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SOURCE EMISSION EVALUATION REPORT

JULY 18, 1989

Prepared For:

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TCW ASSOCIATES
CEDAR HILLS LANDFILL
GAS COMBUSTOR TESTING
MAPLE VALLEY, WASHINGTON
MARCH 13-14, 1989

Submitted by:

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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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INTRODUCTION

The purpose of this source emission evaluation was to determine emission levels during typical operation of a gas combustor installed at King County's Cedar Hills landfill in Maple Valley, Washington. Testing of the emissions at the inlet and the outlet of the combustor were conducted by Am Test, Inc.'s Air Quality Division on March 13-14, 1989. The testing was performed to comply with the requirements of the Puget Sound Air Pollution Control Agency (PSAPCA) Notice of Construction No. 2906 dated July 6, 1987, Section 5. A copy of the Notice of Construction is included in the Appendix of this report. The testing was performed in accordance with a test plan Am Test, Inc. submitted to PSAPCA dated February 12, 1988.

This is the second (2nd) series of tests conducted at this source. The first series of tests were conducted on August 4-5, 1988. The tests performed on March 13-14, 1989 were conducted to determine the inlet and outlet emission concentration and mass emissions rate and the destruction efficiency of the combustor system. The inlet and outlet gas streams were measured to quantify the velocity, 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), volatile organic compounds (VOCs), and semi-volatile organic compounds.

Landfill gases are piped to the incineration area where they are burned in a John Zink combustor (flare) prior to emitting the exhaust gas to the atmosphere. These tests were performed to verify that volatile principal organic hazardous constituents (POHCs) present in the landfill gases are destroyed prior to emitting the exhaust gas to the atmosphere. The parameters measured included volatile

organic compounds (VOCs, or those with boiling points in the range of approximately 30° to 100° C), semi-volatile organic compounds with boiling points above 100° C (outlet only), sulfur compounds (outlet only), nitrogen oxides (outlet only), hydrochloric acid (outlet only), percent methane, percent oxygen, percent carbon dioxide, temperature, moisture, and airflow.

Volatile organic compounds (VOCs) were collected at the outlet using Volatile Organic Sample Train (VOST) procedures specified in SW-846 Method 0030. This technique involves sampling a gas stream at a constant rate through a series of condensers and organic traps. Analysis of the volatile organic compounds was accomplished using gas chromatography/mass spectrometry (GC/MS) and EPA Method 5040 and 8240 procedures. The expected high concentration of some volatile organic compounds at the inlet to the combustor make VOST sampling impractical. Therefore, samples were collected in Tedlar^{R} bags to be analyzed using EPA Method 601 and 602 gas chromatograph (GC) procedures. In addition to the volatile organic compounds identified by EPA Method 601 and 602 procedures, a gas chromatograph was used to determine the percent methane and C_2-C_6 hydrocarbon concentration in the inlet gas.

Semi-volatile organic compounds were collected at the outlet only using Semi-Volatile Organic Sample Train (Semi-VOST) procedures specified in SW-846 Method 0010. This technique involves sampling a gas stream at a constant rate through a condenser and organic trap containing XAD-2 resin. Analysis of the semi-volatile organic compounds was accomplished using gas chromatography/mass spectrometry (GC/MS) and EPA Contract Laboratory Protocol for semi-volatile organics (Method 8270).

Environmental Protection Agency (EPA) sampling and analysis methods specified in the July 1, 1988 Title 40 Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, Methods 1-4, 6C, 7E and 16A were utilized. Methods 1 and 2 were performed to determine the stack gas velocity and volumetric flow rate. Method 3 was performed to determine the molecular weight of the stack gas. Method 4 was performed to determine the moisture content of the stack gas at the outlet. Chlorides as hydrochloric acid (HCl) were collected in the semi-VOST 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 on March 13-14, 1989 by Mr. Kris A. Hansen, Ms. Angela F. Blaisdell, Mr. James A. Guenthoer, and Mr. Earl R. Lawrence of Am Test, Inc.'s Air Quality Division. Preparation of the sorbent modules and analysis of the organic samples was performed by Twin City Testing Corporation in St. Paul, Minnesota. Analysis of the inlet volatile organic samples and hydrochloric acid samples was performed by Am Test, Inc.'s Trace Organics and Water Chemistry departments. 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 on the following page.

SUMMARY OF METHODOLOGY

Methodology	Information Obtained
EPA Method 1, 2	Velocity, airflow, and temperature.
EPA Method 3	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 using ion chromatography.
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 0030 (VOST)	Volatile organic compound emission concentration and mass rate. VOST was performed at the outlet site only. Destruction efficiency for VOCs.
EPA Method 8240	Purge and trap method for GC-MS analysis of VOST samples.
EPA Method 601 & 602	Gas chromatography procedure approximately equivalent to EPA Method 8240. Used to analyze inlet samples.
Method 0010 (Semi-VOST)	Semi-volatile organic compound emission concentration and mass rate. Semi-VOST was performed at the outlet site only.
Method 8240	Gas chromatography procedure used to quantify semi-volatile organic compounds.

SUMMARY OF RESULTS

EPA METHODS 1-2 - VELOCITY 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 114° F. The velocity of the inlet gas stream averaged 43.26 ft/second, or 2595 ft/minute. The airflow of landfill gas into the system was 633.3 dry standard cubic feet per minute (dscf/min) on test days. A range of velocity heads and temperatures in the outlet stack were also measured. A point of average velocity was determined at the outlet stack per Method 1 and 2 criteria (40 CFR 60, July 1, 1988) using calibrated "S" type pitot tubes. The average velocity at the outlet was 12.43 ft/second. The average airflow through the stack was 4887.5 dscf/min. The average temperature at the outlet was 1221° F. These averages are based on measurements taken during the three (3) 180-minute semi-VOST sample runs. The residence time based on combustion from the burner to the sample port was calculated to be 1.2 seconds using actual cubic feet per minute (ft/min) and an average temperature of 1200° F.

INLET METHANE ANALYSIS

Inlet samples to be analyzed for methane were injected directly onto a field gas chromatograph equipped with a flame ionization detector (FID). The methane values are presented in Table 1 on page 6.

EPA Method 3 and 3A - Combustion Gas Analyses

EPA Method 3A analyses were performed utilizing continuous emission analyzers. An Infrared Industries non-dispersive infrared (NDIR) analyzer (Model 702D) was utilized to measure the percent carbon dioxide (CO_2). An Infrared Industries Model 2200 oxygen (O2) analyzer was utilized to measure the percent oxygen. An Automated Custom Systems (ACS) Model 3300 non-dispersive infrared analyzer was used to measure the parts per million (ppm) carbon monoxide (CO). These analyzers meet 40 CFR 60, Appendix B, Performance Specification 3 and 4 criteria. Average combustion gas values obtained at the inlet and outlet sites are presented in Table 1 below. Values for outlet carbon dioxide, oxygen, and carbon monoxide may also be found on computer printouts titled "Volatile Organic Sample Train (VOST)", which are included in the "Calculation of Results" section of this report.

Table 1. Concentration of gaseous constituents found in the inlet and outlet combustor gas at Cedar Hills Landfill on March 13-14, 1989.

Compound	Average Inlet Gas Concentrations	Average Outlet Gas Concentrations
Methane (%)	52.7	---
Carbon Dioxide (CO_2) (%)	30.6	4.9
Oxygen (%)	2.6	14.8
Carbon Monoxide (ppm)	0	169
Nitrogen (%)	~9.8	---
Moisture (%)	~4.3	5.8

EPA Method 4 and Hydrochloric Acid Emissions

The results of the three (3) semi-VOST tests for quantifying moisture and hydrochloric acid emissions at the combustor outlet are presented in computer printouts titled "Method 1-5 Particulate Matter Emission Concentration Results", which are included in the "Calculation of Results" section of this report. The average chloride emission concentration was less than 1 parts per million (ppm).

The Method 1-4 results are summarized on a printout titled "Methods 1-4 and HCl - Summary of Results" on page 8.

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

On March 13-14, 1989 the combustor outlet gas was continuously monitored to determine the total sulfur (TS) (including sulfur dioxide (SO_2), hydrogen sulfide (H_2S) and total reduced sulfur (TRS)) and nitrogen oxides (NO_x) concentration. 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. A portion of the sample was also conveyed to an instrumental chemiluminescent analyzer for determining the NO_x concentration.

Measurements were recorded every minute over three (3) 180-minute periods, and averaged. The results of Method 6C/16A and 7E testing at the combustor outlet are presented in Table 2 below:

Table 2. Summary of EPA Method 6C/16A and 7E results from tests conducted at the combustor outlet at Cedar Hills Landfill on March 13-14, 1989.

Run #	Oxygen dry-%	Airflow dscf/min	TS dry-ppm	TS @ 7% O_2 dry-ppm	NO_x dry-ppm	NO_x @ 7% O_2 dry-ppm
1	14.8	4818.2	< 1	< 2	14	31.9
2	14.7	4915.8	< 1	< 2	17	38.1
3	14.9	4928.6	4	9	14	32.4
Avg.	14.8	4887.5	~2	~4	15	34.1

The results in Table 2 above are presented in parts per million (ppm) on a dry basis, uncorrected and corrected to 7% oxygen.

METHODS 1-4 & HCl - SUMMARY OF RESULTS
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME:	CHHCLSUM
CLIENT:	SWEET-EDWARDS/EMCON
LOCATION:	CEDAR HILLS LANDFILL
SAMPLE SITE:	FLARE OUTLET
OPERATORS:	HANSEN/LAWRENCE
CONTACT:	D. VONASEK

	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	903342	903343	903345	
DATE:	3/13/89	3/14/89	3/14/89	
START TIME:	13:42	07:38	11:12	
STOP TIME:	16:32	10:31	14:07	
SAMPLE TIME (Minutes):	180.0	180.0	180.0	
VOLUME SAMPLED (Cubic Feet):	**91.035**	**119.000**	**119.242**	**109.759**
VOLUME SAMPLED (Dry Std. Cubic Feet):	**85.855**	**113.391**	**113.164**	**104.137**
STACK GAS MOISTURE (Percent):	**6.24**	**6.15**	**5.15**	**5.85**
BAROMETRIC PRESURE (Inches of Hg):	29.62	29.70	29.72	29.68
STATIC PRESSURE (Inches of H2O):	0.00	0.00	0.00	0.00
STACK PRESSURE (Inches of Hg):	29.62	29.70	29.72	29.68
STACK TEMPERATURE (Degrees F.):	1252.0	1195.4	1214.4	1220.6
STACK TEMPERATURE (Degrees R.):	1712.0	1655.4	1674.4	1680.6
CARBON DIOXIDE (Percent):	5.1	4.7	4.9	4.9
OXYGEN (Percent):	14.8	14.7	14.9	14.8
CARBON MONOXIDE (ppm):	165	202	139	169
MOLECULAR WEIGHT (Dry, Lb/Lb-Mole):	29.41	29.34	29.38	29.38
MOLECULAR WEIGHT (Wet, Lb/Lb-Mole):	28.70	28.64	28.79	28.71
AVERAGE VELOCITY HEAD (Inches of H2O):	0.015	0.015	0.015	0.015
PITOT TUBE Cp:	0.845	0.845	0.845	
VELOCITY (Feet/Second):	12.56	12.34	12.38	12.43
STACK DIAMETER (Inches):	64.00	64.00	64.00	
STACK AREA (Square Feet):	22.340	22.340	22.340	
AIRFLOW (Dry Std. Cubic Feet per Min.):	4818.2	4915.8	4928.6	4887.5
AIRFLOW (Actual Cubic Feet per Min.):	16830.8	16543.3	16588.6	16654.2
CHLORIDE CONCENTRATION (mg/dscm):	< 0.13	< 0.05	< 0.07	< 0.08
CHLORIDE CONCENTRATION (ppm):	< 0.09	< 0.04	<0.05	< 0.06

VOLATILE ORGANIC COMPOUND DETERMINATION

Samples were analyzed at the inlet to the John Zink combustor by direct injection onto a field gas chromatograph equipped with a flame ionization detector (GC-FID). Inlet gas collected in Tedlar^{R} bags (3 runs) was analyzed in the Am Test Trace Organics laboratory using a GC equipped with a photoionization detector (PID), which quantifies purgeable hydrocarbons, and a HALL^{R} electrolytic detector, which quantifies halocarbon compounds (halogenated compounds e.g. fluorine, chlorine, bromine, etc.).

The outlet volatile organic sample train (VOST) samples collected on Tenax-GC and Tenax/charcoal sorbent traps were desorbed according to EPA Method 5040 procedures and analyzed using the instrumental conditions described in EPA Method 8240. The results from the inlet and outlet runs are discussed below and are summarized on the computer printouts on pages 12-21. These printouts are detailed listings of the compounds which were detected. The concentrations of each compound at the inlet and outlet, reported in units of micrograms per dry standard cubic meter (μg/dscm), are included for each compound present in levels above the detectable limit on pages 13 (inlet) and 14-15 (outlet). For mathematical purposes, if the calculated concentration value for a compound was less than the detection or quantification 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. If 1 or 2 of the values for the 3 runs is less than the detection limit, but the average is greater than the detection limit, then the average is presented as an approximation (~). Separate printouts of detection limits for the inlet and outlet samples in units of μg/dscm are included on pages 16 (inlet) and 17-18 (outlet). The mass emission rate for each compound at the inlet and outlet,

reported in units of milligrams per hour (mg/hr), are included on pages 19 (inlet) and 20-21 (outlet).

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 efficiencies for the compounds which were common to the analysis methods used at the inlet and outlet are reported on page 12 and are discussed below. Some compounds were found at the outlet of the combustor, but not at the inlet. Potentially some of the very volatile gases (e.g. chloromethane, vinyl chloride, etc.) could have escaped prior to analysis. In many cases those compounds found at the outlet only were close to the detection limit and their presence may be suspect (note those compounds found at the outlet with approximation marks). Compounds found at the outlet only may be products of incomplete combustion (PICS). Methylene chloride and toluene were found in concentrations higher than the calibration ranges at the inlet. Therefore, the percent destruction efficiency for these compounds is presented as an approximate value on the destruction efficiency summary sheet. High levels of both of these compounds were also found at the outlet of the combustor. The average combustor efficiency was approximately 98.0%. The average destruction efficiency excluding methylene chloride and toluene was 99.1%.

Destruction efficiencies were calculated based on the mass emission rate of each compound detected in milligrams per hour (mg/hr). For mathematical purposes, if the average value for 3 runs is less than the detection limit, the average is presented as < DL. If 1 or 2 of the values for the 3 runs is less than the detection limit, but the average is greater than the detection limit, then the average is

presented as an approximation (~), therefore, the destruction efficiency would also be presented as an approximation.

Many of the VOST sample tubes contained very high levels of acetone, toluene, benzene, and cumene. A separate standard containing those components was analyzed and a response factor was generated and used to quantify values above the normal calibration range. Some samples were over the 50 microgram standard, and were reported as greater than (>) the calculated value. Acetone and methylene chloride were found in the field blank and methylene chloride was found in the trip blank. Methylene chloride was also found in high levels in the inlet bags, indicating the methylene chloride did come from the landfill gas. The acetone levels found in Run 1, Set 1 were suspiciously high, probably due to contamination. The acetone values for run 1, set 1 were not used in the average for run 1. The Tenax portion of the lab blank was lost during analysis, as explained in the discussion section of Twin City Testing's report, which is included in the Appendix.

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

FILE NAME: CH2DESTR
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE SITE: Inlet/Outlet of John Zink Combustor
SAMPLE DATES: March 13-14, 1989

COMPOUNDS	Average Inlet Mass Rate mg/hr	Average Outlet Mass Rate mg/hr	Destruction Efficiency Percent
Chloromethane	< DL	3298.3	---
Vinyl Chloride	< DL	51.9	---
Bromomethane	< DL	~12.2	---
Chloroethane	< DL	< DL	---
Dichlorodifluoromethane	< DL	947.5	---
Trichlorofluoromethane	9913	~146.1	~98.53
1,1-Dichloroethylene	< DL	~7.4	---
Methylene Chloride	~46437	2052.7	~95.58
Trans-1,2-Dichloroethylene	713	~9.6	~98.65
1,1-Dichloroethane	7129	~10.9	~99.85
Chloroform	< DL	~8.3	---
1,1,1-Trichloroethane	817	~1.0	~99.88
Carbon Tetrachloride	< DL	~1.5	---
1,2-Dichloroethane	634	~7.7	~98.79
Trichloroethylene	11317	50.6	99.55
1,2-Dichloropropane	< DL	< DL	---
Dichlorobromomethane	< DL	< DL	---
Trans-1,3-Dichloropropene	< DL	< DL	---
Cis-1,3-Dichloropropene	< DL	< DL	---
1,1,2-Trichloroethane	< DL	< DL	---
Tetrachloroethylene	17618	~331.1	~98.12
Dibromochloromethane	< DL	< DL	---
Bromoform	< DL	< DL	---
1,1,2,2-Tetrachloroethane	< DL	< DL	---
Benzene	7090	226.7	96.80
Toluene	~123329	>13432.3	~89.11
Chlorobenzene	< DL	~45.5	---
Ethylbenzene	19328	~37.5	~99.81
m+p-Xylene*	31258	~8.6	~99.97
o-Xylene	8800	~11.7	~99.87
1,3-Dichlorobenzene	< DL	~14.7	---
1,4-Dichlorobenzene	< DL	~41.2	---
1,2-Dichlorobenzene	< DL	~9.5	---

* coeluted
< DL denotes that less than the detectable limit was found.
< DL is given the value of zero (0) for mathematical calculations.

EMISSION CONCENTRATION
VOLATILE ORGANIC COMPOUNDS IN AIR
EPA METHODS 601 & 602
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CH2INCON
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Inlet to John Zink Combustor
SAMPLE DATE: March 13-14, 1989

COMPOUNDS	Run 1 ug/m3	Run 2 ug/m3	Run 3 ug/m3	Average ug/m3
Chloromethane	< DL	< DL	< DL	< DL
Vinyl Chloride	< DL	< DL	< DL	< DL
Bromomethane	< DL	< DL	< DL	< DL
Chloroethane	< DL	< DL	< DL	< DL
Dichlorodifluoromethane	< DL	< DL	< DL	< DL
Trichlorofluoromethane	8000	12000	8000	9333
1,1-Dichloroethylene	< DL	< DL	< DL	< DL
Methylene Chloride*	40000	56000	35000	43667
Trans-1,2-Dichloroethylene	700	800	500	667
1,1-Dichloroethane	7000	8000	5000	6667
Chloroform	< DL	< DL	< DL	< DL
1,1,1-Trichloroethane	800	1000	500	767
Carbon Tetrachloride	< DL	< DL	< DL	< DL
1,2-Dichloroethane	400	800	600	600
Trichloroethylene	11000	15000	6000	10667
1,2-Dichloropropane	< DL	< DL	< DL	< DL
Bromodichloromethane	< DL	< DL	< DL	< DL
Trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
Cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Tetrachloroethylene	17000	25000	8000	16667
Chlorodibromomethane	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Benzene	7000	9000	4000	6667
Toluene*	118000	165000	66000	116333
Chlorobenzene	< DL	< DL	< DL	< DL
Ethylbenzene	19000	29000	7000	18333
m+p-Xylene	30000	47000	12000	29667
o-Xylene	9000	13000	3000	8333
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL

Note: m-Xylene and p-Xylene coelute

* Laboratory results were based on data that was more than 20% outside of the calibration range.

Note: < DL denotes that less than the detectable limit was found.
< DL is given the value of zero (0) for mathematical calculations.

EMISSION CONCENTRATION
VOLATILE ORGANIC COMPOUNDS IN AIR
GC/MS ANALYSIS - EPA METHOD 8240

FILE NAME: CH2-CONC
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989

COMPOUNDS	Run 1 Set 1 40 Min ug/m3	Run 1 Set 2 80 Min ug/m3	Run 1 Average ug/m3	Run 2 Set 1 40 Min ug/m3	Run 2 Set 2 80 Min ug/m3	Run 2 Average ug/m3	Run 3 Set 1 40 Min ug/m3	Run 3 Set 2 80 Min ug/m3	Run 3 Average ug/m3	Average Run 1-3 ug/m3
Dichlorodifluoromethane	114.7	108.7	111.7	183.3	85.9	134.6	75.0	118.8	96.9	114.4
Chloromethane	2206.7	85.5	1146.1	48.0	10.8	29.4	26.0	31.0	28.5	401.3
Bromomethane	< DL	4.7	-2.3	3.2	< DL	-1.6	< DL	1.0	-0.5	-1.5
Vinyl Chloride	8.0	9.1	8.6	6.7	5.1	5.9	4.2	4.5	4.4	6.3
Chloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Trichlorofluoromethane	< DL	< DL	< DL	4.6	28.4	16.5	31.2	41.0	36.1	-17.5
Ethyl Ether	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,1,2-Trichlorotrifluoroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Allyl Chloride	10.7	< DL	-5.3	< DL	< DL	< DL	< DL	< DL	< DL	-1.8
Methylene Chloride	1240.0	61.5	650.7	87.5	13.9	50.7	49.6	44.9	47.3	249.6
Acetone	>6666.7*	1383.0	-691.5	808.3	247.3	527.8	134.2	218.2	176.2	465.2
Carbon Disulfide	253.3	22.8	138.0	19.2	18.4	18.8	21.9	16.9	19.4	58.8
1,1-Dichloroethene	< DL	0.7	-0.4	< DL	0.5	-0.3	2.3	1.8	2.1	-0.9
1,1-Dichloroethane	< DL	< DL	< DL	< DL	< DL	< DL	4.2	3.7	4.0	-1.3
trans-1,2-Dichloroethene	1.9	1.0	1.5	< DL	1.5	-0.7	1.2	1.4	1.3	-1.2
Chloroform	< DL	< DL	< DL	< DL	< DL	< DL	3.3	2.7	3.0	-1.0
1,2-Dichloroethane	< DL	< DL	< DL	< DL	< DL	< DL	3.1	2.4	2.8	-0.9
2-Butanone (MEK)	5.3	< DL	-2.6	< DL	< DL	< DL	< DL	1.7	-0.9	-1.2
Tetrahydrofuran	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,1,1-Trichloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	0.7	-0.4	-0.1
Carbon Tetrachloride	< DL	< DL	< DL	< DL	< DL	< DL	1.1	< DL	-0.5	-0.2
Vinyl Acetate	16.0	18.5	17.3	2.4	1.1	1.7	9.5	26.5	18.0	12.3
1,1-Dichloro-1-propene	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Bromodichloromethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,2-Dichloropropane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
2,3-Dichloro-1-propene	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Dibromomethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Trichloroethene	6.7	2.6	4.6	1.9	4.3	3.1	5.0	16.1	10.6	6.1
Dibromochloromethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Benzene	70.7	13.3	42.0	10.4	10.6	10.5	20.0	39.6	29.8	27.4
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
cis-1,2-Dichloroethene	1.7	1.0	1.4	< DL	2.4	-1.2	2.9	8.2	5.5	-2.7
Bromoform	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,3-Dichloropropane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,2-Dibromoethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
2-Hexanone	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Tetrachloroethene	< DL	29.8	-14.9	7.1	19.0	13.1	33.8	149.0	91.4	-39.8
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Toluene	>4466.7	>1063.8	>2765.3	>2084.5	>981.8	>1533.2	134.6	>1027.6	>581.1	>1626.5
Chlorobenzene	6.7	14.0	10.4	< DL	0.7	-0.4	6.9	4.7	5.8	-5.51
Ethylbenzene	9.3	10.4	9.9	< DL	1.5	-0.8	1.0	4.9	3.0	-4.54

ug/m3 = micrograms of compound collected per dry standard cubic meter of gas sampled
* Acetone value for Run 1, Set 1 was high, probably due to contamination.

EMISSION CONCENTRATION
VOLATILE ORGANIC COMPOUNDS IN AIR
GC/MS ANALYSIS - EPA METHOD 8240

FILE NAME: CH2-CONC
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989

COMPOUNDS	Run 1 Set 1 40 Min ug/m3	Run 1 Set 2 80 Min ug/m3	Run 1 Average ug/m3	Run 2 Set 1 40 Min ug/m3	Run 2 Set 2 80 Min ug/m3	Run 2 Average ug/m3	Run 3 Set 1 40 Min ug/m3	Run 3 Set 2 80 Min ug/m3	Run 3 Average ug/m3	Average Run 1-3 ug/m3
1,1,1,2-Tetrachloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Cumene	106.7	3.0	54.8	4.3	0.6	2.5	< DL	1.4	~0.7	~19.3
1,2,3-Trichloropropane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Styrene	4.1	4.5	4.3	< DL	0.7	~0.3	< DL	1.9	~0.9	~1.9
m-/p-Xylene	3.5	2.1	2.8	< DL	0.7	~0.4	< DL	< DL	< DL	~1.0
o-Xylene	3.5	2.1	2.8	< DL	0.7	~0.4	< DL	2.2	~1.1	~1.4
Pentachloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	3.2	5.5	4.4	< DL	< DL	< DL	1.3	0.7	1.0	~1.8
1,4-Dichlorobenzene	< DL	7.0	~3.51	1.1	2.7	1.9	3.1	15.7	9.4	~5.0
1,2-Dichlorobenzene	< DL	4.0	~2.02	< DL	< DL	< DL	1.1	1.7	1.4	~1.2

ug/m3 = micrograms of compound collected per dry standard cubic meter of gas sampled

EMISSION CONCENTRATION
DETECTION LIMITS
VOLATILE ORGANIC COMPOUNDS IN AIR
EPA METHODS 601 & 602
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CH2INDLC
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Inlet to John Zink Combustor
SAMPLE DATE: March 13-14, 1989

COMPOUNDS	Run 1 ug/m3	Run 2 ug/m3	Run 3 ug/m3	Average ug/m3
Chloromethane	600	600	1000	733
Vinyl Chloride	600	600	1000	733
Bromomethane	600	600	1000	733
Chloroethane	600	600	1000	733
Dichlorodifluoromethane	600	600	1000	733
Trichlorofluoromethane	600	600	1000	733
1,1-Dichloroethylene	600	600	1000	733
Methylene Chloride*	600	600	1000	733
Trans-1,2-Dichloroethylene	300	300	500	367
1,1-Dichloroethane	300	300	500	367
Chloroform	300	300	500	367
1,1,1-Trichloroethane	300	300	500	367
Carbon Tetrachloride	300	300	500	367
1,2-Dichloroethane	300	300	500	367
Trichloroethylene	300	300	500	367
1,2-Dichloropropane	300	300	500	367
Bromodichloromethane	300	300	500	367
Trans-1,3-Dichloropropene	300	300	500	367
Cis-1,3-Dichloropropene	300	300	500	367
1,1,2-Trichloroethane	300	300	500	367
Tetrachloroethylene	300	300	500	367
Chlorodibromomethane	300	300	500	367
Bromoform	300	300	500	367
1,1,2,2-Tetrachloroethane	300	300	500	367
Benzene	300	300	500	367
Toluene*	300	300	500	367
Chlorobenzene	300	300	500	367
Ethylbenzene	300	300	500	367
m+p-Xylene	600	600	1000	733
o-Xylene	300	300	500	367
1,3-Dichlorobenzene	300	300	500	367
1,4-Dichlorobenzene	300	300	500	367
1,2-Dichlorobenzene	300	300	500	367

Note: m-Xylene and p-Xylene coelute

* Laboratory results were based on data that was more than 20% outside of the calibration range.

DETECTION LIMITS
VOLATILE ORGANIC COMPOUNDS IN AIR
GC/MS ANALYSIS - EPA METHOD 8240

FILE NAME: CH2DL-UG
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989

COMPOUNDS	Run 1 Set 1 40 Min ug/m3	Run 1 Set 2 80 Min ug/m3	Run 1 Average ug/m3	Run 2 Set 1 40 Min ug/m3	Run 2 Set 2 80 Min ug/m3	Run 2 Average ug/m3	Run 3 Set 1 40 Min ug/m3	Run 3 Set 2 80 Min ug/m3	Run 3 Average ug/m3	Average Run 1-3 ug/m3
Dichlorodifluoromethane	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Chloromethane	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Bromomethane	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Vinyl Chloride	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Chloroethane	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Trichlorofluoromethane	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Ethyl Ether	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
1,1,2-Trichlorotrifluoroethane	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Allyl Chloride	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Methylene Chloride	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Acetone	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Carbon Disulfide	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,1-Dichloroethene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,1-Dichloroethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
trans-1,2-Dichloroethene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Chloroform	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,2-Dichloroethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
2-Butanone (MEK)	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Tetrahydrofuran	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,1,1-Trichloroethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Carbon Tetrachloride	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Vinyl Acetate	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
1,1-Dichloro-1-propene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Bromodichloromethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,2-Dichloropropane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
2,3-Dichloro-1-propene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Dibromomethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
trans-1,3-Dichloropropene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Trichloroethene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Dibromochloromethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,1,2-Trichloroethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Benzene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
cis-1,3-Dichloropropene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
cis-1,2-Dichloroethene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Bromoform	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,3-Dichloropropane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,2-Dibromoethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
4-Methyl-2-Pentanone	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
2-Hexanone	6.67	2.13	4.40	4.17	1.96	3.06	3.85	2.04	2.94	3.47
Tetrachloroethene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,1,2,2-Tetrachloroethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Toluene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Chlorobenzene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Ethylbenzene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73

ug/m3 = micrograms of compound collected per dry standard cubic meter of gas sampled

DETECTION LIMITS
VOLATILE ORGANIC COMPOUNDS IN AIR
GC/MS ANALYSIS - EPA METHOD 8240

FILE NAME: CH2DL-UG
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989

COMPOUNDS	Run 1 Set 1 40 Min ug/m3	Run 1 Set 2 80 Min ug/m3	Run 1 Average ug/m3	Run 2 Set 1 40 Min ug/m3	Run 2 Set 2 80 Min ug/m3	Run 2 Average ug/m3	Run 3 Set 1 40 Min ug/m3	Run 3 Set 2 80 Min ug/m3	Run 3 Average ug/m3	Average Run 1-3 ug/m3
1,1,1,2-Tetrachloroethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Cumene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,2,3-Trichloropropane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Styrene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
m-/p-Xylene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
o-Xylene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
Pentachloroethane	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,3-Dichlorobenzene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,4-Dichlorobenzene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73
1,2-Dichlorobenzene	3.33	1.06	2.20	2.08	0.98	1.53	1.92	1.02	1.47	1.73

ug/m3 = micrograms of compound collected per dry standard cubic meter of gas sampled

EMISSION RATE FOR
VOLATILE ORGANIC COMPOUNDS IN AIR
EPA METHODS 601 & 602
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CH2INRAT
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Inlet to John Zink Combustor
SAMPLE DATE: March 13-14, 1989

COMPOUNDS	Run 1 mg/hr	Run 2 mg/hr	Run 3 mg/hr	Average mg/hr
Chloromethane	< DL	< DL	< DL	< DL
Vinyl Chloride	< DL	< DL	< DL	< DL
Bromomethane	< DL	< DL	< DL	< DL
Chloroethane	< DL	< DL	< DL	< DL
Dichlorodifluoromethane	< DL	< DL	< DL	< DL
Trichlorofluoromethane	9242	11739	8758	9913
1,1-Dichloroethylene	< DL	< DL	< DL	< DL
Methylene Chloride*	46211	54781	38318	46437
Trans-1,2-Dichloroethylene	809	783	547	713
1,1-Dichloroethane	8087	7826	5474	7129
Chloroform	< DL	< DL	< DL	< DL
1,1,1-Trichloroethane	924	978	547	817
Carbon Tetrachloride	< DL	< DL	< DL	< DL
1,2-Dichloroethane	462	783	657	634
Trichloroethylene	12708	14673	6569	11317
1,2-Dichloropropane	< DL	< DL	< DL	< DL
Bromodichloromethane	< DL	< DL	< DL	< DL
Trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
Cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Tetrachloroethylene	19640	24456	8758	17618
Chlorodibromomethane	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Benzene	8087	8804	4379	7090
Toluene*	136324	161408	72256	123329
Chlorobenzene	< DL	< DL	< DL	< DL
Ethylbenzene	21950	28369	7664	19328
m+p-Xylene	34659	45977	13138	31258
o-Xylene	10398	12717	3284	8800
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL

Note: m-Xylene and p-Xylene coelute

* Laboratory results were based on data that was more than 20% outside of the calibration range.

