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FINAL TEST REPORT FOR

USEPA TEST PROGRAM CONDUCTED AT GENERAL SHALE BRICK PLANT JOHNSON CITY, TENNESSEE

U. S. EPA CONTRACT NO. 68D20029
EMB WORK ASSIGNMENT NO. 18

December 1993

ETS, Inc.
1401 Municipal Road, Roanoke, Virginia 24012

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1.0 INTRODUCTION

1.1 SUMMARY

The U.S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards (OAQPS), Emission Inventory Branch (EIB) is responsible for developing and maintaining air pollution emission factors for industrial processes. EIB, in collaboration with the Brick Institute of America, is currently studying the brick manufacturing industry. The purpose of this study is to develop emission factors for the coal-fired kiln operations used by brick manufacturing facilities. The Emission Measurement Branch (EMB) of OAQPS coordinated the emission measurement activities at this plant. ETS Incorporated (ETS, Inc.) conducted the ambient and source measurements. Midwest Research Institute, Inc. (MRI) collected samples of the process materials and obtained process data during testing.

EPA/EIB and the Brick Institute of America considered the General Shale Brick Plant located in Johnson City, Tennessee to be representative of this type of brick manufacturing operation. Three areas of the manufacturing facility were tested; 1) the raw material crushing and screening operations; 2) the kiln dryer zone; and 3) the kiln combustion zone. A facility site plan showing the layout of the operation and the sampling locations is presented in Figure 1.1-1.

The test program was conducted from July 27, 1993 through July 31, 1993. Air sampling at the crushing and screening operations for particulate matter (PM) and particulate matter less than or equal to ten microns (PM_{10}) was performed at the baghouse outlet. In addition, background ambient air sampling for PM and PM_{10} was conducted around the crushing, screening and storage building. The source and ambient testing were both executed on July 27, 1993. Process materials from the grinding and screening operations along with the baghouse catch were sampled and analyzed for moisture content and particle size.

Source sampling at the kiln was performed on both the dryer exhaust stack and the kiln combustion exhaust stack. The dryer exhaust stack was sampled for methane, ethane and total hydrocarbons on July 28, 1993. The kiln exhaust stack was sampled for the following pollutants:

- methane/ethane;
- total hydrocarbons;
- PM, PM_{10}, condensible particulate matter (CPM);
- multiple metals;
- hydrogen fluoride (HF);
- nitrogen oxides (NO_x);
- carbon monoxide (CO)
- volatile organic compounds (VOC);
- semivolatile organic compounds (SVOC).

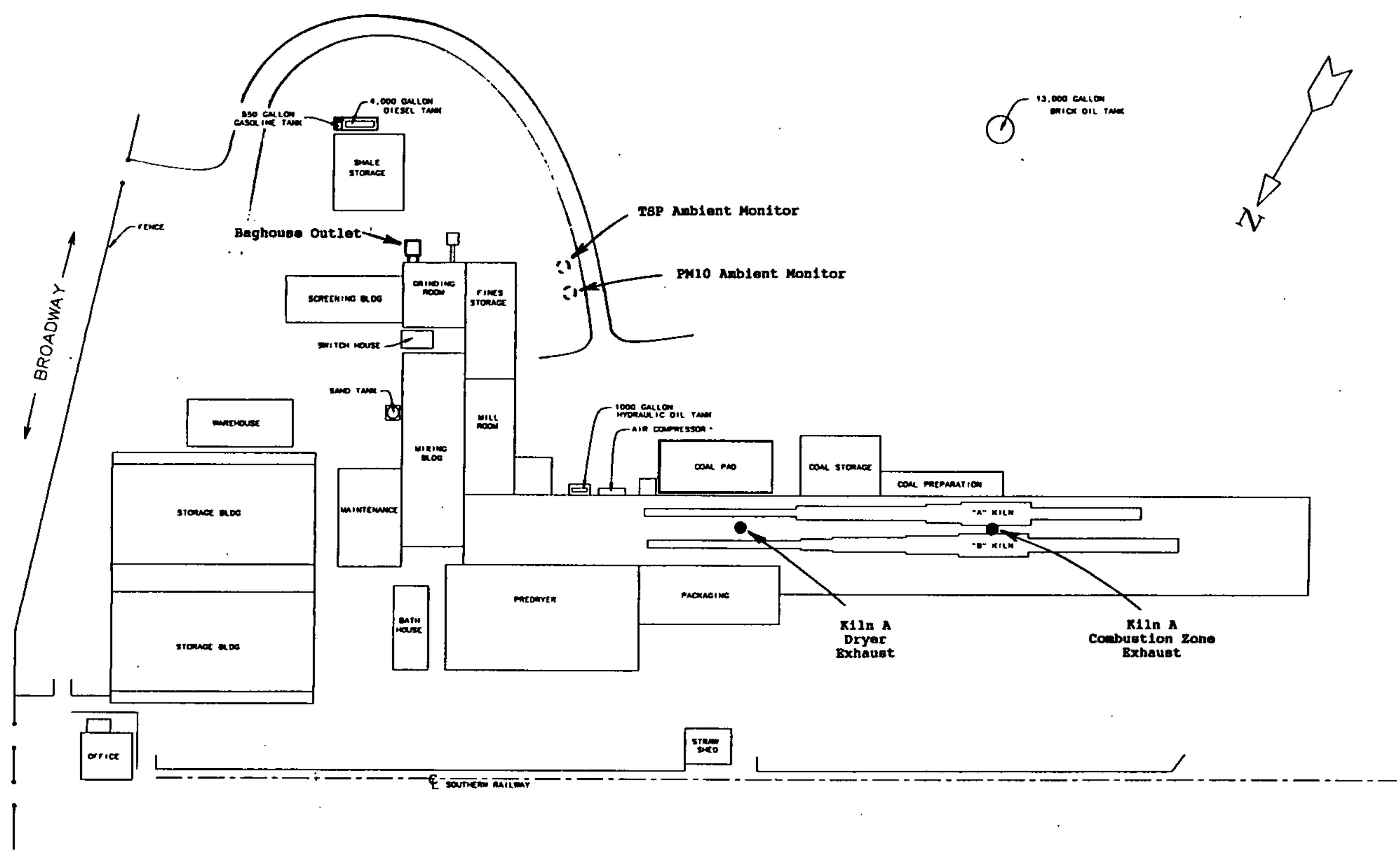


Figure 1.1-1: Johnson City Brick Facility Site Plan

The sampling was conducted from July 29 through July 31, 1993. Table 1.1-1 identifies the metals targeted for measurement. The VOC and SVOC compounds targeted for measurement in this test program are presented in Tables 1.1-2 and 1.1-3, respectively.

TABLE 1.1-1: Targeted Metals for Johnson City Brick (Johnson City, Tennessee)

METAL
antimony
arsenic
beryllium
cadmium
chromium
lead
manganese
mercury
nickel
phosphorus
selenium

TABLE 1.1-2: Targeted Volatile Compounds

COMPOUND (VALIDATED[1])	COMPOUND (NOT VALIDATED[2])
chloromethane	acetone*
bromomethane	carbon disulfide
methylene chloride	2-butanone
chloroform	1,1,1-trichloroethane
trichlorofluoromethane*	vinyl acetate
carbon tetrachloride	2-hexanone*
trichloroethene*	toluene
benzene	ethylbenzene
tetrachloroethene	styrene
	o-xylene
	m-/p-xylene

[1] Validated Analytical Method
[2] Not a Validated Analytical Method
* Not a listed HAP.

TABLE 1.1-3: Targeted Semivolatile Compounds

COMPOUND (VALIDATED[1])	COMPOUND (NOT VALIDATED[2])
phenol	2-methylphenol*
naphthalene	dimethylphthalate
	dibenzofuran
	di-n-butylphthalate*
	bis(2-ethylhexy)phthalate

[1] Validated Analytical Method
[2] Not a Validated Analytical Method
* Not a listed HAP.

1.2 TEST PROGRAM PERSONNEL

The key personnel who coordinated the test program and their phone numbers are:

- ETS, Inc., Project Manager, Ted Handel 703/265-0004
- EIB Technical Coordinator, Ron Myers 919/541-5407
- EMB Field Test Coordinator, John Brown 919/541-0200
- General Shale Contact, Dave McNees 615/282-4661
- MRI Process Monitor, Bryan Schrager 919/677-0249

2.0 PROCESS DESCRIPTION AND SAMPLING LOCATIONS

The Johnson City Brick Plant is located in Johnson City, Tennessee and is also known as General Shale Plant Number 10. The plant encompasses approximately 100 acres and is adjacent to the General Shale mines No.1, No.12, and No.16. The Johnson City plant has an annual manufacturing capacity of 60 million bricks from its two tunnel-type kilns. The plant uses coal as a primary fuel. Natural gas is used as a secondary fuel and is added to the preheater section of the kiln in order to increase combustion efficiency. Ten to twelve percent of the heat provided to the kiln is from natural gas. Natural gas addition is also used during a "flash" cycle which is employed to achieve a darker brick surface. This "flashing" cycle occurs for approximately one minute out of every three.

Emissions from the following operations were studied:

(1) raw material crushing and screening operations.
(2) brick drying process within the kiln.
(3) brick firing process within the kiln.

2.1 Raw Material Crushing, Screening and Storage Operation

A simplified process schematic for the raw material crushing and screening operation is given in Figure 2.1-1.

The raw material (shale) is transported from the excavation area by dump truck where it is loaded into the primary crusher. The primary crusher consists of a single roll crusher where the large pieces of shale are initially broken apart. From the primary crusher, the crushed shale is transported via belt conveyor to the 384 pan grinder. From the pan grinder, the crushed shale is conveyed to a series of four 4' by 5' Leahy vibrating screens. The oversize material may be sent either back to the pan grinder or to a Pasco Claypactor. The Claypactor is a type of hammer mill which is used for final size reduction of the shale. The material exiting the Claypactor is conveyed back to the Leahy vibrating screens. The undersized material from the screen is conveyed into the storage bins via a reciprocating belt conveyor. This material is kept in the storage bins until it is loaded into the brick making operations.

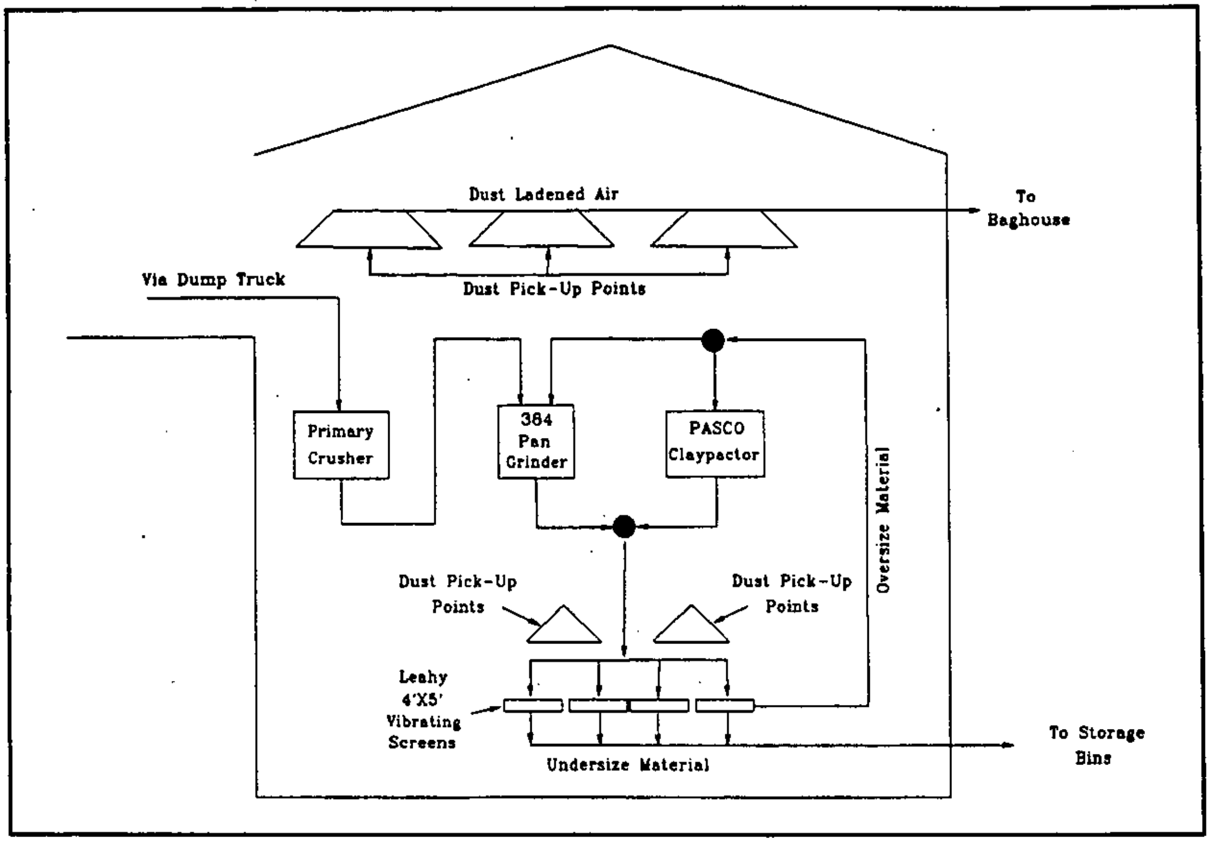


Figure 2.1-1: Schematic of the Crushing, Screening and Storage Operation.

Background ambient measurements of PM and PM_{10} were conducted outside the crushing and screening building. The ambient sampling for PM and PM_{10} was performed using Hi-Vol samplers to collect three sets of samples. The Hi-Vol sampling location was approximately 100 feet north of the crusher building overhead door as depicted in Figure 1.1-1

Particulate emissions from the size reduction and screening operation were measured at the following locations: (1) the baghouse outlet gas duct; (2) the baghouse particulate catch.

The PM and PM_{10} emissions of the crushing and screening building were measured at the baghouse outlet gas duct. All access doors except the shale loading door were closed during sampling. The discharge at the bottom of the baghouse was tested for total mass. Figure 2.1-2 presents a schematic of the baghouse duct sampling locations. In addition, process material was sampled at the crushing and screening building for sieve and moisture analyses.

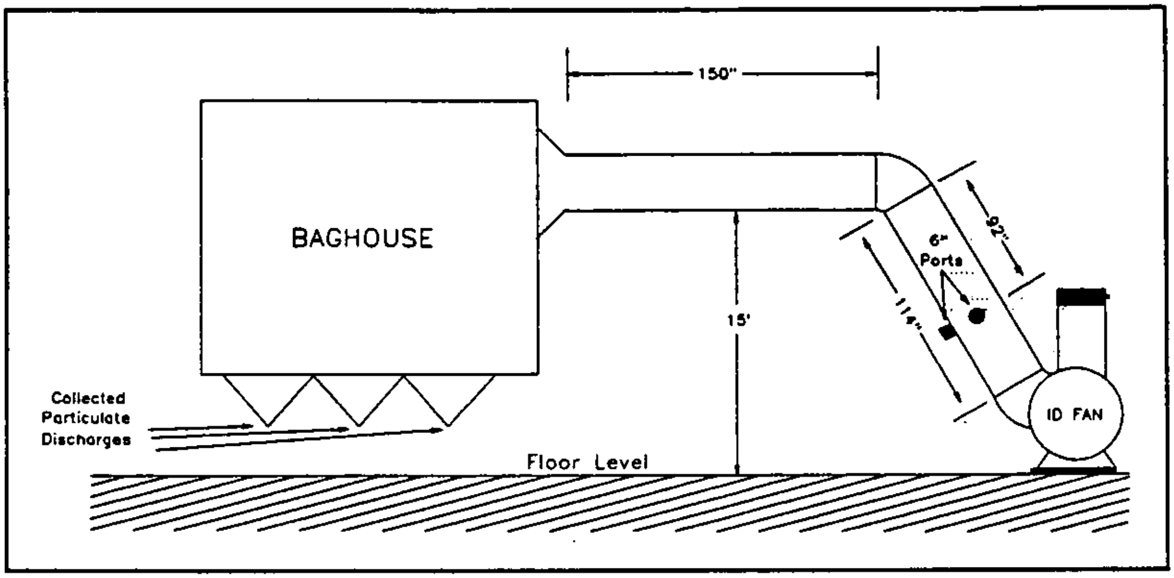


Figure 2.1-2: Schematic of Baghouse Ducting and Sampling Locations for Johnson City Brick Plant.

2.2 Mixing and Extrusion Operation

The sized shale granules are removed from the storage bins and transported on the mill room feed belt conveyor to the texture mixing area. The granules are off-loaded into two feed hoppers that service twin lines of brick extruding equipment. The extruding equipment for each line consists of a J.C. Steele pug sealer and a J.C. Steele extruder. Water and sand are mixed with the shale granules in the extruders to form a thick paste. The paste is extruded in rectangular form and the bricks are then cut to size. The unfired bricks are then conveyed to a setter or are hand set on the kiln cars. After setting, the bricks are transferred to the predryer.

2.3 Kiln Operation

The Johnson City plant has two tunnel kilns labeled A and B. Each kiln is separated into four sections:

(1) the predryer.
(2) the dryer.
(3) the combustion zone.
(4) the cooling zone.

Each kiln has two exhaust stacks. The dryer exhaust stack is located at the start of the dryer zone. It draws heated air from the cooling section located at the end of the tunnel kiln. A schematic of the sampling locations utilized at the dryer exhaust stack is presented in Figure 2.3-1.

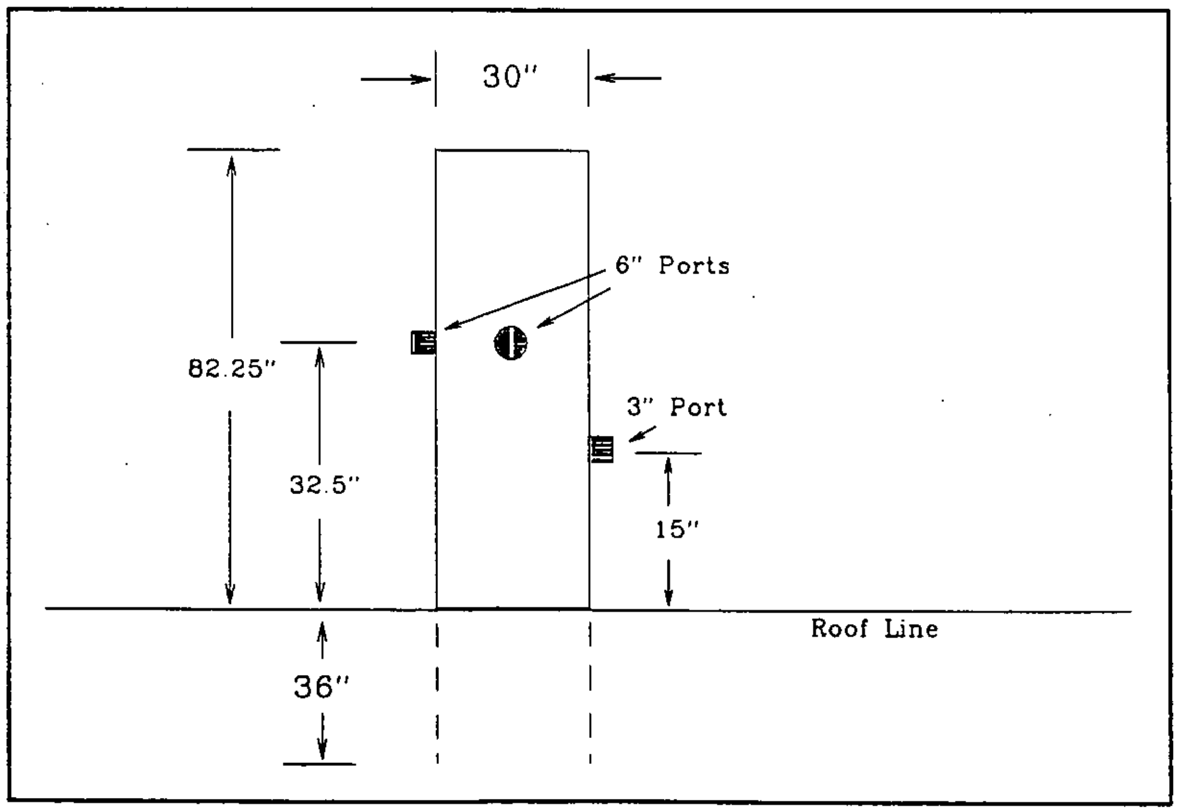


Figure 2.3-1: Schematic of Kiln A Dryer Exhaust Stack Sampling Locations.

The combustion zone exhaust stack is located at the beginning of the combustion zone and draws air through the combustion zone. The stack is rectangular in shape and measured 24" x 25". Figure 2.3-2 displays a schematic of the sampling locations for the kiln combustion zone exhaust stack.

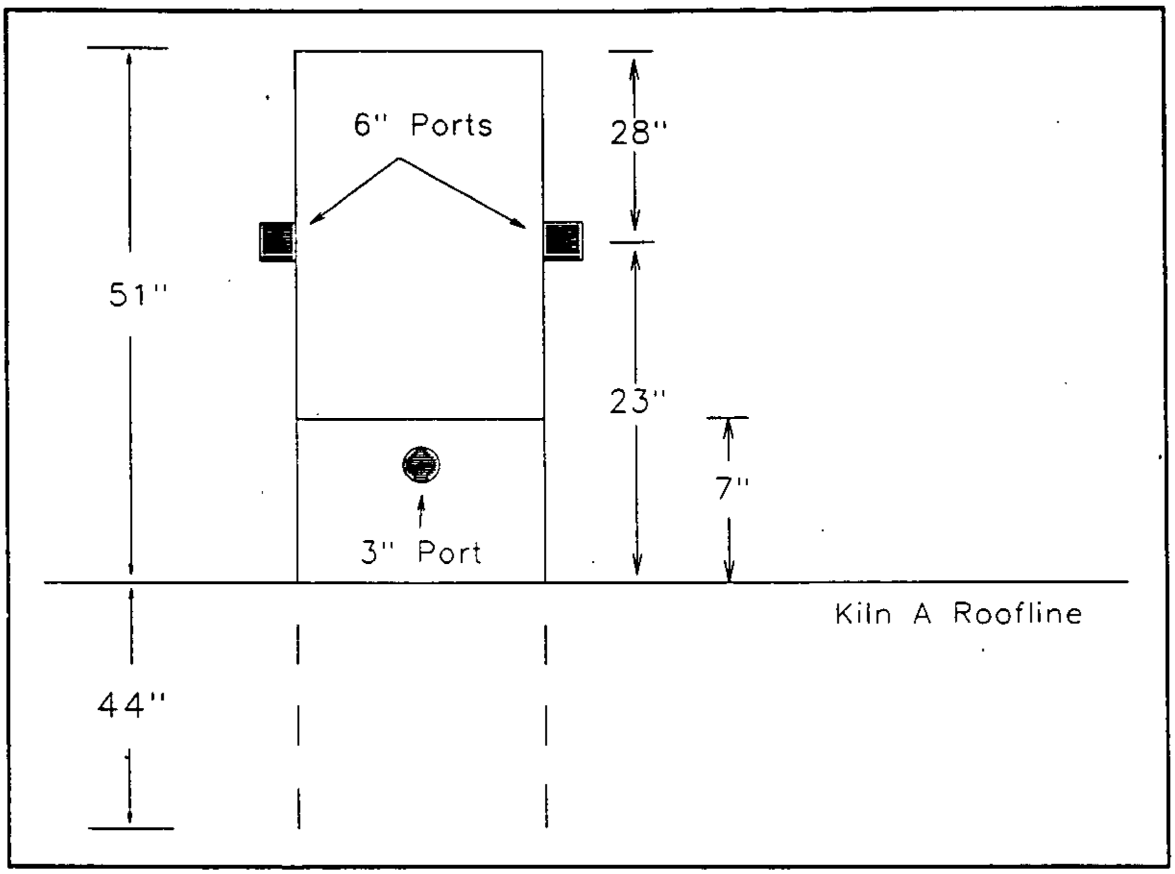


Figure 2.3-2: Schematic of Kiln A Combustion Zone Exhaust Stack Sampling Locations.

2.4 Pollution Control Description

The air pollution control equipment at the Johnson City plant consists of a pulse-jet type baghouse that services the crushing, screening and storage building. The baghouse is a Wheelabrator-Frye Ultra-Jet Aire Filter No. 115/Model 108 that has the following operating parameters:

- Gas Volume (acfm): 17,000
- Gas Temperature: Ambient
- Gas to Cloth Ratio: 8.02
- Flange to Flange Pressure Drop (W.G.): 7-inches
- Tubesheet Pressure Drop (W.G.): 6-inches
- Number of Cells: 5
- Number of Bags per Cell: 30
- Bag-Type: 16-oz. Polyester, Double-Density felt bags.
- Bag-Dimensions: 6-inches I.D. by 108-inches long.
- Cleaning Cycle: 75 seconds

3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 Objectives and Test Matrix

The purpose of the test program is to develop emission factors for the brick manufacturing industry.

The specific objectives of the test program for the Johnson City Brick Plant were:

(1) Measure the following emissions for the crushing, grinding, and storage operation:

- Particulate Matter
- PM_{10}

(2) Measure the following emissions for the kiln at the dryer exhaust stack:

- Total Hydrocarbons
- Methane
- Ethane

(3) Measure the following emissions for the kiln at the brick-firing exhaust stack:

- Particulate Matter
- PM_{10}
- Condensible Particulate Matter
- Multiple Metals
- Hydrogen Fluoride
- Carbon Monoxide
- Nitrogen Oxides
- Total Hydrocarbons
- Methane
- Ethane
- Volatile Organics
- Semivolatile Organics

3.2 Test Matrix

Table 3.2-1 presents an overview of the sampling and analytical matrix for measuring emissions from the Johnson City Brick Plant. A more detailed delineation of the source test program is contained in the field test log in Appendix A of this report.

TABLE 3.2-1: Overview of Test Program for Johnson City Brick Plant.

LOCATION	SAMPLING METHOD	TEST PARAMETER(S)	DATE(S) TESTED
Baghouse Outlet	EPA Method 201A	PM/PM10	07/27/93
Outside of Crushing & Screening Bldg.	Ambient Hi-Vol	Background PM, PM10	07/27/93
Storage Bldg.	Grab	Sieve, Moisture	
Baghouse Catch	Grab	PM	07/27/93
Kiln A Dryer Stack	EPA Methods 1-4	Velocity, Moisture, Gas Flowrate	07/28/93
Kiln A Dryer Stack	EPA Method 25A	Total Hydrocarbons	07/28/93
Kiln A Dryer Stack	Modified Meth. 25A	Methane/Ethane	07/28/93
Kiln Combustion Exhaust	Method 0010	Semivolatiles	07/29-30/93
Kiln Combustion Exhaust	Modified Meth. 25A	Methane/Ethane	07/29-30/93
Kiln Combustion Exhaust	EPA Method 25A	Total Hydrocarbons	07/29-30/93
Kiln Combustion Exhaust	EPA Method 26	Hydrogen Fluoride	07/30-31/93
Kiln Combustion Exhaust	Method 0030	Volatile Organic Compounds	07/29-30/93
Kiln Combustion Exhaust	EPA Method 29	Multiple Metals/PM	07/30-31/93
Kiln Combustion Exhaust	EPA Method 7E	Nitrogen Oxides	07/30-31/93
Kiln Combustion Exhaust	Modified Meth. 10	Carbon Monoxide	07/30-31/93
Kiln Combustion Exhaust	Methods 201A/202	PM/PM10 and Condensible PM	07/31/93
Kiln Coal and Shale	Grab	Elements, Ash, moisture	07/27/93

3.3 Field Test Changes, Problems, and Comments

3.3.1 Kiln Combustion Exhaust Stack:

3.3.3.1 Continuous Emissions Monitoring: The continuous emissions monitoring for total hydrocarbons revealed a steady decline in THC concentrations from the first test run on July 29, 1993. However, the concentration of ethane and methane remained relatively consistent during this time period. The THC concentration measurements were continued beyond the three valid EPA Method 25A test runs to evaluate the trend in THC concentrations. It should be noted that the THC concentrations remained at a low level for the extended test period subsequent to the Method 25A test runs. All Method 25A CEM data for the kiln combustion exhaust is contained in Appendix D.1.4 of this report.

The oxygen CEM during test run 3 of Method 201A/202 testing at the Kiln Combustion Exhaust (KCE-M202A/202-R3) exceeded the calibration drift limit of 3.0% as stated in 40 CFR 60 Appendix A. System calibration drift was 11.68% at the zero span for this run. However, the datum was adjusted to account for calibration drift.

3.4 Summary of Results

3.4.1 Crushing, Screening, and Storage Operation Sampling

3.4.1.1 Ambient Sampling: Ambient particulate sampling was conducted in order to determine background particulate concentrations surrounding the crushing and screening building. In order to determine particulate emission rates from the grinding building, it is important to have a measure of the particulate concentrations of the ambient air. Ambient PM and PM_{10} measurements were made at the crushing, grinding, and screening operation coinciding with source testing at the baghouse outlet for particulates. Table 3.4.1-1 presents the average PM and PM_{10} concentrations measured. The field and laboratory data for the ambient monitoring is contained in Appendix B.3.

TABLE 3.4.1-1: Summary of Ambient Hi-Vol Sampling for TSP and PM_{10} at the Johnson City Brick Plant.

	Run 1	Run 2	Run 3	Average
<u>TSP</u>:				
Date	07/27/93	07/27/93	07/27/93	
Start Time	07:41	10:45	14:12	
End Time	10:38	14:06	17:08	
Average Flow - scfm	39.9	40.1	41.3	
TSP Conc. - ug/m^3	202.1	161.8	133.0	165.6
<u>PM_{10}</u>:				
Date	07/27/93	07/27/93	07/27/93	
Start Time	07:28	10:37	14:00	
End Time	10:25	13:55	17:04	
Average Flow - scfm	39.6	39.4	40.7	
PM_{10} Conc. - ug/m^3	159.3	106.4	103.3	123.0
<u>Percentage PM_{10}</u>	78.8	65.8	77.7	74.1

3.4.1.2 <u>Particulate and PM_{10} Emissions at the Baghouse Outlet</u>: Sampling for total filterable particulate and 10 micron or smaller particulate was conducted using EPA Method 201A. The total particulate emissions, including TSP and PM_{10}, averaged 0.00345 grains per dry standard cubic feet (gr/dscf) with a range of 0.00164 to 0.00444 gr/dscf. The PM_{10} emissions averaged 0.00237 gr/dscf with a range of 0.00123 to 0.00352 gr/dscf. On average, PM_{10} constituted 71% of the total particulate matter. The PM_{10} percentage of total particulate for Run 3, 49.9%, is anomalous compared to the first two runs. Table 3.4.1-2 presents a summary of the Method 201A test program. Detailed data and results for each Method 201A test run are contained in Appendix B.1.

In addition to the PM measured during the Method 201A testing at the baghouse outlet stack, the PM of the baghouse catch was sampled. The results from this testing are contained in Appendix B.2. The total particulate loading may be estimated by combining the total PM from the Method 201A testing and the particulate measured from the baghouse catch.

TABLE 3.4.1-2: Summary of Baghouse Outlet Particulate Emissions

RUN I.D.	BO-M201A-R1	BO-M201A-R2	BO-M201A-R3	AVERAGE
DATE	07/27/93	07/27/93	07/27/93	
TIME STARTED	09:04	10:55	13:05	
TIME ENDED	10:17	12:18	14:36	
<u>SAMPLING PARAMETERS</u>				
Metered Volume - dcf	29.664	37.423	42.414	36.039
Corrected Volume - dscf	29.363	35.918	40.152	34.758
Total Test Time - min	66	81	90	78.0
% Isokinetics	103.9	108.6	99.3	101.6
D50	9.71	9.63	9.54	9.62
<u>GAS PARAMETERS</u>				
Gas Temperature - oF	76.1	81.0	86.8	81.4
Oxygen - %	20.8	20.8	20.8	20.8
Carbon Dioxide - %	0.1	0.1	0.1	0.1
Moisture - %	1.76	2.91	3.51	2.6
<u>GAS FLOWRATE</u>				
Velocity - ft/sec	51.28	49.93	46.37	48.83
Actual Volume - acfm	19401	18887	17540	18471
Standard Volume - dscfm	18418	17559	16034	17226
<u>PM10 EMISSIONS</u>				
Concentration - gr/dscf	3.52E-03	1.36E-03	1.23E-03	2.37E-03
Mass Rate - lb/hr	0.556	0.205	0.168	0.362
<u>PM> 10μ EMISSIONS</u>				
Concentration - gr/dscf	9.16E-04	2.76E-04	1.23E-03	1.07E-03
Mass Rate - lb/hr	0.145	0.042	0.169	0.157
<u>TOTAL PM</u>				
Concentration - gr/dscf	4.44E-03	1.64E-03	2.46E-03	3.45E-03
Mass Rate - lb/hr	0.700	0.247	0.338	0.519
<u>PERCENT AS PM_{10}</u>	79.4	83.1	49.9	70.8

3.4.1.3 Process Sampling: Process samples of the shale and clay were collected from the crushing and screening operations and analyzed for sieve and moisture analyses. Table 3.4.1-3 contains a summary of the sieve analyses. Additional information regarding the sieve and moisture analyses is contained in Appendix B.3. The sieve analysis was consistent for two of the three samples. The third sample sieve analysis revealed an overall smaller mean particulate diameter. The two consistent samples had an average of 60.1% particles less than 18 mesh or 1000 microns. The third sample contained 73.6% particles less than 18 mesh. The third sample contained a larger percentage of smaller particles down to 35 mesh or 500 microns. The two consistent samples averaged 42.9% while the third sample contained 54.4% particles less than 35 mesh. The composition of particles less than 60 mesh is comparable for all three samples. Moisture analyses for the three samples ranged from 8.11% to 10.81%.

TABLE 3.4.1-3: Summary of Results for Sieve Analysis from Process Samples Collected at the Crushing and Screening Operation.

MESH SIZE	SIZE (Microns)	RUN 1 Percent Less Than	RUN 2 Percent Less Than	RUN 3 Percent Less Than
18 Mesh Sample	1000	58.47	61.82	73.56
20 Mesh Sample	850	43.45	56.80	68.73
25 Mesh Sample	710	48.67	51.94	63.60
30 Mesh Sample	600	44.82	47.91	58.82
35 Mesh Sample	500	41.67	44.07	54.39
60 Mesh Sample	250	30.36	32.05	37.75
80 Mesh Sample	180	26.45	27.77	30.90
100 Mesh Sample	150	24.82	26.20	27.53
200 Mesh Sample	75	16.24	18.42	16.70

3.4.2 Kiln A Dryer Stack Sampling

3.4.2.1 Total Hydrocarbons, Methane, and Ethane Emissions: Total hydrocarbon (THC) emissions were monitored instrumentally in accordance with procedures outlined in the Code of Federal Regulations, Title 40, Part 60 (40 CFR 60), Appendix A, Method 25A. EPA Methods 2 through 4 were conducted simultaneously with the Method 25A testing for flue gas flowrate determination. Methane and ethane were measured instrumentally by modifying the Method 25A sampling system. An activated charcoal filter was utilized to remove all hydrocarbons except methane and ethane from the gas sample prior to instrumental analysis. The methane and ethane concentrations were measured immediately before the

Method 25A test runs. Although the methane and ethane concentrations were not measured simultaneously with the THC concentrations, the two measurements are compared to determine the concentration of total gaseous non-methane organics (TGNMO). The three test runs measured consistent concentrations of THC and methane and ethane, averaging 0.324 lb/hr (as carbon) and 0.15 lb/hr (as carbon), respectively. Using the THC and methane/ethane emissions for each of the three test runs, the average TGNMO mass emissions equal 0.173 lb/hr (as carbon). Table 3.4.2-1 presents a summary of the THC, Methane and Ethane test results. Detailed data for the velocity and flowrate measurements are contained in Appendix C.1. The continuous emissions monitoring data for the Method 25A and Modified Method 25A testing are contained in Appendix C.3.

TABLE 3.4.2-1: Summary of Kiln A Dryer Exhaust Total Hydrocarbons, Methane, and Ethane Emissions

RUN I.D.	KAD-M1-4-R1	KAD-M1-4-R2	KAD-M1-4-R3	AVERAGE
DATE	07/28/93	07/28/93	07/28/93	
TIME STARTED	11:05	12:40	14:15	
TIME ENDED	12:05	13:40	15:15	
SAMPLING PARAMETERS				
Metered Volume - dcf	35.484	35.162	36.160	35.602
Corrected Volume - dscf	33.403	32.583	33.363	33.116
Total Test Time - min	60	60	60	60
GAS PARAMETERS				
Gas Temperature - oF	145.3	143.5	148.0	145.6
Oxygen - %	19.4	18.8	18.7	19.0
Carbon Dioxide - %	0.1	0.8	0.8	0.6
Moisture - %	6.69	6.10	6.84	6.54
GAS FLOWRATE				
Velocity - ft/sec	60.16	60.46	60.49	60.37
Actual Volume - acfm	17720	17806	17817	17781
Standard Volume - dscfm	14483	14689	14474	14549
THC EMISSIONS				
Conc. - ppmwv (as Propane)	3.72	3.58	3.82	3.71
Conc. - ppmdv (as Propane)	3.99	3.81	4.10	3.97
Conc. - ppmdv (as Carbon)	11.96	11.44	12.30	11.90
Mass Rate - lb/hr (as Carbon)	0.324	0.314	0.333	0.324
METHANE AND ETHANE EMISSIONS*				
Conc. - ppmwv (as Propane)	2.13	1.62	1.42	1.72
Conc. - ppmdv (as Propane)	2.28	1.73	1.52	1.84
Conc. - ppmdv (as Carbon)	6.85	5.18	4.57	5.53
Mass Rate - lb/hr (as Carbon)	0.186	0.142	0.124	0.150
TGNMO EMISSIONS				
Mass Rate - lb/hr (as Carbon)	0.138	0.172	0.209	0.173

* Methane/Ethane emissions are based on a 14-minute test conducted immediately prior to each THC test run.

3.4.3 Kiln Combustion Exhaust Stack Sampling

3.4.3.1 PM, PM_{10}, and CPM Emissions: Particulate emissions were measured at the kiln combustion exhaust stack using a combined Method 201A/202 approach to determine total filterable particulate, particulate less than 10 microns, and condensible particulate matter. In addition, total particulate was measured in combination with multiple metals using EPA Method 29.

The total particulate matter measured during Method 29 testing averaged 0.1253 gr/dscf at a mass emission rate of 4.67 lb/hr. All three runs measured relatively consistent particulate concentrations. Table 3.4.3-2 presents a summary of the Method 29 test program. More detailed data and results for each individual test run is contained in Appendix D.1.2 of this report.

The PM_{10} emissions measured during EPA Method 201A/202 testing averaged 0.085 gr/dscf at a mass emission rate of 3.14 lb/hr. The combined PM_{10} and particulate matter greater than 10 μ measured during the testing averaged 4.27 lb/hr. The condensible particulate matter (CPM) was measured utilizing Method 202. The CPM averaged 0.026 gr/dscf at a mass emission rate of 0.96 lb/hr. The CPM averaged 20.7% of total particulate emissions for the kiln combustion exhaust stack. Table 3.4.3-1 contains a summary of the Method 201A/202 test program which is presented in detail in Appendix D.1.1.

TABLE 3.4.3-1: Summary of the Kiln Combustion Exhaust PM, PM_{10}, and CPM Emissions

RUN I.D.	KCB-M201A/202-R1	KCB-M201A/202-R2	KCB-M201A/202-R3	AVERAGE
DATE	07/31/93	07/31/93	07/31/93	
TIME STARTED	11:45	14:07	16:49	
TIME ENDED	13:29	15:55	18:26	
<u>SAMPLING PARAMETERS</u>				
Metered Volume - dcf	41.126	44.103	36.054	38.590
Corrected Volume - dscf	39.685	42.171	34.080	36.882
Total Test Time - min	94	100	81.0	87.5
% Isokinetics	107.2	114.8	107.2	107.2
D50	9.47	9.52	9.39	9.43
<u>GAS PARAMETERS</u>				
Gas Temperature - oF	333.6	331.5	342.0	337.8
Oxygen - %	13.12	13.04	12.01	12.57
Carbon Dioxide - %	6.62	6.58	6.47	6.55
Moisture - %	10.25	9.76	11.43	10.84
<u>GAS FLOWRATE</u>				
Velocity - ft/sec	28.83	26.70	29.44	29.13
Actual Volume - acfm	7208	6675	7359	7284
Standard Volume - dscfm	4318	4030	4305	4311
<u>PM10 EMISSIONS</u>				
Concentration - gr/dscf	0.090	0.073	0.080	0.085
Mass Rate - lb/hr	3.323	2.517	2.958	3.141
<u>PM> 10 MICRON EMISSIONS</u>				
Concentration - gr/dscf	0.032	0.044	0.036	0.034
Mass Rate - lb/hr	1.171	1.529	1.334	1.252
<u>CPM EMISSIONS</u>				
Concentration - gr/dscf	0.024	0.042	0.028	0.026
Mass Rate - lb/hr	0.883	1.454	1.026	0.955
<u>TOTAL PM EMISSIONS</u>				
Concentration - gr/dscf	0.145	0.159	0.144	0.145
Mass Rate - lb/hr	5.378	5.500	5.318	5.348

3.4.3.2 <u>Trace Metals Emissions</u>: Trace metal sampling was performed together with total particulate sampling utilizing EPA Method 29. Table 3.4.3-2 presents a summary of the trace metal and total particulate test program. The trace metal emissions were in agreement within a factor of 2 of the mean from run to run. Samples were analyzed for antimony arsenic, beryllium cadmium, chromium, lead, manganese, mercury, nickel, phosphorus, and selenium. Detectable quantities of all the metals were detected in each of the sample runs. Detailed data and results for each Method 29 test run is provided in Appendix D.1.2.

TABLE 3.4.3-2: Summary of the Kiln Combustion Exhaust Multiple Metals and Total Particulate Emissions

RUN I.D.	KCE-M29-R1	KCE-M29-R2	KCE-M29-R3	AVERAGE
DATE	07/30/92	07/30/92	07/31/92	
TIME STARTED	12:28	15:12	09:05	
TIME ENDED	14:44	17:31	11:24	
SAMPLING PARAMETERS				
Metered Volume - dcf	73.243	74.772	72.554	73.523
Corrected Volume - dscf	70.904	72.097	71.292	71.431
Total Test Time - min	120	120	120	120
% Isokinetics	107.7	107.7	105.9	107.1
GAS PARAMETERS				
Gas Temperature - oF	334.0	336.5	336.0	335.5
Oxygen - %	13.16	12.86	13.10	13.04
Carbon Dioxide - %	6.53	6.34	6.62	6.49
Moisture - %	10.60	10.53	10.46	10.53
GAS FLOWRATE				
Velocity - ft/sec	28.83	29.40	29.49	29.24
Actual Volume - acfm	7208	7349	7373	7310
Standard Volume - dscf	4294	4368	4392	4351
PARTICULATE EMISSIONS				
Concentration - gr/dscf	0.1199	0.1229	0.1330	0.1253
Conc. - gr/dscf @ 7% O2	0.2153	0.2124	0.2370	0.2216
Mass Rate - lb/hr	4.41	4.60	5.01	4.67
METALS EMISSIONS - lb/hr				
Antimony	1.06E-04	8.74E-05	9.67E-05	9.65E-05
Arsenic	8.71E-04	9.01E-04	9.21E-04	8.98E-04
Beryllium	9.94E-05	1.07E-04	1.09E-04	1.05E-04
Cadmium	2.95E-05	2.37E-05	1.43E-05	2.25E-05
Chromium	4.97E-04	5.16E-04	5.69E-04	5.27E-04
Lead	6.13E-04	6.27E-04	5.08E-04	5.83E-04
Manganese	3.27E-04	3.11E-04	3.10E-04	3.16E-04
Mercury	6.77E-04	6.03E-04	6.69E-04	6.50E-04
Nickel	1.07E-03	1.12E-03	1.30E-03	1.16E-03
Phosphorus	3.62E-03	3.61E-03	3.84E-03	3.69E-03
Selenium	2.98E-03	2.89E-03	3.41E-03	3.09E-03

3.4.3.3 NO$_x$ and CO Emissions: Nitrogen oxide and carbon monoxide emissions were monitored instrumentally during the EPA Method 29 multiple metals and total particulate testing. Nitrogen oxide emissions were measured in conjunction with EPA Method 7E. The NO$_x$ concentration averaged 154.03 ppmdv with a mass emission rate of 4.80 lb/hr. Carbon monoxide emissions were measured utilizing a modified EPA Method 10 technique. The CO concentration average 322.92 ppmdv with a mass emission rate of 6.13 lb/hr. Table 3.4.3-3 presents a summary of the NO$_x$ and CO emissions. Detailed continuous emissions monitoring data is contained in Appendix D.1.7.

TABLE 3.4.3-3: Summary of the Kiln Combustion Exhaust NO$_x$ and CO Emissions.

RUN I.D.	KCE-M7E/10B-R1	KCE-M7E/10B-R2	KCE-M7E/10B-R3	AVERAGE
DATE	07/30/93	07/30/93	07/31/93	
TIME STARTED	12:29	15:12	09:05	
TIME ENDED	14:44	17:31	11:24	
GAS PARAMETERS*				
Gas Temperature - oF	334.0	336.5	336.0	335.5
Oxygen - %	13.16	12.86	13.10	13.04
Carbon Dioxide - %	6.53	6.34	6.62	6.50
Moisture - %	10.60	10.53	10.46	10.53
GAS FLOWRATE*				
Velocity - ft/sec	28.83	29.40	29.49	29.24
Actual Volume - acfm	7208	7349	7373	7310
Standard Volume - dscfm	4294	4368	4392	4351
CO EMISSIONS				
Concentration - ppmdv	318.26	326.21	324.30	322.92
Mass Rate - lb/hr	5.96	6.21	6.21	6.13
NOx EMISSIONS				
Concentration - ppmdv	160.36	145.17	156.55	154.03
Mass Rate - lb/hr (as NO2)	4.93	4.54	4.93	4.80

* Gas parameters and gas flowrate data were taken from EPA Method 29 testing which was conducted concurrently.

3.4.3.4 Hydrogen Fluoride Emissions: Hydrogen fluoride sampling was conducted using EPA Method 26. The concentration of hydrogen fluoride averaged 110.1 ppmdv @ 7% O_2 at a mass emission rate of 0.85 lb/hr. The hydrogen fluoride emissions were consistent for two of the three test runs. The third run of the Method 26 testing (KCE-M26-R3) measured a hydrogen fluoride concentration greater than 2 times that of the next highest HF measurement. Table 3.4.3-4 displays the results of the hydrogen fluoride testing. Detailed hydrogen fluoride sampling data and analytical results are contained in Appendices D.2.3 and D.3.3, respectively.

TABLE 3.4.3-4: Data and Results for Kiln Combustion Exhaust Hydrogen Fluoride Testing.

RUN NUMBER	KCE-M26-R1	KCE-M26-R2	KCE-M26-R3	AVERAGE
DATE	07/30/93	07/30/93	07/31/93	
START TIME	12:28	15:12	09:05	
END TIME	14:44	17:31	11:24	
SAMPLING DATA				
Initial Meter Volume - l	934.790	1175.340	1420.070	1176.733
Final Meter Volume - l	1175.070	1415.970	1664.410	1418.483
Net Meter Volume - l	240.280	240.630	244.340	241.750
Average Meter Temp. - F	112.1	116.6	106.5	111.8
Barometric Pres. - in.Hg	29.97	29.97	30.00	29.98
Avg. Meter Pres. - in.W.C.	2.4	2.4	2.4	2.4
Meter Cal. Factor - Gamma	0.9985	0.9985	0.9985	
Corr. Meter Volume - dscf	7.875	7.825	8.096	7.932
Oxygen - %dv*	13.16	12.86	13.10	13.04
GAS FLOWRATE DATA*				
Velocity - ft/sec	28.83	29.40	29.49	29.24
Actual Volume - acfm	7208	7349	7373	7310
Standard Volume - dscfm	4294	4368	4392	4351
LABORATORY DATA				
Fluoride Analysis				
Total Liquid Volume - ml	73.0	68.0	80.0	73.7
Fluoride Conc. - mg/liter	74.0	106.0	259.0	146.3
HF EMISSIONS				
Concentration - ppmdv	30.672	41.188	114.439	62.099
Conc. - ppmdv @ 7% O2	55.082	71.208	203.935	110.075
Mass Rate - lb/hr	0.410	0.561	1.566	0.846

* Gas flowrate and oxygen content data were taken from EPA Method 29 testing which was conducted concurrently.

3.4.3.5 Total Hydrocarbons, Methane, and Ethane Emissions: Total hydrocarbon (THC) emissions were monitored instrumentally in accordance with procedures outlined in EPA Method 25A. Methane and ethane were measured instrumentally by modifying the Method 25A sampling system. An activated charcoal filter was utilized to remove all hydrocarbons except methane and ethane. The methane and ethane concentrations were measured before and after each of the Method 25A test runs. Although the methane and ethane concentrations were not measured simultaneously with the THC concentrations, the two measurements are compared to determine the concentration of total gaseous non-methane organics (TGNMO). Table 3.4.3-5 presents the results of the THC, methane and ethane emissions testing.

The THC emissions steadily declined during the Method 25A testing. The first Method 25A test run (KCE-M25A-R1) measured an average mass rate of 1.21 lb/hr reported as carbon. The second and third runs (KCE-M25A-R2 and KCE-M25A-R3) averaged 0.68 lb/hr and 0.36 lb/hr (as carbon), respectively. However, the concentration of ethane and methane remained relatively constant during the testing, averaging a mass emission rate of 0.55 lb/hr (as carbon). The average TGNMO mass emission rate was 0.4 lb/hr.

The THC concentration measurements were continued beyond the three valid EPA Method 25A test runs to evaluate the trend in THC concentrations. All continuous emissions monitoring data are contained in Appendix D.1.4.

TABLE 3.4.3-5: Summary of the Kiln Combustion Exhaust THC and Methane and Ethane Emissions.

RUN I.D.	KCE-M25A-R1	KCE-M25A-R2	KCE-M25A-R3	AVERAGE
DATE	07/29/93	07/29/93	07/29/93	
TIME STARTED	08:48	11:38	14:26	
TIME ENDED	10:48	13:38	15:26	
GAS PARAMETERS*				
Gas Temperature - oF	327.5	327.5	336.1	330.4
Oxygen - %	15.9	15.9	14.7	15.5
Carbon Dioxide - %	4.5	4.5	5.6	4.9
Moisture - %	9.58	9.58	8.36	9.17
GAS FLOWRATE*				
Velocity - ft/sec	29.52	29.52	28.79	29.28
Actual Volume - acfm	7381	7381	7198	7198
Standard Volume - dscfm	4488	4488	4388	4455
THC EMISSIONS				
Conc. - ppmwv (as Propane)	43.50	24.45	13.27	27.07
Conc. - ppmdv (as Propane)	48.11	27.04	14.48	29.88
Conc. - ppmdv (as Carbon)	144.33	81.12	43.44	89.63
Mass Rate - lb/hr (as Carbon)	1.21	0.68	0.36	0.75
METHANE/ETHANE EMISSIONS**				
Conc. - ppmwv (as Propane)	20.98	18.11	20.39	19.83
Conc. - ppmdv (as Propane)	23.20	20.03	22.25	21.83
Conc. - ppmdv (as Carbon)	69.61	60.09	66.75	65.48
Mass Rate - lb/hr (as Carbon)	0.584	0.504	0.548	0.545
TGNMO EMISSIONS				
Mass Rate - lb/hr (as Carbon)	0.626	0.176	-----	0.401

* Gas parameters and gas flowrate data are taken from KCE-M0010-R1 for M25A runs 1 and 2 and KCE-M0010-R2 for M25A run 3.

** Methane/Ethane emissions are calculated from the average of two 14-minute tests; one conducted prior to and one conducted after each of the individual M25A test runs.

3.4.3.6 <u>VOC Emissions</u>: Volatile organic compounds (VOC) emissions were sampled using Method 0030 targeting the compounds identified in Table 1.1-2. In addition, the samples were analyzed for the Method 8240, Table 2 list of volatile compounds. Detectable quantities of bromomethane, methylene chloride, trichlorofluoromethane, 1,1,1-trichloroethane, ethylbenzene, m-/p-xylene, and o-xylene were found in one or more of the sample runs. Table 3.4.3-6 contains a summary of the detailed information contained in Appendix D.1.5.

TABLE 3.4.3-6: Summary of the Kiln Combustion Exhaust Stack Targeted VOC Emissions.

RUN I.D.	KCE-M0030-R1	KCE-M0030-R2	KCE-M0030-R3	AVERAGE[1]
DATE	07/29/93	07/29/93	07/29/93	
START TIME	09:23	14:12	08:15	
END TIME	12:50	17:49	11:33	
<u>POLLUTANT CONCENTRATION - lb/hr</u>				
Chloromethane	* 6.85E-04	< 6.29E-04	* 1.11E-03	< 8.09E-04
Bromomethane	1.45E-04	1.56E-04	1.69E-04	1.57E-04
Trichlorofluoromethane	4.54E-05	* 2.29E-05	* 1.99E-04	* 8.90E-05
Carbon disulfide	< 6.52E-07	* 2.21E-05	* 2.25E-05	* 1.51E-05
Acetone	* 6.09E-03	* 2.58E-03	* 4.78E-03	* 4.49E-03
Methylene chloride	1.57E-05	0.00E+00	0.00E+00	5.24E-06
Chloroform	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
Vinyl acetate	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
2-Butanone	* 1.89E-03	* 1.72E-03	* 1.34E-03	* 1.65E-03
1,1,1-Trichloroethane	< 6.52E-07	< 6.63E-07	< 3.37E-04	< 1.13E-04
Carbon tetrachloride	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
Benzene	* 1.97E-03	* 1.87E-03	* 1.84E-03	* 1.89E-03
Trichloroethene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
Toluene	* 2.05E-03	* 1.55E-03	* 1.33E-03	* 1.64E-03
Tetrachloroethene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
2-Hexanone	< 5.22E-06	< 5.52E-06	< 5.50E-06	< 5.41E-06
Ethylbenzene	1.77E-04	1.23E-04	1.17E-04	1.39E-04
m-/p-Xylene	* 1.20E-03	7.94E-04	6.07E-04	* 8.66E-04
o-Xylene	4.11E-04	2.78E-04	2.37E-04	3.09E-04
Styrene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07

1 The emission values for each run represent the average of two pairs of VOST tube analyses. See Appendix D.1.5 for more detailed test results.
< Not detected.
* Detected but below the quantitation limit; quantity is estimated.

3.4.3.7 SVOC Emissions: Semi-volatile compounds (SVOC) were sampled utilizing Method 0010 targeting phenol, naphthalene, 2-methylphenol, dimethylphthalate, dibenzofuran, di-n-butylphthalate, and bis(2-ethylhexyl)phthalate. In addition, the samples were analyzed for the Method 8270, Table 2 list of semi-volatile compounds. Detectable quantities of phenol, naphthalene, di-n-butylphthalate, and bis(2-ethylhexyl)phthalate were found in one or more of the sample runs. Table 3.4.3-7 presents a summary of the Method 0010 test program. Detailed data and results for the SVOC testing are contained in Appendix D.1.6.

3.4.3.8 Coal and Shale Testing: Three samples of coal used to fire the kilns were collected and analyzed for moisture, ash content, carbon, hydrogen, sulfur, nitrogen, oxygen, and heat content (Btu/lb). In addition, shale samples were collected and analyzed for moisture and sulfur content. The data and results from the analyses are contained in Appendix E.O.

TABLE 3.4.3-7: Summary of the Kiln Combustion Exhaust Stack Targeted SVOC Emissions.

RUN I.D.	KCE-M0010-R1	KCE-M0010-R2	KCE-M0010-R3	AVERAGE
DATE	7/29/93	7/29/93	7/30/93	
TIME STARTED	08:43	14:12	08:15	
TIME ENDED	13:11	16:42	11:49	
SAMPLING PARAMETERS				
Metered Volume - dcf	150.256	117.294	120.078	129.209
Corrected Volume - dscf	142.521	109.693	115.462	122.559
Total Test Time - min	240	192	192	208
% Isokinetics	103.6	101.9	105.5	103.7
GAS PARAMETERS				
Gas Temperature - oF	327.5	336.1	332.8	332.1
Oxygen - %	15.9	14.7	10.1	13.6
Carbon Dioxide - %	4.5	5.6	9.6	6.6
Moisture - %	9.58	8.36	7.99	8.64
GAS FLOWRATE				
Velocity - ft/sec	29.52	28.79	29.06	29.12
Actual Volume - acfm	7381	7198	7264	7281
Standard Volume - dscfm	4488	4388	4461	4445
SEMIVOLATILE EMISSIONS (lb/hr)				
VALIDATED COMPOUNDS				
Phenol	0.00E+00	3.15E-04	3.93E-04	2.36E-04
Naphthalene	1.10E-04	0.00E+00	2.71E-05	4.56E-05
NOT VALIDATED COMPOUNDS				
2-Methylphenol	< 1.30E-05	< 1.48E-05	< 1.49E-05	< 1.42E-05
Dimethylphthalate	< 4.46E-06	< 5.56E-06	< 5.72E-06	< 5.25E-06
Dibenzofuran	< 3.83E-06	* 2.75E-06	< 4.91E-06	* 2.75E-06 [1]
Di-n-butylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	0.00E+00	1.88E-04	8.08E-04	3.32E-04

< Not detected
* Detected but below the quantitation limit; quantity is estimated
1 Average is composed of estimated values only; non-detected values are not included in the calculation of the average.

4.0 SAMPLING AND ANALYTICAL PROCEDURES FOR AMBIENT TESTING

4.1. <u>Ambient Particulate Matter (PM and PM_{10}) - Hi-Vol</u>: Ambient sampling of PM was conducted in accordance with 40 CFR 50 Appendix B. This method provides a measurement of the mass concentration of total suspended particulate matter in ambient air. Ambient sampling of PM_{10} was conducted in accordance with 40 CFR 50 Appendix J. The Hi-Vol samplers were used to establish background PM and PM_{10} concentrations at the site. The samplers operate by drawing a measured quantity of air through a tared filter.

4.2 <u>Sampler Setup and Calibration</u>: The ambient Hi-Vol PM and Hi-Vol PM_{10} samplers were collected at the sampling site. The samplers were secured to level platforms at least 2 meters above the surrounding terrain. The platform at the grinding building inlet location was constructed using industrial scaffolding. The samplers were located on raised platforms with extensions such that they were separated by a minimum of 2 meters. This assured separation minimized interference between the samplers.

The Hi-Vol samplers were calibrated on site. The samplers were calibrated by measuring the pressure drop across a certified calibrated orifice plate attached to the sampler inlet. A flow rate versus pressure drop calibration curve was generated for each sampler.

4.3 <u>Sampler Operation and Filter Recovery</u>: A pre-tared, numbered quartz filter was attached to the inlet screen of each sampler. Using the generated calibration curves, each sampler was adjusted to a predetermined flow rate. The samplers were operated for three distinct tests, each lasting approximately 3 hours. The sample times and flow rates were recorded in order to calculate the total air volume sampled.

At the completion of the each test, the filter was recovered by carefully removing it from the inlet sampler screen and folding it, exposed side in, and placing it in a labeled envelope for later gravimetric analysis. Prior to weighing, the filter was conditioned to a controlled temperature and humidity for at least 24 hours. Filters were inspected for tears or pinholes which, if present, will cause the filter to be voided. Filters were weighed to the nearest 0.1 mg.

5.0 SAMPLING AND ANALYTICAL PROCEDURES FOR SOURCE TESTING

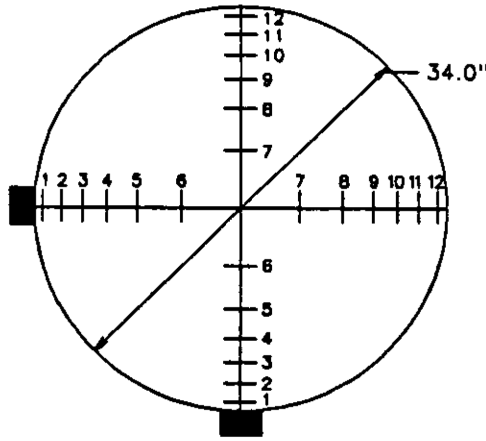
5.1.1 Sampling and Traverse Point Determination - EPA Method 1

EPA Method 1 procedures are used to determine suitability of test locations and to calculate the sampling and traverse points for each location. The results of EPA Method 1 analysis for each sampling location are provided in the following sections.

5.1.1.1 Sampling and Traverse Points for the Baghouse Outlet Stack: Figure 5.1.1-1 presents a schematic of the sampling and traverse points used at the baghouse outlet stack location. A total of 24 points (12 points for each of two ports) were utilized for all pollutant and gas flowrate measurements.

5.1.1.2 Sampling and Traverse Points for the Kiln A Dryer Stack: A total of 24 points (12 points for each of two ports) were utilized for all gas flowrate measurements at the Kiln Dryer Stack location. Figure 5.1.1-2 displays a schematic of the traverse points used to measure flue gas velocity, temperature, moisture.

5.1.1.3 Sampling and Traverse Points for the Kiln Combustion Exhaust Stack: A total of 24 points (6 for each of 4 ports) were utilized for all pollutant and gas flowrate measurements at the kiln combustion exhaust stack location. Figure 5.1.1-3 presents a schematic of the sampling and traverse point locations.

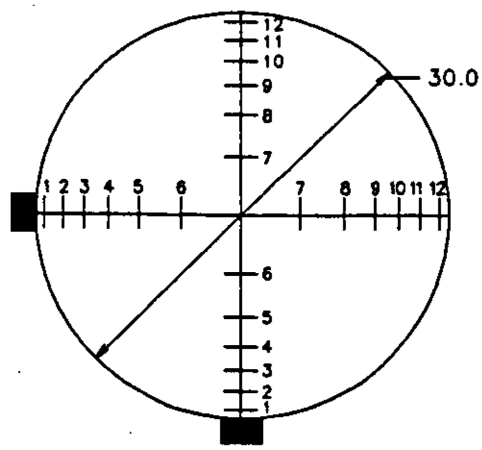


POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	2.1	1.00*
2	6.7	2.28
3	11.8	4.01
4	17.7	6.02
5	25.0	8.50
6	35.6	12.10
7	64.4	21.90
8	75.0	25.50
9	82.3	27.98
10	88.2	29.99
11	93.3	31.72
12	97.9	33.00*

* Points moved 1-inch away from stack wall.

INSIDE STACK DIAMETER	34 in	2.83 ft
DISTANCE UPSTREAM FROM DISTURBANCE	92 in	2.7 DIA
DISTANCE DOWNSTREAM FROM DISTURBANCE	22 in	0.6 DIA

Figure 5.1.1-1: Baghouse duct sampling and traverse point locations.



POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	2.1	1.00*
2	6.7	2.01
3	11.8	3.54
4	17.7	5.22
5	25.0	7.50
6	35.6	10.68
7	64.4	19.32
8	75.0	22.50
9	82.3	24.69
10	88.2	26.46
11	93.3	27.99
12	97.9	29.00 *

* Points moved 1-inch away from stack wall.

INSIDE STACK DIAMETER	30 in	2.5 ft
DISTANCE UPSTREAM FROM DISTURBANCE	68.5 in	2.3 DIA
DISTANCE DOWNSTREAM FROM DISTURBANCE	49.8 in	1.7 DIA

Figure 5.1.1-2: **Dryer Exhaust Stack Sampling and Traverse Point Locations.**

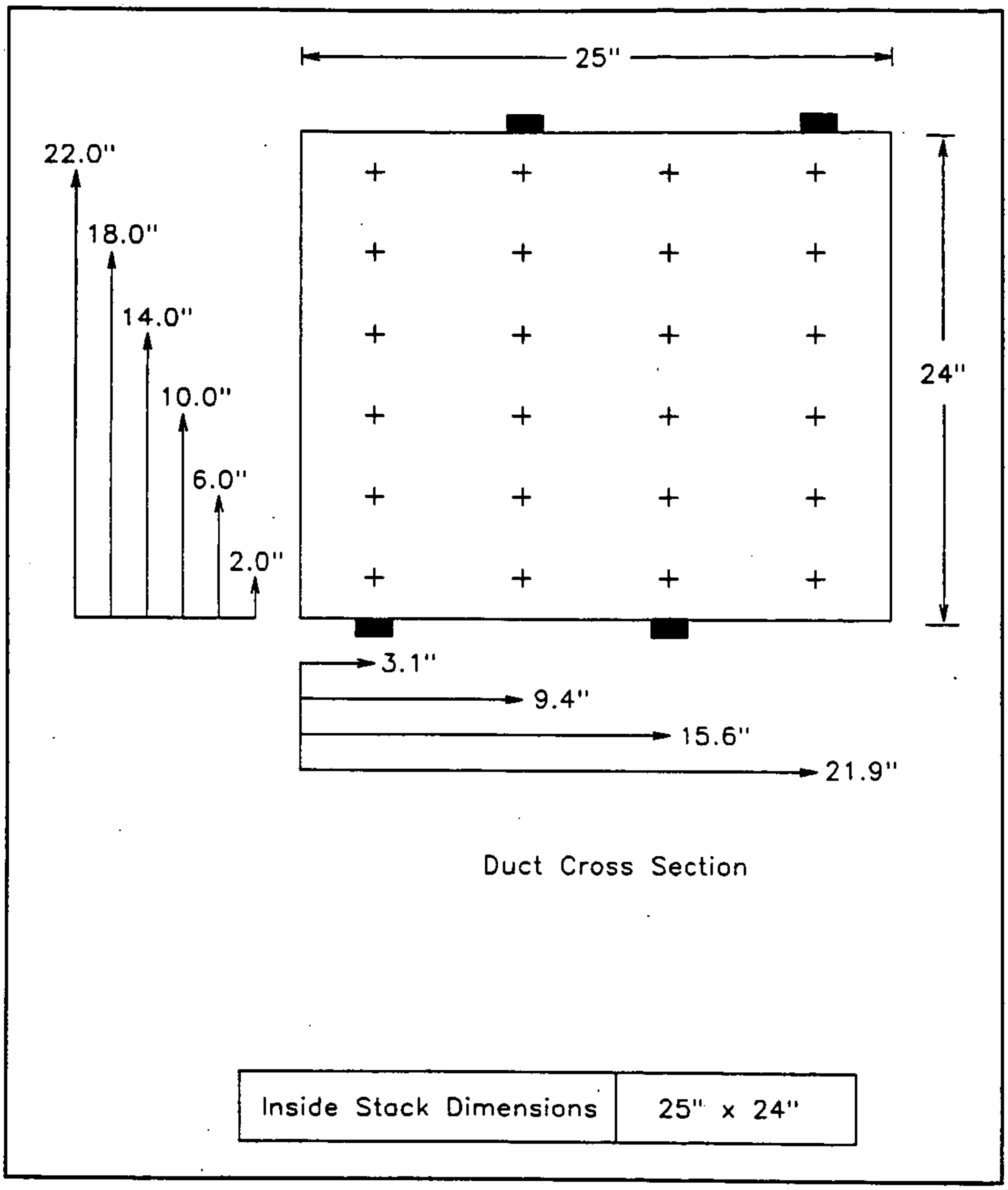


Figure 5.1.1-3: **Kiln A Combustion Zone Exhaust Stack Sampling and Traverse Point Locations.**

5.1.2 Volumetric Measurements - EPA Method 2: EPA Reference Method 2 was used to measure the gas velocity in order to determine volumetric flow rates of the stack gases. Stainless steel Type-S pitot tubes were used to measure the gas velocity heads. The pitot tubes were calibrated against a NBS traceable pitot tube in accordance with Method 2 procedures. Calibrated Type-K thermocouples were used to determine stack gas temperatures. Velocity and temperature measurements were made at each of the traverse points determined by EPA Method 1.

5.1.3 Molecular Weight Determination - EPA Method 3 and 3A: Gas compositional measurements (O_2 and CO_2) for determining the average molecular weight of the stack gases were performed using procedures of EPA Method 3 at the baghouse outlet and kiln A dryer exhaust test locations. EPA Method 3 procedures were also utilized at the kiln combustion exhaust stack during Method 0010 testing for SVOC. Multi-point, integrated sampling was used to obtain a constant rate sample of flue gas concurrent with pollutant testing. Sampling was of the same duration (except purges following port changes) as the pollutant runs.

A stainless steel probe was affixed to the pollutant sampling probe for this purpose. A peristaltic pump, delivering 500 to 750 Ml/min of flue gas, was used to fill a Tedlar bag. Moisture was removed from the sample gas by means of an air-cooled condenser located prior to the pump. Figure 5.1.3-1 shows a schematic of the Method 3 sampling train.

EPA Method 3A procedures were followed for measuring flue gas composition at the kiln combustion exhaust stack for all testing except SVOC. Method 3A involves measuring gas composition (O_2 and CO_2) instrumentally. Sampling was conducted concurrent with pollutant testing with integrated gas samples as part of the continuous emissions monitoring system.

5.1.4 Flue Gas Moisture Content - EPA Method 4: The flue gas moisture content was measured in conjunction with each of the pollutant tests according to the sampling and analytical procedures outlined in EPA Method 4. The flue gas moisture for each test was determined by gravimetric analyses of the water collected in the impinger train. All impingers were contained in an ice bath during the testing in order to assure complete moisture condensation of the sampled flue gas. Any moisture which was not condensed in the impingers was captured in the silica gel contained in the final impinger.

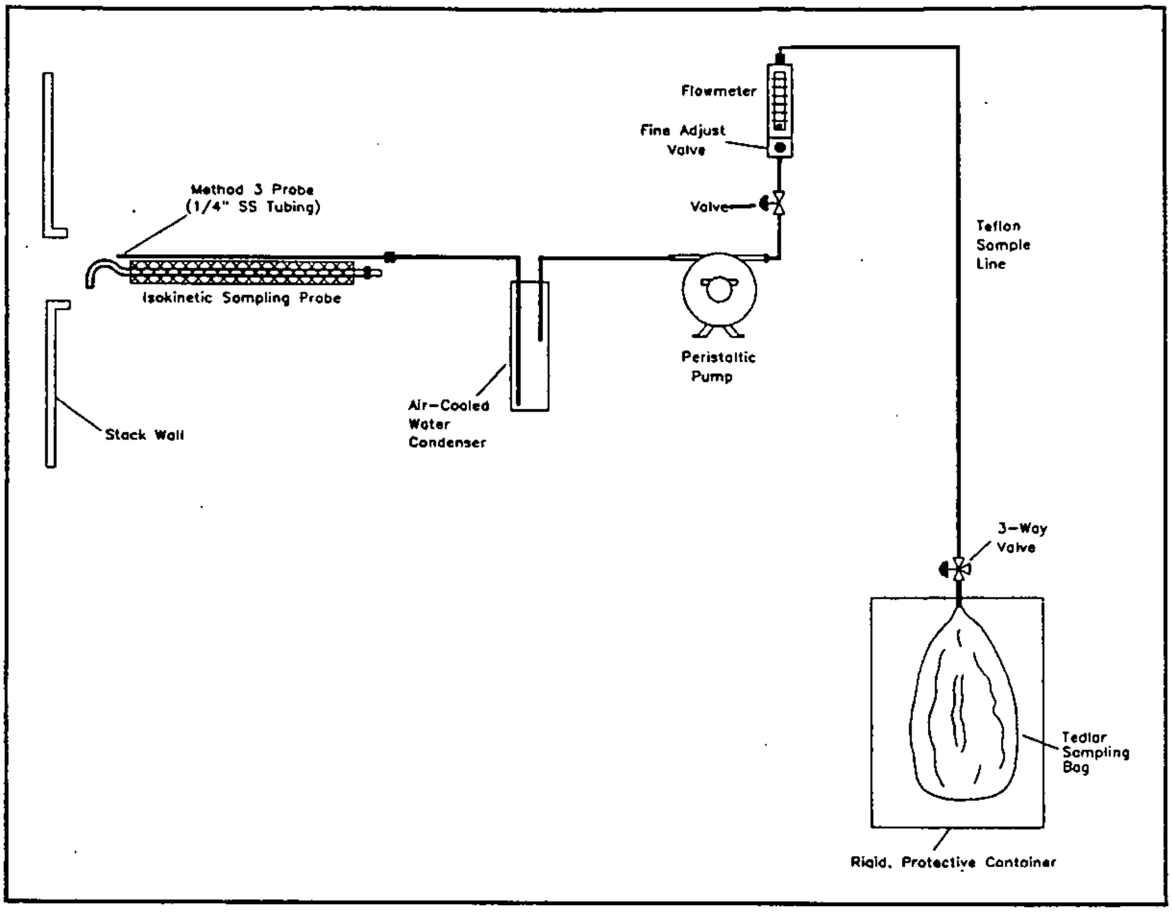


Figure 5.1.3-1: EPA Method 3 Sampling Train

5.1.5 <u>PM and PM_{10} Sampling - EPA Method 201A</u>: EPA Method 201A was used for determination of PM and PM_{10} emissions from the baghouse outlet and the kiln combustion zone exhaust. This procedure utilized an in-stack PM_{10} sizing device and an in-stack filter in conjunction with an EPA Method 17 train. Gravimetric analyses were performed as described by EPA Method 5.

5.1.5.1 <u>Sampling Train Descriptions</u>: The Method 201A train consisted of a cyclone followed by a 47 mm diameter glass fiber (Gelman) filter. These in-stack components were attached to an unheated stainless steel probe. The Method 201A sampling train is shown in Figure 5.1.5-1. The stack gases were drawn through the cyclone where a portion of the airborne particulate is separated before it passes through a Gelman filter. The size fraction of the particles that have a 50 percent probability of exiting the cyclone to the Gelman filter are defined as the cyclone cut size (D_{50}). The required particle size for a valid test run ranges from 9 um to 11 um. After the sample gas passes through the Gelman filter, it then enters a stainless steel conduit which leads into a glass impinger train consisting of four impingers immersed in an ice bath. The first, second and third impingers each contained 100 milliliters of water. The fourth impinger was initially empty and the fifth impinger contained approximately 200 grams of color-indicating silica gel.

5.1.5.2 Pre-Test Preparation: Before sampling, a velocity traverse of the stack was performed. This traverse, along with an analysis of the stack gas, was used to determine the nozzle diameter(s) needed to maintain a flow rate through the cyclone to achieve a cut size of 10μm. A nozzle was selected by comparing the velocity heads from the velocity traverse with the Δp_{min} and Δp_{max} calculated for each nozzle.

5.1.5.3 Sampling Train Operation: Throughout the sampling run the orifice pressure head was maintained at the pretest calculated value. If the stack gas temperature varied by more than 28°F from the pretest average temperature, then the orifice pressure head was determined using the pretest average ± 28°F.

Sampling was started at the first traverse point. Sampling time (or dwell time) at this point was determined by the pretest calculations. After moving to the next traverse point, the dwell time at this point was determined by the velocity head at this point. This procedure was repeated for the remainder of the traverse points.

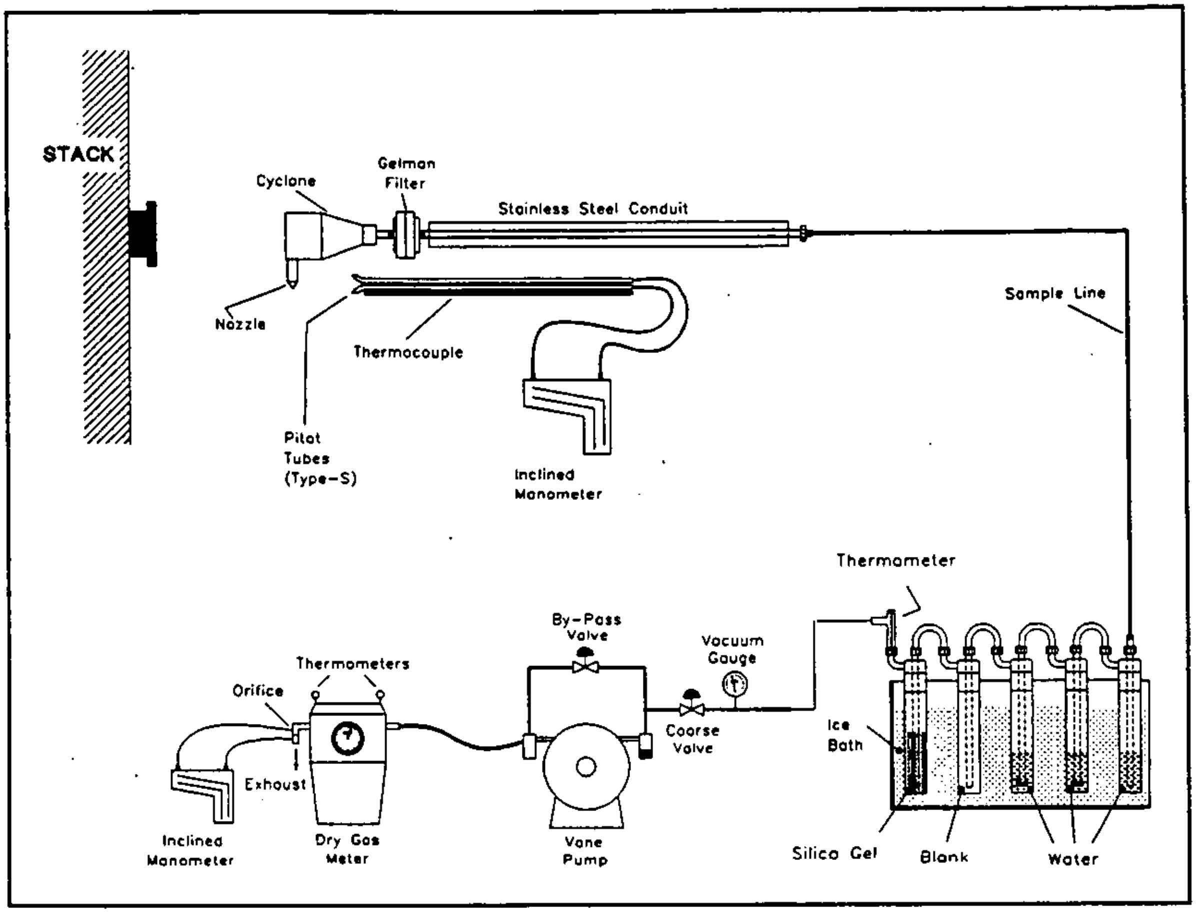


Figure 5.1.5-1: EPA Method 201A/202 Sampling Train

5.1.5.4 Sample Train Recovery: During the run, if necessary, and following the run, the filters were quantitatively recovered into their original tared and labeled foil wrappers. Following the run, the particulate matter was quantitatively recovered using acetone on all of the surfaces of the sampling train from the probe through the cyclone to the cyclone exit to the front half of the in-stack filter holder, including the "turn around" cup inside the cyclone and the interior surfaces of the exit tube. The rinses were placed into labeled glass bottles. The filters and rinses were transported to the ETS laboratory for gravimetric analyses as described by EPA Method 5. The impinger water and silica gel were recovered as per EPA Method 4 procedures. Figure 5.1.5-2 presents a schematic of the sampling train recovery procedure.

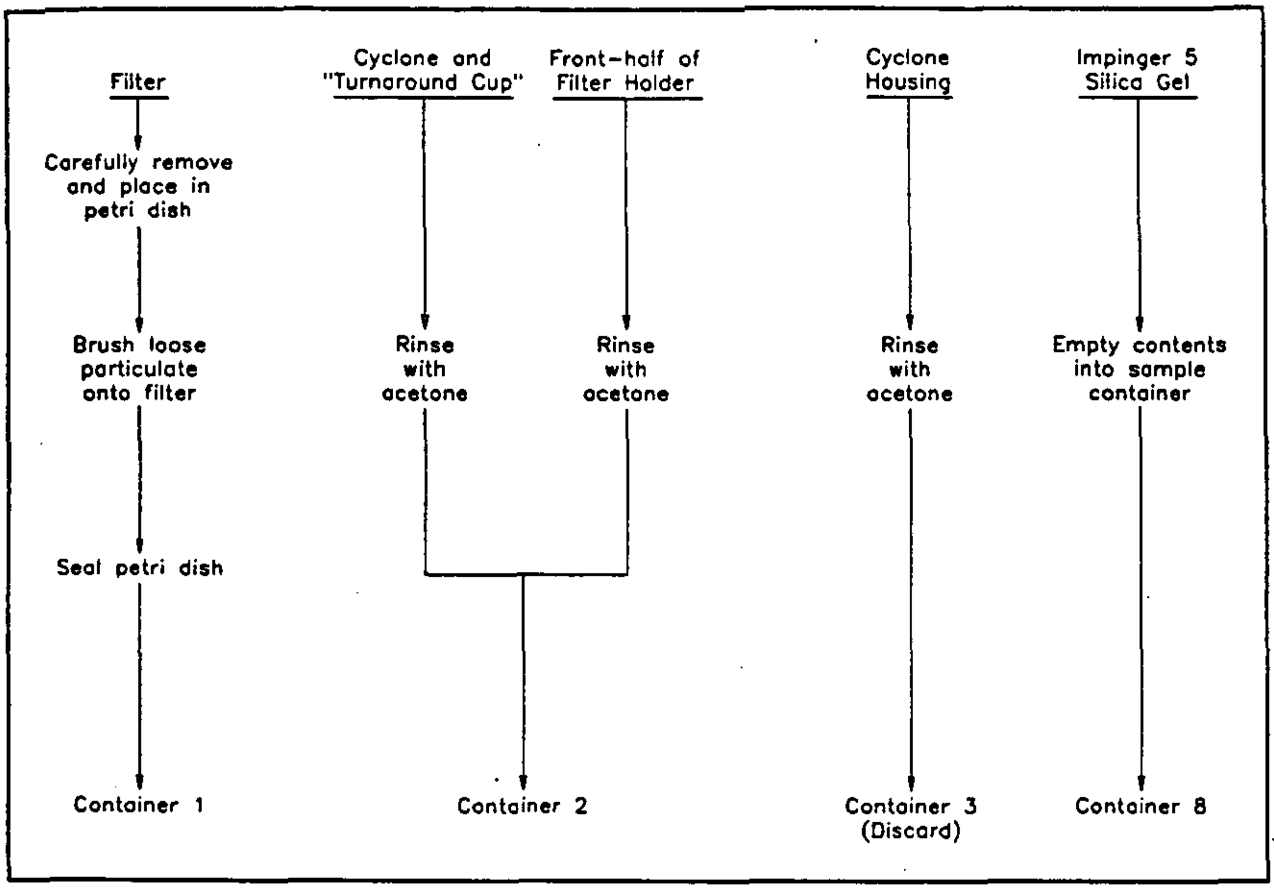


Figure 5.1.5-2. Method 201A Recovery Procedure
Source: 40 CFR Part 51, Appendix M

5.1.5.5 <u>PM_{10} Analyses</u>: Analyses of the glass fiber filters and cyclone acetone rinses from the Method 201A sampling trains were performed gravimetrically in accordance with EPA Method 5 procedures. The total PM_{10} catch included the particulate collected in the acetone rinses from all of the surfaces from the cyclone exit to the front half of the in-stack filter holder, including the "turn around" cup inside the cyclone and the interior surfaces of the exit tube, as well as the particulate collected by the glass fiber filter.

5.1.5.6 <u>PM Analyses</u>: The PM catch from the Method 201A trains included the particulate recovered from the nozzle and the cyclone, excluding the "turn around" cup and the interior surface of the exit tube. Analyses of the acetone rinses for PM larger than 10 micrometers from the Method 201A sampling trains were performed gravimetrically in accordance with EPA Method 5 procedures.

5.1.6 PM, PM_{10}, and CPM Sampling - EPA Method 201A/202: Sampling of total PM, PM_{10}, and CPM at the combustion zone exhaust stack was conducted with a combined Method 201A/202 sampling train. The analyses of the samples included Method 201A procedures for determining total PM and PM_{10} and Method 202 procedures for determining CPM.

5.1.6.1 Sampling Train Description: The Method 201A/202 train consists of a cyclone followed by a 47 mm diameter glass fiber (Gelman) filter. These in-stack components are attached to an heated stainless steel probe. For sampling at the combustion zone exhaust, a teflon liner will be used with the sample probe. The Method 201A/202 sampling train is the same as the Method 201A train presented in Figure 5.1.5-1.

The stack gases are drawn through the cyclone, the Gelman filter, the probe and into a five glass impinger train immersed in an ice bath. The first, second, and third impingers each contained 100 milliliters of deionized distilled water. The fourth impinger was initially empty, and the fifth initially contained approximately 200 grams of silica gel.

5.1.6.2 Pre-Test Preparation: Before sampling, a velocity traverse of the stack was performed. This traverse, along with an analysis of the stack gas, was used to determine the nozzle diameter(s) needed to maintain a flow rate through the cyclone to achieve a cut size of 10μm. A nozzle was selected by comparing the velocity heads from the velocity traverse with the Δp_{min} and Δp_{max} calculated for each nozzle. The details of the calculations are provided in Appendix G.2. Two additional pretest calculations were also needed. First, the orifice pressure head needed to maintain the necessary cyclone flow rate was calculated. Second, the dwell time for the first traverse point was calculated from the pretest traverse.

5.1.6.3 Sampling Train Operation: Throughout the sampling run the orifice pressure head was maintained at the pretest calculated value. If the stack gas temperature varied by more than 28°F from the pretest average temperature, then the orifice pressure head was determined using the pretest average ± 28°F.

Sampling was started at the first traverse point. Sampling time (or dwell time) at this point was determined by the pretest calculations. After moving to the next traverse point, the dwell time at this point was determined by the velocity head at this point. This procedure was repeated for the remainder of the traverse points.

5.1.6.4 Sample Recovery and Clean-up: At the conclusion of the sampling run, the filters were quantitatively recovered into petri dishes. Following the run, the particulate matter was quantitatively recovered using acetone from all of the surfaces from the cyclone exit to the front half of the in-stack filter holder, including the "turn around" cup inside the cyclone and the interior surfaces of the exit tube. The rinses were placed into labeled glass bottles. The filters and rinses were transported to the ETS laboratory for gravimetric analyses as described by EPA Method 5.

The back-half of the sampling train (impingers plus connecting glassware) was recovered in accordance with EPA Method 202 procedures. The pH of the first impinger was measured immediately after the test. If the pH was less than 4.5, then the entire impinger train was purged for one hour using purified air in accordance with Method 202 procedures. If the pH of the first impinger exceeded 4.5, then the purge was omitted. A schematic of the recovery of the combined 201A/202 train is presented in Figure 5.1.6-1 . The analysis for the 201A and 202 sampling trains were slightly different.

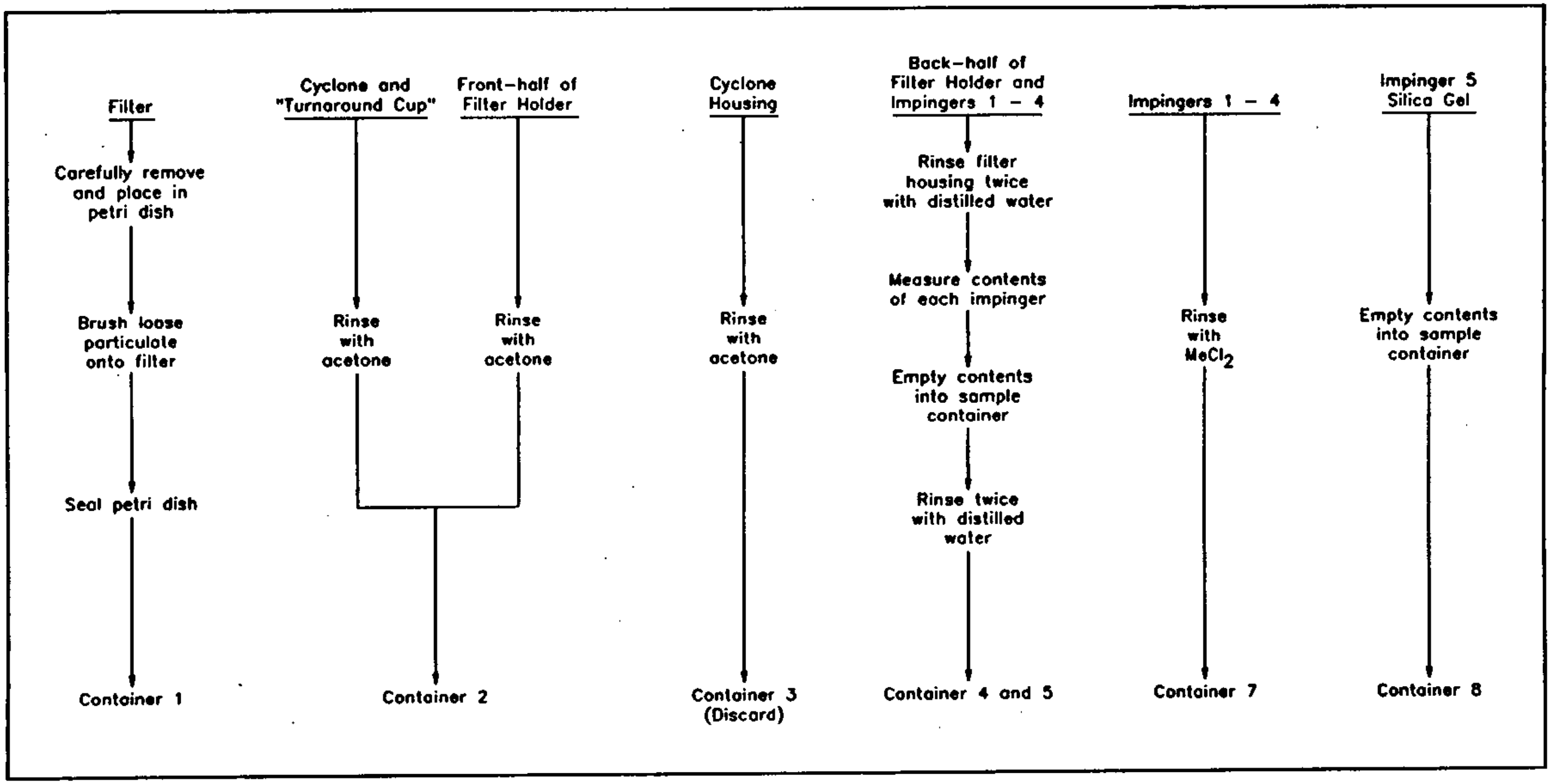


Figure 5.1.6-1: Method 201A/202 Recovery Procedure
Source: 40 CFR Part 51, Appendix M

5.1.6.5 Field Blanks: One field blank was collected during the test program for Method 201A/202 testing at the kiln combustion stack. Each field blank consisted of a complete sampling train set up on site and recovered during the recovery of the normal stack test samples.

5.1.6.6 CPM Analyses - EPA Method 202: The determination of the total condensible particulate matter (CPM) in the back-half of the sampling train was determined in accordance with Method 202 procedures. The total sulfate concentration of the impinger contents was not analyzed because the pH of the solution was greater than 4.5. The impinger contents and aqueous rinses were combined with the methylene chloride rinses and extracted twice with methylene chloride using a separatory funnel. The samples were divided into organic (methylene chloride) and inorganic (aqueous) fractions. The organic fraction was evaporated at room temperature and pressure, and the resulting residue gravimetrically analyzed to a constant weight. The inorganic fraction was evaporated to dryness at 105°C.

The back-half condensible particulate catch equals the organic residue plus the inorganic residue plus the combined water removed by the acid-base reaction based on the impinger analysis for sulfate.

The total particulate catch equals the front-half probe rinse and filter plus the back-half condensibles. A schematic of the analytical procedure is contained in Figure 5.1.6-2.

5.1.6.7 PM_{10} Analyses - EPA Method 201A: Analyses of the glass fiber filters and cyclone acetone rinses from the PM_{10} sampling were performed gravimetrically in accordance with EPA Method 5 procedures. The total PM_{10} catch included the particulate collected in the acetone rinses from all of the surfaces from the cyclone exit to the front half of the in-stack filter holder, including the "turn around" cup inside the cyclone and the interior surfaces of the exit tube, as well as the particulate collected by the glass fiber filter. A schematic of the analytical procedure is contained in Figure 4.1.8.6-1.

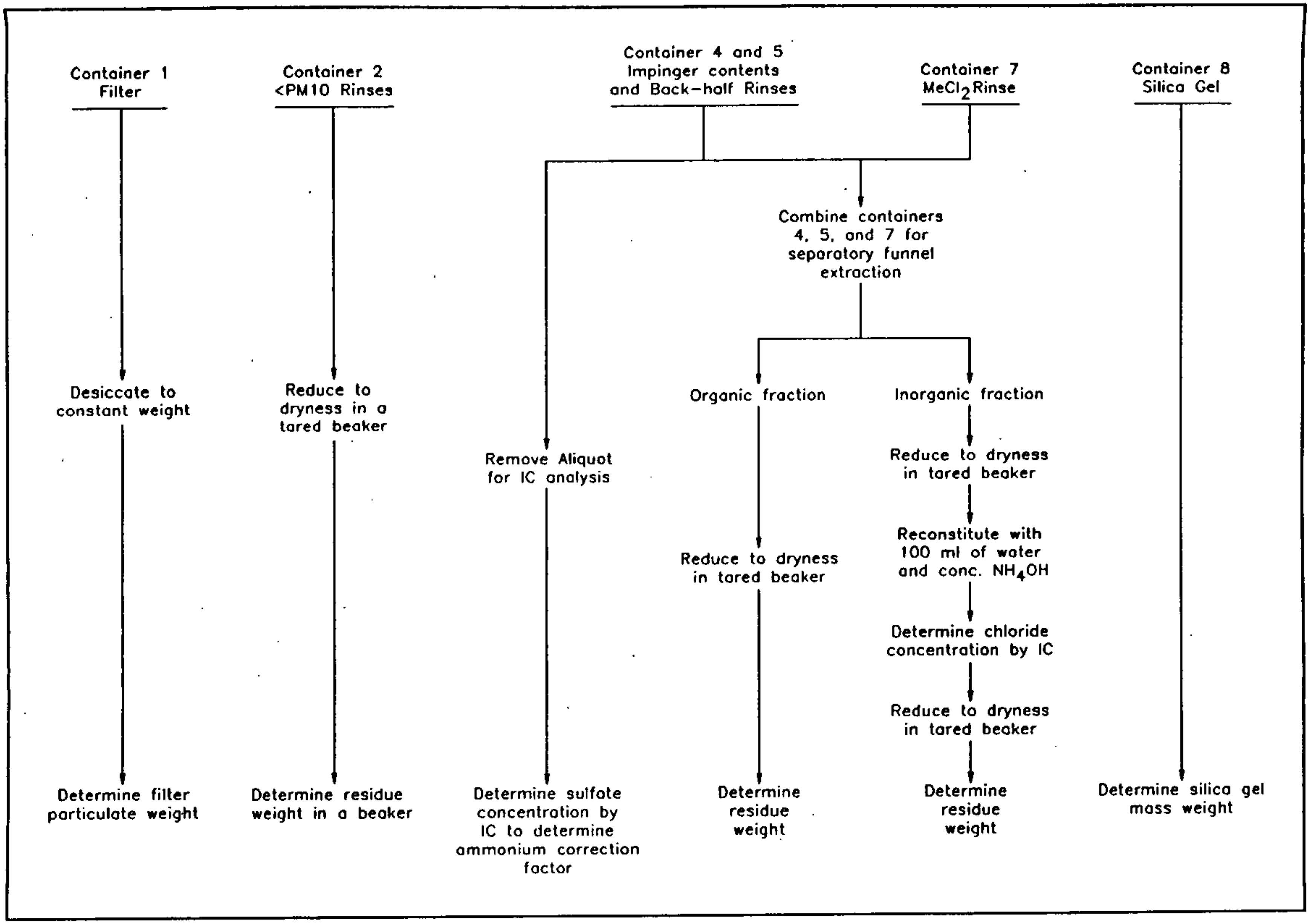


Figure 5.1.6-2: Method 201A/202 Analysis Procedure
Source: 40 CFR Part 51, Appendix M

5.1.7 <u>Multiple Metals with PM - EPA Multi-Metals Procedure</u>: Sampling for antimony, arsenic, beryllium, cadmium, total chromium, lead, manganese, mercury, nickel, phosphorous, and selenium was performed in accordance with EPA Method 5 in conjunction with Section 3.1 of "Methods Manual for Compliance with BIF Regulations (EPA/530-SW-91-010)". This method is commonly referred to as the Multi-Metals procedure which is proposed as EPA Method 29. In addition, the filter and probe washes were analyzed for determining PM in accordance with EPA Method 5.

