AP42 Section: 11.1

Reference Number: 44

Title: **Air Pollution Source Testing At APAC Of Tennessee, Memphis, Tennessee, Ramcon Environmental Corporation, Memphis, TN,**

October 7, 1991.

RAMCON
ENVIRONMENTAL CORPORATION

AIR POLLUTION SOURCE TESTING AT

APAC OF TENNESSEE
Memphis, Tennessee

Submitted to:

APAC OF TENNESSEE
P.O. Box 112
Memphis, Tennessee 38101

and

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

Submitted on:

October 7, 1991

Submitted by:

RAMCON ENVIRONMENTAL CORPORATION
223 Scott Street
Memphis, Tennessee 38112
901/458-7000

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RAMCON

ENVIRONMENTAL CORPORATION

October 9, 1991

Mr. Thomas E. Brumagin
NAPA
5100 Forbes Boulevard
NAPA Building
Lanham, MD 20706-4413

RE: APAC OF TENNESSEE
Memphis, Tennessee

Dear Mr. Brumagin:

Enclosed is a draft copy of the test report for the NAPA protocol test conducted at APAC Tennessee, Memphis Tennessee Mud Island facility. Please review and return at your earliest convenience.

Sincerely,

G. Sumner Buck, III
President

GSBIII:djb
Enclosure

cc: Mr. Ted Rapallo
APAC, Inc.
P.O. Box 19956
Atlanta, GA 30325

CERTIFICATION

We do hereby certify that the following report has been reviewed and is to the best of our knowledge a true representation of the results. Further, all tests, sampling and analytical methods were performed in accordance with acceptable procedures to the United States Environmental Protection Agency.

G. Sumner Buck, III
President

10-7-91
Date

Wm. Joseph Sewell, II
Chemical Engineer

10/7/91
Date

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I. INTRODUCTION

On August 9, 10, 15, & 16, 1991, personnel from RAMCON Environmental Corporation conducted source emissions determinations on APAC of Tennessee's Astec double barrel hotmix asphalt plant located in Memphis, Tennessee. The testing was conducted according to the National Asphalt Pavement Association (NAPA) guidelines entitled, "Protocol for Air Pollution Source Testing".

The scope of work involved testing this facility for filterable and condensible particulate matter, formaldehyde, and polynuclear aromatic hydrocarbons (PAH). These compounds were sampled according to specified isokinetic testing procedures. Also, "real-time" continuous emissions monitor (CEM) instrumentation was utilized to conduct on-site analysis for oxygen (O_2), carbon dioxide (CO_2), total volatile organics (THC), sulfur dioxide (SO_2), carbon monoxide (CO), and nitrogen oxides (NO_x). Methane, benzene, toluene, ethyl benzene, and xylene compounds were analyzed on a semi-continuous basis by employing a gas chromatograph to the sampling location.

Additionally, stack gas moisture, velocity, and volumetric flow rate were determined to provide data enabling conversion of flue gas concentrations to emission data. These determinations were conducted in conjunction with each of the isokinetic testing procedures.

Where possible, the testing was conducted simultaneously. This provides correlations of the various stack effluents relationships with one another. Three (3) test runs were conducted for each testing procedure. Each test run was performed for a one hour duration.

The purpose of the testing project was to provide air emissions data for developing a database of information using various types of hot mix asphalt plants.

Mr. Bruce Shrader and Mr. Paul Taverna, laboratory techinicians of RAMCON Environmental Corporation, were responsible for the on-site sample recovery and particulate laboratory analysis including taring the beakers and filters and recording

final data in the laboratory record books. Custody of these samples were limited to Mr. Shrader and Mr. Taverna. Triangle Laboratories, Inc. of Durham, North Carolina conducted the PAH analysis. American Interplex of Little Rock, Arkansas conducted the formaldehyde analysis.

Mr. Thomas E. Brumagin representing the National Asphalt Pavement Association was present during the testing procedure(s) conducted by RAMCON Environmental Corporation. RAMCON Environmental's testing teams consisted of Ken Allmendinger; Field Supervisor and responsible for calibration of the instruments, Ray Jenkins; responsible for operating the gas chromatograph and conducting the PM and CPM testing, and Billy Lockett; responsible for conducting the PAH testing.

II. TEST RESULTS

Tables I - IV summarize the test results. Tables I & II summarize the instrumental gaseous concentrations and emissions summary. Table III shows the particulate results, Table IV the methane and BTEX concentrations, Table V the PAH results, and Table VI the formaldehyde test summary.

TABLE I
INSTRUMENTAL TEST SUMMARY
GASEOUS CONCENTRATIONS

Run #	THC, ppmd	SO2, ppmd	CO2, %d	CO, ppmd	O2, %d	NOx, ppmd
1	429.9	3.9	4.9	630.3	11.8	29.7
2	442.4	5.2	5.2	>1,000.0	11.1	28.2
3	358.5	3.8	5.1	>1,000.0	10.9	29.3
4	564.5	6.5	4.4	508.7	12.7	24.9
Avg.	448.8	4.9	4.9	784.8	11.6	28.0

TABLE II
EMISSIONS SUMMARY
LBS/HR

Run	THC as methane	SO2	CO	NOx
1	26.59	0.96	68.08	5.27
2	27.36	1.28	>108.01	5.00
3	22.53	0.95	>109.73	5.28
4	37.09	1.71	58.36	4.69
Avg.	24.75	1.04	98.89	5.21

TABLE III
PARTICULATE TEST SUMMARY
CONCENTRATION

Run	Particulate Gr/DSCF	Particulate g/DSCM	CPM* gr/DSCF	CPM g/DSCM
1	0.0119	0.0273	0.0048	0.0110
2	0.0211	0.0484	0.0094	0.0216
3	0.0137	0.0314	0.0050	0.0115
Avg.	0.0156	0.0357	0.0064	0.0147

*CPM = Condensible Particulate Matter

PARTICULATE EMISSIONS SUMMARY

Run #	Particulate Lbs/Hr	CPM Lbs/Hr
1	2.32	0.94
2	4.32	1.93
3	2.52	0.92
Avg.	3.05	1.26

TABLE IV
METHANE & BTEX TEST SUMMARY
PPM CONCENTRATIONS

Run #	Methane	Benzene	Toluene	Ethyl Benzene	Xylene(s)
1	103.4	1.0	0.7	0.6	0.7
2	171.2	1.3	0.1	0.1	0.3
3	145.9	1.4	0.1	0.1	0.4
4	296.5	1.3	0.1	0.0	0.1
Avg.	179.3	1.3	0.3	0.2	0.4

TABLE V
PAH TEST SUMMARY

Run #	Concentration Gr/DSCF	Emissions Lbs/Hr
1	0.000198	0.042
2	0.000173	0.037
3	0.000146	0.033
Avg.	0.000172	0.037

TABLE VI
FORMALDEHYDE TEST SUMMARY

Run #	Concentration Gr/DSCF	Emissions Lbs/Hr
1	0.0082	2.02
2	0.0089	1.96
3	0.0127	2.52
Avg.	0.0099	2.17

III. SAMPLING & ANALYTICAL PROCEDURES

A. Total Particulate - US EPA Reference Method 5:

1. Preparation - All glassware utilized in each sampling train was thoroughly cleaned and dried prior to each test series. A glass fiber filter was used that had been labeled, desiccated for a minimum of 24 hours and pre-weighed.

The impinger system configuration was assembled using the outlined procedure in Method 5. One hundred ml of deionized water was placed in the first two impingers. The third impinger was initially empty and the fourth impinger contained a pre-weighed amount of silica gel for complete moisture removal. In assembling the sample train, a small amount of silicon grease was placed on the ball joints to ensure adequate sealing.

A stainless steel probe liner and nozzle system was utilized for the total particulate determinations. The probe housed a set of calibrated S-type pitot tubes and a calibrated thermocouple for monitoring stack temperature.

2. Sampling - The sample box was heated to an approximate temperature of 250°F. These temperatures were monitored throughout the testing. An ice bath was prepared to submerse the impinger system. The temperature of the last impinger was monitored throughout the testing to ensure adequate condensation of the water vapor in the flue gases.

A leak check was performed prior to each test run. The entire sample train system was subjected to a vacuum that did not exceed 0.02 cfm leakage rate. The vacuum established during the pre-test leak check was not exceeded during the test period.

Three sample runs were conducted at the sampling location to constitute a complete test. The sampling time was a minimum of 1 hour and at least 30 scf of stack gas was extracted via the sampling system.

When a test run was completed, a post-test leak check was conducted prior to any dismantling of the sampling train. Once this was successfully achieved, the sample train was dismantled for sample recovery.

The probe and connecting glassware were washed with acetone. The contents of the impingers were also volumetrically measured for moisture gain and transferred to a labeled sample container. The glass fiber filter was carefully transferred to its sample container.

3. Analysis - The glass fiber filter were desiccated for 24 hours prior to any weighing. The first weighing was performed after this initial period of drying. After a minimum of 6 additional hours of desiccating, a second weighing was conducted. The weights must agree within 0.0005 g. All analysis data was recorded. Sample field blanks of acetone were collected, contained, labeled and analyzed in conjunction with the samples.

B. Determination of Sulfur Dioxide Emissions From Stationary Sources (Instrumental Analyzer Procedure) - US EPA Method 6C:

1. Calibration - The calibration of the instruments was performed using certified gas standards composed of a known concentration of sulfur dioxide in zero grade nitrogen. These gas standards were prepared using partial pressure/volumetric and gravimetric methods.

The prepared gas mixture is analyzed and the certification tolerance is not greater than 2% of the pollutant component. A copy of the analysis certificate for each of the certified gas mixtures used during the testing is included in the test report.

The instrument utilizes an ultraviolet nondispersive infrared detector. The detection limitation is 0.1 ppm. Two test ranges are available according to the sulfur dioxide levels present in the gas stream. A 100 ppm and a 1000 ppm full-scale may be utilized. In this project, the burner was utilizing natural gas as a fuel and subsequent sulfur dioxide levels were very low or non-detectable.

Immediately prior to each compliance test series, a complete calibration of the instrument was performed. Each instrument had zero grade nitrogen injected into it and the zero potentiometer was adjusted, if necessary, until the proper voltage output from the analyzer was achieved.

Then a high range pollutant gas mixture, that has been prepared in the specified range percentage of the span or full-scale, is injected. After the system stabilizes, the span or full-scale potentiometer was adjusted until the voltage output from analyzer corresponds to the certification of analysis for the respective calibration gas.

When this procedure is complete and the system has responded properly to a zero and full-scale reading, a mid range certified calibration gas is injected into the system. No adjustments are made to the system except to achieve proper flow rate through the analyzer. The analyzer, after reaching a stable value, must correspond to the certified value of the calibration gas within a specified percentage of the full-scale.

This mid range calibration gas serves two purposes of quality control and quality assurance. The first is to show the instrument analyzes and outputs data on a linear scale. The second purpose is to validate that the zero and full-scale values of the instrument are properly set.

2. Sampling - After calibration, the system is purged with zero grade nitrogen to remove any pollutants that were injected as calibration gas. Once the system indicates that the pollutant gases have been removed, the calibration valve assembly is positioned to allow stack gas to flow through the instrument.

The sample gas is filtered at the stack position to remove any particulate matter. This prevents instruments from being contaminated and ensures reliable data acquisition.

All samples injected to the instruments are removed from the stack and delivered to the instruments via a heated probe and sample line. This prevents any condensation of water vapor and/or pollutant in the gas stream.

Three test runs were conducted to determine the concentration levels of sulfur dioxide. The test runs were conducted over a period of one hour.

To demonstrate the instrument did not exhibit any deviation from the calibrated values set at the beginning of a test period, a sample of certified calibration gas is injected into the sampling system at the conclusion of each test run. The sample system must respond within specified tolerance limits according to the initial system bias check.

This post-test calibration serves two purposes: 1) it demonstrates that excessive calibration drift of the instrument(s) did not occur during the test period and, 2) that the system was not contaminated with any foreign material from the source to alter any results during the test period.

C. Determination of Nitrogen Oxides Emissions From Stationary Sources (Instrumental Analyzer Procedure) - US EPA Method 7E:

1. Calibration - The calibration of the instruments was performed using certified gas standards composed of a known concentration of nitrogen oxide in zero grade nitrogen. These gas standards were prepared using partial pressure/volumetric and gravimetric methods.

The prepared gas mixture is analyzed and the certification tolerance is not greater than 2% of the pollutant component. A copy of the analysis certificate for each of the certified gas mixtures used during the testing is included in the test report.

The instrument utilizes a chemiluminscent detector. The detection limitation of the analyzer is 0.1 ppm. Multiple full-scale ranges are available for operation. A 250, 1000, 2500, and 10,000 ppm full-scale may be selected according to the concentrations of NO_x present in the gas steam. The

concentrations encountered at the APAC of Tennessee hot mix facility were such that the 250 ppm scale was sufficient for bracketing the concentrations.

The initial calibration of the instruments was performed as previously mentioned in the sulfur dioxide section. A zero nitrogen and a high range calibration gas is utilized to set the instrument potentiometers for proper output.

2. Sampling - After calibration, the system is purged with zero grade nitrogen to remove any pollutants that were injected as calibration gas. Once the system indicates that the pollutant gases have been removed, the calibration valve assembly is positioned to allow stack gas to flow through the instrument.

Three test runs were conducted to determine the NO_x concentrations in the gas stream. Each test run will be conducted over a period of one hour.

To demonstrate that the instrument did not exhibit any deviation from the calibrated values set at the beginning of a test period, a sample of certified calibration gas is injected into the sampling system at the conclusion of each test run as in the sulfur dioxide testing. The sample system must respond within specified tolerance limits according to the initial system bias check.

D. Determination of Carbon Monoxide Emissions From Stationary Sources (Instrumental Analyzer Procedure) - US EPA Method 10:

1. Calibration - The calibration of the instruments is performed using certified gas standards composed of a known concentration of carbon monoxide in zero grade nitrogen. These gas standards are prepared using partial pressure/volumetric and gravimetric methods.

The prepared gas mixture is analyzed and the certification tolerance is not greater than 2% of the pollutant component. A copy of the analysis certificate for each of the certified gas mixtures used during the testing is included in the test report.

The instrument utilizes a Luft-type nondispersive infrared detector. The detection limitation of the analyzer is 0.1 ppm. Two full-scale ranges are available on the analyzer. A 500 ppm and a 1000 ppm full-scale may be utilized. The carbon monoxide levels encountered were analyzed using the 1000 ppm scale.

The initial calibration of the instrument is according to the procedure outlined above. Method 10, however, utilizes an additional calibration mixture for the calibration. A low level calibration gas is required in conjunction with the high and mid level calibration standards.

2. Sampling - Three (3) test runs were conducted to determine the emission value of CO. Each test run was conducted over a period of 1 hour .

To demonstrate that the instrument did not exhibit any deviation from the calibrated values set at the beginning of a test period, a sample of certified calibration gas is injected into the sampling system at the conclusion of each test run. The sample system must respond within specified tolerance limits according to the initial system bias check.

E. Determination of Gaseous Organic Emissions From Stationary Sources By Gas Chromatography - US EPA Method 18:

This procedure utilizes the technology of gas chromatography to separate, identify, and quantitate various volatile organic compounds that co-exist in a flue gas stream. In this testing project, methane and the BTEX compounds were targeted.

The gas chromatograph was first conditioned in the laboratory where ideal conditions exist for this initial calibration. This consists of conditioning the column, if necessary, and creating calibration curves based on actual data from the GC with known concentration standards. As required by EPA, three (3) standards of known concentration were used in creating the calibration curves. The concentrations of the standards bracketed the expected concentration of pollutant at the source level.

A field calibration check was performed prior to introducing any sample into the gas chromatograph. This is performed by injecting one of the known standards into the GC and comparing the result to the calibration curve. It must agree within 5% of the previously determined response.

Analysis of the samples follow a successful field calibration. Collecting the sample consisted of extracting the sample from the stack via a heated sample line. The sample was introduced directly into the sample loop, where it was injected to the instrument for analysis.

Three test runs were performed to determine the values of the specified organic compounds. Each test run consisted of semi-continuously analyzing the gas stream for a one hour period.

F. Determination of Total Gaseous Organic Emissions From Stationary Sources (Instrumental Analyzer Procedure) - US EPA Method 25A:

1. Calibration - The calibration of the instruments is performed using certified gas standards composed of a known concentration of methane in zero grade nitrogen. These gas standards are prepared using partial pressure/volumetric and gravimetric methods.

The prepared gas mixture is analyzed and the certification tolerance is not greater than 2% of the pollutant component. A copy of the analysis certificate for each of the certified gas mixtures used during the testing is included in the test report.

The instrument utilizes an flame ionization detector. The minimum detection limit of the analyzer is 0.1 ppm. Full-scale ranges are available in 100 ppm, 1000 ppm, and 10,000 ppm settings according to the expected concentrations in the flue gas steam. The total organic hydrocarbon concentrations encountered during the testing project enabled the 1000 ppm scale to be used.

As previously mentioned in the carbon monoxide procedure, a low level concentration is employed in conjunction with the high and mid range standards.

2. Sampling - Three test runs were conducted to determine the concentration levels of total organic compounds in the gas stream. Each test run was one hour in duration.

F. Polynuclear Aromatic Hydrocarbons - Method SW846 8270 "Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS): Capillary Column Technique

1. Preparation - All glassware utilized in each sampling train was thoroughly cleaned with hot soapy water and dried prior to each test series. All residue silicon grease was removed from glassware upstream of the absorbent module. A glass fiber filter was used that has been properly labeled.

The absorbent traps was packed by the analytical laboratory that conducted the final analysis. The impinger system was assembled using 100 ml of D.I. water in impingers 1 and 2. The third impinger was initially empty and the fourth impinger contained silica gel.

In assembling the sample train, teflon tape was placed on the ball joints to ensure adequate sealing upstream of the absorbent module. All connections downstream of the module were sealed with silicon grease.

A glass probe liner and nozzle system was utilized for the collection train. The probe housed a set of calibrated S-type pitot tubes and a calibrated thermocouple for monitoring stack temperature.

2. Sampling - The probe and sample box was heated to an approximate temperature of 250°F. These temperatures were monitored throughout the testing. The probe was connected to the heated filter system with connecting glassware. This filter system was connected to the condenser by a teflon line. The condenser and absorbent module are directly connected via ground glass ball and socket.

An ice bath was prepared to submerse the impinger system into. The temperature of the last impinger was monitored throughout the testing to ensure adequate condensation of the water vapor in the flue gases.

The condenser cooling fluid was recirculated through the system by a veristaltic pump. This pump was started prior to the start up of the sampling system to ensure that the temperature of the absorbent material in the module does not exceed its thermal decomposition temperature. The temperature of gas entering the module was monitored to ensure that the temperature did not exceed the recommended limitation for efficient capture.

A leak check was performed prior to each test run. The entire sample train system was subjected to a vacuum that did not exceed 0.02 cfm leakage rate. The vacuum that was established during the pre-test leak check was not exceeded during the test period.

Three sample runs were conducted to constitute a complete test. The sample time was a minimum of one hour. When a test run was completed, a post-test leak check was conducted prior to any dismantling of the sampling train. Once this had been successfully achieved, the sample train was dismantled for sample recovery.

3. Sample Analysis - Method 8270 is used to determine the concentration of semivolatile organic compounds in extracts prepared from all types of solid waste matrices. Each compound present in the sample is separated by gas chromatography and quantified by mass spectrometry. The detection limitation of this type of sample has been determined to be 1.0 microgram. If the samples are separated for further analysis, the detection limit will be 2.0 micrograms.

G. EPA Draft Method 202, "Determination of Filterable and Condensible Particulate Matter":

The testing procedures were conducted according to US EPA Reference Method 5 for particulate matter determination. This testing procedure was covered in a previous section. The filterable portion of the particulate matter

was determined via this procedure. The condensible fraction of the sample was determined by analyzing the back half impinger catch with a methylene chloride extraction.

This extraction procedure will yield fractions of inorganic and organic condensible matter. The concentrations and emission values of both filterable particulate and condensible particulate matter have been summarized in the test results section.

H. EPA Draft Method 0011, "Determination of Formaldehyde":

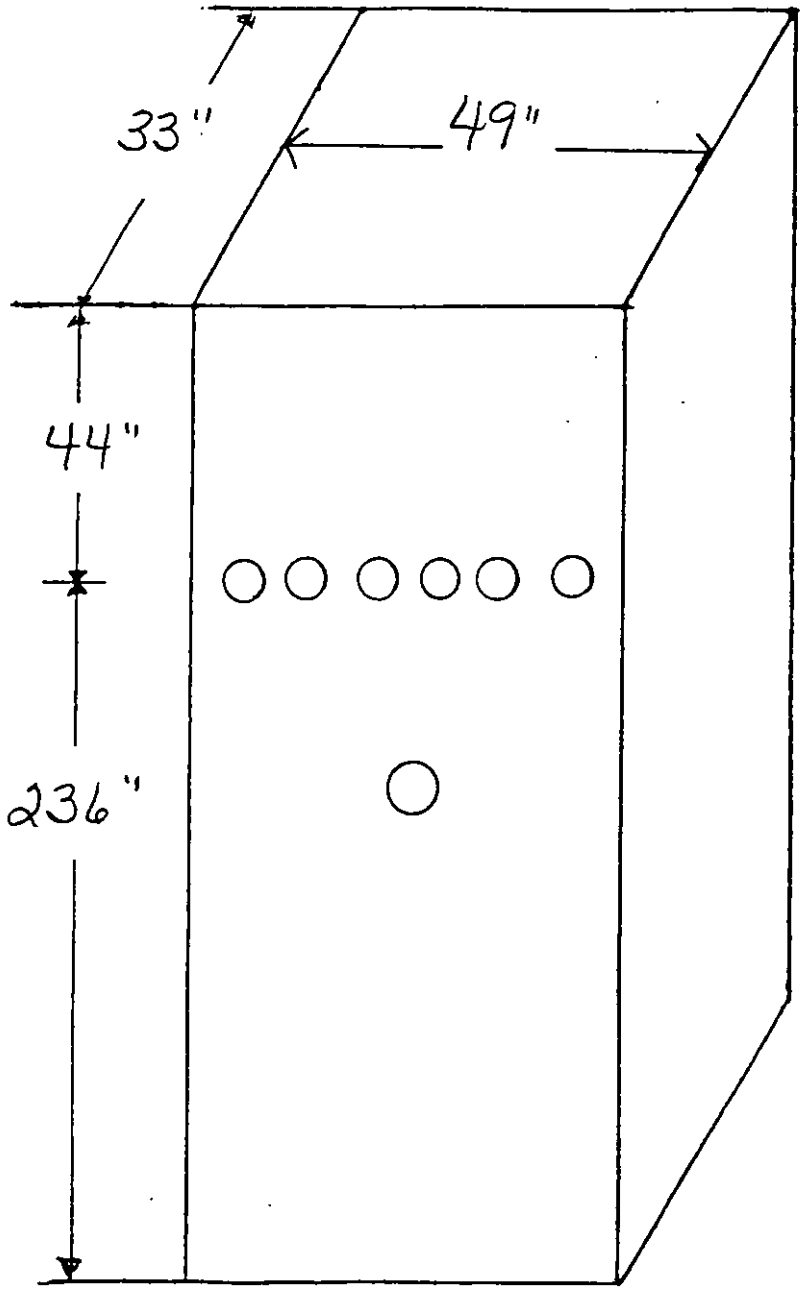
This sampling procedure is similar to the operational procedures found in Reference Method 5. Described in this section are the differences set forth from Method 5 to ensure that the integrity of the formaldehyde sample is maintained.

Prior to any sampling, all glassware was rinsed with methylene chloride to remove any contamination initially on the glassware such as stopcock grease. This includes the rinsing of the glass probe liner material required for the collection of the sample.

In collecting the sample, a minimum of 45 cubic feet must be pulled isokinetically such that the extracted sample is transferred through the DNPH absorption solution. All samples were placed into glass amber sample containers to avoid the alteration of the sample by sunlight.

The analysis of the formaldehyde samples were conducted according to the procedures outlined in Method 8315. This analysis procedure provides guidance in the evaluation of formaldehyde samples by High Performance Liquid Chromatography (HPLC).

Sampling Site: The emissions test was conducted after a baghouse on a rectangular stack measuring 33.0" x 49.0" with an equivalent diameter of 39.4". Six sampling ports were placed 44" down (1.1 diameters upstream) from the top of the stack and 236" up (6.0 diameters downstream) from the last flow disturbance. The ports were evenly spaced on 8.2" centers. The two outside ports are 4.1" from the side walls of the stack. The gaseous samples were taken from an additional sample port located 50" below the original sample ports and located in the center of the stack.



DATA SUMMARY ON STACK BEING TESTED

AGGREGATE

1. Name/type of mix 307 BM
2. Name/type of 2nd mix (if used) 307 B
3. Type/temperature of Liquid Asphalt AC 20 / 310 °F
4. Sieve/Screening analysis: _____ % Passing:

	1st mix / 2nd mix (307 BM / 307B)		1st mix / 2nd mix		1st mix / 2nd mix
1"	100 /	3/8"	40 / 58	#	/
3/4"	95 / 81	#200	4 / 3.5	#	/
1/2"	/ 63	#	/	#	/

CONTROL SYSTEM

Manufacturer WEM

A. Baghouse:

1. Type of bags Nomex # of bags 704 Sq. ft. of bags 4½" X 10'
2. Air to cloth ratio 8524 = 5.98 To 1 Designed ACFM 51,000
3. Type of cleaning - pulse jet ✓ reverse air _____ plenum pulse _____ other _____
4. Cleaning cycle time [illegible] sec. Interval between cleaning cycle 7.5 sec.
5. Pulse pressure on cleaning cycle 80 psi

B. Scrubber:

1. Type - Venturi _____ Wet Washer _____
   Spray Booth _____ Other _____
2. Gallons per minute through system _____
3. Water source _____ (i.e., pond, lagoon, etc.)
4. Number of spray nozzles _____

Company Name _____ Date _____

Company Representative _____

TEC#03

8-9-91

DATA ON FACILITY BEING STACK TESTED

COMPANY NAME APAC Tennessee COMPANY REP. Joe Roberts PHONE (901) 942-1800
LOCATION OF FACILITY Memphis, TN. ORIGINAL START-UP DATE 6-89 DESIGNED CAPACITY
OEM ASTEC Ind. INC MODEL NO. 8' Double Barrel TYPE AC TYPE AC 20

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 % TPH	7 Mix Temp. °F	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
11:11		82%		348.6	104.6	11.66	311	260	5.1				88% - .25" W.C.
11:26		82%		332.8	107.3	10.18	317	255	5.1				88% - .23" W.C.
11:41		82%		354.5	90.3	10.12	319	257	5.1				88% - .24" W.C.
12:04		82%		352.8	89.7	10.2	319	260	5.0				88% - .23" W.C.
12:15		78%		351.4	88.6	10.18	324	260	5.0				87% - .24 WC
12:30		78%		305.03	87.0	11.8	322	260	5.1				87% - 2.4 WC
12:45		73%		371.3	127.0	12.9	304	260	5.1				87% .2.2 W.C.
13:00		73%		344.8	100.1	11.5	306	263	5.0				87% .2.2 WC
15:00		71%		348	106	11.4	328	270	5.1				87% .2.2 WC
15:15		71%		346.9	89.4	10.2	322	270	5.0				87% .23 WC
15:30		71%		340.4	87.3	10.24	322	270	5.1				87% .2.3
15:45		71%		344.7	86.5	10.1	320	272	5.1				87% .23
16:00		66%		369.7	126.3	12.4	320	268	5.0				85% .24 WC
16:16		67%		365.2	121.1	12.1	312	262	5.0				85% .25 WC
16:30		67%		347.7	103.1	11.3	329	262	5.2				88% .25 WC.

Form REC 4

8-1--91

PAGE ___ 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 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 Exhaust Fan Load	
8:40		77		365.5	91.9	9.67	297	250	5.0				90% .24	WC
8:55		82		299.7	90.5	10.1	317	250	5.6				90% .26	WC
9:10		82		328.5	96.1	10.6	295	250	5.8				90% .28	W
9:25		85		329.4	97.7	10.9	299	250	5.9				90% .29	W
9:40		85		317.2	95.0	10.6	305	250	5.9				90% .3	W
9:55		85		323.9	80.9	9.6	303	250	5.9				90% .30	W
10:10		85		288.2	86.0	10.9	295	255	5.9				90% .28	W

Form REC#03

8-15 91

DATA ON FACILITY BEING STACK TESTED

COMPANY NAME APAC Tennessee COMPANY REP. Joe Roberts PHONE (901) 942-1800
LOCATION OF FACILITY Memphis, TN. ORIGINAL START-UP DATE 6-89 DESIGNED CAPACITY
OEM ASTEC MODEL NO. Double Barrel TYPE AC TYPE AC-30

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 Venturi Scrubber / Baghouse Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
8:30		51%		247.6		7.36	312	236	4.2"				88% .30"wc.
8:45		51%		249.1		7.5	310	240	4.8"				88% .30wc
9:00		51%		251.6		7.55	314	241	4.9"				88% .30 wc
9:15		51%		253.1		7.57	316	245	5.0				88% .30wc
9:30		51%		253.0		7.45	315	246	5.0				88% .30"wc
9:45		51%		249.5		7.44	314	249	5.0				88% .30wc
10:00		51%		246.6		7.62	309	250	5.0				87% .30wc
10:15		51%		249.7		7.65	311	250	5.0				87% .30"wc
10:30		51%		249.0		7.57	318	250	5.0				87% .30wc
10:45		51%		253.7		7.65	321	252	5.0				87% .30wc
11:00		51%		251.9		7.48	324	251	5.0				87% .30"wc
11:15		51%		250.4		7.60	321	250	5.0				87% .30wc
11:45		48%		252.5		7.52	327	250	5.0				87% .30"wc
12:00		47%		250.7		7.68	323	250	5.0				87% .30"wc
12:15		44%		253.0		7.55	325	250	5.0				88% .30wc
12:30		44%		252.4		7.65	318	248	5.0				88% .32"wc
12:45		44%		252.6		7.45	327	248	5.0				88% .32wc
13:00		43%		250.5		7.55	328	247	5.0				89% .32wc

Form REC 4

8-15-97

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 ☐ 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
13:15		42%		249.0		7.65	328	250	5.0"				89% .34" WC
13:30		42%		249.2		7.48	332	250	5.0"				89% .34 WC
	PRODUCTION STOPPED												
14:10		54%		253.1		7.45	299	222	3.8"				82% .22 WC
14:25		40%		250.2		7.60	330	240	4.5"				85% .30" WC
14:40		38%		248.3		7.54	327	242	4.7				85% .34 WC

Form REC#03

8-16-01

DATA ON FACILITY BEING STACK TESTED

COMPANY NAME APAC Tennessee COMPANY REP. Joe Roberts PHONE (901) 942-1800
LOCATION OF FACILITY Memphis, TN. ORIGINAL START-UP DATE 6-89 DESIGNED CAPACITY
OEM ASTEC MODEL NO. Double Barrel TYPE AC TYPE AC-30

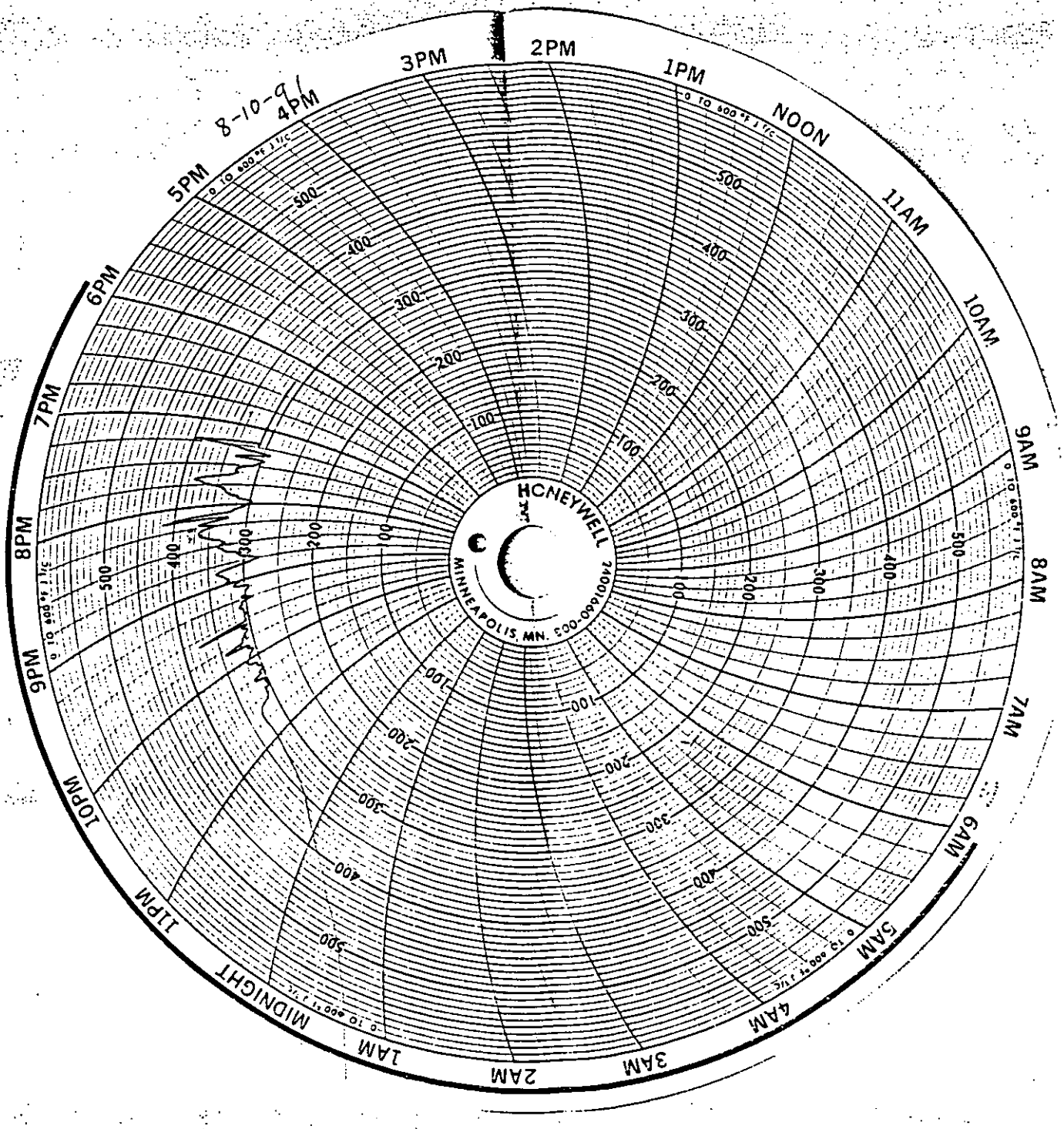
1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use ☐ #Fuel Oil ☑ Nat. Gas ☐ Propane ☐ Coal ☐ other	3 Burner Setting	4 Blower Pressure	5 Production Rate ☑ Mix ☐ Aggregate TPH	5 Production Rate ☐ RAP TPH	6 Asphalt Cement %	7 Mix Temp. °F	8 Exhaust Gas Temp. °F	9 ☐ Venturi Scrubber ☐ Baghouse Pressure Drop In w.g.	9 Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
7:20		49%		255.2	173.6	8.53	318	200°	3.0"				82% .24"w
7:35		50%		275.4		7.73	326	210	3.8"				88% .28"w
7:50		54%		273.6		8.28	297	234	4.5"				88% .28"w
8:05		55%		282.9		8.37	299	245	4.8"				88% .28"w
8:20		64%		295.0		8.90	304	255	5.0				88% .22"w
8:35		64%		301.7		9.0	304	268	5.5				88% .30"w
8:50		64%		304.7		10.3	307	272	5.5				88% .30"w
9:05		64%		301.2		10.1	308	272	5.5				88% .30"w
9:45		65%		297.5		10.3	302	274	5.5				88% .30"w
10:00		62%		312.3	94.1	10.5	301	250	5.4				90% .34"w
10:15		63%		302.1	94.8	10.1	324	240	5.2				90% .32"w
10:30		63%		301.6	88.9	9.9	321	238	4.9				88% .28"w
10:45		61%		298.2		10.28	312	270	5.0				87% .28"w
11:00		61%		300.6		10.2	317	278	5.5				87% .28"w
11:35		63%		305.8	91.4	10.0	321	245	5.3				90% .36"w
11:50		63%		300.8	94.1	9.8	320	240	5.0				90% .34"w

Form RE 04

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 Venturi Scrubber Baghouse Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
12:05		63%		298.4	91.14	9.7	325	240	5.0				90% .32" W
12:20		63%		295.1		10.1	313	268	5.1				88% .28" W
12:35		63%		302.3		10.2	319	280	5.4				88% .3" W
12:50		63%		292.8		9.7	318	280	5.5				88% .3" W
13:05		63%		296.1	87.3	9.9	340	250	5.2				88% .32" W
13:40		50%		290.9	85.4	9.75	335	245	4.9				87% .30" W
13:55		50%		291.5	92.9	9.65	311	238	4.5				87% .3" W
14:10		50%		302.8	91.1	10.2	293	235	4.5				87% .30" W
14:25		57%		319.3	112.6	19.5	293	235	4.5				87% .30" W
14:40		60%		305.6	90.7	10.1	312	238	4.7				87% .30" W

8-9-91
6AM
5AM
4AM
3AM
2AM
1AM
MIDNIGHT
11PM
10PM
9PM
8PM
7PM
6PM
5PM
4PM
3PM
2PM
1PM
NOON
11AM
10AM
9AM
8AM
7AM
HONEYWELL
MINNEAPOLIS MN
24001660-003
0 TO 600 °F 1 1/2
100
200
300
400
500


8-10-91
NOON
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MIDNIGHT
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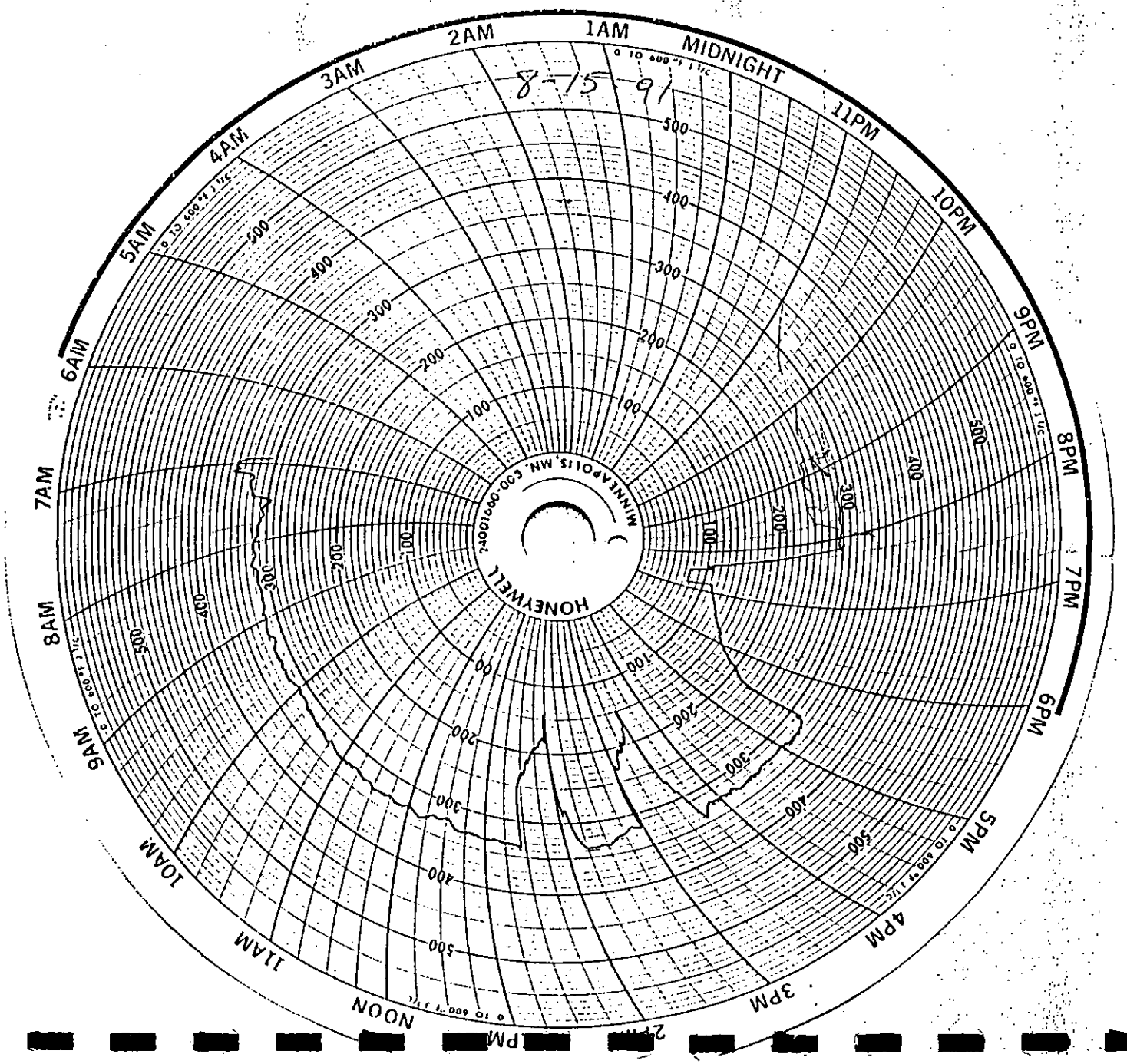
HONEYWELL
MINNEAPOLIS, MN.


8-15-91
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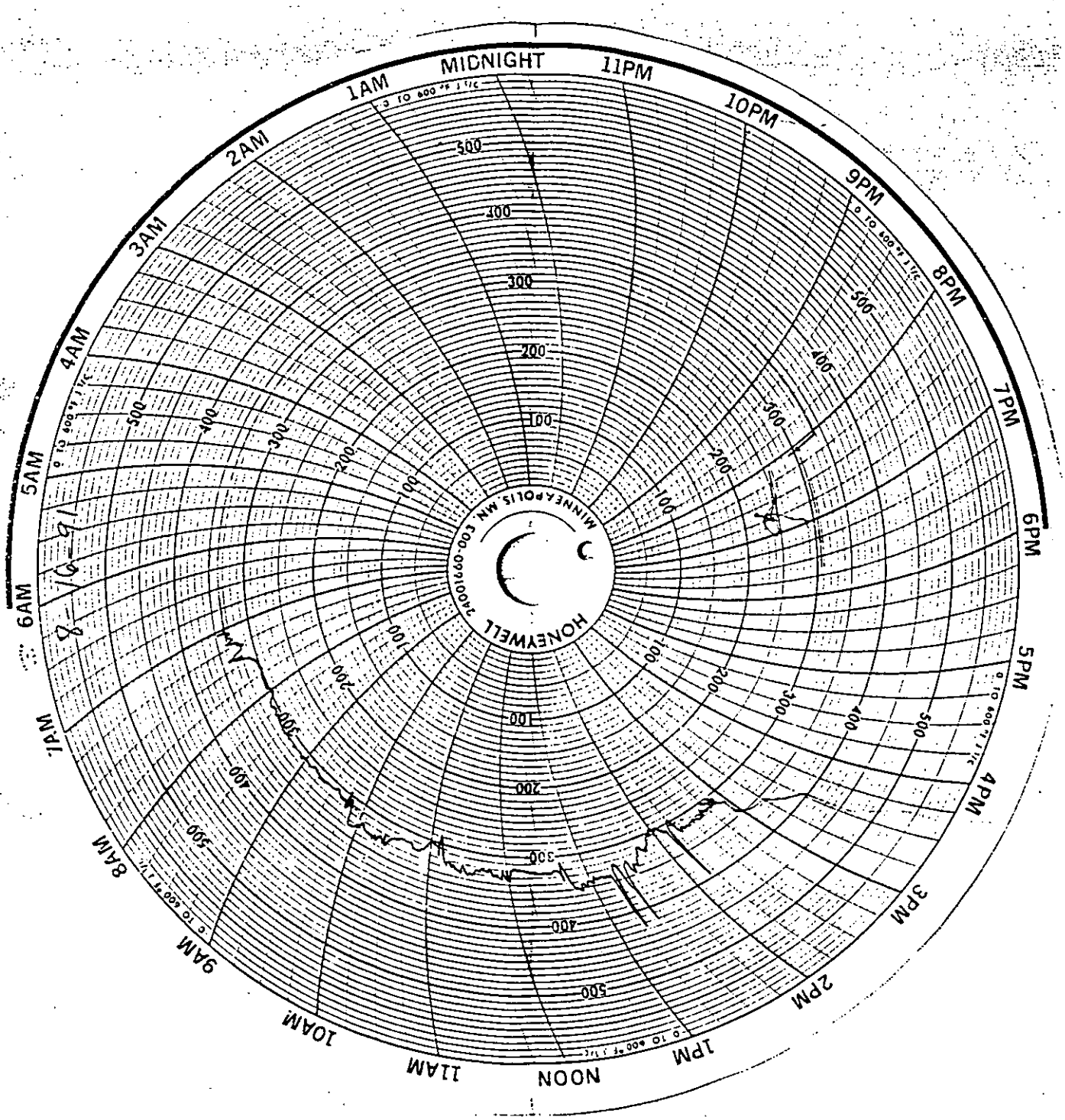
HONEYWELL
MINNEAPOLIS, MN. 530-0991004


MIDNIGHT
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NOON
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10PM
11PM
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400
500
HONEYWELL
MINNEAPOLIS MN. 2400100-0990600

V. EQUIPMENT USED

Equipment used on conducting the particulate emissions test was:

A. The Lear Siegler PM-100 stack sampler with appropriate auxillary equipment and glassware. The train was set up according to the schematic on the nex page.

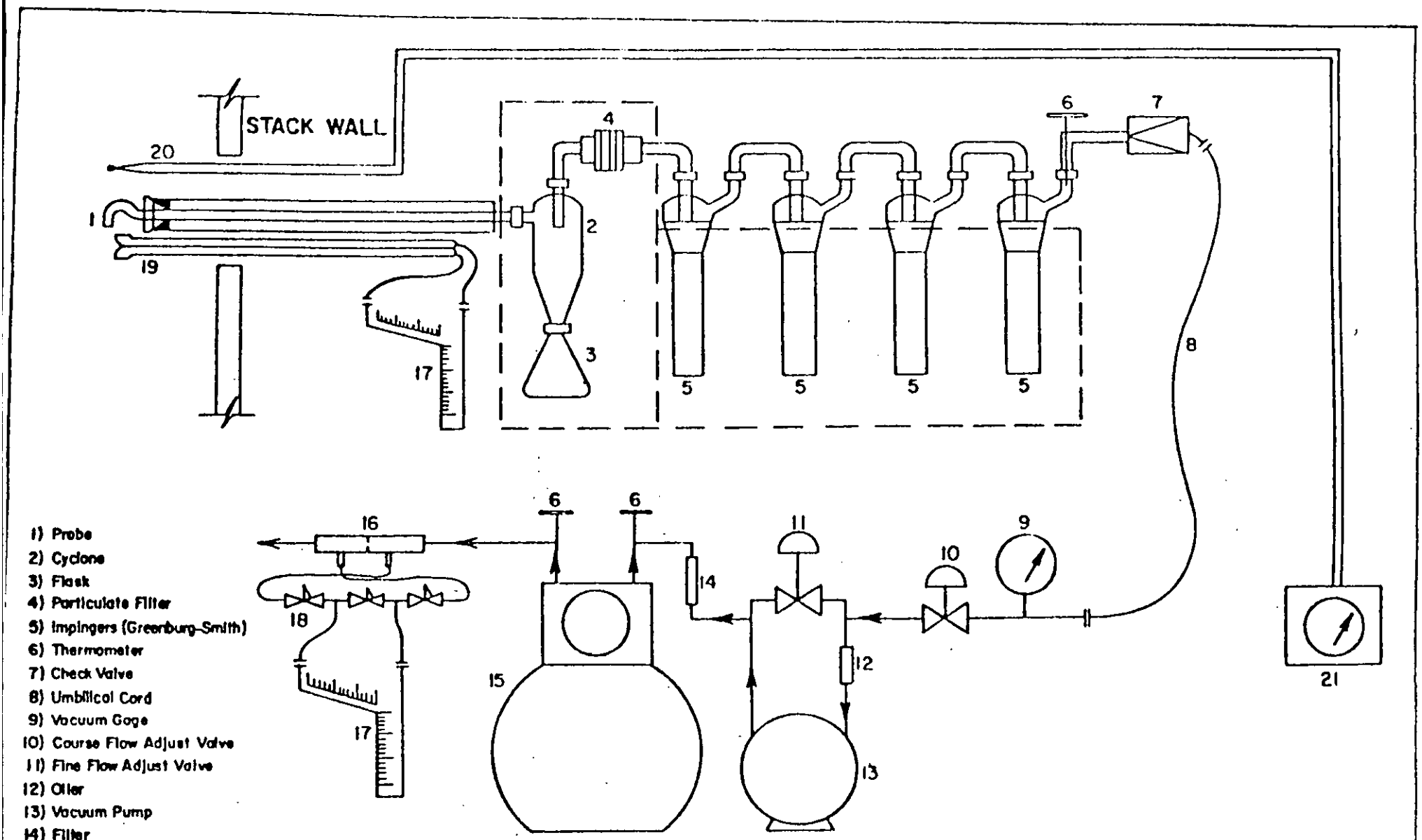
B. An Airguide Instruments Model 211-B (uncorrected) aneroid barometer was used to check the barometric pressure.

C. Weston dial thermometers are used to check meter temperatures. An Analogic Model 2572 Digital Thermocouple is used for stack temperatures.

D. A Hays 621 Analyzer was used to measure the oxygen, carbon dioxide and carbon monoxide content of the stack gases. For non-combustion sources, A Bacharach Instrument Company Fyrite is used for the gas analysis.

E. Filters are mady by Schleicher and Schuell and are type 1-HV with a porosity of .03 microns.

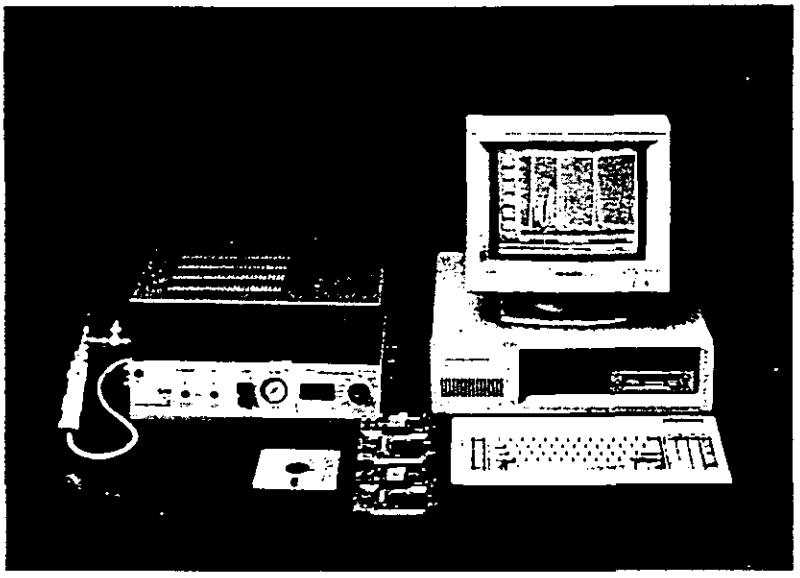
F. The acetone is reagent grade or ACS grade with a residue of $\leq$ .001.



1) Probe
2) Cyclone
3) Flask
4) Particulate Filter
5) Impingers (Greenburg-Smith)
6) Thermometer
7) Check Valve
8) Umbilical Cord
9) Vacuum Gage
10) Course Flow Adjust Valve
11) Fine Flow Adjust Valve
12) Oiler
13) Vacuum Pump
14) Filter
15) Dry Gas Meter
16) Orifice Tube
17) Incline Manometer
18) Solenoid Valves
19) Pitot
20) Thermocouple
21) Pyrometer

SAMPLING TRAIN
USED FOR ISOKINETIC SAMPLING

8610 Gas Chromatograph



Low Cost GC • Free Data System/Integrator
Field Portable • Built-In Purge and Trap
Temperature Programmable • Multiple Detectors

Miniature Lab GC

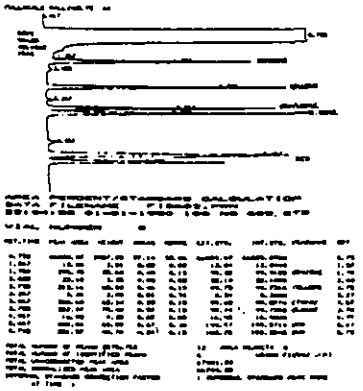
At a fraction of the cost, the SRI 8610 Gas Chromatograph provides the capabilities and sophistication of vastly larger and more expensive instruments in a small, lightweight and attractive package. More of a miniaturized laboratory GC than a true portable, the 8610 is the perfect size and weight for easy field use without sacrificing big GC features. In the lab or in the field, the 8610 Gas Chromatograph gives you up to five detectors plus a built-in purge and trap in a simple to operate, easy to troubleshoot, and unbelievably low cost package. And, the Peaksimple Data System, provided free with every 8610 GC turns your IBM PC into a powerful chromatography integrator which also controls the 8610's temperature program and purge and trap.

Multi-Level Temperature Programming

Temperature programming is a standard feature on every 8610 GC. Up to 15 ramp/-plateau segments permit maximum flexibility. Because the temperature program is controlled by the data system, an unlimited number of different temperature programs may be permanently stored on disk and activated with a few keystrokes. The 8610's temperature program can be controlled either by the Peaksimple Data System (included free with every GC) or by any other data system or integrator which has the ability to close relay contacts at specified times during the run.

Ultra Low Mass Column Oven

The SRI 8610's large easily accessible column oven is designed to fit all standard packed and capillary columns with diameters up to eight inches. The ultra-low mass design allows rapid heat-up and cool-down from ambient to 250 degrees centigrade. Interchangeable screw-in heater elements allow power consumption to be reduced for low temperature battery powered applications, or easy heater replacement in the event of a failure. Squirrel-cage type oven fan insures uniform heat distribution and stability to within .1 degree.



100 NG. 602 STD. Data plotted using Peaksimple Data System.

Digital Gas Flow Controllers

The carrier gas flow rate is regulated by a unique Digital Flow Controller. Precise and reproducible even at capillary flow rates below 1 cc/per minute., the carrier gas flow controller is standard equipment on every SRI 8610 GC (except low-cost student model). Digital dial allows flow rates to be adjusted without having to measure actual flows with a bubblemeter. A column head pressure gauge is provided to alert the operator to leaks or blockages in the column. The same flow controller is optionally available for hydrogen and air combustion gas flows (recommended for NPD operation). In addition, inlet pressure regulators are supplied for each gas to isolate the GC from fluctuations in gas supply pressure.

Direct Cool On Column Injection

The zero-dead volume on-column injector is designed for state of the art, cool on-column injections using both packed and wide-bore capillary (.53mm.). A special wide-bore adapter positions the .53mm column so the syringe smoothly deposits the sample in the bore of the column itself. This provides a totally inert, metal and glass free sample path. Peaks are exceptionally sharp and well resolved.

Detectors

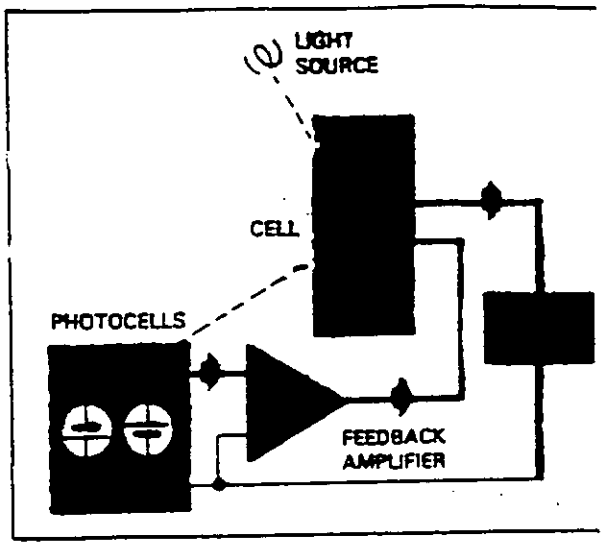
Thermal Conductivity (TCD)	Photo-Ionization (PID)
Flame Ionization (FID)	Electron Capture (ECD)
Nitrogen-Phosphorus (NPD)	Hall Detector (HALL or ELCD)
Thermionic Ionization (TID)	Flame Photometric (FPD)

Up to 3 detectors may be mounted simultaneously and plumbed in series so that one injection passes through each detector and into the next. Common series configurations include: (PID-FID), (TCD-FID), (PID-ECD), (PID-HALL) and (PID-ECD-FID).

Servomex

1400 Series Gas Analyzers

PRINCIPLES OF OPERATION



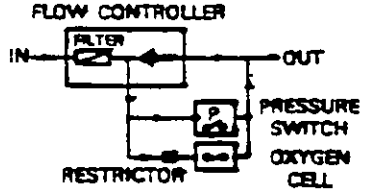
SPECIFICATION — OXYGEN

Principle	Magneto-dynamic
Linearity	±0.2% O_2
Repeatability	±0.2% O_2
Zero Drift (Per Week)	<0.2% O_2
Signal Output	0-1V non-isolated for 0-100% O_2
Alarms	Flow alarm. 4 sets of changeover relay contacts rated at 3A/120V AC, 1A/240V AC or 1A/28V DC
Display	3½ digit LCD reading 0 to 100% O_2
Response Time	Less than 15 seconds to 90%
Operating Ambient Temperature	32 - 104°F (0 - 40°C)
Relative Humidity	0 - 85%, non-condensing
Sample Pressure	0.2 to 0.6 barg
Flowrate	1.5 to 6 liters/min
Sample Condition	Clean, dry, non-toxic, non-flammable gas
Sample Contact Materials	Stainless steel, pyrex glass, brass, platinum, epoxy resin, viton, polypropylene and glass fibre
AC Supply	110 to 120V AC, or 220 to 240V AC, ±10%, 48 to 62Hz, 15VA maximum
Dimensions	19" Rack - 4U case Bench top - 7.1" (180mm) high, 10.1" (256mm) wide, 15.4" (390mm) deep
	22 lbs (10kg) approximately

PARAMAGNETIC OXYGEN

The oxygen analyzer measures the paramagnetic susceptibility of the sample gas by means of a magneto-dynamic type measuring cell.