Note: < DL denotes that less than the detectable limit was found.
< DL is given the value of zero (0) for mathematical calculations.

MASS EMISSION RATE
VOLATILE ORGANIC COMPOUNDS IN AIR
GC/MS ANALYSIS - EPA METHOD 8240

FILE NAME: CH2-RATE
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989

COMPOUNDS	Run 1 Set 1 40 Min mg/hr	Run 1 Set 2 80 Min mg/hr	Run 1 Average mg/hr	Run 2 Set 1 40 Min mg/hr	Run 2 Set 2 80 Min mg/hr	Run 2 Average mg/hr	Run 3 Set 1 40 Min mg/hr	Run 3 Set 2 80 Min mg/hr	Run 3 Average mg/hr	Average Run 1-3 mg/hr
Dichlorodifluoromethane	941.7	898.3	920.0	1513.5	720.0	1116.8	621.5	990.1	805.8	947.5
Chloromethane	18122.6	706.7	9414.6	396.3	90.4	243.3	215.5	258.6	237.0	3298.3
Bromomethane	< DL	38.5	-19.2	26.1	< DL	-13.1	< DL	8.7	-4.3	-12.2
Vinyl Chloride	65.7	75.6	70.6	55.0	42.7	48.9	35.1	37.4	36.2	51.9
Chloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Trichlorofluoromethane	< DL	< DL	< DL	37.8	238.4	138.1	258.2	342.0	300.1	-146.1
Ethyl Ether	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,1,2-Trichlorotrifluoroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Allyl Chloride	87.6	< DL	-43.8	< DL	< DL	< DL	< DL	< DL	< DL	-14.6
Methylene Chloride	10183.7	508.0	5345.9	722.4	116.7	419.5	411.1	374.3	392.7	2052.7
Acetone	>54751*	11426.0	-5713.0	6673.3	2072.9	4373.1	1112.3	1818.7	1465.5	-3850.5
Carbon Disulfide	2080.5	188.1	1134.3	158.2	154.5	156.4	181.7	141.2	161.4	484.0
1,1-Dichloroethene	< DL	6.2	-3.1	< DL	4.3	-2.1	18.8	15.3	17.1	-7.4
1,1-Dichloroethane	< DL	< DL	< DL	< DL	< DL	< DL	35.1	30.6	32.8	-10.9
trans-1,2-Dichloroethene	15.9	8.4	12.2	< DL	12.2	-6.1	9.6	11.4	10.5	-9.6
Chloroform	< DL	< DL	< DL	< DL	< DL	< DL	27.7	22.1	24.9	-8.3
1,2-Dichloroethane	< DL	< DL	< DL	< DL	< DL	< DL	25.8	20.4	23.1	-7.7
2-Butanone (MEK)	43.3	< DL	-21.6	< DL	< DL	< DL	< DL	14.3	-7.1	-9.6
Tetrahydrofuran	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,1,1-Trichloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	6.0	-3.0	-1.0
Carbon Tetrachloride	< DL	< DL	< DL	< DL	< DL	< DL	8.9	< DL	-4.5	-1.5
Vinyl Acetate	131.4	152.9	142.2	19.6	8.9	14.2	78.4	221.0	149.7	102.0
1,1-Dichloro-1-propene	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Bromodichloromethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,2-Dichloropropane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
2,3-Dichloro-1-propene	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Dibromomethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Trichloroethene	54.8	21.1	37.9	15.8	36.2	26.0	41.4	134.4	87.9	50.6
Dibromochloromethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Benzene	580.4	110.0	345.2	86.0	88.8	87.4	165.4	329.7	247.6	226.7
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
cis-1,2-Dichloroethene	14.2	8.6	11.4	< DL	19.7	-9.9	23.9	68.1	46.0	-22.4
Bromoform	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,3-Dichloropropane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,2-Dibromoethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
2-Hexanone	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Tetrachloroethene	< DL	246.1	-123.0	58.5	159.5	109.0	280.5	1241.9	761.2	-331.1
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Toluene	>36683	>8789	>22736	>17209	>8231	>12720	1115.5	>8566	>4841	>13432
Chlorobenzene	54.8	116.0	85.4	< DL	5.9	-3.0	57.4	39.1	48.2	-45.5
Ethylbenzene	76.7	86.1	81.4	< DL	12.8	-6.4	8.6	40.8	24.7	-37.5

mg/hr = milligrams of compound emitted per hour of operation
* Acetone value for Run 1, Set 1 was high, probably due to contamination.

MASS EMISSION RATE
VOLATILE ORGANIC COMPOUNDS IN AIR
GC/MS ANALYSIS - EPA METHOD 8240

FILE NAME: CH2-RATE
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989

COMPOUNDS	Run 1 Set 1 40 Min mg/hr	Run 1 Set 2 80 Min mg/hr	Run 1 Average mg/hr	Run 2 Set 1 40 Min mg/hr	Run 2 Set 2 80 Min mg/hr	Run 2 Average mg/hr	Run 3 Set 1 40 Min mg/hr	Run 3 Set 2 80 Min mg/hr	Run 3 Average mg/hr	Average Run 1-3 mg/hr
1,1,1,2-Tetrachloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Cumene	876.0	24.6	450.3	35.4	5.4	20.4	< DL	12.1	-6.0	-158.9
1,2,3-Trichloropropane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Styrene	33.9	36.9	35.4	< DL	5.8	-2.9	< DL	15.7	-7.8	-15.4
m-/p-Xylene	28.5	17.1	22.8	< DL	5.9	-3.0	< DL	< DL	< DL	-8.6
o-Xylene	28.5	17.1	22.8	< DL	5.9	-3.0	< DL	18.7	-9.4	-11.7
Pentachloroethane	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	26.3	45.7	36.0	< DL	< DL	< DL	10.5	5.8	8.2	-14.7
1,4-Dichlorobenzene	< DL	58.0	-29.0	9.3	23.0	16.2	25.8	131.0	78.4	-41.2
1,2-Dichlorobenzene	< DL	33.4	-16.7	< DL	< DL	< DL	9.2	14.3	11.8	-9.5

mg/hr = milligrams of compound emitted per hour of operation

SEMI-VOLATILE ORGANIC COMPOUND DETERMINATION

The compounds of interest are semi-volatile organic compounds (i.e. species with boiling points above about 200° F). These compounds are defined by several terms which refer to the same general types of compounds. These terms are polyaromatic hydrocarbons (PAH), principal organic hazardous constituents (POHCs), and semi-volatile organic compounds (SOCs). For these tests, only PAHs, which are the base neutral compounds, were quantified. Particulate phase, vapor phase, and aqueous phase semi-volatile organic compounds were collected using an EPA semi-volatile organic sample train (semi-VOST) containing sorbent modules packed with XAD-2 resin which collects the vapor phase semi-volatile organic compounds. Analysis of the semi-volatile organic compounds was accomplished using gas chromatography/mass spectroscopy and EPA Method 8270 procedures. The sampling procedure for semi-VOST is EPA Method 0010 from SW-846.

The results from the laboratory were presented in units of total micrograms per sample. The laboratory results were converted to a concentration unit of micrograms per cubic meter ($\mu g/m^3$) for each run. The emission concentration results from the semi-VOST runs are discussed below and are summarized on pages 24-25. The individual runs are presented on pages 26-31 on computer printouts titled "Semi-Volatile Organic Compounds in Air". These printouts are detailed listings of the compounds which were detected and the calculated detection limits. The concentrations of each compound at the outlet, reported in mass emission rate units of milligrams per hour (mg/hr), are summarized on pages 32-33. The individual runs are presented on pages 34-39. The only compound found in the blanks was bis(2-ethylhexyl)phthalate, which was found in approximately the same levels in the samples. Phthalates are found in plastics, etc. and are common laboratory contaminants. The extract for Run 3, sample #890017 was spilled

during the extraction and 80% of the sample was lost. The extraction was completed on the remaining 20% of the sample, and surrogate recoveries were acceptable. Although the results for this run should be rejected, the results are included. Run 3 data is not included in the averages on the summary sheets.

SUMMARY SHEET
EMISSION CONCENTRATION BASE NEUTRAL-ACID EXTRACTABLE
SEMIVOLATILE ORGANIC COMPOUNDS IN AIR
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CHSUMCON
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989
LAB NUMBER(S): 890015-17 & 903342-45

COMPOUNDS	Run 1 ug/m3	Run 2 ug/m3	Run 3 ug/m3	Average ug/m3
Phenol	69.9	10.9	10.0	40.4
bis(-2-Chloroethyl)Ether	< DL	< DL	< DL	< DL
2-Chlorophenol	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	< DL	< DL	< DL	< DL
Benzyl Alcohol	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL
2-Methylphenol	< DL	< DL	< DL	< DL
bis(2-Chloroisopropyl)Ether	< DL	< DL	< DL	< DL
4-Methylphenol	< DL	< DL	< DL	< DL
N-Nitroso-Di-n-Propylamine	< DL	< DL	< DL	< DL
Hexachloroethane	< DL	< DL	< DL	< DL
Nitrobenzene	< DL	< DL	< DL	< DL
Isophorone	< DL	< DL	< DL	< DL
2-Nitrophenol	4.9	5.0	< DL	5.0
2,4-Dimethylphenol	< DL	< DL	< DL	< DL
Benzoic Acid	493.4	230.4	78.0	361.9
bid(2-Chloroethoxy)Methane	< DL	< DL	< DL	< DL
2,4-Dichlorophenol	< DL	< DL	< DL	< DL
1,2,4-Trichlorobenzene	< DL	< DL	< DL	< DL
Naphthalene	16.9	20.9	< DL	18.9
4-Chloroaniline	< DL	< DL	< DL	< DL
Hexachlorobutadiene	< DL	< DL	< DL	< DL
4-Chloro-3-Methylphenol	< DL	< DL	< DL	< DL
2-Methylnaphthalene	< DL	< DL	< DL	< DL
Hexachlorocyclopentadiene	< DL	< DL	< DL	< DL
2,4,6-Trichlorophenol	< DL	< DL	< DL	< DL
2,4,5-Trichlorophenol	< DL	< DL	< DL	< DL
2-Chloronaphthalene	< DL	< DL	< DL	< DL
2-Nitroaniline	< DL	< DL	< DL	< DL
Dimethyl Phthalate	< DL	< DL	< DL	< DL
Acenaphthylene	< DL	< DL	< DL	< DL
3-Nitroaniline	< DL	< DL	< DL	< DL
Acenaphthene	< DL	< DL	< DL	< DL
2,4-Dinitrophenol	< DL	< DL	< DL	< DL
4-Nitrophenol	< DL	< DL	< DL	< DL
Dibenzofuran	11.9	14.9	7.5	13.4
2,4-Dinitrotoluene	< DL	< DL	< DL	< DL

(Run 3 is not included in the average.)

continued...

FILE NAME: CHSUMCON
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989
LAB NUMBER(S): 890015-17 & 903342-45

COMPOUNDS	Run 1 ug/m3	Run 2 ug/m3	Run 3 ug/m3	Average ug/m3
2,6-Dinitrotoluene	< DL	< DL	< DL	< DL
Diethylphthalate	< DL	< DL	< DL	< DL
4-Chlorophenyl-phenylether	< DL	< DL	< DL	< DL
Fluorene	< DL	< DL	< DL	< DL
4-Nitroaniline	< DL	< DL	< DL	< DL
4,6-Dinitro-2-Methylphenol	< DL	< DL	< DL	< DL
N-Nitrosodiphenylamine	< DL	< DL	< DL	< DL
4-Bromophenyl-phenylether	< DL	< DL	< DL	< DL
Hexachlorobenzene	< DL	< DL	< DL	< DL
Pentachlorophenol	< DL	< DL	< DL	< DL
Phenanthrene	15.2	3.4	4.1	9.3
Anthracene	< DL	< DL	< DL	< DL
Di-n-Butylphthalate	< DL	< DL	< DL	< DL
Fluoranthene	< DL	< DL	< DL	< DL
Pyrene	< DL	< DL	< DL	< DL
Butylbenzylphthalate	< DL	< DL	< DL	< DL
3,3'-Dichlorobenzidine	< DL	< DL	< DL	< DL
Benzo(a)anthracene	< DL	< DL	< DL	< DL
bis(2-ethylhexyl)phthalate	5.3	3.7	< DL	4.5
Chrysene	< DL	< DL	< DL	< DL
Di-n-Octylphthalate	< DL	< DL	< DL	< DL
Benzo(b)fluoranthene	< DL	< DL	< DL	< DL
Benzo(k)fluoranthene	< DL	< DL	< DL	< DL
Benzo(a)pyrene	< DL	< DL	< DL	< DL
Indeno(1,2,3-cd)pyrene	< DL	< DL	< DL	< DL
Dibenz(a,h)anthracene	< DL	< DL	< DL	< DL
Benzo(g,h,i)perylene	< DL	< DL	< DL	< DL

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

ug/m3 = micrograms of compound collected per dry standard cubic meter of gas sampled.

Run 3 was spilled during the extraction for BNAs and 80% of the sample was lost. The extraction was completed on the remaining 20% of the sample. The results of this run should not be considered representative. (Run 3 is not included in the average.)

EMISSION CONCENTRATION
BASE NEUTRAL-ACID EXTRACTABLE
SEMIVOLATILE ORGANIC COMPOUNDS IN AIR
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CHR1CONC
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13, 1989
SAMPLE TIMES: 13:32-16:32
LAB NUMBER(S): 890015 & 903342

COMPOUNDS	Run 1 ug/m3	MDL Run 1 ug/m3
Phenol	69.9	4.1
bis(-2-Chloroethyl)Ether	< DL	4.1
2-Chlorophenol	< DL	4.1
1,3-Dichlorobenzene	< DL	4.1
1,4-Dichlorobenzene	< DL	4.1
Benzyl Alcohol	< DL	4.1
1,2-Dichlorobenzene	< DL	4.1
2-Methylphenol	< DL	4.1
bis(2-Chloroisopropyl)Ether	< DL	4.1
4-Methylphenol	< DL	4.1
N-Nitroso-Di-n-Propylamine	< DL	4.1
Hexachloroethane	< DL	4.1
Nitrobenzene	< DL	4.1
Isophorone	< DL	4.1
2-Nitrophenol	4.9	4.1
2,4-Dimethylphenol	< DL	4.1
Benzoic Acid	493.4	20.6
bid(2-Chloroethoxy)Methane	< DL	4.1
2,4-Dichlorophenol	< DL	4.1
1,2,4-Trichlorobenzene	< DL	4.1
Naphthalene	16.9	4.1
4-Chloroaniline	< DL	4.1
Hexachlorobutadiene	< DL	4.1
4-Chloro-3-Methylphenol	< DL	4.1
2-Methylnaphthalene	< DL	4.1
Hexachlorocyclopentadiene	< DL	4.1
2,4,6-Trichlorophenol	< DL	4.1
2,4,5-Trichlorophenol	< DL	20.6
2-Chloronaphthalene	< DL	4.1
2-Nitroaniline	< DL	20.6
Dimethyl Phthalate	< DL	4.1
Acenaphthylene	< DL	4.1
3-Nitroaniline	< DL	20.6
Acenaphthene	< DL	4.1
2,4-Dinitrophenol	< DL	20.6
4-Nitrophenol	< DL	20.6
Dibenzofuran	11.9	4.1
2,4-Dinitrotoluene	< DL	4.1

continued...

FILE NAME: CHR1CONC
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13, 1989
SAMPLE TIMES: 13:32-16:32
LAB NUMBER(S): 890015 & 903342

COMPOUNDS	Run 1 ug/m3	MDL Run 1 ug/m3
2,6-Dinitrotoluene	< DL	4.1
Diethylphthalate	< DL	4.1
4-Chlorophenyl-phenylether	< DL	4.1
Fluorene	< DL	4.1
4-Nitroaniline	< DL	20.6
4,6-Dinitro-2-Methylphenol	< DL	20.6
N-Nitrosodiphenylamine	< DL	4.1
4-Bromophenyl-phenylether	< DL	4.1
Hexachlorobenzene	< DL	4.1
Pentachlorophenol	< DL	20.6
Phenanthrene	15.2	4.1
Anthracene	< DL	4.1
Di-n-Butylphthalate	< DL	4.1
Fluoranthene	< DL	4.1
Pyrene	< DL	4.1
Butylbenzylphthalate	< DL	4.1
3,3'-Dichlorobenzidine	< DL	8.2
Benzo(a)anthracene	< DL	4.1
bis(2-ethylhexyl)phthalate	5.3	4.1
Chrysene	< DL	4.1
Di-n-Octylphthalate	< DL	4.1
Benzo(b)fluoranthene	< DL	4.1
Benzo(k)fluoranthene	< DL	4.1
Benzo(a)pyrene	< DL	4.1
Indeno(1,2,3-cd)pyrene	< DL	4.1
Dibenz(a,h)anthracene	< DL	4.1
Benzo(g,h,i)perylene	< DL	4.1

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

ug/m3 = micrograms of compound collected per dry standard cubic meter of gas sampled.

EMISSION CONCENTRATION
BASE NEUTRAL-ACID EXTRACTABLE
SEMIVOLATILE ORGANIC COMPOUNDS IN AIR
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CHR2CONC
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 14, 1989
SAMPLE TIMES: 07:38-10:31
LAB NUMBER(S): 890016 & 903343

COMPOUNDS	Run 2 ug/m3	MDL Run 2 ug/m3
Phenol	10.9	3.1
bis(-2-Chloroethyl)Ether	< DL	3.1
2-Chlorophenol	< DL	3.1
1,3-Dichlorobenzene	< DL	3.1
1,4-Dichlorobenzene	< DL	3.1
Benzyl Alcohol	< DL	3.1
1,2-Dichlorobenzene	< DL	3.1
2-Methylphenol	< DL	3.1
bis(2-Chloroisopropyl)Ether	< DL	3.1
4-Methylphenol	< DL	3.1
N-Nitroso-Di-n-Propylamine	< DL	3.1
Hexachloroethane	< DL	3.1
Nitrobenzene	< DL	3.1
Isophorone	< DL	3.1
2-Nitrophenol	5.0	3.1
2,4-Dimethylphenol	< DL	3.1
Benzoic Acid	230.4	15.6
bid(2-Chloroethoxy)Methane	< DL	3.1
2,4-Dichlorophenol	< DL	3.1
1,2,4-Trichlorobenzene	< DL	3.1
Naphthalene	20.9	3.1
4-Chloroaniline	< DL	3.1
Hexachlorobutadiene	< DL	3.1
4-Chloro-3-Methylphenol	< DL	3.1
2-Methylnaphthalene	< DL	3.1
Hexachlorocyclopentadiene	< DL	3.1
2,4,6-Trichlorophenol	< DL	3.1
2,4,5-Trichlorophenol	< DL	15.6
2-Chloronaphthalene	< DL	3.1
2-Nitroaniline	< DL	15.6
Dimethyl Phthalate	< DL	3.1
Acenaphthylene	< DL	3.1
3-Nitroaniline	< DL	15.6
Acenaphthene	< DL	3.1
2,4-Dinitrophenol	< DL	15.6
4-Nitrophenol	< DL	15.6
Dibenzofuran	14.9	3.1
2,4-Dinitrotoluene	< DL	3.1

continued...

FILE NAME: CHR2CONC
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 14, 1989
SAMPLE TIMES: 07:38-10:31
LAB NUMBER(S): 890016 & 903343

COMPOUNDS	Run 2 ug/m3	MDL Run 2 ug/m3
2,6-Dinitrotoluene	< DL	3.1
Diethylphthalate	< DL	3.1
4-Chlorophenyl-phenylether	< DL	3.1
Fluorene	< DL	3.1
4-Nitroaniline	< DL	15.6
4,6-Dinitro-2-Methylphenol	< DL	15.6
N-Nitrosodiphenylamine	< DL	3.1
4-Bromophenyl-phenylether	< DL	3.1
Hexachlorobenzene	< DL	3.1
Pentachlorophenol	< DL	15.6
Phenanthrene	3.4	3.1
Anthracene	< DL	3.1
Di-n-Butylphthalate	< DL	3.1
Fluoranthene	< DL	3.1
Pyrene	< DL	3.1
Butylbenzylphthalate	< DL	3.1
3,3'-Dichlorobenzidine	< DL	6.2
Benzo(a)anthracene	< DL	3.1
bis(2-ethylhexyl)phthalate	3.7	3.1
Chrysene	< DL	3.1
Di-n-Octylphthalate	< DL	3.1
Benzo(b)fluoranthene	< DL	3.1
Benzo(k)fluoranthene	< DL	3.1
Benzo(a)pyrene	< DL	3.1
Indeno(1,2,3-cd)pyrene	< DL	3.1
Dibenz(a,h)anthracene	< DL	3.1
Benzo(g,h,i)perylene	< DL	3.1

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

ug/m3 = micrograms of compound collected per dry standard cubic meter of gas sampled.

EMISSION CONCENTRATION
BASE NEUTRAL-ACID EXTRACTABLE
SEMIVOLATILE ORGANIC COMPOUNDS IN AIR
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CHR3CONC
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 14, 1989
SAMPLE TIMES: 11:12-14:07
LAB NUMBER(S): 890017 & 903345

COMPOUNDS	Run 3 ug/m3	MDL Run 3 ug/m3
Phenol	10.0	3.1
bis(-2-Chloroethyl)Ether	< DL	3.1
2-Chlorophenol	< DL	3.1
1,3-Dichlorobenzene	< DL	3.1
1,4-Dichlorobenzene	< DL	3.1
Benzyl Alcohol	< DL	3.1
1,2-Dichlorobenzene	< DL	3.1
2-Methylphenol	< DL	3.1
bis(2-Chloroisopropyl)Ether	< DL	3.1
4-Methylphenol	< DL	3.1
N-Nitroso-Di-n-Propylamine	< DL	3.1
Hexachloroethane	< DL	3.1
Nitrobenzene	< DL	3.1
Isophorone	< DL	3.1
2-Nitrophenol	< DL	3.1
2,4-Dimethylphenol	< DL	3.1
Benzoic Acid	78.0	15.6
bid(2-Chloroethoxy)Methane	< DL	3.1
2,4-Dichlorophenol	< DL	3.1
1,2,4-Trichlorobenzene	< DL	3.1
Naphthalene	< DL	3.1
4-Chloroaniline	< DL	3.1
Hexachlorobutadiene	< DL	3.1
4-Chloro-3-Methylphenol	< DL	3.1
2-Methylnaphthalene	< DL	3.1
Hexachlorocyclopentadiene	< DL	3.1
2,4,6-Trichlorophenol	< DL	3.1
2,4,5-Trichlorophenol	< DL	15.6
2-Chloronaphthalene	< DL	3.1
2-Nitroaniline	< DL	15.6
Dimethyl Phthalate	< DL	3.1
Acenaphthylene	< DL	3.1
3-Nitroaniline	< DL	15.6
Acenaphthene	< DL	3.1
2,4-Dinitrophenol	< DL	15.6
4-Nitrophenol	< DL	15.6
Dibenzofuran	7.5	3.1
2,4-Dinitrotoluene	< DL	3.1

continued...

FILE NAME: CHR3CONC
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 14, 1989
SAMPLE TIMES: 11:12-14:07
LAB NUMBER(S): 890017 & 903345

COMPOUNDS	Run 3 ug/m3	MDL Run 3 ug/m3
2,6-Dinitrotoluene	< DL	3.1
Diethylphthalate	< DL	3.1
4-Chlorophenyl-phenylether	< DL	3.1
Fluorene	< DL	3.1
4-Nitroaniline	< DL	15.6
4,6-Dinitro-2-Methylphenol	< DL	15.6
N-Nitrosodiphenylamine	< DL	3.1
4-Bromophenyl-phenylether	< DL	3.1
Hexachlorobenzene	< DL	3.1
Pentachlorophenol	< DL	15.6
Phenanthrene	4.1	3.1
Anthracene	< DL	3.1
Di-n-Butylphthalate	< DL	3.1
Fluoranthene	< DL	3.1
Pyrene	< DL	3.1
Butylbenzylphthalate	< DL	3.1
3,3'-Dichlorobenzidine	< DL	6.2
Benzo(a)anthracene	< DL	3.1
bis(2-ethylhexyl)phthalate	< DL	3.1
Chrysene	< DL	3.1
Di-n-Octylphthalate	< DL	3.1
Benzo(b)fluoranthene	< DL	3.1
Benzo(k)fluoranthene	< DL	3.1
Benzo(a)pyrene	< DL	3.1
Indeno(1,2,3-cd)pyrene	< DL	3.1
Dibenz(a,h)anthracene	< DL	3.1
Benzo(g,h,i)perylene	< DL	3.1

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

ug/m3 = micrograms of compound collected per dry standard cubic meter of gas sampled.

Run 3 was spilled during the extraction for BNAs and 80% of the sample was lost. The extraction was completed on the remaining 20% of the sample. The results for this run should not be considered as representative.

SUMMARY SHEET
EMISSION RATE OF BASE NEUTRAL-ACID EXTRACTABLE
SEMIVOLATILE ORGANIC COMPOUNDS IN AIR
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CHSUMRAT
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989
LAB NUMBER(S): 890015-17 & 903342-45

COMPOUNDS	Run 1 ug/hr	Run 2 ug/hr	Run 3 ug/hr	Average ug/hr
Phenol	572	91	84	332
bis(-2-Chloroethyl)Ether	< DL	< DL	< DL	< DL
2-Chlorophenol	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	< DL	< DL	< DL	< DL
Benzyl Alcohol	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL
2-Methylphenol	< DL	< DL	< DL	< DL
bis(2-Chloroisopropyl)Ether	< DL	< DL	< DL	< DL
4-Methylphenol	< DL	< DL	< DL	< DL
N-Nitroso-Di-n-Propylamine	< DL	< DL	< DL	< DL
Hexachloroethane	< DL	< DL	< DL	< DL
Nitrobenzene	< DL	< DL	< DL	< DL
Isophorone	< DL	< DL	< DL	< DL
2-Nitrophenol	40	42	< DL	41
2,4-Dimethylphenol	< DL	< DL	< DL	< DL
Benzoic Acid	4041	1925	653	2983
bid(2-Chloroethoxy)Methane	< DL	< DL	< DL	< DL
2,4-Dichlorophenol	< DL	< DL	< DL	< DL
1,2,4-Trichlorobenzene	< DL	< DL	< DL	< DL
Naphthalene	138	174	< DL	156
4-Chloroaniline	< DL	< DL	< DL	< DL
Hexachlorobutadiene	< DL	< DL	< DL	< DL
4-Chloro-3-Methylphenol	< DL	< DL	< DL	< DL
2-Methylnaphthalene	< DL	< DL	< DL	< DL
Hexachlorocyclopentadiene	< DL	< DL	< DL	< DL
2,4,6-Trichlorophenol	< DL	< DL	< DL	< DL
2,4,5-Trichlorophenol	< DL	< DL	< DL	< DL
2-Chloronaphthalene	< DL	< DL	< DL	< DL
2-Nitroaniline	< DL	< DL	< DL	< DL
Dimethyl Phthalate	< DL	< DL	< DL	< DL
Acenaphthylene	< DL	< DL	< DL	< DL
3-Nitroaniline	< DL	< DL	< DL	< DL
Acenaphthene	< DL	< DL	< DL	< DL
2,4-Dinitrophenol	< DL	< DL	< DL	< DL
4-Nitrophenol	< DL	< DL	< DL	< DL
Dibenzofuran	98	125	63	111
2,4-Dinitrotoluene	< DL	< DL	< DL	< DL

(Run 3 is not included in the average)

FILE NAME: CHSUMRAT
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13-14, 1989
LAB NUMBER(S): 890015-17 & 903342-45

COMPOUNDS	Run 1 ug/hr	Run 2 ug/hr	Run 3 ug/hr	Average ug/hr
2,6-Dinitrotoluene	< DL	< DL	< DL	< DL
Diethylphthalate	< DL	< DL	< DL	< DL
4-Chlorophenyl-phenylether	< DL	< DL	< DL	< DL
Fluorene	< DL	< DL	< DL	< DL
4-Nitroaniline	< DL	< DL	< DL	< DL
4,6-Dinitro-2-Methylphenol	< DL	< DL	< DL	< DL
N-Nitrosodiphenylamine	< DL	< DL	< DL	< DL
4-Bromophenyl-phenylether	< DL	< DL	< DL	< DL
Hexachlorobenzene	< DL	< DL	< DL	< DL
Pentachlorophenol	< DL	< DL	< DL	< DL
Phenanthrene	125	29	34	77
Anthracene	< DL	< DL	< DL	< DL
Di-n-Butylphthalate	< DL	< DL	< DL	< DL
Fluoranthene	< DL	< DL	< DL	< DL
Pyrene	< DL	< DL	< DL	< DL
Butylbenzylphthalate	< DL	< DL	< DL	< DL
3,3'-Dichlorobenzidine	< DL	< DL	< DL	< DL
Benzo(a)anthracene	< DL	< DL	< DL	< DL
bis(2-ethylhexyl)phthalate	44	31	< DL	38
Chrysene	< DL	< DL	< DL	< DL
Di-n-Octylphthalate	< DL	< DL	< DL	< DL
Benzo(b)fluoranthene	< DL	< DL	< DL	< DL
Benzo(k)fluoranthene	< DL	< DL	< DL	< DL
Benzo(a)pyrene	< DL	< DL	< DL	< DL
Indeno(1,2,3-cd)pyrene	< DL	< DL	< DL	< DL
Dibenz(a,h)anthracene	< DL	< DL	< DL	< DL
Benzo(g,h,i)perylene	< DL	< DL	< DL	< DL

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

ug/hr = micrograms of compound emitted per hour of operation

Run 3 was spilled during the extraction for BNAs and 80% of the sample was lost. The extraction was completed on the remaining 20% of the sample. The results of this run should not be considered representative. (Run 3 is not included in the average.)

