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SOURCE
EMISSION
EVALUATION
REPORT

AUGUST 17, 1990

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PUGET SOUND AIR POLLUTION
CONTROL AGENCY

Prepared For:

SWEET-EDWARDS/EMCON, INC.
R.W. BECK AND ASSOCIATES, INC.
TCW ASSOCIATES
HOBART LANDFILL
GAS COMBUSTOR TESTING
HOBART, WASHINGTON
MAY 4, 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 King County's Hobart Landfill in Hobart, 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. Testing of the emissions at the inlet and the outlet of the landfill gas combustor (also called flare) was conducted by Am Test, Inc.'s Air Quality Division on May 4, 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 John Zink ZTOF 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 700 scfm of gas, while providing a minimum 1.0 second residence time at 1400° F. With these requirements, the combustor configuration that resulted is 6.5 feet in diameter (I.D.) and reaches an elevation of 28 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 4, 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_2), hydrogen sulfide (H_2S) and total reduced sulfur (TRS)), nitrogen oxides (NO_x), and volatile organic compounds (VOCs).

Volatile organic compounds (VOCs) were collected at the inlet and outlet using Compendium Method T0-14. This technique allows an integrated sample of gas to be collected in an electropolished SUMMA^R 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 (carbon dioxide, carbon monoxide, oxygen, nitrogen, methane, were analyzed using a GC equipped with a thermal conductivity detector (GC-TCD).

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. 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 (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.

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

Methodology	Information Obtained
EPA Method 1, 2	Velocity, airflow, and temperature.
EPA Method 3A	Combustion gas composition (percent carbon dioxide, oxygen, and carbon monoxide).
EPA Method 4	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.
EPA Method 6C/16A	Total Sulfur (TS) emission concentration and mass rate at the outlet.
EPA Method 7E	Nitrogen Oxides (NO_x) emission concentration and mass rate at the outlet.
Method TO-14	Volatile organic compound emission concentration and mass rate. TO-14 was performed at the inlet and outlet sites. Destruction efficiency for VOCs.
EPA Method 8240	Purge and trap method for GC-MS analysis of VOC samples.

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 by TO-14). There are summary tables which include many of the measurements taken 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 derivation of emission concentration and emission rate units. Appendix D of this report contains copies of the original field data sheets. Appendix E of this report contains miscellaneous 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 102° F. The velocity of the inlet gas stream averaged 10.2 ft/second, or 612 ft/minute. The airflow of landfill gas into the system was 187.7 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 7.66 ft/second. The average airflow through the stack was 3991.1 dscf/min. The average temperature at the outlet was 1412° 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 2.7 seconds using actual cubic feet per minute (ft/min) and an average temperature of 1400° 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 TO-14 canisters. 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 Hobart Landfill on May 4, 1990.

COMPOUND	AVERAGE INLET GAS CONCENTRATIONS	AVERAGE OUTLET GAS CONCENTRATIONS
Methane (%)	42	NA
Carbon Dioxide (%)	20	5.4
Oxygen (%)	3.4	14.2
Carbon Monoxide (percent)	< 0.2	0
Nitrogen (%)	34	NA

2.3 EPA Method 4 - Moisture and Hydrochloric Acid

The moisture concentration at the inlet to the flare was estimated using psychrometry. The moisture was estimated to be 6.5%. 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 7.7%. The average chloride emission concentration was 1.7 parts per million (ppm), or 3.5 ppm corrected to 7% oxygen.

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

On May 4, 1990 the landfill gas at the outlet of the flare were continuously monitored to measure the total sulfur (TS) and nitrogen oxides (NO_x) 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_2S) to sulfur dioxide (SO_2). The oxidized gas sample was introduced to a fluorescence analyzer for measuring total sulfur as SO_2. A portion of the sample was also conveyed to an instrumental chemiluminescent analyzer for measuring the NO_x concentration (as nitrogen dioxide-NO_2).

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 1.3 parts per million (ppm). The average TS emission rate was 0.05 pounds per hour (lb/hr). The average NO_x emission concentration was 27.0 parts per million (ppm). The average NO_x emission rate was 0.8 lb/hr.

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

FILE NAME: 24/HOBINSUM
CLIENT: SWEET EDWARDS/EMCON
LOCATION: HOBART LANDFILL
SAMPLE SITE: FLARE STACK INLET

	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	G-1743-1	G-1743-2	G-1743-3	
DATE:	5/4/90	5/4/90	5/4/90	
START TIME:	11:06	13:13	14:30	
STOP TIME:	N/A	N/A	N/A	
STACK GAS MOISTURE (Percent):	6.5	6.5	6.5	6.5
BAROMETRIC PRESSURE (Inches of Hg):	29.73	29.71	29.71	29.72
STATIC PRESSURE (Inches of H2O):	1.85	1.85	1.85	1.9
STACK PRESSURE (Inches of Hg):	29.87	29.85	29.85	29.86
STACK TEMPERATURE (Degrees F.):	101.0	102.0	104.0	102.3
STACK TEMPERATURE (Degrees R.):	561.0	562.0	564.0	562.3
METHANE (Percent):	42	42	42	42
NITROGEN (Percent):	33	35	35	34
CARBON DIOXIDE (Percent):	20	20	21	20
OXYGEN (Percent):	4.8	3.0	2.4	3.4
CARBON MONOXIDE (Percent):	<0.1	<0.1	<0.5	<0.2
MOLECULAR WEIGHT (Dry, Lb/Lb-Mole):	31.39	31.32	31.46	31.39
MOLECULAR WEIGHT (Wet, Lb/Lb-Mole):	30.52	30.45	30.58	30.52
STACK GAS VELOCITY (Feet per Second):	11.5	9.9	9.8	10.4
STACK AREA (Square Feet):	0.349	0.349	0.349	0.35
AIRFLOW (Dry Std. Cubic Feet per Min.):	211.3	181.1	179.2	190.5
AIRFLOW (Actual Cubic Feet per Min.):	240.5	206.7	205.2	217.5

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

FILE NAME: 65/HOBOTSUM
CLIENT: SWEET-EDWARDS/EMCON
LOCATION: HOBART LANDFILL
SAMPLE SITE: FLARE STACK OUTLET

	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	009937	009938	009939	
DATE:	5/4/90	5/4/90	5/4/90	
START TIME:	11:05	12:39	14:02	
STOP TIME:	12:05	13:39	15:03	
VOLUME SAMPLED (Cubic Feet):	35.269	33.801	35.922	34.997
VOLUME SAMPLED (Dry Std. Cubic Feet):	34.774	32.827	34.791	34.131
VOLUME SAMPLED (Dry Std. Cubic Meters):	0.985	0.930	0.985	0.967
STACK GAS MOISTURE (Percent):	7.05	7.80	8.11	7.65
BAROMETRIC PRESURE (Inches of Hg):	29.73	29.71	29.68	29.71
STATIC PRESSURE (Inches of H2O):	-0.05	-0.07	-0.045	-0.06
STACK PRESSURE (Inches of Hg):	29.73	29.70	29.68	29.70
STACK TEMPERATURE (Degrees F.):	1406.0	1386.3	1444.3	1412.2
STACK TEMPERATURE (Degrees R.):	1866.0	1846.3	1904.3	1872.2
CARBON DIOXIDE (Percent):	5.1	5.5	5.7	5.4
OXYGEN (Percent):	14.7	14.0	13.8	14.2
CARBON MONOXIDE (ppm):	0	0	0	0
MOLECULAR WEIGHT (Dry, Lb/Lb-Mole):	29.40	29.44	29.46	29.43
MOLECULAR WEIGHT (Wet, Lb/Lb-Mole):	28.60	28.55	28.53	28.56
STACK GAS VELOCITY (feet per second):	7.76	7.21	8.00	7.66
STACK DIAMETER (inches):	78.5	78.5	78.5	78.5
STACK AREA (square feet):	33.61	33.61	33.61	33.61
AIRFLOW (Dry Std. Cubic Feet per Min.):	4087.2	3806.4	4079.6	3991.1
AIRFLOW (Actual Cubic Feet per Min.):	15640.5	14541.2	16142.6	15441.4
TOTAL SULFUR CONCENTRATION (ppm):	1.6	1.2	1.0	1.3
TOTAL SULFUR EMISSION RATE (lb/hr as SO2):	0.07	0.05	0.04	0.05
TOTAL SULFUR EMISSION RATE (tons/yr):	0.29	0.20	0.18	0.22
NITROGEN OXIDES EMISSION CONC. (ppm):	26.1	28.4	26.5	27.0
NOx EMISSION RATE (lb/hr as NO2):	0.76	0.77	0.77	0.77
NITROGEN OXIDES EMISSION RATE (tons/yr):	3.3	3.4	3.4	3.4
CHLORIDE EMISSION CONCENTRATION (mg/dscm):	1.98	2.41	3.41	2.60
CHLORIDE EMISSION CONCENTRATION (ppm):	1.31	1.59	2.25	1.72
CHLORIDE EMISSION CONC. (ppm @ 7% oxygen):	2.94	3.21	4.41	3.52
CHLORIDE EMISSION RATE (mg/min):	223.3	252.8	383.4	286.5
CHLORIDE EMISSION RATE (lb/hr):	0.03	0.03	0.05	0.04

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 and 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). 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 (ug/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). For mathematical purposes, 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\HOB#1-IN
CLIENT:	Sweet-Edwards/EMCON
LOCATION:	Hobart Landfill
SAMPLE LOCATION:	Flare Inlet
SAMPLE DATE:	May 4, 1990

	ANALYTE	Inlet Run 1 mg/min	Inlet Run 2 mg/min	Inlet Run 3 mg/min	Inlet Average mg/min
9927	Acetone	12.0	1.8	2.7	5.5
.12	Benzene	6.0	6.2	4.9	5.7
	Bromodichloromethane	< DL	< DL	< DL	< DL
	Bromomethane	< DL	< DL	< DL	< DL
16.7	Bromoform	< DL	< DL	< DL	< DL
	2-Butanone (MEK)	< DL	1.6	< DL	0.5
	Carbon Disulfide	0.6	< DL	1.2	0.6
	Carbon Tetrachloride	< DL	< DL	< DL	< DL
	Chlorobenzene	1.3	0.9	0.8	1.0
	Chloroethane	2.2	1.9	1.5	1.9
	2-Chloroethylvinyl Ether	< DL	< DL	< DL	< DL
	Chloroform	< DL	< DL	< DL	< DL
	Chloromethane	0.8	< DL	< DL	0.3
	Dibromochloromethane	< DL	< DL	< DL	< DL
	1,1-Dichloroethane	2.2	< DL	1.4	1.2
	1,2-Dichloroethane	< DL	< DL	< DL	< DL
	1,1-Dichloroethene	< DL	1.9	< DL	0.6
	c-1,2-Dichloroethene	1.9	1.6	1.1	1.5
	t-1,2-Dichloroethene	< DL	< DL	< DL	< DL
	Dichloromethane	27.5	13.8	16.7	19.3
	1,2-Dichloropropane	< DL	< DL	< DL	< DL
	cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
	trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
	Ethylbenzene	31.7	25.6	25.9	27.7
	2-Hexanone	< DL	< DL	< DL	< DL
	4-Methyl-2-Pentanone (MIBK)	< DL	< DL	< DL	< DL
	Styrene	0.3	< DL	< DL	0.1
	1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
	Tetrachloroethene (PCE)	2.9	2.0	1.8	2.2
	Toluene	29.3	25.6	26.9	27.3
	1,1,1-Trichloroethane (TCA)	2.8	2.6	2.0	2.5
	1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
	Trichloroethene (TCE)	1.0	0.7	< DL	0.6
	Vinyl Acetate	< DL	< DL	< DL	< DL
.623	Vinyl Chloride —	19.7	17.4	11.2	16.1
	Xylenes	37.1	28.2	33.5	32.9

< 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

.077 Formaldehyde

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\HOB#1-OUT
CLIENT:	Sweet-Edwards/EMCON
LOCATION:	Hobart Landfill
SAMPLE LOCATION:	Flare Outlet
SAMPLE DATE:	May 4, 1990

ANALYTE	Outlet Run 1 mg/min	Outlet Run 2 mg/min	Outlet Run 3 mg/min	Outlet Average mg/min
Acetone	92.6	12.9	11.6	39.0
Benzene	0.2	0.2	< DL	0.1
Bromodichloromethane	< DL	< DL	< DL	< DL
Bromomethane	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
2-Butanone (MEK)	< DL	< DL	< DL	< DL
Carbon Disulfide	0.5	< DL	< DL	0.2
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	2.3	< DL	< DL	0.8
1,2-Dichloropropane	< DL	< DL	< DL	< DL
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
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	< DL	< DL
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	< DL	< DL	< DL
Xylenes	0.2	< DL	< 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

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 Hobart 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\HOB-DEST
CLIENT:	Sweet-Edwards/EMCON, Inc.
LOCATION:	Hobart Landfill
SAMPLE SITE:	Inlet/Outlet of Landfill Gas Combustor
SAMPLE DATES:	May 4, 1990

COMPOUNDS	Average Inlet Mass Rate mg/min	Average Outlet Mass Rate mg/min	Destruction Efficiency Percent
Acetone	5.5	39.0	---
Benzene	5.7	0.1	98.25
Bromodichloromethane	< DL	< DL	---
Bromomethane	< DL	< DL	---
Bromoform	< DL	< DL	---
2-Butanone (MEK)	0.5	< DL	100
Carbon Disulfide	0.6	0.2	66.67
Carbon Tetrachloride	< DL	< DL	---
Chlorobenzene	1.0	< DL	100
Chloroethane	1.9	< DL	100
2-Chloroethylvinyl Ether	< DL	< DL	---
Chloroform	< DL	< DL	---
Chloromethane	0.3	< DL	100
Dibromochloromethane	< DL	< DL	---
1,1-Dichloroethane	1.2	< DL	100
1,2-Dichloroethane	< DL	< DL	---
1,1-Dichloroethene	0.6	< DL	100
c-1,2-Dichloroethene	1.5	< DL	100
t-1,2-Dichloroethene	< DL	< DL	---
Dichloromethane	19.3	0.8	95.85
1,2-Dichloropropane	< DL	< DL	---
cis-1,3-Dichloropropene	< DL	< DL	---
trans-1,3-Dichloropropene	< DL	< DL	---
Ethylbenzene	27.7	< DL	100
2-Hexanone	< DL	< DL	---
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	---
Styrene	0.1	< DL	100
1,1,2,2-Tetrachloroethane	< DL	< DL	---
Tetrachloroethene (PCE)	2.2	< DL	100
Toluene	27.3	< DL	100
1,1,1-Trichloroethane (TCA)	2.5	< DL	100
1,1,2-Trichloroethane	< DL	< DL	---
Trichloroethene (TCE)	0.6	< DL	100
Vinyl Acetate	< DL	< DL	---
Vinyl Chloride	16.1	< DL	100
Xylenes	32.9	0.1	99.70

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 an 8-inch (I.D.) circular duct which has a tap available to draw gas samples. The tap was located 18 inches upstream and 36 inches downstream from the nearest flow disturbance. A standard pitot tube connected to a magnehelic gauge was used to monitor the velocity of the inlet gas. The outlet stack is 78.5 inches in diameter (I.D.), with two (2) sample ports available 21 feet upstream and 3 feet downstream from the nearest flow disturbance. 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 TO-14 canisters. 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_2). An Infrared Industries Model 2200 analyzer was used to measure the percent oxygen (O_2). 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_2, O_2, 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. 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 2 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 (SO_2), hydrogen sulfide (H_2S) and total reduced sulfur (TRS)). A gas sample was continuously extracted from the stack and passed through a thermal oxidizer which converts TRS and H_2S to SO_2. The gas sample then passed through an instrumental fluorescent analyzer for measuring total sulfur as 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 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 3 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 NO_2 to 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 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 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 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 4 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^R six-liter stainless steel canisters for transport and subsequent analysis. The interior surfaces of these stainless steel canisters are passivated using the Molectrics SUMMA^R 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 SUMMA^R

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^{R} 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_2S to SO_2 converter was used for Method 6C and 16A sampling. A Monitor Labs Model 8840 NO_2 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/HOBIN-R1
CLIENT: SWEET EDWARDS/EMCON
LOCATION: HOBART LANDFILL
SAMPLE SITE: FLARE STACK INLET
SAMPLE DATE: MAY 4, 1990
RUN #: 1-M1-4
OPERATORS: MACKEY/WIDMEYER
CONTACT: D. VONASEK

LAB #: G-1743-1
START TIME: 11:06 o'clock
STOP TIME: N/A o'clock

PERCENT MOISTURE: 6.5
Bws: 0.065
PITOT TUBE Cp: 0.99
STACK DIAMETER: 8.0 inches
STACK AREA: 0.349 sq. feet
METER TEMPERATURE: 0.0 degrees F
BAROMETRIC PRES.: 29.73 inches Hg
STATIC PRESSURE: 1.85 inches H2O
STACK PRESSURE: 29.87 inches Hg
ORIFICE PRESSURE: 0.00 inches H2O
METER PRESSURE: 29.73 inches Hg

AVERAGE CO2 CONC: 20.0 percent
AVERAGE O2 CONC: 4.8 percent
AVERAGE CO CONC: < 0.1 percent
MOLECULAR WEIGHT: 31.39 g/g-mole-dry
MOLECULAR WEIGHT: 30.52 g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
1	0.018	101	4	0.043	101
2	0.038	101	5	0.038	101
3	0.022	101	6	0.025	101

STACK TEMPERATURE: 101.0 degrees F 561.0 degrees R
AVERAGE VELOCITY HEAD: 0.030 " of H2O
STACK GAS VELOCITY: 11.5 ft/sec
STACK GAS AIR FLOW: 240.5 acf/min 211.3 dscf/min

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

FILE NAME:	24/HOBIN-R2	LAB #:	G-1743-2
CLIENT:	SWEET EDWARDS/EMCON	START TIME:	13:13 o'clock
LOCATION:	HOBART LANDFILL	STOP TIME:	N/A o'clock
SAMPLE SITE:	FLARE STACK INLET		
SAMPLE DATE:	MAY 4, 1990		
RUN #:	2-M1-4		
OPERATORS:	MACKEY/WIDMEYER		
CONTACT:	D. VONASEK		

PERCENT MOISTURE:	6.5
Bws:	0.065
PITOT TUBE Cp:	0.99
STACK DIAMETER:	8.0 inches
STACK AREA:	0.349 sq. feet
METER TEMPERATURE:	0.0 degrees F
BAROMETRIC PRES.:	29.71 inches Hg
STATIC PRESSURE:	1.85 inches H20
STACK PRESSURE:	29.85 inches Hg
ORIFICE PRESSURE:	0.00 inches H20
METER PRESSURE:	29.71 inches Hg