5.1.7.1 <u>Sampling Train Description</u>: The testing was conducted utilizing the multi-metals sampling train as illustrated in Figure 5.1.7-1. A heated stainless steel probe with a quartz liner was used to withdraw the gas sample. The probe was equipped with an appropriately sized integrated quartz nozzle fused directly to the liner for isokinetic gas withdrawal.

From the nozzle and probe, sample gas was pulled through a heated glass filter holder which holds a Pallflex ultra-pure 2500 QUAT-UP quartz filter supported on a teflon frit. The filter was maintained at a temperature sufficiently high to prevent the condensation of water (248 ± 25°F). Sample gas subsequently passed through an impinger train consisting of seven glass impingers immersed in an ice bath. The first impinger was initially empty. The second and third impingers each contained 100 milliliters of 5% nitric acid/10% hydrogen peroxide solution. The fourth impinger was initially empty. The fifth and sixth impingers each contained 100 milliliters of 4% potassium permanganate/10% sulfuric acid solution. The seventh impinger contained approximately 200 grams of silica gel. The amount of moisture collected in the sampling train was quantified in order to determine the stack gas moisture content in accordance with EPA Method 4.

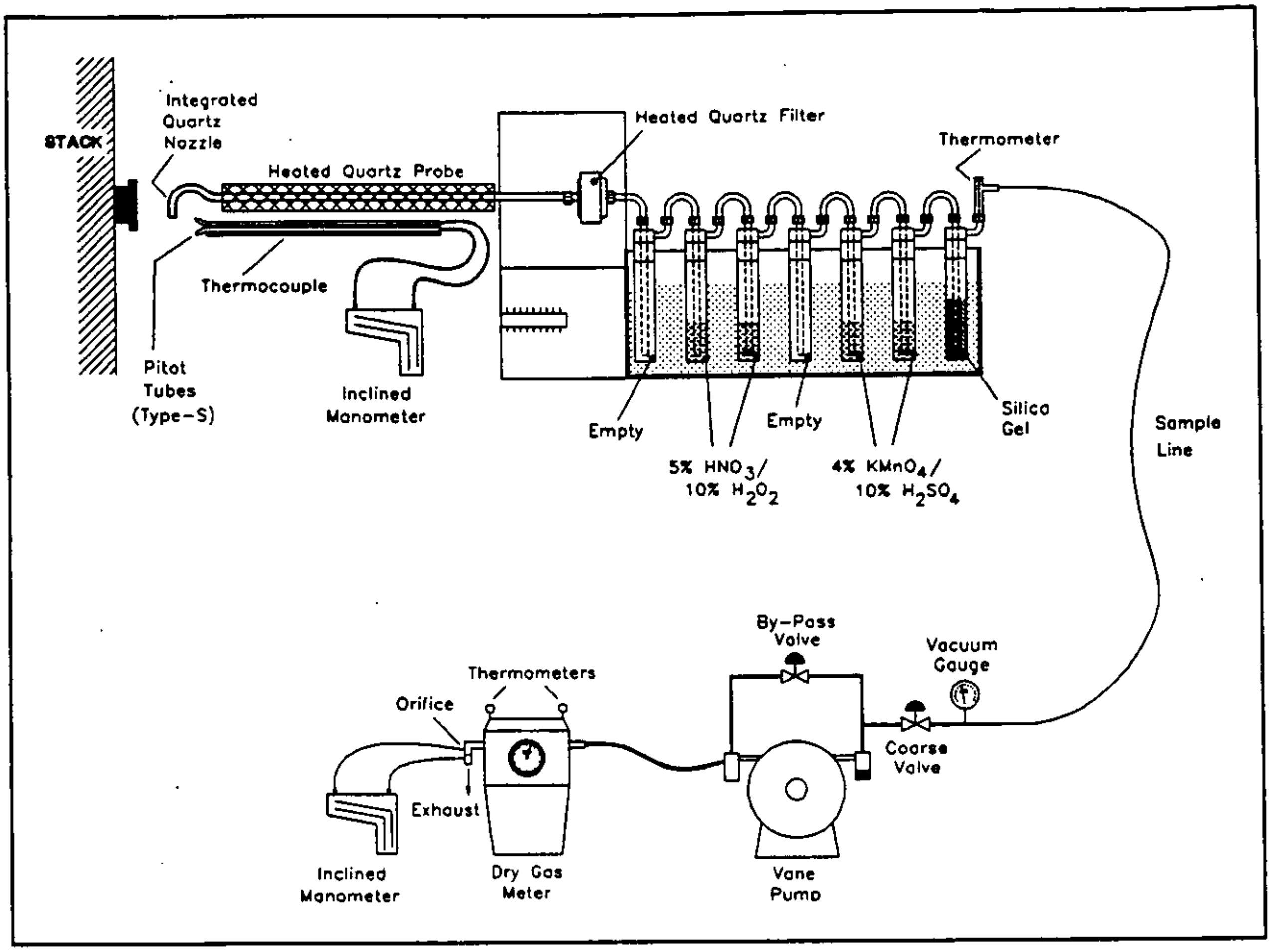


Figure 5.1.7-1: Multiple Metals/TSP Sampling Train

5.1.7.2 Sample Train Preparation: All glassware components of the multiple metals sampling train were pre-cleaned before use. The following cleaning procedure was used:

1) Wash with hot water and detergent.
2) Rinse with tap water three times.
3) Rinse with deionized, distilled water three times.
4) Soak in a 10% nitric acid solution for four hours.
5) Rinse three times with deionized water.
6) Rinse three times with acetone and allow to air dry.

All glassware openings were covered with Teflon tape until sampling to prevent contamination.

5.1.7.3 Sample Train Operation: Sampling was done in accordance with EPA Method 5 procedures and specifications, including leak checking, isokinetic sampling rate and stack traversing.

5.1.7.4 Sample Recovery and Clean-up: At the completion of each test, the probe was removed from the train and the ends of the probe and sample train capped. The probe was cleaned on the test platform, while the remainder of the sample train was transported to a clean-up site for recovery. The sample recovery procedure is shown in Figure 5.1.7-2.

5.1.7.5 Field Blanks: One field blank was collected during the test program for each location from which metals sampling was conducted. Each field blank consisted of a complete sampling train set up on site and recovered during the recovery of the normal stack test samples. In addition, audit metals samples were analyzed as a measure of QA/QC. Section 6.4 of this report discusses the audit samples in detail.

5.1.7.6 PM Analyses - EPA Method 5: Particulate matter was determined in accordance with EPA Method 5 procedures. The filter was analyzed gravimetrically to a constant weight. The front half rinse was evaporated and analyzed gravimetrically to a

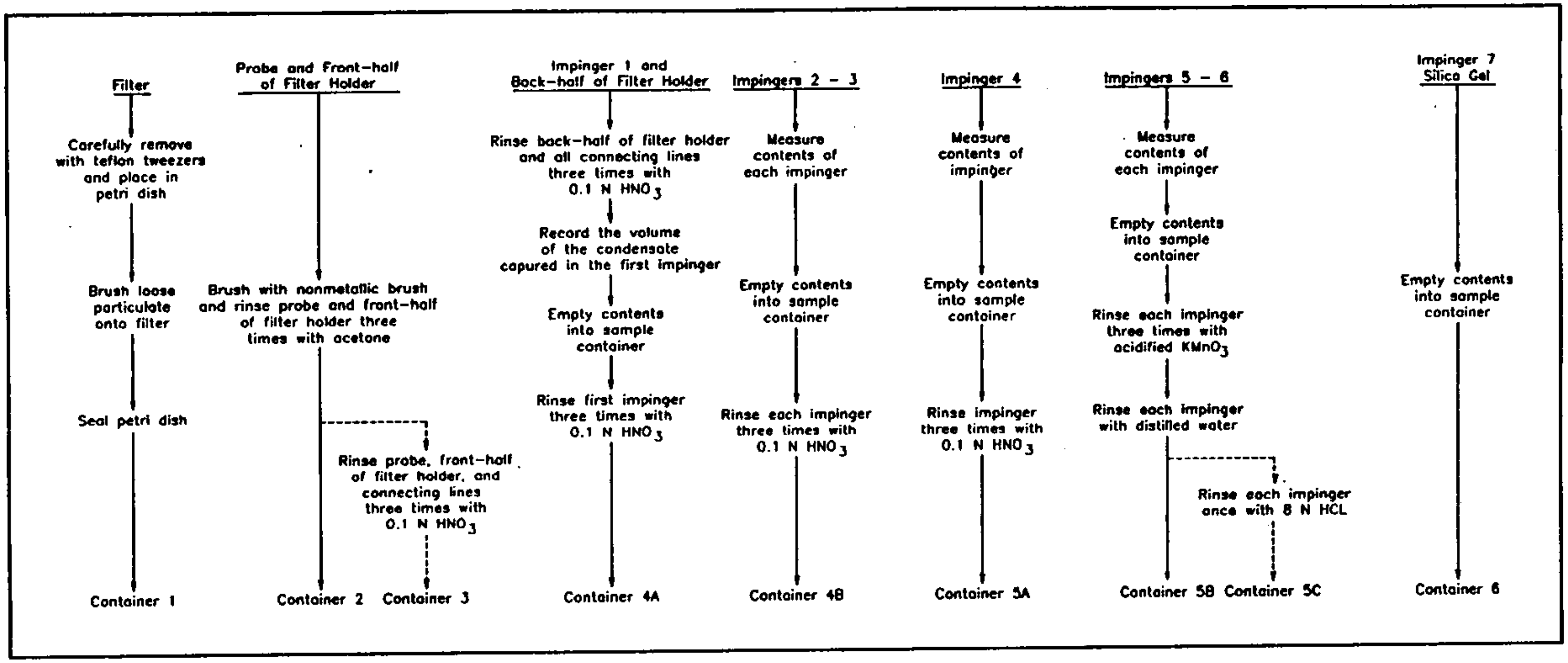


Figure 5.1.7-2: Multiple Metals Recovery Procedure
Source: 40 CFR Part 266, Appendix IX, Section 3

constant weight. The total particulate catch equaled the sum of the front half rinse and the filter.

5.1.7.7 Multi-Metals Analyses - EPA Multi-Metals: The filter, front-half rinses, and contents of impingers 1 through 4 of the multi-metals sampling train were analyzed for antimony, arsenic, beryllium, cadmium, total chromium, lead, manganese, nickel, phosphorous, and selenium. The rinses and contents of impingers 5 and 6 were analyzed for mercury.

Analyses of the filters and front-half acetone rinses were conducted after completion of the Method 5 gravimetric analyses. SW-846 Method (atomic absorption) was used to determine the metals concentrations.

The sampling train components (including the digested filter, probe washes, and impinger contents and rinses) were prepared for analysis in accordance with the procedures given in the EPA draft method. All digestions were performed using a 600-watt microwave digester and Teflon pressure relief vessels. After preparation, the samples were analyzed with a Perkin Elmer Plasma 2000 inductively coupled plasma (ICP) atomic absorption spectrometer for antimony, arsenic, beryllium, cadmium, total chromium, lead, manganese, nickel, phosphorous, and selenium. A Coleman 50A cold vapor atomic absorption spectrometer (CVAAS) was used to analyze the samples for mercury.

Duplicate analyses were performed on all metals samples. In addition, field blanks were analyzed. Spikes were added to the samples to determine the metals recovery efficiencies. A schematic of the analytical procedure is contained in Figure 5.1.7-3.

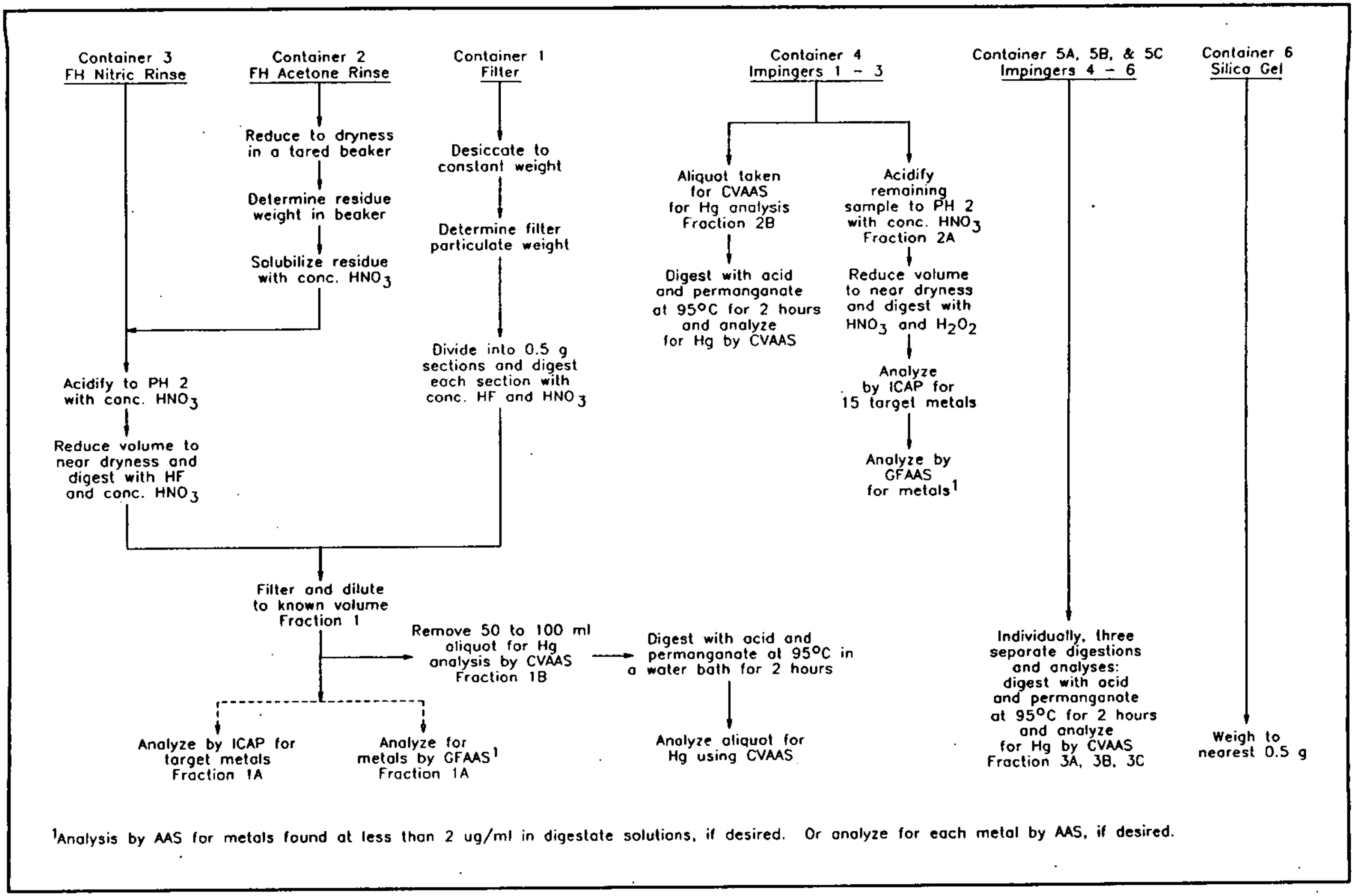


Figure 5.1.7-3: **Multiple Metals Analysis Procedure**
Source: 40 CFR Part 266, Appendix IX, Section 3

5.1.8 Hydrogen Fluoride (HF) - EPA Method 26: HF emissions were measured in accordance with EPA Method 26. The procedure involves absorbing the HF in dilute sulfuric acid and analyzing the solution for total fluorides using an ion chromatography technique.

5.1.8.1 Sampling Train Description: A schematic of the Method 26 sampling train is shown in Figure 5.1.8-1. A heated glass probe was used for sample withdrawal. The gas stream was passed through a heated Teflon filter and five glass impingers. The impingers were immersed in an ice bath. The first impinger was initially left empty, a shortened tube is used to prevent bubbling of the gas sample through the collected condensate. The second and third impingers were each charged with 15 ml of 0.1 Normal sulfuric acid solution for HF absorption. The fourth impinger was charged with 15 ml of 0.1 Normal sodium hydroxide to absorb acid gases harmful to the dry gas meter. The fifth impinger was charged with silica gel to absorb any moisture before the stream enters the dry gas meter.

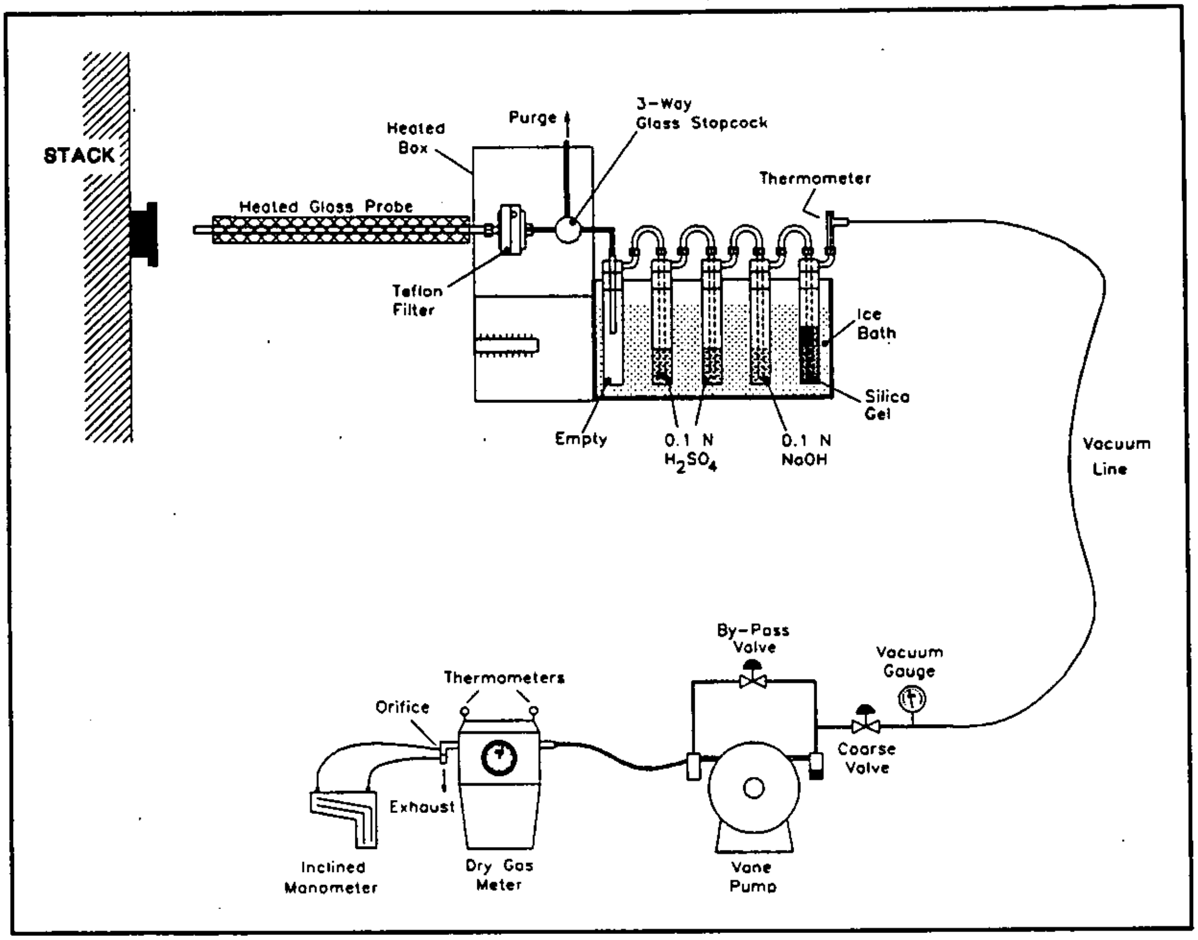


Figure 5.1.8-1: EPA Method 26 Sampling Train

5.1.8.2 Sampling Train Operation: The gas stream was sampled at a single point in the center of the stack for 120 minutes at a sampling rate of approximately 2 liters per minute. All sampling procedures, such as leak checking and system purging, were in accordance with EPA Method 26. The impingers were maintained in an ice bath during the sampling period. The sample train was initially leak checked from the probe and subsequently checked at the three way stopcock for the subsequent runs. The sample trains were leak checked to demonstrate a leakage rate not in excess of 2% of the average sample.

5.1.8.3 Sample Recovery and Clean-up: A schematic of the recovery of the Method 26 sampling train is contained in Figure 5.1.8-2.

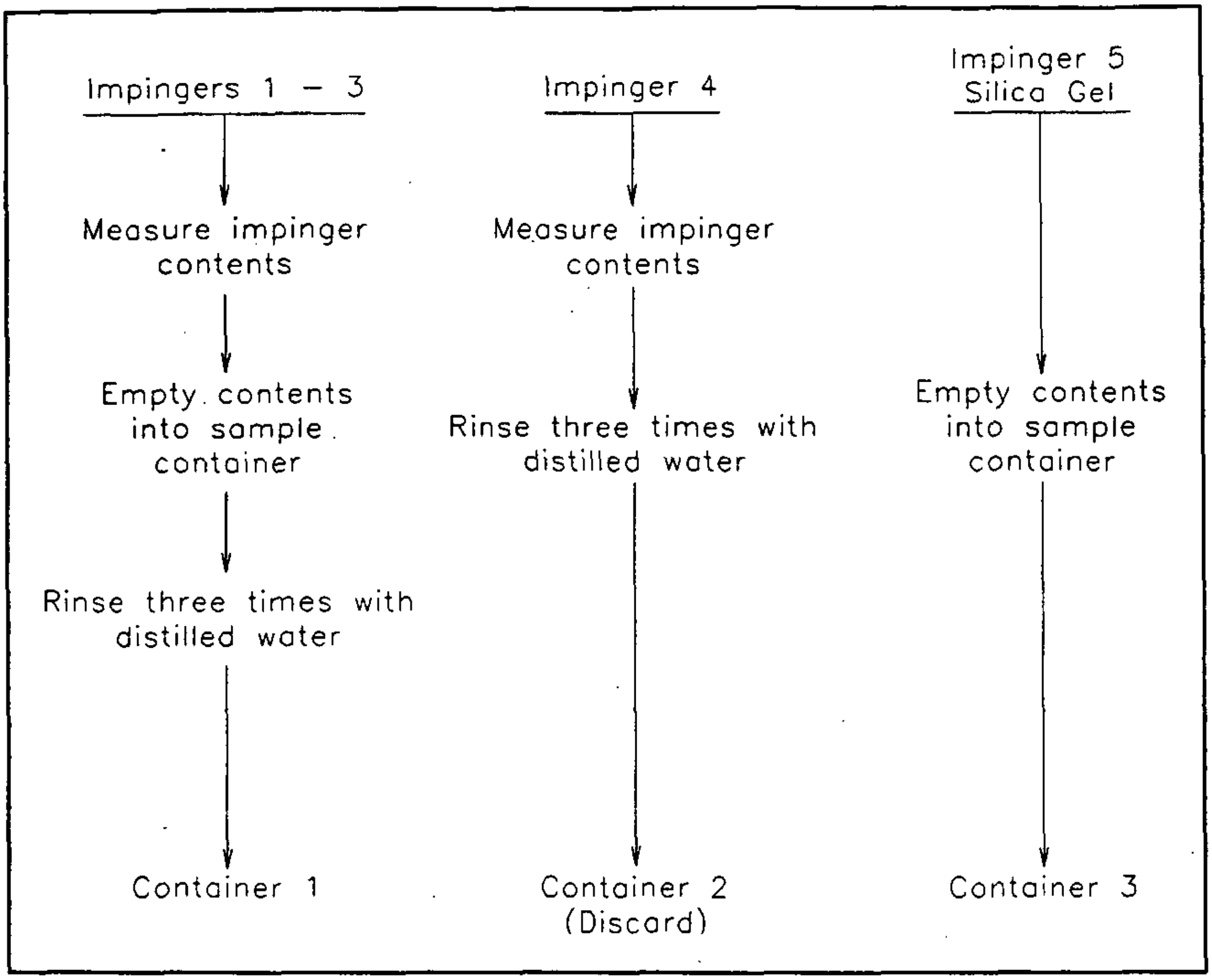


Figure 5.1.8-2: EPA Method 26 Recovery Procedure
Source: 40 CFR Part 60, Appendix A

5.1.8.4 Field Blanks: One field blank was collected during the HF test program at the kiln combustion exhaust stack. The field blank consisted of a complete sampling train set up on site and recovered during the recovery of the normal stack test samples.

5.1.8.5 Hydrogen Fluoride Analyses: The contents of the first three impingers of the Method 26 train were analyzed for fluoride in accordance with EPA Method 26 procedures. The contents of the fourth impinger (sodium hydroxide) was not analyzed. Ion chromatography was employed in the analyses. A schematic of the analytical procedure is contained in Figure 5.1.8-3.

5.1.9 Continuous Emissions Monitoring for O_2, CO_2, CO, NO_x, and THC - Instrumental Methods: Instrumental monitoring of the stack gases were performed in accordance with the following procedures:

GAS	REFERENCE METHOD	INSTRUMENT TYPE
O_2	Method 3A	Teledyne Model 320A Chemical Cell Portable O_2 Analyzer
CO_2	Method 3A	HORIBA Model PIR-2000 NDIR CO_2 Analyzer
NO_x	Method 7E	TECO Model 10AR Chemilu-minesence NO_x Analyzer
CO	Modified M10	TECO Model 48 NDIR CO Analyzer
THC	Method 25A	J.U.M. Model VE-7 Heated THC Analyzer (FID)

All of the analyzers except the hydrocarbon analyzer measured gas concentrations on a dry volume basis. The hydrocarbon analyzer measured the concentrations in parts per million wet volume as propane (ppmwv as C_3H_8).

5.1.9.1 Sampling System Description: An integrated, remote instrumental system housing the pollutant gas analyzers as well as the diluent gas (O_2 and CO_2) monitors were used. The design incorporated a dry extractive system. All of the instruments were housed in a trailer located at ground level.

Figure 5.1.9-1 presents a schematic of the dry sampling system. Each dry sampling system consisted of a heated stainless steel probe located at the stack port location. A heated glass fiber filter was attached to the probe for rough particulate removal. A short section of heated Teflon sample line delivered the sample to an ice-cooled condenser designed to remove the flue gas moisture. An unheated Teflon sample line transported the dry gas sample from the stack port location down to the instrumental system. The sample gas exiting the Teflon sample line was pumped to the O_2, CO_2, CO, and NO_x monitors.

The sampling system for the hydrocarbon analyzer incorporated a heated stainless steel probe, a heated glass fiber filter, and a heated Teflon sample line. The sample line was heated along its entire length from the stack sampling location to the analyzer. Methane and ethane determination was performed by installing an activated charcoal filter in the sample line to remove all hydrocarbons except methane and ethane. Figure 5.1.9-2 presents a schematic of the wet sampling system used for THC and methane and ethane monitoring.

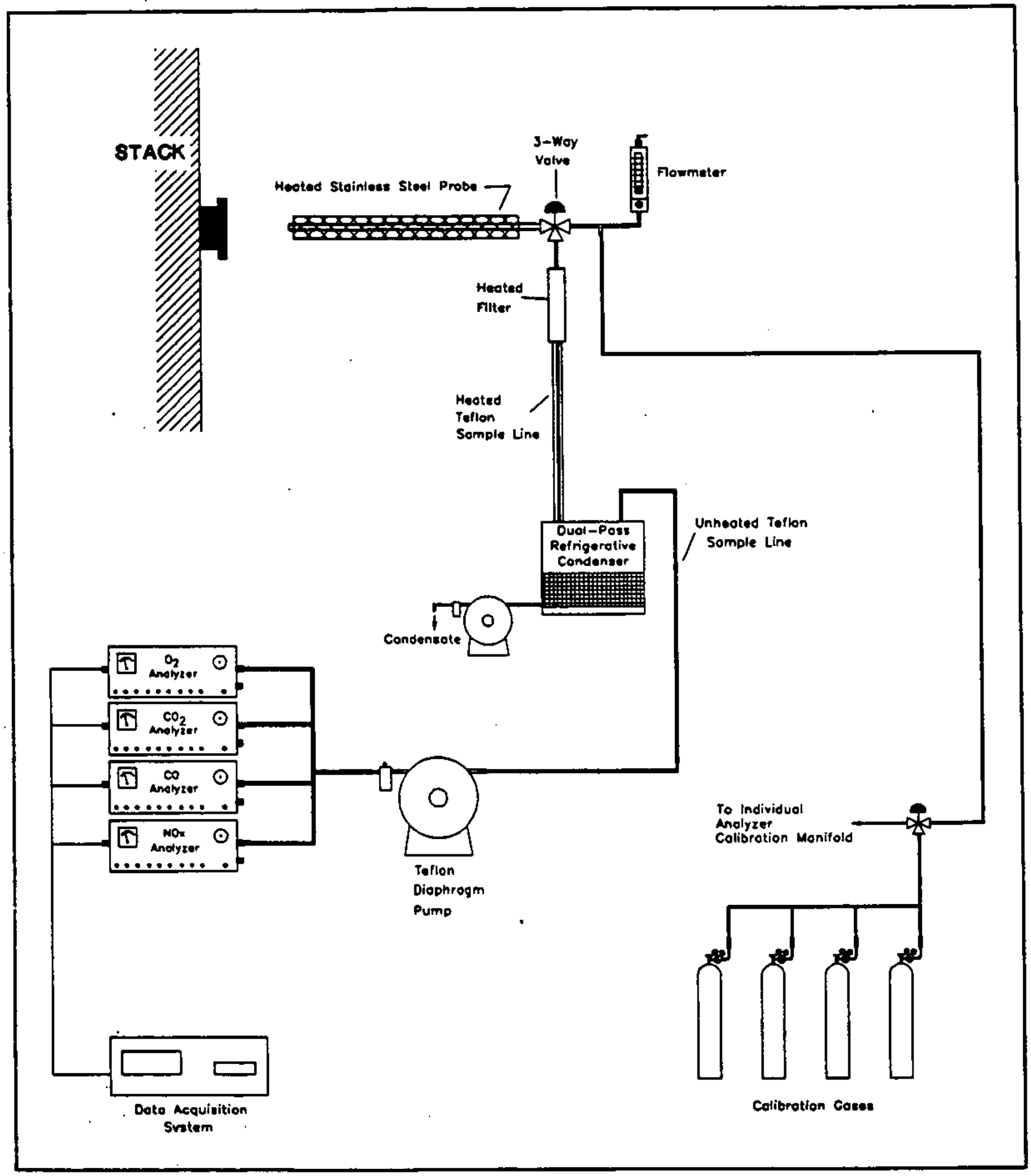


Figure 5.1.9-1: Dry Extractive Continuous Emissions Monitoring System for O_2, CO_2, CO, and NO_x.

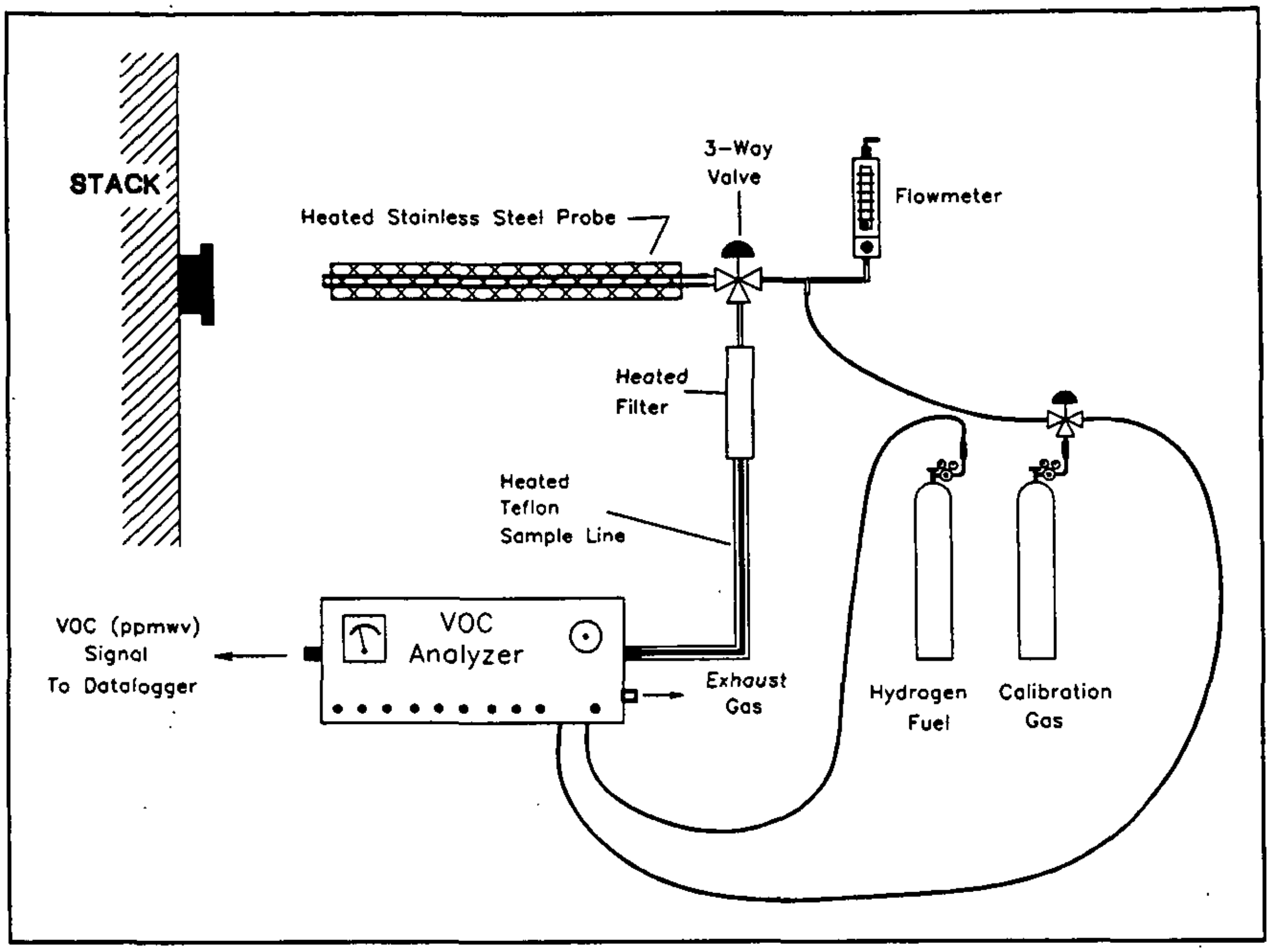


Figure 5.1.9-2: Continuous Emissions Monitoring System for EPA Method 25A.

5.1.9.2 Data Acquisition System: The response outputs of the monitors were recorded digitally by a Campbell Scientific Model CR10WP multi-channel data acquisition system. The system sampled at a rate of 60 Hz, and stored one-minute average values.

5.1.9.3 Calibration: At the beginning of every test day, each monitor in the dry sampling system was zeroed, using Zero Nitrogen, and spanned, using a certified calibration gas (EPA Protocol 1 certified or ± 1% Traceable Standards) with a concentration of 80-100% of the instrument span. Following local calibration a mid range gas, 40-60% of the instrument span, was introduced locally to each monitor to check for response linearity.

At the beginning of every test day in which THCs were to be measured, each THC monitor was zeroed, using Zero Nitrogen, and spanned, using a certified propane calibration gas (EPA Protocol 1 certified or ± 1% Traceable Standards) with a concentration of 80-90% of the instrument span. Following local calibration a mid range gas (45-55% of the instrument span) and a low range gas (25-35% of instrument span) was introduced locally to each monitor to check for response linearity.

After locally calibrating all monitors, calibration gas was introduced remotely through the probe in order to verify the absence of sampling system bias. The bias error did not exceed 5% of the instrument span as required by EPA Reference Method 6C.

After each test run, Zero Nitrogen and a high range calibration gas was introduced locally to each monitor to check for calibration drift error. In accordance with Methods 6C and 25A, the instrument drift did not exceed 3% of the instrument span except for the oxygen monitor on Method 201A/202 Run 3 at the kiln combustion exhaust stack (KCE-M201A/202-R3). All gas values were adjusted to compensate for system calibration drift.

At the end of every test day, calibration gas was again introduced remotely through the probe in order to verify the absence of sampling system bias.

5.1.10 Volatile Organics Sampling: Sampling for volatile organics was conducted in accordance with Method 0030 of SW-846.

5.1.10.1 Sampling Train Description: A schematic of the volatile organic sampling Train (VOST) is shown in Figure 5.1.10-1. The primary components of the VOST system were the probe, condenser, condensate trap, a second condenser, and a backup resin trap. The first cartridge was packed with approximately 1.6 grams of Tenax-GC resin. The second cartridge was packed with Tenax-GC and petroleum-based charcoal (1 gram of each, approximately 3:1 by volume), with the charcoal on the outlet end of the cartridge. The first trap retained most of the higher boiling analytes. Lower boiling analytes and the portion of the higher boiling analytes that break through the first cartridge were retained on the second trap. Analytes that collect in the condensate trap were purged into the second trap and condenser units. The metering system consisted of vacuum gauges, a leak-free pump, a calibrated rotameter, and a dry gas meter.

5.1.10.2 Sampling Train Operation: Sampling was done in accordance with Method 0030 of SW-846 procedures, including leak checking and sampling rate. The train was leak checked by closing the valve at the inlet to the first condenser and pulling a vacuum of 10 in. Hg above the normal operating pressure. The traps and condensers were isolated from the pump and the leak check noted. The leak rate was less than 0.1 in. Hg per minute.

After leak checking, sample collection was accomplished by opening the valve at the inlet to the first condenser, turning on the pump, and sampling at a constant rate for 20 minutes. At this point, the train was leaked checked at the highest vacuum achieved during the sampling run, and the first pair of sorbent cartridges were replaced with a new pair of cartridges. This procedure was repeated until a total of six pairs of sorbent cartridges were used. Three of the six pairs involved sampling at a rate of approprozimately 1 liter per minute (1 lppm), and the remaining three pairs involved sampling at a rate of approximately 2 lpm. The varied sampling rates were incorporated to allow a greater flexibility in the analysis of the sorbent cartridges. Each sampling run had a duration of 120 minutes.

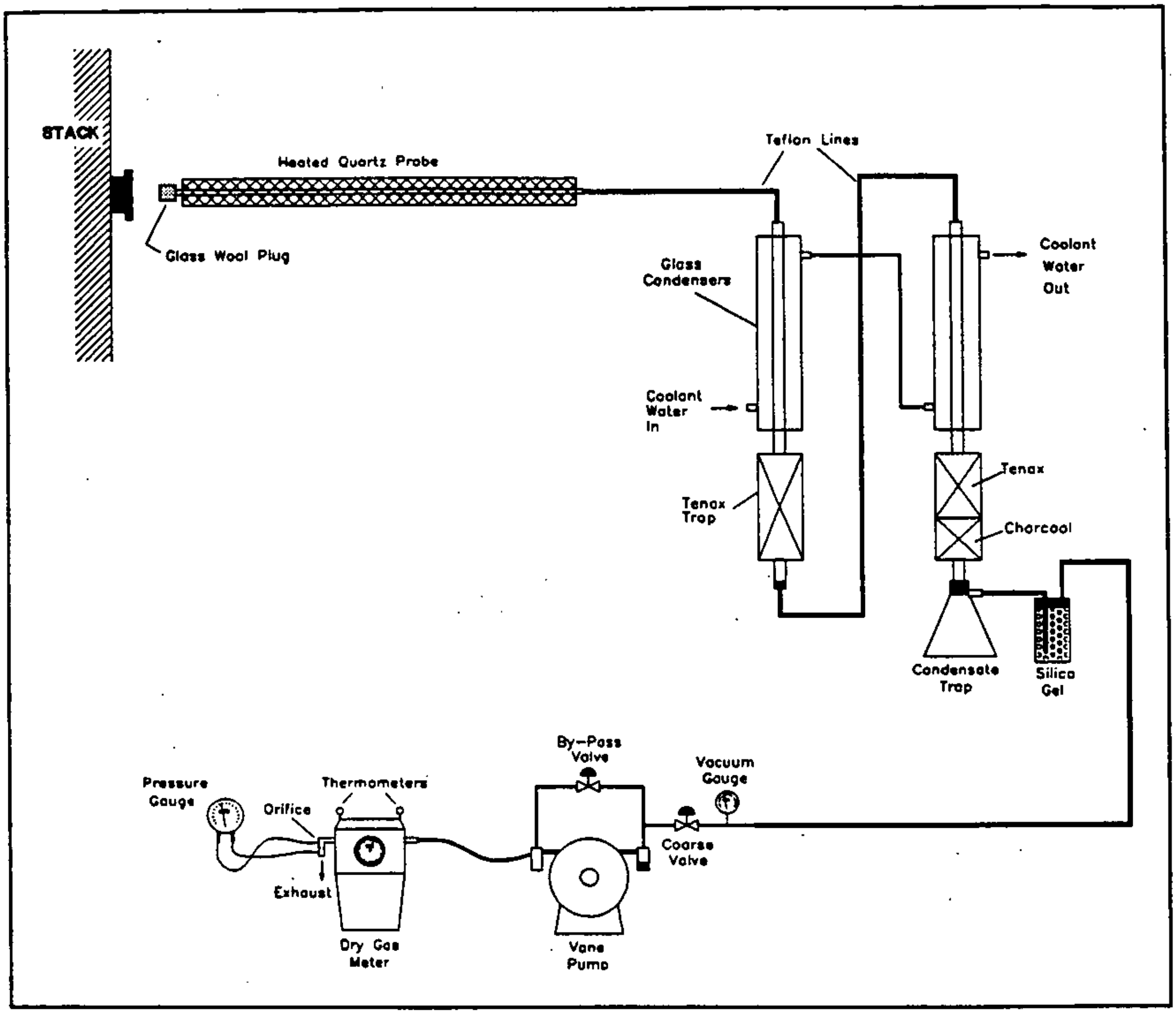


Figure 5.1.10-1: Volatile Organic Sampling Train (Method 0030)

5.1.10.3 Sample Train Recovery and Clean-up: At the end of each 20-minute sampling period, each pair of sorbent cartridges was removed from the sampling train, the end caps were replaced on the cartridges, and the cartridges were stored in a cooler with "Blue Ice" until analysis. A schematic of the recovery is shown in Figure 5.1.10-2.

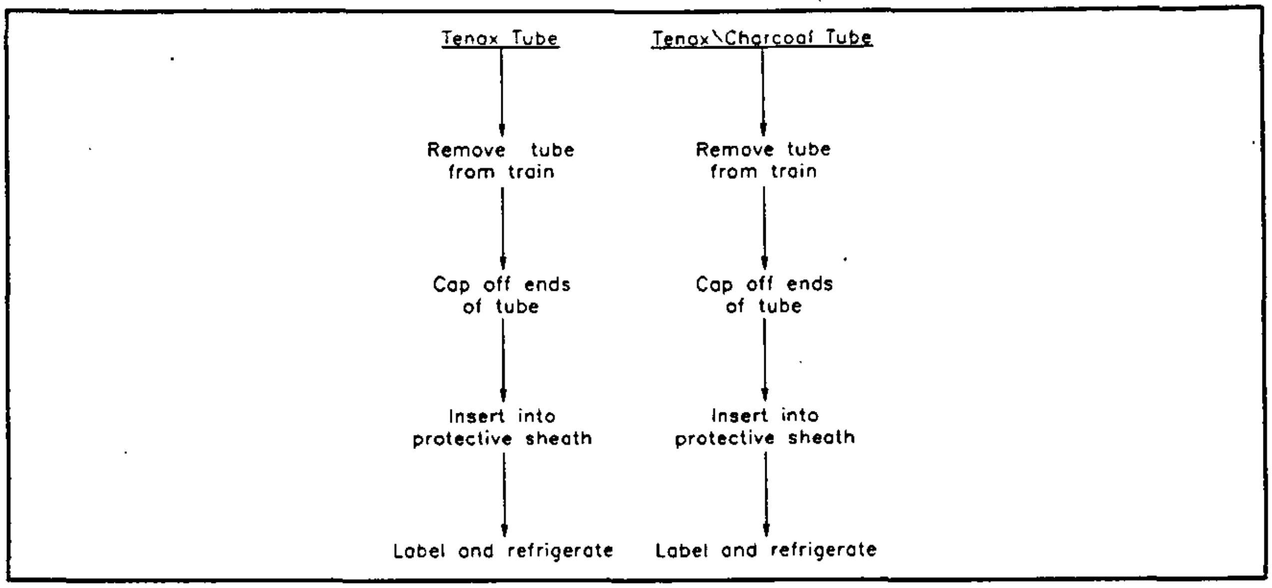


Figure 5.1.10-2: Method 0030 Recovery Procedure
Source: EPA 600/8-84-007

5.1.10.4 Field Blanks: A single pair of sorbent cartridges to the sampling location and the ends removed for a period of time while the two pairs of sorbent cartridges on the VOST system were exchanged. At the end of this period, the end caps were replaced, and the cartridges were stored and analyzed with the samples cartridges.

5.1.10.5 Volatile Organics Analyses - Method 0030: The VOST sorbent cartridges were analyzed for volatile compounds listed in Method 8240, Table 2. The analyses were performed using thermal desorption and gas chromatography with mass spectroscopy (GC/MS) in accordance with Method 0030 procedures. A schematic of the analytical procedure is contained in Figure 5.1.10-3. Only two of the six pairs of cartridges were analyzed for each sampling run for reporting purposes.

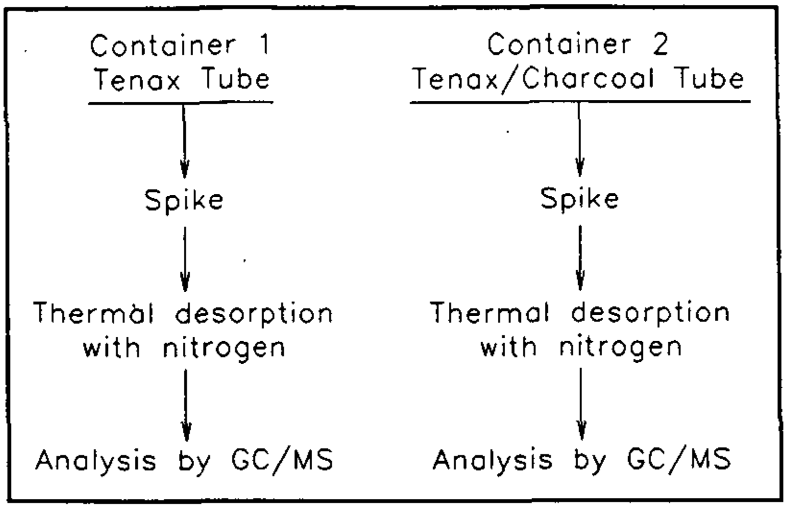


Figure 5.1.10-3: Method 0030 Analysis Procedure
Source: EPA 600/8-84-007

5.1.11 Semivolatile Organics Sampling: Sampling for semi-volatile organics was conducted in accordance with Method 0010 of SW-846.

5.1.11.1 Sampling Train Description: Figure 5.1.11-1 illustrates the Method 0010 sampling train. The train employed a single piece quartz nozzle and probe for sample withdrawal. The nozzle opening was appropriately sized to maintain isokinetic sampling. Particulate matter was removed from the gas stream by means of a heated glass filter supported on a Teflon frit. The filter temperature was maintained at 248 ± 25°F. After particulate removal, the gases passed into a water-cooled glass condenser and entered an XAD resin sorbent trap. The sorbent trap was packed with pre-cleaned, quality control checked amberlite XAD-2 resin. Coolant water maintained at wet-ice temperature was continuously recirculated into the assembly using a submersible water pump. The condenser cooled the sample gases and condensed part of the moisture. The cooled gases and condensate flowed down through the XAD-2 resin which retained the organics. After passing through the sorbent trap, the sample gases passed through a chilled impinger train to remove the remaining moisture. The impinger train consisted of five glass impingers immersed in an ice bath. The first impinger was left blank to facilitate collection of the condensate which passed through the XAD-2 resin trap. The second and third impingers each contained 100 milliliters of distilled water. The fourth impinger was initially empty and the fifth impinger initially contained approximately 200 grams of silica gel. All components from the nozzle to the fourth impinger were made of glass. All connections from the probe to the exit stem of the fourth impinger were sealed with Teflon O-rings. Sealing grease was not used on any connections before the fifth impinger.

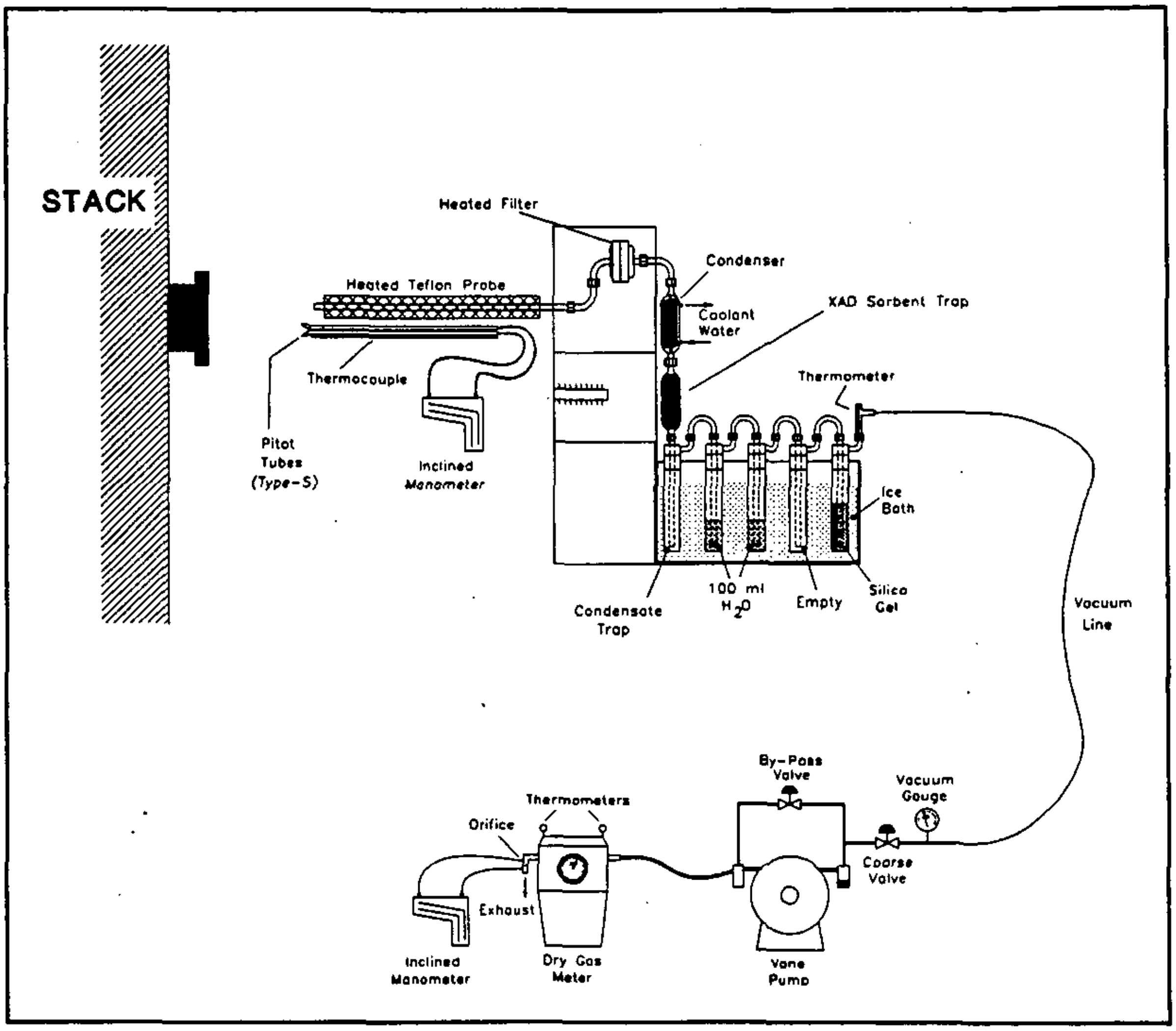


Figure 5.1.11-1: EPA Method 0010 Sampling Train for Semi-volatile Organics

5.1.11.2 Sampling Train Operation: Sampling was performed in general accordance with EPA Method 5 procedures and specifications, including leak checking, isokinetic sampling rate, and stack traversing. A minimum sample volume of 106 dry standard cubic feet was obtained for each run.

5.1.11.3 Sample Recovery and Clean-up: At the completion of each test run, the probe was removed from the train, and the ends of the sample train capped with hexane-rinsed aluminum foil. The probe was immediately recovered at each sampling location, while the remainder of the sampling train was transported to a clean-up site for recovery. Sample recovery proceeded as illustrated in Figure 5.1.11-2.

Immediately upon recovery, all samples including liquid rinses, filters and sorbent traps were placed into insulated coolers packed with ice, thus protecting the samples from light and heat.

The samples remained inside the coolers during transport to the analytical laboratory. While in the custody of ETS, the temperatures inside the coolers were periodically measured to insure that the samples did not exceed 32°F. All samples were express mailed directly to the analytical lab for analysis. While at the lab, the samples were kept in a refrigerated compartment until analyzed.

5.1.11.4 Field Blanks: One field blank was collected during the test program for the Method 0010 tests. The field blank consisted of a complete sampling train set up on site and recovered during the recovery of the normal stack test samples.

5.1.11.5 Semivolatile Organics Analyses: Analysis of the Method 0010 sample train components was performed in accordance with the procedures outlined in Method 0010 of SW-846. Analyses were performed for the semivolatile compounds listed in Method 8270, Table 2. The analyses were performed with high resolution gas chromatography/mass spectrometry (GC/MS). A schematic of the analytical procedure is contained in Figure 5.1.11-3.

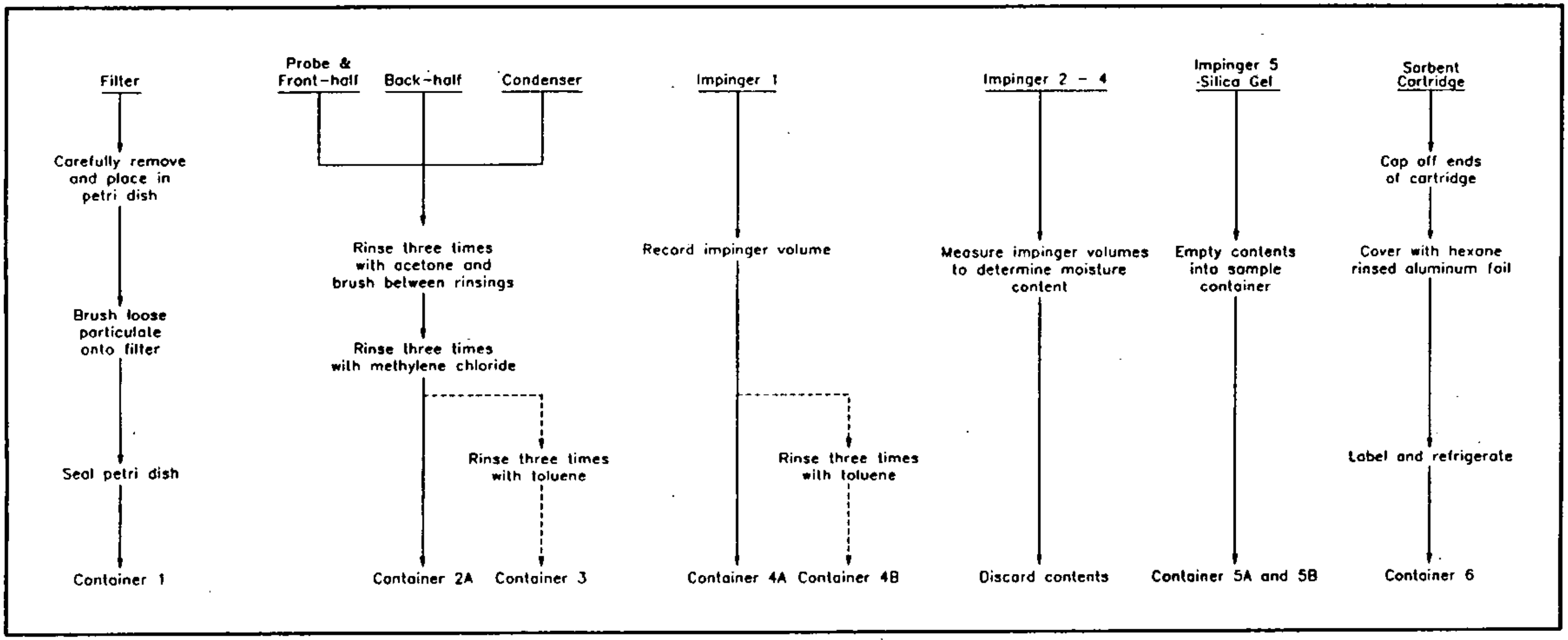


Figure 5.1.11-2: Method 0010 Recovery Procedure
Source: EPA 600/8-84-007

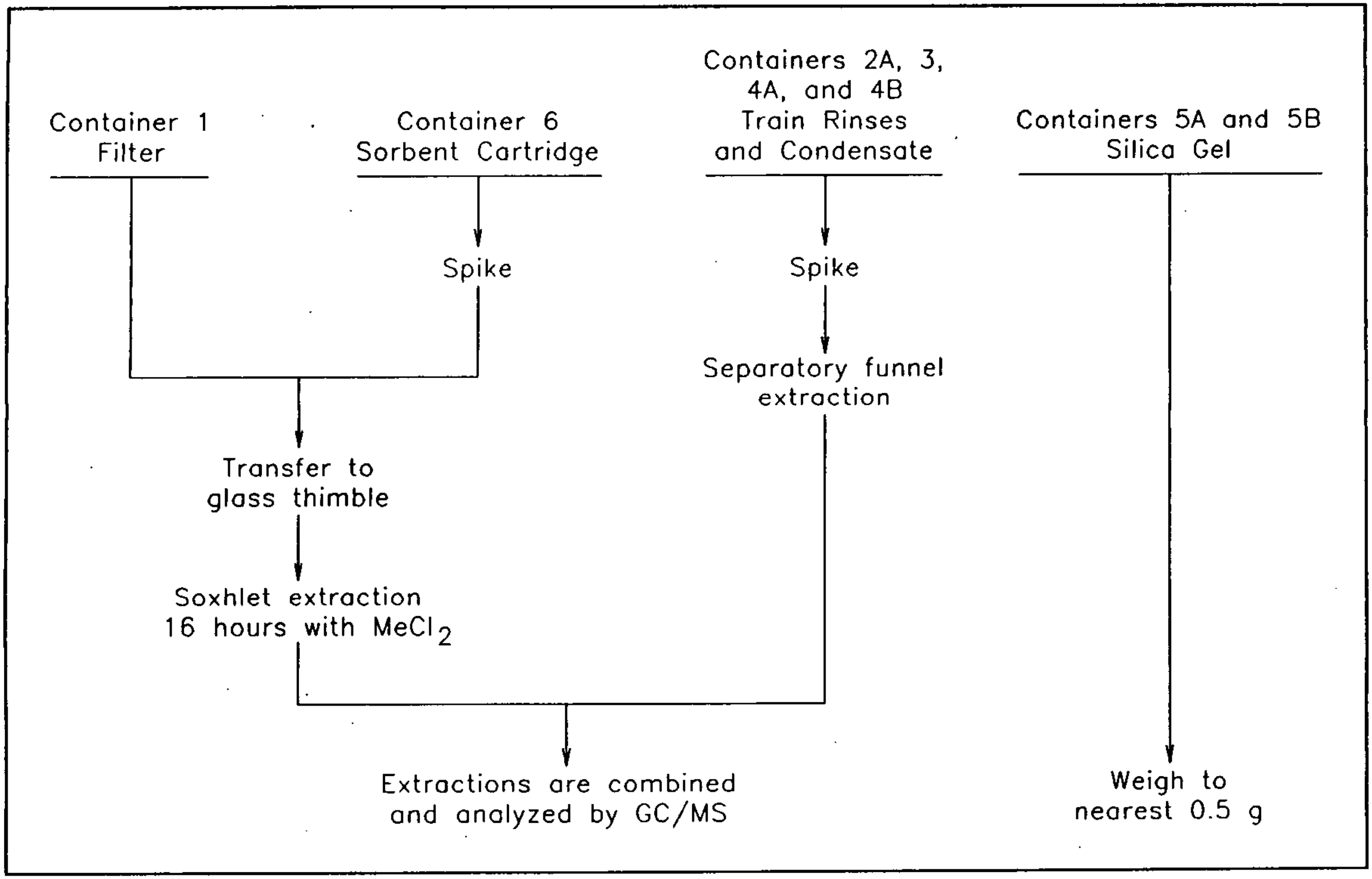


Figure 5.1.11-3: **Method 0010 Analysis Procedure**
Source: EPA 600/8-84-007

7.0 QA/QC ACTIVITIES

Specific quality control (QC) procedures were followed to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Strict adherence to prescribed procedures is quite often the most applicable QC check. A discussion of both the sampling and analytical QC checks that were utilized during this program are presented below.

7.1 Equipment QC Procedures

7.1.1 Equipment Inspection and Maintenance: Each item of field test equipment was assigned a unique, permanent identification number. An effective preventive maintenance program was necessary to ensure data quality. Each item of equipment returning from the field was inspected before it was returned to storage. During the course of these inspections, items were cleaned, repaired, reconditioned, and recalibrated where necessary.

Each item of equipment transported to the field was inspected again before being packed to detect equipment problems which may originate during periods of storage. This minimizes lost time on the job site due to equipment failure.

Equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, ETS routinely transported to the job site spare equipment for all critical sampling train components.

7.1.2 Equipment Calibration: New items for which calibration was required were calibrated before initial field use. Equipment whose calibration status may change with use or time was inspected in the field before testing began and again upon return from each field use. When an item of equipment was found to be out of calibration, it was repaired and recalibrated or retired from service. All equipment was periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. ETS followed the calibration procedures outlined in the EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When these methods were inapplicable, ETS used methods such as those prescribed by the American Society for Testing and Materials (ASTM).

6.0 FACILITY PROCESS DATA

The facility process data reflects the specific operating conditions of the facility during the testing. This section is to contain this process data. However, this data was not available as of the final draft of this report. It is to be included at a later date by EPA/EIB personnel. Appendix I is to contain all facility operating data.

On-site, prior to the start of testing, the reading from the flue gas thermocouple-potentiometer combination was compared with an ASTM mercury-in-glass reference thermometer. If the two agree within ± 1.5 percent (absolute), the thermocouple and potentiometer were considered to be in proper working order for the test series. After each field use, the thermocouple-potentiometer system was compared with an ASTM mercury-in-glass reference thermometer at a temperature within ± 10 percent of the average absolute flue gas temperature data. If the absolute temperatures agree within ± 1.5 percent, the temperature data were considered valid.

7.1.2.5 Dry Gas Meter and Orifice: Two procedures were used to calibrate the dry gas meter and orifice simultaneously. The full calibration was a complete laboratory procedure used to obtain the calibration factor of the dry gas meter. Full calibrations are performed over a wide range of orifice settings. A simpler procedure, the post test calibration, was designed to check whether the calibration factor had changed. Post test calibrations were performed after each field test series at an intermediate orifice setting (based on the test data) and at the maximum vacuum reached during the test.

Each metering system received a full calibration at the time of purchase and a post test calibration after each field use. If the calibration factor Y deviated by less than five percent from the initial value, the test data were acceptable. If Y deviated by more than 5 percent, the meter was recalibrated and the meter coefficient (initial or recalibrated) that yielded the lowest sample volume for the test runs was used. EPA Method 5 requires another full calibration anytime the post test calibration check indicates that Y had changed by more than 5 percent. Standard practice at ETS is to recalibrate the dry gas meter anytime Y was found to be outside the range of 0.98 to 1.02.

An orifice calibration factor was calculated for each flow setting during a full calibration. If the range of values did not vary by more than 0.15 in. H_2O over the range of 0.4 to 4.0 in. H_2O, the arithmetic average of the values obtained during the calibration was used.

7.2 Sampling QC Procedures

7.2.1 Pre-Test QC Checks and Procedures: The following pretest QC checks were conducted:

- All sampling equipment was thoroughly checked to ensure clean and operable components.
- Equipment was inspected for possible damage from shipment.

Data obtained during calibrations were recorded on standardized forms, which were checked for completeness and accuracy by the quality assurance director or the quality assurance manager. Data reduction and subsequent calculations were performed using ETS's own computer facilities. Calculations were checked at least twice for accuracy.

Emissions sampling equipment requiring calibration included pitot tubes, pressure gauges, thermometers, dry gas meters, and barometers. The following sections elaborate on the calibration procedures followed by ETS for these items of equipment.

7.1.2.1 Pitot Tubes: All Type-S pitot tubes used by ETS, whether separate or attached to a sampling probe, are constructed in-house. Each new pitot was calibrated in accordance with the geometric standards contained in EPA Method 2. A Type S pitot tube, constructed and positioned according to these standards, had a coefficient of 0.84 ± 0.02. This coefficient should not change as long as the pitot tube was not damaged. The actual coefficient of each pitot tube was determined using a wind tunnel calibration against a standard NIST traceable pitot tube. These calibrations were performed in accordance with EPA Method 2 procedures.

Each pitot tube was inspected visually upon return from the field. If a cursory inspection indicated damage or raised doubt that the pitot remained true to its original calibration, the pitot tube was refurbished as needed and recalibrated.

7.1.2.2 Impinger Thermometer: Prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger was compared with a mercury-in-glass thermometer which meets ASTM E-1 No. 63F specifications. The impinger thermometer was adjusted when necessary until it agreed within 2°F of the reference thermometer. If the thermometer was not adjustable, it was labeled with a correction factor.

7.1.2.3 Dry Gas Meter Thermometer: The thermometer used to measure the temperature of the metered gas sample was checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer was acceptable if the values agree within ± 5.4°F. Thermometers not meeting this requirement were adjusted or labeled with a correction factor.

7.1.2.4 Flue Gas Temperature Sensor: All thermocouples employed for the measurement of flue gas temperatures were calibrated upon receipt. Initial calibrations were performed at three points (ice bath, boiling water, and furnace). An ASTM mercury-in-glass thermometer was used as a reference. The thermocouple was acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

- Maintained ice in the ice bath at all times.

- Make proper readings of the dry gas meter, delta P and delta H, temperature, and pump vacuum during sampling at each traverse point.

- Maintained isokinetic sampling within the requirements of each method.

7.2.3 QC Checks and Procedures After Testing:

- Visually inspect the sampling nozzle.

- Visually inspect the Type S pitot tube.

- Leak check each leg of the Type S pitot tube.

- Leak check the entire sampling train.

7.3 Analytical QA Procedures

All analytical QA procedures followed those given in each test method. Each test method along with the prescribed reference sections regarding auditing procedures are as follows:

Test Method		Reference
Method 29	-	Method 29, Section 7 proposed to be added to Appendix A of 40 CFR 60
Method 26	-	Method 26, Section 6.2 of 40 CFR 60
Method 18	-	Method 18, Section 7.4.4.3 of 40 CFR 60

- The oil manometer used to measure pressure across the Type S pitot tube was leveled and zeroed.

- The number and location of the sampling traverse points were checked before taking measurements.

- The temperature measurement system was visually checked for damage and operability by measuring the ambient temperature prior to each traverse.

- All cleaned glassware and sample train components were kept sealed until train assembly.

- The sampling trains were assembled in an environment free from uncontrolled dust.

- Each sampling train was visually inspected for proper assembly.

- Pretest calculations determined the proper sampling nozzle size.

7.2.2 <u>QC Checks and Procedures During Testing</u>: The following checks and procedures will be conducted during testing:

- Readings of temperature and differential pressure were taken at each traverse point.

- All sampling data and calculations were recorded on preformatted data sheets.

- All calibration data forms were reviewed for completeness and accuracy.

- Any unusual occurrences were noted during each run on the appropriate data form.

- The project supervisor reviewed sampling data sheets daily during testing.

- The roll and pitch axis of the Type S pitot tube and the sampling nozzle were properly maintained.

- Leak check the train before and after any filter change.

- Conduct additional leak checks if the sampling time exceeded 4 hours.

- Maintained the probe, filter and impingers at the proper temperature.

- Copies of the QC data tabulation were submitted to the quality assurance manager following the completion of the test program.

- All hard copy raw data (i.e., strip charts, computer printouts, etc.) were maintained in organized files.

7.5 QA/QC Checks of Data Reduction

Calculations that were to be used in the field were checked by the QA officer prior to testing with predetermined data. The QA officer performed random checks in the field to insure data was being properly recorded. Upon completion of the testing, data was then transferred from the data sheets to the computer. This process was also reviewed and checked by the QA officer. When multiple tests were performed in one location, data from each test were compared.

7.6 Sample Identification and Custody

Each test run was assigned a unique run identification (i.d.) which consisted of a 3 digit code for the location, the test method and the specific test run. Labels were pre-printed with the test method, the container number, a unique client/sample i.d., a space to write in the run number described above and the contents of the sample container. As each sample was recovered, its sample label was attached and the sample number and contents were recorded in the chain of custody section of the run sheet. The run identification, the sample number and contents were then recorded in a bound field sample log that was maintained by the sample recovery person. A three way check was then made by the recovery person to insure that the sample label information, the log book information and the run sheet chain of custody all corresponded correctly.

When the samples were returned for analysis, the team leader again checked to see that the sample label information, the run sheet chain of custody and the field log book information all corresponded correctly. Any discrepancies were brought to the attention of the project manager. If any condition existed that may influence the integrity of the sample, it was noted and brought to the attention of the project manager (i.e. broken seals, leaking samples, improper storage temperature). All of the chain of custody information was entered into a database. A print out of the computerized field log was made and checked against the chain of custody on the test run sheet. A copy of the computerized chain of custody accompanied the samples to the location where they were to be analyzed. Each sample label was checked again against the computerized field log as it was sent from sample management.

Method 0030 - Method 0030, Section 7.0 of SW - 846

Method 0010 - Method 0010, Section 11.0 of SW - 846

EPA audit samples were submitted and analyzed for trace metals following analytical procedures outlined in proposed EPA Method 29. A summary of the analytical results from the analyses of the audit samples is contained in Table 6.4-1.

TABLE 7.3-1: Summary of Results for Trace Metals Analyses on EPA Audit Samples.

COMPONENT		SAMPLE H399 - High Level Total µ/filter	SAMPLE L399 - Low Level Total µ/filter
Antimony	Sb	7.28	1.04
Arsenic	As	12.8	9.00
Beryllium	Be	34.4	2.42
Cadmium	Cd	40.8	5.43
Chromium	Cr	40.0	7.24
Copper	Cu	43.1	7.24
Lead	Pb	184	21.8
Manganese	Mn	37.6	5.97
Mercury	Hg	< 2	< 2
Nickel	Ni	180	14.5
Phosphorus	P	64.8	48.7
Selenium	Se	3.45	1.15
Silver	Ag	7.63	4.57
Thallium	Tl	2.85	2.32
Zinc	Zn	110	54.6

7.4 Analytical QC Procedures

All analyses for this program were performed using accepted laboratory procedures in accordance with the specified analytical protocols. Adherence to prescribed QC procedures ensured data of consistent and measurable quality. Analytical QC focused upon the use of control standards to provide a measure of analytical precision and accuracy. Also, specific acceptance criteria were defined for various analytical operations including calibrations, control standard analyses, drift checks, blanks, etc. The following general QC procedures were incorporated into the analytical effort:

- The on-site project supervisor reviewed all analytical data and QC data on a daily basis for completeness and acceptability.

- Analytical QC data was tabulated using the appropriate charts and forms on a daily basis.

APPENDIX A

TEST LOG

GENERAL SHALE BRICK PLANT
JOHNSON CITY, TENNESSEE
TEST LOG

LOCATION	TEST METHOD	RUN NUMBER	TEST PARAMETER(S)	DATE	START TIME	END TIME	COMMENTS
Baghouse Outlet	EPA Method 201A	BO-M201A-R1	PM/PM10	07/27/93	09:04	10:17	
Baghouse Outlet	EPA Method 201A	BO-M201A-R2	PM/PM10	07/27/93	10:55	12:18	
Baghouse Outlet	EPA Method 201A	BO-M201A-R3	PM/PM10	07/27/93	13:05	14:36	
Kiln A Dryer Stack	EPA Methods 1-4	KAD-M1-4-R1	Velocity, Moisture, Gas Flowrate	07/28/93	11:05	12:05	
Kiln A Dryer Stack	EPA Methods 1-4	KAD-M1-4-R2	Velocity, Moisture, Gas Flowrate	07/28/93	12:40	13:40	
Kiln A Dryer Stack	EPA Methods 1-4	KAD-M1-4-R3	Velocity, Moisture, Gas Flowrate	07/28/93	14:15	15:15	
Kiln A Dryer Stack	EPA Method 25A	DSO-M25A-R1	Total Hydrocarbons	07/28/93	11:05	12:05	
Kiln A Dryer Stack	EPA Method 25A	DSO-M25A-R2	Total Hydrocarbons	07/28/93	12:40	13:40	
Kiln A Dryer Stack	EPA Method 25A	DSO-M25A-R3	Total Hydrocarbons	07/28/93	14:15	15:15	
Kiln A Dryer Stack	Modified Meth. 25A	DSO-MM25A-R1	Methane/Ethane	07/28/93	10:46	11:00	
Kiln A Dryer Stack	Modified Meth. 25A	DSO-MM25A-R2	Methane/Ethane	07/28/93	12:20	12:34	
Kiln A Dryer Stack	Modified Meth. 25A	DSO-MM25A-R3	Methane/Ethane	07/28/93	13:53	14:07	
Kiln Combustion Exhaust	Method 0010	KCE-M0010-R1	Semivolatiles	07/29/93	08:43	13:11	
Kiln Combustion Exhaust	Method 0010	KCE-M0010-R2	Semivolatiles	07/29/93	14:12	17:42	
Kiln Combustion Exhaust	Method 0010	KCE-M0010-R3	Semivolatiles	07/30/93	08:15	11:49	
Kiln Combustion Exhaust	Modified Meth. 25A	KCE-MM25A-R1	Methane/Ethane	07/29/93	08:31	08:45	
Kiln Combustion Exhaust	Modified Meth. 25A	KCE-MM25A-R2	Methane/Ethane	07/29/93	11:19	11:33	
Kiln Combustion Exhaust	Modified Meth. 25A	KCE-MM25A-R3	Methane/Ethane	07/29/93	13:54	14:07	
Kiln Combustion Exhaust	Modified Meth. 25A	KCE-MM25A-R4	Methane/Ethane	07/29/93	17:45	17:59	Diagnostic data - no gas flowrate data
Kiln Combustion Exhaust	Modified Meth. 25A	KCE-MM25A-R5	Methane/Ethane	07/29/93	22:45	22:59	Diagnostic data - no gas flowrate data
Kiln Combustion Exhaust	Modified Meth. 25A	KCE-MM25A-R6	Methane/Ethane	07/30/93	09:18	09:32	Diagnostic data - no gas flowrate data
Kiln Combustion Exhaust	EPA Method 25A	KCE-M25A-R1	Total Hydrocarbons	07/29/93	08:48	10:48	
Kiln Combustion Exhaust	EPA Method 25A	KCE-M25A-R2	Total Hydrocarbons	07/29/93	11:38	13:38	
Kiln Combustion Exhaust	EPA Method 25A	KCE-M25A-R3	Total Hydrocarbons	07/29/93	14:26	15:26	Port stuffer fire, test ended after one hour
Kiln Combustion Exhaust	EPA Method 25A	KCE-M25A-R4	Total Hydrocarbons	07/29/93	18:00	22:30	Diagnostic data - no gas flowrate data
Kiln Combustion Exhaust	EPA Method 25A	KCE-M25A-R5	Total Hydrocarbons	07/30/93	09:38	17:49	Diagnostic data - no gas flowrate data
Kiln Combustion Exhaust	EPA Method 26	KCE-M26-R1	Hydrogen Fluoride	07/30/93	12:28	14:44	
Kiln Combustion Exhaust	EPA Method 26	KCE-M26-R2	Hydrogen Fluoride	07/30/93	15:12	17:31	
Kiln Combustion Exhaust	EPA Method 26	KCE-M26-R3	Hydrogen Fluoride	07/31/93	09:05	11:24	
Kiln Combustion Exhaust	Method 0030	KCE-M0030-R1	Volatile Organic Compounds	07/29/93	09:23	12:50	
Kiln Combustion Exhaust	Method 0030	KCE-M0030-R2	Volatile Organic Compounds	07/29/93	14:12	17:49	
Kiln Combustion Exhaust	Method 0030	KCE-M0030-R3	Volatile Organic Compounds	07/30/93	08:15	11:33	
Kiln Combustion Exhaust	EPA Method 29	KCE-M29-R1	Multiple Metals/Particulate Matter	07/30/93	12:28	14:44	
Kiln Combustion Exhaust	EPA Method 29	KCE-M29-R2	Multiple Metals/Particulate Matter	07/30/93	15:12	17:31	
Kiln Combustion Exhaust	EPA Method 29	KCE-M29-R3	Multiple Metals/Particulate Matter	07/31/93	09:05	11:24	
Kiln Combustion Exhaust	EPA Method 7E	KCE-M7E-R1	Nitrogen Oxides	07/30/93	12:29	14:44	
Kiln Combustion Exhaust	EPA Method 7E	KCE-M7E-R2	Nitrogen Oxides	07/30/93	15:12	17:31	
Kiln Combustion Exhaust	EPA Method 7E	KCE-M7E-R3	Nitrogen Oxides	07/31/93	09:05	11:24	
Kiln Combustion Exhaust	Modified EPA Method 10	KCE-M10-R1	Carbon Monoxide	07/30/93	12:29	14:44	
Kiln Combustion Exhaust	Modified EPA Method 10	KCE-M10-R2	Carbon Monoxide	07/30/93	15:12	17:31	
Kiln Combustion Exhaust	Modified EPA Method 10	KCE-M10-R3	Carbon Monoxide	07/31/93	09:05	11:24	
Kiln Combustion Exhaust	EPA Methods 201A/202	KCE-M201A/202-R1	PM/PM10 and Condensible PM	07/31/93	11:45	13:29	
Kiln Combustion Exhaust	EPA Methods 201A/202	KCE-M201A/202-R2	PM/PM10 and Condensible PM	07/31/93	14:07	15:55	
Kiln Combustion Exhaust	EPA Methods 201A/202	KCE-M201A/202-R3	PM/PM10 and Condensible PM	07/31/93	16:47	18:26	

B.0

CRUSHING, GRINDING, AND SCREENING OPERATION APPENDICES

APPENDIX B.1

BAGHOUSE OUTLET

DATA AND RESULTS FOR EPA METHOD 201A TESTING

RUN NUMBER	BO-M201A-R1						
DATE	07/27/93		METHOD 4 DATA				
START TIME	09:04			INIT.	FINAL	NET	
END TIME	10:17			(ml)	(ml)	(ml)	
STACK DIAM.	34	inches	IMP.1	100.0	104.0	4.0	
NOZZLE I.D.	0.164	inches	IMP.2	100.0	100.0	0.0	
METER BOX GAMMA	1.00462		IMP.3	0.0	0.0	0.0	
METER BOX dH@	1.85206		IMP.4			0.0	
BAROMETRIC	30.09	in.Hg	IMP.5			0.0	
Cp	0.84		IMP.6			0.0	
TEST DURATION	66.0	minutes	IMP.7			0.0	
			TOTAL	200.0	204.0	4.0	
			S.G.	200.0	207.2	7.2	

SAMPLING RESULTS			**METHOD 3 DATA**			
Metered Volume	29.664	dcf	%O2	20.8	Md	28.85
Metered Volume	0.840	dcm	%CO2	0.1	Ms	28.66
Volume @ Std.Cond.	29.363	dscf	%CO	0.0	Ps	29.35
Volume @ Std.Cond.	0.831	dscm	%N2	79.1	Fo	1.000
% Water	1.76	%	O2+CO2	10.0	%EA	25243
% Isokinetics	103.9	%				

VOLUMETRIC RESULTS - USENG			**VOLUMETRIC RESULTS - SI**		
Velocity	51.28	ft/sec	Velocity	15.63	m/sec
Actual Flow	19401	acfm	Actual Flow	32962	am3/hr
Std. Flow	18747	scfm	Std. Flow	31852	sm3/hr
Dry Std. Flow	18418	dscfm	Dry Std. Flow	31292	dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DWELL TIME	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	68 >	-10.00	0.75	2.62	0.62	469.104	67	67
2	69 >	-10.00	0.65	2.44	0.62	498.768	72	70
3	70		0.96	2.96	0.62		72	71
4	75		0.91	2.89	0.62		74	72
5	75		0.98	2.99	0.62		75	72
6	75		1.00	3.03	0.62		77	73
7	76		0.84	2.77	0.62		77	74
8	77		0.85	2.79	0.62		79	75
9	77		0.71	2.55	0.62		80	76
10	77		0.63	2.40	0.62		81	76
11	78		0.60	2.34	0.62		81	77
12	79		0.59	2.32	0.62		82	78
13	76		0.55	2.24	0.62		87	86
14	72		0.76	2.64	0.62		83	80
15	77		0.62	2.38	0.62		83	81
16	78		0.72	2.57	0.62		84	82
17	78		0.80	2.71	0.62		84	82
18	78		1.00	3.03	0.62		85	83
19	78		0.89	2.85	0.62		85	83
20	78		0.95	2.95	0.62		85	83
21	78		0.96	2.96	0.62		85	83
22	79		0.97	2.98	0.62		86	84
23	79		0.93	2.92	0.62		87	85
24	79		0.75	2.62	0.62		87	86
25						498.768		
AVG.	76 >	-10.00	0.81	2.71	0.62	29.664	80	

EPA METHOD 201A ANALYSES

RUN I.D. **BO-M201A-R1**

SUMMARY

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
PM10:		
Probe Wash <= 10 microns	0.00260	0.00260
Filter	0.00410	0.00410
TOTAL PM10	0.00670	0.00670
PM (>10 Microns):		
Probe Wash > 10 microns	0.00270	0.00174
TOTAL PM	0.0094	0.00844

ANALYTICAL DATA

METHOD 201A COMPONENTS:

	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Filter	0.54180	0.54590	0.00410	NA
Probe Wash Residue <= PM10	66.35430	66.35690	0.00260	124.0
Acetone Blank Residue	67.18690	67.18690	0.00000	125.0
Applicable Acetone Blank			0.00000	124.0
Max. Allowable Blank			0.00097	NA
Probe Wash Residue > PM10	64.90430	64.90700	0.00270	122.0
Acetone Blank Residue	67.28290	67.28440	0.00150	125.0
Applicable Acetone Blank			0.00146	122
Max. Allowable Blank			0.00096	NA

PARTICULATE EMISSIONS:

	PM10	PM>10 u	TOTAL PM
Actual Grain Loading (gr/dscf)	0.00352	0.00092	0.00444
Mass Rate (lb/hr)	0.556	0.145	0.700

D50 Calculations

RUN I.D. **BO-M201A-R1**

Stack Gas Viscosity (micropoise)	181.0818
Cyclone Flow Rate (dscf/min)	0.444895
Cyclone Flow Rate (acfm)	0.468831
D50	9.710571

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	181.7729
Cyclone Flow Rate (acfm)	0.451525

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	74.60326	62.87641	91.91469	1.203301	2.571394
0.15	61.32719	52.54302	76.21100	0.840289	1.767804
0.164	51.30361	44.79688	64.40361	0.610793	1.262464
0.18	42.58833	38.11672	54.18842	0.442211	0.893741
0.197	35.55520	32.77620	45.99485	0.326976	0.643898
0.215	29.85099	28.48740	39.39548	0.247004	0.472380
0.233	25.41697	25.18559	34.30391	0.193065	0.358167
0.264	19.79829	21.04721	27.91599	0.134830	0.237195
0.3	15.33180	17.79213	22.90333	0.096351	0.159660
0.342	11.79732	15.22575	18.98377	0.070560	0.109689
0.39	9.07207	13.23111	15.98466	0.053283	0.077769

RUN NUMBER	BO-M201A-R2

				METHOD 4 DATA			
DATE	07/27/93				INIT. (ml)	FINAL (ml)	NET (ml)
START TIME	10:55						
END TIME	12:18						
STACK DIAM.	34	inches		IMP.1	100.0	118.0	18.0
NOZZLE I.D.	0.164	inches		IMP.2	100.0	100.0	0.0
METER BOX GAMMA	1.00462			IMP.3	0.0	0.0	0.0
METER BOX dH@	1.85206			IMP.4			0.0
BAROMETRIC	30.09	in.Hg		IMP.5			0.0
Cp	0.84			IMP.6			0.0
TEST DURATION	81.0	minutes		IMP.7			0.0
				TOTAL	200.0	218.0	18.0
				S.G.	200.0	204.9	4.8

SAMPLING RESULTS			METHOD 3 DATA			
Metered Volume	37.423	dcf	%O2	20.8	Md	28.85
Metered Volume	1.060	dcm	%CO2	0.1	Ms	28.53
Volume @ Std.Cond.	35.918	dscf	%CO	0.0	Ps	29.35
Volume @ Std.Cond.	1.017	dscm	%N2	79.1	Fo	1.000
% Water	2.91	%	O2+CO2	20.9	%EA	25243
% Isokinetics	108.6	%				

VOLUMETRIC RESULTS - USENG			VOLUMETRIC RESULTS - SI		
Velocity	49.93	ft/sec	Velocity	15.22	m/sec
Actual Flow	18887	acfm	Actual Flow	32090	am3/hr
Std. Flow	18085	scfm	Std. Flow	30727	sm3/hr
Dry Std. Flow	17559	dscfm	Dry Std. Flow	29834	dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DWELL TIME	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	75 >	-10.00	0.87	3.63	0.63	499.080	88	90
2	74 >	-10.00	0.88	2.96	0.63	536.503	87	90
3	80		0.82	3.52	0.63		87	90
4	81		0.84	3.56	0.63		88	90
5	81		0.88	3.64	0.63		89	91
6	82		0.91	3.71	0.63		91	91
7	83		0.89	3.66	0.63		94	93
8	83		0.68	3.20	0.63		96	93
9	83		0.69	3.23	0.63		99	95
10	83		0.64	3.11	0.63		98	93
11	83		0.55	2.88	0.63		99	94
12	83		0.50	2.75	0.63		99	95
13	82		0.54	2.85	0.63		101	98
14	81		0.51	2.77	0.63		102	97
15	80		0.49	2.72	0.63		99	95
16	82		0.66	3.16	0.63		102	98
17	84		0.82	3.52	0.63		101	98
18	84		0.84	3.56	0.63		103	99
19	83		0.82	3.52	0.63		102	98
20	83		0.78	3.43	0.63		103	98
21	83		0.85	3.58	0.63		103	99
22	84		0.87	3.63	0.63		104	100
23	83		0.91	3.71	0.63		104	100
24	84		0.90	3.69	0.63		104	101
25						536.503		
AVG.	82 >	-10.00	0.76	3.33	0.63	37.423	96	

EPA METHOD 201A ANALYSES

RUN I.D. **BO-M201A-R2**

SUMMARY

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
PM10:		
Probe Wash <= 10 microns	0.00190	0.00190
Filter	0.00127	0.00127
TOTAL PM10	0.00317	0.00317
PM (>10 Microns):		
Probe Wash > 10 microns	0.00160	0.00064
TOTAL PM	0.00477	0.00381

ANALYTICAL DATA

METHOD 201A COMPONENTS:

	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Filter	0.53753	0.53880	0.00127	NA
Probe Wash Residue <= PM10	67.19910	67.20100	0.00190	110.0
Acetone Blank Residue	67.18690	67.18690	0.00000	125.0
Applicable Acetone Blank			0.00000	110.0
Max. Allowable Blank			0.00086	NA
Probe Wash Residue > PM10	66.23130	66.23290	0.00160	122.0
Acetone Blank Residue	67.28290	67.28440	0.00150	125.0
Applicable Acetone Blank			0.00146	122
Max. Allowable Blank			0.00096	NA

PARTICULATE EMISSIONS:

	PM10	PM>10 u	TOTAL PM
Actual Grain Loading (gr/dscf)	0.00136	0.00028	0.00164
Mass Rate (lb/hr)	0.205	0.042	0.247

D50 Calculations

RUN I.D. **BO-M201A-R2**

Stack Gas Viscosity (micropoise)	181.6198
Cyclone Flow Rate (dscf/min)	0.443433
Cyclone Flow Rate (acfm)	0.477898
D50	9.629951

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	182.4166
Cyclone Flow Rate (acfm)	0.455138

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	75.20010	63.36569	92.63959	1.203866	2.573137
0.15	61.81782	52.94856	76.80934	0.840578	1.768878
0.164	51.71405	45.13949	64.90662	0.610918	1.263129
0.18	42.92904	38.40492	54.60880	0.442225	0.894118
0.197	35.83965	33.02083	46.34879	0.326923	0.644090
0.215	30.08980	28.69698	39.69581	0.246912	0.472453
0.233	25.62031	25.36821	34.56279	0.192952	0.358168
0.264	19.95668	21.19609	28.12280	0.134704	0.237130
0.3	15.45446	17.91466	23.06928	0.096225	0.159565
0.342	11.89170	15.32779	19.11790	0.070442	0.109585
0.39	9.14465	13.31754	16.09464	0.053176	0.077666

RUN NUMBER	BO-M201A-R3						
DATE	07/27/93		**METHOD 4 DATA**				
START TIME	13:05			INIT. (ml)	FINAL (ml)	NET (ml)	
END TIME	14:36						
STACK DIAM.	34	inches	IMP.1	100.0	121.0	21.0	
NOZZLE I.D.	0.180	inches	IMP.2	100.0	100.0	0.0	
METER BOX GAMMA	1.00462		IMP.3	0.0	0.0	0.0	
METER BOX dH@	1.85206		IMP.4			0.0	
BAROMETRIC	30.09	in.Hg	IMP.5			0.0	
Cp	0.84		IMP.6			0.0	
TEST DURATION	90	minutes	IMP.7			0.0	
			TOTAL	200.0	221.0	21.0	
			S.G.	200.0	210.0	10.0	

SAMPLING RESULTS			**METHOD 3 DATA**			
Metered Volume	42.414	dcf	%O2	20.8	Md	28.85
Metered Volume	1.201	dcm	%CO2	0.1	Ms	28.47
Volume @ Std.Cond.	40.152	dscf	%CO	0.0	Ps	29.35
Volume @ Std.Cond.	1.137	dscm	%N2	79.1	Fo	1.000
% Water	3.51	%	O2+CO2	20.9	%EA	25243
% Isokinetics	99.3	%				

VOLUMETRIC RESULTS - USENG			**VOLUMETRIC RESULTS - SI**		
Velocity	46.37	ft/sec	Velocity	14.13	m/sec
Actual Flow	17540	acfm	Actual Flow	29801	am3/hr
Std. Flow	16617	scfm	Std. Flow	28233	sm3/hr
Dry Std. Flow	16034	dscfm	Dry Std. Flow	27243	dsm3/hr

POINT	STACK TEMP (DegF)		STATIC (in.WC)	DP (in.WC)	DWELL TIME	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	83	>	-10.00	0.73	4.08	0.66	536.880	104	101
2	85	>	-10.00	0.74	4.10	0.66	579.294	103	102
3	87			0.62	3.75	0.66		101	101
4	87			0.73	4.08	0.66		103	102
5	86			0.76	4.15	0.66		103	101
6	86			0.74	4.10	0.66		106	103
7	86			0.65	3.84	0.66		105	102
8	86			0.57	3.60	0.66		107	103
9	87			0.50	3.37	0.66		106	102
10	87			0.46	3.23	0.66		108	104
11	90			0.48	3.30	0.66		106	102
12	88			0.46	3.23	0.66		108	104
13	87			0.50	3.37	0.66		104	101
14	87			0.53	3.47	0.66		105	103
15	88			0.55	3.53	0.66		105	103
16	88			0.55	3.53	0.66		108	104
17	86			0.67	3.90	0.66		106	103
18	88			0.77	4.18	0.66		106	102
19	86			0.76	4.15	0.66		105	103
20	87			0.65	3.84	0.66		106	102
21	87			0.75	4.13	0.66		107	102
22	86			0.76	4.15	0.66		108	104
23	88			0.76	4.15	0.66		108	105
24	87			0.72	4.04	0.66		110	104
25							579.294		
AVG.	87	>	-10.00	0.64	3.80	0.66	42.414	104	

EPA METHOD 201A ANALYSES
RUN I.D. **BO-M201A-R3**

SUMMARY

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
PM10:		
Probe Wash <= 10 microns	0.00200	0.00200
Filter	0.00119	0.00119
TOTAL PM10	0.00319	0.00319
PM (>10 Microns):		
Probe Wash > 10 microns	0.00390	0.00320
TOTAL PM	0.00709	0.00639

ANALYTICAL DATA

METHOD 201A COMPONENTS:

	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Filter	0.53611	0.53730	0.00119	NA
Probe Wash Residue <= PM10	66.36540	66.36740	0.00200	120.0
Acetone Blank Residue	67.18690	67.18690	0.00000	120.0
Applicable Acetone Blank			0.00000	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	65.57020	65.57410	0.00390	89.0
Acetone Blank Residue	67.28290	67.28440	0.00150	125.0
Applicable Acetone Blank			0.00107	89
Max. Allowable Blank			0.00070	NA

PARTICULATE EMISSIONS:

	PM10	PM>10 u	TOTAL PM
Actual Grain Loading (gr/dscf)	0.00123	0.00123	0.00246
Mass Rate (lb/hr)	0.168	0.169	0.338

D50 Calculations

RUN I.D. **BO-M201A-R3**

Stack Gas Viscosity (micropoise)	182.3753
Cyclone Flow Rate (dscf/min)	0.446134
Cyclone Flow Rate (acfm)	0.488233
D50	9.535618

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	183.2633
Cyclone Flow Rate (acfm)	0.45879

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	75.80348	63.86365	93.37496	1.209003	2.584524
0.15	62.31383	53.36212	77.41699	0.844085	1.776611
0.164	52.12899	45.48966	65.41811	0.613402	1.268574
0.18	43.27349	38.70033	55.03696	0.443965	0.897901
0.197	36.12722	33.27238	46.71001	0.328161	0.646755
0.215	30.33123	28.91329	40.00301	0.247808	0.474357
0.233	25.82588	25.55737	34.82826	0.193621	0.359570
0.264	20.11681	21.35130	28.33586	0.135135	0.238008
0.3	15.57846	18.04331	23.24122	0.096506	0.160117
0.342	11.98712	15.43571	19.25777	0.070627	0.109934
0.39	9.21802	13.40959	16.21014	0.053303	0.077892

APPENDIX B.2

DATA AND RESULTS OF TOTAL PARTICULATE SAMPLING FROM THE BAGHOUSE CATCH

92-655 WA14; Johnson City Brick
Baghouse Dust Collection Summary

Run Number	Bag Number	Date	Start Time	End Time	Time (sec)	Dust (lb)	Mass Rate (lb/min)
BO-M201A-R1	1	07/27/93	09:05:00	09:06:00	60	20.0	20.0
BO-M201A-R1	2	07/27/93	09:07:00	09:08:00	60	26.0	26.0
BO-M201A-R1	3	07/27/93	09:10:00	09:11:00	60	21.5	21.5
BO-M201A-R1	4	07/27/93	09:45:00	09:45:30	30	16.0	32.0
BO-M201A-R1	5	07/27/93	09:48:00	09:49:00	60	35.5	35.5
Average							27.0
BO-M201A-R2	6	07/27/93	11:10:00	11:10:30	30	20.5	41.0
BO-M201A-R2	7	07/27/93	11:12:00	11:12:30	30	20.5	41.0
BO-M201A-R2	8	07/27/93	11:14:00	11:14:30	30	16.5	33.0
BO-M201A-R2	9	07/27/93	11:17:00	11:17:30	30	17.5	35.0
BO-M201A-R2	10	07/27/93	11:19:00	11:19:30	30	22.5	45.0
Average							39.0
BO-M201A-R3	11	07/27/93	13:15:00	13:15:30	30	16.5	33.0
BO-M201A-R3	12	07/27/93	13:17:00	13:17:30	30	34.0	68.0
BO-M201A-R3	13	07/27/93	13:19:00	13:19:30	30	61.0	122.0
BO-M201A-R3	14	07/27/93	13:21:00	13:21:30	30	19.0	38.0
BO-M201A-R3	15	07/27/93	13:23:00	13:23:30	30	17.0	34.0
Average							59.0
Average not including Bag Number 13							43.3

