | 4.000                 | 70.00    | 108.00   | 255.00     | 56       | 50.68    |
| 2          |                       | 0.470                 | 3.600                 | 70.00    | 108.00   | 255.00     | 55       | 48.18    |
| East 1     |                       | 0.470                 | 3.600                 | 71.00    | 109.00   | 254.00     | 54       | 48.15    |
| South 12   |                       | 0.250                 | 1.900                 | 74.00    | 71.00    | 149.00     | 53       | 32.43    |
| 11         |                       | 0.370                 | 2.900                 | 74.00    | 102.00   | 190.00     | 48       | 40.76    |
| 10         |                       | 0.420                 | 3.200                 | 73.00    | 106.00   | 242.00     | 47       | 45.13    |
| 9          |                       | 0.450                 | 3.500                 | 73.00    | 108.00   | 259.00     | 46       | 47.28    |
| 8          |                       | 0.500                 | 3.900                 | 74.00    | 110.00   | 260.00     | 47       | 49.87    |
| 7          |                       | 0.500                 | 3.900                 | 74.00    | 110.00   | 261.00     | 47       | 49.90    |
| 6          |                       | 0.510                 | 3.900                 | 74.00    | 111.00   | 260.00     | 48       | 50.36    |
| 5          |                       | 0.510                 | 3.900                 | 75.00    | 112.00   | 258.00     | 48       | 50.29    |
| 4          |                       | 0.480                 | 3.700                 | 75.50    | 113.00   | 258.00     | 48       | 48.79    |
| 3          |                       | 0.430                 | 3.300                 | 76.00    | 114.00   | 257.00     | 50       | 46.15    |
| 2          |                       | 0.460                 | 3.500                 | 77.00    | 114.50   | 256.00     | 50       | 47.70    |
| South 1    | 558.028               | 0.430                 | 3.300                 | 78.00    | 116.00   | 253.00     | 51       | 46.02    |

|          | Vm (ft <sup>3</sup> ) | ΔP (in H <sub>2</sub> O) | ΔH (in H <sub>2</sub> O) | t 1 (°F) | t 2 (°F) | ts (°F) | ti (°F) | vs (ft/sec) |
|----------|-----------------------|--------------------------|--------------------------|----------|----------|---------|---------|-------------|
| Average: | 51.167                | 0.445                    | 3.446                    | 71.27    | 104.19   | 248     | 51      | 46.72       |

|                                                                                                                                                            |  |                                                                                                                                               |  |                                                                                                                                   |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------|--|
| <b>MISCELLANEOUS:</b><br>Ø = 60.0 min<br>tn = 24 points<br>σ = 2.5 min                                                                                     |  | <b>NOZZLE &amp; PROBE:</b><br>Dn = 0.310 in<br>An = 0.0755 in <sup>2</sup><br>Cp = 0.846                                                      |  | <b>METER BOX PARAMETERS:</b><br>ΔH@ = 2.7254<br>Y = 0.9782<br>Box ID = D-337                                                      |  |
| <b>PRESSURES:</b><br>Pbar = 29.46 in Hg<br>Pg = -0.38 in H <sub>2</sub> O<br>Silica gel(yes/no) = yes<br>Vpw @ ts = 58.63 in Hg<br>Vpw @ ti = 0.0000 in Hg |  | <b>VOLUME:</b><br>start leak rate = 0.010 cfm<br>Pass/Fail PASS<br>final leak rate = 0.000 cfm<br>Pass/Fail PASS<br>Vm 51.167 ft <sup>3</sup> |  | <b>TEMPERATURES:</b><br>t1 corr = 0.40 °F<br>t2 corr = 0.10 °F<br>tm = 88 °F<br>ts = 248 °F<br>ti = 51 °F                         |  |
| <b>STACK PARAMETERS:</b><br>circular (yes/no) = yes<br>Ds = 3.48 f t<br>Length = N/A f t<br>As = 9.51 ft <sup>2</sup>                                      |  | <b>LAB DATA:</b><br>mn(front) = 0.02492 g<br>mn(back) = 0.08385 g<br>mn(total) = 0.10877 g<br>Vlc 461.69 ml                                   |  | <b>STACK GAS MEASUREMENTS:</b><br>CO <sub>2</sub> = 3.20 %<br>O <sub>2</sub> = 17.40 %<br>CO = 0.00 %<br>N <sub>2</sub> = 79.40 % |  |

†† The stack has 2-5 inch ports, so we had to adapt a impinger train support at the site, because we do not have 5"-3" scale down untrail port adapters. Our impinger train support forced me to combine points 12 & 11 on the east port. We could sample all the points on the south port.

**TEMPERATURES:**

|     |                                                  |        |
|-----|--------------------------------------------------|--------|
| 01) | $ts = (\sum ts(n))/total\ n's$                   | 248 °F |
| 02) | $Ts = ts + 460$                                  | 708 °R |
| 03) | $tm = (\sum \{(t_1(n) + t_2(n))/2\})/total\ n's$ | 88 °F  |
| 04) | $Tm = (t_1 + t_2)/2 + 460$                       | 548 °R |
| 05) | $ti = (\sum ti(n))/total\ n's$                   | 51 °F  |
| 06) | $Tstd$                                           | 528 °R |

**PRESSURES:**

|     |                                                                 |                           |
|-----|-----------------------------------------------------------------|---------------------------|
| 07) | $Pbar = \{(P @ S.L.) + [ft. above S.L. * (-0.1 in Hg/100ft)]\}$ | 29.46 in Hg               |
| 08) | $Pg = \text{read from pressure sensing device}$                 | -0.38 in H <sub>2</sub> O |
| 09) | $Ps = Pbar + (Pg/13.6)$                                         | 29.43 in Hg               |
| 10) | $\Delta H$                                                      | 3.45 in H <sub>2</sub> O  |
| 11) | $Pm = Pbar + (\Delta H/13.6)$                                   | 29.71 in Hg               |
| 12) | $Pstd$                                                          | 29.92 in Hg               |

**VOLUME:**

|     |                                                                             |                                    |
|-----|-----------------------------------------------------------------------------|------------------------------------|
| 13) | $Vm = Vm(end) - Vm(begin)$                                                  | 51.167 ft <sup>3</sup>             |
| 14) | $Y$                                                                         | 0.9782                             |
| 15) | $Vm' = Vm * Y$                                                              | 50.052 ft <sup>3</sup>             |
| 16) | $Vpw @ ti = \text{from appendix}$                                           | 0.0000                             |
| 17) | $corr\ Vwm = \{[(Vm * Vpw @ imp / Ps) * Pm * Tstd] / (Tm * Pstd)\}$         | 0.0000 ft <sup>3</sup>             |
| 18) | $Vm\ std = \{[Vm * (Tstd / Tm) * (Pm / Pstd)] - corr\ Vwm\}$                | 47.894 ft <sup>3</sup>             |
| 19) | $Vlc = (\sum \text{Volume of impingers})$                                   | 461.69 ml                          |
| 20) | $\partial$                                                                  | 0.002201 lb/ml                     |
| 21) | $R$                                                                         | 21.85 Hg-ft <sup>3</sup> /°R-lb-mo |
| 22) | $MwH_2O$                                                                    | 18.00 g/g-mo                       |
| 23) | $Vw\ std = \{[(Vlc * \partial * R * Tstd) / (Pstd * MwH_2O)] + corr\ Vwm\}$ | 21.7918 ft <sup>3</sup>            |

**CALCULATIONS:****MOISTURE-**

|     |                                                  |             |
|-----|--------------------------------------------------|-------------|
| 24) | $Bws(1) = (Vw\ std) / (Vw\ std + Vm\ std) * 100$ | 31.27 %     |
| 25) | $Vpw @ ts = \text{from appendix}$                | 58.63 in Hg |
| 26) | $Bws(2) = [(Vpw @ ts) / Ps] * 100$               | 199.20 %    |
| 27) | $Bws = \text{lower value of equation 24 or 26}$  | 31.27 %     |

**MOLECULAR WEIGHT-**

|     |                                                                                 |                |
|-----|---------------------------------------------------------------------------------|----------------|
| 28) | $\%O_2$                                                                         | 17.40 %        |
| 29) | $\%CO_2$                                                                        | 3.20 %         |
| 30) | $\%N_2 + \text{inerts} + \%CO$                                                  | 79.40 %        |
| 31) | $Md = [0.440(\%CO_2)] + [0.320(\%O_2)] + [0.280(\%N_2 + \text{inerts} + \%CO)]$ | 29.21 g/g*mole |
| 32) | $Ms = Md * (1 - Bws) + 18.0 * (Bws)$                                            | 25.70 g/g*mole |

**FLOW-**

|     |                                                        |                           |
|-----|--------------------------------------------------------|---------------------------|
| 33) | $\Delta P$                                             | 0.445 in H <sub>2</sub> O |
| 34) | $Cp$                                                   | 0.846                     |
| 35) | $vs = 85.49 * Cp * [(Ts * \Delta P) / (Ps * Ms)]^{.5}$ | 46.719 ft/s               |
| 36) | $As = 3.14 * [(Ds)^2 / 4]$                             | 9.51 ft <sup>2</sup>      |
| 37) | $Qs = (vs) * As * 60$                                  | 2.66E+04 acfm             |
| 38) | $Qstd = 17.64 * Qs * (1 - Bws) * Ps / Ts$              | 1.34E+04 dscfm            |

**EMISSIONS-****FRONT HALF**

|     |                                                 |                   |
|-----|-------------------------------------------------|-------------------|
| 39) | $mn\ (front)$                                   | 0.02492 g         |
| 40) | $Cs\ (front) = 15.43 * mn(front) / Vm\ std$     | 0.0080            |
| 41) | $E\ (front) = (0.00857) * (Qstd) * Cs\ (front)$ | 0.008 grains/dscf |
|     |                                                 | 0.92 lbs/hr       |

**BACK HALF**

|     |                                                               |                   |
|-----|---------------------------------------------------------------|-------------------|
| 42) | $mn\ (back)$                                                  | 0.08385 g         |
| 43) | $Cs(back) = 15.43 * mn(back) / Vm = (12 / \%CO_2) * Cs(back)$ | 0.0270            |
| 44) | $E\ (back) = (0.00857) * (Qstd) * Cs\ (back)$                 | 0.027 grains/dscf |
|     |                                                               | 3.11 lbs/hr       |

**TOTAL**

|     |                                                                  |                   |
|-----|------------------------------------------------------------------|-------------------|
| 45) | $mn\ (total) = mn(front) + mn(back)$                             | 0.10877 g         |
| 46) | $Cs(total) = 15.43 * mn(total) / Vm = (12 / \%CO_2) * Cs(total)$ | 0.0350            |
| 47) | $E\ (total) = (0.00857) * (Qstd) * Cs\ (total)$                  | 0.035 grains/dscf |
|     |                                                                  | 4.03 lbs/hr       |

**ISOKINETICS:**

|     |                                                           |                        |
|-----|-----------------------------------------------------------|------------------------|
| 48) | $An = 3.14 * [(Dn)^2 / 4]$                                | 0.0755 in <sup>2</sup> |
| 49) | $Is = .09450 * (Ts * Vm\ std) / Ps * vs * An * (1 - Bws)$ | 107.88 % = 108 %       |