Oxygen is virtually unique in being a paramagnetic gas, this means that it is attracted into a magnetic field. In the Servomex measuring cell, the oxygen concentration is detected by means of a dumb-bell mounted on a torque suspension in a strong, non-linear magnetic field. The higher the concentration of oxygen, the greater the dumb-bell is deflected from its rest position. This deflection is detected by an optical system and twin photocells connected to an amplifier. Around the dumb-bell is a coil of wire. A current is passed through this coil to return the dumb-bell to its original position. The current is measured and is proportional to the oxygen concentration.



Gas Flow Diagram

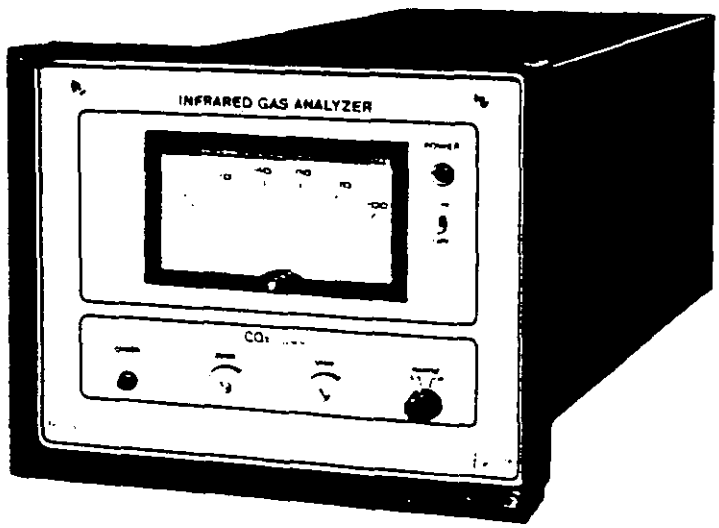
Advantages

- Not cross-sensitive to most common gases
- Long lifetime
- Rugged design
- No routine cell maintenance

Environmental Products

FUJI 730

NDIR SINGLE GAS ANALYZER



**Analog Display Shown,
Digital Display Available**

- **Unique Mass Flow Sensor System Eliminates Interference**
- **Ideal For Applications In**
  - **Combustion Monitoring/Control**
  - **Hydrocarbon Monitoring**
- **Measures In Two Ranges**
  - **Carbon Monoxide (CO)**
  - **Carbon Dioxide (CO_2)**
  - **Methane (CH_4)**
- **Designed For Continuous Operation and Low Maintenance**

The unique Mass Flow Sensor used in the Fuji 730 Single Gas Analyzer provides significant advantages over other sensors used for this purpose. The design of the Mass Flow Detector minimizes the adverse effects of vibration which is often present in harsh environments. In addition, the Mass Flow Sensor System virtually eliminates interference making the Fuji 730 a powerful analytical tool for monitoring burner and boiler efficiency, heat treatment, fermentation, well logging and many other applications which require exceptional accuracy, stability, high sensitivity and reliability.

See specifications on reverse side

FUJI 730 SINGLE GAS ANALYZER

PRINCIPLE OF OPERATION

The Fuji 730 Series Analyzers use the infrared absorption characteristic of gases to measure the concentration of gas samples. An efficient single beam design which incorporates a unique mass flow sensor system insures accurate and interference free analysis for a wide variety of applications.

A single beam of infrared energy is chopped and passed through a sample cell containing the flowing gas sample. Due to the absorption characteristic, the amount of energy in the beam is reduced by the concentration of the measured gas in the sample. The attenuated infrared beam is passed serially through the two cavities of the mass flow sensor which contain a high concentration of the gas species the analyzer is intended to measure. The two cavity sensor performs two functions in the analyzing process, it first eliminates interference caused by other gases and water vapor by detecting and subtracting the interference component from the detector output, and secondly, produces an output signal which represents an accurate duplication of the relative infrared energy absorption. this resultant signal is electronically processed and linearized to provide an electrical signal which drives meters and other output devices.

STANDARD GASES

Carbon Monoxide (CO)
Carbon Dioxide (CO_2)
Methane (CH_4)

STANDARD RANGES

0 - 500/1000 ppm
0 - 1000/2000 ppm
0 - 2000/5000 ppm
0 - 2500/5000 ppm

0-0.5/1.0%
0-1/2%
0-2/5%
0-5/10%
1-10/20%

PURGE GAS FITTING

Standard Equipment

INTERNAL SPAN CHECK FEATURE

Calibration check without the use of span gases.
Conserves gas and reduces operating costs.

SPECIFICATIONS

Repeatability
±0.5% of full scale (low range)
±1.0% of full scale (high range)

Zero Drift*
±1% of full scale per 24 hours

Span Drift*
±1% of full scale per 24 hours

Linearity
±2% of full scale (with linearizer)

Noise Level
0.5% of full scale

Speed of Response
90% indication

Electrical
2,3 or 5 seconds (field selectable)

Pneumatic
less than 15 seconds (depending on cell length)

Warm-Up
Two hours (to ±2% full scale)

Internal Span Check
Manually activated from front panel

Outputs
0 to 1V DC, linear & 4-20mA DC, linear

Ambient Temperature Range
23 to 113°F (-5 to 45°C)

Ambient Humidity
To 90% R.H. (non-condensing)

Sample Gas Temperature
32 to 122°F (0 to 50°C)

Sample Gas Flow Rate
2 ±1 scfh (1.0 ±0.5 slpm)

Purge Gas Rate(where necessary)
2 scfh (1 slpm) when required

Power Requirements
115V AC±10%, 60 Hz, 30VA

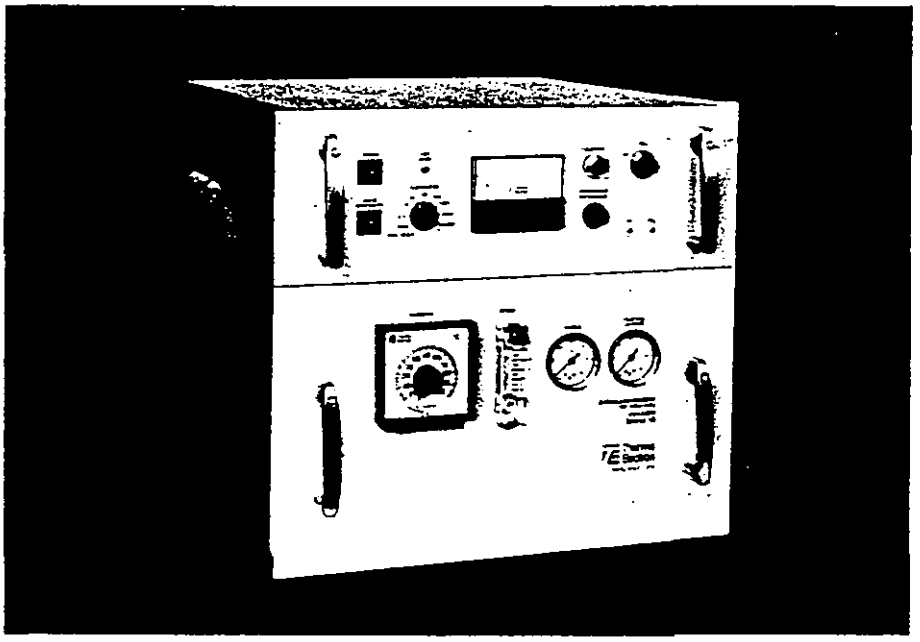
Gas Connections
All ¼" compression-type tube fittings

Size and Weight
7.9 (H) x 9.8 (W) x 21.3 (D) inches
(200 x 250 x 541 mm)
24.2 pounds (11 kg)

*constant conditions

Thermo Electron CORPORATION
Environmental Instruments Division

Chemiluminescent NO/NO_x Analyzer



Model 10
For Continuous Source Gas Monitoring

Thermo Electron's Model 10 NO/NO_x Analyzer is based on the chemiluminescent reaction between nitric oxide (NO) and ozone (O_3) according to the reaction:

$$NO + O_3 \rightarrow NO_2 + O_2 + h\nu$$

Light emission results when the electronically excited NO_2 molecules revert to their ground state.

A front panel mode switch provides for either a direct readout of the NO concentration in the sample being analyzed ("NO" mode) or the total NO_x concentration ("NO_x" mode). When the Model 10 is placed in the "NO_x" mode, the sample stream passes through a NO_x-to-NO converter prior to entering the reaction chamber for subsequent analysis.

Key Features

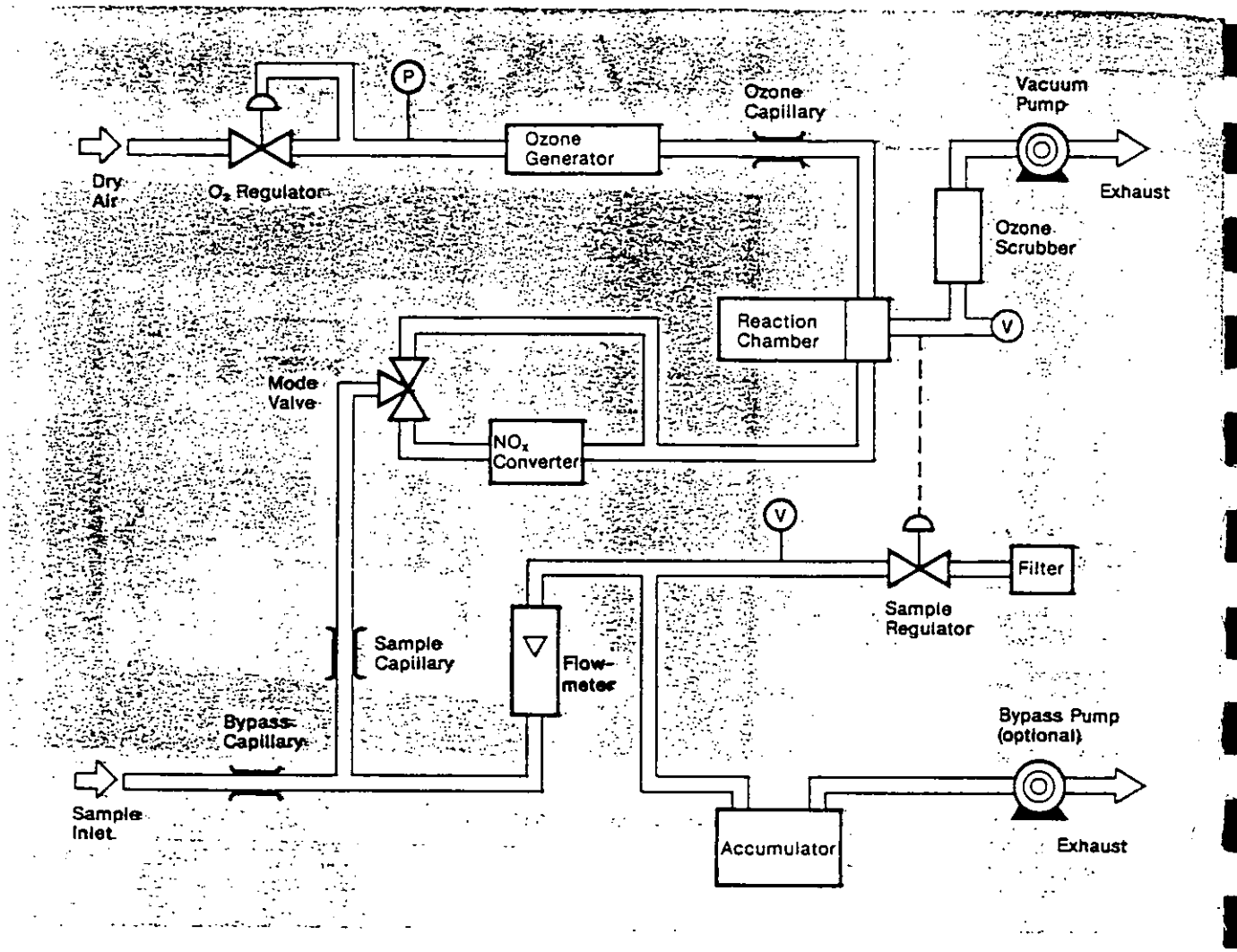
- Selective detection of NO or NO_x
- Eight ranges, from 2.5 to 10,000 ppm FS
- Continuous monitoring with rapid response
- Linear on all ranges
- Field proven reliability
- Insensitive to changes in sample flow

Model 10 Specifications*

Ranges	0–2.5 ppm 0–250 ppm 0–10 ppm 0–1000 ppm 0–25 ppm 0–2500 ppm 0–100 ppm 0–10,000 ppm
Minimum Detectable Concentration	.05 ppm
Noise	Less than 1% of FS
Reproducibility	1% of FS
Operating Temperature Extremes	0–40°C
Response Time (0–90%)	~1.5 second NO mode ~1.7 second NO_x mode
Zero Stability	± 1 ppm in 24 hours
Span Stability	± 1% in 24 hours
Linearity	± 1% from 0.05 to 10,000 ppm**
Power Requirements	1000 watts, 115 ± 10 volts, 60 Hz standard. Also available in 115V 50 Hz, and 210 ± 15 volts, 50 Hz versions
Physical Dimensions	19" wide × 17" high × 20" deep
Instrument Weight	75 lbs. (including pump)
Outputs	Two standard outputs supplied: 1) 0–10V; 2) Field selectable from 0–10V, 5V, 1V, 100mV or 10mV. (ma options available.)

*Specifications are typical and subject to change without notice.
**With O_2 Feed: With dry air, linearity to 2000 ppm.

Model 10 Flow Scheme



As illustrated in the above diagram, sample gas enters the Model 10, flows through the bypass capillary, and divides. Most of the sample flows through the flowmeter, accumulator, bypass pump, and exhausts. Only a small amount of sample flows through the sample capillary for analysis. The bypass pump in conjunction with the sample regulator maintain a constant pressure differential across the sample capillary, thus maintaining constant sample flow for analysis. This plumbing network makes the analyzer insensitive to pressure fluctuation in the sample inlet.

From the sample capillary, the sample to be analyzed is either directed through the NO_x to NO converter or around it, depending on the choice of the operator. In the reaction chamber the sample reacts with ozone to produce the light emission and is exhausted. The ozone is produced internally from dry air entering through the oxygen regulator and ozonator. The light emission is sensed by the photomultiplier tube and amplified.

Options

10-001 Bypass pump assembly includes pump, shock tray, accumulator, tubing, and fittings.

Accessory Instruments

Model 700 Heated Capillary Module
Model 606H Heated Particulate Filter
Model 800 Sample Gas Conditioner
Model 900 Sample Gas Conditioner

Thermo Electron
CORPORATION

Environmental Instruments Division

108 South Street
Hopkinton, MA 01748
Telephone (617) 435-5321
Telex 948325

Environmental Products

PACE ENVIRONMENTAL PRODUCT
A DIVISION OF PACE ASSOCIATES, INC.
1196 EASTON ROAD
HORSHAM, PA 19044
PHONE: (215) 957-1144
FAX: (215) 957-1186

FUJI 760

NDIR GAS ANALYZER

Bench Top or Rack Mount Available

- **Unique Mass Flow Sensor System Eliminates Interference**
- **Wide Dynamic Range Permits Ultra-Sensitive and High Concentration Gas Analysis**
- **Measures**
  - **Carbon Monoxide (CO)**
  - **Carbon Dioxide (CO_2)**
  - **Sulfur Dioxide (SO_2)**
  - **Nitric Oxide (NO)**
  - **Methane (CH_4)**
- **Designed For Continuous Operation and Low Maintenance**
- **Insensitive to Vibration**

This instrument is designed for stack monitoring and process control applications. It's remarkable accuracy and fast reponse makes it an ideal instrument for CEMS, boiler control equipment, research labs and many other monitoring applications. For usage requiring ultra sensitive measurement, the Fuji 760 delivers superior performance. Using the Non-Dispersive Infrared (NDIR) Mass Flow Detector, low concentration measurements are accurate and reliable. The Fuji 760 incorporates an Interference Compensating Detector which minimizes the effects of other gases, particularly when operating in ranges of high sensitivity.

Warranty
Whittaker warrants each new gas analyzer of its manufacture to be free of defects in material and workmanship for one year from the date of delivery. For full warranty information, contact your representative.

See specifications on reverse side

FUJI 760 Gas Analyzer

FEATURES OF THE FUJI-760

The Fuji 760 Analyzer uses infrared absorption techniques to measure gas concentrations, however, many innovative patented features make this instrument far superior to conventional Non Dispersive Infrared Analyzers. Among its unique features are an optical chopper design which virtually eliminates the effects of vibration and resultant optical noise; a mass flow sensor system which reduces the effects of interfering gases to insignificant levels, thus permitting gas analysis at low concentration ranges; and a dual beam optical system derived from a single infrared source which enhances long term stability.

PRINCIPLE OF OPERATION

A single beam of infrared energy is modulated and split into two parallel beams by a distribution cell. One beam is passed through a reference cell containing a non-absorbing gas, and the other beam is passed through a cell containing the sample gas being measured. The beam passing through the sample cell is attenuated by the amount of gas concentration in the sample and compared against the unattenuated reference beam by the mass flow detector system. One set of detectors sense the amount of sample gas as compared against the reference, the second set of detectors measure and cancel interferents in the sample. The outputs of the detectors are electronically processed and conditioned into useable signals for indicators and other output devices.

Detectable Gas Ranges

Standard Configuration

Component	Minimum Range
Carbon Monoxide (CO)	0 to 100 ppm
Carbon Dioxide (CO_2)	0 to 50 ppm
Nitric Oxide (NO)	0 to 100 ppm
Sulfur Dioxide (SO_2)	0 to 100 ppm
Total Hydrocarbons	0 to 500 ppm

Other Gases can be measured. Call our applications engineer or your local sales representative to discuss the suitability for your specific needs.

Specifications (Standard Configuration)

Repeatability
± 0.5% of full scale

Zero Drift
± 2% of full scale per week

Span Drift
± 2% of full scale per week

Linearity
± 2% of full scale

Speed of Response
90% indication within 5 seconds (Electronic Response)

Range Selection
Either of two ranges selected by front panel switch or external contact closure.

Warm-Up
Four hours minimum

Outputs
0 to 1V DC, linear and 4-20mA DC, linear

Ambient Temperature Range
23 to 113° F (—5 to 45° C)

Ambient Humidity
To 90% R.H. (non-condensing)

Sample Gas Temperature
32 to 122° F (0 to 50° C)

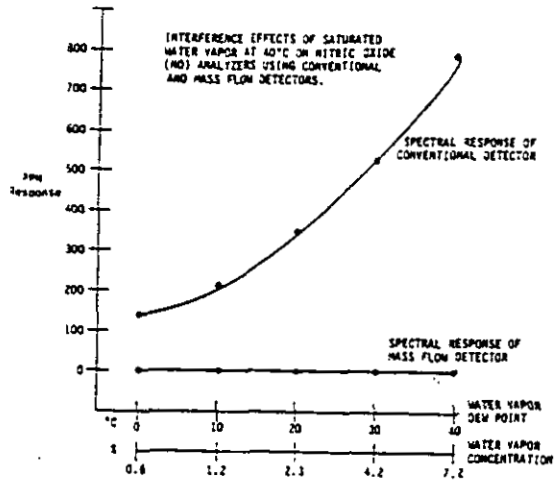
Sample Gas Flow Rate
1.0 ±0.5 scfh (0.50 ± 0.25 slpm) for standard configuration

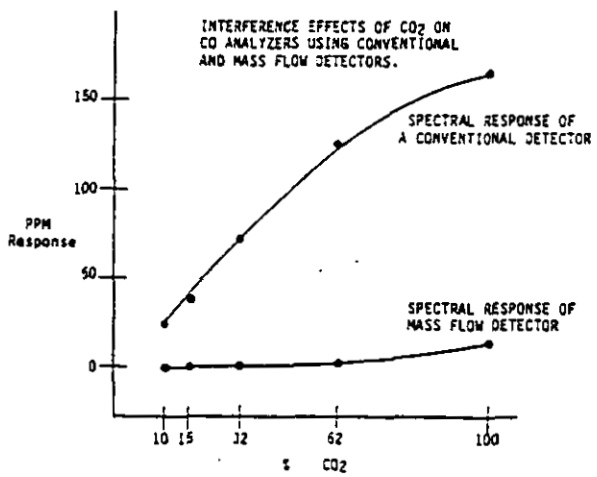
Materials in Contact with Sample
304 stainless steel, neoprene rubber, silicone rubber, CaF_2/ sapphire, Teflon®

Power Requirements
115V AC ±10%, 50/60 Hz (switch selectable) 110 VA max. (200VA max with converter), 220V AC available

Gas Connections
All ¼ inch compression-type tube fittings

Size and Weight
8.66 (H) x 17.44 (W) x 16.78 (D) inches (220 x 443 x 350 mm).
37.4 pounds (17 kg).



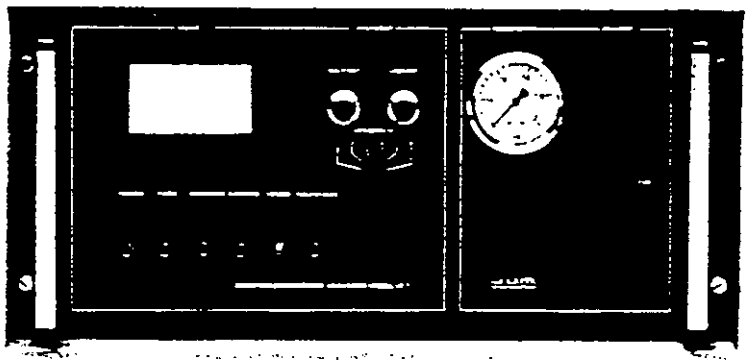


PACE ENVIRONMENTAL PRODUCTS
A DIVISION OF PACE ASSOCIATES, INC.
1196 EASTON ROAD
HORSHAM, PA 19044
PHONE: (215) 957-1144

J.U.M.®
ENGINEERING

HEATED TOTAL HYDROCARBON ANALYZER

MODEL VE7



- All heated components
- Integrated heated sample pump
- Permanent heated stainless steel 2 micron sample filter
- Built in burner air supply- no extra bottles needed
- Automatic fuel enrichment for ignition
- 19 inch relay rack mount
- 1% precision full scale
- Response time- 90% full scale within 1 second

The J.U.M. Engineering Model VE7 is a high accuracy Total Hydrocarbon Analyzer for the measurement and analysis of organic vapors.

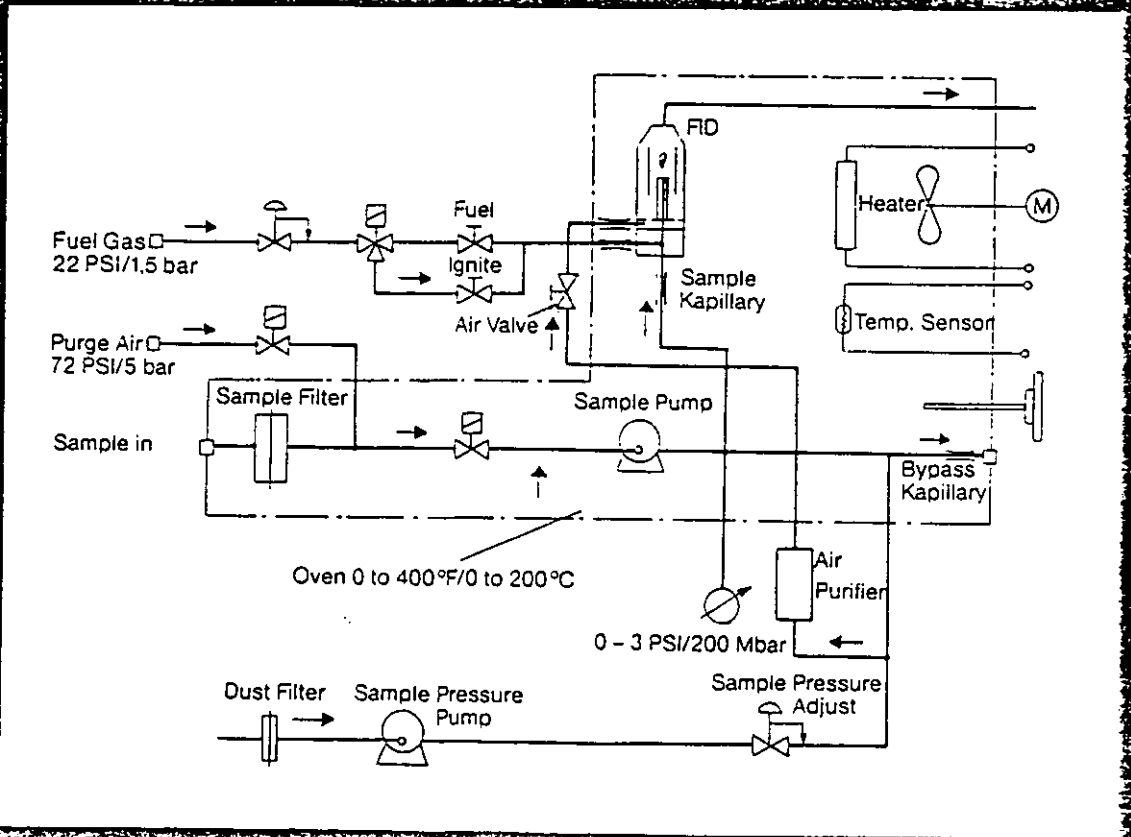
The VE7 utilizes a Hydrogen Flame Ionization Detector (FID) in a thermostatically controlled oven to prevent the loss of high molecular weight hydrocarbons.

Options

Digital display with BCD output/without BCD output
Remote range control and range I.D.
Recorder output of oven temperature

STANDARD SPECIFICATIONS:

Analysis Method:	Flame Ionization Detector (FID)
Sensitivity:	Max. 1 ppm CH
Response Time:	90% of full scale in less than one second
Zero Drift:	1% of full scale per 24 hours
Span Drift:	1% of full scale per 24 hours
Linearity:	Within 1%
Oxygen Synergism:	Less than 1% of selected range
Ranges:	Any three of the following: 0 – 10; 100; 1000; 10,000; 100,000 ppm
Outputs:	0 – 10 Volts D.C.
Display:	Analog Meter in ppm Hydrocarbon or in % LEL
Zero/Span Adjust:	Manual on front panel
Fuel Consumption:	Hydrogen 20 cc/min at 22 psig (1.5 Bar) Hydrogen/Helium 40/60 mix 80 cc/min
Air Consumption:	None, Integral Air generator
Zero & Span Gas:	3 psig (200 m Bar)
Sample Pump:	All Stainless Steel, heated, 3 liters per minute at operating temperature
Sample Pressure:	By Integral Pump 3 psig (200 m Bar)
Sample Filter:	Permanent all stainless steel, 2 micron back-purged for cleaning
Analysis Temperature:	Adjustable 200 to 400°F (93 to 204°C)
Power Requirements:	110 Volts, 60 Hertz AC, 800 Watts (others on request)
Ambient Temperature:	32°F to 110°F (0 to 43°C)
Dimensions:	Width: 483 mm (19 inches) Depth: 460 mm (18 – 1/8 inches) Height: 221 mm (8 – 3/4 inches)
Weight:	38.6 lbs. (17.5 kg)
Shipping Weight:	53 lbs. (24 kg)



VI. LABORATORY ANALYSIS

A. PAH ANALYSIS

TRIANGLE LABORATORIES, INC.
801 Capitola Drive
Durham, NC 27713
Telephone: (919) 544-5729

DATA FILE: GE520
RF FILE: GE513
DATE: 09/23/91
TLI Proj # 18760

SAMPLE ID: Run 1 (1:10 Dil)
DILN FACTOR: 10
TLI Sample ID: 48.052.1
ANALYSIS DATE: 09/13/91

QUANTITATION REPORT

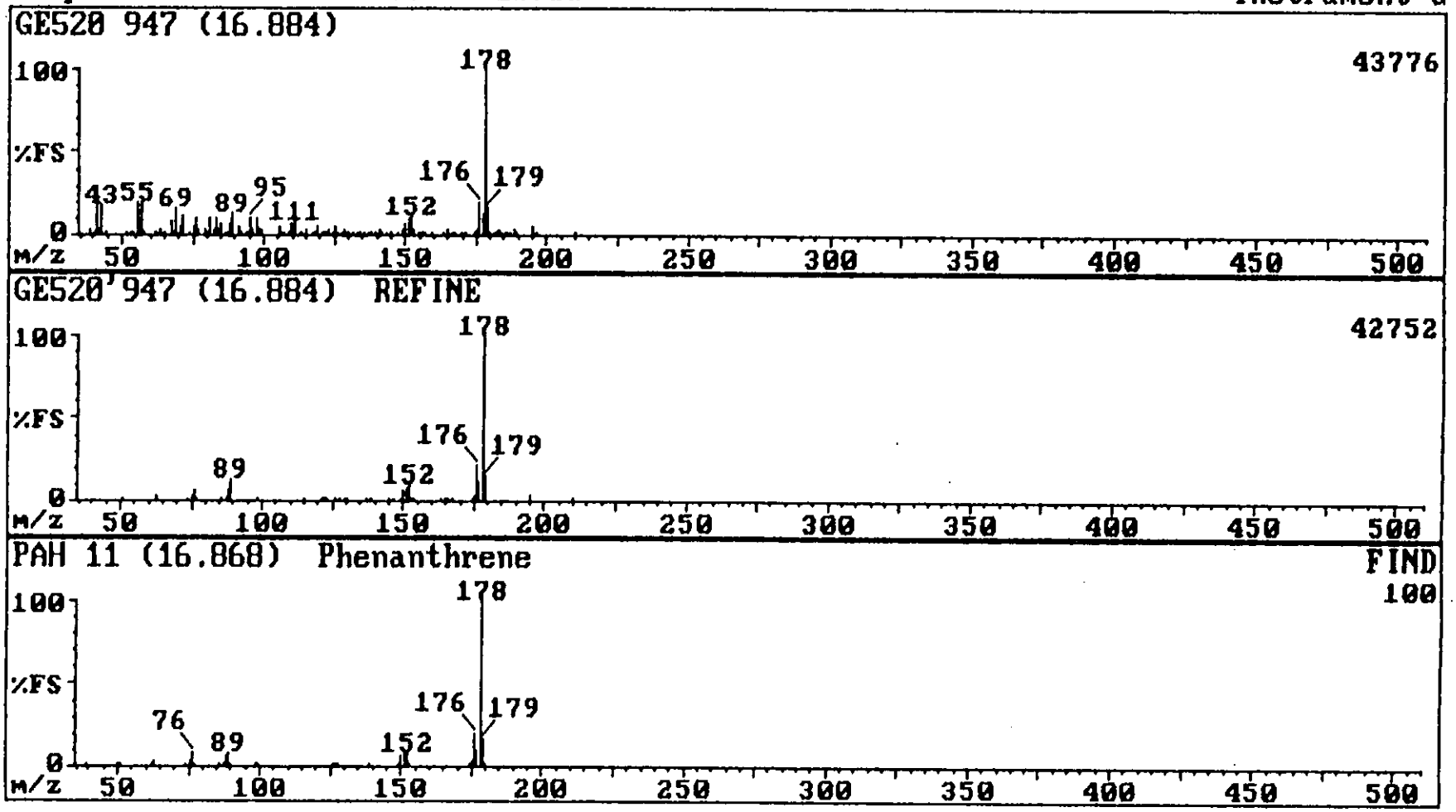
NAME	AREA	RF	SCAN	ISID	AMOUNT, ug	CODE	QUAN LIMIT
Naphthalene-d8	6562		479	14		IS	
Naphthalene	4377	1.2314	481	14	216.88	D	100
2-Methylnaphthalene	3705	1.0355	584	14	218.07	D	100
Acenaphthene-d10	4725		731	28		IS	
2-Chloronaphthalene	0	1.1565	0	28	1.46	ND	100
Acenaphthylene	0	1.8747	0	28	.90	ND	100
Acenaphthene	0	1.3833	0	28	1.22	ND	100
Fluorene	0	1.5591	0	28	1.09	ND	100
Phenanthrene-d10	8472		944	47		IS	
Phenanthrene	1052	1.3189	947	47	37.64	E	100
Anthracene	0	1.2084	0	47	.78	ND	100
Fluoranthene	0	1.5555	0	47	.61	ND	100
Chrysene-d12	11049		1347	57		IS	
Pyrene	0	1.5086	0	57	.48	ND	100
Benzo(a)anthracene	0	1.3339	0	57	.54	ND	100
Chrysene	0	1.4280	0	57	.51	ND	100
Perylene-d12	11205		1573	64		IS	
Benzo(b)fluoranthene	0	1.3885	0	64	.51	ND	100
Benzo(k)fluoranthene	0	1.6922	0	64	.42	ND	100
Benzo(e)pyrene	0	1.3257	0	64	.54	ND	100
Benzo(a)pyrene	0	1.3440	0	64	.53	ND	100
Perylene	0	.8814	0	64	.81	ND	100
Indeno(1,2,3-cd)pyrene	0	.7985	0	64	.89	ND	100
Dibenz(a,h)anthracene	0	.9609	0	64	.74	ND	100
Benzo(g,h,i)perylene	0	1.1532	0	64	.62	ND	100

SURROGATE SUMMARY	AREA	RF	SCAN	ISID	AMOUNT	CODE	% RECOVERY
Terphenyl-d14	1699	1.0153	1193	57	60.59	D	60.6
Pyrene-d10	2575	1.1022	1146	57	84.58	D	84.6

CODES: ND = Not Detected; D = Detected; E = Estimated; IS = Internal Standard

13-Sep-91 18:26 Triangle Laboratories, Inc. (919) 544-5729

Sample:Run 1 1:10 Dil. 18760 Instrument G



TRIANGLE LABORATORIES, INC.
801 Capitola Drive
Durham, NC 27713
Telephone: (919) 544-5729

DATA FILE: GE521
RF FILE: GE513
DATE: 09/23/91
TLI Proj # 18760

SAMPLE ID: Run 2 (1:10 Dil)
DILN FACTOR: 10
TLI Sample ID: 48.052.2
ANALYSIS DATE: 09/13/91

QUANTITATION REPORT

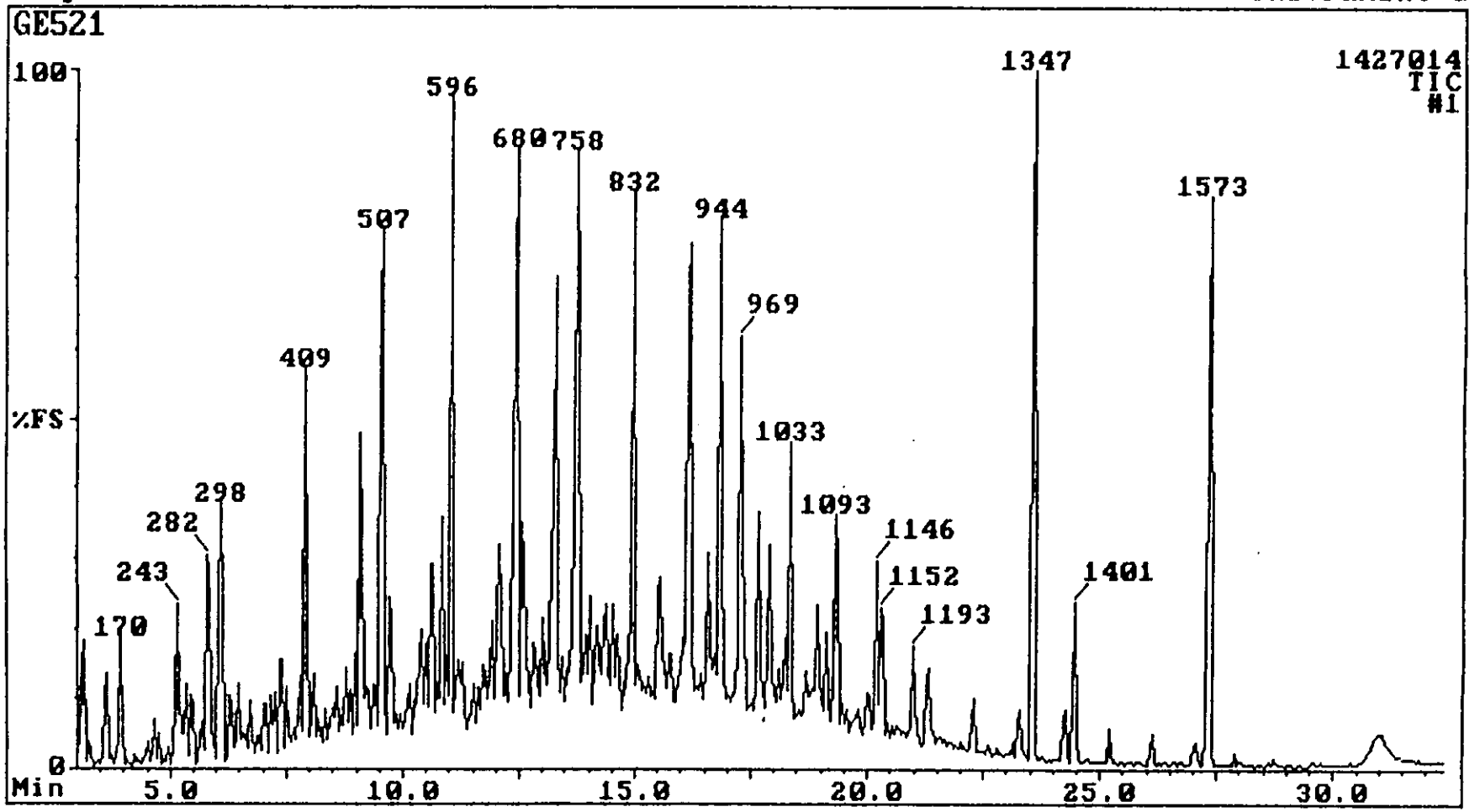
NAME	AREA	RF	SCAN	ISID	AMOUNT, ug	CODE	QUAN LIMIT
Naphthalene-d8	6986		478	14		IS	
Naphthalene	4246	1.2314	481	14	197.40	D	100
2-Methylnaphthalene	2917	1.0355	583	14	161.31	D	100
Acenaphthene-d10	4895		731	28		IS	
2-Chloronaphthalene	0	1.1565	0	28	1.41	ND	100
Acenaphthylene	0	1.8747	0	28	.87	ND	100
Acenaphthene	0	1.3833	0	28	1.18	ND	100
Fluorene	0	1.5591	0	28	1.05	ND	100
Phenanthrene-d10	8815		944	47		IS	
Phenanthrene	1196	1.3189	946	47	41.16	E	100
Anthracene	0	1.2084	0	47	.75	ND	100
Fluoranthene	0	1.5555	0	47	.58	ND	100
Chrysene-d12	12270		1347	57		IS	
Pyrene	0	1.5086	0	57	.43	ND	100
Benzo(a)anthracene	0	1.3339	0	57	.49	ND	100
Chrysene	0	1.4280	0	57	.46	ND	100
Perylene-d12	12139		1573	64		IS	
Benzo(b)fluoranthene	0	1.3885	0	64	.47	ND	100
Benzo(k)fluoranthene	0	1.6922	0	64	.39	ND	100
Benzo(e)pyrene	0	1.3257	0	64	.50	ND	100
Benzo(a)pyrene	0	1.3440	0	64	.49	ND	100
Perylene	0	.8814	0	64	.75	ND	100
Indeno(1,2,3-cd)pyrene	0	.7985	0	64	.83	ND	100
Dibenz(a,h)anthracene	0	.9609	0	64	.69	ND	100
Benzo(g,h,i)perylene	0	1.1532	0	64	.57	ND	100

SURROGATE SUMMARY	AREA	RF	SCAN	ISID	AMOUNT	CODE	% RECOVERY
Terphenyl-d14	1711	1.0153	1192	57	54.93	D	54.9
Pyrene-d10	2676	1.1022	1146	57	79.13	D	79.1

CODES: ND = Not Detected; D = Detected; E = Estimated; IS = Internal Standard

13-Sep-91 19:04 Triangle Laboratories, Inc. (919) 544-5729

Sample:Run 2 1:10 Dil. 18760 Instrument G



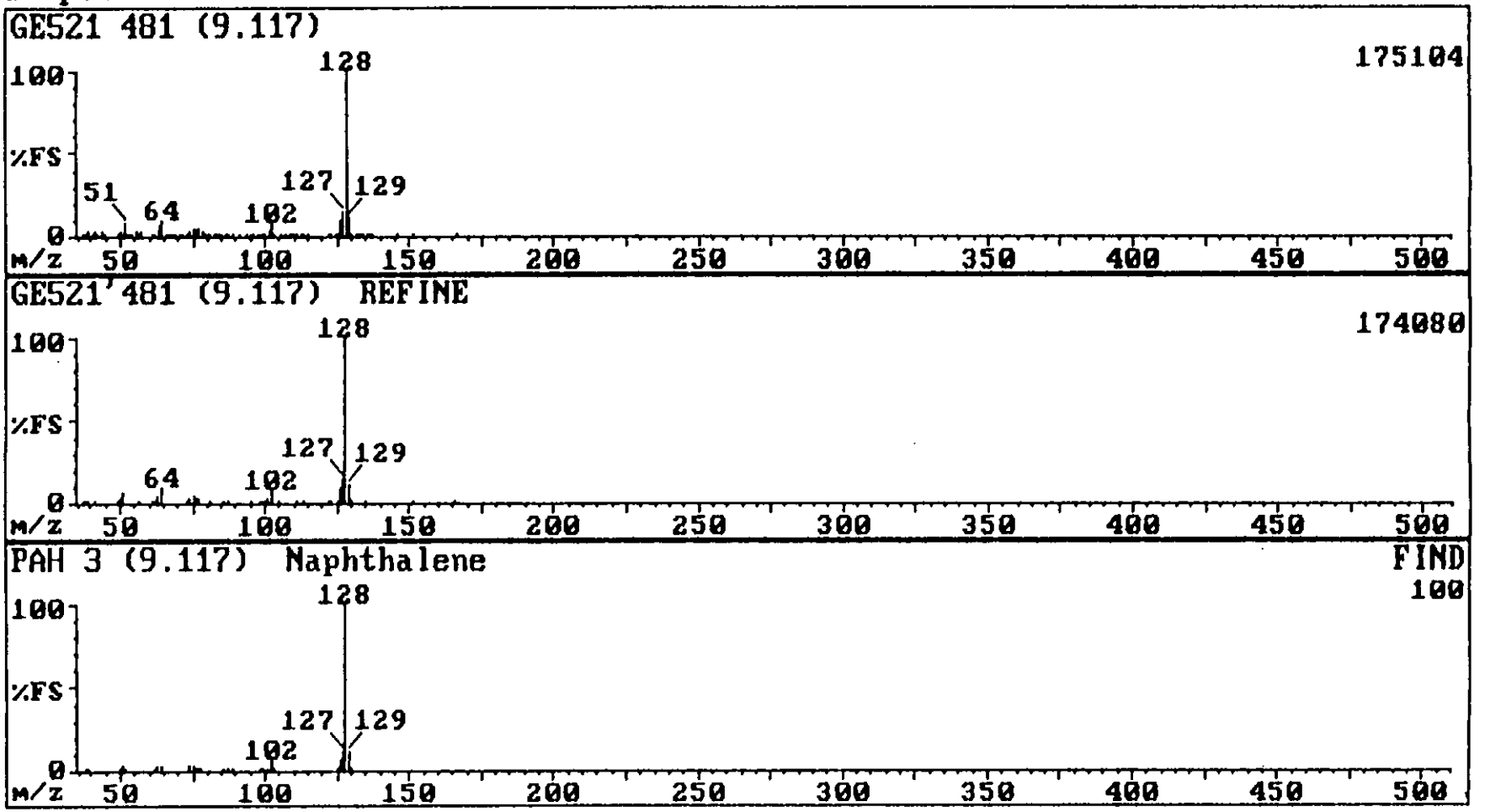
QUAN DB : GE521 LAB-BASE QUAN 14-Sep-91 13:37

o.	MAT	FOR	REV	Delta	Area	P.Flags	Scan	QM	Name
1	100	85	99	1	137940	bb	303	152	1,4-Dichlorobenzene-d4
2	100	68	93	0	698640	bv	478	136	Naphthalene-d8
3	100	81	98	0	424570	bv	481	128	Naphthalene
4	97	72	95	1	291740	vb	583	142	2-Methylnaphthalene
5	100	75	99	1	489530	bb	731	164	Acenaphthene-d10
6	0	0	0	0	0		0	162	2-Chloronaphthalene
7	0	0	0	0	0		0	152	Acenaphthylene
8	0	0	0	0	0		0	153	Acenaphthene
9	0	0	0	0	0		0	166	Fluorene
10	100	77	98	0	881500	vv	944	188	Phenanthrene-d10
11	81	43	97	-1	119630	vv	946	178	Phenanthrene
12	0	0	0	0	0		0	178	Anthracene
13	0	0	0	0	0		0	202	Fluoranthene
14	100	88	95	-1	1227000	bb	1347	240	Chrysene-d12
15	100	65	98	0	171070	bb	1192	244	Terphenyl-d14
16	0	0	0	0	0		0	202	Pyrene
17	0	0	0	0	0		0	228	Benzo(a)anthracene
18	0	0	0	0	0		0	228	Chrysene
19	100	90	95	1	1213900	bb	1573	264	Perylene-d12
20	0	0	0	0	0		0	252	Benzo(b)fluoranthene
21	0	0	0	0	0		0	252	Benzo(k)fluoranthene
22	0	0	0	0	0		0	252	Benzo(e)pyrene
23	0	0	0	0	0		0	252	Benzo(a)pyrene
24	0	0	0	0	0		0	252	Perylene
25	0	0	0	0	0		0	276	Indeno(1,2,3-cd)pyrene
26	0	0	0	0	0		0	278	Dibenz(a,h)anthracene
27	0	0	0	0	0		0	276	Benzo(g,h,i)perylene
28	0	0	0	0	0		0	82	Nitrobenzene-d5
29	0	0	0	0	0		0	172	2-Fluorobiphenyl
30	0	0	0	0	0		0	330	2,4,6-Tribromophenol
31	0	0	0	0	0		0	112	2-Fluorophenol
32	0	0	0	0	0		0	99	Phenol-d5
33	100	73	99	0	267560	vb	1146	212	Pyrene-d10
34	0	0	0	0	0		0	188	Anthracene-d10
35	0	0	0	0	0		0	240	1,4-Dibromobenzene-d4
36	0	0	0	0	0		0	185	1,3,5-Trichlorobenzene-d3

Reviewed By: _____

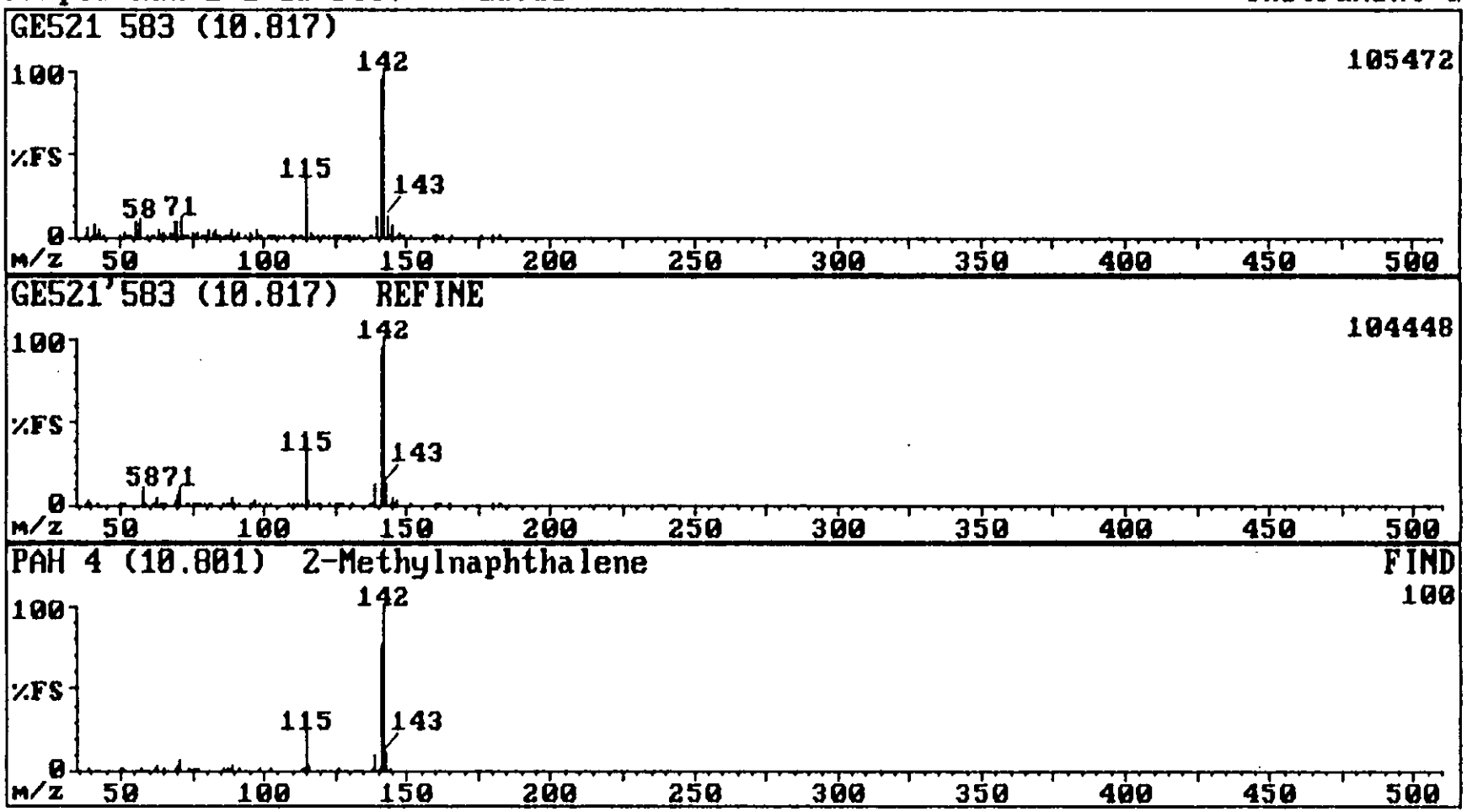
13-Sep-91 19:04 Triangle Laboratories, Inc. (919) 544-5729

Sample:Run 2 1:10 Dil. 18760 Instrument G



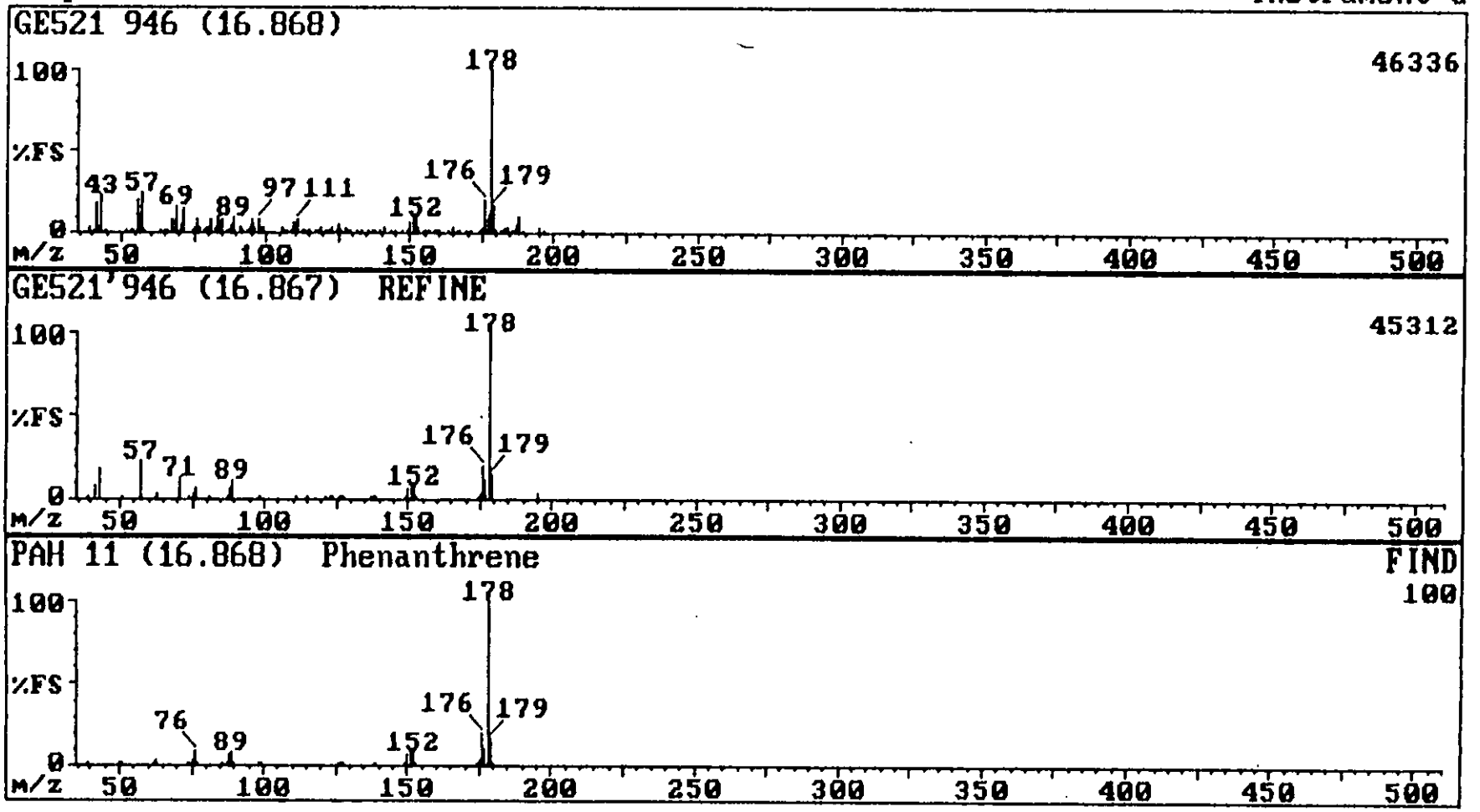
13-Sep-91 19:04 Triangle Laboratories, Inc. (919) 544-5729

Sample:Run 2 1:10 Dil. 18760 Instrument G



13-Sep-91 19:04 Triangle Laboratories, Inc. (919) 544-5729

Sample:Run 2 1:10 Dil. 18760 Instrument G



TRIANGLE LABORATORIES, INC.
801 Capitola Drive
Durham, NC 27713
Telephone: (919) 544-5729