APPENDIX B.3

PROCESS SAMPLING

DATA AND RESULTS FOR MOISTURE AND SIEVE ANALYSIS

DUST MOISTURE CONTENT

ETS CONTRACT: 92-655 WA 14
SITE : JOHNSON CITY BRICK
SAMPLE TYPE : SHALE AND CLAY FROM GRINDING ROOM EXIT

ETS ID	CLIENT ID	CRUCIBLE INT.WT.	CRUCIBLE+DUST INT.WT.	CRUCIBLE+DUST WT.AFTER DRYING		% MOISTURE
6158D	RUN 1	14.3588	22.0001	21.3828		8.08
		14.1548	23.6043	22.8359		8.13
					AVG.	8.11
6159D	RUN 2	14.5292	23.9142	23.1462		8.18
		13.6661	20.9466	20.3592		8.07
					AVG.	8.13
6160D	RUN 3	14.6246	22.5001	21.6511		10.78
		15.3362	23.2467	22.3888		10.85
					AVG.	10.81

SIEVE ANALYSIS RESULTS FOR EPA BRICK PLANT

ETS CONTRACT : 92-655 WA 14

SAMPLE TYPE : SHALE AND CLAY FROM GRINDING ROOM EXIT

SAMPLE ID : RUN 1

ETS ID : 6158D

AS-IS SAMPLE WT.(gms) : 137.3048

		SAMPLE WT.(gms)	PERCENT LESS THAN	SIZE (microns)
18 MESH SAMPLE	:	57.0190	58.4727	1000
20 MESH SAMPLE	:	6.8928	53.4526	850
25 MESH SAMPLE	:	6.5617	48.6737	710
30 MESH SAMPLE	:	5.2896	44.8212	600
35 MESH SAMPLE	:	4.3285	41.6688	500
60 MESH SAMPLE	:	15.5314	30.3571	250
80 MESH SAMPLE	:	5.3679	26.4477	180
100 MESH SAMPLE	:	2.2323	24.8219	150
200 MESH SAMPLE	:	11.7782	16.2437	75

SIEVE ANALYSIS RESULTS FOR EPA BRICK PLANT

ETS CONTRACT : 92-655 WA 14

SAMPLE TYPE : SHALE AND CLAY FROM GRINDING ROOM EXIT

SAMPLE ID : RUN 2

ETS ID : 6159D

AS-IS SAMPLE WT.(gms) : 136.9568

		SAMPLE WT.(gms)	PERCENT LESS THAN	SIZE (microns)
18 MESH SAMPLE	:	52.2936	61.8174	1000
20 MESH SAMPLE	:	6.8745	56.7980	850
25 MESH SAMPLE	:	6.6489	51.9432	710
30 MESH SAMPLE	:	5.5286	47.9065	600
35 MESH SAMPLE	:	5.2587	44.0668	500
60 MESH SAMPLE	:	16.4524	32.0540	250
80 MESH SAMPLE	:	5.8695	27.7683	180
100 MESH SAMPLE	:	2.1479	26.2000	150
200 MESH SAMPLE	:	10.6590	18.4173	75

SIEVE ANALYSIS RESULTS FOR EPA BRICK PLANT

ETS CONTRACT : 92-655 WA 14

SAMPLE TYPE : SHALE AND CLAY FROM GRINDING ROOM EXIT

SAMPLE ID : RUN 3

ETS ID : 6160D

AS-IS SAMPLE WT.(gms) : 137.2600

		SAMPLE WT.(gms)	PERCENT LESS THAN	SIZE (microns)
18 MESH SAMPLE (gms)	:	36.2624	73.5812	1000
20 MESH SAMPLE (gms)	:	6.6530	68.7342	850
25 MESH SAMPLE (gms)	:	7.0444	63.6021	710
30 MESH SAMPLE (gms)	:	6.5583	58.8241	600
35 MESH SAMPLE (gms)	:	6.0927	54.3853	500
60 MESH SAMPLE (gms)	:	22.8304	37.7523	250
80 MESH SAMPLE (gms)	:	9.4026	30.9021	180
100 MESH SAMPLE (gms)	:	4.6225	27.5344	150
200 MESH SAMPLE (gms)	:	14.8698	16.7011	75

APPENDIX B.4

DATA AND RESULTS FOR HI-VOL AMBIENT SAMPLING

SUMMARY OF AMBIENT HI-VOL SAMPLING FOR TSP

GENERAL SHALE PLANT #10

RUN I.D.	RUN 1	RUN 2	RUN 3	AVERAGE
DATE	07/27/93	07/27/93	07/27/93	
START TIME	07:41	10:45	14:12	
END TIME	10:38	14:06	17:08	
TEST DURATION - Min.	177	201	175	
<u>SAMPLING DATA</u>				
Corr. Flow - scfm	39.9	40.1	41.3	
<u>GRAVIMETRIC DATA</u>				
Tare Filter Weight - gm	3.5084	2.6503	2.6450	
Final Filter Weight - gm	3.5488	2.6872	2.6722	
Net Filter Gain - gm	0.0404	0.0369	0.0272	
<u>TSP EMISSIONS</u>				
Conc. - ug/m3	202.14	161.77	132.98	165.6

SUMMARY OF AMBIENT SAMPLING FOR PM 10

GENERAL SHALE PLANT #10

RUN I.D.	RUN 1	RUN 2	RUN 3	AVERAGE
DATE	07/27/93	07/27/93	07/27/93	
START TIME	07:28	10:37	14:00	
END TIME	10:25	13:55	17:04	
TEST DURATION - Min.	177	198	179	
SAMPLING DATA				
Corr. Flow - scfm	39.6	39.4	40.7	
GRAVIMETRIC DATA				
Tare Filter Weight - gm	3.4604	2.6593	2.6377	
Final Filter Weight - gm	3.4920	2.6828	2.6590	
Net Filter Gain - gm	0.0316	0.0235	0.0213	
TSP EMISSIONS				
Conc. - ug/m3	159.31	106.44	103.31	123.0

APPENIDIX B.5

BAGHOUSE OUTLET

RAW FIELD SAMPLING DATA FOR EPA METHOD 201A TESTING

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Johnson City Brick

DATE 07-27-93

START TIME 09:04

TEST LOCATION Baghouse Outlet

RUN NUMBER BØ-M201A-R1

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp. Inlet	Meter Temp. Outlet	Imp. Temp.	Meter Vac.
A 1	0	09:04 ~~0~~		68	.75	2.62	0.62	469.104	67	67	60	3.5
2	2.6	~~2.6~~		69	.65	2.44	.62	470.3	72	70	57	3.5
3	5.9		>10.0	70	.96	2.96	.62	471.3	72	71	56	3.5
4	8.0			75	.91	2.89	.62	472.6	74	72	56	3.5
5	10.9			75	.98	2.99	.62	474.0	75	72	54	3.5
6	13.9			75	1.0	3.03	.62	475.3	77	73	54	3.5
7	16.9			76	.84	2.77	.62	476.6	77	74	55	3.5
8	19.7			77	.85	2.79	.62	477.8	79	75	58	3.5
9	22.5			77	.71	2.55	.62	479.2	80	76	59	3.5
10	25.0			77	.63	2.40	.62	480.2	81	76	62	3.5
11	27.4			78	.60	2.34	.62	481.2	81	77	62	3.5
12	29.7			79	.59	2.32	.62	482.3	82	78	62	3.5
	32.0	09:36						483.403				
B 1	32.0	09:43		76	.55	2.24	.62	483.403	87	86	66	3.8
2	34.2			72	.76	2.64	.62	484.4	83	80	62	3.8
3	36.8			77	.62	2.38	.62	485.5	83	81	61	3.8
4	39.2			78	.72	2.57	.62	486.6	84	82	61	3.8
5	41.8		>10.0	78	.80	2.71	.62	487.7	84	82	60	3.8
6	44.5			78	1.0	3.03	.62	489.0	85	83	59	3.8
7	48.5			78	.89	2.85	.62	490.8	85	83	60	3.8
8	51.3			78	.95	2.95	.62	492.1	85	83	60	3.8
9	54.2			78	.96	2.96	.62	493.5	85	83	60	3.8
10	57.3			79	.97	2.98	.62	494.9	86	84	61	3.5
11	60.3			79	.93	2.92	.62	496.3	87	85	61	3.5
12	63.2			79	.75	2.62	.62	497.5	87	86	62	3.5

498.768

CHAIN OF CUSTODY INFORMATION 058001

Container Number	Sample I.D.	Description
1	100	FG Filter
2	101	>PM10 Acetone Rinse
3	102	<PM10 Acetone Rinse
4	104	Silica Gel

LEAK CHECK

Vacuum	5"				
Rate	.006				

Dwell Time for Point 1 = 2.62

$t_1/\sqrt{P_1}$ = 3.03

IMPINGER VOLUMES

	Initial	Final
#1	100	104
#2	100	100
#3	0	0
#4	200g.	207.15g
#5	0	0

METER BOX I.D.	# 9
GAMMA	1.00462
DELTA H@	1.85206
OPERATOR	C. Fenwen
BAR. PRESS.	30.09
FILTER I.D.	G-92-117

FIELD DATA SHEET FOR METHOD 201A

FACILITY Johnson City Brick DATE 07-27-93

START TIME 10:55 TEST LOCATION Baghouse outlet RUN NUMBER BØ - MACIA-R2

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp. Inlet	Meter Temp. Outlet	Imp. Temp.	Meter Vac.
A 1	0	1055		75	.87	3.63	.63	499.080	88	90	67	3.3
2	3.6			74	.88	2.96	.63	500.6	87	90	56	3.3
3	6.6			80	.82	3.52	.63	502.0	87	90	56	3.3
4	10.1			81	.84	3.56	.63	503.6	88	90	58	3.3
5	13.7			81	.88	3.64	.63	505.3	89	91	60	3.3
6	17.3		>-10.0	82	.91	3.71	.63	506.9	91	91	61	3.3
7	21.0			83	.89	3.66	.63	508.6	94	93	63	3.3
8	24.6			83	.68	3.20	.63	510.2	96	93	62	3.3
9	27.8			83	.69	3.23	.63	511.7	97	95	63	3.3
10	31.0			83	.64	3.11	.63	513.2	98	93	63.	3.3
11	34.1			83	.55	2.88	.63	514.6	99	94	63	3.3
12	36.9			83	.50	2.75	.63	516.0	99	95	64	3.3
	39.6	11:35						517.340				
B 1	39.6	11:38		82	.54	2.85	.63	517.340	101	98	66	3.3
2	42.4			81	.51	2.77	.63	518.5	102	97	64	3.3
3	45.2			80	.49	2.72	.63	519.8	99	95	64	3.3
4	47.9		>-10.0	82	.66	3.16	.63	521.1	102	98	61	3.3
5	51.1			84	.82	3.52	.63	522.6	101	98	59	3.3
6	54.6			84	.84	3.56	.63	524.2	103	99	58	3.3
7	58.2			83	.82	3.52	.63	525.9	102	98	58	3.3
8	61.7			83	.78	3.43	.63	527.6	103	98	59	3.3
9	65.1			83	.85	3.58	.63	529.2	103	99	59	3.3
10	68.7			84	.87	3.63	.63	530.9	104	100	59	3.3
11	72.3			83	.91	3.71	.63	532.6	104	100	61	3.3
12	77.0			84	.90	3.69	.63	534.9	104	101	61	3.3
								536.503				

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	106	Gelman Filter
2	107	>PM10 Acetone Rinse
3	108	<PM10 Acetone Rinse
4	110	SILICA GEL

LEAK CHECK

Vacuum	5"				
Rate	.002				

Dwell Time for Point 1 = 3.63

$t_1 / \sqrt{P_1}$ = 3.89

IMPINGER VOLUMES

	Initial	Final
#1	100 ml	118 ml
#2	100 ml	100 ml
#3	0 ml	0
#4	200 g.	204.85
#5		

METER BOX I.D.	# 9
GAMMA	1.0040
DELTA H@	1.8206
OPERATOR	C. Ferguson
BAR. PRESS.	30.09
FILTER I.D.	G-92-118

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Johnson City Brick

DATE 07-27-93

START TIME 13:05

TEST LOCATION Baghouse Outlet

RUN NUMBER BØ-M201A-R3

	Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp. Inlet	Meter Temp. Outlet	Imp. Temp.	Meter Vac.	
A	1	0	13:05		83	.73	4.08	.66	536.880	104	101	61	~~64~~ 3.3	LF
	2	4.0			85	.74	4.1	.66	538.8	103	102	58	3.3	
	3	8.1			87	.62	3.75	.66	540.7	101	101	57	3.3	
	4	11.8			87	.73	4.08	.66	542.5	103	102	57	3.3	
	5	15.8			86	.76	4.15	.66	544.4	103	101	56	3.3	
	6	19.9			86	.74	4.1	.66	546.3	106	103	56	3.3	
	7	24.0			86	.65	3.84	.66	548.3	105	102	57	3.3	
	8	27.8			86	.57	3.60	.66	550.1	107	103	57	3.3	
	9	31.4		>-10.0	87	.50	3.37	.66	551.8	106	102	59	3.3	
	10	34.8			87	.46	3.23	.66	553.4	108	104	59	3.3	
	11	38.0			90	.48	3.30	.66	555.0	106	102	60	3.3	
	12	41.3			88	.46	3.23	.66	556.5	108	104	61	3.3	
		43.2	13:48						557.468					
B	1	43.2	13:50		87	.50	3.37	.66	557.468	104	101	60	3.3	
	2	46.6			87	.53	3.47	.66	558.9	105	103	57	3.3	
	3	50.1			88	.55	3.53	.66	560.6	105	103	55	3.3	
	4	53.6		>-10.0	88	.55	3.53	.66	562.2	108	104	56	3.3	
	5	57.1			86	.67	3.90	.66	563.9	106	103	56	3.3	
	6	61.0			88	.77	4.18	.66	565.7	106	102	57	3.3	
	7	65.2			86	.76	4.15	.66	567.7	105	103	57	3.3	
	8	69.3			87	.65	3.84	.66	569.7	106	102	58	3.3	
	9	73.1			87	.75	4.13	.66	571.5	107	102	60	3.3	
	10	77.2			86	.76	4.15	.66	573.5	108	104	60	3.3	
	11	81.3			88	.76	4.15	.66	575.4	108	105	62	3.3	
	12	85.4			87	.72	4.04	.66	577.4	110	104	63	3.3	
									579.394					

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
112	1	Gelman filter
113	2	>PM10 Acetone Rinse
114	3	<PM10 Acetone Rinse
116	4	Silica gel

LEAK CHECK

Vacuum	5"				
Rate	.005				

Dwell Time for Point 1 = 4.08

$t_1/\sqrt{P_1}$ = 4.77

IMPINGER VOLUMES

	Initial	Final
#1	100	121
#2	100	100
#3	0	0
#4	200g	210.01
#5		

METER BOX I.D.	#9
GAMMA	1.0046
DELTA H@	1.8520
OPERATOR	C. Ferguson
BAR. PRESS.	30.09
FILTER I.D.	G-92-115

INTEGRATED BAG ANALYSIS DATA

Job Name	EPA Brick WA 14
Contract	92-655
Method of Analysis	O_2 / CO_2

Run Number	%O_2	%CO_2	
BO-M201A-R1	20.8	0.1	
BO-M201A-R2	20.8	0.1	
BO-M201A-R3	20.8	0.1	
KAD-M1-4-R1	19.4	.12	
KAD-M1-4-R2	18.8	.78	
KAD-M1-4-R3	18.7	.77	

APPENDIX B.6

RAW FIELD DATA FOR HI-VOL AMBIENT SAMPLING

3.4

PM-10 AIR QUALITY SAMPLE RECORD

NETWORK: ETS, Inc

SITE/ID: General Shale #10

SAMPLER NO: PM-10 TYPE ____

FILTER NO: 23225

STOP Date/Time: 7/27/93, 2903.2 min

START Date/Time: 2725.7 (0728) 7/27/93

Dickson Reading for this Sample:

START FLOW (cfm): 3.4 40

STOP FLOW (cfm): 3.4 40

AVG FLOW (cfm): 3.4 40 3.38

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: ____

F = Corr FLOW (scfm): 39.6

Dickson (cfm): ____

END Weight (gms): 3.4920

START Weight (gms): 3.4604

W=NET Weight (gms): 0.316

TIMER STOP: ____

TIMER START: ____

T = RUN TIME (Min): 177 Min

53 µg/m**3=W*(10**6)/(F*T*0.0283)

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 µg/m3
Secondary: 150 µg/m3

CHAIN OF CUSTODY NAME/DATE

Name	Date
DJU	7-23-93
DJU	7-29-93
[illegible signature]	7.31.93

Run 2

TSP / IP AIR QUALITY SAMPLE RECORD

NETWORK: ETS

SITE/ID: General Shale Plant #10

SAMPLER NO: PM-10 TYPE

FILTER NO: 25222

STOP Date/Time: 7/27/93 3101.5

1037 START Date/Time: 7/27/93 2903.2 (1037)

Dickson Reading for this Sample:

START FLOW (cfm): 3.4

STOP FLOW (cfm): 3 4

AVG FLOW (cfm): 3.36

Flowmeter/Orifice Operational Check:

DATE OF LAST CHECK:

F = Corr FLOW (scfm): 39.4

Dickson (cfm):

END Weight (gms): 2.6828

START Weight (gms): 2.6593

W-NET Weight (gms): 0.0235

TIMER STOP:

TIMER START:

T = RUN TIME (Min): 198 Min

106.4 μg/m**3=W*(10**6)/(F*T*0.0283)

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 μg/m3
Secondary: 150 μg/m3

CHAIN OF CUSTODY
NAME/DATE

NAME	DATE
DAU	7-27-93
DAU	7-29-93
[illegible]	7-31-93

Run 3

TSP / IP AIR QUALITY SAMPLE RECORD

NETWORK: ETS

SITE/ID: General Shale #10

SAMPLER NO: PM-10 TYPE

FILTER NO: 25322

STOP Date/Time: 7/27/93 (1704) 3280.0

START Date/Time: 7/27/93 1405 3101.5

Dickson Reading for this Sample:

START FLOW (cfm): 3.4

STOP FLOW (cfm): 3.4

AVG FLOW (cfm): ~~3.4~~ 3.52

Flowmeter/Orifice Operational Check:

DATE OF LAST CHECK:

F = Corr FLOW (scfm): 40.7

Dickson (cfm):

END Weight (gms): 2.6590

START Weight (gms): 2.6377

W-NET Weight (gms): 0.0213

TIMER STOP:

TIMER START:

T = RUN TIME (Min): 179 Min

103.3 ug/m**3=W*(10**6)/(F*T*0.0283)

CHAIN OF CUSTODY NAME/DATE

DAY	7-23-93
	/
DAY	7-28-93
[illegible]	7.31.93

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 ug/m3
Secondary: 150 ug/m3

Run 1

PM-10 AIR QUALITY SAMPLE RECORD

NETWORK: ETS

SITE/ID: General Shale #10

SAMPLER NO: Hi-Vol TYPE

FILTER NO: 25228

STOP Date/Time: 7/27/93

START Date/Time: 7/27/93 68220.0 (0741)

Dickson Reading for this Sample:

START FLOW (cfm): 3.3 (in H_2O)

STOP FLOW (cfm): 3.3

AVG FLOW (cfm): 3.3 3.28

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK:

F = Corr FLOW (scfm): 39.9

Dickson (cfm):

END Weight (gms): ~~3.8~~ 3.5488

START Weight (gms): 3.5084

W-NET Weight (gms): 0.0404

TIMER STOP:

TIMER START:

T = RUN TIME (Min): 177 Min

202.1 µg/m**3=W*(10**6)/(F*T*0.0283)

CHAIN OF CUSTODY NAME/DATE

Name	Date
DMY	7-27-93
DMY	7-29-93
[illegible]	7.31.93

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 µg/m3
Secondary: 150 µg/m3

TSP / IP AIR QUALITY SAMPLE RECORD

NETWORK: ETS, Inc.

SITE/ID: General Shale #10

SAMPLER NO: Hi-Vol TYPE

FILTER NO: 25...

14:36 ~~7:55~~ STOP Date/Time: 7/27/93, 68398.6 ~~7101.5~~

10:45 START Date/Time: 7/27/93, 68397.5

Run 2

~~Dickson Reading~~ for this Sample:

10:45 START FLOW (cfm): 3.3 ~~7/27/93, 68397.5~~

STOP FLOW (cfm): 3.3

AVG FLOW (cfm): 3.3

3.31

Flowmeter/Orifice Operational Check:

DATE OF LAST CHECK:

F = Corr FLOW (scfm): 40.1

Dickson (cfm):

END Weight (gms): 2.6872

START Weight (gms): 2.6503

W-NET Weight (gms): 0.0369

TIMER STOP:

TIMER START:

T = RUN TIME (Min): 201 Min

161.8 µg/m**3=W*(10**6)/(F*T*0.0283)

CHAIN OF CUSTODY
NAME/DATE

NAME	DATE
MU	7-27-93
MU	7-28-93
[illegible]	7-31-93

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 µg/m3
Secondary: 150 µg/m3

TSP / IP AIR QUALITY SAMPLE RECORD

NETWORK: ETS

SITE/ID: General Shale #10

SAMPLER NO: Hi-Vol TYPE

FILTER NO: 23326

1403 STOP Date/Time: 7/27/03 68773.3

1412 START Date/Time: 7/27/03, 68598.8

Dickson Reading for this Sample:

START FLOW (cfm): 3.3

STOP FLOW (cfm): 3.3

AVG FLOW (cfm): 3.49

Run 3

Flowmeter/Orifice Operational Check:

DATE OF LAST CHECK:

F = Corr FLOW (scfm): 41.3

Dickson (cfm):

END Weight (gms): ~~2.6590~~ 2.6722

START Weight (gms): 2.6450

W-NET Weight (gms): ~~0.0140~~ 0.0272

TIMER STOP:

TIMER START:

T = RUN TIME (Min): 175 Min

133.0 ug/m**3=W*(10**6)/(F*T*0.0283)

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 ug/m3
Secondary: 150 ug/m3

CHAIN OF CUSTODY NAME/DATE

Name	Date
DJU	7-23-03
DJU	7-29-03
[illegible]	7-31-03

APPENDIX B.7

BAGHOUSE OUTLET

GRAVIMETRIC LABORATORY DATA

E T S , I N C .

F I E L D   S A M P L E   L O G

Contract No. 92-655WA
Job I.D.
Test Method 201A

Print Date 10/29/93   Time 16:57:42
Page 1

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00100	F1	G92-117	BO -201-R1	Gelman Filter			pjb	08/02/93	
00100	F1	G92-0117	BO -201-R1	Gelman Filter			pjb	08/02/93	
00101	F2		BO -201-R1	>PM10 Acetone Rinse			pjb	08/02/93	
00102	F3		BO -201-R1	<=PM10 Acetone Rinse			pjb	08/02/93	
00103	F4		BO -201-R1	Impinger Liquids			pjb	08/02/93	
00104	F5		BO -201-R1	Imp. 4 Silica Gel			pjb	08/02/93	
00105	F6		BO -201-R1	TEDLAR BAG			pjb	08/02/93	
00106	F1	G92-0118	BO -201-R2	Gelman Filter			pjb	08/02/93	
00107	F2		BO -201-R2	>PM10 Acetone Rinse			pjb	08/02/93	
00108	F3		BO -201-R2	<=PM10 Acetone Rinse			pjb	08/02/93	
00109	F4		BO -201-R2	Impinger Liquids			pjb	08/02/93	
00110	F5		BO -201-R2	Imp. 4 Silica Gel			pjb	08/02/93	
00111	F6		BO -201-R2	TEDLAR BAG			pjb	08/02/93	
00112	F1	G92-0119	BO -201-R3	Gelman Filter			pjb	08/02/93	
00113	F2		BO -201-R3	>PM10 Acetone Rinse			pjb	08/02/93	
00114	F3		BO -201-R3	<=PM10 Acetone Rinse			pjb	08/02/93	
00115	F4		BO -201-R3	Impinger Liquids			pjb	08/02/93	
00116	F5		BO -201-R3	Imp. 4 Silica Gel			pjb	08/02/93	
00117	F6		BO -201-R3	TEDLAR BAG			pjb	08/02/93	
00118	F1	G92-0120	BO -201-R0	Gelman Filter			pjb	08/02/93	
00119	F2		BO -201-R0	>PM10 Acetone Rinse	125.00000	125.00000	pjb	08/02/93	
00120	F3		BO -201-R0	<=PM10 Acetone Rinse	125.00000	125.00000	pjb	08/02/93	
00121	F4		BO -201-R0	Impinger Liquids			pjb	08/02/93	
00122	F5		BO -201-R0	Imp. 4 Silica Gel			pjb	08/02/93	
00123	F6		BO -201-R0	TEDLAR BAG			pjb	08/02/93	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Beaker Weights

Report Prepared on: 08/03/93

Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
07/07/93-001	07/19/93	14:18	67.84220	TGW	67.84220
	07/20/93	14:35	67.84220	TGW	
	08/02/93	10:49	67.84220	TGW	
07/07/93-002	07/19/93	14:27	64.90430	TGW	64.90430
	07/20/93	14:36	64.90430	TGW	
07/07/93-003	07/19/93	14:28	66.35420	TGW	66.35430
	07/20/93	14:37	66.35430	TGW	
07/07/93-004	07/19/93	14:29	65.48210	TGW	65.48210
	07/20/93	14:38	65.48210	TGW	
07/07/93-005	07/19/93	14:29	66.23110	TGW	66.23130
	07/20/93	14:39	66.23130	TGW	
07/07/93-006	07/19/93	14:30	67.19940	TGW	67.19910
	07/20/93	14:39	67.19910	TGW	
07/07/93-007	07/19/93	14:31	64.51520	TGW	64.51560
	07/20/93	14:40	64.51560	TGW	
07/07/93-008	07/19/93	14:31	65.56970	TGW	65.57020
	07/20/93	14:40	65.57020	TGW	
07/07/93-009	07/19/93	14:32	66.36560	TGW	66.36540
	07/20/93	14:41	66.36540	TGW	
07/07/93-010	07/19/93	14:41	64.40950	TGW	64.40940
	07/20/93	15:05	64.40940	TGW	
07/07/93-011	07/19/93	14:52	67.28260	TGW	67.28290
	07/20/93	15:06	67.28290	TGW	
07/07/93-012	07/19/93	14:53	67.18740	TGW	67.18690
	07/20/93	15:07	67.18690	TGW	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Filter Weights
Filter Description: Gelmans
Report Prepared on: 08/03/93

Filter Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
G92-0117					0.54180
	02/26/92	07:07	0.54169	NKL	
	03/06/92	16:11	0.54180	nkl	
G92-0118					0.53753
	02/26/92	07:07	0.53751	NKL	
	03/06/92	16:09	0.53753	nkl	
G92-0119					0.53611
	02/26/92	07:08	0.53611	NKL	
	03/06/92	16:07	0.53611	nkl	
G92-0120					0.53242
	02/26/92	07:09	0.53236	NKL	
	03/06/92	16:06	0.53242	nkl	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 11/01/93 Page 1

Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data Date	 Time	 Weight (g)	 Analyst	Constant Final Weight (g)
07/07/93-001	67.84220	07/28/93	12:30	68.37720	PJB	68.38810
G92-117		07/28/93	18:32	68.38500	pjb	
G92-0117	0.54180	07/29/93	07:55	68.38790	PJB	
92-655WA-00100		07/29/93	14:00	68.38810	PJB	
BO -201-R1						
07/07/93-002	64.90430	07/28/93	12:34	64.90550	PJB	64.90700
	0.00000	07/28/93	18:36	64.90740	PJB	
92-655WA-00101		07/29/93	07:55	64.90700	PJB	
BO -201-R1						
122.00000						
122.00000						
07/07/93-003	66.35430	07/28/93	12:32	66.35980	PJB	66.35690
	0.00000	07/28/93	18:33	66.35840	PJB	
92-655WA-00102		07/29/93	07:56	66.35730	PJB	
BO -201-R1		07/29/93	14:02	66.35690	PJB	
124.00000						
124.00000						
07/07/93-004	65.48210	07/28/93	12:35	66.01500	PJB	66.02090
G92-0118	0.53753	07/28/93	18:36	66.02200	PJB	
92-655WA-00106		07/29/93	07:56	66.02070	PJB	
BO -201-R2		07/29/93	14:03	66.02090	PJB	
07/07/93-005	66.23130	07/28/93	12:36	66.23240	PJB	66.23290
	0.00000	07/28/93	18:40	66.23290	PJB	
92-655WA-00107						
BO -201-R2						
122.00000						
122.00000						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 11/01/93

Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data Date	 Time	 Weight (g)	 Analyst	Constant Final Weight (g)
07/07/93-006	67.19910	07/28/93	12:32	67.20150	PJB	67.20100
	0.00000	07/28/93	18:38	67.20100	PJB	
92-655WA-00108						
BO -201-R2						
110.00000						
110.00000						
07/07/93-007	64.51560	07/28/93	12:32	65.05470	PJB	65.05290
G92-0119	0.53611	07/28/93	18:38	65.05230	PJB	
92-655WA-00112		07/29/93	07:56	65.05490	PJB	
BO -201-R3		07/29/93	14:01	65.05200	PJB	
		07/30/93	07:10	65.05340	PJB	
		07/30/93	13:10	65.05290	PJB	
07/07/93-008	65.57020	07/28/93	12:34	65.57440	PJB	65.57410
	0.00000	07/28/93	18:40	65.57410	PJB	
92-655WA-00113						
BO -201-R3						
89.00000						
89.00000						
07/07/93-009	66.36540	07/28/93	12:34	66.36890	PJB	66.36740
	0.00000	07/28/93	18:42	66.37510	pjb	
92-655WA-00114		07/29/93	07:57	66.36710	PJB	
BO -201-R3		07/29/93	14:02	66.36740	PJB	
120.00000						
120.00000						
07/07/93-010	64.40940	07/28/93	12:33	64.93920	PJB	64.94290
G92-0120	0.53242	07/28/93	18:40	64.94070	PJB	
92-655WA-00118		07/29/93	07:58	64.94270	PJB	
BO -201-R0		07/29/93	14:02	64.94290	PJB	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 11/01/93

Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
07/07/93-011 92-655WA-00119 BO -201-RO 125.00000 125.00000	67.28290 0.00000	07/28/93 07/28/93 07/29/93	12:28 18:40 07:59	67.28250 67.28400 67.28440	PJB PJB PJB	67.28440
07/07/93-012 92-655WA-00120 BO -201-RO 125.00000 125.00000	67.18690 0.00000	07/28/93 07/28/93	12:29 18:39	67.18640 67.18690	PJB PJB	67.18690

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Silica Gel Weights

Report Prepared on: 08/03/93 Page 1

Sample Number	Tare Weight (g)	Final Weight (g)	Description
92-655WA-00104	200.0000	207.1500	teal
92-655WA-00110	200.0000	204.8500	purple/teal
92-655WA-00116	200.0000	210.0100	teal/amber
92-655WA-00121	200.0000	200.1600	blue

C.0

KILN A DRYER OUTLET STACK APPENDICES

APPENDIX C.1

DATA AND RESULTS FOR EPA METHOD 25A
AND MODIFIED METHOD 25A TESTING
(THC, METHANE AND ETHANE)

Summary of Kiln A Dryer Exhaust Total Hydrocarbons, Methane, and Ethane Emissions

RUN I.D.	KAD-M1-4-R1	KAD-M1-4-R2	KAD-M1-4-R3	AVERAGE
DATE	07/28/93	07/28/93	07/28/93	
TIME STARTED	11:05	12:40	14:15	
TIME ENDED	12:05	13:40	15:15	
SAMPLING PARAMETERS				
Metered Volume - dcf	35.484	35.162	36.160	35.602
Corrected Volume - dscf	33.403	32.583	33.363	33.116
Total Test Time - min	60	60	60	60
GAS PARAMETERS				
Gas Temperature - oF	145.3	143.5	148.0	145.6
Oxygen - %	19.4	18.8	18.7	19.0
Carbon Dioxide - %	0.1	0.8	0.8	0.6
Moisture - %	6.69	6.10	6.84	6.54
GAS FLOWRATE				
Velocity - ft/sec	60.16	60.46	60.49	60.37
Actual Volume - acfm	17720	17806	17817	17781
Standard Volume - dscfm	14483	14689	14474	14549
THC EMISSIONS				
Conc. - ppmwv (as Propane)	3.72	3.58	3.82	3.71
Conc. - ppmdv (as Propane)	3.99	3.81	4.10	3.97
Conc. - ppmdv (as Carbon)	11.96	11.44	12.30	11.90
Mass Rate - lb/hr (as Carbon)	0.324	0.314	0.333	0.324
METHANE AND ETHANE EMISSIONS*				
Conc. - ppmwv (as Propane)	2.13	1.62	1.42	1.72
Conc. - ppmdv (as Propane)	2.28	1.73	1.52	1.84
Conc. - ppmdv (as Carbon)	6.85	5.18	4.57	5.53
Mass Rate - lb/hr (as Carbon)	0.186	0.142	0.124	0.150
TGNMO EMISSIONS				
Mass Rate - lb/hr (as Carbon)	0.138	0.172	0.209	0.173

* Methane/Ethane emissions are based on a 14-minute test conducted immediately prior to each THC test run.

RUN NUMBER	**KAD-M1-4-R1**
DATE	07/28/93
START TIME	11:05
END TIME	12:05
STACK DIAM.	30 inches
METER BOX GAMMA	1.00624
METER BOX dH@	1.72964
BAROMETRIC	30.01 in.Hg
Cp	0.84
TEST DURATION	60 minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	137.0	37.0
IMP.2	100.0	108.0	8.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	245.0	45.0
S.G.	200.0	205.9	5.9

METHOD 1-4 RESULTS

Metered Volume	35.484	dcf
Volume @ Std.Cond.	33.403	dscf
% Water	6.69	%
Velocity	60.16	ft/sec
Actual Flow	17720	acfm
Std. Flow	15522	scfm
Dry Std. Flow	14483	dscfm

METHOD 3 DATA

%O2	19.4	Md	28.80
%CO2	0.1	Ms	28.07
%CO	0.0	Ps	30.04
%N2	80.5	Fo	12.500
O2+CO2	19.5	%EA	1051

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	111	0.47	0.62	1.00	499.990	100	100
2	110		0.86	1.00	535.474	117	112
3	115		0.96	1.00			
4	119		0.97	1.00			
5	148		1.05	1.00			
6	154		0.98	1.00			
7	156		0.94	1.00			
8	156		0.89	1.00			
9	156		0.89	1.00			
10	157		0.94	1.00			
11	158		0.96	1.00			
12	158		0.83	1.00			
13	137		1.00	1.00			
14	138		1.05	1.00			
15	139		1.10	1.00			
16	139		1.25	1.00			
17	148		1.30	1.00			
18	151		1.30	1.00			
19	153		0.93	1.00			
20	155		0.96	1.00			
21	155		0.99	1.00			
22	157		0.95	1.00			
23	158		0.95	1.00			
24	159		0.93	1.00			
25					535.474		
AVG.	145	0.47	0.98	1.00	35.484	107	

RUN NUMBER	**KAD-M1-4-R2**

DATE	07/28/93	
START TIME	12:40	
END TIME	13:40	
STACK DIAM.	30	inches
METER BOX GAMMA	1.00624	
METER BOX dH@	1.72964	
BAROMETRIC	30.01	in.Hg
Cp	0.84	
TEST DURATION	60	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	132.0	32.0
IMP.2	100.0	106.0	6.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	238.0	38.0
S.G.	200.0	207.0	7.0

METHOD 1-4 RESULTS

Metered Volume	35.162	dcf
Volume @ Std.Cond.	32.583	dscf
% Water	6.10	%
Velocity	60.46	ft/sec
Actual Flow	17806	acfm
Std. Flow	15643	scfm
Dry Std. Flow	14689	dscfm

METHOD 3 DATA

%O2	18.8	Md	28.88
%CO2	0.8	Ms	28.21
%CO	0.0	Ps	30.05
%N2	80.4	Fo	2.692
O2+CO2	19.6	%EA	773

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	121	0.50	0.64	1.00	535.603	114	113
2	122		0.91	1.00	570.765	120	118
3	130		0.96	1.00			
4	135		0.97	1.00			
5	139		1.05	1.00			
6	139		1.05	1.00			
7	145		0.88	1.00			
8	146		0.86	1.00			
9	147		0.83	1.00			
10	148		0.91	1.00			
11	149		0.89	1.00			
12	149		0.94	1.00			
13	139		1.00	1.00			
14	139		1.10	1.00			
15	143		1.15	1.00			
16	147		1.35	1.00			
17	147		1.15	1.00			
18	148		1.10	1.00			
19	150		0.94	1.00			
20	151		0.98	1.00			
21	153		1.05	1.00			
22	153		1.10	1.00			
23	153		1.10	1.00			
24	152		1.10	1.00			
25					570.765		
AVG.	144	0.50	1.00	1.00	35.162	116	

RUN NUMBER	**KAD-M1-4-R3**	
DATE	07/28/93	
START TIME	14:15	
END TIME	15:15	
STACK DIAM.	30	inches
METER BOX GAMMA	1.00624	
METER BOX dH@	1.72964	
BAROMETRIC	30.01	in.Hg
Cp	0.84	
TEST DURATION	60	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	18.0	-82.0
IMP.2	100.0	222.0	122.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	240.0	40.0
S.G.	200.0	212.0	12.0

METHOD 1-4 RESULTS

Metered Volume	36.160	dcf
Volume @ Std.Cond.	33.363	dscf
% Water	6.84	%
Velocity	60.49	ft/sec
Actual Flow	17817	acfm
Std. Flow	15536	scfm
Dry Std. Flow	14474	dscfm

METHOD 3 DATA

%O2	18.7	Md	28.87
%CO2	0.8	Ms	28.13
%CO	0.0	Ps	30.05
%N2	80.5	Fo	2.857
O2+CO2	19.5	%EA	730

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	118	0.49	0.81	1.00	570.927	118	118
2	120		0.94	1.00	607.087	121	118
3	122		1.00	1.00			
4	126		1.05	1.00			
5	138		1.00	1.00			
6	147		0.96	1.00			
7	150		0.93	1.00			
8	154		0.70	1.00			
9	156		0.65	1.00			
10	157		0.86	1.00			
11	157		0.85	1.00			
12	157		0.92	1.00			
13	147		1.10	1.00			
14	146		1.20	1.00			
15	148		1.25	1.00			
16	151		1.35	1.00			
17	154		0.88	1.00			
18	158		1.20	1.00			
19	157		0.95	1.00			
20	158		0.98	1.00			
21	158		1.05	1.00			
22	158		1.10	1.00			
23	158		1.05	1.00			
24	158		1.05	1.00			
25					607.087		
AVG.	148	0.49	0.99	1.00	36.160	119	

APPENDIX C.2

RAW FIELD SAMPLING DATA FOR EPA METHODS 2-4

METHOD 1-4 DATA SHEET

Date 07-28-93

Run Number KAD-M14-R2

Start Time 12:40

End Time 13:40

Box Number #6

Delta Hg 1.72964

Gamma 1.00624

CONTRACT NUMBER 32-655

JOB NAME Johnson City Brick

SAMPLING LOCATION Kiln A Dryer stack

BOX OPERATOR C. Ferguson

STACK SIZE

BAROMETRIC PRESSURE 30.01 in.Hg

AVERAGE DELTA H 1.0 in.W.C.

STATIC PRESSURE + .50 in.W.C.

INITIAL METER VOLUME 535.603 dcf

FINAL METER VOLUME 570.765 dcf

METER TEMPERATURE Initial 114/113 / Final 120/118 °F

%O2

%CO2

%CO

IMPINGER VOLUMES / WEIGHTS

	Initial	Final
#1	100 ml	132 ml
#2	100 ml	106 ml
#3	0 ml	0 ml
SG	200 gm	206.9 gm

SAMPLE # 404

TRAVERSE DATA

Port	dP	Stack Temp. Deg. F
A 1	.64	121
2	.91	122
3	.96	130
4	.97	135
5	1.05	139
6	1.05	139
7	.88	145
8	.86	146
9	.83	147
10	.91	148
11	.89	149
12	.94	149

Port	dP	Stack Temp. Deg. F
B 1	1.0	139
2	1.1	139
3	1.15	143
4	1.35	147
5	1.15	147
6	1.1	148
7	.94	150
8	.98	151
9	1.05	153
10	1.1	153
11	1.1	153
12	1.1	152

Port	dP	Stack Temp. Deg. F

METHOD 1-4 DATA SHEET

Date 07-28-93

Run Number SAD-M1-4-R1

Start Time 11:05

End Time 12:05

Box Number #6

Delta $H_@$ 1.72964

Gamma 1.00624

CONTRACT NUMBER 92-655

JOB NAME Johnson City Brick

SAMPLING LOCATION Kiln A Dryer stack

BOX OPERATOR C. Ferguson

STACK SIZE

%O2

%CO2

%CO

BAROMETRIC PRESSURE 30.01 in.Hg

AVERAGE DELTA H 1.0 in.W.C.

STATIC PRESSURE + .47 in.W.C.

INITIAL METER VOLUME 499.990 dcf

FINAL METER VOLUME 535.474 dcf

METER TEMPERATURE Initial 100 / 100 / Final 117 / 112 °F

IMPINGER VOLUMES / WEIGHTS

	Initial	Final
#1	100 ml	137 ml
#2	100 ml	108 ml
#3	0 ml	0 ml
SG	200g gm	205.90 gm

Sample # 402

TRAVERSE DATA

A

Port	dP	Stack Temp. Deg. F
1	.62	111
2	.86	110
3	.96	115
4	.97	119
5	1.05	148
6	.98	154
7	.94	156
8	.89	156
9	.89	156
10	.94	157
11	.96	158
12	.83	158

B

Port	dP	Stack Temp. Deg. F
1	1.0	137
2	1.05	138
3	1.1	139
4	1.25	139
5	1.3	148
6	1.3	151
7	.93	153
8	.96	155
9	.99	155
10	.95	157
11	.95	158
12	.93	159

Port	dP	Stack Temp. Deg. F

Leak Check 7" .002

METHOD 1-4 DATA SHEET

Date 07-28-93

Run Number KAD-M1-4-R3

Start Time 14:15

End Time 15:15

Box Number #6

Delta Hg 1.72964

Gamma 1.00624

CONTRACT NUMBER 92-655

JOB NAME Johnson City Brick

SAMPLING LOCATION Kiln A Dryer stack

BOX OPERATOR C. Ferguson

STACK SIZE

%O2

%CO2

%CO

BAROMETRIC PRESSURE 30.01 in.Hg

AVERAGE DELTA H 1.0 in.W.C.

STATIC PRESSURE +.49 in.W.C.

INITIAL METER VOLUME 570.927 dcf

FINAL METER VOLUME 607.087 dcf

METER TEMPERATURE Initial 118/118 / Final 121/118 °F

IMPINGER VOLUMES / WEIGHTS

	Initial	Final
#1	100 ml	18.0 ml
#2	100 ml	222.0 ml
#3	0 ml	0 ml
SG	200 gm	212.01 gm

TRAVERSE DATA

Port	dP	Stack Temp. Deg. F	Port	dP	Stack Temp. Deg. F	Port	dP	Stack Temp. Deg. F
A 1	.81	118	B 1	1.1	147			
2	.94	120	2	1.2	146			
3	1.0	122	3	1.25	148			
4	1.05	126	4	1.35	151			
5	1.0	138	5	.88	154			
6	.96	147	6	1.2	158			
7	.93	150	7	.95	157			
8	.70	154	8	.98	158			
9	.65	156	9	1.05	158			
10	.86	157	10	1.1	158			
11	.85	157	11	1.05	158			
12	.92	157	12	1.05	158			

INTEGRATED BAG ANALYSIS DATA

Job Name	EPA Brick WA 14
Contract	92-655
Method of Analysis	O_2 / CO_2

Run Number	$\%O_2$	$\%CO_2$	
BO-M201A-R1	20.8	0.1	
BO-M201A-R2	20.8	0.1	
BO-M201A-R3	20.8	0.1	
KAD-M1-4-R1	19.4	.12	
KAD-M1-4-R2	18.8	.78	
KAD-M1-4-R3	18.7	.77	

APPENDIX C.3

DATA AND RESULTS FOR CONTINUOUS EMISSIONS MONITORING (THC, METHANE AND ETHANE)

EPA Brick WA 14
Dryer Stack
Total Hydrocarbons
DSO-M25A-R1

Starting
07-28-93

Time	THC PPMWV
11:07	4.04
11:08	4.24
11:09	4.22
11:10	3.98
11:11	3.88
11:12	3.97
11:13	4.06
11:14	3.95
11:15	3.94
11:16	4.04
11:17	4.20
11:18	4.20
11:19	4.16
11:20	4.10
11:21	4.18
11:22	4.14
11:23	3.87
11:24	3.71
11:25	3.78
11:26	3.87
11:27	3.94
11:28	3.92
11:29	3.92
11:30	3.92
11:31	3.98
11:32	3.92
11:33	3.92
11:34	3.97
11:35	4.15
11:36	4.22
11:37	4.14
11:38	4.30
11:39	4.27
11:40	4.25
11:41	4.18
11:42	4.15
11:43	4.16
11:44	4.31
11:45	4.41

EPA Brick WA 14
Dryer Stack
Total Hydrocarbons
DSO-M25A-R1

Starting
07-28-93

Time	THC PPMWV
11:46	4.29
11:47	4.28
11:48	4.24
11:49	4.30
11:50	4.28
11:51	4.56
11:52	4.39
11:53	4.49
11:54	4.39
11:55	4.16
11:56	3.97
11:57	3.91
11:58	4.00
11:59	3.96
12:00	3.86
12:01	3.81
12:02	3.95
12:03	4.02
12:04	4.00
12:05	4.05
59 MinAvg	4.09

Data Corrected for Calibrations
59 MinAvg 3.72

Calibrations:

VOC 100	Span Value = 100		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	24.58
Initial Cal. at: 1041			
LOW Cal. Response =	-0.01	HIGH Cal. Response =	24.83
Cal. Drift =	-0.00	Cal. Drift =	0.00
Final Cal. at: 1215			
LOW Cal. Response =	0.74	HIGH Cal. Response =	25.27
Cal. Drift =	0.01	Cal. Drift =	0.01
LOW System Drift =	0.01	HIGH System Drift =	0.00

EPA Brick WA 14
Dryer Stack
Total Hydrocarbons
DSO-M25A-R2

Starting
07-28-93

Time	THC PPMWV
12:42	3.93
12:43	4.11
12:44	4.10
12:45	4.08
12:46	4.05
12:47	4.15
12:48	4.26
12:49	4.20
12:50	4.22
12:51	4.18
12:52	4.22
12:53	4.20
12:54	4.17
12:55	4.17
12:56	4.17
12:57	4.31
12:58	4.24
12:59	4.07
13:00	3.86
13:01	3.90
13:02	4.03
13:03	4.03
13:04	4.00
13:05	4.07
13:06	4.17
13:07	4.10
13:08	4.08
13:09	4.07
13:10	4.21
13:11	4.26
13:12	4.23
13:13	4.21
13:14	4.27
13:15	4.49
13:16	4.58
13:17	4.52
13:18	4.51
13:19	4.61
13:20	4.66

EPA Brick WA 14
Dryer Stack
Total Hydrocarbons
DSO-M25A-R2

Starting
07-28-93

Time	THC PPMWV
13:21	4.66
13:22	4.54
13:23	4.40
13:24	4.50
13:25	4.45
13:26	4.41
13:27	4.45
13:28	4.74
13:29	4.81
13:30	4.64
13:31	4.47
13:32	4.34
13:33	4.13
13:34	4.25
13:35	4.13
13:36	4.11
13:37	4.20
13:38	4.31
13:39	4.27
13:40	4.26
59 MinAvg	4.27

Data Corrected for Calibrations
59 MinAvg 3.58

Calibrations:

VOC 100	Span Value = 100		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	24.58
Initial Cal. at: 1215			
LOW Cal. Response =	0.74	HIGH Cal. Response =	25.27
Cal. Drift =	0.01	Cal. Drift =	0.01
Final Cal. at: 1350			
LOW Cal. Response =	0.70	HIGH Cal. Response =	24.93
Cal. Drift =	0.01	Cal. Drift =	0.00
LOW System Drift =	-0.00	HIGH System Drift =	-0.00

EPA Brick WA 14
Dryer Stack
Total Hydrocarbons
DSO-M25A-R3

Starting
07-28-93

Time	THC PPMWV
14:17	4.18
14:18	4.30
14:19	4.33
14:20	4.24
14:21	4.26
14:22	4.37
14:23	4.50
14:24	4.48
14:25	4.39
14:26	4.33
14:27	4.45
14:28	4.50
14:29	4.55
14:30	4.41
14:31	4.57
14:32	4.83
14:33	4.68
14:34	4.59
14:35	4.48
14:36	4.26
14:37	4.11
14:38	4.07
14:39	4.26
14:40	4.18
14:41	4.35
14:42	4.34
14:43	4.35
14:44	4.34
14:45	4.62
14:46	4.63
14:47	4.55
14:48	4.39
14:49	4.40
14:50	4.53
14:51	4.51
14:52	4.45
14:53	4.48
14:54	4.53
14:55	4.61

EPA Brick WA 14
Dryer Stack
Total Hydrocarbons
DSO-M25A-R3

Starting
07-28-93

Time	THC PPMWV
14:56	4.53
14:57	4.53
14:58	4.54
14:59	4.65
15:00	4.60
15:01	4.61
15:02	4.61
15:03	4.49
15:04	4.62
15:05	4.58
15:06	4.60
15:07	4.65
15:08	4.67
15:09	4.57
15:10	4.35
15:11	4.57
15:12	4.57
15:13	4.62
15:14	4.38
15:15	4.29
59 MinAvg	4.47

Data Corrected for Calibrations
59 MinAvg 3.82

Calibrations:

VOC 100	Span Value = 100		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	24.58
Initial Cal. at: 1350			
LOW Cal. Response =	0.70	HIGH Cal. Response =	24.93
Cal. Drift =	0.01	Cal. Drift =	0.00
Final Cal. at: 1525			
LOW Cal. Response =	0.71	HIGH Cal. Response =	24.91
Cal. Drift =	0.01	Cal. Drift =	0.00
LOW System Drift =	0.00	HIGH System Drift =	-0.00

EPA Brick WA 14
Dryer Stack
Methane/Ethane
RUN 1

Starting
07-28-93

Time	Meth/Eth % PPMWV
10:47	2.11
10:48	2.02
10:49	2.02
10:50	2.07
10:51	2.19
10:52	2.38
10:53	2.20
10:54	2.15
10:55	2.22
10:56	2.25
10:57	2.12
10:58	2.05
10:59	2.07
11:00	2.02
14 MinAvg	2.13

EPA Brick WA 14
Dryer Stack
Methane/Ethane
RUN 2

Starting
07-28-93

Time	Meth/Eth % PPMWV
12:21	1.73
12:22	1.71
12:23	1.77
12:24	1.72
12:25	1.71
12:26	1.74
12:27	1.59
12:28	1.52
12:29	1.49
12:30	1.54
12:31	1.55
12:32	1.54
12:33	1.51
12:34	1.53
14 MinAvg	1.62

EPA Brick WA 14
Dryer Stack
Methane/Ethane
RUN 3

Starting
07-28-93

Time	Meth/Eth % PPMWV
13:54	1.44
13:55	1.41
13:56	1.45
13:57	1.50
13:58	1.46
13:59	1.40
14:00	1.37
14:01	1.37
14:02	1.42
14:03	1.45
14:04	1.42
14:05	1.41
14:06	1.39
14:07	1.38
14 MinAvg	1.42

D.0

KILN COMBUSTION ZONE EXHAUST STACK APPENDICES

APPENDIX D.1.0

KILN COMBUSTION EXHAUST STACK DATA AND RESULTS APPENDICES

APPENDIX D.1.1

DATA AND RESULTS FOR EPA METHOD 201A/202 TESTING

Summary of the Kiln Combustion Exhaust PM, PM_{10}, and CPM Emissions

RUN I.D.	KCE-M201A/202-R1	KCE-M201A/202-R2	KCE-M201A/202-R3	AVERAGE
DATE	07/31/93	07/31/93	07/31/93	
TIME STARTED	11:45	14:07	16:49	
TIME ENDED	13:29	15:55	18:26	
SAMPLING PARAMETERS				
Metered Volume - dcf	41.126	44.103	36.054	38.590
Corrected Volume - dscf	39.685	42.171	34.080	36.882
Total Test Time - min	94	100	81.0	87.5
% Isokinetics	107.2	114.8	107.2	107.2
D50	9.47	9.52	9.39	9.43
GAS PARAMETERS				
Gas Temperature - oF	333.6	331.5	342.0	337.8
Oxygen - %	13.12	13.04	12.01	12.57
Carbon Dioxide - %	6.62	6.58	6.47	6.55
Moisture - %	10.25	9.76	11.43	10.84
GAS FLOWRATE				
Velocity - ft/sec	28.83	26.70	29.44	29.13
Actual Volume - acfm	7208	6675	7359	7284
Standard Volume - dscfm	4318	4030	4305	4311
PM10 EMISSIONS				
Concentration - gr/dscf	0.090	0.073	0.080	0.085
Mass Rate - lb/hr	3.323	2.517	2.958	3.141
PM> 10 MICRON EMISSIONS				
Concentration - gr/dscf	0.032	0.044	0.036	0.034
Mass Rate - lb/hr	1.171	1.529	1.334	1.252
CPM EMISSIONS				
Concentration - gr/dscf	0.024	0.042	0.028	0.026
Mass Rate - lb/hr	0.883	1.454	1.026	0.955
TOTAL PM EMISSIONS				
Concentration - gr/dscf	0.145	0.159	0.144	0.145
Mass Rate - lb/hr	5.378	5.500	5.318	5.348

RUN NUMBER	KCE-M201A/202-R1

DATE	07/31/93	
START TIME	11:45	
END TIME	13:29	
STACK LENGTH	25	inches
STACK WIDTH	24	inches
STACK EQUIV. DIAM.	24.49	inches
NOZZLE I.D.	0.264	inches
METER BOX GAMMA	1.00624	
METER BOX dH@	1.72964	
BAROMETRIC	30.00	in.Hg
Cp	0.84	
TEST DURATION	94.0	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	174.0	74.0
IMP.2	100.0	110.0	10.0
IMP.3	100.0	100.0	0.0
IMP.4	0.0	0.0	0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	300.0	384.0	84.0
S.G.	200.0	212.3	12.3

SAMPLING RESULTS

Metered Volume	41.126	dcf
Metered Volume	1.165	dcm
Volume @ Std.Cond.	39.685	dscf
Volume @ Std.Cond.	1.124	dscm
% Water	10.25	%
% Isokinetics	107.2	%

METHOD 3 DATA

%O2	13.12	Md	29.58
%CO2	6.62	Ms	28.40
%CO	0.0	Ps	30.01
%N2	80.3	Fo	1.175
O2+CO2	10.0	%EA	162.60

VOLUMETRIC RESULTS - USENG

Velocity	28.83	ft/sec
Actual Flow	7208	acfm
Std. Flow	4811	scfm
Dry Std. Flow	4318	dscfm

VOLUMETRIC RESULTS - SI

Velocity	8.79	m/sec
Actual Flow	12247	am3/hr
Std. Flow	8173	sm3/hr
Dry Std. Flow	7336	dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DWELL TIME	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	298	0.17	0.19	4.05	0.52	830.837	93	92
2	319	0.16	0.18	3.94	0.52	871.963	88	80
3	344	0.15	0.22	4.35	0.52		86	87
4	349	0.13	0.21	4.25	0.52		90	88
5	346		0.18	3.94	0.52		90	87
6	331		0.15	3.59	0.52		94	89
7	310		0.18	3.94	0.52		96	92
8	327		0.16	3.71	0.52		91	85
9	337		0.17	3.83	0.52		87	87
10	329		0.15	3.59	0.52		91	89
11	312		0.16	3.71	0.52		89	87
12	342		0.15	3.59	0.52		94	91
13	318		0.15	3.59	0.52		96	93
14	311		0.16	3.71	0.52		97	92
15	341		0.18	3.94	0.52		94	90
16	340		0.21	4.25	0.52		91	90
17	347		0.18	3.94	0.52		98	94
18	348		0.21	4.25	0.52		100	96
19	340		0.15	3.59	0.52		101	98
20	341		0.15	3.59	0.52		102	98
21	341		0.17	3.83	0.52		99	96
22	345		0.16	3.71	0.52		97	94
23	344		0.17	3.83	0.52		98	94
24	346		0.18	3.94	0.52		97	94
25						871.963		
AVG.	334	0.15	0.17	3.86	0.52	41.126	93	

EPA METHOD 201A/202 ANALYSES

RUN I.D. KCE-M201A/202-R1

SUMMARY

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
PM10:		
Probe Wash <= 10 microns	0.01310	0.01310
Filter	0.21782	0.21782
TOTAL PM10	0.23092	0.23092
PM(>10 Microns):		
Probe Wash > 10 microns	0.08150	0.08140
TOTAL PM	0.31242	0.31232
CONDENSIBLE PM		
Organic CPM	0.04600	NA
Inorganic CPM	0.04530	NA
TOTAL CPM	0.09130	0.06140
TOTAL PARTICULATE (TSP+CPM)	0.40372	0.37372

ANALYTICAL DATA

METHOD 201A COMPONENTS:

	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Filter	0.41468	0.63250	0.21782	NA
Probe Wash Residue <= PM10	64.95180	64.96490	0.01310	60.0
Acetone Blank Residue	67.69890	67.69890	0.00000	120.0
Applicable Acetone Blank			0.00000	60.0
Max. Allowable Blank			0.00047	NA
Probe Wash Residue > PM10	65.00620	65.08770	0.08150	105.0
Acetone Blank Residue	64.00410	64.00420	0.00010	110.0
Applicable Acetone Blank			0.00010	105
Max. Allowable Blank			0.00082	NA

METHOD 202 COMPONENTS:

	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Container #4				534
Organic Residue (uncorr.)	67.08520	67.13120	0.04600	250
Inorganic Residue (uncorr.)	197.53390	197.57920	0.04530	450
MeCl2 Blank	64.89250	64.90660	0.01410	125
H2O Blank	64.59390	64.60970	0.01580	500

PARTICULATE EMISSIONS:

	PM10	PM>10 u	Total CPM	Total PM
Actual Grain Loading (gr/dscf)	0.08978	0.03165	0.02387	0.145
Mass Rate (lb/hr)	3.323	1.171	0.883	5.378

D50 Calculations

RUN I.D. **KCE-M201A/202-R1**

Stack Gas Viscosity (micropoise)	235.1002
Cyclone Flow Rate (dscf/min)	0.42218
Cyclone Flow Rate (acfm)	0.705133
D50	9.470939

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	240.5222
Cyclone Flow Rate (acfm)	0.668166

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	110.39773	92.55990	135.64784	1.784526	3.832683
0.15	90.75184	77.23037	112.37690	1.242377	2.630457
0.164	11.00000	17.08689	20.34882	0.060814	0.086249
0.18	63.02211	55.81326	79.72440	0.648861	1.323914
0.197	52.61451	47.87923	67.56796	0.477498	0.950952
0.215	44.17342	41.50585	57.77248	0.358836	0.695215
0.233	37.61197	36.59894	50.21214	0.279006	0.525163
0.264	29.29747	30.45106	40.72376	0.193144	0.345440
0.3	22.68796	25.62170	33.27779	0.136739	0.230667
0.342	17.45765	21.82369	27.45933	0.099205	0.157057
0.39	13.42483	18.88296	23.01457	0.074271	0.110327

RUN NUMBER	KCE-M201A/202-R2

DATE	07/31/93		
START TIME	14:07		
END TIME	15:55		
STACK LENGTH	25	inches	
STACK WIDTH	24	inches	
STACK EQUIV. DIAM.	24.49	inches	
NOZZLE I.D.	0.264	inches	
METER BOX GAMMA	1.00624		
METER BOX dH@	1.72964		
BAROMETRIC	30.00	in.Hg	
Cp	0.84		
TEST DURATION	100.0	minutes	

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	178.0	78.0
IMP.2	100.0	110.0	10.0
IMP.3	100.0	100.0	0.0
IMP.4	0.0	0.0	0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	300.0	388.0	88.0
S.G.	200.0	208.8	8.8

SAMPLING RESULTS

Metered Volume	44.103	dcf
Metered Volume	1.249	dcm
Volume @ Std.Cond.	42.171	dscf
Volume @ Std.Cond.	1.194	dscm
% Water	9.76	%
% Isokinetics	114.8	%

METHOD 3 DATA

%O2	13.04	Md	29.57
%CO2	6.58	Ms	28.45
%CO	0.0	Ps	30.01
%N2	80.4	Fo	1.195
O2+CO2	19.6	%EA	159.41

VOLUMETRIC RESULTS - USENG

Velocity	26.70	ft/sec
Actual Flow	6675	acfm
Std. Flow	4466	scfm
Dry Std. Flow	4030	dscfm

VOLUMETRIC RESULTS - SI

Velocity	8.14	m/sec
Actual Flow	11341	am3/hr
Std. Flow	7588	sm3/hr
Dry Std. Flow	6848	dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DWELL TIME	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	318	0.16	0.13	3.93	0.53	872.362	90	90
2	322	0.14	0.15	4.21	0.53	916.465	90	90
3	335	0.14	0.13	3.93	0.53		91	91
4	322	0.17	0.14	4.07	0.53		92	92
5	320		0.14	4.07	0.53		91	90
6	338		0.13	3.93	0.53		97	94
7	335		0.13	3.93	0.53		95	94
8	340		0.13	3.93	0.53		100	97
9	331		0.14	4.07	0.53		100	97
10	317		0.18	4.62	0.53		97	95
11	334		0.18	4.62	0.53		98	95
12	340		0.13	3.93	0.53		102	98
13	329		0.15	4.21	0.53		100	99
14	335		0.15	4.21	0.53		102	98
15	314		0.13	3.93	0.53		101	98
16	337		0.14	4.07	0.53		106	100
17	333		0.14	4.07	0.53		101	96
18	334		0.13	3.93	0.53		97	94
19	340		0.21	4.99	0.53		98	97
20	329		0.21	4.99	0.53		102	98
21	336		0.18	4.62	0.53		104	100
22	334		0.17	4.49	0.53		107	102
23	342		0.15	4.21	0.53		108	102
24	342		0.13	3.93	0.53		107	103
25						916.465		
AVG.	332	0.15	0.15	4.20	0.53	44.103	98	

EPA METHOD 201A/202 ANALYSES

RUN I.D. KCE-M201A/202-R2

SUMMARY

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
PM10:		
Probe Wash <= 10 microns	0.01110	0.01110
Filter	0.18800	0.18800
TOTAL PM10	0.19910	0.19910
PM (>10 Microns):		
Probe Wash > 10 microns	0.12110	0.12100
TOTAL PM	0.3202	0.32010
CONDENSIBLE PM		
Organic CPM	0.01920	NA
Inorganic CPM	0.12570	NA
TOTAL CPM	0.14490	0.11500
TOTAL PARTICULATE (TSP+CPM)	0.46510	0.43510

ANALYTICAL DATA

METHOD 201A COMPONENTS:

	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Filter	0.40990	0.59790	0.18800	NA
Probe Wash Residue <= PM10	67.64640	67.65750	0.01110	70.0
Acetone Blank Residue	67.69890	67.69890	0.00000	120.0
Applicable Acetone Blank			0.00000	70.0
Max. Allowable Blank			0.00055	NA
Probe Wash Residue > PM10	68.14970	68.27080	0.12110	110.0
Acetone Blank Residue	64.00410	64.00420	0.00010	110.0
Applicable Acetone Blank			0.00010	110
Max. Allowable Blank			0.00086	NA

METHOD 202 COMPONENTS:

	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Container #4				538
Organic Residue (uncorr.)	65.12590	65.14510	0.01920	250
Inorganic Residue (uncorr.)	196.20190	196.32760	0.12570	450
MeCl2 Blank	64.89250	64.90660	0.01410	125
H2O Blank	64.59390	64.60970	0.01580	500

PARTICULATE EMISSIONS:

	PM10	PM>10 u	Total CPM	Total PM
Actual Grain Loading (gr/dscf)	0.07285	0.04427	0.04208	0.159
Mass Rate (lb/hr)	2.517	1.529	1.454	5.500

D50 Calculations

RUN I.D. **KCE-M201A/202-R2**

Stack Gas Viscosity (micropoise)	234.8959
Cyclone Flow Rate (dscf/min)	0.421707
Cyclone Flow Rate (acfm)	0.69869
D50	9.518384

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	240.2805
Cyclone Flow Rate (acfm)	0.666653

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	110.14761	92.35538	135.34444	1.784272	3.831929
0.15	90.54623	77.06099	112.12656	1.242241	2.629988
0.164	75.74696	65.59021	94.66319	0.899942	1.874558
0.18	62.87933	55.69315	79.54874	0.648844	1.323742
0.197	52.49530	47.77745	67.42018	0.477510	0.950860
0.215	44.07334	41.41881	57.64721	0.358866	0.695174
0.233	37.52676	36.52325	50.10429	0.279046	0.525154
0.264	29.23109	30.38958	40.63780	0.193191	0.345460
0.3	22.63656	25.57132	33.20903	0.136786	0.230701
0.342	17.41810	21.78193	27.40397	0.099250	0.157095
0.39	13.39441	18.84776	22.96937	0.074312	0.110366

RUN NUMBER	KCE-M201A/202-R3					
DATE	07/31/93		METHOD 4 DATA			
START TIME	16:49			INIT.	FINAL	NET
END TIME	18:26			(ml)	(ml)	(ml)
STACK LENGTH	25	inches	IMP.1	100.0	172.0	72.0
STACK WIDTH	24	inches	IMP.2	100.0	106.0	6.0
STACK EQUIV. DIAM.	24.49	inches	IMP.3	100.0	100.0	0.0
NOZZLE I.D.	0.264	inches	IMP.4	0.0	0.0	0.0
METER BOX GAMMA	1.00624		IMP.5			0.0
METER BOX dH@	1.72964		IMP.6			0.0
BAROMETRIC	30.00	in.Hg	IMP.7			0.0
Cp	0.84		TOTAL	300.0	378.0	78.0
TEST DURATION	81	minutes	S.G.	200.0	215.4	15.4

SAMPLING RESULTS			METHOD 3 DATA			
Metered Volume	36.054	dcf	%O2	12.01	Md	29.52
Metered Volume	1.021	dcm	%CO2	6.47	Ms	28.20
Volume @ Std.Cond.	34.080	dscf	%CO	0.0	Ps	30.01
Volume @ Std.Cond.	0.965	dscm	%N2	81.5	Fo	1.374
% Water	11.43	%	O2+CO2	18.5	%EA	126.27
% Isokinetics	107.2	%				

VOLUMETRIC RESULTS - USENG			VOLUMETRIC RESULTS - SI		
Velocity	29.44	ft/sec	Velocity	8.97	m/sec
Actual Flow	7359	acfm	Actual Flow	12503	am3/hr
Std. Flow	4860	scfm	Std. Flow	8257	sm3/hr
Dry Std. Flow	4305	dscfm	Dry Std. Flow	7314	dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DWELL TIME	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	339	0.16	0.19	3.53	0.53	916.753	104	100
2	342	0.14	0.21	3.71	0.53	952.807	105	101
3	345	0.15	0.22	3.79	0.53		105	101
4	344	0.15	0.21	3.71	0.53		109	102
5	344		0.18	3.43	0.53		108	102
6	340		0.16	3.23	0.53		111	104
7	329		0.15	3.13	0.53		108	106
8	341		0.16	3.23	0.53		111	105
9	343		0.18	3.43	0.53		112	106
10	345		0.19	3.53	0.53		112	106
11	347		0.16	3.23	0.53		108	103
12	345		0.15	3.13	0.53		106	101
13	337		0.15	3.13	0.53		104	100
14	344		0.16	3.23	0.53		105	102
15	344		0.16	3.23	0.53		108	103
16	347		0.18	3.43	0.53		109	104
17	340		0.21	3.71	0.53		108	102
18	343		0.18	3.43	0.53		106	103
19	335		0.16	3.23	0.53		105	104
20	339		0.18	3.43	0.53		105	98
21	342		0.19	3.53	0.53		104	97
22	344		0.20	3.61	0.53		103	97
23	344		0.18	3.43	0.53		101	96
24	344		0.16	3.23	0.53		101	95
25						952.807		
AVG.	342	0.15	0.18	3.40	0.53	36.054	104	

EPA METHOD 201A/202 ANALYSES

RUN I.D. **KCE-M201A/202-R3**

SUMMARY

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
PM10:		
Probe Wash <= 10 microns	0.01940	0.01940
Filter	0.15769	0.15769
TOTAL PM10	0.17709	0.17709
PM (>10 Microns):		
Probe Wash > 10 microns	0.07990	0.07983
TOTAL PM	0.25699	0.25692
CONDENSIBLE PM		
Organic CPM	0.02680	NA
Inorganic CPM	0.06450	NA
TOTAL CPM	0.09130	0.06140
TOTAL PARTICULATE (TSP+CPM)	0.34829	0.31832

ANALYTICAL DATA

METHOD 201A COMPONENTS:

	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Filter	0.39921	0.55690	0.15769	NA
Probe Wash Residue <= PM10	64.49090	64.51030	0.01940	79.0
Acetone Blank Residue	67.69890	67.69890	0.00000	120.0
Applicable Acetone Blank			0.00000	79.0
Max. Allowable Blank			0.00062	NA
Probe Wash Residue > PM10	67.83080	67.91070	0.07990	82.0
Acetone Blank Residue	64.00410	64.00420	0.00010	110.0
Applicable Acetone Blank			0.00007	82
Max. Allowable Blank			0.00064	NA

METHOD 202 COMPONENTS:

	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Container #4				528
Organic Residue (uncorr.)	64.25800	64.28480	0.02680	250
Inorganic Residue (uncorr.)	196.65340	196.71790	0.06450	450
MeCl2 Blank	64.89250	64.90660	0.01410	125
H2O Blank	64.59390	64.60970	0.01580	500

PARTICULATE EMISSIONS:

	PM10	PM>10 u	Total CPM	Total PM
Actual Grain Loading (gr/dscf)	0.08018	0.03614	0.02780	0.144
Mass Rate (lb/hr)	2.958	1.334	1.026	5.318

D50 Calculations

RUN I.D. **KCE-M201A/202-R3**

Stack Gas Viscosity (micropoise)	235.8046
Cyclone Flow Rate (dscf/min)	0.420737
Cyclone Flow Rate (acfm)	0.719574
D50	9.38981

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	241.3803
Cyclone Flow Rate (acfm)	0.674012

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	111.36357	93.34840	136.81848	1.783642	3.831629
0.15	91.54580	77.88304	113.34249	1.241594	2.629538
0.164	76.58316	66.28370	95.68463	0.899306	1.874037
0.18	63.57347	56.27545	80.40151	0.648234	1.323190
0.197	53.07482	48.27059	68.13729	0.476935	0.950306
0.215	44.55988	41.84022	58.25477	0.358329	0.694635
0.233	37.94103	36.88940	50.62711	0.278546	0.524639
0.264	29.55378	30.68659	41.05409	0.192749	0.344990
0.3	22.88645	25.81434	33.54166	0.136400	0.230284
0.342	17.61038	21.98300	27.67140	0.098916	0.156731
0.39	13.54228	19.01697	23.18738	0.074025	0.110052

APPENDIX D.1.2

DATA AND RESULTS FOR EPA METHOD 29 TESTING

RUN NUMBER	KCE-M29-R1	
DATE	07/30/92	
START TIME	12:28	
END TIME	14:44	
STACK DIAM.	25 x 24	inches
NOZZLE I.D.	0.3125	inches
METER BOX GAMMA	1.00624	
METER BOX dH@	1.72964	
BAROMETRIC	29.97	in.Hg
Cp	0.84	
TEST DURATION	120	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	0.0	96.0	96.0
IMP.2	100.0	152.0	52.0
IMP.3	100.0	112.0	12.0
IMP.4	0.0	2.0	2.0
IMP.5	100.0	100.0	0.0
IMP.6	100.0	100.0	0.0
IMP.7			0.0
TOTAL	400.0	562.0	162.0
S.G.	200.0	216.5	16.5

SAMPLING RESULTS

Metered Volume	73.243	dcf
Metered Volume	2.074	dcm
Volume @ Std.Cond.	70.904	dscf
Volume @ Std.Cond.	2.008	dscm
% Water	10.60	%
% Isokinetics	107.7	%

METHOD 3 DATA

%O2	13.16	Md	29.57
%CO2	6.53	Ms	28.35
%CO	0.0	Ps	29.98
%N2	80.3	Fo	1.185
O2+CO2	10.0	%EA	163.64

VOLUMETRIC RESULTS - USENG

Velocity	28.83	ft/sec
Actual Flow	7208	acfm
Std. Flow	4803	scfm
Dry Std. Flow	4294	dscfm

VOLUMETRIC RESULTS - SI

Velocity	8.79	m/sec
Actual Flow	12247	am3/hr
Std. Flow	8160	sm3/hr
Dry Std. Flow	7296	dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	321	0.16	0.20	1.30	608.374	97	90
2	331	0.15	0.22	1.55		92	89
3	345	0.14	0.19	1.20		95	90
4	336	0.17	0.19	1.20		96	90
5	332		0.18	1.10		98	91
6	320		0.15	0.96		93	89
7	316		0.12	0.96		89	89
8	331		0.17	1.10		90	89
9	346		0.17	1.10		88	86
10	321		0.19	1.20		92	88
11	340		0.16	1.00		93	87
12	334		0.15	0.96	644.845	92	85
13	320		0.15	0.96	644.894	90	90
14	331		0.16	1.00		95	90
15	331		0.16	1.00		91	88
16	335		0.18	1.15		93	89
17	347		0.21	1.40		94	88
18	348		0.22	1.55		94	89
19	331		0.15	0.96		90	88
20	342		0.15	0.96		96	93
21	340		0.16	1.00		94	90
22	336		0.17	1.10		92	90
23	342		0.19	1.20		95	91
24	341		0.18	1.15		93	89
25					681.666		
AVG.	334	0.16	0.17	1.13	73.243	91	

EPA METHOD 5 DATA
RUN NUMBER KC[illegible] [illegible]29-R1

COMPONENT	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Probe Wash	67.07370	67.08480	0.01110	132.0
Corr. for Blank			0.01110	
Filter	0.43440	0.97420	0.53980	
Back Half	0.00000	0.00000	0.00000	
TOTAL			0.55090	

ACETONE BLANK

Actual Residue	0.00000 grams
Actual Blank Corr.	0.00000 grams
Max. Allowable Res.	0.00104 grams
Volume	125.0 ml

PARTICULATE EMISSIONS

Actual Grain Loading	0.11990	gr/dscf
Corrected to 7% O2	0.21533	gr/dscf @ 7% O2
Corrected to 12% CO2	0.22035	gr/dscf @ 12% CO2
Corrected to 50% Excess Air	0.21075	gr/dscf @ 50% EA
Mass Rate	4.4132	lb/hr

SAMPLING QA/QC

Isokinetics	107.7 %
Corrected Meter Volume	70.904 dscf

SUMMARY OF METAL EMISSIONS

RUN NUMBER = KCE-M29-R1
SAMPLE VOLUME = 70.904 dscf
TOTAL GAS FLOWRATE = 4294.030 dscfm
CARBON DIOXIDE % = 6.5
OXYGEN % = 13.2

		LABORATORY DATA					GAS EMISSIONS			
		SAMPLE CATCH - micrograms					CONCENTRATION			MASS
		FRONT HALF:		BACK HALF:			ACTUAL	@ 12% CO2	@7% O2	RATE
COMPONENT		SAMPLE	BLANK	SAMPLE	BLANK	TOTAL	ug/Nm3	ug/Nm3	ug/Nm3	lb/hr
Antimony	Sb	12.40	0.00	0.78	0.00	13.18	7.04	12.95	12.65	1.06E-04
Arsenic	As	106.00	0.00	2.77	0.00	108.77	58.14	106.84	104.41	8.71E-04
Beryllium	Be	12.40	0.00	0.00	0.00	12.40	6.63	12.18	11.90	9.94E-05
Cadmium	Cd	3.36	0.09	0.46	0.05	3.68	1.97	3.61	3.53	2.95E-05
Chromium	Cr	65.20	4.20	2.05	1.00	62.05	33.17	60.95	59.56	4.97E-04
Lead	Pb	61.80	1.06	15.80	0.00	76.54	40.91	75.18	73.47	6.13E-04
Manganese	Mn	34.90	1.41	7.88	0.59	40.78	21.80	40.06	39.14	3.27E-04
Mercury	Hg	65.40	0.00	19.10	0.00	84.50	45.17	83.00	81.11	6.77E-04
Nickel	Ni	136.00	2.72	1.27	1.00	133.55	71.38	131.18	128.20	1.07E-03
Phosphorus	P	452.00	0.00	0.00	0.00	452.00	241.60	443.98	433.88	3.62E-03
Selenium	Se	371.00	0.00	0.77	0.00	371.77	198.71	365.17	356.86	2.98E-03

Front Half - Probe Wash and Filter
Back Half - Impinger Catches
Blank - Field Blank

RUN NUMBER	KCE-M29-R2
DATE	07/30/92
START TIME	15:12
END TIME	17:31
STACK DIAM.	25 X 24 inches
NOZZLE I.D.	0.3125 inches
METER BOX GAMMA	1.00624
METER BOX dH@	1.72964
BAROMETRIC	29.97 in.Hg
Cp	0.84
TEST DURATION	120 minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	0.0	117.0	117.0
IMP.2	100.0	138.0	38.0
IMP.3	100.0	104.0	4.0
IMP.4	0.0	1.0	1.0
IMP.5	100.0	104.0	4.0
IMP.6	100.0	100.0	0.0
IMP.7			0.0
TOTAL	400.0	564.0	164.0
S.G.	200.0	216.2	16.2

SAMPLING RESULTS

Metered Volume	74.772	dcf
Metered Volume	2.117	dcm
Volume @ Std.Cond.	72.097	dscf
Volume @ Std.Cond.	2.042	dscm
% Water	10.53	%
% Isokinetics	107.7	%

METHOD 3 DATA

%O2	12.86	Md	29.53
%CO2	6.34	Ms	28.32
%CO	0.0	Ps	29.98
%N2	80.8	Fo	1.268
O2+CO2	19.2	%EA	151.81

VOLUMETRIC RESULTS - USENG

Velocity	29.40	ft/sec
Actual Flow	7349	acfm
Std. Flow	4882	scfm
Dry Std. Flow	4368	dscfm

VOLUMETRIC RESULTS - SI

Velocity	8.96	m/sec
Actual Flow	12487	am3/hr
Std. Flow	8295	sm3/hr
Dry Std. Flow	7421	dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	324	0.15	0.15	0.96	682.140	91	90
2	331	0.17	0.16	1.00		92	90
3	333	0.15	0.18	1.15		93	90
4	340	0.16	0.18	1.15		94	91
5	341		0.20	1.30		95	91
6	335		0.19	1.20		95	91
7	335		0.16	1.00		90	89
8	345		0.16	1.00		93	89
9	346		0.18	1.15		95	90
10	341		0.20	1.30		97	92
11	340		0.18	1.15		97	93
12	344		0.17	1.10	719.092	98	94
13	321		0.15	0.96	719.165	90	89
14	336		0.16	1.00		95	91
15	338		0.18	1.15		96	91
16	341		0.19	1.20		100	92
17	335		0.19	1.20		99	91
18	335		0.17	1.10		98	91
19	325		0.16	1.00		97	90
20	336		0.22	1.55		99	91
21	342		0.21	1.40		99	92
22	331		0.22	1.55		98	91
23	337		0.18	1.15		97	90
24	344		0.16	1.00		96	94
25					756.985		
AVG.	337	0.16	0.18	1.16	74.772		93

EPA METHOD 5 DATA
RUN NUMBER KCE-M29-R2

COMPONENT	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Probe Wash	67.94350	67.95340	0.00990	130.0
Corr. for Blank			0.00990	
Filter	0.44220	1.00630	0.56410	
Back Half	0.00000	0.00000	0.00000	
TOTAL			0.57400	

ACETONE BLANK

Actual Residue	0.00000 grams
Actual Blank Corr.	0.00000 grams
Max. Allowable Res.	0.00102 grams
Volume	125.0 ml

PARTICULATE EMISSIONS

Actual Grain Loading	0.12286	gr/dscf
Corrected to 7% O2	0.21242	gr/dscf @ 7% O2
Corrected to 12% CO2	0.23255	gr/dscf @ 12% CO2
Corrected to 50% Excess Air	0.20626	gr/dscf @ 50% EA
Mass Rate	4.6001	lb/hr

SAMPLING QA/QC

Isokinetics	107.7 %
Corrected Meter Volume	72.097 dscf

SUMMARY OF METAL EMISSIONS

RUN NUMBER = **KCE-M29-R2**
SAMPLE VOLUME = 72.097 dscf
TOTAL GAS FLOWRATE = 4368.014 dscfm
CARBON DIOXIDE % = 6.3
OXYGEN % = 12.9

		LABORATORY DATA					GAS EMISSIONS			
		SAMPLE CATCH - micrograms					CONCENTRATION			MASS
		FRONT HALF:		BACK HALF:			ACTUAL	@ 12% CO2	@7% O2	RATE
COMPONENT		SAMPLE	BLANK	SAMPLE	BLANK	TOTAL	ug/Nm3	ug/Nm3	ug/Nm3	lb/hr
Antimony	Sb	10.90	0.00	0.00	0.00	10.90	5.73	10.84	9.91	8.74E-05
Arsenic	As	110.00	0.00	2.45	0.00	112.45	59.11	111.88	102.19	9.01E-04
Beryllium	Be	13.30	0.00	0.00	0.00	13.30	6.99	13.23	12.09	1.07E-04
Cadmium	Cd	2.73	0.09	0.37	0.05	2.96	1.56	2.95	2.69	2.37E-05
Chromium	Cr	67.40	4.20	2.16	1.00	64.36	33.83	64.03	58.49	5.16E-04
Lead	Pb	56.30	1.06	23.00	0.00	78.24	41.13	77.84	71.10	6.27E-04
Manganese	Mn	39.00	1.41	1.85	0.59	38.85	20.42	38.65	35.31	3.11E-04
Mercury	Hg	72.00	0.00	3.21	0.00	75.21	39.53	74.83	68.35	6.03E-04
Nickel	Ni	142.00	2.72	1.51	1.00	139.79	73.48	139.08	127.04	1.12E-03
Phosphorus	P	451.00	0.00	0.00	0.00	451.00	237.07	448.72	409.86	3.61E-03
Selenium	Se	361.00	0.00	0.00	0.00	361.00	189.76	359.17	328.07	2.89E-03

Front Half - Probe Wash and Filter
Back Half - Impinger Catches
Blank - Field Blank

RUN NUMBER	KCE-M29-R3						
DATE	07/31/92		**METHOD 4 DATA**				
START TIME	09:05			INIT. (ml)	FINAL (ml)	NET (ml)	
END TIME	11:24						
STACK DIAM.	24 X 25	inches	IMP.1	0.0	102.0	102.0	
NOZZLE I.D.	0.3125	inches	IMP.2	100.0	147.0	47.0	
METER BOX GAMMA	1.00624		IMP.3	100.0	106.0	6.0	
METER BOX dH@	1.72964		IMP.4	0.0	1.0	1.0	
BAROMETRIC	30.00	in.Hg	IMP.5	100.0	105.0	5.0	
Cp	0.84		IMP.6	100.0	101.0	1.0	
TEST DURATION	120	minutes	IMP.7			0.0	
			TOTAL	400.0	562.0	162.0	
			S.G.	200.0	214.9	14.9	

SAMPLING RESULTS			**METHOD 3 DATA**			
Metered Volume	72.554	dcf	%O2	13.10	Md	29.58
Metered Volume	2.055	dcm	%CO2	6.62	Ms	28.37
Volume @ Std.Cond.	71.292	dscf	%CO	0.0	Ps	30.01
Volume @ Std.Cond.	2.019	dscm	%N2	80.3	Fo	1.178
% Water	10.46	%	O2+CO2	19.7	%EA	161.85
% Isokinetics	105.9	%				

VOLUMETRIC RESULTS - USENG			**VOLUMETRIC RESULTS - SI**		
Velocity	29.49	ft/sec	Velocity	8.99	m/sec
Actual Flow	7373	acfm	Actual Flow	12527	am3/hr
Std. Flow	4905	scfm	Std. Flow	8334	sm3/hr
Dry Std. Flow	4392	dscfm	Dry Std. Flow	7463	dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	338	0.18	0.21	1.30	757.526	70	70
2	344	0.16	0.22	1.35		76	74
3	348	0.16	0.24	1.50		77	74
4	340	0.15	0.24	1.50		80	75
5	339		0.20	1.25		81	76
6	342		0.20	1.25		81	76
7	327		0.15	0.93		77	76
8	331		0.15	0.93		81	79
9	338		0.16	0.97		84	81
10	346		0.16	0.97		87	81
11	346		0.15	0.93		86	81
12	347		0.15	0.93	793.726	87	82
13	323		0.15	0.93	793.726	84	83
14	332		0.16	0.97		87	83
15	332		0.18	1.10		85	82
16	332		0.18	1.10		86	82
17	340		0.22	1.35		89	83
18	343		0.24	1.50		86	82
19	337		0.16	0.97		89	87
20	336		0.16	0.97		92	89
21	335		0.18	1.10		98	94
22	320		0.18	1.10		94	93
23	310		0.16	0.97		93	88
24	339		0.16	0.97		94	89
25					830.080		
AVG.	336	0.17	0.18	1.12	72.554	83	

EPA METHOD 5 DATA
RUN NUMBER KCE-M29-R3

COMPONENT	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Probe Wash	64.32910	64.33800	0.00890	120.0
Corr. for Blank			0.00890	
Filter	0.44340	1.04900	0.60560	
Back Half	0.00000	0.00000	0.00000	
TOTAL			0.61450	

ACETONE BLANK

Actual Residue	0.00000 grams
Actual Blank Corr.	0.00000 grams
Max. Allowable Res.	0.00094 grams
Volume	125.0 ml

PARTICULATE EMISSIONS

Actual Grain Loading	0.13302	gr/dscf
Corrected to 7% O2	0.23705	gr/dscf @ 7% O2
Corrected to 12% CO2	0.24112	gr/dscf @ 12% CO2
Corrected to 50% Excess Air	0.23221	gr/dscf @ 50% EA
Mass Rate	5.0080	lb/hr

SAMPLING QA/QC

Isokinetics	105.9 %
Corrected Meter Volume	71.292 dscf

SUMMARY OF METAL EMISSIONS

RUN NUMBER = KCE-M29-R3
SAMPLE VOLUME = 71.292 dscf
TOTAL GAS FLOWRATE = 4392.346 dscfm
CARBON DIOXIDE % = 6.6
OXYGEN % = 13.1

		LABORATORY DATA					GAS EMISSIONS			
		SAMPLE CATCH - micrograms					CONCENTRATION			MASS RATE
		FRONT HALF:		BACK HALF:			ACTUAL	@ 12% CO2	@7% O2	
COMPONENT		SAMPLE	BLANK	SAMPLE	BLANK	TOTAL	ug/Nm3	ug/Nm3	ug/Nm3	lb/hr
Antimony	Sb	11.30	0.00	0.56	0.00	11.86	6.30	11.43	11.24	9.67E-05
Arsenic	As	111.00	0.00	2.05	0.00	113.05	60.10	108.94	107.10	9.21E-04
Beryllium	Be	13.40	0.00	0.00	0.00	13.40	7.12	12.91	12.69	1.09E-04
Cadmium	Cd	1.80	0.09	0.10	0.05	1.76	0.94	1.70	1.67	1.43E-05
Chromium	Cr	73.10	4.20	1.85	1.00	69.75	37.08	67.21	66.08	5.69E-04
Lead	Pb	60.60	1.06	2.74	0.00	62.28	33.11	60.01	59.00	5.08E-04
Manganese	Mn	36.70	1.41	3.30	0.59	38.00	20.20	36.62	36.00	3.10E-04
Mercury	Hg	80.10	0.00	2.00	0.00	82.10	43.64	79.11	77.78	6.69E-04
Nickel	Ni	162.00	2.72	0.95	0.95	159.28	84.67	153.49	150.89	1.30E-03
Phosphorus	P	471.00	0.00	0.00	0.00	471.00	250.38	453.87	446.19	3.84E-03
Selenium	Se	417.00	0.00	0.78	0.00	417.78	222.09	402.58	395.78	3.41E-03

Front Half - Probe Wash and Filter
Back Half - Impinger Catches
Blank - Field Blank

APPENDIX D.1.3

DATA AND RESULTS FOR EPA METHOD 26 TESTING

Data and Results for Kiln Combustion Exhaust Hydrogen Fluoride Testing

RUN NUMBER	KCE-M26-R1	KCE-M26-R2	KCE-M26-R3	AVERAGE
DATE	07/30/93	07/30/93	07/31/93	
START TIME	12:28	15:12	09:05	
END TIME	14:44	17:31	11:24	
<u>SAMPLING DATA</u>				
Initial Meter Volume - l	934.790	1175.340	1420.070	1176.733
Final Meter Volume - l	1175.070	1415.970	1664.410	1418.483
Net Meter Volume - l	240.280	240.630	244.340	241.750
Average Meter Temp. - F	112.1	116.6	106.5	111.8
Barometric Pres. - in.Hg	29.97	29.97	30.00	29.98
Avg. Meter Pres. - in.W.C.	2.4	2.4	2.4	2.4
Meter Cal. Factor - Gamma	0.9985	0.9985	0.9985	
Corr. Meter Volume - dscf	7.875	7.825	8.096	7.932
Oxygen - %dv*	13.16	12.86	13.10	13.04
<u>GAS FLOWRATE DATA*</u>				
Velocity - ft/sec	28.83	29.40	29.49	29.24
Actual Volume - acfm	7208	7349	7373	7310
Standard Volume - dscfm	4294	4368	4392	4351
<u>LABORATORY DATA</u>				
Fluoride Analysis				
Total Liquid Volume - ml	73.0	68.0	80.0	73.7
Floride Conc. - mg/liter	74.0	106.0	259.0	146.3
<u>HF EMISSIONS</u>				
Concentration - ppmdv	30.672	41.188	114.439	62.099
Conc. - ppmdv @ 7% O2	55.082	71.208	203.935	110.075
Mass Rate - lb/hr	0.410	0.561	1.566	0.846

* Gas flowrate and oxygen content data were taken from EPA Method 29 testing which was conducted concurrently.

APPENDIX D.1.4

DATA AND RESULTS FOR EPA METHOD 25A AND MODIFIED METHOD 25A TESTING (THC, METHANE AND ETHANE)

Summary of the Kiln Combustion Exhaust THC and Methane and Ethane Emissions

RUN I.D.	KCE-M25A-R1	KCE-M25A-R2	KCE-M25A-R3	AVERAGE
DATE	07/29/93	07/29/93	07/29/93	
TIME STARTED	08:48	11:38	14:26	
TIME ENDED	10:48	13:38	15:26	
GAS PARAMETERS*				
Gas Temperature - oF	327.5	327.5	336.1	330.4
Oxygen - %	15.9	15.9	14.7	15.5
Carbon Dioxide - %	4.5	4.5	5.6	4.9
Moisture - %	9.58	9.58	8.36	9.17
GAS FLOWRATE*				
Velocity - ft/sec	29.52	29.52	28.79	29.28
Actual Volume - acfm	7381	7381	7198	7198
Standard Volume - dscfm	4488	4488	4388	4455
THC EMISSIONS				
Conc. - ppmwv (as Propane)	43.50	24.45	13.27	27.07
Conc. - ppmdv (as Propane)	48.11	27.04	14.48	29.88
Conc. - ppmdv (as Carbon)	144.33	81.12	43.44	89.63
Mass Rate - lb/hr (as Carbon)	1.21	0.68	0.36	0.75
METHANE/ETHANE EMISSIONS**				
Conc. - ppmwv (as Propane)	20.98	18.11	20.39	19.83
Conc. - ppmdv (as Propane)	23.20	20.03	22.25	21.83
Conc. - ppmdv (as Carbon)	69.61	60.09	66.75	65.48
Mass Rate - lb/hr (as Carbon)	0.584	0.504	0.548	0.545
TGNMO EMISSIONS				
Mass Rate - lb/hr (as Carbon)	0.626	0.176	-----	0.401

* Gas parameters and gas flowrate data are taken from KCE-M0010-R1 for M25A runs 1 and 2 and KCE-M0010-R2 for M25A run 3.

** Methane/Ethane emissions are calculated from the average of two 14-minute tests; one conducted prior to and one conducted after each of the individual M25A test runs.

