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SOURCE

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EVALUATION

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CONTROL AGENCY

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Prepared For:

VOLUME I
KING COUNTY SOLID WASTE DIVISION
CEDAR HILLS REGIONAL LANDFILL
GAS COMBUSTOR TESTING
FLARES #1, #2 AND #3
MAPLE VALLEY, WASHINGTON
FEBRUARY 8-10, 1994

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

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1.0
INTRODUCTION

The purpose of this source emission evaluation was to quantify emission levels during typical operation of three (3) landfill gas (LFG) combustors (flares) at the Cedar Hills Regional Landfill in Maple Valley, Washington. The gases produced from the decomposition of buried organic wastes are extracted and piped to the combustors where they are burned prior to emitting the exhaust gases to the atmosphere. Testing of the emissions at the inlet and the outlet of each flare was performed to demonstrate compliance with Puget Sound Air Pollution Control Agency (PSAPCA) air permit requirements.

Testing was performed at each flare to determine the emission rate and destruction efficiency of selected volatile organic compounds entering and exiting each flare. The inlet and outlet gas streams of each flare were measured to quantify the gas velocity, gas temperature, percent carbon dioxide (CO_2), percent oxygen (O_2), parts per million (ppm) carbon monoxide (CO), percent methane (CH_4), percent moisture and volatile organic compounds (VOCs). The outlet gas stream of each flare was also measured to quantify ppm sulfur dioxide (SO_2), ppm nitrogen oxides (NO_x as NO_2) and chloride (as hydrogen chloride (HCl)).

Sampling and analysis procedures used for this project are presented in the July 1, 1992 edition of the Environmental Protection Agency (EPA) document Title 40 Code of Federal Regulations, Parts 53-60 (40 CFR 60), Appendix A, Methods 1, 2, 3A, 4, 6C, 7E, 10 and 26A (proposed); and in the EPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Method TO-14. Methods 1 and 2 were performed to measure the stack gas temperature and velocity

and for calculating the volumetric flow rate. Method 3A was performed to determine the molecular weight of the stack gas based on measurements of oxygen (O_2) and carbon dioxide (CO_2). Method 4 was performed to measure the moisture content of the stack gas at the outlet. Moisture content of the inlet gas was determined using psychrometry. Method 6C was performed to quantify SO_2 emissions at each flare outlet using an ultraviolet analyzer. Method 7E was performed to quantify NO_x emissions at each flare outlet using a chemiluminescent analyzer. Method 10 was performed to quantify CO emissions using a non-dispersive infrared (NDIR) analyzer. Method 26A was performed to quantify the gaseous emissions of chloride as HCl. VOCs were collected at the inlet and outlet of each flare using EPA Method TO-14. This technique allows an integrated sample of gas to be collected in an evacuated electropolished SUMMA^R stainless steel canister. The integrated samples were analyzed using a gas chromatograph equipped with a mass spectrometer detector (GC-MS). In addition to the volatile organic compounds identified by GC-MS procedures, the fixed gases (CO_2, O_2, CO, nitrogen (N_2) and methane (CH_4)) were analyzed using a GC equipped with a thermal conductivity detector (GC-TCD). Three (3) replicate samples of each type were collected at each flare on February 8-10, 1994.

Mr. Kevin P. Orton, Mr. E. Ray Lawrence and Ms. Wendy A. Linn of Am Test-Air Quality, Inc. conducted the field sampling and sample recovery. Analysis of the samples collected in SUMMA^R canisters was performed by Coast-to-Coast Analytical Services, Inc. (CCAS) of Camarillo, California. Analysis of the chloride samples was performed by Am Test, Inc.'s Water Chemistry Division of Redmond, Washington. Mr. Kris A. Hansen, Ms. Angela F. Blaisdell, Ms. Jan W. Alden, Ms. Cassie B. Heaton, Ms. Amy M. Brotherton and Ms. Stacy Akin performed data reduction, quality assurance review, and report preparation. Mr. Ed Henderson and

reduction, quality assurance review, and report preparation. Mr. Ed Henderson and Mr. Jamie Barker of the King County Solid Waste Division and Mr. Sam Roudebush of CH2M Hill coordinated this project. Mr. Landon Collom of CH2M Hill was the on-site coordinator.

2.0
SUMMARY OF RESULTS

The following subsections of this report present the results of this evaluation. The order of presentation is first by sample location (Flare #1, Flare #2 and Flare #3), and then by method number. The method order is as follows: Method 1, 2, 3A, 4, 6C, 7E, 10, fixed gases (including methane), 26A and VOCs by TO-14. Inlet data are presented before outlet data. Summary tables are included for each type of analysis which present the results from each test, and the average for each set of three (3) runs. Refer to the Table of Contents to locate specific information for each type of test. The summary tables in this section contain information obtained from computer printouts of results for each individual run which are included in Appendix A of this report. Appendix B of this report contains copies of the original laboratory data from Coast-to-Coast Analytical Services, Inc. and Am Test, Inc. Appendix C of this report contains example calculations of results. By-hand calculations of the results were performed for 1 run of each type of test. The same data reduction programs were used for all 3 flares. Appendix D of this report contains copies of the original field data sheets and raw gaseous emission data. Appendix E of this report contains miscellaneous supporting information and schematics of the sample trains utilized.

Standard conditions are 68° F and 29.92 inches of mercury. It should also be noted that if a value is less than the detection limit (< DL) or is not detected (ND), it is counted as zero (0) in the average. When all individual test results are < DL or the average test results are < the average DL, the average is reported as < DL. If one (1) or two (2) values are < DL or ND and the average is a value larger than the average detection limit, then it is presented as an approximation (~) in the average

column. In cases where a compound is found in levels above the detection limit for only 1 or 2 of 3 runs, the data should be considered to be less significant than cases where a compound was found for all 3 runs. The data becomes increasingly significant as the concentration value increases in orders of magnitude above the blank value or detection limit. The converse of this would be true as the concentration value approaches the detection limit. Analytical laboratories typically use a multiplier of five (5) times the DL to determine significance.

2.1 FLARE #1

2.1.1 Velocity, Temperature and Airflow - Inlet

The results of the three (3) moisture and airflow tests performed at the inlet to Flare #1 on February 9, 1994 are summarized on the following computer printout titled "Summary of Results - Moisture and Airflow".

The average temperature of gas at the inlet was 94.3° F. The moisture of the inlet gas was measured using psychrometry. The velocity of the gas at the inlet to the flare averaged 63.9 feet per second. The average airflow of landfill gas into the flare was 2825.7 dry standard cubic feet per minute (dscf/min).

AMTEST
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SUMMARY OF RESULTS - MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME: S705\CHIN1VSM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

FLARE #1 INLET

	RUN #1	RUN #2	RUN #3	AVERAGE
AT LAB #:	5081	5082	5083	
CCAS LAB #:	CK-0679-7	CK-0679-8	CK-0679-9	
DATE:	2/9/94	2/9/94	2/9/94	
START TIME:	11:16	13:10	15:10	
STOP TIME:	11:26	13:20	15:20	
PSYCHROMETRIC MOISTURE (%):	2.62	3.19	2.82	2.88
BAROMETRIC PRESSURE (inches of Hg):	29.55	29.55	29.72	29.61
STATIC PRESSURE (inches of H2O):	10.0	10.0	10.0	10.0
DUCT PRESSURE (inches of Hg):	30.29	30.29	30.46	30.35
DUCT GAS TEMPERATURE (degrees F.):	93.8	94.3	94.8	94.3
DUCT GAS TEMPERATURE (degrees R.):	553.8	554.3	554.8	554.3
CARBON DIOXIDE (percent):	48.0	48.0	48.0	48.0
OXYGEN (percent):	2.1	2.0	1.9	2.0
CARBON MONOXIDE (ppm):	7.3	7.3	7.3	7.3
METHANE (percent):	41	41	42	41
MOLECULAR WEIGHT (dry, g/g-mole):	30.84	30.84	30.72	30.80
MOLECULAR WEIGHT (wet, g/g-mole):	30.51	30.43	30.36	30.43
AVERAGE VELOCITY HEAD (inches of H2O):	0.956	0.942	0.952	0.950
PITOT TUBE Cp:	0.99	0.99	0.99	
DUCT GAS VELOCITY (feet/second):	64.1	63.7	64.0	63.9
DUCT DIAMETER (inches):	12.00	12.00	12.00	
DUCT AREA (square feet):	0.785	0.785	0.785	
DUCT GAS AIRFLOW (dry std. cubic feet per min.):	2838.0	2801.6	2837.4	2825.7
DUCT GAS AIRFLOW (actual cubic feet per min.):	3019.9	3001.5	3014.0	3011.8

2.1.2 Velocity, Temperature and Airflow - Outlet

The results of the three (3) Method 1, 2, 3A and 4 tests performed at the Flare #1 outlet on February 9, 1994 are summarized on the following computer printout titled "Summary of Results - Moisture and Airflow".

The moisture of the outlet gas was determined using Method 4 during the Method 26A (HCl) tests which were conducted immediately following each airflow measurement. The velocity of the gas at the flare outlet averaged 26.1 feet per second. The average stack gas airflow was 36,652.6 dry standard cubic feet per minute (dscf/min). The residence time based on combustion from the top of the burners to the height of the sample ports was calculated to be 1.2 seconds using an average of 162,930.6 actual cubic feet per minute (acfm) and an average temperature of 1673.8° F as measured on February 9, 1994.

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SUMMARY OF RESULTS - MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME: S705\CH01VSM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #1 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
AM TEST LAB #:	5154	5155	5156	
CCAS LAB #:	CK-0679-10	CK-0679-11	CK-0679-12	
DATE:	2/9/94	2/9/94	2/9/94	
START TIME:	09:55	12:45	14:45	
STOP TIME:	10:15	13:05	15:05	
MOISTURE (%):	9.11	7.90	7.52	8.18
BAROMETRIC PRESSURE (inches of Hg):	29.55	29.55	29.72	29.61
STATIC PRESSURE (inches of H2O):	0.14	0.13	0.14	0.14
STACK PRESSURE (inches of Hg):	29.56	29.56	29.73	29.62
STACK GAS TEMPERATURE (degrees F.):	1690.7	1649.0	1681.7	1673.8
STACK GAS TEMPERATURE (degrees R.):	2150.7	2109.0	2141.7	2133.8
CARBON DIOXIDE (percent):	9.4	7.8	7.6	8.3
OXYGEN (percent):	10.5	12.0	12.4	11.6
CARBON MONOXIDE (ppm):	15	81	73	56
MOLECULAR WEIGHT (dry, g/g-mole):	29.92	29.73	29.71	29.79
MOLECULAR WEIGHT (wet, g/g-mole):	28.84	28.80	28.83	28.82
AVERAGE VELOCITY HEAD (inches of H2O):	0.052	0.058	0.049	0.053
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet/second):	26.0	27.2	25.2	26.1
STACK DIAMETER (inches):	138.0	138.0	138.0	
STACK AREA (square feet):	103.9	103.9	103.9	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	35761.7	38597.7	35598.4	36652.6
STACK GAS AIRFLOW (actual cubic feet per min.):	162219.1	169437.1	157135.5	162930.6

2.1.3 EPA Method 3A, 6C, 7E, 10 and Fixed Gases Analysis

Fixed gases at the inlet and outlet of Flare #1 were quantified by Coast-to-Coast Analytical Services (CCAS) using the gas collected in SUMMA^R canisters. The GC-TCD analysis performed on the samples by CCAS quantifies percent levels of carbon monoxide (CO). Am Test measured parts per million (ppm) levels of CO at the inlet from samples collected in Tedlar bags using a non-dispersive infrared analyzer (NDIR). Am Test measured ppm CO at the flare outlet using a gas filter correlation NDIR.

Three (3) Method 6C, 7E and 10 tests were performed on February 9, 1994 at the flare outlet. SO_2, NO_x and CO emission data are summarized on the following computer printout titled, "Summary of Results - Methods 6C, 7E and 10". Emission rates were calculated in units of pounds per hour (lb/hr). Gaseous emission data were measured continuously during each test period. The data were recorded once per minute and averaged, and the average values were bias-corrected for calibration drift during each test. Average combustion gas values obtained at the inlet and outlet of Flare #1 are presented in Table 2.1.3 below. Am Test's real-time O_2, CO_2 and CO data were used for this comparison rather than the GC-TCD data at the outlet.

Table 2.1.3. Concentration of gaseous constituents quantified from samples collected at the landfill gas inlet and outlet of Flare #1 on February 9, 1994 at the Cedar Hills Landfill in Maple Valley, Washington.

Compound	Average Inlet Gas Concentrations	Average Outlet Gas Concentrations
Methane (%)	41	< 0.005
Carbon Dioxide (%)	48.0	8.3
Oxygen (%)	2.0	11.6
Carbon Monoxide (ppm)	7.3	56
Nitrogen (%)	8.8	80.1

AMTEST
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SUMMARY OF RESULTS - METHODS 6C, 7E AND 10
AM TEST - AIR QUALITY, INC.

FILE NAME: S704\CH29#1SM
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #1 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
DATE:	2/9/94	2/9/94	2/9/94	
START TIME:	11:01	13:07	15:07	
STOP TIME:	12:01	14:07	16:07	
AIRFLOW (dry std. cubic feet per min.):	35761.7	38597.7	35598.4	36652.6
METHOD 6C - SULFUR DIOXIDE (SO2)				
SULFUR DIOXIDE CONCENTRATION (ppm):	6.3	6.6	5.2	6.0
SULFUR DIOXIDE EMISSION RATE (lb/hr):	2.24	2.54	1.84	2.21
METHOD 7E - NITROGEN OXIDES (NOx)				
NITROGEN OXIDES EMISSION CONC. (ppm):	20.9	28.0	16.8	21.9
NOx EMISSION RATE (lb/hr as NO2):	5.35	7.74	4.28	5.79
METHOD 10 - CARBON MONOXIDE (CO)				
CARBON MONOXIDE CONCENTRATION (ppm):	15	81	73	56
CARBON MONOXIDE EMISSION RATE (lb/hr):	2.34	13.6	11.3	9.10

2.1.4 EPA Method 26A - Gaseous Chloride (as HCl)

Three (3) EPA Method 1, 2, 3A, 4 and 26A samples were collected at the flare outlet on February 9, 1994. Each sample was collected over a 60-minute period. The Method 26A sample train utilizes 0.1 N sulfuric acid solution in a series of impingers which scrub hydrogen chloride (HCl) from the gas stream. The sampling was performed isokinetically. The sulfuric acid solution from each train was recovered and analyzed for chlorides using ion chromatography (IC). The chloride emission results are summarized on the following computer printout titled "Summary of Results - Methods 1, 2, 3A, 4 and 26A".

Copies of the laboratory analysis results in units of micrograms (μg) per sample are presented in Appendix B of this report. The laboratory results were converted to emission concentration units of milligrams per dry standard cubic meter (mg/dscm) and parts per million (ppm) uncorrected and corrected to 7% O_2 for each sample. The results were also converted to emission rate units of pounds per hour (lb/hr).

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SUMMARY OF RESULTS - METHODS 1, 2, 3A, 4 AND 26A
AM TEST-AIR QUALITY, INC.

FILE NAME: S707\CH#126SM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #1 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	5087	5088	5089	
DATE:	2/9/94	2/9/94	2/9/94	
START TIME:	11:01	13:07	15:07	
STOP TIME:	12:01	14:07	16:07	
SAMPLE LENGTH (minutes):	60.0	60.0	60.0	
VOLUME SAMPLED (cubic feet):	64.606	65.253	60.924	63.594
VOLUME SAMPLED (dry std. cubic feet):	65.368	65.006	61.143	63.839
VOLUME SAMPLED (dry std. cubic meters):	1.851	1.841	1.732	1.808
STACK GAS MOISTURE (percent):	9.11	7.90	7.52	8.18
BAROMETRIC PRESSURE (inches of Hg):	29.55	29.55	29.72	29.61
STATIC PRESSURE (inches of H2O):	0.14	0.14	0.14	0.14
STACK PRESSURE (inches of Hg):	29.56	29.56	29.73	29.62
STACK TEMPERATURE (degrees F.):	1661.5	1589.0	1610.7	1620.4
STACK TEMPERATURE (degrees R.):	2121.5	2049.0	2070.7	2080.4
CARBON DIOXIDE (percent):	9.4	7.8	7.6	8.3
OXYGEN (percent):	10.5	12.0	12.4	11.6
CARBON MONOXIDE (ppm):	15	81	73	56
MOLECULAR WEIGHT (dry, g/g-mole):	29.92	29.73	29.71	29.79
MOLECULAR WEIGHT (wet, g/g-mole):	28.84	28.80	28.83	28.82
AVERAGE VELOCITY HEAD (inches of H2O):	0.056	0.056	0.050	0.054
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet/second):	26.8	26.4	25.0	26.1
STACK DIAMETER (inches):	138.0	138.0	138.0	
STACK AREA (square feet):	103.9	103.9	103.9	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	37277.8	38542.8	36444.8	37421.8
STACK GAS AIRFLOW (actual cubic feet per min.):	166804.7	164382.8	155540.4	162242.6
NOZZLE DIAMETER (inches):	0.765	0.765	0.765	
ISOKINETICS (percent):	95	92	91	
GASEOUS CHLORIDE EMISSIONS (as HYDROGEN CHLORIDE)				
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	9.89	9.16	8.37	9.14
CHLORIDE EMISSION CONCENTRATION (ppm):	6.52	6.04	5.53	6.03
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	8.72	9.44	9.04	9.07
CHLORIDE EMISSION RATE (lb/hr):	1.38	1.32	1.14	1.28

2.1.5 EPA Method TO-14 - Volatile Organic Compounds (VOCs)

Three (3) EPA Method TO-14 samples were collected simultaneously at the inlet and outlet of Flare #1 on February 9, 1994 for quantifying volatile organic compound (VOC) emissions. VOC emission rates were calculated in units of milligrams per minute (mg/min). VOC emission rate calculations were performed using the laboratory analysis data provided by Coast-to-Coast Analytical Services, and from airflow data collected concurrently. The inlet/outlet VOC results are summarized on the following computer printouts titled "Summary of Emission Rate Results - TO-14 Volatile Organic Compounds". The emission rate results compared to the detection limits and instrument blank for each individual run are presented on the computer printouts titled "TO-14 Emission Rate Results" in Appendix A of this report. Copies of the VOC laboratory analysis results in emission concentration units of micrograms per cubic meter (ug/m^3) are included in Appendix B of this report.

AMTEST
AIR QUALITY, INC.

SUMMARY OF EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST - AIR QUALITY, INC.

FILE NAME: S702\#1INRSM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #1 INLET			
	RUN #1 (mg/min)	RUN #2 (mg/min)	RUN #3 (mg/min)	AVERAGE (mg/min)
LAB NUMBER:	CK-0679-7	CK-0679-8	CK-0679-9	
DATE:	2/9/94	2/9/94	2/9/94	
START TIME:	11:01	13:07	15:07	
STOP TIME:	11:51	13:57	15:57	
ANALYTE				
Acetone	1527	1269	1286	1361
Benzene	393.8	325.3	353.6	357.6
Bromodichloromethane	< DL	< DL	< DL	< DL
Bromomethane (Methyl Bromide)	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
1,3-Butadiene	< DL	< DL	< DL	< DL
2-Butanone (MEK)	3295	2618	2571	2828
Carbon Disulfide	< DL	< DL	< DL	< DL
Carbon Tetrachloride	< DL	< DL	< DL	< DL
Chlorobenzene	120.6	79.3	96.4	98.8
Chloroethane (Ethyl Chloride)	393.8	372.9	241.1	335.9
2-Chloroethyl Vinyl Ether	< DL	< DL	< DL	< DL
Chloroform	< DL	< DL	< DL	< DL
Chloromethane (Methyl Chloride)	112.5	111.1	96.4	106.7
Dibromochloromethane	< DL	< DL	< DL	< DL
1,2-Dibromoethane (EDB)	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	< DL	222.2	112.5	~ 111.6
1,1-Dichloroethane	739.4	626.8	650.9	672.4
1,2-Dichloroethane (EDC)	< DL	< DL	< DL	< DL
1,1-Dichloroethene	16.1	7.93	8.04	10.7
cis-1,2-Dichloroethene	771.6	642.7	683.0	699.1
trans-1,2-Dichloroethene	32.1	23.8	32.1	29.4
Dichloromethane	1849	1508	1607	1654
1,2-Dichloropropane	< DL	< DL	< DL	< DL
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
Ethylbenzene	3778	2777	3214	3256
2-Hexanone	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone (MIBK)	1286	872.8	530.4	896.4
Styrene	667.1	452.3	554.5	557.9
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Tetrachloroethene (PCE)	1447	1111	1286	1281
Toluene	12056	10315	11250	11207
1,1,1-Trichloroethane (TCA)	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Trichloroethene (TCE)	361.7	285.6	321.4	322.9
Trichlorofluoromethane (F-11)	184.9	166.6	168.7	173.4
Trichlorotrifluoroethane (F-113)	56.3	47.6	48.2	50.7
Vinyl Acetate	< DL	< DL	< DL	< DL
Vinyl Chloride	618.9	571.3	554.5	581.5
Xylenes, Total	13664	10315	12054	12011

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

mg/min = milligrams of analyte emitted per minute.

AMTEST
AIR QUALITY, INC.

SUMMARY OF EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST - AIR QUALITY, INC.

FILE NAME: S702\#1OUTRSM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #1 OUTLET			
	RUN #1 (mg/min)	RUN #2 (mg/min)	RUN #3 (mg/min)	AVERAGE (mg/min)
LAB NUMBER:	CK-0679-10	CK-0679-11	CK-0679-12	
DATE:	2/9/94	2/9/94	2/9/94	
START TIME:	11:01	13:07	15:07	
STOP TIME:	11:51	13:57	15:57	
ANALYTE		BAD DATA		
Acetone	395.0	1749	64.5	736.2
Benzene	17.2	12.0	1.11	10.1
Bromodichloromethane	< DL	< DL	< DL	< DL
Bromomethane (Methyl Bromide)	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
1,3-Butadiene	< DL	< DL	< DL	< DL
2-Butanone (MEK)	< DL	< DL	< DL	< DL
Carbon Disulfide	8.00	< DL	< DL	< DL
Carbon Tetrachloride	< DL	< DL	< DL	< DL
Chlorobenzene	< DL	< DL	1.21	< DL
Chloroethane (Ethyl Chloride)	< DL	< DL	< DL	< DL
2-Chloroethyl Vinyl Ether	< DL	< DL	< DL	< DL
Chloroform	< DL	< DL	< DL	< DL
Chloromethane (Methyl Chloride)	2.33	< DL	< DL	~ 0.776
Dibromochloromethane	< DL	< DL	< DL	< DL
1,2-Dibromoethane (EDB)	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	< DL	< DL	< DL	< DL
1,1-Dichloroethane	< DL	< DL	< DL	< DL
1,2-Dichloroethane (EDC)	< DL	< DL	< DL	< DL
1,1-Dichloroethene	< DL	< DL	< DL	< DL
cis-1,2-Dichloroethene	< DL	< DL	< DL	< DL
trans-1,2-Dichloroethene	< DL	< DL	< DL	< DL
Dichloromethane	< DL	< DL	< DL	< DL
1,2-Dichloropropane	< DL	< DL	< DL	< DL
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
Ethylbenzene	< DL	2.95	< DL	< DL
2-Hexanone	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	< DL	< DL
Styrene	< DL	< DL	< DL	< DL
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Tetrachloroethene (PCE)	< DL	< DL	< DL	< DL
Toluene	1.32	546.6	< DL	~ 182.6
1,1,1-Trichloroethane (TCA)	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Trichloroethene (TCE)	< DL	< DL	< DL	< DL
Trichlorofluoromethane (F-11)	< DL	< DL	< DL	< DL
Trichlorotrifluoroethane (F-113)	< DL	< DL	< DL	< DL
Vinyl Acetate	< DL	< DL	< DL	< DL
Vinyl Chloride	< DL	< DL	< DL	< DL
Xylenes, Total	< DL	29.5	< DL	~ 9.84

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

mg/min = milligrams of analyte emitted per minute.

2.1.6 Destruction Efficiency of Volatile Organic Compounds

The destruction efficiency is the amount of vapors destroyed through incineration, expressed on a percentage basis. The percent destruction efficiency for each volatile organic compound which was analyzed in the gas at Flare #1 at the Cedar Hills Landfill is presented on the following computer printout titled "Volatile Organic Compounds in Air - Destruction Efficiency Evaluation". Destruction efficiencies were calculated based on the average emission rate of each compound detected in milligrams per minute (mg/min). The laboratory analysis detection limits are lower for the outlet samples because the inlet samples required dilution in the laboratory.

AMTEST
AIR QUALITY, INC.

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

FILE NAME: S702\CH1DEFF
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE SITE: Flare #1
SAMPLE DATE: February 9, 1994

COMPOUNDS	Average Inlet Emission Rate mg/min	Average Outlet Emission Rate mg/min	Destruction Efficiency Percent
Acetone	1361	736.2	45.90 BAD DATA
Benzene	357.6	10.1	97.17
Bromodichloromethane	< DL	< DL	-----
Bromomethane (Methyl Bromide)	< DL	< DL	-----
Bromoform	< DL	< DL	-----
1,3-Butadiene	< DL	< DL	-----
2-Butanone (MEK)	2828	< DL	> 99.99
Carbon Disulfide	< DL	< DL	-----
Carbon Tetrachloride	< DL	< DL	-----
Chlorobenzene	98.8	< DL	> 99.99
Chloroethane (Ethyl Chloride)	335.9	< DL	> 99.99
2-Chloroethyl Vinyl Ether	< DL	< DL	-----
Chloroform	< DL	< DL	-----
Chloromethane (Methyl Chloride)	106.7	~ 0.776	~ 99.27
Dibromochloromethane	< DL	< DL	-----
1,2-Dibromoethane (EDB)	< DL	< DL	-----
1,2-Dichlorobenzene	< DL	< DL	-----
1,3-Dichlorobenzene	< DL	< DL	-----
1,4-Dichlorobenzene	~ 111.6	< DL	> 99.99
1,1-Dichloroethane	672.4	< DL	> 99.99
1,2-Dichloroethane (EDC)	< DL	< DL	-----
1,1-Dichloroethene	10.7	< DL	> 99.99
cis-1,2-Dichloroethene	699.1	< DL	> 99.99
trans-1,2-Dichloroethene	29.4	< DL	> 99.99
Dichloromethane	1654	< DL	> 99.99
1,2-Dichloropropane	< DL	< DL	-----
cis-1,3-Dichloropropene	< DL	< DL	-----
trans-1,3-Dichloropropene	< DL	< DL	-----
Ethylbenzene	3256	< DL	> 99.99
2-Hexanone	< DL	< DL	-----
4-Methyl-2-Pentanone (MIBK)	896.4	< DL	> 99.99
Styrene	557.9	< DL	> 99.99
1,1,2,2-Tetrachloroethane	< DL	< DL	-----
Tetrachloroethene (PCE)	1281	< DL	> 99.99
Toluene	11207	~ 182.6	~ 98.37
1,1,1-Trichloroethane (TCA)	< DL	< DL	-----
1,1,2-Trichloroethane	< DL	< DL	-----
Trichloroethene (TCE)	322.9	< DL	> 99.99
Trichlorofluoromethane (F-11)	173.4	< DL	> 99.99
Trichlorotrifluoroethane (F-113)	50.7	< DL	> 99.99
Vinyl Acetate	< DL	< DL	-----
Vinyl Chloride	581.5	< DL	> 99.99
Xylenes, Total	12011	~ 9.84	~ 99.92

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

mg/min = milligrams of analyte emitted per minute.

2.1.7 Thermocouple Probe Check

As an additional part of this evaluation, Am Test recorded temperatures from the digital display of the John Zink continuous temperature probe located approximately 3 feet below the stack ports. Temperatures were measured by inserting a calibrated thermocouple in through the sample port and diagonally downward to position it near the flare thermocouple. The table below compares the average temperatures recorded by Am Test and by the flare thermocouple. Data from the John Zink thermocouple were manually recorded on the inlet flow data sheets. Data from Am Test's thermocouple were recorded continuously during each test period.

Table 2.1.7. Comparison of temperature probe/indicators at Flare #1 at the Cedar Hills Landfill.

Run #	Am Test Probe Stack Temp (°F)	Zink Probe Stack Temp (°F)
1	1687	1619
2	1650	1631
3	1665	1619

2.2 FLARE #2

2.2.1 Velocity, Temperature and Airflow - Inlet

The results of the three (3) moisture and airflow tests performed at the inlet to Flare #2 on February 10, 1994 are summarized on the following computer printout titled "Summary of Results - Moisture and Airflow".

The average temperature of gas at the inlet was 96.4° F. The moisture of the inlet gas was measured using psychrometry. The velocity of the gas at the inlet to the flare averaged 64.9 feet per second. The average airflow of landfill gas into the flare was 2840.0 dry standard cubic feet per minute (dscf/min).

AM TEST
AIR QUALITY, INC.

SUMMARY OF RESULTS - MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME: S705\CHIN2SM2
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

FLARE #2 INLET

	RUN #1	RUN #2	RUN #3	AVERAGE
AT LAB #:	5124	5125	5126	
CCAS LAB #:	CK-0707-1	CK-0707-2	CK-0707-3	
DATE:	2/10/94	2/10/94	2/10/94	
START TIME:	10:25	12:20	13:50	
STOP TIME:	10:35	12:30	14:00	
PSYCHROMETRIC MOISTURE (%):	3.66	3.22	3.76	3.55
BAROMETRIC PRESSURE (inches of Hg):	29.65	29.60	29.62	29.62
STATIC PRESSURE (inches of H2O):	9.8	9.8	9.8	9.8
DUCT PRESSURE (inches of Hg):	30.37	30.32	30.34	30.34
DUCT GAS TEMPERATURE (degrees F.):	96.5	95.3	97.3	96.4
DUCT GAS TEMPERATURE (degrees R.):	556.5	555.3	557.3	556.4
CARBON DIOXIDE (percent):	48.0	48.0	48.0	48.0
OXYGEN (percent):	1.8	1.7	1.8	1.8
CARBON MONOXIDE (ppm):	9.8	9.9	9.8	9.8
METHANE (percent):	42	43	42	42
MOLECULAR WEIGHT (dry, g/g-mole):	30.71	30.59	30.71	30.67
MOLECULAR WEIGHT (wet, g/g-mole):	30.25	30.18	30.23	30.22
AVERAGE VELOCITY HEAD (inches of H2O):	1.00	0.965	0.945	0.970
PITOT TUBE Cp:	0.99	0.99	0.99	
DUCT GAS VELOCITY (feet/second):	65.9	64.8	64.1	64.9
DUCT DIAMETER (inches):	12.00	12.00	12.00	
DUCT AREA (square feet):	0.785	0.785	0.785	
DUCT GAS AIRFLOW (dry std. cubic feet per min.):	2880.4	2845.4	2794.2	2840.0
DUCT GAS AIRFLOW (actual cubic feet per min.):	3104.5	3051.3	3022.2	3059.3

2.2.2 Velocity, Temperature and Airflow - Outlet

The results of the three (3) Method 1, 2, 3A and 4 tests performed at the Flare #2 outlet on February 10, 1994 are summarized on the following computer printout titled "Summary of Results - Moisture and Airflow".

The moisture of the outlet gas was determined using Method 4 during the Method 26A (HCl) tests which were conducted immediately following each airflow measurement. The velocity of the gas at the flare outlet averaged 25.0 feet per second. The average stack gas airflow was 35,447.9 dry standard cubic feet per minute (dscf/min). The residence time based on combustion from the top of the burners to the height of the sample ports was calculated to be 1.2 seconds using an average of 155,942.6 actual cubic feet per minute (acfm) and an average temperature of 1652.4° F as measured on February 10, 1994.

AMTEST AIR QUALITY, INC.

SUMMARY OF RESULTS - MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME: S705\CHO2AVSM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #2 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
AM TEST LAB #:	5157	5158	5159	
CCAS LAB #:	CK-0707-4	CK-0707-5	CK-0707-6	
DATE:	2/10/94	2/10/94	2/10/94	
START TIME:	09:28	11:20	13:10	
STOP TIME:	09:46	11:38	13:27	
MOISTURE (%):	7.57	8.39	8.42	8.13
BAROMETRIC PRESSURE (inches of Hg):	29.65	29.60	29.62	29.62
STATIC PRESSURE (inches of H2O):	-0.135	-0.135	-0.135	-0.135
STACK PRESSURE (inches of Hg):	29.64	29.59	29.61	29.61
STACK GAS TEMPERATURE (degrees F.):	1639.9	1669.7	1647.7	1652.4
STACK GAS TEMPERATURE (degrees R.):	2099.9	2129.7	2107.7	2112.4
CARBON DIOXIDE (percent):	8.3	8.3	8.3	8.3
OXYGEN (percent):	11.6	11.5	11.6	11.6
CARBON MONOXIDE (ppm):	66	42	59	56
MOLECULAR WEIGHT (dry, g/g-mole):	29.79	29.79	29.79	29.79
MOLECULAR WEIGHT (wet, g/g-mole):	28.90	28.80	28.80	28.83
AVERAGE VELOCITY HEAD (inches of H2O):	0.051	0.049	0.047	0.049
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet/second):	25.5	25.0	24.5	25.0
STACK DIAMETER (inches):	138.0	138.0	138.0	
STACK AREA (square feet):	103.9	103.9	103.9	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	36544.5	35063.4	34735.8	35447.9
STACK GAS AIRFLOW (actual cubic feet per min.):	158728.1	156104.6	152995.2	155942.6

2.2.3 EPA Method 3A, 6C, 7E, 10 and Fixed Gases Analysis

Fixed gases at the inlet and outlet of Flare #2 were quantified by Coast-to-Coast Analytical Services (CCAS) using the gas collected in SUMMA^R canisters. The GC-TCD analysis performed on the samples by CCAS quantifies percent levels of carbon monoxide (CO). Am Test measured parts per million (ppm) levels of CO at the inlet from samples collected in Tedlar bags using a non-dispersive infrared analyzer (NDIR). Am Test measured ppm CO at the flare outlet using a gas filter correlation NDIR.

Three (3) Method 6C, 7E and 10 tests were performed on February 10, 1994 at the flare outlet. SO_2, NO_x and CO emission data are summarized on the following computer printout titled, "Summary of Results - Methods 6C, 7E and 10". Emission rates were calculated in units of pounds per hour (lb/hr). Gaseous emission data were measured continuously during each test period. The data were recorded once per minute and averaged, and the average values were bias-corrected for calibration drift during each test. Average combustion gas values obtained at the inlet and outlet of Flare #2 are presented in Table 2.2.3 below. Am Test's real-time O_2, CO_2 and CO data were used for this comparison rather than the GC-TCD data at the outlet.

Table 2.2.3. Concentration of gaseous constituents quantified from samples collected at the landfill gas inlet and outlet of Flare #2 on February 10, 1994 at the Cedar Hills Landfill in Maple Valley, Washington.

Compound	Average Inlet Gas Concentrations	Average Outlet Gas Concentrations
Methane (%)	42	< 0.005
Carbon Dioxide (%)	48.0	8.3
Oxygen (%)	1.8	11.6
Carbon Monoxide (ppm)	9.8	56
Nitrogen (%)	7.8	80.1

AMTEST
AIR QUALITY, INC.

SUMMARY OF RESULTS - METHODS 6C, 7E AND 10
AM TEST - AIR QUALITY, INC.

FILE NAME: S704\CH210#2S
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #2 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
DATE:	2/10/94	2/10/94	2/10/94	
START TIME:	09:51	11:40	13:30	
STOP TIME:	10:51	12:40	14:30	
AIRFLOW (dry std. cubic feet per min.):	36544.5	35063.4	34735.8	35447.9
METHOD 6C - SULFUR DIOXIDE (SO2)				
SULFUR DIOXIDE CONCENTRATION (ppm):	5.9	5.8	5.3	5.7
SULFUR DIOXIDE EMISSION RATE (lb/hr):	2.15	2.03	1.83	2.00
METHOD 7E - NITROGEN OXIDES (NOx)				
NITROGEN OXIDES EMISSION CONC. (ppm):	18.5	18.5	19.0	18.7
NOx EMISSION RATE (lb/hr as NO2):	4.84	4.65	4.73	4.74
METHOD 10 - CARBON MONOXIDE (CO)				
CARBON MONOXIDE CONCENTRATION (ppm):	66	42	59	56
CARBON MONOXIDE EMISSION RATE (lb/hr):	10.5	6.42	8.94	8.63

2.2.4 EPA Method 26A - Gaseous Chloride (as HCl)

Three (3) EPA Method 1, 2, 3A, 4 and 26A samples were collected at the Flare #2 outlet on February 10, 1994. Each sample was collected over a 60-minute period. The Method 26A sample train utilizes 0.1 N sulfuric acid solution in a series of impingers which scrub hydrogen chloride (HCl) from the gas stream. The sampling was performed isokinetically. The sulfuric acid solution from each train was recovered and analyzed for chlorides using ion chromatography (IC). The chloride emission results are summarized on the following computer printout titled "Summary of Results - Methods 1, 2, 3A, 4 and 26A".

Copies of the laboratory analysis results in units of micrograms (μg) per sample are presented in Appendix B of this report. The laboratory results were converted to emission concentration units of milligrams per dry standard cubic meter (mg/dscm) and parts per million (ppm) uncorrected and corrected to 7% O_2 for each sample. The results were also converted to emission rate units of pounds per hour (lb/hr).

AMTEST
AIR QUALITY, INC.

SUMMARY OF RESULTS - METHODS 1, 2, 3A, 4 AND 26A
AM TEST-AIR QUALITY, INC.

FILE NAME: S707\CH#2A26S
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #2 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	5130	5131	5132	
DATE:	2/10/94	2/10/94	2/10/94	
START TIME:	09:51	11:40	13:30	
STOP TIME:	10:51	12:40	14:30	
SAMPLE LENGTH (minutes):	60.0	60.0	60.0	
VOLUME SAMPLED (cubic feet):	61.479	60.572	58.725	60.259
VOLUME SAMPLED (dry std. cubic feet):	62.138	60.814	58.940	60.631
VOLUME SAMPLED (dry std. cubic meters):	1.760	1.722	1.669	1.717
STACK GAS MOISTURE (percent):	7.57	8.39	8.42	8.13
BAROMETRIC PRESSURE (inches of Hg):	29.65	29.60	29.62	29.62
STATIC PRESSURE (inches of H2O):	-0.135	-0.13	-0.135	-0.133
STACK PRESSURE (inches of Hg):	29.64	29.59	29.61	29.61
STACK TEMPERATURE (degrees F.):	1643.5	1634.8	1631.1	1636.5
STACK TEMPERATURE (degrees R.):	2103.5	2094.8	2091.1	2096.5
CARBON DIOXIDE (percent):	8.3	8.3	8.3	8.3
OXYGEN (percent):	11.6	11.5	11.6	11.6
CARBON MONOXIDE (ppm):	66	42	59	56
MOLECULAR WEIGHT (dry, g/g-mole):	29.79	29.79	29.79	29.79
MOLECULAR WEIGHT (wet, g/g-mole):	28.90	28.80	28.80	28.83
AVERAGE VELOCITY HEAD (inches of H2O):	0.050	0.050	0.046	0.049
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet/second):	25.2	25.2	24.2	24.9
STACK DIAMETER (inches):	138.0	138.0	138.0	
STACK AREA (square feet):	103.9	103.9	103.9	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	36044.1	35830.3	34482.4	35452.3
STACK GAS AIRFLOW (actual cubic feet per min.):	156820.2	156900.9	150676.6	154799.2
NOZZLE DIAMETER (inches):	0.765	0.765	0.765	
ISOKINETICS (percent):	94	92	93	
GASEOUS CHLORIDE EMISSIONS (as HYDROGEN CHLORIDE)				
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	5.60	5.13	7.89	6.21
CHLORIDE EMISSION CONCENTRATION (ppm):	3.69	3.38	5.20	4.09
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	5.52	5.00	7.78	6.10
CHLORIDE EMISSION RATE (lb/hr):	0.756	0.689	1.02	0.822

2.2.5 EPA Method TO-14 - Volatile Organic Compounds (VOCs)

Three (3) EPA Method TO-14 samples were collected simultaneously at the inlet and outlet of Flare #2 on February 10, 1994 for quantifying volatile organic compound (VOC) emissions. VOC emission rates were ca/lculated in units of milligrams per minute (mg/min). VOC emission rate calculations were performed using the laboratory analysis data provided by Coast-to-Coast Analytical Services, and from airflow data collected concurrently. The inlet/outlet VOC results are summarized on the following computer printouts titled "Summary of Emission Rate Results - TO-14 Volatile Organic Compounds". The emission rate results compared to the detection limits and instrument blank for each individual run are presented on the computer printouts titled "TO-14 Emission Rate Results" in Appendix A of this report. Copies of the VOC laboratory analysis results in emission concentration units of micrograms per cubic meter ($\mu g/m^3$) are included in Appendix B of this report.

AMTEST AIR QUALITY, INC.

SUMMARY OF EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST - AIR QUALITY, INC.

FILE NAME: S302\#2INRSUM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #2 INLET			
	RUN #1 (mg/min)	RUN #2 (mg/min)	RUN #3 (mg/min)	AVERAGE (mg/min)
LAB NUMBER:	CK-0707-1	CK-0707-2	CK-0707-3	
DATE:	2/10/94	2/10/94	2/10/94	
START TIME:	09:56	11:45	13:35	
STOP TIME:	10:46	12:35	14:25	
ANALYTE				
Acetone	1387	1451	1424	1421
Benzene	342.6	354.6	340.3	345.8
Bromodichloromethane	< DL	< DL	< DL	< DL
Bromomethane (Methyl Bromide)	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
1,3-Butadiene	< DL	< DL	< DL	< DL
2-Butanone (MEK)	2937	2901	2849	2895
Carbon Disulfide	< DL	< DL	< DL	< DL
Carbon Tetrachloride	< DL	< DL	< DL	< DL
Chlorobenzene	81.6	88.6	95.0	88.4
Chloroethane (Ethyl Chloride)	318.1	322.3	340.3	326.9
2-Chloroethyl Vinyl Ether	< DL	< DL	< DL	< DL
Chloroform	< DL	< DL	< DL	< DL
Chloromethane (Methyl Chloride)	106.0	112.8	87.0	102.0
Dibromochloromethane	< DL	< DL	< DL	< DL
1,2-Dibromoethane (EDB)	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	< DL	< DL	< DL	< DL
1,1-Dichloroethane	668.9	693.0	664.7	675.5
1,2-Dichloroethane (EDC)	< DL	< DL	< DL	< DL
1,1-Dichloroethene	< DL	< DL	< DL	< DL
cis-1,2-Dichloroethene	660.8	701.1	672.6	678.2
trans-1,2-Dichloroethene	< DL	< DL	< DL	< DL
Dichloromethane	1631	1692	1583	1635
1,2-Dichloropropane	< DL	< DL	< DL	< DL
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
Ethylbenzene	2937	3062	3165	3055
2-Hexanone	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone (MIBK)	897.3	701.1	680.5	759.6
Styrene	465.0	515.7	546.0	508.9
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Tetrachloroethene (PCE)	1142	1209	1266	1206
Toluene	10605	11282	11079	10988
1,1,1-Trichloroethane (TCA)	97.9	104.8	95.0	99.2
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Trichloroethene (TCE)	285.5	314.3	308.6	302.8
Trichlorofluoromethane (F-11)	179.5	177.3	174.1	176.9
Trichlorotrifluoroethane (F-113)	48.9	40.3	47.5	45.6
Vinyl Acetate	< DL	< DL	< DL	< DL
Vinyl Chloride	636.3	668.8	546.0	617.0
Xylenes, Total	10605	11282	11870	11252

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

mg/min = milligrams of analyte emitted per minute.

AMTEST
AIR QUALITY, INC

SUMMARY OF EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST - AIR QUALITY, INC.

FILE NAME: S302\#2OUTSUM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #2 OUTLET			
	RUN #1 (mg/min)	RUN #2 (mg/min)	RUN #3 (mg/min)	AVERAGE (mg/min)
LAB NUMBER:	CK-0707-4	CK-0707-5	CK-0707-6	
DATE:	2/10/94	2/10/94	2/10/94	
START TIME:	09:56	11:45	13:35	
STOP TIME:	10:46	12:35	14:25	
ANALYTE	BAD DATA			
Acetone	476.1	149.0	6.20	210.4
Benzene	< DL	< DL	< DL	< DL
Bromodichloromethane	< DL	< DL	< DL	< DL
Bromomethane (Methyl Bromide)	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
1,3-Butadiene	< DL	< DL	< DL	< DL
2-Butanone (MEK)	< DL	< DL	< DL	< DL
Carbon Disulfide	< DL	22.8	< DL	~ 7.61
Carbon Tetrachloride	< DL	< DL	< DL	< DL
Chlorobenzene	< DL	< DL	< DL	< DL
Chloroethane (Ethyl Chloride)	< DL	< DL	< DL	< DL
2-Chloroethyl Vinyl Ether	< DL	< DL	< DL	< DL
Chloroform	< DL	< DL	< DL	< DL
Chloromethane (Methyl Chloride)	16.6	< DL	2.07	~ 6.21
Dibromochloromethane	< DL	< DL	< DL	< DL
1,2-Dibromoethane (EDB)	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	< DL	< DL	< DL	< DL
1,1-Dichloroethane	< DL	< DL	< DL	< DL
1,2-Dichloroethane (EDC)	< DL	< DL	< DL	< DL
1,1-Dichloroethene	< DL	< DL	< DL	< DL
cis-1,2-Dichloroethene	< DL	< DL	< DL	< DL
trans-1,2-Dichloroethene	< DL	< DL	< DL	< DL
Dichloromethane	< DL	< DL	< DL	< DL
1,2-Dichloropropane	< DL	< DL	< DL	< DL
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
Ethylbenzene	< DL	< DL	< DL	< DL
2-Hexanone	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	< DL	< DL
Styrene	< DL	< DL	< DL	< DL
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Tetrachloroethene (PCE)	< DL	< DL	< DL	< DL
Toluene	< DL	< DL	< DL	< DL
1,1,1-Trichloroethane (TCA)	< DL	< DL	2.16	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Trichloroethene (TCE)	< DL	< DL	< DL	< DL
Trichlorofluoromethane (F-11)	< DL	< DL	< DL	< DL
Trichlorotrifluoroethane (F-113)	< DL	< DL	< DL	< DL
Vinyl Acetate	< DL	< DL	< DL	< DL
Vinyl Chloride	< DL	< DL	< DL	< DL
Xylenes, Total	< DL	32.8	< DL	~ 10.9

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

mg/min = milligrams of analyte emitted per minute.

2.2.6 Destruction Efficiency of Volatile Organic Compounds

The destruction efficiency is the amount of vapors destroyed through incineration, expressed on a percentage basis. The percent destruction efficiency for each volatile organic compound which was analyzed in the gas at Flare #2 at the Cedar Hills Landfill is presented on the following computer printout titled "Volatile Organic Compounds in Air - Destruction Efficiency Evaluation". Destruction efficiencies were calculated based on the average emission rate of each compound detected in milligrams per minute (mg/min). The laboratory analysis detection limits are lower for the outlet samples because the inlet samples required dilution in the laboratory.

2.2.7 Thermocouple Probe Check

As an additional part of this evaluation, Am Test recorded temperatures from the digital display of the John Zink continuous temperature probe located approximately 3 feet below the stack ports. Temperatures were measured by inserting a calibrated thermocouple in through the sample port and diagonally downward to position it near the flare thermocouple. The table below compares the average temperatures recorded by Am Test and by the flare thermocouple. Data were recorded continuously during each test period.

Table 2.2.7. Comparison of temperature probe/indicators at Flare #2 at the Cedar Hills Landfill.

Run #	Am Test Probe Stack Temp (°F)	Zink Probe Stack Temp (°F)
1	1666	1668
2	1687	1687
3	1675	1669

AMTEST
AIR QUALITY, INC.

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

FILE NAME: S702\CH2DEFF
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE SITE: Flare #2
SAMPLE DATE: February 10, 1994

COMPOUNDS	Average Inlet Emission Rate mg/min	Average Outlet Emission Rate mg/min	Destruction Efficiency Percent
Acetone	1421	210.4	85.19 BAD DATA
Benzene	345.8	< DL	> 99.99
Bromodichloromethane	< DL	< DL	-----
Bromomethane (Methyl Bromide)	< DL	< DL	-----
Bromoform	< DL	< DL	-----
1,3-Butadiene	< DL	< DL	-----
2-Butanone (MEK)	2895	< DL	> 99.99
Carbon Disulfide	< DL	~ 7.61	*-----
Carbon Tetrachloride	< DL	< DL	-----
Chlorobenzene	88.4	< DL	> 99.99
Chloroethane (Ethyl Chloride)	326.9	< DL	> 99.99
2-Chloroethyl Vinyl Ether	< DL	< DL	-----
Chloroform	< DL	< DL	-----
Chloromethane (Methyl Chloride)	102.0	~ 6.21	~ 93.91
Dibromochloromethane	< DL	< DL	-----
1,2-Dibromoethane (EDB)	< DL	< DL	-----
1,2-Dichlorobenzene	< DL	< DL	-----
1,3-Dichlorobenzene	< DL	< DL	-----
1,4-Dichlorobenzene	< DL	< DL	-----
1,1-Dichloroethane	675.5	< DL	> 99.99
1,2-Dichloroethane (EDC)	< DL	< DL	-----
1,1-Dichloroethene	< DL	< DL	-----
cis-1,2-Dichloroethene	678.2	< DL	> 99.99
trans-1,2-Dichloroethene	< DL	< DL	-----
Dichloromethane	1635	< DL	> 99.99
1,2-Dichloropropane	< DL	< DL	-----
cis-1,3-Dichloropropene	< DL	< DL	-----
trans-1,3-Dichloropropene	< DL	< DL	-----
Ethylbenzene	3055	< DL	> 99.99
2-Hexanone	< DL	< DL	-----
4-Methyl-2-Pentanone (MIBK)	759.6	< DL	> 99.99
Styrene	508.9	< DL	> 99.99
1,1,2,2-Tetrachloroethane	< DL	< DL	-----
Tetrachloroethene (PCE)	1206	< DL	> 99.99
Toluene	10988	< DL	> 99.99
1,1,1-Trichloroethane (TCA)	99.2	< DL	> 99.99
1,1,2-Trichloroethane	< DL	< DL	-----
Trichloroethene (TCE)	302.8	< DL	> 99.99
Trichlorofluoromethane (F-11)	176.9	< DL	> 99.99
Trichlorotrifluoroethane (F-113)	45.6	< DL	> 99.99
Vinyl Acetate	< DL	< DL	-----
Vinyl Chloride	617.0	< DL	> 99.99
Xylenes, Total	11252	~ 10.9	~ 99.90

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

mg/min = milligrams of analyte emitted per minute.

* Not reported due to negative destruction efficiency.

2.3 FLARE #3

2.3.1 Velocity, Temperature and Airflow - Inlet

The results of the three (3) moisture and airflow tests performed at the inlet to Flare #3 on February 8, 1994 are summarized on the following computer printout titled "Summary of Results - Moisture and Airflow".

The average temperature of gas at the inlet was 94.1° F. The moisture of the inlet gas was measured using psychrometry. The velocity of the gas at the inlet to the flare averaged 42.8 feet per second. The average airflow of landfill gas into the flare was 1880.7 dry standard cubic feet per minute (dscf/min).

AMTEST AIR QUALITY, INC

SUMMARY OF RESULTS - MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME: S705\CHIN3VSM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #3 INLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
AM TEST LAB #:	5075	5076	5077	
CCAS LAB #:	CK-0679-1	CK-0679-2	CK-0679-3	
DATE:	2/8/94	2/8/94	2/8/94	
START TIME:	11:25	13:55	17:00	
STOP TIME:	11:40	14:10	17:15	
PSYCHROMETRIC MOISTURE (%):	2.29	2.38	1.87	2.18
BAROMETRIC PRESSURE (inches of Hg):	29.70	29.60	29.58	29.63
STATIC PRESSURE (inches of H2O):	4.5	4.5	4.6	4.5
DUCT PRESSURE (inches of Hg):	30.03	29.93	29.92	29.96
DUCT GAS TEMPERATURE (degrees F.):	94.2	93.7	94.3	94.1
DUCT GAS TEMPERATURE (degrees R.):	554.2	553.7	554.3	554.1
CARBON DIOXIDE (percent):	43.0	44.0	43.0	43.3
OXYGEN (percent):	2.9	2.7	2.9	2.8
CARBON MONOXIDE (ppm):	8.8	8.8	8.8	8.8
METHANE (percent):	38	38	38	38
MOLECULAR WEIGHT (dry, g/g-mole):	30.44	30.59	30.44	30.49
MOLECULAR WEIGHT (wet, g/g-mole):	30.15	30.29	30.20	30.21
AVERAGE VELOCITY HEAD (inches of H2O):	0.431	0.418	0.402	0.417
PITOT TUBE Cp:	0.99	0.99	0.99	
DUCT GAS VELOCITY (feet/second):	43.5	42.8	42.0	42.8
DUCT DIAMETER (inches):	12.00	12.00	12.00	
DUCT AREA (square feet):	0.785	0.785	0.785	
DUCT GAS AIRFLOW (dry std. cubic feet per min.):	1914.8	1877.2	1850.0	1880.7
DUCT GAS AIRFLOW (actual cubic feet per min.):	2049.2	2015.6	1979.4	2014.7

2.3.2 Velocity, Temperature and Airflow - Outlet

The results of the three (3) Method 1, 2, 3A and 4 tests performed at the Flare #3 outlet on February 8, 1994 are summarized on the following computer printout titled "Summary of Results - Moisture and Airflow".

The moisture of the outlet gas was determined using Method 4 during the Method 26A (HCl) tests which were conducted immediately following each airflow measurement. The velocity of the gas at the outlet to the flare averaged 18.1 feet per second. The average stack gas airflow was 24,926.4 dry standard cubic feet per minute (dscf/min). The residence time based on combustion from the top of the burners to the height of the sample ports was calculated to be 1.7 seconds using an average of 112,383.6 actual cubic feet per minute (acfm) and an average temperature of 1679.1° F as measured on February 8, 1994.

AMTEST
AIR QUALITY, INC.

SUMMARY OF RESULTS - MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME: S705\CHO3VSM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #3 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
AM TEST LAB #:	5163	5164	5165	
CCAS LAB #:	CK-0679-4	CK-0679-5	CK-0679-6	
DATE:	2/8/94	2/8/94	2/8/94	
START TIME:	10:00	13:00	16:00	
STOP TIME:	10:25	13:20	16:25	
MOISTURE (%):	9.04	9.09	9.65	9.26
BAROMETRIC PRESSURE (inches of Hg):	29.70	29.60	29.60	29.63
STATIC PRESSURE (inches of H2O):	0.13	0.15	0.15	0.14
STACK PRESSURE (inches of Hg):	29.71	29.61	29.61	29.64
STACK GAS TEMPERATURE (degrees F.):	1692.3	1667.8	1677.1	1679.1
STACK GAS TEMPERATURE (degrees R.):	2152.3	2127.8	2137.1	2139.1
CARBON DIOXIDE (percent):	7.3	7.3	8.1	7.6
OXYGEN (percent):	12.6	12.6	11.6	12.3
CARBON MONOXIDE (ppm):	0	0	0	0
MOLECULAR WEIGHT (dry, g/g-mole):	29.67	29.67	29.76	29.70
MOLECULAR WEIGHT (wet, g/g-mole):	28.62	28.61	28.63	28.62
AVERAGE VELOCITY HEAD (inches of H2O):	0.018	0.020	0.039	0.026
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet/second):	15.5	16.1	22.6	18.1
STACK DIAMETER (inches):	138.0	138.0	138.0	
STACK AREA (square feet):	103.9	103.9	103.9	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	21336.0	22348.1	31095.0	24926.4
STACK GAS AIRFLOW (actual cubic feet per min.):	96295.1	100099.8	140756.0	112383.6

2.3.3 EPA Method 3A, 6C, 7E, 10 and Fixed Gases Analysis

Fixed gases at the inlet and outlet of Flare #3 were quantified by Coast-to-Coast Analytical Services (CCAS) using the gas collected in SUMMA^R canisters. The GC-TCD analysis performed on the samples by CCAS quantifies percent levels of carbon monoxide (CO). Am Test measured parts per million (ppm) levels of CO at the inlet from samples collected in Tedlar bags using a non-dispersive infrared analyzer (NDIR). Am Test measured ppm CO at the flare outlet using a gas filter correlation NDIR.

Three (3) Method 6C, 7E and 10 tests were performed on February 8, 1994 at the flare outlet. SO_2, NO_x and CO emission data are summarized on the following computer printout titled, "Summary of Results - Methods 6C, 7E and 10". Emission rates were calculated in units of pounds per hour (lb/hr). Gaseous emission data were measured continuously during each test period. The data were recorded once per minute and averaged, and the average values were bias-corrected for calibration drift during each test. Average combustion gas values obtained at the inlet and outlet of Flare #3 are presented in Table 2.3.3 below. Am Test's real-time O_2, CO_2 and CO data were used for this comparison rather than the GC-TCD data at the outlet.

Table 2.3.3. Concentration of gaseous constituents quantified from samples collected at the landfill gas inlet and outlet of Flare #3 on February 8, 1994 at the Cedar Hills Landfill in Maple Valley, Washington.

Compound	Average Inlet Gas Concentrations	Average Outlet Gas Concentrations
Methane (%)	38	< 0.005
Carbon Dioxide (%)	43.3	7.6
Oxygen (%)	2.8	12.3
Carbon Monoxide (ppm)	8.8	0
Nitrogen (%)	16.0	80.1

AM TEST
AIR QUALITY, INC.

SUMMARY OF RESULTS - METHODS 6C, 7E AND 10
AM TEST - AIR QUALITY, INC.

FILE NAME: S704\CH28#3SM
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #3 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
DATE:	2/8/94	2/8/94	2/8/94	
START TIME:	11:15	13:23	16:28	
STOP TIME:	12:15	14:23	17:28	
AIRFLOW (dry std. cubic feet per min.):	21336.0	22348.1	31095.0	24926.4
METHOD 6C - SULFUR DIOXIDE (SO2)				
SULFUR DIOXIDE CONCENTRATION (ppm):	2.2	2.0	1.3	1.8
SULFUR DIOXIDE EMISSION RATE (lb/hr):	0.468	0.445	0.403	0.438
METHOD 7E - NITROGEN OXIDES (NOx)				
NITROGEN OXIDES EMISSION CONC. (ppm):	18.8	18.6	22.1	19.8
NOx EMISSION RATE (lb/hr as NO2):	2.87	2.98	4.92	3.59
METHOD 10 - CARBON MONOXIDE (CO)				
CARBON MONOXIDE CONCENTRATION (ppm):	0	0	0	0
CARBON MONOXIDE EMISSION RATE (lb/hr):	0	0	0	0

2.3.4 EPA Method 26A - Gaseous Chloride (as HCl)

Three (3) EPA Method 1, 2, 3A, 4 and 26A samples were collected at the Flare #2 outlet on February 8, 1994. Each sample was collected over a 60-minute period. The Method 26A sample train utilizes 0.1 N sulfuric acid solution in a series of impingers which scrub hydrogen chloride (HCl) from the gas stream. The sampling was performed isokinetically. The sulfuric acid solution from each train was recovered and analyzed for chlorides using ion chromatography (IC). The chloride emission results are summarized on the following computer printout titled "Summary of Results - Methods 1, 2, 3A, 4 and 26A".

Copies of the laboratory analysis results in units of micrograms (μg) per sample are presented in Appendix B of this report. The laboratory results were converted to emission concentration units of milligrams per dry standard cubic meter (mg/dscm) and parts per million (ppm) uncorrected and corrected to 7% O_2 for each sample. The results were also converted to emission rate units of pounds per hour (lb/hr).

AMTEST
AIR QUALITY, INC.

SUMMARY OF RESULTS - METHODS 1, 2, 3A, 4 AND 26A
AM TEST-AIR QUALITY, INC.

FILE NAME: S707\CH#326SM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #3 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	5072	5073	5074	
DATE:	2/8/94	2/8/94	2/8/94	
START TIME:	11:15	13:23	16:28	
STOP TIME:	12:15	14:23	17:28	
SAMPLE LENGTH (minutes):	60.0	60.0	60.0	
VOLUME SAMPLED (cubic feet):	44.937	40.444	39.728	41.703
VOLUME SAMPLED (dry std. cubic feet):	45.800	40.914	40.160	42.291
VOLUME SAMPLED (dry std. cubic meters):	1.297	1.159	1.137	1.198
STACK GAS MOISTURE (percent):	9.04	9.09	9.65	9.26
BAROMETRIC PRESSURE (inches of Hg):	29.65	29.60	29.60	29.62
STATIC PRESSURE (inches of H2O):	0.13	0.15	0.15	0.14
STACK PRESSURE (inches of Hg):	29.66	29.61	29.61	29.63
STACK TEMPERATURE (degrees F.):	1660.8	1695.9	1734.4	1697.0
STACK TEMPERATURE (degrees R.):	2120.8	2155.9	2194.4	2157.0
CARBON DIOXIDE (percent):	7.3	7.3	8.1	7.6
OXYGEN (percent):	12.6	12.6	11.6	12.3
CARBON MONOXIDE (ppm):	0	0	0	0
MOLECULAR WEIGHT (dry, g/g-mole):	29.67	29.67	29.76	29.70
MOLECULAR WEIGHT (wet, g/g-mole):	28.62	28.61	28.62	28.62
AVERAGE VELOCITY HEAD (inches of H2O):	0.022	0.021	0.020	0.021
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet/second):	16.8	16.5	16.3	16.5
STACK DIAMETER (inches):	138.0	138.0	138.0	
STACK AREA (square feet):	103.9	103.9	103.9	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	23553.5	22663.1	21909.4	22708.7
STACK GAS AIRFLOW (actual cubic feet per min.):	104920.0	102856.2	101837.5	103204.6
NOZZLE DIAMETER (inches):	0.765	0.765	0.765	
ISOKINETICS (percent):	106	98	99	
GASEOUS CHLORIDE EMISSIONS (as HYDROGEN CHLORIDE)				
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	3.79	3.47	4.17	3.81
CHLORIDE EMISSION CONCENTRATION (ppm):	2.50	2.29	2.75	2.51
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	4.19	3.83	4.11	4.04
CHLORIDE EMISSION RATE (lb/hr):	0.334	0.295	0.342	0.324

2.3.5 EPA Method TO-14 - Volatile Organic Compounds (VOCs)

Three (3) EPA Method TO-14 samples were collected simultaneously at the inlet and outlet of Flare #3 on February 8, 1994 for quantifying volatile organic compound (VOC) emissions. VOC emission rates were calculated in units of milligrams per minute (mg/min). VOC emission rate calculations were performed using the laboratory analysis data provided by Coast-to-Coast Analytical Services, and from airflow data collected concurrently. The inlet/outlet VOC results are summarized on the following computer printouts titled "Summary of Emission Rate Results - TO-14 Volatile Organic Compounds". The emission rate results compared to the detection limits and instrument blank for each individual run are presented on the computer printouts titled "TO-14 Emission Rate Results" in Appendix A of this report. Copies of the VOC laboratory analysis results in emission concentration units of micrograms per cubic meter (ug/m^3) are included in Appendix B of this report.

AMTEST
AIR QUALITY, INC

SUMMARY OF EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST - AIR QUALITY, INC.

FILE NAME: S702\#3INRSM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #3 INLET			
	RUN #1 (mg/min)	RUN #2 (mg/min)	RUN #3 (mg/min)	AVERAGE (mg/min)
LAB NUMBER:	CK-0679-1	CK-0679-2	CK-0679-3	
DATE:	2/8/94	2/8/94	2/8/94	
START TIME:	11:17	13:25	16:30	
STOP TIME:	12:07	14:15	17:20	
ANALYTE				
Acetone	650.7	903.8	733.5	762.7
Benzene	119.3	127.6	120.5	122.5
Bromodichloromethane	< DL	< DL	< DL	< DL
Bromomethane (Methyl Bromide)	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
1,3-Butadiene	< DL	< DL	< DL	< DL
2-Butanone (MEK)	1627	1701	1362	1563
Carbon Disulfide	< DL	< DL	< DL	< DL
Carbon Tetrachloride	< DL	< DL	< DL	< DL
Chlorobenzene	135.6	148.9	115.3	133.2
Chloroethane (Ethyl Chloride)	< DL	< DL	< DL	< DL
2-Chloroethyl Vinyl Ether	< DL	< DL	< DL	< DL
Chloroform	< DL	< DL	< DL	< DL
Chloromethane (Methyl Chloride)	< DL	< DL	< DL	< DL
Dibromochloromethane	< DL	< DL	< DL	< DL
1,2-Dibromoethane (EDB)	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	119.3	101.0	< DL	~ 73.4
1,1-Dichloroethane	38.0	37.2	36.7	37.3
1,2-Dichloroethane (EDC)	< DL	< DL	< DL	< DL
1,1-Dichloroethene	< DL	< DL	< DL	< DL
cis-1,2-Dichloroethene	303.7	319.0	303.9	308.8
trans-1,2-Dichloroethene	< DL	< DL	< DL	< DL
Dichloromethane	124.7	127.6	125.7	126.0
1,2-Dichloropropane	< DL	< DL	< DL	< DL
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
Ethylbenzene	2711	2871	2305	2629
2-Hexanone	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone (MIBK)	759.2	850.6	628.7	746.2
Styrene	271.1	292.4	199.1	254.2
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Tetrachloroethene (PCE)	428.4	467.8	382.5	426.2
Toluene	4230	4359	3929	4173
1,1,1-Trichloroethane (TCA)	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Trichloroethene (TCE)	97.6	101.0	94.3	97.6
Trichlorofluoromethane (F-11)	< DL	< DL	< DL	< DL
Trichlorotrifluoroethane (F-113)	< DL	< DL	< DL	< DL
Vinyl Acetate	< DL	< DL	< DL	< DL
Vinyl Chloride	206.1	223.3	293.4	240.9
Xylenes, Total	9219	9569	7859	8882

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

mg/min = milligrams of analyte emitted per minute.

AMTEST
AIR QUALITY, INC.

SUMMARY OF EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST - AIR QUALITY, INC.

FILE NAME: S702\#3OUTRSM
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington

	FLARE #3 OUTLET			
	RUN #1	RUN #2	RUN #3	AVERAGE
	(mg/min)	(mg/min)	(mg/min)	(mg/min)
LAB NUMBER:	CK-0679-4	CK-0679-5	CK-0679-6	
DATE:	2/8/94	2/8/94	2/8/94	
START TIME:	11:17	13:25	16:30	
STOP TIME:	12:07	14:15	17:20	
ANALYTE				
Acetone	38.1	75.9	105.7	73.2
Benzene	1.39	< DL	1.76	~ 1.05
Bromodichloromethane	< DL	< DL	< DL	< DL
Bromomethane (Methyl Bromide)	< DL	< DL	< DL	< DL
Bromoform	< DL	< DL	< DL	< DL
1,3-Butadiene	< DL	< DL	< DL	< DL
2-Butanone (MEK)	< DL	94.9	< DL	~ 31.6
Carbon Disulfide	< DL	4.30	7.93	~ 4.08
Carbon Tetrachloride	< DL	< DL	< DL	< DL
Chlorobenzene	< DL	< DL	< DL	< DL
Chloroethane (Ethyl Chloride)	< DL	< DL	< DL	< DL
2-Chloroethyl Vinyl Ether	< DL	< DL	< DL	< DL
Chloroform	< DL	< DL	< DL	< DL
Chloromethane (Methyl Chloride)	< DL	< DL	< DL	< DL
Dibromochloromethane	< DL	< DL	< DL	< DL
1,2-Dibromoethane (EDB)	< DL	< DL	< DL	< DL
1,2-Dichlorobenzene	< DL	< DL	< DL	< DL
1,3-Dichlorobenzene	< DL	< DL	< DL	< DL
1,4-Dichlorobenzene	< DL	< DL	< DL	< DL
1,1-Dichloroethane	< DL	< DL	< DL	< DL
1,2-Dichloroethane (EDC)	< DL	< DL	< DL	< DL
1,1-Dichloroethene	< DL	< DL	< DL	< DL
cis-1,2-Dichloroethene	< DL	< DL	< DL	< DL
trans-1,2-Dichloroethene	< DL	< DL	< DL	< DL
Dichloromethane	< DL	< DL	< DL	< DL
1,2-Dichloropropane	< DL	< DL	< DL	< DL
cis-1,3-Dichloropropene	< DL	< DL	< DL	< DL
trans-1,3-Dichloropropene	< DL	< DL	< DL	< DL
Ethylbenzene	< DL	< DL	< DL	< DL
2-Hexanone	< DL	< DL	< DL	< DL
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	< DL	< DL
Styrene	< DL	< DL	< DL	< DL
1,1,2,2-Tetrachloroethane	< DL	< DL	< DL	< DL
Tetrachloroethene (PCE)	< DL	< DL	< DL	< DL
Toluene	< DL	20.3	< DL	~ 6.75
1,1,1-Trichloroethane (TCA)	< DL	< DL	< DL	< DL
1,1,2-Trichloroethane	< DL	< DL	< DL	< DL
Trichloroethene (TCE)	< DL	< DL	< DL	< DL
Trichlorofluoromethane (F-11)	< DL	< DL	< DL	< DL
Trichlorotrifluoroethane (F-113)	< DL	< DL	< DL	< DL
Vinyl Acetate	< DL	< DL	< DL	< DL
Vinyl Chloride	< DL	< DL	< DL	< DL
Xylenes, Total	< DL	< DL	< DL	< DL

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

mg/min = milligrams of analyte emitted per minute.