# APPENDIX

SAN DIEGO AIR POLLUTION CONTROL DISTRICT, 9150 CHESAPEAKE DRIVE, SAN DIEGO, CA 92123

## LABORATORY ANALYSIS OF PARTICULATE TEST

TEST SITE: Calmat-Pala  
Pala Indian Reservation  
Pala, CA 92059

|                                 |           |                     |
|---------------------------------|-----------|---------------------|
| TEST # 91301.0                  | P.O.# 117 | TEST DATE: 10/28/91 |
| LAB ANALYSIS BY: David N. Shina | <i>DM</i> | DATE: 11/6/91       |
| LAB REPORT BY: David N. Shina   | <i>DM</i> | DATE: 11/6/91       |
| REVIEWED BY: Linda Twaddle      |           | DATE:               |

**(1) IMPINGER VOLUMES**

| FINAL WEIGHT          | INITIAL WEIGHT | NET WEIGHT           |
|-----------------------|----------------|----------------------|
| # 1 807.96 g          | 552.38 g       | 255.58 g             |
| # 2 720.19 g          | 540.67 g       | 179.52 g             |
| # 3 469.17 g          | 458.16 g       | 11.01 g              |
| # 4 450.59 g          | 447.45 g       | 3.14 g               |
| SILICA GEL CONTAINER: |                |                      |
| # 5 828.87 g          | 816.43 g       | 12.44 g              |
|                       |                | Tot. Vol. = 461.69 g |

**(2) BLANKS**

$$STD = Net\ Wgt(solv) / Tot.\ Vol(solv.\ used)$$
**ACETONE:****VOLUMES:**

BKR ID = 91101  
Initial = 200.00 ml  
tot. Rinses = 30.00 ml  
Tot. Vol = 230.00 ml

**WEIGHTS:**

final = 29.1612 g  
initial = 29.1599 g  
net = 0.0013 g

LIMIT: 0.001% = 10 ppm = 0.000010g/ml

STD = 5.65217E-06 g/ml

0.000565 %

= 5.65 ppm

The Blank

**PASSED****WATER:****VOLUMES:**

BKR ID = 91127  
Initial = 200.00 ml  
tot. Rinses = 30.00 ml  
Tot. Vol = 230.00 ml

**WEIGHTS:**

final = 29.9974 g  
initial = 29.9968 g  
net = 0.0006 g

LIMIT: 4ppm = 4mg/L = 0.000004g/ml

STD = 2.60870E-06 g/ml

0.000261 %

2.61 ppm

The Blank

**PASSED****ORGANIC:****VOLUMES:**

BKR ID =  
Initial = ml  
tot. Rinses = ml  
Tot. Vol = 0.00 ml

**WEIGHTS:**

final = g  
initial = g  
net = 0.0000 g

LIMIT: 0.001% = 10 ppm = 0.000010g/ml

STD = N/A g/ml

N/A %

N/A ppm

The Blank

**N/A**



**(3) WEIGHT****FRONT HALF**

WEIGHT (uncorrected):

**ACETONE**
 BKR ID= 91114  
 final= 29.1280 g  
 initial= 29.1235 g

Wgt. Ac= 0.0045 g

VOLUME:

 Initial= 120.00 ml  
 tot. rinses= 30.00 ml  
 Sep funnel= 0.00 ml

Tot. Vol= 150.00 ml

WEIGHT FROM SOLVENT:

Total Vol \* Acetone STD = 0.000848 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.003652 g

WEIGHT (uncorrected):

**WATER:**
 BKR ID= 91126  
 final= 28.5938 g  
 initial= 28.5716 g

Wgt. Water= 0.0220 g

VOLUMES:

 Initial= 250.00 ml  
 tot. Rinses= 30.00 ml

Tot. Vol = 280.00 ml

WEIGHT FROM SOLVENT:

Total Vol \* Water STD = 0.000730 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt. from solvent= 0.021270 g

WEIGHT (uncorrected):

**ORGANIC:**
 BKR ID= \_\_\_\_\_  
 final= \_\_\_\_\_ g  
 initial= \_\_\_\_\_ g

Wgt. Org= 0.0000 g

VOLUMES:

tot. Rinses= \_\_\_\_\_ ml

Tot. Vol= 0.00 ml

WEIGHT FROM SOLVENT:

Total Vol \* Organic STD = N/A g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= N/A g

WEIGHT:

**FILTERS:**
 ID No.= \_\_\_\_\_  
 final= \_\_\_\_\_ g  
 initial= \_\_\_\_\_ g

Wgt. Filter= 0.0000 g

**BACK HALF**

WEIGHT (uncorrected):

**ACETONE**
 BKR ID= 91103  
 final= 29.2957 g  
 initial= 29.2921 g

Wgt. Ac.= 0.0036 g

VOLUME:

 Initial= 150.00 ml  
 tot. Rinses= 30.00 ml  
 Sep. funnel= 0.00 ml

Tot. Vol= 180.00 ml

WEIGHT FROM SOLVENT:

Total Vol \* Acetone STD = 0.001017 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.002583 g

WEIGHT (uncorrected):

**WATER:**
 BKR ID= 91051  
 final= 49.5703 g  
 initial= 49.4876 g

Wgt. Water= 0.0827 g

VOLUMES:

 Initial= 350.00 ml  
 tot. Rinses= 40.00 ml

Imp. charge= 197.53 ml Tot. Vol= 587.53 ml

WEIGHT FROM SOLVENT:

Total Vol \* Water STD = 0.001533 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.081167 g

WEIGHT (uncorrected):

**ORGANIC:**
 BKR ID= \_\_\_\_\_  
 final= \_\_\_\_\_ g  
 initial= \_\_\_\_\_ g

Wgt. Org= 0.0000 g

VOLUMES:

tot. Rinses= \_\_\_\_\_ ml

Tot. Vol= 0.00 ml

WEIGHT FROM SOLVENT:

Total Vol \* Organic STD = N/A g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= N/A g

WEIGHT:

**FILTERS:**
 ID No.= 89065  
 final= 1.5966 g  
 initial= 1.5965 g

Wgt. Filter= 0.0001 g

PARTICULATE COLLECTED (front half):

ΣWgt corrected + Wgt filter= mn (front)= 0.02492 g

PARTICULATE COLLECTED (back half):

ΣWgt corrected + Wgt filter= mn (back)= 0.08385 g

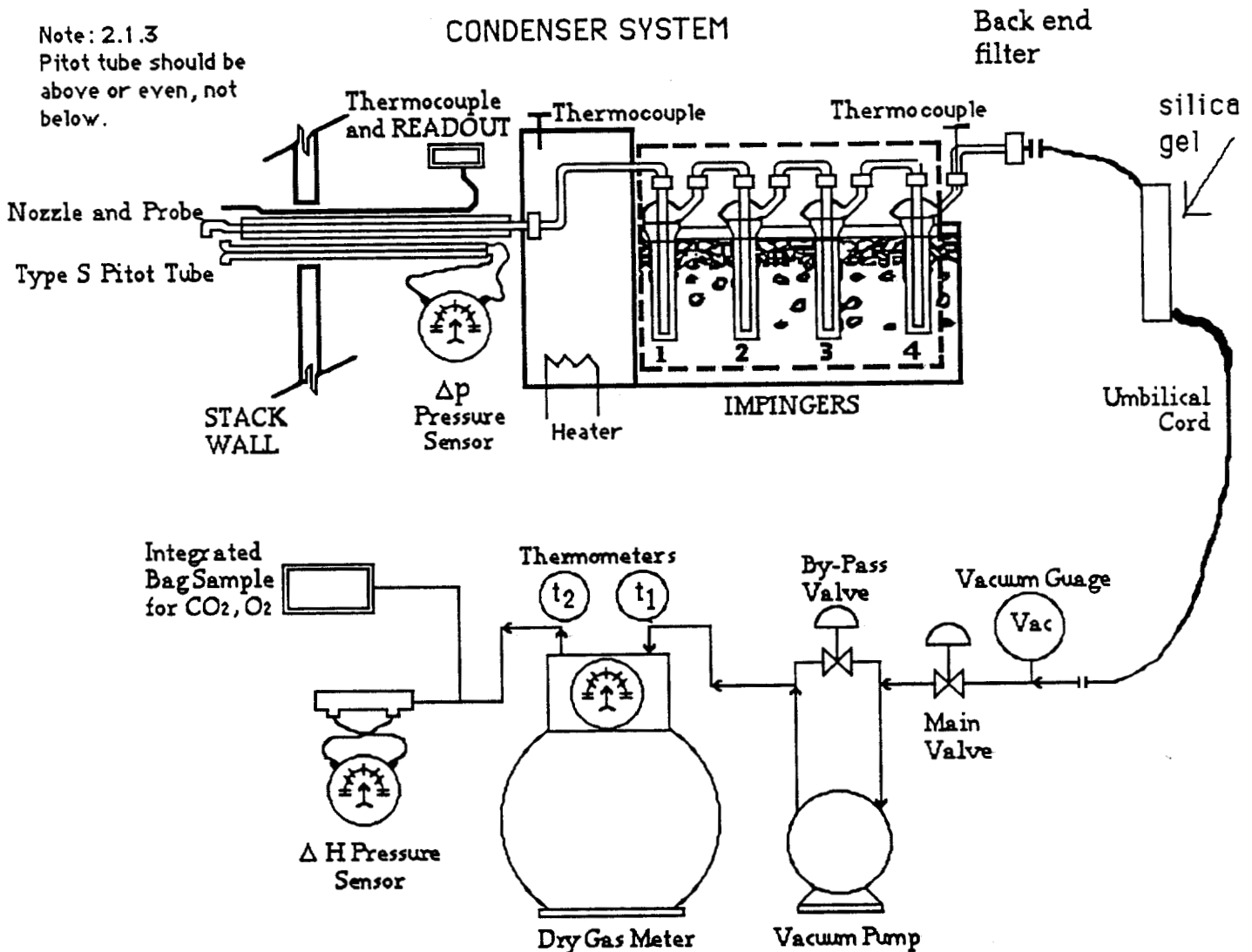
TOTAL PARTICULATE COLLECTED:

mn(front) + mn(back) = 0.10877 g

# SAN DIEGO COUNTY AIR POLLUTION CONTROL DISTRICT

## FIGURE 1

### CONDENSER SYSTEM



### LEGEND

No. 1 Mod- 100 ML Deionized Water  
 No. 2 Std - 100 ML Deionized Water  
 No. 3 Mod- Dry  
 No. 4 Mod- Dry  
  
 Mod - Modified Type Greenburg-Smith  
 Std - Standard Type " "

