Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP42 Section:	11.3
Reference:	25
Title:	*Stationary Source Sampling Report Reference No. 14448, Triangle Brick, Merry Oaks, North Carolina, Emissions Testing For: Carbon Monoxide, Condensible Particulate, Metals, Methane, Nitrogen Oxides, Particulate, Particulate # 10 Microns, Sulfur Dioxide, Total Hydrocarbons*, Entropy, Inc., Research Triangle Park, NC, October, 1995.

AP-42 Section 11.3
Reference 25
Report Sect. 4
Reference 22

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STATIONARY SOURCE SAMPLING REPORT

REFERENCE NO. 14448

TRIANGLE BRICK

MERRY OAKS, NORTH CAROLINA

EMISSIONS TESTING FOR:

CARBON MONOXIDE

CONDENSIBLE PARTICULATE

METALS

METHANE

NITROGEN OXIDES

PARTICULATE

PARTICULATE ≤ 10 MICRONS

SULFUR DIOXIDE

TOTAL HYDROCARBONS

BRICK KILN NO. 2 STACK

PERFORMED FOR: WITHERS & RAVENEL ENVIRONMENTAL ENGINEERING, INC.

OCTOBER, 1995

CONTACT REPORT--MRI Project No. 4603-01

From: Brian Shrager, Environmental Engineering Department

Date of Contact: June 25, 1996

Contacted by: Telephone

Company/Agency: Withers and Ravenel
Cary, NC

Telephone Number: (919) 460-6006

Person(s) Contacted/Title(s)

Bill Colby

CONTACT SUMMARY: Mr. Colby was contacted to determine the production rate for the emission test conducted at Triangle Brick in Merry Oaks, NC for the Brick Institute of America. He no longer works at Withers and Ravenel; he moved to New Hampshire, and his new phone number is (603) 623-3600. The process rate was not readily available, but Mr. Colby provided emission factors for several pollutants measured during the test, and I subsequently calculated a process rate of **10.56 tons of brick produced per hour**. This process rate was constant throughout testing, and was confirmed for three different emission factors provided by Mr. Colby. He did not have any documentation of the production rates, but stated that they were measured by weighing several fired bricks and multiplying by the total number of bricks produced.

REPORT CERTIFICATION

EI Reference Number 14448

The sampling and analysis performed for this report were carried out under my direction and supervision, and I hereby certify that the test report is authentic and accurate.

Signature: Vincent Jude Tomaino Date: 4/16/95

Vincent Jude Tomaino
Project Director
Chemical and Manufacturing Services Division

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1.0 INTRODUCTION

1.1 Background

Testing was performed at the Triangle Brick facility in Merry Oaks, North Carolina to determine emission factors to be used by the Brick Association of North Carolina. During the testing, the brick kiln fired a brick which is common to many other brick manufacturing facilities and which has no facing material or other additives. The emissions measured originated either from the combustion of natural gas or from the bulk of the brick itself.

The actual feed rate (lb-brick/hr) was continuously monitored throughout the testing program. No facing materials or other additives were supplied to the bricks during this period.

1.2 Outline of Test Program

Table 1-1 is a test log which presents the sampling locations, sampling objectives, sampling methods, test dates, and run numbers for the test program. Several runs utilized volumetric air flow rates and/or flue gas composition data from other runs; refer to **Table 1-1.**

TABLE 1-1
TEST LOG
BRICK KILN NO. 2 STACK
OCTOBER, 1995

Sampling Objective	Test Method	Test Date	Run Numbers	Flue Gas Composition	Volumetric Air Flow Rate
Metals	EPA 29	10/17 10/17 10/17	S-M29-1 S-M29-2 S-M29-3	S-M29/M3-1 S-M29/M3-2 S-M29/M3-3	NA
SO_2, NO_X, CO, & THC	EPA 6C, 7E, 10, & 25A	10/17 10/17 10/17	S-CEM-1 S-CEM-2 S-CEM-3	NA	S-M29-1 S-M29-2 S-M29-3
Particulate	EPA 5	10/18 10/18 10/18	S-M5-1 S-M5-2 S-M5-3	S-M5/M3-1 S-M5/M3-2 S-M5/M3-3	NA
Particulate ≤ 10μ & Condensible Particulate	EPA 201A & 202	10/18 10/18 10/18	S-M201A/202-1 S-M201A/202-2 S-M201A/202-3	S-M5/M3-1 S-M5/M3-2 S-M5/M3-3	NA

1.3 Test Participants

Table 1-2 lists the personnel involved in the test program.

TABLE 1-2
TEST PARTICIPANTS
OCTOBER, 1995

460-4004

Withers & Ravenel Environmental Engineering, Inc.	William G. Colby Test Coordinator
Entropy, Inc.	Vincent Jude Tomaino Project Director
	Dennis D. Holzschuh Project Manager
	Joseph P. Daley Sampling Team Leader
	Julie R. Ruff Sampling Team Leader
	Dan Wise Engineering Technician
	Joseph R. Winslow Laboratory Technician

2.0 SUMMARY OF RESULTS

2.1 Presentation

Table 2-1 presents the test results versus the permitted limits. **Table 2-2** presents additional test concentrations. Detailed test results are presented in **Appendix A**; field data are given in **Appendix B**; and analytical data can be found in **Appendix C**.

