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**SOURCE  
EMISSION  
EVALUATION  
REPORT**

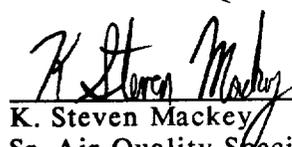
**AUGUST 31, 1990**

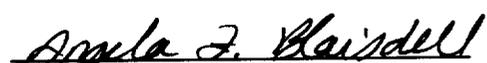
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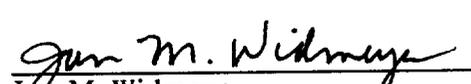
**SWEET-EDWARDS/EMCON, INC.  
LAND RECOVERY, INC.  
HIDDEN VALLEY LANDFILL  
GAS COMBUSTOR TESTING  
PUYALLUP, WASHINGTON  
MAY 30, 1990**

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*We certify that the information contained herein is accurate and complete  
to the best of our knowledge.*

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## 1.0 INTRODUCTION

The purpose of this source emission evaluation was to quantify emission levels during typical operation of a gas combustor installed at Land Recovery, Inc.'s Hidden Vally Landfill in Puyallup, Washington. Landfill gases are extracted from the landfill and are piped to the combustor area where they are incinerated by the flare prior to emitting the exhaust gas to the atmosphere. The gas at the inlet and the outlet of the landfill gas combustor (also called flare) was sampled by Am Test, Inc.'s Air Quality Division on May 30, 1990. The testing was performed to demonstrate compliance with the requirements of the Puget Sound Air Pollution Control Agency (PSAPCA).

The landfill gas combustor is a McGill Environmental combustor. The combustor is a refractory-lined steel shell with a landfill gas burner at the base. The system is designed to burn a maximum 2,100 scfm of gas, while providing a minimum 1.0 second residence time at 1800° F. With these requirements, the combustor configuration that resulted is 9 feet in diameter and reaches an elevation of 40 feet. An extractive collection system supplies the landfill gas to the combustor. Centrifugal blowers create the necessary vacuum in the gas collection wells and trenches to extract the gas and vent it through the combustor burner.

The testing performed on May 30, 1990 was conducted to determine the inlet and outlet emission concentration, mass emissions rate, and the destruction efficiency of the combustor system which controls emissions of landfill gas. The inlet and outlet gas streams were measured to quantify the gas velocity, gas temperature, percent carbon dioxide, percent oxygen, ppm carbon monoxide, percent moisture, hydrochloric acid (HCl), total sulfur (TS) (including sulfur dioxide (SO<sub>2</sub>), hydrogen

sulfide ( $\text{H}_2\text{S}$ ) and total reduced sulfur (TRS)), nitrogen oxides ( $\text{NO}_x$ ), and volatile organic compounds (VOCs).

Volatile organic compounds (VOCs) were collected at the inlet in Tedlar<sup>R</sup> bags. VOCs were collected at the outlet using Compendium Method T0-14. This technique involves collecting an integrated sample of gas in an electropolished SUMMA<sup>R</sup> six-liter stainless steel canister. The integrated samples were analyzed using EPA Method 8240, which utilizes a gas chromatograph equipped with a mass spectrophotometer detector (GC-MS). In addition to the volatile organic compounds identified by GC-MS procedures, the fixed gases at the inlet (carbon dioxide, carbon monoxide, oxygen, nitrogen, methane) were analyzed using a GC equipped with a thermal conductivity detector (GC-TCD). The fixed gases at the outlet were analyzed on-site using instrumental analyzers.

Environmental Protection Agency (EPA) sampling and analysis methods specified in the July 1, 1989 Title 40 Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, Methods 1, 2, 3A, 4, 6C, 7E and 16A were utilized. Methods 1 and 2 were performed to determine the stack gas velocity and volumetric flow rate. Method 3A was performed to determine the molecular weight of the stack gas. Method 4 was performed to measure the moisture content of the stack gas at the outlet. Chlorides as hydrochloric acid (HCl) were collected in the moisture sample train. Method 16A/6C was performed to determine the total sulfur (TS) emission concentration. Total sulfur was measured at the outlet site only. Method 7E was performed to determine the nitrogen oxides ( $\text{NO}_x$ ) emission concentration at the outlet. Three (3) replicate samples of each type were collected.

The samples were collected by Mr. K. Steven Mackey, and Ms. Jan M. Widmeyer of Am Test, Inc.'s Air Quality Division. Analysis of the volatile organic samples was performed by Coast-to-Coast Analytical of San Luis Obispo, California. Analysis of the chloride samples was performed by Am Test, Inc.'s Water Chemistry division. Data reduction and final report preparation was performed by Mr. Kris A. Hansen, Ms. Angela F. Blaisdell, and Ms. Jan M. Widmeyer of Am Test. Mr. David Vonasek coordinated this project for Sweet-Edwards/EMCON. Mr. Fred Austin of the Puget Sound Air Pollution Control Agency (PSAPCA) observed the field sampling. Mr. Harvey A. Doman of Land Recovery, Inc. is the Operations Manager for Land Recovery, Inc. who manages the Hidden Valley Landfill.

A summary of the methodology which was used, and details of the information that each type of test yields is included below:

<b><u>Methodology</u></b>	<b><u>Information Obtained</u></b>
<b>EPA Method 1, 2</b>	Velocity, airflow, and temperature.
<b>EPA Method 3A</b>	Combustion gas composition (percent carbon dioxide, oxygen, and carbon monoxide).
<b>EPA Method 4</b>	Percent moisture in stack gas. Hydrochloric acid emissions are also quantified in this sample train by bubbling the gas through water and analyzing the liquid for chlorides.
<b>EPA Method 6C/16A</b>	Total Sulfur (TS) emission concentration and mass rate at the outlet.
<b>EPA Method 7E</b>	Nitrogen Oxides (NO <sub>x</sub> ) emission concentration and mass rate at the outlet.
<b>Method TO-14</b>	Volatile organic compound emission concentration and mass rate. TO-14 was performed at the outlet site. Destruction efficiency for VOCs.
<b>EPA Method 8240</b>	Purge and trap method for GC-MS analysis of VOC samples collected at the inlet and outlet.

## 2.0 SUMMARY OF RESULTS

The following sections of this report summarize the findings of this emission evaluation. The order of presentation is sequentially, by EPA method number (i.e., Method 1, 2, 3A, 4, 6C, 7E, and VOCs). There are summary tables which include results from measurements collected at the inlet and outlet of the flare on pages 9 and 10. These summary tables contain information obtained from computer printouts of results for each individual run which are included in Appendix A of this report. Appendix B of this report contains copies of the original laboratory data from Coast-to-Coast Analytical and Am Test, Inc.'s Water Chemistry Division. Appendix C of this report contains example calculations of the results for each type of test performed. Appendix D of this report contains copies of the original field data sheets. Appendix E of this report contains supporting information and schematics of the sample trains utilized. The Table of Contents should be consulted to locate the page number of specific information the reader may be interested in.

## 2.1 EPA Methods 1 and 2 - Airflow Determination

The velocity and temperature of the gas passing through the inlet duct was measured during this testing program. The average temperature at the inlet was 94° F. The velocity of the inlet gas stream averaged 18.1 ft/second, or 1086 ft/minute. The airflow of landfill gas into the system was 757.2 dry standard cubic feet per minute (dscf/min) on the test day. The results of the airflow determination at the inlet are presented in the summary table on page 9.

A range of velocity heads and temperatures were also measured at the outlet of the flare. The average velocity at the outlet was 11.4 ft/second. The average airflow through the stack was 10,112 dscf/min. The average temperature at the outlet was 1560° F. These averages are based on measurements taken during the three (3) 60-minute moisture/chloride runs. The results of the airflow determination at the outlet are presented in the summary table on page 10. The residence time based on combustion from the burner to the sample port was calculated to be 2.6 seconds using actual cubic feet per minute (ft/min) and an average temperature of 1560° F.

## 2.2 EPA Method 3A and Fixed Gases Analysis

EPA Method 3A procedures were used by Am Test in the field to obtain continuous measurements of oxygen, carbon dioxide and carbon monoxide during each test at the flare outlet. Fixed gases were also quantified by Coast-to-Coast Analytical using the gas collected at the inlet in Tedlar<sup>R</sup> bags. Average combustion gas values obtained at the inlet and outlet of the flare are presented in Table 2.2 below.

**Table 2.2.** Concentration of gaseous constituents found in the inlet and outlet landfill gas at the Hidden Valley Landfill on May 30, 1990.

COMPOUND	AVERAGE INLET GAS CONCENTRATIONS	AVERAGE OUTLET GAS CONCENTRATIONS
Methane (%)	41	NA
Carbon Dioxide (%)	25	7.4
Oxygen (%)	5.0	12.5
Carbon Monoxide (percent)	< 0.1	0
Nitrogen (%)	28	80.1

### **2.3 EPA Method 4 - Moisture and Hydrochloric Acid**

The moisture concentration at the inlet to the flare was estimated using psychrometry, and was confirmed during run 3 using a wet bulb-dry bulb technique. The average moisture was 5.3%. The results of the three (3) Method 4 moisture tests for quantifying moisture and hydrochloric acid emissions at the outlet of the flare are presented in the summary table on page 10. The average moisture at the outlet of the flare was 9.2%. The average chloride emission concentration was 10.76 parts per million (ppm), or 17.82 ppm corrected to 7% oxygen.

#### 2.4 EPA Method 6C/16A and 7E - Total Sulfur and Nitrogen Oxides

On May 30, 1990 the landfill gas at the outlet of the flare were continuously monitored to measure the total sulfur (TS) and nitrogen oxides (NO<sub>x</sub>) content of the gas. A gas sample was continuously extracted from the stack and passed through a thermal oxidizer which converts total reduced sulfur compounds (TRS) and hydrogen sulfide (H<sub>2</sub>S) to sulfur dioxide (SO<sub>2</sub>). The oxidized gas sample was introduced to a fluorescence analyzer for measuring total sulfur as SO<sub>2</sub>. A portion of the sample was also conveyed to an instrumental chemiluminescent analyzer for measuring the NO<sub>x</sub> concentration (as nitrogen dioxide-NO<sub>2</sub>).

Measurements were recorded every minute over three (3) 60-minute periods. The readings were recorded using a data logger, and were averaged for each test period. Printouts of the 1-minute readings and the averages are included in Appendix A of this report. The emission concentration and emission rate of each gas measured during each run are included the summary table on page 10. The average total sulfur (TS) emission concentration was 20.5 parts per million (ppm). The average TS emission rate was 2.06 pounds per hour (lb/hr). The average NO<sub>x</sub> emission concentration was 21.2 parts per million (ppm). The average NO<sub>x</sub> emission rate was 1.54 lb/hr.

**SUMMARY OF RESULTS - METHODS 1, 2, 3a AND 4  
AM TEST, INC. - AIR QUALITY DIVISION**

FILE NAME: 24/HIVALSUM  
 CLIENT: SWEET EDWARDS/EMCON  
 LOCATION: HIDDEN VALLEY LANDFILL  
 SAMPLE SITE: FLARE STACK INLET

	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	G-2051-1	G-2051-2	G-2051-3	
DATE:	5/30/90	5/30/90	5/30/90	
START TIME:	11:13	12:37	14:05	
STOP TIME:	12:13	13:37	15:05	
STACK GAS MOISTURE (Percent):	5.4	4.9	5.5	5.3
BAROMETRIC PRESSURE (Inches of Hg):	29.28	29.22	29.21	29.24
STATIC PRESSURE (Inches of H2O):	2.4	2.4	2.4	2.4
STACK PRESSURE (Inches of Hg):	29.46	29.40	29.39	29.42
STACK TEMPERATURE (Degrees F.):	94.2	91.5	95.0	93.6
STACK TEMPERATURE (Degrees R.):	554.2	551.5	555.0	553.6
METHANE (Percent):	41	41	42	41
NITROGEN (Percent):	29	29	27	28
CARBON DIOXIDE (Percent):	25	25	26	25
OXYGEN (Percent):	5.2	5.3	4.6	5.0
CARBON MONOXIDE (Percent):	<0.1	<0.1	<0.1	<0.1
MOLECULAR WEIGHT (Dry, Lb/Lb-Mole):	32.21	32.21	32.34	32.25
MOLECULAR WEIGHT (Wet, Lb/Lb-Mole):	31.44	31.52	31.56	31.51
STACK GAS VELOCITY (Feet per Second):	17.8	18.0	18.4	18.1
STACK AREA (Square Feet):	0.785	0.785	0.785	0.79
AIRFLOW (Dry Std. Cubic Feet per Min.):	744.6	758.7	768.2	757.2
AIRFLOW (Actual Cubic Feet per Min.):	839.1	848.2	866.4	851.2

SUMMARY OF RESULTS - METHODS 1, 2, 3A, 4, 6C, 7E, 10 AND HCL  
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 65/HIVALSUM  
CLIENT: SWEET-EDWARDS/EMCON  
LOCATION: HIDDEN VALLEY LANDFILL  
SAMPLE SITE: FLARE STACK OUTLET

	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	G-2051-4	G-2051-5	G-2051-6	
DATE:	5/30/90	5/30/90	5/30/90	
START TIME:	11:07	12:34	14:01	
STOP TIME:	12:07	13:34	15:01	
VOLUME SAMPLED (Cubic Feet):	26.830	27.181	31.729	28.580
VOLUME SAMPLED (Dry Std. Cubic Feet):	26.147	26.125	30.385	27.552
VOLUME SAMPLED (Dry Std. Cubic Meters):	0.740	0.740	0.861	0.780
STACK GAS MOISTURE (Percent):	9.04	9.30	9.15	9.16
BAROMETRIC PRESSURE (Inches of Hg):	29.28	29.22	29.21	29.24
STATIC PRESSURE (Inches of H2O):	-0.105	-0.105	-0.065	-0.09
STACK PRESSURE (Inches of Hg):	29.27	29.21	29.21	29.23
STACK TEMPERATURE (Degrees F.):	1533.6	1583.0	1563.5	1560.0
STACK TEMPERATURE (Degrees R.):	1993.6	2043.0	2023.5	2020.0
CARBON DIOXIDE (Percent):	7.4	7.3	7.4	7.4
OXYGEN (Percent):	12.5	12.6	12.4	12.5
CARBON MONOXIDE (ppm):	0.1	0.0	0.0	0.0
MOLECULAR WEIGHT (Dry, Lb/Lb-Mole):	29.68	29.67	29.68	29.68
MOLECULAR WEIGHT (Wet, Lb/Lb-Mole):	28.63	28.59	28.61	28.61
STACK GAS VELOCITY (feet per second):	10.82	11.98	11.48	11.43
STACK DIAMETER (inches):	108.0	108.0	108.0	108.0
STACK AREA (square feet):	63.62	63.62	63.62	63.62
AIRFLOW (Dry Std. Cubic Feet per Min.):	9730.8	10462.2	10142.2	10111.7
AIRFLOW (Actual Cubic Feet per Min.):	41285.3	45712.7	43830.3	43609.4
TOTAL SULFUR CONCENTRATION (ppm):	20.3	20.0	21.2	20.5
TOTAL SULFUR EMISSION RATE (lb/hr as SO2):	1.97	2.08	2.14	2.06
TOTAL SULFUR EMISSION RATE (tons/yr):	8.62	9.13	9.38	9.04
NITROGEN OXIDES EMISSION CONC. (ppm):	21.1	21.0	21.5	21.2
NOx EMISSION RATE (lb/hr as NO2):	1.47	1.57	1.56	1.54
NITROGEN OXIDES EMISSION RATE (tons/yr):	6.4	6.9	6.8	6.7
CHLORIDE EMISSION CONCENTRATION (mg/dscm):	16.15	18.20	14.56	16.30
CHLORIDE EMISSION CONCENTRATION (ppm):	10.66	12.01	9.60	10.76
CHLORIDE EMISSION CONC. (ppm @ 7% oxygen):	17.63	20.11	15.71	17.82
CHLORIDE EMISSION RATE (mg/min):	4327.5	5244.0	4065.6	4545.7
CHLORIDE EMISSION RATE (lb/hr):	0.59	0.71	0.55	0.62

## **2.5 Volatile Organic Compound Determination**

Integrated samples of the gas at the inlet and outlet of the flare were collected for volatile organic compound analysis. The inlet samples were collected in Tedlar<sup>®</sup> bags. The outlet samples were collected using Compendium Method T0-14. TO-14 is an ambient air testing method, which can be used for source testing applications to collect integrated samples of volatile organic compounds (VOCs). The integrated samples were analyzed using EPA Method 8240, which utilizes a gas chromatograph equipped with a mass spectrophotometer (GC-MS) to quantify a standard list of volatile organic compounds. Copies of the original laboratory analysis data supplied by Coast-to-Coast Analytical are included in Appendix B of this report in concentration units of micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). The concentration units were converted to mass emission rate units of milligrams per minute (mg/min) to use in the destruction efficiency calculations. Copies of the VOC emission rate results for each individual run are included in Appendix A of this report. The emission rate results for each of the three (3) runs at the inlet and outlet of the flare were averaged and are presented on the summary tables on pages 12 (inlet) and 13 (outlet). If the calculated concentration value for a compound was less than the detection limit, it is presented as < DL and is included in the average as zero. If the average value is less than the detection limit, the average is presented as < DL.

SUMMARY OF EMISSION RATE RESULTS  
 TO-14 VOLATILE ORGANIC COMPOUNDS  
 ANALYZED BY GC/MS - EPA METHOD 8240  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 13\HV#1-IN  
 CLIENT: Sweet-Edwards/EMCON  
 LOCATION: Hidden Valley Landfill  
 SAMPLE LOCATION: Flare Stack Outlet  
 SAMPLE DATE: May 30, 1990

ANALYTE	Inlet Run 1 mg/min	Inlet Run 2 mg/min	Inlet Run 3 mg/min	Inlet Average mg/min
Acetone	< DL	< DL	< DL	< DL
Benzene	337.4	601.6	217.6	385.5
Bromodichloromethane	< DL	< DL	< DL	< DL
Bromomethane	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
2-Butanone (MEK)	< DL	< DL	< DL	< DL
Carbon Disulfide	< DL	< DL	< DL	< DL
Carbon Tetrachloride	< DL	< DL	< DL	< DL
Chlorobenzene	< DL	94.5	< DL	31.5
Chloroethane	< DL	< DL	< DL	< DL
2-Chloroethylvinyl Ether	< DL	< DL	< DL	< DL
Chloroform	< DL	< DL	< DL	< DL
Chloromethane	< DL	< DL	< DL	< DL
Dibromochloromethane	< DL	< DL	< DL	< DL
1,1-Dichloroethane	< DL	< DL	< DL	< DL
1,2-Dichloroethane	< DL	< DL	< DL	< DL
1,1-Dichloroethene	< DL	< DL	< DL	< DL
c-1,2-Dichloroethene	< DL	< DL	< DL	< DL
t-1,2-Dichloroethene	< DL	< DL	< DL	< DL
Dichloromethane	< DL	1761.9	< DL	587.3
1,2-Dichloropropane	< DL	< DL	< DL	< DL
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
Ethylbenzene	295.2	4082.5	239.3	1539.0
2-Hexanone	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	< DL	< DL
Styrene	< DL	< DL	< DL	< DL
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Tetrachloroethene (PCE)	< DL	537.2	< DL	179.1
Toluene	970.0	83.8	152.3	402.0
1,1,1-Trichloroethane (TCA)	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Trichloroethene (TCE)	< DL	558.7	< DL	186.2
Vinyl Acetate	< DL	< DL	< DL	< DL
Vinyl Chloride	< DL	< DL	< DL	< DL
Xylenes	864.6	6446.0	282.8	2531.1

< DL designates that the compound was not detected, or was found at levels below the method detection limit.

mg/min = milligrams of analyte emitted per minute

SUMMARY OF EMISSION RATE RESULTS  
 TO-14 VOLATILE ORGANIC COMPOUNDS  
 ANALYZED BY GC/MS - EPA METHOD 8240  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 13\HV#1-OUT  
 CLIENT: Sweet-Edwards/EMCON  
 LOCATION: Hidden Valley Landfill  
 SAMPLE LOCATION: Flare Stack Outlet  
 SAMPLE DATE: May 30, 1990

ANALYTE	Outlet Run 1 mg/min	Outlet Run 2 mg/min	Outlet Run 3 mg/min	Outlet Average mg/min
Acetone	< DL	< DL	< DL	< DL
Benzene	1.0	0.3	0.2	0.5
Bromodichloromethane	< DL	< DL	< DL	< DL
Bromomethane	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
2-Butanone (MEK)	< DL	< DL	< DL	< DL
Carbon Disulfide	< DL	< DL	< DL	< DL
Carbon Tetrachloride	< DL	< DL	< DL	< DL
Chlorobenzene	< DL	< DL	< DL	< DL
Chloroethane	< DL	< DL	< DL	< DL
2-Chloroethylvinyl Ether	< DL	< DL	< DL	< DL
Chloroform	< DL	< DL	< DL	< DL
Chloromethane	< DL	< DL	< DL	< DL
Dibromochloromethane	< DL	< DL	< DL	< DL
1,1-Dichloroethane	< DL	< DL	< DL	< DL
1,2-Dichloroethane	< DL	< DL	< DL	< DL
1,1-Dichloroethene	< DL	< DL	< DL	< DL
c-1,2-Dichloroethene	< DL	< DL	< DL	< DL
t-1,2-Dichloroethene	< DL	< DL	< DL	< DL
Dichloromethane	< DL	< DL	< DL	< DL
1,2-Dichloropropane	< DL	< DL	< DL	< DL
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	0.5	0.4	0.3
Ethylbenzene	< DL	< DL	< DL	< DL
2-Hexanone	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	< DL	< DL
Styrene	< DL	< DL	< DL	< DL
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Tetrachloroethene (PCE)	< DL	< DL	0.4	0.1
Toluene	< DL	< DL	< DL	< DL
1,1,1-Trichloroethane (TCA)	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Trichloroethene (TCE)	< DL	< DL	< DL	< DL
Vinyl Acetate	< DL	< DL	< DL	< DL
Vinyl Chloride	< DL	0.6	0.6	0.4
Xylenes	< DL			

< DL designates that the compound was not detected, or was found at levels below the method detection limit.

mg/min = milligrams of analyte emitted per minute

## **2.6 Destruction Efficiency of Volatile Organic Compounds**

The destruction efficiency is the amount of vapors destroyed through incineration, expressed on a percentage basis. The percent destruction efficiency for each volatile organic compound which was analyzed at the Hidden Vally Landfill flare are reported on page 15. Destruction efficiencies were calculated based on the average mass emission rate of each compound detected in milligrams per minute (mg/min).