MASS EMISSION RATE
BASE NEUTRAL-ACID EXTRACTABLE
SEMIVOLATILE ORGANIC COMPOUNDS IN AIR
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CHR1RATE
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13, 1989
LAB NUMBER(S): 890015 & 903342

COMPOUNDS	Run 1 ug/hr	MDL Run 1 ug/hr
Phenol	572.4	33.7
bis(-2-Chloroethyl)Ether	< DL	33.7
2-Chlorophenol	< DL	33.7
1,3-Dichlorobenzene	< DL	33.7
1,4-Dichlorobenzene	< DL	33.7
Benzyl Alcohol	< DL	33.7
1,2-Dichlorobenzene	< DL	33.7
2-Methylphenol	< DL	33.7
bis(2-Chloroisopropyl)Ether	< DL	33.7
4-Methylphenol	< DL	33.7
N-Nitroso-Di-n-Propylamine	< DL	33.7
Hexachloroethane	< DL	33.7
Nitrobenzene	< DL	33.7
Isophorone	< DL	33.7
2-Nitrophenol	40.4	33.7
2,4-Dimethylphenol	< DL	33.7
Benzoic Acid	4040.7	168.4
bid(2-Chloroethoxy)Methane	< DL	33.7
2,4-Dichlorophenol	< DL	33.7
1,2,4-Trichlorobenzene	< DL	33.7
Naphthalene	138.1	33.7
4-Chloroaniline	< DL	33.7
Hexachlorobutadiene	< DL	33.7
4-Chloro-3-Methylphenol	< DL	33.7
2-Methylnaphthalene	< DL	33.7
Hexachlorocyclopentadiene	< DL	33.7
2,4,6-Trichlorophenol	< DL	33.7
2,4,5-Trichlorophenol	< DL	168.4
2-Chloronaphthalene	< DL	33.7
2-Nitroaniline	< DL	168.4
Dimethyl Phthalate	< DL	33.7
Acenaphthylene	< DL	33.7
3-Nitroaniline	< DL	168.4
Acenaphthene	< DL	33.7
2,4-Dinitrophenol	< DL	168.4
4-Nitrophenol	< DL	168.4
Dibenzofuran	97.6	33.7
2,4-Dinitrotoluene	< DL	33.7

continued...

FILE NAME: CHR1RATE
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 13, 1989
LAB NUMBER(S): 890015 & 903342

COMPOUNDS	Run 1 ug/hr	MDL Run 1 ug/hr
2,6-Dinitrotoluene	< DL	33.7
Diethylphthalate	< DL	33.7
4-Chlorophenyl-phenylether	< DL	33.7
Fluorene	< DL	33.7
4-Nitroaniline	< DL	168.4
4,6-Dinitro-2-Methylphenol	< DL	168.4
N-Nitrosodiphenylamine	< DL	33.7
4-Bromophenyl-phenylether	< DL	33.7
Hexachlorobenzene	< DL	33.7
Pentachlorophenol	< DL	168.4
Phenanthrene	124.6	33.7
Anthracene	< DL	33.7
Di-n-Butylphthalate	< DL	33.7
Fluoranthene	< DL	33.7
Pyrene	< DL	33.7
Butylbenzylphthalate	< DL	33.7
3,3'-Dichlorobenzidine	< DL	67.3
Benzo(a)anthracene	< DL	33.7
bis(2-ethylhexyl)phthalate	43.8	33.7
Chrysene	< DL	33.7
Di-n-Octylphthalate	< DL	33.7
Benzo(b)fluoranthene	< DL	33.7
Benzo(k)fluoranthene	< DL	33.7
Benzo(a)pyrene	< DL	33.7
Indeno(1,2,3-cd)pyrene	< DL	33.7
Dibenz(a,h)anthracene	< DL	33.7
Benzo(g,h,i)perylene	< DL	33.7

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

ug/hr = micrograms of compound emitted per hour of operation

MASS EMISSION RATE
BASE NEUTRAL-ACID EXTRACTABLE
SEMIVOLATILE ORGANIC COMPOUNDS IN AIR
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CHR2RATE
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 14, 1989
LAB NUMBER(S): 890016 & 903343

COMPOUNDS	Run 2 ug/hr	MDL Run 2 ug/hr
Phenol	91.0	26.0
bis(-2-Chloroethyl)Ether	< DL	26.0
2-Chlorophenol	< DL	26.0
1,3-Dichlorobenzene	< DL	26.0
1,4-Dichlorobenzene	< DL	26.0
Benzyl Alcohol	< DL	26.0
1,2-Dichlorobenzene	< DL	26.0
2-Methylphenol	< DL	26.0
bis(2-Chloroisopropyl)Ether	< DL	26.0
4-Methylphenol	< DL	26.0
N-Nitroso-Di-n-Propylamine	< DL	26.0
Hexachloroethane	< DL	26.0
Nitrobenzene	< DL	26.0
Isophorone	< DL	26.0
2-Nitrophenol	41.6	26.0
2,4-Dimethylphenol	< DL	26.0
Benzoic Acid	1924.9	130.1
bid(2-Chloroethoxy)Methane	< DL	26.0
2,4-Dichlorophenol	< DL	26.0
1,2,4-Trichlorobenzene	< DL	26.0
Naphthalene	174.3	26.0
4-Chloroaniline	< DL	26.0
Hexachlorobutadiene	< DL	26.0
4-Chloro-3-Methylphenol	< DL	26.0
2-Methylnaphthalene	< DL	26.0
Hexachlorocyclopentadiene	< DL	26.0
2,4,6-Trichlorophenol	< DL	26.0
2,4,5-Trichlorophenol	< DL	130.1
2-Chloronaphthalene	< DL	26.0
2-Nitroaniline	< DL	130.1
Dimethyl Phthalate	< DL	26.0
Acenaphthylene	< DL	26.0
3-Nitroaniline	< DL	130.1
Acenaphthene	< DL	26.0
2,4-Dinitrophenol	< DL	130.1
4-Nitrophenol	< DL	130.1
Dibenzofuran	124.9	26.0
2,4-Dinitrotoluene	< DL	26.0

continued...

FILE NAME: CHR2RATE
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 14, 1989
LAB NUMBER(S): 890016 & 903343

COMPOUNDS	Run 2 ug/hr	MDL Run 2 ug/hr
2,6-Dinitrotoluene	< DL	26.0
Diethylphthalate	< DL	26.0
4-Chlorophenyl-phenylether	< DL	26.0
Fluorene	< DL	26.0
4-Nitroaniline	< DL	130.1
4,6-Dinitro-2-Methylphenol	< DL	130.1
N-Nitrosodiphenylamine	< DL	26.0
4-Bromophenyl-phenylether	< DL	26.0
Hexachlorobenzene	< DL	26.0
Pentachlorophenol	< DL	130.1
Phenanthrene	28.6	26.0
Anthracene	< DL	26.0
Di-n-Butylphthalate	< DL	26.0
Fluoranthene	< DL	26.0
Pyrene	< DL	26.0
Butylbenzylphthalate	< DL	26.0
3,3'-Dichlorobenzidine	< DL	52.0
Benzo(a)anthracene	< DL	26.0
bis(2-ethylhexyl)phthalate	31.2	26.0
Chrysene	< DL	26.0
Di-n-Octylphthalate	< DL	26.0
Benzo(b)fluoranthene	< DL	26.0
Benzo(k)fluoranthene	< DL	26.0
Benzo(a)pyrene	< DL	26.0
Indeno(1,2,3-cd)pyrene	< DL	26.0
Dibenz(a,h)anthracene	< DL	26.0
Benzo(g,h,i)perylene	< DL	26.0

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

ug/hr = micrograms of compound emitted per hour of operation

MASS EMISSION RATE
BASE NEUTRAL-ACID EXTRACTABLE
SEMIVOLATILE ORGANIC COMPOUNDS IN AIR
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: CHR3RATE
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 14, 1989
LAB NUMBER(S): 890017 & 903345

COMPOUNDS	Run 3 ug/hr	MDL Run 3 ug/hr
Phenol	83.6	26.1
bis(-2-Chloroethyl)Ether	< DL	26.1
2-Chlorophenol	< DL	26.1
1,3-Dichlorobenzene	< DL	26.1
1,4-Dichlorobenzene	< DL	26.1
Benzyl Alcohol	< DL	26.1
1,2-Dichlorobenzene	< DL	26.1
2-Methylphenol	< DL	26.1
bis(2-Chloroisopropyl)Ether	< DL	26.1
4-Methylphenol	< DL	26.1
N-Nitroso-Di-n-Propylamine	< DL	26.1
Hexachloroethane	< DL	26.1
Nitrobenzene	< DL	26.1
Isophorone	< DL	26.1
2-Nitrophenol	< DL	26.1
2,4-Dimethylphenol	< DL	26.1
Benzoic Acid	653.3	130.7
bid(2-Chloroethoxy)Methane	< DL	26.1
2,4-Dichlorophenol	< DL	26.1
1,2,4-Trichlorobenzene	< DL	26.1
Naphthalene	< DL	26.1
4-Chloroaniline	< DL	26.1
Hexachlorobutadiene	< DL	26.1
4-Chloro-3-Methylphenol	< DL	26.1
2-Methylnaphthalene	< DL	26.1
Hexachlorocyclopentadiene	< DL	26.1
2,4,6-Trichlorophenol	< DL	26.1
2,4,5-Trichlorophenol	< DL	130.7
2-Chloronaphthalene	< DL	26.1
2-Nitroaniline	< DL	130.7
Dimethyl Phthalate	< DL	26.1
Acenaphthylene	< DL	26.1
3-Nitroaniline	< DL	130.7
Acenaphthene	< DL	26.1
2,4-Dinitrophenol	< DL	130.7
4-Nitrophenol	< DL	130.7
Dibenzofuran	62.7	26.1
2,4-Dinitrotoluene	< DL	26.1

continued...

FILE NAME: CHR3RATE
CLIENT: Sweet-Edwards/EMCON, Inc.
LOCATION: Cedar Hills Landfill
SAMPLE LOCATION: Flare Outlet
SAMPLE DATE: March 14, 1989
LAB NUMBER(S): 890017 & 903345

COMPOUNDS	Run 3 ug/hr	MDL Run 3 ug/hr
2,6-Dinitrotoluene	< DL	26.1
Diethylphthalate	< DL	26.1
4-Chlorophenyl-phenylether	< DL	26.1
Fluorene	< DL	26.1
4-Nitroaniline	< DL	130.7
4,6-Dinitro-2-Methylphenol	< DL	130.7
N-Nitrosodiphenylamine	< DL	26.1
4-Bromophenyl-phenylether	< DL	26.1
Hexachlorobenzene	< DL	26.1
Pentachlorophenol	34.0	130.7
Phenanthrene	< DL	26.1
Anthracene	< DL	26.1
Di-n-Butylphthalate	< DL	26.1
Fluoranthene	< DL	26.1
Pyrene	< DL	26.1
Butylbenzylphthalate	< DL	26.1
3,3'-Dichlorobenzidine	< DL	52.3
Benzo(a)anthracene	< DL	26.1
bis(2-ethylhexyl)phthalate	< DL	26.1
Chrysene	< DL	26.1
Di-n-Octylphthalate	< DL	26.1
Benzo(b)fluoranthene	< DL	26.1
Benzo(k)fluoranthene	< DL	26.1
Benzo(a)pyrene	< DL	26.1
Indeno(1,2,3-cd)pyrene	< DL	26.1
Dibenz(a,h)anthracene	< DL	26.1
Benzo(g,h,i)perylene	< DL	26.1

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

ug/hr = micrograms of compound emitted per hour of operation

Run 3 was spilled during the extraction for BNAs and 80% of the sample was lost. The extraction was completed on the remaining 20% of the sample. The results for this run should not be considered as representative.

METHODOLOGY REFERENCES

Sampling procedures specified in the July 1, 1988 Title 40 Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, Methods 1-5, 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. Sampling and analysis methods used for PAH determinations are detailed in the U.S. EPA document titled Test Methods for Evaluating Solid Waste, SW-846, 3rd Edition, November 1986. Method 0010 is the specific method for the semi-volatile organic sample train (semi-VOST). Method 0030 is the specific method for the Volatile Organic Sampling Train (VOST).

SAMPLING PROCEDURES

Methods 1-2 - Velocity Traverses

The inlet gas flows through 7 inch (I.D.) circular ducts which have taps available to draw gas samples. A KURZ digital velometer, which is NBS traceable, was used to monitor the temperature and velocity of the inlet gas. The outlet stack is 64 inches in diameter (inside diameter) with one (1) sample port available 3 feet upstream and approximately 15 feet downstream from the nearest flow disturbance. A point of average velocity was determined in the stack per Method 1 and 2 criteria (40 CFR 60, July 1, 1988) using calibrated "S" type pitot tubes. Temperature was monitored using thermocouple probes connected to a digital thermocouple indicator.

Method 3 and 3A - Gas Analysis

The inlet and outlet gas was sampled to determine 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. Sample lines were connected to the meter box used to collect the moisture/HCl/semi-VOST sample at the outlet to monitor the combustion gas continuously during each test. Samples of inlet gas were collected in multilayer bags during each run for analysis. The results of these combustion gas analyses were utilized to calculate the molecular weight of the gas.

Method 4 - Moisture Determination

The moisture of content of the inlet gas was approximated using psychrometry. The moisture content of the outlet gas stream was measured using EPA Method 4. The deionized, distilled water used in the impinger section of the semi-VOST sample train was recovered and analyzed for hydrochloric acid using a titrametric method. The Method 4 moisture sample train was assembled and determined to be leak free following the procedures outlined in Method 5. Ice was added to the condenser section. 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 during each semi-VOST test. Three (3) Method 4/HCl sample runs were performed at the combustor outlet.

EPA Method 6C, 7E and 16A

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 VOST and semi-VOST test period and 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 VOST and semi-VOST test and 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 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.

Volatile Organic Compounds Determination

Volatile Organic Sample Train (VOST) sampling was performed to quantify volatile organic compounds in air by absorbing and concentrating samples in two (2) sorbent modules packed with approximately 1.6 grams Tenax (front cartridge), and 1 gram each of Tenax and petroleum based charcoal (back cartridge), 3:1 by volume. The purpose of the charcoal on the downstream side of the Tenax-GC resin is to capture any very volatile organic compounds which may pass through the Tenax. The tubes were prepared by Twin City Testing of St. Paul, Minnesota. They were thermally conditioned in accordance with the VOST methodology. Several tubes were analyzed prior to sending the lot into the field to verify the quality assurance procedures used during the preparation of the Tenax and charcoal. The tubes were capped until they were used, and they were capped immediately after sample collection and refrigerated until they were analyzed. Four (4) sorbent modules were collected during each run. Each run was collected over a two (2) hour period, with the tubes being switched after 40 minutes into the run and replaced with fresh tubes upon which sample was collected for the remaining 80 minutes of the run. A set of field blanks was exposed to ambient air for the amount of time it takes to switch tubes during a run. A set of transport blanks which did not have the end caps removed, accompanied the tubes to and from the laboratory to demonstrate that there was no contamination of the samples during shipment.

The glassware which was used in the VOST was washed, sulfuric acid rinsed (if necessary), distilled, deionized water rinsed, baked, and the ends were capped with

glass plugs and stoppers prior to use. The sample train was assembled and leak checked prior to the start of each run. The sample probe was positioned in the stack at a point of average velocity. The sample pump was started and the sampling rate was adjusted to a rate of 0.5 liters per minute. Each sample run consisted of two (2) sample sets, a 40 minute set and an 80 minute set. Upon completion of each test (two (2) hour runs), a post-test leak check was performed according to VOST procedures. After collecting a sample, the sorbent modules were sealed and packed in an ice chest with blue ice for shipment to Twin City Testing in St. Paul, Minnesota.

The volatile organic compound and light hydrocarbon sampling at the inlet site was performed by collecting samples in Tedlar^{R} bags which were submitted to the Am Test laboratory for analysis. Additional samples were collected in Tedlar^{R} bags and analyzed using a Hewlett-Packard 5890 gas chromatograph with a flame ionization detector. Methane and C_2-C_4 compounds were measured using the FID.

Semi-Volatile Organic Compounds Determination

Prior to arriving at the job site, all sample train components from the first impinger forward were rigorously cleaned to avoid organic contamination. Am Test does not use silicon grease with the glassware which was utilized in these sample trains, which helps reduce the chances of contamination from previous use. All glassware and sample train components were washed with non-ionic detergent and hot water, rinsed thoroughly with hot tap water, rinsed several times with deionized water, rinsed with reagent grade acetone, and baked for 2 hours at >500° F. Prior to use, the glassware was given a final rinse with distilled in glass methylene chloride (CH_2Cl_2). All openings where contamination could occur were

kept covered with clean ground glass stoppers and plugs, or with heavy duty aluminum foil which had been rinsed with CH_2Cl_2 prior to and after use.

The glass sorbent cartridges and end caps were cleaned and prepared by Twin City Testing according to procedures specified in the reference methods. One (1) XAD-2 cartridge was kept by the laboratory as a lab blank. The remaining 5 modules were sent to Am Test, Inc. Three (3) of the modules were used for collecting the actual test runs. One (1) module was opened in the field to expose the ends for the time it takes to assemble and disassemble the sample train. The ends were replaced and the module was labeled as the field blank. One (1) module remained in the container which was used to store the modules and was not opened. The unexposed module was labeled as the transport blank.

Stack condition measurements were made prior to starting the first sample run. Measurements of pressure, temperature, and a range of velocity heads in the stack, and a check for cyclonic flow were made. A sample nozzle was selected and isokinetic operating parameters were established. The stainless steel sample nozzle, quartz probe liner and prefilter connective glassware were cleaned and rinsed with carbon free water and distilled in glass methylene chloride prior to assembling the sample train. All openings where contamination could occur were kept covered with pre-cleaned aluminum foil or capped with ground glass plugs and sockets until just prior to sampling, and immediately after the samples were collected. The semi-VOST sample train was assembled and determined to be leak free following the procedures in Method 5. Under no circumstance was silicon stopcock grease used to facilitate passing the leak test. Before each sample run a final check was made to assure that the process was operating at the desired production rate and the desired operating parameters. A final check was made of the sample box and

probe heat. Ice was added to the condenser section and a submersible pump was turned on to pump icewater through the coil condenser which was mounted vertically atop the sorbent module and through the water-cooled jacket of each sorbent module. The purpose of the icewater condenser is to lower the sample gas temperature to below 68° F so the semi-volatile organic compounds of interest stay trapped in the resin. The temperature at the lower end of the sorbent module was monitored during each test with a flexible thermocouple sensor.

To begin a sample run, the sample nozzle was positioned in the stack, the sample pump was started and the sampling rate was adjusted for isokinetic sampling. The samples were collected at a point of average velocity in the stack. The samples were collected over a three (3) hour period to collect a large enough sample volume to get acceptable detection limits. A leak check was performed prior to the start of the test. Upon completion of each test, the probe was removed from the stack and a post-test leak check was performed according to Method 5 procedures. Post-test leak check procedures included a check through the filter at 15" Hg (or at the maximum vacuum during the run), and a check through the nozzle at 1" Hg. Three (3) semi-VOST sample runs were collected for quantifying the emissions of polynuclear aromatic hydrocarbons (PAHs) from this source.

SAMPLE TRAINS

EPA Method 6C, 7E and 16A

The Method 6C and 7E sample trains are illustrated in Figures 1 and 2 in the Appendix 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, which corresponded to the VOST tests.

Volatile Organic Sample Train (VOST)

The Volatile Organic Sample Train (VOST) used for collecting volatile organic compounds at the outlet is an EPA Method 5 design with modifications. A schematic of the sampling system is illustrated in Figure 3, which is included in the Appendix. A 321 stainless steel probe sheath equipped with a heated liner was used for pulling a sample from the stack. A thermocouple sensor connected to a Fluke digital thermocouple indicator was used to measure the stack gas temperature. All glassware utilized in the sample train was cleaned, rinsed with organic-free water and baked at 500° F for 2 hours prior to use. Once the gas passed through the probe liner, it entered an ice water cooled condenser to cool the gas to below 20° C, followed by a sorbent module packed with Tenax resin. The sorbent module was connected in series with an empty bubbler and a second condenser and sorbent module containing Tenax and charcoal, 3:1 by volume. The purpose of the charcoal at the backhalf of the second module is to collect any very volatile compounds which readily break through a Tenax trap. The gas exits the second sorbent module and enters a bubbler containing indicating silica gel desiccant. The temperature of the gas at the entrance to the first sorbent module was periodically monitored with a thermocouple sensor. 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 diaphragm 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.

Semi-Volatile Organic Compounds Determination

The sample train which was used for quantifying moisture, hydrochloric acid (HCl) and polyaromatic hydrocarbons was a semi-volatile organic sample train (semi-VOST), which is an EPA Method 5 design as illustrated in Figure 4 in the Appendix. The appropriate stainless steel button hook nozzle for collecting isokinetic samples was selected and measured on-site with digital inside calipers which have a readability of 0.001 inch. The nozzle was attached to a a heated quartz probe liner which was used to draw a sample from the gas stream. The probe temperature was monitored to assure that condensation did not occur within the probe liner. The probe liner was housed inside a stainless steel probe sheath. Attached to the probe sheath were "S" type pitot tubes which were used to obtain velocity readings, and a thermocouple probe to monitor the stack gas temperature. The thermocouple was attached to the probe and connected to a multichannel Fluke^{R} digital thermocouple indicator. The probe was attached to a glass filter assembly with a stainless steel filter support and Teflon gasket, containing a previously muffled 90 millimeter Whatman QM-A ultrapure microfiber quartz filter. The filter was enclosed in a temperature controlled heated sample box. The average sample box temperature surrounding the filter was maintained at a temperature of 248 $\pm$ 25° F. Once the gas had passed the quartz fiber filter, it entered an ice water-cooled coil condenser which cooled the gas stream to a temperature below 68° F before it entered a sorbent module packed with XAD-2 resin. The sorbent module has a water-cooled jacket surrounding the resin to further cool the gas and assure that the semi-volatile compounds of interest remain trapped in the resin. The water-cooled coil condenser and sorbent module were mounted vertically atop the first impinger of the sample train. The first impinger is modified with a short stem and acts as a condensate knockout trap. The condensate percolates through the sorbent resin module for subsequent collection

for organic analysis. The temperature at the outlet of the sorbent resin module was monitored with a flexible thermocouple probe which was inserted in a well in the bottom of the sorbent module to assure that the temperature remained below 68° F throughout the test period. At the downstream side of the sorbent module, four impingers were connected in series and immersed in an ice water bath. The first impinger, or condensate knockout, was connected to the outlet of the sorbent module, and collected any condensate which percolated through the sorbent module. The second impinger was a modified Greenburg-Smith bubbler which contained 100 milliliters of ASTM Type II water for scrubbing hydrochloric acid (HCl) from the gas stream. The third impinger contained water for condensing HCl, the fourth impinger was empty, and the fifth bubbler contained indicating silica gel desiccant to absorb any moisture from the stack gas before it entered the control box. The back-half section was maintained at a temperature below 68° F by keeping the impingers cooled in an ice water bath. The temperature at the outlet of the silica gel bubbler was monitored to assure that the temperature of the condenser section did not exceed 68° F during a test. The sample box 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 and to facilitate isokinetic sampling. 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 are 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 spirometer. At the outlet of the dry gas meter is a calibrated orifice which is used

to monitor the flow of gas through the metering system to assure that samples are collected isokinetically. The pressure drop across the orifice was monitored with both low and high range magnehelic gauges. The pitot tubes utilized to measure stack gas velocity were connected to the control box via the umbilical cord. The control box contains low and high range magnehelic gauges which are used for the velocity measurement.

The vapor phase semi-volatile compounds of interest were adsorbed in sorbent modules containing XAD-2 resin. The sorbent traps were prepared and analyzed by Twin City Testing, in St. Paul, Minnesota. The sorbent modules for PAH determinations contained Amberlite^{R} XAD-2 resin. XAD-2 is a porous polymer resin with high surface area which has the capability of adsorbing a broad range of organic species. The sorbent is expected to give efficient collection of vapor phase organic materials with boiling points greater than approximately 200° F. The sorbent modules Am Test utilizes are constructed of borosilicate glass with a ball joint on one end and a socket joint on the other end. The resin is held in place with plugs of glass wool which have been solvent extracted and oven-dried. The sample analysis section of this report details the post-test handling of the sorbent modules.

SAMPLE CLEAN-UP AND ANALYSIS

Volatile Organic Compound Determination

Analysis of the sorbent traps was accomplished by desorbing each tube separately according to EPA Method 5040 procedures. The tubes were analyzed using EPA Method 8240 (purge and trap) for volatile organic compounds. The sorbent traps were thermally desorbed onto a water trap prepared with purgeable organic-free water. Then the sample is purged into a concentrator tube containing Tenax, silica gel, and charcoal. The flow is reversed and the sample is sent to the gas chromatograph/mass spectrophotometer (GC/MS). Figure 5, which is included in the Appendix, is a schematic of the sorbent trap desorption apparatus. The VOST tubes were analyzed by Twin City Testing based in St. Paul, Minnesota. The data from the GC/MS is computer generated and lists the concentrations of each compound of interest. Twin City's full report is included in the Appendix, including a discussion of the results.

Semi-Volatile Organic Compounds Determination

Following sample collection, the semi-VOST sample train was transferred to a temporary laboratory at the job site. The nozzle and probe were disconnected from the sample box and the ends were capped. Any particulate matter collected on the outside of the probe was wiped off before cleaning the inside of the probe liner. The filter holder was also disconnected and the ends were capped. The contents of the nozzle, quartz probe liner and prefilter glassware were quantitatively transferred to a labeled glass sample container. Several rinses with distilled in glass methylene chloride (dichloromethane - CH_2Cl_2) from a Teflon squeeze bottle, with simultaneous loosening of particulate matter using a clean nylon and stainless steel brush attached to a Teflon line, were used for the front-half clean-up. An

iodine flask with a female ball joint end was attached to the male ball joint end of the probe to assure that no liquid was lost during the cleaning of the probe. The probe rinses were transferred to a labeled glass sample container with a Teflon lined lid and the liquid level was noted by drawing a line on the outside of the jar with felt pen. The contents of this front-half rinse were solvent extracted for subsequent organic analysis.

The quartz filter was removed from the filter assembly and transferred to a labeled glass sample container with a Teflon lined lid. In the laboratory, the filters were solvent extracted for subsequent organic analysis. The back-half of the filter holder and the pre-sorbent module connecting glassware, including the coil condenser, were rinsed with distilled in glass CH_2Cl_2 into a labeled glass sample container. The contents of the condensate knockout trap (first impinger) were transferred to the container holding the back-half rinse, and rinsed with methylene chloride into the same container and the liquid level was noted. The solution was shipped to the contract laboratory for subsequent extraction and analysis. The contents of the second impinger, containing Type II water, and the contents of the third impinger containing water, were quantitatively transferred to a glass graduated cylinder using Type II water and the liquid level was recorded. The solution was transferred to a labeled sample container and submitted to Am Test's water chemistry laboratory for hydrochloric acid (HCl) analysis using a titrametric method.

Immediately upon completion of a test, the labeled sorbent module containing XAD-2 resin was capped with ground glass plugs and stoppers, wrapped in pre-cleaned aluminum foil, and refrigerated until their contents were extracted and analyzed.

The particulate phase, vapor phase, and aqueous phase fractions from each semi-VOST test were each extracted and their extracts were combined for concentration in a Kuderna-Danish (K-D) apparatus. The concentrate was analyzed for PAHs utilizing gas chromatography/mass spectroscopy (GC/MS).

QUALITY ASSURANCE

A strict quality assurance program was followed throughout preparation, sampling, analysis, and data reduction. This program includes recent equipment calibrations, careful chain-of-custody procedures, use of ACS quality or better reagents, analysis of control samples, and "by-hand" calculation checks of computerized results. Field, trip and laboratory blank samples, determination of recovery by spiking samples with surrogates, and analysis of calibration standards were incorporated into the laboratory quality control procedures.

The dry gas meters used to measure the volume of gas sampled have been recently calibrated using a spirometer at the Washington State Department of Ecology (DOE). The S-type pitot tubes utilized for velocity determination have been recently calibrated using a wind tunnel and standard P-type pitot tube at the DOE laboratory. The Fluke thermocouple indicators used for temperature measurement have a readability of 1 degree Fahrenheit and have been recently certified by the manufacturer for their accuracy. The Thommen barometer used to obtain barometric pressure readings has a readability of 0.02 inches of mercury.

In addition to quantitative clean-up and analysis procedures, reagent, deionized, distilled water, and sorbent blanks were carried throughout the analysis procedures. Trip blanks, which were never exposed to ambient air or stack gas were sent along with the sorbent traps in the container they were shipped in. Upon return to the laboratory, they were analyzed to determine whether there was any contamination of the samples during shipping. A field blank set which was carried to the site had the end caps removed for the time it takes to set up the sample train. The field blank was analyzed to determine if there was any contribution of VOCs from

ambient air. A laboratory blank which remained at Twin City Testing in St. Paul, Minnesota was also analyzed. A solvent blank was prepared by pouring 100 milliliters of methylene chloride into a glass jar identical to the jars used for condensate rinses.

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. A certification for each cylinder used is provided in the Appendix. Purified nitrogen was utilized for the zero gas. Additional information with respect to the Am Test, Inc. laboratory quality assurance protocol is included in the Appendix of this report.

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 the Appendix. Standard conditions are 68° F and 29.92 inches of mercury. The laboratory results were converted to concentration units of micrograms per dry standard cubic meter (*u*g/dscm). Oxygen and carbon dioxide are reported on a percent basis. Carbon monoxide is reported on a parts per million basis.

The results from each run are presented along with an average for the series of three (3) runs. The detection limits for each compound are presented on the original laboratory printouts from Twin City Testing. If the total micrograms for a specific compound were found in levels less than the detection limit, it was presented as ND (not detected) on Twin City's printouts. Am Test's printout of results in micrograms per dry standard cubic meter (*u*g/dscm) present ND values as less than the detection limit (< DL), and that value was included in the average as 0. If the average value for 3 runs is less than the detection limit, the average is presented as < DL. If 1 or 2 of the values for the 3 runs is less than the DL, but the average is greater than the DL, then the average is presented as an approximation (~).

Results from the inlet organic testing were calculated in accordance with 40 CFR 44, Method 601, 602 equations. Final result calculations and report preparation were performed using Hewlett-Packard Vectra computer systems. By-hand sample calculations of computerized results were performed to verify computer program integrity and are included in the Appendix.