AVERAGE CO2 CONC:	20.0 percent
AVERAGE O2 CONC:	3.0 percent
AVERAGE CO CONC:	< 0.1 percent
MOLECULAR WEIGHT:	31.32 g/g-mole-dry
MOLECULAR WEIGHT:	30.45 g/g-mole-wet

****

SAMPLE POINT	VELOCITY " OF H20	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H20	TEMPERATURE DEGREES F.
1	0.012	102	4	0.033	102
2	0.019	102	5	0.022	102
3	0.028	102	6	0.021	102

****

STACK TEMPERATURE:	102.0 degrees F	562.0 degrees R
AVERAGE VELOCITY HEAD:	0.022 " of H20	
STACK GAS VELOCITY:		9.9 ft/sec
STACK GAS AIR FLOW:	206.7 acf/min	181.1 dscf/min

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

FILE NAME: 24/HOBIN-R3
CLIENT: SWEET EDWARDS/EMCON
LOCATION: HOBART LANDFILL
SAMPLE SITE: FLARE STACK INLET
SAMPLE DATE: MAY 4, 1990
RUN #: 3-M1-4
OPERATORS: MACKEY/WIDMEYER
CONTACT: D. VONASEK

LAB #: G-1743-3
START TIME: 14:30 o'clock
STOP TIME: N/A o'clock

PERCENT MOISTURE: 6.5
Bws: 0.065
PITOT TUBE Cp: 0.99
STACK DIAMETER: 8.0 inches
STACK AREA: 0.349 sq. feet
METER TEMPERATURE: 0.0 degrees F
BAROMETRIC PRES.: 29.71 inches Hg
STATIC PRESSURE: 1.85 inches H2O
STACK PRESSURE: 29.85 inches Hg
ORIFICE PRESSURE: 0.00 inches H2O
METER PRESSURE: 29.71 inches Hg

AVERAGE CO2 CONC: 21.0 percent
AVERAGE O2 CONC: 2.4 percent
AVERAGE CO CONC: < 0.5 percent
MOLECULAR WEIGHT: 31.46 g/g-mole-dry
MOLECULAR WEIGHT: 30.58 g/g-mole-wet

****

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
1	0.012	104	4	0.035	104
2	0.015	104	5	0.025	104
3	0.022	104	6	0.025	104

****

STACK TEMPERATURE: 104.0 degrees F 564.0 degrees R
AVERAGE VELOCITY HEAD: 0.022 " of H2O
STACK GAS VELOCITY: 9.8 ft/sec
STACK GAS AIR FLOW: 205.2 acf/min 179.2 dscf/min

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

FILE NAME:     66/HOBOT-R1           LAB #:              009937          GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)
CLIENT:        SWEET EDWARDS/EMCON   START TIME:          11:05 o'clock  ---------------------------------------------------
LOCATION:      HOBART LANDFILL       STOP TIME:           12:05 o'clock  CHLORIDE DETECTION LIMIT (micrograms):          1.0
SAMPLE SITE:   FLARE STACK OUTLET    SAMPLE TIME:          60.0 minutes  CHLORIDE CONCENTRATION IN SAMPLE (micrograms): 1900
SAMPLE DATE:   MAY 4, 1990                                               CHLORIDE CONCENTRATION IN AIR (mg/dscm):       1.98
RUN #:         1-METHOD 1-4/HCL                                          CHLORIDE AS HCL (ppm):                         1.31
OPERATORS:     MACKEY/WIDMEYER                                           CHLORIDE AS HCL (ppm @ 7% O2):                 2.94
CONTACT:       D. VONASEK                                                CHLORIDE EMISSION RATE (mg/min):              223.3
                                                                         CHLORIDE EMISSION RATE (lb/hr):                0.03

    IMPINGER WEIGHTS                 PITOT TUBE Cp:         0.84
  FINAL   INITIAL   NET              NOZZLE DIAMETER:         NA inches
  GRAMS    GRAMS   GRAMS             NOZZLE AREA:             NA sq. feet
  -----   -------  -----             STACK DIAMETER:        78.5 inches
  606.6    584.7    21.9             STACK AREA:           33.61 sq. feet
  609.9    590.6    19.3             METER TEMPERATURE:     82.9 degrees F
  496.2    490.8     5.4             BAROMETRIC PRES.:     29.73 inches Hg
  787.8    778.5     9.3             STATIC PRESSURE:      -0.05 inches H20
TOTAL H20 GAIN:     55.9             STACK PRESSURE:       29.73 inches Hg
TOTAL VOLUME (SCF):  2.64            ORIFICE PRESSURE:     1.300 inches H20
PERCENT MOISTURE:    7.05            METER PRESSURE:       29.83 inches Hg
Bws:               0.0705

INIT. METER VOLUME: 590.195
FINAL METER VOLUME: 625.464          AVERAGE CONC. CO2:      5.1 percent
VOLUME SAMPLED:      35.269          AVERAGE CONC. O2:      14.7 percent
STD VOLUME (DSCF):   34.774          AVERAGE CONC. CO:         0 ppm
STD VOLUME (DSCM):    0.985          MOLECULAR WEIGHT:     29.40 g/g-mole-dry
Y FACTOR:             1.017          MOLECULAR WEIGHT:     28.60 g/g-mole-wet
*****************************************************************************
SAMPLE   VELOCITY   TEMPERATURE     SAMPLE  VELOCITY   TEMPERATURE
POINT    " OF H20   DEGREES F.      POINT   " OF H20   DEGREES F.

  1        0.001      1406            7       0.008      1406
  2        0.001      1406            8       0.010      1406
  3        0.001      1406            9       0.011      1406
  4        0.001      1406           10       0.012      1406
  5        0.008      1406           11       0.009      1406
  6        0.008      1406           12       0.005      1406
*****************************************************************************

STACK TEMPERATURE:            1406.0 degrees F          1866.0 degrees R
AVERAGE VELOCITY HEAD:         0.005 inches H20
STACK GAS VELOCITY:                                       7.76 ft/sec
STACK GAS AIR FLOW:          15640.5 acf/min            4087.2 dscf/min
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                          METHODS 1-4 AND CHLORIDE
                      AM TEST, INC. - AIR QUALITY DIVISION

                                                                      GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)
                                                                      ----------------------------------------------------
FILE NAME:     66/HOBOT-R2              LAB #:          009938        CHLORIDE DETECTION LIMIT (micrograms):               1.0
CLIENT:        SWEET EDWARDS/EMCON      START TIME:      12:39 o'clock CHLORIDE CONCENTRATION IN SAMPLE (micrograms):      2180
LOCATION:      HOBART LANDFILL          STOP TIME:       13:39 o'clock CHLORIDE CONCENTRATION IN AIR (mg/dscm):            2.41
SAMPLE SITE:   FLARE STACK OUTLET       SAMPLE TIME:      60.0 minutes CHLORIDE AS HCL (ppm):                              1.59
SAMPLE DATE:   MAY 4, 1990                                            CHLORIDE AS HCL (ppm @ 7% O2):                       3.21
RUN #:         2-METHOD 1-4/HCL                                       CHLORIDE EMISSION RATE (mg/min):                    252.8
OPERATORS:     MACKEY/WIDMEYER                                        CHLORIDE EMISSION RATE (lb/hr):                      0.03
CONTACT:       D. VONASEK

     IMPINGER WEIGHTS                   PITOT TUBE Cp:          0.84
  FINAL   INITIAL    NET                NOZZLE DIAMETER:          NA inches
  GRAMS    GRAMS    GRAMS               NOZZLE AREA:              NA sq. feet
  -----   -------   -----               STACK DIAMETER:         78.5 inches
  656.9    617.9     39.0               STACK AREA:            33.61 sq. feet
  608.6    597.1     11.5               METER TEMPERATURE:      90.8 degrees F
  535.3    534.1      1.2               BAROMETRIC PRES.:      29.71 inches Hg
  786.5    779.3      7.2               STATIC PRESSURE:       -0.07 inches H20
TOTAL H20 GAIN:      58.9               STACK PRESSURE:        29.70 inches Hg
TOTAL VOLUME (SCF):   2.78              ORIFICE PRESSURE:      1.300 inches H20
PERCENT MOISTURE:     7.80              METER PRESSURE:        29.81 inches Hg
Bws:                0.0780

INIT. METER VOLUME: 625.697             AVERAGE CONC. CO2:       5.5 percent
FINAL METER VOLUME: 659.498             AVERAGE CONC. O2:       14.0 percent
VOLUME SAMPLED:      33.801             AVERAGE CONC. CO:          0 ppm
STD VOLUME (DSCF):   32.827             MOLECULAR WEIGHT:      29.44 g/g-mole-dry
STD VOLUME (DSCM):    0.930             MOLECULAR WEIGHT:      28.55 g/g-mole-wet
Y FACTOR:             1.017
*******************************************************************************
SAMPLE    VELOCITY    TEMPERATURE     SAMPLE    VELOCITY    TEMPERATURE
POINT     " OF H20    DEGREES F.      POINT     " OF H20    DEGREES F.

  1        0.001        1425            7        0.010        1333
  2        0.001        1425            8        0.005        1333
  3        0.001        1425            9        0.007        1401
  4        0.001        1425           10        0.018        1401
  5        0.005        1333           11        0.005        1401
  6        0.005        1333           12        0.008        1401
*******************************************************************************

STACK TEMPERATURE:           1386.3 degrees F            1846.3 degrees R
AVERAGE VELOCITY HEAD:        0.005 inches H20
STACK GAS VELOCITY:                                        7.21 ft/sec
STACK GAS AIR FLOW:         14541.2 acf/min              3806.4 dscf/min
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                                  METHODS 1-4 AND CHLORIDE
                              AM TEST, INC. - AIR QUALITY DIVISION

                                                                     GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)
                                   LAB #:               009939       ------------------------------------------------------
FILE NAME:     66/HOBOT-R3         START TIME:          14:02 o'clock CHLORIDE DETECTION LIMIT (micrograms):              1.0
CLIENT:        SWEET EDWARDS/EMCON STOP TIME:           15:03 o'clock CHLORIDE CONCENTRATION IN SAMPLE (micrograms):   3270
LOCATION:      HOBART LANDFILL     SAMPLE TIME:          61.0 minutes CHLORIDE CONCENTRATION IN AIR (mg/dscm):         3.41
SAMPLE SITE:   FLARE STACK OUTLET                                    CHLORIDE AS HCL (ppm):                           2.25
SAMPLE DATE:   MAY 4, 1990                                           CHLORIDE AS HCL (ppm @ 7% O2):                   4.41
RUN #:         3-METHOD 1-4/HCL                                      CHLORIDE EMISSION RATE (mg/min):                383.4
OPERATORS:     MACKEY/WIDMEYER                                       CHLORIDE EMISSION RATE (lb/hr):                  0.05
CONTACT:       D. VONASEK

       IMPINGER WEIGHTS               PITOT TUBE Cp:          0.84
   FINAL    INITIAL    NET            NOZZLE DIAMETER:          NA inches
   GRAMS    GRAMS     GRAMS           NOZZLE AREA:              NA sq. feet
   -----    -------   -----           STACK DIAMETER:         78.5 inches
   627.2    580.4     46.8            STACK AREA:            33.61 sq. feet
   641.9    631.9     10.0            METER TEMPERATURE:     91.75 degrees F
   479.5    478.4      1.1            BAROMETRIC PRES.:      29.68 inches Hg
   755.2    748.0      7.2            STATIC PRESSURE:      -0.045 inches H2O
TOTAL H2O GAIN:       65.1            STACK PRESSURE:        29.68 inches Hg
TOTAL VOLUME (SCF):   3.07            ORIFICE PRESSURE:      1.300 inches H2O
PERCENT MOISTURE:     8.11            METER PRESSURE:        29.78 inches Hg
Bws:                0.0811

INIT. METER VOLUME: 659.706           AVERAGE CONC. CO2:       5.7 percent
FINAL METER VOLUME: 695.628           AVERAGE CONC. O2:       13.8 percent
VOLUME SAMPLED:      35.922           AVERAGE CONC. CO:          0 ppm
STD VOLUME (DSCF):   34.791           MOLECULAR WEIGHT:      29.46 g/g-mole-dry
STD VOLUME (DSCM):    0.985           MOLECULAR WEIGHT:      28.53 g/g-mole-wet
Y FACTOR:             1.017
*************************************************************************************
SAMPLE    VELOCITY   TEMPERATURE    SAMPLE   VELOCITY   TEMPERATURE
POINT     " OF H2O   DEGREES F.     POINT    " OF H2O   DEGREES F.

  1         0.001      1453           7        0.009      1404
  2         0.001      1453           8        0.010      1497
  3         0.001      1453           9        0.010      1497
  4         0.001      1453          10        0.013      1497
  5         0.008      1404          11        0.009      1408
  6         0.009      1404          12        0.006      1408
*************************************************************************************

STACK TEMPERATURE:            1444.3 degrees F           1904.3 degrees R
AVERAGE VELOCITY HEAD:         0.006 inches H2O
STACK GAS VELOCITY:                                        8.00 ft/sec
STACK GAS AIR FLOW:          16142.6 acf/min             4079.6 dscf/min
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EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
ANALYZED BY GC/MS - EPA METHOD 8240
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME:	67\HOB-IN1
CLIENT:	Sweet-Edwards/EMCON
LOCATION:	Hobart Landfill
SAMPLE LOCATION:	Flare Inlet
SAMPLE DATE:	May 4, 1990
SAMPLE TIME:	11:06
LAB NUMBER(S):	G-1743-1
AIRFLOW:	211.3 dscf/min

ANALYTE	Inlet Run 1 mg/min	Blank mg/min	DL Run 1 mg/min
Acetone	12.0	< DL	0.3
Benzene	6.0	< DL	0.0
Bromodichloromethane	< DL	< DL	0.1
Bromomethane	< DL	< DL	0.1
Bromoform	< DL	< DL	0.1
2-Butanone (MEK)	< DL	< DL	0.0
Carbon Disulfide	0.6	< DL	0.1
Carbon Tetrachloride	< DL	< DL	0.4
Chlorobenzene	1.3	< DL	0.1
Chloroethane	2.2	< DL	0.0
2-Chloroethylvinyl Ether	< DL	< DL	0.6
Chloroform	< DL	< DL	0.1
Chloromethane	0.8	< DL	0.0
Dibromochloromethane	< DL	< DL	0.1
1,1-Dichloroethane	2.2	< DL	0.1
1,2-Dichloroethane	< DL	< DL	0.1
1,1-Dichloroethene	< DL	< DL	0.1
c-1,2-Dichloroethene	1.9	< DL	0.1
t-1,2-Dichloroethene	< DL	< DL	0.1
Dichloromethane	27.5	< DL	0.5
1,2-Dichloropropane	< DL	< DL	0.1
cis-1,3-Dichloropropene	< DL	< DL	0.1
trans-1,3-Dichloropropene	< DL	< DL	0.1
Ethylbenzene	31.7	< DL	0.1
2-Hexanone	< DL	< DL	0.1
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.1
Styrene	0.3	< DL	0.1
1,1,2,2-Tetrachloroethane	< DL	< DL	0.5
Tetrachloroethene (PCE)	2.9	< DL	0.2
Toluene	29.3	< DL	0.0
1,1,1-Trichloroethane (TCA)	2.8	< DL	0.1
1,1,2-Trichloroethane	< DL	< DL	0.1
Trichloroethene (TCE)	1.0	< DL	0.1
Vinyl Acetate	< DL	< DL	0.5
Vinyl Chloride	19.7	< DL	0.2
Xylenes	37.1	< 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\HOB-IN2
CLIENT:	Sweet-Edwards/EMCON
LOCATION:	Hobart Landfill
SAMPLE LOCATION:	Flare Inlet
SAMPLE DATE:	May 4, 1990
SAMPLE TIME:	13:13
LAB NUMBER(S):	G-1743-2
AIRFLOW:	181.1 dscf/min

ANALYTE	Inlet Run 2 mg/min	Blank mg/min	DL Run 2 mg/min
Acetone	1.8	< DL	1.3
Benzene	6.2	< DL	0.2
Bromodichloromethane	< DL	< DL	0.4
Bromomethane	< DL	< DL	0.4
Bromoform	< DL	< DL	0.6
2-Butanone (MEK)	1.6	< DL	0.2
Carbon Disulfide	< DL	< DL	0.4
Carbon Tetrachloride	< DL	< DL	1.7
Chlorobenzene	0.9	< DL	0.3
Chloroethane	1.9	< DL	0.1
2-Chloroethylvinyl Ether	< DL	< DL	0.5
Chloroform	< DL	< DL	0.3
Chloromethane	< DL	< DL	0.1
Dibromochloromethane	< DL	< DL	0.5
1,1-Dichloroethane	< DL	< DL	0.2
1,2-Dichloroethane	< DL	< DL	0.2
1,1-Dichloroethene	1.9	< DL	0.2
c-1,2-Dichloroethene	1.6	< DL	0.2
t-1,2-Dichloroethene	< DL	< DL	0.2
Dichloromethane	13.8	< DL	2.0
1,2-Dichloropropane	< DL	< DL	0.3
cis-1,3-Dichloropropene	< DL	< DL	0.3
trans-1,3-Dichloropropene	< DL	< DL	0.3
Ethylbenzene	25.6	< DL	0.2
2-Hexanone	< DL	< DL	0.2
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.2
Styrene	< DL	< DL	0.5
1,1,2,2-Tetrachloroethane	< DL	< DL	2.0
Tetrachloroethene (PCE)	2.0	< DL	0.7
Toluene	25.6	< DL	0.2
1,1,1-Trichloroethane (TCA)	2.6	< DL	0.3
1,1,2-Trichloroethane	< DL	< DL	0.3
Trichloroethene (TCE)	0.7	< DL	0.3
Vinyl Acetate	< DL	< DL	2.0
Vinyl Chloride	17.4	< DL	0.7
Xylenes	28.2	< DL	0.2

< 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

AMTEST

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

FILE NAME: 67\HOB-IN3
CLIENT: Sweet-Edwards/EMCON
LOCATION: Hobart Landfill
SAMPLE LOCATION: Flare Inlet
SAMPLE DATE: May 4, 1990
SAMPLE TIME: 14:30
LAB NUMBER(S): G-1743-3
AIRFLOW: 179.2 dscf/min