VOLATILE ORGANIC COMPOUNDS IN AIR  
 DESTRUCTION EFFICIENCY EVALUATION  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 13\HV-DEST  
 CLIENT: Sweet-Edwards/EMCON, Inc.  
 LOCATION: Hidden Valley Landfill  
 SAMPLE SITE: Flare Stack Outlet  
 SAMPLE DATES: May 30, 1990

COMPOUNDS	Average Inlet Mass Rate mg/min	Average Outlet Mass Rate mg/min	Destruction Efficiency Percent
Acetone	< DL	< DL	---
Benzene	385.5	0.5	99.87
Bromodichloromethane	< DL	< DL	---
Bromomethane	< DL	< DL	---
Bromoform	< DL	< DL	---
2-Butanone (MEK)	< DL	< DL	---
Carbon Disulfide	< DL	< DL	---
Carbon Tetrachloride	< DL	< DL	---
Chlorobenzene	31.5	< DL	99.99
Chloroethane	< DL	< DL	---
2-Chloroethylvinyl Ether	< DL	< DL	---
Chloroform	< DL	< DL	---
Chloromethane	< DL	< DL	---
Dibromochloromethane	< DL	< DL	---
1,1-Dichloroethane	< DL	< DL	---
1,2-Dichloroethane	< DL	< DL	---
1,1-Dichloroethene	< DL	< DL	---
c-1,2-Dichloroethene	< DL	< DL	---
t-1,2-Dichloroethene	< DL	< DL	---
Dichloromethane	587.3	< DL	99.99
1,2-Dichloropropane	< DL	< DL	---
cis-1,3-Dichloropropene	< DL	< DL	---
trans-1,3-Dichloropropene	< DL	< DL	---
Ethylbenzene	1539.0	0.3	99.98
2-Hexanone	< DL	< DL	---
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	---
Styrene	< DL	< DL	---
1,1,2,2-Tetrachloroethane	< DL	< DL	---
Tetrachloroethene (PCE)	179.1	< DL	99.99
Toluene	402.0	0.1	99.98
1,1,1-Trichloroethane (TCA)	< DL	< DL	---
1,1,2-Trichloroethane	< DL	< DL	---
Trichloroethene (TCE)	186.2	< DL	99.99
Vinyl Acetate	< DL	< DL	---
Vinyl Chloride	< DL	< DL	---
Xylenes	2531.1	0.4	99.98

### 3.0 METHODOLOGY REFERENCES

Sampling procedures specified in the July 1, 1989 Title 40 Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, Methods 1, 2, 3A, 4, 5, 6C , 7E and 16A were followed throughout this project. Methodology suggested in the EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, (EPA-600/4-77-027b)" was used for supplemental information with respect to quality assurance and testing protocol. A document titled Guidelines for Stack Testing of Municipal Waste Combustion Facilities, EPA-600/8-88-085, dated June 1988 was used to obtain suggested procedures for sampling at municipal waste facilities. Compendium Method TO-14 is the specific method for the volatile organic compound (VOC) sampling. This is an ambient air sampling method included in the EPA document "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air".

## 4.0 SAMPLING AND ANALYSIS PROCEDURES

### 4.1 EPA Methods 1 and 2 - Airflow Determination

The inlet gas flows to the flare through a 12-inch (I.D.) circular duct which has a tap available to draw gas samples. A standard pitot tube connected to a magnehelic gauge was used to monitor the velocity of the inlet gas. The outlet stack is 108 inches in diameter (I.D.), with two (2) sample ports available, however, only 1 port could be accessed with the lift truck which was available on-site. A point of average velocity was selected in the stack per Method 1 and 2 criteria using calibrated "S" type pitot tubes. The emissions samples were collected at a point of average velocity. Temperature was monitored using thermocouple probes connected to a digital thermocouple indicator.

### 4.2 EPA Method 3A and Fixed Gas Analysis

Fixed gases from the inlet (carbon dioxide, carbon monoxide, oxygen, nitrogen, and methane) were quantified by Coast-to-Coast Analytical using the gas collected in the Tedlar<sup>R</sup> bags. A gas chromatograph equipped with a thermal conductivity detector (GC-TCD) was used for this analysis.

The outlet gas was continuously measured on-site to quantify the carbon monoxide, oxygen and carbon monoxide content. An Infrared Industries non-dispersive infrared (NDIR) analyzer (Model IR 702D) was used to measure the percent carbon dioxide (CO<sub>2</sub>). An Infrared Industries Model 2200 analyzer was used to measure the percent oxygen (O<sub>2</sub>). An Automated Custom Systems (ACS) Model 3300 non-dispersive infrared analyzer was used to measure the parts per million (ppm) carbon monoxide (CO). Standard CO<sub>2</sub>, O<sub>2</sub>, and CO calibration gases provided by Scott Specialty Gases were utilized to check the calibration of the instruments.

The results of these combustion gas analyses were utilized to calculate the molecular weight of the gas.

#### **4.3 EPA Method 4 - Moisture and Hydrochloric Acid**

The moisture content of the inlet gas stream was estimated using a psychrometric chart, and was verified in the field using a wet bulb-dry bulb technique. The moisture content of the outlet gas stream was measured using EPA Method 4. The deionized water used in the impinger section of the moisture sample train at the outlet was recovered and analyzed for hydrochloric acid using a titrametric method. The sample probe was positioned in the stack at a point of average velocity. The sample pump was started and a moisture sample was collected over a 60-minute period. Three (3) Method 4/HCl sample runs were performed at the combustor outlet.

The sample train used for moisture sampling was an EPA Method 4 design as illustrated in Figure 1 in Appendix E of this report. The gas was pulled through a heated probe liner into an impinger train which was immersed in an ice water bath. The first impinger was a modified Greenburg-Smith type containing 100 milliliters of deionized water. The second Greenburg-Smith impinger also contained 100 ml of water. The third impinger was empty, and the fourth bubbler contained indicating silica gel desiccant to absorb any moisture from the stack gas before it entered the control box. The impinger section was maintained at a temperature below 68° F by keeping ice on the impingers. The temperature at the outlet of the silica gel bubbler was monitored to verify that it did not exceed 68° F during a test. Prior to each run, the sample train was leak-checked following the procedures in Method 5. Upon completion of each test, the probe was removed from the stack and a post-test leak check was performed.

The sample train was connected to a control box by means of an umbilical cord which contains a vacuum hose, pitot lines, thermocouple wires and a 4-wire electrical cord. The control box (meter box) is used to monitor stack conditions. The control box consists of a leak-free pump used to pull the stack gas through the sample train, fine and coarse metering valves to control the sampling rate, a vacuum gauge which measures the pressure drop from the sampling nozzle to the metering valves, and a calibrated dry gas meter readable to 0.005 cubic feet. The dry gas meter inlet and outlet temperatures were monitored by thermocouples which are connected to the multichannel Fluke thermocouple indicator. The dry gas meter calibration factor, Y, is determined by calibrating the meter against a wet test meter.

Before and after each run, the impingers in the sample train were removed and weighed with a readability of 0.1 grams using a Mettler electronic top loading balance. The difference between the initial and final weights of the condenser section constitute the amount of moisture gained during the run. The moisture at the inlet was quantified by allowing the positive pressure gas to pass through a series of pre-weighed impingers while metering the gas volume.

#### 4.4 EPA Method 6C, 7E and 16A - Total Sulfur and Nitrogen Oxides

The Method 6C/16A samples were collected at a point of average velocity in the outlet gas stream. Method 6C and 16A utilize instrumental analyzers to measure total sulfur (TS) (including sulfur dioxide ( $\text{SO}_2$ ), hydrogen sulfide ( $\text{H}_2\text{S}$ ) and total reduced sulfur (TRS)). A gas sample was continuously extracted from the stack and passed through a thermal oxidizer which converts TRS and  $\text{H}_2\text{S}$  to  $\text{SO}_2$ . The gas sample then passed through an instrumental fluorescent analyzer for measuring total sulfur as  $\text{SO}_2$ . Measurements were recorded at 1-minute intervals during each

60-minute test period, and the results were averaged. For each run, only those measurements obtained after twice the response time of the measurement system had elapsed were used to determine the average emission concentration.

The Method 7E samples were collected along with the Method 6C and 16A samples at the outlet. Method 7E utilizes an instrumental analyzer to measure nitrogen oxides. A gas sample was continuously extracted from the stack, and a portion of the sample was conveyed to an instrumental chemiluminescent analyzer for determination of  $\text{NO}_x$  concentration. Measurements were recorded at 1-minute intervals during each 60-minute test, and the results were averaged. For each run, only those measurements obtained after twice the response time of the measurement system had elapsed were used to determine the average emission concentration.

The Method 6C and 7E sample train is illustrated in Figure 2 in Appendix E of this report. An effluent gas sample was drawn through a stainless steel sample probe and through a refrigerator type moisture removal system to continuously remove condensate from the sample gas. A Teflon coated leak-free pump was utilized to pull the sample gas through the system at a flow rate sufficient to minimize the response time of the measurement system. A sample flow rate control valve and rotameter were used to maintain a constant sampling rate within 10 percent. A sample gas manifold system (dilution system) constructed of nonreactive materials was utilized to divert a portion of the sample gas stream to the analyzer for dilution with ambient air at a ratio of 20:1, and the remainder of the gas to the by-pass discharge vent. The dilution sample system is capable of introducing calibration gases directly to the analyzer. The gas passes through an  $\text{NO}_2$  to  $\text{NO}$  converter which converts the nitrogen dioxide in the sample to nitrogen

oxide (with no ammonia interference). The sample is divided into two paths, one leading through the converter and the other leading directly to the reaction chamber of the analyzer. The difference between the 2 channels' readings is  $\text{NO}_2$ . The dilution sample system is capable of introducing calibration gases directly to the analyzers. An analyzer flow rate control valve and rotameter were used to maintain a constant sampling rate to the analyzer. A Hewlett-Packard data acquisition system was used to log outputs of the analyzer. Readings were recorded at one-minute intervals over the duration of each sample run.

The TS and  $\text{NO}_x$  measurement system was assembled on-site and calibration gases were introduced and calibration adjustments were made to calibrate the instrument. The sampling system components were adjusted to achieve correct sampling rates. Prior to sampling, a calibration error check was performed by introducing calibration gases to the system upstream of the analyzer. Zero, mid-range, and high-range calibration gases were introduced, and no adjustments to the system were made, except as necessary to maintain a constant flow rate of calibration gas through the instrument.

Immediately preceding and following each run, or whenever adjustments to the measurement system were made, a sampling system bias check was performed. In this test, a zero gas and either the mid-range or high-range gas, whichever most closely approximates the effluent concentrations, was introduced. The concentration displayed by the analyzer was noted and then the zero gas was introduced to verify that the output returned to zero. The calibration gas flow rates were maintained at a constant rate. Zero and upscale gases were alternately introduced until a stable response was achieved. The response time was determined by observing the times required to achieve a stable response when both the zero

and upscale gas was introduced. The longer of the two times was used as the response time of the analyzer. Once acceptable bias specifications were met, the average of the initial and final bias check values were used to calculate the gas concentration for the run.

#### **4.5 Volatile Organic Compound Determination**

Integrated samples of the gas at the inlet and outlet of the flare were collected for volatile organic compound analysis. The inlet samples were collected in Tedlar<sup>®</sup> bags. The outlet samples were collected using Compendium Method T0-14. This ambient air testing method was used for these source tests to collect integrated samples of volatile organic compounds (VOCs) at the inlet and outlet sites. The TO-14 sampling system is illustrated in Figure 3 in Appendix E of this report. The integrated samples were analyzed using EPA Method 8240, which utilizes a gas chromatograph - mass spectrophotometer (GC-MS).

The TO-14 sampling apparatus included a leak-free metal bellows pump, a mechanical critical orifice flow regulator, and a mechanical compensating flow restrictive device. The system is specifically designed to collect uniformly integrated air samples over a predetermined time period. The integrated air sample was pressurized and stored in electropolished SUMMA<sup>®</sup> six-liter stainless steel canisters for transport and subsequent analysis. The interior surfaces of these stainless steel canisters are passivated using the Molecetrics SUMMA<sup>®</sup> process. A teflon sample line was inserted into the port to pull a gas sample through the flow controller and into the canister. Other components of the sampling system were constructed of stainless-steel or Teflon fittings.

Coast-to-Coast Analytical Services, Inc., the outside contract laboratory used to analyze these samples, owns and maintains the integrity of the SUMMAR<sup>R</sup> passivated canisters and performs leak tests to assure that they can contain a gas sample over time. To prepare the canisters, the contract laboratory heated them in an isothermal oven to 100° C. Once heated, the canisters were evacuated and maintained under vacuum for several hours. At the end of the heated/evacuation cycle, the canisters were pressurized with humid zero air and were quality assurance checked with a gas chromatograph equipped with a flame ionization detector. Once certified cleaned, the canisters were reevacuated and remained in the evacuated state until they were used.

Each canister was labeled with an identification tag before it was returned to the contract laboratory for analysis. Upon return receipt of the canisters by the contract laboratory, the pressure of each canister was checked by attaching a pressure gauge to the canister inlet and opening the valve briefly to note the pressure. The sample canister was connected to the inlet of the GC-MS-SCAN analytical system. A mass flow controller was placed on the canister and the canister valve was opened. Following preliminary flushing, the canister flow was vented past a tee inlet to the analytical system. The sample was preconcentrated in a cryogenic trap, then the trapped analytes were thermally desorbed onto the head of the column to be separated and scanned. Primary identification is based on retention time and relative abundance of eluting ions as compared to the spectral library stored on the hard disk of the GC-MS data system. The concentration of each compound was calculated using the previously established response factors. Analysis of the gas contained in the canisters was accomplished using GC-MS as described in Method TO-14. This protocol is virtually identical to EPA Method 8240 procedures for quantifying volatile organic compounds.

## 5.0 CALCULATION OF RESULTS

The Method 1-4, 6C, 7E and 16A results were calculated in accordance with the 40 CFR 60, Appendix A criteria. Copies of the pertinent equations are included in Appendix E of this report. Standard conditions are 68° F and 29.92 inches of mercury. The laboratory results were converted to concentration and mass emission rate units. The results from each run are presented along with an average for the series of three (3) runs. If the average value for 3 runs is less than the detection limit, the average is presented as < DL. Final result calculations were performed using custom-written spreadsheets run on Hewlett-Packard Vectra computer systems. By-hand sample calculations of computerized results were performed to verify computer program integrity, and are included in Appendix C of this report.

## 6.0 QUALITY ASSURANCE PLAN

The purpose of the quality assurance plan is to provide guidelines for achieving quality control in air pollution measurements. The detailed procedures Am Test, Inc.'s Air Quality Division utilized are included in the Environmental Protection Agency's (EPA's) reference manual titled Quality Assurance Handbook for Air Pollution Measurements Systems, Volume 3, EPA-600/4-77-027b. Procedures were followed throughout equipment preparation, field sampling, sample recovery, analysis, and data reduction. Am Test, Inc.'s Air Quality Division quality assurance procedures are discussed below.

### 6.1 Calibration Procedures and Frequency

Field equipment utilized for on-site measurements is calibrated at a frequency as recommended by the equipment manufacturer or industry practice. Prior to field use, each instrument is calibrated and the calibration value reported in a calibration log. If any measuring or test device requiring calibration cannot immediately be removed from service, the Project Manager may extend the calibration cycle providing a review of the equipment's history warrants the issuance of an extension. No equipment will be extended more than twice a calibration cycle, nor will the extension exceed one-half the prescribed calibration cycle. Test equipment consistently found to be out of calibration will be repaired or replaced.

The dry gas meter used to accurately measure sample volumes has been calibrated using a wet test meter. A standard P-type pitot tube or a calibrated S-type pitot tube was used for velocity measurements. The Fluke<sup>R</sup> digital thermocouple indicator used for temperature measurement has a readability of 1 degree

Fahrenheit and has been certified by the manufacturer for its' accuracy. Each thermocouple probe used to monitor temperature is checked quarterly at three (3) temperature settings.

A Monitor Labs Model 8850 sulfur dioxide measurement system equipped with a Model 8770 H<sub>2</sub>S to SO<sub>2</sub> converter was used for Method 6C and 16A sampling. A Monitor Labs Model 8840 NO<sub>2</sub> analyzer was used for Method 7E nitrogen oxides sampling. These instruments are capable of meeting the system performance specifications detailed in 40 CFR 60, Appendix A, Method 6C, Section 4. The calibration gases used were purchased from Scott Specialty Gases and were analyzed following the EPA Traceability Protocol Number 1. Purified nitrogen was utilized for the zero gas.

Support equipment is defined as all equipment, not previously discussed that is required for completing an environmental monitoring or measurement task. This equipment may include storage and transportation containers, sample recovery glassware, and communications gear. Support equipment is periodically inspected to maintain the performance standards necessary for proper and efficient execution of all tasks and responsibilities.

During the project, a systems audit was performed, consisting of an on-site qualitative inspection and review of the total measurement system. This inspection was conducted on a daily basis by the Project Manager. During the systems audit, the auditor observed the procedures and techniques of the field team in the following general areas:

- Setting up and leak testing the sampling train
- Isokinetic sampling check of the sampling train
- Final leak check of train
- Sample recovery

Visual inspections of pitot tubes, glassware, and other equipment were also made. The main purpose of a systems audit is to ensure that the measurement system will generate valid data, if operated properly.

## **6.2 Sample Recovery and Field Documentation**

Data relative to samples, collected during each test, were immediately inspected for completeness and placed under the custody of the Project Manager until custody was transferred when the samples were turned over to the laboratory. Sample recovery was carried out in a suitable area sheltered from wind and dust to prevent contamination of samples.

Many types of documentation were used in the field to keep track of project information. A bound field notebook was used to note any conditions which were not covered by the various field data sheets which Am Test uses. The field team leader recorded all information related to sampling or field activities.

## **6.3 Chain of Custody**

The history of each sample was documented from collection through all transfers of custody until it was transferred to the analytical laboratory. Copies of chain of custody forms are included in Appendix B of this report. Internal laboratory records document the custody of the samples through their final disposition. Care was taken to record precisely the sample type, sample time, and sample location

and to help ensure that the sample number on the label exactly matches those numbers on the sample logsheet and the chain-of-custody record. The persons undertaking the actual sampling in the field were responsible for the care and custody of the samples collected until they were properly transferred or dispatched. Sample labels were completed for each sample bottle using water-proof ink.

#### **6.4 Transfer of Custody and Shipment**

All sample shipping containers were accompanied by an analysis request or chain-of-custody record form when they left the site. When transferring the possession of samples, the individuals relinquishing and receiving the samples signed, dated, and noted the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the analyst in the laboratory.

The laboratory representative who accepted the incoming sample shipment signed and dated the chain-of-custody record, completing the sample transfer process. It is the laboratory's responsibility to maintain internal logbooks and custody records throughout sample preparation and analysis in accordance with the laboratory's written QA Plan.

It is important to maintain the integrity of the samples from the time of collection until the analyses are performed. The samples were preserved during transportation and storage to prevent or retard degradation or modification of chemicals in samples. The chloride samples were kept cool with blue ice packets placed in the coolers the sample were shipped in. Prior to shipping the TO-14 canisters, the samples were placed in boxes along with a chain-of-custody form. Empty space in the box was filled with bubble pack and styrofoam to prevent

damage during shipment. The samples were shipped to Coast-to-Coast Analytical via Federal Express for overnight delivery.

### **6.5 Data Reduction, Validation, and Reporting**

Raw data is handled according to strict guidelines when they are being transposed into computer files or on other logs. The guidelines include document receipt control procedures, file review, and sign-off by a checker. Raw data was entered into the appropriate software package by a "processor", then the entered figures were checked for accuracy by a "checker," different from the "processor". Any mistakes were corrected, and figures were rechecked and signed off by the "checker". In addition, by-hand calculation checks were made to validate the computer output. All data generated by each phase of a laboratory or field sampling program were reviewed by the senior reviewer. The data was signed off by the senior reviewer prior to releasing the data for report preparation.

**APPENDIX A**  
**Computer Printouts of Results**

METHOD 1-4 - VELOCITY AND MOISTURE INFORMATION  
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 24/HIDVAL-1 LAB #: G-2051-1  
CLIENT: SWEET EDWARDS/EMCON START TIME: 11:13 o'clock  
LOCATION: HIDDEN VALLEY LANDFILL STOP TIME: 12:13 o'clock  
SAMPLE SITE: FLARE STACK INLET  
SAMPLE DATE: MAY 30, 1990  
RUN #: 1-Method 1-4  
OPERATORS: MACKAY/WIDMEYER  
CONTACT: D. VOWASEK

PERCENT MOISTURE: 5.4  
Bws: 0.054  
PITOT TUBE Cp: 0.99  
STACK DIAMETER: 12.0 inches  
STACK AREA: 0.785 sq. feet  
METER TEMPERATURE: 0.0 degrees F  
BAROMETRIC PRES.: 29.28 inches Hg  
STATIC PRESSURE: 2.4 inches H2O  
STACK PRESSURE: 29.46 inches Hg  
ORIFICE PRESSURE: 0.00 inches H2O  
METER PRESSURE: 29.28 inches Hg

AVERAGE CO2 CONC: 25.0 percent  
AVERAGE O2 CONC: 5.2 percent  
AVERAGE CO CONC: < 0.1 percent  
MOLECULAR WEIGHT: 32.21 g/g-mole-dry  
MOLECULAR WEIGHT: 31.44 g/g-mole-wet

\*\*\*\*\*

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
Point	0.072	93	Point	0.074	94
of Avg	0.072	94	of Avg	0.073	95
Velocity	0.072	96	Velocity	0.081	93

\*\*\*\*\*

STACK TEMPERATURE: 94.2 degrees F 554.2 degrees R  
AVERAGE VELOCITY HEAD: 0.074 " of H2O  
STACK GAS VELOCITY: 17.8 ft/sec  
STACK GAS AIR FLOW: 839.1 acf/min 744.6 dscf/min

METHOD 1-4 - VELOCITY AND MOISTURE INFORMATION  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 24/HIDVAL-2 LAB #: G-2051-2  
 CLIENT: SWEET EDWARDS/EMCON START TIME: 12:37 o'clock  
 LOCATION: HIDDEN VALLEY LANDFILL STOP TIME: 13:37 o'clock  
 SAMPLE SITE: FLARE STACK INLET  
 SAMPLE DATE: MAY 30, 1990  
 RUN #: 2-Method 1-4  
 OPERATORS: MACKAY/WIDMEYER  
 CONTACT: D. VONASEK

PERCENT MOISTURE: 4.9  
 Bws: 0.049  
 PITOT TUBE Cp: 0.99  
 STACK DIAMETER: 12.0 inches  
 STACK AREA: 0.785 sq. feet  
 METER TEMPERATURE: 0.0 degrees F  
 BAROMETRIC PRES.: 29.22 inches Hg  
 STATIC PRESSURE: 2.4 inches H2O  
 STACK PRESSURE: 29.40 inches Hg  
 ORIFICE PRESSURE: 0.00 inches H2O  
 METER PRESSURE: 29.22 inches Hg

AVERAGE CO2 CONC: 25.0 percent  
 AVERAGE O2 CONC: 5.3 percent  
 AVERAGE CO CONC: < 0.1 percent  
 MOLECULAR WEIGHT: 32.21 g/g-mole-dry  
 MOLECULAR WEIGHT: 31.52 g/g-mole-wet

\*\*\*\*\*

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
Point	0.072	91	Point	0.077	91
of Avg	0.072	91	of Avg	0.079	93
Velocity	0.077	90	Velocity	0.079	93

\*\*\*\*\*

STACK TEMPERATURE: 91.5 degrees F 551.5 degrees R  
 AVERAGE VELOCITY HEAD: 0.076 " of H2O 18.0 ft/sec  
 STACK GAS VELOCITY: 758.7 dscf/min  
 STACK GAS AIR FLOW: 848.2 acf/min