DATA FILE: GE522
RF FILE: GE513
DATE: 09/23/91
TLI Proj # 18760

SAMPLE ID: Run 3 (1:10 Dil)
DILN FACTOR: 10
TLI Sample ID: 48.052.3
ANALYSIS DATE: 09/13/91

QUANTITATION REPORT

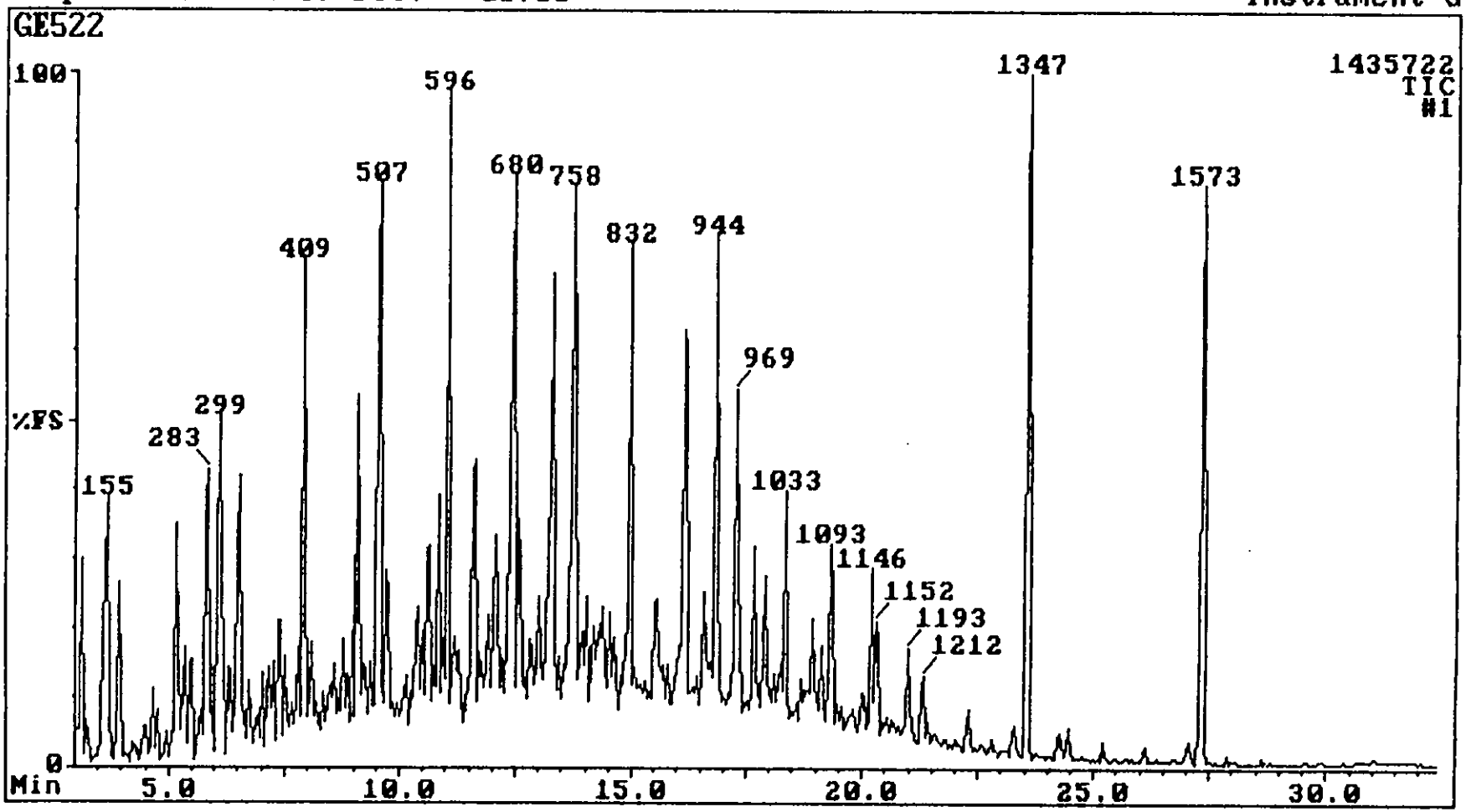
NAME	AREA	RF	SCAN	ISID	AMOUNT, ug	CODE	QUAN LIMIT
Naphthalene-d8	7522		478	14		IS	
Naphthalene	3635	1.2314	481	14	156.96	D	100
2-Methylnaphthalene	3052	1.0355	583	14	156.73	D	100
Acenaphthene-d10	5169		731	28		IS	
2-Chloronaphthalene	0	1.1565	0	28	1.34	ND	100
Acenaphthylene	0	1.8747	0	28	.83	ND	100
Acenaphthene	0	1.3833	0	28	1.12	ND	100
Fluorene	0	1.5591	0	28	.99	ND	100
Phenanthrene-d10	9344		943	47		IS	
Phenanthrene	949	1.3189	946	47	30.79	E	100
Anthracene	0	1.2084	0	47	.71	ND	100
Fluoranthene	0	1.5555	0	47	.55	ND	100
Chrysene-d12	12519		1347	57		IS	
Pyrene	0	1.5086	0	57	.42	ND	100
Benzo(a)anthracene	0	1.3339	0	57	.48	ND	100
Chrysene	0	1.4280	0	57	.45	ND	100
Perylene-d12	12486		1573	64		IS	
Benzo(b)fluoranthene	0	1.3885	0	64	.46	ND	100
Benzo(k)fluoranthene	0	1.6922	0	64	.38	ND	100
Benzo(e)pyrene	0	1.3257	0	64	.48	ND	100
Benzo(a)pyrene	0	1.3440	0	64	.48	ND	100
Perylene	0	.8814	0	64	.73	ND	100
Indeno(1,2,3-cd)pyrene	0	.7985	0	64	.80	ND	100
Dibenz(a,h)anthracene	0	.9609	0	64	.67	ND	100
Benzo(g,h,i)perylene	0	1.1532	0	64	.56	ND	100

SURROGATE SUMMARY

	AREA	RF	SCAN	ISID	AMOUNT	CODE	% RECOVERY
Terphenyl-d14	1680	1.0153	1192	57	52.86	D	52.9
Pyrene-d10	2518	1.1022	1146	57	73.01	D	73.0

CODES: ND = Not Detected; D = Detected; E = Estimated; IS = Internal Standard

13-Sep-91 19:46 Triangle Laboratories, Inc. (919) 544-5729
Sample:Run 3 1:10 Dil. 18760 Instrument G



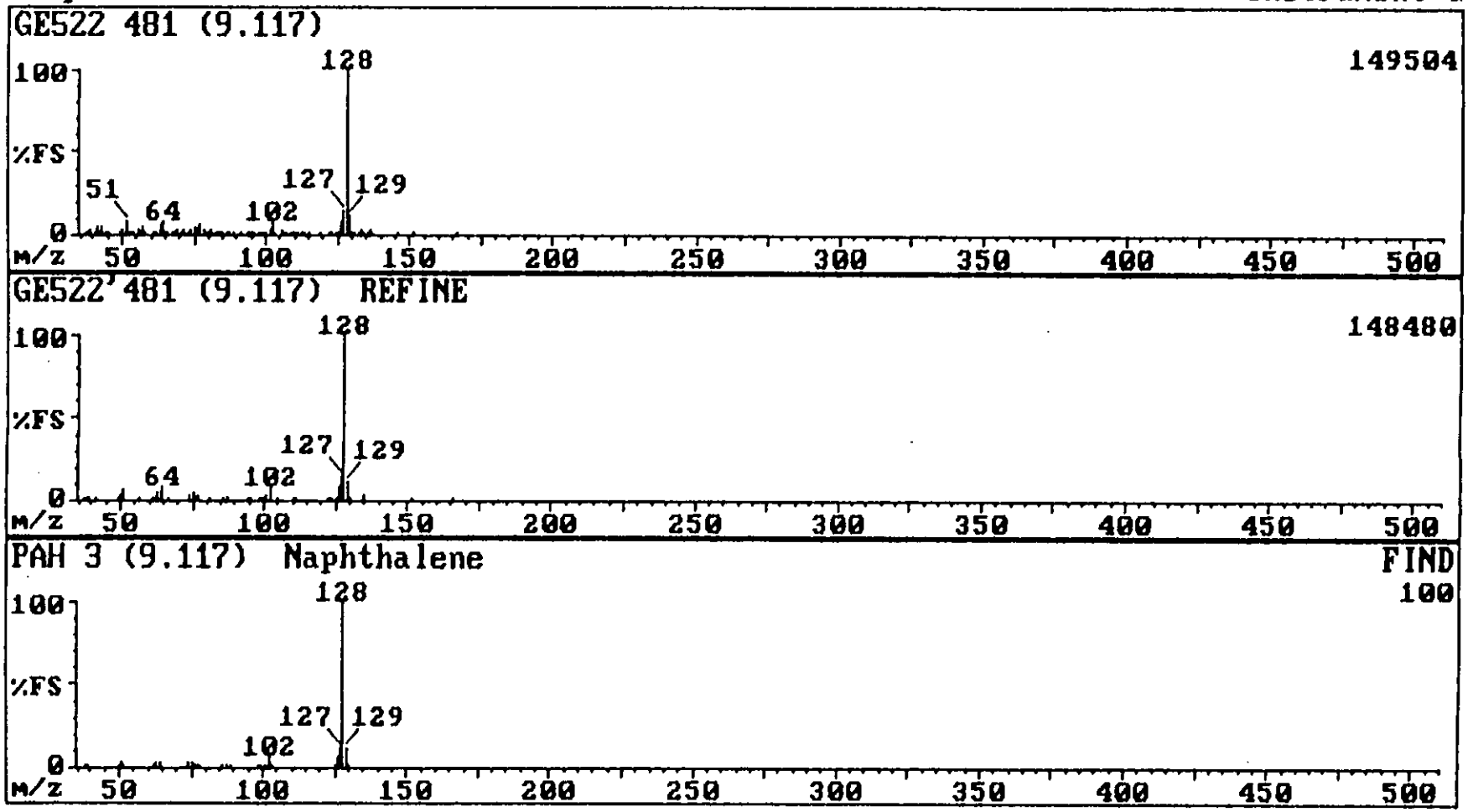
QUAN DB : GE522 LAB-BASE QUAN 14-Sep-91 13:3

No.	MAT	FOR	REV	Delta	Area	P.Flags	Scan	QM	Name
1	100	81	98	1	149220	bb	303	152	1,4-Dichlorobenzene-d4
2	100	67	94	0	752200	bv	478	136	Naphthalene-d8
3	100	74	98	0	363480	bv	481	128	Naphthalene
4	97	72	95	1	305190	vb	583	142	2-Methylnaphthalene
5	100	76	99	1	516920	bb	731	164	Acenaphthene-d10
6	0	0	0	0	0		0	162	2-Chloronaphthalene
7	0	0	0	0	0		0	152	Acenaphthylene
8	0	0	0	0	0		0	153	Acenaphthene
9	0	0	0	0	0		0	166	Fluorene
10	100	79	99	-1	934380	bv	943	188	Phenanthrene-d10
11	86	40	97	0	94869	vv	946	178	Phenanthrene
12	0	0	0	0	0		0	178	Anthracene
13	0	0	0	0	0		0	202	Fluoranthene
14	100	87	96	0	1251900	bb	1347	240	Chrysene-d12
15	97	61	94	0	167970	bb	1192	244	Terphenyl-d14
16	0	0	0	0	0		0	202	Pyrene
17	0	0	0	0	0		0	228	Benzo(a)anthracene
18	0	0	0	0	0		0	228	Chrysene
19	100	89	95	1	1246600	bb	1573	264	Perylene-d12
20	0	0	0	0	0		0	252	Benzo(b)fluoranthene
21	0	0	0	0	0		0	252	Benzo(k)fluoranthene
22	0	0	0	0	0		0	252	Benzo(e)pyrene
23	0	0	0	0	0		0	252	Benzo(a)pyrene
24	0	0	0	0	0		0	252	Perylene
25	0	0	0	0	0		0	276	Indeno(1,2,3-cd)pyrene
26	0	0	0	0	0		0	278	Dibenz(a,h)anthracene
27	0	0	0	0	0		0	276	Benzo(g,h,i)perylene
28	0	0	0	0	0		0	82	Nitrobenzene-d5
29	0	0	0	0	0		0	172	2-Fluorobiphenyl
30	0	0	0	0	0		0	330	2,4,6-Tribromophenol
31	0	0	0	0	0		0	112	2-Fluorophenol
32	0	0	0	0	0		0	99	Phenol-d5
33	100	71	97	0	251850	vb	1146	212	Pyrene-d10
34	0	0	0	0	0		0	188	Anthracene-d10
35	0	0	0	0	0		0	240	1,4-Dibromobenzene-d4
36	0	0	0	0	0		0	185	1,3,5-Trichlorobenzene-d3

Reviewed By: Mark Wagton

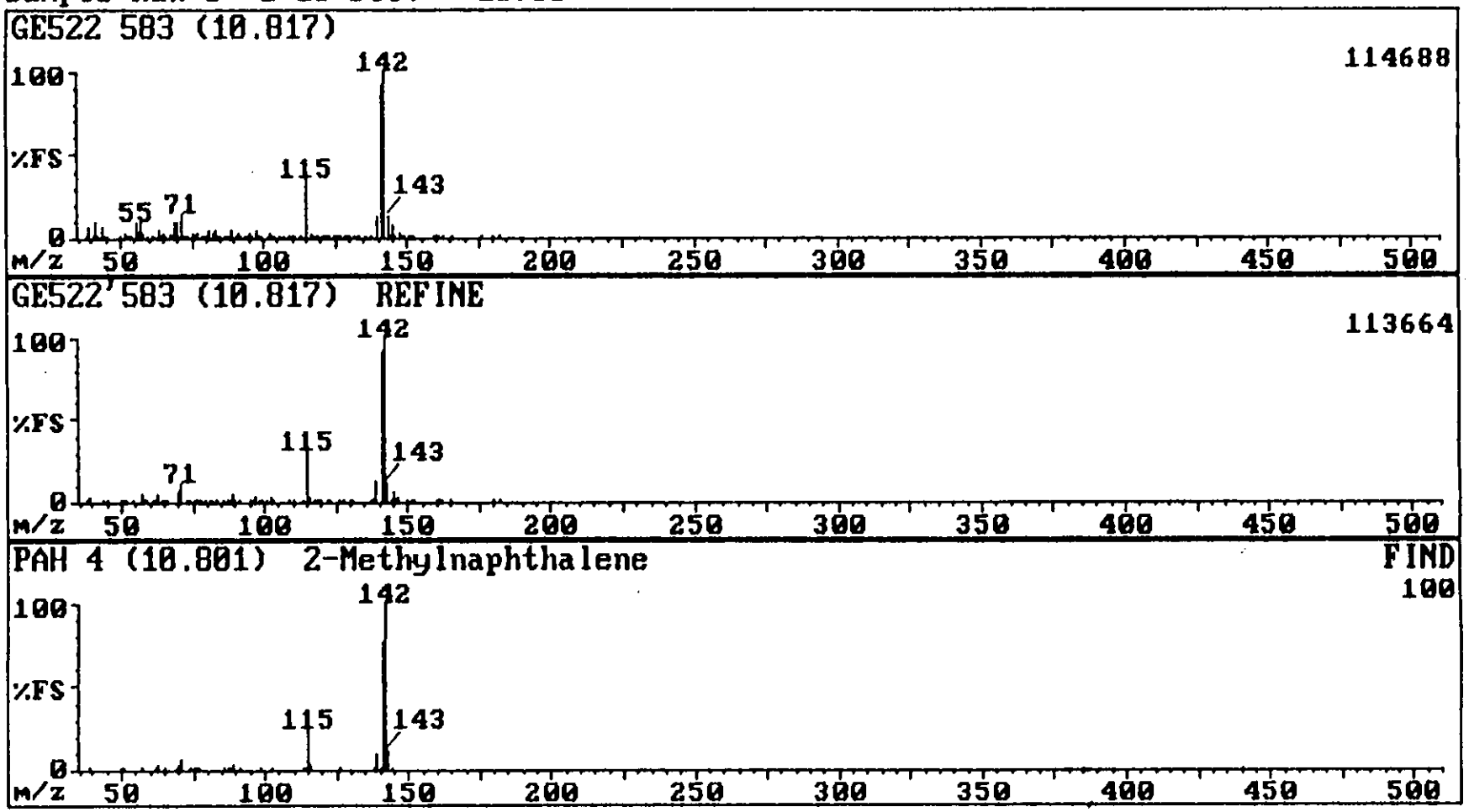
13-Sep-91 19:46 Triangle Laboratories, Inc. (919) 544-5729

Sample:Run 3 1:10 Dil. 18760 Instrument G

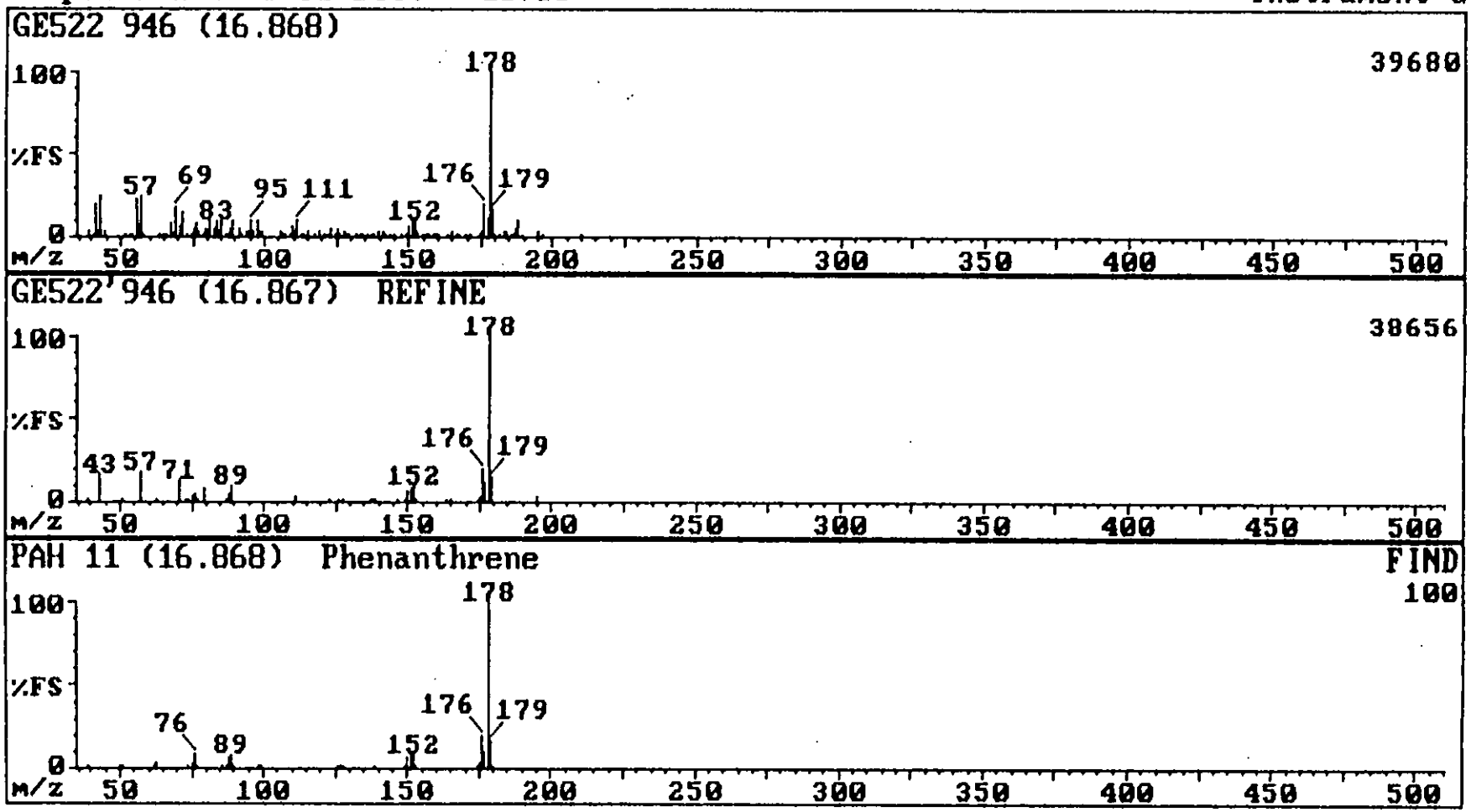


13-Sep-91 19:46 Triangle Laboratories, Inc. (919) 544-5729

Sample:Run 3 1:10 Dil. 18760 Instrument G



13-Sep-91 19:46 Triangle Laboratories, Inc. (919) 544-5729
Sample:Run 3 1:10 Dil. 18760 Instrument G



TRIANGLE LABORATORIES, INC.
801 Capitola Drive
Durham, NC 27713
Telephone: (919) 544-5729

DATA FILE: GE516
RF FILE: GE513
DATE: 09/23/91
TLI Proj # 18760

SAMPLE ID: Blank
DILN FACTOR: 1
TLI Sample ID: 48.053.1
ANALYSIS DATE: 09/13/91

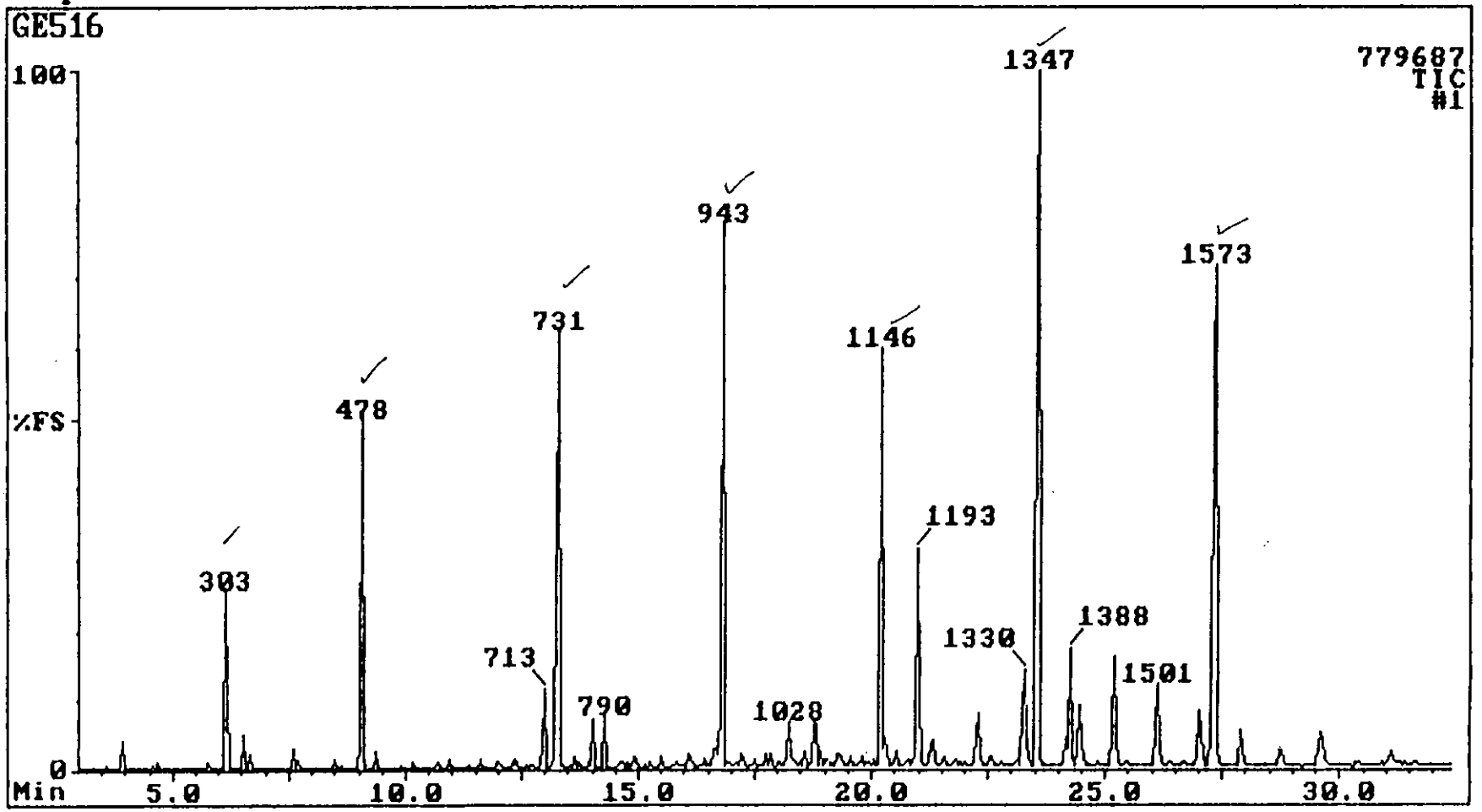
QUANTITATION REPORT

NAME	AREA	RF	SCAN	ISID	AMOUNT, ug	CODE	QUAN LIMIT
Naphthalene-d8	4428		478	14		IS	
Naphthalene	0	1.2314	0	14	.15	ND	10
2-Methylnaphthalene	0	1.0355	0	14	.17	ND	10
Acenaphthene-d10	3460		730	28		IS	
2-Chloronaphthalene	0	1.1565	0	28	.20	ND	10
Acenaphthylene	0	1.8747	0	28	.12	ND	10
Acenaphtnene	0	1.3833	0	28	.17	ND	10
Fluorene	0	1.5591	0	28	.15	ND	10
Phenanthrene-d10	6784		943	47		IS	
Phenanthrene	0	1.3189	0	47	.09	ND	10
Anthracene	0	1.2084	0	47	.10	ND	10
Fluoranthene	0	1.5555	0	47	.08	ND	10
Chrysene-d12	6778		1347	57		IS	
Pyrene	0	1.5086	0	57	.08	ND	10
Benzo(a)anthracene	0	1.3339	0	57	.09	ND	10
Chrysene	0	1.4280	0	57	.08	ND	10
Perylene-d12	5855		1573	64		IS	
Benzo(b)fluoranthene	0	1.3885	0	64	.10	ND	10
Benzo(k)fluoranthene	0	1.6922	0	64	.08	ND	10
Benzo(e)pyrene	0	1.3257	0	64	.10	ND	10
Benzo(a)pyrene	0	1.3440	0	64	.10	ND	10
Perylene	0	.8814	0	64	.16	ND	10
Indeno(1,2,3-cd)pyrene	0	.7985	0	64	.17	ND	10
Dibenz(a,h)anthracene	0	.9609	0	64	.14	ND	10
Benzo(g,h,i)perylene	0	1.1532	0	64	.12	ND	10

SURROGATE SUMMARY	AREA	RF	SCAN	ISID	AMOUNT	CODE	% RECOVERY
Terphenyl-d14	2328	1.0153	1193	57	13.53	D	13.5
Pyrene-d10	3706	1.1022	1146	57	19.84	D	19.8

CODES: ND = Not Detected; D = Detected; E = Estimated; IS = Internal Standard

13-Sep-91 17:02 Triangle Laboratories, Inc. (919) 544-5729
Sample:Blank 18760 Instrument G



QUAN DP : GE516 LAB-BASE QUAN 14-Sep-91 13:34

No.	MAT	FOR	REV	Delta	Area	P.Flags	Scan	QM	Name
1	100	91	99	1	83236	bb	303	152	1,4-Dichlorobenzene-d4
2	100	90	92	0	442770	bb	478	136	Naphthalene-d8
3	0	0	0	0	0		0	128	Naphthalene
4	0	0	0	0	0		0	142	2-Methylnaphthalene
5	100	97	99	0	345980	bb	730	164	Acenaphthene-d10
6	0	0	0	0	0		0	162	2-Chloronaphthalene
7	0	0	0	0	0		0	152	Acenaphthylene
8	0	0	0	0	0		0	153	Acenaphthene
9	0	0	0	0	0		0	166	Fluorene
10	100	94	97	0	678430	bb	943	188	Phenanthrene-d10
11	0	0	0	0	0		0	178	Phenanthrene
12	0	0	0	0	0		0	178	Anthracene
13	0	0	0	0	0		0	202	Fluoranthene
14	100	88	94	0	677770	vb	1347	240	Chrysene-d12
15	100	90	97	1	232790	bb	1193	244	Terphenyl-d14
16	0	0	0	0	0		0	202	Pyrene
17	0	0	0	0	0		0	228	Benzo(a)anthracene
18	0	0	0	0	0		0	228	Chrysene
19	100	90	93	1	585490	bb	1573	264	Perylene-d12
20	0	0	0	0	0		0	252	Benzo(b)fluoranthene
21	0	0	0	0	0		0	252	Benzo(k)fluoranthene
22	0	0	0	0	0		0	252	Benzo(e)pyrene
23	0	0	0	0	0		0	252	Benzo(a)pyrene
24	0	0	0	0	0		0	252	Perylene
25	0	0	0	0	0		0	276	Indeno(1,2,3-cd)pyrene
26	0	0	0	0	0		0	278	Dibenz(a,h)anthracene
27	0	0	0	0	0		0	276	Benzo(g,h,i)perylene
28	0	0	0	0	0		0	82	Nitrobenzene-d5
29	0	0	0	0	0		0	172	2-Fluorobiphenyl
30	0	0	0	0	0		0	330	2,4,6-Tribromophenol
31	0	0	0	0	0		0	112	2-Fluorophenol
32	0	0	0	0	0		0	99	Phenol-d5
33	100	92	98	0	370580	vb	1146	212	Pyrene-d10
34	0	0	0	0	0		0	188	Anthracene-d10
35	0	0	0	0	0		0	240	1,4-Dibromobenzene-d4
36	0	0	0	0	0		0	185	1,3,5-Trichlorobenzene-d3

Reviewed By: _____

TRIANGLE LABORATORIES, INC.
801 Capitola Drive
Durham, NC 27713
Telephone: (919) 544-5729

DATA FILE: GE515
RF FILE: GE513
DATE: 09/23/91
TLI Proj # 18760

SAMPLE ID: SBLK 082791
DILN FACTOR: 1
TLI Sample ID: N/A
ANALYSIS DATE: 09/13/91

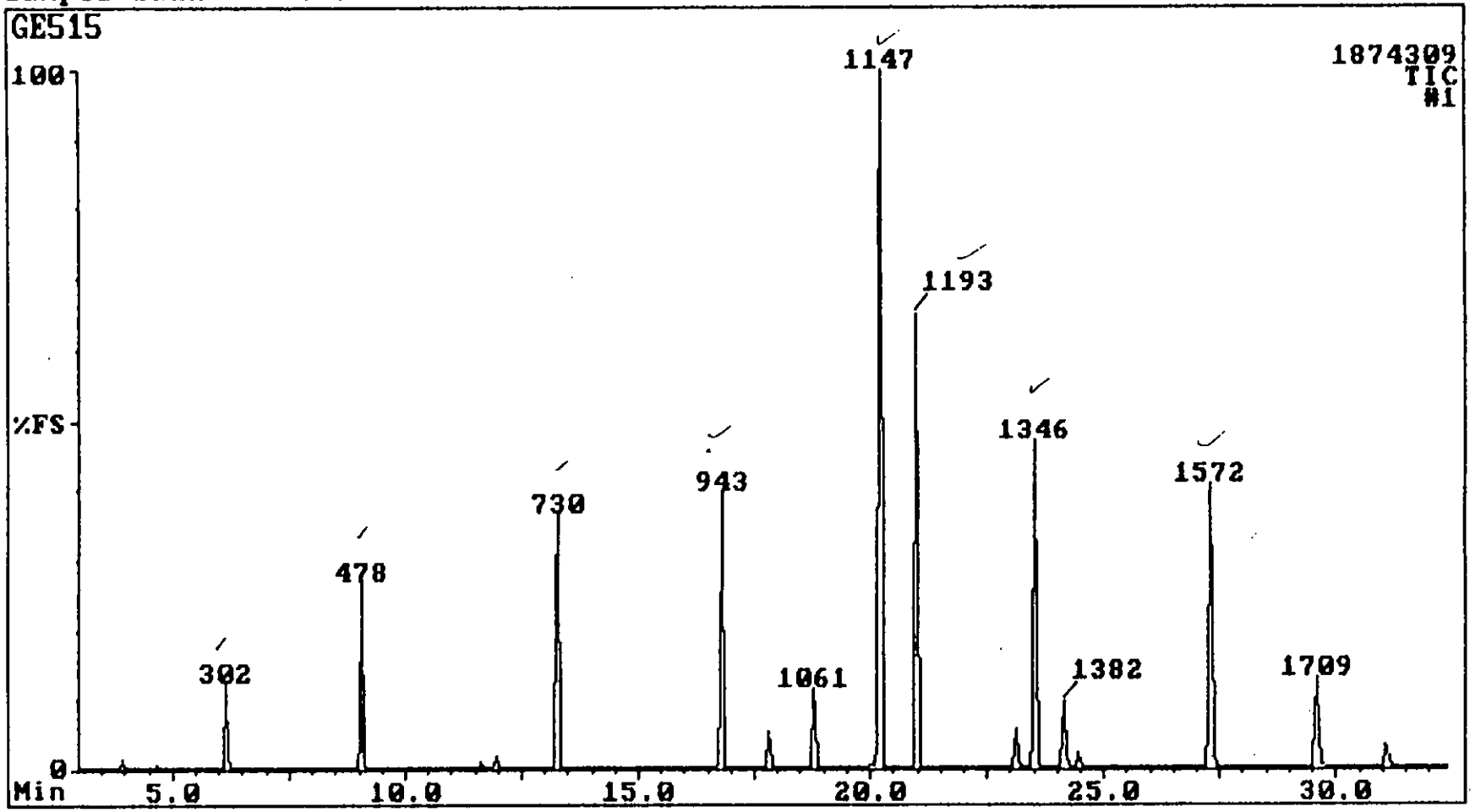
Q U A N T I T A T I O N R E P O R T

NAME	AREA	RF	SCAN	ISID	AMOUNT, ug	CODE	QUAN LIMIT
Naphthalene-d8	6032		478	14		IS	
Naphthalene	0	1.2314	0	14	.11	ND	10
2-Methylnaphthalene	0	1.0355	0	14	.13	ND	10
Acenaphthene-d10	4135		730	28		IS	
2-Chloronaphthalene	0	1.1565	0	28	.17	ND	10
Acenaphthylene	0	1.8747	0	28	.10	ND	10
Acenapnthene	0	1.3833	0	28	.14	ND	10
Fluorene	0	1.5591	0	28	.12	ND	10
Phenanthrene-d10	7566		943	47		IS	
Phenanthrene	0	1.3189	0	47	.08	ND	10
Anthracene	0	1.2084	0	47	.09	ND	10
Fluoranthene	0	1.5555	0	47	.07	ND	10
Chrysene-d12	8238		1346	57		IS	
Pyrene	0	1.5086	0	57	.06	ND	10
Benzo(a)anthracene	0	1.3339	0	57	.07	ND	10
Chrysene	0	1.4280	0	57	.07	ND	10
Perylene-d12	7827		1572	64		IS	
Benzo(b)fluoranthene	0	1.3885	0	64	.07	ND	10
Benzo(k)fluoranthene	0	1.6922	0	64	.06	ND	10
Benzo(e)pyrene	0	1.3257	0	64	.08	ND	10
Benzo(a)pyrene	0	1.3440	0	64	.08	ND	10
Perylene	0	.8814	0	64	.12	ND	10
Indeno(1,2,3-cd)pyrene	0	.7985	0	64	.13	ND	10
Dibenz(a,h)anthracene	0	.9609	0	64	.11	ND	10
Benzo(g,h,i)perylene	0	1.1532	0	64	.09	ND	10

S U R R O G A T E S U M M A R Y	AREA	RF	SCAN	ISID	AMOUNT	CODE	% RECOVERY
Terphenyl-d14	11587	1.0153	1193	57	55.42	D	55.4
Pyrene-d10	16615	1.1022	1147	57	73.19	D	73.2

CODES: ND = Not Detected; D = Detected; E = Estimated; IS = Internal Standard

13-Sep-91 15:53 Triangle Laboratories, Inc. (919) 544-5729
Sample:SBLK 18760 Instrument G



QUAN DB : GE515 LAB-BASE QUAN 14-Sep-91 13:3

No.	MAT	FOR	REV	Delta	Area	P.Flags	Scan	QM	Name
1	100	92	98	0	116880	bb	302	152	1,4-Dichlorobenzene-d4
2	100	91	93	0	603200	bb	478	136	Naphthalene-d8
3	0	0	0	0	0		0	128	Naphthalene
4	0	0	0	0	0		0	142	2-Methylnaphthalene
5	100	98	99	0	413460	bb	730	164	Acenaphthene-d10
6	0	0	0	0	0		0	162	2-Chloronaphthalene
7	0	0	0	0	0		0	152	Acenaphthylene
8	0	0	0	0	0		0	153	Acenaphthene
9	0	0	0	0	0		0	166	Fluorene
10	100	94	96	0	756570	bb	943	188	Phenanthrene-d10
11	0	0	0	0	0		0	178	Phenanthrene
12	0	0	0	0	0		0	178	Anthracene
13	0	0	0	0	0		0	202	Fluoranthene
14	100	89	93	-1	823780	bb	1346	240	Chrysene-d12
15	100	91	98	2	1158700	bb	1193	244	Terphenyl-d14
16	0	0	0	0	0		0	202	Pyrene
17	0	0	0	0	0		0	228	Benzo(a)anthracene
18	0	0	0	0	0		0	228	Chrysene
19	100	89	93	1	782690	bb	1572	264	Perylene-d12
20	0	0	0	0	0		0	252	Benzo(b)fluoranthene
21	0	0	0	0	0		0	252	Benzo(k)fluoranthene
22	0	0	0	0	0		0	252	Benzo(e)pyrene
23	0	0	0	0	0		0	252	Benzo(a)pyrene
24	0	0	0	0	0		0	252	Perylene
25	0	0	0	0	0		0	276	Indeno(1,2,3-cd)pyrene
26	0	0	0	0	0		0	278	Dibenz(a,h)anthracene
27	0	0	0	0	0		0	276	Benzo(g,h,i)perylene
28	0	0	0	0	0		0	82	Nitrobenzene-d5
29	0	0	0	0	0		0	172	2-Fluorobiphenyl
30	0	0	0	0	0		0	330	2,4,6-Tribromophenol
31	0	0	0	0	0		0	112	2-Fluorophenol
32	0	0	0	0	0		0	99	Phenol-d5
33	100	90	97	2	1661500	vb	1147	212	Pyrene-d10
34	0	0	0	0	0		0	188	Anthracene-d10
35	0	0	0	0	0		0	240	1,4-Dibromobenzene-d4
36	0	0	0	0	0		0	185	1,3,5-Trichlorobenzene-d3

Reviewed By: NW

VI. LABORATORY ANALYSIS

B. FORMALDEHYDE

AMERICAN INTERPLEX
CORPORATION
LABORATORIES

8600 Kanis Road
Little Rock, Arkansas 72204
(501) 224-5060

Ramcon Environmental Corporation (C-488)
223 Scott Street
Memphis, TN 38112

August 26, 1991

ATTN: Mr. Joe Sewell

Control No. 3825

Description of Sample: Four (4) impinger solution samples received on 8/22/91
Re: NAPA

Results:

Sample Identification	Formaldehyde, mg	Volume, ml
Run #1-DNPH & Wash	23	1100
Run #2-DNPH & Wash	25	900
Run #3-DNPH & Wash	48	1000
Blank	0.053	685

Method: EPA 8315

AMERICAN INTERPLEX CORPORATION

MWM/lb

By Michael W. McNerlin
Michael W. McNerlin
Laboratory Director

VI. LABORATORY ANALYSIS

C. PARTICULATE

Form REC#8

SAMPLE ANALYTICAL DATA FORM

Company Name APAC - RM 202 TEST - FRONT HALF RINSE (ACETONE)

Sample Location _____ Relative Humidity in Lab 43 %

Blank Volume (V_a) 175 ml Density of Acetone (ρ_a) .7857 mg/ml

Date/Time wt. blank 3-24-91 11:00AM Gross wt. 164.2439 g

Date/Time wt. blank 3-24-91 5:00PM Gross wt. 164.2438 g

Ave. Gross wt. 164.2439 g

Tare wt. 164.2429 g

Weight of blank (m_{ab}) 0.0010 g

Acetone blank residue concentration (C_a): $(C_a) = (m_{ab}) / (V_a)\ (\rho_a) = (7.2729 \times 10^{-6}$ mg/g)

Acetone Blank Wt.: $W_a = C_a V_{aw} \rho_a = (7.2729 \times 10^{-6})(150)(0.7857) = (0.0009$ g)

		Run # 1	Run # 2	Run # 3
Acetone rinse volume (V_{aw})	ml	150	150	150
Date/Time of wt. 3-24-91 11:00AM Gross wt.	g	173.5514	165.1176	153.1529
Date/Time of wt. 3-24-91 5:00PM Gross wt.	g	173.5509	165.1179	153.1532
Average Gross wt.	g	173.5512	165.1178	153.1531
Tare wt.	g	173.5373	165.0941	153.1400
Less Acetone blank wt. (W_a)	g	0.0009	0.0009	0.0009
Weight of particulate in acetone rinse (m_a)	g	0.0130	0.0228	0.0122

Filter Numbers	#	PT 5439	PT 5442	PT 5441
Date/Time of wt. 3-24-91 11:00AM Gross wt.	g	0.5812	0.5969	0.5841
Date/Time of wt. 3-24-91 5:00PM Gross wt.	g	0.5811	0.5968	0.5842
Average Gross wt.	g	0.5812	0.5969	0.5842
Tare wt.	g	0.5633	0.5600	0.5643

Weight of particulate on filter (m_f)	g	0.0179	0.0369	0.0199
Weight of particulate in acetone rinse (m_a)	g	0.0130	0.0228	0.0122
Total weight of particulate (m_n)	g	0.0309	0.0597	0.0321

NOTE: In no case should a blank residue greater than 0.01 mg/g (or 0.001% of the blank weight) be subtracted from the sample weight.

Remarks: _____

Signature of Analyst _____ Signature of Reviewer _____

D:\DONNA\FORMS\LAB\SAMPLE.TBL

MINNESOTA BACK-HALF ANALYSIS

CHLOROFORM-ETHER EXTRACTION

Plant Location APAC - CPM - RM202 Date 8-26-91

Sample Location _____ Relative Humidity in lab 43 %

Blank Volume (V_a) 150 ml

Date/Time wt. blank 8-24-91 11:00AM Gross wt. 134.3456 g

Date/Time wt. blank 8-24-91 5:00PM Gross wt. 134.3453 g

Ave. Gross wt. 134.3455 g

Tare wt. 134.3443 g

Weight of blank Extract 0.0012 g

		Run # 1	Run # 2	Run # 3
Impinger rinse volume	ml	770	895	900
Date/Time of wt 8-24-91 11:00AM Gross wt	g	143.4085	95.1543	86.6244
Date/Time of wt 8-24-91 5:00PM Gross wt	g	143.4087	95.1547	86.6242
Average Gross wt	g	143.4086	95.1545	86.6243
Tare wt	g	143.4050	95.1449	86.6173
Less Extract blank wt	g	0.0012	0.0012	0.0012
Wt of particulate in impinger rinse (m_a)	g	0.0024	0.0084	0.0058

Remarks: oily deposits on probe wash rins

Signature of Analyst Paul J Thoenen Signature of Reviewer _____

D:\DONNA\FORMS\LAB\MINN.BH

FORM REC#8

SAMPLE ANALYTICAL DATA FORM

Company Name APAC - RM202 TEST - BACKHALF RINSE ($MeCl_2$)

Sample Location _____ Relative Humidity in Lab 43 %

Blank Volume (V_a) 155 ml $MeCl_2$ Blank Density of $MeCl_2$ 1.3255 mg/ml

Date/Time wt. blank 8-24-91 11:00AM Gross wt. 158.8641 g

Date/Time wt. blank 8-24-91 5:00PM Gross wt. 158.8646 g

Ave. Gross wt. 158.8644 g

Tare wt. 158.8576 g

Weight of blank (m_{ab}) 0.0068 g

$MeCl_2$ blank residue concentration (C_a): (C_a) = (m_{ab}) / (V_a) (ρ_a) = (3.3098×10^{-5} mg/g)

$MeCl_2$ Blank Wt.: $W_a = C_a V_{aw} \rho_a$ = (3.3098×10^{-5})(170)(1.3255) = (0.0075 g)

		Run # 1	Run # 2	Run # 3
Acetone rinse volume (V_{aw})	ml	170	170	170
Date/Time of wt 8-24-91 11:00AM	Gross wt. g	180.2474	165.1177	161.8350
Date/Time of wt 8-24-91 5:00PM	Gross wt. g	180.2476	165.1178	161.8355
	Average Gross wt. g	180.2475	165.1178	161.8353
	Tare wt. g	180.2300	165.0923	161.8219
	Less Acetone blank wt. (W_a) g	0.0075	0.0075	0.0075
Weight of particulate in $MeCl_2$ rinse (m_a)	g	0.0100	0.0180	0.0059

Filter Numbers	#			
Date/Time of wt. _____	Gross wt. g			
Date/Time of wt. _____	Gross wt. g			
	Average Gross wt. g			
	Tare wt. g			

Weight of particulate on filter (m_f)	g			
Weight of particulate in acetone rinse (m_a)	g			
Total weight of particulate (m_n)	g			

NOTE: In no case should a blank residue greater than 0.01 mg/g (or 0.001% of the blank weight) be subtracted from the sample weight.

Remarks: cloudy white deposits

Signature of Analyst Paul J Arnesen Signature of Reviewer _____

VII. CALCULATIONS

A. PAH'S

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

SUMMARY OF TEST DATA

			8-9-91 RUN #1	8-9-91 RUN #2	8-10-91 RUN #3
SAMPLING TRAIN DATA					
		start	11:26	15:05	08:57
		finish	12:45	16:22	10:07
1.	Sampling time, minutes	θ	60.0	60.0	60.0
2.	Sampling nozzle diameter, in.	D_n	.2200	.2200	.2200
3.	Sampling nozzle cross-sect. area, ft^2	A_n	.000264	.000264	.000264
4.	Isokinetic variation	I	104.9	100.1	97.8
5.	Sample gas volume - meter cond., cf.	V_m	38.079	37.372	36.816
6.	Average meter temperature, ^oR	T_m	556	563	545
7.	Avg. oriface pressure drop, in. H_2O	dH	1.08	1.00	1.08
8.	Total PAH collected, mg.	M_n	0.4724	0.3999	0.3445
VELOCITY TRAVERSE DATA					
9.	Stack area, ft^2	A	11.23	11.23	11.23
10.	Absolute stack gas pressure, in. Hg.	P_s	30.00	30.00	30.09
11.	Barometric pressure, in. Hg.	P_{bar}	30.00	30.00	30.09
12.	Avg. absolute stack temperature, R^o	T_s	716	720	712
13.	Average $-\sqrt{\overline{vel.\ head}}$, (C_p= .84)	$-\sqrt{d\bar{P}}$	0.99	1.01	1.07
14.	Average stack gas velocity, ft./sec.	V_s	67.72	69.34	73.26
STACK MOISTURE CONTENT					
15.	Total water collected by train, ml.	V_{ic}	280.00	274.00	306.90
16.	Moisture in stack gas, %	B_{ws}	26.45	26.62	28.40
EMISSIONS DATA					
17.	Stack gas flow rate, dscf/hr.(000's)	Q_{sd}	1488	1512	1581
18.	Stack gas flow rate, cfm	acfm	45630	46721	49363
19.	PAH concentration, gr/dscf	C_s	0.000198	0.000173	0.000146
20.	PAH concentration, lb/hr	E	0.042	0.037	0.033
21.	concentration, lb/mBtu	E'			
ORSAT DATA					
22.	Percent CO_2 by volume	CO_2	5.10	5.10	4.40
23.	Percent O_2 by volume	O_2	11.50	10.90	12.70
24.	Percent CO by volume	CO	.00	.00	.00
25.	Percent N_2 by volume	N_2	83.40	84.00	82.90

Format: summryR3

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Dry Gas Volume

$$V_{m(std)} = V_m \left[\frac{T_{(std)}}{T_m}\right]\left[\frac{P_{bar} + \frac{dH}{13.6}}{P_{(std)}}\right] = 17.64 \frac{^oR}{in.Hg} Y V_m \left[\frac{P_{bar} + \frac{dH}{13.6}}{T_m}\right]$$

Where:

$V_{m(std)}$ = Dry Gas Volume through meter at standard conditions, cu. ft.

V_m = Dry Gas Volume measured by meter, cu. ft.

P_{bar} = Barometric pressure at oriface meter, in. Hg.

P_{std} = Standard absolute pressure,(29.92 in. Hg.).

T_m = Absolute temperature at meter ^oR.

T_{std} = Standard absolute temperature (528^oR).

dH = Average pressure drop across oriface meter, in. H_2O.

Y = Dry gas meter calibration factor.

13.6 = Inches water per inches Hg.

RUN 1:

$$V_{m(std)} = (17.64)(1.010)(38.079)\left[\frac{(30.00) + \frac{1.08}{13.6}}{556}\right] = 36.703 \text{ dscf}$$

RUN 2:

$$V_{m(std)} = (17.64)(1.010)(37.372)\left[\frac{(30.00) + \frac{1.00}{13.6}}{563}\right] = 35.567 \text{ dscf}$$

RUN 3:

$$V_{m(std)} = (17.64)(1.010)(36.816)\left[\frac{(30.09) + \frac{1.08}{13.6}}{545}\right] = 36.310 \text{ dscf}$$

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Total Contaminants by Weight: GRAIN LOADING

PAH concentration C_s' gr./dscf.

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{M_n}{V_{m(std)}}\right]$$

Where:

C_s' = Concentration of PAH in stack gas, dry basis, corrected to standard conditions, gr./dscf.

M_n = Total amount of PAH collected, mg.

$V_{m(std)}$ = Dry gas volume through meter at standard conditions, cu. ft.

Run 1:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{0.4724}{36.703}\right] = 0.000198 \text{ gr./dscf.}$$

Run 2:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{0.3999}{35.567}\right] = 0.000173 \text{ gr./dscf.}$$

Run 3:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{0.3445}{36.310}\right] = 0.000146 \text{ gr./dscf.}$$

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Dry Molecular Weight

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%CO + \%N_2)$$

Where:

M_d = Dry molecular weight, lb./lb.-mole.

$\%CO_2$ = Percent carbon dioxide by volume (dry basis).

$\%O_2$ = Percent oxygen by volume (dry basis).

$\%N_2$ = Percent nitrogen by volume (dry basis).

%CO = Percent carbon monoxide by volume (dry basis).

0.264 = Ratio of O_2 to N_2 in air, v/v.

0.28 = Molecular weight of N_2 or CO, divided by 100.

0.32 = Molecular weight of O_2 divided by 100.

0.44 = Molecular weight of CO_2 divided by 100.

Run 1:

$M_d = 0.44(\ 5.10\%) + 0.32(11.50\%) + 0.28(\ .00\% + 83.40\%) = 29.28$ lb/lb-mole

Run 2:

$M_d = 0.44(\ 5.10\%) + 0.32(10.90\%) + 0.28(\ .00\% + 84.00\%) = 29.25$ lb/lb-mole

Run 3:

$M_d = 0.44(\ 4.40\%) + 0.32(12.70\%) + 0.28(\ .00\% + 82.90\%) = 29.21$ lb/lb-mole

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Water Vapor Condensed

$$V_{wc_{std}} = \left[V_f - V_i \right] \left[\frac{p_w \, R \, T_{(std)}}{M_w \quad P_{(std)}} \right] = 0.04707 \left[V_f - V_i \right]$$

$$V_{wsg_{std}} = \left[W_f - W_i \right] \left[\frac{R \quad T_{(std)}}{M_w \quad P_{(std)}} \right] = 0.04715 \left[W_f - W_i \right]$$

Where:

0.04707 = Conversion factor, $ft.^3/ml.$

0.04715 = Conversion factor, $ft.^3/g.$

$V_{wc_{std}}$ = Volume of water vapor condensed (standard conditions), scf.

$V_{wsg_{std}}$ = Volume of water vapor collected in silica gel (standard conditions), ml.

$V_f - V_i$ = Final volume of impinger contents less initial volume, ml.

$W_f - W_i$ = Final weight of silica gel less initial weight, g.

p_w = Density of water, 0.002201 lb/ml.

R = Ideal gas constant, 21.85 in.Hg. (cu.ft./lb.-mole)(^oR).

M_w = Molecular weight of water vapor, 18.0 lb/lb-mole.

T_{std} = Absolute temperature at standard conditions, 528^oR.

P_{std} = Absolute pressure at standard conditions, 29.92 inches Hg.

Run 1:

$V_{wc(std)}$ = (0.04707) (280.0) = 13.2 cu.ft
$V_{wsg(std)}$ = (0.04715) (.0) = 0.0 cu.ft

Run 2:

$V_{wc(std)}$ = (0.04707) (274.0) = 12.9 cu.ft
$V_{wsg(std)}$ = (0.04715) (.0) = 0.0 cu.ft

Run 3:

$V_{wc(std)}$ = (0.04707) (300.0) = 14.1 cu.ft
$V_{wsg(std)}$ = (0.04715) (6.9) = 0.3 cu.ft

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Moisture Content of Stack Gases

$$B_{ws} = \frac{V_{wc_{std}} + V_{wsg_{std}}}{V_{wc_{std}} + V_{wsg_{std}} + V_{m_{std}}} \times 100$$

Where:

B_{ws} = Proportion of water vapor, by volume, in the gas stream.

V_m = Dry gas volume measured by dry gas meter,(dcf).

$V_{wc_{std}}$ = Volume of water vapor condensed corrected to standard conditions (scf).

$V_{wsg_{std}}$ = Volume of water vapor collected in silica gel corrected to standard conditions (scf).

Run 1:

$$B_{ws} = \frac{13.2 + 0.0}{13.2 + 0.0 + 36.703} \times 100 = 26.45\ \%$$

Run 2:

$$B_{ws} = \frac{12.9 + 0.0}{12.9 + 0.0 + 35.567} \times 100 = 26.62\ \%$$

Run 3:

$$B_{ws} = \frac{14.1 + 0.3}{14.1 + 0.3 + 36.310} \times 100 = 28.40\ \%$$

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Molecular Weight of Stack Gases

$$M_s = M_d (1 - B_{ws}) + 18 (B_{ws})$$

Where:

M_s = Molecular weight of stack gas, wet basis, (lb./lb.-mole).

M_d = Molecular weight of stack gas, dry basis, (lb./lb.-mole).

Run 1:

M_s = 29.28 (1 - 26.45) + 18 (26.45) = 26.30 (lb./lb.-mole)

Run 2:

M_s = 29.25 (1 - 26.62) + 18 (26.62) = 26.26 (lb./lb.-mole)

Run 3:

M_s = 29.21 (1 - 28.40) + 18 (28.40) = 26.03 (lb./lb.-mole)

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Stack Gas Velocity

$$V_s = K_p C_p \left[-\sqrt{dP} \right]_{avg.} -\sqrt{\frac{T_{s(avg.)}}{P_s \; M_s}}$$

Where:

V_s = Average velocity of gas stream in stack, ft./sec.

K_p = 85.49 ft/sec $\boxed{(g/g\text{-mole})\text{-(mm Hg)}}$ / (^oK)(mm $\boxed{H_2O}^{1}/2$

C_p = Pitot tube coefficient, (dimensionless).

dP = Velocity head of stack gas, in. H_2O.

P_{bar} = Barometric pressure at measurement site, (in. Hg).

P_g = Stack static pressure, (in. Hg).

P_s = Absolute stack gas pressure, (in. Hg) = $P_{bar} + P_g$

P_{std} = Standard absolute pressure, (29.92 in. Hg).

t_s = Stack temperature, (^of).

T_s = Absolute stack temperature, (^oR). = 460 + t_s.

M_s = Molecular weight of stack gas, wet basis, (lb/lb-mole).

Run 1:

$$V = (85.49)\,(.84)\,(0.99) -\sqrt{\frac{716}{(30.00)(26.30)}} = 67.72 \text{ ft/sec.}$$

Run 2:

$$V = (85.49)\,(.84)\,(1.01) -\sqrt{\frac{720}{(30.00)(26.26)}} = 69.34 \text{ ft/sec.}$$

Run 3:

$$V = (85.49)\,(.84)\,(1.07) -\sqrt{\frac{712}{(30.09)(26.03)}} = 73.26 \text{ ft/sec.}$$

Format: vsR3

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Stack Gas Flow Rate

$$Q_{sd} = 3600 \left[1 - B_{wc} \right] V_s A \left[\frac{T_{std}}{T_{stk}} \right] \left[\frac{P_s}{P_{std}} \right]$$

Where:

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, (dscf/hr).

A = Cross sectional area of stack, ($ft.^2$).

3600 = Conversion factor, (sec./hr.).

t_s = Stack temperature, (^oF).

T_s = Absolute stack temperature, (^oR).

T_{std} = Standard absolute temperature, (528^oR).

P_{bar} = Barometric pressure at measurement site, (in.Hg.).

P_g = Stack static pressure, (in.Hg.).

P_s = Absolute stack gas pressure, (in.Hg.); = $P_{bar} + P_g$

P_{std} = Standard absolute pressure, (29.92 in.Hg.).

Run 1:

$$Q_{sd}=3600(1-\ .2645\ )(\ 67.72)(\ 11.23)\left[\frac{528}{716}\right]\left[\frac{30.00}{29.92}\right] = 1488889.4\ \frac{dscf}{hr}$$

Run 2:

$$Q_{sd}=3600(1-\ .2662\ )(\ 69.34)(\ 11.23)\left[\frac{528}{720}\right]\left[\frac{30.00}{29.92}\right] = 1512533.1\ \frac{dscf}{hr}$$

Run 3:

$$Q_{sd}=3600(1-\ .2840\ )(\ 73.26)(\ 11.23)\left[\frac{528}{712}\right]\left[\frac{30.09}{29.92}\right] = 1581527.4\ \frac{dscf}{hr}$$

Format: qR3

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Emissions Rate from Stack

$$E = \frac{(C_s)(Q_{sd})}{7000 \text{ gr./lb.}} = \text{lb. / hr.}$$

Where:

E = Emissions rate, lb/hr.

C_s = Concentration of PAH : in stack gas, dry basis, corrected to standard conditions, gr/dscf.

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, dscf/hr.

Run 1:

$$E = \frac{(.000198)(1488889.4)}{7000} = 0.042 \text{ lb. / hr.}$$

Run 2:

$$E = \frac{(.000173)(1512533.1)}{7000} = 0.037 \text{ lb. / hr.}$$

Run 3:

$$E = \frac{(.000146)(1581527.4)}{7000} = 0.033 \text{ lb. / hr.}$$

APAC OF TENN - FOR N.A.P.A.
MEMPHIS, TENNESSEE - PAH'S

Isokinetic Variation

$$I = 100\ T_s \left[\frac{0.002669\ V_{ic} + (V_m / T_m)\ (P_{bar} + dH / 13.6)}{60\ \Theta\ V_s\ P_s\ A_n} \right]$$

Where:

I	=	Percent isokinetic sampling.
100	=	Conversion to percent.
T_s	=	Absolute average stack gas temperature, ^oR.
0.002669	=	Conversion factor, Hg - ft^3/ml - ^oR.
V_{ic}	=	Ttl vol of liquid collected in impingers and silica gel, ml.
T_m	=	Absolute average dry gas meter temperature, ^oR.
P_{bar}	=	Barometric pressure at sampling site, (in. Hg).
dH	=	Av pressure differential across the oriface meter, (in.H_2O).
13.6	=	Specific gravity of mercury.
60	=	Conversion seconds to minutes.
Θ	=	Total sampling time, minutes.
V_s	=	Stack gas velocity, ft./sec.
P_s	=	Absolute stack gas pressure, in. Hg.
A_n	=	Cross sectional area of nozzle, ft^2.