ANALYTE	Inlet Run 3 mg/min	Blank mg/min	DL Run 3 mg/min
Acetone	2.7	< DL	1.3
Benzene	4.9	< DL	0.2
Bromodichloromethane	< DL	< DL	0.4
Bromomethane	< DL	< DL	0.4
Bromoform	< DL	< DL	0.6
2-Butanone (MEK)	< DL	< DL	0.2
Carbon Disulfide	1.2	< DL	0.4
Carbon Tetrachloride	< DL	< DL	1.7
Chlorobenzene	0.8	< DL	0.3
Chloroethane	1.5	< DL	0.1
2-Chloroethylvinyl Ether	< DL	< DL	0.5
Chloroform	< DL	< DL	0.3
Chloromethane	< DL	< DL	0.1
Dibromochloromethane	< DL	< DL	0.5
1,1-Dichloroethane	1.4	< DL	0.2
1,2-Dichloroethane	< DL	< DL	0.2
1,1-Dichloroethene	< DL	< DL	0.2
c-1,2-Dichloroethene	1.1	< DL	0.2
t-1,2-Dichloroethene	< DL	< DL	0.2
Dichloromethane	16.7	< DL	2.0
1,2-Dichloropropane	< DL	< DL	0.3
cis-1,3-Dichloropropene	< DL	< DL	0.3
trans-1,3-Dichloropropene	< DL	< DL	0.3
Ethylbenzene	25.9	< DL	0.2
2-Hexanone	< DL	< DL	0.2
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.2
Styrene	< DL	< DL	0.5
1,1,2,2-Tetrachloroethane	< DL	< DL	2.0
Tetrachloroethene (PCE)	1.8	< DL	0.7
Toluene	26.9	< DL	0.2
1,1,1-Trichloroethane (TCA)	2.0	< DL	0.3
1,1,2-Trichloroethane	< DL	< DL	0.3
Trichloroethene (TCE)	< DL	< DL	0.3
Vinyl Acetate	< DL	< DL	2.0
Vinyl Chloride	11.2	< DL	0.7
Xylenes	33.5	< DL	0.2

< 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

AMTEST

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

FILE NAME:	67\HOB-OUT1
CLIENT:	Sweet-Edwards/EMCON
LOCATION:	Hobart Landfill
SAMPLE LOCATION:	Flare Outlet
SAMPLE DATE:	May 4, 1990
SAMPLE TIMES:	11:05-12:05
LAB NUMBER(S):	G-1743-4, 009937
AIRFLOW:	4087.2 dscf/min

ANALYTE	Outlet Run 1 mg/min	Blank mg/min	DL Run 1 mg/min
Acetone	92.6	< DL	1.5
Benzene	0.2	< DL	0.2
Bromodichloromethane	< DL	< DL	0.4
Bromomethane	< DL	< DL	0.5
Bromoform	< DL	< DL	0.6
2-Butanone (MEK)	< DL	< DL	0.2
Carbon Disulfide	0.5	< DL	0.4
Carbon Tetrachloride	< DL	< DL	1.5
Chlorobenzene	< DL	< DL	0.3
Chloroethane	< DL	< DL	0.2
2-Chloroethylvinyl Ether	< DL	< DL	2.8
Chloroform	< DL	< DL	0.3
Chloromethane	< DL	< DL	0.1
Dibromochloromethane	< DL	< DL	0.5
1,1-Dichloroethane	< DL	< DL	0.3
1,2-Dichloroethane	< DL	< DL	0.3
1,1-Dichloroethene	< DL	< DL	0.3
c-1,2-Dichloroethene	< DL	< DL	0.3
t-1,2-Dichloroethene	< DL	< DL	0.3
Dichloromethane	2.3	< DL	2.2
1,2-Dichloropropane	< DL	< DL	0.3
cis-1,3-Dichloropropene	< DL	< DL	0.3
trans-1,3-Dichloropropene	< DL	< DL	0.3
Ethylbenzene	< DL	< DL	0.3
2-Hexanone	< DL	< DL	0.3
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.3
Styrene	< DL	< DL	0.5
1,1,2,2-Tetrachloroethane	< DL	< DL	1.8
Tetrachloroethene (PCE)	< DL	< DL	0.8
Toluene	< DL	< DL	0.2
1,1,1-Trichloroethane (TCA)	< DL	< DL	0.3
1,1,2-Trichloroethane	< DL	< DL	0.3
Trichloroethene (TCE)	< DL	< DL	0.3
Vinyl Acetate	< DL	< DL	2.2
Vinyl Chloride	< DL	< DL	0.6
Xylenes	0.2	< DL	0.3

< 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

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

FILE NAME:	67\HOB-OUT2
CLIENT:	Sweet-Edwards/EMCON
LOCATION:	Hobart Landfill
SAMPLE LOCATION:	Flare Outlet
SAMPLE DATE:	May 4, 1990
SAMPLE TIMES:	12:39-13:39
LAB NUMBER(S):	G-1743-5, 009938
AIRFLOW:	3806.4 dscf/min

ANALYTE	Outlet Run 2 mg/min	Blank mg/min	DL Run 2 mg/min
Acetone	12.9	< DL	1.4
Benzene	0.2	< DL	0.2
Bromodichloromethane	< DL	< DL	0.4
Bromomethane	< DL	< DL	0.4
Bromoform	< DL	< DL	0.6
2-Butanone (MEK)	< DL	< DL	0.2
Carbon Disulfide	< DL	< DL	0.4
Carbon Tetrachloride	< DL	< DL	1.4
Chlorobenzene	< DL	< DL	0.3
Chloroethane	< DL	< DL	0.2
2-Chloroethylvinyl Ether	< DL	< DL	2.6
Chloroform	< DL	< DL	0.3
Chloromethane	< DL	< DL	0.1
Dibromochloromethane	< DL	< DL	0.5
1,1-Dichloroethane	< DL	< DL	0.2
1,2-Dichloroethane	< DL	< DL	0.2
1,1-Dichloroethene	< DL	< DL	0.2
c-1,2-Dichloroethene	< DL	< DL	0.2
t-1,2-Dichloroethene	< DL	< DL	0.2
Dichloromethane	< DL	< DL	2.1
1,2-Dichloropropane	< DL	< DL	0.3
cis-1,3-Dichloropropene	< DL	< DL	0.3
trans-1,3-Dichloropropene	< DL	< DL	0.3
Ethylbenzene	< DL	< DL	0.3
2-Hexanone	< DL	< DL	0.2
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.2
Styrene	< DL	< DL	0.5
1,1,2,2-Tetrachloroethane	< DL	< DL	1.7
Tetrachloroethene (PCE)	< DL	< DL	0.8
Toluene	< DL	< DL	0.2
1,1,1-Trichloroethane (TCA)	< DL	< DL	0.3
1,1,2-Trichloroethane	< DL	< DL	0.3
Trichloroethene (TCE)	< DL	< DL	0.3
Vinyl Acetate	< DL	< DL	2.1
Vinyl Chloride	< DL	< DL	0.6
Xylenes	< DL	< DL	0.3

< 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

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

FILE NAME:	67\HOB-OUT3
CLIENT:	Sweet-Edwards/EMCON
LOCATION:	Hobart Landfill
SAMPLE LOCATION:	Flare Outlet
SAMPLE DATE:	May 4, 1990
SAMPLE TIMES:	14:02-15:03
LAB NUMBER(S):	G-1743-6, 009939
AIRFLOW:	4079.6 dscf/min

ANALYTE	Outlet Run 3 mg/min	Blank mg/min	DL Run 3 mg/min
Acetone	11.6	< DL	1.5
Benzene	< DL	< DL	0.2
Bromodichloromethane	< DL	< DL	0.4
Bromomethane	< DL	< DL	0.5
Bromoform	< DL	< DL	0.6
2-Butanone (MEK)	< DL	< DL	0.2
Carbon Disulfide	< DL	< DL	0.4
Carbon Tetrachloride	< DL	< DL	1.5
Chlorobenzene	< DL	< DL	0.3
Chloroethane	< DL	< DL	0.2
2-Chloroethylvinyl Ether	< DL	< DL	2.8
Chloroform	< DL	< DL	0.3
Chloromethane	< DL	< DL	0.1
Dibromochloromethane	< DL	< DL	0.5
1,1-Dichloroethane	< DL	< DL	0.3
1,2-Dichloroethane	< DL	< DL	0.3
1,1-Dichloroethene	< DL	< DL	0.3
c-1,2-Dichloroethene	< DL	< DL	0.3
t-1,2-Dichloroethene	< DL	< DL	0.3
Dichloromethane	< DL	< DL	2.2
1,2-Dichloropropene	< DL	< DL	0.3
cis-1,3-Dichloropropene	< DL	< DL	0.3
trans-1,3-Dichloropropene	< DL	< DL	0.3
Ethylbenzene	< DL	< DL	0.3
2-Hexanone	< DL	< DL	0.3
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.3
Styrene	< DL	< DL	0.5
1,1,2,2-Tetrachloroethane	< DL	< DL	1.8
Tetrachloroethene (PCE)	< DL	< DL	0.8
Toluene	< DL	< DL	0.2
1,1,1-Trichloroethane (TCA)	< DL	< DL	0.3
1,1,2-Trichloroethane	< DL	< DL	0.3
Trichloroethene (TCE)	< DL	< DL	0.3
Vinyl Acetate	< DL	< DL	2.2
Vinyl Chloride	< DL	< DL	0.6
Xylenes	< DL	< DL	0.3

< 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

GAS MEASUREMENT DATA LOG

Client Name:	Sweet Edwards/Emcon
Sample Location:	Hobart Landfill Flare Stack Outlet
Date:	May 4, 1990

TIME	CARBON MONOXIDE ppm	OXYGEN %	CARBON DIOXIDE %	NITROGEN OXIDES ppm	TOTAL SULFUR ppm
RUN 1					
1105	0	12.5	5.9	35.4	6.7
1106	0	14.9	4.8	30.8	8.7
1107	0	15.4	5.9	25.6	5.7
1108	0	13.4	6.3	28.6	3.8
1109	0	13.8	5.8	30.7	3.1
1110	0	14.7	5.1	29.2	2.6
1111	0	14.6	4.9	27.4	2.2
1112	0	14.1	5.6	26.6	1.9
1113	0	14.3	5.0	27.7	1.8
1114	0	15.3	4.7	26.3	1.7
1115	0	15.6	4.0	24.3	1.6
1116	0	16.2	4.2	21.8	1.4
1117	0	15.2	5.0	21.9	1.3
1118	0	14.4	5.3	24.4	1.3
1119	0	15.2	4.4	26.0	1.3
1120	0	16.1	4.2	22.2	1.2
1121	0	16.2	3.7	21.1	1.1
1122	0	15.8	4.5	20.8	1.1
1123	0	14.9	4.8	22.1	1.0
1124	0	15.2	5.4	22.8	1.0
1125	0	14.3	5.2	26.1	1.1
1126	0	14.6	5.0	26.9	1.2
1127	0	14.2	5.2	26.1	1.2
1128	0	15.0	5.5	26.6	1.2
1129	0	14.5	5.7	27.4	1.1
1130	0	14.7	5.2	28.1	1.1
1131	0	15.5	4.5	26.1	1.1
1132	0	14.4	5.2	25.5	0.9
1133	0	14.1	5.6	26.2	1.0
1134	0	15.0	4.0	27.1	0.9
1135	0	16.4	3.8	22.7	0.9
1136	0	14.2	5.4	22.8	0.8
1137	0	12.0	6.6	29.8	0.8
1138	0	12.8	6.5	33.4	1.7
1139	0	13.6	6.9	32.4	2.2
1140	0	12.8	5.9	34.9	2.2
1141	0	13.9	5.1	31.7	2.5
1142	0	13.7	5.5	29.8	2.1
1143	0	15.6	4.2	27.2	1.6
1144	0	15.5	4.3	23.6	1.3
1145	0	15.9	3.7	22.6	1.1
1146	0	15.8	4.4	21.1	0.9
1147	0	15.6	3.8	21.8	0.9

1148	0	16.3	3.8	19.8	0.8
1149	0	14.0	5.9	21.3	0.7
1150	0	13.4	6.8	27.7	0.8
1151	0	13.4	5.2	32.1	1.1
1152	0	15.1	5.1	28.0	1.3
1153	0	14.0	4.9	28.0	1.2
1154	0	15.6	4.4	25.5	1.0
1155	0	15.6	4.6	22.4	0.8
1156	0	16.4	4.9	21.1	0.7
1157	0	14.8	5.4	22.7	0.7
1158	0	14.6	4.5	26.1	0.6
1159	0	15.9	4.6	23.8	0.6
1200	0	15.4	4.5	23.4	0.7
1201	0	16.2	4.2	21.9	0.7
1202	0	15.5	4.9	21.4	0.6
1203	0	13.2	6.5	25.7	0.6
1204	0	12.7	6.7	30.8	0.9
1205	0	12.7	5.8	33.9	2.1
AVG RUN 1	0 ppm CARBON MONOXIDE	14.7 % OXYGEN	5.1 % CARBON DIOXIDE	26.1 ppm NITROGEN OXIDES	1.6 ppm TOTAL SULFUR

TIME	CARBON MONOXIDE ppm	OXYGEN %	CARBON DIOXIDE %	NITROGEN OXIDES ppm	TOTAL SULFUR ppm
RUN 2					
1239	0	12.8	6.0	33.4	1.1
1240	0	14.0	5.6	31.1	1.2
1241	0	15.0	4.3	28.0	1.2
1242	0	13.5	5.7	26.6	1.0
1243	0	14.5	5.1	27.5	0.8
1244	0	15.0	5.0	26.6	0.7
1245	0	15.7	4.4	24.1	0.7
1246	0	13.8	6.2	25.2	0.6
1247	0	13.9	4.9	29.4	0.6
1248	0	14.6	5.5	26.6	0.7
1249	0	15.0	4.2	26.4	0.7
1250	0	15.8	4.2	22.4	0.7
1251	0	16.0	3.9	21.7	0.6
1252	0	15.2	4.8	21.0	0.5
1253	0	14.9	4.9	23.0	0.6
1254	0	15.1	5.1	23.0	0.5
1255	0	14.6	4.9	24.6	0.5
1256	0	15.1	4.9	24.5	0.5
1257	0	14.8	5.1	25.4	0.5
1258	0	15.2	5.2	25.5	0.5
1259	0	14.1	6.5	26.6	0.6
1300	0	12.7	6.4	31.3	0.7
1301	0	12.5	6.6	33.6	1.2
1302	0	13.5	5.3	33.3	1.8
1303	0	14.2	6.0	29.8	1.9
1304	0	13.6	6.2	30.2	1.6
1305	0	12.4	6.5	32.8	1.2
1306	0	12.0	6.7	35.0	1.3
1307	0	13.3	5.8	34.8	1.8
1308	0	13.7	5.9	31.7	1.7
1309	0	12.3	7.2	32.7	1.4
1310	0	12.4	6.3	36.0	1.4
1311	0	12.7	7.1	34.4	1.8
1312	0	13.3	5.9	34.9	1.8
1313	0	12.2	7.1	33.8	1.7
1314	0	11.3	8.1	37.0	1.7
1315	0	10.8	8.0	40.5	2.3
1316	0	12.1	6.9	40.6	4.4
1317	0	13.3	5.3	36.7	5.7
1318	0	14.7	5.2	30.6	4.5
1319	0	15.0	4.5	26.9	3.0
1320	0	15.8	4.8	24.4	2.0
1321	0	13.7	6.0	25.3	1.5
1322	0	15.4	3.8	26.7	1.2
1323	0	15.4	4.2	22.2	1.0
1324	0	16.0	4.0	21.6	0.8
1325	0	16.0	4.0	20.6	0.7
1326	0	14.8	5.0	21.8	0.7
1327	0	13.6	6.1	25.4	0.6
1328	0	14.4	5.1	28.4	0.7
1329	0	15.0	4.2	26.3	0.7
1330	0	15.5	4.2	22.6	0.7

1331	0	14.9	4.6	22.7	0.5
1332	0	16.0	4.9	22.5	0.5
1333	0	14.2	5.3	25.0	0.5
1334	0	13.3	5.8	28.2	0.5
1335	0	14.6	5.5	28.1	0.6
1336	0	14.2	6.2	27.7	0.6
1337	0	12.8	5.9	30.7	0.6
1338	0	13.1	7.3	30.3	0.6
1339	0	11.8	7.3	35.5	0.9
AVG RUN 2	0	14.0	5.5	28.4	1.2
	ppm	%	%	ppm	ppm
	CARBON MONOXIDE	OXYGEN	CARBON DIOXIDE	NITROGEN OXIDES	TOTAL SULFUR

TIME	CARBON MONOXIDE ppm	OXYGEN %	CARBON DIOXIDE %	NITROGEN OXIDES ppm	TOTAL SULFUR ppm
RUN 3					
1402	0	12.8	6.2	32.9	0.8
1403	0	14.0	5.1	31.3	1.4
1404	0	15.6	3.8	26.6	1.3
1405	0	15.0	5.0	23.2	1.0
1406	0	15.7	3.6	22.6	0.8
1407	0	15.1	4.3	20.5	0.7
1408	0	15.5	4.1	19.8	0.6
1409	0	16.1	4.3	18.6	0.5
1410	0	14.1	6.5	20.1	0.5
1411	0	12.5	7.0	27.8	0.5
1412	0	11.9	7.1	31.8	0.8
1413	0	11.5	6.9	33.8	1.2
1414	0	12.8	7.1	32.9	2.0
1415	0	12.5	7.1	32.9	2.1
1416	0	11.9	7.0	32.9	1.9
1417	0	13.2	5.9	32.0	1.7
1418	0	15.3	5.3	27.2	1.4
1419	0	13.2	6.5	25.8	1.1
1420	0	12.1	7.4	29.1	0.9
1421	0	13.0	6.1	31.3	0.9
1422	0	14.9	4.3	28.6	1.0
1423	0	15.5	4.3	22.4	1.0
1424	0	16.0	3.5	19.8	0.8
1425	0	15.5	4.4	18.0	0.7
1426	0	14.1	5.9	20.5	0.6
1427	0	12.7	6.9	26.3	0.6
1428	0	12.4	6.9	30.4	0.6
1429	0	13.0	6.2	30.4	0.9
1430	0	12.9	5.9	29.5	0.9
1431	0	15.1	5.5	26.6	0.9
1432	0	14.5	4.1	25.5	0.8
1433	0	16.2	4.2	21.2	0.7
1434	0	14.4	5.9	21.3	0.6
1435	0	13.6	6.3	24.6	0.5
1436	0	12.1	7.1	28.4	0.6
1437	0	13.8	4.6	31.1	0.8
1438	0	14.1	5.7	24.8	1.0
1439	0	14.8	4.7	24.7	1.0
1440	0	16.2	3.1	21.7	0.8
1441	0	14.2	6.0	19.2	0.6
1442	0	13.8	6.2	24.0	0.6
1443	0	15.7	3.9	23.9	0.6
1444	0	14.6	3.8	21.0	0.6
1445	0	14.5	5.4	20.7	0.5
1446	0	13.8	4.7	24.8	0.5
1447	0	15.7	4.4	22.8	0.5
1448	0	15.4	4.4	21.0	0.5
1449	0	15.5	4.2	20.2	0.5
1450	0	14.7	5.5	20.9	0.6
1451	0	12.5	7.1	24.9	0.6
1452	0	12.8	5.9	30.0	0.7
1453	0	14.3	4.8	28.2	1.1

