AP-42 Section 9.13.2
Reference 8
Report Sect. ____
Reference ____

Ambient Engineering Inc.

1145 Bordentown Avenue
Parlin, New Jersey 08859
(201) 727-8333
ENVIRONMENTAL ENGINEERING/SYSTEMS

WA
WASTE
NOISE
ENERGY
O.S.H.A.

60003

COMPLIANCE

STACK SAMPLING REPORT

For

Hills Brothers Coffee, Inc.
535 River Road
Edgewater, NJ 07020

Source Tested:

Afterburner #23 Inlet/Outlet
Hills Brothers Coffee, Inc.
Edgewater, NJ

In Fulfillment of Purchase Order No. 32065

Ambient Engineering Project No. 859

Test Date: August 31, 1988

Report Date: September 23, 1988

Ambient Engineering Inc.

1145 Bordentown Avenue
Parlin, New Jersey 08859
(201) 727-8333
ENVIRONMENTAL ENGINEERING/SYSTEMS

AIR
WATER
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ENERGY
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STACK SAMPLING REPORT FOR
Hills Brothers Coffee, Inc.
535 River Road
Edgewater, NJ 07020
On Afterburner #23 Inlet/Outlet
At Hills Brothers Coffee, Inc., Edgewater, NJ

INTRODUCTION

The above referenced stack was sampled for particulates, total hydrocarbons as methane, and carbon monoxide emissions on August 31, 1988. This report contains the following information.

SUMMARY

The following results were obtained:

Run No.	INLET 1	2	3
Date	8/31/88	----------	----------
Time	0834-0938	1644-1747	1900-2005
Emissions Data			
Particulate Emissions			
pounds/hour	2.55	2.61	2.48
grains/dscf	0.101	0.106	0.108
grains/scf	0.082	0.085	0.084
Total Hydrocarbons (as methane)			
pounds/hour	3.83	8.73	5.38
ppmv (wet)	420	975	625
ppmv (dry)	520	1200	800
Carbon Monoxide			
pounds/hour	6.0	7.9	7.2
ppmv (wet)	380	510	480
ppmv (dry)	460	630	610

Run No.	OUTLET 1	2	3
Date	8/31/88		
Time	0833-0937	1642-1745	1849-2005
Emissions Data			
Particulate Emissions			
pounds/hour	0.26	0.07	0.14
grains/dscf	0.007	0.002	0.004
grains/scf	0.006	0.002	0.003
Total Hydrocarbons* (as methane)			
pounds/hour	1.40-1.48	0.99-1.08	0.63-0.72
ppmv (wet)	110-117	74-81	48-54
ppmv (dry)	134-142	90-98	58-66
Carbon Monoxide			
pounds/hour	0.04	0.02	0.02
ppmv (wet)	1.8	1.1	1.1
ppmv (dry)	2.2	1.3	1.3

* By New Jersey Test Method 3. If a range of values is shown, the range was determined by assuming the non-detected hydrocarbons in a portion of the catch was (1) aero or (2) the detection limit of the analytical instrument.

Samples from this project will be retained for sixty days from the date of this report unless otherwise directed.

PERSONNEL AND CERTIFICATIONS

Field sampling on this project was performed by:

T.F. Mattei S.J. Culmo

P.F. Marshall A.W. McNeel

Laboratory work on this project was performed by:

A.W. McNeel R.N. Schaffer

Calculations and report preparations were by:

P.F. Marshall

The testing was observed by: NJ DEP Representative:

Staffort Stewart NJ DEP.

Gary Andrew NJ DEP.

This Report is submitted by:

Barry Hull

Barry Hull

Project Manager

Professional Engineer Certification

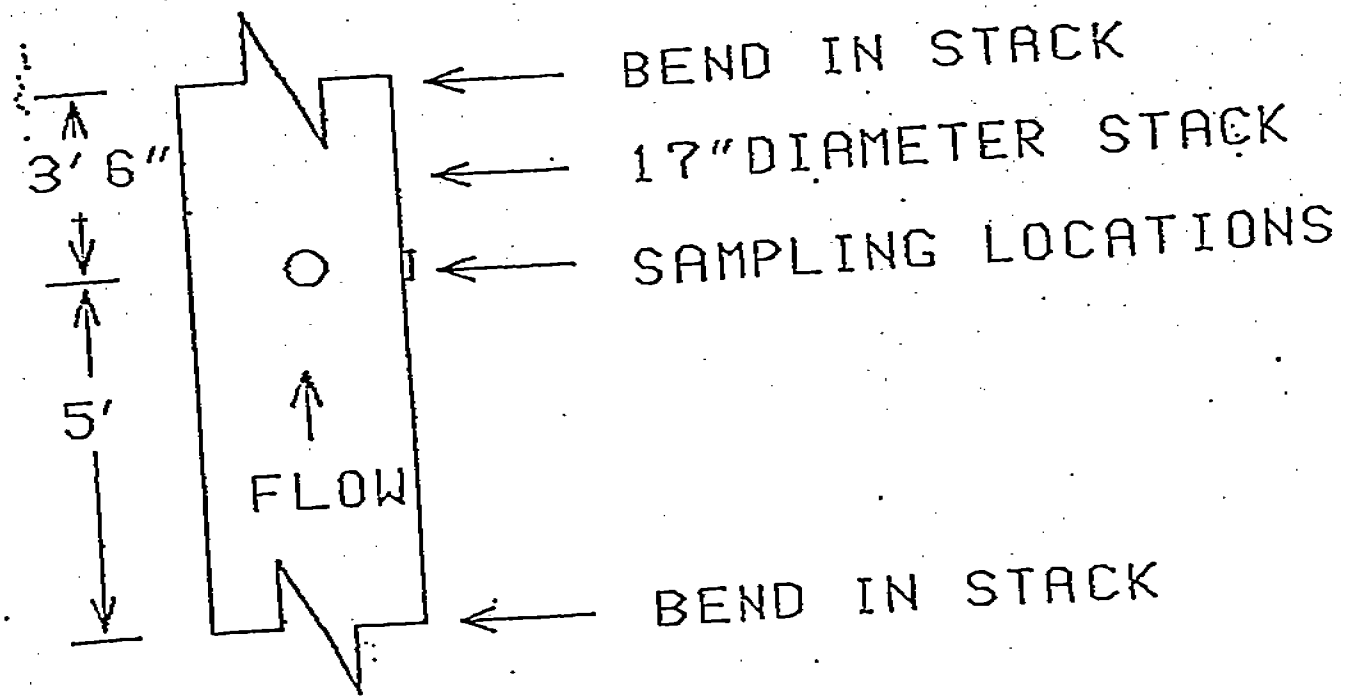
I am in responsible charge of Ambient Engineering's stack test work, and have discussed and reviewed the procedures and results of this set of tests with the relevant field and laboratory personnel.

John Yavorsky

John Yavorsky, Ph.D., PE

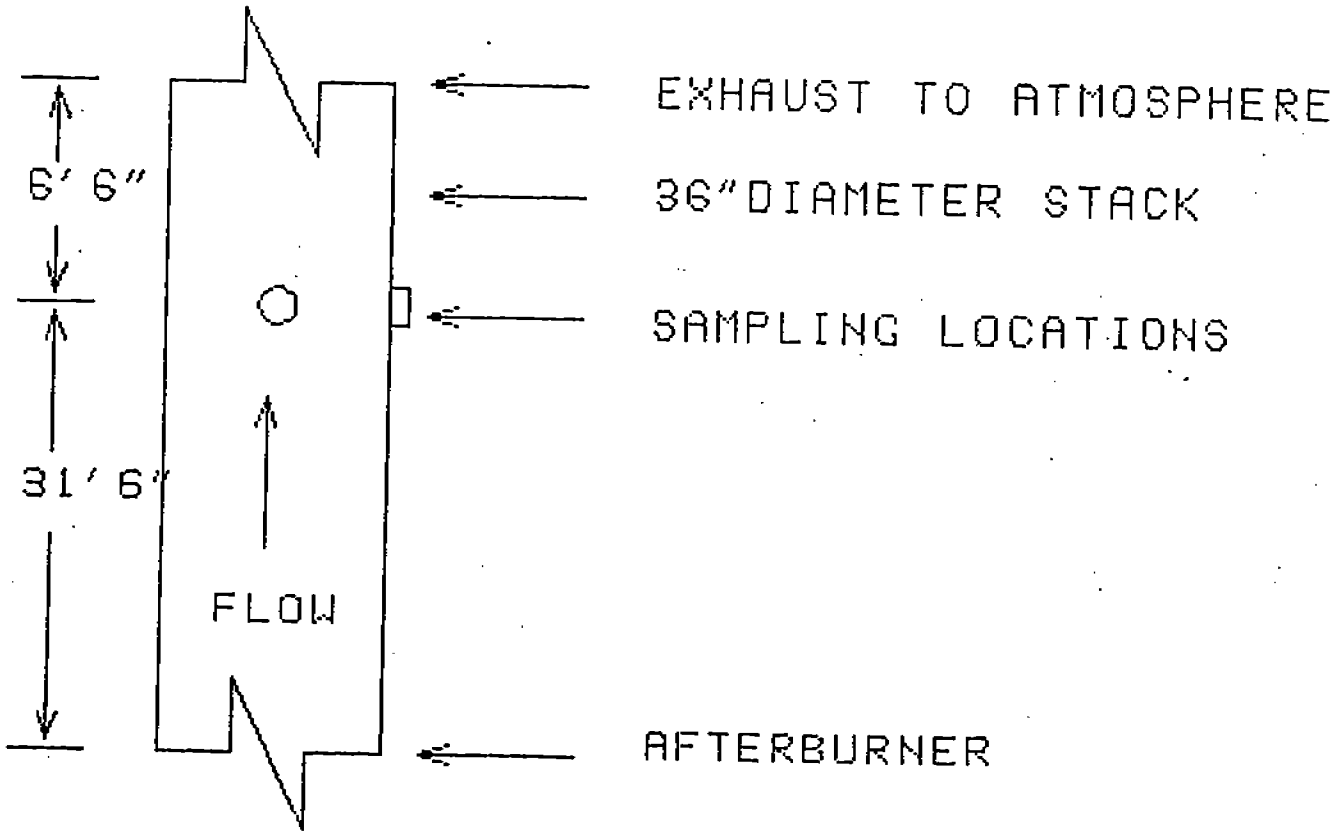
NJ License: 28675

HILLS BROS. COFFEE
AFTERBURNER INLET
STACK 23



EPA DISTANCE"A": >2.00
EPA DISTANCE"B": 3.53
TRAVERSE POINTS: 24

HILLS BROS. COFFEE
AFTERBURNER OUTLET
STACK 22 AND 23



EPA DISTANCE"A":2.17

EPA DISTANCE"B":10.5

TRAVERSE POINTS:12

VELOCITY AND FLOW RATE DATA - Inlet

Run No.	1	2	3
Date	8/31/88		
Time	0834-0938	1644-1747	1900-2005
Stack Diameter (in)	17		
Stack Cross Section (sq ft)	1.58		
Barometric Pressure ("Hg)	29.98		
Average Stack Temperature (°F)	525	551	590
Stack Pressure ("H_2O-gage)	4.2	4.0	4.1
Moisture (% vol)	18.0	19.2	21.6
Average Velocity (ft/sec)	70.02	71.20	71.06
Actual Flow Rate (acfm)	6,620	6,730	6,720
Standard Flow Rate (scfm)	3,610	3,570	3,430
Dry Standard Flow Rate (dscfm)	2,960	2,880	2,690

Standard Conditions are 70°F, 29.92 "Hg.

VELOCITY AND FLOW RATE DATA - Outlet

Run No.	1	2	3
Date	8/31/88		
Time	0833-0937	1642-1745	1849-2005
Stack Diameter (in)	36		
Stack Cross Section (sq ft)	7.07		
Barometric Pressure ("Hg)	29.98		
Average Stack Temperature (°F)	1205	1210	1210
Stack Pressure ("H_2O-gage)	-0.11	-0.14	-0.13
Moisture (% vol)	17.7	17.3	18.0
Average Velocity (ft/sec)	37.45	39.50	39.35
Actual Flow Rate (acfm)	15,900	16,700	16,700
Standard Flow Rate (scfm)	5,060	5,320	5,290
Dry Standard Flow Rate (dscfm)	4,170	4,400	4,340

Standard Conditions are 70°F, 29.92 "Hg.

CYCLONIC FLOW - Inlet

	Angle, Degrees	
Point	Port A	Port B
1	0	2
2	5	3
3	5	5
4	7	9
5	7	9
6	8	4
7	6	7
8	10	7
9	10	8
10	8	4
11	0	4
12	3	3

Avg 5.6

CYCLONIC FLOW - Outlet

	Angle, Degrees	
Point	Port A	Port B
1	3	4
2	4	3
3	4	3
4	2	3
5	2	2
6	2	2

Avg 2.8

STACK GAS COMPOSITION - Inlet

Run No.	1	2	3
Date	8/31/88	----------	----------
Time	0834-0938	1644-1747	1900-2005

	% By Volume (Dry Basis)		
ONSITE FYRITE			
CO_2	3.0	3.0	3.0
O_2	17.0	17.0	17.0
N_2 (By Difference)	80.0	80.0	80.0
LAB ORSAT			
CO_2	2.7	2.7	2.9
O_2	17.0	16.8	16.5
N_2 (By Difference)	80.3	80.5	80.6

STACK GAS COMPOSITION - Outlet

Run No.	1	2	3
Date	8/31/88	----------	----------
Time	0833-0937	1642-1745	1849-2005

	% By Volume (Dry Basis)		
ONSITE FYRITE			
CO_2	0.0	0.0	0.0
O_2	21.0	21.0	21.0
N_2 (By Difference)	79.0	79.0	79.0
LAB ORSAT			
CO_2	0.1	0.1	0.1
O_2	21.1	21.1	21.1
N_2 (By Difference)	78.8	78.8	78.8

PARTICULATE AND SULFUR OXIDE EMISSIONS - Inlet

Run No.	1	2	3
Date	8/31/88	----------	----------
Time	0834-0938	1644-1747	1900-2005
Sampling Data			
Nominal Nozzle Size (in)	1/4	----------	----------
No. of Sampling Points	24	----------	----------
Sampling Time (min)	60	----------	----------
Sample Volume (dscf)	39.8	39.3	35.0
% Isokinetic	99	98	94
Emissions Data			
Particulate Emissions			
pounds/hour	2.55	2.61	2.48
grains/dscf	0.101	0.106	0.108
grains/scf	0.082	0.085	0.084

PARTICULATE AND SULFUR OXIDE EMISSIONS - Outlet

Run No.	1	2	3
Date	8/31/88		
Time	0833-0937	1642-1745	1849-2005
Sampling Data			
Nominal Nozzle Size (in)	7/16		
No. of Sampling Points	12		
Sampling Time (min)	60		
Sample Volume (dscf)	40.1	42.4	41.9
% Isokinetic	103	104	99
Emissions Data Particulate Emissions			
pounds/hour	0.26	0.07	0.14
grains/dscf	0.007	0.002	0.004
grains/scf	0.006	0.0016	0.003

HYDROCARBON EMISSIONS AND CARBON MONOXIDE - Inlet

Run No.	1	2	3
Date	8/31/88	----------	----------
Time	0834-0938	1644-1747	1900-2005

Sampling Data

No. of Sampling Points	1	----------	----------
Sampling Time (min)	60	----------	----------
Sample Volume (dscf)	2.12	----------	----------

Emissions Data

Total Hydrocarbons (as methane)			
pounds/hour	3.83	8.73	5.38
ppmv (wet)	420	975	625
ppmv (dry)	520	1200	800
Carbon Monoxide			
pounds/hour	5.97	7.91	7.18
ppmv (wet)	380	510	480
ppmv (dry)	460	630	610

HYDROCARBON EMISSIONS AND CARBON MONOXIDE - Outlet

Run No.	1	2	3
Date	8/31/88	----------	----------
Time	0833-0937	1642-1745	1849-2005

Sampling Data

No. of Sampling Points	1	----------	----------
Sampling Time (min)	60	----------	----------
Sample Volume (dscf)	2.12	----------	----------

Emissions Data

Total Hydrocarbons* (as methane) pounds/hour	1.40-1.48	0.99-1.08	0.63-0.72
ppmv (wet)	110-117	74.4-81.2	47.6-54.3
ppmv (dry)	134-142	90.0-98.2	58.0-66.2
Carbon Monoxide pounds/hour	0.04	0.02	0.02
ppmv (wet)	1.81	1.07	1.07
ppmv (dry)	2.20	1.30	1.30

* By New Jersey Test Method 3. If a range of values is shown, the range was determined by assuming the non-detected hydrocarbons in a portion of the catch was (1) zero or (2) the detection limit of the analytical instrument.

Ambient Engineering Inc.

1145 Bordentown Avenue
Parlin, New Jersey 08859
(201) 727-8333
ENVIRONMENTAL ENGINEERING/SYSTEMS

AIR
WATER
WASTE
NOISE
ENERGY
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Hills Bros. Coffee, Inc.
535 River Road
Edgewater, NJ 07020

PROCESS DESCRIPTION
Stack #23

Hills Brothers Coffee, Inc. is a world leader in the production of fine coffee for sale in retail and commercial establishments. Coffee beans are purchased world wide and shipped to Hills Brothers, Edgewater, New Jersey plant for processing and packaging.

Stack 23R is the emission to atmosphere point for the coffee Roaster and Stack 23C is the outlet for air used to cool the Roasted Beans.

The process consists of a mixture of green coffee beans being fed on a continuous basis (up to 16 hours per day) into roaster 23. The beans are weighed and fed by gravity on the roaster belts. The feed rate is between 150-170#/minute. Only green coffee beans are roasted in these ovens and the control feed is in the main control room.

Hills Bros. Coffee, Inc
Process Description
Stack #23/AE859(8)

Roaster Stack outlet flow rates:

	Run 1	Run 2	Run 3
Actual Flow Rate, ACFM	15875.48	16747.00	16682.61
Standard Flow Rate, SCFM	5061.60	5323.35	5291.38
Dry Standard Flow Rate, DSCFM	4167.66	4402.18	4339.71

CONTROL APPARATUS ON SOURCE

The Smoke reduction system consists of a variable speed fan, dampers and ductwork that remove smoke from the roaster to a natural gas fired afterburner. By designing this system to provide a negative pressure inside the roaster, smoke is prevented from leaking into the cooler. A low profile hood over the coffee conveying pan between the roaster and cooler reduces the volume of air over the beans. Combined with negative pressure within the roaster, this creates an air velocity over the roasted beans that will further reduce the smoke introduced into the cooler.

Hills Bros. Coffee, Inc
Process Description
Stack #23/AE859(8)

Roaster Stack #23 was tested on August 31, 1988. The following process data was recorded during the testing"

Roaster #23 Stack:	Gas Meter		Gas Meter
Afterburner	Run 1	Roaster	Run 1
Finish 0938	74990	Finish 0942	42570
Start 0835	74930	Start 0846	42525
Total 63 min	60	Total 56 min	45
Afterburner	Run 2	Roaster	Run 2
Finish 1745	75473	Finish 1749	42943
Start 1641	75410	Start 1643	42890
Total 64 min	63	Total 66 min	53
Afterburner	Run 3	Roaster	Run 3
Finish 2005	75605	Finish 2005	43045
Start 1845	75532	Start 1848	42989
Total 80 min	73	Total 77 min	56

*Natural gas meter readings in nearest 100 cu ft.

Production of 165#/min was constant during the testing.

Note: The roaster #23R was in continuous operation during the stack testing. The production rate remained at 165 #/min and was monitored by the Dep. representative Mr. M. Klein, of the Metropolitan Regional Office.

ALLOWABLE EMISSIONS

The following allowable emissions are based on our understanding of the applicable regulatory rules and regulations. Since we are not always privy to the situation, these should not be accepted without confirmation from relevant sources.

Particulate	Reference	Allowable
Federal Regulations		
State Regulations	7:27-6.2	0.02 grains/SCF
State Permit		
Sulfur Dioxide		
Federal Regulations		
State Regulations		
State Permit		
Sulfur Trioxide and Sulfuric Acid		
Federal Regulations		
State Regulations		
State Permit		
Nitrogen Oxides		
Federal Regulations		
State Regulations		
State Permit		
Hydrocarbon (VOS, VOC)		
Federal Regulations		
State Regulations		
State Permit		
Other: Opacity		
Federal Regulations		
State Regulations	7:27-6.2	20%
State Permit		

Ambient Engineering Inc.

STACK TEST PROTOCOL SUBMITTAL

NEW JERSEY DEPARTMENT OF
ENVIRONMENTAL PROTECTION
Technical Services Section
380 Scotch Road
W. Trenton, NJ 08628

RE: HILLS BROTHERS COFFEE, INC.
535 River Road
Edgewater, NJ 07020

Contact: Barry Hull
Phone No: 201-727-8333

ATTN: Edward Choromanski

AE Project No. 859

This protocol is submitted for stack testing planned by Ambient Engineering, Inc. for the above referenced client.

