AP42 Section: 11.1

Reference Number: 46

Title: Report Of Air Pollution Source Testing For Selected Air Toxics At Industrial Asphalt, Wilmington, California,

Engineering-Science, Inc., Irwindale, CA,

August 5, 1992.

REPORT OF AIR POLLUTION SOURCE TESTING FOR SELECTED AIR TOXICS AT INDUSTRIAL ASPHALT WILMINGTON, CALIFORNIA

Conducted On:

April 30 - May 4, 1992

Submitted To:

INDUSTRIAL ASPHALT
3200 San Fernando Road
Los Angeles, California 90065

And

NATIONAL ASPHALT PAVEMENT ASSOCIATION
5100 Forbes Boulevard
NAPA Building
Lanham, Maryland 20706-4413

Submitted On:

August 5, 1992

Submitted By:

ENGINEERING-SCIENCE, INC.
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REPORT OF AIR POLLUTION SOURCE TESTING FOR SELECTED TOXICS AT INDUSTRIAL ASPHALT WILMINGTON, CALIFORNIA

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REPORT OF AIR POLLUTION SOURCE TESTING FOR SELECTED AIR TOXICS AT INDUSTRIAL ASPHALT WILMINGTON, CALIFORNIA

SOURCE TEST INFORMATION

SOURCE OWNER:	Industrial Asphalt 3200 San Fernando Road Los Angeles, California 90065
CONTACT:	Mr. Dwight Beavers 818-781-6080
CLIENT:	National Asphalt Pavement Association NAPA Building 5100 Forbes Blvd. Lanham, Maryland 20706
CONTACT:	Mr. Tom Brumagin 301-731-4748
TEST SITE:	Industrial Asphalt Wilmington, California
CONTACT:	Mr. Terry Prentice 213-834-2655
SOURCE DESCRIPTION:	Baghouse Stack Batch Asphalt Processing
REFERENCE:	Air Toxics "Hot Spots" Information & Assessment Act, AB 2588
SOURCE TEST CONTRACTOR:	Engineering-Science, Inc. 6060 N. Irwindale Ave, Suite J Irwindale, California 91706
CONTACTS:	Mr. Dennis Becvar Mr. Rollie Rosario 818-969-5758
TESTING DATES:	April 30, May 1, May 4, 1992

SECTION 1

INTRODUCTION

REPORT OF AIR POLLUTION SOURCE TESTING FOR SELECTED AIR TOXICS AT INDUSTRIAL ASPHALT, WILMINGTON, CALIFORNIA

SECTION 1
INTRODUCTION

During the period April 30 through May 4, 1992, Engineering-Science, Inc., (ES), of Irwindale, California, conducted air pollution source testing to quantify the mass emission rates of selected air toxics from the baghouse serving the rotary dryer at the Industrial Asphalt (IA) facility in Wilmington, California. The facility is a batch type asphalt plant and operates under Authority-to-Construct granted by the South Coast Air Quality Management District (SCAQMD). Testing was conducted to determine air toxic emissions for use in calculating emission factors for air toxic emissions inventories as required by recent amendments to Title III of the Clean Air Act. The testing program was conducted at the request of the National Asphalt Paving Association (NAPA), and will be used as "pooled source test" data.

A total of three test runs for each pollutant was conducted. Testing was performed to determine mass emission rates of particulate matter (PM), condensible particulate matter (Condensible PM), polycyclic aromatic hydrocarbons (PAH), cresols, formaldehyde (HCHO), and volatile organic compounds (VOC) including methane, benzene, toluenes, ethyl benzene, and xylenes (BTEX). In addition, continuous emissions monitoring (CEM) was conducted to determine concentrations of total hydrocarbons as methane, sulfur dioxide (SO_2), nitrogen oxides (NO_2), carbon monoxide (CO), oxygen (O_2), and carbon dioxide (CO_2).

The testing program was coordinated by Messrs. Dwight Beavers and Terry Prentice of IA. The ES testing team was comprised of Messrs. Rollie Rosario, Mike Edwards, Dwight Wieman, Cory Holt, Cesario Mangaoang, and Rob Pearman. Mr. Tom Brumagin of NAPA assisted in the coordination and planning of the testing program. Also present as observers were Messrs. Don England and Steve Falzarano of ES. IA control room personnel monitored and documented plant operating conditions and throughput.

The actual testing schedule during the testing program was as follows:

April 30, 1992

Run 1 PM
Run 1 Condensible PM
Run 1 PAH & Cresols, start Run 2
Run 1 HCHO
Run 1-3 Methane, BTEX
Run 1 CEM - Hydrocarbons
Run 1 CEM - (SO_2), (NO_2), (CO), (O_2), (CO_2)

May 1, 1992

Run 2 PM
Run 2 Condensible PM
Run 2 PAH & Cresols
Run 2-3 HCHO
Run 4-6 Methane, BTEX
Run 2 CEM - Hydrocarbons
Run 2 CEM - (SO_2), (NO_2), (CO), (O_2), (CO_2)

May 4, 1992

Run 3 PM
Run 3 Condensible PM
Run 3 PAH & Cresols
Run 7-9 Methane, BTEX
Run 3 CEM - TGO
Run 3 CEM - (SO_2), (NO_2), (CO), (O_2), (CO_2)

SECTION 2

PROCESS DESCRIPTION
EMISSION SOURCE INFORMATION

SECTION 2
PROCESS DESCRIPTION AND
EMISSION SOURCE INFORMATION

2.0 Process Description

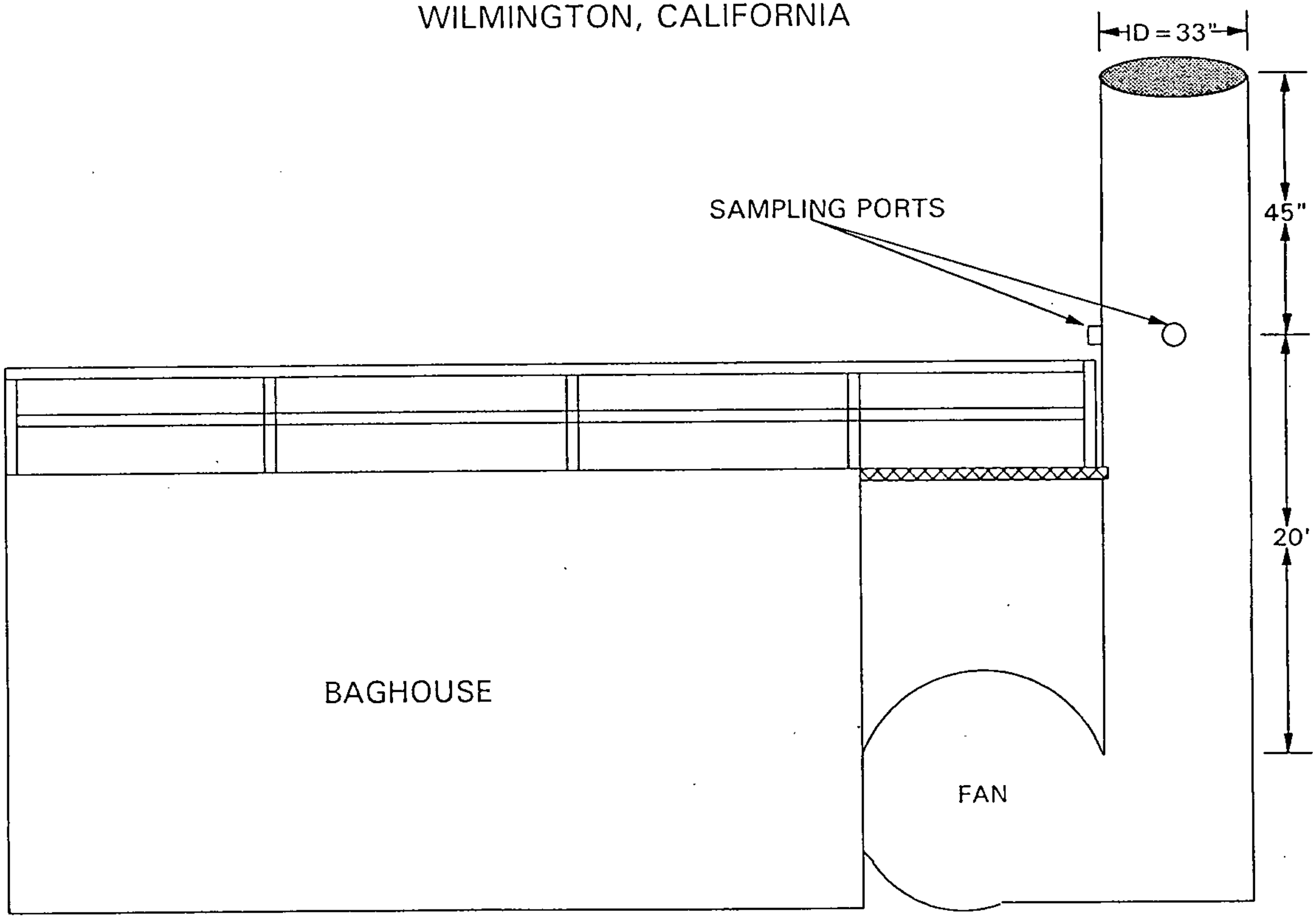
Plant operations at Industrial Asphalt, Wilmington, California involve the drying, sizing, and combining of aggregate with hot asphalt to produce asphalt concrete for use in paving. The batch plant is supplied from aggregate storage bins maintained on-site and heated asphalt delivered by tank transport. The primary source of emissions at the plant are from the rotary aggregate dryer which is vented, via a cyclone and baghouse, to the stack. The final asphalt product is temporarily stored, and then transferred to dump trucks.

2.1 Emission Source Description

The baghouse stack discharge is approximately 25' above grade, with an internal diameter of 33 inches. The sampling ports are located about 45" (> 1 diameter upstream) from the exit to the atmosphere and about 20' (5 diameters downstream) from the nearest flow disturbance. There were only two sampling ports available, and were oriented 90° to each other in the same cross-sectional plane. 12 points for each port were used for a 24 point sampling traverse in accordance with EPA Method 1, "Sample and Velocity Traverses for Stationary Sources". A diagram of the sampling port locations is presented as Figure 2.1-1. A small 1/2" porthole was drilled six inches below the sampling port to accommodate the CEM sample probe.

Figure 2.1-1

LOCATION OF SAMPLING PORTS
INDUSTRIAL ASPHALT
WILMINGTON, CALIFORNIA



NOT TO SCALE

ENGINEERING-SCIENCE, INC.

SECTION 3

METHODOLOGY

SECTION 3
METHODOLOGY

3.0 Introduction

The testing and analytical procedures used for the various parameters are based on U. S. Environmental Protection Agency (EPA), and California Air Resources Board (CARB) approved and published methods. The EPA methodology was used primarily to serve the client requirement for a "national pooled source test".

3.1 Test Methods

Location and Number of Traverse Points (EPA Method 1)

The procedures specified by EPA Method 1, "Sample and Velocity Traverses for Stationary Sources", were followed to determine the number and location of the traverse points to be used for sampling the source. The number of straight run stack diameters (equivalent diameters) upstream and downstream from the sample ports were measured and used to determine the exact number of traverse points required.

Parallel, or non-cyclonic, gas stream flow in the stack was verified using an S-type Pitot tube connected to an inclined oil manometer. The manometer has 0.01 inch gradations on the inclined scale and 0.10 inch gradations on the vertical scale. The Pitot tube was rotated so the planes of the face openings were perpendicular to the stack cross-sectional plane. This is referred to as the 0 degree reference position. A zero manometer reading obtained in this position indicates no cyclonic flow. If the manometer did not read zero, the Pitot tube was rotated until a zero reading was obtained. The angle of rotation was measured to the nearest degree. All traverse points were examined in this fashion. Since the average of the absolute values of the rotation angles were less than 20 degrees, the sampling location was deemed acceptable.

Velocity and Temperature Traverse (EPA METHOD 2)

The procedures delineated by EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (S-Type Pitot Tube)", were followed to determine the stack gas velocity and volumetric flow rate. A preliminary velocity and temperature traverse was conducted from the results of the measurements taken in the preceding section to determine the number and location of traverse points, in order to calculate the diameter of the sampling nozzle required for isokinetic testing. An S-type Pitot tube and K-type thermocouple were positioned at each traverse point and the data recorded. The Pitot tube was connected to an inclined-vertical oil manometer and the thermocouple was connected to an Omega 601 digital temperature readout. The Pitot tube, thermocouple, and readout device were calibrated prior to and after field use.

Stack Gas Molecular Weight Determination (EPA Method 3A)

Oxygen and carbon dioxide concentrations were determined in accordance with EPA Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations from Stationary Sources, (Instrumental Analyzer Procedure)". A continuous emissions monitoring (CEM) system was operated in conjunction with the wet impingement sampling. The gas component concentrations were used to determine the stack gas molecular weight.

Moisture Content (EPA Method 4)

The moisture content of the stack gas was determined in conjunction with the wet impingement isokinetic sampling runs as described in EPA Method 4, "Determination of Moisture Content in Stack Gases". The moisture content for each run was determined volumetrically as the liquid gain in each impinger and gravimetrically as the weight gain in the silica gel impinger.

Particulate Matter (EPA METHOD 5)

The procedures delineated in EPA Method 5, "Determination of Particulate Emissions from Stationary Sources", were followed to determine the particulate matter concentration in the effluent stream. Particulate matter samples were extracted isokinetically from the source and collected on a glass-fiber filter maintained at a temperature range of 248 $\pm$25 ^{o}F. The particulate mass which included any material that condenses at or above the filter temperature, was gravimetrically determined after removal of uncombined water from the filter and collected liquids.

The wet impingement sampling train was comprised of a quartz-glass nozzle and a heated probe connected to four chilled Greenburg-Smith design impingers followed by a vacuum pump, and a calibrated dry gas meter. The nozzle had a sharp, tapered leading edge. The angle of taper was $<30^{\circ}$ on the outer side to preserve a constant internal diameter. The nozzle was of the button hook design, permanently and uniquely identified, then inspected and calibrated before use.

The probe liner was made of quartz-glass and was equipped with a heating system capable of maintaining the temperature of the extracted gas in the range of 248 ±25°F at the probe exit. An S-type Pitot tube and a type K thermocouple were attached to the probe to constantly monitor stack gas velocity and temperature as described in EPA Method 2.

The filter was fiberglass, without organic binder, and exhibiting a collection efficiency of 99.95% (<0.05% penetration) for 0.3-micron dioctyl phthalate. The filter was visually inspected against light for flaws and pinhole leaks, numbered, and tared to constant weight prior to testing. The filter holder was constructed of glass, with a glass frit filter support and was installed in a heated box at the exit end of the sampling probe.

The four impingers were connected in series with leak free glass U-tubes. The first, third, and fourth impingers were modified Greenburg-Smith design with the tip replaced with 1/2 inch ID glass tube extending about 1/2 inch from the flask bottom. The first two impingers each contained 100 mls of distilled, deionized water. The third impinger was empty. The fourth impinger contained approximately 400 grams of indicating silica gel.

A leak check of the entire train assembly was conducted prior to and after each test run. The train was operated in an ice bath in an effort to maintain an exit gas temperature of 68°F or less from the last impinger. The train was operated isokinetically with a sampling time of 3 minutes per traverse point for a total sample time of 72 minutes and a minimum volume of at least 45 dry standard cubic feet.

The train recovery was conducted in a clean and wind-free environment to minimize contamination of, or loss of sample. The probe and filter holder were allowed to cool so they could be safely handled. When the assembly was cool, the nozzle and probe tip were capped off. HPLC grade acetone with a predetermined value of ≤0.001% residue was used as a probe wash solution. A portion of the acetone taken into the field was saved and analyzed as an acetone blank. The liquid gain in the collection impingers was determined volumetrically and the weight gain in the silica gel impinger was determined gravimetrically. The total moisture gain was used to calculate the moisture content of the stack gas.

The recovered fractions were reported as follows: **Front Half** comprised of the filter catch, and probe catch (nozzle included); and **Back Half** comprised of the impinger catch, and the solvent extract (methylene chloride extraction of impinger water). The sample fractions, as applicable, were stored in leak free polyethylene bottles (water) and borosilicate bottles (solvents) with Teflon lined screw caps.

The analysis consisted of particulate weight determination by drydown of each fraction. The respective acetone rinses were dried down at ambient conditions. The water fractions were extracted with methylene chloride. After extraction, the aqueous fraction was dried down at 105 $\pm 2°C$ while the organic fraction was dried down at ambient conditions. The dried fractions were desiccated and weighed to a constant weight. The total weight of all the fractions less the acetone blank and solvent extract weight was reported as total particulate.

Condensible PM (EPA Draft Method 202)

The emission rate of condensible particulate matter was determined using EPA Draft Method 202, "Determination of Condensible Emissions from Stationary Sources", which is very similar to EPA Method 5. The major method modification was an additional impinger charged with 100 ml of deionized water and a gaseous nitrogen purge of the impinger train and final collected contents. The post-test nitrogen purge was set at a rate of 20 lpm for one hour. Analysis of the organic and inorganic fractions of the impinger contents allowed the determination of emissions which condense at temperatures below filter temperature.

The filter and probe catches (**Front Half**) were determined according to EPA 5 procedures. The particulate matter in the impinger catch (**Back Half**) was also analyzed. The back half catch was included as particulate matter. The total back half weight was the sum of the weight of the impinger catch (organic and inorganic) and the weight of the back half acetone rinse. The impinger liquid was extracted with 75 ml portions of methylene chloride. The organic and aqueous phases were fully separated and drained into separate tared beakers, leaving a small amount of the solvent phase to insure no water was collected in the organic phase. The extraction was repeated with the aqueous phase at least two more times to yield about 250 ml of organic extract.

The weight of the organic fraction was determined by evaporation at ambient temperature and pressure in a laboratory hood. The evaporated organic fraction was desiccated for 24 hours, and weighed to a constant weight. The results were reported to the nearest 0.1 mg.

The weight of the inorganic portion was also determined by evaporation to approximately 50 ml on a hot plate then dried in an oven at 105 °C. If the pH of the impinger contents was less than 4.5 the inorganic residue was redissolved in 100 ml of water. Concentrated NH_4OH was added, aided by 5 drops of phenolphatalein indicator, until the solution turned pink. The sample was re-evaporated and re-desiccated and re-weighed to constant weight.

Water and methylene chloride blanks were also analyzed as described above. The sum of the values of both blanks should be less than 2 mg or 5% of the condensible particulate matter, whichever is greater. If the sum of the blank values is more than above, the greater value is to be subtracted from the total sample value.

<u>Polycyclic Aromatic Hydrocarbon (PAH) and Cresols (CARB Method 429)</u>

PAH and cresol samples were collected in accordance with the procedures delineated in CARB Method 429, "Determination of Polycyclic Aromatic Hydrocarbon Emissions from Stationary Sources". As per agreement between Mr. Tom Brumagin of NAPA and Mr. Gary McAllister of EPA, the sample recovery was conducted using only acetone and methylene chloride as rinsing solutions.

Three samples were collected in accordance with the procedures delineated in CARB Method 429, "Determination of Polycyclic Aromatic Hydrocarbon Emissions from Stationary Sources". The impinger train design was based on a validated emission collection system with the addition of an adsorbent cartridge of XAD-2 resin to collect vaporous emissions of PAH. The system was operated isokinetically according to the method.

The sampling train consisted of a glass nozzle, a heated quartz lined probe, a heated Teflon coated glass fiber filter, Teflon sample line, glass condenser, XAD-2 sorbent module, and the impinger train. Heated components were maintained at 248 $\pm$25 ^{o}F. The condenser is designed to provide sufficient cooling of the sample gas to maintain a gas exit temperature of no more than 68 ^{o}F. The impinger train consisted of four impingers in series; the first two each contained 100 mls of deionized, distilled water, the third impinger was dry, and the fourth contained approximately 400 grams of indicating silica gel. A thermocouple was located at the outlet of the silica gel impinger to measure the temperature of the exiting gases. Sealant grease was not used in any portion of the sampling train. Train components were covered with hexane rinsed foil before and after each test run.

All recovery solvents were nanograde quality, distilled-in-glass, and stored in their original containers. The sample recovery involved at least three sequential brushings and rinsings with acetone and methylene chloride until all train components were visually clean.

The analytical method is isotope dilution mass spectrometry combined with high resolution gas chromatography. The analysis included the addition of internal standards in known quantities. A matrix specific extraction was performed, followed by clean-up and analysis of the extract for PAH using high-resolution capillary column gas chromatography coupled with high resolution mass spectrometry (HRGC/HRMS).

The analysis was performed by ALTA Laboratories of El Dorado Hills, California. The PAH and cresol compounds for analysis included:

POLYCYCLIC AROMATIC HYDROCARBONS & CRESOLS

Acenaphthene	Benzo-k-Fluoranthene
Acenaphthylene	Fluorene
Anthracene	Naphthalene
Benz-a-Anthracene	Phenanthrene
Dibenzo-a,h-Anthracene	Pyrene
Chrysene	Benzo-a-Pyrene
Fluoranthene	Indeno-1,2,3-cd-Pyrene
Benzo-b-Fluoranthene	Benzo-ghi-Perylene
2-Methylphenol	3-Methylphenol
4-Methylphenol	

Formaldehyde Sampling (EPA Method 0011)

The formaldehyde emission rate was determined using the procedures delineated in EPA Method 0011, "Sampling for Aldehyde and Ketone Emissions from Stationary Sources". The gas sample was extracted isokinetically from the source and collected in 2,4-dinitrophenyl-hydrazine (DNPH) solution. Full size (1000 ml) impingers were used and contained 100 ml each of DNPH in the first and second impingers. A minimum volume of 45 DSCF was collected. Three test runs were conducted.

The method is based on the formation of the formaldehyde dinitrophenylhydrazone derivative. The derivative is extracted, solvent-exchanged, concentrated, and then analyzed by high performance liquid chromatography (HPLC). The samples were analyzed for formaldehyde content as specified by EPA Method 0011. The samples underwent a solvent extraction with a 70/30 mix of hexane and methylene chloride. A gradient HPLC system complete with column supplies, mobile phase reservoir, high pressure pump and syringes, and all required accessories, including an injection valve, and a compatible data recording system was used to measure peak areas and retention time. The analysis was performed by Atmospheric Assessments Association (AtmAA), of Chatsworth, California.

Methane, Benzene, Toluene, Ethylbenzene and Xylene (BTEX) (EPA Method 18)

Sampling for benzene, toluene, ethylbenzene and xylene was conducted in accordance with EPA Method 18, "Measurement of Gaseous Organic Compound Emissions by Gas Chromatography". Samples were collected over a period of thirty minutes each. Each sample was collected into an evacuated ten liter Tedlar bag. The Tedlar bag was cleaned and leak checked prior to and after the testing and analysis. The Tedlar bag was equipped with a minimum length 1/8" ID Teflon tube and a 1/8" ID stainless steel probe. The bag was mounted in a rigid leak free vessel. Sample was drawn into the bag by withdrawing the air from the vessel containing the Tedlar bag according to the procedures of the method.

The samples were subjected to gas chromatographic (GC) analysis using an appropriate column and detector. Gas chromatography with electron capture detection was used. The chromatographic columns were suitable for the separation of methane, benzene, toluene, ethyl benzene, and xylenes. The analytical system consisted of a gas chromatograph and all required accessories including syringes, analytical columns, compressed gases, detectors, and data system for peak integration. The analysis was performed with selected columns and operating parameters best suited to the equipment used and compound detection range. The analysis was performed by Performance Analytical Inc., of Canoga Park, California.

3.2 Continuous Emissions Monitoring

The gaseous criteria pollutants and composition of the exit gas were determined by continuous emissions monitoring (CEM). The ES mobile source test van (MSTV) is dedicated to CEM source testing. A schematic diagram of the CEM set up is presented in Figure 3.2-1. The monitoring equipment is rack mounted in a climate controlled environment. The instruments are CARB approved and were operated by personnel experienced in CARB Method 100 procedures.

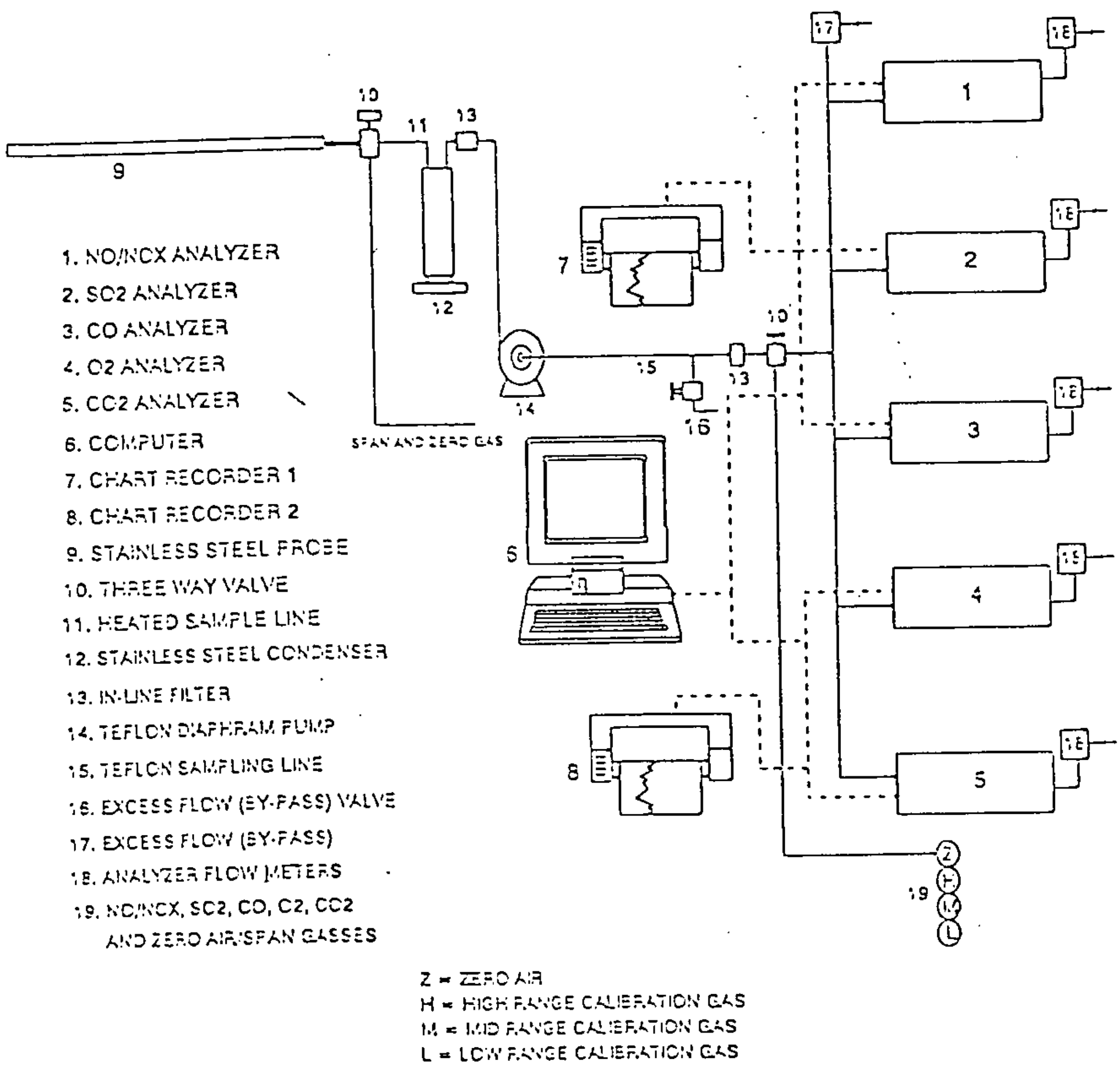
Sample Conditioning and Delivery System

Gas sample was extracted from the source through a stainless steel probe inserted into the source exhaust stack through sample ports provided. The exhaust gas was delivered to the analyzers via a conditioning and delivery system comprised of: an insulated, heated 0.25" ID Teflon sample line, condenser (for moisture removal), Balston filter (for particulate removal), Teflon-lined pump, Teflon sample line, and a manifold system for distribution of the exhaust gas to the continuous analyzers. Measurements from all monitors were continuously recorded by Soltec, Model DS 6000, chart recorders. The sample delivery system was leak checked at 20 inches of mercury vacuum for five minutes prior to calibration and at the conclusion of testing.

Total Hydrocarbons Concentration (EPA Method 25A)

The total hydrocarbon concentration was measured using a Gow-Mac Model 23-500 total hydrocarbon analyzer. The instrument utilizes the flame ionization method of detection. The instrument full scale used for the testing program was 0-50 ppm. Standards maintained regarding instrument operation were:

CONTINUOUS EMISSIONS ANALYZER SAMPLING EQUIPMENT



Zero Drift	≤2% of full scale
Span Drift	≤2% of full scale
Sample Bias Check	≤5% of span gas value
Response Time	≤2 minutes

Sulfur Dioxide, SO_2 (EPA Method 6C)

Sulfur dioxide concentration was measured using a Western Research Model 721A analyzer. The instrument uses ultraviolet fluorescence as the method of detection. The instrument full scale used for of the test runs was 0-100 ppm. Standards maintained regarding instrument operation were:

Zero Drift	≤2% of full scale
Span Drift	≤2% of full scale
Sample Bias Check	≤5% of span gas value
Response Time	≤2 minutes
Sample Residence Time	≤2 minutes

Nitrogen Oxides, NO_2 (EPA Method 7E)

Nitrogen oxides concentrations were measured using a Teco, Model 10 S chemiluminescence analyzer. The analyzer was multi-point calibrated before and after each test run. The instrument full scale response used for the test runs was 0-100 ppm. Standards maintained regarding instrument operation were:

Zero Drift	≤2% of full scale
Span Drift	≤2% of full scale
Sample Bias Check	≤5% of span gas value
Response Time	≤2 minutes
Sample Residence Time	≤2 minutes
NO_x to NO Conversion	≥95%

Carbon Monoxide, CO (EPA Method 10)

Carbon monoxide concentration was measured with a Monitor Labs, Model 8310, non-dispersive infrared analyzer, equipped with a micro mass flow detector. The analyzer was multipoint calibrated before and after field use. The instrument full scale response for the test runs was 0-100 ppm. Standards maintained regarding instrument operation were:

Zero Drift	≤2% of full scale
Span Drift	≤2% of full scale
Sample Bias Check	≤5% of span gas value
Response Time	≤2 minutes
Sample Residence Time	<2 minutes

Carbon Dioxide, CO_2 (EPA Method 3A)

Carbon dioxide concentration was measured with an Infra-Red Industries (Fuji), Model 732 analyzer. The instrument uses the non-dispersive infrared method of detection. The instrument full scale used for all test runs was 20%. Standards maintained regarding instrument operation were:

Zero Drift	≤2% of full scale
Span Drift	≤2% of full scale
Sample Bias Check	≤5% of span gas value
Response Time	≤2 minutes
Sample Residence Time	<2 minutes

Oxygen, O_2 (EPA Method 3A)

Oxygen concentration was measured with a Mine Safety Appliance (MSA), Model 4000 analyzer, employing a micro-fuel cell detector. The instrument full scale used for all test runs was 25% and was multipoint calibrated before and after each test run. Standards maintained regarding instrument operation were:

Zero Drift	≤2% of full scale
Span Drift	≤2% of full scale
Response Time	≤2 minutes
Sample Residence Time	<2 minutes

SECTION 4

QUALITY ASSURANCE

SECTION 4
QUALITY ASSURANCE

Introduction

Sampling and analytical procedures for the most part are specified by the CARB or EPA test methods. The quality assurance guidelines as published in "Quality Assurance Handbook for Air Pollution Measurement Systems", Volume III, U. S. EPA-600/4-77-027b, were followed.

Engineering-Science, Inc., corporate QC/QA commitment is total. A corporate QC/QA officer oversaw the testing program in terms of QC/QA review of test plan, independent random data reduction check and/or validation, and evaluation of final report to assure the client of a quality product.

The field sampling was performed by personnel experienced with the methods. All quality control procedures specified in the methods were followed rigorously. All recovery solvents used, materials handling and storage procedures conformed to the methodology. Field trip blanks were part of the testing program and were processed in the same manner as the actual samples.

Sample documentation was mainly supported with Chain-of-Custody forms and sample labels legibly and completely filled out in ink. The project manager, on-site team leader, and laboratory personnel kept track of and recorded sample field numbers and descriptions in their personal field books. Sample integrity was assured by all required recovery and preservation techniques per the particular method. Samples were stored as required by the procedures under the custody of the field laboratory technician. Laboratory blanks, field blanks, spikes, replicates, and splits were also processed as required by the particular methods.

Field Sampling Quality Assurance

Prior to and at the conclusion of field sampling, the dry gas meters and orifices (meter boxes) were calibrated against a secondary transfer standard traceable to an NIST prover. The results of each orifice calibration was expressed as the "delta H" at various pressure drops (in inches of water), as specified in EPA publication APTD-0576. The dry gas meter accuracy was expressed as "gamma (Y)" and determined as the ratio between the meter box dry gas meter and the transfer standard.

Stack, filter, gas meter, and impinger temperatures were monitored using K-type thermocouples connected to an Omega Model 601 digital readout. The thermocouples and readout were calibrated against an NIST traceable mercury-in-glass thermometer. Stack velocity was determined for establishing isokinetic sampling rates and volumetric flow using a S-type Pitot tube attached to the probe as specified in EPA Reference 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. The sampling trains were considered leak free since the leak rates were all 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 sampling 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.

CEM Quality Assurance

The analyzers employed for the continuous monitoring of Hydrocarbons, CO, CO_2, NO_2, and O_2 are California Air Resources Board (CARB) approved instruments. The instruments were calibrated at the beginning and conclusion of the testing. The zero and calibration gases were prepared by Scott Specialty Gases, San Bernardino, California, and Scott Marin Inc. of Riverside, California.

The analytical ranges selected were between 20 and 95 percent of the full scale range for the sample gas concentration. Sample system biases recorded during the tests were all less than the ± 5 percent limit for all parameters. Analyzer calibration errors were all below the ± 2 percent limit for all species sampled. Both zero drift and calibration drift for all species sampled were below the ± 3 percent limit.

Laboratory Quality Assurance

Filter drydown weights were obtained using a Sartorius Model 2003 digital analytical balance. Prior to conducting weighings, the accuracy of the balance was checked with a 100 gram Class S weight. All weighings were conducted in an environmentally controlled balance room maintained at $\leq 70°F$, with a relative humidity of $\leq 50\%$. All samples were conditioned and desiccated before weighing. A constant weight is defined as ± 0.5 mg between consecutive weighings with an elapsed time between weighings greater than 6 hours. All weight data were recorded in a permanently bound notebook maintained in the balance room. The fiberglass filters used for the Method 5 train were Schleicher & Schuell No. 30, EPA approved filters for particulate source sampling.

All reagents for charging the sample train and sample recovery were as specified by the method. Prior to conducting any titration for a batch of samples, a blank titration was conducted. Replicate titrations were also conducted as an additional quality check. Engineering-Science, Irwindale, also participates in the interlaboratory National Performance Audit Program (P-122) administered by the NSI Technology Services Corporation, Research Triangle Park, North Carolina, for the US EPA.

Sample Custody

The following Chain-of-Custody procedures and documentation were used for this project. The major elements included:

- Sampling train component identification
- Sample identification
- Sample labels
- Documentation
- Chain-of-Custody

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

1. Sample train prepared by laboratory including impingers, and other sampling equipment identified by tags and color 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 was 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 Irwindale 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 of liquid, label legibility).

Upon completing the required analysis, the analyst returned the Chain-of-Custody form along with the certified laboratory results to the project manager. All samples were accounted for by the laboratory supervisor and project manager. Each laboratory identified the samples in its own laboratory notebooks by the lab I.D. number as well as any internal identification. Notebooks are retained by each laboratory according to usual laboratory practices.

SECTION 5

RESULTS

SECTION 5
RESULTS

The results of the testing program are presented in **Tables 1-13**. All information necessary for the regulatory agency to adequately assess the validity and representativeness of the results are contained in the appendices. All information required to independently duplicate all calculations are included.

Example calculations sheets for the methodology used are included. EPA standard conditions are 29.92" Hg and 68°F. For all values found to be below the analytical limit of detection the full detection value was reported as the full value and flagged with the $\leq$ symbol.

TABLE 1

SUMMARY OF EPA 5
PARTICULATE MATTER

CONCENTRATIONS & EMISSION RATES

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30; May 1 & 4, 1992

Parameter	Run #1	Run #2	Run #3	Average
At Actual Excess Air, (%)				
Excess Air, (%)	181.8	193.9	201.9	192.5
gr/dscf	0.0074	0.0044	0.0048	0.0055
mg/dscm	16.92	10.07	10.98	12.66
lb/hr	1.00	0.58	0.68	0.75
At 100% Excess Air				
gr/dscf	0.0135	0.0085	0.0097	0.0106
mg/dscm	30.76	19.53	22.17	24.15
lb/hr	1.82	1.12	1.37	1.44

TABLE 2

SUMMARY OF EPA 202
PARTICULATE MATTER & CONDENSIBLES

CONCENTRATIONS & EMISSION RATES

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30; May 1 & 4, 1992

Parameter	Run #1	Run #2	Run #3	Average
At Actual Excess Air, (%)				
Excess Air, (%)	181.8	193.9	201.9	192.5
gr/dscf	0.0018	0.0005	0.0064	0.0029
mg/dscm	4.12	1.14	14.64	6.63
lb/hr	0.25	0.07	0.85	0.39
At 100 % Excess Air				
gr/dscf	0.0033	0.0010	0.0129	0.0057
mg/dscm	7.49	2.21	29.56	13.09
lb/hr	0.45	0.14	1.72	0.77

TABLE 3

SUMMARY OF MODIFIED EPA 5 (CARB 429) POLYAROMATIC HYDROCARBON AND CRESOL

CONCENTRATIONS (mg/dscm) AT ACTUAL EXCESS AIR, (%)

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30, May 1 & 4 1992

Parameter	Run 1 (mg/dscm)	Run 2 (mg/dscm)	Run 3 (mg/dscm)	Average (mg/dscm)
Excess Air, (%)	181.8	181.8	201.9	188.5
Naphthalene	2.19×10^{-1}	1.66×10^{-1}	5.28×10^{-1}	3.05×10^{-1}
Acenaphthene	5.22×10^{-3}	5.53×10^{-3}	1.22×10^{-2}	7.66×10^{-3}
Acenaphthalene	5.22×10^{-3}	4.98×10^{-3}	5.01×10^{-3}	5.07×10^{-3}
Fluorene	1.02×10^{-2}	1.08×10^{-2}	2.14×10^{-2}	1.41×10^{-2}
Phenanthrene	1.36×10^{-2}	1.69×10^{-2}	3.06×10^{-2}	2.03×10^{-2}
Anthracene	1.30×10^{-3}	1.60×10^{-3}	3.06×10^{-3}	1.99×10^{-3}
Fluoranthene	3.13×10^{-4}	4.98×10^{-4}	3.34×10^{-4}	3.82×10^{-4}
Pyrene	2.17×10^{-4}	3.60×10^{-4}	2.64×10^{-4}	2.80×10^{-4}
Benzo-a-Anthracene	1.15×10^{-5}	9.41×10^{-6}	8.90×10^{-6}	9.93×10^{-6}
Chrysene	2.45×10^{-5}	2.35×10^{-5}	1.95×10^{-5}	2.25×10^{-5}
Benzo-b-Fluoranthene	7.30×10^{-6}	5.81×10^{-6}	5.84×10^{-6}	6.32×10^{-6}
Benzo-k-Fluoranthene	2.87×10^{-6}	$<2.77\times10^{-6}$	$<2.78\times10^{-6}$	$<2.81\times10^{-6}$
Benzo-a-Pyrene	$<2.61\times10^{-6}$	$<2.77\times10^{-6}$	$<2.78\times10^{-6}$	$<2.72\times10^{-6}$
Indeno-123-cd-Pyrene	3.39×10^{-6}	$<2.77\times10^{-6}$	$<2.78\times10^{-6}$	$<2.98\times10^{-6}$
Dibenzo-ah-Anthracene	2.61×10^{-6}	$<2.77\times10^{-6}$	$<2.78\times10^{-6}$	$<2.72\times10^{-6}$
Benzo-ghi-Perylene	$<2.61\times10^{-6}$	$<2.77\times10^{-6}$	$<2.78\times10^{-6}$	$<2.72\times10^{-6}$
2-Methylphenol	$<5.81\times10^{-3}$	$<6.16\times10^{-3}$	$<6.24\times10^{-2}$	$<2.48\times10^{-2}$
3-Methylphenol	$<5.81\times10^{-3}$	$<6.16\times10^{-3}$	$<6.24\times10^{-2}$	$<2.48\times10^{-2}$
4-Methylphenol	$<5.81\times10^{-3}$	$<6.16\times10^{-3}$	$<6.24\times10^{-2}$	$<2.48\times10^{-2}$

TABLE 4

SUMMARY OF MODIFIED EPA 5 (CARB 429) POLYAROMATIC HYDROCARBON AND CRESOL

CONCENTRATIONS (mg/dscm) AT 100% EXCESS AIR

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30, May 1 & 4 1992

Parameter	Run 1 (mg/dscm)	Run 2 (mg/dscm)	Run 3 (mg/dscm)	Average (mg/dscm)
Naphthalene	3.98×10^{-1}	3.02×10^{-1}	1.07×10^{-0}	5.90×10^{-1}
Acenaphthene	9.49×10^{-3}	1.01×10^{-2}	2.46×10^{-2}	1.47×10^{-2}
Acenaphthalene	9.49×10^{-3}	9.05×10^{-3}	1.01×10^{-2}	9.55×10^{-3}
Fluorene	1.85×10^{-2}	1.96×10^{-2}	4.32×10^{-2}	2.71×10^{-2}
Phenanthrene	2.47×10^{-2}	3.07×10^{-2}	6.18×10^{-2}	3.91×10^{-2}
Anthracene	2.36×10^{-3}	2.91×10^{-3}	6.18×10^{-3}	3.82×10^{-3}
Fluoranthene	5.69×10^{-4}	9.05×10^{-4}	6.74×10^{-4}	7.16×10^{-4}
Pyrene	3.95×10^{-4}	6.54×10^{-4}	5.33×10^{-4}	5.27×10^{-4}
Benzo-a-Anthracene	2.09×10^{-5}	1.71×10^{-5}	1.80×10^{-5}	1.87×10^{-5}
Chrysene	4.45×10^{-5}	4.27×10^{-5}	3.94×10^{-5}	4.22×10^{-5}
Benzo-b-Fluoranthene	1.33×10^{-5}	1.06×10^{-5}	1.18×10^{-5}	1.19×10^{-5}
Benzo-k-Fluoranthene	5.22×10^{-6}	$<5.04 \times 10^{-6}$	$<5.61 \times 10^{-6}$	$<5.29 \times 10^{-6}$
Benzo-a-Pyrene	$<4.74 \times 10^{-6}$	$<5.04 \times 10^{-6}$	$<5.61 \times 10^{-6}$	$<5.13 \times 10^{-6}$
Indeno-123-cd-Pyrene	6.16×10^{-6}	$<5.04 \times 10^{-6}$	$<5.61 \times 10^{-6}$	$<5.60 \times 10^{-6}$
Dibenzo-ah-Anthracene	4.74×10^{-6}	$<5.04 \times 10^{-6}$	$<5.61 \times 10^{-6}$	$<5.13 \times 10^{-6}$
Benzo-ghi-Perylene	$<4.74 \times 10^{-6}$	$<5.04 \times 10^{-6}$	$<5.61 \times 10^{-6}$	$<5.13 \times 10^{-6}$
2-Methylphenol	$<1.06 \times 10^{-2}$	$<1.12 \times 10^{-2}$	$<1.26 \times 10^{-1}$	$<4.93 \times 10^{-2}$
3-Methylphenol	$<1.06 \times 10^{-2}$	$<1.12 \times 10^{-2}$	$<1.26 \times 10^{-1}$	$<4.93 \times 10^{-2}$
4-Methylphenol	$<1.06 \times 10^{-2}$	$<1.12 \times 10^{-2}$	$<1.26 \times 10^{-1}$	$<4.93 \times 10^{-2}$

TABLE 5

SUMMARY OF MODIFIED EPA 5 (CARB 429)
POLYAROMATIC HYDROCARBON AND CRESOL

CONCENTRATIONS (ppm v/v) AT ACTUAL EXCESS AIR, (%)

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30, May 1 & 4 1992

Parameter	Run 1 (ppm v/v)	Run 2 (ppm v/v)	Run 3 (ppm v/v)	Average (ppm v/v)
Excess Air, (%)	181.8	181.8	201.9	188.5
Naphthalene	$4.12x10^{-2}$	$3.12x10^{-2}$	$9.93x10^{-2}$	$5.72x10^{-2}$
Acenaphthene	$8.15x10^{-4}$	$8.64x10^{-4}$	$1.91x10^{-3}$	$1.20x10^{-3}$
Acenaphthalene	$8.26x10^{-4}$	$7.88x10^{-4}$	$7.92x10^{-4}$	$8.02x10^{-4}$
Fluorene	$1.47x10^{-3}$	$1.56x10^{-3}$	$3.10x10^{-3}$	$2.05x10^{-3}$
Phenanthrene	$1.83x10^{-3}$	$2.28x10^{-3}$	$4.14x10^{-3}$	$2.75x10^{-3}$
Anthracene	$1.76x10^{-4}$	$2.17x10^{-4}$	$4.14x10^{-4}$	$2.69x10^{-4}$
Fluoranthene	$3.73x10^{-5}$	$5.93x10^{-5}$	$3.98x10^{-5}$	$4.54x10^{-5}$
Pyrene	$2.58x10^{-5}$	$4.28x10^{-5}$	$3.15x10^{-5}$	$3.34x10^{-5}$
Benzo-a-Anthracene	$1.21x10^{-6}$	$9.92x10^{-7}$	$9.39x10^{-7}$	$1.05x10^{-6}$
Chrysene	$2.59x10^{-6}$	$2.48x10^{-6}$	$2.05x10^{-6}$	$2.37x10^{-6}$
Benzo-b-Fluoranthene	$6.97x10^{-7}$	$5.55x10^{-7}$	$5.58x10^{-7}$	$6.03x10^{-7}$
Benzo-k-Fluoranthene	$2.74x10^{-7}$	$<2.64x10^{-7}$	$<2.66x10^{-7}$	$<2.68x10^{-7}$
Benzo-a-Pyrene	$<2.49x10^{-7}$	$<2.64x10^{-7}$	$<2.66x10^{-7}$	$<2.68x10^{-7}$
Indeno-123-cd-Pyrene	$2.96x10^{-7}$	$<2.41x10^{-7}$	$<2.42x10^{-7}$	$<2.60x10^{-7}$
Dibenzo-ah-Anthracene	$2.26x10^{-7}$	$<2.39x10^{-7}$	$<2.41x10^{-7}$	$<2.35x10^{-7}$
Benzo-ghi-Perylene	$<2.27x10^{-7}$	$<2.41x10^{-7}$	$<2.42x10^{-7}$	$<2.37x10^{-7}$
2-Methylphenol	$<5.81x10^{-3}$	$<6.16x10^{-3}$	$<6.24x10^{-2}$	$<2.48x10^{-2}$
3-Methylphenol	$<5.81x10^{-3}$	$<6.16x10^{-3}$	$<6.24x10^{-2}$	$<2.48x10^{-2}$
4-Methylphenol	$<5.81x10^{-3}$	$<6.16x10^{-3}$	$<6.24x10^{-2}$	$<2.48x10^{-2}$

TABLE 6

SUMMARY OF MODIFIED EPA 5 (CARB 429)
POLYAROMATIC HYDROCARBON AND CRESOL

CONCENTRATIONS (ppm v/v) AT 100% EXCESS AIR

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30, May 1 & 4 1992

Parameter	Run 1 (ppm v/v)	Run 2 (ppm v/v)	Run 3 (ppm v/v)	Average (ppm v/v)
Naphthalene	7.49×10^{-2}	5.67×10^{-2}	2.00×10^{-1}	1.11×10^{-1}
Acenaphthene	1.48×10^{-3}	1.57×10^{-3}	3.86×10^{-3}	2.30×10^{-3}
Acenaphthalene	1.50×10^{-3}	1.43×10^{-3}	1.60×10^{-3}	1.51×10^{-3}
Fluorene	2.67×10^{-3}	2.84×10^{-3}	6.26×10^{-3}	3.92×10^{-3}
Phenanthrene	3.33×10^{-3}	4.15×10^{-3}	8.36×10^{-3}	5.28×10^{-3}
Anthracene	3.20×10^{-4}	3.95×10^{-4}	8.36×10^{-4}	5.17×10^{-4}
Fluoranthene	6.78×10^{-5}	1.08×10^{-4}	8.04×10^{-5}	8.54×10^{-5}
Pyrene	4.69×10^{-5}	7.78×10^{-5}	6.36×10^{-5}	6.28×10^{-5}
Benzo-a-Anthracene	2.20×10^{-6}	1.80×10^{-6}	1.90×10^{-6}	1.97×10^{-6}
Chrysene	4.70×10^{-6}	4.51×10^{-6}	4.14×10^{-6}	4.45×10^{-6}
Benzo-b-Fluoranthene	1.27×10^{-6}	1.01×10^{-6}	1.13×10^{-6}	1.14×10^{-6}
Benzo-k-Fluoranthene	4.98×10^{-7}	$<4.80 \times 10^{-7}$	$<5.37 \times 10^{-7}$	$<5.05 \times 10^{-7}$
Benzo-a-Pyrene	$<4.52 \times 10^{-7}$	$<4.80 \times 10^{-7}$	$<5.37 \times 10^{-7}$	$<4.90 \times 10^{-7}$
Indeno-123-cd-Pyrene	5.38×10^{-7}	$<4.38 \times 10^{-7}$	$<4.89 \times 10^{-7}$	$<4.88 \times 10^{-7}$
Dibenzo-ah-Anthracene	4.11×10^{-7}	$<4.35 \times 10^{-7}$	$<4.87 \times 10^{-7}$	$<4.44 \times 10^{-7}$
Benzo-ghi-Perylene	$<4.13 \times 10^{-7}$	$<4.38 \times 10^{-7}$	$<4.89 \times 10^{-7}$	$<4.47 \times 10^{-7}$
2-Methylphenol	$<1.06 \times 10^{-2}$	$<1.12 \times 10^{-2}$	$<1.26 \times 10^{-1}$	$<4.93 \times 10^{-2}$
3-Methylphenol	$<1.06 \times 10^{-2}$	$<1.12 \times 10^{-2}$	$<1.26 \times 10^{-1}$	$<4.93 \times 10^{-2}$
4-Methylphenol	$<1.06 \times 10^{-2}$	$<1.12 \times 10^{-2}$	$<1.26 \times 10^{-1}$	$<4.93 \times 10^{-2}$

TABLE 7

SUMMARY OF MODIFIED EPA 5 (CARB 429) POLYAROMATIC HYDROCARBON AND CRESOL

MASS EMISSION RATES (lb/hr) AT ACTUAL EXCESS AIR, (%)

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30, May 1 & 4, 1992

Parameter	Run 1 (lb/hr)	Run 2 (lb/hr)	Run 3 (lb/hr)	Average (lb/hr)
Excess Air, (%)	181.8	181.8	201.9	188.5
Naphthalene	1.40×10^{-2}	9.92×10^{-3}	3.18×10^{-2}	1.86×10^{-2}
Acenaphthene	3.33×10^{-4}	3.31×10^{-4}	7.37×10^{-4}	4.67×10^{-4}
Acenaphthalene	3.33×10^{-4}	2.97×10^{-4}	3.02×10^{-4}	3.11×10^{-4}
Fluorene	6.49×10^{-4}	6.45×10^{-4}	1.29×10^{-3}	8.61×10^{-4}
Phenanthrene	8.65×10^{-4}	1.01×10^{-3}	1.84×10^{-3}	1.24×10^{-3}
Anthracene	8.31×10^{-5}	9.59×10^{-5}	1.84×10^{-4}	1.21×10^{-4}
Fluoranthene	2.00×10^{-5}	2.97×10^{-5}	2.01×10^{-5}	2.33×10^{-5}
Pyrene	1.38×10^{-5}	2.15×10^{-5}	1.59×10^{-5}	1.71×10^{-5}
Benzo-a-Anthracene	7.32×10^{-7}	5.62×10^{-7}	5.36×10^{-7}	6.10×10^{-7}
Chrysene	1.56×10^{-6}	1.40×10^{-6}	1.17×10^{-6}	1.38×10^{-6}
Benzo-b-Fluoranthene	4.66×10^{-7}	3.47×10^{-7}	3.52×10^{-7}	3.88×10^{-7}
Benzo-k-Fluoranthene	1.83×10^{-7}	$< 1.65 \times 10^{-7}$	$< 1.68 \times 10^{-7}$	$< 1.72 \times 10^{-7}$
Benzo-a-Pyrene	$< 1.66 \times 10^{-7}$	$< 1.65 \times 10^{-7}$	$< 1.68 \times 10^{-7}$	$< 1.66 \times 10^{-7}$
Indeno-123-cd-Pyrene	2.16×10^{-7}	$< 1.65 \times 10^{-7}$	$< 1.68 \times 10^{-7}$	$< 1.83 \times 10^{-7}$
Dibenzo-ah-Anthracene	1.66×10^{-7}	$< 1.65 \times 10^{-7}$	$< 1.68 \times 10^{-7}$	$< 1.66 \times 10^{-7}$
Benzo-ghi-Perylene	$< 1.66 \times 10^{-7}$	$< 1.65 \times 10^{-7}$	$< 1.68 \times 10^{-7}$	$< 1.66 \times 10^{-7}$
2-Methylphenol	$< 1.66 \times 10^{-3}$	$< 1.66 \times 10^{-3}$	$< 1.69 \times 10^{-2}$	$< 6.74 \times 10^{-3}$
3-Methylphenol	$< 1.66 \times 10^{-3}$	$< 1.66 \times 10^{-3}$	$< 1.69 \times 10^{-2}$	$< 6.74 \times 10^{-2}$
4-Methylphenol	$< 1.66 \times 10^{-3}$	$< 1.66 \times 10^{-3}$	$< 1.69 \times 10^{-2}$	$< 6.74 \times 10^{-2}$

TABLE 8

SUMMARY OF MODIFIED EPA 5 (CARB 429)
POLYAROMATIC HYDROCARBON AND CRESOL

EMISSION RATES (lb/hr) AT 100 % EXCESS AIR

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30, May 1 & 4, 1992

Parameter	Run 1 (lb/hr)	Run 2 (lb/hr)	Run 3 (lb/hr)	Average (lb/hr)
Naphthalene	2.55×10^{-2}	1.80×10^{-2}	6.42×10^{-2}	3.59×10^{-2}
Acenaphthene	6.05×10^{-4}	6.02×10^{-4}	1.49×10^{-3}	8.99×10^{-4}
Acenaphthalene	6.05×10^{-4}	5.40×10^{-4}	6.10×10^{-4}	5.85×10^{-4}
Fluorene	1.18×10^{-3}	1.17×10^{-3}	2.60×10^{-3}	1.65×10^{-3}
Phenanthrene	1.57×10^{-3}	1.84×10^{-3}	3.71×10^{-3}	2.37×10^{-3}
Anthracene	1.51×10^{-4}	1.74×10^{-4}	3.71×10^{-4}	2.32×10^{-4}
Fluoranthene	3.64×10^{-5}	5.40×10^{-5}	4.06×10^{-5}	4.38×10^{-5}
Pyrene	2.51×10^{-5}	3.91×10^{-5}	3.21×10^{-5}	3.21×10^{-5}
Benzo-a-Anthracene	1.33×10^{-6}	1.02×10^{-6}	1.08×10^{-6}	1.14×10^{-6}
Chrysene	2.84×10^{-6}	2.54×10^{-6}	2.36×10^{-6}	2.58×10^{-6}
Benzo-b-Fluoranthene	8.47×10^{-7}	6.31×10^{-7}	7.11×10^{-7}	7.30×10^{-7}
Benzo-k-Fluoranthene	3.33×10^{-7}	$<3.00 \times 10^{-7}$	$<3.39 \times 10^{-7}$	$<3.24 \times 10^{-7}$
Benzo-a-Pyrene	$<3.02 \times 10^{-7}$	$<3.00 \times 10^{-7}$	$<3.39 \times 10^{-7}$	$<3.14 \times 10^{-7}$
Indeno-123-cd-Pyrene	3.93×10^{-7}	$<3.00 \times 10^{-7}$	$<3.39 \times 10^{-7}$	$<3.44 \times 10^{-7}$
Dibenzo-ah-Anthracene	3.02×10^{-7}	$<3.00 \times 10^{-7}$	$<3.39 \times 10^{-7}$	$<3.14 \times 10^{-7}$
Benzo-ghi-Perylene	$<3.02 \times 10^{-7}$	$<3.00 \times 10^{-7}$	$<3.39 \times 10^{-7}$	$<3.14 \times 10^{-7}$
2-Methylphenol	$<3.02 \times 10^{-3}$	$<3.02 \times 10^{-3}$	$<3.41 \times 10^{-2}$	$<1.34 \times 10^{-2}$
3-Methylphenol	$<3.02 \times 10^{-3}$	$<3.02 \times 10^{-3}$	$<3.41 \times 10^{-2}$	$<1.34 \times 10^{-2}$
4-Methylphenol	$<3.02 \times 10^{-3}$	$<3.02 \times 10^{-3}$	$<3.41 \times 10^{-2}$	$<1.34 \times 10^{-2}$

TABLE 9

SUMMARY OF EPA 0011
FORMALDEHYDE

CONCENTRATIONS & MASS EMISSION RATES

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30 & May 1, 1992

Parameter	Run 1	Run 2	Run 3	Average
At Actual Excess Air, (%)				
Excess Air, %	181.8	180.6	180.6	181.0
mg/dscm	0.399	1.627	1.191	1.072
ppm v/v	0.320	1.30	1.28	0.967
lb/hr	0.026	0.089	0.103	0.073
At 100% Excess Air				
mg/dscm	0.725	2.938	2.151	1.938
ppm v/v	0.582	2.348	2.312	1.747
lb/hr	0.047	0.161	0.186	0.131

TABLE 10

SUMMARY OF EPA METHOD 18
METHANE, BENZENE, TOLUENE, ETHYLBENZENE, XYLENE

CONCENTRATIONS & MASS EMISSION RATES
AT ACTUAL EXCESS AIR, (%)

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30 & May 1, 1992

Parameter	Run 1	Run 2	Run 3	Average
Excess Air, (%)	212.1	189.5	200.0	200.5
Methane				
mg/dscm	<0.330	2.790	6.120	3.080
ppm v/v	<0.500	4.200	9.200	<4.630
lb/hr	<0.020	0.170	0.370	<0.190
Benzene				
mg/dscm	0.190	4.500	0.640	1.777
ppm v/v	0.060	1.400	0.200	0.553
lb/hr	0.012	0.274	0.039	0.108
Toluene				
mg/dscm	0.280	15.000	0.600	5.290
ppm v/v	0.073	4.000	0.160	1.410
lb/hr	0.002	0.924	0.037	0.321
Ethylbenzene				
mg/dscm	0.180	8.100	0.280	2.850
ppm v/v	0.041	1.900	0.065	0.669
lb/hr	0.001	0.506	0.017	0.175
Xylene				
mg/dscm	0.480	15.400	0.730	5.540
ppm v/v	0.111	3.500	0.164	1.258
lb/hr	0.029	0.931	0.042	0.334

TABLE 11

SUMMARY OF EPA METHOD 18
METHANE, BENZENE, TOLUENE, ETHYLBENZENE, XYLENE

CONCENTRATIONS & MASS EMISSION RATES
AT 100% EXCESS AIR

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30 & May 1, 1992

Parameter	Run 1	Run 2	Run 3	Average
Methane				
mg/dscm	<0.699	5.287	12.240	<6.075
ppm v/v	<1.061	7.957	18.400	<9.139
lb/hr	<0.042	0.320	0.738	<0.367
Benzene				
mg/dscm	0.403	8.525	1.280	3.403
ppm v/v	0.127	2.653	0.400	1.060
lb/hr	0.025	0.519	0.078	0.207
Toluene				
mg/dscm	0.594	28.418	1.200	10.071
ppm v/v	0.155	7.578	0.320	2.684
lb/hr	0.004	1.751	0.074	0.609
Ethylbenzene				
mg/dscm	0.382	15.350	0.560	5.431
ppm v/v	0.087	3.601	0.130	1.273
lb/hr	0.002	0.959	0.034	0.332
Xylene				
mg/dscm	1.018	29.183	1.460	10.554
ppm v/v	0.235	6.633	0.328	2.399
lb/hr	0.062	1.764	0.084	0.637

TABLE 12

SUMMARY OF EPA METHODS 25A, 6C, 7E, AND 10
HYDROCARBONS, SULFUR DIOXIDE, NITROGEN OXIDES, CARBON DIOXIDE

CONCENTRATIONS & MASS EMISSION RATES
AT ACTUAL EXCESS AIR, (%)

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30 & May 1, 1992

32.42 includes "0" for 2nd run (should be void-- no calibration)

Parameter		April 30	May 1	May 4	Average
Excess Air, (%)		181.8	193.9	201.9	192.5
THC					
	mg/dscm	21.63	NA	NA	21.63
	ppm v/v	48.63 32.42	NA	NA	32.42
	lb/hr	1.34	NA	NA	1.34
SO_2					
	mg/dscm	23.44	37.36	9.00	23.23
	ppm v/v	8.81	14.04 10.44	3.38	8.74
	lb/hr	1.45	2.26	0.56	1.42
NO_2					
	mg/dscm	54.68	44.09	46.23	48.33
	ppm v/v	28.59	27.32 23.05	24.17	25.27
	lb/hr	3.39	2.66	2.88	2.98
CO					
	mg/dscm	140.18	118.76	95.75	118.23
	ppm v/v	120.40	102.01	82.24	101.55
	lb/hr	8.68	7.18	5.96	7.27

Note: NA, not available

TABLE 13

SUMMARY OF EPA METHODS 25A, 6C, 7E, AND 10
HYDROCARBONS, SULFUR DIOXIDE, NITROGEN OXIDES, CARBON DIOXIDE

CONCENTRATIONS & MASS EMISSION RATES
AT 100% EXCESS AIR, (%)

ROTARY DRYER BAGHOUSE STACK

INDUSTRIAL ASPHALT
Wilmington, California
April 30 & May 1, 1992

Parameter	April 30	May 1	May 4	Average
THC				
mg/dscm	39.33	NA	NA	39.33
ppm v/v	58.93	NA	NA	58.93
lb/hr	2.44	NA	NA	2.44
SO_2				
mg/dscm	42.61	72.44	18.17	44.41
ppm v/v	16.02	25.52	6.14	15.89
lb/hr	2.64	4.38	1.13	2.72
NO_2				
mg/dscm	99.41	85.49	93.34	92.75
ppm v/v	51.98	41.90	43.94	45.94
lb/hr	6.16	5.16	5.82	5.71
CO				
mg/dscm	254.85	230.28	193.32	226.15
ppm v/v	218.89	185.45	149.50	184.61
lb/hr	15.78	13.92	12.03	13.91

Note: NA, not available

APPENDIX A

EPA METHOD 5
PARTICULATE MATTER

FIELD DATA SUMMARY

NAPA
KILN BAGHOUSE STACK

30-Apr-92

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
Vlc, Volume of water vapor condensed in impingers and silica gel	352.1	206.4	82.4			
Vm, Dry gas volume as measured by dry gas meter (dcf)	55.029	35.877	42.402			
y, Dry gas meter calibration factor (dimensionless)	1.003	1.003	1.003			
Pb, Barometric Pressure at sampling site (in. Hg)	29.83	29.83	29.86			
Ps, Absolute stack gas pressure (in. Hg.)	29.79	29.79	29.82			
dH, Average pressure differential across the orifice meter (in. H2O)	1.80	1.66	1.52			
Tm, Meter temperature (dR)	548.00	545.00	549.00			
Vm(std), Dry gas volume as measured by dry gas meter, corrected to standard conditions (dscf)	53.255	34.900	40.973			
Bws, Water vapor in the gas stream, proportion by volume (dimensionless)	0.238	0.218	0.087			
%CO2, Percent carbon dioxide by volume (dry basis)	3.80	3.60	4.70			
%O2, Percent oxygen by volume (dry basis)	14.00	14.30	14.30			
Md, Dry molecular weight of stack gas (lb/lb-mole)	29.17	29.15	29.32			
Ms, Wet molecular weight of stack gas (lb/lb-mole)	26.51	26.72	28.34			
Cp, Pitot tube coefficient (dimensionless)	0.84	0.84	0.84			
Sq.Rt. dP, Average square root of velocity pressure of stack gas (in. of H2O)	1.1140	1.0600	1.0170			
Ts, Stack temperature (dR)	674	659	671			
As, Cross-sectional area of stack (ft2)	5.940	5.940	5.940			
Qs(std), Dry volumetric stack gas flow rate, standard conditions (dscfm)	15,661	15,399	16,613			
An, Cross-sectional area of nozzle (ft2)	2.64E-04	2.23E-04	2.23E-04			
Ø, Total sampling time (min)	72.0	60.0	72.0			
I, Isokinetic sample rate (percent)	106.24	100.79	91.41			