1454	0	12.8	6.5	26.9	1.2
1455	0	12.0	7.5	30.1	1.0
1456	0	11.6	7.2	33.6	1.3
1457	0	11.8	7.3	34.2	2.0
1458	0	12.1	6.9	33.3	2.6
1459	0	12.5	6.9	33.2	2.7
1500	0	13.1	6.4	32.0	2.3
1501	0	12.2	6.4	31.0	1.9
1502	0	11.7	7.4	32.4	1.5
AVG RUN 3	0	13.8	5.7	26.5	1.0
	ppm	%	%	ppm	ppm
	CARBON MONOXIDE	OXYGEN	CARBON DIOXIDE	NITROGEN OXIDES	TOTAL SULFUR

APPENDIX B

Laboratory Results

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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-1743-1
Collected: 05/04/90
Received: 05/14/90
Tested: 05/18/90
Collected by: S.Mackey

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

GC/MS AMBIENT AIR ANALYSIS

Sample Description:
Hobart Landfill, Run 1,
Flare Inlet, Can #428, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit (CAS RN)	ppbv	Concentration ug/cu M	ppbv
Acetone	(67641)	20.	2000.	770.
Benzene	(71432)	2.	1000.	290.
Bromodichloromethane	(75274)	2.	not found	not found
Bromomethane	(74839)	5.	not found	not found
Bromoform	(75252)	2.	not found	not found
2-Butanone (MEK)	(78933)	2.	not found	not found
Carbon Disulfide	(75150)	5.	96.	28.
Carbon Tetrachloride	(56235)	10.	not found	not found
Chlorobenzene	(108907)	2.	220.	44.
Chloroethane	(75003)	2.	370.	130.
2-Chloroethylvinyl Ether	(110758)	20.	not found	not found
Chloroform	(67663)	2.	not found	not found
Chloromethane	(107302)	2.	130.	58.
Dibromochloromethane	(124481)	2.	not found	not found
1,1-Dichloroethane	(75343)	2.	360.	82.
1,2-Dichloroethane	(107062)	2.	not found	not found
1,1-Dichloroethene	(75354)	2.	not found	not found
c-1,2-Dichloroethene	(156605)	2.	310.	72.
t-1,2-Dichloroethene	(156605)	2.	not found	not found
Dichloromethane	(75092)	20.	4600.	1200.
1,2-Dichloropropane	(78875)	2.	not found	not found
cis-1,3-Dichloropropene	(10061015)	2.	not found	not found
trans-1,3-Dichloropropene	(10061026)	2.	not found	not found
Ethylbenzene	(100414)	2.	5300.	1100.
2-Hexanone	(591786)	2.	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	2.	not found	not found
Styrene	(100425)	5.	50.	11.
1,1,2,2-Tetrachloroethane	(79345)	10.	not found	not found
Tetrachloroethene (PCE)	(127184)	5.	480.	65.
Toluene	(108883)	2.	4900.	1200.
1,1,1-Trichloroethane (TCA)	(71556)	2.	460.	77.
1,1,2-Trichloroethane	(79005)	2.	not found	not found
Trichloroethene (TCE)	(79016)	2.	160.	27.
Vinyl Acetate	(108054)	20.	not found	not found
Vinyl Chloride	(75014)	10.	3300.	1200.
Xylenes	(1330207)	2.	6200.	1300.

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Stephen C Havlicek

Stephen C. Havlicek, Ph.D.
Executive Vice President

MSD#1
06-12-90
G1743-1.wr1/HSL#7
SCH/cr/dc/co

805-453-2543

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-1743-2
Collected: 05/04/90
Received: 05/14/90
Tested: 05/18/90
Collected by: S.Mackey

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

GC/MS AMBIENT AIR ANALYSIS
Sample Description:
Hobart Landfill, Run 2,
Flare Inlet, Can #426, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit (CAS RN)	ppbv	Concentration ug/cu M	ppbv
Acetone	(67641)	100.	350.	100.
Benzene	(71432)	10.	1200.	340.
Bromodichloromethane	(75274)	10.	not found	not found
Bromomethane	(74839)	20.	not found	not found
Bromoform	(75252)	10.	not found	not found
2-Butanone (MEK)	(78933)	10.	320.	100.
Carbon Disulfide	(75150)	20.	not found	not found
Carbon Tetrachloride	(56235)	50.	not found	not found
Chlorobenzene	(108907)	10.	170.	30.
Chloroethane	(75003)	10.	370.	130.
2-Chloroethylvinyl Ether	(110758)	20.	not found	not found
Chloroform	(67663)	10.	not found	not found
Chloromethane	(107302)	10.	not found	not found
Dibromochloromethane	(124481)	10.	not found	not found
1,1-Dichloroethane	(75343)	10.	not found	not found
1,2-Dichloroethane	(107062)	10.	not found	not found
1,1-Dichloroethene	(75354)	10.	370.	90.
c-1,2-Dichloroethene	(156605)	10.	310.	70.
t-1,2-Dichloroethene	(156605)	10.	not found	not found
Dichloromethane	(75092)	100.	2700.	700.
1,2-Dichloropropane	(78875)	10.	not found	not found
cis-1,3-Dichloropropene	(10061015)	10.	not found	not found
trans-1,3-Dichloropropene	(10061026)	10.	not found	not found
Ethylbenzene	(100414)	10.	5000.	1100.
2-Hexanone	(591786)	10.	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	10.	not found	not found
Styrene	(100425)	20.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	50.	not found	not found
Tetrachloroethene (PCE)	(127184)	20.	390.	50.
Toluene	(108883)	10.	5000.	1200.
1,1,1-Trichloroethane (TCA)	(71556)	10.	510.	90.
1,1,2-Trichloroethane	(79005)	10.	not found	not found
Trichloroethene (TCE)	(79016)	10.	140.	20.
Vinyl Acetate	(108054)	100.	not found	not found
Vinyl Chloride	(75014)	50.	3400.	1200.
Xylenes	(1330207)	10.	5500.	1200.

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Stephen C Havlicek

Stephen C. Havlicek, Ph.D.
Executive Vice President

MSD#1
06-12-90
G1743-2.wr1/HSL#7
SCH/cr/dc/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-1743-3
Collected: 05/04/90
Received: 05/14/90
Tested: 05/18/90
Collected by: S.Mackey

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

GC/MS AMBIENT AIR ANALYSIS

Sample Description:
Hobart Landfill, Run 3,
Flare Inlet, Can #306, Air

HAZARDOUS SUBSTANCE LIST	Detection Limit		Concentration	
Compound Analyzed	(CAS RN)	ppbv	ug/cu M	ppbv
Acetone	(67641)	100.	540.	200.
Benzene	(71432)	10.	960.	280.
Bromodichloromethane	(75274)	10.	not found	not found
Bromomethane	(74839)	20.	not found	not found
Bromoform	(75252)	10.	not found	not found
2-Butanone (MEK)	(78933)	10.	not found	not found
Carbon Disulfide	(75150)	20.	230.	70.
Carbon Tetrachloride	(56235)	50.	not found	not found
Chlorobenzene	(108907)	10.	160.	30.
Chloroethane	(75003)	10.	300.	100.
2-Chloroethylvinyl Ether	(110758)	20.	not found	not found
Chloroform	(67663)	10.	not found	not found
Chloromethane	(107302)	10.	not found	not found
Dibromochloromethane	(124481)	10.	not found	not found
1,1-Dichloroethane	(75343)	10.	280.	60.
1,2-Dichloroethane	(107062)	10.	not found	not found
1,1-Dichloroethene	(75354)	10.	not found	not found
c-1,2-Dichloroethene	(156605)	10.	210.	not found
t-1,2-Dichloroethene	(156605)	10.	not found	50.
Dichloromethane	(75092)	100.	3300.	900.
1,2-Dichloropropane	(78875)	10.	not found	not found
cis-1,3-Dichloropropene	(10061015)	10.	not found	not found
trans-1,3-Dichloropropene	(10061026)	10.	not found	not found
Ethylbenzene	(100414)	10.	5100.	1100.
2-Hexanone	(591786)	10.	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	10.	not found	not found
Styrene	(100425)	20.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	50.	not found	not found
Tetrachloroethene (PCE)	(127184)	20.	360.	50.
Toluene	(108883)	10.	5300.	1300.
1,1,1-Trichloroethane (TCA)	(71556)	10.	400.	70.
1,1,2-Trichloroethane	(79005)	10.	not found	not found
Trichloroethene (TCE)	(79016)	10.	not found	not found
Vinyl Acetate	(108054)	100.	not found	not found
Vinyl Chloride	(75014)	50.	2200.	790.
Xylenes	(1330207)	10.	6600.	1400.

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Stephen C Havlicek

Stephen C. Havlicek, Ph.D.
Executive Vice President

MSD#1
06-12-90
G1743-3.wr1/HSL#7
SCH/cr/dc/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-1743-3dup
Collected: 05/04/90
Received: 05/14/90
Tested: 05/18/90
Collected by: S.Mackey

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

GC/MS AMBIENT AIR ANALYSIS
Sample Description:
Hobart Landfill, Run 3,
Flare Inlet, Can #306, Air
DUPLICATE ANALYSIS

HAZARDOUS SUBSTANCE LIST	Detection Limit		Concentration	
Compound Analyzed	(CAS RN)	ppbv	ug/cu M	ppbv
Acetone	(67641)	100.	600.	200.
Benzene	(71432)	10.	1200.	340.
Bromodichloromethane	(75274)	10.	not found	not found
Bromomethane	(74839)	20.	not found	not found
Bromoform	(75252)	10.	not found	not found
2-Butanone (MEK)	(78933)	10.	not found	not found
Carbon Disulfide	(75150)	20.	150.	40.
Carbon Tetrachloride	(56235)	50.	not found	not found
Chlorobenzene	(108907)	10.	220.	40.
Chloroethane	(75003)	10.	320.	110.
2-Chloroethylvinyl Ether	(110758)	20.	not found	not found
Chloroform	(67663)	10.	not found	not found
Chloromethane	(107302)	10.	not found	not found
Dibromochloromethane	(124481)	10.	not found	not found
1,1-Dichloroethane	(75343)	10.	300.	70.
1,2-Dichloroethane	(107062)	10.	not found	not found
1,1-Dichloroethene	(75354)	10.	not found	not found
c-1,2-Dichloroethene	(156605)	10.	270.	not found
t-1,2-Dichloroethene	(156605)	10.	not found	60.
Dichloromethane	(75092)	100.	3400.	900.
1,2-Dichloropropane	(78875)	10.	not found	not found
cis-1,3-Dichloropropene	(10061015)	10.	not found	not found
trans-1,3-Dichloropropene	(10061026)	10.	not found	not found
Ethylbenzene	(100414)	10.	6600.	1400.
2-Hexanone	(591786)	10.	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	10.	not found	not found
Styrene	(100425)	20.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	50.	not found	not found
Tetrachloroethene (PCE)	(127184)	20.	440.	60.
Toluene	(108883)	10.	6400.	1600.
1,1,1-Trichloroethane (TCA)	(71556)	10.	380.	60.
1,1,2-Trichloroethane	(79005)	10.	not found	not found
Trichloroethene (TCE)	(79016)	10.	100.	20.
Vinyl Acetate	(108054)	100.	not found	not found
Vinyl Chloride	(75014)	50.	3100.	1100.
Xylenes	(1330207)	10.	7600.	1600.

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Stephen C Havlicek

Stephen C. Havlicek, Ph.D.
Executive Vice President

MSD#1
06-12-90
G1743-3d.wr1/HSL#7
SCH/cr/dc/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-1743-4
Collected: 05/04/90
Received: 05/14/90
Tested: 05/18/90
Collected by: S. Mackey

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

GC/MS AMBIENT AIR ANALYSIS
Sample Description:
Hobart Landfill, Run #1,
Flare Outlet, Can #404, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit (CAS RN)	ppbv	Concentration ug/cu M	ppbv
Acetone	(67641)	5.	800.	310.
Benzene	(71432)	0.5	1.8	0.5
Bromodichloromethane	(75274)	0.5	not found	not found
Bromomethane	(74839)	1.	not found	not found
Bromoform	(75252)	0.5	not found	not found
2-Butanone (MEK)	(78933)	0.5	not found	not found
Carbon Disulfide	(75150)	1.	4.3	1.
Carbon Tetrachloride	(56235)	2.	not found	not found
Chlorobenzene	(108907)	0.5	not found	not found
Chloroethane	(75003)	0.5	not found	not found
2-Chloroethylvinyl Ether	(110758)	5.	not found	not found
Chloroform	(67663)	0.5	not found	not found
Chloromethane	(107302)	0.5	not found	not found
Dibromochloromethane	(124481)	0.5	not found	not found
1,1-Dichloroethane	(75343)	0.5	not found	not found
1,2-Dichloroethane	(107062)	0.5	not found	not found
1,1-Dichloroethene	(75354)	0.5	not found	not found
c-1,2-Dichloroethene	(156605)	0.5	not found	not found
t-1,2-Dichloroethene	(156605)	0.5	not found	not found
Dichloromethane	(75092)	5.	20.	5.
1,2-Dichloropropane	(78875)	0.5	not found	not found
cis-1,3-Dichloropropene	(10061015)	0.5	not found	not found
trans-1,3-Dichloropropene	(10061026)	0.5	not found	not found
Ethylbenzene	(100414)	0.5	not found	not found
2-Hexanone	(591786)	0.5	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	0.5	not found	not found
Styrene	(100425)	1.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	2.	not found	not found
Tetrachloroethene (PCE)	(127184)	1.	not found	not found
Toluene	(108883)	0.5	not found	not found
1,1,1-Trichloroethane (TCA)	(71556)	0.5	not found	not found
1,1,2-Trichloroethane	(79005)	0.5	not found	not found
Trichloroethene (TCE)	(79016)	0.5	not found	not found
Vinyl Acetate	(108054)	5.	not found	not found
Vinyl Chloride	(75014)	2.	not found	not found
Xylenes*	(1330207)	0.5	1.4	0.3

*Reported below detection limit for comparison purposes.

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Stephen C Havlicek

Stephen C. Havlicek, Ph.D.,
Executive Vice President

MSD#1
06-12-90
G1743-4.wr1/HSL#7
SCH/ec/dc/co

55

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-1743-4dup
Collected: 05/04/90
Received: 05/14/90
Tested: 05/18/90
Collected by: S. Mackey

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

GC/MS AMBIENT AIR ANALYSIS
Sample Description:
Hobart Landfill, Run #1,
Flare Outlet, Can #404, Air
DUPLICATE ANALYSIS

HAZARDOUS SUBSTANCE LIST Compound Analyzed	(CAS RN)	Detection Limit ppbv	Concentration ug/cu M	Concentration ppbv
Acetone	(67641)	5.	890.	340.
Benzene	(71432)	0.5	2.2	0.6
Bromodichloromethane	(75274)	0.5	not found	not found
Bromomethane	(74839)	1.	not found	not found
Bromoform	(75252)	0.5	not found	not found
2-Butanone (MEK)	(78933)	0.5	not found	not found
Carbon Disulfide	(75150)	1.	5.4	2.
Carbon Tetrachloride	(56235)	2.	not found	not found
Chlorobenzene	(108907)	0.5	not found	not found
Chloroethane	(75003)	0.5	not found	not found
2-Chloroethylvinyl Ether	(110758)	5.	not found	not found
Chloroform	(67663)	0.5	not found	not found
Chloromethane	(107302)	0.5	not found	not found
Dibromochloromethane	(124481)	0.5	not found	not found
1,1-Dichloroethane	(75343)	0.5	not found	not found
1,2-Dichloroethane	(107062)	0.5	not found	not found
1,1-Dichloroethene	(75354)	0.5	not found	not found
c-1,2-Dichloroethene	(156605)	0.5	not found	not found
t-1,2-Dichloroethene	(156605)	0.5	not found	not found
Dichloromethane*	(75092)	5.	7.8	2.
1,2-Dichloropropane	(78875)	0.5	not found	not found
cis-1,3-Dichloropropene	(10061015)	0.5	not found	not found
trans-1,3-Dichloropropene	(10061026)	0.5	not found	not found
Ethylbenzene	(100414)	0.5	not found	not found
2-Hexanone	(591786)	0.5	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	0.5	not found	not found
Styrene	(100425)	1.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	2.	not found	not found
Tetrachloroethene (PCE)	(127184)	1.	not found	not found
Toluene	(108883)	0.5	not found	not found
1,1,1-Trichloroethane (TCA)	(71556)	0.5	not found	not found
1,1,2-Trichloroethane	(79005)	0.5	not found	not found
Trichloroethene (TCE)	(79016)	0.5	not found	not found
Vinyl Acetate	(108054)	5.	not found	not found
Vinyl Chloride	(75014)	2.	not found	not found
Xylenes	(1330207)	0.5	2.6	0.6

*Reported below detection limit for comparison purposes.