Run 1:

$$I = (100)(716)\left[\frac{(0.002669)(280) + \frac{38.079}{556}\left[30.00 + \frac{1.08}{13.6}\right]}{60\ (60.0)\ (67.72)\ (30.00)\ (.000264)} \right] = 104.9\%$$

Run 2:

$$I = (100)(720)\left[\frac{(0.002669)(274) + \frac{37.372}{563}\left[30.00 + \frac{1.00}{13.6}\right]}{60\ (60.0)\ (69.34)\ (30.00)\ (.000264)} \right] = 100.1\%$$

Run 3:

$$I = (100)(712)\left[\frac{(0.002669)(306.9) + \frac{36.816}{545}\left[30.09 + \frac{1.08}{13.6}\right]}{60\ (60.0)\ (73.26)\ (30.09)\ (.000264)} \right] = 97.8\%$$

Format: iR3

VII. CALCULATIONS

B. FORMALDEHYDE

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

SUMMARY OF TEST DATA

			8-14-91 RUN #1	8-14-91 RUN #2	8-15-91 RUN #3
SAMPLING TRAIN DATA					
		start	09:33	12:07	07:19
		finish	11:01	14:21	08:56
1.	Sampling time, minutes	Θ	75.0	90.0	90.0
2.	Sampling nozzle diameter, in.	D_n	.2000	.2000	.2500
3.	Sampling nozzle cross-sect. area, ft^2	A_n	.000218	.000218	.000341
4.	Isokinetic variation	I	104.0	96.2	92.1
5.	Sample gas volume - meter cond., cf.	V_m	46.102	46.651	60.790
6.	Average meter temperature, ^oR	T_m	561	570	552
7.	Avg. oriface pressure drop, in. H_2O	dH	1.09	0.80	1.47
8.	Total formaldehyde collected, mg.	M_n	23.00	25.00	48.00
VELOCITY TRAVERSE DATA					
9.	Stack area, ft^2	A	11.23	11.23	11.23
10.	Absolute stack gas pressure, in. Hg.	P_s	30.16	30.16	30.14
11.	Barometric pressure, in. Hg.	P_{bar}	30.16	30.16	30.14
12.	Avg. absolute stack temperature, R^o	T_s	709	703	704
13.	Average $-\sqrt{vel.\ head}$, (C_p= .84)	$-\sqrt{dP}$	1.08	0.92	0.88
14.	Average stack gas velocity, ft./sec.	V_s	72.62	61.08	59.23
STACK MOISTURE CONTENT					
15.	Total water collected by train, ml.	V_{ic}	259.00	195.00	376.00
16.	Moisture in stack gas, %	B_{ws}	21.94	17.56	23.33
EMISSIONS DATA					
17.	Stack gas flow rate, dscf/hr.(000's)	Q_{sd}	1720	1541	1387
18.	Stack gas flow rate, cfm	acfm	48931	41156	39909
19.	Formaldehyde concentration, gr/dscf	C_s	0.0082	0.0089	0.0127
20.	Formaldehyde concentration, lb/hr	E	2.02	1.96	2.52
21.	concentration, lb/mBtu	E'	0.00000	0.00000	0.00000
ORSAT DATA					
22.	Percent CO_2 by volume	CO_2	5.10	5.10	4.40
23.	Percent O_2 by volume	O_2	11.50	10.90	12.70
24.	Percent CO by volume	CO	.00	.00	.00
25.	Percent N_2 by volume	N_2	83.40	84.00	82.90

Format: summryR3

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

Dry Gas Volume

$$V_{m(std)} = V_m \left[\frac{T_{(std)}}{T_m}\right]\left[\frac{P_{bar} + \frac{dH}{13.6}}{P_{(std)}}\right] = 17.64 \frac{^oR}{in.Hg} \; Y \; V_m \left[\frac{P_{bar} + \frac{dH}{13.6}}{T_m}\right]$$

Where:

$V_{m(std)}$ = Dry Gas Volume through meter at standard conditions, cu. ft.

V_m = Dry Gas Volume measured by meter, cu. ft.

P_{bar} = Barometric pressure at oriface meter, in. Hg.

P_{std} = Standard absolute pressure,(29.92 in. Hg.).

T_m = Absolute temperature at meter ^oR.

T_{std} = Standard absolute temperature (528^oR).

dH = Average pressure drop across oriface meter, in. H_2O.

Y = Dry gas meter calibration factor.

13.6 = Inches water per inches Hg.

RUN 1:

$$V_{m(std)} = (17.64)(.990)(46.102)\left[\frac{(30.16) + \frac{1.09}{13.6}}{561}\right] = 43.398 \text{ dscf}$$

RUN 2:

$$V_{m(std)} = (17.64)(.990)(46.651)\left[\frac{(30.16) + \frac{0.80}{13.6}}{570}\right] = 43.191 \text{ dscf}$$

RUN 3:

$$V_{m(std)} = (17.64)(.990)(60.790)\left[\frac{(30.14) + \frac{1.47}{13.6}}{552}\right] = 58.173 \text{ dscf}$$

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

Total Contaminants by Weight: GRAIN LOADING

Formaldehyde concentration C_s' gr./dscf.

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{M_n}{V_{m(std)}}\right]$$

Where:

C_s' = Concentration of ..... in stack gas, dry basis, corrected to standard conditions, gr./dscf.

M_n = Total amount of formaldehyde collected, mg.

$V_{m(std)}$ = Dry gas volume through meter at standard conditions, cu. ft.

Run 1:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{23.00}{43.398}\right] = 0.0082 \text{ gr./dscf.}$$

Run 2:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{25.00}{43.191}\right] = 0.0089 \text{ gr./dscf.}$$

Run 3:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{48.00}{58.173}\right] = 0.0127 \text{ gr./dscf.}$$

Dry Molecular Weight

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%CO + \%N_2)$$

Where:

M_d = Dry molecular weight,lb./lb.-mole.

$\%CO_2$ = Percent carbon dioxide by volume (dry basis).

$\%O_2$ = Percent oxygen by volume (dry basis).

$\%N_2$ = Percent nitrogen by volume (dry basis).

%CO = Percent carbon monoxide by volume (dry basis).

0.264 = Ratio of O_2 to N_2 in air, v/v.

0.28 = Molecular weight of N_2 or CO, divided by 100.

0.32 = Molecular weight of O_2 divided by 100.

0.44 = Molecular weight of CO_2 divided by 100.

Run 1:

$$M_d = 0.44(\ 5.10\%) + 0.32(11.50\%) + 0.28(\ .00\% + 83.40\%) = 29.28\ \frac{lb}{lb\text{-mole}}$$

Run 2:

$$M_d = 0.44(\ 5.10\%) + 0.32(10.90\%) + 0.28(\ .00\% + 84.00\%) = 29.25\ \frac{lb}{lb\text{-mole}}$$

Run 3:

$$M_d = 0.44(\ 4.40\%) + 0.32(12.70\%) + 0.28(\ .00\% + 82.90\%) = 29.21\ \frac{lb}{lb\text{-mole}}$$

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

Water Vapor Condensed

$$V_{wc_{std}} = \left[V_f - V_i \right] \left[\frac{P_w \, R \, T_{(std)}}{M_w \quad P_{(std)}} \right] = 0.04707 \left[V_f - V_i \right]$$

$$V_{wsg_{std}} = \left[W_f - W_i \right] \left[\frac{R \quad T_{(std)}}{M_w \quad P_{(std)}} \right] = 0.04715 \left[W_f - W_i \right]$$

Where:

0.04707 = Conversion factor, $ft.^3/ml.$

0.04715 = Conversion factor, $ft.^3/g.$

$V_{wc_{std}}$ = Volume of water vapor condensed (standard conditions), scf.

$V_{wsg_{std}}$ = Volume of water vapor collected in silica gel (standard conditions), ml.

$V_f - V_i$ = Final volume of impinger contents less initial volume, ml.

$W_f - W_i$ = Final weight of silica gel less initial weight, g.

p_w = Density of water, 0.002201 lb/ml.

R = Ideal gas constant, 21.85 in.Hg. (cu.ft./lb.-mole)(^oR).

M_w = Molecular weight of water vapor, 18.0 lb/lb-mole.

T_{std} = Absolute temperature at standard conditions, 528^oR.

P_{std} = Absolute pressure at standard conditions, 29.92 inches Hg.

Run 1:

$V_{wc(std)}$ = (0.04707) (245.0) = 11.5 cu.ft
$V_{wsg(std)}$ = (0.04715) (14.0) = 0.7 cu.ft

Run 2:

$V_{wc(std)}$ = (0.04707) (183.0) = 8.6 cu.ft
$V_{wsg(std)}$ = (0.04715) (12.0) = 0.6 cu.ft

Run 3:

$V_{wc(std)}$ = (0.04707) (358.0) = 16.9 cu.ft
$V_{wsg(std)}$ = (0.04715) (18.0) = 0.8 cu.ft

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

Moisture Content of Stack Gases

$$B_{ws} = \frac{V_{wc_{std}} + V_{wsg_{std}}}{V_{wc_{std}} + V_{wsg_{std}} + V_{m_{std}}} \times 100$$

Where:

B_{ws} = Proportion of water vapor, by volume, in the gas stream.

V_m = Dry gas volume measured by dry gas meter,(dcf).

$V_{wc_{std}}$ = Volume of water vapor condensed corrected to standard conditions (scf).

$V_{wsg_{std}}$ = Volume of water vapor collected in silica gel corrected to standard conditions (scf).

Run 1:

$$B_{ws} = \frac{11.5 + 0.7}{11.5 + 0.7 + 43.398} \times 100 = 21.94\ \%$$

Run 2:

$$B_{ws} = \frac{8.6 + 0.6}{8.6 + 0.6 + 43.191} \times 100 = 17.56\ \%$$

Run 3:

$$B_{ws} = \frac{16.9 + 0.8}{16.9 + 0.8 + 58.173} \times 100 = 23.33\ \%$$

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

Molecular Weight of Stack Gases

$$M_s = M_d (1 - B_{ws}) + 18 (B_{ws})$$

Where:

M_s = Molecular weight of stack gas, wet basis, (lb./lb.-mole).

M_d = Molecular weight of stack gas, dry basis, (lb./lb.-mole).

Run 1:

$M_s = 29.28 (1 - 21.94) + 18 (21.94) = 26.81$ (lb./lb.-mole)

Run 2:

$M_s = 29.25 (1 - 17.56) + 18 (17.56) = 27.27$ (lb./lb.-mole)

Run 3:

$M_s = 29.21 (1 - 23.33) + 18 (23.33) = 26.59$ (lb./lb.-mole)

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

Stack Gas Velocity

$$V_s = K_p C_p \left[-\sqrt{dP} \right]_{avg.} -\sqrt{\frac{T_{s(avg.)}}{P_s \; M_s}}$$

Where:

V_s = Average velocity of gas stream in stack, ft./sec.

K_p = 85.49 ft/sec $\boxed{(g/g\text{-mole})\text{-}(mm\ Hg)}$ / $(^{o}K)(\ mm\ \underline{H_2O})^{1/2}$

C_p = Pitot tube coefficient, (dimensionless).

dP = Velocity head of stack gas, in. H_2O.

P_{bar} = Barometric pressure at measurement site, (in. Hg).

P_g = Stack static pressure, (in. Hg).

P_s = Absolute stack gas pressure, (in. Hg) = $P_{bar} + P_g$

P_{std} = Standard absolute pressure, (29.92 in. Hg).

t_s = Stack temperature, (^{o}f).

T_s = Absolute stack temperature, (^{o}R). = 460 + t_s.

M_s = Molecular weight of stack gas, wet basis, (lb/lb-mole).

Run 1:

$$V = (85.49)\ (\ .84)\ (\ 1.08)\ -\sqrt{\frac{709}{(30.16)(26.81)}} = 72.62 \text{ ft/sec.}$$

Run 2:

$$V = (85.49)\ (\ .84)\ (\ 0.92)\ -\sqrt{\frac{703}{(30.16)(27.27)}} = 61.08 \text{ ft/sec.}$$

Run 3:

$$V = (85.49)\ (\ .84)\ (\ 0.88)\ -\sqrt{\frac{704}{(30.14)(26.59)}} = 59.23 \text{ ft/sec.}$$

Format: vsR3

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

Stack Gas Flow Rate

$$Q_{sd} = 3600 \left[1 - B_{wc} \right] V_s A \left[\frac{T_{std}}{T_{stk}} \right] \left[\frac{P_s}{P_{std}} \right]$$

Where:

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, (dscf/hr).

A = Cross sectional area of stack, ($ft.^2$).

3600 = Conversion factor, (sec./hr.).

t_s = Stack temperature, (^oF).

T_s = Absolute stack temperature, (^oR).

T_{std} = Standard absolute temperature, (528^oR).

P_{bar} = Barometric pressure at measurement site, (in.Hg.).

P_g = Stack static pressure, (in.Hg.).

P_s = Absolute stack gas pressure, (in.Hg.); = $P_{bar} + P_g$

P_{std} = Standard absolute pressure, (29.92 in.Hg.).

Run 1:

$$Q_{sd}=3600(1-\ .2194\ )(\ 72.62)(\ 11.23)\left[\frac{528}{709}\right]\left[\frac{30.16}{29.92}\right] = 1720380.4\ \frac{dscf}{hr}$$

Run 2:

$$Q_{sd}=3600(1-\ .1756\ )(\ 61.08)(\ 11.23)\left[\frac{528}{703}\right]\left[\frac{30.16}{29.92}\right] = 1541230.6\ \frac{dscf}{hr}$$

Run 3:

$$Q_{sd}=3600(1-\ .2333\ )(\ 59.23)(\ 11.23)\left[\frac{528}{704}\right]\left[\frac{30.14}{29.92}\right] = 1387050.8\ \frac{dscf}{hr}$$

Format: qR3

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

Emissions Rate from Stack

$$E = \frac{(C_s)(Q_{sd})}{7000 \text{ gr./lb.}} = \text{lb. / hr.}$$

Where:

E = Emissions rate, lb/hr.

C_s = Concentration of formaldehyde in stack gas, dry basis, corrected to standard conditions, gr/dscf.

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, dscf/hr.

Run 1:

$$E = \frac{(0.0082)(1720380.4)}{7000} = 2.02 \text{ lb. / hr.}$$

Run 2:

$$E = \frac{(0.0089)(1541230.6)}{7000} = 1.96 \text{ lb. / hr.}$$

Run 3:

$$E = \frac{(0.0127)(1387050.8)}{7000} = 2.52 \text{ lb. / hr.}$$

EMISSIONS OF FORMALDEHYDE: PPM (PARTS PER MILLION)

$$E = \frac{C_s}{} \left| \frac{g}{1{,}000\ mg} \right| \frac{MOL}{g} \left| \frac{22.4\ l}{MOL} \right| \frac{293°F}{273°F} \left| \frac{ft^3}{28.317} \right| 1{,}000{,}000$$

Where:

C_s =	Concentration of formaldehyde in mg/dscf.
1000 mg/g =	Conversion to grams.
30.03 g/MOL =	Molar conversion for formaldehyde.
22.4 l/MOL =	Volumetric molar conversion @ 273°K.
293°K/273°K =	Temperature correction to standard conditions.
28.317/ft^3 =	Conversion to liters.
1,000,000 =	Conversion to parts per million.

Run #1:

23.0 mg	g	MOL	22.4 ℓ	293°K	ft^3	1,000,000	=	15.0 ppm
43.398 dscf	1000 mg	30.03 g	MOL	273°K	28.317 ℓ			

Run #2:

25.0 mg	g	MOL	22.4 ℓ	293°K	ft^3	1,000,000	=	16.4 ppm
43.191 dscf	1000 mg	30.03 g	MOL	273°K	28.317 ℓ			

Run #3:

48.0 mg	g	MOL	22.4 ℓ	293°K	ft^3	1,000,000	=	23.3 ppm
58.173 dscf	1000 mg	30.03 g	MOL	273°K	28.317 ℓ			

APAC OF TENN - FOR NAPA
MEMPHIS, TN FORMALDEHYDE

Isokinetic Variation

$$I = 100\ T_s \left[\frac{0.002669\ V_{ic} + (V_m / T_m)\ (P_{bar} + dH / 13.6)}{60\ \Theta\ V_s\ P_s\ A_n} \right]$$

Where:

I	=	Percent isokinetic sampling.
100	=	Conversion to percent.
T_s	=	Absolute average stack gas temperature, ^oR.
0.002669	=	Conversion factor, Hg - ft^3/ml - ^oR.
V_{ic}	=	Ttl vol of liquid collected in impingers and silica gel, ml.
T_m	=	Absolute average dry gas meter temperature, ^oR.
P_{bar}	=	Barometric pressure at sampling site, (in. Hg).
dH	=	Av pressure differential across the oriface meter, (in.H_2O).
13.6	=	Specific gravity of mercury.
60	=	Conversion seconds to minutes.
Θ	=	Total sampling time, minutes.
V_s	=	Stack gas velocity, ft./sec.
P_s	=	Absolute stack gas pressure, in. Hg.
A_n	=	Cross sectional area of nozzle, ft^2.

Run 1:

$$I = (100)(709)\left[\frac{(0.002669)(259) + \frac{46.102}{561}\left[30.16 + \frac{1.09}{13.6}\right]}{60\ (75.0)\ (72.62)\ (30.16)\ (.000218)} \right] = 104.0\%$$

Run 2:

$$I = (100)(703)\left[\frac{(0.002669)(195) + \frac{46.651}{570}\left[30.16 + \frac{0.80}{13.6}\right]}{60\ (90.0)\ (61.08)\ (30.16)\ (.000218)} \right] = 96.2\%$$

Run 3:

$$I = (100)(704)\left[\frac{(0.002669)(376) + \frac{60.790}{552}\left[30.14 + \frac{1.47}{13.6}\right]}{60\ (90.0)\ (59.23)\ (30.14)\ (.000341)} \right] = 92.1\%$$

Format: iR3

VII. CALCULATIONS

C. PARTICULATE & CONDENSIBLE PM

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

SUMMARY OF TEST DATA

		8-16-91 RUN #1	8-16-91 RUN #2	8-16-91 RUN #3
SAMPLING TRAIN DATA				
	start	09:46	11:31	13:38
	finish	10:54	12:59	14:44
1. Sampling time, minutes	Θ	60.0	60.0	60.0
2. Sampling nozzle diameter, in.	D_n	.2500	.2500	.2500
3. Sampling nozzle cross-sect. area, ft^2	A_n	.000341	.000341	.000341
4. Isokinetic variation	I	96.3	100.0	92.7
5. Sample gas volume - meter cond., cf.	V_m	42.636	47.445	39.260
6. Average meter temperature, ^oR	T_m	564	577	574
7. Avg. oriface pressure drop, in. H_2O	dH	1.57	1.87	1.78
8. Total particulate collected, mg.	M_n	30.90	59.70	32.10
VELOCITY TRAVERSE DATA				
9. Stack area, ft^2	A	11.23	11.23	11.23
10. Absolute stack gas pressure, in. Hg.	P_s	30.14	30.14	30.14
11. Barometric pressure, in. Hg.	P_{bar}	30.14	30.14	30.14
12. Avg. absolute stack temperature, R^o	T_s	712	720	694
13. Average $-\sqrt{\overline{vel.\ head}}$, (C_p= .84)	$-\sqrt{d\bar{P}}$	0.87	0.98	0.94
14. Average stack gas velocity, ft./sec.	V_s	58.80	67.44	64.50
STACK MOISTURE CONTENT				
15. Total water collected by train, ml.	V_{ic}	254.00	375.00	426.00
16. Moisture in stack gas, %	B_{ws}	23.10	28.82	35.61
EMISSIONS DATA				
17. Stack gas flow rate, dscf/hr.(000's)	Q_{sd}	1365	1433	1286
18. Stack gas flow rate, cfm	acfm	39619	45441	43460
19. Particulate concentration, gr/dscf	C_s	0.0119	0.0211	0.0137
20. Particulate concentration, lb/hr	E	2.32	4.32	2.52
21. Particulate concentration, lb/mBtu	E'	0.00000	0.00000	0.00000
ORSAT DATA				
22. Percent CO_2 by volume	CO_2	5.10	5.10	4.40
23. Percent O_2 by volume	O_2	11.50	10.90	12.70
24. Percent CO by volume	CO	.00	.00	.00
25. Percent N_2 by volume	N_2	83.40	84.00	82.90

Format: summryR3

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Dry Gas Volume

$$V_{m(std)} = V_m \left[\frac{T_{(std)}}{T_m}\right]\left[\frac{P_{bar} + \frac{dH}{13.6}}{P_{(std)}}\right] = 17.64 \frac{^oR}{in.Hg}\ Y\ V_m \left[\frac{P_{bar} + \frac{dH}{13.6}}{T_m}\right]$$

Where:

$V_{m(std)}$ = Dry Gas Volume through meter at standard conditions, cu. ft.

V_m = Dry Gas Volume measured by meter, cu. ft.

P_{bar} = Barometric pressure at oriface meter, in. Hg.

P_{std} = Standard absolute pressure,(29.92 in. Hg.).

T_m = Absolute temperature at meter ^oR.

T_{std} = Standard absolute temperature (528^oR).

dH = Average pressure drop across oriface meter, in. H_2O.

Y = Dry gas meter calibration factor.

13.6 = Inches water per inches Hg.

RUN 1:

$$V_{m(std)} = (17.64)(.990)(42.636)\left[\frac{(30.14) + \frac{1.57}{13.6}}{564}\right] = 39.942 \text{ dscf}$$

RUN 2:

$$V_{m(std)} = (17.64)(.990)(47.445)\left[\frac{(30.14) + \frac{1.87}{13.6}}{577}\right] = 43.478 \text{ dscf}$$

RUN 3:

$$V_{m(std)} = (17.64)(.990)(39.260)\left[\frac{(30.14) + \frac{1.78}{13.6}}{574}\right] = 36.157 \text{ dscf}$$

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Total Contaminants by Weight: GRAIN LOADING

Particulate concentration C_s' gr./dscf.

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{M_n}{V_{m(std)}}\right]$$

Where:

C_s' = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, gr./dscf.

M_n = Total amount of particulate matter collected, mg.

$V_{m(std)}$ = Dry gas volume through meter at standard conditions, cu. ft.

Run 1:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{30.90}{39.942}\right] = 0.0119 \text{ gr./dscf.}$$

Run 2:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{59.70}{43.478}\right] = 0.0211 \text{ gr./dscf.}$$

Run 3:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{32.10}{36.157}\right] = 0.0137 \text{ gr./dscf.}$$

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)
Total Contaminants by Weight: GRAIN LOADING

Particulate concentration C_s' gr./dscf.

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{M_n}{V_{m(std)}}\right]$$

Where:

C_s' = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions,gr./dscf.

M_n = Total amount of particulate matter collected, mg.

$V_{m(std)}$ = Dry gas volume through meter at standard conditions, cu. ft.

Run 1:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{12.40}{39.942}\right] = 0.0048 \text{ gr./dscf.}$$

Run 2:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{26.40}{43.478}\right] = 0.0094 \text{ gr./dscf.}$$

Run 3:

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{11.70}{36.157}\right] = 0.0050 \text{ gr./dscf.}$$

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Dry Molecular Weight

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%CO + \%N_2)$$

Where:

M_d = Dry molecular weight,lb./lb.-mole.

$\%CO_2$ = Percent carbon dioxide by volume (dry basis).

$\%O_2$ = Percent oxygen by volume (dry basis).

$\%N_2$ = Percent nitrogen by volume (dry basis).

%CO = Percent carbon monoxide by volume (dry basis).

0.264 = Ratio of O_2 to N_2 in air, v/v.

0.28 = Molecular weight of N_2 or CO, divided by 100.

0.32 = Molecular weight of O_2 divided by 100.

0.44 = Molecular weight of CO_2 divided by 100.

Run 1:

$M_d = 0.44(\ 5.10\%) + 0.32(11.50\%) + 0.28(\ .00\% + 83.40\%) = 29.28\ \frac{lb}{lb\text{-mole}}$

Run 2:

$M_d = 0.44(\ 5.10\%) + 0.32(10.90\%) + 0.28(\ .00\% + 84.00\%) = 29.25\ \frac{lb}{lb\text{-mole}}$

Run 3:

$M_d = 0.44(\ 4.40\%) + 0.32(12.70\%) + 0.28(\ .00\% + 82.90\%) = 29.21\ \frac{lb}{lb\text{-mole}}$

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Water Vapor Condensed

$$V_{wc_{std}} = \left[V_f - V_i \right] \left[\frac{p_w \, R \, T_{(std)}}{M_w \quad P_{(std)}} \right] = 0.04707 \left[V_f - V_i \right]$$

$$V_{wsg_{std}} = \left[W_f - W_i \right] \left[\frac{R \quad T_{(std)}}{M_w \quad P_{(std)}} \right] = 0.04715 \left[W_f - W_i \right]$$

Where:

0.04707 = Conversion factor, $ft.^3/ml.$

0.04715 = Conversion factor, $ft.^3/g.$

$V_{wc_{std}}$ = Volume of water vapor condensed (standard conditions), scf.

$V_{wsg_{std}}$ = Volume of water vapor collected in silica gel (standard conditions), ml.

$V_f - V_i$ = Final volume of impinger contents less initial volume, ml.

$W_f - W_i$ = Final weight of silica gel less initial weight, g.

p_w = Density of water, 0.002201 lb/ml.

R = Ideal gas constant, 21.85 in.Hg. (cu.ft./lb.-mole)($^\circ$R).

M_w = Molecular weight of water vapor, 18.0 lb/lb-mole.

T_{std} = Absolute temperature at standard conditions, 528°R.

P_{std} = Absolute pressure at standard conditions, 29.92 inches Hg.

Run 1:

$V_{wc(std)}$ = (0.04707) (238.0) = 11.2 cu.ft
$V_{wsg(std)}$ = (0.04715) (16.0) = 0.8 cu.ft

Run 2:

$V_{wc(std)}$ = (0.04707) (357.0) = 16.8 cu.ft
$V_{wsg(std)}$ = (0.04715) (18.0) = 0.8 cu.ft

Run 3:

$V_{wc(std)}$ = (0.04707) (404.0) = 19.0 cu.ft
$V_{wsg(std)}$ = (0.04715) (22.0) = 1.0 cu.ft

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Moisture Content of Stack Gases

$$B_{ws} = \frac{V_{wc_{std}} + V_{wsg_{std}}}{V_{wc_{std}} + V_{wsg_{std}} + V_{m_{std}}} \times 100$$

Where:

B_{ws} = Proportion of water vapor, by volume, in the gas stream.

V_m = Dry gas volume measured by dry gas meter,(dcf).

$V_{wc_{std}}$ = Volume of water vapor condensed corrected to standard conditions (scf).

$V_{wsg_{std}}$ = Volume of water vapor collected in silica gel corrected to standard conditions (scf).

Run 1:

$$B_{ws} = \frac{11.2 + 0.8}{11.2 + 0.8 + 39.942} \times 100 = 23.10\ \%$$

Run 2:

$$B_{ws} = \frac{16.8 + 0.8}{16.8 + 0.8 + 43.478} \times 100 = 28.82\ \%$$

Run 3:

$$B_{ws} = \frac{19.0 + 1.0}{19.0 + 1.0 + 36.157} \times 100 = 35.61\ \%$$

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Molecular Weight of Stack Gases

$$M_s = M_d (1 - B_{ws}) + 18 (B_{ws})$$

Where:

M_s = Molecular weight of stack gas, wet basis, (lb./lb.-mole).

M_d = Molecular weight of stack gas, dry basis, (lb./lb.-mole).

Run 1:

M_s = 29.28 (1 - 23.10) + 18 (23.10) = 26.67 (lb./lb.-mole)

Run 2:

M_s = 29.25 (1 - 28.82) + 18 (28.82) = 26.01 (lb./lb.-mole)

Run 3:

M_s = 29.21 (1 - 35.61) + 18 (35.61) = 25.22 (lb./lb.-mole)

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Stack Gas Velocity

$$V_s = K_p\, C_p \left[-\sqrt{dP} \right]_{avg.} \sqrt{\frac{T_{s(avg.)}}{P_s\ M_s}}$$

Where:

V_s = Average velocity of gas stream in stack, ft./sec.

K_p = 85.49 ft/sec $\boxed{(g/g\text{-mole})\text{-}(mm\ Hg)}$ / $(^{o}K)(\ mm\ \underline{H_2O}\ )^{1/2}$

C_p = Pitot tube coefficient, (dimensionless).

dP = Velocity head of stack gas, in. H_2O.

P_{bar} = Barometric pressure at measurement site, (in. Hg).

P_g = Stack static pressure, (in. Hg).

P_s = Absolute stack gas pressure, (in. Hg) = $P_{bar} + P_g$

P_{std} = Standard absolute pressure, (29.92 in. Hg).

t_s = Stack temperature, (^{o}f).

T_s = Absolute stack temperature, (^{o}R). = 460 + t_s.

M_s = Molecular weight of stack gas, wet basis, (lb/lb-mole).

Run 1:

$$V = (85.49)\ (\ .84)\ (\ 0.87)\ \sqrt{\frac{712}{(30.14)(26.67)}} = 58.80\ ft/sec.$$

Run 2:

$$V = (85.49)\ (\ .84)\ (\ 0.98)\ \sqrt{\frac{720}{(30.14)(26.01)}} = 67.44\ ft/sec.$$

Run 3:

$$V = (85.49)\ (\ .84)\ (\ 0.94)\ \sqrt{\frac{694}{(30.14)(25.22)}} = 64.50\ ft/sec.$$

Format: vsR3

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Stack Gas Flow Rate

$$Q_{sd} = 3600 \left[1 - B_{wc} \right] V_s A \left[\frac{T_{std}}{T_{stk}} \right] \left[\frac{P_s}{P_{std}} \right]$$

Where:

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, (dscf/hr).

A = Cross sectional area of stack, ($ft.^2$).

3600 = Conversion factor, (sec./hr.).

t_s = Stack temperature, (^oF).

T_s = Absolute stack temperature, (^oR).

T_{std} = Standard absolute temperature, (528^oR).

P_{bar} = Barometric pressure at measurement site, (in.Hg.).

P_g = Stack static pressure, (in.Hg.).

P_s = Absolute stack gas pressure, (in.Hg.); = $P_{bar} + P_g$

P_{std} = Standard absolute pressure, (29.92 in.Hg.).

Run 1:

$$Q_{sd}=3600(1-\ .2310\ )(\ 58.80)(\ 11.23)\left[\frac{528}{712}\right]\left[\frac{30.14}{29.92}\right] = 1365593.7\ \frac{dscf}{hr}$$

Run 2:

$$Q_{sd}=3600(1-\ .2882\ )(\ 67.44)(\ 11.23)\left[\frac{528}{720}\right]\left[\frac{30.14}{29.92}\right] = 1433642.6\ \frac{dscf}{hr}$$

Run 3:

$$Q_{sd}=3600(1-\ .3561\ )(\ 64.50)(\ 11.23)\left[\frac{528}{694}\right]\left[\frac{30.14}{29.92}\right] = 1286816.2\ \frac{dscf}{hr}$$

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Emissions Rate from Stack

$$E = \frac{(C_s)(Q_{sd})}{7000 \text{ gr./lb.}} = \text{lb. / hr.}$$

Where:

E = Emissions rate, lb/hr.

C_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, gr/dscf.

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, dscf/hr.

Run 1:

$$E = \frac{(0.0119)(1365593.7)}{7000} = 2.32 \text{ lb. / hr.}$$

Run 2:

$$E = \frac{(0.0211)(1433642.6)}{7000} = 4.32 \text{ lb. / hr.}$$

Run 3:

$$E = \frac{(0.0137)(1286816.2)}{7000} = 2.52 \text{ lb. / hr.}$$

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Emissions Rate from Stack

$$E = \frac{(C_s)\ (Q_{sd})}{7000\ gr./lb.} = \text{lb. / hr.}$$

Where:

E = Emissions rate, lb/hr.

C_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, gr/dscf.

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, dscf/hr.

Run 1:

$$E = \frac{(0.0048)\ (1365593.7)}{7000} = 0.94 \text{ lb. / hr.}$$

Run 2:

$$E = \frac{(0.0094)\ (1433642.6)}{7000} = 1.93 \text{ lb. / hr.}$$

Run 3:

$$E = \frac{(0.0050)\ (1286816.2)}{7000} = 0.92 \text{ lb. / hr.}$$

APAC OF TENN - FOR NAPA
PARTICULATE (PM)/CONDENSIBLE PART (CPM)

Isokinetic Variation

$$I = 100\ T_s \left[\frac{0.002669\ V_{ic} + (V_m / T_m)\ (P_{bar} + dH / 13.6)}{60\ \theta\ V_s\ P_s\ A_n} \right]$$

Where:

I	=	Percent isokinetic sampling.
100	=	Conversion to percent.
T_s	=	Absolute average stack gas temperature, ^{o}R.
0.002669	=	Conversion factor, Hg - ft^3/ml - ^{o}R.
V_{ic}	=	Ttl vol of liquid collected in impingers and silica gel, ml.
T_m	=	Absolute average dry gas meter temperature, ^{o}R.
P_{bar}	=	Barometric pressure at sampling site, (in. Hg).
dH	=	Av pressure differential across the oriface meter, (in.H_2O).
13.6	=	Specific gravity of mercury.
60	=	Conversion seconds to minutes.
θ	=	Total sampling time, minutes.
V_s	=	Stack gas velocity, ft./sec.
P_s	=	Absolute stack gas pressure, in. Hg.
A_n	=	Cross sectional area of nozzle, ft^2.

Run 1:

$$I = (100)(712)\left[\frac{(0.002669)(254) + \frac{42.636}{564}\left[30.14 + \frac{1.57}{13.6}\right]}{60\ (60.0)\ (58.80)\ (30.14)\ (.000341)} \right] = 96.3\%$$

Run 2:

$$I = (100)(720)\left[\frac{(0.002669)(375) + \frac{47.445}{577}\left[30.14 + \frac{1.87}{13.6}\right]}{60\ (60.0)\ (67.44)\ (30.14)\ (.000341)} \right] = 100.0\%$$

Run 3:

$$I = (100)(694)\left[\frac{(0.002669)(426) + \frac{39.260}{574}\left[30.14 + \frac{1.78}{13.6}\right]}{60\ (60.0)\ (64.50)\ (30.14)\ (.000341)} \right] = 92.7\%$$

Format: iR3

VII. CALCULATIONS

D. GASEOUS POLLUTANTS

NAME: APAC OF TENNESSEE (NAPA)
LOCATION: MEMPHIS, TENNESSEE

THC GASEOUS CONCENTRATION CORRECTION TO CALIBRATION GASES

$$C_{GAS} = (\overline{C} - C_o) \left[\frac{C_{ma}}{C_m - C_o} \right]$$

Where:

C_{GAS} = Effluent gas concentration, dry basis, ppm.

$\overline{C}$ = Average gas concentration indicated by gas analyzer.

C_o = Average of initial and final system calibration bias check for zero gas.

C_{ma} = Actual concentration of upscale calibration gas.

C_m = Average of initial and final system calibration bias check for upscale gas.

Run #1:

$$C_{GAS} = (314.0 - (-0.85)) \left[\frac{509.0}{506.0 - (-0.85)} \right] = 316.2 \text{ ppm}$$

Run #2

$$C_{GAS} = (324.2 - (-0.35)) \left[\frac{509.0}{507.3 - (-0.35)} \right] = 325.4 \text{ ppm}$$

Run #3

$$C_{GAS} = (261.5 - (+0.45)) \left[\frac{509.0}{507.3 - (+0.45)} \right] = 263.1 \text{ ppm}$$

Run #4

$$C_{GAS} = (402.5 - (+0.40)) \left[\frac{509.0}{506.7 - (+0.40)} \right] = 404.2 \text{ ppm}$$

NAME: APAC OF TENNESSEE (NAPA)
LOCATION: MEMPHIS, TENNESSEE

SO_2 GASEOUS CONCENTRATION CORRECTION TO CALIBRATION GASES

$$C_{GAS} = (\overline{C} - C_o) \left[\frac{C_{ma}}{C_m - C_o} \right]$$

Where:

C_{GAS} = Effluent gas concentration, dry basis, ppm.

$\overline{C}$ = Average gas concentration indicated by gas analyzer.

C_o = Average of initial and final system calibration bias check for zero gas.

C_{ma} = Actual concentration of upscale calibration gas.

C_m = Average of initial and final system calibration bias check for upscale gas.

Run #1:

$$C_{GAS} = (4.1 - 0.0) \left[\frac{53.1}{55.35 - 0.0} \right] = 3.9 \text{ ppm}$$

Run #2

$$C_{GAS} = (5.3 - (-0.1)) \left[\frac{53.1}{55.2 - (-0.1)} \right] = 5.2 \text{ ppm}$$

Run #3

$$C_{GAS} = (3.6 - (-0.35)) \left[\frac{53.1}{55.15 - (-0.35)} \right] = 3.8 \text{ ppm}$$

Run #4

$$C_{GAS} = (6.6 - (-0.1)) \left[\frac{53.1}{54.85 - (-0.1)} \right] = 6.5 \text{ ppm}$$

NAME: APAC OF TENNESSEE (NAPA) DATE: AUGUST 9 & 10, 1991
LOCATION: MEMPHIS, TENNESSEE

TOTAL SO_2 EMISSIONS: POUNDS PER HOUR

$$E = (2.59 \times 10^{-9})\ (M_d)\ (ppm_d)\ (Q_{sd})$$

Where:

E = Sulfur dioxide emissions rate, lbs/hr.

2.59×10^{-9} = Conversion factor, lbs/dscf.

M_d = Dry molecular weight.

Q_{sd} = Dry volumetric stack gas flow rate corrected to std. conditions, dscf/hr.

ppm_d = Parts per million, dry basis.

Run #1:

$$E = (2.59 \times 10^{-9})\ (64.07)\ (3.9)\ (1{,}488{,}889.4) = 0.96\ \frac{lbs}{hr}$$

Run #2:

$$E = (2.59 \times 10^{-9})\ (64.07)\ (5.2)\ (1{,}488{,}889.4) = 1.28\ \frac{lbs}{hr}$$

Run 3:

$$E = (2.59 \times 10^{-9})\ (64.07)\ (3.8)\ (1{,}512{,}533.1) = 0.95\ \frac{lbs}{hr}$$

Run 4:

$$E = (2.59 \times 10^{-9})\ (64.07)\ (6.5)\ (1{,}581{,}527.4) = 1.71\ \frac{lbs}{hr}$$

NAME: APAC OF TENNESSEE (NAPA)
LOCATION: MEMPHIS, TENNESSEE

CO GASEOUS CONCENTRATION CORRECTION TO CALIBRATION GASES

$$C_{GAS} = (\overline{C} - C_o)\left[\frac{C_{ma}}{C_m - C_o}\right]$$

Where:

C_{GAS} = Effluent gas concentration, dry basis, ppm.

$\overline{C}$ = Average gas concentration indicated by gas analyzer.

C_o = Average of initial and final system calibration bias check for zero gas.

C_{ma} = Actual concentration of upscale calibration gas.

C_m = Average of initial and final system calibration bias check for upscale gas.

Run #1:

$$C_{GAS} = (643.6 - (-0.25))\left[\frac{598.0}{610.6 - (-0.25)}\right] = 630.3 \text{ ppm}$$

Run #2

$$C_{GAS} = (>1{,}000 - (+0.2))\left[\frac{598.0}{609.05 - (+0.2)}\right] = >1{,}000 \text{ ppm}$$

Run #3

$$C_{GAS} = (>1{,}000 - (-0.15))\left[\frac{598.0}{608.05 - (-0.15)}\right] = >1{,}000 \text{ ppm}$$

Run #4

$$C_{GAS} = (516.9 - (-0.05))\left[\frac{598.0}{607.6 - (-0.05)}\right] = 508.7 \text{ ppm}$$

NAME: APAC OF TENNESSEE (NAPA) DATE: AUGUST 9 & 10, 1991
LOCATION: MEMPHIS, TENNESSEE

TOTAL CARBON MONOXIDE EMISSIONS: POUNDS PER HOUR

$$E = (2.59 \times 10^{-9})\ (M_d)\ (ppm_d)\ (Q_{sd})$$

Where:

E = Carbon Monoxide emissions rate, lbs/hr.

2.59×10^{-9} = Conversion factor, lbs/dscf.

M_d = Dry molecular weight.

Q_{sd} = Dry volumetric stack gas flow rate corrected to std. conditions, dscf/hr.

ppm_d = Parts per million, dry basis.

Run #1:

$$E = (2.59 \times 10^{-9})\ (28.01)\ (630.3)\ (1{,}488{,}889.4) = 68.08\ \frac{lbs}{hr}$$

Run #2:

$$E = (2.59 \times 10^{-9})\ (28.01)\ (>1{,}000)\ (1{,}488{,}889.4) = >108.01\ \frac{lbs}{hr}$$

Run 3:

$$E = (2.59 \times 10^{-9})\ (28.01)\ (>1{,}000)\ (1{,}512{,}533.1) = >109.73\ \frac{lbs}{hr}$$

Run 4:

$$E = (2.59 \times 10^{-9})\ (28.01)\ (508.7)\ (1{,}581{,}527.4) = 58.36\ \frac{lbs}{hr}$$

NAME: APAC OF TENNESSEE (NAPA)
LOCATION: MEMPHIS, TENNESSEE

NO_x GASEOUS CONCENTRATION CORRECTION TO CALIBRATION GASES

$$C_{GAS} = (\overline{C} - C_o) \left[\frac{C_{ma}}{C_m - C_o} \right]$$

Where:

C_{GAS} = Effluent gas concentration, dry basis, ppm.

$\overline{C}$ = Average gas concentration indicated by gas analyzer.

C_o = Average of initial and final system calibration bias check for zero gas.

C_{ma} = Actual concentration of upscale calibration gas.

C_m = Average of initial and final system calibration bias check for upscale gas.

Run #1:

$$C_{GAS} = (29.5 - 0.15) \left[\frac{551.0}{544.55 - 0.15} \right] = 29.7 \text{ ppm}$$

Run #2

$$C_{GAS} = (28.2 - 0.40) \left[\frac{551.0}{544.25 - 0.40} \right] = 28.2 \text{ ppm}$$

Run #3

$$C_{GAS} = (29.6 - 0.65) \left[\frac{551.0}{544.65 - 0.65} \right] = 29.3 \text{ppm}$$

Run #4

$$C_{GAS} = (24.8 - 0.15) \left[\frac{551.0}{545.0 - 0.15} \right] = 24.9 \text{ ppm}$$

NAME: APAC OF TENNESSEE (NAPA) DATE: AUGUST 9 & 10, 1991
LOCATION: MEMPHIS, TENNESSEE

TOTAL NO_x EMISSIONS: POUNDS PER HOUR

$$E = (2.59 \times 10^{-9})\ (M_d)\ (ppm_d)\ (Q_{sd})$$

Where:

E = Nitrogen oxide emissions rate, lbs/hr.

2.59×10^{-9} = Conversion factor, lbs/dscf.

M_d = Dry molecular weight.

Q_{sd} = Dry volumetric stack gas flow rate corrected to std. conditions, dscf/hr.

ppm_d = Parts per million, dry basis.

Run #1:

$$E = (2.59 \times 10^{-9})\ (46.01)\ (29.7)\ (1{,}488{,}889.4) = 5.27\ \frac{lbs}{hr}$$

Run #2:

$$E = (2.59 \times 10^{-9})\ (46.01)\ (28.2)\ (1{,}488{,}889.4) = 5.00\ \frac{lbs}{hr}$$

Run 3:

$$E = (2.59 \times 10^{-9})\ (46.01)\ (29.3)\ (1{,}512{,}533.1) = 5.28\ \frac{lbs}{hr}$$

Run 4:

$$E = (2.59 \times 10^{-9})\ (46.01)\ (24.9)\ (1{,}581{,}527.4) = 4.69\ \frac{lbs}{hr}$$

NAME: APAC OF TENNESSEE (NAPA) DATE: AUGUST 9 & 10, 1991
LOCATION: MEMPHIS, TENNESSEE

TOTAL HYDROCARBON EMISSIONS: Convert ppm (wet) to ppm (dry)

$$ppm_d - ppm_w \left(\frac{100}{100 - B_{ws}} \right)$$

Where: ppm_d = Parts per million, dry basis.

ppm_w = Parts per million, wet basis (as measured by the instrument).

B_{ws} = Proportion of water vapor, by volume, in the gas stream.

Run #1:

$$THC - (316.2) \left(\frac{100}{100 - 26.45} \right) - 429.9\ ppm_d$$

Run #2:

$$THC - (325.4) \left(\frac{100}{100 - 26.45} \right) - 442.4\ ppm_d$$

Run #3:

$$THC - (263.1) \left(\frac{100}{100 - 26.62} \right) - 358.5\ ppm_d$$

Run #4:

$$THC - (404.2) \left(\frac{100}{100 - 28.40} \right) - 564.5\ ppm_d$$

NAME: APAC OF TENNESSEE (NAPA) DATE: AUGUST 9 & 10, 1991
LOCATION: MEMPHIS, TENNESSEE

TOTAL HYDROCARBON EMISSIONS: POUNDS PER HOUR

$$E = (2.59 \times 10^{-9})\ (M_d)\ (ppm_d)\ (Q_{sd})$$

Where:

E = Total Hydrocarbon emissions rate, lbs/hr.

2.59×10^{-9} = Conversion factor, lbs/dscf.

M_d = Dry molecular weight.

Q_{sd} = Dry volumetric stack gas flow rate corrected to std. conditions, dscf/hr.

ppm_d = Parts per million, dry basis.

Run #1:

$$E = (2.59 \times 10^{-9})\ (16.04)\ (429.9)\ (1{,}488{,}889.4) = 26.59\ \frac{lbs}{hr}\ \text{as methane}$$

Run #2:

$$E = (2.59 \times 10^{-9})\ (16.04)\ (442.4)\ (1{,}488{,}889.4) = 27.36\ \frac{lbs}{hr}\ \text{as methane}$$

Run 3:

$$E = (2.59 \times 10^{-9})\ (16.04)\ (358.5)\ (1{,}512{,}533.1) = 22.53\ \frac{lbs}{hr}\ \text{as methane}$$

Run 4:

$$E = (2.59 \times 10^{-9})\ (16.04)\ (564.5)\ (1{,}581{,}527.4) = 37.09\ \frac{lbs}{hr}\ \text{as methane}$$

VIII. FIELD DATA

A. INSTRUMENTAL

APAC - MEMPHIS, TN.

RUN # 1 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/09/91	10:53	278.0	4.2	5.3	686.0	11.3	32
08/09/91	10:54	279.5	4.2	5.3	673.5	11.3	32
08/09/91	10:55	287.5	4.2	5.2	584.5	11.4	31
08/09/91	10:56	324.0	4.1	5.1	519.0	11.6	30
08/09/91	10:57	381.5	4.6	5.0	564.5	11.7	30
08/09/91	10:58	398.0	5.0	5.1	695.5	11.6	30
08/09/91	10:59	354.0	4.7	4.6	662.0	12.1	28
08/09/91	11:00	353.0	4.6	4.8	673.5	12.1	29
08/09/91	11:01	337.5	4.4	4.8	674.5	12.1	29
08/09/91	11:02	341.5	4.5	4.8	646.0	12.1	29
08/09/91	11:03	341.0	4.5	4.8	635.0	12.1	29
08/09/91	11:04	329.5	4.5	4.8	675.5	12.0	29
08/09/91	11:05	354.5	4.6	4.9	702.5	12.0	29
08/09/91	11:06	344.5	4.8	4.9	777.0	11.9	28
08/09/91	11:07	320.5	4.5	4.8	653.5	12.0	29
08/09/91	11:08	323.5	4.4	4.8	679.0	12.0	29
/09/91	11:09	346.5	4.6	4.8	671.0	12.0	29
/09/91	11:10	352.5	4.7	4.9	758.0	11.9	28
08/09/91	11:11	347.5	4.6	4.8	712.5	12.0	28
08/09/91	11:12	346.0	4.6	4.8	686.0	12.0	28
08/09/91	11:13	334.0	4.7	4.8	647.5	12.0	29
08/09/91	11:14	346.0	4.4	4.8	670.0	12.0	29
08/09/91	11:15	353.0	4.5	4.8	671.5	12.0	28
08/09/91	11:16	343.5	4.5	4.8	665.0	12.0	29
08/09/91	11:17	214.5	3.9	3.7	497.5	12.6	26
08/09/91	11:18	186.5	2.8	2.4	310.0	15.9	17
08/09/91	11:19	367.5	3.6	4.1	546.0	14.7	21
08/09/91	11:20	346.0	4.1	4.8	609.5	12.2	28
08/09/91	11:21	356.0	4.3	4.9	619.5	12.1	29
08/09/91	11:22	368.0	4.4	5.1	661.5	11.6	30
08/09/91	11:23	354.5	4.5	5.1	713.5	11.5	30
08/09/91	11:24	339.0	4.7	5.1	674.5	11.5	30
08/09/91	11:25	335.0	4.4	5.0	649.0	11.6	30
08/09/91	11:26	345.0	4.4	5.0	659.5	11.5	30
08/09/91	11:27	344.5	4.4	5.0	633.5	11.6	30
08/09/91	11:28	334.0	4.5	5.1	676.5	11.6	30
08/09/91	11:29	346.0	4.6	5.1	657.5	11.5	30
08/09/91	11:30	313.5	4.4	5.1	622.0	11.5	30
08/09/91	11:31	283.5	3.8	5.0	563.5	11.6	32
08/09/91	11:32	288.0	3.6	5.0	581.0	11.7	32
08/09/91	11:33	283.0	3.8	5.2	666.5	11.5	31
/09/91	11:34	284.5	3.9	5.2	689.5	11.4	31

APAC - MEMPHIS, TN.

RUN # 1 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/09/91	11:35	267.5	3.8	5.2	738.0	11.3	31
08/09/91	11:36	262.5	3.6	5.2	630.5	11.4	31
08/09/91	11:37	272.5	3.5	5.2	603.0	11.5	31
08/09/91	11:38	280.5	3.6	5.2	663.5	11.4	31
08/09/91	11:39	275.5	3.7	5.2	611.0	11.4	31
08/09/91	11:40	275.5	3.6	5.1	577.0	11.5	31
08/09/91	11:41	275.5	3.7	5.1	585.0	11.5	31
08/09/91	11:42	278.5	3.7	5.1	609.5	11.5	31
08/09/91	11:43	297.5	3.6	5.1	623.0	11.5	31
08/09/91	11:44	302.5	3.8	5.2	754.0	11.4	31
08/09/91	11:45	296.5	3.7	5.2	771.0	11.4	30
08/09/91	11:46	304.0	4.0	5.2	748.0	11.4	30
08/09/91	11:47	284.5	3.9	5.2	670.5	11.4	30
08/09/91	11:48	287.0	3.7	5.1	622.5	11.5	31
'09/91	11:49	284.0	3.7	5.1	616.0	11.5	31
08/09/91	11:50	278.0	3.7	5.1	626.0	11.5	31
08/09/91	11:51	291.5	3.6	5.1	608.5	11.5	31
08/09/91	11:52	285.5	3.8	5.0	637.5	11.5	30
08/09/91	11:53	246.0	3.2	4.8	550.0	12.0	30
Averages:		314.0	4.1	4.9	643.6	11.8	29.5

APAC - MEMPHIS, TN.

RUN # 2 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/09/91	12:14	402.0	32.6	5.1	842.3	11.0	27
08/09/91	12:15	386.5	14.3	5.2	902.2	11.3	28
08/09/91	12:16	392.5	9.6	5.1	819.5	11.1	27
08/09/91	12:17	355.5	8.1	5.1	848.0	11.3	28
08/09/91	12:18	323.5	8.8	5.2	838.0	11.3	28
08/09/91	12:19	321.5	7.3	5.1	874.5	11.4	27
08/09/91	12:20	296.0	6.3	5.1	848.5	11.4	28
08/09/91	12:21	302.5	5.9	5.1	834.5	11.4	28
08/09/91	12:22	312.0	5.6	5.1	807.0	11.4	29
08/09/91	12:23	310.0	5.2	5.2	884.0	11.4	29
08/09/91	12:24	289.5	4.7	5.2	916.0	11.4	28
08/09/91	12:25	302.5	4.7	5.2	849.0	11.4	29
08/09/91	12:26	304.0	4.6	5.2	899.0	11.4	28
08/09/91	12:27	289.5	4.7	5.2	945.5	11.4	28
08/09/91	12:28	315.0	4.5	5.2	971.0	11.3	28
08/09/91	12:29	307.5	4.5	5.2	956.5	11.3	28
08/09/91	12:30	310.0	4.3	5.2	937.5	11.3	28
08/09/91	12:31	312.5	4.4	5.2	866.5	11.3	29
08/09/91	12:32	315.5	4.3	5.2	910.5	11.4	29
08/09/91	12:33	325.0	4.1	5.1	793.0	11.4	28
08/09/91	12:34	364.5	4.4	5.0	669.0	11.6	27
08/09/91	12:35	423.5	5.1	5.0	799.5	11.6	27
08/09/91	12:36	429.0	5.5	5.1	955.0	11.4	27
08/09/91	12:37	397.5	5.4	5.0	917.0	11.4	27
08/09/91	12:38	377.5	5.1	5.0	852.0	11.5	28
08/09/91	12:39	386.5	5.1	5.0	922.0	11.5	28
08/09/91	12:40	368.5	5.1	5.1	1023.5	11.4	28
08/09/91	12:41	358.0	4.9	5.2	1023.5	11.3	27
08/09/91	12:42	328.5	4.8	5.2	1023.5	11.1	28
08/09/91	12:43	326.5	4.6	5.2	1023.5	11.1	28
08/09/91	12:44	300.5	4.0	5.1	1023.5	11.2	29
08/09/91	12:45	328.5	4.1	5.2	1023.5	11.2	28
08/09/91	12:46	341.0	4.6	5.3	1023.5	11.0	28
08/09/91	12:47	335.0	4.8	5.3	1023.5	10.9	27
08/09/91	12:48	329.5	4.5	5.3	1023.5	10.8	27
08/09/91	12:49	325.0	4.5	5.4	1023.5	10.8	28
08/09/91	12:50	319.0	4.4	5.4	1023.5	10.8	28
08/09/91	12:51	309.5	4.7	5.3	1023.5	10.8	28
08/09/91	12:52	297.0	4.2	5.3	1023.5	10.9	29
08/09/91	12:53	279.5	4.1	5.3	1023.5	11.0	29
08/09/91	12:54	319.5	4.2	5.3	1023.5	11.0	29

APAC - MEMPHIS, TN.

RUN # 2 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/09/91	12:55	333.0	4.7	5.4	1023.5	10.8	28
08/09/91	12:56	321.0	4.4	5.4	1023.5	10.8	28
08/09/91	12:57	323.0	4.3	5.4	1023.5	10.8	28
08/09/91	12:58	315.5	4.3	5.2	1023.5	11.0	27
08/09/91	12:59	322.0	4.2	5.4	1023.5	10.8	28
08/09/91	13:00	298.5	4.2	5.4	1023.5	10.7	28
08/09/91	13:01	308.5	4.0	5.4	1023.5	10.7	28
08/09/91	13:02	299.0	3.8	5.3	1023.5	10.8	28
08/09/91	13:03	290.5	3.7	5.3	1023.5	10.9	29
08/09/91	13:04	286.0	3.6	5.3	1023.5	11.0	30
08/09/91	13:05	275.0	3.4	5.2	1023.5	11.1	30
08/09/91	13:06	303.0	3.6	5.3	1023.5	11.0	29
08/09/91	13:07	292.5	3.5	5.3	1023.5	11.0	29
08/09/91	13:08	287.0	3.6	5.2	1023.5	11.0	29
/09/91	13:09	307.5	3.9	5.2	1023.5	11.1	29
08/09/91	13:10	310.0	3.8	5.2	1023.5	11.1	29
08/09/91	13:11	306.5	3.7	5.2	1023.5	11.2	29
08/09/91	13:12	300.0	3.8	5.2	1023.5	11.1	29
08/09/91	13:13	285.0	3.6	5.3	1023.5	11.1	30
08/09/91	13:14	294.5	3.5	5.3	1023.5	10.9	30
AVERAGES:		324.2	5.3	5.2	>1000	11.1	28.2

APAC - MEMPHIS, TN.

RUN # 3 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/09/91	14:30	310.5	4.7	5.1	1023.5	10.9	30
08/09/91	14:31	314.5	4.8	5.1	1023.5	10.9	30
08/09/91	14:32	295.5	4.8	5.1	1023.5	10.9	30
08/09/91	14:33	292.0	4.7	5.1	1023.5	10.9	30
08/09/91	14:34	306.0	4.3	5.1	1023.5	10.9	30
08/09/91	14:35	301.5	4.5	5.2	1023.5	10.9	30
08/09/91	14:36	300.0	4.5	5.2	1023.5	10.8	30
08/09/91	14:37	261.5	4.4	4.9	1023.5	11.1	29
08/09/91	14:38	288.5	4.4	5.2	1023.5	11.0	30
08/09/91	14:39	298.0	4.6	5.1	1023.5	10.8	29
08/09/91	14:40	299.5	4.7	5.1	1023.5	10.9	29
08/09/91	14:41	302.5	4.4	5.1	1023.5	10.9	30
08/09/91	14:42	299.0	4.5	5.1	1023.5	10.9	30
08/09/91	14:43	299.0	4.6	5.1	1023.5	10.9	30
08/09/91	14:44	290.0	4.3	5.1	1023.5	10.9	31
08/09/91	14:45	297.0	4.2	5.1	1023.5	10.9	30
09/91	14:46	290.0	4.2	5.2	1023.5	10.8	30
08/09/91	14:47	272.5	4.3	5.1	1023.5	10.9	30
08/09/91	14:48	282.5	4.1	5.1	1023.5	10.9	30
08/09/91	14:49	285.0	4.0	5.1	1023.5	10.9	30
08/09/91	14:50	275.5	4.0	5.2	1023.5	10.8	29
08/09/91	14:51	280.5	4.2	5.1	1023.5	10.8	29
08/09/91	14:52	288.0	4.3	5.2	1023.5	10.9	30
08/09/91	14:53	282.5	4.3	5.1	1023.5	10.8	29
08/09/91	14:54	279.5	4.0	5.1	1023.5	10.9	30
08/09/91	14:55	312.0	4.3	5.2	1023.5	10.8	30
08/09/91	14:56	303.5	4.5	5.2	1023.5	10.7	30
08/09/91	14:57	294.0	4.2	5.2	1023.5	10.7	31
08/09/91	14:58	294.0	4.2	5.2	1023.5	10.7	31
08/09/91	14:59	296.0	4.5	5.2	1023.5	10.8	31
08/09/91	15:00	297.5	4.3	5.2	1023.5	10.8	31
08/09/91	15:01	290.5	4.2	5.2	1023.5	10.8	30
08/09/91	15:02	288.0	4.0	5.2	1023.5	10.7	30
08/09/91	15:03	289.0	4.2	5.2	1023.5	10.7	30
08/09/91	15:04	281.5	4.0	5.2	1023.5	10.7	30
08/09/91	15:05	291.0	4.1	5.2	1023.5	10.7	31
08/09/91	15:06	293.0	4.3	5.2	1023.5	10.7	30
08/09/91	15:07	242.0	4.0	5.2	1023.5	10.8	31
08/09/91	15:08	211.5	3.2	5.2	1023.5	10.8	32
08/09/91	15:09	201.5	3.1	5.2	1023.5	10.9	33
08/09/91	15:10	218.0	3.2	5.3	1023.5	10.8	32

APAC - MEMPHIS, TN.