### FIELD DATA ABBREVIATIONS

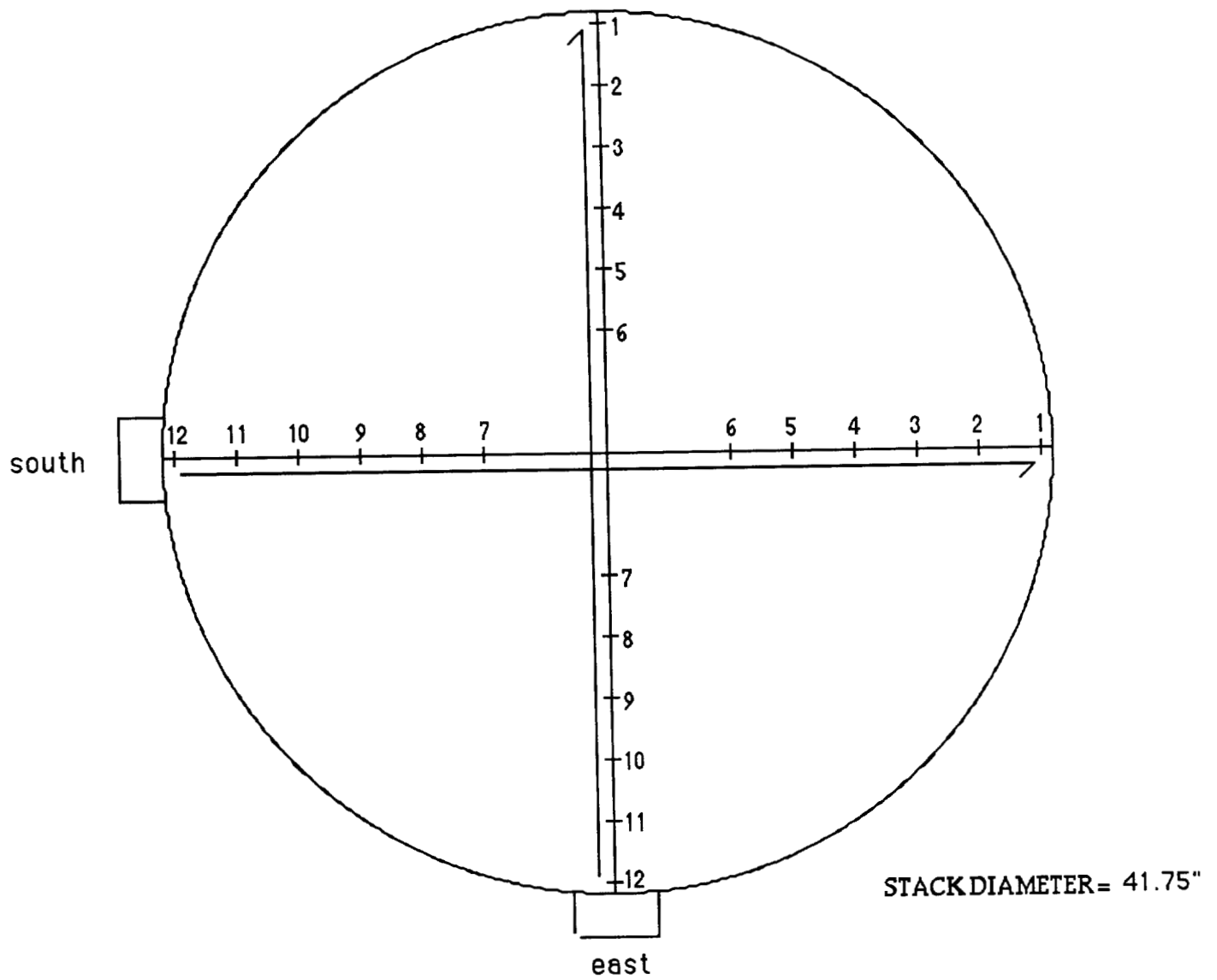
PT = Point Number  
 T<sub>s</sub> = Stack Temperature  
 Δp = Pitot Tube Pressure Differential; in H<sub>2</sub>O  
 V<sub>s</sub> = Stack Velocity, fps  
 ΔH = Orifice Meter Pressure Drop, in H<sub>2</sub>O  
 t<sub>1</sub> = Meter Inlet Temperature, °F  
 t<sub>2</sub> = Meter Outlet Temperature, °F  
 P<sub>m</sub> = Pump Vacuum, in Hg  
 t<sub>i</sub> = Impinger Temperature  
 P<sub>bar</sub> = Barometric Pressure

FIGURE 1 : PARTICULATE MATTER SAMPLING TRAIN

# SAN DIEGO COUNTY AIR POLLUTION CONTROL DISTRICT

CALMAT-PALA

TRAVERSE POINTS



| POINT | DISTANCE (inches) |
|-------|-------------------|
| 1)    | 2.1               |
| 2)    | 6.7               |
| 3)    | 11.8              |
| 4)    | 17.7              |
| 5)    | 25.0              |
| 6)    | 35.6              |
| 7)    | 64.4              |
| 8)    | 75.0              |
| 9)    | 82.3              |
| 10)   | 88.2              |
| 11)   | 93.3              |
| 12)   | 97.9              |

FIGURE 2

Figure 3

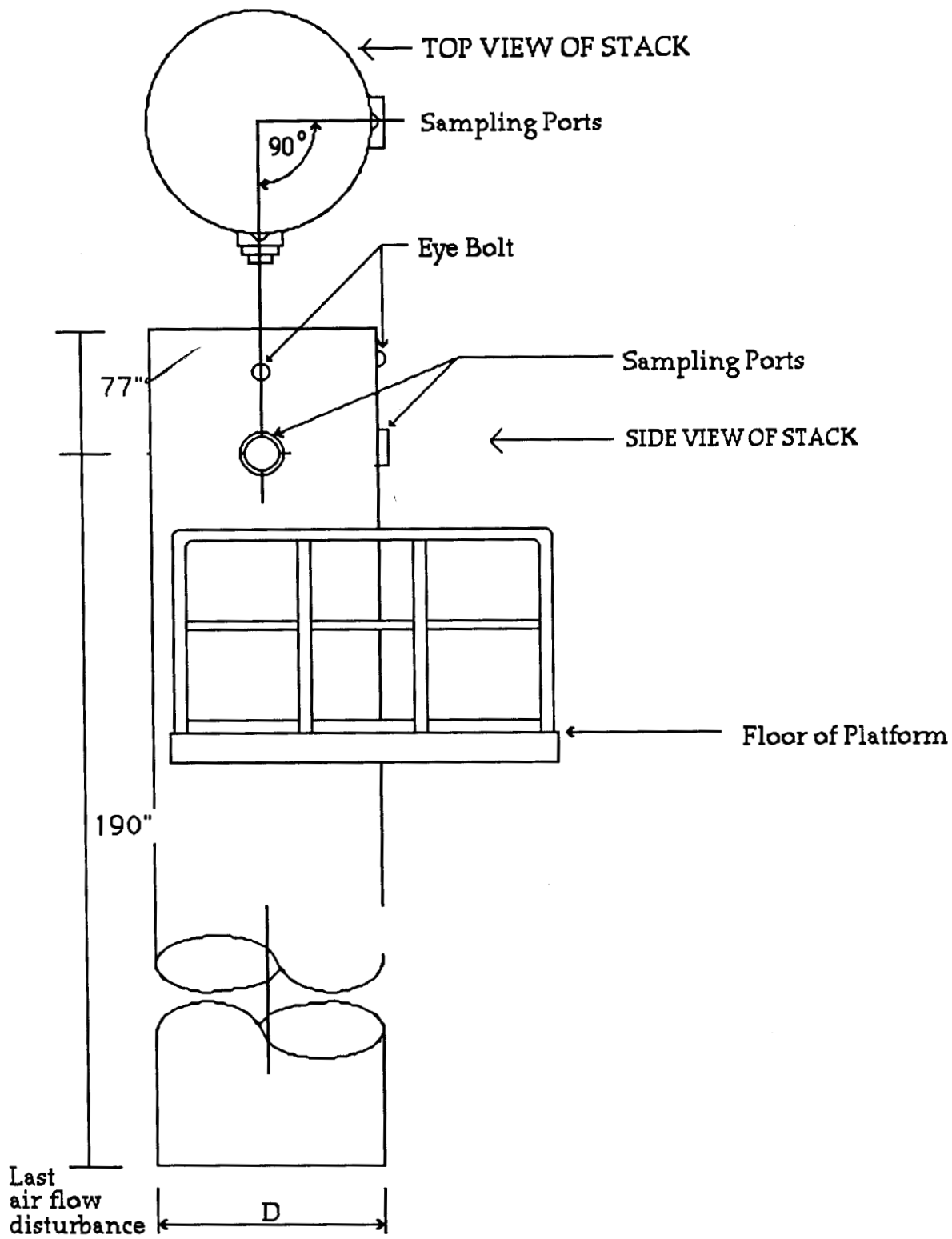


Figure 3

# NOMENCLATURE

| symbol      | units           | explanation                                                           | equation                                                                |
|-------------|-----------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>A</b>    |                 |                                                                       |                                                                         |
| An          | in <sup>2</sup> | nozzle area                                                           | $\pi/4((Dn)^2)$                                                         |
| As          | ft <sup>2</sup> | stack area                                                            | $\pi/4((Ds)^2)$ or LxW                                                  |
| <b>B</b>    |                 |                                                                       |                                                                         |
| Bws(1)      | %               | fractional stack gas moisture-equ 1                                   | $((Vw \text{ std})/(Vw \text{ std}+Vm \text{ std}))100$                 |
| Bws(2)      | %               | fractional stack gas moisture-equ 2                                   | $((Vpw @ ts)/Ps)100$                                                    |
| Bws         | %               | water vapor in the gas stream                                         | lower of Bws(1) and Bws(2)                                              |
| <b>C</b>    |                 |                                                                       |                                                                         |
| C12         | gr/dscf         | corr for grain loading at 12% CO2                                     | $(12*Cs)/(\%CO2)$                                                       |
| CO          | %               | carbon monoxide                                                       | read from measuring device(0 for Asphalt plants)                        |
| CO2         | %               | carbon dioxide                                                        | read from measuring device                                              |
| Corr Vwm    | ft <sup>3</sup> | correction for Vw w/o silica gel                                      | $((Vm*(Vpw@ti)/Ps)*Pm*Tsstd)/$<br>$(Tm*Psstd)$                          |
| Cp          | none            | pilot tube correction factor                                          | see EPA method 3                                                        |
| Cs(front)   | gr/dscf         | concentration of particulate in stack gas, corrected to STP-for front | $(15.43*mn(front))/(Vm \text{ std})$                                    |
| Cs(back)    | gr/dscf         | concentration of particulate in stack gas, corrected to STP-for back  | $(15.43*mn(back))/(Vm \text{ std})$                                     |
| Cs(total)   | gr/dscf         | concentration of particulate in stack gas, corrected to STP-for total | $(15.43*mn(total))/(Vm \text{ std})$                                    |
| <b>D</b>    |                 |                                                                       |                                                                         |
| d (density) | lb/ml           | density of water at STP                                               | 0.002201 (see CRC)                                                      |
| Ds          | in or ft        | stack diameter                                                        | measure at site                                                         |
| Dn          | in              | nozzle diameter                                                       | avg of at least three measurements                                      |
| <b>E</b>    |                 |                                                                       |                                                                         |
| E.A.        | %               | Excess air (for combustion)                                           | $((\%O2-\%CO)*100)/$<br>$(.264*\%N2-\%O2-.5*\%CO)$                      |
| E(front)    | lbs/hr          | part. emissions rate-front                                            | $(0.00857)(Qsd*Cs(front))$                                              |
| E(back)     | lbs/hr          | part. emissions rate-back                                             | $(0.00857)(Qsd*Cs(back))$                                               |
| E(total)    | lbs/hr          | part. emissions rate-total                                            | $(0.00857)(Qsd*Cs(total))$                                              |
| <b>H</b>    |                 |                                                                       |                                                                         |
| ΔH          | in H2O          | average differential pressure across the orifice meter                | avg of the readings from the pressure measuring device                  |
| ΔH@         | none            | orifice pressure differential at STP                                  | see EPA Method 5 Appendix                                               |
| <b>I</b>    |                 |                                                                       |                                                                         |
| I           | %               | isokinetics                                                           | $[0.09450*Ts*Vm \text{ std}]/$<br>$[Ps*vs*\phi*(An/144)*(1-(Bws/100))]$ |
| <b>M</b>    |                 |                                                                       |                                                                         |
| Md          | g/g-mole        | dry stack gas molecular wgt                                           | $0.44(\%CO2)+0.320(\%O2)+0.280$<br>$(\%N2+inerts+CO)$                   |
| mn(back)    | g               | particulate in impingers                                              | measurement from lab analysis                                           |
| mn(front)   | g               | particulate in nozzle & probe                                         | measurement from lab analysis                                           |
| mn(total)   | g               | total particulate collected                                           | measurement from lab analysis                                           |
| Ms          | g/g-mole        | wet stack gas molecular wgt                                           | $Md(1-Bws)+18.0(Bws)$                                                   |
| MW CO2      | g/mole          | mo. wgt of carbon dioxide                                             | 44 (see periodic table)                                                 |
| MW N2       | g/mole          | mo. wgt of nitrogen                                                   | 28 (see periodic table)                                                 |
| MW O2       | g/mole          | mo. wgt of oxygen                                                     | 32 (see periodic table)                                                 |
| MW H2O      | g/mole          | mo. wgt of water                                                      | 18 (see periodic table)                                                 |
| <b>N</b>    |                 |                                                                       |                                                                         |
| N2          | %               | percent nitrogen                                                      | $100-(\%CO2+\%O2+\%CO+inerts)$                                          |
| <b>O</b>    |                 |                                                                       |                                                                         |
| O2          | %               | percent oxygen                                                        | read from measuring device                                              |