2.3.6 Destruction Efficiency of Volatile Organic Compounds

The destruction efficiency is the amount of vapors destroyed through incineration, expressed on a percentage basis. The percent destruction efficiency for each volatile organic compound which was analyzed in the gas at Flare #3 at the Cedar Hills Landfill is presented on the following computer printout titled "Volatile Organic Compounds in Air - Destruction Efficiency Evaluation". Destruction efficiencies were calculated based on the average emission rate of each compound detected in milligrams per minute (mg/min). The laboratory analysis detection limits are lower for the outlet samples because the inlet samples required dilution in the laboratory.

AMTEST
AIR QUALITY, INC.

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

FILE NAME: S702\CH3DEFF
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE SITE: Flare #3
SAMPLE DATE: February 8, 1994

COMPOUNDS	Average Inlet Emission Rate mg/min	Average Outlet Emission Rate mg/min	Destruction Efficiency Percent
Acetone	762.7	73.2	90.40
Benzene	122.5	~ 1.05	~ 99.14
Bromodichloromethane	< DL	< DL	-----
Bromomethane (Methyl Bromide)	< DL	< DL	-----
Bromoform	< DL	< DL	-----
1,3-Butadiene	< DL	< DL	-----
2-Butanone (MEK)	1563	~ 31.6	~ 97.98
Carbon Disulfide	< DL	~ 4.08	----*
Carbon Tetrachloride	< DL	< DL	-----
Chlorobenzene	133.2	< DL	> 99.99
Chloroethane (Ethyl Chloride)	< DL	< DL	-----
2-Chloroethyl Vinyl Ether	< DL	< DL	-----
Chloroform	< DL	< DL	-----
Chloromethane (Methyl Chloride)	< DL	< DL	-----
Dibromochloromethane	< DL	< DL	-----
1,2-Dibromoethane (EDB)	< DL	< DL	-----
1,2-Dichlorobenzene	< DL	< DL	-----
1,3-Dichlorobenzene	< DL	< DL	-----
1,4-Dichlorobenzene	~ 73.4	< DL	> 99.99
1,1-Dichloroethane	37.3	< DL	> 99.99
1,2-Dichloroethane (EDC)	< DL	< DL	-----
1,1-Dichloroethene	< DL	< DL	-----
cis-1,2-Dichloroethene	308.8	< DL	> 99.99
trans-1,2-Dichloroethene	< DL	< DL	-----
Dichloromethane	126.0	< DL	> 99.99
1,2-Dichloropropane	< DL	< DL	-----
cis-1,3-Dichloropropene	< DL	< DL	-----
trans-1,3-Dichloropropene	< DL	< DL	-----
Ethylbenzene	2629	< DL	> 99.99
2-Hexanone	< DL	< DL	-----
4-Methyl-2-Pentanone (MIBK)	746.2	< DL	> 99.99
Styrene	254.2	< DL	> 99.99
1,1,2,2-Tetrachloroethane	< DL	< DL	-----
Tetrachloroethene (PCE)	426.2	< DL	> 99.99
Toluene	4173	~ 6.75	~ 99.84
1,1,1-Trichloroethane (TCA)	< DL	< DL	-----
1,1,2-Trichloroethane	< DL	< DL	-----
Trichloroethene (TCE)	97.6	< DL	> 99.99
Trichlorofluoromethane (F-11)	< DL	< DL	-----
Trichlorotrifluoroethane (F-113)	< DL	< DL	-----
Vinyl Acetate	< DL	< DL	-----
Vinyl Chloride	240.9	< DL	> 99.99
Xylenes, Total	8882	< DL	> 99.99

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

mg/min = milligrams of analyte emitted per minute.

*Not reported due to negative destruction efficiency.

2.3.7 Thermocouple Probe Check

As an additional part of this evaluation, Am Test recorded temperatures from the digital display of the John Zink continuous temperature probe located approximately 3 feet below the stack ports. Temperatures were measured by inserting a calibrated thermocouple in through the sample port and diagonally downward to position it near the flare thermocouple. The table below compares the average temperatures recorded by Am Test and by the flare thermocouple. Data were recorded continuously during each test period.

Table 2.3.7. Comparison of temperature probe/indicators at Flare #3 at the Cedar Hills Landfill.

Run #	Am Test Probe Stack Temp (°F)	Zink Probe Stack Temp (°F)
1	1629	1628
2	1632	1639
3	1606	1642

3.0
PROJECT OVERVIEW/EXCEPTIONS

An acceptable leak check of less than 0.02 cfm at the highest vacuum rate (or greater) used during the test preceded and followed each Method 26A run. The average percentage isokinetics for each run were within the acceptable limits of 100 $\pm$ 10%.

Both Coast-to-Coast Analytical Services, Inc. (CCAS) and Am Test-Air Quality, Inc. performed analysis of the combustion gases (O_2, CO_2 and CO) at the outlet during this evaluation. Am Test's real-time continuous analyzer data were used because the analyzers give more accurate results than the results obtained using GC-TCD. The inlet gas cannot be analyzed using continuous analyzers because of the high concentrations of carbon dioxide and methane, however, the ppm carbon monoxide at the inlet was quantified from integrated samples of the gas collected in Tedlar bags which were run on a separate analyzer in Am Test's laboratory.

The destruction efficiency for acetone for all 3 flares was low compared to other speciated VOCs. Acetone is a common laboratory contaminant and is commonly used for source testing, therefore, the data may be biased higher than is actually true for this source.

Method 26A runs 1 and 2 at the Flare #3 outlet were run with no front-half filter. Run 3 and all subsequent runs at Flare #1 and Flare #2 were run with a filter. The chloride results from runs 1 and 2 at Flare #3 were very close to run 3.

4.0
SOURCE OPERATION

King County's Cedar Hills Regional Landfill is an active municipal solid waste facility located in Maple Valley, Washington. The gas is extracted from the landfill by extraction wells and a network of collection piping which connect to centrifugal blowers installed at the North Flare Station located at the north end of the landfill. The collected gas is discharged from the blowers to three (3) flares for incineration. All three (3) flares were tested during this emission evaluation.

Each John Zink ZTOF flare at Cedar Hills consists of a refractory-lined, cylindrical, steel stack 14 feet in diameter by 40 feet in height. Each unit is designed to burn up to 4,000 cubic feet per minute of LFG with a minimum operating temperature of 1,400°F. There are four (4) 4-inch diameter sample ports located at the same elevation and circumferentially 90 degrees apart. The sample ports are located approximately 30 feet above the top of the flame.

5.0
SAMPLING AND ANALYSIS PROCEDURES

5.1 EPA Methods 1 and 2 - Velocity, Temperature, and Airflow

EPA Method 1 procedures were used to assure that representative measurements of volumetric flow rate were obtained by dividing the cross-section of the stack or duct into a number of equal areas, and then locating a traverse point within each of the equal areas. Refer to the "Stack Schematic and Location of Sample Points" data sheet and/or the figure titled, "Location of Sampling Ports and Traverse Points", located in the appendices of this report, for a schematic of the stack and the point locations selected for testing. Method 2 was performed to measure the stack gas velocity using a type S or a standard pitot tube, and the gas temperature using a calibrated thermocouple probe connected to a digital thermocouple indicator. The type S pitot tubes were connected with tubing to an oil-filled inclined manometer, a hook gauge manometer or magnehelic gauges to obtain velocity measurements. The pitot tube lines were leak-checked and the pressure measurement device was leveled and zeroed prior to use. Calibration information for each pressure and temperature measurement device used are included in the appendices of this report.

5.2 EPA Method 3A and Fixed Gas Analysis

The concentration of fixed gases at the inlet and outlet sample sites (carbon dioxide (CO_2), carbon monoxide (CO), oxygen (O_2), nitrogen, and methane (CH_4)) were quantified by Coast-to-Coast Analytical Services, Inc. using the gas collected in the SUMMA^R canisters. A gas chromatograph equipped with a thermal conductivity detector (GC-TCD) was used for this analysis, which detects percent levels of these compounds. In addition, Am Test collected integrated samples in Tedlar bags at the inlet and analyzed them for ppm levels of CO.

Real-time measurements were made to quantify the O_2, CO_2 and CO concentration at the flare exhaust stacks. The stack gas composition was determined using EPA Method 3A procedures, which allow the use of instrumental analyzers. A paramagnetic analyzer was used to measure the percent (%) oxygen (O_2), and a non-dispersive infrared (NDIR) analyzer was used to measure the % carbon dioxide (CO_2). The manufacturer and model number for the specific analyzers used are detailed on the "Continuous Analyzer Checklist" in the appendices of this report. Certified O_2 and CO_2 gases were utilized to check the calibration of the instruments after each test. The O_2 and CO_2 data were used to calculate the molecular weight of the stack gas.

The Method 3A sample system is illustrated in the figure titled "EPA Method 3A, 6C, 7E and 10 Sample Train" in the appendices of this report. Also included in the appendices are specifications for the analyzers used along with copies of the certificates of analysis for the calibration gases used. An effluent gas sample was drawn through a stainless steel sampling probe and out-of-stack filter which were sufficiently heated to prevent condensation. A calibration valve was connected to the inlet of the probe for the purpose of introducing calibration gas to flood the probe. The gas sample passed through a refrigerator type moisture removal system which continuously removed condensate from the sample gas. A Teflon sample line was used to transport the gas sample to the continuous monitoring system. 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. Data from the instruments were recorded once per minute using a data acquisition system.

The combustion gas measurement system was assembled on-site and calibration gases were introduced and adjustments were made to calibrate the instrument. The sampling system components were adjusted to achieve appropriate sampling rates. Sampling was continuous, with a calibration check (calibrated upstream of the analyzers) at the end of every test run and a sampling system bias check (calibrated through the probe) at the end of every three (3) runs (maximum).

5.3 EPA Method 4 - Moisture

The psychrometric moisture content of the flare inlet gas stream was calculated using wet bulb and dry bulb temperatures recorded during each velocity test. The percent moisture in the outlet gas stream was quantified by weighing the impingers to 0.1 grams before and after each Method 26A run on a digital top-loading balance. The net weight (final minus initial) was used to calculate the amount of moisture condensed from the known volume of stack gas collected.

5.4 EPA Method 6C - Sulfur Dioxide

Sulfur dioxide (SO_2) data were collected using Method 6C, which is an instrumental method. A gas sample was continuously extracted from the stack and passed through an ultraviolet analyzer which measures the parts per million (ppm) SO_2 on a dry basis. The manufacturer and model number for the specific analyzers used are detailed on the "Continuous Analyzer Checklist" in the appendices of this report. Measurements from the instrument were recorded once per minute.

The Method 6C sample system is illustrated in the figure titled "EPA Method 3A, 6C, 7E and 10 Sample Train" in the appendices of this report. An effluent gas sample was drawn through the same sample conditioning system described for Method 3A testing. A linearity check was performed prior to sampling using zero,

mid-range and high-range span gas. Sampling was continuous, with a calibration check using zero and span gas after each run.

5.5 EPA Method 7E - Nitrogen Oxides

Nitrogen oxides (NO_X) data were collected using Method 7E, which is an instrumental method. A gas sample was continuously extracted from the stack and passed through a chemiluminescent analyzer which measures the parts per million (ppm) NO_X on a dry basis. The manufacturer and model number for the specific analyzers used are detailed on the "Continuous Analyzer Checklist" in the appendices of this report. Measurements from the instrument were recorded once per minute.

The Method 7E sample system is illustrated in the figure titled "EPA Method 3A, 6C, 7E and 10 Sample Train" in the appendices of this report. An effluent gas sample was drawn through the same sample conditioning system described for Method 3A testing. A linearity check was performed prior to sampling using zero, mid-range and high-range span gas. Sampling was continuous, with a calibration check using zero and span gas after each run.

5.6 EPA Method 10 - Carbon Monoxide

Carbon monoxide (CO) data were collected using Method 10, which is an instrumental method. A gas sample was continuously extracted from the stack and passed through a gas filter correlation non-dispersive infrared (NDIR) analyzer which measures the parts per million (ppm) CO on a dry basis. The manufacturer and model number for the specific analyzers used are detailed on the "Continuous Analyzer Checklist" in the appendices of this report. Measurements from the instrument were recorded once per minute.

The Method 10 sample system is illustrated in the figure titled "EPA Method 3A, 6C, 7E and 10 Sample Train" in the appendices of this report. An effluent gas sample was drawn through the same sample conditioning system described for Method 3A testing. A linearity check was performed prior to sampling using zero, mid-range and high-range span gas. Sampling was continuous, with a calibration check using zero and span gas after each run.

5.7 EPA Method 26A - Chloride (as HCl)

The sample train used for chloride sampling was an EPA Method 26A design as illustrated in the figure titled "Method 26A Sample Train" in the appendices of this report. The "Sample Train Information Sheet" (also in the appendices) details the type of nozzle, probe, probe liner and filter used along with the contents of the sample train impingers. To quantify chloride emissions, the stack gas was withdrawn isokinetically from the stack and passed through a filter. The probe was equipped with type S pitot tubes for measuring gas velocity and a thermocouple sensor for measuring stack gas temperature. The thermocouple sensor was connected to a digital thermocouple indicator which was used to measure the stack gas temperature at each sample point. A glass filter assembly was enclosed in a temperature-controlled heated sample box. The temperature of the probe liner was monitored to assure that condensation did not occur within the probe liner. The probe sheath has type S pitot tubes attached, along with a thermocouple sensor for monitoring the stack gas temperature. The thermocouple sensors were connected to a digital thermocouple indicator to monitor temperature throughout testing. The nozzle, probe liner, prefilter connective glassware and filter is often referred to as the "front-half" of the sample train. Following the filter was a condenser section which, by convention, is referred to as the "back-half". The impinger section was maintained at a temperature below 68° F by keeping ice on the impingers. The

temperature at the outlet of the silica gel bubbler was monitored to verify that it did not exceed 68° F during a test. Note: Some subparts or methods specify alternate temperatures for the probe liner, filter holder box and impinger ice bath. The "Sample Train Information Sheet" details any exceptions.

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 contains 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 0.001 cubic feet. The dry gas meter inlet and outlet temperatures were monitored by thermocouples which are connected to the multichannel thermocouple indicator. The dry gas meter calibration factor, Y, is determined by calibrating the meter against a standard laboratory dry gas meter.

Stack condition measurements were made prior to collecting a sample, including measurements of velocity, temperature and a check for cyclonic flow in the stack. A sample nozzle was chosen and isokinetic operating parameters were established utilizing a Hewlett-Packard programmable calculator. The sampling nozzle, probe and prefilter connective glassware were cleaned and rinsed prior to use. The sample train was assembled and determined to be leak free following the procedures outlined in Method 5. Before each test, a final check was made to assure that the process was operating at the desired production rate and operating parameters. A final check was made of the sample box and probe heat temperatures. Crushed ice was added to the condenser section. The sample nozzle

was positioned in the stack at the first sample point. The sample pump was then turned on and the gas sampling rate was adjusted for isokinetic sampling. Isokinetic sampling proceeded at each of the traverse points. Upon completion of the test, the sample probe was removed from the stack and a post-test leak check was performed according to Method 5 procedures. Care was taken to assure that the nozzle tip did not touch the port nipple.

The bubblers and impingers utilized for the condenser section, or "back-half" of the sample train were weighed with a readability of 0.1 grams before and after sampling using an electronic top loading balance. The difference between the initial and final weights of the condenser section constitute the amount of moisture gain during the run. The contents of the first two (2) impingers containing condensate and 0.1 N H_2SO_4 were quantitatively transferred to a sample bottle. The impingers and connecting glassware were rinsed with deionized water and these rinses were added to the impinger solution in the sample bottle. The solutions in the third and fourth impingers containing 0.1 N NaOH (used to scrub chlorine) were discarded. The sulfuric acid solution from each run was analyzed for chlorides using ion chromatography by EPA Method 300.0.

5.8 EPA Method TO-14 - Volatile Organic Compounds

Integrated samples of the gas at the inlet and outlet of the flare were collected using Compendium Method TO-14 for volatile organic compound (VOC) analysis. The TO-14 sample train is illustrated in the figure titled "TO-14 Sample System Schematic" in the appendices of this report. This ambient air testing method was used for this source testing project to collect integrated samples of gas in evacuated SUMMA^R electropolished stainless steel canisters. The integrated samples were analyzed using EPA Method TO-14, which utilizes a gas chromatograph equipped

with a mass spectrometer (GC-MS) to quantify a standard list of volatile organic compounds.

The TO-14 sampling apparatus included a stainless steel probe, a mechanical critical orifice flow regulator or metering valve, and a 0-30 inch vacuum gauge to monitor canister vacuum. The system is specifically designed to collect uniformly integrated air samples over a predetermined time period. A stainless steel probe was inserted into the port to pull a gas sample through the flow controller and into the evacuated canister. The teflon sample line was attached to a stainless steel "T" connection, with the side branch connected to a vacuum gauge atop the SUMMA^R canister, the other end of the "T" was connected to a valve with a sample pump attached. The sample train was evacuated to approximately one inch above absolute pressure. A leak check was performed by observing the vacuum gauge for one (1) minute. The SUMMA^R canister valve was opened and the initial vacuum was recorded. The sample line valve was then opened until the canister vacuum was zero.

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

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

6.0
QUALITY ASSURANCE PLAN

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

6.1 Calibration Procedures and Frequency

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

The sample nozzles used to collect isokinetic samples are calibrated on-site before sampling using digital inside calipers readable to 0.001 inch. Three (3) measurements were taken at varying points around the inside of the nozzle tip and averaged. The dry gas meters used to accurately measure sample volumes are

calibrated using a standard laboratory dry gas meter. The type S pitot tubes utilized for velocity determination are calibrated using Method 2, Section 4.1, and are inspected regularly for wear. The magnehelic gauges used for pressure measurements are checked against an oil-filled manometer. The digital thermocouple indicator used for temperature measurement has a readability of 1 degree Fahrenheit and is periodically re-certified by the manufacturer. Each thermocouple probe used to monitor temperature is checked periodically at three (3) temperature settings. Copies of calibration information for each measurement device used are included in the appendices of this report. A barometer readable to 0.01 inches of mercury is used in the field to obtain barometric pressure readings.

The gaseous measurement systems are capable of meeting the system performance specifications detailed in 40 CFR 60, Appendix A, Method 6C, Section 4. For meeting these specifications, the analyzer's calibration error must be less than ± 2 percent of the span for the zero, mid-range, and high-range calibration gases. The sampling system bias must be less than $\pm 5\%$ of the span for the zero, and mid- or high-range calibration gases. The zero drift must be less than $\pm 3\%$ of the span over the period of each run. The calibration drift must be less than $\pm 3\%$ of the span over the period of each run. Copies of the certificates of analysis for each tank of calibration gas used are included in the appendices of this report. The calibration gases were analyzed following the EPA Traceability Protocol Number 1, or next best available. Purified nitrogen was utilized for the zero gas.

Support equipment is defined as all equipment, not previously discussed, that is required for completing an environmental monitoring or measurement task. This equipment may include storage and transportation containers, sample recovery glassware, and communications gear. Support equipment is periodically inspected

to maintain the performance standards necessary for proper and efficient execution of all tasks and responsibilities.

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

- Setting up and leak testing the sample train
- Isokinetic sampling check (if applicable)
- Final leak check of the sample train
- Sample recovery

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

6.2 Sample Recovery and Field Documentation

Data collected during each test, are immediately inspected for completeness and placed under the custody of the Project Leader until custody is transferred when the samples were returned to the Air Quality laboratory. Sample recovery is carried out in a suitable area free from particulate matter contamination. Each sample is assigned an identifying lab number to assist the chemists in tracking the sample.

6.3 Chain of Custody

The history of each sample was documented from collection through all transfers of custody until it was transferred to the analytical laboratory. Copies of the chain of custody forms are included in the appendices of this report. Internal laboratory

records document the custody of the samples through their final disposition. Care was taken to record precisely the sample type, sample time, and sample location and to help ensure that the sample number on the label exactly matches those numbers on the sample logsheet and the chain-of-custody record. The persons undertaking the actual sampling in the field were responsible for the care and custody of the samples collected until they were properly transferred or dispatched. Sample labels were completed for each sample bottle using water-proof ink.

6.4 Transfer of Custody and Shipment

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

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

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

Empty space in the box was filled with bubble pack and styrofoam to prevent damage during shipment. The samples were shipped to Coast-to-Coast Analytical via UPS red for next day delivery.

6.5 Data Reduction, Validation and Reporting

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

The test results were calculated according to EPA 40 CFR 60 criteria. Copies of the pertinent equations used to derive these results are included in the appendices of this report. Standard conditions are 68° F and 29.92 inches of mercury. The average values from instrumental analyzer readings were computed and bias corrected for each test period. The average gas effluent concentration was determined from the average gas concentration displayed by the gas analyzer, adjusted for the zero and upscale sampling system bias checks. Calculations are on a dry basis using the following equation:

$$C_{gas} = (C - C_o) * (C_{ma}/(C_m - C_o)$$

where:

C_{gas} = Effluent gas concentration, dry basis

C = Average gas concentration indicated by analyzer, dry basis

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

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

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

7.0
METHODOLOGY REFERENCES

EPA. Title 40 Code of Federal Regulations, Parts 53-60 (40 CFR 60), Appendix A, Reference Methods 1, 2, 3A, 4, 6C, 7E, 10 and 26A (proposed). July 1, 1992.

EPA. EPA APTI Course, "Course 468 - Source Sampling For Gaseous Pollutants".

EPA. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 3, EPA-60/4-77-027b.

EPA. EPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Method TO-14.

APPENDIX A

Computer Printouts of Results

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\KCVEL#11	LAB #:	CK-0679-7
CLIENT:	King County Solid Waste	START TIME:	11:16 o'clock
	@ Cedar Hills Landfill	STOP TIME:	11:26 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #1 Inlet		
SAMPLE DATE:	February 9, 1994		
RUN #:	1 - Velocity		
OPERATORS:	Orton/Lawrence		

WET BULB TEMPERATURE (Tw):	78	°F
DRY BULB TEMPERATURE (Td):	94	°F
SAT'd H2O VAPOR PRESSURE (SVP):	0.9666	inches of Hg (wet bulb °F - from chart)
VAPOR PRESSURE (VP):	0.7928	inches of Hg
Bws:	0.0262	
MOISTURE (%):	2.62	
PITOT TUBE Cp:	0.99	
DUCT DIAMETER:	12.00	inches
DUCT AREA:	0.785	sq. feet
BAROMETRIC PRES.:	29.55	inches Hg
STATIC PRESSURE:	10.0	inches H2O
DUCT PRESSURE:	30.29	inches Hg
AVERAGE CO2 CONC:	48.0	percent
AVERAGE O2 CONC:	2.1	percent
AVERAGE CO CONC:	7.3	ppm
AVERAGE CH4 CONC:	41	percent
MOLECULAR WEIGHT:	30.84	g/g-mole-dry
MOLECULAR WEIGHT:	30.51	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Top 1	0.92	92	Top 4	0.98	94
2	0.94	93	5	0.95	95
3	1.00	94	6	0.95	95

DUCT GAS TEMPERATURE:	93.8	degrees F
DUCT GAS TEMPERATURE:	553.8	degrees R
AVERAGE VELOCITY HEAD:	0.956	" of H2O
DUCT GAS VELOCITY:	64.1	ft/sec
DUCT GAS AIR FLOW:	2838.0	dscf/min
DUCT GAS AIR FLOW:	3019.9	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\KCVEL#12	LAB #:	CK-0679-8
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	13:10 o'clock
		STOP TIME:	13:20 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #1 Inlet		
SAMPLE DATE:	February 9, 1994		
RUN #:	2 - Velocity		
OPERATORS:	Orton/Lawrence		

WET BULB TEMPERATURE (Tw):	83 °F
DRY BULB TEMPERATURE (Td):	99 °F
SAT'd H2O VAPOR PRESSURE (SVP):	1.138 inches of Hg (wet bulb °F - from chart)
VAPOR PRESSURE (VP):	0.9648 inches of Hg
Bws:	0.0319
MOISTURE (%):	3.19
PITOT TUBE Cp:	0.99
DUCT DIAMETER:	12.00 inches
DUCT AREA:	0.785 sq. feet
BAROMETRIC PRES.:	29.55 inches Hg
STATIC PRESSURE:	10.0 inches H2O
DUCT PRESSURE:	30.29 inches Hg
AVERAGE CO2 CONC:	48.0 percent
AVERAGE O2 CONC:	2.0 percent
AVERAGE CO CONC:	7.3 ppm
AVERAGE CH4 CONC:	41 percent
MOLECULAR WEIGHT:	30.84 g/g-mole-dry
MOLECULAR WEIGHT:	30.43 g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Top 1	0.92	93	Top 4	0.95	95
2	0.93	94	5	0.95	94
3	0.97	95	6	0.93	95

DUCT GAS TEMPERATURE:	94.3 degrees F
DUCT GAS TEMPERATURE:	554.3 degrees R
AVERAGE VELOCITY HEAD:	0.942 " of H2O
DUCT GAS VELOCITY:	63.7 ft/sec
DUCT GAS AIR FLOW:	2801.6 dscf/min
DUCT GAS AIR FLOW:	3001.5 acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\KCVEL#13	LAB #:	CK-0679-9
CLIENT:	King County Solid Waste	START TIME:	15:10 o'clock
	@ Cedar Hills Landfill	STOP TIME:	15:20 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #1 Inlet		
SAMPLE DATE:	February 9, 1994		
RUN #:	3 - Velocity		
OPERATORS:	Orton/Lawrence		

WET BULB TEMPERATURE (Tw):	80	°F
DRY BULB TEMPERATURE (Td):	96	°F
SAT'd H2O VAPOR PRESSURE (SVP):	1.032	inches of Hg (wet bulb °F - from chart)
VAPOR PRESSURE (VP):	0.8574	inches of Hg
Bws:	0.0282	
MOISTURE (%):	2.82	
PITOT TUBE Cp:	0.99	
DUCT DIAMETER:	12.00	inches
DUCT AREA:	0.785	sq. feet
BAROMETRIC PRES.:	29.72	inches Hg
STATIC PRESSURE:	10.0	inches H2O
DUCT PRESSURE:	30.46	inches Hg
AVERAGE CO2 CONC:	48.0	percent
AVERAGE O2 CONC:	1.9	percent
AVERAGE CO CONC:	7.3	ppm
AVERAGE CH4 CONC:	42	percent
MOLECULAR WEIGHT:	30.72	g/g-mole-dry
MOLECULAR WEIGHT:	30.36	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Top 1	0.96	93	Top 4	0.95	96
2	0.95	94	5	0.95	95
3	0.95	95	6	0.95	96

DUCT GAS TEMPERATURE:	94.8	degrees F
DUCT GAS TEMPERATURE:	554.8	degrees R
AVERAGE VELOCITY HEAD:	0.952	" of H2O
DUCT GAS VELOCITY:	64.0	ft/sec
DUCT GAS AIR FLOW:	2837.4	dscf/min
DUCT GAS AIR FLOW:	3014.0	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\CHOUT1R1	LAB #:	5154
CLIENT:	King County Solid Waste	START TIME:	09:55 o'clock
	@ Cedar Hills Landfill	STOP TIME:	10:15 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #1 Outlet		
SAMPLE DATE:	February 9, 1994		
RUN #:	1 - Moisture/Airflow		
OPERATORS:	Orton/Lawrence		

MOISTURE (%):	9.11	
Bws:	0.0911	
PITOT TUBE Cp:	0.84	
STACK DIAMETER:	138.0	inches
STACK AREA:	103.9	sq. feet
BAROMETRIC PRESSURE:	29.55	inches Hg
STATIC PRESSURE:	0.14	inches H2O
STACK PRESSURE:	29.56	inches Hg
AVERAGE CO2 CONCENTRATION:	9.4	percent
AVERAGE O2 CONCENTRATION:	10.5	percent
AVERAGE CO CONCENTRATION:	15	ppm
MOLECULAR WEIGHT:	29.92	g/g-mole-dry
MOLECULAR WEIGHT:	28.84	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
SE 6	0.060	1672	SW 6	0.055	1660
5	0.055	1690	5	0.060	1664
4	0.050	1710	4	0.060	1664
3	0.070	1754	3	0.060	1669
2	0.045	1765	2	0.065	1678
1	0.025	1730	1	0.050	1682
NE 6	0.055	1716	NW 6	0.055	1686
5	0.050	1714	5	0.065	1688
4	0.045	1699	4	0.065	1699
3	0.055	1682	3	0.060	1701
2	0.040	1644	2	0.050	1688
1	0.030	1652	1	0.040	1670

STACK GAS TEMPERATURE:	1690.7	degrees F
STACK GAS TEMPERATURE:	2150.7	degrees R
AVERAGE VELOCITY HEAD:	0.052	" of H2O
STACK GAS VELOCITY:	26.0	ft/sec
STACK GAS AIR FLOW:	35761.7	dscf/min
STACK GAS AIR FLOW:	162219.1	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\CHOUT1R2	LAB #:	5155
CLIENT:	King County Solid Waste	START TIME:	12:45 o'clock
	@ Cedar Hills Landfill	STOP TIME:	13:05 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #1 Outlet		
SAMPLE DATE:	February 9, 1994		
RUN #:	2 - Moisture/Airflow		
OPERATORS:	Orton/Lawrence		

MOISTURE (%):	7.90	
Bws:	0.0790	
PITOT TUBE Cp:	0.84	
STACK DIAMETER:	138.0	inches
STACK AREA:	103.9	sq. feet
BAROMETRIC PRESSURE:	29.55	inches Hg
STATIC PRESSURE:	0.13	inches H2O
STACK PRESSURE:	29.56	inches Hg
AVERAGE CO2 CONCENTRATION:	7.8	percent
AVERAGE O2 CONCENTRATION:	12.0	percent
AVERAGE CO CONCENTRATION:	81	ppm
MOLECULAR WEIGHT:	29.73	g/g-mole-dry
MOLECULAR WEIGHT:	28.80	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
NE 6	0.070	1639	NW 6	0.060	1658
5	0.065	1646	5	0.060	1654
4	0.070	1662	4	0.065	1663
3	0.060	1630	3	0.065	1676
2	0.060	1651	2	0.055	1669
1	0.040	1596	1	0.035	1620
SW 6	0.065	1666	SE 6	0.055	1654
5	0.070	1655	5	0.060	1663
4	0.070	1669	4	0.060	1665
3	0.060	1672	3	0.050	1647
2	0.050	1633	2	0.060	1650
1	0.035	1607	1	0.060	1631

STACK GAS TEMPERATURE:	1649.0	degrees F
STACK GAS TEMPERATURE:	2109.0	degrees R
AVERAGE VELOCITY HEAD:	0.058	" of H2O
STACK GAS VELOCITY:	27.2	ft/sec
STACK GAS AIR FLOW:	38597.7	dscf/min
STACK GAS AIR FLOW:	169437.1	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\CHOUT1R3	LAB #:	5156
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	14:45 o'clock
		STOP TIME:	15:05 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #1 Outlet		
SAMPLE DATE:	February 9, 1994		
RUN #:	3 - Moisture/Airflow		
OPERATORS:	Orton/Lawrence		

MOISTURE (%):	7.52	
Bws:	0.0752	
PITOT TUBE Cp:	0.84	
STACK DIAMETER:	138.0	inches
STACK AREA:	103.9	sq. feet
BAROMETRIC PRESSURE:	29.72	inches Hg
STATIC PRESSURE:	0.14	inches H2O
STACK PRESSURE:	29.73	inches Hg
AVERAGE CO2 CONCENTRATION:	7.6	percent
AVERAGE O2 CONCENTRATION:	12.4	percent
AVERAGE CO CONCENTRATION:	73	ppm
MOLECULAR WEIGHT:	29.71	g/g-mole-dry
MOLECULAR WEIGHT:	28.83	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
SW 6	0.050	1708	SE 6	0.070	1674
5	0.060	1715	5	0.080	1660
4	0.055	1703	4	0.070	1603
3	0.040	1698	3	0.070	1694
2	0.030	1714	2	0.060	1678
1	0.020	1651	1	0.030	1593
NW 6	0.050	1690	NE 6	0.070	
5	0.045	1703	5	0.065	
4	0.040	1716	4	0.065	
3	0.030	1711	3	0.060	
2	0.035	1678	2	0.060	
1	0.025	1682	1	0.040	

STACK GAS TEMPERATURE:	1681.7	degrees F
STACK GAS TEMPERATURE:	2141.7	degrees R
AVERAGE VELOCITY HEAD:	0.049	" of H2O
STACK GAS VELOCITY:	25.2	ft/sec
STACK GAS AIR FLOW:	35598.4	dscf/min
STACK GAS AIR FLOW:	157135.5	acf/min

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: LB600\CH#1BI-1
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SITE LOCATION: FLARE STACK #1
SAMPLE DATE: FEBRUARY 9, 1994
RUN #: 1 - METHODS 3A, 6C, 7E AND 10
SAMPLE TIMES: 11:01-12:01

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	5.8	6.0	0.1	5.9	9.2
Oxygen (O2)	%	0.0	0.1	15.0	15.0	14.98	0.1	15.0	10.5
Carbon Monoxide (CO)	ppm	0.0	-0.4	302.0	288.0	300.0	-0.2	295.0	15
Sulfur Dioxide (SO2)	ppm	0.0	-1.8	50.8	47.0	50.7	-0.9	48.9	5.3
Nitrogen Oxides (NOx as NO2)	ppm	0.0	0.0	49.0	47.0	49.0	0.0	48.0	20.5

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	9.4 %
Oxygen (O2)	10.5 %
Carbon Monoxide (CO)	15 ppm
Sulfur Dioxide (SO2)	6.3 ppm
Nitrogen Oxides (NOx as NO2)	20.9 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: LB600\CH#1BI-2
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SITE LOCATION: FLARE STACK #1
SAMPLE DATE: FEBRUARY 9, 1994
RUN #: 2 - METHODS 3A, 6C, 7E AND 10
SAMPLE TIMES: 13:07-14:07

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.0	6.0	0.1	6.0	7.8
Oxygen (O2)	%	0.0	0.1	15.0	15.0	14.98	0.1	15.0	12.0
Carbon Monoxide (CO)	ppm	0.0	0.3	300.0	304.0	300.0	0.2	302.0	82
Sulfur Dioxide (SO2)	ppm	0.0	0.6	51.0	53.0	50.7	0.3	52.0	7.0
Nitrogen Oxides (NOx as NO2)	ppm	0.0	0.2	50.0	51.5	49.0	0.1	50.8	29.0

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	7.8 %
Oxygen (O2)	12.0 %
Carbon Monoxide (CO)	81 ppm
Sulfur Dioxide (SO2)	6.6 ppm
Nitrogen Oxides (NOx as NO2)	28.0 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: LB600\CH#1BI-3
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SITE LOCATION: FLARE STACK #1
SAMPLE DATE: FEBRUARY 9, 1994
RUN #: 3 - METHODS 3A, 6C, 7E AND 10
SAMPLE TIMES: 15:07-16:07

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.0	6.0	0.1	6.0	7.6
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.00	0.0	15.0	12.4
Carbon Monoxide (CO)	ppm	0.0	0.4	300.0	306.0	300.0	0.2	303.0	74
Sulfur Dioxide (SO2)	ppm	0.0	-0.4	50.8	52.9	50.7	-0.2	51.9	5.1
Nitrogen Oxides (NOx as NO2)	ppm	0.0	0.2	49.0	48.3	49.0	0.1	48.7	16.7

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas	
Carbon Dioxide (CO2)	7.6	%
Oxygen (O2)	12.4	%
Carbon Monoxide (CO)	73	ppm
Sulfur Dioxide (SO2)	5.2	ppm
Nitrogen Oxides (NOx as NO2)	16.8	ppm

METHODS 1, 2, 3A, 4 AND 26A
AM TEST - AIR QUALITY, INC.

FILE NAME:	S707\CHM26AR1	LAB #:	5087
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	11:01 o'clock
		STOP TIME:	12:01 o'clock
LOCATION:	Maple Valley, Washington	SAMPLE LENGTH:	60.0 minutes
SAMPLE SITE:	Flare Stack #1		
SAMPLE DATE:	February 9, 1994		
RUN #:	1 - Method 26A		
OPERATORS:	Orton\Lawrence		

IMPINGER WEIGHTS

FINAL grams	INITIAL grams	NET grams
622.8	612.6	10.2
714.3	638.6	75.7
663.4	643.0	20.4
652.7	644.9	7.8
797.8	772.9	24.9

TOTAL H2O GAIN:	139.0	PITOT TUBE Cp:	0.84
TOTAL VOLUME (scf):	6.55	NOZZLE DIAMETER:	0.765 inches
PERCENT MOISTURE:	9.11	NOZZLE AREA:	0.0032 sq. feet
Bws:	0.0911	STACK DIAMETER:	138.0 inches
		STACK AREA:	103.9 sq. feet
INIT. METER VOLUME:	589.712	METER TEMPERATURE:	56.3 degrees F
FINAL METER VOLUME:	654.318	BAROMETRIC PRES.:	29.55 inches Hg
VOLUME SAMPLED:	64.606	STATIC PRESSURE:	0.14 inches H2O
STD VOLUME (dscf):	65.368	STACK PRESSURE:	29.56 inches Hg
STD VOLUME (dscm):	1.851	ORIFICE PRESSURE:	4.365 inches H2O
Y FACTOR:	0.991	METER PRESSURE:	29.87 inches Hg
		AVERAGE CONC. CO2:	9.4 percent
		AVERAGE CONC. O2:	10.5 percent
		AVERAGE CONC. CO:	15 ppm
		MOLECULAR WEIGHT:	29.92 g/g-mole-dry
		MOLECULAR WEIGHT:	28.84 g/g-mole-wet
		FUEL FACTOR:	1.11

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Point of Average Velocity	0.060	1614	Point of Average Velocity	0.055	1688
	0.060	1665		0.055	1692
	0.055	1678		0.055	1648
	0.055	1635		0.055	1620
	0.055	1685		0.055	1640
	0.055	1687		0.055	1686

PERCENT ISOKINETICS:	95 %		
STACK GAS TEMPERATURE:	1661.5 degrees F		2121.5 degrees R
AVERAGE VELOCITY HEAD:	0.056 " of H2O		
STACK GAS VELOCITY:			26.8 ft/second
STACK GAS AIR FLOW:	166804.7 acf/min		37277.8 dscf/min

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)

CHLORIDE DETECTION LIMIT (micrograms/ml):	1.0
TOTAL VOLUME OF SAMPLE (milliliters):	365
CHLORIDE DETECTION LIMIT (micrograms):	365.0
CHLORIDE CONCENTRATION IN SAMPLE (micrograms):	17800
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	9.89
CHLORIDE EMISSION CONCENTRATION (ppm):	6.52
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	8.72
CHLORIDE EMISSION RATE (lb/hr):	1.38

METHODS 1, 2, 3A, 4 AND 26A
AM TEST - AIR QUALITY, INC.

FILE NAME:	S707\CHM26AR2	LAB #:	5088
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	13:07 o'clock
		STOP TIME:	14:07 o'clock
LOCATION:	Maple Valley, Washington	SAMPLE LENGTH:	60.0 minutes
SAMPLE SITE:	Flare Stack #1		
SAMPLE DATE:	February 9, 1994		
RUN #:	2 - Method 26A		
OPERATORS:	Orton\Lawrence		

IMPINGER WEIGHTS

FINAL grams	INITIAL grams	NET grams
668.1	663.1	5.0
764.6	703.2	61.4
686.4	660.0	26.4
619.2	613.6	5.6
747.4	727.5	19.9

TOTAL H2O GAIN:	118.3	PITOT TUBE Cp:	0.84
TOTAL VOLUME (scf):	5.58	NOZZLE DIAMETER:	0.765 inches
PERCENT MOISTURE:	7.90	NOZZLE AREA:	0.0032 sq. feet
Bws:	0.0790	STACK DIAMETER:	138.0 inches
		STACK AREA:	103.9 sq. feet
INIT. METER VOLUME:	655.028	METER TEMPERATURE:	64.4 degrees F
FINAL METER VOLUME:	720.281	BAROMETRIC PRES.:	29.55 inches Hg
VOLUME SAMPLED:	65.253	STATIC PRESSURE:	0.14 inches H2O
STD VOLUME (dscf):	65.006	STACK PRESSURE:	29.56 inches Hg
STD VOLUME (dscm):	1.841	ORIFICE PRESSURE:	4.383 inches H2O
Y FACTOR:	0.991	METER PRESSURE:	29.87 inches Hg
		AVERAGE CONC. CO2:	7.8 percent
		AVERAGE CONC. O2:	12.0 percent
		AVERAGE CONC. CO:	81 ppm
		MOLECULAR WEIGHT:	29.73 g/g-mole-dry
		MOLECULAR WEIGHT:	28.80 g/g-mole-wet
		FUEL FACTOR:	1.14

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Point of Average Velocity	0.055	1661	Point of Average Velocity	0.055	1608
	0.055	1585		0.055	1594
	0.063	1576		0.055	1623
	0.055	1563		0.055	1576
	0.060	1565		0.055	1586
	0.055	1569		0.055	1562

PERCENT ISOKINETICS:	92 %	
STACK GAS TEMPERATURE:	1589.0 degrees F	2049.0 degrees R
AVERAGE VELOCITY HEAD:	0.056 " of H2O	
STACK GAS VELOCITY:		26.4 ft/second
STACK GAS AIR FLOW:	164382.8 acf/min	38542.8 dscf/min

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)

CHLORIDE DETECTION LIMIT (micrograms/ml):	1.0
TOTAL VOLUME OF SAMPLE (milliliters):	415
CHLORIDE DETECTION LIMIT (micrograms):	415.0
CHLORIDE CONCENTRATION IN SAMPLE (micrograms):	16400
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	9.16
CHLORIDE EMISSION CONCENTRATION (ppm):	6.04
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	9.44
CHLORIDE EMISSION RATE (lb/hr):	1.32

METHODS 1, 2, 3A, 4 AND 26A
AM TEST - AIR QUALITY, INC.

FILE NAME:	S707\CHM26AR3	LAB #:	5089
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	15:07 o'clock
		STOP TIME:	16:07 o'clock
LOCATION:	Maple Valley, Washington	SAMPLE LENGTH:	60.0 minutes
SAMPLE SITE:	Flare Stack #1		
SAMPLE DATE:	February 9, 1994		
RUN #:	3 - Method 26A		
OPERATORS:	Orton\Lawrence		

IMPINGER WEIGHTS

FINAL grams	INITIAL grams	NET grams
635.7	606.3	29.4
700.3	650.6	49.7
622.6	617.4	5.2
663.1	660.2	2.9
799.2	780.9	18.3

TOTAL H2O GAIN:	105.5	PITOT TUBE Cp:	0.84
TOTAL VOLUME (scf):	4.97	NOZZLE DIAMETER:	0.765 inches
PERCENT MOISTURE:	7.52	NOZZLE AREA:	0.0032 sq. feet
Bws:	0.0752	STACK DIAMETER:	138.0 inches
		STACK AREA:	103.9 sq. feet
INIT. METER VOLUME:	721.008	METER TEMPERATURE:	62.9 degrees F
FINAL METER VOLUME:	781.932	BAROMETRIC PRES.:	29.72 inches Hg
VOLUME SAMPLED:	60.924	STATIC PRESSURE:	0.14 inches H2O
STD VOLUME (dscf):	61.143	STACK PRESSURE:	29.73 inches Hg
STD VOLUME (dscm):	1.732	ORIFICE PRESSURE:	3.910 inches H2O
Y FACTOR:	0.991	METER PRESSURE:	30.01 inches Hg
		AVERAGE CONC. CO2:	7.6 percent
		AVERAGE CONC. O2:	12.4 percent
		AVERAGE CONC. CO:	73 ppm
		MOLECULAR WEIGHT:	29.71 g/g-mole-dry
		MOLECULAR WEIGHT:	28.83 g/g-mole-wet
		FUEL FACTOR:	1.12

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Point of Average Velocity	0.050	1610	Point of Average Velocity	0.050	1660
	0.050	1647		0.050	1606
	0.050	1620		0.050	1600
	0.050	1585		0.050	1603
	0.050	1590		0.050	1613
	0.050	1591		0.050	1603

PERCENT ISOKINETICS:	91 %	
STACK GAS TEMPERATURE:	1610.7 degrees F	2070.7 degrees R
AVERAGE VELOCITY HEAD:	0.050 " of H2O	
STACK GAS VELOCITY:		25.0 ft/second
STACK GAS AIR FLOW:	155540.4 acf/min	36444.8 dscf/min

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)

CHLORIDE DETECTION LIMIT (micrograms/ml):	1.0
TOTAL VOLUME OF SAMPLE (milliliters):	450
CHLORIDE DETECTION LIMIT (micrograms):	450.0
CHLORIDE CONCENTRATION IN SAMPLE (micrograms):	14100
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	8.37
CHLORIDE EMISSION CONCENTRATION (ppm):	5.53
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	9.04
CHLORIDE EMISSION RATE (lb/hr):	1.14

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R303\KCIN#11
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #1 Inlet
SAMPLE DATE: February 9, 1994
SAMPLE TIME: 11:01-11:51
LAB NUMBER(S): CK-0679-7
CANISTER #: 616
AIRFLOW: 2838.0 dscf/min

ANALYTE	Run 1 mg/min	Blank mg/min	DL Run 1 mg/min
Acetone	1527	< DL	24.1
Benzene	393.8	< DL	4.02
Bromodichloromethane	< DL	< DL	8.04
Bromomethane (Methyl Bromide)	< DL	< DL	8.04
Bromoform	< DL	< DL	8.04
1,3-Butadiene	< DL	< DL	8.04
2-Butanone (MEK)	3295	< DL	8.04
Carbon Disulfide	< DL	< DL	40.2
Carbon Tetrachloride	< DL	< DL	8.04
Chlorobenzene	120.6	< DL	4.02
Chloroethane (Ethyl Chloride)	393.8	< DL	4.02
2-Chloroethyl Vinyl Ether	< DL	< DL	40.2
Chloroform	< DL	< DL	24.1
Chloromethane (Methyl Chloride)	112.5	< DL	4.02
Dibromochloromethane	< DL	< DL	8.04
1,2-Dibromoethane (EDB)	< DL	< DL	16.1
1,2-Dichlorobenzene	< DL	< DL	8.04
1,3-Dichlorobenzene	< DL	< DL	8.04
1,4-Dichlorobenzene	< DL	< DL	8.04
1,1-Dichloroethane	739.4	< DL	4.02
1,2-Dichloroethane (EDC)	< DL	< DL	8.04
1,1-Dichloroethene	16.1	< DL	8.04
cis-1,2-Dichloroethene	771.6	< DL	8.04
trans-1,2-Dichloroethene	32.1	< DL	8.04
Dichloromethane	1849	< DL	40.2
1,2-Dichloropropane	< DL	< DL	4.02
cis-1,3-Dichloropropene	< DL	< DL	4.02
trans-1,3-Dichloropropene	< DL	< DL	4.02
Ethylbenzene	3778	< DL	8.04
2-Hexanone	< DL	< DL	4.02
4-Methyl-2-Pentanone (MIBK)	1286	< DL	4.02
Styrene	667.1	< DL	8.04
1,1,2,2-Tetrachloroethane	< DL	< DL	8.04
Tetrachloroethene (PCE)	1447	< DL	8.04
Toluene	12056	< DL	8.04
1,1,1-Trichloroethane (TCA)	< DL	< DL	8.04
1,1,2-Trichloroethane	< DL	< DL	8.04
Trichloroethene (TCE)	361.7	< DL	4.02
Trichlorofluoromethane (F-11)	184.9	< DL	8.04
Trichlorotrifluoroethane (F-113)	56.3	< DL	16.1
Vinyl Acetate	< DL	< DL	16.1
Vinyl Chloride	618.9	< DL	4.02
Xylenes, Total	13664	< DL	8.04

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R303\KCIN#12
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #1 Inlet
SAMPLE DATE: February 9, 1994
SAMPLE TIME: 13:07-13:57
LAB NUMBER(S): CK-0679-8
CANISTER #: 507
AIRFLOW: 2801.6 dscf/min

ANALYTE	Run 2 mg/min	Blank mg/min	DL Run 2 mg/min
Acetone	1269	< DL	23.8
Benzene	325.3	< DL	3.97
Bromodichloromethane	< DL	< DL	7.93
Bromomethane (Methyl Bromide)	< DL	< DL	7.93
Bromoform	< DL	< DL	7.93
1,3-Butadiene	< DL	< DL	7.93
2-Butanone (MEK)	2618	< DL	7.93
Carbon Disulfide	< DL	< DL	39.7
Carbon Tetrachloride	< DL	< DL	7.93
Chlorobenzene	79.3	< DL	3.97
Chloroethane (Ethyl Chloride)	372.9	< DL	3.97
2-Chloroethyl Vinyl Ether	< DL	< DL	39.7
Chloroform	< DL	< DL	23.8
Chloromethane (Methyl Chloride)	111.1	< DL	3.97
Dibromochloromethane	< DL	< DL	7.93
1,2-Dibromoethane (EDB)	< DL	< DL	15.9
1,2-Dichlorobenzene	< DL	< DL	7.93
1,3-Dichlorobenzene	< DL	< DL	7.93
1,4-Dichlorobenzene	222.2	< DL	7.93
1,1-Dichloroethane	626.8	< DL	3.97
1,2-Dichloroethane (EDC)	< DL	< DL	7.93
1,1-Dichloroethene	7.93	< DL	7.93
cis-1,2-Dichloroethene	642.7	< DL	7.93
trans-1,2-Dichloroethene	23.8	< DL	7.93
Dichloromethane	1508	< DL	39.7
1,2-Dichloropropane	< DL	< DL	3.97
cis-1,3-Dichloropropene	< DL	< DL	3.97
trans-1,3-Dichloropropene	< DL	< DL	3.97
Ethylbenzene	2777	< DL	7.93
2-Hexanone	< DL	< DL	3.97
4-Methyl-2-Pentanone (MIBK)	872.8	< DL	3.97
Styrene	452.3	< DL	7.93
1,1,2,2-Tetrachloroethane	< DL	< DL	7.93
Tetrachloroethene (PCE)	1111	< DL	7.93
Toluene	10315	< DL	7.93
1,1,1-Trichloroethane (TCA)	< DL	< DL	7.93
1,1,2-Trichloroethane	< DL	< DL	7.93
Trichloroethene (TCE)	285.6	< DL	3.97
Trichlorofluoromethane (F-11)	166.6	< DL	7.93
Trichlorotrifluoroethane (F-113)	47.6	< DL	15.9
Vinyl Acetate	< DL	< DL	15.9
Vinyl Chloride	571.3	< DL	3.97
Xylenes, Total	10315	< DL	7.93

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME:	R303\KCIN#13
CLIENT:	King County Solid Waste @ Cedar Hills Landfill
LOCATION:	Maple Valley, Washington
SAMPLE LOCATION:	Flare #1 Inlet
SAMPLE DATE:	February 9, 1994
SAMPLE TIME:	15:07-15:57
LAB NUMBER(S):	CK-0679-9
CANISTER #:	549
AIRFLOW:	2837.4 dscf/min

ANALYTE	Run 3 mg/min	Blank mg/min	DL Run 3 mg/min
Acetone	1286	< DL	24.1
Benzene	353.6	< DL	4.02
Bromodichloromethane	< DL	< DL	8.04
Bromomethane (Methyl Bromide)	< DL	< DL	8.04
Bromoform	< DL	< DL	8.04
1,3-Butadiene	< DL	< DL	8.04
2-Butanone (MEK)	2571	< DL	8.04
Carbon Disulfide	< DL	< DL	40.2
Carbon Tetrachloride	< DL	< DL	8.04
Chlorobenzene	96.4	< DL	4.02
Chloroethane (Ethyl Chloride)	241.1	< DL	4.02
2-Chloroethyl Vinyl Ether	< DL	< DL	40.2
Chloroform	< DL	< DL	24.1
Chloromethane (Methyl Chloride)	96.4	< DL	4.02
Dibromochloromethane	< DL	< DL	8.04
1,2-Dibromoethane (EDB)	< DL	< DL	16.1
1,2-Dichlorobenzene	< DL	< DL	8.04
1,3-Dichlorobenzene	< DL	< DL	8.04
1,4-Dichlorobenzene	112.5	< DL	8.04
1,1-Dichloroethane	650.9	< DL	4.02
1,2-Dichloroethane (EDC)	< DL	< DL	8.04
1,1-Dichloroethene	8.04	< DL	8.04
cis-1,2-Dichloroethene	683.0	< DL	8.04
trans-1,2-Dichloroethene	32.1	< DL	8.04
Dichloromethane	1607	< DL	40.2
1,2-Dichloropropane	< DL	< DL	4.02
cis-1,3-Dichloropropene	< DL	< DL	4.02
trans-1,3-Dichloropropene	< DL	< DL	4.02
Ethylbenzene	3214	< DL	8.04
2-Hexanone	< DL	< DL	4.02
4-Methyl-2-Pentanone (MIBK)	530.4	< DL	4.02
Styrene	554.5	< DL	8.04
1,1,2,2-Tetrachloroethane	< DL	< DL	8.04
Tetrachloroethene (PCE)	1286	< DL	8.04
Toluene	11250	< DL	8.04
1,1,1-Trichloroethane (TCA)	< DL	< DL	8.04
1,1,2-Trichloroethane	< DL	< DL	8.04
Trichloroethene (TCE)	321.4	< DL	4.02
Trichlorofluoromethane (F-11)	168.7	< DL	8.04
Trichlorotrifluoroethane (F-113)	48.2	< DL	16.1
Vinyl Acetate	< DL	< DL	16.1
Vinyl Chloride	554.5	< DL	4.02
Xylenes, Total	12054	< DL	8.04

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R302\KCOUT#11
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #1 Outlet
SAMPLE DATE: February 9, 1994
SAMPLE TIME: 11:01-11:51
LAB NUMBER(S): CK-0679-10
CANISTER #: 569
AIRFLOW: 35761.7 dscf/min

ANALYTE	Run 1 mg/min	Blank mg/min	DL Run 1 mg/min
Acetone	395.0	< DL	3.04
Benzene	17.2	< DL	0.51
Bromodichloromethane	< DL	< DL	1.01
Bromomethane (Methyl Bromide)	< DL	< DL	1.01
Bromoform	< DL	< DL	1.01
1,3-Butadiene	< DL	< DL	1.01
2-Butanone (MEK)	< DL	< DL	1.01
Carbon Disulfide	8.00	< DL	5.06
Carbon Tetrachloride	< DL	< DL	1.01
Chlorobenzene	< DL	< DL	0.51
Chloroethane (Ethyl Chloride)	< DL	< DL	0.51
2-Chloroethyl Vinyl Ether	< DL	< DL	5.06
Chloroform	< DL	< DL	3.04
Chloromethane (Methyl Chloride)	2.33	< DL	0.51
Dibromochloromethane	< DL	< DL	1.01
1,2-Dibromoethane (EDB)	< DL	< DL	2.03
1,2-Dichlorobenzene	< DL	< DL	1.01
1,3-Dichlorobenzene	< DL	< DL	1.01
1,4-Dichlorobenzene	< DL	< DL	1.01
1,1-Dichloroethane	< DL	< DL	0.51
1,2-Dichloroethane (EDC)	< DL	< DL	1.01
1,1-Dichloroethene	< DL	< DL	1.01
cis-1,2-Dichloroethene	< DL	< DL	1.01
trans-1,2-Dichloroethene	< DL	< DL	1.01
Dichloromethane	< DL	< DL	5.06
1,2-Dichloropropane	< DL	< DL	0.51
cis-1,3-Dichloropropene	< DL	< DL	0.51
trans-1,3-Dichloropropene	< DL	< DL	0.51
Ethylbenzene	< DL	< DL	1.01
2-Hexanone	< DL	< DL	0.51
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.51
Styrene	< DL	< DL	1.01
1,1,2,2-Tetrachloroethane	< DL	< DL	1.01
Tetrachloroethene (PCE)	< DL	< DL	1.01
Toluene	1.32	< DL	1.01
1,1,1-Trichloroethane (TCA)	< DL	< DL	1.01
1,1,2-Trichloroethane	< DL	< DL	1.01
Trichloroethene (TCE)	< DL	< DL	0.51
Trichlorofluoromethane (F-11)	< DL	< DL	1.01
Trichlorotrifluoroethane (F-113)	< DL	< DL	2.03
Vinyl Acetate	< DL	< DL	2.03
Vinyl Chloride	< DL	< DL	0.51
Xylenes, Total	< DL	< DL	1.01

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R302\KCOUT#12
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #1 Outlet
SAMPLE DATE: February 9, 1994
SAMPLE TIME: 13:07-13:57
LAB NUMBER(S): CK-0679-11
CANISTER #: 579
AIRFLOW: 38597.7 dscf/min

ANALYTE	Run 2 mg/min	Blank mg/min	DL Run 2 mg/min
Acetone	1749	< DL	3.28
Benzene	12.0	< DL	0.55
Bromodichloromethane	< DL	< DL	1.09
Bromomethane (Methyl Bromide)	< DL	< DL	1.09
Bromoform	< DL	< DL	1.09
1,3-Butadiene	< DL	< DL	1.09
2-Butanone (MEK)	< DL	< DL	1.09
Carbon Disulfide	< DL	< DL	5.47
Carbon Tetrachloride	< DL	< DL	1.09
Chlorobenzene	< DL	< DL	0.55
Chloroethane (Ethyl Chloride)	< DL	< DL	0.55
2-Chloroethyl Vinyl Ether	< DL	< DL	5.47
Chloroform	< DL	< DL	3.28
Chloromethane (Methyl Chloride)	< DL	< DL	0.55
Dibromochloromethane	< DL	< DL	1.09
1,2-Dibromoethane (EDB)	< DL	< DL	2.19
1,2-Dichlorobenzene	< DL	< DL	1.09
1,3-Dichlorobenzene	< DL	< DL	1.09
1,4-Dichlorobenzene	< DL	< DL	1.09
1,1-Dichloroethane	< DL	< DL	0.55
1,2-Dichloroethane (EDC)	< DL	< DL	1.09
1,1-Dichloroethene	< DL	< DL	1.09
cis-1,2-Dichloroethene	< DL	< DL	1.09
trans-1,2-Dichloroethene	< DL	< DL	1.09
Dichloromethane	< DL	< DL	5.47
1,2-Dichloropropane	< DL	< DL	0.55
cis-1,3-Dichloropropene	< DL	< DL	0.55
trans-1,3-Dichloropropene	< DL	< DL	0.55
Ethylbenzene	2.95	< DL	1.09
2-Hexanone	< DL	< DL	0.55
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.55
Styrene	< DL	< DL	1.09
1,1,2,2-Tetrachloroethane	< DL	< DL	1.09
Tetrachloroethene (PCE)	< DL	< DL	1.09
Toluene	546.6	< DL	1.09
1,1,1-Trichloroethane (TCA)	< DL	< DL	1.09
1,1,2-Trichloroethane	< DL	< DL	1.09
Trichloroethene (TCE)	< DL	< DL	0.55
Trichlorofluoromethane (F-11)	< DL	< DL	1.09
Trichlorotrifluoroethane (F-113)	< DL	< DL	2.19
Vinyl Acetate	< DL	< DL	2.19
Vinyl Chloride	< DL	< DL	0.55
Xylenes, Total	29.5	< DL	1.09

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R302\KCOUT#13
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #1 Outlet
SAMPLE DATE: February 9, 1994
SAMPLE TIME: 15:07-15:57
LAB NUMBER(S): CK-0679-12
CANISTER #: 517
AIRFLOW: 35598.4 dscf/min

ANALYTE	Run 3 mg/min	Blank mg/min	DL Run 3 mg/min
Acetone	64.5	< DL	3.02
Benzene	1.11	< DL	0.50
Bromodichloromethane	< DL	< DL	1.01
Bromomethane (Methyl Bromide)	< DL	< DL	1.01
Bromoform	< DL	< DL	1.01
1,3-Butadiene	< DL	< DL	1.01
2-Butanone (MEK)	< DL	< DL	1.01
Carbon Disulfide	< DL	< DL	5.04
Carbon Tetrachloride	< DL	< DL	1.01
Chlorobenzene	1.21	< DL	0.50
Chloroethane (Ethyl Chloride)	< DL	< DL	0.50
2-Chloroethyl Vinyl Ether	< DL	< DL	5.04
Chloroform	< DL	< DL	3.02
Chloromethane (Methyl Chloride)	< DL	< DL	0.50
Dibromochloromethane	< DL	< DL	1.01
1,2-Dibromoethane (EDB)	< DL	< DL	2.02
1,2-Dichlorobenzene	< DL	< DL	1.01
1,3-Dichlorobenzene	< DL	< DL	1.01
1,4-Dichlorobenzene	< DL	< DL	1.01
1,1-Dichloroethane	< DL	< DL	0.50
1,2-Dichloroethane (EDC)	< DL	< DL	1.01
1,1-Dichloroethene	< DL	< DL	1.01
cis-1,2-Dichloroethene	< DL	< DL	1.01
trans-1,2-Dichloroethene	< DL	< DL	1.01
Dichloromethane	< DL	< DL	5.04
1,2-Dichloropropane	< DL	< DL	0.50
cis-1,3-Dichloropropene	< DL	< DL	0.50
trans-1,3-Dichloropropene	< DL	< DL	0.50
Ethylbenzene	< DL	< DL	1.01
2-Hexanone	< DL	< DL	0.50
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.50
Styrene	< DL	< DL	1.01
1,1,2,2-Tetrachloroethane	< DL	< DL	1.01
Tetrachloroethene (PCE)	< DL	< DL	1.01
Toluene	< DL	< DL	1.01
1,1,1-Trichloroethane (TCA)	< DL	< DL	1.01
1,1,2-Trichloroethane	< DL	< DL	1.01
Trichloroethene (TCE)	< DL	< DL	0.50
Trichlorofluoromethane (F-11)	< DL	< DL	1.01
Trichlorotrifluoroethane (F-113)	< DL	< DL	2.02
Vinyl Acetate	< DL	< DL	2.02
Vinyl Chloride	< DL	< DL	0.50
Xylenes, Total	< DL	< DL	1.01

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

mg/min = milligrams of analyte emitted per minute

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\KCVEL#21	LAB #:	CK-0707-1
CLIENT:	King County Solid Waste	START TIME:	10:25 o'clock
	@ Cedar Hills Landfill	STOP TIME:	10:35 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #2 Inlet		
SAMPLE DATE:	February 10, 1994		
RUN #:	1 - Velocity		
OPERATORS:	Orton/Lawrence		

WET BULB TEMPERATURE (Tw):	86	°F
DRY BULB TEMPERATURE (Td):	99	°F
SAT'd H2O VAPOR PRESSURE (SVP):	1.253	inches of Hg (wet bulb °F - from chart)
VAPOR PRESSURE (VP):	1.1122	inches of Hg
Bws:	0.0366	
MOISTURE (%):	3.66	
PITOT TUBE Cp:	0.99	
DUCT DIAMETER:	12.00	inches
DUCT AREA:	0.785	sq. feet
BAROMETRIC PRES.:	29.65	inches Hg
STATIC PRESSURE:	9.8	inches H2O
DUCT PRESSURE:	30.37	inches Hg
AVERAGE CO2 CONC:	48.0	percent
AVERAGE O2 CONC:	1.8	percent
AVERAGE CO CONC:	9.8	ppm
AVERAGE CH4 CONC:	42	percent
MOLECULAR WEIGHT:	30.71	g/g-mole-dry
MOLECULAR WEIGHT:	30.25	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Top 1	0.92	94	Top 4	1.00	98
2	0.99	95	5	1.10	98
3	0.90	96	6	1.10	98

DUCT GAS TEMPERATURE:	96.5	degrees F
DUCT GAS TEMPERATURE:	556.5	degrees R
AVERAGE VELOCITY HEAD:	1.00	" of H2O
DUCT GAS VELOCITY:	65.9	ft/sec
DUCT GAS AIR FLOW:	2880.4	dscf/min
DUCT GAS AIR FLOW:	3104.5	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\KCVEL#22	LAB #:	CK-0707-2
CLIENT:	King County Solid Waste	START TIME:	12:20 o'clock
	@ Cedar Hills Landfill	STOP TIME:	12:30 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #2 Inlet		
SAMPLE DATE:	February 10, 1994		
RUN #:	2 - Velocity		
OPERATORS:	Orton/Lawrence		

WET BULB TEMPERATURE (Tw):	83	°F
DRY BULB TEMPERATURE (Td):	98	°F
SAT'd H2O VAPOR PRESSURE (SVP):	1.138	inches of Hg (wet bulb °F - from chart)
VAPOR PRESSURE (VP):	0.9754	inches of Hg
Bws:	0.0322	
MOISTURE (%):	3.22	
PITOT TUBE Cp:	0.99	
DUCT DIAMETER:	12.00	inches
DUCT AREA:	0.785	sq. feet
BAROMETRIC PRES.:	29.60	inches Hg
STATIC PRESSURE:	9.8	inches H2O
DUCT PRESSURE:	30.32	inches Hg
AVERAGE CO2 CONC:	48.0	percent
AVERAGE O2 CONC:	1.7	percent
AVERAGE CO CONC:	9.9	ppm
AVERAGE CH4 CONC:	43	percent
MOLECULAR WEIGHT:	30.59	g/g-mole-dry
MOLECULAR WEIGHT:	30.18	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Top 1	0.85	93	Top 4	1.00	96
2	0.90	94	5	1.10	96
3	0.90	96	6	1.05	97

DUCT GAS TEMPERATURE:	95.3	degrees F
DUCT GAS TEMPERATURE:	555.3	degrees R
AVERAGE VELOCITY HEAD:	0.965	" of H2O
DUCT GAS VELOCITY:	64.8	ft/sec
DUCT GAS AIR FLOW:	2845.4	dscf/min
DUCT GAS AIR FLOW:	3051.3	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\KCVEL#23	LAB #:	CK-0707-3
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	13:50 o'clock
		STOP TIME:	14:00 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #2 Inlet		
SAMPLE DATE:	February 10, 1994		
RUN #:	3 - Velocity		
OPERATORS:	Orton/Lawrence		

WET BULB TEMPERATURE (Tw):	87	°F
DRY BULB TEMPERATURE (Td):	101	°F
SAT'd H2O VAPOR PRESSURE (SVP):	1.293	inches of Hg (wet bulb °F - from chart)
VAPOR PRESSURE (VP):	1.1416	inches of Hg
Bws:	0.0376	
MOISTURE (%):	3.76	
PITOT TUBE Cp:	0.99	
DUCT DIAMETER:	12.00	inches
DUCT AREA:	0.785	sq. feet
BAROMETRIC PRES.:	29.62	inches Hg
STATIC PRESSURE:	9.8	inches H2O
DUCT PRESSURE:	30.34	inches Hg
AVERAGE CO2 CONC:	48.0	percent
AVERAGE O2 CONC:	1.8	percent
AVERAGE CO CONC:	9.8	ppm
AVERAGE CH4 CONC:	42	percent
MOLECULAR WEIGHT:	30.71	g/g-mole-dry
MOLECULAR WEIGHT:	30.23	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Top 1	0.88	94	Top 4	1.10	99
2	0.90	96	5	1.00	98
3	0.90	98	6	0.90	99

DUCT GAS TEMPERATURE:	97.3	degrees F
DUCT GAS TEMPERATURE:	557.3	degrees R
AVERAGE VELOCITY HEAD:	0.945	" of H2O
DUCT GAS VELOCITY:	64.1	ft/sec
DUCT GAS AIR FLOW:	2794.2	dscf/min
DUCT GAS AIR FLOW:	3022.2	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME: S705\CHOUT2R1
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE SITE: Flare #2 Outlet
SAMPLE DATE: February 10, 1994
RUN #: 1 - Moisture/Airflow
OPERATORS: Orton/Lawrence

LAB #: 5157
START TIME: 09:28 o'clock
STOP TIME: 09:46 o'clock

MOISTURE (%):	7.57
Bws:	0.0757
PITOT TUBE Cp:	0.84
STACK DIAMETER:	138.0 inches
STACK AREA:	103.9 sq. feet
BAROMETRIC PRESSURE:	29.65 inches Hg
STATIC PRESSURE:	-0.135 inches H2O
STACK PRESSURE:	29.64 inches Hg
AVERAGE CO2 CONCENTRATION:	8.3 percent
AVERAGE O2 CONCENTRATION:	11.6 percent
AVERAGE CO CONCENTRATION:	66 ppm
MOLECULAR WEIGHT:	29.79 g/g-mole-dry
MOLECULAR WEIGHT:	28.90 g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
SE 6	0.055	1608	NW 6	0.070	1565
5	0.050	1601	5	0.060	1606
4	0.055	1643	4	0.070	1612
3	0.065	1676	3	0.060	1610
2	0.065	1700	2	0.050	1611
1	0.035	1600	1	0.030	1569
NE 6	0.055	1689	* SW 6		
5	0.060	1708	5		
4	0.050	1705	4		
3	0.050	1692	3		
2	0.035	1691	2		
1	0.025	1632	1		

STACK GAS TEMPERATURE:	1639.9 degrees F
STACK GAS TEMPERATURE:	2099.9 degrees R
AVERAGE VELOCITY HEAD:	0.051 " of H2O
STACK GAS VELOCITY:	25.5 ft/sec
STACK GAS AIR FLOW:	36544.5 dscf/min
STACK GAS AIR FLOW:	158728.1 acf/min

* Not able to access southwest port.