ANALYTICAL SUMMARY
EPA METHOD 5/8

NAPA
KILN BAGHOUSE STACK

30-Apr-92

	grams			mg H^2SO4		
Run #	Front Half Wash (FHW)	Filterable Particulate (MF)	Condensible Particulate (BHW)	Front Half Sulfate (FHS)	Back Half Sulfate (BHS)	Sulfur Dioxide (SO2)
1	0.01260	0.00350	0.00950	0.00000	0.00000	0.00000
2	0.00110	0.00440	0.00440	0.00000	0.00000	0.00000
3	0.00005	0.00610	0.00660	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

SOURCE TEST CALCULATIONS

NAPA
KILN BAGHOUSE STACK

30–Apr 92
Run No. 1

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	88.0	°F	Static Pressure, Pstatic	–0.48	"H2O
Stack Temperature, Ts	214.0	°F	Barometric Pressure, Pb	29.83	"Hg
SQ.RT. dP	1.1140		Condensate Volume, Vlc	352.1	mℓ
Meter Orifice, dH	1.80	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	55.029	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0030		Duct Width	0.00	inch
Stack Gas Oxygen	14.00	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	3.80	% CO2	Test Time, Ø	72.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.220	inch
Stack Gas Nitrogen	82.20	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)	53.255	dscf
Vw(std) = 0.04715 ft3/g / 528 x [T(std) + 460] x Vlc	16.602	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.238	
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Pstack, in.Hg.)	Lower Bws Value Used 1.000	
% Excess Air = (%O2 – 0.5%CO) / [0.264%N2 – (%O2–0.5%CO)] x 100	181.80	%
Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)]	29.17	lb/lb–mole
Ms = (Md x (1–Bws)) + (18.0 x Bws)	26.51	lb/lb–mole
P(stack) = Pb + [Pstatic / 13.6]	29.79	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	73.89	ft/sec
Qs = vs x As x 60	26,334	acfm
Qs(std) = Qs x (1 – Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	15,661	dscfm
Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4	0.000264	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	106.24	%

SOURCE TEST CALCULATIONS

NAPA
KILN BAGHOUSE STACK

01–May 92
Run No. 2

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	85.0	°F	Static Pressure, Pstatic	–0.48	"H2O
Stack Temperature, Ts	199.0	°F	Barometric Pressure, Pb	29.83	"Hg
SQ.RT. dP	1.0600		Condensate Volume, Vlc	206.4	mℓ
Meter Orifice, dH	1.66	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	35.877	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0030		Duct Width	0.00	inch
Stack Gas Oxygen	14.30	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	3.60	% CO2	Test Time, Ø	60.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.202	inch
Stack Gas Nitrogen	82.10	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)	34.900	dscf
Vw(std) = 0.04715 ft3/g / 528 x [T(std) + 460] x Vlc	9.732	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.218	
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Pstack, in.Hg.)	Lower Bws Value Used 0.772	
% Excess Air =(%O2 – 0.5%CO) / [0.264%N2 – (%O2–0.5%CO)] x 100	193.9?	%
Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)]	29.15	lb/lb–mole
Ms = (Md x (1–Bws)) + (18.0 x Bws)	26.72	lb/lb–mole
P(stack) = Pb + [Pstatic / 13.6]	29.79	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	69.26	ft/sec
Qs = vs x As x 60	24,682	acfm
Qs(std) = Qs x (1 – Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	15,399	dscfm
Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4	0.000223	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	100.79	%

SOURCE TEST CALCULATIONS

NAPA
KILN BAGHOUSE STACK

04–May 92
Run No. 3

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	89.0	°F	Static Pressure, Pstatic	–0.48	"H2O
Stack Temperature, Ts	211.0	°F	Barometric Pressure, Pb	29.86	"Hg
SQ.RT. dP	1.0170		Condensate Volume, Vlc	82.4	mℓ
Meter Orifice, dH	1.52	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	42.402	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0030		Duct Width	0.00	inch
Stack Gas Oxygen	14.30	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	4.70	% CO2	Test Time, Ø	72.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.202	inch
Stack Gas Nitrogen	81.00	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460) .	40.973	dscf
Vw(std) = 0.04715 ft3/g / 528 x [T(std) + 460] x Vlc	3.885	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.087	
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Pstack, in.Hg.)	Lower Bws Value Used 0.984	
% Excess Air = (%O2 – 0.5%CO) / [0.264%N2 – (%O2–0.5%CO)] x 100	201.86	%
Md = (0.44 x %CO2) + (0.32 x %O2) + [0.28 x (%N2 + %CO)]	29.32	lb/lb–mole
Ms = (Md x (1–Bws)) + (18.0 x Bws)	28.34	lb/lb–mole
P(stack) = Pb + [Pstatic / 13.6]	29.82	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	65.07	ft/sec
Qs = vs x As x 60	23,188	acfm
Qs(std) = Qs x (1 – Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd) ...	16,613	dscfm
Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4	0.000223	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	91.41	%

EMISSION CALCULATIONS
PARTICULATE MATTER / SULFUR COMPOUNDS

NAPA
KILN BAGHOUSE STACK

Run No : 1
30-Apr-92

ANALYTICAL DATA

Front Half Wash (FHW)	0.01260 grams
Mass Filter (MF)	0.00350 grams
Back Half Wash (BHW)	0.00950 grams
Front Half Sulfate (FHS)	0.00 mg H^2SO4
Back Half Sulfate (BHS)	0.00 mg H^2SO4
Sulfur Dioxide, (SO2)	0.00 mg H^2SO4

STACK GAS DATA

Vm(std)	53.255 ft3
Vw(std)	16.602 ft3
Qs(std)	15,661 dscfm
Bws	0.238 fraction
O2	14.00 %
CO2	3.80 %

CALCULATION CONSTANTS

Standard Temperature = 68 °F
Oxygen Correction = 15.0 %
1.60982 = Ideal Gas Law Constant
MW of SO2 = 64.062
MW of H2SO4 = 98.076

EMISSION CALCULATIONS

	gr/scf	gr/dscf	gr/dscf @ 12% CO2	lb/hr	lb/MMBtu	ppm dry	ppm @15.0 %O2	ppm wet	lb/dscf
FILTERABLE PARTICULATE	0.0036	0.0047	0.0147	0.63		–	–	–	–
TOTAL PARTICULATE	0.0057	0.0074	0.0234	1.00		–	–	–	–
TOTAL SULFATE	0.0000	0.0000	0.0000	0.00		–	–	–	–
SULFUR DIOXIDE (SO^2)	–	–	–	0.00		0.00	0.00	0.00	0.00E+00
SULFUR (S), from H^2O^2 solution	–	–	–	–		–	–	–	–
SULFUR (S), from IPA solution	–	–	–	–		–	–	–	–
SULFUR (S), Total	–	–	–	–		–	–	–	–

PARTICULATE EQUATIONS

gr/scf = 15.432 grains/gram x (FHW + MF) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram x (FHW + MF) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F-Factor x 0.000143 lb/grain x [20.9 / (20.9 - %O2)] x gr/dscf

TOTAL SULFATE EQUATIONS

gr/scf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F-Factor x 0.000143 lb/grain x [20.9 / (20.9 - %O2)] x gr/dscf

SULFUR DIOXIDE EQUATIONS

ppm = 1.60982 x [T(std) + 460] x (mg H^2SO4) / [98.076 x Vm(std)]
ppm @ 15.0 % O2 = ppm x [(20.9 - 15.0) / (20.9 - %O2 measured)]
ppm (wet) = ppm x (1 - Bws)
lb/hr = (0.00000137 Lb-Mole °R / ft3) x 60 min/hr x Qs(std) x
MW x ppm / [T(std) + 460]
lb/MMBtu = F-Factor x MW x (0.00000137 Lb-Mole °R / ft3) /
[T(Std) + 460]x [20.9 / (20.9 - %O2)] x ppm
lb/dscf = lb/hr / (dscfm x 60 min/hr)

SULFUR EQUATIONS

lb/MMBtu, from H2O2 solution = (lb/MMBtu SO2) / 2
lb/MMBtu, from IPA solution = (lb/MMBtu Total Sulfate) x (32.0 / 98.076)
lb/MMBtu, total sulfur = (H2O2 portion + IPA portion)

EMISSION CALCULATIONS
PARTICULATE MATTER / SULFUR COMPOUNDS

NAPA
KILN BAGHOUSE STACK

Run No : 2
01–May–92

ANALYTICAL DATA		STACK GAS DATA		CALCULATION CONSTANTS
Front Half Wash (FHW)	0.00110 grams	Vm(std)	34.900 ft3	Standard Temperature = 68 °F
Mass Filter (MF)	0.00440 grams	Vw(std)	9.732 ft3	Oxygen Correction = 15.0 %
Back Half Wash (BHW)	0.00440 grams	Qs(std)	15,399 dscfm	1.60982 = Ideal Gas Law Constant
Front Half Sulfate (FHS)	0.00 mg H_2SO_4	Bws	0.218 fraction	MW of SO2 = 64.062
Back Half Sulfate (BHS)	0.00 mg H_2SO_4	O2	14.30 %	MW of H2SO4 = 98.076
Sulfur Dioxide, (SO2)	0.00 mg H_2SO_4	CO2	3.60 %	

EMISSION CALCULATIONS

	gr/scf	gr/dscf	gr/dscf @ 12% CO2	lb/hr	lb/MMBtu	ppm dry	ppm @15.0 %O2	ppm wet	lb/dscf
FILTERABLE PARTICULATE	0.0019	0.0024	0.0081	0.32		–	–	–	–
TOTAL PARTICULATE	0.0034	0.0044	0.0146	0.58		–	–	–	–
TOTAL SULFATE	0.0000	0.0000	0.0000	0.00		–	–	–	–
SULFUR DIOXIDE (SO_2)	–	–	–	0.00		0.00	0.00	0.00	0.00E+00
SULFUR (S), from H_2O_2 solution	–	–	–	–		–	–	–	–
SULFUR (S), from IPA solution	–	–	–	–		–	–	–	–
SULFUR (S), Total	–	–	–	–		–	–	–	–

PARTICULATE EQUATIONS

gr/scf = 15.432 grains/gram x (FHW + MF) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram x (FHW + MF) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F–Factor x 0.000143 lb/grain x [20.9 / (20.9–%O2)] x gr/dscf

TOTAL SULFATE EQUATIONS

gr/scf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F–Factor x 0.000143 lb/grain x [20.9 / (20.9–%O2)] x gr/dscf

SULFUR DIOXIDE EQUATIONS

ppm = 1.60982 x [T(std) + 460] x (mg H_2SO_4) / [98.076 x Vm(std)]
ppm @ 15.0 % O2 = ppm x [(20.9 – 15.0) / (20.9 – %O2 measured)]
ppm (wet) = ppm x (1 – Bws)
lb/hr = (0.00000137 Lb–Mole °R / ft3) x 60 min/hr x Qs(std) x MW x ppm / [T(std) + 460]
lb/MMBtu = F–Factor x MW x (0.00000137 Lb–Mole °R / ft3) / [T(Std) + 460]x [20.9 / (20.9 – %O2)] x ppm
lb/dscf = lb/hr / (dscfm x 60 min/hr)

SULFUR EQUATIONS

lb/MMBtu, from H2O2 solution = (lb/MMBtu SO2) / 2
lb/MMBtu, from IPA solution = (lb/MMBtu Total Sulfate) x (32.0 / 98.076)
lb/MMBtu, total sulfur = (H2O2 portion + IPA portion)

EMISSION CALCULATIONS
PARTICULATE MATTER / SULFUR COMPOUNDS

NAPA
KILN BAGHOUSE STACK

Run No : 3
04-May-92

ANALYTICAL DATA

Front Half Wash (FHW)	0.00005 grams
Mass Filter (MF)	0.00610 grams
Back Half Wash (BHW)	0.00660 grams
Front Half Sulfate (FHS)	0.00 mg H^2SO4
Back Half Sulfate (BHS)	0.00 mg H^2SO4
Sulfur Dioxide, (SO2)	0.00 mg H^2SO4

STACK GAS DATA

Vm(std)	40.973 ft3
Vw(std)	3.885 ft3
Qs(std)	16,613 dscfm
Bws	0.087 fraction
O2	14.30 %
CO2	4.70 %

CALCULATION CONSTANTS

Standard Temperature = 68 °F
Oxygen Correction = 15.0 %
1.60982 = Ideal Gas Law Constant
MW of SO2 = 64.062
MW of H2SO4 = 98.076

EMISSION CALCULATIONS

	gr/scf	gr/dscf	gr/dscf @ 12% CO2	lb/hr	lb/MMBtu	ppm dry	ppm @15.0 %O2	ppm wet	lb/dscf
FILTERABLE PARTICULATE	0.0021	0.0023	0.0059	0.33		–	–	–	–
TOTAL PARTICULATE	0.0044	0.0048	0.0123	0.68		–	–	–	–
TOTAL SULFATE	0.0000	0.0000	0.0000	0.00		–	–	–	–
SULFUR DIOXIDE (SO^2)	–	–	–	0.00		0.00	0.00	0.00	0.00E+00
SULFUR (S), from H^2O^2 solution	–	–	–	–		–	–	–	–
SULFUR (S), from IPA solution	–	–	–	–		–	–	–	–
SULFUR (S), Total	–	–	–	–		–	–	–	–

PARTICULATE EQUATIONS

gr/scf = 15.432 grains/gram x (FHW + MF) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram x (FHW + MF) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F-Factor x 0.000143 lb/grain x [20.9 / (20.9-%O2)] x gr/dscf

TOTAL SULFATE EQUATIONS

gr/scf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F-Factor x 0.000143 lb/grain x [20.9 / (20.9-%O2)] x gr/dscf

SULFUR DIOXIDE EQUATIONS

ppm = 1.60982 x [T(std) + 460] x (mg H^2SO4) / [98.076 x Vm(std)]
ppm @ 15.0 % O2 = ppm x [(20.9 - 15.0) / (20.9 - %O2 measured)]
ppm (wet) = ppm x (1 - Bws)
lb/hr = (0.00000137 Lb-Mole °R / ft3) x 60 min/hr x Qs(std) x
MW x ppm / [T(std) + 460]
lb/MMBtu = F-Factor x MW x (0.00000137 Lb-Mole °R / ft3) /
[T(Std) + 460]x [20.9 / (20.9 - %O2)] x ppm
lb/dscf = lb/hr / (dscfm x 60 min/hr)

SULFUR EQUATIONS

lb/MMBtu, from H2O2 solution = (lb/MMBtu SO2) / 2
lb/MMBtu, from IPA solution = (lb/MMBtu Total Sulfate) x (32.0 / 98.076)
lb/MMBtu, total sulfur = (H2O2 portion + IPA portion)

ES

ENGINEERING–SCIENCE, INC.

Method: EPA 5 — Laboratory Data For Particulate Drydown

Test Date: 4–30–92 & 5–1–92 — Project: NAPA IA

Date Analyzed: 5–7–92 Tech: J.C.

BEAKER/ FILTER #	FRACTION	TOTAL VOLUME (mL)	ALIQUOT FACTOR	GROSS WEIGHT (g)	TARE WEIGHT (g)	NET WEIGHT (mg)	SAMPLE BLANK (mg)	*SAMPLE WEIGHT (mg)
Field Sample ID: Run # 1								
Laboratory Control No: 920504								
6984	Impinger	790	1	126.8443	126.8348	9.5	< 0.05	9.5
6985	Back 1/2	105	1	119.3613	119.3619	<0.05	0.3	<0.05
6986	Front 1/2	40	1	118.1711	118.1572	13.9	1.3	12.6
A91419	Filter	NA	1	7.6467	7.6431	3.6	0.1	3.5
Field Sample ID: Run # 2								
Laboratory Control No: 920505								
7987	Impinger	600	1	122.5334	122.5313	2.1	< 0.05	2.1
6988	Back 1/2	140	1	118.4098	118.4072	2.6	0.3	2.3
6989	Front 1/2	27	1	120.2963	120.2939	2.4	1.3	1.1
A91418	Filter	NA	1	7.6474	7.6429	4.5	0.1	4.4
Field Sample ID: Run # 3								
Laboratory Control No: 920506								
6990	Impinger	533	1	123.6570	123.6513	5.7	< 0.05	5.7
6991	Back 1/2	69	1	112.6118	112.6106	1.2	0.3	0.9
6992	Front 1/2	40	1	117.5136	117.5134	0.2	1.3	<0.05
A91425	Filter	NA	1	7.7310	7.7248	6.2	0.1	6.1
Field Sample ID: Sample Blank								
Laboratory Control No: 920507								
7021	Impinger	200	1	122.5038	122.5040	<0.05		
7016	Back 1/2	150	1	112.7050	112.7047	0.3		
7017	Front 1/2	150	1	126.4819	126.4806	1.3		
A91433	Filter	NA	1	7.7262	7.7261	0.1		

* Sample Weight = (Net Weight)(Aliquot Factor) − Sample Blank

Data Checked By: JL Date: 6-9-92

ES ENGINEERING-SCIENCE, INC.

Client NAPA | Job No. | Sheet of
Subject % EXCESS AIR , PM | By CNM | Date
METHOD 5 (EPA) | Checked | Rev.

FORMULA:

$$\% \text{ EXCESS AIR} = \frac{(\% O_2 - 0.5\ \% CO)}{[0.264\ \% N_2 - (\% O_2 - 0.5\ \% CO)]} \times 100$$

FOR RUN # 1: $\% O_2 = 140$; $\% CO = \emptyset$; $\% N_2 = 82.20$;

$$\% \text{ EXCESS AIR} = \frac{(14.0 - 0.5 \times \emptyset)}{[0.264(82.20) - (140 - 0.5 \times \emptyset)]} \times 100 = 181.80 ✓$$

FOR RUN # 2: $\% O_2 = 14.30$; $\% CO = \emptyset$; $\% N_2 = 82.10$

$$\% \text{ EXCESS AIR} = \frac{[14.30 - 0.5(\emptyset)]}{[0.264(82.10) - (14.30 - 0.5(\emptyset))]} \times 100 = 193.91 ✓$$

FOR RUN # 3: $\% O_2 = 14.30$; $\% CO = \emptyset$; $\% N_2 = 81.00$

$$\% \text{ EXCESS AIR} = \frac{[14.30 - 0.5(\emptyset)]}{[0.264(81.00) - (14.30 - 0.5(\emptyset))]} \times 100 = 201.86 ✓$$

EPA 5

72 min

= 3 min

K = 1.43

ENGINEERING-SCIENCE,INC.

FIELD DATA

PAGE 1 OF 2

PLANT NAPA
DATE 4-30-92
TEST SITE STACK OUTLET
RUN NUMBER 1 PM
OPERATORS CHM, CH

AMBIENT TEMP. 75
BAROMETER 29.83
STACK PRESSURE -0.48
STACK H2O 20%
STACK I.D. 33"

METER ΔH @ 1.88
METER GAMMA 1.003
METER BOX # BROWN II
NOZZLE DIAMETER 0.[illegible]
PROBE LENGTH 5'

PROBE MAT'L GLASS
FILTER NUMBER
SAMPLE BOX #
PRE LEAK 0.009 @ 15" Hg
POST LEAK

H

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP. (4)	METER INLET (6)	METER OUTLET (7)	IMPINGER (3)	FILTER (5)	PUMP VAC. "HG
1	0	0835	702.714	1.1	1.57	1.6	202	79	77	57	241	6
2	3	0838	704.7	1.2	1.72	1.7	208	81	78	58	244	8
3	6	0841	706.9	1.2	1.72	1.7	210	83	78	56	249	8
4	9	0844	709.1	1.2	1.72	1.7	211	85	78	54	253	8
5	12	0847	711.3	1.3	1.86	1.9	211	86	79	56	266	9
6	15	0850	713.5	1.3	1.86	1.9	210	87	79	58	251	9
7	18	0853	715.8	1.6	2.29	2.3	211	88	80	59	244	10
8	21	0856	718.2	1.4	2.00	2.0	211	89	81	59	246	9
9	24	0859	720.6	1.3	1.86	1.9	210	90	81	60	238	9
10	27	0902	722.9	1.3	1.86	1.9	210	90	81	60	257	9
11	30	0905	725.2	1.1	1.56	1.6	212	90	82	61	255	8
12	33	0908	727.5	1.1	1.57	1.6	212	91	82	62	255	8
	36	0911	729.865									
AVERAGE /SUM												

1 PM EPA 5

K = 1.43

ENGINEERING-SCIENCE, INC.

PLANT NAPA
SOURCE STACK OUTLET
DATE 4-30-92
POST LEAK RATE .003 @ 10 in Vac

PAGE 2 OF 2

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O)		TEMPERATURES					PUMP VAC. "HG
					DESIRED	ACTUAL	STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	
1	36	0916	729.865	1.1	1.57	1.6	212	86	83	62	255	8
2	39	0919	733.1	1.1	1.57	1.6	221	90	84	63	240	8
3	42	0922	736.0	1.2	1.72	1.7	223	91	85	64	243	8
4	45	0925	738.2	1.2	1.72	1.7	224	93	86	66	231	8
5	48	0928	740.2	1.2	1.72	1.7	225	94	86	68	231	8
6	51	0931	742.4	1.4	2.0	2.0	224	95	87	69	233	10
7	54	0933	744.5	1.6	2.3	2.3	221	95	87	72	231	10
8	57	0936	746.8	1.6	2.3	2.3	219	97	88	73	227	10
9	60	0939	749.2	1.1	1.57	1.6	217	97	88	77	222	8
10	63	0942	751.4	1.1	1.57	1.6	215	97	89	77	228	8
11	66	0945	753.6	1.1	1.57	1.6	213	96	89	76	223	8
12	69	0948	755.5	1.1	1.57	1.6	212	96	89	75	225	8
	72	0951	757.7	1.6	1.5	1.6						
AVERAGE /SUM	72		53.029	1.114		1.80	214	88				

E

BIAS #2

ENGINEERING-SCIENCE,INC.

FIELD DATA

PLANT NAPA
DATE 5-1-92
TEST SITE KILN STACK
RUN NUMBER 2 BIAS
OPERATORS RRJ

AMBIENT TEMP. 82°F
BAROMETER 29.83
STACK PRESSURE -0.48
STACK H2O 20%
STACK I.D. 32"

METER ΔH @ 1.88
METER GAMMA 1.003
METER BOX # BROWN II
NOZZLE DIAMETER 0.202
PROBE LENGTH 6'

PROBE MAT'L QUARTZ
FILTER NUMBER
SAMPLE BOX #
PRE LEAK 0.008 @ 15"HG
POST LEAK 0.010 @ 15"HG

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	0	1109 1/2	985.662	1.05	1.54	1.6	185	81	83	67	243	8
2	2.5	1112	987.3	1.05	1.54	1.6	190	81	83	67	240	8
3	5	1114 1/2	988.6	1.10	1.62	1.6	190	81	84	65	238	12
4	7.5	1116	990.0	1.2	1.77	1.8	198	82	85	65	237	12
5	10	1118 1/2	991.4	1.2	1.77	1.8	197	82	85	65	237	12
6	12.5	1120	992.5	1.3	1.92	1.9	198	83	84	64	237	12
7	15	1122 1/2	993.1	1.3	1.92	1.9	198	84	87	60	232	15
8	17.5	1125	994.8	1.3	1.92	1.9	198	84	87	60	230	15
9	20	1127 1/2	995.1	1.0	1.48	1.5	199	84	87	62	231	12
10	22.5	1130	996.7	1.0	1.48	1.5	197	84	87	62	230	12
11	25	1132 1/2	998.1	1.0	1.48	1.5	200	84	87	62	230	12
12	27 1/2	1135	999.7	1.1	1.62	1.6	196	84	87	65	241	13
	30	1137 1/2	1.920	PORT	CHANGE							
AVERAGE /SUM												

EPA 5.2 1 K

ENGINEERING-SCIENCE,INC.

FIELD DATA

PAGE 1 OF 2

PLANT NAPA
DATE 3/1/92
TEST SITE Stack Outlet
RUN NUMBER 2 EPA 5
OPERATORS RA

AMBIENT TEMP. 82°
BAROMETER 29.83
STACK PRESSURE
STACK H2O 3%
STACK I.D. 32"

METER ΔH @ 1.88
METER GAMMA 1.003
METER BOX # Brown 7
NOZZLE DIAMETER 0.202
PROBE LENGTH 4 ft

PROBE MAT'L Quartz
FILTER NUMBER
SAMPLE BOX #
PRE LEAK 0.008 @ 15Hg
POST LEAK 0.010 @ 15Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	30	1140	1.3	1.0	1.44	1.5	200	82	85	61	236	10
2	32.5	1142½	2.1	0.99	1.42	1.4	201	82	86	60	230	10
3	35	1145	3.8	0.99	1.42	1.4	201	81	84	60	229	10
4	37.5	1147½	4.6	1.3	1.86	1.9	201	83	87	62	236	14
5	40	1150	5.9	1.3	1.86	1.9	201	83	88	63	237	14
6	42.5	1152½	009.1	1.4	2.00	2.0	204	88	88	63	240	14
7	45	1155	010.8	1.3	1.86	1.9	204	85	89	63	243	14
8	47.5	1157.5	012.6	1.2	1.77	1.8	205	85	89	63	251	14
9	50.0	1200.0	014.3	1.0	1.48	1.5	205	85	89	63	257	14
10	52.5	1202.5	016.2	1.0	1.48	1.5	206	86	90	63	260	12
11	55.0	1205.0	017.9	0.99	1.42	1.4	206	86	90	64	261	12
12	57.5	1207.5	019.8	0.99	1.42	1.4	205	86	90	64	265	12
	60.0	1210.0	021.539									
			End		Run							
AVERAGE /SUM	60		35.877	1.060		1.66	199	85				

30

EPA 5 #3 K = 1.48

ENGINEERING-SCIENCE, INC.

FIELD DATA

PLANT NAPA
DATE 5/4/92
TEST SITE KILN STACK OUTLET
RUN NUMBER 3 PM
OPERATORS CH

AMBIENT TEMP. 85°
BAROMETER 29.86
STACK PRESSURE -0.48
STACK H2O 20%
STACK I.D. 32"

METER ΔH @ 1.88
METER GAMMA 1.003
METER BOX # Brown III
NOZZLE DIAMETER .202
PROBE LENGTH 5'

PROBE MAT'L Quartz
FILTER NUMBER
SAMPLE BOX #
PRE LEAK 0.005 @ 15 in
POST LEAK

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
			138.878									
1	0	1120	138.878	0.94	1.39	1.4	204	91	91	56	256	9
2	3	1123	140.1	1.0	1.48	1.5	207	91	91	56	261	10
3	6	1126	143.5	1.0	1.48	1.5	208	92	91	56	267	10
4	9	1129	145.6	1.1	1.63	1.6	209	92	91	57	271	10
5	12	1132	147.8	1.3	1.92	1.9	210	92	91	57	264	10
6	15	1135	149.7	1.2	1.78	1.8	211	93	91	58	260	10
7	18	1138	151.7	1.1	1.63	1.6	213	93	92	57	255	10
8	21	1141	153.6	1.0	1.48	1.5	215	91	92	57	247	10
9	24	1144	154.9	1.0	1.48	1.5	215	88	89	58	251	10
10	27	1147	155.7	1.1	1.48	1.5	216	88	88	57	247	10
11	30	1150	157.8	0.96	1.42	1.4	218	87	87	56	243	10
12	33	1153	158.48	~~0.96~~	~~1.42~~	~~1.4~~	~~217~~	~~87~~ 87	~~88~~	~~56~~	~~249~~	10
	36	1156	159.67	—	PORT			CHANGE				
AVERAGE /SUM												

EPA 5 #3

K = 1.48

ENGINEERING-SCIENCE,INC.

PLANT NAPA
SOURCE STACK OUTLET
DATE 5-4-92
POST LEAK RATE 0.007@12" Hg

PAGE 2 OF 2

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE (DELTA H, "H2O) ACTUAL	TEMPERATURES STACK TEMP.	TEMPERATURES METER INLET	TEMPERATURES METER OUTLET	TEMPERATURES IMPINGER	TEMPERATURES FILTER	PUMP VAC. "HG
1	36	1200	159.867	0.97	1.44	1.4	212	85	84	53	241	8
2	39	1203	161.9[illegible]	0.98	1.45	1.4	214	86	86	53	239	8
3	42	1206	163.2	1.0	1.48	1.5	214	86	87	54	247	8
4	45	1209	164.8	1.1	1.63	1.6	215	87	87	55	241	9
5	48	1212	166.7	1.2	1.78	1.8	213	87	87	55	237	9
6	51	1215	170.1	1.1	1.63	1.6	210	87	87	56	240	9
7	54	1218	171.9	1.0	1.48	1.5	210	87	87	56	237	9
8	57	1221	173.7	0.96	1.42	1.4	210	88	87	57	241	8
9	60	1224	175.9	0.97	1.44	1.4	211	88	87	57	244	8
10	63	1227	177.5	0.98	1.45	1.4	209	89	87	57	249	8
11	66	1230	179.4	0.97	1.44	1.4	206	88	87	58	254	8
12	69	1233	180.9	0.96	1.42	1.4	207	88	87	57	241	8
	72	1236	[illegible]	END	RUN	#3						
AVERAGE /SUM	72		42.482	1.017		1.52	211	89				

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 4-30-92

FACILITY NAPA IA

ES NO. 920504

RUN NO. 1 METHOD 5

TYPE PART.

IMP SOLN H_2O

	SOLUTION	VOL.(ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1	H_2O	420	100	320
IMPINGER# 2	H_2O	110	100	10
IMPINGER# 3	MT	0	0	0
IMPINGER#				
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL(g)	
SILICA GEL		810.9	788.8	22.1
FILTER # DESCRIPTION			TOTAL MOISTURE	

TOTAL MOISTURE: 352.1 (g)

COMMENTS

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 5-1-92

RUN NO. 2 METHOD 5

FACILITY Napa 7A

TYPE Part.

ES NO. 920505

IMP SOLN H_2O

SOLUTION	VOL.(ml.)	DESCRIPTION
NOZ.PROBE.RINSE		
UMBILICAL RINSE		

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1	H_2O	280	100	180
IMPINGER# 2	H_2O	100	100	0
IMPINGER# 3	MT	0	0	0
IMPINGER#				
DESCRIPTION				
IMPINGER RINSE				

	FINAL (g)	INITIAL(g)	
SILICA GEL	907.8	881.4	26.4
FILTER # DESCRIPTION		TOTAL MOISTURE	
		206.4 (g)	

COMMENTS

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 5-4-92
FACILITY Napa
ES NO. 920506

RUN NO. 3 METHOD 5
TYPE PM
IMP SOLN H_2O

	SOLUTION	VOL.(ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1	H_2O	160	100	60
IMPINGER# 2	H_2O	96	100	-4
IMPINGER# 3	Mt	0	0	0
IMPINGER#				
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL(g)	
SILICA GEL		655.7	629.3	26.4
FILTER # DESCRIPTION			TOTAL MOISTURE	

82.4 (g)

COMMENTS

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

POST TEST METER BOX CALIBRATION FORM

METER BOX NO. Brown II DATE 05-26-92 CALIBRATED BY D Marsden

BAROMETRIC PRESSURE 29.39 AMBIENT TEMP. 68 PRE TEST YI 1.003

PROJECT NAME NAPA PROJECT NO. ______ H RUN 2.3 VACUUM 17

ORIFICE MANOMETER (IN H2O) DELTA H	GAS VOLUME		TEMPERATURES		TIME (MINUTES)	YI	H@I
	WET TEST METER (CU. FT.) Vw	DRY GAS METER (CU. FT.) Vd	WET TEST METER (DEG. F.) Tw	DRY GAS METER (DEG. F.) Td	TI		
2.3	12.757	12.691	69	73	15	1.006	—
2.3	16.120	16.098	70	74	19	1.003	—
2.3	12.727	12.716	70	76	15	1.006	—

YI AVERAGE 1.005

METER BOX CALIBRATION HISTORY

LAST CALIBRATION DATE 04-02-92 CALIBRATED BY D MARSDEN

H@ OF CALIBRATION 1.88 YI OF CALIBRATION 1.003

NOTES:

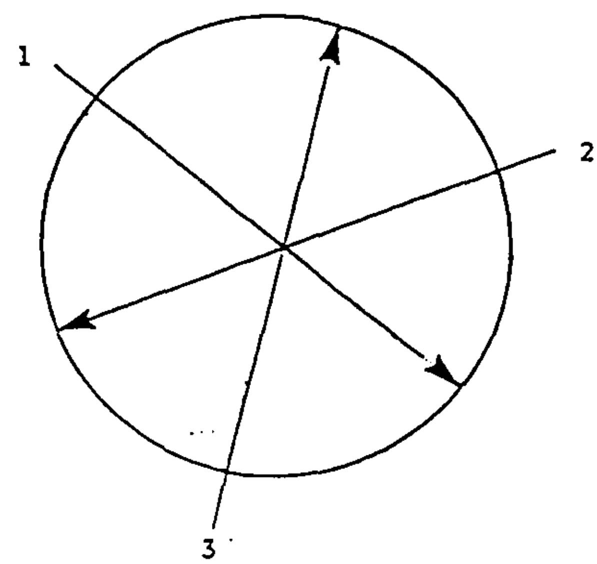
NOZZLE CALIBRATION

Source: NAPA.

Date of Source Test: 05-01-92

Sampling Method: METHOD 5

Pollutant: P.M.



Nozzle Measurement Data:

Diameter #1 0.2205 inches

Diameter #2 0.2195 inches

Diameter #3 0.220 inches

Average 0.220 inches

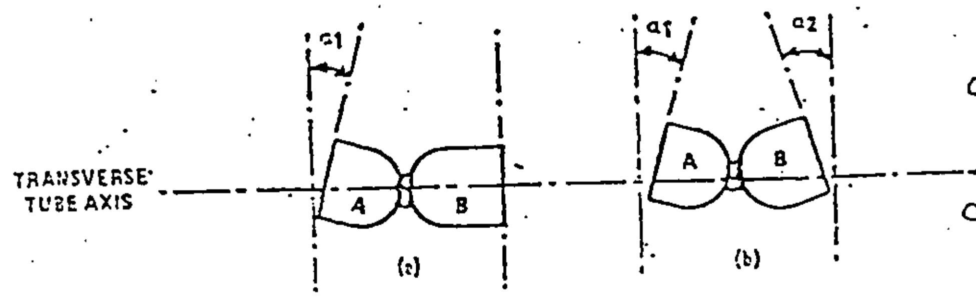
Note: (1) Measure nozzle to nearest 0.001 inches

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

QUARTZ.

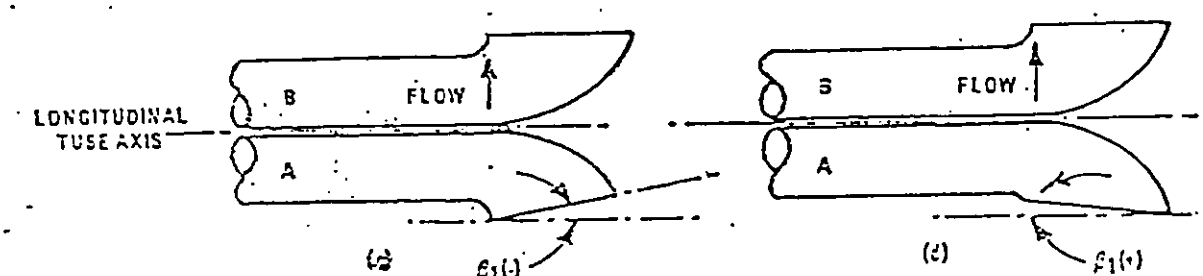
PITOT TUBE CALIBRATION S/N PROBE # 84 DATE 03-05-92

CAL. BY [signature]



a_1 1°

a_2 0°



β_1 + 1°

β_2 + 1°

Z — (< 0.32 CM)

W — (< 0.08 CM)

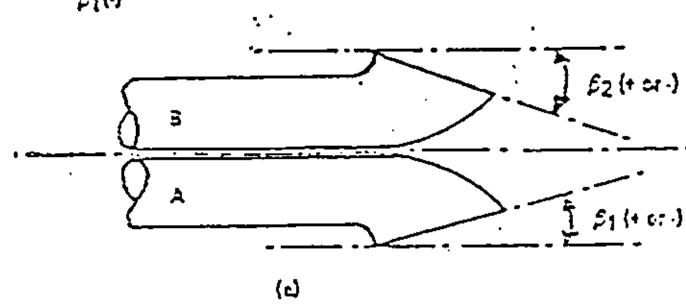
Dt 0.95 CM

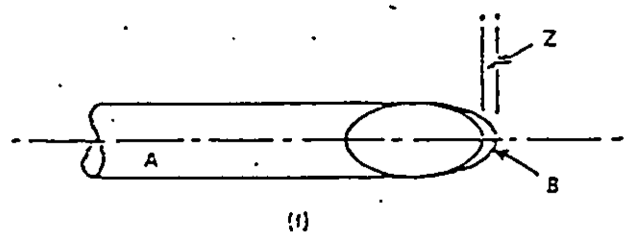
PA + PB 2.38 CM

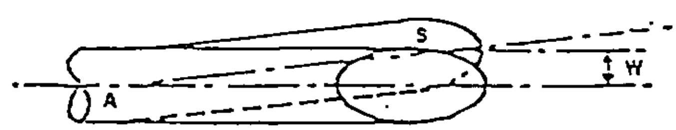
$P = \frac{PA + PB}{2}$ · 1.195

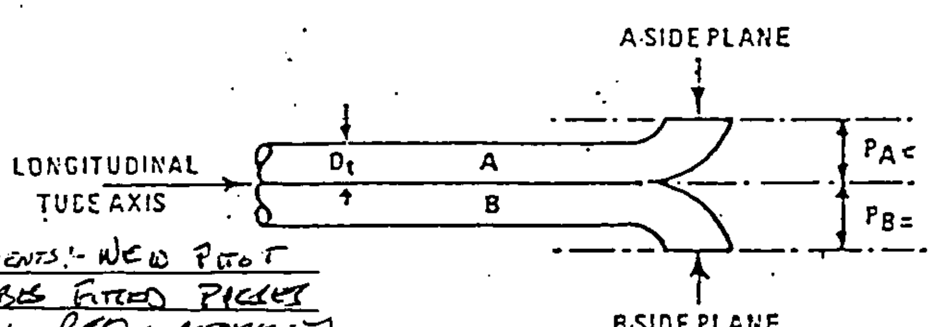
0.998 ≤ 1.195 ≤ 1.425

NOTE :- (1.05 Dt ≤ P ≤ 1.50 DT)









NOTE:

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

$P_A = P_B$

COMMENTS :- NEW PITOT TUBES FITTED PASSES ALL REQUIREMENTS

[signature]

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 03-05-92
BAROMETRIC PRESSURE 29.45
CALIBRATED BY D [signature]
THERMOCOUPLE NO. GLASS # 84
AMBIENT TEMPERATURE 65
REFERENCE: MERCURY IN GLASS ASTM/3C
OTHER

REFERENCE POINT NUMBER	SOURCE (SPECIFY)	REFERENCE THERMOMETER TEMPERATURE (°C)	THERMOCOUPLE POTENTIOMETER TEMPERATURE (°F)	(°C)	DIFFERENCE (%)
	MUFFLE FURNACE	245	471		
		245	471		
		245	471		
	AVERAGE	245	471	243.89	0.22%
0.0°C	ICE WATER	-0.5	30		
		0.0	31		
		0.0	31		
	AVERAGE	-0.17	30.67	0.74	0.21%
100°C	BOILING WATER	100	211		
		100	211		
		100	211		
	AVERAGE	100	211	99.44	0.15%

$$\text{DIFF.} = \frac{(\text{REF. TEMP} + 273) - (\text{TEST TEMP.} + 273)}{(\text{REF. TEMP.} + 273)} \times 100$$

APPENDIX B

EPA METHOD 202
PARTICULATE MATTER & CONDENSIBLES

FIELD DATA SUMMARY

NAPA--METHOD 202
KILN BAGHOUSE STACK

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
Vlc, Volume of water vapor condensed in impingers and silica gel	363.2	210.0	322.8			
Vm, Dry gas volume as measured by dry gas meter (dcf)	54.302	57.381	57.768			
y, Dry gas meter calibration factor (dimensionless)	1.003	1.005	1.003			
Pb, Barometric Pressure at sampling site (in. Hg)	29.83	29.83	29.86			
Ps, Absolute stack gas pressure (in. Hg.)	29.79	29.79	29.82			
dH, Average pressure differential across the orifice meter (in. H2O)	1.86	1.90	1.71			
Tm, Meter temperature (dR)	552.00	549.00	545.00			
Vm(std), Dry gas volume as measured by dry gas meter, corrected to standard conditions (dscf)	52.178	55.554	56.257			
Bws, Water vapor in the gas stream, proportion by volume (dimensionless)	0.247	0.151	0.213			
%CO2, Percent carbon dioxide by volume (dry basis)	3.80	3.60	4.70			
%O2, Percent oxygen by volume (dry basis)	14.00	14.30	14.30			
Md, Dry molecular weight of stack gas (lb/lb-mole)	29.17	29.15	29.32			
Ms, Wet molecular weight of stack gas (lb/lb-mole)	26.41	27.46	26.91			
Cp, Pitot tube coefficient (dimensionless)	0.84	0.84	0.84			
Sq.Rt. dP, Average square root of velocity pressure of stack gas (in. of H2O)	1.1340	1.1440	1.0690			
Ts, Stack temperature (dR)	665	668	665			
As, Cross-sectional area of stack (ft2)	5.940	5.940	5.940			
Qs(std), Dry volumetric stack gas flow rate, standard conditions (dscfm)	15,882	17,672	15,512			
An, Cross-sectional area of nozzle (ft2)	2.76E-04	2.76E-04	2.76E-04			
Ø, Total sampling time (min)	72.0	72.0	72.0			
I, Isokinetic sample rate (percent)	98.13	93.91	108.33			

SOURCE TEST CALCULATIONS

NAPA--METHOD 202	30-Apr 92
KILN BAGHOUSE STACK	Run No. 1

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	92.0	°F	Static Pressure, Pstatic	-0.48	"H2O
Stack Temperature, Ts	205.0	°F	Barometric Pressure, Pb	29.83	"Hg
SQ.RT. dP	1.1340		Condensate Volume, Vlc	363.2	mℓ
Meter Orifice, dH	1.86	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	54.302	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0030		Duct Width	0.00	inch
Stack Gas Oxygen	14.00	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	3.80	% CO2	Test Time, Ø	72.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.225	inch
Stack Gas Nitrogen	82.20	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)	52.178	dscf
Vw(std) = 0.04715 ft3/g / 528 x [T(std) + 460] x Vlc	17.125	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.247	
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Pstack, in.Hg.)	Lower Bws Value Used 0.873	
% Excess Air =(%O2 - 0.5%CO) / [0.264%N2 - (%O2-0.5%CO)] x 100	181.6	%
Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)]	29.17	lb/lb-mole
Ms = (Md x (1-Bws)) + (18.0 x Bws)	26.41	lb/lb-mole
P(stack) = Pb + [Pstatic / 13.6]	29.79	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	74.86	ft/sec
Qs = vs x As x 60	26,680	acfm
Qs(std) = Qs x (1 - Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	15,882	dscfm
Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4	0.000276	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	98.13	%

SOURCE TEST CALCULATIONS

NAPA--METHOD 202
KILN BAGHOUSE STACK

01-May 92
Run No. 2

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	89.0	°F	Static Pressure, Pstatic	-0.48	"H2O
Stack Temperature, Ts	208.0	°F	Barometric Pressure, Pb	29.83	"Hg
SQ.RT. dP	1.1440		Condensate Volume, Vlc	210.0	mℓ
Meter Orifice, dH	1.90	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	57.381	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0050		Duct Width	0.00	inch
Stack Gas Oxygen	14.30	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	3.60	% CO2	Test Time, Ø	72.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.225	inch
Stack Gas Nitrogen	82.10	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460) .. 55.554 dscf

Vw(std) = 0.04715 ft3/g / 528 x [T(std) + 460] x Vlc .... 9.902 scf

Bws = Vw(std) / [Vm(std) + Vw(std)] 0.151

Bws @ Saturated Conditions = Vapor Press. of H2O
@ Dew Point Temp. / (Pstack, in.Hg.) .... Lower Bws Value Used 0.927

% Excess Air =(%O2 - 0.5%CO) / [0.264%N2 - (%O2-0.5%CO)] x 100 ...... 192.0 %

Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)] .... 29.15 lb/lb-mole

Ms = (Md x (1-Bws)) + (18.0 x Bws) .... 27.46 lb/lb-mole

P(stack) = Pb + [Pstatic / 13.6] .... 29.79 "Hg

vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))] .... 74.23 ft/sec

Qs = vs x As x 60 .... 26,453 acfm

Qs(std) = Qs x (1 - Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd) ... 17,672 dscfm

Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4 .... 0.000276 ft2

I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 /
[Ø x P(stack) x An x vs x 60] .... 93.91 %

SOURCE TEST CALCULATIONS

NAPA--METHOD 202
KILN BAGHOUSE STACK

04-May 92
Run No. 3

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	85.0	°F	Static Pressure, Pstatic	-0.48	"H2O
Stack Temperature, Ts	205.0	°F	Barometric Pressure, Pb	29.86	"Hg
SQ.RT. dP	1.0690		Condensate Volume, Vlc	322.8	mℓ
Meter Orifice, dH	1.71	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	57.768	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0030		Duct Width	0.00	inch
Stack Gas Oxygen	14.30	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	4.70	% CO2	Test Time, Ø	72.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.225	inch
Stack Gas Nitrogen	81.00	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)	56.257	dscf
Vw(std) = 0.04715 ft3/g / 528 x [T(std) + 460] x Vlc	15.220	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.213	
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Pstack, in.Hg.)	Lower Bws Value Used 0.872	
% Excess Air =(%O2 - 0.5%CO) / [0.264%N2 - (%O2-0.5%CO)] x 100	201.9	%
Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)]	29.32	lb/lb-mole
Ms = (Md x (1-Bws)) + (18.0 x Bws)	26.91	lb/lb-mole
P(stack) = Pb + [Pstatic / 13.6]	29.82	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	69.87	ft/sec
Qs = vs x As x 60	24,901	acfm
Qs(std) = Qs x (1 - Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	15,512	dscfm
Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4	0.000276	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	108.33	%

ANALYTICAL SUMMARY
EPA METHOD 5/8

NAPA
KILN BAGHOUSE STACK

30-Apr-92

	grams			mg H_2SO_4		
Run #	Front Half Wash (FHW)	Filterable Particulate (MF)	Condensible Particulate (BHW)	Front Half Sulfate (FHS)	Back Half Sulfate (BHS)	Sulfur Dioxide (SO2)
1	0.00009	0.00380	0.00220	0.00000	0.00000	0.00000
2	0.00160	0.00000	0.00005	0.00000	0.00000	0.00000
3	0.01180	0.00008	0.01150	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EMISSION CALCULATIONS
PARTICULATE MATTER / SULFUR COMPOUNDS

NAPA
KILN BAGHOUSE STACK

Run No : 1
30-Apr-92

ANALYTICAL DATA

Front Half Wash (FHW)	0.00009 grams
Mass Filter (MF)	0.00380 grams
Back Half Wash (BHW)	0.00220 grams
Front Half Sulfate (FHS)	0.00 mg H^2SO4
Back Half Sulfate (BHS)	0.00 mg H^2SO4
Sulfur Dioxide, (SO2)	0.00 mg H^2SO4

STACK GAS DATA

Vm(std)	52.178 ft3
Vw(std)	17.125 ft3
Qs(std)	15,882 dscfm
Bws	0.247 fraction
O2	14.00 %
CO2	3.80 %

CALCULATION CONSTANTS

Standard Temperature = 68 °F
Oxygen Correction = 15.0 %
1.60982 = Ideal Gas Law Constant
MW of SO2 = 64.062
MW of H2SO4 = 98.076

EMISSION CALCULATIONS

	gr/scf	gr/dscf	gr/dscf @ 12% CO2	lb/hr	lb/MMBtu	ppm dry	ppm @15.0 %O2	ppm wet	lb/dscf
FILTERABLE PARTICULATE	0.0009	0.0012	0.0036	0.16		–	–	–	–
TOTAL PARTICULATE	0.0014	0.0018	0.0057	0.25		–	–	–	–
TOTAL SULFATE	0.0000	0.0000	0.0000	0.00		–	–	–	–
SULFUR DIOXIDE (SO^2)	–	–	–	0.00		0.00	0.00	0.00	0.00E+00
SULFUR (S), from H^2O^2 solution	–	–	–	–		–	–	–	–
SULFUR (S), from IPA solution	–	–	–	–		–	–	–	–
SULFUR (S), Total	–	–	–	–		–	–	–	–

PARTICULATE EQUATIONS

gr/scf = 15.432 grains/gram x (FHW + MF) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram x (FHW + MF) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F-Factor x 0.000143 lb/grain x [20.9 / (20.9-%O2)] x gr/dscf

TOTAL SULFATE EQUATIONS

gr/scf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F-Factor x 0.000143 lb/grain x [20.9 / (20.9-%O2)] x gr/dscf

SULFUR DIOXIDE EQUATIONS

ppm = 1.60982 x [T(std) + 460] x (mg H^2SO4) / [98.076 x Vm(std)]
ppm @ 15.0 % O2 = ppm x [(20.9 - 15.0) / (20.9 - %O2 measured)]
ppm (wet) = ppm x (1 - Bws)
lb/hr = (0.00000137 Lb-Mole °R / ft3) x 60 min/hr x Qs(std) x
MW x ppm / [T(std) + 460]
lb/MMBtu = F-Factor x MW x (0.00000137 Lb-Mole °R / ft3) /
[T(Std) + 460]x [20.9 / (20.9 - %O2)] x ppm
lb/dscf = lb/hr / (dscfm x 60 min/hr)

SULFUR EQUATIONS

lb/MMBtu, from H2O2 solution = (lb/MMBtu SO2) / 2
lb/MMBtu, from IPA solution = (lb/MMBtu Total Sulfate) x (32.0 / 98.076)
lb/MMBtu, total sulfur = (H2O2 portion + IPA portion)

EMISSION CALCULATIONS
PARTICULATE MATTER / SULFUR COMPOUNDS

NAPA
KILN BAGHOUSE STACK

Run No : 2
01-May-92

ANALYTICAL DATA		STACK GAS DATA		CALCULATION CONSTANTS
Front Half Wash (FHW)	0.00160 grams	Vm(std)	55.554 ft3	Standard Temperature = 68 °F
Mass Filter (MF)	0.00000 grams	Vw(std)	9.902 ft3	Oxygen Correction = 15.0 %
Back Half Wash (BHW)	0.00005 grams	Qs(std)	17,672 dscfm	1.60982 = Ideal Gas Law Constant
Front Half Sulfate (FHS)	0.00 mg H^2SO4	Bws	0.151 fraction	MW of SO2 = 64.062
Back Half Sulfate (BHS)	0.00 mg H^2SO4	O2	14.30 %	MW of H2SO4 = 98.076
Sulfur Dioxide, (SO2)	0.00 mg H^2SO4	CO2	3.60 %	

EMISSION CALCULATIONS

	gr/scf	gr/dscf	gr/dscf @ 12% CO2	lb/hr	lb/MMBtu	ppm dry	ppm @15.0 %O2	ppm wet	lb/dscf
FILTERABLE PARTICULATE	0.0004	0.0004	0.0015	0.07		–	–	–	–
TOTAL PARTICULATE	0.0004	0.0005	0.0015	0.07		–	–	–	–
TOTAL SULFATE	0.0000	0.0000	0.0000	0.00		–	–	–	–
SULFUR DIOXIDE (SO^2)	–	–	–	0.00		0.00	0.00	0.00	0.00E+00
SULFUR (S), from H^2O^2 solution	–	–	–	–		–	–	–	–
SULFUR (S), from IPA solution	–	–	–	–		–	–	–	–
SULFUR (S), Total	–	–	–	–		–	–	–	–

PARTICULATE EQUATIONS
gr/scf = 15.432 grains/gram x (FHW + MF) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram x (FHW + MF) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F-Factor x 0.000143 lb/grain x [20.9 / (20.9-%O2)] x gr/dscf

TOTAL SULFATE EQUATIONS
gr/scf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F-Factor x 0.000143 lb/grain x [20.9 / (20.9-%O2)] x gr/dscf

SULFUR DIOXIDE EQUATIONS
ppm = 1.60982 x [T(std) + 460] x (mg H^2SO4) / [98.076 x Vm(std)]
ppm @ 15.0 % O2 = ppm x [(20.9 - 15.0) / (20.9 - %O2 measured)]
ppm (wet) = ppm x (1 - Bws)
lb/hr = (0.00000137 Lb-Mole °R / ft3) x 60 min/hr x Qs(std) x MW x ppm / [T(std) + 460]
lb/MMBtu = F-Factor x MW x (0.00000137 Lb-Mole °R / ft3) / [T(Std) + 460]x [20.9 / (20.9 - %O2)] x ppm
lb/dscf = lb/hr / (dscfm x 60 min/hr)

SULFUR EQUATIONS
lb/MMBtu, from H2O2 solution = (lb/MMBtu SO2) / 2
lb/MMBtu, from IPA solution = (lb/MMBtu Total Sulfate) x (32.0 / 98.076)
lb/MMBtu, total sulfur = (H2O2 portion + IPA portion)

EMISSION CALCULATIONS
PARTICULATE MATTER / SULFUR COMPOUNDS

NAPA
KILN BAGHOUSE STACK

Run No : 3
04–May–92

ANALYTICAL DATA

Front Half Wash (FHW)	0.01180 grams
Mass Filter (MF)	0.00008 grams
Back Half Wash (BHW)	0.01150 grams
Front Half Sulfate (FHS)	0.00 mg H^2SO4
Back Half Sulfate (BHS)	0.00 mg H^2SO4
Sulfur Dioxide, (SO2)	0.00 mg H^2SO4

STACK GAS DATA

Vm(std)	56.257 ft3
Vw(std)	15.220 ft3
Qs(std)	15,512 dscfm
Bws	0.213 fraction
O2	14.30 %
CO2	4.70 %

CALCULATION CONSTANTS

Standard Temperature = 68 °F
Oxygen Correction = 15.0 %
1.60982 = Ideal Gas Law Constant
MW of SO2 = 64.062
MW of H2SO4 = 98.076

EMISSION CALCULATIONS

			gr/dscf			ppm			
	gr/scf	gr/dscf	@ 12% CO2	lb/hr	lb/MMBtu	dry	@15.0 %O2	wet	lb/dscf
FILTERABLE PARTICULATE	0.0026	0.0033	0.0083	0.43		–	–	–	–
TOTAL PARTICULATE	0.0050	0.0064	0.0164	0.85		–	–	–	–
TOTAL SULFATE	0.0000	0.0000	0.0000	0.00		–	–	–	–
SULFUR DIOXIDE (SO^2)	–	–	–	0.00		0.00	0.00	0.00	0.00E+00
SULFUR (S), from H^2O^2 solution	–	–	–	–		–	–	–	–
SULFUR (S), from IPA solution	–	–	–	–		–	–	–	–
SULFUR (S), Total	–	–	–	–		–	–	–	–

PARTICULATE EQUATIONS

gr/scf = 15.432 grains/gram x (FHW + MF) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram x (FHW + MF) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F–Factor x 0.000143 lb/grain x [20.9 / (20.9–%O2)] x gr/dscf

TOTAL SULFATE EQUATIONS

gr/scf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / [Vm(std) + Vw(std)]
gr/dscf = 15.432 grains/gram / 1000 mg/gram x (FHS + BHS) / Vm(std)
gr/dscf @ 12% CO2 = gr/dscf x (12 / %CO2)
lb/hr = 0.000143 lb/grain x 60 min/hr x Qs(std) x gr/dscf
lb/MMBtu = F–Factor x 0.000143 lb/grain x [20.9 / (20.9–%O2)] x gr/dscf

SULFUR DIOXIDE EQUATIONS

ppm = 1.60982 x [T(std) + 460] x (mg H^2SO4) / [98.076 x Vm(std)]
ppm @ 15.0 % O2 = ppm x [(20.9 – 15.0) / (20.9 – %O2 measured)]
ppm (wet) = ppm x (1 – Bws)
lb/hr = (0.00000137 Lb–Mole °R / ft3) x 60 min/hr x Qs(std) x
MW x ppm / [T(std) + 460]
lb/MMBtu = F–Factor x MW x (0.00000137 Lb–Mole °R / ft3) /
[T(Std) + 460]x [20.9 / (20.9 – %O2)] x ppm
lb/dscf = lb/hr / (dscfm x 60 min/hr)

SULFUR EQUATIONS

lb/MMBtu, from H2O2 solution = (lb/MMBtu SO2) / 2
lb/MMBtu, from IPA solution = (lb/MMBtu Total Sulfate) x (32.0 / 98.076)
lb/MMBtu, total sulfur = (H2O2 portion + IPA portion)

ES

ENGINEERING-SCIENCE, INC.

Method: EPA 202 Laboratory Data For Particulate Drydown

Test Date: 4-30-92 & 5-1-92 Project: NAPA IA

Date Analyzed: 5-8-92 Tech: Ordonez

BEAKER/ FILTER #	FRACTION	TOTAL VOLUME (mL)	ALIQUOT FACTOR	GROSS WEIGHT (g)	TARE WEIGHT (g)	NET WEIGHT (mg)	SAMPLE BLANK (mg)	*SAMPLE WEIGHT (mg)
Field Sample ID: Run # 1								
Laboratory Control No: 920500								
6996	Impinger	810	1	121.3240	121.3208	3.2	1.0	2.2
6993	Organic	166	1	119.4703	119.4682	2.1	1.2	0.9
A91421	Filter	NA	1	7.5215	7.5177	3.8	< 0.05	3.8
Field Sample ID: Run # 2								
Laboratory Control No: 920501								
6997	Impinger	700	1	122.4010	122.3995	1.5	1.0	0.5
6994	Organic	120	1	119.7734	119.7706	2.8	1.2	1.6
A91424	Filter	NA	1	7.6537	7.6549	< 0.05	< 0.05	0.0
Field Sample ID: Run # 3								
Laboratory Control No: 920502								
6998	Impinger	850	1	120.9053	120.8928	12.5	1.0	11.5
6995	Organic	220	1	121.3992	121.3862	13.0	1.2	11.8
A91423	Filter	NA	1	7.6543	7.6535	0.8	< 0.05	0.8
Field Sample ID: Sample Blank								
Laboratory Control No: 920503								
7003	Impinger	200	1	121.0796	121.0786	1.0		
7008	Organic	287	1	122.0387	122.0375	1.2		
A91444	Filter	NA	1	7.8770	7.8775	<0.05		

* Sample Weight = (Net Weight)(Aliquot Factor)-Sample Blank

Data Checked By: JL

Date: 6-9-92

ES ENGINEERING-SCIENCE

Client NAPA | Job No. | Sheet __ of __

Subject % Excess Air EPA Method 202 | By SF | Date

Checked | Rev.

Equation:

$$\%\text{ Excess Air} = \frac{(\%O_2 - 0.5\%CO)}{[0.264\%N_2 - (\%O_2 - 0.5\%CO)]} \times 100$$

Run #1 $\%O_2 = 14.00$; $\%N_2 = 82.2$; $\%CO = \emptyset$

$$\%\text{ Excess Air} = \frac{(14.0 - 0)}{[(0.264)(82.2) - (14.0 - 0)]} = 181.8\%$$

Run #2 $\%O_2 = 14.3$; $\%N_2 = 82.1$; $\%CO = \emptyset$

$$\%\text{ Excess Air} = \frac{(14.3 - \emptyset)}{[(0.264)(82.1) - (14.3 - 0)]} = 193.9\%$$

Run #3 $\%O_2 = 14.3$; $\%N_2 = 81.0$; $\%CO = \emptyset$

$$\%\text{ Excess Air} = \frac{(14.3 - \emptyset)}{[(0.264)(81.0) - (14.3 - 0)]} = 201.9\%$$

RUN #1 202#1 K=1.43

ENGINEERING-SCIENCE, INC.

FIELD DATA

PAGE 1 OF 2

PLANT NAPA
DATE 4-30-92
TEST SITE Stack-outlet
RUN NUMBER 1
OPERATORS RP, D

AMBIENT TEMP. 75
BAROMETER 29.93
STACK PRESSURE -0.48
STACK H2O 20%
STACK I.D. 33"

METER ΔH@ 1.88
METER GAMMA 1.003
METER BOX # Brown II
NOZZLE DIAMETER 0.225
PROBE LENGTH 6'

PROBE MAT'L QUARTZ
FILTER NUMBER
SAMPLE BOX # NE
PRE LEAK 0.00 @ 18 in Vac
POST LEAK

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O)		TEMPERATURES					PUMP VAC. "HG
					DESIRED	ACTUAL	STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	
1	0	1032	772.[illegible]	1.1	1.57	1.6	207	94	90	70	265	7
2	3	1035	774.6	1.1	1.57	1.6	208	95	[illegible]	[illegible]	226	7
3	6	1038	777.1	1.2	1.72	1.7	208	95	91	71	230	7
4	9	1041	779.[illegible]	1.2	[illegible]	1.7	208	[illegible]	[illegible]	70	[illegible]	7
5	12	1044	782.1	1.2	1.72	1.7	208	97	91	73	243	7
6	15	1047	784.6	1.4	2.0	2.0	207	77	91	72	261	6
7	18	[illegible]	786.9	1.4	2.0	2.0	207	97	92	71	232	6
8	21	10[illegible]	789.1	1.3	1.86	1.9	207	97	92	[illegible]	[illegible]	6
9	24	[illegible]	791.2	1.6	2.29	2.3	207	[illegible]	[illegible]	[illegible]	[illegible]	7
10	27	[illegible]	793.7	1.6	2.29	2.3	206	97	92	71	226	6
11	30	[illegible]	796.1	1.6	2.29	2.3	204	97	92	69	217	6
12	33	[illegible]	798.7	1.1	1.57	1.6	204	97	92	68	226	6
	[illegible]	[illegible]	800.572			Pos	Change					
AVERAGE /SUM												

RUN # 1

202 #2

K = 1.43

ENGINEERING-SCIENCE,INC.

PLANT NAPA
SOURCE STACK outlet
DATE 4/30/92
POST LEAK RATE 0.004 @ 15 in Vac

PAGE 2 OF 2

#1

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE (DELTA H, "H2O) ACTUAL	TEMPERATURES STACK TEMP.	TEMPERATURES METER INLET	TEMPERATURES METER OUTLET	TEMPERATURES IMPINGER	TEMPERATURES FILTER	PUMP VAC. "HG
1	36	11:13	800.572	1.1	1.57	1.6	206	92	91	69	223	6
2	39	11:16	802.6	1.1	1.57	1.6	206	93	91	68	249	6
3	42	11:19	805.0	1.2	1.72	1.7	207	93	91	64	254	6
4	45	11:22	807.1	1.2	1.72	1.7	206	95	91	63	225	6
5	48	11:25	808.9	1.3	1.89	1.9	208	94	91	63	209	7
6	51	11:28	810.8	1.4	2.0	2.0	204	95	91	63	230	7
7	54	11:31	813.8	1.6	2.3	2.3	202	95	91	67	228	8
8	57	11:34	815.4	1.6	2.3	2.3	201	96	92	67	230	8
9	60	11:37	817.9	1.4	2.0	2.0	201	97	92	68	226	7
10	63	11:40	819.8	1.1	1.57	1.6	202	97	92	70	225	6
11	66	11:43	821.9	1.1	1.57	1.6	202	97	92	70	226	6
12	69	11:46	824.4	1.1	1.57	1.6	200	97	92	72	223	6
	72	11:49	826.464	1.1	1.57	1.6	199	97	92	72	223	6
AVERAGE /SUM	72		54.302	1.134		1.86	205	92				

1.9

Meth. 202 K=1.43 Run #2

ENGINEERING-SCIENCE, INC.