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R1

Starting
07-29-93

Time	THC PPMWV
08:50	56.43
08:51	67.11
08:52	63.13
08:53	54.50
08:54	53.14
08:55	58.81
08:56	64.72
08:57	53.72
08:58	51.15
08:59	51.01
09:00	61.82
09:01	57.70
09:02	50.88
09:03	49.92
09:04	54.83
09:05	66.90
09:06	49.81
09:07	49.50
09:08	49.04
09:09	58.37
09:10	54.28
09:11	47.91
09:12	46.80
09:13	50.99
09:14	56.80
09:15	47.99
09:16	45.76
09:17	49.62
09:18	53.77
09:19	52.87
09:20	46.09
09:21	44.63
09:22	48.43
09:23	54.96
09:24	45.89
09:25	43.80
09:26	42.77
09:27	51.77
09:28	51.44

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R1

Starting
07-29-93

Time	THC PPMWV
09:29	43.55
09:30	42.31
09:31	50.64
09:32	50.83
09:33	45.18
09:34	42.81
09:35	43.54
09:36	51.54
09:37	50.85
09:38	42.67
09:39	42.75
09:40	44.83
09:41	51.91
09:42	44.79
09:43	41.57
09:44	40.44
09:45	46.97
09:46	41.46
09:47	40.10
09:48	39.43
09:49	41.12
09:50	48.93
09:51	42.20
09:52	38.69
09:53	38.46
09:54	46.11
09:55	45.25
09:56	37.36
09:57	35.31
09:58	36.38
09:59	43.17
10:00	37.46
10:01	33.40
10:02	33.34
10:03	40.17
10:04	43.31
10:05	36.67
10:06	36.37
10:07	38.61

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R1

Starting
07-29-93

Time	THC PPMWV
10:08	46.97
10:09	41.22
10:10	37.58
10:11	36.98
10:12	42.26
10:13	45.36
10:14	37.34
10:15	36.14
10:16	35.87
10:17	43.74
10:18	38.64
10:19	34.84
10:20	34.71
10:21	37.74
10:22	40.16
10:23	34.19
10:24	32.83
10:25	33.37
10:26	40.00
10:27	36.97
10:28	33.06
10:29	32.40
10:30	34.94
10:31	38.61
10:32	32.65
10:33	31.31
10:34	31.75
10:35	38.24
10:36	33.26
10:37	31.49
10:38	31.36
10:39	31.42
10:40	33.02
10:41	31.48
10:42	31.37
10:43	31.42
10:44	37.28
10:45	34.84
10:46	31.29

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R1

Starting
07-29-93

Time	THC PPMWV
10:47	30.49
10:48	32.64
119 MinAvg	43.45

Data Corrected for Calibrations
119 MinAvg 43.50

Calibrations:

```
VOC  100       Span Value =  100
LOW Calibration Gas =    0.00   HIGH Calibration Gas =   24.58
Initial Cal. at:   744
LOW Cal. Response =    0.11   HIGH Cal. Response =   24.15
       Cal. Drift =    0.00             Cal. Drift =   -0.00
Final Cal. at:  1111
LOW Cal. Response =    0.98   HIGH Cal. Response =   25.43
       Cal. Drift =    0.01             Cal. Drift =    0.01
 LOW System Drift =    0.01    HIGH System Drift =    0.01
```

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R2

Starting
07-29-93

Time	THC PPMWV
12:19	31.89
12:20	30.78
12:21	25.54
12:22	24.98
12:23	27.34
12:24	32.12
12:25	26.59
12:26	24.78
12:27	24.75
12:28	31.08
12:29	30.35
12:30	25.68
12:31	25.16
12:32	26.19
12:33	30.84
12:34	25.93
12:35	24.04
12:36	23.74
12:37	27.81
12:38	27.24
12:39	23.49
12:40	22.69
12:41	23.37
12:42	27.23
12:43	23.24
12:44	21.73
12:45	21.62
12:46	24.31
12:47	24.82
12:48	21.78
12:49	20.86
12:50	21.19
12:51	23.74
12:52	21.25
12:53	19.44
12:54	18.86
12:55	21.99
12:56	22.56
12:57	20.06

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R2

Starting
07-29-93

Time	THC PPMWV
11:40	28.01
11:41	27.98
11:42	29.23
11:43	31.73
11:44	29.05
11:45	29.33
11:46	30.52
11:47	34.38
11:48	37.55
11:49	31.83
11:50	30.71
11:51	30.26
11:52	35.73
11:53	31.98
11:54	27.85
11:55	27.07
11:56	28.41
11:57	31.25
11:58	26.66
11:59	25.09
12:00	24.94
12:01	29.46
12:02	28.56
12:03	25.59
12:04	26.97
12:05	29.34
12:06	32.78
12:07	28.50
12:08	26.43
12:09	25.41
12:10	30.82
12:11	30.15
12:12	25.55
12:13	25.08
12:14	27.76
12:15	33.36
12:16	27.28
12:17	25.72
12:18	25.58

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R2

Starting
07-29-93

Time	THC PPMWV
12:58	20.21
12:59	20.69
13:00	24.00
13:01	21.84
13:02	20.01
13:03	20.23
13:04	22.33
13:05	22.65
13:06	20.10
13:07	20.35
13:08	21.40
13:09	25.27
13:10	23.44
13:11	20.78
13:12	20.43
13:13	22.34
13:14	23.31
13:15	21.12
13:16	21.07
13:17	21.62
13:18	23.93
13:19	23.20
13:20	21.26
13:21	20.84
13:22	22.26
13:23	23.88
13:24	20.69
13:25	19.70
13:26	20.13
13:27	22.86
13:28	20.99
13:29	19.60
13:30	20.07
13:31	22.49
13:32	23.17
13:33	20.12
13:34	19.50
13:35	19.28
13:36	23.09

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R2

Starting
07-29-93

Time	THC PPMWV
13:37	21.66
13:38	19.74
119 MinAvg	25.10

Data Corrected for Calibrations
119 MinAvg 24.45

Calibrations:

VOC 100	Span Value = 100		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	24.58
Initial Cal. at: 1111			
LOW Cal. Response =	0.98	HIGH Cal. Response =	25.43
Cal. Drift =	0.01	Cal. Drift =	0.01
Final Cal. at: 1349			
LOW Cal. Response =	0.77	HIGH Cal. Response =	25.03
Cal. Drift =	0.01	Cal. Drift =	0.00
LOW System Drift =	-0.00	HIGH System Drift =	-0.00

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R3

Starting
07-29-93

Time	THC PPMWV
14:28	15.63
14:29	15.37
14:30	14.88
14:31	13.38
14:32	13.86
14:33	14.51
14:34	14.77
14:35	14.24
14:36	13.32
14:37	13.40
14:38	13.47
14:39	13.17
14:40	12.92
14:41	13.26
14:42	13.31
14:43	13.42
14:44	13.28
14:45	12.92
14:46	12.90
14:47	13.20
14:48	13.52
14:49	13.82
14:50	13.19
14:51	13.06
14:52	13.13
14:53	12.95
14:54	12.29
14:55	12.98
14:56	13.54
14:57	13.65
14:58	13.79
14:59	13.54
15:00	13.89
15:01	13.91
15:02	14.15
15:03	13.71
15:04	13.42
15:05	14.17
15:06	14.35

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R3

Starting
07-29-93

Time	THC PPMWV
15:07	14.29
15:08	14.50
15:09	14.27
15:10	14.61
15:11	14.38
15:12	13.82
15:13	13.21
15:14	13.79
15:15	13.82
15:16	12.75
15:17	12.91
15:18	12.94
15:19	13.53
15:20	13.24
15:21	12.34
15:22	13.11
15:23	13.34
15:24	13.48
15:25	12.65
15:26	12.81
60 MinAvg	13.59

Data Corrected for Calibrations
60 MinAvg 13.27

Calibrations:

```
VOC  100       Span Value =  100
LOW Calibration Gas =    0.00   HIGH Calibration Gas =   24.58
Initial Cal. at:  1349
LOW Cal. Response =    0.77  HIGH Cal. Response =   25.03
       Cal. Drift =    0.01           Cal. Drift =    0.00
Final Cal. at:  1723
LOW Cal. Response =    0.48  HIGH Cal. Response =   24.28
       Cal. Drift =    0.00           Cal. Drift =   -0.00
 LOW System Drift =   -0.00   HIGH System Drift =   -0.01
```

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV
18:01	24.19
18:02	22.40
18:03	12.60
18:04	22.88
18:05	-6999.00*
18:06	35.03
18:07	32.77
18:08	27.32
18:09	22.20
18:10	20.00
18:11	19.79
18:12	26.95
18:13	32.34
18:14	37.76
18:15	46.90
18:16	40.20
18:17	27.99
18:18	22.56
18:19	19.46
18:20	17.78
18:21	16.52
18:22	14.60
18:23	14.85
18:24	14.83
18:25	14.87
18:26	13.18
18:27	12.90
18:28	13.52
18:29	13.23
18:30	12.73
18:31	11.73
18:32	12.63
18:33	13.04
18:34	12.89
18:35	12.32
18:36	12.22
18:37	12.53
18:38	12.62
18:39	12.02

* Data marked with an * is not included in the average.

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV
18:40	10.81
18:41	11.54
18:42	12.18
18:43	12.46
18:44	11.24
18:45	10.88
18:46	12.06
18:47	11.97
18:48	11.33
18:49	10.01
18:50	14.15
18:51	18.86
18:52	24.42
18:53	31.19
18:54	33.88
18:55	38.67
18:56	42.10
18:57	30.48
18:58	21.08
18:59	17.79
19:00	16.73
19:01	16.12
19:02	14.33
19:03	13.32
19:04	13.60
19:05	13.42
19:06	12.98
19:07	11.47
19:08	12.10
19:09	12.39
19:10	12.53
19:11	12.75
19:12	11.69
19:13	12.89
19:14	12.96
19:15	12.36
19:16	10.98
19:17	11.85
19:18	12.66

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV
19:19	12.44
19:20	11.54
19:21	10.50
19:22	11.98
19:23	12.59
19:24	12.61
19:25	12.40
19:26	12.29
19:27	12.80
19:28	13.29
19:29	12.08
19:30	11.29
19:31	12.29
19:32	12.80
19:33	12.99
19:34	10.96
19:35	11.59
19:36	13.14
19:37	13.17
19:38	11.79
19:39	10.76
19:40	12.39
19:41	12.09
19:42	12.73
19:43	10.19
19:44	11.27
19:45	12.29
19:46	12.40
19:47	11.85
19:48	10.22
19:49	11.52
19:50	12.30
19:51	12.74
19:52	11.14
19:53	11.75
19:54	12.95
19:55	13.14
19:56	12.79
19:57	10.47

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV
19:58	12.06
19:59	12.66
20:00	12.68
20:01	10.59
20:02	10.91
20:03	12.18
20:04	12.33
20:05	11.69
20:06	9.82
20:07	11.87
20:08	12.27
20:09	12.20
20:10	9.91
20:11	10.28
20:12	11.15
20:13	11.66
20:14	11.02
20:15	9.39
20:16	10.80
20:17	11.24
20:18	11.68
20:19	9.75
20:20	9.69
20:21	11.12
20:22	11.66
20:23	11.63
20:24	9.42
20:25	10.65
20:26	11.83
20:27	12.47
20:28	12.21
20:29	10.80
20:30	12.60
20:31	13.25
20:32	13.18
20:33	11.12
20:34	12.30
20:35	12.88
20:36	13.46

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV
18:01	24.19
18:02	22.40
18:03	12.60
18:04	22.88
18:05	-6999.00*
18:06	35.03
18:07	32.77
18:08	27.32
18:09	22.20
18:10	20.00
18:11	19.79
18:12	26.95
18:13	32.34
18:14	37.76
18:15	46.90
18:16	40.20
18:17	27.99
18:18	22.56
18:19	19.46
18:20	17.78
18:21	16.52
18:22	14.60
18:23	14.85
18:24	14.83
18:25	14.87
18:26	13.18
18:27	12.90
18:28	13.52
18:29	13.23
18:30	12.73
18:31	11.73
18:32	12.63
18:33	13.04
18:34	12.89
18:35	12.32
18:36	12.22
18:37	12.53
18:38	12.62
18:39	12.02

* Data marked with an * is not included in the average.

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV
18:40	10.81
18:41	11.54
18:42	12.18
18:43	12.46
18:44	11.24
18:45	10.88
18:46	12.06
18:47	11.97
18:48	11.33
18:49	10.01
18:50	14.15
18:51	18.86
18:52	24.42
18:53	31.19
18:54	33.88
18:55	38.67
18:56	42.10
18:57	30.48
18:58	21.08
18:59	17.79
19:00	16.73
19:01	16.12
19:02	14.33
19:03	13.32
19:04	13.60
19:05	13.42
19:06	12.98
19:07	11.47
19:08	12.10
19:09	12.39
19:10	12.53
19:11	12.75
19:12	11.69
19:13	12.89
19:14	12.96
19:15	12.36
19:16	10.98
19:17	11.85
19:18	12.66

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV
20:37	11.31
20:38	10.88
20:39	12.82
20:40	13.10
20:41	13.16
20:42	10.20
20:43	12.08
20:44	13.31
20:45	13.57
20:46	11.13
20:47	10.48
20:48	12.50
20:49	13.11
20:50	12.91
20:51	10.45
20:52	12.00
20:53	13.19
20:54	13.20
20:55	11.23
20:56	10.40
20:57	12.02
20:58	12.48
20:59	12.35
21:00	9.51
21:01	10.64
21:02	11.53
21:03	12.39
21:04	10.83
21:05	9.34
21:06	11.24
21:07	11.46
21:08	11.22
21:09	8.77
21:10	9.25
21:11	10.39
21:12	10.92
21:13	9.39
21:14	7.77
21:15	9.54

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV
21:16	9.90
21:17	10.07
21:18	9.39
21:19	10.10
21:20	10.66
21:21	10.73
21:22	9.30
21:23	7.95
21:24	9.57
21:25	10.04
21:26	9.88
21:27	7.56
21:28	7.76
21:29	9.00
21:30	9.61
21:31	8.55
21:32	7.05
21:33	8.49
21:34	8.79
21:35	8.93
21:36	7.62
21:37	7.43
21:38	8.46
21:39	8.98
21:40	8.66
21:41	6.80
21:42	8.18
21:43	9.06
21:44	9.63
21:45	7.62
21:46	7.79
21:47	9.34
21:48	9.68
21:49	9.21
21:50	7.12
21:51	9.14
21:52	9.74
21:53	10.30
21:54	8.34

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV
21:55	8.10
21:56	10.04
21:57	10.55
21:58	10.17
21:59	7.55
22:00	9.82
22:01	10.38
22:02	10.52
22:03	8.51
22:04	8.25
22:05	10.04
22:06	10.76
22:07	10.36
22:08	7.98
22:09	9.39
22:10	9.91
22:11	10.12
22:12	8.30
22:13	7.52
22:14	9.79
22:15	10.28
22:16	9.84
22:17	6.98
22:18	8.69
22:19	9.84
22:20	10.26
22:21	8.30
22:22	7.12
22:23	9.67
22:24	10.19
22:25	10.01
22:26	6.95
22:27	8.79
22:28	9.99
22:29	10.40
22:30	8.37
270 MinAvg	12.78

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R4

Starting
07-29-93

Time	THC PPMWV

Data Corrected for Calibrations

270 MinAvg	12.70

APPENDIX D.1.5

DATA AND RESULTS FOR EPA METHOD 0030 TESTING

EPA Brick WA 14
Calibration Report

Starting
07-30-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
08:37	20.37	2.54	1.31	-3.37
08:38	20.38	2.53	1.50	-3.36
08:39	20.38	2.51	1.39	-3.37
08:40	20.38	2.50	1.58	-3.35
08:41	20.38	2.49	1.45	-3.36
08:42	20.39	2.47	1.43	-3.36
08:43	20.39	2.46	1.41	-3.36
08:44	20.38	2.44	1.40	-3.36
08:45	20.38	2.43	1.29	-3.36
08:46	20.38	2.42	1.26	-3.36

EPA Brick WA 14
Calibration Report

Starting
07-30-93

Time	THC % PPMWV
08:37	0.04C
08:38	-0.05
08:39	0.50
08:40	82.00
08:41	86.00C
08:42	74.40
08:43	38.47
08:44	55.92C
08:45	23.44
08:46	24.82C

EPA Brick WA 14
Calibration Report

Starting
07-29-93

Time	THC % PPMWV
16:11	0.04C
16:12	-0.50
16:13	-0.08
16:14	0.48
16:15	19.42
16:16	68.74
16:17	86.10
16:18	86.10C
16:19	70.10
16:20	55.80
16:21	55.80
16:22	55.81C
16:23	55.80
16:24	53.92
16:25	26.81
16:26	24.95
16:27	24.88
16:28	24.86C

EPA Brick WA 14
Calibration Report

Starting
07-29-93

Time	THC % PPMWV
07:32	0.01C
07:33	15.00
07:34	84.60
07:35	85.60
07:36	86.10
07:37	86.00C
07:38	86.00
07:39	79.90
07:40	54.61C
07:41	54.63
07:42	53.88
07:43	32.10
07:44	24.15C

EPA Brick WA 14
Calibration Report

Starting
07-28-93

Time	THC % PPMWV
10:30	-0.01C
10:31	-0.02
10:32	8.58
10:33	86.10C
10:34	76.80
10:35	86.10
10:36	63.78
10:37	55.50C
10:38	55.47
10:39	35.45
10:40	24.85
10:41	24.83C

EPA Brick WA 14
Bias Check Report

Starting
07-28-93

Time	THC % PPMWV
15:24	0.70B
15:25	13.06
15:26	24.90B

EPA Brick WA 14
Bias Check Report

Starting
07-28-93

Time	THC % PPMWV
13:47	0.70B
13:48	17.45
13:49	25.10
13:50	24.93B

EPA Brick WA 14
Bias Check Report

Starting
07-28-93

Time	THC % PPMWV
12:11	0.74B
12:12	14.63
12:13	25.41
12:14	25.45
12:15	25.27B

EPA Brick WA 14
Kiln Combustion Exhaust
Methane/Ethane
RUN 7

Starting
07-30-93

Time	Meth/Eth % PPMWV
17:57	3.09
17:58	4.19
17:59	3.59
18:00	3.04
18:01	3.29
18:02	3.42
18:03	4.79
18:04	3.91
18:05	3.63
18:06	3.76
18:07	4.40
18:08	4.46
18:09	3.64
18:10	3.64
14 MinAvg	3.77

EPA Brick WA 14
Kiln Combustion Exhaust
Methane/Ethane
RUN 6

Starting
07-30-93

Time	Meth/Eth % PPMWV
09:19	5.34
09:20	4.93
09:21	6.09
09:22	6.95
09:23	6.90
09:24	6.95
09:25	7.14
09:26	7.61
09:27	8.63
09:28	7.94
09:29	8.02
09:30	8.26
09:31	8.91
09:32	8.54
14 MinAvg	7.30

EPA Brick WA 14
Kiln Combustion Exhaust
Methane/Ethane
RUN 5

Starting
07-29-93

Time	Meth/Eth % PPMWV
22:46	5.53
22:47	5.31
22:48	5.57
22:49	5.18
22:50	5.69
22:51	6.00
22:52	6.36
22:53	5.99
22:54	5.75
22:55	6.48
22:56	7.07
22:57	7.25
22:58	6.78
22:59	7.05
14 MinAvg	6.14

EPA Brick WA 14
Kiln Combustion Exhaust
Methane/Ethane
RUN 4

Starting
07-29-93

Time	Meth/Eth % PPMWV
17:46	9.93
17:47	9.54
17:48	9.57
17:49	9.68
17:50	9.38
17:51	8.57
17:52	8.82
17:53	8.78
17:54	-6999.00*
17:55	-6999.00*
17:56	-6999.00*
17:57	65.30
17:58	46.93
17:59	37.76
14 MinAvg	20.39

* Data marked with an * is not included in the average.

EPA Brick WA 14
Kiln Combustion Exhaust
Methane/Ethane
RUN 3

Starting
07-29-93

Time	Meth/Eth % PPMWV
13:55	8.55
13:56	9.23
13:57	10.29
13:58	11.65
13:59	13.35
14:00	12.59
14:01	12.43
14:02	12.59
14:03	14.48
14:04	14.78
14:05	13.27
14:06	13.07
14:07	12.94
14 MinAvg	20.39

EPA Brick WA 14
Kiln Combustion Exhaust
Methane/Ethane
RUN 2

Starting
07-29-93

Time	Meth/Eth % PPMWV
11:19	10.70
11:20	12.53
11:21	13.50
11:22	12.87
11:23	14.36
11:24	14.46
11:25	16.37
11:26	15.34
11:27	14.94
11:28	15.50
11:29	16.65
11:30	17.14
11:31	15.88
11:32	15.75
11:33	15.63
14 MinAvg	15.83

EPA Brick WA 14
Kiln Combustion Exhaust
Methane/Ethane
RUN 1

Starting
07-29-93

Time	Meth/Eth % PPMWV
08:32	11.28
08:33	15.35
08:34	14.30
08:35	15.21
08:36	16.32
08:37	30.65
08:38	40.75
08:39	33.07
08:40	30.39
08:41	30.95
08:42	37.98
08:43	30.47
08:44	29.75
08:45	29.35
14 MinAvg	26.13

Calibrations:

VOC 100	Span Value = 100		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	24.58
Initial Cal. at: 846			
LOW Cal. Response =	0.04	HIGH Cal. Response =	24.82
Cal. Drift =	0.00	Cal. Drift =	0.00
Final Cal. at: 1751			
LOW Cal. Response =	0.09	HIGH Cal. Response =	25.29
Cal. Drift =	0.00	Cal. Drift =	0.01
LOW System Drift =	0.00	HIGH System Drift =	0.00

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
17:27	7.83
17:28	6.72
17:29	6.42
17:30	6.35
17:31	8.07
17:32	7.35
17:33	6.91
17:34	6.92
17:35	8.01
17:36	9.22
17:37	7.47
17:38	7.73
17:39	7.61
17:40	7.87
17:41	8.43
17:42	7.60
17:43	7.20
17:44	7.68
17:45	8.16
17:46	7.29
17:47	7.13
17:48	6.73
17:49	6.11
491 MinAvg	9.84

Data Corrected for Calibrations
491 MinAvg 9.61

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
16:48	7.79
16:49	7.83
16:50	7.91
16:51	8.72
16:52	7.79
16:53	7.46
16:54	7.20
16:55	8.21
16:56	8.04
16:57	8.14
16:58	7.83
16:59	8.63
17:00	8.41
17:01	7.83
17:02	7.94
17:03	9.07
17:04	9.50
17:05	8.53
17:06	8.37
17:07	7.81
17:08	8.22
17:09	8.59
17:10	7.81
17:11	7.54
17:12	7.16
17:13	7.93
17:14	7.46
17:15	7.22
17:16	7.63
17:17	8.15
17:18	7.99
17:19	7.22
17:20	7.08
17:21	6.91
17:22	7.59
17:23	7.54
17:24	7.61
17:25	7.14
17:26	7.79

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
16:09	7.91
16:10	8.25
16:11	8.00
16:12	8.06
16:13	8.07
16:14	8.78
16:15	8.35
16:16	7.91
16:17	8.05
16:18	8.53
16:19	9.43
16:20	8.45
16:21	8.25
16:22	8.31
16:23	8.77
16:24	8.30
16:25	8.44
16:26	8.09
16:27	8.33
16:28	9.21
16:29	8.44
16:30	7.72
16:31	8.30
16:32	8.80
16:33	8.48
16:34	7.51
16:35	7.50
16:36	7.50
16:37	8.71
16:38	7.35
16:39	7.79
16:40	7.28
16:41	7.84
16:42	7.97
16:43	7.49
16:44	7.72
16:45	7.63
16:46	8.57
16:47	7.75

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
15:30	8.44
15:31	8.64
15:32	8.27
15:33	8.61
15:34	9.06
15:35	9.16
15:36	9.03
15:37	8.86
15:38	9.33
15:39	8.46
15:40	8.53
15:41	8.61
15:42	8.87
15:43	8.77
15:44	8.10
15:45	8.17
15:46	8.44
15:47	8.81
15:48	8.42
15:49	8.46
15:50	7.68
15:51	7.76
15:52	8.60
15:53	8.36
15:54	8.12
15:55	8.17
15:56	9.31
15:57	8.66
15:58	7.88
15:59	8.09
16:00	9.56
16:01	9.08
16:02	8.87
16:03	8.79
16:04	8.60
16:05	8.64
16:06	8.34
16:07	7.97
16:08	7.68

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
14:51	8.84
14:52	8.93
14:53	9.16
14:54	8.76
14:55	8.33
14:56	8.00
14:57	8.07
14:58	8.18
14:59	7.95
15:00	7.74
15:01	7.62
15:02	8.79
15:03	8.60
15:04	8.50
15:05	8.28
15:06	8.87
15:07	9.24
15:08	8.91
15:09	8.40
15:10	8.40
15:11	8.35
15:12	8.13
15:13	8.22
15:14	8.18
15:15	8.83
15:16	8.49
15:17	8.03
15:18	8.65
15:19	8.59
15:20	9.38
15:21	9.06
15:22	8.31
15:23	8.08
15:24	8.34
15:25	8.41
15:26	8.65
15:27	8.60
15:28	9.57
15:29	8.94

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
14:12	9.40
14:13	9.24
14:14	9.46
14:15	9.30
14:16	9.14
14:17	8.58
14:18	9.02
14:19	8.59
14:20	8.57
14:21	9.02
14:22	9.23
14:23	9.40
14:24	8.68
14:25	8.79
14:26	9.09
14:27	8.87
14:28	8.53
14:29	10.95
14:30	10.09
14:31	9.18
14:32	8.51
14:33	8.56
14:34	8.68
14:35	8.88
14:36	8.89
14:37	8.69
14:38	8.73
14:39	9.35
14:40	8.87
14:41	8.54
14:42	8.35
14:43	8.57
14:44	8.94
14:45	8.87
14:46	8.71
14:47	8.45
14:48	9.10
14:49	8.88
14:50	8.44

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
13:33	8.73
13:34	8.90
13:35	8.78
13:36	8.75
13:37	8.88
13:38	9.23
13:39	9.17
13:40	8.65
13:41	8.82
13:42	8.95
13:43	9.14
13:44	9.15
13:45	9.06
13:46	9.54
13:47	9.92
13:48	9.30
13:49	9.49
13:50	8.99
13:51	8.77
13:52	9.16
13:53	9.04
13:54	9.59
13:55	9.16
13:56	9.03
13:57	9.09
13:58	9.48
13:59	9.67
14:00	8.97
14:01	9.15
14:02	9.49
14:03	8.73
14:04	8.48
14:05	7.95
14:06	8.02
14:07	8.80
14:08	8.69
14:09	8.34
14:10	8.27
14:11	8.18

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
12:54	12.13
12:55	11.84
12:56	11.07
12:57	11.09
12:58	10.46
12:59	10.55
13:00	10.42
13:01	10.41
13:02	10.55
13:03	11.10
13:04	10.81
13:05	10.19
13:06	9.77
13:07	9.72
13:08	9.89
13:09	10.03
13:10	10.39
13:11	10.01
13:12	9.71
13:13	9.44
13:14	9.78
13:15	9.92
13:16	9.71
13:17	9.77
13:18	10.33
13:19	10.11
13:20	9.76
13:21	9.85
13:22	9.08
13:23	9.69
13:24	9.53
13:25	9.46
13:26	9.55
13:27	9.58
13:28	9.20
13:29	8.97
13:30	8.79
13:31	9.16
13:32	9.10

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
12:15	11.30
12:16	10.76
12:17	10.46
12:18	10.64
12:19	11.94
12:20	11.07
12:21	10.76
12:22	10.63
12:23	12.02
12:24	12.19
12:25	11.52
12:26	11.37
12:27	13.04
12:28	14.69
12:29	12.69
12:30	11.42
12:31	11.38
12:32	11.86
12:33	11.03
12:34	10.13
12:35	10.33
12:36	10.75
12:37	11.93
12:38	10.35
12:39	10.59
12:40	12.04
12:41	12.13
12:42	11.01
12:43	10.74
12:44	10.92
12:45	11.17
12:46	12.20
12:47	11.74
12:48	11.26
12:49	11.74
12:50	12.62
12:51	12.25
12:52	11.94
12:53	11.64

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
11:36	9.94
11:37	9.83
11:38	10.70
11:39	9.78
11:40	9.49
11:41	9.58
11:42	10.30
11:43	10.33
11:44	9.40
11:45	9.38
11:46	10.10
11:47	11.78
11:48	10.18
11:49	9.73
11:50	10.49
11:51	10.74
11:52	10.66
11:53	9.08
11:54	9.57
11:55	10.34
11:56	10.81
11:57	9.96
11:58	10.12
11:59	10.12
12:00	10.73
12:01	10.45
12:02	9.33
12:03	9.43
12:04	9.53
12:05	11.34
12:06	10.49
12:07	9.80
12:08	9.86
12:09	10.56
12:10	11.12
12:11	10.10
12:12	10.08
12:13	10.94
12:14	11.35

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
10:57	13.84
10:58	13.54
10:59	12.40
11:00	12.86
11:01	12.67
11:02	13.22
11:03	12.38
11:04	12.52
11:05	11.94
11:06	12.75
11:07	12.66
11:08	11.87
11:09	11.59
11:10	12.27
11:11	12.91
11:12	11.92
11:13	11.66
11:14	11.64
11:15	13.20
11:16	12.84
11:17	11.59
11:18	11.67
11:19	11.74
11:20	12.19
11:21	10.72
11:22	10.06
11:23	9.89
11:24	10.64
11:25	10.62
11:26	9.67
11:27	9.12
11:28	9.15
11:29	10.19
11:30	9.60
11:31	9.28
11:32	9.30
11:33	9.40
11:34	10.17
11:35	9.89

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
10:18	11.25
10:19	11.00
10:20	11.77
10:21	12.56
10:22	11.84
10:23	11.33
10:24	11.19
10:25	11.14
10:26	11.96
10:27	11.23
10:28	11.20
10:29	10.99
10:30	12.40
10:31	11.81
10:32	11.43
10:33	11.15
10:34	12.18
10:35	12.40
10:36	11.58
10:37	11.46
10:38	10.99
10:39	12.02
10:40	11.94
10:41	11.20
10:42	12.14
10:43	12.76
10:44	12.84
10:45	11.12
10:46	10.79
10:47	10.66
10:48	12.46
10:49	12.18
10:50	11.67
10:51	11.81
10:52	12.71
10:53	14.38
10:54	13.08
10:55	12.81
10:56	12.43

EPA Brick WA 14
Kiln Combustion Exhaust
Total Hydrocarbons
KSO-M25A-R5

Starting
07-30-93

Time	THC PPMWV
09:39	15.88
09:40	16.14
09:41	15.92
09:42	14.90
09:43	14.43
09:44	14.35
09:45	15.37
09:46	14.81
09:47	14.36
09:48	15.02
09:49	15.27
09:50	15.18
09:51	14.28
09:52	13.53
09:53	13.49
09:54	13.90
09:55	12.95
09:56	12.51
09:57	12.71
09:58	13.66
09:59	13.20
10:00	12.92
10:01	12.50
10:02	12.06
10:03	12.47
10:04	12.40
10:05	12.34
10:06	11.91
10:07	12.12
10:08	12.99
10:09	12.49
10:10	11.75
10:11	12.40
10:12	13.30
10:13	12.10
10:14	11.50
10:15	11.59
10:16	12.95
10:17	13.66

Calibrations:

VOC 100	Span Value = 100		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	24.58
Initial Cal. at: 1723			
LOW Cal. Response =	0.48	HIGH Cal. Response =	24.28
Cal. Drift =	0.00	Cal. Drift =	-0.00
Final Cal. at: 2240			
LOW Cal. Response =	0.16	HIGH Cal. Response =	24.62
Cal. Drift =	0.00	Cal. Drift =	0.00
LOW System Drift =	-0.00	HIGH System Drift =	0.00

SUMMARY OF EPA M0030 TESTING
KILN COMBUSTION EXHAUST

RUN I.D.	KCE-M0030-R1	KCE-M0030-R2	KCE-M0030-R3	AVERAGE
DATE	07/29/93	07/29/93	07/29/93	
START TIME	09:23	14:12	08:15	
END TIME	12:50	17:49	11:33	

POLLUTANT CONCENTRATION - lb/hr

Chloromethane	* 6.85E-04	< 6.29E-04	• 1.11E-03	< 8.09E-04
Vinyl Chloride	< 1.30E-06	< 1.33E-06	< 1.76E-06	< 1.46E-06
Bromomethane	1.45E-04	1.56E-04	1.69E-04	1.57E-04
Chloroethane	6.65E-05	6.77E-05	9.19E-05	7.53E-05
Trichlorofluoromethane	4.54E-05	* 2.29E-05	* 1.99E-04	* 8.90E-05
1,1-Dichloroethene	* 6.11E-06	* 5.09E-06	8.79E-05	• 3.30E-05
Carbon disulfide	< 6.52E-07	* 2.21E-05	• 2.25E-05	< 1.51E-05
Acetone	* 6.09E-03	• 2.58E-03	• 4.78E-03	* 4.49E-03
Methylene chloride	1.57E-05	0.00E+00	0.00E+00	5.24E-06
trans-1,2-Dichloroethene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
1,1-Dichloroethane	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
cis-1,2-Dichloroethene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
Chloroform	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
1,2-Dichloroethane	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
Vinyl acetate	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
2-Butanone	* 1.89E-03	* 1.72E-03	* 1.34E-03	• 1.65E-03
1,1,1-Trichloroethane	< 6.52E-07	< 6.63E-07	< 3.37E-04	< 1.13E-04
Carbon tetrachloride	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
Benzene	• 1.97E-03	* 1.87E-03	* 1.84E-03	• 1.89E-03
Trichloroethene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
1,2-Dichloropropane	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
Bromodichloromethane	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
cis-1,3-Dichloropropene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
trans-1,3-Dichloropropene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
1,1,2-Trichloroethane	< 1.30E-06	< 1.10E-06	< 1.10E-06	< 1.17E-06
Dibromochloromethane	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
Bromoform	< 1.30E-06	< 1.33E-06	< 1.76E-06	< 1.46E-06
4-Methyl-2-pentanone	< 2.61E-06	< 3.09E-06	< 3.08E-06	< 2.93E-06
Toluene	* 2.05E-03	• 1.55E-03	• 1.33E-03	• 1.64E-03
Tetrachloroethene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
2-Hexanone	< 5.22E-06	< 5.52E-06	< 5.50E-06	< 5.41E-06
Chlorobenzene	1.60E-04	1.60E-04	9.41E-05	1.38E-04
Ethylbenzene	1.77E-04	1.23E-04	1.17E-04	1.39E-04
m-/p-Xylene	* 1.20E-03	7.94E-04	6.07E-04	• 8.66E-04
o-Xylene	4.11E-04	2.78E-04	2.37E-04	3.09E-04
Styrene	< 6.52E-07	< 6.63E-07	< 6.60E-07	< 6.58E-07
1,1,2,2-Tetrachloroethane	< 1.30E-06	< 1.77E-06	< 1.76E-06	< 1.61E-06

Notes:
The emission values for each run represent the average of two pairs of VOST tube analyses.
< Not detected
• Detected but below the quantitation limit; quantity is estimated

SUMMARY OF EPA M0030 TESTING

KILN COMBUSTION EXHAUST

RUN I.D.		KCE-M0030-R1A		KCE-M0030-R1B	AVERAGE
DATE		07/29/93		07/29/93	
POLLUTANT CONCENTRATION - lb/hr					
Chloromethane	*	9.16E-04	●	4.55E-04	*6.85E-04
Vinyl Chloride	<	1.72E-06	<	8.86E-07	<1.30E-06
Bromomethane		1.40E-04		1.51E-04	1.45E-04
Chloroethane		7.14E-05		6.16E-05	6.65E-05
Trichlorofluoromethane		3.36E-05		5.71E-05	4.54E-05
1,1-Dichloroethene	*	6.03E-06	*	6.20E-06	*6.11E-06
Carbon disulfide	<	8.61E-07	<	4.43E-07	<6.52E-07
Acetone	*	1.03E-02	*	1.92E-03	*6.09E-03
Methylene chloride		0.00E+00		3.15E-05	1.57E-05
trans-1,2-Dichloroethene	<	8.61E-07	<	4.43E-07	<6.52E-07
1,1-Dichloroethane	<	8.61E-07	<	4.43E-07	<6.52E-07
cis-1,2-Dichloroethene	<	8.61E-07	<	4.43E-07	<6.52E-07
Chloroform	<	8.61E-07	<	4.43E-07	<6.52E-07
1,2-Dichloroethane	<	8.61E-07	<	4.43E-07	<6.52E-07
Vinyl acetate	<	8.61E-07	<	4.43E-07	<6.52E-07
2-Butanone	●	2.31E-03	*	1.46E-03	*1.89E-03
1,1,1-Trichloroethane	<	8.61E-07	<	4.43E-07	<6.52E-07
Carbon tetrachloride	<	8.61E-07	<	4.43E-07	<6.52E-07
Benzene	*	2.32E-03	*	1.63E-03	*1.97E-03
Trichloroethene	<	8.61E-07	<	4.43E-07	<6.52E-07
1,2-Dichloropropane	<	8.61E-07	<	4.43E-07	<6.52E-07
Bromodichloromethane	<	8.61E-07	<	4.43E-07	<6.52E-07
cis-1,3-Dichloropropene	<	8.61E-07	<	4.43E-07	<6.52E-07
trans-1,3-Dichloropropene	<	8.61E-07	<	4.43E-07	<6.52E-07
1,1,2-Trichloroethane	<	1.72E-06	<	8.86E-07	<1.30E-06
Dibromochloromethane	<	8.61E-07	<	4.43E-07	<6.52E-07
Bromoform	<	1.72E-06	<	8.86E-07	<1.30E-06
4-Methyl-2-pentanone	<	3.44E-06	<	1.77E-06	<2.61E-06
Toluene	*	2.00E-03	*	2.10E-03	*2.05E-03
Tetrachloroethene	<	8.61E-07	<	4.43E-07	<6.52E-07
2-Hexanone	<	6.89E-06	<	3.54E-06	<5.22E-06
Chlorobenzene		1.64E-04		1.56E-04	1.60E-04
Ethylbenzene		1.88E-04		1.67E-04	1.77E-04
m-/p-Xylene		1.06E-03	*	1.33E-03	*1.20E-03
o-Xylene		3.93E-04		4.29E-04	4.11E-04
Styrene	<	8.61E-07	<	4.43E-07	<6.52E-07
1,1,2,2-Tetrachloroethane	<	1.72E-06	<	8.86E-07	<1.30E-06

< Not detected

* Detected but below the quantitation limit; quantity is estimated

PRELIMINARY

VOST SAMPLING DATA AND RESULTS

Run I.D.	Date	Start Time	End Time	Meter Temp. (Fo)	Meter Press. (in. wc)	Bar. Press. (in. Hg)	Initial Meter Volume (liters)	Final Meter Volume (liters)	Sample Volume (liters)	Corrected Sample Volume (dscm)
KCE-M0030-R1A	07/29/93	09:23	09:43	96.0	1.0	30.00	263.320	283.790	20.470	0.0195
KCE-M0030-R1B	07/29/93	09:58	10:18	105.0	2.1	30.00	284.610	324.920	40.310	0.0379
KCE-M0030-R1C	07/29/93	10:28	10:48	111.0	1.0	30.00	325.690	345.690	20.000	0.0186
KCE-M0030-R1D	07/29/93	11:27	11:47	110.0	2.1	30.00	363.430	403.970	40.540	0.0378
KCE-M0030-R1E	07/29/93	12:00	12:20	112.5	1.0	30.00	404.440	424.440	20.000	0.0185
KCE-M0030-R1F	07/29/93	12:30	12:50	113.5	2.1	30.00	426.740	466.760	40.020	0.0371
KCE-M0030-R1										

ANALYTICAL DATA AND RESULTS FOR ORGANIC SAMPLING

RUN I.D.	**KCE-M0030-R1A**
DATE	07/29/93
START TIME	09:23
END TIME	09:43
CORR. SAMPLE VOL.	0.020 dscm
VOLUMETRIC FLOWRATE	4488 dscmf[1]
SAMPLE I.D.	600/602

	GAS EMISSIONS				
POLLUTANT	(a) SAMPLE ug	(b) BLANK ug	(a-b) TOTAL** ug	CONC. ACTUAL ug/Nm3	MASS RATE lb/hr
Chloromethane	* 1.083	• 0.019	• 1.064	• 58.469	* 9.16E-04
Vinyl Chloride	< 0.002	< 0.002	< 0.002	< 0.110	< 1.72E-06
Bromomethane	0.163	< 0.002	0.163	8.957	1.40E-04
Chloroethane	0.083	< 0.003	0.083	4.561	7.14E-05
Trichlorofluoromethane	0.058	• 0.019	0.039	2.143	3.36E-05
1,1-Dichloroethene	• 0.007	< 0.001	• 0.007	* 0.385	* 6.03E-06
Carbon disulfide	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
Acetone	*11.932	< 0.011	• 11.932	• 655.691	* 1.03E-02
Methylene chloride	0.070	0.299	0.000	0.000	0.00E+00
trans-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
1,1-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
cis-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
Chloroform	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
1,2-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
Vinyl acetate	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
2-Butanone	• 2.688	< 0.035	• 2.688	* 147.712	• 2.31E-03
1,1,1-Trichloroethane	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
Carbon tetrachloride	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
Benzene	• 2.693	< 0.001	• 2.693	• 147.987	• 2.32E-03
Trichloroethene	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
1,2-Dichloropropane	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
Bromodichloromethane	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
cis-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
trans-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
1,1,2-Trichloroethane	< 0.002	< 0.001	< 0.002	< 0.110	< 1.72E-06
Dibromochloromethane	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
Bromoform	< 0.002	< 0.002	< 0.002	< 0.110	< 1.72E-06
4-Methyl-2-pentanone	< 0.004	< 0.004	< 0.004	< 0.220	< 3.44E-06
Toluene	• 2.333	* 0.015	• 2.318	• 127.380	• 2.00E-03
Tetrachloroethene	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
2-Hexanone	< 0.008	< 0.007	< 0.008	< 0.440	< 6.89E-06
Chlorobenzene	0.190	< 0.001	0.190	10.441	1.64E-04
Ethylbenzene	0.218	< 0.001	0.218	11.980	1.88E-04
m-/p-Xylene	1.236	< 0.001	1.236	67.921	1.06E-03
o-Xylene	0.457	< 0.001	0.457	25.113	3.93E-04
Styrene	< 0.001	< 0.001	< 0.001	< 0.055	< 8.61E-07
1,1,2,2-Tetrachloroethane	< 0.002	< 0.002	< 0.002	< 0.110	< 1.72E-06

< Not detected

• Detected but below the quantitation limit; quantity is estimated

**If Blank(ug) Not Detected, then TOTAL(ug) = SAMPLE(ug); if BLANK(ug) > SAMPLE(ug), the TOTAL(ug) = 0.00

1 Flowrate is from KCE-M0010-R1.

ANALYTICAL DATA AND RESULTS FOR ORGANIC SAMPLING

RUN I.D.	KCE-M0030-R1B
DATE	07/29/93
START TIME	09:58
END TIME	10:18
CORR. SAMPLE VOL.	0.038 dscm
VOLUMETRIC FLOWRATE	4488 dscmf[1]
SAMPLE I.D.	603/605

POLLUTANT	(a) SAMPLE ug	(b) BLANK ug	(a-b) TOTAL** ug	GAS EMISSIONS CONC. ACTUAL ug/Nm3	GAS EMISSIONS MASS RATE lb/hr
Chloromethane	• 1.046	• 0.019	* 1.027	• 29.045	• 4.55E-04
Vinyl Chloride	< 0.002	< 0.002	< 0.002	< 0.057	< 8.86E-07
Bromomethane	0.340	< 0.002	0.340	9.616	1.51E-04
Chloroethane	0.139	< 0.003	0.139	3.931	6.16E-05
Trichlorofluoromethane	0.148	• 0.019	0.129	3.648	5.71E-05
1,1-Dichloroethene	• 0.014	< 0.001	• 0.014	• 0.396	• 6.20E-06
Carbon disulfide	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
Acetone	• 4.329	< 0.011	• 4.329	* 122.429	• 1.92E-03
Methylene chloride	0.370	0.299	0.071	2.008	3.15E-05
trans-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
1,1-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
cis-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
Chloroform	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
1,2-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
Vinyl acetate	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
2-Butanone	• 3.292	< 0.035	• 3.292	• 93.102	• 1.46E-03
1,1,1-Trichloroethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
Carbon tetrachloride	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
Benzene	• 3.676	< 0.001	* 3.676	• 103.962	• 1.63E-03
Trichloroethene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
1,2-Dichloropropane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
Bromodichloromethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
cis-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
trans-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
1,1,2-Trichloroethane	< 0.002	< 0.001	< 0.002	< 0.057	< 8.86E-07
Dibromochloromethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
Bromoform	< 0.002	< 0.002	< 0.002	< 0.057	< 8.86E-07
4-Methyl-2-pentanone	< 0.004	< 0.004	< 0.004	< 0.113	< 1.77E-06
Toluene	* 4.746	• 0.015	• 4.731	* 133.799	* 2.10E-03
Tetrachloroethene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
2-Hexanone	< 0.008	< 0.007	< 0.008	< 0.226	< 3.54E-06
Chlorobenzene	0.353	< 0.001	0.353	9.983	1.56E-04
Ethylbenzene	0.376	< 0.001	0.376	10.634	1.67E-04
m-/p-Xylene	• 2.999	< 0.001	* 2.999	• 84.815	• 1.33E-03
o-Xylene	0.968	< 0.001	0.968	27.376	4.29E-04
Styrene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.43E-07
1,1,2,2-Tetrachloroethane	< 0.002	< 0.002	< 0.002	< 0.057	< 8.86E-07

< Not detected

• Detected but below the quantitation limit; quantity is estimated

**If Blank(ug) Not Detected, then TOTAL(ug) = SAMPLE(ug); if BLANK(ug) > SAMPLE(ug), the TOTAL(ug) = 0.00

[1] Flowrate is from KCE-M0010-R1.

SUMMARY OF EPA M0030 TESTING

KILN COMBUSTION EXHAUST

RUN I.D.		KCE-M0030-R2E		KCE-M0030-R2F		AVERAGE
DATE		07/29/93		07/29/93		
POLLUTANT CONCENTRATION - lb/hr						
Chloromethane	●	4.80E-04	<	7.78E-04	*	6.29E-04
Vinyl Chloride	<	8.88E-07	<	1.76E-06	<	1.33E-06
Bromomethane		1.70E-04		1.42E-04		1.56E-04
Chloroethane		5.68E-05		7.85E-05		6.77E-05
Trichlorofluoromethane	*	0.00E+00	*	4.59E-05	*	2.29E-05
1,1-Dichloroethene	*	4.00E-06	*	6.17E-06	*	5.09E-06
Carbon disulfide	*	1.95E-05	*	2.47E-05	*	2.21E-05
Acetone	*	2.31E-03	*	2.86E-03	*	2.58E-03
Methylene chloride	*	0.00E+00		0.00E+00	*	0.00E+00
trans-1,2-Dichloroethene	<	4.44E-07	<	8.82E-07	<	6.63E-07
1,1-Dichloroethane	<	4.44E-07	<	8.82E-07	<	6.63E-07
cis-1,2-Dichloroethene	<	4.44E-07	<	8.82E-07	<	6.63E-07
Chloroform	<	4.44E-07	<	8.82E-07	<	6.63E-07
1,2-Dichloroethane	<	4.44E-07	<	8.82E-07	<	6.63E-07
Vinyl acetate	<	4.44E-07	<	8.82E-07	<	6.63E-07
2-Butanone	*	1.92E-03	●	1.52E-03	*	1.72E-03
1,1,1-Trichloroethane	<	4.44E-07	<	8.82E-07	<	6.63E-07
Carbon tetrachloride	<	4.44E-07	<	8.82E-07	<	6.63E-07
Benzene	*	1.39E-03	*	2.36E-03	*	1.87E-03
Trichloroethene	<	4.44E-07	<	8.82E-07	<	6.63E-07
1,2-Dichloropropane	<	4.44E-07	<	8.82E-07	<	6.63E-07
Bromodichloromethane	<	4.44E-07	<	8.82E-07	<	6.63E-07
cis-1,3-Dichloropropene	<	4.44E-07	<	8.82E-07	<	6.63E-07
trans-1,3-Dichloropropene	<	4.44E-07	<	8.82E-07	<	6.63E-07
1,1,2-Trichloroethane	<	4.44E-07	<	1.76E-06	<	1.10E-06
Dibromochloromethane	<	4.44E-07	<	8.82E-07	<	6.63E-07
Bromoform	<	8.88E-07	<	1.76E-06	<	1.33E-06
4-Methyl-2-pentanone	<	1.78E-06	<	4.41E-06	<	3.09E-06
Toluene	*	1.51E-03	●	1.58E-03	*	1.55E-03
Tetrachloroethene	<	4.44E-07	<	8.82E-07	<	6.63E-07
2-Hexanone	<	3.11E-06	<	7.94E-06	<	5.52E-06
Chlorobenzene		1.56E-04		1.65E-04		1.60E-04
Ethylbenzene		1.16E-04		1.30E-04		1.23E-04
m-/p-Xylene		8.52E-04		7.35E-04		7.94E-04
o-Xylene		2.77E-04		2.79E-04		2.78E-04
Styrene	<	4.44E-07	<	8.82E-07	<	6.63E-07
1,1,2,2-Tetrachloroethane	<	8.88E-07	<	2.65E-06	<	1.77E-06

< Not detected

* Detected but below the quantitation limit; quantity is estimated

PRELIMINARY

VOST SAMPLING DATA AND RESULTS

Run I.D.	Date	Start Time	End Time	Meter Temp. (Fo)	Meter Press. (in. wc)	Bar. Press. (in. Hg)	Initial Meter Volume (liters)	Final Meter Volume (liters)	Sample Volume (liters)	Corrected Sample Volume (dscm)
KCE-M0030-R2A	07/29/93	14:12	14:32	113.5	1.0	30.00	528.960	548.960	20.000	0.0185
KCE-M0030-R2B	07/29/93	14:49	15:09	114.0	2.1	30.00	549.680	589.850	40.170	0.0372
KCE-M0030-R2G	07/29/93	17:29	17:49	116.0	2.1	30.00	677.640	717.900	40.260	0.0372
KCE-M0030-R2D	07/29/93	15:48	16:08	118.0	1.0	30.00	593.800	613.930	20.130	0.0185
KCE-M0030-R2E	07/29/93	16:34	16:54	116.0	2.1	30.00	614.230	654.320	40.090	0.0370
KCE-M0030-R2F	07/29/93	17:01	17:21	115.0	1.0	30.00	655.980	676.180	20.200	0.0186
KCE-M0030-R2										

ANALYTICAL DATA AND RESULTS FOR ORGANIC SAMPLING

RUN I.D.	KCE-M0030-R2E
DATE	07/29/93
START TIME	16:34
END TIME	16:54
CORR. SAMPLE VOL.	0.037 dscm
VOLUMETRIC FLOWRATE	4388 dscfm[1]
SAMPLE I.D.	630/632

	GAS EMISSIONS				
POLLUTANT	(a) SAMPLE ug	(b) BLANK ug	(a-b) TOTAL** ug	CONC. ACTUAL ug/Nm3	MASS RATE lb/hr
Chloromethane	* 1.101	* 0.019	* 1.082	* 31.367	* 4.80E-04
Vinyl Chloride	< 0.002	< 0.002	< 0.002	< 0.058	< 8.88E-07
Bromomethane	0.382	< 0.002	0.382	11.074	1.70E-04
Chloroethane	0.128	< 0.003	0.128	3.711	5.68E-05
Trichlorofluoromethane	* 0.003	* 0.019	* 0.000	* 0.000	* 0.00E+00
1,1-Dichloroethene	* 0.009	< 0.001	* 0.009	* 0.261	* 4.00E-06
Carbon disulfide	* 0.044	< 0.001	* 0.044	* 1.276	* 1.95E-05
Acetone	* 5.197	< 0.011	* 5.197	* 150.661	* 2.31E-03
Methylene chloride	* 0.048	0.299	* 0.000	* 0.000	* 0.00E+00
trans-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
1,1-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
cis-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
Chloroform	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
1,2-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
Vinyl acetate	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
2-Butanone	* 4.329	< 0.035	* 4.329	* 125.498	* 1.92E-03
1,1,1-Trichloroethane	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
Carbon tetrachloride	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
Benzene	* 3.127	< 0.001	* 3.127	* 90.652	* 1.39E-03
Trichloroethene	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
1,2-Dichloropropane	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
Bromodichloromethane	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
cis-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
trans-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
1,1,2-Trichloroethane	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
Dibromochloromethane	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
Bromoform	< 0.002	< 0.002	< 0.002	< 0.058	< 8.88E-07
4-Methyl-2-pentanone	< 0.004	< 0.004	< 0.004	< 0.116	< 1.78E-06
Toluene	* 3.415	* 0.015	* 3.400	* 98.566	* 1.51E-03
Tetrachloroethene	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
2-Hexanone	< 0.007	< 0.007	< 0.007	< 0.203	< 3.11E-06
Chlorobenzene	0.351	< 0.001	0.351	10.176	1.56E-04
Ethylbenzene	0.261	< 0.001	0.261	7.566	1.16E-04
m-/p-Xylene	1.920	< 0.001	1.920	55.661	8.52E-04
o-Xylene	0.624	< 0.001	0.624	18.090	2.77E-04
Styrene	< 0.001	< 0.001	< 0.001	< 0.029	< 4.44E-07
1,1,2,2-Tetrachloroethane	< 0.002	< 0.002	< 0.002	< 0.058	< 8.88E-07

< Not detected
* Detected but below the quantitation limit; quantity is estimated
**If Blank(ug) Not Detected, then TOTAL(ug) = SAMPLE(ug); if BLANK(ug) > SAMPLE(ug), the TOTAL(ug) = 0.00
[1] Volumetric flowrate is from KCE-M0010-R2.

ANALYTICAL DATA AND RESULTS FOR ORGANIC SAMPLING

RUN I.D.	KCE-M0030-R2F
DATE	07/29/93
START TIME	17:01
END TIME	17:21
CORR. SAMPLE VOL.	0.019 dscm
VOLUMETRIC FLOWRATE	4388 dscfm[1]
SAMPLE I.D.	633/635

				GAS EMISSIONS	
POLLUTANT	(a) SAMPLE ug	(b) BLANK ug	(a-b) TOTAL** ug	CONC. ACTUAL ug/Nm3	MASS RATE lb/hr
Chloromethane	< 0.901	• 0.019	< 0.882	< 50.794	< 7.78E-04
Vinyl Chloride	< 0.002	< 0.002	< 0.002	< 0.115	< 1.76E-06
Bromomethane	0.161	< 0.002	0.161	9.272	1.42E-04
Chloroethane	0.089	< 0.003	0.089	5.125	7.85E-05
Trichlorofluoromethane	0.071	• 0.019	• 0.052	* 2.995	• 4.59E-05
1,1-Dichloroethene	• 0.007	< 0.001	• 0.007	• 0.403	• 6.17E-06
Carbon disulfide	• 0.028	< 0.001	* 0.028	• 1.613	* 2.47E-05
Acetone	• 3.237	< 0.011	* 3.237	* 186.418	• 2.86E-03
Methylene chloride	0.059	0.299	0.000	0.000	0.00E+00
trans-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
1,1-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
cis-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
Chloroform	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
1,2-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
Vinyl acetate	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
2-Butanone	• 1.724	< 0.035	• 1.724	• 99.285	• 1.52E-03
1,1,1-Trichloroethane	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
Carbon tetrachloride	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
Benzene	• 2.675	< 0.001	• 2.675	* 154.053	• 2.36E-03
Trichloroethene	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
1,2-Dichloropropane	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
Bromodichloromethane	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
cis-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
trans-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
1,1,2-Trichloroethane	< 0.002	< 0.001	< 0.002	< 0.115	< 1.76E-06
Dibromochloromethane	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
Bromoform	< 0.002	< 0.002	< 0.002	< 0.115	< 1.76E-06
4-Methyl-2-pentanone	< 0.005	< 0.004	< 0.005	< 0.288	< 4.41E-06
Toluene	• 1.809	• 0.015	• 1.794	• 103.316	• 1.58E-03
Tetrachloroethene	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
2-Hexanone	< 0.009	< 0.007	< 0.009	< 0.518	< 7.94E-06
Chlorobenzene	0.187	< 0.001	0.187	10.769	1.65E-04
Ethylbenzene	0.147	< 0.001	0.147	8.466	1.30E-04
m-/p-Xylene	0.833	< 0.001	0.833	47.972	7.35E-04
o-Xylene	0.316	< 0.001	0.316	18.198	2.79E-04
Styrene	< 0.001	< 0.001	< 0.001	< 0.058	< 8.82E-07
1,1,2,2-Tetrachloroethane	< 0.003	< 0.002	< 0.003	< 0.173	< 2.65E-06

< Not detected
* Detected but below the quantitation limit; quantity is estimated
**If Blank(ug) Not Detected, then TOTAL(ug) = SAMPLE(ug); if BLANK(ug) > SAMPLE(ug), the TOTAL(ug) = 0.00
[1] Volumetric flowrate is from KCE-M0010-R2.

SUMMARY OF EPA M0030 TESTING

KILN COMBUSTION EXHAUST

RUN I.D.		KCE-M0030-R3E		KCE-M0030-R3F	AVERAGE
DATE		07/30/93		07/30/93	
POLLUTANT CONCENTRATION - lb/hr					
Chloromethane	•	1.02E-03	*	1.21E-03	*1.11E-03
Vinyl Chloride	<	2.64E-06	<	8.84E-07	<1.76E-06
Bromomethane		1.21E-04		2.16E-04	1.69E-04
Chloroethane		9.23E-05		9.14E-05	9.19E-05
Trichlorofluoromethane	*	2.54E-04	*	1.44E-04	*1.99E-04
1,1-Dichloroethene		1.01E-04		7.47E-05	8.79E-05
Carbon disulfide	*	2.64E-05	*	1.86E-05	*2.25E-05
Acetone	*	3.83E-03	*	5.73E-03	*4.78E-03
Methylene chloride		0.00E+00		0.00E+00	0.00E+00
trans-1,2-Dichloroethene	<	8.79E-07	<	4.42E-07	<6.60E-07
1,1-Dichloroethane	<	8.79E-07	<	4.42E-07	<6.60E-07
cis-1,2-Dichloroethene	<	8.79E-07	<	4.42E-07	<6.60E-07
Chloroform	<	8.79E-07	<	4.42E-07	<6.60E-07
1,2-Dichloroethane	<	8.79E-07	<	4.42E-07	<6.60E-07
Vinyl acetate	<	8.79E-07	<	4.42E-07	<6.60E-07
2-Butanone	*	1.50E-03	*	1.18E-03	*1.34E-03
1,1,1-Trichloroethane		3.89E-04	<	2.85E-04	<3.37E-04
Carbon tetrachloride	<	8.79E-07	<	4.42E-07	<6.60E-07
Benzene	*	2.37E-03	*	1.31E-03	*1.84E-03
Trichloroethene	<	8.79E-07	<	4.42E-07	<6.60E-07
1,2-Dichloropropane	<	8.79E-07	<	4.42E-07	<6.60E-07
Bromodichloromethane	<	8.79E-07	<	4.42E-07	<6.60E-07
cis-1,3-Dichloropropene	<	8.79E-07	<	4.42E-07	<6.60E-07
trans-1,3-Dichloropropene	<	8.79E-07	<	4.42E-07	<6.60E-07
1,1,2-Trichloroethane	<	1.76E-06	<	4.42E-07	<1.10E-06
Dibromochloromethane	<	8.79E-07	<	4.42E-07	<6.60E-07
Bromoform	<	2.64E-06	<	8.84E-07	<1.76E-06
4-Methyl-2-pentanone	<	4.39E-06	<	1.77E-06	<3.08E-06
Toluene	•	1.32E-03	•	1.33E-03	*1.33E-03
Tetrachloroethene	<	8.79E-07	<	4.42E-07	<6.60E-07
2-Hexanone	<	7.91E-06	<	3.09E-06	<5.50E-06
Chlorobenzene		9.67E-05		9.14E-05	9.41E-05
Ethylbenzene		1.20E-04		1.14E-04	1.17E-04
m-/p-Xylene		5.87E-04		6.28E-04	6.07E-04
o-Xylene		2.42E-04		2.31E-04	2.37E-04
Styrene	<	8.79E-07	<	4.42E-07	<6.60E-07
1,1,2,2-Tetrachloroethane	<	2.64E-06	<	8.84E-07	<1.76E-06

< Not detected

* Detected but below the quantitation limit; quantity is estimated

PRELIMINARY

VOST SAMPLING DATA AND RESULTS

Run I.D.	Date	Start Time	End Time	Meter Temp. (Fo)	Meter Press. (in. wc)	Bar. Press. (in. Hg)	Initial Meter Volume (liters)	Final Meter Volume (liters)	Sample Volume (liters)	Corrected Sample Volume (dscm)
KCE-M0030-R3A	07/30/93	08:15	08:35	87.5	1.0	29.97	732.050	752.520	20.470	0.0198
KCE-M0030-R3B	07/30/93	08:42	09:02	93.0	2.1	29.97	752.840	793.050	40.210	0.0386
KCE-M0030-R3C	07/30/93	09:20	09:40	102.5	1.0	29.97	794.420	815.050	20.630	0.0194
KCE-M0030-R3D	07/30/93	10:13	10:33	109.0	2.1	29.97	828.790	868.830	40.040	0.0374
KCE-M0030-R3E	07/30/93	10:42	11:02	112.0	1.0	29.97	869.200	889.720	20.520	0.0190
KCE-M0030-R3F	07/30/93	11:13	11:33	110.5	2.1	29.97	890.020	930.630	40.610	0.0378
KCE-M0030-R3										

ANALYTICAL DATA AND RESULTS FOR ORGANIC SAMPLING

RUN I.D.	**KCE-M0030-R3E**
DATE	07/30/93
START TIME	10:42
END TIME	11:02
CORR. SAMPLE VOL.	0.019 dscm
VOLUMETRIC FLOWRATE	4461 dscfm[1]
SAMPLE I.D.	651/653

	GAS EMISSIONS				
POLLUTANT	(a) SAMPLE ug	(b) BLANK ug	(a-b) TOTAL** ug	CONC. ACTUAL ug/Nm3	MASS RATE lb/hr
Chloromethane	* 1.175	* 0.019	* 1.156	* 65.259	• 1.02E-03
Vinyl Chloride	< 0.003	< 0.002	< 0.003	< 0.169	< 2.64E-06
Bromomethane	0.138	< 0.002	0.138	7.790	1.21E-04
Chloroethane	0.105	< 0.003	0.105	5.927	9.23E-05
Trichlorofluoromethane	0.308	* 0.019	* 0.289	* 16.315	• 2.54E-04
1,1-Dichloroethene	0.115	< 0.001	0.115	6.492	1.01E-04
Carbon disulfide	• 0.030	< 0.001	* 0.030	• 1.694	• 2.64E-05
Acetone	• 4.361	< 0.011	* 4.361	*246.188	* 3.83E-03
Methylene chloride	0.065	0.299	0.000	0.000	0.00E+00
trans-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
1,1-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
cis-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
Chloroform	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
1,2-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
Vinyl acetate	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
2-Butanone	* 1.703	< 0.035	• 1.703	* 96.138	* 1.50E-03
1,1,1-Trichloroethane	0.442	< 0.001	0.442	24.952	3.89E-04
Carbon tetrachloride	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
Benzene	* 2.696	< 0.001	* 2.696	*152.195	* 2.37E-03
Trichloroethene	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
1,2-Dichloropropane	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
Bromodichloromethane	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
cis-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
trans-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
1,1,2-Trichloroethane	< 0.002	< 0.001	< 0.002	< 0.113	< 1.76E-06
Dibromochloromethane	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
Bromoform	< 0.003	< 0.002	< 0.003	< 0.169	< 2.64E-06
4-Methyl-2-pentanone	< 0.005	< 0.004	< 0.005	< 0.282	< 4.39E-06
Toluene	* 1.522	* 0.015	• 1.507	* 85.074	* 1.32E-03
Tetrachloroethene	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
2-Hexanone	< 0.009	< 0.007	< 0.009	< 0.508	< 7.91E-06
Chlorobenzene	0.110	< 0.001	0.110	6.210	9.67E-05
Ethylbenzene	0.137	< 0.001	0.137	7.734	1.20E-04
m-/p-Xylene	0.668	< 0.001	0.668	37.710	5.87E-04
o-Xylene	0.275	< 0.001	0.275	15.524	2.42E-04
Styrene	< 0.001	< 0.001	< 0.001	< 0.056	< 8.79E-07
1,1,2,2-Tetrachloroethane	< 0.003	< 0.002	< 0.003	< 0.169	< 2.64E-06

< Not detected
• Detected but below the quantitation limit; quantity is estimated
**If Blank(ug) Not Detected, then TOTAL(ug) = SAMPLE(ug); if BLANK(ug) > SAMPLE(ug), the TOTAL(ug) = 0.00
[1] Volumetric flowrate is from KCE-M0010-R3.

ANALYTICAL DATA AND RESULTS FOR ORGANIC SAMPLING

RUN I.D.	**KCE-M0030-R3F**
DATE	07/30/93
START TIME	11:13
END TIME	11:33
CORR. SAMPLE VOL.	0.038 dscm
VOLUMETRIC FLOWRATE	4461 dscfm[1]
SAMPLE I.D.	654/656

POLLUTANT	(a) SAMPLE ug	(b) BLANK ug	GAS EMISSIONS (a-b) TOTAL** ug	GAS EMISSIONS CONC. ACTUAL ug/Nm3	MASS RATE lb/hr
Chloromethane	• 2.755	• 0.019	• 2.736	• 77.631	• 1.21E-03
Vinyl Chloride	< 0.002	< 0.002	< 0.002	< 0.057	< 8.84E-07
Bromomethane	0.490	< 0.002	0.490	13.903	2.16E-04
Chloroethane	0.207	< 0.003	0.207	5.873	9.14E-05
Trichlorofluoromethane	0.344	• 0.019	• 0.325	• 9.221	* 1.44E-04
1,1-Dichloroethene	0.169	< 0.001	0.169	4.795	7.47E-05
Carbon disulfide	• 0.042	< 0.001	• 0.042	• 1.192	• 1.86E-05
Acetone	*12.964	< 0.011	• 12.964	• 367.838	• 5.73E-03
Methylene chloride	0.199	0.299	0.000	0.000	0.00E+00
trans-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
1,1-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
cis-1,2-Dichloroethene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
Chloroform	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
1,2-Dichloroethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
Vinyl acetate	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
2-Butanone	• 2.681	< 0.035	• 2.681	* 76.070	* 1.18E-03
1,1,1-Trichloroethane	0.646	< 0.001	< 0.646	< 18.329	< 2.85E-04
Carbon tetrachloride	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
Benzene	• 2.955	< 0.001	• 2.955	• 83.845	• 1.31E-03
Trichloroethene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
1,2-Dichloropropane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
Bromodichloromethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
cis-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
trans-1,3-Dichloropropene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
1,1,2-Trichloroethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
Dibromochloromethane	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
Bromoform	< 0.002	< 0.002	< 0.002	< 0.057	< 8.84E-07
4-Methyl-2-pentanone	< 0.004	< 0.004	< 0.004	< 0.113	< 1.77E-06
Toluene	• 3.024	• 0.015	• 3.009	* 85.377	* 1.33E-03
Tetrachloroethene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
2-Hexanone	< 0.007	< 0.007	< 0.007	< 0.199	< 3.09E-06
Chlorobenzene	0.207	< 0.001	0.207	5.873	9.14E-05
Ethylbenzene	0.257	< 0.001	0.257	7.292	1.14E-04
m-/p-Xylene	1.421	< 0.001	1.421	40.319	6.28E-04
o-Xylene	0.524	< 0.001	0.524	14.868	2.31E-04
Styrene	< 0.001	< 0.001	< 0.001	< 0.028	< 4.42E-07
1,1,2,2-Tetrachloroethane	< 0.002	< 0.002	< 0.002	< 0.057	< 8.84E-07

< Not detected
• Detected but below the quantitation limit; quantity is estimated
**If Blank(ug) Not Detected, then TOTAL(ug) = SAMPLE(ug); if BLANK(ug) > SAMPLE(ug), the TOTAL(ug) = 0.00
[1] Volumetric flowrate is from KCE-M0010-R3.

APPENDIX D.1.6

DATA AND RESULTS FOR EPA METHOD 0010 TESTING

SUMMARY OF EMMISSIONS FOR SEMIVOLATILE TESTING

KILN COMBUSTION EXHAUST

RUN I.D.	KCE-M0010-R1	KCE-M0010-R2	KCE-M0010-R3	AVERAGE
DATE	7/29/93	7/29/93	7/30/93	
TIME STARTED	08:43	14:12	08:15	
TIME ENDED	13:11	17:42	11:49	

SEMIVOLATILE EMISSIONS (lb/hr)

Phenol	0.00E+00	3.15E-04	3.93E-04	2.36E-04
bis(2-Chloroethyl)ether	< 1.24E-05	< 1.40E-05	< 1.42E-05	< 1.35E-05
2-Chlorophenol	< 9.71E-06	< 1.10E-05	< 1.11E-05	< 1.06E-05
1,3-Dichlorobenzene	< 9.12E-06	< 1.03E-05	< 1.04E-05	< 9.94E-06
1,4-Dichlorobenzene	< 9.04E-06	• 2.75E-05	• 3.15E-05	• 2.95E-05**
1,2-Dichlorobenzene	< 9.58E-06	< 1.08E-05	< 1.09E-05	< 1.05E-05
Benzyl alcohol	< 1.96E-05	< 2.22E-05	< 2.23E-05	< 2.14E-05
2,2'-oxybis(1-Chloropropane)	< 1.07E-05	< 1.22E-05	< 1.23E-05	< 1.17E-05
2-Methylphenol	< 1.30E-05	< 1.48E-05	< 1.49E-05	< 1.42E-05
3/4-Methylphenol	< 1.26E-05	< 1.43E-05	< 1.44E-05	< 1.38E-05
N-Nitroso-di-n-propylamine	< 1.97E-05	< 2.22E-05	< 2.24E-05	< 2.14E-05
Hexachloroethane	< 2.02E-05	< 2.28E-05	< 2.30E-05	< 2.20E-05
Nitrobenzene	< 1.00E-04	< 1.30E-05	< 1.36E-05	< 4.24E-05
Isophorone	5.71E-04	6.93E-06	7.26E-06	1.95E-04
2-Nitrophenol	< 1.63E-05	< 1.92E-05	< 2.00E-05	< 1.85E-05
2,4-Dimethylphenol	< 1.08E-05	< 1.27E-05	< 1.33E-05	< 1.23E-05
bis(2-Chloroethoxy)methane	< 9.42E-06	< 1.10E-05	< 1.15E-05	< 1.06E-05
Benzoic acid	1.05E-03	1.25E-03	2.56E-03	1.62E-03
2,4-Dichlorophenol	< 1.21E-05	< 1.42E-05	< 1.48E-05	< 1.37E-05
1,2,4-Trichlorobenzene	< 1.07E-05	< 1.26E-05	< 1.31E-05	< 1.22E-05
Naphthalene	1.10E-04	0.00E+00	2.71E-05	4.56E-05
4-Chloroaniline	< 8.83E-06	< 1.04E-05	< 1.08E-05	< 1.00E-05
Hexachlorobutadiene	< 1.85E-05	< 2.17E-05	< 2.27E-05	< 2.10E-05
4-Chloro-3-methylphenol	< 1.22E-05	< 1.42E-05	< 1.49E-05	< 1.38E-05
2-Methylnaphthalene	* 9.46E-06	• 8.26E-06	• 1.65E-05	• 1.14E-05
Hexachlorocyclopentadiene	< 1.95E-05	< 2.42E-05	< 2.50E-05	< 2.29E-05
2,4,6-Trichlorophenol	< 1.63E-05	< 2.03E-05	< 2.09E-05	< 1.92E-05
2,4,5-Trichlorophenol	< 1.50E-05	< 1.86E-05	< 1.92E-05	< 1.76E-05
2-Chloronaphthalene	< 5.71E-06	< 7.14E-06	< 7.36E-06	< 6.74E-06
2-Nitroaniline	< 1.91E-05	< 2.38E-05	< 2.45E-05	< 2.25E-05
Dimethylphthalate	< 4.46E-06	< 5.56E-06	< 5.72E-06	< 5.25E-06
2,6-Dinitrotoluene	< 1.83E-05	< 2.28E-05	< 2.35E-05	< 2.15E-05
2,4-Dinitrotoluene	< 1.08E-05	< 1.35E-05	< 1.39E-05	< 1.27E-05
Acenaphthylene	< 3.29E-06	< 4.13E-06	• 1.43E-05	• 1.43E-05**
3-Nitroaniline	< 1.41E-05	< 1.76E-05	< 1.81E-05	< 1.66E-05
Acenaphthene	< 5.79E-06	< 7.25E-06	< 7.46E-06	< 6.83E-06
2,4-Dinitrophenol	< 2.82E-05	< 3.52E-05	< 3.63E-05	< 3.32E-05
4-Nitrophenol	< 1.91E-05	< 2.38E-05	< 2.45E-05	< 2.25E-05
Dibenzofuran	< 3.83E-06	• 2.75E-06	< 4.91E-06	• 2.75E-06**
Diethylphthalate	* 1.59E-05	• 5.82E-06	• 5.21E-06	• 8.97E-06
4-Chlorophenyl-phenylether	< 1.03E-05	< 1.29E-05	< 1.33E-05	< 1.22E-05
Fluorene	< 4.62E-06	< 5.77E-06	< 5.93E-06	< 5.44E-06
4-Nitroaniline	< 1.02E-05	< 1.27E-05	< 1.31E-05	< 1.20E-05
4,6-Dinitro-2-methylphenol	< 1.57E-05	< 2.32E-05	< 2.48E-05	< 2.12E-05
N-Nitrosodiphenylamine	< 5.96E-06	< 8.84E-06	< 9.46E-06	< 8.08E-06
4-Bromophenyl-phenylether	< 1.41E-05	< 2.09E-05	< 2.23E-05	< 1.91E-05
Hexachlorobenzene	< 1.08E-05	< 1.60E-05	< 1.71E-05	< 1.46E-05
Pentachlorophenol	< 1.32E-05	< 1.97E-05	< 2.10E-05	< 1.80E-05
Phenanthrene	< 2.33E-06	• 6.93E-06	< 3.73E-06	• 6.93E-06**
Anthracene	< 2.50E-06	< 3.70E-06	< 3.99E-06	< 3.40E-06
Di-n-butylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	< 1.67E-06	< 2.49E-06	< 2.66E-06	< 2.27E-06
Pyrene	< 1.42E-06	< 1.96E-06	• 1.99E-06	• 1.99E-06**
Butylbenzylphthalate	< 1.66E-05	• 8.20E-06	• 8.02E-06	• 8.11E-06**
3,3'-Dichlorobenzidine	< 4.71E-06	< 6.46E-06	< 6.59E-06	< 5.92E-06
bis(2-Ethylhexyl)phthalate	0.00E+00	1.88E-04	8.08E-04	3.32E-04
Benzo(a)anthracene	< 1.71E-06	< 2.38E-06	< 2.40E-06	< 2.16E-06
Chrysene	< 1.87E-06	< 2.54E-06	< 2.61E-06	< 2.34E-06
Di-n-octylphthalate	< 1.79E-04	8.88E-05	5.21E-05	1.07E-04
Benzo(b)fluoranthene	< 2.00E-06	< 2.54E-06	< 2.56E-06	< 2.37E-06
Benzo(k)fluoranthene	< 2.00E-06	< 2.54E-06	< 2.56E-06	< 2.37E-06
Benzo(a)pyrene	< 2.04E-06	< 2.59E-06	< 2.61E-06	< 2.41E-06
Indeno(1,2,3-cd)pyrene	< 1.79E-06	< 2.28E-06	< 2.30E-06	< 2.12E-06
Dibenz(a,h)anthracene	< 2.33E-06	< 2.91E-06	< 2.96E-06	< 2.74E-06
Benzo(g,h,i)perylene	< 2.12E-06	< 2.70E-06	< 2.71E-06	< 2.51E-06

< Not detected

• Detected but below the quantitation limit; quantity is estimated

** Average is composed of estimated values only, non-detected values are not included in the calculation of the average.

RUN NUMBER KCE-M0010-R1

DATE	7/29/93	
START TIME	08:43	
END TIME	13:11	
STACK DIAM.	25 X 24	inches
NOZZLE I.D.	0.3125	inches
METER BOX GAMMA	1.0046	
METER BOX dH@	1.8521	
BAROMETRIC	30.00	in.Hg
Cp	0.84	
TEST DURATION	240	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	0.0	295.0	295.0
IMP.2	100.0	98.0	-2.0
IMP.3	100.0	101.0	1.0
IMP.4	0.0	2.0	2.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	496.0	296.0
S.G.	200.0	224.7	24.7

METHOD 1-4 RESULTS

Metered Volume	150.256	dcf
Volume @ Std.Cond.	142.521	dscf
% Water	9.58	%
% Isokinetics	103.6	%
Velocity	29.52	ft/sec
Actual Flow	7381	acfm
Std. Flow	4963	scfm
Dry Std. Flow	4488	dscfm

METHOD 3 DATA

%O2	15.9	Md	29.36
%CO2	4.5	Ms	28.27
%CO	0.0	Ps	30.01
%N2	79.6	Fo	1.104
O2+CO2	20.4	%EA	311

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	285	0.17	0.19	1.20	606.361	87	86
2	296	0.13	0.19	1.20		90	87
3	311	0.14	0.17	1.10		92	88
4	301	0.13	0.18	1.15		94	89
5	321		0.22	1.50		94	90
6	324		0.24	1.80		96	91
7	321		0.20	1.30		97	91
8	329		0.20	1.30		97	91
9	328		0.16	1.00		98	92
10	330		0.15	0.96		99	93
11	331		0.15	0.96		99	93
12	329		0.17	1.10		100	94
13	291		0.15	0.96	643.596	98	95
14	295		0.15	0.96	643.596	102	98
15	325		0.17	1.10		103	98
16	327		0.16	1.00		103	98
17	331		0.19	1.20		105	99
18	331		0.18	1.15		105	99
19	324		0.21	1.40		106	100
20	320		0.21	1.40		107	101
21	336		0.18	1.15		108	102
22	329		0.16	1.00		108	102
23	340		0.16	1.00		107	102
24	335		0.17	1.10	679.763	107	102
25	280		0.15	0.96	680.150	101	100
26	326		0.19	1.20		104	102
27	337		0.17	1.10		106	101
28	343		0.15	0.96		107	102
29	345		0.22	1.50		106	102
30	336		0.20	1.30		107	102
31	338		0.19	1.20		106	102
32	337		0.19	1.20		108	103
33	336		0.22	1.50		110	104
34	321		0.22	1.50		111	104
35	344		0.23	1.65		111	105
36	346		0.23	1.65	720.161	111	106
37	335		0.16	1.00	720.161	106	103
38	333		0.16	1.00		107	104
39	337		0.15	0.96		108	104
40	340		0.16	1.00		110	105
41	336		0.19	1.20		113	106
42	330		0.20	1.30		115	108
43	333		0.20	1.30		115	109
44	337		0.19	1.20		112	107
45	340		0.17	1.10		110	106
46	337		0.17	1.10		110	106
47	342		0.19	1.20		112	106
48	343		0.17	1.10		112	107
49					757.004		
AVG.	328	0.14	0.18	1.19	150.256	102	

LABORATORY DATA AND RESULTS F...
SEMIVOLATILE COMPOUNDS

RUN NUMBER KCE-M0010-R1
SAMPLE VOLUME 142.521 dscf
TOTAL GAS FLOWRATE 4488 dscfm
OXYGEN 15.9 %

SEMIVOLATILE COMPOUNDS		(a) SAMPLE ug		(b) BLANK ug		(a-b) TOTAL** ug		GAS EMISSIONS CONCENTRATION ACTUAL ug/Nm3		@ 7% O2 ug/Nm3		MASS RATE lb/hr
Phenol	<	2.23	•	6.46		0.00		0.000		0.000		0.00E+00
bis(2-Chloroethyl)ether	<	2.98	<	2.69	<	2.98	<	0.792	<	2.203	<	1.24E-05
2-Chlorophenol	<	2.33	<	2.11	<	2.33	<	0.620	<	1.722	<	9.71E-06
1,3-Dichlorobenzene	<	2.19	<	1.97	<	2.19	<	0.582	<	1.619	<	9.12E-06
1,4-Dichlorobenzene	<	2.17	<	1.96	<	2.17	<	0.577	<	1.604	<	9.04E-06
1,2-Dichlorobenzene	<	2.30	<	2.08	<	2.30	<	0.612	<	1.700	<	9.58E-06
Benzyl alcohol	<	4.70	<	4.25	<	4.70	<	1.250	<	3.474	<	1.96E-05
2,2'-oxybis(1-Chloropropane)	<	2.58	<	2.33	<	2.58	<	0.686	<	1.907	<	1.07E-05
2-Methylphenol	<	3.13	<	2.83	<	3.13	<	0.832	<	2.314	<	1.30E-05
3/4-Methylphenol	<	3.03	<	2.73	<	3.03	<	0.806	<	2.240	<	1.26E-05
N-Nitroso-di-n-propylamine	<	4.72	<	4.26	<	4.72	<	1.255	<	3.489	<	1.97E-05
Hexachloroethane	<	4.84	<	4.37	<	4.84	<	1.287	<	3.578	<	2.02E-05
Nitrobenzene	<	24.11	<	2.66	<	24.11	<	6.411	<	17.823	<	1.00E-04
Isophorone		137.13	<	1.42		137.13		36.465		101.373		5.71E-04
2-Nitrophenol	<	3.92	<	3.91	<	3.92	<	1.042	<	2.898	<	1.63E-05
2,4-Dimethylphenol	<	2.60	<	2.60	<	2.60	<	0.691	<	1.922	<	1.08E-05
bis(2-Chloroethoxy)methane	<	2.26	<	2.25	<	2.26	<	0.601	<	1.671	<	9.42E-06
Benzoic acid		277.50		25.16		252.34		67.101		186.541		1.05E-03
2,4-Dichlorophenol	<	2.91	<	2.91	<	2.91	<	0.774	<	2.151	<	1.21E-05
1,2,4-Trichlorobenzene	<	2.58	<	2.57	<	2.58	<	0.686	<	1.907	<	1.07E-05
Naphthalene		76.77		50.42		26.35		7.007		19.479		1.10E-04
4-Chloroaniline	<	2.12	<	2.12	<	2.12	<	0.564	<	1.567	<	8.83E-06
Hexachlorobutadiene	<	4.45	<	4.44	<	4.45	<	1.183	<	3.290	<	1.85E-05
4-Chloro-3-methylphenol	<	2.92	<	2.92	<	2.92	<	0.776	<	2.159	<	1.22E-05
2-Methylnaphthalene	*	2.27	<	1.45	•	2.27	•	0.604	•	1.678	•	9.46E-06
Hexachlorocyclopentadiene	<	4.68	<	5.01	<	4.68	<	1.244	<	3.460	<	1.95E-05
2,4,6-Trichlorophenol	<	3.91	<	4.18	<	3.91	<	1.040	<	2.890	<	1.63E-05
2,4,5-Trichlorophenol	<	3.59	<	3.84	<	3.59	<	0.955	<	2.654	<	1.50E-05
2-Chloronaphthalene	<	1.37	<	1.47	<	1.37	<	0.364	<	1.013	<	5.71E-06
2-Nitroaniline	<	4.59	<	4.91	<	4.59	<	1.221	<	3.393	<	1.91E-05
Dimethylphthalate	<	1.07	<	1.14	<	1.07	<	0.285	<	0.791	<	4.46E-06
2,6-Dinitrotoluene	<	4.39	<	4.70	<	4.39	<	1.167	<	3.245	<	1.83E-05
2,4-Dinitrotoluene	<	2.60	<	2.78	<	2.60	<	0.691	<	1.922	<	1.08E-05
Acenaphthylene	<	0.79	<	0.85	<	0.79	<	0.210	<	0.584	<	3.29E-06
3-Nitroaniline	<	3.39	<	3.63	<	3.39	<	0.901	<	2.506	<	1.41E-05
Acenaphthene	<	1.39	<	1.49	<	1.39	<	0.370	<	1.028	<	5.79E-06
2,4-Dinitrophenol	<	6.78	<	7.27	<	6.78	<	1.803	<	5.012	<	2.82E-05
4-Nitrophenol	<	4.59	<	4.91	<	4.59	<	1.221	<	3.393	<	1.91E-05
Dibenzofuran	<	0.92	<	0.99	<	0.92	<	0.245	<	0.680	<	3.83E-06
Diethylphthalate	*	6.21	•	2.40	•	3.81	•	1.013	•	2.817	•	1.59E-05
4-Chlorophenyl-phenylether	<	2.48	<	2.66	<	2.48	<	0.659	<	1.833	<	1.03E-05
Fluorene	<	1.11	<	1.19	<	1.11	<	0.295	<	0.821	<	4.62E-06
4-Nitroaniline	<	2.45	<	2.63	<	2.45	<	0.651	<	1.811	<	1.02E-05
4,6-Dinitro-2-methylphenol	<	3.76	<	5.20	<	3.76	<	1.000	<	2.780	<	1.57E-05
N-Nitrosodiphenylamine	<	1.43	<	1.98	<	1.43	<	0.380	<	1.057	<	5.96E-06
4-Bromophenyl-phenylether	<	3.38	<	4.68	<	3.38	<	0.899	<	2.499	<	1.41E-05
Hexachlorobenzene	<	2.59	<	3.58	<	2.59	<	0.689	<	1.915	<	1.08E-05
Pentachlorophenol	<	3.18	<	4.40	<	3.18	<	0.846	<	2.351	<	1.32E-05
Phenanthrene	<	0.56	<	0.78	<	0.56	<	0.149	<	0.414	<	2.33E-06
Anthracene	<	0.60	<	0.83	<	0.60	<	0.160	<	0.444	<	2.50E-06
Di-n-butylphthalate		93.91		222.49		0.00		0.000		0.000		0.00E+00
Fluoranthene	<	0.40	<	0.56	<	0.40	<	0.106	<	0.296	<	1.67E-06
Pyrene	<	0.34	<	0.48	<	0.34	<	0.090	<	0.251	<	1.42E-06
Butylbenzylphthalate	<	3.99	<	0.86	<	3.99	<	1.061	<	2.950	<	1.66E-05
3,3'-Dichlorobenzidine	<	1.13	<	1.58	<	1.13	<	0.300	<	0.835	<	4.71E-06
bis(2-Ethylhexyl)phthalate		23.13		103.97		0.00		0.000		0.000		0.00E+00
Benzo(a)anthracene	<	0.41	<	0.58	<	0.41	<	0.109	<	0.303	<	1.71E-06
Chrysene	<	0.45	<	0.63	<	0.45	<	0.120	<	0.333	<	1.87E-06
Di-n-octylphthalate		42.99	<	0.44	<	42.99	<	11.432	<	31.780	<	1.79E-04
Benzo(b)fluoranthene	<	0.48	<	0.62	<	0.48	<	0.128	<	0.355	<	2.00E-06
Benzo(k)fluoranthene	<	0.48	<	0.62	<	0.48	<	0.128	<	0.355	<	2.00E-06
Benzo(a)pyrene	<	0.49	<	0.63	<	0.49	<	0.130	<	0.362	<	2.04E-06
Indeno(1,2,3-cd)pyrene	<	0.43	<	0.56	<	0.43	<	0.114	<	0.318	<	1.79E-06
Dibenz(a,h)anthracene	<	0.56	<	0.72	<	0.56	<	0.149	<	0.414	<	2.33E-06
Benzo(g,h,i)perylene	<	0.51	<	0.66	<	0.51	<	0.136	<	0.377	<	2.12E-06

< Not detected
• Detected but below the quantitation limit; quantity is estimated
** If BLANK(ug) Not Detected, then TOTAL(ug) = SAMPLE (ug); if BLANK(ug) > SAMPLE (ug), then TOTAL(ug) = 0.00

RUN NUMBER KCE-M0010-R2

DATE	7/29/93	
START TIME	14:12	
END TIME	17:42	
STACK DIAM.	25 X 24	inches
NOZZLE I.D.	0.3125	inches
METER BOX GAMMA	1.00462	
METER BOX dH@	1.85206	
BAROMETRIC	30.00	in.Hg
Cp	0.84	
TEST DURATION	192	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	0.0	196.0	196.0
IMP.2	100.0	100.0	0.0
IMP.3	100.0	95.0	-5.0
IMP.4	0.0	1.0	1.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	392.0	192.0
S.G.	200.0	220.4	20.4

METHOD 1-4 RESULTS

Metered Volume	117.294	dcf
Volume @ Std.Cond.	109.693	dscf
% Water	8.36	%
% Isokinetics	101.9	%
Velocity	28.79	ft/sec
Actual Flow	7198	acfm
Std. Flow	4788	scfm
Dry Std. Flow	4388	dscfm

METHOD 3 DATA

%O2	14.7	Md	29.49
%CO2	5.6	Ms	28.53
%CO	0.0	Ps	30.01
%N2	79.7	Fo	1.103
O2+CO2	20.3	%EA	232

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	313	0.16	0.15	0.96	762.757	109	107
2	305	0.15	0.15	0.96		108	107
3	315	0.13	0.17	1.10		109	108
4	317	0.13	0.18	1.15		107	107
5	317		0.17	1.10		111	107
6	325		0.19	1.20		112	107
7	339		0.16	1.00		111	106
8	344		0.16	1.00		111	106
9	341		0.18	1.15		111	107
10	336		0.17	1.10		111	107
11	336		0.18	1.15		112	108
12	340		0.18	1.15	791.734	112	108
13	335		0.16	1.00	791.734	109	105
14	335		0.16	1.00		110	105
15	334		0.18	1.15		110	106
16	337		0.19	1.20		111	107
17	350		0.16	1.00		111	107
18	345		0.15	0.96		113	106
19	325		0.18	1.15		113	107
20	330		0.19	1.20		113	107
21	353		0.21	1.40		113	107
22	350		0.21	1.40		113	107
23	341		0.22	1.50		115	108
24	354		0.21	1.40	821.923	116	108
25	312		0.15	0.96	822.787	112	109
26	310		0.17	1.10		114	110
27	348		0.19	1.20		117	111
28	336		0.21	1.40		118	111
29	337		0.18	1.15		118	112
30	341		0.18	1.15		117	110
31	353		0.19	1.20		118	111
32	351		0.18	1.15		116	111
33	351		0.15	0.96		116	111
34	352		0.15	0.96		115	110
35	341		0.15	0.96		112	108
36	323		0.15	0.96	851.759	112	109
37	327		0.17	1.10	851.759	109	106
38	344		0.18	1.15		110	107
39	342		0.18	1.15		111	107
40	339		0.19	1.20		112	107
41	326		0.16	1.00		113	108
42	334		0.16	1.00		113	107
43	326		0.16	1.00		112	106
44	335		0.17	1.10		111	106
45	352		0.16	1.00		112	107
46	348		0.16	1.00		113	106
47	348		0.17	1.10		112	106
48	342		0.15	0.96		112	106
49					880.915		
AVG.	336	0.14	0.17	1.11	117.294	110	

LABORATORY DATA AND RESULTS FO..
SEMIVOLATILE COMPOUNDS

RUN NUMBER KCE-M0010-R2
SAMPLE VOLUME 109.693 dscf
TOTAL GAS FLOWRATE 4388 dscfm
OXYGEN 14.7 %

				GAS EMISSIONS		
				CONCENTRATION		MASS
	(a) SAMPLE	(b) BLANK	(a-b) TOTAL**	ACTUAL	@ 7% O2	RATE
SEMIVOLATILE COMPOUNDS	ug	ug	ug	ug/Nm3	ug/Nm3	lb/hr
Phenol	66.05	* 6.46	59.59	20.588	46.157	3.15E-04
bis(2-Chloroethyl)ether	< 2.65	< 2.69	< 2.65	< 0.916	< 2.053	< 1.40E-05
2-Chlorophenol	< 2.08	< 2.11	< 2.08	< 0.719	< 1.611	< 1.10E-05
1,3-Dichlorobenzene	< 1.95	< 1.97	< 1.95	< 0.674	< 1.510	< 1.03E-05
1,4-Dichlorobenzene	* 5.19	< 1.96	* 5.19	* 1.793	* 4.020	* 2.75E-05
1,2-Dichlorobenzene	< 2.05	< 2.08	< 2.05	< 0.708	< 1.588	< 1.08E-05
Benzyl alcohol	< 4.19	< 4.25	< 4.19	< 1.448	< 3.245	< 2.22E-05
2,2'-oxybis(1-Chloropropane)	< 2.30	< 2.33	< 2.30	< 0.795	< 1.782	< 1.22E-05
2-Methylphenol	< 2.79	< 2.83	< 2.79	< 0.964	< 2.161	< 1.48E-05
3/4-Methylphenol	< 2.70	< 2.73	< 2.70	< 0.933	< 2.091	< 1.43E-05
N-Nitroso-di-n-propylamine	< 4.20	< 4.26	< 4.20	< 1.451	< 3.253	< 2.22E-05
Hexachloroethane	< 4.31	< 4.37	< 4.31	< 1.489	< 3.338	< 2.28E-05
Nitrobenzene	< 2.46	< 2.66	< 2.46	< 0.850	< 1.905	< 1.30E-05
Isophorone	1.31	< 1.42	1.31	0.453	1.015	6.93E-06
2-Nitrophenol	< 3.62	< 3.91	< 3.62	< 1.251	< 2.804	< 1.92E-05
2,4-Dimethylphenol	< 2.40	< 2.60	< 2.40	< 0.829	< 1.859	< 1.27E-05
bis(2-Chloroethoxy)methane	< 2.08	< 2.25	< 2.08	< 0.719	< 1.611	< 1.10E-05
Benzoic acid	261.41	25.16	236.25	81.623	182.994	1.25E-03
2,4-Dichlorophenol	< 2.68	< 2.91	< 2.68	< 0.926	< 2.076	< 1.42E-05
1,2,4-Trichlorobenzene	< 2.38	< 2.57	< 2.38	< 0.822	< 1.843	< 1.26E-05
Naphthalene	26.13	50.42	0.00	0.000	0.000	0.00E+00
4-Chloroaniline	< 1.96	< 2.12	< 1.96	< 0.677	< 1.518	< 1.04E-05
Hexachlorobutadiene	< 4.10	< 4.44	< 4.10	< 1.417	< 3.176	< 2.17E-05
4-Chloro-3-methylphenol	< 2.69	< 2.92	< 2.69	< 0.929	< 2.084	< 1.42E-05
2-Methylnaphthalene	* 1.56	< 1.45	* 1.56	* 0.539	* 1.208	* 8.26E-06
Hexachlorocyclopentadiene	< 4.58	< 5.01	< 4.58	< 1.582	< 3.548	< 2.42E-05
2,4,6-Trichlorophenol	< 3.83	< 4.18	< 3.83	< 1.323	< 2.967	< 2.03E-05
2,4,5-Trichlorophenol	< 3.51	< 3.84	< 3.51	< 1.213	< 2.719	< 1.86E-05
2-Chloronaphthalene	< 1.35	< 1.47	< 1.35	< 0.466	< 1.046	< 7.14E-06
2-Nitroaniline	< 4.49	< 4.91	< 4.49	< 1.551	< 3.478	< 2.38E-05
Dimethylphthalate	< 1.05	< 1.14	< 1.05	< 0.363	< 0.813	< 5.56E-06
2,6-Dinitrotoluene	< 4.30	< 4.70	< 4.30	< 1.486	< 3.331	< 2.28E-05
2,4-Dinitrotoluene	< 2.55	< 2.78	< 2.55	< 0.881	< 1.975	< 1.35E-05
Acenaphthylene	< 0.78	< 0.85	< 0.78	< 0.269	< 0.604	< 4.13E-06
3-Nitroaniline	< 3.32	< 3.63	< 3.32	< 1.147	< 2.572	< 1.76E-05
Acenaphthene	< 1.37	< 1.49	< 1.37	< 0.473	< 1.061	< 7.25E-06
2,4-Dinitrophenol	< 6.65	< 7.27	< 6.65	< 2.298	< 5.151	< 3.52E-05
4-Nitrophenol	< 4.49	< 4.91	< 4.49	< 1.551	< 3.478	< 2.38E-05
Dibenzofuran	* 0.52	< 0.99	* 0.52	* 0.180	* 0.403	* 2.75E-06
Diethylphthalate	* 3.50	* 2.40	* 1.10	* 0.380	* 0.852	* 5.82E-06
4-Chlorophenyl-phenylether	< 2.43	< 2.66	< 2.43	< 0.840	< 1.882	< 1.29E-05
Fluorene	< 1.09	< 1.19	< 1.09	< 0.377	< 0.844	< 5.77E-06
4-Nitroaniline	< 2.40	< 2.63	< 2.40	< 0.829	< 1.859	< 1.27E-05
4,6-Dinitro-2-methylphenol	< 4.39	< 5.20	< 4.39	< 1.517	< 3.400	< 2.32E-05
N-Nitrosodiphenylamine	< 1.67	< 1.98	< 1.67	< 0.577	< 1.294	< 8.84E-06
4-Bromophenyl-phenylether	< 3.95	< 4.68	< 3.95	< 1.365	< 3.060	< 2.09E-05
Hexachlorobenzene	< 3.02	< 3.58	< 3.02	< 1.043	< 2.339	< 1.60E-05
Pentachlorophenol	< 3.72	< 4.40	< 3.72	* 1.285	< 2.881	< 1.97E-05
Phenanthrene	* 1.31	< 0.78	* 1.31	* 0.453	* 1.015	* 6.93E-06
Anthracene	< 0.70	< 0.83	< 0.70	< 0.242	< 0.542	< 3.70E-06
Di-n-butylphthalate	61.30	222.49	0.00	0.000	0.000	0.00E+00
Fluoranthene	< 0.47	< 0.56	< 0.47	< 0.162	< 0.364	< 2.49E-06
Pyrene	< 0.37	< 0.48	< 0.37	< 0.128	< 0.287	< 1.96E-06
Butylbenzylphthalate	* 1.55	< 0.86	* 1.55	* 0.536	* 1.201	* 8.20E-06
3,3'-Dichlorobenzidine	< 1.22	< 1.58	< 1.22	< 0.422	< 0.945	< 6.46E-06
bis(2-Ethylhexyl)phthalate	139.40	103.97	35.43	12.241	27.443	1.88E-04
Benzo(a)anthracene	< 0.45	< 0.58	< 0.45	< 0.155	< 0.349	< 2.38E-06
Chrysene	< 0.48	< 0.63	< 0.48	< 0.166	< 0.372	< 2.54E-06
Di-n-octylphthalate	16.78	< 0.44	16.78	5.797	12.997	8.88E-05
Benzo(b)fluoranthene	< 0.48	< 0.62	< 0.48	< 0.166	< 0.372	< 2.54E-06
Benzo(k)fluoranthene	< 0.48	< 0.62	< 0.48	< 0.166	< 0.372	< 2.54E-06
Benzo(a)pyrene	< 0.49	< 0.63	< 0.49	< 0.169	< 0.380	< 2.59E-06
Indeno(1,2,3-cd)pyrene	< 0.43	< 0.56	< 0.43	< 0.149	< 0.333	< 2.28E-06
Dibenz(a,h)anthracene	< 0.55	< 0.72	< 0.55	< 0.190	< 0.426	< 2.91E-06
Benzo(g,h,i)perylene	< 0.51	< 0.66	< 0.51	< 0.176	< 0.395	< 2.70E-06