METHOD 1-4 RESULTS
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: A:\CH2-IN-1
CLIENT: SWEET-EDWARDS/EMCON
LOCATION: CEDAR HILLS LANDFILL
SAMPLE SITE: INLET TO FLARE
SAMPLE DATE: MARCH 13, 1989
RUN #: 1 - TEDLAR BAG
OPERATORS: HANSEN/BLAISDELL/LAWRENCE
CONTACT: D. VONASEK

PITOT Cp:	NA	PERCENT MOISTURE:	4.3
STACK DIA. INCHES:	7.0	Bws:	0.043
STACK AREA FT^2:	0.267	AVERAGE % CO2:	30.6
BAROM. PRES. "HG:	29.62	AVERAGE % O2:	2.6
STATIC PRES. "H2O:	18.5	AVERAGE PPM CO:	0
STACK PRES. "HG:	30.98	STACK GAS MW. DRY:	33.00
ORIFICE PRES "H2O:	0.00	STACK GAS MW. WET:	32.36
METER PRES. "HG:	29.62		

SAMPLE POINT	VELOCITY FT/MIN	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY FT/MIN	TEMPERATURE DEGREES F.
Single	2330	119.5	Single	3270	112.2
Point	2330	119.5	Point	3270	112.2

STACK TEMPERATURE:	115.9 DEGREES F	575.9	DEGREES R
STACK GAS VELOCITY:		2800	FT/MIN
STACK GAS AIR FLOW:	748.3 ACF/MIN	679.9	DSCF/MIN

METHOD 1-4 RESULTS
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: A:\CH2-IN-2
CLIENT: SWEET-EDWARDS/EMCON
LOCATION: CEDAR HILLS LANDFILL
SAMPLE SITE: INLET TO FLARE
SAMPLE DATE: MARCH 14, 1989
RUN #: 2 - TEDLAR BAG
OPERATORS: HANSEN/BLAISDELL/LAWRENCE
CONTACT: D. VONASEK

PITOT Cp:	NA	PERCENT MOISTURE:	4.3
STACK DIA. INCHES:	7.0	Bws:	0.043
STACK AREA FT^2:	0.267	AVERAGE % CO2:	30.6
BAROM. PRES. "HG:	29.70	AVERAGE % O2:	2.6
STATIC PRES. "H2O:	18.5	AVERAGE PPM CO:	0
STACK PRES. "HG:	31.06	STACK GAS MW. DRY:	33.00
ORIFICE PRES "H2O:	0.00	STACK GAS MW. WET:	32.36
METER PRES. "HG:	29.70		

SAMPLE POINT	VELOCITY FT/MIN	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY FT/MIN	TEMPERATURE DEGREES F.
Single Point	2400	110.9	Single Point	2310	111.4
	2420	110.6		2380	111.4
	2440	110.6		2360	111.0
	2400	110.6		2330	111.4
	2360	111.0		2340	111.7
	2330	111.0		2330	111.2
	2350	111.5		2320	111.3
	2360	111.0		2280	111.6
	2330	111.0		2340	112.0
	2250	111.0		2340	112.0
	2390	111.4		2330	112.3
	2330	111.4		2340	112.0
	2280	111.5		2360	112.0

STACK TEMPERATURE:	111.3 DEGREES F	571.3 DEGREES R
STACK GAS VELOCITY:		2346 FT/MIN
STACK GAS AIR FLOW:	627.0 ACF/MIN	575.7 DSCF/MIN

METHOD 1-4 RESULTS
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME: A:\CH2-IN-3
CLIENT: SWEET-EDWARDS/EMCON
LOCATION: CEDAR HILLS LANDFILL
SAMPLE SITE: INLET TO FLARE
SAMPLE DATE: MARCH 14, 1989
RUN #: 3 - TEDLAR BAG
OPERATORS: HANSEN/BLAISDELL/LAWRENCE
CONTACT: D. VONASEK

PITOT Cp:	NA	PERCENT MOISTURE:	4.3
STACK DIA. INCHES:	7.0	Bws:	0.043
STACK AREA FT^2:	0.267	AVERAGE % CO2:	30.6
BAROM. PRES. "HG:	29.72	AVERAGE % O2:	2.6
STATIC PRES. "H2O:	18.5	AVERAGE PPM CO:	0
STACK PRES. "HG:	31.08	STACK GAS MW. DRY:	33.00
ORIFICE PRES "H2O:	0.00	STACK GAS MW. WET:	32.36
METER PRES. "HG:	29.72		

SAMPLE POINT	VELOCITY FT/MIN	TEMP. ° F	SAMPLE POINT	VELOCITY FT/MIN	TEMP. ° F
Single Point	2320	112.6	Single Point	2830	114.2
	2360	112.9		2810	114.2
	2320	112.8		2810	114.5
	2320	113.4		2780	114.6
	2330	113.4		2700	114.9
	2320	113.7		2800	115.7
	2350	114.0		2780	115.6
	2320	114.0		2810	115.7
	2340	114.2		2790	115.7
	2400	114.2		2810	115.9
	2450	114.4		2800	115.5
	2400	115.6		2800	115.5
	2440	115.6		2810	115.6
	2770	114.5		2790	116.5
	2830	114.5		2780	116.7
	2810	114.2		2820	117.1
	2820	114.5		2810	117.2
	2810	114.2		2810	117.7

STACK TEMPERATURE:	114.9 DEGREES F	574.9 DEGREES R
STACK GAS VELOCITY:		2640 FT/MIN
STACK GAS AIR FLOW:	705.6 ACF/MIN	644.3 DSCF/MIN

VOLATILE ORGANIC SAMPLE TRAIN (VOST)
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME:	A:\2CHVOST1
CLIENT:	SWEET-EDWARDS/EMCON
LOCATION:	CEDAR HILLS LANDFILL
SAMPLE SITE:	FLARE OUTLET
SAMPLE DATE:	MARCH 13, 1989
RUN #:	1-VOST
OPERATORS:	K. HANSEN/R. LAWRENCE
CONTACT:	D. VONASEK

PITOT Cp:	0.85	PERCENT MOISTURE:	6
STACK DIA. INCHES:	64.0	Bws:	0.06
STACK AREA FT^2:	22.340	AVERAGE % CO2:	5.1
BAROM. PRES. "HG:	29.62	AVERAGE % O2:	14.8
STATIC PRES. "H2O:	0.00	AVERAGE ppm CO:	165
STACK PRES. "HG:	29.62	STACK GAS MW. DRY:	29.41
ORIFICE PRES "H2O:	0.00	STACK GAS MW. WET:	28.68
METER PRES. "HG:	29.62		

FIRST SORBENT TRAP SET		SECOND SORBENT TRAP SET	
START TIME:	13:40	START TIME:	15:10
STOP TIME:	14:20	STOP TIME:	16:25
METER TEMP. DEG F:	57.6	METER TEMP. DEG F:	55.7
INIT. METER VOLUME	624.309	INIT. METER VOLUME	625.132
FINAL METER VOLUME	624.835	FINAL METER VOLUME	626.764
VOLUME SAMPLED:	0.526	VOLUME SAMPLED:	1.632
STD VOLUME (DSCF):	0.532	STD VOLUME (DSCF):	1.657
STD VOLUME (DSCM):	0.015	STD VOLUME (DSCM):	0.047
Y FACTOR:	1.002	Y FACTOR:	1.002

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
Single Point	0.015	1226	Single Point	0.015	1227
	0.015	1233		0.015	1225
	0.015	1282		0.015	1219
	0.015	1288		0.015	1240
	0.015	1280		0.015	1253
	0.015	1256		0.015	1242
	0.015	1245		0.015	1241
	0.015	1284		0.015	1208
	0.015	1223		0.015	1280
	0.015	1242		0.015	1201
	0.015	1276		0.015	1204
	0.015	1257		0.015	1203

STACK TEMPERATURE:	1243.1	DEGREES F	1703.1	DEGREES R
AVERAGE VELOCITY HEAD:	0.015	" OF H2O		
STACK GAS VELOCITY:			12.60	FT/SEC
STACK GAS AIR FLOW:	16890.1	ACF/MIN	4854.6	DSCF/MIN

VOLATILE ORGANIC SAMPLE TRAIN (VOST)
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME:	A:\2CHVOST2
CLIENT:	SWEET-EDWARDS/EMCON
LOCATION:	CEDAR HILLS LANDFILL
SAMPLE SITE:	FLARE OUTLET
SAMPLE DATE:	MARCH 14, 1989
RUN #:	2-VOST
OPERATORS:	K. HANSEN/R. LAWRENCE
CONTACT:	D. VONASEK

PITOT Cp:	0.85	PERCENT MOISTURE:	6
STACK DIA. INCHES:	64.0	Bws:	0.06
STACK AREA FT^2:	22.340	AVERAGE % CO2:	4.7
BAROM. PRES. "HG:	29.70	AVERAGE % O2:	14.7
STATIC PRES. "H2O:	0.00	AVERAGE ppm CO:	202
STACK PRES. "HG:	29.70	STACK GAS MW. DRY:	29.34
ORIFICE PRES "H2O:	0.00	STACK GAS MW. WET:	28.64
METER PRES. "HG:	29.70		

FIRST SORBENT TRAP SET		SECOND SORBENT TRAP SET	
START TIME:	07:40	START TIME:	08:35
STOP TIME:	08:20	STOP TIME:	09:50
METER TEMP. DEG F:	45.1	METER TEMP. DEG F:	49.2
INIT. METER VOLUME	626.778	INIT. METER VOLUME	627.630
FINAL METER VOLUME	627.609	FINAL METER VOLUME	629.383
VOLUME SAMPLED:	0.831	VOLUME SAMPLED:	1.753
STD VOLUME (DSCF):	0.864	STD VOLUME (DSCF):	1.808
STD VOLUME (DSCM):	0.024	STD VOLUME (DSCM):	0.051
Y FACTOR:	1.002	Y FACTOR:	1.002

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
Single	0.015	1142	Single	0.015	1176
Point	0.015	1181	Point	0.015	1189
	0.015	1183		0.015	1225
	0.015	1174		0.015	1220
	0.015	1162		0.015	1228
	0.015	1154		0.015	1206
	0.015	1155		0.015	1239
	0.015	1154		0.015	1219
	0.015	1160		0.015	1239
	0.015	1157		0.015	1233
	0.015	1174		0.015	1211
	0.015	1173		0.015	1211

STACK TEMPERATURE:	1190.2 DEGREES F	1650.2	DEGREES R
AVERAGE VELOCITY HEAD:	0.015 " OF H2O		
STACK GAS VELOCITY:		12.40	FT/SEC
STACK GAS AIR FLOW:	16614.5 ACF/MIN	4953.4	DSCF/MIN

VOLATILE ORGANIC SAMPLE TRAIN (VOST)
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME:	A:\2CHVOST3
CLIENT:	SWEET-EDWARDS/EMCON
LOCATION:	CEDAR HILLS LANDFILL
SAMPLE SITE:	FLARE OUTLET
SAMPLE DATE:	MARCH 14, 1989
RUN #:	3-VOST
OPERATORS:	K. HANSEN/R. LAWRENCE
CONTACT:	D. VONASEK

PITOT Cp:	0.85	PERCENT MOISTURE:	5
STACK DIA. INCHES:	64.0	Bws:	0.05
STACK AREA FT^2:	22.340	AVERAGE % CO2:	4.9
BAROM. PRES. "HG:	29.72	AVERAGE % O2:	14.9
STATIC PRES. "H2O:	0.00	AVERAGE ppm CO:	139
STACK PRES. "HG:	29.72	STACK GAS MW. DRY:	29.38
ORIFICE PRES "H2O:	0.00	STACK GAS MW. WET:	28.80
METER PRES. "HG:	29.72		

FIRST SORBENT TRAP SET		SECOND SORBENT TRAP SET	
START TIME:	11:10	START TIME:	12:02
STOP TIME:	11:50	STOP TIME:	13:22
METER TEMP. DEG F:	51.5	METER TEMP. DEG F:	53.9
INIT. METER VOLUME	629.394	INIT. METER VOLUME	630.308
FINAL METER VOLUME	630.301	FINAL METER VOLUME	632.015
VOLUME SAMPLED:	0.907	VOLUME SAMPLED:	1.707
STD VOLUME (DSCF):	0.932	STD VOLUME (DSCF):	1.746
STD VOLUME (DSCM):	0.026	STD VOLUME (DSCM):	0.049
Y FACTOR:	1.002	Y FACTOR:	1.002

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
Single Point	0.015	1200	Single Point	0.015	1281
	0.015	1195		0.015	1264
	0.015	1188		0.015	1216
	0.015	1201		0.015	1201
	0.015	1204		0.015	1207
	0.015	1169		0.015	1217
	0.015	1205		0.015	1228
	0.015	1202		0.015	1239
	0.015	1258		0.015	1207
	0.015	1220		0.015	1215
	0.015	1267		0.015	1201
	0.015	1286		0.015	1201

STACK TEMPERATURE:	1219.7 DEGREES F	1679.7 DEGREES R
AVERAGE VELOCITY HEAD:	0.015 " OF H2O	
STACK GAS VELOCITY:		12.47 FT/SEC
STACK GAS AIR FLOW:	16712.4 ACF/MIN	4950.7 DSCF/MIN

METHOD 1-5 - PARTICULATE EMISSION CONCENTRATION RESULTS
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME:	CHPAHCL1	LAB #:	903342
CLIENT:	SWEET EDWARDS/EMCON	START TIME:	13:32 O'CLOCK
LOCATION:	CEDAR HILLS LANDFILL	STOP TIME:	16:32 O'CLOCK
SAMPLE SITE:	FLARE OUTLET	SAMPLE TIME:	180.0 MINUTES
SAMPLE DATE:	MARCH 13, 1989		
RUN #:	1-METHOD 5/PAH/HCl		
OPERATORS:	HANSEN/LAWRENCE		
CONTACT:	D. VONASEK		

FINAL WT. OF H2O G.	INIT.WT. OF H2O G	NET WT. OF H2O G.
422.8	319.1	103.7
485.8	484.0	1.8
711.4	709.4	2.0
583.2	569.4	13.8
TOTAL H2O GAIN:		121.3
TOTAL VOLUME (SCF)		5.71
PERCENT MOISTURE:		6.24
Bws:		0.0624

PITOT Cp:	0.845
NOZZLE DIA INCHES:	0.650
NOZZLE AREA FT^2:	0.0023
STACK DIA. INCHES:	64.00
STACK AREA FT^2:	22.340
METER TEMP. DEG F:	94.8
BAROM. PRES. "HG:	29.62
STATIC PRES. "H2O:	0.00
STACK PRES. "HG:	29.62
ORIFICE PRES "H2O:	0.810
METER PRES. "HG:	29.68

INIT. METER VOL.:	787.849
FINAL METER VOL.:	878.884
VOLUME SAMPLED:	91.035
STD VOLUME (DSCF):	85.855
STD VOLUME (DSCM):	2.432
Y FACTOR:	0.999

AVERAGE % CO2:	5.1
AVERAGE % O2:	14.8
AVERAGE ppm CO:	165
STACK GAS MW. DRY:	29.41
STACK GAS MW. WET:	28.70

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
POINT OF	0.015	1226	POINT OF	0.015	1244
AV. VEL.	0.015	1265	AV. VEL.	0.015	1263
	0.015	1237		0.015	1280
	0.015	1162		0.015	1238
	0.015	1241		0.015	1268
	0.015	1290		0.015	1259
	0.015	1284		0.015	1262
	0.015	1245		0.015	1222
	0.015	1266		0.015	1243
	0.015	1269		0.015	1259
	0.015	1285		0.015	1243
	0.015	1275		0.015	1237
	0.015	1272		0.015	1241
	0.015	1263		0.015	1256
	0.015	1285		0.015	1221
	0.015	1243		0.015	1210
	0.015	1265		0.015	1255
	0.015	1279		0.015	1220

PERCENT ISOKINETICS:	96 %	
STACK TEMPERATURE:	1252.0 DEG. F.	1712.0 DEG. R.
AVERAGE VELOCITY HEAD:	0.015 " OF H2O	
STACK GAS VELOCITY:		12.56 FT/SEC.
STACK GAS AIR FLOW:	16830.8 ACF/MIN.	4818.2 DSCF/MIN.

PARTICULATE MASS LOADING

FILTER NUMBER:	#90-975
TARE WEIGHT OF FILTER IN GRAMS:	0.6036
FINAL WEIGHT OF FILTER IN GRAMS:	0.6036
NET WEIGHT OF PARTIC. MATTER IN GRAMS:	0.0000
PARTIC. EMISSION CONC. (GR/DSCF):	0.000
PARTIC. EMISSION CONC. (MG/DSCM):	0.00
POLLUTANT MASS EMISSION RATE (LB/HR):	0.00

CHLORIDE AS HCl

MILLILITERS OF SOLUTION IN IMPINGERS:	316
CHLORIDE CONC. IN IMPINGERS (MG/L):	< 1.0
CHLORIDE CONC. IN IMPINGERS (MG/DSCM):	< 0.13
TOTAL CHLORIDE AS HCl IN SAMPLE (PPM):	< 0.09

METHOD 1-5 - PARTICULATE EMISSION CONCENTRATION RESULTS
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME:	CHPAHCL2	LAB #:	903343
CLIENT:	SWEET EDWARDS/EMCON	START TIME:	07:38 O'CLOCK
LOCATION:	CEDAR HILLS LANDFILL	STOP TIME:	10:31 O'CLOCK
SAMPLE SITE:	FLARE OUTLET	SAMPLE TIME:	180.0 MINUTES
SAMPLE DATE:	MARCH 14, 1989		
RUN #:	2-METHOD 5/PAH/HCl		
OPERATORS:	HANSEN/LAWRENCE		
CONTACT:	D. VONASEK		

FINAL WT. OF H2O G.	INIT.WT. OF H2O G	NET WT. OF H2O G.
389.7	256.0	133.7
470.3	466.9	3.4
707.9	708.0	-0.1
626.4	605.7	20.7
TOTAL H2O GAIN:		157.7
TOTAL VOLUME (SCF)		7.42
PERCENT MOISTURE:		6.15
Bws:		0.0615

PITOT Cp:	0.845
NOZZLE DIA INCHES:	0.751
NOZZLE AREA FT^2:	0.0031
STACK DIA. INCHES:	64.00
STACK AREA FT^2:	22.340
METER TEMP. DEG F:	91.3
BAROM. PRES. "HG:	29.70
STATIC PRES. "H2O:	0.00
STACK PRES. "HG:	29.70
ORIFICE PRES "H2O:	1.330
METER PRES. "HG:	29.80

INIT. METER VOL.:	879.024
FINAL METER VOL.:	998.024
VOLUME SAMPLED:	119.000
STD VOLUME (DSCF):	113.391
STD VOLUME (DSCM):	3.212
Y FACTOR:	0.999

AVERAGE % CO2:	4.7
AVERAGE % O2:	14.7
AVERAGE ppm CO:	202
STACK GAS MW. DRY:	29.34
STACK GAS MW. WET:	28.64

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
POINT OF	0.015	1145	POINT OF	0.015	1214
AV. VEL.	0.015	1159	AV. VEL.	0.015	1228
	0.015	1182		0.015	1239
	0.015	1184		0.015	1223
	0.015	1192		0.015	1228
	0.015	1165		0.015	1240
	0.015	1151		0.015	1242
	0.015	1152		0.015	1221
	0.015	1161		0.015	1220
	0.015	1157		0.015	1203
	0.015	1163		0.015	1219
	0.015	1175		0.015	1204
	0.015	1155		0.015	1183
	0.015	1170		0.015	1203
	0.015	1173		0.015	1211
	0.015	1192		0.015	1226
	0.015	1190		0.015	1234
	0.015	1219		0.015	1212

PERCENT ISOKINETICS:	93 %	
STACK TEMPERATURE:	1195.4 DEG. F.	1655.4 DEG. R.
AVERAGE VELOCITY HEAD:	0.015 " OF H2O	
STACK GAS VELOCITY:		12.34 FT/SEC.
STACK GAS AIR FLOW:	16543.3 ACF/MIN.	4915.8 DSCF/MIN.

PARTICULATE MASS LOADING

FILTER NUMBER:	#90-974
TARE WEIGHT OF FILTER IN GRAMS:	0.6110
FINAL WEIGHT OF FILTER IN GRAMS:	0.6110
NET WEIGHT OF PARTIC. MATTER IN GRAMS:	0.0000
PARTIC. EMISSION CONC. (GR/DSCF):	0.000
PARTIC. EMISSION CONC. (MG/DSCM):	0.00
POLLUTANT MASS EMISSION RATE (LB/HR):	0.00

CHLORIDE AS HCl

MILLILITERS OF SOLUTION IN 1st IMPINGER:	154
MILLILITERS OF SOLUTION IN 2nd IMPINGER:	125
CHLORIDE CONC. IN 1st IMPINGER (MG/L):	< 1.0
CHLORIDE CONC. IN 2nd IMPINGER (MG/L):	< 2.0
CHLORIDE CONC. IN 1st IMPINGER (MG/DSCM):	< 0.02
CHLORIDE CONC. IN 2nd IMPINGER (MG/DSCM):	< 0.03
TOTAL CHLORIDE AS HCl IN SAMPLE (PPM):	< 0.04

METHOD 1-5 - PARTICULATE EMISSION CONCENTRATION RESULTS
AM TEST, INC. - AIR QUALITY DIVISION

FILE NAME:	CHPAHCL3	LAB #:	903345
CLIENT:	SWEET EDWARDS/EMCON	START TIME:	11:12 O'CLOCK
LOCATION:	CEDAR HILLS LANDFILL	STOP TIME:	14:07 O'CLOCK
SAMPLE SITE:	FLARE OUTLET	SAMPLE TIME:	180.0 MINUTES
SAMPLE DATE:	MARCH 14, 1989		
RUN #:	3-METHOD 5/PAH/HCl		
OPERATORS:	HANSEN/LAWRENCE		
CONTACT:	D. VONASEK		

FINAL WT. OF H2O G.	INIT.WT. OF H2O G	NET WT. OF H2O G.
426.7	320.2	106.5
484.7	483.4	1.3
712.4	711.5	0.9
678.3	656.6	21.7
TOTAL H2O GAIN:		130.4
TOTAL VOLUME (SCF)		6.14
PERCENT MOISTURE:		5.15
Bws:		0.0515

PITOT Cp:	0.845
NOZZLE DIA INCHES:	0.751
NOZZLE AREA FT^2:	0.0031
STACK DIA. INCHES:	64.00
STACK AREA FT^2:	22.340
METER TEMP. DEG F:	93.9
BAROM. PRES. "HG:	29.72
STATIC PRES. "H2O:	0.00
STACK PRES. "HG:	29.72
ORIFICE PRES "H2O:	1.330
METER PRES. "HG:	29.82

INIT. METER VOL.:	998.534
FINAL METER VOL.:	1117.776
VOLUME SAMPLED:	119.242
STD VOLUME (DSCF):	113.164
STD VOLUME (DSCM):	3.206
Y FACTOR:	0.999

AVERAGE % CO2:	4.9
AVERAGE % O2:	14.9
AVERAGE ppm CO:	139
STACK GAS MW. DRY:	29.38
STACK GAS MW. WET:	28.79

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE DEGREES F.
POINT OF	0.015	1214	POINT OF	0.015	1173
AV. VEL.	0.015	1192	AV. VEL.	0.015	1212
	0.015	1196		0.015	1280
	0.015	1204		0.015	1223
	0.015	1193		0.015	1222
	0.015	1185		0.015	1206
	0.015	1176		0.015	1223
	0.015	1189		0.015	1229
	0.015	1234		0.015	1222
	0.015	1218		0.015	1228
	0.015	1225		0.015	1215
	0.015	1230		0.015	1200
	0.015	1275		0.015	1097
	0.015	1223		0.015	1209
	0.015	1279		0.015	1190
	0.015	1295		0.015	1192
	0.015	1271		0.015	1177
	0.015	1263		0.015	1159

PERCENT ISOKINETICS:	93 %	
STACK TEMPERATURE:	1214.4 DEG. F.	1674.4 DEG. R.
AVERAGE VELOCITY HEAD:	0.015 " OF H2O	
STACK GAS VELOCITY:		12.38 FT/SEC.
STACK GAS AIR FLOW:	16588.6 ACF/MIN.	4928.6 DSCF/MIN.

PARTICULATE MASS LOADING

FILTER NUMBER:	#90-165
TARE WEIGHT OF FILTER IN GRAMS:	0.6122
FINAL WEIGHT OF FILTER IN GRAMS:	0.6156
NET WEIGHT OF PARTIC. MATTER IN GRAMS:	0.0034
PARTIC. EMISSION CONC. (GR/DSCF):	0.0005
PARTIC. EMISSION CONC. (MG/DSCM):	1.06
POLLUTANT MASS EMISSION RATE (LB/HR):	0.02

CHLORIDE AS HCl

MILLILITERS OF SOLUTION IN IMPINGERS:	238
CHLORIDE CONC. IN IMPINGERS (MG/L):	< 1.0
CHLORIDE CONC. IN IMPINGERS (MG/DSCM):	< 0.07
TOTAL CHLORIDE AS HCl IN SAMPLE (PPM):	< 0.05

APPENDIX

CLIENT: AM Test, Inc. - Air Quality Division
REPORT TO: Kris Hansen

DATE RECEIVED: 3/16/89
DATE REPORTED: 4/13/89
PROJECT: Cedar Hill

GC ANALYSIS OF PURGEABLE HALOCARBONS BY EPA METHOD 601

Laboratory Sample Nos. / Client Identification	Trap Blank --	903763 Inlet, Run-1	Detection Limit (ug/l)
Chloromethane	ND	ND	0.6
Vinyl Chloride	ND	ND	0.6
Bromomethane	ND	ND	0.6
Chloroethane	ND	ND	0.6
Dichlorodifluoromethane	ND	ND	0.6
Trichlorofluoromethane	ND	8.0	0.6
1,1,-Dichloroethylene	ND	ND	0.6
Methylene Chloride*	ND	40.	0.6
Trans-1,2-Dichloroethylene	ND	0.7	0.3
1,1-Dichloroethane	ND	7.0	0.3
Chloroform	ND	ND	0.3
1,1,1-Trichloroethane	ND	0.8	0.3
Carbon Tetrachloride	ND	ND	0.3
1,2-Dichloroethane	ND	0.4	0.3
Trichloroethylene	ND	11.	0.3
1,2-Dichloropropane	ND	ND	0.3
Dichlorobromomethane	ND	ND	0.3
Trans-1,3-Dichloropropene	ND	ND	0.3
Cis-1,3-Dichloropropene	ND	ND	0.3
1,1,2-Trichloroethane	ND	ND	0.3
Tetrachloroethylene	ND	17.	0.3
Dibromochloromethane	ND	ND	0.3
Bromoform	ND	ND	0.3
1,1,2,2-Tetrachloroethane	ND	ND	0.3

All results are reported in ug/l.
ND = Not Detected.
*Results were based on data that was more than 20% outside the calibration range.
20 ml. of gas analyzed (minimum volume for this instrument).

CLIENT: AM Test, Inc. - Air Quality Division
DATE RECEIVED: 3/16/89
DATE REPORTED: 4/13/89
REPORT TO: Kris Hansen
PROJECT: Cedar Hill

GC ANALYSIS OF PURGEABLE HALOCARBONS BY EPA METHOD 601

Laboratory Sample Nos.	903764	Detection Limit
Client Identification	Inlet, Run-2	(ug/l)
Chloromethane	ND	0.6
Vinyl Chloride	ND	0.6
Bromomethane	ND	0.6
Chloroethane	ND	0.6
Dichlorodifluoromethane	ND	0.6
Trichlorofluoromethane	12.	0.6
1,1,-Dichloroethylene	ND	0.6
Methylene Chloride*	56.	0.6
Trans-1,2-Dichloroethylene	0.8	0.3
1,1-Dichloroethane	8.0	0.3
Chloroform	ND	0.3
1,1,1-Trichloroethane	1.0	0.3
Carbon Tetrachloride	ND	0.3
1,2-Dichloroethane	0.8	0.3
Trichloroethylene	15.	0.3
1,2-Dichloropropane	ND	0.3
Dichlorobromomethane	ND	0.3
Trans-1,3-Dichloropropene	ND	0.3
Cis-1,3-Dichloropropene	ND	0.3
1,1,2-Trichloroethane	ND	0.3
Tetrachloroethylene*	25.	0.3
Dibromochloromethane	ND	0.3
Bromoform	ND	0.3
1,1,2,2-Tetrachloroethane	ND	0.3

All results are reported in ug/l.
ND = Not Detected.
*Results were based on data that was more than 20% outside the calibration range.
20 ml. of gas analyzed (minimum volume for this instrument).

REPORTED BY _____
Kenneth Pang

KP/pb

CLIENT: AM Test, Inc. - Air Quality Division
REPORT TO: Kris Hansen

DATE RECEIVED: 3/16/89
DATE REPORTED: 4/13/89
PROJECT: Cedar Hill

GC ANALYSIS OF PURGEABLE HALOCARBONS BY EPA METHOD 601

Laboratory Sample Nos.	903765	Detection Limit
Client Identification	Inlet, Run-3	(ug/l)
Chloromethane	ND	1.0
Vinyl Chloride	ND	1.0
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Dichlorodifluoromethane	ND	1.0
Trichlorofluoromethane	8.0	1.0
1,1,-Dichloroethylene	ND	1.0
Methylene Chloride*	35.	1.0
Trans-1,2-Dichloroethylene	0.5	0.5
1,1-Dichloroethane	5.0	0.5
Chloroform	ND	0.5
1,1,1-Trichloroethane	0.5	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	0.6	0.5
Trichloroethylene	6.0	0.5
1,2-Dichloropropane	ND	0.5
Dichlorobromomethane	ND	0.5
Trans-1,3-Dichloropropene	ND	0.5
Cis-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethylene	8.0	0.5
Dibromochloromethane	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5

All results are reported in ug/l.
ND = Not Detected.
*Results were based on data that was more than 20% outside the calibration range.
20 ml. of gas analyzed (minimum volume for this instrument).

ANALYSIS REPORT

CLIENT: AM Test, Inc. - Air Quality Division
REPORT TO: Kris Hansen

DATE RECEIVED: 3/16/89
DATE REPORTED: 4/13/89
PROJECT: Cedar Hill

GC ANALYSIS OF PURGEABLE HALOCARBONS BY EPA METHOD 602

Laboratory Sample Nos.	903763	903764	Trap Blank	Detection Limit
Client Identification	Inlet Run-1	Inlet Run-2	--	(ug/l)
Benzene	7.0	9.0	ND	0.3
Toluene*	118.	165.	ND	0.3
Chlorobenzene	ND	ND	ND	0.3
Ethylbenzene	19.	29.	ND	0.3
m+p-Xylene	30.	47.	ND	0.6
o-Xylene	9.0	13.	ND	0.3
1,3-Dichlorobenzene	ND	ND	ND	0.3
1,4-Dichlorobenzene	ND	ND	ND	0.3
1,2-Dichlorobenzene	ND	ND	ND	0.3

m-Xylene and p-Xylene coelute.
All results are reported in ug/l.
*Results were based on data that was more than 20% outside of the calibration range.
20 ml. of gas analyzed (minimum volume for this instrument).
ND = Not Detected.