FIELD DATA

PAGE 1 OF 2

PLANT Napa
DATE 5/1/92
TEST SITE Stack outlet
RUN NUMBER 2
OPERATORS

AMBIENT TEMP. 85
BAROMETER 29.83
STACK PRESSURE -0.48
STACK H2O 20%
STACK I.D. 33"

METER ΔH@ 1.94
METER GAMMA 1.005
METER BOX #
NOZZLE DIAMETER 0.225
PROBE LENGTH 5'

PROBE MAT'L Glass
FILTER NUMBER
SAMPLE BOX #
PRE LEAK 0.005 @ 15"Hg
POST LEAK 0.007 @ 15"Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE (DELTA H, "H2O) ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	0	1320	428.916	1.0	1.43	1.4	207	84	83	60	240	10
2	3	1323	431.2	1.1	1.57	1.6	208	83	83	60	254	11
3	6	1326	433.5	1.1	1.57	1.6	207	83	81	61	260	11
4	9	1329	435.8	1.2	1.72	1.7	208	88	83	61	255	11
5	12	1332	438.2	1.3	1.86	1.9	207	89	84	61	255	12
6	15	1335	440.6	1.4	2.00	2.0	207	90	84	60	259	12
7	18	1338	443.1	1.5	2.15	2.2	208	90	85	61	263	14
8	21	1341	445.5	1.4	2.00	2.0	207	90	86	61	275	14
9	24	1344	448.0	1.6	2.29	2.3	207	90	86	61	~~285~~	14
10	27	1347	450.4	1.4	2.00	2.0	207	91	86	61	270	14
11	30	1350	452.8	1.4	2.00	2.0	207	91	86	61	264	14
12	33	1353	455.2	1.3	1.86	1.9	207	91	86	61	261	13
	36	1356	457.710			Port	Change					
AVERAGE /SUM												

Meth 202 K-1.43 Run #2

ENGINEERING-SCIENCE,INC.

PLANT: Napa
DATE: 5/1/92
POST LEAK RATE: 0.007 @ 15 Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE (DELTA H, "H2O) ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	36	1400	457.710	1.2	1.72	1.7	208	88	86	60	251	11
2	39	1403	460.0	1.2	1.72	1.7	208	88	85	60	249	11
3	42	1406	462.3	1.5	2.15	2.2	208	90	87	60	260	13
4	45	1409	464.8	1.5	2.15	2.2	208	91	87	60	258	13
5	48	1412	467.3	1.5	2.15	2.2	208	91	87	60	258	14
6	51	1415	469.8	1.6	2.29	2.3	207	91	88	61	258	14
7	54	1418	472.3	1.6	2.29	2.3	208	97	91	61	250	14
8	57	1421	474.8	1.4	2.00	2.0	209	98	91	61	243	12
9	60	1424	477.2	1.3	1.86	1.9	208	96	90	61	247	11
10	63	1427	479.6	1.1	1.57	1.6	212	97	91	62	250	10
11	66	1430	481.9	1.0	1.43	1.4	213	96	91	62	257	10
12	69	1433	484.1	1.0	1.43	1.4	215	96	91	62	260	10
	72	1436	486.297			End	Run					
						1.90	208					
AVERAGE /SUM	72		57.381	1.44		~~1.64~~	~~210~~	89				

TIC

M202 K=1.48

ENGINEERING-SCIENCE,INC.

Temp. 76

PLANT: NAPA
DATE: 5/4/92
~~PRE~~ POST LEAK RATE: 0.007 @ 15"Hg
Post Leak

Brown II
Δ@ 1.88
Y 1.003

@ 840 Shutdown
Started @ 930

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	0	0830	080.057	0.98	1.45	1.5	198	72	71	57	240	9
2	3	0833	082.9	1.0	1.48	1.5	199	75	72	57	244	9
3	6	0836	084.9	1.2	1.78	1.8	199	77	73	57	250	10
4	9	0839	087.1	1.2	1.78	1.8	200	79	73	57	256	10
5	12	0842	089.4	1.4	2.07	2.1	201	81	74	58	262	12
6	15	0845	091.5	1.5	2.22	2.2	201	82	75	58	267	13
7	18	0848	093.8	1.3	1.92	1.9	203	82	75	58	270	12
8	21	0901	096.0	1.2	1.78	1.8	195	81	79	58	260	10
9	24[5]	0930	098.4	1.1	1.63	1.6	196	82	79	58	256	10
10	27[8]	0933	100.5	1.1	1.63	1.6	196	84	81	58	251	10
11	30[11]	0936	102.7	1.0	1.48	1.5	198	87	81	58	250	10
12	33[14]	0939	104.7	1.0	1.48	1.5	198	88	82	59	245	5
	36[17]	0942	107.049									
		~~0945~~	Port		Change							
		~~0948~~										
AVERAGE /SUM												

M 202

K = 1.48

ENGINEERING-SCIENCE,INC.

PLANT NAPA
SOURCE Stack outlet
DATE 5/4/92
POST LEAK RATE 0.006 @ 14 "Hg

PAGE 2 OF 2

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME 1060	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE (DELTA H, "H2O) ACTUAL	TEMPERATURES STACK TEMP.	TEMPERATURES METER INLET	TEMPERATURES METER OUTLET	TEMPERATURES IMPINGER	TEMPERATURES FILTER	PUMP VAC. "HG
1	36 20	0958	107.149	0.95	1.41	1.4	205	89	84	59	239	9
2	39 23	1003	102.5	0.99	1.47	1.5	210	91	85	59	242	9
3	42 26	1006	114.5	1.0	1.48	1.5	212	93	86	59	248	9
4	45 29	1009	116.7	1.2	1.78	1.8	213	95	89	59	252	10
5	48 32	1012	119.3	1.3	1.92	1.9	214	96	88	59	257	10
6	51 35	1015	121.7	1.4	2.07	2.1	214	97	88	59	259	11
7	54 38	1018	124.3	1.4	2.07	2.1	218	97	89	60	264	11
8	41 57	1021	127.1	1.3	1.92	1.9	212	98	91	60	270	11
9	44 60	1024	129.7	1.1	1.43	1.6	212	98	91	60	268	10
-10	47 63	1027	131.9	1.0	1.48	1.5	208	98	91	60	263	10
11	50 66	1030	134.0	0.98	1.45	1.5	213	99	92	61	260	9
12	53 69	1033	136.3	0.95	1.41	1.4	214	98	92	61	256	9
	56 72	1039	138.625									
				End	Run							
AVERAGE /SUM	72		57.768	1.069		1.71	205	85				

1.7

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 4-30-92

RUN NO. 1

METHOD 202

FACILITY NAPA ZA

TYPE Part

ES NO. 920500

IMP SOLN H_2O

	SOLUTION	VOL. (ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL (ml.)	INITIAL (ml.)	NET.
IMPINGER# 1	H_2O	340	100	240
IMPINGER# 2	H_2O	170	100	70
IMPINGER# 3	H_2O	125	100	25
IMPINGER#				
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL (g)	
SILICA GEL		865.4	837.2	28.2
FILTER # DESCRIPTION			TOTAL MOISTURE	

TOTAL MOISTURE: 363.2 (g)

COMMENTS

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 5-1-92 RUN NO. 2 METHOD 202

FACILITY NAPA FA TYPE PART

ES NO. 920501 IMP SOLN H_2O

	SOLUTION	VOL.(ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1	H_2O	250	100	150
IMPINGER# 2	H_2O	130	100	30
IMPINGER# 3	H_2O	100	100	0
IMPINGER#				
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL(g)	
SILICA GEL		830.6	600.6	30.0
FILTER # DESCRIPTION			TOTAL MOISTURE	
				210.0 (g)

COMMENTS

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 5-4-92
RUN NO. 3
METHOD 202
FACILITY Napa
TYPE
ES NO. 920502
IMP SOLN H_2O

	SOLUTION	VOL.(ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1	H_2O	387	100	287
IMPINGER# 2	H_2O	113	100	13
IMPINGER# 3	H_2O	107	100	7
IMPINGER#				
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL(g)	
SILICA GEL		852.4	836.6	15.8
FILTER # DESCRIPTION			TOTAL MOISTURE	

TOTAL MOISTURE 322.8 (g)

COMMENTS

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

POST TEST METER BOX CALIBRATION FORM

METER BOX NO. Brown II DATE 05-26-92 CALIBRATED BY D. Marsden

BAROMETRIC PRESSURE 29.39 AMBIENT TEMP. 68 PRE TEST Yi 1.003

PROJECT NAME NAPA PROJECT NO. ___ H RUN 2.3 VACUUM 17

ORIFICE MANOMETER (IN H2O) DELTA H	GAS VOLUME		TEMPERATURES		TIME (MINUTES) Ti	Yi	H@I
	WET TEST METER (CU. FT.) Vw	DRY GAS METER (CU. FT.) Vd	WET TEST METER (DEG. F.) Tw	DRY GAS METER (DEG. F.) Td			
2.3	12.757	12.691	69	73	15	1.006	—
2.3	16.120	16.098	70	74	19	1.003	—
2.3	12.727	12.716	70	76	15	1.006	—

Yi AVERAGE 1.005

METER BOX CALIBRATION HISTORY

LAST CALIBRATION DATE 04-02-92 CALIBRATED BY D MARSDEN

H@ OF CALIBRATION 1.88 Yi OF CALIBRATION 1.003

NOTES:

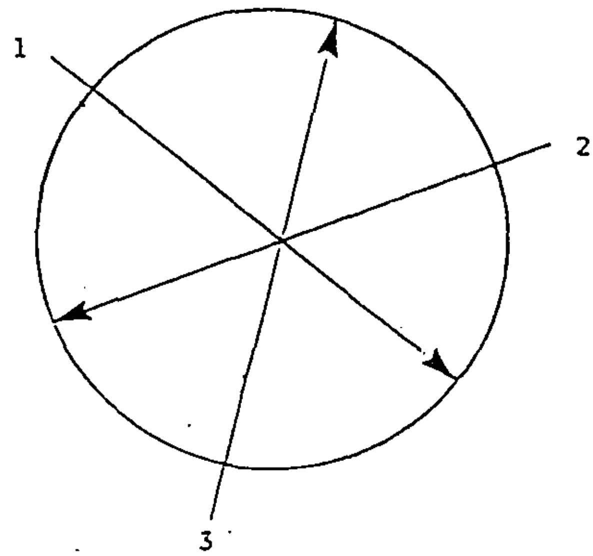
NOZZLE CALIBRATION

Source: NAPA

Date of Source Test: 04-30-92

Sampling Method: 202.

Pollutant: P. M.



Nozzle Measurement Data:

Diameter #1 0.224 inches

Diameter #2 0.225 inches

Diameter #3 0.226 inches

Average 0.225 inches

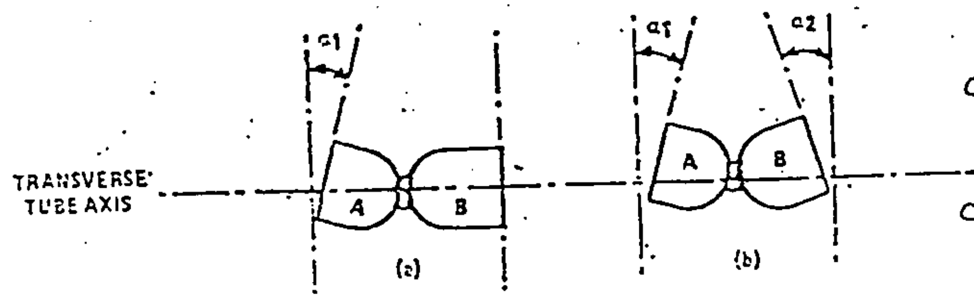
Note: (1) Measure nozzle to nearest 0.001 inches

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

QUARTZ.

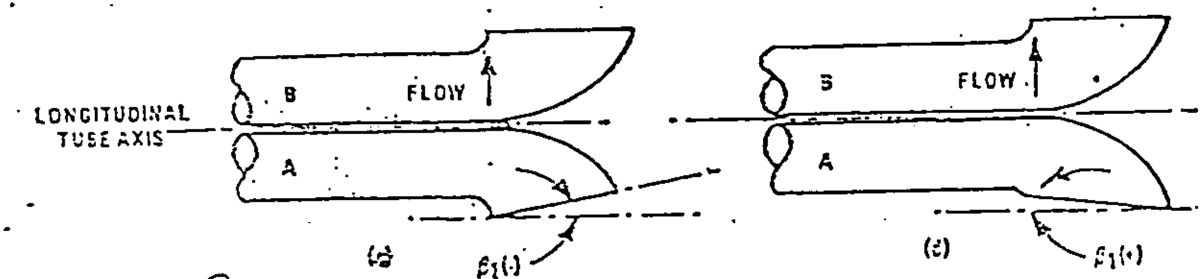
PITOT TUBE CALIBRATION S/N PROBE # 84 DATE 03-05-92

CAL. BY [signature]



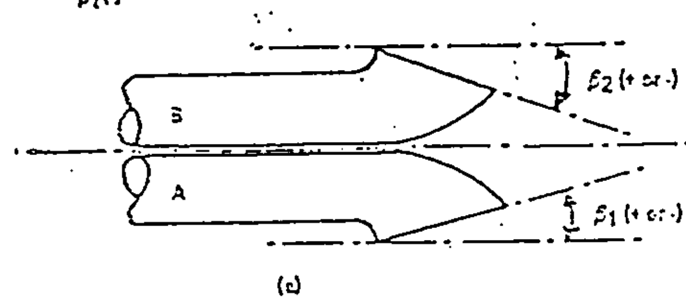
a_1 1°

a_2 0°



β_1 + 1°

β_2 ∓ 1°



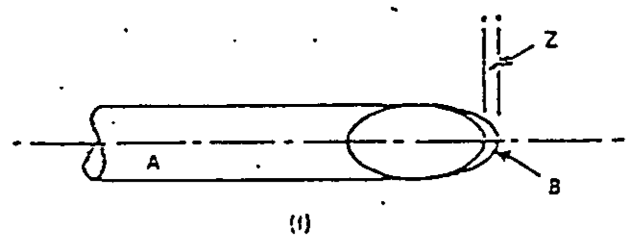
Z — (< 0·32 CM)

W — (< 0·08 CM)

Dt 0·95 CM

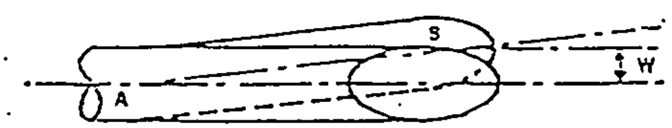
PA + PB 2·38 CM

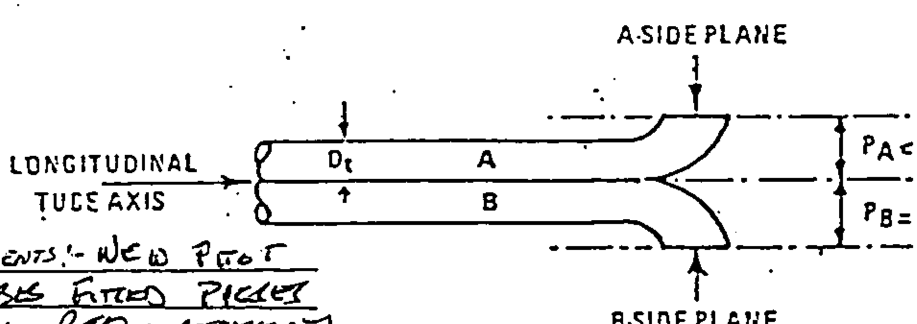
$P = \frac{PA + PB}{2}$ 1·195



0·998 ≤ 1·195 ≤ 1·425

NOTE:- (1·05 Dt ≤ P ≤ 1·50 DT)





NOTE:

1.05 D_t ≤ P ≤ 1.50 D_t

$P_A = P_B$

COMMENTS:- NEW PITOT TUBES FITTED PASSES ALL REQUIREMENTS

[signature]

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 03-05-92
BAROMETRIC PRESSURE 29.45
CALIBRATED BY D. [illegible]

THERMOCOUPLE NO. GLASS # 84
AMBIENT TEMPERATURE 65
REFERENCE: MERCURY IN GLASS ASTM/3C
OTHER

REFERENCE POINT NUMBER	SOURCE (SPECIFY)	REFERENCE THERMOMETER TEMPERATURE (°C)	THERMOCOUPLE POTENTIOMETER TEMPERATURE (°F)	THERMOCOUPLE POTENTIOMETER TEMPERATURE (°C)	DIFFERENCE (%)
	MUFFLE FURNACE	245	471		
		245	471		
		245	471		
	AVERAGE	245	471	243.89	0.22%
0.0°C	ICE WATER	-0.5	30		
		0.0	31		
		0.0	31		
	AVERAGE	-0.17	30.67	0.74	0.21%
100°C	BOILING WATER	100	211		
		100	211		
		100	211		
	AVERAGE	100	211	99.44	0.15%

$$\text{DIFF.} = \frac{(\text{REF. TEMP} + 273) - (\text{TEST TEMP.} + 273)}{(\text{REF. TEMP.} + 273)} \times 100$$

APPENDIX C

MODIFIED EPA 5
(CARB METHOD 429)
POLYCYCLIC AROMATIC HYDROCARBONS & CRESOLS

FIELD DATA SUMMARY

NAPA
KILN BAGHOUSE STACK

30-Apr-92

	Run 1	Run 2	Run 3
Vlc, Volume of water vapor condensed in impingers and silica gel	722.5	775.9	648
Vm, Dry gas volume as measured by dry gas meter (dcf)	139.099	131.193	130.841
y, Dry gas meter calibration factor (dimensionless)	1.005	1.005	1.005
Pb, Barometric Pressure at sampling site (in. Hg)	29.83	29.83	29.86
Ps, Absolute stack gas pressure (in. Hg.)	29.79	29.79	29.82
dH, Average pressure differential across the orifice meter (in. H2O)	1.06	0.99	0.92
Tm, Meter temperature (dR)	545.00	545.00	547.00
Vm(std), Dry gas volume as measured by dry gas meter, corrected to standard conditions (dscf)	135.379	127.663	126.960
Bws, Water vapor in the gas stream, proportion by volume (dimensionless)	0.201	0.223	0.194
%CO2, Percent carbon dioxide by volume (dry basis)	3.80	3.80	4.70
%O2, Percent oxygen by volume (dry basis)	14.00	14.00	14.30
Md, Dry molecular weight of stack gas (lb/lb-mole)	29.17	29.17	29.32
Ms, Wet molecular weight of stack gas (lb/lb-mole)	26.92	26.68	27.13
Cp, Pitot tube coefficient (dimensionless)	0.84	0.84	0.84
Sq.Rt. dP, Average square root of velocity pressure of stack gas (in. of H2O)	1.1600	1.1150	1.0850
Ts, Stack temperature (dR)	671	674	665
As, Cross-sectional area of stack (ft2)	5.940	5.940	5.940
Qs(std), Dry volumetric stack gas flow rate, standard conditions (dscfm)	16,998	15,932	16,059
An, Cross-sectional area of nozzle (ft2)	1.91E-04	1.91E-04	1.91E-04
Ø, Total sampling time (min)	240.0	240.0	240.0
I, Isokinetic sample rate (percent)	103.32	103.95	102.56

SOURCE TEST CALCULATIONS
POLYCYCLIC AROMATIC HYDROCARBONS

NAPA
KILN BAGHOUSE STACK

30–Apr 92
Run No. 1

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	85.0	°F	Static Pressure, Pstatic	−0.48	"H2O
Stack Temperature, Ts	211.0	°F	Barometric Pressure, Pb	29.83	"Hg
SQ.RT. dP	1.1600		Condensate Volume, Vlc	722.5	mℓ
Meter Orfice, dH	1.06	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	139.099	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0050		Duct Width	0.00	inch
Stack Gas Oxygen	14.00	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	3.80	% CO2	Test Time, Ø	240.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.187	inch
Stack Gas Nitrogen	82.20	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)	135.379	dscf
Vw(std) = (0.04715 ft3/g) / 528 x [T(std) + 460] x Vlc	34.066	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.201	
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Pstack, in.Hg.)	Lower Bws Value Used 0.985	
% Excess Air =(%O2 − 0.5%CO) / [0.264%N2 − (%O2−0.5%CO)] x 100	[illegible]	%
Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)]	29.17	lb/lb−mole
Ms = (Md x (1−Bws)) + (18.0 x Bws)	26.92	lb/lb−mole
P(stack) = Pb + [Pstatic / 13.6]	29.79	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	76.19	ft/sec
Qs = vs x As x 60	27,151	acfm
Qs(std) = Qs x (1 − Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	16,998	dscfm
Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4	0.000191	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	103.32	%

SOURCE TEST CALCULATIONS
POLYCYCLIC AROMATIC HYDROCARBONS

NAPA
KILN BAGHOUSE STACK

30–Apr 92
Run No. 2

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	85.0	°F	Static Pressure, Pstatic	−0.48	"H2O
Stack Temperature, Ts	214.0	°F	Barometric Pressure, Pb	29.83	"Hg
SQ.RT. dP	1.1150		Condensate Volume, Vlc	775.9	mℓ
Meter Orfice, dH	0.99	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	131.193	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0050		Duct Width	0.00	inch
Stack Gas Oxygen	14.00	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	3.80	% CO2	Test Time, Ø	240.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.187	inch
Stack Gas Nitrogen	82.20	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)	127.663	dscf
Vw(std) = (0.04715 ft3/g) / 528 x [T(std) + 460] x Vlc	36.584	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.223	
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Pstack, in.Hg.)	Lower Bws Value Used 1.000	
% Excess Air =(%O2 − 0.5%CO) / [0.264%N2 − (%O2−0.5%CO)] x 100		%
Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)]	29.17	lb/lb−mole
Ms = (Md x (1−Bws)) + (18.0 x Bws)	26.68	lb/lb−mole
P(stack) = Pb + [Pstatic / 13.6]	29.79	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	73.73	ft/sec
Qs = vs x As x 60	26,275	acfm
Qs(std) = Qs x (1 − Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	15,932	dscfm
Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4	0.000191	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	103.95	%

SOURCE TEST CALCULATIONS
POLYCYCLIC AROMATIC HYDROCARBONS

NAPA
KILN BAGHOUSE STACK

04–May 92
Run No. 3

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	87.0	°F	Static Pressure, Pstatic	−0.48	"H2O
Stack Temperature, Ts	205.0	°F	Barometric Pressure, Pb	29.86	"Hg
SQ.RT. dP	1.0850		Condensate Volume, Vlc	648.0	mℓ
Meter Orfice, dH	0.92	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	130.841	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0050		Duct Width	0.00	inch
Stack Gas Oxygen	14.30	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	4.70	% CO2	Test Time, Ø	240.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.187	inch
Stack Gas Nitrogen	81.00	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)	126.960	dscf
Vw(std) = (0.04715 ft3/g) / 528 x [T(std) + 460] x Vlc	30.553	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.194	
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Pstack, in.Hg.)	Lower Bws Value Used 0.872	
% Excess Air = (%O2 − 0.5%CO) / [0.264%N2 − (%O2−0.5%CO)] x 100	[illegible]	%
Md = (0.44 x %CO2) + (0.32 x %O2) + [0.28 x (%N2 + %CO)]	29.32	lb/lb−mole
Ms = (Md x (1−Bws)) + (18.0 x Bws)	27.13	lb/lb−mole
P(stack) = Pb + [Pstatic / 13.6]	29.82	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	70.64	ft/sec
Qs = vs x As x 60	25,174	acfm
Qs(std) = Qs x (1 − Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	16,059	dscfm
Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4	0.000191	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	102.56	%

ANALYTICAL SUMMARY
POLYCYCLIC AROMATIC HYDROCARBONS
TOTAL SAMPLE

30-Apr ERR

NAPA
KILN BAGHOUSE STACK

PAH Compound	Molecular Weight	Sample Weight (ng)				Laboratory Detection Limit (ng)			
		Run 1	Run 2	Run 3	Blank	Run 1	Run 2	Run 3	Blank
Naphthalene	128.06	840000	600000	1900000	880				
2-Methyl-Naphthalene	142.08								
2-Chloro-Naphthalene	162.02								
Acenaphthene	154.08	20000	20000	44000	16				
Acenaphthalene	152.06	20000	18000	18000	11				
Fluorene	166.08	39000	39000	77000	72				
Phenanthrene	178.08	52000	61000	110000	290				
Anthracene	178.08	5000	5800	11000	40				
Fluoranthene	202.08	1200	1800	1200	95				
Pyrene	202.08	830	1300	950	48				
Benzo-a-Anthracene	228.09	44	34	32					10
Chrysene	228.09	94	85	70	18				
Benzo-b-Fluoranthene	252.09	28	21	21					10
Benzo-k-Fluoranthene	252.09	11					10	10	10
Benzo-e-Pyrene	252.09					10	10	10	10
Benzo-a-Pyrene	252.09								
Perylene	252.09						10	10	10
Indeno-123-c,d-Pyrene	276.09	13					10	10	10
Dibenzo-ah-Anthracene	278.35	10					10	10	10
Benzo-ghi-Perylene	276.09					10	10	10	10

EMISSION CALCULATIONS – ppm
POLYCYCLIC AROMATIC HYDROCARBONS

NAPA
KILN BAGHOUSE STACK

30–Apr 92

PAH Compound	Molecular Weight	Sample Weight, (ng) Run 1	Run 2	Run 3	Blank	ppm Run 1	Run 2	Run 3	Average	Blank
Naphthalene	128.06	8.40E+05	6.00E+05	1.90E+06	8.80E+02	4.12E–02	3.12E–02	9.93E–02	5.72E–02	4.49E–05
2–Methyl–Naphthalene	142.08									
2–Chloro–Naphthalene	162.02									
Acenaphthene	154.08	2.00E+04	2.00E+04	4.40E+04	1.60E+01	8.15E–04	8.64E–04	1.91E–03	1.20E–03	6.79E–07
Acenaphthalene	152.06	2.00E+04	1.80E+04	1.80E+04	1.10E+01	8.26E–04	7.88E–04	7.92E–04	8.02E–04	4.73E–07
Fluorene	166.08	3.90E+04	3.90E+04	7.70E+04	7.20E+01	1.47E–03	1.56E–03	3.10E–03	2.05E–03	2.83E–06
Phenanthrene	178.08	5.20E+04	6.10E+04	1.10E+05	2.90E+02	1.83E–03	2.28E–03	4.14E–03	2.75E–03	1.06E–05
Anthracene	178.08	5.00E+03	5.80E+03	1.10E+04	4.00E+01	1.76E–04	2.17E–04	4.14E–04	2.69E–04	1.47E–06
Fluoranthene	202.08	1.20E+03	1.80E+03	1.20E+03	9.50E+01	3.73E–05	5.93E–05	3.98E–05	4.54E–05	3.07E–06
Pyrene	202.08	8.30E+02	1.30E+03	9.50E+02	4.80E+01	2.58E–05	4.28E–05	3.15E–05	3.34E–05	1.55E–06
Benzo–a–Anthracene	228.09	4.40E+01	3.40E+01	3.20E+01	<1.00E+01	1.21E–06	9.92E–07	9.39E–07	1.05E–06	<2.87E–07
Chrysene	228.09	9.40E+01	8.50E+01	7.00E+01	1.80E+01	2.59E–06	2.48E–06	2.05E–06	2.37E–06	5.16E–07
Benzo–b–Fluoranthene	252.09	2.80E+01	2.10E+01	2.10E+01	<1.00E+01	6.97E–07	5.55E–07	5.58E–07	6.03E–07	<2.59E–07
Benzo–k–Fluoranthene	252.09	1.10E+01	<1.00E+01	<1.00E+01	<1.00E+01	2.74E–07	<2.64E–07	<2.66E–07	<2.68E–07	<2.59E–07
Benzo–e–Pyrene	252.09	<1.00E+01	<1.00E+01	<1.00E+01	<1.00E+01	<2.49E–07	<2.64E–07	<2.66E–07	<2.60E–07	<2.59E–07
Benzo–a–Pyrene	252.09									
Perylene	252.09	0.00E+00	<1.00E+01	<1.00E+01	<1.00E+01	0.00E+00	<2.64E–07	<2.66E–07	<1.77E–07	<2.59E–07
Indeno–123–c,d–Pyrene	276.09	1.30E+01	<1.00E+01	<1.00E+01	<1.00E+01	2.96E–07	<2.41E–07	<2.42E–07	<2.60E–07	<2.37E–07
Dibenzo–ah–Anthracene	278.35	1.00E+01	<1.00E+01	<1.00E+01	<1.00E+01	2.26E–07	<2.39E–07	<2.41E–07	<2.35E–07	<2.35E–07
Benzo–ghi–Perylene	276.09	<1.00E+01	<1.00E+01	<1.00E+01	<1.00E+01	<2.27E–07	<2.41E–07	<2.42E–07	<2.37E–07	<2.37E–07

" < " indicates a sample with a non–detectable concentration. Laboratory Detection Limit was used for emission calculation.

ppm = 1.60982 x [T(std) + 460] x ng x (1E–06 mg/ng) / [MW x Vm(std)]
where : 1.60982 = Ideal Gas Law Constant

Standard Temperature = 68 °F

	Run 1	Run 2	Run 3	Blank Value (avg)
Vm(std), ft3 =	135.379	127.663	126.960	130.001

EMISSION CALCULATIONS – lb/hr
POLYCYCLIC AROMATIC HYDROCARBONS

NAPA
KILN BAGHOUSE STACK

30–Apr 92

PAH Compound	Molecular Weight	ppm Run 1	ppm Run 2	ppm Run 3	ppm Blank	lb/hr Run 1	lb/hr Run 2	lb/hr Run 3	lb/hr Average	lb/hr Blank
Naphthalene	128.06	4.12E–02	3.12E–02	9.93E–02	4.49E–05	1.40E–02	9.92E–03	3.18E–02	1.86E–02	1.46E–05
2–Methyl–Naphthalene	142.08									
2–Chloro–Naphthalene	162.02									
Acenaphthene	154.08	8.15E–04	8.64E–04	1.91E–03	6.79E–07	3.33E–04	3.31E–04	7.37E–04	4.67E–04	2.66E–07
Acenaphthalene	152.06	8.26E–04	7.88E–04	7.92E–04	4.73E–07	3.33E–04	2.97E–04	3.02E–04	3.11E–04	1.83E–07
Fluorene	166.08	1.47E–03	1.56E–03	3.10E–03	2.83E–06	6.49E–04	6.45E–04	1.29E–03	8.61E–04	1.20E–06
Phenanthrene	178.08	1.83E–03	2.28E–03	4.14E–03	1.06E–05	8.65E–04	1.01E–03	1.84E–03	1.24E–03	4.82E–06
Anthracene	178.08	1.76E–04	2.17E–04	4.14E–04	1.47E–06	8.31E–05	9.59E–05	1.84E–04	1.21E–04	6.65E–07
Fluoranthene	202.08	3.73E–05	5.93E–05	3.98E–05	3.07E–06	2.00E–05	2.97E–05	2.01E–05	2.33E–05	1.58E–06
Pyrene	202.08	2.58E–05	4.28E–05	3.15E–05	1.55E–06	1.38E–05	2.15E–05	1.59E–05	1.71E–05	7.98E–07
Benzo–a–Anthracene	228.09	1.21E–06	9.92E–07	9.39E–07	<2.87E–07	7.32E–07	5.62E–07	5.36E–07	6.10E–07	<1.66E–07
Chrysene	228.09	2.59E–06	2.48E–06	2.05E–06	5.16E–07	1.56E–06	1.40E–06	1.17E–06	1.38E–06	2.99E–07
Benzo–b–Fluoranthene	252.09	6.97E–07	5.55E–07	5.58E–07	<2.59E–07	4.66E–07	3.47E–07	3.52E–07	3.88E–07	<1.66E–07
Benzo–k–Fluoranthene	252.09	2.74E–07	<2.64E–07	<2.66E–07	<2.59E–07	1.83E–07	<1.65E–07	<1.68E–07	<1.72E–07	<1.66E–07
Benzo–e–Pyrene	252.09	<2.49E–07	<2.64E–07	<2.66E–07	<2.59E–07	<1.66E–07	<1.65E–07	<1.68E–07	<1.66E–07	<1.66E–07
Benzo–a–Pyrene	252.09									
Perylene	252.09	0.00E+00	<2.64E–07	<2.66E–07	<2.59E–07	0.00E+00	<1.65E–07	<1.68E–07	<1.11E–07	<1.66E–07
Indeno–123–c,d–Pyrene	276.09	2.96E–07	<2.41E–07	<2.42E–07	<2.37E–07	2.16E–07	<1.65E–07	<1.68E–07	<1.83E–07	<1.66E–07
Dibenzo–ah–Anthracene	278.35	2.26E–07	<2.39E–07	<2.41E–07	<2.35E–07	1.66E–07	<1.65E–07	<1.68E–07	<1.66E–07	<1.66E–07
Benzo–ghi–Perylene	276.09	<2.27E–07	<2.41E–07	<2.42E–07	<2.37E–07	<1.66E–07	<1.65E–07	<1.68E–07	<1.66E–07	<1.66E–07

" < " indicates a sample with a non–detectable concentration. Laboratory Detection Limit was used for emission calculation.

lb/hr = (0.00000137 Lb–Mole °R / ft3) x 60 min/hr x Qs(std) x MW x ppm / [T(std) + 460]

Standard Temperature = 68 °F

	Run 1	Run 2	Run 3	Blank Value (avg)
Qs(std), ft³/min =	16,998	15,932	16,059	16,330

EMISSION CALCULATIONS – lb/MMBtu
POLYCYCLIC AROMATIC HYDROCARBONS

NAPA
KILN BAGHOUSE STACK

30-Apr 92

PAH Compound	Molecular Weight	ppm Run 1	ppm Run 2	ppm Run 3	ppm Blank	lb/MMBtu Run 1	lb/MMBtu Run 2	lb/MMBtu Run 3	lb/MMBtu Average	lb/MMBtu Blank
Naphthalene	128.06	4.12E-02	3.12E-02	9.93E-02	4.49E-05	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00	ERR
2-Methyl-Naphthalene	142.08					0	0	0		
2-Chloro-Naphthalene	162.02					0	0	0		
Acenaphthene	154.08	8.15E-04	8.64E-04	1.91E-03	6.79E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00	ERR
Acenaphthalene	152.06	8.26E-04	7.88E-04	7.92E-04	4.73E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00	ERR
Fluorene	166.08	1.47E-03	1.56E-03	3.10E-03	2.83E-06	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00	ERR
Phenanthrene	178.08	1.83E-03	2.28E-03	4.14E-03	1.06E-05	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00	ERR
Anthracene	178.08	1.76E-04	2.17E-04	4.14E-04	1.47E-06	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00	ERR
Fluoranthene	202.08	3.73E-05	5.93E-05	3.98E-05	3.07E-06	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00	ERR
Pyrene	202.08	2.58E-05	4.28E-05	3.15E-05	1.55E-06	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00	ERR
Benzo-a-Anthracene	228.09	1.21E-06	9.92E-07	9.39E-07	<2.87E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00 <	ERR
Chrysene	228.09	2.59E-06	2.48E-06	2.05E-06	5.16E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00	ERR
Benzo-b-Fluoranthene	252.09	6.97E-07	5.55E-07	5.58E-07	<2.59E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	0.00E+00 <	ERR
Benzo-k-Fluoranthene	252.09	2.74E-07	<2.64E-07	<2.66E-07	<2.59E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	<0.00E+00 <	ERR
Benzo-e-Pyrene	252.09	<2.49E-07	<2.64E-07	<2.66E-07	<2.59E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	<0.00E+00 <	ERR
Benzo-a-Pyrene	252.09					0	0	0		
Perylene	252.09	0.00E+00	<2.64E-07	<2.66E-07	<2.59E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	<0.00E+00 <	ERR
Indeno-123-c,d-Pyrene	276.09	2.96E-07	<2.41E-07	<2.42E-07	<2.37E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	<0.00E+00 <	ERR
Dibenzo-ah-Anthracene	278.35	2.26E-07	<2.39E-07	<2.41E-07	<2.35E-07	0 0.00E+00	0.0.00E+00	0 0.00E+00	<0.00E+00 <	ERR
Benzo-ghi-Perylene	276.09	<2.27E-07	<2.41E-07	<2.42E-07	<2.37E-07	0 0.00E+00	0 0.00E+00	0 0.00E+00	<0.00E+00 <	ERR

" < " indicates a sample with a non-detectable concentration. Laboratory Detection Limit was used for emission calculation.

lb/MMBtu = F-Factor x MW x (0.00000137 Lb-Mole °R / ft3) / [T(Std) + 460]x [20.9 / (20.9 - %O2)] x ppm

Standard Temperature = 68 °F

	Run 1	Run 2	Run 3	Blank Value (avg)
Fuel-Factor, dscf/MMBtu =	0.00	0.00	0.00	ERR
Oxygen, % =	14.00	14.00	14.30	14.10

EMISSION CALCULATIONS – ng/dscm
POLYCYCLIC AROMATIC HYDROCARBONS

NAPA
KILN BAGHOUSE STACK

30–Apr 92

	Sample Weight, (ng)				ng/dscm				
PAH Compound	Run 1	Run 2	Run 3	Blank	Run 1	Run 2	Run 3	Average	Blank
Naphthalene	8.40E+05	6.00E+05	1.90E+06	8.80E+02	2.19E+05	1.66E+05	5.28E+05	3.05E+05	2.39E+02
2–Methyl–Naphthalene									
2–Chloro–Naphthalene									
Acenaphthene	2.00E+04	2.00E+04	4.40E+04	1.60E+01	5.22E+03	5.53E+03	1.22E+04	7.66E+03	4.35E+00
Acenaphthalene	2.00E+04	1.80E+04	1.80E+04	1.10E+01	5.22E+03	4.98E+03	5.01E+03	5.07E+03	2.99E+00
Fluorene	3.90E+04	3.90E+04	7.70E+04	7.20E+01	1.02E+04	1.08E+04	2.14E+04	1.41E+04	1.96E+01
Phenanthrene	5.20E+04	6.10E+04	1.10E+05	2.90E+02	1.36E+04	1.69E+04	3.06E+04	2.03E+04	7.88E+01
Anthracene	5.00E+03	5.80E+03	1.10E+04	4.00E+01	1.30E+03	1.60E+03	3.06E+03	1.99E+03	1.09E+01
Fluoranthene	1.20E+03	1.80E+03	1.20E+03	9.50E+01	3.13E+02	4.98E+02	3.34E+02	3.82E+02	2.58E+01
Pyrene	8.30E+02	1.30E+03	9.50E+02	4.80E+01	2.17E+02	3.60E+02	2.64E+02	2.80E+02	1.30E+01
Benzo–a–Anthracene	4.40E+01	3.40E+01	3.20E+01	<1.00E+01	1.15E+01	9.41E+00	8.90E+00	9.93E+00	<2.72E+00
Chrysene	9.40E+01	8.50E+01	7.00E+01	1.80E+01	2.45E+01	2.35E+01	1.95E+01	2.25E+01	4.89E+00
Benzo–b–Fluoranthene	2.80E+01	2.10E+01	2.10E+01	<1.00E+01	7.30E+00	5.81E+00	5.84E+00	6.32E+00	<2.72E+00
Benzo–k–Fluoranthene	1.10E+01	<1.00E+01	<1.00E+01	<1.00E+01	2.87E+00	<2.77E+00	<2.78E+00	<2.81E+00	<2.72E+00
Benzo–e–Pyrene	<1.00E+01	<1.00E+01	<1.00E+01	<1.00E+01	<2.61E+00	<2.77E+00	<2.78E+00	<2.72E+00	<2.72E+00
Benzo–a–Pyrene									
Perylene	0.00E+00	<1.00E+01	<1.00E+01	<1.00E+01	0.00E+00	<2.77E+00	<2.78E+00	<1.85E+00	<2.72E+00
Indeno–123–c,d–Pyrene	1.30E+01	<1.00E+01	<1.00E+01	<1.00E+01	3.39E+00	<2.77E+00	<2.78E+00	<2.98E+00	<2.72E+00
Dibenzo–ah–Anthracene	1.00E+01	<1.00E+01	<1.00E+01	<1.00E+01	2.61E+00	<2.77E+00	<2.78E+00	<2.72E+00	<2.72E+00
Benzo–ghi–Perylene	<1.00E+01	<1.00E+01	<1.00E+01	<1.00E+01	<2.61E+00	<2.77E+00	<2.78E+00	<2.72E+00	<2.72E+00

' < ' indicates a sample with a non–detectable concentration. Laboratory Detection Limit was used for emission calculation.

ng/dscm = ng / [Vm(std) x 0.028317 m3/ft3]

	Run 1	Run 2	Run 3	Blank Value (avg)
Vm(std), ft^3 =	135.379	127.663	126.960	130.001

ANALYTICAL SUMMARY
POLYCYCLIC AROMATIC HYDROCARBONS

NAPA
KILN BAGHOUSE STACK
MINIMUM DETECTABLE CONCENTRATION, TOTAL SAMPLE

30-Apr 92

	Laboratory Detection Limit ng (1)				Minimum Detectable Concentration, ng/dscm (2)			
PAH Compound	Run 1	Run 2	Run 3	Blank	Run 1	Run 2	Run 3	Blank
Naphthalene	0	0	0	0	0.00	0.00	0.00	0.00
2-Methyl-Naphthalene	0	0	0	0	0.00	0.00	0.00	0.00
2-Chloro-Naphthalene	0	0	0	0	0.00	0.00	0.00	0.00
Acenaphthene	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acenaphthalene	0	0	0		0.00E+00	0.00E+00	0.00E+00	
Fluorene	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo-a-Anthracene	0	0	0	10	0.00E+00	0.00E+00	0.00E+00	2.72E+00
Chrysene	0	0	0		0.00E+00	0.00E+00	0.00E+00	
Benzo-b-Fluoranthene	0	0	0	10	0.00E+00	0.00E+00	0.00E+00	2.72E+00
Benzo-k-Fluoranthene	0	10	10	10	0.00E+00	2.77E+00	2.78E+00	2.72E+00
Benzo-e-Pyrene	10	10	10	10	2.61E+00	2.77E+00	2.78E+00	2.72E+00
Benzo-a-Pyrene	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Perylene		10	10	10		2.77E+00	2.78E+00	2.72E+00
Indeno-123-c,d-Pyrene	0	10	10	10	0.00E+00	2.77E+00	2.78E+00	2.72E+00
Dibenzo-ah-Anthracene	0	10	10	10	0.00E+00	2.77E+00	2.78E+00	2.72E+00
Benzo-ghi-Perylene	10	10	10	10	2.61E+00	2.77E+00	2.78E+00	2.72E+00

(1) Laboratory Detection Limit, ng = As / (Ais x RRF)
where : As = Mean noise for the congener mass chromatogram at the m/z.
Ais = SIM response for the internal standard ion (m/z).
RRF = Relative response factor = (As x Cis) / (Ais x Cs)
where : Cis = Concentration of the appropriate internal standard, ng/ul.
Cs = Concentration of the native ion of interest.

(2) Minimum Detectable Concentration, ng/dscm = Laboratory Detection Limit / [Vm(std) x 0.028317 m3/ft3]

	Run 1	Run 2	Run 3	Blank Value (avg)
Vm(std), ft³ =	135.379	127.663	126.960	130.001

ES ENGINEERING-SCIENCE, INC.

Client	NAPA	Job No.		Sheet	of
Subject	% EXCESS AIR: PAH & CRESOLS MODIFIED EPA 5	By	CNM	Date	
		Checked		Rev.	

FORMULA:

$$\% \text{ EXCESS AIR} = \frac{(\% O_2 - 0.5\ \% CO)}{[0.264\ \% N_2 - (\% O_2 - 0.5\ \% CO)]} \times 100$$

FOR RUN # 1: $\% O_2 = 14.00$; $\% CO = \emptyset$; $\% N_2 = 82.20$

$$\% \text{ EXCESS AIR} = \frac{[14.00 - 0.5(\emptyset)]}{[0.264(82.20) - (14.00 - 0.5(\emptyset))]} \times 100 = 181.80$$

RUN # 2: $\% O_2 = 14.00$; $\% CO = \emptyset$; $\% N_2 = 82.20$

$$\% \text{ EXCESS AIR} = \frac{[14.00 - 0.5(\emptyset)]}{[0.264(82.20) - (14.00 - 0.5(\emptyset))]} \times 100 = 181.80$$

RUN # 3: $\% O_2 = 14.30$; $\% CO = \emptyset$; $\% N_2 = 81.00$

$$\% \text{ EXCESS AIR} = \frac{[14.30 - 0.5(\emptyset)]}{[0.264(81.00) - (14.30 - 0.5(\emptyset))]} \times 100 = 201.86$$

ALTA

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

LCS RESULTS
Lab ID: 11249-LCS1/LCS2
Matrix: MM5

Date Received: NA
Date Extracted: 5/7/92
Sample Amount: Sample

ICAL ID: IPAH
QC Lot: LC0507M
Units: NA

COMPOUND	LCS1 % R	LCS2 % R	RPD %
Naphthalene	122	127	4.0
Acenaphthylene	105	104	0.96
Acenaphthene	102	103	0.98
Fluorene	108	114	5.4
Phenanthrene	135	134	0.74
Anthracene	108	108	0.0
Fluoranthene	97	97	0.0
Pyrene	82	81	1.2
Benz(a)anthracene	49	51	4.0
Chrysene	60	60	0.0
Benzo(b)fluoranthene	84	86	2.4
Benzo(k)fluoranthene	114	102	11
Benzo(a)pyrene	118	110	7.0
Benzo(e)pyrene	NA	NA	NA
Indeno(1,2,3-c,d)pyrene	109	108	0.92
Dibenz(a,h)anthracene	127	118	7.4
Benzo(g,h,i)perylene	115	111	3.5

Analyst: [signature]

Reviewer: [signature]

ALTA

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

LCS RESULTS
Lab ID: 11249-LCS1/LCS2

Isotopic Recovery Results

Internal Standard:	LCS1 % R	LCS2 % R
d_8-Napththalene	55	60
d_8-Acenaphthylene	42	44
d_{10}-Acenaphthene	42	45
d_{10}-Fluorene	34	32
d_{10}-Phenanthrene	42	47
d_{10}-Anthracene	30	50
d_{10}-Fluoranthene	146	150
d_{10}-Pyrene	135	139
d_{12}-Benz(a)anthracene	101	102
d_{12}-Chrysene	96	102
d_{12}-Benzo(b)fluoranthene	82	86
d_{12}-Benzo(k)fluoranthene	69	73
d_{12}-Benzo(a)pyrene	69	76
d_{12}-Indeno(1,2,3-c,d)pyrene	38	40
d_{12}-Benzo(g,h,i)perylene	45	45
d_{14}-Dibenz(a,h)anthracene	30	32

Date Analyzed: 5/13/92

Analyst: JME

Reviewer: BM

ALTA

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

Sample ID: Run 1
Lab ID: 11249-001-PAH
Matrix: MM5

Date Received: 5/7/92
Date Extracted: 5/7/92
Sample Amount: Sample

ICAL ID: IPAH
QC Lot: LC0507M
Units: ng/sample

Compound	Conc.	R.L.	Qualifier
Naphthalene	840000	630	*,B
Acenaphthylene	20000	250	*
Acenaphthene	20000	250	*
Fluorene	39000	250	*
Phenanthrene	52000	630	*
Anthracene	5000	250	*
Fluoranthene	1200	10	
Pyrene	830	10	
Benz(a)anthracene	44	10	
Chrysene	94	10	
Benzo(b)fluoranthene	28	10	
Benzo(k)fluoranthene	11	10	
Benzo(a)pyrene	ND	10	
Benzo(e)pyrene	NA	NA	
Indeno(1,2,3-c,d)pyrene	13	10	
Dibenz(a,h)anthracene	10	10	
Benzo(g,h,i)perylene	ND	10	

Analyst: BM

Reviewer: JM

ALTA

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

Sample ID: Run 1
Lab ID: 11249-001-PAH

Isotopic Recovery Results

Internal Standard:	% R	Qualifier
d_8-Naphthalene	44	H
d_8-Acenaphthylene	NA	*,I
d_{10}-Acenaphthene	60	
d_{10}-Fluorene	92	
d_{10}-Phenanthrene	112	
d_{10}-Anthracene	58	
d_{10}-Fluoranthene	61	
d_{10}-Pyrene	70	
d_{12}-Benz(a)anthracene	108	
d_{12}-Chrysene	92	
d_{12}-Benzo(b)fluoranthene	85	
d_{12}-Benzo(k)fluoranthene	72	
d_{12}-Benzo(a)pyrene	71	
d_{12}-Indeno(1,2,3-c,d)pyrene	30	H
d_{12}-Benzo(g,h,i)perylene	37	H
d_{14}-Dibenz(a,h)anthracene	23	H

Pre-spike Recovery Standard:

d_{12}-Benzo(e)pyrene	119	
d_{14}-Terphenyl	101	

Date Analyzed: 5/13/92

Analyst: *6th*

Reviewer: *[signature]*

ALTA

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

Sample ID: Run 2
Lab ID: 11249-002-PAH
Matrix: MM5

Date Received: 5/7/92
Date Extracted: 5/7/92
Sample Amount: Sample

ICAL ID: IPAH
QC Lot: LC0507M
Units: ng/sample

Compound	Conc.	R.L.	Qualifier
Naphthalene	600000	630	*,B
Acenaphthylene	18000	250	*
Acenaphthene	20000	250	*
Fluorene	39000	250	*
Phenanthrene	61000	630	*
Anthracene	5800	250	*
Fluoranthene	1800	10	
Pyrene	1300	10	
Benz(a)anthracene	34	10	
Chrysene	85	10	
Benzo(b)fluoranthene	21	10	
Benzo(k)fluoranthene	ND	10	
Benzo(a)pyrene	ND	10	
Benzo(e)pyrene	NA	NA	
Indeno(1,2,3-c,d)pyrene	ND	10	
Dibenz(a,h)anthracene	ND	10	
Benzo(g,h,i)perylene	ND	10	

Analyst: BM

Reviewer: JM

ALTA

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

Sample ID: Run 2
Lab ID: 11249-002-PAH

Isotopic Recovery Results

Internal Standard:	% R	Qualifier
d_8-Naphthalene	68	
d_8-Acenaphthylene	NA	*,I
d_{10}-Acenaphthene	84	
d_{10}-Fluorene	107	
d_{10}-Phenanthrene	126	
d_{10}-Anthracene	82	
d_{10}-Fluoranthene	69	
d_{10}-Pyrene	81	
d_{12}-Benz(a)anthracene	123	
d_{12}-Chrysene	102	
d_{12}-Benzo(b)fluoranthene	95	
d_{12}-Benzo(k)fluoranthene	76	
d_{12}-Benzo(a)pyrene	76	
d_{12}-Indeno(1,2,3-c,d)pyrene	28	H
d_{12}-Benzo(g,h,i)perylene	35	H
d_{14}-Dibenz(a,h)anthracene	19	H
Pre-spike Recovery Standard:		
d_{12}-Benzo(e)pyrene	126	
d_{14}-Terphenyl	103	

Date Analyzed: 5/13/92

Analyst: *[signature]*

Reviewer: *[signature]*

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

ALTA

Sample ID: Run 3	Date Received: 5/7/92	ICAL ID: IPAH
Lab ID: 11249-003-PAH	Date Extracted: 5/7/92	QC Lot: LC0507M
Matrix: MM5	Sample Amount: Sample	Units: ng/sample

Compound	Conc.	R.L.	Qualifier
Naphthalene	1900000	630	*,B
Acenaphthylene	18000	250	*
Acenaphthene	44000	250	*
Fluorene	77000	250	*
Phenanthrene	110000	630	*
Anthracene	11000	250	*
Fluoranthene	1200	10	
Pyrene	950	10	
Benz(a)anthracene	32	10	
Chrysene	70	10	
Benzo(b)fluoranthene	21	10	
Benzo(k)fluoranthene	ND	10	
Benzo(a)pyrene	ND	10	
Benzo(e)pyrene	NA	NA	
Indeno(1,2,3-c,d)pyrene	ND	10	
Dibenz(a,h)anthracene	ND	10	
Benzo(g,h,i)perylene	ND	10	

Analyst: *bmq*

Reviewer: *[illegible]*

ALTA

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

Sample ID: Run 3
Lab ID: 11249-003-PAH

Isotopic Recovery Results

Internal Standard:	% R	Qualifier
d_8-Naphthalene	NA	*,I
d_8-Acenaphthylene	NA	*,I
d_{10}-Acenaphthene	NA	*,I
d_{10}-Fluorene	NA	*,I
d_{10}-Phenanthrene	NA	*,I
d_{10}-Anthracene	NA	*,I
d_{10}-Fluoranthene	55	
d_{10}-Pyrene	67	
d_{12}-Benz(a)anthracene	106	
d_{12}-Chrysene	91	
d_{12}-Benzo(b)fluoranthene	88	
d_{12}-Benzo(k)fluoranthene	65	
d_{12}-Benzo(a)pyrene	75	
d_{12}-Indeno(1,2,3-c,d)pyrene	35	H
d_{12}-Benzo(g,h,i)perylene	38	H
d_{14}-Dibenz(a,h)anthracene	28	H
Pre-spike Recovery Standard:		
d_{12}-Benzo(e)pyrene	113	
d_{14}-Terphenyl	104	

Date Analyzed: 5/13/92

Analyst: bkg

Reviewer: JMP

ALTA

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

Sample ID: Blank Run
Lab ID: 11249-004-PAH
Matrix: MM5

Date Received: 5/7/92
Date Extracted: 5/7/92
Sample Amount: Sample

ICAL ID: IPAH
QC Lot: LC0507M
Units: ng/sample

Compound	Conc.	R.L.	Qualifier
Naphthalene	880	25	B
Acenaphthylene	11	10	
Acenaphthene	16	10	
Fluorene	72	10	
Phenanthrene	290	25	
Anthracene	40	10	
Fluoranthene	95	10	
Pyrene	48	10	
Benz(a)anthracene	ND	10	
Chrysene	18	10	
Benzo(b)fluoranthene	ND	10	
Benzo(k)fluoranthene	ND	10	
Benzo(a)pyrene	ND	10	
Benzo(e)pyrene	NA	NA	
Indeno(1,2,3-c,d)pyrene	ND	10	
Dibenz(a,h)anthracene	ND	10	
Benzo(g,h,i)perylene	ND	10	

Analyst: Jm

Reviewer: GJ

ALTA

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

Sample ID: Blank Run
Lab ID: 11249-004-PAH

Isotopic Recovery Results

Internal Standard:	% R	Qualifier
d_8-Naphthalene	52	
d_8-Acenaphthylene	55	
d_{10}-Acenaphthene	58	
d_{10}-Fluorene	63	
d_{10}-Phenanthrene	78	
d_{10}-Anthracene	53	
d_{10}-Fluoranthene	90	
d_{10}-Pyrene	85	
d_{12}-Benz(a)anthracene	88	
d_{12}-Chrysene	68	
d_{12}-Benzo(b)fluoranthene	92	
d_{12}-Benzo(k)fluoranthene	68	
d_{12}-Benzo(a)pyrene	84	
d_{12}-Indeno(1,2,3-c,d)pyrene	80	
d_{12}-Benzo(g,h,i)perylene	80	
d_{14}-Dibenz(a,h)anthracene	79	
Pre-spike Recovery Standard:		
d_{12}-Benzo(e)pyrene	100	
d_{14}-Terphenyl	92	

Date Analyzed: 5/13/92

Analyst: JMB

Reviewer: BBy

ALTA

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

METHOD BLANK
Lab ID: 11249-MB-PAH
Matrix: MM5

Date Received: NA
Date Extracted: 5/7/92
Sample Amount: Sample

ICAL ID: IPAH
QC Lot: LC0507M
Units: ng/sample

Compound	Conc.	R.L.	Qualifier
Naphthalene	250	25	
Acenaphthylene	ND	10	
Acenaphthene	ND	10	
Fluorene	ND	10	
Phenanthrene	ND	25	
Anthracene	ND	10	
Fluoranthene	ND	10	
Pyrene	ND	10	
Benz(a)anthracene	ND	10	
Chrysene	ND	10	
Benzo(b)fluoranthene	ND	10	
Benzo(k)fluoranthene	ND	10	
Benzo(a)pyrene	ND	10	
Benzo(e)pyrene	NA	NA	
Indeno(1,2,3-c,d)pyrene	ND	10	
Dibenz(a,h)anthracene	ND	10	
Benzo(g,h,i)perylene	ND	10	

Analyst: [signature]

Reviewer: [signature]

ALTA

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

METHOD BLANK
Lab ID: 11249-MB-PAH

Isotopic Recovery Results

Internal Standard:	% R	Qualifier
d_8-Naphthalene	55	
d_8-Acenaphthylene	51	
d_{10}-Acenaphthene	56	
d_{10}-Fluorene	52	
d_{10}-Phenanthrene	51	
d_{10}-Anthracene	36	H
d_{10}-Fluoranthene	142	
d_{10}-Pyrene	137	
d_{12}-Benz(a)anthracene	87	
d_{12}-Chrysene	88	
d_{12}-Benzo(b)fluoranthene	93	
d_{12}-Benzo(k)fluoranthene	69	
d_{12}-Benzo(a)pyrene	76	
d_{12}-Indeno(1,2,3-c,d)pyrene	70	
d_{12}-Benzo(g,h,i)perylene	77	
d_{14}-Dibenz(a,h)anthracene	64	

Pre-spike Recovery Standard:

d_{12}-Benzo(e)pyrene	NA
d_{14}-Terphenyl	NA

Date Analyzed: 5/13/92

Analyst: JMB

Reviewer: BMy

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

QA REQUIREMENTS FOR SUB-CONTRACTING LABORATORIES

Sub-contracting Laboratory ALTA ANALYTICAL LABORATORY

ES Project Name NAPA Project No. WA 349

ES Sample Number(s) 920508 - 920511

Sample Description PAH Run #1 - 3 + Blank

Sample Matrix H2O, Acetone, Methylene Chloride, XAD, filter

Parameter to be analyzed for Polycyclic Aromatic Hydrocarbons

Point of Contact for ES John Crawley Phone (818) 969-5758

1. Responsible laboratory supplying analysis guarantees the above stated sample will be analyzed according to :

   a. Method Number CARB 429

   b. Regulatory Board CARB

   c. Last Approved Revision__________

2. The above analysis will be completed including written report by:

   a. Date 5/28/92

3. A written notice of non-compliance with the above, must be submitted to the ES point of contact, no later than twenty four hours prior to the analysis. An explanation of non-compliance should be included with this notice. If another method is substituted for the above method, without ES approval, the sub-contract laboratory will be liable for all costs, including field and laboratory retesting.

4. It is necessary all reported results are accompanied by the appropriate quality control information such as spike recoveries, duplicates, replicates and blanks.

5. Invoices for sub-contract laboratories will not be accepted without this completed agreement.

6. As an authorized representative for this sub-contracting laboratory, I have read and understood this document completely

Robert S. Mitzel	Robert S. Mitzel	5/7/92
Signature	Print Name	Date

W/12

ALTA

May 14, 1992

Alta Batch I.D.: 11249

Mr. John Crawley
Engineering Science Inc.
6060 N. Irwindale Ave. Suite J
Irwindale, CA 91706

Dear Mr. Crawley,

Enclosed are the results for the four MM5 trains received at Alta Analytical Laboratory on May 7, 1992. This work was identified as your Project Number WA349. These samples were analyzed using CARB Method 429 for polycyclic aromatic hydrocarbons (PAH) using High Resolution Mass Spectrometry (HRMS). A standard turnaround time was requested for this work.

The following difficulties were associated with the analysis of these samples. Sample ID.'s Run 1, Run 2, and Run 3 had to be diluted at 1:25 due significant concentrations of the PAH compounds present. For Sample ID.'s Run 1 and Run 2 the result for acenaphthylene was quantitated using d8-naphthalene because of interferences with d8-acenaphthylene. Due to interferences in Sample ID. Run 3 some internal standards could not be used for quantition. Because of this naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene were quantitated using the recovery standard. Compounds reported from the 1:25 dilution are designated on the data sheet with an " * " asterisk. Some samples had internal standard recoveries below 50%. However, in every instance the signal-to-noise ratio was greater than 10:1, therefore no further action was required, as per the method.

The following report consists of a Sample Inventory (Section I), Analytical Results (Section II) and the Appendix. The Appendix contains a copy of the chain-of-custody, a list of data qualifiers and abbreviations and copies of the raw data (if requested).

If you have any questions regarding this report please feel free to contact me.

Sincerely,

Robert S. Mitzel

Robert S. Mitzel
Director of Operations

Alta Analytical Laboratory Inc.

5070 Robert J. Mathews Pkwy., Suite 2
El Dorado Hills, CA 95630

FAX (916) 933-0940
(916) 933-1640

ALTA

May 7, 1992

Mr. Rollie Rosario
Engineering Science Inc.
6060 N. Irwindale Ave., Suite J
Irwindale, CA 91706

Dear Mr. Rosario,

The samples listed in Table 1 were received by Alta Analytical Laboratory on 7-May-92. Attached is a copy of the chain-of-custody (C-O-C) or other documentation for your records.

Analytical results are scheduled to be reported to you on or about 28-May-92. All sample containers and their contents will be returned to you at the above address approximately 30 calendar days following issuance of a final written report.

Please contact me if you have any questions regarding the status of the work associated with these samples at (916) 933-1640.

For rapid telephone assistance, please refer to the laboratory Identification Number: 11249 when requesting information.

Sincerely,

Robert S. Mitzel

Robert S. Mitzel
Alta Analytical Laboratory

Alta Analytical Laboratory Inc.

5070 Robert J. Mathews Pkwy., Suite 2
El Dorado Hills, CA 95630

FAX (916) 933-0940
(916) 933-1640

ALTA

June 8, 1992

Alta Batch I.D.: 11249

Mr. John Crawley
Engineering Science Inc.
6060 N. Irwindale Ave. Suite J
Irwindale, CA 91706

Dear Mr. Crawley,

Enclosed are the results for the four MM5 trains received at Alta Analytical Laboratory on May 7, 1992. At your request on 5/29/92, the archive portions of these samples were worked-up and analyzed for 2-methylphenol, 3-methylphenol, and 4-methylphenol. Please note on the data sheets that 2-methylphenol and 3-methylphenol co-elute. This work was identified as your Project Number WA349. A standard turnaround time was requested for this work.

The following difficulties were associated with the analysis of these samples. Sample ID.'s Run 1, Run 2, had to be diluted at 1:10 due significant matrix interferences present in the extracts. Sample ID.'s Run 3 had to be diluted 1:50 for the same reasons. The reporting limits were raised due to the dilutions. There were no surrogate results available, because the request for this analysis occurred after the extraction, therefore no surrogate compounds were added.

If you have any questions regarding this report please feel free to contact me.

Sincerely,

Robert S. Mitzel

Robert S. Mitzel
Director of Operations

Alta Analytical Laboratory Inc.