< Not detected

* Detected but below the quantitation limit; quantity is estimated

** If BLANK(ug) Not Detected, then TOTAL(ug) = SAMPLE (ug); if BLANK(ug) > SAMPLE (ug), then TOTAL(ug) = 0.00

RUN NUMBER	KCE-M0010-R3

DATE	7/30/93					
START TIME	08:15					
END TIME	11:49	METHOD 4 DATA				
STACK DIAM.	25 X 24 inches		INIT. (ml)	FINAL (ml)	NET (ml)	
NOZZLE I.D.	0.3125 inches					
METER BOX GAMMA	1.00462	IMP.1	0.0	189.0	189.0	
METER BOX dH@	1.85206	IMP.2	100.0	100.0	0.0	
BAROMETRIC	29.97 in.Hg	IMP.3	100.0	101.0	1.0	
Cp	0.84	IMP.4	0.0	0.0	0.0	
TEST DURATION	192 minutes	IMP.5			0.0	
		IMP.6			0.0	
		IMP.7			0.0	
METHOD 1-4 RESULTS		TOTAL	200.0	390.0	190.0	
Metered Volume	120.078 dcf	S.G.	200.0	223.1	23.1	
Volume @ Std.Cond.	115.462 dscf					
% Water	7.99 %	METHOD 3 DATA				
% Isokinetics	105.5 %	%O2	10.1	Md	29.94	
Velocity	29.06 ft/sec	%CO2	9.6	Ms	28.99	
Actual Flow	7264 acfm	%CO	0.0	Ps	29.98	
Std. Flow	4848 scfm	%N2	80.3	Fo	1.125	
Dry Std. Flow	4461 dscfm	O2+CO2	19.7	%EA	91	

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	314	0.19	0.23	1.65	881.470	78	78
2	319	0.17	0.24	1.80		76	77
3	328	0.11	0.22	1.50		78	77
4	312	0.13	0.23	1.65		79	77
5	322		0.24	1.80		81	77
6	340		0.24	1.80		82	78
7	341		0.22	1.50		82	78
8	341		0.19	1.20		83	79
9	342		0.21	1.40		84	80
10	341		0.19	1.20		85	80
11	342		0.18	1.15		86	82
12	315		0.18	1.15	914.642	89	86
13	316		0.15	0.96	914.642	93	91
14	313		0.15	0.96		94	93
15	341		0.18	1.15		94	93
16	342		0.18	1.15		97	96
17	342		0.17	1.10		98	97
18	335		0.17	1.10		100	98
19	339		0.18	1.15		101	99
20	332		0.18	1.15		102	100
21	329		0.17	1.10		103	100
22	318		0.17	1.10		104	101
23	347		0.15	0.96		106	102
24	345		0.15	0.96	943.461	105	101
25	319		0.15	0.96	943.668	100	99
26	324		0.15	0.96		100	100
27	322		0.16	1.00		101	100
28	331		0.15	0.96		101	99
29	337		0.17	1.10		101	99
30	335		0.17	1.10		104	100
31	348		0.18	1.15		105	101
32	349		0.19	1.20		107	102
33	347		0.15	0.96		108	102
34	344		0.15	0.96		110	104
35	343		0.20	1.30		109	103
36	324		0.20	1.30	972.65	109	103
37	330		0.15	0.96	972.65	103	100
38	332		0.16	1.00		102	100
39	338		0.15	0.96		105	101
40	340		0.15	0.96		106	101
41	338		0.18	1.15		104	100
42	340		0.19	1.20		104	100
43	336		0.20	1.30		102	99
44	334		0.19	1.20		103	99
45	322		0.18	1.15		103	98
46	321		0.18	1.15		102	98
47	332		0.17	1.10		102	98
48	346		0.17	1.10		104	99
49					1001.755		
AVG.	333	0.15	0.18	1.21	120.078	94	

LABORATORY DATA AND RESULTS F...
SEMIVOLATILE COMPOUNDS

RUN NUMBER KCE-M0010-R3
SAMPLE VOLUME 115.462 dscf
TOTAL GAS FLOWRATE 4461 dscfm
OXYGEN 10.1 %

SEMIVOLATILE COMPOUNDS		(a) SAMPLE ug		(b) BLANK ug		(a-b) TOTAL** ug		GAS EMISSIONS CONCENTRATION ACTUAL ug/Nm3		@ 7% O2 ug/Nm3		MASS RATE lb/hr
Phenol		83.37	*	6.46		76.91		25.244		32.490		3.93E-04
bis(2-Chloroethyl)ether	<	2.77	<	2.69	<	2.77	<	0.909	<	1.170	<	1.42E-05
2-Chlorophenol	<	2.17	<	2.11	<	2.17	<	0.712	<	0.917	<	1.11E-05
1,3-Dichlorobenzene	<	2.03	<	1.97	<	2.03	<	0.666	<	0.858	<	1.04E-05
1,4-Dichlorobenzene	*	6.16	<	1.96	*	6.16	*	2.022	*	2.602	*	3.15E-05
1,2-Dichlorobenzene	<	2.14	<	2.08	<	2.14	<	0.702	<	0.904	<	1.09E-05
Benzyl alcohol	<	4.37	<	4.25	<	4.37	<	1.434	<	1.846	<	2.23E-05
2,2'-oxybis(1-Chloropropane)	<	2.40	<	2.33	<	2.40	<	0.788	<	1.014	<	1.23E-05
2-Methylphenol	<	2.91	<	2.83	<	2.91	<	0.955	<	1.229	<	1.49E-05
3/4-Methylphenol	<	2.81	<	2.73	<	2.81	<	0.922	<	1.187	<	1.44E-05
N-Nitroso-di-n-propylamine	<	4.38	<	4.26	<	4.38	<	1.438	<	1.850	<	2.24E-05
Hexachloroethane	<	4.50	<	4.37	<	4.50	<	1.477	<	1.901	<	2.30E-05
Nitrobenzene	<	2.66	<	2.66	<	2.66	<	0.873	<	1.124	<	1.36E-05
Isophorone		1.42	<	1.42		1.42		0.466		0.600		7.26E-06
2-Nitrophenol	<	3.91	<	3.91	<	3.91	<	1.283	<	1.652	<	2.00E-05
2,4-Dimethylphenol	<	2.60	<	2.60	<	2.60	<	0.853	<	1.098	<	1.33E-05
bis(2-Chloroethoxy)methane	<	2.25	<	2.25	<	2.25	<	0.739	<	0.951	<	1.15E-05
Benzoic acid		526.35		25.16		501.19		164.507		211.727		2.56E-03
2,4-Dichlorophenol	<	2.90	<	2.91	<	2.90	<	0.952	<	1.225	<	1.48E-05
1,2,4-Trichlorobenzene	<	2.57	<	2.57	<	2.57	<	0.844	<	1.086	<	1.31E-05
Naphthalene		55.73		50.42		5.31		1.743		2.243		2.71E-05
4-Chloroaniline	<	2.12	<	2.12	<	2.12	<	0.696	<	0.896	<	1.08E-05
Hexachlorobutadiene	<	4.44	<	4.44	<	4.44	<	1.457	<	1.876	<	2.27E-05
4-Chloro-3-methylphenol	<	2.91	<	2.92	<	2.91	<	0.955	<	1.229	<	1.49E-05
2-Methylnaphthalene	*	3.22	<	1.45	*	3.22	*	1.057	*	1.360	*	1.65E-05
Hexachlorocyclopentadiene	<	4.89	<	5.01	<	4.89	<	1.605	<	2.066	<	2.50E-05
2,4,6-Trichlorophenol	<	4.09	<	4.18	<	4.09	<	1.342	<	1.728	<	2.09E-05
2,4,5-Trichlorophenol	<	3.75	<	3.84	<	3.75	<	1.231	<	1.584	<	1.92E-05
2-Chloronaphthalene	<	1.44	<	1.47	<	1.44	<	0.473	<	0.608	<	7.36E-06
2-Nitroaniline	<	4.80	<	4.91	<	4.80	<	1.576	<	2.028	<	2.45E-05
Dimethylphthalate	<	1.12	<	1.14	<	1.12	<	0.368	<	0.473	<	5.72E-06
2,6-Dinitrotoluene	<	4.60	<	4.70	<	4.60	<	1.510	<	1.943	<	2.35E-05
2,4-Dinitrotoluene	<	2.72	<	2.78	<	2.72	<	0.893	<	1.149	<	1.39E-05
Acenaphthylene	*	2.79	<	0.85	*	2.79	*	0.916	*	1.179	*	1.43E-05
3-Nitroaniline	<	3.55	<	3.63	<	3.55	<	1.165	<	1.500	<	1.81E-05
Acenaphthene	<	1.46	<	1.49	<	1.46	<	0.479	<	0.617	<	7.46E-06
2,4-Dinitrophenol	<	7.10	<	7.27	<	7.10	<	2.330	<	2.999	<	3.63E-05
4-Nitrophenol	<	4.80	<	4.91	<	4.80	<	1.576	<	2.028	<	2.45E-05
Dibenzofuran	<	0.96	<	0.99	<	0.96	<	0.315	<	0.406	<	4.91E-06
Diethylphthalate	*	3.42	*	2.40	*	1.02	*	0.335	*	0.431	*	5.21E-06
4-Chlorophenyl-phenylether	<	2.60	<	2.66	<	2.60	<	0.853	<	1.098	<	1.33E-05
Fluorene	<	1.16	<	1.19	<	1.16	<	0.381	<	0.490	<	5.93E-06
4-Nitroaniline	<	2.57	<	2.63	<	2.57	<	0.844	<	1.086	<	1.31E-05
4,6-Dinitro-2-methylphenol	<	4.86	<	5.20	<	4.86	<	1.595	<	2.053	<	2.48E-05
N-Nitrosodiphenylamine	<	1.85	<	1.98	<	1.85	<	0.607	<	0.782	<	9.46E-06
4-Bromophenyl-phenylether	<	4.37	<	4.68	<	4.37	<	1.434	<	1.846	<	2.23E-05
Hexachlorobenzene	<	3.35	<	3.58	<	3.35	<	1.100	<	1.415	<	1.71E-05
Pentachlorophenol	<	4.11	<	4.40	<	4.11	<	1.349	<	1.736	<	2.10E-05
Phenanthrene	<	0.73	<	0.78	<	0.73	<	0.240	<	0.308	<	3.73E-06
Anthracene	<	0.78	<	0.83	<	0.78	<	0.256	<	0.330	<	3.99E-06
Di-n-butylphthalate		47.71		222.49		0.00		0.000		0.000		0.00E+00
Fluoranthene	<	0.52	<	0.56	<	0.52	<	0.171	<	0.220	<	2.66E-06
Pyrene	*	0.39	<	0.48	*	0.39	*	0.128	*	0.165	*	1.99E-06
Butylbenzylphthalate	*	1.57	<	0.86	*	1.57	*	0.515	*	0.663	*	8.02E-06
3,3'-Dichlorobenzidine	<	1.29	<	1.58	<	1.29	<	0.423	<	0.545	<	6.59E-06
bis(2-Ethylhexyl)phthalate		262.00		103.97		158.03		51.871		66.759		8.08E-04
Benzo(a)anthracene	<	0.47	<	0.58	<	0.47	<	0.154	<	0.199	<	2.40E-06
Chrysene	<	0.51	<	0.63	<	0.51	<	0.167	<	0.215	<	2.61E-06
Di-n-octylphthalate		10.19	<	0.44		10.19		3.345		4.305		5.21E-05
Benzo(b)fluoranthene	<	0.50	<	0.62	<	0.50	<	0.164	<	0.211	<	2.56E-06
Benzo(k)fluoranthene	<	0.50	<	0.62	<	0.50	<	0.164	<	0.211	<	2.56E-06
Benzo(a)pyrene	<	0.51	<	0.63	<	0.51	<	0.167	<	0.215	<	2.61E-06
Indeno(1,2,3-cd)pyrene	<	0.45	<	0.56	<	0.45	<	0.148	<	0.190	<	2.30E-06
Dibenz(a,h)anthracene	<	0.58	<	0.72	<	0.58	<	0.190	<	0.245	<	2.96E-06
Benzo(g,h,i)perylene	<	0.53	<	0.66	<	0.53	<	0.174	<	0.224	<	2.71E-06

< Not detected

* Detected but below the quantitation limit; quantity is estimated

** If BLANK(ug) Not Detected, then TOTAL(ug) = SAMPLE (ug); if BLANK(ug) > SAMPLE (ug), then TOTAL(ug) = 0.00

APPENDIX D.1.7

DATA AND RESULTS FOR CONTINUOUS EMISSIONS MONITORING
(O_2, CO_2, CO, and NOx)

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KCE-M201/202-R1

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
11:46	12.83	6.63	335.30	160.20
11:47	12.36	7.06	327.20	152.60
11:48	13.23	6.26	314.10	162.70
11:49	13.60	5.93	320.50	164.10
11:50	13.53	6.05	315.00	159.40
11:51	12.37	7.02	343.30	128.90
11:52	11.93	7.44	311.90	129.80
11:53	12.09	7.33	297.20	142.50
11:54	12.31	7.12	302.70	154.30
11:55	13.25	6.25	320.40	150.00
11:56	13.13	6.28	336.00	163.50
11:57	12.88	6.58	330.40	181.40
11:58	12.44	7.05	321.50	180.60
11:59	12.72	6.82	313.90	155.60
12:00	12.10	7.29	333.60	132.10
12:01	11.80	7.53	317.70	136.90
12:02	12.96	6.46	317.40	173.90
12:03	13.05	6.47	318.60	179.70
12:04	13.39	6.15	318.80	157.90
12:05	12.53	6.81	342.50	150.70
12:06	12.78	6.67	321.70	174.60
12:07	12.85	6.64	321.50	170.90
12:08	14.01	5.59	315.80	162.00
12:09	12.68	6.75	336.10	144.10
12:10	12.46	6.94	323.30	162.90
12:11	13.00	6.50	311.00	176.80
12:12	13.26	6.30	314.30	181.30
12:13	13.19	6.38	309.10	148.70
12:14	12.09	7.25	341.20	140.70
12:15	12.18	7.27	304.80	157.40
12:16	12.56	6.94	307.60	175.60
12:17	13.12	6.45	303.70	167.70
12:18	12.88	6.57	328.20	152.20
12:19	12.05	7.30	331.50	153.10
12:20	13.58	5.97	319.50	170.00
12:21	13.62	5.95	321.80	176.20
12:22	13.61	5.97	313.80	161.60
12:23	12.36	7.00	337.90	149.00
12:24	13.03	6.46	303.50	174.00

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KCE-M201/202-R1

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
12:25	13.27	6.25	307.70	178.90
12:26	13.90	5.71	301.20	167.50
12:27	13.31	6.14	332.30	147.50
12:28	12.46	6.91	326.50	157.90
12:29	13.42	6.05	316.00	172.80
12:30	12.77	6.77	313.40	175.50
12:31	13.04	6.50	307.30	146.30
12:32	11.75	7.57	327.90	128.30
12:33	12.70	6.73	301.70	154.40
12:34	13.27	6.23	313.50	177.10
12:35	13.38	6.17	310.10	168.10
12:36	13.40	6.06	329.00	149.60
12:37	13.19	6.15	342.50	165.50
12:38	13.71	5.82	316.50	181.20
12:39	13.28	6.29	310.80	189.20
12:40	13.71	5.88	301.90	168.40
12:41	12.37	6.98	327.60	156.70
12:42	12.60	6.84	294.50	172.10
12:43	13.62	5.92	299.00	177.60
12:44	14.05	5.56	303.80	172.20
12:45	12.84	6.64	314.00	144.20
12:46	11.59	7.74	309.20	137.40
12:47	12.90	6.53	296.10	168.80
12:48	13.15	6.36	300.20	184.90
12:49	13.29	6.24	301.20	170.20
12:50	12.86	6.61	302.10	157.60
12:51	12.85	6.61	308.70	173.70
12:52	13.00	6.51	301.40	175.40
12:53	12.83	6.72	289.60	154.00
12:54	13.26	6.23	306.70	140.20
12:55	12.10	7.18	321.00	140.20
12:56	12.65	6.81	284.90	155.90
12:57	12.49	6.98	286.30	151.10
12:58	12.85	6.67	281.10	133.80
12:59	11.80	7.56	303.70	118.70
13:00	12.26	7.11	297.80	138.80
13:01	13.34	6.16	298.20	155.30
13:02	13.52	6.04	301.00	152.50
13:03	12.77	6.73	307.50	122.40

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KCE-M201/202-R1

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
13:04	11.68	7.65	308.80	105.20
13:05	12.84	6.60	278.70	130.40
13:06	13.30	6.20	287.40	148.10
13:07	13.54	6.06	273.90	132.90
13:08	12.81	6.62	314.10	124.20
13:09	12.09	7.32	285.70	118.70
13:10	12.63	6.85	278.70	144.00
13:11	13.57	6.00	286.60	136.40
13:12	13.96	5.53	304.80	129.40
13:13	12.08	7.22	327.40	121.10
13:14	12.59	6.83	284.20	141.10
13:15	12.84	6.63	294.30	155.10
13:16	13.52	6.02	291.20	151.10
13:17	12.36	6.98	324.20	126.80
13:18	11.77	7.54	305.10	122.90
13:19	12.40	7.03	284.40	143.00
13:20	12.69	6.78	292.30	142.90
13:21	13.15	6.31	295.80	125.10
13:22	12.30	6.95	332.50	122.30
13:23	12.31	7.08	290.70	134.80
13:24	12.42	7.00	287.50	145.60
99 MinAvg	12.85	6.61	310.37	153.52

Data Corrected for Calibrations

99 MinAvg	13.12	6.62	320.06	159.72

Calibrations:

O2 25 Span Value = 25

LOW Calibration Gas =	0.00	HIGH Calibration Gas =	22.00
Initial Cal. at: 1133			
LOW Cal. Response =	0.05	HIGH Cal. Response =	21.59
Cal. Drift =	0.00	Cal. Drift =	-0.02
Final Cal. at: 1640			
LOW Cal. Response =	0.02	HIGH Cal. Response =	21.45
Cal. Drift =	0.00	Cal. Drift =	-0.02
LOW System Drift =	-0.00	HIGH System Drift =	-0.01

CO2 20 Span Value = 20

LOW Calibration Gas =	0.00	HIGH Calibration Gas =	18.20
Initial Cal. at: 1133			
LOW Cal. Response =	0.01	HIGH Cal. Response =	18.23
Cal. Drift =	0.00	Cal. Drift =	0.00
Final Cal. at: 1640			
LOW Cal. Response =	0.01	HIGH Cal. Response =	18.10
Cal. Drift =	0.00	Cal. Drift =	-0.00
LOW System Drift =	0.00	HIGH System Drift =	-0.01

CO 1000 Span Value = 1000

LOW Calibration Gas =	0.00	HIGH Calibration Gas =	929.00
Initial Cal. at: 1142			
LOW Cal. Response =	-0.38	HIGH Cal. Response =	906.00
Cal. Drift =	-0.00	Cal. Drift =	-0.02
Final Cal. at: 1640			
LOW Cal. Response =	-0.17	HIGH Cal. Response =	896.78
Cal. Drift =	-0.00	Cal. Drift =	-0.03
LOW System Drift =	0.00	HIGH System Drift =	-0.01

NOx 250 Span Value = 250

LOW Calibration Gas =	0.00	HIGH Calibration Gas =	257.00
Initial Cal. at: 1137			
LOW Cal. Response =	-0.31	HIGH Cal. Response =	250.50
Cal. Drift =	-0.00	Cal. Drift =	-0.03
Final Cal. at: 1640			
LOW Cal. Response =	0.92	HIGH Cal. Response =	243.17
Cal. Drift =	0.00	Cal. Drift =	-0.06
LOW System Drift =	0.00	HIGH System Drift =	-0.03

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KCE-M201/202-R2

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
14:08	12.56	6.86	306.50	176.00
14:09	13.53	5.98	302.30	159.10
14:10	12.74	6.59	327.60	140.40
14:11	11.93	7.35	316.40	139.60
14:12	12.26	7.10	298.80	149.90
14:13	12.93	6.52	299.60	150.50
14:14	13.67	5.75	312.40	137.00
14:15	12.29	6.98	337.20	133.40
14:16	12.83	6.56	298.80	144.70
14:17	13.74	5.70	301.20	154.00
14:18	13.54	5.91	306.30	166.80
14:19	12.86	6.47	324.70	153.30
14:20	11.62	7.62	319.30	149.00
14:21	12.42	6.96	305.10	173.30
14:22	13.08	6.35	316.70	173.70
14:23	13.02	6.41	314.50	153.40
14:24	11.70	7.52	330.30	138.90
14:25	12.83	6.54	305.10	175.30
14:26	12.92	6.49	310.10	180.30
14:27	12.97	6.51	301.40	165.60
14:28	12.07	7.23	326.50	136.90
14:29	11.99	7.30	317.00	152.60
14:30	13.47	5.96	310.60	173.30
14:31	13.64	5.83	317.00	179.20
14:32	13.01	6.44	308.10	155.30
14:33	11.46	7.75	318.50	138.30
14:34	12.13	7.20	296.40	167.60
14:35	12.91	6.51	305.60	182.80
14:36	13.47	6.02	306.50	169.70
14:37	12.77	6.56	324.60	153.40
14:38	11.94	7.36	319.60	155.90
14:39	13.01	6.44	303.00	172.20
14:40	13.34	6.14	309.10	172.40
14:41	13.00	6.47	300.30	156.60
14:42	11.55	7.68	322.40	143.30
14:43	12.23	7.14	293.20	172.10
14:44	12.72	6.70	302.30	179.70
14:45	13.54	5.97	304.60	167.50
14:46	13.04	6.28	336.80	150.60

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KCE-M201/202-R2

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
14:47	11.95	7.39	312.80	152.40
14:48	12.37	7.04	299.10	174.30
14:49	12.77	6.70	302.40	176.20
14:50	12.79	6.64	309.50	153.20
14:51	12.34	6.92	331.30	155.60
14:52	13.38	6.03	313.30	174.40
14:53	12.75	6.71	311.30	179.50
14:54	13.08	6.43	297.80	163.70
14:55	12.03	7.29	322.10	137.10
14:56	12.39	6.91	312.90	146.50
14:57	12.48	6.89	312.30	166.00
14:58	14.11	5.42	311.20	169.20
14:59	13.93	5.55	315.40	152.50
15:00	12.42	6.87	335.30	157.10
15:01	13.82	5.65	306.10	163.10
15:02	13.13	6.33	305.10	182.90
15:03	13.13	6.39	290.70	165.50
15:04	12.40	6.93	318.20	146.20
15:05	13.02	6.35	309.90	156.90
15:06	13.84	5.63	301.50	168.70
15:07	13.02	6.43	304.90	165.40
15:08	13.38	6.08	304.50	159.20
15:09	12.16	7.08	332.00	150.60
15:10	12.99	6.42	303.40	170.20
15:11	13.22	6.22	306.10	169.80
15:12	13.56	5.97	283.00	149.10
15:13	12.35	6.97	312.50	119.70
15:14	12.61	6.70	300.60	134.70
15:15	13.15	6.21	290.20	157.40
15:16	13.56	5.87	293.80	157.90
15:17	13.44	5.94	301.30	135.70
15:18	12.81	6.38	328.20	140.70
15:19	12.95	6.37	297.30	158.40
15:20	13.11	6.24	300.40	169.00
15:21	13.44	5.97	298.40	162.70
15:22	12.74	6.49	328.90	152.40
15:23	13.00	6.28	311.30	157.00
15:24	13.33	6.00	305.40	175.90
15:25	12.71	6.66	298.90	175.20

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KCE-M201/202-R2

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
15:26	12.87	6.48	301.50	150.60
15:27	11.49	7.65	317.20	135.00
15:28	12.37	6.90	293.70	165.40
15:29	12.39	6.91	299.90	169.80
15:30	12.96	6.41	295.40	164.80
15:31	11.83	7.34	323.20	133.70
15:32	12.24	6.98	314.70	151.70
15:33	13.57	5.78	316.10	166.00
15:34	13.42	5.96	317.10	176.20
15:35	12.79	6.55	311.90	147.50
15:36	11.71	7.44	321.80	140.90
15:37	12.28	6.97	287.40	171.40
15:38	12.74	6.56	300.70	184.20
15:39	13.40	5.95	302.50	167.30
15:40	12.48	6.68	332.40	155.70
15:41	12.20	6.97	324.70	163.60
15:42	13.01	6.24	321.90	174.60
15:43	12.61	6.66	322.00	165.10
15:44	12.57	6.69	320.50	142.80
15:45	11.25	7.79	336.10	130.90
15:46	12.53	6.66	307.50	170.30
15:47	12.86	6.36	320.00	177.30
15:48	13.42	5.92	314.30	161.40
15:49	12.36	6.74	339.80	145.60
15:50	12.62	6.55	325.70	160.70
15:51	12.71	6.54	319.90	174.60
15:52	12.79	6.53	310.60	167.40
15:53	12.68	6.57	319.90	143.40
15:54	11.40	7.65	330.90	138.50
15:55	12.82	6.40	315.40	171.30
108 MinAvg	12.77	6.58	311.49	158.92

EPA Brick WA 14
Kiln Combustion Exhaust
$O_2/CO_2/CO/NO_x$
KCE-M201/202-R2

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
Data Corrected for Calibrations				
108 MinAvg	13.04	6.58	321.21	165.35

Calibrations:

```
O2     25        Span Value =  25
LOW Calibration Gas =     0.00   HIGH Calibration Gas =   22.00
Initial Cal. at:  1133
LOW Cal. Response =    0.05   HIGH Cal. Response =   21.59
       Cal. Drift =    0.00           Cal. Drift =   -0.02
Final Cal. at:  1640
LOW Cal. Response =    0.02   HIGH Cal. Response =   21.45
       Cal. Drift =    0.00           Cal. Drift =   -0.02
 LOW System Drift =   -0.00    HIGH System Drift =   -0.01
```

```
CO2    20        Span Value =  20
LOW Calibration Gas =     0.00   HIGH Calibration Gas =   18.20
Initial Cal. at:  1133
LOW Cal. Response =    0.01   HIGH Cal. Response =   18.23
       Cal. Drift =    0.00           Cal. Drift =    0.00
Final Cal. at:  1640
LOW Cal. Response =    0.01   HIGH Cal. Response =   18.10
       Cal. Drift =    0.00           Cal. Drift =   -0.00
 LOW System Drift =    0.00    HIGH System Drift =   -0.01
```

Calibrations:

```
CO  1000        Span Value =  1000
LOW Calibration Gas =     0.00   HIGH Calibration Gas =  929.00
Initial Cal. at:  1142
LOW Cal. Response =   -0.38   HIGH Cal. Response =  906.00
       Cal. Drift =   -0.00            Cal. Drift =   -0.02
Final Cal. at:  1640
LOW Cal. Response =   -0.17   HIGH Cal. Response =  896.78
       Cal. Drift =   -0.00            Cal. Drift =   -0.03
 LOW System Drift =    0.00    HIGH System Drift =   -0.01
```

```
NOx  250        Span Value =  250
LOW Calibration Gas =     0.00   HIGH Calibration Gas =  257.00
Initial Cal. at:  1137
LOW Cal. Response =   -0.31   HIGH Cal. Response =  250.50
       Cal. Drift =   -0.00            Cal. Drift =   -0.03
Final Cal. at:  1640
LOW Cal. Response =    0.92   HIGH Cal. Response =  243.17
       Cal. Drift =    0.00            Cal. Drift =   -0.06
 LOW System Drift =    0.00    HIGH System Drift =   -0.03
```

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KCE-M201/202-R3

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
16:49	13.10	6.24	332.50	185.40
16:50	12.48	6.86	332.70	187.50
16:51	13.23	6.18	324.80	161.00
16:52	12.75	6.47	362.00	144.70
16:53	12.22	7.02	345.10	154.10
16:54	11.87	7.40	336.60	174.80
16:55	12.87	6.51	337.50	174.20
16:56	13.52	5.83	356.10	141.00
16:57	12.43	6.79	362.70	166.80
16:58	12.96	6.39	334.00	182.00
16:59	12.64	6.73	337.00	183.40
17:00	13.27	6.16	331.10	154.90
17:01	12.19	7.03	354.90	147.10
17:02	12.13	7.11	336.00	163.00
17:03	13.62	5.78	352.30	171.50
17:04	13.17	6.26	346.20	170.10
17:05	12.72	6.64	341.20	145.90
17:06	11.52	7.64	342.30	139.20
17:07	12.49	6.81	324.80	170.20
17:08	13.55	5.83	342.80	176.30
17:09	13.66	5.79	347.40	160.70
17:10	12.41	6.81	361.30	150.00
17:11	12.29	6.97	333.70	167.30
17:12	12.95	6.41	333.40	180.20
17:13	13.16	6.24	332.20	168.60
17:14	12.53	6.78	338.40	148.20
17:15	11.72	7.42	336.20	138.40
17:16	12.51	6.73	330.10	176.50
17:17	13.00	6.34	341.20	185.00
17:18	13.51	5.90	334.20	163.70
17:19	11.69	7.47	351.10	136.70
17:20	12.33	6.93	323.10	162.60
17:21	12.51	6.80	329.80	174.40
17:22	13.30	6.11	323.30	172.40
17:23	12.90	6.40	339.40	149.10
17:24	12.85	6.33	358.50	159.50
17:25	12.86	6.46	348.50	180.40
17:26	12.57	6.78	339.60	183.80
17:27	13.17	6.21	329.10	157.40

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KCE-M201/202-R3

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
17:28	12.11	7.05	359.70	146.20
17:29	12.24	6.99	328.60	162.50
17:30	12.75	6.56	332.80	179.30
17:31	13.39	5.99	327.80	171.60
17:32	12.95	6.36	346.20	153.70
17:33	12.14	7.04	344.30	159.90
17:34	13.16	6.19	335.60	180.10
17:35	13.25	6.14	336.40	182.30
17:36	13.11	6.31	332.20	158.70
17:37	11.66	7.52	354.80	132.30
17:38	12.17	7.07	322.60	164.10
17:39	12.74	6.57	330.20	178.90
17:40	13.83	5.61	334.90	168.40
17:41	13.24	6.09	354.70	150.60
17:42	11.68	7.50	343.30	152.30
17:43	12.41	6.90	321.70	179.50
17:44	12.89	6.48	328.00	181.10
17:45	13.38	6.02	330.00	165.00
17:46	12.07	7.11	358.10	159.00
17:47	12.40	6.86	323.30	171.20
17:48	12.90	6.44	330.70	187.30
17:49	12.71	6.67	325.00	174.60
17:50	12.50	6.81	346.50	149.90
17:51	12.09	7.07	356.20	162.20
17:52	12.83	6.53	344.30	176.60
17:53	13.13	6.29	326.50	168.50
17:54	13.50	5.93	339.70	155.50
17:55	11.69	7.49	361.20	135.00
17:56	12.57	6.70	331.30	166.80
17:57	12.96	6.38	339.80	180.50
17:58	13.56	5.88	335.00	171.00
17:59	12.41	6.89	347.60	145.80
18:00	11.67	7.49	340.30	143.50
18:01	12.42	6.86	331.20	178.70
18:02	12.73	6.62	336.00	169.70
18:03	13.47	5.93	334.40	153.30
18:04	11.80	7.32	366.00	141.00
18:05	12.27	6.99	327.70	162.90
18:06	13.18	6.17	342.00	178.20

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KCE-M201/202-R3

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
18:07	14.19	5.30	339.50	163.00
18:08	12.48	6.83	355.90	139.30
18:09	12.05	7.15	331.20	131.50
18:10	12.82	6.49	332.80	172.20
18:11	14.18	5.30	334.30	169.10
18:12	13.91	5.56	334.60	151.60
18:13	11.79	7.39	354.00	145.40
18:14	12.89	6.42	324.30	164.30
18:15	13.83	5.60	339.10	175.60
18:16	13.54	5.93	326.80	175.30
18:17	12.03	5.78	352.50	158.30
18:18	0.10	0.02	123.60	0.04
18:19	0.04	0.02	-0.03	-0.91
18:20	2.42	0.02	-0.07	-1.05
18:21	20.63	3.89	-0.18	-0.72
18:22	21.24	11.65	0.53	-0.91
18:23	21.67	17.83	-0.66	-1.23
18:24	16.47	10.44	-1.07	32.40
18:25	0.12	0.03	0.49	255.90
18:26	2.78	0.03	0.84	231.70
98 MinAvg	12.45	6.40	309.37	153.74

Data Corrected for Calibrations

98 MinAvg	12.01	6.47	307.62	153.33

Calibrations:

O_2 25 Span Value = 25

LOW Calibration Gas =	0.00	HIGH Calibration Gas =	22.00
Initial Cal. at: 1640			
LOW Cal. Response =	0.02	HIGH Cal. Response =	21.45
Cal. Drift =	0.00	Cal. Drift =	-0.02
Final Cal. at: 1839			
LOW Cal. Response =	2.94	HIGH Cal. Response =	21.69
Cal. Drift =	0.12	Cal. Drift =	-0.01
LOW System Drift =	0.12	HIGH System Drift =	0.01

CO_2 20 Span Value = 20

LOW Calibration Gas =	0.00	HIGH Calibration Gas =	18.20
Initial Cal. at: 1640			
LOW Cal. Response =	0.01	HIGH Cal. Response =	18.10
Cal. Drift =	0.00	Cal. Drift =	-0.00
Final Cal. at: 1839			
LOW Cal. Response =	0.01	HIGH Cal. Response =	17.86
Cal. Drift =	0.00	Cal. Drift =	-0.02
LOW System Drift =	0.00	HIGH System Drift =	-0.01

CO 1000 Span Value = 1000

LOW Calibration Gas =	0.00	HIGH Calibration Gas =	929.00
Initial Cal. at: 1641			
LOW Cal. Response =	-0.20	HIGH Cal. Response =	939.00
Cal. Drift =	-0.00	Cal. Drift =	0.01
Final Cal. at: 1839			
LOW Cal. Response =	0.00	HIGH Cal. Response =	929.97
Cal. Drift =	0.00	Cal. Drift =	0.00
LOW System Drift =	0.00	HIGH System Drift =	-0.01

NO_x 250 Span Value = 250

LOW Calibration Gas =	0.00	HIGH Calibration Gas =	257.00
Initial Cal. at: 1641			
LOW Cal. Response =	-0.40	HIGH Cal. Response =	256.70
Cal. Drift =	-0.00	Cal. Drift =	-0.00
Final Cal. at: 1839			
LOW Cal. Response =	-0.48	HIGH Cal. Response =	259.26
Cal. Drift =	-0.00	Cal. Drift =	0.01
LOW System Drift =	-0.00	HIGH System Drift =	0.01

EPA Brick WA 14
Kiln Combustion Exhaust
$O_2/CO_2/CO/NO_x$
KSO-M3A/10B/7E-R1

Starting
07-30-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
12:29	12.67	7.04	323.90	172.10
12:30	13.25	6.51	324.40	176.70
12:31	14.06	5.82	320.40	164.00
12:32	12.61	7.10	341.00	130.20
12:33	12.16	7.40	327.60	139.80
12:34	13.42	6.28	315.50	163.60
12:35	14.16	5.63	325.60	168.00
12:36	13.84	5.97	322.90	154.40
12:37	12.54	7.04	343.00	145.60
12:38	13.36	6.29	313.60	160.80
12:39	14.04	5.76	308.20	170.30
12:40	14.04	5.80	296.20	165.90
12:41	13.20	6.49	325.50	149.20
12:42	12.05	7.43	328.80	153.30
12:43	13.04	6.60	314.50	173.30
12:44	13.25	6.43	320.20	179.80
12:45	13.69	6.06	316.70	159.90
12:46	12.38	7.14	343.50	146.70
12:47	12.57	7.03	311.60	161.90
12:48	12.56	7.05	307.90	174.80
12:49	13.63	6.09	303.90	173.10
12:50	13.58	6.05	331.60	143.80
12:51	12.68	6.84	341.20	164.40
12:52	12.64	6.98	310.70	179.70
12:53	13.61	6.06	305.30	173.50
12:54	14.26	5.51	311.10	156.40
12:55	12.51	7.02	339.70	151.90
12:56	13.42	6.17	311.60	168.60
12:57	13.03	6.65	312.80	186.20
12:58	13.03	6.66	298.40	172.70
12:59	13.17	6.50	314.10	151.60
13:00	12.31	7.16	326.00	163.70
13:01	13.59	6.09	312.40	179.40
13:02	14.10	5.68	321.80	176.30
13:03	13.53	6.28	307.50	152.30
13:04	12.03	7.50	317.50	133.80
13:05	12.82	6.78	305.70	164.40
13:06	13.28	6.42	310.50	181.00
13:07	13.89	5.89	317.20	165.90

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R1

Starting
07-30-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
13:08	13.69	6.09	328.70	145.80
13:09	11.87	7.65	320.60	139.80
13:10	13.13	6.56	302.90	161.00
13:11	13.48	6.24	322.90	174.10
13:12	14.53	5.36	314.70	155.70
13:13	12.63	7.00	329.60	147.90
13:14	13.40	6.25	312.00	169.10
13:15	13.75	6.03	319.10	185.20
13:16	13.89	5.99	311.00	183.40
13:17	13.53	6.28	321.80	150.80
13:18	12.93	6.71	331.90	157.50
13:19	12.67	7.06	311.20	174.50
13:20	12.76	6.99	310.30	177.80
13:21	13.22	6.60	298.70	150.50
13:22	12.01	7.62	321.60	129.00
13:23	12.39	7.18	313.60	158.50
13:24	13.30	6.45	319.90	184.10
13:25	13.51	6.30	317.30	177.10
13:26	14.08	5.73	317.20	153.70
13:27	12.55	7.06	334.80	162.10
13:28	12.62	7.09	302.00	177.40
13:29	12.71	7.01	300.90	167.30
13:30	13.69	6.07	302.90	153.70
13:31	13.09	6.55	328.70	149.00
13:32	12.44	7.16	316.50	170.30
13:33	12.77	6.91	298.10	170.00
13:34	13.75	6.00	309.50	170.60
13:35	13.20	6.54	319.90	141.70
13:36	11.75	7.73	330.70	134.90
13:37	12.87	6.72	314.70	170.60
13:38	12.83	6.82	315.20	176.90
13:39	13.57	6.14	309.10	152.40
13:40	12.67	6.91	335.80	140.00
13:41	12.55	6.94	319.10	146.70
13:42	13.38	6.26	314.90	169.20
13:43	12.95	6.74	310.30	164.90
13:44	13.02	6.66	311.50	143.30
13:45	11.56	7.86	327.00	125.30
13:46	13.52	6.02	314.30	154.50

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R1

Starting
07-30-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
13:47	13.36	6.27	320.60	178.20
13:48	13.41	6.29	307.80	168.00
13:49	12.14	7.41	322.00	129.80
13:50	11.97	7.48	315.90	142.70
13:51	12.74	6.81	314.80	164.20
13:52	14.23	5.44	324.40	162.20
13:53	13.70	5.98	324.30	149.40
13:54	12.10	7.35	337.60	148.50
13:55	12.29	7.23	308.00	156.80
13:56	12.99	6.61	303.70	165.60
13:57	14.75	4.96	311.80	139.30
13:58	13.34	6.25	344.70	146.20
13:59	12.07	7.41	324.60	150.00
14:00	12.99	6.59	302.90	166.60
14:01	13.62	5.99	309.30	171.50
14:02	13.75	5.93	305.10	158.50
14:03	12.22	7.22	327.00	149.70
14:04	13.03	6.52	311.10	174.60
14:05	13.30	6.32	310.40	168.90
14:06	13.48	6.20	305.90	160.30
14:07	12.31	7.24	323.00	128.30
14:08	11.69	7.68	320.10	138.50
14:09	12.37	7.13	310.80	161.10
14:10	12.62	6.93	308.60	168.10
14:11	13.31	6.28	310.00	139.70
14:12	12.88	6.54	344.20	144.80
14:13	12.49	7.03	317.20	159.40
14:14	12.92	6.67	303.20	163.10
14:15	13.50	6.14	297.30	150.60
14:16	13.06	6.48	320.20	134.50
14:17	11.74	7.64	318.70	134.00
14:18	12.52	6.98	297.90	161.50
14:19	12.77	6.75	315.50	168.30
14:20	14.09	5.53	321.40	151.70
14:21	12.64	6.90	334.40	138.60
14:22	12.59	6.93	308.00	152.60
14:23	12.60	6.94	305.70	163.60
14:24	13.61	5.99	305.10	162.50
14:25	13.72	5.84	326.80	140.40

EPA Brick WA 14
Kiln Combustion Exhaust
$O_2/CO_2/CO/NO_x$
KSO-M3A/10B/7E-R1

Starting
07-30-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
14:26	12.47	6.92	333.90	157.10
14:27	12.39	7.10	306.70	165.30
14:28	12.82	6.68	310.10	173.10
14:29	13.97	5.65	314.70	148.90
14:30	12.63	6.79	337.70	148.10
14:31	13.10	6.34	319.10	159.90
14:32	12.97	6.57	313.00	174.30
14:33	12.84	6.71	302.10	165.50
14:34	13.55	6.00	309.40	150.90
14:35	12.88	6.53	330.90	164.30
14:36	12.82	6.71	311.40	177.90
14:37	12.80	6.78	300.40	169.20
14:38	13.30	6.29	294.90	149.40
14:39	13.10	6.30	337.20	139.60
14:40	13.50	5.99	324.30	164.20
14:41	13.36	6.21	310.00	173.80
14:42	13.40	6.19	309.40	166.70
14:43	13.26	6.29	315.60	133.30
14:44	12.72	6.62	332.00	142.10
14:45	13.86	5.69	313.90	164.20
137 MinAvg	13.06	6.56	316.92	158.87

Data Corrected for Calibrations

137 MinAvg	13.16	6.53	318.26	160.36

Calibrations:

O2 25 Span Value = 25
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 22.00
Initial Cal. at: 935

LOW Cal. Response =	0.03	HIGH Cal. Response =	22.00
Cal. Drift =	0.00	Cal. Drift =	0.00

Final Cal. at: 1505

LOW Cal. Response =	0.04	HIGH Cal. Response =	21.60
Cal. Drift =	0.00	Cal. Drift =	-0.02
LOW System Drift =	0.00	HIGH System Drift =	-0.02

CO2 20 Span Value = 20
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 18.20
Initial Cal. at: 1002

LOW Cal. Response =	-0.00	HIGH Cal. Response =	18.28
Cal. Drift =	-0.00	Cal. Drift =	0.00

Final Cal. at: 1505

LOW Cal. Response =	0.02	HIGH Cal. Response =	18.24
Cal. Drift =	0.00	Cal. Drift =	0.00
LOW System Drift =	0.00	HIGH System Drift =	-0.00

CO 1000 Span Value = 1000
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 929.00
Initial Cal. at: 1002

LOW Cal. Response =	-0.03	HIGH Cal. Response =	929.00
Cal. Drift =	-0.00	Cal. Drift =	0.00

Final Cal. at: 1505

LOW Cal. Response =	0.00	HIGH Cal. Response =	921.21
Cal. Drift =	0.00	Cal. Drift =	-0.01
LOW System Drift =	0.00	HIGH System Drift =	-0.01

NOx 250 Span Value = 250
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 257.00
Initial Cal. at: 950

LOW Cal. Response =	0.11	HIGH Cal. Response =	257.70
Cal. Drift =	0.00	Cal. Drift =	0.00

Final Cal. at: 1505

LOW Cal. Response =	-0.23	HIGH Cal. Response =	251.61
Cal. Drift =	-0.00	Cal. Drift =	-0.02
LOW System Drift =	-0.00	HIGH System Drift =	-0.02

Calibrations:

VOC 100 Span Value = 100

LOW Calibration Gas =	0.00	HIGH Calibration Gas =	24.58
Initial Cal. at: 846			
LOW Cal. Response =	0.04	HIGH Cal. Response =	24.82
Cal. Drift =	0.00	Cal. Drift =	0.00
Final Cal. at: 1751			
LOW Cal. Response =	0.09	HIGH Cal. Response =	25.29
Cal. Drift =	0.00	Cal. Drift =	0.01
LOW System Drift =	0.00	HIGH System Drift =	0.00

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R2

Starting
07-30-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
15:13	13.04	6.20	319.80	172.50
15:14	13.64	5.68	306.00	159.50
15:15	12.52	6.68	323.80	131.60
15:16	11.77	7.26	316.70	134.70
15:17	12.79	6.35	308.90	150.40
15:18	12.77	6.40	317.30	166.60
15:19	13.57	5.68	310.30	141.00
15:20	11.82	7.20	334.80	124.90
15:21	12.23	6.85	313.10	154.00
15:22	12.57	6.55	307.10	165.00
15:23	13.50	5.72	310.40	160.80
15:24	13.03	6.11	327.50	135.70
15:25	12.56	6.48	337.50	150.80
15:26	12.59	6.57	311.30	161.60
15:27	12.85	6.34	306.70	165.00
15:28	13.37	5.83	308.80	147.40
15:29	12.36	6.65	338.60	143.60
15:30	12.77	6.31	315.20	158.30
15:31	13.12	6.01	325.60	169.30
15:32	13.45	5.74	320.10	159.20
15:33	13.14	5.96	332.10	142.90
15:34	12.57	6.42	338.30	144.40
15:35	13.45	5.67	319.80	163.00
15:36	13.03	6.07	317.90	175.40
15:37	13.58	5.57	309.60	154.00
15:38	12.16	6.79	328.10	139.90
15:39	12.06	6.96	310.70	154.50
15:40	12.55	6.48	306.90	162.20
15:41	13.87	5.26	321.70	151.40
15:42	13.07	5.98	329.10	134.70
15:43	11.69	7.19	326.30	123.30
15:44	12.45	6.53	298.70	149.20
15:45	12.66	6.35	305.60	154.00
15:46	13.32	5.73	302.00	145.30
15:47	12.38	6.49	332.90	131.90
15:48	12.03	6.85	320.70	137.80
15:49	12.57	6.39	308.40	152.90
15:50	13.66	5.39	311.70	146.40
15:51	13.44	5.56	321.60	135.90

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R2

Starting
07-30-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
15:52	11.91	6.91	333.90	129.40
15:53	12.32	6.60	308.60	149.10
15:54	12.40	6.53	307.30	157.60
15:55	13.30	5.71	307.90	149.60
15:56	12.77	6.10	326.50	129.30
15:57	12.49	6.36	333.40	146.60
15:58	12.42	6.53	313.80	157.90
15:59	12.67	6.32	317.30	154.40
16:00	13.30	5.70	312.60	135.40
16:01	12.03	6.76	335.80	131.40
16:02	12.63	6.28	316.70	156.80
16:03	12.31	6.62	312.20	157.80
16:04	12.86	6.13	308.20	146.70
16:05	13.05	5.84	327.20	129.50
16:06	12.66	6.19	339.40	150.90
16:07	13.15	5.83	315.10	162.80
16:08	13.36	5.66	315.40	160.90
16:09	13.43	5.58	312.00	142.50
16:10	12.24	6.57	333.40	135.90
16:11	12.70	6.20	317.50	157.70
16:12	12.79	6.18	312.20	153.00
16:13	13.44	5.59	311.10	147.10
16:14	12.32	6.59	325.70	120.50
16:15	11.77	7.05	332.60	120.60
16:16	12.55	6.37	313.60	143.20
16:17	13.07	5.90	322.60	150.50
16:18	13.39	5.62	323.90	135.10
16:19	12.35	6.47	343.10	127.00
16:20	12.76	6.15	331.60	146.20
16:21	12.49	6.47	320.40	156.50
16:22	12.97	6.05	310.10	143.70
16:23	13.30	5.64	326.60	130.00
16:24	12.47	6.46	341.70	138.10
16:25	12.77	6.24	309.00	161.10
16:26	12.48	6.55	304.80	158.50
16:27	12.95	6.06	311.50	139.10
16:28	12.04	6.79	352.60	128.60
16:29	12.75	6.16	325.40	135.00
16:30	11.99	6.96	327.30	149.40

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R2

Starting
07-30-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
16:31	12.85	6.20	317.10	151.30
16:32	12.25	6.71	333.10	124.40
16:33	11.70	7.19	327.40	129.30
16:34	12.31	6.68	314.70	153.40
16:35	12.92	6.12	317.50	159.80
16:36	13.09	5.98	324.20	139.60
16:37	11.61	7.29	341.70	117.50
16:38	12.08	6.87	320.90	138.00
16:39	13.05	5.97	323.20	150.50
16:40	12.91	6.17	321.60	143.60
16:41	12.38	6.62	331.90	122.40
16:42	11.47	7.40	338.40	119.20
16:43	12.04	6.91	312.50	131.90
16:44	12.42	6.59	316.20	146.70
16:45	14.03	5.06	324.40	126.60
16:46	12.29	6.59	360.20	125.10
16:47	11.82	7.10	331.30	139.20
16:48	12.19	6.79	321.10	151.00
16:49	12.92	6.13	314.60	141.40
16:50	12.62	6.35	324.90	123.60
16:51	12.10	6.75	343.50	126.40
16:52	13.12	5.86	325.90	144.50
16:53	12.49	6.50	323.80	154.70
16:54	12.86	6.17	320.00	139.90
16:55	12.02	6.85	344.70	119.50
16:56	12.44	6.46	341.20	144.30
16:57	12.75	6.22	329.90	153.50
16:58	12.66	6.35	324.60	149.70
16:59	12.56	6.42	326.20	124.40
17:00	11.17	7.60	346.30	114.90
17:01	11.94	6.96	316.50	147.30
17:02	13.28	5.71	328.20	151.30
17:03	13.57	5.47	332.50	142.80
17:04	12.09	6.79	358.30	124.80
17:05	11.61	7.25	336.50	131.00
17:06	12.15	6.78	325.50	158.20
17:07	12.58	6.40	329.10	154.30
17:08	13.08	5.91	332.20	134.30
17:09	11.77	7.04	356.50	128.50

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R2

Starting
07-30-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
17:10	12.83	6.10	335.00	150.00
17:11	12.30	6.66	330.30	154.30
17:12	12.85	6.17	317.00	143.10
17:13	11.76	7.12	341.80	114.70
17:14	11.58	7.25	327.80	130.90
17:15	12.50	6.41	320.80	153.10
17:16	13.71	5.30	329.30	150.50
17:17	13.22	5.74	332.80	137.00
17:18	11.69	7.08	348.40	132.10
17:19	11.98	6.94	318.80	148.40
17:20	12.93	6.03	321.90	154.40
17:21	12.89	6.11	326.00	139.60
17:22	12.28	6.59	340.80	122.40
17:23	12.02	6.88	346.10	136.70
17:24	12.88	6.09	328.40	159.20
17:25	13.41	5.66	336.60	152.90
17:26	13.30	5.59	339.00	131.60
17:27	11.40	7.35	352.20	115.30
17:28	12.16	6.72	325.20	124.20
17:29	11.94	6.96	331.10	146.30
17:30	12.78	6.26	317.90	144.10
17:31	12.57	6.26	339.80	128.10
139 MinAvg	12.62	6.36	324.51	143.34

Data Corrected for Calibrations

139 MinAvg	12.86	6.34	326.21	145.17

Calibrations:

O2 25	Span Value = 25		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	22.00
Initial Cal. at: 1505			
LOW Cal. Response =	0.04	HIGH Cal. Response =	21.60
Cal. Drift =	0.00	Cal. Drift =	-0.02
Final Cal. at: 1751			
LOW Cal. Response =	0.04	HIGH Cal. Response =	21.56
Cal. Drift =	0.00	Cal. Drift =	-0.02
LOW System Drift =	-0.00	HIGH System Drift =	-0.00

CO2 20	Span Value = 20		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	18.20
Initial Cal. at: 1505			
LOW Cal. Response =	0.02	HIGH Cal. Response =	18.24
Cal. Drift =	0.00	Cal. Drift =	0.00
Final Cal. at: 1751			
LOW Cal. Response =	0.01	HIGH Cal. Response =	18.21
Cal. Drift =	0.00	Cal. Drift =	0.00
LOW System Drift =	-0.00	HIGH System Drift =	-0.00

CO 1000	Span Value = 1000		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	929.00
Initial Cal. at: 1505			
LOW Cal. Response =	0.00	HIGH Cal. Response =	921.21
Cal. Drift =	0.00	Cal. Drift =	-0.01
Final Cal. at: 1751			
LOW Cal. Response =	0.00	HIGH Cal. Response =	927.12
Cal. Drift =	0.00	Cal. Drift =	-0.00
LOW System Drift =	0.00	HIGH System Drift =	0.01

NOx 250	Span Value = 250		
LOW Calibration Gas =	0.00	HIGH Calibration Gas =	257.00
Initial Cal. at: 1505			
LOW Cal. Response =	-0.23	HIGH Cal. Response =	251.61
Cal. Drift =	-0.00	Cal. Drift =	-0.02
Final Cal. at: 1751			
LOW Cal. Response =	0.97	HIGH Cal. Response =	255.32
Cal. Drift =	0.00	Cal. Drift =	-0.01
LOW System Drift =	0.00	HIGH System Drift =	0.01

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R3

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
09:06	12.73	6.96	329.90	175.60
09:07	13.57	6.25	322.70	164.00
09:08	12.69	6.97	350.10	145.80
09:09	12.27	7.32	329.80	154.10
09:10	12.57	7.12	310.70	169.70
09:11	12.99	6.75	311.60	164.00
09:12	13.52	6.24	323.10	149.00
09:13	11.55	7.94	345.70	133.40
09:14	12.15	7.43	310.00	160.70
09:15	12.54	7.14	320.40	163.50
09:16	13.65	6.12	317.40	152.80
09:17	12.68	6.96	353.80	132.90
09:18	12.34	7.22	330.20	140.00
09:19	13.08	6.62	327.30	170.40
09:20	13.10	6.65	317.10	172.30
09:21	12.94	6.80	317.10	141.00
09:22	12.44	7.06	345.60	140.30
09:23	12.98	6.66	325.20	163.50
09:24	13.04	6.72	318.50	173.20
09:25	13.51	6.32	311.40	162.70
09:26	12.89	6.80	346.20	148.60
09:27	12.07	7.49	333.70	146.70
09:28	12.52	7.17	305.50	166.20
09:29	13.07	6.65	317.00	152.90
09:30	12.91	6.84	324.80	140.40
09:31	11.82	7.67	343.50	128.00
09:32	13.06	6.56	321.70	158.60
09:33	13.70	6.09	325.00	168.00
09:34	13.69	6.15	316.00	168.00
09:35	13.12	6.63	342.10	146.10
09:36	12.47	7.10	333.40	152.90
09:37	13.74	5.99	328.40	172.70
09:38	13.64	6.16	329.90	183.80
09:39	14.32	5.58	325.80	153.30
09:40	13.14	6.55	356.60	140.40
09:41	12.37	7.32	306.40	132.20
09:42	12.66	7.08	296.50	145.70
09:43	12.80	6.96	293.70	132.50
09:44	12.37	7.27	324.10	121.40

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R3

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
09:45	12.03	7.53	313.50	118.60
09:46	13.50	6.22	312.50	147.70
09:47	13.28	6.48	316.20	146.50
09:48	13.17	6.65	304.20	126.50
09:49	11.46	8.09	335.00	104.10
09:50	12.21	7.37	297.70	133.10
09:51	12.66	7.01	308.00	152.50
09:52	14.21	5.63	311.80	151.10
09:53	13.79	5.98	337.00	134.80
09:54	11.85	7.70	338.10	133.20
09:55	12.62	7.05	300.90	154.00
09:56	13.36	6.36	314.20	167.60
09:57	14.27	5.56	314.70	146.40
09:58	12.79	6.84	355.80	140.70
09:59	12.75	6.90	309.70	155.30
10:00	12.73	7.00	300.30	163.90
10:01	13.38	6.38	298.10	155.10
10:02	13.30	6.43	329.00	139.70
10:03	11.47	7.99	331.10	126.80
10:04	13.04	6.60	314.90	163.00
10:05	13.34	6.39	323.30	173.10
10:06	13.91	5.93	316.90	159.90
10:07	12.48	7.11	345.50	140.40
10:08	12.37	7.24	315.70	160.20
10:09	12.50	7.16	305.70	165.20
10:10	13.84	5.94	321.70	162.70
10:11	13.56	6.13	331.90	145.50
10:12	12.65	6.90	344.50	153.40
10:13	13.24	6.49	310.70	177.50
10:14	13.15	6.58	316.80	187.80
10:15	13.70	6.09	305.90	167.80
10:16	12.61	6.97	337.90	148.00
10:17	13.02	6.59	318.50	164.70
10:18	13.51	6.18	322.80	178.90
10:19	13.19	6.57	311.90	179.40
10:20	12.85	6.87	315.00	145.50
10:21	12.01	7.49	329.70	144.40
10:22	13.35	6.33	310.30	170.70
10:23	14.20	5.58	309.20	173.00

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R3

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
10:24	13.93	5.87	301.10	161.30
10:25	12.44	7.15	326.70	142.40
10:26	11.98	7.53	307.20	143.90
10:27	13.68	5.96	308.30	170.90
10:28	13.71	6.04	307.60	172.80
10:29	13.58	6.15	314.00	156.10
10:30	12.17	7.33	339.10	145.40
10:31	13.09	6.55	306.90	175.40
10:32	13.77	5.93	313.50	176.20
10:33	14.03	5.73	316.70	165.10
10:34	12.13	7.44	330.80	130.00
10:35	11.78	7.69	315.30	134.70
10:36	12.58	7.02	307.50	156.50
10:37	12.84	6.82	307.20	162.80
10:38	12.87	6.78	312.80	142.10
10:39	12.56	6.91	344.40	146.70
10:40	13.47	6.14	321.50	170.50
10:41	13.23	6.44	325.30	178.70
10:42	13.60	6.10	314.60	167.40
10:43	13.46	6.16	332.40	151.30
10:44	12.54	7.08	308.90	149.50
10:45	13.03	6.61	305.10	159.10
10:46	13.45	6.23	311.80	164.00
10:47	13.02	6.59	313.10	143.30
10:48	12.65	6.90	305.10	140.00
10:49	12.61	6.97	297.00	152.10
10:50	14.29	5.38	313.20	144.40
10:51	13.86	5.82	312.00	157.10
10:52	12.68	6.86	332.20	149.10
10:53	12.43	7.06	327.00	159.10
10:54	13.70	5.95	314.80	171.30
10:55	14.30	5.44	316.00	164.20
10:56	13.21	6.46	308.00	142.90
10:57	11.84	7.61	325.80	124.50
10:58	12.63	6.89	291.70	149.30
10:59	12.76	6.83	301.40	173.50
11:00	13.57	6.11	300.20	157.40
11:01	13.69	5.90	329.00	140.60
11:02	12.50	7.00	327.80	144.80

EPA Brick WA 14
Kiln Combustion Exhaust
O2/CO2/CO/NOx
KSO-M3A/10B/7E-R3

Starting
07-31-93

Time	O2 % DV	CO2 % DV	CO PPMDV	NOx PPMDV
11:03	13.43	6.17	303.40	169.40
11:04	13.23	6.41	311.40	174.00
11:05	13.77	5.92	310.40	157.70
11:06	12.23	7.19	337.70	142.80
11:07	12.84	6.69	312.30	171.10
11:08	13.50	6.10	317.50	172.80
11:09	14.24	5.46	321.50	165.80
11:10	13.10	6.46	332.50	148.10
11:11	11.92	7.51	327.60	140.60
11:12	12.53	7.01	298.80	160.80
11:13	12.64	6.93	309.20	170.80
11:14	13.06	6.54	302.50	148.20
11:15	12.83	6.57	342.10	147.40
11:16	13.30	6.21	323.50	166.50
11:17	13.84	5.75	327.90	167.20
11:18	13.17	6.47	308.70	164.10
11:19	12.60	6.94	319.30	131.10
11:20	11.35	8.00	318.10	121.20
11:21	12.95	6.53	304.90	154.90
11:22	13.63	5.90	321.50	171.90
11:23	13.67	5.95	320.20	161.60
11:24	12.35	7.06	341.90	148.60
139 MinAvg	12.99	6.65	319.64	154.24

Data Corrected for Calibrations

139 MinAvg	13.10	6.62	324.30	156.55

Calibrations:

```
O2     25        Span Value =  25
LOW Calibration Gas =    0.00   HIGH Calibration Gas =   22.00
Initial Cal. at:   749
LOW Cal. Response =    0.01   HIGH Cal. Response =   22.02
       Cal. Drift =    0.00           Cal. Drift =    0.00
Final Cal. at:  1133
LOW Cal. Response =    0.05   HIGH Cal. Response =   21.59
       Cal. Drift =    0.00           Cal. Drift =   -0.02
 LOW System Drift =    0.00    HIGH System Drift =   -0.02
```

```
CO2    20        Span Value =  20
LOW Calibration Gas =    0.00   HIGH Calibration Gas =   18.20
Initial Cal. at:   749
LOW Cal. Response =    0.00   HIGH Cal. Response =   18.36
       Cal. Drift =    0.00           Cal. Drift =    0.01
Final Cal. at:  1133
LOW Cal. Response =    0.01   HIGH Cal. Response =   18.23
       Cal. Drift =    0.00           Cal. Drift =    0.00
 LOW System Drift =    0.00    HIGH System Drift =   -0.01
```

```
CO  1000         Span Value =  1000
LOW Calibration Gas =    0.00   HIGH Calibration Gas =  929.00
Initial Cal. at:   801
LOW Cal. Response =    0.02   HIGH Cal. Response =  926.00
       Cal. Drift =    0.00           Cal. Drift =   -0.00
Final Cal. at:  1142
LOW Cal. Response =   -0.38   HIGH Cal. Response =  906.00
       Cal. Drift =   -0.00           Cal. Drift =   -0.02
 LOW System Drift =   -0.00    HIGH System Drift =   -0.02
```

```
NOx  250         Span Value =  250
LOW Calibration Gas =    0.00   HIGH Calibration Gas =  257.00
Initial Cal. at:   756
LOW Cal. Response =   -2.94   HIGH Cal. Response =  258.00
       Cal. Drift =   -0.01           Cal. Drift =    0.00
Final Cal. at:  1137
LOW Cal. Response =   -0.31   HIGH Cal. Response =  250.50
       Cal. Drift =   -0.00           Cal. Drift =   -0.03
 LOW System Drift =    0.01    HIGH System Drift =   -0.03
```

APPENDIX D.2.0

KILN COMBUSTION EXHAUST STACK
RAW FIELD DATA APPENDICES

APPENDIX D.2.1

RAW FIELD SAMPLING DATA FOR EPA METHOD 201A/202 TESTING

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Johnson City Brick

DATE 07-31-93

START TIME 11:45

TEST LOCATION Combustion Exhaust

RUN NUMBER KCE-201/202/R1

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp. Inlet	Meter Temp. Outlet	Imp. Temp.	Meter Vac.
A 1	0	11:45		298	.19	4.05	0.52	830.837	93	92	65	2.0
2	4			319	.18	3.94	.52	832.6	88	80	55	2.0
3	7.9			344	.22	4.35	.52	834.3	86	87	56	2.0
4	12.2		+.17	349	.21	4.25	.52	836.0	90	88	58	2.0
5	16.4			346	.18	3.94	.52	837.9	90	87	59	2.0
6	20.3			331	.15	3.59	.52	839.6	94	89	62	2.0
	23.9	12:09						841.134				
B 1	23.9	12:12		310	.18	3.94	.52	841.134	96	92	65	2.0
2	27.8			327	.16	3.71	.52	842.7	91	85	59	2.0
3	31.5		+.16	337	.17	3.83	.52	844.4	87	87	54	2.0
4	35.3			329	.15	3.59	.52	846.1	91	89	56	2.0
5	38.9			312	.16	3.71	.52	847.7	89	87	58	2.0
6	42.6			342	.15	3.59	.52	849.2	94	91	61	2.0
C 1	46.2	12:34 12:37		318	.15	3.59	.52	850.843	96	93	66	2.0
2	49.8			311	.16	3.71	.52	852.4	97	92	64	2.0
3	53.5			341	.18	3.94	.52	854.0	94	90	60	2.0
4	57.4		+.15	340	.21	4.25	.52	855.7	91	90	57	2.0
5	61.6			347	.18	3.94	.52	857.6	98	94	59	2.0
6	65.5			348	.21	4.25	.52	859.2	100	96	61	2.0
D 1	69.7	13:01 ~~13:03~~ 13:04		340	.15	3.59	.52	861.099	101	98	60	2.0
2	73.3			341	.15	3.59	.52	862.6	103	98	57	2.0
3	76.9		+.13	341	.17	3.83	.52	864.2	99	96	53	2.0
4	80.7			345	.16	3.71	.52	865.9	97	94	52	2.0
5	84.4			344	.17	3.83	.52	867.6	98	94	53	2.0
6	88.2			346	.18	3.94	.52	869.2	97	94	54	2.0

92 13:30

871.963

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	200	FG Filter
2	201	PM10 Acetone Rinse
3	202	<PM10 Acetone Rinse
4	203	Imp Contents
5	204	Imp Cont Extract
6	205	MeCl2BH Rinse
7	206	Silica Gel

LEAK CHECK

Vacuum	4"				
Rate	.004				

Dwell Time for Point 1 = 4.05

$t_1 / \sqrt{P_1}$ = 9.29

IMPINGER VOLUMES

	Initial	Final
#1	100	174
#2	100	110
#3	100	100
#4	0	0
#5	200g	212.26

METER BOX I.D.	#6
GAMMA	1.00624
DELTA H@	1.72964
OPERATOR	C. [illegible]
BAR. PRESS.	30.00
FILTER I.D.	92-8

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Johnson City Brick

DATE 07-31-93

START TIME 14:07

TEST LOCATION Combustion Exhaust

RUN NUMBER KCE-201/202 - R2

	Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp. Inlet	Meter Temp. Outlet	Imp. Temp.	Meter Vac.
D	1	0	14:07		318	.13	3.93	.53	872.362	90	90	64	2.0
	2	3.9			322	.15	4.21	.53	874.1	90	90	62	2.0
	3	8.1			335	.13	3.93	.53	875.9	91	91	61	2.0
	4	12.0		+.16	322	.14	4.07	.53	877.7	92	92	61	2.0
	5	16.0			320	.14	4.07	.53	879.4	91	90	60	2.0
	6	20.0			338	.13	3.93	.53	881.2	97	94	61	2.0
C	1	23.9	~~14:31~~ 14:34		335	.13	3.93	.53	882.933	95	94	65	2.0
	2	27.8			340	.13	3.93	.53	884.5	100	97	62	2.0
	3	31.7			331	.14	4.07	.53	886.3	100	97	61	2.0
	4	35.7		+.14	317	.18	4.62	.53	888.0	97	95	60	2.0
	5	40.3			334	.18	4.62	.53	890.0	98	95	60	2.0
	6	44.9	~~14:59~~		340	.13	3.93	.53	892.1	102	98	60	2.0
		48.8	14:59						893.749				
B	1	44.4	15:01		325	.15	4.21	.53	893.749	100	99	55	2.0
	2	53.0			335	.15	4.21	.53	895.6	102	98	56	2.0
	3	57.2			314	.13	3.93	.53	897.4	101	98	56	2.0
	4	60.7		+.14	337	.14	4.07	.53	899.2	106	100	58	2.0
	5	65.1			333	.14	4.07	.53	900.9	101	96	59	2.0
	6	69.1			334	.13	3.93	.53	902.7	97	94	56	2.0
A	1	73.0	~~15:23~~ 15:28		340	.21	4.99	.53	904.484	98	97	64	2.0
	2	78.0		+.17	329	.21	4.99	.53	906.5	102	98	61	2.0
	3	83.0			336	.18	4.62	.53	908.9	104	100	63	2.0
	4	87.6			334	.17	4.49	.53	910.9	107	102	64	2.0
	5	92.1			342	.15	4.21	.53	912.8	108	102	64	2.0
	6	96.3			342	.13	3.93	.53	914.7	107	103	64	2.0
		100.2	15:53						916.463				

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	207	Fa Filter
2	208	PM10 Acetone
3	209	CPM10 Acetone
4	210	Imp Contents
5	211	Imp. Contents Extra
6	212	MeCl2 Rinse
7	213	Silica Gel

LEAK CHECK

Vacuum	5"
Rate	.010

Dwell Time for Point 1 = 3.93

$t_1/\sqrt{P_1}$ = 10.89

IMPINGER VOLUMES

	Initial	Final
#1	100	178
#2	100	110
#3	100	100
#4	0	0
#5	200a	208.84

METER BOX I.D.	#6
GAMMA	1.00624
DELTA H@	1.72964
OPERATOR	C. Figueroa
BAR. PRESS.	30.00
FILTER I.D.	92-9

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Johnson City Brick

DATE 07-31-93

START TIME 15:47

TEST LOCATION Combustion Exhaust

RUN NUMBER JCCB-201/202-R3

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp. Inlet	Meter Temp. Outlet	Imp. Temp.	Meter Vac.
A 1	0	15:47		339	.19	3.53	.53	916.753	104	100	54	2
2	3.53			342	.21	3.71	.53	918.3	105	101	54	2
3	7.2		+.16	345	.22	3.79	.53	920.0	105	101	54	2
4	11.0			344	.21	3.71	.53	921.6	109	102	54	2
5	14.7			344	.18	3.43	.53	923.3	108	102	56	2
6	18.1			340	.16	3.23	.53	924.8	111	104	55	2
B 1	21.4	~~16:09~~ 16:12		329	.15	3.13	.53	926.260	108	106	57	2
2	24.7			341	.16	3.23	.53	927.6	111	105	55	2
3	27.9			343	.18	3.43	.53	929.0	112	106	55	2
4	31.3		+.14	345	.19	3.63	.53	930.5	112	106	55	2
5	34.9			347	.16	3.23	.53	932.1	104	103	54	2
6	38.0			345	.15	3.13	.53	933.5	106	101	53	2
	41.1	16:32						934.930				
C 1	41.1	16:38		337	.15	3.13	.53	934.930	104	100	54	2
2	44.2			344	.16	3.23	.53	936.3	105	102	53	2
3	47.4			344	.16	3.23	.53	937.7	108	103	54	2
4	50.6		+.15	347	.18	3.43	.53	939.1	109	104	55	2
5	54.0			340	.21	3.71	.53	940.6	108	102	54	2
6	57.7			343	.18	3.43	.53	942.3	106	103	53	2
D 1	61.1	~~16:58~~ 17:06		335	.16	3.23	.53	943.796	105	104	54	2
2	64.3			339	.18	3.43	.53	945.2	105	98	53	2
3	67.7		+.16	342	.19	3.53	.53	946.8	104	97	52	2
4	71.2			344	.20	3.61	.53	948.3	103	97	53	2
5	74.8			344	.18	3.43	.53	949.8	101	96	54	2
6	78.2			344	.16	3.23	.53	951.2	101	95	54	2
								952.807				

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	214	Filter (FG)
2	215	>PM10 Acetone
3	216	<PM10 Acetone
4	217	Imp Contents
5	218	Imp Contents Extract
6	219	~~Silica gel~~ MeCl2 Rinse
7	220	Silica gel

LEAK CHECK

Vacuum	7				
Rate	.006				

Dwell Time for Point 1 = 3.53

$t_1/\sqrt{P_1}$ = 8.09

IMPINGER VOLUMES

	Initial	Final
#1	100	172
#2	100	106
#3	100	100
#4	0	0
#5	200g	215.37

METER BOX I.D.	#6
GAMMA	1.00624
DELTA H@	1.72964
OPERATOR	C. Ferguson
BAR. PRESS.	30.00
FILTER I.D.	GF-144

APPENDIX D.2.2

RAW FIELD SAMPLING DATA FOR EPA METHOD 29 TESTING

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

FACILITY Johnson City Brick TEST LOCATION Combustion Exhaust DATE 2/30/93

START TIME 12:29 POLLUTANT Multi Metals RUN I.D. KCE-M25-R1

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac
A1	0	12:29		321	.20	1.3	608.374	91	90	245	54	4
2	5			331	.22	1.55	611.5	92	85	245	54	4
3	10			345	.19	1.2	615.0	95	90	245	54	4
4	15		+.16	336	.19	1.2	618.1	96	90	249	54	4
5	20			332	.17	1.1	621.2	98	91	249	54	4
6	25			320	.15	.96	624.2	93	85	251	52	4
B1	30	12:59 / 13:00		316	.15	.96	627.061	85	85	252	57	4
2	35			331	.17	1.1	629.8	90	85	252	58	4
3	40			346	.17	1.1	632.8	88	86	252	52	4
4	45		+.15	321	.19	1.2	635.8	92	88	251	51	4
5	50			340	.16	1.0	635.0	93	87	253	52	4
6	55			335	.15	.96	641.5	92	85	252	54	4
	60	13:30					644.845					
C1	60	13:39		320	.15	.96	644.854	90	90	252	55	4
2	65			331	.14	1.0	647.7	95	90	253	52	4
3	70			331	.16	1.0	650.6	91	88	254	53	4
4	75		+.14	335	.18	1.15	653.6	93	85	254	53	4
5	80			347	.21	1.4	654.7	94	88	254	53	4
6	85			349	.22	1.55	660.0	94	85	254	53	4
D1	90	14:08 / 14:14		331	.15	.96	663.623	90	88	254	53	4
2	95			342	.15	.96	666.4	96	93	255	54	4
3	100			340	.16	1.0	669.3	94	90	255	54	4
4	105			336	.17	1.1	672.3	92	90	254	55	4
5	110		+.17	342	.19	1.2	675.3	95	91	256	56	4
6	115	14:44		341	.18	1.15	678.5	93	85	255	52	4

681.666

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	700	Q FILTER
2	701	FH Acetone Rinse
3	702	FH Nitric Rinse
4A	703	Imp 1-3 Contents Bias
4B	704	Imp 1-3 Extra Stage
5A	705	Imp 4 Cont/Rinses
5B	706	Imp 5+6-Rinses
5C	707	Water/HCl Rinse
	708	SG

LEAK CHECK

Vacuum	15	10	10		
Rate	.016	.010	.003		

IMPINGER VOLUMES

	Initial	Final
#1	0	96 ml
#2	100	152
#3	100	112
#4	0	2
#5	100	100
#6	100	100

#7 - 200 216.53

NOZZLE SIZE	.3125
METER BOX I.D.	6
GAMMA	1.00624
DELTA H@	1.72964
BAR. PRESS.	29.57
FILTER I.D.	Q:0/5/92-37
OPERATOR	Travis

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

PAGE 1

FACILITY Johnson City Bowl TEST LOCATION Combustion Exhaust DATE 7/30/53

START TIME 15:12 POLLUTANT Multi Metals RUN I.D. KCE-M 29 -P2

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
B1	0	15:12		324	.15	.96	682.140	91	90	246	54	5
2	5			331	.16	1.0	685.0	92	90	247	56	5
3	10			333	.14	1.15	647.9	93	90	248	55	5
4	15		+.15	340	.14	1.15	690.0	94	91	248	55	5
5	20			341	.20	1.3	694.2	95	91	248	65	5
6	25			335	.19	1.2	697.4	95	91	248	55	5
C1	30	15:42 / 15:47		335	.16	1.0	700.745	90	89	248	55	5
2	35			345	.16	1.0	703.7	93	89	244	57	5
3	40			346	.14	1.15	706.6	95	90	244	57	5
4	45		+.17	341	.20	1.3	709.8	97	92	251	56	5
5	50			340	.18	1.15	713.0	97	93	251	56	5
6	55			344	.17	1.10	716.0	98	94	252	56	5
	60	16:17					719.092					
B1	60	16:26		321	.15	.96	719.165	90	89	255	55	5
2	65			336	.16	1.0	722.0	95	91	253	55	5
3	70		+.15	338	.19	1.15	725.0	98	91	254	54	5
4	75			341	.19	1.2	728.1	100	92	254	54	5
5	80			335	.19	1.2	731.2	99	91	254	55	5
6	85			335	.17	1.10	734.4	98	91	254	54	5
A1	90	16:56 / 17:01		325	.16	1.0	737.479	97	90	255	54	5
2	95			336	.22	1.55	740.4	99	91	256	55	5
3	100		+.16	342	.21	1.4	744.0	99	92	255	56	5
4	105			331	.22	1.55	747.4	98	91	254	54	5
5	110			337	.18	1.15	750.9	97	90	254	54	5
6	115			344	.16	1.0	754.0	96	94	254	54	5

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	709	Q FILTER
2	710	FH Acetone Rinse
3	711	FH Nitric Rinse
4A	712	Imp 1-3 + Rinses
4B	713	Imp 1-3 + Rinses
5A	714	Imp 4 + Rinses
5B	715	Imp 5+6 + Rinses
5C	716	Water/HCl Rinse
6	~~Filter~~	SILICA GEL

LEAK CHECK 756.985

Vacuum	10	9	10		
Rate	.009	.005	.003		

IMPINGER VOLUMES

	Initial	Final
#1	0	117 ml
#2	100	138
#3	100	104
#4	0	1
#5	100	104
#6	100	100
#7	200g	216.21g

NOZZLE SIZE	.2125
METER BOX I.D.	6
GAMMA	1.00624
DELTA H@	1.72564
BAR. PRESS.	29.57
FILTER I.D.	Q10/5/92-38
OPERATOR	Travis

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

PAGE 1

FACILITY Johnson City Brick TEST LOCATION Combustion Exhaust DATE 7/31/93

START TIME 09:05 POLLUTANT Multi Metals RUN I.D. KCE-M29-P3

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
A 1	0	9:05		338	.21	1.30	757.526	70	70	242	60	4
2	5			344	.22	1.25	760.6	76	74	245	57	4
3	10			344	.24	1.5	763.5	77	74	246	55	4
4	15		+.19	340	.24	1.5	767.3	80	75	246	55	4
5	20			339	.20	1.25	770.6	81	76	246	54	4
6	25			342	.20	1.25	773.7	81	76	246	55	4
B 1	30	9:35 9:39		327	.15	.93	776.968	77	76	245	54	4
2	35			331	.15	.93	779.7	81	79	245	55	4
3	40		+.16	338	.16	.97	782.4	84	81	245	55	4
4	45			346	.16	.97	785.1	87	81	244	56	4
5	50			346	.15	.93	788.1	86	81	245	57	4
6	55			347	.15	.93	790.5	87	82	245	55	4
	60	10:09					793.726					
C 1	60	10:14		323	.15	.93	793.726	84	83	241	57	4.3
2	65			332	.16	.97	796.5	87	83	244	55	4.5
3	70			332	.18	1.1	799.3	85	82	243	54	5.0
4	75		+.16	332	.18	1.1	802.4	86	82	243	54	5.0
5	80			340	.22	1.35	805.5	89	83	244	55	6.0
6	85			343	.24	1.5	808.8	86	82	244	55	7.0
D 1	90	10:44 10:54		337	.16	.97	812.673	89	87	248	58	4.8
2	95			336	.16	.97	815.1	92	89	245	56	4.8
3	100			335	.18	1.1	818.0	98	94	244	56	5.3
4	105		+.15	320	.18	1.1	821.1	94	93	243	58	5.3
5	110			310	.16	.97	824.2	93	88	243	59	5.0
6	115			339	.16	.97	827.1	94	89	243	60	5.0
	120						830.080					

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	718	Quartz Filter
2	719	FH Acetone Rinse
3	720	FH Nitric Rinse
4A	721	Imp 1-3 + Rinses
4B	722	Imp 4 + 3 Rinses
5A	723	Imp 4 + Rinses
5B	724	Imp 5 + 6 + Rinses
5C	725	Water + HCl Rinse
6	726	Silica Gel
7	727	

LEAK CHECK

Vacuum	10				
Rate	0.015				

IMPINGER VOLUMES

	Initial	Final
#1	0	102
#2	100	147
#3	100	106
#4	0	1
#5	100	105
#6	100	101
#7	200g	211 g

NOZZLE SIZE	.3125
METER BOX I.D.	6
GAMMA	1.00624
DELTA H@	1.7264
BAR. PRESS.	30.00
FILTER I.D.	6-10/15/93-39
OPERATOR	Travis

APPENDIX D.2.3

RAW FIELD SAMPLING DATA FOR EPA METHOD 26 TESTING

Figure 6.0- EPA Method 26 Sampling Da Sheet

Project EPA Brick Plant

Location Kiln Combustion Exhaust

Date 7-30-93 ; 7-31-93

Meter Box I.D. #18

Meter Box Gamma 0.9985

Nominal Sampling Rate 2 lpm

Nominal Sampling dH-in.W.C. 2.4

Barometric Pressure-in. Hg 29.97 (7-30-93) 30.00 (7-31-93)

Operator D. Vecellio

RUN NUMBER	START TIME	END TIME	INITIAL METER VOLUME (liters)	FINAL METER VOLUME (liters)	INITIAL METER TEMP. (deg.F)	FINAL METER TEMP. (deg.F)	SAMPLE I.D.'s
7-30-93 KCE-M26-R1	12:28	12:58	934.79	995.11	105°F	111°F	300 – Imp 1-3 + Ri
	13:00	13:30	995.11	1054.77	108°	115°	
	13:38	14:08	1054.77	1114.15	108	118	
	14:14	14:44	1114.15	1175.07	115	117	304 – Imp 1-3 + Ri Extra
KCE-M26-R2	15:12	15:42	1175.34	1235.34	112	120	305 – Imp 1-3 + R
	15:47	16:18	1235.34	1295.21	115	118	309 – Imp 1-3 + R. EXTRA
	16:26	16:56	1295.21	1355.95	117	122	
	17:01	17:31	1355.95	1415.97	117	112	
7-31-93 KCE-M26-R3	9:05	9:35	1420.07 1419.93	1480.30	85	103	310 – Imp 1-3 + Rinse
	9:39	10:09	1480.30	1540.61	100	110°F	
	10:14	10:44	1540.61	1601.70	108	118	314 – Imp 1-3 Extra
	10:54	11:24	1601.70	1664.41	110	118	
							315 – Imp 1-3 + Rinse
							319 – Imp 1-3 + Rinse Extra

APPENDIX D.2.4

RAW FIELD SAMPLING DATA FOR EPA METHOD 0030 TESTING

RUN NUMBER KCE - M0030 - R1

Date 7-29-93

Test Location Kiln Combustion Exhaust

Meter Box I.D. #18

Meter Box Calibration Factor 0.4985

INITIAL LEAK CHECK

Vacuum 15.0"

Leak Rate mm Hg/minute 0.00

SAMPLE COLLECTION

	CARTRIDGE SET 1 (1 lpm)		CARTRIDGE SET 2 (2 lpm)		CARTRIDGE SET 3 (1 lpm)	
Tenax I.D.	KCE-M0030-R1A		KCE-M0030-R1B		KCE-M0030-R1C	
Charcoal I.D.	KCE-M0030-R1A		KCE-M0030-R1B		KCE-M0030-R1C	
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
Time	9:23	9:43	9:58	10:18	10:28	10:48
Meter Volume	263.32	283.79	284.61	324.92	325.69	345.69
Meter Temperature	90°F	102.0°F	100°F	116°F	110°F	112°F
Meter Pressure	1.0	1.0	2.1	2.1	1.0	1.0
System Vacuum	5.0	5.0	7.0	7.0	4.0	4.0
Condenser 1 Temp.	60°F	65°F	59°F	63°F	65°F	58°F
Condenser 2 Temp.	63°F	67°F	62°F	66°F	68°F	60°F
Probe Temperature	255°F	260°F	225°F	242°F	240°F	245°F
Leak Rate	0.00	0.00	0.00	0.00	0.00	0.00

	CARTRIDGE SET 4 (2 lpm)		CARTRIDGE SET 5 (1 lpm)		CARTRIDGE SET 6 (~~2~~ 1 lpm)	
Tenax I.D.	KCE-M0030-R1D		KCE-M0030-R1E		KCE-M0030-R1F	
Charcoal I.D.	KCE-M0030-R1D		KCE-M0030-R1E		KCE-M0030-R1F	
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
Time	11:27	11:47	12:00	12:20	12:30	12:50
Meter Volume	363.43	403.97	404.44	424.44	426.74	~~446.74~~ 466.?
Meter Temperature	108°F	112°F	110°F	115°F	112°F	115°F
Meter Pressure	2.1	2.1	1.0	1.0	2.1	2.1
System Vacuum	7.0	7.0	4.0	4.0	7.0	7.0
Condenser 1 Temp.	62°F	60°F	56°F	62°F	65°F	65°F
Condenser 2 Temp.	65°F	63°F	59°F	65°F	67°F	68°F
Probe Temperature	240°F	245°F	245°F	248°F	245°F	250°F
Leak Rate	0.00	0.00	0.00	0.00	0.00	0.00

RUN NUMBER KCE - M0030- R2

Date 7-29-93

Test Location Kiln Combustion Exhaust

Meter Box I.D. #18

Meter Box Calibration Factor 0.9985

INITIAL LEAK CHECK

Vacuum 16.0

Leak Rate mm Hg/minute 0.00

SAMPLE COLLECTION

	1 lpm CARTRIDGE SET 1 #1 #2		2 lpm CARTRIDGE SET 2		1 lpm CARTRIDGE SET 3	
#1 Tenax I.D.	KCE-M0030-R2A		KCE-M0030-R2B		KCE-M0030-R2C	
#2 Charcoal I.D.	KCE-M0030-R2A		KCE-M030-R2B		KCE-M0030-R2C	
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
Time	14:12	14:32	DU ~~15:~~ 14:49	15:09	15:18	
Meter Volume	528.96	548.96	549.68	589.85	590.85	
Meter Temperature	110°F	117°F	112°F	116°F	116°F	
Meter Pressure	1.0	1.0	2.1	2.1	1.0	
System Vacuum	4.0	4.0	7.0	7.0	4.0	
Condenser 1 Temp.	63°F	65°F	60°F	61°F	62°F	
Condenser 2 Temp.	65°F	67°F	63°F	64°F	65°F	
Probe Temperature	230°F	230°F	240°F	242°F	242°F	
Leak Rate	0.00	0.00	0.00	0.00	0.00	

	1 lpm CARTRIDGE SET 4		2 lpm CARTRIDGE SET 5		1 lpm CARTRIDGE SET 6 633 635	
Tenax I.D.	KCE-M0030-R2D		KCE-M0030-R2E		KCE-M0030-R2F	
Charcoal I.D.	KCE-M0030-R2D		KCE-M0030-R2E		KCE-M0030-R2F	
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
Time	15:48	16:08	16:34	16:54	17:01	17:21
Meter Volume	593.80	613.93	614.23	654.32	655.98	676.18
Meter Temperature	115°F	121°F	112°F	115°F	115°F	115°F
Meter Pressure	1.0	1.0	2.1	2.1	1.0	1.0
System Vacuum	4.0	4.0	7.0	7.0	4.0	4.0
Condenser 1 Temp.	63°F	65°F	58°F	60°F	60°F	62°F
Condenser 2 Temp.	65°F	68°F	60°F	62°F	62°F	65°F
Probe Temperature	240°F	243°F	242°F	242°F	238°F	240°F
Leak Rate	0.00	0.00	0.00	0.00	0.00	0.00

ETS102490

RUN NUMBER KCE-M0050-R2

Date 2-29-93

Test Location Kiln Combustion Exhaust

Meter Box I.D. #18

Meter Box Calibration Factor 0.9985

INITIAL LEAK CHECK

Vacuum 16.0

Leak Rate mm Hg/minute 0.00

SAMPLE COLLECTION

#1 638
#2 636

	CARTRIDGE SET 1		CARTRIDGE SET 2		CARTRIDGE SET 3	
#1 Tenax I.D.	KCE-M0030-R2G					
#2 Charcoal I.D.	KCE-M0030-R2G					
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
Time	17:29	17:49				
Meter Volume	677.64	717.90				
Meter Temperature	115°F	117°F				
Meter Pressure	2.1	2.1				
System Vacuum	8.0	8.0				
Condenser 1 Temp.	62°F	65°F				
Condenser 2 Temp.	64°F	68°F				
Probe Temperature	246°F	248°F				
Leak Rate	0.00	0.00				

	CARTRIDGE SET 4		CARTRIDGE SET 5		CARTRIDGE SET 6	
Tenax I.D.						
Charcoal I.D.						
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
Time						
Meter Volume						
Meter Temperature						
Meter Pressure						
System Vacuum						
Condenser 1 Temp.						
Condenser 2 Temp.						
Probe Temperature						
Leak Rate						

ETS102490

RUN NUMBER KCE-M0030-R3

Date 7-30-93

Test Location Kiln Combustion Exhaust

Meter Box I.D. #18

Meter Box Calibration Factor 0.9985

INITIAL LEAK CHECK

Vacuum 16.0

Leak Rate mm Hg/minute 0.00

SAMPLE COLLECTION

	CARTRIDGE SET 1 (2 lpm; #1 641, #2 639)		CARTRIDGE SET 2 (2 lpm; 644, 642)		CARTRIDGE SET 3 (2 lpm; 647, 645)	
#1 Tenax I.D.	KCE-M0030-R3A		KCE-M0030-R3B		KCE-M0030-R3C	
#2 Charcoal I.D.	KCE-M0030-R3A		KCE-M0030-R3B		KCE-M0030-R3C	
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
Time	8:15	8:35	8:42	9:02	9:20	9:40
Meter Volume	732.05	752.52	752.84	793.05	794.42	815.05
Meter Temperature	83°F	92°F	92°F	98°F	100°F	105°F
Meter Pressure	1.0	1.0	2.1	2.1	1.0	1.0
System Vacuum	4.0	4.0	7.0	7.0	5.0	5.0
Condenser 1 Temp.	63°F	65°F	64°F	62°F	60°F	61°F
Condenser 2 Temp.	68°F	68°F	66°F	65°F	62°F	63°F
Probe Temperature	225°F	235°F	240°F	240°F	240°F	242°F
Leak Rate	0.00	0.00	0.00	0.00	0.00	0.00

	CARTRIDGE SET 4 (2 lpm; 650, 648)		CARTRIDGE SET 5 (2 lpm; 653, 651)		CARTRIDGE SET 6 (2 lpm; 656, 654)	
Tenax I.D.	KCE-M0030-R3D		KCE-M0030-R3E		KCE-M0030-R3F	
Charcoal I.D.	KCE-M0030-R3D		KCE-M0030-R3E		KCE-M0030-R3F	
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
Time	10:13	10:33	10:42	11:02	11:13	11:33
Meter Volume	828.79	868.83	869.20	889.72	890.02	930.63
Meter Temperature	102°F	111°F	112°F	112°F	111°F	110°F
Meter Pressure	2.1	2.1	1.0	1.0	2.1	2.1
System Vacuum	8.0	8.0	5.0	5.0	8.0	8.0
Condenser 1 Temp.	54°F	63°F	55°F	53°F	55°F	52°F
Condenser 2 Temp.	57°F	65°F	59°F	57°F	58°F	57°F
Probe Temperature	240°F	242°F	232°F	235°F	225°F	230°F
Leak Rate	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX D.2.5

RAW FIELD SAMPLING DATA FOR EPA METHOD 0010 TESTING

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

PAGE 1

FACILITY Johnson City Brick TEST LOCATION Combustion Exhaust DATE 7/29/97

START TIME ______ POLLUTANT ______ RUN I.D. KCE -M0010 -R1

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac
A1	0	8:43		285	.19	1.2	606.361	87	86	245	54	9
1	5			296	.19	1.2	609.4	90	87	245	55	11
2	10			311	.17	1.1	612.5	92	88	248	56	11
	15		+.17	301	.18	1.15	615.6	94	89	250	56	11
3	20			321	.22	1.5	618.6	94	90	252	56	13
	25			324	.24	1.8	622.0	96	91	250	55	15
4	30			321	.20	1.3	625.6	97	91	251	56	14
	35			325	.20	1.3	628.9	97	91	251	56	14
5	40			328	.16	1.0	632.2	98	92	251	57	14
	45			330	.15	.96	635.0	99	93	252	57	12
6	50			331	.15	.96	637.8	99	93	252	57	12
	55			329	.17	1.1	640.6	100	94	252	55	13
	60	9:43					643.556					
B1	60	9:50		291	.15	.96	643.556	98	95	252	55	13
1	65			295	.15	.96	646.4	102	98	252	55	13
2	70			325	.17	1.1	649.1	103	98	252	56	13
	75			327	.16	1.0	652.1	103	98	263	56	13
3	80		+.13	331	.19	1.2	655.0	105	99	254	57	13
	85			331	.18	1.15	658.1	105	99	254	57	13
4	90			324	.21	1.4	661.1	106	100	254	57	13
	95			320	.21	1.4	664.4	107	101	254	57	13
5	100			336	.18	1.15	667.8	108	102	252	58	12
	105			329	.16	1.0	670.9	108	102	253	59	12
6	110			340	.16	1.0	674.0	107	102	253	59	12
	115			335	.17	1.1	676.8	107	102	252	55	12

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	500	Q FILTER
2	501	FH Rinse / PH Rinse
3	502	XAD TRAP
4	503	Imp 1 Cont/Rinse
5	504	BH Rinse
6	505	SG

LEAK CHECK

Vacuum	15				
Rate	.017				

IMPINGER VOLUMES

	Initial	Final
#1	0	295 ml
#2	100	98 ml
#3	100	101 ml
#4	0	2 ml
#5	200g	224.73
#6	0	

NOZZLE SIZE	.312
METER BOX I.D.	#9
GAMMA	1.0046.2
DELTA H@	1.85206
BAR. PRESS.	30.00
FILTER I.D.	—
OPERATOR	Travis

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

RUN I.D. KCE -MODIC- R 1

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp. Inlet	Meter Temp. Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
	120	10:50					674.763					
C 1	120	11:07		260	.15	.96	680.150	101	100	251	59	10.8
	125			326	.19	1.2	683.0	104	102	252	57	13.0
2	130			337	.17	1.1	686.1	106	101	247	56	13.0
	135			343	.15	.96	689.3	107	102	250	53	11.0
3	140		+.14	345	.22	1.5	692.2	106	102	251	54	15.0
	145			336	.20	1.3	695.6	107	102	254	54	14.5
4	150			338	.19	1.2	699.1	106	102	253	56	14.5
	155			337	.19	1.2	702.3	108	103	254	56	14.5
5	160			336	.22	1.5	705.5	110	104	253	58	15.5
	165			331	.22	1.5	709.1	111	104	252	55	15.5
6	170			344	.23	1.65	712.7	111	105	252	55	16.0
	175			346	.23	1.65	716.5	111	106	255	56	16.0
	180	12:07					720.161					
D 1	180	12:11		335	.16	1.0	720.161	106	103	252	59	11.0
	185			333	.16	1.0	723.1	107	104	249	57	11.0
2	190			337	.15	.96	726.0	108	104	252	56	11.0
	195			340	.16	1.0	728.8	110	105	250	56	11.3
3	200			336	.19	1.2	731.7	113	106	251	57	13
	205			330	.20	1.3	734.9	115	108	251	58	13
4	210			333	.20	1.3	738.1	115	109	252	55	13
	215			337	.19	1.2	741.2	112	107	252	55	12
5	220			340	.17	1.1	744.4	110	106	252	59	12
	225		+.13	337	.17	1.1	747.5	110	106	249	60	12
6	230			342	.19	1.2	750.6	112	106	250	60	13.0
	235			343	.17	1.1	753.8	112	107	248	62	12.0
	240	13:11					757.004					

LEAK CHECK

Vacuum	20"				
Rate	.003				

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

PAGE 1

FACILITY Johnson City Brick TEST LOCATION Combustion Exhaust DATE 7/29/93

START TIME ______ POLLUTANT ______ RUN I.D. JCE-M0010-R2

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
B1	0	14:12		313	.15	.96	762.757	109	107	245	53	4
2	4			305	.16	.96	766.0	104	107	244	54	5
2	8			315	.17	1.1	767.3	109	108	244	54	7
	12			317	.18	1.15	769.7	107	107	244	54	7
3	16			317	.17	1.1	772.1	111	107	246	55	7
	20		+.16	325	.19	1.2	774.5	112	107	247	55	7
4	24			339	.16	1.0	777.0	111	106	247	55	7
	28			344	.16	1.0	779.3	111	106	247	55	7
5	32			341	.18	1.15	781.7	111	107	247	55	7
	36			336	.17	1.1	784.1	111	107	248	57	7
6	40			336	.18	1.15	786.6	112	108	245	55	7
	44			340	.18	1.15	789.0	112	108	245	54	7
	48	15:00					791.734					
C1	48	15:04		335	.16	1.0	791.734	109	105	249	53	7
	52			335	.16	1.0	794.0	110	105	250	53	7
2	56			334	.18	1.15	796.3	110	106	251	53	7
	60			337	.19	1.2	798.7	111	107	251	53	7
3	64			350	.16	1.0	801.2	111	107	251	53	7
	68			345	.15	.96	803.6	113	106	252	54	7
4	72		+.15	325	.18	1.15	806.9	113	107	253	54	7
	76			330	.19	1.2	808.4	113	107	253	55	7
5	80			353	.21	1.4	810.9	113	107	253	55	7
	84			350	.21	1.4	813.6	113	107	253	56	7
6	88			341	.22	1.5	816.3	115	108	254	56	7
	92			354	.21	1.4	819.1	116	108	254	56	7

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	506	Q FILTER
2	507	FH Rinse
3	508	XAD TRAP
4	509	Imp / Contents / Rinse
5	510	BH Rinse
6	511	SILICA GEL

LEAK CHECK

Vacuum					
Rate					

IMPINGER VOLUMES

	Initial	Final
#1	0	196
#2	100	100
#3	100	95
#4	0	1
#5	200g	220.44
#6	0	

NOZZLE SIZE	0.313
METER BOX I.D.	#9
GAMMA	1.00462
DELTA H@	1.95206
BAR. PRESS.	30.00
FILTER I.D.	—
OPERATOR	Travis

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

RUN I.D. KCE -MD010-R 2

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp. Inlet	Meter Temp. Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
	96						821.923					
B1	96	16:02		312	.15	.96	822.187	112	109	243	64	5.8
	100			310	.17	1.1	824.4	114	110	247	58	6.5
2	104			348	.19	1.2	826.9	117	111	248	57	7.0
	108			336	.21	1.4	829.5	118	111	251	56	8.0
3	112			337	.18	1.15	832.3	118	112	253	54	7.0
	116			341	.18	1.15	834.9	117	110	248	54	7.0
4	120		+.13	353	.19	1.2	837.5	118	111	239	55	7.3
	124			351	.18	1.15	840.2	116	111	252	55	7.0
5	128			351	.15	.96	842.6	116	111	247	56	6.3
	132			352	.15	.96	844.9	115	110	245	56	6.3
6	136			341	.15	.96	847.1	112	108	245	58	6.3
	140			323	.15	.96	849.4	112	109	255	59	6.3
	144	16:50					851.759					
A1	144	16:54		327	.17	1.1	851.759	109	106	242	63	7.0
CP	148	~~16:54~~		344	.18	1.15	854.2	110	107	251	59	7.3
2	152			342	.18	1.15	856.7	111	107	248	57	7.3
	156			339	.19	1.2	859.2	112	107	248	55	7.5
3	160			326	.16	1.0	861.8	113	108	251	55	7.0
	164			334	.16	1.0	864.2	113	107	249	55	7.0
4	168		+.13	326	.16	1.0	866.3	112	106	253	56	7.0
	172			335	.17	1.1	868.9	111	106	246	56	7.3
5	176			352	.16	1.0	871.3	112	107	242	57	7.0
	180			348	.16	1.0	873.7	113	106	245	57	7.0
6	184			348	.17	1.1	876.2	112	106	237	59	7.3
	188			342	.15	.96	878.5	112	106	241	60	6.3
	192	16:42					880.915					

LEAK CHECK

Vacuum	10"				
Rate	.007				

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

PAGE 1

FACILITY Johnson City Brick TEST LOCATION Combustion exhaust DATE 07-30-93

START TIME 08:15 POLLUTANT ______ RUN I.D. KEE-M0010-R3

	Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
A	1	0	08:15		314	.23	1.65	881.470	78	78	240	63	8.0
		4			319	.24	1.8	884.3	76	77	248	59	11.0
	2	8			328	.22	1.5	887.3	78	77	245	57	9.3
		12		+.19	312	.23	1.65	890.2	79	77	245	56	10.0
	3	16			322	.24	1.8	893.0	81	77	247	55	11.0
		20			340	.24	1.8	896.1	82	78	245	55	11.0
	4	24			341	.22	1.5	899.1	82	78	245	56	9.8
		28			341	.19	1.2	901.9	83	79	243	56	8.0
	5	32			342	.21	1.4	904.4	84	80	243	58	9.2
		36			341	.19	1.2	907.1	85	80	246	58	8.0
	6	40			342	.18	1.15	909.7	86	82	245	59	8.2
		44			315	.18	1.15	912.1	89	86	243	59	8.2
		48	09:03					914.642					
B	1	48	09:08		316	.15	.96	914.642	93	91	254	60	7.0
		52			313	.15	.96	916.8	94	93	248	56	7.0
	2	56			341	.18	1.15	919.1	94	93	250	54	8.3
		60			342	.18	1.15	921.6	97	96	249	53	8.3
	3	64		+.17	342	.17	1.1	924.1	98	97	253	53	8.0
		68			335	.17	1.1	926.5	100	98	256	54	8.0
	4	72			339	.18	1.15	928.9	101	99	255	54	8.8
		76			332	.18	1.15	931.5	102	100	250	55	8.8
	5	80			329	.17	1.1	934.0	103	100	242	55	8.8
		84			318	.17	1.1	936.5	104	101	250	56	8.8
	6	88			347	.15	.96	938.9	106	102	246	56	8.0
		92			345	.15	.96	941.2	105	101	250	56	8.0

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	512	Q FILTER
2	513	Probe/FH Rinse
3	514	XAD Trap
4	515	Imp 1 Contents + Rinse
5	516	BH Rinses
6	517	SILICA GEL

LEAK CHECK

Vacuum					
Rate					

IMPINGER VOLUMES

	Initial	Final
#1	0	189
#2	100	100
#3	100	101
#4	0	0
#5	200g	223.08
#6	0	

NOZZLE SIZE	5/16
METER BOX I.D.	#9
GAMMA	1.00462
DELTA H@	1.85206
BAR. PRESS.	29.97
FILTER I.D.	—
OPERATOR	C. Ferguson

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

RUN I.D. KCE-M0010-R3

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp. Inlet	Meter Temp. Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
	96	09:56					943.461					
C 1	96	10:09		319	.15	.96	943.668	100	99	259	60	7.0
	100			324	.15	.96	945.9	100	100	260	53	7.0
2	104			322	.16	1.0	948.1	101	100	260	52	7.0
	108		+.11	331	.15	.96	950.5	101	99	262	52	7.0
3	112			337	.17	1.1	952.8	101	99	261	53	8.0
	116			335	.17	1.1	955.2	104	100	262	53	8.0
4	120			348	.18	1.15	957.7	103	101	251	55	8.3
	124			349	.19	1.2	960.2	107	102	247	55	8.8
5	128			347	.15	.96	962.7	108	102	248	56	7.0
	132			344	.15	.96	965.0	110	104	250	57	7.0
6	136			343	.20	1.3	967.3	109	103	247	58	9.0
	140			324	.20	1.3	970.0	109	103	248	59	9.0
	144	10:57		-			972.650					
D 1	144	11:01		330	.15	.96	972.650	103	100	244	64	7.0
	148			332	.16	1.0	974.8	102	100	245	60	7.3
2	152			338	.15	.96	977.1	105	101	248	58	7.3
	156			340	.15	.96	979.1	106	101	248	57	7.3
3	160		+.13	338	.18	1.15	981.4	104	100	244	57	8.5
	164			340	.19	1.2	984.0	104	100	248	58	9.0
4	168			336	.20	1.3	986.5	102	99	243	58	9.3
	172			334	.19	1.2	989.1	103	99	246	60	9.0
5	176			322	.18	1.15	991.9	103	98	246	61	9.0
	180			321	.18	1.15	994.3	102	98	246	61	9.0
6	184			332	.17	1.1	996.8	102	98	247	62	8.8
	188			346	.17	1.1	999.2	104	99	249	63	8.8
	192	11:49					1001.755					

LEAK CHECK

Vacuum	16"				
Rate	.004				

ORSAT FIELD DATA

JOB NAME 92-605 JOB NUMBER Johnson City Brick

FUEL TYPE Coal w/ 20% N.G.