RUN # 3 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/09/91	15:11	217.5	3.1	5.3	1023.5	10.7	31
08/09/91	15:12	208.5	3.1	5.3	1023.5	10.6	32
08/09/91	15:13	205.0	3.1	5.3	1023.5	10.7	32
08/09/91	15:14	223.5	3.2	5.3	1023.5	10.7	32
08/09/91	15:15	219.5	3.2	5.3	1023.5	10.7	31
08/09/91	15:16	229.0	3.3	5.3	1023.5	10.8	31
08/09/91	15:17	238.0	3.3	5.3	1023.5	10.7	31
08/09/91	15:18	234.0	3.4	5.2	1023.5	10.8	30
08/09/91	15:19	228.0	3.3	5.2	1023.5	10.8	31
08/09/91	15:20	234.0	3.1	5.3	1023.5	10.8	30
08/09/91	15:21	232.5	3.0	5.3	1023.5	10.7	31
08/09/91	15:22	233.0	3.4	5.3	1023.5	10.7	31
08/09/91	15:23	230.0	3.1	5.3	1023.5	10.7	31
08/09/91	15:24	229.0	3.3	5.3	1023.5	10.7	31
08/09/91	15:25	231.5	3.4	5.3	1023.5	10.7	31
08/09/91	15:26	225.0	3.0	5.3	1023.5	10.7	31
09/91	15:27	230.5	3.1	5.3	1023.5	10.7	31
08/09/91	15:28	228.0	3.0	5.3	1023.5	10.7	31
08/09/91	15:29	235.5	3.2	5.2	1023.5	10.7	30
08/09/91	15:30	236.0	3.1	5.3	1023.5	10.7	30
08/09/91	15:31	241.5	3.1	5.3	1023.5	10.7	30
08/09/91	15:32	239.0	3.5	5.3	1023.5	10.7	30
08/09/91	15:33	236.5	3.1	5.2	1023.5	10.7	30
08/09/91	15:34	239.0	3.2	5.2	1023.5	10.8	30
08/09/91	15:35	245.0	3.2	5.1	1023.5	10.9	30
08/09/91	15:36	257.0	3.2	5.1	1023.5	10.9	29
08/09/91	15:37	259.5	3.2	5.1	1023.5	10.9	29
08/09/91	15:38	253.5	3.5	5.2	1023.5	10.8	29
08/09/91	15:39	243.5	3.0	5.2	1023.5	10.7	29
08/09/91	15:40	240.0	3.2	5.3	1023.5	10.7	29
08/09/91	15:41	231.5	3.2	5.3	1023.5	10.6	29
08/09/91	15:42	226.5	3.0	5.2	1023.5	10.6	29
08/09/91	15:43	221.0	2.9	5.2	1023.5	10.6	29
08/09/91	15:44	222.0	3.0	5.2	1023.5	10.7	30
08/09/91	15:45	228.0	2.9	5.2	1023.5	10.7	29
08/09/91	15:46	232.0	3.3	5.2	1023.5	10.7	29
08/09/91	15:47	239.0	3.2	5.2	1023.5	10.7	29
08/09/91	15:48	237.0	3.0	5.1	1023.5	10.7	29
08/09/91	15:49	231.5	3.1	5.1	1023.5	10.8	30
08/09/91	15:50	244.5	3.0	5.1	1023.5	10.8	29
08/09/91	15:51	248.5	3.3	5.1	1023.5	10.7	28

APAC - MEMPHIS, TN.

RUN # 3 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/09/91	15:52	276.5	3.3	5.1	1023.5	10.8	28
08/09/91	15:53	331.0	3.7	5.0	1023.5	10.9	28
08/09/91	15:54	355.0	4.3	5.0	1023.5	10.9	27
08/09/91	15:55	297.0	4.2	5.0	1023.5	10.8	28
08/09/91	15:56	294.5	3.8	5.1	1023.5	10.8	29
08/09/91	15:57	277.5	3.6	5.1	1023.5	10.8	28
08/09/91	15:58	247.5	3.6	5.1	1023.5	10.7	29
08/09/91	15:59	260.0	3.4	5.1	1023.5	10.9	30
08/09/91	16:00	237.5	3.2	4.9	1023.5	11.0	30
08/09/91	16:01	264.5	3.7	5.0	1023.5	11.1	29
08/09/91	16:02	242.5	3.3	5.0	1023.5	11.0	29
08/09/91	16:03	250.0	3.4	5.0	1023.5	11.0	28
08/09/91	16:04	265.5	3.5	5.0	1023.5	10.9	27
08/09/91	16:05	265.5	3.5	5.0	1023.5	10.9	27
08/09/91	16:06	263.0	3.5	5.0	1023.5	10.9	28
08/09/91	16:07	254.5	3.5	5.0	1023.5	11.0	28
/09/91	16:08	250.0	3.2	4.7	1023.5	11.4	26
08/09/91	16:09	251.5	3.5	4.9	1023.5	11.1	28
08/09/91	16:10	241.0	3.3	4.9	1023.5	11.1	28
08/09/91	16:11	244.5	3.4	4.9	1023.5	11.1	28
08/09/91	16:12	244.0	3.4	4.9	1023.5	11.1	28
08/09/91	16:13	255.5	3.4	4.9	1023.5	11.1	28
08/09/91	16:14	241.0	3.4	4.4	1023.5	11.4	27
08/09/91	16:15	245.5	3.1	4.8	1023.5	11.8	28
08/09/91	16:16	277.5	3.3	4.8	1023.5	11.5	30
08/09/91	16:17	279.5	3.5	4.9	1023.5	11.2	28
08/09/91	16:18	287.0	3.5	4.9	1023.5	11.1	27
08/09/91	16:19	279.5	3.4	4.9	1023.5	11.1	27
08/09/91	16:20	281.0	3.6	4.9	1023.5	11.1	28
08/09/91	16:21	267.5	3.4	4.9	1023.5	11.0	28
08/09/91	16:22	263.5	3.5	4.9	1023.5	11.1	28
08/09/91	16:23	263.0	3.3	4.9	1023.5	11.2	29
AVERAGES:		261.5	3.6	5.1	>1000	10.9	29.6

APAC - MEMPHIS, TN.

RUN # 4 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/10/91	07:21	293.5	4.1	3.4	726.5	14.4	24
08/10/91	07:22	327.5	4.4	3.5	401.0	14.5	24
08/10/91	07:23	333.0	5.2	3.6	376.0	14.2	24
08/10/91	07:24	334.0	5.5	3.7	383.5	14.2	24
08/10/91	07:25	336.0	5.7	3.7	392.5	14.1	25
08/10/91	07:26	361.0	5.9	3.8	395.5	14.0	24
08/10/91	07:27	447.5	7.1	4.0	481.5	13.7	25
08/10/91	07:28	454.0	7.8	4.1	515.0	13.4	25
08/10/91	07:29	457.5	7.4	4.2	516.5	13.3	25
08/10/91	07:30	456.0	7.2	4.1	512.0	13.3	25
08/10/91	07:31	456.5	7.1	4.1	507.5	13.4	25
08/10/91	07:32	455.5	7.0	4.1	504.5	13.5	25
08/10/91	07:33	460.0	7.0	4.0	508.5	13.5	24
08/10/91	07:34	476.5	7.5	4.0	514.0	13.5	24
08/10/91	07:35	493.0	7.8	4.0	510.5	13.5	23
08/10/91	07:36	514.0	8.0	4.0	504.5	13.5	23
08/10/91	07:37	538.5	7.9	4.0	517.0	13.5	23
08/10/91	07:38	567.5	8.0	4.0	563.5	13.5	23
08/10/91	07:39	571.5	7.9	4.0	587.5	13.5	23
08/10/91	07:40	440.5	6.9	4.1	718.0	13.4	24
08/10/91	07:41	394.0	4.4	4.1	914.0	13.2	27
08/10/91	07:42	402.0	4.5	4.0	644.5	13.4	26
08/10/91	07:43	400.0	4.9	3.8	502.5	13.7	26
08/10/91	07:44	398.5	5.2	3.6	437.0	14.0	24
08/10/91	07:45	395.0	5.6	3.6	418.0	14.1	24
08/10/91	07:46	400.0	5.8	3.6	403.5	14.2	24
08/10/91	07:47	388.5	5.7	3.6	394.0	14.2	24
08/10/91	07:48	391.0	5.6	3.6	385.0	14.2	24
08/10/91	07:49	390.5	5.5	3.5	378.0	14.3	24
08/10/91	07:50	381.0	5.3	3.5	374.5	14.3	24
08/10/91	07:51	381.0	5.0	3.6	375.5	14.3	24
08/10/91	07:52	378.5	4.9	3.6	374.5	14.2	24
08/10/91	07:53	365.5	4.9	3.6	377.0	14.2	24
08/10/91	07:54	362.0	5.0	3.6	370.5	14.2	24
08/10/91	07:55	355.0	5.2	3.6	376.0	14.2	24
08/10/91	07:56	375.0	5.9	3.7	411.5	14.1	24
08/10/91	07:57	398.5	6.2	3.9	443.0	13.8	24
08/10/91	07:58	460.0	7.3	4.1	519.0	13.5	25
08/10/91	07:59	483.5	7.9	4.1	550.5	13.3	25
08/10/91	08:00	470.5	7.7	3.9	522.5	13.6	24
08/10/91	08:01	540.0	8.1	4.0	553.0	13.7	23
08/10/91	08:02	552.5	8.7	4.2	606.5	13.3	24

APAC - MEMPHIS, TN.

RUN # 4 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/10/91	08:03	534.0	8.6	4.3	609.5	13.2	24
08/10/91	08:04	520.0	8.0	4.5	610.0	12.8	25
08/10/91	08:05	530.5	8.5	4.5	618.0	12.7	25
08/10/91	08:06	503.5	8.7	4.4	602.5	12.7	24
08/10/91	08:07	443.5	7.6	4.2	525.5	13.1	25
08/10/91	08:08	406.5	6.7	4.4	515.0	12.9	27
08/10/91	08:09	457.0	6.6	4.6	558.0	12.7	27
08/10/91	08:10	468.0	7.0	4.8	615.0	12.2	27
08/10/91	08:11	394.0	6.3	4.7	579.0	12.2	27
08/10/91	08:12	353.5	5.5	4.6	516.0	12.4	28
08/10/91	08:13	363.5	5.7	4.6	507.0	12.5	29
08/10/91	08:14	372.5	6.0	4.7	515.0	12.5	28
08/10/91	08:15	381.5	6.2	4.7	518.5	12.4	28
08/10/91	08:16	383.0	6.3	4.7	516.5	12.4	28
08/10/91	08:17	388.5	6.2	4.6	512.0	12.4	28
08/10/91	08:18	392.0	6.1	4.7	524.0	12.4	28
08/10/91	08:19	382.5	5.8	4.7	530.0	12.4	28
08/10/91	08:20	373.0	5.5	4.7	532.0	12.3	28
08/10/91	08:21	369.5	5.4	4.8	543.0	12.3	28
08/10/91	08:22	370.0	5.6	4.8	557.0	12.2	28
08/10/91	08:23	366.5	5.8	4.8	580.0	12.2	29
08/10/91	08:24	348.5	6.0	4.9	599.5	12.1	29
08/10/91	08:25	333.0	6.3	4.9	608.5	12.1	29
08/10/91	08:26	352.5	6.1	4.9	604.5	12.1	29
08/10/91	08:27	336.0	6.0	4.9	592.5	12.0	30
08/10/91	08:28	303.5	5.8	4.9	600.0	12.1	29
08/10/91	08:29	346.5	5.6	4.9	583.0	12.1	29
08/10/91	08:30	342.5	5.5	4.9	586.0	12.0	29
08/10/91	08:31	353.0	5.2	4.9	576.5	12.1	29
08/10/91	08:32	342.0	5.3	4.9	559.5	12.1	29
08/10/91	08:33	336.5	5.4	4.9	566.0	12.1	29
08/10/91	08:34	361.0	6.0	4.9	600.5	12.1	29
08/10/91	08:35	359.0	6.6	4.9	627.0	12.0	29
08/10/91	08:36	347.0	6.3	4.9	617.0	12.0	29
08/10/91	08:37	338.5	6.1	4.9	623.0	12.0	29
08/10/91	08:38	358.5	6.0	5.0	656.5	12.0	28
08/10/91	08:39	338.0	5.8	5.0	664.5	11.9	29
08/10/91	08:40	348.5	5.6	5.0	676.5	11.9	29
08/10/91	08:41	339.0	5.7	5.1	693.5	11.8	29

APAC - MEMPHIS, TN.

RUN # 4 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/10/91	08:42	378.0	6.3	5.1	720.5	11.8	29
08/10/91	08:43	399.5	7.1	5.0	712.5	11.8	29
08/10/91	08:44	400.5	8.1	4.6	606.0	12.5	27
08/10/91	08:45	373.5	8.0	4.7	599.0	12.5	27
08/10/91	08:46	364.5	7.2	4.6	531.0	12.6	27
08/10/91	08:47	381.0	6.6	4.4	472.5	12.8	26
08/10/91	08:48	446.5	6.8	4.3	488.0	13.0	25
08/10/91	08:49	489.0	7.1	4.3	518.5	13.0	24
08/10/91	08:50	449.5	7.0	4.1	510.0	13.2	23
08/10/91	08:51	480.0	7.1	4.3	523.5	13.3	24
08/10/91	08:52	334.5	7.2	3.7	501.5	13.0	24
08/10/91	08:53	9.5	1.6	0.1	12.0	3.9	5
08/10/91	08:54	3.5	1.1	0.0	0.5	0.3	2
08/10/91	08:55	359.0	2.7	2.0	223.0	2.4	6
[illegible]10/91	08:56	531.5	7.3	4.3	527.5	11.8	22
[illegible]/10/91	08:57	530.0	7.3	4.3	525.0	12.8	23
08/10/91	08:58	513.0	7.6	4.3	528.0	12.9	22
08/10/91	08:59	497.5	7.6	4.3	532.0	12.9	22
08/10/91	09:00	502.0	7.5	4.4	534.5	12.9	22
08/10/91	09:01	523.5	7.6	4.5	566.5	12.8	23
08/10/91	09:02	515.0	8.3	4.5	578.0	12.6	23
08/10/91	09:03	471.5	8.1	4.5	563.5	12.7	23
08/10/91	09:04	472.0	8.1	4.5	564.0	12.7	23
08/10/91	09:05	460.5	8.2	4.5	558.0	12.7	23
08/10/91	09:06	447.5	8.2	4.6	584.5	12.6	23
08/10/91	09:07	418.5	8.1	4.6	579.0	12.6	24
08/10/91	09:08	458.5	7.8	4.5	559.0	12.7	24
08/10/91	09:09	452.0	7.6	4.5	550.5	12.7	24
08/10/91	09:10	418.5	7.5	4.5	542.0	12.7	24
08/10/91	09:11	445.5	7.5	4.5	540.0	12.8	24
08/10/91	09:12	441.5	7.7	4.5	541.0	12.7	24
08/10/91	09:13	447.5	7.6	4.5	547.0	12.7	24
08/10/91	09:14	441.5	8.0	4.5	543.5	12.7	24
08/10/91	09:15	443.0	7.9	4.5	547.5	12.8	24
08/10/91	09:16	463.5	7.9	4.6	570.5	12.7	24
08/10/91	09:17	431.5	7.8	4.6	562.5	12.6	24
08/10/91	09:18	395.5	7.1	4.6	512.0	12.6	25
08/10/91	09:19	394.0	6.8	4.5	503.5	12.7	25
08/10/91	09:20	421.0	7.1	4.5	509.0	12.7	25
[illegible]8/10/91	09:21	413.5	7.2	4.5	509.5	12.7	24

APAC - MEMPHIS, TN.

RUN # 4 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/10/91	09:22	422.0	7.1	4.5	508.5	12.7	24
08/10/91	09:23	433.5	7.7	4.6	522.5	12.7	24
08/10/91	09:24	425.0	7.8	4.6	525.5	12.6	24
08/10/91	09:25	407.5	7.6	4.6	523.5	12.6	24
08/10/91	09:26	396.0	7.2	4.6	518.5	12.6	25
08/10/91	09:27	402.5	7.2	4.6	517.5	12.6	25
08/10/91	09:28	408.0	6.9	4.7	520.0	12.5	25
08/10/91	09:29	397.5	6.8	4.6	512.0	12.6	25
08/10/91	09:30	424.0	7.3	4.6	516.5	12.6	25
08/10/91	09:31	403.5	7.1	4.6	510.5	12.6	25
08/10/91	09:32	402.5	7.0	4.6	511.5	12.6	25
08/10/91	09:33	386.0	7.4	4.6	507.0	12.6	25
08/10/91	09:34	352.0	6.6	4.5	461.5	12.8	26
08/10/91	09:35	422.0	7.2	4.6	522.5	12.7	25
08/10/91	09:36	418.5	7.4	4.7	524.0	12.5	24
08/10/91	09:37	407.0	7.0	4.6	502.0	12.6	25
08/10/91	09:38	408.0	6.8	4.6	501.5	12.6	24
08/10/91	09:39	415.0	6.9	4.6	510.0	12.6	24
08/10/91	09:40	426.0	7.1	4.7	512.0	12.6	24
08/10/91	09:41	421.0	7.3	4.6	504.0	12.6	24
08/10/91	09:42	419.5	7.4	4.6	504.5	12.7	24
08/10/91	09:43	418.0	7.3	4.6	503.5	12.7	24
08/10/91	09:44	424.5	7.5	4.6	502.5	12.7	24
08/10/91	09:45	412.0	7.3	4.5	494.0	12.8	24
08/10/91	09:46	369.0	7.1	4.5	487.0	12.8	24
08/10/91	09:47	387.0	6.6	4.5	482.0	12.8	24
08/10/91	09:48	334.5	6.4	4.5	467.5	12.9	24
08/10/91	09:49	336.5	6.1	4.5	460.0	12.9	25
08/10/91	09:50	356.5	6.2	4.6	473.0	12.8	25
08/10/91	09:51	370.0	6.8	4.7	504.5	12.7	24
08/10/91	09:52	341.0	6.8	4.7	498.0	12.5	25
08/10/91	09:53	326.5	6.5	4.7	479.5	12.6	25
08/10/91	09:54	334.5	6.7	4.7	474.5	12.7	25
08/10/91	09:55	345.0	6.4	4.7	471.5	12.7	25
08/10/91	09:56	355.5	6.4	4.6	465.5	12.7	25
08/10/91	09:57	363.0	6.4	4.6	465.0	12.8	24
08/10/91	09:58	376.5	6.3	4.6	465.5	12.9	24

APAC - MEMPHIS, TN.

RUN # 4 DATA LISTING

NAME: RAMCON ENVIRONMENTAL LOCATION: APAC - MEMPHIS, TN.

CHAN NAME		HC	SO2	CO2	CO	O2	NOx
CHAN UNITS		ppm	ppm	%	ppm	%	ppm
FULL SCALE		1000.0	100.0	20.0	1000.0	25.0	250
ZERO OFFSET		0.0	0.0	0.0	0.0	0.0	0
START / CHANNEL		01	02	03	04	05	06
08/10/91	09:59	376.5	6.6	4.6	469.5	12.8	24
08/10/91	10:00	373.5	6.7	4.6	464.0	12.9	24
08/10/91	10:01	374.5	6.7	4.6	467.0	12.8	24
08/10/91	10:02	364.5	6.7	4.6	460.5	12.8	24
08/10/91	10:03	373.5	6.9	4.6	465.5	12.8	24
08/10/91	10:04	364.5	7.1	4.6	465.5	12.8	25
08/10/91	10:05	359.5	6.8	4.7	475.0	12.6	25
08/10/91	10:06	351.0	6.7	4.8	495.0	12.5	25
08/10/91	10:07	369.0	6.7	4.8	504.5	12.4	25
08/10/91	10:08	348.5	6.5	4.8	490.0	12.4	26
08/10/91	10:09	334.5	6.3	4.8	487.5	12.5	26
AVERAGES:		402.5	6.6	4.4	516.9	12.7	24.8

VIII. FIELD DATA

B. GAS CHROMATOGRAPHY

FIELD ANALYSIS DATA SHEETS

Plant NAPA (APAC) Date 8-9-91

Location Memphis, TN

1. General Information:

Source temp. (°C)	260(F°)	Columnar temperature:	
Probe temp. (°C)	260(F°)	Initial (°C)/time (min)	75°
Ambient temp. (°C)	29.4	Program rate (°C/min)	—
Atmospheric press. (in. Hg)	30.00	Final (°C)/time (min)	75°
Source press. (in. Hg)		Carrier gas flow rate (ml/min)	30
Absolute source press. (mm)		Detector temperature (°C)	
Sampling rate (liter/min)	1	Injection time (24-hr basis)	
Sample loop volume (ml)	1	Chart speed (mm/min)	
Sample loop temp. (°C)	75	Dilution ratio	
Dilution gas flow rate (ml/min)		Dilution gas used (symbol)	

2. Field Analysis Data:

Run # 1A Time 11:17

Components	Area	Attenuation	A x A Factor	Concentration (ppm
Methane	172.24	32	5575.68	109.2
Benzene	15.18	32	485.76	1.3
Toluene	14.15	32	452.8	1.1
Ethyl Benzene	12.32	32	394.24	.78
Xylene	7.24	32	231.68	1.1

Run # 1B Time 11:27

Components	Area	Attenuation	A x A Factor	Concentration (ppm
M	139.12	32	4451.84	90.7
B	9.39	32	300.48	.77
T	10.32	32	330.24	.81
E	9.80	32	313.6	.62
X	4.85	32	155.2	.76

Run # 1C Time 11:36

Components	Area	Attenuation	A x A Factor	Concentration (ppm
M	174.49	32	5583.68	110.4
B	13.04	32	417.28	1.0
T	2.49	32	79.68	.19
E	5.14	32	164.48	.35
X	1.66	32	53.12	.26

FIELD ANALYSIS DATA SHEETS

Plant _____ Date _____

Location _____

1. General Information:

Source temp. (°C)		Columnar temperature:	
Probe temp. (°C)		Initial (°C)/time (min)	
Ambient temp. (°C)		Program rate (°C/min)	
Atmospheric press. (in. Hg)		Final (°C)/time (min)	
Source press. (in. Hg)		Carrier gas flow rate (ml/min)	
Absolute source press. (mm)		Detector temperature (°C)	
Sampling rate (liter/min)		Injection time (24-hr basis)	
Sample loop volume (ml)		Chart speed (mm/min)	
Sample loop temp. (°C)		Dilution ratio	
Dilution gas flow rate (ml/min)		Dilution gas used (symbol)	

2. Field Analysis Data:

Run # 1D Time 11:46

Components	Area	Attenuation	A x A Factor	Concentration (ppb)
M	264.71	32	8470.72	160.6
B	11.94	32	382.08	.98
T	2.07	32	66.24	.16
E	–	32		–
X	1.84	32	58.88	.29

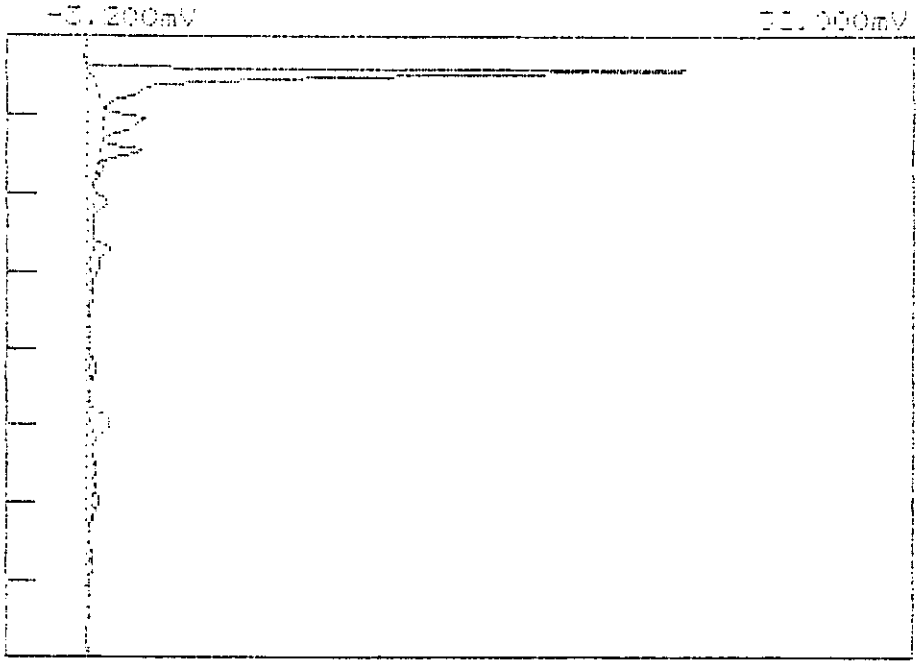
Run # _____ Time _____

Components	Area	Attenuation	A x A Factor	Concentration (ppb)

Run # _____ Time _____

Components	Area	Attenuation	A x A Factor	Concentration (ppb)

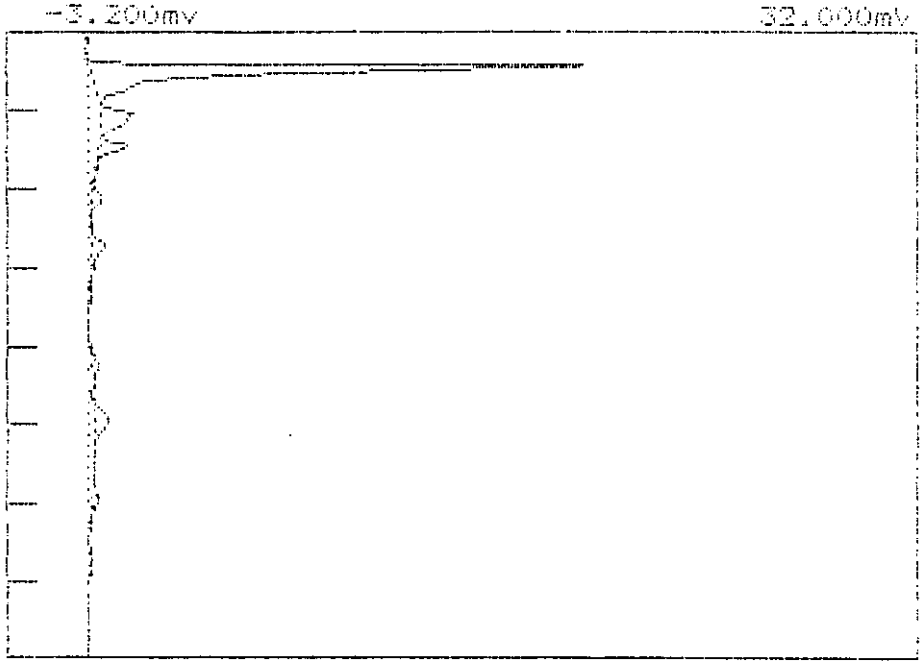
Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : INAPAC.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 11:17:00



METHANE	1	23.004	172.24	0.416
(Unknown)	0	1.113	20.56	1.050
BENZENE	2	1.394	15.13	1.450
(Unknown)	0	0.579	6.08	2.116
TOLUENE	3	0.699	14.15	2.716
(Unknown)	0	0.276	5.66	4.250
ETHYL BENZENE	4	0.723	12.32	4.966
P-XYLENE	5	0.224	4.08	5.950
O-XYLENE	7	0.135	3.16	6.733

Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.416	23.004	172.24	67.50	N/A	
BENZENE	2	1.450	1.394	15.13	5.93	N/A	
TOLUENE	3	2.716	0.699	14.15	5.55	N/A	
ETHYL BENZENE	4	4.966	0.723	12.32	4.83	N/A	
P-XYLENE	5	5.950	0.224	4.08	1.60	N/A	
O-XYLENE	7	6.733	0.135	3.16	1.24	N/A	
6				221.13	100.00	N/A	

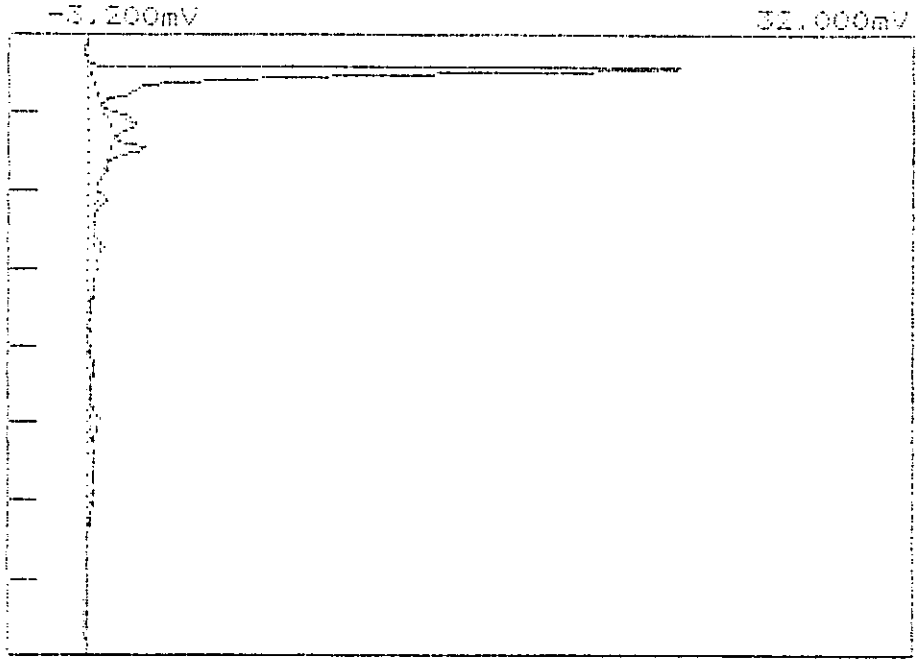
Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 1NAPAD.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 11:27:09



METHANE	1	19.121	133.12	0.416
(unknown)	0	1.252	17.09	1.050
BENZENE	2	1.079	9.39	1.450
(unknown)	0	0.414	4.30	2.116
TOLUENE	3	0.545	10.42	2.733
(unknown)	0	0.230	3.96	4.250
ETHYL BENZENE	4	0.572	9.30	4.950
P-XYLENE	5	0.153	2.65	5.933
O-XYLENE	7	0.104	2.30	6.750

Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.416	19.121	89.12	51.33	N/A	
BENZENE	2	1.450	1.079	9.39	5.42	N/A	
TOLUENE	3	2.733	0.545	10.42	6.00	N/A	
ETHYL BENZENE	4	4.950	0.572	9.30	5.36	N/A	
P-XYLENE	5	5.933	0.153	2.65	1.53	N/A	
O-XYLENE	7	6.750	0.104	2.30	1.32	N/A	
6				173.59	100.00	N/A	

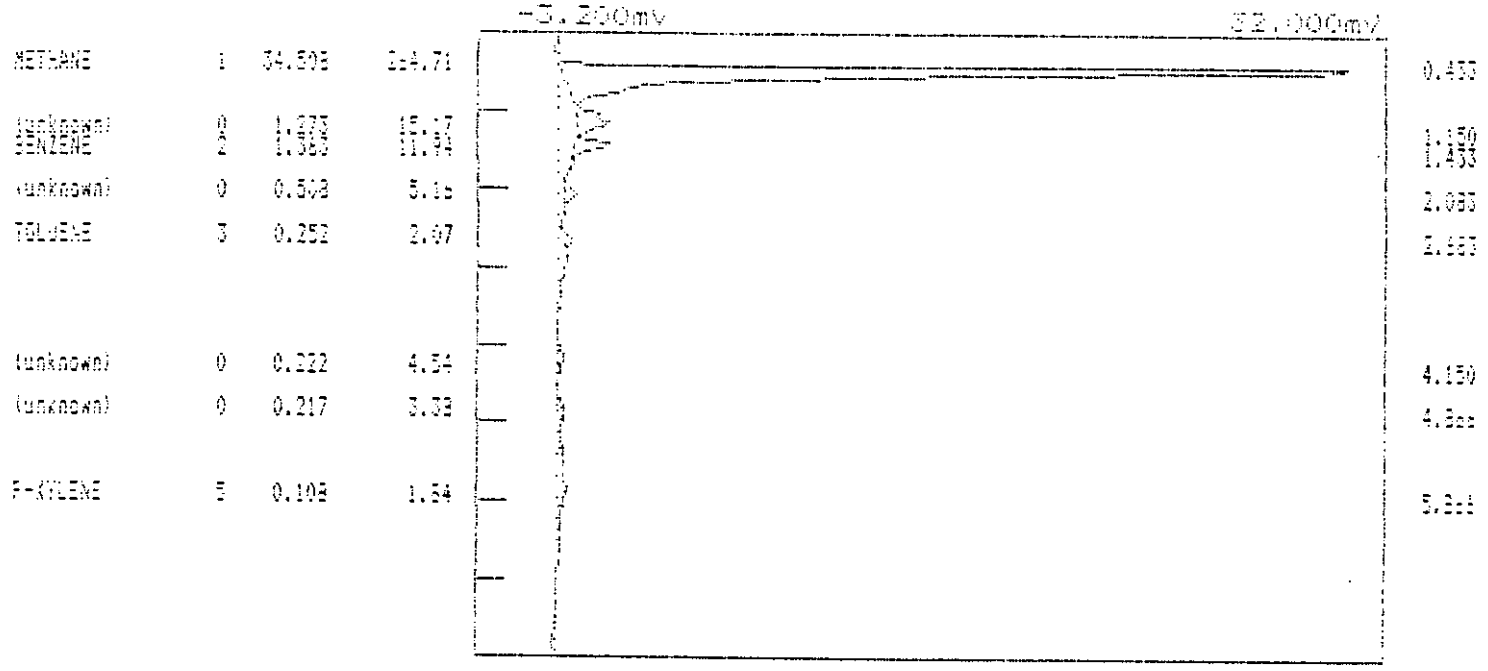
Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 1NAPAE.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 11:36:53



ETHANE	1	22.955	174.47	0.416
(unknown)	0	1.130	14.25	1.144
BENZENE	2	1.349	10.04	1.466
(unknown)	0	0.472	4.84	2.133
TOLUENE	3	0.280	2.49	2.333
(unknown)	0	0.193	3.50	4.283
ETHYL BENZENE	4	0.314	5.64	4.983
O-XYLENE	7	0.056	1.65	5.766

Component	Number	Retention	Height	Area	Area %	External	Units
ETHANE	1	0.416	22.955	174.47	88.51	N/A	
BENZENE	2	1.466	1.349	10.04	5.09	N/A	
TOLUENE	3	2.133	0.280	2.49	1.26	N/A	
ETHYL BENZENE	4	4.983	0.314	5.64	2.86	N/A	
O-XYLENE	7	5.766	0.056	1.65	0.84	N/A	
5				197.32	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 1NAPAF.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 11:46:05



Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.453	34.508	264.71	55.73	N/A	
BENZENE	2	1.453	1.365	11.94	1.57	N/A	
TOLUENE	3	2.083	0.252	2.07	0.67	N/A	
P-XYLENE	5	5.383	0.108	1.64	0.53	N/A	
4				280.56	100.00	N/A	

FIELD ANALYSIS DATA SHEETS

Plant NAPA Date 8-9-91

Location Mphis, TN

1. General Information:

Source temp. (°C)	126.	Columnar temperature:	
Probe temp. (°C)	126	Initial (°C)/time (min)	75°
Ambient temp. (°C)	29.41	Program rate (°C/min)	-
Atmospheric press. (in. Hg)	30.00	Final (°C)/time (min)	75°
Source press. (in. Hg)	30.00	Carrier gas flow rate (ml/min)	30
Absolute source press. (mm)		Detector temperature (°C)	
Sampling rate (liter/min)	1	Injection time (24-hr basis)	
Sample loop volume (ml)	1	Chart speed (mm/min)	
Sample loop temp. (°C)	75	Dilution ratio	
Dilution gas flow rate (ml/min)		Dilution gas used (symbol)	

2. Field Analysis Data:

Run # 2A Time 12:11

Components	Area	Attenuation	A x A Factor	Concentration (ppm
Methane	327.82	32	10490.24	195.7
Benzene	16.02	32	512.64	1.3
Toluene	-	32		-
Ethyl Benzene	1.43	32	45.76	.1
Xylene	1.85	32	59.2	.29

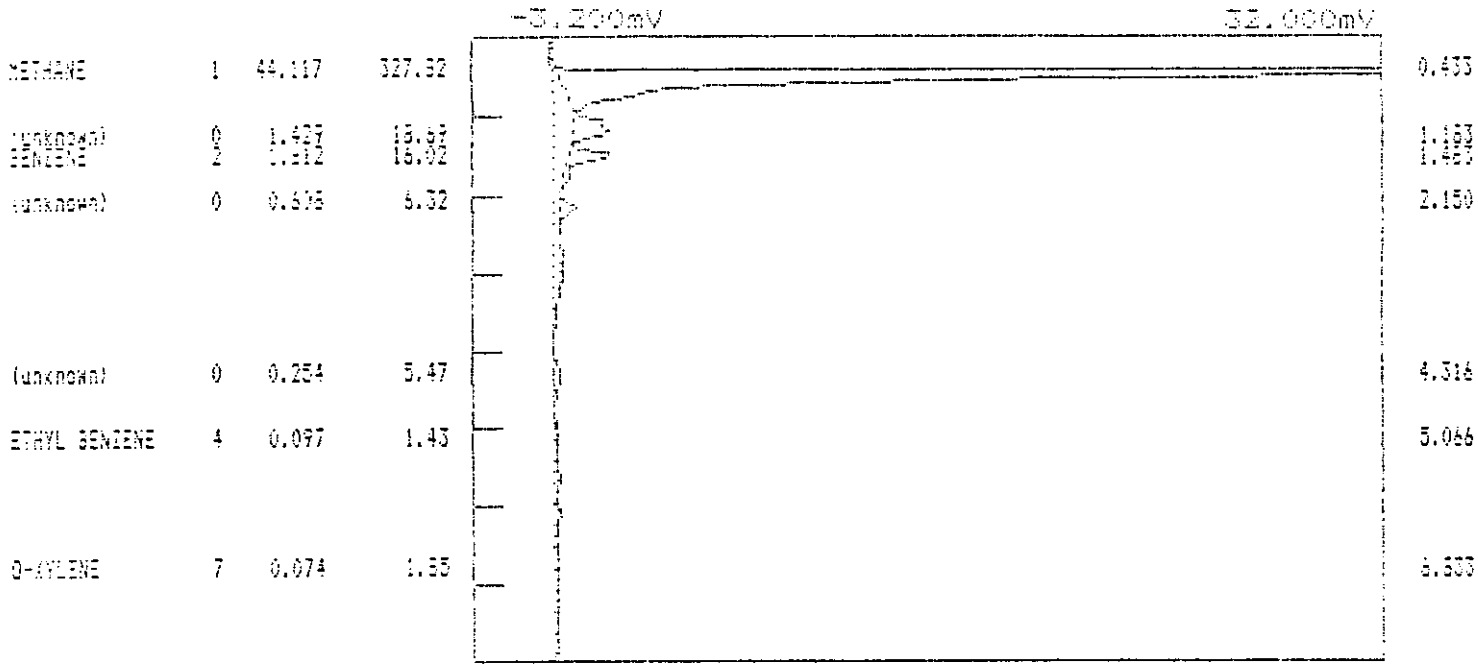
Run # 2B Time 12:21

Components	Area	Attenuation	A x A Factor	Concentration (ppm
M	275.26	32	8808.32	166.5
B	15.34	32	490.88	1.26
T	1.42	32	45.44	.11
E	2.50	32	80	.15
X	-	32		

Run # 2C Time 12:30

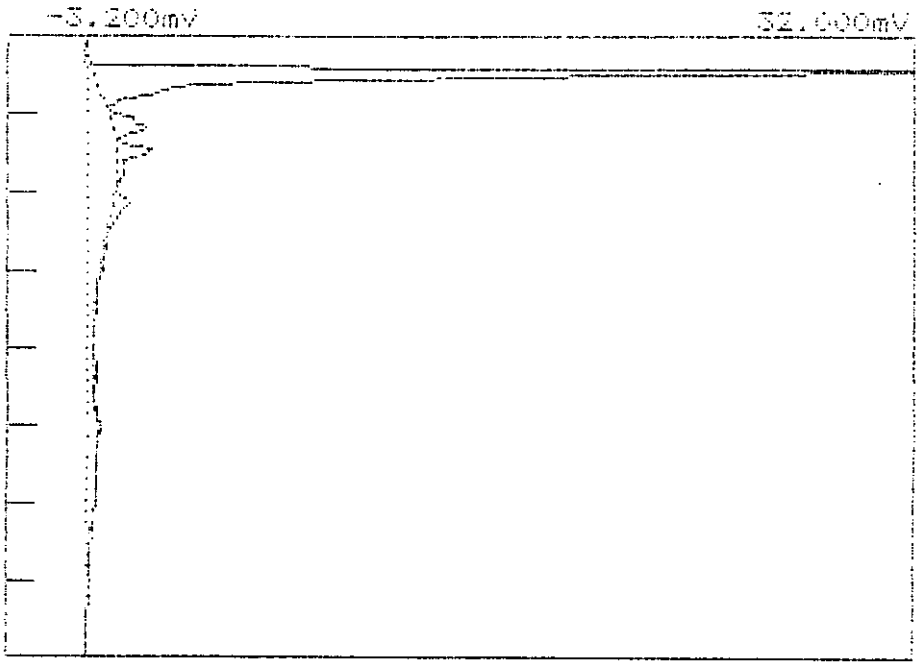
Components	Area	Attenuation	A x A Factor	Concentration (ppm
M	248.20	32	7942.4	151.4
B	14.56	32	466.56	1.2
T	3.70	32	118.4	.29
E	-	32	-	-
X	3.13	32	100.16	.49

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 2NAPAA.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 12:11:35



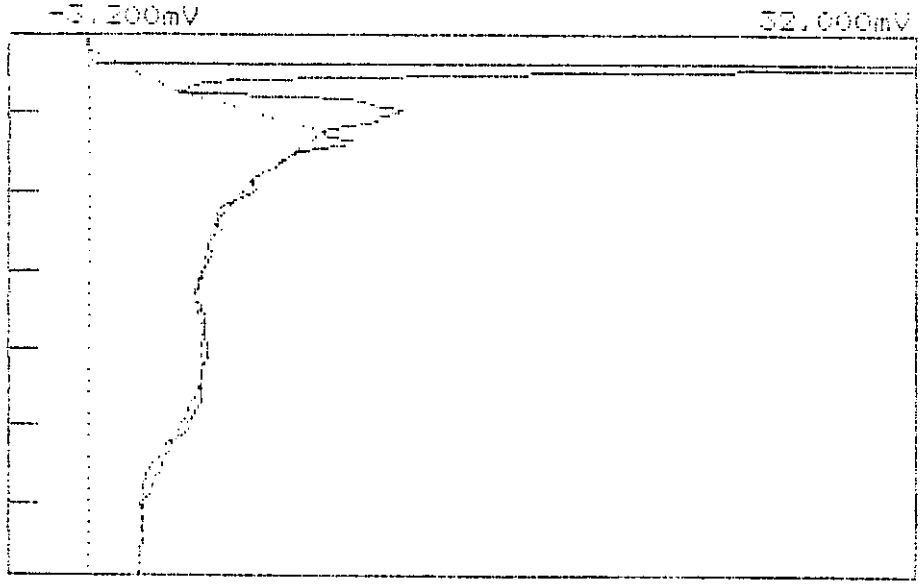
Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.433	44.117	327.82	94.05	N/A	
BENZENE	2	1.483	1.612	16.02	4.60	N/A	
TOLUENE	3	1.760	0.157	1.11	0.32	N/A	
ETHYL BENZENE	4	5.066	0.097	1.43	0.41	N/A	
O-XYLENE	7	6.333	0.074	1.83	0.52	N/A	
5				348.39	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 2NAPAB.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 12:21:21



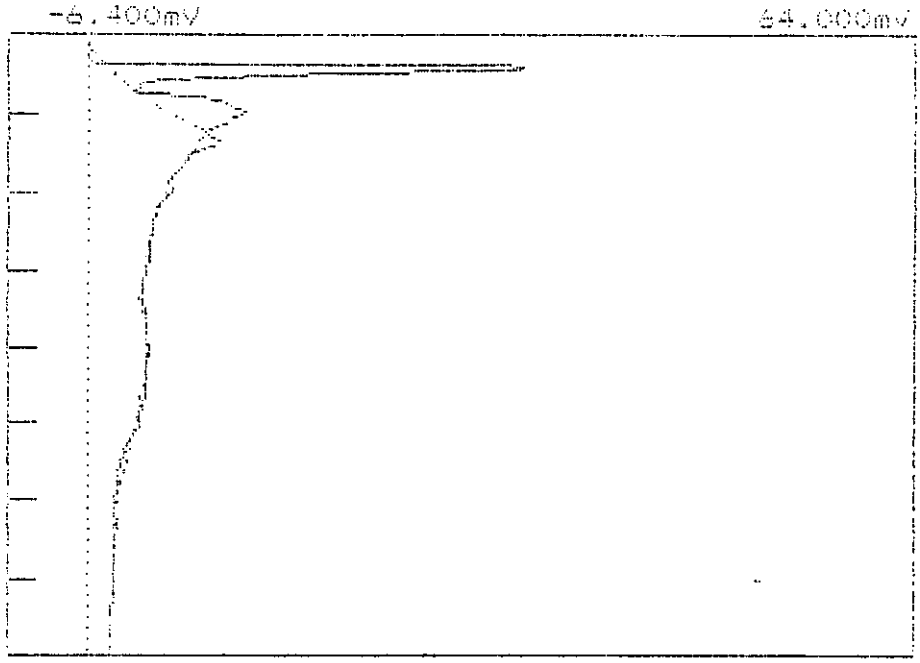
Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.416	37.126	275.26	64.77	N/A	
BENZENE	2	1.466	1.422	19.84	4.72	N/A	
TOLUENE	3	2.966	0.074	1.42	0.44	N/A	
ETHYL BENZENE	4	5.000	0.130	2.80	0.77	N/A	
4				294.32	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 2NAPAC.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 12:30:53



(unknown)	0	37.710	248.20	0.400
(unknown)	0	6.289	120.11	0.988
BENZENE	2	1.842	14.58	1.368
(unknown)	0	0.429	1.03	1.983
(unknown)	0	0.219	1.36	2.300
TOLUENE	3	0.150	3.70	2.800
(unknown)	0	0.209	2.83	3.566
(unknown)	0	0.279	4.37	4.050
m-XYLENE	6	0.110	3.13	6.300

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 2NAPAC.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 12:30:53



ETHANE	1	37.710	246.20
(unknown)	0	6.287	120.11
BENZENE	2	1.642	14.55
(unknown)	0	0.428	1.03
(unknown)	0	0.215	1.36
TOLUENE	3	0.160	3.70
(unknown)	0	0.209	2.33
(unknown)	0	0.270	4.37
M-XYLENE	6	0.110	3.13

Component	Number	Retention	Height	Area	Area %	External	Units
ETHANE	1	0.400	37.710	246.20	91.56	N/A	
BENZENE	2	1.366	1.642	14.55	5.41	N/A	
TOLUENE	3	2.800	0.160	3.70	1.38	N/A	
M-XYLENE	6	5.300	0.110	3.13	1.16	N/A	
4				269.61	100.00	N/A	

FIELD ANALYSIS DATA SHEETS

Plant NAPA (APAC) Date 8-9-91

Location Nghs, ID

1. General Information:

Source temp. (°C)	126	Columnar temperature:	
Probe temp. (°C)	126	Initial (°C)/time (min)	75
Ambient temp. (°C)	29.4	Program rate (°C/min)	–
Atmospheric press. (in. Hg)	30.00	Final (°C)/time (min)	75
Source press. (in. Hg)		Carrier gas flow rate (ml/min)	30
Absolute source press. (mm)		Detector temperature (°C)	
Sampling rate (liter/min)	1	Injection time (24-hr basis)	
Sample loop volume (ml)	1	Chart speed (mm/min)	
Sample loop temp. (°C)	75	Dilution ratio	
Dilution gas flow rate (ml/min)		Dilution gas used (symbol)	

2. Field Analysis Data:

Run # 3A Time 14:33

Components	Area	Attenuation	A x A Factor	Concentration (ppb)
M	294.10	32	9411.2	176.9
B	24.52	32	784.64	2.02
T	1.95	32	62.4	.15
E	2.0	32	65.9	.13
X	3.93	32	125.76	.62

Run # 3B Time 14:55

Components	Area	Attenuation	A x A Factor	Concentration (ppb)
M	174.96	32	5598.72	110.7
B	15.24	32	487.68	1.2
T	1.47	32	47.04	.11
E	1.14	32	36.48	.13
X	1.27	32	40.64	.30

Run # 3C Time 15:14

Components	Area	Attenuation	A x A Factor	Concentration (ppb)
M	245.84	32	7867.52	150.1
B	12.87	32	411.84	1.1
T	1.52	32	48.64	.11
E	1.76	32	56.32	.11
X	2.15	32	68.8	.34

FIELD ANALYSIS DATA SHEETS

Plant _____ Date _____

Location _____

1. General Information:

Source temp. (°C)		Columnar temperature:	
Probe temp. (°C)		Initial (°C)/time (min)	
Ambient temp. (°C)		Program rate (°C/min)	
Atmospheric press. (in. Hg)		Final (°C)/time (min)	
Source press. (in. Hg)		Carrier gas flow rate (ml/min)	
Absolute source press. (mm)		Detector temperature (°C)	
Sampling rate (liter/min)		Injection time (24-hr basis)	
Sample loop volume (ml)		Chart speed (mm/min)	
Sample loop temp. (°C)		Dilution ratio	
Dilution gas flow rate (ml/min)		Dilution gas used (symbol)	

2. Field Analysis Data:

Run # 3D Time 15:34

Components	Area	Attenuation	A x A Factor	Concentration (ppr
m	257.21	32	8230.72	156.4
B	14.19	32	454.08	1.2
T	1.45	32	46.4	.11
E	1.80	32	57.6	.11
X	1.27	32	40.6	.20

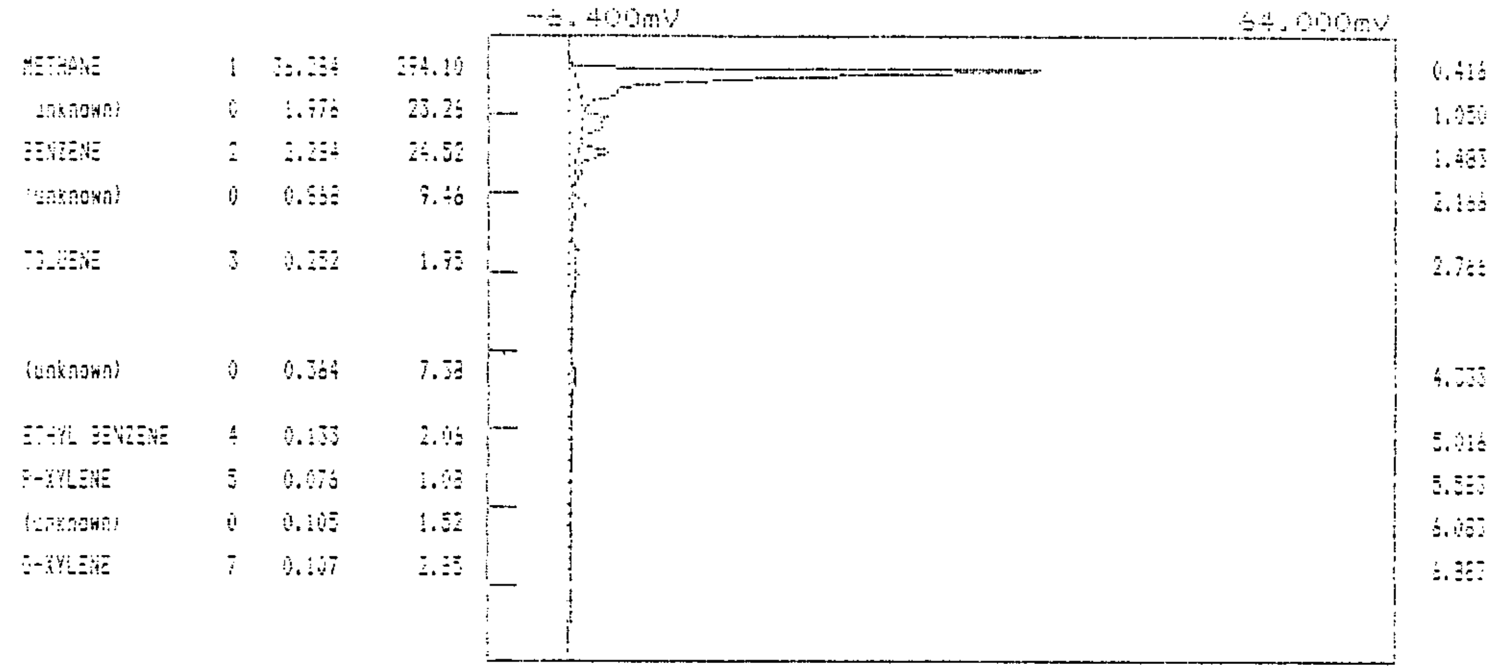
Run # _____ Time _____

Components	Area	Attenuation	A x A Factor	Concentration (ppr

Run # _____ Time _____

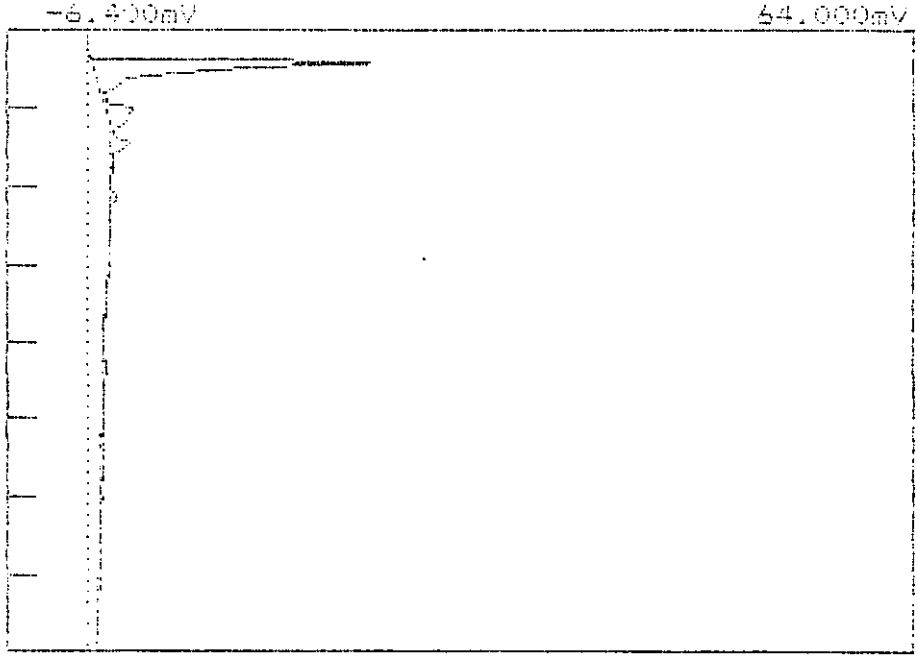
Components	Area	Attenuation	A x A Factor	Concentration (ppr

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 3NAPAA.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 14:33:25



Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.416	36.284	294.10	[illegible]	N/A	
BENZENE	2	1.483	2.284	24.52	[illegible]	N/A	
TOLUENE	3	2.766	[illegible]	1.95	[illegible]	N/A	
ETHYL BENZENE	4	5.016	[illegible]	[illegible]	[illegible]	N/A	
P-XYLENE	5	5.583	[illegible]	[illegible]	[illegible]	N/A	
O-XYLENE	7	6.883	[illegible]	[illegible]	[illegible]	N/A	
6				326.56	100.00	N/A	