5070 Robert J. Mathews Pkwy., Suite 2
El Dorado Hills, CA. 95630

FAX (916) 933-0940
(916) 933-1640

ALTA

MODIFIED EPA METHOD 8270

Sample ID: Run #1
Lab ID: 11249-001-PHENOL
Matrix: MM5

Date Received: 5/07/92
Date Extracted: 5/07/92
Sample Amount: Sample

ICAL ID: NA
QC Lot: NA
Units: ug/sample

Compound	Conc.	R.L.	Qualifier
2-Methylphenol	ND	100	
3-Methylphenol	ND	100	
4-Methyphenol	ND	100	

SURROGATES	% REC.
2-Fluorophenol	NA
Phenol-d6	NA
2,4,6-Tribromophenol	NA

Date Analyzed: 6/02/92

Analyst: BJM

Reviewer: [signature]

ALTA

MODIFIED EPA METHOD 8270

Sample ID: Run #2
Lab ID: 11249-002-PHENOL
Matrix: MM5

Date Received: 5/07/92
Date Extracted: 5/07/92
Sample Amount: Sample

ICAL ID: NA
QC Lot: NA
Units: ug/sample

Compound	Conc.	R.L.	Qualifier
2-Methylphenol	ND	100	
3-Methylphenol	ND	100	
4-Methyphenol	ND	100	

SURROGATES	% REC.
2-Fluorophenol	NA
Phenol-d6	NA
2,4,6-Tribromophenol	NA

Date Analyzed: 6/02/92

Analyst: *[signature]*

Reviewer: *[signature]*

ALTA

MODIFIED EPA METHOD 8270

Sample ID: Run #3	**Date Received:** 5/07/92	**ICAL ID:** NA
Lab ID: 11249-003-PHENOL	**Date Extracted:** 5/07/92	**QC Lot:** NA
Matrix: MM5	**Sample Amount:** Sample	**Units:** ug/sample

Compound	Conc.	R.L.	Qualifier
2-Methylphenol	ND	500	
3-Methylphenol	ND	500	
4-Methyphenol	ND	500	

SURROGATES	% REC.
2-Fluorophenol	NA
Phenol-d6	NA
2,4,6-Tribromophenol	NA

Date Analyzed: 6/03/92

Analyst: *[signature]*

Reviewer: *[signature]*

MODIFIED EPA METHOD 8270

ALTA

Sample ID: Blank Run
Lab ID: 11249-004-PHENOL
Matrix: MM5

Date Received: 5/07/92
Date Extracted: 5/07/92
Sample Amount: Sample

ICAL ID: NA
QC Lot: NA
Units: ug/sample

Compound	Conc.	R.L.	Qualifier
2-Methylphenol	ND	10	
3-Methylphenol	ND	10	
4-Methyphenol	ND	10	

SURROGATES	% REC.
2-Fluorophenol	NA
Phenol-d6	NA
2,4,6-Tribromophenol	NA

Date Analyzed: 6/03/92

Analyst: BM

Reviewer: JMR

ALTA

MODIFIED EPA METHOD 8270

METHOD BLANK	Date Received: NA	ICAL ID: NA
Lab ID: 11249-MB1-PHENOL	Date Extracted: 5/07/92	QC Lot: NA
Matrix: MM5	Sample Amount: Sample	Units: ug/sample

Compound	Conc.	R.L.	Qualifier
2-Methylphenol	ND	10	
3-Methylphenol	ND	10	
4-Methyphenol	ND	10	

SURROGATES	% REC.
2-Fluorophenol	NA
Phenol-d6	NA
2,4,6-Tribromophenol	NA

Date Analyzed: 6/02/92

Analyst: *[signature]* Reviewer: *[signature]*

ALTA

Section I. Sample Inventory

Date Received: 7-May-92

Alta Lab ID.	Client ID.
11249-1-A	92508 D RUN 1 FILTER
11249-1-B	92508 E RUN 1 XAD
11249-1-C	92508 C RUN 1 H2O RINSE
11249-1-D	92508 A RUN 1 ACETONE SOLVENT RINSE
11249-1-E	92508 B RUN 1 MeCl2 SOLVENT RINSE
11249-2-A	92509 D RUN 2 FILTER
11249-2-B	92509 E RUN 2 XAD
11249-2-C	92509 C RUN 2 H2O RINSE
11249-2-D	92509 A RUN 2 ACETONE SOLVENT RINSE
11249-2-E	92509 B RUN 2 MeCl2 SOLVENT RINSE
11249-3-A	92510 D RUN 3 FILTER
11249-3-B	92510 E RUN 3 XAD
11249-3-C	92510 C RUN 3 H2O RINSE
11249-3-D	92510 A RUN 3 ACETONE SOLVENT RINSE
11249-3-E	92510 B RUN 3 MeCl2 SOLVENT RINSE
11249-4-A	92511 D BLANK FILTER
11249-4-B	92511 E BLANK XAD
11249-4-C	92511 C BLANK H2O RINSE
11249-4-D	92511 A BLANK ACETONE SOLVENT RINSE
11249-4-E	92511 B BLANK MeCl2 SOLVENT RINSE

ALTA

Section I. Sample Inventory

Date Received: 7-May-92

Alta Lab ID.	Client ID.
11249-1-A	92508 D RUN 1 FILTER
11249-1-B	92508 E RUN 1 XAD
11249-1-C	92508 C RUN 1 H2O RINSE
11249-1-D	92508 A RUN 1 ACETONE SOLVENT RINSE
11249-1-E	92508 B RUN 1 MeCl2 SOLVENT RINSE
11249-2-A	92509 D RUN 2 FILTER
11249-2-B	92509 E RUN 2 XAD
11249-2-C	92509 C RUN 2 H2O RINSE
11249-2-D	92509 A RUN 2 ACETONE SOLVENT RINSE
11249-2-E	92509 B RUN 2 MeCl2 SOLVENT RINSE
11249-3-A	92510 D RUN 3 FILTER
11249-3-B	92510 E RUN 3 XAD
11249-3-C	92510 C RUN 3 H2O RINSE
11249-3-D	92510 A RUN 3 ACETONE SOLVENT RINSE
11249-3-E	92510 B RUN 3 MeCl2 SOLVENT RINSE
11249-4-A	92511 D BLANK FILTER
11249-4-B	92511 E BLANK XAD
11249-4-C	92511 C BLANK H2O RINSE
11249-4-D	92511 A BLANK ACETONE SOLVENT RINSE
11249-4-E	92511 B BLANK MeCl2 SOLVENT RINSE

ALTA

SECTION II.

ALTA

APPENDIX

ALTA

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 resulted has been reported off the 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
MPC	Maximum Possible Concentration
•	See Cover Letter
R.L.	Reporting Limit

PAH#1 K = 0.78

ENGINEERING-SCIENCE, INC.

FIELD DATA

PLANT NARA
DATE 4/30/92
TEST SITE Stack Outlet
RUN NUMBER 1 PAH
OPERATORS CH/MB/RR/ GA/RR

AMBIENT TEMP. 75°
BAROMETER 29.83
STACK PRESSURE -0.48
STACK H2O 3%
STACK I.D. 33"

METER ΔH @ 1.94
METER GAMMA 1.005
METER BOX # Brown III
NOZZLE DIAMETER 0.187
PROBE LENGTH 6 ft

PROBE MAT'L Quartz
FILTER NUMBER
SAMPLE BOX #
PRE LEAK 0.010 @ 15 Hg
POST LEAK

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	0	0835	754.139	1.1	0.86	0.86	214	77	72	55	240	11
2	10	0845	762.9	1.2	0.94	0.94	211	78	73	55	245	12
3	20	0855	768.3	1.2	0.94	0.94	212	78	73	56	251	12
4	30	0905	773.5	1.4	1.09	1.1	210	80	75	56	258	13
5	40	0915	778.1	1.4	1.09	1.1	213	82	77	56	264	13
6	50	0925	783.7	1.6	1.25	1.3	225	85	78	56	270	13
7	60	0935	790.2	1.7	1.33	1.3	224	88	79	56	271	13
8	70	0945	796.7	1.6	1.25	1.3	223	89	79	56	242	13
9	80	0955	803.0	1.4	1.09	1.1	220	92	81	57	255	13
10	90	1005	809.3	1.4	1.09	1.1	217	93	82	57	261	13
11	100	1015	815.4	1.3	1.01	1.0	215	95	84	57	255	12
12	110	1025	820.6	1.2	0.94	0.94	210	96	85	57	242	11
	120	1035	825.788									
			Port Change									
AVERAGE /SUM												

PAH #1

K = 0.76

ENGINEERING-SCIENCE, INC.

PLANT NAPA
SOURCE Stack Outlet
DATE 4/30/92
POST LEAK RATE 0.007 @ 13"Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE (DELTA H, "H2O) ACTUAL	TEMPERATURES STACK TEMP.	TEMPERATURES METER INLET	TEMPERATURES METER OUTLET	TEMPERATURES IMPINGER	TEMPERATURES FILTER	PUMP VAC. "HG
1	120	1045	825.788	1.0	0.78	0.78	203	84	84	56	236	11
2	130	1055	830.4	1.2	0.94	0.94	204	88	84	57	245	12
3	140	1105	835.5	1.3	1.01	1.0	200	89	84	57	257	12
4	150	1115	841.3	1.3	1.01	1.0	201	81	85	58	264	12
5	160	1125	846.8	1.4	1.09	1.1	203	92	87	58	252	13
6	170	1135	852.0	1.4	1.09	1.0	206	93	87	58	240	13
7	180	1145	859.9	1.6	1.25	1.3	207	93	88	58	249	13
8	190	1155	865.5	1.5	1.17	1.2	208	93	89	58	250	13
9	200	1205	871.8	1.4	1.09	1.1	208	93	89	59	249	13
10	210	1215	877.7	1.3	1.01	1.0	214	91	88	59	246	13
11	220	1225	883.7	1.3	1.01	1.0	211	91	85	59	246	13
12	230	1235	889.7	1.2	.94	1.0	212	91	86	59	247	13
	240	1245	895.232									
			End		Run							
AVERAGE /SUM	240		139.099	1.160		1.06	211	85				

1.1

PAH #2   K = 0.78

ENGINEERING-SCIENCE,INC.

FIELD DATA

PAGE 1 OF 2

PLANT NAPA
DATE 4/30/92
TEST SITE Stack Outlet
RUN NUMBER 2 PAH
OPERATORS CH/RR/MB SM/JB

AMBIENT TEMP. 80°
BAROMETER 29.83
STACK PRESSURE -0.78
STACK H2O 38%
STACK I.D. 32"

METER ΔH @ 1.94
METER GAMMA 1.005
METER BOX # [illegible]
NOZZLE DIAMETER 0.187
PROBE LENGTH 6ft

PROBE MAT'L Quartz
FILTER NUMBER
SAMPLE BOX #
PRE LEAK 0.007 @ 15"Hg
POST LEAK

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE (DELTA H, "H2O) ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	0	1325	897.350	1.0	0.78	0.78	218	85	85	59	234	10
2	10	1335	902.4	1.1	0.86	0.86	216	89	86	59	240	10
3	20	1345	907.5	1.3	1.01	1.0	217	90	87	59	247	11
4	30	1355	919.9	1.4	1.09	1.1	217	90	86	59	248	12
5	40	0840	918.5	1.6	1.25	1.3	218	89	85	59	255	13
6	50	0850	924.3	1.6	1.25	1.3	218	89	75	59	255	13
7	60	0900	931.0	1.5	1.17	1.2	209	82	76	60	234	13
8	70	0910	937.0	1.5	1.17	1.2	210	86	79	60	251	13
9	80	0920	943.0	1.4	1.09	1.1	214	89	82	60	259	12
10	90	0930	949.1	1.2	0.94	0.94	216	92	84	60	263	11
11	100	0940	955.1	1.1	0.86	0.86	215	93	86	66	276	11
12	110	0950	960.2	1.0	0.86	0.86	213	94	86	60	262	10
	120	1000	965.875									
		Port Change										
AVERAGE /SUM												

Shutdown
started
5/1/92

$(849.8)(0.84)^2(D_N)^4(\Delta H@)(\frac{}{T+460})$

PAH #2   K = 0.78

ENGINEERING-SCIENCE, INC.

PLANT NAPA
SOURCE Stack Outlet
DATE 5/1/92
POST LEAK RATE 0.0 @ 17" Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES #5 STACK TEMP.	#6 METER INLET	#7 METER OUTLET	#1 IMPINGER	#5 FILTER	PUMP VAC. "HG
1	120	1005	965.875	1.2	0.94	0.94	220	89	84	61	270	7
2	130	1015	969.0	1.3	1.01	1.0	218	87	84	60	273	4
3	140	1025	973.8	1.4	1.09	1.1	222	93	85	67	278	13
4	150	1000	979.8	1.4	1.09	1.1	220	82	82	67	292	17
5	160	1020	984.7	1.4	1.09	1.1	220	85	83	70	272	14
6	170	1030	990.0	1.2	0.94	1.0	222	85	83	70	230	13
7	180	1140	995.9	1.2	0.94	1.0	210	85	83	70	229	13
8	190	1150	000.5	1.1	0.86	0.9	210	85	84	70	220	13
9	200	1209	007.1	1.0	0.78	0.78	209	85	82	70	243	13
10	210	1230	012.8	1.0	0.78	0.78	207	85	83	70	249	13
11	220	1280	017.9	1.0	0.78	0.78	208	86	83	70	242	13
12	230	1230	023.6	1.0	0.78	0.79	204	88	84	70	233	13
	240	1240	028.576									
End Run												
shut down @ 1035 Boiler @ site would not start												
AVERAGE /SUM	240		131.193	1.115		0.99	214	85				

PAH #3

K = 0.78

ENGINEERING-SCIENCE, INC.

FIELD DATA

PAGE 1 OF 2

PLANT: NAPA
DATE: 5-4-92
TEST SITE: KILN STACK OUTLET
RUN NUMBER: 3 PAH
OPERATORS: [illegible]

AMBIENT TEMP.: 76
BAROMETER: 29.86
STACK PRESSURE: 0
STACK H2O: 20%
STACK I.D.: 33"

METER ΔH @: 1.94
METER GAMMA: 1.005
METER BOX #: BROWN 3
NOZZLE DIAMETER: ~~0.187~~
PROBE LENGTH: 5'

PROBE MAT'L: GLASS
FILTER NUMBER:
SAMPLE BOX #:
PRE LEAK: 0.009 CFM @ 15" Hg
POST LEAK: 0.007 @ 12" Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	0	0800	064.56	1.0	0.78	0.78	200	75	73	51	230	7
2	10	0810	069.8	1.1	0.86	0.86	201	76	74	51	245	7
3	20	0820	076.2	1.3	1.01	1.0	198	76	74	51	247	8
4	30	0830	081.9	1.3	1.01	1.0	186	86	82	53	235	8
5	40	0840	087.4	1.4	1.09	1.1	199	89	84	53	225	9
6	50	0850	093.5	1.5	1.17	1.2	204	94	87	53	240	9
7	60	0900	100.2	1.5	1.17	1.2	204	102	91	54	225	9
8	70	0910	106.5	1.2	0.94	0.94	207	103	92	54	220	8
9	80	0920	111.9	1.2	0.94	0.94	210	105	95	54	239	8
10	90	0930	117.6	1.1	0.86	0.86	211	105	96	54	241	8
11	100	0940	122.6	1.0	0.78	0.78	211	94	90	54	255	8
12	110	0950	127.5	1.0	0.78	0.78	212	93	89	54	261	8
	120	1000	132.678	PORT CHANGE								
AVERAGE /SUM												

Plant down @0840 hrs.
@0930 hrs.

PAH #3 K= 0.78

ENGINEERING-SCIENCE,INC.

PLANT: NAPA
DATE: 5-4-92
POST LEAK RATE: 0.007 @ 12" Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	120	1115	132.678	1.1	0.86	0.86	205	91	86	53	244	6
2	130	1125	137.9	1.0	0.78	0.78	204	91	85	53	236	6
3	140	1135	142.9	1.2	0.94	0.94	205	91	85	53	247	7
4	150	1145	148.3	1.3	1.01	1.0	205	92	88	54	249	7
5	160	1155	154.3	1.4	1.09	1.1	210	88	82	56	255	8
6	170	1205	159.9	1.2	0.94	0.94	211	84	81	55	247	7
7	180	1215	164.5	1.2	0.94	0.94	207	86	81	55	241	7
8	190	1225	170.5	1.0	0.78	0.78	210	87	81	54	239	6
9	200	1235	175.4	1.2	0.94	0.94	206	86	81	56	240	7
10	210	1245	181.5	1.2	0.94	0.94	206	88	82	56	252	7
11	220	1255	186.6	1.0	0.78	0.78	206	87	81	56	243	7
12	230	1305	190.0	0.97	0.76	0.76	207	88	81	56	238	6
	240	1315	191.417	—	END		RUN	#3		—		
AVERAGE /SUM	240		130.841	1.085 : 1.04		0.92	205	87				

ENGINEERING-SCIENCE, INC.

PRELIMINARY VELOCITY TRAVERSE DATA

PLANT NAPA

DATE 4/30/92

LOCATION STACK OUTLET

STACK I.D. 33"

BAROMETRIC PRESSURE 2

STATIC PRESSURE -0.48

OPERATORS ME, CH, SF

TRAVERSE POINT NUMBER	VELOCITY HEAD (DELTA P)	STACK TEMP.	CYCLONIC FLOW ANGLE
1	1.0	268	1
2	1.2	233	3
3	1.2	233	0
4	1.3	235	0
5	1.4	237	5
6	1.4	243	2
7	1.4	245	2
8	1.5	241	1
9	1.4	238	0
10	1.3	236	1
11	1.1	233	0
12	1.0	230	3
AVERAGE	1.13	235	

TRAVERSE POINT NUMBER	VELOCITY HEAD (DELTA P)	STACK TEMP.	CYCLONIC FLOW ANGLE
1	1.2	250	2
2	1.3	252	2
3	1.5	246	1
4	1.5	245	0
5	1.5	247	2
6	1.6	249	4
7	1.4	253	6
8	1.3	255	1
9	1.1	254	0
10	1.0	251	1
11	1.0	250	5
12	0.90	250	2
AVERAGE	1.13	250	

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 4-30-92

FACILITY NAPA IA

ES NO. 920508

RUN NO. 1

METHOD 429

TYPE PAH

IMP SOLN H2O

	SOLUTION	VOL.(ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1	H2O	140	100.	40
IMPINGER# 2	H2O	100	100	0
IMPINGER# 3	mT	0	0	0
IMPINGER# 4	mT	620	0	620
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL(g)	
SILICA GEL		865.8	803.3	62.5
FILTER # DESCRIPTION			TOTAL MOISTURE	
				722.50 (g)

COMMENTS

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TRAIN RECOVERY DATA SHEET

DATE 5-1-92
FACILITY NAPA
ES NO. 920509

RUN NO. 2 METHOD 429
TYPE PAH
IMP SOLN H_2O

	SOLUTION	VOL. (ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1	H_2O	585	MT	585
IMPINGER# 2	H_2O	178	100	78
IMPINGER# 3	MT	128	100	28
IMPINGER# 4	MT	40	MT	40
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL(g)	
SILICA GEL		849.5	804.6	44.9
FILTER # DESCRIPTION			TOTAL MOISTURE	
				775.9 (g)

COMMENTS

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IRWINDALE, CA 91706
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TRAIN RECOVERY DATA SHEET

DATE 5-4-92 RUN NO. 3 METHOD 429.
FACILITY NAPA IA TYPE PAH
ES NO. 920510 IMP SOLN H_2O

	SOLUTION	VOL. (ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL (ml.)	INITIAL (ml.)	NET.
IMPINGER# 1	H_2O	627	100	527
IMPINGER# 2	H_2O	157	100	57
IMPINGER# 3	MT	—	MT	—
IMPINGER# 4	MT	—	—	—
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL (g)	
SILICA GEL		884.2	820.2	64.0
FILTER # DESCRIPTION			TOTAL MOISTURE	

TOTAL MOISTURE: 648.0 (g)

COMMENTS

1c3

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6060 Irwinda Ave., Suite J
P.O. Box 2007
Irwindale, CA 91706
Telephone:(818)969-5758 Fax:(818)969-4692

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	Samples Sent To:
WA349	NATA IA	Rollie Rosario	ALTA
Samples Collected By: RR + CREW.	Regulatory Agency (EPA, CARB, SCAQMD, etc.)		By:

ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Source)	Sample Amount ml	Sample Medium	Comments	Analysis Required: CARB 429				
920508 A	4-30-92	Acetone Solvent Rinse (Run#1)	110	liquid		✓				
B	"	MeCl2 Solvent Rinse (Run#1)	98	"		✓				
C	"	H2O Rinse (Run#1)	830	"		✓				
D	"	Filter (Run#1)	—	—		✓				
E	"	XAD (Run#1)	—	—		✓				
920509 A	5-1-92	Acetone Solvent Rinse (Run#2)	106	liquid		✓				
B	"	MeCl2 Solvent Rinse (Run#2)	94	"		✓				
C	"	H2O Rinse (Run#2)	731	"		✓				
D	"	Filter (Run#2)	—	—		✓				

Relinquished By: (Sign & Print)	Date/Time	Received By: (Sign & Print)	Comments:
[signature] Phone: (818) 969-5758	5-5-92 1700	Jennifer Cobabe Jennifer Cobabe 5-7-92 Of: ALTA	
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:

ENGINEERI[illegible]IENCE, INC.
6060 Irwinda__ Ave., Suite J
P.O. Box 2007
Irwindale, CA 91706
Telephone:(818)969-5758 Fax:(818)969-4692

f3

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	Samples Sent To:	Analysis Required
WA 349	NAPA IA	Ollie Rosario	ALTA	CARB 429
Samples Collected By: RR + CREW.	Regulatory Agency (EPA, CARB, SCAQMD, etc.)		By:	

ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Source)	Sample Amount	Sample Medium	Comments	CARB 429				
920509 E	5-1-92	XAD (RUN #2)	—	—		✓				
920510 A	5-4-92	ACETONE SOLVENT RINSE (RUN #3)	163	liquid		✓				
B	"	MeCl2 SOLVENT RINSE (RUN #3)	52	"		✓				
C	"	H2O RINSE (RUN #3)	790	"		✓				
D	"	FILTER (RUN #3)	—	—		✓				
E	"	XAD (RUN #3)	—	—		✓				
920511 A	5-4-92	ACETONE SOLVENT RINSE (BLANK)	100	liquid		✓				
B	"	MeCl2 SOLVENT RINSE (BLANK)	100	"		✓				
C	"	H2O RINSE (BLANK)	750	"		✓				

Relinquished By: (Sign & Print)	Date/Time	Received By: (Sign & Print)	Comments:
[signature] Phone: (818) 969-5788	5-5-92 1100	Jennifer Cobabe Jennifer Cobabe 5-7-92 Of: ALTA	
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:

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Telephone:(818)969-5758 Fax:(818)969-4692

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	Samples Sent To:
WA 349	NAPA IA	Rollie Rosario	ALTA.

Samples Collected By	Regulatory Agency (EPA, CARB, SCAQMD, etc.)	By:
RR + Crew.	CARB	

ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Source)	Sample Amount	Sample Medium	Comments	Analysis Required: CARB 429				
920511 D	5-4-92	FILTER (BLANK)	—	—		/				
E	"	XAD (BLANK)	—	—		/				

Relinquished By: (Sign & Print)	Date/Time	Received By: (Sign & Print)	Comments:
[signature] Phone: (818) 969-5758	5-5-92 1100	Jennifer Cabale [signature] Jennifer Cabale 5-7-92 Of: ALTA	
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:

ALTA

ALTA Analytical Laboratory

Batch ID: 11249

Sample Log-In Checklist		Yes	No
1.	Samples Arrived by: UPS		
2.	Airbill Present? Number 1946 8917 236	X	
3.	Shipping Container is Intact?	X	
4.	Custody Seals Present? Number		X
	If yes, are they intact? N/A		
5.	Sample Containers Intact?	X	
6.	Shipping Preservation: Ice/Blue Ice/None		
7.	Temperature: 18°C		
8.	Chain of Custody Present?	X	
9.	Discrepancies in Chain of Custody?		X
10.	Packing Retained?	X	

Name: Jennifer Cobabe Date Rcv'd: 5-7-92

Comments:

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

POST TEST METER BOX CALIBRATION FORM

METER BOX NO. BROWN III DATE 05-26-92 CALIBRATED BY [signature]
BAROMETRIC PRESSURE 29.43 AMBIENT TEMP. 72 PRE TEST Yi 1.005
PROJECT NAME NAPA PROJECT NO. ______ H RUN 1.3 VACUUM 17

ORIFICE MANOMETER (IN H2O) DELTA H	GAS VOLUME		TEMPERATURES		TIME (MINUTES)	Yi	H@I
	WET TEST METER (CU. FT.) Vw	DRY GAS METER (CU. FT.) Vd	WET TEST METER (DEG. F.) Tw	DRY GAS METER (DEG. F.) Td	Ti		
1.3	9.813	9.815	75	77	15	1.000	—
1.3	9.984	10.014	75	79	15	1.001	—
1.3	9.826	9.866	75	81	15	1.003	—

Yi AVERAGE 1.002

METER BOX CALIBRATION HISTORY

LAST CALIBRATION DATE 05-19-92 CALIBRATED BY D MARSDEN.
H@ OF CALIBRATION 1.94 Yi OF CALIBRATION 1.005

NOTES:

ENGINEERING-SCIENCE

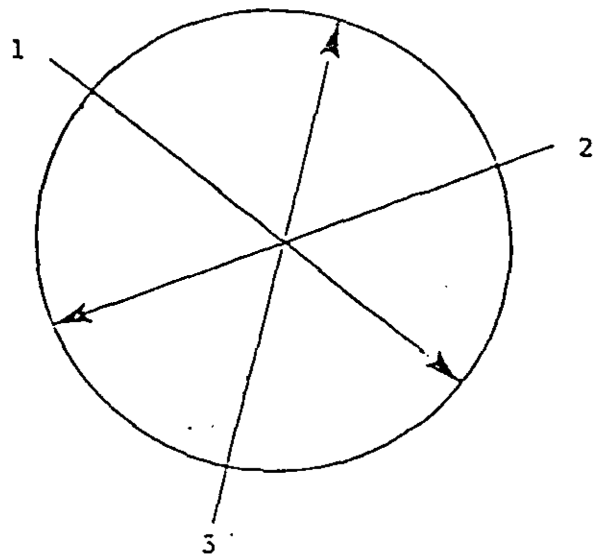
NOZZLE CALIBRATION

Source: NAPA

Date of Source Test: 04-30-92

Sampling Method: CARB 429

Pollutant: P. A. H.



Nozzle Measurement Data:

Diameter #1	0.187	inches
Diameter #2	0.1865	inches
Diameter #3	0.1875	inches
Average	0.187	inches

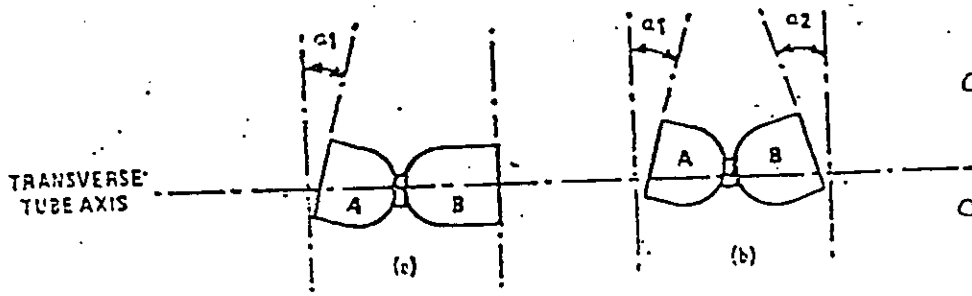
Note: (1) Measure nozzle to nearest 0.001 inches

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

QUARTZ.

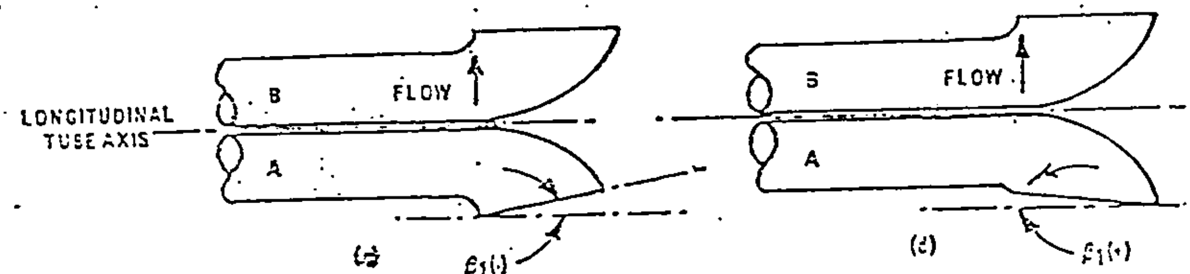
PITOT TUBE CALIBRATION S/N PROBE # 84 DATE 03-05-92

CAL. BY [signature]



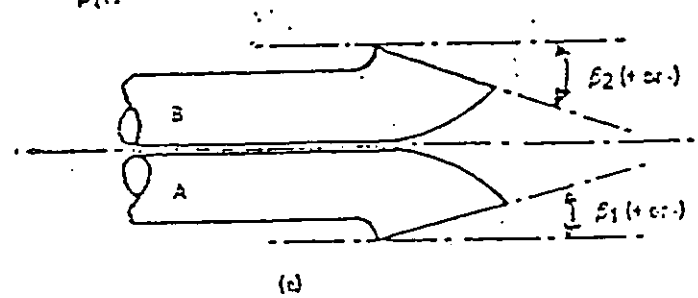
a_1 1°

a_2 0°



β_1 + 1°

β_2 ∓ 1°



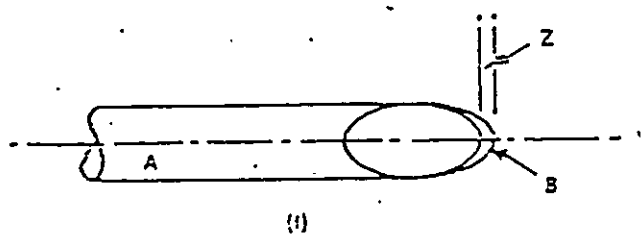
Z —— (< 0.32 CM)

W ~ (< 0.08 CM)

Dt 0.95 CM

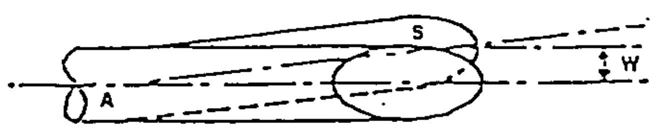
PA + PB 2.38 CM

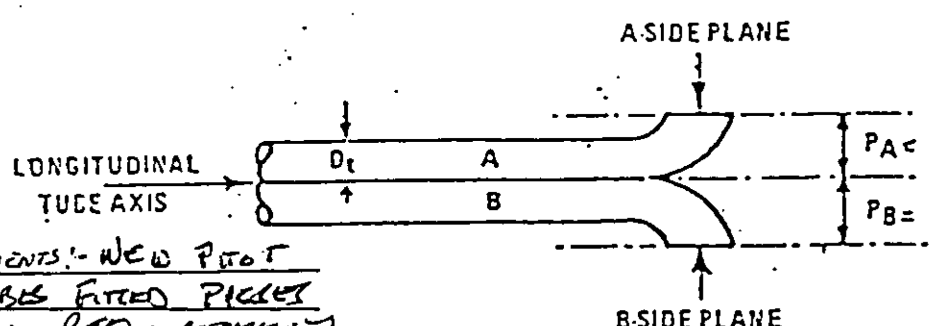
$P = \frac{P_A + P_B}{2}$ · 1.195



0.998 ≤ 1.195 ≤ 1.425

NOTE :- (1.05 Dt ≤ P ≤ 1.50 DT)





NOTE:

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

$P_A = P_B$

COMMENTS :- NEW PITOT TUBES FITTED PIECES ALL REQUIREMENTS

[signature]

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 03-05-92
THERMOCOUPLE NO. GLASS # 84
BAROMETRIC PRESSURE 29.45
AMBIENT TEMPERATURE 65
CALIBRATED BY [illegible]
REFERENCE: MERCURY IN GLASS ASTM/1C
OTHER

REFERENCE POINT NUMBER	SOURCE (SPECIFY)	REFERENCE THERMOMETER TEMPERATURE (°C)	THERMOCOUPLE POTENTIOMETER TEMPERATURE (°F)	(°C)	DIFFERENCE (%)
	MUFFLE FURNACE	245	471		
		245	471		
		245	471		
	AVERAGE	245	471	243.89	0.22%
0.0°C	ICE WATER	-0.5	30		
		0.0	31		
		0.0	31		
	AVERAGE	-0.17	30.67	0.74	0.21%
100°C	BOILING WATER	100	211		
		100	211		
		100	211		
	AVERAGE	100	211	99.44	0.15%

$$\text{DIFF.} = \frac{(\text{REF. TEMP} + 273) - (\text{TEST TEMP.} + 273)}{(\text{REF. TEMP.} + 273)} \times 100$$

APPENDIX D

EPA METHOD 18
METHANE & BTEX

Performance Analytical Inc.
Environmental Testing and Consulting

LABORATORY REPORT

Client:	ENGINEERING-SCIENCE, INC.	Date of Report:	05/07/92
Address:	6060 N. Irwindale Ave., Suite J	Date Received:	05/05/92
	Irwindale, CA 91706	PAI Project No:	4139
Contact:	Mr. John Crawley	Purchase Order:	Verbal

Client Project ID: NAPA #WA349

Nine (9) Tedlar Bag Samples labeled: "920516" through "920524"

The samples were received at the laboratory under chain of custody on May 5, 1992. The samples were received intact. The client requested that only samples "920517", "920520" and "920523" be analyzed. The dates of analysis are indicated on the attached data sheets.

Volatile Organic Compounds Analysis

The samples were analyzed by combined gas chromatography/mass spectrometry (GC/MS) for Benzene, Toluene, Ethylbenzene and Total Xylenes. The analyses were performed according to the methodology outlined in EPA Method TO-14 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, EPA 600/4-84-041, U.S. Environmental Protection Agency, Research Triangle Park, NC, April, 1984 and May, 1988. The analyses were performed by gas chromatography/mass spectrometry, utilizing a direct cryogenic trapping technique. The analytical system used was comprised of a Finnigan Model 4500 GC/MS/DS interfaced to an Entech 2000 automated whole air inlet system/cryogenic concentrator. A thick film (5 micron) crossbonded 100% Dimethyl polysiloxane megabore column (RT_x-1, Restek Corporation, Bellefonte, PA) was used to achieve chromatographic separation.

Methane Analysis

The samples were also analyzed for Methane according to EPA 18 using a gas chromatograph equipped with a flame ionization detector (GC/FID).

The results of the analyses are included on the attached data sheets.

Data Release Authorization:

Kathleen Aguilera

Kathleen Aguiléra
Analytical Chemist

Reviewed and Approved:

Michael Tuday
Laboratory Director

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: Engineering Science, Inc.

Client Job ID: WA 349
PAI Job ID: #4139

Test code: EPA 18
Analyst: Sharon Smithbauer
Instrument ID: HP5890/FID #3
Verified by: Michael Tuday

Matrix: Tedlar Bags
Date Received: 05/05/92
Date Analyzed: 05/05/92
Volume Analyzed: 2.5 ml

Client Sample ID	PAI Sample ID	Methane ppm Result	Detection Limit
920517	9201872	ND	0.50
920520	9201873	4.2	0.50
920523	9201874	9.2	0.50
920523	LAB DUPLICATE	9.2	0.50
N/A (05/05/92)	METHOD BLANK	ND	0.50

ND = Not Detected - Less Than Indicated Detection Limit

Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: Engineering Science, Inc.

Client Sample ID: N/A

PAI Sample ID: PAI Method Blank

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Kathleen Aguilera	Date Received:	N/A
Instrument ID:	Finnigan 4500B/Entech 2000	Date Analyzed:	05/06/92
Verified by:	Michael Tuday	Volume Analyzed:	1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
71-43-2	BENZENE	ND	5.0	ND	1.6
108-88-3	TOLUENE	ND	5.0	ND	1.3
100-41-4	ETHYLBENZENE	ND	5.0	ND	1.2
1330-20-7	m- & p-XYLENES	ND	5.0	ND	1.2
95-47-6	o-XYLENE	ND	5.0	ND	1.2

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: Engineering Science, Inc.

Client Sample ID: 920517 → RUN #1

PAI Sample ID: 9201872

Test Code: GC/MS Mod. EPA TO-14
Analyst: Kathleen Aguilera
Instrument ID: Finnigan 4500B/Entech 2000
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 05/05/92
Date Analyzed: 05/06/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
71-43-2	BENZENE	190	5.0	60	1.6
108-88-3	TOLUENE	280	5.0	73	1.3
100-41-4	ETHYLBENZENE	180	5.0	41	1.2
1330-20-7	m- & p-XYLENES 480	290	5.0	67	1.2
95-47-6	o-XYLENE	190	5.0	44	1.2

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: Engineering Science, Inc.

Client Sample ID: 920520 → RUN # 2

PAI Sample ID: 9201873

Test Code: GC/MS Mod. EPA TO-14
Analyst: Kathleen Aguilera
Instrument ID: Finnigan 4500B/Entech 2000
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 05/05/92
Date Analyzed: 05/06/92
Volume Analyzed: 0.050 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
71-43-2	BENZENE	4500	100	1400	31
108-88-3	TOLUENE	15000	100	4000	27
100-41-4	ETHYLBENZENE	8100	100	1900	23
1330-20-7	m- & p-XYLENES 15400	9600	100	2200 3500	23
95-47-6	o-XYLENE	5800	100	1300	23

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: Engineering Science, Inc.

Client Sample ID: 920520

PAI Sample ID: 9201873 (Laboratory Duplicate)

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Kathleen Aguilera	Date Received:	05/05/92
Instrument ID:	Finnigan 4500B/Entech 2000	Date Analyzed:	05/06/92
Verified by:	Michael Tuday	Volume Analyzed:	0.050 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
71-43-2	BENZENE	4400	100	1400	31
108-88-3	TOLUENE	15000	100	3900	27
100-41-4	ETHYLBENZENE	8000	100	1900	23
1330-20-7	m- & p-XYLENES	9500	100	2200	23
95-47-6	o-XYLENE	5800	100	1300	23

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: Engineering Science, Inc.

Client Sample ID: 920523 → RUN # 3

PAI Sample ID: 9201874

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Kathleen Aguilera	Date Received:	05/05/92
Instrument ID:	Finnigan 4500B/Entech 2000	Date Analyzed:	05/06/92
Verified by:	Michael Tuday	Volume Analyzed:	1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
71-43-2	BENZENE	640	5.0	200	1.6
108-88-3	TOLUENE	600	5.0	160	1.3
100-41-4	ETHYLBENZENE	280	5.0	65	1.2
1330-20-7	m- & p-XYLENES 730	450	5.0	100 164	1.2
95-47-6	o-XYLENE	280	5.0	64	1.2

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

ES ENGINEERING-SCIENCE, INC.

Client	NAPA	Job No.		Sheet	of
Subject	% EXCESS AIR ; METHANE & BTEX	By	CNM	Date	
	EPA 18	Checked		Rev.	

FORMULA:

$$\% \text{ EXCESS AIR} = \frac{(\% O_2 - 0.5\ \% CO)}{[0.264(\% N_2) - (\% O_2 - 0.5\ \% CO)]} \times 100$$

FOR RUN # 1: $\% O_2 = 14.33$; $\% N_2 = 79.87$; $\% CO = \emptyset$

$$\% \text{ EXCESS AIR} = \frac{[14.33 - 0.5\ (\emptyset)]}{[0.264\ (79.87) - (14.33 - 0.5\ (\emptyset))]} \times 100 = 212.12$$ ✓

RUN # 2: $\% O_2 = 14.20$; $\% N_2 = 82.18$; $\% CO = \emptyset$

$$\% \text{ EXCESS AIR} = \frac{[14.20 - 0.5\ (\emptyset)]}{[0.264\ (82.18) - (14.20 - 0.5(\emptyset))]} \times 100 = 189.45$$ ✓

RUN # 3: $\% O_2 = 14.26$; $\% N_2 = 81.03$; $\% CO = \emptyset$

$$\% \text{ EXCESS AIR} = \frac{[14.26 - 0.5\ (\emptyset)]}{[0.264\ (81.03) - (14.26 - 0.5(\emptyset))]} \times 100 = 199.95$$ ✓

ENGINEERING SCIENCE, INC.
6060 Irwindale Ave., Suite J
P.O. Box 2007
Irwindale, CA 91706
Telephone:(818)969-5758 Fax:(818)969-4692

#4139

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	Samples Sent To:
WA 349	NAPA	R.R.	P.A.I.

Samples Collected By	Regulatory Agency (EPA, CARB, SCAQMD, etc.)	By:
RR & crew.		John Crawley

ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Source)	Sample Amount	Sample Medium	Comments	Analysis Required: CH4	Analysis Required: BTEX			
920517		TEDLAR RUN # 2	9201872		Analyze today 5-5-92	X	X			
920520		TEDLAR RUN # 5	9201873			X	X			
920523		TEDLAR RUN # 8	9201874			X	X			
[illegible]	920516	3 per	9201875		Hold till notified.					
3	920518	TEDLARS # 1, 3, 4,	9201876		Analyze:					
4	920519	6, 7, 9	9201877		5-6-92					
6	920521	6 per	9201878		Waiting for client advise, RR					
7	920522		9201879							
9	920524		9201880							

Relinquished By: (Sign & Print)	Date/Time	Received By: (Sign & Print)	Comments:
[signature] Phone: (818)969-5758		Manuel Gill Of: PERFORMANCE ANALYTICAL INC.	5/5/92 1:50 pm
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:

APPENDIX E

EPA METHOD 0011
FORMALDEHYDE

FIELD DATA SUMMARY

NAPA--METHOD 0011
KILN BAGHOUSE STACK OUTLET

30-Apr-92

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
Vlc, Volume of water vapor condensed in impingers and silica gel	293.9	416.9	239.3			
Vm, Dry gas volume as measured by dry gas meter (dcf)	71.988	63.381	53.456			
y, Dry gas meter calibration factor (dimensionless)	1.003	1.003	1.003			
Pb, Barometric Pressure at sampling site (in. Hg)	29.83	29.83	29.83			
Ps, Absolute stack gas pressure (in. Hg.)	29.79	29.79	29.79			
dH, Average pressure differential across the orifice meter (in. H2O)	1.83	1.59	1.90			
Tm, Meter temperature (dR)	555.00	543.00	551.00			
Vm(std), Dry gas volume as measured by dry gas meter, corrected to standard conditions (dscf)	68.794	61.871	51.464			
Bws, Water vapor in the gas stream, proportion by volume (dimensionless)	0.168	0.241	0.180			
%CO2, Percent carbon dioxide by volume (dry basis)	3.80	3.60	3.60			
%O2, Percent oxygen by volume (dry basis)	14.00	14.00	14.00			
Md, Dry molecular weight of stack gas (lb/lb-mole)	29.17	29.14	29.14			
Ms, Wet molecular weight of stack gas (lb/lb-mole)	27.30	26.45	27.13			
Cp, Pitot tube coefficient (dimensionless)	0.84	0.84	0.84			
Sq.Rt. dP, Average square root of velocity pressure of stack gas (in. of H2O)	1.1270	1.0470	1.1490			
Ts, Stack temperature (dR)	675	676	665			
As, Cross-sectional area of stack (ft2)	5.940	5.940	5.940			
Qs(std), Dry volumetric stack gas flow rate, standard conditions (dscfm)	17,036	14,648	17,295			
An, Cross-sectional area of nozzle (ft2)	2.64E-04	2.64E-04	2.64E-04			
Ø, Total sampling time (min)	96.0	96.0	72.0			
I, Isokinetic sample rate (percent)	94.63	98.97	92.97			

SOURCE TEST CALCULATIONS

NAPA--METHOD 0011 — 30-Apr 92
KILN BAGHOUSE STACK OUTLET — Run No. 1

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	95.0	°F	Static Pressure, Pstatic	-0.48	"H2O
Stack Temperature, Ts	215.0	°F	Barometric Pressure, Pb	29.83	"Hg
SQ.RT. dP	1.1270		Condensate Volume, Vlc	293.9	mℓ
Meter Orifice, dH	1.83	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	71.988	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0030		Duct Width	0.00	inch
Stack Gas Oxygen	14.00	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	3.80	% CO2	Test Time, Ø	96.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.220	inch
Stack Gas Nitrogen	82.20	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)	68.794	dscf
Vw(std) = 0.04715 ft3/g / 528 x [T(std) + 460] x Vlc	13.857	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.168	
Bws @ Saturated Conditions = Vapor Press. of H2O @.Dew Point Temp. / (Pstack, in.Hg.)	Lower Bws Value Used 1.000	
% Excess Air =(%O2 - 0.5%CO) / [0.264%N2 - (%O2-0.5%CO)] x 100	181.8	%
Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)]	29.17	lb/lb-mole
Ms = (Md x (1-Bws)) + (18.0 x Bws)	27.30	lb/lb-mole
P(stack) = Pb + [Pstatic / 13.6]	29.79	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	73.73	ft/sec
Qs = vs x As x 60	26,276	acfm
Qs(std) = Qs x (1 - Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	17,036	dscfm
Area of sampling nozzle, An = [(Dn / 12)^2 x Pi] / 4	0.000264	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	94.63	%

SOURCE TEST CALCULATIONS

NAPA--METHOD 0011
KILN BAGHOUSE STACK OUTLET

01-May 92
Run No. 2

FIELD DATA

Standard Temperature, T(std)	68 °F		Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	83.0	°F	Static Pressure, Pstatic	-0.48	"H2O
Stack Temperature, Ts	216.0	°F	Barometric Pressure, Pb	29.83	"Hg
SQ.RT. dP	1.0470		Condensate Volume, Vlc	416.9	ml
Meter Orifice, dH	1.59	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	63.381	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0030		Duct Width	0.00	inch
Stack Gas Oxygen	14.00	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	3.60	% CO2	Test Time, Ø	96.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.220	inch
Stack Gas Nitrogen	82.40	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460) .. $\boxed{61.871}$ dscf

Vw(std) = 0.04715 ft3/g / 528 x [T(std) + 460] x Vlc .... $\boxed{19.657}$ scf

Bws = Vw(std) / [Vm(std) + Vw(std)] .... $\boxed{0.241}$

Lower Bws Value Used

Bws @ Saturated Conditions = Vapor Press. of H2O
@ Dew Point Temp. / (Pstack, in.Hg.) .... $\boxed{1.000}$

% Excess Air =(%O2 - 0.5%CO) / [0.264%N2 - (%O2-0.5%CO)] x 100 ...... $\boxed{180.6}$ %

Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)] .... $\boxed{29.14}$ lb/lb-mole

Ms = (Md x (1-Bws)) + (18.0 x Bws) .... $\boxed{26.45}$ lb/lb-mole

P(stack) = Pb + [Pstatic / 13.6] .... $\boxed{29.79}$ "Hg

vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))] .... $\boxed{69.63}$ ft/sec

Qs = vs x As x 60 .... $\boxed{24,816}$ acfm

Qs(std) = Qs x (1 - Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd) ... $\boxed{14,648}$ dscfm

Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4 .... $\boxed{0.000264}$ ft2

I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 /
[Ø x P(stack) x An x vs x 60] .... $\boxed{98.97}$ %

SOURCE TEST CALCULATIONS

NAPA--METHOD 0011
KILN BAGHOUSE STACK OUTLET

01-May 92
Run No. 3

FIELD DATA

Standard Temperature, T(std)	68	°F	Standard Pressure, Pstd	29.92	"Hg
Meter Temperature, Tm	91.0	°F	Static Pressure, Pstatic	-0.48	"H2O
Stack Temperature, Ts	205.0	°F	Barometric Pressure, Pb	29.83	"Hg
SQ.RT. dP	1.1490		Condensate Volume, Vlc	239.3	mℓ
Meter Orifice, dH	1.90	"H2O	Stack I.D.	33.00	inch
Meter Volume, Vm	53.456	ft3	Duct Length	0.00	inch
Meter Correction, y	1.0030		Duct Width	0.00	inch
Stack Gas Oxygen	14.00	% O2	Stack Area, As	5.940	ft2
Stack Gas Carbon Dioxide	3.60	% CO2	Test Time, Ø	72.0	min.
Stack Gas Carbon Monoxide	0.00	% CO	Nozzle Diameter	0.220	inch
Stack Gas Nitrogen	82.40	% N2	Pitot Coefficient, Cp	0.84	

CALCULATIONS

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)	51.464	dscf
Vw(std) = 0.04715 ft3/g / 528 x [T(std) + 460] x Vlc	11.283	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.180 Lower Bws Value Used	
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Pstack, in.Hg.)	0.873	
% Excess Air =(%O2 - 0.5%CO) / [0.264%N2 - (%O2-0.5%CO)] x 100	180.6	%
Md = (0.44 x %CO2)+(0.32 x %O2)+[0.28 x (%N2 + %CO)]	29.14	lb/lb-mole
Ms = (Md x (1-Bws)) + (18.0 x Bws)	27.13	lb/lb-mole
P(stack) = Pb + [Pstatic / 13.6]	29.79	"Hg
vs = 85.49 x Cp x (Sq.Rt. dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	74.83	ft/sec
Qs = vs x As x 60	26,669	acfm
Qs(std) = Qs x (1 - Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	17,295	dscfm
Area of sampling nozzle, An = [(Dn / 12) ^ 2 x Pi] / 4	0.000264	ft2
I = (Ts+460) x [(0.002669 x Vlc) + [Vm(std) / ((T(std) + 460) / Pstd)]] x 100 / [Ø x P(stack) x An x vs x 60]	92.97	%

EMISSION CALCULATIONS
FORMALDEHYDE

NAPA--METHOD 0011
KILN BAGHOUSE STACK

30-Apr 92

STACK DATA	Run 1	Run 2	Run 3	Blank Value (average)
Vm(std), ft^3	68.794	61.871	51.464	60.709
Qs(std), ft^3/min	17,036	14,648	17,295	16,326
F-Factor, dscf/MMBtu				0.00
Oxygen, %	14.00	14.00	14.00	14.00

EMISSION CALCULATIONS

	Run #	ug	ppm	lb/hr	lb/MMBtu	ng/dscm
	1	7.78E+02	3.20E-01	2.55E-02	0.00E+00	3.99E+08
	2	2.85E+03	1.30E+00	8.94E-02	0.00E+00	1.63E+09
	3	2.32E+03	1.28E+00	1.03E-01	0.00E+00	1.59E+09
Average		1.98E+03	9.67E-01	7.27E-02	0.00E+00	1.21E+09
Blank Train		3.20E+00	1.49E-03	1.14E-04	0.00E+00	1.86E+06

< * indicates a sample with a non-detectable concentration. Laboratory Detection Limit was used for emission calculation.

ppm = 1.60982 x [T(std) + 460] x ug x (0.001 mg/ug) / [MW x Vm(std)]
where : 1.60982 = Ideal Gas Law Constant

lb/hr = (0.00000137 Lb-Mole °R / ft3) x 60 min/hr x Qs(std) x MW x ppm / [T(std) + 460]

lb/MMBtu = F-Factor x MW x (0.00000137 Lb-Mole °R / ft3) /
[T(Std) + 460]x [20.9 / (20.9 - %O^2)] x ppm

ng/dscm = mg x (1e6 ng/mg) / [Vm(std) x 0.028317 m3/ft3]

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pb + (dH / 13.6)) / (Tm + 460)

MW of Formaldehyde = 30.026

Standard Temperature = 68 °F

ANALYTICAL SUMMARY
FORMALDEHYDE

NAPA--METHOD 0011 30-Apr 92
KILN BAGHOUSE STACK

Run #	Sample Solution	Sample Concentration (μg)	Detection Limit (μg)
1	DNPH	778	
2	DNPH	2850	
3	DNPH	2320	
Blank	DNPH	3.2	

ES ENGINEERING-SCIENCE, INC.

Client: NAPA | Job No. | Sheet of
Subject: % EXCESS AIR ; CHO | By: CNM | Date
EPA M0011 | Checked | Rev.

FORMULA:

$$\% \text{ EXCESS AIR} = \frac{(\% O_2 - 0.5\,\% CO}{[0.264\,\% N_2 - (\% O_2 - 0.5\,\% CO)]} \times 100$$

FOR RUN # 1: $\% O_2 = 14.00$; $\% N_2 = 82.20$; $\% CO = \emptyset$

$$\% \text{ EXCESS AIR} = \frac{[14.00 - (0.5)(\emptyset)]}{[0.264(82.20) - (14.00 - 0.5(\emptyset))]} \times 100 = 181.8$$

RUN # 2: $\% O_2 = 14.00$; $\% N_2 = 82.40$; $\% CO = \emptyset$

$$\% \text{ EXCESS AIR} = \frac{[14.00 - (0.5)(\emptyset)]}{[0.264(82.40) - (14.00 - 0.5(\emptyset))]} \times 100 = 180.6$$

RUN # 3: $\% O_2 = 14.00$; $\% N_2 = 82.40$; $\% CO = \emptyset$

$$\% \text{ EXCESS AIR} = \frac{[14.00 - (0.5)(\emptyset)]}{[0.264(82.40) - (14.00 - 0.5(\emptyset))]} \times 100 = 180.6$$

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

QA REQUIREMENTS FOR SUB-CONTRACTING LABORATORIES

Sub-contracting Laboratory West Coast Analytical Servic, Inc.

ES Project Name NAPA Project No. WA 340

ES Sample Number(s) 920512 - 920515

Sample Description Formaldehyde mn #1, #2 #3 & BLK.

Sample Matrix DNPH reagent

Parameter to be analyzed for Formaldehyde.

Point of Contact for ES John Crawley Phone (818) 969 5758.

1. Responsible laboratory supplying analysis guarantees the above stated sample will be analyzed according to :

   a. Method Number EPA ~~0011~~ 8315 ok'd by John 5/7/92

   b. Regulatory Board EPA

   c. Last Approved Revision__________

2. The above analysis will be completed including written report by:

   a. Date 5/15/92

3. A written notice of non-compliance with the above, must be submitted to the ES point of contact, no later than twenty four hours prior to the analysis. An explanation of non-compliance should be included with this notice. If another method is substituted for the above method, without ES approval, the sub-contract laboratory will be liable for all costs, including field and laboratory retesting.

4. It is necessary all reported results are accompanied by the appropriate quality control information such as spike recoveries, duplicates, replicates and blanks.

5. Invoices for sub-contract laboratories will not be accepted without this completed agreement.

6. As an authorized representative for this sub-contracting laboratory, I have read and understood this document completely

Bob Olson	Bob Olson	5/7/92
Signature	Print Name	Date

#21255

May 8, 1992

WEST COAST
ANALYTICAL
SERVICE, INC.

ENGINEERING SCIENCE, INC.
6060 Irwindale Avenue
Suite J
Irwindale, CA 91706

Attn: John Crawley

JOB NO. 21255 S

LABORATORY REPORT

Samples Received: Four (4) Liquid Samples
Date Received: 5-4-92
Purchase Order No: Proj#: WA340/Napa

The samples were analyzed as follows:

Samples Analyzed	Analysis	Results
Four (4) liquids	Formaldehyde by EPA 8315	Table 1

Michael Shelton
Technical Director

D. J. Northington, Ph.D.
President

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

WEST COAST ANALYTICAL SERVICE, INC.

ENGINEERING SCIENCE, INC. Job #21255
Mr. John Crawley May 8, 1992

LABORATORY REPORT

Table 1

Formaldehyde by EPA 8315

Sample ID	Parts per Million	Impinger Volume (mL)	Total Micrograms
920512	1.62	480	778
920513	4.91	580	2850
920514	5.54	419	2320
920515	0.013	250	3.2
Detection Limit	----	----	0.05

Date Analyzed: 5-7,8-92

Matrix Spike/Matrix Spike Duplicate Recovery Summary

Client: Engineering Science QC Batch #: 50792I
Job no.: 21255
Date Analyzed: 5-7,8-92
Matrix: Impinger
Units: Micrograms

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
Formaldehy	1.47	4.72	6.05	97	5.81	92	-4.0

QC Limits

Analyte	RPD Control	RPD Warning	% Recovery Warning		% Recovery Control	
Formaldehyde	15	20	59	115	45	129

WCAS

RUN # 1 CHO EP1001l K=1.43

ENGINEERING-SCIENCE,INC.

FIELD DATA

PLANT NAPA
DATE 4-30-92
TEST SITE KILN STACK OUTLET
RUN NUMBER 1
OPERATORS BP, D

AMBIENT TEMP. 75 °F
BAROMETER 29.83
STACK PRESSURE -0.48
STACK H2O 20%
STACK I.D. 33"

METER ΔH @ 1.88
METER GAMMA 1.023
METER BOX # BROWN II
NOZZLE DIAMETER 0.22
PROBE LENGTH 5'

PROBE MAT'L QUARTZ
FILTER NUMBER
SAMPLE BOX #
PRE LEAK 0.005 @ 15 inches
POST LEAK

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE (DELTA H, "H2O) ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	0	12:17	846.627	1.1	1.57	1.6	208	98	93	58	—	2
2	4	12:21	849.9	1.1	1.57	1.6	208	98	93	59	—	3
3	8	12:25	852.7	1.2	1.72	1.7	211	97	93	60	—	3
4	12	12:29	855.5	1.2	1.72	1.7	212	98	93	60	—	2
5	16	12:33	858.3	1.2	1.72	1.7	212	99	93	61	—	2
6	20	1237	861.0	1.2	1.72	1.7	214	97	93	62	—	2
7	24	1241	863.8	1.3	1.86	1.9	214	98	94	61	—	3
8	28	1245	865.0	1.3	1.86	1.9	214	98	94	61	—	3
9	32	1249	870.0	1.2	1.72	1.7	216	100	96	61	—	3
10	36	1253	873.0	1.1	1.57	1.6	215	100	96	61	—	3
11	40	1257	875.8	1.1	1.57	1.6	216	101	96	62	—	3
12	44	1301	878.8	1.1	1.5	1.6	216	101	96	62	—	3
	48	1305	881.879	1.1								
AVERAGE /SUM												

RUN # 1   CHO   EPA0011   K = 1.43

ENGINEERING-SCIENCE,INC.

PLANT Napa
SOURCE Stack outlet
DATE 4/30/92
POST LEAK RATE 0.003@11"Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O)		TEMPERATURES					PUMP VAC. "HG
					DESIRED	ACTUAL	STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	
1	48	1315	881.879	1.1	1.57	1.6	215	90	92	62	—	3
2	52	1319	884.4	1.2	1.72	1.7	222	98	93	62	—	3
3	56	1323	887.2	1.4	2.02	2.0	218	92	94	63	—	3
4	60	1327	890.2	1.5	2.15	2.2	218	94	92	63	—	3
5	64	1331	893.5	1.5	2.15	2.2	217	96	92	63	—	3
6	68	1335	898.7	1.6	2.29	2.3	217	98	93	64	—	4
7	72	1339	900.0	1.4	2.00	2.0	218	98	93	64	—	4
8	76	1343	903.1	1.4	2.00	2.0	216	98	93	64		3
9	80	1347	906.4	1.4	2.0	2.0	216	98	93	64		3
10	84	1351	907.9	1.4	2.0	2.0	214	98	93	64		3
11	88	1355	912.7	1.4	2.0	2.0	215	98	93	65		3
12	92	1359	915.8	1.2	1.72	1.7	211	96	93	65		3
	96	14:03	918.619									
AVERAGE /SUM	96		71.988	1.127		1.83	215	95				

1.8

EPA 11 RUN # 2

K = 1.43

ENGINEERING-SCIENCE, INC.

FIELD DATA

PLANT NAPA
DATE 6-21-92
TEST SITE MAIN STACK OUTLET
RUN NUMBER 2 BACT
OPERATORS CHM, METER

AMBIENT TEMP.
BAROMETER 29.83
STACK PRESSURE 0.48
STACK H2O 20%
STACK I.D. 33"

METER ΔH @ 1.88
METER GAMMA 1.003
METER BOX # BROWN II
NOZZLE DIAMETER 0.272
PROBE LENGTH 5'

PROBE MAT'L GLASS
FILTER NUMBER
SAMPLE BOX #
PRE LEAK 0.015 @ 15" Hg
POST LEAK

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	0	0845	922.281	.96	1.37	1.4	206	75	72	55	NA	12
2	4	0849	924.8	1.3	1.86	1.9	207	78	73	56		21
3	8	0853	927.5	1.4	2.00	2.0	210	81	74	56		21
4	12	0857	930.1	1.0	1.48	1.5	209	82	75	57		21
5	16	0901	932.7	1.2	1.72	1.7	210	83	76	57		21
6	20	0905	935.3	1.3	1.86	1.9	214	83	77	58		21
7	24	0909	937.9	1.1	1.57	1.6	213	83	77	58		21
8	28	0913	940.6	1.1	1.57	1.6	214	84	78	58		21
9	32	0917	943.2	1.2	1.72	1.7	215	85	79	59		21
10	36	0921	945.8	0.99	1.42	1.4	216	85	80	60		21
11	40	0925	948.5	0.97	1.39	1.4	214	85	80	61		21
12	44	0929	951.2	0.96	1.37	1.4	213	86	81	61		21
	48	0933	953.~~710~~	CHANGE PORT								
AVERAGE /SUM	96											

RUN # 2 EPA 11

ENGINEERING-SCIENCE,INC.

PLANT NAPA
SOURCE KILN STACK OUTLET
DATE 5-1-92
POST LEAK RATE 0.017 @ 21 "Hg

PAGE 2 OF 2

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O)		TEMPERATURES					PUMP VAC. "HG
					DESIRED	ACTUAL	STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	
1	48	0938	953.790	0.97	1.41	1.4	215	85	82	63	N.A.	15
2	52	0942	956.3	0.99	1.42	1.4	213	88	82	61		16
3	56	0946	959.0	1.1	1.57	1.6	219	89	83	62		21
4	60	0950	961.6	1.1	1.57	1.6	219	89	83	62		21
5	64	0954	964.3	1.2	1.72	1.7	220	89	84	60		21
6	68	0958	966.9	1.4	2.00	2.0	221	89	84	61		21
7	72	1002	969.6	1.3	1.86	1.9	222	88	84	60		21
8	76	1006	972.3	1.0	1.43	1.4	224	88	85	60		21
9	80	1010	975.0	0.98	1.40	1.4	227	87	84	58		22
10	84	1014	977.6	0.98	1.40	1.4	224	87	84	57		21
11	88	1018	980.3	0.97	1.39	1.4	222	88	85	57		20
12	92	1022	983.0	0.96	1.37	1.4	221	89	85	58		20
	96	1026	985.662		E	N D	RUN # 2					
AVERAGE /SUM	96		63.32	1.047		1.59	216	83				

1.6

Formaldyhe K=1.48 #7

ENGINEERING-SCIENCE,INC.

FIELD DATA

PLANT NAPA
DATE 5/1/92
TEST SITE Stack outlet
RUN NUMBER 3
OPERATORS CH/RR(cn) KP

AMBIENT TEMP. 85°
BAROMETER 29.83
STACK PRESSURE +0.48
STACK H2O 50%
STACK I.D. 32"

METER ΔH@ 1.88
METER GAMMA 1.003
METER BOX # Beewitt
NOZZLE DIAMETER .22
PROBE LENGTH 6ft

PROBE MAT'L Quart
FILTER NUMBER
SAMPLE BOX # 1
PRE LEAK 0.005@15Hg
POST LEAK

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (M3)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE (DELTA H, "H2O) ACTUAL	TEMPERATURES STACK TEMP.	TEMPERATURES METER INLET	TEMPERATURES METER OUTLET	TEMPERATURES IMPINGER	TEMPERATURES FILTER	PUMP VAC. "HG
1	0	021.775	1225	0.96	1.37	1.4	204	87	86	57	NA	10
2	3	1228	023.9	1.0	1.45	1.5	205	87	86	57		10
3	6	1231	025.9	1.1	1.62	1.6	206	87	86	57		11
4	9	1234	0281	1.3	1.86	1.7	207	89	87	58		12
5	12	1237	030.2	1.4	2.00	2.0	204	90	87	58		12
6	15	1240	032.4	1.4	2.0	2.0	204	91	87	58		12
7	18	1243	034.8	1.3	1.86	1.8	204	92	87	58		12
8	21	1246	037.3	1.3	1.86	1.8	204	97	88	58		12
9	24	1249	039.2	1.2	1.77	1.8	205	93	88	58		11
10	27	1252	041.5	1.4	2.0	2.0	205	95	89	58		11
11	30	1255	043.8	1.4	2.0	2.0	205	95	89	59		11
12	33	1258	046.18	1.4	2.0	2.0	205	95	89	62		
			Port Change									
	36	1300	048.48									
AVERAGE /SUM												

RUN # 3 Formaldyhal $K = 1.48$ #"

ENGINEERING-SCIENCE,INC.

PLANT NAPA
SOURCE Stack outlet
DATE 6/1/92
POST LEAK RATE 0.003 @ 15" Vac

TRAVERSE POINT NUMBER	ELAPSED TIME (MINS.)	CLOCK TIME	GAS METER READING (VM)	VELOCITY HEAD (DELTA P)	ORIFICE PRESSURE (DELTA H, "H2O) DESIRED	ORIFICE PRESSURE ACTUAL	TEMPERATURES STACK TEMP.	METER INLET	METER OUTLET	IMPINGER	FILTER	PUMP VAC. "HG
1	36	13:05	048.418	1.2	1.77	1.8	202	96	93	69	–	10
2	39	13:08	050.4	1.2	1.77	1.8	202	96	93	70	–	10
3	42	13:11	052.5	1.2	1.77	1.8	202	96	93	69	–	10
4	45	13:14	054.8	1.4	2.00	2.0	206	98	92	67	–	9
5	48	13:17	057.0	1.4	2.00	2.0	206	98	92	67	–	9
6	51	13:20	059.4	1.4	2.00	2.0	206	98	92	67	–	9
7	54	13:23	061.3	1.6	2.37	2.4	207	101	93	68	–	10
8	57	13:26	064.1	1.6	2.37	2.4	207	101	94	68	–	10
9	60	13:29	066.6	1.4	2.00	2.0	207	101	94	69	–	10
10	63	13:32	069.0	1.4	2.00	2.0	209	102	95	68	–	10
11	66	13:35	071.0	1.2	1.77	1.8	208	101	95	68	–	10
12	69	13:38	073.2	1.2	1.77	1.8	207	101	95	67	–	9
	72	13:41	075.231									
				End of Run								
				1.149								
AVERAGE /SUM	72		53.456	1.139		1.90	205	91				

ENGINEERING-SCIENCE, INC.