## NOMENCLATURE (cont.)

## NOMENCLATURE (concl.)

| symbol                 | units                           | explanation                                                       | equation                                                                                          |
|------------------------|---------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>P</b>               |                                 |                                                                   |                                                                                                   |
| $\Delta P$             | in H <sub>2</sub> O             | pilot diff. press.-velocity head of stack gas                     | read from measuring device                                                                        |
| $P_{bar}$              | in Hg                           | barometric pressure at sampling pt.                               | read from press measuring device                                                                  |
| $\pi(pi)$              | none                            | the ratio of the circumference of a circle to its diameter        | 3.14165 (see CRC)                                                                                 |
| $P_m$                  | in Hg                           | absolute meter pressure                                           | $P_{bar} + (\Delta H / 13.6)$                                                                     |
| $P_s$                  | in Hg                           | absolute stack pressure                                           | $P_{bar} + (P_{static} / 13.6)$                                                                   |
| $P_g$                  | in H <sub>2</sub> O             | static pressure of stack                                          | read from pressure sensing device                                                                 |
| $P_{std}$              | in Hg                           | press at std conditions (29.92)                                   | see CFR                                                                                           |
| <b>Q</b>               |                                 |                                                                   |                                                                                                   |
| $Q_s$                  | acfm                            | flow rate                                                         | $vs \cdot A_o \cdot 60$                                                                           |
| $Q_{std}$              | dscfm                           | dry volumetric stack gas flow rate, corrected to STP              | $17.64 \cdot Q_s (1 - B_{ws}) \cdot (P_s / T_s)$                                                  |
| <b>R</b>               |                                 |                                                                   |                                                                                                   |
| $R$                    | in Hg-ft <sup>3</sup> /°R-lb-mo | ideal gas constant                                                | 21.85 (see CRC)                                                                                   |
| <b>S</b>               |                                 |                                                                   |                                                                                                   |
| S.L.                   | none                            | Sea Level                                                         | read from a relief map                                                                            |
| <b>T</b>               |                                 |                                                                   |                                                                                                   |
| $t_1$                  | °F                              | dry gas meter inlet temp, uncorrected                             | read from temp sensing device                                                                     |
| $t_2$                  | °F                              | dry gas meter outlet temp, uncorrected                            | read from temp sensing device                                                                     |
| $t_1 \text{ corr}$     | °F                              | dry gas meter outlet temp, corrected                              | $t_1 + \text{temperature correction}$                                                             |
| $t_2 \text{ corr}$     | °F                              | dry gas meter outlet temp, corrected                              | $t_2 + \text{temperature correction}$                                                             |
| $\theta(\text{theta})$ | min                             | sampling time/point                                               | $\theta / t_n$                                                                                    |
| $\Theta(\text{Theta})$ | min                             | total sampling time                                               | none                                                                                              |
| $t_i$                  | °F                              | impinger outlet temp                                              | read from temp sensing device                                                                     |
| $t_m$                  | °F                              | dry gas meter temp in F                                           | $(t_1 + t_2) / 2$                                                                                 |
| $T_m$                  | °R                              | dry gas meter temp in R                                           | $t_m + 460$                                                                                       |
| $t_n$                  | none                            | $t_1$ number or traverse pts                                      | summation of the traverse points                                                                  |
| $t_s$                  | °F                              | stack temp in F                                                   | read from temp sensing device                                                                     |
| $T_s$                  | °R                              | stack temp in R                                                   | $t_s + 460$                                                                                       |
| $T_{std}$              | °R                              | temp at std conditions (528)                                      | see CFR                                                                                           |
| <b>V</b>               |                                 |                                                                   |                                                                                                   |
| $V_{lc}$               | ml                              | water collected from impingers and the silica gel (if applicable) | from lab analysis                                                                                 |
| $V_m$                  | ft <sup>3</sup>                 | sample gas volume, uncorrected                                    | read from dry gas meter                                                                           |
| $V_m'$                 | ft <sup>3</sup>                 | sample gas volume, corrected                                      | $V_m \cdot Y$                                                                                     |
| $V_m \text{ std}$      | ft <sup>3</sup>                 | volume of gas sample by the dry gas meter, corrected to STP       | $((V_m' \cdot T_{std}) / P_m) / ((P_{std} \cdot T_m) - \text{corr } V_m)$                         |
| $V_{pw@ts}$            | in Hg                           | vapor pressure of water at $t_s$                                  | see CRC water vapor press. tables                                                                 |
| $V_{pw@ti}$            | in Hg                           | vapor pressure of water at $t_i$                                  | see CRC water vapor press. tables                                                                 |
| $vs$                   | ft/sec                          | stack gas velocity                                                | $85.49 \cdot C_p ((T_s \cdot \Delta P) / (P_s \cdot M_s))^{0.5}$                                  |
| $V_w \text{ std}$      | ft <sup>3</sup>                 | Vol. of water vapor in gas sample, corrected to STP               | $(V_{lc} \cdot \partial \cdot R \cdot T_{std}) / (P_{std} \cdot MW_{H_2O}) + \text{corr } V_{wm}$ |
| <b>Y</b>               |                                 |                                                                   |                                                                                                   |
| $Y$                    | none                            | dry gas meter calibration factor                                  | see CFR 40, parts 53-60                                                                           |

## Conversion Factors

(multiply by the number)

|          |                                                                  |                                             |                                   |
|----------|------------------------------------------------------------------|---------------------------------------------|-----------------------------------|
| 0.002669 | in Hg-ft <sup>3</sup> /°R-ml                                     | conversion to get in Hg-ft <sup>3</sup> /R  | see CRC                           |
| 0.00857  | lb/gr-min/hr                                                     | conv from gr/min to lb/hr                   | see Lange's Handbook of Chemistry |
| 0.04707  | ft <sup>3</sup> /ml                                              | conversion from ml to ft <sup>3</sup>       | see Lange's Handbook of Chemistry |
| 15.43    | gr/g                                                             | conversion from g to gr                     | see Lange's Handbook of Chemistry |
| 85.49    | (ft/sec)-(lb-in Hg/lb-mo-°R-in H <sub>2</sub> O)) <sup>0.5</sup> | conversion factor to get velocity in ft/sec | see CRC                           |

(divide by the number)

|      |                                  |                                                    |         |
|------|----------------------------------|----------------------------------------------------|---------|
| 144  | in <sup>2</sup> /ft <sup>2</sup> | conversion from in <sup>2</sup> to ft <sup>2</sup> | see CRC |
| 13.6 | in H <sub>2</sub> O/in Hg        | conversion from in H <sub>2</sub> O to in Hg       | see CRC |

(add to the number)

|     |       |                        |         |
|-----|-------|------------------------|---------|
| 460 | °R/°F | conversion from F to R | see CRC |
|-----|-------|------------------------|---------|

# Mechanical Engineering Source Test Report Permit Renewal Test

Engineer: Earnest Davis  
Test: Particulate Matter  
P.O. no.: 0017  
Test Start Time: 7:45

Test Date: 10/28/91  
Source: Industrial Asphalt  
Highway 76 Pala CA 92059  
Test Stop Time: 8:15

Equipment Description: Hot-mix Asphalt Batch Plant

## I Asphalt Production Data

| <u>Bin #</u> | <u>MATERIAL NAME</u>      | <u>TONS @ 8.33</u> | <u>TONS @ 8.59</u> | <u>Prod. Rate TPH</u> |
|--------------|---------------------------|--------------------|--------------------|-----------------------|
| AG1          | Sand & Rock Dust          | 267.73             | 320.48             | 121.73                |
| AG2          | 3/8" Rock                 | 214.95             | 255.50             | 93.58                 |
| AG3          | 1/2" Rock                 | 58.01              | 68.93              | 25.20                 |
| AG4          | 3/4" Rock                 | 0.00               | 0.00               | 0.00                  |
| AG5          | Filler                    | 0.00               | 0.00               | 0.00                  |
| AC1          | Asphalt Oil AR4000        | 62520              | 75168              | 29187                 |
| <u>AC2</u>   | <u>Asphalt Oil AR8000</u> | <u>0.00</u>        | <u>0.00</u>        | <u>0.00</u>           |
| Total        |                           | 63060.69           | 75812.91           | 29427.51              |

## II. Asphalt Composition for 1 Ton Batch

| <u>Bin #</u> | <u>Material</u>       | <u>3/8"</u> | <u>3/4"</u> | <u>Berm</u> | <u>1/2"</u> | <u>Sheet</u> |
|--------------|-----------------------|-------------|-------------|-------------|-------------|--------------|
| AG1          | Sand & Dust           | 1146 lb.s   | 778 lb.s    | 1138 lb.s   | 908 lb.s    | 1816 lb.s    |
| AG2          | 3/8" Rock             | 714         | 474         | 710         | 756         |              |
| AG3          | 1/2" Rock             | 0.00        | 380         |             | 209         |              |
| AG4          | 3/4" Rock             | 0.00        | 247         |             |             |              |
| AC5          | Filler                | 20.00       | 19          | 20          | 19          | 20           |
| AC1          | Alt Oil AR4000        | 120.00      | 102         |             | 108         | 164          |
| <u>AC2</u>   | <u>Alt Oil AR8000</u> | <u>0.00</u> | <u>0.00</u> | <u>132</u>  | <u>0.00</u> | <u>0 lbs</u> |
| Total        |                       | 2000 lbs    | 2000 lbs    | 2000 lbs    | 2000 lbs    | 2000 lbs     |

### III Summary of Data

Average production Rate : 240.50 TPH (excluding asphalt oil)

Material Temperature °F:  $309 \pm 7^*$

Baghouse Pressure "H<sub>2</sub>O:  $4.8 \pm 0.1$

Exhaust Ammeter Amps :  $75 \pm 0$

Fuel type: diesel

Fuel rate: 4.1 GPM

Burner Position (range): 80% to 85%\*

Visible emissions (% opacity):

Baghouse exhaust stack : 0%

Rotary aft dryer seal : 0%\*\*

Rotary forward dryer seal : 10% ( generated intermittently)

Truck drop area : 20%  $\pm 10$  per drop ; blue smoke; less than 30 seconds duration per drop

Underground asphalt tank vent: 0% ( no asphalt unloading was witnessed).