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\CHOUT2R2	LAB #:	5158
CLIENT:	King County Solid Waste	START TIME:	11:20 o'clock
	@ Cedar Hills Landfill	STOP TIME:	11:38 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #2 Outlet		
SAMPLE DATE:	February 10, 1994		
RUN #:	2 - Moisture/Airflow		
OPERATORS:	Orton/Lawrence		

MOISTURE (%):	8.39	
Bws:	0.0839	
PITOT TUBE Cp:	0.84	
STACK DIAMETER:	138.0	inches
STACK AREA:	103.9	sq. feet
BAROMETRIC PRESSURE:	29.60	inches Hg
STATIC PRESSURE:	-0.135	inches H2O
STACK PRESSURE:	29.59	inches Hg
AVERAGE CO2 CONCENTRATION:	8.3	percent
AVERAGE O2 CONCENTRATION:	11.5	percent
AVERAGE CO CONCENTRATION:	42	ppm
MOLECULAR WEIGHT:	29.79	g/g-mole-dry
MOLECULAR WEIGHT:	28.80	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
NW 6	0.070	1724	NE 6	0.060	1649
5	0.080	1723	5	0.060	1663
4	0.060	1650	4	0.055	1660
3	0.055	1630	3	0.050	1625
2	0.060	1626	2	0.035	1603
1	0.040	1602	1	0.020	1583
SE 6	0.055	1732	* SW 6		
5	0.050	1716	5		
4	0.050	1733	4		
3	0.040	1760	3		
2	0.040	1737	2		
1	0.020	1639	1		

STACK GAS TEMPERATURE:	1669.7	degrees F
STACK GAS TEMPERATURE:	2129.7	degrees R
AVERAGE VELOCITY HEAD:	0.049	" of H2O
STACK GAS VELOCITY:	25.0	ft/sec
STACK GAS AIR FLOW:	35063.4	dscf/min
STACK GAS AIR FLOW:	156104.6	acf/min

* Not able to access southwest port.

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME: S705\CHOUT2R3
CLIENT: King County Solid Waste
@ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE SITE: Flare #2 Outlet
SAMPLE DATE: February 10, 1994
RUN #: 3 - Moisture/Airflow
OPERATORS: Orton/Lawrence

LAB #: 5159
START TIME: 13:10 o'clock
STOP TIME: 13:27 o'clock

MOISTURE (%):	8.42
Bws:	0.0842
PITOT TUBE Cp:	0.84
STACK DIAMETER:	138.0 inches
STACK AREA:	103.9 sq. feet
BAROMETRIC PRESSURE:	29.62 inches Hg
STATIC PRESSURE:	-0.135 inches H2O
STACK PRESSURE:	29.61 inches Hg
AVERAGE CO2 CONCENTRATION:	8.3 percent
AVERAGE O2 CONCENTRATION:	11.6 percent
AVERAGE CO CONCENTRATION:	59 ppm
MOLECULAR WEIGHT:	29.79 g/g-mole-dry
MOLECULAR WEIGHT:	28.80 g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
NE 6	0.060	1643	NW 6	0.065	1691
5	0.060	1621	5	0.075	1708
4	0.050	1622	4	0.075	1712
3	0.040	1571	3	0.060	1694
2	0.035	1547	2	0.050	1698
1	0.020	1549	1	0.040	1543
SE 6	0.045	1665	* SW 6		
5	0.040	1674	5		
4	0.040	1660	4		
3	0.050	1692	3		
2	0.050	1721	2		
1	0.020	1648	1		

STACK GAS TEMPERATURE:	1647.7 degrees F
STACK GAS TEMPERATURE:	2107.7 degrees R
AVERAGE VELOCITY HEAD:	0.047 " of H2O
STACK GAS VELOCITY:	24.5 ft/sec
STACK GAS AIR FLOW:	34735.8 dscf/min
STACK GAS AIR FLOW:	152995.2 acf/min

* Not able to access southwest port.

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: LB600\CH2B10-1
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SITE LOCATION: FLARE STACK #2
SAMPLE DATE: FEBRUARY 10, 1994
RUN #: 1 - METHODS 3A, 6C, 7E AND 10
SAMPLE TIMES: 09:51-10:51

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.0	6.0	0.1	6.0	8.3
Oxygen (O2)	%	0.0	-0.1	15.0	15.0	14.98	-0.1	15.0	11.6
Carbon Monoxide (CO)	ppm	0.0	0.0	300.0	299.0	300.0	0.0	299.5	66
Sulfur Dioxide (SO2)	ppm	0.0	0.2	50.7	53.8	50.7	0.1	52.3	6.2
Nitrogen Oxides (NOx as NO2)	ppm	0.0	0.0	49.0	48.0	49.0	0.0	48.5	18.3

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	8.3 %
Oxygen (O2)	11.6 %
Carbon Monoxide (CO)	66 ppm
Sulfur Dioxide (SO2)	5.9 ppm
Nitrogen Oxides (NOx as NO2)	18.5 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: LB600\CH2B10-2
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SITE LOCATION: FLARE STACK #2
SAMPLE DATE: FEBRUARY 10, 1994
RUN #: 2 - METHODS 3A, 6C, 7E AND 10
SAMPLE TIMES: 11:40-12:40

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	5.9	6.0	0.1	6.0	8.2
Oxygen (O2)	%	0.0	-0.1	15.0	15.0	14.98	-0.1	15.0	11.5
Carbon Monoxide (CO)	ppm	0.0	0.0	299.0	298.0	300.0	0.0	298.5	42
Sulfur Dioxide (SO2)	ppm	0.0	0.0	50.7	50.8	50.7	0.0	50.8	5.8
Nitrogen Oxides (NOx as NO2)	ppm	0.0	-0.3	49.0	48.5	49.0	-0.2	48.8	18.3

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	8.3 %
Oxygen (O2)	11.5 %
Carbon Monoxide (CO)	42 ppm
Sulfur Dioxide (SO2)	5.8 ppm
Nitrogen Oxides (NOx as NO2)	18.5 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: LB600\CH2B10-3
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SITE LOCATION: FLARE STACK #2
SAMPLE DATE: FEBRUARY 10, 1994
RUN #: 3 - METHODS 3A, 6C, 7E AND 10
SAMPLE TIMES: 13:30-14:30

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.1	5.9	5.9	6.0	0.1	5.9	8.1
Oxygen (O2)	%	0.0	0.0	15.0	15.0	14.98	0.0	15.0	11.6
Carbon Monoxide (CO)	ppm	0.0	0.0	298.0	299.0	300.0	0.0	298.5	59
Sulfur Dioxide (SO2)	ppm	0.0	-0.3	50.8	50.5	50.7	-0.2	50.7	5.2
Nitrogen Oxides (NOx as NO2)	ppm	0.0	0.0	49.0	49.0	49.0	0.0	49.0	19.0

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	8.3 %
Oxygen (O2)	11.6 %
Carbon Monoxide (CO)	59 ppm
Sulfur Dioxide (SO2)	5.3 ppm
Nitrogen Oxides (NOx as NO2)	19.0 ppm

METHODS 1, 2, 3A, 4 AND 26A
AM TEST - AIR QUALITY, INC.

FILE NAME:	S707\F2M26AR1	LAB #:	5130
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	09:51 o'clock
		STOP TIME:	10:51 o'clock
LOCATION:	Maple Valley, Washington	SAMPLE LENGTH:	60.0 minutes
SAMPLE SITE:	Flare Stack #2		
SAMPLE DATE:	February 10, 1994		
RUN #:	1 - Method 26A		
OPERATORS:	Orton/Lawrence		

IMPINGER WEIGHTS

FINAL grams	INITIAL grams	NET grams
640.9	633.7	7.2
715.4	644.0	71.4
650.4	638.9	11.5
650.9	646.4	4.5
790.9	777.6	13.3

TOTAL H2O GAIN:	107.9	PITOT TUBE Cp:	0.84
TOTAL VOLUME (scf):	5.09	NOZZLE DIAMETER:	0.765 inches
PERCENT MOISTURE:	7.57	NOZZLE AREA:	0.0032 sq. feet
Bws:	0.0757	STACK DIAMETER:	138.0 inches
		STACK AREA:	103.9 sq. feet
INIT. METER VOLUME:	782.606	METER TEMPERATURE:	58.0 degrees F
FINAL METER VOLUME:	844.085	BAROMETRIC PRES.:	29.65 inches Hg
VOLUME SAMPLED:	61.479	STATIC PRESSURE:	-0.135 inches H2O
STD VOLUME (dscf):	62.138	STACK PRESSURE:	29.64 inches Hg
STD VOLUME (dscm):	1.760	ORIFICE PRESSURE:	3.910 inches H2O
Y FACTOR:	0.991	METER PRESSURE:	29.94 inches Hg
		AVERAGE CONC. CO2:	8.3 percent
		AVERAGE CONC. O2:	11.6 percent
		AVERAGE CONC. CO:	66 ppm
		MOLECULAR WEIGHT:	29.79 g/g-mole-dry
		MOLECULAR WEIGHT:	28.90 g/g-mole-wet
		FUEL FACTOR:	1.12

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Point of	0.05	1646	Point of	0.05	1630
Average	0.05	1643	Average	0.05	1648
Velocity	0.05	1648	Velocity	0.05	1644
	0.05	1658		0.05	1642
	0.05	1640		0.05	1646
	0.05	1641		0.05	1636

PERCENT ISOKINETICS:	94 %	
STACK GAS TEMPERATURE:	1643.5 degrees F	2103.5 degrees R
AVERAGE VELOCITY HEAD:	0.050 " of H2O	
STACK GAS VELOCITY:		25.2 ft/second
STACK GAS AIR FLOW:	156820.2 acf/min	36044.1 dscf/min

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)

CHLORIDE DETECTION LIMIT (micrograms/ml):	1.0
TOTAL VOLUME OF SAMPLE (milliliters):	315
CHLORIDE DETECTION LIMIT (micrograms):	315.0
CHLORIDE CONCENTRATION IN SAMPLE (micrograms):	9580
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	5.60
CHLORIDE EMISSION CONCENTRATION (ppm):	3.69
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	5.52
CHLORIDE EMISSION RATE (lb/hr):	0.756

METHODS 1, 2, 3A, 4 AND 26A
AM TEST - AIR QUALITY, INC.

FILE NAME:	S707\F2M26AR2	LAB #:	5131
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	11:40 o'clock
		STOP TIME:	12:40 o'clock
LOCATION:	Maple Valley, Washington	SAMPLE LENGTH:	60.0 minutes
SAMPLE SITE:	Flare Stack #2		
SAMPLE DATE:	February 10, 1994		
RUN #:	2 - Method 26A		
OPERATORS:	Orton/Lawrence		

IMPINGER WEIGHTS

FINAL grams	INITIAL grams	NET grams
662.2	658.0	4.2
710.2	641.7	68.5
624.1	627.0	-2.9
631.5	600.8	30.7
858.3	840.7	17.6

TOTAL H2O GAIN:	118.1	PITOT TUBE Cp:	0.84
TOTAL VOLUME (scf):	5.57	NOZZLE DIAMETER:	0.765 inches
PERCENT MOISTURE:	8.39	NOZZLE AREA:	0.0032 sq. feet
Bws:	0.0839	STACK DIAMETER:	138.0 inches
		STACK AREA:	103.9 sq. feet
INIT. METER VOLUME:	844.750	METER TEMPERATURE:	60.6 degrees F
FINAL METER VOLUME:	905.322	BAROMETRIC PRES.:	29.60 inches Hg
VOLUME SAMPLED:	60.572	STATIC PRESSURE:	-0.13 inches H2O
STD VOLUME (dscf):	60.814	STACK PRESSURE:	29.59 inches Hg
STD VOLUME (dscm):	1.722	ORIFICE PRESSURE:	3.910 inches H2O
Y FACTOR:	0.991	METER PRESSURE:	29.89 inches Hg
		AVERAGE CONC. CO2:	8.3 percent
		AVERAGE CONC. O2:	11.5 percent
		AVERAGE CONC. CO:	42 ppm
		MOLECULAR WEIGHT:	29.79 g/g-mole-dry
		MOLECULAR WEIGHT:	28.80 g/g-mole-wet
		FUEL FACTOR:	1.13

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Point	0.05	1635	Point	0.05	1629
of	0.05	1632	of	0.05	1625
Average	0.05	1632	Average	0.05	1635
Velocity	0.05	1625	Velocity	0.05	1640
	0.05	1635		0.05	1647
	0.05	1638		0.05	1645

PERCENT ISOKINETICS:	92 %	
STACK GAS TEMPERATURE:	1634.8 degrees F	2094.8 degrees R
AVERAGE VELOCITY HEAD:	0.050 " of H2O	
STACK GAS VELOCITY:		25.2 ft/second
STACK GAS AIR FLOW:	156900.9 acf/min	35830.3 dscf/min

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)

CHLORIDE DETECTION LIMIT (micrograms/ml):	1.0
TOTAL VOLUME OF SAMPLE (milliliters):	310
CHLORIDE DETECTION LIMIT (micrograms):	310.0
CHLORIDE CONCENTRATION IN SAMPLE (micrograms):	8590
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	5.13
CHLORIDE EMISSION CONCENTRATION (ppm):	3.38
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	5.00
CHLORIDE EMISSION RATE (lb/hr):	0.689

METHODS 1, 2, 3A, 4 AND 26A
AM TEST - AIR QUALITY, INC.

FILE NAME:	S707\F2M26AR3	LAB #:	5132
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	13:30 o'clock
		STOP TIME:	14:30 o'clock
LOCATION:	Maple Valley, Washington	SAMPLE LENGTH:	60.0 minutes
SAMPLE SITE:	Flare Stack #2		
SAMPLE DATE:	February 10, 1994		
RUN #:	3 - Method 26A		
OPERATORS:	Orton/Lawrence		

IMPINGER WEIGHTS

FINAL grams	INITIAL grams	NET grams
650.8	614.4	36.4
699.4	653.0	46.4
587.6	575.0	12.6
646.9	643.6	3.3
816.0	799.8	16.2

TOTAL H2O GAIN:	114.9		
TOTAL VOLUME (scf):	5.42	PITOT TUBE Cp:	0.84
PERCENT MOISTURE:	8.42	NOZZLE DIAMETER:	0.765 inches
Bws:	0.0842	NOZZLE AREA:	0.0032 sq. feet
		STACK DIAMETER:	138.0 inches
INIT. METER VOLUME:	906.050	STACK AREA:	103.9 sq. feet
FINAL METER VOLUME:	964.775	METER TEMPERATURE:	60.7 degrees F
VOLUME SAMPLED:	58.725	BAROMETRIC PRES.:	29.62 inches Hg
STD VOLUME (dscf):	58.940	STATIC PRESSURE:	-0.135 inches H2O
STD VOLUME (dscm):	1.669	STACK PRESSURE:	29.61 inches Hg
Y FACTOR:	0.991	ORIFICE PRESSURE:	3.584 inches H2O
		METER PRESSURE:	29.88 inches Hg
		AVERAGE CONC. CO2:	8.3 percent
		AVERAGE CONC. O2:	11.6 percent
		AVERAGE CONC. CO:	59 ppm
		MOLECULAR WEIGHT:	29.79 g/g-mole-dry
		MOLECULAR WEIGHT:	28.80 g/g-mole-wet
		FUEL FACTOR:	1.12

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Point	0.050	1637	Point	0.045	1622
of	0.050	1631	of	0.045	1629
Average	0.050	1625	Average	0.045	1631
Velocity	0.045	1647	Velocity	0.045	1633
	0.045	1628		0.045	1628
	0.045	1629		0.045	1633

PERCENT ISOKINETICS:	93 %	
STACK GAS TEMPERATURE:	1631.1 degrees F	2091.1 degrees R
AVERAGE VELOCITY HEAD:	0.046 " of H2O	
STACK GAS VELOCITY:		24.2 ft/second
STACK GAS AIR FLOW:	150676.6 acf/min	34482.4 dscf/min

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)

CHLORIDE DETECTION LIMIT (micrograms/ml):	1.0
TOTAL VOLUME OF SAMPLE (milliliters):	320
CHLORIDE DETECTION LIMIT (micrograms):	320.0
CHLORIDE CONCENTRATION IN SAMPLE (micrograms):	12800
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	7.89
CHLORIDE EMISSION CONCENTRATION (ppm):	5.20
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	7.78
CHLORIDE EMISSION RATE (lb/hr):	1.02

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R302\KCIN#21
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #2 Inlet
SAMPLE DATE: February 10, 1994
SAMPLE TIME: 09:56-10:46
LAB NUMBER(S): CK-0707-1
CANISTER #: 476
AIRFLOW: 2880.4 dscf/min

ANALYTE	Run 1 mg/min	Blank mg/min	DL Run 1 mg/min
Acetone	1387	< DL	24.5
Benzene	342.6	< DL	4.08
Bromodichloromethane	< DL	< DL	8.16
Bromomethane (Methyl Bromide)	< DL	< DL	8.16
Bromoform	< DL	< DL	8.16
1,3-Butadiene	< DL	< DL	8.16
2-Butanone (MEK)	2937	< DL	8.16
Carbon Disulfide	< DL	< DL	40.8
Carbon Tetrachloride	< DL	< DL	8.16
Chlorobenzene	81.6	< DL	4.08
Chloroethane (Ethyl Chloride)	318.1	< DL	4.08
2-Chloroethyl Vinyl Ether	< DL	< DL	40.8
Chloroform	< DL	< DL	24.5
Chloromethane (Methyl Chloride)	106.0	< DL	4.08
Dibromochloromethane	< DL	< DL	8.16
1,2-Dibromoethane (EDB)	< DL	< DL	16.3
1,2-Dichlorobenzene	< DL	< DL	8.16
1,3-Dichlorobenzene	< DL	< DL	8.16
1,4-Dichlorobenzene	< DL	< DL	8.16
1,1-Dichloroethane	668.9	< DL	4.08
1,2-Dichloroethane (EDC)	< DL	< DL	8.16
1,1-Dichloroethene	< DL	< DL	8.16
cis-1,2-Dichloroethene	660.8	< DL	8.16
trans-1,2-Dichloroethene	< DL	< DL	8.16
Dichloromethane	1631	< DL	40.8
1,2-Dichloropropane	< DL	< DL	4.08
cis-1,3-Dichloropropene	< DL	< DL	4.08
trans-1,3-Dichloropropene	< DL	< DL	4.08
Ethylbenzene	2937	< DL	8.16
2-Hexanone	< DL	< DL	4.08
4-Methyl-2-Pentanone (MIBK)	897.3	< DL	4.08
Styrene	465.0	< DL	8.16
1,1,2,2-Tetrachloroethane	< DL	< DL	8.16
Tetrachloroethene (PCE)	1142	< DL	8.16
Toluene	10605	< DL	8.16
1,1,1-Trichloroethane (TCA)	97.9	< DL	8.16
1,1,2-Trichloroethane	< DL	< DL	8.16
Trichloroethene (TCE)	285.5	< DL	4.08
Trichlorofluoromethane (F-11)	179.5	< DL	8.16
Trichlorotrifluoroethane (F-113)	48.9	< DL	16.3
Vinyl Acetate	< DL	< DL	16.3
Vinyl Chloride	636.3	< DL	4.08
Xylenes, Total	10605	< DL	8.16

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R302\KCIN#22
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #2 Inlet
SAMPLE DATE: February 10, 1994
SAMPLE TIME: 11:45-12:35
LAB NUMBER(S): CK-0707-2
CANISTER #: 583
AIRFLOW: 2845.4 dscf/min

ANALYTE	Run 2 mg/min	Blank mg/min	DL Run 2 mg/min
Acetone	1451	< DL	24.2
Benzene	354.6	< DL	4.03
Bromodichloromethane	< DL	< DL	8.06
Bromomethane (Methyl Bromide)	< DL	< DL	8.06
Bromoform	< DL	< DL	8.06
1,3-Butadiene	< DL	< DL	8.06
2-Butanone (MEK)	2901	< DL	8.06
Carbon Disulfide	< DL	< DL	40.3
Carbon Tetrachloride	< DL	< DL	8.06
Chlorobenzene	88.6	< DL	4.03
Chloroethane (Ethyl Chloride)	322.3	< DL	4.03
2-Chloroethyl Vinyl Ether	< DL	< DL	40.3
Chloroform	< DL	< DL	24.2
Chloromethane (Methyl Chloride)	112.8	< DL	4.03
Dibromochloromethane	< DL	< DL	8.06
1,2-Dibromoethane (EDB)	< DL	< DL	16.1
1,2-Dichlorobenzene	< DL	< DL	8.06
1,3-Dichlorobenzene	< DL	< DL	8.06
1,4-Dichlorobenzene	< DL	< DL	8.06
1,1-Dichloroethane	693.0	< DL	4.03
1,2-Dichloroethane (EDC)	< DL	< DL	8.06
1,1-Dichloroethene	< DL	< DL	8.06
cis-1,2-Dichloroethene	701.1	< DL	8.06
trans-1,2-Dichloroethene	< DL	< DL	8.06
Dichloromethane	1692	< DL	40.3
1,2-Dichloropropane	< DL	< DL	4.03
cis-1,3-Dichloropropene	< DL	< DL	4.03
trans-1,3-Dichloropropene	< DL	< DL	4.03
Ethylbenzene	3062	< DL	8.06
2-Hexanone	< DL	< DL	4.03
4-Methyl-2-Pentanone (MIBK)	701.1	< DL	4.03
Styrene	515.7	< DL	8.06
1,1,2,2-Tetrachloroethane	< DL	< DL	8.06
Tetrachloroethene (PCE)	1209	< DL	8.06
Toluene	11282	< DL	8.06
1,1,1-Trichloroethane (TCA)	104.8	< DL	8.06
1,1,2-Trichloroethane	< DL	< DL	8.06
Trichloroethene (TCE)	314.3	< DL	4.03
Trichlorofluoromethane (F-11)	177.3	< DL	8.06
Trichlorotrifluoroethane (F-113)	40.3	< DL	16.1
Vinyl Acetate	< DL	< DL	16.1
Vinyl Chloride	668.8	< DL	4.03
Xylenes, Total	11282	< DL	8.06

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R302\KCIN#23
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #2 Inlet
SAMPLE DATE: February 10, 1994
SAMPLE TIME: 13:35-14:25
LAB NUMBER(S): CK-0707-3
CANISTER #: 652
AIRFLOW: 2794.2 dscf/min

ANALYTE	Run 3 mg/min	Blank mg/min	DL Run 3 mg/min
Acetone	1424	< DL	23.7
Benzene	340.3	< DL	3.96
Bromodichloromethane	< DL	< DL	7.91
Bromomethane (Methyl Bromide)	< DL	< DL	7.91
Bromoform	< DL	< DL	7.91
1,3-Butadiene	< DL	< DL	7.91
2-Butanone (MEK)	2849	< DL	7.91
Carbon Disulfide	< DL	< DL	39.6
Carbon Tetrachloride	< DL	< DL	7.91
Chlorobenzene	95.0	< DL	3.96
Chloroethane (Ethyl Chloride)	340.3	< DL	3.96
2-Chloroethyl Vinyl Ether	< DL	< DL	39.6
Chloroform	< DL	< DL	23.7
Chloromethane (Methyl Chloride)	87.0	< DL	3.96
Dibromochloromethane	< DL	< DL	7.91
1,2-Dibromoethane (EDB)	< DL	< DL	15.8
1,2-Dichlorobenzene	< DL	< DL	7.91
1,3-Dichlorobenzene	< DL	< DL	7.91
1,4-Dichlorobenzene	< DL	< DL	7.91
1,1-Dichloroethane	664.7	< DL	3.96
1,2-Dichloroethane (EDC)	< DL	< DL	7.91
1,1-Dichloroethene	< DL	< DL	7.91
cis-1,2-Dichloroethene	672.6	< DL	7.91
trans-1,2-Dichloroethene	< DL	< DL	7.91
Dichloromethane	1583	< DL	39.6
1,2-Dichloropropane	< DL	< DL	3.96
cis-1,3-Dichloropropene	< DL	< DL	3.96
trans-1,3-Dichloropropene	< DL	< DL	3.96
Ethylbenzene	3165	< DL	7.91
2-Hexanone	< DL	< DL	3.96
4-Methyl-2-Pentanone (MIBK)	680.5	< DL	3.96
Styrene	546.0	< DL	7.91
1,1,2,2-Tetrachloroethane	< DL	< DL	7.91
Tetrachloroethene (PCE)	1266	< DL	7.91
Toluene	11079	< DL	7.91
1,1,1-Trichloroethane (TCA)	95.0	< DL	7.91
1,1,2-Trichloroethane	< DL	< DL	7.91
Trichloroethene (TCE)	308.6	< DL	3.96
Trichlorofluoromethane (F-11)	174.1	< DL	7.91
Trichlorotrifluoroethane (F-113)	47.5	< DL	15.8
Vinyl Acetate	< DL	< DL	15.8
Vinyl Chloride	546.0	< DL	3.96
Xylenes, Total	11870	< DL	7.91

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R302\KCOUT#21
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #2 Outlet
SAMPLE DATE: February 10, 1994
SAMPLE TIME: 09:56-10:46
LAB NUMBER(S): CK-0707-4
CANISTER #: 477
AIRFLOW: 36544.5 dscf/min

ANALYTE	Run 1 mg/min	Blank mg/min	DL Run 1 mg/min
Acetone	476.1	< DL	3.10
Benzene	< DL	< DL	0.52
Bromodichloromethane	< DL	< DL	1.03
Bromomethane (Methyl Bromide)	< DL	< DL	1.03
Bromoform	< DL	< DL	1.03
1,3-Butadiene	< DL	< DL	1.03
2-Butanone (MEK)	< DL	< DL	1.03
Carbon Disulfide	< DL	< DL	5.17
Carbon Tetrachloride	< DL	< DL	1.03
Chlorobenzene	< DL	< DL	0.52
Chloroethane (Ethyl Chloride)	< DL	< DL	0.52
2-Chloroethyl Vinyl Ether	< DL	< DL	5.17
Chloroform	< DL	< DL	3.10
Chloromethane (Methyl Chloride)	16.6	< DL	0.52
Dibromochloromethane	< DL	< DL	1.03
1,2-Dibromoethane (EDB)	< DL	< DL	2.07
1,2-Dichlorobenzene	< DL	< DL	1.03
1,3-Dichlorobenzene	< DL	< DL	1.03
1,4-Dichlorobenzene	< DL	< DL	1.03
1,1-Dichloroethane	< DL	< DL	0.52
1,2-Dichloroethane (EDC)	< DL	< DL	1.03
1,1-Dichloroethene	< DL	< DL	1.03
cis-1,2-Dichloroethene	< DL	< DL	1.03
trans-1,2-Dichloroethene	< DL	< DL	1.03
Dichloromethane	< DL	< DL	5.17
1,2-Dichloropropane	< DL	< DL	0.52
cis-1,3-Dichloropropene	< DL	< DL	0.52
trans-1,3-Dichloropropene	< DL	< DL	0.52
Ethylbenzene	< DL	< DL	1.03
2-Hexanone	< DL	< DL	0.52
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.52
Styrene	< DL	< DL	1.03
1,1,2,2-Tetrachloroethane	< DL	< DL	1.03
Tetrachloroethene (PCE)	< DL	< DL	1.03
Toluene	< DL	< DL	1.03
1,1,1-Trichloroethane (TCA)	< DL	< DL	1.03
1,1,2-Trichloroethane	< DL	< DL	1.03
Trichloroethene (TCE)	< DL	< DL	0.52
Trichlorofluoromethane (F-11)	< DL	< DL	1.03
Trichlorotrifluoroethane (F-113)	< DL	< DL	2.07
Vinyl Acetate	< DL	< DL	2.07
Vinyl Chloride	< DL	< DL	0.52
Xylenes, Total	< DL	< DL	1.03

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R302\KCOUT#22
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #2 Outlet
SAMPLE DATE: February 10, 1994
SAMPLE TIME: 11:45-12:35
LAB NUMBER(S): CK-0707-5
CANISTER #: 489
AIRFLOW: 35063.4 dscf/min

ANALYTE	Run 2 mg/min	Blank mg/min	DL Run 2 mg/min
Acetone	149.0	< DL	2.98
Benzene	< DL	< DL	0.50
Bromodichloromethane	< DL	< DL	0.99
Bromomethane (Methyl Bromide)	< DL	< DL	0.99
Bromoform	< DL	< DL	0.99
1,3-Butadiene	< DL	< DL	0.99
2-Butanone (MEK)	< DL	< DL	0.99
Carbon Disulfide	22.8	< DL	4.97
Carbon Tetrachloride	< DL	< DL	0.99
Chlorobenzene	< DL	< DL	0.50
Chloroethane (Ethyl Chloride)	< DL	< DL	0.50
2-Chloroethyl Vinyl Ether	< DL	< DL	4.97
Chloroform	< DL	< DL	2.98
Chloromethane (Methyl Chloride)	< DL	< DL	0.50
Dibromochloromethane	< DL	< DL	0.99
1,2-Dibromoethane (EDB)	< DL	< DL	1.99
1,2-Dichlorobenzene	< DL	< DL	0.99
1,3-Dichlorobenzene	< DL	< DL	0.99
1,4-Dichlorobenzene	< DL	< DL	0.99
1,1-Dichloroethane	< DL	< DL	0.50
1,2-Dichloroethane (EDC)	< DL	< DL	0.99
1,1-Dichloroethene	< DL	< DL	0.99
cis-1,2-Dichloroethene	< DL	< DL	0.99
trans-1,2-Dichloroethene	< DL	< DL	0.99
Dichloromethane	< DL	< DL	4.97
1,2-Dichloropropane	< DL	< DL	0.50
cis-1,3-Dichloropropene	< DL	< DL	0.50
trans-1,3-Dichloropropene	< DL	< DL	0.50
Ethylbenzene	< DL	< DL	0.99
2-Hexanone	< DL	< DL	0.50
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.50
Styrene	< DL	< DL	0.99
1,1,2,2-Tetrachloroethane	< DL	< DL	0.99
Tetrachloroethene (PCE)	< DL	< DL	0.99
Toluene	< DL	< DL	0.99
1,1,1-Trichloroethane (TCA)	< DL	< DL	0.99
1,1,2-Trichloroethane	< DL	< DL	0.99
Trichloroethene (TCE)	< DL	< DL	0.50
Trichlorofluoromethane (F-11)	< DL	< DL	0.99
Trichlorotrifluoroethane (F-113)	< DL	< DL	1.99
Vinyl Acetate	< DL	< DL	1.99
Vinyl Chloride	< DL	< DL	0.50
Xylenes, Total	32.8	< DL	0.99

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R302\KCOUT#23
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #2 Outlet
SAMPLE DATE: February 10, 1994
SAMPLE TIME: 13:35-14:25
LAB NUMBER(S): CK-0707-6
CANISTER #: 649
AIRFLOW: 34735.8 dscf/min

ANALYTE	RUN 3 mg/min	Blank mg/min	DL RUN 3 mg/min
Acetone	6.20	< DL	2.95
Benzene	< DL	< DL	0.49
Bromodichloromethane	< DL	< DL	0.98
Bromomethane (Methyl Bromide)	< DL	< DL	0.98
Bromoform	< DL	< DL	0.98
1,3-Butadiene	< DL	< DL	0.98
2-Butanone (MEK)	< DL	< DL	0.98
Carbon Disulfide	< DL	< DL	4.92
Carbon Tetrachloride	< DL	< DL	0.98
Chlorobenzene	< DL	< DL	0.49
Chloroethane (Ethyl Chloride)	< DL	< DL	0.49
2-Chloroethyl Vinyl Ether	< DL	< DL	4.92
Chloroform	< DL	< DL	2.95
Chloromethane (Methyl Chloride)	2.07	< DL	0.49
Dibromochloromethane	< DL	< DL	0.98
1,2-Dibromoethane (EDB)	< DL	< DL	1.97
1,2-Dichlorobenzene	< DL	< DL	0.98
1,3-Dichlorobenzene	< DL	< DL	0.98
1,4-Dichlorobenzene	< DL	< DL	0.98
1,1-Dichloroethane	< DL	< DL	0.49
1,2-Dichloroethane (EDC)	< DL	< DL	0.98
1,1-Dichloroethene	< DL	< DL	0.98
cis-1,2-Dichloroethene	< DL	< DL	0.98
trans-1,2-Dichloroethene	< DL	< DL	0.98
Dichloromethane	< DL	< DL	4.92
1,2-Dichloropropane	< DL	< DL	0.49
cis-1,3-Dichloropropene	< DL	< DL	0.49
trans-1,3-Dichloropropene	< DL	< DL	0.49
Ethylbenzene	< DL	< DL	0.98
2-Hexanone	< DL	< DL	0.49
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.49
Styrene	< DL	< DL	0.98
1,1,2,2-Tetrachloroethane	< DL	< DL	0.98
Tetrachloroethene (PCE)	< DL	< DL	0.98
Toluene	< DL	< DL	0.98
1,1,1-Trichloroethane (TCA)	2.16	< DL	0.98
1,1,2-Trichloroethane	< DL	< DL	0.98
Trichloroethene (TCE)	< DL	< DL	0.49
Trichlorofluoromethane (F-11)	< DL	< DL	0.98
Trichlorotrifluoroethane (F-113)	< DL	< DL	1.97
Vinyl Acetate	< DL	< DL	1.97
Vinyl Chloride	< DL	< DL	0.49
Xylenes, Total	< DL	< DL	0.98

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

mg/min = milligrams of analyte emitted per minute

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\KCVEL#31	LAB #:	CK-0679-1
CLIENT:	King County Solid Waste	START TIME:	11:25 o'clock
	@ Cedar Hills Landfill	STOP TIME:	11:40 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #3 Inlet		
SAMPLE DATE:	February 8, 1994		
RUN #:	1 - Velocity		
OPERATORS:	Orton/Lawrence		

WET BULB TEMPERATURE (Tw):	76	°F
DRY BULB TEMPERATURE (Td):	96	°F
SAT'd H2O VAPOR PRESSURE (SVP):	0.9046	inches of Hg (wet bulb °F - from chart)
VAPOR PRESSURE (VP):	0.6889	inches of Hg
Bws:	0.0229	
MOISTURE (%):	2.29	
PITOT TUBE Cp:	0.99	
DUCT DIAMETER:	12.00	inches
DUCT AREA:	0.785	sq. feet
BAROMETRIC PRES.:	29.70	inches Hg
STATIC PRESSURE:	4.5	inches H2O
DUCT PRESSURE:	30.03	inches Hg
AVERAGE CO2 CONC:	43.0	percent
AVERAGE O2 CONC:	2.9	percent
AVERAGE CO CONC:	8.8	ppm
AVERAGE CH4 CONC:	38	percent
MOLECULAR WEIGHT:	30.44	g/g-mole-dry
MOLECULAR WEIGHT:	30.15	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Top 1	0.40	92	Top 4	0.46	95
2	0.44	93	5	0.44	95
3	0.45	95	6	0.40	95

DUCT GAS TEMPERATURE:	94.2	degrees F
DUCT GAS TEMPERATURE:	554.2	degrees R
AVERAGE VELOCITY HEAD:	0.431	" of H2O
DUCT GAS VELOCITY:	43.5	ft/sec
DUCT GAS AIR FLOW:	1914.8	dscf/min
DUCT GAS AIR FLOW:	2049.2	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\KCVEL#32	LAB #:	CK-0679-2
CLIENT:	King County Solid Waste	START TIME:	13:55 o'clock
	@ Cedar Hills Landfill	STOP TIME:	14:10 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #3 Inlet		
SAMPLE DATE:	February 8, 1994		
RUN #:	2 - Velocity		
OPERATORS:	Orton/Lawrence		

WET BULB TEMPERATURE (Tw):	76	°F
DRY BULB TEMPERATURE (Td):	94	°F
SAT'd H2O VAPOR PRESSURE (SVP):	0.9046	inches of Hg (wet bulb °F - from chart)
VAPOR PRESSURE (VP):	0.7112	inches of Hg
Bws:	0.0238	
MOISTURE (%):	2.38	
PITOT TUBE Cp:	0.99	
DUCT DIAMETER:	12.00	inches
DUCT AREA:	0.785	sq. feet
BAROMETRIC PRES.:	29.60	inches Hg
STATIC PRESSURE:	4.5	inches H2O
DUCT PRESSURE:	29.93	inches Hg
AVERAGE CO2 CONC:	44.0	percent
AVERAGE O2 CONC:	2.7	percent
AVERAGE CO CONC:	8.8	ppm
AVERAGE CH4 CONC:	38	percent
MOLECULAR WEIGHT:	30.59	g/g-mole-dry
MOLECULAR WEIGHT:	30.29	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Top 1	0.40	92	Top 4	0.43	95
2	0.42	93	5	0.44	94
3	0.42	94	6	0.40	94

DUCT GAS TEMPERATURE:	93.7	degrees F
DUCT GAS TEMPERATURE:	553.7	degrees R
AVERAGE VELOCITY HEAD:	0.418	" of H2O
DUCT GAS VELOCITY:	42.8	ft/sec
DUCT GAS AIR FLOW:	1877.2	dscf/min
DUCT GAS AIR FLOW:	2015.6	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\KCVEL#33	LAB #:	CK-0679-3
CLIENT:	King County Solid Waste	START TIME:	17:00 o'clock
	@ Cedar Hills Landfill	STOP TIME:	17:15 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #3 Inlet		
SAMPLE DATE:	February 8, 1994		
RUN #:	3 - Velocity		
OPERATORS:	Orton/Lawrence		

WET BULB TEMPERATURE (Tw):	73	°F
DRY BULB TEMPERATURE (Td):	97	°F
SAT'd H2O VAPOR PRESSURE (SVP):	0.8183	inches of Hg (wet bulb °F - from chart)
VAPOR PRESSURE (VP):	0.5601	inches of Hg
Bws:	0.0187	
MOISTURE (%):	1.87	
PITOT TUBE Cp:	0.99	
DUCT DIAMETER:	12.00	inches
DUCT AREA:	0.785	sq. feet
BAROMETRIC PRES.:	29.58	inches Hg
STATIC PRESSURE:	4.6	inches H2O
DUCT PRESSURE:	29.92	inches Hg
AVERAGE CO2 CONC:	43.0	percent
AVERAGE O2 CONC:	2.9	percent
AVERAGE CO CONC:	8.8	ppm
AVERAGE CH4 CONC:	38	percent
MOLECULAR WEIGHT:	30.44	g/g-mole-dry
MOLECULAR WEIGHT:	30.20	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Top 1	0.40	91	Top 4	0.41	95
2	0.40	94	5	0.43	96
3	0.39	95	6	0.38	95

DUCT GAS TEMPERATURE:	94.3	degrees F
DUCT GAS TEMPERATURE:	554.3	degrees R
AVERAGE VELOCITY HEAD:	0.402	" of H2O
DUCT GAS VELOCITY:	42.0	ft/sec
DUCT GAS AIR FLOW:	1850.0	dscf/min
DUCT GAS AIR FLOW:	1979.4	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\CHOUT3R1	LAB #:	5163
CLIENT:	King County Solid Waste	START TIME:	10:00 o'clock
	@ Cedar Hills Landfill	STOP TIME:	10:25 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #3 Outlet		
SAMPLE DATE:	February 8, 1994		
RUN #:	1 - Moisture/Airflow		
OPERATORS:	Orton\Lawrence		

MOISTURE (%):	9.04	
Bws:	0.0904	
PITOT TUBE Cp:	0.84	
STACK DIAMETER:	138.0	inches
STACK AREA:	103.9	sq. feet
BAROMETRIC PRESSURE:	29.70	inches Hg
STATIC PRESSURE:	0.13	inches H2O
STACK PRESSURE:	29.71	inches Hg
AVERAGE CO2 CONCENTRATION:	7.3	percent
AVERAGE O2 CONCENTRATION:	12.6	percent
AVERAGE CO CONCENTRATION:	0	ppm
MOLECULAR WEIGHT:	29.67	g/g-mole-dry
MOLECULAR WEIGHT:	28.62	g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
SE 6	0.055	1671	NW 6	0.020	1727
5	0.009	1686	5	0.020	1747
4	0.006	1671	4	0.240	1747
3	0.008	1646	3	0.025	1745
2	0.010	1690	2	0.021	1734
1	0.010	1691	1	0.016	1715
NE 6	0.006	1626	SW 6	0.013	1670
5	0.010	1660	5	0.015	1725
4	0.010	1655	4	0.015	1717
3	0.011	1662	3	0.014	1690
2	0.011	1657	2	0.018	1698
1	0.010	1683	1	0.022	1703

STACK GAS TEMPERATURE:	1692.3	degrees F
STACK GAS TEMPERATURE:	2152.3	degrees R
AVERAGE VELOCITY HEAD:	0.018	" of H2O
STACK GAS VELOCITY:	15.5	ft/sec
STACK GAS AIR FLOW:	21336.0	dscf/min
STACK GAS AIR FLOW:	96295.1	acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\CHOUT3R2	LAB #:	5164
CLIENT:	King County Solid Waste	START TIME:	13:00 o'clock
	@ Cedar Hills Landfill	STOP TIME:	13:20 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #3 Outlet		
SAMPLE DATE:	February 8, 1994		
RUN #:	2 - Moisture/Airflow		
OPERATORS:	Orton\Lawrence		

MOISTURE (%):	9.09
Bws:	0.0909
PITOT TUBE Cp:	0.84
STACK DIAMETER:	138.0 inches
STACK AREA:	103.9 sq. feet
BAROMETRIC PRESSURE:	29.60 inches Hg
STATIC PRESSURE:	0.15 inches H2O
STACK PRESSURE:	29.61 inches Hg
AVERAGE CO2 CONCENTRATION:	7.3 percent
AVERAGE O2 CONCENTRATION:	12.6 percent
AVERAGE CO CONCENTRATION:	0 ppm
MOLECULAR WEIGHT:	29.67 g/g-mole-dry
MOLECULAR WEIGHT:	28.61 g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
SW 6	0.010	1676	SE 6	0.020	1665
5	0.015	1677	5	0.025	1670
4	0.020	1678	4	0.020	1665
3	0.025	1662	3	0.020	1658
2	0.035	1696	2	0.010	1608
1	0.020	1638	1	0.010	1500
NW 6	0.025	1694	NE 6	0.025	1694
5	0.023	1686	5	0.025	1708
4	0.025	1707	4	0.020	1682
3	0.020	1700	3	0.023	1670
2	0.020	1696	2	0.020	1687
1	0.017	1673	1	0.015	1637

STACK GAS TEMPERATURE:	1667.8 degrees F
STACK GAS TEMPERATURE:	2127.8 degrees R
AVERAGE VELOCITY HEAD:	0.020 " of H2O
STACK GAS VELOCITY:	16.1 ft/sec
STACK GAS AIR FLOW:	22348.1 dscf/min
STACK GAS AIR FLOW:	100099.8 acf/min

MOISTURE AND AIRFLOW
AM TEST - AIR QUALITY, INC.

FILE NAME:	S705\CHOUT3R3	LAB #:	5165
CLIENT:	King County Solid Waste	START TIME:	16:00 o'clock
	@ Cedar Hills Landfill	STOP TIME:	16:25 o'clock
LOCATION:	Maple Valley, Washington		
SAMPLE SITE:	Flare #3 Outlet		
SAMPLE DATE:	February 8, 1994		
RUN #:	3 - Moisture/Airflow		
OPERATORS:	Orton\Lawrence		

MOISTURE (%):	9.65
Bws:	0.0965
PITOT TUBE Cp:	0.84
STACK DIAMETER:	138.0 inches
STACK AREA:	103.9 sq. feet
BAROMETRIC PRESSURE:	29.60 inches Hg
STATIC PRESSURE:	0.15 inches H2O
STACK PRESSURE:	29.61 inches Hg
AVERAGE CO2 CONCENTRATION:	8.1 percent
AVERAGE O2 CONCENTRATION:	11.6 percent
AVERAGE CO CONCENTRATION:	0 ppm
MOLECULAR WEIGHT:	29.76 g/g-mole-dry
MOLECULAR WEIGHT:	28.63 g/g-mole-wet

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
SE 6	0.018	1647	SW 6	0.070	1688
5	0.015	1616	5	0.075	1704
4	0.020	1633	4	0.080	1682
3	0.010	1638	3	0.075	1695
2	0.015	1636	2	0.075	1679
1	0.012	1535	1	0.075	1611
NW 6	0.070	1720	NE 6	0.025	1700
5	0.065	1758	5	0.025	1707
4	0.070	1758	4	0.025	1713
3	0.070	1763	3	0.025	1693
2	0.050	1721	2	0.020	1665
1	0.045	1648	1	0.015	1641

STACK GAS TEMPERATURE:	1677.1 degrees F
STACK GAS TEMPERATURE:	2137.1 degrees R
AVERAGE VELOCITY HEAD:	0.039 " of H2O
STACK GAS VELOCITY:	22.6 ft/sec
STACK GAS AIR FLOW:	31095.0 dscf/min
STACK GAS AIR FLOW:	140756.0 acf/min

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: LB600\CH3BI8-1
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SITE LOCATION: FLARE STACK #3
SAMPLE DATE: FEBRUARY 8, 1994
RUN #: 1 - METHODS 3A, 6C, 7E AND 10
SAMPLE TIMES: 11:15-12:15

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	5.9	5.9	6.0	0.0	5.9	7.2
Oxygen (O2)	%	0.1	-0.1	14.8	15.0	14.98	0.0	14.9	12.5
Carbon Monoxide (CO)	ppm	0.2	0.2	303.0	301.0	300.0	0.2	302.0	0
Sulfur Dioxide (SO2)	ppm	0.0	0.4	50.0	51.3	50.7	0.2	50.7	2.4
Nitrogen Oxides (NOx as NO2)	ppm	0.0	-0.3	48.7	48.3	49.0	-0.2	48.5	18.5

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	7.3 %
Oxygen (O2)	12.6 %
Carbon Monoxide (CO)	0 ppm
Sulfur Dioxide (SO2)	2.2 ppm
Nitrogen Oxides (NOx as NO2)	18.8 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: LB600\CH3B18-2
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SITE LOCATION: FLARE STACK #3
SAMPLE DATE: FEBRUARY 8, 1994
RUN #: 2 - METHODS 3A, 6C, 7E AND 10
SAMPLE TIMES: 13:23-14:23

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.0	6.0	0.1	6.0	7.3
Oxygen (O2)	%	0.0	0.0	15.0	15.0	14.98	0.0	15.0	12.6
Carbon Monoxide (CO)	ppm	0.0	0.1	301.0	302.0	300.0	0.1	301.5	0
Sulfur Dioxide (SO2)	ppm	0.0	0.2	51.7	51.4	50.7	0.1	51.6	2.1
Nitrogen Oxides (NOx as NO2)	ppm	0.0	0.2	49.0	48.5	49.0	0.1	48.8	18.6

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas	
Carbon Dioxide (CO2)	7.3	%
Oxygen (O2)	12.6	%
Carbon Monoxide (CO)	0	ppm
Sulfur Dioxide (SO2)	2.0	ppm
Nitrogen Oxides (NOx as NO2)	18.6	ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: LB600\CH3BI8-3
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SITE LOCATION: FLARE STACK #3
SAMPLE DATE: FEBRUARY 8, 1994
RUN #: 3 - METHODS 3A, 6C, 7E AND 10
SAMPLE TIMES: 16:28-17:28

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.0	6.0	0.1	6.0	8.1
Oxygen (O2)	%	0.0	0.1	15.0	15.1	14.98	0.1	15.1	11.7
Carbon Monoxide (CO)	ppm	0.0	-0.2	302.0	283.0	300.0	-0.1	292.5	0
Sulfur Dioxide (SO2)	ppm	0.0	0.2	51.3	49.9	50.7	0.1	50.6	1.4
Nitrogen Oxides (NOx as NO2)	ppm	0.0	-0.3	49.0	47.4	49.0	-0.2	48.2	21.7

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas	
Carbon Dioxide (CO2)	8.1	%
Oxygen (O2)	11.6	%
Carbon Monoxide (CO)	0	ppm
Sulfur Dioxide (SO2)	1.3	ppm
Nitrogen Oxides (NOx as NO2)	22.1	ppm

METHODS 1, 2, 3A, 4 AND 26A
AM TEST - AIR QUALITY, INC.

FILE NAME:	S707\F3M26AR1	LAB #:	5072
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	11:15 o'clock
		STOP TIME:	12:15 o'clock
LOCATION:	Maple Valley, Washington	SAMPLE LENGTH:	60.0 minutes
SAMPLE SITE:	Flare Stack #3		
SAMPLE DATE:	February 8, 1994		
RUN #:	1 - Method 26A		
OPERATORS:	Orton/Lawrence		

IMPINGER WEIGHTS

FINAL grams	INITIAL grams	NET grams
596.6	543.7	52.9
689.8	675.4	14.4
639.2	624.7	14.5
641.3	637.5	3.8
834.4	823.5	10.9

TOTAL H2O GAIN:	96.5	PITOT TUBE Cp:	0.84
TOTAL VOLUME (scf):	4.55	NOZZLE DIAMETER:	0.765 inches
PERCENT MOISTURE:	9.04	NOZZLE AREA:	0.0032 sq. feet
Bws:	0.0904	STACK DIAMETER:	138.0 inches
		STACK AREA:	103.9 sq. feet
INIT. METER VOLUME:	461.843	METER TEMPERATURE:	51.2 degrees F
FINAL METER VOLUME:	506.780	BAROMETRIC PRES.:	29.65 inches Hg
VOLUME SAMPLED:	44.937	STATIC PRESSURE:	0.13 inches H2O
STD VOLUME (dscf):	45.800	STACK PRESSURE:	29.66 inches Hg
STD VOLUME (dscm):	1.297	ORIFICE PRESSURE:	1.943 inches H2O
Y FACTOR:	0.991	METER PRESSURE:	29.79 inches Hg
		AVERAGE CONC. CO2:	7.3 percent
		AVERAGE CONC. O2:	12.6 percent
		AVERAGE CONC. CO:	0 ppm
		MOLECULAR WEIGHT:	29.67 g/g-mole-dry
		MOLECULAR WEIGHT:	28.62 g/g-mole-wet
		FUEL FACTOR:	1.14

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
	0.017	1656		0.025	1650
Point	0.025	1712	Point	0.023	1642
of	0.025	1695	of	0.020	1634
Average	0.025	1657	Average	0.020	1649
Velocity	0.025	1694	Velocity	0.020	1674
	0.020	1647		0.020	1620

PERCENT ISOKINETICS:	106 %		
STACK GAS TEMPERATURE:	1660.8 degrees F	2120.8	degrees R
AVERAGE VELOCITY HEAD:	0.022 " of H2O		
STACK GAS VELOCITY:		16.8	ft/second
STACK GAS AIR FLOW:	104920.0 acf/min	23553.5	dscf/min

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)

CHLORIDE DETECTION LIMIT (micrograms/ml):	1.0
TOTAL VOLUME OF SAMPLE (milliliters):	435
CHLORIDE DETECTION LIMIT (micrograms):	435.0
CHLORIDE CONCENTRATION IN SAMPLE (micrograms):	4780
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	3.79
CHLORIDE EMISSION CONCENTRATION (ppm):	2.50
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	4.19
CHLORIDE EMISSION RATE (lb/hr):	0.334

METHODS 1, 2, 3A, 4 AND 26A
AM TEST - AIR QUALITY, INC.

FILE NAME:	S707\F3M26AR2	LAB #:	5073
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	13:23 o'clock
		STOP TIME:	14:23 o'clock
LOCATION:	Maple Valley, Washington	SAMPLE LENGTH:	60.0 minutes
SAMPLE SITE:	Flare Stack #3		
SAMPLE DATE:	February 8, 1994		
RUN #:	2 - Method 26A		
OPERATORS:	Orton/Lawrence		

IMPINGER WEIGHTS

FINAL grams	INITIAL grams	NET grams
693.2	635.9	57.3
705.5	688.8	16.7
649.8	646.6	3.2
668.0	667.6	0.4
824.3	815.1	9.2

TOTAL H2O GAIN:	86.8	PITOT TUBE Cp:	0.84
TOTAL VOLUME (scf):	4.09	NOZZLE DIAMETER:	0.765 inches
PERCENT MOISTURE:	9.09	NOZZLE AREA:	0.0032 sq. feet
Bws:	0.0909	STACK DIAMETER:	138.0 inches
		STACK AREA:	103.9 sq. feet
INIT. METER VOLUME:	507.306	METER TEMPERATURE:	53.7 degrees F
FINAL METER VOLUME:	547.750	BAROMETRIC PRES.:	29.60 inches Hg
VOLUME SAMPLED:	40.444	STATIC PRESSURE:	0.15 inches H2O
STD VOLUME (dscf):	40.914	STACK PRESSURE:	29.61 inches Hg
STD VOLUME (dscm):	1.159	ORIFICE PRESSURE:	1.573 inches H2O
Y FACTOR:	0.991	METER PRESSURE:	29.72 inches Hg
		AVERAGE CONC. CO2:	7.3 percent
		AVERAGE CONC. O2:	12.6 percent
		AVERAGE CONC. CO:	0 ppm
		MOLECULAR WEIGHT:	29.67 g/g-mole-dry
		MOLECULAR WEIGHT:	28.61 g/g-mole-wet
		FUEL FACTOR:	1.14

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Point	0.020	1691	Point	0.020	1705
of	0.030	1703	of	0.020	1645
Average	0.020	1713	Average	0.020	1684
Velocity	0.020	1731	Velocity	0.020	1698
	0.020	1712		0.020	1687
	0.020	1720		0.020	1662

PERCENT ISOKINETICS:	98 %		
STACK GAS TEMPERATURE:	1695.9 degrees F	2155.9	degrees R
AVERAGE VELOCITY HEAD:	0.021 " of H2O		
STACK GAS VELOCITY:		16.5	ft/second
STACK GAS AIR FLOW:	102856.2 acf/min	22663.1	dscf/min

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)

CHLORIDE DETECTION LIMIT (micrograms/ml):	1.0
TOTAL VOLUME OF SAMPLE (milliliters):	380
CHLORIDE DETECTION LIMIT (micrograms):	380.0
CHLORIDE CONCENTRATION IN SAMPLE (micrograms):	3910
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	3.47
CHLORIDE EMISSION CONCENTRATION (ppm):	2.29
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	3.83
CHLORIDE EMISSION RATE (lb/hr):	0.295

METHODS 1, 2, 3A, 4 AND 26A
AM TEST - AIR QUALITY, INC.

FILE NAME:	S707\F3M26AR3	LAB #:	5074
CLIENT:	King County Solid Waste @ Cedar Hills Landfill	START TIME:	16:28 o'clock
		STOP TIME:	17:28 o'clock
LOCATION:	Maple Valley, Washington	SAMPLE LENGTH:	60.0 minutes
SAMPLE SITE:	Flare Stack #3		
SAMPLE DATE:	February 8, 1994		
RUN #:	3 - Method 26A		
OPERATORS:	Orton/Lawrence		

IMPINGER WEIGHTS

FINAL grams	INITIAL grams	NET grams
701.6	635.4	66.2
651.6	640.8	10.8
636.2	630.2	6.0
688.0	687.6	0.4
823.2	815.6	7.6

TOTAL H2O GAIN:	91.0	PITOT TUBE Cp:	0.84
TOTAL VOLUME (scf):	4.29	NOZZLE DIAMETER:	0.765 inches
PERCENT MOISTURE:	9.65	NOZZLE AREA:	0.0032 sq. feet
Bws:	0.0965	STACK DIAMETER:	138.0 inches
		STACK AREA:	103.9 sq. feet
INIT. METER VOLUME:	548.585	METER TEMPERATURE:	54.0 degrees F
FINAL METER VOLUME:	588.313	BAROMETRIC PRES.:	29.60 inches Hg
VOLUME SAMPLED:	39.728	STATIC PRESSURE:	0.15 inches H2O
STD VOLUME (dscf):	40.160	STACK PRESSURE:	29.61 inches Hg
STD VOLUME (dscm):	1.137	ORIFICE PRESSURE:	1.510 inches H2O
Y FACTOR:	0.991	METER PRESSURE:	29.71 inches Hg
		AVERAGE CONC. CO2:	8.1 percent
		AVERAGE CONC. O2:	11.6 percent
		AVERAGE CONC. CO:	0 ppm
		MOLECULAR WEIGHT:	29.76 g/g-mole-dry
		MOLECULAR WEIGHT:	28.62 g/g-mole-wet
		FUEL FACTOR:	1.15

SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " OF H2O	TEMPERATURE °F
Point	0.020	1684	Point	0.020	1700
of	0.020	1687	of	0.020	1787
Average	0.020	1690	Average	0.020	1803
Velocity	0.020	1690	Velocity	0.020	1806
	0.020	1694		0.020	1812
	0.020	1699		0.020	1761

PERCENT ISOKINETICS:	99 %	
STACK GAS TEMPERATURE:	1734.4 degrees F	2194.4 degrees R
AVERAGE VELOCITY HEAD:	0.020 " of H2O	
STACK GAS VELOCITY:		16.3 ft/second
STACK GAS AIR FLOW:	101837.5 acf/min	21909.4 dscf/min

GASEOUS CHLORIDE EMISSIONS (as HYDROCHLORIC ACID)

CHLORIDE DETECTION LIMIT (micrograms/ml):	1.0
TOTAL VOLUME OF SAMPLE (milliliters):	435
CHLORIDE DETECTION LIMIT (micrograms):	435.0
CHLORIDE CONCENTRATION IN SAMPLE (micrograms):	4610
CHLORIDE CONCENTRATION IN AIR (mg/dscm):	4.17
CHLORIDE EMISSION CONCENTRATION (ppm):	2.75
CHLORIDE EMISSION CONCENTRATION (ppm @ 7% O2):	4.11
CHLORIDE EMISSION RATE (lb/hr):	0.342

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R303\KCIN#31
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #3 Inlet
SAMPLE DATE: February 8, 1994
SAMPLE TIME: 11:17-12:07
LAB NUMBER(S): CK-0679-1
CANISTER #: 661
AIRFLOW: 1914.8 dscf/min

ANALYTE	Run 1 mg/min	Blank mg/min	DL Run 1 mg/min
Acetone	650.7	< DL	16.3
Benzene	119.3	< DL	2.71
Bromodichloromethane	< DL	< DL	5.42
Bromomethane (Methyl Bromide)	< DL	< DL	5.42
Bromoform	< DL	< DL	5.42
1,3-Butadiene	< DL	< DL	5.42
2-Butanone (MEK)	1627	< DL	5.42
Carbon Disulfide	< DL	< DL	27.1
Carbon Tetrachloride	< DL	< DL	5.42
Chlorobenzene	135.6	< DL	2.71
Chloroethane (Ethyl Chloride)	< DL	< DL	2.71
2-Chloroethyl Vinyl Ether	< DL	< DL	27.1
Chloroform	< DL	< DL	16.3
Chloromethane (Methyl Chloride)	< DL	< DL	2.71
Dibromochloromethane	< DL	< DL	5.42
1,2-Dibromoethane (EDB)	< DL	< DL	10.8
1,2-Dichlorobenzene	< DL	< DL	5.42
1,3-Dichlorobenzene	< DL	< DL	5.42
1,4-Dichlorobenzene	119.3	< DL	5.42
1,1-Dichloroethane	38.0	< DL	2.71
1,2-Dichloroethane (EDC)	< DL	< DL	5.42
1,1-Dichloroethene	< DL	< DL	5.42
cis-1,2-Dichloroethene	303.7	< DL	5.42
trans-1,2-Dichloroethene	< DL	< DL	5.42
Dichloromethane	124.7	< DL	27.1
1,2-Dichloropropane	< DL	< DL	2.71
cis-1,3-Dichloropropene	< DL	< DL	2.71
trans-1,3-Dichloropropene	< DL	< DL	2.71
Ethylbenzene	2711	< DL	5.42
2-Hexanone	< DL	< DL	2.71
4-Methyl-2-Pentanone (MIBK)	759.2	< DL	2.71
Styrene	271.1	< DL	5.42
1,1,2,2-Tetrachloroethane	< DL	< DL	5.42
Tetrachloroethene (PCE)	428.4	< DL	5.42
Toluene	4230	< DL	5.42
1,1,1-Trichloroethane (TCA)	< DL	< DL	5.42
1,1,2-Trichloroethane	< DL	< DL	5.42
Trichloroethene (TCE)	97.6	< DL	2.71
Trichlorofluoromethane (F-11)	< DL	< DL	5.42
Trichlorotrifluoroethane (F-113)	< DL	< DL	10.8
Vinyl Acetate	< DL	< DL	10.8
Vinyl Chloride	206.1	< DL	2.71
Xylenes, Total	9219	< DL	5.42

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R303\KCIN#32
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #3 Inlet
SAMPLE DATE: February 8, 1994
SAMPLE TIME: 13:25-14:15
LAB NUMBER(S): CK-0679-2
CANISTER #: 418
AIRFLOW: 1877.2 dscf/min

ANALYTE	Run 2 mg/min	Blank mg/min	DL Run 2 mg/min
Acetone	903.8	< DL	15.9
Benzene	127.6	< DL	2.66
Bromodichloromethane	< DL	< DL	5.32
Bromomethane (Methyl Bromide)	< DL	< DL	5.32
Bromoform	< DL	< DL	5.32
1,3-Butadiene	< DL	< DL	5.32
2-Butanone (MEK)	1701	< DL	5.32
Carbon Disulfide	< DL	< DL	26.6
Carbon Tetrachloride	< DL	< DL	5.32
Chlorobenzene	148.9	< DL	2.66
Chloroethane (Ethyl Chloride)	< DL	< DL	2.66
2-Chloroethyl Vinyl Ether	< DL	< DL	26.6
Chloroform	< DL	< DL	15.9
Chloromethane (Methyl Chloride)	< DL	< DL	2.66
Dibromochloromethane	< DL	< DL	5.32
1,2-Dibromoethane (EDB)	< DL	< DL	10.6
1,2-Dichlorobenzene	< DL	< DL	5.32
1,3-Dichlorobenzene	< DL	< DL	5.32
1,4-Dichlorobenzene	101.0	< DL	5.32
1,1-Dichloroethane	37.2	< DL	2.66
1,2-Dichloroethane (EDC)	< DL	< DL	5.32
1,1-Dichloroethene	< DL	< DL	5.32
cis-1,2-Dichloroethene	319.0	< DL	5.32
trans-1,2-Dichloroethene	< DL	< DL	5.32
Dichloromethane	127.6	< DL	26.6
1,2-Dichloropropane	< DL	< DL	2.66
cis-1,3-Dichloropropene	< DL	< DL	2.66
trans-1,3-Dichloropropene	< DL	< DL	2.66
Ethylbenzene	2871	< DL	5.32
2-Hexanone	< DL	< DL	2.66
4-Methyl-2-Pentanone (MIBK)	850.6	< DL	2.66
Styrene	292.4	< DL	5.32
1,1,2,2-Tetrachloroethane	< DL	< DL	5.32
Tetrachloroethene (PCE)	467.8	< DL	5.32
Toluene	4359	< DL	5.32
1,1,1-Trichloroethane (TCA)	< DL	< DL	5.32
1,1,2-Trichloroethane	< DL	< DL	5.32
Trichloroethene (TCE)	101.0	< DL	2.66
Trichlorofluoromethane (F-11)	< DL	< DL	5.32
Trichlorotrifluoroethane (F-113)	< DL	< DL	10.6
Vinyl Acetate	< DL	< DL	10.6
Vinyl Chloride	223.3	< DL	2.66
Xylenes, Total	9569	< DL	5.32

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R303\KCIN#33
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #3 Inlet
SAMPLE DATE: February 8, 1994
SAMPLE TIME: 16:30-17:20
LAB NUMBER(S): CK-0679-3
CANISTER #: 511
AIRFLOW: 1850.0 dscf/min

ANALYTE	Run 3 mg/min	Blank mg/min	DL Run 3 mg/min
Acetone	733.5	< DL	15.7
Benzene	120.5	< DL	2.62
Bromodichloromethane	< DL	< DL	5.24
Bromomethane (Methyl Bromide)	< DL	< DL	5.24
Bromoform	< DL	< DL	5.24
1,3-Butadiene	< DL	< DL	5.24
2-Butanone (MEK)	1362	< DL	5.24
Carbon Disulfide	< DL	< DL	26.2
Carbon Tetrachloride	< DL	< DL	5.24
Chlorobenzene	115.3	< DL	2.62
Chloroethane (Ethyl Chloride)	< DL	< DL	2.62
2-Chloroethyl Vinyl Ether	< DL	< DL	26.2
Chloroform	< DL	< DL	15.7
Chloromethane (Methyl Chloride)	< DL	< DL	2.62
Dibromochloromethane	< DL	< DL	5.24
1,2-Dibromoethane (EDB)	< DL	< DL	10.5
1,2-Dichlorobenzene	< DL	< DL	5.24
1,3-Dichlorobenzene	< DL	< DL	5.24
1,4-Dichlorobenzene	< DL	< DL	5.24
1,1-Dichloroethane	36.7	< DL	2.62
1,2-Dichloroethane (EDC)	< DL	< DL	5.24
1,1-Dichloroethene	< DL	< DL	5.24
cis-1,2-Dichloroethene	303.9	< DL	5.24
trans-1,2-Dichloroethene	< DL	< DL	5.24
Dichloromethane	125.7	< DL	26.2
1,2-Dichloropropane	< DL	< DL	2.62
cis-1,3-Dichloropropene	< DL	< DL	2.62
trans-1,3-Dichloropropene	< DL	< DL	2.62
Ethylbenzene	2305	< DL	5.24
2-Hexanone	< DL	< DL	2.62
4-Methyl-2-Pentanone (MIBK)	628.7	< DL	2.62
Styrene	199.1	< DL	5.24
1,1,2,2-Tetrachloroethane	< DL	< DL	5.24
Tetrachloroethene (PCE)	382.5	< DL	5.24
Toluene	3929	< DL	5.24
1,1,1-Trichloroethane (TCA)	< DL	< DL	5.24
1,1,2-Trichloroethane	< DL	< DL	5.24
Trichloroethene (TCE)	94.3	< DL	2.62
Trichlorofluoromethane (F-11)	< DL	< DL	5.24
Trichlorotrifluoroethane (F-113)	< DL	< DL	10.5
Vinyl Acetate	< DL	< DL	10.5
Vinyl Chloride	293.4	< DL	2.62
Xylenes, Total	7859	< DL	5.24

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R303\KCOUT#31
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #3 Outlet
SAMPLE DATE: February 8, 1994
SAMPLE TIME: 11:17-12:07
LAB NUMBER(S): CK-0679-4
CANISTER #: 648
AIRFLOW: 21336.0 dscf/min

ANALYTE	Run 1 mg/min	Blank mg/min	DL Run 1 mg/min
Acetone	38.1	< DL	1.81
Benzene	1.39	< DL	0.30
Bromodichloromethane	< DL	< DL	0.60
Bromomethane (Methyl Bromide)	< DL	< DL	0.60
Bromoform	< DL	< DL	0.60
1,3-Butadiene	< DL	< DL	0.60
2-Butanone (MEK)	< DL	< DL	0.60
Carbon Disulfide	< DL	< DL	3.02
Carbon Tetrachloride	< DL	< DL	0.60
Chlorobenzene	< DL	< DL	0.30
Chloroethane (Ethyl Chloride)	< DL	< DL	0.30
2-Chloroethyl Vinyl Ether	< DL	< DL	3.02
Chloroform	< DL	< DL	1.81
Chloromethane (Methyl Chloride)	< DL	< DL	0.30
Dibromochloromethane	< DL	< DL	0.60
1,2-Dibromoethane (EDB)	< DL	< DL	1.21
1,2-Dichlorobenzene	< DL	< DL	0.60
1,3-Dichlorobenzene	< DL	< DL	0.60
1,4-Dichlorobenzene	< DL	< DL	0.60
1,1-Dichloroethane	< DL	< DL	0.30
1,2-Dichloroethane (EDC)	< DL	< DL	0.60
1,1-Dichloroethene	< DL	< DL	0.60
cis-1,2-Dichloroethene	< DL	< DL	0.60
trans-1,2-Dichloroethene	< DL	< DL	0.60
Dichloromethane	< DL	< DL	3.02
1,2-Dichloropropane	< DL	< DL	0.30
cis-1,3-Dichloropropene	< DL	< DL	0.30
trans-1,3-Dichloropropene	< DL	< DL	0.30
Ethylbenzene	< DL	< DL	0.60
2-Hexanone	< DL	< DL	0.30
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.30
Styrene	< DL	< DL	0.60
1,1,2,2-Tetrachloroethane	< DL	< DL	0.60
Tetrachloroethene (PCE)	< DL	< DL	0.60
Toluene	< DL	< DL	0.60
1,1,1-Trichloroethane (TCA)	< DL	< DL	0.60
1,1,2-Trichloroethane	< DL	< DL	0.60
Trichloroethene (TCE)	< DL	< DL	0.30
Trichlorofluoromethane (F-11)	< DL	< DL	0.60
Trichlorotrifluoroethane (F-113)	< DL	< DL	1.21
Vinyl Acetate	< DL	< DL	1.21
Vinyl Chloride	< DL	< DL	0.30
Xylenes, Total	< DL	< DL	0.60

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R303\KCOUT#32
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #3 Outlet
SAMPLE DATE: February 8, 1994
SAMPLE TIME: 13:25-14:15
LAB NUMBER(S): CK-0679-5
CANISTER #: 538
AIRFLOW: 22348.1 dscf/min

ANALYTE	Run 2 mg/min	Blank mg/min	DL Run 2 mg/min
Acetone	75.9	< DL	1.90
Benzene	< DL	< DL	0.32
Bromodichloromethane	< DL	< DL	0.63
Bromomethane (Methyl Bromide)	< DL	< DL	0.63
Bromoform	< DL	< DL	0.63
1,3-Butadiene	< DL	< DL	0.63
2-Butanone (MEK)	94.9	< DL	0.63
Carbon Disulfide	4.30	< DL	3.16
Carbon Tetrachloride	< DL	< DL	0.63
Chlorobenzene	< DL	< DL	0.32
Chloroethane (Ethyl Chloride)	< DL	< DL	0.32
2-Chloroethyl Vinyl Ether	< DL	< DL	3.16
Chloroform	< DL	< DL	1.90
Chloromethane (Methyl Chloride)	< DL	< DL	0.32
Dibromochloromethane	< DL	< DL	0.63
1,2-Dibromoethane (EDB)	< DL	< DL	1.27
1,2-Dichlorobenzene	< DL	< DL	0.63
1,3-Dichlorobenzene	< DL	< DL	0.63
1,4-Dichlorobenzene	< DL	< DL	0.63
1,1-Dichloroethane	< DL	< DL	0.32
1,2-Dichloroethane (EDC)	< DL	< DL	0.63
1,1-Dichloroethene	< DL	< DL	0.63
cis-1,2-Dichloroethene	< DL	< DL	0.63
trans-1,2-Dichloroethene	< DL	< DL	0.63
Dichloromethane	< DL	< DL	3.16
1,2-Dichloropropane	< DL	< DL	0.32
cis-1,3-Dichloropropene	< DL	< DL	0.32
trans-1,3-Dichloropropene	< DL	< DL	0.32
Ethylbenzene	< DL	< DL	0.63
2-Hexanone	< DL	< DL	0.32
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.32
Styrene	< DL	< DL	0.63
1,1,2,2-Tetrachloroethane	< DL	< DL	0.63
Tetrachloroethene (PCE)	< DL	< DL	0.63
Toluene	20.3	< DL	0.63
1,1,1-Trichloroethane (TCA)	< DL	< DL	0.63
1,1,2-Trichloroethane	< DL	< DL	0.63
Trichloroethene (TCE)	< DL	< DL	0.32
Trichlorofluoromethane (F-11)	< DL	< DL	0.63
Trichlorotrifluoroethane (F-113)	< DL	< DL	1.27
Vinyl Acetate	< DL	< DL	1.27
Vinyl Chloride	< DL	< DL	0.32
Xylenes, Total	< DL	< DL	0.63

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

mg/min = milligrams of analyte emitted per minute

EMISSION RATE RESULTS
TO-14 VOLATILE ORGANIC COMPOUNDS
AM TEST-AIR QUALITY, INC.