CLIENT: AM Test, Inc. - Air Quality Division
REPORT TO: Kris Hansen

DATE RECEIVED: 3/16/89
DATE REPORTED: 4/13/89
PROJECT: Cedar Hill

GC ANALYSIS OF PURGEABLE HALOCARBONS BY EPA METHOD 602

Laboratory Sample Nos.	903765	Detection Limit (ug/l)
Client Identification	Inlet Run-3	
Benzene	4.0	0.5
Toluene*	66.	0.5
Chlorobenzene	ND	0.5
Ethylbenzene	7.0	0.5
m+p-Xylene	12.	1.0
o-Xylene	3.0	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

m-Xylene and p-Xylene coelute.
All results are reported in ug/l.
*Results were based on data that was more than 20% outside of the calibration range.
20 ml. of gas analyzed (minimum volume for this instrument).
ND = Not Detected.

twin city testing
corporation
662 CROMWELL AVENUE
ST PAUL, MN 55114
PHONE 612/645-3601

MAY 9 1989

REPORT OF: MASS SPECTROMETRY ANALYSIS

PROJECT: Sweet-Edwards/Cedar Hills

DATE: May 3, 1989

ISSUED TO: AM Test Incorporated
Attn: Kris A. Hansen
14603 NE 87th Street
Redmond, WA 98052

INVOICE NO.: 4410 89-3278

INTRODUCTION

This report describes the analyses and summarizes the results from 9 VOST samples and 5 XAD resin samples which were submitted on March 20, 1989, by Angela Blaisdell of AM Test Corporation. The scope of the project included the determination of volatile organic compounds and base neutral-acid extractable compounds.

SAMPLE IDENTIFICATION

		Analysis	
		BNA	VOA
Sample #	Client I.D.	GC/MS	GC/MS
116825	890015 Run 1-PAH	x	
116831	890016 Run 2-PAH	x	
116834	890017 Run 3-PAH	x	
116837	890018 SV Field Blank	x	
116840	890019 Trip Blank	x	
116842	890020 Lab Blank	x	
116849	890021 Run 1-Set 1-VOST		x
116853	890022 Run 1-Set 2-VOST		x
116854	890023 Run 2-Set 1-VOST		x
116855	890024 Run 2-Set 2-VOST		x
116856	890025 Run 3-Set 1-VOST		x
116858	890026 Run 3-Set 2-VOST		x
116859	890027 Field Blank		x
116862	890028 Trip Blank		x
116864	890029 Lab Blank		x

METHODOLOGY

BNA Analysis

The samples for semivolatile analysis were received as three components: 1) an XAD cartridge, 2) a filter, and 3) a condensate. The XAD cartridge and filter from each sample were combined and soxhlet extracted with methylene chloride. The condensate was extracted separately with methylene chloride and the extract was combined with the soxhlet extract. The extracts were analyzed according to the EPA Contract Laboratory Protocol for semivolatile organics.

twin city testing corporation
662 CROMWELL AVENUE
ST. PAUL, MN 55114
PHONE 612/645-3601

REPORT OF: MASS SPECTROMETRY ANALYSIS

DATE: May 3, 1989

INVOICE NO.: 4410 89-3278

Instrumentation: VG Trio-2 Quadrapole Mass Spectrometer
Hewlett-Packard 5890 Gas Chromatograph
Hewlett-Packard 7673A Auto Sampler

VOA Analysis

Each VOST sample consisted of two tubes collected in series. The primary tube contained tenax, while the backup tube contained tenax and charcoal. Both tubes were analyzed and reported separately. The VOST tubes were desorbed according to EPA Method 5040 and analyzed using the instrumental conditions described in EPA Method 8240.

Instrumentation: VG Trio-2 Quadrapole Mass Spectrometer
Hewlett-Packard 5890 Gas Chromatograph
Tekmar Model 4000 Dynamic Headspace Concentrator

RESULTS

The results of the analyses are summarized in attached sample results forms titled "HSL Semivolatile Organics", "HSL Volatile Organics," and "Minnesota Department of Health Volatile Organic Compounds."

DISCUSSION

Many of the VOST sample tubes contained very high levels of acetone, toluene, benzene, and cummene. A separate standard containing those components at 10 ug and 50 ug was analyzed and a response factor was generated and used to quantify values above the normal calibration range. Any samples over the 50 ug standard were reported as greater than 50 ug. The recoveries of the surrogate standards in these samples were erratic due to interferences from the high level compounds.

The data from the tenax portion of analysis of the Lab Blank #890029, was lost due to equipment failure when the capillary column broke during analysis. The charcoal portion of the lab blank, trip blank, and field blank were clean; however, the tenax portions contained acetone and methylene chloride above the method detection level. The daily system blank for that analysis was clean. The daily system blanks for the duration of the analyses were clean with exception of small amounts of cummene, which were less than two times the detection level.

The analyses of the VOST blank samples utilized the compound list from the EPA Contract Laboratory Program. The samples were analyzed for an expanded compound list from the Minnesota Department of Health, which

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was required for another project being run in the same time period. The data for the additional compounds was reported for the samples that were analyzed for the longer list. Some of the additional compounds such as dichlorodifluoromethane and cummene were present in the samples. The field blanks, lab blanks, and trip blanks were not analyzed for the additional compounds; however, visual inspection of the chromatograms did not indicate they were present.

Sample #890017, Run 3, was spilled during the extraction for BNAs and 80 percent of the sample was lost. The extraction was completed upon the remainder of the sample and the surrogate recoveries were acceptable for the remaining 20 percent of the sample.

REMARKS

The sample extracts will be retained for a minimum of 60 days from the date of this report. They will then be discarded unless other arrangements are made.

TWIN CITY TESTING CORPORATION

Steven Albrecht
Mass Spectrometrist

Barbara Larka
Supervisor, Mass Spectrometry Section

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TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN1 SET1 TENAX

ANALYSIS DATE: 04/16/1989
TCT ID: 116849 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9107F07

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	320	50
Chloromethane	2100	50
Bromomethane	ND	50
Vinyl Chloride	BQL	50
Chloroethane	ND	50
Trichlorofluoromethane	ND	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	ND	50
Methylene Chloride	7600	25
Acetone	>50000	50
Carbon Disulfide	3800	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	29	25
Chloroform	BQL	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	BQL	25
1,1,1-Trichloroethane	BQL	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	240	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	100	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	950	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	26	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	>50000	25
Chlorobenzene	100	25
Ethylbenzene	140	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN1 SET1 TENAX

ANALYSIS DATE: 04/16/1989
TCT ID: 116849 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9107F07

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	1600	25
1,2,3-Trichloropropane	ND	25
Styrene	62	25
m-/p-Xylene	52	25
o-Xylene	52	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	48	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	196%	
4-Bromofluorobenzene	21%	
Toluene-d8	2%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S. Albright
Technical Review: B Lambert

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN1 SET1 CHARCOAL

ANALYSIS DATE: 04/16/1989
TCT ID: 116849 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9107F06

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	1400	50
Chloromethane	31000	50
Bromomethane	ND	50
Vinyl Chloride	120	50
Chloroethane	ND	50
Trichlorofluoromethane	ND	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	160	50
Methylene Chloride	11000	25
Acetone	>50000	50
Carbon Disulfide	ND	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	ND	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	79	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	ND	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	ND	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	110	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	17000	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN1 SET1 CHARCOAL

ANALYSIS DATE: 04/16/1989
TCT ID: 116849 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9107F06

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	ND	25
1,2,3-Trichloropropane	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
o-Xylene	ND	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	161%	
4-Bromofluorobenzene	93%	
Toluene-d8	77%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S. Albrecht
Technical Review: B Karsten

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN1 SET2 TENAX

ANALYSIS DATE: 04/20/1989
TCT ID: 116853 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9110F06

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	410	50
Chloromethane	220	50
Bromomethane	99	50
Vinyl Chloride	110	50
Chloroethane	ND	50
Trichlorofluoromethane	BQL	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	BQL	50
Allyl Chloride	ND	50
Methylene Chloride	2300	25
Acetone	49000	50
Carbon Disulfide	950	25
1,1-Dichloroethene	35	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	48	25
Chloroform	ND	25
1,2-Dichloroethane	BQL	25
2-Butanone	BQL	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	380	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	120	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	600	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	49	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	1400	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	>50000	25
Chlorobenzene	660	25
Ethylbenzene	490	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN1 SET2 TENAX

ANALYSIS DATE: 04/20/1989
TCT ID: 116853 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9110F06

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	140	25
1,2,3-Trichloropropane	ND	25
Styrene	210	25
m-/p-Xylene	97	25
o-Xylene	97	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	260	25
1,4-Dichlorobenzene	330	25
1,2-Dichlorobenzene	190	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	97%	
4-Bromofluorobenzene	140%	
Toluene-d8	38%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: [signature]
Technical Review: [signature]

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN1 SET2 CHARCOAL

ANALYSIS DATE: 04/20/1989
TCT ID: 116853 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9110F05

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	4700	50
Chloromethane	3800	50
Bromomethane	120	50
Vinyl Chloride	320	50
Chloroethane	ND	50
Trichlorofluoromethane	BQL	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	ND	50
Methylene Chloride	590	25
Acetone	16000	50
Carbon Disulfide	120	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	ND	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	490	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	ND	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	26	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	BQL	50
2-Hexanone	BQL	50
Tetrachloroethene	BQL	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	BQL	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN1 SET2 CHARCOAL

ANALYSIS DATE: 04/20/1989
TCT ID: 116853 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9110F05

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	ND	25
1,2,3-Trichloropropane	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
o-Xylene	ND	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	109%	
4-Bromofluorobenzene	144%	
Toluene-d8	128%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: _____
Technical Review: _____

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN2 SET1 TENAX

ANALYSIS DATE: 04/24/1989
TCT ID: 116854 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9114F08

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	ND	50
Chloromethane	52	50
Bromomethane	ND	50
Vinyl Chloride	ND	50
Chloroethane	ND	50
Trichlorofluoromethane	ND	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	ND	50
Methylene Chloride	400	25
Acetone	15000	50
Carbon Disulfide	560	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	BQL	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	BQL	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	46	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	250	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	BQL	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	170	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	>50000	25
Chlorobenzene	BQL	25
Ethylbenzene	BQL	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN2 SET1 TENAX

ANALYSIS DATE: 04/24/1989
TCT ID: 116854 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9114F08

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	44	25
1,2,3-Trichloropropane	ND	25
Styrene	BQL	25
m-/p-Xylene	BQL	25
o-Xylene	BQL	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	BQL	25
1,4-Dichlorobenzene	27	25
1,2-Dichlorobenzene	BQL	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	97%	
4-Bromofluorobenzene	92%	
Toluene-d8	34%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: _____ 4410 89-3278
Technical Review: _____ Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN2 SET1 CHARCOAL

ANALYSIS DATE: 04/24/1989
TCT ID: 116854 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9114F06

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	4400	50
Chloromethane	1100	50
Bromomethane	76	50
Vinyl Chloride	160	50
Chloroethane	ND	50
Trichlorofluoromethane	110	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	BQL	50
Allyl Chloride	ND	50
Methylene Chloride	1700	25
Acetone	4400	50
Carbon Disulfide	ND	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	ND	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	BQL	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	57	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	ND	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	BQL	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	28	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN2 SET1 CHARCOAL

ANALYSIS DATE: 04/24/1989
TCT ID: 116854 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9114F06

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	59	25
1,2,3-Trichloropropane	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
o-Xylene	ND	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	**86%**	
4-Bromofluorobenzene	**69%**	
Toluene-d8	**74%**	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: _____
Technical Review: _____

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN2 SET2 TENAX

ANALYSIS DATE: 04/24/1989
TCT ID: 116855 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9114F021

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	180	50
Chloromethane	BQL	50
Bromomethane	ND	50
Vinyl Chloride	BQL	50
Chloroethane	ND	50
Trichlorofluoromethane	1100	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	BQL	50
Allyl Chloride	ND	50
Methylene Chloride	420	25
Acetone	12000	50
Carbon Disulfide	500	25
1,1-Dichloroethene	26	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	74	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	BQL	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	54	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	220	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	540	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	120	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	970	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	>50000	25
Chlorobenzene	36	25
Ethylbenzene	78	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN2 SET2 TENAX

ANALYSIS DATE: 04/24/1989
TCT ID: 116855 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9114F021

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MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	33	25
1,2,3-Trichloropropane	ND	25
Styrene	35	25
m-/p-Xylene	36	25
o-Xylene	36	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	140	25
1,2-Dichlorobenzene	BQL	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	76%	
4-Bromofluorobenzene	55%	
Toluene-d8	36%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S. Albrecht
Technical Review: [signature]

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN2 SET2 CHARCOAL

ANALYSIS DATE: 04/24/1989
TCT ID: 116855 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9114F011

90

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	4200	50
Chloromethane	550	50
Bromomethane	BQL	50
Vinyl Chloride	260	50
Chloroethane	ND	50
Trichlorofluoromethane	350	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	ND	50
Methylene Chloride	290	25
Acetone	610	50
Carbon Disulfide	440	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	ND	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	BQL	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	ND	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	BQL	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	73	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN2 SET2 CHARCOAL

ANALYSIS DATE: 04/24/1989
TCT ID: 116855 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9114F011

91

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	BQL	25
1,2,3-Trichloropropane	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
o-Xylene	ND	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	83%	
4-Bromofluorobenzene	79%	
Toluene-d8	89%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S. allbrecht
Technical Review: B Last

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN3 SET1 TENAX

ANALYSIS DATE: 04/25/1989
TCT ID: 116856 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9115F06

92

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	150	50
Chloromethane	66	50
Bromomethane	BQL	50
Vinyl Chloride	BQL	50
Chloroethane	ND	50
Trichlorofluoromethane	120	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	ND	50
Methylene Chloride	560	25
Acetone	3200	50
Carbon Disulfide	460	25
1,1-Dichloroethene	27	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	30	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	160	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	130	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	480	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	75	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	880	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	3300	25
Chlorobenzene	180	25
Ethylbenzene	27	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN3 SET1 TENAX

ANALYSIS DATE: 04/25/1989
TCT ID: 116856 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9115F06

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	BQL	25
1,2,3-Trichloropropane	ND	25
Styrene	BQL	25
m-/p-Xylene	BQL	25
o-Xylene	BQL	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	33	25
1,4-Dichlorobenzene	81	25
1,2-Dichlorobenzene	29	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	**58%**	
4-Bromofluorobenzene	**15%**	
Toluene-d8	**115%**	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: [signature]
Technical Review: [signature]

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN3 SET1 CHARCOAL

ANALYSIS DATE: 04/25/1989
TCT ID: 116856 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9115F05

94

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	1800	50
Chloromethane	610	50
Bromomethane	ND	50
Vinyl Chloride	110	50
Chloroethane	ND	50
Trichlorofluoromethane	690	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	BQL	50
Allyl Chloride	ND	50
Methylene Chloride	730	25
Acetone	290	50
Carbon Disulfide	110	25
1,1-Dichloroethene	32	25
1,1-Dichloroethane	110	25
trans-1,2-Dichloroethene	ND	25
Chloroform	87	25
1,2-Dichloroethane	81	25
2-Butanone	ND	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	BQL	25
Carbon Tetrachloride	28	25
Vinyl Acetate	86	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	BQL	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	39	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	BQL	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	200	25
Chlorobenzene	ND	25
Ethylbenzene	BQL	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN3 SET1 CHARCOAL

ANALYSIS DATE: 04/25/1989
TCT ID: 116856 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9115F05

95

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	BQL	25
1,2,3-Trichloropropane	ND	25
Styrene	BQL	25
m-/p-Xylene	BQL	25
o-Xylene	BQL	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	59%	
4-Bromofluorobenzene	49%	
Toluene-d8	77%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S allhart
Technical Review: B Lambo

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN3 SET2 TENAX

ANALYSIS DATE: 04/25/1989
TCT ID: 116858 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9115F021

96

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	320	50
Chloromethane	120	50
Bromomethane	51	50
Vinyl Chloride	BQL	50
Chloroethane	ND	50
Trichlorofluoromethane	310	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	BQL	50
Allyl Chloride	ND	50
Methylene Chloride	1200	25
Acetone	10000	50
Carbon Disulfide	540	25
1,1-Dichloroethene	39	25
1,1-Dichloroethane	BQL	25
trans-1,2-Dichloroethene	67	25
Chloroform	BQL	25
1,2-Dichloroethane	BQL	25
2-Butanone	84	50
Tetrahydrofuran	BQL	25
1,1,1-Trichloroethane	BQL	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	1200	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	790	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	1900	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	400	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	7300	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	>50000	25
Chlorobenzene	230	25
Ethylbenzene	240	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN3 SET2 TENAX

ANALYSIS DATE: 04/25/1989
TCT ID: 116858 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9115F021

97

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	71	25
1,2,3-Trichloropropane	ND	25
Styrene	92	25
m-/p-Xylene	ND	25
o-Xylene	110	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	34	25
1,4-Dichlorobenzene	770	25
1,2-Dichlorobenzene	84	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	50%	
4-Bromofluorobenzene	38%	
Toluene-d8	74%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S. Allmendinger
Technical Review: B Lanka

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN3 SET2 CHARCOAL

ANALYSIS DATE: 04/25/1989
TCT ID: 116858 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9115F011

98

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	5500	50
Chloromethane	1400	50
Bromomethane	BQL	50
Vinyl Chloride	220	50
Chloroethane	ND	50
Trichlorofluoromethane	1700	50
Ethyl Ether	BQL	50
1,1,2-Trichlorotrifluoroethane	BQL	50
Allyl Chloride	ND	50
Methylene Chloride	1000	25
Acetone	690	50
Carbon Disulfide	290	25
1,1-Dichloroethene	51	25
1,1-Dichloroethane	180	25
trans-1,2-Dichloroethene	BQL	25
Chloroform	130	25
1,2-Dichloroethane	120	25
2-Butanone	ND	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	35	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	99	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	BQL	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	38	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	BQL	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	350	25
Chlorobenzene	BQL	25
Ethylbenzene	BQL	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: RUN3 SET2 CHARCOAL

ANALYSIS DATE: 04/25/1989
TCT ID: 116858 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9115F011

99

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	BQL	25
1,2,3-Trichloropropane	ND	25
Styrene	BQL	25
m-/p-Xylene	BQL	25
o-Xylene	BQL	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	**90%**	
4-Bromofluorobenzene	**77%**	
Toluene-d8	**92%**	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S. Allmart
Technical Review: B Lanken

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: FIELD BLANK TENAX
DATE SAMPLED:

ANALYSIS DATE: 04/06/1989
TCT ID: 116859 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9096F11

100

HSL VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Chloromethane	ND	50
Vinyl Chloride	ND	50
Bromomethane	ND	50
Chloroethane	ND	50
Acetone	130	50
1,1-Dichloroethene	ND	25
Vinyl Acetate	ND	50
Methylene Chloride	ND	25
Carbon Disulfide	ND	25
trans-1,2-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
2-Butanone	ND	50
Chloroform	ND	25
1,1,1-Trichloroethane	ND	25
1,2-Dichloroethane	ND	25
Benzene	ND	25
Carbon Tetrachloride	ND	25
1,2-Dichloropropane	ND	25
Trichloroethene	ND	25
Bromodichloromethane	ND	25
cis-1,3-Dichloropropene	ND	25
2-Hexanone	ND	50
Toluene	ND	25
trans-1,3-Dichloropropene	ND	25
1,1,2-Trichloroethane	ND	25
4-Methyl-2-Pentanone	ND	50
Dibromochloromethane	ND	25
Tetrachloroethene	ND	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25
Bromoform	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	86%	
Toluene-d8	91%	
4-Bromofluorobenzene	82%	

ND = Not Detected
MDL = Method Detection Limit
BQL = Below Quantitation Limit

Analyst: S allmark
Technical Review: BDark

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: FIELD BLANK CHARCOAL
DATE SAMPLED:

ANALYSIS DATE: 04/06/1989
TCT ID: 116859 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9096F10

101

HSL VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Chloromethane	ND	50
Vinyl Chloride	ND	50
Bromomethane	ND	50
Chloroethane	ND	50
Acetone	ND	50
1,1-Dichloroethene	ND	25
Vinyl Acetate	ND	50
Methylene Chloride	28	25
Carbon Disulfide	ND	25
trans-1,2-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
2-Butanone	ND	50
Chloroform	ND	25
1,1,1-Trichloroethane	ND	25
1,2-Dichloroethane	ND	25
Benzene	ND	25
Carbon Tetrachloride	ND	25
1,2-Dichloropropane	ND	25
Trichloroethene	ND	25
Bromodichloromethane	ND	25
cis-1,3-Dichloropropene	ND	25
2-Hexanone	ND	50
Toluene	ND	25
trans-1,3-Dichloropropene	ND	25
1,1,2-Trichloroethane	ND	25
4-Methyl-2-Pentanone	ND	50
Dibromochloromethane	ND	25
Tetrachloroethene	ND	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25
Bromoform	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	96%	
Toluene-d8	100%	
4-Bromofluorobenzene	97%	

ND = Not Detected
MDL = Method Detection Limit
BQL = Below Quantitation Limit

Analyst: g allwood
Technical Review: B Lamm

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: TRIP BLANK TENAX
DATE SAMPLED:

ANALYSIS DATE: 04/06/1989
TCT ID: 116862 TEN
DATE RECEIVED:03/20/1989
RUNNAME:9096F09

102

HSL VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Chloromethane	ND	50
Vinyl Chloride	ND	50
Bromomethane	ND	50
Chloroethane	ND	50
Acetone	BQL	50
1,1-Dichloroethene	ND	25
Vinyl Acetate	ND	50
Methylene Chloride	540	25
Carbon Disulfide	ND	25
trans-1,2-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
2-Butanone	ND	50
Chloroform	ND	25
1,1,1-Trichloroethane	ND	25
1,2-Dichloroethane	ND	25
Benzene	ND	25
Carbon Tetrachloride	ND	25
1,2-Dichloropropane	ND	25
Trichloroethene	ND	25
Bromodichloromethane	ND	25
cis-1,3-Dichloropropene	ND	25
2-Hexanone	ND	50
Toluene	BQL	25
trans-1,3-Dichloropropene	ND	25
1,1,2-Trichloroethane	ND	25
4-Methyl-2-Pentanone	ND	50
Dibromochloromethane	ND	25
Tetrachloroethene	ND	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25
Bromoform	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	79%	
Toluene-d8	104%	
4-Bromofluorobenzene	78%	

ND = Not Detected
MDL = Method Detection Limit
BQL = Below Quantitation Limit

Analyst: [signature]
Technical Review: [signature]

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: TRIP BLANK CHARCOAL
DATE SAMPLED:

ANALYSIS DATE: 04/06/1989
TCT ID: 116862 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9096F08

103

HSL VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Chloromethane	BQL	50
Vinyl Chloride	ND	50
Bromomethane	ND	50
Chloroethane	ND	50
Acetone	ND	50
1,1-Dichloroethene	ND	25
Vinyl Acetate	ND	50
Methylene Chloride	BQL	25
Carbon Disulfide	ND	25
trans-1,2-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
2-Butanone	ND	50
Chloroform	ND	25
1,1,1-Trichloroethane	ND	25
1,2-Dichloroethane	ND	25
Benzene	ND	25
Carbon Tetrachloride	ND	25
1,2-Dichloropropane	ND	25
Trichloroethene	ND	25
Bromodichloromethane	ND	25
cis-1,3-Dichloropropene	ND	25
2-Hexanone	ND	50
Toluene	ND	25
trans-1,3-Dichloropropene	ND	25
1,1,2-Trichloroethane	ND	25
4-Methyl-2-Pentanone	BQL	50
Dibromochloromethane	ND	25
Tetrachloroethene	ND	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25
Bromoform	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	95%	
Toluene-d8	100%	
4-Bromofluorobenzene	97%	

ND = Not Detected
MDL = Method Detection Limit
BQL = Below Quantitation Limit

Analyst: [signature]
Technical Review: [signature]

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: LAB BLK CHARCOAL
DATE SAMPLED:

ANALYSIS DATE: 04/07/1989
TCT ID: 116864 CHA
DATE RECEIVED:03/20/1989
RUNNAME:9097F06

104

HSL VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Chloromethane	BQL	50
Vinyl Chloride	ND	50
Bromomethane	BQL	50
Chloroethane	ND	50
Acetone	ND	50
1,1-Dichloroethene	ND	25
Vinyl Acetate	ND	50
Methylene Chloride	BQL	25
Carbon Disulfide	ND	25
trans-1,2-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
2-Butanone	ND	50
Chloroform	ND	25
1,1,1-Trichloroethane	ND	25
1,2-Dichloroethane	ND	25
Benzene	ND	25
Carbon Tetrachloride	ND	25
1,2-Dichloropropane	ND	25
Trichloroethene	ND	25
Bromodichloromethane	ND	25
cis-1,3-Dichloropropene	ND	25
2-Hexanone	ND	50
Toluene	ND	25
trans-1,3-Dichloropropene	ND	25
1,1,2-Trichloroethane	ND	25
4-Methyl-2-Pentanone	ND	50
Dibromochloromethane	ND	25
Tetrachloroethene	ND	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25
Bromoform	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	88%	
Toluene-d8	81%	
4-Bromofluorobenzene	56%	

ND = Not Detected
MDL = Method Detection Limit
BQL = Below Quantitation Limit

Analyst: [signature]
Technical Review: [signature]

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: BLANK
DATE SAMPLED:

ANALYSIS DATE: 04/06/1989
TCT ID: BLANK
DATE RECEIVED:03/20/1989
RUNNAME:9096F07

105

HSL VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Chloromethane	BQL	50
Vinyl Chloride	ND	50
Bromomethane	ND	50
Chloroethane	ND	50
Acetone	ND	50
1,1-Dichloroethene	ND	25
Vinyl Acetate	ND	50
Methylene Chloride	ND	25
Carbon Disulfide	ND	25
trans-1,2-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
2-Butanone	ND	50
Chloroform	ND	25
1,1,1-Trichloroethane	ND	25
1,2-Dichloroethane	ND	25
Benzene	ND	25
Carbon Tetrachloride	ND	25
1,2-Dichloropropane	ND	25
Trichloroethene	ND	25
Bromodichloromethane	ND	25
cis-1,3-Dichloropropene	ND	25
2-Hexanone	ND	50
Toluene	ND	25
trans-1,3-Dichloropropene	ND	25
1,1,2-Trichloroethane	ND	25
4-Methyl-2-Pentanone	BQL	50
Dibromochloromethane	ND	25
Tetrachloroethene	ND	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25
Bromoform	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
1,1,2,2-Tetrachloroethane	BQL	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	103%	
Toluene-d8	105%	
4-Bromofluorobenzene	99%	

ND = Not Detected
MDL = Method Detection Limit
BQL = Below Quantitation Limit

Analyst: S. Albrecht
Technical Review: B. Fast

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: BLANK

ANALYSIS DATE: 04/16/1989
TCT ID: BLANK
DATE RECEIVED:
RUNNAME:9107F05

106

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	ND	50
Chloromethane	BQL	50
Bromomethane	BQL	50
Vinyl Chloride	ND	50
Chloroethane	ND	50
Trichlorofluoromethane	ND	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	ND	50
Methylene Chloride	ND	25
Acetone	ND	50
Carbon Disulfide	ND	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	ND	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	ND	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	ND	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	ND	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	BQL	50
2-Hexanone	BQL	50
Tetrachloroethene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	ND	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: BLANK

ANALYSIS DATE: 04/16/1989
TCT ID: BLANK
DATE RECEIVED:
RUNNAME:9107F05

107

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	ND	25
1,2,3-Trichloropropane	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
o-Xylene	ND	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	**89%**	
4-Bromofluorobenzene	**52%**	
Toluene-d8	**88%**	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S allen
Technical Review: B Lawrence

Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: BLANK

ANALYSIS DATE: 04/20/1989
TCT ID: BLANK
DATE RECEIVED:
RUNNAME:9110F04

108

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	ND	50
Chloromethane	ND	50
Bromomethane	ND	50
Vinyl Chloride	ND	50
Chloroethane	ND	50
Trichlorofluoromethane	ND	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	ND	50
Methylene Chloride	ND	25
Acetone	ND	50
Carbon Disulfide	ND	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	ND	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	BQL	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	BQL	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	ND	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	ND	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	85	50
2-Hexanone	64	50
Tetrachloroethene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	ND	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: BLANK

ANALYSIS DATE: 04/20/1989
TCT ID: BLANK
DATE RECEIVED:
RUNNAME:9110F04

109

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	ND	25
1,2,3-Trichloropropane	BQL	25
Styrene	ND	25
m-/p-Xylene	ND	25
o-Xylene	ND	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	BQL	25
1,4-Dichlorobenzene	BQL	25
1,2-Dichlorobenzene	BQL	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	**93%**	
4-Bromofluorobenzene	**95%**	
Toluene-d8	**141%**	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: E. Ulmer
Technical Review: B Lanke

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: BLANK

ANALYSIS DATE: 04/24/1989
TCT ID: BLANK
DATE RECEIVED:03/20/1989
RUNNAME:9114F05

110

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	ND	50
Chloromethane	ND	50
Bromomethane	ND	50
Vinyl Chloride	ND	50
Chloroethane	ND	50
Trichlorofluoromethane	ND	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	ND	50
Methylene Chloride	ND	25
Acetone	BQL	50
Carbon Disulfide	ND	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	ND	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	BQL	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	ND	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	ND	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	33	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	67	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: BLANK

ANALYSIS DATE: 04/24/1989
TCT ID: BLANK
DATE RECEIVED:03/20/1989
RUNNAME:9114F05

111

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	330	25
1,2,3-Trichloropropane	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
o-Xylene	ND	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	**92%**	
4-Bromofluorobenzene	**54%**	
Toluene-d8	**94%**	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S Schmidt
Technical Review: B Lantz

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: BLANK

ANALYSIS DATE: 04/25/1989
TCT ID: BLANK
DATE RECEIVED:03/20/1989
RUNNAME:9115F04

112

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
Dichlorodifluoromethane	ND	50
Chloromethane	ND	50
Bromomethane	ND	50
Vinyl Chloride	ND	50
Chloroethane	ND	50
Trichlorofluoromethane	ND	50
Ethyl Ether	ND	50
1,1,2-Trichlorotrifluoroethane	ND	50
Allyl Chloride	ND	50
Methylene Chloride	ND	25
Acetone	BQL	50
Carbon Disulfide	ND	25
1,1-Dichloroethene	ND	25
1,1-Dichloroethane	ND	25
trans-1,2-Dichloroethene	ND	25
Chloroform	ND	25
1,2-Dichloroethane	ND	25
2-Butanone	ND	50
Tetrahydrofuran	ND	25
1,1,1-Trichloroethane	ND	25
Carbon Tetrachloride	ND	25
Vinyl Acetate	ND	50
1,1-Dichloro-1-propene	ND	25
Bromodichloromethane	ND	25
1,2-Dichloropropane	ND	25
2,3-Dichloro-1-propene	ND	25
Dibromomethane	ND	25
trans-1,3-Dichloropropene	ND	25
Trichloroethene	ND	25
Dibromochloromethane	ND	25
1,1,2-Trichloroethane	ND	25
Benzene	BQL	25
cis-1,3-Dichloropropene	ND	25
cis-1,2-Dichloroethene	ND	25
Bromoform	ND	25
1,3-Dichloropropane	ND	25
1,2-Dibromoethane	ND	25
4-Methyl-2-Pentanone	ND	50
2-Hexanone	ND	50
Tetrachloroethene	ND	25
1,1,2,2-Tetrachloroethane	ND	25
Toluene	BQL	25
Chlorobenzene	ND	25
Ethylbenzene	ND	25