TEST LOCATION Kiln A Combustion Exhaust

RUN NUMBER KAC-R1 LEAK TEST? — DATE 7/29 OPERATOR KA

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
TO	TO						
	Average	4.53		Average	15.9		

TEST LOCATION Kiln A Combustion Exhaust

RUN NUMBER KAC-R2 LEAK TEST? — DATE 7/29 OPERATOR KA

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
TO	TO						
	Average	5.62		Average	14.7		

TEST LOCATION

RUN NUMBER LEAK TEST? DATE OPERATOR

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
TO	TO						
	Average			Average			

ORSAT FIELD DATA

JOB NAME Johnson City Brick JOB NUMBER 92-655 W/A 14

FUEL TYPE Coal w/ 20% NCG

TEST LOCATION Kiln Exhaust Stack (Run 3)

RUN NUMBER KAC-R3-0010 LEAK TEST? ✓ DATE 7/30 OPERATOR CF

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	%O_2 B-A	%CO C-B	%N_2 100-C
TO	TO						
			~~10.1~~				
	Average	9.6 ~~10.1~~		Average	10.1		

TEST LOCATION

RUN NUMBER LEAK TEST? DATE OPERATOR

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	%O_2 B-A	%CO C-B	%N_2 100-C
TO	TO						
	Average			Average			

TEST LOCATION

RUN NUMBER LEAK TEST? DATE OPERATOR

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	%O_2 B-A	%CO C-B	%N_2 100-C
TO	TO						
	Average			Average			

APPENDIX D.3.0

KILN COMBUSTION EXHAUST STACK
LABORATORY DATA APPENDICES

APPENDIX D.3.1

GRAVIMETRIC LABORATORY DATA FOR
THE KILN COMBUSTION EXHAUST STACK

E T S , I N C .

F I E L D   S A M P L E   L O G

Contract No. 92-655WA
Job I.D.
Test Method 201A/202

Print Date 08/02/93   Time 11:54:50
Page 1

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00200	F1	92-0008	KCE-1A2-R1	FIBERGLASS FILTER			pjb	08/02/93	
00201	F2		KCE-1A2-R1	>PM10 ACETONE RINSE			pjb	08/02/93	
00202	F3		KCE-1A2-R1	<=PM10 ACETONE RINSE			pjb	08/02/93	
00203	F4		KCE-1A2-R1	IMPINGER CONTENTS			pjb	08/02/93	
00204	F5		KCE-1A2-R1	IMP CONT EXTRA STORE			pjb	08/02/93	
00205	F6		KCE-1A2-R1	BACK HALF MeCL2			pjb	08/02/93	
00206	F7		KCE-1A2-R1	SILICA GEL			pjb	08/02/93	
00207	F1	92-0009	KCE-1A2-R2	FIBERGLASS FILTER			pjb	08/02/93	
00208	F2		KCE-1A2-R2	>PM10 ACETONE RINSE			pjb	08/02/93	
00209	F3		KCE-1A2-R2	<=PM10 ACETONE RINSE			pjb	08/02/93	
00210	F4		KCE-1A2-R2	IMPINGER CONTENTS			pjb	08/02/93	
00211	F5		KCE-1A2-R2	IMP CONT EXTRA STORE			pjb	08/02/93	
00212	F6		KCE-1A2-R2	BACK HALF MeCL2			pjb	08/02/93	
00213	F7		KCE-1A2-R2	SILICA GEL			pjb	08/02/93	
00214	F1	92-0144	KCE-1A2-R3	FIBERGLASS FILTER			pjb	08/02/93	
00215	F2		KCE-1A2-R3	>PM10 ACETONE RINSE			pjb	08/02/93	
00216	F3		KCE-1A2-R3	<=PM10 ACETONE RINSE			pjb	08/02/93	
00217	F4		KCE-1A2-R3	IMPINGER CONTENTS			pjb	08/02/93	
00218	F5		KCE-1A2-R3	IMP CONT EXTRA STORE			pjb	08/02/93	
00219	F6		KCE-1A2-R3	BACK HALF MeCL2			pjb	08/02/93	
00220	F7		KCE-1A2-R3	SILICA GEL			pjb	08/02/93	
00221	F1	92-0145	KCE-1A2-R0	FIBERGLASS FILTER			pjb	08/02/93	blank
00222	F2		KCE-1A2-R0	>PM10 ACETONE RINSE			pjb	08/02/93	blank
00223	F3		KCE-1A2-R0	<=PM10 ACETONE RINSE			pjb	08/02/93	blank

E T S , I N C .

F I E L D   S A M P L E   L O G

Contract No. 92-655WA
Job I.D.
Test Method 201A/202

Print Date 08/02/93

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00224	F4		KCE-1A2-RO	IMPINGER CONTENTS			pjb	08/02/93	blank
00225	F5		KCE-1A2-RO	IMP CONT EXTRA STORE			pjb	08/02/93	blank
00226	F6		KCE-1A2-RO	BACK HALF MeCL2			pjb	08/02/93	blank
00227	F7		KCE-1A2-RO	SILICA GEL			pjb	08/02/93	blank

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Filter Weights
Filter Description: Fiberglass
Report Prepared on: 10/29/93

Filter Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
92-0144					0.39921
	03/24/92	13:57	0.39924	TLP	
	03/26/92	13:17	0.39921	TLP	
92-0145					0.39883
	03/24/92	13:58	0.39887	TLP	
	03/26/92	13:40	0.39883	TLP	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Filter Weights
Filter Description: Fiberglass

Report Prepared on: 10/29/93 Page 1

Filter Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
92-0008					0.41468
	03/16/92	12:01	0.41442	TLP	
	03/18/92	15.24	0.41468	tlp	
92-0009					0.40990
	03/16/92	12:03	0.40957	TLP	
	03/18/92	15:21	0.40990	TLP	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Beaker Weights

Report Prepared on: 11/01/93

Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
07/07/93-013	07/18/93	11:30	67.28980	PJB	67.28950
	07/20/93	08:28	67.28950	PJB	
07/07/93-014	07/18/93	10:40	65.00610	PJB	65.00620
	07/20/93	08:29	65.00620	PJB	
07/07/93-015	07/18/93	10:31	64.95150	pjb	64.95180
	07/20/93	08:30	64.95180	pjb	
07/07/93-016	07/18/93	10:15	66.14850	pjb	66.14820
	07/20/93	08:31	66.14820	pjb	
07/07/93-017	07/18/93	11:20	68.14960	pjb	68.14970
	07/20/93	08:32	68.14970	pjb	
07/07/93-018	07/19/93	15:04	67.64630	TGW	67.64640
	07/20/93	15:10	67.64640	TGW	
07/07/93-019	07/18/93	11:12	64.61520	tgw	64.61510
	07/20/93	15:16	64.61510	TGW	
07/07/93-020	07/19/93	15:12	67.83120	TGW	67.83080
	07/20/93	15:17	67.83080	TGW	
07/07/93-021	07/18/93	11:14	64.49130	pjb	64.49090
	07/20/93	08:34	64.49090	tgw	
07/07/93-022	07/19/93	15:12	66.86780	TGW	66.86770
	07/20/93	15:19	66.86770	TGW	
07/07/93-023	07/19/93	15:13	64.00530	TGW	64.00410
	07/20/93	08:19	64.00440	TGW	
	07/20/93	16:11	64.00410	WLL	
07/07/93-024	07/19/93	15:14	67.69920	TGW	67.69890
	07/20/93	15:19	67.69890	TGW	
07/07/93-025	07/19/93	15:14	67.08480	TGW	67.08520
	07/20/93	15:20	67.08520	TGW	
07/07/93-026	07/19/93	15:15	64.71440	TGW	64.71440
	07/20/93	15:21	64.71440	TGW	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Beaker Weights

Report Prepared on: 11/01/93

Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
07/07/93-027	07/19/93	15:15	64.90910	TGW	64.90890
	07/20/93	15:21	64.90890	TGW	
07/07/93-028	07/19/93	15:25	64.46020	TGW	64.45970
	07/20/93	15:33	64.45970	TGW	
07/07/93-029	07/19/93	15:25	65.12580	TGW	65.12590
	07/20/93	15:34	65.12590	TGW	
07/07/93-030	07/19/93	15:29	65.18230	TGW	65.18190
	07/20/93	15:35	65.18190	TGW	
07/07/93-031	07/19/93	15:30	64.54770	TGW	64.54770
	07/20/93	15:35	64.54770	TGW	
07/07/93-032	07/19/93	15:30	66.88850	TGW	66.88820
	07/20/93	15:36	66.88820	TGW	
07/07/93-033	07/19/93	15:30	64.25760	TGW	64.25800
	07/20/93	15:36	64.25800	TGW	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Beaker Weights

Report Prepared on: 10/29/93 Page 1

Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
07/13/93-020	07/14/93	09:45	64.20170	PJB	64.20180
	07/14/93	15:55	64.20180	PJB	
07/13/93-021	07/14/93	09:45	65.98910	PJB	65.98930
	07/14/93	15:55	65.98930	PJB	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Beaker Weights

Report Prepared on: 10/29/93

Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
07/30/93-009	07/30/93	16:03	64.59380	TGW	64.59390
	08/02/93	10:21	64.59390	TGW	
07/30/93-010	07/30/93	16:04	64.89210	TGW	64.89250
	08/02/93	10:22	64.89250	TGW	
07/30/93-011	07/30/93	16:04	66.31110	TGW	66.31110
	08/02/93	10:22	66.31110	TGW	
07/30/93-012	07/30/93	16:04	67.34300	TGW	67.34280
	08/02/93	10:23	67.34280	TGW	
07/30/93-013	07/30/93	16:04	66.83330	TGW	66.83330
	08/02/93	10:23	66.83330	TGW	
07/30/93-014	07/30/93	16:05	65.21750	TGW	65.21750
	08/02/93	10:24	65.21750	TGW	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/09/93 Page 1

Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
07/07/93-013 92-0008 92-655WA-00200 KCE-1A2-R1	67.28950 0.41468	08/04/93 08/05/93	13:51 08:09	67.92230 67.92200	TGW TGW	67.92200
07/07/93-014 92-655WA-00201 KCE-1A2-R1 105.00000 105.00000	65.00620 0.00000	08/04/93 08/05/93	13:51 08:10	65.08810 65.08770	TGW TGW	65.08770
07/07/93-015 92-655WA-00202 KCE-1A2-R1 60.00000 60.00000	64.95180 0.00000	08/04/93 08/05/93	13:52 08:11	64.96490 64.96490	TGW TGW	64.96490
07/07/93-016 92-0009 92-655WA-00207 KCE-1A2-R2	66.14820 0.40990	08/04/93 08/05/93	13:52 08:11	66.74610 66.74610	TGW TGW	66.74610
07/07/93-017 92-655WA-00208 KCE-1A2-R2 110.00000 110.00000	68.14970 0.00000	08/04/93 08/05/93	13:53 08:12	68.27060 68.27080	TGW TGW	68.27080

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/09/93

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) / Beaker / Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
07/07/93-018	67.64640	08/04/93	13:53	67.65730	TGW	67.65750
	0.00000	08/05/93	08:12	67.65750	TGW	
92-655WA-00209						
KCE-1A2-R2						
70.00000						
70.00000						
07/07/93-019	64.61510	08/04/93	13:53	65.17020	TGW	65.17200
92-0144	0.39921	08/05/93	08:13	65.17160	TGW	
92-655WA-00214		08/06/93	15:00	65.17200	TGW	
KCE-1A2-R3						
07/07/93-020	67.83080	08/04/93	13:54	67.91060	TGW	67.91070
	0.00000	08/05/93	08:13	67.91070	TGW	
92-655WA-00215						
KCE-1A2-R3						
82.00000						
82.00000						
07/07/93-021	64.49090	08/04/93	13:54	64.51030	TGW	64.51030
	0.00000	08/05/93	08:13	64.51030	TGW	
92-655WA-00216						
KCE-1A2-R3						
79.00000						
79.00000						
07/07/93-022	66.86770	08/04/93	13:55	67.26610	TGW	67.26570
92-0145	0.39883	08/05/93	08:14	67.26570	TGW	
92-655WA-00221						
KCE-1A2-RO						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/09/93 Page 3

Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
07/07/93-023	64.00410	08/04/93	13:55	64.00450	TGW	64.00420
	0.00000	08/05/93	08:14	64.00420	TGW	
92-655WA-00222						
KCE-1A2-RO						
110.00000						
110.00000						
07/07/93-024	67.69890	08/04/93	13:55	67.69880	TGW	67.69850
	0.00000	08/05/93	08:15	67.69850	TGW	
92-655WA-00223						
KCE-1A2-RO						
120.00000						
120.00000						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/13/93

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) / Beaker / Filter	Final Weight Data: Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
07/13/93-020	64.20180	08/12/93	11:23	64.21850	TGW	64.21900
	0.00000	08/13/93	08:57	64.21900	TGW	
92-655WA-00203						
KCE-1A2-R1						
07/13/93-021	65.98930	08/12/93	11:23	66.00340	TGW	66.00320
	0.00000	08/13/93	08:58	66.00320	TGW	
92-655WA-00204						
KCE-1A2-R1						
07/30/93-012	67.34280	08/12/93	11:27	67.35690	TGW	67.35700
	0.00000	08/13/93	09:03	67.35700	TGW	
92-655WA-00204						
KCE-1A2-R1						
07/07/93-025	67.08520	08/12/93	11:23	67.13120	TGW	67.13120
	0.00000	08/13/93	08:58	67.13120	TGW	
92-655WA-00205						
KCE-1A2-R1						
07/07/93-018	67.64640	08/04/93	13:53	67.65730	TGW	67.65750
	0.00000	08/05/93	08:12	67.65750	TGW	
92-655WA-00209						
KCE-1A2-R2						
70.00000						
70.00000						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/13/93

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) Beaker / Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
07/07/93-027	64.90890	08/12/93	11:24	64.95170	TGW	64.95360
	0.00000	08/13/93	08:09	64.95320	TGW	
92-655WA-00210		08/13/93	14:35	64.95360	TGW	
KCE-1A2-R2						
07/07/93-028	64.45970	08/12/93	11:24	64.50310	TGW	64.50420
	0.00000	08/13/93	08:09	64.50420	TGW	
92-655WA-00211		08/13/93	14:36	64.50420	TGW	
KCE-1A2-R2						
07/30/93-013	66.83330	08/12/93	11:28	66.87260	TGW	66.86980
	0.00000	08/13/93	08:04	66.87000	TGW	
92-655WA-00211		08/13/93	14:38	66.86980	TGW	
KCE-1A2-R2						
07/07/93-029	65.12590	08/12/93	11:25	65.14530	TGW	65.14510
	0.00000	08/13/93	08:59	65.14510	TGW	
92-655WA-00212						
KCE-1A2-R2						
07/07/93-020	67.83080	08/04/93	13:54	67.91060	TGW	67.91070
	0.00000	08/05/93	08:13	67.91070	TGW	
92-655WA-00215						
KCE-1A2-R3						
82.00000						
82.00000						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/13/93

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) / Beaker / Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
07/07/93-021	64.49090	08/04/93	13:54	64.51030	TGW	64.51030
	0.00000	08/05/93	08:13	64.51030	TGW	
92-655WA-00216						
KCE-1A2-R3						
79.00000						
79.00000						
07/07/93-031	64.54770	08/12/93	11:25	64.56770	TGW	64.56810
	0.00000	08/13/93	08:00	64.56860	TGW	
92-655WA-00217		08/13/93	14:37	64.56810	TGW	
KCE-1A2-R3						
07/07/93-032	66.88820	08/12/93	11:25	66.90770	TGW	66.90780
	0.00000	08/13/93	09:01	66.90780	TGW	
92-655WA-00218						
KCE-1A2-R3						
07/30/93-014	65.21750	08/12/93	11:28	65.24170	TGW	65.24200
	0.00000	08/13/93	08:04	65.24230	TGW	
92-655WA-00218		08/13/93	14:38	65.24200	TGW	
KCE-1A2-R3						
07/07/93-033	64.25800	08/12/93	11:26	64.28510	TGW	64.28480
	0.00000	08/13/93	09:01	64.28480	TGW	
92-655WA-00219						
KCE-1A2-R3						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/13/93

Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
07/07/93-022 92-0145 92-655WA-00221 KCE-1A2-RO	66.86770 0.39883	08/04/93 08/05/93	13:55 08:14	67.26610 67.26570	TGW TGW	67.26570
07/07/93-023 92-655WA-00222 KCE-1A2-RO 110.00000 110.00000	64.00410 0.00000	08/04/93 08/05/93	13:55 08:14	64.00450 64.00420	TGW TGW	64.00420
07/07/93-024 92-655WA-00223 KCE-1A2-RO 120.00000 120.00000	67.69890 0.00000	08/04/93 08/05/93	13:55 08:15	67.69880 67.69850	TGW TGW	67.69850
07/30/93-009 92-655WA-00224 KCE-1A2-RO	64.59390 0.00000	08/12/93 08/13/93	11:26 09:02	64.60980 64.60970	TGW TGW	64.60970
07/30/93-010 92-655WA-00225 KCE-1A2-RO	64.89250 0.00000	08/12/93 08/13/93	11:27 09:02	64.90620 64.90660	TGW TGW	64.90660

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/13/93

Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
07/30/93-011	66.31110	08/12/93	11:27	66.33990	TGW	66.34010
	0.00000	08/13/93	09:03	66.34010	TGW	
92-655WA-00226						
KCE-1A2-R0						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Silica Gel Weights

Report Prepared on: 08/03/93

Sample Number	Tare Weight (g)	Final Weight (g)	Description
92-655WA-00206	200.0000	212.2600	tan/light purple
92-655WA-00213	200.0000	208.8400	light purple/pink
92-655WA-00220	200.0000	215.3700	pink/light purple
92-655WA-00227	200.0000	199.9800	blue

E T S , I N C .

F I E L D   S A M P L E   L O G

Contract No. 92-655WA
Job I.D.
Test Method M29

Print Date 08/02/93   Time 11:47:34
Page 1

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00700	F1	Q10/15/92-0037	KCE-M29-R1	Quartz Filter			pjb	08/02/93	
00701	F2		KCE-M29-R1	FH Acetone Rinse			pjb	08/02/93	
00702	F3		KCE-M29-R1	FH Nitric Rinse			pjb	08/02/93	
00703	F4A		KCE-M29-R1	Imp. 1-3 + Rinses			pjb	08/02/93	
00704	F4B		KCE-M29-R1	Imp. 1-3 + Rinses			pjb	08/02/93	
00705	F5A		KCE-M29-R1	Imp. 4 + Rinses			pjb	08/02/93	
00706	F5B		KCE-M29-R1	IMP 5,6+RINSE (+H2O)			pjb	08/02/93	
00707	F5C		KCE-M29-R1	Water+HCl Rinse 5+6			pjb	08/02/93	
00708	F6		KCE-M29-R1	Imp. 7 Silica Gel			pjb	08/02/93	
00709	F1	Q10/15/92-0038	KCE-M29-R2	Quartz Filter			pjb	08/02/93	
00710	F2		KCE-M29-R2	FH Acetone Rinse			pjb	08/02/93	
00711	F3		KCE-M29-R2	FH Nitric Rinse			pjb	08/02/93	
00712	F4A		KCE-M29-R2	Imp. 1-3 + Rinses			pjb	08/02/93	
00713	F4B		KCE-M29-R2	Imp. 1-3 + Rinses			pjb	08/02/93	
00714	F5A		KCE-M29-R2	Imp. 4 + Rinses			pjb	08/02/93	
00715	F5B		KCE-M29-R2	IMP 5,6+RINSE (+H2O)			pjb	08/02/93	
00716	F5C		KCE-M29-R2	Water+HCl Rinse 5+6			pjb	08/02/93	
00717	F6		KCE-M29-R2	Imp. 7 Silica Gel			pjb	08/02/93	
00718	F1	Q10/15/92-0039	KCE-M29-R3	Quartz Filter			pjb	08/02/93	
00719	F2		KCE-M29-R3	FH Acetone Rinse			pjb	08/02/93	
00720	F3		KCE-M29-R3	FH Nitric Rinse			pjb	08/02/93	
00721	F4A		KCE-M29-R3	Imp. 1-3 + Rinses			pjb	08/02/93	
00722	F4B		KCE-M29-R3	Imp. 1-3 + Rinses			pjb	08/02/93	
00723	F5A		KCE-M29-R3	Imp. 4 + Rinses			pjb	08/02/93	
00724	F5B		KCE-M29-R3	IMP 5,6+RINSE (+H2O)			pjb	08/02/93	
00725	F5C		KCE-M29-R3	Water+HCl Rinse 5+6			pjb	08/02/93	
00726	F6		KCE-M29-R3	Imp. 7 Silica Gel			pjb	08/02/93	

E T S , I N C .

F I E L D   S A M P L E   L O G

Contract No. 92-655WA
Job I.D.
Test Method M29

Print Date 08/02/93

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00727	F1	Q10/15/92-0040	KCE-M29-RO	Quartz Filter			pjb	08/02/93	
00728	F2		KCE-M29-RO	FH Acetone Rinse			pjb	08/02/93	
00729	F3		KCE-M29-RO	FH Nitric Rinse			pjb	08/02/93	
00730	F4A		KCE-M29-RO	Imp. 1-3 + Rinses			pjb	08/02/93	
00731	F4B		KCE-M29-RO	Imp. 1-3 + Rinses			pjb	08/02/93	
00732	F5A		KCE-M29-RO	Imp. 4 + Rinses			pjb	08/02/93	
00733	F5B		KCE-M29-RO	IMP 5,6+RINSE (+H2O)			pjb	08/02/93	
00734	F5C		KCE-M29-RO	Water+HCl Rinse 5+6			pjb	08/02/93	
00735	F6		KCE-M29-RO	Imp. 7 Silica Gel			pjb	08/02/93	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Beaker Weights

Report Prepared on: 08/03/93 Page 1

Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
04/08/93-001	05/04/93	15:30	64.54570	TLP	64.54610
	05/07/93	11:20	64.54610	WLL	
04/08/93-002	05/04/93	15:29	67.07360	TLP	67.07370
	05/07/93	09:50	67.07370	TLP	
04/08/93-003	05/04/93	15:32	64.45080	TLP	64.45030
	05/07/93	09:51	64.45030	TLP	
04/08/93-004	05/04/93	15:33	67.94340	TLP	67.94350
	05/21/93	14:14	67.94350	PJB	
04/08/93-005	05/04/93	15:27	64.86260	TLP	64.86250
	05/06/93	14:21	64.86200	TLP	
	05/07/93	10:00	64.86250	TLP	
04/08/93-006	05/04/93	15:31	64.32930	TLP	64.32910
	05/21/93	14:16	64.32910	PJB	
04/08/93-007	05/04/93	15:25	64.69810	TLP	64.69950
	05/06/93	10:05	64.69910	TLP	
	05/14/93	15:20	64.69920	RKT	
	05/21/93	14:16	64.69950	PJB	
04/08/93-008	05/04/93	15:24	64.64180	TLP	64.64150
	05/21/93	14:18	64.64150	PJB	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Tare Filter Weights
Filter Description: Quartz

Report Prepared on: 08/03/93

Filter Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
Q10/15/92-0037					0.43440
	12/07/92	08:38	0.45120	TLP	
	12/08/92	13:42	0.44580	TLP	
	12/09/92	11:00	0.44380	TLP	
	01/22/93	11:21	0.4349	PJB	
	01/27/93	12:16	0.43440	PJB	
Q10/15/92-0038					0.44220
	12/07/92	11:00	0.44170	TLP	
	12/08/92	13:43	0.44220	TLP	
Q10/15/92-0039					0.44340
	12/07/92	08:49	0.46820	TLP	
	12/08/92	13:45	0.45960	TLP	
	12/09/92	11:00	0.45330	TLP	
	01/22/93	11:06	0.4438	PJB	
	01/27/93	12:23	0.44340	PJB	
Q10/15/92-0040					0.44830
	12/07/92	08:46	0.44530	TLP	
	12/08/92	13:47	0.44810	TLP	
	12/09/92	11:00	0.44830	TLP	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/03/93 Page 1

Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
04/08/93-001 Q10/15/92-0037 92-655WA-00700 KCE-M29-R1	64.54610 0.43440	08/03/93 08/03/93	12:05 18:20	65.52060 65.52030	PJB PJB	65.52030
04/08/93-002 92-655WA-00701 KCE-M29-R1 132.00000 132.00000	67.07370 0.00000	08/03/93 08/03/93	12:05 18:20	67.08510 67.08480	PJB PJB	67.08480
04/08/93-003 Q10/15/92-0038 92-655WA-00709 KCE-M29-R2	64.45030 0.44220	08/03/93 08/03/93	12:05 18:20	65.45640 65.45660	PJB PJB	65.45660
04/08/93-004 92-655WA-00710 KCE-M29-R2 130.00000 130.00000	67.94350 0.00000	08/03/93 08/03/93	12:05 18:21	67.95310 67.95340	PJB PJB	67.95340
04/08/93-005 Q10/15/92-0039 92-655WA-00718 KCE-M29-R3	64.86250 0.44340	08/03/93 08/03/93	12:06 18:21	65.91100 65.91150	PJB PJB	65.91150

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 92-655WA
Report Prepared on: 08/03/93

Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
04/08/93-006	64.32910	08/03/93	12:06	64.33750	PJB	64.33800
	0.00000	08/03/93	18:21	64.33800	PJB	
92-655WA-00719						
KCE-M29-R3						
120.00000						
120.00000						
04/08/93-007	64.69950	08/03/93	12:06	65.13880	PJB	65.13920
Q10/15/92-0040	0.44830	08/03/93	18:21	65.13920	PJB	
92-655WA-00727						
KCE-M29-R0						
04/08/93-008	64.64150	08/03/93	12:06	64.63960	PJB	64.63940
	0.00000	08/03/93	18:22	64.63940	PJB	
92-655WA-00728						
KCE-M29-R0						
125.00000						
125.00000						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Silica Gel Weights

Report Prepared on: 08/03/93 Page 1

Sample Number	Tare Weight (g)	Final Weight (g)	Description
92-655WA-00708	200.0000	216.5300	teal/tan
92-655WA-00717	200.0000	216.2100	orange/lt.purple
92-655WA-00726	200.0000	214.9200	pink/teal
92-655WA-00735	200.0000	200.0100	blue

APPENDIX D.3.2

EPA METHOD 29 MULTIPLE METALS LABORATORY DATA

ETS Analytical Services, Inc.

Proudly serving industry and government since 1973.

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ETS, Inc.
1401 Municipal Road N.W.
Roanoke, VA 24012
ATTN: Dr. Ted Handel

Re: Laboratory Analysis
Project #92-655 WA-14

REPORT DATE/NUMBER: September 21, 1993

SAMPLES COLLECTED BY:

ANALYSIS FOR: Metals by Inductively Coupled Plasma Emission (ICP), Graphite Furnace Atomic Absorption (GFAAS), and Cold Vapor AAS

METHOD OF ANALYSIS: Methodology for the Determination of Trace Metal Emissions in Exhaust Gasses From Stationary Combustion Processes, USEPA

INSTRUMENTAL: Bacharach CVAAS, 2000 ICP, PE Z5100 GFAAS

SAMPLE PREPARATION INFORMATION

LAB ID	RUN #	FRACTION	INIT VOL (ml)	DIG VOL ICP/AAS	FIN VOL ICP/AAS	DIG VOL CVAAS
144268	KCE-M29-R1	1A & 1B	128	128	300	1
144269	KCE-M29-R1	2A & 2B	498	398	150	10
144270	KCE-M29-R1	3A	98			10
144271	KCE-M29-R1	3B	503			10
144272	KCE-M29-R1	3C	110	110	500	10
144273	KCE-M29-R2	1A & 1B	104	104	300	1
144274	KCE-M29-R2	2A & 2B	510	410	150	10
144275	KCE-M29-R2	3A	103			10
144276	KCE-M29-R2	3B	513			10
144277	KCE-M29-R2	3C	118	118	500	10
144278	KEC-M29-R3	1A & 1B	108	108	300	1
144279	KEC-M29-R3	2A & 2B	500	400	150	10
144280	KCE-M29-R3	3A	103			10
144281	KCE-M29-R3	3B	465			10
144282	KCE-M29-R3	3C	158	158	500	10
144283	KCE-M29-R0	1A & 1B	112	112	300	10
144284	KCE-M29-R0	1A & 1B	347	247	150	10

REPORT CONTINUED ON NEXT PAGE

SAMPLE PREPARATION INFORMATION

LAB ID	RUN #	FRACTION	INIT VOL (ml)	DIG VOL ICP/AAS	FIN VOL ICP/AAS	DIG VOL CVAAS
144285	KCE-M29-R0	3A	98			10
144286	KCE-M29-R0	3B	478			10
144287	KCE-M29-R0	3C	120	120	500	10

SAMPLE ANALYSIS DATA

Lab ID: 144268 Description: Fraction 1A & 1B Train ID: KCE-M29-R1

Antimony ———— 12.40 µg, Total
└>Comments: Solution Concentration= 41.20 ug/l
Arsenic ———— 106.00 µg, Total
└>Comments: Solution Concentration= 352.40 ug/l
Beryllium ———— 12.40 µg, Total
└>Comments: Solution Concentration= 41.40 ug/l
Cadmium ———— 3.36 µg, Total
└>Comments: Solution Concentration= 11.20 ug/l
Chromium ———— 65.20 µg, Total
└>Comments: Solution Concentration= 217.30 ug/l
Lead ———— 61.80 µg, Total
└>Comments: Solution Concentration= 205.90 ug/l
Manganese ———— 34.90 µg, Total
└>Comments: Solution Concentration= 116.40 ug/l
Mercury ———— 65.40 µg, Total
└>Comments: Solution Concentration= 218.00 ug/l
Nickel ———— 136.00 µg, Total
└>Comments: Solution Concentration= 452.40 ug/l
Phosphorus ———— 452.00 µg, Total
└>Comments: Solution Concentration= 1507.50 ug/l
Selenium ———— 371.00 µg, Total
└>Comments: Solution Concentration= 1237.00 ug/l

Lab ID: 144269 Description: Fraction 2A & 2B Train ID: KCE-M29-R1

Antimony ———— 0.78 µg, Total
└>Comments: Solution Concentration= 4.16 ug/l
Arsenic ———— 2.77 µg, Total
└>Comments: Solution Concentration= 14.76 ug/l
Beryllium ———— < 0.02 µg, Total
└>Comments: Solution Concentration= <0.10 ug/l
Cadmium ———— 0.46 µg, Total
└>Comments: Solution Concentration= 2.45 ug/l
Chromium ———— 2.05 µg, Total
└>Comments: Solution Concentration= 10.94 ug/l
Lead ———— 15.80 µg, Total
└>Comments: Solution Concentration= 84.10 ug/l

REPORT CONTINUED ON NEXT PAGE

SAMPLE ANALYSIS DATA

Lab ID: 144269 (continued)

Manganese ———— 7.88 µg, Total
└>Comments: Solution Concentration= 42.00 ug/l
Mercury ———— 19.10 µg, Total
└>Comments: Solution Concentration= 38.30 ug/l
Nickel ———— 1.27 µg, Total
└>Comments: Solution Concentration= 6.75 ug/l
Phosphorus ———— < 93.80 µg, Total
└>Comments: Solution Concentration= <500.00 ug/l
Selenium ———— 0.77 µg, Total
└>Comments: Solution Concentration= 4.08 ug/l

Lab ID: 144270 Description: Fraction 3A Train ID: KCE-M29-R1

Mercury ———— < 0.20 µg, Total
└>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144271 Description: Fraction 3B Train ID: KCE-M29-R1

Mercury ———— < 1.01 µg, Total
└>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144272 Description: Fraction 3C Train ID: KCE-M29-R1

Mercury ———— < 1.00 µg, Total
└>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144273 Description: Fraction 1A & 1B Train ID: KCE-M29-R2

Antimony ———— 10.90 µg, Total
└>Comments: Solution Concentration= 36.40 ug/l
Arsenic ———— 110.00 µg, Total
└>Comments: Solution Concentration= 365.10 ug/l
Beryllium ———— 13.30 µg, Total
└>Comments: Solution Concentration= 44.20 ug/l
Cadmium ———— 2.73 µg, Total
└>Comments: Solution Concentration= 9.10 ug/l
Chromium ———— 67.40 µg, Total
└>Comments: Solution Concentration= 224.80 ug/l
Lead ———— 56.30 µg, Total
└>Comments: Solution Concentration= 187.50 ug/l
Manganese ———— 39.00 µg, Total
└>Comments: Solution Concentration= 130.10 ug/l
Mercury ———— 72.00 µg, Total
└>Comments: Solution Concentration= 240.00 ug/l
Nickel ———— 142.00 µg, Total
└>Comments: Solution Concentration= 474.70 ug/l
Phosphorus ———— 451.00 µg, Total
└>Comments: Solution Concentration= 1503.70 ug/l

REPORT CONTINUED ON NEXT PAGE

SAMPLE ANALYSIS DATA

Lab ID: 144273 (continued)
Selenium — 361.00 μg, Total
↳>Comments: Solution Concentration= 1202.00 ug/l

Lab ID: 144274 Description: Fraction 2A & 2B Train ID: KCE-M29-R2
Antimony — < 0.37 μg, Total
↳>Comments: Solution Concentration= <2.00 ug/l
Arsenic — 2.45 μg, Total
↳>Comments: Solution Concentration= 13.12 ug/l
Beryllium — < 0.02 μg, Total
↳>Comments: Solution Concentration= <0.10 ug/l
Cadmium — 0.37 μg, Total
↳>Comments: Solution Concentration= 1.96 ug/l
Chromium — 2.16 μg, Total
↳>Comments: Solution Concentration= 11.59 ug/l
Lead — 23.00 μg, Total
↳>Comments: Solution Concentration= 123.50 ug/l
Manganese — 1.85 μg, Total
↳>Comments: Solution Concentration= 9.90 ug/l
Mercury — 3.21 μg, Total
↳>Comments: Solution Concentration= 6.30 ug/l
Nickel — 1.51 μg, Total
↳>Comments: Solution Concentration= 8.08 ug/l
Phosphorus — < 93.30 μg, Total
↳>Comments: Solution Concentration= <500.00 ug/l
Selenium — < 0.37 μg, Total
↳>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144275 Description: Fraction 3A Train ID: KCE-M29-R2
Mercury — < 0.21 μg, Total
↳>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144276 Description: Fraction 3B Train ID: KCE-M29-R2
Mercury — < 1.03 μg, Total
↳>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144277 Description: Fraction 3C Train ID: KCE-M29-R2
Mercury — < 1.00 μg, Total
↳>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144278 Description: Fraction 1A & 1B Train ID: KEC-M29-R3
Antimony — 11.30 μg, Total
↳>Comments: Solution Concentration= 37.60 ug/l
Arsenic — 111.00 μg, Total
↳>Comments: Solution Concentration= 368.80 ug/l

REPORT CONTINUED ON NEXT PAGE

ETS, Inc. / #92-655 WA-14
Report of September 21, 1993
Page No. 5

SAMPLE ANALYSIS DATA

Lab ID: 144278 (continued)

Beryllium ——— 13.40 μg, Total
↳>Comments: Solution Concentration= 44.80 ug/l
Cadmium ——— 1.80 μg, Total
↳>Comments: Solution Concentration= 6.00 ug/l
Chromium ——— 73.10 μg, Total
↳>Comments: Solution Concentration= 243.50 ug/l
Lead ——— 60.60 μg, Total
↳>Comments: Solution Concentration= 202.00 ug/l
Manganese ——— 36.70 μg, Total
↳>Comments: Solution Concentration= 122.40 ug/l
Mercury ——— 80.10 μg, Total
↳>Comments: Solution Concentration= 267.00 ug/l
Nickel ——— 162.00 μg, Total
↳>Comments: Solution Concentration= 538.40 ug/l
Phosphorus ——— 471.00 μg, Total
↳>Comments: Solution Concentration= 1571.60 ug/l
Selenium ——— 417.00 μg, Total
↳>Comments: Solution Concentration= 1390.00 ug/l

Lab ID: 144279 Description: Fraction 2A & 2B Train ID: KEC-M29-R3

Antimony ——— 0.56 μg, Total
↳>Comments: Solution Concentration= 2.99 ug/l
Arsenic ——— 2.05 μg, Total
↳>Comments: Solution Concentration= 10.92 ug/l
Beryllium ——— < 0.02 μg, Total
↳>Comments: Solution Concentration= <0.10 ug/l
Cadmium ——— 0.10 μg, Total
↳>Comments: Solution Concentration= 0.54 ug/l
Chromium ——— 1.85 μg, Total
↳>Comments: Solution Concentration= 9.88 ug/l
Lead ——— 2.74 μg, Total
↳>Comments: Solution Concentration= 14.60 ug/l
Manganese ——— 3.30 μg, Total
↳>Comments: Solution Concentration= 17.60 ug/l
Mercury ——— 2.00 μg, Total
↳>Comments: Solution Concentration= 4.00 ug/l
Nickel ——— 0.95 μg, Total
↳>Comments: Solution Concentration= 5.09 ug/l
Phosphorus ——— < 93.80 μg, Total
↳>Comments: Solution Concentration= <500.00 ug/l
Selenium ——— 0.78 μg, Total
↳>Comments: Solution Concentration= 4.14 ug/l

REPORT CONTINUED ON NEXT PAGE

SAMPLE ANALYSIS DATA

Lab ID: 144280 Description: Fraction 3A Train ID: KCE-M29-R3
Mercury —— < 0.21 µg, Total
L>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144281 Description: Fraction 3B Train ID: KCE-M29-R3
Mercury —— < 0.93 µg, Total
L>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144282 Description: Fraction 3C Train ID: KCE-M29-R3
Mercury —— < 1.00 µg, Total
L>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144283 Description: Fraction 1A & 1B Train ID: KCE-M29-R0
Antimony —— < 0.60 µg, Total
L>Comments: Solution Concentration= <2.00 ug/l
Arsenic —— < 0.30 µg, Total
L>Comments: Solution Concentration= <1.00 ug/l
Beryllium —— < 0.03 µg, Total
L>Comments: Solution Concentration= <0.10 ug/l
Cadmium —— 0.09 µg, Total
L>Comments: Solution Concentration= 0.31 ug/l
Chromium —— 4.20 µg, Total
L>Comments: Solution Concentration= 14.00 ug/l
Lead —— 1.06 µg, Total
L>Comments: Solution Concentration= 3.52 ug/l
Manganese —— 1.41 µg, Total
L>Comments: Solution Concentration= 4.70 ug/l
Mercury —— < 0.60 µg, Total
L>Comments: Solution Concentration= <2.00 ug/l
Nickel —— 2.72 µg, Total
L>Comments: Solution Concentration= 9.07 ug/l
Phosphorus —— < 150.00 µg, Total
L>Comments: Solution Concentration= <500.00 ug/l
Selenium —— < 0.60 µg, Total
L>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144284 Description: Fraction 1A & 1B Train ID: KCE-M29-R0
Antimony —— < 0.42 µg, Total
L>Comments: Solution Concentration= <2.00 ug/l
Arsenic —— < 0.21 µg, Total
L>Comments: Solution Concentration= <1.00 ug/l
Beryllium —— < 0.02 µg, Total
L>Comments: Solution Concentration= <0.10 ug/l
Cadmium —— 0.05 µg, Total
L>Comments: Solution Concentration= 0.22 ug/l
Chromium —— 1.23 µg, Total
L>Comments: Solution Concentration= 5.82 ug/l

REPORT CONTINUED ON NEXT PAGE

SAMPLE ANALYSIS DATA

Lab ID: 144284 (continued)

Lead —— < 0.21 µg, Total
└>Comments: Solution Concentration= <1.00 ug/l

Manganese —— 0.59 µg, Total
└>Comments: Solution Concentration= 2.80 ug/l

Mercury —— < 0.60 µg, Total
└>Comments: Solution Concentration= <2.00 ug/l

Nickel —— 1.16 µg, Total
└>Comments: Solution Concentration= 5.51 ug/l

Phosphorus —— < 105.00 µg, Total
└>Comments: Solution Concentration= <500.00 ug/l

Selenium —— < 0.42 µg, Total
└>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144285 Description: Fraction 3A Train ID: KCE-M29-R0

Mercury —— < 0.20 µg, Total
└>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144286 Description: Fraction 3B Train ID: KCE-M29-R0

Mercury —— < 0.96 µg, Total
└>Comments: Solution Concentration= <2.00 ug/l

Lab ID: 144287 Description: Fraction 3C Train ID: KCE-M29-R0

Mercury —— < 1.00 µg, Total
└>Comments: Solution Concentration= <2.00 ug/l

If we may be of further assistance, please contact us at any time.

Sincerely,
ETS ANALYTICAL SERVICES

Susanne H. Deegan

Susanne H. Deegan
AS Department Manager

QUALITY ASSURANCE SUMMARY

CALIBRATION

ANALYTE	UNITS	TRUE	FOUND	% REC	QAO
Antimony (Sb)	ug/l	1024.0	998.00	97.5	85% to 115% REC
Arsenic (As)	ug/l	50.90	50.60	99.4	85% to 115% REC
Beryllium (Be)	ug/l	478.00	471.90	98.7	85% to 115% REC
Cadmium (Cd)	ug/l	493.00	476.90	96.7	85% to 115% REC
Cadmium (Cd)	ug/l	493.00	504.10	102.3	85% to 115% REC
Cadmium (Cd)	ug/l	100.90	102.80	101.9	85% to 115% REC
Chromium(Cr)	ug/l	480.00	473.40	98.6	85% to 115% REC
Chromium(Cr)	ug/l	480.00	510.60	106.4	85% to 115% REC
Lead (Pb)	ug/l	4739.0	5058.4	106.7	85% to 115% REC
Lead (Pb)	ug/l	98.40	101.80	103.5	85% to 115% REC
Manganese(Mn)	ug/l	474.00	450.10	95.0	85% to 115% REC
Mercury(Hg)	ug/l	5.00	5.30	106.0	85% to 115% REC
Mercury(Hg)	ug/l	5.00	5.00	100.0	85% to 115% REC
Nickel (Ni)	ug/l	488.00	505.60	103.6	85% to 115% REC
Nickel (Ni)	ug/l	488.00	499.60	102.4	85% to 115% REC
Phosphorus (P)	ug/l	2500.0	2475.1	99.0	85% to 115% REC
Selenium (Se)	ug/l	50.70	50.50	99.7	85% to 115% REC
Selenium (Se)	ug/l	50.70	50.40	99.4	85% to 115% REC
Selenium (Se)	ug/l	50.70	51.20	101.0	85% to 115% REC

DUPLICATES

LAB ID	ANALYTE	SAMPLE	DUPLICATE	UNITS	RPD	QAO
144268	Antimony	12.36	11.78	µg, Total	4.8	<26 RPD or 2X IDL
144268	Arsenic	105.72	107.46	µg, Total	1.6	<26 RPD or 2X IDL
144268	Beryllium	12.42	12.21	µg, Total	1.7	<26 RPD or 2X IDL
144268	Cadmium	3.36	3.33	µg, Total	0.9	<26 RPD or 2X IDL
144268	Chromium	65.19	60.39	µg, Total	7.6	<26 RPD or 2X IDL
144268	Lead	61.77	62.94	µg, Total	1.9	<26 RPD or 2X IDL
144268	Manganese	34.92	34.65	µg, Total	0.8	<26 RPD or 2X IDL
144268	Mercury	65.40	65.10	µg, Total	0.5	<26 RPD or 2X IDL
144268	Nickel	135.72	141.66	µg, Total	4.3	<26 RPD or 2X IDL
144268	Phosphorus	452.25	397.86	µg, Total	12.8	<26 RPD or 2X IDL
144268	Selenium	371.10	364.20	µg, Total	1.9	<26 RPD or 2X IDL
144269	Antimony	0.78	0.68	µg, Total	13.3	<26 RPD or 2X IDL

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QUALITY ASSURANCE SUMMARY
Continued

DUPLICATES

LAB ID	ANALYTE	SAMPLE	DUPLICATE	UNITS	RPD	QAO
144269	Arsenic	2.77	2.66	µg, Total	4.2	<26 RPD or 2X IDL
144269	Beryllium	<0.02	<0.02	µg, Total	NC	<26 RPD or 2X IDL
144269	Cadmium	0.46	0.46	µg, Total	0.8	<26 RPD or 2X IDL
144269	Chromium	2.05	2.27	µg, Total	10.2	<26 RPD or 2X IDL
144269	Lead	15.78	18.77	µg, Total	17.3	<26 RPD or 2X IDL
144269	Manganese	7.88	8.54	µg, Total	8.0	<26 RPD or 2X IDL
144269	Mercury	19.07	19.17	µg, Total	0.5	<26 RPD or 2X IDL
144269	Nickel	1.27	1.44	µg, Total	12.6	<26 RPD or 2X IDL
144269	Phosphorus	<93.84	<93.84	µg, Total	0.0	<26 RPD or 2X IDL
144269	Selenium	0.77	<0.38	µg, Total	NC	<26 RPD or 2X IDL
144270	Mercury	<0.20	<0.20	µg, Total	NC	<26 RPD or 2X IDL
144271	Mercury	<1.01	<1.01	µg, Total	NC	<26 RPD or 2X IDL
144272	Mercury	<1.00	<1.00	µg, Total	NC	<26 RPD or 2X IDL
144273	Antimony	10.92	10.88	µg, Total	0.4	<26 RPD or 2X IDL
144273	Arsenic	109.53	110.64	µg, Total	1.0	<26 RPD or 2X IDL
144273	Mercury	72.00	72.60	µg, Total	0.8	<26 RPD or 2X IDL
144273	Selenium	360.60	347.10	µg, Total	3.8	<26 RPD or 2X IDL
144274	Antimony	<0.37	0.39	µg, Total	NC	<26 RPD or 2X IDL
144274	Arsenic	2.45	2.41	µg, Total	1.6	<26 RPD or 2X IDL
144274	Beryllium	<0.02	<0.02	µg, Total	NC	<26 RPD or 2X IDL
144274	Cadmium	0.37	0.37	µg, Total	2.0	<26 RPD or 2X IDL
144274	Chromium	2.16	2.16	µg, Total	0.1	<26 RPD or 2X IDL
144274	Lead	23.04	23.85	µg, Total	3.4	<26 RPD or 2X IDL
144274	Mercury	3.21	3.47	µg, Total	7.6	<26 RPD or 2X IDL
144274	Nickel	1.51	1.54	µg, Total	2.0	<26 RPD or 2X IDL
144274	Selenium	<0.37	<0.37	µg, Total	NC	<26 RPD or 2X IDL
144275	Mercury	<0.21	<0.21	µg, Total	NC	<26 RPD or 2X IDL
144276	Mercury	<1.03	<1.03	µg, Total	NC	<26 RPD or 2X IDL
144277	Mercury	<1.00	<1.00	µg, Total	NC	<26 RPD or 2X IDL
144278	Antimony	11.28	11.50	µg, Total	1.9	<26 RPD or 2X IDL
144278	Arsenic	110.64	111.48	µg, Total	0.8	<26 RPD or 2X IDL
144278	Mercury	80.10	78.90	µg, Total	1.5	<26 RPD or 2X IDL
144278	Selenium	417.00	401.10	µg, Total	3.9	<26 RPD or 2X IDL
144279	Antimony	0.56	0.49	µg, Total	14.0	<26 RPD or 2X IDL
144279	Arsenic	2.05	1.71	µg, Total	18.0	<26 RPD or 2X IDL
144279	Beryllium	<0.02	<0.02	µg, Total	NC	<26 RPD or 2X IDL
144279	Cadmium	0.10	0.10	µg, Total	1.9	<26 RPD or 2X IDL
144279	Chromium	1.85	1.88	µg, Total	1.4	<26 RPD or 2X IDL
144279	Lead	2.74	2.72	µg, Total	0.8	<26 RPD or 2X IDL

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QUALITY ASSURANCE SUMMARY
Continued

DUPLICATES

LAB ID	ANALYTE	SAMPLE	DUPLICATE	UNITS	RPD	QAO
144279	Mercury	2.00	<1.00	µg, Total	NC	<26 RPD or 2X IDL
144279	Nickel	0.95	0.80	µg, Total	17.8	<26 RPD or 2X IDL
144279	Selenium	0.78	<0.38	µg, Total	NC	<26 RPD or 2X IDL
144280	Mercury	<0.21	<0.21	µg, Total	NC	<26 RPD or 2X IDL
144281	Mercury	<0.93	<0.93	µg, Total	NC	<26 RPD or 2X IDL
144282	Mercury	<1.00	<1.00	µg, Total	NC	<26 RPD or 2X IDL
144283	Antimony	<0.60	<0.60	µg, Total	NC	<26 RPD or 2X IDL
144283	Arsenic	<0.30	<0.30	µg, Total	NC	<26 RPD or 2X IDL
144283	Beryllium	<0.03	<0.03	µg, Total	NC	<26 RPD or 2X IDL
144283	Cadmium	0.09	0.09	µg, Total	6.7	<26 RPD or 2X IDL
144283	Lead	1.06	1.09	µg, Total	3.1	<26 RPD or 2X IDL
144283	Mercury	<0.60	<0.60	µg, Total	NC	<26 RPD or 2X IDL
144283	Nickel	2.72	2.65	µg, Total	2.8	<26 RPD or 2X IDL
144283	Selenium	<0.60	<0.60	µg, Total	NC	<26 RPD or 2X IDL
144284	Antimony	<0.42	<0.42	µg, Total	NC	<26 RPD or 2X IDL
144284	Arsenic	<0.21	<0.21	µg, Total	NC	<26 RPD or 2X IDL
144284	Beryllium	<0.02	<0.02	µg, Total	NC	<26 RPD or 2X IDL
144284	Cadmium	0.05	0.03	µg, Total	37.8	<26 RPD or 2X IDL
144284	Chromium	1.23	1.27	µg, Total	3.9	<26 RPD or 2X IDL
144284	Lead	<0.21	<0.21	µg, Total	NC	<26 RPD or 2X IDL
144284	Mercury	<0.60	<0.60	µg, Total	NC	<26 RPD or 2X IDL
144284	Nickel	1.16	1.14	µg, Total	1.6	<26 RPD or 2X IDL
144284	Selenium	<0.42	<0.42	µg, Total	NC	<26 RPD or 2X IDL
144285	Mercury	<0.20	<0.20	µg, Total	NC	<26 RPD or 2X IDL
144286	Mercury	<0.96	<0.96	µg, Total	NC	<26 RPD or 2X IDL
144287	Mercury	<1.00	<1.00	µg, Total	NC	<26 RPD or 2X IDL

SPIKES

LAB ID	ANALYTE	SA RESULT	SPK RESULT	SPK ADD	% REC	QAO
144268	Antimony	41.20	141.65	100	100.5	75%-125%
144268	Arsenic	352.40	677.00	400	96.9	75%-125%
144268	Beryllium	41.40	93.30	50	103.8	75%-125%
144268	Cadmium	11.20	550.10	50	101.4	75%-125%
144268	Chromium	217.30	413.90	200	98.3	75%-125%

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QUALITY ASSURANCE SUMMARY
Continued

SPIKES

LAB ID	ANALYTE	SA RESULT	SPK RESULT	SPK ADD	% REC	QAO
144268	Lead	205.90	759.30	500	110.7	75%-125%
144268	Manganese	116.40	657.70	500	108.3	75%-125%
144268	Mercury	218.00	309.00	100	91.0	75%-125%
144268	Nickel	452.40	1005.60	500	110.6	75%-125%
144268	Phosphorus	1507.50	11570.80	10000	100.6	75%-125%
144268	Selenium	1237.00	2181.50	1000	94.5	75%-125%
144269	Antimony	4.16	2.99	20	-5.9	75%-125%
144269	Arsenic	14.76	33.63	20	94.4	75%-125%
144269	Beryllium	<0.10	53.50	50	106.8	75%-125%
144269	Cadmium	2.45	4.34	87	87.4	75%-125%
144269	Chromium	10.94	12.11	1	117.0	75%-125%
144269	Lead	84.10	859.50	500	85.4	75%-125%
144269	Manganese	42.00	595.20	500	110.6	75%-125%
144269	Mercury	38.30	43.00	5	94.0	75%-125%
144269	Nickel	6.75	24.90	20	90.8	75%-125%
144269	Phosphorus	<500.00	8792.10	10000	82.9	75%-125%
144269	Selenium	4.08	4.71	10	6.3	75%-125%
144270	Mercury	<2.00	9.90	10	99.0	75%-125%
144271	Mercury	<2.00	10.50	10	105.0	75%-125%
144272	Mercury	<2.00	9.70	10	97.0	75%-125%

QAO: Quality Assurance Objective; REC: Recovery; RPD: Relative Percent Difference
NC: Not Calculatable; IDL: Instrument Detection Limit

DETECTION LIMITS SUMMARY

LAB ID	ANALYTE	DET LIMIT	UNITS	INSTRUMENT DL	UNITS
144268	Antimony	0.60	µg, Total	2.00	µg/L
144268	Arsenic	0.30	µg, Total	1.00	µg/L
144268	Beryllium	0.30	µg, Total	1.00	µg/L
144268	Cadmium	1.50	µg, Total	5.00	µg/L
144268	Chromium	0.60	µg, Total	2.00	µg/L
144268	Lead	0.30	µg, Total	1.00	µg/L
144268	Manganese	0.60	µg, Total	2.00	µg/L
144268	Mercury	6.00	µg, Total	20.00	µg/L
144268	Nickel	4.80	µg, Total	16.00	µg/L
144268	Phosphorus	150.00	µg, Total	500.00	µg/L
144268	Selenium	0.60	µg, Total	2.00	µg/L
144269	Antimony	0.38	µg, Total	2.00	µg/L
144269	Arsenic	0.19	µg, Total	1.00	µg/L
144269	Beryllium	0.02	µg, Total	0.10	µg/L
144269	Cadmium	0.02	µg, Total	0.10	µg/L
144269	Chromium	0.38	µg, Total	2.00	µg/L
144269	Lead	0.19	µg, Total	1.00	µg/L
144269	Manganese	0.38	µg, Total	2.00	µg/L
144269	Mercury	1.00	µg, Total	2.00	µg/L
144269	Nickel	0.38	µg, Total	2.00	µg/L
144269	Phosphorus	93.84	µg, Total	500.00	µg/L
144269	Selenium	0.38	µg, Total	2.00	µg/L
144270	Mercury	0.20	µg, Total	2.00	µg/L
144271	Mercury	1.01	µg, Total	2.00	µg/L
144272	Mercury	1.00	µg, Total	2.00	µg/L
144273	Antimony	0.60	µg, Total	2.00	µg/L
144273	Arsenic	0.30	µg, Total	1.00	µg/L
144273	Beryllium	0.30	µg, Total	1.00	µg/L
144273	Cadmium	1.50	µg, Total	5.00	µg/L
144273	Chromium	0.60	µg, Total	2.00	µg/L
144273	Lead	0.30	µg, Total	1.00	µg/L
144273	Manganese	0.60	µg, Total	2.00	µg/L
144273	Mercury	6.00	µg, Total	20.00	µg/L
144273	Nickel	4.80	µg, Total	16.00	µg/L
144273	Phosphorus	150.00	µg, Total	500.00	µg/L
144273	Selenium	0.60	µg, Total	2.00	µg/L
144274	Antimony	0.37	µg, Total	2.00	µg/L
144274	Arsenic	0.19	µg, Total	1.00	µg/L

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DETECTION LIMITS SUMMARY
Continued

LAB ID	ANALYTE	DET LIMIT	UNITS	INSTRUMENT DL	UNITS
144274	Beryllium	0.02	µg, Total	0.10	µg/L
144274	Cadmium	0.02	µg, Total	0.10	µg/L
144274	Chromium	0.37	µg, Total	2.00	µg/L
144274	Lead	0.19	µg, Total	1.00	µg/L
144274	Manganese	0.37	µg, Total	2.00	µg/L
144274	Mercury	1.02	µg, Total	2.00	µg/L
144274	Nickel	0.37	µg, Total	2.00	µg/L
144274	Phosphorus	93.29	µg, Total	500.00	µg/L
144274	Selenium	0.37	µg, Total	2.00	µg/L
144275	Mercury	0.21	µg, Total	2.00	µg/L
144276	Mercury	1.03	µg, Total	2.00	µg/L
144277	Mercury	1.00	µg, Total	2.00	µg/L
144278	Antimony	0.60	µg, Total	2.00	µg/L
144278	Arsenic	0.30	µg, Total	1.00	µg/L
144278	Beryllium	0.30	µg, Total	1.00	µg/L
144278	Cadmium	1.50	µg, Total	5.00	µg/L
144278	Chromium	0.60	µg, Total	2.00	µg/L
144278	Lead	0.30	µg, Total	1.00	µg/L
144278	Manganese	0.60	µg, Total	2.00	µg/L
144278	Mercury	6.00	µg, Total	20.00	µg/L
144278	Nickel	4.80	µg, Total	16.00	µg/L
144278	Phosphorus	150.00	µg, Total	500.00	µg/L
144278	Selenium	0.60	µg, Total	2.00	µg/L
144279	Antimony	0.38	µg, Total	2.00	µg/L
144279	Arsenic	0.19	µg, Total	1.00	µg/L
144279	Beryllium	0.02	µg, Total	0.10	µg/L
144279	Cadmium	0.02	µg, Total	0.10	µg/L
144279	Chromium	0.38	µg, Total	2.00	µg/L
144279	Lead	0.19	µg, Total	1.00	µg/L
144279	Manganese	0.38	µg, Total	2.00	µg/L
144279	Mercury	1.00	µg, Total	2.00	µg/L
144279	Nickel	0.38	µg, Total	2.00	µg/L
144279	Phosphorus	93.75	µg, Total	500.00	µg/L
144279	Selenium	0.38	µg, Total	2.00	µg/L
144280	Mercury	0.21	µg, Total	2.00	µg/L
144281	Mercury	0.93	µg, Total	2.00	µg/L
144282	Mercury	1.00	µg, Total	2.00	µg/L
144283	Antimony	0.60	µg, Total	2.00	µg/L

DL Report Continued on Next Page

DETECTION LIMITS SUMMARY
Continued

LAB ID	ANALYTE	DET LIMIT	UNITS	INSTRUMENT DL	UNITS
144283	Arsenic	0.30	µg, Total	1.00	µg/L
144283	Beryllium	0.03	µg, Total	0.10	µg/L
144283	Cadmium	0.03	µg, Total	0.10	µg/L
144283	Chromium	0.60	µg, Total	2.00	µg/L
144283	Lead	0.30	µg, Total	1.00	µg/L
144283	Manganese	0.60	µg, Total	2.00	µg/L
144283	Mercury	0.60	µg, Total	2.00	µg/L
144283	Nickel	0.60	µg, Total	2.00	µg/L
144283	Phosphorus	150.00	µg, Total	500.00	µg/L
144283	Selenium	0.60	µg, Total	2.00	µg/L
144284	Antimony	0.42	µg, Total	2.00	µg/L
144284	Arsenic	0.21	µg, Total	1.00	µg/L
144284	Beryllium	0.02	µg, Total	0.10	µg/L
144284	Cadmium	0.02	µg, Total	0.10	µg/L
144284	Chromium	0.42	µg, Total	2.00	µg/L
144284	Lead	0.21	µg, Total	1.00	µg/L
144284	Manganese	0.42	µg, Total	2.00	µg/L
144284	Mercury	0.60	µg, Total	2.00	µg/L
144284	Nickel	0.42	µg, Total	2.00	µg/L
144284	Phosphorus	105.36	µg, Total	500.00	µg/L
144284	Selenium	0.42	µg, Total	2.00	µg/L
144285	Mercury	0.20	µg, Total	2.00	µg/L
144286	Mercury	0.96	µg, Total	2.00	µg/L
144287	Mercury	1.00	µg, Total	2.00	µg/L

APPENDIX D.3.3

EPA METHOD 26 FLUORIDE LABORATORY DATA

E T S , I N C .

F I E L D S A M P L E L O G

Contract No. 92-655WA
Job I.D.
Test Method 26

Print Date 08/02/93 Time 11:38:40
Page 1

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00300	F2		KCE-M26-R1	Imps. 1-3 / Rinses			pjb	08/02/93	
00301	F3		KCE-M26-R1	Imp. 4+5 NaOH			pjb	08/02/93	
00302	F5		KCE-M26-R1	Imp. 6 Silica Gel			pjb	08/02/93	
00303	F6		KCE-M26-R1	TEDLAR BAG			pjb	08/02/93	
00304	F2A		KCE-M26-R1	EXTRA STORE IMP 1-3			pjb	08/02/93	
00305	F2		KCE-M26-R2	Imps. 1-3 / Rinses			pjb	08/02/93	
00306	F3		KCE-M26-R2	Imp. 4+5 NaOH			pjb	08/02/93	
00307	F5		KCE-M26-R2	Imp. 6 Silica Gel			pjb	08/02/93	
00308	F6		KCE-M26-R2	TEDLAR BAG			pjb	08/02/93	
00309	F2A		KCE-M26-R2	EXTRA STORE IMP 1-3			pjb	08/02/93	
00310	F2		KCE-M26-R3	Imps. 1-3 / Rinses			pjb	08/02/93	
00311	F3		KCE-M26-R3	Imp. 4+5 NaOH			pjb	08/02/93	
00312	F5		KCE-M26-R3	Imp. 6 Silica Gel			pjb	08/02/93	
00313	F6		KCE-M26-R3	TEDLAR BAG			pjb	08/02/93	
00314	F2A		KCE-M26-R3	EXTRA STORE IMP 1-3			pjb	08/02/93	
00315	F2		KCE-M26-R0	Imps. 1-3 / Rinses			pjb	08/02/93	
00316	F3		KCE-M26-R0	Imp. 4+5 NaOH			pjb	08/02/93	
00317	F5		KCE-M26-R0	Imp. 6 Silica Gel			pjb	08/02/93	
00318	F6		KCE-M26-R0	TEDLAR BAG			pjb	08/02/93	
00319	F2A		KCE-M26-R0	EXTRA STORE IMP 1-3			pjb	08/02/93	

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ETS, Inc.
1401 Municipal Road N.W.
Roanoke, VA 24012
ATTN: Dr. Ted Handel

Re: Laboratory Analysis
ETSAS Client No. 6593
Project #92-655
Johnson City Brick Plant

REPORT DATE/NUMBER: August 18, 1993 / 216

ANALYSIS FOR: Fluoride

METHOD OF ANALYSIS: USEPA Method 26

SAMPLE ANALYSIS DATA

Lab ID: 144180 Client ID: KCE-M26-R1 Matrix: AQUEOUS
Other ID: 92-655WA Collected by: CLIENT
Collection Date: 08/02/93 Time: Received at ETSAS: 08/04/93
ORGANIC ANALYTES:
Fluoride — 74.0 mg/l
>Analysis Date: 9-AUG-1993 by: GAM Run ID: 10010070
>Method: Ion Chromatography; Det Limit= 0.10 mg/l
>Comments: Rep1 = 73.80 mg/l; Rep2 = 74.20 mg/l; RPD = 0.5

Lab ID: 144181 Client ID: KCE-M26-R2 Matrix: AQUEOUS
Other ID: 92-655WA Collected by: CLIENT
Collection Date: 08/02/93 Time: Received at ETSAS: 08/04/93
Fluoride — 106 mg/l
>Analysis Date: 9-AUG-1993 by: GAM Run ID: 10010070
>Method: Ion Chromatography; Det Limit= 0.10 mg/l
>Comments: Rep1 = 106.00 mg/l; Rep2 = 106.00 mg/l; RPD = 0.0

Lab ID: 144182 Client ID: KCE-M26-R3 Matrix: AQUEOUS
Other ID: 92-655WA Collected by: CLIENT
Collection Date: 08/02/93 Time: Received at ETSAS: 08/04/93
Fluoride — 259 mg/l
>Analysis Date: 9-AUG-1993 by: GAM Run ID: 10010070
>Method: Ion Chromatography; Det Limit= 0.10 mg/l
>Comments: Rep1 = 260.00 mg/l; Rep2 = 258.00 mg/l; RPD = 0.8

Lab ID: 144183 Client ID: KCE-M26-R0 Matrix: AQUEOUS
Other ID: 92-655WA Collected by: CLIENT
Collection Date: 08/02/93 Time: Received at ETSAS: 08/04/93

REPORT CONTINUED ON NEXT PAGE

SAMPLE ANALYSIS DATA

Lab ID: 144183 (continued)
Fluoride —— < 0.10 mg/l
>Analysis Date: 9-AUG-1993 by: GAM Run ID: 10010070
>Method: Ion Chromatography; Det Limit= 0.10 mg/l
>Comments: Rep1 = <0.10 mg/l; Rep2 = <0.10 mg/l; RPD = 0.0

NOTE: Bottle volumes:	144180	KCE-M26-R1	73 mls
	144181	KCE-M26-R2	68 mls
	144182	KCE-M26-R3	80 mls
	144183	KCE-M26-R0	58 mls

Quality Assurance performed on the above data is presented on the following page(s).

If we may be of further assistance, please contact us at any time.

Sincerely,
ETS ANALYTICAL SERVICES, INC.

Chris Southworth

Chris Southworth, Project Manager

ETS, Inc.
Report of 08/18/93
Page No. 3

ETS

QUALITY ASSURANCE SUMMARY

CALIBRATION VERIFICATION

ANALYTE	UNITS	TRUE	FOUND	% REC	QAO	RUN ID
Fluoride	mg/l	1.90	1.89	99.5	75-125%	10010070
Fluoride	mg/l	1.90	1.89	99.5	75-125%	10010070
Fluoride	mg/l	2.05	2.07	101.0	75-125%	10010070
Fluoride	mg/l	2.05	2.05	100.0	75-125%	10010070
Fluoride	mg/l	2.05	2.09	102.0	75-125%	10010070

BLANKS

ANALYTE	UNITS	FOUND	TYPE	QAO	RUN ID
Fluoride	mg/l	<0.10	ICB	<0.1 ug/l	10010070
Fluoride	mg/l	<0.10	CCB1	<0.1 ug/l	10010070
Fluoride	mg/l	<0.10	CCB2	<0.1 ug/l	10010070
Fluoride	mg/l	<0.10	CCB3	<0.1 ug/l	10010070
Fluoride	mg/l	<0.10	ICB	<0.1 mg/l	10010070
Fluoride	mg/l	<0.10	CCB1	<0.1 mg/l	10010070
Fluoride	mg/l	<0.10	CCB2	<0.1 mg/l	10010070
Fluoride	mg/l	<0.10	CCB3	<0.1 mg/l	10010070

SPIKES

LAB ID	ANALYTE	SAMPLE	SPK	ADDED	% REC	QAO	RUN ID
144180	Fluoride	73.8	116.0	49.8	84.7	75-125%	10010070

QAO: Quality Assurance Objective; REC: Recovery; RPD: Relative Percent Difference
NC: Not Calculatable; DUP: Duplicate Analysis Result; SPK: Spiked Analysis Result.
For Duplicates <5X the Detection Limit (DL), ± DL shall apply for the QAO.

APPENDIX D.3.4

EPA METHOD 0030 VOC LABORATORY DATA

ETS, INC.

FIELD SAMPLE LOG

Contract No. 92-655WA
Job I.D.
Test Method VOST

Print Date 08/02/93 Time 16:22:35
Page 1

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00600	F1		KCE-VST-R1	VOST TUBE - CHARCOAL			pjb	08/02/93	
00601	F3		KCE-VST-R1	TEDLAR BAG			pjb	08/02/93	
00602	F2		KCE-VST-R1	VOST TUBE -TENAX			pjb	08/02/93	
00603	F1		KCE-VST-R1	VOST TUBE - CHARCOAL			pjb	08/02/93	analyze
00604	F3		KCE-VST-R1	TEDLAR BAG			pjb	08/02/93	
00605	F2		KCE-VST-R1	VOST TUBE -TENAX			pjb	08/02/93	analyze
00606	F1		KCE-VST-R1	VOST TUBE - CHARCOAL			pjb	08/02/93	
00607	F3		KCE-VST-R1	TEDLAR BAG			pjb	08/02/93	
00608	F2		KCE-VST-R1	VOST TUBE -TENAX			pjb	08/02/93	
00609	F1		KCE-VST-R1	VOST TUBE - CHARCOAL			pjb	08/02/93	
00610	F3		KCE-VST-R1	TEDLAR BAG			pjb	08/02/93	
00611	F2		KCE-VST-R1	VOST TUBE -TENAX			pjb	08/02/93	
00612	F1		KCE-VST-R1	VOST TUBE - CHARCOAL			pjb	08/02/93	
00613	F3		KCE-VST-R1	TEDLAR BAG			pjb	08/02/93	
00614	F2		KCE-VST-R1	VOST TUBE -TENAX			pjb	08/02/93	
00615	F1		KCE-VST-R1	VOST TUBE - CHARCOAL			pjb	08/02/93	
00616	F3		KCE-VST-R1	TEDLAR BAG			pjb	08/02/93	
00617	F2		KCE-VST-R1	VOST TUBE -TENAX			pjb	08/02/93	
00618	F1		KCE-VST-R2	VOST TUBE - CHARCOAL			pjb	08/02/93	
00619	F3		KCE-VST-R2	TEDLAR BAG			pjb	08/02/93	
00620	F2		KCE-VST-R2	VOST TUBE -TENAX			pjb	08/02/93	
00621	F1		KCE-VST-R2	VOST TUBE - CHARCOAL			pjb	08/02/93	
00622	F3		KCE-VST-R2	TEDLAR BAG			pjb	08/02/93	
00623	F2		KCE-VST-R2	VOST TUBE -TENAX			pjb	08/02/93	
00624	F1		KCE-VST-R2	VOST TUBE - CHARCOAL			pjb	08/02/93	

ETS, INC.

FIELD SAMPLE LOG

Contract No. 92-655WA
Job I.D.
Test Method VOST

Print Date 08/02/93
Page 2

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00625	F3		KCE-VST-R2	TEDLAR BAG			pjb	08/02/93	
00626	F2		KCE-VST-R2	VOST TUBE -TENAX			pjb	08/02/93	
00627	F1		KCE-VST-R2	VOST TUBE - CHARCOAL			pjb	08/02/93	
00628	F3		KCE-VST-R2	TEDLAR BAG			pjb	08/02/93	
00629	F2		KCE-VST-R2	VOST TUBE -TENAX			pjb	08/02/93	
00630	F1		KCE-VST-R2	VOST TUBE - CHARCOAL			pjb	08/02/93	analyze
00631	F3		KCE-VST-R2	TEDLAR BAG			pjb	08/02/93	
00632	F2		KCE-VST-R2	VOST TUBE -TENAX			pjb	08/02/93	analyze
00633	F1		KCE-VST-R2	VOST TUBE - CHARCOAL			pjb	08/02/93	
00634	F3		KCE-VST-R2	TEDLAR BAG			pjb	08/02/93	
00635	F2		KCE-VST-R2	VOST TUBE -TENAX			pjb	08/02/93	
00636	F1		KCE-VST-R3	VOST TUBE - CHARCOAL			pjb	08/02/93	
00637	F3		KCE-VST-R3	TEDLAR BAG			pjb	08/02/93	
00638	F2		KCE-VST-R3	VOST TUBE -TENAX			pjb	08/02/93	
00639	F1		KCE-VST-R3	VOST TUBE - CHARCOAL			pjb	08/02/93	
00640	F3		KCE-VST-R3	TEDLAR BAG			pjb	08/02/93	
00641	F2		KCE-VST-R3	VOST TUBE -TENAX			pjb	08/02/93	
00642	F1		KCE-VST-R3	VOST TUBE - CHARCOAL			pjb	08/02/93	
00643	F3		KCE-VST-R3	TEDLAR BAG			pjb	08/02/93	
00644	F2		KCE-VST-R3	VOST TUBE -TENAX			pjb	08/02/93	
00645	F1		KCE-VST-R3	VOST TUBE - CHARCOAL			pjb	08/02/93	
00646	F3		KCE-VST-R3	TEDLAR BAG			pjb	08/02/93	
00647	F2		KCE-VST-R3	VOST TUBE -TENAX			pjb	08/02/93	
00648	F1		KCE-VST-R3	VOST TUBE - CHARCOAL			pjb	08/02/93	
00649	F3		KCE-VST-R3	TEDLAR BAG			pjb	08/02/93	

E T S , I N C .

F I E L D   S A M P L E   L O G

Contract No. 92-655WA
Job I.D.
Test Method VOST

Print Date 08/02/93

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00650	F2		KCE-VST-R3	VOST TUBE -TENAX			pjb	08/02/93	
00651	F1		KCE-VST-R3	VOST TUBE - CHARCOAL			pjb	08/02/93	
00652	F3		KCE-VST-R3	TEDLAR BAG			pjb	08/02/93	
00653	F2		KCE-VST-R3	VOST TUBE -TENAX			pjb	08/02/93	
00654	F1		KCE-VST-R3	VOST TUBE - CHARCOAL			pjb	08/02/93	analyze
00655	F3		KCE-VST-R3	TEDLAR BAG			pjb	08/02/93	
00656	F2		KCE-VST-R3	VOST TUBE -TENAX			pjb	08/02/93	analyze
00657	F1		KCE-VST-R0	VOST TUBE - CHARCOAL			PJB	08/02/93	BLANK/ANALYZE
00658	F3		KCE-VST-R0	TEDLAR BAG			PJB	08/02/93	
00659	F2		KCE-VST-R0	VOST TUBE -TENAX			PJB	08/02/93	BLANK/ANALYZE

CASE NARRATIVE
Triangle Laboratories of RTP, Inc.
801 Capitola Drive
Durham, NC 27713
Phone: (919) 544-5729
Fax: (919) 544-5491

DATE: August 19, 1993
CLIENT P.O. NO:
TLI PROJECT NO: 24685A&B

OBJECTIVE: Analysis of seven VOST tube pairs for the Method 8240 Table 2 volatile compounds.

METHOD:

The samples were analyzed according to the guidelines of Methods 5040 and 8240. The internal standards bromochloromethane, 1,4-difluorobenzene, and chlorobenzene-d5 and the surrogate standards 1,2-dichloroethane-d4, benzene-d6, and toluene-d8 were added in the amount of 0.25 ug to the tubes immediately prior to analysis by GC/MS.

The GC/MS analysis conditions are listed below:

Purge and trap:	Tekmar LSC-2000
Purge:	17 min.
Desorb Temperature:	250 C
Desorb Time:	3 min.
GC CONDITIONS:	
Column:	30 m x .53 mm x 0.3*u* J&W DB624
Program:	0 C hold .5 min. to 45 C at 10 C/min, to 90 C at 6 C/min, hold 4 min to 200 at 27.5 C/min.
MS CONDITIONS:	
Instrument:	VG TRIO-1 Lab Base data system
Scan:	35-350 amu at .60 s/scan
Source temperature:	180 C
Interface:	Jet Separator, 200 C

REPORT:

Enclosed with the case narrative are a project summary, client chain-of-custody, TLI sample log-in sheets, instrument tracking forms and log book pages. The project summary reports the amounts of detected compounds for all samples. Estimated detection limits are reported in parentheses for non-detected compounds.

The data are reported as quantitation reports, total ion chromatograms, interim reports, and spectra of detected compounds. The quantitation report header gives the sample and calibration file names as well as the client sample name, TLI sample number, TLI project number, and the dates of analysis and report. The raw areas and retention times found on the quantitation report are from the interim report. The response factors used for the VOST tubes are the average response factors from the initial calibration. All initial and continuing calibration data are located in the back of the data package. The ISID is the internal standard identifier. Those compounds matched to chlorobenzene-d5, for example, are flagged with the ISID number 3. The amounts for the target compounds and surrogate standards are reported in total micrograms (ug). Sample calculations are shown below. If the target compound is detected, a code of 'D' is reported. If the target compound is detected but at a level below the quantitation limit or above the calibration range, a code of 'E' or estimated is reported. If the target compound is not detected, a code of 'ND' or not detected is reported. Estimated detection limits which are reported for target compounds that are not detected are calculated using an area of 20 counts. Compounds flagged with the code 'I' are internal standards.

RESULTS

Four samples were analyzed on August 11, 1993 and were calibrated against a standard five point initial calibration. These samples were 00657/00659 T/TC, 00654/00656 T/TC, 00630/00632 T/TC, and 00603/00605 T/TC. Three of these samples were found to contain several target analytes exceeding the calibration limit of one microgram. After discussion with the client, three additional samples were analyzed against an initial calibration with an extended range for chloromethane, toluene, benzene, acetone, 2-butanone, and m-/p-xylene. The upper limit for this calibration is 10 ug for acetone and 2-butanone, 5 ug for chloromethane, toluene, benzene, and m-/p-xylene, and 1 ug for all other compounds. The samples analyzed against this extended ICAL were 00600/00602 T/TC, 00633/00635 T/TC, and 00651/00653 T/TC.

As requested all tube pairs were analyzed in tandem. All samples were analyzed within the fourteen day sampling to analysis holding period.

The compounds chloromethane, acetone, 2-butanone, benzene, toluene, and m-/p-xylene were all above the calibration range in samples 00603/00605 T/TC, 00630/00632 T/TC, and 00654/00655 T/TC. These compounds are flagged with an 'E' on the report and should be considered estimates. Benzene was found to have a saturated spectrum in these three samples, and the quantitations for benzene should therefore be considered underestimates.

Although 00600/00602 T/TC was analyzed against the extended calibration, acetone still exceeded the calibration limit in this sample.

All internal standard areas and surrogate standard percent recoveries were within criteria for the matrix.

The laboratory blank VOSTBLK081193 T/TC analyzed along with the samples was found to contain the target analytes methylene chloride and toluene at levels below the quantitation limit. The laboratory blank VOST081393 T/TC was found to contain methylene chloride, chloroform, toluene, m-/p-xylene, o-xylene, and styrene at levels below the quantitation limit. Although these compounds are so low as to be considered estimates, none of these compounds should be considered native to the samples unless they are detected at levels at least five times that found in the associated blank.

TRIANGLE LABORATORIES OF RTP, INC. August 19, 1993
CASE NARRATIVE 24685

The four ketone analytes reported for the VOST samples are acetone, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone. While these compounds are Method 8240 Table 2 analytes, they are not addressed by Method 5040, and often experience erratic recoveries from VOST. All ketone results for VOST matrices should therefore be considered semi-quantitative.