Source to be tested: Afterburner Inlet and Outlet
ID No.: #22 Stack

Approximate Date of Testing: August 10 and 11, 1988

INLET

Isokinetic Testing

Stack diameter	17"
Nearest upstream disturbances	3'
Nearest downstream disturbances	6'
EPA Distance "A" >2.00 EPA Distance "B"	4.23
Proposed number of sampling points	24
Proposed time per sampling point	3 minutes
Proposed total stack gas sample size	35.00 dry standard ft^3

Hydrocarbon Testing

Proposed number of sampling points	1
Proposed time per sampling point	60 minutes
Proposed total stack gas sample size	2.12 dry standard ft^3

Outlet

Isokinetic Testing

Stack diameter	36"
Nearest upstream disturbances	6'6"
Nearest downstream disturbances	31'6"
EPA Distance "A" 2.17 EPA Distance "B"	10.5
Proposed number of sampling points	12
Proposed time per sampling point	5 minutes
Proposed total stack gas sample size	35.00 dry standard ft^3

Hydrocarbon Testing

Proposed number of sampling points	1
Proposed time per sampling point	60 minutes
Proposed total stack gas sample size	2.12 dry standard ft^3

Source Operation Record Keeping

Responsibility of __A__ Owner __B__ RECON

__A__ Production rate
___ Fuel usage
___ Incineration feed rate
___ Steam production
__A__ Operating parameters (temperatures, pressures, flows, etc.)
___ Other

ANALYTICAL PROGRAM

Hydrocarbon and Carbon Monoxide

Sample stack gas will be pulled through hydrocarbon-free water to remove condensibles, and pumped into an 80 liter Tedlar gas bag. The entire sampling train shall consist of teflon, glass, stainless steel and Tedlar (diagram of sampling train follows). Sampling rates will be determined by use of an in-line rotameter which will be calibrated onsite using a dry gas meter. The sampling train will be run during the particulate testing.

LABORATORY PROCEDURES

Samples will be analyzed as follows:

1. Condensible material recovered in the impinger catches will be determined by a gas chromatograph equipped with a flame ionization detector for determination of total hydrocarbons as methane with known standards.

2. Gas bag samples will be directly injected into the GIC/FID via a calibrated sample loop. Concentrations will be determined as above. Concentrations of both phases will be totaled and used to calculate emissions. The gas bags will then be analyzed for carbon monoxide using a Thermo Electron Model 48 Non-Dispersive Infrared (NDIR) analyzer using specific standards. Copies of chromatograms will be included in our final report showing identified responses plus any other unidentified peaks.

Particulate

Three (3) one-hour compliance tests will be conducted for particulates using New Jersey Air Test Method 1. Temperatures of the stack, probe, filter inlet, filter box and filter outlet will be recorded. Flow rates, O_2, CO_2, N_2 (by difference) will also be recorded. Impinger Numbers 1 and 2 will have 100 mls. each H_2O. Impinger Number 3 empty. Impinger Number 4 200 gms. silica gel. Non-cyclonic flow will be field verified. Calibration data will be made available to the onsite observer.

Total Hydrocarbons

New Jersey Air Test Method 3 will be utilized to determine total hydrocarbon emissions. Concentrations will be expressed as equivalent methane.

Opacity

US EPA Method 9 will be utilized to determine outlet opacity.

Meter Orifice Calibration Form (L-98)

Meter Box No. 4 Barometric Pressure (Pb) 29.96 "Hg Calibrated by: SJC

Dry Gas Meter No. 5-78753 Ambient Temperature (Tamb) 82°F Date: 6-17-88

ΔH Orifice Setting	Meter Temperature (T_m) Inlet (°F)	Outlet (°F)	Avg (°F)	T_m+460 (°F)	METER READING (V_m) (ft³) Final	Initial	Difference	Time Θ seconds	ΔH@	Difference From ΔH@
~~0.25~~										
0.50	84	82	83	543	531.960	531.205	.755	120	2.02	
0.75	87	82	84.5	544.5	523.187	522.259	.928	120	2.01	.01
1.00	87	82	84.5	544.5	524.618	523.550	1.068	120	2.02	.02
1.50	89	83	86	546	526.045	524.760	1.285	120	2.11	.11
2.00	90	84	87	547	527.762	526.254	1.508	120	2.05	.05
2.50	90	83	86.5	546.5	529.689	528.011	1.678	120	2.07	.07
~~3.00~~										

Avg. 2.00

Calculation

$$\Delta H@ = \frac{0.0317(\Delta H)}{Pb \cdot (T_{amb}+460)} \times \left[\frac{(T_m+460)(\Theta)}{(V_m)(Y\text{-factor})(60)}\right]^2$$

Y Factor - Dry Gas Meter Correction Factor

Note: Difference From ΔH@ not to exceed ± 0.15

PROOF AND DIFFERENTIAL TEST RECORD

Meter Size S-130, S-90 S-175 Date Received 8-27-87 Inspector J. SOPRANO

Date Tested 9-2-87 New ___ Repaired ✓ Manufacturer Rockwell + A

Prover No. 1264 Temperatures: Room Air 79 F.

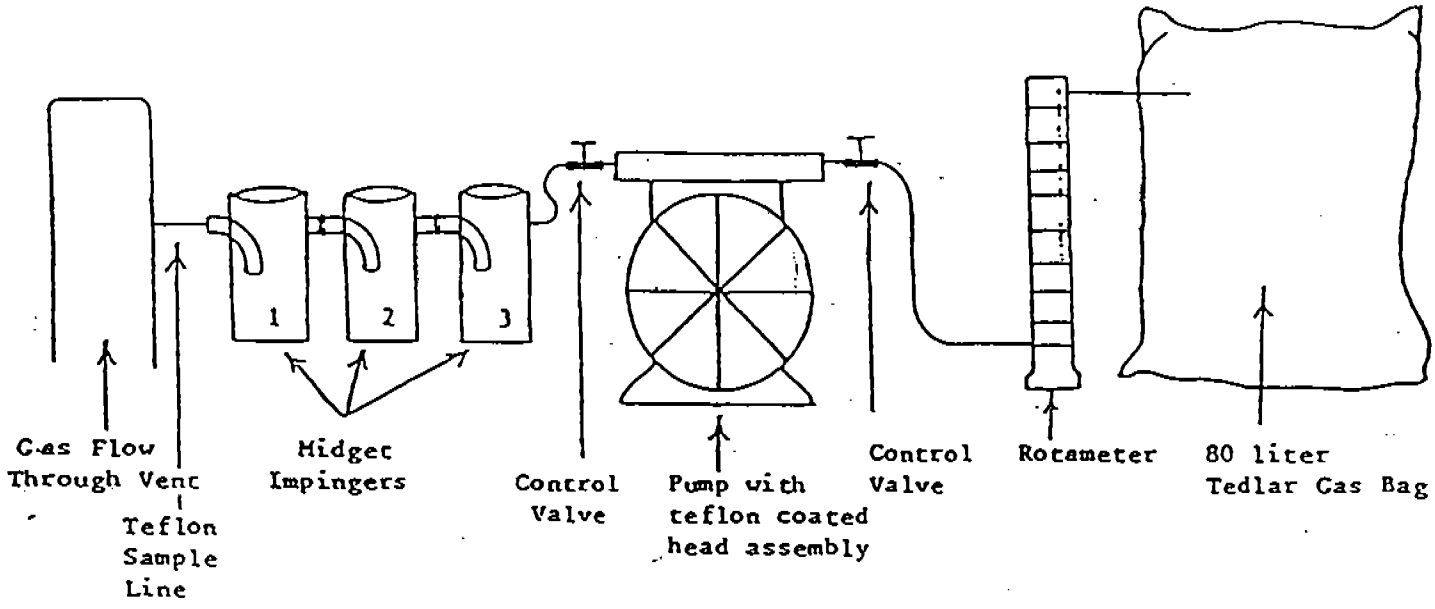
Total Meters this Page 3 Oil 79 F.

Prover Air 79 F.

Temp.Comp.Meters: $\frac{\text{Abs.Base Temp.}}{\text{Abs.Prover Temp.}}$ x Uncorr. %Proof = Corr. % Proof

Meter No.	Repair Class	Percent Proof Check	Percent Proof Open	Differential Maximum	Remarks
716691	INTEST	99.8	100.7	20	Uncorr. % Proof AS FOUND
					Corr. % Proof
38949	INTEST	106.2	103.8	36	Uncorr. % Proof AS FOUND
					Corr. % Proof
125176	INTEST	98.8	98.8	28	Uncorr. % Proof AS FOUND
					Corr. % Proof
					Uncorr. % Proof
					Corr. % Proof
716691	ADJUST	100.0	100.2	20	Uncorr. AS % Proof CALIBRATED
					Corr. % Proof
38949	VALVE	100.0	100.1	36	Uncorr. AS % Proof CALIBRATED
					Corr. % Proof
125176	ADJUST	100.2	100.8	28	Uncorr. AS % Proof CALIBRATED
					Corr. % Proof

DIAGRAM OF SAMPLING TRAIN



- Midget impingers - 1 and 2 with distilled water, and 3 empty.
- Condenser section in ice bath.
- Complete sample train to be leak checked using a soap film bubble meter or a dry gas meter prior to and after testing.
- Rotameter settings (sampling rate of assembled train) to be carefully calibrated with a soap film meter.

M-82DWG

STACK TESTING PROCEDURES CHECKL.

Particulate Emissions:
- ___ US EPA 5
- ___ US EPA 17
- X N.J. Method 1
- ___ N.J. Method 5 (draft)
- ___ Plus impinger catch
- ___ Plus aqueous and organic impinger catch
- ___ Other Pyrex glass

Probe Material _____

Velocity:
- ___ Standard pitot tube and manometer
- X "S" pitot tube and manometer
- ___ Other: _____
- X Cyclonic Flow Check X Yes ___ No

Temperature:
- X Thermocouple
- ___ Temperature gage
- ___ Process indicator

Gas Composition:
- X Onsite fyrite
- ___ Grab sample and lab orsat
- ___ Integrated sample and lab orsat
- X Integrated and traversed sample and lab orsat
- ___ Oxygen by Infrared Industries 2200 Electrochemical Analyzer

Particle Sizing:
- ___ Instack cascade impactor
- ___ Heated out of stack cascade impactor
- ___ Plus impinger catch
- ___ Plus aqueous and organic impinger catch

Sulfur Oxide Emissions:
- ___ US EPA 6
- ___ US EPA 8
- ___ Sulfite Corrections Made
- ___ Controlled condensation for SO_3

Nitrogen Oxide Emissions:
- X US EPA 7 ___ A, ___ B, ___ C, X D, ___ E
- ___ Chemiluminescent monitor
- ___ US EPA 20 (Chemiluminescent Monitor)

Hydrogen Chloride (HCl) Emissions:
- ___ API 767-54
- ___ Cl^- analysis of particulate test wet catch
- ___ Other _____

Hydrocarbon Emissions:
- X N.J. Method 3
- ___ RECON Method 2
- ___ Integrated gas bag direct and lab GC
- ___ Grab sample gas bag direct and lab GC
- ___ Onsite GC direct ___ detector
- ___ Onsite Continuous Monitor (FID)

Metal Emissions
- ___ AA determination on filter and probe wash
- ___ AA determination on impinger catch

Carbon Monoxide Emissions:
- X Thermal Conductivity analysis of "Gas Composition" sample(s)
- ___ Onsite Continuous Monitor

Opacity:
- ___ N.J. Method 2
- X U.S. EPA Method 9

Calibrations: Dry gas meters and orifice, pitot tubes, thermocouples and nozzle calibrations will be supplied with the test report unless test is unofficial.

Comments:

SELECTED NOMENCLATURE

Time	= military time
min	= minutes
°F	= degrees Fahrenheit
°C	= degrees Centigrade
in_2O	= inches water (pressure or vacuum)
in Hg	= inches mercury (pressure or vacuum)
mm Hg	= millimeters of mercury (pressure or vacuum)
psig	= pounds of pressure per square inch-gage
sq ft	= square feet
in	= inches
micron	= 10^{-6} meters
ft/sec	= feet per second
ft/min	= feet per minute
acfm	= cubic feet per minute of total gas flow at flowing conditions
scfm	= cubic feet per minute of total gas flow at 70°F, 29.92"Hg
dscfm	= dry cubic feet per minute of dry gas flow at 70°F, 29.92"Hg
pounds/hour	= pounds per hour
pounds/hour	= pounds per hour
BTU/hr	= British thermal units per hour
%	= volume per cent when referred to gases and water vapor
	= weight percent for solids, liquids
% vol	= volume per cent
% wgt	= weight percent
ppmv	= volumes of gaseous contaminants per million volumes of total gas
grains	= grams x 15.4
ug	= micrograms = 10^{-6} grams
mg	= milligrams = 10^{-3} grams
grains/dscf	= grains of pollutants per cubic foot of dry stack gas at 70°F, 29.92 "Hg
gr/dscf	= grains/dscf
ug/m^3	= micrograms of pollutants per cubic meter of total stack gas at 25°C, 760 mm Hg
mg/l	= milligrams/liter of liquid = ppm by weight if specific gravity of liquid = 1.0
C	= elemental carbon
CO_2	= carbon dioxide
H	= elemental hydrogen
H_2	= molecular hydrogen
H_2O	= water
N	= elemental nitrogen
N_2	= molecular nitrogen
NO_x = NO + NO_2	= nitrogen oxides = nitric oxide plus nitrogen dioxide reported as equivalent nitrogen dioxide
S	= elemental sulfur
SO_2	= sulfur dioxide
SO_3	= sulfur trioxide
SO_4	= sulfate
H_2SO_4	= sulfuric acid
H_2S	= hydrogen sulfide
Cl	= elemental chlorine or chloride
Cl_2	= molecular chlorine
HCl	= hydrogen chloride
F	= elemental fluorine or fluoride
CH_4	= methane
O	= elemental oxygen
O_2	= molecular oxygen
A	= argon
<	= less than; represents the minimum detectability limits
≤	= equal to or less than
ND	= none detected

Front half (dry catch particulate) = particulate matter collected in/on nozzle, probe, cyclone, flask heated hose, and filter of EPA sampling train

Back Half (wet catch particulate) = material collected in impingers after filter of EPA sampling train

Organic wet catch = residue after low temperature (70°F) evaporation of ether/chloroform used to extract soluble materials from the wet catch

Aqueous wet catch = residue after high temperature (220°F) evaporation of water left after ether/chloroform extraction

Combustibles = volatiles = loss on heating @ 550°C after drying @ 100°C

Ash = residue after heating @550°C

CALIBRATION DATA

Test Equipment Calibration

Data Sheets Follow

AMBIENT ENGINEERING, INC.
1145 Bordentown Avenue
PARLIN, NEW JERSEY 08859
(201) 727-8333

Meter Orifice Calibration Form (L-32)

Meter Box No. 2 | Barometric Pressure (Pb) 29.95 "Hg | Calibrated by: SJC

Dry Gas Meter No. 417470 | Ambient Temperature (TAmb) 70 °F | Date: 6-28-8X

ΔH Orifice Setting	Meter Temperature (Tm) Inlet (°F)	Outlet (°F)	Avg (°F)	Tm+460 (°F)	METER READING (Vm) (ft³) Final	Initial	Difference	Time Θ seconds	ΔH@	Difference From ΔHe
0.25										
0.50	89	72	78	538	162.846	162.106	.74	120	1.90	.15
0.75	81	72	78	538	163.961	163.031	.930	120	2.00	.05
1.00	84	73	78.5	538.5	165.368	164.294	1.074	120	2.01	.04
1.50	85	74	79.5	539.5	166.819	165.536	1.283	120	2.12	.07
2.00	88	74	81	541	168.992	167.512	1.48	120	2.13	.08
2.50	88	74	81	541	170.813	169.163	1.65	120	2.15	.1
3.00									Avg.	2.05

Calculation

$$\Delta H@ = \frac{0.0317(\Delta H)}{Pb \cdot (T_{Amb} + 460)} \times \left[\frac{(T_m + 460)(\ominus)}{(V_m)(Y\text{-factor})(60)}\right]^2$$

Y Factor - Dry Gas Meter Correction Factor

Note: Difference From ΔH@ not to exceed ± 0.15

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STATE METER SHOP

Cory J. Leo

PROOF AND DIFFERENTIAL TEST RECORD

Meter Size S-190 T.C Date Received 8-27-87 Inspector J. SPRAGUE

Date Tested 9-1-87 New ____ Repaired ____ Manufacturer ROCKWELL

Prover No. 1244 Temperatures: Room Air 77 F.

Total Meters this Page ____ Oil 77 F.

Prover Air 77 F.

Temp. Comp. Meters: $\frac{\text{Abs. Base Temp.}}{\text{Abs. Prover Temp.}}$ x Uncorr. % Proof = Corr. % Proof

Meter No.	Repair Class	Percent Proof Check	Percent Proof Open	Differential Maximum	Remarks
59019	TEST	101.8	101.0	26	Uncorr. % Proof AS FOUND
					Corr. % Proof
211740	TEST	101.6	101.2	40	Uncorr. % Proof AS FOUND
					Corr. % Proof
					Uncorr. % Proof
					Corr. % Proof
					Uncorr. % Proof
					Corr. % Proof
					Uncorr. % Proof
					Corr. % Proof
59219	ADJUST	99.8	999	26	Uncorr. % Proof AS CALIBRATED
					Corr. % Proof
211741	ADJUST	100.6	100 ?	40	Uncorr. % Proof AS CALIBRATED
					Corr. % Proof

Date 12/24/81 Thermocouple number 45

Ambient temperature 24 °C Barometric pressure 30.46 in. Hg

Calibrator TPS Reference: mercury-in-glass ASTM

other

Reference point number	Source[a] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[b] %
0°	ICE WATER	0.0	0.2	0.1
100°	boiling WATER	100.5	101.3	0.2
—	boiling cooking oil			

[a] Type of calibration system used.

[b] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

Figure 2.5 Stack temperature sensor calibration data form.

PRELIMINARY DATA

COMPANY: Hills Bros.

SAMPLE LOCATION: #23 Outlet

DATE: 8/30/88

TIME:

PITOT TUBE LINES LEAK CHECK ✓

LEVEL AND ZERO MANOMETER ✓

ESTIMATED MOISTURE -(%) 15

C_p .84

DRY BULB -(°F) _____ WET BULB -(°F) _____ DIRECTION OF FLOW _____

TRAVERSE POINT NUMBER	CYCLONIC FLOW ANGLE THAT YIELDS A NULL DELTA P	VELOCITY HEAD DELTA P INCHES OF H_2O	STACK TEMPERATURE (DEGREES F)
A-1	3	1.8	1200
2	4	2.0	
3	4	1.9	
4	2	1.9	
5	2	1.3	
6	2	1.4	
B-1	4	2.0	
2	3	1.8	
3	3	1.9	
4	3	1.6	
5	2	1.6	
6	2	1.3	
	AVERAGE		

AVERAGE ANGLE MUST BE <20 DEGREES

PARTICULATE FIELD DATA SHEET

PLANT Hills Bros DATE 8/31/88 RUN NO. 1

SAMPLE LOCATION Outlet RAC BOX NO. 4 DRY GAS METER NO. 578753

NOZZLE NO. _____ NOZZLE SIZE 7/16 INCHES PITOT NO. 7 C_p 0.84

TIME AT EACH POINT (θ) 5 MINUTES DELTA H @ 2.00 THERMOCOUPLE NO.: T_s 45
PROBE OUTLET 23
BOX OUTLET 86

AMBIENT PRESSURE (P_{BAR}) 29.98 "HG

STATIC PRESSURE (P) ~0.11 "H_2O/13.6 = _____ "Hg(P meter)

STACK PRESSURE (P_s) = P_{bar} + P_{meter} = _____ "Hg OPERATING CONDITION OR REMARKS _____

DRY BULB _____ °F WET BULB _____ °F _____ %H_2O

PORT/ POINT	MILITARY CLOCK TIME	METER READING	PITOT DELTA P "H_2O	ORIFICE DELTA H "H_2O	METER TEMP. °F IN	METER TEMP. °F OUT	LINE VAC "Hg	PROBE OUTLET °F	BOX OUTLET TEMP °F	BOX TEMP °F	STACK TEMP °F
							6 (03)	2	1	4	
A-1	0832	857.10	0.14	1.7	87	86	6	343	147	235	1194
2	38		0.15	1.8	100	88	6	514	240	232	1212
3	43	864.0	0.16	1.9	102	89	6	542	296	219	1225
4	48		0.14	1.7	103	91	6	530	318	214	1214
5	53	871.2	0.13	1.6	103	92	6	456	316	208	1189
6	58		0.01	1.1	105	93		397	302	195	1185
End	0903	877.280									
B-1	0907	897.280	0.13	1.85	105	96	5	361	225	167	1206
2	0912		0.16	1.9	107	96	5	525	269	163	1224
3	17	904.3	0.16	1.9	107	97	6	566	307	167	1234
4	22		0.14	1.7	107	98	6	546	318	172	1218
5	27		0.11	1.3	109	99	5	458	322	172	1177
6	32		0.08	0.98	104	100	4	374	298	171	1175
End	0937	917.179									
*	θ	V= 40.079...	delta H =		T_m =						T_s=

* Sum, average or Difference

Pre-Leak Check 0.01 Post Leak Check ✓

FYRITE: % OXYGEN 21
% CARBON DIOXIDE 0

PARTICULATE.ATG (August 1988)

AirRecon
THREE BRIDGES, NJ

CLIENT: HILLS BROS.