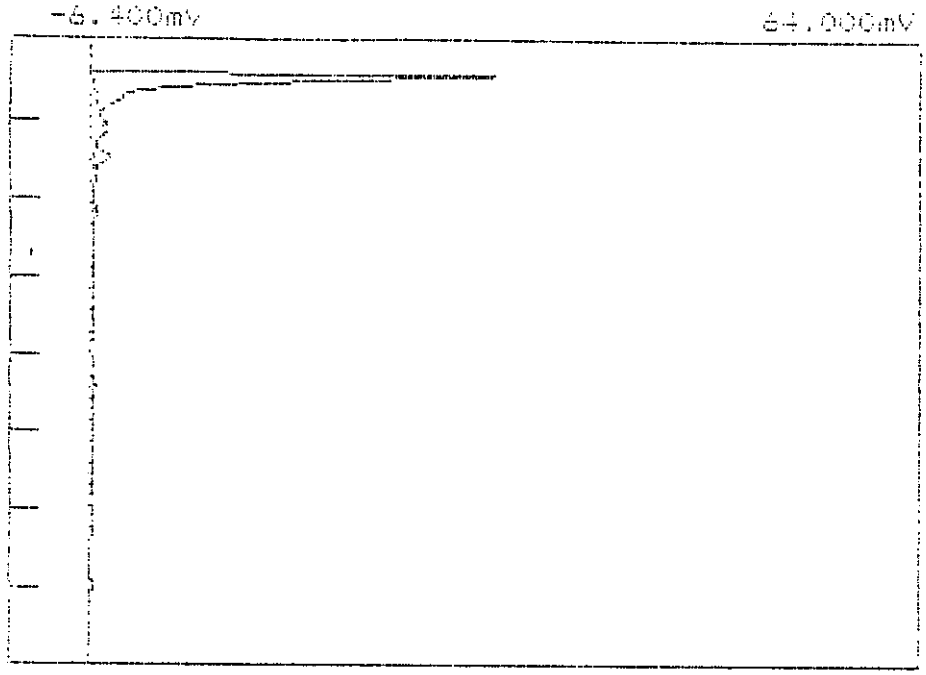
Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 3NAPAB.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 14:55:55



ETHANE	1	22.963	174.76	0.400
(unknown)	0	2.132	27.82	1.033
BENZENE	2	1.425	15.24	1.466
(unknown)	0	0.526	5.34	2.150
TOLUENE	3	0.176	1.47	2.750
(unknown)	0	0.209	4.02	4.366
Tri/L BENZENE	4	0.073	1.14	5.033
O-XYLENE	7	0.054	1.27	6.383

Component	Number	Retention	Height	Area	Area %	External	Units
ETHANE	1	0.400	22.963	174.76	75.[illegible]	N/A	
BENZENE	2	1.466	1.425	15.24	[illegible]	N/A	
TOLUENE	3	2.750	0.176	1.47	[illegible]	N/A	
TRIMETHYL BENZENE	4	5.033	0.073	1.14	[illegible]	N/A	
O-XYLENE	7	6.383	0.054	1.27	[illegible]	N/A	
5				174.08	100.00	N/A	

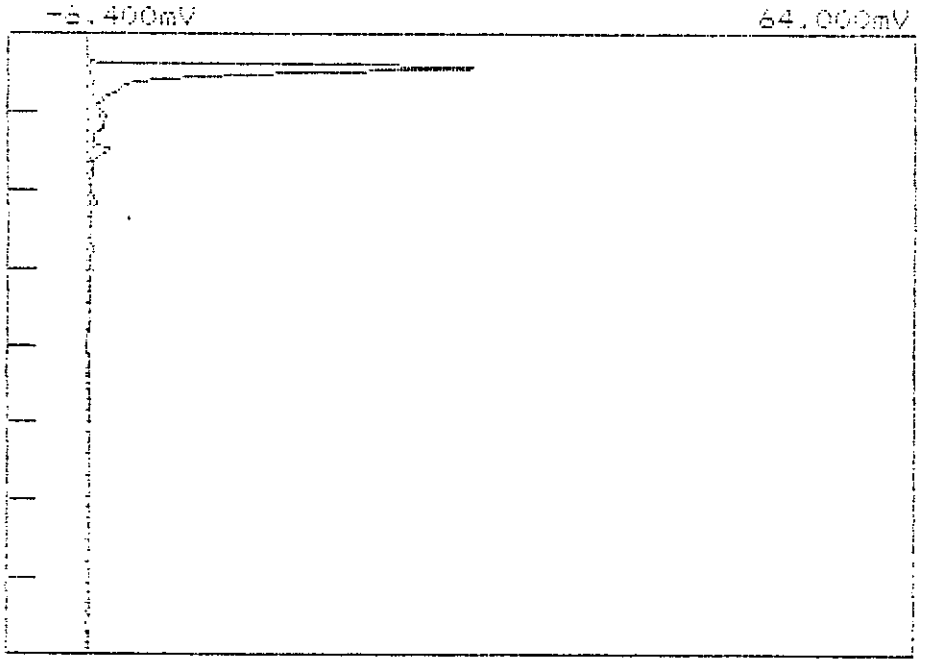
Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 3NAPAC.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 15:14:55



METHANE	1	31.237	245.36
(unknown)	0	0.501	2.11
(unknown)	0	0.927	1.96
BENZENE	2	1.267	12.67
(unknown)	0	6.450	4.69
TOLUENE	3	6.180	1.32
(unknown)	0	0.194	3.79
ETHYL BENZENE	4	0.110	1.76
O-XYLENE	7	0.062	2.15

Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.416	31.237	245.36	56.96	N/A	
BENZENE	2	1.266	1.267	12.67	4.82	N/A	
TOLUENE	3	1.766	0.180	1.32	0.55	N/A	
ETHYL BENZENE	4	5.083	0.110	1.76	0.74	N/A	
O-XYLENE	7	5.900	0.062	2.15	0.76	N/A	
5				264.15	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 3NAPAD.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 15:34:30



ETHANE	1	33.278	257.21
(unknown)	0	0.556	2.57
(unknown)	0	0.345	1.19
BENZENE	2	1.355	14.19
(unknown)	0	0.300	5.09
TOLUENE	3	0.170	1.45
(unknown)	0	0.207	4.11
ETHYL BENZENE	4	0.105	1.80
O-XYLENE	7	0.064	1.27

Component	Number	Retention	Height	Area	Area %	External	Units
ETHANE	1	0.400	33.278	257.21	86.71	N/A	
BENZENE	2	1.466	1.355	14.19	4.84	N/A	
TOLUENE	3	2.766	0.170	1.45	0.52	N/A	
ETHYL BENZENE	4	4.400	0.105	1.80	0.62	N/A	
O-XYLENE	7	5.983	0.064	1.27	0.44	N/A	
5				275.92	100.00	N/A	

FIELD ANALYSIS DATA SHEETS

Plant DAPA Date 8-10-91

Location Memphis, TN

1. General Information:

Source temp. (°C)	126°	Columnar temperature:	
Probe temp. (°C)	126	Initial (°C)/time (min)	75
Ambient temp. (°C)	29.4	Program rate (°C/min)	
Atmospheric press. (in. Hg)	30.07	Final (°C)/time (min)	75
Source press. (in. Hg)		Carrier gas flow rate (ml/min)	30
Absolute source press. (mm)		Detector temperature (°C)	
Sampling rate (liter/min)	1	Injection time (24-hr basis)	
Sample loop volume (ml)	1	Chart speed (mm/min)	
Sample loop temp. (°C)	75	Dilution ratio	
Dilution gas flow rate (ml/min)		Dilution gas used (symbol)	

2. Field Analysis Data:

Run # 4A Time 8:46

Components	Area	Attenuation	A x A Factor	Concentration (p
M	581.52	32	18608.6	336.9
B	19.77	32	632.6	1.6
T	1.68	32	53.76	.13
E	–	32	–	–
X	1.02	32	32.6	.16

Run # 4B Time 9:01

Components	Area	Attenuation	A x A Factor	Concentration (ppn
M	550.17	32	17605.44	319.4
B	14.75	"	472	1.2
T	1.14	"	36.48	.1
F	–	"		–
X	–	"		–

Run # 4C Time 9:18

Components	Area	Attenuation	A x A Factor	Concentration (p
M	395.28	32	12648.9	233.3
B	13.48	"	431.3	1.1
T	1.17	"	37.44	.1
F	–	"		
X	–	"		

FIELD ANALYSIS DATA SHEETS

Plant _____ Date _____

Location _____

1. General Information:

Source temp. (°C)		Columnar temperature:	
Probe temp. (°C)		Initial (°C)/time (min)	
Ambient temp. (°C)		Program rate (°C/min)	
Atmospheric press. (in. Hg)		Final (°C)/time (min)	
Source press. (in. Hg)		Carrier gas flow rate (ml/min)	
Absolute source press. (mm)		Detector temperature (°C)	
Sampling rate (liter/min)		Injection time (24-hr basis)	
Sample loop volume (ml)		Chart speed (mm/min)	
Sample loop temp. (°C)		Dilution ratio	
Dilution gas flow rate (ml/min)		Dilution gas used (symbol)	

2. Field Analysis Data:

Run # 4D Time 9:33

Components	Area	Attenuation	A x A Factor	Concentration (ppm
M	447.59	32	14322.88	262.4
B	15.08	"	482.56	1.2
T	3.81	"	121.6	.24
E	3.60	"	115.2	
X	–			

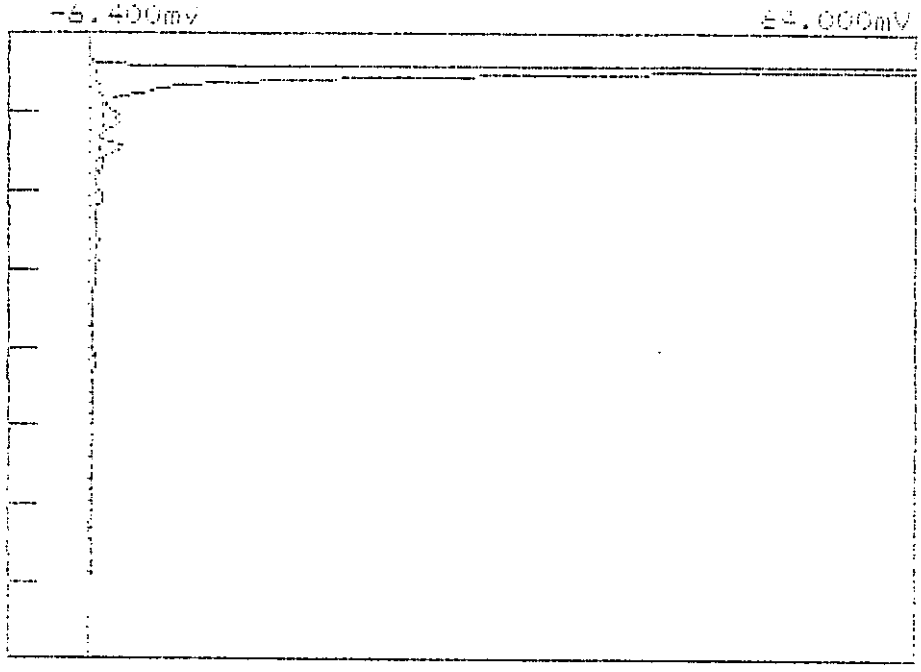
Run # _____ Time _____

Components	Area	Attenuation	A x A Factor	Concentration (ppm

Run # _____ Time _____

Components	Area	Attenuation	A x A Factor	Concentration (ppm

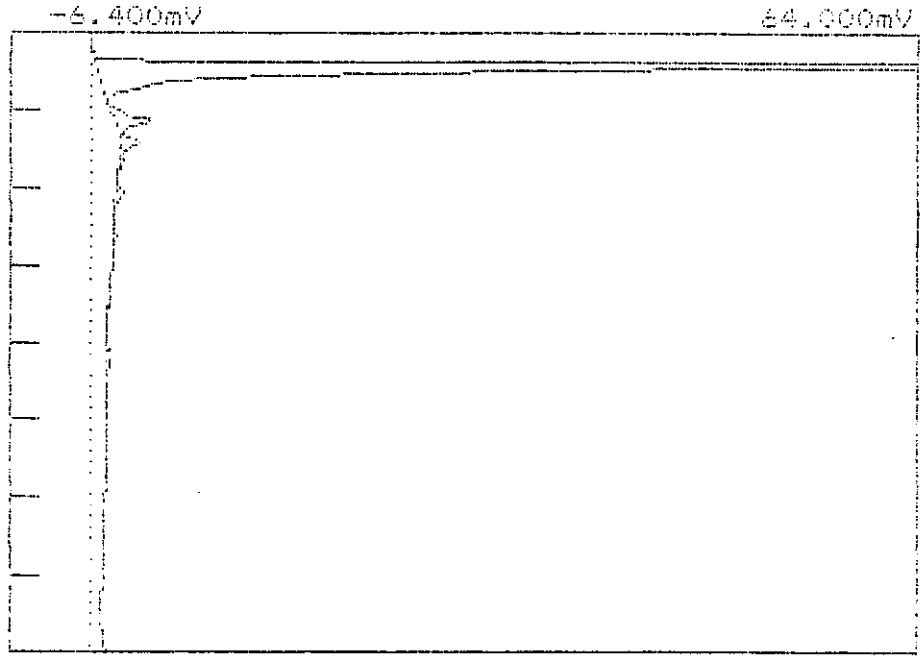
Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 4NAPAA.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 08:46:30



METHANE	1	77.004	521.52	0.433
(unknown)	0	1.310	17.26	1.033
BENZENE	2	1.764	19.77	1.433
(unknown)	0	0.795	7.23	2.083
TOLUENE	3	0.218	1.68	2.466
(unknown)	0	0.300	6.23	4.150
(unknown)	0	0.052	1.42	4.850
P-XYLENE	3	0.081	1.02	5.883
(unknown)	0	0.074	2.37	6.616

Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.433	77.004	521.52	91.93	N/A	
BENZENE	2	1.433	1.764	19.77	3.33	N/A	
TOLUENE	3	2.466	0.218	1.68	0.28	N/A	
P-XYLENE	3	5.883	0.081	1.02	0.18	N/A	
4				603.99	100.00	N/A	

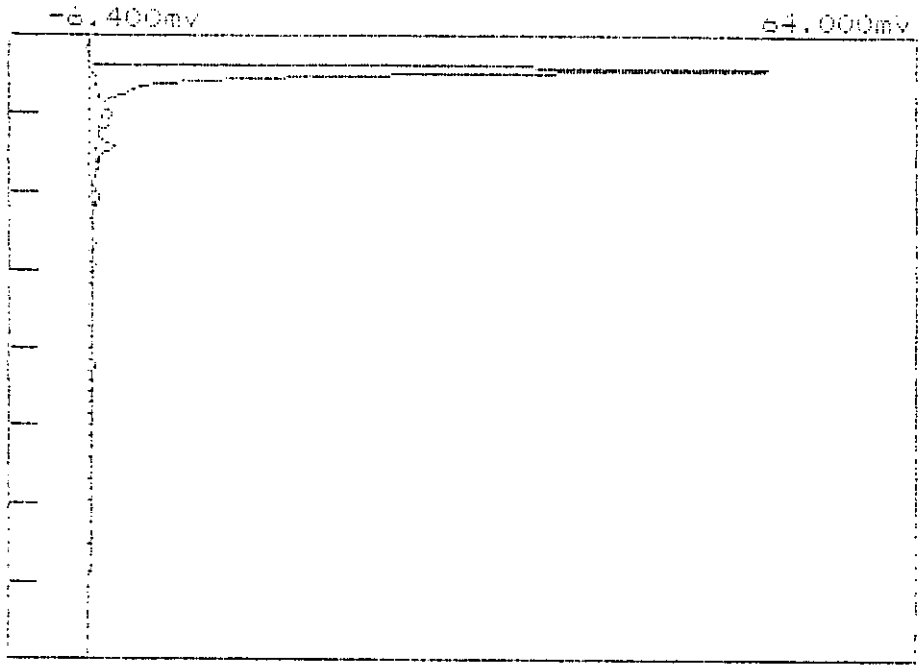
Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 4NAPAB.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 09:01:02



METHANE	1	76.811	550.17
(unknown)	0	2.378	24.45
BENZENE	2	1.403	14.75
(unknown)	0	0.534	5.37
TOLUENE	3	0.150	1.14
(unknown)	0	0.222	4.30
(unknown)	0	0.046	1.49

Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.400	76.811	550.17	91.44	N/A	
BENZENE	2	1.416	1.403	14.75	2.45	N/A	
TOLUENE	3	2.650	0.150	1.14	0.19	N/A	
3				566.06	100.00	N/A	

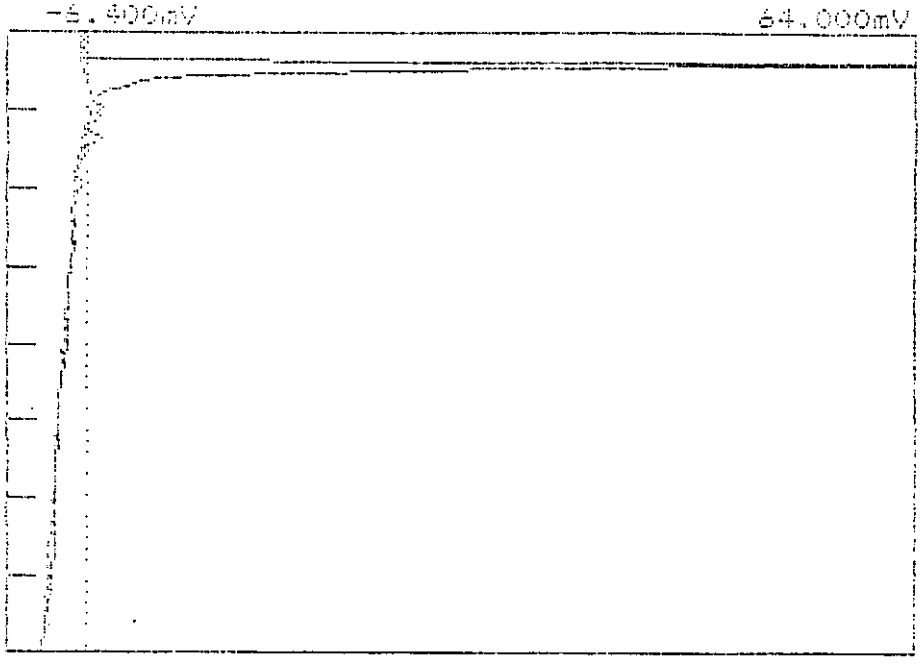
Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 4NAPAC.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 09:18:26



METHANE	1	57.084	399.26	0.400
(unknown)	0	0.720	11.53	1.016
BENZENE	2	1.283	13.48	1.433
(unknown)	0	0.468	4.75	2.083
TOLUENE	3	0.142	1.17	2.666
(unknown)	0	0.212	4.19	4.216

Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.400	57.084	399.26	97.44	N/A	
BENZENE	2	1.433	1.283	13.48	3.29	N/A	
TOLUENE	3	2.666	0.142	1.17	0.27	N/A	
3				409.93	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : 4NAPAD.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 09:33:25



(unknown)	0	55.353	447.39
(unknown)	0	0.775	6.27
BENZENE	2	1.417	15.06
(unknown)	0	0.603	5.66
(unknown)	0	0.211	1.71
TOLUENE	3	0.197	3.31
(unknown)	0	0.343	10.82
ETHYL BENZENE	4	0.067	3.60
M-XYLENE	6	0.247	25.19

Component	Number	Retention	Height	Area	Area %	External	Units
BENZENE	2	1.350	1.417	15.06	2.97	N/A	
TOLUENE	3	1.966	0.197	3.31	0.65	N/A	
ETHYL BENZENE	4	2.450	0.067	3.60	0.71	N/A	
M-XYLENE	6	3.133	0.247	25.19	4.96	N/A	
4				50.78	100.00	N/A	

VIII. FIELD DATA

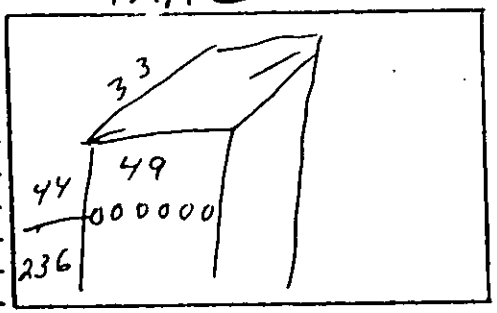
C. PAH'S

RAMCON ENVIRONMENTAL CORPORATION

PAH'S

Plant APAC

Location MEMPHIS, TN
Operator W. J. LOCKETT
Date 8-9-91
Run No. 1
Sample Box No. 1
Meter Box No. C-185
Meter H @ 1.569
C Factor 1.01
Pitot Tube Coefficient Cp .84



Schematic of Stack Cross Section

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
Ambient Temperature 80		
Barometric Pressure 30.00 FINAL	480	508.5
Assumed Moisture, % 25 INITIAL	200	508.5
Probe Length, m(ft) 4 DIFFERENCE	280	—

Nozzle Identification No. .0002639
Avg. Calibrated Nozzle Dia., (in.) .220/.220/.220
Probe Heater Setting 7
Leak Rate, m^3/min. (cfm) .015 @ 12"
Probe Liner Material GLASS
Static Pressure, mm Hg (in.Hg)
Filter No. 85 5457

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_S) °F	VELOCITY HEAD (P_S) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F Inlet	GAS SAMPLE TEMP. AT DRY GAS METER °F Outlet	FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
A 1	11:26 / 11:28:30	5	230	.93	1.0	677.0 / 678.5	82	82	250	55
2	11:31	6	230	.83	.89	679.9	94	82	250	60
3	11:33:30	5	255	.65	~~1.0~~ .70	681.2	102	82	250	60
4	11:36	4	255	.40	.43	682.2	104	82	225	60
B 1	11:44 / 11:46:30	6	255	.95	1.0	683.7	90	84	260	60
2	11:49	6	255	.87	.93	685.2	102	84	260	60
3	11:51:30	5	255	.70	.75	686.6	108	84	260	60
4	11:54	5	255	.60	.64	687.8	108	84	260	60
C 1	11:56 / 11:58:30	6	255	.95	1.0	689.3	104	84	260	60
2	12:01	6	255	.90	.96	690.8	108	86	260	60
3	12:03:30	7	260	.77	.83	692.3	110	86	260	60
4	12:06	6	260	.75	.80	693.7	112	86	260	60

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 8-9-91 LOCATION APAC TEST NO. 1

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
D 1	12:09 / 12:11:30	8	260	1.2	1.3	695.3	102	86	260	60
2	12:14	8	260	1.2	1.3	697.2	110	88	260	60
3	12:16:30	8	260	1.1	1.2	698.9	112	88	260	60
4	12:19	8	260	1.0	1.1	700.5	114	88	260	60
E 1	12:22 / 12:24:30	10	260	1.4	1.5	701.7	110	88	260	60
2	12:27	10	260	1.4	1.5	704.2	112	88	260	60
3	12:29:30	10	260	1.3	1.4	706.1	114	88	260	60
4	12:32	8	260	1.1	1.2	707.8	114	88	260	60
F 1	12:35 / 12:37:30	11	260	1.6	1.7	709.8	110	88	260	60
2	12:40	11	260	1.5	1.6	711.6	112	88	260	60
3	12:42:30	11	260	1.2	1.3	713.5	114	88	260	60
4	12:45	9	260	.95	1.0	715.079	114	88	260	60

RAMCON ENVIRONMENTAL CORPORATION

Plant A&AC

Location Memphis, Tn
Operator W. T. Lovell
Date 8-9-91
Run No. #2
Sample Box No. 1
Meter Box No. C-135
Meter H @ 1.569
C Factor 1.011
Pitot Tube Coefficient Cp .84

Ambient Temperature 85
Barometric Pressure 30.00
Assumed Moisture, % 20
Probe Length, m(ft) 4'

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	474	575.7
INITIAL	200	575.5
DIFFERENCE	274	—

Nozzle Identification No. 0002639
Avg. Calibrated Nozzle Dia., (in.) .210/.220/.220
Probe Heater Setting
Leak Rate, m^3/min. (cfm) .01 @ 10"
Probe Liner Material Glass
Static Pressure, mm Hg (in.Hg)
Filter No. BS 5456

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
A 1	15:05 / 15:07:30	6	255	1.5	1.4	715.7 / 717.5	92	92	250	60
2	15:10	8	255	1.5	1.4	719.2	106	92	250	60
3	15:12	9	265	1.3	1.3	720.8	110	92	250	60
4	15:15	9	265	1.2	1.2	722.6	110	92	250	60
B 1	15:18 / 15:20:30	10	250	1.6	1.5	724.8	110	92	250	60
2	15:23	9	255	1.5	1.4	727.0	110	92	250	60
3	15:25:30	10	260	1.4	1.3	728.7	112	92	250	60
4	15:28	10	265	1.3	1.3	730.4	112	92	250	60
C 1	15:34 / 15:31:30	8	265	1.2	1.2	732.1	108	92	250	60
2	15:39	8	265	1.2	1.2	733.7	114	92	250	60
3	15:41:30	8	265	1.1	1.1	735.3	114	92	260	60
4	15:44	7	265	.98	.94	736.9	116	92	260	60

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 8-9-91 LOCATION Apac TEST NO. 2

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP.(°F) in	GAS SAMPLE TEMP.(°F) out	SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
D 1	15:47 ~~15:49:30~~	8	260	.95	.91	738.3	110	94	260	60
2	15:52	7	260	.87	.84	739.7	118	94	260	60
3	15:54:30	7	260	.85	.82	741.2	120	94	260	60
4	15:57	7	260	.85	.82	742.6	120	94	260	60
E 1	16:00 ~~16:02:30~~	7	260	.77	.74	743.9	112	94	260	60
2	16:05	7	260	.68	.65	745.2	118	94	260	60
3	16:07:30	6	260	.52	.50	746.3	120	94	260	60
4	16:10	5	260	.47	.45	747.3	120	94	260	60
F 1	16:12 ~~16:14:30~~	7	260	.95	.91	748.8	116	94	260	60
2	16:17	7	260	.84	.81	750.2	120	96	260	60
3	16:19:30	7	260	.77	.74	751.7	120	96	260	60
4	16:22	7	260	.64	.62	753.42	120	96	260	60

RAMCON ENVIRONMEN... CORPORATION

Plant APAC

Location Memphis, TN
Operator W. J. Lockett
Date 8-10-91
Run No. 3
Sample Box No. 1
Meter Box No. C-185
Meter H @ 1.569
C Factor 1.01
Pitot Tube Coefficient Cp .84

Schematic of Stack Cross Section

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
Ambient Temperature		
Barometric Pressure 30.09 FINAL	500	552.9
Assumed Moisture, % 30 INITIAL	200	546.0
Probe Length, m(ft) 4 DIFFERENCE	300	6.9

Nozzle Identification No. .000263 9
Avg. Calibrated Nozzle Dia., (in.) .224/.220/.220
Probe Heater Setting
Leak Rate, m^3/min. (cfm) .033 @ 14"
Probe Liner Material GLASS
Static Pressure, mm Hg(in.Hg)
Filter No. BS 5454

TRAV. PT NO.	SAMPLING TIME (θ)min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H20	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F Inlet	GAS SAMPLE TEMP. AT DRY GAS METER °F Outlet	FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
A 1	8:57 / 8:59:30	5	250	1.2	1.1	754.3 / 755.8	76	76	250	60
2	9:02	8	250	1.2	1.1	757.4	86	76	250	60
3	9:04:30	9	250	.95	.90	758.m	90	76	275	60
4	9:07	9	250	.80	.76	760.2	92	76	275	60
B 1	9:09 / 9:11:30	10	250	1.2	1.1	761.7	88	76	260	60
2	9:14	11	250	1.1	1.0	763.2	92	76	260	50
3	9:16:30	10	250	.95	.90	764.7	94	76	260	50
4	9:19	9	250	.82	.78	766.1	96	76	265	50
C 1	9:20:30 / 9:23	10	250	1.2	1.1	767.7	94	76	285	55
2	9:25:30	11	255	1.0	.95	769.2	96	76	230	55
3	9:28	9	255	.92	.88	770.6	98	76	240	55
4	9:30:30	9	250	.83	.79		100	76	250	55

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 9-10-91 LOCATION Space TEST NO. 3

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
P1	9:33 / 9:34:30	10	250	1.2	1.1	773.5	96	76	275	55
2	9:37	11	255	1.2	1.1	775.1	100	76	270	55
3	9:39:30	10	258	1.1	1.0	776.6	100	76	225	55
4	9:42	10	250	.94	.96	778.1	100	76	270	55
E 1	9:45 / 9:47:30	13	250	1.5	1.4	779.8	90	76	250	55
2	9:50	13	250	1.5	1.4	781.6	96	76	260	55
3	9:52:30	12	255	1.2	1.1	783.2	98	78	275	55
4	9:55	11	255	1.1	1.0	784.8	100	78	275	55
F 1	9:57:30 / 10:00	13	255	1.6	1.5	786.5	94	78	250	55
2	10:02:30	13	255	1.6	1.5	788.4	96	78	260	55
3	10:05	14	255	1.5	1.4	790.2	96	78	270	55
4	10:07:30	12	255	1.2	1.1	791.896	96	78	275	55

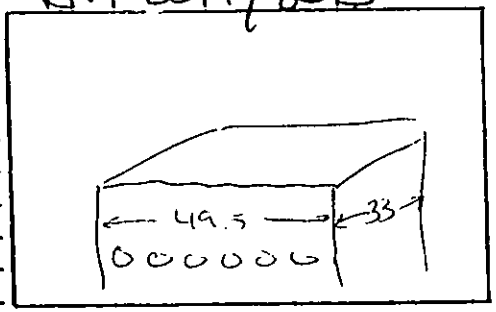
VIII. FIELD DATA

D. FORMALDEHYDE

RAMCON ENVIRONMENTAL CORPORATION

Plant NAPA 2 — RM 0011/8315

Location Nampa, ID
Operator RS/TB
Date 8-14-91
Run No. 1 (Formaldehyde)
Sample Box No. C-282
Meter Box No. C-282
Meter H @ 1.7
C Factor .99
Pitot Tube Coefficient Cp .841



Schematic of Stack Cross Section

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
Ambient Temperature 80		
Barometric Pressure 30.16 FINAL	445	214
Assumed Moisture, % 3.0 INITIAL	200	200
Probe Length, m(ft) 4 DIFFERENCE	245	14

Nozzle Identification No. .1000218
Avg. Calibrated Nozzle Dia., (in.) .20 x .20 x .20
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) .005 at 4 inch
Probe Liner Material glass
Static Pressure, mm Hg (in. Hg)
Filter No. ~~A-5[illegible]~~ N/A

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
1	0933 / 09:35:30	2	245	1.3	1.2	593.975 / 595.5	100	80	250	60
2	9:38	2	245	1.4	1.3	597.91	100	80	250	60
3	9:40:30	2	245	1.4	1.3	598.89	100	80	250	60
4	9:43	2	245	1.2	1.1	600.3	100	80	250	60
5	09:47 / 09:49:30	2	245	1.1	1.0	601.85	100	80	250	60
1	09:50:30 / 09:53	2	245	1.2	1.1	603.3	100	80	250	60
2	09:55:30	2	245	1.2	1.1	604.8	110	90	250	60
3	09:58	2	245	1.3	1.2	606.2	110	90	250	60
4	10:00:30	2	245	1.2	1.1	607.9	110	90	250	60
5	10:03	2	250	1.2	1.1	609.5	110	90	250	60
1	10:04:30 / 10:07	2	250	.85	.80	610.8	110	90	250	60
2	10:09:30	2	250	.85	.80	612.2	110	90	250	60
3	10:12	2	250	.95	.90	613.6	110	90	250	60

Form #REC-08

RAMCON emissions test log sheet, cont. DATE 8-[illegible] LOCATION Hybrid TEST NO. 1

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
4	10:14:30	2	250	.98	.93	615.0	115	90	250	60
5	10:17	2	250	1.1	1.0	616.6	115	90	250	60
1	10:18:30 / 10:21	2	250	.60	.57	617.7	115	90	250	60
2	10:23:30	2	250	.65	.61	618.9	115	90	250	60
3	10:26	2	250	.65	.61	620.1	115	90	250	60
4	10:28:30	2	250	.80	.76	621.4	120	90	250	60
5	10:31	2	250	.85	.80	622.8	120	90	250	60
1	10:34:30 / 10:37	2	250	1.5	1.4	624.4	120	90	250	60
2	10:39:30	2	250	1.5	1.4	626.1	120	90	250	60
3	10:42	2	250	1.6	1.5	627.9	120	90	250	60
4	10:44:30	2	250	1.5	1.4	629.7	120	90	250	60
5	10:47	2	250	1.5	1.4	631.6	120	90	250	60
1	10:48:30 / 10:51	2	250	1.3	1.2	633.2	120	90	250	60
2	10:53:30	2	250	1.3	1.2	634.8	120	90	250	60
3	10:56	2	250	1.5	1.4	636.6	120	100	250	60
4	10:58:30	2	250	1.4	1.3	638.5	120	100	250	60
5	11:01	2	250	1.4	1.3	640.077	120	100	250	60

RAMCON ENVIRONMEN. L CORPORATION

Plant UAPA

Location Mpls, TN
Operator RS/TB
Date 8-14-91
Run No. 2 (From Aldehyde)
Sample Box No. C-282
Meter Box No. C-282
Meter H @ 1.7
C Factor .99
Pitot Tube Coefficient Cp .84

.95

		IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
Ambient Temperature 85			
Barometric Pressure 30.16	FINAL	~~643~~ 643	212
Assumed Moisture, % 3.0	INITIAL	200	200
Probe Length, m(ft) 4	DIFFERENCE	~~443~~ 183	12

Nozzle Identification No. .000218
Avg. Calibrated Nozzle Dia., (in.) .20 x .20 x .20
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) .001 at 12 inch
Probe Liner Material S/SS
Static Pressure, mm Hg (in. Hg)
Filter No. N/A

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (Ts) °F	VELOCITY HEAD (Ps) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
1	12:07:30 / 12:10:30	2	250	.45	.42	640.180 / 641.2	120	100	250	60
2	12:13:30	2	250	.45	.42	642.4	120	100	250	60
3	12:16:30	4	245	.45	.42	643.5	120	100	250	60
4	12:19:30	4	245	.48	.45	644.7	120	100	250	60
5	12:22:30	4	245	.45	.42	645.9	120	100	250	60
1	12:24 / 12:27	4	245	.56	.47	647.0	120	100	250	60
2	12:30	4	245	.55	.52	648.3	120	100	250	60
3	12:33	4	245	.70	.66	649.7	120	100	250	60
4	12:36	5	245	.80	.76	651.2	120	100	250	60
5	12:39	5	245	.85	.80	652.8	120	100	250	60
1	12:41 / 12:44	5	245	.55	.52	654.0	120	100	250	60
2	12:47	5	245	.60	.57	655.5	120	100	250	60
3	12:50	5	245	.70	.66	657.0	120	100	250	60

Form #REC-08

RAMCON emissions test log sheet, cont. DATE 8-14-91 LOCATION Ophs TEST NO. 2

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP.(°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
4	12:53	5	250	.90	.85	658.5	120	100	250	60
5	12:56	8	250	1.1	1.0	660.2	120	100	250	60
1	12:57:30 / 13:00:30	8	250	.85	.80	661.7	120	100	250	60
2	1303:30	8	250	.90	.80	663.3	120	100	250	60
3	13:06:30	10	250	.95	.90	665.1	120	100	250	60
4	13:09:30	10	245	1.2	1.1	666.8	120	100	250	60
5	13:12:30	10	245	1.1	1.0	668.6	120	100	250	60
1	13:13:34 / 13:16:34	10	245	1.2	1.1	670.43	120	100	250	60
2	13:19:30	10	245	1.2	1.1	672.2	120	100	250	60
3	13:22:30	10	245	1.2	1.1	674.0	120	100	250	60
4	13:25:30	10	245	1.1	1.0	675.8	120	100	250	60
5	13:28:30	10	245	1.1	1.0	677.7	120	100	250	60
1	14:06:34 / 14:09:30	10	215	1.1	1.0	679.5	120	100	250	60
2	14:12:30	10	215	1.1	1.0	681.5	120	100	250	60
3	14:15:30	10	230	1.1	1.0	683.1	120	100	250	60
4	14:18:30	10	230	1.2	1.1	684.9	120	100	250	60
5	14:21:34	10	230	1.2	1.1	686.831	120	100	250	60

RAMCON ENVIRONMEL .AL CORPORATION

Plant IDAPA

Location Nampa, ID
Operator RSTB
Date 8-15-91
Run No. 3 (Formaldehyde)
Sample Box No. C-282
Meter Box No. C-282
Meter H @ 1.7
C Factor .99
Pitot Tube Coefficient Cp .84

1,95

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	558	218
INITIAL	200	200
DIFFERENCE	358	18

Ambient Temperature 80
Barometric Pressure 30.14
Assumed Moisture, % 25
Probe Length, m(ft) 4
Nozzle Identification No. 0.0003409
Avg. Calibrated Nozzle Dia., (in.) .25 x .25 x .25
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) .008 at 6 inch
Probe Liner Material glass
Static Pressure, mm Hg (in.Hg)
Filter No. N/A

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
1	7:19:30 / 7:22:30	6	200	1.3	2.5	691.573 / 693.0	90	80	250	60
2	7:25:30	6	200	1.2	2.3	696.0	90	80	250	60
3	7:28:30	6	200	.95	1.8	698.4	90	80	250	60
4	7:31:30	6	200	.90	1.7	700.5	90	80	250	60
5	7:34:30	6	200	.90	1.7	702.7	90	80	250	60
1	7:36 / 7:39	6	225	.91	1.7	704.7	90	80	250	60
2	7:42	6	225	.85	1.6	706.9	100	80	250	60
3	7:45	6	230	.82	1.5	709.0	100	80	250	60
4	7:48	6	230	.82	1.5	711.1	100	80	250	60
5	7:51	6	230	.82	1.5	713.3	100	80	250	60
1	7:52:32 / 7:55:32	6	240	.90	1.7	715.2	100	80	250	60
2	7:56:30	6	240	.90	1.7	717.3	100	80	250	60
3	8:01:30	6	240	.80	1.5	719.3	100	80	250	60

Form #REC

RAMCON emissions test log sheet, cont. DATE 8-15-91 LOCATION _____ TEST NO. 3

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
4	8:04:30	6	245	.80	1.5	721.3	100	90	250	60
5	8:07:30	6	250	.80	1.5	723.5	100	90	250	60
1	8:09 / 8:12	6	250	.65	1.3	725.5	100	90	250	60
2	8:15	6	250	.60	1.1	727.2	100	90	250	60
3	8:18	6	256	.60	1.1	729.1	100	90	250	60
4	8:21	6	260	.65	1.3	731.2	100	90	250	60
5	8:24	6	260	.60	1.1	733.2	100	90	250	60
1	8:25 / 8:28	6	260	.80	1.5	735.5	100	90	250	60
2	8:31	6	270	.75	1.4	737.3	100	90	250	60
3	8:34	6	270	.75	1.4	739.3	100	90	250	60
4	8:37	6	270	.65	1.3	741.2	100	90	250	60
5	8:40	6	270	.58	1.1	743.2	100	90	250	60
1	8:41:30 / 8:44:30	6	270	.65	1.3	745.1	100	90	250	60
2	8:47:30	6	270	.60	1.1	746.8	100	90	250	60
3	8:50:30	6	270	.62	1.2	748.8	100	90	250	60
4	8:53:30	6	270	.60	1.1	750.6	100	90	250	60
5	8:56:30	6	270	.50	.97	752.363	100	90	250	60

VIII. FIELD DATA

E. PARTICULATE & CONDENSIBLE PM

RAMCON ENVIRONMEN. .L CORPORATION

Plant NAPA 1

Location Memphis, TN
Operator RD / TB
Date 8/16/81
Run No. 1
Sample Box No. C-282
Meter Box No. C-282
Meter H @ 1.7
C Factor .99
Pitot Tube Coefficient Cp .841

Rm 202

PARTICULATE (PM)
&
Condensible PARTICULATE
(CPM)

1.95

Ambient Temperature 80
Barometric Pressure 30.14
Assumed Moisture, % 25
Probe Length, m(ft) 4

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	438	216
INITIAL	200	200
DIFFERENCE	238	16

Nozzle Identification No. 0003407
Avg. Calibrated Nozzle Dia., (in.) .25x.25x.25
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) .001 at 10 inch
Probe Liner Material glass
Static Pressure, mm Hg (in. Hg)
Filter No. PT-5439

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
1	9:46 / 9:48	10	270	.48	.95	752.524 / 753.4	100	90	250	68
2	9:50	10	270	.41	.8	754.5	100	90	250	68
3	9:52	10	270	.38	.75	755.5	100	90	250	68
4	9:54	10	270	.36	.72	756.5	100	90	250	68
5	9:56	10	270	.36	.72	757.6	100	90	250	68
1	9:58 / 10:00	10.0	250	.42	.82	758.6	100	90	250	68
2	10:02	10	250	.38	.75	759.6	100	100	250	68
3	10:04	10	250	.38	.75	760.5	110	100	250	68
4	10:06	10	240	.35	.70	761.6	110	100	250	68
5	10:08	10	240	.35	.70	762.6	110	100	250	68
1	10:11 / 10:13	10	240	.38	.75	763.5	110	100	250	68
2	10:15	10	240	.36	.71	764.5	110	100	250	68
3	10:17	10	240	.35	.70	765.6	110	100	250	68

Form #REC-06

RAMCON emissions test log sheet, cont. DATE _____ LOCATION _____ TEST NO. _____

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME Vm (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
4	10:19	10	240	.35	.70	767.4	110	90	250	68
5	10:21	3	240	.85	1.65	768.9	110	90	250	68
1	10:22 / 10:24	4	240	1.0	1.95	770.3	110	90	250	68
2	10:26	4	240	1.0	1.95	771.9	110	90	250	68
3	10:28	4	240	1.1	2.1	773.6	120	100	250	68
4	10:30	4	240	1.0	1.9	774.9	120	100	250	68
5	10:32	4	240	1.2	2.3	776.7	120	100	250	68
1	10:33 / 10:35	4	240	1.3	2.5	778.3	120	100	250	68
2	10:37	4	250	1.3	2.5	780.1	120	100	250	68
3	10:39	4	250	1.2	2.3	781.9	120	100	250	68
4	10:41	4	260	1.3	2.5	783.7	120	100	250	68
5	10:43	4	260	1.2	2.3	785.7	120	100	250	68
1	10:44 / 10:46	5	260	1.6	3.1	787.5	120	100	250	68
2	10:48	5	260	1.4	2.7	789.5	120	100	250	68
3	10:50	4	270	1.3	2.5	791.3	120	100	250	68
4	10:52	4	270	1.2	2.3	793.2	120	100	250	68
5	10:54	4	270	1.2	2.3	795.160	120	100	250	68

RAMCON ENVIRONMENT... CORPORATION

Plant NAPA

Location Napa TN
Operator RS/TB
Date 5-16-91
Run No. 2
Sample Box No. C-282
Meter Box No. C-282
Meter H @ 1.7
C Factor .99
Pitot Tube Coefficient Cp .84

Ambient Temperature 85
Barometric Pressure 30.14
Assumed Moisture, % 25
Probe Length, m(ft) 4
Nozzle Identification No. 900340?
Avg. Calibrated Nozzle Dia., (in.) .25x.25x.25
Probe Heater Setting
Leak Rate, m^3/min. (cfm) .005 @ 5 inch
Probe Liner Material glass
Static Pressure, mm Hg (In. Hg)
Filter No. PT-5442

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	557	218
INITIAL	200	200
DIFFERENCE	357	18

1.25

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
1	11:31 / 11:33	4	240	1.5	2.9	795.3 / 797.2	120	110	250	68
2	11:35	4	240	1.5	2.9	798.9	120	110	250	68
3	11:37	5	240	1.5	2.9	800.7	120	100	250	68
4	11:39	4	240	1.0	1.95	802.7	120	100	250	68
5	11:41	4	240	1.0	1.95	804.8	120	100	250	68
1	11:42 / 11:44	4	240	1.5	2.9	806.5	120	100	250	68
2	11:46	3	240	1.3	2.5	808.5	120	100	250	68
3	11:48	3	240	1.2	2.34	810.2	120	100	250	68
4	12:11 / 11:13	4	250	1.2	2.34	812.2	120	110	250	68
5	12:15	4	250	1.2	2.34	814.1	120	110	250	68
1	12:16 / 12:18	4	270	1.0	1.95	815.5	120	110	250	68
2	12:20	4	270	1.0	1.95	817.2	120	110	250	68
3	12:22	4	270	1.0	1.95	818.9	120	110	250	68

Form #REC-06

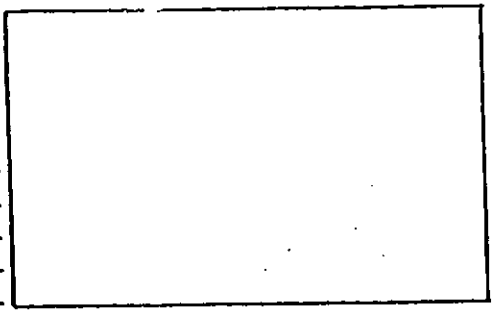
RAMCON emissions test log sheet, cont. DATE _____ LOCATION _____ TEST NO. _____

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
4	12:24	4	270	1.0	1.95	820.5	130	110	250	68
5	12:26	4	270	1.0	1.95	822.3	130	110	250	68
1	12:27 / 12:29	4	270	.95	1.8	823.4	130	110	250	68
2	12:31	4	270	.85	1.6	824.8	130	110	250	68
3	12:33	3	270	.80	1.5	826.3	130	110	250	68
4	12:35	3	270	.78	1.5	827.8	130	110	250	68
5	12:37	3	270	.80	1.5	829.3	130	110	250	68
1	12:38 / 12:40	3	270	.97	1.8	830.7	130	110	250	68
2	12:42	3	280	.75	1.4	832.0	130	110	250	68
3	12:44	3	280	.68	1.3	833.4	130	110	250	68
4	12:46	3	280	.60	1.1	834.8	130	110	250	68
5	12:48	3	280	.60	1.1	836.1	130	110	250	68
1	12:49 / 12:51	4	270	.90	1.7	837.5	130	110	250	68
2	12:53	3	270	.80	1.5	838.9	130	110	250	68
3	12:55	3	260	.80	1.5	840.3	130	110	250	68
4	12:57	2	250	.55	1.0	841.5	130	110	250	68
5	12:59	2	250	.52	1.0	842.843	130	110	250	68

RAMCON ENVIRONMEN.. .. CORPORATION

Plant UAPA

Location Mpls, ID
Operator RJ/TB
Date 8-16-91
Run No. 3
Sample Box No. C-282
Meter Box No. C-262
Meter H @ 1.7
C Factor 99
Pitot Tube Coefficient Cp .841



Schematic of Stack Cross Section

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	604	222
INITIAL	200	200
DIFFERENCE	404	22

Ambient Temperature 85
Barometric Pressure 30.14
Assumed Moisture, % 25
Probe Length, m(ft) 4
Nozzle Identification No. 0003407
Avg. Calibrated Nozzle Dia., (in.) .25x.25x.25
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) .001 @ 5 inch
Probe Liner Material glass
Static Pressure, mm Hg(in.Hg)
Filter No. PT-5441

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
1	1:38 / 1:40	2	240	.45	.87	843.01 / 843.9	120	110	250	68
2	1:42	2	240	.45	.87	845.0	120	110	250	68
3	1:44	2	240	.45	.87	846.1	120	110	250	68
4	1:46	2	240	.48	.93	847.2	120	110	250	68
5	1:48	2	240	.45	.87	848.4	120	110	250	68
1	1:50 / 1:52	2	240	.60	1.1	849.6	120	110	250	68
2	1:54	2	240	.45	.87	850.7	120	110	250	68
3	1:56	2	240	.50	.97	851.9	120	100	250	68
4	1:58	2	240	.52	1.0	853.1	120	100	250	68
5	2:00	2	240	.50	.97	854.4	120	100	250	68
1	2:01 / 2:03	2	240	.50	.97	855.5	120	100	250	68
2	2:05	2	240	.55	1.07	856.8	120	100	250	68
3	2:07	2	240	.80	1.56	858.2	120	100	250	68

orm #REC-06

RAMCON emissions test log sheet, cont. DATE _____ LOCATION _____ TEST NO. _____

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
4	2:09	3	230	.82	1.6	859.8	130	100	250	68
5	2:11	3	230	1.0	1.9	861.5	130	100	250	68
1	2:12 / 2:14	3	230	1.0	1.9	862.9	120	100	250	68
2	2:16	3	230	.97	1.8	864.5	120	100	250	68
3	2:18	3	230	.97	1.8	866.0	130	100	250	68
4	2:20	3	230	1.0	1.9	867.6	130	100	250	68
5	2:22	3	230	1.1	2.1	869.3	130	100	250	68
1	2:23 / 2:25	4	230	1.5	2.9	871.2	130	100	250	69
2	2:27	4	230	1.5	2.9	873.1	130	100	250	68
3	2:29	4	230	1.3	2.5	875.0	130	100	250	68
4	2:31	4	230	1.5	2.9	876.9	130	100	250	68
5	2:33	4	230	1.4	2.7	879.1	130	100	250	68
1	2:34 / 2:36	4	230	1.5	2.9	880.7	130	100	250	68
2	2:38	4	230	1.5	2.9	882.4	130	100	250	68
3	2:40	4	230	1.3	2.5	884.3	130	100	250	68
4	2:42	4	230	1.5	2.9	886.0	130	100	250	68
5	2:44	4	230	1.3	2.5	882.27	130	100	250	68

IX. CALIBRATIONS

A. PAH DATA

DAILY CALIBRATION CHECK

DATE : 13-Sep-91

TIME : 15:19

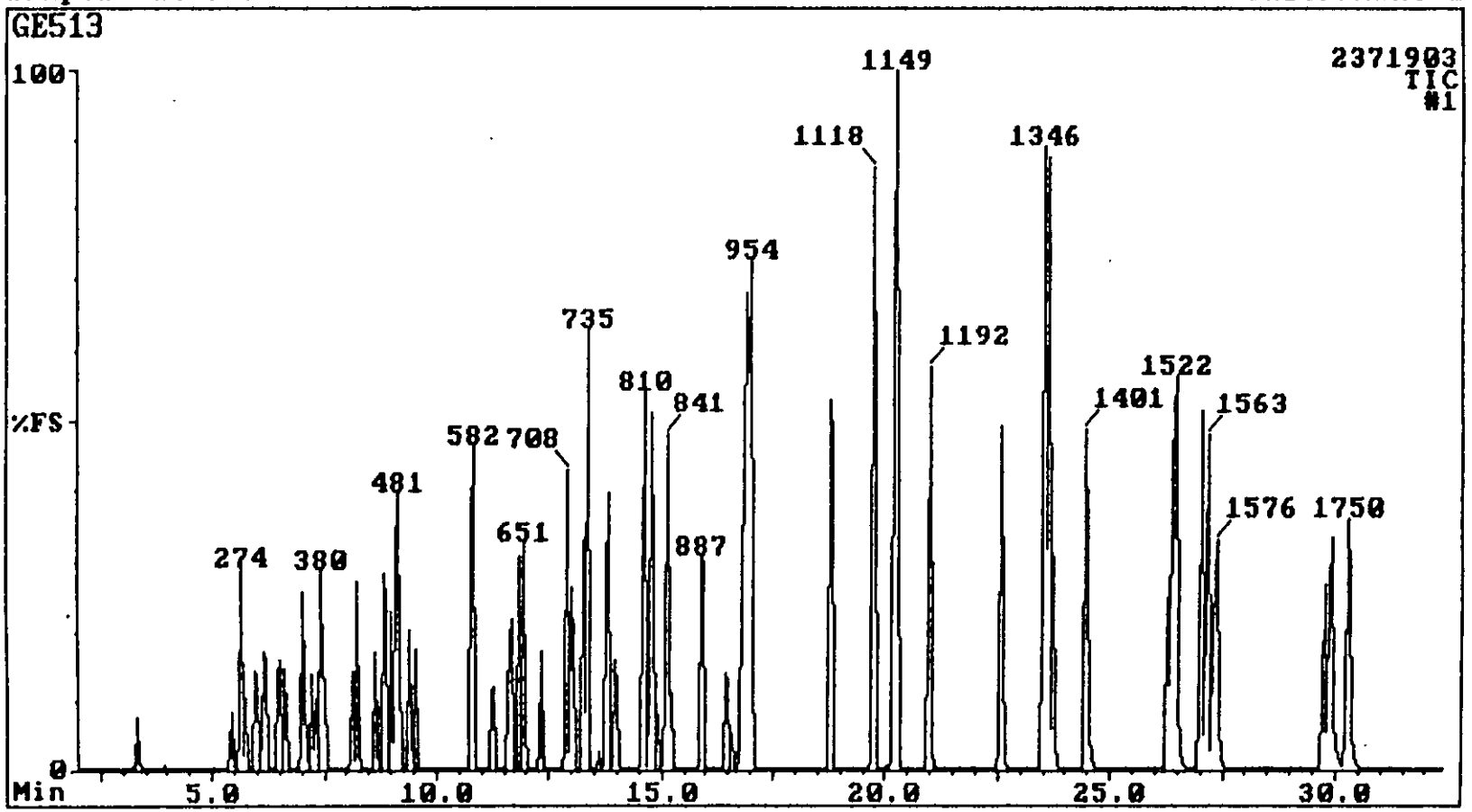
LAB FILE ID: GE513

NB
9-18-91

	COMPOUND	FLAG	RF MEAN	RF 50	%D
3	Naphthalene		1.141	1.231	-8.0
4	2-Methylnaphthalene		0.895	1.036	-15.7
6	2-Chloronaphthalene		1.096	1.157	-5.5
7	Acenaphthylene		1.798	1.875	-4.2
8	Acenaphthene		1.197	1.383	-15.6
9	Fluorene		1.428	1.559	-9.2
11	Phenanthrene		1.210	1.319	-9.0
12	Anthracene		1.159	1.208	-4.3
13	Fluoranthene		1.396	1.556	-11.5
16	Pyrene		1.492	1.509	-1.1
17	Benzo(a)anthracene		1.342	1.334	0.6
18	Chrysene		1.323	1.428	-7.9
20	Benzo(b)fluoranthene		1.324	1.389	-4.9
21	Benzo(k)fluoranthene		1.376	1.692	-22.9
22	Benzo(e)pyrene		1.235	1.326	-7.3
23	Benzo(a)pyrene		1.224	1.344	-9.8
24	Perylene		0.759	0.881	-16.1
25	Indeno(1,2,3-cd)pyrene		0.869	0.798	8.1
26	Dibenz(a,h)anthracene		1.006	0.961	4.5
27	Benzo(g,h,i)perylene		0.958	1.153	-20.4
15	Terphenyl-d14	S	0.897	1.015	-13.2
28	Nitrobenzene-d5	S	0.369	0.291	21.2
29	2-Fluorobiphenyl	S	1.074	1.129	-5.2
30	2,4,6-Tribromophenol	S	0.128	0.145	-13.7
31	2-Fluorophenol	S	1.235	0.938	24.1
32	Phenol-d5	S	1.360	1.406	-3.4
33	Pyrene-d10	S	1.039	1.102	-6.1
34	Anthracene-d10	S	1.047	1.089	-4.0
35	1,4-Dibromobenzene-d4	S	0.709	0.949	-33.9
36	1,3,5-Trichlorobenzene-d3	S	0.343	0.318	7.2