FILE NAME: R303\KCOUT#33
CLIENT: King County Solid Waste @ Cedar Hills Landfill
LOCATION: Maple Valley, Washington
SAMPLE LOCATION: Flare #3 Outlet
SAMPLE DATE: February 8, 1994
SAMPLE TIME: 16:30-17:20
LAB NUMBER(S): CK-0679-6
CANISTER #: 564
AIRFLOW: 31095.0 dscf/min

ANALYTE	Run 3 mg/min	Blank mg/min	DL Run 3 mg/min
Acetone	105.7	< DL	2.64
Benzene	1.76	< DL	0.44
Bromodichloromethane	< DL	< DL	0.88
Bromomethane (Methyl Bromide)	< DL	< DL	0.88
Bromoform	< DL	< DL	0.88
1,3-Butadiene	< DL	< DL	0.88
2-Butanone (MEK)	< DL	< DL	0.88
Carbon Disulfide	7.93	< DL	4.40
Carbon Tetrachloride	< DL	< DL	0.88
Chlorobenzene	< DL	< DL	0.44
Chloroethane (Ethyl Chloride)	< DL	< DL	0.44
2-Chloroethyl Vinyl Ether	< DL	< DL	4.40
Chloroform	< DL	< DL	2.64
Chloromethane (Methyl Chloride)	< DL	< DL	0.44
Dibromochloromethane	< DL	< DL	0.88
1,2-Dibromoethane (EDB)	< DL	< DL	1.76
1,2-Dichlorobenzene	< DL	< DL	0.88
1,3-Dichlorobenzene	< DL	< DL	0.88
1,4-Dichlorobenzene	< DL	< DL	0.88
1,1-Dichloroethane	< DL	< DL	0.44
1,2-Dichloroethane (EDC)	< DL	< DL	0.88
1,1-Dichloroethene	< DL	< DL	0.88
cis-1,2-Dichloroethene	< DL	< DL	0.88
trans-1,2-Dichloroethene	< DL	< DL	0.88
Dichloromethane	< DL	< DL	4.40
1,2-Dichloropropane	< DL	< DL	0.44
cis-1,3-Dichloropropene	< DL	< DL	0.44
trans-1,3-Dichloropropene	< DL	< DL	0.44
Ethylbenzene	< DL	< DL	0.88
2-Hexanone	< DL	< DL	0.44
4-Methyl-2-Pentanone (MIBK)	< DL	< DL	0.44
Styrene	< DL	< DL	0.88
1,1,2,2-Tetrachloroethane	< DL	< DL	0.88
Tetrachloroethene (PCE)	< DL	< DL	0.88
Toluene	< DL	< DL	0.88
1,1,1-Trichloroethane (TCA)	< DL	< DL	0.88
1,1,2-Trichloroethane	< DL	< DL	0.88
Trichloroethene (TCE)	< DL	< DL	0.44
Trichlorofluoromethane (F-11)	< DL	< DL	0.88
Trichlorotrifluoroethane (F-113)	< DL	< DL	1.76
Vinyl Acetate	< DL	< DL	1.76
Vinyl Chloride	< DL	< DL	0.44
Xylenes, Total	< DL	< DL	0.88

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

mg/min = milligrams of analyte emitted per minute

APPENDIX B

Laboratory Analysis

121

ANALYSIS REPORT

AMTEST

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

Am Test Air Quality, Inc.
30545 SE 84th Street
Suite 5
Preston, WA 98050
Attention: Wendy

Date Received: 2/11/94
Date Reported: 2/23/94

Project Name: Cedar Hills Landfill
Project #: 94-016
Date Sampled: 2/ 9/94

PARAMETER	UNITS	RESULT
94-A003554		
Client ID: 5087 R-1 M26A Flare #1		
Volume	(mls)	365.
Chloride	(ug)	17800
94-A003555		
Client ID: 5088 R-2 M26A Flare #1		
Volume	(mls)	415.
Chloride	(ug)	16400
94-A003556		
Client ID: 5089 R-3 M26A Flare #1		
Volume	(mls)	450.
Chloride	(ug)	14100
94-A003557		
Client ID: Blank		
Volume	(mls)	50.0
Chloride	(ug)	< 50

< = less than
Detection Limit = 1.0 ug/ml
Analysis by EPA Method 300.0.

Reported by: Kathy Fugiel

AMTEST

122

ANALYSIS REQUEST

Client: Cedar Hills Landfill

Address: ATAQ

P.O. Number: 94-016

Date Sampled: 2/9/94

Number of Bottles: 4

Number of Samples: 4

Contact: [illegible] Phone: 222-7746 Fax:

Matrix: drinking water ___ water ___ soil ___ sludge ___ oil ___

other 1N H_2SO_4

Am Test Sample No.	Client Identification	Analysis Requested	Vol
ATAQ			
5087	R-1 M26A flare #1	Cl- By IC	50/365 ml
5088	R-2 M26A flare #1		50/415 ml
5089	R-3 M26A flare #1	3-Day TURN	50/450 ml
	Blank		50 ml

Comments:

Please fax a copy of this document to Am Test-Air Quality, Inc. after the laboratory numbers have been assigned. Thank you.

Please Do Not Write Below This Line - Laboratory Use Only

cc: Micro ___ T.O. ___ WChem ___ Ind ___

Date Sample Rec'd: _____ Rec'd By: _____ Logged in: _____

Final Report To: _____ Shelf No.: _____ T.O. Shelf No.: _____

123

ANALYSIS REPORT

AMTEST

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

Am Test Air Quality, Inc.
30545 SE 84th Street
Suite 5
Preston, WA 98050
Attention: Wendy

Date Received: 2/14/94
Date Reported: 3/ 2/94

Project Name: Cedar Hills Landfill
Project #: 94-016
Date Sampled: 2/10/94

PARAMETER	UNITS	RESULT
94-A003580		
Client ID: 5130 R-1 M26A Flare #2		
Volume	(mls)	315.
Chloride	(ug)	9580
94-A003581		
Client ID: 5131 R-2 M26A Flare #2		
Volume	(mls)	310.
Chloride	(ug)	8590
94-A003582		
Client ID: 5132 R-3 M26A Flare #2		
Volume	(mls)	320.
Chloride	(ug)	12800
94-A003583		
Client ID: 5133 R-4 M26A Flare #2		
Volume	(mls)	300.
Chloride	(ug)	12200
94-A003584		
Client ID: 5134 R-5 M26A Flare #2		
Volume	(mls)	290.
Chloride	(ug)	11700
94-A003585		
Client ID: 5135 R-6 M26A Flare #2		
Volume	(mls)	290.
Chloride	(ug)	14200

AMTEST

124

ANALYSIS REPORT

Am Test Air Quality, Inc.

Date Received: 2/14/94
Date Reported: 3/ 2/94

Attention: Wendy

PARAMETER	UNITS	RESULT
94-A003586		
Client ID: Blank		
Volume	(mls)	290.
Chloride	(ug)	< 290

Reported by: Kathy Fugiel

AMTEST

125

ANALYSIS REQUEST

Client: Cedar Hills Landfill

Address: ATAQ

P.O. Number: 94-016

Date Sampled: 2/10/94

Number of Bottles: 4

Number of Samples: 4

Contact: Wendy Phone: 222-7746 Fax:

Matrix: drinking water ___ water ___ soil ___ sludge ___ oil ___

other 0.1N H_2SO_4

Am Test Sample No.	Client Identification	Analysis Requested	Vol
ATAQ			
5130	R-1 M26A flare #2	Cl- by IC	50/315
5131	R-2 M26A flare #2		50/310
5132	R-3 M26A flare #2	3-DAY TURN	50/320
—	Blank		50

Comments:

Please fax a copy of this document to Am Test-Air Quality, Inc. after the laboratory numbers have been assigned. Thank you.

Please Do Not Write Below This Line - Laboratory Use Only

cc: Micro ___ T.O. ___ WChem ___ Ind ___

Date Sample Rec'd: ___ Rec'd By: ___ Logged in: ___

Final Report To: ___ Shelf No.: ___ T.O. Shelf No.: ___

126

ANALYSIS REPORT AMTEST

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

Am Test Air Quality, Inc.
30545 SE 84th Street
Suite 5
Preston, WA 98050
Attention: Wendy/Stan

Date Received: 2/ 9/94
Date Reported: 2/22/94

Project Name: Cedar Hill Landfill
Date Sampled: 2/ 8/94

PARAMETER	UNITS	RESULT
94-A003305 Flare #3		
Client ID: 5072 R1 26A		
Volume	(mls)	435.
Chloride	(ug)	4780
94-A003306		
Client ID: 5073 R2 26A		
Volume	(mls)	380.
Chloride	(ug)	3910
94-A003307		
Client ID: 5074 R3 26A		
Volume	(mls)	435.
Chloride	(ug)	4610
94-A003308		
Client ID: Blank 0.1N H2SO4		
Volume	(mls)	100.
Chloride	(ug)	< 100

< = less than
Analysis by EPA Method 300.0
Detection Limit = 1.0 ug/ml

Reported by: Kathy Fugiel

AMTEST

127

ANALYSIS REQUEST

Client: Cedar Hill Landfill

Address: AMTEST Air Quality

P.O. Number:

Date Sampled: 2-8-94

Number of Bottles: 4

Number of Samples: 4

Contact: Wendy / STAN Phone: (206) 222-7746 Fax: (206) 222-7849

Matrix: drinking water ___ water X soil ___ sludge ___ oil ___

other 0.1N H_2SO_4

Am Test Sample No.	Client Identification	Analysis Requested
Lab #	Run / method / vol.	I.C. Analysis for Cl^-
372	R1 / 26A / 50/435	
373	R2 / ↓ / 50/380	Please Rush this Thru (3day turn)
374	R3 / ↓ / 50/435	
	Blank .1N H_2SO_4 200 ml	also need Rush Cl^- screen by titration.

Comments:

Please fax a copy of this document to Am Test-Air Quality, Inc. after the laboratory numbers have been assigned. Thank you.

Please Do Not Write Below This Line - Laboratory Use Only

cc: Micro ___ T.O. ___ WChem ___ Ind ___

Date Sample Rec'd: ___ Rec'd By: ___ Logged in: ___

Final Report To: ___ Shelf No.: ___ T.O. Shelf No.: ___

COAST-TO-COAST ANALYTICAL SERVICES, INC.

EXCELLENCE IN ANALYSIS

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805) 389-1438

128

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-7
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-IN FLARE #1 CAN #616	Air		02/09/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	48.	
Oxygen	(7782447)	0.01	2.1	
Nitrogen	(7727379)	0.02	9.2	
Methane	(74828)	0.005	41.	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119412
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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COAST-TO-COAST ANALYTICAL SERVICES, INC.

129

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805)389-1438

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-8
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-IN FLARE #1 CAN #507	Air		02/09/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	48.	
Oxygen	(7782447)	0.01	2.	
Nitrogen	(7727379)	0.02	8.7	
Methane	(74828)	0.005	41.	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119413
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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CCAS
EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

130

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805)389-1438

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-9
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-IN FLARE #1 CAN #549	Air		02/09/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	48.	
Oxygen	(7782447)	0.01	1.9	
Nitrogen	(7727379)	0.02	8.4	
Methane	(74828)	0.005	42.	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119414
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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131

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805)389-1438

QC Batch ID: KB11TA CK-0679-9
Project : 94-016 Cedar Hills

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

QC DUPLICATE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-IN FLARE #1 CAN #549	Air		02/09/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	%DIFF	NOTE
FIXED GASES AND METHANE					
Carbon Dioxide	(124389)	0.1	48.	0.	
Oxygen	(7782447)	0.01	1.9	0.	
Nitrogen	(7727379)	0.02	8.3	1.2	
Methane	(74828)	0.005	42.	0.	
Carbon Monoxide	(630080)	0.1	ND		

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119415
GD/ge
CK0679-9

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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COAST-TO-COAST ANALYTICAL SERVICES, INC.

132

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805)389-1438

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-10
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-1-OUT FLARE #1 CAN #569	Air		02/09/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	13.	
Oxygen	(7782447)	0.01	11.	
Nitrogen	(7727379)	0.02	76.	
Methane	(74828)	0.005	ND	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119406
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

133

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805)389-1438

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-11
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-2-OUT FLARE #1 CAN #579	Air		02/09/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	13.	
Oxygen	(7782447)	0.01	12.	
Nitrogen	(7727379)	0.02	75.	
Methane	(74828)	0.005	ND	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119407
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

134

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805)389-1438

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-12
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-OUT FLARE #1 CAN #517	Air		02/09/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	13.	
Oxygen	(7782447)	0.01	11.	
Nitrogen	(7727379)	0.02	76.	
Methane	(74828)	0.005	ND	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119408
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805)389-1438

135

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-7
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-IN FLARE #1 CAN #616	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	0.1	8.	19.	
Benzene	0.02	1.5	4.9	
Bromodichloromethane	0.01	ND	ND	
Bromomethane (Methyl Bromide)	0.02	ND	ND	
Bromoform	0.01	ND	ND	
1,3-Butadiene	0.05	ND	ND	
2-Butanone (MEK)	0.02	14.	41.	
Carbon Disulfide	0.2	ND	ND	
Carbon Tetrachloride	0.02	ND	ND	
Chlorobenzene	0.01	0.3	1.5	
Chloroethane (Ethyl Chloride)	0.02	1.9	4.9	
2-Chloroethyl Vinyl Ether	0.1	ND	ND	
Chloroform	0.05	ND	ND	
Chloromethane (Methyl Chloride)	0.02	0.7	1.4	
Dibromochloromethane	0.01	ND	ND	
1,2-Dibromoethane (EDB)	0.02	ND	ND	
1,2-Dichlorobenzene	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16 psig with He.

02/16/94
MS1/1R90K
GD/ge
MS1*A

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

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136

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-7
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-IN FLARE #1 CAN #616	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
1,3-Dichlorobenzene	0.02	ND	ND	
1,4-Dichlorobenzene	0.02	ND	ND	
1,1-Dichloroethane	0.01	2.3	9.2	
1,2-Dichloroethane (EDC)	0.02	ND	ND	
1,1-Dichloroethene	0.02	0.05	0.2	
cis-1,2-Dichloroethene	0.02	2.4	9.6	
trans-1,2-Dichloroethene	0.02	0.1	0.4	
Dichloromethane	0.1	6.6	23.	
1,2-Dichloropropane	0.01	ND	ND	
cis-1,3-Dichloropropene	0.01	ND	ND	
trans-1,3-Dichloropropene	0.01	ND	ND	
Ethylbenzene	0.02	11.	47.	
2-Hexanone	0.01	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.01	3.9	16.	
Styrene	0.02	1.9	8.3	
1,1,2,2-Tetrachloroethane	0.01	ND	ND	
Tetrachloroethene (PCE)	0.01	2.7	18.	
Toluene	0.02	40.	150.	
1,1,1-Trichloroethane (TCA)	0.02	ND	ND	
1,1,2-Trichloroethane	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R90K
GD/ge
MS1*A

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CLIENT: Kris Hansen
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Preston, WA 98050

Lab Number : CK-0679-7
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-IN FLARE #1 CAN #616	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
Trichloroethene (TCE)	0.01	0.8	4.5	
Trichlorofluoromethane (F-11)	0.02	0.4	2.3	
Trichlorotrifluoroethane (F-113)	0.02	0.09	0.7	
Vinyl Acetate	0.05	ND	ND	
Vinyl Chloride	0.02	3.6	7.7	
Xylenes	0.02	39.	170.	
Percent Surrogate Recovery			99.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R90K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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138

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-8
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-IN FLARE #1 CAN #507	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	0.1	6.7	16.	
Benzene	0.02	1.3	4.1	
Bromodichloromethane	0.01	ND	ND	
Bromomethane (Methyl Bromide)	0.02	ND	ND	
Bromoform	0.01	ND	ND	
1,3-Butadiene	0.05	ND	ND	
2-Butanone (MEK)	0.02	11.	33.	
Carbon Disulfide	0.2	ND	ND	
Carbon Tetrachloride	0.02	ND	ND	
Chlorobenzene	0.01	0.2	1.	
Chloroethane (Ethyl Chloride)	0.02	1.8	4.7	
2-Chloroethyl Vinyl Ether	0.1	ND	ND	
Chloroform	0.05	ND	ND	
Chloromethane (Methyl Chloride)	0.02	0.7	1.4	
Dibromochloromethane	0.01	ND	ND	
1,2-Dibromoethane (EDB)	0.02	ND	ND	
1,2-Dichlorobenzene	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 15 psig with He.

02/16/94
MS1/1R91K
GD/ge
MS1*A

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Lab Number : CK-0679-8
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-IN FLARE #1 CAN #507	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
1,3-Dichlorobenzene	0.02	ND	ND	
1,4-Dichlorobenzene	0.02	0.5	2.8	
1,1-Dichloroethane	0.01	2.	7.9	
1,2-Dichloroethane (EDC)	0.02	ND	ND	
1,1-Dichloroethene	0.02	0.03	0.1	
cis-1,2-Dichloroethene	0.02	2.	8.1	
trans-1,2-Dichloroethene	0.02	0.08	0.3	
Dichloromethane	0.1	5.5	19.	
1,2-Dichloropropane	0.01	ND	ND	
cis-1,3-Dichloropropene	0.01	ND	ND	
trans-1,3-Dichloropropene	0.01	ND	ND	
Ethylbenzene	0.02	8.1	35.	
2-Hexanone	0.01	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.01	2.7	11.	
Styrene	0.02	1.3	5.7	
1,1,2,2-Tetrachloroethane	0.01	ND	ND	
Tetrachloroethene (PCE)	0.01	2.1	14.	
Toluene	0.02	34.	130.	
1,1,1-Trichloroethane (TCA)	0.02	ND	ND	
1,1,2-Trichloroethane	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

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MS1/1R91K
GD/ge
MS1*A

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CLIENT: Kris Hansen
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Lab Number : CK-0679-8
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-IN FLARE #1 CAN #507	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
Trichloroethene (TCE)	0.01	0.7	3.6	
Trichlorofluoromethane (F-11)	0.02	0.4	2.1	
Trichlorotrifluoroethane (F-113)	0.02	0.08	0.6	
Vinyl Acetate	0.05	ND	ND	
Vinyl Chloride	0.02	3.4	7.2	
Xylenes	0.02	30.	130.	
Percent Surrogate Recovery			103.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R91K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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

Lab Number : CK-0679-9
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-IN FLARE #1 CAN #549	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	0.1	6.7	16.	
Benzene	0.02	1.4	4.4	
Bromodichloromethane	0.01	ND	ND	
Bromomethane (Methyl Bromide)	0.02	ND	ND	
Bromoform	0.01	ND	ND	
1,3-Butadiene	0.05	ND	ND	
2-Butanone (MEK)	0.02	11.	32.	
Carbon Disulfide	0.2	ND	ND	
Carbon Tetrachloride	0.02	ND	ND	
Chlorobenzene	0.01	0.3	1.2	
Chloroethane (Ethyl Chloride)	0.02	1.1	3.0	
2-Chloroethyl Vinyl Ether	0.1	ND	ND	
Chloroform	0.05	ND	ND	
Chloromethane (Methyl Chloride)	0.02	0.6	1.2	
Dibromochloromethane	0.01	ND	ND	
1,2-Dibromoethane (EDB)	0.02	ND	ND	
1,2-Dichlorobenzene	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 18.5 psig with He.

02/16/94
MS1/1R92K
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MS1*A

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

142

SoCal Division (Camarillo Laboratory) (805) 389-1353
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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-9
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-IN FLARE #1 CAN #549	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
1,3-Dichlorobenzene	0.02	ND	ND	
1,4-Dichlorobenzene	0.02	0.2	1.4	
1,1-Dichloroethane	0.01	2.	8.1	
1,2-Dichloroethane (EDC)	0.02	ND	ND	
1,1-Dichloroethene	0.02	0.03	0.1	
cis-1,2-Dichloroethene	0.02	2.1	8.5	
trans-1,2-Dichloroethene	0.02	0.1	0.4	
Dichloromethane	0.1	5.8	20.	
1,2-Dichloropropane	0.01	ND	ND	
cis-1,3-Dichloropropene	0.01	ND	ND	
trans-1,3-Dichloropropene	0.01	ND	ND	
Ethylbenzene	0.02	9.2	40.	
2-Hexanone	0.01	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.01	1.6	6.6	
Styrene	0.02	1.6	6.9	
1,1,2,2-Tetrachloroethane	0.01	ND	ND	
Tetrachloroethene (PCE)	0.01	2.4	16.	
Toluene	0.02	37.	140.	
1,1,1-Trichloroethane (TCA)	0.02	ND	ND	
1,1,2-Trichloroethane	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

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MS1/1R92K
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MS1*A

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Preston, WA 98050

Lab Number : CK-0679-9
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-IN FLARE #1 CAN #549	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
Trichloroethene (TCE)	0.01	0.7	4.0	
Trichlorofluoromethane (F-11)	0.02	0.4	2.1	
Trichlorotrifluoroethane (F-113)	0.02	0.08	0.6	
Vinyl Acetate	0.05	ND	ND	
Vinyl Chloride	0.02	3.2	6.9	
Xylenes	0.02	35.	150.	
Percent Surrogate Recovery			99.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R92K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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144

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-10
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-OUT FLARE #1 CAN #569	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	1.	160.	390.	
Benzene	0.2	5.3	17.	
Bromodichloromethane	0.1	ND	ND	
Bromomethane (Methyl Bromide)	0.2	ND	ND	
Bromoform	0.1	ND	ND	
1,3-Butadiene	0.5	ND	ND	
2-Butanone (MEK)	0.2	ND	ND	
Carbon Disulfide	2.	3.	7.9	
Carbon Tetrachloride	0.2	ND	ND	
Chlorobenzene	0.1	ND	ND	
Chloroethane (Ethyl Chloride)	0.2	ND	ND	
2-Chloroethyl Vinyl Ether	1.	ND	ND	
Chloroform	0.5	ND	ND	
Chloromethane (Methyl Chloride)	0.2	1.1	2.3	
Dibromochloromethane	0.1	ND	ND	
1,2-Dibromoethane (EDB)	0.2	ND	ND	
1,2-Dichlorobenzene	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16.5 psig with He.

02/16/94
MS1/1R82K
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145

Lab Number : CK-0679-10
Project : 94-016 Cedar Hills

CLIENT: Kris Hansen
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Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-1-OUT FLARE #1 CAN #569	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
1,3-Dichlorobenzene	0.2	ND	ND	
1,4-Dichlorobenzene	0.2	ND	ND	
1,1-Dichloroethane	0.1	ND	ND	
1,2-Dichloroethane (EDC)	0.2	ND	ND	
1,1-Dichloroethene	0.2	ND	ND	
cis-1,2-Dichloroethene	0.2	ND	ND	
trans-1,2-Dichloroethene	0.2	ND	ND	
Dichloromethane	1.	ND	ND	
1,2-Dichloropropane	0.1	ND	ND	
cis-1,3-Dichloropropene	0.1	ND	ND	
trans-1,3-Dichloropropene	0.1	ND	ND	
Ethylbenzene	0.2	ND	ND	
2-Hexanone	0.1	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.1	ND	ND	
Styrene	0.2	ND	ND	
1,1,2,2-Tetrachloroethane	0.1	ND	ND	
Tetrachloroethene (PCE)	0.1	ND	ND	
Toluene	0.2	0.3	1.3	
1,1,1-Trichloroethane (TCA)	0.2	ND	ND	
1,1,2-Trichloroethane	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R82K
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MS1*A

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146

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CLIENT: Kris Hansen
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Preston, WA 98050

Lab Number : CK-0679-10
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-OUT FLARE #1 CAN #569	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
Trichloroethene (TCE)	0.1	ND	ND	
Trichlorofluoromethane (F-11)	0.2	ND	ND	
Trichlorotrifluoroethane (F-113)	0.2	ND	ND	
Vinyl Acetate	0.5	ND	ND	
Vinyl Chloride	0.2	ND	ND	
Xylenes	0.2	ND	ND	
Percent Surrogate Recovery			95.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R82K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

147

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805) 389-1438

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-11
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-OUT FLARE #1 CAN #579	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	1.	670.	1600.	
Benzene	0.2	3.4	11.	
Bromodichloromethane	0.1	ND	ND	
Bromomethane (Methyl Bromide)	0.2	ND	ND	
Bromoform	0.1	ND	ND	
1,3-Butadiene	0.5	ND	ND	
2-Butanone (MEK)	0.2	ND	ND	
Carbon Disulfide	2.	ND	ND	
Carbon Tetrachloride	0.2	ND	ND	
Chlorobenzene	0.1	ND	ND	
Chloroethane (Ethyl Chloride)	0.2	ND	ND	
2-Chloroethyl Vinyl Ether	1.	ND	ND	
Chloroform	0.5	ND	ND	
Chloromethane (Methyl Chloride)	0.2	ND	ND	
Dibromochloromethane	0.1	ND	ND	
1,2-Dibromoethane (EDB)	0.2	ND	ND	
1,2-Dichlorobenzene	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 17.5 psig with He.

02/16/94
MS1/1R83K
GD/ge
MS1*A

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148

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-11
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-OUT FLARE #1 CAN #579	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
1,3-Dichlorobenzene	0.2	ND	ND	
1,4-Dichlorobenzene	0.2	ND	ND	
1,1-Dichloroethane	0.1	ND	ND	
1,2-Dichloroethane (EDC)	0.2	ND	ND	
1,1-Dichloroethene	0.2	ND	ND	
cis-1,2-Dichloroethene	0.2	ND	ND	
trans-1,2-Dichloroethene	0.2	ND	ND	
Dichloromethane	1.	ND	ND	
1,2-Dichloropropane	0.1	ND	ND	
cis-1,3-Dichloropropene	0.1	ND	ND	
trans-1,3-Dichloropropene	0.1	ND	ND	
Ethylbenzene	0.2	0.6	2.7	
2-Hexanone	0.1	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.1	ND	ND	
Styrene	0.2	ND	ND	
1,1,2,2-Tetrachloroethane	0.1	ND	ND	
Tetrachloroethene (PCE)	0.1	ND	ND	
Toluene	0.2	130.	500.	
1,1,1-Trichloroethane (TCA)	0.2	ND	ND	
1,1,2-Trichloroethane	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R83K
GD/ge
MS1*A

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

Lab Number : CK-0679-11
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-OUT FLARE #1 CAN #579	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
Trichloroethene (TCE)	0.1	ND	ND	
Trichlorofluoromethane (F-11)	0.2	ND	ND	
Trichlorotrifluoroethane (F-113)	0.2	ND	ND	
Vinyl Acetate	0.5	ND	ND	
Vinyl Chloride	0.2	ND	ND	
Xylenes	0.2	6.2	27.	
Percent Surrogate Recovery			95.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R83K
GD/ge
MS1*A

Respectfully submitted,
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Gesheng Dai

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Air Toxics Group Leader

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

Lab Number : CK-0679-12
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-OUT FLARE #1 CAN #517	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	1.	27.	64.	
Benzene	0.2	0.3	1.1	
Bromodichloromethane	0.1	ND	ND	
Bromomethane (Methyl Bromide)	0.2	ND	ND	
Bromoform	0.1	ND	ND	
1,3-Butadiene	0.5	ND	ND	
2-Butanone (MEK)	0.2	ND	ND	
Carbon Disulfide	2.	ND	ND	
Carbon Tetrachloride	0.2	ND	ND	
Chlorobenzene	0.1	0.3	1.2	
Chloroethane (Ethyl Chloride)	0.2	ND	ND	
2-Chloroethyl Vinyl Ether	1.	ND	ND	
Chloroform	0.5	ND	ND	
Chloromethane (Methyl Chloride)	0.2	ND	ND	
Dibromochloromethane	0.1	ND	ND	
1,2-Dibromoethane (EDB)	0.2	ND	ND	
1,2-Dichlorobenzene	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 17.5 psig with He.

02/16/94
MS1/1R84K
GD/ge
MS1*A

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EXCELLENCE IN ANALYSIS

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-12
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-OUT FLARE #1 CAN #517	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
1,3-Dichlorobenzene	0.2	ND	ND	
1,4-Dichlorobenzene	0.2	ND	ND	
1,1-Dichloroethane	0.1	ND	ND	
1,2-Dichloroethane (EDC)	0.2	ND	ND	
1,1-Dichloroethene	0.2	ND	ND	
cis-1,2-Dichloroethene	0.2	ND	ND	
trans-1,2-Dichloroethene	0.2	ND	ND	
Dichloromethane	1.	ND	ND	
1,2-Dichloropropane	0.1	ND	ND	
cis-1,3-Dichloropropene	0.1	ND	ND	
trans-1,3-Dichloropropene	0.1	ND	ND	
Ethylbenzene	0.2	ND	ND	
2-Hexanone	0.1	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.1	ND	ND	
Styrene	0.2	ND	ND	
1,1,2,2-Tetrachloroethane	0.1	ND	ND	
Tetrachloroethene (PCE)	0.1	ND	ND	
Toluene	0.2	ND	ND	
1,1,1-Trichloroethane (TCA)	0.2	ND	ND	
1,1,2-Trichloroethane	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R84K
GD/ge
MS1*A

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152

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

Lab Number : CK-0679-12
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-OUT FLARE #1 CAN #517	Air		02/09/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
Trichloroethene (TCE)	0.1	ND	ND	
Trichlorofluoromethane (F-11)	0.2	ND	ND	
Trichlorotrifluoroethane (F-113)	0.2	ND	ND	
Vinyl Acetate	0.5	ND	ND	
Vinyl Chloride	0.2	ND	ND	
Xylenes	0.2	ND	ND	
Percent Surrogate Recovery			92.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R84K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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AMTEST

Inc.
Professional
Analytical
Services

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

Fax: 206 883 3495
Tel: 206 885 1664

CK0679

CHAIN OF CUSTODY RECORD

PROJ. NO.: 94-016

PROJECT NAME: CH_2M Hill - Cedar Hills

SAMPLERS: (Signature)

Client Name: Amtest - Air Quality

Client Address: 30545 S.E. 84th st #5

Client Phone: Preston, WA 98050

Contact Person: Angela - 206-222-7746

P.O. No.

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	JOB#	CAN#	NO. OF CONTAINERS	SUMMA Canisters					
✓	2/9	1101-1151			R-1-IN-Flare #1	5081	616	1	X					TO-14 - Speciated VOC's
✓		1307-1357			R-2-IN-Flare #1	5082	507	1	X					By GC/MS
✓		1507-1557			R-3-IN-flare #1	5083	549	1	X					Fixed GAS Analysis
✓		1101-1151			R-1-OUT-Flare #1	~~5084~~ 5154	569	1	X					(CH_4, CO_2, O_2 CO)
✓		1307-1357			R-2-OUT-Flare #1	~~5085~~ 5155	579	1	X					by GC/MS
✓		1507-1557			R-3-OUT-Flare #1	~~5086~~ 5156	517	1	X					

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	2-10-94 pm				
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		[signature] CCAS	2/11/94 1030	no seals UPS# 02198790 855 02198790 846 02198790 864

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CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-1
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-in-flare #2, Job #5124, Can #476	Air	Unknown	02/10/94	02/14/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	48.	
Oxygen	(7782447)	0.01	1.8	
Nitrogen	(7727379)	0.02	7.8	
Methane	(74828)	0.005	42.	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02149406
GD/ge
KB14TA

Respectfully submitted,
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155

CLIENT: Angela
AmTest - Air Quality Inc.
30515 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-2
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-in-flare #2, Job #5125, Can #583	Air	Unknown	02/10/94	02/14/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	48.	
Oxygen	(7782447)	0.01	1.7	
Nitrogen	(7727379)	0.02	7.8	
Methane	(74828)	0.005	43.	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02149407
GD/ge
KB14TA

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1516

CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-3
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-in-flare #2, Job #5126, Can #652	Air	Unknown	02/10/94	02/14/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	48.	
Oxygen	(7782447)	0.01	1.8	
Nitrogen	(7727379)	0.02	7.8	
Methane	(74828)	0.005	42.	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; AZLA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02149408
GD/ge
KB14TA

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CLIENT: Angela
AmTest - Air Quality Inc.
20545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-4
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: YL
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-1-out-flare #2, Job #5127, Can #477	Air	Unknown	02/10/94	02/14/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	13.	
Oxygen	(7782447)	0.01	12.	
Nitrogen	(7727379)	0.02	75.	
Methane	(74828)	0.005	ND	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02149402
GD/ge
KB14TA

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CLIENT: Angela
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30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-5
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: YL
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-out-flare #2, Job #5128, Can #489	Air	Unknown	02/10/94	02/14/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	13.	
Oxygen	(7782447)	0.01	12.	
Nitrogen	(7727379)	0.02	75.	
Methane	(74828)	0.005	ND	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02149404
GD/ge
KB14TA

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CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-6
Project : CHZM Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: YL
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-out-flare #2, Job #5129, Can #649	Air	Unknown	02/10/94	02/14/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	12.	
Oxygen	(7782447)	0.01	12.	
Nitrogen	(7727379)	0.02	76.	
Methane	(74828)	0.005	ND	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
T6CD/02149405
GD/ge
KB14TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

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160

CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-1
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-in-flare #2, Can #476	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	0.1	7.2	17.	
Benzene	0.02	1.3	4.2	
Bromodichloromethane	0.01	ND	ND	
Bromomethane (Methyl Bromide)	0.02	ND	ND	
Bromoform	0.01	ND	ND	
1,3-Butadiene	0.05	ND	ND	
2-Butanone (MEK)	0.02	12.	36.	
Carbon Disulfide	0.2	ND	ND	
Carbon Tetrachloride	0.02	ND	ND	
Chlorobenzene	0.01	0.2	1.	
Chloroethane (Ethyl Chloride)	0.02	1.5	3.9	
2-Chloroethyl Vinyl Ether	0.1	ND	ND	
Chloroform	0.05	ND	ND	
Chloromethane (Methyl Chloride)	0.02	0.6	1.3	
Dibromochloromethane	0.01	ND	ND	
1,2-Dibromoethane (EDB)	0.02	ND	ND	
1,2-Dichlorobenzene	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16.0 psig with He.

02/16/94
MS1/1S13K
GD/ge
MS1*A

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EXCELLENCE IN ANALYSIS

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CLIENT: Angela
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Preston, WA 98050

Lab Number : CK-0707-1
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-in-flare #2, Can #476	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
1,3-Dichlorobenzene	0.02	ND	ND	
1,4-Dichlorobenzene	0.02	ND	ND	
1,1-Dichloroethane	0.01	2.	8.2	
1,2-Dichloroethane (EDC)	0.02	ND	ND	
1,1-Dichloroethene	0.02	ND	ND	
cis 1,2-Dichloroethene	0.02	2.	8.1	
trans-1,2 Dichloroethene	0.02	ND	ND	
Dichloromethane	0.1	5.8	20.	
1,2-Dichloropropane	0.01	ND	ND	
cis 1,3 Dichloropropene	0.01	ND	ND	
trans-1,3-Dichloropropene	0.01	ND	ND	
Ethylbenzene	0.02	8.3	36.	
2-Hexanone	0.01	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.01	2.7	11.	
Styrene	0.02	1.3	5.7	
1,1,2,2-Tetrachloroethane	0.01	ND	ND	
Tetrachloroethene (PCE)	0.01	2.1	14.	
Toluene	0.02	34.	130.	
1,1,1-Trichloroethane (TCA)	0.02	0.2	1.2	
1,1,2 Trichloroethane	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S13K
GD/ge
MS1*A

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CLIENT: Angela
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30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-1
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-1-in-flare #2, Can #476	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
Trichloroethene (TCE)	0.01	0.7	3.5	
Trichlorofluoromethane (F-11)	0.02	0.4	2.2	
Trichlorotrifluoroethane (F-113)	0.02	0.08	0.6	
Vinyl Acetate	0.05	ND	ND	
Vinyl Chloride	0.02	3.6	7.8	
Xylenes	0.02	30.	130.	
Percent Surrogate Recovery			102.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S13K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

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Air Toxics Group Leader

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CLIENT: Angela
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30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-2
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-in-flare #2, Can #583	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	0.1	7.6	18.	
Benzene	0.02	1.4	4.4	
Bromodichloromethane	0.01	ND	ND	
Bromomethane (Methyl Bromide)	0.02	ND	ND	
Bromoform	0.01	ND	ND	
1,3-Butadiene	0.05	ND	ND	
2-Butanone (MEK)	0.02	12.	36.	
Carbon Disulfide	0.2	ND	ND	
Carbon Tetrachloride	0.02	ND	ND	
Chlorobenzene	0.01	0.2	1.1	
Chloroethane (Ethyl Chloride)	0.02	1.5	4.0	
2-Chloroethyl Vinyl Ether	0.1	ND	ND	
Chloroform	0.05	ND	ND	
Chloromethane (Methyl Chloride)	0.02	0.7	1.4	
Dibromochloromethane	0.01	ND	ND	
1,2-Dibromoethane (EDB)	0.02	ND	ND	
1,2-Dichlorobenzene	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16.5 psig with He.

02/16/94
MS1/1S14K
GD/ge
MS1*A

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CLIENT: Angela
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Lab Number : CK-0707-2
Project : CHZM Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R 2 in-flare #2, Can #583	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
1,3-Dichlorobenzene	0.02	ND	ND	
1,4 Dichlorobenzene	0.02	ND	ND	
1,1-Dichloroethane	0.01	2.1	8.6	
1,2 Dichloroethane (EDC)	0.02	ND	ND	
1,1-Dichloroethene	0.02	ND	ND	
cis 1,2 Dichloroethene	0.02	2.2	8.7	
trans-1,2-Dichloroethene	0.02	ND	ND	
Dichloromethane	0.1	6.	21.	
1,2-Dichloropropane	0.01	ND	ND	
cis 1,3 Dichloropropene	0.01	ND	ND	
trans-1,3-Dichloropropene	0.01	ND	ND	
Ethylbenzene	0.02	8.8	38.	
2-Hexanone	0.01	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.01	2.1	8.7	
Styrene	0.02	1.5	6.4	
1,1,2,2 Tetrachloroethane	0.01	ND	ND	
Tetrachloroethene (PCE)	0.01	2.2	15.	
Toluene	0.02	37.	140.	
1,1,1 Trichloroethane (TCA)	0.02	0.2	1.3	
1,1,2 Trichloroethane	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S14K
GD/ge
MS1*A

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Lab Number : CK-0707-2
Project : CHZM Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R 2-in-flare #2, Can #583	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
Trichloroethene (TCE)	0.01	0.7	3.9	
Trichlorofluoromethane (F-11)	0.02	0.4	2.2	
Trichlorotrifluoroethane (F-113)	0.02	0.07	0.5	
Vinyl Acetate	0.05	ND	ND	
Vinyl Chloride	0.02	3.9	8.3	
Xylenes	0.02	32.	140.	
Percent Surrogate Recovery			97.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S14K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

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CLIENT: Angela
AmTest Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-3
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-in-flare #2, Can #652	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	0.1	7.6	18.	
Benzene	0.02	1.3	4.3	
Bromodichloromethane	0.01	ND	ND	
Bromomethane (Methyl Bromide)	0.02	ND	ND	
Bromoform	0.01	ND	ND	
1,3-Butadiene	0.05	ND	ND	
2 Butanone (MEK)	0.02	12.	36.	
Carbon Disulfide	0.2	ND	ND	
Carbon Tetrachloride	0.02	ND	ND	
Chlorobenzene	0.01	0.3	1.2	
Chloroethane (Ethyl Chloride)	0.02	1.6	4.3	
2-Chloroethyl Vinyl Ether	0.1	ND	ND	
Chloroform	0.05	ND	ND	
Chloromethane (Methyl Chloride)	0.02	0.5	1.1	
Dibromochloromethane	0.01	ND	ND	
1,2-Dibromoethane (EDB)	0.02	ND	ND	
1,2 Dichlorobenzene	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16.0 psig with He.

02/16/94
MS1/1S15K
GD/ge
MS1*A

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CLIENT: Angela
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Preston, WA 98050

Lab Number : CK-0707-3
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-in-flare #2, Can #652	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
1,3-Dichlorobenzene	0.02	ND	ND	
1,4-Dichlorobenzene	0.02	ND	ND	
1,1-Dichloroethane	0.01	2.1	8.4	
1,2 Dichloroethane (EDC)	0.02	ND	ND	
1,1-Dichloroethene	0.02	ND	ND	
cis-1,2-Dichloroethene	0.02	2.1	8.5	
trans-1,2-Dichloroethene	0.02	ND	ND	
Dichloromethane	0.1	5.8	20.	
1,2 Dichloropropane	0.01	ND	ND	
cis-1,3-Dichloropropene	0.01	ND	ND	
trans-1,3-Dichloropropene	0.01	ND	ND	
Ethylbenzene	0.02	9.2	40.	
2-Hexanone	0.01	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.01	2.1	8.6	
Styrene	0.02	1.6	6.9	
1,1,2,2-Tetrachloroethane	0.01	ND	ND	
Tetrachloroethene (PCE)	0.01	2.4	16.	
Toluene	0.02	37.	140.	
1,1,1-Trichloroethane (TCA)	0.02	0.2	1.2	
1,1,2-Trichloroethane	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S15K
GD/ge
MS1*A

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EXCELLENCE IN ANALYSIS

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30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-3
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-in-flare #2, Can #652	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
Trichloroethene (TCE)	0.01	0.7	3.9	
Trichlorofluoromethane (F-11)	0.02	0.4	2.2	
Trichlorotrifluoroethane (F-113)	0.02	0.08	0.6	
Vinyl Acetate	0.05	ND	ND	
Vinyl Chloride	0.02	3.2	6.9	
Xylenes	0.02	35.	150.	
Percent Surrogate Recovery			98.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S15K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

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Air Toxics Group Leader

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QC Batch ID: MS1*A CK-0707-3
Project : CH2M Hill-Cedar Hills

CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

QC DUPLICATE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-in-flare #2, Can #652	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	%DIFF	NOTE
VOLATILE ORGANICS BY EPA TO-14					1,2
Acetone	0.1	7.2	17.	5.7	
Benzene	0.02	1.3	4.2	2.4	
Bromodichloromethane	0.01	ND	ND		
Bromomethane (Methyl Bromide)	0.02	ND	ND		
Bromoform	0.01	ND	ND		
1,3-Butadiene	0.05	ND	ND		
2-Butanone (MEK)	0.02	13.	37.	2.7	
Carbon Disulfide	0.2	ND	ND		
Carbon Tetrachloride	0.02	ND	ND		
Chlorobenzene	0.01	0.22	1.0	18.	
Chloroethane (Ethyl Chloride)	0.02	1.8	4.7	8.9	
2-Chloroethyl Vinyl Ether	0.1	ND	ND		
Chloroform	0.05	ND	ND		
Chloromethane (Methyl Chloride)	0.02	0.73	1.5	31.	
Dibromochloromethane	0.01	ND	ND		
1,2-Dibromoethane (EDB)	0.02	ND	ND		
1,2-Dichlorobenzene	0.02	ND	ND		
1,3 Dichlorobenzene	0.02	ND	ND		
1,4-Dichlorobenzene	0.02	ND	ND		
1,1-Dichloroethane	0.01	2.1	8.4	0.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)
(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.
(2) Canister received at 0 psig and pressurized to 16.0 psig with He.

02/16/94
MS1/1S16K
GD/ge
CK0707-3

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COAST-TO-COAST ANALYTICAL SERVICES, INC.

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EXCELLENCE IN ANALYSIS

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CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

QC Batch ID: MS1*A CK-0707-3
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

QC DUPLICATE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-in-flare #2, Can #652	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	%DIFF	NOTE
1,2-Dichloroethane (EDC)	0.02	ND	ND		
1,1-Dichloroethene	0.02	ND	ND		
cis-1,2-Dichloroethene	0.02	2.1	8.4	1.2	
trans-1,2-Dichloroethene	0.02	ND	ND		
Dichloromethane	0.1	5.8	20.	0.	
1,2-Dichloropropane	0.01	ND	ND		
cis 1,3-Dichloropropene	0.01	ND	ND		
trans-1,3-Dichloropropene	0.01	ND	ND		
Ethylbenzene	0.02	8.5	37.	7.8	
2-Hexanone	0.01	ND	ND		
4-Methyl-2-Pentanone (MIBK)	0.01	2.2	9.2	6.7	
Styrene	0.02	1.2	5.1	30.	
1,1,2,2-Tetrachloroethane	0.01	ND	ND		
Tetrachloroethene (PCE)	0.01	2.1	14.	13.	
Toluene	0.02	34.	130.	7.4	
1,1,1-Trichloroethane (TCA)	0.02	0.22	1.2	0.	
1,1,2-Trichloroethane	0.02	ND	ND		
Trichloroethene (TCE)	0.01	0.69	3.7	5.3	
Trichlorofluoromethane (F-11)	0.02	0.39	2.2	0.	
Trichlorotrifluoroethane (F-113)	0.02	0.078	0.6	0.	
Vinyl Acetate	0.05	ND	ND		
Vinyl Chloride	0.02	4.5	9.7	34.	
Xylenes	0.02	32.	140.	6.9	
Percent Surrogate Recovery			100.		

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S16K
GD/ge
CK0707-3

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

171

SoCal Division (Camarillo Laboratory)
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(805) 389-1353
FAX (805)389-1438

CLIENT: Angela
AmTest Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-4
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-out-flare #2, Can #477	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	1.	190.	460.	
Benzene	0.2	ND	ND	
Bromodichloromethane	0.1	ND	ND	
Bromomethane (Methyl Bromide)	0.2	ND	ND	
Bromoform	0.1	ND	ND	
1,3-Butadiene	0.5	ND	ND	
2-Butanone (MEK)	0.2	ND	ND	
Carbon Disulfide	2.	ND	ND	
Carbon Tetrachloride	0.2	ND	ND	
Chlorobenzene	0.1	ND	ND	
Chloroethane (Ethyl Chloride)	0.2	ND	ND	
2-Chloroethyl Vinyl Ether	1.	ND	ND	
Chloroform	0.5	ND	ND	
Chloromethane (Methyl Chloride)	0.2	7.7	16.	
Dibromochloromethane	0.1	ND	ND	
1,2-Dibromoethane (EDB)	0.2	ND	ND	
1,2-Dichlorobenzene	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16.0 psig with He.

02/16/94
MS1/1S10K
GD/ge
MS1*A

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

172

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CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-4
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-1-out-flare #2, Can #477	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
1,3 Dichlorobenzene	0.2	ND	ND	
1,4-Dichlorobenzene	0.2	ND	ND	
1,1 Dichloroethane	0.1	ND	ND	
1,2-Dichloroethane (EDC)	0.2	ND	ND	
1,1 Dichloroethene	0.2	ND	ND	
cis-1,2-Dichloroethene	0.2	ND	ND	
trans-1,2-Dichloroethene	0.2	ND	ND	
Dichloromethane	1.	ND	ND	
1,2 Dichloropropane	0.1	ND	ND	
cis-1,3-Dichloropropene	0.1	ND	ND	
trans-1,3-Dichloropropene	0.1	ND	ND	
Ethylbenzene	0.2	ND	ND	
2-Hexanone	0.1	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.1	ND	ND	
Styrene	0.2	ND	ND	
1,1,2,2-Tetrachloroethane	0.1	ND	ND	
Tetrachloroethene (PCE)	0.1	ND	ND	
Toluene	0.2	ND	ND	
1,1,1-Trichloroethane (TCA)	0.2	ND	ND	
1,1,2 Trichloroethane	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S10K
GD/ge
MS1*A

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COAST-TO-COAST ANALYTICAL SERVICES, INC.

173

EXCELLENCE IN ANALYSIS

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CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-4
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-out-flare #2, Can #477	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
Trichlorocthene (TCE)	0.1	ND	ND	
Trichlorofluoromethane (F-11)	0.2	ND	ND	
Trichlorotrifluoroethane (F-113)	0.2	ND	ND	
Vinyl Acetate	0.5	ND	ND	
Vinyl Chloridc	0.2	ND	ND	
Xylenes	0.2	ND	ND	
Percent Surrogate Recovery			98.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S10K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

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174

CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-5
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2 out-flare #2, Can #489	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	1.	63.	150.	
Benzene	0.2	ND	ND	
Bromodichloromethane	0.1	ND	ND	
Bromomethane (Methyl Bromide)	0.2	ND	ND	
Bromoform	0.1	ND	ND	
1,3-Butadiene	0.5	ND	ND	
2-Butanone (MEK)	0.2	ND	ND	
Carbon Disulfide	2.	7.	23.	
Carbon Tetrachloride	0.2	ND	ND	
Chlorobenzene	0.1	ND	ND	
Chloroethane (Ethyl Chloride)	0.2	ND	ND	
2-Chloroethyl Vinyl Ether	1.	ND	ND	
Chloroform	0.5	ND	ND	
Chloromethane (Methyl Chloride)	0.2	ND	ND	
Dibromochloromethane	0.1	ND	ND	
1,2-Dibromoethane (EDB)	0.2	ND	ND	
1,2-Dichlorobenzene	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 17.0 psig with He.

02/16/94
MS1/1S11K
GD/ge
MS1*A

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EXCELLENCE IN ANALYSIS

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175

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CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-5
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-2-out-flare #2, Can #489	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
1,3-Dichlorobenzene	0.2	ND	ND	
1,4-Dichlorobenzene	0.2	ND	ND	
1,1-Dichloroethane	0.1	ND	ND	
1,2-Dichloroethane (EDC)	0.2	ND	ND	
1,1-Dichloroethene	0.2	ND	ND	
cis-1,2-Dichloroethene	0.2	ND	ND	
trans-1,2-Dichloroethene	0.2	ND	ND	
Dichloromethane	1.	ND	ND	
1,2-Dichloropropane	0.1	ND	ND	
cis-1,3-Dichloropropene	0.1	ND	ND	
trans-1,3-Dichloropropene	0.1	ND	ND	
Ethylbenzene	0.2	ND	ND	
2-Hexanone	0.1	ND	ND	
4-Methyl 2-Pentanone (MIBK)	0.1	ND	ND	
Styrene	0.2	ND	ND	
1,1,2,2-Tetrachloroethane	0.1	ND	ND	
Tetrachloroethene (PCE)	0.1	ND	ND	
Toluene	0.2	ND	ND	
1,1,1-Trichloroethane (TCA)	0.2	ND	ND	
1,1,2-Trichloroethane	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S11K
GD/ge
MS1*A

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CLIENT: Angela
AmTest Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-5
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-out-flare #2, Can #489	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
Trichloroethene (TCE)	0.1	ND	ND	
Trichlorofluoromethane (F-11)	0.2	ND	ND	
Trichlorotrifluoroethane (F-113)	0.2	ND	ND	
Vinyl Acetate	0.5	ND	ND	
Vinyl Chloride	0.2	ND	ND	
Xylenes	0.2	7.6	33.	
Percent Surrogate Recovery			97.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S11K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

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FAX (805) 389-1438

CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-6
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-out-flare #2, Can #649	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	1.	3.	6.3	
Benzene	0.2	ND	ND	
Bromodichloromethane	0.1	ND	ND	
Bromomethane (Methyl Bromide)	0.2	ND	ND	
Bromoform	0.1	ND	ND	
1,3-Butadiene	0.5	ND	ND	
2-Butanone (MEK)	0.2	ND	ND	
Carbon Disulfide	2.	ND	ND	
Carbon Tetrachloride	0.2	ND	ND	
Chlorobenzene	0.1	ND	ND	
Chloroethane (Ethyl Chloride)	0.2	ND	ND	
2-Chloroethyl Vinyl Ether	1.	ND	ND	
Chloroform	0.5	ND	ND	
Chloromethane (Methyl Chloride)	0.2	1.	2.1	
Dibromochloromethane	0.1	ND	ND	
1,2-Dibromoethane (EDB)	0.2	ND	ND	
1,2-Dichlorobenzene	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16.5 psig with He.

02/16/94
MS1/1S12K
GD/ge
MS1*A

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178

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CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-6
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R 3 out-flare #2, Can #649	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
1,3 Dichlorobenzene	0.2	ND	ND	
1,4-Dichlorobenzene	0.2	ND	ND	
1,1-Dichloroethane	0.1	ND	ND	
1,2-Dichloroethane (EDC)	0.2	ND	ND	
1,1-Dichloroethene	0.2	ND	ND	
cis-1,2-Dichloroethene	0.2	ND	ND	
trans-1,2-Dichloroethene	0.2	ND	ND	
Dichloromethane	1.	ND	ND	
1,2-Dichloropropane	0.1	ND	ND	
cis-1,3-Dichloropropene	0.1	ND	ND	
trans-1,3-Dichloropropene	0.1	ND	ND	
Ethylbenzene	0.2	ND	ND	
2-Hexanone	0.1	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.1	ND	ND	
Styrene	0.2	ND	ND	
1,1,2,2 Tetrachloroethane	0.1	ND	ND	
Tetrachloroethene (PCE)	0.1	ND	ND	
Toluene	0.2	ND	ND	
1,1,1-Trichloroethane (TCA)	0.2	0.4	2.2	
1,1,2-Trichloroethane	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S12K
GD/ge
MS1*A

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EXCELLENCE IN ANALYSIS

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(805) 389-1353
FAX (805)389-1438

CLIENT: Angela
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0707-6
Project : CH2M Hill-Cedar Hills

Analyzed : 02/14/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-out-flare #2, Can #649	Air	R. Lawrence	02/10/94	02/14/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
Trichloroethene (TCE)	0.1	ND	ND	
Trichlorofluoromethane (F-11)	0.2	ND	ND	
Trichlorotrifluoroethane (F-113)	0.2	ND	ND	
Vinyl Acetate	0.5	ND	ND	
Vinyl Chloride	0.2	ND	ND	
Xylenes	0.2	ND	ND	
Percent Surrogate Recovery			97.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1S12K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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AVITEST

Professional Analytical Services

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

Fax: 206 883 3495
Tel: 206 885 1664

CHAIN OF CUSTODY RECORD

PROJ. NO. 94-016

PROJECT NAME: CH_2M Hill - Cedar Hills

SAMPLERS: (Signature)

Ray Lawrence

Client Name: Avtest. Air Quality

Client Address: 30545 S.E. 84th St.

Client Phone: Preston, WA 98050

Contact Person: Angela 206-222-7746

P.O. No. 94-016

STA. NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	JOB#	CAN#	NO. OF CONTAINERS	Summa Canisters
	2/10	956-1046			R-1-IN-FLARE #2	5124	476	1	X
		1145-1235			R-2-IN-FLARE #2	5125	583	1	X
		1335-1425			R-3-IN-FLARE #2	5126	652	1	X
		0956-1046			R-1-OUT-FLARE #2	5127	477	1	X
		1145-1235			R-2-OUT-FLARE #2	5128	489	1	X
		1335-1425			R-3-OUT-FLARE #2	5129	649	1	X

TO-14 Speciated VOC's By GC/MS
Fixed Gas Analysis (CH_4, CO_2, O_2, CO) by GC/MS

CK0707

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	2/10/94 PM	UPS	UPS	2-14-94 1000	Rebecca Burns
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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03/25/94

081

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COAST-TO-COAST ANALYTICAL SERVICES, INC.

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181

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-1
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-1-IN FLARE #3 CAN #661	Air		02/08/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	43.	
Oxygen	(7782447)	0.01	2.9	
Nitrogen	(7727379)	0.02	16.	
Methane	(74828)	0.005	38.	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119409
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

182

SoCal Division (Camarillo Laboratory)
4765 Calle Quetzal, Camarillo, California 93012

(805) 389-1353
FAX (805)389-1438

Lab Number : CK-0679-2
Project : 94-016 Cedar Hills

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-2-IN FLARE #3 CAN #418	Air		02/08/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	44.	
Oxygen	(7782447)	0.01	2.7	
Nitrogen	(7727379)	0.02	15.	
Methane	(74828)	0.005	38.	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119410
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

183

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(805) 389-1353
FAX (805)389-1438

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-3
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-IN FLARE #3 CAN #511	Air		02/08/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	43.	
Oxygen	(7782447)	0.01	2.9	
Nitrogen	(7727379)	0.02	16.	
Methane	(74828)	0.005	38.	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119411
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

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184

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-4
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-1-OUT FLARE #3 CAN #648	Air		02/08/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	14.	
Oxygen	(7782447)	0.01	10.	
Nitrogen	(7727379)	0.02	76.	
Methane	(74828)	0.005	ND	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119403
GD/ge
KB11TA

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

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EXCELLENCE IN ANALYSIS

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185

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-5
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-2-OUT FLARE #3 CAN #538	Air		02/08/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	14.	
Oxygen	(7782447)	0.01	10.	
Nitrogen	(7727379)	0.02	76.	
Methane	(74828)	0.005	ND	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119404
GD/ge
KB11TA

Respectfully submitted,
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186

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CLIENT: Kris Hansen
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Preston, WA 98050

Lab Number : CK-0679-6
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-OUT FLARE #3 CAN #564	Air		02/08/94	02/11/94

CONSTITUENT	(CAS RN)	*PQL PERCENT	RESULT PERCENT	NOTE
FIXED GASES AND METHANE				
Carbon Dioxide	(124389)	0.1	15.	
Oxygen	(7782447)	0.01	9.7	
Nitrogen	(7727379)	0.02	75.	
Methane	(74828)	0.005	ND	
Carbon Monoxide	(630080)	0.1	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119405
GD/ge
KB11TA

Respectfully submitted,
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Gesheng Dai

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-1
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-IN FLARE #3 CAN #661	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	0.1	5.1	12.	
Benzene	0.02	0.7	2.2	
Bromodichloromethane	0.01	ND	ND	
Bromomethane (Methyl Bromide)	0.02	ND	ND	
Bromoform	0.01	ND	ND	
1,3-Butadiene	0.05	ND	ND	
2-Butanone (MEK)	0.02	10.	30.	
Carbon Disulfide	0.2	ND	ND	
Carbon Tetrachloride	0.02	ND	ND	
Chlorobenzene	0.01	0.5	2.5	
Chloroethane (Ethyl Chloride)	0.02	ND	ND	
2-Chloroethyl Vinyl Ether	0.1	ND	ND	
Chloroform	0.05	ND	ND	
Chloromethane (Methyl Chloride)	0.02	ND	ND	
Dibromochloromethane	0.01	ND	ND	
1,2-Dibromoethane (EDB)	0.02	ND	ND	
1,2-Dichlorobenzene	0.02	ND	ND	

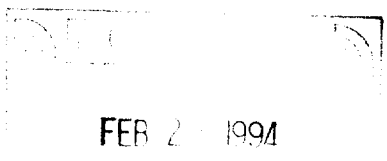
Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 15.5 psig with He.

02/16/94
MS1/1R85K
GD/ge
MS1*A



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COAST-TO-COAST ANALYTICAL SERVICES, INC.

188

SoCal Division (Camarillo Laboratory)
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Preston, WA 98050

Lab Number : CK-0679-1
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-IN FLARE #3 CAN #661	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
1,3-Dichlorobenzene	0.02	ND	ND	
1,4-Dichlorobenzene	0.02	0.4	2.2	
1,1-Dichloroethane	0.01	0.2	0.7	
1,2-Dichloroethane (EDC)	0.02	ND	ND	
1,1-Dichloroethene	0.02	ND	ND	
cis-1,2-Dichloroethene	0.02	1.4	5.6	
trans-1,2-Dichloroethene	0.02	ND	ND	
Dichloromethane	0.1	0.7	2.3	
1,2-Dichloropropane	0.01	ND	ND	
cis-1,3-Dichloropropene	0.01	ND	ND	
trans-1,3-Dichloropropene	0.01	ND	ND	
Ethylbenzene	0.02	12.	50.	
2-Hexanone	0.01	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.01	3.4	14.	
Styrene	0.02	1.2	5.0	
1,1,2,2-Tetrachloroethane	0.01	ND	ND	
Tetrachloroethene (PCE)	0.01	1.2	7.9	
Toluene	0.02	21.	78.	
1,1,1-Trichloroethane (TCA)	0.02	ND	ND	
1,1,2-Trichloroethane	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R85K
GD/ge
MS1*A

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189

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-1
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-1-IN FLARE #3 CAN #661	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
Trichloroethene (TCE)	0.01	0.3	1.8	
Trichlorofluoromethane (F-11)	0.02	ND	ND	
Trichlorotrifluoroethane (F-113)	0.02	ND	ND	
Vinyl Acetate	0.05	ND	ND	
Vinyl Chloride	0.02	1.8	3.8	
Xylenes	0.02	39.	170.	
Percent Surrogate Recovery			99.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R85K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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EXCELLENCE IN ANALYSIS

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-2
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-IN FLARE #3 CAN #418	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	0.1	7.2	17.	
Benzene	0.02	0.8	2.4	
Bromodichloromethane	0.01	ND	ND	
Bromomethane (Methyl Bromide)	0.02	ND	ND	
Bromoform	0.01	ND	ND	
1,3-Butadiene	0.05	ND	ND	
2-Butanone (MEK)	0.02	11.	32.	
Carbon Disulfide	0.2	ND	ND	
Carbon Tetrachloride	0.02	ND	ND	
Chlorobenzene	0.01	0.6	2.8	
Chloroethane (Ethyl Chloride)	0.02	ND	ND	
2-Chloroethyl Vinyl Ether	0.1	ND	ND	
Chloroform	0.05	ND	ND	
Chloromethane (Methyl Chloride)	0.02	ND	ND	
Dibromochloromethane	0.01	ND	ND	
1,2-Dibromoethane (EDB)	0.02	ND	ND	
1,2-Dichlorobenzene	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16.0 psig with He.

02/16/94
MS1/1R86K
GD/ge
MS1*A

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

Lab Number : CK-0679-2
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-IN FLARE #3 CAN #418	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
1,3-Dichlorobenzene	0.02	ND	ND	
1,4-Dichlorobenzene	0.02	0.3	1.9	
1,1-Dichloroethane	0.01	0.2	0.7	
1,2-Dichloroethane (EDC)	0.02	ND	ND	
1,1-Dichloroethene	0.02	ND	ND	
cis-1,2-Dichloroethene	0.02	1.5	6.0	
trans-1,2-Dichloroethene	0.02	ND	ND	
Dichloromethane	0.1	0.7	2.4	
1,2-Dichloropropane	0.01	ND	ND	
cis-1,3-Dichloropropene	0.01	ND	ND	
trans-1,3-Dichloropropene	0.01	ND	ND	
Ethylbenzene	0.02	12.	54.	
2-Hexanone	0.01	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.01	3.9	16.	
Styrene	0.02	1.3	5.5	
1,1,2,2-Tetrachloroethane	0.01	ND	ND	
Tetrachloroethene (PCE)	0.01	1.3	8.8	
Toluene	0.02	22.	82.	
1,1,1-Trichloroethane (TCA)	0.02	ND	ND	
1,1,2-Trichloroethane	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R86K
GD/ge
MS1*A

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CCAS
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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-2
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-IN FLARE #3 CAN #418	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
Trichloroethene (TCE)	0.01	0.4	1.9	
Trichlorofluoromethane (F-11)	0.02	ND	ND	
Trichlorotrifluoroethane (F-113)	0.02	ND	ND	
Vinyl Acetate	0.05	ND	ND	
Vinyl Chloride	0.02	2.	4.2	
Xylenes	0.02	42.	180.	
Percent Surrogate Recovery			98.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R86K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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193

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30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-3
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-IN FLARE #3 CAN #511	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	0.1	5.9	14.	
Benzene	0.02	0.7	2.3	
Bromodichloromethane	0.01	ND	ND	
Bromomethane (Methyl Bromide)	0.02	ND	ND	
Bromoform	0.01	ND	ND	
1,3-Butadiene	0.05	ND	ND	
2-Butanone (MEK)	0.02	8.8	26.	
Carbon Disulfide	0.2	ND	ND	
Carbon Tetrachloride	0.02	ND	ND	
Chlorobenzene	0.01	0.5	2.2	
Chloroethane (Ethyl Chloride)	0.02	ND	ND	
2-Chloroethyl Vinyl Ether	0.1	ND	ND	
Chloroform	0.05	ND	ND	
Chloromethane (Methyl Chloride)	0.02	ND	ND	
Dibromochloromethane	0.01	ND	ND	
1,2-Dibromoethane (EDB)	0.02	ND	ND	
1,2-Dichlorobenzene	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16.5 psig with He.

02/16/94
MS1/1R87K
GD/ge
MS1*A

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

Lab Number : CK-0679-3
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-IN FLARE #3 CAN #511	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
1,3-Dichlorobenzene	0.02	ND	ND	
1,4-Dichlorobenzene	0.02	ND	ND	
1,1-Dichloroethane	0.01	0.2	0.7	
1,2-Dichloroethane (EDC)	0.02	ND	ND	
1,1-Dichloroethene	0.02	ND	ND	
cis-1,2-Dichloroethene	0.02	1.5	5.8	
trans-1,2-Dichloroethene	0.02	ND	ND	
Dichloromethane	0.1	0.7	2.4	
1,2-Dichloropropane	0.01	ND	ND	
cis-1,3-Dichloropropene	0.01	ND	ND	
trans-1,3-Dichloropropene	0.01	ND	ND	
Ethylbenzene	0.02	10.	44.	
2-Hexanone	0.01	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.01	2.9	12.	
Styrene	0.02	0.9	3.8	
1,1,2,2-Tetrachloroethane	0.01	ND	ND	
Tetrachloroethene (PCE)	0.01	1.1	7.3	
Toluene	0.02	20.	75.	
1,1,1-Trichloroethane (TCA)	0.02	ND	ND	
1,1,2-Trichloroethane	0.02	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R87K
GD/ge
MS1*A

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

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195

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-3
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-IN FLARE #3 CAN #511	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	NOTE
Trichloroethene (TCE)	0.01	0.3	1.8	
Trichlorofluoromethane (F-11)	0.02	ND	ND	
Trichlorotrifluoroethane (F-113)	0.02	ND	ND	
Vinyl Acetate	0.05	ND	ND	
Vinyl Chloride	0.02	2.6	5.6	
Xylenes	0.02	35.	150.	
Percent Surrogate Recovery			99.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R87K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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196

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

QC Batch ID: MS1*A CK-0679-3
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

QC DUPLICATE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-IN FLARE #3 CAN #511	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	%DIFF	NOTE
VOLATILE ORGANICS BY EPA TO-14					1,2
Acetone	0.1	6.3	15.	6.9	
Benzene	0.02	0.78	2.5	8.3	
Bromodichloromethane	0.01	ND	ND		
Bromomethane (Methyl Bromide)	0.02	ND	ND		
Bromoform	0.01	ND	ND		
1,3-Butadiene	0.05	ND	ND		
2-Butanone (MEK)	0.02	9.5	28.	7.4	
Carbon Disulfide	0.2	ND	ND		
Carbon Tetrachloride	0.02	ND	ND		
Chlorobenzene	0.01	0.46	2.1	4.7	
Chloroethane (Ethyl Chloride)	0.02	ND	ND		
2-Chloroethyl Vinyl Ether	0.1	ND	ND		
Chloroform	0.05	ND	ND		
Chloromethane (Methyl Chloride)	0.02	ND	ND		
Dibromochloromethane	0.01	ND	ND		
1,2-Dibromoethane (EDB)	0.02	ND	ND		
1,2-Dichlorobenzene	0.02	ND	ND		
1,3-Dichlorobenzene	0.02	ND	ND		
1,4-Dichlorobenzene	0.02	ND	ND		
1,1-Dichloroethane	0.01	0.17	0.7	0.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)
(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.
(2) Canister received at 0 psig and pressurized to 16.5 psig with He.