Date: 09/19/88
Time: 10:21 AM

Delta H (IN H2O)	Meter Temp(F) IN	OUT	Stack Temp(F)
1.70	87.00	86.00	1194.00
1.80	100.00	88.00	1212.00
1.90	102.00	89.00	1225.00
1.70	103.00	91.00	1214.00
1.60	103.00	92.00	1189.00
1.10	105.00	93.00	1185.00
1.55	105.00	96.00	1206.00
1.90	107.00	96.00	1224.00
1.90	107.00	97.00	1234.00
1.70	107.00	98.00	1218.00
1.30	109.00	99.00	1177.00
0.98	109.00	100.00	1175.00

AVERAGES
DELTA H = 1.594167 IN H2O
METER TEMP. = 98.70834 F
STACK TEMP. = 1204.417 F

CLIENT: HILLS BROS.

Date: 09/19/88
Time: 10:21 AM

AVERAGE VELOCITY PRESSURE

Delta P (IN H2O)	Delta P Square Root
0.14	0.37
0.15	0.39
0.16	0.40
0.14	0.37
0.13	0.36
0.10	0.32
0.13	0.36
0.16	0.40
0.16	0.40
0.14	0.37
0.11	0.33
0.08	0.28

THE AVERAGE SQUARE ROOT OF DELTA P = .3634699

HYDROCARBON SAMPLING DATA

SAMPLE LOCATION Outlet RUN NO. 1 DATE 8/31/88

HYDROCARBON PUMP NO. 2

TIME	ROTOMETER SETTING	GAS METER TEMP.	VACUUM "HG	SAMPLE RATE L/M
0833	60	79	1	.933
38	60	79	1	.933
43	60	80	1	.933
48	60	80	1	.933
0853	60	80	1	.933
58	60	80	1	.933
0903	Stop for post charge of NMHC Train			
0907	Restart 60	81	1	.933
12	60	81	1	.933
17	60	81	1	.933
22	60	81	1	.933
27	60	81	1	.933
32	60	81	1	.933
0937	end			

PRE-LEAK CHECK ✓ POST-LEAK CHECK ✓

PUMP CALIBRATION FLOW RATE		CALIBRATION INSTRUMENT	FYRITE
FLOW RATE LITERS/MIN	ROTAMETER SETTING	✓ SOAP FILM BURET	% OXYGEN
.933	60	DRY GAS METER	% CARBON DIOXIDE
		OTHER	

CORRECTING ROTOMETER VOLUME TO DRY STANDARD CONDITIONS

EQUATION: $V_{STD} = V_m \times \frac{Pm}{T_m} \times \frac{T_{STD}}{P_{STD}}$

WHERE:

V_M = SAMPLE RATE OF ROTOMETER (L/M)

T_{STD} = $70^0F + 460^0F = 530^0F$

P_{STD} = 29.92"HG

P_M = BAROMETRIC PRESSURE DURING SAMPLING ("HG)

Tm = TEMPERATURE OF GAS STREAM ($+460^0F$)

V_{STD} = $\times \frac{(\quad)}{(\quad)} \times \frac{(530)}{(29.92)} . =$ _____

CF = (V_{STD} L/MIN) (3.53×10^{-2} CF/L) (60 MIN/1 HR) = ( )(3.53×10^{-2})(60)

= CFH

MOISTURE DETERMINATION

SAMPLE LOCATION Outlet RUN NO. 1 DATE 8/31/88

CHAIN-OF-CUSTODY SAMPLE NO. _____

		GRAMS	GRAMS
IMPINGER 1	FINAL WEIGHT	686.1	
	INITIAL WEIGHT	571.5	
	INCREASE		IMPINGER 1 114.6
IMPINGER 2	FINAL WEIGHT	739.5	
	INITIAL WEIGHT	708.0	
	INCREASE		IMPINGER 2 31.5
IMPINGER 3	FINAL WEIGHT	487.3	
	INITIAL WEIGHT	480.1	
	INCREASE		IMPINGER 3 7.2
SILICA GEL	FINAL WEIGHT	808.2	
	INITIAL WEIGHT	788.8	
	INCREASE		SILICA GEL 19.4

TOTAL MASS OF WATER CAUGHT 172.7 GRAMS

CHAIN-OF-CUSTODY SAMPLE NO. _____

FILTER DIAMETER 4 INCHES FILTER TYPE GFC

FILTER: FINAL WEIGHT .6230 GMS
INITIAL WEIGHT .6215 GMS
INCREASE

0.0015 GRAMS
TOTAL MASS OF PARTICULATE CAUGHT THIS FILTER

IS ICE PRESENT IN THE IMPINGER BATH AT THE END OF THIS SAMPLE? YES____ NO____

CALCULATIONS

$V_{m\text{-}std} = 17.65\ (V_m)\left(\frac{P_{bar} + \text{DELTA H}/13.6}{T_m + 460}\right) = 17.65\ (\quad)\left(\frac{\quad + 13.6}{\quad}\right)$

$= 17.65\ (\quad)(\quad) = \_\_\_\_\_\ FT^3$

$V_{w\text{-}std}\ (H_2O) = \frac{\text{GRAMS COLLECTED}}{21.2\ \text{GRAMS/FT}^3} = \frac{(\quad)}{(21.2)} = \_\_\_\_\_\ FT^3$

$\%\ H_2O = \frac{(V_{w\text{-}std})\ 100}{((V_{w\text{-}std}) + (V_{w\text{-}std})} = \frac{100\ (\quad)}{(\quad)(\quad)} = \frac{(\quad)}{(\quad)} = \_\_\_\_\_\ \%$

MOLECULAR WEIGHT (MW) $= \frac{18\ (\%H_2O)}{100} + \frac{\text{DRY MW}\ (100 - \%H_2O)}{100} = 0.18(\quad) + \frac{(\quad)(\quad)}{100}$

VELOCITY (ACTUAL) IN STACK $= 85.48(Cp)\sqrt{\frac{T_s + 460}{P_s(MW)}}\sqrt{\text{DELTA P}} = 85.48\ (.68)\sqrt{\frac{(1660)}{(\quad)(28)}}\sqrt{\text{DELTA P}}$

$V_s = (71.8)\sqrt{1.98}\sqrt{\text{DELTA P}} = (71.8)(1.40)\sqrt{\text{DELTA P}}$

$V_s = (\quad)\ \text{DELTA P} = (\quad)(\quad) = 32.61\ FT/SEC$

$ACFM = (V_s)(60)(CSA) = (\quad)(60)(\quad) = \_\_\_\_\_$

VELOCITY @ Stp $V_{s\text{-}std} = V_s\ (17.65)\left(\frac{P_s}{Ts + 460}\right) = \frac{(3761)(17.65)(.930)}{(1660)} = 11.997\ FT/SEC$

$SCFM = (V_{s\text{-}std})(csa)(60) = (\quad)(\quad)(60) = \_\_\_\_\_$

$DSCFM = \left(\frac{100 - \%H_2O}{100}\right)(SCFM) = (\quad)(\quad) = \_\_\_\_\_$

NOZZLE VELOCITY @ STD $V_n = \frac{(V_{m\text{-}std} + V_{w\text{-}std})}{60\ (\Theta)\ A_n} = \frac{(973)}{60\ (\quad)(\quad)\ (10^{-4})} = \_\_\_\_\_\ FT/SEC$ (.00164)

$I = \frac{100\ V_{n\text{-}std}}{V_{s\text{-}std}} = \frac{100\ (\quad)}{(\quad)} = \_\_\_\_\_\ \%$ Isokinetic

LAB DATA - EVAPORATIONS

PLANT Hills Bros. SAMPLE LOCATION #23 Outlet RUN NO. 1 FOR ____

SAMPLING DATE 8/31/88 OPERATING CONDITION ____

CHAIN-OF-CUSTODY SAMPLE NO. ____

ACETONE WASHINGS

TOTAL SAMPLE	GROSS	581.8 GMS
	TARE -	409.5 GMS
	(A) NET	172.3 GMS
AMOUNT EVAPORATED (B)		172.3 GMS

EVAP. BEAKER NO. ____

	GROSS	97.1463 GMS
	TARE -	97.1301 GMS
	(C) NET	0.0162 GMS

ACETONE BLANK

EVAP. BEAKER NO. ____

	GROSS	97.6580 GMS
	TARE -	97.6583 GMS
	NET	0 GMS

ACETONE BLANK = NET 0 GMS (D) / TOTAL AMOUNT EVAPORATED 200 GMS (F)

CORRECTED NET (E) = (C) - (B)[(D)/(F)]

= (0.0162) - (172.3) [(0)/(200)]

= 0.0162 GMS (E) = (C) - B [(D)/(F)]

SCALED UP NET = (E)(A/B)

= 0.0162 (172.3/172.3)

= 0.0162 GMS

WET CATCH

TOTAL SAMPLE	GROSS	____ GMS
	TARE -	____ GMS
	(A) NET	____ GMS
AMOUNT EXTRACTED (G)		____ GMS (MLS)
AMOUNT OF E/C		____ GMS (H)

WATER PHASE
EVAP. BEAKER NO. ____

	GROSS	____ GMS
	TARE -	____ GMS
	(J) NET	____ GMS
WATER BLANK (L) =		____ GMS / 100 GMS

CORRECTED NET (N) = J - (G)(L)

= ____ - ____ (100)

= ____ GMS

SCALED UP NET = (N)(F/G)

= ____ (____)

= ____ GMS

EC PHASE
EVAP. BEAKER NO. ____

	GROSS	____ GMS
	TARE -	____ GMS
	(K) NET	____ GMS
E/C BLANK (M) =		____ GMS / 100 MLS

CORRECTED NET (M) = K - (H)(M)

= ____ - ____ (100)

= ____ GMS

SCALED UP NET = (P)(F/G)

= ____ (____)

= ____ GMS

Particulates

Nozzle, Probe, and Acetone Washing .0162 grms

Filter .0015 grms

Enter "0" if no Organic or Aqueous Phase

Aqueous Phase 0 grms

Organic Phase 0 grms

Totals

GRAINS/DSCF = 7.167679E-03
POUNDS/HOUR = .2560486

HIT RETURN TO CONTINUE

PARTICULATE FIELD DATA SHEET

PLANT Hills Bros DATE 8 RUN NO. 2

SAMPLE LOCATION Outlet RAC BOX NO. 4 DRY GAS METER NO. _____

NOZZLE NO. _____ NOZZLE SIZE 7/16 INCHES PITOT NO. _____ C_p _____

TIME AT EACH POINT (θ) 5 MINUTES DELTA H @ 2.00 THERMOCOUPLE NO.: T_s 4

PROBE OUTLET 3

AMBIENT PRESSURE (P_{BAR}) 29.98 "HG BOX OUTLET 2

STATIC PRESSURE (P) -0.14 "H_2O/13.6 = _____ "Hg(P meter) BOX 1

STACK PRESSURE (P_s) = P_{bar} + P_{meter} = _____ "Hg OPERATING CONDITION OR REMARKS _____

DRY BULB ____ °F WET BULB ____ °F ____ %H_2O

PORT/ POINT	MILITARY CLOCK TIME	METER READING	PITOT DELTA P "H_2O	ORIFICE DELTA H "H_2O	METER TEMP, °F IN	METER TEMP, °F OUT	LINE VAC "Hg	PROBE OUTLET °F	BOX OUTLET TEMP °F	BOX TEMP °F	STACK TEMP °F
A-1	1324	981.374	0.16	1.7	100	99	5	453	143	176	1195
2	1647		0.18	2.2	100	97	6	619	252	240	1217
3	52		0.16	1.9	100	96	6	609	329	229	1234
4	57		0.16	1.9	100	95	6	554	343	225	1227
5	1702		0.13	1.6	100	94	5	468	336	220	1197
6	07		0.10	1.2	102	94		395	315	208	1193
End	1712	1002.740	~	~	~	~	~	~	~	~	~
B-1	1715	1002.740	0.16	1.9	100	94	6	326	257	185	1194
2	1720		0.18	2.15	103	94	6	341	326	185	1227
3	25		0.18	2.15	103	93	5	626	362	192	1239
4	30		0.15	1.8	102	93	5	550	359	190	1205
5	35		0.13	1.55	101	93	5	440	332	181	1194
6	40		0.09	1.1	101	92	4	360	295	170	1190
End	1745	1023.796	~	~	~	~	~	~	~	~	~
*	θ	V=	....	delta H =	T_m =						T_s=

* Sum, average or Difference

Pre-Leak Check ✓ Post Leak Check ✓

FYRITE: % OXYGEN 21

% CARBON DIOXIDE 0

PARTICULATE.ATG (August 1988)

AirRecon
THREE BRIDGES, NJ

CLIENT: HILLS BROS.

Date: 09/19/88
Time: 10:21 AM

Delta H (IN H2O)	Meter Temp(F) IN	OUT	Stack Temp(F)
1.70	100.00	99.00	1195.00
2.20	100.00	97.00	1217.00
1.90	100.00	96.00	1234.00
1.90	100.00	95.00	1227.00
1.60	100.00	94.00	1197.00
1.20	102.00	94.00	1193.00
1.90	100.00	94.00	1194.00
2.15	103.00	94.00	1227.00
2.15	103.00	93.00	1239.00
1.80	102.00	93.00	1205.00
1.55	101.00	93.00	1194.00
1.10	101.00	92.00	1190.00

AVERAGES
DELTA H = 1.7625 IN H2O
METER TEMP. = 97.75 F
STACK TEMP. = 1209.333 F

CLIENT: HILLS BROS.

Date: 09/19/88
Time: 10:21 AM

AVERAGE VELOCITY PRESSURE

Delta P (IN H20)	Delta P Square Root
0.16	0.40
0.18	0.42
0.16	0.40
0.16	0.40
0.13	0.36
0.10	0.32
0.16	0.40
0.18	0.42
0.18	0.42
0.15	0.39
0.13	0.36
0.00	0.00

THE AVERAGE SQUARE ROOT OF DELTA P = .383119

HYDROCARBON SAMPLING DATA

SAMPLE LOCATION Outlet RUN NO. 2 DATE 6/31/88

HYDROCARBON PUMP NO. 2

TIME	ROTOMETER SETTING	GAS METER TEMP.	VACUUM "HG	SAMPLE RATE L/M
1642	60	78	1	.933
1647	60	79	1	.933
1652	60	79	1	.933
57	60	79	1	.933
1702	60	80	1	.933
1707	60	80	1	.933
1712	~~60~~ Stop	80	1	
715	Restart 60	80	1	.933
1720	60	80	1	.933
25	60	80	1	.933
30	60	81	1	.933
35	60	81	1	.933
40	60	81	1	.933
45	End			

PRE-LEAK CHECK _____ POST-LEAK CHECK ✓

PUMP CALIBRATION FLOW RATE		CALIBRATION INSTRUMENT	FYRITE
FLOW RATE LITERS/MIN	ROTAMETER SETTING	✓ SOAP FILM BURET	% OXYGEN
.933	60	_____ DRY GAS METER	% CARBON DIOXIDE
		_____ OTHER_____	

CORRECTING ROTOMETER VOLUME TO DRY STANDARD CONDITIONS

EQUATION: $V_{STD} = V_m \times \frac{P_m}{T_m} \times \frac{T_{STD}}{P_{STD}}$

WHERE:

V_M = SAMPLE RATE OF ROTOMETER (L/M)

T_{STD} = $70^0F + 460^0F = 530^0F$

P_{STD} = 29.92"HG

P_M = BAROMETRIC PRESSURE DURING SAMPLING ("HG)

Tm = TEMPERATURE OF GAS STREAM ($+460^0F$)

V_{STD} = $\times \frac{(\quad)}{(\quad)} \times \frac{(530)}{(29.92)} =$ _____

CF = (V_{STD} L/MIN) (3.53 X 10^{-2} CF/L) (60 MIN/1 HR) = ( )(3.53 x 10^{-2})(60)

= CFH

MOISTURE DETERMINATION

SAMPLE LOCATION Outlet RUN NO. 2 DATE 8/30/88

CHAIN-OF-CUSTODY SAMPLE NO. _____

		GRAMS	GRAMS
IMPINGER 1	FINAL WEIGHT	823.3	
	INITIAL WEIGHT	686.1	
	INCREASE		IMPINGER 1 137.2
IMPINGER 2	FINAL WEIGHT	765.9	
	INITIAL WEIGHT	739.5	
	INCREASE		IMPINGER 2 26.4
IMPINGER 3	FINAL WEIGHT	490.7	
	INITIAL WEIGHT	487.8	
	INCREASE		IMPINGER 3 2.9
SILICA GEL	FINAL WEIGHT	829.8	
	INITIAL WEIGHT	817.6	
	INCREASE		SILICA GEL 12.2

TOTAL MASS OF WATER CAUGHT 178.7 GRAMS

CHAIN-OF-CUSTODY SAMPLE NO. _____

FILTER DIAMETER 4 INCHES FILTER TYPE Glass Fiber

FILTER: FINAL WEIGHT 6264 GMS
INITIAL WEIGHT 6235 GMS
INCREASE

0.0029 GRAMS
TOTAL MASS OF PARTICULATE CAUGHT THIS FILTER

IS ICE PRESENT IN THE IMPINGER BATH AT THE END OF THIS SAMPLE? YES____ NO____

CALCULATIONS

$V_{m\text{-}std} = 17.65\ (V_m)\left(\frac{P_{bar} + \text{DELTA H}/13.6}{T_m + 460}\right) = 17.65\ (\quad)\left(\frac{\quad + 13.6}{\quad}\right)$

$= 17.65\ (\quad)(\quad) = \_\_\_\_\_\ FT^3$

$V_{w\text{-}std}\ (H_2O) = \frac{\text{GRAMS COLLECTED}}{21.2\ \text{GRAMS/FT}^3} = \frac{(\quad)}{(21.2)} = \_\_\_\_\_\ FT^3$

$\%\ H_2O = \frac{(V_{w\text{-}std})\ 100}{((V_{w\text{-}std}) + (V_{w\text{-}std})} = \frac{100\ (\quad)}{(\quad)(\quad)} = \frac{(\quad)}{(\quad)} = \_\_\_\_\_\ \%$

MOLECULAR WEIGHT (MW) $= \frac{18\ (\%H_2O)}{100} + \frac{\text{DRY MW}\ (100 - \%H_2O)}{100} = 0.18(\quad) + \frac{(\quad)(\quad)}{100}$

VELOCITY (ACTUAL) IN STACK $= 85.48(Cp)\sqrt{\frac{T_s + 460}{P_s(MW)}}\sqrt{\text{DELTA P}} = 85.48\ (\quad)\sqrt{\frac{(\quad)}{(\quad)(\quad)}}\sqrt{\text{DELTA P}}$

$V_s = (\quad)\sqrt{\quad}\sqrt{\text{DELTA P}} = (\quad)(\quad)\sqrt{\text{DELTA P}}$

$V_s = (\quad)\ \text{DELTA P} = (\quad)(\quad) = \_\_\_\_\_\ FT/SEC$

$ACFM = (V_s)(60)(CSA) = (\quad)(60)(\quad) = \_\_\_\_\_$

VELOCITY @ Stp $V_{s\text{-}std} = V_s\ (17.65)\left(\frac{P_s}{Ts + 460}\right) = \frac{(\quad)(17.65)(\quad)}{(\quad)} = \_\_\_\_\_\ FT/SEC$

$SCFM = (V_{s\text{-}std})(csa)(60) = (\quad)(\quad)(60) = \_\_\_\_\_$

$DSCFM = \left(\frac{100 - \%H_2O}{100}\right)(SCFH) = (\quad)(\quad) = \_\_\_\_\_$

NOZZLE VELOCITY @ STD $V_n = \frac{(V_{m\text{-}std} + V_{w\text{-}std})}{60\ (\Theta)\ A_n} = \frac{(\quad)}{60\ (\quad)(\quad)\ (10^{-4})} = \_\_\_\_\_\ FT/SEC$

$I = \frac{100\ V_{n\text{-}std}}{V_{s\text{-}std}} = \frac{100\ (\quad)}{(\quad)} = \_\_\_\_\_\ \%$ Isokinetic

LAB DATA - EVAPORATIONS

PLANT Hills Bros. SAMPLE LOCATION #23 Outlet RUN NO. 2 FOR _____

SAMPLING DATE 8/31/88 OPERATING CONDITION _____

CHAIN-OF-CUSTODY SAMPLE NO. _____

ACETONE WASHINGS

TOTAL SAMPLE	GROSS	573.9	GMS
	TARE -	410.2	GMS
	(A) NET	163.7	GMS
AMOUNT EVAPORATED (B)		163.7	GMS

EVAP. BEAKER NO. _____

GROSS	98.7101	GMS
TARE -	98.7078	GMS
(C) NET	0.0023	GMS

ACETONE BLANK

EVAP. BEAKER NO. _____

GROSS	97.6580	GMS
TARE -	97.6583	GMS
NET	0	GMS

ACETONE BLANK = NET 0 GMS (D) / TOTAL AMOUNT EVAPORATED 200 GMS (F)