P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 4-30-92

FACILITY Napa

ES NO. 920512

RUN NO. 1 METHOD 0011

TYPE R-CHO

IMP SOLN DNPH

SOLUTION	VOL. (ml.)	DESCRIPTION
NOZ.PROBE.RINSE		
UMBILICAL RINSE		

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1	DNPH	360	100	260
IMPINGER# 2	DNPH	110	100	10
IMPINGER# 3	MT	0	0	0
IMPINGER#				
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL(g)	
SILICA GEL		676.0	652.1	23.9
FILTER # DESCRIPTION			TOTAL MOISTURE	

TOTAL MOISTURE: 293.9 (g)

COMMENTS

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 5-1-92
FACILITY Ntpa IA.
ES NO 920513

RUN NO. 2
METHOD EPA CO 11
TYPE R-CHO
IMP SOLN DNPH

	SOLUTION	VOL.(ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1		320	100	220
IMPINGER# 2		250	100	150
IMPINGER# 3		5	0	5
IMPINGER#				
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL(g)	
SILICA GEL		839.8	797.9	41.9
FILTER # DESCRIPTION			TOTAL MOISTURE	

TOTAL MOISTURE 416.9 (g)

COMMENTS

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

TRAIN RECOVERY DATA SHEET

DATE 5-1-92
FACILITY Napa
ES NO. 920514

RUN NO. 3 METHOD 0011
TYPE Formaldehyde
IMP SOLN DNPH

	SOLUTION	VOL. (ml.)	DESCRIPTION
NOZ.PROBE.RINSE			
UMBILICAL RINSE			

		FINAL(ml.)	INITIAL(ml.)	NET.
IMPINGER# 1	DNPH	313	100	213
IMPINGER# 2	DNPH	106	100	6
IMPINGER# 3	Mt	0	0	0
IMPINGER#				
DESCRIPTION				
IMPINGER RINSE				

		FINAL (g)	INITIAL(g)	
SILICA GEL		818.2	797.9	20.3
FILTER # DESCRIPTION			TOTAL MOISTURE	

TOTAL MOISTURE: 239.3 (g)

COMMENTS

ENGINEERIF [illegible]ENCE, INC.
6060 Irwind. Ave., Suite J
P.O. Box 2007
Irwindale, CA 91706
Telephone:(818)969-5758 Fax:(818)969-4692

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	Samples Sent To:
WA 340	Napa	S.F.	WCAS
Samples Collected By: RR & crew		Regulatory Agency (EPA, CARB, SCAQMD, etc.): EPA 0011	By: John Crawley

Analysis Required: EPA 0011 HPLC Analysis

ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Source)	Sample Amount	Sample Medium	Comments	EPA 0011 HPLC Analysis				
920512	4-30-92	R-CHO Run # 1	480 mL	DNPH		X				
920513	5-1-92	R-CHO Run # 2	~550 mL			X				
920514	5-1-92	R-CHO Run # 3	419 mL			X				
920515	5-1-92	R-CHO BLANK	~250 mL			X				

Relinquished By: (Sign & Print)	Date/Time	Received By: (Sign & Print)	Comments:
[signature] Phone: (818) 969 5758	5-4-92 11:00	[signature] WCAS Of: 5-4-92 12:55	#21255
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

POST TEST METER BOX CALIBRATION FORM

METER BOX NO. Brown II DATE 05-26-92 CALIBRATED BY [signature]

BAROMETRIC PRESSURE 29.39 AMBIENT TEMP. 68 PRE TEST Yi 1.003

PROJECT NAME NAPA PROJECT NO. ___ H RUN 2.3 VACUUM 17

ORIFICE MANOMETER (IN H2O) DELTA H	GAS VOLUME		TEMPERATURES		TIME (MINUTES)	Yi	H@
	WET TEST METER (CU. FT.) Vw	DRY GAS METER (CU. FT.) Vd	WET TEST METER (DEG. F.) Tw	DRY GAS METER (DEG. F.) Td	Ti		
2.3	12.757	12.691	69	73	15	1.006	—
2.3	16.120	16.098	70	74	19	1.003	—
2.3	12.727	12.716	70	76	15	1.006	—
						Yi AVERAGE	1.005

METER BOX CALIBRATION HISTORY

LAST CALIBRATION DATE 04-02-92 CALIBRATED BY D MARSDEN

H@ OF CALIBRATION 1.88 Yi OF CALIBRATION 1.003

NOTES:

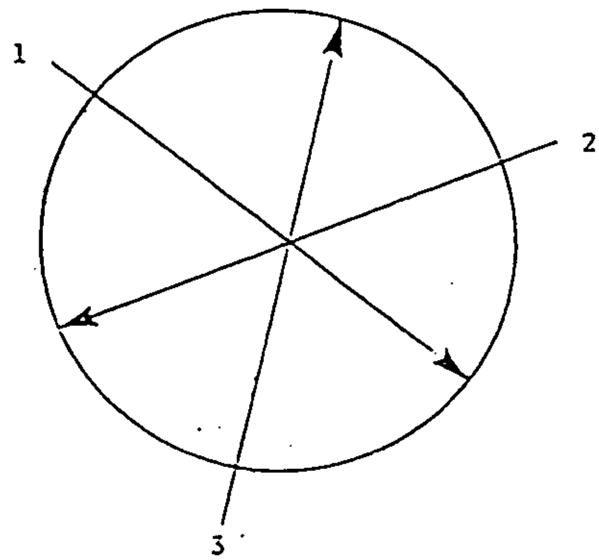
NOZZLE CALIBRATION

Source: NAPA.

Date of Source Test: 04-30-92

Sampling Method:

Pollutant: C.H.O.



Nozzle Measurement Data:

Diameter #1 0.2205 inches

Diameter #2 0.2195 inches

Diameter #3 0.2200 inches

Average 0.220 inches

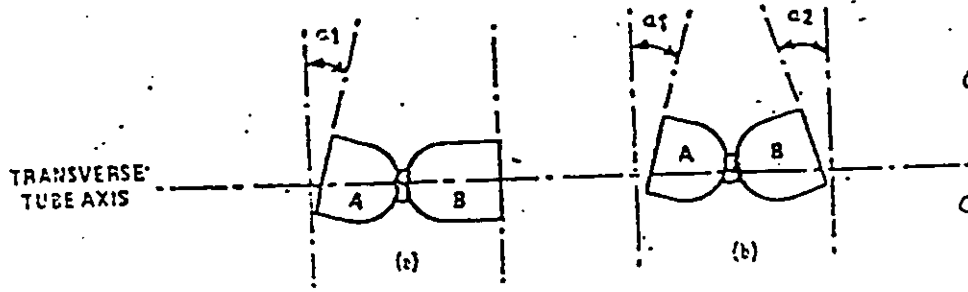
Note: (1) Measure nozzle to nearest 0.001 inches

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

QUARTZ.

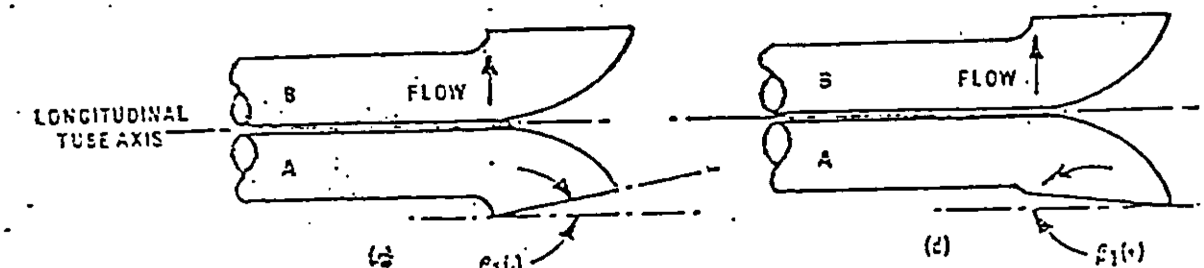
PITOT TUBE CALIBRATION   S/N PROBE # 84   DATE 03-05-92

CAL. BY [signature]



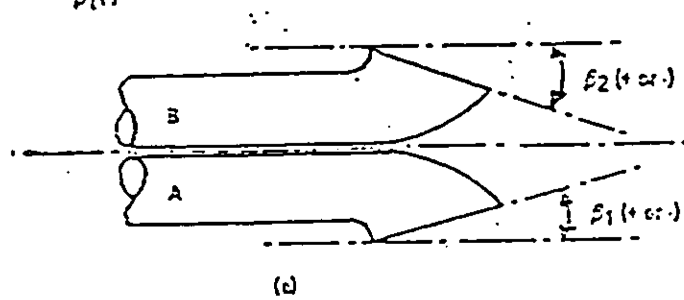
a_1 1°

a_2 0°



β_1 + 1°

β_2 + 1°



Z —
(< 0.32 CM)

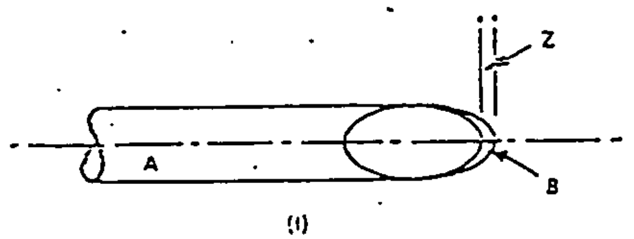
W —
(< 0.08 CM)

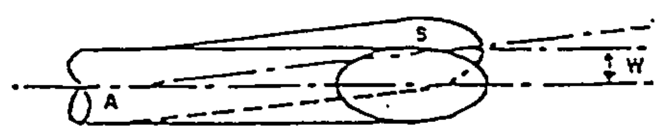
Dt 0.95 CM

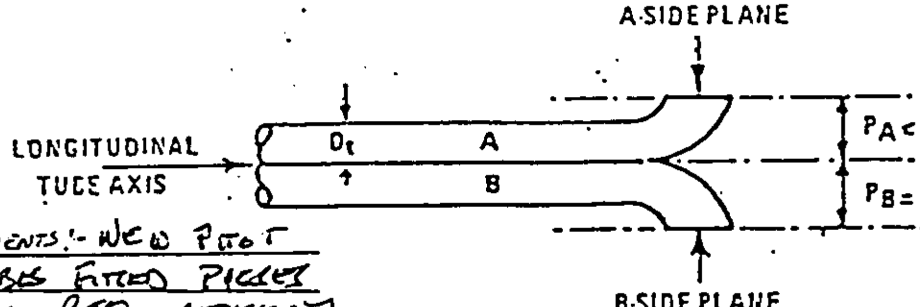
PA + PB 2.38 CM

$P = \frac{PA + PB}{2}$. 1.195

0.998 ≤ 1.195 ≤ 1.425
NOTE:- (1.05 Dt ≤ P ≤ 1.50 DT)







NOTE:
$1.05\ D_t \leq P \leq 1.50\ D_t$
$P_A = P_B$

COMMENTS:- NEW PITOT TUBES FITTED PASSES ALL REQUIREMENTS

[signature]

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 03-05-92
THERMOCOUPLE NO. GLASS # 84
BAROMETRIC PRESSURE 29.45
AMBIENT TEMPERATURE 65
CALIBRATED BY D [illegible]
REFERENCE: MERCURY IN GLASS ASTM/IC
OTHER

REFERENCE POINT NUMBER	SOURCE (SPECIFY)	REFERENCE THERMOMETER TEMPERATURE (°C)	THERMOCOUPLE POTENTIOMETER TEMPERATURE (°F)	(°C)	DIFFERENCE (%)
	MUFFLE FURNACE	245	471		
		245	471		
		245	471		
	AVERAGE	245	471	243.89	0.22%
0.0°C	ICE WATER	-0.5	30		
		0.0	31		
		0.0	31		
	AVERAGE	-0.17	30.67	0.74	0.21%
100°C	BOILING WATER	100	211		
		100	211		
		100	211		
	AVERAGE	100	211	99.44	0.15%

$$\text{DIFF.} = \frac{(\text{REF. TEMP} + 273) - (\text{TEST TEMP.} + 273)}{(\text{REF. TEMP.} + 273)} \times 100$$

APPENDIX F

CEM DATA REDUCTION, STRIP CHARTS, AND QUALITY ASSURANCE

TOTAL HYDROCARBONS

O_2, CO_2, SO_2, NO_x, CO

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

ES CONTINUOUS EMISSIONS MONITORS DATA CALIBRATION DRIFT CORRECTION

PROJECT NAPA
PLANT Long Beach
LOCATION Stack Outlet

SHEET 1 OF 2
CALCULATED BY WDE
DATE 4/30/92

RUN NO.	PARAMETER	$\overline{C}$	C_O	C_M	C_{MA}	C_{GAS}
1	NO_x	29.8	0.75	22.85	22.97	30.19
1	CO_{LOW}	48.0	0.0	44.65	45.6	49.02
1	SO_2	12.8	0.0	14.5	14.04	12.39
1	O_2	13.3	0.0	12.5	12.34	13.13
1	CO_2	3.65	0.17	8.65	8.60	3.52
1	THC	54.3	0.0	19.75	19.9	54.71
1	CO_{HIGH}	49.0	0.0	458	456	48.79
2	NO_x	23.1	1.0	22.6	22.97	23.50
2	CO_{LOW}	N/A	off scale			N/A
2	SO_2	7.0	0.0	14.25	14.04	6.90
2	O_2	14.8	0.0	12.44	12.34	14.68
2	CO_2	3.56	0.2	8.69	8.60	3.40
2	THC	36.0	SEE RUN # 3 No calibration			N/A
2	CO_{HIGH}	292.9	0.0	455.0	456	293.5

$$C_{GAS} = (\overline{C} - C_O)\left(\frac{C_{MA}}{C_M - C_O}\right)$$

C_{GAS} = CORRECTED SAMPLE GAS CONCENTRATON, PPM OR % VOL (DRY)

$\overline{C}$ = AVERAGE SAMPLE GAS CONCENTRATION (FROM ANALYZER) PPM OR % VOL (DRY)

C_O = 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_{MA} = SPAN GAS CYLINDER CONCENTRATION, PPM OR % VOL (DRY)

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

ES CONTINUOUS EMISSIONS MONITORS DATA CALIBRATION DRIFT CORRECTION

PROJECT Napa
PLANT Long [illegible]
LOCATION Stack Outlet

SHEET 2 OF 2
CALCULATED BY WDE
DATE 4/30/92

RUN NO.	PARAMETER	$\overline{C}$	C_O	C_M	C_{MA}	C_{GAS}
3	NO_x	30.6	1.0	22.2	22.97	32.07
3	CO_{Low}	11.6	0.0	45.1	45.6	11.73
3	SO_2	7.5	0.0	14.75	14.04	7.14
3	O_2	14.25	0.0	12.32	12.34	14.27
3	CO_2	4.65	0.21	8.69	8.60	4.50
3	THc	41.4	0.25	19.5	19.9	42.54
3	CO_{High}	19.0	0.0	458	456	18.92

$$C_{GAS} = (\overline{C} - C_O)\left(\frac{C_{MA}}{C_M - C_O}\right)$$

C_{GAS} = CORRECTED SAMPLE GAS CONCENTRATON, PPM OR % VOL (DRY)
$\overline{C}$ = AVERAGE SAMPLE GAS CONCENTRATION (FROM ANALYZER) PPM OR % VOL (DRY)
C_O = 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_{MA} = SPAN GAS CYLINDER CONCENTRATION, PPM OR % VOL (DRY)

ENGINEERING-SCIENCE
SUMMARY OF CEM DATA

Sheet 1 of ____

Date: 4/30/92

Project: NAPH　　Data Reduced By: WDE

Operator: DT

Plant: LONG BEACH　　Location: STACK OUTLET

Date & Time	NOx % Chart	NOx Conc. (ppm)	CO (Low) % Chart	CO (Low) Conc. (ppm)	SO2 % Chart	SO2 Conc. (ppm)	O2 % Chart	O2 Conc. (%)	CO2 % Chart	CO2 Conc. (%)	THC (CH4) % Chart	THC (CH4) Conc. PPM	CO (High) % Chart	CO (High) Conc. PPM
4/30/92	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Pre-calibration	86.5	86.5	92.5	91.3	91.0	91.1	50.0	12.34	94.8	18.69	95.0	96.4	91.0	1819
	46.3	46.2	44.1	45.6	44.0	43.4	47.5	11.79	43.0	8.60	50.0	49.9	47.0	919
	22.9	22.97	22.2	23.3	15.0	14.04	12.5	2.01	16.7	3.12	19.5	19.9	23.1	456
	0-100	F/S	0-100	F/S	0-100	F/S	0-25	F/S	0-20	F/S	0-100	F/S	0-2000	F/S
STACK OUTLET														
RUN #1														
0855-0915	29.0	29.0	45.0	450	11.0	11.0	57.0	14.3	18.0	3.60	N/A	N/A	2.2	44.0
0915-0930	33.7	33.7	34.0	34.0	14.0	14.0	55.5	13.9	19.1	3.82	N/A	N/A	1.9	38.0
0930-0945	32.8	32.8	39.0	39.0	12.0	12.0	56.0	14.0	19.3	3.86	60.0	60.0	2.0	40.0
0945-1000	29.5	29.5	36.0	36.0	14.0	14.0	58.0	14.5	17.5	3.50	60.0	60.0	2.0	40.0
1000-1015	27.0	27.0	68.0	68.0	15.0	15.0	58.5	14.6	17.7	3.54	50.0	50.0	3.5	70.0
1015-1030	26.9	26.9	66.0	66.0	11.0	11.0	58.5	14.6	18.0	3.60	47.0	47.0	3.1	62.0
Run Average		29.8		48.0		12.8		13.3		3.65		54.3		49.0
MID-Calibration	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
	22.7	22.97	45.2	45.6	14.0	14.04	50.0	12.34	42.5	8.60	20.0	19.9	22.7	456
RUN #2														
11:00-1115	26.5	26.5	52.0	52.0	4.0	4.0	59.5	14.9	17.8	3.56	N/A	N/A	2.5	50.0
1115-1130	22.0	22.0	OFF	SCALE	4.0	4.0	59.5	14.9	17.5	3.50	N/A	N/A	29.0	580.0
1130-1145	18.0	18.0	OFF	SCALE	5.0	5.0	59.5	14.9	17.4	3.48	20.0	20.0	30.0	600.0
1145-1200	18.0	18.0	OFF	SCALE	4.0	4.0	59.0	14.8	17.5	3.50	20.0	20.0	33.0	660.0
1200-1215	24.3	24.3	OFF	SCALE	5.0	5.0	59.0	14.8	17.9	3.58	40.0	40.0	5.5	110.0
1215-1230	28.0	28.0	40.0	40.0	10.0	10.0	58.0	14.5	18.5	3.70	60.0	60.0	2.0	40.0
1230-1245	25.0	25.0	9.0	9.0	17.0	17.0	59.0	14.8	18.0	3.60	40.0	40.0	0.5	10.0
Run Average		23.1		N/A		7.0		14.8		3.56		36.0		292.9

ENGINEERING-SCIENCE
SUMMARY OF CEM DATA

Sheet 2 of ___

Date: 4/30/92

Project: NAPA

Data Reduced By: WDE

Operator: DJ

Plant: LONG Beach

Location: STACK Outlet

Date & Time	NOx % Chart	NOx Conc. (ppm)	CO (LOW) % Chart	CO (LOW) Conc. (ppm)	SO2 % Chart	SO2 Conc. (ppm)	O2 % Chart	O2 Conc. (%)	CO2 % Chart	CO2 Conc. (%)	THC (CH4) % Chart	THC (CH4) Conc. (PPM)	CO (HIGH) % Chart	CO (HIGH) Conc. (PPM)
MID CALIBRATION	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	Not	Done	0.0	0.0
	22.4	22.97	45.1	45.6	14.5	14.04	49.5	12.34	43.4	8.60	Not	Done	22.8	456
RUN #3														
1315-1330	32.3	32.3	11.5	11.5	12.0	12.0	56.0	14.0	19.2	4.80	73.0	73.0	0.9	18.0
1330-1345	32.5	32.5	16.0	16.0	8.0	8.0	57.0	14.25	19.0	4.75	45.0	45.0	1.0	20.0
1345-1400	28.5	28.5	10.0	10.0	3.0	3.0	57.0	14.25	18.6	4.65	45.0	45.0	0.9	18.0
1400-1412	29.0	29.0	9.0	9.0	7.0	7.0	58.0	14.5	17.5	4.38	30.0	30.0	1.0	20.0
Run Average		30.6		11.6		7.5		14.25		4.65		48.3		19.0
Final Calibration	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.5	0.0	0.0	0.0
	22.0	22.97	45.1	45.6	15.0	14.04	49.0	12.34	43.5	8.60	19.0	19.9	23.0	456

Quality Assurance Data
Engineering-Science, Irwindale, California
ANALYZER CALIBRATION ERROR

FACILTIY NAPA

SOURCE ______

LOCATION STACK Outlet

DATE 4/30/92 SHEET 1 OF 2

OPERATOR DJ DATA REDUCED BY WDE

TIME ______

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
NO_X	0 - 100	ZERO	0.0	0.5	+0.5
	PPM	HIGH SCALE	86.5	86.5	0.0
NO_X	0 - 100	ZERO	0.0	0.5	+0.5
	PPM	MEDIUM SCALE	46.2	46.3	+0.1
NO_X	0 - 100	ZERO	0.0	0.5	+0.5
	PPM	LOW SCALE	22.97	22.9	-0.1
CO Low	0 - 100	ZERO	0.0	0.0	0.0
	PPM	HIGH SCALE	91.3	92.5	+1.2
CO Low	0 - 100	ZERO	0.0	0.0	0.0
	PPM	MEDIUM SCALE	45.6	44.1	-1.5
CO Low	0 - 100	ZERO	0.0	0.0	0.0
	PPM	LOW SCALE	23.3	22.2	-1.1

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
O_2	0 - 25	ZERO	0.0	0.0	0.0
	PERCENT (%)	HIGH SCALE	12.34	12.5	+0.6
O_2	0 - 25	ZERO	0.0	0.0	0.0
	PERCENT (%)	MEDIUM SCALE	11.79	11.88	+0.3
O_2	0 - 25	ZERO	0.0	0.0	0.0
	PERCENT (%)	LOW SCALE	3.01	3.12	+0.5
CO_2	0 - 20	ZERO	0.0	0.14	+0.7
	PERCENT (%)	HIGH SCALE	18.69	18.96	+1.4
CO_2	0 - 20	ZERO	0.0	3.5	+0.7
	PERCENT (%)	MEDIUM SCALE	8.60	8.60	0.0
CO_2	0 - 20	ZERO	0.0	3.5	+0.7
	PERCENT (%)	LOW SCALE	3.12	3.34	+1.1

$$\text{ANALYZER CALIBRATION ERROR} = \frac{\text{CAL. GAS - INSTRUMENT RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California
ANALYZER CALIBRATION ERROR

FACILTIY NAPA
SOURCE
LOCATION STACK Outlet

DATE 4/30/92 SHEET 2 OF 2
OPERATOR DT DATA REDUCED BY WDE
TIME

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
THC (CH_4)	0 - 100	ZERO	0.0	0.0	0.0
	PPM	HIGH SCALE	96.4	95.0	- 1.6
THC (CH_4)	0 - 100	ZERO	0.0	0.0	0.0
	PPM	MEDIUM SCALE	49.9	50.0	+0.1
THC (CH_4)	0 - 100	ZERO	0.0	0.0	0.0
	PPM	LOW SCALE	19.9	19.5	-0.4
CO High	0 - 2000	ZERO	0.0	0.0	0.0
	PPM	HIGH SCALE	1819	1820	+0.1
CO High	0 - 2000	ZERO	0.0	0.0	0.0
	PPM	MEDIUM SCALE	919	940	+1.1
CO High	0 - 2000	ZERO	0.0	0.0	0.0
	PPM	LOW SCALE	456	462	+0.3

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
SO_2	0 - 100	ZERO	0.0	0.0	0.0
	PPM	HIGH SCALE	91.1	91.0	-0.1
SO_2	0 - 100	ZERO	0.0	0.0	0.0
	PPM	MEDIUM SCALE	43.4	44.0	+0.6
SO_2	0 - 100	ZERO	0.0	0.0	0.0
	PPM	LOW SCALE	14.04	15.0	+1.0
CO_2	0 ____	ZERO			
	PERCENT (%)	HIGH SCALE			
CO_2	0 ____	ZERO			
	PERCENT (%)	MEDIUM SCALE			
CO_2	0 ____	ZERO			
	PERCENT (%)	LOW SCALE			

$$\text{ANALYZER CALIBRATION ERROR} = \frac{\text{CAL. GAS - INSTRUMENT RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California
CALIBRATION DRIFT

FACILTIY NAPA
SOURCE
LOCATION Stack outlet

DATE 4/30/[illegible]
OPERATOR [illegible]
TIME

SHEET 1 OF 2
DATA REDUCED BY WDE

RUN NO. 1	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALIB. DRIFT (%)
NO_X	0 -100	ZERO	0.5	1.0	+0.5
	PPM	UPSCALE	22.9	22.8	-0.1
CO LOW	0 -100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	44.1	45.2	+1.1
SO_2	0 -100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	15.0	[illegible]	-1.0
O_2	0 -25	ZERO	0.0	0.0	0.0
	PERCENT (%)	UPSCALE	12.5	12.5	0.0
CO_2	0 -20	ZERO	0.14	0.2	+0.06
	PERCENT (%)	UPSCALE	8.60	8.70	+0.5
THC	0 -100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	19.5	20.0	+0.5

RUN NO. 2	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALIB. DRIFT (%)
NO_X	0 -100	ZERO	1.0	1.0	0.0
	PPM	UPSCALE	22.8	22.4	-0.4
CO LOW	0 -100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	[illegible]	45.1	-0.1
SO_2	0 -100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	[illegible]	14.5	+0.5
O_2	0 -25	ZERO	0.0	0.0	0.0
	PERCENT (%)	UPSCALE	[illegible]	12.38	-0.5
CO_2	0 -20	ZERO	[illegible]	0.2	0.0
	PERCENT (%)	UPSCALE	[illegible]	8.68	-0.1
THC	0 -100	ZERO	[illegible]	N/A	N/A
	PPM	UPSCALE	[illegible]	N/A	N/A

SEE RUN #3

$$\text{CALIBRATION DRIFT} = \frac{\text{FINAL RESPONSE-INITIAL RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California
CALIBRATION DRIFT

FACILTIY NAPA
SOURCE
LOCATION Stack Outlet

DATE 4/30/92
OPERATOR DJ
TIME

SHEET 2 OF 2
DATA REDUCED BY WJOE

RUN NO. 3	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALID. DRIFT (%)
NO_X	0 - 100	ZERO	1.0	1.0	0.0
	PPM	UPSCALE	22.4	22.0	-0.4
CO Low	0 - 100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	45.1	45.1	0.0
SO_2	0 - 100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	14.5	15.0	+0.5
O_2	0 - 25	ZERO	0.0	0.0	0.0
	PERCENT (%)	UPSCALE	12.38	12.25	-0.5
CO_2	0 - 20	ZERO	0.2	0.22	+0.1
	PERCENT (%)	UPSCALE	8.68	8.70	+0.1
THC	0 - 100	ZERO	0.0	0.5	+0.5
	PPM	UPSCALE	20.0	19.0	-1.0

RUN NO. ____	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALID. DRIFT (%)
NO_X	0 ____	ZERO			
	PPM	UPSCALE			
CO	0 ____	ZERO			
	PPM	UPSCALE			
SO_2	0 ____	ZERO			
	PPM	UPSCALE			
O_2	0 ____	ZERO			
	PERCENT (%)	UPSCALE			
CO_2	0 ____	ZERO			
	PERCENT (%)	UPSCALE			
	0 ____	ZERO			
	PPM	UPSCALE			

$$\text{CALIBRATION DRIFT} = \frac{\text{FINAL RESPONSE-INITIAL RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California

SAMPLE SYSTEM BIAS TEST

Facility: NAPA

Source:

Location: Stack Outlet

Date: 4/30/92

Operator: DJ

Time:

Sheet 1 of 2

Run	Specie	Full Scale	Calib. Response	Initial Values Response	Initial Values % Bias	Final Values Response	Final Values % Bias
Zero	CO Low	0.0	0.0	0.0	0.0	0.0	0.0
Upscale		100.0	45.6	45.1	-0.5	45.0	-0.1
Zero	SO_2	0.0	0.0	0.0	0.0	0.0	0.0
Upscale		100.0	14.04	15.0	+0.96	13.5	-1.50
Zero	NO_x	0.0	0.0	1.0	+1.0	1.0	0.0
Upscale		100.0	22.97	22.0	-0.97	22.0	0.0
Zero	O_2	0.0	0.0	0.0	0.0		
Upscale		25.0	12.34	12.25	-0.36		
Zero	CO_2	0.0	0.0	0.22	+1.1		
Upscale		20.0	8.60	8.70	+0.5		
Zero	THc	0.0	0.0	0.5	+0.5	0.5	0.0
Upscale		100.0	19.9	19.0	-0.9	18.5	-0.5

Quality Assurance Data
Engineering-Science, Irwindale, California

SAMPLE SYSTEM BIAS TEST

Facility: NAPA
Source:
Location: Stack Outlet

Date: 4/30/92
Operator: DJ
Time:
Sheet 2 of 2

Run	Specie	Full Scale	Calib. Response	Initial Values Response	Initial Values % Bias	Final Values Response	Final Values % Bias
Zero	CO High	0.0	0.0	0.0	0.0	0.0	0.0
Upscale		20000	456	460	+0.2	460	0.0
Zero	SO_2						
Upscale							
Zero	NO_x						
Upscale							
Zero	O_2						
Upscale							
Zero	CO_2						
Upscale							
Zero							
Upscale							

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

ES CONTINUOUS EMISSIONS MONITORS DATA CALIBRATION DRIFT CORRECTION

PROJECT NAPA, LONG BEACH
PLANT NAPA
LOCATION BAGHOUSE STACK OUTLET
SHEET 1 OF 2
CALCULATED BY CHM
DATE 01 MAY 1992

RUN NO.	PARAMETER	$\overline{C}$	C_O	C_M	C_{MA}	C_{GAS}
1	NO_x	22.7	0.30	23.12	23.02	22.68
	$CO_{(low)}$	44.75	Ø	224.25	229.7	45.84
	SO_2	9.5	Ø	14.75	14.04	9.04
	O_2	13.96	0.06	12.54	12.34	13.74
	CO_2	4.2	0.12	8.60	8.60	4.14
2	NO_x	23.0	0.31	23.22	23.02	22.80
	$CO_{(low)}$	141.0	Ø	224.25	229.7	144.43
	SO_2	10.2	Ø	14.00	14.04	10.23
	O_2	15.18	0.13	12.46	12.34	15.06
	CO_2	3.34	0.22	8.74	8.60	3.15

$$C_{GAS} = (\overline{C} - C_O)\left(\frac{C_{MA}}{C_M - C_O}\right)$$

C_{GAS} = CORRECTED SAMPLE GAS CONCENTRATON, PPM OR % VOL (DRY)
$\overline{C}$ = AVERAGE SAMPLE GAS CONCENTRATION (FROM ANALYZER) PPM OR % VOL (DRY)
C_O = 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_{MA} = SPAN GAS CYLINDER CONCENTRATION, PPM OR % VOL (DRY)

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

ES CONTINUOUS EMISSIONS MONITORS DATA CALIBRATION DRIFT CORRECTION

PROJECT NAPA, LONG BEACH　　SHEET 2 OF 2
PLANT NAPA　　CALCULATED BY CKM
LOCATION BAGHOUSE STACK OUTLET　　DATE 01 MAY 1992

RUN NO.	PARAMETER	$\overline{C}$	C_O	C_M	C_{MA}	C_{GAS}
3	NO_x	26.5	0.78	23.15	23.02	26.47
	CO (low)	113.0	Ø	224.25	229.7	115.75
	SO_2	11.8	Ø	13.75	14.04	12.05
	O_2	14.7	0.13	12.44	12.34	14.61
	CO_2	3.68	0.26	8.76	8.60	3.45

$$C_{GAS} = (\overline{C} - C_O)\left(\frac{C_{MA}}{C_M - C_O}\right)$$

C_{GAS} = CORRECTED SAMPLE GAS CONCENTRATON, PPM OR % VOL (DRY)

$\overline{C}$ = AVERAGE SAMPLE GAS CONCENTRATION (FROM ANALYZER) PPM OR % VOL (DRY)

C_O = 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_{MA} = SPAN GAS CYLINDER CONCENTRATION, PPM OR % VOL (DRY)

ENGINEERING-SCIENCE
SUMMARY OF CEM DATA

Sheet 1 of 2

Date: 5/1/92

Project: NAPA

Data Reduced By: [illegible]

Operator: DJ

Plant: Long Beach

Location: Stack Outlet

Date & Time	NOx % Chart	NOx Conc. (ppm)	CO (Low) % Chart	CO (Low) Conc. (ppm)	SO2 % Chart	SO2 Conc. (ppm)	O2 % Chart	O2 Conc. (%)	CO2 % Chart	CO2 Conc. (%)	% Chart	Conc.	% Chart	Conc.
5/1/92	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0				
Pre-Calibration	86.7	86.5	91.5	456	91.0	91.1	50.2	12.34	95.0	18.65				
	46.6	46.5	448	229.7	44.0	43.4	48.0	11.79	4225	8.60				
	23.0	23.02	18.9	91.3	15.0	14.04	12.6	3.01	16.75	3.12				
	0-100	F/S	0-500	F/S	0-100	F/S	0-25	F/S	0-20	F/S				
RUN #1														
0930-0945	32.2	32.2	7.8	39.0	10.0	10.0	55.75	13.94	21.0	4.2				
0945-1000	33.6	33.6	9.5	47.5	12.0	12.0	55.5	13.88	21.0	4.2				
1000-1015	34.0	34.0	8.0	40.0	9.0	9.0	55.0	13.75	21.2	4.24				
1015-1030	30.0	30.0	10.5	52.5	7.0	7.0	57.0	14.25	20.8	4.16				
Average		32.7		44.75		9.5		13.96		4.2				
Mid Calibration	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.0	0.0				
	23.25	23.02	44.9	229.7	14.5	14.04	50.0	12.34	43.7	8.60				
RUN #2														
1115-1130	29.0	29.0	11.0	55.0	9.0	9.0	59.0	14.75	18.2	3.64				
1130-1145	12.0	12.0	6.0	30.0	10.0	10.0	68.0	17.0	11.0	2.2				
1145-1200	26.0	26.0	34.0	170.0	11.0	11.0	59.0	14.75	18.2	3.64				
1200-1215	24.0	24.0	59.0	295.0	11.0	11.0	58.5	14.63	18.2	3.64				
1215-1230	24.0	24.0	31.0	155.0	10.0	10.0	59.0	14.75	18.0	3.6				
Average		23.0		141.0		10.2		15.18		3.34				

ENGINEERING-SCIENCE
SUMMARY OF CEM DATA

Sheet 2 of 2

Date: 5/1/92

Operator: DJ

Project: NAPA

Data Reduced By: WDE

Plant: LONG Beach

Location: STACK Outlet

Date & Time	NOx		CO		SO2		O2		CO2					
	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (%)	% Chart	Conc. (%)	% Chart	Conc.	% Chart	Conc.
Mid Calibration	0.75	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.25	0.0				
	23.2	23.02	44.8	229.7	13.5	14.04	49.7	12.34	43.75	8.60				
RUN #3														
1250-1300	24.5	24.5	27.0	135.0	10.0	10.0	59.5	14.9	17.75	3.55				
1300-1315	24.5	24.5	28.0	140.0	13.0	13.0	60.0	15.0	17.8	3.56				
1315-1330	24.4	24.4	23.0	115.0	13.0	13.0	60.0	15.0	17.5	3.50				
1330-1345	29.0	29.0	24.0	120.0	13.0	13.0	57.0	14.25	19.0	3.80				
1345-1400	30.0	30.0	11.0	55.0	10.0	10.0	57.0	14.5	20.0	4.00				
Average		26.5		113.0		11.8		14.7		3.68				
Final Calibration	0.8	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.5	0.0				
	23.1	23.02	44.9	229.7	14.0	14.04	49.8	12.34	43.8	8.60				

Quality Assurance Data
Engineering-Science, Irwindale, California
ANALYZER CALIBRATION ERROR

FACILTIY NAPA — DATE 5/1/92 — SHEET 1 OF 2

SOURCE ________ — OPERATOR DJ — DATA REDUCED BY WDE

LOCATION STACK Outlet — TIME ________

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
NO_X	0 - 100	ZERO	0.0	0.1	+1.0
	PPM	HIGH SCALE	86.5	86.7	+0.2
NO_X	0 - 100	ZERO	0.0	0.1	+1.0
	PPM	MEDIUM SCALE	46.2	46.6	+0.4
NO_X	0 - 100	ZERO	0.0	0.1	+1.0
	PPM	LOW SCALE	22.97	23.0	0.0
CO (Low)	0 - 500	ZERO	0.0	0.0	0.0
	PPM	HIGH SCALE	456	457.5	+0.3
CO	0 - 500	ZERO	0.0	0.0	0.0
	PPM	MEDIUM SCALE	229.7	224.0	-1.1
CO	0 - 500	ZERO	0.0	0.0	0.0
	PPM	LOW SCALE	91.3	94.5	+0.6

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
O_2	0 - 25	ZERO	0.0	0.0	0.0
	PERCENT (%)	HIGH SCALE	12.34	12.58	+ 1.0
O_2	0 - 25	ZERO	0.0	0.0	0.0
	PERCENT (%)	MEDIUM SCALE	11.79	12.0	+ 0.8
O_2	0 - 25	ZERO	0.0	0.0	0.0
	PERCENT (%)	LOW SCALE	3.01	3.15	+ 0.6
CO_2	0 - 20	ZERO	0.0	0.2	+1.0
	PERCENT (%)	HIGH SCALE	18.69	19.0	+1.6
CO_2	0 - 20	ZERO	0.0	0.2	+1.0
	PERCENT (%)	MEDIUM SCALE	8.60	8.65	+0.2
CO_2	0 - 20	ZERO	0.0	0.2	+1.0
	PERCENT (%)	LOW SCALE	3.12	3.35	+1.2

$$\text{ANALYZER CALIBRATION ERROR} = \frac{\text{CAL. GAS - INSTRUMENT RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California
ANALYZER CALIBRATION ERROR

FACILTIY NAPH

SOURCE ____

LOCATION STACK Outlet

DATE 5/1/92 SHEET 2 OF 2

OPERATOR DJ DATA REDUCED BY WDE

TIME ____

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
NO_x	0 ____	ZERO			
	PPM	HIGH SCALE			
NO_x	0 ____	ZERO			
	PPM	MEDIUM SCALE			
NO_x	0 ____	ZERO			
	PPM	LOW SCALE			
CO	0 ____	ZERO			
	PPM	HIGH SCALE			
CO	0 ____	ZERO			
	PPM	MEDIUM SCALE			
CO	0 ____	ZERO			
	PPM	LOW SCALE			

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
SO_2	0 100	ZERO	0.0	0.0	0.0
	PPM	HIGH SCALE	91.1	91.0	-0.1
SO_2	0 -100	ZERO	0.0	0.0	0.0
	PPM	MEDIUM SCALE	43.4	44.0	+0.6
SO_2	0 -100	ZERO	0.0	0.0	0.0
	PPM	LOW SCALE	14.04	15.0	+1.0
CO_2	0 ____	ZERO			
	PERCENT (%)	HIGH SCALE			
CO_2	0 ____	ZERO			
	PERCENT (%)	MEDIUM SCALE			
CO_2	0 ____	ZERO			
	PERCENT (%)	LOW SCALE			

$$\text{ANALYZER CALIBRATION ERROR} = \frac{\text{CAL. GAS - INSTRUMENT RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California
CALIBRATION DRIFT

FACILTY NAIH
SOURCE
LOCATION Stack Outlet

DATE 5/1/92 SHEET 1 OF 2
OPERATOR DT DATA REDUCED BY WDE
TIME

RUN NO. 1	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALIB. DRIFT (%)
NO_X	0 -100	ZERO	0.1	0.5	+0.4
	PPM	UPSCALE	23.0	23.25	+0.25
CO	0 -500	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	224.0	224.5	+0.1
SO_2	0 -100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	15.0	14.5	-0.5
O_2	0 -25	ZERO	0.0	0.13	+0.5
	PERCENT (%)	UPSCALE	12.58	12.5	-0.3
CO_2	0 -20	ZERO	0.04	0.2	0.8
	PERCENT (%)	UPSCALE	8.45	8.74	1.45
	0 ____	ZERO			
	PPM	UPSCALE			

RUN NO. 2	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALIB. DRIFT (%)
NO_X	0 -100	ZERO	0.5	0.75	+0.25
	PPM	UPSCALE	23.25	23.2	-0.05
CO	0 -500	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	224.5	224.0	-0.5
SO_2	0 -100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	14.5	13.5	-1.0
O_2	0 -25	ZERO	0.13	0.13	0.0
	PERCENT (%)	UPSCALE	[illegible]	12.43	-0.3
CO_2	0 -20	ZERO	0.2	0.25	+0.25
	PERCENT (%)	UPSCALE	8.74	8.75	+0.05
	0 ____	ZERO			
	PPM	UPSCALE			

$$\text{CALIBRATION DRIFT} = \frac{\text{FINAL RESPONSE-INITIAL RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California
CALIBRATION DRIFT

FACILTIY NAPA
SOURCE
LOCATION Stack Outlet

DATE 5/1/92 SHEET 2 OF 2
OPERATOR DT DATA REDUCED BY WDE
TIME

RUN NO. 3	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALIB. DRIFT (%)
NO_X	0 -100	ZERO	0.75	0.8	+0.05
	PPM	UPSCALE	23.2	23.1	-0.1
CO	0 -500	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	224.0	224.5	+0.1
SO_2	0 -100	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	13.5	14.0	+0.5
O_2	0 -25	ZERO	0.13	0.13	0.0
	PERCENT (%)	UPSCALE	12.43	13.45	+0.1
CO_2	0 -20	ZERO	0.25	0.30	+0.25
	PERCENT (%)	UPSCALE	8.75	8.76	+0.05
	0	ZERO			
	PPM	UPSCALE			

RUN NO.	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALIB. DRIFT (%)
NO_X	0	ZERO			
	PPM	UPSCALE			
CO	0	ZERO			
	PPM	UPSCALE			
SO_2	0	ZERO			
	PPM	UPSCALE			
O_2	0	ZERO			
	PERCENT (%)	UPSCALE			
CO_2	0	ZERO			
	PERCENT (%)	UPSCALE			
	0	ZERO			
	PPM	UPSCALE			

$$\text{CALIBRATION DRIFT} = \frac{\text{FINAL RESPONSE-INITIAL RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California

SAMPLE SYSTEM BIAS TEST

Facility: NAPA

Source:

Location: Stack Outlet

Date: 5/1/92

Operator: DJ

Time:

Sheet 1 of 1

Run	Specie	Full Scale	Calib. Response	Initial Values Response	Initial Values % Bias	Final Values Response	Final Values % Bias
Zero	CO (Low)	0.0	0.0	0.0	0.0	0.0	0.0
Upscale		500.0	229.7	224.5	-1.04	225.0	+0.1
Zero	SO_2	0.0	0.0	0.0	0.0	0.0	0.0
Upscale		100.0	14.04	14.0	-0.04	12.0	-2.0
Zero	NO_x	0.0	0.0	0.8	+0.8	0.8	0.0
Upscale		100.0	23.02	23.1	+0.08	23.0	-0.1
Zero	O_2	0.0	0.0	0.13	+0.52		
Upscale		25.0	12.34	12.45	+0.44		
Zero	CO_2	0.0	0.0	0.30	+1.5		
Upscale		20.0	8.60	8.76	+0.8		
Zero							
Upscale							

ENGINEERING-SCIENCE, INC.
IRWINDALE, CA

ES CONTINUOUS EMISSIONS MONITORS DATA
CALIBRATION DRIFT CORRECTION

PROJECT NADA. LONG BEACH SHEET 1 OF 1
PLANT NADA CALCULATED BY CNAI
LOCATION BAGHOUSE STACK OUTLET DATE 04 MAY 1992

RUN NO.	PARAMETER	$\overline{C}$	C_O	C_M	C_{MA}	C_{GAS}
1	NOx	18.38	0.20	22.85	22.97	18.42
	CO	76.25	∅	222.88	229.7	78.23
	SO_2	3.75	0.25	15.20	14.04	3.29
	O_2	14.39	0.06	12.40	12.34	14.23
	CO_2	5.78	0.09	8.68	8.60	5.80
2	NOx	29.29	0.5	22.60	22.97	29.92
	CO	84.29	∅	224.50	229.7	86.24
	SO_2	4.14	0.5	15.25	14.04	3.46
	O_2	14.3	0.13	12.44	12.34	14.20
	CO_2	3.72	0.17	8.60	8.60	3.62

$$C_{GAS} = (\overline{C} - C_O)\left(\frac{C_{MA}}{C_M - C_O}\right)$$

C_{GAS} = CORRECTED SAMPLE GAS CONCENTRATON, PPM OR % VOL (DRY)
$\overline{C}$ = AVERAGE SAMPLE GAS CONCENTRATION (FROM ANALYZER) PPM OR % VOL (DRY)
C_O = 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_{MA} = SPAN GAS CYLINDER CONCENTRATION, PPM OR % VOL (DRY)

ENGINEERING-SCIENCE
SUMMARY OF CEM DATA

Sheet 1 of 2

Date: 5/4/92

Operator: WOE/DJ

Project: NAPA

Data Reduced By: WOE

Plant: LONG Beach

Location: Stack Outlet

Date & Time	NOx % Chart	NOx Conc. (ppm)	CO % Chart	CO Conc. (ppm)	SO2 % Chart	SO2 Conc. (ppm)	O2 % Chart	O2 Conc. (%)	CO2 % Chart	CO2 Conc. (%)	% Chart	Conc.	% Chart	Conc.
Pre Calibration	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0				
	86.7	86.5	90.5	456	91.0	91.1	49.2	12.34	94.0	18.69				
	46.6	46.2	44.76	229.7	43.5	43.4	46.8	11.79	43.75	8.60				
	23.0	22.97	17.5	91.3	14.9	14.04	13.0	3.01	16.25	3.12				
	0-100	F/S	0-500	F/S	0-100	F/S	0-25	F/S	0-20	F/S				
RUN # 1														
0930-0945	18.5	18.5	9.0	45.0	2.5	2.5	57.0	14.25	30.0	6.00				
0945-1000	18.0	18.0	10.0	50.0	2.5	2.5	58.1	14.53	27.5	5.50				
1000-1015	18.5	18.5	37.0	185.0	5.0	5.0	57.5	14.38	28.0	5.60				
1015-1030	18.5	18.5	5.0	25.0	5.0	5.0	57.5	14.38	30.0	6.00				
AVERAGE		18.38		76.25		3.75		14.39		5.78				
Mid calibration	0.5	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.7	0.0				
	22.7	22.97	44.8	229.7	15.5	14.04	50.0	12.34	43.0	8.60				
RUN # 2														
1045-1100	29.0	29.0	15.0	75.0	5.0	5.0	57.0	14.25	19.0	3.80				
1100-1115	30.0	30.0	11.0	55.0	3.0	3.0	57.0	14.25	18.5	3.70				
1115-1130	30.0	30.0	27.0	135.0	2.0	2.0	58.0	14.5	18.2	3.64				
1130-1145	29.0	29.0	22.0	110.0	4.0	4.0	57.0	14.25	18.5	3.70				
1145-1200	29.0	29.0	16.0	80.0	5.0	5.0	57.0	14.25	19.0	3.80				
1200-1215	29.0	29.0	11.0	55.0	4.0	4.0	[illegible]	14.38	18.5	3.70				
1215-1230	29.0	29.0	16.0	80.0	6.0	6.0	[illegible]	14.25	18.5	3.70				
Average		29.29		84.29		4.14		14.30		3.72				

ENGINEERING-SCIENCE
SUMMARY OF CEM DATA

Date: 5/4/92

Project: NAPA   Data Reduced By: WDE

Operator: WDE/DJ

Plant: Long Beach   Location: Stack Outlet

Date & Time	NOx		CO		SO2		O2		CO2					
	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (ppm)	% Chart	Conc. (%)	% Chart	Conc. (%)	% Chart	Conc.	% Chart	Conc.
FINAL CALS	0.5	0.0	0.0	0.0	0.5	0.0	0.5	0.0	1.0	0.0				
	22.5	22.97	45.0	229.7	15.0	14.04	49.5	12.34	43.0	8.60				

Quality Assurance Data
Engineering-Science, Irwindale, California
ANALYZER CALIBRATION ERROR

FACILTIY NAPA
SOURCE
LOCATION STACK Outlet

DATE 5/4/92 SHEET 1 OF 2
OPERATOR DT WDE DATA REDUCED BY WDE
TIME

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
NO_X	0 -100	ZERO	0.0	0.0	0.0
	PPM	HIGH SCALE	86.5	86.0	-0.5
NO_X	0 -100	ZERO	0.0	0.0	0.0
	PPM	MEDIUM SCALE	46.2	46.0	-0.2
NO_X	0 -100	ZERO	0.0	0.0	0.0
	PPM	LOW SCALE	22.77	[illegible]	-0.57
CO Low	0 -500	ZERO	0.0	0.0	0.0
	PPM	HIGH SCALE	456	452.5	-0.7
CO Low	0 -500	ZERO	0.0	0.0	0.0
	PPM	MEDIUM SCALE	229.7	223.75	-1.2
CO Low	0 -500	ZERO	0.0	0.0	0.0
	PPM	LOW SCALE	91.3	87.5	-0.8

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
O_2	0 -25	ZERO	0.0	0.0	0.0
	PERCENT (%)	HIGH SCALE	12.34	12.3	-0.2
O_2	0 -25	ZERO	0.0	0.0	0.0
	PERCENT (%)	MEDIUM SCALE	11.79	11.7	-0.4
O_2	0 -25	ZERO	0.0	0.0	0.0
	PERCENT (%)	LOW SCALE	3.01	3.25	+0.5
CO_2	0 -20	ZERO	0.0	0.0	0.0
	PERCENT (%)	HIGH SCALE	18.65	18.8	+0.8
CO_2	0 -20	ZERO	0.0	0.0	[illegible]
	PERCENT (%)	MEDIUM SCALE	8.60	8.55	-0.3
CO_2	0 -20	ZERO	0.0	0.0	[illegible]
	PERCENT (%)	LOW SCALE	3.12	3.25	+0.7

$$\text{ANALYZER CALIBRATION ERROR} = \frac{\text{CAL. GAS - INSTRUMENT RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California
ANALYZER CALIBRATION ERROR

FACILTIY NAPA
SOURCE
LOCATION Stack Outlet

DATE 5/4/92 SHEET 2 OF 2
OPERATOR DT/WDE DATA REDUCED BY WDE
TIME

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
NO_X	0 ___	ZERO			
	PPM	HIGH SCALE			
NO_X	0 ___	ZERO			
	PPM	MEDIUM SCALE			
NO_X	0 ___	ZERO			
	PPM	LOW SCALE			
CO	0 ___	ZERO			
	PPM	HIGH SCALE			
CO	0 ___	ZERO			
	PPM	MEDIUM SCALE			
CO	0 ___	ZERO			
	PPM	LOW SCALE			

RUN NO.	FULL SCALE		CAL. GAS INPUT (CONC.)	INSTRUMENT RESPONSE (CONC.)	CALIB. ERROR (%)
SO_2	0 - 100	ZERO	0.0	0.0	0.0
	PPM	HIGH SCALE	91.1	91.0	-0.1
SO_2	0 - 100	ZERO	0.0	0.0	0.0
	PPM	MEDIUM SCALE	43.4	43.5	+0.1
SO_2	0 - 100	ZERO	0.0	0.0	0.0
	PPM	LOW SCALE	14.04	14.9	+0.9
CO_2	0 ___	ZERO			
	PERCENT (%)	HIGH SCALE			
CO_2	0 ___	ZERO			
	PERCENT (%)	MEDIUM SCALE			
CO_2	0 ___	ZERO			
	PERCENT (%)	LOW SCALE			

$$\text{ANALYZER CALIBRATION ERROR} = \frac{\text{CAL. GAS - INSTRUMENT RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California
CALIBRATION DRIFT

FACILITY NAPA
SOURCE
LOCATION Stack Outlet

DATE 5/4/92 SHEET 1 OF 1
OPERATOR WOE/DT DATA REDUCED BY WDE
TIME

RUN NO. 1	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALIB. DRIFT (%)
NO_X	0 - 100	ZERO	0.1	0.5	+0.4
	PPM	UPSCALE	23.0	22.7	-0.3
CO	0 - 500	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	223.75	224.0	+0.15
SO_2	0 - 100	ZERO	0.0	0.5	+0.5
	PPM	UPSCALE	14.9	15.5	+0.6
O_2	0 - 25	ZERO	0.0	0.13	+0.5
	PERCENT (%)	UPSCALE	12.3	12.5	+0.8
CO_2	0 - 20	ZERO	0.04	0.14	+0.5
	PERCENT (%)	UPSCALE	8.75	8.60	-0.75
	0	ZERO			
	PPM	UPSCALE			

RUN NO. 2	FULL SCALE		INITIAL RESPONSE (CONC.)	FINAL RESPONSE (CONC.)	CALIB. DRIFT (%)
NO_X	0 - 100	ZERO	0.5	0.5	0.0
	PPM	UPSCALE	22.7	22.5	-0.2
CO	0 - 500	ZERO	0.0	0.0	0.0
	PPM	UPSCALE	224.0	225.0	+0.2
SO_2	0 - 100	ZERO	0.5	0.5	0.0
	PPM	UPSCALE	15.5	15.0	-0.5
O_2	0 - 25	ZERO	0.13	0.13	0.0
	PERCENT (%)	UPSCALE	12.5	12.38	-0.5
CO_2	0 - 20	ZERO	0.14	0.20	+0.3
	PERCENT (%)	UPSCALE	8.60	8.60	0.0
	0	ZERO			
	PPM	UPSCALE			

$$\text{CALIBRATION DRIFT} = \frac{\text{FINAL RESPONSE-INITIAL RESPONSE}}{\text{ANALYZER FULL SCALE}} \times 100$$

Quality Assurance Data
Engineering-Science, Irwindale, California

SAMPLE SYSTEM BIAS TEST

Facility: NAPA

Source:

Location: Stack outlet

Date: 5/4/92

Operator: WDE/DT

Time:

Sheet 1 of 1

Run	Specie	Full Scale	Calib. Response	Initial Values		Final Values	
				Response	% Bias	Response	% Bias
Zero	CO	0.0	0.0	0.0	0.0	0.0	0.0
Upscale		500.0	229.7	225.0	-0.94	225	0.0
Zero	SO_2	0.0	0.0	0.5	+0.5	0.5	0.0
Upscale		100.0	14.04	15.0	+0.96	15.5	+0.5
Zero	NO_x	0.0	0.0	0.5	+0.5	0.5	0.0
Upscale		100.0	22.97	22.5	-0.47	22.5	0.0
Zero	O_2	0.0	0.0	0.13	+0.5		
Upscale		25.0	12.34	12.38	+0.16		
Zero	CO_2	0.0	0.0	0.20	+1.0		
Upscale		20.0	8.60	8.60	0.0		
Zero							
Upscale							

ES ENGINEERING-SCIENCE, INC.

Client NAPA | Job No. | Sheet of
Subject EXCESS AIR ; CEM | By CNM | Date
Checked | Rev.

FORMULA:

$$\% EA = \frac{(\% O_2 - 0.5\% CO)}{[0.264 \% N_2 - (\% O_2 - 0.5\% CO)]} \times 100$$

FOR RUN # 1 : Assuming first testing day as run # 1
$\% O_2 = 14.00$; $\% N_2 = 82.20$; $\% CO = \emptyset$

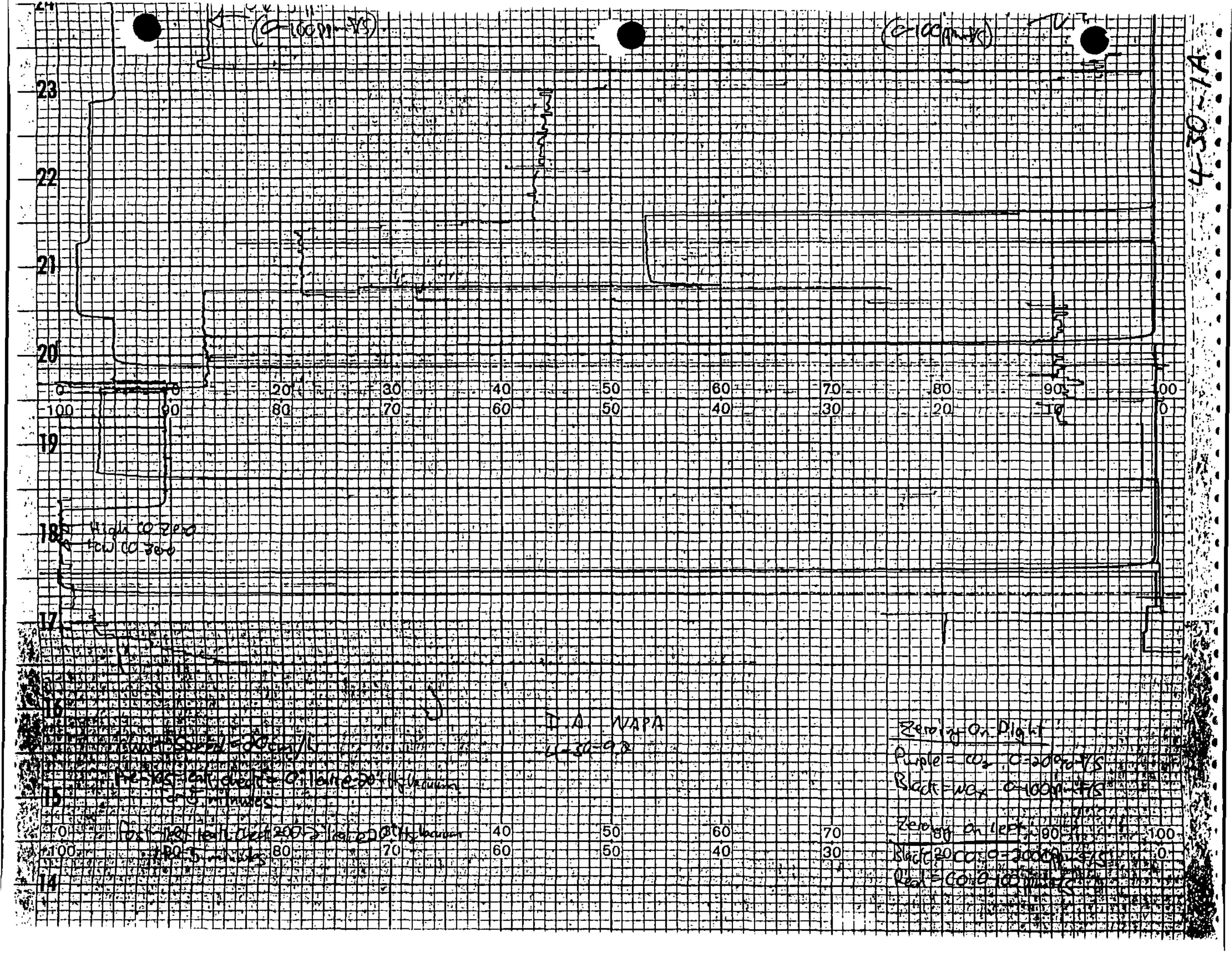
$$\% EA = \frac{[14.00 - 0.5(\emptyset)]}{[0.264(82.20) - (14.00 - 0.5(\emptyset))]} \times 100 = 181.8$$

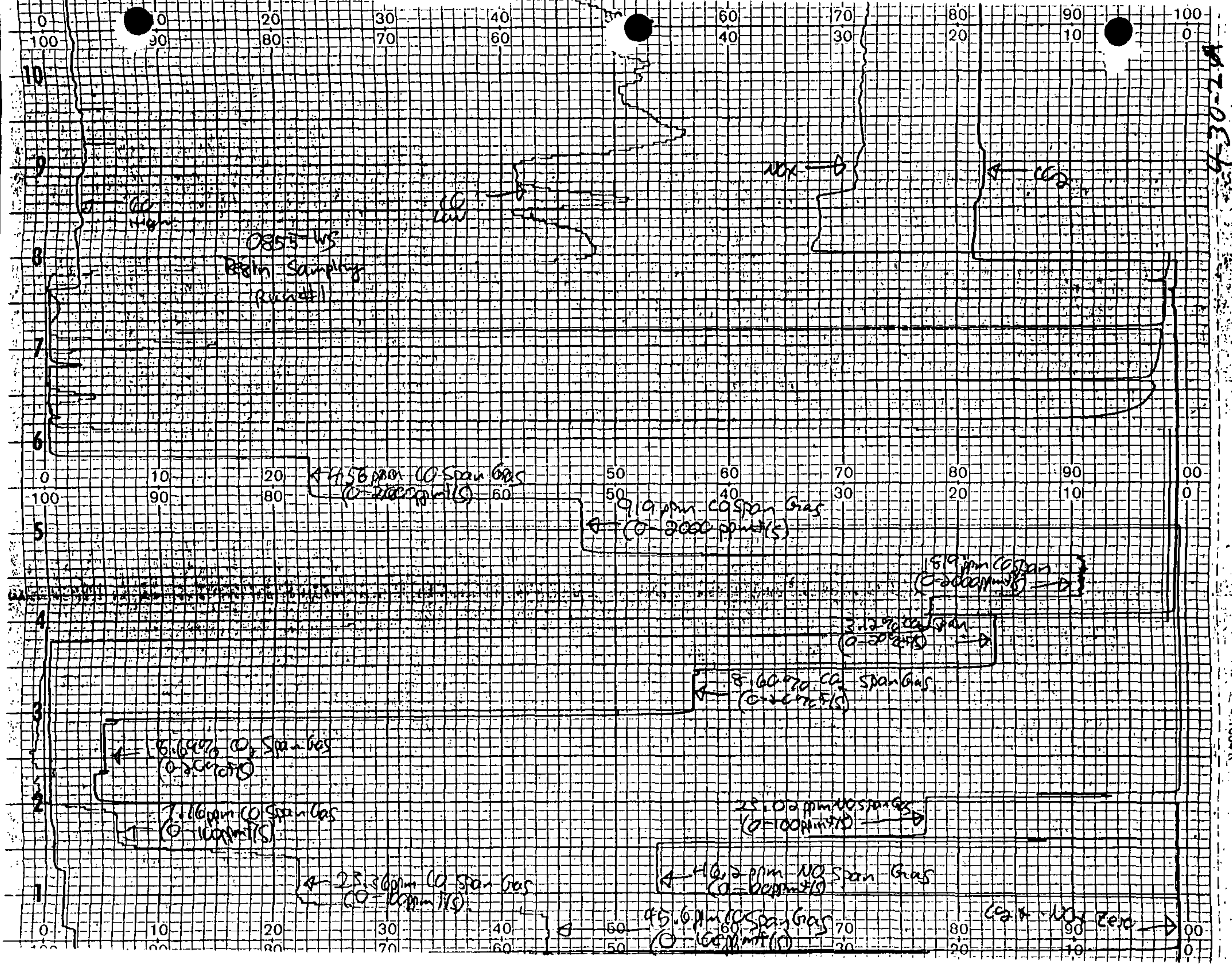
RUN # 2 : $\% O_2 = 14.30$; $\% N_2 = 82.10$; $\% CO = \emptyset$

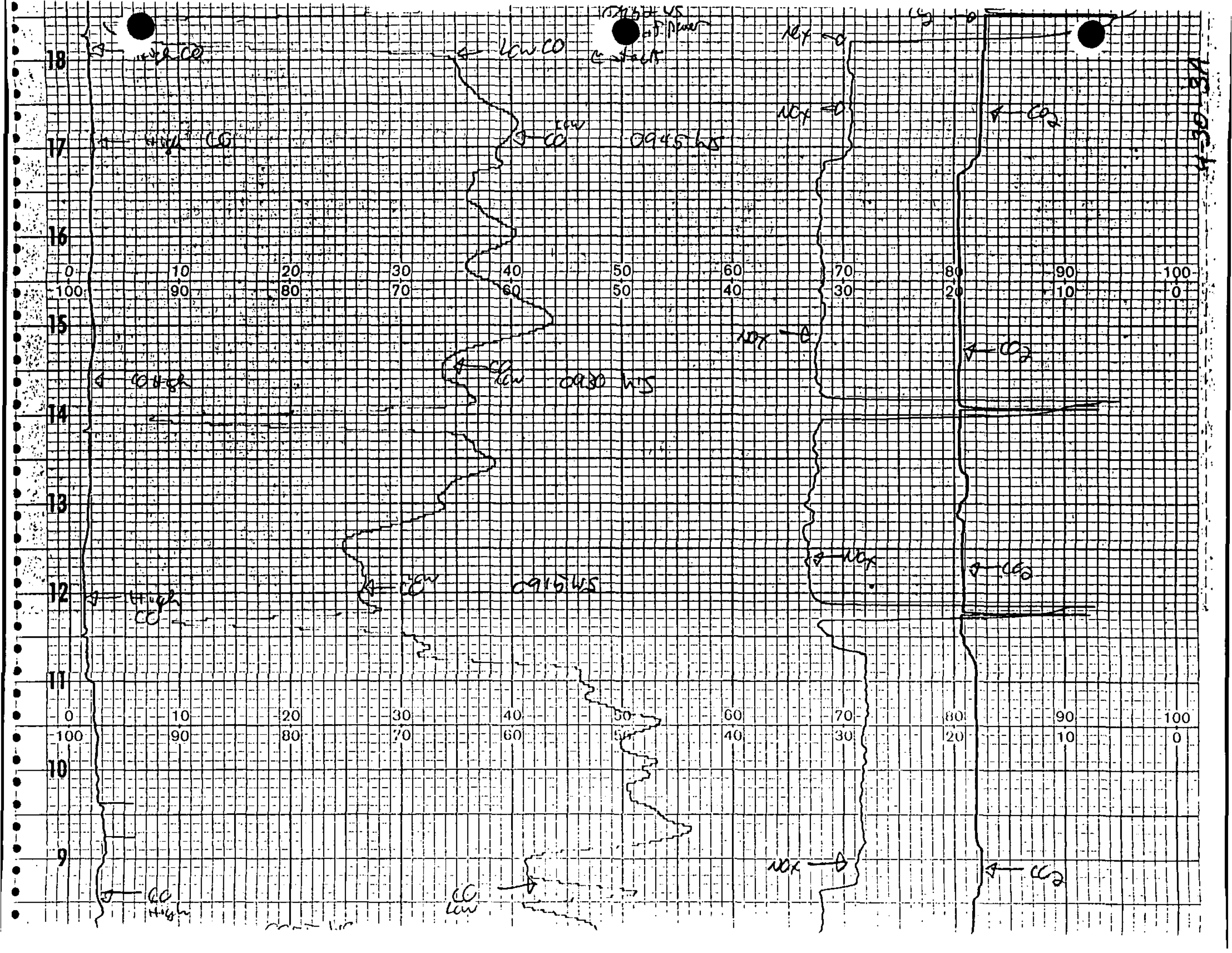
$$\% EA = \frac{[14.30 - 0.5(\emptyset)]}{[0.264(82.10) - (14.30 - 0.5(\emptyset))]} \times 100 = 193.9$$