METHOD 1-4 - VELOCITY AND MOISTURE INFORMATION  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 24/HIDVAL-3 LAB #: G-2051-3  
 CLIENT: SWEET EDWARDS/EMCON START TIME: 14:05 o'clock  
 LOCATION: HIDDEN VALLEY LANDFILL STOP TIME: 15:05 o'clock  
 SAMPLE SITE: FLARE STACK INLET  
 SAMPLE DATE: MAY 30, 1990  
 RUN #: 3-Method 1-4  
 OPERATORS: MACKAY/WIDMEYER  
 CONTACT: D. VONASEK

PERCENT MOISTURE: 5.1  
 Bws: 0.051  
 PITOT TUBE Cp: 0.99  
 STACK DIAMETER: 12.0 inches  
 STACK AREA: 0.785 sq. feet  
 METER TEMPERATURE: 0.0 degrees F  
 BAROMETRIC PRES.: 29.21 inches Hg  
 STATIC PRESSURE: 2.4 inches H2O  
 STACK PRESSURE: 29.39 inches Hg  
 ORIFICE PRESSURE: 0.00 inches H2O  
 METER PRESSURE: 29.21 inches Hg

AVERAGE CO2 CONC: 26.0 percent  
 AVERAGE O2 CONC: 4.6 percent  
 AVERAGE CO CONC: < 0.1 percent  
 MOLECULAR WEIGHT: 32.34 g/g-mole-dry  
 MOLECULAR WEIGHT: 31.61 g/g-mole-wet

\*\*\*\*\*

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
Point	0.076	96	Point	0.078	90
of Avg	0.082	102	of Avg	0.078	89
Velocity	0.082	103	Velocity	0.078	90

\*\*\*\*\*

STACK TEMPERATURE: 95.0 degrees F 555.0 degrees R  
 AVERAGE VELOCITY HEAD: 0.079 " of H2O  
 STACK GAS VELOCITY: 18.4 ft/sec  
 STACK GAS AIR FLOW: 866.4 acf/min 768.2 dscf/min

METHODS 1-4 AND CHLORIDE  
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 66/HVFSOR1  
 CLIENT: SHEET EDWARDS/EMCON  
 LOCATION: HIDDEN VALLEY LANDFILL  
 SAMPLE SITE: FLARE STACK OUTLET  
 SAMPLE DATE: MAY 30, 1990  
 RUN #: 1-METHOD 1-4/HCL  
 OPERATORS: MACKAY/WIDMAYER  
 CONTACT: D. VONASEK

LAB #: G-2051-4  
 START TIME: 11:07 o'clock  
 STOP TIME: 12:07 o'clock  
 SAMPLE TIME: 60.0 minutes

IMPINGER WEIGHTS  
 FINAL INITIAL NET  
 GRAMS GRAMS GRAMS  
 -----  
 491.3 446.9 44.4  
 454.7 448.6 6.1  
 319.8 319.8 0.0  
 759.9 755.3 4.6  
 TOTAL H2O GAIN: 55.1  
 TOTAL VOLUME (SCF): 2.60  
 PERCENT MOISTURE: 9.04  
 BWS: 0.0904

PITOT TUBE Co: 0.84  
 NOZZLE DIAMETER: NA inches  
 NOZZLE AREA: NA sq. feet  
 STACK DIAMETER: 108.0 inches  
 STACK AREA: 63.62 sq. feet  
 METER TEMPERATURE: 80.3 degrees F  
 BAROMETRIC PRES.: 29.28 inches Hg  
 STATIC PRESSURE: -0.105 inches H2O  
 STACK PRESSURE: 29.27 inches Hg  
 ORIFICE PRESSURE: 0.800 inches H2O  
 METER PRESSURE: 29.34 inches Hg

INIT. METER VOLUME: 615.782  
 FINAL METER VOLUME: 642.612  
 VOLUME SAMPLED: 26.830  
 STD VOLUME (DSCF): 26.147  
 STD VOLUME (DSCM): 0.740  
 Y FACTOR: 1.017

AVERAGE CONC. CO2: 7.4 percent  
 AVERAGE CONC. O2: 12.5 percent  
 AVERAGE CONC. CO: 0.1 ppm  
 MOLECULAR WEIGHT: 29.68 g/g-mole-dry  
 MOLECULAR WEIGHT: 28.63 g/g-mole-wet

\*\*\*\*\*  
 SAMPLE VELOCITY TEMPERATURE  
 POINT " OF H2O DEGREES F.  
 N 1 0.010 1440  
 2 0.009 1431  
 3 0.010 1535  
 4 0.010 1543  
 5 0.011 1522  
 6 0.014 1512  
 \*\*\*\*\*

\*\*\*\*\*  
 SAMPLE VELOCITY TEMPERATURE  
 POINT " OF H2O DEGREES F.  
 N 7 0.012 1533  
 8 0.012 1577  
 9 0.007 1588  
 10 0.007 1575  
 11 0.007 1577  
 12 0.007 1570  
 \*\*\*\*\*

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)  
 -----  
 CHLORIDE DETECTION LIMIT (ug/ml): 1.0  
 CHLORIDE DETECTION LIMIT (micrograms): 306  
 CHLORIDE CONCENTRATION IN SAMPLE (ug/ml): 38.0  
 TOTAL VOLUME OF SAMPLE (milliliters): 306  
 CHLORIDE CONCENTRATION IN SAMPLE (micrograms): 11628  
 CHLORIDE CONCENTRATION IN AIR (mg/dscm): 16.15  
 CHLORIDE AS HCL (ppm): 10.66  
 CHLORIDE AS HCL (ppm @ 7% O2): 17.63  
 CHLORIDE EMISSION RATE (mg/min): 4327.5  
 CHLORIDE EMISSION RATE (lb/hr): 0.59

\*\*\*\*\*  
 STACK TEMPERATURE: 1533.6 degrees F  
 AVERAGE VELOCITY HEAD: 0.010 inches H2O  
 STACK GAS VELOCITY: 10.82 ft/sec  
 STACK GAS AIR FLOW: 41285.3 acf/min  
 \*\*\*\*\*

METHODS 1-4 AND CHLORIDE  
AM TEST, INC. - AIR QUALITY DIVISION

G-2051-5  
12:34 o'clock  
13:34 o'clock  
60.0 minutes  
CHLORIDE DETECTION LIMIT (ug/ml): 1.0  
CHLORIDE DETECTION LIMIT (micrograms): 291  
CHLORIDE CONCENTRATION IN SAMPLE (ug/ml): 45.0  
TOTAL VOLUME OF SAMPLE (milliliters): 291  
CHLORIDE CONCENTRATION IN SAMPLE (micrograms): 13095  
CHLORIDE CONCENTRATION IN AIR (mg/dscm): 18.20  
CHLORIDE AS HCL (ppm): 20.11  
CHLORIDE AS HCL (ppm @ 7% O2): 5244.0  
CHLORIDE EMISSION RATE (mg/min): 0.71  
CHLORIDE EMISSION RATE (lb/hr):

LAB #: G-2051-5  
START TIME: 12:34 o'clock  
STOP TIME: 13:34 o'clock  
SAMPLE TIME: 60.0 minutes

FILE NAME: 66/HVFSOR2  
CLIENT: SHEET EDWARDS/EMCON  
LOCATION: HIDDEN VALLEY LANDFILL  
SAMPLE SITE: FLARE STACK OUTLET  
SAMPLE DATE: MAY 30, 1990  
RUN #: 2-METHOD 1-4/HCL  
OPERATORS: MACKAY/MIDMEYER  
CONTACT: D. VONASEK

PITOT TUBE Cp: 0.84 inches  
NOZZLE DIAMETER: NA sq. feet  
NOZZLE AREA: NA sq. feet  
STACK DIAMETER: 108.0 inches  
STACK AREA: 63.62 sq. feet  
METER TEMPERATURE: 86.7 degrees F  
BAROMETRIC PRES.: 29.22 inches Hg  
STATIC PRESSURE: -0.105 inches Hg  
STACK PRESSURE: 29.21 inches Hg  
ORIFICE PRESSURE: 0.800 inches H2O  
METER PRESSURE: 29.28 inches Hg

IMPINGER WEIGHTS  
FINAL INITIAL NET  
GRAMS GRAMS GRAMS  
423.6 378.4 45.2  
459.0 452.7 6.3  
318.0 317.9 0.1  
841.0 835.8 5.2  
TOTAL H2O GAIN: 56.8  
TOTAL VOLUME (SCF): 2.68  
PERCENT MOISTURE: 9.30  
Bus: 0.0930

INIT. METER VOLUME: 642.813  
FINAL METER VOLUME: 669.994  
VOLUME SAMPLED: 27.181  
STD VOLUME (DSCF): 26.125  
STD VOLUME (DSCM): 0.740  
Y FACTOR: 1.017  
AVERAGE CONC. CO2: 7.3 percent  
AVERAGE CONC. O2: 12.6 percent  
AVERAGE CONC. CO: 0.0 ppm  
MOLECULAR WEIGHT: 29.67 g/g-mole-dry  
MOLECULAR WEIGHT: 28.59 g/g-mole-wet

\*\*\*\*\*  
SAMPLE VELOCITY TEMPERATURE SAMPLE VELOCITY TEMPERATURE  
POINT # OF H2O DEGREES F. POINT # OF H2O DEGREES F.  
N 1 0.010 1584 N 7 0.013 1583  
2 0.010 1590 8 0.012 1575  
3 0.013 1600 9 0.010 1563  
4 0.014 1612 10 0.010 1555  
5 0.012 1602 11 0.010 1560  
6 0.013 1597 12 0.010 1575  
\*\*\*\*\*

STACK TEMPERATURE: 1583.0 degrees F 2043.0 degrees R  
AVERAGE VELOCITY HEAD: 0.011 inches H2O 11.98 ft/sec  
STACK GAS VELOCITY: 45712.7 acf/min 10462.2 dscf/min

METHODS 1-4 AND CHLORIDE  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: HVFSOR3  
 CLIENT: SWEET EDWARDS/EMCON  
 LOCATION: HIDDEN VALLEY LANDFILL  
 SAMPLE SITE: FLARE STACK OUTLET  
 SAMPLE DATE: MAY 30, 1990  
 RUN #: 3-METHOD 1-4/HCL  
 OPERATORS: MACKAY/WIDMEYER  
 CONTACT: D. VONASEK

LAB #: G-2051-6  
 START TIME: 14:01 o'clock  
 STOP TIME: 15:01 o'clock  
 SAMPLE TIME: 60.0 minutes

LAB #: G-2051-6  
 START TIME: 14:01 o'clock  
 STOP TIME: 15:01 o'clock  
 SAMPLE TIME: 60.0 minutes

IMPINGER WEIGHTS  
 FINAL INITIAL NET  
 GRAMS GRAMS GRAMS  
 480.1 429.3 50.8  
 472.8 465.9 6.9  
 320.6 319.2 1.4  
 765.7 759.9 5.8  
 TOTAL H2O GAIN: 64.9  
 TOTAL VOLUME (SCF): 3.06  
 PERCENT MOISTURE: 9.15  
 BWS: 0.0915

PITOT TUBE CP: 0.84  
 NOZZLE DIAMETER: NA inches  
 NOZZLE AREA: NA sq. feet  
 STACK AREA: 108.0 sq. feet  
 METER TEMPERATURE: 88.8 degrees F  
 BAROMETRIC PRES.: 29.21 inches Hg  
 STATIC PRESSURE: -0.065 inches H2O  
 STACK PRESSURE: 29.21 inches Hg  
 ORIFICE PRESSURE: 1.000 inches H2O  
 METER PRESSURE: 29.28 inches Hg

INIT. METER VOLUME: 670.213  
 FINAL METER VOLUME: 701.942  
 VOLUME SAMPLED: 31.729  
 STD VOLUME (DSCF): 30.385  
 STD VOLUME (DSCR): 0.861  
 Y FACTOR: 1.017

CHLORIDE DETECTION LIMIT (ug/ml): 1.0  
 CHLORIDE DETECTION LIMIT (micrograms): 290  
 CHLORIDE CONCENTRATION IN SAMPLE (ug/ml): 42.0  
 TOTAL VOLUME OF SAMPLE (milliliters): 290  
 CHLORIDE CONCENTRATION IN SAMPLE (micrograms): 12180  
 CHLORIDE AS HCL (ppm): 14.56  
 CHLORIDE AS HCL (ppm @ 7% O2): 9.60  
 CHLORIDE EMISSION RATE (mg/min): 15.71  
 CHLORIDE EMISSION RATE (lb/hr): 4065.6  
 CHLORIDE EMISSION RATE (lb/hr): 0.55

AVERAGE CONC. CO2: 7.4 percent  
 AVERAGE CONC. O2: 12.4 percent  
 AVERAGE CONC. CO: 0.0 ppm  
 MOLECULAR WEIGHT: 29.68 g/g-mole-dry  
 MOLECULAR WEIGHT: 28.61 g/g-mole-wet

\*\*\*\*\*  
 SAMPLE VELOCITY TEMPERATURE  
 POINT # OF H2O DEGREES F.  
 N 1 0.001 1609  
 N 2 0.005 1592  
 N 3 0.014 1580  
 N 4 0.014 1578  
 N 5 0.014 1540  
 N 6 0.012 1532  
 \*\*\*\*\*

\*\*\*\*\*  
 SAMPLE VELOCITY TEMPERATURE  
 POINT # OF H2O DEGREES F.  
 N 7 0.013 1544  
 N 8 0.013 1513  
 N 9 0.012 1569  
 N 10 0.012 1550  
 N 11 0.012 1575  
 N 12 0.012 1580  
 \*\*\*\*\*

\*\*\*\*\*  
 SAMPLE VELOCITY TEMPERATURE  
 POINT # OF H2O DEGREES F.  
 N 7 0.013 1544  
 N 8 0.013 1513  
 N 9 0.012 1569  
 N 10 0.012 1550  
 N 11 0.012 1575  
 N 12 0.012 1580  
 \*\*\*\*\*

\*\*\*\*\*  
 SAMPLE VELOCITY TEMPERATURE  
 POINT # OF H2O DEGREES F.  
 N 7 0.013 1544  
 N 8 0.013 1513  
 N 9 0.012 1569  
 N 10 0.012 1550  
 N 11 0.012 1575  
 N 12 0.012 1580  
 \*\*\*\*\*

STACK TEMPERATURE: 1563.5 degrees F  
 AVERAGE VELOCITY HEAD: 0.011 inches H2O  
 STACK GAS VELOCITY: 11.48 ft/sec  
 STACK GAS AIR FLOW: 43830.3 acf/min

STACK TEMPERATURE: 1563.5 degrees F  
 AVERAGE VELOCITY HEAD: 0.011 inches H2O  
 STACK GAS VELOCITY: 11.48 ft/sec  
 STACK GAS AIR FLOW: 10142.2 dscf/min

STACK TEMPERATURE: 1563.5 degrees F  
 AVERAGE VELOCITY HEAD: 0.011 inches H2O  
 STACK GAS VELOCITY: 11.48 ft/sec  
 STACK GAS AIR FLOW: 10142.2 dscf/min

EMISSION RATE RESULTS  
 TO-14 VOLATILE ORGANIC COMPOUNDS  
 ANALYZED BY GC/MS - EPA METHOD 8240  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 67\HVAL-IN1  
 CLIENT: Sweet-Edwards/EMCON  
 LOCATION: Hidden Valley Landfill  
 SAMPLE LOCATION: Flare Stack Inlet  
 SAMPLE DATE: May 30, 1990  
 SAMPLE TIME: 11:13-12:13  
 LAB NUMBER(S): G-2051-1  
 AIRFLOW: 744.6 dscf/min

ANALYTE	Inlet	Blank	DL
	Run 1 mg/min	mg/min	Run 1 mg/min
Acetone	< DL	< DL	1081.4
Benzene	337.4	< DL	145.4
Bromodichloromethane	< DL	< DL	301.3
Bromomethane	< DL	< DL	439.3
Bromoform	< DL	< DL	468.6
2-Butanone (MEK)	< DL	< DL	136.0
Carbon Disulfide	< DL	< DL	363.6
Carbon Tetrachloride	< DL	< DL	1405.8
Chlorobenzene	< DL	< DL	210.9
Chloroethane	< DL	< DL	120.5
2-Chloroethylvinyl Ether	< DL	< DL	2008.3
Chloroform	< DL	< DL	222.0
Chloromethane	< DL	< DL	95.9
Dibromochloromethane	< DL	< DL	383.4
1,1-Dichloroethane	< DL	< DL	183.4
1,2-Dichloroethane	< DL	< DL	183.4
1,1-Dichloroethene	< DL	< DL	183.4
c-1,2-Dichloroethene	< DL	< DL	183.4
t-1,2-Dichloroethene	< DL	< DL	183.4
Dichloromethane	< DL	< DL	1622.1
1,2-Dichloropropane	< DL	< DL	210.9
cis-1,3-Dichloropropene	< DL	< DL	210.9
trans-1,3-Dichloropropene	< DL	< DL	210.9
Ethylbenzene	295.2	< DL	200.8
2-Hexanone	< DL	< DL	191.7
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	191.7
Styrene	< DL	< DL	479.3
1,1,2,2-Tetrachloroethane	< DL	< DL	1622.1
Tetrachloroethene (PCE)	< DL	< DL	753.1
Toluene	970.0	< DL	175.7
1,1,1-Trichloroethane (TCA)	< DL	< DL	248.1
1,1,2-Trichloroethane	< DL	< DL	248.1
Trichloroethene (TCE)	< DL	< DL	248.1
Vinyl Acetate	< DL	< DL	1622.1
Vinyl Chloride	< DL	< DL	585.8
Xylenes	864.6	< DL	200.8

< DL designates that the compound was not detected, or was found at levels below the method detection limit.

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS  
 TO-14 VOLATILE ORGANIC COMPOUNDS  
 ANALYZED BY GC/MS - EPA METHOD 8240  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 67\HVAL-IN2  
 CLIENT: Sweet-Edwards/EMCON  
 LOCATION: Hidden Valley Landfill  
 SAMPLE LOCATION: Flare Stack Inlet  
 SAMPLE DATE: May 30, 1990  
 SAMPLE TIME: 12:37-13:37  
 LAB NUMBER(S): G-2051-2  
 AIRFLOW: 758.7 dscf/min

ANALYTE	Inlet	Blank	DL
	Run 2 mg/min	mg/min	Run 2 mg/min
Acetone	< DL	< DL	550.9
Benzene	601.6	< DL	74.1
Bromodichloromethane	< DL	< DL	153.5
Bromomethane	< DL	< DL	179.1
Bromoform	< DL	< DL	238.7
2-Butanone (MEK)	< DL	< DL	69.3
Carbon Disulfide	< DL	< DL	148.2
Carbon Tetrachloride	< DL	< DL	716.2
Chlorobenzene	94.5	< DL	107.4
Chloroethane	< DL	< DL	61.4
2-Chloroethylvinyl Ether	< DL	< DL	1023.2
Chloroform	< DL	< DL	113.1
Chloromethane	< DL	< DL	48.8
Dibromochloromethane	< DL	< DL	195.3
1,1-Dichloroethane	< DL	< DL	93.4
1,2-Dichloroethane	< DL	< DL	93.4
1,1-Dichloroethene	< DL	< DL	93.4
c-1,2-Dichloroethene	< DL	< DL	93.4
t-1,2-Dichloroethene	< DL	< DL	93.4
Dichloromethane	1761.9	< DL	826.4
1,2-Dichloropropane	< DL	< DL	107.4
cis-1,3-Dichloropropene	< DL	< DL	107.4
trans-1,3-Dichloropropene	< DL	< DL	107.4
Ethylbenzene	4082.5	< DL	102.3
2-Hexanone	< DL	< DL	97.7
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	97.7
Styrene	< DL	< DL	195.3
1,1,2,2-Tetrachloroethane	< DL	< DL	826.4
Tetrachloroethene (PCE)	537.2	< DL	307.0
Toluene	83.8	< DL	89.5
1,1,1-Trichloroethane (TCA)	< DL	< DL	126.4
1,1,2-Trichloroethane	< DL	< DL	126.4
Trichloroethene (TCE)	558.7	< DL	126.4
Vinyl Acetate	< DL	< DL	826.4
Vinyl Chloride	< DL	< DL	298.4
Xylenes	6446.0	< DL	102.3

< DL designates that the compound was not detected, or was found at levels below the method detection limit.

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS  
 TO-14 VOLATILE ORGANIC COMPOUNDS  
 ANALYZED BY GC/MS - EPA METHOD 8240  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 67\HVAL-IN3  
 CLIENT: Sweet-Edwards/EMCON  
 LOCATION: Hidden Valley Landfill  
 SAMPLE LOCATION: Flare Stack Inlet  
 SAMPLE DATE: May 30, 1990  
 SAMPLE TIME: 14:05-15:05  
 LAB NUMBER(S): G-2051-3  
 AIRFLOW: 768.2 dscf/min

ANALYTE	Inlet	Blank	DL
	Run 3 mg/min	mg/min	Run 3 mg/min
Acetone	< DL	< DL	557.8
Benzene	217.6	< DL	75.0
Bromodichloromethane	< DL	< DL	155.4
Bromomethane	< DL	< DL	181.3
Bromoform	< DL	< DL	241.7
2-Butanone (MEK)	< DL	< DL	70.2
Carbon Disulfide	< DL	< DL	150.0
Carbon Tetrachloride	< DL	< DL	725.2
Chlorobenzene	< DL	< DL	108.8
Chloroethane	< DL	< DL	62.2
2-Chloroethylvinyl Ether	< DL	< DL	1036.0
Chloroform	< DL	< DL	114.5
Chloromethane	< DL	< DL	49.4
Dibromochloromethane	< DL	< DL	197.8
1,1-Dichloroethane	< DL	< DL	94.6
1,2-Dichloroethane	< DL	< DL	94.6
1,1-Dichloroethene	< DL	< DL	94.6
c-1,2-Dichloroethene	< DL	< DL	94.6
t-1,2-Dichloroethene	< DL	< DL	836.8
Dichloromethane	< DL	< DL	108.8
1,2-Dichloropropane	< DL	< DL	108.8
cis-1,3-Dichloropropene	< DL	< DL	108.8
trans-1,3-Dichloropropene	< DL	< DL	103.6
Ethylbenzene	239.3	< DL	98.9
2-Hexanone	< DL	< DL	98.9
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	197.8
Styrene	< DL	< DL	836.8
1,1,2,2-Tetrachloroethane	< DL	< DL	310.8
Tetrachloroethene (PCE)	< DL	< DL	90.6
Toluene	152.3	< DL	128.0
1,1,1-Trichloroethane (TCA)	< DL	< DL	128.0
1,1,2-Trichloroethane	< DL	< DL	128.0
Trichloroethene (TCE)	< DL	< DL	836.8
Vinyl Acetate	< DL	< DL	302.2
Vinyl Chloride	< DL	< DL	103.6
Xylenes	282.8	< DL	

< DL designates that the compound was not detected, or was found at levels below the method detection limit.