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Stephen C Havlicek

Stephen C. Havlicek, Ph.D.,
Executive Vice President

MSD#1
06-12-90
G1743-4d.wr1/HSL#7
SCH/ec/dc/co

Coast-to-
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Analytical
Services

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

Lab Number: G-1743-5
Collected: 05/04/90
Received: 05/14/90
Tested: 05/18/90
Collected by: S. Mackey

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

GC/MS AMBIENT AIR ANALYSIS
Sample Description:
Hobart Landfill, Run #2,
Flare Outlet, Can #119, Air

HAZARDOUS SUBSTANCE LIST	**Detection Limit**		**Concentration**	
Compound Analyzed	**(CAS RN)**	**ppbv**	**ug/cu M**	**ppbv**
Acetone	(67641)	5.	120.	46.
Benzene	(71432)	0.5	2.3	0.7
Bromodichloromethane	(75274)	0.5	not found	not found
Bromomethane	(74839)	1.	not found	not found
Bromoform	(75252)	0.5	not found	not found
2-Butanone (MEK)	(78933)	0.5	not found	not found
Carbon Disulfide	(75150)	1.	not found	not found
Carbon Tetrachloride	(56235)	2.	not found	not found
Chlorobenzene	(108907)	0.5	not found	not found
Chloroethane	(75003)	0.5	not found	not found
2-Chloroethylvinyl Ether	(110758)	5.	not found	not found
Chloroform	(67663)	0.5	not found	not found
Chloromethane	(107302)	0.5	not found	not found
Dibromochloromethane	(124481)	0.5	not found	not found
1,1-Dichloroethane	(75343)	0.5	not found	not found
1,2-Dichloroethane	(107062)	0.5	not found	not found
1,1-Dichloroethene	(75354)	0.5	not found	not found
c-1,2-Dichloroethene	(156605)	0.5	not found	not found
t-1,2-Dichloroethene	(156605)	0.5	not found	not found
Dichloromethane	(75092)	5.	not found	not found
1,2-Dichloropropane	(78875)	0.5	not found	not found
cis-1,3-Dichloropropene	(10061015)	0.5	not found	not found
trans-1,3-Dichloropropene	(10061026)	0.5	not found	not found
Ethylbenzene	(100414)	0.5	not found	not found
2-Hexanone	(591786)	0.5	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	0.5	not found	not found
Styrene	(100425)	1.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	2.	not found	not found
Tetrachloroethene (PCE)	(127184)	1.	not found	not found
Toluene	(108883)	0.5	not found	not found
1,1,1-Trichloroethane (TCA)	(71556)	0.5	not found	not found
1,1,2-Trichloroethane	(79005)	0.5	not found	not found
Trichloroethene (TCE)	(79016)	0.5	not found	not found
Vinyl Acetate	(108054)	5.	not found	not found
Vinyl Chloride	(75014)	2.	not found	not found
Xylenes	(1330207)	0.5	not found	not found

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Stephen C Havlicek

Stephen C. Havlicek, Ph.D.,
Executive Vice President

MSD#1
06-12-90
G1743-5.wr1/HSL#7
SCH/ec/dc/kc/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-1743-6
Collected: 05/04/90
Received: 05/14/90
Tested: 05/18/90
Collected by: S. Mackey

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

GC/MS AMBIENT AIR ANALYSIS
Sample Description:
Hobart Landfill, Run #3,
Flare Outlet, Can #105, Air

HAZARDOUS SUBSTANCE LIST Compound Analyzed	(CAS RN)	Detection Limit ppbv	Concentration ug/cu M	ppbv
Acetone	(67641)	5.	100.	39.
Benzene	(71432)	0.5	not found	not found
Bromodichloromethane	(75274)	0.5	not found	not found
Bromomethane	(74839)	1.	not found	not found
Bromoform	(75252)	0.5	not found	not found
2-Butanone (MEK)	(78933)	0.5	not found	not found
Carbon Disulfide	(75150)	1.	not found	not found
Carbon Tetrachloride	(56235)	2.	not found	not found
Chlorobenzene	(108907)	0.5	not found	not found
Chloroethane	(75003)	0.5	not found	not found
2-Chloroethylvinyl Ether	(110758)	5.	not found	not found
Chloroform	(67663)	0.5	not found	not found
Chloromethane	(107302)	0.5	not found	not found
Dibromochloromethane	(124481)	0.5	not found	not found
1,1-Dichloroethane	(75343)	0.5	not found	not found
1,2-Dichloroethane	(107062)	0.5	not found	not found
1,1-Dichloroethene	(75354)	0.5	not found	not found
c-1,2-Dichloroethene	(156605)	0.5	not found	not found
t-1,2-Dichloroethene	(156605)	0.5	not found	not found
Dichloromethane	(75092)	5.	not found	not found
1,2-Dichloropropane	(78875)	0.5	not found	not found
cis-1,3-Dichloropropene	(10061015)	0.5	not found	not found
trans-1,3-Dichloropropene	(10061026)	0.5	not found	not found
Ethylbenzene	(100414)	0.5	not found	not found
2-Hexanone	(591786)	0.5	not found	not found
4-Methyl-2-Pentanone (MIBK)	(624839)	0.5	not found	not found
Styrene	(100425)	1.	not found	not found
1,1,2,2-Tetrachloroethane	(79345)	2.	not found	not found
Tetrachloroethene (PCE)	(127184)	1.	not found	not found
Toluene	(108883)	0.5	not found	not found
1,1,1-Trichloroethane (TCA)	(71556)	0.5	not found	not found
1,1,2-Trichloroethane	(79005)	0.5	not found	not found
Trichloroethene (TCE)	(79016)	0.5	not found	not found
Vinyl Acetate	(108054)	5.	not found	not found
Vinyl Chloride	(75014)	2.	not found	not found
Xylenes	(1330207)	0.5	not found	not found

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Stephen C Havlicek

Stephen C. Havlicek, Ph.D.,
Executive Vice President

MSD#1
06-12-90
G1743-6.wr1/HSL#7
SCH/ec/dc/kc/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-051890
Collected:
Received:
Tested: 05/18/90
Collected by:

SUBMITTED BY:
CCAS

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

HAZARDOUS SUBSTANCE LIST Compound Analyzed	Detection Limit (CAS RN)	 ppbv	Concentration 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)	0.1	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	not found	not found

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Stephen C Havlicek

Stephen C. Havlicek, Ph.D.,
Executive Vice President

MSD#1
06-12-90
B051890.wr1/HSL#7
SCH/jm/dc/co

AIR, WATER & HAZARDOUS WASTE LABORATORY (No.131) CERTIFIED by CALIFORNIA DEPT of HEALTH SERVICES

59

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-1743-1
Collected: 05/04/90
Received: 05/14/90
Tested: 05/15/90
Collected by: J.W. & S.M.

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

Sample Description:
Hobart Landfill, Flare Inlet,
Run #1, Can #428

REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT
CARBON DIOXIDE	0.1	20.
OXYGEN	0.01	4.8
NITROGEN	0.02	33.
METHANE	0.005	42.
CARBON MONOXIDE	0.1	<0.1
TOTAL		100.

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Laurence R. Hilpert
Vice President

TCD/FID
05/30/90
G17431fg.wr1/FG10
LRH/mk/mk

AIR, WATER & HAZARDOUS WASTE LABORATORY (No.131) CERTIFIED by CALIFORNIA DEPT of HEALTH SERVICES

60

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-1743-1dup
Collected: 05/04/90
Received: 05/14/90
Tested: 05/15/90
Collected by: J.W. & S.M.

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

Sample Description:
Hobart Landfill, Flare Inlet,
Run #1, Can #428

DUPLICATE ANALYSIS

REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT
CARBON DIOXIDE	0.1	21.
OXYGEN	0.01	4.9
NITROGEN	0.02	33.
METHANE	0.005	41.
CARBON MONOXIDE	0.1	<0.1
TOTAL		100.

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Laurence R. Hilpert
Vice President

TCD
05/30/90
G17431qd.wr1/FG11
LRH/mk/mk

AIR, WATER & HAZARDOUS WASTE LABORATORY (No.131) CERTIFIED by CALIFORNIA DEPT of HEALTH SERVICES

61

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-1743-2
Collected: 05/04/90
Received: 05/14/90
Tested: 05/15/90
Collected by: J.W. & S.M.

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

Sample Description:
Hobart Landfill, Flare Inlet,
Run #2, Can #426

REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT
CARBON DIOXIDE	0.1	20.
OXYGEN	0.01	3.0
NITROGEN	0.02	35.
METHANE	0.005	42.
CARBON MONOXIDE	0.1	<0.1
TOTAL		100.

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Laurence R. Hilpert
Vice President

TCD
05/30/90
G17432fg.wr1/FG11
LRH/mk/mk

62

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-1743-3
Collected: 05/04/90
Received: 05/14/90
Tested: 05/15/90
Collected by: J.W. & S.M.

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

Sample Description:
Hobart Landfill, Flare Inlet,
Run #3, Can #306

REPORT

FIXED GASES AND METHANE TESTED BY GC/TCD

CONSTITUENT	DETECTION LIMIT PERCENT	LEVEL FOUND PERCENT
CARBON DIOXIDE	0.5	42.
OXYGEN	0.05	2.4
NITROGEN	0.10	21.
METHANE	0.020	35.
CARBON MONOXIDE	0.5	<0.5
TOTAL		100.

NOTE: Sample Received Under Vacuum at -18 inHg

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Laurence R. Hilpert

Laurence R. Hilpert
Vice President

TCD
05/30/90
G17433fg.wr1/FG11
LRH/mk/mk

63

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-05150-1
Collected:
Received:
Tested: 05/15/90
Collected by:

CCAS

Sample Description:

SPIKE

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	45.	45.	100.
OXYGEN	0.01	2.0	2.0	100.
NITROGEN	0.02	7.8	8.0	98.
METHANE	0.005	45.	45.	100.
CARBON MONOXIDE	0.1	not spiked	----	----
TOTAL		100.	100.	

Respectfully submitted,.
COAST-TO-COAST ANALYTICAL SERVICES

Laurence R. Hilpert
Vice President

TCD
05/31/90
QS0515F1.WR1/FG11
LRH/MK/MK

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-05150-2
Collected:
Received:
Tested: 05/15/90
Collected by:

Sample Description:

CCAS

SPIKE

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	46.	45.	102.
OXYGEN	0.01	2.2	2.0	110.
NITROGEN	0.02	8.7	8.0	109.
METHANE	0.005	43.	45.	96.
CARBON MONOXIDE	0.1	not spiked	----	----
TOTAL		100.	100.	

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES

Laurence R. Hilpert
Vice President

TCD
05/31/90
QS0515F2.WR1/FG11
LRH/MK/MK

AMTest Inc.
sional
Analytical
Services

14603 N.E. 87th St.
Redmond, WA
98052

Fax: 206 8[illegible]
Tel: 206 885 1664

CHAIN OF CUSTODY RECORD

PROJ. NO.

PROJECT NAME Hobart Landfill

SAMPLERS: (Signature) Jan M. Widmeyer
K. Steven Mackey

Client Name Am Test Inc.

Client Address 30545 S.E. 84th St #5 Preston, WA 98050

Client Phone (206) 222-7746

Contact Person Kris Hansen

P.O. No. NA

SG1743

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Stainless Steel Canister					
Flare Inlet	5/4/90	1240		✓	Run 1 - Flare Inlet	1	1					01 - Flare Inlet (Tank # 428) -1
Flare Inlet	5/4/90	1309		✓	Run 2 - Flare Inlet	1	1					02 - Flare Inlet (Tank # 426) -2
Flare Inlet	5/4/90	1410		✓	Run 3 - Flare Inlet	1	1					03 - Flare Inlet (Tank # 306) -3
												01 - Flare Outlet (Tank # 404) -4
Flare Outlet	5/4/90	1115		✓	Run 1 - Flare Outlet	1	1					02 - Flare Outlet (Tank # 119) -5
Flare Outlet	5/4/90	1246		✓	Run 2 - Flare Outlet	1	1					03 - Flare Outlet (Tank # 105) -6
Flare Outlet	5/4/90	1422		✓	Run 3 - Flare Outlet	1	1					

Analyze each sample for TO-14 (8240 Compounds)

Analyze inlet samples only for Fixed Gases: Methane, Nitrogen, Oxygen, Carbon Monoxide, Carbon Dioxide

Relinquished by: (Signature) K. Steven Mackey	Date/Time 5/10/90 PM	Received by: (Signature) Fed Ex	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature) Fed Ex	Date/Time 5-14-90 1100	Received by: (Signature) Bertha [illegible]	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks Shipped in 3 total boxes 2 air cans sent back unused #519 and #507	

65

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

AMTEST

AmTest Inc.
Professional
Analytical
Services

14603 N.E. 87th St
Redmond, WA
98052

Fax: 206 883 3495

Tel: 206 885 1664

ANALYSIS REPORT

CLIENT: Am Test, Inc. - Air Quality Division

DATE RECEIVED: 5/7/90
DATE REPORTED: 5/9/90

REPORT TO: Kris Hansen

SWEET EDWARDS EMCON AT HOBART LANDFILL

Laboratory Sample Nos.	Client Identification	Chloride (Total ug)
009937	Run 1	1,900.
009938	Run 2	2,180.
009939	Run 3	3,270.
009940	Blank	<200.
METHOD DETECTION LIMIT		1.0

Analysis by EPA Method 325.3 - Mercuric Nitrate Titration.

JTD/pb

REPORTED BY Jol T. Dailey
John T. Dailey

APPENDIX C

Example Calculations

Example Calculation of Retention Time
Hobart Landfill

Length of combustion zone = 21 feet to test port
area of combustion zone = $33.61\ ft^2$
Average airflow at test port = 1541.4 acfm

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

$$\frac{33.61\ ft^2 \times 21\ ft \times 60}{1541.4\ \text{acfm}} =$$ 2.7 seconds based on combustion to the height of the test port and acfm @ an average temperature of 1400° F

SAMPLE CALCULATION SHEET (continued)
METHODS ~~1-5~~ 1,2,3A,4

Run 1 - Inlet
Hobart Landfill

B_{ws} = (_______scf)/(_______scf + _______dscf)

= _______

%Moisture = 0.065 * 100

= 6.5 %

Molecular weight - Equation 3-2

M_d = 0.440 * (20.0 %CO_2) + 0.320 * (4.8 %O_2) + 0.280 * (75.2 % CO + %N_2)

M_d = 31.39 g/g-mole (dry)

M_s = 31.39 g/g-mole * (1 - .065) + 18.0g/g-mole * 0.065

M_s = 30.52 g/g-mole (wet)

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

$V_s = 85.49 * .79 * .173 * \sqrt{561 \text{ °R} / 30.52 \text{ g/g-mole} / 29.87 \text{ "Hg}}$

V_s = 11.5 ft/sec (std)

Q_{sd} = 3600 * (1 - .065) * 11.5 ft/sec * 0.349 ft^2 * (528 ° R/ 561 ° R) * (29.87 "Hg/ 29.92 "Hg)

= 12677 dscf/hr / 60 min/hr

= 211.3 dscf/min (dry standard cubic feet per minute)

acfm = 11.5 ft/sec * 0.349 ft^2 * 60 sec/min

= 240.5 acfm (actual cubic feet per minute)

Isokinetic variation - Equation 5-8

I = 0.09450 * _______dscf * _____° R/(_____"Hg * _____ft/sec * _____min * _______ft^2 *(1 - _____))

I = _____ %

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

SAMPLE CALCULATION SHEET
METHODS 1-5

CLIENT: Hobart Landfill DATE OF TEST: May 4, 1990

LOCATION: Flare Outlet RUN #: 1

Particulate Matter Emission Concentration - Equation 5-1

Vm_{std} =
17.647°R/"Hg*35.269 ft^3*1.617*(29.73"Hg + (1.3 "H_2O/13.6))/(460 + 82.9° F)

= 34.774 dscf

dscm = 34.774 dscf/35.31 ft^3/m^3

= 0.985 dscm

Substitution of Equation 5-4 into 5-5

W_a = ____mg * ____ml /____ml

= ____mg

M_n = (net weight filter catch) + (net weight "B" section) - Wa + Back-half

= ____mg = ____mg + ____mg - ____mg +____mg

C_s= (0.001 g/mg) * (15.43 grains/gram) * ____mg /____dscf

= ____gr/dscf (Equation 5-6)

gr/dscf @7% O_2 = ____gr/dscf * (20.9% - 7%O_2)/(20.9% - ____%O_2)

= ____gr/dscf @ 7% O_2

gr/dscf @ 12% CO_2 = ____gr/dscf * 12% / ____%CO_2

= ____gr/dscf @ 12% CO_2

mg/dscm = ____mg/____dscm

= ____mg/dscm

Particulate Matter Emission Rate

pounds/hour = ____gr/dscf * ____dscf/min * 60 min/hr * 1 lb/7000 grains

= ____lb/hr

Moisture - Equation 5-2 and 5-3

Vw_{std} = 0.04715 ft^3/g * 55.9 grams of H_2O collected in impingers

= 2.64 scf

SAMPLE CALCULATION SHEET (continued)
METHODS 1-5

B_{ws} = (2.64 scf)/(2.64 scf + 34.774 dscf)

= 0.0705

%Moisture = .0705 * 100

= 7.05 %

Molecular weight - Equation 3-2

M_d = 0.440 * (5.1 %CO_2) + 0.320 * (14.7 %O_2) + 0.280 * (80.2 % CO + %N_2)

M_d = 29.40 g/g-mole (dry)

M_s = 29.40 g/g-mole * (1 - .0705) + 18.0g/g-mole * .0705

M_s = 28.60 g/g-mole (wet)

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

V_s = 85.49 * .84 * 0.073 * $\sqrt{1866 \text{° R} / 28.60 \text{g/g-mole} / 29.73 \text{"Hg}}$

V_s = 7.76 ft/sec (std)

Q_{sd} = 3600 * (1 - .0705) * 7.76 ft/sec * 33.61 ft² * (528 ° R/1866 ° R) * (29.73"Hg/29.92"Hg)

= 245230 dscf/hr / 60 min/hr

= 4087.2 dscf/min (dry standard cubic feet per minute)

acfm = 7.76 ft/sec * 33.61 ft² * 60 sec/min

= 15640.5 acfm (actual cubic feet per minute)

Isokinetic variation - Equation 5-8

I = 0.09450 * _____dscf * _____° R/(_____"Hg * _____ft/sec * _____min * _____ft² *(1 - _____))

I = _____ %

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

Sample Calculation

Hydrochloric Acid Emissions

Client: Hobart Landfill
Location: Flare Outlet
Date: 5-4-90
Run #: 1

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

$$\frac{1900\,\mu g}{0.985\,\text{dscm}} * \frac{1\,mg}{1000\,\mu g} * \frac{36.46\,g/g\text{-mole}}{35.45\,g/g\text{-mole}} = 1.98\,\frac{mg}{\text{dscm}}$$

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

$$= 1.98\,\text{mg/dscm} * \frac{22.414\,ml/m\text{-mole}}{36.46\,mg/m\text{-mole}} * \frac{293.15°K}{273.15°K} * \frac{m^3}{10^6\,ml} * 10^6\,\text{ppm}$$

$$= 1.31\,\text{ppm}$$

$$\text{ppm@}7\%\,O_2 = \text{ppm} * (20.9\%\,O_2 - 7\%\,O_2)/(20.9\%\,O_2 - \text{measured}\,\%\,O_2)$$

$$1.31\,\text{ppm} * (20.9 - 7\%\,O_2)/(20.9\% - 14.7\%\,O_2)$$

$$= 2.94\,\text{ppm @ }7\%\,O_2$$

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

$$1.98\,\text{mg/dscm} * 4087.2\,\frac{\text{dscf}}{min} * \frac{0.001\,g}{mg} * \frac{1}{453.6\,g} * .02832\,\frac{m^3}{ft^3} * \frac{60\,min}{hr}$$

$$= \underline{0.03\,\text{lb/hr}}$$

EXAMPLE CALCULATION OF GASEOUS EMISSION RATES

RUN 1

CLIENT Sweet-Edward/Emcon LOCATION Flare Outlet

SAMPLE SITE Hobart Landfill DATE 5-4-90

SULFUR DIOXIDE (SO_2)

instrument averaged 1.6 ppm during the run

ppm x 1.660×10^{-7} = lb/dscf SO_2 (from 40 CFR 60, Appendix A, Method 19)
conversion factor