CORRECTED NET (E) = (C) - (B)[(D)/(F)]

= (0.0023) - (163.7) [(0)/(200)]

= 0.0023 GMS (E) = (C) - B [(D)/(F)]

SCALED UP NET = (E)(A/B)

= 0.0023 (163.7/163.7)

= 0.0023 GMS

WET CATCH

TOTAL SAMPLE	GROSS	GMS
	TARE -	GMS
	(A) NET	GMS
AMOUNT EXTRACTED (G)		GMS (MLS)
AMOUNT OF EXC		GMS (H)

WATER PHASE
EVAP. BEAKER NO. _____

GROSS		GMS
TARE -		GMS
(J) NET		GMS

WATER BLANK (L) = _____ GMS / 100 GMS

CORRECTED NET (N) = J - (G)(L)

= _____ - _____ (100)

= _____ GMS

SCALED UP NET = (N)(F/G)

= _____ ( )

= _____ GMS

EC PHASE
EVAP. BEAKER NO. _____

GROSS		GMS
TARE -		GMS
(K) NET		GMS

E/C BLANK (M) = _____ GMS / 100 MLS

CORRECTED NET (M) = K - (H)(M)

= _____ - _____ (100)

= _____ GMS

SCALED UP NET = (P)(F/G)

= _____ ( )

= _____ GMS

Particulates

Nozzle, Probe, and Acetone Washing .0023 grms

Filter .0029 grms

Enter "0" if no Organic or Aqueous Phase

Aqueous Phase 0 grms

Organic Phase 0 grms

Totals

GRAINS/DSCF = 1.985317E-03
POUNDS/HOUR = 7.491164E-02

HIT RETURN TO CONTINUE

PARTICULATE FIELD DATA SHEET

PLANT Ellis Bros DATE 8/31/88 RUN NO. 3

SAMPLE LOCATION OUTLET RAC BOX NO. 4 DRY GAS METER NO. _____

NOZZLE NO. _____ NOZZLE SIZE 7/16 INCHES PITOT NO. 7 C_p _____

TIME AT EACH POINT (θ) 5 MINUTES DELTA H @ 2.00 THERMOCOUPLE NO.: T_s 4

PROBE OUTLET 5

BOX OUTLET 2

AMBIENT PRESSURE (P_{BAR}) 29.98 "HG

STATIC PRESSURE (P) -0.13 "H_2O/13.6 = _____ "Hg(P meter) BOX 1

STACK PRESSURE (P_s) = P_{bar} + P_{meter} = _____ "Hg OPERATING CONDITION OR REMARKS _____

DRY BULB 75 °F WET BULB 60 °F 43% RH %H_2O

PORT/ POINT	MILITARY CLOCK TIME	METER READING	PITOT DELTA P "H_2O	ORIFICE DELTA H "H_2O	METER TEMP. °F IN	METER TEMP. °F OUT	LINE VAC "Hg	PROBE OUTLET °F	BOX OUTLET TEMP °F	BOX TEMP °F	STACK TEMP °F
B-1	1849	024.042	0.17	2.0	91	89	4	350	151	232	1203
2	1904		0.17	2.0	93	88	4	668	322	233	1226
3	1909		0.17	2.0	96	84	4	663	370	241	1237
4	1914		0.16	1.9	97	88	4	622	373	245	1227
5	1919		0.12	1.4	98	89	3	470	337	224	1206
6	1926		0.09	1.05	101	88	2	397	316	211	1204
End	1934	045.112	—	—	—	—	—	—	—	—	—
A-1	1435	045.112	0.16	1.9	98	89	4	476	238	180	1195
2	1440		0.17	2.0	102	89	4	678	308	177	1219
3	1445		0.17	2.0	102	89	4	675	344	181	1234
4	1950		0.16	1.9	103	90	4	547	354	182	1227
5	1955		0.13	1.5	102	89	4	490	334	178	1189
6	2000		0.09	1.05	102	89	3	406	305	170	1184
End	2005	065.955	—	—	—	—	—	—	—	—	—
*	θ	V=	----	delta H =	T_m =						T_s=

* Sum, average or Difference

Pre-Leak Check ✓ Post Leak Check ✓

FYRITE: % OXYGEN 21

% CARBON DIOXIDE 0

PARTICULATE.ATG (August 1988)

Stop 18:49:45
Restart 18:59:45

19:15:30 Stop
19:17:30 restart

CLIENT: HILLS BROS.

Date: 09/19/88
Time: 10:21 AM

Delta H (IN H20)	Meter Temp (F) IN	OUT	Stack Temp (F)
2.00	91.00	89.00	1203.00
2.00	93.00	88.00	1226.00
2.00	96.00	88.00	1237.00
1.90	97.00	88.00	1227.00
1.40	98.00	88.00	1206.00
1.05	101.00	88.00	1204.00
1.90	98.00	89.00	1195.00
2.00	102.00	897.00	1219.00
2.00	102.00	89.00	1234.00
1.90	103.00	90.00	1227.00
1.50	102.00	89.00	1189.00
1.05	102.00	89.00	1189.00

AVERAGES
DELTA H = 1.725 IN H20
METER TEMP. = 127.375 F
TACK TEMP. = 1213 F

CLIENT: HILLS BROS.

Date: 09/19/88
Time: 10:21 AM

AVERAGE VELOCITY PRESSURE

Delta P (IN H2O)	Delta P Square Root
0.17	0.41
0.17	0.41
0.17	0.41
0.16	0.40
0.12	0.35
0.00	0.00
0.16	0.40
0.17	0.41
0.17	0.41
0.16	0.40
0.13	0.36
0.00	0.00

THE AVERAGE SQUARE ROOT OF DELTA P = .3807099

HYDROCARBON SAMPLING DATA

SAMPLE LOCATION Outlet RUN NO. 3 DATE 8/31/88

HYDROCARBON PUMP NO. 2

TIME	ROTOMETER SETTING	GAS METER TEMP.	VACUUM "HG	SAMPLE RATE L/M
1849	60	80	1	.93
1904	60	80	1	.93
1909	60	80	1	.93
1914	60	80	1	.93
1921	60	80	1	.93
1926	60	80	1	.93
1931	Stop	81	1	
1935	start 60	81	1	.93
1940	60	81	1	.93
1945	60	81	1	.93
1950	60	81	1	.93
1955	60	80	1	.93
2000	60	80	1	.93

PRE-LEAK CHECK _____ POST-LEAK CHECK _____

PUMP CALIBRATION FLOW RATE		CALIBRATION INSTRUMENT	FYRITE
FLOW RATE LITERS/MIN	ROTAMETER SETTING	✓ SOAP FILM BURET	% OXYGEN
.933	60	_____ DRY GAS METER	% CARBON DIOXIDE
		_____ OTHER _____	

18:49:45 stop
18:59:45 restart
19:15:30 stop
19:17:30 start

CORRECTING ROTOMETER VOLUME TO DRY STANDARD CONDITIONS

EQUATION: $V_{STD} = V_m \times \frac{Pm}{T_m} \times \frac{T_{STD}}{P_{STD}}$

WHERE:

V_M = SAMPLE RATE OF ROTOMETER (L/M)

T_{STD} = $70^0F + 460^0F = 530^0F$

P_{STD} = 29.92"HG

P_H = BAROMETRIC PRESSURE DURING SAMPLING ("HG)

Tm = TEMPERATURE OF GAS STREAM ($+460^0F$)

V_{STD} = $\times \frac{(\quad\quad)}{(\quad\quad)} \times \frac{(530)}{(29.92)}$ = _____

CF = (V_{STD} L/MIN) (3.53×10^{-2} CF/L) (60 MIN/1 HR) = ( )(3.53×10^{-2})(60)

= CFH

MOISTURE DETERMINATION

SAMPLE LOCATION Outlet RUN NO. 3 DATE 8/3/88

CHAIN-OF-CUSTODY SAMPLE NO. _____

		GRAMS	GRAMS
IMPINGER 1	FINAL WEIGHT	863.1	
	INITIAL WEIGHT	723.4	
	INCREASE		IMPINGER 1 141.7
IMPINGER 2	FINAL WEIGHT	651.5	
	INITIAL WEIGHT	630.1	
	INCREASE		IMPINGER 2 21.4
IMPINGER 3	FINAL WEIGHT	487.7	
	INITIAL WEIGHT	484.5	
	INCREASE		IMPINGER 3 .1
SILICA GEL	FINAL WEIGHT	208.7	
	INITIAL WEIGHT	199.0	
	INCREASE		SILICA GEL 9.7

TOTAL MASS OF WATER CAUGHT 175.6 GRAMS

CHAIN-OF-CUSTODY SAMPLE NO. _____

FILTER DIAMETER 4 INCHES FILTER TYPE Glass fiber

FILTER: FINAL WEIGHT 0.6146 GMS
INITIAL WEIGHT 0.6134 GMS
INCREASE

0.0012 GRAMS
TOTAL MASS OF PARTICULATE CAUGHT THIS FILTER

IS ICE PRESENT IN THE IMPINGER BATH AT THE END OF THIS SAMPLE? YES___ NO___

CALCULATIONS

$V_{m\text{-}std} = 17.65\ (V_m)\left(\frac{P_{bar} + \text{DELTA H}/13.6}{T_m + 460}\right) = 17.65\ (\ \ )\left(\frac{\ \ + \overline{13.6}}{\ \ }\right)$

$= 17.65\ (\ \ )(\ \ ) =$ _____ FT^3

$V_{w\text{-}std}\ (H_2O) = \frac{\text{GRAMS COLLECTED}}{21.2\ \text{GRAMS/FT}^3} = \frac{(\ \ \ \ \ \ )}{(21.2)} =$ _____ FT^3

$\%\ H_2O = \frac{(V_{w\text{-}std})\ 100}{((V_{w\text{-}std}) + (V_{w\text{-}std})} = \frac{100\ (\ \ \ \ \ \ )}{(\ \ )(\ \ \ \ \ \ )} = \frac{(\ \ \ \ \ \ )}{(\ \ \ \ \ \ )} =$ _____ %

$\text{MOLECULAR WEIGHT (MW)} = \frac{18\ (\%H_2O)}{100} + \frac{\text{DRY MW}\ (100 - \%H_2O)}{100} = 0.18(\ \ \ \ \ \ ) + \frac{(\ \ \ \ \ \ )(\ \ \ \ \ \ )}{100}$

$\text{VELOCITY (ACTUAL) IN STACK} = 85.48(Cp)\sqrt{\frac{T_s + 460}{P_s(MW)}}\sqrt{\text{DELTA P}} = 85.48\ (\ \ )\sqrt{\frac{(\ \ \ \ \ \ )}{(\ \ )(\ \ \ \ \ \ )}}\sqrt{\text{DELTA P}}$

$V_s = (\ \ \ \ \ \ )\sqrt{\ \ }\sqrt{\text{DELTA P}} = (\ \ \ \ \ \ )(\ \ \ \ \ \ )\sqrt{\text{DELTA P}}$

$V_s = (\ \ \ \ \ \ )\ \text{DELTA P} = (\ \ \ \ \ \ )(\ \ \ \ \ \ ) =$ _____ FT/SEC

$ACFM = (V_s)(60)(CSA) = (\ \ \ \ \ \ )(60)(\ \ \ \ \ \ ) =$ _____

$\text{VELOCITY @ Stp}\ V_{s\text{-}std} = V_s\ (17.65)\left(\frac{P_s}{Ts + 460}\right) = \frac{(\ \ \ \ \ \ )(17.65)(\ \ \ \ \ \ )}{(\ \ \ \ \ \ )} =$ _____ FT/SEC

$SCFM = (V_{s\text{-}std})(csa)(60) = (\ \ \ \ \ \ )(\ \ \ \ \ \ )(60) =$ _____

$DSCFM = \left(\frac{100 - \%H_2O}{100}\right)(SCFM) = (\ \ \ \ \ \ )(\ \ \ \ \ \ ) =$ _____

$\text{NOZZLE VELOCITY @ STD}\ V_n = \frac{(V_{m\text{-}std} + V_{w\text{-}std})}{60\ (\theta)\ A_n} = \frac{(\ \ \ \ \ \ )}{60\ (\ \ \ \ \ \ )(\ \ \ \ \ \ )(10^{-4})} =$ _____ FT/SEC

$I = \frac{100\ V_{n\text{-}std}}{V_{s\text{-}std}} = \frac{100\ (\ \ \ \ \ \ )}{(\ \ \ \ \ \ )} =$ _____ % Isokinetic

LAB DATA - EVAPORATIONS

PLANT Hills Bros.

SAMPLING DATE 8/31/88

SAMPLE LOCATION #23 Outlet

RUN NO. 3 FOR _____

OPERATING CONDITION _____

CHAIN-OF-CUSTODY SAMPLE NO. _____

ACETONE WASHINGS

TOTAL SAMPLE	GROSS	577.0	GMS
	TARE -	408.7	GMS
	(A) NET	168.3	GMS
AMOUNT EVAPORATED (B)		168.3	GMS

EVAP. BEAKER NO. _____

GROSS	164.3923	GMS
TARE -	164.3820	GMS
(C) NET	0.0083	GMS

ACETONE BLANK

EVAP. BEAKER NO. _____

GROSS	97.6580	GMS
TARE -	97.6583	GMS
NET	0	GMS

ACETONE BLANK = NET 0 GMS (D) / TOTAL AMOUNT EVAPORATED 200 GMS (F)

CORRECTED NET (E) = (C) - (B)[(D)/(F)]

= (0.0083) - (168.3) [(0)/(200)]

= 0.0083 GMS (E) = (C) - B [(D)/(F)]

SCALED UP NET = (E)(A/B)

= 0.0083 (168.3/168.3)

= 0.0083 GMS

WET CATCH

TOTAL SAMPLE	GROSS	GMS
	TARE -	GMS
	(A) NET	GMS
AMOUNT EXTRACTED (G)		GMS (MLS)
AMOUNT OF E/C		GMS (H)

WATER PHASE
EVAP. BEAKER NO. _____

GROSS		GMS
TARE -		GMS
(J) NET		GMS
WATER BLANK (L) =		GMS / 100 GMS

CORRECTED NET (N) = J - (G)(L)

= _____ - _____ (100)

= _____ GMS

SCALED UP NET = (N)(F/G)

= _____ ( )

= _____ GMS

EC PHASE
EVAP. BEAKER NO. _____

GROSS		GMS
TARE -		GMS
(K) NET		GMS
E/C BLANK (M) =		GMS / 100 MLS

CORRECTED NET (M) = K - (H)(M)

= _____ - _____ (100)

= _____ GMS

SCALED UP NET = (P)(F/G)

= _____ ( )

= _____ GMS

Particulates

Nozzle, Probe, and Acetone Washing .0083 grms

Filter .0012 grms

Enter "0" if no Organic or Aqueous Phase

Aqueous Phase 0 grms

Organic Phase 0 grms

Totals

GRAINS/DSCF = 3.868192E-03
POUNDS/HOUR = .1438865

HIT RETURN TO CONTINUE

CLIENT: HILLS BROS.

Date: 09/19/88
Time: 10:21 AM

ISOKINETIC CALCULATIONS

SAMPLE NO.	1	2	3
DATE	8/31/88	8/31/88	8/31/88
TIME	0833-0937	1642-1745	1849-2005
UNIT SAMPLED	#23 OUTLET	#23 OUTLET	#23 OUTLET
METER VOLUME (VM-STD), SCU-FT	38.11	40.42	37.90
WATER COLLECTED (VW-STD), SCU-FT	8.17	8.46	8.31
MOISTURE (VOL %)	17.66	17.30	17.99
ACTUAL MOLECULAR WEIGHT (MW), LBS/LB-MOLE	26.94	26.98	26.91
ACTUAL VELOCITY IN STACK (VS), FT/SEC	37.45	39.50	39.35
ACTUAL FLOW RATE IN STACK (ACFM)	15875.48	16747.00	16682.61
VELOCITY @ STP (VS-STD), FT/SEC	11.94	12.56	12.48
STACK FLOW RATE @ STP (SCFM)	5061.60	5323.35	5291.38
DRY FLOW RATE (DSCFM)	4167.66	4402.18	4339.71
NOZZLE VELOCITY @ STP (VN-STD), FT/SEC	12.31	13.01	12.30
ISOKINETIC %	103.15	103.58	98.52

CLIENT: HILLS BROS.

Date: 09/19/88
Time: 10:21 AM

THE FOLLOWING WERE PROGRAMMER INPUTS FOR ISOKINETICS

SAMPLE NO.	1	2	3
DATE	8/31/88	8/31/88	8/31/88
TIME	0833-0937	1642-1745	1849-2005
UNIT SAMPLED	#23 OUTLET	#23 OUTLET	#23 OUTLET
ACTUAL NOZZLE DIAMETER (ND), IN	0.44	0.44	0.44
PITOT FACTOR (CP)	0.84	0.84	0.84
TIME @ EACH POINT (MIN)	5.00	5.00	5.00
AMBIENT PRESSURE (PBAR), IN-HG	29.98	29.98	29.98
STACK PRESSURE (PS), IN-HG	-0.11	-0.14	-0.13
METER VOLUME (VM), CU-FT	40.07	42.42	41.89
WATER COLLECTED IMPINGERS, GRMS	172.70	178.70	175.60
CARBON DIOXIDE (CO_2), %	0.10	0.10	0.10
OXYGEN (O_2), %	21.10	21.10	21.10
STACK DIAMETER (DIA), IN	36.00	36.00	36.00
STACK CROSS SECTIONAL AREA (CSA), FT^2	7.07	7.07	7.07

N.J. Method #3 Gas Bag and Impinger Contents Data Sheet

Company Name: HILLS BROS.
Location: #23 OUTLET
Unit: _____
Sample I.D.: RUN 1

Total Wet Catch(mls) : 44.00
Sample Volume(std. FT3): 2.12
Stack Flowrate(DSCFM): 4168.00
Stack % Moisture: 17.60

Contaminants	Name	MW	GC:Liquid Concentration (mg/l)	GC: Gas Concentration (ppmv)
(1)	THC as METHANE	16.05	7.500	134.000
(2)	CARBON MONOXIDE	28.01	0.000	2.200
(3)				
(4)				
(5)				
(6)				
(7)				
(8)				
(9)				
(10)				

Concentrations and Emissions

Contaminants	Name	LB/HR	PPMV(WET)	PPMV(DRY)
(1)	THC as METHANE	1.485	117.177	142.205
(2)	CARBON MONOXIDE	0.040	1.813	2.200
(3)	0.00	0.000	ERR	ERR
(4)	0.00	0.000	ERR	ERR
(5)	0.00	0.000	ERR	ERR
(6)	0.00	0.000	ERR	ERR
(7)	0.00	0.000	ERR	ERR
(8)	0.00	0.000	ERR	ERR
(9)	0.00	0.000	ERR	ERR
(10)	0.00	0.000	ERR	ERR

This Program Uses the Following Equations for Each Contaminant Where:

A = Total Wet Catch(mls)
B = Sample Volume (std. FT3)
C = Stack Moisture (%)
D = Stack Flowrate (DSCFM)
E = GC: Liquid Concentration (mg/l)
F = GC: Gas Concentration (dry ppmv)
G = Contaminant's Molecular Weight

For The Impinger Contents:
(H1) = dry ppmv = (0.846 x(A)x(E)) / ((G)x(B))
(J1) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K1) = pounds/hour = 0.000000133 x(A)x(E)x(D) / (B)

For the Gas Bag Contents:
(H2) = dry ppmv = (F)
(J2) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K2) = pounds/hour = 0.000000156 x (dry ppmv) x (D) x (G)

Concentrations and Emissions:
Total dry ppmv = (H1) + (H2)
Total wet ppmv = (J1) + (J2)
Total pounds/hour = (K1) + (K2)

N.J. Method #3 Gas Bag and Impinger Contents Data Sheet

Company Name: HILLS BROS.
Location: #23 OUTLET
Unit: _____
Sample I.D.: RUN 2

Total Wet Catch(mls) : 44.0
Sample Volume(std. FT3): 2.1
Stack Flowrate(DSCFM): 4402.00
Stack % Moisture: 17.30

Contaminants	Name	MW	GC:Liquid Concentration (mg/l)	GC: Gas Concentration (ppmv)
(1)	THC as METHANE	16.05	7.500	90.000
(2)	CARBON MONOXIDE	28.01	0.000	1.300
(3)				
(4)				
(5)				
(6)				
(7)				
(8)				
(9)				
(10)				