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS  
 TO-14 VOLATILE ORGANIC COMPOUNDS  
 ANALYZED BY GC/MS - EPA METHOD 8240  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 67\HV-OUT1  
 CLIENT: Sweet-Edwards/EMCON  
 LOCATION: Hidden Valley Landfill  
 SAMPLE LOCATION: Flare Stack Outlet  
 SAMPLE DATE: May 30, 1990  
 SAMPLE TIMES: 11:07-12:07  
 LAB NUMBER(S): G-2051-4  
 AIRFLOW: 9730.8 dscf/min

ANALYTE	Outlet Run 1 mg/min	Blank mg/min	DL Run 1 mg/min
Acetone	< DL	< DL	7.1
Benzene	1.0	< DL	1.0
Bromodichloromethane	< DL	< DL	2.0
Bromomethane	< DL	< DL	2.3
Bromoform	< DL	< DL	3.1
2-Butanone (MEK)	< DL	< DL	0.9
Carbon Disulfide	< DL	< DL	1.9
Carbon Tetrachloride	< DL	< DL	9.2
Chlorobenzene	< DL	< DL	1.4
Chloroethane	< DL	< DL	0.8
2-Chloroethylvinyl Ether	< DL	< DL	13.1
Chloroform	< DL	< DL	1.5
Chloromethane	< DL	< DL	0.6
Dibromochloromethane	< DL	< DL	2.5
1,1-Dichloroethane	< DL	< DL	1.2
1,2-Dichloroethane	< DL	< DL	1.2
1,1-Dichloroethene	< DL	< DL	1.2
c-1,2-Dichloroethene	< DL	< DL	1.2
t-1,2-Dichloroethene	< DL	< DL	1.2
Dichloromethane	< DL	< DL	10.6
1,2-Dichloropropane	< DL	< DL	1.4
cis-1,3-Dichloropropene	< DL	< DL	1.4
trans-1,3-Dichloropropene	< DL	< DL	1.4
Ethylbenzene	< DL	< DL	1.3
2-Hexanone	< DL	< DL	1.3
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	2.5
Styrene	< DL	< DL	2.5
1,1,2,2-Tetrachloroethane	< DL	< DL	10.6
Tetrachloroethene (PCE)	< DL	< DL	3.9
Toluene	< DL	< DL	1.1
1,1,1-Trichloroethane (TCA)	< DL	< DL	1.6
1,1,2-Trichloroethane	< DL	< DL	1.6
Trichloroethene (TCE)	< DL	< DL	1.6
Vinyl Acetate	< DL	< DL	10.6
Vinyl Chloride	< DL	< DL	3.8
Xylenes	< DL	< DL	1.3

< DL designates that the compound was not detected, or was found at levels below the method detection limit.

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS  
 TO-14 VOLATILE ORGANIC COMPOUNDS  
 ANALYZED BY GC/MS - EPA METHOD 8240  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 67\HV-OUT2  
 CLIENT: Sweet-Edwards/EMCON  
 LOCATION: Hidden Valley Landfill  
 SAMPLE LOCATION: Flare Stack Outlet  
 SAMPLE DATE: May 30, 1990  
 SAMPLE TIMES: 12:34-13:34  
 LAB NUMBER(S): G-2051-5  
 AIRFLOW: 10462.2 dscf/min

ANALYTE	Outlet Run 2 mg/min	Blank mg/min	DL Run 2 mg/min
Acetone	< DL	< DL	0.8
Benzene	0.3	< DL	0.1
Bromodichloromethane	< DL	< DL	0.2
Bromomethane	< DL	< DL	0.2
Bromoform	< DL	< DL	0.3
2-Butanone (MEK)	< DL	< DL	0.1
Carbon Disulfide	< DL	< DL	0.2
Carbon Tetrachloride	< DL	< DL	1.0
Chlorobenzene	< DL	< DL	0.1
Chloroethane	< DL	< DL	0.1
2-Chloroethylvinyl Ether	< DL	< DL	1.4
Chloroform	< DL	< DL	0.2
Chloromethane	< DL	< DL	0.1
Dibromochloromethane	< DL	< DL	0.3
1,1-Dichloroethane	< DL	< DL	0.1
1,2-Dichloroethane	< DL	< DL	0.1
1,1-Dichloroethene	< DL	< DL	0.1
c-1,2-Dichloroethene	< DL	< DL	0.1
t-1,2-Dichloroethene	< DL	< DL	0.1
Dichloromethane	< DL	< DL	1.1
1,2-Dichloropropane	< DL	< DL	0.1
cis-1,3-Dichloropropene	< DL	< DL	0.1
trans-1,3-Dichloropropene	< DL	< DL	0.1
Ethylbenzene	0.5	< DL	0.1
2-Hexanone	< DL	< DL	0.1
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.1
Styrene	< DL	< DL	0.3
1,1,2,2-Tetrachloroethane	< DL	< DL	1.1
Tetrachloroethene (PCE)	< DL	< DL	0.4
Toluene	< DL	< DL	0.1
1,1,1-Trichloroethane (TCA)	< DL	< DL	0.2
1,1,2-Trichloroethane	< DL	< DL	0.2
Trichloroethene (TCE)	< DL	< DL	0.2
Vinyl Acetate	< DL	< DL	1.1
Vinyl Chloride	< DL	< DL	0.4
Xylenes	0.6	< DL	0.1

< DL designates that the compound was not detected, or was found at levels below the method detection limit.

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS  
 TO-14 VOLATILE ORGANIC COMPOUNDS  
 ANALYZED BY GC/MS - EPA METHOD 8240  
 AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: 67\HV-OUT3  
 CLIENT: Sweet-Edwards/EMCON  
 LOCATION: Hidden Valley Landfill  
 SAMPLE LOCATION: Flare Stack Outlet  
 SAMPLE DATE: May 30, 1990  
 SAMPLE TIMES: 14:01-15:01  
 LAB NUMBER(S): G-2051-6  
 AIRFLOW: 10142.2 dscf/min

ANALYTE	Outlet Run 3 mg/min	Blank mg/min	DL Run 3 mg/min
Acetone	< DL	< DL	0.7
Benzene	0.2	< DL	0.1
Bromodichloromethane	< DL	< DL	0.2
Bromomethane	< DL	< DL	0.2
Bromoform	< DL	< DL	0.3
2-Butanone (MEK)	< DL	< DL	0.1
Carbon Disulfide	< DL	< DL	0.2
Carbon Tetrachloride	< DL	< DL	1.0
Chlorobenzene	< DL	< DL	0.1
Chloroethane	< DL	< DL	0.1
2-Chloroethylvinyl Ether	< DL	< DL	1.4
Chloroform	< DL	< DL	0.2
Chloromethane	< DL	< DL	0.1
Dibromochloromethane	< DL	< DL	0.3
1,1-Dichloroethane	< DL	< DL	0.1
1,2-Dichloroethane	< DL	< DL	0.1
1,1-Dichloroethene	< DL	< DL	0.1
c-1,2-Dichloroethene	< DL	< DL	0.1
t-1,2-Dichloroethene	< DL	< DL	1.1
Dichloromethane	< DL	< DL	0.1
1,2-Dichloropropane	< DL	< DL	0.1
cis-1,3-Dichloropropene	< DL	< DL	0.1
trans-1,3-Dichloropropene	0.4	< DL	0.1
Ethylbenzene	< DL	< DL	0.1
2-Hexanone	< DL	< DL	0.1
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.3
Styrene	< DL	< DL	1.1
1,1,2,2-Tetrachloroethane	< DL	< DL	1.1
Tetrachloroethene (PCE)	0.4	< DL	0.4
Toluene	< DL	< DL	0.1
1,1,1-Trichloroethane (TCA)	< DL	< DL	0.2
1,1,2-Trichloroethane	< DL	< DL	0.2
Trichloroethene (TCE)	< DL	< DL	1.1
Vinyl Acetate	< DL	< DL	0.4
Vinyl Chloride	< DL	< DL	0.4
Xylenes	0.6	< DL	0.1

< DL designates that the compound was not detected, or was found at levels below the method detection limit.

mg/min = milligrams of analyte emitted per minute

## GAS MEASUREMENT LOG

File Name: 25/HIDVAL1  
 Client Name: Sweet Edwards/EMCON  
 Sample Location: Hidden Valley Landfill  
 Sample Site: Flare Outlet  
 Date: May 30, 1990

TIME	CARBON MONOXIDE ppm	OXYGEN %	CARBON DIOXIDE %	TOTAL SULFUR ppm	NITROGEN OXIDES ppm
RUN 1					
1107	0	12.5	7.3	19.7	21.2
.....					
.....	Printer malfunction (data logger not logging down)				
.....					
1122	0	12.5	7.3	16.7	21.1
1122	0.4	12.5	7.4	16.5	21.1
1123	0.5	12.3	7.4	16.2	21.5
1124	0.5	12.4	7.2	16.4	21.5
1125	0	12.7	7.3	16.6	21.1
1126	0	12.5	7.3	17.0	21.0
1127	0	12.5	7.4	17.8	21.0
1128	0	12.4	7.4	18.5	21.0
1129	0	12.5	7.5	19.0	21.0
1130	0	12.3	7.6	18.7	21.2
1131	0.3	12.3	7.4	18.7	21.4
1132	0.1	12.6	7.3	18.8	21.1
1133	0	12.4	7.6	18.4	21.1
1134	0.1	12.5	7.1	19.0	21.2
1135	0	12.6	7.5	19.1	20.8
1136	0	12.5	7.3	19.5	21.0
1137	0	12.4	7.2	20.1	21.2
1138	0	12.3	7.8	20.4	21.2
1139	0.3	12.2	7.5	20.6	21.5
1140	0.7	12.3	7.2	21.0	21.6
1141	0.7	12.4	7.4	20.7	21.5
1142	0.5	12.3	7.6	20.5	21.4
1143	0.5	12.3	7.3	20.6	21.4
1144	0.3	12.3	7.6	20.7	21.4
1145	0.4	12.4	7.5	20.6	21.5
1146	0.5	12.3	7.2	19.8	21.4
1147	0.0	12.5	7.0	18.9	21.1
1148	0	12.8	7.3	18.4	20.5
1149	0	12.3	7.6	18.8	20.9
1150	0.5	12.3	7.5	19.9	21.5
1151	0.3	12.5	7.6	20.3	21.5
1152	0.2	12.3	7.5	19.8	21.4
1153	0.1	12.5	7.4	20.5	21.3
1154	0.2	12.4	7.4	21.0	21.3
1155	0.1	12.5	7.2	21.6	21.0
1156	0	12.6	7.0	21.4	20.9

1157	0	12.7	7.2	20.9	20.5
1158	0	12.8	7.3	21.0	20.6
1159	0	12.6	7.5	21.3	20.6
1200	0	12.4	7.4	21.9	21.0
1201	0	12.6	7.3	22.5	20.9
1202	0	12.6	7.3	22.2	20.8
1203	0	12.4	7.5	22.4	20.8
1204	0	12.6	7.5	23.1	21.1
1205	0	12.4	7.4	23.0	21.0
1206	0	12.6	7.1	22.7	21.2
1207	0	12.6	7.1	22.7	20.7
1208	0	12.5	7.4	22.6	20.8
1209	0	12.6	7.3	22.7	20.8
1210	0	12.7	7.3	23.2	20.8
1211	0	12.6	7.4	23.8	20.8
1212	0	12.6	7.3	24.2	20.8
1213	0	12.4	7.5	24.9	21.1
<b>AVG RUN 1</b>	<b>0.1</b>	<b>12.5</b>	<b>7.4</b>	<b>20.3</b>	<b>21.1</b>
	<b>ppm</b>	<b>%</b>	<b>%</b>	<b>ppm</b>	<b>ppm</b>
	<b>CARBON</b>	<b>OXYGEN</b>	<b>CARBON</b>	<b>TOTAL</b>	<b>NITROGEN</b>
	<b>MONOXIDE</b>		<b>DIOXIDE</b>	<b>SULFUR</b>	<b>OXIDES</b>

TIME	CARBON MONOXIDE ppm	OXYGEN %	CARBON DIOXIDE %	TOTAL SULFUR ppm	NITROGEN OXIDES ppm
RUN 2					
1237	0	12.6	7.4	23.2	20.9
1238	0	12.4	7.5	23.5	21.2
1239	0	12.5	7.4	23.4	21.1
1240	0	12.5	7.5	23.0	21.1
1241	0	12.4	7.6	22.6	21.3
1242	0	12.4	7.6	22.1	21.5
1243	0	12.4	7.3	22.3	21.4
1244	0	12.4	7.4	22.3	21.4
1245	0	12.4	7.2	22.1	21.5
1246	0	12.4	7.4	22.2	21.5
1247	0	12.4	7.4	22.0	21.4
1248	0	12.3	7.5	21.7	21.5
1249	0	12.3	7.5	21.7	21.7
1250	0	12.5	7.5	21.6	21.4
1251	0	12.4	7.4	21.4	21.4
1252	0	12.4	7.7	21.4	21.4
1253	0	12.3	7.6	21.5	21.7
1254	0	12.3	7.5	21.8	21.7
1255	0	12.4	7.4	22.2	21.7
1256	0	12.3	7.7	22.1	21.7
1257	0	12.3	7.8	21.8	21.8
1258	0	12.4	7.3	21.5	21.9
1259	0	12.7	7.3	20.7	21.6
1300	0	12.5	7.4	20.0	21.2
1301	0	12.5	7.3	19.3	21.3
1302	0	12.6	7.4	19.2	21.2
1303	0	12.4	7.4	19.2	21.2
1304	0	12.4	7.2	19.3	21.4
1305	0	12.9	7.1	19.3	20.7
1306	0	12.7	7.4	18.8	20.4
1307	0	12.7	7.2	19.1	20.6
1308	0	12.7	7.2	19.2	20.7
1309	0	12.7	7.4	18.9	20.6
1310	0	12.6	7.3	18.9	20.8
1311	0	12.7	7.1	18.7	20.8
1312	0	12.7	7.1	18.2	20.6
1313	0	12.6	7.4	18.2	20.8
1314	0	12.6	7.3	18.5	21.0
1315	0	12.5	7.6	18.8	21.1
1316	0	12.6	7.3	18.8	21.0
1317	0	12.7	7.6	18.7	20.8
1318	0	12.6	7.1	18.4	20.8
1319	0	12.8	7.1	18.6	20.6
1320	0	12.8	7.3	18.4	20.2
1321	0	12.7	7.4	18.4	20.4
1322	0	12.6	7.1	18.5	20.5
1323	0	12.7	7.1	18.8	20.5
1324	0	12.8	7.2	18.9	20.5
1325	0	12.9	6.9	19.2	20.6
1326	0	12.8	7.0	19.4	20.5
1327	0	12.8	7.1	19.5	20.6
1328	0	12.8	7.1	20.0	20.6

1329	0	12.8	7.1	20.1	20.5
1330	0	12.7	7.0	20.1	20.4
1331	0	12.8	7.3	20.1	20.6
1332	0	12.7	7.3	20.0	20.6
1333	0	12.9	6.9	19.7	20.6
1334	0	12.9	7.0	19.4	20.5
1335	0	13.2	6.7	19.4	20.1
1336	0	13.0	7.0	19.2	19.9
1337	0	12.9	7.1	19.8	20.0
AVG RUN 2	0.0	12.6	7.3	20.0	21.0
	ppm	%	%	ppm	ppm
	CARBON	OXYGEN	CARBON	TOTAL	NITROGEN
	MONOXIDE		DIOXIDE	SULFUR	OXIDES

TIME	CARBON MONOXIDE ppm	OXYGEN %	CARBON DIOXIDE %	TOTAL SULFUR ppm	NITROGEN OXIDES ppm
RUN 3					
1405	0	12.5	7.4	25.7	21.6
1406	0	12.5	7.8	25.7	21.5
1407	0	12.3	7.5	26.2	21.8
1408	0	12.5	7.0	25.0	21.9
1409	0	12.7	7.1	21.8	21.4
1410	0	12.9	7.0	21.4	20.8
1411	0	12.8	7.1	22.1	20.9
1412	0	12.7	7.1	22.2	21.1
1413	0	12.6	7.1	22.6	21.2
1414	0	13.2	6.9	21.7	20.3
1415	0	12.8	7.5	19.9	20.3
1416	0	12.5	7.4	18.7	20.9
1417	0	12.3	7.4	17.9	21.6
1418	0	12.3	7.6	17.0	21.9
1419	0	12.5	7.3	15.9	21.7
1420	0	12.4	7.4	14.3	21.5
1421	0	12.4	7.5	14.1	21.4
1422	0	12.4	7.6	14.2	21.5
1423	0	12.6	7.4	14.1	21.1
1424	0	12.4	7.3	14.3	21.3
1425	0	12.5	7.4	14.5	21.3
1426	0	12.4	7.4	14.7	21.3
1427	0	12.3	7.6	15.0	21.5
1428	0	12.4	7.6	15.0	21.7
1429	0	12.4	7.6	15.1	21.6
1430	0	12.4	7.4	15.2	21.6
1431	0	12.5	7.3	15.9	21.3
1432	0	12.3	7.6	16.4	21.5
1433	0	12.4	7.7	16.9	21.6
1434	0	12.3	7.5	17.2	21.8
1435	0	12.4	7.4	17.2	21.9
1436	0	12.3	7.8	17.2	21.8
1437	0	12.2	7.7	17.0	22.0
1438	0	12.2	7.7	17.3	22.4
1439	0	12.2	7.7	17.5	22.2
1440	0	12.3	7.5	18.0	22.0
1441	0	12.2	7.4	19.2	22.0
1442	0	12.2	7.6	20.9	22.0
1443	0	12.1	7.6	22.9	22.3
1444	0	12.3	7.5	25.1	22.4
1445	0	12.5	7.1	25.7	21.8
1446	0	12.4	7.4	26.1	21.6
1447	0	12.5	7.1	26.2	21.5
1448	0	12.6	7.3	26.1	21.1
1449	0	12.5	7.3	26.3	21.1
1450	0	12.3	7.1	27.1	21.3
1451	0	12.3	7.3	27.7	21.6
1452	0	12.2	6.6	28.2	21.8
1453	0	12.2	7.3	28.7	21.8
1454	0	12.2	7.6	27.7	21.5
1455	0	12.1	7.8	27.7	21.5
1456	0	12.2	8.1	27.3	21.7

1457	0	12.2	8.5	27.3	21.6
1458	0	12.2	7.7	27.3	21.6
1459	0	12.2	7.7	27.6	21.4
1500	0	12.2	7.5	28.1	21.4
1501	0	12.1	7.5	28.5	21.3
AVG RUN 3	0.0	12.4	7.4	21.2	21.5
	ppm	%	%	ppm	ppm
	CARBON	OXYGEN	CARBON	TOTAL	NITROGEN
	MONOXIDE		DIOXIDE	SULFUR	OXIDES

**APPENDIX B**  
**Laboratory Results**

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services  
141 Suburban Road, Suite C-4  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-1  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/07/90  
Collected by: JW/KM

Attn: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

Sample Description:  
Hidden Valley Landfill, Flare Inlet,  
Run #1

REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT
CARBON DIOXIDE	0.1	25.
OXYGEN	0.01	5.2
NITROGEN	0.02	29.
METHANE	0.005	41.
CARBON MONOXIDE	0.1	<0.1
TOTAL		100.

TCD  
06/18/90  
G20511FG.wr1/FG12  
LRH/mk/mk

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES

  
Laurence R. Hilpert  
Vice President

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services  
141 Suburban Road, Suite C-4  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-1dup  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/07/90  
Collected by: JW/KM

Attn: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

Sample Description:  
Hidden Valley Landfill, Flare Inlet,  
Run #1

DUPLICATE ANALYSIS

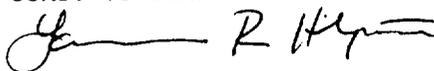
REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT
CARBON DIOXIDE	0.1	25.
OXYGEN	0.01	5.3
NITROGEN	0.02	29.
METHANE	0.005	41.
CARBON MONOXIDE	0.1	<0.1
TOTAL		100.

TCD  
06/18/90  
G20511DU.wr1/FG12  
LRH/mk/mk

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES

  
Laurence R. Hilpert  
Vice President

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services  
141 Suburban Road, Suite C-4  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-2  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/07/90  
Collected by: JW/KM

Attn: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

Sample Description:  
Hidden Valley Landfill, Flare Inlet,  
Run #2

REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT
CARBON DIOXIDE	0.1	25.
OXYGEN	0.01	5.3
NITROGEN	0.02	29.
METHANE	0.005	41.
CARBON MONOXIDE	0.1	<0.1
TOTAL		100.

TCD  
06/18/90  
G20512FG.wr1/FG12  
LRH/mk/mk

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES

  
Laurence R. Hilpert  
Vice President

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services  
141 Suburban Road, Suite C-4  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-3  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/07/90  
Collected by: JW/KM

Attn: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

Sample Description:  
Hidden Valley Landfill, Flare Inlet,  
Run #3

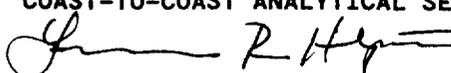
REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT
CARBON DIOXIDE	0.1	26.
OXYGEN	0.01	4.6
NITROGEN	0.02	27.
METHANE	0.005	42.
CARBON MONOXIDE	0.1	<0.1
TOTAL		100.

TCD  
06/18/90  
G20513FG.wr1/FG12  
LRH/mk/mk

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES



Laurence R. Hilpert  
Vice President

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Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services  
141 Suburban Road, Suite C-4  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: QS-06070-1  
Collected:  
Received:  
Tested: 06/07/90  
Collected by:

CCAS

Sample Description:

SPIKE  
CAN MIX 237

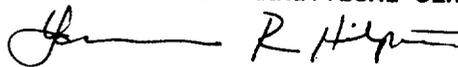
REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT	TRUE VALUE PERCENT	PERCENT RECOVERY
CARBON DIOXIDE	0.1	15.	15.	100.
OXYGEN	0.01	6.9	7.0	99.
NITROGEN	0.02	66.	66.	100.
METHANE	0.005	4.6	4.5	102.
CARBON MONOXIDE	0.1	7.0	7.0	100.
TOTAL		100.	100.	

TCD  
06/18/90  
QS0607F1.WR1/FG12  
LRH/mk/mk/mk

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES

  
Laurence R. Hilpert, Ph.D.  
Vice President

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services  
141 Suburban Road, Suite C-4  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: QS-06070-2  
Collected:  
Received:  
Tested: 06/07/90  
Collected by:

CCAS

Sample Description:

SPIKE  
CAN MIX 237

REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT	TRUE VALUE PERCENT	PERCENT RECOVERY
CARBON DIOXIDE	0.1	15.	15.	100.
OXYGEN	0.01	7.0	7.0	100.
NITROGEN	0.02	67.	66.	102.
METHANE	0.005	4.5	4.5	100.
CARBON MONOXIDE	0.1	6.9	7.0	99.
TOTAL		100.	100.	