1.6 ppm x 1.660×10^{-7} = 2.66×10^{-7} lb/dscf

2.66×10^{-7} lb/dscf x 4087.2 dscf/min x 60 min/hr = 0.07 lb/hr

NITROGEN OXIDES (NO_x as NO_2)

instrument averaged 26.1 ppm during the run

ppm x 1.194×10^{-7} = lb/dscf NO_x (from Method 19)
conversion factor

26.1 ppm x 1.194×10^{-7} = 3.12×10^{-6} lb/dscf

3.12×10^{-6} lb/dscf x 4087.2 dscf/min x 60 min/hr = 0.76 lb/hr

$$0.76\ \frac{lb}{hr} \times \frac{24\ hr}{day} \times \frac{365\ days}{yr} \times \frac{1\ ton}{2000\ lb} = 3.3\ ton/yr$$

Example Calculation
VOC Emission Rates
Hobart Landfill

Run 1 - Inlet

Example Compound = Benzene

$$1000\ \mu g/m^3 * \frac{1\ m^3}{35.31\ ft^3} * 211.3\ \frac{dscf}{min} * \frac{1\ mg}{1000\ \mu g}$$

$$= \underline{\underline{6.0\ mg/min}}$$

Run 1 - Outlet

Example Compound = Benzene

$$1.8\ \mu g/m^3 * \frac{1\ m^3}{35.31\ ft^3} * 4087.2\ \frac{dscf}{min} * \frac{1\ mg}{1000\ \mu g}$$

$$= \underline{\underline{0.2\ mg/min}}$$

Destruction Efficiency

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

$$\frac{5.7\ mg/min - 0.1\ mg/min}{5.7\ mg/min} \times 100\% = \underline{\underline{98.25\%}}$$

APPENDIX D

Field Data Sheets

AT

TRAVERSE SAMPLING DATA

Page 1 of 1

HOBIN-R1

Client Sweet Edwards/Emcon
Date 5-4-90
Sample Location Hobart Landfill flare stack
Operators JMW/KSM
Sample Box #
Run# 1 - Inlet Velocity

EQUIPMENT CHECKS

Initial/Final

Leak Rate Cfm /
Leak Test Vac /
Pitots, Pretest
Pitots, Postest
Orsat Sampling System
Tedlar Bag
Thermocouple @ °F

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter 8" Ø
Distance Upstream 18"
Distance Downstream 3'

Filter # tare mgs

	Final Wt.		Initial Wt.		Net Wt.
#1 Bubbler		-		=	
#2 Impinger		-		=	
#3 Bubbler		-		=	
#4 Silica Gel		-		=	

TOTAL WATER VOLUME

Start Time ~1106
Stop Time
Barometric Pressure "Hg 29.73
Static Pres"H_2O +1.85
Production Rate

NOMOGRAPH SETUP

% Moisture
Meter Temp.
Stack Temp.
ΔH@ Y NA
Pitot# Side#
Cp .99
Nozzle Diameter NA
K Factor
Reference ΔP

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu. Ft.	Pitot Reading (ΔP), In. H_2O	Orifice Setting (ΔH), In H_2O Ideal	Orifice Setting (ΔH), In H_2O Actual	Gas Meter Temp°F In	Gas Meter Temp°F Out	Pump Vacuum In. Hg Gauge	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F
1			.018								101
2		Quick traverse	.038								101
3			.022								101
4			.043								101
5			.038								101
6			.025								101

TRAVERSE SAMPLING DATA

Page 1 of 1

Client Swett Edwards/Emcon
Date 5-4-90
Sample Location Flare Inlet
Hubbart Landfill
Operators JMW
Sample Box #
Run# 2 - Inlet Velocity

EQUIPMENT CHECKS

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

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter
Distance Upstream
Distance Downstream

Filter # tare mgs

	Final Wt.		Initial Wt.		Net Wt.
#1 Bubbler		-		=	
#2 Impinger		-		=	
#3 Bubbler		-		=	
#4 Silica Gel		-		=	

TOTAL WATER VOLUME

Start Time ~1313
Stop Time
Barometric Pressure "Hg 29.71
Static Pres"H_2O +1.85
Production Rate

NOMOGRAPH SETUP

% Moisture
Meter Temp.
Stack Temp.
ΔH@ Y
Pitot# Side#
Cp .99
Nozzle Diameter
K Factor
Reference ΔP

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu. Ft.	Pitot Reading (ΔP), In. H_2O	Orifice Setting (ΔH), In H_2O		Gas Meter Temp°F		Pump Vacuum In. Hg Gauge	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F
				Ideal	Actual	In	Out				
1			.012								
2			.019								102
3			.028								102
4			.033								102
5			.022								102
6			.021								102
											102

TRAVERSE SAMPLING DATA

Page 1 of 1

Client Sweet Edwards/Emcon
Date 5-4-90
Sample Location Flare Inlet
Hobart Landfill
Operators JMW
Sample Box #
Run# 3- Inlet Velocity

EQUIPMENT CHECKS

Initial/Final
Leak Rate Cfm ___/___
Leak Test Vac ___/___
___ Pitots, Pretest
___ Pitots, Postest
___ Orsat Sampling System
___ Tedlar Bag
___ Thermocouple @___ °F

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter 8" ⌀
Distance Upstream
Distance Downstream

Filter # ___ tare ___ mgs

	Final Wt.		Initial Wt.		Net Wt.
#1 Bubbler		-		=	
#2 Impinger		-		=	
#3 Bubbler		-		=	
#4 Silica Gel		-		=	

TOTAL WATER VOLUME

Start Time ~1430
Stop Time
Barometric Pressure "Hg 29.71
Static Pres"H_2O +1.85
Production Rate

NOMOGRAPH SETUP

% Moisture
Meter Temp.
Stack Temp.
ΔH@ ___ Y
Pitot# ___ Side#
Cp
Nozzle Diameter
K Factor
Reference ΔP

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu. Ft.	Pitot Reading (ΔP), In. H_2O	Orifice Setting (ΔH), In H_2O		Gas Meter Temp°F		Pump Vacuum In. Hg Gauge	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	
				Ideal	Actual	In	Out					
1			.017								104	
2			.015								104	
3			.022								104	
4			.035								104	
5			.025								104	
6			.025								104	

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: Flare Inlet
SITE ADDRESS: Hobart Landfill
SAMPLING DATE: 5-9-90

SHIPPING DATE:
CANISTER SERIAL NO. 428
SAMPLER ID: Run 1 Inlet - #428
OPERATOR: KSM
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	102	84	☒	☒
STOP	102	86		

PRESSURE

	CANISTER PRESSURE	
START		0
STOP	☒	4.1

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	1240	
STOP	1308	

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED: 5-14-90 SG 1743-1
RECEIVED BY: Bertha Kielsbach
INITIAL PRESSURE: 2.5 psig
FINAL PRESSURE: 17 psig
DILUTION FACTOR: 1.85
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE: 5/18/90
GC-MSD-SIM DATE:
RESULTS :

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

Stephen C [illegible]
SIGNATURE/TITLE

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: Flare Inlet
SITE ADDRESS:
Hobart Landfill

SAMPLING DATE: 5-4-90

SHIPPING DATE:
CANISTER SERIAL NO. 426
SAMPLER ID: Run 2 Inlet #426
OPERATOR:
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	102	86	☒	☒
STOP	102			

PRESSURE

CANISTER PRESSURE	
	0
☒	3.8

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	1309	
STOP	1409	

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED: 5-14-90 5G1743-2
RECEIVED BY: Berthe Kriebsbach
INITIAL PRESSURE: +3.0 psig
FINAL PRESSURE: +17. psig
DILUTION FACTOR: 1.79
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE: 5/18/90
GC-MSD-SIM DATE:
RESULTS :

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

Stephen C Hanlick
SIGNATURE/TITLE

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: Flare Inlet

SITE ADDRESS: Hobart Landfill

SAMPLING DATE: 5-4-90

SHIPPING DATE:

CANISTER SERIAL NO. 306

SAMPLER ID: Run 3-Inlet # 306

OPERATOR: KSm

CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	~~140~~ 104	86		
STOP	~~15~~ 103	84		

PRESSURE

CANISTER PRESSURE	
	0
	1.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	1410	
STOP	1510	

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE:

QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

SG 1743-3

DATE RECEIVED: 5-14-90

RECEIVED BY: Bertha Krebsbach

INITIAL PRESSURE: −18"

FINAL PRESSURE: +20.5

DILUTION FACTOR: 5.99

ANALYSIS

GC-FID-ECD DATE:

GC-MSD-SCAN DATE: 5/18/90

GC-MSD-SIM DATE:

RESULTS :

GC-FID-ECD:

GC-MSD-SCAN:

GC-MSD-SIM:

Stephen C Havlicek/VP

SIGNATURE/TITLE

AT Lab # 009937

HUBOUT-R1

TRAVERSE SAMPLING DATA

Page 1 of 1

Client Sweet Edwards / Emcon
Date 5-4-90
Sample Location Hubert Landfill Flare Stack
Operators KSM / JMW
Sample Box # 1
Run# 1 - Outlet / HCl

EQUIPMENT CHECKS

Initial/Final

Leak Rate Cfm .001 / .002
Leak Test Vac 17 / 15
✓ Pitots, Pretest
✓ Pitots, Postest
✓ Orsat Sampling System
NA Tedlar Bag
✓ Thermocouple @ ____ °F

SCHEMATIC TRAVERSE LAYOUT

7" port nipple
Stack Diameter 78 ½" Ø
Distance Upstream 21 ft.
Distance Downstream 3 ft

Filter # ____ tare ____ mgs

	Final Wt.	Initial Wt.	Net Wt.
#1 Bubbler	606.6	584.7	
#2 Impinger	609.9	590.6	
#3 Bubbler	496.2	490.8	
#4 Silica Gel	787.8	778.5	

TOTAL WATER VOLUME 55.9

Start Time 1105
Stop Time 1205
Barometric Pressure "Hg 29.73
Static Pres"H_2O -.05
Production Rate ____

NOMOGRAPH SETUP

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

SE Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu. Ft.	Pitot Reading (ΔP), In. H_2O	Orifice Setting (ΔH), In H_2O Ideal	Orifice Setting (ΔH), In H_2O Actual	Gas Meter Temp°F In	Gas Meter Temp°F Out	Pump Vacuum In. Hg Gauge	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	John Zink Temp oF
CP	0	590.195			1.3	72	73	2.5		68		1410
	10				1.3	87	75			60		1406
	20				1.3	89	77			58		1468
	30				1.3	91	79			57		1599
	40				1.3	93	82			58		1422
	50				1.3	94	83			56		1458
	60	625.464										
			SW								1406	
1			.001									
2			.001									
3			.001									
4			.001									
5			.008									
6			.008									
7			.008									
8			.010									
9			.011									
10			.012									
11			.009									
12			.005									

35.269 1.3 83.9 1406.

Lab # 009938

AT

HOBOUT-R2

TRAVERSE SAMPLING DATA

Page 1 of 1

Client Sweet Edwards/Emcon
Date 5-4-90
Sample Location Hobart Landfill Flare Stack
Operators KSM/JMW
Sample Box # 2
Run# 2 · outlet/HCl

EQUIPMENT CHECKS

Initial/Final

Leak Rate Cfm OK
Leak Test Vac

✓	Pitots, Pretest
✓	Pitots, Posttest
✓	Orsat Sampling System
NA	Tedlar Bag
✓	Thermocouple @ ____ °F

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter
Distance Upstream
Distance Downstream

Filter # ____ tare ____ mgs

	Final Wt.		Initial Wt.		Net Wt.
#1 Bubbler	656.9	-	617.9	=	
#2 Impinger	608.6	-	597.1	=	
#3 Bubbler	535.3	-	534.1	=	
#4 Silica Gel	786.5	-	779.3	=	

TOTAL WATER VOLUME 58.9

Start Time 1239
Stop Time 1339
Barometric Pressure "Hg 29.71
Static Pres"H_2O -.07
Production Rate

NOMOGRAPH SETUP

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

SE Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu. Ft.	Pitot Reading (ΔP), In. H_2O	Orifice Setting (ΔH), In H_2O		Gas Meter Temp°F		Pump Vacuum In. Hg Gauge	Filter Box Temp °F	Imp. Exit Temp °F	on Stack Temp °F	PNL-101 John Zink °F
				Ideal	Actual	In	Out					
CP	0	625.697			1.3	81	82	1	NA	68	1425	1584
	10				1.3	94	82	2.5		58		1428
	20				1.3	96	85			58	1333	1516
	30				1.3	102	88	2.5		56		1628
	40				1.3	100	89			57		1410
	50				1.3	102	91			60	1401	1582
	60	659.498										
		SW										1330
	1	~~0.0~~										
	2	0.0										
	3	0.0										
	4	0.0										
	5	0.005										
	6	0.005										
	7	0.010										
	8	0.005										
	9	0.007										
	10	0.018										
	11	0.005										1401
	12	0.008										

1.3 90.8

Lab # 009939

84

TRAVERSE SAMPLING DATA

Page 1 of 1

Client Sweet Edwards/Emcon
Date 5-4-90
Sample Location Flare Outlet Hobart Landfill
Operators KSM / JMW
Sample Box # 3
Run# 3- Outlet / HCl

EQUIPMENT CHECKS

Initial/Final

Leak Rate Cfm ____/____
Leak Test Vac ____/____
____ Pitots, Pretest
____ Pitots, Postest
____ Orsat Sampling System
____ Tedlar Bag
____ Thermocouple @____°F

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter____
Distance Upstream____
Distance Downstream____

Filter #____ tare____ mgs

	Final Wt.		Initial Wt.		Net Wt.
#1 Bubbler	627.2	-	580.4	=	
#2 Impinger	641.9	-	631.9	=	
#3 Bubbler	479.5	-	478.4	=	
#4 Silica Gel	755.2	-	748.0	=	

TOTAL WATER VOLUME 63.1

Start Time 1402
Stop Time 1503
Barometric Pressure "Hg 29.68
Static Pres"H_2O -.045
Production Rate____

NOMOGRAPH SETUP

% Moisture____
Meter Temp.____
Stack Temp.____
ΔH@____ Y____
Pitot#____ Side#____
Cp____
Nozzle Diameter____
K Factor____
Reference ΔP____

SE Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu. Ft.	Pitot Reading (ΔP), In. H_2O	Orifice Setting (ΔH), In H_2O Ideal	Orifice Setting (ΔH), In H_2O Actual	Gas Meter Temp°F In	Gas Meter Temp°F Out	Pump Vacuum In. Hg Gauge	Filter Box Temp °F	Imp. Exit Temp °F	OVM Stack Temp °F	PNL-101 John Zink
CP	0	659.706			1.3	84	87	1	NA	66		1429
	10				1.3	95	85	2.5		52		1572
	20				1.3	97	86			53		1400
	30				1.3	99	88			55		1486
	40				1.3	100	89			58	1453	1385
	50				1.3	101	90			59	1404	1575
	61	695.628										
	SW											
1	0.0										1497	
2	0.0											
3	0.0											
4	0.0											
5	0.008											
6	0.009											
7	0.009											
8	0.010											
9	0.010											
10	0.013											
11	0.009											
12	0.006										1408	

1.300 91.75

√ 100

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: Flare stack outlet
SITE ADDRESS: Hobart Landfill
SAMPLING DATE: 5-4-90

SHIPPING DATE:
CANISTER SERIAL NO. 404
SAMPLER ID: Run 1 #404 outlet
OPERATOR: BSM
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	1406	70	☒	☒
STOP	1487	78		

PRESSURE

CANISTER PRESSURE	
	0
☒	31.8

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	1115	
STOP	1215	

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED: 5-14-90

SG1743-4

RECEIVED BY: Bertha [illegible]
INITIAL PRESSURE: 27 psig
FINAL PRESSURE: 27 psig
DILUTION FACTOR: None
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE: 5/18/90
GC-MSD-SIM DATE:
RESULTS :
GC-FID-ECD:
GC-MSD-SCAN:
GC-MSD-SIM:

Stephen C [illegible] /VP
SIGNATURE/TITLE

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: Flare Stack outlet
SITE ADDRESS: Hobart
Landfill
SAMPLING DATE: 5-4-90

SHIPPING DATE:
CANISTER SERIAL NO. 119
SAMPLER ID: Run 2 - #119 Outlet
OPERATOR: SSM
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	1425	76	X	X
STOP	1401	72		

PRESSURE

CANISTER PRESSURE	
	0
X	29.6

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	1246	
STOP	1338	

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED: 5-14-90
RECEIVED BY: Bertha Krebsbach
INITIAL PRESSURE: 25.5 psig
FINAL PRESSURE: 25.5 psig
DILUTION FACTOR: NONE
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE: 5/18/90
GC-MSD-SIM DATE:
RESULTS :

SG1743-5

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

Stephen C [illegible] / VP
SIGNATURE/TITLE

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: Flare Outlet
SITE ADDRESS: Hobart Landfill
SAMPLING DATE: 5-4-90

SHIPPING DATE:
CANISTER SERIAL NO. 105
SAMPLER ID: Run 3 - Outlet #105
OPERATOR: BSM/JMW
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	1400	80		
STOP	1408	76		

PRESSURE

CANISTER PRESSURE	
	0
	25.7

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	1422	
STOP	1510	

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

SG 1743-6

DATE RECEIVED: 5-14-90
RECEIVED BY: Bertha Krebsbach
INITIAL PRESSURE: 22.5 psig
FINAL PRESSURE: 22.5 psig
DILUTION FACTOR: NONE
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE: 5/18/90
GC-MSD-SIM DATE:
RESULTS :
GC-FID-ECD:
GC-MSD-SCAN:
GC-MSD-SIM:

Stephen C Hourihan / VP
SIGNATURE/TITLE

APPENDIX E

Miscellaneous Supporting Information

CROSS SECTIONAL AREA

Traverse Point	Distance (inches)
1	1.65
2	5.26
3	9.26
4	13.89
5	19.63
6	27.95
7	50.55
8	58.88
9	64.61
10	69.24
11	73.24
12	76.85

STACK DIMENSIONS

78.5 inch diameter circular stack

2 ports at 90 degrees

A = 3 feet

B = 21 feet

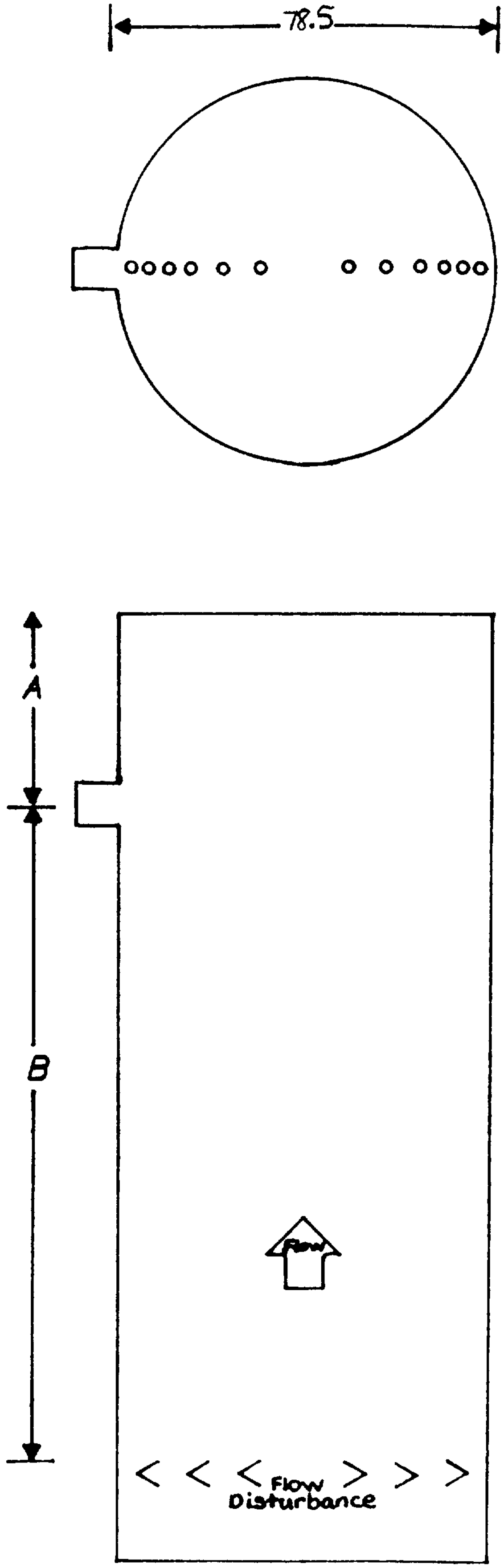


Figure 1. Location of sampling ports and traverse points at the outlet stack.