TWIN CITY TESTING
CLIENT: AM TEST
CLIENT ID: BLANK

ANALYSIS DATE: 04/25/1989
TCT ID: BLANK
DATE RECEIVED:03/20/1989
RUNNAME:9115F04

113

MINNESOTA DEPARTMENT OF HEALTH

VOLATILE ORGANIC COMPOUNDS

COMPOUND	NG/TUBE	MDL
1,1,1,2-Tetrachloroethane	ND	25
Cumene	44	25
1,2,3-Trichloropropane	ND	25
Styrene	ND	25
m-/p-Xylene	ND	25
o-Xylene	ND	25
Pentachloroethane	ND	25
1,3-Dichlorobenzene	ND	25
1,4-Dichlorobenzene	ND	25
1,2-Dichlorobenzene	ND	25
SURROGATE RECOVERY:		
1,2-Dichloroethane-d4	**29%**	
4-Bromofluorobenzene	**56%**	
Toluene-d8	73%	

ND = not detected
MDL = minimum detection limit
* = detected at a level below the detection limit
BQL = below quantitation limit

Analyst: S allnutt
Technical Review: B Zarbin

4410 89-3278
Analyst:SJA

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890015 RUN 1
DATE SAMPLED: 3/13/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116825
DATE RECEIVED:3/20/1989
RUNNAME:9082B131

114

DATE EXTRACTED: 3/21/1989

HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
Phenol	170	10
bis(-2-Chloroethyl)Ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-Chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	12	10
2,4-Dimethylphenol	ND	10
Benzoic Acid	1200	50
bis(2-Chloroethoxy)Methane	ND	10
2,4-Dichlorophenol	ND	10
1,2,4-Trichlorobenzene	ND	10
Naphthalene	41	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	50
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	50
Dimethyl Phthalate	ND	10
Acenaphthylene	ND	10
3-Nitroaniline	ND	50
Acenapthene	ND	10
2,4-Dinitrophenol	ND	50
4-Nitrophenol	ND	50
Dibenzofuran	29	10
2,4-Dinitrotoluene	ND	10
2,6-Dinitrotoluene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
Fluorene	ND	10
4-Nitroaniline	ND	50
4,6-Dinitro-2-Methylphenol	ND	50
N-Nitrosodiphenylamine	ND	10

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890015 RUN 1
DATE SAMPLED: 3/13/1989
DATE EXTRACTED: 3/21/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116825
DATE RECEIVED:3/20/1989
RUNNAME:9082B131

115

HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	50
Phenanthrene	37	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
3,3'-Dichlorobenzidine	ND	20
Benzo(a)anthracene	ND	10
bis(2-ethylhexyl)phthalate	13	10
Chrysene	ND	10
Di-n-Octylphthalate	ND	10
Benzo(b)fluoranthene	ND	10
Benzo(k)fluoranthene	ND	10
Benzo(a)pyrene	ND	10
Indeno(1,2,3-cd)pyrene	ND	10
Dibenz(a,h)anthracene	ND	10
Benzo(g,h,i)perylene	ND	10
SURROGATE RECOVERY:		
2-Fluorophenol	86%	
Phenol-d5	92%	
Nitrobenzene-d5	82%	
2-Fluorobiphenyl	88%	
2,4,6-Tribromophenol	121%	
Terphenyl-d14	104%	

ND = Not Detected
MDL = Method Detection Limit
* = Detected at a level below the MDL

Analyst: S E Murray
Technical Review: S. Allen

4410 89-3278
Analyst:S.E.MURRAY

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890016 RUN 2
DATE SAMPLED: 3/13/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116831
DATE RECEIVED:3/20/1989
RUNNAME:9082B121

116

DATE EXTRACTED: 3/21/1989

HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
Phenol	35	10
bis(-2-Chloroethyl)Ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-Chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	16	10
2,4-Dimethylphenol	ND	10
Benzoic Acid	740	50
bis(2-Chloroethoxy)Methane	ND	10
2,4-Dichlorophenol	ND	10
1,2,4-Trichlorobenzene	ND	10
Naphthalene	67	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	50
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	50
Dimethyl Phthalate	ND	10
Acenaphthylene	ND	10
3-Nitroaniline	ND	50
Acenapthene	ND	10
2,4-Dinitrophenol	ND	50
4-Nitrophenol	ND	50
Dibenzofuran	48	10
2,4-Dinitrotoluene	ND	10
2,6-Dinitrotoluene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
Fluorene	ND	10
4-Nitroaniline	ND	50
4,6-Dinitro-2-Methylphenol	ND	50
N-Nitrosodiphenylamine	ND	10

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890016 RUN 2
DATE SAMPLED: 3/13/1989
DATE EXTRACTED: 3/21/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116831
DATE RECEIVED:3/20/1989
RUNNAME:9082B121

117

HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	50
Phenanthrene	11	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
3,3'-Dichlorobenzidine	ND	20
Benzo(a)anthracene	ND	10
bis(2-ethylhexyl)phthalate	12	10
Chrysene	ND	10
Di-n-Octylphthalate	ND	10
Benzo(b)fluoranthene	ND	10
Benzo(k)fluoranthene	ND	10
Benzo(a)pyrene	ND	10
Indeno(1,2,3-cd)pyrene	ND	10
Dibenz(a,h)anthracene	ND	10
Benzo(g,h,i)perylene	ND	10
SURROGATE RECOVERY:		
2-Fluorophenol	89%	
Phenol-d5	95%	
Nitrobenzene-d5	80%	
2-Fluorobiphenyl	87%	
2,4,6-Tribromophenol	130%	
Terphenyl-d14	108%	

ND = Not Detected
MDL = Method Detection Limit
* = Detected at a level below the MDL

Analyst: S.E. Murray
Technical Review: S. Albert

4410 89-3278
Analyst:S.E.MURRAY

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890017 RUN 3
DATE SAMPLED: 3/13/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116834
DATE RECEIVED:3/20/1989
RUNNAME:9082B111

118

DATE EXTRACTED: 3/21/1989

HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
Phenol	32	10
bis(-2-Chloroethyl)Ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-Chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
Benzoic Acid	250	50
bis(2-Chloroethoxy)Methane	ND	10
2,4-Dichlorophenol	ND	10
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	50
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	50
Dimethyl Phthalate	ND	10
Acenaphthylene	ND	10
3-Nitroaniline	ND	50
Acenapthene	ND	10
2,4-Dinitrophenol	ND	50
4-Nitrophenol	ND	50
Dibenzofuran	24	10
2,4-Dinitrotoluene	ND	10
2,6-Dinitrotoluene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
Fluorene	ND	10
4-Nitroaniline	ND	50
4,6-Dinitro-2-Methylphenol	ND	50
N-Nitrosodiphenylamine	ND	10

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890017 RUN 3
DATE SAMPLED: 3/13/1989
DATE EXTRACTED: 3/21/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116834
DATE RECEIVED:3/20/1989
RUNNAME:9082B111

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HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	50
Phenanthrene	13	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
3,3'-Dichlorobenzidine	ND	20
Benzo(a)anthracene	ND	10
bis(2-ethylhexyl)phthalate	ND	10
Chrysene	ND	10
Di-n-Octylphthalate	ND	10
Benzo(b)fluoranthene	ND	10
Benzo(k)fluoranthene	ND	10
Benzo(a)pyrene	ND	10
Indeno(1,2,3-cd)pyrene	ND	10
Dibenz(a,h)anthracene	ND	10
Benzo(g,h,i)perylene	ND	10
SURROGATE RECOVERY:		
2-Fluorophenol	16%	
Phenol-d5	16%	
Nitrobenzene-d5	16%	
2-Fluorobiphenyl	16%	
2,4,6-Tribromophenol	18%	
Terphenyl-d14	19%	

ND = Not Detected
MDL = Method Detection Limit
* = Detected at a level below the MDL

Analyst: S E Murray
Technical Review: G. Allen

4410 89-3278
Analyst:S.E.MURRAY

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890018 FIELD BLANK
DATE SAMPLED: 3/13/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116837
DATE RECEIVED:3/20/1989
RUNNAME:9082B101

120

DATE EXTRACTED: 3/21/1989

HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
Phenol	ND	10
bis(-2-Chloroethyl)Ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-Chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
Benzoic Acid	ND	50
bis(2-Chloroethoxy)Methane	ND	10
2,4-Dichlorophenol	ND	10
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	50
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	50
Dimethyl Phthalate	ND	10
Acenaphthylene	ND	10
3-Nitroaniline	ND	50
Acenapthene	ND	10
2,4-Dinitrophenol	ND	50
4-Nitrophenol	ND	50
Dibenzofuran	ND	10
2,4-Dinitrotoluene	ND	10
2,6-Dinitrotoluene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
Fluorene	ND	10
4-Nitroaniline	ND	50
4,6-Dinitro-2-Methylphenol	ND	50
N-Nitrosodiphenylamine	ND	10

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890018 FIELD BLANK
DATE SAMPLED: 3/13/1989
DATE EXTRACTED: 3/21/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116837
DATE RECEIVED:3/20/1989
RUNNAME:9082B101

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HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	50
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
3,3'-Dichlorobenzidine	ND	20
Benzo(a)anthracene	ND	10
bis(2-ethylhexyl)phthalate	19	10
Chrysene	ND	10
Di-n-Octylphthalate	ND	10
Benzo(b)fluoranthene	ND	10
Benzo(k)fluoranthene	ND	10
Benzo(a)pyrene	ND	10
Indeno(1,2,3-cd)pyrene	ND	10
Dibenz(a,h)anthracene	ND	10
Benzo(g,h,i)perylene	ND	10
SURROGATE RECOVERY:		
2-Fluorophenol	74%	
Phenol-d5	87%	
Nitrobenzene-d5	98%	
2-Fluorobiphenyl	102%	
2,4,6-Tribromophenol	108%	
Terphenyl-d14	125%	

ND = Not Detected
MDL = Method Detection Limit
* = Detected at a level below the MDL

Analyst: S E Murray
Technical Review: S. Allyst

4410 89-3278
Analyst:S.E.MURRAY

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890019 TRANSPORT BLA
DATE SAMPLED: 3/13/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116840
DATE RECEIVED:3/20/1989
RUNNAME:9082B091

122

DATE EXTRACTED: 3/21/1989

HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
Phenol	ND	10
bis(-2-Chloroethyl)Ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-Chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
Benzoic Acid	ND	50
bis(2-Chloroethoxy)Methane	ND	10
2,4-Dichlorophenol	ND	10
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	50
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	50
Dimethyl Phthalate	ND	10
Acenaphthylene	ND	10
3-Nitroaniline	ND	50
Acenapthene	ND	10
2,4-Dinitrophenol	ND	50
4-Nitrophenol	ND	50
Dibenzofuran	ND	10
2,4-Dinitrotoluene	ND	10
2,6-Dinitrotoluene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
Fluorene	ND	10
4-Nitroaniline	ND	50
4,6-Dinitro-2-Methylphenol	ND	50
N-Nitrosodiphenylamine	ND	10

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890019 TRANSPORT BLA
DATE SAMPLED: 3/13/1989
DATE EXTRACTED: 3/21/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116840
DATE RECEIVED:3/20/1989
RUNNAME:9082B091

123

HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	50
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
3,3'-Dichlorobenzidine	ND	20
Benzo(a)anthracene	ND	10
bis(2-ethylhexyl)phthalate	11	10
Chrysene	ND	10
Di-n-Octylphthalate	ND	10
Benzo(b)fluoranthene	ND	10
Benzo(k)fluoranthene	ND	10
Benzo(a)pyrene	ND	10
Indeno(1,2,3-cd)pyrene	ND	10
Dibenz(a,h)anthracene	ND	10
Benzo(g,h,i)perylene	ND	10
SURROGATE RECOVERY:		
2-Fluorophenol	84%	
Phenol-d5	100%	
Nitrobenzene-d5	89%	
2-Fluorobiphenyl	96%	
2,4,6-Tribromophenol	123%	
Terphenyl-d14	112%	

ND = Not Detected
MDL = Method Detection Limit
* = Detected at a level below the MDL

Analyst: S E Murray
Technical Review: S. Allsup

4410 89-3278
Analyst:S.E.MURRAY

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890020 LAB BLANK
DATE SAMPLED: 3/13/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116842
DATE RECEIVED:3/20/1989
RUNNAME:9082B081

124

DATE EXTRACTED: 3/21/1989

HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
Phenol	ND	10
bis(-2-Chloroethyl)Ether	ND	10
2-Chlorophenol	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
Benzyl Alcohol	ND	10
1,2-Dichlorobenzene	ND	10
2-Methylphenol	ND	10
bis(2-Chloroisopropyl)Ether	ND	10
4-Methylphenol	ND	10
N-Nitroso-Di-n-Propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	10
Benzoic Acid	ND	50
bis(2-Chloroethoxy)Methane	ND	10
2,4-Dichlorophenol	ND	10
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
4-Chloro-3-Methylphenol	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	50
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	50
Dimethyl Phthalate	ND	10
Acenaphthylene	ND	10
3-Nitroaniline	ND	50
Acenapthene	ND	10
2,4-Dinitrophenol	ND	50
4-Nitrophenol	ND	50
Dibenzofuran	ND	10
2,4-Dinitrotoluene	ND	10
2,6-Dinitrotoluene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
Fluorene	ND	10
4-Nitroaniline	ND	50
4,6-Dinitro-2-Methylphenol	ND	50
N-Nitrosodiphenylamine	ND	10

TWIN CITY TESTING
CLIENT: AM TEST INC.
CLIENT ID: 890020 LAB BLANK
DATE SAMPLED: 3/13/1989
DATE EXTRACTED: 3/21/1989

ANALYSIS DATE: 3/23/1989
TCT ID: 116842
DATE RECEIVED:3/20/1989
RUNNAME:9082B081

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HSL SEMIVOLATILE ORGANIC COMPOUNDS

COMPOUND	UG/SAMPLE	MDL
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Pentachlorophenol	ND	50
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-Butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
3,3'-Dichlorobenzidine	ND	20
Benzo(a)anthracene	ND	10
bis(2-ethylhexyl)phthalate	11	10
Chrysene	ND	10
Di-n-Octylphthalate	ND	10
Benzo(b)fluoranthene	ND	10
Benzo(k)fluoranthene	ND	10
Benzo(a)pyrene	ND	10
Indeno(1,2,3-cd)pyrene	ND	10
Dibenz(a,h)anthracene	ND	10
Benzo(g,h,i)perylene	ND	10
SURROGATE RECOVERY:		
2-Fluorophenol	77%	
Phenol-d5	86%	
Nitrobenzene-d5	93%	
2-Fluorobiphenyl	101%	
2,4,6-Tribromophenol	113%	
Terphenyl-d14	130%	

ND = Not Detected
MDL = Method Detection Limit
* = Detected at a level below the MDL

Analyst: S C Murray
Technical Review: [signature]

4410 89-3278
Analyst:S.E.MURRAY

AMTEST

AmTest Inc
Professional Analytical Services
14603 N E 87th St
Redmond, WA
98052
Fax: 206 883 3495
Tel: 206 885 1664

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ANALYSIS REPORT

CLIENT: AM TEST - Air Quality Division

DATE RECEIVED: 3/16/89

REPORT TO: Kris Hansen

DATE REPORTED: 3/27/89

SWEET - EDWARDS

Laboratory Sample Nos.	Client Identification	Chloride (ug/ml)
903342	Run 1	<1.0
903343	Run 2, Imp 1	<1.0
903344	Run 2, Imp 2	<2.0
903345	Run 3	<1.0

JTD/pb

REPORTED BY J. T. Dailey
John T. Dailey

Example Calculations
Volatiles in Air

Inlet Site - Tedlar Bag - Run 1 - Toluene
Lab results in units of ug/liter

$$\frac{ug}{liter} * \frac{1000\ l}{m^3} = ug/m^3$$

$118\ ug/l * 1000 =$ **118000 ug/m³ toluene**

$$118000\ ug/m^3 * .02832\ \frac{m^3}{ft^3} * 60\ \frac{min}{hr} * \frac{1\ mg}{1000\ ug} * 679.9\ \frac{dscf}{min}$$

= **136323.8 mg/hr toluene**

Outlet Site - VOST - Run 1 - Set 1 - Toluene

>50000 ng Toluene in Tenax + 17000 ng in charcoal
= >67000 ng toluene in sample

>67000 ng / 0.015 dscm * 1 ug/1000 ng = **>4466.7 ug/m³**

>67000 ng / 0.532 dscf * 4854.6 dscf/min * 60 min/hr * 1 mg/10^6 ng

=>36683.3 mg/hr toluene

Destruction Efficiency of Toluene

$$\frac{(123329\ mg/hr - >13432\ mg/hr)}{123329\ mg/hr} * 100 = 89.1\%\ \text{efficiency}$$

(Avg. Inlet − Avg. Outlet) / Avg Inlet

Example Calculation of Inlet Airflow Run 3

Velocity measured using KURZ velometer - average

2640 feet/minute

To calculate actual cubic feet per minute (acfm):

$2640\ ft/min * \text{area of duct } 0.267\ ft^2 = \underline{705.6\ ft^3/min}$

To calculate dry standard cubic feet per min (dscf/min):

$$705.6\ \frac{ft^3}{min} * \frac{528^\circ R\ (\text{std temp})}{574.9^\circ K\ (\text{stack temp})} * \frac{31.08"\ Hg\ (P_s)}{29.92\ Hg\ (P_{std})} * \left(1 - \underset{.043}{B_{ws}}\right) =$$

$\underline{644.3\ dscf/min}$

SAMPLE CALCULATION SHEET
METHODS 1-5

CLIENT: Brent Edwards/ERICON DATE OF TEST: 3-13-89

LOCATION: Cedar Hills Landfill RUN #: 1 - VOST - Set 1

Particulate Matter Emission Concentration - Equation 5-1

Vm_{std} = 17.647 * .526 ft^3 * 1.002 * (29.62 "Hg + (0.0 "H_2O/13.6))/(460 + 57.6 °F)

= 0.532 dscf

dscm = 0.532 dscf/35.3 ft^3/m^3

= 0.015 dscm

Substitution of Equation 5-4 into 5-5

W_a = _____ mg * _____ ml /_____ ml

= NA mg

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

= NA mg = _____ mg + _____ mg - _____ mg +_____ mg

C_s= (0.001 g/mg) * (15.43 grains/gram) * _____ mg /_____ dscf

= NA gr/dscf (Equation 5-6)

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

= NA gr/dscf @ 7% O_2

gr/dscf @ 12% CO_2 = _____ gr/dscf * 12% / _____ %CO_2

= NA gr/dscf @ 12% CO_2

mg/dscm = _____ mg/_____ dscm

= NA mg/dscm

Particulate Matter Emission Rate

pounds/hour = _____ gr/dscf * _____ dscf/min * 60 min/hr * 1 lb/7000 grains

= NA lb/hr

Moisture - Equation 5-2 and 5-3

Vw_{std} = (0.04707 * _____ grams of H_2O condensed) +
(0.04715 * _____ grams of H_2O in silica gel)

= NA scf

SAMPLE CALCULATION SHEET (continued)
METHODS 1-5

B_{ws} = (_____scf)/(_____scf + _____dscf)

= .0635 from Semi VOST

%Moisture = .0635 * 100

= 6.35 % rounded to 6 on printout

Molecular weight - Equation 3-2

M_d = 0.440 * (5.1 %CO_2) + 0.320 * (14.8 %O_2) + 0.280 * (80.1 % CO + %N_2)

M_d = 29.41 g/g-mole (dry)

M_s = 29.41 g/g-mole * (1 - .0635) + 18.0 * .0635

M_s = 28.68 g/g-mole (wet)

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

V_s = 85.49 * .85 * .1225 * $\sqrt{1703.1}$ ° R / 28.68 g/g-mole / 29.62 "Hg

V_s = 12.60 ft/sec (std)

Q_{sd} = 3600 * (1 - .0635) * 12.60 ft/sec * 22.34 ft^2 * (528 ° R/1703.1 ° R) * (29.62 "Hg/ 29.92 "Hg)

= 291274.4 dscf/hr / 60 min/hr

= 4854.6 dscf/min (dry standard cubic feet per minute)

acfm = 12.60 ft/sec * 22.34 ft^2 * 60 sec/min

= 16890.1 acfm (actual cubic feet per minute)

Isokinetic variation - Equation 5-8

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

I = NA %

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

SAMPLE CALCULATION SHEET
METHODS 1-5

CLIENT: Sweet-Edwards/EMCON DATE OF TEST: 3-14-89

LOCATION: Cedar Hills Landfill Flare Outlet RUN #: 1 - Semi-VOST/HCl

Particulate Matter Emission Concentration - Equation 5-1

Vm_{std} = 17.647 * 91.035 ft^3 * .999 * (29.62 "Hg + (0.810 "H_2O/13.6))/(460 + 94.8° F)

= 85.855 dscf

dscm = 85.855 dscf/35.3 ft^3/m^3

= 2.432 dscm

Substitution of Equation 5-4 into 5-5

W_a = _____ mg * _____ ml /_____ ml

= NA mg

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

= 0.0 mg = 0.0 mg + NA mg - NA mg + _____ mg

C_s = (0.001 g/mg) * (15.43 grains/gram) * 0.0 mg / 85.855 dscf

= 0.0 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 = 0.0 mg/ 2.432 dscm

= 0.0 mg/dscm

Particulate Matter Emission Rate

pounds/hour = 0.0 gr/dscf * 4818.2 dscf/min * 60 min/hr * 1 lb/7000 grains

= 0.0 lb/hr

Moisture - Equation 5-2 and 5-3

Vw_{std} = (0.04707 * 107.5 grams of H_2O condensed) +
(0.04715 * 13.8 grams of H_2O in silica gel)

= 5.71 scf

SAMPLE CALCULATION SHEET (continued)
METHODS 1-5

B_{ws} = (5.71 scf)/(5.71 scf + 85.855 dscf)

= 0.0624

%Moisture = .0624 * 100

= 6.24 %

Molecular weight - Equation 3-2

M_d = 0.440 * (5.1 $\%CO_2$) + 0.320 * (14.8 $\%O_2$) + 0.280 * (80.1 % CO + $\%N_2$)

M_d = 29.41 g/g-mole (dry)

M_s = 29.41 g/g-mole * (1 - .0624) + 18.0 * .0624

M_s = 28.70 g/g-mole (wet)

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

V_s = 85.49 * .845 * .1225 * $\sqrt{}$ 1712.0° R / 28.70 g/g-mole / 29.62 "Hg

V_s = 12.56 ft/sec (std)

Q_{sd} = 3600 * (1 - .0624) * 12.56 ft/sec * 22.34 ft^2 * (528° R/ 1712° R) * (29.62 "Hg/ 29.92 "Hg)

= 289094 dscf/hr / 60 min/hr

= 4818.2 dscf/min (dry standard cubic feet per minute)

acfm = 12.56 ft/sec * 22.34 ft^2 * 60 sec/min

= 16830.8 acfm (actual cubic feet per minute)

Isokinetic variation - Equation 5-8

I = 0.09450 * 85.855 dscf * 1712 ° R/(29.62 "Hg * 12.56 ft/sec * 180 min * .0017 ft^2 *(1 - .0624))

I = 128 % OK 013

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

HCl results were not less than the detection limit of the method.

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

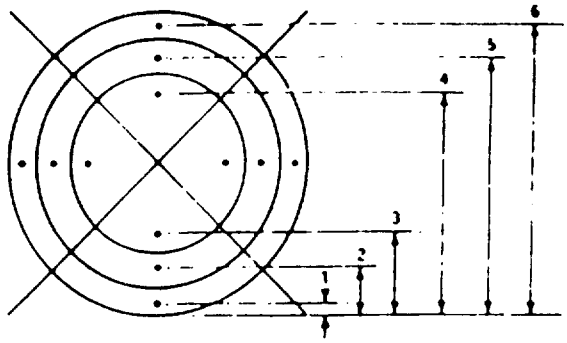

Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points indicated.

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	78.4	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	88.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	85.4	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.

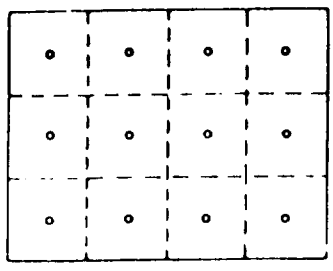

Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with a traverse point at centroid of each area.

METHOD 1 - MINIMUM NUMBER OF TRAVERSE POINTS

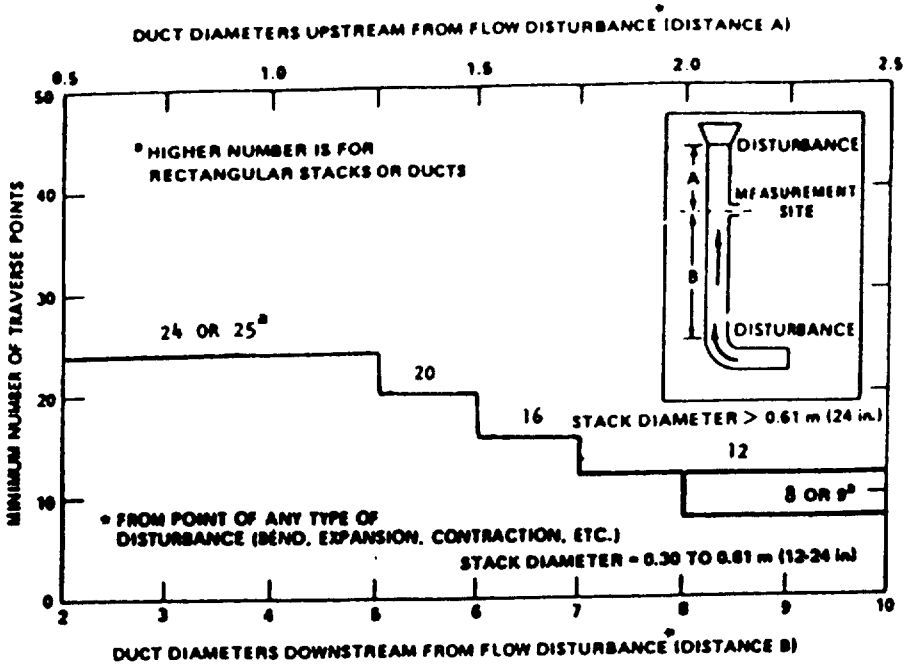

Figure 1-1. Minimum number of traverse points for particulate traverses.

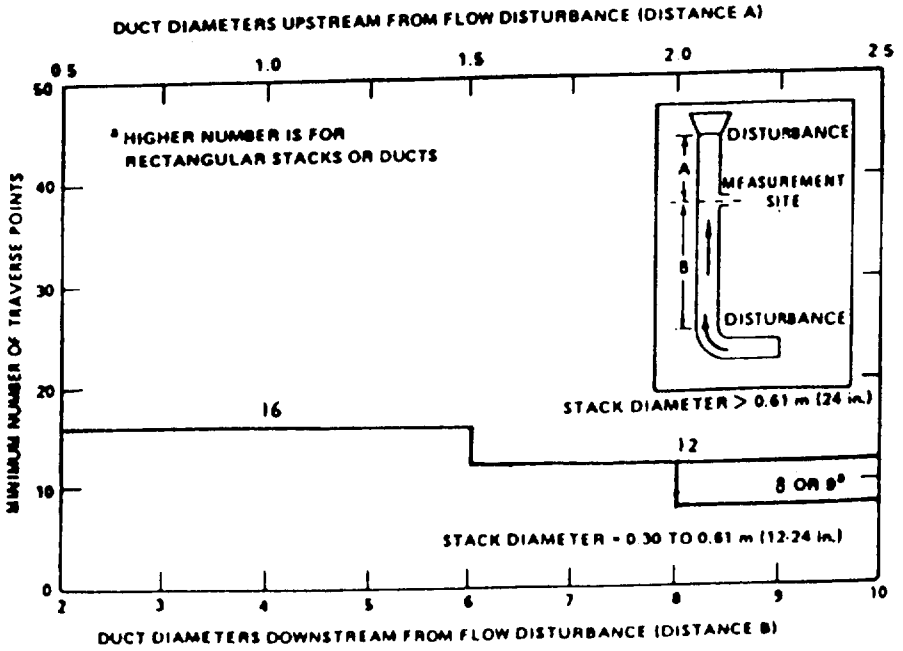

Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

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,

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

for the metric system and

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

for the English system.

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

$$= M_d(1 - B_{ws}) + 18.0\,B_{ws} \qquad \text{Eq. 2-5}$$

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).

$$= P_{bar} + P_g \qquad \text{Eq. 2-6}$$

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).

$$= 273 + t_s \text{ for metric.} \qquad \text{Eq. 2-7}$$

$$= 460 + t_s \text{ for English.} \qquad \text{Eq. 2-8}$$

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 H_2O (in. H_2O).
3,600 = Conversion factor, sec/hr.
18.0 = Molecular weight of water, g/g-mole (lb/lb-mole).

5.2 Average Stack Gas Velocity.

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{s\,avg}}{P_s M_s}} \qquad \text{Equation 2-9}$$

5.3 Average Stack Gas Dry Volumetric Flow Rate.

$$Q_{sd} = 3{,}600(1 - B_{ws})\,v_s A \left(\frac{T_{std}}{T_{s\,avg}}\right)\left(\frac{P_s}{P_{std}}\right) \qquad \text{Eq. 2-10}$$

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.
$\%CO_2$ = Percent CO_2 by volume (dry basis).
$\%O_2$ = Percent O_2 by volume (dry basis).
%CO = Percent CO by volume (dry basis).
$\%N_2$ = Percent N_2 by volume (dry basis).
0.264 = Ratio of O_2 to N_2 in air, v/v.
0.280 = Molecular weight of N_2 or CO, divided by 100.
0.320 = Molecular weight of O_2 divided by 100.
0.440 = Molecular weight of CO_2 divided by 100.

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

$$\%\,EA = \frac{\%O_2 - 0.5\%\ CO}{0.264\%\ N_2(\%O_2 - 0.5\%\ CO)} \times 100 \qquad \text{Eq. 3-1}$$

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

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

$$M_d = 0.440(\%CO_2) + 0.320(\%O_2) + 0.280(\%N_2 + \%CO) \qquad \text{Eq. 3-2}$$

METHOD 4 - STACK GAS MOISTURE CALCULATIONS

2.3.1 Nomenclature.

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

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

P_m = Absolute pressure (for this method, same as barometric pressure) at the dry gas meter, mm Hg (in. Hg).