TCD  
06/18/90  
QS0607F2.WR1/FG12  
LRH/mk/mk/mk

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES

  
Laurence R. Hilpert, Ph.D.  
Vice President

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services, Inc.  
141 Suburban Road  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-1  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/11/90  
Collected by: JMW/KSM

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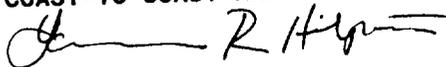
ATTN: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

GC/MS AMBIENT AIR ANALYSIS  
Sample Description:  
Hidden Valley Landfill, Run 1, Flare  
Inlet, Tedlar Bag, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit		Concentration	
	(CAS RN)	ppbv	ug/cu M	ppbv
Acetone	(67641)	20000.	not found	not found
Benzene	(71432)	2000.	16000.	5000.
Bromodichloromethane	(75274)	2000.	not found	not found
Bromomethane	(74839)	5000.	not found	not found
Bromoform	(75252)	2000.	not found	not found
2-Butanone (MEK)	(78933)	2000.	not found	not found
Carbon Disulfide	(75150)	5000.	not found	not found
Carbon Tetrachloride	(56235)	10000.	not found	not found
Chlorobenzene	(108907)	2000.	not found	not found
Chloroethane	(75003)	2000.	not found	not found
2-Chloroethylvinyl Ether	(110758)	20000.	not found	not found
Chloroform	(67663)	2000.	not found	not found
Chloromethane	(107302)	2000.	not found	not found
Dibromochloromethane	(124481)	2000.	not found	not found
1,1-Dichloroethane	(75343)	2000.	not found	not found
1,2-Dichloroethane	(107062)	2000.	not found	not found
1,1-Dichloroethene	(75354)	2000.	not found	not found
c-1,2-Dichloroethene	(156605)	2000.	not found	not found
t-1,2-Dichloroethene	(156605)	2000.	not found	not found
Dichloromethane	(75092)	20000.	not found	not found
1,2-Dichloropropane	(78875)	2000.	not found	not found
cis-1,3-Dichloropropene	(10061015)	2000.	not found	not found
trans-1,3-Dichloropropene	(10061026)	2000.	not found	not found
Ethylbenzene	(100414)	2000.	14000.	3000.
2-Hexanone	(591786)	2000.	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	2000.	not found	not found
Styrene	(100425)	5000.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	10000.	not found	not found
Tetrachloroethene (PCE)	(127184)	5000.	not found	not found
Toluene	(108883)	2000.	46000.	11000.
1,1,1-Trichloroethane (TCA)	(71556)	2000.	not found	not found
1,1,2-Trichloroethane	(79005)	2000.	not found	not found
Trichloroethene (TCE)	(79016)	2000.	not found	not found
Vinyl Acetate	(108054)	20000.	not found	not found
Vinyl Chloride	(75014)	10000.	not found	not found
Xylenes	(1330207)	2000.	41000.	9000.

Percent Recovery of Sample-Specific Quality Assurance Spike is: 110.

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES



Laurence R. Hilpert, Ph.D.  
Vice President

MSD#1  
06/21/90  
G2051-1.wr1/HLS#8  
LRH/jm/gd/co

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services, Inc.  
141 Suburban Road  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-2  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/11/90  
Collected by: JMW/KSM

57

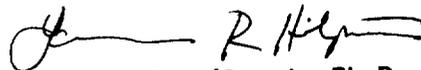
ATTN: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

GC/MS AMBIENT AIR ANALYSIS  
Sample Description:  
Hidden Valley Landfill, Run 2, Flare  
Inlet, Tedlar Bag, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit		Concentration	
	(CAS RN)	ppbv	ug/cu M	ppbv
Acetone	(67641)	10000.	not found	not found
Benzene	(71432)	1000.	28000.	8000.
Bromodichloromethane	(75274)	1000.	not found	not found
Bromomethane	(74839)	2000.	not found	not found
Bromoform	(75252)	1000.	not found	not found
2-Butanone (MEK)	(78933)	1000.	not found	not found
Carbon Disulfide	(75150)	2000.	not found	not found
Carbon Tetrachloride	(56235)	5000.	not found	not found
Chlorobenzene	(108907)	1000.	4400.	880.
Chloroethane	(75003)	1000.	not found	not found
2-Chloroethylvinyl Ether	(110758)	10000.	not found	not found
Chloroform	(67663)	1000.	not found	not found
Chloromethane	(107302)	1000.	not found	not found
Dibromochloromethane	(124481)	1000.	not found	not found
1,1-Dichloroethane	(75343)	1000.	not found	not found
1,2-Dichloroethane	(107062)	1000.	not found	not found
1,1-Dichloroethene	(75354)	1000.	not found	not found
c-1,2-Dichloroethene	(156605)	1000.	not found	not found
t-1,2-Dichloroethene	(156605)	1000.	not found	not found
Dichloromethane	(75092)	10000.	82000.	22000.
1,2-Dichloropropane	(78875)	1000.	not found	not found
cis-1,3-Dichloropropene	(10061015)	1000.	not found	not found
trans-1,3-Dichloropropene	(10061026)	1000.	not found	not found
Ethylbenzene	(100414)	1000.	190000.	40000.
2-Hexanone	(591786)	1000.	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	1000.	not found	not found
Styrene	(100425)	2000.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	5000.	not found	not found
Tetrachloroethene (PCE)	(127184)	2000.	25000.	3400.
Toluene	(108883)	1000.	3900.	950.
1,1,1-Trichloroethane (TCA)	(71556)	1000.	not found	not found
1,1,2-Trichloroethane	(79005)	1000.	not found	not found
Trichloroethene (TCE)	(79016)	1000.	26000.	4400.
Vinyl Acetate	(108054)	10000.	not found	not found
Vinyl Chloride	(75014)	5000.	not found	not found
Xylenes	(1330207)	1000.	300000.	63000.

Percent Recovery of Sample-Specific Quality Assurance Spike is: 120.

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES

  
Laurence R. Hilpert, Ph.D.  
Vice President

MSD#1  
06/22/90  
G2051-2.wr1/HLS#8  
LRH/jm/gd/co

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services, Inc.  
141 Suburban Road  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-3  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/11/90  
Collected by: JMW/KSM

58

ATTN: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

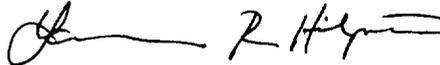
GC/MS AMBIENT AIR ANALYSIS  
Sample Description:  
Hidden Valley Landfill, Run 3, Flare  
Inlet, Tedlar Bag, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit		Concentration	
	(CAS RN)	ppbv	ug/cu M	ppbv
Acetone	(67641)	10000.	not found	not found
Benzene	(71432)	1000.	10000.	2900.
Bromodichloromethane	(75274)	1000.	not found	not found
Bromomethane	(74839)	2000.	not found	not found
Bromoform	(75252)	1000.	not found	not found
2-Butanone (MEK)	(78933)	1000.	not found	not found
Carbon Disulfide	(75150)	2000.	not found	not found
Carbon Tetrachloride	(56235)	5000.	not found	not found
Chlorobenzene	(108907)	1000.	not found	not found
Chloroethane	(75003)	1000.	not found	not found
2-Chloroethylvinyl Ether	(110758)	10000.	not found	not found
Chloroform	(67663)	1000.	not found	not found
Chloromethane	(107302)	1000.	not found	not found
Dibromochloromethane	(124481)	1000.	not found	not found
1,1-Dichloroethane	(75343)	1000.	not found	not found
1,2-Dichloroethane	(107062)	1000.	not found	not found
1,1-Dichloroethene	(75354)	1000.	not found	not found
c-1,2-Dichloroethene	(156605)	1000.	not found	not found
t-1,2-Dichloroethene	(156605)	1000.	not found	not found
Dichloromethane	(75092)	10000.	not found	not found
1,2-Dichloropropane	(78875)	1000.	not found	not found
cis-1,3-Dichloropropene	(10061015)	1000.	not found	not found
trans-1,3-Dichloropropene	(10061026)	1000.	not found	not found
Ethylbenzene	(100414)	1000.	11000.	2300.
2-Hexanone	(591786)	1000.	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	1000.	not found	not found
Styrene	(100425)	2000.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	5000.	not found	not found
Tetrachloroethene (PCE)	(127184)	2000.	not found	not found
Toluene	(108883)	1000.	7000.	1700.
1,1,1-Trichloroethane (TCA)	(71556)	1000.	not found	not found
1,1,2-Trichloroethane	(79005)	1000.	not found	not found
Trichloroethene (TCE)	(79016)	1000.	not found	not found
Vinyl Acetate	(108054)	10000.	not found	not found
Vinyl Chloride	(75014)	5000.	not found	not found
Xylenes	(1330207)	1000.	13000.	2700.

Percent Recovery of Sample-Specific Quality Assurance Spike is: 120.

MSD#1  
06/22/90  
G2051-3.wr1/HLS#8  
LRH/jm/gd/co

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES



Laurence R. Hilpert, Ph.D.  
Vice President

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services, Inc.  
141 Suburban Road  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-4  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/11/90  
Collected by: JMW/KSM

59

ATTN: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

GC/MS AMBIENT AIR ANALYSIS  
Sample Description:  
Hidden Valley Landfill, Run 1, Flare  
Outlet, Can #531, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit		Concentration	
	(CAS RN)	ppbv	ug/cu M	ppbv
Acetone	(67641)	10.	not found	not found
Benzene	(71432)	1.	3.5	1.
Bromodichloromethane	(75274)	1.	not found	not found
Bromomethane	(74839)	2.	not found	not found
Bromoform	(75252)	1.	not found	not found
2-Butanone (MEK)	(78933)	1.	not found	not found
Carbon Disulfide	(75150)	2.	not found	not found
Carbon Tetrachloride	(56235)	5.	not found	not found
Chlorobenzene	(108907)	1.	not found	not found
Chloroethane	(75003)	1.	not found	not found
2-Chloroethylvinyl Ether	(110758)	10.	not found	not found
Chloroform	(67663)	1.	not found	not found
Chloromethane	(107302)	1.	not found	not found
Dibromochloromethane	(124481)	1.	not found	not found
1,1-Dichloroethane	(75343)	1.	not found	not found
1,2-Dichloroethane	(107062)	1.	not found	not found
1,1-Dichloroethene	(75354)	1.	not found	not found
c-1,2-Dichloroethene	(156605)	1.	not found	not found
t-1,2-Dichloroethene	(156605)	1.	not found	not found
Dichloromethane	(75092)	10.	not found	not found
1,2-Dichloropropane	(78875)	1.	not found	not found
cis-1,3-Dichloropropene	(10061015)	1.	not found	not found
trans-1,3-Dichloropropene	(10061026)	1.	not found	not found
Ethylbenzene	(100414)	1.	not found	not found
2-Hexanone	(591786)	1.	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	1.	not found	not found
Styrene	(100425)	2.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	5.	not found	not found
Tetrachloroethene (PCE)	(127184)	2.	not found	not found
Toluene	(108883)	1.	not found	not found
1,1,1-Trichloroethane (TCA)	(71556)	1.	not found	not found
1,1,2-Trichloroethane	(79005)	1.	not found	not found
Trichloroethene (TCE)	(79016)	1.	not found	not found
Vinyl Acetate	(108054)	10.	not found	not found
Vinyl Chloride	(75014)	5.	not found	not found
Xylenes	(1330207)	1.	not found	not found

Percent Recovery of Sample-Specific Quality Assurance Spike is: 102.

MSD#1  
06/22/90  
G2051-4.wr1/HLS#8  
LRH/jm/gd/co

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES



Laurence R. Hilpert, Ph.D.  
Vice President

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services, Inc.  
141 Suburban Road  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-5  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/11/90  
Collected by: JMW/KSM

60

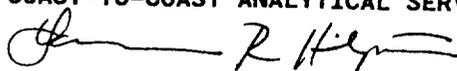
ATTN: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

GC/MS AMBIENT AIR ANALYSIS  
Sample Description:  
Hidden Valley Landfill, Run 2, Flare  
Outlet, Can #546, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit		Concentration	
	(CAS RN)	ppbv	ug/cu M	ppbv
Acetone	(67641)	1.0	not found	not found
Benzene	(71432)	0.1	1.1	0.3
Bromodichloromethane	(75274)	0.1	not found	not found
Bromomethane	(74839)	0.2	not found	not found
Bromoform	(75252)	0.1	not found	not found
2-Butanone (MEK)	(78933)	0.1	not found	not found
Carbon Disulfide	(75150)	0.2	not found	not found
Carbon Tetrachloride	(56235)	0.5	not found	not found
Chlorobenzene	(108907)	0.1	not found	not found
Chloroethane	(75003)	0.1	not found	not found
2-Chloroethylvinyl Ether	(110758)	1.0	not found	not found
Chloroform	(67663)	0.1	not found	not found
Chloromethane	(107302)	0.1	not found	not found
Dibromochloromethane	(124481)	0.1	not found	not found
1,1-Dichloroethane	(75343)	0.1	not found	not found
1,2-Dichloroethane	(107062)	0.1	not found	not found
1,1-Dichloroethene	(75354)	0.1	not found	not found
c-1,2-Dichloroethene	(156605)	0.1	not found	not found
t-1,2-Dichloroethene	(156605)	0.1	not found	not found
Dichloromethane	(75092)	1.0	not found	not found
1,2-Dichloropropane	(78875)	0.1	not found	not found
cis-1,3-Dichloropropene	(10061015)	0.1	not found	not found
trans-1,3-Dichloropropene	(10061026)	0.1	not found	not found
Ethylbenzene	(100414)	0.1	1.7	0.4
2-Hexanone	(591786)	0.1	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	0.1	not found	not found
Styrene	(100425)	0.2	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	0.5	not found	not found
Tetrachloroethene (PCE)	(127184)	0.2	not found	not found
Toluene	(108883)	0.1	not found	not found
1,1,1-Trichloroethane (TCA)	(71556)	0.1	not found	not found
1,1,2-Trichloroethane	(79005)	0.1	not found	not found
Trichloroethene (TCE)	(79016)	0.1	not found	not found
Vinyl Acetate	(108054)	1.0	not found	not found
Vinyl Chloride	(75014)	0.5	not found	not found
Xylenes	(1330207)	0.1	2.1	0.4

Percent Recovery of Sample-Specific Quality Assurance Spike is: 89.

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES



Laurence R. Hilpert, Ph.D.  
Vice President

MSD#1  
06/22/90  
G2051-5.wr1/HLS#8  
LRH/jm/gd/co

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services, Inc.  
141 Suburban Road  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: G-2051-6  
Collected: 05/30/90  
Received: 06/06/90  
Tested: 06/11/90  
Collected by: JMW/KSM

61

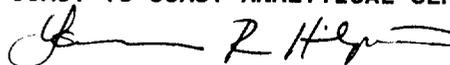
ATTN: Kris Hansen  
AMTest Inc.  
30545 S. E. 84th Street #5  
Preston, WA 98050

GC/MS AMBIENT AIR ANALYSIS  
Sample Description:  
Hidden Valley Landfill, Run 3, Flare  
Outlet, Can #S9013, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit		Concentration	
	(CAS RN)	ppbv	ug/cu M	ppbv
Acetone	(67641)	1.0	not found	not found
Benzene	(71432)	0.1	0.7	0.2
Bromodichloromethane	(75274)	0.1	not found	not found
Bromomethane	(74839)	0.2	not found	not found
Bromoform	(75252)	0.1	not found	not found
2-Butanone (MEK)	(78933)	0.1	not found	not found
Carbon Disulfide	(75150)	0.2	not found	not found
Carbon Tetrachloride	(56235)	0.5	not found	not found
Chlorobenzene	(108907)	0.1	not found	not found
Chloroethane	(75003)	0.1	not found	not found
2-Chloroethylvinyl Ether	(110758)	1.0	not found	not found
Chloroform	(67663)	0.1	not found	not found
Chloromethane	(107302)	0.1	not found	not found
Dibromochloromethane	(124481)	0.1	not found	not found
1,1-Dichloroethane	(75343)	0.1	not found	not found
1,2-Dichloroethane	(107062)	0.1	not found	not found
1,1-Dichloroethene	(75354)	0.1	not found	not found
c-1,2-Dichloroethene	(156605)	0.1	not found	not found
t-1,2-Dichloroethene	(156605)	0.1	not found	not found
Dichloromethane	(75092)	1.0	not found	not found
1,2-Dichloropropane	(78875)	0.1	not found	not found
cis-1,3-Dichloropropene	(10061015)	0.1	not found	not found
trans-1,3-Dichloropropene	(10061026)	0.1	not found	not found
Ethylbenzene	(100414)	0.1	1.5	0.3
2-Hexanone	(591786)	0.1	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	0.1	not found	not found
Styrene	(100425)	0.2	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	0.5	not found	not found
Tetrachloroethene (PCE)	(127184)	0.2	not found	not found
Toluene	(108883)	0.1	1.5	0.4
1,1,1-Trichloroethane (TCA)	(71556)	0.1	not found	not found
1,1,2-Trichloroethane	(79005)	0.1	not found	not found
Trichloroethene (TCE)	(79016)	0.1	not found	not found
Vinyl Acetate	(108054)	1.0	not found	not found
Vinyl Chloride	(75014)	0.5	not found	not found
Xylenes	(1330207)	0.1	2.0	0.4

Percent Recovery of Sample-Specific Quality Assurance Spike is: 76.

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES



Laurence R. Hilpert, Ph.D.  
Vice President

MSD#1  
06/22/90  
G2051-6.wr1/HLS#8  
LRH/jm/gd/co

Coast-to-Coast  
Analytical  
Services

Coast-to-Coast  
Analytical Services, Inc.  
141 Suburban Road  
San Luis Obispo, California 93401  
(805) 543-2553

Lab Number: B-06110  
Collected:  
Received:  
Tested: 06/11/90  
Collected by:

62

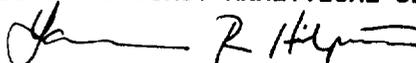
SUBMITTED BY:  
CCAS

GC/MS AMBIENT AIR ANALYSIS  
Sample Description:  
ZERO AIR BLANK

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit		Concentration	
	(CAS RN)	ppbv	ug/cu M	ppbv
Acetone	(67641)	1.0	not found	not found
Benzene	(71432)	0.1	not found	not found
Bromodichloromethane	(75274)	0.1	not found	not found
Bromomethane	(74839)	0.2	not found	not found
Bromoform	(75252)	0.1	not found	not found
2-Butanone (MEK)	(78933)	0.1	not found	not found
Carbon Disulfide	(75150)	0.2	not found	not found
Carbon Tetrachloride	(56235)	0.5	not found	not found
Chlorobenzene	(108907)	0.1	not found	not found
Chloroethane	(75003)	0.1	not found	not found
2-Chloroethylvinyl Ether	(110758)	1.0	not found	not found
Chloroform	(67663)	0.1	not found	not found
Chloromethane	(107302)	0.1	not found	not found
Dibromochloromethane	(124481)	0.1	not found	not found
1,1-Dichloroethane	(75343)	0.1	not found	not found
1,2-Dichloroethane	(107062)	0.1	not found	not found
1,1-Dichloroethene	(75354)	0.1	not found	not found
c-1,2-Dichloroethene	(156605)	0.1	not found	not found
t-1,2-Dichloroethene	(156605)	0.1	not found	not found
Dichloromethane	(75092)	1.0	not found	not found
1,2-Dichloropropane	(78875)	0.1	not found	not found
cis-1,3-Dichloropropene	(10061015)	0.1	not found	not found
trans-1,3-Dichloropropene	(10061026)	0.1	not found	not found
Ethylbenzene	(100414)	0.1	not found	not found
2-Hexanone	(591786)	0.1	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	0.1	not found	not found
Styrene	(100425)	0.2	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	0.5	not found	not found
Tetrachloroethene (PCE)	(127184)	0.2	not found	not found
Toluene	(108883)	0.8	not found	not found
1,1,1-Trichloroethane (TCA)	(71556)	0.1	not found	not found
1,1,2-Trichloroethane	(79005)	0.1	not found	not found
Trichloroethene (TCE)	(79016)	0.1	not found	not found
Vinyl Acetate	(108054)	1.0	not found	not found
Vinyl Chloride	(75014)	0.5	not found	not found
Xylenes	(1330207)	0.1	not found	not found

Percent Recovery of Sample-Specific Quality Assurance Spike is: 98.

Respectfully submitted,  
COAST-TO-COAST ANALYTICAL SERVICES



Laurence R. Hilpert, Ph.D.  
Vice President

MSD#1  
06/21/90  
B061190.wr1/HSL#8  
LRH/jm/gd/co



## ANALYSIS REPORT

CLIENT: Air Quality

DATE RECEIVED: 6/4/90

REPORT TO: Kris Hansen

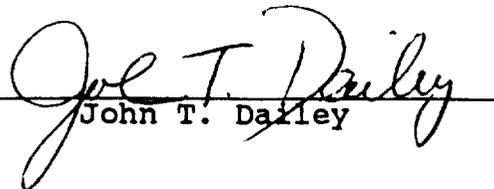
DATE REPORTED: 6/12/90

### HIDDEN VALLEY LANDFILL

Laboratory Sample No.	Client Identification	Chloride (ug/ml)
012326	Blank DI H <sub>2</sub> O	<1.0
012327	Run 1 - HCl	38.0
012328	Run 2 - HCl	45.0
012329	Run 3 - HCl	42.0
	Detection Limit	1.0
	EPA Method	325.3

JTD/ccy

REPORTED BY:

  
John T. Darley

**APPENDIX C**  
**Example Calculations**

Example Calculation of Retention Time  
Hidden Valley Landfill

Length of combustion zone = 30 feet (approx.)

Area of combustion zone = 63.62 ft<sup>2</sup>

Average airflow at the test port = 43609.4 acfm

$$\frac{\text{Area} \times \text{Length} \times 60 \text{ sec/min}}{\text{acfm}} = \text{retention time}$$

$$\frac{63.62 \text{ ft}^2 \times 30 \text{ ft} \times 60}{43609.4 \text{ acfm}} = 2.6 \text{ seconds based on combustion to the height of the test port and acfm @ an average temp. of } 1560^{\circ}\text{F}$$

Run 1 - Inlet  
Hidden Valley  
Landfill

67

SAMPLE CALCULATION SHEET (continued)  
METHODS 15  
1, 2, 3A, 4

$$B_{ws} = (\text{_____ scf}) / (\text{_____ scf} + \text{_____ dscf})$$
$$= \text{_____}$$

$$\% \text{Moisture} = 0.0540 * 100$$
$$= \underline{5.4} \%$$

Molecular weight - Equation 3-2

$$M_d = 0.440 * (\underline{25.0} \% \text{CO}_2) + 0.320 * (\underline{5.2} \% \text{O}_2) + 0.280 * (\underline{69.8} \% \text{CO} + \% \text{N}_2)$$

$$M_d = \underline{32.21} \text{ g/g-mole (dry)}$$

$$M_s = \underline{32.21} \text{ g/g-mole} * (1 - \underline{.0540}) + 18.0 \text{ g/g-mole} * \underline{.0540}$$

$$M_s = \underline{31.44} \text{ g/g-mole (wet)}$$

Stack gas velocity and volumetric flow rate - Equation 2-9 and 2-10

$$V_s = 85.49 * \underline{0.99} * \underline{0.2720} * \sqrt{\underline{554.2}^\circ \text{R} / \underline{31.44} \text{ g/g-mole} / \underline{29.46} \text{ "Hg}}$$

$$V_s = \underline{17.8} \text{ ft/sec (std)}$$

$$Q_{sd} = 3600 * (1 - \underline{.0540}) * \underline{17.8} \text{ ft/sec} * \underline{0.785} \text{ ft}^2 * (\underline{528}^\circ \text{R} / \underline{554.2}^\circ \text{R}) * (\underline{29.46} \text{ "Hg} / \underline{29.92} \text{ "Hg})$$

$$= \underline{44673.2} \text{ dscf/hr} / 60 \text{ min/hr}$$

$$= \underline{744.6} \text{ dscf/min (dry standard cubic feet per minute)}$$

$$\text{acfm} = \underline{17.8} \text{ ft/sec} * \underline{0.785} \text{ ft}^2 * 60 \text{ sec/min}$$

$$= \underline{839.1} \text{ acfm (actual cubic feet per minute)}$$

Isokinetic variation - Equation 5-8

$$I = 0.09450 * \text{_____ dscf} * \text{_____}^\circ \text{R} / (\text{_____ "Hg} * \text{_____ ft/sec} * \text{_____ min} * \text{_____ ft}^2 * (1 - \text{_____}))$$

$$I = \text{_____} \%$$

All of the above numbered equations are from the 40 CFR 60 and assume English units.