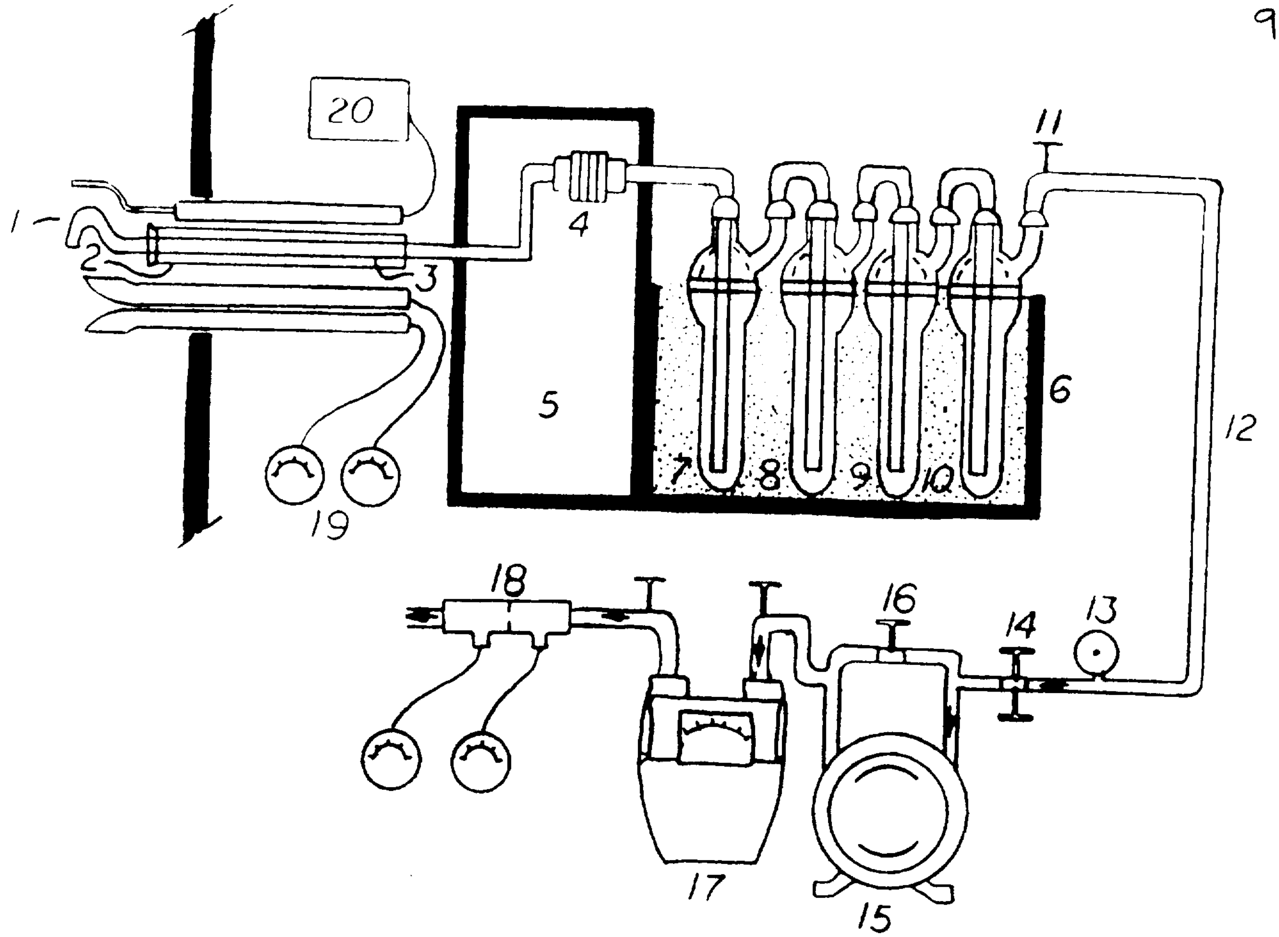


Figure 2. **EPA Method 4 Moisture Sample Train.**

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_2O
8.	Modified Greenburg-Smith impinger containing 100 ml H_2O
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

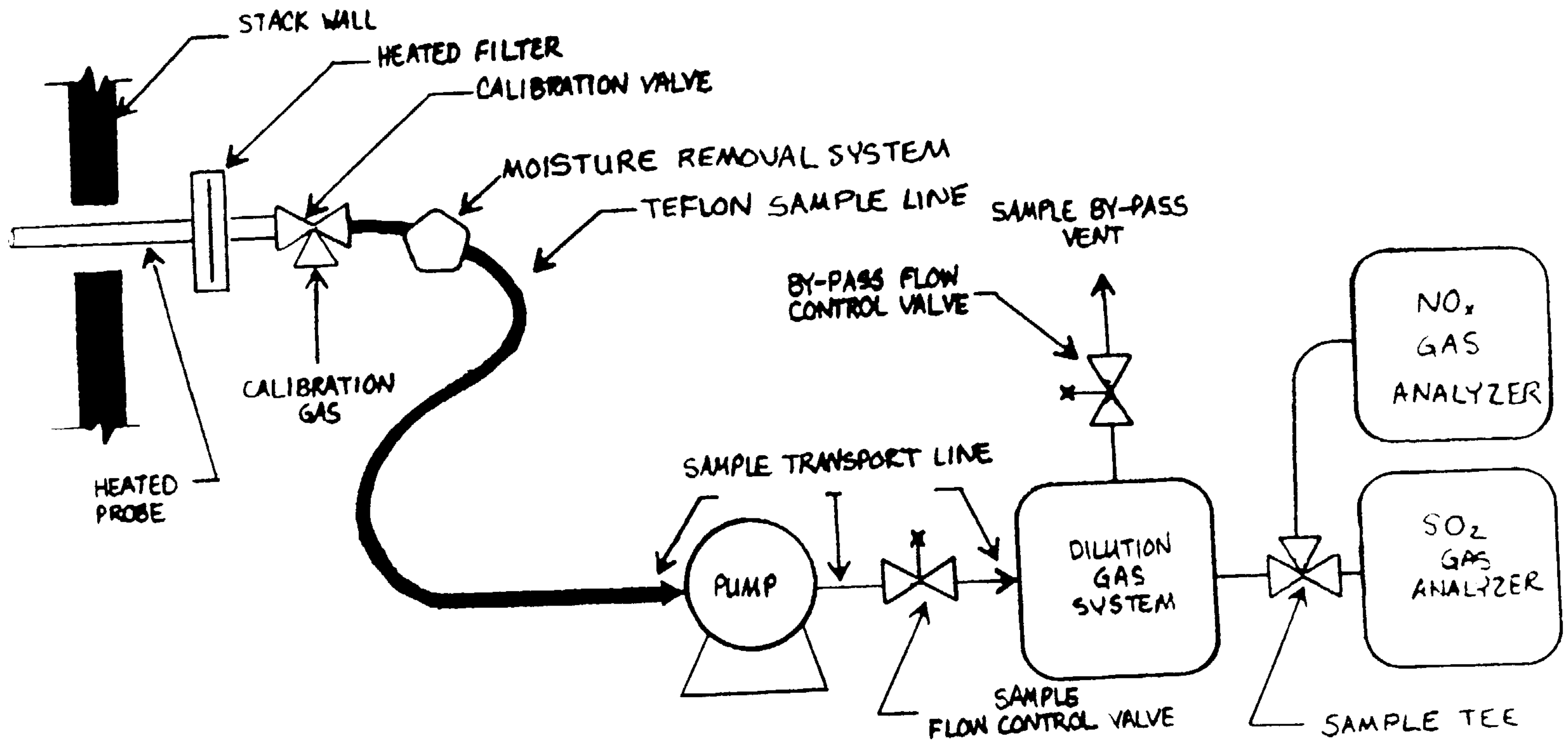


Figure 3. Method 6C/7E sampling system schematic.

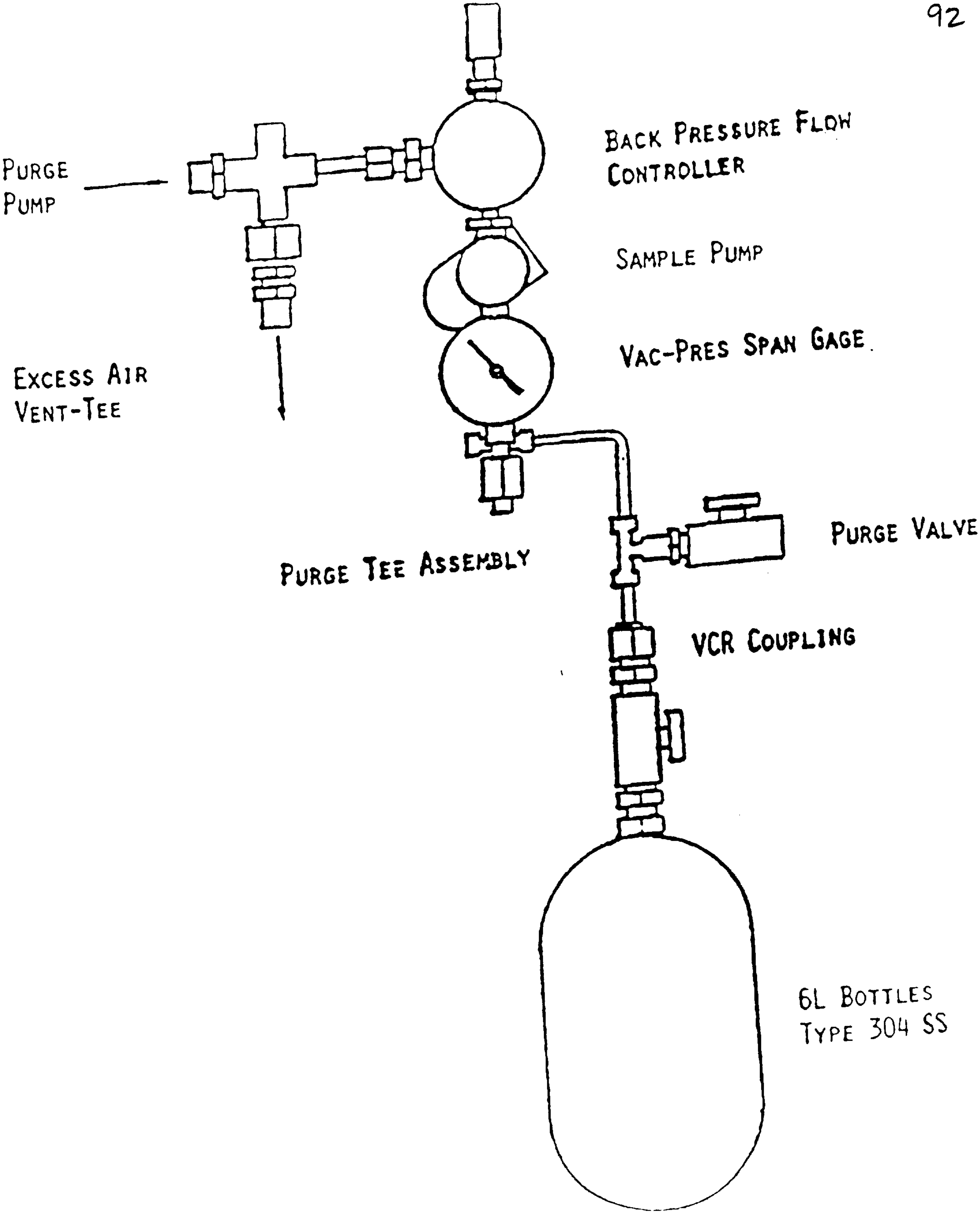


Figure 4. TO-14 Sample System Schematic.

METHOD 1 - LOCATION OF TRAVERSE POINTS

Circular Stacks

TRAVERSE POINT	DISTANCE % of diameter
1	4.4
2	14.7
3	29.5
4	70.5
5	85.3
6	95.6

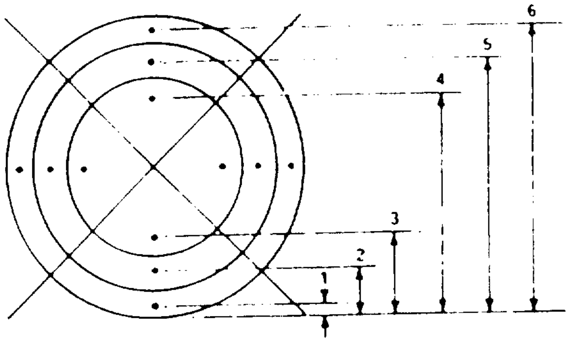


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points indicated.

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	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	65.4	80.6
18									98.6	93.3	88.4	83.9

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.

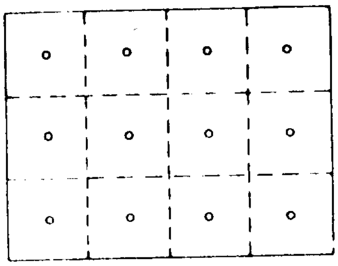


Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with a traverse point at centroid of each area.

METHOD 1 - MINIMUM NUMBER OF TRAVERSE POINTS

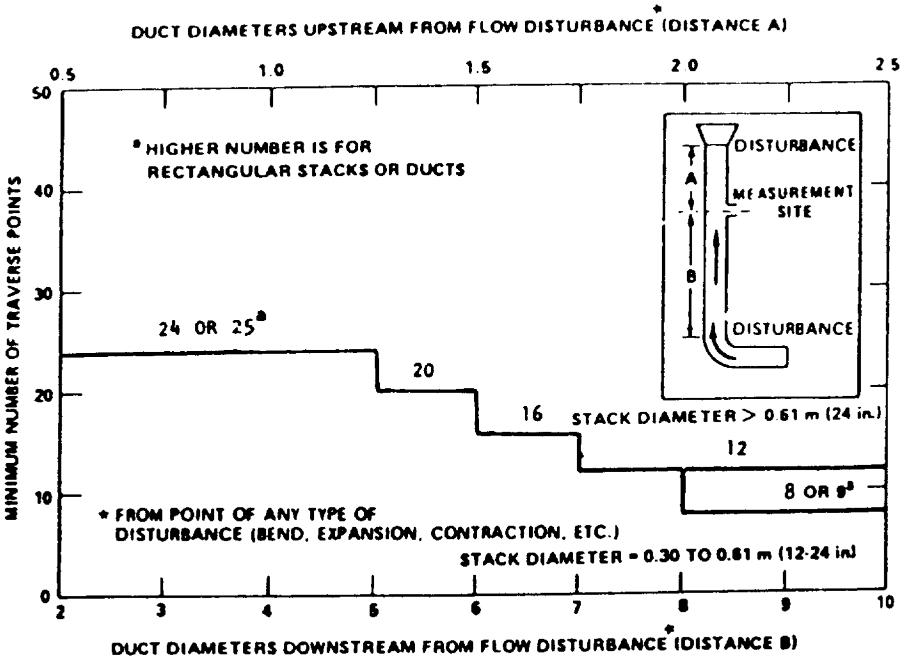


Figure 1-1. Minimum number of traverse points for particulate traverses.

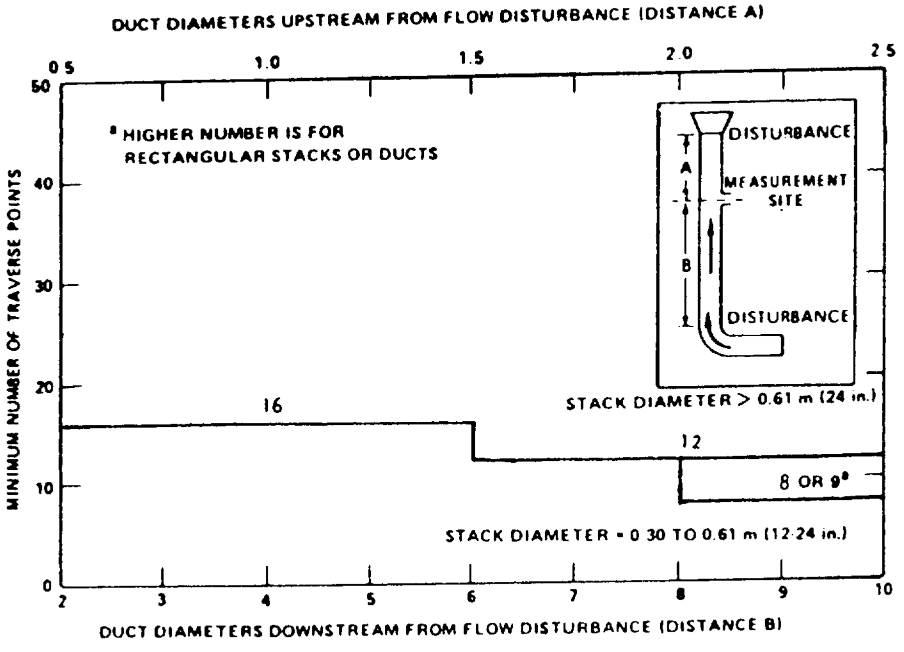


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

METHOD 2 - STACK GAS VELOCITY AND VOLUMETRIC FLOW CALCULATIONS

5.1 Nomenclature.

A = Cross-sectional area of stack, m² (ft²).