Concentrations and Emissions

Contaminants	Name	LB/HR	PPMV(WET)	PPMV(DRY)
(1)	THC as METHANE	1.083	81.215	98.205
(2)	CARBON MONOXIDE	0.025	1.075	1.30
(3)	0.00	0.000	ERR	ER
(4)	0.00	0.000	ERR	ERR
(5)	0.00	0.000	ERR	ERR
(6)	0.00	0.000	ERR	ERR
(7)	0.00	0.000	ERR	ERR
(8)	0.00	0.000	ERR	ERR
(9)	0.00	0.000	ERR	ERR
(10)	0.00	0.000	ERR	ERR

This Program Uses the Following Equations for Each Contaminant Where:

A = Total Wet Catch(mls)
B = Sample Volume (std. FT3)
C = Stack Moisture (%)
D = Stack Flowrate (DSCFM)
E = GC: Liquid Concentration (mg/l)
F = GC: Gas Concentration (dry ppmv)
G = Contaminant's Molecular Weight

For The Impinger Contents:
(H1) = dry ppmv = (0.846 x(A)x(E)) / ((G)x(B))
(J1) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K1) = pounds/hour = 0.000000133 x(A)x(E)x(D) / (B)

For the Gas Bag Contents:
(H2) = dry ppmv = (F)
(J2) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K2) = pounds/hour = 0.000000156 x (dry ppmv) x (D) x (G)

Concentrations and Emissions:
Total dry ppmv = (H1) + (H2)
Total wet ppmv = (J1) + (J2)
Total pounds/hour = (K1) + (K2)

N.J. Method #3 Gas Bag and Impinger Contents Data Sheet

Company Name: HILLS BROS.
Location: #23 OUTLET
Unit: _____
Sample I.D.: RUN 3

Total Wet Catch(mls) : 44.00
Sample Volume(std. FT3): 2.12
Stack Flowrate(DSCFM): 4340.00
Stack % Moisture: 18.00

Contaminants	Name	MW	GC:Liquid Concentration (mg/l)	GC: Gas Concentration (ppmv)
(1)	THC as METHANE	16.05	7.500	58.000
(2)	CARBON MONOXIDE	28.01	0.000	1.300
(3)				
(4)				
(5)				
(6)				
(7)				
(8)				
(9)				
(10)				

Concentrations and Emissions

Contaminants	Name	LB/HR	PPMV(WET)	PPMV(DRY)
(1)	THC as METHANE	0.720	54.288	66.205
(2)	CARBON MONOXIDE	0.025	1.066	1.300
(3)	0.00	0.000	ERR	ERR
(4)	0.00	0.000	ERR	ERR
(5)	0.00	0.000	ERR	ERR
(6)	0.00	0.000	ERR	ERR
(7)	0.00	0.000	ERR	ERR
(8)	0.00	0.000	ERR	ERR
(9)	0.00	0.000	ERR	ERR
(10)	0.00	0.000	ERR	ERR

This Program Uses the Following Equations for Each Contaminant Where:

A = Total Wet Catch(mls)
B = Sample Volume (std. FT3)
C = Stack Moisture (%)
D = Stack Flowrate (DSCFM)
E = GC: Liquid Concentration (mg/l)
F = GC: Gas Concentration (dry ppmv)
G = Contaminant's Molecular Weight

For The Impinger Contents:
(H1) = dry ppmv = (0.846 x(A)x(E)) / ((G)x(B))
(J1) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K1) = pounds/hour = 0.000000133 x(A)x(E)x(D) / (B)

For the Gas Bag Contents:
(H2) = dry ppmv = (F)
(J2) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K2) = pounds/hour = 0.000000156 x (dry ppmv) x (D) x (G)

Concentrations and Emissions:
Total dry ppmv = (H1) + (H2)
Total wet ppmv = (J1) + (J2)
Total pounds/hour = (K1) + (K2)

N.J. Method #3 Gas Bag and Impinger Contents Data Sheet

Company Name: HILLS BROS.
Location: #23 OUTLET
Unit: _____
Sample I.D.: RUN 1

Total Wet Catch(mls) : 44.00
Sample Volume(std. FT3): 2.1
Stack Flowrate(DSCFM): 4168.00
Stack % Moisture: 17.60

Contaminants	Name	MW	GC:Liquid Concentration (mg/l)	GC: Gas Concentration (ppmv)
(1)	THC as METHANE	16.05	0.000	134.000
(2)				
(3)				
(4)				
(5)				
(6)				
(7)				
(8)				
(9)				
(10)				

Concentrations and Emissions

Contaminants	Name		LB/HR	PPMV(WET)	PPMV(DRY)
(1)	THC as METHANE		1.398	110.416	134.000
(2)		0.00	0.000	ERR	ERR
(3)		0.00	0.000	ERR	EF
(4)		0.00	0.000	ERR	ERR
(5)		0.00	0.000	ERR	ERR
(6)		0.00	0.000	ERR	ERR
(7)		0.00	0.000	ERR	ERR
(8)		0.00	0.000	ERR	ERR
(9)		0.00	0.000	ERR	ERR
(10)		0.00	0.000	ERR	ERR

This Program Uses the Following Equations for Each Contaminant Where:

A = Total Wet Catch(mls)
B = Sample Volume (std. FT3)
C = Stack Moisture (%)
D = Stack Flowrate (DSCFM)
E = GC: Liquid Concentration (mg/l)
F = GC: Gas Concentration (dry ppmv)
G = Contaminant's Molecular Weight

For The Impinger Contents:
(H1) = dry ppmv = (0.846 x(A)x(E)) / ((G)x(B))
(J1) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K1) = pounds/hour = 0.000000133 x(A)x(E)x(D) / (B)

For the Gas Bag Contents:
(H2) = dry ppmv = (F)
(J2) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K2) = pounds/hour = 0.000000156 x (dry ppmv) x (D) x (G)

Concentrations and Emissions:
Total dry ppmv = (H1) + (H2)
Total wet ppmv = (J1) + (J2)
Total pounds/hour = (K1) + (K2)

N.J. Method #3 Gas Bag and Impinger Contents Data Sheet

Company Name: HILLS BROS.
Location: #23 OUTLET
Unit: _____
Sample I.D.: RUN 2

Total Wet Catch(mls) : 44.00
Sample Volume(std. FT3): 2.12
Stack Flowrate(DSCFM): 4402.00
Stack % Moisture: 17.30

Contaminants	Name	MW	GC:Liquid Concentration (mg/l)	GC: Gas Concentration (ppmv)
(1)	THC as METHANE	16.05	0.000	90.000
(2)				
(3)				
(4)				
(5)				
(6)				
(7)				
(8)				
(9)				
(10)				

Concentrations and Emissions

Contaminants	Name	LB/HR	PPMV(WET)	PPMV(DRY)
(1)	THC as METHANE	0.992	74.430	90.000
(2)	0.00	0.000	ERR	ERR
(3)	0.00	0.000	ERR	ERR
(4)	0.00	0.000	ERR	ERR
(5)	0.00	0.000	ERR	ERR
(6)	0.00	0.000	ERR	ERR
(7)	0.00	0.000	ERR	ERR
(8)	0.00	0.000	ERR	ERR
(9)	0.00	0.000	ERR	ERR
(10)	0.00	0.000	ERR	ERR

This Program Uses the Following Equations for Each Contaminant Where:

A = Total Wet Catch(mls)
B = Sample Volume (std. FT3)
C = Stack Moisture (%)
D = Stack Flowrate (DSCFM)
E = GC: Liquid Concentration (mg/l)
F = GC: Gas Concentration (dry ppmv)
G = Contaminant's Molecular Weight

For The Impinger Contents:
(H1) = dry ppmv = (0.846 x(A)x(E)) / ((G)x(B))
(J1) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K1) = pounds/hour = 0.000000133 x(A)x(E)x(D) / (B)

For the Gas Bag Contents:
(H2) = dry ppmv = (F)
(J2) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K2) = pounds/hour = 0.000000156 x (dry ppmv) x (D) x (G)

Concentrations and Emissions:
Total dry ppmv = (H1) + (H2)
Total wet ppmv = (J1) + (J2)
Total pounds/hour = (K1) + (K2)

N.J. Method #3 Gas Bag and Impinger Contents Data Sheet

Company Name: HILLS BROS.
Location: #23 OUTLET
Unit: _____
Sample I.D.: RUN 3

Total Wet Catch(mls) : 44.00
Sample Volume(std. FT3): 2.12
Stack Flowrate(DSCFM): 4340.00
Stack % Moisture: 18.00

Contaminants	Name	MW	GC:Liquid Concentration (mg/l)	GC: Gas Concentration (ppmv)
(1)	THC as METHANE	16.05	0.000	58.000
(2)				
(3)				
(4)				
(5)				
(6)				
(7)				
(8)				
(9)				
(10)				

Concentrations and Emissions

Contaminants	Name	LB/HR	PPMV(WET)	PPMV(DRY)
(1)	THC as METHANE	0.630	47.560	58.000
(2)	0.00	0.000	ERR	ERR
(3)	0.00	0.000	ERR	ERR
(4)	0.00	0.000	ERR	ERR
(5)	0.00	0.000	ERR	ERR
(6)	0.00	0.000	ERR	ERR
(7)	0.00	0.000	ERR	ERR
(8)	0.00	0.000	ERR	ERR
(9)	0.00	0.000	ERR	ERR
(10)	0.00	0.000	ERR	ERR

This Program Uses the Following Equations for Each Contaminant Where:

A = Total Wet Catch(mls)
B = Sample Volume (std. FT3)
C = Stack Moisture (%)
D = Stack Flowrate (DSCFM)
E = GC: Liquid Concentration (mg/l)
F = GC: Gas Concentration (dry ppmv)
G = Contaminant's Molecular Weight

For The Impinger Contents:
(H1) = dry ppmv = (0.846 x(A)x(E)) / ((G)x(B))
(J1) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K1) = pounds/hour = 0.000000133 x(A)x(E)x(D) / (B)

For the Gas Bag Contents:
(H2) = dry ppmv = (F)
(J2) = wet ppmv = (dry ppmv) x (100-(C)) / 100
(K2) = pounds/hour = 0.000000156 x (dry ppmv) x (D) x (G)

Concentrations and Emissions:
Total dry ppmv = (H1) + (H2)
Total wet ppmv = (J1) + (J2)
Total pounds/hour = (K1) + (K2)

Sample: Hills Brothers Plant, Afterburner Inlet and Outlet - Tested 8-31-88

Method: Volatile Organic Analysis - FID
all units are mg/l*

RECON ID	Run No.	Sample Location	Total Hydrocarbons as Methane
12417	1	Inlet	220
12418	2	Inlet	620
12419	3	Inlet	280
12420	1	Outlet	ND
12421	2	Outlet	ND
12422	3	Outlet	ND
Detection Limit			7.5

ND = none detected, less than the value shown
< = less than the value shown
* = total volume of 44ml

Samples from this project will be retained for sixty days from the date of this report unless otherwise directed.

RECON SYSTEMS, INC.
ROUTE 202N, BOX 460, THREE BRIDGES, NJ 08887
201-782-5900

CHAIN-OF-CUSTODY/REQUEST FOR ANALYSIS/DOT SHIPPING PAPER

(Use one ... mple) PROJECT MANAGER PFM

SAMPLE NO 12417-12419 ANALYTICAL RESULTS TO BE REPORTED TO: PAT

SAMPLE LOCATION After burner Inlet RECON JOB NO. 0654

SAMPLE DESCRIP. Impinger catch SAMPLING DATE/TIME 8/31/88 0830 BY: PFM/AWM

Relinquished By Person/Organ. (Signature)	Received By Person/Organ./ Date/Time (Signature)	Container Description and Preservative	Analysis Requested	Analysis Performed By Person/Lab	Date/Time Analysis Performed	Results
EM/Rec	ALH/FEL 9/6/88 0932	B 12417 Run 1	Total Hydrocarbons as Methane, ~~EO~~	R/ENS	8-7	
		B 12418 Run 2	Total Hydrocarbons as Methane, ~~EO~~	ENS/R	8-7	
		B 12419 Run 3	Total Hydrocarbons as Methane, ~~EO~~	ENS/R	8-7	

MAKE ADDITIONAL COMMENTS/NOTES

RUSH YES [X] NO [ ]

EMERGENCY YES [ ] NO [X]

COMPLIANCE OR TIER II YES [X]

...ES HAVE BEEN DETERMINED HAZARDOUS, PLEASE INCLUDE SHIPPING NAME, HAZARD CLASS, AND IDENTIFICATION NUMBER.

COPIES OF THIS FORM MUST BE ATTACHED TO EACH LABORATORY REPORT. ... T-37A (CPB)(July 11, 1988)

RECON SYSTEMS, INC.
ROUTE 202N, BOX 460, THREE BRIDGES, NJ 08887
201-782-5900

102

CHAIN-OF-CUSTODY/REQUEST FOR ANALYSIS/DOT SHIPPING PAPER

(Use one sample) PROJECT MANAGER PFM

SAMPLE NO. 12420-12422 ANALYTICAL RESULTS TO BE REPORTED TO: PAT

SAMPLE LOCATION After burner Outlet RECON JOB NO. 8654

SAMPLE DESCRIP. Impinger catch SAMPLING DATE/TIME 8/31/88 0830 BY: PFM/AWM

Relinquished By Person/Organ. Signature)	Received By Person/Organ./ Date/Time (Signature)	Container Description and Preservative	Analysis Requested	Analysis Performed By Person/Lab	Date/Time Analysis Performed	Results
PFM/Rec	ALH/FEC 9/6/88 0935	B 12420 Run 1	Total Hydrocarbons as Methane, ∅∅	R/ENS	8-7	
		B 12421 Run 2	Total Hydrocarbons as Methane, ∅∅	ENS/R	8-7	
		B 12422 Run 3	Total Hydrocarbons as Methane, ∅∅	ENS/R	8-7	

MAKE ADDITIONAL COMMENTS/NOTES

RUSH YES ☒ NO ☐

EMERGENCY YES ☐ NO ☒

COMPLIANCE OR TIER II YES ☒

MPLES HAVE BEEN DETERMINED HAZARDOUS, PLEASE INCLUDE SHIPPING NAME, HAZARD CLASS AND IDENTIFICATION NUMBER

COPIES OF THIS FORM MUST BE ATTACHED TO EACH LABORATORY REPORT

1437A (CP8) (July 11, 1988)

Linear Regression Calculations
for Gas Chromatographic Analysis - Impingers

RECON SYSTEMS INC
THREE BRIDGES, NJ

STANDARDS Conc. (mg/L)	STANDARDS Area Counts
0	5543
70.15	23679
1169	349417

UNKNOWNS Sample ID	Sample Number	Sample Area Counts	Dil. Factor	Dil. Samp. Conc. (mg/L)	Actual Conc. (mg/L)
Outlet-1	12420	5179	1.00	N/A	ND<7.5
Outlet-2	12421	4794	1.00	N/A	ND<7.5
Outlet-3	12422	4691	1.00	N/A	ND<7.5
Inlet-1	12417	69004	1.00	219.2	219
Inlet-2	12418	187981	1.00	622.3	622
Inlet-3	12419	85664	1.00	275.7	276

Method Detection Limit - 7.5 mg/L

COEFF. OF DETERMIN.
0.9999555

COEFF. OF CORRELATION
0.9999777

STD ERROR OF ESTIMATE
1.825E+03

Client: Ambient Engineering
Job Number: 0654
Hills Bros. Plant
Compound: Total HxCx (as Methane)
Sample Location: Afterburner (In & Out)
Sample Date: 8-31-88

Report Date: 07-Sep-88

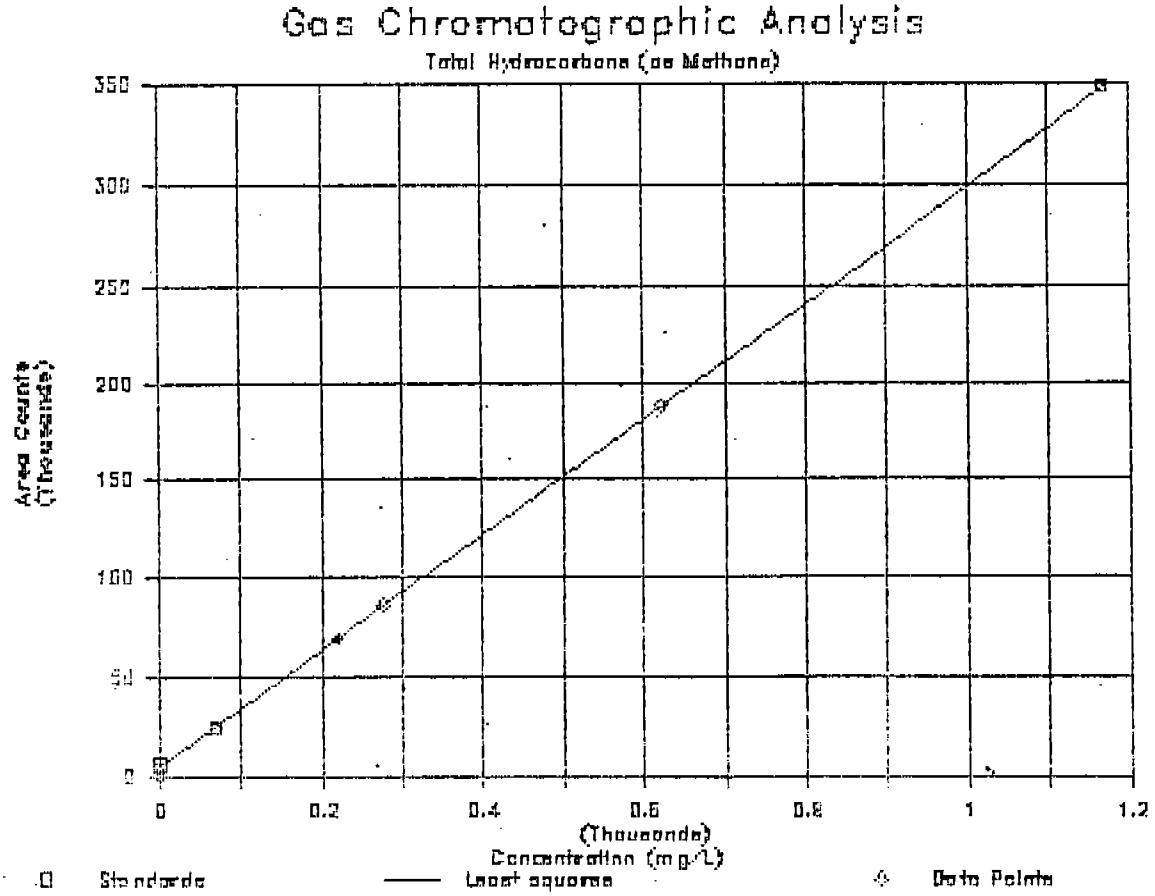
Samples Run: 6

Analyst: RNS

Reference: RNS#2, p.82

2uL inj. of samples and standards.

Total volume of 44 ml.



ut)

Total Hydrocarbons (Engineers Only)
(as Methane)

Analytical Conditions

Tracor 550 - GC/FID
H_2 - 30 ml/m ; Air - 1.0 ml/m
He carrier - 5.5 ml/m
inlet - 190°C detector - 260°C
isothermal oven - 185°C
col. - 6' x 1/4" ID Glass - empty (glass wool plugs)
Nelson Analytical Data Handling
2 ul, replicate injections of standards & samples
Att. - 10'

Standards (conc. as CH_4 (mg/L))

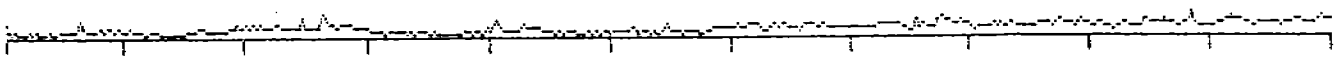
50 ul - Isobutyl Alcohol in 25 ml H_2O. ~~[illegible]~~ 116
3 ul Isobutyl Alcohol in 25 ml H_2O: 70.15 - ~~[illegible]~~
3 ul TBA in 25 ml H_2O: 7.02 - Too low -
300 ul Isobutyl Alcohol in 25 ml H_2O: ~~[illegible]~~ 70.5 (1 in cc.)