SAMPLE CALCULATIONS:

$$\text{Response Factor (RF)} = \frac{\text{(area analyte) x (amt IS)}}{\text{(area IS) x (amt analyte)}}$$

$$\text{Amount in ug} = \frac{\text{(area analyte in sample) x (amt IS)}}{\text{(area IS) x (avg ical RF)}}$$

Where:

ical = initial calibration
ccal = continuing calibration
IS = internal standard
amt IS = amount of internal standard = 0.25 ug
amt analyte ical = amount of analyte in the ical = .1 to 1.0 ug

For Triangle Laboratories of RTP, Inc.,

Report Preparation:

Selena Armistead
Selena Armistead
Report Preparation Chemist

Quality Control:

Amy Wall
Amy Wall
Report Preparation Chemist

Triangle Laboratories of RTP
Project Summary for Project 24685

SA
8-20-93

Filename :	FK744	FK747	FK746	FK745	FK763	FK764	FK765
Client Id:	00657/0065	00603/00605	00630/00632	00654/00656	00600/00602	00633/00635	00651/00653
Units :	ug	ug	ug	ug	ug	ug	ug
Chloromethane	0.019	1.046	1.101	2.755	1.083	0.901	1.175
Vinyl Chloride	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Bromomethane	(0.002)	0.340	0.382	0.490	0.163	0.161	0.138
Chloroethane	(0.003)	0.139	0.128	0.207	0.083	0.089	0.105
Trichlorofluoromethane	0.019	0.148	0.003	0.344	0.058	0.071	0.308
1,1-Dichloroethene	(0.001)	0.014	0.009	0.169	0.007	0.007	0.115
Carbon disulfide	(0.001)	(0.001)	0.044	0.042	(0.001)	0.028	0.030
Acetone	(0.011)	4.329	5.197	12.964	11.932	3.237	4.361
Methylene chloride	0.299	0.370	0.048	0.199	0.070	0.059	0.065
trans-1,2-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,1-Dichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
cis-1,2-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Chloroform	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,2-Dichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Vinyl acetate	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
2-Butanone	(0.035)	3.292	4.329	2.681	2.688	1.724	1.703
1,1,1-Trichloroethane	(0.001)	(0.001)	(0.001)	0.646	(0.001)	(0.001)	0.442
Carbon tetrachloride	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Benzene	(0.001)	3.676	3.127	2.955	2.693	2.675	2.696
Trichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,2-Dichloropropane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bromodichloromethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
cis-1,3-Dichloropropene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
trans-1,3-Dichloropropene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,1,2-Trichloroethane	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Dibromochloromethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bromoform	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)

Triangle Laboratories of RTP
Project Summary for Project 24685

SA
8-26-93

Filename :	FK744	FK747	FK746	FK745	FK763	FK764	FK765
Client Id:	00657/0065	00603/00605	00630/00632	00654/00656	00600/00602	00633/00635	00651/00653
Units :	ug	ug	ug	ug	ug	ug	ug
4-Methyl-2-pentanone	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Toluene	0.015	4.746	3.415	3.024	2.333	1.809	1.522
Tetrachloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
2-Hexanone	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)	(0.009)	(0.009)
Chlorobenzene	(0.001)	0.353	0.351	0.207	0.190	0.187	0.110
Ethylbenzene	(0.001)	0.376	0.261	0.257	0.218	0.147	0.137
m-/p-Xylene	(0.001)	2.999	1.920	1.421	1.236	0.833	0.668
o-Xylene	(0.001)	0.968	0.624	0.524	0.457	0.316	0.275
Styrene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,1,2,2-Tetrachloroethane	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)

Triangle Laboratories of RTP
Project Summary for Project 24685

Filename :	FK743	FK762
Client Id:	VOSTBLK081193	VOSTBLK081393
Units :	ug	ug
Chloromethane	(0.003)	(0.003)
Vinyl Chloride	(0.002)	(0.002)
Bromomethane	(0.002)	(0.002)
Chloroethane	(0.003)	(0.003)
Trichlorofluoromethane	(0.001)	(0.001)
1,1-Dichloroethene	(0.001)	(0.001)
Carbon disulfide	(0.001)	(0.001)
Acetone	(0.010)	(0.013)
Methylene chloride	0.011	0.015
trans-1,2-Dichloroethene	(0.001)	(0.001)
1,1-Dichloroethane	(0.001)	(0.001)
cis-1,2-Dichloroethene	(0.001)	(0.001)
Chloroform	(0.001)	0.008
1,2-Dichloroethane	(0.001)	(0.001)
Vinyl acetate	(0.001)	(0.001)
2-Butanone	(0.035)	(0.045)
1,1,1-Trichloroethane	(0.001)	(0.001)
Carbon tetrachloride	(0.001)	(0.001)
Benzene	(0.001)	(0.001)
Trichloroethene	(0.001)	(0.001)
1,2-Dichloropropane	(0.001)	(0.001)
Bromodichloromethane	(0.001)	(0.001)
cis-1,3-Dichloropropene	(0.001)	(0.001)
trans-1,3-Dichloropropene	(0.001)	(0.001)
1,1,2-Trichloroethane	(0.001)	(0.002)
Dibromochloromethane	(0.001)	(0.001)
Bromoform	(0.002)	(0.002)

SA 8-26-93

Triangle Laboratories of RTP
Project Summary for Project 24685

Filename :	FK743	FK762
Client Id:	VOSTBLK081193	VOSTBLK081393
Units :	ug	ug
4-Methyl-2-pentanone	(0.004)	(0.005)
Toluene	0.004	0.004
Tetrachloroethene	(0.001)	(0.001)
2-Hexanone	(0.007)	(0.009)
Chlorobenzene	(0.001)	(0.001)
Ethylbenzene	(0.001)	(0.001)
m-/p-Xylene	(0.001)	0.006
o-Xylene	(0.001)	0.004
Styrene	(0.001)	0.009
1,1,2,2-Tetrachloroethane	(0.002)	(0.003)

SA 8-20-93

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK763
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 0C '00602 T/TC KCE-VST-R1
TLI ID: 68-178-1/2

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	2070		5.42	1		I		
Chloromethane	8212	0.915	1.41	1	1.083	E	0.05	
Vinyl Chloride	0	1.025	0.00	1	0.002	ND	0.05	
Bromomethane	1463	1.087	2.05	1	0.163	D	0.05	
Chloroethane	571	0.828	2.18	1	0.083	D	0.05	
Trichlorofluoromethane	2196	4.564	2.53	1	0.058	D	0.05	
1,1-Dichloroethene	116	2.000	3.16	1	0.007	E	0.05	
Carbon disulfide	0	7.386	0.00	1	0.001	ND	0.05	
Acetone	18582	0.188	3.35	1	11.932	E	0.05	
Methylene chloride	1032	1.789	3.76	1	0.070	D	0.05	
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	
Chloroform	0	4.743	0.00	1	0.001	ND	0.05	
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	
1,4-Difluorobenzene	11256		6.68	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	
2-Butanone	1210	0.010	5.25	2	2.688	E	0.05	
1,1,1-Trichloroethane	0	0.889	0.00	2	0.001	ND	0.05	
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	
Benzene	178701	1.474	6.13	2	2.693	E	0.05	
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	
1,1,2-Trichloroethane	0	0.262	0.00	2	0.002	ND	0.05	
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	
Bromoform	0	0.188	0.00	2	0.002	ND	0.05	
Chlorobenzene-d_5	13444		11.11	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.004	ND	0.05	
Toluene	118542	0.945	8.81	3	2.333	E	0.05	
Tetrachloroethene	0	0.440	0.00	3	0.001	ND	0.05	
2-Hexanone	0	0.047	0.00	3	0.008	ND	0.05	
Chlorobenzene	10582	1.038	11.15	3	0.190	D	0.05	
Ethylbenzene	6836	0.584	11.43	3	0.218	D	0.05	
m-/p-Xylene	53830	0.810	11.67	3	1.236	D	0.10	

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK763
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 0C 00602 T/TC KCE-VST-R1
TLI ID: 68-178-1/2

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
o-Xylene	16718	0.680	12.40	3	0.457	D	0.05	___
Styrene	0	1.063	0.00	3	0.001	ND	0.05	___
1,1,2,2-Tetrachloroethane	0	0.157	0.00	3	0.002	ND	0.05	___

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
1,2-Dichloroethane-d_4	5096	2.292	6.09	1	0.268	D	107
Benzene-d_6	20352	1.441	6.08	2	0.314	D	126
Toluene-d_8	17559	1.206	8.71	3	0.271	D	108

Reviewed by SH Date 8/19/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

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Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK747
Response File: ICALF731
Date Analyzed : 08/11/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 00 90605 T/TC KCE-VST-R1
TLI ID: 68-178-3/4

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	2293		5.43	1		I		
Chloromethane	7665	0.799	1.40	1	1.046	E	0.05	___
Vinyl Chloride	0	1.025	0.00	1	0.002	ND	0.05	___
Bromomethane	3392	1.086	2.04	1	0.340	D	0.05	___
Chloroethane	1055	0.828	2.17	1	0.139	D	0.05	___
Trichlorofluoromethane	6198	4.564	2.53	1	0.148	D	0.05	___
1,1-Dichloroethene	251	2.000	3.17	1	0.014	E	0.05	___
Carbon disulfide	0	7.386	0.00	1	0.001	ND	0.05	___
Acetone	7983	0.201	3.48	1	4.329	E	0.05	___
Methylene chloride	6077	1.789	3.77	1	0.370	D	0.05	___
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	___
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	___
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	___
Chloroform	0	4.743	0.00	1	0.001	ND	0.05	___
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	___
1,4-Difluorobenzene	11513		6.69	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	___
2-Butanone	1667	0.011	5.32	2	3.292	E	0.05	___
1,1,1-Trichloroethane	0	0.889	0.00	2	0.001	ND	0.05	___
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	___
Benzene	254434	1.503	6.14	2	3.676	E	0.05	SAT.
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	___
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	___
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	___
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	___
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	___
1,1,2-Trichloroethane	0	0.262	0.00	2	0.002	ND	0.05	___
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	___
Bromoform	0	0.188	0.00	2	0.002	ND	0.05	___
Chlorobenzene-d_5	13582		11.12	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.004	ND	0.05	___
Toluene	219679	0.852	8.83	3	4.746	E	0.05	___
Tetrachloroethene	0	0.439	0.00	3	0.001	ND	0.05	___
2-Hexanone	0	0.047	0.00	3	0.008	ND	0.05	___
Chlorobenzene	19883	1.038	11.16	3	0.353	D	0.05	___
Ethylbenzene	11921	0.584	11.44	3	0.376	D	0.05	___
m-/p-Xylene	129055	0.792	11.69	3	2.999	E	0.10	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard   Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK747
Response File: ICALF731
Date Analyzed : 08/11/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 00[illegible]00605 T/TC KCE-VST-R1
TLI ID: 68-17[illegible]4

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
o-Xylene	35760	0.680	12.41	3	0.968	D	0.05	___
Styrene	0	1.063	0.00	3	0.001	ND	0.05	___
1,1,2,2-Tetrachloroethane	0	0.157	0.00	3	0.002	ND	0.05	___

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
1,2-Dichloroethane-d_4	7334	2.292	6.11	1	0.349	D	140
Benzene-d_6	23054	1.441	6.11	2	0.347	D	139
Toluene-d_8	18255	1.206	8.72	3	0.279	D	112

Reviewed by SA Date 8/19/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK746
Response File: ICALF731
Date Analyzed : 08/11/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 00' 90632 T/TC KCE 'VST-R2
TLI ID: 68-178-21/22

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	2533		5.43	1		I		
Chloromethane	8915	0.799	1.40	1	1.101	E	0.05	
Vinyl Chloride	0	1.025	0.00	1	0.002	ND	0.05	
Bromomethane	4204	1.086	2.05	1	0.382	D	0.05	
Chloroethane	1071	0.828	2.18	1	0.128	D	0.05	
Trichlorofluoromethane	137	4.564	2.54	1	0.003	E	0.05	
1,1-Dichloroethene	186	2.000	3.17	1	0.009	E	0.05	
Carbon disulfide	3290	7.386	3.30	1	0.044	E	0.05	
Acetone	10585	0.201	3.50	1	5.197	E	0.05	
Methylene chloride	865	1.789	3.77	1	0.048	E	0.05	
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	
Chloroform	0	4.743	0.00	1	0.001	ND	0.05	
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	
1,4-Difluorobenzene	13179		6.70	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	
2-Butanone	2510	0.011	5.32	2	4.329	E	0.05	
1,1,1-Trichloroethane	0	0.889	0.00	2	0.001	ND	0.05	
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	
Benzene	247773	1.503	6.14	2	3.127	E	0.05	SAT
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	
1,1,2-Trichloroethane	0	0.262	0.00	2	0.001	ND	0.05	
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	
Bromoform	0	0.188	0.00	2	0.002	ND	0.05	
Chlorobenzene-d_5	15493		11.12	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.004	ND	0.05	
Toluene	180306	0.852	8.83	3	3.415	E	0.05	
Tetrachloroethene	0	0.439	0.00	3	0.001	ND	0.05	
2-Hexanone	0	0.047	0.00	3	0.007	ND	0.05	
Chlorobenzene	22596	1.038	11.17	3	0.351	D	0.05	
Ethylbenzene	9445	0.584	11.44	3	0.261	D	0.05	
m-/p-Xylene	94254	0.792	11.69	3	1.920	D	0.10	

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard   Orgrep v4.3

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801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK746
Response File: ICALF731
Date Analyzed : 08/11/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 00630/00632 T/TC KCE-VST-R2
TLI ID: 68-17.   22

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
o-Xylene	26288	0.680	12.41	3	0.624	D	0.05	____
Styrene	0	1.063	0.00	3	0.001	ND	0.05	____
1,1,2,2-Tetrachloroethane	0	0.157	0.00	3	0.002	ND	0.05	____

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
1,2-Dichloroethane-d_4	6909	2.292	6.12	1	0.297	D	119
Benzene-d_6	23284	1.441	6.10	2	0.307	D	123
Toluene-d_8	20417	1.206	8.73	3	0.273	D	109

Reviewed by SA Date 8/19/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK764
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 006[illegible]/00635 T/TC KCE-VST-R2
TLI ID: 68-17[illegible]3/24

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	1957		5.41	1		I		
Chloromethane	6451	0.915	1.40	1	0.901	D	0.05	
Vinyl Chloride	0	1.025	0.00	1	0.002	ND	0.05	
Bromomethane	1366	1.087	2.03	1	0.161	D	0.05	
Chloroethane	573	0.828	2.17	1	0.089	D	0.05	
Trichlorofluoromethane	2532	4.564	2.52	1	0.071	D	0.05	
1,1-Dichloroethene	114	2.000	3.16	1	0.007	E	0.05	
Carbon disulfide	1609	7.386	3.29	1	0.028	E	0.05	
Acetone	4763	0.188	3.45	1	3.237	E	0.05	
Methylene chloride	825	1.789	3.76	1	0.059	D	0.05	
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	
Chloroform	0	4.743	0.00	1	0.001	ND	0.05	
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	
1,4-Difluorobenzene	10748		6.68	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	
2-Butanone	741	0.010	5.30	2	1.724	E	0.05	
1,1,1-Trichloroethane	0	0.889	0.00	2	0.001	ND	0.05	
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	
Benzene	169550	1.474	6.12	2	2.675	E	0.05	
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	
1,1,2-Trichloroethane	0	0.262	0.00	2	0.002	ND	0.05	
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	
Bromoform	0	0.188	0.00	2	0.002	ND	0.05	
Chlorobenzene-d_5	11953		11.10	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.005	ND	0.05	
Toluene	81719	0.945	8.80	3	1.809	E	0.05	
Tetrachloroethene	0	0.440	0.00	3	0.001	ND	0.05	
2-Hexanone	0	0.047	0.00	3	0.009	ND	0.05	
Chlorobenzene	9299	1.038	11.15	3	0.187	D	0.05	
Ethylbenzene	4111	0.584	11.42	3	0.147	D	0.05	
m-/p-Xylene	32264	0.810	11.66	3	0.833	D	0.10	

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK764
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 00633/00635 T/TC KCE-VST-R2
TLI ID: 68-178 24

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
o-Xylene	10280	0.680	12.39	3	0.316	D	0.05	___
Styrene	0	1.063	0.00	3	0.001	ND	0.05	___
1,1,2,2-Tetrachloroethane	0	0.157	0.00	3	0.003	ND	0.05	___

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
1,2-Dichloroethane-d_4	4957	2.292	6.09	1	0.276	D	110
Benzene-d_6	19078	1.441	6.08	2	0.308	D	123
Toluene-d_8	15475	1.206	8.70	3	0.268	D	107

Reviewed by SA Date 8/19/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK765
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 00651/00653 T/TC KCE-VST-R3
TLI ID: 68-17 /36

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	1937		5.41	1		I		
Chloromethane	8333	0.915	1.41	1	1.175	E	0.05	
Vinyl Chloride	0	1.025	0.00	1	0.003	ND	0.05	
Bromomethane	1159	1.087	2.04	1	0.138	D	0.05	
Chloroethane	675	0.828	2.17	1	0.105	D	0.05	
Trichlorofluoromethane	10883	4.564	2.53	1	0.308	D	0.05	
1,1-Dichloroethene	1778	2.000	3.16	1	0.115	D	0.05	
Carbon disulfide	1731	7.386	3.29	1	0.030	E	0.05	
Acetone	6352	0.188	3.50	1	4.361	E	0.05	
Methylene chloride	906	1.789	3.76	1	0.065	D	0.05	
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	
Chloroform	0	4.743	0.00	1	0.001	ND	0.05	
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	
1,4-Difluorobenzene	10234		6.68	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	
2-Butanone	697	0.010	5.30	2	1.703	E	0.05	
1,1,1-Trichloroethane	16072	0.889	5.68	2	0.442	D	0.05	
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	
Benzene	162671	1.474	6.12	2	2.696	E	0.05	
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	
1,1,2-Trichloroethane	0	0.262	0.00	2	0.002	ND	0.05	
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	
Bromoform	0	0.188	0.00	2	0.003	ND	0.05	
Chlorobenzene-d_5	12029		11.09	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.005	ND	0.05	
Toluene	69201	0.945	8.80	3	1.522	E	0.05	
Tetrachloroethene	0	0.440	0.00	3	0.001	ND	0.05	
2-Hexanone	0	0.047	0.00	3	0.009	ND	0.05	
Chlorobenzene	5485	1.038	11.14	3	0.110	D	0.05	
Ethylbenzene	3861	0.584	11.42	3	0.137	D	0.05	
m-/p-Xylene	26026	0.810	11.65	3	0.668	D	0.10	

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK765
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 00[illegible]/00653 T/TC KCE-VST-R3
TLI ID: 68-17[illegible]/36

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
o-Xylene	8996	0.680	12.38	3	0.275	D	0.05	___
Styrene	0	1.063	0.00	3	0.001	ND	0.05	___
1,1,2,2-Tetrachloroethane	0	0.157	0.00	3	0.003	ND	0.05	___

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
1,2-Dichloroethane-d_4	5251	2.292	6.09	1	0.296	D	118
Benzene-d_6	18954	1.441	6.08	2	0.321	D	128
Toluene-d_8	15388	1.206	8.70	3	0.265	D	106

Reviewed by SA Date 8/19/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

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Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK745
Response File: ICALF731
Date Analyzed : 08/11/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 00 '00656 T/TC KCE-VST-R3
TLI ID: 68-178-37/38

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	2580		5.43	1		I		
Chloromethane	22723	0.799	1.41	1	2.755	E	0.05	___
Vinyl Chloride	0	1.025	0.00	1	0.002	ND	0.05	___
Bromomethane	5490	1.086	2.04	1	0.490	D	0.05	___
Chloroethane	1765	0.828	2.18	1	0.207	D	0.05	___
Trichlorofluoromethane	16189	4.564	2.53	1	0.344	D	0.05	___
1,1-Dichloroethene	3483	2.000	3.17	1	0.169	D	0.05	___
Carbon disulfide	3194	7.386	3.30	1	0.042	E	0.05	___
Acetone	26897	0.201	3.44	1	12.964	E	0.05	___
Methylene chloride	3672	1.789	3.77	1	0.199	D	0.05	___
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	___
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	___
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	___
Chloroform	0	4.743	0.00	1	0.001	ND	0.05	___
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	___
1,4-Difluorobenzene	13187		6.70	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	___
2-Butanone	1555	0.011	5.29	2	2.681	E	0.05	___
1,1,1-Trichloroethane	30284	0.889	5.70	2	0.646	D	0.05	___
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	___
Benzene	234248	1.503	6.14	2	2.955	E	0.05	SAT
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	___
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	___
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	___
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	___
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	___
1,1,2-Trichloroethane	0	0.262	0.00	2	0.001	ND	0.05	___
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	___
Bromoform	0	0.188	0.00	2	0.002	ND	0.05	___
Chlorobenzene-d_5	15722		11.12	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.004	ND	0.05	___
Toluene	162034	0.852	8.83	3	3.024	E	0.05	___
Tetrachloroethene	0	0.439	0.00	3	0.001	ND	0.05	___
2-Hexanone	0	0.047	0.00	3	0.007	ND	0.05	___
Chlorobenzene	13531	1.038	11.17	3	0.207	D	0.05	___
Ethylbenzene	9436	0.584	11.44	3	0.257	D	0.05	___
m-/p-Xylene	70768	0.792	11.69	3	1.421	D	0.10	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK745
Response File: ICALF731
Date Analyzed : 08/11/93
Date Reported : 08/19/93
Project Number: 24685

Sample ID: 00654/00656 T/TC KCE-VST-R3
TLI ID: 68-17. ./38

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
o-Xylene	22394	0.680	12.41	3	0.524	D	0.05	___
Styrene	0	1.063	0.00	3	0.001	ND	0.05	___
1,1,2,2-Tetrachloroethane	0	0.157	0.00	3	0.002	ND	0.05	___

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
1,2-Dichloroethane-d_4	6021	2.292	6.11	1	0.255	D	102
Benzene-d_6	23069	1.441	6.09	2	0.304	D	122
Toluene-d_8	21263	1.206	8.72	3	0.280	D	112

Reviewed by SA Date 8/19/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Orgrep v4.3

angle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK743
Response File: ICALF731
Date Analyzed : 08/11/93
Date Reported : 08/18/93
Project Number: 24685

Sample ID: VOSTBLK081193 T/TC
TLI ID: VOS K081193T/TC

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
o-Xylene	0	0.680	0.00	3	0.001	ND	0.05	___
Styrene	0	1.063	0.00	3	0.001	ND	0.05	___
1,1,2,2-Tetrachloroethane	0	0.157	0.00	3	0.002	ND	0.05	___

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
1,2-Dichloroethane-d_4	4649	2.292	6.09	1	0.210	D	84
Benzene-d_6	20610	1.441	6.09	2	0.274	D	110
Toluene-d_8	20295	1.206	8.71	3	0.292	D	117

Reviewed by SA Date 8/18/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK743
Response File: ICALF731
Date Analyzed : 08/11/93
Date Reported : 08/18/93
Project Number: 24685

Sample ID: VO[illegible]LK081193 T/TC
TLI ID: VOSTb[illegible]081193T/TC

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	2410		5.42	1		I		
Chloromethane	0	0.799	0.00	1	0.003	ND	0.05	___
Vinyl Chloride	0	1.025	0.00	1	0.002	ND	0.05	___
Bromomethane	0	1.086	0.00	1	0.002	ND	0.05	___
Chloroethane	0	0.828	0.00	1	0.003	ND	0.05	___
Trichlorofluoromethane	0	4.564	0.00	1	0.001	ND	0.05	___
1,1-Dichloroethene	0	2.000	0.00	1	0.001	ND	0.05	___
Carbon disulfide	0	7.386	0.00	1	0.001	ND	0.05	___
Acetone	0	0.201	0.00	1	0.010	ND	0.05	___
Methylene chloride	182	1.789	3.76	1	0.011	E	0.05	___
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	___
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	___
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	___
Chloroform	0	4.743	0.00	1	0.001	ND	0.05	___
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	___
1,4-Difluorobenzene	13056		6.69	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	___
2-Butanone	0	0.011	0.00	2	0.035	ND	0.05	___
1,1,1-Trichloroethane	0	0.889	0.00	2	0.001	ND	0.05	___
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	___
Benzene	0	1.503	0.00	2	0.001	ND	0.05	___
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	___
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	___
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	___
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	___
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	___
1,1,2-Trichloroethane	0	0.262	0.00	2	0.001	ND	0.05	___
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	___
Bromoform	0	0.188	0.00	2	0.002	ND	0.05	___
Chlorobenzene-d_5	14395		11.11	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.004	ND	0.05	___
Toluene	204	0.852	8.81	3	0.004	E	0.05	___
Tetrachloroethene	0	0.439	0.00	3	0.001	ND	0.05	___
2-Hexanone	0	0.047	0.00	3	0.007	ND	0.05	___
Chlorobenzene	0	1.038	0.00	3	0.001	ND	0.05	___
Ethylbenzene	0	0.584	0.00	3	0.001	ND	0.05	___
m-/p-Xylene	0	0.792	0.00	3	0.001	ND	0.10	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK762
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/18/93
Project Number: 24685

Sample ID: VOSTBLK081393 T/TC
TLI ID: VOS K081393T/TC

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	2065		5.40	1		I		
Chloromethane	0	0.915	0.00	1	0.003	ND	0.05	
Vinyl Chloride	0	1.025	0.00	1	0.002	ND	0.05	
Bromomethane	0	1.087	0.00	1	0.002	ND	0.05	
Chloroethane	0	0.828	0.00	1	0.003	ND	0.05	
Trichlorofluoromethane	0	4.564	0.00	1	0.001	ND	0.05	
1,1-Dichloroethene	0	2.000	0.00	1	0.001	ND	0.05	
Carbon disulfide	0	7.386	0.00	1	0.001	ND	0.05	
Acetone	0	0.188	0.00	1	0.013	ND	0.05	
Methylene chloride	228	1.789	3.75	1	0.015	E	0.05	
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	
Chloroform	331	4.743	5.55	1	0.008	E	0.05	
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	
1,4-Difluorobenzene	11175		6.67	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	
2-Butanone	0	0.010	0.00	2	0.045	ND	0.05	
1,1,1-Trichloroethane	0	0.889	0.00	2	0.001	ND	0.05	
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	
Benzene	0	1.474	0.00	2	0.001	ND	0.05	
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	
1,1,2-Trichloroethane	0	0.262	0.00	2	0.002	ND	0.05	
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	
Bromoform	0	0.188	0.00	2	0.002	ND	0.05	
Chlorobenzene-d_5	11745		11.08	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.005	ND	0.05	
Toluene	183	0.945	8.79	3	0.004	E	0.05	
Tetrachloroethene	0	0.440	0.00	3	0.001	ND	0.05	
2-Hexanone	0	0.047	0.00	3	0.009	ND	0.05	
Chlorobenzene	0	1.038	0.00	3	0.001	ND	0.05	
Ethylbenzene	0	0.584	0.00	3	0.001	ND	0.05	
m-/p-Xylene	211	0.810	11.64	3	0.006	E	0.10	

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK762
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/18/93
Project Number: 24685

Sample ID: VOSTBLK081393 T/TC
TLI ID: VOS K081393T/TC

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	2065		5.40	1		I		
Chloromethane	0	0.915	0.00	1	0.003	ND	0.05	___
Vinyl Chloride	0	1.025	0.00	1	0.002	ND	0.05	___
Bromomethane	0	1.087	0.00	1	0.002	ND	0.05	___
Chloroethane	0	0.828	0.00	1	0.003	ND	0.05	___
Trichlorofluoromethane	0	4.564	0.00	1	0.001	ND	0.05	___
1,1-Dichloroethene	0	2.000	0.00	1	0.001	ND	0.05	___
Carbon disulfide	0	7.386	0.00	1	0.001	ND	0.05	___
Acetone	0	0.188	0.00	1	0.013	ND	0.05	___
Methylene chloride	228	1.789	3.75	1	0.015	E	0.05	___
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	___
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	___
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	___
Chloroform	331	4.743	5.55	1	0.008	E	0.05	___
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	___
1,4-Difluorobenzene	11175		6.67	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	___
2-Butanone	0	0.010	0.00	2	0.045	ND	0.05	___
1,1,1-Trichloroethane	0	0.889	0.00	2	0.001	ND	0.05	___
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	___
Benzene	0	1.474	0.00	2	0.001	ND	0.05	___
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	___
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	___
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	___
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	___
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	___
1,1,2-Trichloroethane	0	0.262	0.00	2	0.002	ND	0.05	___
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	___
Bromoform	0	0.188	0.00	2	0.002	ND	0.05	___
Chlorobenzene-d_5	11745		11.08	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.005	ND	0.05	___
Toluene	183	0.945	8.79	3	0.004	E	0.05	___
Tetrachloroethene	0	0.440	0.00	3	0.001	ND	0.05	___
2-Hexanone	0	0.047	0.00	3	0.009	ND	0.05	___
Chlorobenzene	0	1.038	0.00	3	0.001	ND	0.05	___
Ethylbenzene	0	0.584	0.00	3	0.001	ND	0.05	___
m-/p-Xylene	211	0.810	11.64	3	0.006	E	0.10	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK762
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/18/93
Project Number: 24685

Sample ID: VOSTBLK081393 T/TC
TLI ID: VOS K081393T/TC

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
Bromochloromethane	2065		5.40	1		I		
Chloromethane	0	0.915	0.00	1	0.003	ND	0.05	___
Vinyl Chloride	0	1.025	0.00	1	0.002	ND	0.05	___
Bromomethane	0	1.087	0.00	1	0.002	ND	0.05	___
Chloroethane	0	0.828	0.00	1	0.003	ND	0.05	___
Trichlorofluoromethane	0	4.564	0.00	1	0.001	ND	0.05	___
1,1-Dichloroethene	0	2.000	0.00	1	0.001	ND	0.05	___
Carbon disulfide	0	7.386	0.00	1	0.001	ND	0.05	___
Acetone	0	0.188	0.00	1	0.013	ND	0.05	___
Methylene chloride	228	1.789	3.75	1	0.015	E	0.05	___
trans-1,2-Dichloroethene	0	2.138	0.00	1	0.001	ND	0.05	___
1,1-Dichloroethane	0	3.654	0.00	1	0.001	ND	0.05	___
cis-1,2-Dichloroethene	0	2.145	0.00	1	0.001	ND	0.05	___
Chloroform	331	4.743	5.55	1	0.008	E	0.05	___
1,2-Dichloroethane	0	2.457	0.00	1	0.001	ND	0.05	___
1,4-Difluorobenzene	11175		6.67	2		I		
Vinyl acetate	0	0.396	0.00	2	0.001	ND	0.05	___
2-Butanone	0	0.010	0.00	2	0.045	ND	0.05	___
1,1,1-Trichloroethane	0	0.889	0.00	2	0.001	ND	0.05	___
Carbon tetrachloride	0	0.882	0.00	2	0.001	ND	0.05	___
Benzene	0	1.474	0.00	2	0.001	ND	0.05	___
Trichloroethene	0	0.574	0.00	2	0.001	ND	0.05	___
1,2-Dichloropropane	0	0.400	0.00	2	0.001	ND	0.05	___
Bromodichloromethane	0	0.687	0.00	2	0.001	ND	0.05	___
cis-1,3-Dichloropropene	0	0.639	0.00	2	0.001	ND	0.05	___
trans-1,3-Dichloropropene	0	0.533	0.00	2	0.001	ND	0.05	___
1,1,2-Trichloroethane	0	0.262	0.00	2	0.002	ND	0.05	___
Dibromochloromethane	0	0.417	0.00	2	0.001	ND	0.05	___
Bromoform	0	0.188	0.00	2	0.002	ND	0.05	___
Chlorobenzene-d_5	11745		11.08	3		I		
4-Methyl-2-pentanone	0	0.084	0.00	3	0.005	ND	0.05	___
Toluene	183	0.945	8.79	3	0.004	E	0.05	___
Tetrachloroethene	0	0.440	0.00	3	0.001	ND	0.05	___
2-Hexanone	0	0.047	0.00	3	0.009	ND	0.05	___
Chlorobenzene	0	1.038	0.00	3	0.001	ND	0.05	___
Ethylbenzene	0	0.584	0.00	3	0.001	ND	0.05	___
m-/p-Xylene	211	0.810	11.64	3	0.006	E	0.10	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: FK762
Response File: ICALF6PT
Date Analyzed : 08/13/93
Date Reported : 08/18/93
Project Number: 24685

Sample ID: VOST3LK081393 T/TC
TLI ID: VOST K081393T/TC

Quantitation Results Method 8240

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
o-Xylene	130	0.680	12.37	3	0.004	E	0.05	___
Styrene	473	1.063	12.41	3	0.009	E	0.05	___
1,1,2,2-Tetrachloroethane	0	0.157	0.00	3	0.003	ND	0.05	___

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
1,2-Dichloroethane-d_4	4121	2.292	6.07	1	0.218	D	87
Benzene-d_6	16426	1.441	6.07	2	0.255	D	102
Toluene-d_8	16561	1.206	8.69	3	0.292	D	117

Reviewed by SA Date 8/18/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard Orgrep v4.3

APPENDIX D.3.5

EPA METHOD 0010 SVOC LABORATORY DATA

E T S , I N C .

F I E L D   S A M P L E   L O G

Contract No. 92-655WA
Job I.D.
Test Method SW-846 0010

Print Date 08/02/93   Time 10:26:25
Page 1

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00500	F1		KCE-010-R1	FILTER			pjb	08/02/93	
00501	F2		KCE-010-R1	PROBE & FH RINSE			pjb	08/02/93	
00502	F3		KCE-010-R1	XAD TRAP			pjb	08/02/93	
00503	F4		KCE-010-R1	IMP 1 CONTENTS+RINSE			pjb	08/02/93	
00504	F5		KCE-010-R1	IMP 1 & BH RINSES			pjb	08/02/93	
00505	F6		KCE-010-R1	IMP 5 SILICA GEL			pjb	08/02/93	
00506	F1		KCE-010-R2	FILTER			pjb	08/02/93	
00507	F2		KCE-010-R2	PROBE & FH RINSE			pjb	08/02/93	
00508	F3		KCE-010-R2	XAD TRAP			pjb	08/02/93	
00509	F4		KCE-010-R2	IMP 1 CONTENTS+RINSE			pjb	08/02/93	
00510	F5		KCE-010-R2	IMP 1 & BH RINSES			pjb	08/02/93	
00511	F6		KCE-010-R2	IMP 5 SILICA GEL			pjb	08/02/93	
00512	F1		KCE-010-R3	FILTER			pjb	08/02/93	
00513	F2		KCE-010-R3	PROBE & FH RINSE			pjb	08/02/93	
00514	F3		KCE-010-R3	XAD TRAP			pjb	08/02/93	
00515	F4		KCE-010-R3	IMP 1 CONTENTS+RINSE			pjb	08/02/93	
00516	F5		KCE-010-R3	IMP 1 & BH RINSES			pjb	08/02/93	
00517	F6		KCE-010-R3	IMP 5 SILICA GEL			pjb	08/02/93	
00518	F1		KCE-010-R0	FILTER			pjb	08/02/93	
00519	F2		KCE-010-R0	PROBE & FH RINSE			pjb	08/02/93	
00520	F3		KCE-010-R0	XAD TRAP			pjb	08/02/93	
00521	F4		KCE-010-R0	IMP 1 CONTENTS+RINSE			pjb	08/02/93	
00522	F5		KCE-010-R0	IMP 1 & BH RINSES			pjb	08/02/93	
00523	F6		KCE-010-R0	IMP 5 SILICA GEL			pjb	08/02/93	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Silica Gel Weights

Report Prepared on: 08/03/93

Sample Number	Tare Weight (g)	Final Weight (g)	Description
92-655WA-00505	200.0000	224.7300	light orange/teal
92-655WA-00511	200.0000	220.4400	light orange/pink
92-655WA-00517	200.0000	223.0800	light pink/purple
92-655WA-00524	200.0000	200.0300	blue

CASE NARRATIVE

Triangle Laboratories of RTP, Inc
801 Capitola Dr.
Durham, N.C. 27713
PHONE: (919) 544-5729
FAX: (919) 544-5491

DATE: August 16, 1993

CLIENT P.O. NO: 4371

TLI NO: 24684

OBJECTIVE: Analysis of four MM5 train samples for the Method 8270 Table 2 list of semivolatile compounds.

METHOD

The MM5 train sample extractions and GC/MS analyses are based on the guidelines of Method 8270. The XAD traps were prespiked with 100 micrograms of terphenyl-d_{14} prior to sampling. The XAD, filter, and rinse portions of the samples were spiked with 100 ug of surrogate standards phenol-d_5, 2,4,6-tribromophenol, and 1,4-dibromobenzene-d_4 before being Soxhlet extracted for 16 hours with methylene chloride. The impinger rinses were spiked with 100 ug of surrogate standard anthracene-d_{10}, 1,3,5-trichlorobenzene-d_3, nitrobenzene-d_5, and 2-fluorobiphenyl before being extracted with methylene chloride using a separatory funnel. The extracts were combined and brought to a volume of 1 milliliter.

The internal standards 1,4-dichlorobenzene-d_4, naphthalene-d_8, phenanthrene-d_{10}, chrysene-d_{12}, and perylene-d_{12} were added to the extracts such that the final internal standard concentration was 40 ug/mL immediately prior to analysis by GC/MS.

The GC/MS analysis conditions are listed below:

GC CONDITIONS:

Column:	J&W DB5-625, 30m x .32mm x 1u film
Program:	35 C, ramp 12C/min to 285C, hold for 2min, ramp at 8.5C/min to 315C hold for 13 min.
Carrier Gas:	Helium

MS CONDITIONS:

Instrument:	HP MSD, Chemsystem and Target data systems
Scan:	35-550 amu at 1.67s/scan
Interface:	Capillary, 250C

REPORT

Enclosed with the case narrative are the client request for analysis sheet and chain of custody, TLI chain of custody sheets, wet laboratory extraction information sheets, analyst worksheets, run logs and tracking forms. All initial and continuing calibration data is located behind the samples in the back of the data package. Please find at the rear of this case narrative a project summary. The project summary lists the amounts of the analyte detected in the samples, and the estimated detection limit in parentheses for the samples in which the analyte was not found.

The data are reported as quantitation reports, chromatograms, interim reports, and spectra of detected compounds. The quantitation report headers list the sample and calibration file names. The client sample name, TLI identification number, dilution factor, TLI project number, date of report, and analysis date are also listed in the quantitation report header. The raw responses and retention time values found on the quantitation report are from the interim report located behind the quantitation report. The response factor (RF) is from the continuing calibration. The ISID is the internal standard identifier. Those compounds matched to phenanthrene-d_{10} for example, are flagged with ISID number 4. Compounds flagged with an 'I' are internal standards. If the internal standard area is above or below quality control criteria a flag of "H" or "L" will appear in the right hand margin next to the internal standard. The quantitations for the target compounds and surrogate standards are reported in units of micrograms (ug). Some example calculations are listed below in the Sample Calculations section of the narrative. If the target compound is detected, a code of "D" is reported. If the target compound is detected but the amount is below the quantitation limit or over the calibration range, a code of "E" or estimated is reported. If the target compound is not detected, a code of "ND" is reported. The estimated detection limits reported for target compounds that are not detected are calculated using an area of 100 counts.

Immediately following the sample report are two pages which comprise the total ion chromatograms. Labeled internal and surrogate standards present in the sample have their identifications and retention time printed above their peak on the chromatograms. On the interim report a ($) is indicative of a surrogate standard and a (*) represents an internal standard. The interim report from the instrument is followed by the target spectra of the detected compounds. Four spectral plots are included for each compound: a raw spectrum of the peak, a background subtracted version of the same spectrum, a library spectrum of the compound, and a plot showing the percent difference between the library spectrum and the background subtracted spectrum. Extracted ion current profiles are plotted on the right-hand side of the page showing the quantitation mass and one or two other prominent ions known to be present in the target compound as they appear in the sample peak.

RESULTS

Please note that the sample names which appear on the quantitation report, the names used on the ETS field sample log, are not those used for the samples throughout the extraction process nor analysis of the samples. The difference is due to the necessity of keeping the parts of the train separate to allow for proper extraction of the samples.

The front and back half rinses for samples KCE-010-R1 and KCE-010-R2 became aqueous during the extraction procedure and were therefore added and extracted with the impinger water portion of the sample train.

Triangle Laboratories of RTP
Case Narrative

August 16, 1993
24684

RESULTS

Per the client's request dilutions were performed on the samples in order for the target analytes to be within the calibration range of the instrument. For all the samples please find both an undiluted analysis and a diluted analysis. All detected target analytes were within the calibration range in the diluted analyses of the samples, although a few low level analytes wre lost in the dilution.

All internal standard areas and surrogate standard percent recoveries were within Method 8270 criteria for the samples and method blank with the following exceptions: surrogate standard 2,4,6-tribromophenol was extremely low in samples KCE-010-R1 (undiluted), KCE-010-R0 (1:2), KCE-010-R2 (1:2), KCE-010-R3 (1:4), SBLK 080593, and was not detected at all in sample KCE-010-R1 (1:4).

The method blank, SBLK 072393, was found to contain naphthalene at a level below the quantitation limit and di-n-butylphthalate and bis(2-Ethylhexyl)phthalate within the calibration range. Naphthalene is a common XAD contaminate and although estimated should not be considered as native to the samples unless found at a level at least five times that of the associated blank.

All holding times from sampling to extraction and extraction to analysis were met.

SAMPLE CALCULATIONS:

Response Factor, RF:

$$RF = \frac{(\text{Area X x Amount Int Std})}{(\text{Area Int Std x Amount X})}$$

Amount in samples:

$$\text{Amount, ug} = \frac{(\text{Area X x Amt Int Std x DF})}{(\text{Area Int Std x RF X})}$$

where:
X = Analyte
Int Std = internal standard
Amt Int Std = amount of internal standard = 40 ug
RF X = response factor of X from continuing calibration
DF = dilution factor

For Triangle Laboratories, Inc.,

Report Generation

Amy Wall

Amy Wall
Report Preparation Chemist

Quality Control

Nancy Bragg

Nancy Bragg
Air Quality Senior Project Manager

Triangle Laboratories of RTP
Project Summary for Project 24684

Filename :	ZD926	ZD930	ZD929	ZD935	ZD928
Client Id:	KCE-010-R0	KCE-010-R0 (1:2)	KCE-010-R1	KCE-010-R1 (1.4)	KCE-010-R2
Units :	ug	ug	ug	ug	ug
Phenol	6.46	(3.96)	(2.23)	(5.57)	66.05
bis(2-Chloroethyl)ether	(2.69)	(5.28)	(2.98)	(7.44)	(2.65)
2-Chlorophenol	(2.11)	(4.14)	(2.33)	(5.83)	(2.08)
1,3-Dichlorobenzene	(1.97)	(3.88)	(2.19)	(5.46)	(1.95)
1,4-Dichlorobenzene	(1.96)	(3.85)	(2.17)	(5.42)	5.19
1,2-Dichlorobenzene	(2.08)	(4.08)	(2.30)	(5.75)	(2.05)
2,2'-oxybis(1-Chloropropane)	(2.33)	(4.58)	(2.58)	(6.45)	(2.30)
Benzyl alcohol	(4.25)	(8.34)	(4.70)	(11.75)	(4.19)
2-Methylphenol	(2.83)	(5.55)	(3.13)	(7.82)	(2.79)
3/4-Methylphenol	(2.73)	(5.37)	(3.03)	(7.56)	(2.70)
N-Nitroso-di-n-propylamine	(4.26)	(8.37)	(4.72)	(11.79)	(4.20)
Hexachloroethane	(4.37)	(8.58)	(4.84)	(12.09)	(4.31)
Nitrobenzene	(2.66)	(5.33)	24.11	(7.07)	(2.46)
Isophorone	(1.42)	(2.84)	137.13	70.49	(1.31)
2-Nitrophenol	(3.91)	(7.84)	(3.92)	(10.40)	(3.62)
2,4-Dimethylphenol	(2.60)	(5.20)	(2.60)	(6.90)	(2.40)
bis(2-Chloroethoxy)methane	(2.25)	(4.51)	(2.26)	(5.98)	(2.08)
Benzoic acid	25.16	17.90	635.11	277.50	236.27
2,4-Dichlorophenol	(2.91)	(5.82)	(2.91)	(7.72)	(2.68)
1,2,4-Trichlorobenzene	(2.57)	(5.16)	(2.58)	(6.84)	(2.38)
Naphthalene	50.42	50.57	76.77	45.35	26.13
4-Chloroaniline	(2.12)	(4.24)	(2.12)	(5.62)	(1.96)
Hexachlorobutadiene	(4.44)	(8.90)	(4.45)	(11.80)	(4.10)
4-Chloro-3-methylphenol	(2.92)	(5.84)	(2.92)	(7.75)	(2.69)
2-Methylnaphthalene	(1.45)	(2.90)	5.14	2.27	3.99
Hexachlorocyclopentadiene	(5.01)	(9.63)	(4.68)	(13.30)	(4.58)
2,4,6-Trichlorophenol	(4.18)	(8.04)	(3.91)	(11.11)	(3.83)
2,4,5-Trichlorophenol	(3.84)	(7.38)	(3.59)	(10.20)	(3.51)
2-Chloronaphthalene	(1.47)	(2.83)	(1.37)	(3.91)	(1.35)
2-Nitroaniline	(4.91)	(9.45)	(4.59)	(13.05)	(4.49)
Dimethylphthalate	(1.14)	(2.20)	(1.07)	(3.04)	(1.05)
2,6-Dinitrotoluene	(4.70)	(9.05)	(4.39)	(12.49)	(4.30)
2,4-Dinitrotoluene	(2.78)	(5.35)	(2.60)	(7.39)	(2.55)
Acenaphthylene	(0.85)	(1.63)	(0.79)	(2.26)	(0.78)
3-Nitroaniline	(3.63)	(6.99)	(3.39)	(9.65)	(3.32)
Acenaphthene	(1.49)	(2.87)	(1.39)	(3.97)	(1.37)
2,4-Dinitrophenol	(7.27)	(13.97)	(6.78)	(19.30)	(6.65)
4-Nitrophenol	(4.91)	(9.45)	(4.59)	(13.05)	(4.49)
Dibenzofuran	(0.99)	(1.90)	(0.92)	(2.62)	0.52

Triangle Laboratories of RTP
Project Summary for Project 24684

Filename :	ZD926	ZD930	ZD929	ZD935	ZD928
Client Id:	KCE-010-R0	KCE-010-R0	KCE-010-R1	KCE-010-R1	KCE-010-R2
Units :	ug	ug (1:2)	ug	ug (1:4)	ug
Diethylphthalate	2.40	(1.87)	6.21	(2.58)	3.50
4-Chlorophenyl-phenylether	(2.66)	(5.11)	(2.48)	(7.06)	(2.43)
Fluorene	(1.19)	(2.28)	(1.11)	(3.15)	(1.09)
4-Nitroaniline	(2.63)	(5.05)	(2.45)	(6.98)	(2.40)
4,6-Dinitro-2-methylphenol	(5.20)	(9.95)	(3.76)	(12.15)	(4.39)
N-Nitrosodiphenylamine	(1.98)	(3.79)	(1.43)	(4.63)	(1.67)
4-Bromophenyl-phenylether	(4.68)	(8.96)	(3.38)	(10.93)	(3.95)
Hexachlorobenzene	(3.58)	(6.86)	(2.59)	(8.37)	(3.02)
Pentachlorophenol	(4.40)	(8.43)	(3.18)	(10.29)	(3.72)
Phenanthrene	(0.78)	(1.49)	(0.56)	(1.82)	1.31
Anthracene	(0.83)	(1.59)	(0.60)	(1.95)	(0.70)
Di-n-butylphthalate	210.52	222.49	93.91	54.97	61.30
Fluoranthene	(0.56)	(1.07)	(0.40)	(1.31)	(0.47)
Pyrene	(0.48)	(0.78)	(0.34)	(0.94)	(0.37)
Butylbenzylphthalate	(0.86)	(1.39)	3.99	(1.68)	1.55
3,3'-Dichlorobenzidine	(1.58)	(2.55)	(1.13)	(3.09)	(1.22)
bis(2-Ethylhexyl)phthalate	103.97	100.91	23.13	10.68	260.19
Benzo(a)anthracene	(0.58)	(0.94)	(0.41)	(1.13)	(0.45)
Chrysene	(0.63)	(1.02)	(0.45)	(1.23)	(0.48)
Di-n-octylphthalate	(0.44)	(0.79)	42.99	15.96	16.78
Benzo(b)fluoranthene	(0.62)	(1.11)	(0.48)	(1.25)	(0.48)
Benzo(k)fluoranthene	(0.62)	(1.11)	(0.48)	(1.25)	(0.48)
Benzo(a)pyrene	(0.63)	(1.13)	(0.49)	(1.27)	(0.49)
Indeno(1,2,3-cd)pyrene	(0.56)	(1.00)	(0.43)	(1.13)	(0.43)
Dibenz(a,h)anthracene	(0.72)	(1.29)	(0.56)	(1.45)	(0.55)
Benzo(g,h,i)perylene	(0.66)	(1.18)	(0.51)	(1.33)	(0.51)

Filename :	ZD933	ZD927	ZD934	ZD925
Client Id:	KCE-010-R2 (1:2)	KCE-010-R3	KCE-010-R3 (1:4)	SBLK 08059
Units :	ug	ug	ug	ug
Phenol	(3.66)	83.37	(7.23)	(2.17)
bis(2-Chloroethyl)ether	(4.88)	(2.77)	(9.64)	(2.90)
2-Chlorophenol	(3.82)	(2.17)	(7.56)	(2.27)
1,3-Dichlorobenzene	(3.58)	(2.03)	(7.08)	(2.13)
1,4-Dichlorobenzene	(3.56)	6.16	(7.03)	(2.11)
1,2-Dichlorobenzene	(3.77)	(2.14)	(7.46)	(2.24)
2,2'-oxybis(1-Chloropropane)	(4.23)	(2.40)	(8.36)	(2.51)
Benzyl alcohol	(7.71)	(4.37)	(15.24)	(4.58)
2-Methylphenol	(5.13)	(2.91)	(10.14)	(3.05)
3/4-Methylphenol	(4.96)	(2.81)	(9.81)	(2.95)
N-Nitroso-di-n-propylamine	(7.73)	(4.38)	(15.29)	(4.59)
Hexachloroethane	(7.93)	(4.50)	(15.68)	(4.71)
Nitrobenzene	(4.69)	(2.66)	(9.00)	(2.78)
Isophorone	(2.50)	(1.42)	(4.80)	(1.48)
2-Nitrophenol	(6.89)	(3.91)	(13.23)	(4.09)
2,4-Dimethylphenol	(4.58)	(2.60)	(8.78)	(2.71)
bis(2-Chloroethoxy)methane	(3.96)	(2.25)	(7.60)	(2.35)
Benzoic acid	261.41	657.34	526.35	(3.78)
2,4-Dichlorophenol	(5.12)	(2.90)	(9.82)	(3.03)
1,2,4-Trichlorobenzene	(4.53)	(2.57)	(8.70)	(2.69)
Naphthalene	12.74	55.73	51.49	5.49
4-Chloroaniline	(3.73)	(2.12)	(7.15)	(2.21)
Hexachlorobutadiene	(7.82)	(4.44)	(15.01)	(4.64)
4-Chloro-3-methylphenol	(5.14)	(2.91)	(9.85)	(3.04)
2-Methylnaphthalene	1.56	3.87	3.22	(1.51)
Hexachlorocyclopentadiene	(8.93)	(4.89)	(17.23)	(5.12)
2,4,6-Trichlorophenol	(7.46)	(4.09)	(14.39)	(4.28)
2,4,5-Trichlorophenol	(6.85)	(3.75)	(13.21)	(3.93)
2-Chloronaphthalene	(2.62)	(1.44)	(5.06)	(1.50)
2-Nitroaniline	(8.76)	(4.80)	(16.90)	(5.02)
Dimethylphthalate	(2.04)	(1.12)	(3.93)	(1.17)
2,6-Dinitrotoluene	(8.39)	(4.60)	(16.18)	(4.81)
2,4-Dinitrotoluene	(4.96)	(2.72)	(9.57)	(2.85)
Acenaphthylene	(1.52)	2.79	(2.92)	(0.87)
3-Nitroaniline	(6.48)	(3.55)	(12.49)	(3.71)
Acenaphthene	(2.66)	(1.46)	(5.14)	(1.53)
2,4-Dinitrophenol	(12.95)	(7.10)	(24.99)	(7.43)
4-Nitrophenol	(8.76)	(4.80)	(16.90)	(5.02)
Dibenzofuran	(1.76)	(0.96)	(3.39)	(1.01)

()-Estimated Detection Limit

Triangle Laboratories of RTP
Project Summary for Project 24684

Filename :	ZD933	ZD927	ZD934	ZD925
Client Id:	KCE-010-R2	KCE-010-R3	KCE-010-R3	SBLK 08059
Units :	ug (1:2)	ug	ug (1:4)	ug
Diethylphthalate	(1.73)	3.42	(3.34)	(0.99)
4-Chlorophenyl-phenylether	(4.74)	(2.60)	(9.15)	(2.72)
Fluorene	(2.12)	(1.16)	(4.08)	(1.21)
4-Nitroaniline	(4.68)	(2.57)	(9.04)	(2.69)
4,6-Dinitro-2-methylphenol	(8.75)	(4.86)	(16.88)	(5.53)
N-Nitrosodiphenylamine	(3.33)	(1.85)	(6.43)	(2.11)
4-Bromophenyl-phenylether	(7.87)	(4.37)	(15.19)	(4.97)
Hexachlorobenzene	(6.03)	(3.35)	(11.63)	(3.81)
Pentachlorophenol	(7.41)	(4.11)	(14.30)	(4.68)
Phenanthrene	(1.31)	(0.73)	(2.53)	(0.83)
Anthracene	(1.40)	(0.78)	(2.70)	(0.89)
Di-n-butylphthalate	32.02	47.71	47.77	62.35
Fluoranthene	(0.94)	(0.52)	(1.82)	(0.59)
Pyrene	(0.68)	0.39	(1.30)	(0.51)
Butylbenzylphthalate	(1.22)	1.57	(2.34)	(0.92)
3,3'-Dichlorobenzidine	(2.24)	(1.29)	(4.29)	(1.69)
bis(2-Ethylhexyl)phthalate	139.40	254.71	262.00	25.40
Benzo(a)anthracene	(0.82)	(0.47)	(1.57)	(0.62)
Chrysene	(0.89)	(0.51)	(1.71)	(0.67)
Di-n-octylphthalate	(0.68)	10.19	(1.32)	(0.51)
Benzo(b)fluoranthene	(0.96)	(0.50)	(1.86)	(0.72)
Benzo(k)fluoranthene	(0.96)	(0.50)	(1.85)	(0.72)
Benzo(a)pyrene	(0.98)	(0.51)	(1.89)	(0.74)
Indeno(1,2,3-cd)pyrene	(0.86)	(0.45)	(1.67)	(0.65)
Dibenz(a,h)anthracene	(1.11)	(0.58)	(2.16)	(0.84)
Benzo(g,h,i)perylene	(1.02)	(0.53)	(1.98)	(0.77)

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August 2, 1993

Mr. Bill Hurst
Triangle Laboratories of RTP, Inc.
801 Capitola Drive
Durham, NC 27713

Dear Mr. Hurst,

Accompanying this letter are two coolers and one box of Method 0010 and 0030 sampling train components for analysis, plus six (6) extra unused XAD traps and seven (7) 0030 VOST tube sets for Triangle to keep for ETS, Inc. for use at a later date.

Each Method 0010 sampling train consists of one (1) filter, one (1) sorbent (XAD) trap, one (1) probe wash/rinse (aqueous sample) and one (1) impinger catch/rinse (aqueous sample). Each 0030 sampling train consists of six (6) sets of Tenax and Charcoal Tubes; please note only ONE set per train will be analyzed at this time, as noted on the field log. Please store the remainder of 0030 samples we are returning - we will notify you of any further analysis if necessary. The 0030 blank train consists of only one set of Tenax and Charcoal tubes.

A field sample log is included which lists each method sample types and identification numbers for each; please note highlighted samples ONLY for analysis at this time. Please analyze Method 0010 according to Method 8270, Table 2, SW-846 Semi-volatiles and analyze Method 0030 according to Method 8240, Table 2, SW-846 Volatiles.

Attached please find a copy of ETS, Inc. purchase order information, analysis requirements for each method and a copy of Triangle Labs price quote for analysis, as per Deborah Hage. A turnaround time of 21 calendar days is appreciated. Please contact Project Manager Ken Appel, Field Services Manager Andy Hetz, Terry Williamson or me if you have any questions.

Sincerely,

Pamela J. Broadwell
Sample Technician
ETS, Inc.

/PJB
Enclosure(s)

ETS, INC.

FIELD SAMPLE LOG

Contract No. 92-655WA　　　　Print Date 08/02/93　Time 10:25:39
Job I.D.　　　　Page 1
Test Method SW-846 0010

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00500	F1		KCE-010-R1	FILTER			pjb	08/02/93	
00501	F2		KCE-010-R1	PROBE & FH RINSE			pjb	08/02/93	
00502	F3		KCE-010-R1	XAD TRAP			pjb	08/02/93	
00503	F4		KCE-010-R1	IMP 1 CONTENTS+RINSE			pjb	08/02/93	
00504	F5		KCE-010-R1	IMP 1 & BH RINSES			pjb	08/02/93	
~~00505~~	~~F6~~		~~KCE-010-R1~~	~~IMP 5 SILICA GEL~~			~~pjb~~	~~08/02/93~~	
00506	F1		KCE-010-R2	FILTER			pjb	08/02/93	
00507	F2		KCE-010-R2	PROBE & FH RINSE			pjb	08/02/93	
00508	F3		KCE-010-R2	XAD TRAP			pjb	08/02/93	
00509	F4		KCE-010-R2	IMP 1 CONTENTS+RINSE			pjb	08/02/93	
00510	F5		KCE-010-R2	IMP 1 & BH RINSES			pjb	08/02/93	
~~00511~~	~~F6~~		~~KCE-010-R2~~	~~IMP 5 SILICA GEL~~			~~pjb~~	~~08/02/93~~	
00512	F1		KCE-010-R3	FILTER			pjb	08/02/93	
00513	F2		KCE-010-R3	PROBE & FH RINSE			pjb	08/02/93	
00514	F3		KCE-010-R3	XAD TRAP			pjb	08/02/93	
00515	F4		KCE-010-R3	IMP 1 CONTENTS+RINSE			pjb	08/02/93	
00516	F5		KCE-010-R3	IMP 1 & BH RINSES			pjb	08/02/93	
~~00517~~	~~F6~~		~~KCE-010-R3~~	~~IMP 5 SILICA GEL~~			~~pjb~~	~~08/02/93~~	
00518	F1		KCE-010-R0	FILTER			pjb	08/02/93	
00519	F2		KCE-010-R0	PROBE & FH RINSE			pjb	08/02/93	
00520	F3		KCE-010-R0	XAD TRAP			pjb	08/02/93	
00521	F4		KCE-010-R0	IMP 1 CONTENTS+RINSE			pjb	08/02/93	
00522	F5		KCE-010-R0	IMP 1 & BH RINSES			pjb	08/02/93	
~~00523~~	~~F6~~		~~KCE-010-R0~~	~~IMP 5 SILICA GEL~~			~~pjb~~	~~08/02/93~~	

RECEIVED AUG 0 4 1993
TRIANGLE LABS INC.
Bill Hurst

Custody Seal : Present/Intact Chain of Custody : Present Sample Tags : Present Sample Tag Numbers : Listed SMO Forms : Absent	TLI Project Number	24684	Book
	Client: ETS02	ETS INTERNATIONAL, INC.	68
	Date Received	08/04/93 By	Page
Ice Chest Ice Temp 40.0 F	Carrier and Number	FEDX.5055023422	177

Sample ID TLI	Client	Matrix	Storage Location	To Lab Date/Initial		To Storage Date/Initial		To Lab Date/Initial	
68-177-1A	92-655WA-00500=R1	FILTER	COOLER#2						
68-177-1B	92-655WA-00502=R1	XAD	COOLER#2						
68-177-1C	92-655WA-00501=R1	FH/RINSE	COOLER#2						
68-177-1D	92-655WA-00504=R1	BH/RINSE	COOLER#2						
68-177-1E	92-655WA-00503=R1	IMPINGER	COOLER#2						
68-177-2A	92-655WA-00506=R2	FILTER	COOLER#2						
68-177-2B	92-655WA-00508=R2	XAD	COOLER#2						
68-177-2C	92-655WA-00507=R2	FH/RINSE	COOLER#2						
68-177-2D	92-655WA-00510=R2	BH/RINSE	COOLER#2						
68-177-2E	92-655WA-00509=R2	IMPINGER	COOLER#2						
68-177-3A	92-655WA-00512=R3	FILTER	COOLER#2						
68-177-3B	92-655WA-00514=R3	XAD	COOLER#2						
68-177-3C	92-655WA-00513=R3	FH/RINSE	COOLER#2						
68-177-3D	92-655WA-00516=R3	BH/RINSE	COOLER#2						
68-177-3E	92-655WA-00515=R3	IMPINGER	COOLER#2						
68-177-4A	92-655WA-00518=R0	FILTER	COOLER#2						
68-177-4B	92-655WA-00520=R0	XAD	COOLER#2						

Receiving Remarks:

Archive Remarks:

Custody Seal	: Present/Intact	TLI Project Number	24684
Chain of Custody	: Present		
Sample Tags	: Present	Client: ETS02	ETS INTERNATIONAL, INC.
Sample Tag Numbers	: Listed		
SMO Forms	: Absent	Date Received	08/04/93 By
Ice Chest Ice Temp 40.0 F		Carrier and Number	FEDX.5055023422

Book 68 Page 177

Sample ID TLI	Client	Matrix	Storage Location	To Lab Date/Initial	To Storage Date/Initial	To Lab Date/Initial
68-177-4C	92-655WA-00519=R0	FH/RINSE	COOLER#2			
68-177-4D	92-655WA-00522=R0	BH/RINSE	COOLER#2			
68-177-4E	92-655WA-00521=R0	IMPINGER	COOLER#2			

Receiving Remarks:

Archive Remarks:

xadprep rev. 2/11/93

hipped 7-23-93

TLI # 24475

TRIANGLE LABORATORIES OF RTP, INC.

AIR QUALITY PREPARATION WORK ORDER FORM

PLEASE RETURN THIS FORM WITH THE SAMPLES AFTER THE SAMPLING SESSION

TLI INFORMATION SECTION

Order Taken BY: DA

Reference No: ____

Order Date: 7 / 16 / 93

P.O. Number: 4371

Due Date: 7 / 27 / 93

Customer ID: ETS02

Product Manager: Henri Hanam

Type & No. of Traps: 6 XAD ____ PUF ____ QA/QC ____ FILTER

Petri dishes seperate: yes / no

SAMPLE HISTORY XAD Resin Batch No.: 1719 from Supelco

PUF > Sandwich with XAD resin: yes / no

Preparer GL > Screen Required: yes / no

# of Blanks 1 > PUF's Shipped in: Jars / Sleeves

Fortification: XAD: yes / no PUF: yes / no Joint Project: yes / no

Spiker/Observer: (D) ____ (O) GL / Wm Exp. 1/6/94

Spiking Date: (D) ____ (O) 7-22-93

Spiking Sln ID: (D) ____ ____ µL (O) BS9-014-4 1000 µL

Nominal con.: (D) ____ ng/µl (O) ____ ng/ml 100 µg/ml

Terphenyl d14 100 µg ____ ng

Fluorene d10 ____ µg ____ ng

Nature & Amount of Surrogates:

37C14-2,3,7,8 - TCDD	____ng	
13C12-2,3,4,7,8 - PeCDF	____ng	
13C12-1,2,3,4,7,8 - HxCDF	____ng	
13C12-1,2,3,4,7,8 - HxCDD	____ng	
13C12-1,2,3,4,7,8,9 - HpCDF	____ng	

HRPCB: 13C12-3,3;5,5	T-PCB	____ng
13C12-3;3;4,4;5	PePCB	____ng
13C12-2,2;3,4,4;5	HxPCB	____ng
13C12-2,2;3,3;5,5;6,6	O-PCB	____ng

Other: ____

Special Instructions: ____

SHIPPING INFORMATION

Ship to the attention of: Tony Underwood by 7 / 23 / 93 (shipping date)

Mailing Address: Holiday Inn

(street address) c/o Tony Underwood 2406 N. Roan St

Johnson City TN 37601

Air Bill No.: ____ Phone No: 615 - 282 - 2161

CLIENT INFORMATION SECTION
circle requested analysis

Selections circled by: ____

Date: ____/____/____

MM5 Front & Back Halves (pooled): yes / no PUF & Filter Pooled: yes / no

M23 Toluene Analysis (separate): yes / no

PCDD / PCDF		ORGANICS	
Mono through Octachlorinated:	yes / no	HSL:	yes / no
Tri through Octachlorinated:	yes / no	PAH:	yes / no
Tetra through Octachlorinated:	yes / no	PAHH:	yes / no
Confirmation of 2,3,7,8-TCDF:	yes / no	PCB:	yes / no
Toxicity Equivalency Factor:	yes / no	PCBH:	yes / no

DATE: 07/16/93

VALID THRU: 09/30/93

TRIANGLE LABORATORIES OF RTP, INC.
SAMPLE ANALYSIS QUOTATION FORM
Phone: (919) 544-5729
Fax: (919) 544-5491

Ship Samples To:
801 Capitola Drive
Durham, NC 27713

Client Information | Client Code: ETS02

Client: ETS INTERNATIONAL, INC.
Contact: TERRY WILLIAMSON
Phone No: 703-265-0004
Fax No: 703-265-0131

NOTES:
1. Send this quote w/samples.
2. Re-extractions or Dilutions due to matrix problems will have additional billing. Client will be notified.
3. Payment Terms.- NET 30 Days

REFERENCE NO.: 0300000767
PRODUCT MANAGER: Hani Karam 919-544-8351
SALES REP: Deborah Hage 919-544-8355

TO BE CORRECTED BY CUSTOMER

.......Billing Address........
ATTN: ACCOUNTS PAYABLE
1401 MUNICIPAL ROAD
ROANOKE
VA 24012-1309

.......Shipping Address.......
(No PO Box)
1401 MUNICIPAL DRIVE
ROANOKE, VA 24012

......Purchase Order No.......

Sample/Analysis Information

Start Date: 08/01/93
Frequency: ______
Turn-Around Time: 21 Days
Minimum Amount Needed: ______ g ______ L
Percent Moisture/Lipids: yes / no

Legislation
TSCA ______
FIFRA ______
RCRA ______
NPDES ______
Other ______

PREPS	Qty	Price Unit	Price Total
Grinding			
Compositing			
% Lipid			
XAD Prep.			
PUF Prep.			
Filter Prep.			
VOST Prep.			
Other			
Pooled FH/BH:	yes	no	
Tandem VOST:	yes	no	

#	Matrix	ANALYSIS Analysis/Method	PRICE Unit	Total
22	VOSTPREP	E02101 CLEAN/PACK (NO SPIKE)	45.00	990.00
19	VOST	B00101 8240 (TABLE 2) TCL	232.50	4417.50
6	XAD PREP	E00061 CLEAN/PACK/SPIKE (OTHERS)	110.00	660.00
4	MM5	C01061 8270 (TABLE 2) TCL	371.25	1485.00
		GRAND TOTAL		7552.50

SPECIAL REQUIREMENTS: SPECIAL DEAL- THIS PROJECT ONLY!

Report Generation

Dry Weight: yes / no
Toxic Equivalency Factors: yes / no Type: ____
No. Copies: ____

Authorized Signatures:

TLI Contact: Deborah E Hage
Deborah E. Hage

Customer: ______________________

SEMIVOLATILE EXTRACTION FORM

TLI #: 24684 CLIENT ID: ETS

SDG #:

SAMPLE #: 0-74
EXT DATE: 1/15/93
METHOD: 3520

EXTRACTION: SEP (SOX) SON

SOLVENT: CH2CL2 TOLUENE 10%ETHER/HEXANE CH2CL2:ACETONE 1:1

SOLVENT LOT NUMBER(S): CH_2Cl_2 932280

LEVEL: LOW MED

JOINT PROJECT: Y (N)
REEXTRACTION: Y (N)

MS/MSD: Y (N)
MS/MSD ID:
MS/MSD VOL:
SURR ID:
SURR VOL:

MNS SS Spike X
B59-015-2A
100 mg/mL
Exp. 15 Jan 94
1000 ml

WATER
SOIL
MMS ✓
PUF
ACH
FISH
OTHER

MNS SS
MNS Spike W
B59-009-1B
1000 µg/ml
Exp. 11/Nov/93
1000 µl

NUM	TLI ID	CLIENT ID	WT/VOL	FINAL VOL	FINAL SOLV	PH	SPIKE INT	SPIKE WTS	SPIKE INT	SPIKE WT	SPIKE INT	SPIKE WT	SPI INT
0	TLI BLK	SBLK	1 liter	1 ml	CH2Cl2	—	[illegible]	CHH			BCL	Nu	
1	68-177-1A→E	92-655WA-00500-00524=R1				—		CHH				Nu	
2	68-177-2A→E	92-655WA-00506-00510=R2				–		CHH				Nu	
3	68-177-3A→E	92-655WA-00512-00516=R3				—		CHH				Nu	
4	68-177-4A→E	92-655WA-00518-00522=R4				—		CHH				Nu	
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

COMMENTS:

Chain of Custody

1. Relinquished by ES date 8/9/93 Received by [illegible] date 8/9
number of samples 5 of 5

2. Relinquished by ______ date ______ Received by ______ date ______
number of samples ______ of ______

3. Relinquished by ______ date ______ Received by ______ date ______
number of samples ______ of ______

OWL Sample Extraction and Cleanup Tracking Form
MM5 Single Analysis

Project: Method

Sample No.	Step Description	SOP #	Date	Initials
0 → 4	Prep Glassware		8/5/93	Wm
3, 4	K/D front half and back half rinses to 1ml. (*)		↓	↓
0 → 4	Place filter in thimble and empty XAD into thimble.		↓	↓
NA SE 8/5/93 3, 4	Add FH and BH rinses to thimble		↓	↓
" 0 → 4	Spike appropriate surrogates.	DSP-128-90	↓	Wm, CMH
—	Spike appropriate QC spikes.	DSP-128-90	—	—
0 → 4	Extract for 16 hours with CH_2Cl_2 on sox.		8/5/93	Wm
~~2, 3~~ 1, 2 8/5/93	K/D down impinger rinses if any. (*)		↓	↓
0 → 4	Pour impinger water in separatory funnel, measure and record pH and volume.		8/5/93	Nu
1, 2 8/5/93	Add impinger rinses to the water.		8/5/93	Wm / Nu
0 → 4	Add appropriate surrogates.	DSP-128-90	↓	Nu
↓	Adjust pH to <2 and extract 3 x 60 ml CH_2Cl_2		↓	↓
↓	Adjust pH >11 and extract 3 x 60 mL		↓	↓
↓	Filter both sox and impinger extracts through Na_2SO_4.	OWL-111-90	8/6/93	Nu
↓	K/D both extracts to about 5 mLs. combining upon K/Ding.	OWL-111-90	↓	↓
↓	N_2 extract to 1 Ml, vialize, and rinse with 2 x 0.5 mL CH_2Cl_2.	OWL-111-90	8/9/93	ES
↓	N_2 to 1 mL.	OWL-111-90	↓	↓
↓	Relinquish to GC/MS.	OWL-111-90	↓	↓

Comments: (*) Received "FH" and "BH" rinses. Samples' ~~2, 3~~ 1, 2 rinses KD'd to an aqueous state, so they were combined w/ impinger water. The rinses for (3, 4) were treated as "usual" FH/BH rinses and added to XAD and filter (and soxhlet extracted). —Wm 8/5/93

Organic Wet Lab: Extraction Observation Form for Aqueous Samples

Project # 246844 Observer Nu Method 8270 Date 8/5/93

Wet Lab #.	Volume Used	Initial pH	Volume of NaOH	Adjusted pH	Volume of H_2SO_4	Adjusted pH	Clarity	Color	Odor
6	500mls	8	3mls	13	1ml	<2	clear	clear	No
1	350mls	<2	4mls	12	—		—		—
2	230mls		3mls	13	—				—
3	200mls				—				Yes
4		8			.5				No

Sample Notes: Sample # 4 was mostly methanol and so sample volume could not be obtained

Organic Wet Lab: Extraction Observation Form for PUFs, XAD Traps, MM5

TLI# 24684 Observer WM Method 8270 Date 8/5/93

Wet Lab#	Matrix	# Filter	# Solvent	Types of Solv.	XAD Color	Filter Color	Glasswool Color	PUF Color	Odor	XAD I
0	XAD	—	—	—	white	—	—	ND	ND	T71
1	"	1	EH/BH (2)	Organic	off-white	gray/black w ash	off white		"burnt"	"
2	"	1	"	"	white	"	white		NP	"
3	"	1	"	"	off-white	"	"		"burnt"	"
4	"	1	"	"	white	white w 2 gray spots	"		NP	"

Sample Notes:

Page ___ of ___

244821

Triangle Laboratories, Inc.
TLI PROJECT# 24475
DATE 07/22/93
SPIKE 100ug TERPHENYL-d14
SPIKER L.M.
PREPARER G.L.

E.T.S.

ETS02-ETS INTERNATIONAL. INC.
92-655WA-00514=R3
Project:24684
68-177-3B

METHOD SW-846 0010
CONTAINER F3
SAMPLE # 92-655WA-00514
RUN # KCE-M0010-R3
CONTENTS XAD TRAP

3

Triangle Laboratories, Inc.
TLI PROJECT# 24475
DATE 07/22/93
SPIKE 100ug TERPHENYL-d14
SPIKER L.M.
PREPARER G.L.

E.T.S.

METHOD SW-846 0010
CONTAINER F3
SAMPLE # 92-655WA-00520 Blank
RUN # KCE-M0010-R0
CONTENTS XAD TRAP

ETS02-ETS INTERNATIONAL. INC.
92-655WA-00520=R0
Project:24684
68-177-4B

4

SEMIVOLATILE GC/MS TRACING FORM

Project #: 24684

MM5 PUF Water Soil Other ______

8270 625 CLP

LIST: Table 2 TCLP 625 CLP CAA/PAP PAH CB/CP Other ______

me: ICAL Z807

me	TLRTP ID	Sample ID	File Name	Comments
12	~~BSS~~-114-1	DFTPP	ZD922	
:37	BSS-014-2	SSTD050	ZD923	
28	—	Solvent Blks	ZD924	
0	—	SBLK 080593	ZD925	2,4,6-Tribromophenol out Phthalate contamination
12	68-177-4A-E	92-655WA-00518-00522 = R0	ZD926	Di-n-butyl phthalate over calib range
:56	68-177-3A-E	92-655WA-00512-00516 = R3	ZD927	Bis(2-ethylhexyl)phthalate over calib range
01	68-177-2A-E	92-655WA-00506-00510 = R2	ZD928	Benzoic acid and Bis(2-ethylhexyl)phthalate over calib range
9	68-177-1A-E	92-655WA-00500-00504 = R1	ZD929	2,4,6-Tribromophenol out Benzoic acid over calib range
48	68-177-4A-E	92-655WA-00518-0522 = R0	ZD930	2,4,6-Tribromophenol out Diluted 2X
25	68-177-3A-E	92-655WA-00512-00516 = R3	ZD931	2,4,6-Tribromophenol out Diluted 2X Benzoic acid over calib range
	68-177-2A-E	92-655WA-00506-00510 = R2	ZD932	Phenol-d5 and 2,4,6-Tribromophenol out Diluted 2X Benzoic acid over calib range
1	68-177-2A-E	92-655WA-00506-00510 = R2	ZD933	Phenol-d5 + 2,4,6 TBP out Diluted 4X
31	68-177-3A-E	92-655WA-00512-00516 = R3	ZD934	Diluted 4X
	68-177-1A-E	92-655WA-00500-00504 = R1	ZD935	Diluted 4X

MS# | COLUMN TYPE | COLUMN # | ANALYSIS | ACQ METHOD | GC METHOD | FIND DB'S | OTHER

TRIANGLE LABORATORIES OF RTP, INC. RUN LOG

TRIANGLE LABORATORIES OF RTP, INC. RUN LOG

MS#	COLUMN TYPE	COLUMN #	ANALYSIS	ACQ METHOD	GC METHOD	FIND DB'S	OTHER
2	DB5-625	3808152A		newlst.m		1. table2.sub	
						2.	

EXTRACT / SAMPLE VOLUME 400 uL / mL

DATE	TIME	PROJECT #	SAMPLE #	CLIENT SAMPLE ID	FILENAME	OPER	BACKUP NET	BACKUP ARC	PROC	pH	COMMENTS
8/4/93	18:16	24684	68.177-2A-E	92-655WA-00516-00510 = R2	ZD932	RK			RK		Hard disk 2467.6 Biphenyl not Bentz cut Run calib range diluted 2X
8/4/93	1951	24684	68.177-2A-E	92-655WA-00506-00510 = R2	ZD933	RK			DD		diluted ~~2X~~ 4X EE 8/7/93
8/4/93	2031	24684	68.177-3 A-E ~~68.173-KM~~ EE 8/4/93	92-655WA-00512-00516 = R3	ZD934	RK			DD		diluted 4X
8/4/93	2118	24684	68.177-1A-E	92-655WA-00500-00504 = R1	ZD135	RK			DD		diluted 4X

INTERNAL STANDARD EE / SURROGATE STANDARD	ANALYTE STANDARD
BS4-012-1C Exp 8 12/17/93	

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD926
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: KCF-010-R0
Sample ID:
TLI ID: 68-177-4(A-E)
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
1,4-Dichlorobenzene-d_4	1583		9.80	1		I		
Phenol	320	1.254	9.10	1	6.46	E	10	___
bis(2-Chloroethyl)ether	0	0.940	0.00	1	2.69	ND	10	___
2-Chlorophenol	0	1.199	0.00	1	2.11	ND	10	___
1,3-Dichlorobenzene	0	1.280	0.00	1	1.97	ND	10	___
1,4-Dichlorobenzene	0	1.289	0.00	1	1.96	ND	10	___
1,2-Dichlorobenzene	0	1.215	0.00	1	2.08	ND	10	___
2,2'-oxybis(1-Chloropropane)	0	1.084	0.00	1	2.33	ND	10	___
Benzyl alcohol	0	0.595	0.00	1	4.25	ND	10	___
2-Methylphenol	0	0.894	0.00	1	2.83	ND	10	___
3/4-Methylphenol	0	0.924	0.00	1	2.73	ND	10	___
N-Nitroso-di-n-propylamine	0	0.593	0.00	1	4.26	ND	10	___
Hexachloroethane	0	0.578	0.00	1	4.37	ND	10	___
Naphthalene-d_8	4666		12.32	2		I		
Nitrobenzene	0	0.322	0.00	2	2.66	ND	10	___
Isophorone	0	0.604	0.00	2	1.42	ND	10	___
2-Nitrophenol	0	0.219	0.00	2	3.91	ND	10	___
2,4-Dimethylphenol	0	0.330	0.00	2	2.60	ND	10	___
bis(2-Chloroethoxy)methane	0	0.381	0.00	2	2.25	ND	10	___
Benzoic acid	695	0.237	11.74	2	25.16	D	10	___
2,4-Dichlorophenol	0	0.295	0.00	2	2.91	ND	10	___
1,2,4-Trichlorobenzene	0	0.333	0.00	2	2.57	ND	10	___
Naphthalene	5722	0.973	12.37	2	50.42	D	10	___
4-Chloroaniline	0	0.405	0.00	2	2.12	ND	10	___
Hexachlorobutadiene	0	0.193	0.00	2	4.44	ND	10	___
4-Chloro-3-methylphenol	0	0.294	0.00	2	2.92	ND	10	___
2-Methylnaphthalene	0	0.592	0.00	2	1.45	ND	10	___
Acenaphthene-d_{10}	2584		15.94	3		I		
Hexachlorocyclopentadiene	0	0.309	0.00	3	5.01	ND	10	___
2,4,6-Trichlorophenol	0	0.370	0.00	3	4.18	ND	10	___
2,4,5-Trichlorophenol	0	0.403	0.00	3	3.84	ND	10	___
2-Chloronaphthalene	0	1.052	0.00	3	1.47	ND	10	___
2-Nitroaniline	0	0.315	0.00	3	4.91	ND	10	___
Dimethylphthalate	0	1.354	0.00	3	1.14	ND	10	___
2,6-Dinitrotoluene	0	0.329	0.00	3	4.70	ND	10	___
2,4-Dinitrotoluene	0	0.556	0.00	3	2.78	ND	10	___
Acenaphthylene	0	1.821	0.00	3	0.85	ND	10	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD926
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: KCF-010-R0
Sample ID:
TLI ID: 68-177-4(A-E)
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
3-Nitroaniline	0	0.426	0.00	3	3.63	ND	10	___
Acenaphthene	0	1.036	0.00	3	1.49	ND	10	___
2,4-Dinitrophenol	0	0.213	0.00	3	7.27	ND	10	___
4-Nitrophenol	0	0.315	0.00	3	4.91	ND	10	___
Dibenzofuran	0	1.570	0.00	3	0.99	ND	10	___
Diethylphthalate	246	1.594	16.86	3	2.40	E	10	___
4-Chlorophenyl-phenylether	0	0.582	0.00	3	2.66	ND	10	___
Fluorene	0	1.304	0.00	3	1.19	ND	10	___
4-Nitroaniline	0	0.589	0.00	3	2.63	ND	10	___
Phenanthrene-d_{10}	5343		19.04	4		I		
4,6-Dinitro-2-methylphenol	0	0.144	0.00	4	5.20	ND	10	___
N-Nitrosodiphenylamine	0	0.378	0.00	4	1.98	ND	10	___
4-Bromophenyl-phenylether	0	0.160	0.00	4	4.68	ND	10	___
Hexachlorobenzene	0	0.209	0.00	4	3.58	ND	10	___
Pentachlorophenol	0	0.170	0.00	4	4.40	ND	10	___
Phenanthrene	0	0.959	0.00	4	0.78	ND	10	___
Anthracene	0	0.899	0.00	4	0.83	ND	10	___
Di-n-butylphthalate	43726	1.555	20.29	4	210.52	E	10	___
Fluoranthene	0	1.339	0.00	4	0.56	ND	10	___
Chrysene-d_{12}	6429		24.59	5		I		
Pyrene	0	1.296	0.00	5	0.48	ND	10	___
Butylbenzylphthalate	0	0.723	0.00	5	0.86	ND	10	___
3,3'-Dichlorobenzidine	0	0.394	0.00	5	1.58	ND	10	___
bis(2-Ethylhexyl)phthalate	14588	0.873	24.68	5	103.97	D	10	___
Benzo(a)anthracene	0	1.074	0.00	5	0.58	ND	10	___
Chrysene	0	0.990	0.00	5	0.63	ND	10	___
Perylene-d_{12}	7232		28.59	6		I		
Di-n-octylphthalate	0	1.262	0.00	6	0.44	ND	10	___
Benzo(b)fluoranthene	0	0.893	0.00	6	0.62	ND	10	___
Benzo(k)fluoranthene	0	0.895	0.00	6	0.62	ND	10	___
Benzo(a)pyrene	0	0.877	0.00	6	0.63	ND	10	___
Indeno(1,2,3-cd)pyrene	0	0.992	0.00	6	0.56	ND	10	___
Dibenz(a,h)anthracene	0	0.770	0.00	6	0.72	ND	10	___
Benzo(g,h,i)perylene	0	0.838	0.00	6	0.66	ND	10	___

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD926
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: KC5-010-R0
Sample ID:
TLI ID: 68-177-4(A-E)
Dilution Factor: 1.00

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
Phenol-d_5	4353	1.202	9.08	1	91.53	D	92
Nitrobenzene-d_5	3430	0.368	10.88	2	79.92	D	80
1,3,5-Trichlorobenzene-d_3	2908	0.354	11.55	2	70.42	D	70
1,4-Dibromobenzene-d_4	2674	0.824	12.43	1	82.02	D	82
2-Fluorobiphenyl	6365	1.238	14.55	3	79.58	D	80
2,4,6-Tribromophenol	1113	0.282	17.58	3	61.13	D	61
Anthracene-d_{10}	10806	0.864	19.15	4	93.64	D	94
Pyrene-d_{10}	16088	1.050	22.00	5	95.33	D	95
Terphenyl-d_{14}	12915	0.785	22.38	5	102.36	D	102

Reviewed by ___MB___ Date 8/16/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD930
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K' '910-R0
Sample ID:
TLI ID: 68-177-4(A-E)
Dilution Factor: 2.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
1,4-Dichlorobenzene-d_4	1612		9.81	1		I		
Phenol	0	1.254	0.00	1	3.96	ND	20	____
bis(2-Chloroethyl)ether	0	0.940	0.00	1	5.28	ND	20	____
2-Chlorophenol	0	1.199	0.00	1	4.14	ND	20	____
1,3-Dichlorobenzene	0	1.280	0.00	1	3.88	ND	20	____
1,4-Dichlorobenzene	0	1.289	0.00	1	3.85	ND	20	____
1,2-Dichlorobenzene	0	1.215	0.00	1	4.08	ND	20	____
2,2'-oxybis(1-Chloropropane)	0	1.084	0.00	1	4.58	ND	20	____
Benzyl alcohol	0	0.595	0.00	1	8.34	ND	20	____
2-Methylphenol	0	0.894	0.00	1	5.55	ND	20	____
3/4-Methylphenol	0	0.924	0.00	1	5.37	ND	20	____
N-Nitroso-di-n-propylamine	0	0.593	0.00	1	8.37	ND	20	____
Hexachloroethane	0	0.578	0.00	1	8.58	ND	20	____
Naphthalene-d_8	4658		12.33	2		I		
Nitrobenzene	0	0.322	0.00	2	5.33	ND	20	____
Isophorone	0	0.604	0.00	2	2.84	ND	20	____
2-Nitrophenol	0	0.219	0.00	2	7.84	ND	20	____
2,4-Dimethylphenol	0	0.330	0.00	2	5.20	ND	20	____
bis(2-Chloroethoxy)methane	0	0.381	0.00	2	4.51	ND	20	____
Benzoic acid	247	0.237	11.73	2	17.90	E	20	____
2,4-Dichlorophenol	0	0.295	0.00	2	5.82	ND	20	____
1,2,4-Trichlorobenzene	0	0.333	0.00	2	5.16	ND	20	____
Naphthalene	2865	0.973	12.37	2	50.57	D	20	____
4-Chloroaniline	0	0.405	0.00	2	4.24	ND	20	____
Hexachlorobutadiene	0	0.193	0.00	2	8.90	ND	20	____
4-Chloro-3-methylphenol	0	0.294	0.00	2	5.84	ND	20	____
2-Methylnaphthalene	0	0.592	0.00	2	2.90	ND	20	____
Acenaphthene-d_{10}	2688		15.95	3		I		
Hexachlorocyclopentadiene	0	0.309	0.00	3	9.63	ND	20	____
2,4,6-Trichlorophenol	0	0.370	0.00	3	8.04	ND	20	____
2,4,5-Trichlorophenol	0	0.403	0.00	3	7.38	ND	20	____
2-Chloronaphthalene	0	1.052	0.00	3	2.83	ND	20	____
2-Nitroaniline	0	0.315	0.00	3	9.45	ND	20	____
Dimethylphthalate	0	1.354	0.00	3	2.20	ND	20	____
2,6-Dinitrotoluene	0	0.329	0.00	3	9.05	ND	20	____
2,4-Dinitrotoluene	0	0.556	0.00	3	5.35	ND	20	____
Acenaphthylene	0	1.821	0.00	3	1.63	ND	20	____

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD930
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K 010-R0
Sample ID:
TLI ID: 68-177-4(A-E)
Dilution Factor: 2.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
3-Nitroaniline	0	0.426	0.00	3	6.99	ND	20	___
Acenaphthene	0	1.036	0.00	3	2.87	ND	20	___
2,4-Dinitrophenol	0	0.213	0.00	3	13.97	ND	20	___
4-Nitrophenol	0	0.315	0.00	3	9.45	ND	20	___
Dibenzofuran	0	1.570	0.00	3	1.90	ND	20	___
Diethylphthalate	0	1.594	0.00	3	1.87	ND	20	___
4-Chlorophenyl-phenylether	0	0.582	0.00	3	5.11	ND	20	___
Fluorene	0	1.304	0.00	3	2.28	ND	20	___
4-Nitroaniline	0	0.589	0.00	3	5.05	ND	20	___
Phenanthrene-d_{10}	5580		19.04	4		I		
4,6-Dinitro-2-methylphenol	0	0.144	0.00	4	9.95	ND	20	___
N-Nitrosodiphenylamine	0	0.378	0.00	4	3.79	ND	20	___
4-Bromophenyl-phenylether	0	0.160	0.00	4	8.96	ND	20	___
Hexachlorobenzene	0	0.209	0.00	4	6.86	ND	20	___
Pentachlorophenol	0	0.170	0.00	4	8.43	ND	20	___
Phenanthrene	0	0.959	0.00	4	1.49	ND	20	___
Anthracene	0	0.899	0.00	4	1.59	ND	20	___
Di-n-butylphthalate	24134	1.555	20.29	4	222.49	D	20	___
Fluoranthene	0	1.339	0.00	4	1.07	ND	20	___
Chrysene-d_{12}	7950		24.60	5		I		
Pyrene	0	1.296	0.00	5	0.78	ND	20	___
Butylbenzylphthalate	0	0.723	0.00	5	1.39	ND	20	___
3,3'-Dichlorobenzidine	0	0.394	0.00	5	2.55	ND	20	___
bis(2-Ethylhexyl)phthalate	8754	0.873	24.68	5	100.91	D	20	___
Benzo(a)anthracene	0	1.074	0.00	5	0.94	ND	20	___
Chrysene	0	0.990	0.00	5	1.02	ND	20	___
Perylene-d_{12}	8060		28.60	6		I		
Di-n-octylphthalate	0	1.262	0.00	6	0.79	ND	20	___
Benzo(b)fluoranthene	0	0.893	0.00	6	1.11	ND	20	___
Benzo(k)fluoranthene	0	0.895	0.00	6	1.11	ND	20	___
Benzo(a)pyrene	0	0.877	0.00	6	1.13	ND	20	___
Indeno(1,2,3-cd)pyrene	0	0.992	0.00	6	1.00	ND	20	___
Dibenz(a,h)anthracene	0	0.770	0.00	6	1.29	ND	20	___
Benzo(g,h,i)perylene	0	0.838	0.00	6	1.18	ND	20	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD930
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K 910-R0
Sample ID:
TLI ID: 68-177-4(A-E)
Dilution Factor: 2.00

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
Phenol-d_5	719	1.202	9.09	1	29.69	D	30
Nitrobenzene-d_5	1648	0.368	10.87	2	76.91	D	77
1,3,5-Trichlorobenzene-d_3	1367	0.354	11.55	2	66.33	D	66
1,4-Dibromobenzene-d_4	1287	0.824	12.43	1	77.48	D	77
2-Fluorobiphenyl	3212	1.238	14.56	3	77.22	D	77
2,4,6-Tribromophenol	71	0.282	17.61	3	7.49	D	7
Anthracene-d_{10}	5588	0.864	19.16	4	92.72	D	93
Pyrene-d_{10}	9197	1.050	22.00	5	88.15	D	88
Terphenyl-d_{14}	7373	0.785	22.38	5	94.51	D	95

Reviewed by ___ ___ Date 8/16/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD929
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K 010-R1
Sample ID:
TLI ID: 68-177-1(A-E)
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
1,4-Dichlorobenzene-d_4	1429		9.81	1		I		
Phenol	0	1.254	0.00	1	2.23	ND	10	___
bis(2-Chloroethyl)ether	0	0.940	0.00	1	2.98	ND	10	___
2-Chlorophenol	0	1.199	0.00	1	2.33	ND	10	___
1,3-Dichlorobenzene	0	1.280	0.00	1	2.19	ND	10	___
1,4-Dichlorobenzene	0	1.289	0.00	1	2.17	ND	10	___
1,2-Dichlorobenzene	0	1.215	0.00	1	2.30	ND	10	___
2,2'-oxybis(1-Chloropropane)	0	1.084	0.00	1	2.58	ND	10	___
Benzyl alcohol	0	0.595	0.00	1	4.70	ND	10	___
2-Methylphenol	0	0.894	0.00	1	3.13	ND	10	___
3/4-Methylphenol	0	0.924	0.00	1	3.03	ND	10	___
N-Nitroso-di-n-propylamine	0	0.593	0.00	1	4.72	ND	10	___
Hexachloroethane	0	0.578	0.00	1	4.84	ND	10	___
Naphthalene-d_8	4654		12.33	2		I		
Nitrobenzene	903	0.322	10.99	2	24.11	D	10	___
Isophorone	9638	0.604	11.43	2	137.13	D	10	___
2-Nitrophenol	0	0.219	0.00	2	3.92	ND	10	___
2,4-Dimethylphenol	0	0.330	0.00	2	2.60	ND	10	___
bis(2-Chloroethoxy)methane	0	0.381	0.00	2	2.26	ND	10	___
Benzoic acid	17516	0.237	12.03	2	635.11	E	10	___
2,4-Dichlorophenol	0	0.295	0.00	2	2.91	ND	10	___
1,2,4-Trichlorobenzene	0	0.333	0.00	2	2.58	ND	10	___
Naphthalene	8692	0.973	12.37	2	76.77	D	10	___
4-Chloroaniline	0	0.405	0.00	2	2.12	ND	10	___
Hexachlorobutadiene	0	0.193	0.00	2	4.45	ND	10	___
4-Chloro-3-methylphenol	0	0.294	0.00	2	2.92	ND	10	___
2-Methylnaphthalene	354	0.592	13.79	2	5.14	E	10	___
Acenaphthene-d_{10}	2768		15.94	3		I		
Hexachlorocyclopentadiene	0	0.309	0.00	3	4.68	ND	10	___
2,4,6-Trichlorophenol	0	0.370	0.00	3	3.91	ND	10	___
2,4,5-Trichlorophenol	0	0.403	0.00	3	3.59	ND	10	___
2-Chloronaphthalene	0	1.052	0.00	3	1.37	ND	10	___
2-Nitroaniline	0	0.315	0.00	3	4.59	ND	10	___
Dimethylphthalate	0	1.354	0.00	3	1.07	ND	10	___
2,6-Dinitrotoluene	0	0.329	0.00	3	4.39	ND	10	___
2,4-Dinitrotoluene	0	0.556	0.00	3	2.60	ND	10	___
Acenaphthylene	0	1.821	0.00	3	0.79	ND	10	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD929
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K)10-R1
Sample ID:
TLI ID: 68-177-1(A-E)
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
3-Nitroaniline	0	0.426	0.00	3	3.39	ND	10	___
Acenaphthene	0	1.036	0.00	3	1.39	ND	10	___
2,4-Dinitrophenol	0	0.213	0.00	3	6.78	ND	10	___
4-Nitrophenol	0	0.315	0.00	3	4.59	ND	10	___
Dibenzofuran	0	1.570	0.00	3	0.92	ND	10	___
Diethylphthalate	684	1.594	16.87	3	6.21	E	10	___
4-Chlorophenyl-phenylether	0	0.582	0.00	3	2.48	ND	10	___
Fluorene	0	1.304	0.00	3	1.11	ND	10	___
4-Nitroaniline	0	0.589	0.00	3	2.45	ND	10	___
Phenanthrene-d_{10}	7395		19.04	4		I		
4,6-Dinitro-2-methylphenol	0	0.144	0.00	4	3.76	ND	10	___
N-Nitrosodiphenylamine	0	0.378	0.00	4	1.43	ND	10	___
4-Bromophenyl-phenylether	0	0.160	0.00	4	3.38	ND	10	___
Hexachlorobenzene	0	0.209	0.00	4	2.59	ND	10	___
Pentachlorophenol	0	0.170	0.00	4	3.18	ND	10	___
Phenanthrene	0	0.959	0.00	4	0.56	ND	10	___
Anthracene	0	0.899	0.00	4	0.60	ND	10	___
Di-n-butylphthalate	26998	1.555	20.30	4	93.91	D	10	___
Fluoranthene	0	1.339	0.00	4	0.40	ND	10	___
Chrysene-d_{12}	9019		24.62	5		I		
Pyrene	0	1.296	0.00	5	0.34	ND	10	___
Butylbenzylphthalate	650	0.723	23.41	5	3.99	E	10	___
3,3'-Dichlorobenzidine	0	0.394	0.00	5	1.13	ND	10	___
bis(2-Ethylhexyl)phthalate	4553	0.873	24.68	5	23.13	D	10	___
Benzo(a)anthracene	0	1.074	0.00	5	0.41	ND	10	___
Chrysene	0	0.990	0.00	5	0.45	ND	10	___
Perylene-d_{12}	9304		28.62	6		I		
Di-n-octylphthalate	12619	1.262	26.84	6	42.99	D	10	___
Benzo(b)fluoranthene	0	0.893	0.00	6	0.48	ND	10	___
Benzo(k)fluoranthene	0	0.895	0.00	6	0.48	ND	10	___
Benzo(a)pyrene	0	0.877	0.00	6	0.49	ND	10	___
Indeno(1,2,3-cd)pyrene	0	0.992	0.00	6	0.43	ND	10	___
Dibenz(a,h)anthracene	0	0.770	0.00	6	0.56	ND	10	___
Benzo(g,h,i)perylene	0	0.838	0.00	6	0.51	ND	10	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD929
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K 010-R1
Sample ID:
TLI ID: 68-177-1(A-E)
Dilution Factor: 1.00

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
Phenol-d_5	3363	1.202	9.18	1	78.30	D	78
Nitrobenzene-d_5	3918	0.368	10.89	2	91.49	D	91
1,3,5-Trichlorobenzene-d_3	3234	0.354	11.56	2	78.52	D	79
1,4-Dibromobenzene-d_4	3066	0.824	12.43	1	104.11	D	104
2-Fluorobiphenyl	8356	1.238	14.56	3	97.54	D	98
2,4,6-Tribromophenol	26	0.282	17.66	3	1.38	D	1
Anthracene-d_{10}	14787	0.864	19.17	4	92.57	D	93
Pyrene-d_{10}	17350	1.050	22.02	5	73.29	D	73
Terphenyl-d_{14}	17010	0.785	22.39	5	96.10	D	96

Reviewed by ______ W ______ Date 8/16/93

ND -Not Detected: D- Detected: E- Estimated: I- Internal Standard   Ororep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD935
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K 010-R1
Sample ID:
TLI ID: 68-177-1(A-E)
Dilution Factor: 4.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
1,4-Dichlorobenzene-d_4	2289		9.81	1		I		
Phenol	0	1.254	0.00	1	5.57	ND	40	___
bis(2-Chloroethyl)ether	0	0.940	0.00	1	7.44	ND	40	___
2-Chlorophenol	0	1.199	0.00	1	5.83	ND	40	___
1,3-Dichlorobenzene	0	1.280	0.00	1	5.46	ND	40	___
1,4-Dichlorobenzene	0	1.289	0.00	1	5.42	ND	40	___
1,2-Dichlorobenzene	0	1.215	0.00	1	5.75	ND	40	___
2,2'-oxybis(1-Chloropropane)	0	1.084	0.00	1	6.45	ND	40	___
Benzyl alcohol	0	0.595	0.00	1	11.75	ND	40	___
2-Methylphenol	0	0.894	0.00	1	7.82	ND	40	___
3/4-Methylphenol	0	0.924	0.00	1	7.56	ND	40	___
N-Nitroso-di-n-propylamine	0	0.593	0.00	1	11.79	ND	40	___
Hexachloroethane	0	0.578	0.00	1	12.09	ND	40	___
Naphthalene-d_8	7025		12.32	2		I		
Nitrobenzene	0	0.322	0.00	2	7.07	ND	40	___
Isophorone	1869	0.604	11.39	2	70.49	D	40	___
2-Nitrophenol	0	0.219	0.00	2	10.40	ND	40	___
2,4-Dimethylphenol	0	0.330	0.00	2	6.90	ND	40	___
bis(2-Chloroethoxy)methane	0	0.381	0.00	2	5.98	ND	40	___
Benzoic acid	2887	0.237	11.83	2	277.50	D	40	___
2,4-Dichlorophenol	0	0.295	0.00	2	7.72	ND	40	___
1,2,4-Trichlorobenzene	0	0.333	0.00	2	6.84	ND	40	___
Naphthalene	1937	0.973	12.37	2	45.35	D	40	___
4-Chloroaniline	0	0.405	0.00	2	5.62	ND	40	___
Hexachlorobutadiene	0	0.193	0.00	2	11.80	ND	40	___
4-Chloro-3-methylphenol	0	0.294	0.00	2	7.75	ND	40	___
2-Methylnaphthalene	59	0.592	13.78	2	2.27	E	40	___
Acenaphthene-d_{10}	3892		15.95	3		I		
Hexachlorocyclopentadiene	0	0.309	0.00	3	13.30	ND	40	___
2,4,6-Trichlorophenol	0	0.370	0.00	3	11.11	ND	40	___
2,4,5-Trichlorophenol	0	0.403	0.00	3	10.20	ND	40	___
2-Chloronaphthalene	0	1.052	0.00	3	3.91	ND	40	___
2-Nitroaniline	0	0.315	0.00	3	13.05	ND	40	___
Dimethylphthalate	0	1.354	0.00	3	3.04	ND	40	___
2,6-Dinitrotoluene	0	0.329	0.00	3	12.49	ND	40	___
2,4-Dinitrotoluene	0	0.556	0.00	3	7.39	ND	40	___
Acenaphthylene	0	1.821	0.00	3	2.26	ND	40	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD935
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: KC [illegible]10-R1
Sample ID:
TLI ID: 68-177-1(A-E)
Dilution Factor: 4.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
3-Nitroaniline	0	0.426	0.00	3	9.65	ND	40	___
Acenaphthene	0	1.036	0.00	3	3.97	ND	40	___
2,4-Dinitrophenol	0	0.213	0.00	3	19.30	ND	40	___
4-Nitrophenol	0	0.315	0.00	3	13.05	ND	40	___
Dibenzofuran	0	1.570	0.00	3	2.62	ND	40	___
Diethylphthalate	0	1.594	0.00	3	2.58	ND	40	___
4-Chlorophenyl-phenylether	0	0.582	0.00	3	7.06	ND	40	___
Fluorene	0	1.304	0.00	3	3.15	ND	40	___
4-Nitroaniline	0	0.589	0.00	3	6.98	ND	40	___
Phenanthrene-d_{10}	9146		19.04	4		I		
4,6-Dinitro-2-methylphenol	0	0.144	0.00	4	12.15	ND	40	___
N-Nitrosodiphenylamine	0	0.378	0.00	4	4.63	ND	40	___
4-Bromophenyl-phenylether	0	0.160	0.00	4	10.93	ND	40	___
Hexachlorobenzene	0	0.209	0.00	4	8.37	ND	40	___
Pentachlorophenol	0	0.170	0.00	4	10.29	ND	40	___
Phenanthrene	0	0.959	0.00	4	1.82	ND	40	___
Anthracene	0	0.899	0.00	4	1.95	ND	40	___
Di-n-butylphthalate	4885	1.555	20.29	4	54.97	D	40	___
Fluoranthene	0	1.339	0.00	4	1.31	ND	40	___
Chrysene-d_{12}	13142		24.61	5		I		
Pyrene	0	1.296	0.00	5	0.94	ND	40	___
Butylbenzylphthalate	0	0.723	0.00	5	1.68	ND	40	___
3,3'-Dichlorobenzidine	0	0.394	0.00	5	3.09	ND	40	___
bis(2-Ethylhexyl)phthalate	765	0.873	24.67	5	10.68	E	40	___
Benzo(a)anthracene	0	1.074	0.00	5	1.13	ND	40	___
Chrysene	0	0.990	0.00	5	1.23	ND	40	___
Perylene-d_{12}	14329		28.60	6		I		
Di-n-octylphthalate	1804	1.262	26.56	6	15.96	E	40	___
Benzo(b)fluoranthene	0	0.893	0.00	6	1.25	ND	40	___
Benzo(k)fluoranthene	0	0.895	0.00	6	1.25	ND	40	___
Benzo(a)pyrene	0	0.877	0.00	6	1.27	ND	40	___
Indeno(1,2,3-cd)pyrene	0	0.992	0.00	6	1.13	ND	40	___
Dibenz(a,h)anthracene	0	0.770	0.00	6	1.45	ND	40	___
Benzo(g,h,i)perylene	0	0.838	0.00	6	1.33	ND	40	___

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD935
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K' 010-R1
Sample ID:
TLI ID: 68-177-1(A-E)
Dilution Factor: 4.00