RUN # 3 : $\% O_2 = 14.30$; $\% N_2 = 81.00$; $\% CO = \emptyset$

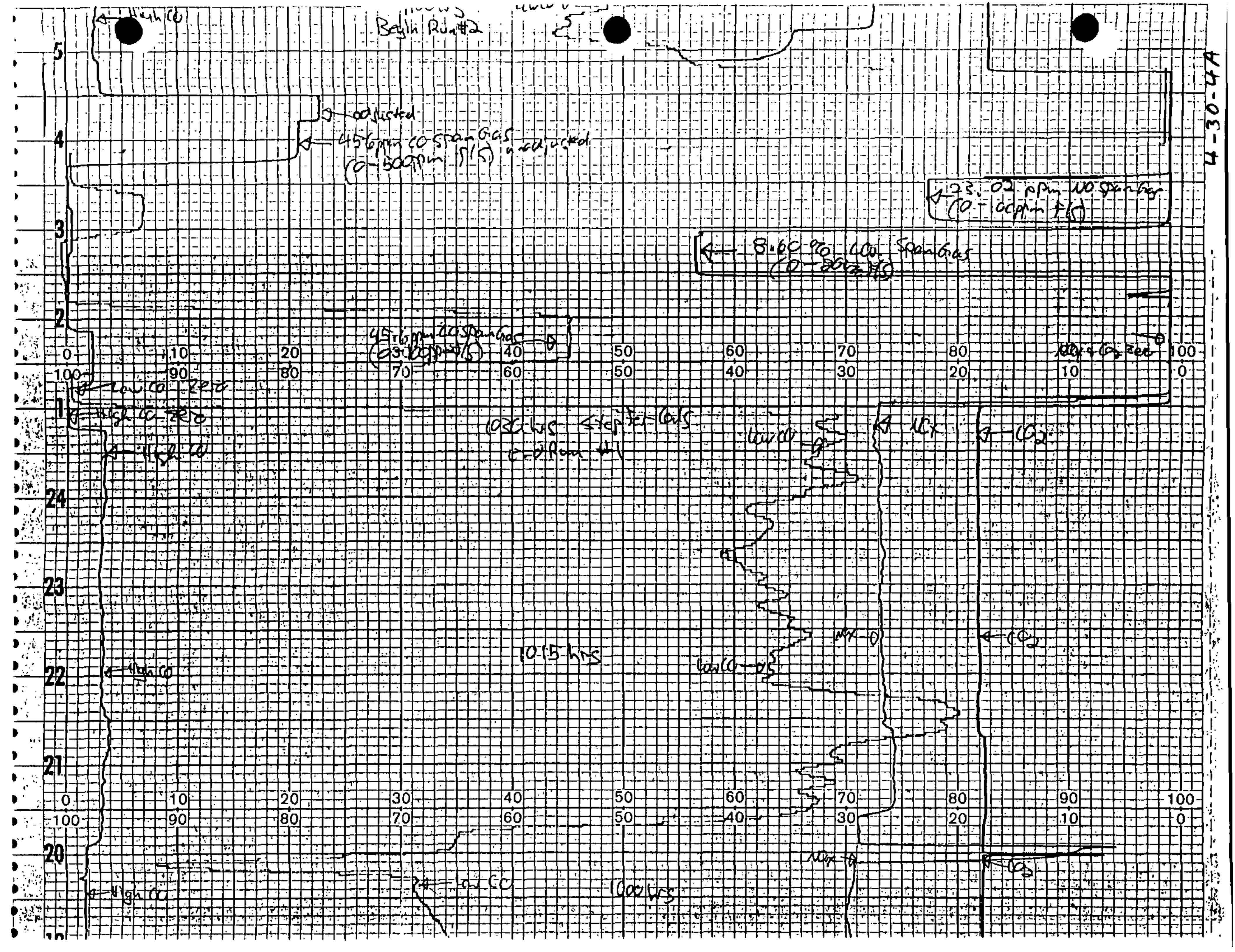
$$\% EA = \frac{[14.30 - 0.5(\emptyset)]}{[0.264(81.00) - (14.30 - 0.5(\emptyset))]} \times 100 = 201.9$$

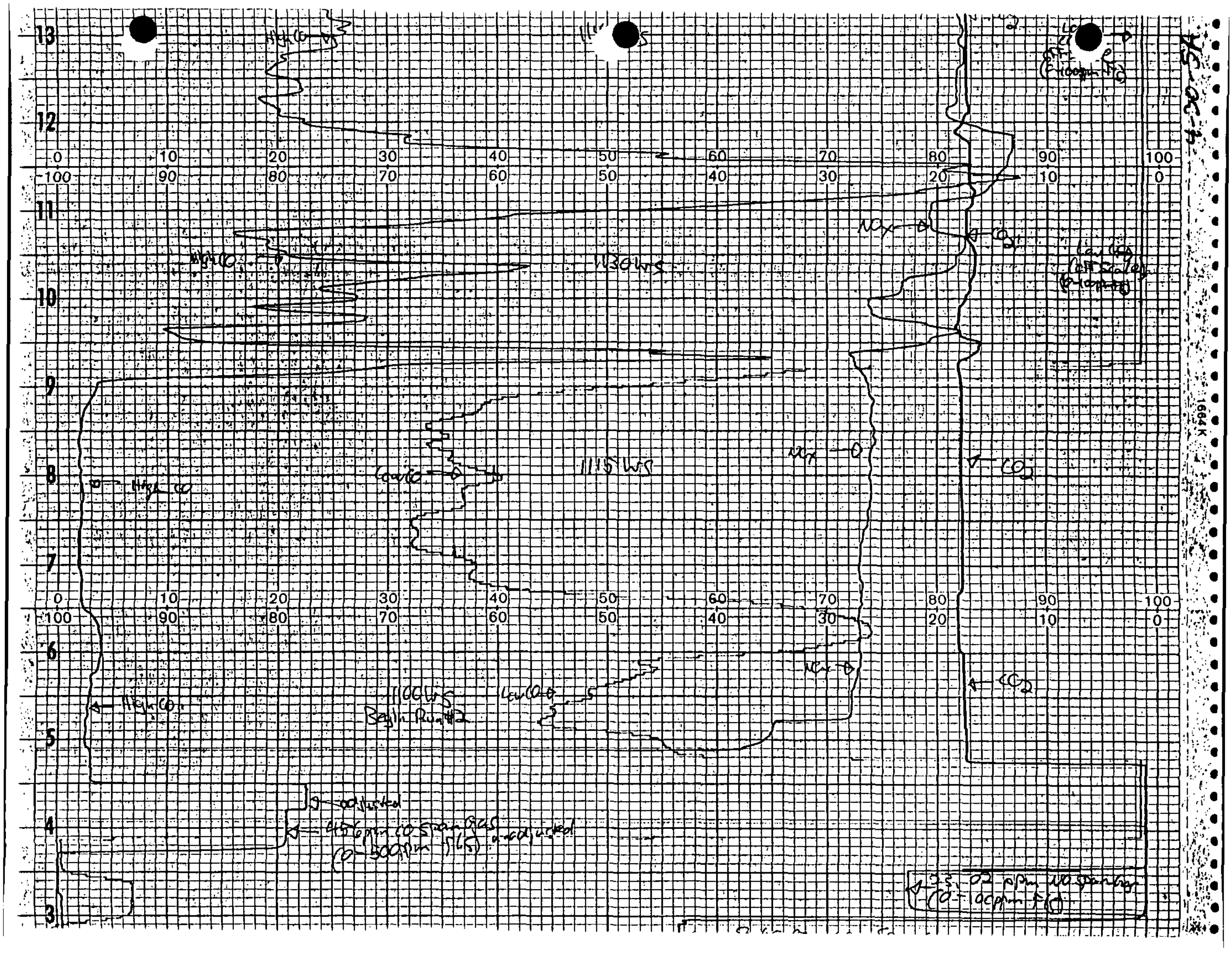

4-30-1A
(0-100ppm-FS)
(0-100ppm-FS)
High CO zero
Low CO zero
D.A. NAPA
4-30-98
Zeroing On Right
Purple = CO2 0-20%-FS
Black = NOx 0-100ppm-FS
Zeroing on Left

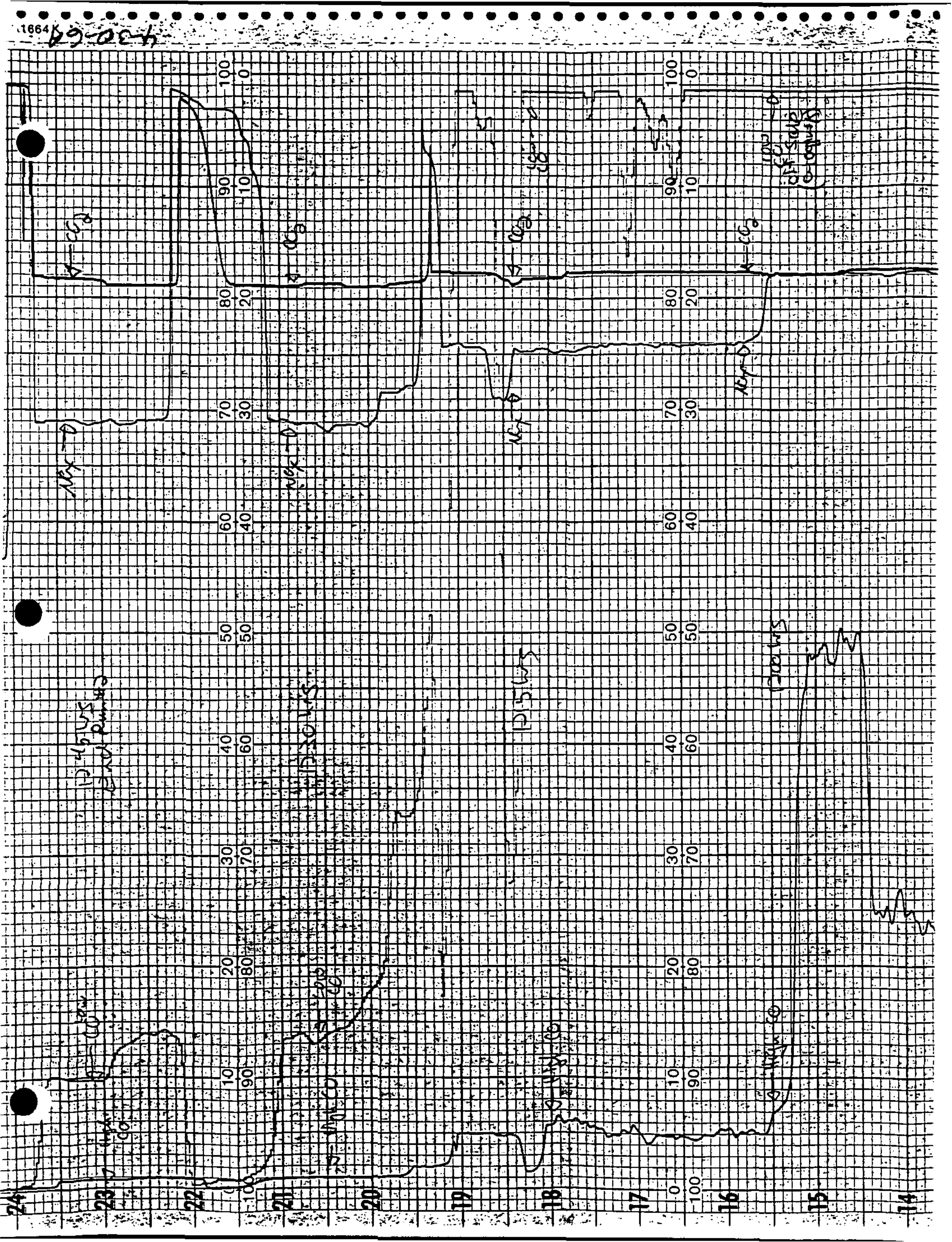

4-30-04
1664 K
CO High
CO Low
NOx
CO2
0855 - WS
Begin Sampling
Run #1
4.56 ppm CO Span Gas
(0-2000 ppm) (S)
91.9 ppm CO Span Gas
(0-2000 ppm) (S)
151.9 ppm CO Span
(0-2000 ppm) (S)
3.12% CO2 Span
(0-20%) (S)
8.60% CO2 Span Gas
(0-20%) (S)
16.64% CO2 Span Gas
(0-20%) (S)
7.16 ppm CO Span Gas
(0-100 ppm) (S)
25.02 ppm NO Span Gas
(0-100 ppm) (S)
23.36 ppm CO Span Gas
(0-100 ppm) (S)
46.2 ppm NO Span Gas
(0-100 ppm) (S)
45.6 ppm CO Span Gas
(0-100 ppm) (S)
CO2 + NOx Zero

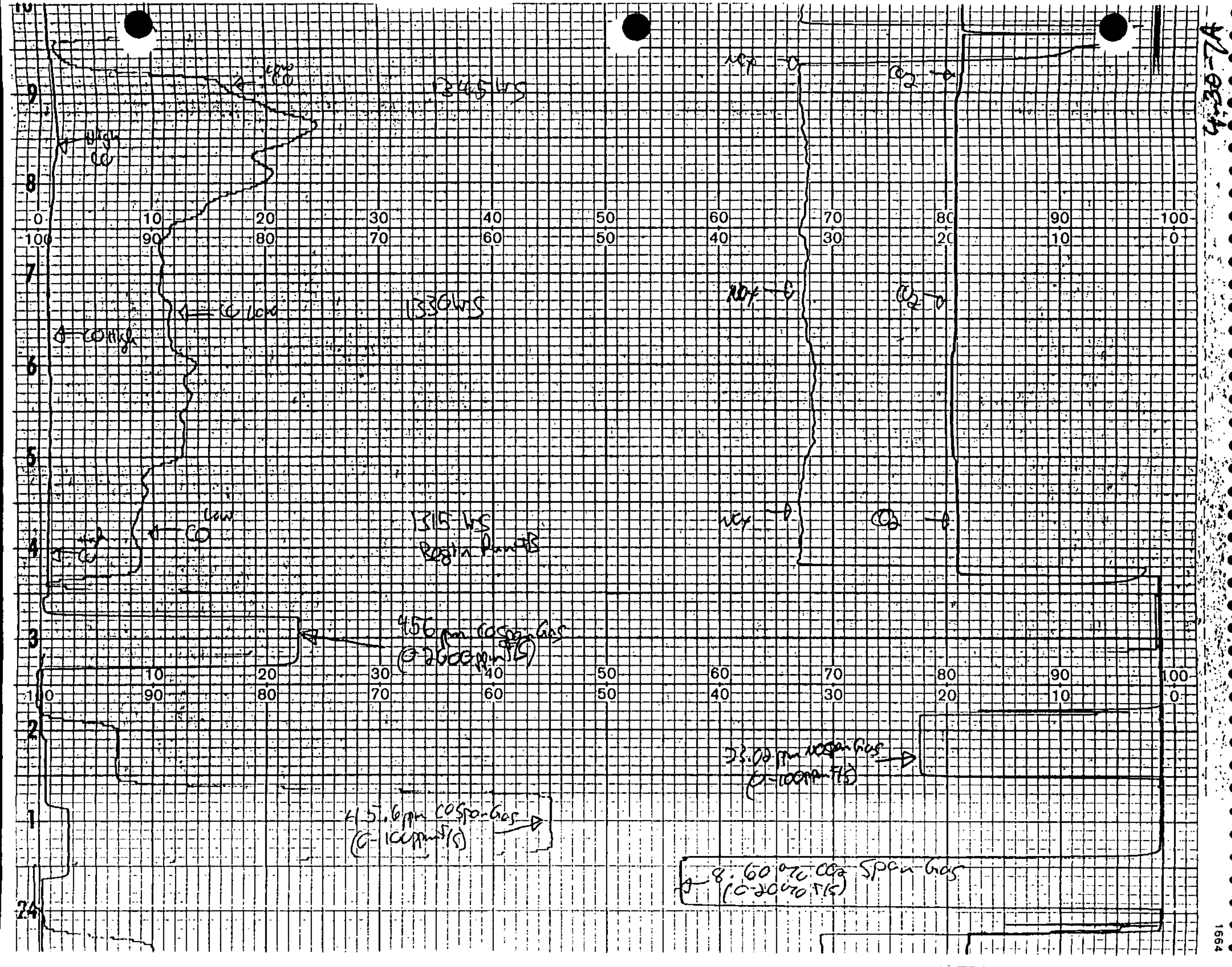


CO2
NOx
Low CO
High CO
0945 WS
0930 WS
0915 WS

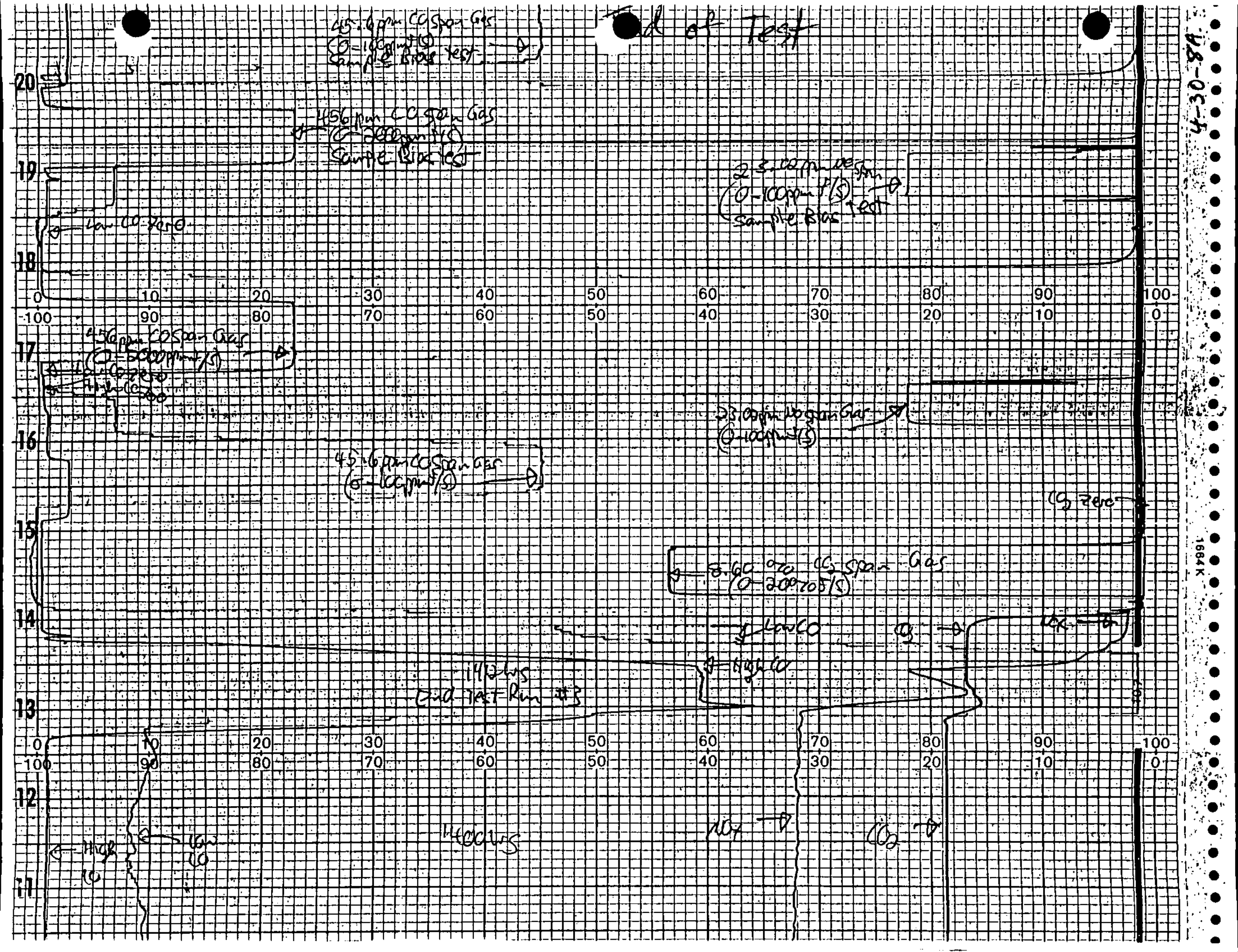

4-30-44
Bailey Run #2
High CO
adjusted
456ppm CO Span Gas unadjusted
(0-500ppm F/S)
23.02 ppm NO Span Gas
(0-100ppm F/S)
8.60% CO2 Span Gas
(0-20% F/S)
456ppm CO Span Gas
(0-300ppm F/S)
NOx + CO2 zero
Low CO zero
High CO zero
High CO
1030 hrs Start Gas
→ Run #1
Low CO
NOx
CO2
NOx
Low CO
10:15 hrs
High CO
NOx
CO2
Low CO
1000 hrs
High CO
5
4
3
2
1
24
23
22
21
20
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0


1664 K
High CO
1130 WS
High CO
NOx
CO2
1115 WS
Low CO
High CO
NOx
CO2
1100 WS
Begin Run #2
Low CO
NOx
CO2
High CO
adjusted

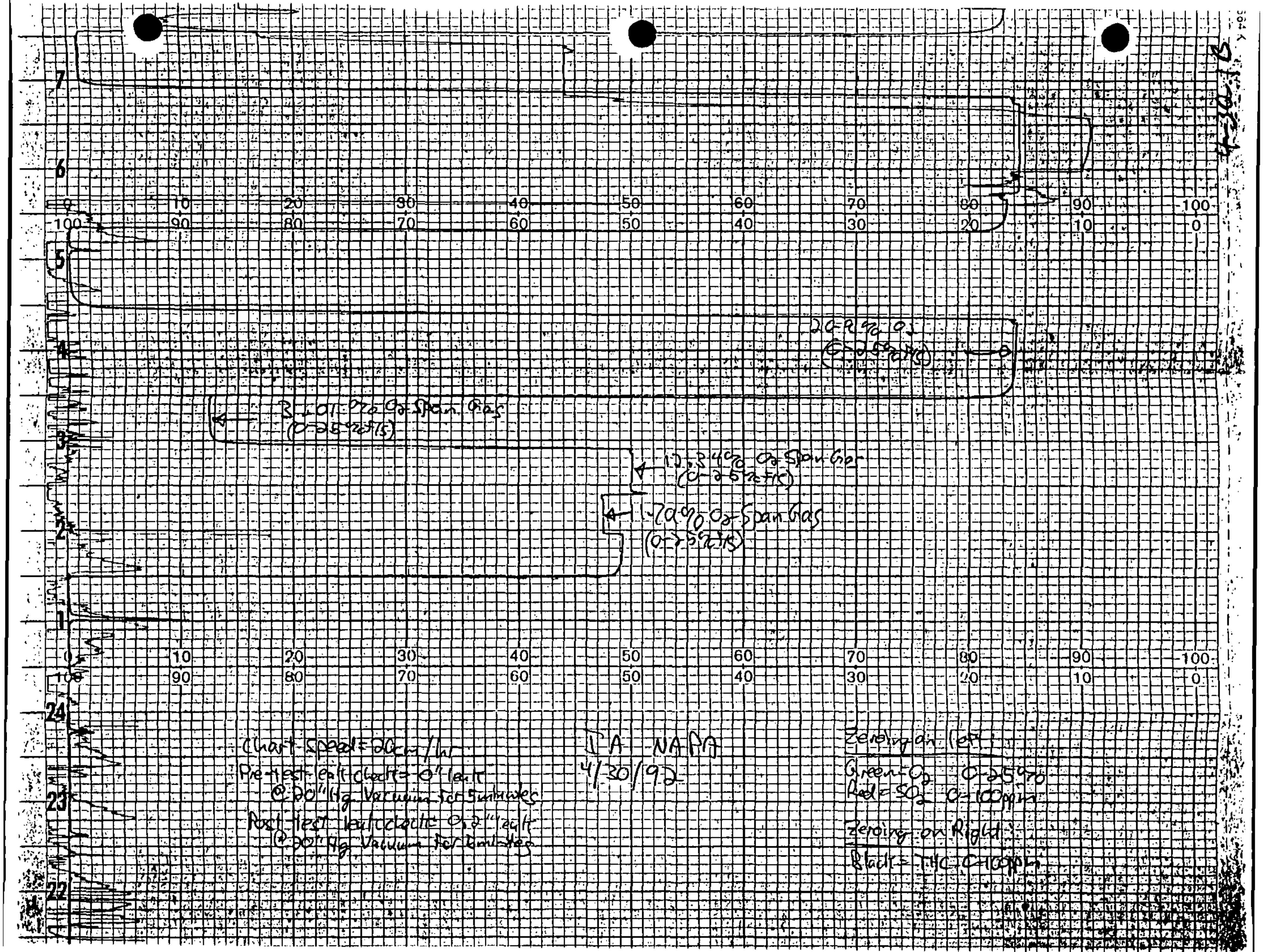

1664 K

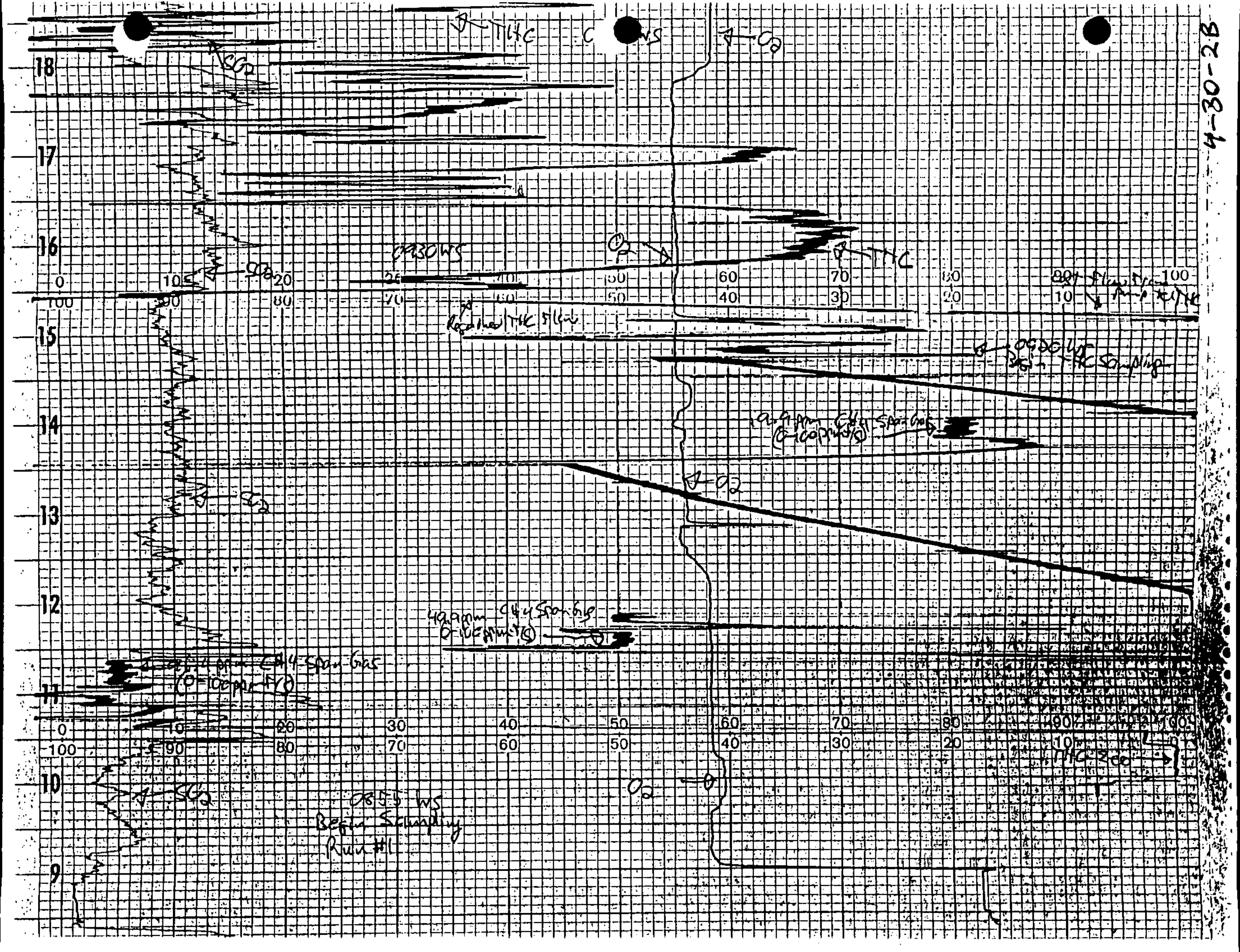


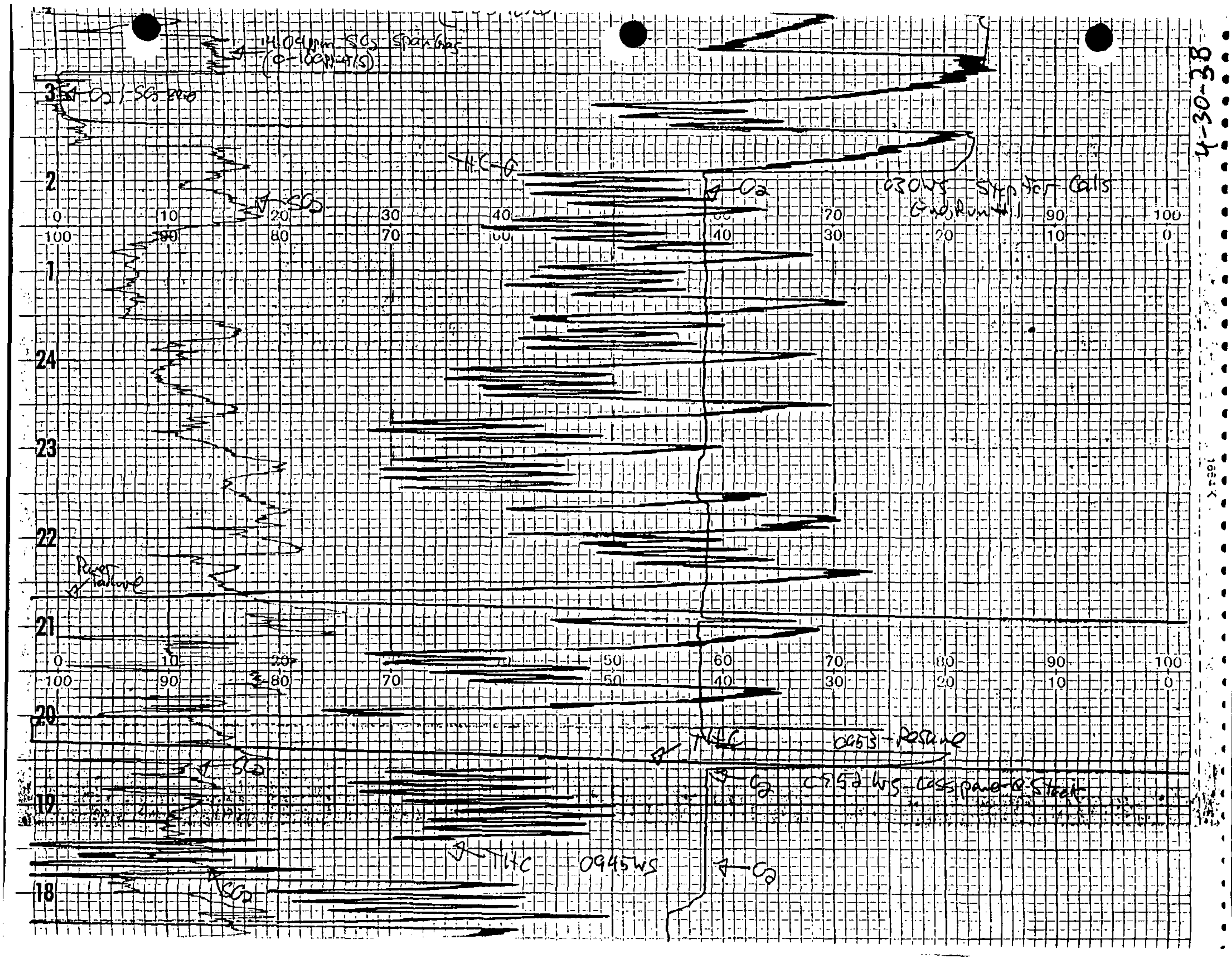
1345 WS
1336 WS
1315 WS
Begin Run
CO High
CO Low
NOx
CO2
456 ppm CO Span Gas
(0-2600 ppm FS)
45.6 ppm CO Span Gas
(0-100 ppm FS)
23.00 ppm NOx Span Gas
(0-100 ppm FS)
8.60% CO2 Span Gas
(0-20% FS)
1664

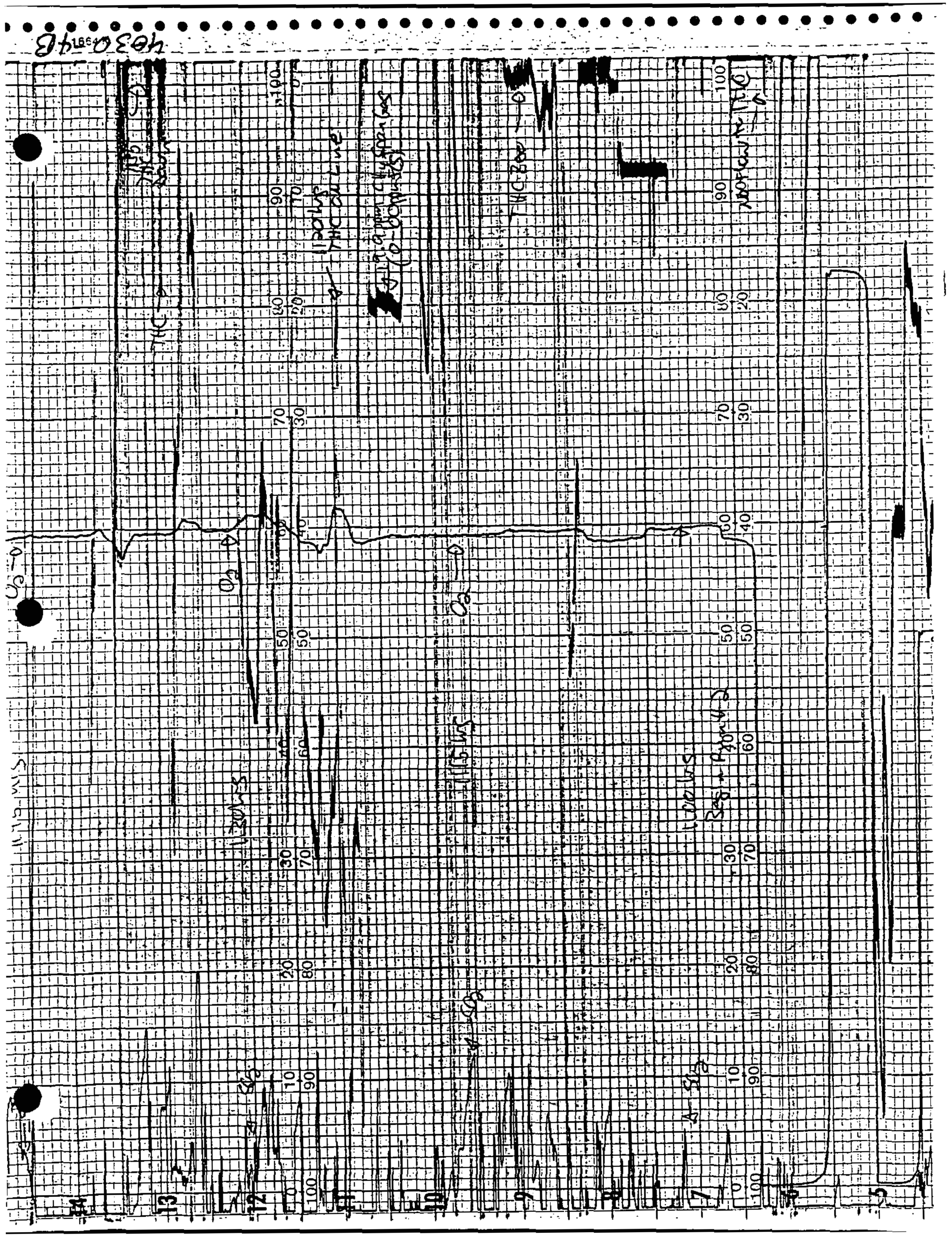


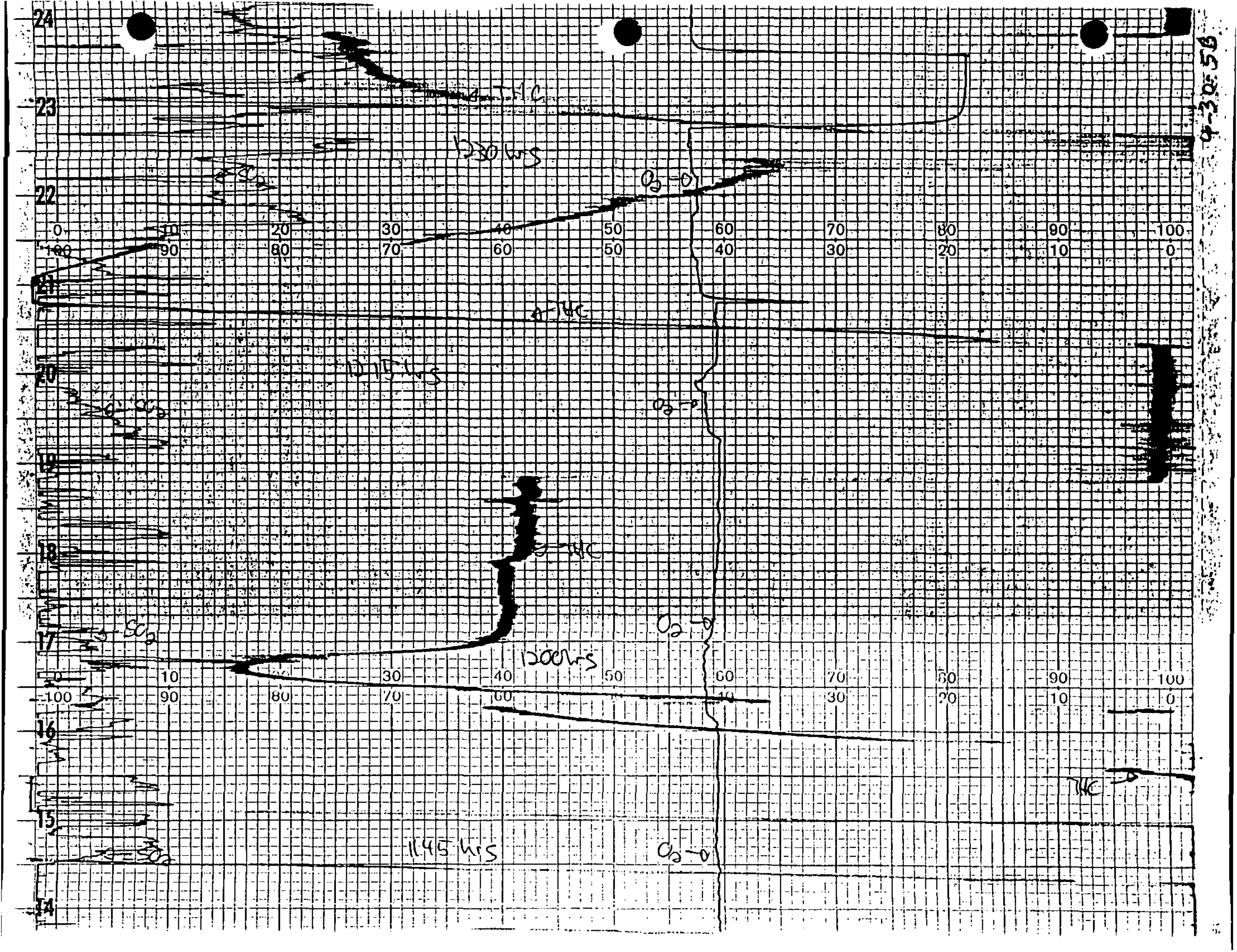
4-30-8A
End of Test
45.6ppm CO Span Gas
(0-100ppm F/S)
Sample Bias Test
456ppm CO Span Gas
(0-2000ppm F/S)
Sample Bias Test
23.0ppm NO Span
(0-100ppm F/S)
Sample Bias Test
Low CO Zero
456ppm CO Span Gas
(0-5000ppm F/S)
23.0ppm NO Span Gas
(0-100ppm F/S)
45.6ppm CO Span Gas
(0-100ppm F/S)
CO2 Zero
8.60 % CO2 Span Gas
(0-20% F/S)
Low CO
High CO
1412 hrs
End Test Run #3
1400 hrs
High CO
Low CO
NOx
CO2
1664 K


20.8% O2 (0-25% Scale)
3.01% O2 Span Gas (0-25% Scale)
12.34% O2 Span Gas (0-25% Scale)
1.70% O2 Span Gas (0-25% Scale)
Chart Speed = 20cm/hr
Pre-test leak check = 0" leak @20" Hg Vacuum for 5 minutes
Post-test leak check 0.2" leak @20" Hg Vacuum for 5 minutes
IA NAPA
4/30/92
Zeroing on left:
Green - O2 0-25%
Red = SO2 0-100ppm
Zeroing on Right:
Black = THC 0-100ppm

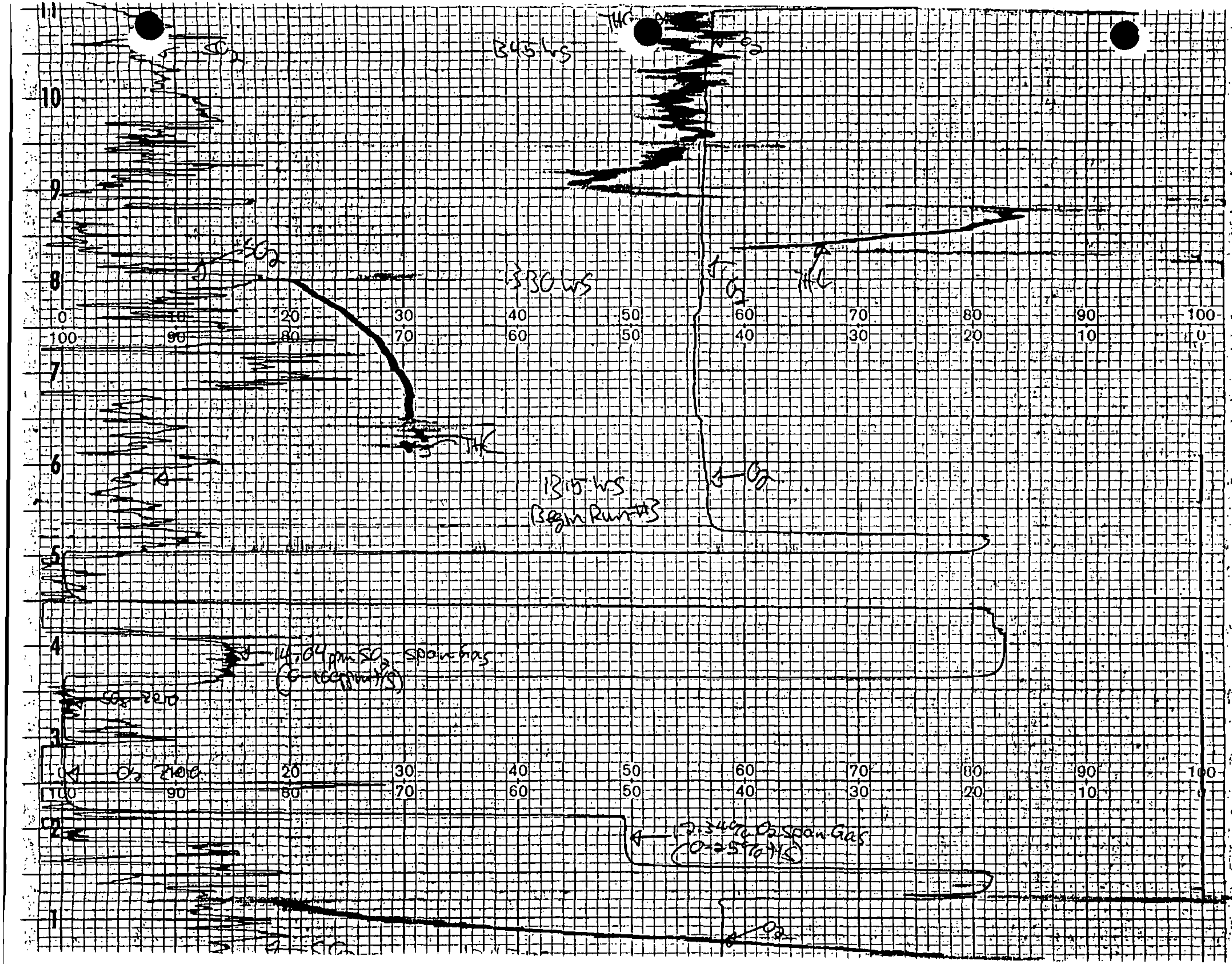

4-30-28
THC
CO2
O2
0930 WS
THC
Begin THC Sampling
CH4 Span Gas
O2
CH4 Span Gas
CH4 Span Gas
(0-100ppm FS)
0855 WS
Begin Sampling
Run #1
THC 200
18
17
16
15
14
13
12
11
10
9


4-30-38
1404pm SO2 Span Gas
(0-100ppm/S)
SO2 / SO2 zero
THC-0
O2
1030WS Stop for Cals
SO2
Pump failure
0053 - Resume
THC
O2
0945WS
THC
O2
SO2
SO2

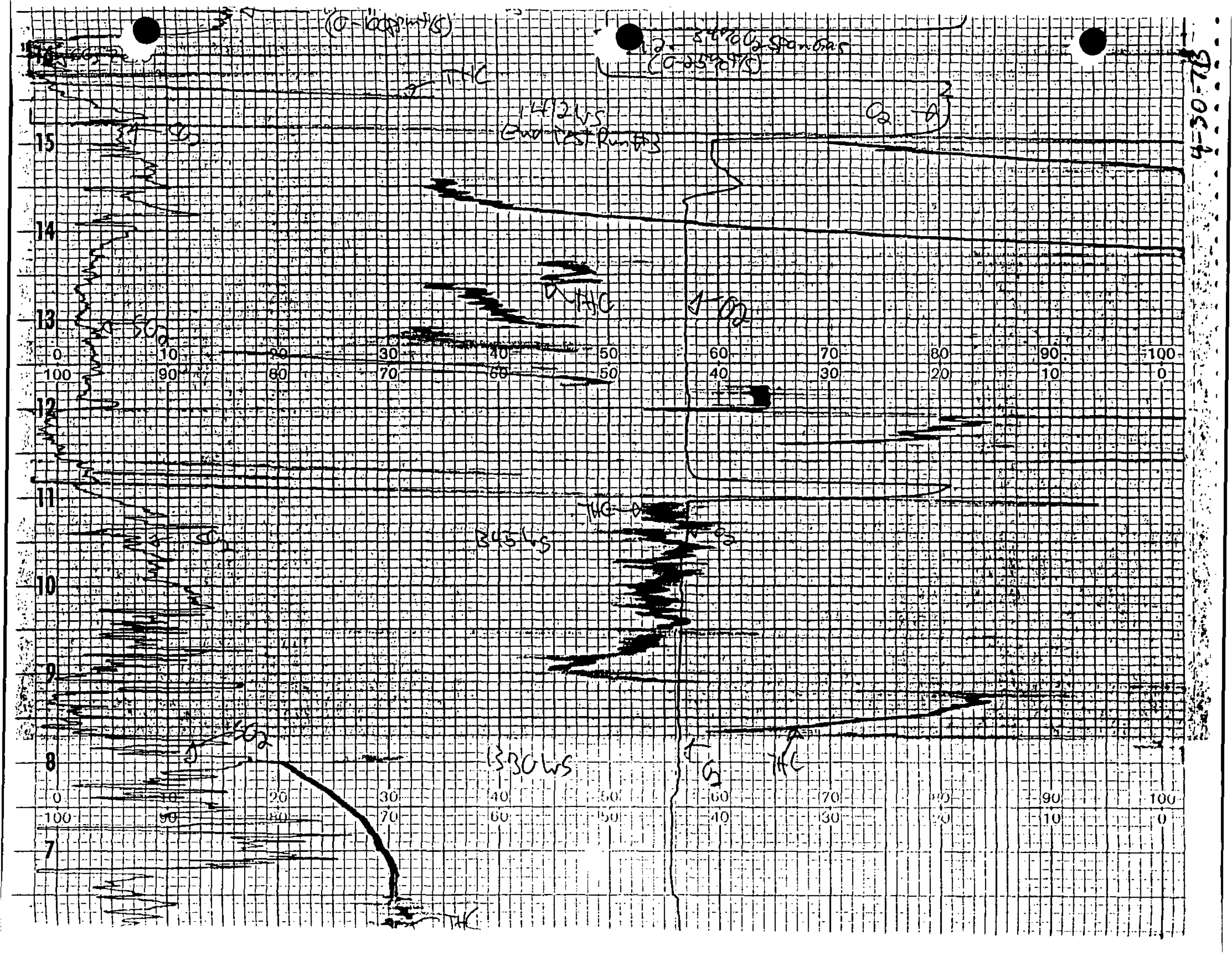




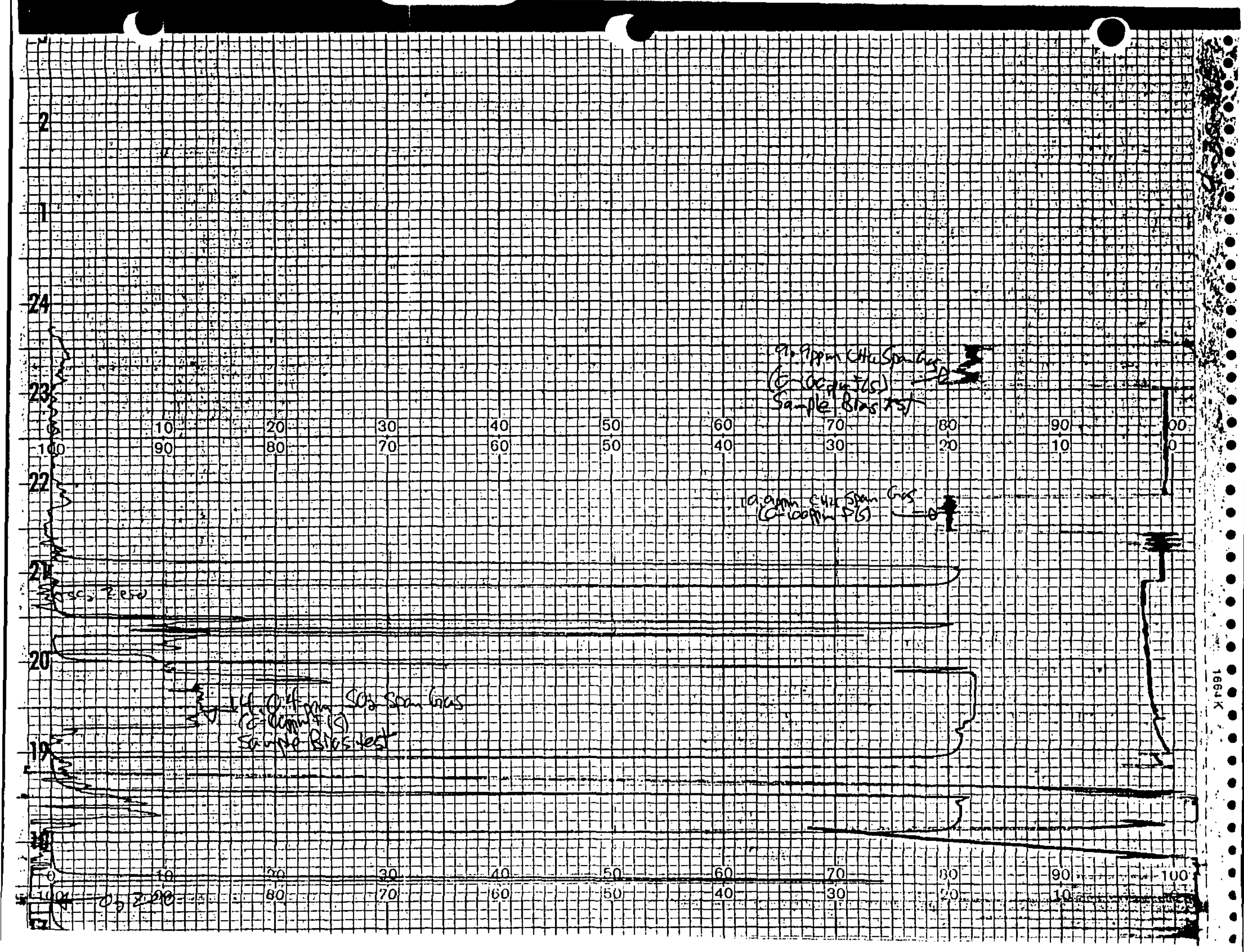
4-30-58
1230 hrs
1215 hrs
1200 hrs
1145 hrs
O_2-0
SO_2
THC
0-THC

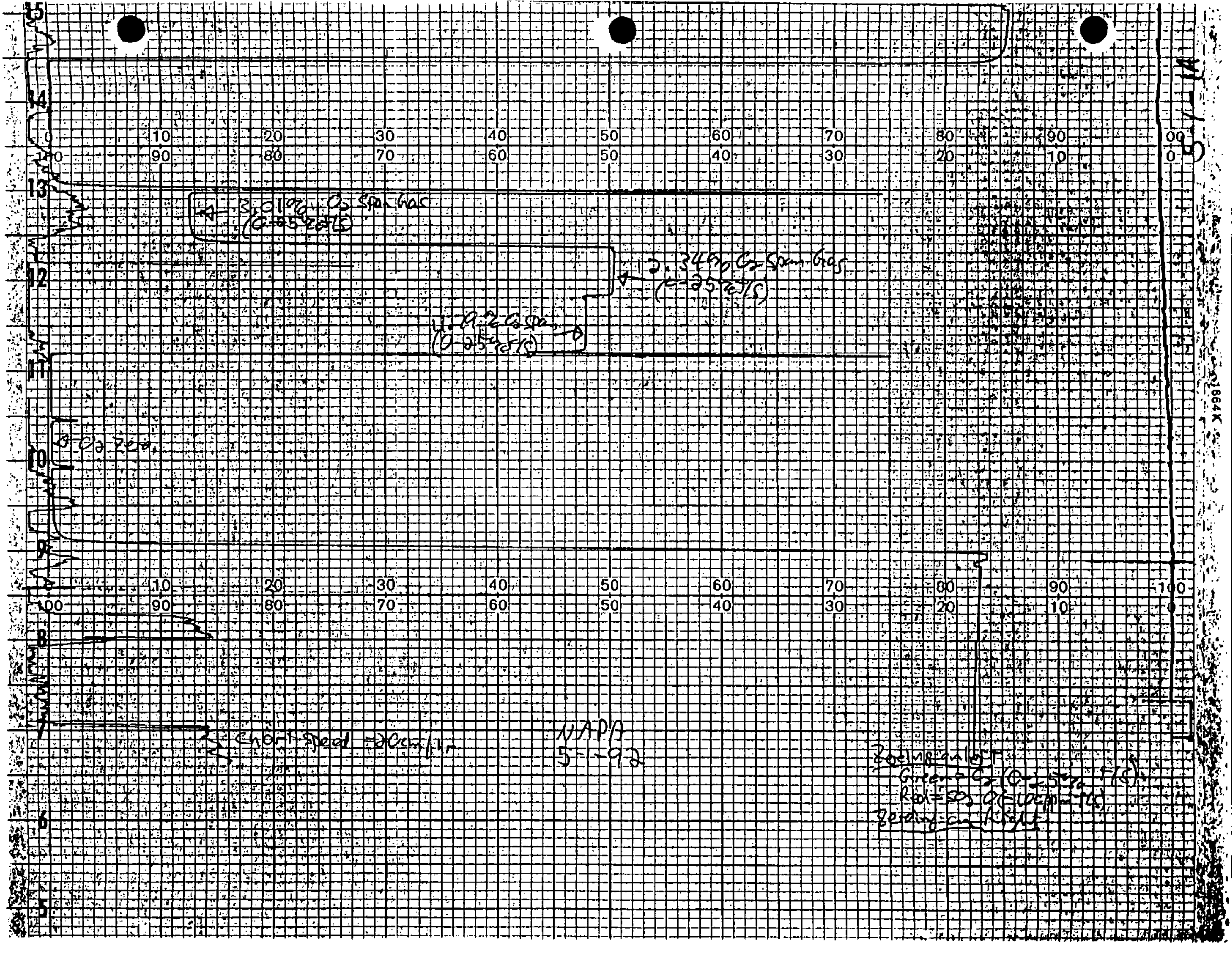


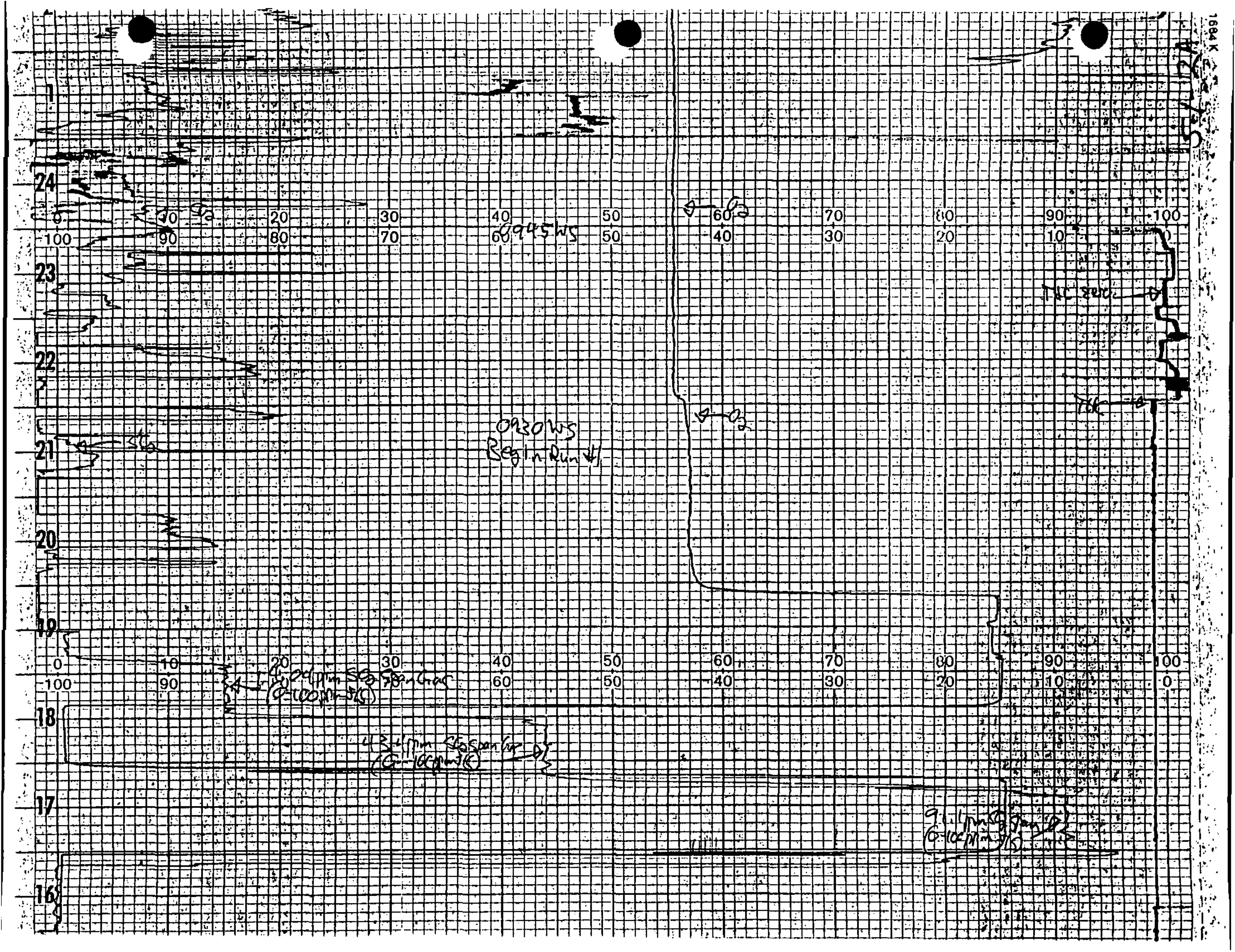
1345 hrs
THC
O_2
SO_2
1330 hrs
THC
1315 hrs
Begin Run #3
14.04 ppm SO_2 span gas
SO_2 zero
O_2 zero
21.34% O_2 span gas
(0-25% FS)
O_2
1664 K