B_{ws} = 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,

$$34.97 \frac{\text{m}}{\text{sec}} \left[\frac{(g/g\text{-mole})(\text{mm Hg})}{(°\text{K})(\text{mm H}_2\text{O})} \right]^{1/2}$$

for the metric system and

$$85.49 \frac{\text{ft}}{\text{sec}} \left[\frac{(\text{lb/lb-mole})(\text{in. Hg})}{(°\text{R})(\text{in. H}_2\text{O})} \right]^{1/2}$$

for the English system.

M_d = Molecular weight of stack gas, dry basis (see Section 3.6) g/g-mole (lb/lb-mole).

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

$= M_d\,(1-B_{ws}) + 18.0\,B_{ws}$

Eq. 2-5

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

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

P_s = Absolute stack gas pressure, mm Hg (in. Hg).

$= P_{bar} + P_g$

Eq. 2-6

Eq. 2-6

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

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

t_s = Stack temperature, °C (°F).

T_s = Absolute stack temperature, °K, (°R).

$= 273 + t_s$ for metric.

Eq. 2-7

$= 460 + t_s$ for English.

Eq. 2-8

T_{std} = Standard absolute temperature, 293 °K (528° R).

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

Δ_p = Velocity head of stack gas, mm H₂O (in. H₂O).

3,600 = Conversion factor, sec/hr.

18.0 = Molecular weight of water, g/g-mole (lb/lb-mole).

5.2 Average Stack Gas Velocity.

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{s(avg)}}{P_s M_s}}$$

Equation 2-9

5.3 Average Stack Gas Dry Volumetric Flow Rate.

$$Q_{sd} = 3{,}600(1-B_{ws}) v_s A \left(\frac{T_{std}}{T_{s\,(avg)}}\right)\left(\frac{P_s}{P_{std}}\right)$$

Eq. 2-10

METHOD 3 - MOLECULAR WEIGHT AND EXCESS AIR CALCULATIONS

6.1 Nomenclature.

M_d = Dry molecular weight, g/g-mole (lb/lb-mole).

%EA = Percent excess air.

%CO₂ = Percent CO₂ by volume (dry basis).

%O₂ = Percent O₂ by volume (dry basis).

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

%N₂ = Percent N₂ by volume (dry basis).

0.264 = Ratio of O₂ to N₂ in air, v/v.

0.280 = Molecular weight of N₂ or CO, divided by 100.

0.320 = Molecular weight of O₂ divided by 100.

0.440 = Molecular weight of CO₂ divided by 100.

6.2 Percent Excess Air. Calculate the percent excess air (if applicable), by substituting the appropriate values of percent O₂, CO, and N₂ (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 O₂ and that the fuel does not contain appreciable amounts of N₂ (as do coke oven or blast furnace gases). For those cases when appreciable amounts of N₂ are present (coal, oil, and natural gas do not contain appreciable amounts of N₂) 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) (m³)/(g-mole) (°K) for metric units and 21.85 (in. Hg) (ft³)/(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).

ΔV_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).

$V_{wc(std)}$ = 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.

ρ_w = Density of water, 0.9982 g/ml (0.002201 lb/ml).

2.3.2 Volume of Water Vapor Condensed.

$$V_{wc(std)} = \frac{(V_f - V_i)\rho_w R T_{std}}{P_{std} M_w}$$

$$= K_1 (V_f - V_i)$$

Eq. 4-1

K_1 = 0.001333 m³/ml for metric units
= 0.04707 ft³/ml for English units

2.3.3 Volume of Water Vapor Collected in Silica Gel.

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

$$= K_3 (W_f - W_i)$$

Eq. 4-2

Where:

K_3 = 0.001335 m³/g for metric units
= 0.04715 ft³/g for English units

2.3.4 Sample Gas Volume.

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

$$= K_4 Y \frac{V_m P_m}{T_m}$$

Eq. 4-3

Where:

K_4 = 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.

$$B_{ws} = \frac{V_{wc(std)} + V_{wsg(std)}}{V_{wc(std)} + V_{wsg(std)} + V_{m(std)}}$$

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

Vm_{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_2O (in. H_2O)

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

Vw_{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

Δp = Velocity head of stack gas, mm H_2O (in. H_2O)

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)

AMTEST

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 "H2O	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 FACTOR	Y FACTOR	DELTA H@
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

DESCRIPTION

The two-channel phase-detection system in the Monitor Labs Model 8850 Fluorescent SO_2 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_2 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.

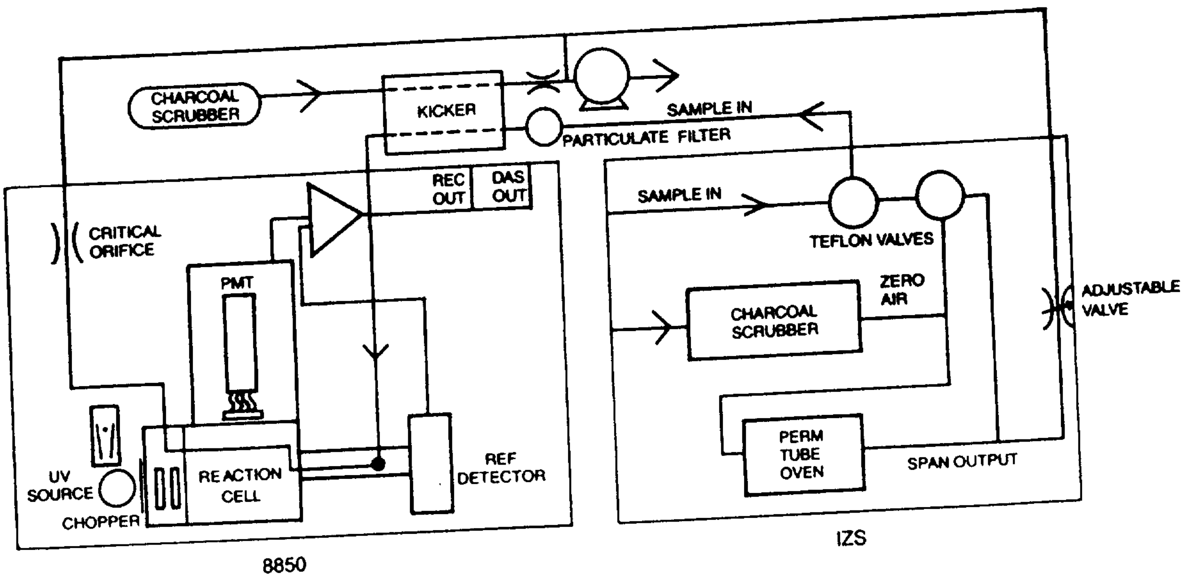
SPECIFICATIONS:

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

RANGES	.25, .5, 1.0, 5.0, 10.0 ppm
Noise — ppm at zero	.0005 ppm
ppm at 80%	.001 ppm
Lower Detectable Limit	.001 ppm
Total Interference Equivalent	**Less than .012 ppm**
Zero Drift	**Less than 3 ppb/7 days** **Less than 2 ppb/24 hours**
Span Drift	**Less than 1%/7 days average** **Less than 0.5%/24 hours**
Lag Time	**20 sec**
Rise Time	**Less than 260 sec to 95%**
Fall Time	**Less than 260 sec to 95%**
Precision	**.001 ppm**
Sample Flow Rate	**500 cc/min**
Temperature Range	**5°C - 40°C (EPA equivalent range 20°C - 30°C)**
Dimensions (H × W × D)	**8.75" × 17" × 23"** **(22.2 cm × 43.2 cm × 58.4 cm)**

	Analyzer	Pump
Weight	**50 lbs (22.7 kg)**	**11 lbs (5 kg)**
Power	**300 VA**	**400 VA**
	115VAC 50/60Hz **220VAC 50 Hz**	

Data Outputs (Switch Selectable)	
DAS	**10 mV, 100 mV, 1V, 2V, 5V, 10V**
Recorder	**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-[illegible]
Toll Free 1-800-422-1499

MONITOR LABS

A Division of

LEAR SIEGLER MEASUREMENT CONTROLS CORPORATION

MONITOR TECHNOLOGIES GmbH, Kammerfeldstrasse 2, D 8051 Allershausen, 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_x 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_2-to NO converter and the other leading directly to the reaction chamber. The difference between the two channels' readings is NO_2.

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 molycon converter selectively converts NO_2 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 CALTRACK 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_x, NO, and NO_2).

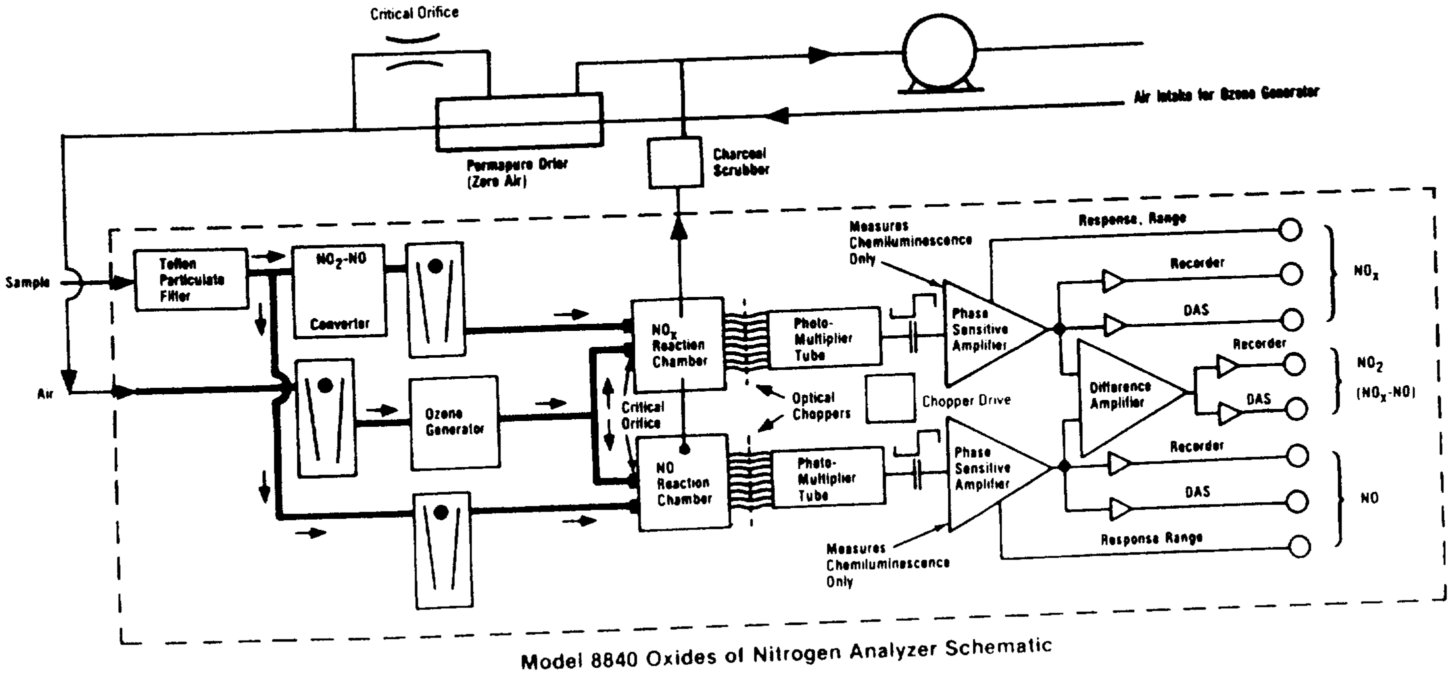
The 8840 is truly a second generation dual channel NO_x analyzer which combines accuracy of dual channel measurement with simplicity of operation and maintenance.

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.)	3 minutes to 95% of reading change
Normal operating temperature	5°C - 40°C (EPA equivalent range 20°C - 30°C)
Humidity tolerance	0 – 95% (non-condensing)
Sample flowrate	250 cc/minute (nominal) each channel on Reference Method Model. 700 cc/minute optional (not approved as Reference Method).
Data Outputs (Switch Selectable)	
DAS	10mV, 100mV, 1V, 2V, 5V, 10V
Recorder	10mV, 100mV, 1V, 2V, 5V, 10V
Status outputs (optional)	Range, Function, Power Fail
Unattended operation	7 days
Power requirements	115V ± 10V, 220VAC-20V, 240VAC ± 25V, 50/60 Hz standard 420 watts maximum (turn on) 320 watts typical (operating)
Weight	59 pounds (26.8 kg)
Dimensions (H × W × D)	Bench: 9.5" × 17" × 23" (24.1cm × 43.2cm × 58.4cm) Rack: 8.25" × 17" × 23" (21cm × 43.2cm × 58.4cm)



Model 8840 Oxides of Nitrogen Analyzer Schematic

Prices and specifications subject to change without prior notice

[illegible] INVERNESS DRIVE EAST ENGLEWOOD [illegible] 80112-5189 (303 [illegible]
Toll Free 1-800-422-1499
ML A Division of

DESCRIPTION

Monitor Labs' Gas Dilution System provides the ideal approach to high level SO_2 and NO_x 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 dilution technique 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 orifice 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 the 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_2 to NO converter, HI-CON, which will handle up to 200 ppm NO_2 continuously with no ammonia interference. The HI-CON replaces the MOLYCON in the 8840HL for high level applications.

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

The dilutor also eliminates the CO_2 and water quenching often found in chemiluminescent NO_x and SO_2 measurements.

SPECIFICATIONS

Sample Conditioning Requirements

	8850, SO_2	8840, NO_2
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_2—12-16 ppm	<1%	N/A
CO_2—10-18%	<1%	<1%
O_2—0.25-4%	<1%	<1%
NH_3—5-20 ppm	<1%	<1%
CO—7-100 ppm	<1%	<1%

Dilution Method

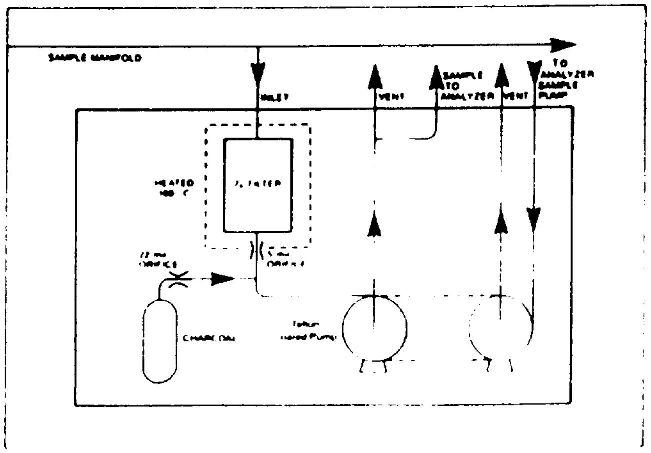
	20:1 Active Dilution Using Orifices	20:1 Active Dilution Using Orifices

Operational Performances

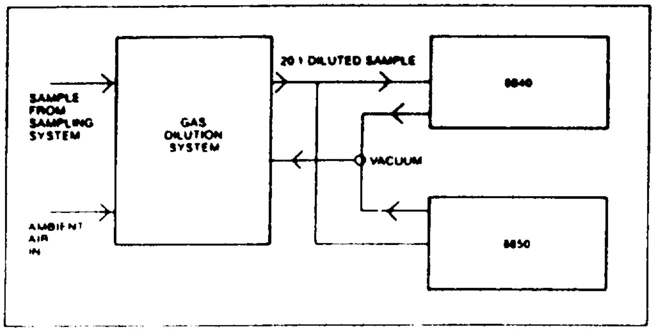
Ranges	0-25, 0-500, 0-100, 0-50, 0-1000ppm SO_2	0-50, 0-100, 0-200, 0-500, 0-1000, 0-2500 0-5000ppm NO_x
Detection Limit	1 ppm	1 ppm
Linearity	± 1%	± 1%
Span Drift	< 2%/wk	< 2%/wk
Zero Drift	< 2%/wk	< 2%/wk
Response Time/Range	< 5 min to 95%	< 60 sec to 95%
Time Constants	60 sec.	55 sec.
Lag Time	< 10 sec.	< 10 sec
Noise	1% F.S.	1% F.S.

Operational Requirements

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



DILUTION MODULE



SYSTEM DIAGRAM

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

Printed in U.S.A. 8706 5KS

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

Shipped From: Scott SAN BERNARDINO, CA
Date Shipped 1/16/89
Our Project No: 415564
Your P.O. No: 2279
Page 1 of 1
Expiration Date: 7/16/89

KRIS HANSEN
attn: KRIS HANSEN

CERTIFICATE OF ANALYSIS—EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. AAL-16929 Cylinder Pressure 1900 psig Certified Accuracy ±1 % NBS Traceable

		REFERENCE STD			GAS ANALYZER		
COMPONENTS	CERTIFIED CONC	SRM/CRM NO.	CYL. NO.	CONC.	MAKE/MODEL/SERIAL NO.	LAST CAL. DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	91.38 ppm	SRM 1684 B	AAL-6032	94.54 ppm	THERMO-ELECTRON/	11/1/88	CHEMI-LUMINENSCENT
					10 AR/ 14853-150		
NOX	91.50 ppm						
SULFUR DIOXIDE	94.86 ppm	CRM 1694	AAL-6025	95.1 ppm	HORIBA/ AIA-23/ 56174104	9/27/88	INFRA-RED

BALANCE GAS NITROGEN

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component NITRIC OXIDE

First Analysis Date 1/5/89 Units ppm

Z 0.00	R 94.55	T 91.06
R 94.60	Z 0.06	T 90.95
Z 0.05	T 91.03	R 94.53

Mean Test Assay 91.27 ppm

Second Analysis Date 1/12/89 Units ppm

Z 0.00	R 94.75	T 91.33
R 94.70	Z 0.04	T 91.25
Z 0.03	T 91.18	R 94.65

Mean Test Assay 91.38 ppm

Component SULFUR DIOXIDE

Date 1/5/89 Units ppm

Z 00.0	R 95.0	T 94.9
R 95.0	Z 00.0	T 94.9
Z 00.0	T 94.8	R 95.0

Mean Test Assay 94.97 ppm

Date 1/13/89 Units ppm

Z 00.0	R 95.0	T 94.7
R 95.0	Z 00.1	T 94.8
Z 00.0	T 94.8	R 95.0

Mean Test Assay 94.86 ppm

Component ____

Date ____ Units ____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ____

Date ____ Units ____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ____

Chronology: Date ____
Assay ____

Analyst DOUG HAGBERG/MAYNARD JOHNSON

Approved By:

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

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

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

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

CERTIFIED

Cyl. No. ALM-11915
Analytical Accuracy ±1%*

Component	Concentration
Carbon Dioxide	12.00%
Carbon Monoxide	500.0PPM
Oxygen	10.00%
Nitrogen	Balance
*Gravimetric Master	

Cyl. No. ALM-12276
Analytical Accuracy ±1%*

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

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.