2.2 Cyclonic Flow Checks

A cyclonic flow check was performed at the sampling location to determine if any cyclonic flow existed. An average yaw angle of < 8° was measured, indicating an acceptable location with respect to EPA Method 1 requirements.

2.3 Metals Results

The reagent blank analytical results for antimony, arsenic, chromium, manganese, and nickel were as follows:

Metal	Blank (µg)
Antimony	1.45
Arsenic	3.49
Chromium	1.73
Manganese	1.27
Nickel	1.06

In accordance with Section 3.1.8.4.3 of the method, the runs' analytical results were adjusted to account for the reagent blank results. The adjusted results were used in the concentration and emission rate calculations.

2.4 Orsat Analyses

Twenty-seven (27) consecutive identical Orsat analyses were conducted, yielding 2.4% CO_2 and 16.6% O_2. These Orsat analyses did not agree with the Fyrite analyses of approximately 5% CO_2. The causes of these differences were explored on-site. Orsat measurements and re-analyses were witnessed by Mr. John Brown of USEPA, and the results confirmed. A leak-check was performed of the Orsat sampling line with no leak found. No explanation of these unusual results have been found. In any case, any possible error in the measurement of O_2 and CO_2 would only have a small effect on the calculated flow rates and emission rates.

TABLE 2-1
TEST RESULTS VERSUS PERMITTED LIMITS
EMISSION RATE, LB/HR
BRICK KILN NO. 2 STACK
OCTOBER, 1995

	Rep 1	Rep 2	Rep 3	Average	Permit Limit
Emission Rate, lb/hr					
Carbon Monoxide	6.19	5.96	6.14	6.09	15.95
Nitrogen Oxides as NO_2	1.31	1.34	1.34	1.33	8.70
Sulfur Dioxide	0.778	0.623	0.587	0.663	7.25
Methane	< 0.0756	< 0.0710	< 0.0706	< 0.0724	- -
Total Hydrocarbons as C	0.585	0.600	0.616	0.600	- -
Total Non-Methane Hydrocarbons as C	0.585	0.600	0.616	0.600	1.35
Filterable Particulate	0.367	0.330	0.414	0.370	5.08
Particulate ≤ 10 Microns	0.561	0.477	0.528	0.522	1.74
Condensible Particulate	1.54	2.07	2.10	1.90	- -
Metals					
Antimony	0.0	3.40 E-05	1.99 E-03	6.75 E-04	- -
Arsenic	8.03 E-05	1.20 E-04	5.25 E-04	2.42 E-04	- -
Beryllium	< 4.39 E-06	< 4.41 E-06	< 4.73 E-06	< 4.51 E-06	0.0
Cadmium	3.48 E-05	7.46 E-05	7.34 E-05	6.09 E-05	4.79 E-04
Chromium	1.82 E-04	2.40 E-04	2.41 E-04	2.21 E-04	1.09 E-01
Cobalt	< 4.39 E-05	< 4.41 E-05	< 4.73 E-05	< 4.51 E-05	1.60 E-03
Lead	1.41 E-04	1.29 E-04	2.48 E-03	9.17 E-04	1.15 E-03
Manganese	1.05 E-03	8.25 E-04	8.09 E-04	8.95 E-04	- -
Mercury	< 1.03 E-04	< 1.04 E-04	< 1.11 E-04	< 1.06 E-04	- -
Nickel	1.57 E-04	2.04 E-04	4.64 E-05	1.36 E-04	- -
Selenium	4.83 E-04	4.48 E-04	4.27 E-04	4.53 E-04	- -