1 mg TBA = .728 mg CH_4 - (p. 4 - "Resp. Factors")

Continued on Page

Read and Understood By

Signed _____ Date _____ Signed _____ Date 9-13-88

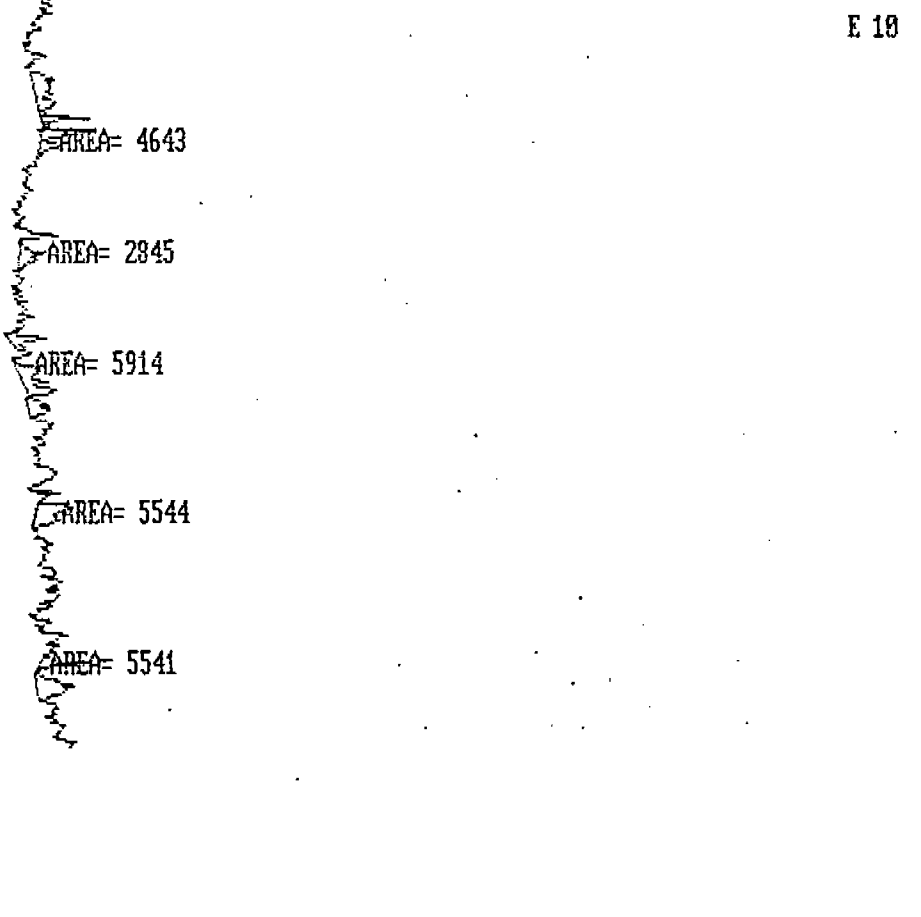


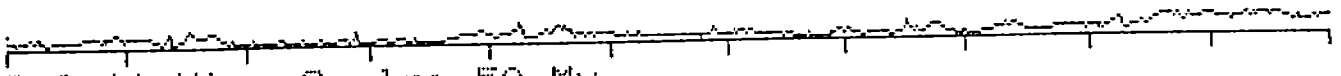
[Interface 1] 0-11 Min Scale: 50 Mv
BLANK DIST Processed: 09-07-1988 12:53:03, segment 1, cycle 1
Error, duplicate file name = E:AMB91.PTS
RAW DATA SAVED IN FILE E:ANB91.PTS

AREA PERCENT REPORT

```
*************************************************************************
* Sample Name: BLANK DISTILLED WATER  2uL        Operator Initials: RNS *
* Date:  09-07-1988 12:53:11 Method:FIDSCAN     DATA FILE: E:ANB91.PTS  *
* Interface: 1                Cycle#:  1        Channel#: 0   Vial#: N.A.*
* Starting Peak Width:  5     Threshold:  1                             *
*************************************************************************
*  Instrument Type: TRACOR MODEL 550          Column Type: 6' X 1/4'' GLASS *
*              Solvent Description: EMPTY - (GLASS WOOL PLUGS)            *
*   Operating Conditions: ISOTHERMAL OVEN 185-C, INJ. PORT 190-C, DET. 260-C *
*             Detector 0: FID                  Detector 1: NONE           *
*     Misc. Information: He carr. 5.5roto, 2uL repl. inj.                 *
*************************************************************************
```

```
  START TIME=    10.367  START HEIGHT=     8182
  STOP TIME=     9.983  STOP HEIGHT=     8129
AREA =  5541
  START TIME=     8.033  START HEIGHT=     8129
  STOP TIME=     7.683  STOP HEIGHT=     8202
  EA =  5544
  START TIME=     6.250  START HEIGHT=     8098
  STOP TIME=     5.733  STOP HEIGHT=     7847
AREA =  5914
  START TIME=     4.550  START HEIGHT=     7934
  STOP TIME=     4.133  STOP HEIGHT=     7998
AREA =  2845
  START TIME=     3.033  START HEIGHT=     8192
  STOP TIME=     2.533  STOP HEIGHT=     8305
AREA =  4643
Plot of data file:  E:ANB91.PTS
Date:  09-07-1988    Time:  13:21:45
Sample Name:  BLANK DISTILLED 5
Start Time=    0.02 Stop Time=  11.00Min. Scale=   7752Max. Scale=  19522
```





[Interface 1] 0-11 Min Scale: 50 Mv
S#12420 0 Processed: 09-07-1988 13:15:08, segment 1, cycle 3
RAW DATA SAVED IN FILE E:AMB93.PTS

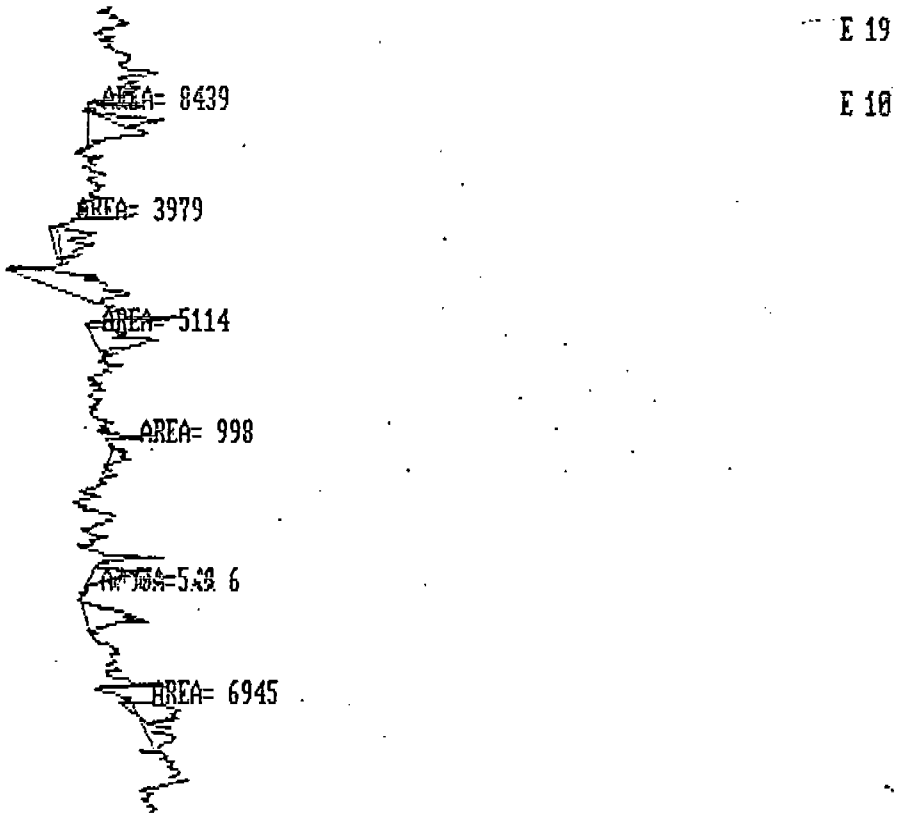
******** AREA PERCENT REPORT ********

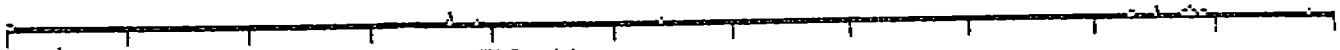
****
* Sample Name: S#12420 OUTLET RUN #1 - IMPINGERS
Operator Initials: RNS *
* Date: 09-07-1988 13:15:14 Method:FIDSCAN DATA FILE: E:AMB93.PTS *
* Interface: 1 Cycle#: 3 Channel#: 0 Vial#: N.A. *
* Starting Peak Width: 5 Threshold: 1 *
****
* Instrument Type: TRACOR MODEL 550 Column Type: 6' X 1/4'' GLASS *
* Solvent Description: EMPTY - (GLASS WOOL PLUGS) *
* Operating Conditions: ISOTHERMAL OVEN 185-C, INJ. PORT 190-C, DET. 260-C *
* Detector 0: FID Detector 1: NONE *
* Misc. Information: He carr. 5.5roto, 2uL repl. inj. *
****
Starting Delay: 0.00 Ending Retention Time: 11.00

Pk No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height

Total Area: 0 Area Reject: %1000000000 One sample per 1.000 sec.

```
   START TIME=    10.133  START HEIGHT=     8502
    TOP TIME=     9.433  STOP HEIGHT=      8314
AREA =  6945
   START TIME=     8.533  START HEIGHT=     7994
   STOP TIME=     8.067  STOP HEIGHT=      7903
AREA =  5243
   START TIME=     8.067  START HEIGHT=     7903
   STOP TIME=     7.650  STOP HEIGHT=      8029
AREA =  3136
   START TIME=     6.383  START HEIGHT=     8097
   STOP TIME=     6.000  STOP HEIGHT=      8178
AREA =  998
   START TIME=     4.717  START HEIGHT=     8061
   STOP TIME=     4.367  STOP HEIGHT=      7943
AREA =  5114
   START TIME=     3.533  START HEIGHT=     7756
   STOP TIME=     3.000  STOP HEIGHT=      7710
AREA =  3979
   START TIME=     1.883  START HEIGHT=     7959
   STOP TIME=     1.417  STOP HEIGHT=      7964
AREA =  8439
Plot of data file:  E:AMB93.PTS
Date:  09-07-1988     Time:  13:42:20
Sample Name:  S#12420  OUTLET 5
Start Time=    0.02 Stop Time=  11.00Min. Scale=   7205Max. Scale=  14570
```





[Interface 1] 0-11 Min Scale: 50 Mv
S#12421 0 Processed: 09-07-1988 13:33:48, segment 2, cycle 4
RAW DATA SAVED IN FILE E:AMB94.PTS

******** AREA PERCENT REPORT ********

****
* Sample Name: S#12421 OUTLET RUN #2 - IMPINGERS
Operator Initials: RNS *
* Date: 09-07-1988 13:33:55 Method:FIDSCAN DATA FILE: E:AMB94.PTS *
* Interface: 1 Cycle#: 4 Channel#: 0 Vial#: N.A. *
* Starting Peak Width: 5 Threshold: 1 *
****
* Instrument Type: TRACOR MODEL 550 Column Type: 6' X 1/4'' GLASS *
* Solvent Description: EMPTY - (GLASS WOOL PLUGS) *
* Operating Conditions: ISOTHERMAL OVEN 185-C, INJ. PORT 190-C, DET. 260-C *
* Detector 0: FID Detector 1: NONE *
* Misc. Information: He carr. 5.5roto, 2uL repl. inj. *
****
Starting Delay: 0.00 Ending Retention Time: 11.00

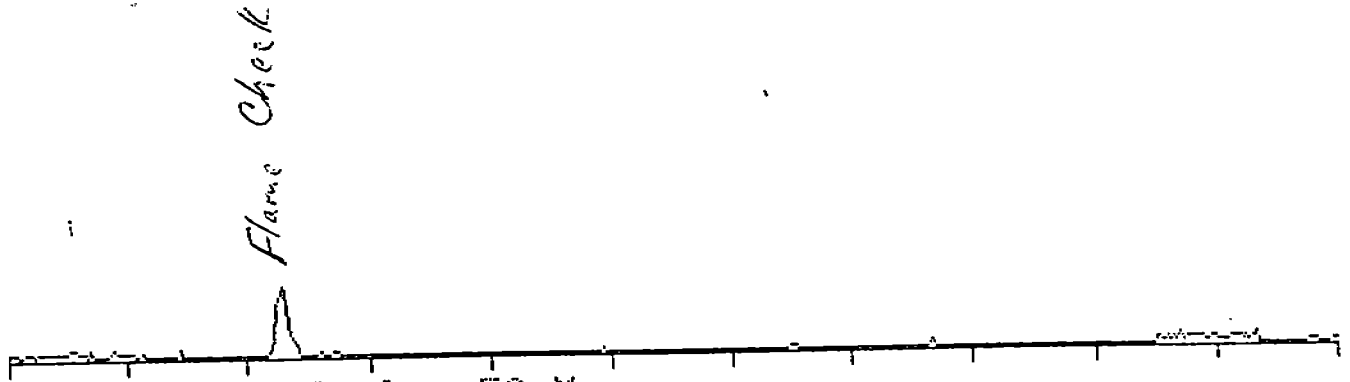
Pk No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height

Total Area: 0 Area Reject: %1000000000 One sample per 1.000 sec

Areas, times, and heights stored in: E:AMB94.ATB

```
DATA FILE E:AMB94.HDR TAKEN 09-07-1988 13:33:55
NEW PEAK WIDTH =  10
  START TIME=    10.083  START HEIGHT=     8281
  STOP TIME=     9.633  STOP HEIGHT=     8137
AREA =  5331
  START TIME=     8.067  START HEIGHT=     8242
  STOP TIME=     7.667  STOP HEIGHT=     8316
AREA =  4256
  START TIME=     6.350  START HEIGHT=     8353
  STOP TIME=     5.517  STOP HEIGHT=     8326
AREA =  6818
  START TIME=     1.133  START HEIGHT=     8196
  STOP TIME=     0.833  STOP HEIGHT=     8099
AREA =  2913
Plot of data file:  E:AMB94.PTS
Date:  09-07-1988    Time:  13:39:24
Sample Name:  S#12421  OUTLET 5
Start Time=   0.02 Stop Time=  11.00Min. Scale=   7616Max. Scale=  15096
```


```
DATA FILE E:AMB93.HDR TAKEN 09-07-1988 13:15:14
NEW PEAK WIDTH =  10
```



[Interface 1] 0-11 Min Scale: 50 Mv
S#12423 0 Processed: 09-07-1988 14:14:41, segment 1, cycle 5
RAW DATA SAVED IN FILE E:AMB95.PTS

********* AREA PERCENT REPORT **********

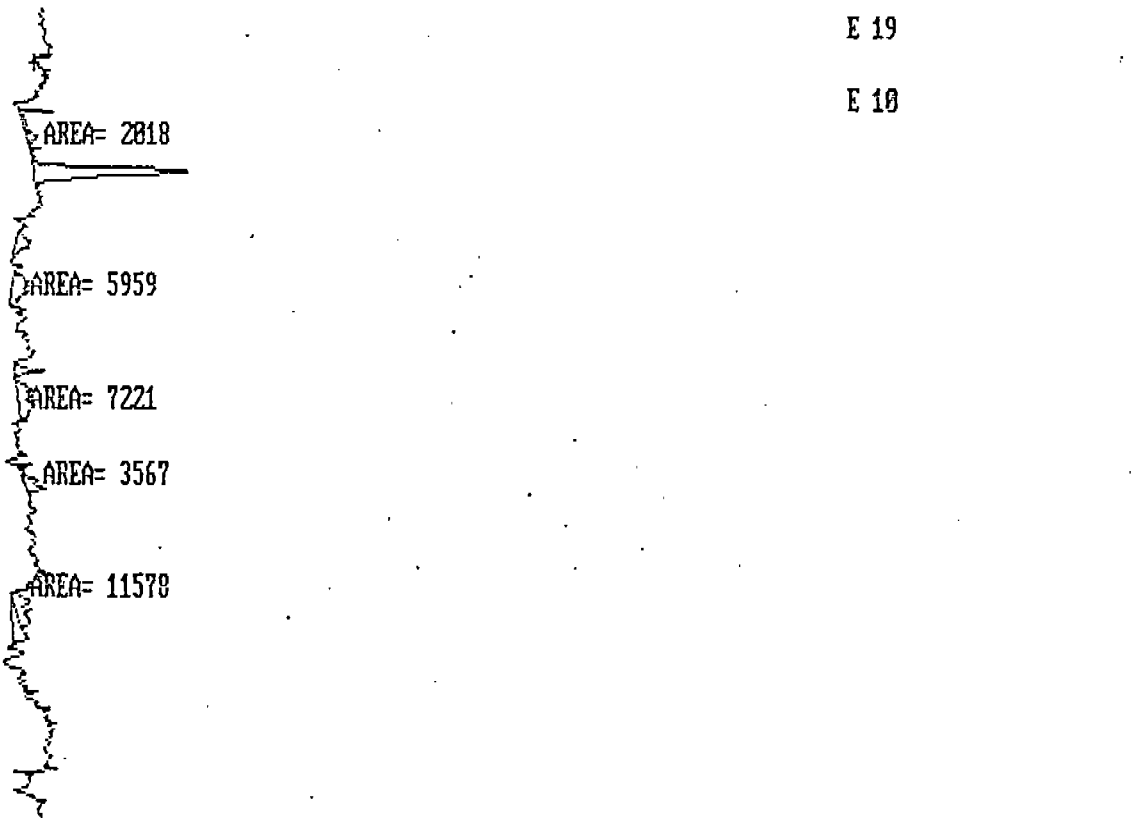
****
* Sample Name: S#12423 OUTLET RUN #3 - IMPINGERS
Operator Initials: RNS *
* Date: 09-07-1988 14:14:47 Method:FIDSCAN DATA FILE: E:AMB95.PTS *
* Interface: 1 Cycle#: 5 Channel#: 0 Vial#: N.A. *
* Starting Peak Width: 5 Threshold: 1 *
****
* Instrument Type: TRACOR MODEL 550 Column Type: 6' X 1/4'' GLASS *
* Solvent Description: EMPTY - (GLASS WOOL PLUGS) *
* Operating Conditions: ISOTHERMAL OVEN 185-C, INJ. PORT 190-C, DET. 260-C *
* Detector 0: FID Detector 1: NONE *
* Misc. Information: He carr. 5.5roto, 2uL repl. inj. *
****
Starting Delay: 0.00 Ending Retention Time: 11.00

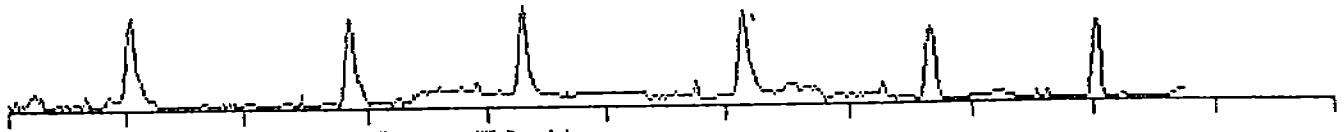
Pk No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height

Tota' Area: 0 Area Reject %1000000000 One sample per 1.000 sec.