SAMPLE CALCULATION SHEET  
METHODS 1-~~8~~  
4

CLIENT: Sweet Edwards/Emcon @  
Hidden Valley Landfill

DATE OF TEST: 5/30/90

RUN #: 1-HCl-Outlet

Particulate Matter Emission Concentration - Equation 5-1

$$V_{m_{std}} = \frac{17.647^\circ R / "Hg * 26.830 \text{ ft}^3 * 1.017 * (29.28 "Hg + (0.800 "H_2O / 13.6))}{(460 + 80.3^\circ F)}$$

$$= 26.147 \text{ dscf}$$

$$\text{dscm} = 26.147 \text{ dscf} / 35.31 \text{ ft}^3/\text{m}^3$$

$$= 0.740 \text{ dscm}$$

Substitution of Equation 5-4 into 5-5

$$W_a = \text{_____ mg} * \text{_____ ml} / \text{_____ ml}$$

$$= \text{_____ mg}$$

$$M_n = (\text{net weight filter catch}) + (\text{net weight "B" section}) - W_a + \text{Back-half}$$

$$= \text{_____ mg} = \text{_____ mg} + \text{_____ mg} - \text{_____ mg} + \text{_____ mg}$$

$$C_s = (0.001 \text{ g/mg}) * (15.43 \text{ grains/gram}) * \text{_____ mg} / \text{_____ dscf}$$

$$= \text{_____ gr/dscf} \quad (\text{Equation 5-6})$$

$$\text{gr/dscf @ 7\% O}_2 = \text{_____ gr/dscf} * (20.9\% - 7\% \text{O}_2) / (20.9\% - \text{_____ \%O}_2)$$

$$= \text{_____ gr/dscf @ 7\% O}_2$$

$$\text{gr/dscf @ 12\% CO}_2 = \text{_____ gr/dscf} * 12\% / \text{_____ \%CO}_2$$

$$= \text{_____ gr/dscf @ 12\% CO}_2$$

$$\text{mg/dscm} = \text{_____ mg} / \text{_____ dscm}$$

$$= \text{_____ mg/dscm}$$

Particulate Matter Emission Rate

$$\text{pounds/hour} = \text{_____ gr/dscf} * \text{_____ dscf/min} * 60 \text{ min/hr} * 1 \text{ lb}/7000 \text{ grains}$$

$$= \text{_____ lb/hr}$$

Moisture - Equation 5-2 and 5-3

$$V_{w_{std}} = 0.04715 \text{ ft}^3/\text{g} * 55.1 \text{ grams of H}_2\text{O collected in impingers}$$

$$= 2.60 \text{ scf}$$

Run 1 - HCl

SAMPLE CALCULATION SHEET (continued)  
METHODS 1-5

69

$$B_{ws} = (2.60 \text{ scf}) / (2.60 \text{ scf} + 26.147 \text{ dscf})$$

$$= 0.0904$$

$$\% \text{Moisture} = 0.0904 * 100$$

$$= 9.04 \%$$

Molecular weight - Equation 3-2

$$M_d = 0.440 * (7.4 \% \text{CO}_2) + 0.320 * (12.5 \% \text{O}_2) + 0.280 * (80.1 \% \text{CO} + \% \text{N}_2)$$

$$M_d = 29.68 \text{ g/g-mole (dry)}$$

$$M_s = 29.68 \text{ g/g-mole} * (1 - 0.0904) + 18.0 \text{ g/g-mole} * 0.0904$$

$$M_s = 28.63 \text{ g/g-mole (wet)}$$

Stack gas velocity and volumetric flow rate - Equation 2-9 and 2-10

$$V_s = 85.49 * 0.84 * 0.0977 * \sqrt{1993.6^\circ \text{R} / 28.63 \text{ g/g-mole} / 29.27 \text{ "Hg}}$$

$$V_s = 10.82 \text{ ft/sec (std)}$$

$$Q_{sd} = 3600 * (1 - 0.0904) * 10.82 \text{ ft/sec} * 63.62 \text{ ft}^2 * (528^\circ \text{R} / 1993.6^\circ \text{R}) * (29.27 \text{ "Hg} / 29.92 \text{ "Hg})$$

$$= 5838495 \text{ dscf/hr} / 60 \text{ min/hr}$$

$$= 97308 \text{ dscf/min (dry standard cubic feet per minute)}$$

$$\text{acfm} = 10.82 \text{ ft/sec} * 63.62 \text{ ft}^2 * 60 \text{ sec/min}$$

$$= 41285.3 \text{ acfm (actual cubic feet per minute)}$$

Isokinetic variation - Equation 5-8

$$I = 0.09450 * \frac{\text{dscf}}{\text{ft}^2} * \frac{^\circ \text{R}}{(1 - \text{moisture})} / (\text{"Hg} * \text{ft/sec} * \text{min})$$

$$I = \text{ } \%$$

All of the above numbered equations are from the 40 CFR 60 and assume English units.



Sample Calculations  
Hydrochloric Acid Emissions

Client: Sweet Edwards/Euron  
Hidden Valley Landfill  
Date: 5/30/90

Location: Flare Outlet  
Run #: 1-HCl

$$\text{milligrams/dscm} = \frac{\text{mg/liter} \times \text{ml of solution/1000 mg/l}}{\text{already converted}} \text{ /dscm} \times \text{ratio of HCl to Cl}^-$$

$$\frac{11628 \text{ mg}}{0.740 \text{ dscm}} * \frac{1 \text{ mg}}{1000 \text{ mg}} * \frac{36.46 \text{ g/g-mole}}{35.45 \text{ g/g-mole}} = \underline{\underline{16.15 \text{ mg/dscm}}}$$

$$\text{ppm} = \text{mg/dscm} * \frac{22.414 \text{ ml/m-mole}}{36.46 \text{ mg/m-mole}} * \frac{293.15 \text{ }^\circ\text{K}}{273.15 \text{ }^\circ\text{K}} * \frac{\text{m}^3}{10^6 \text{ ml}} * 10^6 \text{ ppm}$$

$$= 16.15 \text{ mg/dscm} * \frac{22.414 \text{ ml/m-mole}}{36.46 \text{ mg/m-mole}} * \frac{293.5 \text{ }^\circ\text{K}}{273.15 \text{ }^\circ\text{K}} * \frac{\text{m}^3}{10^6 \text{ ml}} * 10^6 \text{ ppm}$$

$$= \underline{\underline{10.66 \text{ ppm}}}$$

$$\text{ppm@7\%O}_2 = \text{ppm} * \frac{(20.9\% \text{O}_2 - 7\% \text{O}_2)}{(20.9\% \text{O}_2 - \text{measured } \% \text{O}_2)}$$

$$10.66 \text{ ppm} * \frac{(20.9\% \text{O}_2 - 7\% \text{O}_2)}{(20.9\% \text{O}_2 - 12.5\% \text{O}_2)}$$

$$= 17.63 \text{ ppm @ 7\% O}_2$$

$$\text{lb/hr} = \text{mg/dscm} * \text{dscf/min} * \frac{.001 \text{ g}}{\text{mg}} * \frac{1 \text{ lb}}{453.6 \text{ g}} * \frac{.02832 \text{ m}^3}{\text{ft}^3} * \frac{60 \text{ min}}{\text{hr}}$$

$$16.15 \text{ mg/dscm} * 9730.8 \text{ dscf/min} * \frac{.001 \text{ g}}{\text{mg}} * \frac{1 \text{ lb}}{453.6 \text{ g}} * \frac{.02832 \text{ m}^3}{\text{ft}^3} * \frac{60 \text{ min}}{\text{hr}}$$

$$= \underline{\underline{0.59 \text{ lb/hr}}}$$

## EXAMPLE CALCULATION OF GASEOUS EMISSION RATES

RUN 1CLIENT Sweet Edwards/Emcon LOCATION Flare OutletSAMPLE SITE Hidden Valley  
Land fill DATE 5/30/90SULFUR DIOXIDE (SO<sub>2</sub>)instrument averaged 20.3 ppm during the run

ppm x  $1.660 \times 10^{-7}$  = lb/dscf SO<sub>2</sub> (from 40 CFR 60, Appendix A, Method 19)  
 conversion  
 factor

$$\underline{20.3} \text{ ppm} \times 1.660 \times 10^{-7} = \underline{3.37 \times 10^{-6}} \text{ lb/dscf}$$

$$\underline{3.37 \times 10^{-6}} \text{ lb/dscf} \times \underline{9730.8} \text{ dscf/min} \times 60 \text{ min/hr} = \underline{1.97} \text{ lb/hr}$$

NITROGEN OXIDES (NO<sub>x</sub> as NO<sub>2</sub>)instrument averaged 21.1 ppm during the run

ppm x  $1.194 \times 10^{-7}$  = lb/dscf NO<sub>x</sub> (from Method 19)  
 conversion  
 factor

$$\underline{21.1} \text{ ppm} \times 1.194 \times 10^{-7} = \underline{2.5 \times 10^{-6}} \text{ lb/dscf}$$

$$\underline{2.5 \times 10^{-6}} \text{ lb/dscf} \times \underline{9730.8} \text{ dscf/min} \times 60 \text{ min/hr} = \underline{1.47} \text{ lb/hr}$$

$$1.47 \text{ lb/hr} \times 24 \text{ hr/day} \times 365 \text{ days/yr} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} = \underline{\underline{6.44}} \text{ ton/yr}$$

Example Calculation  
 VOC Emission Rates  
 Hidden Valley Landfill

Run 1 - Inlet

Example Compound = Benzene

$$16000 \text{ mg/m}^3 * \frac{1 \text{ m}^3}{35.31 \text{ ft}^3} * 744.6 \frac{\text{dscf}}{\text{min}} * \frac{1 \text{ mg}}{1000 \text{ mg}}$$

$$= \underline{\underline{337.4 \text{ mg/min}}}$$

Run 1 - Outlet

Example Compound = Benzene

$$3.5 \text{ mg/m}^3 * \frac{1 \text{ m}^3}{35.31 \text{ ft}^3} * 9730.8 \frac{\text{dscf}}{\text{min}} * \frac{1 \text{ mg}}{1000 \text{ mg}}$$

$$= \underline{\underline{1.0 \text{ mg/min}}}$$

Destruction Efficiency

$$\left( \frac{\text{Average Inlet Emission Rate} - \text{Average Outlet Emission Rate}}{\text{Average Inlet Emission Rate}} \right) * 100\%$$

$$\frac{385.5 \text{ mg/min} - 0.5 \text{ mg/min}}{385.5 \text{ mg/min}} * 100\% = 99.87\%$$

**APPENDIX D**  
**Field Data Sheets**









TRAVERSE SAMPLING DATA

Client Sweet Edwards/Emcor  
 Date 5/30/90  
 Sample Location Hidden Valley Landfill Flare Stack  
 Operators JSM/JMN  
 Sample Box # 1  
 Run# 1-HC1

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter 10 8" Ø  
 Distance Upstream \_\_\_\_\_  
 Distance Downstream \_\_\_\_\_

Start Time 1107  
 Stop Time 1207  
 Barometric Pressure "Hg 29.28  
 Static Pres "H<sub>2</sub>O -.105  
 Production Rate \_\_\_\_\_

EQUIPMENT CHECKS

Initial/Final  
 Leak Rate Cfm 4.02/0.001  
 Leak Test Vac 15/12  
 Pitots, Pretest \_\_\_\_\_  
 Pitots, Postest \_\_\_\_\_  
 Orsat Sampling System \_\_\_\_\_  
 Tedlar Bag \_\_\_\_\_  
 Thermocouple @ \_\_\_\_\_ °F

NOMOGRAPH SETUP

% Moisture \_\_\_\_\_  
 Meter Temp. \_\_\_\_\_  
 Stack Temp. \_\_\_\_\_  
 ΔHe \_\_\_\_\_ y 1.017  
 Pitot# \_\_\_\_\_ Side# \_\_\_\_\_  
 Cp .84  
 Nozzle Diameter NA  
 K Factor \_\_\_\_\_  
 Reference ΔP \_\_\_\_\_

Filter # \_\_\_\_\_ tare \_\_\_\_\_ mgs  
 Final Initial Net  
 Wt. Wt. Wt.  
 #1 Bubbler 491.3 - 446.9 -  
 #2 Impinger 454.7 - 448.6 -  
 #3 Bubbler 319.8 - 319.8 -  
 #4 Silica Gel 7599 - 7553 -  
 TOTAL WATER VOLUME 56.1

N Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu. Ft.	Pitot Reading (ΔP), In. H <sub>2</sub> O	Orifice Setting (ΔH), In H <sub>2</sub> O		Gas Meter Temp °F		Pump Vacuum In. Hg Gauge	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	not digitized (not very accurate) McGill °F
				Ideal	Actual	In	Out					
PAV	0	15.782			0.8	69	70	2.5	NA	68	1598	
	10					81	71			49	1605	
	20					85	74			50		~1490
	30					89	79			52	1587	~1490
	40					91	81			52		~1520
	50					91	82			52	1562	~1525
	60	1642.612										
Velocity Traverse Before Man											1440	
N	1		.01								1471	
	2		.009								1535	O <sub>2</sub> = 12.5%
	3		.01								1543	CO <sub>2</sub> = 7.4%
	4		.01								1522	CO = 0.1 ppm
	5		.011								1512	SO <sub>2</sub> = 20.3 ppm
	6		.014								1533	NO <sub>x</sub> = 2.1 ppm
	7		.012								1577	
	8		.012								1588	
	9		.007								1575	
	10		.007								1577	
	11		.007								1570	
	12		.007									

$\frac{0.000}{\Delta H} \frac{80.3}{T_m}$

$\frac{1533.6}{T_s}$

$v = \frac{(\Delta P)^2}{...}$

✓ JSM



TRAVERSE SAMPLING DATA

<p>Client <u>Sweet Ed/Emon</u>          Date <u>5-30-90</u>          Sample Location <u>Hidden Valley Landfill - Flare Stack</u>          Operators <u>Jmw/KBM</u>          Sample Box # <u>2</u>          Run# <u>2 HCl</u></p> <p><b>EQUIPMENT CHECKS</b></p> <p>Initial/Final          Leak Rate Cfm <u>1.00/1.00</u>          Leak Test Vac <u>12/12</u>          _____ Pitots, Pretest          _____ Pitots, Postest          _____ Orsat Sampling System          _____ Tedlar Bag          _____ Thermocouple @ _____ °F</p>	<p style="text-align: center;"><b>SCHEMATIC TRAVERSE LAYOUT</b></p> <p>Stack Diameter _____          Distance Upstream _____          Distance Downstream _____</p> <hr/> <p>Filter # _____ tare _____ mgs          Final Initial Net          Wt. Wt. Wt.</p> <p>#1 Bubbler <u>423.6</u> - <u>378.4</u> - _____          #2 Impinger <u>459.0</u> - <u>452.7</u> - _____          #3 Bubbler <u>319.0</u> - <u>317.9</u> - _____          #4 Silica Gel <u>841.0</u> - <u>835.8</u> - _____</p> <p>TOTAL WATER VOLUME <u>56.8</u></p>	<p>Start Time <u>1234</u>          Stop Time <u>1334</u>          Barometric Pressure "Hg <u>29.72</u>          Static Pres "H<sub>2</sub>O <u>-0.105</u>          Production Rate _____</p> <hr/> <p style="text-align: center;"><b>NOMOGRAPH SETUP</b></p> <p>% Moisture _____          Meter Temp. _____          Stack Temp. _____          ΔH@ _____ Y <u>1.017</u>          Pitot# _____ Side# _____          Cp <u>.84</u>          Nozzle Diameter _____          K Factor _____          Reference ΔP _____</p>
--	--	--

N Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu. Ft.	Pitot Reading (ΔP), In. H <sub>2</sub> O	Orifice Setting (ΔH), In H <sub>2</sub> O		Gas Meter Temp °F		Pump Vacuum In. Hg Gauge	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	McGill °F
				Ideal	Actual	In	Out					
PAV	0	642.813			0.8	77	79	2.5	NA	68	1584	
	10				0.8	90	80	2.5		47	1590	
	20				0.8	92	82	2.5		47	1613	~1502
	30				0.8	93	83	2.5		47	1595	~1495
	40				0.8	95	84	2.5		48	1592	~1498
	50				0.8	96	89	2.5		48	1577	~1502
	60	669.994										
Vel. traverse done after run												
N	1	.010									1584	
	2	.010									1590	O <sub>2</sub> = 12.6%
	3	.013									1600	CO <sub>2</sub> = 7.3%
	4	.013									1612	CO = 0ppm
	5	.014									1602	SO <sub>2</sub> = 20ppm
	6	.012									1597	NO <sub>x</sub> = 21ppm
	7	.013									1583	
	8	.012									1575	
	9	.010									1563	
	10	.010									1555	
	11	.010									1560	
	12	.010									1575	

$\frac{0.800}{\Delta H} \frac{86.7}{T_r}$

$V \sqrt{(\Delta P)^2}$

$T_r$

JOB



TRAVERSE SAMPLING DATA

Client Sweet Edwards / Emur  
 Date 5-30-90  
 Sample Location Hidden Valley  
Landfill - Flare outlet  
 Operators BSM / Jmw  
 Sample Box # 3  
 Run# 3 HCL

SCHEMATIC TRAVERSE LAYOUT

Start Time 1401  
 Stop Time 1501  
 Barometric Pressure "Hg 29.21  
 Static Pres "H<sub>2</sub>O -0.65  
 Production Rate \_\_\_\_\_

EQUIPMENT CHECKS

Initial/Final  
 Leak Rate Cfm 4.024 4.02  
 Leak Test Vac 12 / 12  
 Pitots, Pretest \_\_\_\_\_  
 Pitots, Postest \_\_\_\_\_  
 Orsat Sampling System \_\_\_\_\_  
 Tedlar Bag \_\_\_\_\_  
 Thermocouple @ \_\_\_\_\_ °F

Stack Diameter \_\_\_\_\_  
 Distance Upstream \_\_\_\_\_  
 Distance Downstream \_\_\_\_\_

NOMOGRAPH SETUP

% Moisture \_\_\_\_\_  
 Meter Temp. \_\_\_\_\_  
 Stack Temp. \_\_\_\_\_  
 ΔH@ \_\_\_\_\_ Y 1.017  
 Pitot# \_\_\_\_\_ Side# \_\_\_\_\_  
 Cp .84  
 Nozzle Diameter NA  
 K Factor \_\_\_\_\_  
 Reference ΔP \_\_\_\_\_

Filter # \_\_\_\_\_ tare \_\_\_\_\_ mgs  
 Final Initial Net  
 Wt. Wt. Wt.  
 #1 Bubbler 480.1 - 429.3 = \_\_\_\_\_  
 #2 Impinger 472.8 - 465.9 = \_\_\_\_\_  
 #3 Bubbler 320.6 - 319.2 = \_\_\_\_\_  
 #4 Silica Gel 765.7 - 759.9 = \_\_\_\_\_  
 TOTAL WATER VOLUME 64.9

N Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu. Ft.	Pitot Reading (ΔP), In. H <sub>2</sub> O	Orifice Setting (ΔH), In H <sub>2</sub> O		Gas Meter Temp °F		Pump Vacuum In. Hg Gauge	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	McGill °F
				Ideal	Actual	In	Out					
PAV	0	670.213			1.0	82	82		NA	68	1609	
	10				1.0	92	82	2		50	1592	1522
	20				1.0	95	84	2		49	1580	1485
	30				1.0	97	86			51	1578	
	40				1.0	97	87	2		54	1575	1510
	50				1.0	96	86	2		54	1575	1505
	60	701.942									1580	1510
Vel. traverse after run 1530												
N1			.001									O <sub>2</sub> = 12.4%
2			.005									CO <sub>2</sub> = 7.4%
3			.014									CO = 0 ppm
4			.014									SO <sub>2</sub> = 21.2 ppm
5			.014								1540	NO <sub>x</sub> = 21.5 ppm
6			.012								1537	
7			.013								1544	
8			.013								1513	
9			.012								1509	
10			.012								1550	
11			.012									
12			.012									

1.000 88.8  
 AH T

1563.5

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: Flare Stack Outlet  
SITE ADDRESS: Hidden Valley Landfill  
SAMPLING DATE: 5-30-90

SHIPPING DATE: 6-4-90  
CANISTER SERIAL NO. \_\_\_\_\_  
SAMPLER ID: #531 Run 1 Method  
OPERATOR: BSM  
CANISTER LEAK CHECK DATE: \_\_\_\_\_

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	1600	72	X	X
STOP	1562	67		

PRESSURE

CANISTER PRESSURE	
	0
X	30.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	1108	////
STOP	1208	////

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE: \_\_\_\_\_  
QUARTERLY RECERTIFICATION DATE: \_\_\_\_\_

C. LABORATORY INFORMATION

DATE RECEIVED: 6-6-90  
RECEIVED BY: Shellie Hoyt  
INITIAL PRESSURE: 28.5 psi  
FINAL PRESSURE: \_\_\_\_\_  
DILUTION FACTOR: \_\_\_\_\_

592051-4

ANALYSIS

GC-FID-ECD DATE: \_\_\_\_\_  
GC-MSD-SCAN DATE: 6-11-90  
GC-MSD-SIM DATE: \_\_\_\_\_

RESULTS : \_\_\_\_\_

GC-FID-ECD: \_\_\_\_\_  
GC-MSD-SCAN: \_\_\_\_\_  
GC-MSD-SIM: \_\_\_\_\_

[Signature] R Hoyt VP  
SIGNATURE/TITLE

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: Flare Stack Outlet  
 SITE ADDRESS: Hidden Valley Landfill  
 SAMPLING DATE: 5-30-90

SHIPPING DATE: 6-4-90  
 CANISTER SERIAL NO. \_\_\_\_\_  
 SAMPLER ID: #546 Rm 2 Outlet  
 OPERATOR: KSM  
 CANISTER LEAK CHECK DATE: \_\_\_\_\_

B. SAMPLING INFORMATION

TEMPERATURE				
	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	1583	68	X	X
STOP	1584	71		

PRESSURE	
CANISTER PRESSURE	
	0
X	28.8

SAMPLING TIMES		
	LOCAL TIME	ELAPSED TIME METER READING
START	1234	/
STOP	1336	/

FLOW RATES		
MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE: \_\_\_\_\_  
 QUARTERLY RECERTIFICATION DATE: \_\_\_\_\_

C. LABORATORY INFORMATION

DATE RECEIVED: 6-6-90  
 RECEIVED BY: Shellie Hoyt 562051-5  
 INITIAL PRESSURE: 27.5 psl  
 FINAL PRESSURE: \_\_\_\_\_  
 DILUTION FACTOR: \_\_\_\_\_  
 ANALYSIS  
 GC-FID-ECD DATE: \_\_\_\_\_  
 GC-MSD-SCAN DATE: 6/11/90  
 GC-MSD-SIM DATE: \_\_\_\_\_

RESULTS : \_\_\_\_\_  
 \_\_\_\_\_  
 GC-FID-ECD: \_\_\_\_\_  
 GC-MSD-SCAN: \_\_\_\_\_  
 GC-MSD-SIM: \_\_\_\_\_

Shellie Hoyt VP  
 SIGNATURE/TITLE

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: Flare outlet  
 SITE ADDRESS: Hidden Valley  
Land fill - Puyallup WA  
 SAMPLING DATE: 5-30-90

SHIPPING DATE: 6-4-90  
 CANISTER SERIAL NO. \_\_\_\_\_  
 SAMPLER ID: S9013 Run 3 outlet  
 OPERATOR: KSM  
 CANISTER LEAK \_\_\_\_\_  
 CHECK DATE: \_\_\_\_\_

\*difficulty in pressurizing tank

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	1107	75	X	X
STOP	1580	65		

PRESSURE

CANISTER PRESSURE	
	0
X	12.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	1402	/
STOP	1525	/

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE: \_\_\_\_\_  
 QUARTERLY RECERTIFICATION DATE: \_\_\_\_\_

C. LABORATORY INFORMATION

DATE RECEIVED: 6-6-90  
 RECEIVED BY: Shellie Hoyt  
 INITIAL PRESSURE: 10.5 psi  
 FINAL PRESSURE: \_\_\_\_\_  
 DILUTION FACTOR: \_\_\_\_\_

SG2051-6

ANALYSIS

GC-FID-ECD DATE: \_\_\_\_\_  
 GC-MSD-SCAN DATE: 6/11/90  
 GC-MSD-SIM DATE: \_\_\_\_\_

RESULTS : \_\_\_\_\_

GC-FID-ECD: \_\_\_\_\_  
 GC-MSD-SCAN: \_\_\_\_\_  
 GC-MSD-SIM: \_\_\_\_\_

Jan R. Hoyt VP  
 SIGNATURE/TITLE

**APPENDIX E**  
**Miscellaneous Supporting Information**

## METHOD 1 - LOCATION OF TRAVERSE POINTS

### Circular Stacks

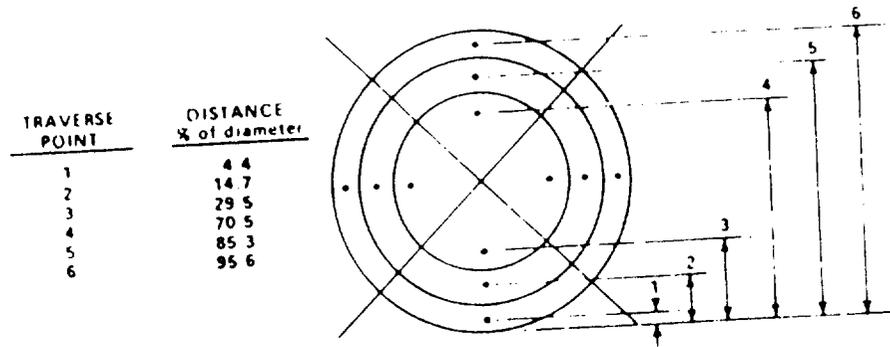


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points indicated.