13-Sep-91 14:21 Triangle Laboratories, Inc. (919) 544-5729

Sample:SSTD050 Instrument G

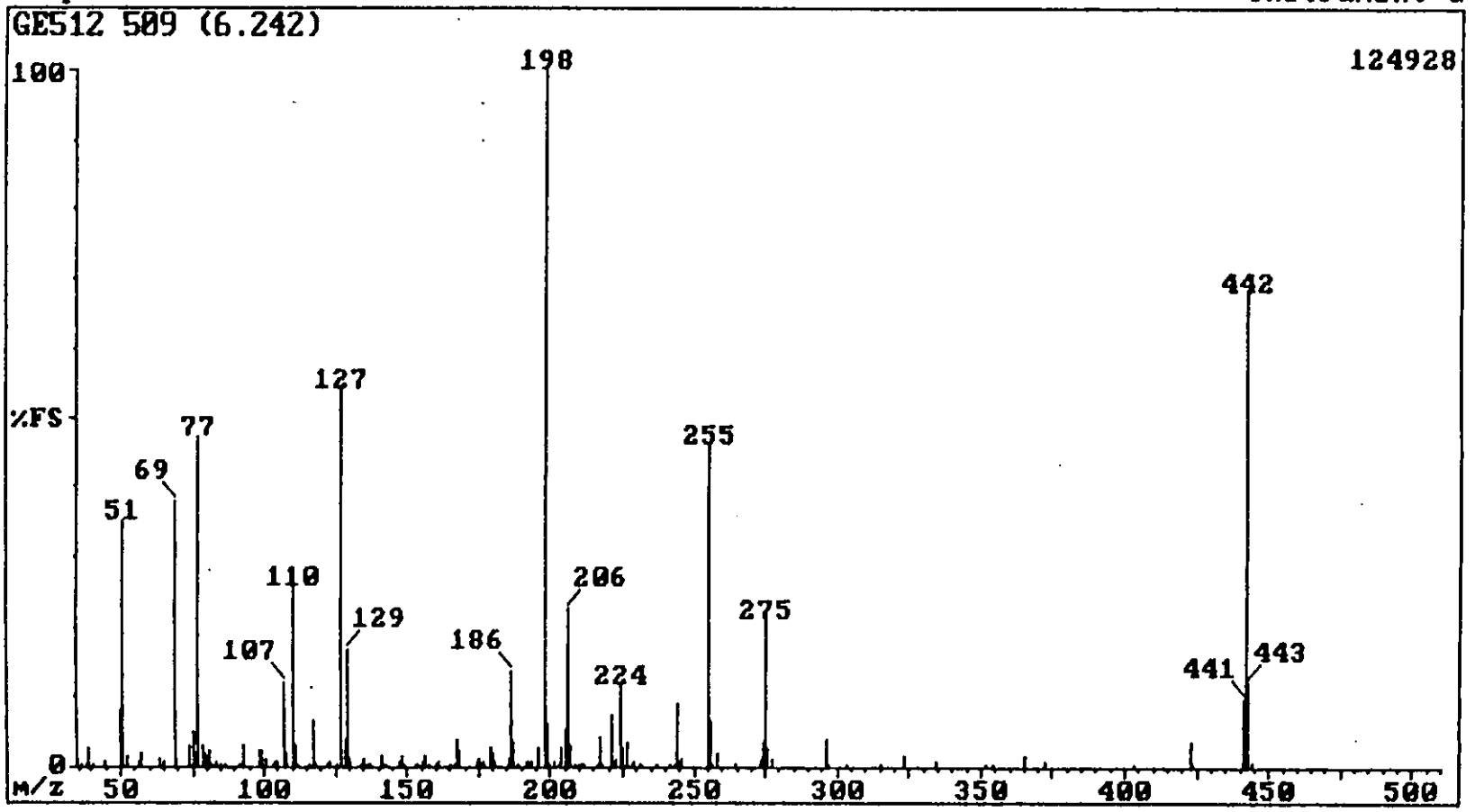


QUAN DB : GE513 LAB-BASE QUAN 13-Sep-91 15:30

No.	MAT	FOR	REV	Delta	Area	P.Flags	Scan	QM	Name
1	100	80	96	2	133830	bb	302	152	1,4-Dichlorobenzene-d4
2	98	88	94	7	656980	bb	478	136	Naphthalene-d8
3	100	94	98	1	1011300	bb	481	128	Naphthalene
4	99	79	93	4	850380	bb	582	142	2-Methylnaphthalene
5	100	95	99	7	473990	bb	730	164	Acenaphthene-d10
6	100	97	99	-2	685230	bb	650	162	2-Chloronaphthalene
7	100	97	99	0	1110700	bb	708	152	Acenaphthylene
8	100	84	99	-1	819570	bb	734	153	Acenaphthene
9	100	95	97	0	923760	bb	810	166	Fluorene
10	100	89	97	3	984980	bv	943	188	Phenanthrene-d10
11	100	95	98	-1	1623900	bv	946	178	Phenanthrene
12	100	95	98	0	1487800	vb	954	178	Anthracene
13	100	96	98	1	1915200	vv	1118	202	Fluoranthene
14	92	58	95	2	1058300	bv	1347	240	Chrysene-d12
15	100	92	98	0	1343100	bb	1192	244	Terphenyl-d14
16	100	94	97	-1	1995700	vb	1149	202	Pyrene
17	100	86	97	0	1764600	bv	1345	228	Benzo(a)anthracene
18	100	92	98	0	1889100	vb	1351	228	Chrysene
19	100	84	92	1	774120	bb	1572	264	Perylene-d12
20	100	89	93	0	1343600	bv	1517	252	Benzo(b)fluoranthene
21	100	93	95	0	1637500	vv	1522	252	Benzo(k)fluoranthene
22	100	93	99	1	1282800	bv	1556	252	Benzo(e)pyrene
23	100	94	100	0	1300500	vv	1563	252	Benzo(a)pyrene
24	100	86	98	0	852920	vv	1576	252	Perylene
25	100	95	97	2	772650	bv	1719	276	Indeno(1,2,3-cd)pyrene
26	100	90	92	2	929830	vv	1727	278	Dibenz(a,h)anthracene
27	100	94	95	3	1115900	vv	1750	276	Benzo(g,h,i)perylene
28	98	69	95	-2	238800	bb	381	82	Nitrobenzene-d5
29	100	96	99	-1	669060	bb	644	172	2-Fluorobiphenyl
30	91	69	79	1	86160	bb	845	330	2,4,6-Tribromophenol
31	99	89	96	-7	156920	vb	133	112	2-Fluorophenol
32	100	72	96	1	235240	bb	273	99	Phenol-d5
33	100	88	98	-1	1458100	vb	1146	212	Pyrene-d10
34	100	89	98	-1	1340600	vb	951	188	Anthracene-d10
35	100	92	96	7	158770	bb	486	240	1,4-Dibromobenzene-d4
36	93	67	82	0	260990	bb	428	185	1,3,5-Trichlorobenzene-d3

13-Sep-91 13:58 Triangle Laboratories, Inc. (919) 544-5729

Sample:DFTPP Instrument G



GE512 509 (6.242) 124928

Pk#	Mass	Abs Int	Rel Int	Pk#	Mass	Abs Int	Rel Int	Pk#	Mass	Abs Int	Rel Int	Pk#	Mass	Abs Int	Rel Int	Pk#	Mass	Abs Int	Rel Int
1	36	376	0.30	30	99	2752	2.20	59	149	392	0.31	88	201	764	0.61	117	256	8128	6.51
2	38	548	0.44	31	101	1456	1.17	60	153	460	0.37	89	203	644	0.52	118	257	548	0.44
3	39	3440	2.75	32	103	384	0.31	61	154	448	0.36	90	204	3600	2.88	119	258	2224	1.78
4	40	460	0.37	33	104	784	0.63	62	155	1104	0.88	91	205	6840	5.48	120	265	580	0.46
5	44	1120	0.90	34	105	756	0.61	63	156	2040	1.64	92	206	28416	22.75	121	273	1344	1.08
6	50	10040	8.04	35	107	15104	12.09	64	158	336	0.27	93	207	3720	2.98	122	274	4352	3.48
7	51	43520	34.84	36	108	2272	1.82	65	160	484	0.39	94	208	588	0.47	123	275	26368	21.11
8	52	1856	1.49	37	110	32256	25.82	66	161	820	0.66	95	210	336	0.27	124	276	3232	2.59
9	56	888	0.71	38	111	4048	3.24	67	165	524	0.42	96	211	636	0.51	125	277	1488	1.19
10	57	2448	1.96	39	112	356	0.28	68	166	584	0.48	97	211	664	0.53	126	296	4800	3.84
11	63	1248	1.00	40	116	404	0.32	69	167	4736	3.79	98	216	320	0.26	127	297	400	0.32
12	65	752	0.60	41	117	8448	6.76	70	168	2816	2.25	99	217	5568	4.46	128	303	520	0.42
13	69	47104	37.70	42	118	428	0.34	71	174	752	0.60	100	218	612	0.49	129	315	392	0.31
14	74	3792	3.04	43	122	556	0.45	72	175	1696	1.36	101	221	9280	7.43	130	323	1872	1.50
15	75	6464	5.17	44	123	1000	0.80	73	176	432	0.35	102	222	960	0.77	131	334	944	0.76
16	76	2240	1.79	45	125	392	0.31	74	177	756	0.61	103	223	1376	1.10	132	352	332	0.27
17	77	58624	46.93	46	127	67584	54.10	75	179	3344	2.68	104	224	14656	11.73	133	354	516	0.41
18	78	4000	3.20	47	128	4864	3.89	76	180	2496	2.00	105	225	3472	2.78	134	365	1888	1.51
19	79	2480	1.99	48	129	20736	16.60	77	181	924	0.74	106	227	4600	3.69	135	372	888	0.71
20	80	2016	1.61	49	130	1520	1.22	78	185	1520	1.22	107	228	352	0.28	136	403	416	0.33
21	81	2896	2.32	50	134	476	0.38	79	186	17152	13.73	108	229	916	0.73	137	423	4352	3.48
22	82	600	0.48	51	135	1360	1.09	80	187	4600	3.69	109	231	324	0.26	138	424	652	0.52
23	83	824	0.66	52	136	440	0.35	81	189	528	0.42	110	237	316	0.25	139	441	12096	9.68
24	85	356	0.28	53	137	724	0.58	82	192	836	0.67	111	242	460	0.37	140	442	84992	68.03
25	86	536	0.43	54	141	2032	1.63	83	193	896	0.72	112	243	596	0.48	141	443	15840	12.04
26	91	448	0.36	55	142	636	0.51	84	196	3632	2.91	113	244	11136	8.91	142	444	1200	0.96
27	92	484	0.32	56	143	412	0.33	85	198	124928	100.00	114	245	1136	0.91				
28	93	4000	3.20	57	147	984	0.79	86	199	8000	6.40	115	246	1344	1.08				
29	98	2832	2.27	58	148	2096	1.68	87	200	628	0.50	116	255	57600	46.11				

DFTPP TUNE CHECK REPORT

Raw Data File: GE512
Date: 13-Sep-91
Time: 13:58

M/E	ION ABUNDANCE CRITERIA	ABUNDANCE	TUNE
51	30.0 - 60.0% of mass 198	34.84	PASS
68	Less than 2.0% of mass 69	0.00(0.0)1	PASS
69	Mass 69 relative abundance	37.70	PASS
70	Less then 2.0% of mass 69	0.00(0.0)1	PASS
127	40.0 - 60.0% of mass 198	54.10	PASS
197	Less than 1% of mass 198	0.00	PASS
198	Base peak, 100% relative abundance	100.00	PASS
199	5 - 9% of mass 198	6.40	PASS
275	10 - 30% of mass 198	21.11	PASS
365	greater than 1% of mass 198	1.51	PASS
441	Present, but less then mass 443	9.68	PASS
442	Greater than 40% of mass 198	68.03	PASS
443	17 - 23% of mass 442	12.04(17.7)2	PASS

JB
9-18-91

INITIAL CALIBRATION CHECK

DATE : 13-Sep-91

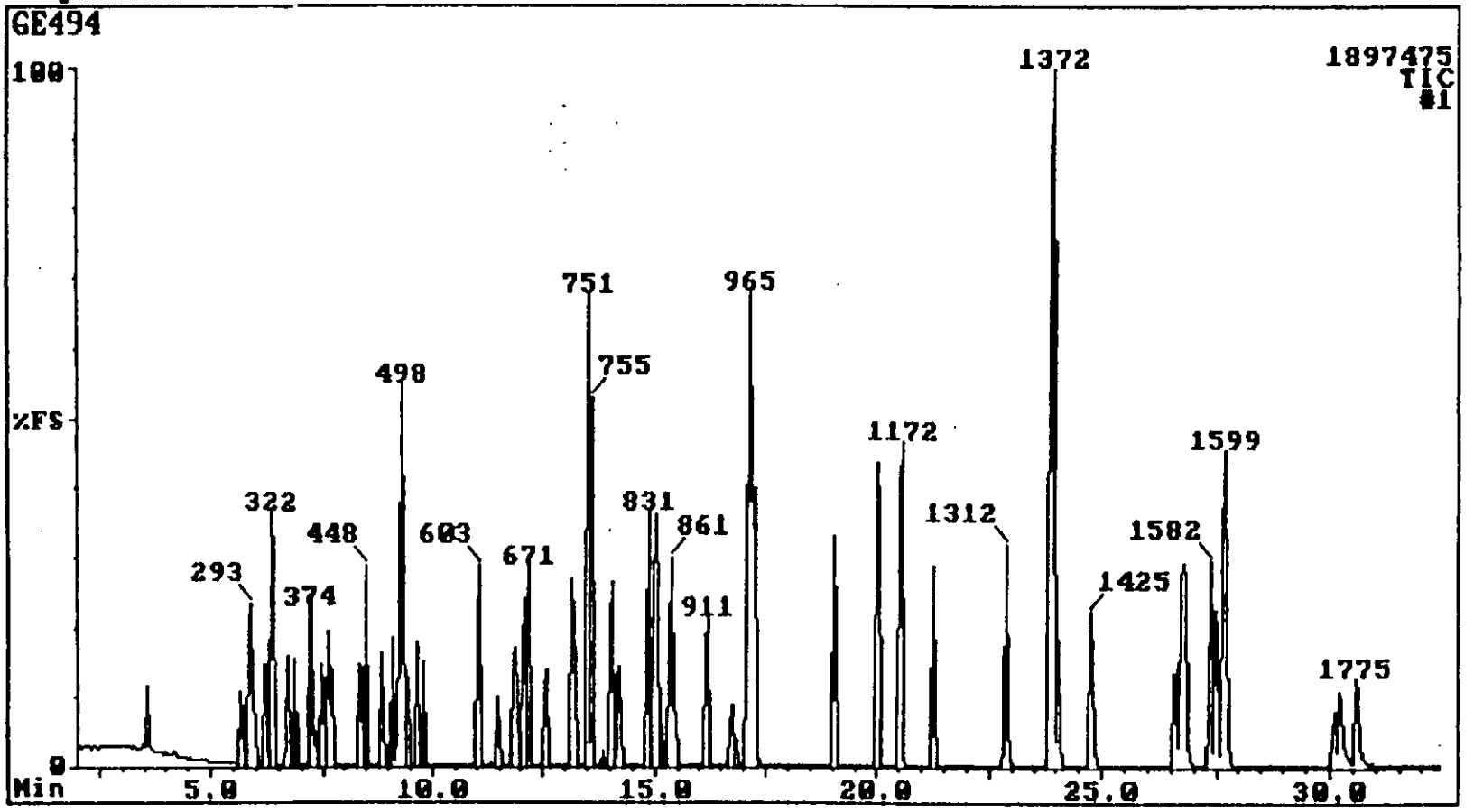
TIME : 14:36

LAB FILE ID: RF20 =GE494 RF50 =GE489 RF80 =GE493
RF120=GE492 RF160=GE491

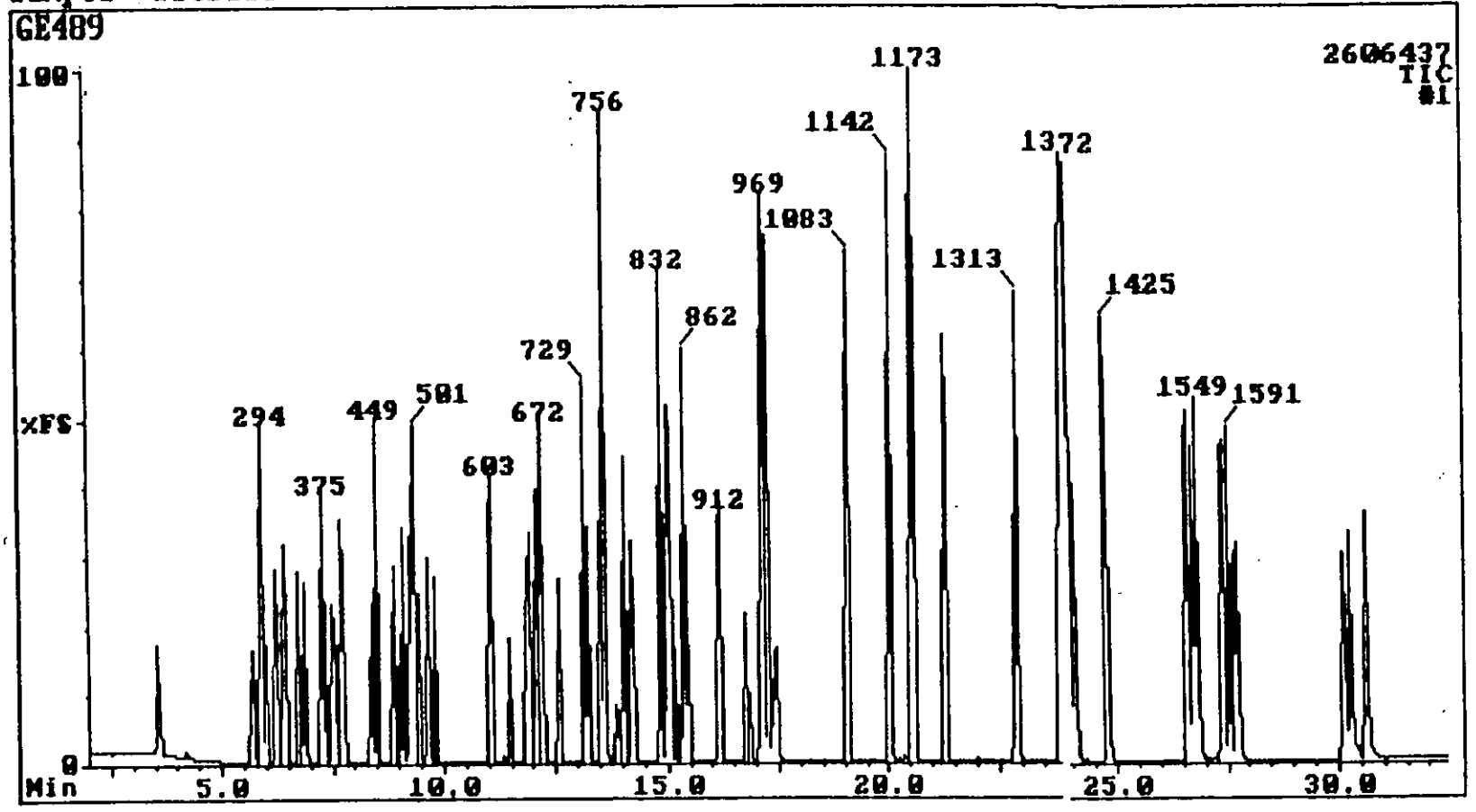
	COMPOUND	FLAG	RF 20NG	RF 50NG	RF 80NG	RF 120NG	RF 160NG	RF MEAN	%RSD
3	Naphthalene		1.085	1.225	1.176	1.166	1.051	1.141	6.2
4	2-Methylnaphthalene		0.724	1.028	0.914	0.942	0.868	0.895	12.5
6	2-Chloronaphthalene		1.037	1.161	1.141	1.115	1.027	1.096	5.6
7	Acenaphthylene		1.685	1.895	1.878	1.876	1.657	1.798	6.5
8	Acenaphthene		1.125	1.291	1.222	1.244	1.102	1.197	6.7
9	Fluorene		1.276	1.588	1.445	1.452	1.378	1.428	8.0
11	Phenanthrene		1.184	1.358	1.235	1.216	1.057	1.210	8.9
12	Anthracene		1.148	1.284	1.141	1.144	1.075	1.159	6.6
13	Fluoranthene		1.373	1.529	1.435	1.384	1.258	1.396	7.1
16	Pyrene		1.286	1.778	1.499	1.415	1.483	1.492	12.1
17	Benzo(a)anthracene		1.207	1.437	1.405	1.314	1.350	1.342	6.7
18	Chrysene		1.276	1.422	1.310	1.341	1.267	1.323	4.7
20	Benzo(b)fluoranthene		1.167	1.282	1.417	1.454	1.300	1.324	8.7
21	Benzo(k)fluoranthene		1.594	1.570	1.413	1.230	1.076	1.376	16.2
22	Benzo(e)pyrene		1.201	1.287	1.299	1.269	1.122	1.235	6.0
23	Benzo(a)pyrene		1.167	1.259	1.284	1.288	1.124	1.224	6.1
24	Perylene		0.826	0.785	0.771	0.745	0.672	0.759	7.5
25	Indeno(1,2,3-cd)pyrene		0.501	0.878	0.972	1.005	0.988	0.869	24.4
26	Dibenz(a,h)anthracene		0.690	1.009	1.110	1.143	1.079	1.006	18.3
	Benzo(g,h,i)perylene		0.827	0.993	1.025	0.983	0.960	0.958	8.0
15	Terphenyl-d14	S	0.808	1.043	0.947	0.858	0.828	0.897	10.9
28	Nitrobenzene-d5	S	0.334	0.400	0.361	0.377	0.373	0.369	6.5
29	2-Fluorobiphenyl	S	1.003	1.155	1.105	1.097	1.009	1.074	6.1
30	2,4,6-Tribromophenol	S	0.106	0.131	0.137	0.135	0.130	0.128	9.8
31	2-Fluorophenol	S	1.071	1.285	1.286	1.261	1.272	1.235	7.5
32	Phenol-d5	S	1.176	1.456	1.413	1.392	1.364	1.360	8.0
33	Pyrene-d10	S	0.919	1.245	1.043	0.985	1.004	1.039	11.9
34	Anthracene-d10	S	1.068	1.153	1.066	1.025	0.921	1.047	8.0
35	1,4-Dibromobenzene-d4	S	0.619	0.822	0.699	0.706	0.698	0.709	10.3
36	1,3,5-Trichlorobenzene-d3	S	0.305	0.393	0.343	0.337	0.335	0.343	9.3

11-Sep-91 15:22 Triangle Labs, Inc. (919) 544-5729

Sample: SSTD020 Instrument G



11-Sep-91 11:40 Triangle Labs, Inc. (919) 544-5729
Sample: SSTD050 Instrument G

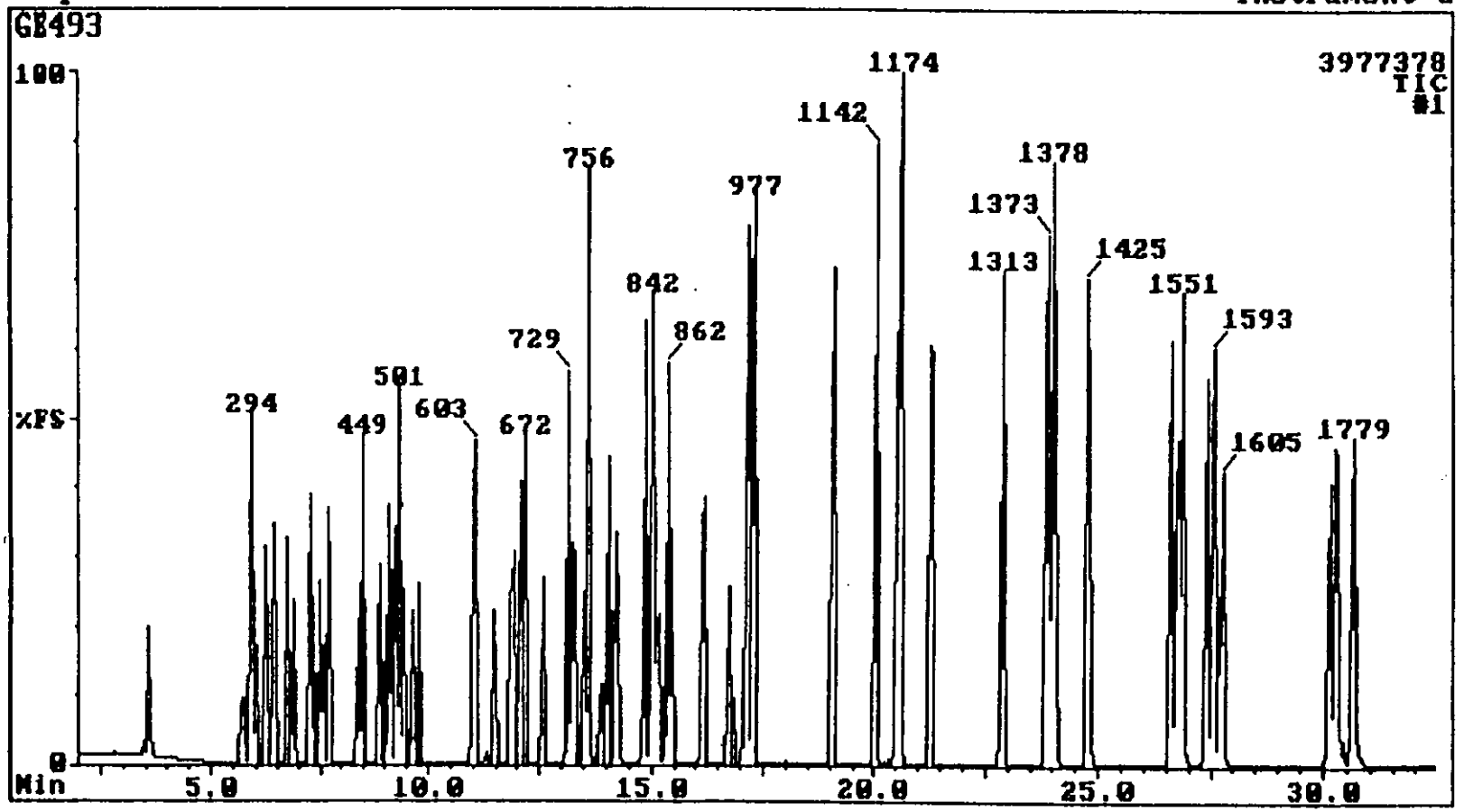


QUAN DB : GE489 LAB-BASE QUAN 13-Sep-91 14:41

No.	MAT	FOR	REV	Delta	Area	P.Flags	Scan	QM	Name
1	100	75	98	0	222940	bb	323	152	1,4-Dichlorobenzene-d4
2	100	87	96	0	865350	bb	499	136	Naphthalene-d8
3	100	91	98	0	1324800	bb	501	128	Naphthalene
4	100	92	97	0	1111400	A	603	142	2-Methylnaphthalene
5	100	96	99	0	619460	bb	751	164	Acenaphthene-d10
6	100	95	98	0	899100	bb	672	162	2-Chloronaphthalene
7	100	96	100	0	1467500	bv	729	152	Acenaphthylene
8	100	71	99	0	999750	bb	756	153	Acenaphthene
9	100	94	97	0	1229700	bb	832	166	Fluorene
10	100	90	97	0	1197100	bv	965	188	Phenanthrene-d10
11	100	95	99	0	2031800	bv*	969	178	Phenanthrene
12	100	94	99	0	1921700	vv*	976	178	Anthracene
13	100	95	98	0	2288300	vb	1142	202	Fluoranthene
14	97	59	96	0	1041500	bv	1373	240	Chrysene-d12
15	100	89	98	0	1357200	vv	1216	244	Terphenyl-d14
16	100	94	98	0	2315000	vb	1173	202	Pyrene
17	100	87	97	0	1870100	vv*	1371	228	Benzo(a)anthracene
18	100	90	98	0	1851700	vv	1377	228	Chrysene
19	100	86	93	0	757800	bv	1600	264	Perylene-d12
20	100	90	95	0	1214500	vv	1544	252	Benzo(b)fluoranthene
21	100	92	96	0	1486700	vv	1549	252	Benzo(k)fluoranthene
22	100	89	99	0	1219100	bv*	1583	252	Benzo(e)pyrene
23	100	90	100	0	1192900	vv	1591	252	Benzo(a)pyrene
24	100	86	99	0	743250	vv	1604	252	Perylene
25	100	94	98	0	831970	vv	1747	276	Indeno(1,2,3-cd)pyrene
26	100	88	94	0	956060	vv	1755	278	Dibenz(a,h)anthracene
27	100	92	95	0	940800	vv	1777	276	Benzo(g,h,i)perylene
28	100	87	96	0	432380	bb	401	82	Nitrobenzene-d5
29	100	94	99	0	893970	bb	664	172	2-Fluorobiphenyl
30	100	79	90	0	101220	bb	867	330	2,4,6-Tribromophenol
31	100	83	98	0	358150	vv	154	112	2-Fluorophenol
32	100	73	97	0	405660	bv	292	99	Phenol-d5
33	100	87	99	0	1621300	vv	1170	212	Pyrene-d10
34	100	86	98	0	1724800	vv	974	188	Anthracene-d10
35	100	89	96	0	229100	bb	507	240	1,4-Dibromobenzene-d4
36	93	66	82	0	425540	bb	448	185	1,3,5-Trichlorobenzene-d3

11-Sep-91 14:40 Triangle Labs, Inc. (919) 544-5729

Sample: SSTD080 Instrument G



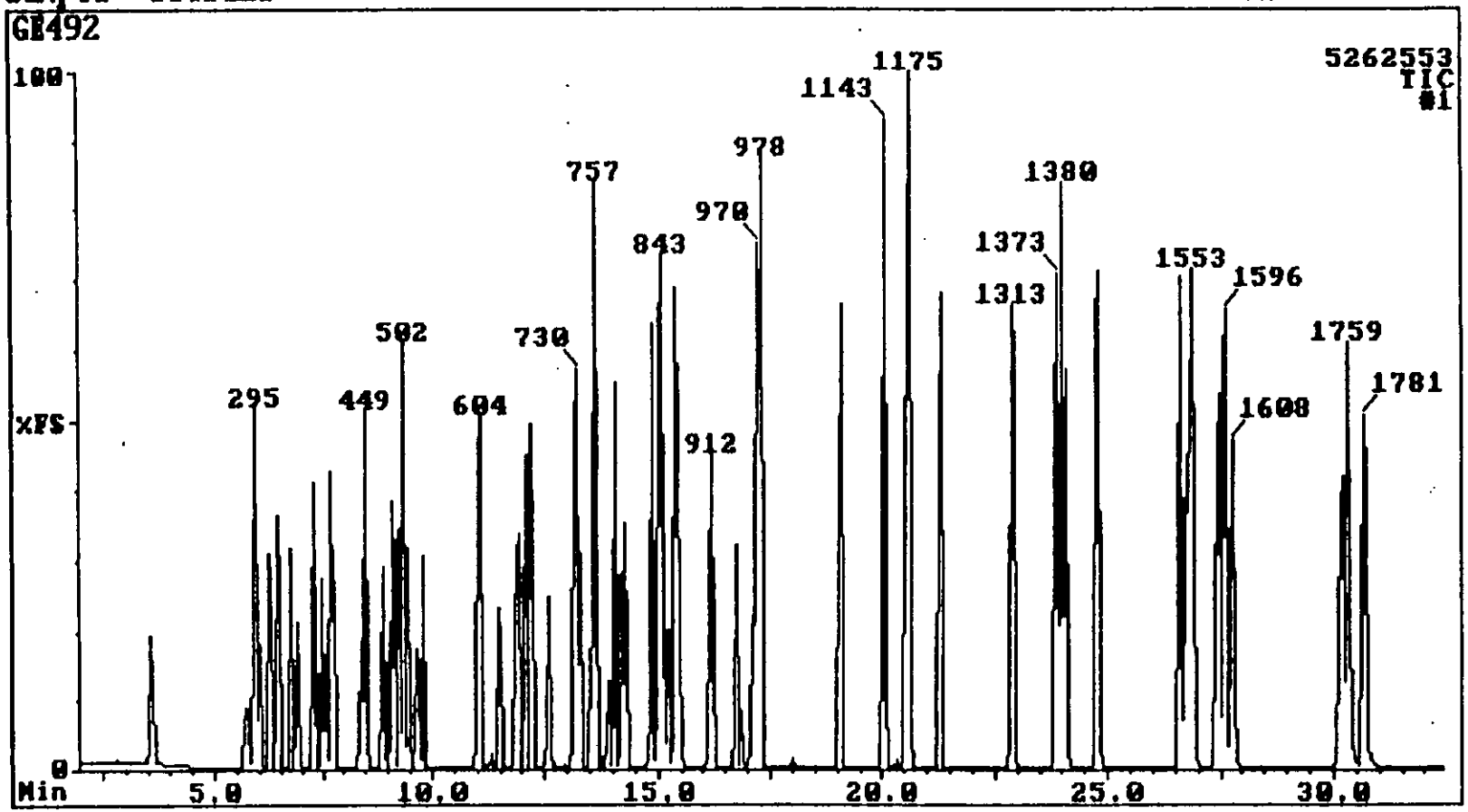
QUAN DB : GE493 LAB-BASE QUAN 13-Sep-91 14:41

No.	MAT	FOR	REV	Delta	Area	P.Flags	Scan	QM	Name
1	100	79	98	0	244900	bb	323	152	1,4-Dichlorobenzene-d4
2	100	86	93	-1	968500	bb	498	136	Naphthalene-d8
3	100	92	99	1	2277000	bb	501	128	Naphthalene
4	100	93	98	2	1769600	bb	603	142	2-Methylnaphthalene
5	100	92	99	1	606260	bb	751	164	Acenaphthene-d10
6	100	94	98	0	1383000	bb	672	162	2-Chloronaphthalene
7	100	95	100	0	2277600	bv	729	152	Acenaphthylene
8	100	74	99	0	1481500	bb	756	153	Acenaphthene
9	100	93	97	0	1752600	bb	832	166	Fluorene
10	100	88	97	0	1222300	bv	965	188	Phenanthrene-d10
11	100	94	99	0	3019200	bv*	969	178	Phenanthrene
12	100	94	99	1	2790000	vb*	977	178	Anthracene
13	100	95	98	0	3507400	vb	1142	202	Fluoranthene
14	91	61	95	0	1179400	bv	1373	240	Chrysene-d12
15	100	85	94	0	2234900	vb	1216	244	Terphenyl-d14
16	100	94	98	1	3536900	vv	1174	202	Pyrene
17	100	86	97	1	3314500	vv*	1372	228	Benzo(a)anthracene
18	100	90	98	1	3088900	vv	1378	228	Chrysene
19	100	83	93	1	1014500	bv	1601	264	Perylene-d12
20	100	90	95	0	2874900	v!*	1545	252	Benzo(b)fluoranthene
21	100	91	96	1	2866400	vv	1551	252	Benzo(k)fluoranthene
22	100	90	99	1	2635000	bv	1585	252	Benzo(e)pyrene
23	100	89	100	1	2605400	vv	1593	252	Benzo(a)pyrene
24	100	88	99	0	1563300	vv	1605	252	Perylene
25	100	92	97	1	1973000	bv	1749	276	Indeno(1,2,3-cd)pyrene
26	100	89	95	0	2251400	vv	1756	278	Dibenz(a,h)anthracene
27	100	91	94	1	2079400	bv	1779	276	Benzo(g,h,i)perylene
28	100	84	98	1	698380	bb	401	82	Nitrobenzene-d5
29	100	93	99	0	1339200	bb	664	172	2-Fluorobiphenyl
30	100	79	90	0	166660	bb	867	330	2,4,6-Tribromophenol
31	100	84	98	0	629920	vb	154	112	2-Fluorophenol
32	100	68	96	0	692280	bv	292	99	Phenol-d5
33	100	77	98	1	2460100	vv	1171	212	Pyrene-d10
34	100	86	98	0	2606500	vb	974	188	Anthracene-d10
35	100	86	95	0	342220	bb	507	240	1,4-Dibromobenzene-d4
36	84	63	82	1	664130	bb	448	185	1,3,5-Trichlorobenzene-d3

9/13/91

11-Sep-91 13:59 Triangle Labs, Inc. (919) 544-5729

Sample: SSTD120 Instrument G



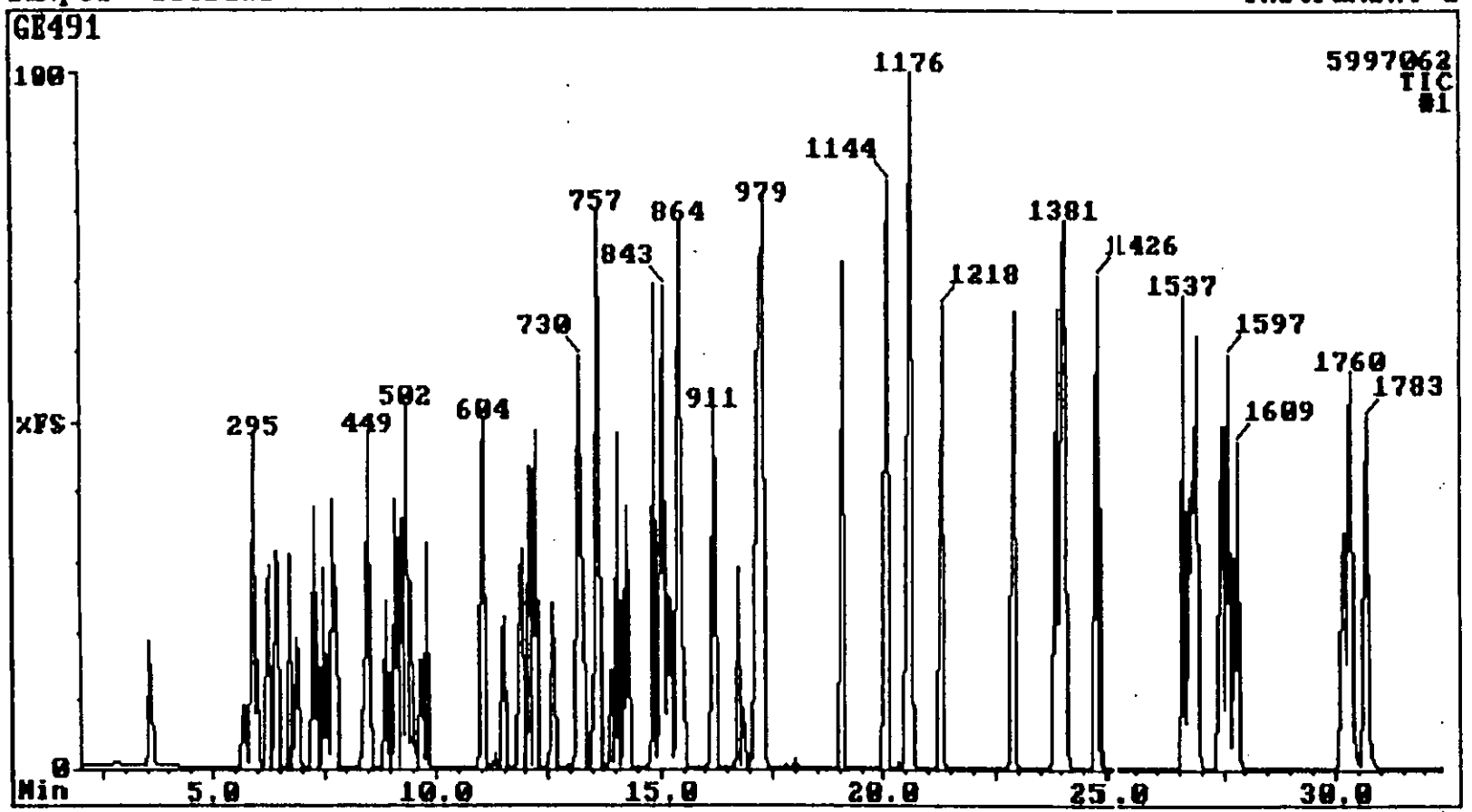
QUAN DB : GE492 LAB-BASE QUAN 13-Sep-91 14:42

No.	MAT	FOR	REV	Delta	Area	P.Flags	Scan	QM	Name
1	99	60	98	0	242260	bb	323	152	1,4-Dichlorobenzene-d4
2	100	73	92	0	924820	bb	499	136	Naphthalene-d8
3	100	92	98	1	3235700	bv	502	128	Naphthalene
4	100	92	97	2	2613200	bv	604	142	2-Methylnaphthalene
5	100	88	99	0	608700	bb	751	164	Acenaphthene-d10
6	100	95	99	0	2035300	bb	672	162	2-Chloronaphthalene
7	100	94	99	1	3425400	bv	730	152	Acenaphthylene
8	100	79	100	1	2272100	bb	757	153	Acenaphthene
9	100	92	97	1	2652000	bb	833	166	Fluorene
10	100	81	97	1	1251800	vv	966	188	Phenanthrene-d10
11	100	94	99	0	4566800	vv*	970	178	Phenanthrene
12	100	94	99	1	4296800	vv	978	178	Anthracene
13	100	94	98	0	5197900	vv	1143	202	Fluoranthene
14	87	56	93	0	1193100	bb	1374	240	Chrysene-d12
15	100	84	93	0	3071000	vv	1217	244	Terphenyl-d14
16	100	92	98	1	5066200	vv	1175	202	Pyrene
17	100	88	97	1	4703900	vv*	1373	228	Benzo(a)anthracene
18	100	90	98	1	4798300	vv	1379	228	Chrysene
19	100	81	93	1	1177600	bv	1602	264	Perylene-d12
20	100	91	95	2	5137300	v!*	1548	252	Benzo(b)fluoranthene
21	100	92	96	2	4343500	vv	1553	252	Benzo(k)fluoranthene
22	93	89	99	3	4482300	bv	1588	252	Benzo(e)pyrene
23	93	89	100	3	4549000	vv	1596	252	Benzo(a)pyrene
24	100	88	99	1	2631000	vv	1607	252	Perylene
25	100	92	97	2	3549200	bv	1751	276	Indeno(1,2,3-cd)pyrene
26	98	88	95	2	4037500	vv	1759	278	Dibenz(a,h)anthracene
27	99	90	94	2	3474300	bv	1781	276	Benzo(g,h,i)perylene
28	100	78	98	1	1044500	bb	402	82	Nitrobenzene-d5
29	100	93	99	1	2003300	bb	665	172	2-Fluorobiphenyl
30	99	79	91	1	245750	bb	868	330	2,4,6-Tribromophenol
31	100	85	98	1	916640	vv	155	112	2-Fluorophenol
32	89	59	94	2	1011900	bb	294	99	Phenol-d5
33	100	79	97	1	3525000	vv	1172	212	Pyrene-d10
34	100	82	98	0	3850800	vv	975	188	Anthracene-d10
35	100	81	96	0	513200	bb	507	240	1,4-Dibromobenzene-d4
36	91	63	82	0	933920	bb	448	185	1,3,5-Trichlorobenzene-d3

9/13/91

11-Sep-91 13:25 Triangle Labs, Inc. (919) 544-5729

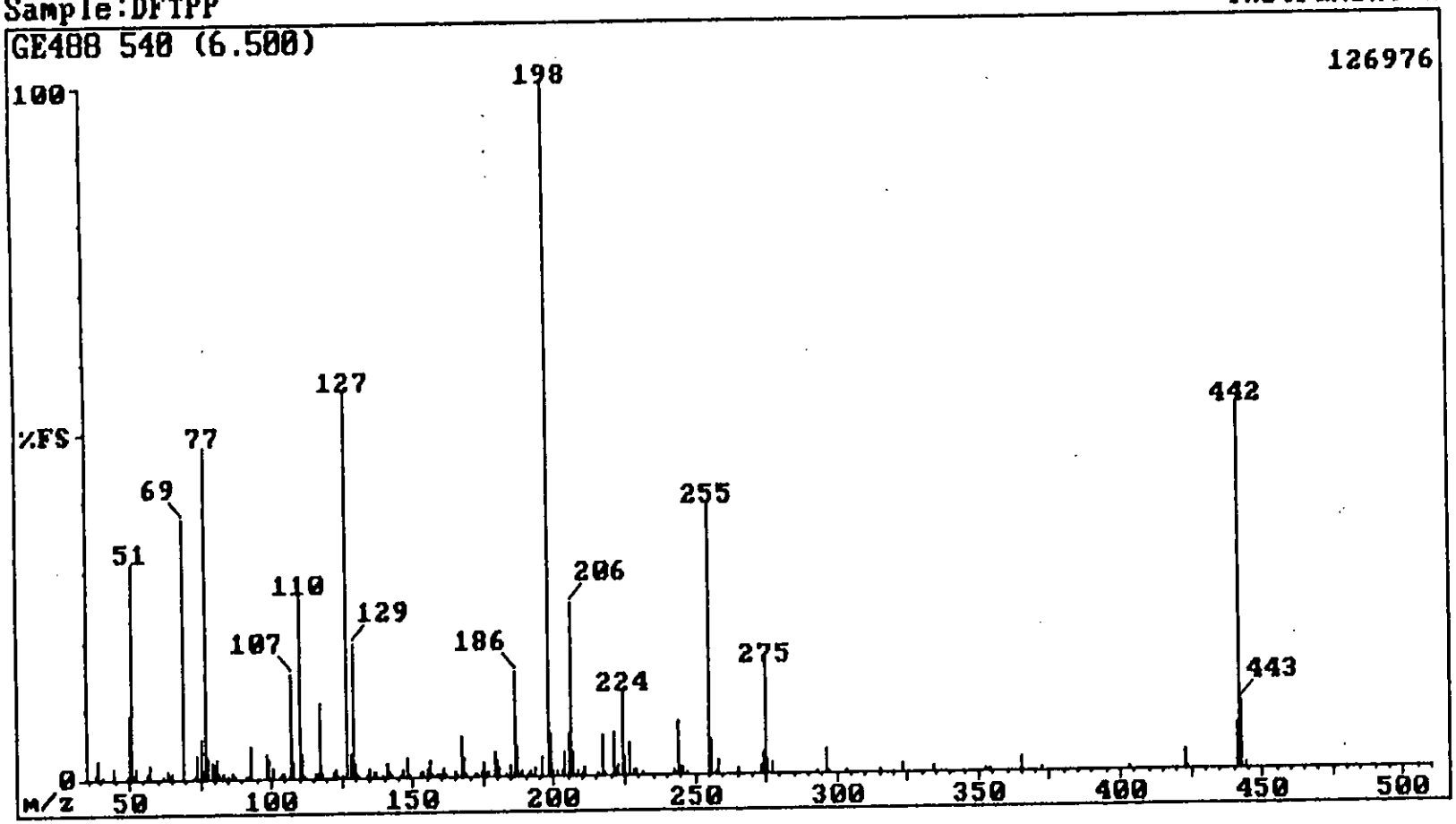
Sample: SSTD160 Instrument G



QUAN DB : GE491 LAB-BASE QUAN 13-Sep-91 14:43

No.	MAT	FOR	REV	Delta	Area	P.Flags	Scan	QM	Name
1	98	58	98	0	209360	bb	323	152	1,4-Dichlorobenzene-d4
2	100	73	92	0	801380	bb	499	136	Naphthalene-d8
3	100	92	98	1	3369200	bb	502	128	Naphthalene
4	100	91	97	2	2780900	bv	604	142	2-Methylnaphthalene
5	100	80	99	1	568880	bb	752	164	Acenaphthene-d10
6	100	94	98	0	2336100	bb	673	162	2-Chloronaphthalene
7	100	94	100	0	3771000	bv	730	152	Acenaphthylene
8	100	79	99	0	2506900	bb	757	153	Acenaphthene
9	100	93	97	0	3134700	bv	833	166	Fluorene
10	100	81	97	0	1270600	vv	966	188	Phenanthrene-d10
11	100	94	99	0	5372900	vv	970	178	Phenanthrene
12	100	94	99	2	5462800	vv*	979	178	Anthracene
13	100	94	98	1	6391100	vv	1144	202	Fluoranthene
14	74	34	94	1	1051500	bb	1375	240	Chrysene-d12
15	100	87	97	0	3480900	vv	1218	244	Terphenyl-d14
16	100	90	97	1	6237300	vv	1176	202	Pyrene
17	100	88	94	0	5675900	vv*	1373	228	Benzo(a)anthracene
18	100	89	97	1	5329500	vv	1380	228	Chrysene
19	100	81	93	1	1078600	vb	1603	264	Perylene-d12
20	99	90	95	2	5609400	v!*	1549	252	Benzo(b)fluoranthene
21	100	91	96	2	4642400	!v	1554	252	Benzo(k)fluoranthene
22	93	89	99	3	4838900	bv	1589	252	Benzo(e)pyrene
23	93	89	100	3	4848800	vv	1597	252	Benzo(a)pyrene
24	100	88	99	2	2899100	vv	1609	252	Perylene
25	100	92	97	2	4263000	bv	1752	276	Indeno(1,2,3-cd)pyrene
26	98	88	95	2	4657100	bv	1760	278	Dibenz(a,h)anthracene
27	92	91	95	3	4139800	bv	1783	276	Benzo(g,h,i)perylene
28	98	72	96	1	1197100	bb	402	82	Nitrobenzene-d5
29	100	93	99	0	2296300	bb	665	172	2-Fluorobiphenyl
30	100	80	92	1	296520	bb	869	330	2,4,6-Tribromophenol
31	100	86	98	1	1065200	vb	155	112	2-Fluorophenol
32	77	52	91	2	1142300	bb	294	99	Phenol-d5
33	100	75	99	0	4222000	vv	1172	212	Pyrene-d10
34	100	84	98	1	4683000	vv	976	188	Anthracene-d10
35	100	81	96	0	584900	bb	507	240	1,4-Dibromobenzene-d4
36	82	59	83	1	1073200	bb	449	185	1,3,5-Trichlorobenzene-d3

11-Sep-91 11:25 Triangle Laboratories, Inc. (919) 544-5729
Sample:DFTPP Instrument G



GE488 548 (6.588) 126976

Pk#	Mass	Abs Int	Rel Int	Pk#	Mass	Abs Int	Rel Int	Pk#	Mass	Abs Int	Rel Int	Pk#	Mass	Abs Int	Rel Int	Pk#	Mass	Abs Int	Rel Int
1	38	828	0.65	33	99	3664	2.89	65	147	1648	1.30	97	189	948	0.74	129	245	1344	1.06
2	39	3472	2.73	34	101	1768	1.39	66	148	3504	2.76	98	191	516	0.41	130	246	1520	1.20
3	40	376	0.30	35	103	588	0.46	67	149	648	0.50	99	192	1056	0.83	131	247	416	0.33
4	44	1904	1.50	36	104	1160	0.92	68	153	828	0.65	100	193	1296	1.02	132	255	49400	38.91
5	49	596	0.47	37	105	1136	0.89	69	154	892	0.70	101	196	3216	2.53	133	256	6656	5.24
6	50	11712	9.22	38	106	364	0.29	70	155	1392	1.10	102	198	126976	100.00	134	257	572	0.45
7	51	39424	31.05	39	107	19200	15.12	71	156	2736	2.15	103	199	7600	6.05	135	258	2400	1.95
8	52	2000	1.64	40	108	2976	2.34	72	157	688	0.54	104	200	784	0.62	136	265	852	0.67
9	56	1160	0.92	41	110	33536	26.41	73	158	420	0.33	105	201	876	0.69	137	273	1504	1.18
10	57	2224	1.75	42	111	4352	3.43	74	159	548	0.43	106	203	788	0.62	138	274	4000	3.21
11	62	496	0.39	43	112	424	0.33	75	160	648	0.51	107	204	4224	3.33	139	275	20224	15.93
12	63	1680	1.32	44	116	844	0.66	76	161	1328	1.05	108	205	7936	6.25	140	276	2480	1.95
13	65	872	0.69	45	117	14080	11.09	77	162	364	0.29	109	206	31744	25.00	141	277	1904	1.50
14	69	47616	37.50	46	118	872	0.69	78	165	1024	0.81	110	207	4480	3.53	142	293	388	0.31
15	73	584	0.40	47	122	856	0.67	79	166	656	0.52	111	208	796	0.63	143	296	4600	3.63
16	74	4352	3.43	48	123	1696	1.34	80	167	7424	5.85	112	210	544	0.43	144	297	548	0.43
17	75	7360	5.80	49	124	456	0.36	81	168	3600	2.84	113	211	1312	1.03	145	303	576	0.45
18	76	1504	1.18	50	125	676	0.53	82	169	428	0.34	114	215	452	0.36	146	315	568	0.44
19	77	68672	47.70	51	127	70656	55.65	83	172	656	0.52	115	217	7424	5.85	147	323	1600	1.26
20	78	3872	3.05	52	128	4416	3.48	84	173	588	0.46	116	218	560	0.44	148	334	1872	0.84
21	79	3184	2.44	53	129	24576	19.35	85	174	1184	0.93	117	221	7744	6.10	149	352	664	0.52
22	80	2704	2.13	54	130	2256	1.78	86	175	2368	1.86	118	222	1040	0.82	150	354	612	0.48
23	81	3696	2.91	55	131	540	0.43	87	176	692	0.54	119	223	1776	1.40	151	365	2368	1.86
24	82	1040	0.82	56	134	664	0.52	88	177	748	0.59	120	224	15168	11.95	152	372	740	0.58
25	83	944	0.74	57	135	1696	1.34	89	179	4672	3.68	121	225	3504	2.76	153	403	588	0.40
26	85	584	0.40	58	136	828	0.65	90	180	3000	2.37	122	227	5760	4.54	154	423	3232	2.55
27	86	936	0.74	59	137	960	0.76	91	181	1456	1.15	123	228	756	0.60	155	424	568	0.45
28	87	388	0.31	60	140	376	0.30	92	183	404	0.32	124	229	936	0.74	156	441	8576	6.75
29	91	720	0.57	61	141	2640	2.00	93	185	2144	1.69	125	231	488	0.38	157	442	66560	52.42
30	92	712	0.56	62	142	1040	0.82	94	186	19456	15.32	126	242	824	0.65	158	443	12160	9.58
31	93	5760	4.54	63	143	600	0.47	95	187	5312	4.18	127	243	604	0.48	159	444	1072	0.84
32	98	4288	3.38	64	146	520	0.41	96	188	592	0.47	128	244	9984	7.86				

DFTPP TUNE CHECK REPORT

Raw Data File: GE488
Date: 11-Sep-91
Time: 11:25

M/E	ION ABUNDANCE CRITERIA	ABUNDANCE		TUNE
51	30.0 - 60.0% of mass 198	31.05		PASS
68	Less than 2.0% of mass 69	0.00(	0.0)1	PASS
69	Mass 69 relative abundance	37.50		PASS
70	Less then 2.0% of mass 69	0.00(	0.0)1	PASS
127	40.0 - 60.0% of mass 198	55.65		PASS
197	Less than 1% of mass 198	0.00		PASS
198	Base peak, 100% relative abundance	100.00		PASS
199	5 - 9% of mass 198	6.05		PASS
275	10 - 30% of mass 198	15.93		PASS
365	greater than 1% of mass 198	1.86		PASS
441	Present, but less then mass 443	6.75		PASS
442	Greater than 40% of mass 198	52.42		PASS
443	17 - 23% of mass 442	9.58(	18.3)2	PASS

IX. CALIBRATIONS

B. GAS CHROMATOGRAPHY

FIELD ANALYSIS DATA SHEETS

Plant NAPA Date 8-9-91

Location Mpls, IN

1. General Information:

Source temp. (°C)	126	Columnar temperature:	
Probe temp. (°C)	126	Initial (°C)/time (min)	75
Ambient temp. (°C)	29.4	Program rate (°C/min)	6
Atmospheric press. (in. Hg)	30.00	Final (°C)/time (min)	75
Source press. (in. Hg)		Carrier gas flow rate (ml/min)	30
Absolute source press. (mm)		Detector temperature (°C)	
Sampling rate (liter/min)	1	Injection time (24-hr basis)	
Sample loop volume (ml)	1	Chart speed (mm/min)	
Sample loop temp. (°C)	75	Dilution ratio	
Dilution gas flow rate (ml/min)		Dilution gas used (symbol)	

2. Field Analysis Data: Methane Calibration

Run # _____ Time _____

Components	Area	Attenuation	A x A Factor	Concentration (ppm
Methane	452.61	32	14483.52	262
"	439.09	32	14048	262
	Avg: 445.85		14267.2	

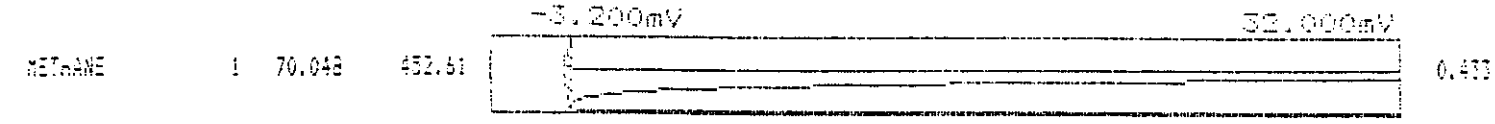
Run # _____ Time _____

Components	Area	Attenuation	A x A Factor	Concentration (ppm
Methane	891.38	32		509
"	895.05	32		509
	Avg 893.02		28576.64	

Run # _____ Time _____

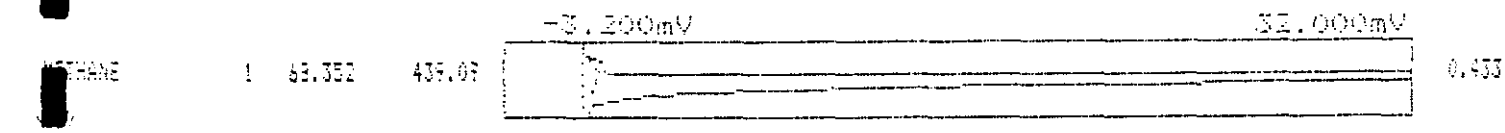
Components	Area	Attenuation	A x A Factor	Concentration (ppm
Methane	1381.40	32		765
"	1318.59	32		765
	Avg 1349.99		43199.68	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : XMET200A.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 09:40:14



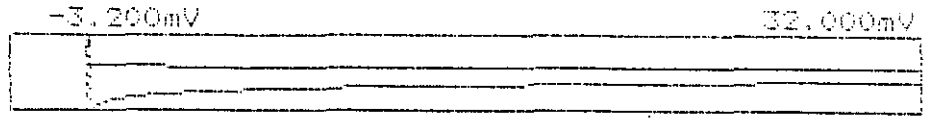
Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.433	70.048	452.61	100.00	N/A	
1				452.61	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : XMET200B.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 09:42:47



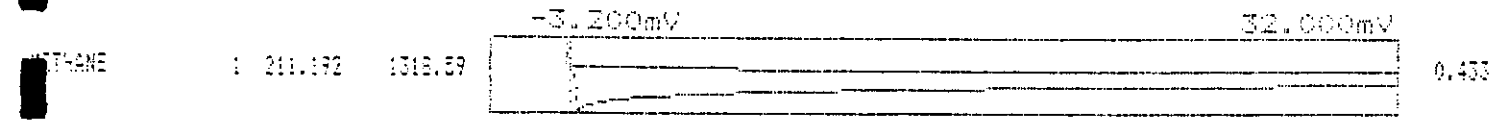
Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.433	68.352	439.09	99.27	N/A	
1				439.09	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : XMET700A.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 09:55:26



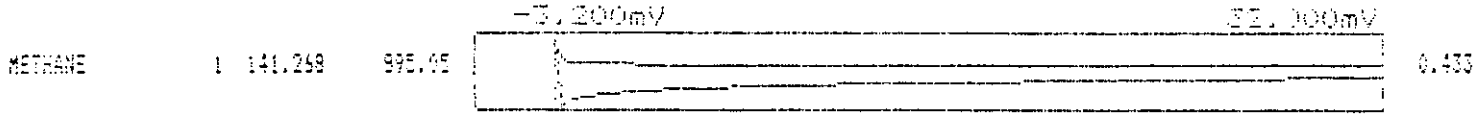
Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.433	215.017	1381.40	100.00	N/A	
1				1381.40	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : XMET700B.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 09:58:15



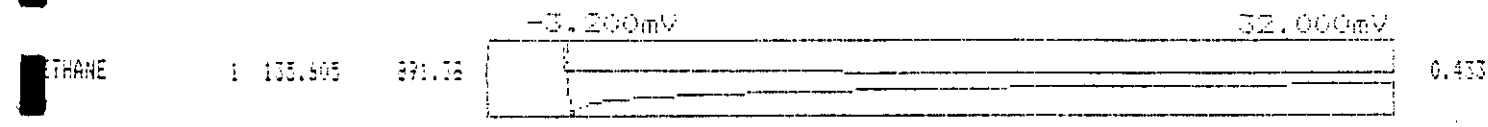
Component	Number	Retention	Height	Area	Area %	External	Units
ETHANE	1	0.433	211.172	1318.59	100.00	N/A	
1				1318.59	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : XMET500A.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 10:02:58



Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.433	141.268	895.05	100.00	N/A	
1				895.05	100.00	N/A	

Operator : RRAMCON ENVIRONMENTAL
Instrument : Instrument 1
File : XMET500B.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/09/1991
Time : 10:06:11



Component	Number	Retention	Height	Area	Area %	External	Units
METHANE	1	0.433	135.605	891.38	100.00	N/A	
1				891.38	100.00	N/A	

CHROMATOGRAPHIC CONDITIONS DATA SHEET

COMPONENTS TO BE ANALYZED	EXPECTED CONCENTRATION
Methane	50-500 ppm
Benzene	< 10
Toluene	< 10
Ethyl Benzene	< 10
Xylene	< 10

Suggested Chromatographic Column: SP-1200/Bentone 34

Column flow rate: 30 ml/min Head Pressure: _____ mm Hg

Column temperature:

Isothermal 75 °C

Programmed from — °C to — °C at — °C/min

Injection port/sample loop temperature: 75 °C

Detector temperature: _____ °C

Detector flow rates: Hydrogen _____ ml/min.