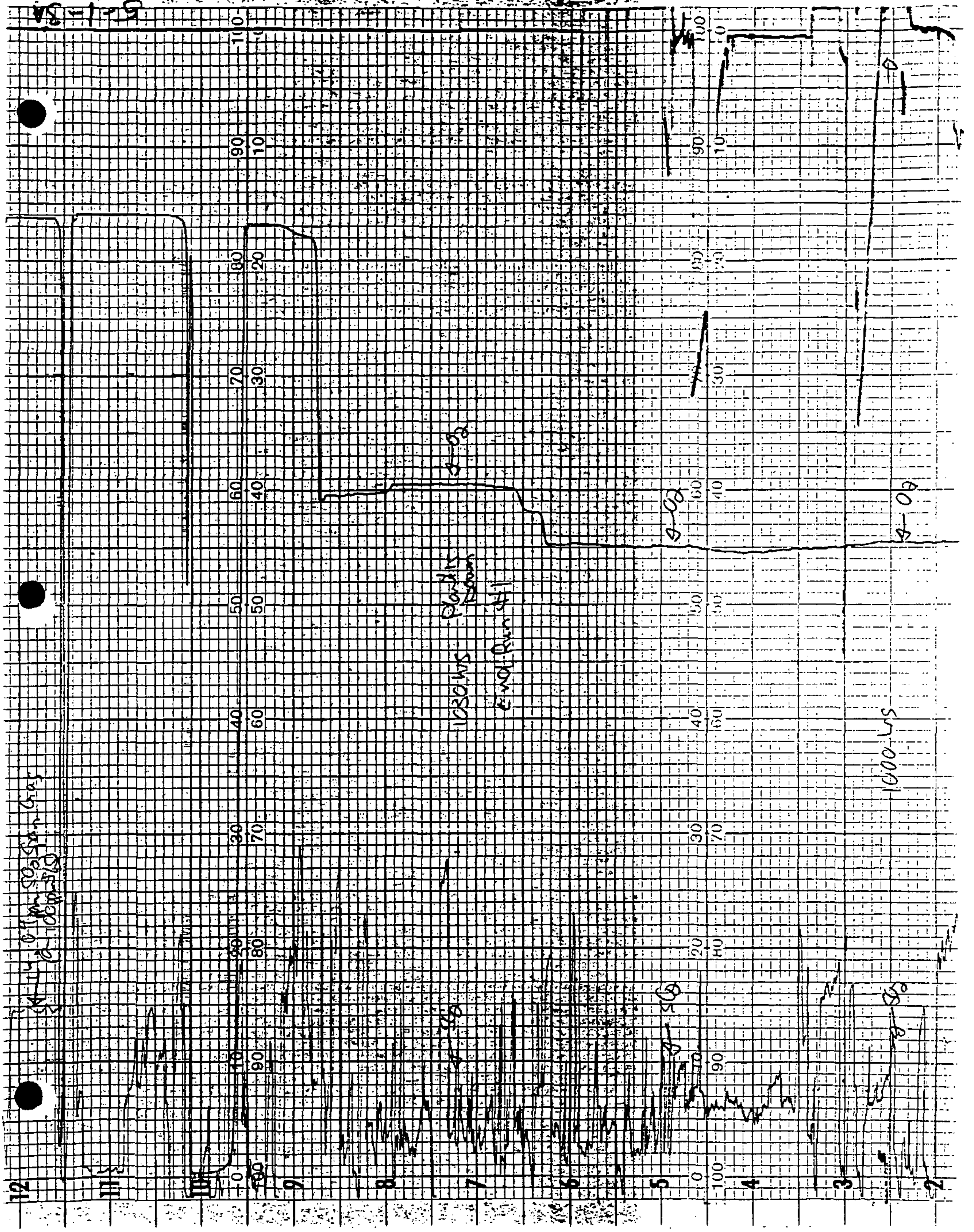


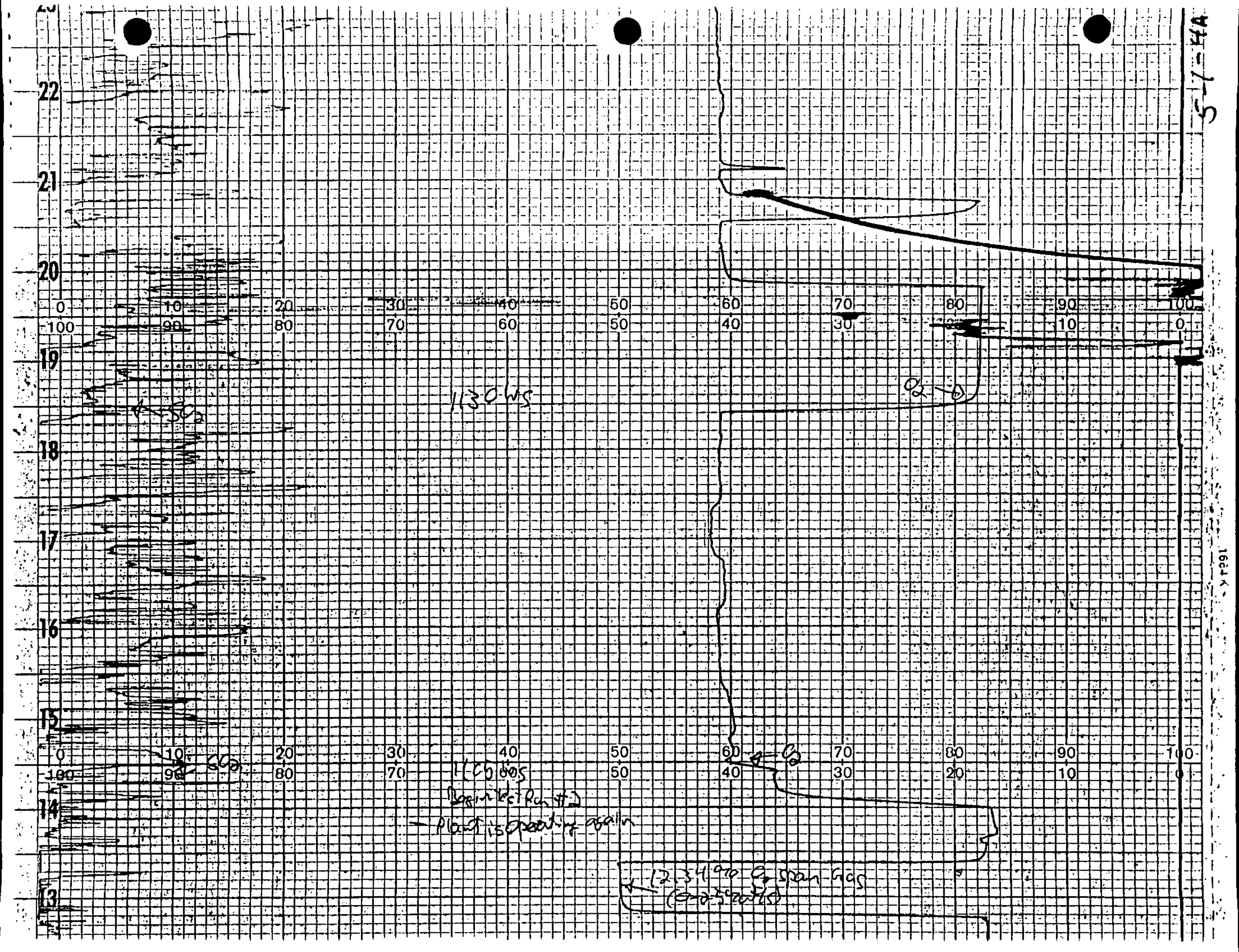
4-30-78
(0-100ppm)(S)
THC
4:12 hrs
End Test Run #3
O_2
SO_2
THC
O_2
THC
O_2
8:45 hrs
SO_2
SO_2
1:30 hrs
O_2
THC
THC


9.9ppm CH4 Span Gas
(C-Ocean 2(s))
Sample Bias test
SO2 Zero
Sample Bias test
O2 Zero
1664 K

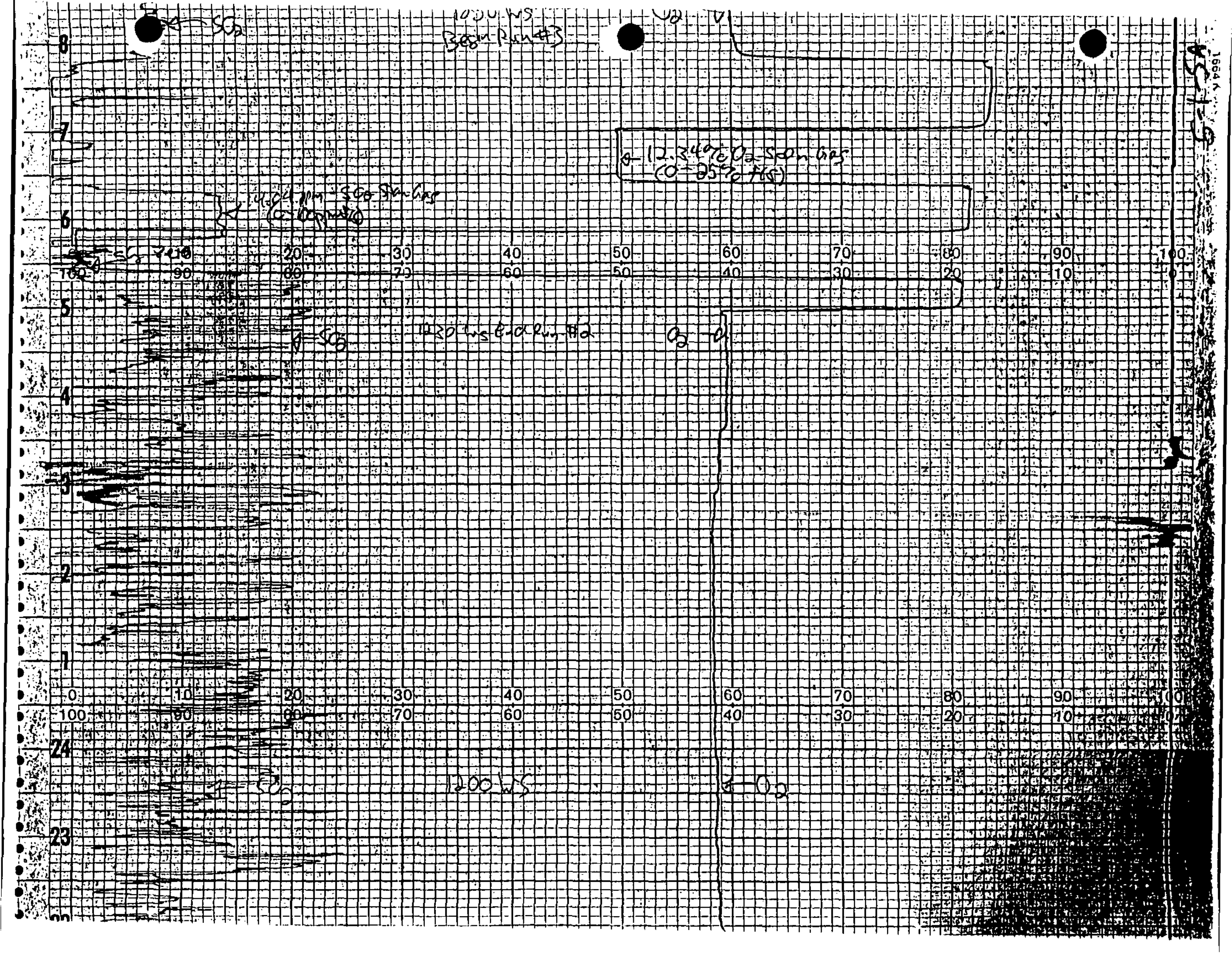

3.01% O2 Span Gas
12.34% O2 Span Gas
B-O2 Zero
Chart speed = 2cm/hr
NAPA


1684 K
0945 WS
0930 WS
Begin Run #1
O_2
THC
THC zero
SO_2
(0-100 ppm SO_2)
(0-100 ppm SO_2)

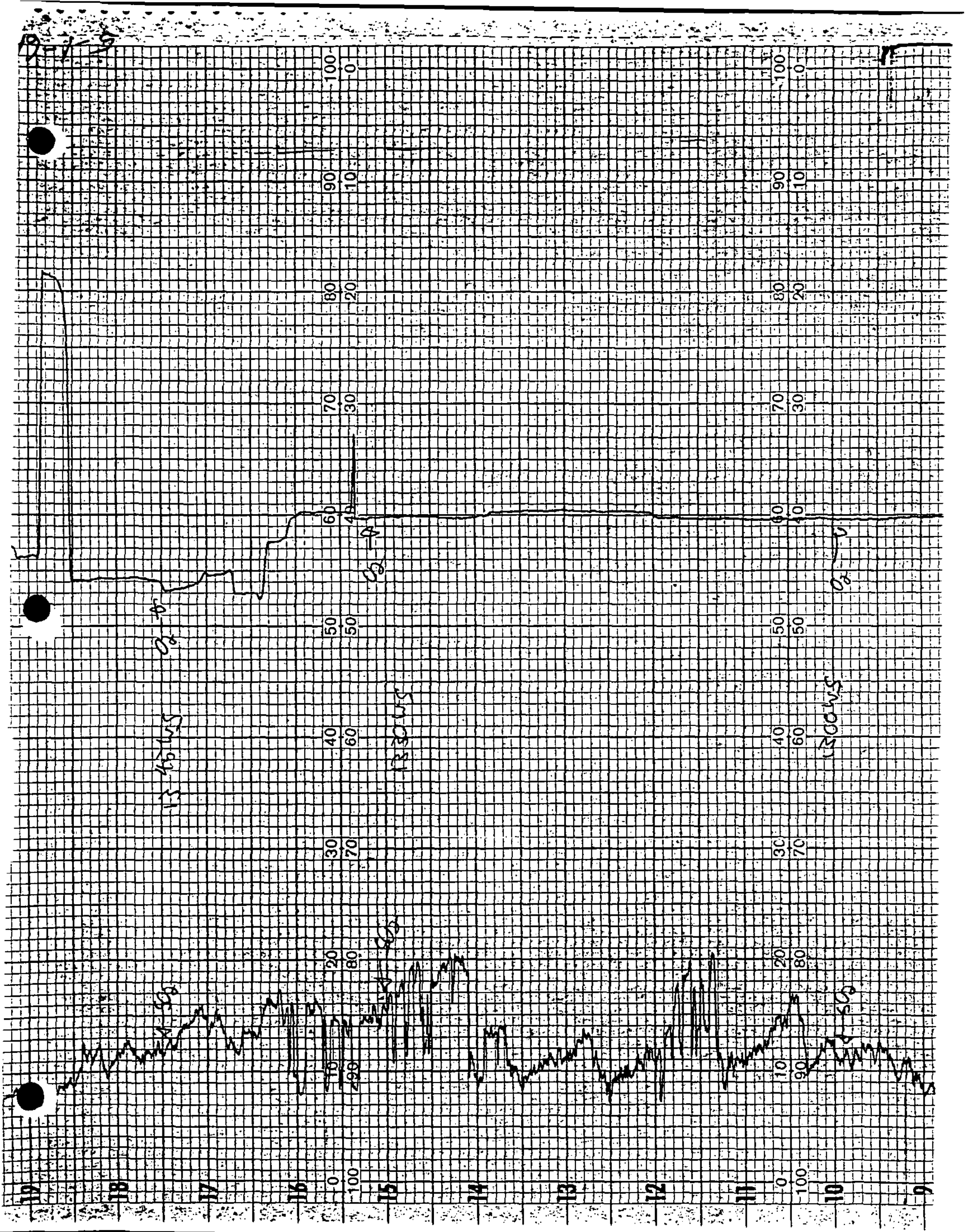

1030 ws
Plant Down
End Run #1
1000 ws



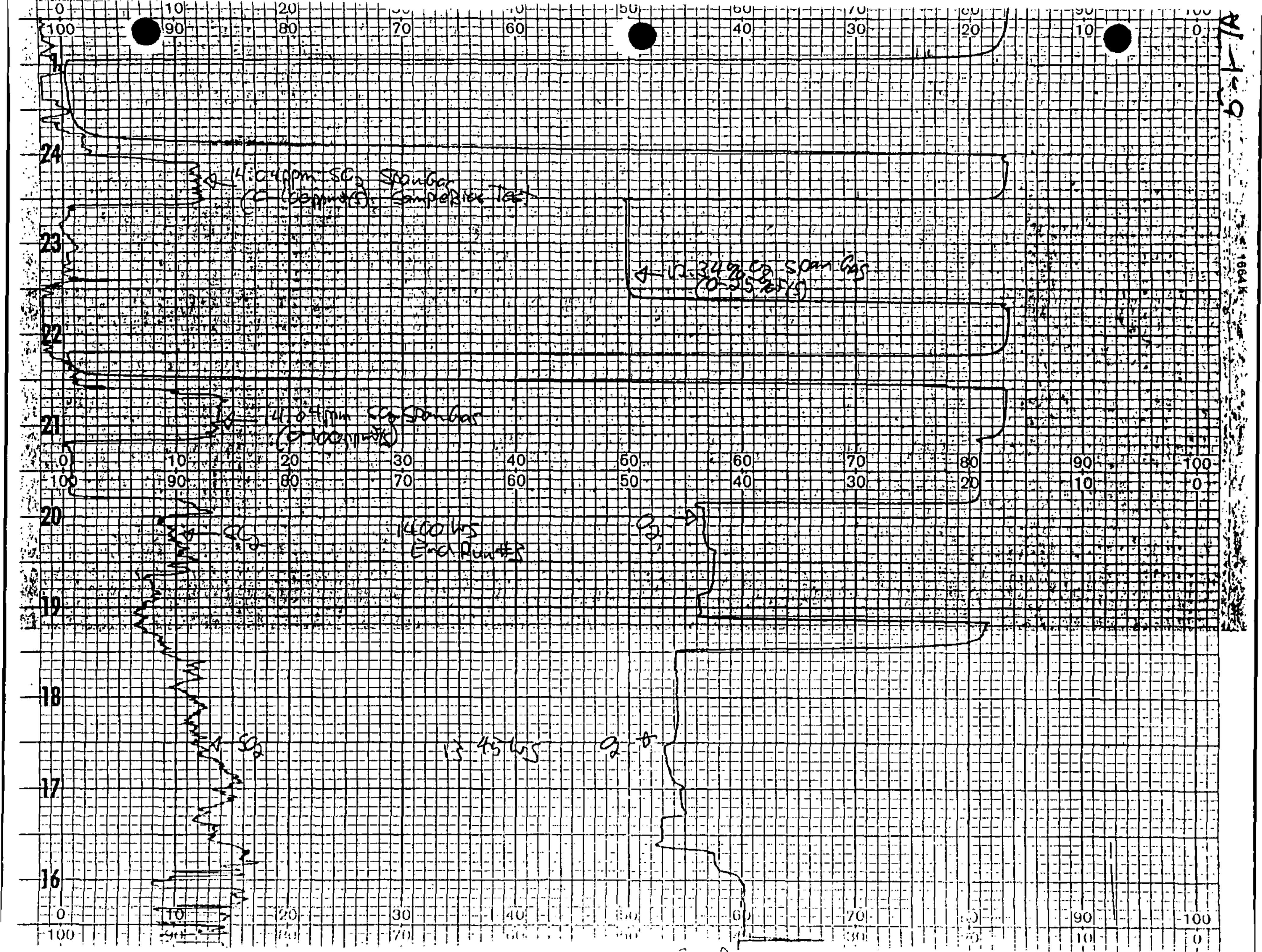
5-1-44
1130 WS
O_2
SO_2
1100 hrs
Begin Test Run #2
— Plant is operating again
O_2
SO_2
12.34 and O_2 span gas
1634 K



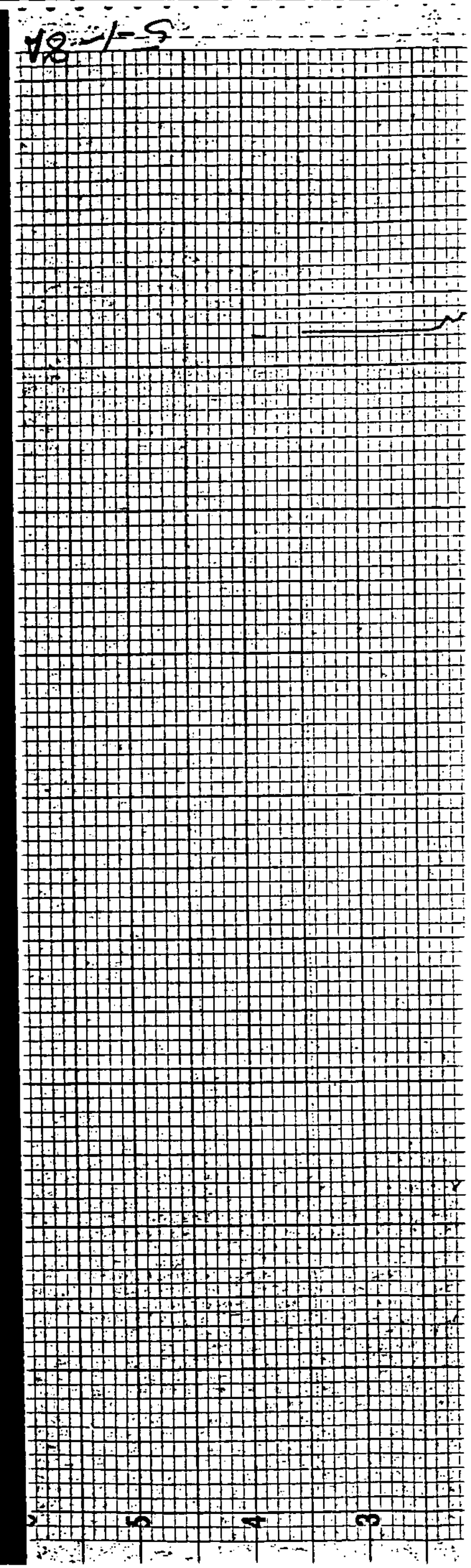
1030 WS
Begin Run #3
SO2
O2
12.34% O2 Span Gas
(0-25% FS)
1020 ws end Run #2
SO2
O2
1200 WS
O2

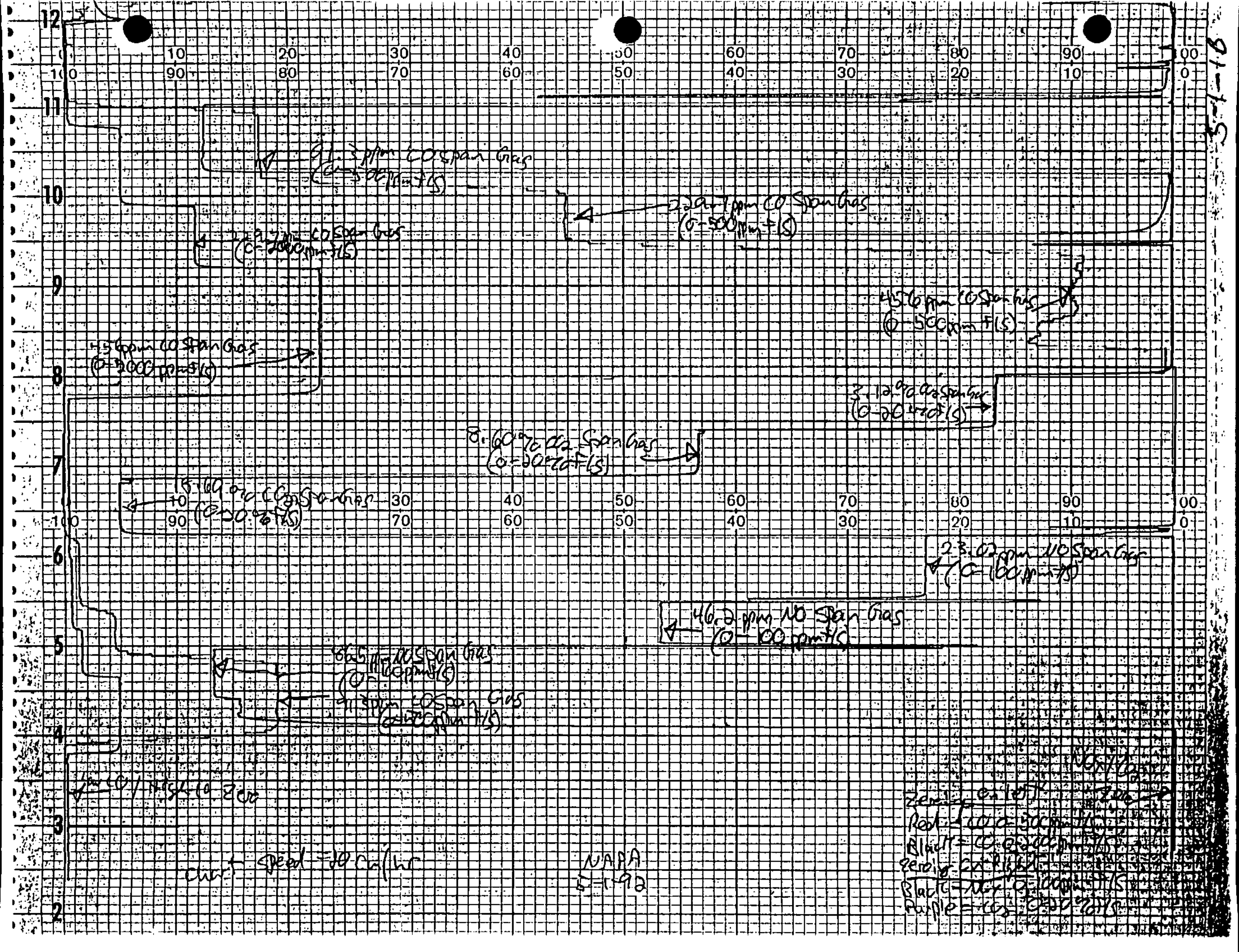


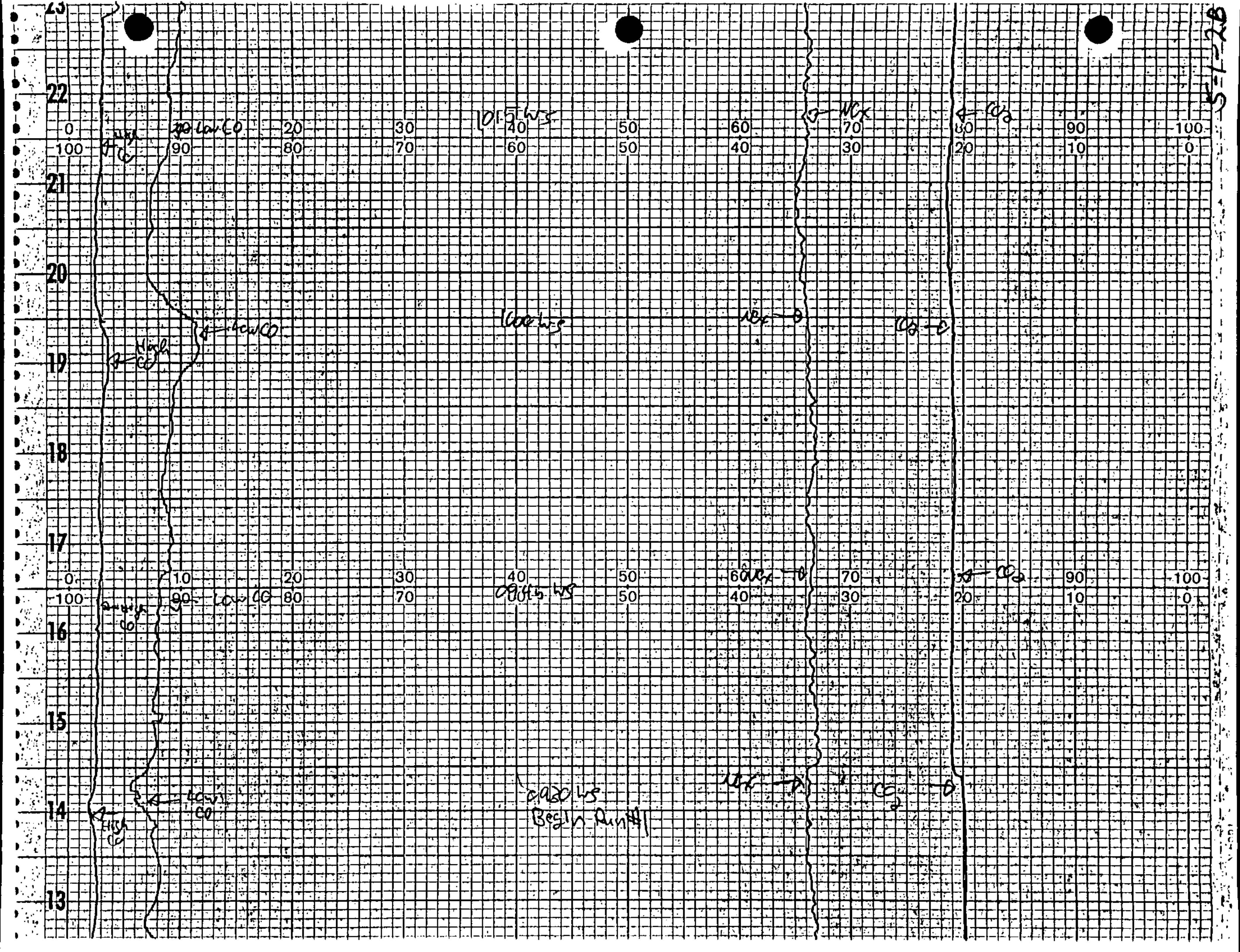
100 0
90 10
80 20
70 30
60 40
50 50
40 60
30 70
20 80
10 90
0 100
19
18
17
16
15
14
13
12
11
10
9



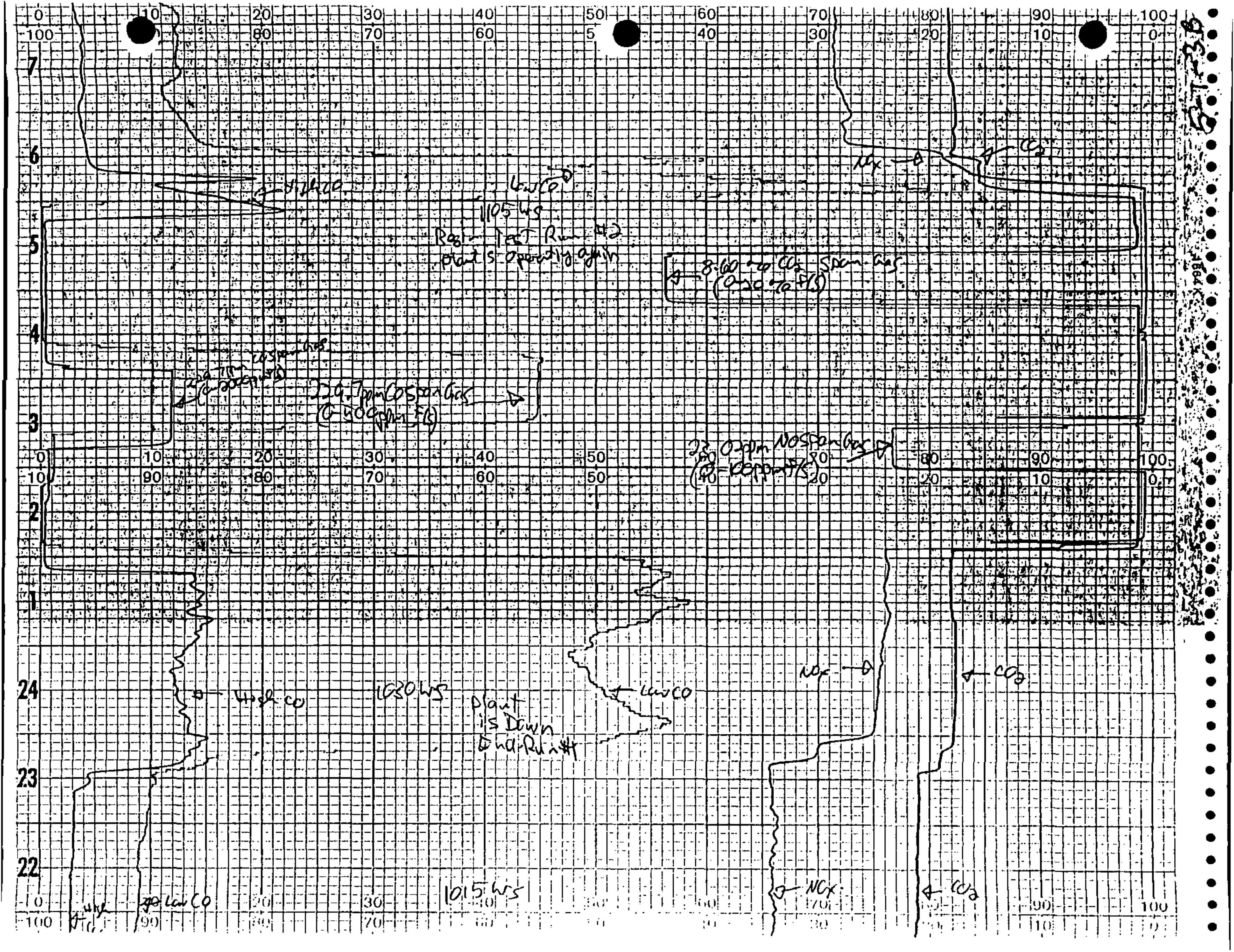
AL-1-9
1664 K
41.04ppm SO2 Span Gas
(0-100ppm(S)) Sample Line Test
12.34% CO2 Span Gas
(0-25%(S))
41.04ppm SO2 Span Gas
(0-100ppm(S))
SO2
1400 hrs
End Run #5
O2
SO2
1345 hrs
O2



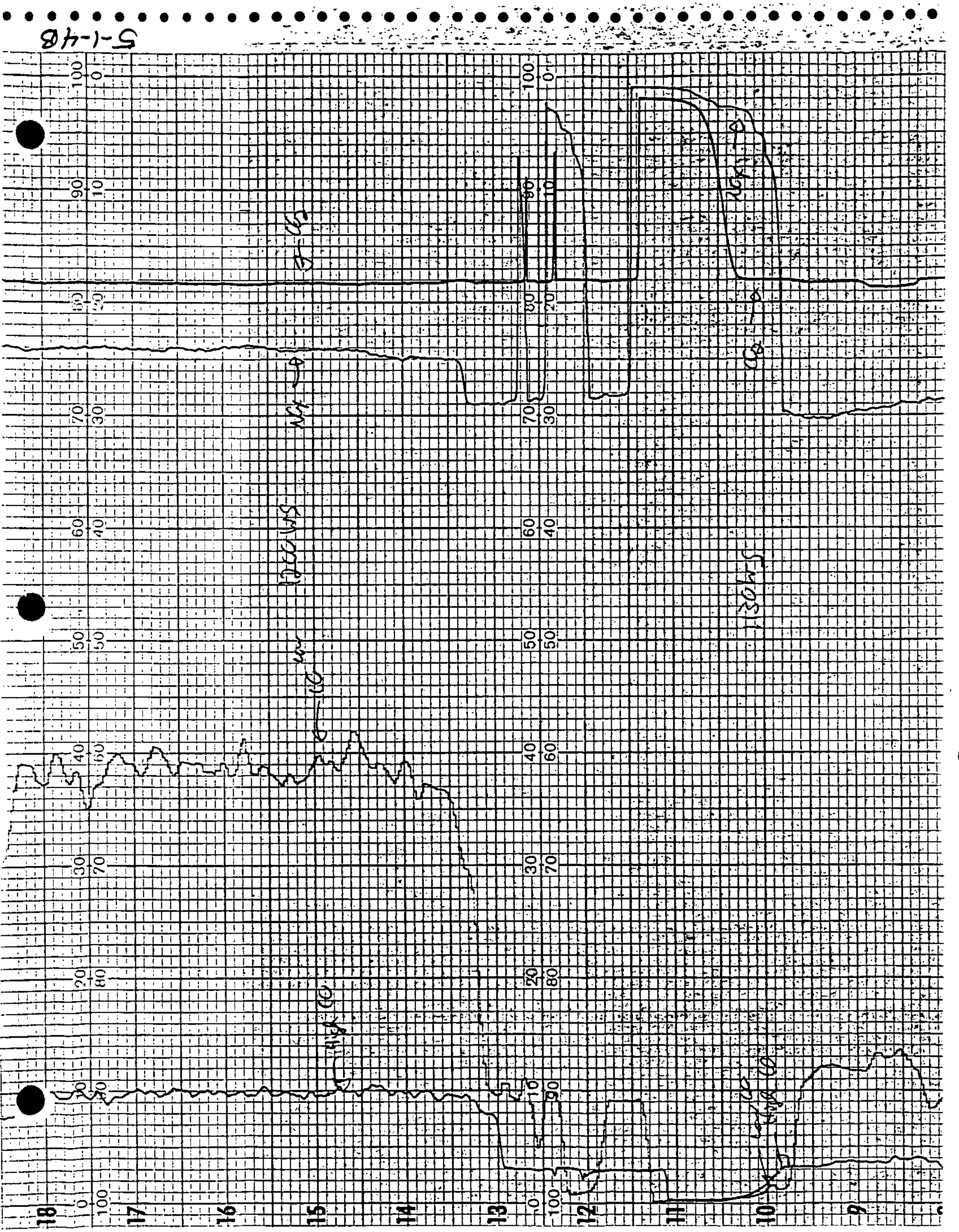

5-1-18
91.3 ppm CO Span Gas
(0-500ppm F/S)
224.7 ppm CO Span Gas
(0-500ppm F/S)
(0-2000ppm F/S)
45.6 ppm CO Span Gas
(0-500ppm F/S)
45 ppm CO Span Gas
(0-3000 ppm F/S)
3.12.9% O_2 Span Gas
(0-20% F/S)
8.60% O_2 Span Gas
(0-20% F/S)
(0-20% F/S)
23.02 ppm NO Span Gas
(0-100 ppm F/S)
46.2 ppm NO Span Gas
(0-100 ppm F/S)
Chart Speed = 20 cm/hr
NAPA
5-1-92



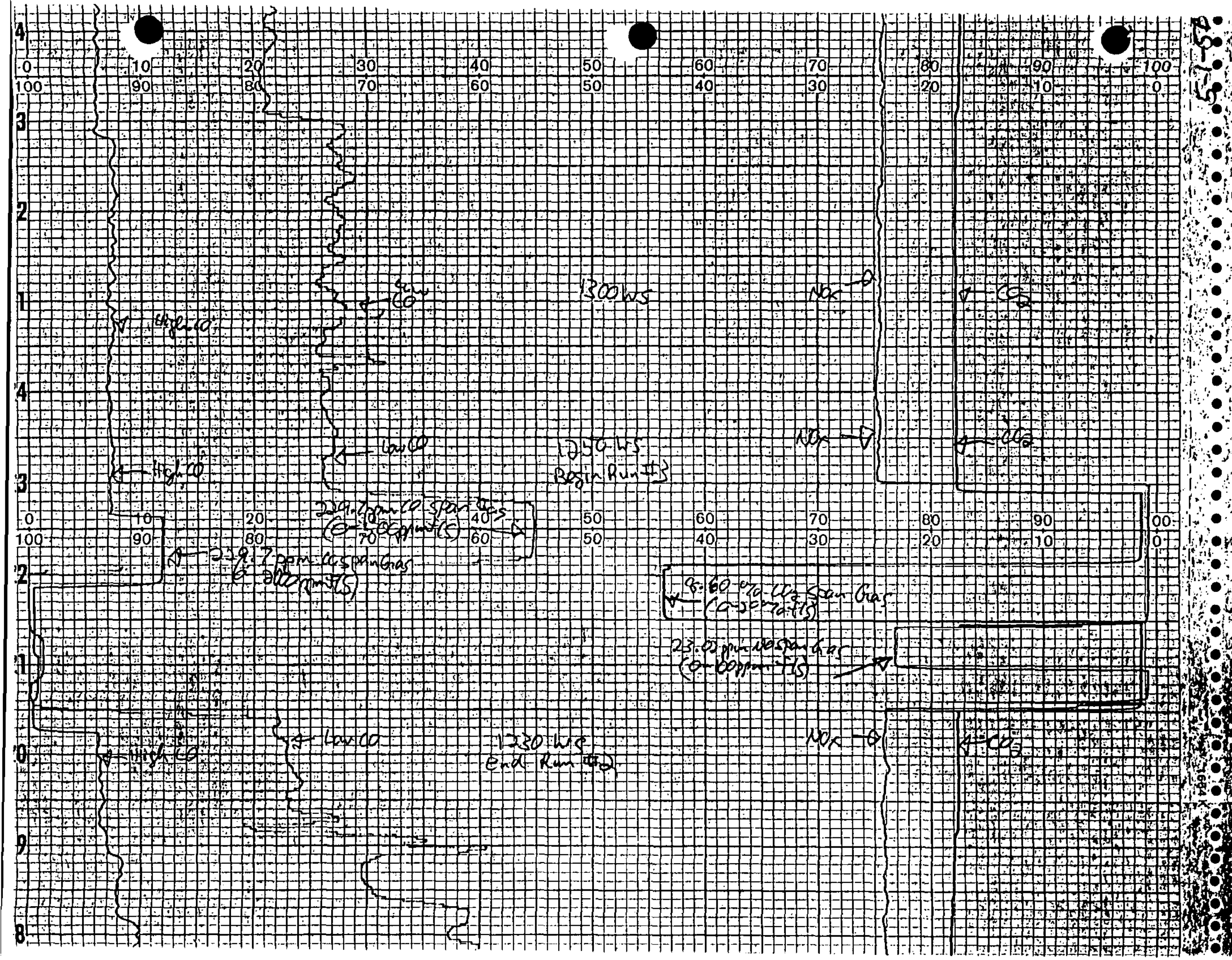
5-1-28
1015 WS
High CO
Low CO
NOx
CO_2
1000 WS
0945 WS
0930 WS
Begin Run #1



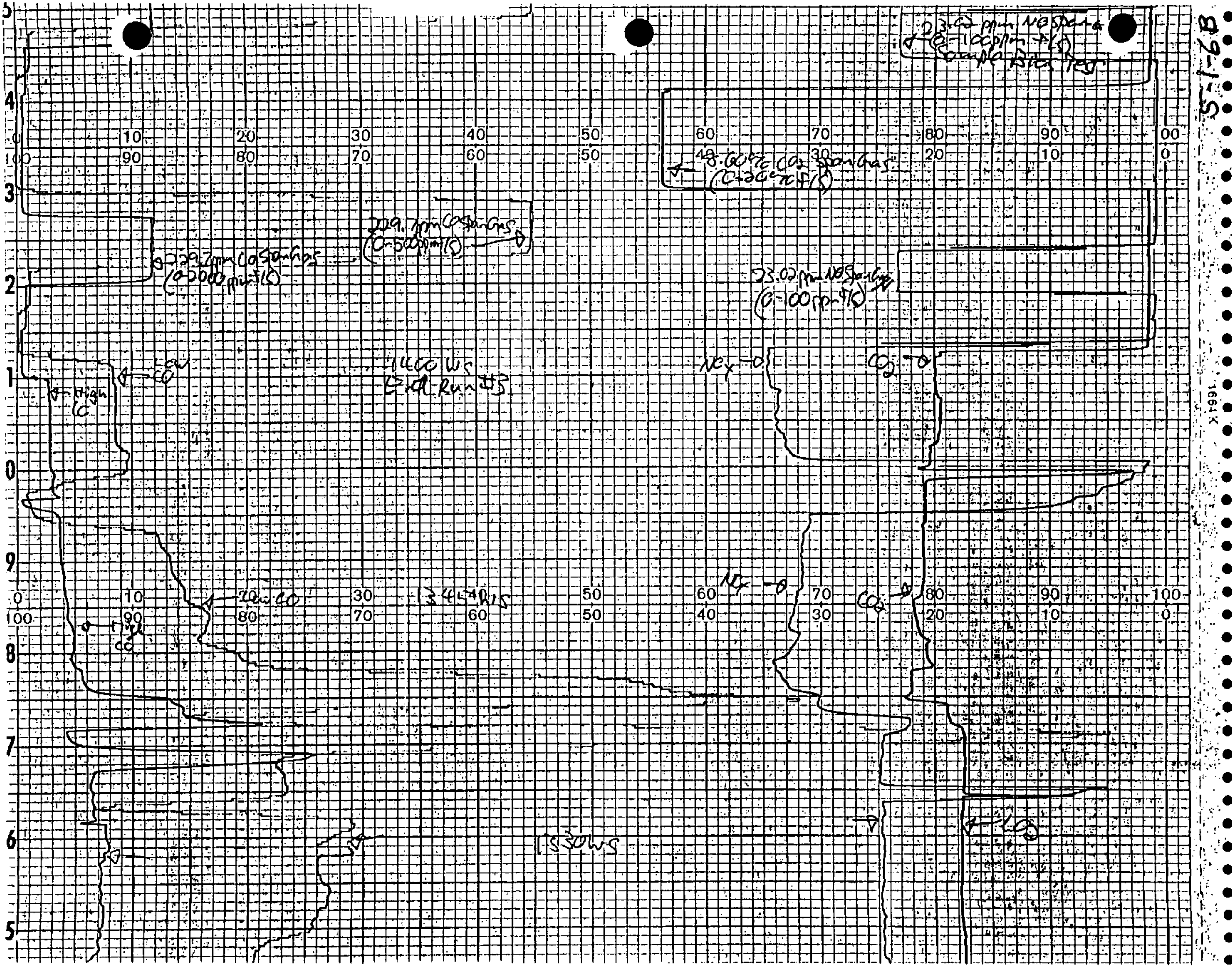
NOx
CO_2
High CO
Low CO
1105 WS
Begin Test Run #2
plant is operating again
8.60 % CO_2 Span Gas
22.9 ppm CO Span Gas
(@ 40 ppm F/S)
23.0 ppm NO Span Gas
1030 WS
Plant is Down
End Run #1
1015 WS



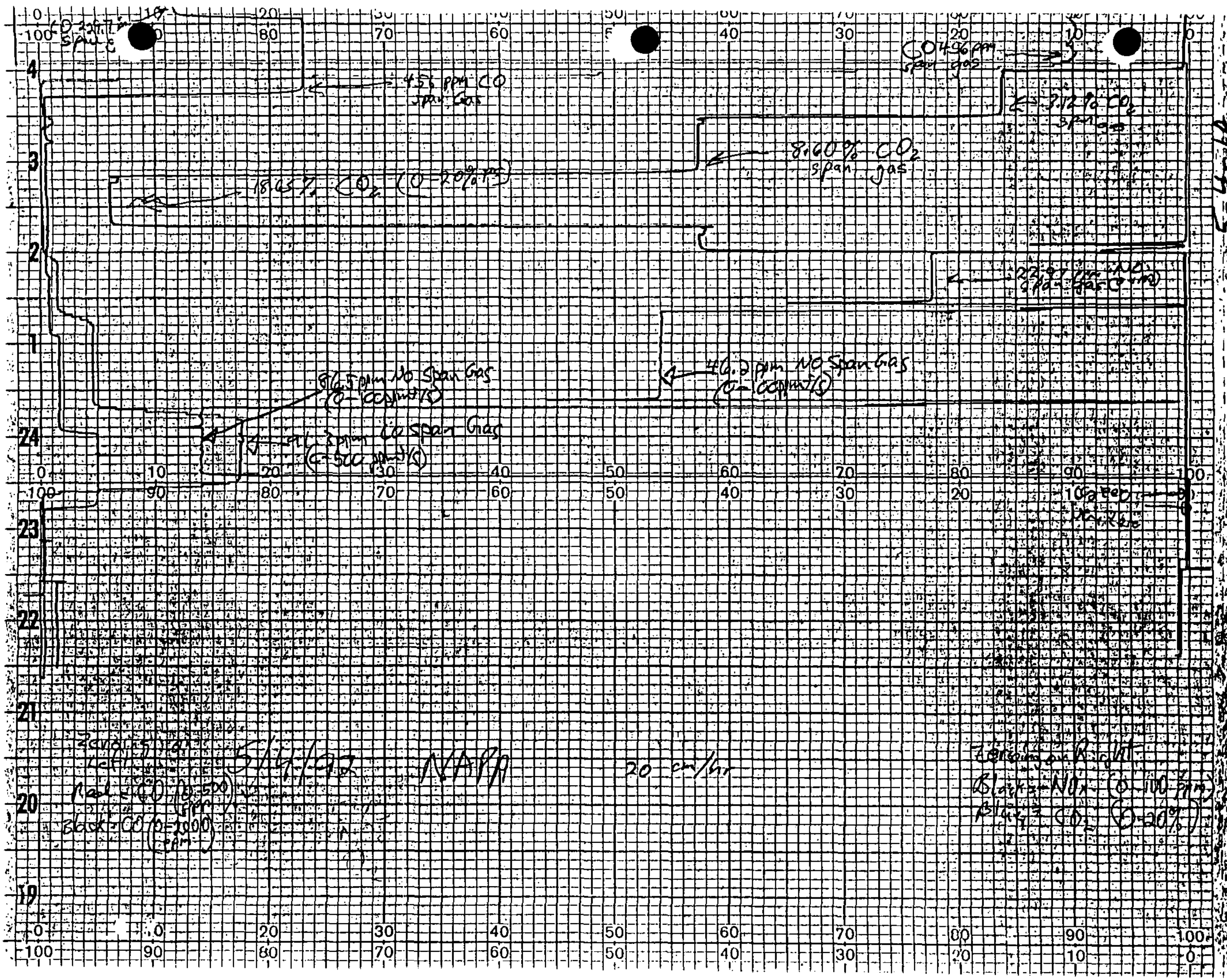
5-1-48



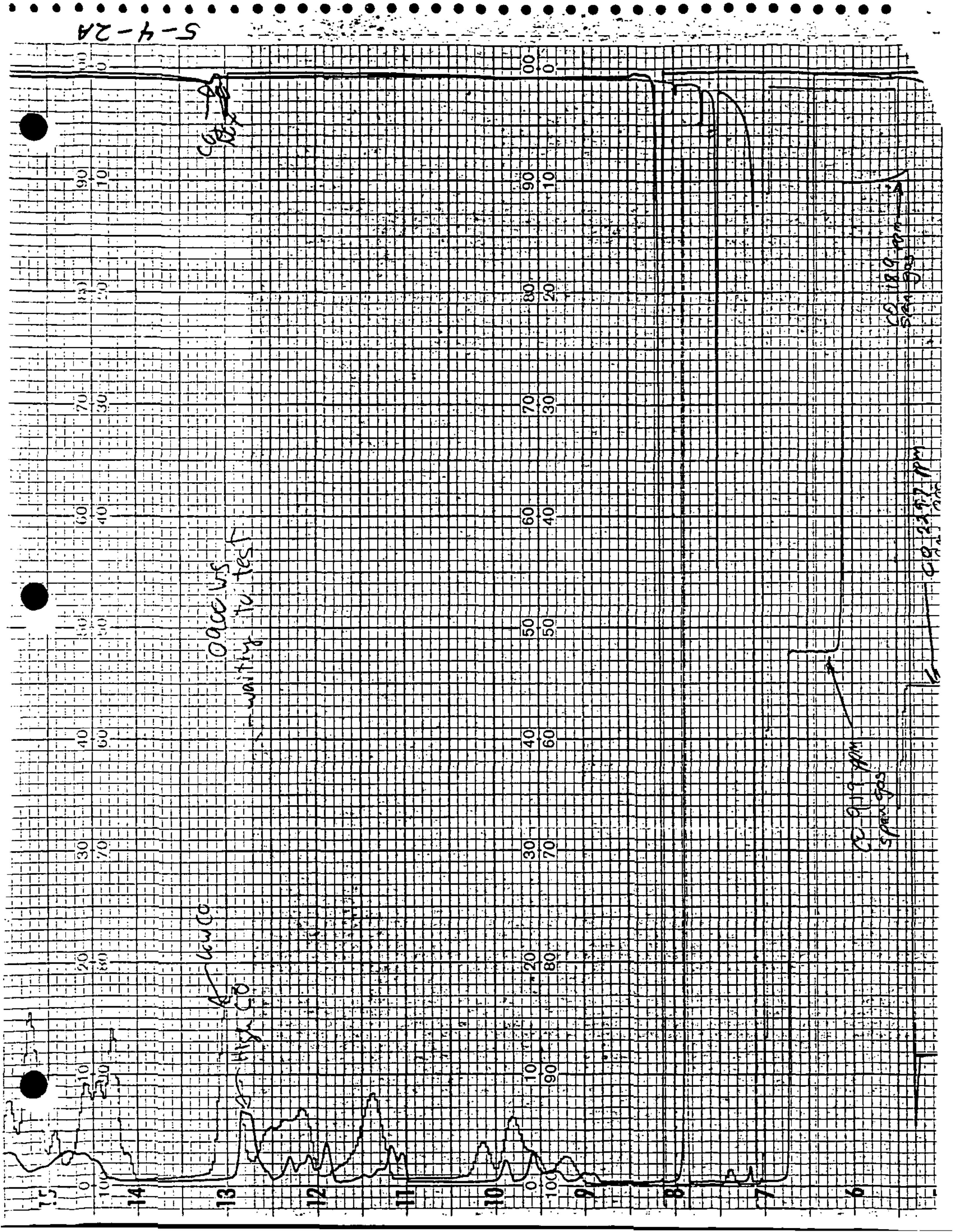
High CO
Low CO
1300 WS
NOx
CO2
High CO
Low CO
1250 WS
Begin Run #3
NOx
CO2
229.7 ppm CO Span Gas
(0-400 ppm FS)
229.7 ppm CO Span Gas
(0-300 ppm FS)
8.60 % CO2 Span Gas
(0-20 % FS)
23.0 ppm NOx Span Gas
(0-60 ppm FS)
High CO
Low CO
1330 WS
End Run #3
NOx
CO2

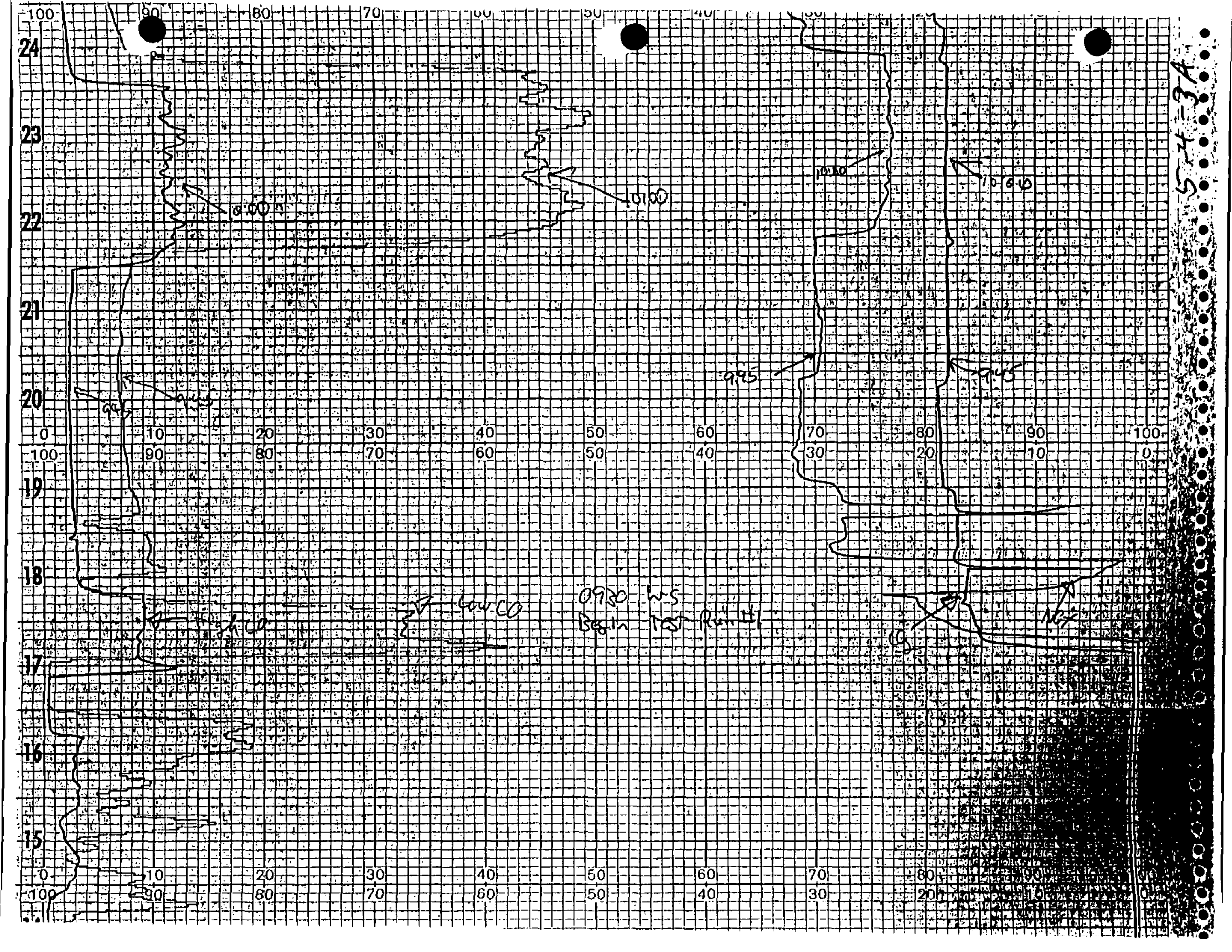


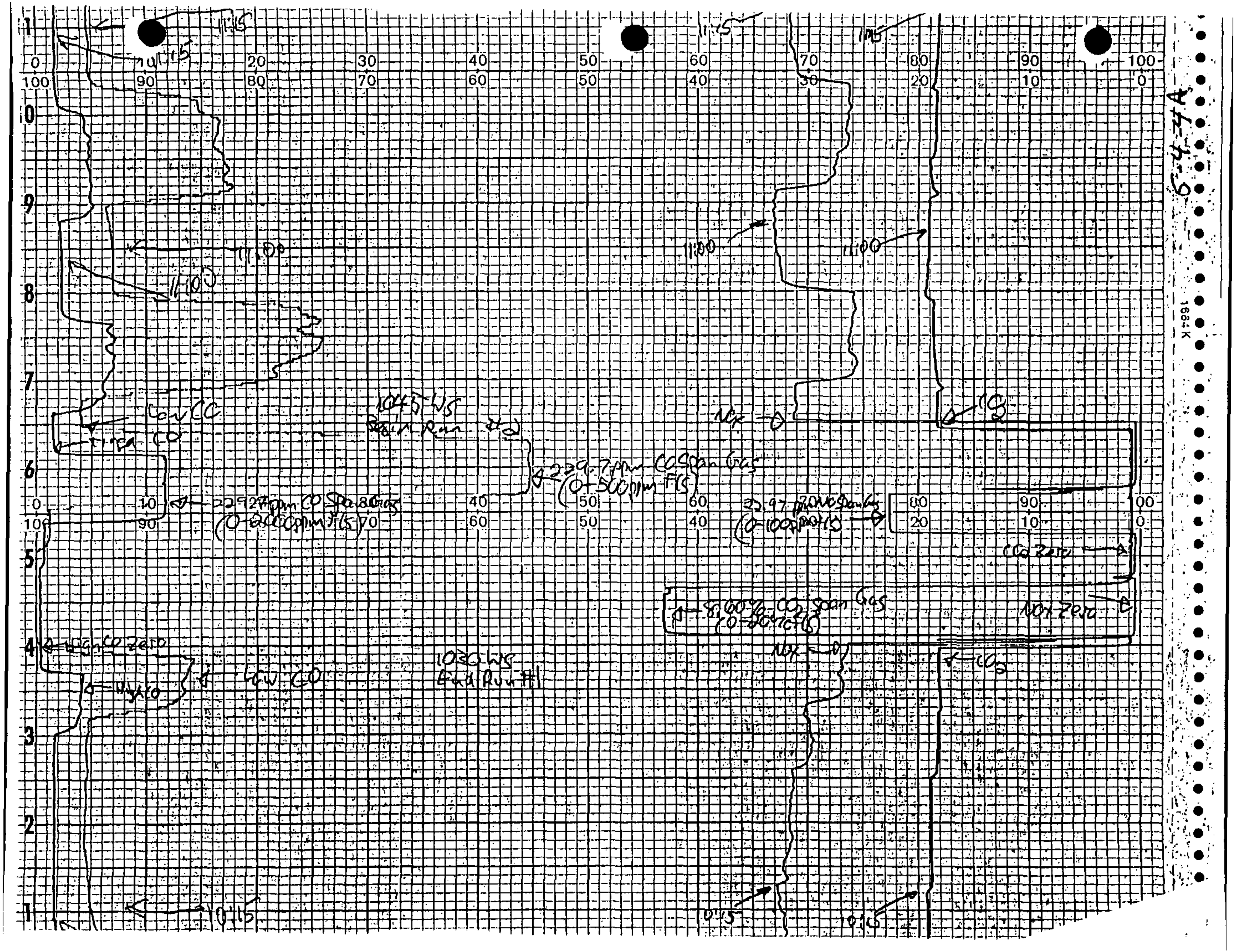
5-1-6B
1664 K
23.02 ppm NO Span Gas
(0-100 ppm F/S)
Sample Bias Test
48.60% CO2 Span Gas
(0-20% F/S)
229.7 ppm CO Span Gas
(0-2000 ppm F/S)
23.02 ppm NO Span Gas
(0-100 ppm F/S)
NOx
CO2
Low CO
1330 hrs

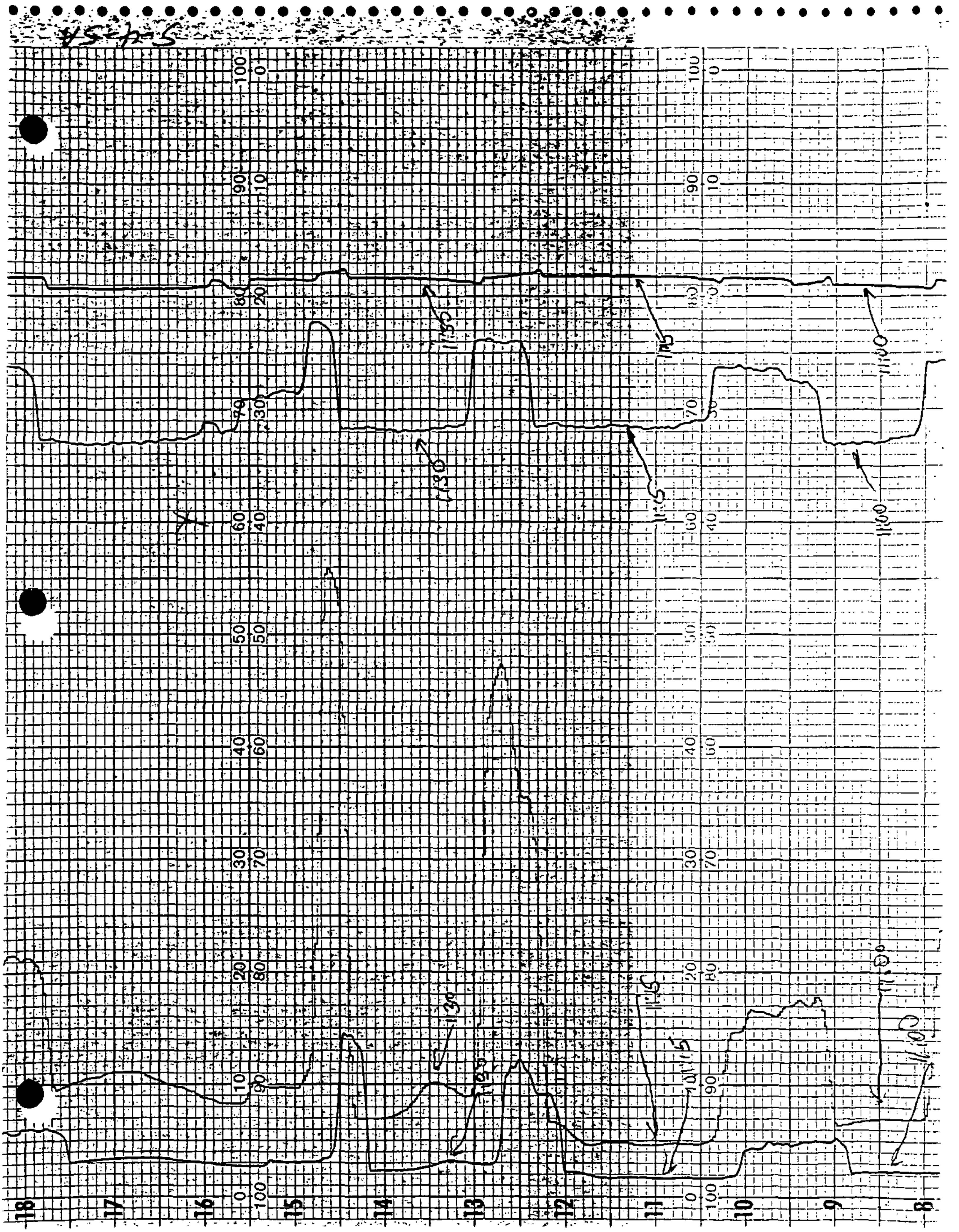


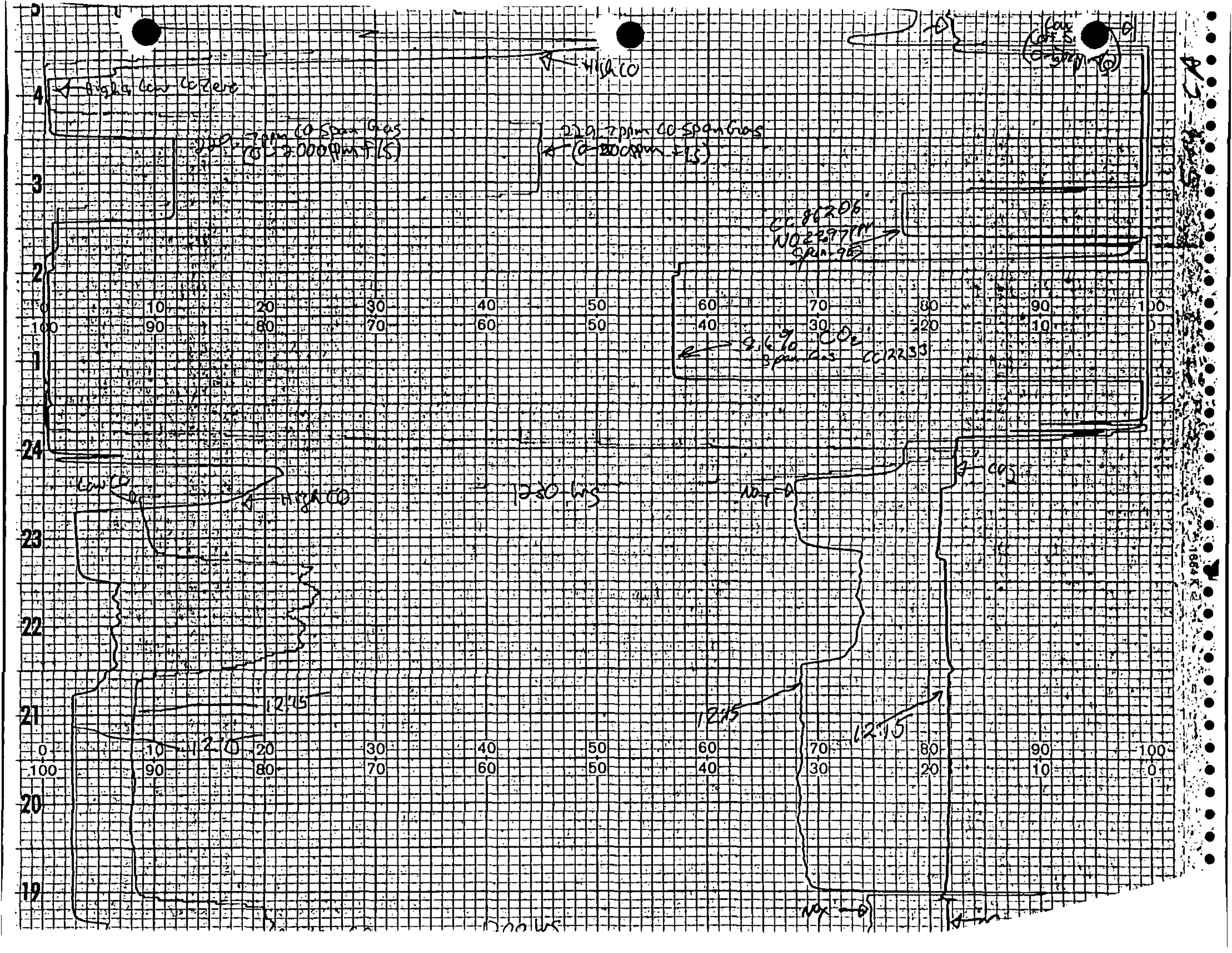
5-4-14
1664 K
CO 496 ppm span gas
3.12% CO2 span gas
456 ppm CO span gas
8.60% CO2 span gas
18.63% CO2 (0-20% FS)
46.2 ppm NO span gas (0-100 ppm FS)
86.5 ppm NO span gas (0-100 ppm FS)
CO span gas (0-500 ppm FS)
5/4/92 NAPA
20 cm/hr
Red - CO (0-500 ppm)
Black - CO (0-1000 ppm)
Black - NOx (0-100 ppm)
Black - CO2 (0-20%)