---

\*During a 2 minute period of time proceeding an aggregate feed rate readjustment (slowing the throughput), the material temperature reached 327°F as the burner compensated with a corresponding minimum burner position of 29%.

\*\*A gap existed between the burner assembly and the dryer drum ranging from 1 "at the top to 5" at the bottom (of the burner assembly/dryer drum interface). The flame of the burner was clearly visible.



# RAW DATA SHEETS

Dashwood  
10/28/89

P.O. # 117 (1/4)

dulmont Pala  
015  
Test # 91301

CPS

The  $\Delta P_{avg} = .445$  in  $H_2O$  from test

| <u>P<sub>slow</sub></u> | <u>AVG</u> | <u>C<sub>slow</sub></u> |
|-------------------------|------------|-------------------------|
| .310                    | > .3083    | .8427                   |
| .300                    |            |                         |
| .315                    |            |                         |

| <u>P<sub>middle</sub></u> |      | <u>C<sub>middle</sub></u> |
|---------------------------|------|---------------------------|
| .445                      | .445 | $\chi$                    |

| <u>P<sub>high</sub></u> |         | <u>C<sub>high</sub></u> |
|-------------------------|---------|-------------------------|
| .670                    | > .7033 | .8513                   |
| .760                    |         |                         |
| .680                    |         |                         |

$$\frac{.445 - .3083}{.7033 - .3083} = \frac{\chi - .8427}{.8513 - .8427}$$

$$\frac{.1367}{.3950} = \frac{\chi - .8427}{.0086} ; .3461 = \frac{\chi - .8427}{.0086}$$

$$.0030 = \chi - .8427 ; \chi = .846$$

Dasham  
10/28/91

P.O. #717

Culmex-P416  
Test # 91301 016

IMMUNAGERS (2/4)

| PRE-TEST                         |     |         |                        |                      |                                 | POST-TEST  |           |          |          |
|----------------------------------|-----|---------|------------------------|----------------------|---------------------------------|------------|-----------|----------|----------|
| DATE                             | IMP | WGT IMP | IMP + H <sub>2</sub> O | WGT H <sub>2</sub> O | IMP + H <sub>2</sub> O + INSERT | DATE       | WGT (all) | NET GAIN | COMMENTS |
| 10/27<br>↓                       | 1   | 325.06  | 423.23                 | 98.17                | 552.38                          | 10/28<br>↓ | 807.96    | 255.58   |          |
|                                  | 2   | 312.75  | 412.11                 | 99.36                | 540.07                          |            | 720.19    | 174.52   |          |
|                                  | 3   | -       | -                      | -                    | 458.16                          |            | 464.17    | 11.01    |          |
|                                  | 4   | -       | -                      | -                    | 447.45                          |            | 450.54    | 3.14     |          |
|                                  | 5   | -       | -                      | -                    | 816.43                          |            | 828.87    | 12.44    |          |
| Imp. Vol. = 19553 147.53 TOTAL = |     |         |                        |                      |                                 |            |           | 461.69   |          |

### WEIGHTS

| DOE   | Beaker # | INIT WGT | WGT 1<br>11/4, 2pm | WGT 2<br>1/5, 10am | WGT 3<br>1/6, 9am | WGT 4 | COMMENTS     | FINAL   |
|-------|----------|----------|--------------------|--------------------|-------------------|-------|--------------|---------|
| ai    | 89065    | 1.5965   | 1.5968             | 1.5966             | 1.5966            |       | white        | 1.5966  |
| Ba Ac | 91103    | 29.2421  | 29.2439            | 29.55              | 29.57             |       | clear        | 29.2457 |
| Ba Wa | 91061    | 49.4873  | 49.5702            | 5703               | 5703              |       | black ppt    | 49.5703 |
| Fr Ac | 91114    | 29.1235  | 29.1282            | .1280              | .1280             |       | zone br. ppt | 29.1280 |
| Fr Wa | 91126    | 28.5718  | 28.5939            | .5938              | .5938             |       | tan ppt      | 28.5738 |
| BL Ac | 91101    | 29.1599  | 29.1613            | .1613              | .1612             |       | clear        | 29.1612 |
| BL Wa | 91127    | 29.9968  | 29.9976            | .9974              | .9974             |       | clear        | 29.9974 |

### GAS

| DATE  | Trial 1<br>g, % | Trial 2<br>g, % | Trial 3<br>g, % | cal # | cal gas | Avg  | COMMENTS | GAS             |
|-------|-----------------|-----------------|-----------------|-------|---------|------|----------|-----------------|
| 10/28 | 3.2             | 3.2             | 3.2             | 24.9  | 52      | 3.2  |          | CO <sub>2</sub> |
| 10/28 | 17.4            | 17.4            | 17.4            | 20.8  | -       | 17.4 |          | O <sub>2</sub>  |

### SOLVENTS

Acetone: Omnisolve, EMSCIENCE  
\*\*H650AXO1160012, Lot # 9132

Sushu

10/28/94

P.O. #117

ACETONE (3/4)

cell mat - Pals

TEST # 91301

017

| DATE    | RINSE | VOL | Label | COMMENTS |
|---------|-------|-----|-------|----------|
| 10/28   | INIT  | 120 | Fr Ac | clear    |
| 10/29   | 10    | 30  | 91114 |          |
|         | 20    |     |       |          |
| TOTAL = |       |     |       |          |

| DATE    | RINSE | VOL | Label   | COMMENTS |
|---------|-------|-----|---------|----------|
| 10/28   | INIT  | 150 | Back Ac | clear    |
|         | 10    | 30  | 91103   |          |
|         | 20    |     |         |          |
| TOTAL = |       |     |         |          |

| DATE    | RINSE | VOL | Label    | COMMENTS |
|---------|-------|-----|----------|----------|
| 10/28   | INIT  | 200 | Blank Ac |          |
|         | 10    | 30  | 91101    |          |
|         | 20    |     |          |          |
| TOTAL = |       |     |          |          |

Dustin  
10/28/91

P.O. #117  
WATER (H/H)

COE/MCH-DE/9  
018  
TEST # 91301

| DATE   | RUSE | VOL | LABEL               | COMMENTS |
|--------|------|-----|---------------------|----------|
| 10/28  | INIT | 250 | FR H <sub>2</sub> O |          |
| 10/29  | 10   | 30  | 91126               | Brown    |
|        | 20   |     |                     |          |
| TOTAL= |      |     |                     |          |

| DATE   | RUSE | VOL | LABEL                     | COMMENTS |
|--------|------|-----|---------------------------|----------|
| 10/28  | INIT | 350 | Back H <sub>2</sub> O     |          |
| 11/1   | 10   | 40  | 91061<br><del>91127</del> |          |
|        | 20   |     |                           |          |
| TOTAL= |      |     |                           |          |

| DATE   | RUSE | VOL | LABEL       |  |
|--------|------|-----|-------------|--|
| 10/28  | INIT | 200 | Blank Water |  |
|        | 10   | 30  | 91127       |  |
|        | 20   |     |             |  |
| TOTAL= |      |     |             |  |

## BAROMETRIC PRESSURE REQUEST

SITE: Calmat - Pala

TEST#: 91301

P.O.# 0117

DATE: 10/24/91

TO: HAZ  
Tom / Don

OF: Met

DATE: 10/24

FROM: David S.

OF: MIS

DATE: 10/24

ADDRESS: Calmat Co. Highway 76  
7mi E of I-15

Pala Indian Reservation

TEST DATE: 10/28/91

TEST TIME: 6am - 12pm

I need the usual hourly breakdown

GRADE LEVEL: 550 Feet above MSL

+ - Feet above Grade

ALTITUDE: 550 Feet above MSL

### CALCULATIONS:

06 - 29.43" Hg  
07 - 29.44"  
08 - 29.46"  
09 - 29.46"  
10 - 29.44"  
11 - 29.42"  
12 - 29.40"

7:30 - 9:00

$29.45 + 29.46 + 29.46 = 29.46$

SIGNATURE: [Signature]

DATE: 10/28/91

TIME: 1240 PST

# METHOD 5 EQUIPMENT CHECKLIST

## MISCELLANEOUS

- \_\_\_\_\_ Camera & film
- \_\_\_\_\_ Ice chest
- \_\_\_\_\_ Ice
- \_\_\_\_\_ 3 Tedlar bags
- \_\_\_\_\_ Duct tape

## TOOL BOX

- \_\_\_\_\_ Assorted monkey wrenches
- \_\_\_\_\_ Assorted open-end wrenches
- \_\_\_\_\_ Assorted screwdrivers
- \_\_\_\_\_ 3' pipe wrench
- \_\_\_\_\_ Port (wire) brush
- \_\_\_\_\_ Tape measure

## SAFETY

- \_\_\_\_\_ First aid box
- \_\_\_\_\_ Hard hat
- \_\_\_\_\_ Ear plugs
- \_\_\_\_\_ Safety shoes
- \_\_\_\_\_ Safety cones

## LAB/FIELD EQUIPMENT

- \_\_\_\_\_ Acetone
- \_\_\_\_\_ Foil
- \_\_\_\_\_ Parafilm
- \_\_\_\_\_ Distilled water
- \_\_\_\_\_ Kimwipes
- \_\_\_\_\_ Vac. grease
- \_\_\_\_\_ 100 ml graduated cylinder
- \_\_\_\_\_ Sample collection bottles
- \_\_\_\_\_ Nozzle brush
- \_\_\_\_\_ Probe brush

## CALCULATION EQUIPMENT

- \_\_\_\_\_ Source Test brief case
- \_\_\_\_\_ Calibration notebook
- \_\_\_\_\_ Stopwatch
- \_\_\_\_\_ Nomograph
- \_\_\_\_\_ Calculator
- \_\_\_\_\_ Assorted pens
- \_\_\_\_\_ Tape measure
- \_\_\_\_\_ White out (2 bottles)
- \_\_\_\_\_ Labels
- \_\_\_\_\_ Scissors
- \_\_\_\_\_ Teflon tape
- \_\_\_\_\_ L/S Box fuses

## SAMPLING EQUIPMENT (main)

- \_\_\_\_\_ L/S Box
- \_\_\_\_\_ Pitot tube leak test equipment
- \_\_\_\_\_ Thermocouple read-out
- \_\_\_\_\_ Electrical cords (50' & 100')
- \_\_\_\_\_ Umbilical cord
- \_\_\_\_\_ Cold/Hot box
- \_\_\_\_\_ Impingers (Impingers 1-4)
- \_\_\_\_\_ Imp-imp connections
- \_\_\_\_\_ Imp-probe connections
- \_\_\_\_\_ Spare set of both sets of connections
- \_\_\_\_\_ 100ml of water in 1st 2 impingers
- \_\_\_\_\_ Impinger clips
- \_\_\_\_\_ Silica gel impinger with vac. adapter
- \_\_\_\_\_ Filter & Filter holder
- \_\_\_\_\_ Spare filter & filter holder
- \_\_\_\_\_ Heating coil
- \_\_\_\_\_ Probe
- \_\_\_\_\_ Spare probe
- \_\_\_\_\_ Nozzle box (selection of nozzles & nuts)

## SAMPLING EQUIPMENT (reserve)

- \_\_\_\_\_ L/S Box
- \_\_\_\_\_ Pitot tube leak test equipment
- \_\_\_\_\_ Umbilical cord
- \_\_\_\_\_ Cold/Hot box
- \_\_\_\_\_ Impingers (Impingers 1-4)
- \_\_\_\_\_ Imp-imp connections
- \_\_\_\_\_ Imp-probe connections
- \_\_\_\_\_ 100ml of water in 1st 2 impingers
- \_\_\_\_\_ Impinger clips
- \_\_\_\_\_ Silica gel impinger with vac. adapter
- \_\_\_\_\_ Filter & Filter holder
- \_\_\_\_\_ Heating coil