02/16/94
MS1/1R89K
GD/ge
CK0679-3

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EXCELLENCE IN ANALYSIS

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CLIENT: Kris Hansen
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QC Batch ID: MS1*A CK-0679-3
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

QC DUPLICATE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-IN FLARE #3 CAN #511	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppmv	RESULT ppmv	RESULT mg/cu M	%DIFF	NOTE
1,2-Dichloroethane (EDC)	0.02	ND	ND		
1,1-Dichloroethene	0.02	ND	ND		
cis-1,2-Dichloroethene	0.02	1.5	6.0	3.4	
trans-1,2-Dichloroethene	0.02	ND	ND		
Dichloromethane	0.1	0.72	2.5	4.1	
1,2-Dichloropropane	0.01	ND	ND		
cis-1,3-Dichloropropene	0.01	ND	ND		
trans-1,3-Dichloropropene	0.01	ND	ND		
Ethylbenzene	0.02	11.	46.	4.4	
2-Hexanone	0.01	ND	ND		
4-Methyl-2-Pentanone (MIBK)	0.01	2.9	12.	0.	
Styrene	0.02	0.92	3.9	2.6	
1,1,2,2-Tetrachloroethane	0.01	ND	ND		
Tetrachloroethene (PCE)	0.01	1.	7.0	4.2	
Toluene	0.02	21.	79.	5.2	
1,1,1-Trichloroethane (TCA)	0.02	ND	ND		
1,1,2-Trichloroethane	0.02	ND	ND		
Trichloroethene (TCE)	0.01	0.32	1.7	5.7	
Trichlorofluoromethane (F-11)	0.02	ND	ND		
Trichlorotrifluoroethane (F-113)	0.02	ND	ND		
Vinyl Acetate	0.05	ND	ND		
Vinyl Chloride	0.02	2.9	6.3	12.	
Xylenes	0.02	35.	150.	0.	
Percent Surrogate Recovery			99.		

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R89K
GD/ge
CK0679-3

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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198

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-4
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-OUT FLARE #3 CAN #648	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	1.	27.	63.	
Benzene	0.2	0.7	2.3	
Bromodichloromethane	0.1	ND	ND	
Bromomethane (Methyl Bromide)	0.2	ND	ND	
Bromoform	0.1	ND	ND	
1,3-Butadiene	0.5	ND	ND	
2-Butanone (MEK)	0.2	ND	ND	
Carbon Disulfide	2.	ND	ND	
Carbon Tetrachloride	0.2	ND	ND	
Chlorobenzene	0.1	ND	ND	
Chloroethane (Ethyl Chloride)	0.2	ND	ND	
2-Chloroethyl Vinyl Ether	1.	ND	ND	
Chloroform	0.5	ND	ND	
Chloromethane (Methyl Chloride)	0.2	ND	ND	
Dibromochloromethane	0.1	ND	ND	
1,2-Dibromoethane (EDB)	0.2	ND	ND	
1,2-Dichlorobenzene	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 15.5 psig with He.

02/16/94
MS1/1R79K
GD/ge
MS1*A

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Preston, WA 98050

Lab Number : CK-0679-4
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-OUT FLARE #3 CAN #648	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
1,3-Dichlorobenzene	0.2	ND	ND	
1,4-Dichlorobenzene	0.2	ND	ND	
1,1-Dichloroethane	0.1	ND	ND	
1,2-Dichloroethane (EDC)	0.2	ND	ND	
1,1-Dichloroethene	0.2	ND	ND	
cis-1,2-Dichloroethene	0.2	ND	ND	
trans-1,2-Dichloroethene	0.2	ND	ND	
Dichloromethane	1.	ND	ND	
1,2-Dichloropropane	0.1	ND	ND	
cis-1,3-Dichloropropene	0.1	ND	ND	
trans-1,3-Dichloropropene	0.1	ND	ND	
Ethylbenzene	0.2	ND	ND	
2-Hexanone	0.1	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.1	ND	ND	
Styrene	0.2	ND	ND	
1,1,2,2-Tetrachloroethane	0.1	ND	ND	
Tetrachloroethene (PCE)	0.1	ND	ND	
Toluene	0.2	ND	ND	
1,1,1-Trichloroethane (TCA)	0.2	ND	ND	
1,1,2-Trichloroethane	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R79K
GD/ge
MS1*A

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Preston, WA 98050

Lab Number : CK-0679-4
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-1-OUT FLARE #3 CAN #648	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
Trichloroethene (TCE)	0.1	ND	ND	
Trichlorofluoromethane (F-11)	0.2	ND	ND	
Trichlorotrifluoroethane (F-113)	0.2	ND	ND	
Vinyl Acetate	0.5	ND	ND	
Vinyl Chloride	0.2	ND	ND	
Xylenes	0.2	ND	ND	
Percent Surrogate Recovery			95.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R79K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-5
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-OUT FLARE #3 CAN #538	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	1.	51.	120.	
Benzene	0.2	ND	ND	
Bromodichloromethane	0.1	ND	ND	
Bromomethane (Methyl Bromide)	0.2	ND	ND	
Bromoform	0.1	ND	ND	
1,3-Butadiene	0.5	ND	ND	
2-Butanone (MEK)	0.2	51.	150.	
Carbon Disulfide	2.	2.	6.8	
Carbon Tetrachloride	0.2	ND	ND	
Chlorobenzene	0.1	ND	ND	
Chloroethane (Ethyl Chloride)	0.2	ND	ND	
2-Chloroethyl Vinyl Ether	1.	ND	ND	
Chloroform	0.5	ND	ND	
Chloromethane (Methyl Chloride)	0.2	ND	ND	
Dibromochloromethane	0.1	ND	ND	
1,2-Dibromoethane (EDB)	0.2	ND	ND	
1,2-Dichlorobenzene	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 19.5 psig with He.

02/16/94
MS1/1R80K
GD/ge
MS1*A

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-5
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-OUT FLARE #3 CAN #538	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
1,3-Dichlorobenzene	0.2	ND	ND	
1,4-Dichlorobenzene	0.2	ND	ND	
1,1-Dichloroethane	0.1	ND	ND	
1,2-Dichloroethane (EDC)	0.2	ND	ND	
1,1-Dichloroethene	0.2	ND	ND	
cis-1,2-Dichloroethene	0.2	ND	ND	
trans-1,2-Dichloroethene	0.2	ND	ND	
Dichloromethane	1.	ND	ND	
1,2-Dichloropropane	0.1	ND	ND	
cis-1,3-Dichloropropene	0.1	ND	ND	
trans-1,3-Dichloropropene	0.1	ND	ND	
Ethylbenzene	0.2	ND	ND	
2-Hexanone	0.1	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.1	ND	ND	
Styrene	0.2	ND	ND	
1,1,2,2-Tetrachloroethane	0.1	ND	ND	
Tetrachloroethene (PCE)	0.1	ND	ND	
Toluene	0.2	8.5	32.	
1,1,1-Trichloroethane (TCA)	0.2	ND	ND	
1,1,2-Trichloroethane	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R80K
GD/ge
MS1*A

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CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-5
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-2-OUT FLARE #3 CAN #538	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
Trichloroethene (TCE)	0.1	ND	ND	
Trichlorofluoromethane (F-11)	0.2	ND	ND	
Trichlorotrifluoroethane (F-113)	0.2	ND	ND	
Vinyl Acetate	0.5	ND	ND	
Vinyl Chloride	0.2	ND	ND	
Xylenes	0.2	ND	ND	
Percent Surrogate Recovery			94.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R80K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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204

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-6
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-OUT FLARE #3 CAN #564	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1,2
Acetone	1.	51.	120.	
Benzene	0.2	0.6	2.0	
Bromodichloromethane	0.1	ND	ND	
Bromomethane (Methyl Bromide)	0.2	ND	ND	
Bromoform	0.1	ND	ND	
1,3-Butadiene	0.5	ND	ND	
2-Butanone (MEK)	0.2	ND	ND	
Carbon Disulfide	2.	3.	9.0	
Carbon Tetrachloride	0.2	ND	ND	
Chlorobenzene	0.1	ND	ND	
Chloroethane (Ethyl Chloride)	0.2	ND	ND	
2-Chloroethyl Vinyl Ether	1.	ND	ND	
Chloroform	0.5	ND	ND	
Chloromethane (Methyl Chloride)	0.2	ND	ND	
Dibromochloromethane	0.1	ND	ND	
1,2-Dibromoethane (EDB)	0.2	ND	ND	
1,2-Dichlorobenzene	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Canister received at 0 psig and pressurized to 16.2 psig with He.

02/16/94
MS1/1R81K
GD/ge
MS1*A

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205

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-6
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
R-3-OUT FLARE #3 CAN #564	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
1,3-Dichlorobenzene	0.2	ND	ND	
1,4-Dichlorobenzene	0.2	ND	ND	
1,1-Dichloroethane	0.1	ND	ND	
1,2-Dichloroethane (EDC)	0.2	ND	ND	
1,1-Dichloroethene	0.2	ND	ND	
cis-1,2-Dichloroethene	0.2	ND	ND	
trans-1,2-Dichloroethene	0.2	ND	ND	
Dichloromethane	1.	ND	ND	
1,2-Dichloropropane	0.1	ND	ND	
cis-1,3-Dichloropropene	0.1	ND	ND	
trans-1,3-Dichloropropene	0.1	ND	ND	
Ethylbenzene	0.2	ND	ND	
2-Hexanone	0.1	ND	ND	
4-Methyl-2-Pentanone (MIBK)	0.1	ND	ND	
Styrene	0.2	ND	ND	
1,1,2,2-Tetrachloroethane	0.1	ND	ND	
Tetrachloroethene (PCE)	0.1	ND	ND	
Toluene	0.2	ND	ND	
1,1,1-Trichloroethane (TCA)	0.2	ND	ND	
1,1,2-Trichloroethane	0.2	ND	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R81K
GD/ge
MS1*A

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EXCELLENCE IN ANALYSIS

COAST-TO-COAST ANALYTICAL SERVICES, INC.

SoCal Division (Camarillo Laboratory)
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(805) 389-1353
FAX (805)389-1438

CLIENT: Kris Hansen
AmTest - Air Quality Inc.
30545 S. E. 84th Street #5
Preston, WA 98050

Lab Number : CK-0679-6
Project : 94-016 Cedar Hills

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
R-3-OUT FLARE #3 CAN #564	Air		02/08/94	02/11/94

CONSTITUENT	*PQL ppbv	RESULT ppbv	RESULT µg/cu M	NOTE
Trichloroethene (TCE)	0.1	ND	ND	
Trichlorofluoromethane (F-11)	0.2	ND	ND	
Trichlorotrifluoroethane (F-113)	0.2	ND	ND	
Vinyl Acetate	0.5	ND	ND	
Vinyl Chloride	0.2	ND	ND	
Xylenes	0.2	ND	ND	
Percent Surrogate Recovery			95.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
MS1/1R81K
GD/ge
MS1*A

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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SoCal Division (Camarillo Laboratory)
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(805) 389-1353
FAX (805)389-1438

CLIENT: Coast-to-Coast Analytical Services, Inc.

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

INSTRUMENT BLANK
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED
INSTRUMENT BLANK	Air		

CONSTITUENT	(CAS RN)	*PQL µg/cu M	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1
Acetone	(67641)	3.	ND	
Benzene	(71432)	0.5	ND	
Bromodichloromethane	(75274)	1.	ND	
Bromomethane (Methyl Bromide)	(74839)	1.	ND	
Bromoform	(75252)	1.	ND	
1,3-Butadiene	(106990)	1.	ND	
2-Butanone (MEK)	(78933)	1.	ND	
Carbon Disulfide	(75150)	5.	ND	
Carbon Tetrachloride	(56235)	1.	ND	
Chlorobenzene	(108907)	0.5	ND	
Chloroethane (Ethyl Chloride)	(75003)	0.5	ND	
2-Chloroethyl Vinyl Ether	(110758)	5.	ND	
Chloroform	(67663)	3.	ND	
Chloromethane (Methyl Chloride)	(74873)	0.5	ND	
Dibromochloromethane	(124381)	1.	ND	
1,2-Dibromoethane (EDB)	(106934)	2.	ND	
1,2-Dichlorobenzene	(95501)	1.	ND	
1,3-Dichlorobenzene	(541731)	1.	ND	
1,4-Dichlorobenzene	(106467)	1.	ND	
1,1-Dichloroethane	(75343)	0.5	ND	
1,2-Dichloroethane (EDC)	(107062)	1.	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)
(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

02/14/94
MS1/1R76K
GD/ge
CK9402-11

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(805) 389-1353
FAX (805)389-1438

CLIENT: Coast-to-Coast Analytical Services, Inc.

Analyzed : 02/11/94
Analyzed by: YL
Method : EPA TO-14

INSTRUMENT BLANK
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED
INSTRUMENT BLANK	Air		

CONSTITUENT	(CAS RN)	*PQL µg/cu M	RESULT µg/cu M	NOTE
1,1-Dichloroethene	(75354)	1.	ND	
cis-1,2-Dichloroethene	(156694)	1.0	ND	
trans-1,2-Dichloroethene	(156605)	1.	ND	
Dichloromethane	(75092)	5.	ND	
1,2-Dichloropropane	(78875)	0.5	ND	
cis-1,3-Dichloropropene	(10061015)	0.5	ND	
trans-1,3-Dichloropropene	(10061026)	0.5	ND	
Ethylbenzene	(100411)	1.	ND	
2-Hexanone	(591786)	0.5	ND	
4-Methyl-2-Pentanone (MIBK)	(108101)	0.5	ND	
Styrene	(100425)	1.	ND	
1,1,2,2-Tetrachloroethane	(79345)	1.	ND	
Tetrachloroethene (PCE)	(127184)	1.	ND	
Toluene	(108883)	1	ND	
1,1,1-Trichloroethane (TCA)	(71556)	1.	ND	
1,1,2-Trichloroethane	(79005)	1.	ND	
Trichloroethene (TCE)	(79016)	0.5	ND	
Trichlorofluoromethane (F-11)	(75694)	1.	ND	
Trichlorotrifluoroethane (F-113)	(76131)	2.	ND	
Vinyl Acetate	(108054)	2.	ND	
Vinyl Chloride	(75104)	0.5	ND	
Xylenes	(1330207)	1.	ND	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/14/94
MS1/1R76K
GD/ge
CK9402-11

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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FAX (805)389-1438

CLIENT: Coast-to-Coast Analytical Services, Inc.

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

QC SPIKE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
QC SPIKE	Air			

CONSTITUENT	*PQL µg/cu M	SPIKE AMOUNT	RESULT µg/cu M	%REC	NOTE
VOLATILE ORGANICS BY EPA TO-14					1,2
Acetone	3.		NS		
Benzene	0.5	16.	19.	119.	
Bromodichloromethane	1.		NS		
Bromomethane (Methyl Bromide)	1.	21.	19.	90.	
Bromoform	1.		NS		
1,3-Butadiene	1.	10.	12.	120.	
2-Butanone (MEK)	1.		NS		
Carbon Disulfide	5.		NS		
Carbon Tetrachloride	1.	31.	28.	90.	
Chlorobenzene	0.5	23.	27.	117.	
Chloroethane (Ethyl Chloride)	0.5		NS		
2-Chloroethyl Vinyl Ether	5.		NS		
Chloroform	3.	25.	26.	104.	
Chloromethane (Methyl Chloride)	0.5		NS		
Dibromochloromethane	1.		NS		
1,2-Dibromoethane (EDB)	2.	10.	8.6	86.	
1,2-Dichlorobenzene	1.		NS		
1,3-Dichlorobenzene	1.		NS		
1,4-Dichlorobenzene	1.		NS		
1,1-Dichloroethane	0.5		NS		

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187

* RESULTS listed as 'NS' were not spiked. PQL = Practical Quantitation Limit

(1) Concentrations in ug/cu M reported at 760 mm Hg pressure and 298 deg. K.

(2) Zero Air spiked with NIST SRM 1804, Cylinder # ALM-000881.

02/14/94
MS1/1R93K
GD/ge
CK9402-11

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FAX (805)389-1438

CLIENT: Coast-to-Coast Analytical Services, Inc.

Analyzed : 02/11/94
Analyzed by: EJ
Method : EPA TO-14

QC SPIKE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED
QC SPIKE	Air		

CONSTITUENT	*PQL µg/cu M	SPIKE AMOUNT	RESULT µg/cu M	%REC	NOTE
1,2-Dichloroethane (EDC)	1.	20.	20.	100.	
1,1-Dichloroethene	1.		NS		
cis-1,2-Dichloroethene	1.0		NS		
trans-1,2-Dichloroethene	1.		NS		
Dichloromethane	5.	17.	18.	106.	
1,2-Dichloropropane	0.5	23.	26.	113.	
cis-1,3-Dichloropropene	0.5		NS		
trans-1,3-Dichloropropene	0.5		NS		
Ethylbenzene	1.	15.	19.	127.	
2-Hexanone	0.5		NS		
4-Methyl-2-Pentanone (MIBK)	0.5		NS		
Styrene	1.		NS		
1,1,2,2-Tetrachloroethane	1.		NS		
Tetrachloroethene (PCE)	1.	34.	35.	103.	
Toluene	1	18.	23.	128.	
1,1,1-Trichloroethane (TCA)	1.	28.	29.	104.	
1,1,2-Trichloroethane	1.		NS		
Trichloroethene (TCE)	0.5	27.	32.	119.	
Trichlorofluoromethane (F-11)	1.	29.	27.	93.	
Trichlorotrifluoroethane (F-113)	2.		NS		
Vinyl Acetate	2.		NS		
Vinyl Chloride	0.5	14.	17.	121.	
Xylenes	1.	15.	19.	127.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187
* RESULTS listed as 'NS' were not spiked. PQL = Practical Quantitation Limit

02/14/94
MS1/1R93K
GD/ge
CK9402-11

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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211

QC Batch ID: KB11TA

CLIENT: Coast-to-Coast Analytical Services, Inc.

Analyzed : 02/11/94
Analyzed by: GD
Method : GC/TCD

QC SPIKE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED
QC SPIKE	Air		

CONSTITUENT	*PQL PERCENT	SPIKE AMOUNT	RESULT PERCENT	%REC	NOTE
FIXED GASES AND METHANE					
Carbon Dioxide	0.1	15.	15.	100.	
Oxygen	0.01	7.1	7.	99.	
Nitrogen	0.02	66.	66.	100.	
Methane	0.005	4.6	4.6	100.	
Carbon Monoxide	0.1	7.1	7.	99.	

Lab Certifications: CAELAP #1598 & #1783; UTELAP #E-142; AZELAP #AZ0162; A2LA #0136-01; L.A.Co.CSD #10187
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)

02/16/94
TCD/02119416
GD/ge
CK0679-1

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai, Ph.D.
Air Toxics Group Leader

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

CHAIN OF CUSTODY RECORD

PROJ. NO.

PROJECT NAME: CH_2MHILL - [illegible] Hills

SAMPLERS: *(Signature)*

Client Name: [illegible]

Client Address: 30545 S.E. [illegible] #5

Client Phone: [illegible] 98 [illegible]

Contact Person: Angela 206-222-7746

P.O. No.

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	JOB#	CAN#	NO. OF CONTAINERS	[illegible]					
	2/8	1117-1207			R-1-in-flare #3	5075	661	1	X					TO-14 - Speciated VOC's
		1325-1415			R-2-in-flare #3	5076	418	1	X					by GC/MS
		1630-1720			R-3-in-flare #3	5077	511	1	X					Fixed Gas Analysis
		1117-1207			R-1-out-flare #3	5163	648	1	X					(CH_4, CO_2, O_2, CO)
		1325-1425			R-2-out-flare #3	5164	538	1	X					by GC/MS
		1630-1720			R-3-out-flare #3	5165	564	1	X					

Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*
[signature]	2-10-94 pm				
Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date/Time	Received for Laboratory by: *(Signature)*	Date/Time	Remarks	

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AIR QUALITY, INC.

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EVALUATION

April 6, 1994

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PUGET SOUND AIR POLLUTION
CONTROL AGENCY

Prepared For:

VOLUME II
KING COUNTY SOLID WASTE DIVISION
CEDAR HILLS REGIONAL LANDFILL
GAS COMBUSTOR TESTING
FLARES #1, #2 AND #3
MAPLE VALLEY, WASHINGTON
FEBRUARY 7-10, 1994

Submitted by:

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Project Manager

Kevin P. Orton
Sr. Air Quality Specialist

Angela F. Blaisdell
Sr. Technical Writer

Am Test-Air Quality, Inc.
Preston, Washington

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

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APPENDIX C

Example Calculations

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EXAMPLE CALCULATION OF PSYCHROMETRIC MOISTURE (WET BULB/DRY BULB)

Client: [illegible]

Location: [illegible]

Site: [illegible]

Date: [illegible]

Run: [illegible]

Vapor Pressure (VP) = Sat'd Vapor Pressure (SVP) - $\frac{((P_A - SVP)(td - tw))}{(2800 - 1.3tw)}$

P_A = Absolute pressure in "Hg

= $P_{barometric}$ + (P_{static} / 13.6 "Hg/"H_2O)

= 29.60 "Hg + (4.5 "H_2O / 13.6 "Hg/"H_2O)

P_A = 29.93 "Hg

tw = Wet bulb temperature °F = 76

td = Dry bulb temperature °F = 94

SVP = Saturated Vapor Pressure = 0.9046

$$VP = 0.9046 \text{ SVP} - \frac{((29.93 \text{ "Hg} - 0.9046 \text{SVP}) * (94 \text{ °F} - 76 \text{ °F}))}{(2800 - (1.3 * 76 \text{ °F}))}$$

VP = 0.7112 "Hg

Bws = $\frac{VP}{P_A}$ = $\frac{0.7112 \text{ "Hg}}{29.93 \text{ "Hg}}$ = 0.0238

Percent Moisture (%) = Bws * 100 = 0.0238 * 100

= 2.38

* Oregon DEQ Source Sampling Manual, October 15, 1991

EXAMPLE CALCULATION SHEET
EPA METHODS 1, 2, 3A AND 4

FOR METHOD TO-14

CLIENT: King County Solid Waste LOCATION: Cedar Hills Landfill DATE: 2/8/94

RUN #: 2 LAB #: CK-05192-2 SITE LOCATION: Flare #3 inlet

Dry Gas Volume - Equation 5-1

Vm_{std} = 17.647°R/"$Hg_{(constant)}$ * volume sampled * Y_{factor} * (P_B + $\Delta H/13.6$)/(460 + T_m)

= 17.647°R/"Hg * _____ ft^3 * _____ * (_____ "Hg + (_____ "H_2O/13.6))/(460 + ___ °F)

= N/A dscf

dscm = _____ dscf/35.31 ft^3/m^3 = N/A dscm

Moisture - Equation 5-2 and 5-3

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

B_{ws} = (_____ scf)/(_____ scf + _____ dscf) = [illegible]

% Moisture = 2.38 % = B_{ws} * 100 from psychr. tbl. moisture + 0.16 x (38% CH_4) - 38% CH_4

Molecular weight - Equation 3-2

M_d = 0.440*(44.0 %CO_2) + 0.320*(2.7 %O_2) + 0.280*(100%- 44.0 %CO_2- 2.7 %O_2(%CO + %N_2))

= 30.59 g/g-mole (dry)

M_s = M_d * (1-B_{ws}) + 18.0 * B_{ws} = 30.59 g/g-mole * (1 - 0.0238) + 18.0 g/g-mole * 0.0238

= 30.27 g/g-mole (wet) F_o = (20.9-_____)%O_2/_____ %CO_2 = N/A

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

V_s = 85.49 * C_p * $\sqrt{\Delta P * T_s / (M_s * P_s)}$

V_s = 85.49 * 0.99 * $\sqrt{0.418 * 553.7\ ^\circ R / (30.31\ g/g\text{-}mole * 29.93\ "Hg)}$

(73.7°F + 460)° R; (29.93 P_B + 45 P_s/13.6)

V_s = 42.8 ft/sec (std)

Q_{sd} = 3600 * (1 - B_{ws}) * V_s * A_s * (T_{std}/T_s) * (P_s / P_{std}) / 60 min/hr

Q_{sd} = 3600 * (1 - 0.0238) * 42.8 ft/sec * 0.785 ft^2 * (528° R/553.7° R) * (29.73"Hg / 29.92"Hg) / 60

= 1977.2 dscf/min (dry standard cubic feet per minute)

acfm = 42.8 ft/sec * 0.785 ft^2 * 60 sec/min

= 2019.6 acfm (actual cubic feet per minute)

Isokinetic variation - Equation 5-8

I = 0.09450 * Vm_{std} * T_s ÷ [P_s * V_s * sample time * A_n *(1 - B_{ws})]

I = 0.09450 * _____ dscf * _____ ° R/[_____ "Hg * _____ ft/sec * _____ min * _____ ft^2 *(1 - _____)]

(_____ $N_{dia}/12/2)^2$*Pi

I = N/A %

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

EXAMPLE CALCULATION SHEET
EPA METHODS 1, 2, 3A AND 4

FOR METHOD TO-14

CLIENT: King County Solid Waste & Cedar Hills Landfill LOCATION: Maple Valley, Washington DATE: 2/8/94

RUN #: 2 LAB #: 5164 SITE LOCATION: Flare #3 Outlet

Dry Gas Volume - Equation 5-1

Vm_{std} = 17.647°R/"$Hg_{(constant)}$ * volume sampled * Y_{factor} * (P_B + $\Delta H/13.6$)/(460 + T_m)

= 17.647°R/"Hg* _____ ft^3* _____ *(_____ "Hg + (_____ "H_2O/13.6))/(460 + ___ °F)

= N/A dscf

dscm = N/A dscf/35.31 ft^3/m^3 = _____ dscm

Moisture - Equation 5-2 and 5-3

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

B_{ws} = (_____ scf)/(_____ scf + _____ dscf) = 0.0909

% Moisture = 9.09 % = B_{ws} * 100 from Method 26A

Molecular weight - Equation 3-2

M_d = 0.440*(7.3 %CO_2) + 0.320*(12.6 %O_2) + 0.280*(100%- 7.3 %CO_2- 12.6 %O_2(%CO + %N_2))

= 29.67 g/g-mole (dry)

M_s = M_d * (1-B_{ws}) + 18.0 * B_{ws} = 29.67 g/g-mole * (1 - 0.0909) + 18.0 g/g-mole * 0.0909

= 28.61 g/g-mole (wet) F_o = (20.9-_____)%O_2/_____%CO_2= N/A

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

$V_s = 85.49 * C_p * \sqrt{\Delta P * T_s / (M_s * P_s)}$

V_s = 85.49 * 0.84 * $\sqrt{0.020 * 2127.8°R / (28.61 \text{ g/g-mole} * 29.61 \text{ "Hg})}$

(1667.8° F + 460)° R (29.60 P_B + 0.15 P_s/13.6)

V_s = 16.1 ft/sec (std)

Q_{sd} = 3600 * (1 - B_{ws}) * V_s * A_s * (T_{std}/T_s) * (P_s / P_{std}) / 60 min/hr

Q_{sd} = 3600 * (1 - 0.0909) * 16.1 ft/sec * 103.9 ft^2 * (528° R/2127.8° R) * (29.61 "Hg / 29.92"Hg) / 60

π*138²/4/144

= 22348.1 dscf/min (dry standard cubic feet per minute)

acfm = 16.1 ft/sec * 103.9 ft^2* 60 sec/min

= 100099.8 acfm (actual cubic feet per minute)

Isokinetic variation - Equation 5-8

I = 0.09450 * Vm_{std} * T_s ÷ [P_s * V_s * sample time * A_n *(1 - B_{ws})]

I = 0.09450 * _____ dscf * _____ ° R/[_____ "Hg * _____ ft/sec * _____ min * _____ ft^2 *(1 - _____)]

(____ $N_{dia}/12/2)^2$*Pi

I = N/A %

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

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Example Calculation of Bias Correction

Client: King County Solid Waste **Location:** Cedar Hills Landfill

Site Location: Flare #1 Stack

Run #: 2

Date: 2/19/91

$$C_{gas} = (C - C_o) * (C_{ma}/(C_m - C_o)$$

where:

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

C = Average gas concentration indicated by analyzer, dry basis, ppm

C_o = Average of initial and final system calibration bias check responses for the zero gas, ppm

C_{ma} = Actual concentration of the upscale calibration gas, ppm

C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm

= [82 ppm - 0.2] * [500/(300 - 0.2]

= 91 ppm CO (bias corrected)

Example Calculation of Gaseous Sulfur Dioxide (SO_2) Emissions

Client: King County Solid Waste

Location: Cedar Hills Landfill

Site Location: Flare #1 Outlet

Run #: 2

Date: 2/9/94

Emission Concentration Results

instrument averaged 6.6 ppm sulfur dioxide (SO_2) during the run

$$\_\_\_\_\_ \text{ppm} * \frac{(20.9 - \_\_\_\_\_ \%\ O_2)}{(20.9 - \_\_\_\_\_ \%\ O_2)} = \text{NA} \text{ ppm } SO_2 @ \_\_\_ \%\ O_2$$

$$6.6 \text{ ppm} * [1.660 \times 10^{-7}]^1 = 1.10 \times 10^{-6} \text{ lb/dscf } SO_2$$

[1]Conversion factor from 40 CFR 60, Appendix A, Method 19.

Emission Rate Results

$$1.10 \times 10^{-6} \frac{\text{lb}}{\text{dscf}} * 38597.7 \frac{\text{dscf}}{\text{min}} * 60 \frac{\text{min}}{\text{hr}} = 2.54 \text{ lb/hr } SO_2$$

$$\_\_\_\_\_ \frac{\text{lb}}{\text{hr}} * 24 \frac{\text{hrs}}{\text{day}} * 365 \frac{\text{days}}{\text{yr}} * \frac{1 \text{ ton}}{2000 \text{ lbs}} = \text{NA} \text{ tons/yr } SO_2$$

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Example Calculation of Gaseous Nitrogen Oxides (NO_x) Emissions

Client: King County Solid Waste

Location: Cedar Hills Landfill

Site Location: Flare #1 Outlet

Run #: 2

Date: 2-9-94

Emission Concentration Results

instrument averaged 28.0 ppm nitrogen oxides (NO_x) during the run

$$\_\_\_\_\_ \text{ ppm} * \frac{(20.9 - \_\_\_\_\_ \%\ O_2)}{(20.9 - \_\_\_\_\_ \%\ O_2)} = \text{NA ppm } NO_x \text{ @ } \_\_\_ \%\ O_2$$

$$28.0 \text{ ppm} * [1.194 \times 10^{-7}]^{1} = 3.3 \times 10^{-6} \text{ lb/dscf } NO_x$$

[1]Conversion factor from 40 CFR 60, Appendix A, Method 19.

Emission Rate Results

$$3.3 \times 10^{-6} \frac{\text{lb}}{\text{dscf}} * 38597.7 \frac{\text{dscf}}{\text{min}} * 60 \frac{\text{min}}{\text{hr}} = 7.74 \text{ lb/hr } NO_x$$

$$\_\_\_\_\_ \frac{\text{lb}}{\text{hr}} * 24 \frac{\text{hrs}}{\text{day}} * 365 \frac{\text{days}}{\text{yr}} * \frac{1 \text{ ton}}{2000 \text{ lbs}} = \text{NA tons/yr } NO_x$$

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Example Calculation of Gaseous Carbon Monoxide (CO) Emissions

Client: King County Solid Waste

Location: Cedar Hills Landfill

Site Location: Flare #1 Outlet

Run #: 2

Date: 2-9-94

Emission Concentration Results

instrument averaged 81 ppm carbon monoxide (CO) during the run

$$\_\_\_\_\_ \text{ppm} * \frac{(20.9 - \_\_\_\_\_ \%\ O_2)}{(20.9 - \_\_\_\_\_ \%\ O_2)} = \text{NA} \text{ ppm CO @ } \_\_\_ \%\ O_2$$

$$81 \text{ ppm} * \frac{28.01 \text{ g/g-mole}}{22.414 \text{ L/g-mole}} * \frac{273.15 \text{ °K}}{293.15 \text{ °K}} * \frac{1000 \text{ l}}{1 \text{ m}^3} * \frac{1}{10^6 \text{ ppm}} = 0.094 \text{ g/m}^3 \text{ CO}$$

Emission Rate Results

$$0.094 \text{ g/m}^3 * \frac{1 \text{ m}^3}{35.31 \text{ ft}^3} * \frac{32597.7 \text{ dscf}}{\text{min}} * 60 \frac{\text{min}}{\text{hr}} * \frac{1 \text{ lb}}{453.6 \text{ g}} = 13.6 \text{ lb/hr CO}$$

$$\_\_\_\_\_ \frac{\text{lb}}{\text{hr}} * 24 \frac{\text{hrs}}{\text{day}} * 365 \frac{\text{days}}{\text{yr}} * \frac{1 \text{ ton}}{2000 \text{ lbs}} = \text{NA} \text{ tons/yr CO}$$

EXAMPLE CALCULATION SHEET
EPA METHODS 1, 2, 3A AND 4

FOR METHOD 26A

CLIENT: King County Solid Waste LOCATION: Cedar Hills Landfill DATE: 5/3/94

RUN #: 2 LAB #: 5073 SITE LOCATION: Flare #3 Outlet

Dry Gas Volume - Equation 5-1

Vm_{std} = 17.647°R/"Hg(constant)*volume sampled*Yfactor*(P_B + ΔH/13.6)/(460 + T_m)

= 17.647°R/"Hg* 40.444 ft³* 0.991 *(29.60"Hg + (1.573 "H_2O/13.6))/(460 + 53.9° F)

= 40.914 dscf

dscm = 40.914 dscf/35.31 ft³/m³ = 1.159 dscm

Moisture - Equation 5-2 and 5-3

Vw_{std} = 0.04715 ft³/g * 86.9 grams of H_2O collected in impingers = 4.09 scf

B_{ws} = (4.09 scf)/(4.09 scf + 40.914 dscf) = 0.0909

% Moisture = 9.09 % = B_{ws} * 100

Molecular weight - Equation 3-2

M_d = 0.440*(7.3 %CO_2)+0.320*(12.6 %O_2)+0.280*(100%-7.3 %CO_2-12.6 %O_2(%CO+%N_2))

= 29.67 g/g-mole (dry)

M_s = M_d * (1-B_{ws}) + 18.0 * B_{ws} = 29.67 g/g-mole * (1 - 0.0909) + 18.0 g/g-mole * 0.0909

= 28.61 g/g-mole (wet) F_o = (20.9-12.6)%O_2/ 7.3 %CO_2= 1.14

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

V_s = 85.49 * Cp* $\sqrt{\Delta P * T_s / (M_s * P_s)}$

V_s = 85.49 * 0.84 *$\sqrt{0.021 * 2155.9 \text{ °R} / (28.61 \text{ g/g-mole} * 29.61 \text{ "Hg})}$

(1695.9° F + 460)° R (29.60 P_B+ .15 P_s/13.6)

V_s = 16.5 ft/sec (std)

Q_{sd} = 3600 * (1 - B_{ws}) * V_s * A_s * (T_{std}/T_s) * (P_s / P_{std}) / 60 min/hr

Q_{sd} = 3600 * (1 - 0.0909) * 16.5 ft/sec * 103.9 ft² * (528° R/ 2155.9° R) * (29.61 "Hg / 29.92"Hg) / 60

= 22,863.1 dscf/min (dry standard cubic feet per minute)

acfm = 16.5 ft/sec * 0.0 ft²* 60 sec/min

= 0.0 acfm (actual cubic feet per minute)

Isokinetic variation - Equation 5-8

I = 0.09450 * Vm_{std} * T_s ÷ [P_s * V_s * sample time * A_n *(1 -B_{ws})]

I = 0.09450 * 40.914 dscf * 2155.9° R/[29.61 "Hg * 16.5 ft/sec * 60 min * 0.0032 ft² *(1 - 0.0909)]

(.765 Ndia/12/2)²*Pi

I = 98 %

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

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SAMPLE CALCULATION SHEET
HYDROCHLORIC ACID (HCl)

CLIENT: King [illegible]

LOCATION: Cedar Hills Land. II

DATE OF TEST: 2/3/94

RUN #: 2 - 5073

Concentration of Hydrochloric Acid (HCl)

$$\text{mg/dscm} = \frac{3910\ \mu g}{40914\ \text{dscm}} * \frac{1\ \text{mg}}{1000\ \mu g} * \frac{36.46\ \text{g/g-mole (MW HCl)}}{35.45\ \text{g/g-mole (MW Cl)}}$$

$$= 3.47\ \text{mg/dscm}$$

$$\text{ppm} = \frac{3.47\ \text{mg/dscm} * 22.414\ \text{l/g-mole}}{36.46\ \text{g/g-mole}} * \frac{293.15°K}{273.15°K} * \frac{1\ \text{g}}{10^3\ \text{mg}} * \frac{1\ \text{m}^3}{10^3\ \text{l}} * 10^6\ \text{ppm}$$

$$= 2.09\ \text{ppm}$$

$$\text{ppm @ 7\% } O_2 = 2.09\ \text{ppm} * \frac{(20.9 - 7\%\ O_2)}{(20.9 - 12.6\%\ O_2)}$$

$$= 3.33\ \text{ppm @ 7\% } O_2$$

Emission Rate of Hydrochloric Acid (HCl)

$$\text{g/min} = \frac{\_\_\_\_\ \mu g}{\_\_\_\_\ \text{dscf}} * \_\_\_\_\ \text{dscf/min} * \frac{1\ \text{mg}}{1000\ \mu g} * \frac{1\ \text{gram}}{1000\ \text{mg}}$$

$$= \text{NA g/min}$$

$$\text{lb/hr} = \frac{3.47\ \text{mg/dscm} * 1\ \text{m}^3}{35.31\ \text{ft}^3} * 22663.1\ \text{dscf/min} * \frac{1\ \text{lb}}{453600\ \text{mg}} * 60\ \text{min/hr}$$

$$= 0.295\ \text{lb/hr}$$

$$\text{tons/year} = \_\_\_\_\ \text{lb/hr} * 1\ \text{ton}/2000\ \text{lb} * 24\ \text{hr/day} * 365\ \text{days/yr}$$

$$= \text{NA tons/yr}$$

EXAMPLE CALCULATION OF TO-14 RESULTS

Client: King County Solid Waste
Location: [illegible] Landfill
Site Location: [illegible] #3

Date: 2/8/94
Lab #: CK-[illegible]-2
Run #: 2

EXAMPLE COMPOUND: Acetone

EMISSION RATE (mg/min)

$$\frac{mg}{min} = \frac{ug}{m3} \times \frac{m3}{35.31\ ft3} \times \frac{dscf}{min} \times \frac{1\ mg}{1000\ ug}$$

17 mg/m³ = 17000 µg/m³

$$= 17000\ \frac{ug}{m3} \times \frac{m3}{35.31\ ft3} \times 1877.2\ \frac{dscf}{min} \times \frac{1\ mg}{1000\ ug}$$

$$= 903.8\ \frac{mg}{min}$$

DESTRUCTION EFFICIENCY

$$DE = \frac{\text{Average Inlet Rate - Average Outlet Rate}}{\text{Average Inlet Rate}} \times 100\%$$

$$= \frac{762.7\ \frac{mg}{min} - 73.2\ \frac{mg}{min}}{762.7\ \frac{mg}{min}} \times 100\%$$

$$= 90.40\ \%$$

RETENTION TIME (seconds)

Length of Combustion Zone = 30 feet to test port
Area of Combustion Zone = 103.9 ft2
Average Airflow at Test Port = 112383.6 acfm

$$\text{Seconds of Retention} = \frac{\text{Area X Length X 60 s/min}}{\text{Airflow}}$$

$$= \frac{103.9\ ft2 \times 30\ ft \times 60\ s/min}{112383.6\ acfm}$$

= 1.7 seconds @ 1679.1 °F

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APPENDIX D

Field Data Sheets

STACK SCHEMATIC AND LOCATION OF SAMPLE POINTS

225

Client King County

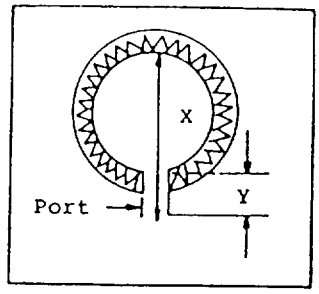
Location Cedar Hills Landfill

Sampling Location Flare #1 Inlet

Inside of far wall to outside of port (distance, X) 13.5"

Inside of near wall to outside of port (distance, Y) 1.5"

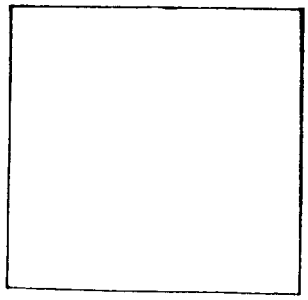
Stack I.D. (distance X - distance Y) 12"

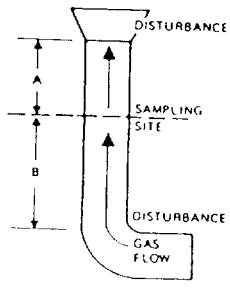


Schematic of Sampling Location

1 Traverse Point #	2 Fractional Percent of Stack I.D.	3 Stack I.D. inches	4 Column 2 x 3	5 Distance Y	6 Traverse Point Location from Outside of Port columns 4 + 5
1	4.4	12"	1	1.5"	2.5
2	14.6	↓	1.75	↓	3.25
3	29.6		3.55		5.0
4	70.4		8.5		10.0
5	85.4		10.25		11.75
6	95.6	↓	11	↓	12.5
7					
8					
9					
10					
11					
12					

CROSS SECTION

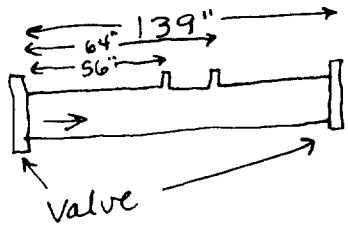




Distance A = 94" *downstream*

Distance B = 56" *upstream*

STACK, CONTROL DEVICE AND PROCESS FLOW DIAGRAM



METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

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Client: King Co. Landfill
Location: Cedar Hills
Sample Site: Flare Stack #1 Inlet
Stack Diameter: 120"
Date: 2-9-94
Operators: KPO, GLL
Run I.D.: R-1 Flows

QA FORMS COMPLETED

Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Start Time: 11:16
Stop Time: 11:26
Barometric Pressure "Hg: 29.55
Static Pres "H_2O: 10.0
Production Rate: Set Point @ 1600°F

EQUIPMENT CHECKS

	Initial	Final
Leak Rate cfm	0	0
Leak Test Vacuum	0	0

✓ Pitots, Pre Leak Ck
✓ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

Filter # ___ Box # ___

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.			
#2 Imp.			
#3 Imp.			
#4 Imp.			
#5 Imp.			
#6 S.G.			

Total H_2O Volume ___ g

SAMPLING PARAMETERS

% Moisture ___
Meter Temp. ___
Stack Temp. ___
△ H@ ___ Y ___
Meter Box ID: Backmag
Pitot #: S-24 Side #: A
Thermocouple ID ___
Flow Meas. Device: MAL
Cp: .99
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								TOP 1	.92	92	Out 78
								2	.921	93	Dry 94
								3	1.0	94	
								4	.98	94	
								5	.95	95	
								6	.95	95	
			THIER STACK								
			TEMP. T/C								
		11:01	1615°F								
		11:16	1607.								
		11:31	1632								
		11:46	1621								
		12:01									
			1618.6 △H		Tm				(△ P)²	93.8 Ts	

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Client King Co. Landfill
Location Cedar Hills
Sample Site Flare Stack #1 Inlet
Stack Diameter 12.0"
Date 2-9-94
Operators KPU, GRL
Run I.D. R-2' Flows

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	0 / 0
Leak Test Vacuum	0 / 0
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
___ Gas Sampling System	
___ Integrated Bag	
___ Thermocouples @ ___ °F	

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ___ Box # ___

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.			
#2 Imp.			
#3 Imp.			
#4 Imp.			
#5 Imp.			
#6 S.G.			

Total H_2O Volume ___ g

Start Time 13:10
Stop Time 13:20
Barometric Pressure "Hg 29.55
Static Pres "H_2O 10.0"
Production Rate ___

SAMPLING PARAMETERS

% Moisture ___
Meter Temp. ___
Stack Temp. ___
△ H@ ___ Y ___
Meter Box ID Black Mag
Pitot # S-24 Side # 4
Thermocouple ID [illegible]
Flow Meas. Device Mag
Cp 0.99
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								TOP 1	.92	93	WET-83
								2	.93	94	DRY .99
								3	.97	95	
								4	.95	95	
								5	.95	94	
			THIER					6	.93	95	
			STACK TEMP								
			TC °F								
		13:07	1615								
		13:22	1649								
		13:37	1639								
		13:52	1621								
			1631.0 △H		Tm				(△ P)²	94.3 ✓ Ts	

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Client KMC COLANDFILLS
Location CEDAR HILLS
Sample Site FLARE STACK #1 INLET
Stack Diameter 12.0"
Date 2-5-14
Operators KDO EXC
Run I.D. R-3 FLOWS

EQUIPMENT CHECKS

	Initial	Final
Leak Rate cfm	0	0
Leak Test Vacuum	0	0
✓ Pitots, Pre Leak Ck		
✓ Pitots, Post Leak Ck		
___ Gas Sampling System		
___ Integrated Bag		
___ Thermocouples @ ___ °F		

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # _____ Box # _____

	Final Wt. gram		Initial Wt. gram		Net Wt. gram
#1 Imp.		-		=	
#2 Imp.		-		=	
#3 Imp.		-		=	
#4 Imp.		-		=	
#5 Imp.		-		=	
#6 S.G.		-		=	

Total H_2O Volume _____ g

Start Time 15:10
Stop Time 15:20
Barometric Pressure "Hg 29.32
Static Pres "H_2O 10.0
Production Rate _____

SAMPLING PARAMETERS

% Moisture _____
Meter Temp. _____
Stack Temp. _____
△H@ 0 Y 0
Meter Box ID BLACK MAC
Pitot # S-24 Side # A
Thermocouple ID _____
Flow Meas. Device MAG
Cp 0.99
K Factor _____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								TOP 1	.96	93	WET-80
								2	.95	94	DRY-96
								3	.95	95	
								4	.95	96	
								5	.95	95	
								6	.95	96	
			THICK								
			STACK TEMP								
			~~96~~ °F								
		15:07	1583								
		15:22	1596								
		15:37	1628								
		15:52	1664								
		16:07									
			1618.8 △H		Tm				(△P)²	94.8 Ts	

KDO

STACK SCHEMATIC AND LOCATION OF SAMPLE POINTS

Client King County / Cedar Hills Landfill

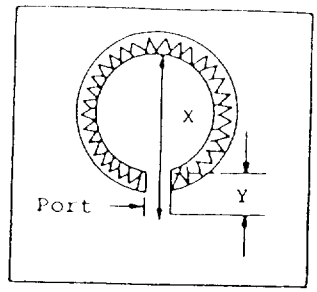
Location Maple Valley, WA

Sampling Location Landfill Flare Stacks Flares #1 #2, #3

Inside of far wall to outside of port (distance, X) 145.5" All 3 have same dimension

Inside of near wall to outside of port (distance, Y) 7.5"

Stack I.D. (distance X - distance Y) 138.0"

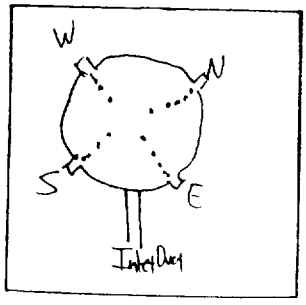


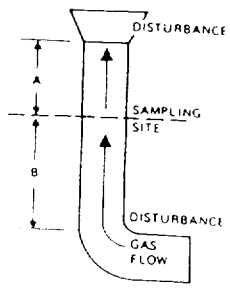
Schematic of Sampling Location

King County – Cedar Hills Traverse Points

1 Traverse Point #	2 Fractional Percent of Stack I.D.	3 Stack I.D. inches	4 Column 2 x 3	5 Distance Y	6 Traverse Point Location from Outside of Port columns 4 + 5
1	2.1%	138"	2.9	7.5"	10.4"
2	6.7%	↓	9.3	↓	16.8"
3	11.8%		16.3		23.8"
4	17.7%		24.4		31.9"
5	25.0%		34.5		42.0"
6	35.6%	↓	49.1	↓	56.6"
7					
8					
9					
10					
11					
12					

CROSS SECTION

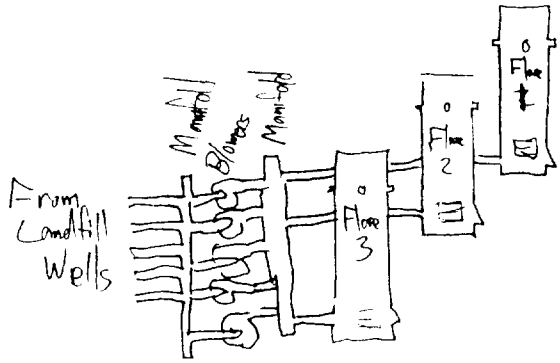




Distance A = 6.0 feet downstream

Distance B = 30.0 feet upstream

STACK, CONTROL DEVICE AND PROCESS FLOW DIAGRAM



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METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

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Client KING COUNTY
Location CEDAR HILLS
Sample Site FLARE #1 OUTLET
Stack Diameter 138.0"
Date 2-9-94
Operators KPC CRL
Run I.D. R-1 FLOWS

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	___/___
Leak Test Vacuum	___/___
___ Pitots, Pre Leak Ck	
___ Pitots, Post Leak Ck	
___ Gas Sampling System	
___ Integrated Bag	
T9B Thermocouples @ ___ °F	

QA FORMS COMPLETED
Stack Schematic ___
Sample Train ___
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter #_____ Box #_____

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	___	- ___ =	___
#2 Imp.	___	- ___ =	___
#3 Imp.	___	- ___ =	___
#4 Imp.	___	- ___ =	___
#5 Imp.	___	- ___ =	___
#6 S.G.	___	- ___ =	___

Total H_2O Volume _____ g

Start Time 09:55
Stop Time 10:15
Barometric Pressure "Hg 29.55
Static Pres "H_2O .14
Production Rate _____

SAMPLING PARAMETERS

% Moisture _____
Meter Temp. _____
Stack Temp. _____
△ H@ _____ Y _____
Meter Box ID BMG MNG
Pitot # P9A Side # A
Thermocouple ID T9B
Flow Meas. Device MAG
Cp 0.84
K Factor _____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								SE 6	.06	1672	
								5	.055	1690	
								4	.05	1710	
								3	.07	1754	CO_2 - 9.4 %
								2	.045	1765	O_2 - 10.5 %
								1	.025	1730	CO - 15 ppm
								SW 6	.055	1716	
								5	.05	1714	
								4	.045	1669	
								3	.055	1662	
								2	.04	1644	
								(X) 1	.03	1652	
								SW 6	.055	1660	
								5	.06	1664	
								4	.06	1664	
								3	.06	1669	
								2	.065	1678	
								1	.05	1682	
								NW 6	.055	1676	
								5	.065	1676	
								4	.065	1679	
								3	.06	1701	
								2	.05	1688	
								1	.04	1670	
			△ H		T_m				$(\Delta P)^2$	1690.7 T_s	

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METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

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Client KING CO LANDFILL
Location CEDAR HILLS
Sample Site FLARE STACK #1 OUTLET
Stack Diameter 138.0"
Date 2-9-94
Operators KPO CRC
Run I.D. R-2 FLOWS

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	0 / 0
Leak Test Vacuum	C / C
✓ Pitots, Pre Leak Ck	
___ Pitots, Post Leak Ck	
___ Gas Sampling System	
___ Integrated Bag	
___ Thermocouples @ ___ °F	

QA FORMS COMPLETED

Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # _____ Box # _____

	Final Wt. gram		Initial Wt. gram		Net Wt. gram
#1 Imp.		-		=	
#2 Imp.		-		=	
#3 Imp.		-		=	
#4 Imp.		-		=	
#5 Imp.		-		=	
#6 S.G.		-		=	

Total H_2O Volume _____ g

Start Time 12:45
Stop Time 13:05
Barometric Pressure "Hg 29.55
Static Pres "H_2O .13
Production Rate _____

SAMPLING PARAMETERS

% Moisture _____
Meter Temp. _____
Stack Temp. _____
△ H@ _____ Y _____
Meter Box ID BLACK MAC
Pitot # PGA Side # A
Thermocouple ID TGB
Flow Meas. Device MAC
Cp 0.84
K Factor _____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								NE 6	.07	1639	
								5	.065	1646	
								4	.07	1662	CO_2 - 7.8%
								3	.06	1630	O_2 - 12.0%
								2	.06	1651	CO - 81
								SW 1	.04	1596	
								6	.065	1666	
								5	.07	1655	
								4	.07	1669	
								3	.06	1662	
								2	.05	1623 → 1633	
								1	.035	1607	
								NW 6	.06	1658	
								5	.06	1650	
								4	.065	1663	
								3	.065	1696	
								2	.055	1669	
								1	.035	1620	
								SE 6	.055	1654	
								5	.06	1663	
								4	.06	1665	
								3	.05	1649	
								2	.06	1650	
								1	.01	1631	
										1649.0 ✓	
			△ H		T_m				$(\Delta p)^2$	T_s	

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METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

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Client KING Co. LANDFILL
Location CEDAR HILLS
Sample Site FLARE STACK #7 OUTLET
Stack Diameter 138.0"
Date 2-9-94
Operators KP, ERL
Run I.D. R-3 FLOWS

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	0 / 0
Leak Test Vacuum	0 / 0
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
___ Gas Sampling System	
___ Integrated Bag	
___ Thermocouples @ ___ °F	

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # _____ Box # _____

	Final Wt. gram		Initial Wt. gram		Net Wt. gram
#1 Imp.		-		=	
#2 Imp.		-		=	
#3 Imp.		-		=	
#4 Imp.		-		=	
#5 Imp.		-		=	
#6 S.G.		-		=	

Total H_2O Volume _____ g

Start Time 14:45
Stop Time 15:05
Barometric Pressure "Hg 29.92
Static Pres "H_2O .14
Production Rate _____

SAMPLING PARAMETERS

% Moisture _____
Meter Temp. _____
Stack Temp. _____
△ H@ _____ Y _____
Meter Box ID BLACK MAC
Pitot # 99A Side # A
Thermocouple ID T9B
Flow Meas. Device ~~ORIFICE~~
Cp 0.84
K Factor _____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								W 6	.05	1708	
								5	.06	1715	CO_2 7.6%
								4	.05	1703	O_2 12.4%
								3	.04	1698	CO 73 ppm
								2	.03	1714	
								1	.02	1651	
								NW 6	.05	1690	
								5	.045	1703	
								4	.04	1716	
								3	.03	1711	
								2	.035	1698	
								1	.025	1682	
								NE 6	.07	1694	
								5	.06	1660	
								4	.07	1663	
								3	.07	1694	
								2	.06	1678	
								1	.03	1592	
								NE 6	.07		
								5	.065		
								4	.065		
								3	.06		
								2	.06		
								1	.04		
			△ H		T_m				$(\Delta P)^2$	1681.7 T_s	

GAS LOG MEASUREMENT DATA

FILE NAME: LB600\CH#1GAS
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SAMPLE SITE: FLARE STACK #1
SAMPLE DATE: FEBRUARY 9, 1994

TIME	NITROGEN OXIDES (ppm)	SULFUR DIOXIDE (ppm)	CARBON MONOXIDE (ppm)	CARBON DIOXIDE (%)	OXYGEN (%)
RUN 1 - 11:01-12:01					
11:01:00	20.9	6.0	11	9.3	10.4
11:02:00	19.1	5.9	14	9.0	11.0
11:03:00	20.0	5.8	18	8.8	10.8
11:04:00	20.3	5.9	21	9.1	10.8
11:05:00	20.1	5.8	27	9.0	10.7
11:06:00	20.9	5.9	24	9.1	10.7
11:07:00	21.0	5.9	8	9.3	10.3
11:08:00	20.8	5.9	18	9.4	10.5
11:09:00	20.5	6.1	21	9.2	10.6
11:10:00	20.1	5.9	16	9.2	10.7
11:11:00	19.4	5.9	26	9.0	10.9
11:12:00	20.1	5.8	30	8.8	10.8
11:13:00	21.1	5.9	13	9.2	10.5
11:14:00	20.1	5.8	22	9.3	10.7
11:15:00	20.8	5.8	17	9.1	10.6
11:16:00	20.4	5.7	17	9.2	10.7
11:17:00	19.9	5.6	22	9.2	10.6
11:18:00	19.8	5.5	37	9.1	10.9
11:19:00	19.5	5.5	26	8.9	10.8
11:20:00	20.3	5.2	39	8.9	11.0
11:21:00	20.5	5.2	19	9.0	10.6
11:22:00	19.4	5.2	18	9.1	10.7
11:23:00	20.6	5.1	10	9.0	10.6
11:24:00	19.9	5.1	12	9.2	10.6
11:25:00	20.0	4.9	16	9.1	10.8
11:26:00	21.3	5.1	6	9.1	10.4
11:27:00	20.1	5.1	14	9.3	10.5
11:28:00	21.9	5.0	15	9.2	10.5
11:29:00	20.9	5.2	6	9.6	10.2
11:30:00	21.1	5.1	15	9.0	10.3
11:31:00	21.1	5.2	9	9.4	10.3
11:32:00	20.8	5.1	8	9.5	10.3
11:33:00	20.0	5.1	15	9.3	10.6
11:34:00	21.4	5.0	11	9.2	10.6
11:35:00	21.5	5.2	7	9.4	10.2
11:36:00	21.6	5.3	6	9.6	10.1
11:37:00	22.0	5.4	3	9.7	9.8
11:38:00	21.5	5.4	7	9.3	10.3
11:39:00	21.6	5.2	10	9.3	10.4

11:40:00	21.4	5.3	14	9.5	10.0
11:41:00	21.8	5.2	3	9.4	10.2
11:42:00	21.5	5.4	8	9.5	10.1
11:43:00	21.1	5.2	7	9.4	10.3
11:44:00	21.1	5.3	10	9.4	10.3
11:45:00	21.0	5.4	15	9.4	10.1
11:46:00	20.8	5.2	19	9.2	10.5
11:47:00	20.5	5.4	12	9.2	10.3
11:48:00	19.3	5.3	14	9.1	10.8
11:49:00	20.6	5.0	24	8.9	10.7
11:50:00	20.0	5.2	16	9.0	10.5
11:51:00	19.5	5.0	19	9.0	10.8
11:52:00	20.3	4.8	25	8.9	10.7
11:53:00	20.6	5.1	15	9.0	10.3
11:54:00	20.4	5.2	11	9.1	10.5
11:55:00	20.1	4.9	9	9.0	10.6
11:56:00	19.9	4.9	17	9.0	10.6
11:57:00	19.6	5.0	20	9.0	10.8
11:58:00	20.3	4.8	18	8.9	10.8
11:59:00	20.4	4.9	19	9.0	10.4
12:00:00	20.9	4.6	15	9.2	10.4
12:01:00	19.4	4.7	12	8.9	10.7
AVERAGE RUN 1	20.5	5.3	15	9.2	10.5
	(ppm)	(ppm)	(ppm)	(%)	(%)
	NITROGEN OXIDES	SULFUR DIOXIDE	CARBON MONOXIDE	CARBON DIOXIDE	OXYGEN

TIME	NITROGEN OXIDES (ppm)	SULFUR DIOXIDE (ppm)	CARBON MONOXIDE (ppm)	CARBON DIOXIDE (%)	OXYGEN (%)
RUN 2 - 13:07-14:07					
13:07:00	26.3	7.2	117	7.6	12.5
13:08:00	27.1	7.1	137	7.3	12.4
13:09:00	27.1	7.2	137	7.4	12.4
13:10:00	28.0	7.0	76	7.6	12.1
13:11:00	30.5	7.2	70	7.7	11.9
13:12:00	29.0	7.2	63	8.1	11.7
13:13:00	29.5	7.2	97	8.0	11.9
13:14:00	28.5	7.4	79	8.0	11.7
13:15:00	30.9	7.2	68	7.9	11.7
13:16:00	27.5	7.3	73	8.3	11.6
13:17:00	30.8	7.3	74	7.5	12.2
13:18:00	28.3	7.3	46	8.2	11.5
13:19:00	28.6	7.2	54	7.9	11.8
13:20:00	29.1	7.3	67	7.8	12.0
13:21:00	28.3	7.3	95	7.8	12.1
13:22:00	27.3	7.2	138	7.4	12.4
13:23:00	27.6	7.1	131	7.4	12.4
13:24:00	28.0	7.1	108	7.6	12.2
13:25:00	27.4	6.9	101	7.4	12.6
13:26:00	27.4	7.0	106	7.5	12.1
13:27:00	27.4	6.9	157	7.1	12.7
13:28:00	26.6	6.9	125	7.4	12.5
13:29:00	28.1	6.9	131	7.4	12.2
13:30:00	28.8	6.9	88	7.7	12.0
13:31:00	27.0	6.9	120	7.6	12.4
13:32:00	25.9	6.8	150	7.2	12.6
13:33:00	29.4	6.8	110	7.4	12.2
13:34:00	28.1	6.9	104	7.8	12.3
13:35:00	28.3	6.9	67	7.3	12.2
13:36:00	28.3	7.0	94	7.6	12.2
13:37:00	27.4	7.0	80	7.5	12.4
13:38:00	27.8	6.9	75	7.5	12.2
13:39:00	29.6	6.9	105	7.5	12.1
13:40:00	28.8	7.0	53	8.1	11.8
13:41:00	29.4	6.9	73	7.9	12.0
13:42:00	31.9	6.9	53	8.1	11.6
13:43:00	33.9	7.1	17	8.7	10.9
13:44:00	30.3	7.2	28	8.5	11.3
13:45:00	28.0	7.0	41	8.2	11.9
13:46:00	30.1	6.9	73	7.7	12.1
13:47:00	33.0	7.0	25	8.4	11.2
13:48:00	32.0	7.1	24	8.6	11.3
13:49:00	34.4	7.2	22	8.6	11.0
13:50:00	34.0	7.3	14	9.0	10.8
13:51:00	33.4	7.2	25	8.8	11.2
13:52:00	27.6	7.2	58	8.3	11.8
13:53:00	28.6	7.0	108	7.7	12.1
13:54:00	33.8	7.0	39	8.1	11.3
13:55:00	31.4	7.0	30	8.8	11.1
13:56:00	28.3	7.0	65	8.3	11.7
13:57:00	28.1	6.9	92	7.7	12.1
13:58:00	30.9	6.9	86	7.9	11.8

13:59:00	27.9	6.8	65	8.0	12.0
14:00:00	30.3	6.8	133	7.6	12.3
14:01:00	28.5	6.9	58	8.1	11.8
14:02:00	28.9	6.8	91	7.7	12.1
14:03:00	26.8	6.7	98	7.6	12.4
14:04:00	26.3	6.6	90	7.4	12.4
14:05:00	27.0	6.6	115	7.5	12.4
14:06:00	27.0	6.5	130	7.4	12.6
14:07:00	30.4	6.5	91	7.6	12.2
AVERAGE RUN 2	29.0	7.0	82	7.8	12.0
	(ppm)	(ppm)	(ppm)	(%)	(%)
	NITROGEN OXIDES	SULFUR DIOXIDE	CARBON MONOXIDE	CARBON DIOXIDE	OXYGEN

TIME	NITROGEN OXIDES (ppm)	SULFUR DIOXIDE (ppm)	CARBON MONOXIDE (ppm)	CARBON DIOXIDE (%)	OXYGEN (%)
RUN 3 - 15:07-16:07					
15:07:00	15.5	5.0	121	7.3	12.8
15:08:00	15.9	5.0	107	7.2	12.8
15:09:00	15.5	5.1	71	7.5	12.4
15:10:00	15.1	4.9	133	7.1	13.0
15:11:00	16.0	5.0	81	7.1	12.7
15:12:00	16.5	4.9	63	7.3	12.6
15:13:00	17.3	5.0	23	7.9	11.9
15:14:00	15.9	5.0	33	7.7	12.4
15:15:00	16.9	5.0	43	7.6	12.4
15:16:00	14.1	5.0	163	7.2	13.1
15:17:00	13.9	4.8	189	6.7	13.3
15:18:00	15.3	4.8	194	6.9	13.0
15:19:00	14.0	4.9	198	7.1	13.0
15:20:00	15.6	4.8	227	6.8	13.1
15:21:00	15.0	4.8	163	7.1	12.9
15:22:00	15.8	4.9	107	7.0	12.6
15:23:00	16.5	4.9	90	7.5	12.6
15:24:00	16.0	4.9	101	7.4	12.6
15:25:00	14.6	5.0	105	7.3	12.9
15:26:00	15.6	4.8	159	7.1	12.8
15:27:00	16.1	4.9	72	7.4	12.6
15:28:00	16.3	4.9	74	7.3	12.5
15:29:00	15.5	4.9	108	7.2	12.8
15:30:00	15.6	5.0	107	7.2	12.6
15:31:00	15.8	4.9	102	7.1	12.8
15:32:00	17.0	4.9	81	7.2	12.5
15:33:00	17.9	4.9	53	7.8	12.0
15:34:00	16.1	5.1	49	7.8	12.1
15:35:00	17.9	5.1	37	7.5	12.4
15:36:00	17.0	5.1	32	8.0	11.9
15:37:00	16.5	5.0	32	7.6	12.4
15:38:00	16.6	5.0	39	7.4	12.6
15:39:00	16.0	5.1	61	7.4	12.6
15:40:00	17.3	5.1	44	7.5	12.3
15:41:00	17.4	5.1	60	7.7	12.3
15:42:00	17.3	5.2	48	7.9	12.0
15:43:00	17.8	5.2	50	7.9	12.0
15:44:00	17.5	5.3	33	7.8	12.2
15:45:00	18.4	5.1	34	8.0	11.7
15:46:00	17.0	5.3	42	8.1	12.0
15:47:00	16.6	5.2	64	7.6	12.3
15:48:00	17.5	5.4	45	7.6	12.2
15:49:00	16.4	5.3	38	7.7	12.2
15:50:00	16.8	5.3	73	7.5	12.5
15:51:00	16.3	5.3	83	7.4	12.5
15:52:00	17.3	5.3	62	7.7	12.1
15:53:00	16.8	5.1	84	7.5	12.5
15:54:00	17.3	5.2	42	7.7	12.0
15:55:00	17.1	5.2	59	7.6	12.6
15:56:00	18.6	5.3	27	8.1	11.6
15:57:00	16.8	5.3	31	8.2	12.0
15:58:00	17.3	5.2	65	7.6	12.3

15:59:00	18.1	5.3	35	7.7	12.0
16:00:00	16.0	5.3	68	7.7	12.4
16:01:00	16.6	5.3	89	7.3	12.8
16:02:00	20.9	5.3	23	8.1	11.3
16:03:00	19.1	5.3	4	8.8	11.0
16:04:00	17.8	5.4	23	8.3	11.9
16:05:00	19.6	5.3	14	8.2	11.5
16:06:00	17.9	5.3	13	8.3	11.7
16:07:00	17.5	5.3	32	8.2	11.9
AVERAGE RUN 3	16.7	5.1	74	7.6	12.4
	(ppm)	(ppm)	(ppm)	(%)	(%)
	NITROGEN OXIDES	SULFUR DIOXIDE	CARBON MONOXIDE	CARBON DIOXIDE	OXYGEN

SAMPLING SYSTEM BIAS CHECK

Am Test-Air Quality, Inc.

AMTEST AIR QUALITY, INC

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CLIENT: King Co. Landfill

LOCATION: CEDAR HILLS

SITE LOCATION: Flare Sta Flare Stack #1 Outlet -

DATE: 2-9-94

RUN # 1 CONDITION:

START: 11:01
STOP: 12:01

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	5.8	6.0	0-25 %		✓
Oxygen (O2)	%	0.0	0.1	15.0	15.0	14.91	0-25 %		✓
Carbon Monoxide (CO)	ppm	0.0	+0.4	302.0	288.0	300.0	0-1000 PPM		✓
Sulfur Dioxide (SO2)	ppm	0.0	-1.8	50.8	47.0	50.7	0-100 PPM		✓
Nitrogen Oxides (NOx)	ppm	0.0	0.0	49.0	47.0	49.0	0-100 PPM		✓
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 2 CONDITION:

START: 13:07
STOP: 14:07

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.0	6.0	0-25 %		✓
Oxygen (O2)	%	0.0	0.1	15.0	15.0	14.98	0-25 %		✓
Carbon Monoxide (CO)	ppm	0.0	0.3	300.0	304.0	300.0	0-1000 PPM		✓
Sulfur Dioxide (SO2)	ppm	0.0	0.6	51.0	53.0	50.7	0-100 PPM		✓
Nitrogen Oxides (NOx)	ppm	0.0	0.2	50.0	51.5	49.0	0-100 PPM		✓
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 3 CONDITION:

START: 15:07
STOP: 16:07

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.0	6.0	0-25 %		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.0	0-25 %		✓
Carbon Monoxide (CO)	ppm	0.0	0.4	300.0	306.0	300.0	0-1000 PPM		✓
Sulfur Dioxide (SO2)	ppm	0.0	-.04	50.8	52.9	50.7	0-100 PPM		✓
Nitrogen Oxides (NOx)	ppm	0.0	.02	49.0	48.3	49.0	0-100 PPM		✓
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

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TRAVERSE SAMPLING DATA SHEET

Page ___ of ___ 2A0

Client KING CO LANDFILL
Location COEDAR HILLS
Sample Site FLARE STACK #1 OUTLET
Stack Diameter 138.0"
Date 2-5-94
Operators KDO URC
Run I.D. R-1 M-26A

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.005 / .009
Leak Test Vacuum	15.0 / 16.0"
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
___ Gas Sampling System	
___ Integrated Bag	
___ Thermocouples @ ___ °F	

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ___ Box # R-1

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	622.8	612.6	10.2
#2 Imp.	714.3	638.6	75.7
#3 Imp.	663.4	643.0	20.4
#4 Imp.	652.7	644.9	7.8
#5 Imp.	___	___	___
#6 S.G.	797.8	772.9	24.9
Total H_2O Volume			139.0 ✓ g

Start Time 11:01
Stop Time 12:01
Barometric Pressure "Hg 29.55
Static Pres "H_2O .14
Production Rate
SET POINT @ 1600°F

SAMPLING PARAMETERS

% Moisture 9.1
Meter Temp. ___
Stack Temp. ___
ΔH@ 1.85 Y .991
Pitot # ___ Side # ___
Cp 0.84
Nozzle Diameter .765 inch
D_1 .764 D_2 .765 D_3 .766
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
NE 3	0.0	589.712	.06	4.69	4.69	53	52	5.0	233	49	1614		
	5	594.133	.06	4.69	4.69	53	52	5.0	244	46	1665		
	10	599.335	.055	4.3	4.3	53	52	5.0	251	43	1678		
	15	604.775	.055	4.3	4.3	54	52	5.0	255	42	1635	CO_2 -	9.4%
	20	610.320	.055	4.3	4.3	56	53	5.0	265	42	1685	O_2 -	10.5%
	25	615.466	.065	4.3	4.3	57	54	5.0	267	42	1687	CO	15 ppm
	30	620.108	.055	4.3	4.3	58	55	5.0	255	43	1688		
	35	626.718	.055	4.3	4.3	60	56	5.0	248	42	1692		
	40	632.288	.055	4.3	4.3	61	57	5.0	245	44	1648		
	45	638.283	.055	4.3	4.3	62	58	5.0	246	45	1621		
	50	643.225	.055	4.3	4.3	62	58	5.0	243	45	1640		
	55	649.662	.055	4.3	4.3	63	59	5.0	252	36	1686		
	60	654.318											
		64.606 ✓	$\sqrt{(\Delta P)^2}$		4.365 ✓ ΔH		56.3 ✓ T_m				1661.5 ✓ T_s		

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TRAVERSE SAMPLING DATA SHEET

Page ___ of 241

Client KING CO. LANDFILL
Location CEDAR HILLS
Sample Site FLARE STACK #1 OUTLET
Stack Diameter 138.0"
Date 2-5-94
Operators KHD CRL
Run I.D. R-2 M-26A.