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
Phenol-d_5	65	1.202	9.15	1	3.83	D	4
Nitrobenzene-d_5	853	0.368	10.87	2	52.80	D	53
1,3,5-Trichlorobenzene-d_3	670	0.354	11.56	2	43.14	D	43
1,4-Dibromobenzene-d_4	602	0.824	12.43	1	51.12	D	51
2-Fluorobiphenyl	1546	1.238	14.55	3	51.33	D	51
2,4,6-Tribromophenol	0	0.282	0.00	3	NA	ND	NA
Anthracene-d_{10}	2716	0.864	19.15	4	55.01	D	55
Pyrene-d_{10}	3235	1.050	22.00	5	37.52	D	38
Terphenyl-d_{14}	2981	0.785	22.38	5	46.24	D	46

Reviewed by _____ MJ _____ Date 8/10/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD928
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K 010-R2
Sample ID:
TLI ID: 68-177-2(A-E)
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
1,4-Dichlorobenzene-d_4	1605		9.81	1		I		
Phenol	3323	1.254	9.12	1	66.05	D	10	
bis(2-Chloroethyl)ether	0	0.940	0.00	1	2.65	ND	10	
2-Chlorophenol	0	1.199	0.00	1	2.08	ND	10	
1,3-Dichlorobenzene	0	1.280	0.00	1	1.95	ND	10	
1,4-Dichlorobenzene	268	1.289	9.84	1	5.19	E	10	
1,2-Dichlorobenzene	0	1.215	0.00	1	2.05	ND	10	
2,2'-oxybis(1-Chloropropane)	0	1.084	0.00	1	2.30	ND	10	
Benzyl alcohol	0	0.595	0.00	1	4.19	ND	10	
2-Methylphenol	0	0.894	0.00	1	2.79	ND	10	
3/4-Methylphenol	0	0.924	0.00	1	2.70	ND	10	
N-Nitroso-di-n-propylamine	0	0.593	0.00	1	4.20	ND	10	
Hexachloroethane	0	0.578	0.00	1	4.31	ND	10	
Naphthalene-d_8	5050		12.33	2		I		
Nitrobenzene	0	0.322	0.00	2	2.46	ND	10	
Isophorone	0	0.604	0.00	2	1.31	ND	10	
2-Nitrophenol	0	0.219	0.00	2	3.62	ND	10	
2,4-Dimethylphenol	0	0.330	0.00	2	2.40	ND	10	
bis(2-Chloroethoxy)methane	0	0.381	0.00	2	2.08	ND	10	
Benzoic acid	7070	0.237	11.88	2	236.27	E	10	
2,4-Dichlorophenol	0	0.295	0.00	2	2.68	ND	10	
1,2,4-Trichlorobenzene	0	0.333	0.00	2	2.38	ND	10	
Naphthalene	3210	0.973	12.36	2	26.13	D	10	
4-Chloroaniline	0	0.405	0.00	2	1.96	ND	10	
Hexachlorobutadiene	0	0.193	0.00	2	4.10	ND	10	
4-Chloro-3-methylphenol	0	0.294	0.00	2	2.69	ND	10	
2-Methylnaphthalene	298	0.592	13.78	2	3.99	E	10	
Acenaphthene-d_{10}	2825		15.95	3		I		
Hexachlorocyclopentadiene	0	0.309	0.00	3	4.58	ND	10	
2,4,6-Trichlorophenol	0	0.370	0.00	3	3.83	ND	10	
2,4,5-Trichlorophenol	0	0.403	0.00	3	3.51	ND	10	
2-Chloronaphthalene	0	1.052	0.00	3	1.35	ND	10	
2-Nitroaniline	0	0.315	0.00	3	4.49	ND	10	
Dimethylphthalate	0	1.354	0.00	3	1.05	ND	10	
2,6-Dinitrotoluene	0	0.329	0.00	3	4.30	ND	10	
2,4-Dinitrotoluene	0	0.556	0.00	3	2.55	ND	10	
Acenaphthylene	0	1.821	0.00	3	0.78	ND	10	

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD928
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K)10-R2
Sample ID:
TLI ID: 68-177-2(A-E)
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
3-Nitroaniline	0	0.426	0.00	3	3.32	ND	10	
Acenaphthene	0	1.036	0.00	3	1.37	ND	10	
2,4-Dinitrophenol	0	0.213	0.00	3	6.65	ND	10	
4-Nitrophenol	0	0.315	0.00	3	4.49	ND	10	
Dibenzofuran	57	1.570	16.37	3	0.52	E	10	
Diethylphthalate	394	1.594	16.87	3	3.50	E	10	
4-Chlorophenyl-phenylether	0	0.582	0.00	3	2.43	ND	10	
Fluorene	0	1.304	0.00	3	1.09	ND	10	
4-Nitroaniline	0	0.589	0.00	3	2.40	ND	10	
Phenanthrene-d_{10}	6329		19.04	4		I		
4,6-Dinitro-2-methylphenol	0	0.144	0.00	4	4.39	ND	10	
N-Nitrosodiphenylamine	0	0.378	0.00	4	1.67	ND	10	
4-Bromophenyl-phenylether	0	0.160	0.00	4	3.95	ND	10	
Hexachlorobenzene	0	0.209	0.00	4	3.02	ND	10	
Pentachlorophenol	0	0.170	0.00	4	3.72	ND	10	
Phenanthrene	198	0.959	19.09	4	1.31	E	10	
Anthracene	0	0.899	0.00	4	0.70	ND	10	
Di-n-butylphthalate	15083	1.555	20.29	4	61.30	D	10	
Fluoranthene	0	1.339	0.00	4	0.47	ND	10	
Chrysene-d_{12}	8333		24.61	5		I		
Pyrene	0	1.296	0.00	5	0.37	ND	10	
Butylbenzylphthalate	233	0.723	23.41	5	1.55	E	10	
3,3'-Dichlorobenzidine	0	0.394	0.00	5	1.22	ND	10	
bis(2-Ethylhexyl)phthalate	47321	0.873	24.69	5	260.19	E	10	
Benzo(a)anthracene	0	1.074	0.00	5	0.45	ND	10	
Chrysene	0	0.990	0.00	5	0.48	ND	10	
Perylene-d_{12}	9376		28.59	6		I		
Di-n-octylphthalate	4963	1.262	26.55	6	16.78	D	10	
Benzo(b)fluoranthene	0	0.893	0.00	6	0.48	ND	10	
Benzo(k)fluoranthene	0	0.895	0.00	6	0.48	ND	10	
Benzo(a)pyrene	0	0.877	0.00	6	0.49	ND	10	
Indeno(1,2,3-cd)pyrene	0	0.992	0.00	6	0.43	ND	10	
Dibenz(a,h)anthracene	0	0.770	0.00	6	0.55	ND	10	
Benzo(g,h,i)perylene	0	0.838	0.00	6	0.51	ND	10	

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD928
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K(10-R2
Sample ID:
TLI ID: 68-177-2(A-E)
Dilution Factor: 1.00

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
Phenol-d_5	4292	1.202	9.10	1	88.99	D	89
Nitrobenzene-d_5	3474	0.368	10.88	2	74.77	D	75
1,3,5-Trichlorobenzene-d_3	2758	0.354	11.55	2	61.72	D	62
1,4-Dibromobenzene-d_4	2657	0.824	12.43	1	80.38	D	80
2-Fluorobiphenyl	7171	1.238	14.55	3	82.00	D	82
2,4,6-Tribromophenol	2055	0.282	17.59	3	103.18	D	103
Anthracene-d_{10}	12700	0.864	19.16	4	92.90	D	93
Pyrene-d_{10}	15602	1.050	22.01	5	71.33	D	71
Terphenyl-d_{14}	14080	0.785	22.39	5	86.10	D	86

Reviewed by ______ M) ______ Date 8/16/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard   Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD933
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K(10-R2
Sample ID:
TLI ID: 68-177-2(A-E)
Dilution Factor: 2.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
1,4-Dichlorobenzene-d_4	1744		9.81	1		I		
Phenol	0	1.254	0.00	1	3.66	ND	20	____
bis(2-Chloroethyl)ether	0	0.940	0.00	1	4.88	ND	20	____
2-Chlorophenol	0	1.199	0.00	1	3.82	ND	20	____
1,3-Dichlorobenzene	0	1.280	0.00	1	3.58	ND	20	____
1,4-Dichlorobenzene	0	1.289	0.00	1	3.56	ND	20	____
1,2-Dichlorobenzene	0	1.215	0.00	1	3.77	ND	20	____
2,2'-oxybis(1-Chloropropane)	0	1.084	0.00	1	4.23	ND	20	____
Benzyl alcohol	0	0.595	0.00	1	7.71	ND	20	____
2-Methylphenol	0	0.894	0.00	1	5.13	ND	20	____
3/4-Methylphenol	0	0.924	0.00	1	4.96	ND	20	____
N-Nitroso-di-n-propylamine	0	0.593	0.00	1	7.73	ND	20	____
Hexachloroethane	0	0.578	0.00	1	7.93	ND	20	____
Naphthalene-d_8	5298		12.33	2		I		
Nitrobenzene	0	0.322	0.00	2	4.69	ND	20	____
Isophorone	0	0.604	0.00	2	2.50	ND	20	____
2-Nitrophenol	0	0.219	0.00	2	6.89	ND	20	____
2,4-Dimethylphenol	0	0.330	0.00	2	4.58	ND	20	____
bis(2-Chloroethoxy)methane	0	0.381	0.00	2	3.96	ND	20	____
Benzoic acid	4103	0.237	11.85	2	261.41	D	20	____
2,4-Dichlorophenol	0	0.295	0.00	2	5.12	ND	20	____
1,2,4-Trichlorobenzene	0	0.333	0.00	2	4.53	ND	20	____
Naphthalene	821	0.973	12.37	2	12.74	E	20	____
4-Chloroaniline	0	0.405	0.00	2	3.73	ND	20	____
Hexachlorobutadiene	0	0.193	0.00	2	7.82	ND	20	____
4-Chloro-3-methylphenol	0	0.294	0.00	2	5.14	ND	20	____
2-Methylnaphthalene	61	0.592	13.79	2	1.56	E	20	____
Acenaphthene-d_{10}	2899		15.95	3		I		
Hexachlorocyclopentadiene	0	0.309	0.00	3	8.93	ND	20	____
2,4,6-Trichlorophenol	0	0.370	0.00	3	7.46	ND	20	____
2,4,5-Trichlorophenol	0	0.403	0.00	3	6.85	ND	20	____
2-Chloronaphthalene	0	1.052	0.00	3	2.62	ND	20	____
2-Nitroaniline	0	0.315	0.00	3	8.76	ND	20	____
Dimethylphthalate	0	1.354	0.00	3	2.04	ND	20	____
2,6-Dinitrotoluene	0	0.329	0.00	3	8.39	ND	20	____
2,4-Dinitrotoluene	0	0.556	0.00	3	4.96	ND	20	____
Acenaphthylene	0	1.821	0.00	3	1.52	ND	20	____

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD933
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K)10-R2
Sample ID:
TLI ID: 68-177-2(A-E)
Dilution Factor: 2.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
3-Nitroaniline	0	0.426	0.00	3	6.48	ND	20	
Acenaphthene	0	1.036	0.00	3	2.66	ND	20	
2,4-Dinitrophenol	0	0.213	0.00	3	12.95	ND	20	
4-Nitrophenol	0	0.315	0.00	3	8.76	ND	20	
Dibenzofuran	0	1.570	0.00	3	1.76	ND	20	
Diethylphthalate	0	1.594	0.00	3	1.73	ND	20	
4-Chlorophenyl-phenylether	0	0.582	0.00	3	4.74	ND	20	
Fluorene	0	1.304	0.00	3	2.12	ND	20	
4-Nitroaniline	0	0.589	0.00	3	4.68	ND	20	
Phenanthrene-d_{10}	6351		19.05	4		I		
4,6-Dinitro-2-methylphenol	0	0.144	0.00	4	8.75	ND	20	
N-Nitrosodiphenylamine	0	0.378	0.00	4	3.33	ND	20	
4-Bromophenyl-phenylether	0	0.160	0.00	4	7.87	ND	20	
Hexachlorobenzene	0	0.209	0.00	4	6.03	ND	20	
Pentachlorophenol	0	0.170	0.00	4	7.41	ND	20	
Phenanthrene	0	0.959	0.00	4	1.31	ND	20	
Anthracene	0	0.899	0.00	4	1.40	ND	20	
Di-n-butylphthalate	3953	1.555	20.29	4	32.02	D	20	
Fluoranthene	0	1.339	0.00	4	0.94	ND	20	
Chrysene-d_{12}	9055		24.61	5		I		
Pyrene	0	1.296	0.00	5	0.68	ND	20	
Butylbenzylphthalate	0	0.723	0.00	5	1.22	ND	20	
3,3'-Dichlorobenzidine	0	0.394	0.00	5	2.24	ND	20	
bis(2-Ethylhexyl)phthalate	13774	0.873	24.69	5	139.40	D	20	
Benzo(a)anthracene	0	1.074	0.00	5	0.82	ND	20	
Chrysene	0	0.990	0.00	5	0.89	ND	20	
Perylene-d_{12}	9349		28.60	6		I		
Di-n-octylphthalate	0	1.262	0.00	6	0.68	ND	20	
Benzo(b)fluoranthene	0	0.893	0.00	6	0.96	ND	20	
Benzo(k)fluoranthene	0	0.895	0.00	6	0.96	ND	20	
Benzo(a)pyrene	0	0.877	0.00	6	0.98	ND	20	
Indeno(1,2,3-cd)pyrene	0	0.992	0.00	6	0.86	ND	20	
Dibenz(a,h)anthracene	0	0.770	0.00	6	1.11	ND	20	
Benzo(g,h,i)perylene	0	0.838	0.00	6	1.02	ND	20	

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801 Capitola Dr.
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Sample File: ZD933
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: KC 10-R2
Sample ID:
TLI ID: 68-177-2(A-E)
Dilution Factor: 2.00

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
Phenol-d_5	139	1.202	9.16	1	5.33	D	5
Nitrobenzene-d_5	808	0.368	10.88	2	33.17	D	33
1,3,5-Trichlorobenzene-d_3	678	0.354	11.56	2	28.93	D	29
1,4-Dibromobenzene-d_4	659	0.824	12.43	1	36.71	D	37
2-Fluorobiphenyl	1726	1.238	14.55	3	38.47	D	38
2,4,6-Tribromophenol	19	0.282	17.62	3	1.86	D	2
Anthracene-d_{10}	3044	0.864	19.16	4	44.38	D	44
Pyrene-d_{10}	3920	1.050	22.01	5	32.98	D	33
Terphenyl-d_{14}	3676	0.785	22.38	5	41.38	D	41

Reviewed by M) Date 8/16/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard Orgrep v4.3

Triangle Laboratories of RTP, Inc.
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Sample File: ZD927
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: ł 010-R3
Sample ID:
TLI ID: 68-177-3(A-E)
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
1,4-Dichlorobenzene-d_4	1538		9.80	1		I		
Phenol	4021	1.254	9.12	1	83.37	D	10	___
bis(2-Chloroethyl)ether	0	0.940	0.00	1	2.77	ND	10	___
2-Chlorophenol	0	1.199	0.00	1	2.17	ND	10	___
1,3-Dichlorobenzene	0	1.280	0.00	1	2.03	ND	10	___
1,4-Dichlorobenzene	305	1.289	9.84	1	6.16	E	10	___
1,2-Dichlorobenzene	0	1.215	0.00	1	2.14	ND	10	___
2,2'-oxybis(1-Chloropropane)	0	1.084	0.00	1	2.40	ND	10	___
Benzyl alcohol	0	0.595	0.00	1	4.37	ND	10	___
2-Methylphenol	0	0.894	0.00	1	2.91	ND	10	___
3/4-Methylphenol	0	0.924	0.00	1	2.81	ND	10	___
N-Nitroso-di-n-propylamine	0	0.593	0.00	1	4.38	ND	10	___
Hexachloroethane	0	0.578	0.00	1	4.50	ND	10	___
Naphthalene-d_8	4667		12.33	2		I		
Nitrobenzene	0	0.322	0.00	2	2.66	ND	10	___
Isophorone	0	0.604	0.00	2	1.42	ND	10	___
2-Nitrophenol	0	0.219	0.00	2	3.91	ND	10	___
2,4-Dimethylphenol	0	0.330	0.00	2	2.60	ND	10	___
bis(2-Chloroethoxy)methane	0	0.381	0.00	2	2.25	ND	10	___
Benzoic acid	18180	0.237	12.01	2	657.34	E	10	___
2,4-Dichlorophenol	0	0.295	0.00	2	2.90	ND	10	___
1,2,4-Trichlorobenzene	0	0.333	0.00	2	2.57	ND	10	___
Naphthalene	6327	0.973	12.37	2	55.73	D	10	___
4-Chloroaniline	0	0.405	0.00	2	2.12	ND	10	___
Hexachlorobutadiene	0	0.193	0.00	2	4.44	ND	10	___
4-Chloro-3-methylphenol	0	0.294	0.00	2	2.91	ND	10	___
2-Methylnaphthalene	267	0.592	13.78	2	3.87	E	10	___
Acenaphthene-d_{10}	2644		15.94	3		I		
Hexachlorocyclopentadiene	0	0.309	0.00	3	4.89	ND	10	___
2,4,6-Trichlorophenol	0	0.370	0.00	3	4.09	ND	10	___
2,4,5-Trichlorophenol	0	0.403	0.00	3	3.75	ND	10	___
2-Chloronaphthalene	0	1.052	0.00	3	1.44	ND	10	___
2-Nitroaniline	0	0.315	0.00	3	4.80	ND	10	___
Dimethylphthalate	0	1.354	0.00	3	1.12	ND	10	___
2,6-Dinitrotoluene	0	0.329	0.00	3	4.60	ND	10	___
2,4-Dinitrotoluene	0	0.556	0.00	3	2.72	ND	10	___
Acenaphthylene	335	1.821	15.95	3	2.79	E	10	___

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard

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Sample File: ZD927
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K 10-R3
Sample ID:
TLI ID: 68-177-3(A-E)
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
3-Nitroaniline	0	0.426	0.00	3	3.55	ND	10	____
Acenaphthene	0	1.036	0.00	3	1.46	ND	10	____
2,4-Dinitrophenol	0	0.213	0.00	3	7.10	ND	10	____
4-Nitrophenol	0	0.315	0.00	3	4.80	ND	10	____
Dibenzofuran	0	1.570	0.00	3	0.96	ND	10	____
Diethylphthalate	360	1.594	16.86	3	3.42	E	10	____
4-Chlorophenyl-phenylether	0	0.582	0.00	3	2.60	ND	10	____
Fluorene	0	1.304	0.00	3	1.16	ND	10	____
4-Nitroaniline	0	0.589	0.00	3	2.57	ND	10	____
Phenanthrene-d_{10}	5718		19.04	4		I		
4,6-Dinitro-2-methylphenol	0	0.144	0.00	4	4.86	ND	10	____
N-Nitrosodiphenylamine	0	0.378	0.00	4	1.85	ND	10	____
4-Bromophenyl-phenylether	0	0.160	0.00	4	4.37	ND	10	____
Hexachlorobenzene	0	0.209	0.00	4	3.35	ND	10	____
Pentachlorophenol	0	0.170	0.00	4	4.11	ND	10	____
Phenanthrene	0	0.959	0.00	4	0.73	ND	10	____
Anthracene	0	0.899	0.00	4	0.78	ND	10	____
Di-n-butylphthalate	10606	1.555	20.29	4	47.71	D	10	____
Fluoranthene	0	1.339	0.00	4	0.52	ND	10	____
Chrysene-d_{12}	7851		24.60	5		I		
Pyrene	99	1.296	22.04	5	0.39	E	10	____
Butylbenzylphthalate	222	0.723	23.41	5	1.57	E	10	____
3,3'-Dichlorobenzidine	0	0.394	0.00	5	1.29	ND	10	____
bis(2-Ethylhexyl)phthalate	43645	0.873	24.70	5	254.71	E	10	____
Benzo(a)anthracene	0	1.074	0.00	5	0.47	ND	10	____
Chrysene	0	0.990	0.00	5	0.51	ND	10	____
Perylene-d_{12}	8959		28.60	6		I		
Di-n-octylphthalate	2880	1.262	26.55	6	10.19	D	10	____
Benzo(b)fluoranthene	0	0.893	0.00	6	0.50	ND	10	____
Benzo(k)fluoranthene	0	0.895	0.00	6	0.50	ND	10	____
Benzo(a)pyrene	0	0.877	0.00	6	0.51	ND	10	____
Indeno(1,2,3-cd)pyrene	0	0.992	0.00	6	0.45	ND	10	____
Dibenz(a,h)anthracene	0	0.770	0.00	6	0.58	ND	10	____
Benzo(g,h,i)perylene	0	0.838	0.00	6	0.53	ND	10	____

Triangle Laboratories of RTP, Inc.
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(919) 544-5729

Sample File: ZD927
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K)10-R3
Sample ID:
TLI ID: 68-177-3(A-E)
Dilution Factor: 1.00

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
Phenol-d_5	4619	1.202	9.09	1	99.91	D	100
Nitrobenzene-d_5	3706	0.368	10.88	2	86.30	D	86
1,3,5-Trichlorobenzene-d_3	3176	0.354	11.56	2	76.88	D	77
1,4-Dibromobenzene-d_4	2851	0.824	12.43	1	89.96	D	90
2-Fluorobiphenyl	7511	1.238	14.55	3	91.76	D	92
2,4,6-Tribromophenol	2007	0.282	17.58	3	107.65	D	108
Anthracene-d_{10}	12987	0.864	19.16	4	105.14	D	105
Pyrene-d_{10}	16575	1.050	22.01	5	80.43	D	80
Terphenyl-d_{14}	14152	0.785	22.39	5	91.85	D	92

Reviewed by M Date 8/16/93

ND -Not Detected: D- Detected: E- Estimated: I- Internal Standard Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD934
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: K)10-R3
Sample ID:
TLI ID: 68-177-3(A-E)
Dilution Factor: 4.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
1,4-Dichlorobenzene-d_4	1765		9.81	1		I		
Phenol	0	1.254	0.00	1	7.23	ND	40	
bis(2-Chloroethyl)ether	0	0.940	0.00	1	9.64	ND	40	
2-Chlorophenol	0	1.199	0.00	1	7.56	ND	40	
1,3-Dichlorobenzene	0	1.280	0.00	1	7.08	ND	40	
1,4-Dichlorobenzene	0	1.289	0.00	1	7.03	ND	40	
1,2-Dichlorobenzene	0	1.215	0.00	1	7.46	ND	40	
2,2'-oxybis(1-Chloropropane)	0	1.084	0.00	1	8.36	ND	40	
Benzyl alcohol	0	0.595	0.00	1	15.24	ND	40	
2-Methylphenol	0	0.894	0.00	1	10.14	ND	40	
3/4-Methylphenol	0	0.924	0.00	1	9.81	ND	40	
N-Nitroso-di-n-propylamine	0	0.593	0.00	1	15.29	ND	40	
Hexachloroethane	0	0.578	0.00	1	15.68	ND	40	
Naphthalene-d_8	5523		12.32	2		I		
Nitrobenzene	0	0.322	0.00	2	9.00	ND	40	
Isophorone	0	0.604	0.00	2	4.80	ND	40	
2-Nitrophenol	0	0.219	0.00	2	13.23	ND	40	
2,4-Dimethylphenol	0	0.330	0.00	2	8.78	ND	40	
bis(2-Chloroethoxy)methane	0	0.381	0.00	2	7.60	ND	40	
Benzoic acid	4306	0.237	11.86	2	526.35	D	40	
2,4-Dichlorophenol	0	0.295	0.00	2	9.82	ND	40	
1,2,4-Trichlorobenzene	0	0.333	0.00	2	8.70	ND	40	
Naphthalene	1729	0.973	12.37	2	51.49	D	40	
4-Chloroaniline	0	0.405	0.00	2	7.15	ND	40	
Hexachlorobutadiene	0	0.193	0.00	2	15.01	ND	40	
4-Chloro-3-methylphenol	0	0.294	0.00	2	9.85	ND	40	
2-Methylnaphthalene	65	0.592	13.78	2	3.22	E	40	
Acenaphthene-d_{10}	3005		15.94	3		I		
Hexachlorocyclopentadiene	0	0.309	0.00	3	17.23	ND	40	
2,4,6-Trichlorophenol	0	0.370	0.00	3	14.39	ND	40	
2,4,5-Trichlorophenol	0	0.403	0.00	3	13.21	ND	40	
2-Chloronaphthalene	0	1.052	0.00	3	5.06	ND	40	
2-Nitroaniline	0	0.315	0.00	3	16.90	ND	40	
Dimethylphthalate	0	1.354	0.00	3	3.93	ND	40	
2,6-Dinitrotoluene	0	0.329	0.00	3	16.18	ND	40	
2,4-Dinitrotoluene	0	0.556	0.00	3	9.57	ND	40	
Acenaphthylene	0	1.821	0.00	3	2.92	ND	40	

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD934
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: KC '0-R3
Sample ID:
TLI ID: 68-177-3(A-E)
Dilution Factor: 4.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
3-Nitroaniline	0	0.426	0.00	3	12.49	ND	40	____
Acenaphthene	0	1.036	0.00	3	5.14	ND	40	____
2,4-Dinitrophenol	0	0.213	0.00	3	24.99	ND	40	____
4-Nitrophenol	0	0.315	0.00	3	16.90	ND	40	____
Dibenzofuran	0	1.570	0.00	3	3.39	ND	40	____
Diethylphthalate	0	1.594	0.00	3	3.34	ND	40	____
4-Chlorophenyl-phenylether	0	0.582	0.00	3	9.15	ND	40	____
Fluorene	0	1.304	0.00	3	4.08	ND	40	____
4-Nitroaniline	0	0.589	0.00	3	9.04	ND	40	____
Phenanthrene-d_{10}	6581		19.04	4		I		
4,6-Dinitro-2-methylphenol	0	0.144	0.00	4	16.88	ND	40	____
N-Nitrosodiphenylamine	0	0.378	0.00	4	6.43	ND	40	____
4-Bromophenyl-phenylether	0	0.160	0.00	4	15.19	ND	40	____
Hexachlorobenzene	0	0.209	0.00	4	11.63	ND	40	____
Pentachlorophenol	0	0.170	0.00	4	14.30	ND	40	____
Phenanthrene	0	0.959	0.00	4	2.53	ND	40	____
Anthracene	0	0.899	0.00	4	2.70	ND	40	____
Di-n-butylphthalate	3055	1.555	20.29	4	47.77	D	40	____
Fluoranthene	0	1.339	0.00	4	1.82	ND	40	____
Chrysene-d_{12}	9465		24.60	5		I		
Pyrene	0	1.296	0.00	5	1.30	ND	40	____
Butylbenzylphthalate	0	0.723	0.00	5	2.34	ND	40	____
3,3'-Dichlorobenzidine	0	0.394	0.00	5	4.29	ND	40	____
bis(2-Ethylhexyl)phthalate	13531	0.873	24.68	5	262.00	D	40	____
Benzo(a)anthracene	0	1.074	0.00	5	1.57	ND	40	____
Chrysene	0	0.990	0.00	5	1.71	ND	40	____
Perylene-d_{12}	9638		28.60	6		I		
Di-n-octylphthalate	0	1.262	0.00	6	1.32	ND	40	____
Benzo(b)fluoranthene	0	0.893	0.00	6	1.86	ND	40	____
Benzo(k)fluoranthene	0	0.895	0.00	6	1.85	ND	40	____
Benzo(a)pyrene	0	0.877	0.00	6	1.89	ND	40	____
Indeno(1,2,3-cd)pyrene	0	0.992	0.00	6	1.67	ND	40	____
Dibenz(a,h)anthracene	0	0.770	0.00	6	2.16	ND	40	____
Benzo(g,h,i)perylene	0	0.838	0.00	6	1.98	ND	40	____

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard   Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD934
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: F 010-R3
Sample ID:
TLI ID: 68-177-3(A-E)
Dilution Factor: 4.00

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
Phenol-d_5	126	1.202	9.12	1	9.50	D	10
Nitrobenzene-d_5	991	0.368	10.88	2	78.07	D	78
1,3,5-Trichlorobenzene-d_3	845	0.354	11.56	2	69.21	D	69
1,4-Dibromobenzene-d_4	768	0.824	12.43	1	84.53	D	85
2-Fluorobiphenyl	1971	1.238	14.56	3	84.79	D	85
2,4,6-Tribromophenol	54	0.282	17.60	3	10.31	D	10
Anthracene-d_{10}	3442	0.864	19.15	4	96.85	D	97
Pyrene-d_{10}	4726	1.050	22.00	5	76.09	D	76
Terphenyl-d_{14}	3974	0.785	22.38	5	85.57	D	86

Reviewed by m Date 8/16/93

ND -Not Detected; D- Detected; E- Estimated; I- Internal Standard Orgrep v4.3

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD925
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: SB)80593
Sample ID:
TLI ID: N/A
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
1,4-Dichlorobenzene-d_4	1467		9.80	1		I		
Phenol	0	1.254	0.00	1	2.17	ND	10	___
bis(2-Chloroethyl)ether	0	0.940	0.00	1	2.90	ND	10	___
2-Chlorophenol	0	1.199	0.00	1	2.27	ND	10	___
1,3-Dichlorobenzene	0	1.280	0.00	1	2.13	ND	10	___
1,4-Dichlorobenzene	0	1.289	0.00	1	2.11	ND	10	___
1,2-Dichlorobenzene	0	1.215	0.00	1	2.24	ND	10	___
2,2'-oxybis(1-Chloropropane)	0	1.084	0.00	1	2.51	ND	10	___
Benzyl alcohol	0	0.595	0.00	1	4.58	ND	10	___
2-Methylphenol	0	0.894	0.00	1	3.05	ND	10	___
3/4-Methylphenol	0	0.924	0.00	1	2.95	ND	10	___
N-Nitroso-di-n-propylamine	0	0.593	0.00	1	4.59	ND	10	___
Hexachloroethane	0	0.578	0.00	1	4.71	ND	10	___
Naphthalene-d_8	4468		12.32	2		I		
Nitrobenzene	0	0.322	0.00	2	2.78	ND	10	___
Isophorone	0	0.604	0.00	2	1.48	ND	10	___
2-Nitrophenol	0	0.219	0.00	2	4.09	ND	10	___
2,4-Dimethylphenol	0	0.330	0.00	2	2.71	ND	10	___
bis(2-Chloroethoxy)methane	0	0.381	0.00	2	2.35	ND	10	___
Benzoic acid	0	0.237	0.00	2	3.78	ND	10	___
2,4-Dichlorophenol	0	0.295	0.00	2	3.03	ND	10	___
1,2,4-Trichlorobenzene	0	0.333	0.00	2	2.69	ND	10	___
Naphthalene	596	0.973	12.36	2	5.49	E	10	___
4-Chloroaniline	0	0.405	0.00	2	2.21	ND	10	___
Hexachlorobutadiene	0	0.193	0.00	2	4.64	ND	10	___
4-Chloro-3-methylphenol	0	0.294	0.00	2	3.04	ND	10	___
2-Methylnaphthalene	0	0.592	0.00	2	1.51	ND	10	___
Acenaphthene-d_{10}	2528		15.94	3		I		
Hexachlorocyclopentadiene	0	0.309	0.00	3	5.12	ND	10	___
2,4,6-Trichlorophenol	0	0.370	0.00	3	4.28	ND	10	___
2,4,5-Trichlorophenol	0	0.403	0.00	3	3.93	ND	10	___
2-Chloronaphthalene	0	1.052	0.00	3	1.50	ND	10	___
2-Nitroaniline	0	0.315	0.00	3	5.02	ND	10	___
Dimethylphthalate	0	1.354	0.00	3	1.17	ND	10	___
2,6-Dinitrotoluene	0	0.329	0.00	3	4.81	ND	10	___
2,4-Dinitrotoluene	0	0.556	0.00	3	2.85	ND	10	___
Acenaphthylene	0	1.821	0.00	3	0.87	ND	10	___

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD925
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: S: 080593
Sample ID:
TLI ID: N/A
Dilution Factor: 1.00

Quantitation Results Method 8270-TB2

Analyte	Area	RF	RT	ISID	Amount ug	Code	Quan Limit	FLAG
3-Nitroaniline	0	0.426	0.00	3	3.71	ND	10	____
Acenaphthene	0	1.036	0.00	3	1.53	ND	10	____
2,4-Dinitrophenol	0	0.213	0.00	3	7.43	ND	10	____
4-Nitrophenol	0	0.315	0.00	3	5.02	ND	10	____
Dibenzofuran	0	1.570	0.00	3	1.01	ND	10	____
Diethylphthalate	0	1.594	0.00	3	0.99	ND	10	____
4-Chlorophenyl-phenylether	0	0.582	0.00	3	2.72	ND	10	____
Fluorene	0	1.304	0.00	3	1.21	ND	10	____
4-Nitroaniline	0	0.589	0.00	3	2.69	ND	10	____
Phenanthrene-d_{10}	5026		19.04	4		I		
4,6-Dinitro-2-methylphenol	0	0.144	0.00	4	5.53	ND	10	____
N-Nitrosodiphenylamine	0	0.378	0.00	4	2.11	ND	10	____
4-Bromophenyl-phenylether	0	0.160	0.00	4	4.97	ND	10	____
Hexachlorobenzene	0	0.209	0.00	4	3.81	ND	10	____
Pentachlorophenol	0	0.170	0.00	4	4.68	ND	10	____
Phenanthrene	0	0.959	0.00	4	0.83	ND	10	____
Anthracene	0	0.899	0.00	4	0.89	ND	10	____
Di-n-butylphthalate	12184	1.555	20.29	4	62.35	D	10	____
Fluoranthene	0	1.339	0.00	4	0.59	ND	10	____
Chrysene-d_{12}	6010		24.59	5		I		
Pyrene	0	1.296	0.00	5	0.51	ND	10	____
Butylbenzylphthalate	0	0.723	0.00	5	0.92	ND	10	____
3,3'-Dichlorobenzidine	0	0.394	0.00	5	1.69	ND	10	____
bis(2-Ethylhexyl)phthalate	3331	0.873	24.68	5	25.40	D	10	____
Benzo(a)anthracene	0	1.074	0.00	5	0.62	ND	10	____
Chrysene	0	0.990	0.00	5	0.67	ND	10	____
Perylene-d_{12}	6200		28.59	6		I		
Di-n-octylphthalate	0	1.262	0.00	6	0.51	ND	10	____
Benzo(b)fluoranthene	0	0.893	0.00	6	0.72	ND	10	____
Benzo(k)fluoranthene	0	0.895	0.00	6	0.72	ND	10	____
Benzo(a)pyrene	0	0.877	0.00	6	0.74	ND	10	____
Indeno(1,2,3-cd)pyrene	0	0.992	0.00	6	0.65	ND	10	____
Dibenz(a,h)anthracene	0	0.770	0.00	6	0.84	ND	10	____
Benzo(g,h,i)perylene	0	0.838	0.00	6	0.77	ND	10	____

Triangle Laboratories of RTP, Inc.
801 Capitola Dr.
Durham, NC 27713
(919) 544-5729

Sample File: ZD925
Response File: ZD923
Date Analyzed : 08/09/93
Date Reported : 08/16/93
Project Number: 24684

Sample ID: SF)80593
Sample ID:
TLI ID: N/A
Dilution Factor: 1.00

Surrogate Summary	Area	RF	RT	ISID	Amount (ug)	Code	%REC
Phenol-d_5	3474	1.202	9.07	1	78.77	D	79
Nitrobenzene-d_5	2664	0.368	10.88	2	64.81	D	65
1,3,5-Trichlorobenzene-d_3	2020	0.354	11.55	2	51.10	D	51
1,4-Dibromobenzene-d_4	2177	0.824	12.43	1	72.02	D	72
2-Fluorobiphenyl	5305	1.238	14.55	3	67.80	D	68
2,4,6-Tribromophenol	222	0.282	17.58	3	12.51	D	13
Anthracene-d_{10}	10225	0.864	19.15	4	94.17	D	94
Pyrene-d_{10}	15519	1.050	22.00	5	98.36	D	98
Terphenyl-d_{14}	12766	0.785	22.37	5	108.23	D	108

Reviewed by ____MW____ Date 8/16/93

ND -Not Detected: D- Detected: E- Estimated: I- Internal Standard

APPENDIX E

COAL AND SHALE SAMPLING RESULTS

SUMMARY OF COAL SAMPLING

GENERAL SHALE PLANT #10

RUN I.D.	RUN 1	RUN 2	RUN 3	AVERAGE
DATE	07/29/93	07/29/93	07/30/93	
SAMPLING DATA (AS RECEIVED)				
%Moisture	1.44	1.49	1.46	1.46
%Carbon	79.83	79.77	79.84	79.81
%Hydrogen	5.48	5.43	5.45	5.45
%Nitrogen	1.96	1.89	1.95	1.93
%Sulfur	0.90	0.90	0.90	0.90
%Ash	3.38	3.26	3.20	3.28
%Oxygen(diff)	7.01	7.26	7.20	7.16
Btu/lb	14408	14690	14451	14516
SAMPLING DATA (DRY BASIS)				
%Moisture	NA	NA	NA	NA
%Carbon	81.00	80.98	81.02	81.00
%Hydrogen	5.56	5.51	5.53	5.53
%Nitrogen	1.99	1.92	1.98	1.96
%Sulfur	0.91	0.91	0.91	0.91
%Ash	3.43	3.31	3.25	3.33
%Oxygen(diff)	7.11	7.37	7.31	7.26
Btu/lb	14619	14690	14665	14658

SUMMARY OF SHALE SAMPLING

GENERAL SHALE PLANT #10

RUN I.D. DATE	RUN 1 07/27/93	RUN 2 07/29/93	RUN 3 07/30/93	AVERAGE
SAMPLING DATA (AS RECEIVED)				
%Moisture	1.47	1.16	1.56	1.40
%Sulfur	< 0.01	< 0.01	< 0.01	< 0.01
SAMPLING DATA (DRY BASIS)				
%Moisture	NA	NA	NA	NA
%Sulfur	< 0.01	< 0.01	< 0.01	< 0.01

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COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300

SINCE 1908

Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 808, CHARLESTON, WV 25323
TELEPHONE: (304) 925-6631
FAX: (304) 925-8877

August 6, 1993

ETS, INCORPORATED
1401 MUNICIPAL ROAD, NW
ROANOKE VA 24012
KENNETH APPELL

Sample identification by

SAMPLE I.D.: COAL SAMPLE
07/29/93

Kind of sample reported to us: COAL

Sample taken at: --

Sample taken by

Date sampled: July 29, 1993

Date received: August 5, 1993

Analysis Report No. 61-28088

SHORT PROXIMATE - ULTIMATE ANALYSIS

	As Received	Dry Basis		
% Moisture	1.49	xxxxx		
% Carbon	79.77	80.98		
% Hydrogen	5.43	5.51		
% Nitrogen	1.89	1.92		
% Sulfur	0.90	0.91		
% Ash	3.26	3.31		
% Oxygen(diff)	7.26	7.37		
	100.00	100.00		
Btu/lb	14471	14690	MAF	15193

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Allan B. Seaman

Manager, Charleston Laboratory

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COMMERCIAL TESTING & ENGINEERING CO.

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TELEPHONE: (304) 925-6631
FAX: (304) 925-8877

August 6, 1993

ETS, INCORPORATED
1401 MUNICIPAL ROAD, NW
ROANOKE VA 24012
KENNETH APPELL

Sample identification by

SAMPLE I.D.: COAL SAMPLE
07/29/93

Kind of sample reported to us: COAL

Sample taken at: --

Sample taken by:

Date sampled: July 29, 1993

Date received: August 5, 1993

Analysis Report No. 61-28087

SHORT PROXIMATE - ULTIMATE ANALYSIS

	As Received	Dry Basis		
% Moisture	1.44	xxxxx		
% Carbon	79.83	81.00		
% Hydrogen	5.48	5.56		
% Nitrogen	1.96	1.99		
% Sulfur	0.90	0.91		
% Ash	3.38	3.43		
% Oxygen(diff)	7.01	7.11		
	100.00	100.00		
Btu/lb	14408	14619	MAF	15138

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Allan R. Simmons

Manager, Charleston Laboratory

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COMMERCIAL TESTING & ENGINEERING CO.

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P.O. BOX 808, CHARLESTON, WV 25323
TELEPHONE: (304) 925-6631
FAX: (304) 925-8877

August 6, 1993

ETS, INCORPORATED
1401 MUNICIPAL ROAD, NW
ROANOKE VA 24012
KENNETH APPELL

Sample identification by

SAMPLE I.D.: COAL SAMPLE
07/30/93

Kind of sample reported to us: COAL

Sample taken at: --

Sample taken by:

Date sampled: July 30, 1993

Date received: August 5, 1993

Analysis Report No. 61-28089

SHORT PROXIMATE - ULTIMATE ANALYSIS

	As Received	Dry Basis		
% Moisture	1.46	xxxxx		
% Carbon	79.84	81.02		
% Hydrogen	5.45	5.53		
% Nitrogen	1.95	1.98		
% Sulfur	0.90	0.91		
% Ash	3.20	3.25		
% Oxygen(diff)	7.20	7.31		
	100.00	100.00		
Btu/lb	14451	14665	MAF	15158

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Allan B. [signature]

Manager, Charleston Laboratory

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Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 808, CHARLESTON, WV 25323
TELEPHONE: (304) 925-6631
FAX: (304) 925-6877

August 6, 1993

ETS, INCORPORATED
1401 MUNICIPAL ROAD, NW
ROANOKE VA 24012
KENNETH APPELL

Sample identification by

SAMPLE I.D.: SHALE SAMPLE RUN 1
07/27/93

Kind of sample reported to us SHALE

Sample taken at --

Sample taken by

Date sampled July 27, 1993

Date received August 5, 1993

Analysis report no. 61-28090

MOISTURE & SULFUR IN THE ANALYSIS SAMPLE

	As Received	Dry Basis
% Moisture	1.47	xxxxx
% Sulfur	<.01	<.01

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Allan R. Seaman

Manager, Charleston Laboratory

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P.O. BOX 808, CHARLESTON, WV 25323
TELEPHONE: (304) 925-6631
FAX: (304) 925-8877

August 6, 1993

ETS, INCORPORATED
1401 MUNICIPAL ROAD, NW
ROANOKE VA 24012
KENNETH APPELL

Sample identification by

SAMPLE I.D.: SHALE SAMPLE RUN 2
07/27/93

Kind of sample reported to us: SHALE

Sample taken at: --

Sample taken by:

Date sampled: July 27, 1993

Date received: August 5, 1993

Analysis report no. 61-28091

MOISTURE & SULFUR IN THE ANALYSIS SAMPLE

	As Received	Dry Basis
% Moisture	1.16	xxxxx
% Sulfur	<.01	<.01

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Charleston Laboratory

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COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 808, CHARLESTON, WV 25323
TELEPHONE: (304) 925-6631
FAX: (304) 925-8877

August 6, 1993

ETS, INCORPORATED
1401 MUNICIPAL ROAD, NW
ROANOKE VA 24012
KENNETH APPELL

Sample identification by

SAMPLE I.D.: SHALE SAMPLE RUN 3
07/27/93

Kind of sample reported to us SHALE

Sample taken at --

Sample taken by

Date sampled July 27, 1993

Date received August 5, 1993

Analysis report no. 61-28092

MOISTURE & SULFUR IN THE ANALYSIS SAMPLE

	As Received	Dry Basis
% Moisture	1.56	xxxxx
% Sulfur	<.01	<.01

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Allan R. Swann

Manager, Charleston Laboratory

TERMS AND CONDITIONS ON REVERSE

APPENDIX F.0

LABORATORY RESULTS FOR TRACE METALS AUDIT SAMPLES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ATMOSPHERIC RESEARCH AND EXPOSURE ASSESSMENT LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

ETS INC.
21 TAT

Analysis for Multi-Metal Filters

Sample: Multi metals on glass fiber filters

Procedure: The filter samples should be analyzed according to the proper EPA Reference methods.

Please note that following the complete digestion of the filters, the digestion solution must be either centrifuged or filtered to remove glass fibers.

Results: Report results in ug/filter.

14493-94

EPA AUDIT SAMPLE SUMMARY

Multi Metals Filters
High Level

RUN I.D. = **H399**

LABORATORY DATA
SAMPLE CATCH - micrograms/filter

COMPONENT			SAMPLE
Antimony	Sb		7.28
Arsenic	As		12.8
Beryllium	Be		34.4
Cadmium	Cd		40.8
Chromium	Cr		40.0
Copper	Cu		43.1
Lead	Pb		184
Manganese	Mn		37.6
Mercury	Hg	<	2
Nickel	Ni		180
Phosphorus	P		64.8
Selenium	Se		3.45
Silver	Ag		7.63
Thallium	Tl		2.85
Zinc	Zn		110

EPA AUDIT SAMPLE SUMMARY

Multi Metals Filters
Low Level

RUN I.D. = **L399**

LABORATORY DATA
SAMPLE CATCH - micrograms/filter

COMPONENT			SAMPLE
Antimony	Sb		1.04
Arsenic	As		9.00
Beryllium	Be		2.42
Cadmium	Cd		5.43
Chromium	Cr		7.24
Copper	Cu		7.24
Lead	Pb		21.8
Manganese	Mn		5.97
Mercury	Hg	<	2
Nickel	Ni		14.5
Phosphorus	P		48.7
Selenium	Se		1.15
Silver	Ag		4.57
Thallium	Tl		2.32
Zinc	Zn		54.6

RECEIVED SEP 24 1993

ETS Analytical Services, Inc.

Proudly serving industry and government since 1973.

A USEPA Contract Laboratory

A subsidiary of ETS International, Inc.

WA 1-14 EPA AUDIT SAMPLES

ETS, Inc.
1401 Municipal Road N.W.
Roanoke, VA 24012
ATTN: Dr. Ted Handel

Re: Laboratory Analysis
ETSAS Client No. 6593

REPORT DATE/NUMBER: September 24, 1993 / 223

ANALYSIS FOR: Multi Metals on Glass Fiber Filters

METHOD OF ANALYSIS: USEPA Methods 200.7, 245.5, 270.2, 279.2

SAMPLE ANALYSIS DATA

Lab ID: 144193 Client ID: H399 Matrix: FILTER
Other ID: Collected by: CLIENT
Collection Date: / / Time: Received at ETSAS: 08/04/93

Antimony	7.28 ug/filter
Arsenic	12.8 ug/filter
Beryllium	34.4 ug/filter
Cadmium	40.8 ug/filter
Chromium	40.0 ug/filter
Copper	43.1 ug/filter
Lead	184 ug/filter
Manganese	37.6 ug/filter
Mercury	< 2 ug/filter
Nickel	180 ug/filter
Phosphorous	64.8 ug/filter
Selenium	3.45 ug/filter
Silver	7.63 ug/filter
Thallium	2.85 ug/filter
Zinc	110 ug/filter

Lab ID: 144194 Client ID: L399 Matrix: FILTER
Other ID: Collected by: CLIENT
Collection Date: / / Time: Received at ETSAS: 08/04/93

Antimony	1.04 ug/filter
Arsenic	9.00 ug/filter
Beryllium	2.42 ug/filter

REPORT CONTINUED ON NEXT PAGE

ETS, Inc.
Report of 09/24/93
Page No. 2

SAMPLE ANALYSIS DATA

Lab ID: 144194 (continued)

Cadmium	5.43 ug/filter
Chromium	7.24 ug/filter
Copper	7.24 ug/filter
Lead	21.8 ug/filter
Manganese	5.97 ug/filter
Mercury	< 2 ug/filter
Nickel	14.5 ug/filter
Phosphorous	48.7 ug/filter
Selenium	1.15 ug/filter
Silver	4.57 ug/filter
Thallium	2.32 ug/filter
Zinc	54.6 ug/filter

If we may be of further assistance, please contact us at any time.

Sincerely,
ETS ANALYTICAL SERVICES, INC.

Susanne H. Deegan

Susanne H. Deegan, Project Manager

	Multi Metals Filters Low Level	Multi Metals Filters High Level
Elements	Reported Values (µg)	Reported Values (µg)
Be	2.42	34.4
Cd	5.43	40.8
Cr	7.24	40.0
Cu	7.24	43.1
P	48.7	64.8
Pb	21.8	184
Mn	5.97	37.6
Ni	14.5	180
Ag	4.57	7.63
Zn	54.6	110
As	9.00	12.8
Sb	1.04	7.28
Se .f	1.15	3.45
Tl .f	2.32	2.85
Hg cv	~~0.2w~~ 2u	~~0.2w~~ 2u

APPENDIX G.0

EQUATIONS AND CALCULATIONS

APPENDIX G.1

CALCULATIONS FOR EPA METHODS 2-4

EPA METHODS 2-4 CALCULATIONS

1. Metered Gas Sample Volume at Standard Conditions

$$V_{m(std)} = V_m \times \gamma \times \frac{528}{29.92} \times \left[\frac{P_B + \frac{\Delta H}{13.6}}{T_m + 460}\right]$$

2. Gas Volume of Water Vapor Collected in Impinger Liquid

$$V_{WC(std)} = (v_f - v_i) \times 0.04707$$

3. Gas Volume of Water Vapor Collected in Silica Gel

$$V_{wsg(std)} = (w_f - w_i) \times 0.04715$$

4. Moisture Volume Fraction in Flue Gas

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

5. Moisture Volume Percentage in Flue Gas

$$\%H_2O = B_{ws} \times 100$$

6. Absolute Pressure of Flue Gas

$$P_s = P_B + \frac{P_{static}}{13.6}$$

7. Nitrogen Content of Flue Gas

$$\%N_2 = 100 - (\%CO_2 + \%O_2 + \%CO)$$

8. Dry Molecular Weight of Flue Gas

$$M_d = 0.44 \times \%CO_2 + 0.32 \times \%O_2 + 0.28 \times (\%N_2 + \%CO)$$

9. Wet Molecular Weight of Flue Gas

$$M_s = M_d \times (1 - B_{ws}) + 18 \times B_{ws}$$

10. Fuel Factor Based on Flue Gas Composition

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

11. Excess Air of Flue Gas

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

12. Average Gas Velocity, ft/sec

$$v_s = 85.49 \times C_p \times (\Delta P)^{1/2}{}_{avg} \times \frac{(T_s + 460)^{1/2}}{(P_s \times M_s)^{1/2}}$$

13. Area of Round Duct or Stack

$$A_s = \frac{\pi \times D^2}{4 \times 144} \quad (round\ ducts)$$

14. Area of Rectangular Duct

$$A_s = \frac{L \times W}{144} \quad (rectangular\ ducts)$$

15. Actual Volumetric Flow Rate of Flue Gas

$$Q_a = v_s \times A_s \times 60$$

16. Flow Rate of Flue Gas at Standard Temperature and Pressure

$$Q_s = Q_a \times \left[\frac{P_s \times 528}{(T_s + 460) \times 29.92} \right]$$

17. Dry Flow Rate of Flue Gas at Std. Temperature and Pressure

$$Q_{sd} = Q_s \times (1 - B_{ws})$$

NOMENCLATURE FOR EPA METHODS 2-4

A_s	=	Stack area, ft^2
B_{ws}	=	Moisture volume fraction
C_p	=	Pitot tube coefficient (≈0.84)
D_s	=	Stack diameter, inches
ΔH	=	Average meter orifice pressure, in.W.C.
ΔP	=	Pitot tube differential pressure, in.W.C.
F_o	=	Combustion factor
γ	=	Meter calibration factor, gamma
L	=	Length of rectangular stack or duct, inches
M_D	=	Dry molecular weight, lb/lb-mole
M_s	=	Wet molecular weight, lb/lb-mole
P_B	=	Barometric pressure, in.Hg
P_s	=	Absolute stack pressure, in.Hg
P_{static}	=	Average static pressure, in.W.C.
Q_a	=	Actual gas flow rate, acfm
Q_s	=	Standard gas flow rate, scfm
Q_{sd}	=	Dry standard gas flow rate, dscfm
T_m	=	Average meter temperature, °F
T_s	=	Average stack temperature, °F
v_f	=	Final impinger volume, ml
v_i	=	Initial impinger volume, ml
V_m	=	Uncorrected metered gas volume, dcf
$V_{m(std)}$	=	Corrected gas volume, dscf
v_s	=	Average gas velocity, ft/sec
$V_{wc(std)}$	=	Gas volume of water caught in impingers, scf
$V_{wsg(std)}$	=	Gas volume of water caught in silica gel, scf
W	=	Width of rectangular stack or duct, inches
w_f	=	Final silica gel mass, grams
w_i	=	Initial silica gel mass, grams
$\%O_2$	=	Dry volumetric concentration of O_2, %dv
$\%CO_2$	=	Dry volumetric concentration of CO_2, %dv
%CO	=	Dry volumetric concentration of CO, %dv
$\%N_2$	=	Dry volumetric concentration of N_2, %dv
%EA	=	Percent excess air

APPENDIX G.2

CALCULATIONS FOR EPA METHOD 5 PARTICULATE,
METHOD 201A, AND METHOD 202

EPA METHOD 5 GRAVIMETRIC CALCULATIONS

1. PM Collected in Probe Wash - M_{pw}

$$M_{pw} = (W_{pw})_{final} - (W_{pw})_{tare}$$

2. Applicable Acetone Blank Correction - B_{apw}

$$B_{apw} = \left[(W_{ab})_{final} - (W_{ab})_{tare}\right] \times \frac{V_{pw}}{V_{ab}}$$

3. Maximum Allowable Acetone Blank - B_{amax}

$$B_{amax} = 0.7845 \times 0.00001 \times V_{pw}$$

4. Actual Probe Wash Blank Correction - B_{pw}

$$B_{pw} = MINIMUM\ [B_{apw},\ B_{amax}]$$

5. PM Collected on Filter - M_f

$$M_f = (W_f)_{final} - (W_f)_{tare}$$

6. Total PM Collected for Method 5 Calculations - M_5

$$M_5 = M_{pw} + M_f - B_{pw}$$

NOMENCLATURE

B_{amax}	=	Maximum allowable acetone blank correction, based on weight of acetone in probe wash, grams
B_{apw}	=	Acetone blank correction based on residue of blank, grams
B_{pw}	=	Acetone blank correction actually used, grams
M_5	=	Total mass of particulate in train corrected for acetone blank, grams
M_f	=	Mass gain of filter, grams
M_{pw}	=	Probe wash residue, grams
V_{ab}	=	Liquid volume of acetone blank, ml
V_{pw}	=	Liquid volume of probe wash, ml
$(W_{ab})_{final}$	=	Final weight of beaker containing acetone blank residue, grams
$(W_{ab})_{tare}$	=	Tare weight of beaker containing acetone blank residue, grams
$(W_f)_{final}$	=	Final weight of filter, grams
$(W_f)_{tare}$	=	Tare weight of filter, grams
$(W_{pw})_{final}$	=	Final weight of beaker containing probe wash residue, grams
$(W_{pw})_{tare}$	=	Tare weight of beaker containing probe wash residue, grams

PARTICULATE EMISSIONS CALCULATIONS

1. Particulate Concentration - M_p

$$C_{sd} = \frac{\Sigma(M_i)}{V_{m(std)}} \times \frac{7000}{453.593}$$

2. Particulate Concentration Corrected to 7% O_2 - $C_{sd}@7\%O_2$

$$C_{sd@7\%} = C_{sd} \times \frac{20.9 - 7.0}{20.9 - \%O_2}$$

3. Particulate Concentration Corrected to 12% CO_2 - $C_{sd}@12\%CO_2$

$$C_{sd@12\%} = C_{sd} \times \frac{12}{\%CO_2}$$

4. Particulate Concentration Corrected to 50% Excess Air - $C_{sd}@50\%EA$

$$C_{sd@50\%EA} = C_{sd} \times \frac{100 + \%EA}{150}$$

5. Particulate Mass Rate - M_p

$$M_p = \frac{\Sigma(M_i)}{V_{m(std)}} \times Q_{sd} \times \frac{60}{453.593}$$

6. Isokinetic Variation - %ISO

$$\%Iso = \frac{0.09450 \times (T_s + 460) \times V_{m(std)}}{P_s \times v_s \times A_n \times time \times (1 - B_{ws})}$$

NOMENCLATURE

A_n	=	Nozzle area, ft^2
C_{sd}	=	Particulate concentration, grains/dscf
D_n	=	Nozzle diameter, inches
ΣM_i	=	Summation of PM collected in sample train, grams
M_p	=	Mass rate of particulate emissions, lb/hr
P_s	=	Absolute stack pressure, in.Hg
Q_{sd}	=	Dry standard gas flow rate, dscfm
time	=	Net sampling time, minutes
T_s	=	Average stack temperature, ^oF
$V_{m(std)}$	=	Corrected gas volume, dscf
v_s	=	Average gas velocity, ft/sec
$\%O_2$	=	Dry volumetric concentration of O_2, %dv
$\%CO_2$	=	Dry volumetric concentration of CO_2, %dv
%EA	=	Percent excess air
%Iso	=	Percent isokinetics

CALCULATIONS FOR EPA METHOD 201A

Determination of cyclone flow rate and orifice pressure head:

Molecular weight of stack gas, dry basis, M_d:

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2 + \%CO)$$

where M_d = lb/lbmol.

Molecular weight of stack gas, wet basis, M_w:

$$M_w = M_d(1 - B_{ws}) + 18(B_{ws})$$

where B_{ws} = moisture fraction of the stack gas;
M_w = lb/lbmol.

Absolute stack pressure, P_s:

$$P_s = P_{bar} + \frac{P_g}{13.6}$$

where P_{bar} = barometric pressure ("Hg);
P_g = stack static pressure ("H_2O);
P_s = "Hg.

Viscosity of stack gas, μ_s:

$$\mu_s = 152.418 + 0.2552 t_s + 3.2355 x 10^{-5} t_s^2 + 0.53147(\%O_2) - 74.143 B_{ws}$$

where t_s = average stack temperature ($^{\circ}F$);
μ_s = micropoise.

Cyclone flow rate, Q_s:

$$Q_s = 0.002837 \mu_s \left[\frac{(t_s + 460)}{M_w P_s}\right]^{0.2949}$$

where Q_s = ft^3/min.

Orifice pressure head, ΔH, needed for cyclone flow rate:

$$\Delta H = \left[\frac{Q_s(1-B_{ws})P_s}{t_s+460}\right]^2 \frac{(t_m+460)M_d 1.083\,\Delta H_@}{P_{bar}}$$

where t_m = meter temperature (°F);
ΔH = "H_2O.

Equations for Nozzle Selection:

Nozzle velocity, v_n:

$$v_n = \frac{3.056\,Q_s}{D_n^2}$$

where D_n = nozzle diameter (in.);
v_n = ft/sec.

Minimum and maximum velocities, v_{min} and v_{max}, in ft/sec:

Calculate R_{min}:

$$R_{min} = 0.2457 + \sqrt{0.3072 - \frac{0.2603\sqrt{Q_s}\,\mu_s}{v_n^{1.5}}}$$

If R_{min} is less than 0.5 or imaginary then:

$$v_{min} = 0.5\,v_n$$

Otherwise use:

$$v_{min} = v_n R_{min}$$

Calculate R_{max}:

$$R_{max} = 0.4457 + \sqrt{0.5690 + \frac{0.2603\sqrt{Q_s}\mu_s}{v_n^{1.5}}}$$

If R_{max} is greater than 1.5 then:

$$v_{max} = 1.5 v_n$$

Otherwise use:

$$v_{max} = v_n R_{max}$$

Minimum and maximum velocity head values, Δp_{min} and Δp_{max}:

$$\Delta p_{min} = 1.3686 x 10^{-4} \frac{P_s M_w v_{min}^2}{(t_s + 460) C_p^2}$$

$$\Delta p_{max} = 1.3686 x 10^{-4} \frac{P_s M_w v_{max}^2}{(t_s + 460) C_p^2}$$

where C_p = pitot coefficient
Δp_{min} and Δp_{max} = "H_2O.

Dwell time:

Dwell time at first traverse point, t_1:

$$t_1 = \frac{\theta}{N}\sqrt{\frac{\Delta p_1'}{\Delta p_{avg}'}}$$

where θ = total run time (min);
N = total number of traverse points;
$\Delta p'_1$ = velocity head at the first traverse point (from a previous traverse) ("H_2O);
$\Delta p'_{avg}$ = the square of the average square root of the Δp's (from a previous traverse) ("H_2O);
t_1 = min.

CALCULATIONS FOR EPA METHOD 201A (continued)

Dwell time at subsequent traverse points, t_n:

$$t_n = \frac{t_1}{\sqrt{\Delta p_1}} \sqrt{\Delta p_n} \quad , n = 2, 3, \ldots N$$

Δp_n = measured velocity head at point n ("H_2O);
Δp_1 = measured velocity heat at point 1 ("H_2O);
t_n = min.

Determination of D_{50}:

Stack gas viscosity, μ_{cyc}:

$$\mu_{cyc} = C_1 + C_2 T_s + C_3 T_s^2 + C_4 f_{O_2} - C_5 B_{ws}$$

where C_1 = 51.05 micropoise;
C_2 = 0.207 micropoise/R;
C_3 = 3.24x10^{-5} micropoise/R_2;
C_4 = 53.147 micropoise/fraction O_2;
C_5 = 74.143 micropoise/fraction H_2O;
T_s = average absolute stack gas temperature (R);
f_{02} = stack gas O_2 volume fraction, dry basis;
B_{ws} = stack gas moisture volume fraction;
μ_{cyc} = micropoise.

Total cyclone flow rate at standard conditions, $Q_{s(std)}$:

$$Q_{s(std)} = \frac{V_{m(std)}}{\theta}$$

where $V_{m(std)}$ = volume of gas measured by DGM corrected to standard conditions (dscf);
θ = total sampling time (min);
$Q_{s(std)}$ = dscf/min.

PM_{10} flow rate, at actual cyclone conditions, Q_s:

$$Q_s = \frac{T_s}{K_1 P_s}\left[Q_{s(std)} + \frac{V_{w(std)}}{\theta}\right]$$

CALCULATIONS FOR EPA METHOD 201A (continued)

where K_1 = 17.64 R/"Hg;
$V_{w(std)}$ = volume of water vapor in gas sample at standard conditions (scf);
Q_s = ft_3/min.

Diameter of particles having a 50% probability of penetration, D_{50}:

$$D_{50} = \beta_1 \left[\frac{T_s}{M_w P_s}\right]^{0.2091} \left[\frac{\mu_{cyc}}{Q_s}\right]^{0.7091}$$

where β_1 = 0.15625
D_{50} = μm.

METHOD 202 CALCULATIONS

1. Calculated correction factor

$$m_c = K\, C_{SO_4^{-2}}\, V_{ic}$$

where,

K = 0.0205 when correcting for NH_{4+} and H_2O
= 0.1840 when correcting for NH_{4+} only

2. Weight of total corrected inorganic CPM (mg)

$$m_i = m_r \left(\frac{V_{ic}}{V_{ic} - V_b} \right) - m_c - m_{Cl^-}$$

3. Corrected concentration of CPM (mg/dscm, mg/dscf)

$$C_{cpm} = \frac{m_o + m_i - m_b}{V_{m(std)}}$$

4. CPM emission rate (kg/hr, lb/hr)

$$ER_{cpm} = K\, C_{cpm}\, Q$$

where K = 6.0E-5 (kg min)/(mg hr) for metric units
= 1.32E-4 (lb min)/(mg hr) for English units

5. Calculation of sulfate ion concentration using NH_3 titration

$$C_{SO_4^{-2}} = \frac{48.03\, V_t\, N}{100}$$

METHOD 202 CALCULATIONS (Continued)

NOMENCLATURE

C_{CPM}	=	concentration of CPM in flue gas (mg/dscm, mg/dscf)
C_{SO4}	=	concentration of SO_4^{-2} in sample (mg/ml)
m_c	=	mass of NH_{4+} added to sample to form $(NH_4)_2SO_4$ (mg)
m_{Cl}	=	correction factor for chloride
m_b	=	weight of CPM in $MeCl_2$ and H_2O blanks (mg)
m_i	=	weight of inorganic CPM (mg)
m_o	=	weight of organic CPM (mg)
m_r	=	weight of dried inorganic fraction (mg)
N	=	normality of NH_4OH (mg/ml)
Q	=	volumetric flow rate (dscmm, dscfm)
V_b	=	volume of sample taken for IC analysis (ml)
V_{ic}	=	volume of impinger contents sample (ml)
$V_{m(std)}$	=	volume of gas sampled, corrected to standard conditions (dscm, dscf)
V_t	=	volume of NH_4OH titrant

APPENDIX G.3

CALCULATIONS FOR EPA METHOD 29 MULTIPLE METALS

METALS CALCULATIONS

LABORATORY CALCULATIONS:

1. Percent recovery - (%R)

$$\%R = \frac{SpikeResult - SampleResult}{SpikeAdded} * 100$$

2. Total mass of each metal in the front half (except Hg)

$$M_{fh} = C_{a1} * F_d * V_{sol.1}$$

where M_{fh} = total mass of each metal (except Hg) collected in the front half of the sampling train.

C_{a1} = concentration of metal in sample Fraction 1A as read from the standard curve (ug/ml).

F_d = dilution factor (F_d = the inverse of the fractional portion of the concentrated sample in the solution actually used in the instrument to produce the reading C_{a1}).

$V_{soln,1}$ = total volume of digested sample solution (Fraction 1), ml.

3. Total mass of each metal in the back half (except Hg)

$$M_{bh} = C_{a2} \bullet F_a \bullet V_a$$

where M_{bh} = total mass of each metal (except Hg) collected in the back half of the sampling train (Fraction 2), ug.

C_{a2} = Concentration of metal in sample concentrated Fraction 2A, as read from the standard curve (ug/ml).

F_a = aliquot factor, volume of Fraction 2 divided by volume of aliquot Fraction 2A.

V_a = total volume of digested sample solution (concentrated Fraction 2A), ml.

4. Total mass of mercury in front half

$$Hg_{fh} = \frac{Q_{fh}}{V_{f1B}} * V_{sol,1}$$

where Hg_{fh} = total mass of mercury collected in the front half of the sampling train (Fraction 1), ug.

Q_{fh} = quantity of mercury in analyzed sample, ug

V_{f1B} = volume of fraction 1B analyzed, ml.

$V_{soln,1}$ = total volume of digested sample solution (Fraction 1), ml.

5. Total mass of mercury in back half Fraction 2

$$Hg_{bh2} = \frac{Q_{bh2}}{V_{f2B}} \bullet V_{sol,2}$$

where Hg_{bh2}	=	total mass of mercury collected in Fraction 2, ug.
Q_{bh2}	=	quantity of mercury in analyzed sample, ug
V_{f2B}	=	volume of fraction 2B analyzed, ml.
$V_{soln,2}$	=	total volume of Fraction 2, ml.

6. Back half mercury calculation for Fractions 3A, 3B, and 3C

$$Hg_{bh3(A,B,C)} = \frac{Q_{bh3(A,B,C)}}{V_{f3(A,B,C)}} * V_{soln,3(A,B,C)}$$

where $Hg_{bh3(A,B,C)}$	=	total mass of mercury collected separately in Fraction 3a,3b, or 3c, ug.
$Q_{bh3(A,B,C)}$	=	quantity of mercury in separately analyzed samples, ug.
$V_{f3(A,B,C)}$	=	volume of Fraction 3A,3B, or 3C analyzed, ml.
$V_{soln,3(A,B,C)}$	=	total volume of Fraction 3A, 3B, or 3C, ml.

METALS EMISSIONS CALCULATIONS:

1. Total sample weight - W_i (micrograms)

$$W_i = [m_{front} - mb_{front}] + [m_{back} - mb_{back}]$$

where m_{front}	=	total sample weight collected in front half of sample train (micrograms)
m_{back}	=	total sample weight collected in back half of sample train (micrograms)
mb_{front}	=	front half blank correction (micrograms)
mb_{back}	=	back half blank correction (micrograms)

2. Gas Concentration - Cm_i (micrograms/Nm^3)

$$Cm_i = \frac{W_i \times 35.3145}{Vmstd} \times \frac{528}{492}$$

where W_i	=	total sample weight of (i) (micrograms)
Vmstd	=	the volume of gas sampled at STP (dscf)
35.3145	=	cubic feet per cubic meter
528/492	=	temperature conversion from 68°F to 32°F

Note that Normal m^3 is defined at 32°F and 1 Atm.

3. Concentration corrected to 7% O_2, C_i7 is:

$$C_{i_7} = C_i \times \frac{13.9}{20.9 - \%O_2}$$

where $\%O_2$ = oxygen content in stack gas, dry %

4. The mass flow rate of substance (i), G_i (lb/hr), is:

$$G_i = \frac{W_i \times Q_{sd} \times 60}{V_{mstd} \times 10^6 \times 453.593}$$

where W_i	=	total sample weight of (i) (micrograms)
Vmstd	=	the volume of gas sampled at STP (dscf)
Q_{sd}	=	stack gas flow rate (dscfm)
60	=	min/hr
10^6	=	micrograms per gram
453.593	=	grams/lb

APPENDIX G.4

GENERAL GASEOUS EMISSIONS CALCULATIONS

INSTRUMENT ANALYZER CALCULATIONS

1. Analyzer Calibration Error is determined by:

$$E_c = \frac{A_c - C_g}{V_s} \times 100$$

2. System Bias is determined by:

$$B_s = \frac{C_s - A_c}{V_s} \times 100$$

3. Calibration Drift is determined by:

$$D_c = \frac{F_c - I_c}{V_s} \times 100$$

4. The Adjusted Data Value is determined by:

$$C_{gas} = (\overline{C} - C_0) \times \frac{C_{ma}}{C_m - C_0}$$

Nomenclature:

A_c	=	the analyzer response for calibration gas standard
B_s	=	Sampling system bias, % analyzer span
$\bar{C}$	=	the average gas concentration of the analyte indicated by the gas analyzer
C_g	=	the actual gas cylinder concentration value
C_{gas}	=	the adjusted gas concentration of the analyte
C_m	=	the average of initial and final system calibration responses for the upscale calibration gas
C_{ma}	=	the actual concentration of the upscale calibration gas used for system calibration
C_o	=	the average of initial and final system calibration responses for the zero gas
C_s	=	the system response for calibration gas introduced remotely at the sample probe (zero or upscale)
D_c	=	Calibration drift, % analyzer span
E_c	=	Analyzer calibration error, % analyzer span
F_c	=	Final system calibration response value
I_c	=	Initial system calibration response value
V_s	=	Span value of analyzer

GASEOUS EMISSIONS MONITORING CALCULATIONS

1. Conversion of wet basis to dry basis concentration (THC only)

$$C_d = \frac{C_w}{1 - \frac{\%H_2O}{100}}$$

where C_d = Dry basis total hydrocarbon concentration, ppmdv
C_w = Wet basis total hydrocarbon concentration, ppmwv
$\%H_2O$ = Moisture content of stack gas, %

2. Conversion of total hydrocarbon concentration as propane to total hydrocarbon concentration as carbon:

$$C_c = K \times C_d$$

where C_c = Hydrocarbon concentration as carbon, ppmdv
C_d = Hydrocarbon concentration as propane, ppmdv
K = Carbon equivalent correction factor (3 for propane)

3. CONCENTRATION AT 7% O_2

$$C_{7i} = C_i \times \frac{20.9 - 7.0}{20.9 - \%O_2}$$

where C_{7i} = Concentration of gas i corrected to 7% O_2
$\%O_2$ = Actual gas concentration of O_2, % dry volume

GASEOUS EMISSIONS MONITORING CALCULATIONS (Continued)

4. Hourly emissions rate - M_i

$$M_i = \frac{C_i \times Q_{sd} \times 60 \times MW_i}{10^6 \times 0.84948 \times 453.593}$$

where	i	=	NO_x, CO, or total hydrocarbons (as carbon)
	M_i	=	Mass emissions rate of i, lb/hr
	C_i	=	Concentration of i in stack gas, ppmdv
	MW_i	=	Molecular weight of i
		=	28.01 for CO
		=	46.01 for NO_2
		=	12.01 for Carbon
	Q_{sd}	=	Average flue gas flow rate, dscfm
	60	=	Minutes per hour
	0.84948	=	Molar volume of ideal gas, ft^3/mole
	453.593	=	grams per pound
	10^6	=	parts per million

APPENDIX H.0

FIELD EQUIPMENT CALIBRATIONS

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 93-950
Job I.D.

Print Date 07/23/93

Meter Box No.: 6
Delta H: 1.7296
Gamma: 1.0062

Analyst: wch
Calibration Date: 07/23/93
Test Meter No. 9548
Barometric Pressure 28.81

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	319.854	330.303	10.449	75.0	75.0	75.00	430.851	441.334	10.483	76.0	75.0	77.0	81.0	77.25	25.0	1.67783	0.99967
2	1.0	330.445	340.935	10.490	76.0	75.0	75.50	441.475	451.991	10.516	81.0	77.0	80.0	85.0	80.75	18.0	1.71804	1.00474
3	1.5	341.135	352.261	11.126	76.0	76.0	76.00	452.211	463.368	11.157	84.0	80.0	81.0	87.0	83.00	16.0	1.80592	1.00639
4	2.0	352.442	362.664	10.222	76.0	76.0	76.00	463.561	473.817	10.256	87.0	81.0	82.0	85.0	83.75	12.5	1.73870	1.00596
5	2.5	362.856	373.009	10.153	76.0	75.0	75.50	474.011	484.182	10.171	85.0	82.0	82.0	90.0	84.75	11.0	1.69971	1.00904
6	3.0	373.198	388.188	14.990	76.0	76.0	76.00	484.366	499.359	14.993	89.0	82.0	83.0	92.0	86.50	15.0	1.73762	1.01164

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No........... 6 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 1 Date 11-May-93

RUN NUMBER	REFRENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	33	33	0.000
3	102	101	0.980
4	200	201	-0.500
5	297	298	-0.337
6	400	400	0.000
7	502	502	0.000
8	601	602	-0.166
9	704	704	0.000
10	800	800	0.000
11	900	900	0.000

-0.0021 AVERAGE DIFF

CALIBRATION PERFORMED BY...... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No........... 6 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 2 Date 11-May-93

RUN NUMBER	REFRENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	32	32	0.000
3	102	101	0.980
4	195	196	-0.513
5	301	302	-0.332
6	398	397	0.251
7	497	495	0.402
8	604	605	-0.166
9	700	700	0.000
10	801	800	0.125
11	898	896	0.223

0.0883 AVERAGE DIFF

CALIBRATION PERFORMED BY...... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No........... 6 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 3 Date 11-May-93

RUN NUMBER	REFRENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	34	34	0.000
3	98	97	1.020
4	196	196	0.000
5	300	302	-0.667
6	401	401	0.000
7	504	502	0.397
8	603	603	0.000
9	701	701	0.000
10	799	798	0.125
11	898	897	0.111

0.0897 AVERAGE DIFF

CALIBRATION PERFORMED BY...... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No........... 6 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 4 Date 11-May-93

RUN NUMBER	REFRENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	31	31	0.000
3	102	104	-1.961
4	204	202	0.980
5	299	296	1.003
6	399	399	0.000
7	503	501	0.398
8	597	597	0.000
9	698	701	-0.430
10	801	800	0.125
11	898	898	0.000

0.0105 AVERAGE DIFF

CALIBRATION PERFORMED BY...... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No........... 6 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 5 Date 11-May-93

RUN NUMBER	REFRENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	31	31	0.000
3	104	104	0.000
4	202	202	0.000
5	295	296	-0.339
6	399	399	0.000
7	502	501	0.199
8	596	597	-0.168
9	701	701	0.000
10	800	800	0.000
11	899	898	0.111

-0.0178 AVERAGE DIFF

CALIBRATION PERFORMED BY...... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No........... 6 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 6 Date 11-May-93

RUN NUMBER	REFRENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	36	36	0.000
3	98	98	0.000
4	197	198	-0.508
5	304	306	-0.658
6	402	402	0.000
7	500	500	0.000
8	599	601	-0.334
9	703	703	0.000
10	804	804	0.000
11	897	897	0.000

-0.1363 AVERAGE DIFF

CALIBRATION PERFORMED BY...... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No........... 6 REFERENCE CALIBRATOR HH71 CAK-K
7 Date 11-May-93

RUN NUMBER	REFRENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	35	35	0.000
3	99	99	0.000
4	205	206	-0.488
5	299	301	-0.669
6	398	398	0.000
7	504	503	0.198
8	597	599	-0.335
9	697	697	0.000
10	800	799	0.125
11	898	898	0.000

-0.1062 AVERAGE DIFF

CALIBRATION PERFORMED BY...... R. RICHARDS

Comments:

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 93-948T
Job I.D.

Print Date 08/04/93

Meter Box No.: 6
Delta H: 1.7168
Gamma: 0.9962

Analyst: wch
Calibration Date: 08/04/93
Test Meter No. 9548
Barometric Pressure 28.94

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	873.460	883.845	10.385	72.0	73.0	72.50	960.694	971.271	10.577	74.0	73.0	76.0	80.0	75.75	25.0	1.67987	0.98659
2	1.0	884.041	893.920	9.879	73.0	73.0	73.00	971.467	981.530	10.063	79.0	76.0	77.0	83.0	78.75	17.0	1.71041	0.98979
3	1.5	894.092	905.653	11.561	72.0	73.0	72.50	981.724	993.478	11.754	82.0	77.0	79.0	83.0	80.25	16.5	1.75660	0.99411
4	2.0	905.876	918.522	12.646	72.0	73.0	72.50	993.722	1006.55	12.823	80.0	78.0	80.0	87.0	81.25	15.5	1.72421	0.99733
5	2.5	918.690	929.164	10.474	73.0	73.0	73.00	1006.72	1017.32	10.593	85.0	80.0	80.0	88.0	83.25	11.5	1.72634	1.00142
6	3.0	929.387	939.912	10.525	73.0	72.0	72.50	1017.54	1028.14	10.597	87.0	80.0	81.0	90.0	84.50	10.5	1.70317	1.00791

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 93-950
Job I.D.

Print Date 07/22/93

Meter Box No.: 9
Delta H: 1.8521
Gamma: 1.0046

Analyst: wch
Calibration Date: 07/22/93
Test Meter No. 9548
Barometric Pressure 28.88

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	241.670	253.505	11.835	73.0	73.0	73.00	392.579	404.490	11.911	72.0	72.0	79.0	75.0	74.50	29.5	1.81237	0.99515
2	1.0	253.772	264.128	10.356	73.0	72.0	72.50	404.753	415.175	10.422	75.0	78.0	82.0	77.0	78.00	18.5	1.84620	1.00138
3	1.5	264.306	275.454	11.148	73.0	73.0	73.00	415.356	426.598	11.242	78.0	82.0	86.0	79.0	81.25	16.5	1.89314	1.00316
4	2.0	275.682	288.965	13.283	73.0	71.0	72.00	426.805	440.186	13.381	79.0	85.0	85.0	79.0	82.00	17.0	1.87768	1.00621
5	2.5	289.196	304.657	15.461	72.0	72.0	72.00	440.415	455.920	15.505	79.0	84.0	86.0	78.0	81.75	17.5	1.83665	1.00901
6	3.0	304.831	317.368	12.537	72.0	72.0	72.00	456.115	468.648	12.533	79.0	86.0	87.0	79.0	82.75	13.0	1.84632	1.01280

ITS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-30-93 Thermocouple No.: #1 Box 9

Ambient Temperature: ______ °F Barometric pressure: ______ "Hg

Calibrator: CK Ferguson Reference: Mercury-in-glass: ______

Other: HH71 [illegible]

Reference point No.[a]	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference,[b] %
		0	0	0
		32	30	6.25
		100	98	2.0
		200	200	0
		300	300	0
		400	401	-0.25
		500	501	-0.2
		600	600	0
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.709

[a] Every 100°F for each reference point when using furnace up to 500°F.

* Source: 1) Ice bath
2) Furnace

[b] Percent difference ≤ 1.5%

$$\frac{\text{Ref. temp. °F - thermocouple temp. °F}}{\text{Ref. temp. °F}} \times 100$$

ETS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-30-93 Thermocouple No.: #2 Box 9

Ambient Temperature: ______ °F Barometric pressure: ______ "Hg

Calibrator: C Ferguson Reference: Mercury-in-glass: ______

Other: HH71-Cal-K

Reference point No.[a]	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference,[b] %
		0	0	0
		32	30	6.25
		100	98	2.0
		200	199	.5
		300	300	0
		400	399	.25
		500	498	.4
		600	600	0
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.855

[a] Every 100°F for each reference point when using furnace up to 500°F.

* Source: 1) Ice bath
2) Furnace

[b] Percent difference ≤ 1.5%

$$\frac{\text{Ref. temp. °F} - \text{thermocouple temp. °F}}{\text{Ref. temp. °F}} \times 100$$

ITS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-23-93 Thermocouple No.: #3 Box 9

Ambient Temperature: ____________ °F Barometric pressure: ____________ "Hg

Calibrator: C. Ferguson Reference: Mercury-in-glass: ____________

Other: HH71-CAL-K

Reference point No.[a]	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference,[b] %
		0	0	0
		32	32	6.25
		100	98	2.0
		200	199	.5
		300	300	0
		400	399	.25
		500	499	.2
		600	600	0
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.836

[a] Every 100°F for each reference point when using furnace up to 500°F.

* Source: 1) Ice bath

2) Furnace

[b] Percent difference ≤ 1.5%

$$\frac{\text{Ref. temp. °F} - \text{thermocouple temp. °F}}{\text{Ref. temp. °F}} \times 100$$

ITS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-31-93 Thermocouple No.: #4 [illegible]

Ambient Temperature: ______ °F Barometric pressure: ______ "Hg

Calibrator: C [illegible] Reference: Mercury-in-glass: ______

Other: [illegible]

Reference point No.[a]	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference,[b] %
		0	0	0
		32	30	6.25
		100	98	2
		200	199	.5
		300	300	0
		400	400	0
		500	499	.2
		600	601	-.167
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.798

[a] Every 100°F for each reference point when using furnace up to 500°F.

* Source: 1) Ice bath
2) Furnace

[b] Percent difference ≤ 1.5%

$$\frac{\text{Ref. temp. °F} - \text{thermocouple temp. °F}}{\text{Ref. temp. °F}} \times 100$$

ITS. INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-31-92 Thermocouple No.: #5 Box 9

Ambient Temperature: ________ °F Barometric pressure: ________ "Hg

Calibrator: C. [illegible] Reference: Mercury-in-glass: ________

Other: HET-GL-5

Reference point No.[a]	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference,[b] %
		0	0	0
		32	30	6.25
		100	98	2
		200	199	.5
		300	300	.0
		400	399	.25
		500	499	.2
		600	600	0
		700	700	0
		800	800	0
		900	900	.0
			Average % difference	.836

[a] Every 100°F for each reference point when using furnace up to 500°F.

* Source: 1) Ice bath
2) Furnace

[b] Percent difference ≤ 1.5%

$$\frac{\text{Ref. temp. °F} - \text{thermocouple temp. °F}}{\text{Ref. temp. °F}} \times 100$$

ITS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-31-93 Thermocouple No.: #6 - Box 9

Ambient Temperature: ______ °F Barometric pressure: ______ "Hg

Calibrator: C Ferguson Reference: Mercury-in-glass: ______

Other: HH 71-CAL-K

Reference point No.[a]	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference,[b] %
		0	0	0
		32	31	3.125
		100	98	2.0
		200	200	0
		300	300	0
		400	399	.25
		500	499	.2
		600	600	0
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.507

[a] Every 100°F for each reference point when using furnace up to 500°F.

* Source: 1) Ice bath
2) Furnace

[b] Percent difference ≤ 1.5%

$$\frac{\text{Ref. temp. °F} - \text{thermocouple temp. °F}}{\text{Ref. temp. °F}} \times 100$$

ETS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-31-87 Thermocouple No.: #7 Box 9

Ambient Temperature: ______ °F Barometric pressure: ______ "Hg

Calibrator: [illegible] Reference: Mercury-in-glass: ______

Other: [illegible]

Reference point No.[a]	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference,[b] %
		0	0	0
		32	31	3.125
		100	99	1
		200	200	0
		300	300	0
		400	399	.25
		500	499	.2
		600	600	0
		701	701	0
		800	800	0
		901	901	0
			Average % difference	.416

[a] Every 100°F for each reference point when using furnace up to 500°F.

* Source: 1) Ice bath
2) Furnace

[b] Percent difference ≤ 1.5%

$$\frac{\text{Ref. temp. °F} - \text{thermocouple temp. °F}}{\text{Ref. temp. °F}} \times 100$$

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 93-937T
Job I.D.

Print Date 08/09/93

Meter Box No.: 9
Delta H: 1.9033
Gamma: 0.9964

Analyst: wch
Calibration Date: 08/06/93
Test Meter No. 9548
Barometric Pressure 28.76

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	11.449	21.460	10.011	73.0	72.0	72.50	77.965	88.056	10.091	75.0	74.0	73.0	77.0	74.75	25.5	1.89607	0.99499
2	1.0	21.782	32.203	10.421	72.0	72.0	72.00	88.380	98.923	10.543	77.0	74.0	76.0	81.0	77.00	19.0	1.93111	0.99517
3	1.5	32.343	50.977	18.634	72.0	71.0	71.50	99.061	117.948	18.887	79.0	76.0	77.0	83.0	78.75	27.5	1.88814	0.99624
4	2.0	51.249	62.159	10.910	71.0	72.0	71.50	118.227	129.272	11.045	83.0	78.0	78.0	83.0	80.50	14.0	1.89722	0.99939
5	2.5	62.285	76.256	13.971	72.0	74.0	73.00	129.399	143.584	14.185	83.0	78.0	88.0	79.0	82.00	16.0	1.89431	0.99518
6	3.0	76.422	86.871	10.449	72.0	72.0	72.00	143.751	154.351	10.600	79.0	85.0	86.0	79.0	82.25	11.0	1.91272	0.99710

APPENDIX I

FACILITY PROCESS DATA

MRI

MIDWEST RESEARCH INSTITUTE
Suite 350
401 Harrison Oaks Boulevard
Cary, North Carolina 27513-2412
Telephone (919) 677-0249
FAX (919) 677-0065

Copy __ of __
4601-01-01

Date: April 7, 1994

Subject: Test Completion Notice: General Shale Plant No. 10
Johnson City, Tennessee
Review and Update of AP-42 Chapter 8, Mineral Products
EPA Contract 68-D2-0159, Work Assignment I-01
MRI Project 4601-01

From: Brian Shrager

To: Ron Myers
TSD/EIB/EFMS (MD-14)
U. S. Environmental Protection Agency
Research Triangle Park, N.C. 27711

I. Background

Source testing was conducted at General Shale Products Corporation (General Shale) Plant No. 10, Johnson City, Tennessee, from July 26 through 31, 1993. The purpose of this testing program was to obtain data to characterize emissions from a typical coal-fired brick manufacturing plant. Specifically, the primary objectives of the test were to quantify emissions of particulate matter (PM), PM-10, metals, hydrogen fluoride, total hydrocarbons, methane, ethane, volatile hazardous air pollutants (HAP's), semivolatile HAP's, carbon monoxide (CO), sulfur dioxide (SO_2) and nitrogen oxides (NO_x) from the most significant sources associated with brick manufacturing. Emission factors will be calculated based on the emission data and the process rates recorded during the testing program.

II. Emission Testing

Figure 1 provides a process flow diagram with the sampling points identified. Production begins at the grinding room, which is a large metal building that houses a primary crusher, a pan grinder, five vibrating screens, a hammermill, and several material transfer points and conveyors. The grinding room has three bay doors, two exhaust fans (not operating during testing) located near the top of the building walls, two exit doors, two doors that lead to the raw material storage building and conveyor system, and a large opening that allows trucks to access the hopper that feeds the primary crusher. With the exception of the truck access opening, all of the bay doors and other doors remained shut during testing. Emissions from the crusher, grinder, and screens are ducted to a fabric filtration system that is also located in the grinding room. Dust collected in the fabric filter is transferred to a conveyor that leads from the primary crusher to the pan grinder. Emissions from the grinding

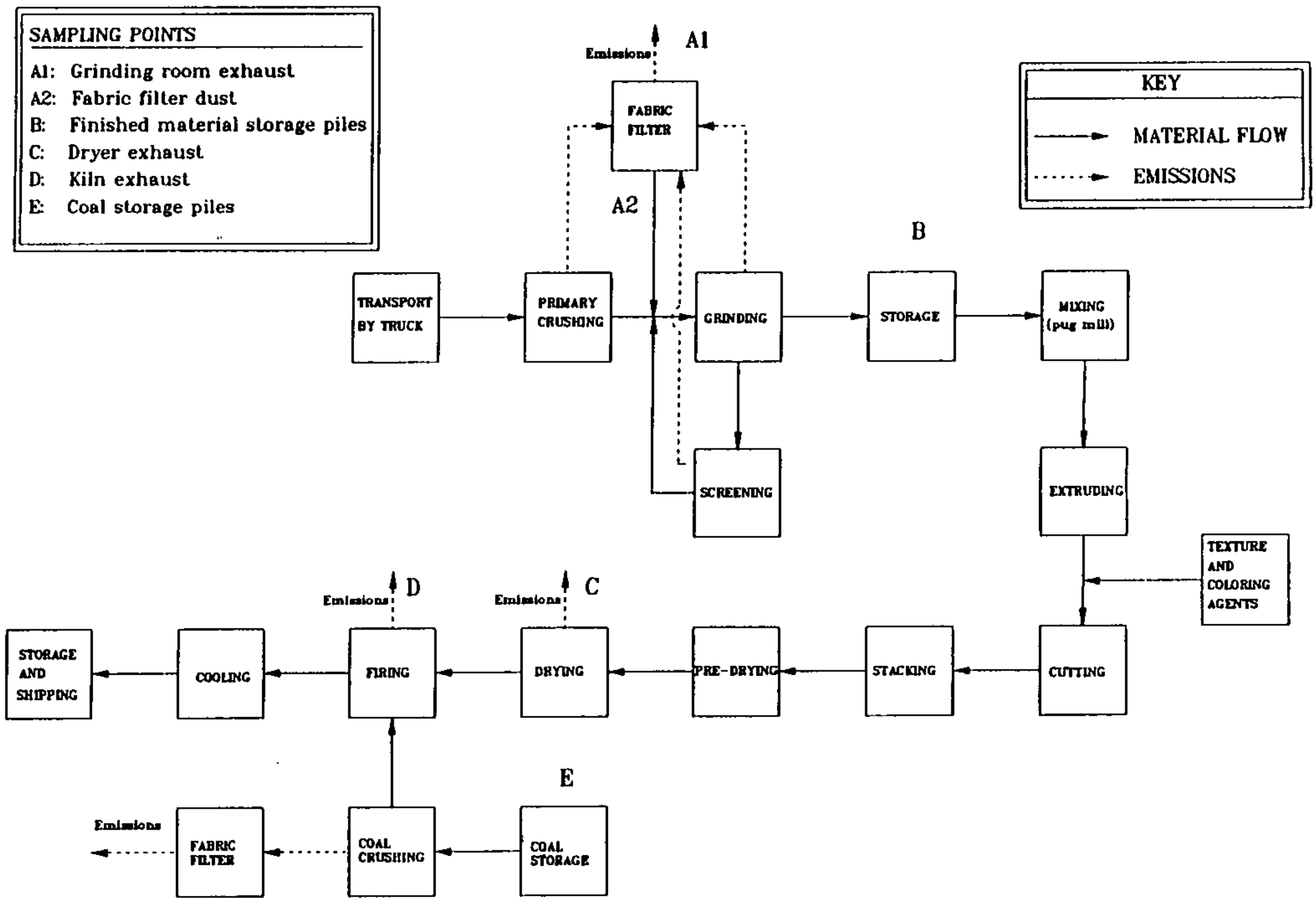

Figure 1. Location of Sampling Points for General Shale, Johnson City, Tennessee.

room consist of fugitive particulate matter (PM). Controlled filterable PM and PM-10 emissions from the grinding room were measured at the fabric filter exhaust stack (Sampling Point A1) using Methods 5 and 201, respectively. During the stack tests, timed samples of the fabric filter discharge (Sampling Point A2) were collected in order to estimate uncontrolled PM emissions from the grinding room operations.

During each grinding room test run, bulk material samples were collected from the grinding room conveyor that conveys the finished material to storage (Sampling Point B). The samples will be analyzed for silt and moisture content.

The exhaust from the drying section of Kiln A (Sampling Point C) was sampled for total hydrocarbons (Method 25A) and methane and ethane (Method 18). The exhaust from the firing section of Kiln A (Sampling Point D) was sampled for several pollutants, including total hydrocarbons (Method 25A), methane and ethane (Method 18), volatile HAP's (Method 0030--VOST), semi-volatile HAP's (Method 0010--modified Method 5), hydrogen fluoride (Method 26), total fluorides, metals and PM (Method 0012 modified for PM), PM-10 and condensible PM (Methods 201A and 202), particle sizing (Andersen impactor), CO (Method 10), CO_2 (Method 3A), SO_2 (Method 6C--instrument analysis) and NO_x (Method 7E--instrument analysis). Three runs of each sampling train were conducted on the kiln exhaust. Samples of pulverized coal were collected daily for sulfur and ash content analyses (Sampling Point E).

Throughout the one week testing period, an ambient air sampler was used to sample background PM and PM-10. The sampler was placed at a site between the grinding room and the kiln, adjacent to an unpaved road. Plant personnel provided sufficient water on the road to limit dust emissions caused by vehicles passing by the monitor.

III. Process Operations During Testing

The first set of tests was conducted at the grinding room, which housed all of the screening and grinding operations. The process rate was calculated using the number of truck loads dumped into the primary crusher, the average size (in cubic yards) of a truck load (historical), and the average weight of a cubic yard of material. The process rate for the grinding room during testing is shown in Table 1. The grinding room operations were observed several times during testing. During each observation, plant personnel indicated that the process was operating normally.

The second set of tests was conducted at the exhaust stack for the drying section of Kiln A. The process rates for these runs were calculated from data that were supplied by the plant, and are shown in Table 2. The kiln (drying section) typically

TABLE 1. RAW MATERIAL PROCESSING RATES (GRINDING ROOM)

Test date	Time	Material processed Mg/hr (tons/hr)
7-27-93	Daily	54.0 (59.5)

TABLE 2. BRICK PRODUCTION RATES (KILNS)

Test date	Kiln A production rate, Mg/hr (tons/hr)
07-28-93	6.24 (6.88)
07-29-93	6.07 (6.58)
07-30-93	6.24 (6.88)
07-31-93	6.07 (6.58)

TABLE 3. AVERAGE COAL AND GAS CONSUMPTION RATES

Test date	Kiln A coal consumption, Mg/hr (tons/hr)	Kiln A gas consumption, m^3/hr (ft^3/hr)
07-28-93	0.28 (0.31)	44.74 (1,580)
07-29-93	0.29 (0.32)	44.74 (1,580)
07-30-93	0.28 (0.31)	44.74 (1,580)
07-31-93	0.29 (0.32)	44.74 (1,580)

TABLE 4. KILN FIRING ZONE TEMPERATURES--DAILY RANGES AND AVERAGES

Test date	Kiln A firing zone temperature range, °C (°F)	Kiln A firing zone average temperature, °C (°F)
07-28-93	954-1027 (1750-1880)	999 (1830)
07-29-93	963-1027 (1765-1880)	999 (1830)
07-30-93	963-1027 (1765-1880)	999 (1830)
07-31-93	963-1024 (1765-1875)	999 (1830)

operates 24 hours per day and no shutdowns or upsets were reported during the testing.

The third set of tests was conducted at the Kiln A exhaust stack. The process rates for these runs were calculated from data that were supplied by the plant, and are shown in Table 2. Average coal and supplemental natural gas firing rates (provided by the plant) are shown in Table 3. Operating temperatures for the kiln were also provided by the plant. Daily kiln (fire zone) temperature ranges and averages are shown in Table 4. The kiln typically operates 24 hours per day and no shutdowns or upsets were reported during the testing.

IV. Conclusions

All processes that were tested operated normally during the test runs. Therefore, the data obtained should be representative of a typical coal-fired brick manufacturing plant.

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