TABLE 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS  
(Percent of stack diameter from inside wall to traverse point)

Traverse point number on a diameter	Number of traverse points on a diameter—																
	2	4	6	8	10	12	14	16	18	20	22	24					
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1					
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2					
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5					
4			93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7					
5				85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6					
6					80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6					
7						89.5	77.4	64.4	36.6	26.3	23.6	20.4					
8							89.5	77.4	64.4	36.6	26.3	23.6					
9								89.5	77.4	64.4	36.6	26.3					
10									89.5	77.4	64.4	36.6					
11										89.5	77.4	64.4					
12											89.5	77.4					
13												89.5					
14													89.5				
15														89.5			
16															89.5		
17																89.5	
18																	89.5

### Rectangular Stacks

For a rectangular cross section, an equivalent diameter ( $D_e$ ) shall be calculated from the following equation, to determine the upstream and downstream distances:

$$D_e = \frac{2LW}{L+W}$$

where  $L$  = length and  $W$  = width.

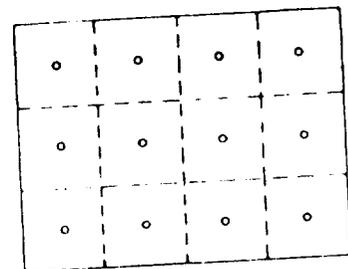


Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with a traverse point at centroid of each area.

METHOD 1 - MINIMUM NUMBER OF TRAVERSE POINTS

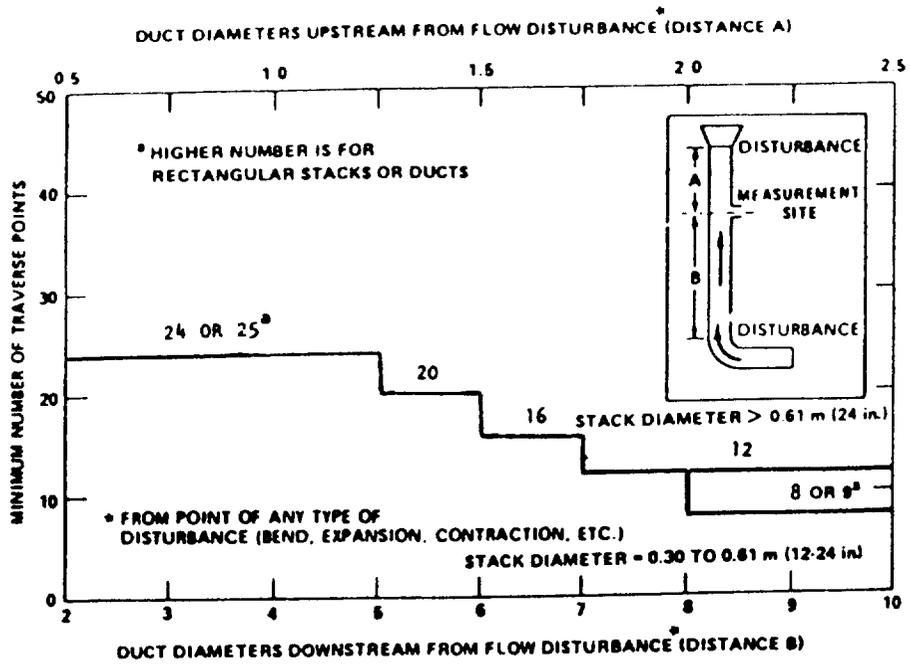


Figure 1-1. Minimum number of traverse points for particulate traverses.

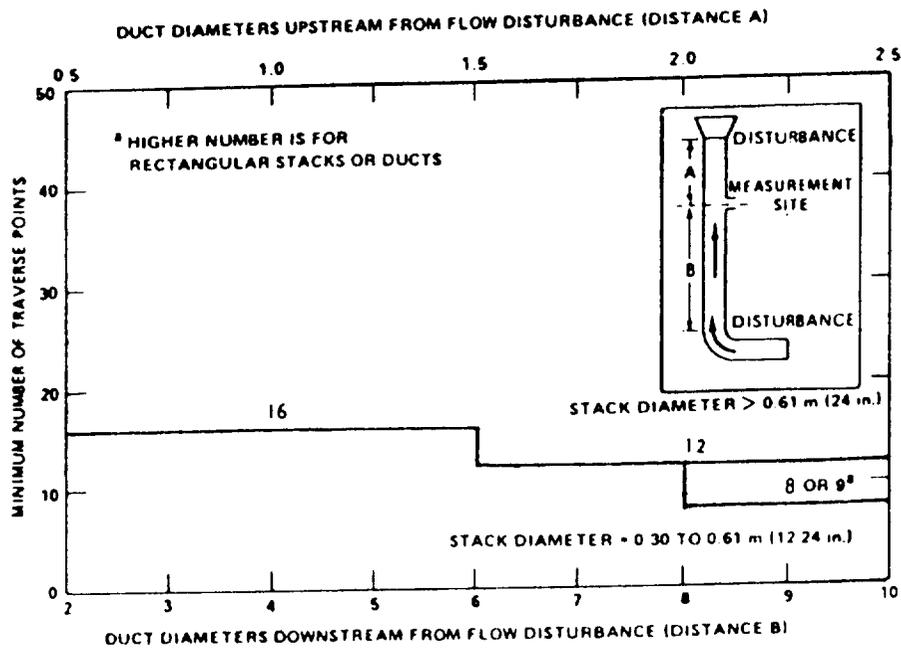


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses

## METHOD 2 - STACK GAS VELOCITY AND VOLUMETRIC FLOW CALCULATIONS

### 5.1 Nomenclature.

$A$  = Cross-sectional area of stack,  $m^2$  ( $ft^2$ ).  
 $B_w$  = Water vapor in the gas stream (from Method 5 or Reference Method 4), proportion by volume.  
 $C_p$  = Pitot tube coefficient, dimensionless.  
 $K_p$  = Pitot tube constant.

$$34.97 \frac{in}{sec} \left[ \frac{(g/g\text{-mole})(mm\ Hg)}{(^{\circ}K)(mm\ H_2O)} \right]^{1/2}$$

for the metric system and

$$85.49 \frac{ft}{sec} \left[ \frac{(lb/lb\text{-mole})(in.\ Hg)}{(^{\circ}R)(in.\ H_2O)} \right]^{1/2}$$

for the English system.

$M_d$  = Molecular weight of stack gas, dry basis (see Section 3.6)  $g/g\text{-mole}$  ( $lb/lb\text{-mole}$ ).  
 $M_w$  = Molecular weight of stack gas, wet basis,  $g/g\text{-mole}$  ( $lb/lb\text{-mole}$ ).  
 $= M_d(1 - B_w) + 18.0 B_w$

Eq. 2-5

$P_{atm}$  = Barometric pressure at measurement site,  $mm\ Hg$  ( $in.\ Hg$ ).  
 $P_s$  = Stack static pressure,  $mm\ Hg$  ( $in.\ Hg$ ).  
 $P_a$  = Absolute stack gas pressure,  $mm\ Hg$  ( $in.\ Hg$ ).  
 $= P_{atm} + P_s$

Eq. 2-6

$P_{std}$  = Standard absolute pressure,  $760\ mm\ Hg$  ( $29.92\ in.\ Hg$ ).  
 $Q_{std}$  = Dry volumetric stack gas flow rate corrected to standard conditions,  $dscm/hr$  ( $dscf/hr$ ).  
 $t_s$  = Stack temperature,  $^{\circ}C$  ( $^{\circ}F$ ).  
 $T_s$  = Absolute stack temperature,  $^{\circ}K$  ( $^{\circ}R$ ).  
 $= 273 + t_s$  for metric.

Eq. 2-6

$= 460 + t_s$  for English.

Eq. 2-7

$T_{std}$  = Standard absolute temperature,  $293\ ^{\circ}K$  ( $528\ ^{\circ}R$ ).

Eq. 2-8

$v_s$  = Average stack gas velocity,  $m/sec$  ( $ft/sec$ ).

$\Delta p$  = Velocity head of stack gas,  $mm\ H_2O$  ( $in.\ H_2O$ ).

$3,600$  = Conversion factor,  $sec/hr$ .  
 $18.0$  = Molecular weight of water,  $g/g\text{-mole}$  ( $lb/lb\text{-mole}$ ).

5.2 Average Stack Gas Velocity.

$$v_s = K_p C_p (\sqrt{\Delta p})_{ave} \sqrt{\frac{T_{std}}{P_s M_d}}$$

Equation 2-9

5.3 Average Stack Gas Dry Volumetric Flow Rate.

$$Q_{std} = 3,600(1 - B_w) v_s A \left( \frac{T_{std}}{T_s} \right) \left( \frac{P_s}{P_{std}} \right)$$

Eq. 2-10

## METHOD 3 - MOLECULAR WEIGHT AND EXCESS AIR CALCULATIONS

### 6.1 Nomenclature.

$M_d$  = Dry molecular weight,  $g/g\text{-mole}$  ( $lb/lb\text{-mole}$ ).  
 $\%EA$  = Percent excess air.  
 $\%CO_2$  = Percent  $CO_2$  by volume (dry basis).  
 $\%O_2$  = Percent  $O_2$  by volume (dry basis).  
 $\%CO$  = Percent  $CO$  by volume (dry basis).  
 $\%N_2$  = Percent  $N_2$  by volume (dry basis).  
 $0.264$  = Ratio of  $O_2$  to  $N_2$  in air,  $v/v$ .  
 $0.280$  = Molecular weight of  $N_2$  or  $CO$ , divided by 100.  
 $0.320$  = Molecular weight of  $O_2$ , divided by 100.  
 $0.440$  = Molecular weight of  $CO$ , divided by 100.

6.2 Percent Excess Air. Calculate the percent excess air (if applicable), by substituting the appropriate values of percent  $O_2$ ,  $CO$ , and  $N_2$  (obtained from Section 4.1.3 or 4.2.4) into Equation 3-1.

$\%EA =$

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

Eq. 3-1

NOTE: The equation above assumes that ambient air is used as the source of  $O_2$ , and that the fuel does not contain appreciable amounts of  $N_2$  (as do coke oven or blast furnace gases). For those cases when appreciable amounts of  $N_2$  are present (coal, oil, and natural gas do not contain appreciable amounts of  $N_2$ ) or when oxygen enrichment is used, alternate methods, subject to approval of the Administrator, are required.

6.3 Dry Molecular Weight. Use Equation 3-2 to calculate the dry molecular weight of the stack gas

$$M_d = 0.440(\%CO_2) + 0.320(\%O_2) + 0.280(\%N_2 + \%CO)$$

Eq. 3-2

## METHOD 4 - STACK GAS MOISTURE CALCULATIONS

### 2.3.1 Nomenclature.

- $B_{ws}$  = Proportion of water vapor, by volume, in the gas stream.
- $M_w$  = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).
- $P_m$  = Absolute pressure (for this method, same as barometric pressure) at the dry gas meter, mm Hg (in. Hg).
- $P_{std}$  = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
- $R$  = Ideal gas constant, 0.06236 (mm Hg) (m<sup>3</sup>)/(g-mole) (°K) for metric units and 21.85 (in. Hg) (ft<sup>3</sup>)/(lb-mole) (°R) for English units.
- $T_m$  = Absolute temperature at meter, °K (°R).
- $T_{std}$  = Standard absolute temperature, 293°K (528°R).
- $V_m$  = Dry gas volume measured by dry gas meter, dcm (dcf).
- $\Delta V_m$  = Incremental dry gas volume measured by dry gas meter at each traverse point, dcm (dcf).
- $V_{m(Std)}$  = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscm (dscf).
- $V_{w(Std)}$  = Volume of water vapor condensed corrected to standard conditions, scm (scf).
- $V_{wsg(Std)}$  = Volume of water vapor collected in silica gel corrected to standard conditions, scm (scf).
- $V_f$  = Final volume of condenser water, ml.
- $V_i$  = Initial volume, if any, of condenser water, ml.
- $W_f$  = Final weight of silica gel or silica gel plus impinger, g.
- $W_i$  = Initial weight of silica gel or silica gel plus impinger, g.
- $Y$  = Dry gas meter calibration factor.
- $\rho_w$  = Density of water, 0.9982 g/ml (0.002201 lb/ml).

### 2.3.2 Volume of Water Vapor Condensed.

$$V_{w(Std)} = \frac{(V_f - V_i)\rho_w RT_{std}}{P_{std} M_w}$$

$$= K_1 (V_f - V_i)$$

Eq. 4-1

- $K_1 = 0.001333$  m<sup>3</sup>/ml for metric units  
 $= 0.04707$  ft<sup>3</sup>/ml for English units
- ### 2.3.3 Volume of Water Vapor Collected in Silica Gel.

$$V_{wsg(Std)} = \frac{(W_f - W_i)RT_{std}}{P_{std} M_w}$$

$$= K_2 (W_f - W_i)$$

Eq. 4-2

Where:

- $K_2 = 0.001335$  m<sup>3</sup>/g for metric units  
 $= 0.04715$  ft<sup>3</sup>/g for English units

### 2.3.4 Sample Gas Volume.

$$V_{m(Std)} = V_m Y \frac{(P_m)(T_{std})}{(P_{std})(T_m)}$$

$$= K_3 Y \frac{V_m P_m}{T_m}$$

Eq. 4-3

Where:

- $K_3 = 0.3858$  °K/mm Hg for metric units  
 $= 17.64$  °R/in. Hg for English units

NOTE: If the post-test leak rate (Section 2.2.6) exceeds the allowable rate, correct the value of  $V_m$  in Equation 4-3, as described in Section 6.3 of Method 5.

### 2.3.5 Moisture Content.

$$B_{ws} = \frac{V_{w(Std)} + V_{wsg(Std)}}{V_{w(Std)} + V_{wsg(Std)} + V_{m(Std)}}$$

Eq. 4-4

NOTE: In saturated or moisture droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one using a value based upon the saturated conditions (see Section 1.2), and another based upon the results of the impinger analysis. The lower of these two values of  $B_{ws}$  shall be considered correct.

NOMENCLATURE  
METHOD 5 CALCULATIONS

- $V_{m_{std}}$  = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscm (dscf).
- $Y$  = Dry gas meter calibration factor
- $P_b$  = Barometric pressure at the sampling site, mm Hg (in. Hg)
- $H$  = Average pressure differential across the orifice meter, mm H<sub>2</sub>O (in. H<sub>2</sub>O)
- $T_m$  = Absolute average dry gas meter temperature, ° K (° R)
- dscm = Dry standard cubic meters
- dscf = Dry standard cubic feet
- $W_a$  = Weight of residue in acetone wash
- $M_a$  = Mass of residue of acetone after evaporation, mg
- $C_a$  = Acetone blank residue concentration, mg/g
- $V_a$  = Volume of acetone blank
- $V_{aw}$  = Volume of acetone used in wash, ml
- $M_n$  = Total amount of particulate matter collected, mg
- $C_s$  = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, mg/dscm (gr/dscf)
- gr/dscf = grains per dry standard cubic foot
- $V_{w_{std}}$  = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf)
- $B_{ws}$  = Water vapor in the gas stream, proportion by volume
- $M_d$  = Molecular weight of stack gas, g/g-mole on dry basis
- $M_s$  = Molecular weight of stack gas, g/g-mole on wet basis
- $V_s$  = Stack gas velocity, calculated by Method 2, Equation 2-9, using data obtained from Method 5, m/sec (ft/sec)
- $C_p$  = Pitot tube coefficient, dimensionless
- $\Delta_p$  = Velocity head of stack gas, mm H<sub>2</sub>O (in. H<sub>2</sub>O)
- $P_s$  = Absolute stack gas pressure, mm Hg (in. Hg)

**NOMENCLATURE (continued)**  
**METHOD 5 CALCULATIONS**

- $Q_{std}$  = Dry volumetric stack gas flow rate corrected to standard conditions, dscm/hr (dscf/hr)
- dscf/min = dry standard cubic feet per minute (also identified as dcfm or scfm)
- acfm = actual cubic feet per minute
- I = Percent of isokinetic sampling
- $A_n$  = Cross-sectional area of nozzle,  $m^2$  ( $ft^2$ )

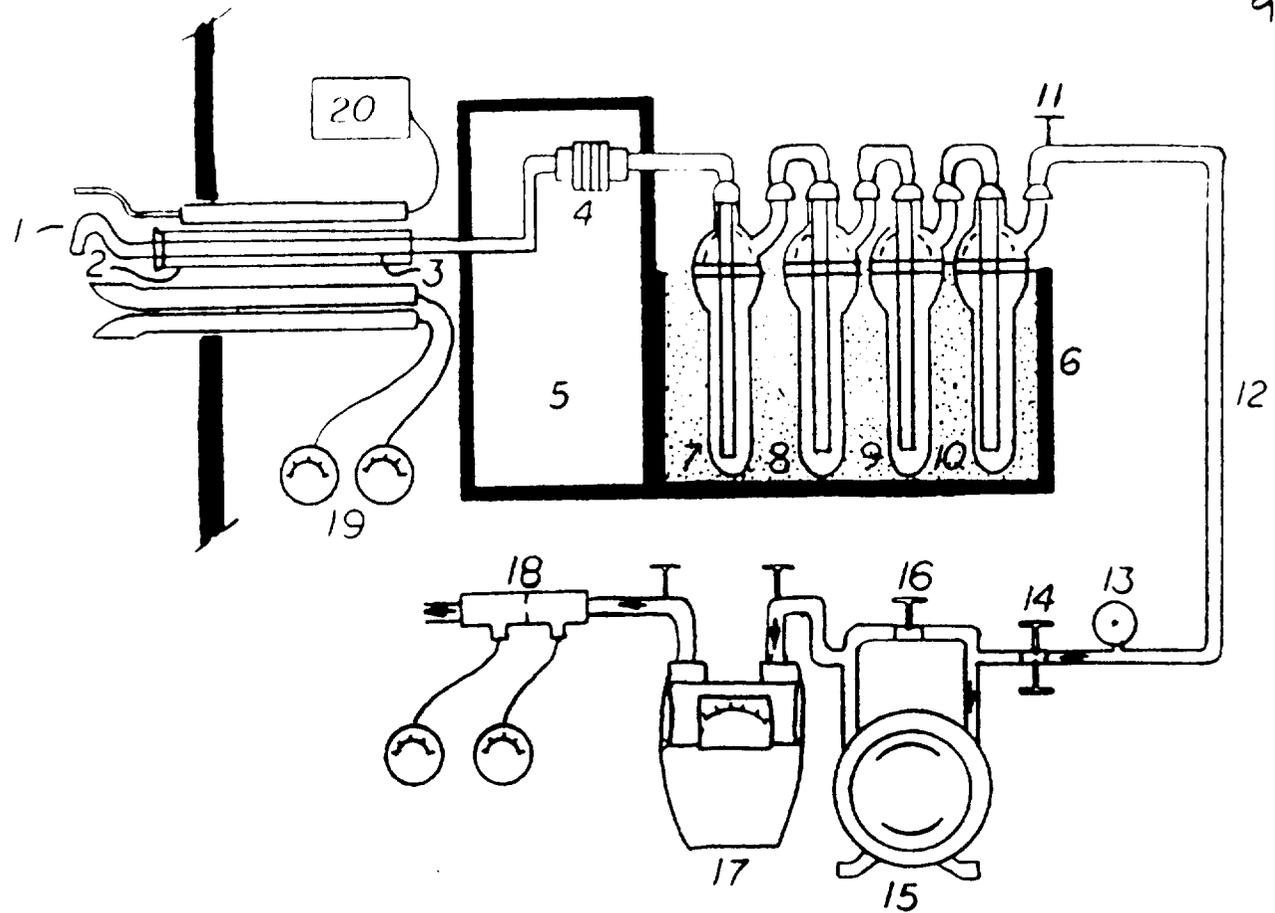


Figure 1. EPA Method 4 Moisture Sample Train.