Chart speed: _____ inches/minute

Compound data:

Compound	Retention Time	Attenuation
Methane	.4	32
Benzene	1.6	32
Toluene	3.1	32
Ethyl Benzene	5.6	32
Xylene	6.9	32

PREPARATION OF STANDARDS IN TEDLAR BAGS AND CALIBRATION CURVE

STANDARDS

Standards Preparation Data:	Mixture #1	Mixture #2	Mixture #3
Organic: BTEX	Benzene	Toluene	Ethyl Benzene
Bag # or identification			
Dry gas meter calibration factor	1.99	1.99	1.99
Final meter reading (liters)	62.3	62.3	62.3
Initial meter reading (liters)	0	0	0
Metered volume (liters)	62.3	62.3	62.3
Avg. meter temperature (°K)	299.64	299.64	299.64
Avg. meter pressure, gauge (mm Hg)	26.02	26.02	26.02
Avg. atmospheric pressure (mm Hg)	762.26	762.26	762.26
Avg. meter pressure, absolute (mm Hg)	788.28	788.28	788.28
Syringe temperature (°K)			
Syringe pressure, absolute (mm Hg)			
Volume of gas in syringe (ml)			
Density of liquid organic (g/ml)	.874	.865	.867
Volume of liquid in syringe (μ l)	9.4	11	13
GC Operating Conditions:			
Sample loop volume (ml)	1	1	1
Sample loop temperature (°C)	75	75	75
Carrier gas flow rate (ml/min)	30	30	30
Column temperature:			
Initial (°C)	75	75	75
Rate change (°C/min)	—	—	—
Final (°C)	75	75	75
Organic Peak Identification and Calculated Concentrations:			
Injection time (24-hr clock)			
Distance to peak (cm)	1.633	3.116	5.1695
Chart speed (cm/min)	—	—	—
Organic retention time (min)	1.633	3.116	5.1695
Attenuation factor	32	32	32
Peak height (mm)	50.750	39.2585	35.1685
Peak area (mm^2)	461.49	523.15	707.165
Peak area x attenuation factor (mm^2)	14,767.68	16,740.80	22629.28
Calculated concentration (ppm) (Equation 18-3 or 18-4)	40.9	39.7	40.8

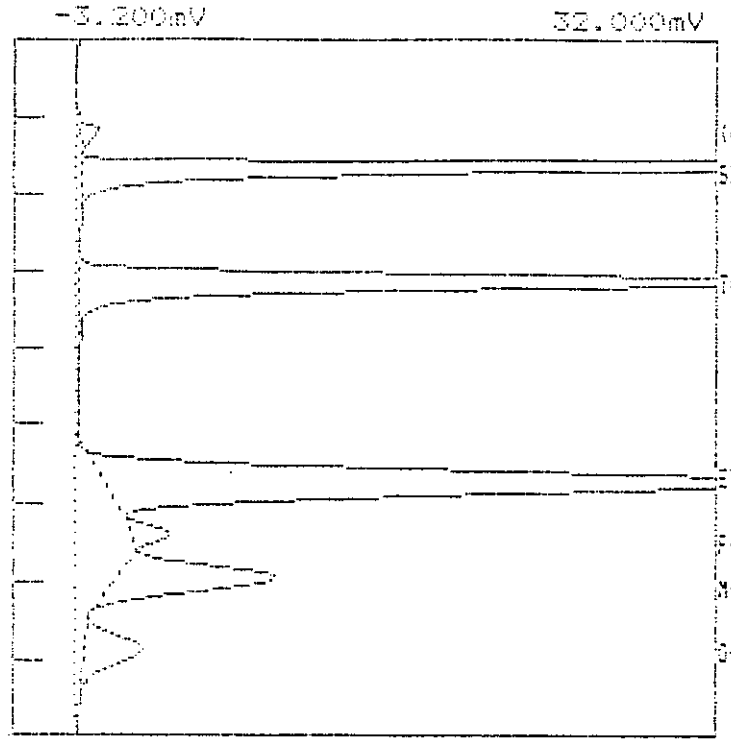
Plot peak area x attenuation factor against calculated concentration to obtain calibration curve.

PREPARATION OF STANDARDS IN TEDLAR BAGS AND CALIBRATION CURVE

Standards Preparation Data:	STANDARDS Mixture #1	Mixture #2	Mixture #3
Organic: BTEX	P-M-O Xylene		
Bag # or identification			
Dry gas meter calibration factor	.99		
Final meter reading (liters)	62.3		
Initial meter reading (liters)	0		
Metered volume (liters)	62.3		
Avg. meter temperature (°K)	299.04		
Avg. meter pressure, gauge (mm Hg)	26.02		
Avg. atmospheric pressure (mm Hg)	762.26		
Avg. meter pressure, absolute (mm Hg)	788.28		
Syringe temperature (°K)			
Syringe pressure, absolute (mm Hg)			
Volume of gas in syringe (ml)			
Density of liquid organic (g/ml)	.860		
Volume of liquid in syringe (μ l)	13		
GC Operating Conditions:			
Sample loop volume (ml)	1		
Sample loop temperature (°C)	75		
Carrier gas flow rate (ml/min)	30		
Column temperature:			
Initial (°C)	75		
Rate change (°C/min)	0		
Final (°C)	75		
Organic Peak Identification and Calculated Concentrations:			
Injection time (24-hr clock)			
Distance to peak (cm)	6.3745/6.9165/7.8495		
Chart speed (cm/min)			
Organic retention time (min)	6.3745/6.9165/7.8495		
Attenuation factor	32		
Peak height (mm)	1.991/8.034/2.910		
Peak area (mm^2)	27.33/170.36/74.28		
Peak area x attenuation factor (mm^2)	59.33/202.36/106.28		
Calculated concentration (ppm) (Equation 18-3 or 18-4)	40.5		

Plot peak area x attenuation factor against calculated concentration to obtain calibration curve.

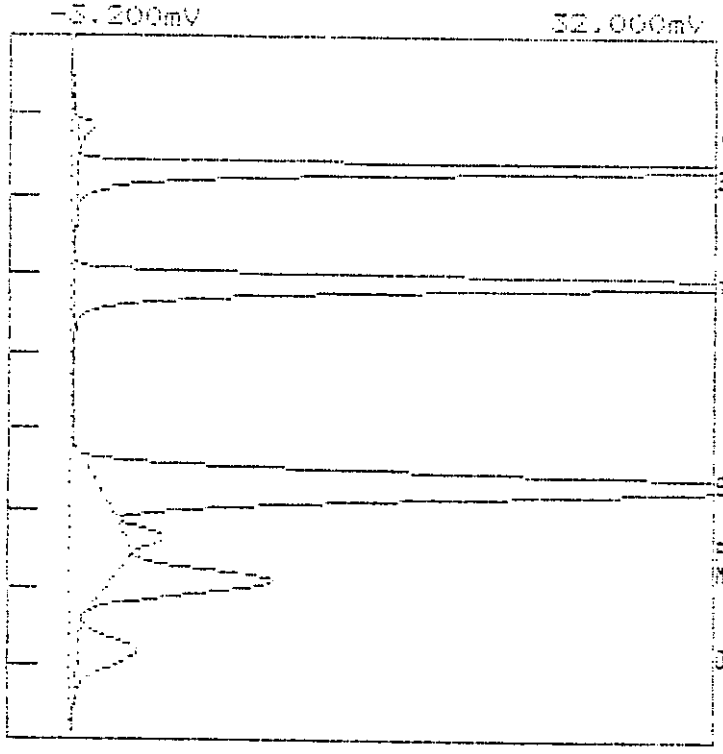
Operator : RAMCON ENVIRONMENTAL CORP.
Instrument : Instrument 1
File : 50BNAPA.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/05/1991
Time : 09:08:54



(unknown)	0	1.166	11.55	(unknown)	1.166	
BENZENE	2	1.633	460.52	BENZENE	1.633	
TOLUENE	3	3.116	521.01	TOLUENE	3.116	
ETHYL BENZENE	4	5.700	701.53	ETHYL BENZENE	5.700	
P-XYLENE	5	6.383	27.05	P-XYLENE	6.383	
M-XYLENE	6	6.933	171.46	M-XYLENE	6.933	
O-XYLENE	7	7.866	74.26	O-XYLENE	7.866	

Component	Number	Retention	Height	Area	Area %	External	Units
BENZENE	[illegible]	1.633	50.402	460.52	23.41	N/A	
TOLUENE		3.116	341.030	521.01	26.48	N/A	
ETHYL BENZENE		5.700	80.518	701.53	35.69	N/A	
P-XYLENE		6.383	14.988	27.05	1.37	N/A	
M-XYLENE		6.933	71.371	171.46	8.71	N/A	
O-XYLENE		7.866	2.886	74.26	3.77	N/A	
6				1955.82	100.00	N/A	

Operator : RAMCON ENVIRONMENTAL CORP.
Instrument : Instrument 1
File : SOANAPA.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/05/1991
Time : 08:55:09



(unknown)	0	1.150	7.62	(unknown)	1.150
BENZENE	2	1.633	462.46	BENZENE	1.633
TOLUENE	3	3.116	925.29	TOLUENE	3.116
ETHYL BENZENE	4	5.683	712.75	ETHYL BENZENE	5.683
P-XYLENE	5	6.266	27.61	P-XYLENE	6.266
M-XYLENE	6	6.900	167.32	M-XYLENE	6.900
O-XYLENE	7	7.333	73.96	O-XYLENE	7.333

Component	Number	Retention	Height	Area	Area %	External	Units
BENZENE	[illegible]	1.650	[illegible]	[illegible]	[illegible]	N/A	
TOLUENE		[illegible]	[illegible]	[illegible]	[illegible]	N/A	
ETHYL BENZENE		[illegible]	[illegible]	[illegible]	[illegible]	N/A	
P-XYLENE		[illegible]	[illegible]	[illegible]	[illegible]	N/A	
M-XYLENE		[illegible]	[illegible]	[illegible]	[illegible]	N/A	
O-XYLENE		[illegible]	[illegible]	[illegible]	[illegible]	N/A	
	6			1971.40	100.00	N/A	

PREPARATION OF STANDARDS IN TEDLAR BAGS AND CALIBRATION CURVE

STANDARDS

Standards Preparation Data:	Mixture #1	Mixture #2	Mixture #3
Organic: BTEX	Benzene	Toluene	Ethyl Benzene
Bag # or identification			
Dry gas meter calibration factor	1.99	1.99	.99
Final meter reading (liters)	50	50	50
Initial meter reading (liters)	0	0	0
Metered volume (liters)	50	50	50
Avg. meter temperature (°K)	299.64	299.64	299.64
Avg. meter pressure, gauge (mm Hg)	26.02	26.02	26.02
Avg. atmospheric pressure (mm Hg)	762.26	762.26	762.26
Avg. meter pressure, absolute (mm Hg)	788.28	788.28	788.28
Syringe temperature (°K)			
Syringe pressure, absolute (mm Hg)			
Volume of gas in syringe (ml)			
Density of liquid organic (g/ml)	.874	.865	.867
Volume of liquid in syringe (μ l)	4	4.5	5
GC Operating Conditions:			
Sample loop volume (ml)	1	1	1
Sample loop temperature (°C)	75	75	75
Carrier gas flow rate (ml/min)	30	30	30
Column temperature:			
Initial (°C)	75	75	75
Rate change (°C/min)	–	–	–
Final (°C)	75	75	75
Organic Peak Identification and Calculated Concentrations:			
Injection time (24-hr clock)			
Distance to peak (cm)	1.608	3.066	5.616
Chart speed (cm/min)	–	–	–
Organic retention time (min)	1.608	3.066	5.616
Attenuation factor	32	32	32
Peak height (mm)	27.966	20.585	14.386
Peak area (mm^2)	252.46	272.81	284.34
Peak area x attenuation factor (mm^2)	8078.88	8730.08	9099.04
Calculated concentration (ppm) (Equation 18-3 or 18-4)	21.4	20.2	19.5

Plot peak area x attenuation factor against calculated concentration to obtain calibration curve.

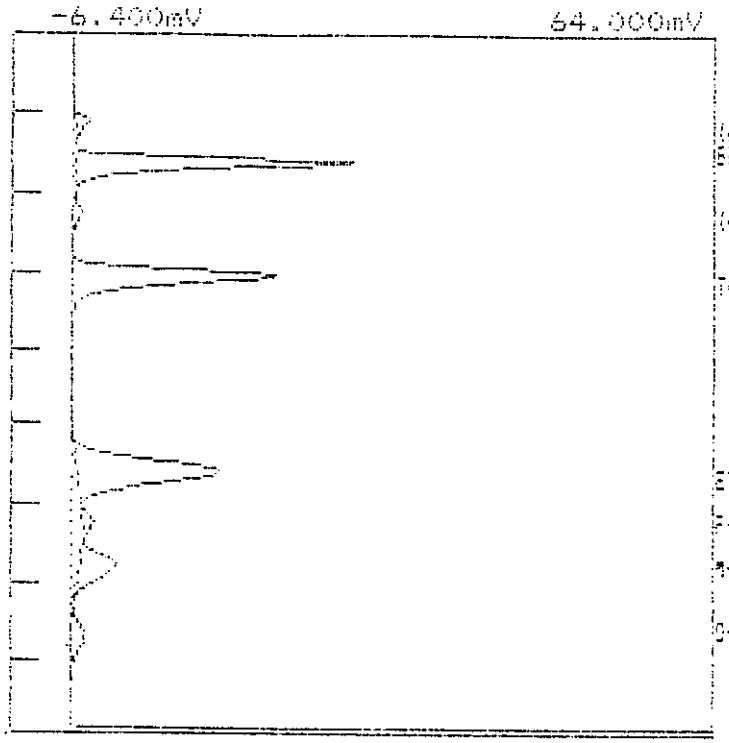
PREPARATION OF STANDARDS IN TEDLAR BAGS AND CALIBRATION CURVE

STANDARDS

Standards Preparation Data:	Mixture #1	Mixture #2	Mixture #3
Organic: BTEX	p-m-o Xylene		
Bag # or identification			
Dry gas meter calibration factor	1.99		
Final meter reading (liters)	50		
Initial meter reading (liters)	0		
Metered volume (liters)	50		
Avg. meter temperature (°K)	299.64		
Avg. meter pressure, gauge (mm Hg)	26.02		
Avg. atmospheric pressure (mm Hg)	762.26		
Avg. meter pressure, absolute (mm Hg)	788.28		
Syringe temperature (°K)			
Syringe pressure, absolute (mm Hg)			
Volume of gas in syringe (ml)			
Density of liquid organic (g/ml)	.860		
Volume of liquid in syringe (µ l)	5		
GC Operating Conditions:			
Sample loop volume (ml)	1		
Sample loop temperature (°C)	75		
Carrier gas flow rate (ml/min)	30		
Column temperature:			
Initial (°C)	75		
Rate change (°C/min)	0		
Final (°C)	75		
Organic Peak Identification and Calculated Concentrations:			
Injection time (24-hr clock)			
Distance to peak (cm)	6.28/6.83/7.24		
Chart speed (cm/min)			
Organic retention time (min)	6.28/6.82/7.24		
Attenuation factor	32		
Peak height (mm)	.960/3.56/1.33		
Peak area (mm^2)	13.3/71.5/34.00		
Peak area x attenuation factor (mm^2)	425.6/467.39/1088.1		
Calculated concentration (ppm) (Equation 18-3 or 18-4)	19.4		

Plot peak area x attenuation factor against calculated concentration to obtain calibration curve.

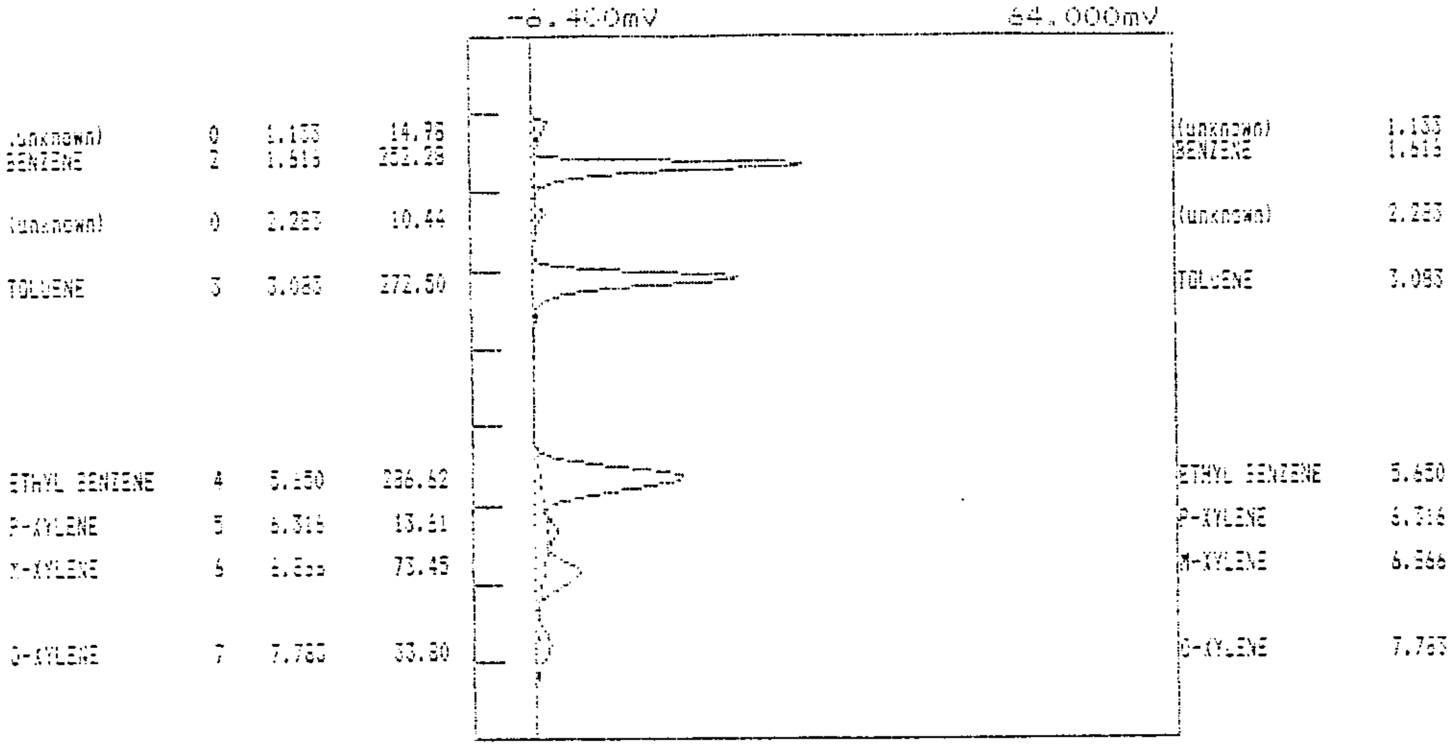
Operator : RAMCON ENVIRONMENTAL CORP.
Instrument : Instrument 1
File : 20ANAPA.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/05/1991
Time : 07:23:42



(unknown)	0	1.116	15.92	(unknown)	1.116
BENZENE	2	1.600	252.65	BENZENE	1.600
(unknown)	0	2.266	10.26	(unknown)	2.266
TOLUENE	3	3.050	273.13	TOLUENE	3.050
ETHYL BENZENE	4	5.583	282.07	ETHYL BENZENE	5.583
P-XYLENE	5	6.250	13.10	P-XYLENE	6.250
M-XYLENE	6	6.300	75.61	M-XYLENE	6.300
O-XYLENE	7	7.700	34.21	O-XYLENE	7.700

Component	Number	Retention	Height	Area	Area %	External	Units
BENZENE	[illegible]	1.600	25.060	[illegible]	[illegible]	N/A	
TOLUENE		3.050	14.462	[illegible]	[illegible]	N/A	
ETHYL BENZENE		5.583	14.462	[illegible]	[illegible]	N/A	
P-XYLENE		6.250	0.[illegible]	[illegible]	[illegible]	N/A	
M-XYLENE		6.300	3.[illegible]	[illegible]	[illegible]	N/A	
O-XYLENE		7.700	1.[illegible]	34.21	3.67	N/A	
6				930.76	100.00	N/A	

Instrument / Operator : RAMCON ENVIRONMENTAL CORP.
File : 20BNAPA.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/05/1991
Time : 07:38:50



Component	Number	Retention	Height	Area	Area %	External	Units
BENZENE	2	1.616	27.877	251.[illegible]	26.[illegible]	N/A	
TOLUENE	3	3.083	20.540	272.50	[illegible]	N/A	
ETHYL BENZENE	4	5.650	14.[illegible]	[illegible]	[illegible]	N/A	
P-XYLENE	5	6.316	0.[illegible]	13.61	1.42	N/A	
M-XYLENE	6	6.566	1.54[illegible]	73.45	7.[illegible]	N/A	
O-XYLENE	7	7.783	1.128	33.80	3.[illegible]	N/A	

6				932.26	100.00	N/A	

PREPARATION OF STANDARDS IN TEDLAR BAGS AND CALIBRATION CURVE

STANDARDS

Standards Preparation Data:	Mixture #1	Mixture #2	Mixture #3
Organic: BTEX	Benzene	Toluene	Ethyl Benzene
Bag # or identification			
Dry gas meter calibration factor	.99	.99	.99
Final meter reading (liters)	50	50	50
Initial meter reading (liters)	0	0	0
Metered volume (liters)	50	50	50
Avg. meter temperature (°K)	299.64	299.64	299.64
Avg. meter pressure, gauge (mm Hg)	26.02	26.02	26.02
Avg. atmospheric pressure (mm Hg)	762.26	762.26	762.26
Avg. meter pressure, absolute (mm Hg)	788.28	788.28	788.28
Syringe temperature (°K)			
Syringe pressure, absolute (mm Hg)			
Volume of gas in syringe (ml)			
Density of liquid organic (g/ml)	.874	.865	.867
Volume of liquid in syringe (μ l)	2	2	2.5
GC Operating Conditions:			
Sample loop volume (ml)	1	1	1
Sample loop temperature (°C)	75	75	75
Carrier gas flow rate (ml/min)	30	30	30
Column temperature:			
Initial (°C)	75	75	75
Rate change (°C/min)	—	—	—
Final (°C)	75	75	75
Organic Peak Identification and Calculated Concentrations:			
Injection time (24-hr clock)			
Distance to peak (cm)	1.615	3.085	5.165
Chart speed (cm/min)	—	—	—
Organic retention time (min)	1.615	3.085	5.65
Attenuation factor	32	32	32
Peak height (mm)	14.025	8.670	7.778
Peak area (mm^2)	129.605	113.555	153.97
Peak area x attenuation factor (mm^2)	4147.36	3633.76	4927.04
Calculated concentration (ppm) (Equation 18-3 or 18-4)	10.7	8.9	9.8

Plot peak area x attenuation factor against calculated concentration to obtain calibration curve.

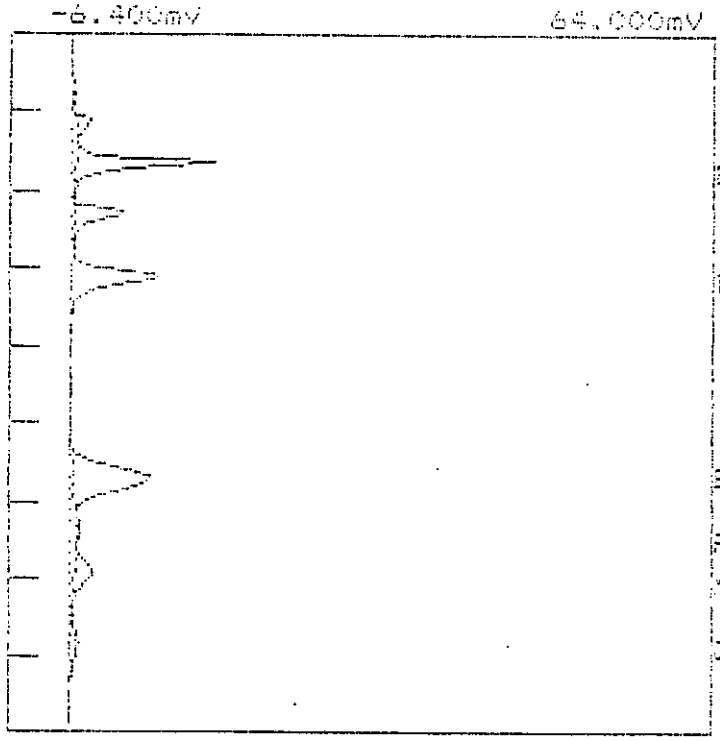
PREPARATION OF STANDARDS IN TEDLAR BAGS AND CALIBRATION CURVE

STANDARDS

Standards Preparation Data:	Mixture #1	Mixture #2	Mixture #3
Organic:	P-M-O Xylenes		
Bag # or identification			
Dry gas meter calibration factor	.99		
Final meter reading (liters)	50		
Initial meter reading (liters)	0		
Metered volume (liters)	50		
Avg. meter temperature (°K)	299.64		
Avg. meter pressure, gauge (mm Hg)	26.02		
Avg. atmospheric pressure (mm Hg)	762.26		
Avg. meter pressure, absolute (mm Hg)	788.28		
Syringe temperature (°K)			
Syringe pressure, absolute (mm Hg)			
Volume of gas in syringe (ml)			
Density of liquid organic (g/ml)	.860		
Volume of liquid in syringe (μ l)	2.5		
GC Operating Conditions:			
Sample loop volume (ml)	1	1	1
Sample loop temperature (°C)	75		
Carrier gas flow rate (ml/min)	30		
Column temperature:			
Initial (°C)	75		
Rate change (°C/min)	—		
Final (°C)	75		
Organic Peak Identification and Calculated Concentrations:			
Injection time (24-hr clock)			
Distance to peak (cm)	6.308/6.849/7.783		
Chart speed (cm/min)			
Organic retention time (min)	6.308/6.849/7.783		
Attenuation factor	32		
Peak height (mm)	.471/1.766/.679		
Peak area (mm^2)	6.48/37.16/17.48		
Peak area x attenuation factor (mm^2)	38.48/69.16/49.48		
Calculated concentration (ppm) (Equation 18-3 or 18-4)	9.7		

Plot peak area x attenuation factor against calculated concentration to obtain calibration curve.

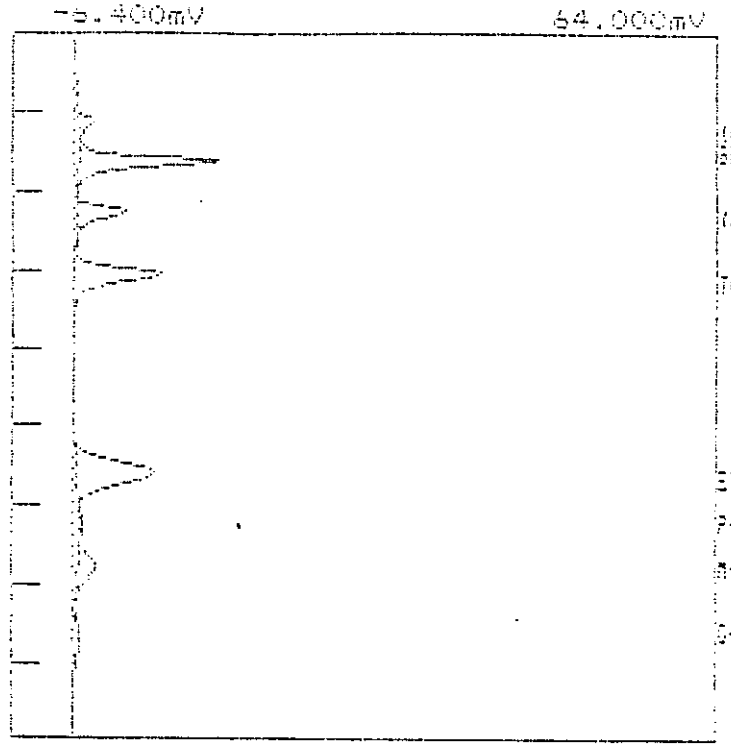
Operator : RAMCON ENVIRONMENTAL CORP.
Instrument : Instrument 1
File : 10ANAPA.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/05/1991
Time : 07:54:59



(unknown)	0	1.133	7.11	(unknown)	1.133
BENZENE	2	1.633	127.78	BENZENE	1.633
(unknown)	0	2.300	54.70	(unknown)	2.300
TOLUENE	3	3.116	112.02	TOLUENE	3.116
ETHYL BENZENE	4	5.700	156.40	ETHYL BENZENE	5.700
P-XYLENE	5	6.366	6.77	P-XYLENE	6.366
M-XYLENE	6	6.916	37.06	M-XYLENE	6.916
O-XYLENE	7	7.830	17.45	O-XYLENE	7.830

Component	Number	Retention	Height	Area	Area %	External	Units
BENZENE	2	1.633	17.997	127.78	27.94	N/A	
TOLUENE	3	3.116	8.647	112.02	24.50	N/A	
ETHYL BENZENE	4	5.700	7.757	156.40	34.20	N/A	
P-XYLENE	5	6.366	0.980	6.77	1.48	N/A	
M-XYLENE	6	6.916	1.774	37.06	8.10	N/A	
O-XYLENE	7	7.830	0.693	17.45	3.82	N/A	
6				457.50	100.00	N/A	

Operator : RAMCON ENVIRONMENTAL CORP.
Instrument : Instrument 1
File : 10BNAPA.CHR
Temperature : BTEX.TEM
Components : BTEX.CPT
Date : 08/05/1991
Time : 08:11:39



(unknown)	0	1.116	7.05	(unknown)	1.116	
BENZENE	2	1.600	151.45	BENZENE	1.600	
(unknown)	0	2.250	56.34	(unknown)	2.250	
TOLUENE	3	3.650	115.09	TOLUENE	3.650	
ETHYL BENZENE	4	5.600	151.84	ETHYL BENZENE	5.600	
P-XYLENE	5	6.250	5.29	P-XYLENE	6.250	
M-XYLENE	6	6.783	37.33	M-XYLENE	6.783	
O-XYLENE	7	7.716	17.82	O-XYLENE	7.716	

Component	Number	Retention	Height	Area	Area %	External	Units
BENZENE	2	1.600	11.05	171.45	37.35	N/A	
TOLUENE	3	3.650	7.80	115.09	25.07	N/A	
ETHYL BENZENE	4	5.600	11.27	151.84	33.08	N/A	
P-XYLENE	5	6.250	0.39	5.29	1.15	N/A	
M-XYLENE	6	6.783	2.75	37.33	8.13	N/A	
O-XYLENE	7	7.716	0.85	17.82	3.88	N/A	
	6			459.11	100.00	N/A	

IX. CALIBRATIONS

C. INSTRUMENTAL

INSTRUMENTAL ANALYSIS CALIBRATION DATA

DILUENT SO_2 MONITORS

Plant NAPA APAC Location Memphis TN

Date 8-9-91 Operator KA

Initial Calibration (Accuracy: ± 2% Span)

Gas Type	Actual Concentration	Analyzer Response
SO_2-Zero	0.0	0.0
SO_2-High	82.8	83
SO_2-Mid	53.1	55.6

System Bias Reponse: Analyzer Response-Initial Bias = ± 5% Span
Final Bias - Initial Bias = ± 3% Span

Run # 1 Time: 10:53 - 11:53

Gas Type	Initial Bias Response	Final Bias Response	Drift
Zero	0.0	0.0	0.0
SO_2	55.6	55.1	0.5

Run # 2 Time: 12:14 - 13:14

Gas Type	Initial Bias Response	Final Bias Response	Drift
Zero	0.0	-0.2	0.2
SO_2	55.1	55.3	0.2

Run # 3 Time: 14:30 - 16:25

Gas Type	Initial Bias Response	Final Bias Response	Drift
Zero	-0.2	-0.5	0.3
SO_2	55.3	55.0	0.3

Run # 4 Time: 16:44 - 17:01 8-10-91

Gas Type	Initial Bias Response	Final Bias Response	Drift
Zero	-0.5	0.3	0.8
SO_2	55.0	54.7	0.3

INSTRUMENTAL ANALYSIS CALIBRATION DATA

DILUENT O_2 AND CO_2 MONITORS

Plant UAPA APAC Location Memphis TN

Date 8-5-91 Operator KA

Initial Calibration (Accuracy: ± 2% Span)

O_2			CO_2		
Gas Type	Actual Concentration	Analyzer Response	Gas Type	Actual Concentration	Analyzer Response
O_2-Zero	0.0	0.0	CO_2-Zero	0.0	0.0
O_2-High	20.9	20.9	CO_2-High	17.6	18.1
O_2-Mid	10.0	9.8	CO_2-Mid	10.0	9.5

System Bias Reponse: Analyzer Response-Initial Bias = ± 5% Span
Final Bias - Initial Bias = ± 3% Span

Run # 1 Time: 10:53 - 11:53

Gas Type	Initial Bias Response		Final Bias Response		Drift	
Zero	0.0	0.0	0.0	0.0	0.0	0.0
CO_2/O_2	9.5	9.8	9.5	9.8	0.0	0.0

Run # 2 Time: 12:14 - 13:14

Gas Type	Initial Bias Response		Final Bias Response		Drift	
Zero	0.0	0.0	0.0	0.0	0.0	0.0
CO_2/O_2	9.5	9.8	9.5	9.8	0.0	0.0

Run # 3 Time: 14:30 - 16:23

Gas Type	Initial Bias Response		Final Bias Response		Drift	
Zero	0.0	0.0	-0.1	0.0	0.1	0.0
CO_2/O_2	9.5	9.8	9.5	9.8	0.0	0.0

Run # 4 Time: ~~16:44~~ 8-10-91 07:01

Gas Type	Initial Bias Response		Final Bias Response		Drift	
Zero	-0.1	0.0	0.0	0.1	0.1	0.1
CO_2/O_2	9.5	9.8	9.5	9.8	0.0	0.0

INSTRUMENTAL ANALYSIS CALIBRATION DATA

CARBON MONOXIDE

Plant NAPA APAC Location Memphis TN

Date 8-5-91 Operator KA

CO Range 1000

Initial Calibration: (Accuracy: ± 5% Span)

Gas Type	Actual Concentration	Anayzer Response
CO-Zero	0	-0.3
CO-High	980	~~976 1023.4~~ 1032
CO-Mid	598	~~576~~ 611.8
CO-Low	328	313.6

Zero & Span Drift: (Accuracy ± 5% Span)

End Run # 1 Time: 10:53 - 11:53

Gas Type	Initial Response	Final Response	Drift
CO-Zero	-0.3	-0.2	0.1
CO-	611.8	609.4	2.4

End Run # 2 Time: 12:14 - 13:14

Gas Type	Initial Response	Final Response	Drift
CO-Zero	-0.2	0.6	0.8
CO-	609.4	608.7	0.7

End Run # 3 Time: 14:30 - 16:23

Gas Type	Initial Response	Final Response	Drift
CO-Zero	0.6	-0.9	1.5
CO-	608.7	607.4	1.3

End Run # 4 Time: ~~16:44~~ 8-10-91 07:01 -

Gas Type	Initial Response	Final Response	Drift
CO-Zero	-0.9	0.8	1.7
CO-	607.4	607.8	0.4

INSTRUMENTAL ANALYSIS CALIBRATION DATA

DILUENT NO_x MONITORS

Plant NAPA APTC Location Memphis TN

Date 8-5-91 Operator IA

Initial Calibration (Accuracy: ± 2% Span)

Gas Type	Actual Concentration	Analyzer Response
NO_x-Zero	0.0	0.1
NO_x-High	845	844.8
NO_x-Mid	551	544.8

System Bias Reponse: Analyzer Response-Initial Bias = ± 5% Span
Final Bias - Initial Bias = ± 3% Span

Run # 1 Time: 10:53 - 11:53

Gas Type	Initial Bias Response	Final Bias Response	Drift
Zero	0.1	0.2	0.1
NO_x	544.8	544.3	0.5

Run # 2 Time: 12:14 - 13:14

Gas Type	Initial Bias Response	Final Bias Response	Drift
Zero	0.2	0.6	0.4
NO_x	544.3	544.2	0.1

Run # 3 Time: 14:30 - 16:23

Gas Type	Initial Bias Response	Final Bias Response	Drift
Zero	0.6	0.7	0.1
NO_x	544.2	545.1	0.9

Run # 4 Time: ~~16:44~~ 8-10-91 07:01

Gas Type	Initial Bias Response	Final Bias Response	Drift
Zero	0.7	-0.4	1.1
NO_x	545.1	544.9	0.2

INSTRUMENTAL ANALYSIS CALIBRATION DATA

TOTAL HYDROCARBONS

PLANT NAPA APAC LOCATION Memphis, TN

DATE 8-9-91 OPERATOR KA

H C RANGE 1000 RESPONSE TIME 6 sec, 6 sec, 6 sec.

INITIAL CALIBRATION: (Accuracy ±5% of calibration gas value)

Gas Type	Actual Concentration	Analyzer	Gas Type	Actual Concentration	Analyzer
HC - Zero	0	-0.9	HC - Mid	509	505.0
HC - High	765	768.5	HC - Low	262	256.9

ZERO & SPAN DRIFT: (Accuracy ±3% of span)

Run # 1	Time: 10:53 - 11:53	
Gas Type	Initial Response	Final Response
HC - Zero	-0.9	-0.8
HC -	505	507

Run # 4	Time: 8-10-91 07:01 - 16:44	
Gas Type	Initial Response	Final Response
HC- Zero	0.8	0.0
HC -	507.1	506.3

Run # 2	Time: 12:14 - 13:14	
Gas Type	Initial Response	Final Response
HC - Zero	-0.8	0.1
HC -	507	507.5

Run #	Time:	
Gas Type	Initial Response	Final Response
HC- Zero		
HC -		

Run # 3	Time: 14:30 - 16:23	
Gas Type	Initial Response	Final Response
HC - Zero	0.1	0.8
HC -	507.5	507.1

Run #	Time:	
Gas Type	Initial Response	Final Response
HC- Zero		
HC -		

IX. CALIBRATIONS

D. METHOD 5 SAMPLING EQUIPMENT

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number _____ Date 9-2-91 Meter box number C-185 Plant _____

Barometric pressure, P_b = _____ in. Hg Dry gas meter number 638809 Pretest Y _____

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	Y_i	$\frac{Y_i V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
15	~~10~~ 5	160.7 / 166.777	73	98 / 91	75 / 76	87.5	13.66		1.014	1.414
1	10	167.6 / 177.733	77	96 / 100	76 / 76	87	16.04		1.01	1.405
2	10	179.5 / 189.637	73	96 / 102	76 / 76	87.5	11.46		1.009	1.433
									Y = 1.011	1.417

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d

where

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ±0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number _____ Date 8-2-91 Meter box number C-185 Plant _____

Barometric pressure, P_b = 30.10 in. Hg Dry gas meter number 638809 Pretest Y _____

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	Y_i	$Y_i \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
.5	10	757.7 / 762.774	76	100 / 102	78 / 78	89.5	11.91	1	1.009	1.562
1	10	769.0 / 779146	76	100 / 102	78 / 80	90	16.88	1	1.009	1.567
2	10	780.3 / 790425	76	100 / 104	80 / 80	91	12.00	1	1.012	1.579
									Y = 1.01	1.569

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d

where

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y $\pm$0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number _____ Date 8-20-91 Meter box number C282 Plant _____

Barometric pressure, P_b = 29.18 in. Hg Dry gas meter number _____ Pretest Y _____

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter Inlet (t_{d_i}), °F	Temperature: Dry gas meter Outlet (t_{d_o}), °F	Temperature: Dry gas meter Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	Y_i	$\frac{Y_i V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
5.103 1	~~10~~ 5	68.268 / 73.371	75	100 / 103	82 / 82	91.75	8.6		1.0	1.66
10.034 2	10	57.949 / 67.983	75	102 / 105	81 / 81	92.3	11.9		1.02	1.59
4.556 3	10	47.954 / 57.510	75	101 / 104	81 / 81	91.8	9.9		1.01	1.65
									Y = 1.01	1.63

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d

where

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ±0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

Form #REG-01

C

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number _____ Date 8-6-91 Meter box number C282 Plant _____

Barometric pressure, P_b = 29.20 in. Hg Dry gas meter number 147810 Pretest Y .99

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	Y_i	$\frac{Y_i V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1	10	10.24	77	100	82	91	14.0	5	.999	1.67
1	10	10.25	77	100	82	91	14.15	5	.999	1.71
1	10	10.25	77	103	81	92	14.20	5	.999	1.71
									Y = .99	1.70

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d

where

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y $\pm$0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

AIR PRODUCTS AND CHEMICALS, INC.
7822 Industry Lane
UDI Business Park
Research Triangle Park, NC 27713
TELEPHONE (919) 361-2077
FAX (919) 361-2074

DATE: 06/03/91
TIME: 10:48
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-063526
ORDER DETAIL SEQ : 2

REMARKS : GAS MIXTURE(S) LISTED BELOW ARE TRACEABLE TO NIST CLASS S WEIGHTS AND/OR NIST GAS MIXTURE STANDARD REFERENCE MATERIALS (SRM's) - REFERENCE APCI SGD FIELD DIRECTIVE BOOK I PART A-3.

ANALYSIS

CERTIFIED GAS MIXTURE: METHANE IN NITROGEN

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 03641	SG119820	METHANE	500	509	MOLAR PPM
ANAL DATE: 06/03/91		NITROGEN		BALANCE	

RAMCON 6-20-91

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

AUTHORIZED SIGNATURE

AIR PRODUCTS AND CHEMICALS, INC.
4822 Industry Lane
Duke Business Park
Research Triangle Park, NC 27713
TELEPHONE (919) 361-2077
FAX (919) 361-2074

DATE: 06/03/91
TIME: 10:47
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-063526
ORDER DETAIL SEQ : 1

REMARKS : GAS MIXTURE(S) LISTED BELOW ARE TRACEABLE TO NIST CLASS S WEIGHTS AND/OR NIST GAS MIXTURE STANDARD REFERENCE MATERIALS (SRM's) - REFERENCE APCI SOP FIELD DIRECTIVE BOOK I PART A-3.

ANALYSIS

CERTIFIED GAS MIXTURE: METHANE IN NITROGEN

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 03642	SG0299928	METHANE	250	262	MOLAR PPM
ANAL DATE: 06/03/91		NITROGEN		BALANCE	

RAMCON 6-20-91

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THESE METHOD(S).

AUTHORIZED SIGNATURE

...CHEMICALS, INC.
...Park, NC 27713
...-1077
FAX ... (919) 361-2074

DATE: 02/15/91
TIME: 15:59
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-055059
ORDER DETAIL SEQ : 4

ANALYSIS

CERTIFIED GAS MIXTURE: SULFUR DIOXIDE IN NITROGEN

CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 02583 ANAL DATE: 02/11/91	SG9003197ALD	SULFUR DIOXIDE NITROGEN	55	53.1 BALANCE	SOLAR PPM

RAMCON 3-1-91

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

AUTHORIZED SIGNATURE

AIR PRODUCTS AND CHEMICALS, INC.
4822 Industry Lane
UDI Business Park
Research Triangle Park, NC 27713
TELEPHONE (919) 361-2077
FAX (919) 361-2074

DATE: 06/03/91
TIME: 10:49
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-063526
ORDER DETAIL SEQ : 3

REMARKS : GAS MIXTURE(S) LISTED BELOW ARE TRACEABLE TO NIST CLASS S WEIGHTS AND/OR NIST GAS MIXTURE STANDARD REFERENCE MATERIALS (SRM's) - REFERENCE AFCI SGD FIELD DIRECTIVE BOOK I PART A-3.

ANALYSIS

CERTIFIED GAS MIXTURE: METHANE IN NITROGEN

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 03643	SG179188	METHANE	850	765	MOLAR PPM
ANAL DATE: 06/03/91		NITROGEN		BALANCE	

RAMCON 6-20-91

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS /THESE METHOD(S).

AUTHORIZED SIGNATURE

AIR PRODUCTS AND CHEMICALS, INC.
4825 Industrial Lane
UDI-Business Park
Research Triangle Park, NC 27713
TELEPHONE (919) 361-2077
FAX (919) 361-2074

DATE: 02/15/71
TIME: 16:08
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2941 HARBOR AVENUE
MEMPHIS TN 38118

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-059059
ORDER DETAIL SEQ : 3

ANALYSIS

CERTIFIED GAS MIXTURE: SULFUR DIOXIDE IN NITROGEN

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 02583	S69002223ALB	SULFUR DIOXIDE	85	83.8	MOLAR PPM
ANAL DATE: 02/11/71		NITROGEN		BALANCE	

RAMCON

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

AUTHORIZED SIGNATURE

AIR PRODUCTS AND CHEMICALS, INC.
4922 Industry Lane
UDI Business Park
Research Triangle Park, NC 27713
TELEPHONE (919) 361-2077
FAX (919) 361-2074

DATE: 02/26/91
TIME: 11:51
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-057503
ORDER DETAIL SEQ : 2

REMARKS : GAS MIXTURE(S) LISTED BELOW ARE TRACEABLE TO NIST CLASS S WEIGHTS AND/OR NIST GAS MIXTURE STANDARD REFERENCE MATERIALS (SRM's) - REFERENCE APCI SOP FIELD DIRECTIVE BOOK I PART A-3.

ANALYSIS

CERTIFIED GAS MIXTURE: CARBON DIOXIDE IN NITROGEN

CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 0265 / ANAL DATE: 02/2 /91 SG112512M	CARBON DIOXIDE	17	17.6	NOLAR %
	NITROGEN		BALANCE	
SG94956	CARBON DIOXIDE	17	17.3	NOLAR %
	NITROGEN		BALANCE	

Ramcon

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

AUTHORIZED SIGNATURE

[redacted] CHEMICALS, INC.

[redacted]
[redacted] Park, NC 27713
[redacted]-3977
[redacted] 361-2074

DATE: 10/31/90
TIME: 09:08
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-049049
ORDER DETAIL SEQ : 1

REMARKS : GAS MIXTURE(S) LISTED BELOW ARE TRACEABLE TO NIST CLASS S WEIGHTS AND/OR NIST GAS MIXTURE STANDARD REFERENCE MATERIALS (SRM's) - REFERENCE APCI SSD FIELD DIRECTIVE BOOK I PART A-3.

ANALYSIS

PRIMARY GAS MIXTURE : 2 COMPONENTS IN NITROGEN

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 01460	66286055	OXYGEN	10	9.99	MOLAR %
ANAL DATE: 10/31/90		CARBON DIOXIDE	10	10.0	MOLAR %
		NITROGEN		BALANCE	

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

AUTHORIZED SIGNATURE

FORM 3806-1 (REV. 6/88)

AIR PRODUCTS AND CHEMICALS, INC.
4922 Industry Lane
UDI Business Park
Research Triangle Park, NC 27713
TELEPHONE (919) 361-2077
FAX (919) 361-2074

DATE: 06/19/90
TIME: 10:12
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 254
CUSTOMER ORDER NO : GARY
ORDER NO : 251-038743
ORDER DETAIL SEQ : 5

REMARKS : GAS MIXTURE(S) LISTED BELOW ARE TRACEABLE TO NIST CLASS I WEIGHTS AND/OR NIST GAS MIXTURE STANDARD REFERENCE MATERIALS (SRM's) - REFERENCE APCI SGD FIELD DIRECTIVE BOOK I PART A-2.

ANALYSIS

CERTIFIED GAS MIXTURE: CARBON MONOXIDE IN NITROGEN

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH ID: 90188 ANAL DATE: 06/14/90	SG0072NB	CARBON MONOXIDE NITROGEN	1000	980 BALANCE	MOLAR PPM
	SG0216173ALP	CARBON MONOXIDE NITROGEN	1000	981 BALANCE	MOLAR PPM

RANCON

CERTIFICATION:

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

Christopher Holmes
AUTHORIZED SIGNATURE

APCI DURHAM
4822 Industry Lane
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DATE: 07/26/90
TIME: 11:51
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-041098
ORDER DETAIL SEQ : 1

REMARKS : GAS MIXTURE(S) LISTED BELOW ARE TRACEABLE TO NIST CLASS S WEIGHTS AND/OR NIST GAS MIXTURE STANDARD REFERENCE MATERIALS (SRM's) - REFERENCE APCI GSO FIELD DIRECTIVE BOOK I PART A-3.

ANALYSIS

CERTIFIED GAS MIXTURE: CARBON MONOXIDE IN NITROGEN

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 00472 ANAL DATE: 07/26/90	S3E0071XLB	CARBON MONOXIDE NITROGEN	200	328 BALANCE	MOLAR PPM

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

AUTHORIZED SIGNATURE

Research Triangle Park, NC 27709
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FAX (919) 361-2074

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-[illegible]
ORDER DETAIL SEQ : 2

REMARKS : GAS MIXTURE(S) LISTED BELOW ARE TRACEABLE TO NIST CLASS 1 WEIGHTS AND/OR NIST GAS MIXTURE STANDARD REFERENCE MATERIALS (SRM's) - REFERENCE APCI SOP FIELD DIRECTIVE BOOK I PART A-3.

ANALYSIS

CERTIFIED GAS MIXTURE: CARBON MONOXIDE IN NITROGEN

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 90474	SG9437024N2	CARBON MONOXIDE	600	598	MOLAR PPM
ANAL DATE: 07/26/90		NITROGEN		BALANCE	

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To Joel Sewel	From Cathy
Co. Ramcon	Co. APCI-Durham
Dept.	Phone # 1-919-361-4645
Fax # 1-901-458-3868	Fax # 1-919-361-2074

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

AUTHORIZED SIGNATURE

AIR PRODUCTS AND CHEMICALS, INC.
4822 Industry Lane
UDI Business Park
Research Triangle Park, NC 27713
TELEPHONE (919) 361-2077
FAX (919) 361-2074

DATE: 08/24/90
TIME: 14:53
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2541 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 351
CUSTOMER ORDER NO : GARY
ORDER NO : 351-042705
ORDER DETAIL SEQ : 4

1 0

ANALYSIS

CERTIFIED GAS MIXTURE: NITRIC OXIDE IN NITROGEN

1 1

	CYL NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 00935	SG900664ALB	NITRIC OXIDE	550	551	MOLAR PPM
ANAL DATE: 08/24/90		Nitrogen Dioxide		9	MOLAR PPM
		NITROGEN		BALANCE	

1 1

1 0

Size B Methane in Nitrogen ux1954 0 3
Size B CO_2 in Nitrogen ux1956 0 1
Alum Size C 0 2
Size C Hydrogen ux1049 0 1

49

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING APPROVED ANALYTICAL METHOD(S) AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACIES OF THIS (THESE) METHOD(S).

[signature]

AUTHORIZED SIGNATURE

RM 3806-1 (REV. 8/88)

AIR PRODUCTS AND CHEMICALS, INC.
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Research Triangle Park, NC 27713
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FAX (919) 361-2074

DATE: 08/24/90
TIME: 10:50
PAGE: 1

CERTIFICATE OF ANALYSIS

AIR PRODUCTS AND CHEMICALS, INC.
2341 HARBOR AVENUE
MEMPHIS TN 38113

CUSTOMER ACCOUNT : 751
CUSTOMER ORDER NO : GARY
ORDER NO : 351-042571
ORDER DETAIL REQ : 2

ANALYSIS

CERTIFIED GAS MIXTURE: NITRIC OXIDE IN NITROGEN

CY NO	COMPONENT REQUESTED	CONCENTRATION REQUESTED	ANALYTICAL RESULT	UNIT OF MEASURE
BATCH NO: 03564	NITRIC OXIDE	350	345	MOLAR PPM
ANAL DATE: 08/23/90	Nitrogen Dioxide		8.6	MOLAR PPM
	NITROGEN		BALANCE	

CERTIFICATION

THIS ANALYSIS HAS BEEN PERFORMED UTILIZING A POWER ANALYTICAL METHODOLOGY AND IS CORRECT TO WITHIN THE ANALYTICAL ACCURACY OF THIS (THESE) METHOD(S).

AUTHORIZED SIGNATURE

Name: Mr. G. Sumner Buck, III
Title: President

Qualifications:

Mr. Buck is a graduate of the University of Mississippi with graduate studies at Memphis State University and State Technical Institute of Memphis. He is a graduate of the EPA 450 "Source Sampling for Particulate Pollutant's" course and the 474 "Continuous Emissions Monitoring" courses outlined by EPA at Research Triangle Park, N.C. He has been directly involved in conducting and supervising air emission testing for over 15 years. He has personally conducted over 400 air emission tests. He currently sponsors and directs visual emission certification schools for US EPA Method 9.

Project Duties:

Mr. Buck will be responsible for the overall supervision of the project. He provided supervision for the project preparation, testing schedules for each team on-site, and overall organization between the testing crews and facility.

Name: **Mr. Joe Sewell**
Title: Instrumentation Director

Qualifications:

Mr. Sewell is the director of our instrumental analysis branch of air emissions testing. He is a graduate of Christian Brothers University in Memphis, Tennessee where he obtained a bachelor of science degree in Chemical Engineering. He has personally conducted and supervised air emissions testing of boilers, incinerators, refineries, etc. utilizing state of the art continuous instrumentation and gas chromatography. He is learned in all US EPA methods with expertise in instrumental techniques for conducting compliance tests and Performance Specifications for CEMS certifications.

Project Duties:

Mr. Sewell provided project leadership for all test procedures conducted at the facility. He is the Quality Assurance/Quality Control Coordinator and will provided guidance in QA/QC to each team leader with regard to individual responsibilities on site for all testing procedures. He acted as a secondary contact person for RAMCON Environmental Corporation.

Name: Mr. Ken Allmendinger
Title: Field Supervisor

Qualifications:

Mr. Allmendinger is currently our Field Supervisor. He provides leadership to other Team Leaders when projects require multiple teams on site as well as coordinating with plant personnel. He has been employed with RAMCON Environmental Corporation for over six years. During that time he has personally conducted over 500 air emission tests. He has extensive training in conducting both isokinetic and instrumental US EPA Reference Methods. He has a current V.E. certification to conduct Method 9 for opacity. He has attended several equipment manufacturers schools for further knowledge of the processes he is testing.

Project Duties:

Mr. Allmendinger provided project leadership at the facility. He provided on-site organization for each Team Leader as to his crews responsibilities as well as providing coordination of testing time periods with the plant personnel.

Name: Mr. Ray Jenkins
Title: Team Leader - Instrumental

Qualifications:

Mr. Jenkins is the Team Leader for our gas chromatography sampling team. He is a graduate of Memphis State University where he obtained a bachelor of science degree with a major emphasis in chemistry. He also serves as a laboratory technician for various specialized analysis procedures conducted in our laboratory. He has experience in conducting the full scope of isokinetic test methods, however he specializes in portable gas chromatography instrumentation methodology. He currently is certified to conduct Method 9 for opacity.

Project Duties:

Mr. Jenkins served as the Team Leader for the testing procedures. He was responsible for conducting the calibration and operation of the gas chromatograph.

Name: **Mr. Bill Lockett**
Title: Team Leader

Qualifications:

Mr. Lockett has been employed by RAMCON Environmental Corp. for three years. He has recently completed Team Leader training in isokinetic and proportional test methods. He currently is certified in conducting Method 9 for opacity. He has been involved in conducting tests on process stacks, incinerators, boilers, etc. He has served as a Field Technician for over two years, however he has recently been upgraded to Team Leader.

Project Duties:

Mr. Lockett is responsible for conducting isokinetic sampling procedures at the facility(s). He is responsible for preparation, calibration and cleaning of the necessary equipment for this testing. His duties on-site include assembling the sample train, leak checking the system, operation of the train and recording the test data on the field data forms.

Name: Mr. Paul Taverna
Title: Assistant Laboratory Technician

Qualifications:

Mr. Taverna is currently serving as Assistant Laboratory Technician. He is proficient in conducting many analysis procedures such as front and back-half particulate analysis, titrations, extractions, etc. He is currently a senior at Memphis State University and is majoring in Biomedical Engineering with a minor in Chemistry.

Project Duties:

Mr. Taverna assists Bruce Shrader in conducting the laboratory analysis on the particulate samples. He is responsible for tare weighing the filters, performing the final weighing of the prepared samples and recording the analysis data in the laboratory record books.

AP42 Section: 11.1

Reference Number: 45

Title: Air Pollution Source Testing At Lehman Roberts Company, Memphis, Tennessee,

2 volumes

Ramcon Environmental Corporation, Memphis, TN,

October 23, 1991.