5-4-2A
CO 189 ppm span gas
span gas
waiting to test

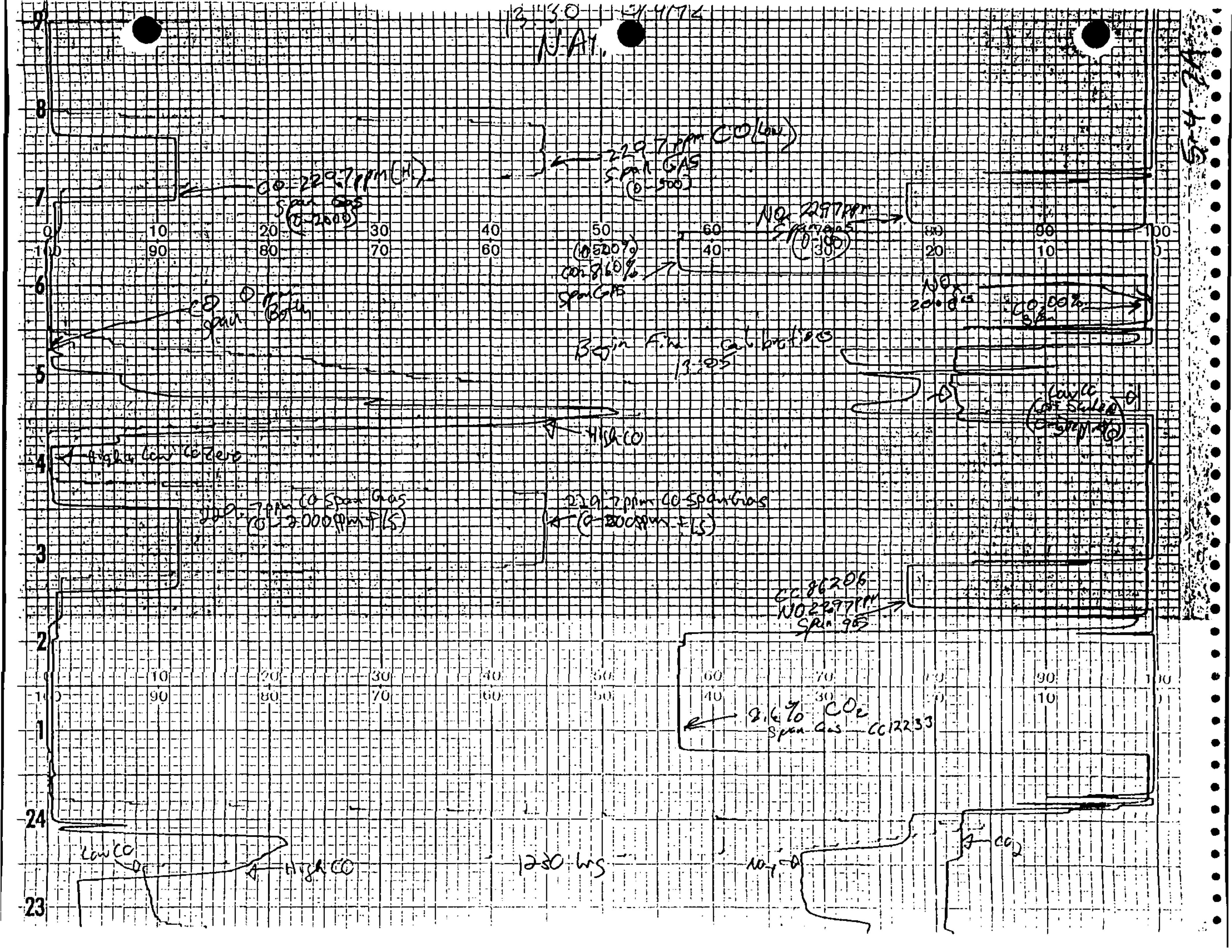

5-4-3A
0100
1030
1060
0100
945
945
945
945
0930 WS
Begin Test Run #1
Low CO
High CO
CO
NOx

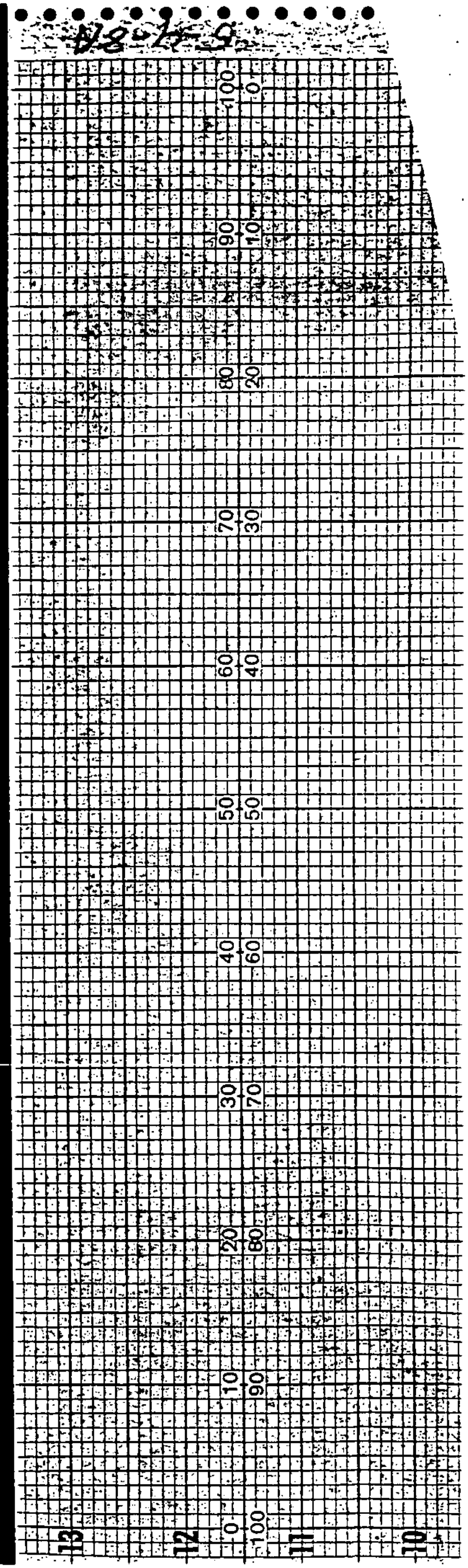

6-4-94A
1664 K
11:15
1115
1115
10:15
1100
11:00
11:00
1100
1045 WS
Begin Run #2
Low CO
High CO
229.7 ppm CO Span Gas
(0-500 ppm F.S.)
229.27 ppm CO Span Gas
(0-2000 ppm F.S.)
22.97 ppm NO Span Gas
(0-100 ppm F.S.)
CO₂
NOx
CO₂ Zero
NOx Zero
8.60% CO₂ Span Gas
(0-20% F.S.)
High CO Zero
Low CO
High CO
1030 WS
End Run #1
10:15
10:15
10:15

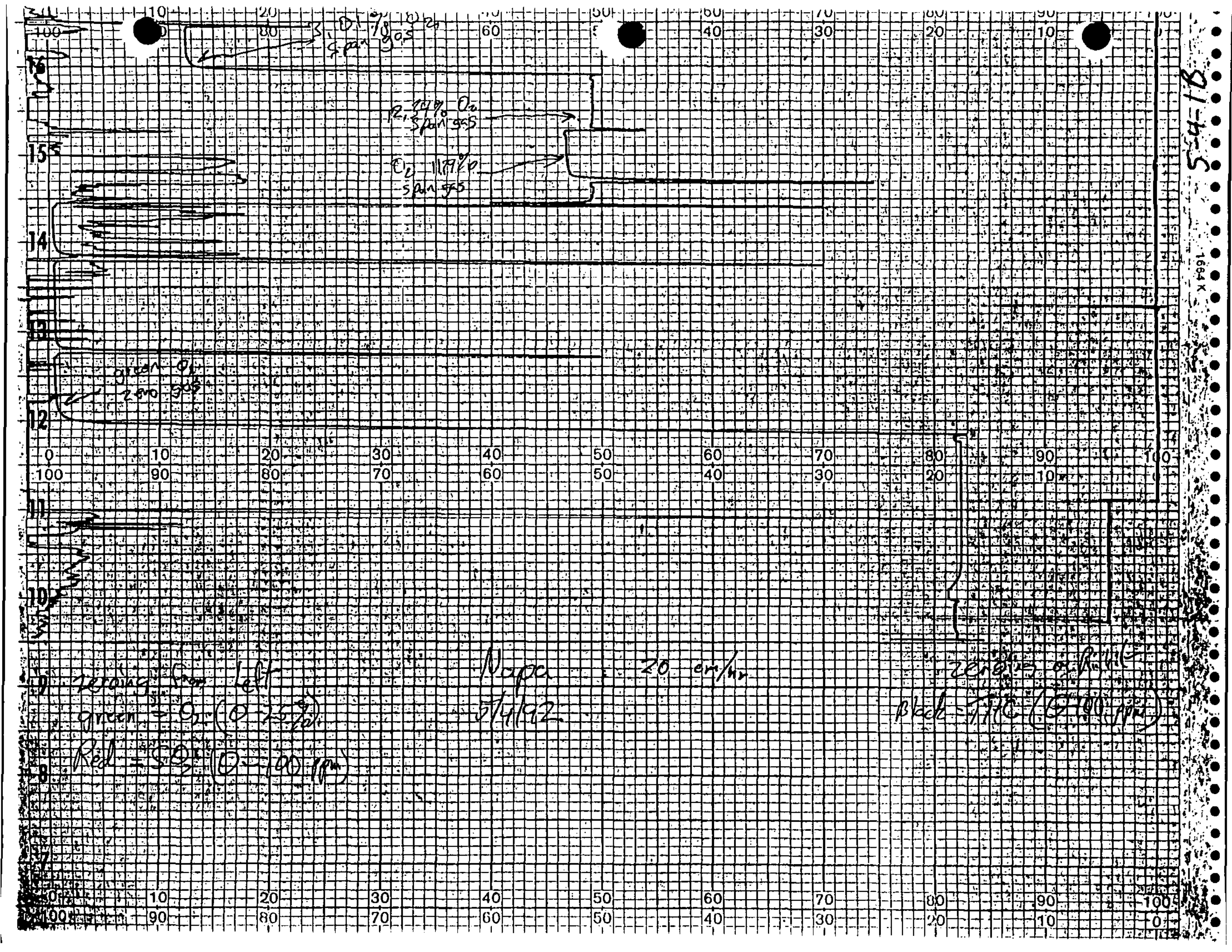


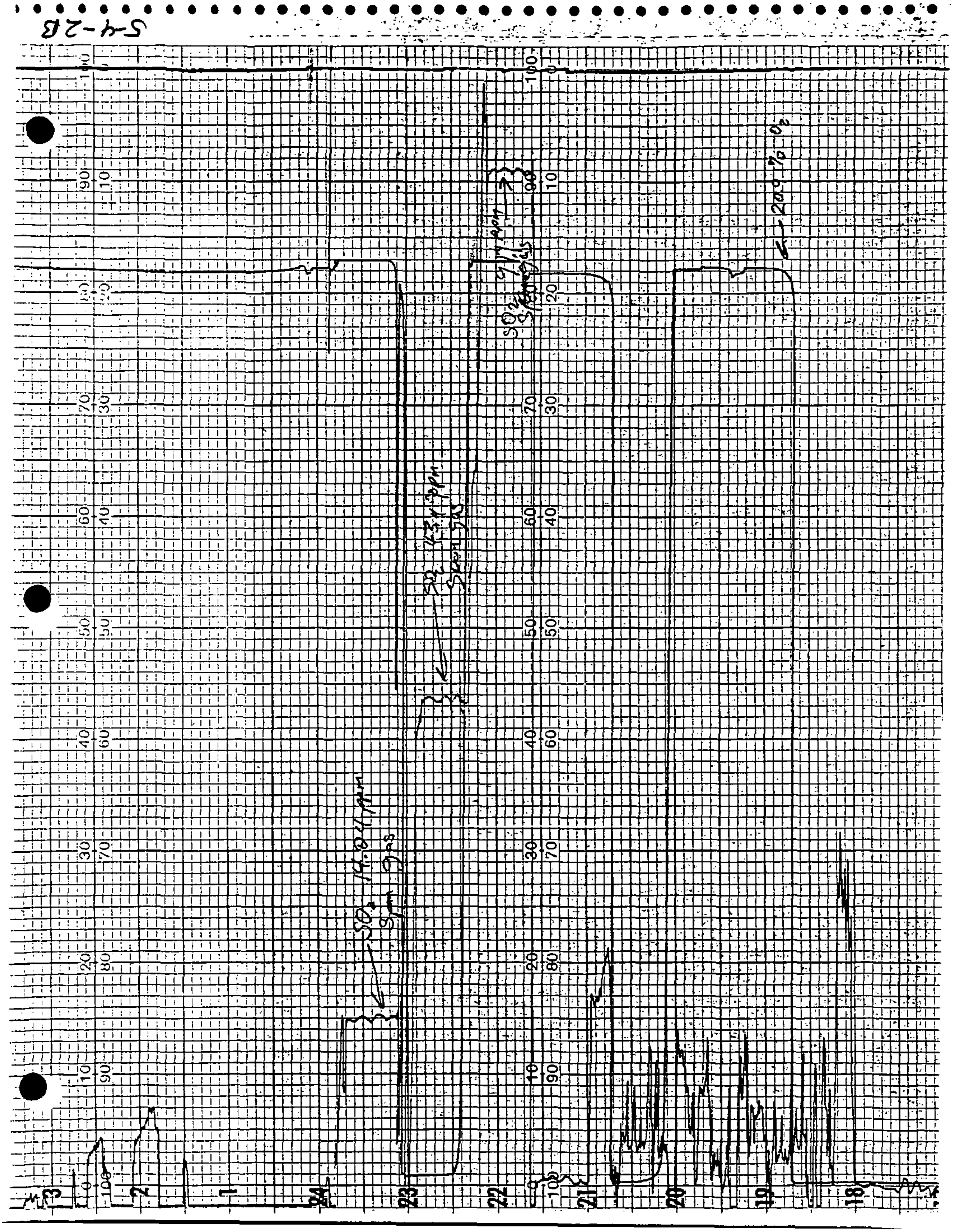


High CO
High & Low CO Zero
220.7ppm CO Span Gas
(CC2000ppm F(S)
229.7ppm CO Span Gas
CC86206
9.6% CO_2
Span Gas
CC2233
Low CO
High CO
1230 hrs
1225
1220
1215
CO_2
1200 hrs

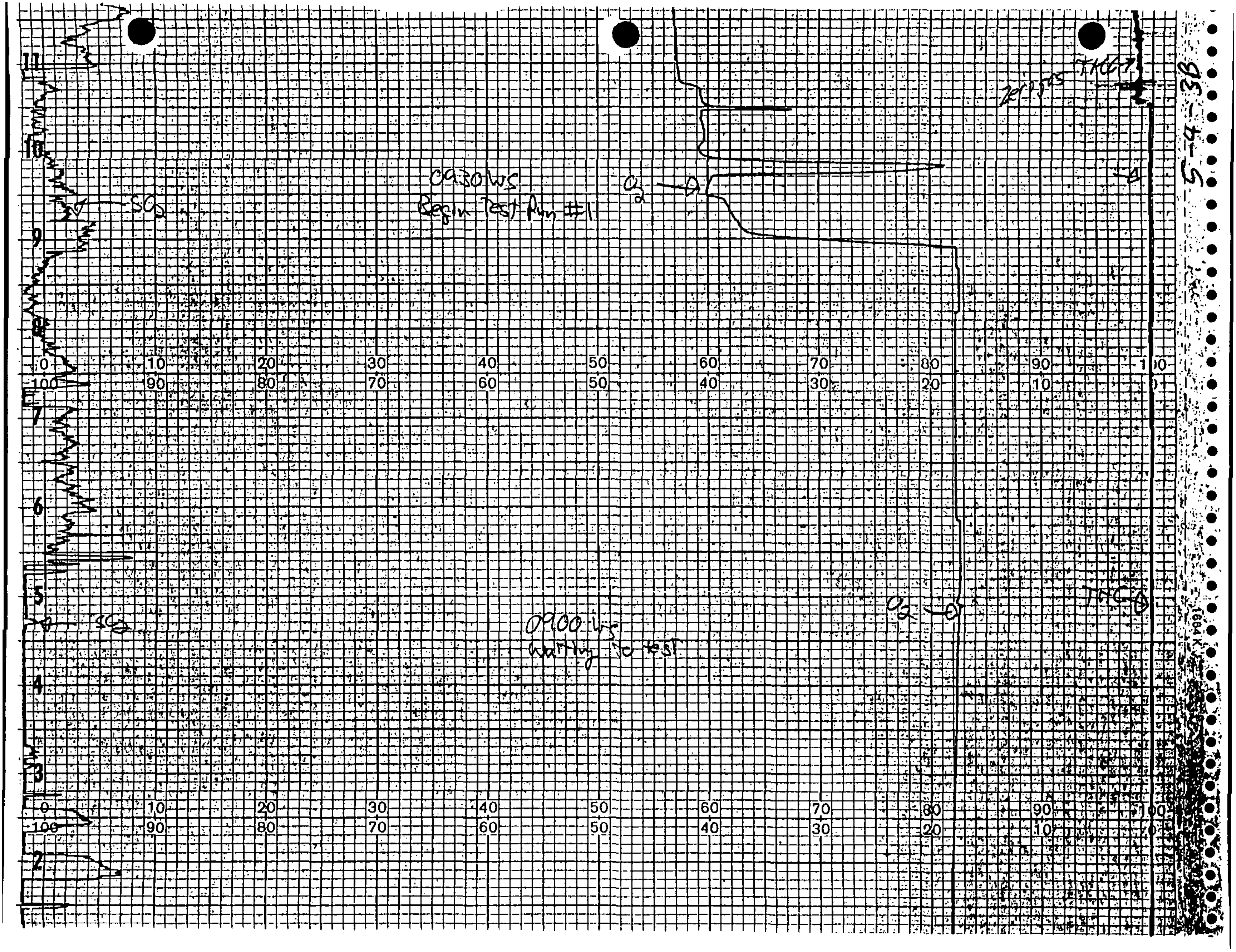

13:30 2/4/77
NAT.
5-4-24
229.7 ppm CO (Low)
Span GAS
(0-500)
CO 229.7 PPM (H)
Span Gas
(0-2000)
NOx 229.7 PPM
Span Gas
(0-100)
(0-30)
CO 86.0%
Span Gas
NOx
200 ppm
CO 0.0%
CO
0 ppm
Span Both
Begin final calibrations
13:05
Low CO
HIGH CO
Low CO zero
229.7 ppm CO Span Gas
(0-2000 ppm F/S)
229.7 ppm CO Span Gas
(0-500 ppm F/S)
CC 86206
NO 229.7 PPM
Span 95
8.6% CO2
Span Gas
CC12233
Low CO
HIGH CO
1250 hrs
NOx
CO2



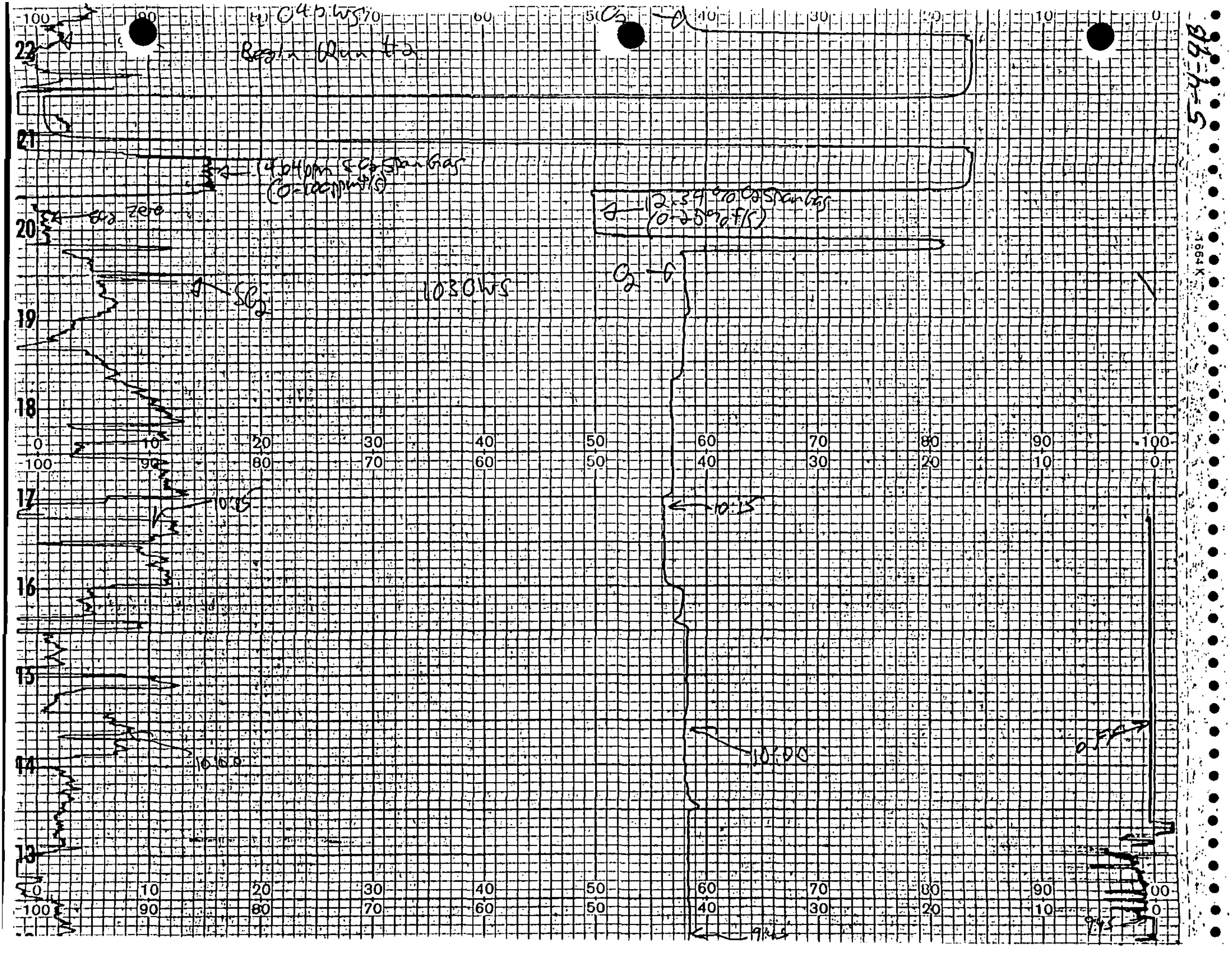

5-4-18
1664 K
span 905
O2 11.9%
span 995
zeroing from left
green = O2 (0-25%)
Red = SO2 (0-100 ppm)
Napa
5/4/92
20 cm/hr
Black = THC (0-100 ppm)

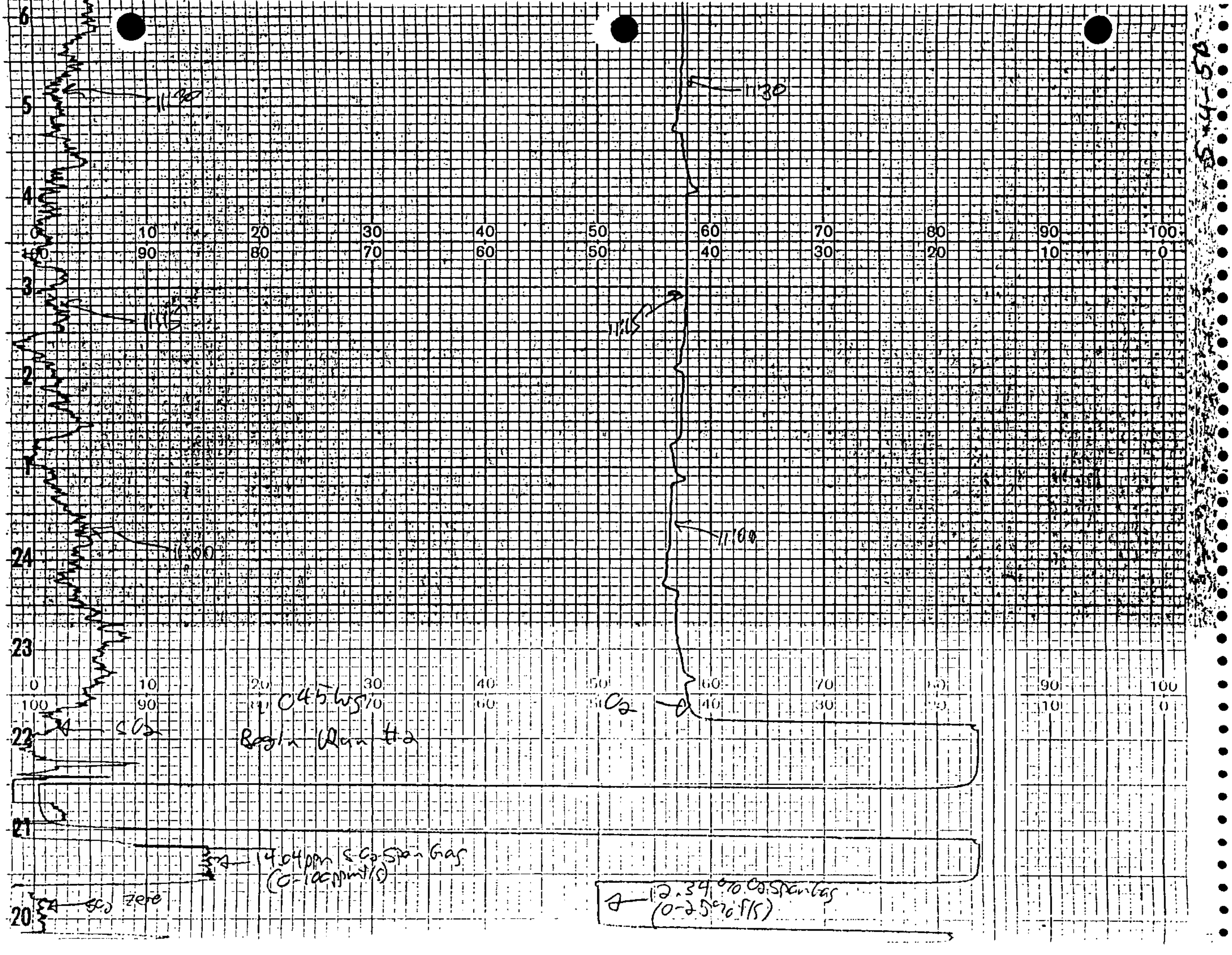


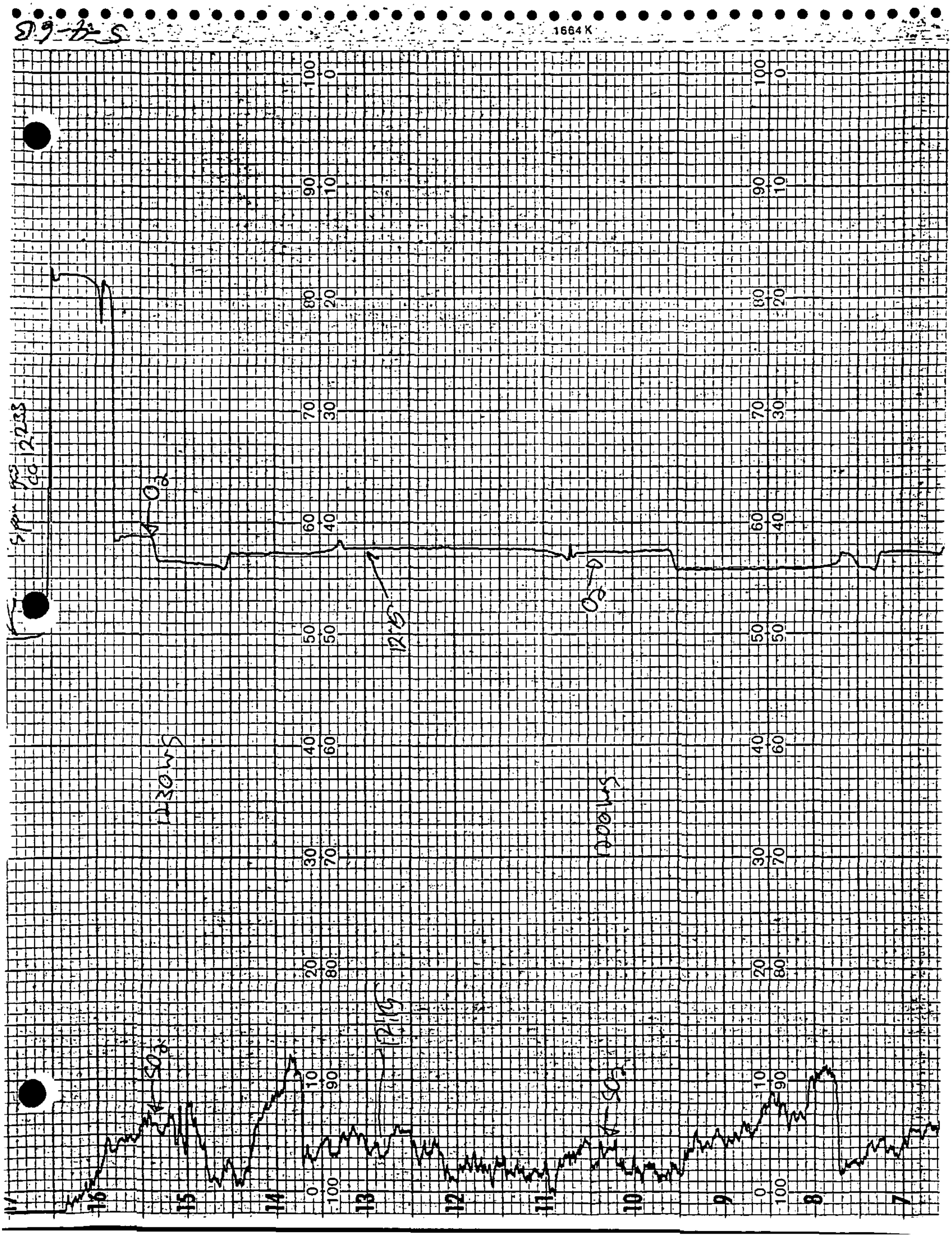
S-4-2B
SO2 14.04 ppm
Span gas
SO2 43.4 ppm
Span gas
20.0% O2

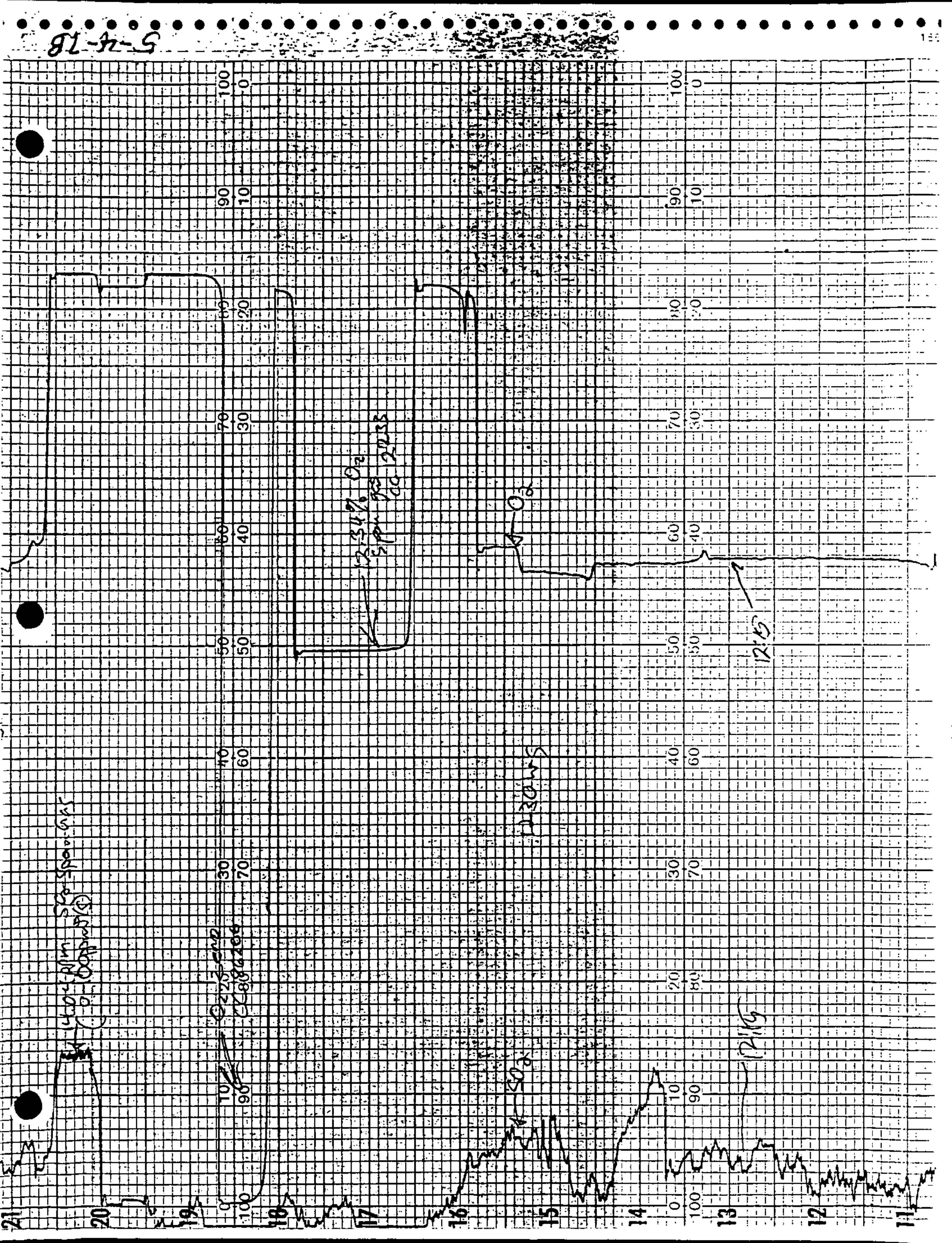


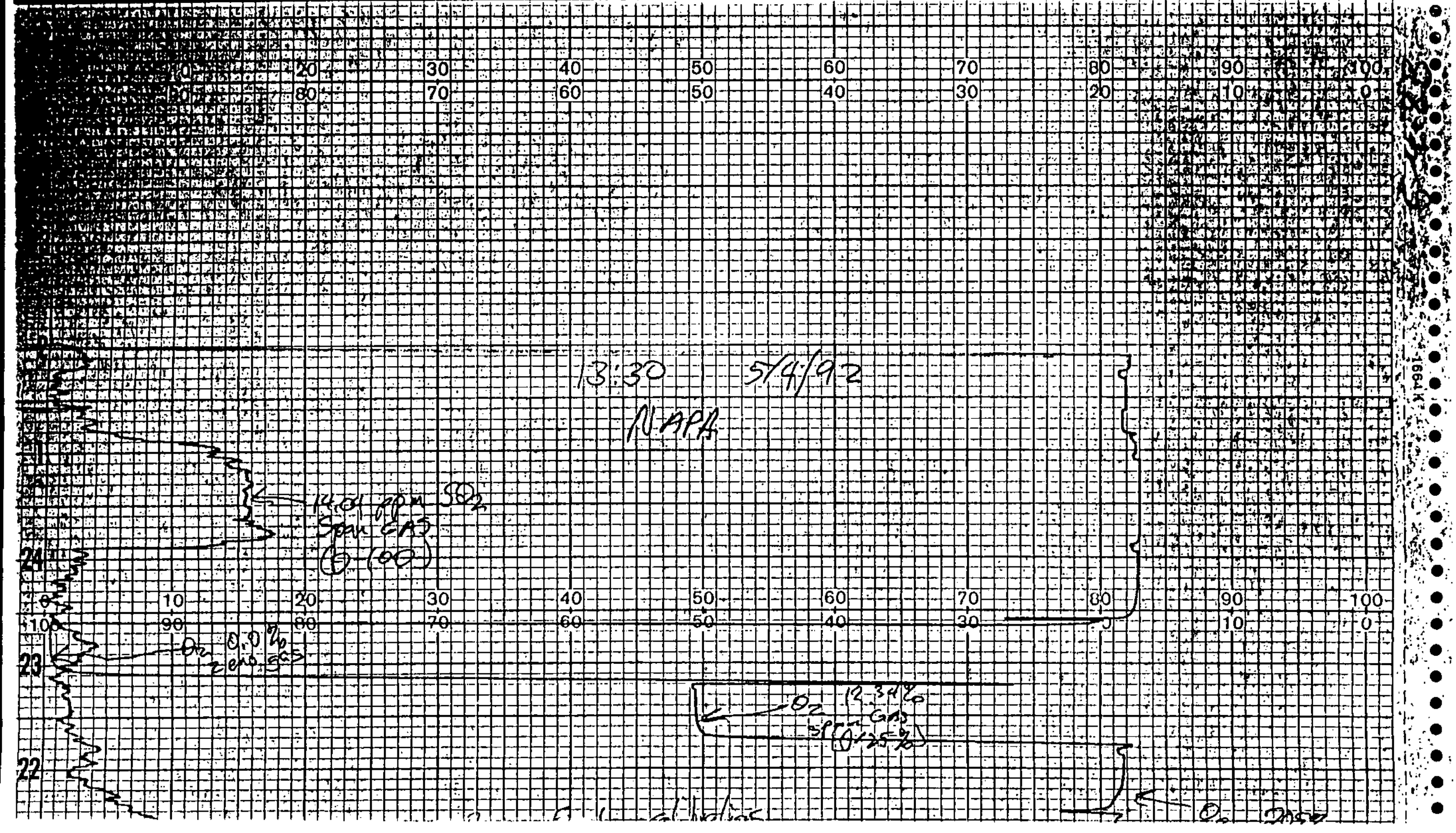
5-4-93
0930 hrs
Begin Test Run #1
O_2
0900 hrs
waiting to test
O_2
THC
SO2


5-4-98
1664 K
0845 WS
Begin Run #2
14.04 ppm SO2 Span Gas
(0-100 ppm f/s)
12.54 % O2 Span Gas
(0-25% f/s)
SO2 zero
SO2
O2
1030 WS
10:35
10:15
10:00
9:45
OFF


11:30
11:15
11:00
SO_2
O_2
Begin Run #2
14.04 ppm SO_2 Span Gas
(0-100 ppm F/S)
12.34 % CO_2 Span Gas
(0-25% F/S)
SO_2 zero


1664 K


5-4-78
12.34% O2
O2
SO2
1215
1216


13:30 5/4/92
NAPA
1401 ppm SO2 Span GAS (0-100)
O2 0.0% zero gas
O2 12.34% Span GAS (0-25%)

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS

ENSIØ1

TO: Nick Nielsen
Engineering Science, Inc.
P.O. Box 2007
Irwindale, CA 91706

DATE: 02 March 1992

CUSTOMER ORDER NUMBER: WA 315/Reanalysis

CYLINDER NUMBER CC86206

COMPONENT	CONCENTRATION (v/v)
Nitric Oxide	22.97 ± 0.23 ppm
Carbon Monoxide	7.16 ± 0.15 ppm
Nitrogen*	Balance

Cylinder Pressure: 600 psig

Replicate	02/27/92	22.73 ppm
Analysis		22.70 ppm
Data On		22.77 ppm
NO:	Mean	22.74 ppm

Expiration Date NO: 08/27/92

Replicate	02/28/92	7.21 ppm
Analysis		7.30 ppm
Data On		7.23 ppm
CO:	Mean	7.25 ppm

Expiration Date CO: 08/28/92

ANALYST Mark Monson
M.J. Monson

APPROVED JMarrin
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.

SCOTT-MARRIN, INC.

2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

ENSI01

TO:

NIK NIELSEN
ENGINEERING SCIENCES, INC.
P.O. BOX 2007
IRWINDALE, CA 91706

DATE : 11/12/91

CUSTOMER ORDER NUMBER: V: NICK NIELSEN

<><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><>

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	CC28858					
			Monitor Labs Model 8440		10/22/91	10/29/91
Nitric Oxide	1247 ± 12 ppm	GMIS	S/N 136	04/29/92	1247 ppm	1240 ppm
		Cylinder #	Continuous		1245 ppm	1245 ppm
		CC78162	Chemiluminescence		1249 ppm	1250 ppm
		@ 1025 ppm	Last Cal Date: 10/10/91		Mean: 1247 ppm	1247 ppm
			Carle Insts Model 8000		10/22/91	11/01/91
Carbon Monoxide	1242 ± 12 ppm	GMIS	S/N 0249	05/01/92	1244 ppm	1251 ppm
		Cylinder #	Methanation/FID		1237 ppm	1237 ppm
Nitrogen, O2-Free	Balance	L302	Gas Chromatography		1237 ppm	1241 ppm
Cylinder Pressure:	2000 psig	@ 1049 ppm	Last Cal Date: 08/02/91		Mean: 1240 ppm	1243 ppm
CYLINDER NO.:	CC28598					
			Monitor Labs Model 8440		10/31/91	11/07/91
Nitric Oxide	86.5 ± 0.9 ppm	GMIS	S/N 136	05/07/92	86.3 ppm	86.5 ppm
		Cylinder #	Continuous		86.6 ppm	86.5 ppm
		CC88868	Chemiluminescence		86.2 ppm	86.4 ppm
		@ 102.5 ppm	Last Cal Date: 08/07/91		Mean: 86.4 ppm	86.5 ppm
			Carle Insts Model 8000		10/31/91	11/11/91
Carbon Monoxide	91.3 ± 0.9 ppm	GMIS	S/N 0249	05/11/92	91.4 ppm	91.6 ppm
		Cylinder #	Methanation/FID		91.2 ppm	91.8 ppm
Nitrogen, O2-Free	Balance	CC81223	Gas Chromatography		90.3 ppm	91.1 ppm
Cylinder Pressure:	2000 psig	@ 100.7 ppm	Last Cal Date: 09/10/91		Mean: 91.0 ppm	91.5 ppm

ppm = umole/mole   % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: VERBAL NICK

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SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS

ENSIØ1

TO: Nick Nielsen
Engineering Science, Inc.
P.O. Box 2007
Irwindale, CA 91706

DATE: 05 March 1992

CUSTOMER ORDER NUMBER: WA 315/Reanalysis

CYLINDER NUMBER CC78206

COMPONENT	CONCENTRATION (v/v)
Nitric Oxide	922 ± 9 ppm
Carbon Monoxide	919 ± 9 ppm
Nitrogen*	Balance

Cylinder Pressure: 650 psig

*Oxygen-free

Replicate	03/04/92	929 ppm
Analysis		928 ppm
Data On		928 ppm
NO:	Mean	928 ppm

Expiration Date NO: 09/04/92

Replicate	02/28/92	925 ppm
Analysis		929 ppm
Data On		928 ppm
CO:	Mean	927 ppm

Expiration Date CO: 08/28/92

ANALYST B.E. Gross 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.

SCOTT - MARRIN, INC. 6531 BOX SPRINGS BLVD. RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: WA 315/Reanalysis

CYLINDER NUMBER CC28282

COMPONENT	CONCENTRATION (v/v)
Nitric Oxide	46.2 ± 0.5 ppm
Carbon Monoxide	23.36 ± 0.23 ppm
Nitrogen*	Balance

Cylinder Pressure: 800 psig

*Oxygen-free

Replicate	02/27/92	45.9 ppm
Analysis		46.0 ppm
Data On		46.0 ppm
NO:	Mean	46.0 ppm

Expiration Date NO: 08/27/92

Replicate	02/28/92	23.34 ppm
Analysis		23.22 ppm
Data On		23.54 ppm
CO:	Mean	23.37 ppm

Expiration Date CO: 08/28/92

SCOTT - MARRIN, INC. 6531 BOX SPRINGS BLVD. RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: Verbal D.J./Reanalysis

CHRONOLOGICAL RECORD OF CERTIFIED CONCENTRATIONS

CYLINDER NUMBER: CC356

DATE:	Nitric Oxide	Carbon Monoxide	
09/16/91	434 ppm	456 ppm	
09/23/91		456 ppm	
09/24/91	436 ppm		
05/27/92	435 ppm		
05/29/92		452 ppm	
AVERAGE	435 ppm	455 ppm	

SCOTT - MARRIN, INC. 2001 THIRD ST., UNIT H RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: 1187/27/Reanalysis

CYLINDER NUMBER CC12818

COMPONENT	CONCENTRATION (v/v)
Carbon Monoxide	1819 ± 18 ppm
Zero Air	Balance

Cylinder Pressure: 1400 psig

Replicate	5/28/91	1789 ppm
Analysis		1820 ppm
Data On		1823 ppm
CO	Mean	1811 ppm

Expiration Date CO: 11/28/92

(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 and Technology by direct)
(intercomparison with GMIS, cylinder number FF5397 at 2409 ppm Carbon Monoxide in)
(Nitrogen. The analysis was performed using a Carle Model 8000 gas chromatograph)
(with catalytic methanation/flame ionization detection. The last multipoint)
(calibration was performed 5/15/91.

SCOTT-MARRIN, INC.

2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

ENSI01

TO:

DATE : 12/31/90

HUMBERT DERIADA
ENGINEERING SCIENCE, INC.
75 N. FAIROAKS AVE.
PASADENA, CA 91103

CUSTOMER ORDER NUMBER: FI-1044-6056

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: CC56850						
			Carle Insts Model 8000		12/11/90	12/28/90
Carbon Monoxide	411 ± 4 ppm	GMIS	S/N 8249	06/28/92	413 ppm	412 ppm
		Cylinder #	Methanation/FID		414 ppm	409 ppm
Zero Air	Balance	CC28362	Gas Chromatography		409 ppm	410 ppm
Cylinder Pressure: 2000 psig		@ 493 ppm	Last Cal Date: 12/26/90	Mean:	412 ppm	410 ppm
CYLINDER NO.: CC62404						
			Carle Insts Model 8000		12/19/90	12/27/90
Carbon Monoxide	229.7 ± 2.3 ppm	GMIS	S/N 8249	06/27/92	230.5 ppm	228.5 ppm
		Cylinder #	Methanation/FID		229.8 ppm	228.0 ppm
Zero Air	Balance	FF16453	Gas Chromatography		231.3 ppm	230.3 ppm
Cylinder Pressure: 2000 psig		@ 268.0 ppm	Last Cal Date: 12/26/90	Mean:	230.5 ppm	228.9 ppm

ppm = umole/mole   % = mole-%

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

Analyst: Mark Monson
M.J. Monson

Approved: [signature]
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

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

ENSI01

TO:

DATE : 08/06/91

NIK NIELSEN
ENGINEERING SCIENCES, INC.
P.O. BOX 2007
IRWINDALE, CA 91706

CUSTOMER ORDER NUMBER: VERBAL Y P LAB

PAGE 1

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	CC28732					
			Carle Insts Model 8000		07/25/91	08/01/91
Carbon Monoxide	45.6 ± 0.5 ppm	GMIS	S/N 8249	02/01/93	46.1 ppm	45.5 ppm
		Cylinder #	Methanation/FID		45.6 ppm	45.6 ppm
Nitrogen	Balance	CC12564	Gas Chromatography		45.4 ppm	45.3 ppm
Cylinder Pressure: 2000 psig		@ 42.4 ppm	Last Cal Date: 07/19/91		Mean: 45.7 ppm	45.5 ppm

ppm = umole/mole   % = mole-%

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

Analyst: *Mark Monson*
M.J. Monson

Approved: *JMarrin*
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

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

ENSI01
TO:

DATE : 10/17/91

N. NIELSEN
ENGINEERING SCIENCES
P.O. BOX 2007
IRWINDALE, CA 91706

CUSTOMER ORDER NUMBER: VER NICKNIELSEN

PAGE 1

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	CC28972					
			Interscan Model RM2450P		10/09/91	10/16/91
Sulfur Dioxide	43.4 ± 0.9 ppm	GMIS	S/N 72138	04/16/93	43.2 ppm	43.3 ppm
		Cylinder #	Electrochemical		43.0 ppm	43.6 ppm
Nitrogen	Balance	CC28644	Gas Chromatography		43.3 ppm	43.8 ppm
Cylinder Pressure: 2000 psig		@ 49.6 ppm	Last Cal Date: 08/15/91	Mean:	43.2 ppm	43.6 ppm

ppm = umole/mole   % = mole-%

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

Analyst: *[signature]*
M.J. Monson

Approved: *[signature]*
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

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: 01/03/92

D.J. WYMAN
ENGINEERING SCIENCES, INC.
P.O. BOX 2007
IRWINDALE, CA 91706-

CUSTOMER ORDER NUMBER: FI1234-24

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC88852	Sulfur Dioxide	14.04 ± 0.28 ppm	SRM 1693
	Zero Air	Balance	

ppm = umole/mole % = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard 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: Mark Monson
M.J. Monson

Approved: [signature]
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

SCOTT - MARRIN, INC. 2001 THIRD ST., UNIT H RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: 1187/27/Reanalysis

CYLINDER NUMBER CC67204

COMPONENT	CONCENTRATION (v/v)
Sulfur Dioxide	91.1 ± 1.8 ppm
Air	Balance

Cylinder Pressure: 1800 psig

Replicate	5/23/91	91.3 ppm
Analysis		91.2 ppm
Data On		91.0 ppm
SO_2:	Mean	91.2 ppm

Expiration Date SO_2: 11/23/91

(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 and Technology by direct)
(intercomparison with GMIS, cylinder number CC68658 at 102.5 ppm Sulfur Dioxide)
(in Nitrogen. The analysis was performed using an Interscan Model RM2450P, S/N)
(72138 gas chromatograph with electrochemical detection. The last calibration)
(was performed 5/10/91.)

Scott Specialty Gases, Inc.

2600 CAJON BLVD., SAN BERNARDINO, CA 92411-0000
PHONE: 714-887-2571 FAX:714-887-0549

8/02/91

ENGINEERING SCIENCE
6060 N. IRWINDALE AVENUE
SUITE J
IRWINDALE CA 91706-0000
YPLAB

PROJECT #: 02-15039
PO #: FI-1212-24

CYLINDER #: AAL6390 ANALYTICAL ACCURACY: +/-2%

COMPONENT	REQUESTED CONCENTRATION		ANALYSIS 1 (MOLES)	U/M
METHANE	20.0	PPM	19.9	PPM
AIR		BALANCE		N/A

DATE OF ANALYSIS: 8/01/91

ANALYST: FV
FRANK VILIMAS

APPROVED BY: RSheały
ROBERT SHEALY

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
CALIBRATION GAS MIXTURES

ENSI01
TO: DENNIS BECVAR
ENGINEERING SCIENCES
C/O ARIZONA PORTLAND CEMENT
11151 N. CASA GRANDE HWY
RILLITO, AZ 85654

DATE : 07/08/91

CUSTOMER ORDER NUMBER: WA-275

PAGE 1

CYLINDER NO.: CC67245

COMPONENT	CONCENTRATION(v/v)
Methane	49.9 ± 2.5 ppm
Zero Air	Balance

CYLINDER NO.: CC12212

COMPONENT	CONCENTRATION(v/v)
Methane	96.4 ± 4.8 ppm
Zero Air	Balance

CYLINDER NO.: CC73043

COMPONENT	CONCENTRATION(v/v)
Oxygen	13.65 ± 0.68 %
Carbon Dioxide	8.63 ± 0.43 %
Nitrogen	Balance

CYLINDER NO.:

COMPONENT	CONCENTRATION(v/v)

ppm = umole/mole % = mole-%

Analyst: B.E. Gross

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

ENSI01
TO: Nick Nielsen
Engineering Science, Inc.
6060 N. Irwindale Ave.
Suite J
Irwindale, CA 91706-

DATE : 03/20/92

CUSTOMER ORDER NUMBER: NICK NIELSEN

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CC12568				
			Varian Model 1860		03/16/92
Oxygen	3.01 ± 0.03 %	GMIS	S/N None	09/16/93	3.01 %
		Cylinder #	Thermal Conductivity		2.996 %
		CC81219	Gas Chromatography		3.02 %
		@ 5.10 %	Last Cal Date: 12/30/91		Mean: 3.01 %
			Varian Model 1860		03/18/92
Carbon Dioxide	3.12 ± 0.03 %	GMIS	S/N None	09/18/93	3.12 %
		Cylinder #	Thermal Conductivity		3.12 %
Nitrogen	Balance	CC88828	Gas Chromatography		3.12 %
Cylinder Pressure: 2000 psig		@ 3.[illegible] %	Last Cal Date: 03/09/92		Mean: 3.12 %
CYLINDER NO.:	CC12722				
			Varian Model 1860		03/17/92
Oxygen	12.34 ± 0.12 %	GMIS	S/N None	09/17/93	12.32 %
		Cylinder #	Thermal Conductivity		12.36 %
		CC12233	Gas Chromatography		12.34 %
		@ 23.[illegible] %	Last Cal Date: 01/07/92		Mean: 12.34 %
			Varian Model 1860		03/19/92
Carbon Dioxide	8.60 ± 0.09 %	GMIS	S/N None	09/19/93	8.61 %
		Cylinder #	Thermal Conductivity		8.59 %
Nitrogen	Balance	CC28297	Gas Chromatography		8.61 %
Cylinder Pressure: 2000 psig		@ 7.40 %	Last Cal Date: 03/09/92		Mean: 8.60 %

ppm = umole/mole % = mole-%

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

Analyst: M.S. Calhoun

Approved: J.T. Marrin

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

ENSI01

TO:

NIK NIELSEN
ENGINEERING SCIENCES, INC.
P.O. BOX 2007
IRWINDALE, CA 91706

DATE: 11/19/91

CUSTOMER ORDER NUMBER: NICK NIELSEN

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC83874	Carbon Dioxide	18.75 ± 0.19 %	SRM 1675b
	Oxygen	11.89 ± 0.12 %	SRM 2659
	Nitrogen	Balance	
CC376	Carbon Dioxide	18.65 ± 0.19 %	SRM 1675b
	Oxygen	11.79 ± 0.12 %	SRM 2659
	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: M.S. Calhoun

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

11151 N. CASA GRANDE HWY
RILLITO, AZ 85654

CUSTOMER ORDER NUMBER: WA-275

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CYLINDER NO.: CC67245

COMPONENT	CONCENTRATION(v/v)
Methane	49.9 ± 2.5 ppm
Zero Air	Balance

CYLINDER NO.: CC12212

COMPONENT	CONCENTRATION(v/v)
Methane	96.4 ± 4.8 ppm
Zero Air	Balance

CYLINDER NO.: CC73Ø43

COMPONENT	CONCENTRATION(v/v)
Oxygen	13.65 ± Ø.68 %
Carbon Dioxide	8.63 ± Ø.43 %
Nitrogen	Balance

CYLINDER NO.:

COMPONENT	CONCENTRATION(v/v)

---

ppm = umole/mole   % = mole-%

Analyst: B.E. Gross
B.E. Gross

Approved: M.C. Dodd Dawson
for 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

END

APPENDIX G

PROCESS DATA

Form RF[illegible]4

PAGE 1 OF 2

Mix Temp = Burner Temp - 20°F

4/30/92

1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use #Fuel Oil ___ Nat. Gas X Propane ___ Coal ___ other	3 Burner Setting	4 Blower Pressure	5 Production Rate: Mix Aggregate TPH Tons	5 Production Rate: RAP TPH	6 Asphalt Cement %	7 Burner Mix Temp. °F (Burner - 20°)	8 Exhaust Gas Temp. °F	9 Venturi Scrubber / Baghouse: Pressure Drop in w.g.	9 Venturi Scrubber / Baghouse: Water Pressure Burner ~~psi~~ Draft	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
8:20		27					329	210	2	.3			
8:30		28		307			324	215	2	.3			
8:45		30		354			317	215	2	.3			
9:00		25		426 ~~327~~			327	210	2	.3			
9:15		32		470			309	230	2	.3			
9:30		33		505			316	230	2	.3			
9:45		25		586			334	220	2	.3			
10:00		24		636			330	215	2	.3			
10:15		25		693			322	215	2	.3			
10:30		24		751			320	215	2	.3			
10:45		21		792			330	210	2	.3			
11:00		22		829			324	210	2	.3			
11:15		21		872			324	210	2	.3			
11:30		13		938			344	200	2	.3			
11:45		17					301	205	2	.3			
12:00		22		1062			320	210	~~3.5~~ 2	.35			
12:15		22		1140			329	215	2	3			
12:30		~~26~~		~~1203~~			~~311~~	~~210~~	~~2~~	~~3~~			
12:45		25		1203			311	210	2	3			
1:00		29		1309			320	210	2	3			

04

4/30/92

1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use: #Fuel Oil __ Nat. Gas __ Propane __ Coal __ other	3 Burner Setting	4 Blower Pressure	5 Production Rate: __Mix __Aggregate TPH	5 Production Rate: __RAP TPH	6 Asphalt Cement %	7 Mix Temp. °F	8 Exhaust Gas Temp. °F	9 __Venturi Scrubber __Baghouse: Pressure Drop in w.g.	9 Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
1:15		31		1359			312	215	2	3			
1:30		31		1433			318	215	2	3			
1:45		28		1495			323	215	2	3			
2:00		21		1558			360	200	2	3			
2:15													
2:30													
2:45													
3:00													
3:15													

Form REC#04

PAGE 1 OF ___

5/1

1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use #Fuel Oil / Nat. Gas NG / Propane / Coal / other	3 Burner Setting	4 Blower Pressure	5 Production Rate: Mix Aggregate TPH	5 Production Rate: RAP TPH	6 Asphalt Cement %	7 Burner ~~Mix~~ Temp. °F	8 Exhaust Gas Temp. °F	9 Venturi Scrubber / Baghouse: Pressure Drop in w.g.	9 Venturi Scrubber / Baghouse: Water Pressure Burner Suction ~~psi~~ "in	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
8:		~~35~~		~~96~~			~~370~~	~~200~~	~~3~~	~~.2~~			
8:30		35		96			370	200	~~3~~ 2	~~2~~ .3			
8:45		32		165			365	210	~~3~~ 2	~~2~~ .3			
9:00		30		214			333	215	~~3~~ 2	~~2~~ .3			
9:15		33		292			345	215	~~3~~ 2	~~2~~ .3			
9:30		37		347			311	220	~~3~~ 2	~~2~~ .3			
9:45		37		412			335	210	~~3~~ 2	~~2~~ .3			
10:00		37		478			333	215	~~3~~ 2	~~2~~ .3			
10:15		37		534			335	220	~~3~~ 2	~~2~~ .3			
10:30	Unit Down 10:40 Started 11:00	17		588			366	215	3 2	~~2~~ .3			
10:45		~~23~~		~~[illegible]~~			~~320~~						
11:00		23		617			320	200	~~3~~ 2	~~2~~ .3			
11:15		27		661			318	200	~~3~~ 2	~~2~~ .3			
11:30		25		697			322	205	1½	.3			
11:45		24		752			320	210	1½	.3			
12:00		22		812			321	210	1½	.3			
12:15		21		879			327	210	1½	3			
12:30		21		926			320	210	2	.3			
12:45		21		989			322	210	2	.3			

HEC#04

PAGE 2 OF ___

1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use __#Fuel Oil __ Nat. Gas __ Propane __ Coal __ other	3 Burner Setting	4 Blower Pressure	5 Production Rate __Mix __Aggregate TPH	5 Production Rate __RAP TPH	6 Asphalt Cement %	7 BURNER ~~Mix~~ Temp. °F	8 Exhaust Gas Temp. °F	9 __Venturi Scrubber __Baghouse Pressure Drop in w.g.	9 Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
1:00		21		1055			319	210	2	.3			
1:15		19		1120			324	210	2	.3			
1:30		18		1185			324	210	2	.3			
1:45		37		1217			330	230	2	.3			
2:00		31		1302			340	230	2	.3			
2:15		26		1359			320	230	2	.3			
2:30	2:25pm	25		1419			310	230	2	.3			
2:45													
3:00													
3:15													
3:30													

TOTAL PAGES 2+1 PROPOSAL/PROJECT No. WA 349 DATE: 5.5.92

FROM: R. ROSARIO OFFICE No. 403 Telephone: 818-969-5758

ATTENTION: MR TOM BRUMAGIN CITY/STATE Lanham Maryland

COMPANY NAME NAPA TELECOPY No. (301) 731-4621

301 731 [illegible]

MESSAGE

Dear Tom:

① We finished testing 1A Longhead yesterday. Attached is the process data.

② CH4-BTEX Tedlar bag samples for Thursday & Friday were victims of the L.A. riots. Our lab was unable to get the samples to sub-contract labs due to transport situation. Samples became overaged.

③ We took 9 1/2 hour samples yesterday. Pls advise if we analyze 3 or all 9 to complete the test.

Rollie R.

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Form RFC#04

Cng. Black

1A 5-4-92

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1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use #Fuel Oil, Nat. Gas, Propane, Coal, other	3 Burner Setting	4 Blower Pressure	5 Production Rate: Mix Aggregate TPH	5 Production Rate: RAP TPH	6 ~~Asphalt Content~~ MIX TEMP	7 ~~Mix Temp.~~ EXHAUST GAS TEMP	8 Exhaust Gas Temp. °F	9 Venturi Scrubber / Baghouse: Pressure Drop in w.g.	9 Venturi Scrubber / Baghouse: Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
7:15		28		114		345	200		2	.3			
7:30		25		284		347	210		2	.3			
7:45		21		235		335	200		2	.3			
8:00		21		314		337	200		2	.3			
8:15		19		358		324	200		2	.3			
8:30		15		425		300	200		2	.3			
8:45													
9:00		HOLD											
9:15													
9:30													
9:45		27		469		311	200		2	3			
10:00		27		550		341	205		2	3			
10:15		27		700		328	215		2	3			
10:30		27		800		324	210		2	3			
10:45		25		770		304	212		2	3			
11:00		18		830		301	212		2	3			
11:15		22		950		304	210		2	3			
11:30				1020									
~~[illegible]~~		18		~~[illegible]~~		296	210		2	3			

Form PCF#04

Long Beach
LA 5-4-92 PAGE 2 OF 2

1. Time (24-HR) NOTE: check small box in column when moisture sample is taken.	2 Fuel Use #Fuel Oil __ Nat. Gas __ Propane __ Coal __ ____ other	3 Burner Setting	4 Blower Pressure	5 Production Rate __Mix __Aggregate TPH	5 Production Rate __RAP TPH	6 Asphalt Cement %	7 Mix Temp. °F	8 Exhaust Gas Temp. °F	9 __Venturi Scrubber __Baghouse Pressure Drop in w.g.	9 Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
11:45		28		1080		3.50	210		2	3			
12:00		24		1140		318	212		2	3			
12:15		18		1190		304	210		2	3			
12:30		29		1250		324	210		2	3			
12:45		32		1310		316	212		2	3			
1:00		28		1360		312	210		2	3			
1:15													