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.005 / .003
Leak Test Vacuum	15.0" / 10.0"
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
✓ Gas Sampling System	
___ Integrated Bag	
___ Thermocouples @ ___ °F	

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ___ Box # R-2

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	668.1	- 663.1	= 5.0
#2 Imp.	764.6	- 703.2	= 61.4
#3 Imp.	686.4	- 660.0	= 26.4
#4 Imp.	619.2	- 613.6	= 5.6
#5 Imp.		-	=
#6 S.G.	747.4	- 727.5	= 19.9
Total H_2O Volume			118.3 ✓ g

Start Time 13:07
Stop Time 14:03
Barometric Pressure "Hg 29.55
Static Pres "H_2O .14
Production Rate
SET POINT @ 1650°F

SAMPLING PARAMETERS

% Moisture 7.9
Meter Temp. 64.8
Stack Temp. 1589
ΔH@ 1.65 Y .991
Pitot # ___ Side # ___
Cp 0.84
Nozzle Diameter .365 inch
D_1 .365 D_2 .364 D_3 .366
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
NE 3	0.0	655.028	.055	4.3	4.3	65	65	8.0	250	52	1601		
	5	659.193	.055	4.3	4.3	65	65	10.0	248	46	1585		
	10		.063	4.9	4.9	64	64	12.0	274	54	1576	CO_2-	7.8%
	15	679.499	.055	4.3	4.3	64	64	12.0	295	58	1563	O_2-	12.0%
	20	681.093	.060	4.7	4.7	64	64	12.0	305	60	1565	CO-	81 ppm
	25	686809	.055	4.3	4.3	64	64	12.0	308	62	1569		
	30	[redacted]	.055	4.3	4.3	64	63	12.0	313	57	1608		
	35	693.551	.055	4.3	4.3	65	63	12.0	311	57	1594		
	40	698.018	.055	4.3	4.3	65	64	12.0	300	57	1623		
	45	703.612	.055	4.3	4.3	65	64	12.0	311	59	1596		
	50	710.005	.055	4.3	4.3	65	65	12.4	311	52	1586		
	55	714.744	.055	4.3	4.3	65	65	12.0	311	48	1562		
	60	720.281											
		65.253 ✓	0.057 / $\sqrt{(\Delta P)^2}$		4.383 ✓ / ΔH		64.4 ✓ / T_m				1589.0 ✓ / T_s		

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TRAVERSE SAMPLING DATA SHEET

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Client King Co Landfill
Location Cedar Hills
Sample Site Flare Stack #1 Outlet
Stack Diameter 138.0"
Date 2-5-94
Operators KAO CML
Run I.D. R-3 M-264

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.006 / .010
Leak Test Vacuum	15.0" / 24.0"

✓ Pitots, Pre Leak Ck
✓ Pitots, Post Leak Ck
✓ Gas Sampling System
• Integrated Bag
___ Thermocouples @ ___ °F

QA FORMS COMPLETED

Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ______ Box # R3

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	635.7	606.3	29.4
#2 Imp.	700.3	650.6	49.7
#3 Imp.	622.6	617.4	5.2
#4 Imp.	663.1	660.2	2.9
#5 Imp.			
#6 S.G.	799.2	780.9	18.3

Total H_2O Volume 105.5 ✓ g

Start Time 15:07
Stop Time 16:07
Barometric Pressure "Hg 29.72
Static Pres "H_2O .14
Production Rate ______

SAMPLING PARAMETERS

% Moisture 7.5
Meter Temp. 62.92
Stack Temp. 1610.8
ΔH@ 1.85 Y .991
Pitot # ______ Side # ______
Cp 0.84
Nozzle Diameter .765 inch
D_1 .765 D_2 .764 D_3 .766

K Factor ______

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Actual	Gas Meter Temp °F In	Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
NE	0.0	721.008	.050	3.91	3.91	64	64	8.0	247	52	1610		
	5.0	724.995	.050	3.91	3.91	63	63	10.0	248	48	1649		
	10.0	730.862	.050	3.91	3.91	63	63	10.0	249	46	1620		
	15.0	734.838	.050	3.91	3.91	63	63	11.0	256	45	1585		
	20.0	739.842	.050	3.91	3.91	63	63	11.0	272	42	1590	CO_2 -	7.6%
	25.0	745.113	.050	3.91	3.91	63	63	11.0	284	43	1591	O_2 -	12.4%
	30.0	750.372	.050	3.91	3.91	63	63	12.0	296	43	1606	CO -	73 ppm
	35.0	755.641	.050	3.91	3.91	63	63	13.0	299	48	1606		
	40.0	760.928	.050	3.91	3.91	63	62	13.0	301	49	1600		
	45.0	766.152	.050	3.91	3.91	63	62	13.0	306	47	1603		
	50.0	772.366	.050	3.91	3.91	63	62	14.0	311	47	1613		
	55.0	777.011	.050	3.91	3.91	63	62	14.0	311	48	1603		
	60.0	781.932											

	60.924 ✓	$\sqrt{(\Delta P)}^2$	3.91 Δ H	62.9 ✓ T_m		1610.7 ✓ T_s

AMTEST AIR QUALITY, INC. 243

SAMPLE TRAIN INFORMATION

Fill out one sheet per site and per test type.

CLIENT: King Co Landfills

LOCATION: Cedar Hills

SITE: North Flare Sta. Flare Stack #1 outlet

TEST TEAM: KA, CL DATE(S): 2-9-94.

RUN #'S: 3 EA TYPE: M-26A.

Probe/Filter Temperature: ____ 248±25 F ____ 320 F ✓ Other

Impinger Temperature: ✓ <68 F ____ Other

THIMBLE: ____ yes ✓ no NOZZLE TYPE: ✓ quartz ____ steel ____ none

PROBE LINER: ✓ quartz ____ glass ____ steel ____ teflon

PROBE TYPE: ✓ regular ____ water-cooled

FRONT-HALF FILTER: ✓ yes ~~✓~~ no SIZE (mm): ___90 ✓ 110 ___125 ___other____
FRONT-HALF FILTER MEDIA: ✓ quartz fiber ____ glass fiber ____ teflon

SUPPORT: ____ steel ✓ glass frit ____ teflon GASKET: ✓ silicon ✓ teflon

BACK-HALF FILTER: ___yes ✓ no
BACK-HALF FILTER MEDIA: ___quartz fiber ___glass fiber ___telfon ___tared ___untared
NOTE: Show the back-half filter location with an arrow on the table below.

CONTENTS	Initial Volume (mL)	Clean-up Solution Used	Bottle Type	Comments
Nozzle/Probe Rinse				
Filter				
#1 0.1N H_2SO_4	100	D.I. water	NALGene	Wt impingers then
#2 0.1N H_2SO_4	100	↓	Sample jar	Combine H_2SO_4 Imp.
#3 0.1N NaOH	100	↓		Together Rinse w/ DI.
#4 0.1N NaOH	100	↓		Combine NaOH Imps.
#5 Silica		↓		Together Rinse w/ DI.
#6		↓		Bring back to Lab for
#7		↓		further analyses

IF THIS INFORMATION IS NOT ACCURATE FOR ALL RUNS, NOTE ALL EXCEPTIONS.

filter was used for PM — not recovered

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CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE:

SHIPPING DATE:
CANISTER SERIAL NO. 616
SAMPLER ID: R-1 TO-14 FLARE #1 INLET / ~~5154~~ 5081
OPERATOR:
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	52°	52°	X	X
STOP	200°	52		

PRESSURE

CANISTER PRESSURE	
	30.0
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	11:01	0.0
STOP	11:51	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
500 cc/min		
D.D.		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS:

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

SIGNATURE/TITLE

#507

245

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: _____

SHIPPING DATE: _____
CANISTER SERIAL NO. 507
SAMPLER ID: R-2 10-14 Flare #1 Inlet ~~5055~~ 5082
OPERATOR: _____
CANISTER LEAK CHECK DATE: _____

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	52°	52°		
STOP	52°	52		

PRESSURE

CANISTER PRESSURE	
	30.0
	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	13:07	0.0
STOP	13:57	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
~~300~~ 100 cc/min		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE: _____
QUARTERLY RECERTIFICATION DATE: _____

C. LABORATORY INFORMATION

DATE RECEIVED: _____
RECEIVED BY: _____
INITIAL PRESSURE: _____
FINAL PRESSURE: _____
DILUTION FACTOR: _____
ANALYSIS
- GC-FID-ECD DATE: _____
- GC-MSD-SCAN DATE: _____
- GC-MSD-SIM DATE: _____

RESULTS : _____

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

_____
SIGNATURE/TITLE

#549

CANISTER SAMPLING FIELD DATA SHEET

246

A. GENERAL INFORMATION

SITE LOCATION: King Co Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE:

SHIPPING DATE:
CANISTER SERIAL NO. 549
SAMPLER ID: R-3 TO-14 Flare #1 Inlet ~~5083~~
OPERATOR:
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	52	52	X	X
STOP	85	50		

PRESSURE

CANISTER PRESSURE	
	30.4
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	15:07	0.6
STOP	15:57	50.4

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
100 ml/min		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS :

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

SIGNATURE/TITLE

#569

CANISTER SAMPLING FIELD DATA SHEET

247

A. GENERAL INFORMATION

SITE LOCATION: Kent Co. Landfill
SITE ADDRESS: Ocean Hills

SAMPLING DATE: _____

SHIPPING DATE: _____
CANISTER SERIAL NO. 569
SAMPLER ID: L-1 10-14 Flow at outlet / 5154 / 5084
OPERATOR: _____
CANISTER LEAK CHECK DATE: _____

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	52	52	X	X
STOP	68	52		

PRESSURE

CANISTER PRESSURE	
	30.0
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	11:01	0.0
STOP	11:51	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
50 cc/min		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE: _____
QUARTERLY RECERTIFICATION DATE: _____

C. LABORATORY INFORMATION

DATE RECEIVED: _____
RECEIVED BY: _____
INITIAL PRESSURE: _____
FINAL PRESSURE: _____
DILUTION FACTOR: _____
ANALYSIS
GC-FID-ECD DATE: _____
GC-MSD-SCAN DATE: _____
GC-MSD-SIM DATE: _____
RESULTS : _____

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

_____
SIGNATURE/TITLE

#579

CANISTER SAMPLING FIELD DATA SHEET

248

A. GENERAL INFORMATION

SITE LOCATION: King Co Landfills
SITE ADDRESS: Cedar Hills

SAMPLING DATE:

SHIPPING DATE:
CANISTER SERIAL NO. 579
SAMPLER ID: R-2 TO-14 Stage #1 outlet - 5155 / 5085
OPERATOR:
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	52	52	X	X
STOP	200	52		

PRESSURE

CANISTER PRESSURE	
	30.0
X	0.0.

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	13:07	0.0
STOP	13:57	50.0.

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
~~500~~ 100 cc/min		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS :

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

SIGNATURE/TITLE

#517

249

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE:

SHIPPING DATE:
CANISTER SERIAL NO. 517
SAMPLER ID: R-3 70-14 Flare #1 Outlet / 5156 / 5086
OPERATOR:
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	52	52	X	X
STOP	200°	50		

PRESSURE

CANISTER PRESSURE	
	30.4
X	0.4

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	13:07	0.0
STOP	15:57	50.4

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
100 cc/min		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS :

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

SIGNATURE/TITLE

TEMPERATURE MEASUREMENT DATA

FILE NAME: LB600\CH#1TMP
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SAMPLE SITE: FLARE STACK #1
SAMPLE DATE: FEBRUARY 9, 1994

STACK TEMPERATURES

TIME	PLANT THERMOCOUPLE (°F)	AMTEST THERMOCOUPLE (°F)	INLET TEMP (°F)
RUN 1 - 11:01-12:01			
1101	**	1671.6	86.8
1102		1686.8	86.6
1103		1682.0	86.4
1104		1677.0	86.0
1105		1683.9	86.2
1106		1692.8	86.0
1107		1690.0	86.0
1108		1683.6	86.0
1109		1673.0	86.0
1110		1661.4	86.2
1111		1679.8	86.0
1112		1695.4	86.4
1113		1677.0	87.0
1114		1688.6	87.2
1115		1673.6	87.0
1116		1680.4	87.0
1117		1665.4	87.0
1118		1675.6	--- *
1119		1667.2	87.0
1120		1681.2	87.0
1121		1681.4	86.8
1122		1688.0	86.6
1123		1685.0	87.0
1124		1678.0	86.8
1125		1699.2	86.6
1126		1683.4	--- *
1127		1701.4	--- *
1128		1701.2	--- *
1129		1699.2	86.0
1130		1693.4	86.0
1131		1690.0	86.4
1132		1691.1	86.4
1133		1694.8	86.4
1134		1700.8	86.8
1135		1703.8	87.0
1136		1724.5	86.8
1137		1701.4	87.0

1138		1696.8	87.0
1139		1711.0	87.0
1140		1711.8	87.0
1141		1704.2	87.0
1142		1706.2	87.0
1143		1715.4	87.0
1144		1699.8	87.0
1145		1680.4	87.0
1146		1693.8	87.0
1147		1672.4	87.0
1148		1678.2	87.0
1149		1688.2	87.0
1150		1672.4	87.0
1151		1673.6	87.0
1152		1691.0	87.0
1153		1689.8	87.0
1154		1681.3	87.0
1155		1678.4	87.0
1156		1670.2	87.0
1157		1673.6	87.0
1158		1680.5	87.0
1159		1687.0	87.3
1200		1687.0	87.2
1201		1668.6	87.0
AVERAGE RUN 1		1687.1	86.8
	(°F) PLANT THERMOCOUPLE	(°F) AMTEST THERMOCOUPLE	(°F) INLET TEMP

* INLET THERMOCOUPLE DISCONNECTED TO READ OTHER DATA

** PLANT STACK TEMPS RECORDED ON INLET FLOW DATA SHEET FROM PLANT DISPLAY

STACK TEMPERATURES

TIME	PLANT THERMOCOUPLE (°F)	AMTEST THERMOCOUPLE (°F)	INLET TEMP (°F)
RUN 2 - 13:07-14:07			
1307	**	1628.4	90.0
1308		1621.4	90.0
1309		1639.2	90.4
1310		1653.4	90.4
1311		1653.4	90.8
1312		1648.2	--- *
1313		1658.8	--- *
1314		1644.6	--- *
1315		1648.0	--- *
1316		1641.9	--- *
1317		1656.7	--- *
1318		1670.2	--- *
1319		1657.7	--- *
1320		1655.1	--- *
1321		1638.0	--- *
1322		1637.3	--- *
1323		1643.0	--- *
1324		1630.3	--- *
1325		1632.8	--- *
1326		1616.2	--- *
1327		1635.2	--- *
1328		1651.0	--- *
1329		1657.8	--- *
1330		1629.6	--- *
1331		1628.0	--- *
1332		1658.2	--- *
1333		1644.3	--- *
1334		1647.5	--- *
1335		1639.2	--- *
1336		1653.3	--- *
1337		1662.9	--- *
1338		1646.7	--- *
1339		1665.0	--- *
1340		1654.2	--- *
1341		1651.7	--- *
1342		1685.2	--- *
1343		1679.0	--- *
1344		1657.0	--- *
1345		1662.2	--- *
1346		1686.4	--- *
1347		1674.4	--- *
1348		1673.4	--- *
1349		1673.8	--- *
1350		1674.3	--- *
1351		1646.6	--- *
1352		1640.8	--- *
1353		1668.5	--- *
1354		1665.8	--- *
1355		1654.2	--- *
1356		1640.2	--- *

1357		1655.7	--- *
1358		1649.2	--- *
1359		1643.8	--- *
1400		1653.3	--- *
1401		1649.0	--- *
1402		1633.2	90.0
1403		1640.4	90.0
1404		1637.4	90.0
1405		1622.2	90.0
1406		1653.2	90.0
1407		1655.0	90.0
AVERAGE RUN 2		1650.4	90.1
	(°F) PLANT THERMOCOUPLE	(°F) AMTEST THERMOCOUPLE	(°F) INLET TEMP

* INLET THERMOCOUPLE DISCONNECTED TO READ OTHER DATA

** PLANT STACK TEMPS RECORDED ON INLET FLOW DATA SHEET FROM PLANT DISPLAY

STACK TEMPERATURES

TIME	PLANT THERMOCOUPLE (°F)	AMTEST THERMOCOUPLE (°F)	INLET TEMP (°F)
RUN 3 - 15:07-16:07			
1507	**	1636.4	89.0
1508		1649.0	89.0
1509		1624.2	88.4
1510		1656.8	--- *
1511		1668.4	--- *
1512		1702.2	--- *
1513		1678.2	--- *
1514		1672.5	--- *
1515		1620.6	--- *
1516		1616.5	--- *
1517		1619.6	--- *
1518		1609.8	--- *
1519		1613.7	--- *
1520		1617.8	--- *
1521		1645.6	--- *
1522		1658.6	--- *
1523		1648.6	--- *
1524		1634.6	--- *
1525		1634.1	--- *
1526		1650.8	--- *
1527		1660.3	--- *
1528		1644.4	--- *
1529		1643.0	--- *
1530		1637.8	--- *
1531		1645.8	--- *
1532		1665.2	--- *
1533		1687.0	--- *
1534		1686.8	--- *
1535		1693.6	--- *
1536		1687.0	--- *
1537		1668.4	--- *
1538		1659.0	--- *
1539		1684.6	--- *
1540		1674.3	--- *
1541		1691.2	--- *
1542		1685.0	--- *
1543		1678.1	--- *
1544		1692.4	--- *
1545		1673.0	--- *
1546		1657.2	--- *
1547		1681.8	--- *
1548		1666.4	--- *
1549		1651.0	--- *
1550		1639.0	--- *
1551		1669.8	--- *
1552		1652.9	--- *
1553		1691.8	--- *
1554		1659.1	--- *
1555		1704.5	--- *
1556		1672.2	--- *

1557		1667.3	--- *
1558		1674.4	--- *
1559		1657.2	--- *
1600		1645.4	--- *
1601		1713.8	--- *
1602		1725.7	--- *
1603		1688.8	--- *
1604		1707.4	--- *
1605		1707.8	--- *
1606		1702.6	--- *
1607		1707.4	--- *
AVERAGE RUN 3		1664.9	88.8
	(°F) PLANT THERMOCOUPLE	(°F) AMTEST THERMOCOUPLE	(°F) INLET TEMP

* INLET THERMOCOUPLE DISCONNECTED TO READ OTHER DATA

** PLANT STACK TEMPS RECORDED ON INLET FLOW DATA SHEET FROM PLANT DISPLAY

STACK SCHEMATIC AND LOCATION OF SAMPLE POINTS

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Client King County

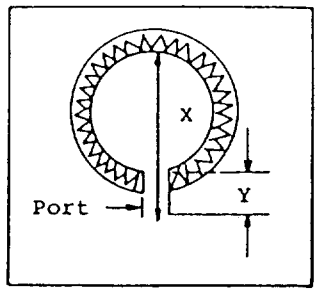
Location ~~[redacted]~~ Cedar Hills Landfill

Sampling Location #2 Flare Inlet

Inside of far wall to outside of port (distance, X) 13.5"

Inside of near wall to outside of port (distance, Y) 1.5"

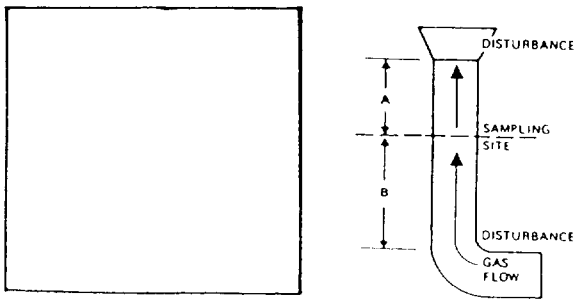
Stack I.D. (distance X - distance Y) 12"



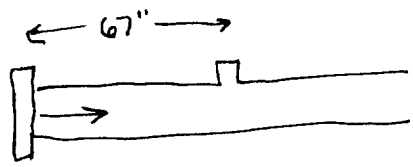
Schematic of Sampling Location

1 *Traverse Point #*	2 *Fractional Percent of Stack I.D.*	3 *Stack I.D. inches*	4 *Column 2 x 3*	5 *Distance Y*	6 *Traverse Point Location from Outside of Port columns 4 + 5*
1	4.4	12"	1	1.5"	2.5
2	14.6	↓	1.75	↓	3.25
3	29.6		3.55		5.05
4	70.4		8.45		9.95
5	85.4		10.25		11.75
6	95.6	↓	11.0	↓	12.5
7					
8					
9					
10					
11					
12					

CROSS SECTION



STACK, CONTROL DEVICE AND PROCESS FLOW DIAGRAM



Distance A = _____ *downstream*

Distance B = 67" *upstream*

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Client King Co. Landfills
Location Cedar Hills
Sample Site Flare Stack #2 Inlet
Stack Diameter 12.0"
Date 2-10-94
Operators KPO CRL
Run I.D. R-1 M-2 Flows

EQUIPMENT CHECKS

Initial/Final
Leak Rate cfm 0 / 0
Leak Test Vacuum 6 / 6
✓ Pitots, Pre Leak Ck
✓ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ___ Box # ___

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	-	=	
#2 Imp.	-	=	
#3 Imp.	-	=	
#4 Imp.	-	=	
#5 Imp.	-	=	
#6 S.G.	-	=	

Total H_2O Volume ___ g

Start Time 10:25
Stop Time 10:35
Barometric Pressure "Hg 29.65
Static Pres "H_2O 9.8"
Production Rate ___

SAMPLING PARAMETERS

% Moisture ___
Meter Temp. ___
Stack Temp. ___
Δ H@ ~~0~~ Y ~~0~~
Meter Box ID Black MAG
Pitot # S-24 Side # A
Thermocouple ID ___
Flow Meas. Device MAG
Cp 0.99
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								Top 1	.92	94	WET 86
								2	.88	95	Dry 99
								3	.90	96	
								4	1.00	98	
								5	1.10	98	
								6	1.10	98	
			Δ H	Tm					$(\Delta P)^2$	96.5 √ Ts	

NWC

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

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Client King Co Landfill
Location Cedar Hills
Sample Site Flare Stack #2 @ Inlet
Stack Diameter 138.0"
Date 2-10-94
Operators KPU ERL
Run I.D. R-2 M-2 Flows

EQUIPMENT CHECKS

Initial/Final
Leak Rate cfm 0 / 0
Leak Test Vacuum 0 / 0
✓ Pitots, Pre Leak Ck
✓ Pitots, Post Leak Ck
____ Gas Sampling System
____ Integrated Bag
____ Thermocouples @ ____ °F

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ____
Magnehelic Cal. ____
Temp. Probe Cal. ____
Gas Meter Calib. ____

Filter # ____ Box # ____

	Final Wt. gram		Initial Wt. gram		Net Wt. gram
#1 Imp.		-		=	
#2 Imp.		-		=	
#3 Imp.		-		=	
#4 Imp.		-		=	
#5 Imp.		-		=	
#6 S.G.		-		=	

Total H_2O Volume ____ g

Start Time 12:20
Stop Time 12:30
Barometric Pressure "Hg 29.6
Static Pres "H_2O 9.8
Production Rate ____

SAMPLING PARAMETERS

% Moisture ____
Meter Temp. ____
Stack Temp. ____
Δ H@ ____ Y ____
Meter Box ID Black Mag
Pitot # S-24 Side # A
Thermocouple ID ____
Flow Meas. Device Mag
Cp 0.95
K Factor ____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (ΔH) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading Δ P " H_2O	Stack Temp °F	
								Top 1	.85	93	Wet-83
								2	.90	94	Dry-98
								3	.90	96	
								4	1.0	96	
								5	1.1	96	
								6	1.05	97	
			Δ H	Tm					$(\Delta P)^2$	95.3 Ts	

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Client King Co Landfill
Location Cedar Hills
Sample Site Flare Stack #2 Inlet
Stack Diameter 12.0"
Date 2-10-94
Operators KPO, GLL
Run I.D. R-3 #2 Flows

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	Ø / Ø
Leak Test Vacuum	Ø / Ø

✓ Pitots, Pre Leak Ck
✓ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ___ Box # ___

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	-	=	
#2 Imp.	-	=	
#3 Imp.	-	=	
#4 Imp.	-	=	
#5 Imp.	-	=	
#6 S.G.	-	=	

Total H_2O Volume ___ g

Start Time 13:50
Stop Time 14:00
Barometric Pressure "Hg 29.62
Static Pres "H_2O 9.8
Production Rate ___

SAMPLING PARAMETERS

% Moisture ___
Meter Temp. ___
Stack Temp. ___
Δ H@ ___ Y ___
Meter Box ID Black Mag
Pitot # S-24 Side # A
Thermocouple ID ___
Flow Meas. Device Mag.
Cp 0.99
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (ΔH) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading Δ P " H_2O	Stack Temp °F	
								Top 1	.88	94	WET-87
								2	.90	96	DRY-101
								3	.90	98	
								4	1.1	99	
								5	1.0	98	
								6	.90	99	
				Δ H	Tm				$(\Delta P)^2$	97.3 ✓ Ts	

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METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Page ___ of ___ 260

Client King Co. Landfills
Location Cedar Hills.
Sample Site Flare Stack #2 Outlet
Stack Diameter 138.0"
Date 2-10-94
Operators KPC GKL
Run I.D. 2-1 M-2 Flare

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	0 / 0
Leak Test Vacuum	0 / 0
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
___ Gas Sampling System	
___ Integrated Bag	
___ Thermocouples @ ___ °F	

QA FORMS COMPLETED

Stack Schematic	✓
Sample Train	✓
Pitot Tube Insp.	
Magnehelic Cal.	
Temp. Probe Cal.	
Gas Meter Calib.	

Filter # _____ Box # _____

	Final Wt. gram		Initial Wt. gram		Net Wt. gram
#1 Imp.		-		=	
#2 Imp.		-		=	
#3 Imp.		-		=	
#4 Imp.		-		=	
#5 Imp.		-		=	
#6 S.G.		-		=	

Total H_2O Volume _____ g

Start Time 9:28
Stop Time 9:46
Barometric Pressure "Hg 26.65
Static Pres "H_2O -0.13
Production Rate _____

SAMPLING PARAMETERS

% Moisture _____
Meter Temp. _____
Stack Temp. _____
△H@ 0 Y 0
Meter Box ID Black Mag
Pitot # PGA Side # A
Thermocouple ID T95
Flow Meas. Device Mag
Cp 0.84
K Factor _____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								SE 6	.055	1608	
								5	.05	1601	
								4	.055	1643	CO_2 - 8.3%
								3	.065	1676	O_2 - 11.6%
								2	.065	1706	CO - 66ppm
								1	.035	1600	
								NE 6	.055	1685	
								5	.06	1708	
								4	.05	1705	
								3	.05	1692	
								2	.035	1691	
								1	.025	1632	
								NW 6	.07	1565	
								5	.06	1606	
								4	.07	1612	
								3	.06	1610	
								2	.05	1611	
								SW 1	.03	1566	
							.03 BG	SW 6	NOT ABLE		
								5	TO ACCESS		
								4	PORT		
								3			
								2			
								1			
			△H		T_m				.051 $(\Delta P)^2$	1639.9 T_s	

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METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Page ___ of 261

Client KING CO LANDFILL
Location CEDAR HILLS
Sample Site FLARE STACK #2 OUTLET
Stack Diameter 138.0"
Date 2-10-94
Operators KDO, CHL
Run I.D. K-2 M-2 FLOWS

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	0 / 0
Leak Test Vacuum	0 / 0
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
✓ Gas Sampling System	
___ Integrated Bag	
___ Thermocouples @ ___ °F	

QA FORMS COMPLETED

Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # _____ Box # _____

	Final Wt. gram		Initial Wt. gram		Net Wt. gram
#1 Imp.		-		=	
#2 Imp.		-		=	
#3 Imp.		-		=	
#4 Imp.		-		=	
#5 Imp.		-		=	
#6 S.G.		-		=	

Total H_2O Volume _____ g

Start Time 11:20
Stop Time 11:38
Barometric Pressure "Hg 29.6
Static Pres "H_2O -.135
Production Rate _____

SAMPLING PARAMETERS

% Moisture _____
Meter Temp. _____
Stack Temp. _____
Δ H@ 1.0 Y 0
Meter Box ID BLACK MAG.
Pitot # P9A Side # A
Thermocouple ID T6B
Flow Meas. Device MAG
Cp 0.84
K Factor _____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (ΔH) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading Δ P " H_2O	Stack Temp °F	
								NW 6	.07	1724	
								5	.07	1723	
								4	.06	1650	CO_2 - 8.3%
								3	.055	1630	O_2 - 11.5%
								2	.06	1626	CO 42 ppm
								1	.04	1602	
								SE 6	.055	1732	
								5	.05	1716	
								4	.05	1733	
								3	.04	1760	
								2	.04	1737	
								1	.02	1659	
								NE 6	.06	1649	
								5	.06	1663	
								4	.055	1660	
								3	.05	1625	
								2	.035	1603	
								1	.02	1583	
								SW	NOT ABLE TO ACCESS PORT		
			Δ H		T_m				$(\Delta p)^2$	1665.7 ✓ T_s	

NE

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METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Page ___ of ___ 2&2

Client KING CO. LANDFILL
Location CEDAR HILLS
Sample Site FLARE STACK #2 OUTLET
Stack Diameter 138.6"
Date 2-10-94
Operators KDO, ERC
Run I.D. R-3 M-2 FLOWS

EQUIPMENT CHECKS

	Initial	Final
Leak Rate cfm	~~0~~	~~0~~
Leak Test Vacuum	~~0~~	~~0~~
✓ Pitots, Pre Leak Ck		
✓ Pitots, Post Leak Ck		
✓ Gas Sampling System		
___ Integrated Bag		
___ Thermocouples @ ___ °F		

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # _____ Box # _____

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	___	___	___
#2 Imp.	___	___	___
#3 Imp.	___	___	___
#4 Imp.	___	___	___
#5 Imp.	___	___	___
#6 S.G.	___	___	___

Total H_2O Volume _____ g

Start Time 13:10
Stop Time 13:27
Barometric Pressure "Hg 29.62
Static Pres "H_2O -.135
Production Rate _____

SAMPLING PARAMETERS

% Moisture _____
Meter Temp. _____
Stack Temp. _____
△ H@ _____ Y _____
Meter Box ID BACK MAG.
Pitot # 094 Side # A.
Thermocouple ID T9B
Flow Meas. Device MAG
Cp 0.84
K Factor _____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								NE 6	.06	1643	
								5	.06	1621	CO_2 - 8.3%
								4	.05	1622	O_2 - 11.6%
								3	.04	1571	CO 59 ppm
								2	.035	1547	
								1	.02	1549	
								SE 6	.05	1665	
								5	.04	1654	
								4	.04	1660	
								3	.05	1692	
								2	.025	1521	
								NW 1	.02	1648	
								6	.05	1691	
								5	.05	1709	
								4	.05	1712	
								3	.02	1641	
								2	.05	1693	
								1	.04	1503	
								SW	NOT ABLE TO ACCESS PORT.		
			△ H		T_m				$(\Delta P)^2$	1647.7 T_s	

GAS LOG MEASUREMENT DATA

FILE NAME: LB600\CH#2GAS1
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SAMPLE SITE: FLARE STACK #2
SAMPLE DATE: FEBRUARY 10, 1994

TIME	NITROGEN OXIDES (ppm)	SULFUR DIOXIDE (ppm)	CARBON MONOXIDE (ppm)	CARBON DIOXIDE (%)	OXYGEN (%)
RUN 1 - 09:51-10:51					
09:51:00	17.3	5.9	132	7.9	12.1
09:52:00	17.9	5.9	150	7.9	12.0
09:53:00	18.1	5.9	79	8.1	11.8
09:54:00	18.8	6.1	61	8.4	11.6
09:55:00	19.0	6.3	65	8.5	11.4
09:56:00	18.3	6.4	48	8.5	11.4
09:57:00	18.0	6.1	44	8.2	11.9
09:58:00	18.4	6.3	36	8.4	11.4
09:59:00	18.6	6.4	46	8.5	11.5
10:00:00	18.9	6.3	46	8.4	11.5
10:01:00	19.3	6.5	49	8.5	11.3
10:02:00	17.9	6.2	87	8.3	11.9
10:03:00	18.4	6.2	94	8.0	11.7
10:04:00	18.1	6.0	141	8.1	12.1
10:05:00	18.9	6.2	84	8.1	11.6
10:06:00	17.1	6.2	121	8.3	11.9
10:07:00	17.9	5.9	134	7.7	12.3
10:08:00	17.8	6.1	82	8.1	11.8
10:09:00	17.8	6.1	44	8.1	11.8
10:10:00	18.4	6.1	62	8.2	11.6
10:11:00	18.9	6.3	95	8.4	11.7
10:12:00	18.3	6.3	69	8.3	11.7
10:13:00	18.1	6.2	106	8.2	11.7
10:14:00	18.1	6.1	109	7.9	12.0
10:15:00	17.9	6.2	76	8.1	11.8
10:16:00	18.3	6.2	105	8.2	11.6
10:17:00	18.0	6.2	61	8.3	11.5
10:18:00	19.4	6.2	75	8.3	11.7
10:19:00	18.0	6.4	43	8.4	11.5
10:20:00	18.0	6.1	90	8.0	11.8
10:21:00	18.6	6.2	59	8.2	11.6
10:22:00	19.0	6.4	44	8.6	11.4
10:23:00	19.0	6.5	24	8.7	11.2
10:24:00	18.8	6.4	36	8.6	11.5
10:25:00	18.1	6.3	40	8.6	11.5
10:26:00	18.3	6.3	66	8.4	11.5
10:27:00	19.0	6.2	52	8.4	11.6
10:28:00	19.3	6.4	48	8.9	10.9
10:29:00	20.5	6.7	44	8.9	10.9

10:30:00	18.8	6.6	31	9.0	11.1
10:31:00	18.4	6.5	49	8.7	11.5
10:32:00	17.4	6.3	52	8.4	11.8
10:33:00	18.0	6.3	33	8.2	11.8
10:34:00	18.5	6.2	33	8.3	11.5
10:35:00	18.0	6.4	35	8.5	11.4
10:36:00	18.6	6.3	68	8.3	11.5
10:37:00	18.6	6.3	43	8.5	11.4
10:38:00	18.3	6.2	47	8.5	11.6
10:39:00	18.9	6.3	48	8.4	11.5
10:40:00	18.4	6.4	62	8.4	11.6
10:41:00	17.9	6.3	78	8.3	11.7
10:42:00	18.1	6.1	81	8.2	11.8
10:43:00	17.6	6.2	101	8.1	12.0
10:44:00	17.3	6.1	103	8.0	11.9
10:45:00	18.1	5.9	85	8.0	12.0
10:46:00	18.6	6.3	44	8.5	11.2
10:47:00	18.1	6.4	38	8.6	11.5
10:48:00	18.5	6.3	29	8.5	11.3
10:49:00	17.8	6.4	69	8.5	11.6
10:50:00	18.0	6.1	37	8.5	11.5
10:51:00	17.5	6.3	44	8.4	11.6
AVERAGE RUN 1	18.3 (ppm) NITROGEN OXIDES	6.2 (ppm) SULFUR DIOXIDE	66 (ppm) CARBON MONOXIDE	8.3 (%) CARBON DIOXIDE	11.6 (%) OXYGEN

TIME	NITROGEN OXIDES (ppm)	SULFUR DIOXIDE (ppm)	CARBON MONOXIDE (ppm)	CARBON DIOXIDE (%)	OXYGEN (%)
RUN 2 - 11:40-12:40					
11:40:00	18.3	5.8	22	8.4	11.4
11:41:00	18.4	5.8	23	8.2	11.5
11:42:00	18.6	5.8	28	8.3	11.3
11:43:00	18.6	5.9	23	8.4	11.4
11:44:00	18.5	6.0	27	8.4	11.4
11:45:00	18.4	5.8	36	8.3	11.5
11:46:00	17.9	5.6	64	8.2	11.6
11:47:00	17.8	5.6	99	7.7	12.0
11:48:00	18.9	5.6	36	8.0	11.6
11:49:00	18.1	5.7	22	8.3	11.5
11:50:00	18.1	5.7	47	8.1	11.8
11:51:00	18.5	5.7	42	8.1	11.6
11:52:00	18.8	5.8	38	8.1	11.6
11:53:00	18.5	5.8	31	8.3	11.3
11:54:00	18.3	5.9	50	8.3	11.5
11:55:00	18.9	5.7	75	8.1	11.5
11:56:00	19.4	6.0	37	8.4	11.2
11:57:00	18.5	6.0	28	8.6	11.0
11:58:00	18.9	5.9	39	8.4	11.4
11:59:00	18.1	5.9	34	8.3	11.5
12:00:00	18.1	5.7	38	8.3	11.4
12:01:00	18.4	5.7	44	8.2	11.5
12:02:00	18.6	5.9	24	8.4	11.3
12:03:00	17.8	5.9	39	8.4	11.5
12:04:00	18.4	5.7	62	8.1	11.7
12:05:00	18.5	5.8	38	8.3	11.4
12:06:00	17.6	5.7	37	8.3	11.6
12:07:00	18.3	5.7	38	8.0	11.7
12:08:00	18.5	5.8	32	8.3	11.4
12:09:00	18.4	5.8	36	8.3	11.5
12:10:00	18.3	5.8	21	8.1	11.6
12:11:00	18.3	5.8	34	8.2	11.6
12:12:00	18.9	5.9	25	8.1	11.4
12:13:00	18.9	5.9	27	8.3	11.3
12:14:00	18.5	5.9	41	8.4	11.4
12:15:00	18.1	5.9	75	8.3	11.5
12:16:00	18.4	5.8	55	8.2	11.6
12:17:00	18.0	5.9	28	8.4	11.6
12:18:00	18.1	5.8	46	8.1	11.6
12:19:00	19.0	5.9	40	8.1	11.5
12:20:00	18.6	5.9	36	8.3	11.3
12:21:00	18.1	6.0	28	8.4	11.3
12:22:00	18.4	6.0	40	8.3	11.5
12:23:00	18.4	5.9	62	8.1	11.6
12:24:00	17.9	5.9	29	8.2	11.7
12:25:00	18.0	5.7	48	8.0	11.7
12:26:00	18.3	5.8	52	8.1	11.5
12:27:00	17.9	5.8	31	8.2	11.5
12:28:00	19.1	5.8	18	8.2	11.4
12:29:00	18.5	5.9	33	8.3	11.3
12:30:00	18.4	6.0	38	8.3	11.5
12:31:00	18.0	5.9	60	8.2	11.5

12:32:00	17.4	6.0	66	8.1	11.7
12:33:00	18.4	5.8	74	8.0	11.7
12:34:00	18.3	5.8	39	8.1	11.5
12:35:00	18.3	5.8	37	8.3	11.4
12:36:00	18.3	5.8	30	8.2	11.6
12:37:00	19.0	5.7	52	8.1	11.5
12:38:00	17.4	5.7	82	8.2	11.7
12:39:00	18.1	5.7	54	8.0	11.6
12:40:00	18.1	5.6	75	8.0	11.8
AVERAGE RUN 2	18.3	5.8	42	8.2	11.5
	(ppm)	(ppm)	(ppm)	(%)	(%)
	NITROGEN OXIDES	SULFUR DIOXIDE	CARBON MONOXIDE	CARBON DIOXIDE	OXYGEN

TIME	NITROGEN OXIDES (ppm)	SULFUR DIOXIDE (ppm)	CARBON MONOXIDE (ppm)	CARBON DIOXIDE (%)	OXYGEN (%)
RUN 3 - 13:30-14:30					
13:30:00	17.5	5.4	135	7.5	12.2
13:31:00	17.6	5.3	112	7.6	12.1
13:32:00	18.4	5.4	117	7.7	12.0
13:33:00	19.9	5.4	72	8.1	11.4
13:34:00	18.3	5.4	60	8.5	11.4
13:35:00	17.4	5.3	120	7.7	12.2
13:36:00	20.5	5.3	73	7.9	11.5
13:37:00	19.9	5.4	50	8.4	11.3
13:38:00	20.1	5.5	56	8.3	11.2
13:39:00	20.0	5.4	53	8.4	11.4
13:40:00	20.3	5.5	34	8.3	11.3
13:41:00	18.9	5.6	53	8.5	11.2
13:42:00	17.6	5.3	67	8.0	11.9
13:43:00	17.8	5.3	49	7.9	11.8
13:44:00	17.5	5.2	36	7.9	11.9
13:45:00	18.4	5.1	76	7.8	11.9
13:46:00	18.3	5.2	88	7.9	11.8
13:47:00	19.0	5.3	64	8.1	11.6
13:48:00	19.3	5.2	42	8.2	11.3
13:49:00	17.8	5.3	68	8.0	11.7
13:50:00	18.3	5.2	41	8.0	11.7
13:51:00	18.3	5.2	37	8.1	11.5
13:52:00	17.0	5.1	56	7.8	12.1
13:53:00	17.6	5.1	75	7.7	12.1
13:54:00	17.4	5.1	115	7.7	12.1
13:55:00	17.4	5.0	108	7.6	12.0
13:56:00	18.3	5.0	53	7.7	11.9
13:57:00	17.4	5.1	70	7.9	11.9
13:58:00	18.8	5.0	83	7.8	11.9
13:59:00	17.8	5.0	96	7.9	11.8
14:00:00	17.1	4.9	100	7.8	12.2
14:01:00	18.5	5.0	49	7.7	11.7
14:02:00	20.0	5.0	56	8.0	11.6
14:03:00	19.6	5.0	48	8.2	11.4
14:04:00	18.8	5.1	39	8.3	11.4
14:05:00	19.3	4.9	78	8.1	11.8
14:06:00	19.4	5.1	74	8.1	11.4
14:07:00	19.4	5.2	39	8.3	11.3
14:08:00	18.3	5.1	88	8.2	11.7
14:09:00	19.9	5.0	61	7.9	11.6
14:10:00	19.8	5.2	33	8.4	11.2
14:11:00	19.6	5.1	50	8.4	11.5
14:12:00	19.9	5.2	64	8.3	11.3
14:13:00	19.6	5.3	60	8.3	11.5
14:14:00	20.1	5.2	34	8.3	11.4
14:15:00	19.5	5.2	34	8.2	11.4
14:16:00	19.5	5.3	46	8.2	11.5
14:17:00	20.8	5.2	50	8.3	11.1
14:18:00	20.4	5.4	44	8.5	11.1
14:19:00	20.4	5.3	22	8.7	10.9
14:20:00	20.5	5.4	30	8.7	11.0
14:21:00	20.4	5.4	23	8.6	11.1

14:22:00	19.1	5.3	38	8.5	11.3
14:23:00	20.0	5.4	48	8.3	11.3
14:24:00	20.1	5.4	26	8.6	11.2
14:25:00	19.3	5.4	39	8.4	11.5
14:26:00	20.1	5.3	31	8.3	11.3
14:27:00	19.5	5.4	26	8.5	11.3
14:28:00	20.0	5.3	30	8.3	11.4
14:29:00	18.9	5.3	54	8.3	11.5
14:30:00	18.3	5.3	52	8.2	11.5
AVERAGE RUN 3	19.0	5.2	59	8.1	11.6
	(ppm)	(ppm)	(ppm)	(%)	(%)
	NITROGEN OXIDES	SULFUR DIOXIDE	CARBON MONOXIDE	CARBON DIOXIDE	OXYGEN

SAMPLING SYSTEM BIAS CHECK

Am Test-Air Quality, Inc.

AMTEST AIR QUALITY, INC.

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CLIENT: KING CO LANDFILL

LOCATION: CEDAR HILLS

SITE LOCATION: NORTH FLARE STA. FLARE STACK EXIT

DATE: 2-10-94

RUN # 1 CONDITION:

START: 09:51
STOP: 10:51

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.0	6.0	0-25 %		✓
Oxygen (O2)	%	0.0	-0.1	15.0	15.0	14.98	0-25 %		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	300.0	299.0	300.0	0-1000 PPM		✓
Sulfur Dioxide (SO2)	ppm	0.0	0.2	50.7	53.8	50.7	0-100 PPM		✓
Nitrogen Oxides (NOx)	ppm	0.0	0.0	49.0	48.0	49.0	0-100 PPM		✓
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 2 CONDITION:

START: 11:40
STOP: 12:40

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	5.9	6.0	0-25		✓
Oxygen (O2)	%	0.0	0.1	15.0	15.0	14.98	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	299.0	298.0	300.0	0-1000		✓
Sulfur Dioxide (SO2)	ppm	0.0	0.0	50.7	50.8	50.7	0-100		✓
Nitrogen Oxides (NOx)	ppm	0.0	-0.3	49.0	48.5	49.0	0-100		✓
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 3 CONDITION:

START: 13:30
STOP: 14:30

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.1	5.9	5.9	6.0	0-25 %		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	14.98	0-25 %		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	298.0	299.0	300.0	0-1000 PPM		✓
Sulfur Dioxide (SO2)	ppm	0.0	-0.3	50.8	50.5	50.7	0-100 PPM		✓
Nitrogen Oxides (NOx)	ppm	0.0	0.0	49.0	49.0	49.0	0-100 PPM		✓
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

[jaa\c\excel\biaschk]

5130

TRAVERSE SAMPLING DATA SHEET

Page ___ of ___ 270

Client KING Co. LANDFILL
Location CEDAR HILLS
Sample Site FLARE STACK #2

Stack Diameter 138.0"
Date 2-10-94
Operators KPO, ERL
Run I.D. R-1 M-26A.

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.005 / .005
Leak Test Vacuum	15.0" / 15.0"
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
✓ Gas Sampling System	
___ Integrated Bag	
16A Thermocouples @ ___ °F	

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # _____ Box # W-1

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	640.9	633.7	
#2 Imp.	715.4	644.0	
#3 Imp.	650.4	638.9	
#4 Imp.	650.9	646.1	
#5 Imp.			
#6 S.G.	790.9	777.6	

Total H_2O Volume 107.9 ✓ g

Start Time 09:51
Stop Time 10:51
Barometric Pressure "Hg 29.65
Static Pres "H_2O -.135
Production Rate
SET POINT @ 1650°F

SAMPLING PARAMETERS

% Moisture
Meter Temp.
Stack Temp.
ΔH@ 1.65 Y .991
Pitot # P34 Side # A
Cp 0.84
Nozzle Diameter .765 inch
D_1 .765 D_2 .764 D_3 .766

K Factor

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
NE 4.	0.0	782.606	.05	3.91	3.91	57	57	5.0	235	64	1646		
	5.0	786.073	.05	3.91	3.91	56	56	6.0	245	50	1643		
	10.0	791.465	.05	3.91	3.91	57	56	6.0	278	50	1648		
	15.0	796.603	.05	3.91	3.91	58	56	6.0	314	50	1658		
	20.0	801.821	.05	3.91	3.91	58	56	6.0	340	51	1640		
	25.0	807.004	.05	3.91	3.91	59	56	6.0	357	53	1641	CO_2 -	8.3%
	30.0	812.346	.05	3.91	3.91	60	56	6.0	366	55	1630	O_2 -	11.6% ✓
	35.0	817.866	.05	3.91	3.91	61	57	6.0	371	57	1648	CO	66 ppm
	40.0	822.862	.05	3.91	3.91	61	57	6.0	374	52	1644		
	45.0	828.097	.05	3.91	3.91	61	57	6.0	376	50	1642		
	50.0	833.443	.05	3.91	3.91	62	58	6.0	380	51	1646		
	55.0	838.993	.05	3.91	3.91	62	58	6.0	383	50	1636		
	60.0	844.085											
		61.479 ✓	$\sqrt{(\Delta P)^2}$		3.91 / ΔH		58.0 ✓ / T_m				1643.5 ✓ / T_s		

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TRAVERSE SAMPLING DATA SHEET

Page ___ of ___

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Client KING CO. LANDFILL
Location CEDAR HILLS
Sample Site FLARE #2 STACK OUTLET
Stack Diameter 138.0"
Date 2-10-94
Operators KDD, GLL
Run I.D. L-2 M-26A

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.005 / .005
Leak Test Vacuum	15.0 / 15.0"
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
___ Gas Sampling System	
✓ Integrated Bag	
734 Thermocouples @ ___ °F	

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # _____ Box # L-2

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	662.2	658.0	
#2 Imp.	710.2	641.7	
#3 Imp.	624.1	627.0	
#4 Imp.	631.5	600.8	
#5 Imp.			
#6 S.G.	858.3	840.7	

Total H_2O Volume 118.1 ✓ g

Start Time 11:40
Stop Time 12:40
Barometric Pressure "Hg 29.6
Static Pres "H_2O -.13
Production Rate
SET POINT @ 1650°F

SAMPLING PARAMETERS

% Moisture ___
Meter Temp. ___
Stack Temp. ___
ΔH@ 1.85 Y .991
Pitot # P6A Side # ___
Cp 0.84
Nozzle Diameter .765 inch
D_1 .765 D_2 .764 D_3 .766
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
NE 3	0.0	844.750	.05	3.91	3.91	60	60	6.0	231	59	1635		
	5.0	847.372	.05	3.91	3.91	60	59	6.0	243	50	1632		
	10.0	852.520	.05	3.91	3.91	60	59	7.0	251	47	1632	CO_2	5.3%
	15.0	857.733	.05	3.91	3.91	60	59	7.0	280	48	1625	O_2	11.5%
	20.0	862.988	.05	3.91	3.91	61	59	7.0	298	47	1635	CO	42ppm
	25.0	868.161	.05	3.91	3.91	62	59	8.0	309	49	1638		
	30.0	873.448	.05	3.91	3.91	62	59	8.0	321	52	1629		
	35.0	878.759	.05	3.91	3.91	63	59	8.0	331	51	1625		
	40.0	884.058	.05	3.91	3.91	63	60	8.0	336	48	1635		
	45.0	888.863	.05	3.91	3.91	63	60	8.0	336	47	1640		
✓	50.0	894.738	.05	3.91	3.91	63	60	8.0	337	48	1647		
	55.0	899.987	.05	3.91	3.91	64	60	8.0	339	49	1645		
	60.0	905.322											
		60.572 ✓	$\sqrt{(\Delta P)^2}$	3.91 ΔH		60.6 ✓ T_m					1634.8 ✓ T_s		

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TRAVERSE SAMPLING DATA SHEET

Page ___ of ___ 272

Client KING CO. LANDFILLS
Location CEDAR HILLS
Sample Site FLARE STACK #2 OUTLET
Stack Diameter 138.0"
Date 2-10-94
Operators KPA, CRL
Run I.D. R-3 M-26A.

EQUIPMENT CHECKS

	Initial	Final
Leak Rate cfm	.008	1.006
Leak Test Vacuum	17.0"	25.0"

✓ Pitots, Pre Leak Ck
✓ Pitots, Post Leak Ck
✓ Gas Sampling System
✓ Integrated Bag
___ Thermocouples @ ___ °F

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ___ Box # W-3

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	650.8	614.4	=
#2 Imp.	699.4	653.0	=
#3 Imp.	587.6	575.0	=
#4 Imp.	646.9	643.6	=
#5 Imp.	___	___	=
#6 S.G.	816.0	799.8	=
Total H_2O Volume			114.9 ✓ g

Start Time 13:30
Stop Time 14:30
Barometric Pressure "Hg 29.62
Static Pres "H_2O -.135
Production Rate
SET POINT @ 1650°F

SAMPLING PARAMETERS

% Moisture ___
Meter Temp. ___
Stack Temp. ___
ΔH@ 1.85 Y .991
Pitot # P64 Side # A
Cp 0.84
Nozzle Diameter .765 inch
D_1 .765 D_2 .765 D_3 .766
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
NE 3	0.0	906.050	.05	3.51	3.51	62	62	11.0	236	55	1637		
	5.0	910.633	.05	3.51	3.51	61	61	15.0	240	43	1631		
	10.0	915.470	.05	3.51	3.60	61	61	15.0	252	43	1625	CO_2-	8.3%
	15.0	920.442	.045	3.51	3.51	61	60	15.0	256	44	1647	O_2	11.6%
	20.0	925.566	.045	3.51	3.51	61	60	15.0	260	49	1628	CO	59ppm
	25.0	930.371	.045	3.51	3.51	61	60	15.0	261	56	1629		
	30.0	935.263	.045	3.51	3.51	61	60	15.0	270	51	1622		
	35.0	940.202	.045	3.51	3.51	61	60	15.0	270	52	1629		
	40.0	945.153	.045	3.51	3.51	61	60	15.0	282	53	1631		
	45.0	950.068	.045	3.51	3.51	61	60	15.0	278	50	1633		
	50.0	955.013	.045	3.51	3.51	61	60	15.0	273	51	1628		
	55.0	960.008	.045	3.51	3.51	61	60	15.0	273	50	1633		
	60.0	964.775											
		58.725 ✓	$\sqrt{(\Delta P)^2}$		3.584 ✓ ΔH		60.7 ✓ T_m				1631.1 ✓ T_s		

AMTEST AIR QUALITY, INC

273

SAMPLE TRAIN INFORMATION

Fill out one sheet per site and per test type.

CLIENT: KING Co LANDFILLS

LOCATION: CEDAR HILLS

SITE: NORTH FLARE STA. FLARE STACK #2 OUTLET

TEST TEAM: KA, CBL DATE(S): 2-10-94.

RUN #'S: 3E7 TYPE: M-26A.

Probe/Filter Temperature: ____ 248±25 F ____ 320 F ✓ Other

Impinger Temperature: ✓ <68 F ____ Other

THIMBLE: ____ yes ✓ no NOZZLE TYPE: ✓ quartz ____ steel ____ none

PROBE LINER: ✓ quartz ____ glass ____ steel ____ teflon

PROBE TYPE: ✓ regular ____ water-cooled

FRONT-HALF FILTER: ✓ yes ____ no SIZE (mm): ___ 90 ✓ 110 ___ 125 ___ other____
FRONT-HALF FILTER MEDIA: ✓ quartz fiber ____ glass fiber ____ teflon

SUPPORT: ____ steel ✓ glass frit ____ teflon GASKET: ✓ silicon ✓ teflon

BACK-HALF FILTER: ____ yes ✓ no
BACK-HALF FILTER MEDIA: ____ quartz fiber ____ glass fiber ____ telfon ____ tared ____ untared
NOTE: Show the back-half filter location with an arrow on the table below.

CONTENTS	Initial Volume (mL)	Clean-up Solution Used	Bottle Type	Comments
Nozzle/Probe Rinse				
Filter				
#1 0.1N H_2SO_4	100	D.I. WATER	NALGENE	INT IMPINGERS THEN
#2 0.1N H_2SO_4	100	↓	SAMPLE JAR	COMBINE H_2SO_4 IMP.
#3 0.1N NaOH	100			TOGETHER RINSE W/ DI.
#4 0.1N NaOH	100	↓		COMBINE NaOH IMPS.
#5 SILICA				TOGETHER RINSE W/ DI.
#6				BRING BACK TO LAB FOR
#7				FURTHER ANALYSES

IF THIS INFORMATION IS NOT ACCURATE FOR ALL RUNS, NOTE ALL EXCEPTIONS.

filter was used for PM — not recovered

#476

CANISTER SAMPLING FIELD DATA SHEET

274

A. GENERAL INFORMATION

SITE LOCATION: King Co. Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: 2-10-94.

SHIPPING DATE: _____
CANISTER SERIAL NO. 477
SAMPLER ID: A-1 TO 19 FLARE FE INLET / 5124
OPERATOR: _____
CANISTER LEAK CHECK DATE: _____

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	55	55	X	X
STOP	60	57.		

PRESSURE

CANISTER PRESSURE	
	30.0
X	0.4

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	09:56	0.0
STOP	10:46	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
100 cc/min		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE: _____
QUARTERLY RECERTIFICATION DATE: _____

C. LABORATORY INFORMATION

DATE RECEIVED: _____
RECEIVED BY: _____
INITIAL PRESSURE: _____
FINAL PRESSURE: _____
DILUTION FACTOR: _____
ANALYSIS
GC-FID-ECD DATE: _____
GC-MSD-SCAN DATE: _____
GC-MSD-SIM DATE: _____
RESULTS : _____

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

_____
SIGNATURE/TITLE

#583

COAST TO COAST ANALYTICAL SERVICES

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275

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co. Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: 2-10-94.

SHIPPING DATE:
CANISTER SERIAL NO.: 583
SAMPLER ID: RZ TO-14 (Inlet #2 INLET)
OPERATOR: 5125
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	58°	60°	X	X
STOP	80°	60°		

PRESSURE

CANISTER PRESSURE	
	29.5 in Hg
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	11:45	0.0
STOP	12:35	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CON READ
100 cc/min		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS*:

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

#652

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276

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: KLAUS RD. LANDFILL
SITE ADDRESS: CEDAR HILLS

SAMPLING DATE: 2-10-94

SHIPPING DATE:
CANISTER SERIAL NO.: 652
SAMPLER ID: R-3 TOM MARCH / INLET
OPERATOR: 5126
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	62	63		
STOP	90	63		

PRESSURE

CANISTER PRESSURE	
	29.5 in Hg
	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	13:35	0.0
STOP	14:25	50.4

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONT READ
100 cc/min		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS*:

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

#477

277

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: 2-10-94

SHIPPING DATE:
CANISTER SERIAL NO. 476
SAMPLER ID: R-1 TO-14 FLARE #2 OUTLET /5127
OPERATOR:
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	55	55	X	X
STOP	200°	57		

PRESSURE

CANISTER PRESSURE	
	30.0
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	09:56	0.0
STOP	10:46	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
100 cc/min		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS :

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

SIGNATURE/TITLE

#489

COAST-TO-COAST ANALYTICAL SERVICES

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278

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co. Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: 2-10-94

SHIPPING DATE:
CANISTER SERIAL NO.: 649
SAMPLER ID: R2 To 14 Flare #2 out
OPERATOR: 5128
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	58	60	X	X
STOP	200°	60		

PRESSURE

CANISTER PRESSURE	
	29.5 in Hg
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	11:45	0.0
STOP	12:35	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CO READ
100cc/min		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS*:

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

#649

COAST-TO-COAST ANALYTICAL SERVICES

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CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: 2-10-94

SHIPPING DATE:
CANISTER SERIAL NO.: 489
SAMPLER ID: R3 TO14 FLARE #2 04T
OPERATOR: 5129
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	62	63	X	X
STOP	200	63		

PRESSURE

CANISTER PRESSURE	
	29.5 in Hg
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	13:35	0.0
STOP	14:25	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONT READ
100 cc/min.		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS*:

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

TEMPERATURE MEASUREMENT DATA

FILE NAME: LB600\CH#2TEMP
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SAMPLE SITE: FLARE STACK #2
SAMPLE DATE: FEBRUARY 10, 1994

STACK TEMPERATURES

TIME	PLANT THERMOCOUPLE (°F)	AMTEST THERMOCOUPLE (°F)	INLET TEMP (°F)
RUN 1 - 09:51-10:51			
951	1649.0	1648.4	*
952	1656.8	1657.8	
953	1670.0	1669.8	
954	1677.2	1683.6	
955	1677.8	1678.0	
956	1669.6	1658.8	
957	1678.2	1680.4	
958	1679.8	1680.4	
959	1678.4	1684.6	
1000	1680.2	1679.4	
1001	1663.6	1639.2	
1002	1657.4	1660.4	
1003	1648.2	1640.0	
1004	1656.2	1655.6	
1005	1650.0	1637.4	
1006	1641.6	1638.2	
1007	1661.6	1667.4	
1008	1667.0	1663.0	
1009	1666.2	1665.4	
1010	1660.4	1645.2	
1011	1654.4	1649.2	
1012	1655.8	1648.8	
1013	1650.4	1649.6	
1014	1657.8	1650.8	
1015	1659.9	1651.3	
1016	1667.6	1672.4	
1017	1665.6	1668.7	
1018	1674.2	1662.4	
1019	1659.5	1656.8	
1020	1663.5	1664.8	
1021	1673.4	1680.0	
1022	1685.0	1685.0	
1023	1678.2	1680.4	
1024	1675.4	1678.0	
1025	1671.1	1670.9	
1026	1669.4	1671.0	
1027	1690.6	1698.2	

1028	1692.2	1697.8
1029	1687.4	1681.0
1030	1672.8	1669.6
1031	1668.2	1667.1
1032	1666.4	1665.9
1033	1675.2	1678.4
1034	1681.4	1680.5
1035	1674.6	1671.1
1036	1677.8	1673.6
1037	1676.0	1672.8
1038	1673.0	1667.2
1039	1665.4	1658.7
1040	1665.2	1655.8
1041	1661.2	1649.2
1042	1651.8	1645.2
1043	1653.2	1650.8
1044	1654.6	1650.6
1045	1677.2	1684.6
1046	1674.4	1672.4
1047	1680.4	1682.6
1048	1667.0	1662.8
1049	1672.6	1666.6
1050	1672.6	1673.0
1051	1669.4	1666.0
AVERAGE RUN 1	1668.0	1665.8
	(°F) PLANT THERMOCOUPLE	(°F) AMTEST THERMOCOUPLE

(°F) INLET TEMP

* INLET LINE WAS NOT ACCESSIBLE DURING RUN 1

STACK TEMPERATURES

TIME	PLANT THERMOCOUPLE (°F)	AMTEST THERMOCOUPLE (°F)	INLET TEMP (°F)
RUN 2 - 11:40-12:40			
1140	1684.2	1685.2	89.0
1141	1690.0	1692.6	89.0
1142	1686.8	1691.0	89.0
1143	1688.2	1688.6	88.8
1144	1686.2	1682.6	89.0
1145	1680.2	1673.8	89.0
1146	1664.2	1663.6	89.0
1147	1682.6	1693.0	89.0
1148	1699.4	1701.4	89.0
1149	1683.4	1675.4	89.0
1150	1680.6	1681.4	89.0
1151	1683.0	1685.2	89.0
1152	1689.4	1689.4	89.0
1153	1684.2	1673.8	89.0
1154	1682.6	1685.6	89.0
1155	1688.5	1691.1	89.0
1156	1693.6	1690.0	89.2
1157	1683.6	1689.4	71.6
1158	1692.0	1685.2	89.2
1159	1692.2	1698.2	89.0
1200	1688.2	1687.2	89.0
1201	1695.6	1698.0	89.0
1202	1688.0	1685.8	89.0
1203	1677.6	1682.4	89.0
1204	1692.4	1692.6	89.0
1205	1688.2	1689.0	89.0
1206	1681.4	1684.0	89.0
1207	1693.6	1689.4	88.6
1208	1688.8	1688.2	88.8
1209	1687.2	1690.2	89.0
1210	1687.8	1684.2	89.0
1211	1692.8	1694.6	89.0
1212	1693.8	1695.0	89.2
1213	1697.0	1697.6	89.0
1214	1689.4	1684.2	89.0
1215	1686.8	1692.6	88.2
1216	1693.0	1692.0	88.8
1217	1689.2	1695.0	88.8
1218	1688.2	1692.4	88.4
1219	1695.2	1692.2	89.0
1220	1693.3	1690.0	71.2
1221	1687.4	1694.2	69.0
1222	1684.7	1685.8	62.8
1223	1693.7	1688.2	70.5
1224	1685.4	1684.4	88.0
1225	1684.8	1686.0	89.0
1226	1694.8	1694.0	89.0
1227	1700.2	1705.8	89.0
1228	1700.2	1696.4	88.8
1229	1689.6	1683.8	88.4

1230	1685.6	1683.6	89.0
1231	1676.0	1665.6	88.8
1232	1677.8	1679.8	89.0
1233	1684.4	1691.4	88.4
1234	1690.0	1683.2	88.6
1235	1685.0	1693.6	89.0
1236	1688.0	1692.9	88.1
1237	1681.4	1668.4	88.4
1238	1675.5	1677.4	88.1
1239	1673.4	1671.6	88.0
1240	1680.2	1681.0	88.0
AVERAGE RUN 2	1687.2	1687.2	87.2
	(°F) PLANT THERMOCOUPLE	(°F) AMTEST THERMOCOUPLE	(°F) INLET TEMP

STACK TEMPERATURES

TIME	PLANT THERMOCOUPLE (°F)	AMTEST THERMOCOUPLE (°F)	INLET TEMP (°F)
RUN 3 - 13:30-14:16			
1330	1665.4	1663.8	89.0
1331	1666.0	1662.6	89.0
1332	1674.4	1675.6	89.0
1333	1678.4	1666.6	88.6
1334	1664.2	1654.8	89.0
1335	1671.8	1680.0	89.0
1336	1684.0	1674.8	88.4
1337	1681.8	1679.6	89.0
1338	1679.6	1678.8	88.0
1339	1679.0	1679.2	89.0
1340	1684.0	1679.4	89.0
1341	1675.8	1672.4	89.0
1342	1682.0	1682.6	89.0
1343	1687.4	1679.6	89.0
1344	1678.8	1674.0	89.0
1345	1675.8	1668.4	88.6
1346	1676.8	1674.4	88.6
1347	1681.9	1680.5	89.0
1348	1672.0	1658.0	88.2
1349	1688.0	1688.8	88.4
1350	1696.8	1699.4	86.6
1351	1687.6	1673.2	88.0
1352	1675.8	1668.8	88.0
1353	1666.2	1663.6	88.0
1354	1664.8	1661.8	88.0
1355	1679.6	1688.4	88.0
1356	1686.8	1675.0	88.0
1357	1574.9	1665.2	88.0
1358	1668.0	1672.8	88.0
1359	1669.7	1666.5	88.0
1400	1676.8	1677.6	74.9
1401	1677.9	1680.8	57.7
1402	1680.2	1681.1	52.4
1403	1684.6	1686.9	56.8
1404	1673.5	1666.5	82.0
1405	1675.1	1677.9	87.2
1406	1680.1	1679.4	87.9
1407	1675.1	1669.0	88.0
1408	1410.5	1679.4	88.0
1409	1655.5	1684.7	88.4
1410	1680.0	1679.8	89.0
1411	1677.2	1673.3	89.0
1412	1672.8	1666.9	89.0

1413	1673.2	1670.0	89.0
1414	1676.6	1668.5	89.0
1415	1677.8	1676.0	89.0
1416	1682.4	1687.6	89.0
AVERAGE RUN 3	1669.1	1674.8	86.0
	(°F)	(°F)	(°F)
	PLANT	AMTEST	INLET
	THERMOCOUPLE	THERMOCOUPLE	TEMP

STACK SCHEMATIC AND LOCATION OF SAMPLE POINTS

286

Client King County

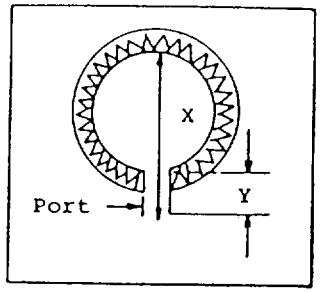
Location Cedar Hills Landfill

Sampling Location Flare #3 Inlet

Inside of far wall to outside of port (distance, X) 13.5"

Inside of near wall to outside of port (distance, Y) 1.5"

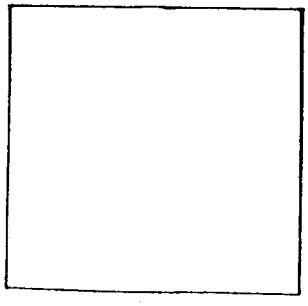
Stack I.D. (distance X - distance Y) 12"

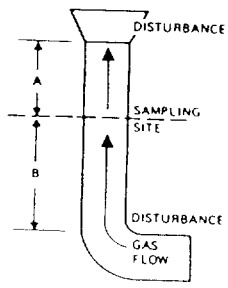


Schematic of Sampling Location

1 *Traverse Point #*	2 *Fractional Percent of Stack I.D.*	3 *Stack I.D. inches*	4 *Column 2 x 3*	5 *Distance Y*	6 *Traverse Point Location from Outside of Port columns 4 + 5*
1	4.4	12"	1	1.5"	2.5
2	14.6	↓	1.75	↓	3.25
3	29.6		3.55		5.05
4	70.4		8.45		9.95
5	85.4		10.25		11.75
6	95.6	↓	11.0	↓	12.5
7					
8					
9					
10					
11					
12					

CROSS SECTION





Distance A = _____ *downstream*

Distance B = _____ *upstream*

STACK, CONTROL DEVICE AND PROCESS FLOW DIAGRAM

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

287

Client King Co. Landfills
Location Cedar Hills
Sample Site Flare Stack #3 Inlet.
Stack Diameter 12.0"
Date 2-8-94
Operators KDO ERL
Run I.D. R-1 Flows

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	ø / ø
Leak Test Vacuum	ø / ø

✓ Pitots, Pre Leak Ck
___ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ___ Box # ___

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.			
#2 Imp.			
#3 Imp.			
#4 Imp.			
#5 Imp.			
#6 S.G.			