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

R = Ideal gas constant, 0.06236 (mm Hg) (m^3)/(g-mole) (°K) for metric units and 21.85 (in. Hg) (ft^3)/(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).

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

$V_{w(std)}$ = 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.

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

$$= K_1 (V_f - V_i)$$

Eq. 4-1

K_1 = 0.001333 m^3/ml for metric units
= 0.04707 ft^3/ml for English units

2.3.3 Volume of Water Vapor Collected in Silica Gel.

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

$$= K_2 (W_f - W_i)$$

Eq. 4-2

Where:

K_2 = 0.001335 m^3/g for metric units
= 0.04715 ft^3/g for English units

2.3.4 Sample Gas Volume.

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

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

Eq. 4-3

Where:

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

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

2.3.5 Moisture Content.

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

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.

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

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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

COMPONENTS	CERTIFIED CONC	REFERENCE STD SRM/CRM NO.	REFERENCE STD CYL. NO.	REFERENCE STD CONC.	GAS ANALYZER MAKE/MODEL/SERIAL NO.	GAS ANALYZER LAST CAL. DATE	GAS ANALYZER ANALYTICAL PRINCIPLE
NITRIC OXIDE	91.38 ppm	SRM 1684 B	AAL-6032	94.54 ppm	THERMO-ELECTRON/	11/1/88	CHEMI-LUMINENSCENT
NOX	91.50 ppm				10 AR/ 14853-150		
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: _____

37

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.

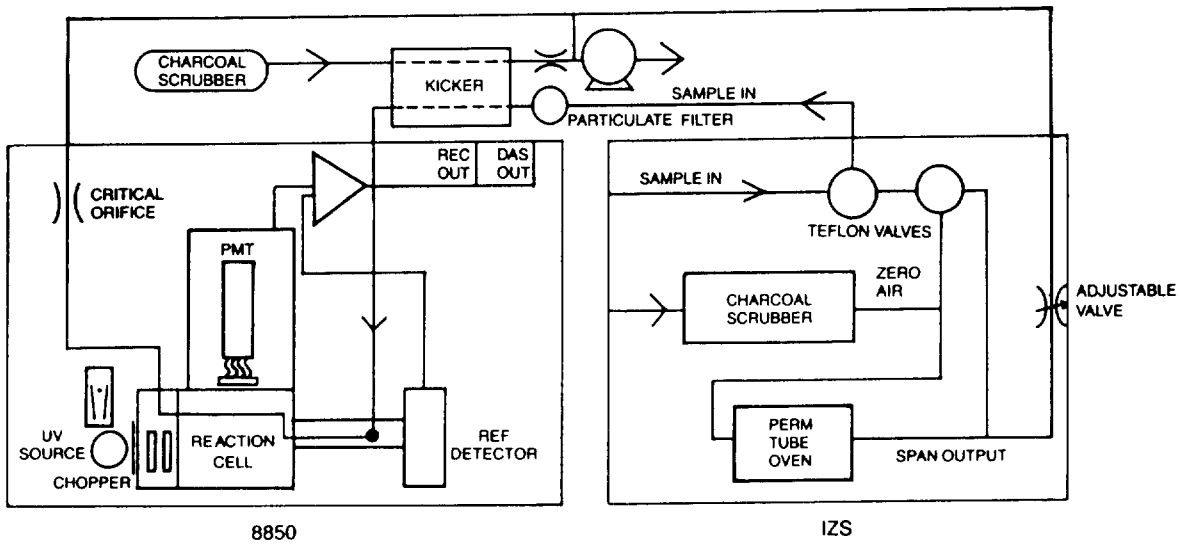
Instrument calibration adjustment time is reduced by the 8850's CALTRACK™ "instant response" zero control.

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

Prices and specifications subject to change without prior notice

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

Printed in U.S.A. 8704-5NP

DESCRIPTION

The Model 8770 H_2S to SO_2 converter quantitatively oxidizes hydrogen sulfide to sulfur dioxide from below 2 ppb to 10.0 ppm When used with a Model 8850 Fluorescent SO_2 Analyzer, it provides a convenient and low maintenance method for the analysis of ambient H_2S concentrations.

Air enters the system through a 5 micron particle filter to remove dust. The SO_x scrubber, which may be bypassed to measure total sulfur, removes SO_2 and SO_x. The catalytic oxidizer oxidizes H_2S to SO_2. This process operates at 300°C and eliminates the special hardware required for the more stressful thermal oxidation systems that operate from 700 - 900°C. The sample containing the oxidized H_2S flows into the fluorescent SO_2 analyzer whose output is equal to the H_2S in the original sample. The Model 8770 includes the sample pump for the 8850 so no additional pump is required.

The ML 8850 is used to measure the output of the 8770 converter and report H_2S concentration. The time proven ML 8850 combined with the proven catalytic conversion process make the ML 8780 the system of choice for fast and accurate response to H_2S.

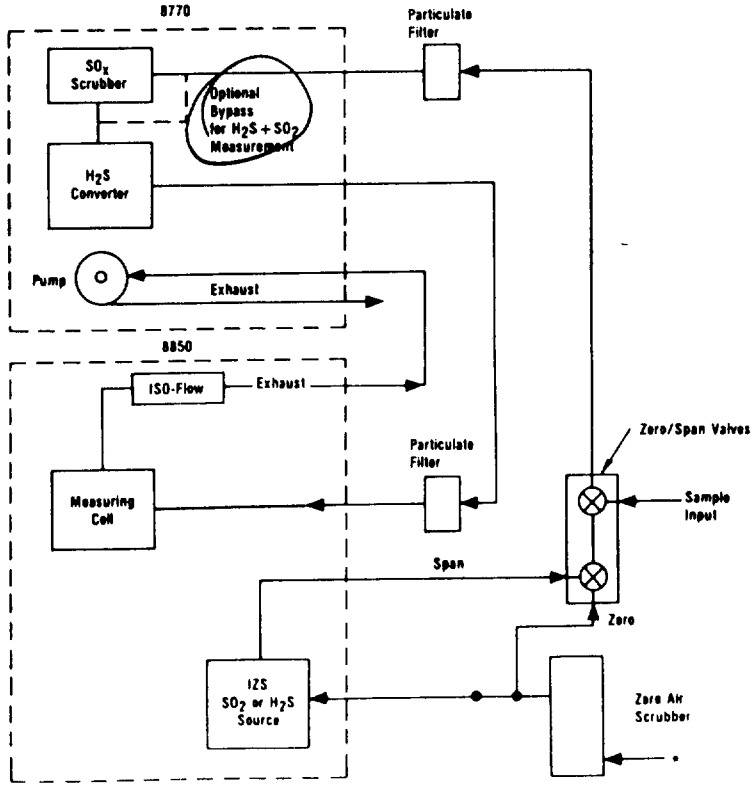
The Model 8770/Model 8850 Hydrogen Sulfide Measurement System represents the state-of-the-art in measurement of H_2S in ambient air. To order the superior H_2S Analyzer, order the ML Model 8780

SPECIFICATIONS

dilute 1st

Lower Detectable Concentration	< 0.002 ppm H_2S
Noise (RMS)	< 0.001 ppm
Zero Drift	Less than 4 ppb/7 days Less than 3 ppb/24 hours
Span Drift	Less than 1%/7 days Less than 0.5%/24 hours
Response Time (95%)	< 7 mins.
Lag Time	< 30-sec.
Interference	< 50% response to other reduced sulfur compounds < 1% response to SO_2 present
Ranges	0 – .25, .5, 1.0, 2.0, 5.0 and 10 ppm selectable
Converter Life	> 1000 ppm hours
SO_x Scrubber Life	500 ppm hours
Flow rate of sample	500 cc/min. nominal
Dimensions (Model 8770 H × W × D)	8.5" × 19" × 10" (21.6 cm × 48.3 cm × 25.4 cm)
Weight (Model 8770)	35 lbs. (15.9 Kg)

See Model 8850 Specification Sheet for additional information.



* Humid air is suspected of causing the output of H_2S permeation tubes to become unstable. Users who plan to use the IZS to determine span stability are encouraged to add an air drier at this point

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Continental U.S. 800-637-7730 In California, (619) 578-5060.

Printed in U.S.A. 8706 5KS

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, 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

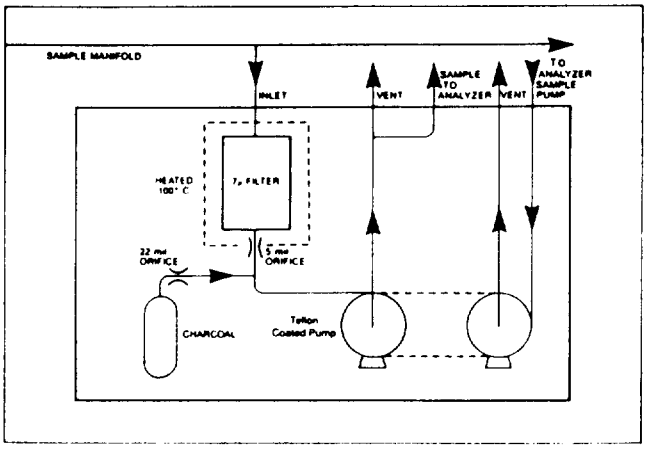
	20:1 Active Dilution Using Orifices	20:1 Active Dilution Using Orifices

Operational Performances

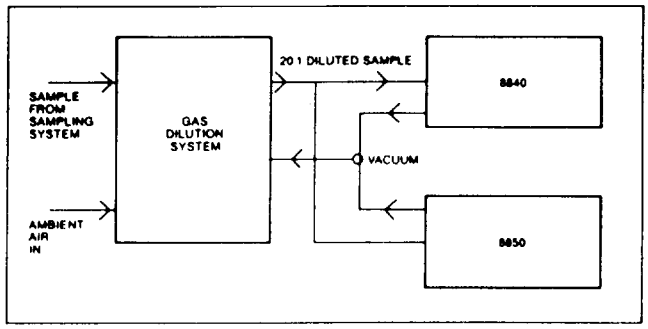
Ranges	0-25, 0-500, 0-100, 0-50, 0-1000ppm SO_2	0-50, 0-100, 0-200, 0-500, 0-1000, 0-2500 0-5000ppm NO_x
Detection Limit	1 ppm	1 ppm
Linearity	± 1%	± 1%
Span Drift	< 2%/wk	< 2%/wk
Zero Drift	< 2%/wk	< 2%/wk
Response Time/Range	< 5 min to 95%	< 60 sec to 95%
Time Constants	60 sec.	55 sec.
Lag Time	<10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

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Printed in U.S.A. 8706 5KS

DESCRIPTION

The single chopper, dual channel Model 8840 is the most accurate, simplest chemiluminescent NO_2 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.

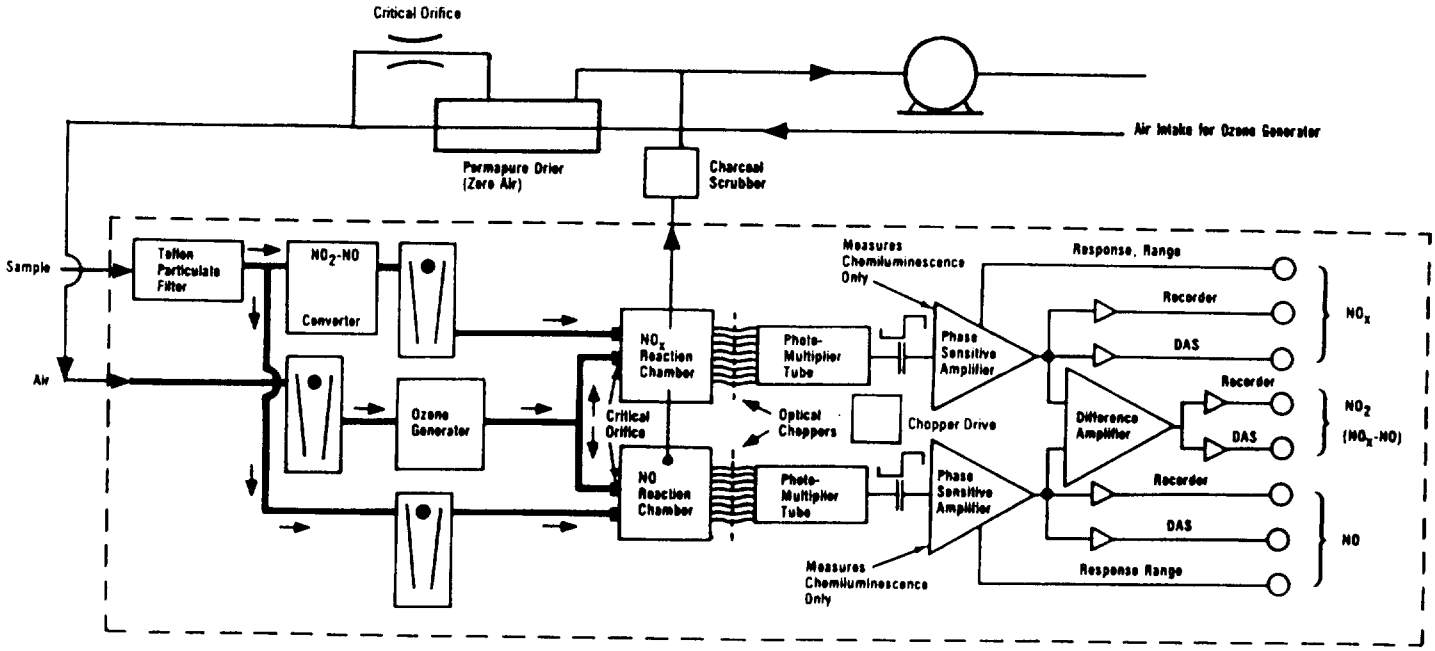
There are two isolated analog outputs at the rear for recorders and data acquisition systems for each output (NO_x, NO, and NO_2).

The 8840 is truly a second generation dual channel NO_2 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.

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.

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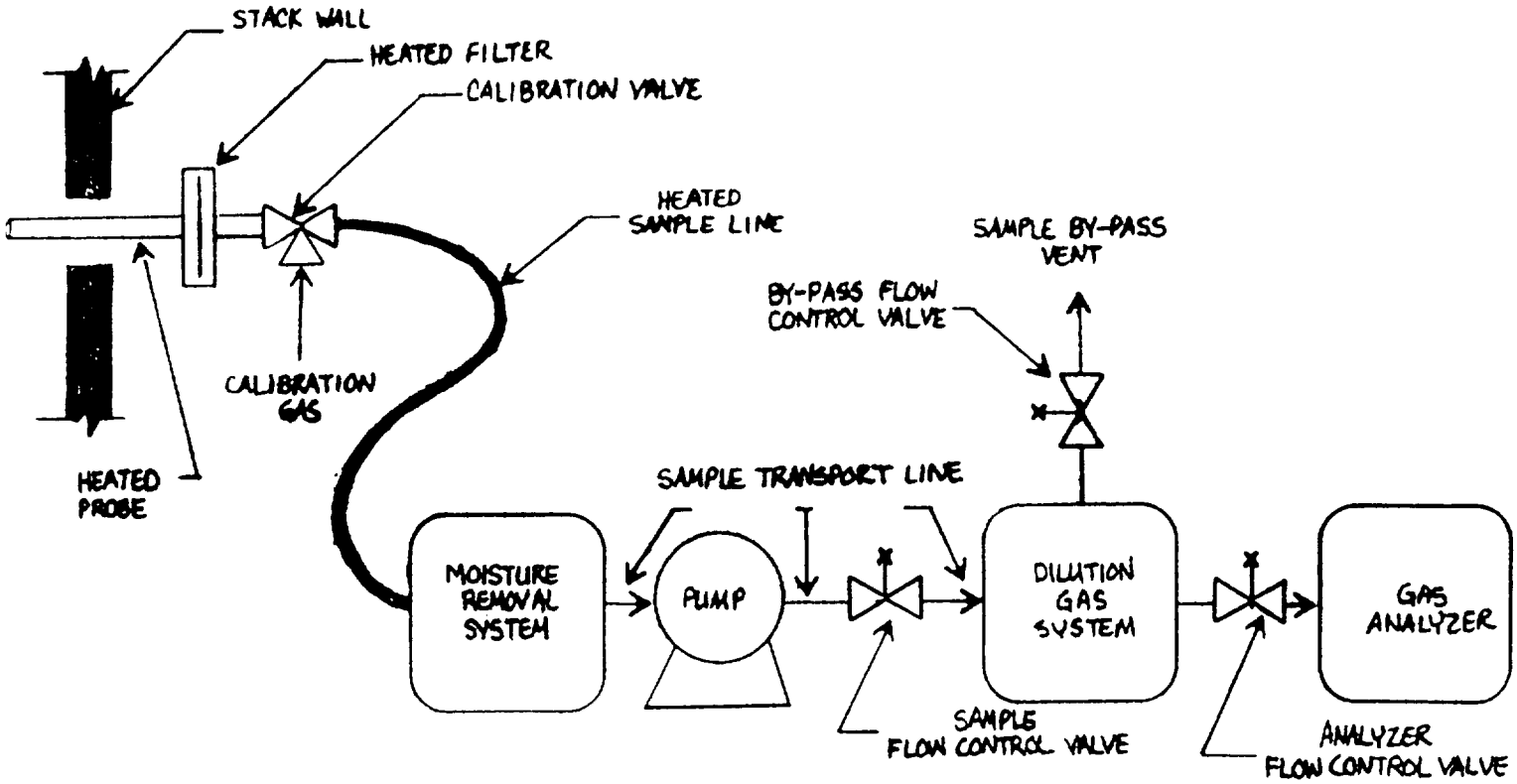

Figure 1. EPA Method 6C sampling system schematic.

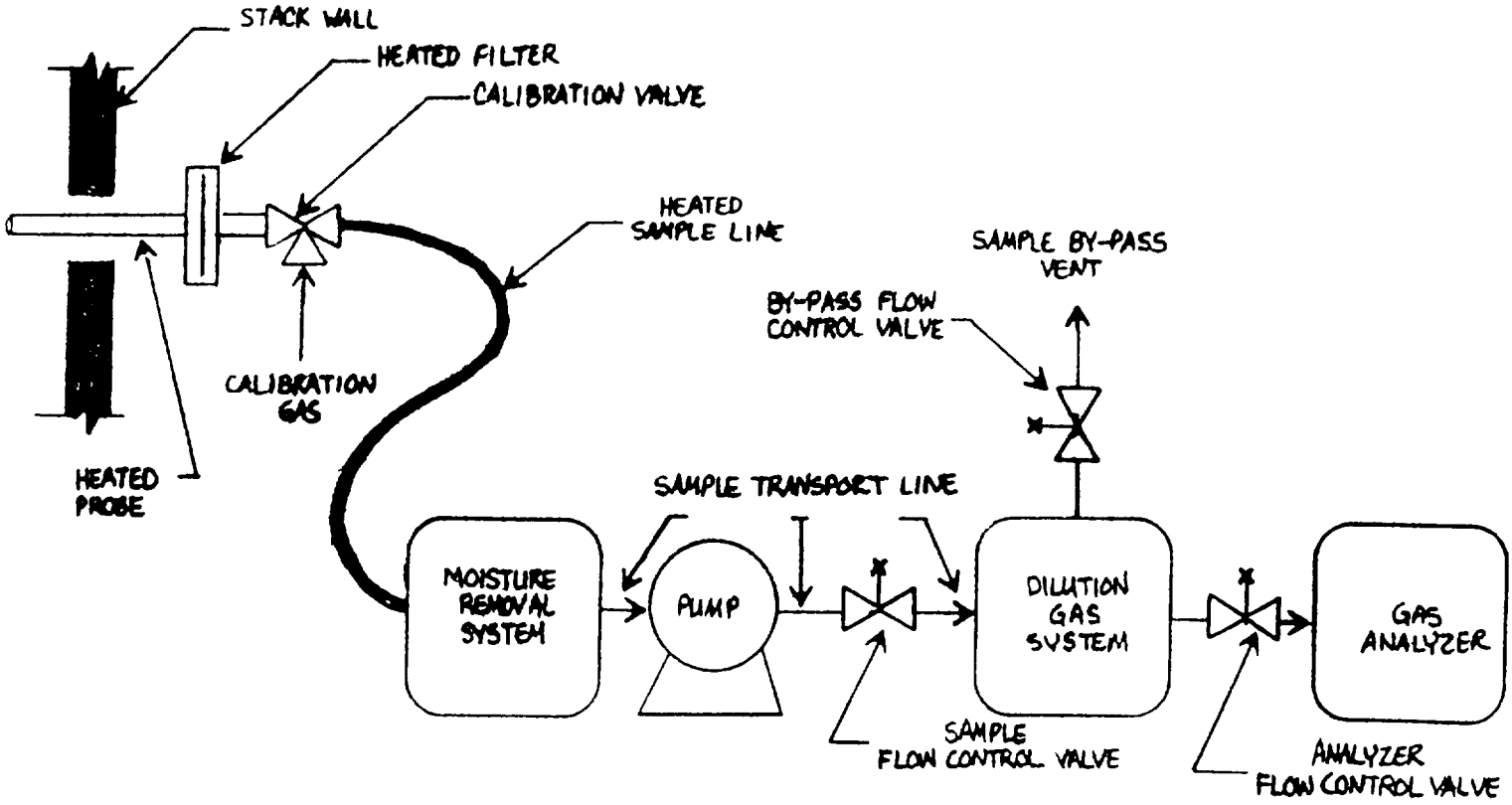

Figure 2. EPA Method 7E sampling system schematic.

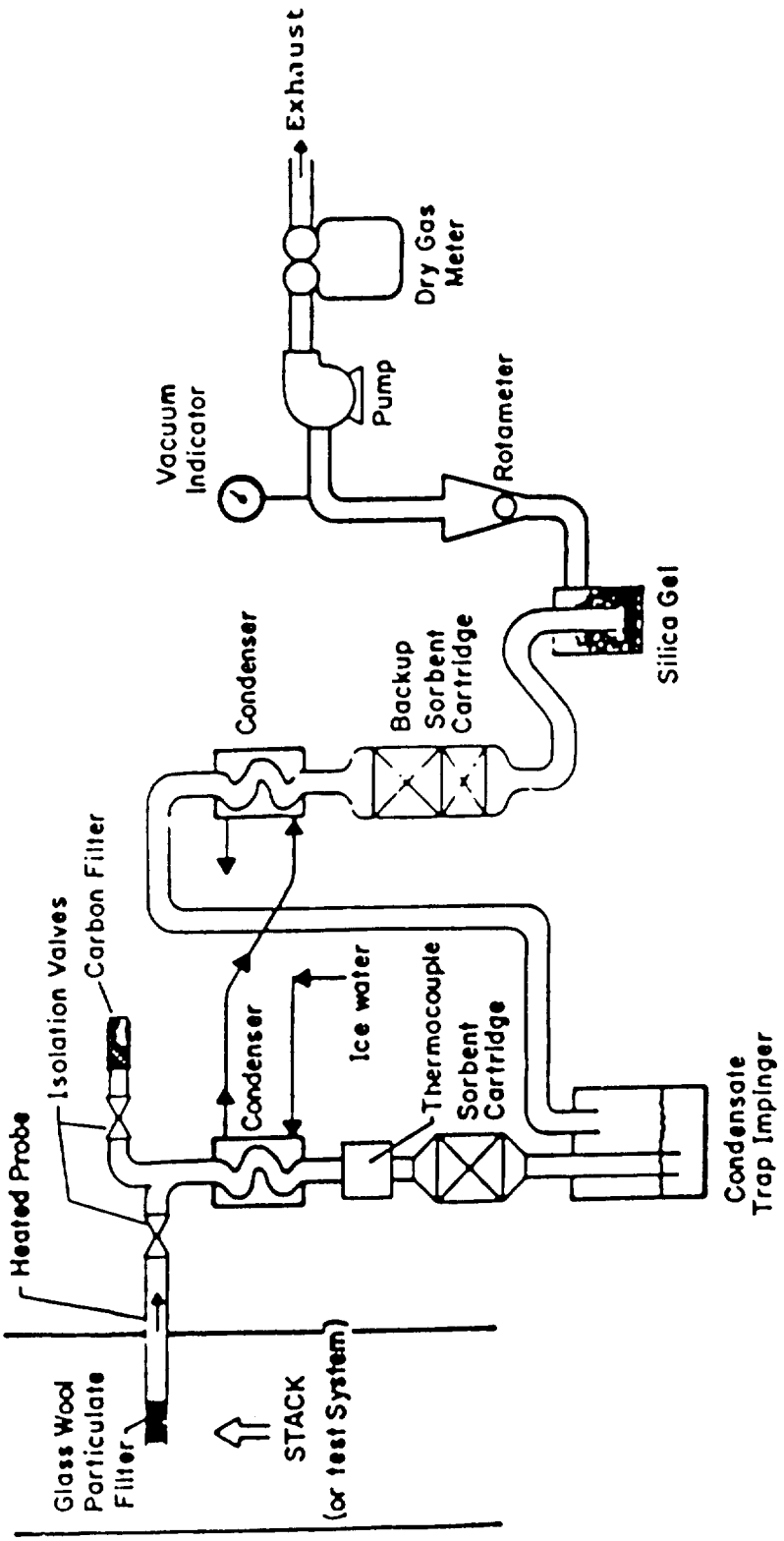

FIGURE 3
SCHEMATIC OF
VOLATILE ORGANIC SAMPLING TRAIN
(VOST)

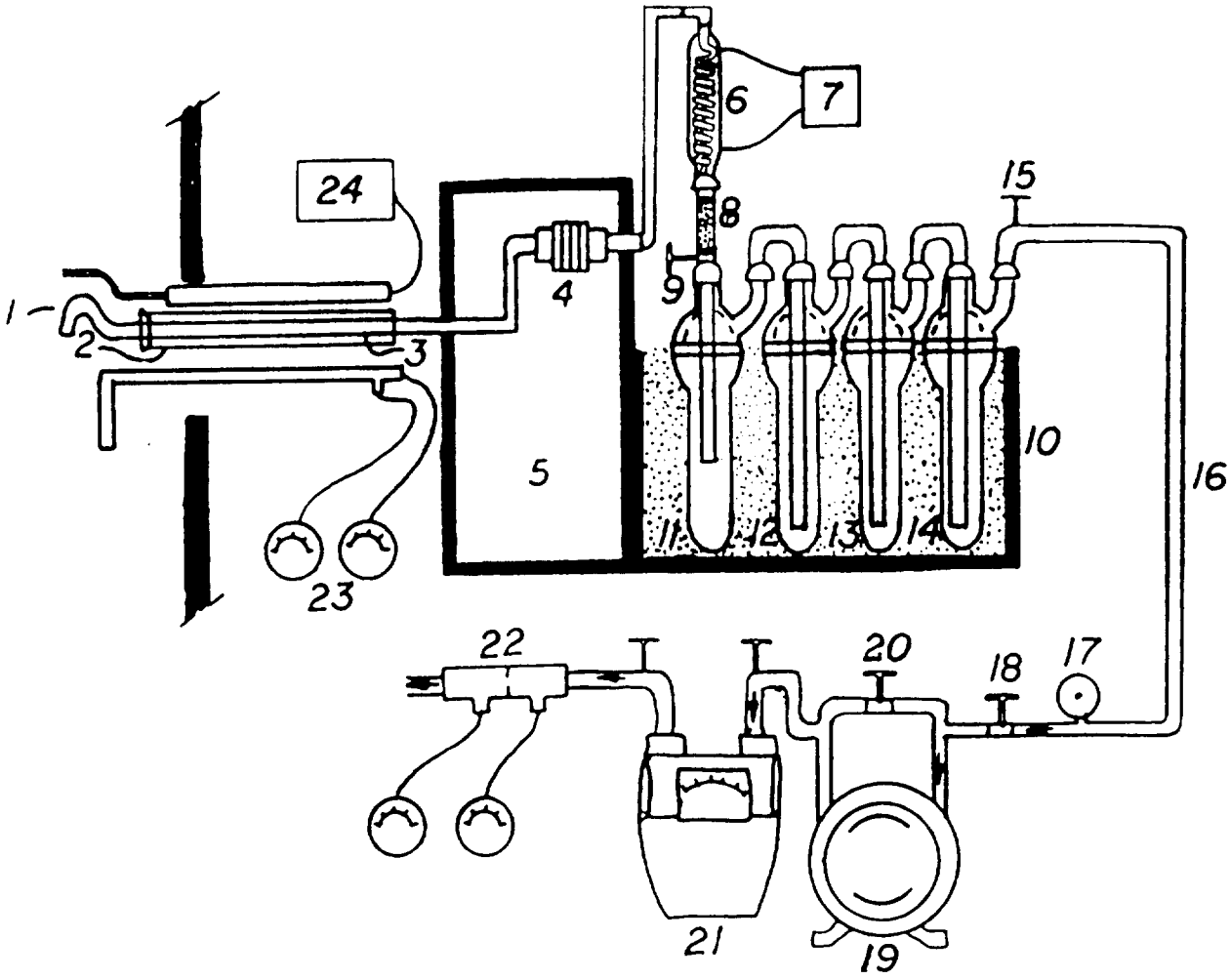

Figure 4. Semi-Volatile Organic Sample Train.