111

```
   TA FILE E:AMB95.HDR TAKEN 09-07-1988 14:14:47
NEW PEAK WIDTH =  10
   START TIME=     8.650  START HEIGHT=      7645
   STOP TIME=     7.917  STOP HEIGHT=      7622
AREA =  11578
   START TIME=     6.700  START HEIGHT=      8047
   STOP TIME=     6.267  STOP HEIGHT=      7833
AREA =  3567
   START TIME=     5.633  START HEIGHT=      7819
   STOP TIME=     5.067  STOP HEIGHT=      7726
AREA =  7221
   START TIME=     4.067  START HEIGHT=      7589
   STOP TIME=     3.600  STOP HEIGHT=      7673
AREA =  5959
   START TIME=     2.033  START HEIGHT=      8037
   STOP TIME=     1.550  STOP HEIGHT=      7882
AREA =  2018
Plot of data file:  E:AMB95.PTS
Date:  09-07-1988    Time:  16:24:57
Sample Name:  S#12423  OUTLET 5
Start Time=   0.02 Stop Time=  11.00Min. Scale=   7327Max. Scale=  27537
```





[Interface 1] 0-11 Min Scale: 50 Mv
70.15 mg/L Processed: 09-07-1988 15:51:54, segment 1, cycle 9
RAW DATA SAVED IN FILE E:AMB99.PTS

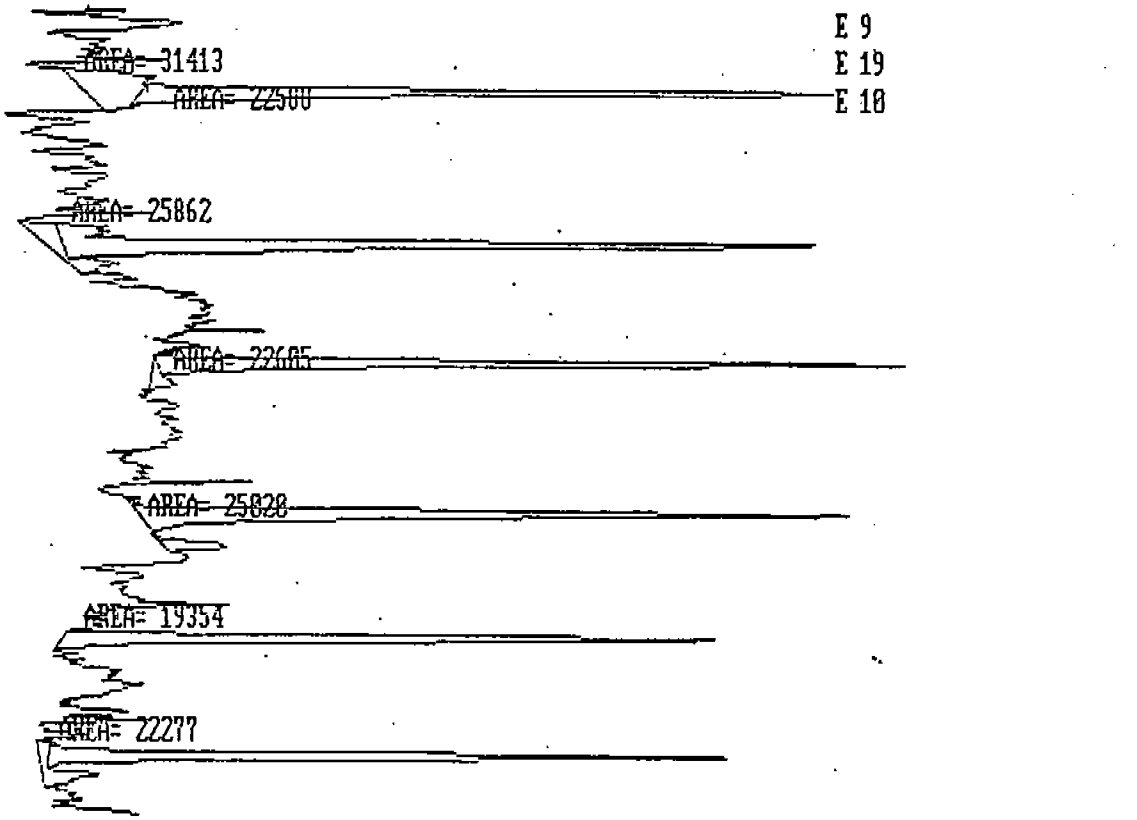
******** AREA PERCENT REPORT ********

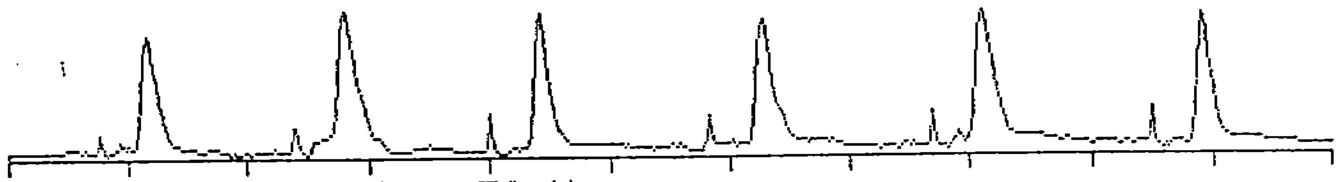
* Sample Name: 70.15 mg/L as Methane 2uL Pre - Cal.
Operator Initials: RNS
* Date: 09-07-1988 15:52:02 Method:FIDSCAN DATA FILE: E:AMB99.PTS
* Interface: 1 Cycle#: 9 Channel#: 0 Vial#: N.A.
* Starting Peak Width: 5 Threshold: 1
* Instrument Type: TRACOR MODEL 550 Column Type: 6' X 1/4'' GLASS
* Solvent Description: EMPTY - (GLASS WOOL PLUGS)
* Operating Conditions: ISOTHERMAL OVEN 185-C, INJ. PORT 190-C, DET. 260-C
* Detector 0: FID Detector 1: NONE
* Misc. Information: He carr. 5.5roto, 2uL repl. inj.
Starting Delay: 0.00 Ending Retention Time: 11.00

Pk No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height

one sample per 1.000 sec

```
DATA FILE E:AMB99.HDR TAKEN 09-07-1988 15:52:02
NEW PEAK WIDTH =  10
   START TIME=     9.400  START HEIGHT=     10996
   STOP TIME=      8.850  STOP HEIGHT=      10959
AREA =  22277
   START TIME=     7.783  START HEIGHT=     11056
   STOP TIME=      7.567  STOP HEIGHT=      11128
AREA =  19354
   START TIME=     6.600  START HEIGHT=     11712
   STOP TIME=      5.983  STOP HEIGHT=      11462
AREA =  25020
   START TIME=     4.617  START HEIGHT=     11596
   STOP TIME=      4.200  STOP HEIGHT=      11618
AREA =  22605
   START TIME=     3.017  START HEIGHT=     11131
   STOP TIME=      2.617  STOP HEIGHT=      11062
AREA =  25862
   START TIME=     1.250  START HEIGHT=     11338
   STOP TIME=      0.767  STOP HEIGHT=      11097
AREA =  31413
   START TIME=     1.233  START HEIGHT=     11479
   STOP TIME=      0.933  STOP HEIGHT=      11587
AREA =  22588
Plot of data file:   E:AMB99.PTS
   te:  09-07-1988     Time:  15:57:40
Sample Name:   70.15 mg/L as Me5
Start Time=    0.02 Stop Time=    9.75Min. Scale=  10686Max. Scale=  15861
```





[Interface 1] 0-11 Min Scale: 50 Mv
S#12417 I Processed: 09-07-1988 14:52:01, segment 1, cycle 6
RAW DATA SAVED IN FILE E:AMB96.PTS

******** AREA PERCENT REPORT ********

```
*************************************************************************
* Sample Name: S#12417  INLET RUN #1 - IMPINGERS Operator Initials: RNS  *
* Date:  09-07-1988 14:52:07 Method:FIDSCAN      DATA FILE: E:AMB96.PTS  *
* Interface: 1                 Cycle#:  6        Channel#: 0   Vial#: N.A. *
* Starting Peak Width:  5    Threshold:  1                               *
*************************************************************************
*  Instrument Type: TRACOR MODEL 550        Column Type: 6' X 1/4'' GLASS  *
*             Solvent Description: EMPTY - (GLASS WOOL PLUGS)            *
*   Operating Conditions: ISOTHERMAL OVEN 185-C, INJ. PORT 190-C, DET. 260-C *
*             Detector 0: FID                  Detector 1: NONE          *
*      Misc. Information: He carr. 5.5roto, 2uL repl. inj.               *
*************************************************************************
```

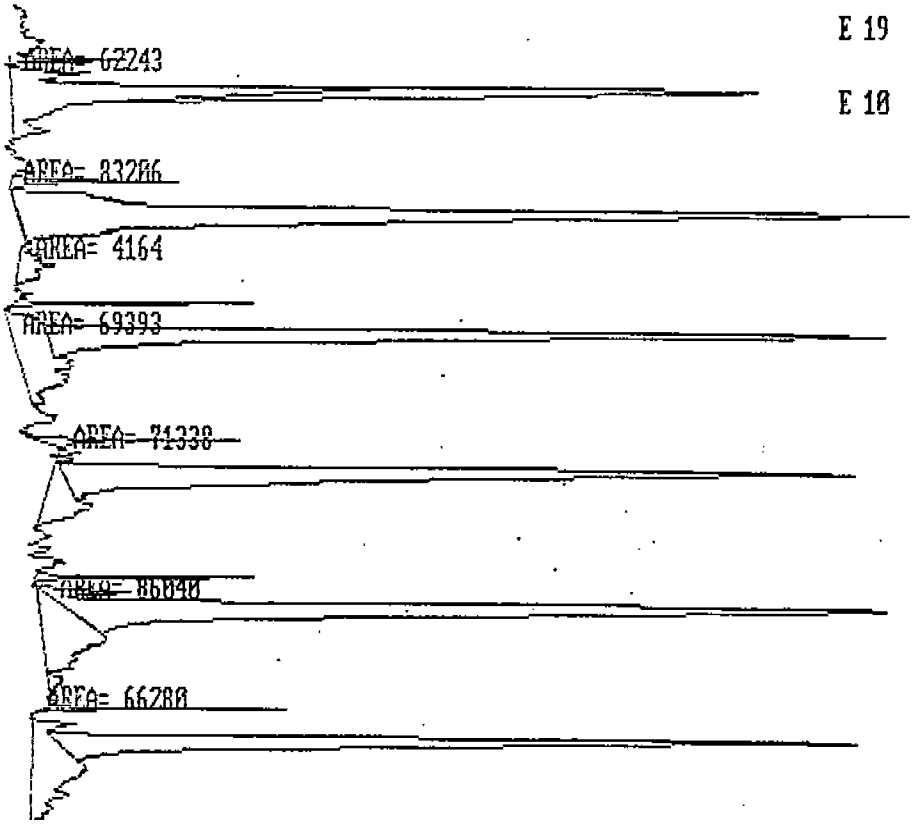
Starting Delay: 0.00   Ending Retention Time: 11.00

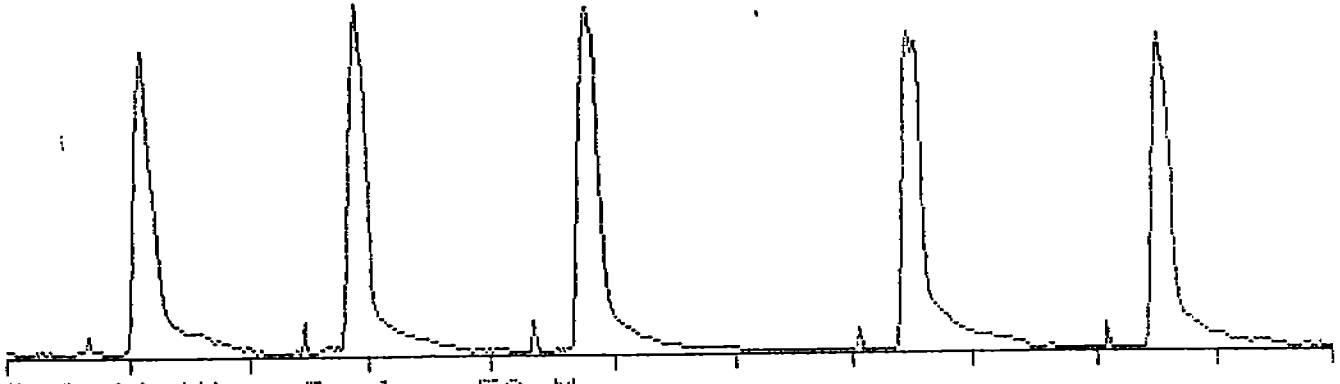
Pk No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height

Total Area: 0   Area Reject: %1000000000   One sample per 1.000 sec.

Area times, and heights stored in: E:AMB96.ATB
DATA ILE E:AMB96.HDR TAKEN 09-07-196 14:52:07

```
  START TIME=    10.983  START HEIGHT=     8636
  STOP TIME=     9.600   STOP HEIGHT=      8645
AREA =  66280
  START TIME=     9.350  START HEIGHT=     8773
  STOP TIME=     7.767   STOP HEIGHT=      8661
 A =  86040
  START TIME=     7.017  START HEIGHT=     8672
  STOP TIME=     5.967   STOP HEIGHT=      8841
AREA =  71338
  START TIME=     5.383  START HEIGHT=     8646
  STOP TIME=     4.100   STOP HEIGHT=      8409
AREA =  69393
  START TIME=     3.817  START HEIGHT=     8496
  STOP TIME=     3.267   STOP HEIGHT=      8540
AREA =  4164
  START TIME=     3.250  START HEIGHT=     8581
  STOP TIME=     2.500   STOP HEIGHT=      8447
AREA =  83206
  START TIME=     1.883  START HEIGHT=     8487
  STOP TIME=     0.817   STOP HEIGHT=      8448
AREA =  62243
Plot of data file:  E:AMB96.PTS
Date:  09-07-1988     Time:  14:55:01
Sample Name:  S#12417  INLET R5
Start Time=   0.02 Stop Time=  11.00Min. Scale=   8309Max. Scale=  15429
```





[Interface 1] 0-11 Min Scale: 50 Mv
S#12418 I Processed: 09-07-1988 15:08:09, segment 2, cycle 7
RAW DATA SAVED IN FILE E:AMB97.PTS

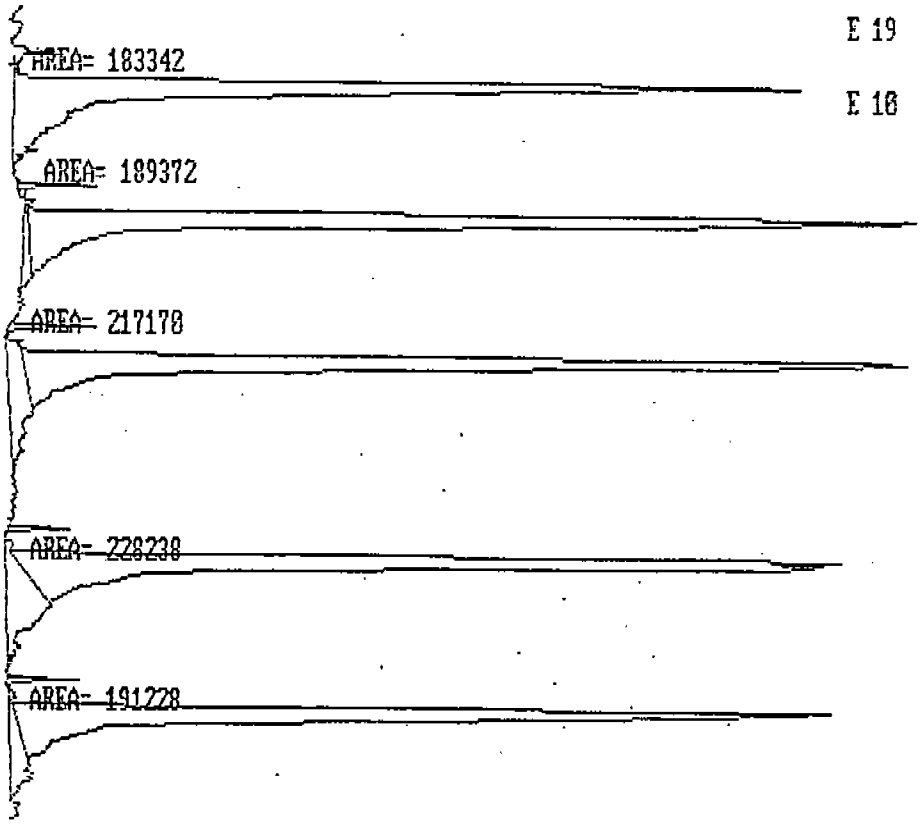
********** AREA PERCENT REPORT **********

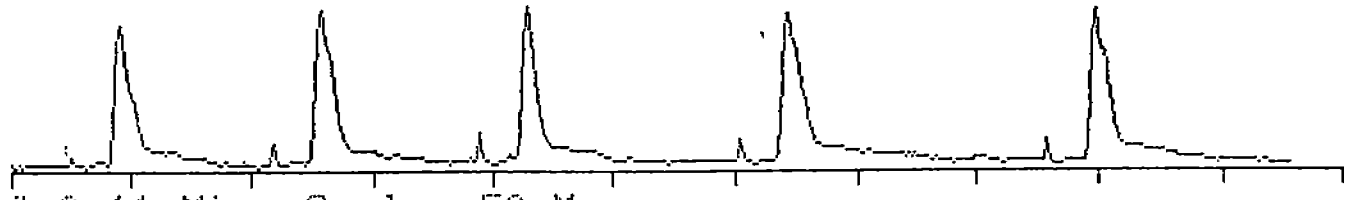
```
**************************************************************************
* Sample Name: S#12418  INLET RUN #2 - IMPINGERS Operator Initials: RNS   *
* Date:  09-07-1988 15:08:16 Method:FIDSCAN    DATA FILE: E:AMB97.PTS     *
* Interface: 1                 Cycle#:  7      Channel#: 0   Vial#: N.A.  *
* Starting Peak Width:  5    Threshold:  1                               *
**************************************************************************
*  Instrument Type: IRACUR MUDEL 550       Column Type: 6' X 1/4'' GLASS  *
*              Solvent Description: EMPTY - (GLASS WOOL PLUGS)           *
*   Operating Conditions: ISOTHERMAL OVEN 185-C, INJ. PORT 190-C, DET. 260-C *
*            Detector 0: FID                 Detector 1: NONE            *
*     Misc. Information: He carr. 5.5roto, 2uL repl. inj.                *
**************************************************************************
Starting Delay:   0.00                    Ending Retention Time:   11.00
```

Pk No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height

Tota Area: 0 Area Rejec %1000000000 One sample per 000 sec.

```
Areas, times, and heights stored in: E:AMB97.ATB
DATA FILE E:AMB97.HDR TAKEN 09-07-1988 15:08:16
NEW PEAK WIDTH =  10
   START TIME=    10.700  START HEIGHT=     8416
   STOP TIME=      9.200  STOP HEIGHT=      8370
   EA =  191228
   START TIME=     8.917  START HEIGHT=     8346
   STOP TIME=      7.150  STOP HEIGHT=      8281
AREA =  228238
   START TIME=     6.300  START HEIGHT=     8431
   STOP TIME=      4.467  STOP HEIGHT=      8279
AREA =  217170
   START TIME=     3.900  START HEIGHT=     8579
   STOP TIME=      2.500  STOP HEIGHT=      8633
AREA =  189372
   START TIME=     2.217  START HEIGHT=     8406
   STOP TIME=      0.817  STOP HEIGHT=      8442
AREA =  183342
Plot of data file:  E:AMB97.PTS
Date:  09-07-1988     Time:  15:10:22
Sample Name:  S#12418  INLET R5
Start Time=   0.02 Stop Time=  11.00Min. Scale=   8162Max. Scale=  25419
```





[Interface 1] 0-11 Min Scale: 50 Mv
S#12419 I Processed: 09-07-1988 15:24:22, segment 3, cycle 8
RAW DATA SAVED IN FILE E:AMB98.PTS

******** AREA PERCENT REPORT ********

```
**************************************************************************
* Sample Name: S#12419  INLET RUN #3 - IMPINGERS Operator Initials: RNS   *
* Date:  09-07-1988 15:24:29 Method:FIDSCAN     DATA FILE: E:AMB98.PTS    *
* Interface: 1                  Cycle#:  8      Channel#: 0    Vial#: N.A. *
* Starting Peak Width:  5     Threshold:  1                               *
**************************************************************************
*  Instrument Type: TRACOR MODEL 550        Column Type: 6' X 1/4'' GLASS *
*              Solvent Description: EMPTY - (GLASS WOOL PLUGS)            *
*   Operating Conditions: ISOTHERMAL OVEN 185-C, INJ. PORT 190-C, DET. 260-C *
*            Detector 0: FID                 Detector 1: NONE             *
*     Misc. Information: He carr. 5.5roto, 2uL repl. inj.                 *
**************************************************************************
Starting Delay:    0.00                    Ending Retention Time:    11.00
```

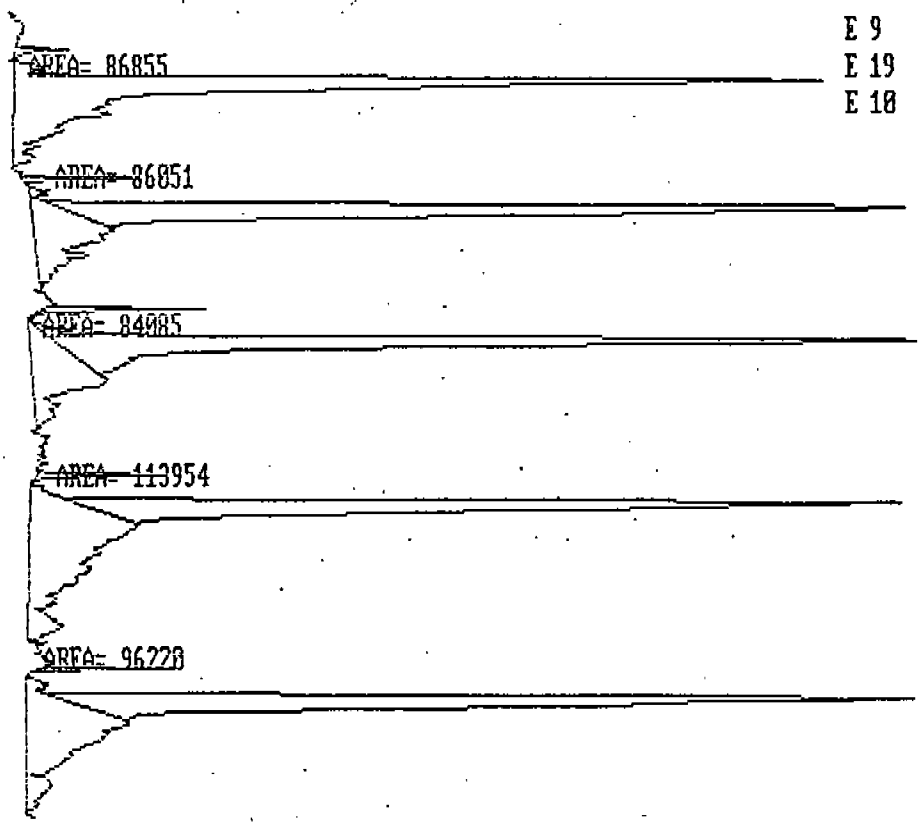
Pk No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height