Total H_2O Volume ___ g

Start Time 11:25
Stop Time 11:40
Barometric Pressure "Hg 29.7
Static Pres "H_2O 4.5
Production Rate ___

SAMPLING PARAMETERS

% Moisture ___
Meter Temp. ___
Stack Temp. ___
Δ H@ ø Y ø
Meter Box ID /
Pitot # S-24. Side # A.
Thermocouple ID ___
Flow Meas. Device MAG
Cp .99
K Factor ø

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								Top 1	.40	92°	[illegible]
								2	.44	93°	AMB = 46°
								3	.45	95°	Avg = 96
								4	.46	95°	
								5	.44	95°	
								6	.40	95°	
			Δ H	Tm					$(\Delta P)^2$	Ts 94.2	

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

288

Client: King Co Landfill
Location: Cedar Hills
Sample Site: Flare Stack #3 Inlet
Stack Diameter: 12.0"
Date: 2-8-94
Operators: KAO, CRL
Run I.D.: R-2 FLOWS

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	0 / 0
Leak Test Vacuum	8 / 6
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
✓ Gas Sampling System	
✓ Integrated Bag	
Thermocouples @ ___ °F	

QA FORMS COMPLETED

- Stack Schematic ✓
- Sample Train ✓
- Pitot Tube Insp. ___
- Magnehelic Cal. ___
- Temp. Probe Cal. ___
- Gas Meter Calib. ___

Filter # ______ Box # ______

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.			
#2 Imp.			
#3 Imp.			
#4 Imp.			
#5 Imp.			
#6 S.G.			

Total H_2O Volume ______ g

Start Time: 13:55
Stop Time: 14:10
Barometric Pressure "Hg: 29.6
Static Pres "H_2O: 4.5
Production Rate: ______

SAMPLING PARAMETERS

% Moisture ______
Meter Temp. ______
Stack Temp. ______
Δ H@ ______ Y ______
Meter Box ID: 0
Pitot #: C-24 Side #: A
Thermocouple ID ______
Flow Meas. Device: MAG
Cp: .99
K Factor ______

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								TOP 1	.40	92	WET-92
								2	.42	93	DRY-94
								3	.42	94	
								4	.43	95	
								5	.44	94	
								6	.40	94.	
			Δ H	Tm					$(\Delta$ P$)^2$	Ts 93.7 ✓	

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Page 1 of 1

289

Client KING CO. LANDFILL
Location CEDAR HILLS
Sample Site FLARE STACK #3 INLET
Stack Diameter 12.0
Date 2-8-94
Operators KAJ, ERL
Run I.D. R-3

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	0 / 0
Leak Test Vacuum	0 / 0
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
Gas Sampling System	
✓ Integrated Bag	
Thermocouples @ ___ °F	

QA FORMS COMPLETED

Stack Schematic	✓
Sample Train	✓
Pitot Tube Insp.	
Magnehelic Cal.	
Temp. Probe Cal.	
Gas Meter Calib.	

Filter # _____ Box # _____

	Final Wt. gram		Initial Wt. gram		Net Wt. gram
#1 Imp.		-		=	
#2 Imp.		-		=	
#3 Imp.		-		=	
#4 Imp.		-		=	
#5 Imp.		-		=	
#6 S.G.		-		=	

Total H_2O Volume _____ g

Start Time 17:00
Stop Time 17:15
Barometric Pressure "Hg 29.58
Static Pres "H_2O -4.6
Production Rate _____

SAMPLING PARAMETERS

% Moisture _____
Meter Temp. _____
Stack Temp. _____
△ H@ _____ Y _____
Meter Box ID BLACK MAC
Pitot # S-24 Side # A
Thermocouple ID _____
Flow Meas. Device MAC
Cp .99
K Factor _____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								TOP 1	.40	91	WET-73
								2	.40	94	DRY-94
								3	.39	95	
								4	.41	95	
								5	.43	96	
								6	.38	95	
			△ H		T_m				(△ P)²	94.3✓ T_s	

1.06

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METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Page 1 of 1

290

Client KING COUNTY LANDFILL
Location CEDAR HILLS
Sample Site FLARE STACK #3 OUTLET
Stack Diameter 138.6"
Date 2-8-94
Operators ROCKEL
Run I.D. R1

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	____/____
Leak Test Vacuum	____/____
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
____ Gas Sampling System	
____ Integrated Bag	
IR Thermocouples @ ___ °F	

QA FORMS COMPLETED

Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # _____ Box # _____

	Final Wt. gram		Initial Wt. gram		Net Wt. gram
#1 Imp.		-		=	
#2 Imp.		-		=	
#3 Imp.		-		=	
#4 Imp.		-		=	
#5 Imp.		-		=	
#6 S.G.		-		=	

Total H_2O Volume _____ g

Start Time 10:00
Stop Time 10:25
Barometric Pressure "Hg 29.7
Static Pres "H_2O .13
Production Rate

SAMPLING PARAMETERS

% Moisture
Meter Temp.
Stack Temp.
△ H@ _____ Y
Meter Box ID
Pitot # AA Side # A
Thermocouple ID TC3
Flow Meas. Device MAC
Cp .84
K Factor

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								SE 1	.005	1691	CO_2 - 7.3%
								2	.009	1686	O_2 - 12.6%
								3	.006	1671	CO - 0
								4	.008	1646	
								5	.01	1690	
								6	.01	1691	
								NE 1	.006	1626	
								2	.01	1660	
								3	.01	1655	
								4	.011	1662	
								5	.011	1652	
								6	.01	1683	
								NW 1	.02	1727	
								2	.02	1747	
								3	.024	1747	
								4	.025	1745	
								5	.021	1734	
								6	.016	1715	
								SW 1	.013	1670	
								2	.015	1725	
								3	.015	1717	
								4	.014	1690	
								5	.018	1688	
								6	.022	1703	
			△ H		T_m				$(\Delta p)^2$	T_s	
									.056 .013	1692.3	

5164

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Client KING CO. LANDFILLS
Location CEDAR HILLS
Sample Site FLARE STACK #3 OUTLET
Stack Diameter 138.0"
Date 2-4-93
Operators KP CRL
Run I.D. R-2 12

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	0 / 0
Leak Test Vacuum	0 / 0
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
✓ Gas Sampling System	
Integrated Bag	
Thermocouples @ °F	

QA FORMS COMPLETED
Stack Schematic
Sample Train
Pitot Tube Insp.
Magnehelic Cal.
Temp. Probe Cal.
Gas Meter Calib.

Filter # Box #

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.			
#2 Imp.			
#3 Imp.			
#4 Imp.			
#5 Imp.			
#6 S.G.			

Total H_2O Volume g

Start Time 13:00
Stop Time 13:20
Barometric Pressure "Hg 29.6
Static Pres "H_2O .15
Production Rate

SAMPLING PARAMETERS

% Moisture
Meter Temp.
Stack Temp.
Δ H@ Y
Meter Box ID BLACK MAC
Pitot #99A Side # A
Thermocouple ID T9B
Flow Meas. Device MAG
Cp 0.84
K Factor

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (ΔH) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading Δ P " H_2O	Stack Temp °F	
								SW 6	.01	167C	
								5	.015	1677	CO_2-7.3%
								4	.02	1678	O_2-12.6%
								3	.025	1662	CO 0 ppm
								2	.035	1696	
								NW 1	.02	1638	
								6	.025	1694	
								5	.023	1686	
								4	.025	1707	
								3	.02	1700	
								2	.02	1696	
								1	.017	1673	
								SE 6	.02	1685	
								5	.025	1670	
								4	.02	1665	
								3	.02	1658	
								2	.01	1608	
								NE 1	.01	1500	
								NE 6	.025	1694	
								5	.025	1708	
								4	.02	1682	
								3	.023	1670	
								2	.020	1687	
								1	.015	1637	
									.020	1667.8 ✓	
			Δ H		T_m				$(\Delta P)^2$	T_s	

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METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

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292

Client King Co Landfill
Location CEDAR HILLS
Sample Site FLARE #3 STACK OUTLET
Stack Diameter 138.0"
Date 2-8-94
Operators KPO CRL
Run I.D. R-3

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	G / G
Leak Test Vacuum	G / G
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
___ Gas Sampling System	
___ Integrated Bag	
___ Thermocouples @ ___ °F	

QA FORMS COMPLETED

Stack Schematic ___
Sample Train ___
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # _____ Box # _____

	Final Wt. gram		Initial Wt. gram		Net Wt. gram
#1 Imp.	_____	-	_____	=	_____
#2 Imp.	_____	-	_____	=	_____
#3 Imp.	_____	-	_____	=	_____
#4 Imp.	_____	-	_____	=	_____
#5 Imp.	_____	-	_____	=	_____
#6 S.G.	_____	-	_____	=	_____

Total H_2O Volume _____ g

Start Time 16:00
Stop Time 16:25
Barometric Pressure "Hg 29.6
Static Pres "H_2O .15
Production Rate _____

SAMPLING PARAMETERS

% Moisture _____
Meter Temp. _____
Stack Temp. _____
△ H@ _____ Y _____
Meter Box ID BLACK MAC
Pitot # P9A Side # A
Thermocouple ID T98
Flow Meas. Device MAG
Cp 0.84
K Factor _____

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
								SE 6	.018	1647	
								5	.015	1616	CO_2 8.1 %
								4	.020	1633	O_2 11.6 %
								3	.01	1638	CO 0 ppm
								2	.015	1636	
								1	.012	1535	
								NW 6	.07	1720	
								5	.065	1758	
								4	.070	1758	
								3	.07	1763	
								2	.05	1721	
								1	.045	1648	
								SW 6	.070	1688	
								5	.075	1704	
								4	.080	1682	
								3	.075	1695	
								2	.075	1679	
								NE 1	.075	1611	
								6	.025	1700	
								5	.025	1707	
								4	.025	1713	
								3	.025	1693	
								2	.020	1665	
								1	.015	1641	
										1677 ✓	
			△ H		T_m				$(\Delta P)^2$	T_s	

GAS LOG MEASUREMENT DATA

FILE NAME: LB600\CH#3GAS2
CLIENT: KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION: MAPLE VALLEY, WASHINGTON
SAMPLE SITE: FLARE STACK #3
SAMPLE DATE: FEBRUARY 8, 1994

TIME	NITROGEN OXIDES (ppm)	SULFUR DIOXIDE (ppm)	CARBON MONOXIDE (ppm)	CARBON DIOXIDE (%)	OXYGEN (%)
RUN 1 - 11:15-12:15					
11:15:00	17.5	2.3	0	7.1	12.7
11:16:00	17.5	2.2	0	6.9	13.0
11:17:00	17.6	2.2	0	7.0	12.9
11:18:00	18.3	2.2	0	6.8	12.8
11:19:00	19.0	2.2	0	7.1	12.4
11:20:00	18.1	2.3	0	7.4	12.4
11:21:00	18.6	2.3	0	7.2	12.7
11:22:00	18.9	2.5	0	7.3	12.3
11:23:00	18.9	2.4	0	7.4	12.3
11:24:00	18.3	2.5	0	7.4	12.5
11:25:00	18.1	2.5	0	7.3	12.5
11:26:00	18.9	2.6	0	7.2	12.5
11:27:00	18.3	2.6	0	7.3	12.5
11:28:00	18.0	2.6	0	7.0	12.8
11:29:00	18.5	2.5	0	7.1	12.5
11:30:00	19.3	2.5	0	7.2	12.5
11:31:00	19.8	2.5	0	7.3	12.2
11:32:00	19.0	2.5	0	7.6	12.3
11:33:00	18.8	2.5	0	7.4	12.3
11:34:00	19.1	2.5	0	7.4	12.3
11:35:00	18.1	2.5	0	7.4	12.6
11:36:00	19.1	2.6	0	7.2	12.5
11:37:00	19.0	2.6	0	7.4	12.2
11:38:00	19.4	2.5	0	7.4	12.2
11:39:00	19.9	2.4	0	7.4	12.3
11:40:00	19.5	2.5	0	7.5	12.2
11:41:00	19.0	2.5	0	7.5	12.3
11:42:00	19.4	2.5	0	7.4	12.3
11:43:00	18.8	2.6	0	7.3	12.5
11:44:00	19.5	2.6	0	7.4	12.2
11:45:00	18.4	2.6	0	7.5	12.3
11:46:00	18.6	2.4	0	7.3	12.5
11:47:00	19.5	2.6	0	7.4	12.3
11:48:00	18.9	2.5	0	7.5	12.3
11:49:00	18.6	2.5	0	7.2	12.5
11:50:00	18.1	2.4	0	7.3	12.4
11:51:00	17.5	2.6	0	7.2	12.8
11:52:00	17.3	2.5	0	6.8	12.9
11:53:00	17.5	2.5	0	6.7	13.3

11:54:00	18.4	2.5	0	6.8	12.8
11:55:00	18.5	2.4	0	7.1	12.6
11:56:00	17.6	2.6	0	7.2	12.7
11:57:00	17.9	2.5	0	6.9	12.9
11:58:00	18.6	2.5	0	7.0	12.5
11:59:00	18.6	2.4	0	7.3	12.5
12:00:00	17.9	2.4	0	7.3	12.6
12:01:00	18.6	2.5	0	7.2	12.6
12:02:00	19.0	2.5	0	7.3	12.2
12:03:00	18.8	2.5	0	7.4	12.2
12:04:00	18.6	2.4	0	7.5	12.2
12:05:00	19.0	2.4	0	7.4	12.4
12:06:00	18.3	2.3	0	7.3	12.5
12:07:00	18.1	2.4	0	7.1	12.7
12:08:00	17.8	2.4	0	7.1	12.7
12:09:00	17.9	2.4	0	7.0	12.8
12:10:00	17.8	2.4	0	7.1	12.7
12:11:00	18.0	2.4	0	7.0	12.8
12:12:00	17.3	2.4	0	7.0	12.8
12:13:00	17.5	2.4	0	6.8	13.1
12:14:00	17.6	2.3	0	6.8	12.9
12:15:00	18.4	2.4	0	6.8	12.8
AVERAGE RUN 1	18.5	2.4	0	7.2	12.5
	(ppm)	(ppm)	(ppm)	(%)	(%)
	NITROGEN OXIDES	SULFUR DIOXIDE	CARBON MONOXIDE	CARBON DIOXIDE	OXYGEN

TIME	NITROGEN OXIDES (ppm)	SULFUR DIOXIDE (ppm)	CARBON MONOXIDE (ppm)	CARBON DIOXIDE (%)	OXYGEN (%)
RUN 2 - 13:23-14:23					
13:23:00	17.6	2.1	0	7.0	13.0
13:24:00	18.3	2.0	0	6.9	12.8
13:25:00	19.1	2.2	0	7.4	12.4
13:26:00	19.3	2.2	0	7.5	12.4
13:27:00	18.6	2.3	0	7.5	12.5
13:28:00	18.5	2.2	0	7.3	12.7
13:29:00	17.9	2.2	0	7.4	12.7
13:30:00	19.0	2.2	0	7.0	12.6
13:31:00	19.4	2.3	0	7.4	12.2
13:32:00	19.4	2.3	0	7.6	12.4
13:33:00	19.9	2.2	0	7.6	12.3
13:34:00	19.6	2.2	0	7.7	12.1
13:35:00	19.5	2.2	0	7.7	12.2
13:36:00	19.8	2.1	0	7.7	12.2
13:37:00	19.5	2.2	0	7.7	12.2
13:38:00	19.4	2.2	0	7.6	12.4
13:39:00	19.5	2.2	0	7.6	12.3
13:40:00	19.3	2.2	0	7.6	12.3
13:41:00	19.0	2.1	0	7.5	12.5
13:42:00	18.9	2.1	0	7.5	12.4
13:43:00	19.0	2.1	0	7.5	12.4
13:44:00	17.5	2.1	0	7.4	12.8
13:45:00	19.4	2.1	0	7.3	12.6
13:46:00	19.8	2.1	0	7.6	12.2
13:47:00	19.5	2.1	0	7.6	12.3
13:48:00	19.4	2.1	0	7.7	12.2
13:49:00	19.3	2.1	0	7.6	12.3
13:50:00	17.4	2.2	0	7.4	12.8
13:51:00	18.0	2.2	0	6.8	13.1
13:52:00	18.5	2.0	0	7.1	12.8
13:53:00	18.8	2.1	0	7.2	12.6
13:54:00	18.9	2.2	0	7.3	12.5
13:55:00	17.6	2.1	0	7.3	12.6
13:56:00	17.5	2.0	0	6.9	13.1
13:57:00	17.5	2.0	0	6.9	13.0
13:58:00	17.9	2.2	0	7.0	13.0
13:59:00	17.9	2.1	0	7.0	13.0
14:00:00	17.8	2.1	0	7.0	12.9
14:01:00	18.3	2.1	0	6.9	13.0
14:02:00	17.8	2.1	0	7.0	13.0
14:03:00	17.9	2.2	0	6.9	13.0
14:04:00	18.1	2.1	0	7.1	12.8
14:05:00	18.3	2.1	0	7.2	12.7
14:06:00	18.9	2.1	0	7.2	12.6
14:07:00	18.9	2.0	0	7.4	12.5
14:08:00	19.0	2.1	0	7.5	12.3
14:09:00	19.3	2.0	0	7.6	12.4
14:10:00	19.3	2.1	0	7.6	12.1
14:11:00	19.3	2.0	0	7.6	12.3
14:12:00	17.5	2.2	0	7.3	12.9
14:13:00	18.5	2.1	0	6.9	12.9
14:14:00	18.1	2.0	0	7.3	12.6

14:15:00	17.8	2.1	0	7.3	12.8
14:16:00	17.9	2.2	0	7.0	13.0
14:17:00	18.4	2.1	0	7.0	12.9
14:18:00	18.8	2.0	0	7.1	12.7
14:19:00	17.9	2.1	0	7.3	12.7
14:20:00	17.4	2.1	0	6.9	13.2
14:21:00	17.6	2.2	0	6.8	13.1
14:22:00	18.9	2.0	0	7.0	12.6
14:23:00	18.1	2.0	0	7.4	12.7
AVERAGE RUN 2	18.6	2.1	0	7.3	12.6
	(ppm) NITROGEN OXIDES	(ppm) SULFUR DIOXIDE	(ppm) CARBON MONOXIDE	(%) CARBON DIOXIDE	(%) OXYGEN

TIME	NITROGEN OXIDES (ppm)	SULFUR DIOXIDE (ppm)	CARBON MONOXIDE (ppm)	CARBON DIOXIDE (%)	OXYGEN (%)
RUN 3 - 16:28-17:28					
16:28:00	21.1	1.8	0	8.0	12.0
16:29:00	21.5	1.7	0	8.1	11.8
16:30:00	21.0	1.8	0	8.1	11.9
16:31:00	21.4	1.8	0	8.0	11.9
16:32:00	21.5	1.9	0	8.1	11.7
16:33:00	20.5	1.9	0	8.1	11.9
16:34:00	20.5	1.8	0	7.9	12.0
16:35:00	20.8	1.9	0	7.9	12.0
16:36:00	20.6	1.9	0	8.0	11.9
16:37:00	20.3	1.8	0	7.9	12.0
16:38:00	20.8	1.9	0	7.9	12.0
16:39:00	20.8	1.8	0	8.0	11.9
16:40:00	20.6	1.9	0	8.0	11.9
16:41:00	20.4	1.7	0	8.0	11.9
16:42:00	20.8	1.7	0	8.0	11.9
16:43:00	20.6	1.8	0	8.0	11.9
16:44:00	20.4	1.7	0	7.9	12.0
16:45:00	20.0	1.7	0	7.9	12.0
16:46:00	20.1	1.8	0	7.9	12.1
16:47:00	20.4	1.7	0	7.9	12.0
16:48:00	20.4	1.6	0	7.9	12.0
16:49:00	20.3	1.6	0	7.9	12.1
16:50:00	20.0	1.6	0	7.9	12.0
16:51:00	20.1	1.4	0	7.9	12.0
16:52:00	19.8	1.4	0	7.9	12.1
16:53:00	20.4	1.5	0	7.8	11.9
16:54:00	19.8	1.5	0	7.8	12.3
16:55:00	20.6	1.4	0	7.9	11.9
16:56:00	20.3	1.4	0	7.9	12.0
16:57:00	20.3	1.5	0	7.9	12.0
16:58:00	20.6	1.3	0	7.9	11.8
16:59:00	20.9	1.5	0	8.0	11.8
17:00:00	20.0	1.5	0	8.0	11.8
17:01:00	19.1	1.4	0	7.5	12.5
17:02:00	18.6	1.3	0	7.4	12.7
17:03:00	21.4	1.3	0	7.4	12.3
17:04:00	22.5	1.3	0	8.2	11.4
17:05:00	22.9	1.3	0	8.5	11.3
17:06:00	23.0	1.4	0	8.4	11.3
17:07:00	23.1	1.3	0	8.4	11.3
17:08:00	23.8	1.2	0	8.4	11.3
17:09:00	23.8	1.3	0	8.5	11.3
17:10:00	23.3	1.1	0	8.5	11.3
17:11:00	23.6	1.1	0	8.4	11.4
17:12:00	23.5	1.1	0	8.3	11.6
17:13:00	23.5	1.2	0	8.3	11.4
17:14:00	23.1	1.2	0	8.2	11.6
17:15:00	23.8	1.0	0	8.3	11.4
17:16:00	22.5	1.0	0	8.2	11.7
17:17:00	23.4	1.0	0	8.1	11.4
17:18:00	23.8	0.9	0	8.3	11.4
17:19:00	23.6	0.9	0	8.4	11.3

17:20:00	23.8	1.1	0	8.3	11.4
17:21:00	23.5	0.9	0	8.3	11.3
17:22:00	23.8	1.0	0	8.3	11.4
17:23:00	23.3	0.9	0	8.3	11.5
17:24:00	23.4	1.0	0	8.2	11.5
17:25:00	23.0	1.1	0	8.3	11.4
17:26:00	23.5	1.1	0	8.3	11.4
17:27:00	23.9	1.1	0	8.3	11.4
17:28:00	24.4	1.1	0	8.4	11.2
AVERAGE RUN 3	21.7	1.4	0	8.1	11.7
	(ppm)	(ppm)	(ppm)	(%)	(%)
	NITROGEN OXIDES	SULFUR DIOXIDE	CARBON MONOXIDE	CARBON DIOXIDE	OXYGEN

SAMPLING SYSTEM BIAS CHECK

Am Test-Air Quality, Inc.

AMTEST AIR QUALITY, INC

299

CLIENT: King County Landfill

LOCATION: Cedar Hills

SITE LOCATION: Flare Stack #3

DATE: 2-8-94.

RUN # 1 CONDITION: Temp Set Point @ 1650°F.

START: 11:15
STOP: 12:15.

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	5.9	5.5	6.0	0-25 %		✓
Oxygen (O2)	%	0.1	-0.1	14.8	15.4	14.98	0-25 %		✓
Carbon Monoxide (CO)	ppm	0.2	0.2	303.0	301.0	300.0	0-1000 PPM		✓
Sulfur Dioxide (SO2)	ppm	0.0	0.4	50.0	51.3	50.7	0-100 PPM		✓
Nitrogen Oxides (NOx)	ppm	0.0	-0.3	48.7	48.3	49.0	0-100 PPM		✓
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 2 CONDITION: Temp Set Point @ 1650°F

START: 13:23
STOP: 14:23

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.0	6.0	0-25 %		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	14.98	0-25 %		✓
Carbon Monoxide (CO)	ppm	0.0	0.1	301.0	302.0	300.0	0-1000 PPM		✓
Sulfur Dioxide (SO2)	ppm	0.0	0.2	51.7	51.4	50.7	0-100 PPM		✓
Nitrogen Oxides (NOx)	ppm	0.0	0.2	49.0	48.5	49.0	0-100 PPM		✓
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 3. CONDITION: Temp Set Point @ 1650°F

START: 16:28
STOP: 17:28

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.1	6.0	6.9	6.0	0-25 %		✓
Oxygen (O2)	%	0.0	0.1	15.0	15.1	14.98	0-25 %		✓
Carbon Monoxide (CO)	ppm	0.0	-0.2	302.0	283.0	300.0	0-1000 PPM		✓
Sulfur Dioxide (SO2)	ppm	0.0	0.2	51.3	46.5	50.7	0-100 PPM		✓
Nitrogen Oxides (NOx)	ppm	0.0	-0.3	49.0	47.9	49.0	0-100 PPM		✓
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

5012

TRAVERSE SAMPLING DATA SHEET

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300

Client Kings County Landfills
Location Coyote Hills
Sample Site Flare Stack #3

Stack Diameter 138"
Date 2-5-93
Operators KAO ERC
Run I.D. M-26A-R-1

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.002 / .002
Leak Test Vacuum	18" / 18"
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
✓ Gas Sampling System	
Integrated Bag	
TGC Thermocouples @ °F	

QA FORMS COMPLETED

Stack Schematic	✓
Sample Train	✓
Pitot Tube Insp.	
Magnehelic Cal.	
Temp. Probe Cal.	
Gas Meter Calib.	

Filter # _____ Box # S-1

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	596.6	543.70	52.9
#2 Imp.	689.8	675.4	14.4
#3 Imp.	639.2	624.7	14.5
#4 Imp.	641.3	637.5	3.8
#5 Imp.			
#6 S.G.	834.4	823.5	10.9

Total H_2O Volume 96.5 ✓ g

Start Time 11:15
Stop Time 12:15
Barometric Pressure "Hg 29.65
Static Pres "H_2O .13
Production Rate Temp Set Point @

SAMPLING PARAMETERS

% Moisture 9.0
Meter Temp. 71
Stack Temp. 166
ΔH@: 1.695 Y .991
Pitot # PGC Side # A
Cp 0.84
Nozzle Diameter .765 inch
D_1 .765 D_2 .764 D_3 .765
K Factor

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
NE 4	0.0	461.843	.017	1.63	1.63	50	50	2.4	246	45	1656		
	5.0	465.433	.025	2.40	2.40	49	49	3.0	248	46	1712		
	10.0	469.385	.025	2.4	2.40	50	49	3.0	242	45	1695	CO_2 -	7.3
	15.0	473.905	.025	2.4	2.40	50	49	3.4	248	45	1657	O_2 -	12.6 ✓
	20.0	477.775	.025	2.4	2.4	51	49	3.0	269	45	1694	CO -	0.0
	25.0	482.045	.020	1.92	1.92	52	50	3.4	252	45	1647		
	30.0	486.372	.025	2.4	2.4	54	52	3.0	244	46	1650		
	35.0	489.866	.023	1.73	1.73	54	52	3.4	248	45	1642		
	40.0	493.621	.02	1.51	1.51	54	51	2.5	255	45	1634		
	45.0	496.962	.02	1.51	1.51	54	51	2.5	250	46	1649		
	50.0	500.125	.02	1.51	1.51	54	51	2.5	252	47	1674		
	55.0	504.062	.02	1.51	1.51	54	51	2.5	255	47	1620		
	60.0	506.780											
		44.937 ✓	.009 / $\sqrt{(\Delta P)^2}$	1.94 / ΔH 1.943 ✓		51.2 ✓ / Tm					1660.8 ✓ / Ts		

1.2

TRAVERSE SAMPLING DATA SHEET

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301

Client KING CO LANDFILLS
Location CEDAR HILLS
Sample Site FLARE STACK #3 OUTLET
Stack Diameter 138.0"
Date 2-8-94
Operators KDO, GRL
Run I.D. K-2 M-26A.

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.010 / .007
Leak Test Vacuum	16.0 / 19.0"
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
✓ Gas Sampling System	
Integrated Bag	
TBC Thermocouples @ °F	

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp.
Magnehelic Cal.
Temp. Probe Cal.
Gas Meter Calib.

Filter # Box # S-2

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	693.2	- 635.9 =	57.3
#2 Imp.	705.5	- 688.8 =	16.7
#3 Imp.	649.8	- 646.6 =	3.2
#4 Imp.	1680	- 667.6 =	0.4
#5 Imp.		- =	
#6 S.G.	824.3	- 815.1 =	9.2
Total H_2O Volume	868 ✓ g		

Start Time 13:23
Stop Time 14:23
Barometric Pressure "Hg 29.6
Static Pres "H_2O -5.15
Production Rate TCMM
SET POINT @ 1650°F

SAMPLING PARAMETERS

% Moisture 9.1
Meter Temp.
Stack Temp.
ΔH@ 1.85 Y .991
Pitot # P6C Side # A
Cp 0.84
Nozzle Diameter .246 inch
D_1 .245 D_2 .244 D_3 .246
K Factor

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
NE 4	0.0	507.306	.020	1.51	1.51	54	54	1.5	250	52	1691		
	5	510.628	.03	2.26	2.26	53	53	2.6	255	50	1703	CO_2 -	7.3%
	10	514.466	.020	1.51	1.61	53	53	2.0	265	47	1713	O_2 -	12.6% ✓
	15	518.015	.020	1.51	1.51	53	53	2.0	265	46	1731	CO -	0.0
	20	521.933	.020	1.51	1.51	53	53	2.0	260	46	1712		
	25	524.862	.020	1.51	1.51	54	53	2.0	247	46	1720		
	30	628.305	.020	1.51	1.51	54	53	2.0	245	46	1905		
	35	531.383	.020	1.51	1.51	55	53	2.0	248	47	1645		
	40	534.001	.020	1.51	1.51	55	53	2.0	256	46	1684		
	45	537.985	.020	1.51	1.51	56	53	2.0	258	47	1691		
	50	541.350	.020	1.51	1.51	56	53	2.0	250	47	1687		
	55	544.487	.020	1.51	1.51	56	53	2.0	247	48	1662		
	60	547.750											
		40.444 ✓	.021 / √(Δ P)²	1.573 ✓ ΔH		537 ✓ Tm					1695 ✓ Ts		

5074

TRAVERSE SAMPLING DATA SHEET

Page ___ of 302

Client Knox Co. Landfills
Location Cedar Hills
Sample Site Flare #3 Stack Outlet
Stack Diameter 138.0"
Date 2-8-94
Operators KAP, GRL
Run I.D. 3 MM-26A

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.007 / .005
Leak Test Vacuum	16.0" / 10.0
✓ Pitots, Pre Leak Ck	
✓ Pitots, Post Leak Ck	
✓ Gas Sampling System	
Integrated Bag	
76c Thermocouples @ ___ °F	

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ___ Box # S-3

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	701.6	635.4	
#2 Imp.	651.6	640.8	
#3 Imp.	636.2	630.2	
#4 Imp.	688.0	687.6	
#5 Imp.			
#6 S.G.	823.2	815.6	
Total H_2O Volume			91.0 ✓ g

Start Time 16:28
Stop Time 19:28
Barometric Pressure "Hg 29.60
Static Pres "H_2O -.15
Production Rate ___

SAMPLING PARAMETERS
% Moisture 9.7
Meter Temp. 53
Stack Temp. 1734
ΔH@ 1.85 Y .991
Pitot # AGC Side # A
Cp 0.84
Nozzle Diameter .365 inch
D_1 .365 D_2 .364 D_3 .366
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
~~NOT~~ 4	0.0	548.585	.020	1.51	1.51	53	53	1.50	248	48	1684		
	5.0	551.788	.020	1.51	1.61	52	52	2.00	242	41	1687	CO_2 -	8.1 %
	10.0	555.010	.020	1.51	1.51	52	52	2.0	240	40	1690	O_2 -	11.6 %
	15.0	558.355	.020	1.51	1.51	52	52	2.5	248	40	1690	CO -	0 ppm
	20.0	563.363	.020	1.51	1.51	54	52	2.5	247	40	1694		
	25.0	564.945	.020	1.51	1.51	54	52	3.0	251	40	1699		
	30.0	568.318	.020	1.51	1.51	55	52	3.0	252	41	1700		
	35.0	571.778	.020	1.51	1.51	56	53	3.0	250	42	1787		
	40.0	575.050	.020	1.51	1.51	56	53	3.0	255	42	1803		
	45.0	578.365	.020	1.51	1.51	58	54	3.0	250	43	1806		
	50.0	581.699	.020	1.51	1.51	59	55	3.0	253	44	1812		
	55.0	584.982	.020	1.51	1.51	59	55	3.0	248	43	1761		
	60.0	588.313											
		39.728 ✓	$\frac{0.020}{\sqrt{(\Delta P)^2}}$		$\frac{1.51}{\Delta H}$		$\frac{54.0}{T_m}$ ✓				$\frac{1734.0}{T_s}$ ✓		

AMTEST AIR QUALITY, INC.

SAMPLE TRAIN INFORMATION

303

Fill out one sheet per site and per test type.

CLIENT: KING Co. LANDFILLS

LOCATION: CEDAR HILLS

SITE: FLARE STA. FLARE #3

TEST TEAM: KPO, ERL DATE(S): 2/8 92/9/94

RUN #'S: 3 EA M-26A TYPE: M 26-A

Probe/Filter Temperature: ____ 248+25 F ____ 320 F ✓ Other

Impinger Temperature: ✓ <68 F ____ Other

THIMBLE: ____ yes ✓ no NOZZLE TYPE: ✓ quartz ____ steel ____ none

PROBE LINER: ✓ quartz ____ glass ____ steel ____ teflon

PROBE TYPE: ✓ regular ____ water-cooled

FRONT-HALF FILTER: ____ yes ✓ no SIZE (mm): ____ 90 ✓ 110 ____ 125 ____ other____
FRONT-HALF FILTER MEDIA: ✓ quartz fiber ____ glass fiber ____ teflon

SUPPORT: ____ steel ✓ glass frit ____ teflon GASKET: ____ silicon ____ teflon

BACK-HALF FILTER: ____ yes ✓ no
BACK-HALF FILTER MEDIA: ~~✓~~ quartz fiber ____ glass fiber ____ telfon ____ tared ____ untared
NOTE: Show the back-half filter location with an arrow on the table below.

CONTENTS	Initial Volume (mL)	Clean-up Solution Used	Bottle Type	Comments
Nozzle/Probe Rinse	NA	—	—	—
Filter	NA	—	—	—
#1 0.1N H_2SO_4	100	H_2O		Rinse Impingers
#2 0.1N H_2SO_4	100	↓		w/ H_2O
#3 0.1N NaOH	100	↓		Combine #1 + #2
#4 0.1N NaOH	100	↓		Combine #3 + #4
#5 Silica				Record Volume
#6				of combine Imp.
#7				

IF THIS INFORMATION IS NOT ACCURATE FOR ALL RUNS, NOTE ALL EXCEPTIONS.

RUNS #1/2 WERE RAN W/O FILTERS. TALK TO KAH TO SEE IF WE NEED TO DO FULL RECOVERY & ANALYSIS.

#661

304

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King County Landfill
SITE ADDRESS: Cedar Hills
Flare Sta.

SAMPLING DATE: 2-2-94

SHIPPING DATE: _____
CANISTER SERIAL NO. 661
SAMPLER ID: R-1 INLET FLARE #3 TO-14 / 5075
OPERATOR: _____
CANISTER LEAK CHECK DATE: _____

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	47.	46	X	X
STOP	92.	50		

PRESSURE

CANISTER PRESSURE	
	30.d
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	11:17	0.0
STOP	12:07	50.4

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
500 cc/min		
1000 cc/min		

SAMPLING SYSTEM CERTIFICATION DATE: _____
QUARTERLY RECERTIFICATION DATE: _____

C. LABORATORY INFORMATION

DATE RECEIVED: _____
RECEIVED BY: _____
INITIAL PRESSURE: _____
FINAL PRESSURE: _____
DILUTION FACTOR: _____
ANALYSIS
GC-FID-ECD DATE: _____
GC-MSD-SCAN DATE: _____
GC-MSD-SIM DATE: _____
RESULTS : _____

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

_____
SIGNATURE/TITLE

#418

305

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co. Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: 2-8-94

SHIPPING DATE:
CANISTER SERIAL NO. 418
SAMPLER ID: R-2 TO-14 Filter #3 Inlet / 5076
OPERATOR: KPO
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	52	52	X	X
STOP	90°	90°		

PRESSURE

CANISTER PRESSURE	
	30.0
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	13:25	0.0
STOP	19:15	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
500 cc/min.		
0.0 cc/min.		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS :

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

SIGNATURE/TITLE

511

306

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: 2-8-89

SHIPPING DATE: _____
CANISTER SERIAL NO. 511
SAMPLER ID: R-3 PM FLARE 3 INLET / 5077
OPERATOR: _____
CANISTER LEAK CHECK DATE: _____

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	48	48		
STOP	90°	47.		

PRESSURE

CANISTER PRESSURE	
	30.0
	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	14:30	0.0
STOP	17:20	50.0.

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
500cc/mn		
0.0		

SAMPLING SYSTEM CERTIFICATION DATE: _____
QUARTERLY RECERTIFICATION DATE: _____

C. LABORATORY INFORMATION

DATE RECEIVED: _____
RECEIVED BY: _____
INITIAL PRESSURE: _____
FINAL PRESSURE: _____
DILUTION FACTOR: _____
ANALYSIS
GC-FID-ECD DATE: _____
GC-MSD-SCAN DATE: _____
GC-MSD-SIM DATE: _____
RESULTS : _____

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

_____
SIGNATURE/TITLE

#648

307

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co. Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: 2-8-94

SHIPPING DATE:
CANISTER SERIAL NO. 648
SAMPLER ID: R-1 TO-14 FLARE #3 OUTLET -/~~5078~~ 5763
OPERATOR: ERL
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	48°	52	X	X
STOP	250°			

PRESSURE

CANISTER PRESSURE	
	30.0
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	11:17	0.0
STOP	12:07	50.0

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
500cc/min		
600cc/min		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS :

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

SIGNATURE/TITLE

#538

308

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co. Landfill
SITE ADDRESS: Cedar Hills

SAMPLING DATE: 2-5-99

SHIPPING DATE:
CANISTER SERIAL NO. 538
SAMPLER ID: R-2 TO-14 FLARE #3 OUTLET /5079
OPERATOR: ERL 5164
CANISTER LEAK CHECK DATE:

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	52.°	50	X	X
STOP	250°	50		

PRESSURE

CANISTER PRESSURE	
	30.4
X	0.4.

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	13:25	0.0
STOP	14:25	50.4

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
500 cc/min.		
0.0 cc/min		

SAMPLING SYSTEM CERTIFICATION DATE:
QUARTERLY RECERTIFICATION DATE:

C. LABORATORY INFORMATION

DATE RECEIVED:
RECEIVED BY:
INITIAL PRESSURE:
FINAL PRESSURE:
DILUTION FACTOR:
ANALYSIS
GC-FID-ECD DATE:
GC-MSD-SCAN DATE:
GC-MSD-SIM DATE:
RESULTS :

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

SIGNATURE/TITLE

#564

309

CANISTER SAMPLING FIELD DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: King Co. LANDFILL
SITE ADDRESS: CEDAR HILLS

SAMPLING DATE: 2-8-94.

SHIPPING DATE: _____
CANISTER SERIAL NO. 564.
SAMPLER ID: R-3 MOM FIELD #3 OUTLET / ~~5080~~ 5165
OPERATOR: ERL
CANISTER LEAK CHECK DATE: _____

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START	48°	48°	X	X
STOP	200°	47°		

PRESSURE

CANISTER PRESSURE	
	30.4
X	0.0

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START	16:30	0.0
STOP	17:20	50.4

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
500 cc/min		
0.6 "		

SAMPLING SYSTEM CERTIFICATION DATE: _____
QUARTERLY RECERTIFICATION DATE: _____

C. LABORATORY INFORMATION

DATE RECEIVED: _____
RECEIVED BY: _____
INITIAL PRESSURE: _____
FINAL PRESSURE: _____
DILUTION FACTOR: _____
ANALYSIS
GC-FID-ECD DATE: _____
GC-MSD-SCAN DATE: _____
GC-MSD-SIM DATE: _____
RESULTS : _____

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

_____
SIGNATURE/TITLE

TEMPERATURE MEASUREMENT DATA

FILE NAME:	LB600\CH#3TMP1
CLIENT:	KING COUNTY SOLID WASTE AT CEDAR HILLS
LOCATION:	MAPLE VALLEY, WASHINGTON
SAMPLE SITE:	FLARE STACK #3
SAMPLE DATE:	FEBRUARY 8, 1994

STACK TEMPERATURES

TIME	PLANT THERMOCOUPLE (°F)	AMTEST THERMOCOUPLE (°F)	INLET TEMP (°F)
RUN 1 - 11:15-12:15			
1115	1595.6	1597.4	94.2
1116	1600.6	1607.4	94.0
1117	1596.0	1606.6	94.2
1118	1619.0	1634.2	94.6
1119	1625.8	1631.6	95.0
1120	1617.2	1621.8	95.0
1121	1628.8	1639.9	95.0
1122	1636.4	1644.4	95.0
1123	1629.8	1632.4	94.2
1124	1633.6	1641.0	95.0
1125	1625.2	1635.8	94.2
1126	1632.5	1640.9	94.4
1127	1610.0	1608.0	94.2
1128	1627.2	1635.0	94.8
1129	1627.4	1628.2	95.0
1130	1631.2	1636.5	95.0
1131	1636.6	1632.2	95.0
1132	1640.4	1645.2	95.0
1133	1636.8	1642.4	94.8
1134	1630.0	1627.4	94.4
1135	1631.2	1641.0	94.6
1136	1648.2	1654.2	94.0
1137	1647.2	1645.2	93.4
1138	1638.4	1640.6	94.0
1139	1645.4	1644.8	94.0
1140	1642.2	1640.8	94.0
1141	1641.2	1640.8	94.0
1142	1632.9	1625.9	94.0
1143	1636.5	1641.8	94.8
1144	1644.4	1643.1	95.0
1145	1639.6	1640.6	95.0
1146	1641.5	1643.6	94.8
1147	1648.5	1650.4	94.6
1148	1637.1	1631.3	94.3
1149	1637.4	1635.8	94.0
1150	1621.2	1618.2	95.0
1151	1613.8	1613.4	94.6

1152	1600.8	1592.0	95.0
1153	1611.0	1612.2	95.0
1154	1620.2	1621.2	95.0
1155	1619.6	1611.8	95.0
1156	1604.4	1600.0	95.0
1157	1626.0	1635.4	95.0
1158	1628.2	1626.2	95.0
1159	1630.4	1630.2	95.0
1200	1626.4	1630.4	95.0
1201	1642.5	1651.3	95.0
1202	1648.8	1652.8	95.0
1203	1646.6	1658.4	94.4
1204	1644.8	1649.0	94.6
1205	1640.6	1639.0	94.3
1206	1618.2	1615.2	94.0
1207	1616.0	1615.2	94.0
1208	1613.0	1611.4	94.0
1209	1621.7	1621.8	94.2
1210	1617.4	1615.2	94.0
1211	1611.8	1607.8	94.5
1212	1606.0	1600.0	95.0
1213	1613.4	1614.0	95.0
1214	1621.8	1617.2	95.0
1215	1619.0	1611.4	95.0
AVERAGE RUN 1	1627.5	1629.2	94.6
	(°F)	(°F)	(°F)
	PLANT	AMTEST	INLET
	THERMOCOUPLE	THERMOCOUPLE	TEMP

STACK TEMPERATURES

TIME	PLANT THERMOCOUPLE (°F)	AMTEST THERMOCOUPLE (°F)	INLET TEMP (°F)
RUN 2 - 13:23-14:23			
1323	1616.0	1625.4	94.0
1324	1643.2	1651.8	94.0
1325	1648.4	1655.8	94.0
1326	1641.6	1639.8	94.0
1327	1629.4	1630.2	94.0
1328	1631.8	1627.8	94.0
1329	1634.4	1645.8	94.0
1330	1658.8	1659.6	94.0
1331	1657.3	1650.6	94.0
1332	1652.8	1652.1	94.0
1333	1663.6	1661.2	94.0
1334	1663.8	1662.8	94.0
1335	1668.3	1666.2	94.0
1336	1669.2	1666.8	93.8
1337	1667.0	1660.6	93.2
1338	1665.3	1659.6	93.4
1339	1667.2	1664.8	93.2
1340	1655.4	1649.0	93.2
1341	1655.6	1647.3	93.0
1342	1654.4	1648.8	93.2
1343	1639.0	1623.4	93.6
1344	1636.6	1643.0	93.4
1345	1658.2	1657.6	93.2
1346	1665.4	1655.6	93.4
1347	1664.9	1658.2	93.0
1348	1661.4	1653.0	93.0
1349	1646.6	1627.6	93.2
1350	1621.0	1605.4	93.4
1351	1625.5	1618.4	93.6
1352	1642.4	1641.4	93.4
1353	1644.8	1637.2	94.0
1354	1643.3	1632.5	93.8
1355	1625.8	1438.7	93.7
1356	1620.4	1605.6	93.8
1357	1620.2	1608.4	94.0
1358	1614.2	1602.6	94.0
1359	1623.1	1616.3	94.0
1400	1621.6	1612.0	94.0
1401	1625.6	1612.6	94.0
1402	1619.2	1607.8	94.0
1403	1622.4	1621.0	94.0
1404	1628.4	1622.2	94.0
1405	1631.0	1635.2	94.0
1406	1643.6	1643.6	94.0
1407	1649.8	1649.2	94.0
1408	1653.2	1649.0	93.8
1409	1654.9	1653.8	94.0
1410	1650.6	1647.6	93.0
1411	1631.0	1615.4	93.8
1412	1619.6	1614.8	93.6

1413	1634.6	1637.3	93.5
1414	1636.2	1627.6	94.0
1415	1617.0	1610.6	93.4
1416	1623.2	1619.8	93.8
1417	1629.4	1623.2	94.0
1418	1626.6	1617.0	94.0
1419	1604.4	1594.4	94.0
1420	1612.6	1603.6	94.0
1421	1625.0	1626.2	94.0
1422	1628.8	1624.6	94.0
1423	1620.4	1611.0	94.2
AVERAGE RUN 2	1639.4	1631.6	93.7
	(°F) PLANT THERMOCOUPLE	(°F) AMTEST THERMOCOUPLE	(°F) INLET TEMP

STACK TEMPERATURES

TIME	PLANT THERMOCOUPLE (°F)	AMTEST THERMOCOUPLE (°F)	INLET TEMP (°F)
RUN 3 - 16:28-17:28			
1628	1636.0	1648.4	92.0
1629	1638.2	1647.0	92.0
1630	1638.4	1654.4	92.0
1631	1641.8	1648.8	92.0
1632	1637.2	1639.2	91.6
1633	1629.6	1634.2	91.0
1634	1632.0	1641.6	91.0
1635	1634.2	1635.6	91.0
1636	1630.7	1635.7	91.0
1637	1629.7	1631.4	91.0
1638	1638.0	1636.8	91.0
1639	1639.6	1639.0	91.0
1640	1638.6	1637.5	91.0
1641	1641.6	1638.7	90.2
1642	1638.0	1614.4	90.4
1643	1614.8	1564.0	90.2
1644	1599.2	1540.8	90.0
1645	1575.0	1504.6	90.2
1646	1576.2	1516.0	90.0
1647	1571.0	1507.8	90.0
1648	1574.8	1518.4	90.0
1649	1581.2	1524.2	90.2
1650	1579.2	1522.2	90.0
1651	1578.0	1522.6	90.0
1652	1586.0	1532.6	90.0
1653	1571.4	1510.8	90.0
1654	1586.4	1536.0	90.0
1655	1582.2	1521.6	90.0
1656	1570.6	1509.6	90.0
1657	1575.0	1530.2	90.0
1658	1584.4	1533.4	90.0
1659	1581.6	1526.6	90.0
1700	1562.8	1509.4	90.0
1701	1562.2	1516.6	90.0
1702	1574.6	1537.2	90.0
1703	1653.2	1618.6	90.2
1704	1665.2	1620.8	89.2
1705	1666.2	1623.4	89.9
1706	1667.0	1624.3	90.0
1707	1664.0	1620.2	90.2
1708	1670.8	1629.0	90.0
1709	1670.6	1619.4	90.6
1710	1677.2	1630.4	90.0
1711	1689.4	1639.4	90.0
1712	1686.0	1632.8	90.0
1713	1699.0	1651.0	90.0
1714	1700.0	1665.4	90.0
1715	1689.4	1638.4	90.0
1716	1699.4	1661.6	90.0
1717	1684.2	1629.2	72.0

1718	1694.2	1644.4	90.0
1719	1715.4	1678.4	90.0
1720	1723.6	1684.4	90.0
1721	1716.2	1664.6	90.4
1722	1711.0	1660.8	90.6
1723	1719.8	1683.6	91.0
1724	1719.8	1671.2	91.0
1725	1706.2	1660.6	91.0
1726	1698.8	1645.8	91.0
1727	1733.8	1703.4	91.0
1728	1736.8	1693.8	91.0
AVERAGE RUN 3	1642.4	1605.9	90.1
	(°F) PLANT THERMOCOUPLE	(°F) AMTEST THERMOCOUPLE	(°F) INLET TEMP

AMTEST
AIR QUALITY, INC

31b

GAS BAG SAMPLE DATA SHEET

CLIENT: King County Landfills.

LOCATION: Cedar Hills Issaquah WA.

SAMPLE SITE: Flare Stack #3 Inlet.

DATE: 2-7-94

NUMBER/TYPE OF TESTS: 3 EA M-10 NUMBER OF BAGS: 6.

SAMPLED BY: ERL

SUBMITTED BY: ERL

ANALYZED BY: KDO DATE: 2-7-94.

BAG NUMBER/IDENTIFICATION	CO_2 %	O_2 %	CO ppm	F_o	NOTES
R-1A INLET CO			6.8		
R-1B			6.8		
R-2A			6.7		
R-2B			6.8		
R-3A			6.8		
R-3B			6.8		

CO_2 ANALYZER: O CALIBRATION GAS:

O_2 ANALYZER: O CALIBRATION GAS:

CO ANALYZER: TECO MOD 48 CALIBRATION GAS: 300. Ø.

KING CO. LANDFILL
CEDAR HILLS
2/7 - 2/11/94.
FLARES 1-3

AMTEST AIR QUALITY, INC.

AmTest-Air Quality, Inc.
30545 S.E. 84th St., #5
Preston, WA 98050
Office: (206) 222-7746
FAX: (206) 222-7849

317

INLET ORSAT BAGS.

		O2 %	CO2 %	CO PPM
2-7-94 FLARE #3				
BAG #	1			
	2			
	3			
2-8-94 FLARE #3		O2 %	CO2 %	CO PPM
BAG #	1	2.5	33.0	8.8
	2	2.5	32.8	8.8
	3	2.5	32.9	8.8
2-9-94 FLARE #1		O2 %	CO2 %	CO PPM
BAG #	1	2.9	31.2	7.3
	2	2.9	31.0	7.3
	3	2.8	31.8	7.3
2-10-94 FLARE #2		O2 %	CO2 %	CO PPM
BAG #	1	2.0	33.3	9.8
	2	2.1	33.7	9.9
	3	2.0	33.4	9.8
2-11-94 FLARE #2		O2 %	CO2 %	CO PPM
BAG #	4	1.4	35.2	10.7
	5	1.7	36.1	10.7
	6	2.0	34.9	10.7

AMTEST
AIR QUALITY, INC

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ANALYZER LINEARITY CHECKS

Am Test-Air Quality, Inc.

CLIENT: King County Landfill

LOCATION: Cedar Hills

SITE LOCATION: Flare Stack #3, #2, #1

DATE: 2-7-94

Type of Analyzer Gas CO

Range: 0-1000 (check one) % [ ] ppm [✓] TIME (hours) [ ]

Make: Teco

Model #: 48

	Calibration Gas	Analyzer Response	Time (minutes)	Absolute Difference	Percent of Span
High	597.0	586.6			
Mid-High					
Mid	300.0	299.0			
Mid Low					
Low	N2	0.0			

Type of Analyzer Gas CO2

Range: 0-25 (check one) % [✓] ppm [ ] TIME (hours) [ ]

Make: Servomex

Model #:

	Calibration Gas	Analyzer Response	Time (minutes)	Absolute Difference	Percent of Span
High	12.0	12.4			
Mid-High					
Mid	6.05	6.0			
Mid Low					
Low	N2	0.0			

Type of Analyzer Gas O2

Range: 0-25 (check one) % [✓] ppm [ ] TIME (hours) [ ]

Make: Servomex

Model #:

	Calibration Gas	Analyzer Response	Time (minutes)	Absolute Difference	Percent of Span
High	14.96	14.9			
Mid-High					
Mid	10.01	10.0			
Mid Low					
Low	N2	0.0			

AMTEST
AIR QUALITY, INC

319

ANALYZER LINEARITY CHECKS

Am Test-Air Quality, Inc.

CLIENT: King County

LOCATION: Cedar Hills Landfill

SITE LOCATION: Flare 1-3

DATE: 2-7-94

Type of Analyzer Gas SO_2 | Range 0-100 | (check one) % | ppm ✓ | TIME (hours)

Make: Western Res.

Model #: 721AT

	Calibration Gas	Analyzer Response	Absolute Difference	Percent of Span
High	89.95	90.0		
Mid	50.7	50.5		
Low	~~N_2~~			

Type of Analyzer Gas NO_x | Range 0-100 | (check one) % | ppm ✓ | TIME (hours)

Make: TECO

Model #: 105

	Calibration Gas	Analyzer Response	Absolute Difference	Percent of Span
High	103.3	104.2		
Mid	49.0	50.1		
Low	N_2			

Type of Analyzer Gas _____ | Range 0- | (check one) % | ppm | TIME (hours)

Make: _____

Model #: _____

	Calibration Gas	Analyzer Response	Absolute Difference	Percent of Span
High				
Mid				
Low				

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1/25/94

AMTEST
AIR QUALITY, INC

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CONTINUOUS ANALYZERS CHECKLIST

Oxygen (O_2)

Infrared Industries Model 2200 O_2 Analyzer _____

Servomex Model 1420B O_2 Analyzer ✓

Western Research Model 721ATM Analyzer with Servomex 1155 O_2 Transducer _____

Carbon Dioxide (CO_2)

Infrared Industries Model 702D CO_2 Analyzer _____

Automated Custom Systems Model 3300 CO_2 Analyzer _____

Servomex Model 1410B Infrared CO_2 Analyzer ✓

Carbon Monoxide (CO)

Automated Custom Systems Model 3300 CO Analyzer ✓ for inlet

Thermo Environmental Instruments Model 48 CO Analyzer ✓

Sulfur Dioxide (SO_2)

Monitor Labs Model 8850 SO_2 Analyzer _____

Sampling Technologies, Inc./Am Test SO_2 Dilution Module _____

Western Research Model 721AT SO_2 Analyzer ✓

Western Research Model 721ATM SO_2 Analyzer _____

Nitrogen Oxides (NO_x)

Monitor Labs Model 8840 NO_x Analyzer _____

Monitor Labs Model 8730 NO_x Dilution Module _____

Thermo Environmental Instruments Model 10S NO_x Analyzer ✓

Thermo Environmental Instruments Model 42H NO_x Analyzer _____

Hydrocarbons (HC)

Byron Model 301 HC Analyzer _____

Infrared Industries Model 702D HC Analyzer _____

Infrared Industries Model 703 HC Analyzer _____

Compur Flame Ionization Detector (FID) THC Analyzer _____

Thermo Environmental Instruments Model 51 THC Analyzer _____

Rev 1/11/94

GAS CYLINDER CHECKLIST

ATAQ#		CYLINDER #	GAS CONCENTRATIONS	EXP. DATE
			Carbon Dioxide, Oxygen	
05	____	LL-10577	9.95% O_2, 11.8% CO_2	---
			Carbon Dioxide, Oxygen, Carbon Monoxide	
119	____	CC-7198	297 ppm CO, 14.67% CO_2, 5.94% O_2	---
13 **AK**	____	CC-44522	300 ppm CO, 6.00% CO_2, 15.0% O_2	---
108	____	CC-1471	300 ppm CO, 6.01% CO_2, 14.98% O_2	---
109	✓	CC-7282	300 ppm CO, 6.05% CO_2, 14.96% O_2	---
120	____	CC-7242	597 ppm CO, 11.98% CO_2, 10.02% O_2	---
121	____	CC-7284	597 ppm CO, 11.99% CO_2, 10.00% O_2	---
112	____	CC-14485	597 ppm CO, 12.00% CO_2, 9.99% O_2	---
114	✓	CC-72326	597 ppm CO, 12.00% CO_2, 10.01% O_2	---
12 **AK**	____	CC-37055	600 ppm CO, 11.99% CO_2, 10.0% O_2	---
85	____	CC-1649	607 ppm CO, 5.97% CO_2, 15.0% O_2	6/96
91	____	CC-58965	1798 ppm CO, 24.03% CO_2, 5.00% O_2	---
			Sulfur Dioxide, Oxygen	
63	____	CC-104500	328.5 ppm SO_2, 10.02% O_2	8/94
86 **AK**	____	CC-61393	49.0 ppm SO_2, 15.0% O_2	11/93
87 **AK**	____	CC-61497	89.0 ppm SO_2, 15.0% O_2	5/95
98	____	CC-5966	148 ppm SO_2, 5.04% O_2	8/95
			Sulfur Dioxide, Nitrogen Oxides	
50	____	CC-97571	22.5 ppm SO_2, 22.0 ppm NO_x	7/93
58 **AK**	____	CC-38345	46.84 ppm SO_2, 47.86 ppm NO_x	8/94
79	____	CC-16636	49.9 ppm SO_2, 49.7 ppm NO	5/95
107	✓	CC-10652	50.7 ppm SO_2, 49.0 ppm NO_x	4/94
60 **AK**	____	CC-56402	83.15 ppm SO_2, 86.65 ppm NO_x	8/94
116	____	CC-4490	86 ppm SO_2, 80 ppm NO_x	10/95
32	✓	CC-104450	88.95 ppm SO_2, 103.3 NO_x	5/94
106	____	CC-10816	90.9 ppm SO_2, 88.8 ppm NO_x	4/94
118	____	CC-4623	212 ppm SO_2, 236 ppm NO_x	10/95

APPENDIX E

Supporting Information

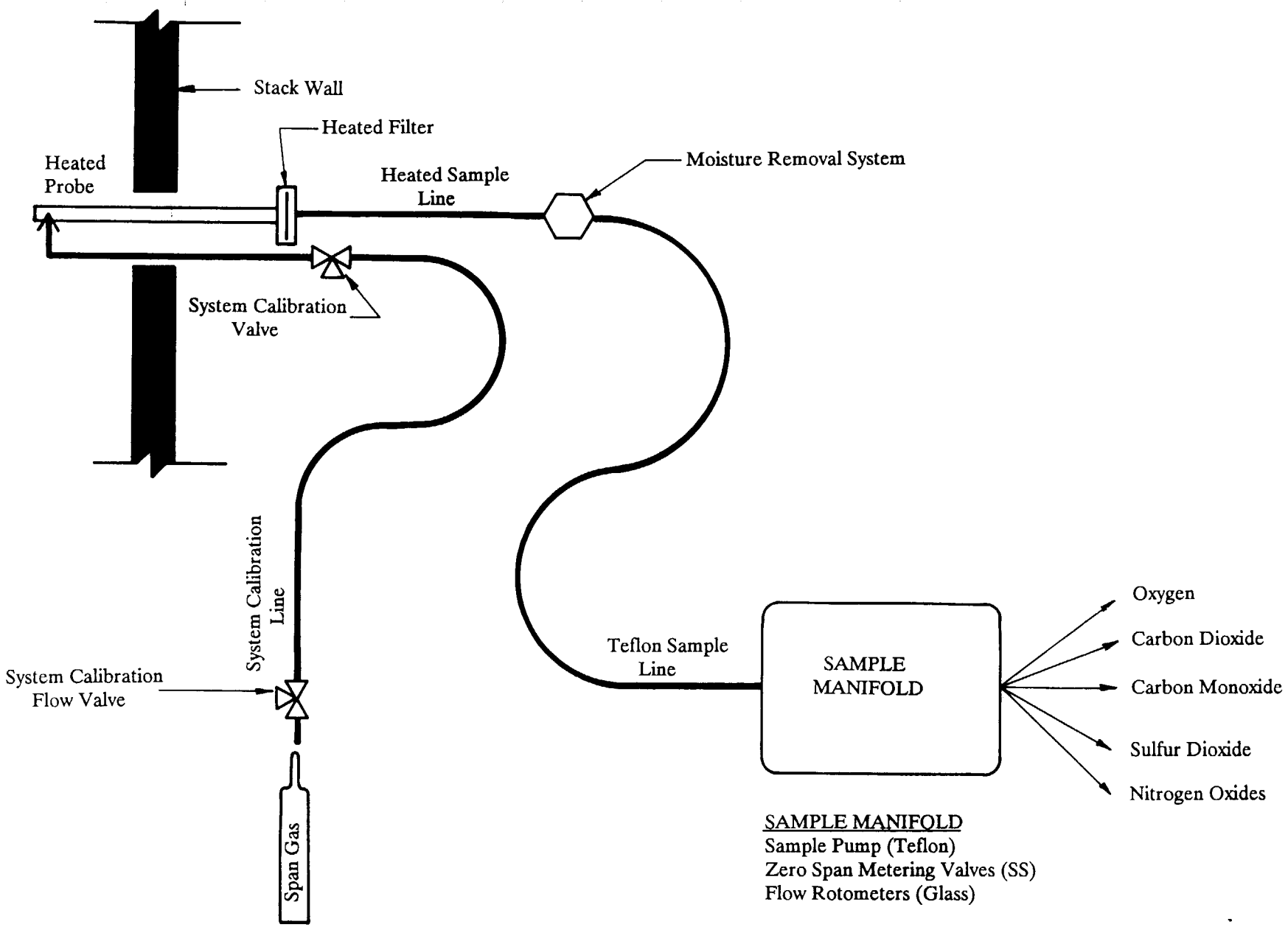

Figure 1 . EPA Method 3A, 6C, 7E and 10 Sample Train

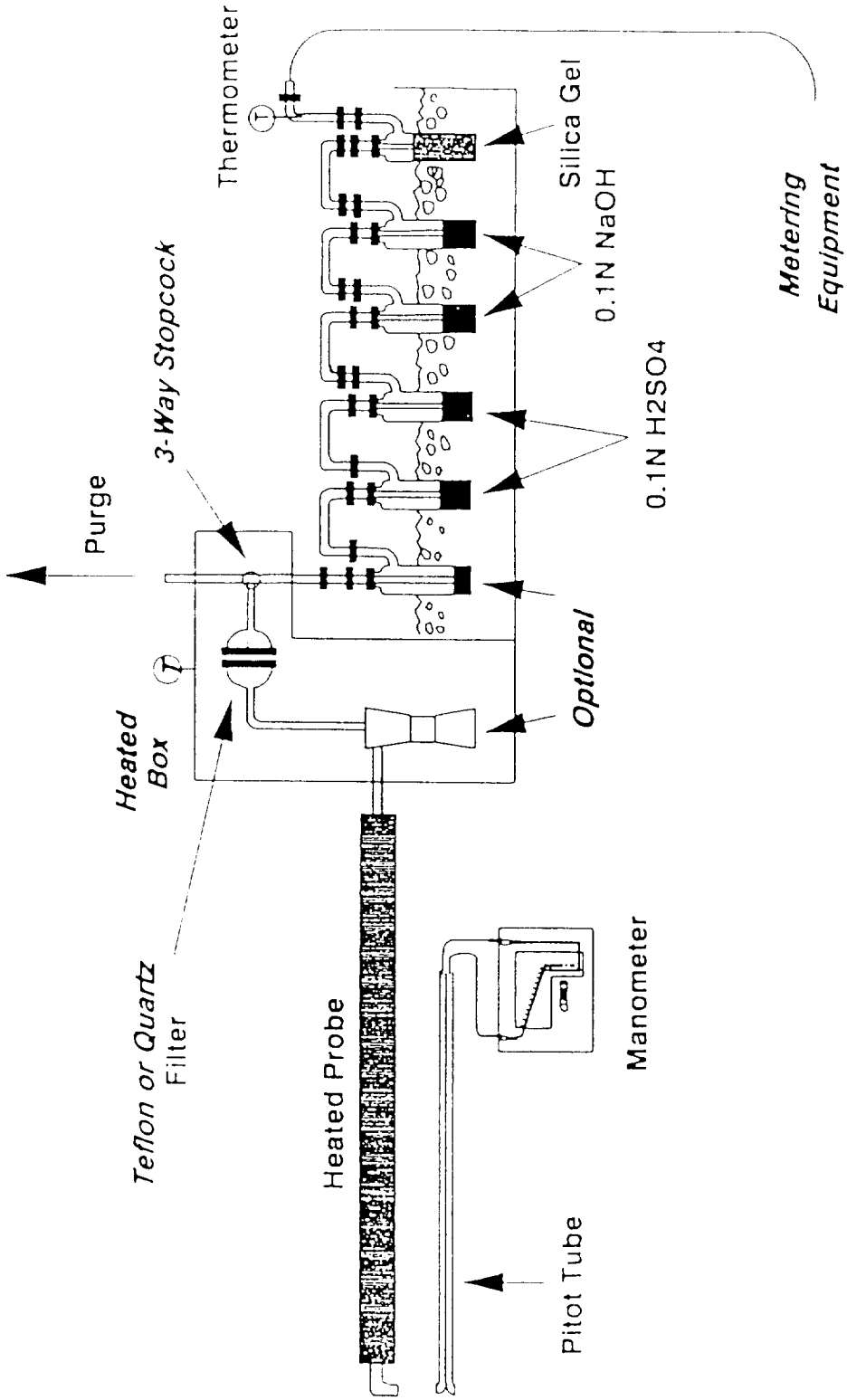

Figure 2. Method 26A Sample Train

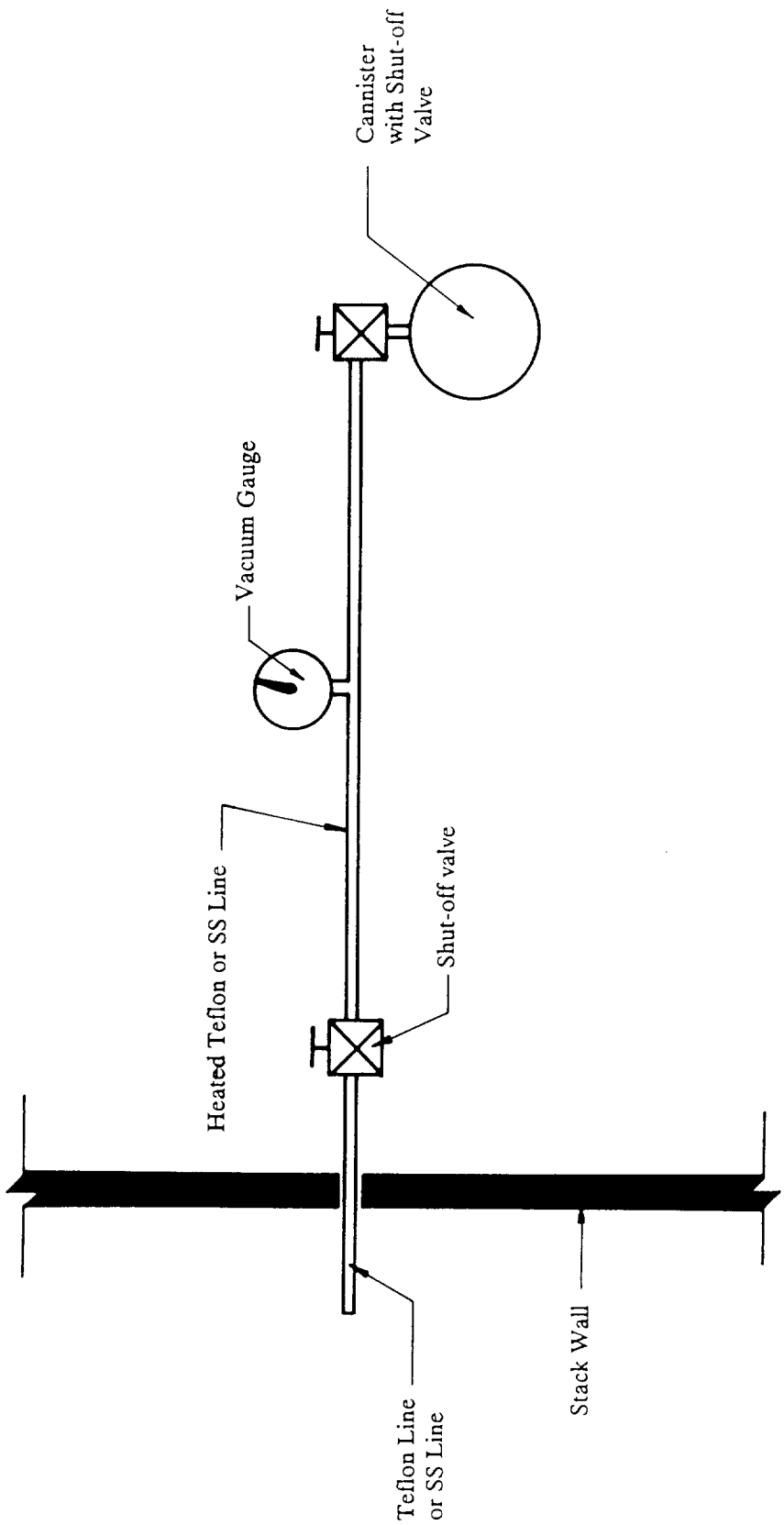

Figure 3. TO-14 Sample System Schematic

METHOD 1 - LOCATION OF TRAVERSE POINTS

Circular Stacks

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

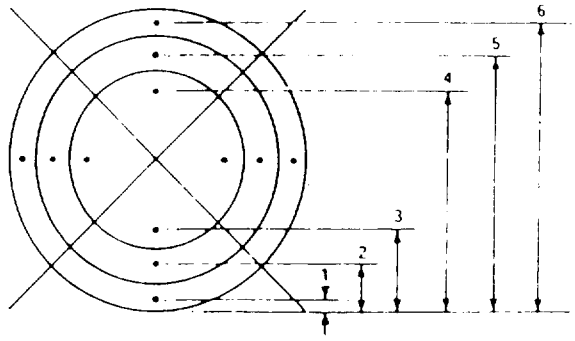

Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points indicated.