1. Sampling nozzle
2. Sampling probe sheath
3. Heated sample probe liner
4. Out of stack filter assembly
5. Heated filter compartment maintained at 248°F ± 25°F (or temperature specified in 40 CFR subpart)
6. Ice water cooled coil condenser
7. Recirculating pump
8. Sorbent module containing XAD-2 resin
9. Sorbent module exit gas temperature sensor
10. Impinger case - contains ice during sampling
11. First impinger w/ short stem - empty
12. Modified Greenburg-Smith impinger containing 100 ml H_2O
13. Third impinger - empty
14. Fourth impinger containing indicating silica gel desiccant
15. Impinger exit gas temperature sensor
16. Umbilical cord - vacuum line
17. Pressure gauge
18. Coarse adjustment valve
19. Leak free pump
20. By-pass valve
21. Dry gas meter with inlet and outlet temperature sensors
22. Orifice meter with magnehelic gauges
23. P or S-type pitot tube with magnehelic gauges
24. Fluke multi-channel digital thermocouple indicator

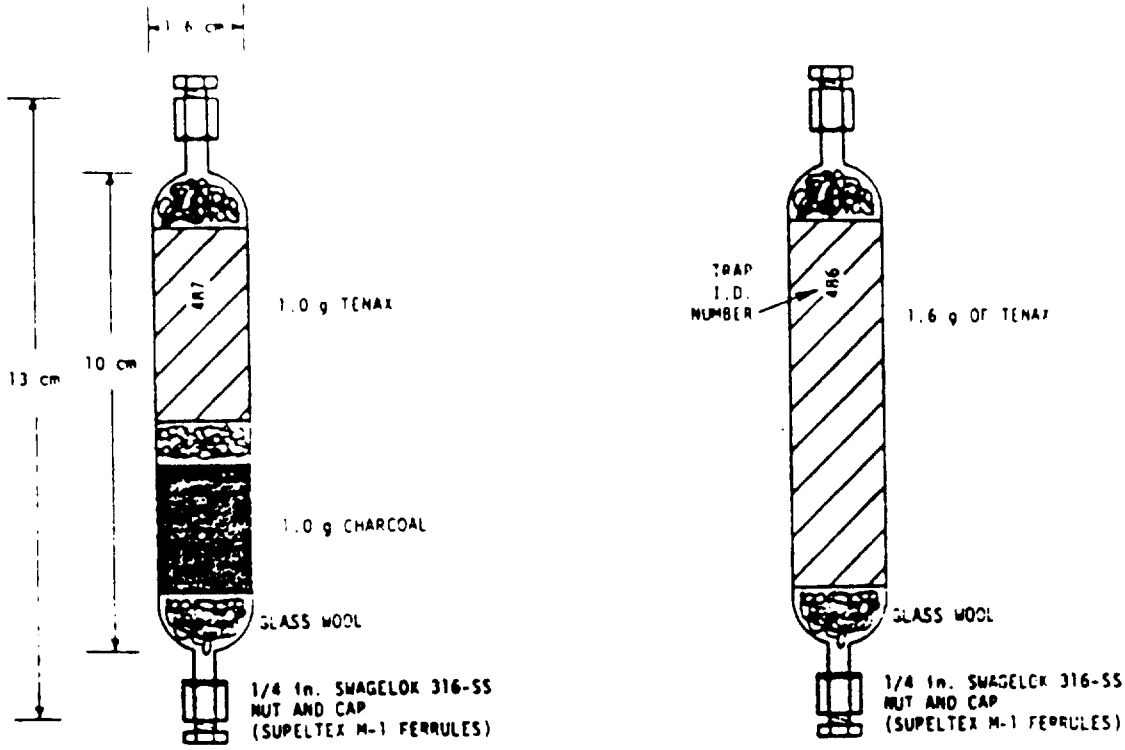

Figure 1. Sorbent trap configurations.

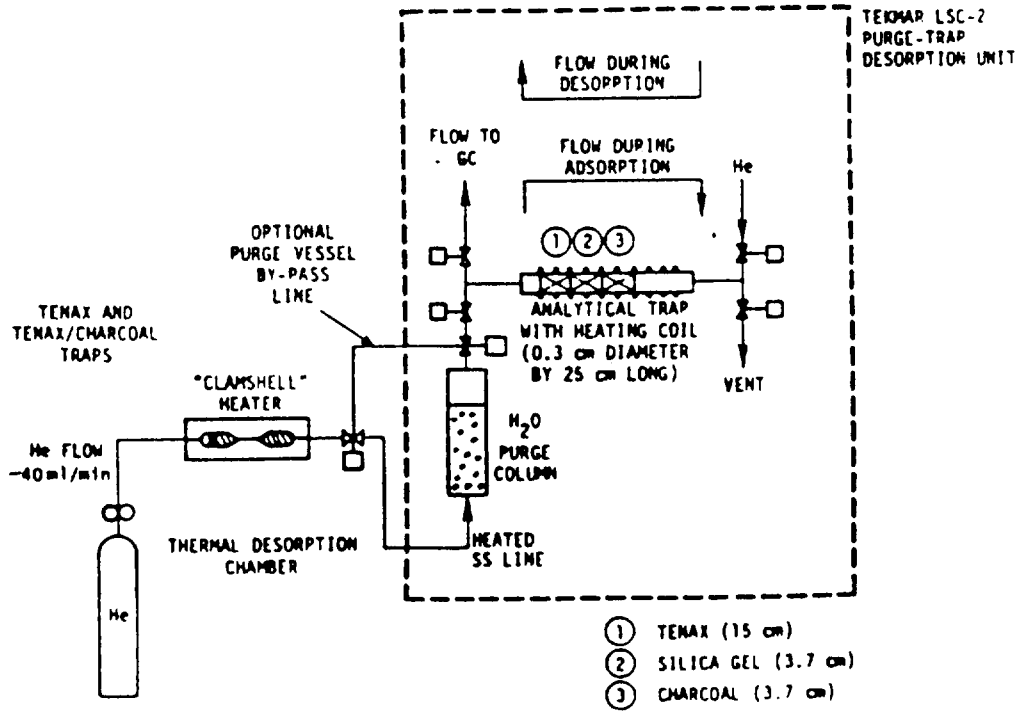

Figure 5. Schematic of sorbent trap desorption and purge and trap apparatus.

AT

CH2-IN-1

TRAVERSE SAMPLING DATA

Client Sweet-Edwards
Date 3-13-89
Sample Location Cedar Hills
~~E~~ Inlet to Combustor
Operators KdH, HEB, EKL
Sample Box # ____
Run# 1- Inlet

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 7'11"
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~~ VAPOR 10%

Start Time ____
Stop Time ____
Barometric Pressure "Hg 29.62
Static Pres"H_2O +18.5
Production Rate ____

NOMOGRAPH SETUP

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

Sample Point	~~Elap~~ Time ~~Met.~~	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	Velocity ft/min
	14:00											119.5	2330
	17:00											112.2	3270
													O_2 = 2.6%
													CO_2 = 30.6%

V ____ √ΔP ____ ΔH ____ T_s ____ 115.9 T_m ____

AT

TRAVERSE SAMPLING DATA

Client Nucor - Edwards
Date 5-14-89
Sample Location Cedar Hills
Inlet to Combustor
Operators KAH
Sample Box # —
Run # 2 - Inlet

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 08:07
Stop Time ____
Barometric Pressure "Hg 29.70
Static Pres "H_2O 18.5
Production Rate ____

NOMOGRAPH SETUP

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

Time / 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	Velocity fpm
08:07												110.9	2400
08:12												110.6	2420
08:37												110.6	2440
08:41												110.6	2400
08:46												111.0	2360
08:51												111.0	2330
08:56												111.5	2350
09:01												111.0	2360
09:05												111.0	2330
09:10												111.0	2250
09:15												111.4	2390
09:20												111.4	2330
09:25												111.5	2280
09:30												111.4	2310
09:35												111.4	2280
09:40												111.0	2360
09:45												111.4	2330
09:50												111.7	2340
09:55												111.2	2330
10:00												111.3	2320
10:05												111.6	2290
10:10												112.0	2340
10:15												112.0	2340
10:20												112.3	2330

V √ΔP×Z ΔH T_m T_s

AT

TRAVERSE SAMPLING DATA

Client Envirt - Edwards
Date 3-14-89
Sample Location Cedar Hills Inlet to Combustor
Operators KAH, ERC
Sample Box # —
Run # 2 - Inlet

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 ____
Stop Time ____
Barometric Pressure "Hg ____
Static Pres "H_2O + 18.5
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 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	
[illegible]												112.0	2340
1030												112.0	2360

V_ (√ΔP)² ΔH T_ T_

AT

TRAVERSE SAMPLING DATA

Client Sweet - Edwards
Date 3-14-89
Sample Location Cedar Hills
Inlet to Combustor
Operators KAH, ERC
Sample Box # —
Run# 3 - Inlet

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 7"
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 11:14
Stop Time ____
Barometric Pressure "Hg 29.72
Static Pres "H_2O +18.5
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 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	Velocity fpm
	0											112.6	2320
	5											112.9	2360
	10											112.8	2320
	15											113.4	2320
	20											113.4	2330
	25											113.7	2320
	30											114.0	2350
	35											114.0	2320
	40											114.2	2340
	45											114.2	2400
	50											114.4	2450
	55											115.6	2400
	60											115.6	2440
	65											114.5	2770
	70											114.5	2830
	75											114.2	2810
	80											114.5	2820
	85											114.2	2810
	90											114.2	2830
	95											114.2	2810
	100											114.5	2810
	105											114.6	2780
	110											114.9	2780
	115											115.1	2800

V (√ΔP)² ΔH T_m T_s

AT

TRAVERSE SAMPLING DATA

Client Sweet - Edwards
Date 3-14-89
Sample Location Cedar Hills Inlet to Combustor
Operators RAH, ERL
Sample Box #
Run# 3- Inlet

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 7"
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
Stop Time 207
Barometric Pressure "Hg 29.72
Static Pres "H_2O 18.5
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 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	Velocity FPM
	120											115.6	2780
	125											115.7	2810
	130											115.7	2790
	135											115.9	2810
	140											115.5	2800
	145											115.5	2800
	150											115.6	2810
	155											116.5	2790
	160											116.7	2780
	165											117.1	2820
	170											117.3	2810
	175											117.7	2810
	180												

AT

TRAVERSE SAMPLING DATA

Client Sweet-Edwards
Date 3-13-89
Sample Location Cedar Hills Flare Outlet
Operators KdH, AFB, ERC
Sample Box # 1
Run# 1-West

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 64"
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 1340
Stop Time 1625
Barometric Pressure "Hg 29.62
Static Pres"H_2O 0.0
Production Rate ____

NOMOGRAPH SETUP

% Moisture ____
Meter Temp. ____
Stack Temp. ____
ΔH@____ Y 1.002
Pitot#____ Side#____
Cp .85
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	#1 Stack Temp °F	
	0	624.309	.015		.5 per	56	55	0	—	55	1226	O_2=14.8%
	5				.5	59	58	0	—	54	1233	
	10				.5 per	57	56	0	—	53	1282	CO_2=5.1%
	15				.5 per	56	56	0	—	52	1288	
	20				.5	58	58	0	—	52	1280	CO=116ppm
	25				.5	58	58	0	—	51	1256	
	30	624.835			.5	60	59	0	—	51	1245	SO_2=<1ppm
	35	~~624.835~~			.5	59	58	0	—	51	1284	
—	40	switched					57.6			51		NO_x=14ppm
	45				.5	60	59	0	—	51	1223	5
	50	625.132			.5	58	58	0	—	52	1242	10
	55				.5	58	57	0	—	51	1276	15
	60				.5	58	57	0	—	52	1257	20
	65				.5	58	57	0	—	52	1227	25
	70				.5	58	57	0		52	1225	30
	75				.5	57	57	0	—	51	1214	35
	80				.5	56	56	0	—	51	1240	40
	85				.5	55	55	0	—	51	1253	45
	90				.5	55	55	0	—	51	1242	50
	95				.5	54	54	0	—	52	1241	55
	100				.5	55	54	0	—	51	1208	60
	105				.5	54	54	0	—	51	1280	65
	110				.5	54	53	0	—	51	1201	70
	115				.5	53	52	0		51	1204	75
	120	626.74			.5	53	52	0	—	51	1203	80 ✓

V √ΔP×2 ΔH T_m T_s

AT

TRAVERSE SAMPLING DATA

Page 1 of _____

Client Sunoco - [illegible]
Date 3-11-91
Sample Location Main Stack
Operators KAH, ERL, ASB
Sample Box #
Run# 2 - VOST

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter 6'
Distance Upstream
Distance Downstream

Start Time [illegible]
Stop Time 09:50
Barometric Pressure "Hg 29.70
Static Pres "H_2O 0
Production Rate

EQUIPMENT CHECKS

Initial/Final

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

Filter # _____ tare _____ mgs

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

TOTAL WATER VOLUME _____

NOMOGRAPH SETUP

% Moisture _____
Meter Temp. _____
Stack Temp. _____
ΔH@ _____ Y Green 1.002
Pitot# _____ Side# _____
Cp .85
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 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	
0740	0	626.778	.015			43	43	0			1142	O_2 14.7%
	5					44	44	0			1181	
	10					45	44	0			1183	CO_2 4.7%
	15					45	45	0			1174	
	20					46	45	0			1162	CO 202 ppm
	25					46	45	0			1154	
	30					47	46	0			1155	SO_2 <1 ppm
	35					47	46	0			1154	
Sample	40						45.1					NO_x 17 ppm
	45	627.623				48	47	0			1160	
	50					48	48	0			1157	
	55					49	48	0			1174	
	60					49	48	0			1173	
	65					50	48	0			1176	
	70					50	48	0			1185	
	75					50	48	0			1225	
	80					50	49	0			1220	
	85					50	49	0			1228	
	90					50	49	0			1206	
	95					50	49	0			1221	
	100					51	50	0			1219	
	105					51	50	0			1239	
	110					51	50	0			1233	
	115					51	50	0			1211	
	120	629.388					49.2				1211	
		V	√ΔP		ΔH		T_m				T_s	

✓

AT

TRAVERSE SAMPLING DATA

Client Sweet-Edwards
Date 3-14-89
Sample Location Cedar Hills Flare Outlet
Operators KAH, AFB, CRL
Sample Box #
Run# 3 - VOST

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter 64"
Distance Upstream
Distance Downstream

Start Time 11:10 1202
Stop Time 11:50 1322
Barometric Pressure "Hg 29.72
Static Pres"H_2O
Production Rate

EQUIPMENT CHECKS

Initial/Final

Leak Rate Cfm ____/____

Leak Test Vac ____/____

____ Pitots, Pretest

____ Pitots, Postest

____ Orsat Sampling System

____ Tedlar Bag

____ Thermocouple @ ____ °F

Filter # ____ tare ____ mgs

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

TOTAL WATER VOLUME

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 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	
	0	629.392				50	50	0			1200	O_2 14.9%
1	5					50	50	0			1195	
6	10					50	50	0			1188	CO_2 4.9%
11	15					51	51	0			1201	
16	20					52	52	0			1204	CO 139 ppm
21	25					52	52	0			1169	
26	30					53	53	0			1205	SO_2 4 ppm
[illegible]	35					54	53	0			1202	
switch tubes	40	630.301				–	51.5				–	NO_x 14 ppm
	5	630.308				53	53	0			1258	
	10					53	53	0			1220	
	15					53	53	0			1267	
	20					53	53	0			1286	
	25					53	53	0			1281	
	30					53	53	0			1264	
	35					53	53	0			1216	
	40					53	53	0			1201	
	45					54	53	0			1207	
	50					54	54	0			1217	
	55					55	54	0			1228	
	60					56	55	0			1239	
	65					56	55	0			1207	
	70					56	55	0			1215	
	75					55	55	0			1201	
	80	632.015									1201	
						53.9						

ΔP V ____ (√ΔP)² ____ ΔH ____ T ____ T ____

✓

AT

903342 TRAVERSE SAMPLING DATA

Client St. Gobain
Date
Sample Location Cidra Hills Flask Outlet
Operators ERL / KAH
Sample Box # 1
Run# 1 - SCAQ-VOST

EQUIPMENT CHECKS

Initial/Final

Leak Rate Cfm 402 /
Leak Test Vac 22 /
✓ Pitots, Pretest
✓ Pitots, Postest
✓ Orsat Sampling System
✓ Tedlar Bag
✓ Thermocouple @ °F

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter
Distance Upstream
Distance Downstream

Filter # 90975 tare mgs

	Final Wt.	Initial Wt.	Net Wt.
#1 Knockout Bubbler	422.8	- 319.1	=
#2 H_2O Impinger	485.8	- 484.0	=
#3 H_2O Bubbler	389.6	- 388.5	=
#4 Silica Gel (empty)	321.8	~~384.8~~ 320.9	
	[illegible]	- 569.4	=

TOTAL WATER VOLUME

Start Time 1332
Stop Time
Barometric Pressure "Hg
Static Pres "H_2O
Production Rate

NOMOGRAPH SETUP

% Moisture 5
Meter Temp.
Stack Temp.
ΔH@ Y Blue 999
Pitot# Side#
Cp .845
Nozzle Diameter .562
K Factor 26.91
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 #2	Imp. Exit Temp °F #2	Stack Temp °F #1
	0	787.547	.015		.81	53	52	2	225	56	1226
	5				.81	76	56	3	251	56	1265
	10				.81	84	59	3	271	54	1237
	15				.81	91	62	3	268	53	1167
	20				.81	95	66	3	258	52	1241
	25				.81	98	70	3	264	52	1290
	30				.81	101	73	3	282	50	1284
	35				.81	103	76	3	270	51	1245
	40				.81	104	78	3	245	52	1266
	45				.81	107	80	3	270	52	1269
	50				.81	107	81	3	268	51	1285
	55				.81	108	83	3	267	51	1275
	60				.81	110	85	3	256	51	1272
	65				.81	110	85	3	254	52	1263
	70				.81	111	86	3	275	51	1285
	75				.81	111	87	3	279	51	1243
	80				.81	111	87	3	267	52	1265
	85				.81	112	87	3	259	52	1278
	90				.81	112	87	3	260	53	1244
	95				.81	112	87	3	260	53	1263
	100				.81	112	88	3	270	53	1250
	105				.81	112	88	3	259	52	1238
	110				.81	112	88	3	258	53	1268
	115				.81	113	89	3	252		1259
						90.5					

V_ (√ΔP)² ΔH T_ T_s

CONT NEXT PAGE →

AT

TRAVERSE SAMPLING DATA

Page 2 of 2

Client Scott EDWARDS
Date
Sample Location Cedar Hills Flare Outlet
Operators ERL/KAH
Sample Box #
Run # 1 Semi Vert

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
Stop Time 1632
Barometric Pressure "Hg
Static Pres "H_2O
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 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
	120		.015	.81	.81	113	89	3	253	52	1262
	125				.81	112	88	3	262	52	1222
	130				.81	112	88	3	261	51	1243
	135				.81	111	88	3	255	51	1257
	140				.81	111	87	3	242	51	1243
	145				.81	111	87	3	261	51	1237
	150				.81	111	87	3	259	51	1241
	155				.81	111	87	3	244	51	1256
	160				.81	111	87	3	249	51	1221
	165				.81	111	87	3	255	51	1210
	170				.81	111	86	3	247	51	1255
	175				.81	110	86	3	267	51	1230
	180	878.884			.81	109	85	3	256	51	1216
							99.1				

V ____ √ΔP ____ ΔH ____ 94.8 T_m ____ 1249.97 T_s ____

AT

903213 TRAVERSE SAMPLING DATA

Page 1 of 2

Client Scott Edwards
Date 3-14-89
Sample Location Cedar Hills Flow District
Operators KAHL, ERL AFB
Sample Box # 2
Run # 2 - Semi-Cost

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter 64"
Distance Upstream
Distance Downstream

Start Time 07:38
Stop Time
Barometric Pressure "Hg 29.70
Static Pres "H_2O
Production Rate

EQUIPMENT CHECKS

Initial/Final

Leak Rate Cfm <.021 /
Leak Test Vac 19 /
✓ Pitots, Pretest
Pitots, Postest
Orsat Sampling System
Tedlar Bag
Thermocouple @ °F

Filter # 90974 tare mgs

	Final Wt.		Initial Wt.		Net Wt.
#1 Bubbler	389.7	-	256.0	=	
#2 Impinger	470.3	-	466.9	=	
#3 Bubbler	445.8	-	446.1	=	
#4 Silica Gel	626.4	-	605.7	=	

TOTAL WATER VOLUME

NOMOGRAPH SETUP

% Moisture
Meter Temp.
Stack Temp.
ΔH@ Y Blue
Pitot # Side #
Cp qual to Pitot
Nozzle Diameter .751
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	#2 Filter Box Temp °F	#3 Imp. Exit Temp °F	#1 Stack Temp °F
	0	879.024	.015	1.33	1.33	49	49	6	263	38	1145
	5			1.33	1.33	70	50	6	271	36	1159
	10			1.33	1.33	80	52	6	269	37	1182
	15			1.33	1.33	87	57	6	265	38	1184
	20			1.33	1.33	89	59	6	270	38	1192
	25			1.33	1.33	92	62	6	268	38	1165
	30			1.33	1.33	95	66	6	272	39	1151
	35			1.33	1.33	97	69	6	266	39	1182
	40			1.33	1.33	99	70	6	270	39	1161
	45			1.33	1.33	101	73	6	264	39	1157
	50			1.33	1.33	102	74	6	263	39	1163
	55			1.33	1.33	103	76	6	264	39	1175
	60			1.33	1.33	103	77	6	270	39	1155
	65			1.33	1.33	105	78	6	268	39	1170
	70			1.33	1.33	105	80				1172
	75				1.33		82	6			1192
	80					107	81	6	271		1190
	85					108	83	6	269		1219
	90					107	83	6		39	1214
	95			1.33	1.33	107	83	6	271	39	1228
	100			1.33	1.33	107	83	6	271	40	1239
	105			1.33	1.33	107	83	6	267	40	1223
	110			1.33	1.33	108	84	6	271	40	1228
	115			1.33	1.33	108	84	5	270	40	1240

8-1.9

V_m $(\sqrt{\Delta P})^2$ ΔH T_m T_s

AT

TRAVERSE SAMPLING DATA

Page 1 of _____

Client Sweet Edwards
Date 3-14-89
Sample Location Cedar Hills Exit Outlet
Operators KAH, ERL, MB
Sample Box #
Run# 2 - Semi-ASTM

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter 64"
Distance Upstream
Distance Downstream

Start Time
Stop Time 10:31
Barometric Pressure "Hg 29.70
Static Pres "H_2O
Production Rate

EQUIPMENT CHECKS

Initial/Final

Leak Rate Cfm 1.004
Leak Test Vac 16
_____ Pitots, Pretest
_____ Pitots, Postest
_____ Orsat Sampling System
_____ Tedlar Bag
_____ Thermocouple @ _____ °F

Filter # _____ tare _____ mgs

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

TOTAL WATER VOLUME

NOMOGRAPH SETUP

% Moisture
Meter Temp.
Stack Temp.
ΔH@ _____ Y Blue
Pitot# _____ Side# _____
Cp
Nozzle Diameter .751
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
	120		.015	1.33	1.33	108	84	5	268	41	1242
	125			1.33	1.33	108	85	5	268	40	1221
	130			1.33	1.33	108	85	5	269	40	1220
	135			1.33	1.33	109	85	5	270	40	1203
	140			1.33	1.33	110	86	5	270	40	1219
	145			1.33	1.33	110	86	5	268	40	1204
	150			1.33	1.33	110	86	5	271	41	1183
	155			1.33	1.33	110	86	5	271	41	1203
	160			1.33	1.33	110	86	5	270	41	1211
	165			1.33	1.33	110	86	5	271	42	1226
	170			1.33	1.33	112	86	5	271	42	1234
	175			1.33	1.33	112	86	5	268	42	1212
	180	998.024					97				

V _____ $(\sqrt{\Delta P})^2$ _____ ΔH _____ T_m 91.3 T_s 1192.0

AT

903345 TRAVERSE SAMPLING DATA

Client Sweet-Edwards
Date 3-14-89
Sample Location Cedar Hills Flare Outlet
Operators RAH, AFE, ERL
Sample Box #
Run # 3-Semi-VOST

SCHEMATIC TRAVERSE LAYOUT

Stack Diameter 64"
Distance Upstream
Distance Downstream

Start Time 11:12
Stop Time
Barometric Pressure "Hg 29.72
Static Pres "H_2O 0.0
Production Rate

EQUIPMENT CHECKS

Initial/Final

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

Filter #~~90~~105 tare ____ mgs

	Final Wt.	Initial Wt.	Net Wt.
#1 Bubbler	426.7	320.2	
#2 Impinger	484.7	483.4	
#3 Bubbler	390.0	389.7	
#4 Silica Gel	678.3	656.6	

TOTAL WATER VOLUME

NOMOGRAPH SETUP

% Moisture
Meter Temp.
Stack Temp.
ΔH@ ____ Y .999
Pitot # ____ Side #
Cp .845
Nozzle Diameter
K Factor
Reference ΔP

223-271

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
	0	998.534	.015	1.33	1.33	67	65	4	230	42	1214
	5			1.33	1.33	88	64	4.5	235	40	1192
	10			1.33	1.33	93	65	4.5	257	40	1196
	15			1.33	1.33	97	67	4.5	235	41	1204
	20			1.33	1.33	99	69	4.5	243	42	1193
	25			1.33	1.33	101	72	4.5	249	43	1185
	30			1.33	1.33	103	74	4.5	238	44	1176
	35			1.33	1.33	105	76	4.5	233	44	1189
	40			1.33	1.33	106	77	4.5	250	45	1234
	45			1.33	1.33	108	79	4.5	248	45	1218
	50			1.33	1.33	109	80	4.5	240	46	1225
	55			1.33	1.33	109	81	4.5	247	46	1230
	60			1.33	1.33	110	82	4.5	260	47	1275
	65			1.33	1.33	110	83	4.5	244	47	1223
	70			1.33	1.33	111	84	4.5	248	47	1279
	75			1.33	1.33	111	84	4.5	256	47	1295
	80			1.33	1.33	111	85	4.5	255	47	1271
	85			1.33	1.33	111	85	4.5	247	48	1263
	90			1.33	1.33	111	85	4.5	262	48	1173
	95			1.33	1.33	111	86	4.5	262	48	1212
	100			1.33	1.33	112	86	4.5	254	49	1280
	105			1.33	1.33	113	86	4.5	247	50	1228
	110			1.33	1.33	113	87	4.5	248	49	1227
	115			1.33	1.33	114	88	4.5	245	48	1206
						87.3					

V_ (ΔP)^2 ΔH T_ T_

AT

TRAVERSE SAMPLING DATA

Client Sweet - Edwards
Date 3-14-89
Sample Location Cedar Hills Flare Outlet
Operators KAH, ERL, AFB
Sample Box #
Run# 3-Semi-VOST

EQUIPMENT CHECKS

Initial/Final

Leak Rate Cfm .008 / ____
Leak Test Vac 17 / ____
____ 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 ____
Stop Time 1407
Barometric Pressure "Hg 29.72
Static Pres "H_2O ____
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 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
	120				1.33	114	88	4.5	255	44	1223
	125				1.33	114	88	4.5	245	42	1229
	130				1.33	114	88	4.5	246	42	1223
	135				1.33	114	88	4.5	256	41	1228
	140				1.33	114	88	4.5	246	40	1215
	145				1.33	113	88	4.5	242	40	1200
	150				1.33	114	88	4.5	256	40	1097
	155				1.33	114	87	4.5	242	40	1209
	160				1.33	113	87	4.5	237	41	1190
	165				1.33	113	87	4.5	247	41	1192
	170				1.33	113	87	4.5	251	41	1177
	175				1.33	113	86	4.5	241	42	1159
	180	117.776	X	X	X	X	X	X	X	X	X
							100.5				

93.9 (T)

1214.4 (T)

V (√ΔP)² ΔH

Puget Sound Air Pollution Control Agency

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HEREBY ISSUES AN ORDER OF APPROVAL TO CONSTRUCT, INSTALL, OR ESTABLISH

Notice of Construction No. 2906

Date JUL 06 1987

Gas Collection System and Disposal System consisting of a John Zink Model No. ZTOF Combustor with capacity of 600 SCFM of landfill gas with one Main Burner and one Pilot Burner and two Lamson Blowers Model No. 510 rated at 600 SCFM.

APPLICANT
Steven N. VanSlyke
CH2M Hill (NAME)
P.O. Box 91500 (STREET)
Bellevue, (CITY) WA (STATE) 98009-2050 (ZIP)

OWNER
King County Div. Public Works (NAME)
Solid Waste Division
601 EX McRory Bldg. (STREET)
419 Occidental Avenue South
Seattle, WA 98104 (CITY, STATE)

INSTALLATION ADDRESS

Cedar Hills Landfill, 16645 - 228th Avenue S.E., (STREET) Maple Valley, (CITY) WA (STATE) 98038

THIS ORDER IS ISSUED SUBJECT TO THE FOLLOWING RESTRICTIONS AND CONDITIONS

1. Approval is hereby granted as provided in Article 6 of Regulation I of the Puget Sound Air Pollution Control Agency to the applicant to install, alter or establish the equipment, device or process described hereon at the INSTALLATION ADDRESS in accordance with the plans and specifications on file in the Engineering Division of PSAPCA.
2. Compliance with this ORDER and its conditions does not relieve the owner or operator from the responsibility of compliance with Regulations I or II, RCW 70.94, or any other emission control requirements, nor from the resulting liabilities and/or legal remedies for failure to comply.
3. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.

4. The owner shall submit for PSAPCA approval a test plan to address the periodic measurement of combustor emissions by July 31, 1987.

5. The owner shall collect and analyze landfill gas emissions from upstream and downstream of the combustor flame. Analysis shall include methane, CO_2, O_2, and trace organic and trace inorganic gases. Initial data shall be reported to PSAPCA following the requirements of the approved test plan in condition 4. by September 30, 1987.

6. The combustion zone will provide for a minimum combustion gas temperature of 1300° F and a 1.0-second minimum residence time.

Fred L. Austin
Reviewing Engineer

A. R. Dammkoehler
Air Pollution Control Officer

sm

Form 50-118, (1/85)

NOTICE OF COMPLETION

177

WARNING:

Regulation I, Section 6.09(a) requires that the owner or applicant notify the Agency of the completion of the work covered by the application and when its operation will begin. This form is provided for your convenience to assist you in complying with that portion of the Regulation.

APPLICANT or OWNER SECTION

Mail to: Puget Sound Air Pollution Control Agency
Plan Review Section
410 West Harrison Street
P.O. Box 9863
Seattle, Washington 98

ADDRESS CHANGE
200 WEST MERCER STREET
ROOM 205

Gentlemen:

The project described below was completed on _____ and will be in operation on _____.

_____ Signature of Owner and/or Applicant

_____ Title

_____ Date

FOR AGENCY USE ONLY

Notice of Construction No. 2906

Project Description: Gas Collection System and Disposal System consisting of a John Zink Model No. ZTOF combustor with capacity of 600 SCFM of landfill gas with One Main Burner and one Pilot Burner and Two Lamson Blowers Model No. 510 rated at 600 SCFM. (See reverse side for Order)

(Appl) Steven N. VanSlyke, SCS Hill, P.O. Box 91500, Bellevue, WA 98009-2050

Owner's Name King County Dept. of Public Works, Solid Waste Div., 601 FX McRory Bldg, 419 Occident Ave. South, Seattle, WA 98104

Location Cedar Hills Landfill, 16645-228th Ave. S.E., Maple Valley, WA 98038

☒ Inspector check ☐ Engineer _____ and Inspector check

Follow-up _____ (Estimated Completion Date Plus 7)

Date Inspected _____ Inspector _____

REMARKS: _____

☐ See Attachment

FORM 63-11.1 9/76

RESTRICTIONS AND CONDITIONS

Puget Sound Air Pollution Control Agency to the applicant to in
ALLATION ADDRESS in accordance with the plans and specificatio

or operator from the responsibility of compliance with Regulations
g liabilities and/or legal remedies for failure to comply.
t of any other governmental agency.

A.C. approval a test plan to address th
missions by July 31, 1987.
landfill gas emissions from ups
me. Analysis shall include metha
e inorganic gases. Initial data
requirements of the approved te
87.
or minimum combustion gas temp
m residence time.

A. R. Dammkoehler
Air Pollution Control Offic