## STACK EQUIPMENT

- \_\_\_\_\_ Unirail
- \_\_\_\_\_ Port/nipple adapters
- \_\_\_\_\_ 2 C-clamps
- \_\_\_\_\_ 2 unirails with rollers
- \_\_\_\_\_ Chains
- \_\_\_\_\_ 2 nylon straps
- \_\_\_\_\_ Rope (25' and 50')
- \_\_\_\_\_ Pail
- \_\_\_\_\_ Gloves (leather)
- \_\_\_\_\_ Gloves (heat resistant)
- \_\_\_\_\_ Rags and diapers

# EQUIPMENT DATA SHEET

SITE: Calmat Pal TEST#: 91301 P.O.# 117 DATE: 10/28/91

## EQUIPMENT CHECK:

### MAIN:

|                   | TYPE       | ID#    | SIZE  | UNITS               | CLEANED | CHECKED | CAL. DATE |
|-------------------|------------|--------|-------|---------------------|---------|---------|-----------|
| Nozzle Dia.       | Napp       |        | 1.310 | in                  | DW      | GDS     | 6/91      |
| Pitot Tube        | Napp       | SU-7   | 5     | ft                  | DW      | GDS     | 6/91      |
| Tedlar Bag        | SLC        | Calmat |       |                     | DW      | DW      | —         |
| L/S Box           | Dapp       | D337   | —     | —                   | —       | —       | 6/91      |
| Stack Temp Sensor | Omega      | N/A    | —     | —                   | —       | —       | 6/91      |
| Box Temp Sensor   | Omega      | N/A    | —     | —                   | —       | —       | 6/91      |
| Imp. Temp Sensor  | Omega      | N/A    | —     | —                   | —       | —       | 6/91      |
| ΔP Sensor         | Dwyer      | —      | 0-5   | in H <sub>2</sub> O | —       | —       | 6/91      |
| ΔH Sensor         | Dwyer      | —      | 0-5   | in H <sub>2</sub> O | —       | —       | 6/91      |
| Cold Box          | Napp       | Blue 4 | —     | —                   | —       | —       | —         |
| Hot Box           | Napp       | Blue 4 | —     | —                   | —       | —       | —         |
| Thermoc. Display  | on L/S box | —      | —     | —                   | —       | —       | —         |

### RESERVE

|                   |               |  |  |  |  |  |  |
|-------------------|---------------|--|--|--|--|--|--|
| Nozzle Dia.       |               |  |  |  |  |  |  |
| Pitot Tube        |               |  |  |  |  |  |  |
| Tedlar Bag        |               |  |  |  |  |  |  |
| L/S Box           | Same as above |  |  |  |  |  |  |
| Stack Temp Sensor |               |  |  |  |  |  |  |
| Box Temp Sensor   |               |  |  |  |  |  |  |
| Imp. Temp Sensor  |               |  |  |  |  |  |  |
| ΔP Sensor         |               |  |  |  |  |  |  |
| ΔH Sensor         |               |  |  |  |  |  |  |
| Cold Box          |               |  |  |  |  |  |  |
| Hot Box           |               |  |  |  |  |  |  |
| Thermoc. Display  |               |  |  |  |  |  |  |

SIGNATURE: DW

DATE: 10/27/91

TIME: \_\_\_\_\_



# LAB DATA SHEET

SITE Calmet-Pala TEST#:            P.O.#: 117 DATE: 10/28

COLD BOX#: Free <sup>Blue 4</sup> HOT BOX#: Blue 4

## PRE TEST MEASUREMENTS POST-TEST

| DATE  | A<br>IMP<br>No. | B<br>TRAP(w/o H2O)<br>grams | C<br>TRAP (w/ H2O)<br>grams | D<br>water<br>(C-B) grams | E<br>INSERT+ H2O<br>grams | DATE  | F<br>IMPINGER+H2O<br>grams | G<br>H2O COLLECTED<br>(F-E) grams |
|-------|-----------------|-----------------------------|-----------------------------|---------------------------|---------------------------|-------|----------------------------|-----------------------------------|
| 10/27 | 1               | 325.06 g                    | 423.23 g                    | 98.17 g                   | 552.38 g                  | 10/28 | 807.96 g                   | 255.58 g                          |
|       | 2               | 312.75 g                    | 412.11 g                    | 99.36 g                   | 540.67 g                  |       | 720.19 g                   | 179.52 g                          |
|       | 3               |                             |                             | — g                       | 58.16 g                   |       | 464.17 g                   | 11.01 g                           |
|       | 4               |                             |                             | — g                       | 447.45 g                  |       | 450.59 g                   | 3.14 g                            |
|       | 5               |                             | 816.43 g                    | — g                       | 616.43 g                  |       | 828.87 g                   | 12.44 g                           |
|       |                 |                             |                             |                           |                           |       |                            |                                   |

197.53

TTL WGT GAIN  
FROM IMP (ΣG) 464.67 g

5N7

PreTest : SIGNATURE: 10/27/91 LMC DATE: 12 pm TIME:             
PostTest: SIGNATURE: Dushine DATE: 10/28 TIME: 1:30

## GAS ANALYSIS

| DATE | TRIAL | INSTRUMENT | RANGE | GAS | PERCENT |
|------|-------|------------|-------|-----|---------|
|      | 1     |            |       | CO2 | 3.2 %   |
|      | 2     |            |       | CO2 | 3.2 %   |
|      | 3     |            |       | CO2 | 3.2 %   |
|      | AVG   |            |       | CO2 | %       |
|      | 1     |            |       | O2  | 17.4 %  |
|      | 2     |            |       | O2  | 17.4 %  |
|      | 3     |            |       | O2  | 17.4 %  |
|      | AVG   |            |       | O2  | %       |

## FILTER DATA

| VARIABLE       | WEIGHTS      |
|----------------|--------------|
| (1) ID #       | <u>89065</u> |
| (2) PRETEST    |              |
| (3) POST-TEST  |              |
| REC. AMT (3-2) |              |

1.5907

cal # 24.9  
51490 calgas CO2

PreTest : SIGNATURE: Du DATE: 10/27 TIME: 12 pm  
PostTest: SIGNATURE: Dushine DATE: 10/28 TIME: 1:30

## Yc METER CHECK

SITE: Calmat - Pole TEST#: P.O#: #117 Date: 10/17

P bar = 29.41 in Hg    L/S Box = 0.337     $\Delta H@ =$  2.2254    Tl corr = 1.4 °F

$$Y = \underline{.4782} \quad 0.97 * Y = \underline{.4649} \quad 1.03 * Y = \underline{.4925} \quad T2 \text{ corr} = \underline{+1}^{\circ}\text{F}$$
$$Y_c = (5 \text{ min/Vm}) * \{[(0.0319 * T_m)/Pb]^{0.5}\} \text{ run L/S box at } \Delta H @ \text{ for 5 minutes}$$

## PRE-TEST 5 MINUTE Y CHECK

|            | Volume                 | t1 (unc) | t1 (corr) | t2 (unc) | t2 (corr) | (t1(c)+t2(c))/2 |
|------------|------------------------|----------|-----------|----------|-----------|-----------------|
| initial(i) | 496.892 t <sup>3</sup> | 66 °F    | 66.4 °F   | 91.5 °F  | 91.6 °F   | 79 °F           |

|          |        |                 |       |         |        |          |          |
|----------|--------|-----------------|-------|---------|--------|----------|----------|
| final(f) | 500.84 | ft <sup>3</sup> | 68 °F | 68.4 °F | 107 °F | 107.1 °F | 87.75 °F |
|----------|--------|-----------------|-------|---------|--------|----------|----------|

$$V_m = \frac{V_m(f) - V_m(i)}{3.949} \text{ ft}^3$$
$$t_m = \frac{(t_{avg-i} + t_{avg-f})}{2} = \frac{t_m + 460}{2} \text{ } ^\circ R / ^\circ F$$
$$Y_c = (5 \text{ min} / \frac{3.949}{\mu\text{m}} \text{ ft}^3) * [((.0319 * \frac{543.38^\circ\text{R}}{T_m}) / \frac{29.41}{P_{\text{bar}}} \text{ in Hg})^{0.5}] = .9720$$
$$0.97 \cdot Y < Y_c < 1.03 \cdot Y = \underline{.9489} < \underline{.9720} < \underline{1.0075} \quad \text{PASS} \quad \text{FAIL}$$

SIGNATURE: [Signature] DATE: 10/27 TIME: 12:50

## POST-TEST 5 MINUTE Y CHECK

|            | Volume                  | t1 (unc) | t1 (corr) | t2 (unc) | t2 (corr) | (t1(c)+t2(c))/2 |
|------------|-------------------------|----------|-----------|----------|-----------|-----------------|
| initial(i) | 562.012 ft <sup>3</sup> | 74 °F    | 74.4 °F   | 102 °F   | 102.1 °F  | 88.25 °F        |

|          |                         |       |         |          |          |         |
|----------|-------------------------|-------|---------|----------|----------|---------|
| final(f) | 565.863 ft <sup>3</sup> | 77 °F | 77.4 °F | 113.5 °F | 113.6 °F | 95.5 °F |
|----------|-------------------------|-------|---------|----------|----------|---------|

$$V_m = \frac{V_m(f) - V_m(i)}{3.851 \text{ ft}^3}$$
$$t_m = \frac{(t_{avg-i} + t_{avg-f})/2}{tm + 460 \text{ } ^\circ R / ^\circ F} = \frac{91.8 \text{ } ^\circ F}{551.88 \text{ } ^\circ R}$$
$$Y_c = (5 \text{ min} / \frac{7.851}{\mu m}) * [((.0319 * \frac{551.88}{T_m} \text{ } ^\circ R) / \frac{29.41}{P_{bar}} \text{ in Hg})^{0.5}] = 1.0045$$

$0.97*Y < Y_c < 1.03*Y = \underline{1.4489} < \underline{1.0045} < \underline{1.0075}$  (PASS) FAIL

10/28

2:15

# Nomograph Calculations

TEST #:

Cellulose Pulp

DATE:

10/28

SITE

91301

P.O. #

117

Pm, absolute

29.53

Ps, absolute

29.43

Tm, absolute

85

ΔH@ across meter

2.725H

% moisture

20%

correction factor

1.150

Ts, absolute

245

ΔP stack

.2755 = .40

ideal nozzle diam

~~.264~~ .264

nozzle used

.310

test differential pressure

1.85 / .24 = 7.71

~~500~~

500

1.6887

72.6

24

= 3 min / pt

50

1.8451

59.10

24

= 2.4 min / pt

2.5 min / pt

**PIT** (AP end) - (AP start) = (AP calc = 0 to Pass): (15 sec. min.)  
in H2O in H2O in H2O

PRE(+): 3.3 - 3.3 - 0 in 15 sec (P) F

PRE(-): 2.7 - 2.7 - 0 in 15 sec (P) F

POST(+): 3.1 - 3.1 - 0 in 15 sec (P) F

POST(-): 2.1 - 2.1 - 0 in 15 sec (P) F

**VAC** (Vend) - (Vstart) = (Vcalc = 0.02 cfm) @ (vac) in 1 min  
ft³ ft³ ft³ in. Hg.

PRE: 505.584 - 505.584 - 0.01 @ 15 in 1 min (P) F

POST: 558.888 - 558.888 - 0.0 @ 9 in 1 min P F

OPER: \_\_\_\_\_

T1 corr: +1.4 °F T2 corr: 7.1 °F

Pbar \_\_\_\_\_ in Hg Ds: 3.48 ft

Ps: -1.38 in H2O T amb: UNK °F

Probe ID: \_\_\_\_\_ L/S box: 0.337

Probe len: 5 ft ΔH@: 2.7254

Cp: \_\_\_\_\_ Y: 478.2

Dn: 1.310 in C. box: \_\_\_\_\_

**K = 7.71**      time/pt = 3.5 min

| TRA<br>PT<br>NO | SAMPLING<br>TIME<br>min | GAS METER<br>ft³, Vm<br>Vm | PRESS DIFF<br>ACROSS PIT<br>TUBES, in H2O<br>ΔP | PRESS DIFF. ACROSS<br>THE ORIFICE, in H2O<br>ΔH |        | STACK<br>TEMP, °F<br>°F | BOX<br>TEMP, °F<br>°F | IMPINGER<br>TEMP, °F<br>°F | DRY GAS<br>TEMP, °F |                | PUMP<br>VAC<br>in. Hg | CLOCK<br>TIME<br>Hr:min |
|-----------------|-------------------------|----------------------------|-------------------------------------------------|-------------------------------------------------|--------|-------------------------|-----------------------|----------------------------|---------------------|----------------|-----------------------|-------------------------|
|                 |                         |                            |                                                 | DESIRED                                         | ACTUAL |                         |                       |                            | INLET<br>(T1)       | OUTLET<br>(T2) |                       |                         |
|                 |                         | <u>506.861</u>             |                                                 |                                                 |        |                         |                       |                            |                     |                |                       | <u>7:45</u> start       |
| 1               | 25                      | 508.041                    | .35                                             | 2.69                                            | 2.7    | 247                     |                       | 50                         | 66                  | 82             | 3                     |                         |
| 2               | 50                      | 509.885                    | .35                                             | 2.69                                            | 2.7    | 249                     | 106                   | 48                         | 64                  | 84             | 3                     |                         |
| 3               | 7.5                     | 511.975                    | .39                                             | 3.00                                            | 3.0    | 254                     | 181                   | 40                         | 65                  | 98             | 4                     |                         |
| 4               | 10.0                    | 514.123                    | .42                                             | 3.2                                             | 3.2    | 254                     |                       | 51                         | 66                  | 100            | 5                     |                         |
| 5               | 12.5                    | 516.443                    | .45                                             | 3.47                                            | 3.5    | 256                     | 237                   | 50                         | 67                  | 102            | 7                     |                         |
| 6               | 15                      | 518.802                    | .47                                             | 3.62                                            | 3.6    | 258                     | 260                   | 58                         | 67                  | 104            | 7                     |                         |
| 7               | 17.5                    | 521.325                    | .52                                             | 4.00                                            | 4.0    | 259                     | 285                   |                            | 68                  | 105            | 8                     |                         |
| 8               | 20                      | 523.682                    | .52                                             | 4                                               | 4      | 260                     | 301                   | 61                         | 69                  | 106            | 6.5                   |                         |
| 9               | 22.5                    | 525.932                    | .51                                             | 3.4                                             | 3.4    | 258                     | 304                   | 59                         | 69.5                | 107            | 6                     |                         |
| 10              | 25                      | 528.232                    | .52                                             | 4                                               | 4      | 255                     | 316                   | 56                         | 70                  | 108            | 6                     |                         |
| 11              | 27.5                    | 530.458                    | .47                                             | 3.62                                            | 3.6    | 255                     | 324                   | 55                         | 70                  | 108            | 5.5                   |                         |
| 12              | 30                      | 532.630                    | .47                                             | 3.62                                            | 3.6    | 254                     | 331                   | 54                         | 71                  | 109            | 5.5                   | 8:15 stop               |
|                 |                         |                            |                                                 |                                                 |        |                         |                       |                            |                     |                |                       |                         |
| 1               | 2.5                     | 534.569                    | .25                                             | 1.9                                             | 1.9    | 149                     | 188                   | 53                         | 74                  | 71             | 4                     | 8:27 start              |
| 2               | 5.0                     | 536.650                    | .37                                             | 2.85                                            | 2.4    | 190                     | 226                   | 48                         | 74                  | 102            | 5                     |                         |
| 3               | 7.5                     | 538.891                    | .42                                             | 3.2                                             | 3.2    | 242                     | 246                   | 47                         | 73                  | 106            | 5                     |                         |
| 4               | 10.0                    | 541.010                    | .45                                             | 3.46                                            | 3.5    | 259                     | 278                   | 46                         | 73                  | 108            | 5.5                   |                         |
| 5               | 12.5                    | 543.325                    | .50                                             | 3.85                                            | 3.9    | 260                     | 299                   | 47                         | 74                  | 110            | 6                     |                         |
| 6               | 15                      | 545.562                    | .50                                             | 3.85                                            | 3.9    | 261                     | 311                   | 47                         | 74                  | 110            | 6                     |                         |
| 7               | 17.5                    | 547.849                    | .51                                             | 3.9                                             | 3.9    | 260                     | 316                   | 48                         | 74                  | 111            | 6                     |                         |
| 8               | 20                      | 550.134                    | .51                                             | 3.9                                             | 3.9    | 258                     | 308                   | 48                         | 75                  | 112            | 6                     |                         |
| 9               | 22.5                    | 552.372                    | .48                                             | 3.7                                             | 3.7    | 258                     | 310                   | 48                         | 75.5                | 113            | 6                     |                         |
| 10              | 25                      | 554.493                    | .43                                             | 3.3                                             | 3.3    | 257                     | 322                   | 50                         | 76                  | 114            | 5.5                   |                         |
| 11              | 27.5                    | 556.657                    | .46                                             | 3.5                                             | 3.5    | 256                     | 332                   | 50                         | 77                  | 114.5          | 6                     |                         |
| 12              | 30                      | 558.828                    | .43                                             | 3.3                                             | 3.3    | 253                     | 340                   | 51                         | 78                  | 116            | 5.5                   | 8:45                    |

SOURCE TEST OF PARTICULATE EMISSIONS TO THE ATMOSPHERE

TEST SITE: Calmat Pala

TEST #: 91301

P.O.# 117

TEST DATE: 10/28/91

Type of plant (Asphalt / Perlite / Combustion):

asphalt

UNIT TESTED: Asphalt

EQUIPMENT: baghouse

TESTED BY: D. Shina et al

DATE: 10/28/91

SITE PERSONNEL: P. Mason

DATE: 10/28/91

APCD ENGINEER: E. Davis

DATE: 10/28/91

LAB ANALYSIS BY: D. Shina

DATE: 11/6/91

REPORT BY: D. Shina

DATE: 11/6/91

REVIEWED BY: L. Twaddle

DATE:

APPROVED BY:

DATE:

ROBERT YELENOSKY, SENIOR AIR POLLUTION CHEMIST

This report has been reviewed and found to be representative of the testing that was performed.

| TEST                 | PERMIT LIMIT | MEASURED    | PERFORMANCE |
|----------------------|--------------|-------------|-------------|
| RULE 54 DUST & FUMES | 40 lbs/hr    | 4.03 lbs/hr | PASSED      |

SUMMARY:

| ITEM  | Vm              | Bws   | Cs      | E      | I   | Qstd     | ts  | PROD RATE |
|-------|-----------------|-------|---------|--------|-----|----------|-----|-----------|
| UNITS | ft <sup>3</sup> | %     | gr/dscf | lbs/hr | %   | dscfm    | °F  | tons/hr   |
| VALUE | 51.167          | 31.27 | 0.035   | 4.033  | 108 | 1.34E+04 | 248 | 240.50    |

**SYSTEM DESCRIPTION:**

This asphalt plant combines crushed rock and sand with asphalt oil in batch loads of varying sizes. The rock and sand are heated in a rotary drum to dry them. The exhaust from this dryer is routed through a baghouse and finally to a stack. It is the emissions from this stack that are the subject of this report.

**PROCEDURES:**

The procedures and equipment utilized in these tests are based on EPA New Source Performance Standards Method 5. The sampling train was modified to utilize a back-end filter and 5th impinger filled with silica gel (fig. 1), as outlined by the SDAPCD QA manual.

**CALCULATIONS**

All preliminary assumptions and calculations are based on data obtained from previous tests. All equations are from EPA CFR 40, July 1, 1990, Parts 53-60, Appendix A, Methods 1-5 inclusive.

**PARTICULATE SAMPLING:**

The test consisted of sampling at 32 traverse points, 4 from each of 8 sample ports (fig.2), collected from 18 inches below the stack (fig.3). All field data was transferred to the computer printout. All calculations were done by the computer and the emissions were compared to rule 54 of the SDAPCD.

**ANALYSES:**

Gas: An integrated bag sample was collected during the test and analyzed at the APCD lab.

Particulate: All procedures follow EPA guidelines, except where noted in the SDAPCD QA manual.

**EQUIPMENT:**

All testing and analysis equipment was calibrated according to EPA guidelines.

**Analysis:**

**Collection:**

**Sampling:**

**Temp./Press.:**

CO2-Anarad AR400

Filter-Gelman

L/S Box-Napp

Thermocouples-Omega

O2-Teledyne Ryan 320 P4

Holder-Gelman

Umbilical cord-Napp

Read out-Omega

Macrobalance-Sargent Welch

Beakers-Pyrex

Cold/Hot box-Napp

Barometric-calc. by APCD

Microbalance-Sartorius

Impingers-Ace

Pitot tube-Napp

L/S box-Dwyer magnehelic

ver.4 APCD P/M-ISOS 9/10/91 by DNS

Printed: 11/20/91 @ 3:22 PM Page 1 of 3

??SITE NAME?? on ??TEST DATE??