Total Area: 0 Area Reject: %1000000000 One sample per 1.000 sec

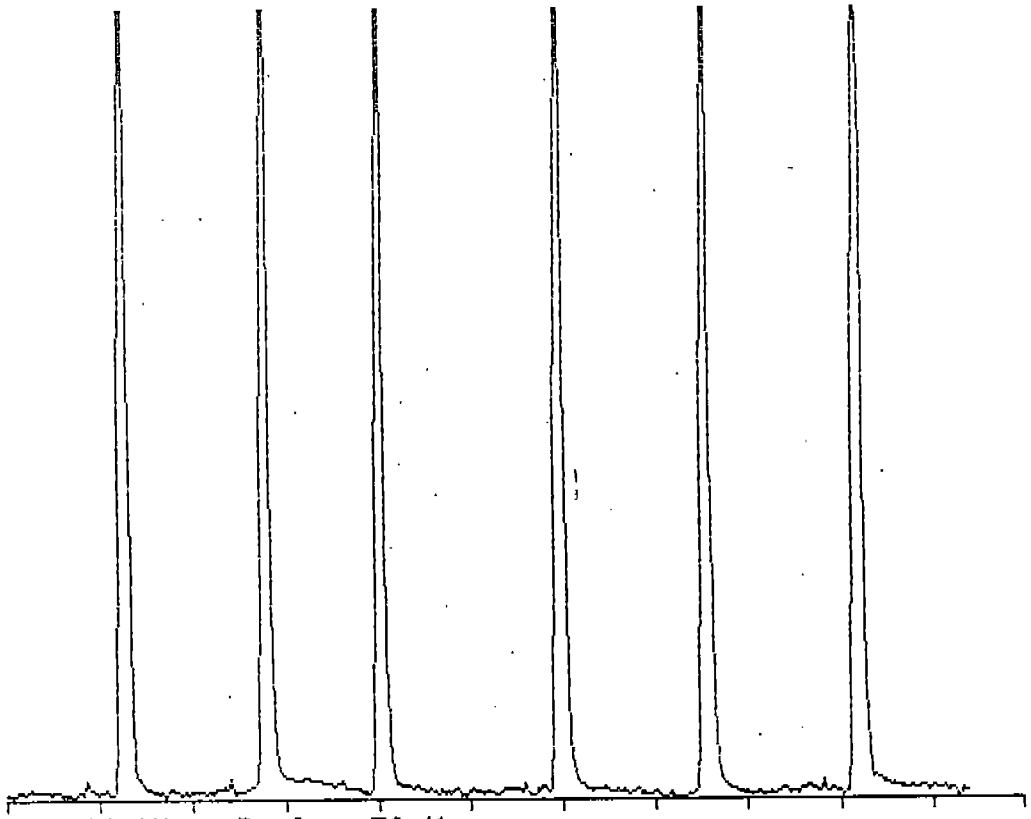
Areas, times, and heights stored in: E:AMB98.ATB

119

```
   TA FILE E:AMB97.HDR TAKEN 09-07-1988 15:08:16
DATA FILE E:AMB98.HDR TAKEN 09-07-1988 15:24:29
NEW PEAK WIDTH =  10
   START TIME=    10.450  START HEIGHT=     8322
   STOP TIME=     8.700  STOP HEIGHT=      8320
AREA =  96220
   START TIME=     8.217  START HEIGHT=     8334
   STOP TIME=     6.150  STOP HEIGHT=      8350
AREA =  113954
   START TIME=     5.433  START HEIGHT=     8412
   STOP TIME=     4.000  STOP HEIGHT=      8339
AREA =  84085
   START TIME=     3.633  START HEIGHT=     8446
   STOP TIME=     2.283  STOP HEIGHT=      8352
AREA =  86051
   START TIME=     2.050  START HEIGHT=     8221
   STOP TIME=     0.650  STOP HEIGHT=      8243
AREA =  86855
Plot of data file:  E:AMB98.PTS
Date:  09-07-1988    Time:  15:28:22
Sample Name:  S#12419  INLET R5
Start Time=   0.02 Stop Time=  10.53Min. Scale=   8091Max. Scale=  15752
```



SEQUENCE RECORDED IN E:AMB.SEQ



[Interface 1] 0-11 Min Scale: 50 Mv
1169 mg/L Processed: 09-07-1988 16:15:56, segment 1, cycle 10
RAW DATA SAVED IN FILE E:AMB910.PTS

******** AREA PERCENT REPORT ********

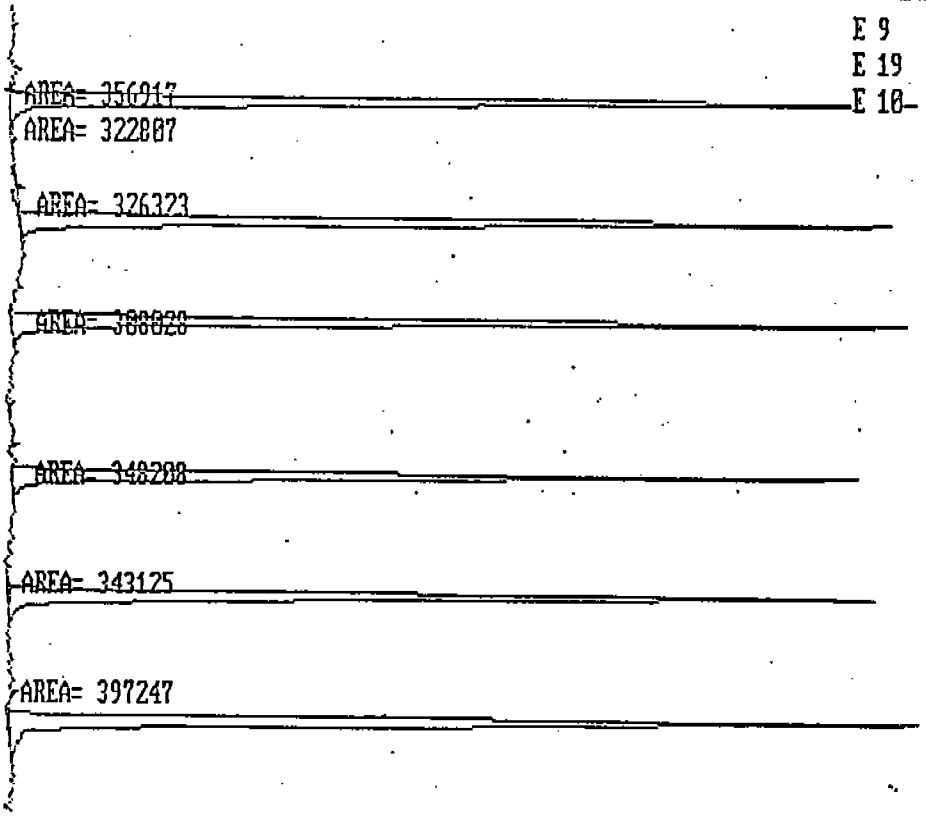
```
**********************************************************************
* Sample Name: 1169 mg/L as Methane  Post - Cal. Operator Initials: RNS
* Date:  09-07-1988 16:16:03 Method:FIDSCAN     DATA FILE: E:AMB910.PTS
* Interface: 1                  Cycle#:  10      Channel#: 0    Vial#: N.A.
* Starting Peak Width:  5     Threshold:  1
**********************************************************************
*  Instrument Type: TRACOR MODEL 550       Column Type: 6' X 1/4'' GLASS
*              Solvent Description: EMPTY - (GLASS WOOL PLUGS)
*   Operating Conditions: ISOTHERMAL OVEN 185-C, INJ. PORT 190-C, DET. 260-
*            Detector 0: FID                  Detector 1: NONE
*     Misc. Information: He carr. 5.5roto, 2uL repl. inj.
**********************************************************************
Starting Delay:   0.00                      Ending Retention Time:   11.00
```

Pk No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height

Total Area: 0 Area Reject: %1000000000 One sample per 1.000

Areas, times, and heights stored in: E:AMB910.ATB

```
ATA FILE E:AMB910.HDR TAKEN 09-07-1988 16:16:03
FW PEAK WIDTH =  10
     RT TIME=     9.850  START HEIGHT=     11240
 STOP TIME=     9.017  STOP HEIGHT=     10751
REA =  397247
 START TIME=     7.967  START HEIGHT=     10935
 STOP TIME=     7.317  STOP HEIGHT=     10734
REA =  343125
 START TIME=     6.433  START HEIGHT=     11264
 STOP TIME=     5.850  STOP HEIGHT=     11081
REA =  348208
 START TIME=     4.450  START HEIGHT=     11236
 STOP TIME=     3.883  STOP HEIGHT=     10927
REA =  308028
 START TIME=     3.100  START HEIGHT=     11740
 STOP TIME=     2.617  STOP HEIGHT=     11182
REA =  326323
 STOP TIME=     1.700  STOP HEIGHT=     10746
REA =  322807
 START TIME=     1.700  START HEIGHT=     10746
 STOP TIME=     1.133  STOP HEIGHT=     10831
REA =  356917
lot of data file:  E:AMB910.PTS
ate:  09-07-1988    Time:  16:18:43
ample Name:  1169 mg/L as Met5
tart Time=   0.02 Stop Time=  10.32Min. Scale=  10442Max. Scale=  75398
```

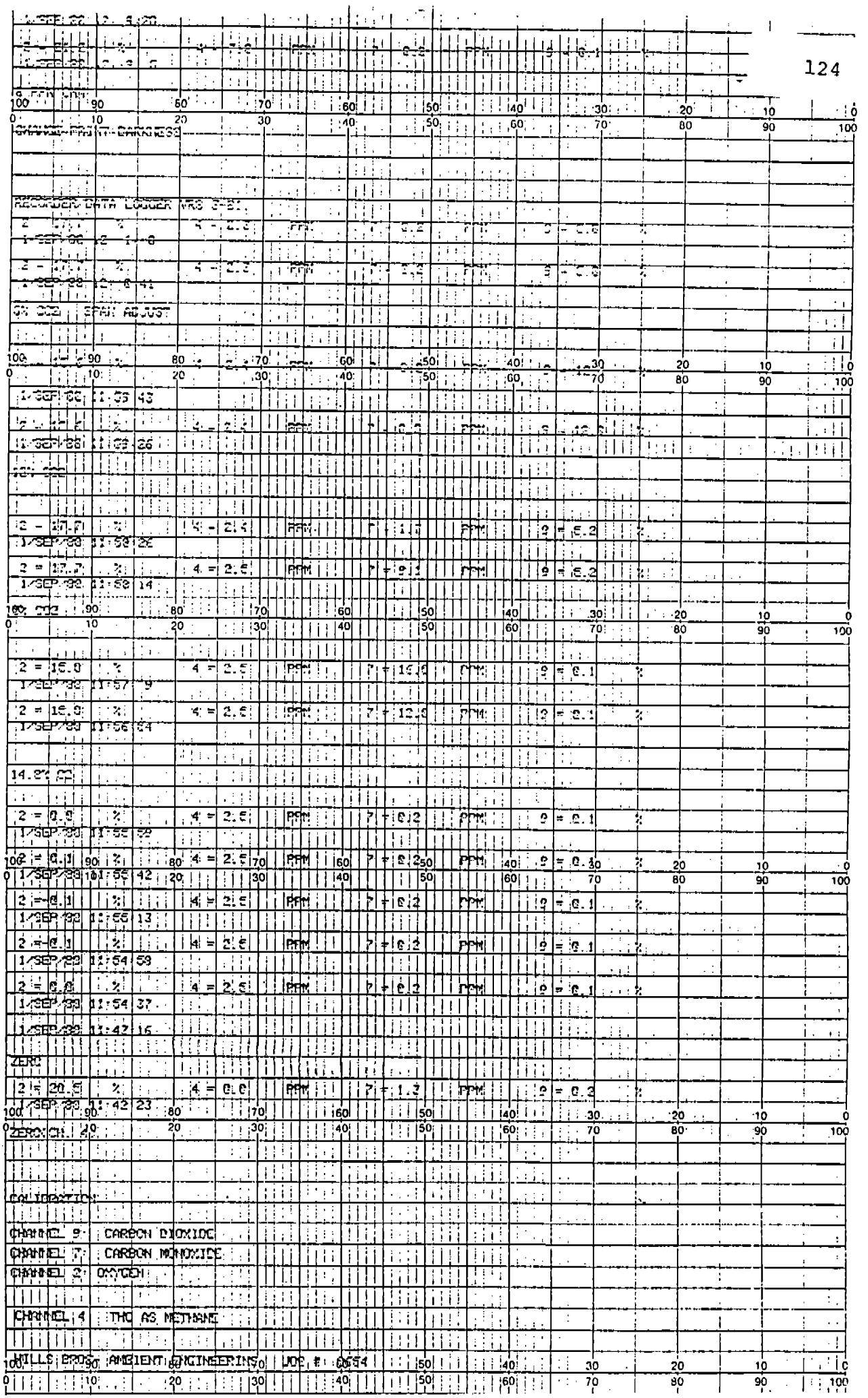


Sample: Hills Brothers Plant, 80L Tedlar Bags Sampled 8/31/88

Method:

RECON ID	Run No.	Sample Location	Total Hydrocarbons as methane	Carbon Monoxide ppm	Oxygen %	Carbon Dioxide %
12423	1	Inlet	275	462	17.0	2.7
12424	2	Inlet	526	628	16.8	2.7
12425	3	Inlet	490	610	16.5	2.9
12426	1	Outlet	134	2.2	21.1	0.1
12427	2	Outlet	90	1.3	21.1	0.1
12428	3	Outlet	58	1.3	21.1	0.1
Detection Limit			1.	1.0	0.1	0.1

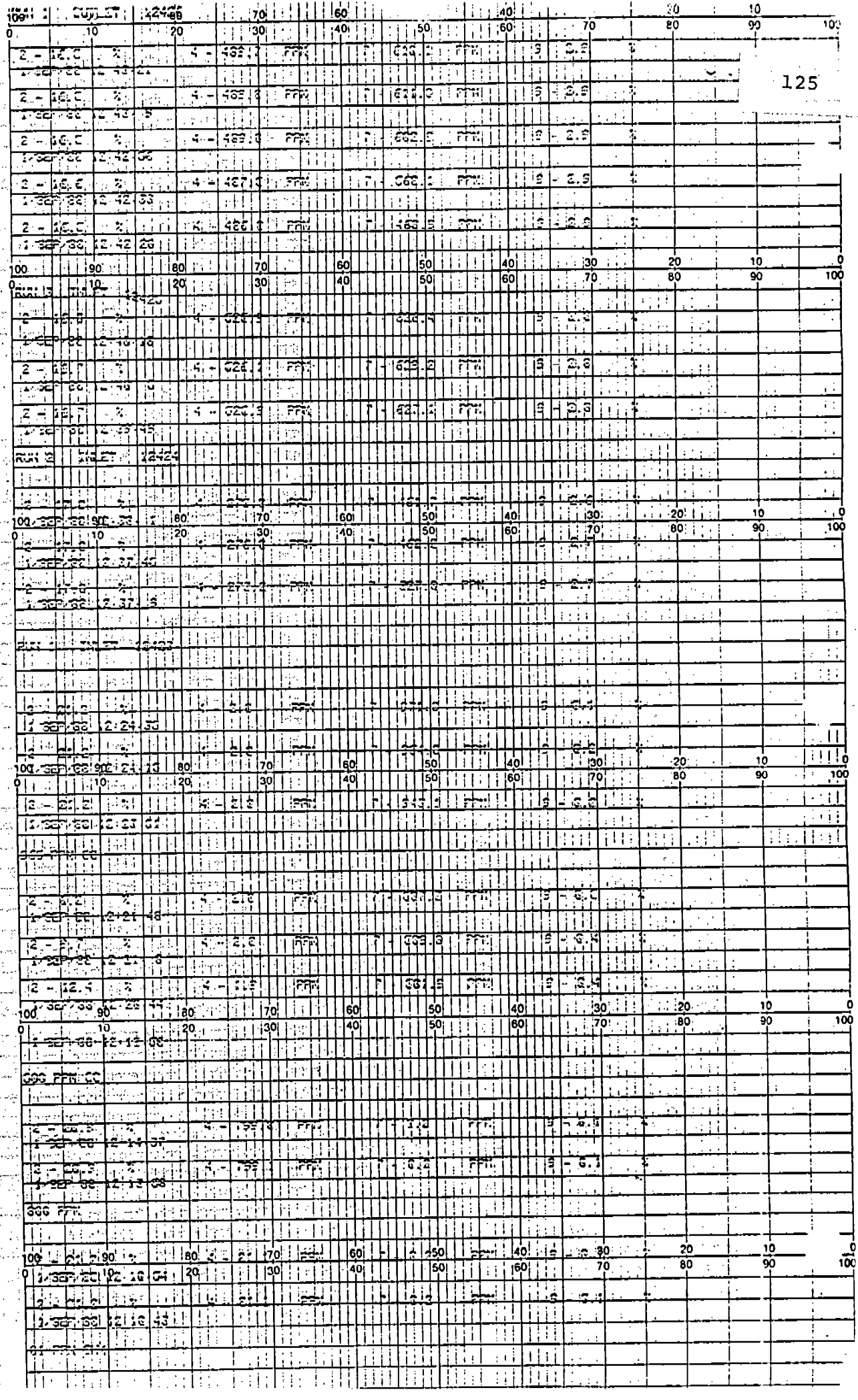
Samples from this project will be retained for sixty days from the date of this report unless otherwise directed.



TOLL FREE IN U.S.: (800) 245-5101 FAX (412) 261-7220

MOLYTEK INC.

CHART NO. 414446



(800) 245-5101 FAX (412) 261-7220

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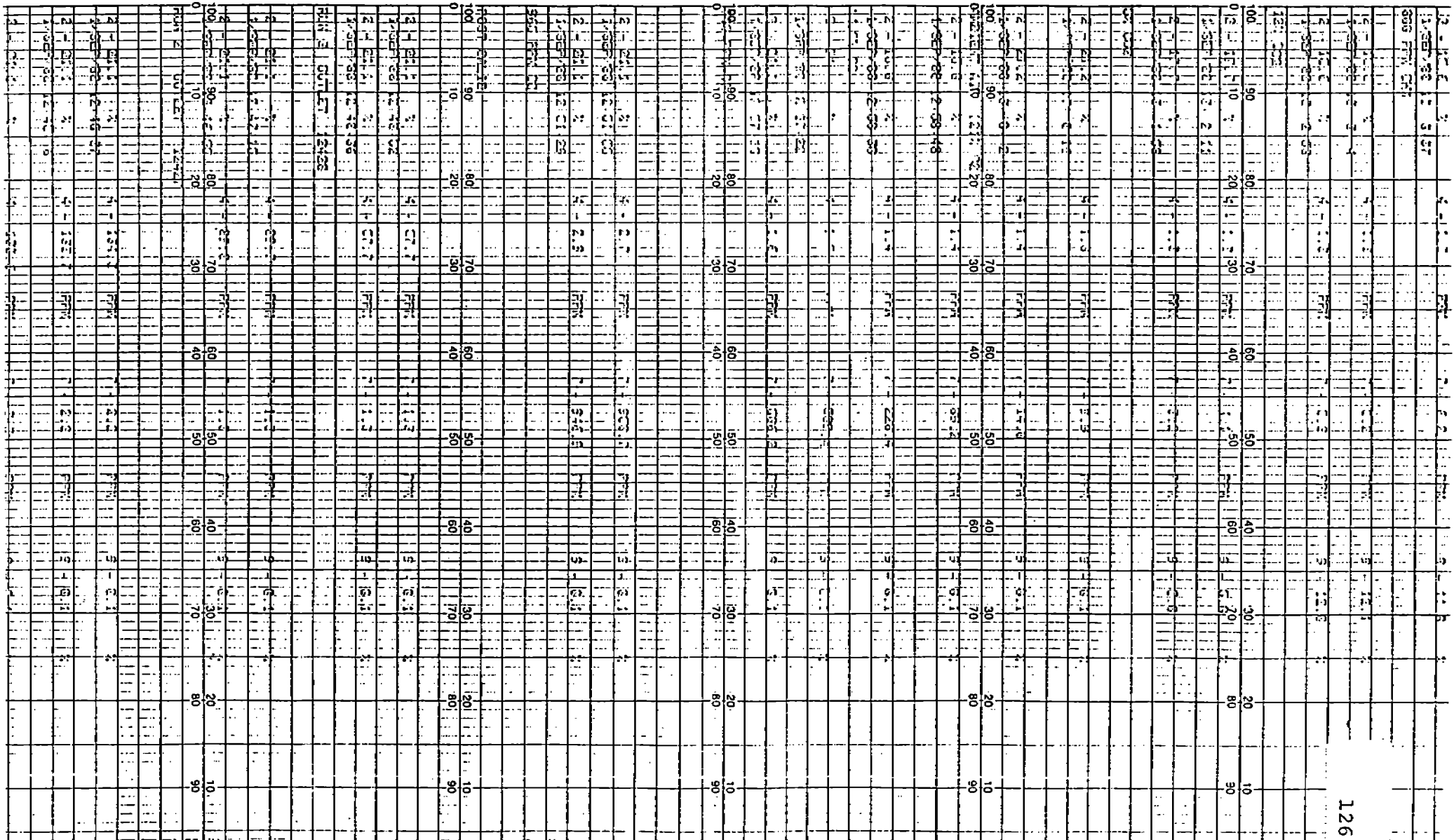

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