TABLE 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

(Percent of stack diameter from inside wall to traverse point)

Traverse point number on a diameter	Number of traverse points on a diameter—											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	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.

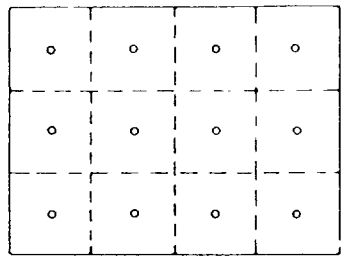

Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with a traverse point at centroid of each area.

METHOD 1 - MINIMUM NUMBER OF TRAVERSE POINTS

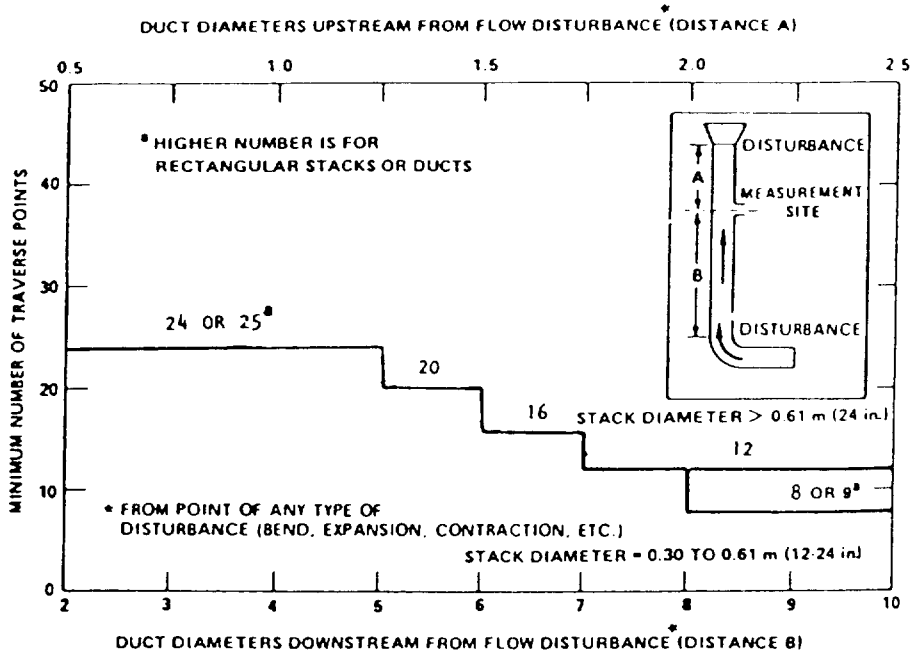

Figure 1-1. Minimum number of traverse points for particulate traverses.

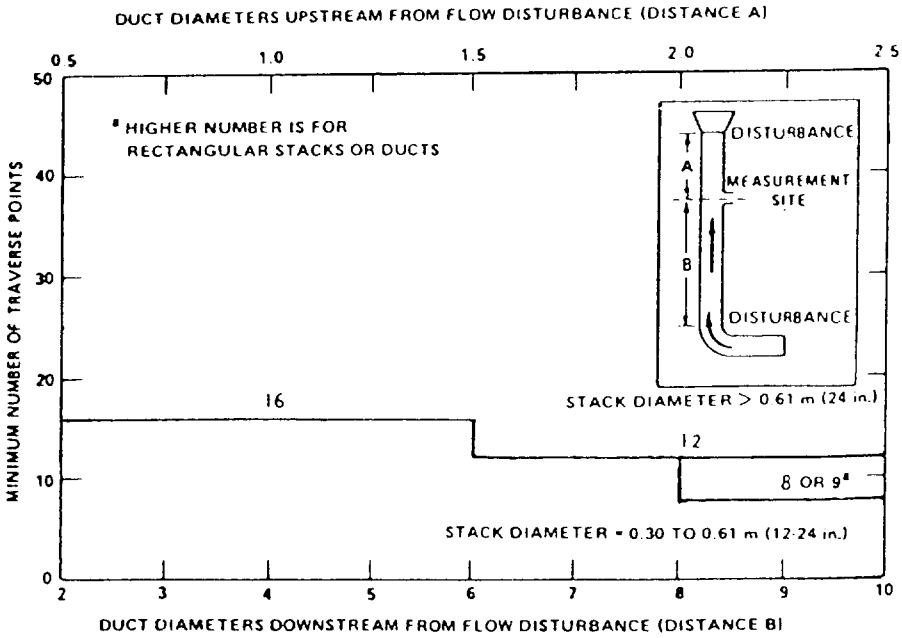

Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

METHOD 2 - STACK GAS VELOCITY AND VOLUMETRIC FLOW CALCULATIONS

5.1 Nomenclature.

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

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

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

V_f = Final volume of condenser water, ml.

V_i = Initial volume, if any, of condenser water, ml.

W_f = Final weight of silica gel or silica gel plus impinger, g.

W_i = Initial weight of silica gel or silica gel plus impinger, g.

Y = Dry gas meter calibration factor.

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

2.3.2 Volume of Water Vapor Condensed.

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

$$= K_1 (V_f - V_i)$$

Eq. 4-1

K_1 = 0.001333 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.

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

$$= K_2 (W_f - W_i)$$

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.

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

Eq. 4-4

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

NOMENCLATURE
METHOD 5 CALCULATIONS

Vm_{std} = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscm (dscf).

Y = Dry gas meter calibration factor

P_b = Barometric pressure at the sampling site, mm Hg (in. Hg)

H = Average pressure differential across the orifice meter, mm H_2O (in. H_2O)

T_m = Absolute average dry gas meter temperature, ° K (° R)

dscm = Dry standard cubic meters

dscf = Dry standard cubic feet

W_a = Weight of residue in acetone wash

M_a = Mass of residue of acetone after evaporation, mg

C_a = Acetone blank residue concentration, mg/g

V_a = Volume of acetone blank

V_{aw} = Volume of acetone used in wash, ml

M_n = Total amount of particulate matter collected, mg

C_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, mg/dscm (gr/dscf)

gr/dscf = grains per dry standard cubic foot

Vw_{std} = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf)

B_{ws} = Water vapor in the gas stream, proportion by volume

M_d = Molecular weight of stack gas, g/g-mole on dry basis

M_s = Molecular weight of stack gas, g/g-mole on wet basis

V_s = Stack gas velocity, calculated by Method 2, Equation 2-9, using data obtained from Method 5, m/sec (ft/sec)

C_p = Pitot tube coefficient, dimensionless

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

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

NOMENCLATURE (continued)
METHOD 5 CALCULATIONS

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

dscf/min = dry standard cubic feet per minute (also identified as dcfm or scfm)

acfm = actual cubic feet per minute

I = Percent of isokinetic sampling

A_n = Cross-sectional area of nozzle, m^2 (ft^2)

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751 S. Kellogg, Suite A • Goleta, CA 93117 • (805) 964-7838 • Fax (805) 967-4386
1885 North Kelly Road • Napa, CA 94558 • (707) 257-7211 • Fax (707) 226-1001
9333 Tech Center Dr., Ste. 800 • Sacramento, CA 95826 • (916) 368-1333 • Fax (916) 362-2484
2400 Cumberland Dr • Valparaiso, Indiana 46383 • (219) 464-2389 • Fax (219) 462-2953

STANDARD OPERATING PROCEDURE

DETERMINATION OF

VOLATILE ORGANIC CONSTITUENTS

IN AMBIENT AIR

BY

EPA METHOD TO-14

April 1991

COAST-TO-COAST ANALYTICAL SERVICES

STANDARD OPERATING PROCEDURE

DETERMINATION OF VOLATILE ORGANIC CONSTITUENTS IN AIR BY EPA TO-14

1. Scope

1.1 This document describes a procedure for analysis for volatile organic compounds in ambient air. The method is based on collection of whole air samples in SUMMA passivated stainless steel canisters. The volatile organics are isolated from the air matrix cryogenically, separated by capillary column gas chromatography and detected by mass spectrometry. Samples collected to final pressures above, at, or below atmospheric pressure are acceptable for measurement by this method.

1.2 This method is applicable to volatile organic compounds that have been tested and determined to be stable when stored in pressurized and sub-atmospheric pressure canisters. Compounds which have been determined by the method are shown on the sample analytical report shown as Exhibit 1. Other volatile organic compounds may be measured by this method, however, performance of the method for the specific compound(s) must be demonstrated.

2. Summary of Method

2.1 Ambient air samples are collected into SUMMA electropolished stainless steel canisters. Both subatmospheric pressure and pressurized sampling modes use an initially evacuated canister to collect the sample. Pressurized sampling requires the use of cryogenic techniques or a sampling pump to provide positive pressure to the sample canister.

2.2 Following sample collection, the canister valve is closed, an identification tag is attached to the canister, a Canister Sampling Field Data Sheet is completed, and the canister is transported to the laboratory for analysis.

2.3 Upon receipt in the laboratory, the sample is logged in by sample control, sample information and canister ID's are checked with the chain-of-custody, and laboratory worksheets are prepared.

Exhibit 1

COAST-TO-COAST ANALYTICAL SERVICES

Air, Water & Hazardous Waste Sampling, Analysis & Consultation
Certified Hazardous Waste, Chemistry, Bacteriology & Bioassay Laboratories

141 Suburban Road	San Luis Obispo, CA 93401	(805) 543-2553	Fax (805) 543-2685
751 S. Kellogg, Suite A	Goleta, CA 93117	(805) 964-7838	Fax (805) 967-4386
1885 North Kelly Road	Napa, CA 94558	(707) 257-7211	Fax (707) 226-1001
9333 Tech Center Dr., Ste. 800	Sacramento, CA 95826	(916) 368-1333	Fax (916) 362-2484
2400 Cumberland Dr.	Valparaiso, Indiana 46383	(219) 464-2389	Fax (219) 462-2953

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CLIENT: ATTN:
Coast-to-Coast Analytical Services
141 Suburban Rd. Ste. C-4
San Luis Obispo, CA 93401

Lab Number : G-4000-4
Project : TEST PROJECT

Analyzed : 11/05/90
Analyzed by: PI
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
Zero Air Blank	Air	A. Sampler	11/03/90	11/03/90

CONSTITUENT	(CAS RN)	*PQL µg/cu M	RESULT µg/cu M	NOTE
1,1-Dichloroethene	(75354)	0.5	Not Found	
cis-1,2-Dichloroethene	(156694)	0.5	Not Found	
trans-1,2-Dichloroethene	(156605)	0.5	Not Found	
Dichloromethane	(75092)	5.	Not Found	
1,2-Dichloropropane	(78875)	0.5	Not Found	
cis-1,3-Dichloropropene	(10061015)	0.5	Not Found	
trans-1,3-Dichloropropene	(10061026)	0.5	Not Found	
Ethylbenzene	(100411)	1.	Not Found	
2-Hexanone	(591786)	0.5	Not Found	
4-Methyl-2-Pentanone (MIBK)	(108101)	0.5	Not Found	
Styrene	(100425)	1.	Not Found	
1,1,2,2-Tetrachloroethane	(79345)	1.	Not Found	
Tetrachloroethene (PCE)	(127184)	1.	Not Found	
Toluene	(108883)	1.	Not Found	
1,1,1-Trichloroethane (TCA)	(71556)	1.	Not Found	
1,1,2-Trichloroethane	(79005)	1.	Not Found	
Trichloroethene (TCE)	(79016)	0.5	Not Found	
Trichlorofluoromethane (F-11)	(75694)	1.	Not Found	
Trichlorotrifluoroethane (F-113)	(76131)	2.	Not Found	
Vinyl Acetate	(108054)	5.	Not Found	
Vinyl Chloride	(75014)	0.5	Not Found	
Xylenes, Total		1.	Not Found	
Percent Surrogate Recovery			100.	

RESULTS listed as 'Not Found' would have been reported if present at or above the listed PQL
* Practical Quantitation Limit

11/28/90

LRH/lrh/pi

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai, Ph.D., Group Leader

Laurence R. Hilpert, Ph.D.
Vice President

Exhibit 1

COAST - TO - COAST ANALYTICAL SERVICES

Air, Water & Hazardous Waste Sampling, Analysis & Consultation
Certified Hazardous Waste, Chemistry, Bacteriology & Bioassay Laboratories

141 Suburban Road	San Luis Obispo, CA 93401	(805) 543-2553	Fax (805) 543-2685
751 S. Kellogg, Suite A	Goleta, CA 93117	(305) 964-7838	Fax (805) 967-4386
1885 North Kelly Road	Napa, CA 94558	(707) 257-7211	Fax (707) 226-1001
9333 Tech Center Dr., Ste. 800	Sacramento, CA 95826	(916) 368-1333	Fax (916) 362-2484
2400 Cumberland Dr.	Valparaiso, Indiana 46383	(219) 464-2389	Fax (219) 462-2953

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CLIENT: ATTN:
Coast-to-Coast Analytical Services
141 Suburban Rd. Ste. C-4
San Luis Obispo, CA 93401

Lab Number : G-4000-4
Project : TEST PROJECT

Analyzed : 11/05/90
Analyzed by: PI
Method : EPA TO-14

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
Zero Air Blank	Air	A. Sampler	11/03/90	11/03/90

CONSTITUENT	(CAS RN)	*PQL µg/cu M	RESULT µg/cu M	NOTE
VOLATILE ORGANICS BY EPA TO-14				1
Acetone	(67641)	2.	Not Found	
Benzene	(71432)	0.5	Not Found	
Bromodichloromethane	(75274)	1.	Not Found	
Bromomethane (Methyl Bromide)	(74839)	1.	Not Found	
Bromoform	(75252)	1.	Not Found	
1,3-Butadiene	(106990)	0.2	Not Found	
2-Butanone (MEK)	(78933)	0.5	Not Found	
Carbon Disulfide	(75150)	1.	Not Found	
Carbon Tetrachloride	(56235)	1.	Not Found	
Chlorobenzene	(108907)	0.5	Not Found	
Chloroethane (Ethyl Chloride)	(75003)	0.5	Not Found	
2-Chloroethyl Vinyl Ether	(110758)	5.	Not Found	
Chloroform	(67663)	0.5	Not Found	
Chloromethane (Methyl Chloride)	(74873)	0.2	Not Found	
Dibromochloromethane	(124381)	1.	Not Found	
1,2-Dibromoethane (EDB)	(106934)	1.	Not Found	
1,2-Dichlorobenzene	(95501)	1.	Not Found	
1,3-Dichlorobenzene	(541731)	1.	Not Found	
1,4-Dichlorobenzene	(106467)	1.	Not Found	
1,1-Dichloroethane	(75343)	0.5	Not Found	
1,2-Dichloroethane (EDC)	(107062)	0.5	Not Found.	

RESULTS listed as 'Not Found' would have been reported if present at or above the listed PQL
* Practical Quantitation Limit
(1) Canister was received under vacuum at -X in. Hg and pressurized to Y psig with He.

11/28/90

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

LRH/lrh/pi

Gesheng Dai, Ph.D., Group Leader

Laurence R. Hilpert, Ph.D.
Vice President

Exhibit 2

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GC/MS PERFORMANCE STANDARD

Bromofluorobenzene (BFB)

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	18.88	18.88	Ok
75	30-60% of mass 95	48.95	48.95	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	6.84	6.84	Ok
173	Less than 2% of mass 174	0.00	0.00	Ok
174	Greater than 50% of mass 95	62.16	62.16	Ok
175	5-9% of mass 174	4.32	6.96	Ok
176	95-101% of mass 174	59.99	96.51	Ok
177	5-9% of mass 176	3.97	6.62	Ok

Injection Date: 03/28/91
Injection Time: 20:12
Data File: >1C14C
Scan: 1923

ok
GD
3/29/91

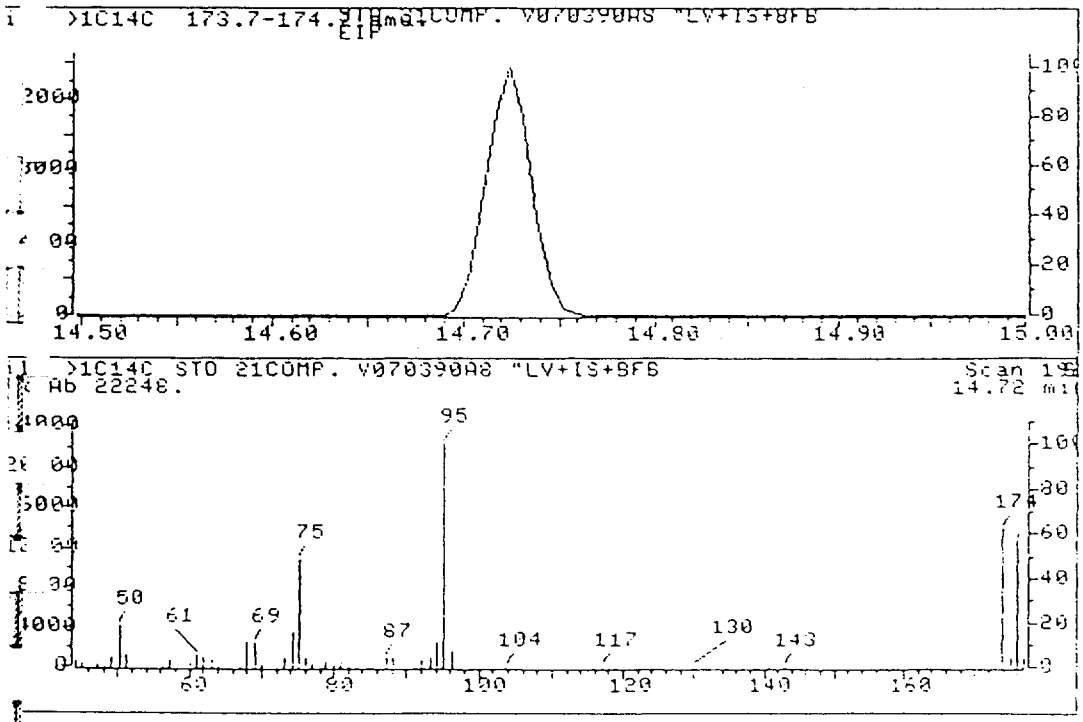

Exhibit 3

COAST-TO-COAST ANALYTICAL SERVICES

Air, Water & Hazardous Waste Sampling, Analysis & Consultation
Certified Hazardous Waste, Chemistry, Bacteriology & Bioassay Laboratories

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141 Suburban Road	San Luis Obispo, CA 93401	(805) 543-2553	Fax (805) 543-2685
751 S. Kellogg, Suite A	Goleta, CA 93117	(805) 964-7838	Fax (805) 967-4386
1885 North Kelly Road	Napa, CA 94558	(707) 257-7211	Fax (707) 226-1001
9333 Tech Center Dr., Ste. 800	Sacramento, CA 95826	(916) 368-1333	Fax (916) 362-2484
2400 Cumberland Dr	Valparaiso, Indiana 46383	(219) 464-2389	Fax (219) 462-2953

QC Batch ID: HC20M1

CLIENT: Coast-to-Coast Analytical Services
141 Suburban Rd. Ste. C-4
San Luis Obispo, CA 93401

Analyzed : 03/20/91
Analyzed by: EA
Method : EPA TO-14

QC SPIKE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED
QC SPIKE	Air		

CONSTITUENT	*PQL µg/cu M	SPIKE AMOUNT	RESULT µg/cu M	%REC	NOTE
VOLATILE ORGANICS PLUS ALL IDENTIFIABLE PEAKS					1
Acetone	2.		NS		
Benzene	0.5	17.	16.	94.	
Bromodichloromethane	1.		NS		
Bromomethane (Methyl Bromide)	1.		NS		
Bromoform	1.		NS		
1,3-Butadiene	0.2		NS		
2-Butanone (MEK)	0.5		NS		
Carbon Disulfide	1.		NS		
Carbon Tetrachloride	1.	34.	32.	94.	
Chlorobenzene	0.5	25.	25.	100.	
Chloroethane (Ethyl Chloride)	0.5		NS		
2-Chloroethyl Vinyl Ether	5.		NS		
Chloroform	0.5		NS		
Chloromethane (Methyl Chloride)	0.2		NS		
Dibromochloromethane	1.		NS		
1,2-Dibromoethane (EDB)	1.	40.	46.	115.	
1,2-Dichlorobenzene	1.		NS		
1,3-Dichlorobenzene	1.		NS		
1,4-Dichlorobenzene	1.		NS		
1,1-Dichloroethane	0.5		NS		
1,2-Dichloroethane (EDC)	0.5	22.	22.	100.	

CCAS is Certified by CA Department of Health Services: Laboratory #131
* RESULTS listed as 'NS' were not spiked. PQL = Practical Quantitation Limit
(1) Zero Air spiked with NIST SRM 1804.

03/22/91
MSD1/1B47C
LRH/ge
H1102-1

Exhibit 3

COAST-TO-COAST ANALYTICAL SERVICES

Air, Water & Hazardous Waste Sampling, Analysis & Consultation
Certified Hazardous Waste, Chemistry, Bacteriology & Bioassay Laboratories

141 Suburban Road	San Luis Obispo, CA 93401	(805) 543-2553	Fax (805) 543-2685
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1885 North Kelly Road	Napa, CA 94558	(707) 257-7211	Fax (707) 226-1001
9333 Tech Center Dr., Ste. 800	Sacramento, CA 95826	(916) 368-1333	Fax (916) 362-2484
2400 Cumberland Dr	Valparaiso, Indiana 46383	(219) 464-2389	Fax (219) 462-2953

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QC Batch ID: HC20M1

CLIENT: Coast-to-Coast Analytical Services
141 Suburban Rd. Ste. C-4
San Luis Obispo, CA 93401

Analyzed : 03/20/91
Analyzed by: EA
Method : EPA TO-14

QC SPIKE
REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED
QC SPIKE	Air		

CONSTITUENT	*PQL µg/cu M	SPIKE AMOUNT	RESULT µg/cu M	%REC	NOTE
1,1-Dichloroethene	0.5		NS		
cis-1,2-Dichloroethene	0.5		NS		
trans-1,2-Dichloroethene	0.5		NS		
Dichloromethane	5.	19.	19.	100.	
1,2-Dichloropropane	0.5	25.	23.	92.	
cis-1,3-Dichloropropene	0.5		NS		
trans-1,3-Dichloropropene	0.5		NS		
Ethylbenzene	1.	22.	21.	95.	
2-Hexanone	0.5		NS		
4-Methyl-2-Pentanone (MIBK)	0.5		NS		
Styrene	1.		NS		
1,1,2,2-Tetrachloroethane	1.		NS		
Tetrachloroethene (PCE)	1.	37.	39.	105.	
Toluene	1.	20.	18.	90.	
1,1,1-Trichloroethane (TCA)	1.	30.	30.	100.	
1,1,2-Trichloroethane	1.		NS		
Trichloroethene (TCE)	0.5		NS		
Trichlorofluoromethane (F-11)	1.		NS		
Trichlorotrifluoroethane (F-113)	2.		NS		
Vinyl Acetate	5.		NS		
Vinyl Chloride	0.5	15.	17.	113.	
Xylenes, Total	1.	24.	22.	92.	
Percent Surrogate Recovery		114.	117.		

CCAS is Certified by CA Department of Health Services: Laboratory #131
* RESULTS listed as 'NS' were not spiked. PQL = Practical Quantitation Limit

03/22/91
MSD1/1B47C
LRH/ge
H1102-1

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Gesheng Dai

Gesheng Dai, Ph.D., Group Leader

Laurence R. Hilpert, Ph.D.
Vice President

AMTEST
AIR QUALITY, INC.

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

FILE NAME: KAH-9-93
METER BOX #: BLUE MAG KAH
CALIBRATION DATE: 9-9-93
METHOD OF CALIB.: STANDARD DRY GAS METER (Method 5 Section 7.1)

TOTAL TIME min	DELTA H "H2O	METER VOL V1 cf	METER VOL V2 cf	TEMP IN deg F	TEMP OUT deg F	BARO. PRES. "Hg	STD DGM V1	STD DGM V2	ST.DGM TEMP IN deg F	ST.DGM TEMP OUT deg F	ST.DGM Yds FACTOR	Y FACTOR	DELTA H@
15.500	0.5	997.856	1003.849	77.0	75.0	29.70	539.700	545.600	74.0	73.0	1.001	0.9889	1.956
14.980	1.0	15.198	23.703	79.0	76.0	29.70	556.800	565.200	75.0	74.0	1.001	0.9917	1.806
11.680	1.5	24.512	32.608	80.0	76.0	29.70	566.000	574.000	76.0	75.0	1.001	0.9901	1.822
6.680	2.0	48.565	53.812	83.0	78.0	29.70	589.800	595.000	76.0	76.0	1.001	0.9954	1.877
5.750	2.5	42.504	47.642	82.0	77.0	29.70	583.800	588.900	76.0	76.0	1.001	0.9939	1.811
6.280	3.0	153.439	159.515	74.0	73.0	29.50	762.500	768.500	70.0	69.0	1.001	0.9886	1.854
AVERAGE												0.991	1.854

AMTEST
AIR QUALITY, INC

STANDARD DRY GAS METER CALIBRATION DATA SUMMARY
AMTEST - AIR QUALITY, INC.

Run #	CAL. DGM IND. SCFM	PRIMARY STANDARD	Y std.	DEVIATION
1	0.249	0.250	1.004	0.001
2	0.349	0.350	1.003	0.001
3	0.448	0.450	1.004	0.002
4	0.498	0.500	1.004	0.002
5	0.598	0.600	1.003	0.002
6	0.799	0.800	1.001	0.001
7	0.900	0.900	1.000	0.000
8	1.001	1.000	0.999	-0.001
9	1.150	1.150	1.000	0.000
10	1.302	1.300	0.998	-0.002
11	1.506	1.500	0.996	-0.006
		AVG Y std. =	1.001	

DATE: 1/15/93
FILE NAME: STD-GASM

PRESSURE SENSOR CALIBRATION DATA FORM

Date 9-23-93 Control Box # Blue Mag (KAH)

Ambient Temperature 67 °F Barometric Pressure 29.7 in Hg

MAGNEHELIC GUAGE #	REFERENCE MANOMETER READING Inches H_2O	MAGNEHELIC GUAGE READING Inches H_2O	PRESSURE DIFFERENCE Inches H_2O	PRESSURE DIFFERENCE %
0"-1"				
high	0.21	0.22	0.01	4.8%
	0.43	0.43	0.00	0.0%
	0.61	0.61	0.00	0.0%
	0.81	0.79	0.02	3.5%
Low	0.25	0.26	0.01	4.0%
	0.41	0.41	0.00	0.0%
	0.62	0.63	0.01	1.6%
	0.80	0.80	0.00	0.0%
0"-4"				
high	0.82	0.83	0.01	1.2%
	1.60	1.59	0.01	0.6%
	2.40	2.41	0.01	0.4%
	3.20	3.23	0.03	0.9%
Low	0.84	0.84	0.00	0.0%
	1.60	1.60	0.00	0.0%
	2.40	2.39	0.01	0.4%
	3.15	3.18	0.03	0.9%

$$\frac{(\text{ref pres. "H}_2O - \text{test pres. "H}_2O))}{(\text{ref pres. "H}_2O)} \cdot 100 \leq 5\%$$

PRESSURE SENSOR CALIBRATION DATA FORM

Date 9-23-93 Control Box # Blue Mag (KAH)

Ambient Temperature 67 °F Barometric Pressure 29.7 in Hg

MAGNEHELIC GUAGE #	REFERENCE MANOMETER READING Inches H_2O	MAGNEHELIC GUAGE READING Inches H_2O	PRESSURE DIFFERENCE Inches H_2O	%
0" - 2"				
High	0.42	~~0.43~~ 0.43	0.01	2.4%
	0.84	0.83	0.01	1.2%
	1.27	1.25	0.02	1.6%
	1.57	1.56	0.01	0.6%
Low	0.46	0.47	0.01	2.2%
	0.83	0.83	0.00	0.0%
	1.20	~~1.21~~ 1.18	0.02	1.6%
	1.65	1.64	0.01	0.6%
0" - 5"				
High	1.02	1.01	0.01	1.0%
	1.99	1.92	0.07	3.5%
	3.11	2.99	0.12	3.9%
	4.00	3.83	0.17	4.3%
LOW	0.99	1.00	0.01	1.0%
	2.09	2.03	0.06	2.9%
	3.03	2.93	0.10	3.3%
	4.11	3.97	0.14	3.4%

$$\frac{(\text{ref pres. "H}_2O - \text{test pres. "H}_2O))}{(\text{ref pres. "H}_2O)} * 100 \leq 5\%$$

PRESSURE SENSOR CALIBRATION DATA FORM

Date 1-4-94 Control Box # MicroTector

Ambient Temperature 70 °F Barometric Pressure 29.25 in Hg

	MAGNEHELIC GUAGE #	REFERENCE MANOMETER READING Inches H_2O	MAGNEHELIC GUAGE READING Inches H_2O	PRESSURE DIFFERENCE Inches H_2O	%
	⊘ Black	Traverse	Box		
High	0-.25	.053	.053	0.000	0.00
		.107	.103	0.002	1.98
		.149	.151	0.002	1.34
		.203	.209	0.006	2.96
Low	0-.25	.046	.048	0.002	4.35
		.092	.096	0.004	4.35
		.147	.149	0.002	1.36
		.203	.208	0.005	2.46

$$\frac{(\text{ref pres. "}H_2O - \text{test pres. "}H_2O)}{(\text{ref pres. "}H_2O)} \cdot 100 \leq 5\%$$

VP

PRESSURE SENSOR CALIBRATION DATA FORM

Date 1-4-94 Control Box # Blue Manometer

Ambient Temperature 70 °F Barometric Pressure 29.25 in Hg

	MAGNEHELIC GUAGE #	REFERENCE MANOMETER READING Inches H_2O	MAGNEHELIC GUAGE READING Inches H_2O	PRESSURE DIFFERENCE Inches H_2O	PRESSURE DIFFERENCE %
	Black Traverse Box				
High	0-2	0.41	0.41	0.00	0.00
		0.81	0.78	0.03	3.70
		1.20	1.17	0.03	2.50
		1.64	1.62	0.02	1.22
Low	0-2	0.40	0.40	0.00	0.00
		0.80	0.78	0.02	2.50
		1.20	1.15	0.05	3.17
		1.60	1.55	0.05	3.13
High	0-1	0.20	0.20	0.00	0.00
		0.40	0.41	0.01	2.50
		0.62	0.62	0.00	0.00
		0.81	0.81	0.00	0.00
Low	0-1	0.20	0.21	0.01	5.00
		0.40	0.40	0.00	0.00
		0.62	0.63	0.01	1.61
		0.80	0.80	0.00	0.00

$$\frac{(\text{ref pres. "H}_2O - \text{test pres. "H}_2O)}{(\text{ref pres. "H}_2O)} \times 100 \leq 5\%$$

VP

PRESSURE SENSOR CALIBRATION DATA FORM

Slack Tube Manometer & Blue Magnometer

Date 1-4-94 Control Box #

Ambient Temperature 70 °F Barometric Pressure 29.25 in Hg

	MAGNEHELIC GUAGE #	REFERENCE MANOMETER READING Inches H_2O	MAGNEHELIC GUAGE READING Inches H_2O	PRESSURE DIFFERENCE Inches H_2O	PRESSURE DIFFERENCE %
	Black Traverse Box				
High	0-15	3	2.9	0.1	3.33
		6	5.7	0.3	5.00
		9	8.6	0.4	4.44
		12	11.5	0.5	4.17
Low	0-15	3	2.9	0.1	3.33
		6	5.8	0.2	3.33
		9	8.8	0.2	2.22
		12	11.8	0.2	1.67
High	0-5	1.02	1.00	0.02	1.96
		1.98	1.96	0.02	1.01
		2.99	2.93	0.06	2.01
		4.00	4.00	0	0.00
Low	0-5	0.99	0.99	0.00	0.00
		2.00	1.95	0.05	2.50
		3.00	2.98	0.07	2.33
		4.00	4.03	0.03	0.75

$$\frac{(\text{ref pres. "}H_2O - \text{test pres. "}H_2O))}{(\text{ref pres. "}H_2O)} \cdot 100 \leq 5\%$$

VP

TYPE S PITOT TUBE INSPECTION DATA FORM

Date 2-12-93 Pitot Tube # P-9-A

Client King Co. Solid Waste Division

Location Cedar Hills Landfill

Site(s) #1,2,3 Flare Outlet

Test Date(s) 2/8-10/94

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 5.0 ° (<10°), α_2 = 4.5 ° (<10°), β_1 = 1.0 ° (<5°),

β_2 = 1.0 ° (<5°)

γ = 0.0 °, θ = 1.0 °, A = 1.122 cm (in.)

$z = A \sin \gamma$ = 0.000 cm (in.); <0.32 cm (<1/8 in.),

$w = A \sin \theta$ = 0.0196 cm (in.); <.08 cm (<1/32 in.)

P_A 0.560 cm (in.) P_b 0.562 cm (in.)

D_t = 0.375 cm (in.)

Comments:

Calibration required? _____ yes* ~~✓~~ no

*If yes, tag and take out of service until repaired.

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TYPE S PITOT TUBE INSPECTION DATA FORM

Date 12-28-93 Pitot Tube # P3A

Client King Co. Solid Waste Div.

Location Cedar Hills Landfill

Site(s) #1,2,3 Flare Outlet

Test Date(s) 2/8-10/94

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 1.0 ° (<10°), α_2 = 0.0 ° (<10°), β_1 = 0.5 ° (<5°),

β_2 = 1.0 ° (<5°)

γ = 3.0 °, θ = 1.5 °, A = 1.056 cm (in.)

$z = A \sin \gamma$ = 0.0553 cm (in.); <0.32 cm (<1/8 in.),

$w = A \sin \theta$ = 0.0276 cm (in.); <.08 cm (<1/32 in.)

P_A 0.528 cm (in.) P_b 0.528 cm (in.)

D_t = 0.375 cm (in.)

Comments:

Calibration required? _____ yes* ✓ no

*If yes, tag and take out of service until repaired.

VP

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 8-4-93 Thermocouple Indicator # T9B

Ambient Temperature 72 °F Barometric Pressure 29.5 in Hg

THERMOCOUPLE # OR REFERENCE	REFERENCE THERMOMETER TEMPERATURE °F	THERMOCOUPLE TEMPERATURE °F	TEMPERATURE DIFFERENCE °F	TEMPERATURE DIFFERENCE %
T9B 0.1	328 (788)	329	1	.127
ICE	32 (492)	35	3	.610
Boiling	211 (671)	214	3	.447

(ref temp, °F + 460) - (test therm. temp, °F + 460) / (ref temp, °F + 460) • 100 ≤ 1.5%

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 12-29-93 Thermocouple Indicator # Red 4/F

Ambient Temperature 71 °F Barometric Pressure 29.85 in Hg

THERMOCOUPLE # OR REFERENCE	REFERENCE THERMOMETER TEMPERATURE °F	THERMOCOUPLE TEMPERATURE °F	TEMPERATURE DIFFERENCE °F	TEMPERATURE DIFFERENCE %
T6 A				
	33	33	0	0.00%
	211	214	3	0.45%
	383	386	3	0.36%

$$\frac{(\text{ref temp, °F} + 460) - (\text{test therm. temp, °F} + 460)}{(\text{ref temp, °F} + 460)} * 100 \leq 1.5\%$$

VP

SECTION 1. DESCRIPTION

1.1 General

The Servomex 1400B series of gas analysers comprises two base units, the 1410B analyser using dual wavelength, single beam infrared technique and the 1420B/1421B oxygen analysers using paramagnetic technology. This manual describes the 1420B oxygen analyser.

The 1400B series may be fitted into a twin unit 19" rack mounted case, a bench top case or a single unit case for flush panel mounting.

The 1420B has voltage and current outputs, multiple ranges, oxygen level alarms, flow alarm and remote range indication.

A version of the analyser is available for oxygen purity measurements.

Included with the analyser are the following accessories:

Fuses	2531-0526
Filters	2377-3608
'D' connectors	2535-7127 (plug)
	2535-7374 (socket)
'D' connector hoods	2535-7088
Manual	01420001B
IEC Power connector	2533-1437

A 3 1/2 digit green LED indicates the oxygen content to 0.1% resolution.

WARNING

This analyser is not suitable for use in hazardous areas or for measuring flammable sample gases.

1.2 Principles of Operation

The 1420B oxygen analyser measures the paramagnetic susceptibility of the sample gas by means of a magneto-dynamic type measuring cell.

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

1.3 Sampling System

The sampling system of the analyser includes a combination filter/automatic flow control device, designed to keep a constant flow of sample gas through the measuring cell for varying input pressures and to prevent the entrance of particulate matter into the measuring cell. Excess flow is vented to the by-pass.

An optional back pressure regulator is available for high oxygen concentrations to reduce the errors which would occur due to changes in barometric pressure.

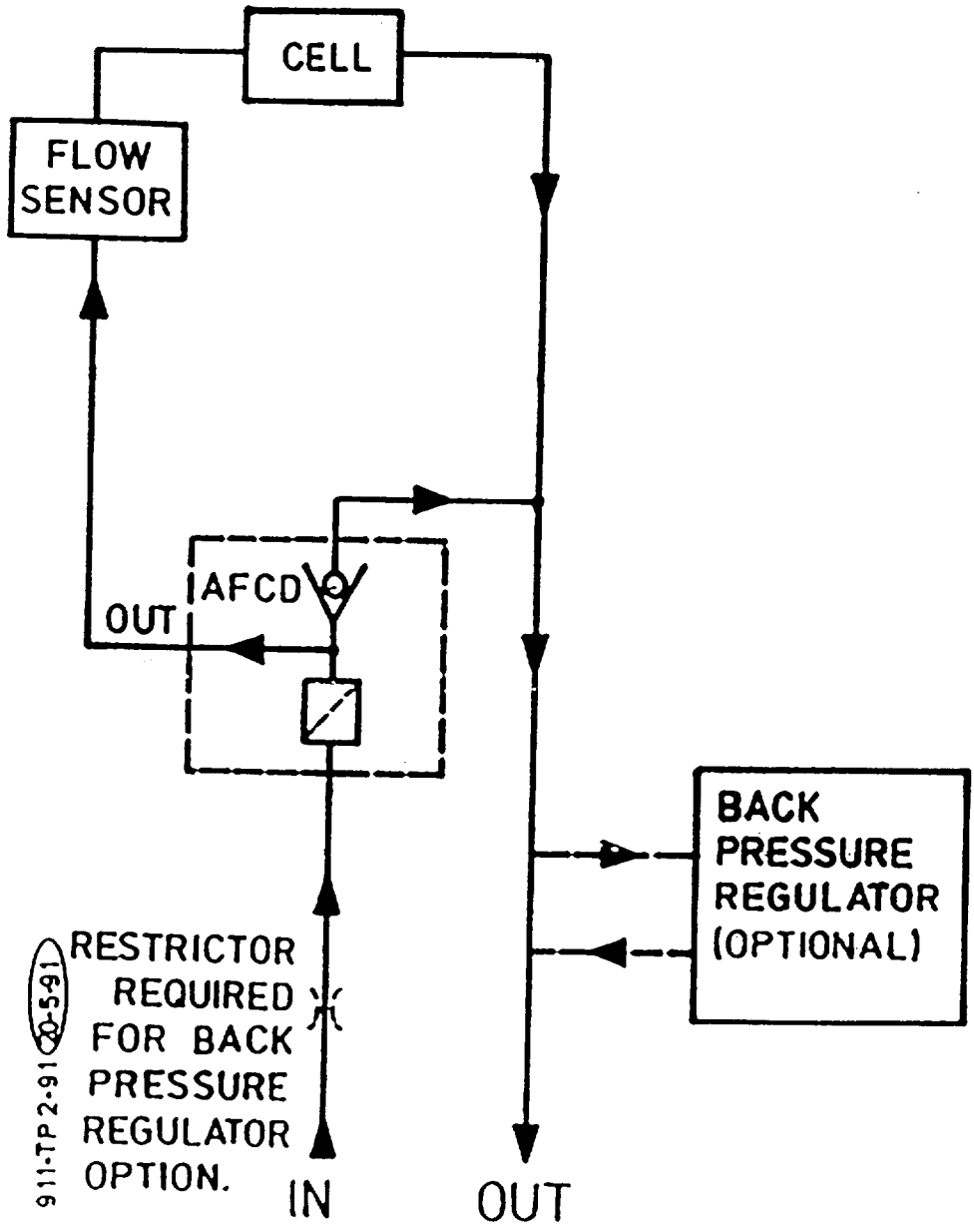


Figure 1.1 Schematic of Sampling System

1.4 Use With Toxic or Flammable Gases

1.4.1 Toxic Gases

If the analyser is used with sample gases which may be toxic, asphyxiant or otherwise harmful to health then adequate precautions should be taken to ensure safe installation and operation.

These precautions could, for example, include ensuring good quality sample piping to reduce the possibility of leaks, regular leak checking of the analyser and sample piping, minimum sample pressure, adequate ventilation of enclosed spaces and the possibility of monitoring for toxic levels.

The analyser vent should be piped to a well ventilated area.

1.4.2 Flammable Gases

WARNING

This analyser is not suitable for use in hazardous areas or for measuring flammable sample gases.

Consult Servomex for details of analysers which may be more suitable for measuring sample gases which can be toxic or flammable.

1.5 Specification

Performance Specification (typical)

Repeatability:	Better than ±0.1% O_2 under constant conditions (measured at the IV electrical output).
Temperature coefficient:	±0.005% O_2 ±0.04% of reading(on display) per °C change from calibration temperature.
Response Time:	Less than 15 seconds to 90%. At point when flow alarm is triggered the response time will be approximately 50 seconds

Outputs

Display:	3 1/2 digit LED reading 0.0 to 100.0% oxygen with overrange capability.
Output:	4-20mA (isolated), maximum load 600 ohms. Isolation 110V ac. 0-1V (unisolated), minimum load 1000 ohms for range selected.

Alarm outputs:

Oxygen level:	2 oxygen level alarms, SPCO relay contacts rated at 1A/110V AC or 1A/28V DC, non-inductive. Can be configured to high or low. Independent of range.
Flow fail:	SPCO relay contacts rated at 1A/110V AC or 1A 28V DC, non-inductive.
Local alarm:	Red LED lamps flash when alarm active.

Sample requirements

Condition:	Clean, dry gas with dew point 5°C below ambient temperature.
Inlet pressure: (Standard)	3.5 to 70kPa (0.5 to 10psig). Inlet pressure changes within this range will change the reading by less than 0.1% O_2.
(With back-pressure regulator)	17kPa to 35kPa (2.5 to 5 psig). Pressure values will be increased by 1 psig for every 2000ft(10Pa per 1000m) altitude above sea level.
Flowrate:	1 to 6 litres/minute approximately depending on sample pressure. Version with back pressure regulator: 1 - 2 litres/min
Filtering:	0.6 micron replaceable filter integral to the automatic flow control device.
Materials exposed to the sample:	Stainless steel, Pyrex glass, brass, platinum, epoxy resin, Viton, nylon, neoprene, polypropylene and glass fibre filter.
Gas connection:	6.4mm (1/4") OD tube.

Physical Characteristics

Case:	Steel and aluminium finished in epoxy powder paint.
Case classification:	IP 20 (IEC 529) when fitted into the Servomex 1400 series 19 inch case.

Dimensions:	See Figure 2.1.
Weight:	5Kg (11lb) approximately.

Electrical

AC Supply:	88 to 264V, 47 to 440Hz.
Power required:	50VA.

Environmental Limits

Operating ambient temperature:	0 to +45°C (32 to 113°F) 0 to 40°C (32 to 104°F), when fitted in bench top case.
Storage temperature range:	-20 to +70°C (-4 to 158°F)
Relative humidity:	0-85%, non-condensing.
Sunlight:	Protect from direct sunlight which may cause the interior of the analyser to overheat.
Vibration:	Protect the analyser from excessive vibration.
EMC:	Complies with EN 50022(1987) CLASS A for conducted interference and radiated electric field.

1.6 Product Identification

A label is fitted to the rear panel giving the model and serial numbers. It is of the form 1420/B701/NNNN where NNNN is the serial number

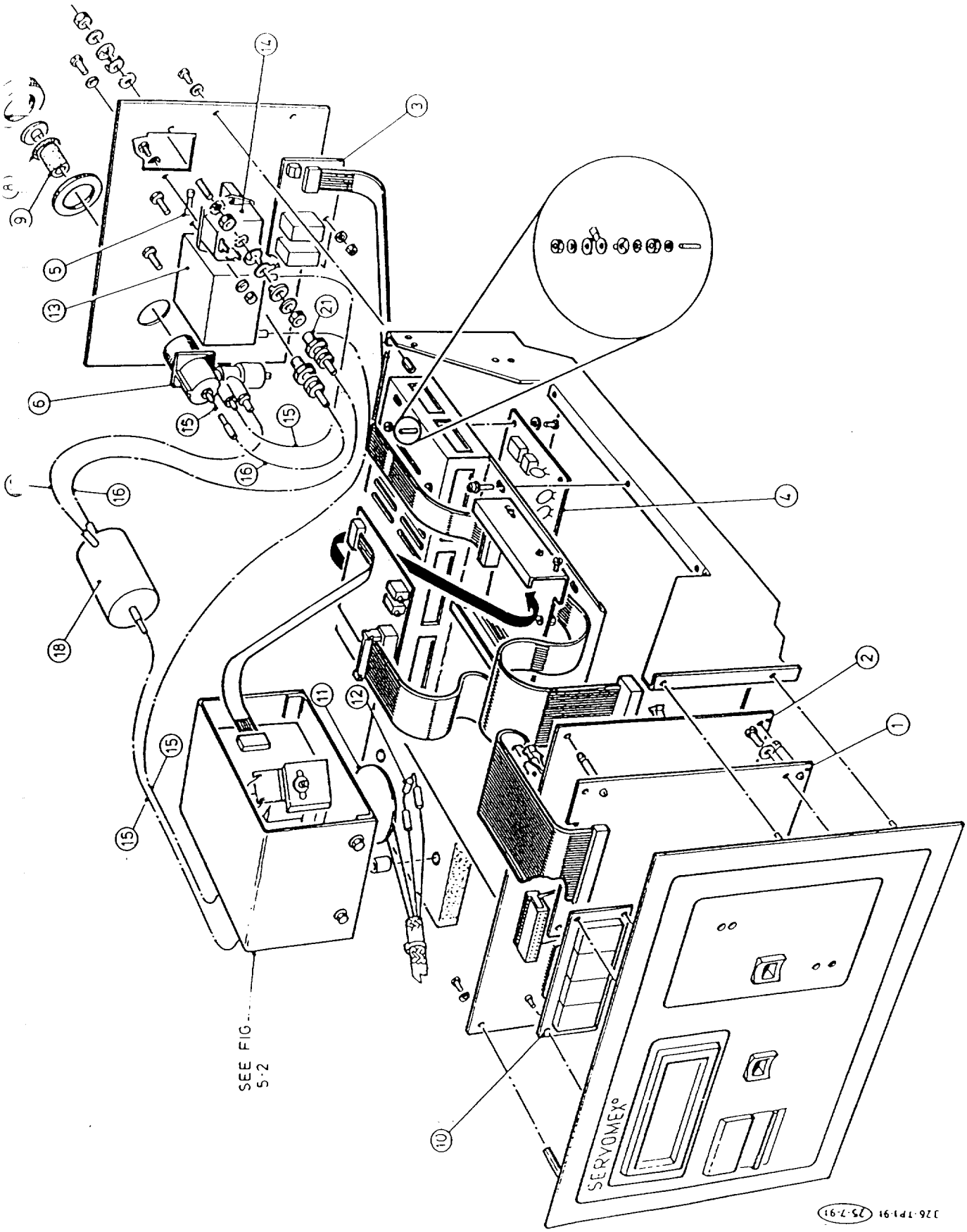


Figure 5.1 Exploded View 1420B Oxygen Analyser

721AT2 ANALYZER DATA

S/N 90 -721AT2 -7722

CUSTOMER: AMTEST INC

LOCATION: WASH.

P.O. #: 0976

CALIBRATION

CELL LENGTH 35.0 cm
CALIBRATION PRESSURE 760 mm Hg
CALIBRATION TEMP. 25 °C + 273 = 298 °K
MOLAR ABSORBTIVITY CONSTANT "k" 258

ELECTRONIC SPAN VALUE 809 ppm
SCALING RATIO 2mV /ppm

	RANGE 1	RANGE 2
FULL SCALE	200 ppm	2000 ppm
LOW OUTPUT	0.1 VDC	0.1 VDC
HIGH OUTPUT	1.0 VDC	1.0 VDC
V/I	— mA	— mA

LAMP TYPE SMG15MB
PMT TYPE R928HA
MEASURING PMT S/N 1A0361
REFERENCE PMT S/N YC6031

MEASURING FILTER WAVELENGTH 285 nM S/N 89-12
REFERENCE FILTER WAVELENGTH 585 nM S/N 90-04

PRIMARY OUTPUT CARD

TJ1 (DPM)	0.00	Vdc
TJ2 (AGC1)	3.49	Vdc
TJ3 (AGC2)	3.56	Vdc
TJ4 (I_{avg})	4.00	Vdc
TJ5 (M1)	9.00	Vdc
TJ6 (M2)	7.98	Vdc
TJ7 (M1B)	4.51	Vdc
TJ8 (M2B)	4.50	Vdc
TJ9 (OPACITY)	0.00	Vdc

JUMPERS

JH1 A (B) C

JH2 A (B) C D

JH3 A (B) C D

JH4 (A) B (C) D

SWITCHES

SW1-1 (OP) CAL

SW1-2 (ZERO) SPAN

SECONDARY OUTPUT CARD

JUMPERS

JH1 (A) B C (D)

JH2 (A) (B) C D

JH3 (1) (2) 3 4 5 6 7 8

JH4 (1) 2 3 4 (5) 6 7 8

JH5 (1) (2) 3 4 5 6 7 8

JH6 (1) 2 3 4 (5) 6 7 8

HARD WIRED JUMPERS

JW1 JW6

JW2 JW7

(JW3) (JW8)

(JW4) (JW9)

(JW5) (JW10)

721AT2 ANALYZER DATA

LAMP POWER SUPPLY

TEST POINTS

TP1	10.15 Vdc (OC1)	
TP2	10.15 Vdc (OC2)	
TP3 (Scope Measurement)		
Base	0.50 Vdc	
Measuring Pulse	8.80 Vdc	
Reference Pulse	2.60 Vdc	
TJ1 I_{avg}	4.00 Vdc	
LAMP VOLTAGE	150.1 Measured Across TB2 Terminals	

JUMPERS

JH1 (1) 3
JH2 (1) 3
JH3 (1) 3

DETECTOR CARD

TEST JACKS

TJ1 (AGC1)	3.49 Vdc
TJ2 (AGC2)	3.56 Vdc
TJ3 (R1)	8.03 Vdc
TJ4 (R2)	8.05 Vdc
TJ5 (M1)	9.00 Vdc
TJ6 (M2)	7.98 Vdc

TEST POINTS

TP1 (RSIG1)	-0.80 Vdc
TP2 (RSIG2)	-0.80 Vdc
TP3 (MSIG1)	-0.90 Vdc
TP4 (MSIG2)	-0.80 Vdc
TP5 (PMTSIG1)	-1.71 Vdc
TP6 (PMTSIG2)	-1.61 Vdc

SWITCHES

SW1-1	(AUTO)	MANUAL
SW1-2	(AUTO)	MANUAL
SW1-3	(ON)	OFF
SW1-4	(ON)	OFF

721AT2 ANALYZER DATA

S/N 90 -721AT2 -7722

CUSTOMER: AMTEST INC

LOCATION: WASH.

P.O. #: 0976

CALIBRATION

CELL LENGTH 35.0 cm
CALIBRATION PRESSURE 760 mm Hg
CALIBRATION TEMP. 25 °C + 273 = 298 °K
MOLAR ABSORBTIVITY CONSTANT "k" 253

ELECTRONIC SPAN VALUE 809 ppm
SCALING RATIO 2mV /ppm

	RANGE 1	RANGE 2
FULL SCALE	200 ppm	2000 ppm
LOW OUTPUT	0.1 VDC	0.1 VDC
HIGH OUTPUT	1.0 VDC	1.0 VDC
V/I	— mA	— mA

LAMP TYPE SMG15M6
PMT TYPE R928HA
MEASURING PMT S/N 1A0361
REFERENCE PMT S/N YC6031

MEASURING FILTER WAVELENGTH 285 nM S/N 89-12
REFERENCE FILTER WAVELENGTH 585 nM S/N 90-04

PRIMARY OUTPUT CARD

TJ1 (DPM)	0.00	Vdc
TJ2 (AGC1)	3.49	Vdc
TJ3 (AGC2)	3.56	Vdc
TJ4 (I_{avg})	4.00	Vdc
TJ5 (M1)	9.00	Vdc
TJ6 (M2)	7.98	Vdc
TJ7 (M1B)	4.51	Vdc
TJ8 (M2B)	4.50	Vdc
TJ9 (OPACITY)	0.00	Vdc

JUMPERS

JH1 A (B) C
JH2 A (B) C D
JH3 A (B) C D
JH4 (A) B (C) D

SWITCHES

SW1-1 (OP) CAL
SW1-2 (ZERO) SPAN

SECONDARY OUTPUT CARD

JUMPERS

JH1 (A) B C (D)
JH2 (A) (B) C D
JH3 (1) (2) 3 4 5 6 7 8
JH4 (1) 2 3 4 (5) 6 7 8
JH5 (1) (2) 3 4 5 6 7 8
JH6 (1) 2 3 4 (5) 6 7 8

HARD WIRED JUMPERS

JW1 JW6
JW2 JW7
(JW3) (JW8)
(JW4) (JW9)
(JW5) (JW10)

721AT2 ANALYZER DATA

LAMP POWER SUPPLY

TEST POINTS

TP1	10.15 Vdc (OC1)	
TP2	10.15 Vdc (OC2)	
TP3 (Scope Measurement)		
Base	0.50 Vdc	
Measuring Pulse	8.80 Vdc	
Reference Pulse	2.60 Vdc	
TJ1 I_{avg}	4.00 Vdc	
LAMP VOLTAGE	150.1 Measured Across TB2 Terminals	

JUMPERS

JH1 (1) 3
JH2 (1) 3
JH3 (1) 3

DETECTOR CARD

TEST JACKS

TJ1 (AGC1)	3.49 Vdc
TJ2 (AGC2)	3.56 Vdc
TJ3 (R1)	8.03 Vdc
TJ4 (R2)	8.05 Vdc
TJ5 (M1)	9.00 Vdc
TJ6 (M2)	7.98 Vdc

TEST POINTS

TP1 (RSIG1)	-0.80 Vdc
TP2 (RSIG2)	-0.80 Vdc
TP3 (MSIG1)	-0.90 Vdc
TP4 (MSIG2)	-0.80 Vdc
TP5 (PMTSIG1)	-1.71 Vdc
TP6 (PMTSIG2)	-1.61 Vdc

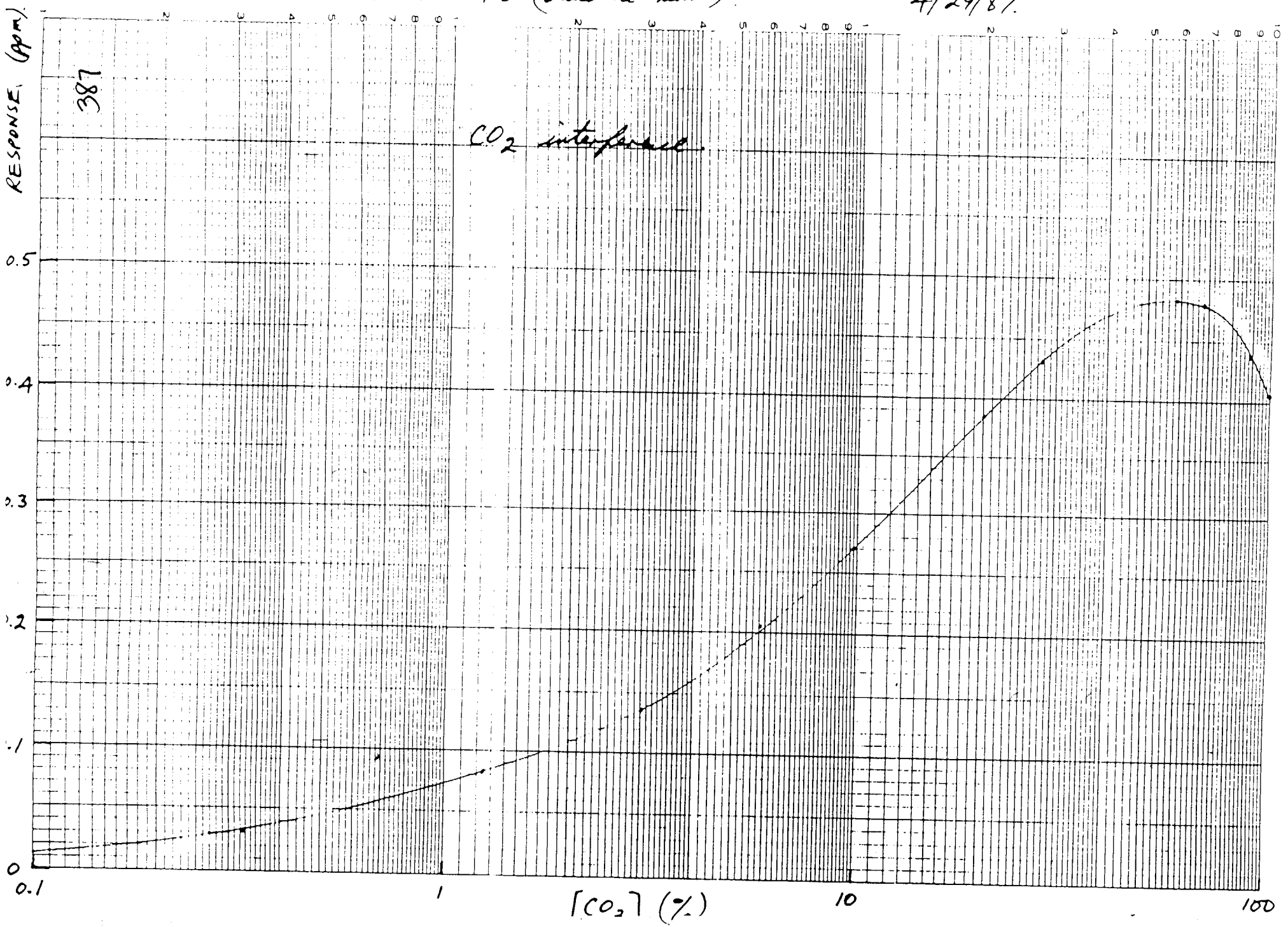
SWITCHES

SW1-1	(AUTO)	MANUAL
SW1-2	AUTO	MANUAL
SW1-3	(ON)	OFF
SW1-4	(ON)	OFF

NO 340-C310 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
3 CYCLES X 10 DIVISIONS PER INCH
DIETZGEN CORPORATION
MADE IN U.S.A.

MODEL A8 (Baseline unit)

4/29/87



AIRCO **Special Gases**
An operating unit of The BOC Group, Inc

Union Landing & River Roads
P.O. Drawer No. 272
Riverton
New Jersey 08077
Telephone: Marketing; 609-829-7878
Prod. & Admin.; 609-829-7914
International; 609-829-7917

595226

390

ANALYTICAL REPORT

To: General Welding Supply
3623 E. Marginal Way So.
Seattle, WA 98134

Date Reported: 12-10-93
Test Number: 35334
Fill Date: 11-19-93

Material Submitted: 300ppm CO,6%CO2,15%O2/N2

Specification Number: N/A

Method of Analysis: Non-Dispersive Infrared Analyzer, Gas Chromatograph

Result of Investigation: Cylinder No. CC-7282

	Component	Specification	Concentration
*	Carbon Monoxide	300 ppm	300 ppm
**	Carbon Dioxide	6%	6.05%
**	Oxygen	15%	14.96%
	Nitrogen	Balance	Balance

Primary Standard
* Analytical Accuracy +/- 2.0% Relative
** Analytical Accuracy +/- 0.02% Absolute

By J. Long
Authorized Signature

DEC 28 1993

AIRCO Special Gases
An operating unit of The BOC Group, Inc
Union Landing & River Roads
P.O. Drawer No. 272
Riverton
New Jersey 08077
Telephone: Marketing; 609-829-7878
Prod. & Admin.; 609-829-7914
International; 609-829-7917

595204

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ANALYTICAL REPORT

To: General Welding Supply
3623 E. Marginal Way So.
Seattle, WA 98134

Date Reported: 11-30-93
Test Number: 35333
Fill Date: 11-18-93

Material Submitted: 600ppm CO,10%O2,12%CO2/N2

Specification Number: N/A

Method of Analysis: Non-Dispersive Infrared Analyzer, Gas Chromatograph

Result of Investigation: Cylinder No. CC-72326

	Component	Specification	Concentration
*	Carbon Monoxide	600 ppm	597 ppm
**	Oxygen	10%	10.01%
**	Carbon Dioxide	12%	12.00%
	Nitrogen	Balance	Balance

Primary Standard
* Analytical Accuracy +/- 2.0% Relative
** Analytical Accuracy +/- 0.02% Absolute

By _____
Authorized Signature

AIRCO

To: General Welding-Hansen

Expiration Date: 04/11/94
Customer P.O.: 172097
Balance Gas: Nitrogen
CAS 7727-37-9

Certification of Analysis - EPA Protocol Gas Performed According to Section 3.0.4

Certified Per Traceablity Procedure # G1
Certified Accuracy 1% NIST Protocol # 1

Test Number: 34327
Cylinder Number: CC-10652
Fill Date: 09/23/93
Cylinder Pressure: 2000 PSIG
Certification Date: 10/11/93
Location: Riverton, N.J.

Component	Certified Concentration	GMIS No.	GMIS Conc.	Cylinder Number
Nitric Oxide	49.0 ppm	GMIS	48.4 ppm	CC-79768

Analytical Information

Serial Number	Analytical Procedure	Make	Model	Calibration Date
0100204	Chemiluminescence	Beckman	952	09/01/93

CAS 10102-43-9

First Analysis — Analyst: A. Lattanze — Date: 10/04/93

Zero Gas	Reference Gas	Sample Gas	-- Concentration
0000	2990	3035	49.1 ppm
0000	2990	3035	49.1 ppm
0000	2990	3035	49.1 ppm
		Average-	49.1 ppm

Second Analysis — Analyst: A. Lattanze — Date: 10/11/93

Zero Gas	Reference Gas	Sample Gas	-- Concentration
0000	2960	2990	48.9 ppm
0000	2960	2990	48.9 ppm
0000	2960	2990	48.9 ppm
		Average-	48.9 ppm

Component	Certified Concentration	GMIS No.	GMIS Conc.	Cylinder Number
Sulfur Dioxide	50.7 ppm	GMIS	50.38 ppm	CC-72396

Analytical Information

Serial Number	Analytical Procedure	Make	Model	Calibration Date
93-721m-7998-3	Non-dispersive Ultraviolet	Bovar	721m	09/01/93

CAS 7446-09-5

First Analysis — Analyst: A. Lattanze — Date: 10/04/93

Zero Gas	Reference Gas	Sample Gas	-- Concentration
000	508	511	50.7 ppm
000	508	511	50.7 ppm
000	508	511	50.7 ppm
		Average-	50.7 ppm

Second Analysis — Analyst: A. Lattanze — Date: 10/11/93

Zero Gas	Reference Gas	Sample Gas	-- Concentration
000	503	506	50.7 ppm
000	503	506	50.7 ppm
000	503	506	50.7 ppm
		Average-	50.7 ppm

This Calibration Standard has been Certified versus EPA Traceability Protocol # 1, Procedure G1, and Analysis performed per section 3.0.4
Certified Concentration: Balance = Nitrogen, Nitric Oxide=49.0 ppm, Sulfur Dioxide=50.7 ppm
NOx = 49.0 ppm

APPROVED BY J. Long
Laboratory Manager

392

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BYRNE SPECIALTY GASES

pure and mixed gases · gas handling equipment · cryogenics

Byrne Specialty Gases, Inc.
118 S. Mead Street
Seattle, Washington 98108 (206) 764-4633

P.O. Box 54083, Terminal Annex
Los Angeles, CA 90054

11711 S. Alameda Street
Los Angeles, CA 90059
(213) 564-5711

ANALYTICAL REPORT — PRODUCT CERTIFICATION

TO: Byrne Specialty Gas

DATE: 16 Nov 1992

P.O. NO SP11271-24935

INV. NO.

EPA Protocol Procedure G-1

REF. # 009142

CYLINDER NO.	CONSTITUENTS CONCENTRATION:	NOMINAL	ACTUAL
CC104450	Sulfur Dioxide	90.0 PPM	88.95 PPM
	Nitric Oxide	90.0 PPM	103.2 PPM
	NOX		103.3 PPM
	Nitrogen	Balance	Balance

EXPIRATION DATE: May 16, 1994
Cylinder Pressure: 2000 psig

William L. Vernon ANALYST

P.D.-042

BYRNE SPECIALTY GASES
pure and mixed gases · gas handling equipment · cryogenics
BYRNE
Byrne Specialty Gases, Inc.
118 S. Mead Street
Seattle, Washington 98108 (206) 764-4633

P.O. Box 54083, Terminal Annex
Los Angeles, CA 90054
11711 S. Alameda Street
Los Angeles, CA 90059
(213) 564-5711

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ANALYTICAL REPORT — PRODUCT CERTIFICATION

TO: Byrne Specialty Gas

DATE: 16 Nov 1992

P.O. NO SP11271-24935

INV. NO.

Page 2 of 3 Analyzer Readings

REF. # 009142

CYLINDER NO.	CONSTITUENTS CONCENTRATION:	NOMINAL	ACTUAL
FF28658	Sulfur Dioxide	100 PPM	96.9 PPM
SRM1649a	Nitrogen	Balance	Balance
Sample:			

Analyzer: Siemens Ultramat 5 E — Date of last multipoint calibration: 11-04-92
Serial Number: BO2-776
Range: 0-200 PPM — Measurement Principle: Infrared
Sample Cylinder Number: CC104450

Date: 11-02-92
Zero: 00.0 — Reference: 98.0 — Sample: 90.0
Reference: 98.0 — Zero: 00.0 — Sample: 90.0
Zero: 00.0 — Sample: 90.0 — Reference 98.0
SO2: 88.99 — SO2: 88.99 — SO2: 88.99 — Mean SO2: 88.99

% deviation of SO2 from mean: 0.0

Date: 11-09-92
Zero: 00.0 — Reference: 97.0 — Sample: 89.0
Reference: 97.0 — Zero: 00.0 — Sample: 89.0
Zero: 00.0 — Sample: 90.0 — Reference: 97.0
SO2: 88.91 — SO2: 88.91 — SO2: 88.91 — Mean SO2: 88.91

% deviation of SO2 from mean: 0.0
Reported analysis: Sulfur Dioxide 88.95 PPM

% deviation of first and second analysis: -0.1

William L. Vernon ANALYST

P.D.-042

BYRNE SPECIALTY GASES
pure and mixed gases · gas handling equipment · cryogenics
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118 S. Mead Street
Seattle, Washington 98108 (206) 764-4633

P.O. Box 54083, Terminal Annex
Los Angeles, CA 90054

11711 S. Alameda Street
Los Angeles, CA 90059
(213) 564-5711

395

ANALYTICAL REPORT — PRODUCT CERTIFICATION

TO: Byrne Specialty Gas

DATE: 16 Nov 1992

P.O. NOSP11271-24935

INV. NO. 009142

REF. #

Page 3 of 3 Analyzer Readings

CYLINDER NO.	CONSTITUENTS CONCENTRATION:	NOMINAL	ACTUAL
150-562	Nitric Oxide	100 PPM	79.9 PPM
GMIS	Nitrogen	Balance	Balance
Sample:			

Analyzer: Thermo Electron Model 10 Date of last multipoint
Serial Number: 10AR-15677-156 calibration: 09-22-92
Range: 0-100 PPM Measurement Principle: Chemiluminescent
Sample Cylinder Number: CC104450

Date: 11-09-92

Zero: 00.0		Reference: 76.3		Sample: 98.7	
Reference: 76.3		Zero: 00.0		Sample: 98.6	
Zero: 00.0		Sample: 98.2		Reference 76.3	
NO: 103.3	NO:	103.2	NO: 102.8	Mean NO:	103.1
				NOX:	103.2

% deviation of NO from mean: 0.3

Date: 11-16-92

Zero: 00.0		Reference: 76.4		Sample: 98.8	
Reference: 76.4		Zero: 00.0		Sample: 98.9	
Zero: 00.0		Sample: 98.9		Reference: 76.4	
NO: 103.3	NO:	103.4	NO: 103.4	Mean NO:	103.3
				NOX:	103.4

% deviation of NO from mean: 0.1
Reported analysis: Nitric Oxide 103.2 PPM
NOX 103.3 PPM

% deviation of first and second analysis: +0.2

William L. Vernon ANALYST