P.O.#????? TEST #?????

| Trav. Pt | Vm (ft^3) | AP (in H2O) | ΔH (in H2O) | t 1(unc) (°F) | t 2(unc) (°F) | Stack Temp (°F) | Imp Temp (°F) | velocity (ft/sec) |
|----------|-----------|-------------|-------------|---------------|---------------|-----------------|---------------|-------------------|
| 1        | 506.861   | 0.350       | 2.700       | 66.00         | 82.00         | 247.00          | 50            | 41.36             |
| 2        |           | 0.350       | 2.700       | 64.00         | 84.00         | 249.00          | 48            | 41.42             |
| 3        |           | 0.390       | 3.000       | 65.50         | 98.00         | 254.00          | 48            | 43.38             |
| 4        |           | 0.420       | 3.200       | 66.00         | 100.00        | 254.00          | 51            | 45.54             |
| 5        |           | 0.450       | 3.500       | 67.00         | 102.00        | 256.00          | 56            | 47.20             |
| 6        |           | 0.470       | 3.600       | 67.00         | 104.00        | 258.00          | 58            | 48.31             |
| 7        |           | 0.520       | 4.000       | 68.00         | 105.00        | 259.00          | 61            | 50.88             |
| 8        |           | 0.520       | 4.000       | 69.00         | 106.00        | 260.00          | 59            | 50.32             |
| 9        |           | 0.510       | 3.900       | 69.50         | 107.00        | 258.00          | 56            | 50.70             |
| 10       |           | 0.520       | 4.000       | 70.00         | 108.00        | 255.00          | 55            | 48.20             |
| 11       |           | 0.470       | 3.600       | 70.00         | 108.00        | 255.00          | 54            | 48.17             |
| 12       |           | 0.470       | 3.600       | 71.00         | 109.00        | 254.00          | 53            | 32.45             |
| 1        |           | 0.250       | 1.900       | 74.00         | 71.00         | 149.00          | 48            | 40.78             |
| 2        |           | 0.370       | 2.900       | 74.00         | 102.00        | 190.00          | 47            | 45.15             |
| 3        |           | 0.420       | 3.200       | 73.00         | 106.00        | 242.00          | 46            | 47.30             |
| 4        |           | 0.450       | 3.500       | 73.00         | 108.00        | 259.00          | 47            | 49.89             |
| 5        |           | 0.500       | 3.900       | 74.00         | 110.00        | 261.00          | 47            | 49.93             |
| 6        |           | 0.500       | 3.900       | 74.00         | 111.00        | 260.00          | 48            | 50.39             |
| 7        |           | 0.510       | 3.900       | 75.00         | 112.00        | 258.00          | 48            | 50.32             |
| 8        |           | 0.510       | 3.900       | 75.50         | 113.00        | 258.00          | 48            | 48.82             |
| 9        |           | 0.480       | 3.700       | 76.00         | 114.00        | 257.00          | 50            | 46.17             |
| 10       |           | 0.430       | 3.300       | 77.00         | 114.50        | 256.00          | 50            | 47.72             |
| 11       |           | 0.460       | 3.500       | 78.00         | 116.00        | 253.00          | 51            | 46.04             |
| 12       | 558.028   | 0.430       | 3.300       | 78.00         | 116.00        | 253.00          | 51            | 46.04             |

Average:

|           |             |             |          |          |         |         |             |
|-----------|-------------|-------------|----------|----------|---------|---------|-------------|
| Vm (ft^3) | ΔP (in H2O) | ΔH (in H2O) | t 1 (°F) | t 2 (°F) | ts (°F) | tl (°F) | vs (ft/sec) |
| 51.167    | 0.445       | 3.446       | 71.27    | 104.19   | 248     | 51      | 46.74       |

#### MISCELLANEOUS:

Ø = 60.0 min  
tn = 24 points  
ø = 2.5 min

#### NOZZLE & PROBE:

Dn = 0.310 in  
An = 0.0755 in^2  
Cp = 0.846

#### METER BOX PARAMETERS:

ΔH@ = 2.7254  
Y = 0.9782  
Box ID = D 337

#### PRESSURES:

Pbar = 29.46 in Hg  
Pg = -0.38 in H2O  
Silica gel(yes/no): YES  
Vpw @ ts = 58.63 in Hg  
Vpw @ ti = 0.0000 in Hg

#### VOLUME:

start leak rate = 0.010 cfm  
Pass/Fail PASS  
final leak rate = 0.000 cfm  
Pass/Fail PASS  
Vm 51.167 ft^3

#### TEMPERATURES:

t1 corr = 0.40 °F  
t2 corr = 0.10 °F  
tm = 88 °F  
ts = 248 °F  
ti = 51 °F

#### STACK PARAMETERS:

circular (yes/no) YES  
Ds = 3.48 ft  
Length = N/A ft  
As = 9.51 ft^2

#### LAB DATA:

mn(front) = 0.02492 g  
mn(back) = 0.08385 g  
mn(total) = 0.10877 g  
VIC 461.69 ml

#### STACK GAS MEASUREMENTS:

CO2 = 3.20 %  
O2 = 17.40 %  
CO = 0.00 %  
N2 = 79.40 %

??SITE NAME?? on ??TEST DATE??

P.O.#????? TEST #?????

### TEMPERATURES:

- 01)  $ts = (\sum ts(n))/total\ n's$   
02)  $Ts = ts+460$   
03)  $tm = (\sum \{(t_1(n)+t_2(n))/2\}/total\ n's$   
04)  $Tm = (t1+t2)/2 + 460$   
05)  $ti = (\sum ti(n))/total\ n's$   
06)  $Tstd$

248 °F  
708 °R  
88 °F  
548 °R  
51 °F  
528 °R

### PRESSURES:

- 07)  $Pbar = \{(P @ S.L.) + [ft. above S.L. * (-0.1 in Hg/100ft)]\}$   
08)  $Pg =$  read from pressure sensing device  
09)  $Ps = Pbar + (Pg/13.6)$   
10)  $\Delta H$   
11)  $Pm = Pbar + (\Delta H/13.6)$   
12)  $Pstd$

29.46 in Hg  
-0.38 in H<sub>2</sub>O  
29.43 in Hg  
3.44 in H<sub>2</sub>O  
29.71 in Hg  
29.92 in Hg

### VOLUME:

- 13)  $Vm = Vm(end) - Vm(begin)$   
14)  $Y$   
15)  $Vm' = Vm * Y$   
16)  $Vpw @ ti =$  from appendix  
17)  $corr\ Vwm = \{[(Vm * Vpw @ imp / Ps) * Pm * Tstd] / (Tm * Pstd)\}$   
18)  $Vm\ std = \{[Vm * (Tstd / Tm) * (Pm / Pstd)] - corr\ Vwm\}$   
19)  $Vlc = (\sum Volume\ of\ impingers)$   
20)  $\partial$   
21)  $R$   
22)  $MwH_2O$   
23)  $Vw\ std = \{[(Vlc * \partial * R * Tstd) / (Pstd * MwH_2O)] + corr\ Vwm\}$

51.167 ft<sup>3</sup>  
0.9782  
50.052 ft<sup>3</sup>  
0.0000  
0.0000 ft<sup>3</sup>  
47.893 ft<sup>3</sup>  
461.69 ml  
0.002201 lb/ml  
21.85 Hg-ft<sup>3</sup>/°R-lb-mo  
18.00 g/g-mo  
21.7918 ft<sup>3</sup>

### CALCULATIONS:

#### MOISTURE-

- 24)  $Bws(1) = (Vw\ std) / (Vw\ std + Vm\ std) * 100$   
25)  $Vpw @ ts =$  from appendix  
26)  $Bws(2) = [(Vpw @ ts) / Ps] * 100$   
27)  $Bws =$  lower value of equation 24 or 26

31.27 %  
58.63 in Hg  
199.20 %

31.27 %

#### MOLECULAR WEIGHT-

- 28) %O<sub>2</sub>  
29) %CO<sub>2</sub>  
30) %N<sub>2</sub>+inerts+%CO  
31)  $Md = [0.440(\%CO_2)] + [0.320(\%O_2)] + [0.280(\%N_2+inerts+%CO)]$   
32)  $Ms = Md * (1 - Bws) + 18.0 * (Bws)$

17.40 %  
3.20 %  
79.40 %  
29.21 g/g\*mole  
25.70 g/g\*mole

#### FLOW-

- 33)  $\Delta P$   
34)  $Cp$   
35)  $vs = 85.49 * Cp * \{[(Ts * \Delta P) / (Ps * Ms)]^{.5}\}$   
36)  $As = 3.14 * [(Ds)^2 / 4]$   
37)  $Qs = (vs) * As * 60$   
38)  $Qstd = 17.64 * Qs * (1 - Bws) * Ps / Ts$

0.445 in H<sub>2</sub>O  
0.846  
46.741 ft/s  
9.51 ft<sup>2</sup>  
2.67E+04 acfm  
1.34E+04 dscfm

#### EMISSIONS-

##### FRONT HALF

- 39)  $mn$  (front)  
40)  $Cs$  (front) =  $15.43 * mn(front) / Vm\ std$   
41)  $E$  (front) =  $(0.00857) * (Qstd) * Cs$  (front)

0.0080

0.02492 g  
0.008 grains/dscf  
0.92 lbs/hr

##### BACK HALF

- 42)  $mn$  (back)  
43)  $Cs$  (back) =  $15.43 * mn(back) / Vm\ std$   
44)  $E$  (back) =  $(0.00857) * (Qstd) * Cs$  (back)

0.0270

0.08385 g  
0.027 grains/dscf  
3.11 lbs/hr

##### TOTAL

- 45)  $mn$  (total) =  $mn(front) + mn(back)$   
46)  $Cs$  (total) =  $15.43 * mn(total) / Vm\ std$   
47)  $E$  (total) =  $(0.00857) * (Qstd) * Cs$  (total)

0.0350

0.10877 g  
0.035 grains/dscf  
4.03 lbs/hr

### ISOKINETICS:

- 48)  $An = 3.14 * [(Dn)^2 / 4]$   
49)  $I = .09450 (Ts * Vm\ std) / Ps * vs * An * (1 - Bws)$

107.83 % =

0.0755 in<sup>2</sup>  
108 %



?? SITE NAME?? on ??TEST DATE

P.O.#?????? TEST#??????

SAN DIEGO AIR POLLUTION CONTROL DISTRICT, 9150 CHESAPEAKE DRIVE, SAN DIEGO, CA 92123

# LABORATORY ANALYSIS OF PARTICULATE TEST

TEST SITE: Calmat Pala

|                           |           |                     |
|---------------------------|-----------|---------------------|
| TEST # 91301.0            | P.O.# 117 | TEST DATE: 10/28/91 |
| LAB ANALYSIS BY: D. Shina |           | DATE: 11/6/91       |
| LAB REPORT BY: D. Shina   |           | DATE: 11/6/91       |
| REVIEWED BY: L. Twaddle   |           | DATE: 11/20/91      |

## (1) IMPINGER VOLUMES

| FINAL WEIGHT          | INITIAL WEIGHT | NET WEIGHT |                     |
|-----------------------|----------------|------------|---------------------|
| # 1 807.96 g          | - 552.38 g     | = 255.58 g |                     |
| # 2 720.19 g          | - 540.67 g     | = 179.52 g |                     |
| # 3 469.17 g          | - 458.16 g     | = 11.01 g  |                     |
| # 4 450.59 g          | - 447.45 g     | = 3.14 g   |                     |
| SILICA GEL CONTAINER: |                |            |                     |
| # 5 828.87 g          | - 816.43 g     | = 12.44 g  | Tot. Vol.= 461.69 g |

## (2) BLANKS

STD = Net Wgt(solv) / Tot. Vol(solv. used)

### ACETONE:

#### VOLUMES:

BKR ID = 91101  
Initial= 200.00 ml  
tot. Rinses= 30.00 ml  
Tot. Vol= 230.00 ml

#### WEIGHTS:

final= 29.1612 g  
initial= 29.1599 g  
net= 0.0013 g

LIMIT: 0.001% = 10 ppm = 0.000010g/ml

STD = 5.65217E-06 g/ml

0.000565 %

= 5.65 ppm

The Blank PASSED

### WATER:

#### VOLUMES:

BKR ID = 91127  
Initial= 200.00 ml  
tot. Rinses= 30.00 ml  
Tot. Vol= 230.00 ml

#### WEIGHTS:

final= 29.9974 g  
initial= 29.9968 g  
net= 0.0006 g

LIMIT: 4ppm = 4mg/L = 0.000004g/ml

STD = 2.60870E-06 g/ml

0.000261 %

2.61 ppm

The Blank PASSED

### ORGANIC:

#### VOLUMES:

BKR ID =  
Initial= ml  
tot. Rinses= ml  
Tot. Vol= 0.00 ml

#### WEIGHTS:

final= g  
initial= g  
net= 0.0000 g

LIMIT: 0.001% = 10 ppm = 0.000010g/ml

STD = N/A g/ml

N/A %

N/A ppm

The Blank N/A