1. Sampling nozzle
2. Sampling probe sheath
3. Heated sample probe liner
4. Connective glassware
5. Heated compartment
6. Impinger case - contains ice during sampling
7. First impinger containing 100 ml H<sub>2</sub>O
8. Modified Greenburg-Smith impinger containing 100 ml H<sub>2</sub>O
9. Third impinger - empty
10. Fourth impinger containing indicating silica gel desiccant
11. Impinger exit gas temperature sensor
12. Umbilical cord - vacuum line
13. Vacuum gauge
14. Fine and coarse adjustment valves
15. Leak free pump
16. By-pass valve
17. Dry gas meter with inlet and outlet temperature sensors
18. Orifice meter with magnehelic gauges
19. S-type pitot tube with magnehelic gauges
20. Fluke multi-channel digital thermocouple indicator



DRY GAS METER CALIBRATION  
AM TEST, INC. - AIR QUALITY DIVISION

METER BOX #: WHITE ANDERSON BOX  
 CALIBRATION DATE: MARCH 20, 1990  
 METHOD OF CALIB.: STANDARD DRY GAS METER (Method 5 Section 7.1)

TOTAL TIME min	DELTA H H <sub>2</sub> O	METER VOL V1 cf	METER VOL V2 cf	TEMP IN deg F	TEMP OUT deg F	BARO. PRES. "Hg	STD DGM V1	STD DGM V2	ST.DGM TEMP IN deg F	ST.DGM TEMP OUT deg F	ST.DGM Yds	Y FACTOR	DELTA Hg
10.414	1.0	954.383	960.002	87.0	73.0	29.96	266.200	271.700	61.5	63.0	0.998	1.0076	1.95
10.179	1.5	961.334	968.170	93.5	76.0	29.96	273.000	279.700	62.0	63.0	0.998	1.0161	1.87
10.585	2.0	973.082	981.271	97.0	79.0	29.96	284.500	292.500	62.0	63.0	0.998	1.0176	1.88
10.583	2.5	982.290	991.485	99.5	80.5	29.96	293.500	302.500	62.0	63.0	0.998	1.0220	1.85
11.843	3.0	992.809	1004.049	101.0	81.5	29.96	303.800	314.800	62.5	63.0	0.998	1.0224	1.86

AVERAGE

1.017 1.89

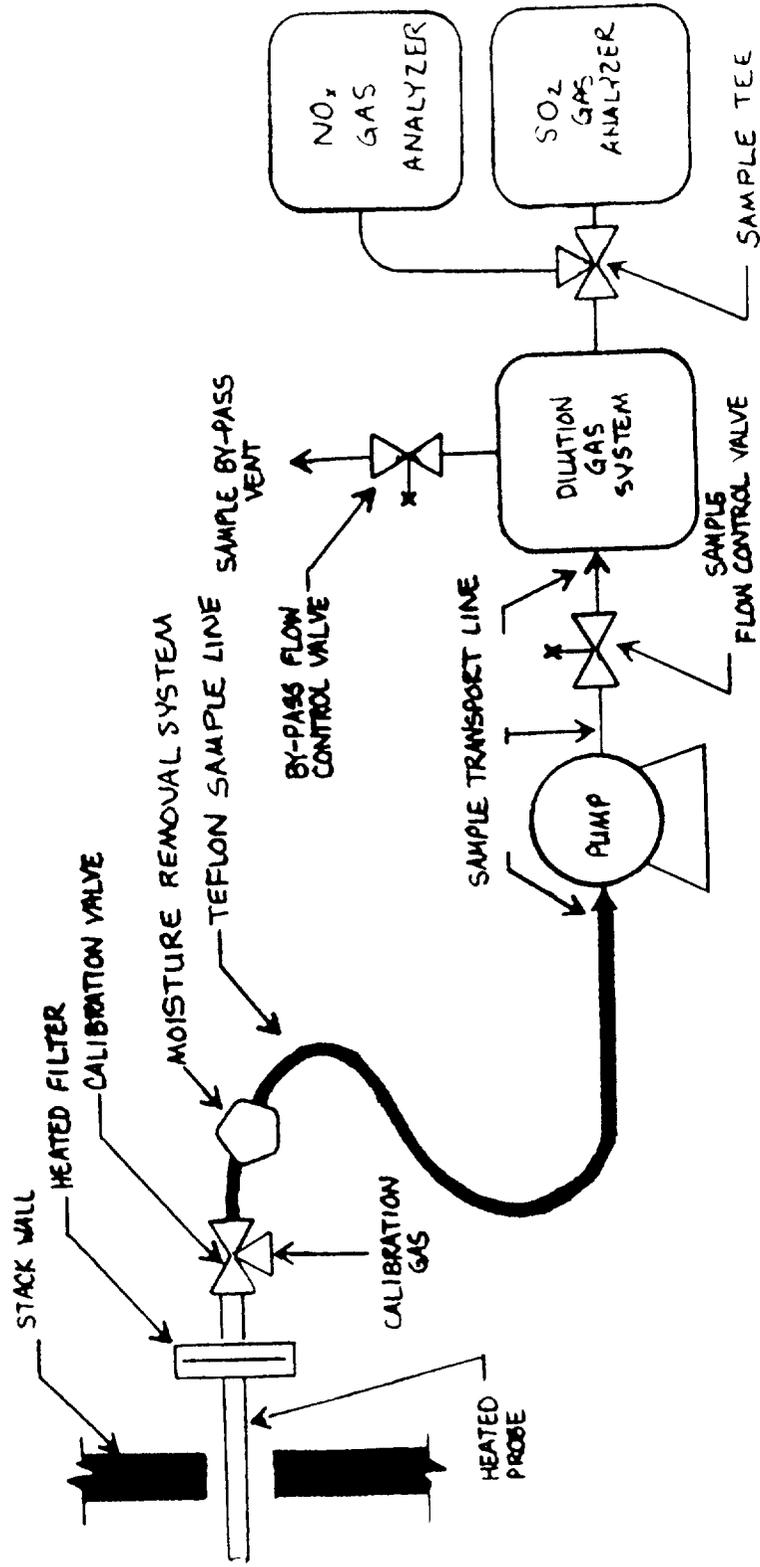


Figure 2. Method 6C/7E sampling system schematic.

**DESCRIPTION**

The two-channel phase-detection system in the Monitor Labs Model 8850 Fluorescent SO<sub>2</sub> Analyzer achieves measurement stability never before possible. The lamp intensity is monitored continuously and variations in source intensity are electronically compensated.

Proper source and filter selection have eliminated water vapor interference from the measurement. Measurement accuracy is significantly improved while maintenance is reduced as compared to units with air driers in the sample line.

Aromatic hydrocarbons are removed using the unique "Kicker". This system incorporates a differential partial pressure technique to selectively remove aromatics across a permeable membrane without influencing the SO<sub>2</sub> sample. This further improves accuracy and reduces maintenance over units with chemical adsorbers.

Built-in front-panel test functions allow the operator to easily verify proper operation of critical parameters including optical system response, electronic response, lamp

intensity, chopper operation and high-voltage power supply.

All measuring and control circuits are on a single PC card with numbered test points for quick fault location.

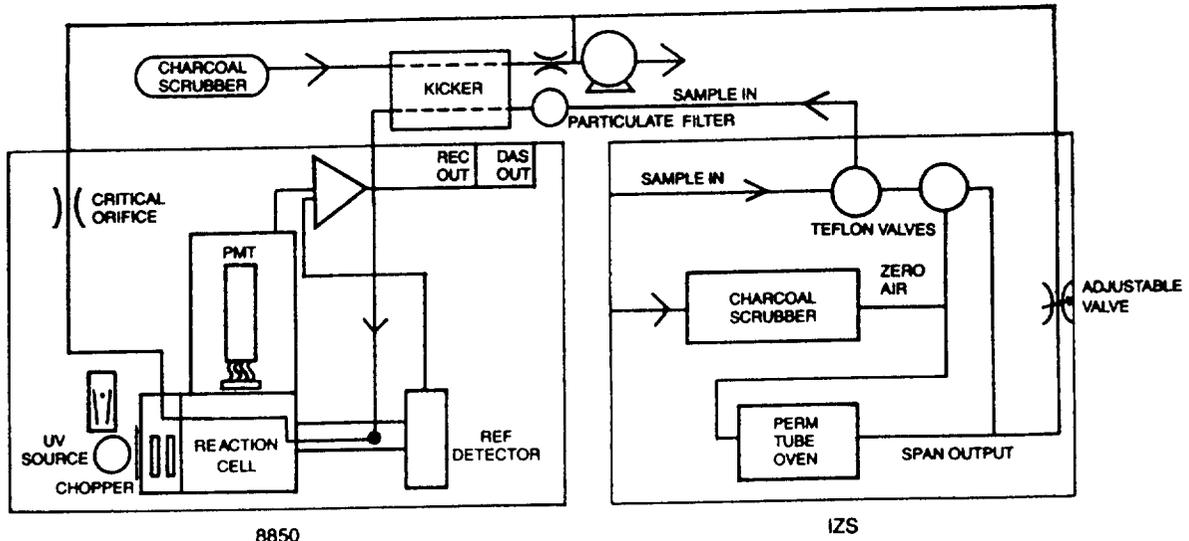
Instrument calibration adjustment time is reduced by the 8850's CALTRACK™ "instant response" zero control.

An optional, internally mounted span/zero check system (IZS) is available. This consists of an NBS-traceable permeation source in a temperature-controlled oven, built-in zero air scrubber and Teflon switching valves.

**SPECIFICATIONS:**

USEPA Reference Method Designation EQSA-0779-039  
FRG Umwelt Bundesamt Equivalency Designation

<b>RANGES</b>	.25, .5, 1.0, 5.0, 10.0 ppm	<b>Fall Time</b>	Less than 260 sec to 95%
<b>Noise</b> — ppm at zero	.0005 ppm	<b>Precision</b>	.001 ppm
ppm at 80%	.001 ppm	<b>Sample Flow Rate</b>	500 cc/min
<b>Lower Detectable Limit</b>	.001 ppm	<b>Temperature Range</b>	5°C - 40°C (EPA equivalent range 20°C - 30°C)
<b>Total Interference Equivalent</b>	Less than .012 ppm	<b>Dimensions (H x W x D)</b>	8.75" x 17" x 23" (22.2 cm x 43.2 cm x 58.4 cm)
<b>Zero Drift</b>	Less than 3 ppb/7 days Less than 2 ppb/24 hours	<b>Weight</b>	<b>Analyzer</b> Pump 50 lbs (22.7 kg) 11 lbs (5 kg)
<b>Span Drift</b>	Less than 1%/7 days average Less than 0.5%/24 hours	<b>Power</b>	300 VA 400 VA 115VAC 50/60Hz 220VAC 50 Hz
<b>Lag Time</b>	20 sec	<b>Data Outputs (Switch Selectable)</b>	
<b>Rise Time</b>	Less than 260 sec to 95%	<b>DAS</b>	10 mV, 100 mV, 1V, 2V, 5V, 10V
		<b>Recorder</b>	100 mV, 100 mV, 1V, 2V, 5V, 10V



**Monitor Labs Model 8850 Sulfur Dioxide Diagram**

74 INVERNESS DRIVE EAST ENGLEWOOD, CO 80112 5189 (303) 792 3100  
**Toll Free 1-800-422-1499**

MONITOR TECHNOLOGIES GmbH, Kammerfeldstrasse 2, D-8051, Altershausen, FRG.  
TEL 49-8166-370, TLX 526785, FAX 49-8166-3720

## DESCRIPTION

The single chopper, dual channel Model 8840 is the most accurate, simplest chemiluminescent NO<sub>x</sub> analyzer available. The ML dual channel technique eliminates the need for valves, timers, pressure balancing and other problems associated with other systems.

In the 8840, the sample is divided into two paths, one leading through the NO<sub>x</sub> to NO converter and the other leading directly to the reaction chamber. The difference between the two channels' readings is NO<sub>x</sub>.

A single chopper with the two photomultiplier tubes operated from a common power supply minimizes detector differential drift. Each detector has its own zero and span adjustments for calibration. An optical chopper simultaneously zeros both channels of the instrument about 90 times per second, thus eliminating zero drift.

Monitor Labs' exclusive molybdenum converter selectively converts NO<sub>x</sub> to NO without interference from ammonia.

Nine built-in front-panel test functions allow the operator to easily verify proper operation

of critical parameters without use of external test equipment.

Instrument calibration adjustment time is reduced by the 8840's CAL TRACK instant response and zero and span controls.

There are two isolated analog outputs at the rear for recorders and data acquisition systems for each output (NO<sub>x</sub>, NO<sub>2</sub> and NO.)

The 8840 is truly a second generation dual channel NO<sub>x</sub> analyzer which combines accuracy of dual channel measurement with simplicity of operation and maintenance.

## SPECIFICATIONS:

USEPA Reference Method Designation RFNA-0280-042  
FRG Umwelt Bundesamt Equivalency Designation

Ranges	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10 ppm full scale standard
Precision	± 1%
Noise (at zero)	1 ppb, 60 second time constant
Minimum detectable concentration	2 ppb
Zero stability	± 0.4% of full scale/24 hours ± 0.5% of full scale/7 days
Span stability (25°C, Nominal line voltage)	± 1% of full scale/24 hours ± 2% of full scale/7 days
Interference	Less than 2 ppb
Linearity	± 1%
Lag time (from step change at input)	10 seconds

Rise or fall time  
(step change in  
sample conc.)  
Normal operating  
temperature  
Humidity tolerance  
Sample flowrate

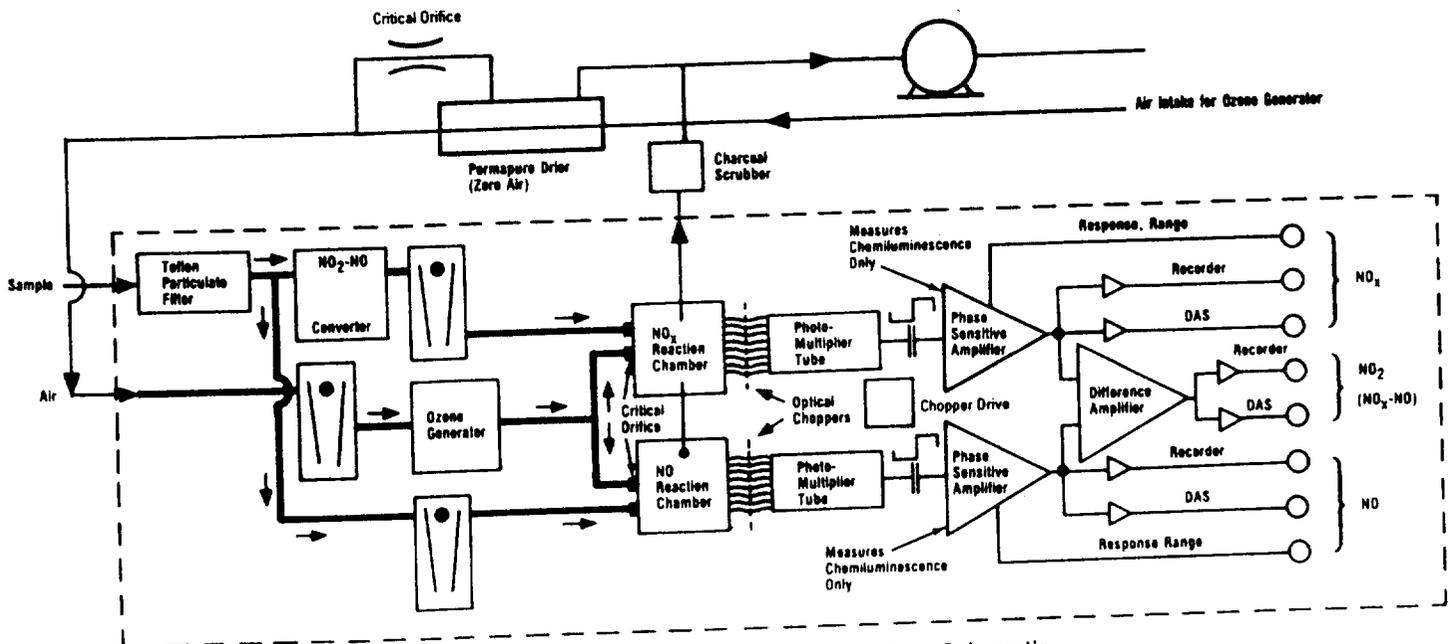
3 minutes to 95% of reading change

5°C - 40°C (EPA equivalent range 20°C - 30°C)  
0 - 95% (non-condensing)  
250 cc/minute (nominal) each  
channel on Reference Method Model.  
700 cc/minute optional (not  
approved as Reference Method).

Data Outputs (Switch Selectable)

DAS  
Recorder  
Status outputs (optional)  
Unattended operation  
Power requirements  
10mV, 100mV, 1V, 2V, 5V, 10V  
10mV, 100mV, 1V, 2V, 5V, 10V  
Range, Function, Power Fail  
7 days  
115V ± 10V, 220VAC-20V, 240VAC ± 25V,  
50/60 Hz standard  
420 watts maximum (turn on)  
320 watts typical (operating)  
59 pounds (26.8 kg)  
Bench: 9.5" × 17" × 23"  
(24.1cm × 43.2cm × 58.4cm)  
Rack: 8.25" × 17" × 23"  
(21cm × 43.2cm × 58.4cm)

Weight  
Dimensions (H × W × D)



Model 8840 Oxides of Nitrogen Analyzer Schematic

Prices and specifications subject to change without prior notice

# DESCRIPTION

Monitor Labs Gas Diluter system provides the ideal approach to high level SO<sub>2</sub> and NO<sub>2</sub> measurements. The sample is diluted 20:1 with clean air. The system is designed to operate in conjunction with customer furnished sample conditioning equipment. The diluter for impurities allows use of time proven ambient level analyzers, eliminating problems associated with direct sample measurements that require pressurized samples.

The dilution ratio is controlled by critical

orifices to ensure long term stability. The orifices are well protected by filters, which stop particles 30 times smaller than the orifice diameter so changing dilution ratio due to orifice plugging will not be a problem. Since the orifices operate beyond their critical point, a sonic self-cleaning effect is present.

The system requires a particulate free sample with a dewpoint of less than 30°C.

ML has developed a new NO<sub>2</sub> to NO converter HI-CON, which will handle up to

200 ppm NO<sub>2</sub> continuously with no ammonia interference. The HI-CON replaces the MOLYCON in the 8840HL for high level applications.

The ML diluter pump has enough power to provide sampling vacuum for the 8850HL plus the 8840HL. The pump is Teflon coated to prevent sample loss.

The diluter also eliminates the CO and water quenching often found in chemiluminescent NO<sub>x</sub> and SO measurements.

## SPECIFICATIONS

### Sample Conditioning Requirements

	8850, SO <sub>2</sub>	8840, NO <sub>2</sub>
Dewpoint	Ambient (20-30°C)	Ambient (20-30°C)
Temperature of sample	20-50°C	20-50°C
Particulates	7 µm Filtered	7 µm Filtered

### Interference Response

#### Test Gas Concentration

NO—288-384 ppm	<1%	N/A
NO <sub>2</sub> —12-16 ppm	<1%	N/A
CO <sub>2</sub> —10-18%	<1%	<1%
O <sub>2</sub> —0.25-4%	<1%	<1%
NH <sub>3</sub> —5-20 ppm	<1%	<1%
CO—7-100 ppm	<1%	<1%

### Dilution Method

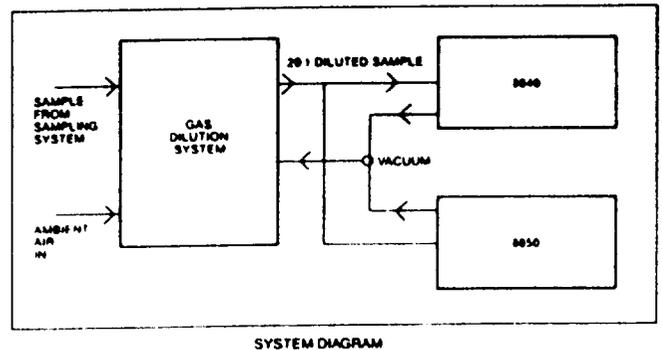
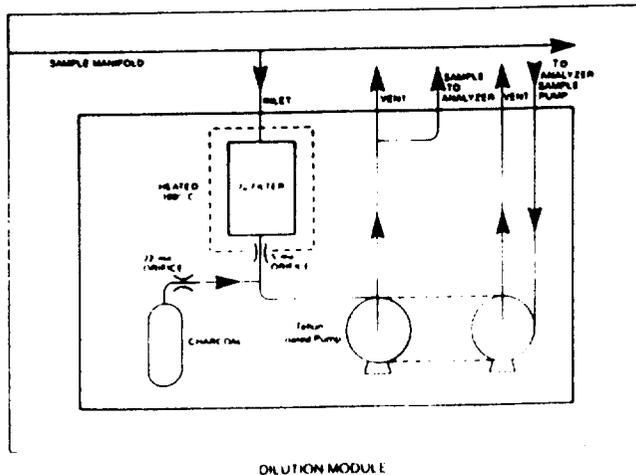
20:1 Active Dilution Using Orifices	20:1 Active Dilution Using Orifices
-------------------------------------	-------------------------------------

### Operational Performances

Ranges	0-25, 0-500, 0-100, 0-50, 0-1000ppm SO <sub>2</sub>	0-50, 0-100, 0-200, 0-500, 0-1000, 0-2500 0-5000ppm NO <sub>x</sub>
Detection Limit	1 ppm	1 ppm
Linearity	< 1%	< 1%
Span Drift	< 2%/wk	< 2%/wk
Zero Drift	< 2%/wk	< 2%/wk
Response Time/Range	< 5 min to 95%	< 60 sec to 95%
Time Constants	60 sec	55 sec
Lag Time	< 10 sec	< 10 sec
Noise	1% F.S.	1% F.S.

### Operational Requirements

Dimensions (W x H x D)		
Analyzer	19 x 8.75 x 24 (48.3cm x 22.2cm x 61cm)	19 x 8.75 x 24 (48.3cm x 22.2cm x 61cm)
Diluter Pump	19 x 8.75 x 10 (48.3cm x 22.2cm x 25.4cm)	19 x 8.75 x 10 (48.3cm x 22.2cm x 25.4cm)
Voltage	110/220 VAC	110/220 VAC
Power Required	325 Watts	325 Watts
Sample Flow Required / Pressure	500cc/min	500cc/min



Prices and specifications subject to change without prior notice



MONITOR LABS, INC., 10180 Scripps Ranch Blvd., San Diego, CA 92131 Ph: (619) 578-5060 Telex: 182794  
Continental U.S. 800-637-7730 In California, (619) 578-5060.





# Scott Specialty Gases

a division of

TELEX: 510 100 8831 (ScottGas)

FAX: 714-887-0549

PHONE: 714-887-2571

Scott Environmental Technology Inc. 2800 CAJON BLVD., SAN BERNARDINO, CA 92405

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Kris A. Hansen Company  
30545 S.E. 84th Street  
Suite 5  
Preston, WA 98050  
Attn: Angela Blaisdel

Date: 2/28/90  
Our Project No.: 5310  
Your P.O. No.: 3368

Gentlemen:

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

### ANALYTICAL REPORT

Cyl. No. <u>ALM-11915</u>	Analytical Accuracy <u>±1%*</u>
Component	Concentration
Carbon Dioxide	12.00%
Carbon Monoxide	500.0PPM
Oxygen	10.00%
Nitrogen	Balance
*Gravimetric Master	

Cyl. No. <u>ALM-12276</u>	Analytical Accuracy <u>±1%*</u>
Component	Concentration
Carbon Dioxide	6.00%
Carbon Monoxide	100.0PPM
Oxygen	15.00%
Nitrogen	Balance
*Gravimetric Master	

Cyl. No. _____	Analytical Accuracy _____
Component	Concentration

Cyl. No. _____	Analytical Accuracy _____
Component	Concentration

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

Analyst \_\_\_\_\_

Approved By R. Shady

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