TABLE 2-2
TEST CONCENTRATIONS SUMMARY
BRICK KILN NO. 2 STACK
OCTOBER, 1995

	Rep 1	Rep 2	Rep 3	Average
Concentration, ppmvd				
Carbon Monoxide	92.8	91.8	95.6	93.4
Nitrogen Oxides as NO_2	12.0	12.6	12.7	12.4
Sulfur Dioxide	5.10	4.20	4.00	4.43
Methane	< 1.98	< 1.91	< 1.92	< 1.94
Total Hydrocarbons as C	20.5	21.6	22.4	21.5
Total Non-Methane Hydrocarbons as C	20.5	21.6	22.4	21.5
Concentration, gr/DSCF				
Filterable Particulate	0.00293	0.00246	0.00325	0.00288
Particulate ≤ 10 Microns	0.00447	0.00380	0.00422	0.00416
Condensible Particulate	0.0122	0.0165	0.0168	0.0152
Metals				
Antimony	0.0	2.67 E-07	1.58 E-05	5.36 E-06
Arsenic	6.13 E-07	9.42 E-07	4.16 E-06	1.91 E-06
Beryllium	< 3.35 E-08	< 3.46 E-08	< 3.75 E-08	< 3.52 E-08
Cadmium	2.65 E-07	5.85 E-07	5.82 E-07	4.77 E-07
Chromium	1.39 E-06	1.88 E-06	1.91 E-06	1.73 E-06
Cobalt	< 3.35 E-07	< 3.46 E-07	< 3.75 E-07	< 3.52 E-07
Lead	1.08 E-06	1.01 E-06	1.96 E-05	7.23 E-06
Manganese	8.01 E-06	6.47 E-06	6.42 E-06	6.97 E-06
Mercury	< 7.87 E-07	< 8.13 E-07	< 8.82 E-07	< 8.27 E-07
Nickel	1.20 E-06	1.60 E-06	3.68 E-07	1.06 E-06
Selenium	3.68 E-06	3.51 E-06	3.39 E-06	3.53 E-06

3.0 PROCESS DESCRIPTION AND OPERATION

3.1 General

Triangle Brick in Merry Oaks, North Carolina operates a brick kiln. Brick Kiln No. 2 is a tunnel brick kiln designed to fire 29,000 lb/hr of triassic shale bricks. The kiln was fired utilizing only natural gas during the testing. No control equipment is installed on the kiln exhaust. The testing covered in this report was performed at the Brick Kiln No. 2 Stack.

3.2 Source Air Flow

Figure 3-1 is an air flow schematic which shows the passage of flue gases exhausted from the kiln.

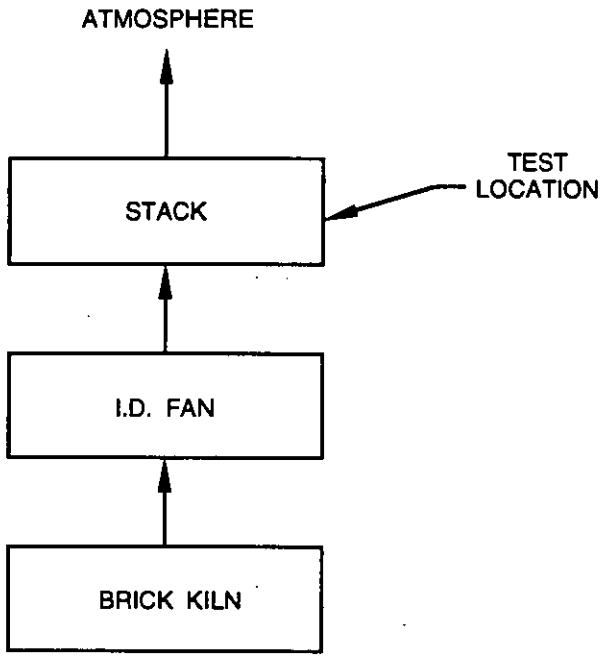


FIGURE 3-1. BRICK KILN NO. 2 AIR FLOW SCHEMATIC

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 General

All sampling and analytical procedures were those recommended by the United States Environmental Protection Agency and the North Carolina Department of Environment, Health, and Natural Resources. This section provides brief descriptions of the sampling and analytical procedures.

4.2 Sampling Points

The number and location of the sampling points were determined according to the procedures outlined in EPA Method 1. As shown in **Figure 4-1**, the stack cross section was divided into 24 equal areas with 12 sampling points on each of two axes.

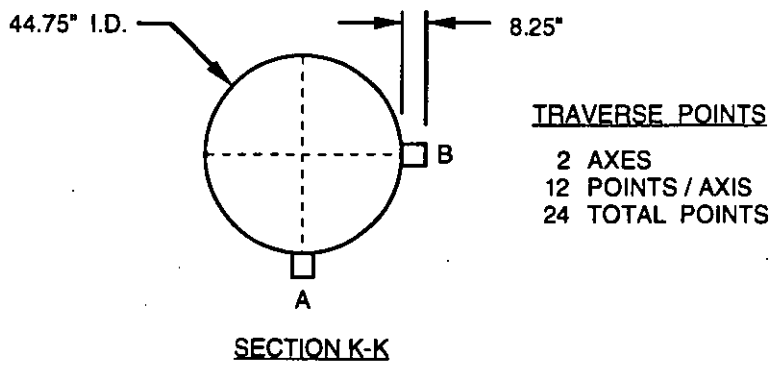
4.3 Cyclonic Flow Check

A Type S Pitot tube assembly, Magnehelic gauges, and a universal protractor (angle finder) were used to determine the flow angles at each of the sampling or velocity traverse points. At each point, the Pitot tube was positioned at a right angle to the air flow. The angles were determined by rotating the Pitot tube until a null reading was obtained on the Magnehelic gauges. When the null reading was obtained, the angle of the Pitot tube was recorded.

4.4 Volumetric Air Flow Rates

4.4.1 Flue Gas Velocity

The flue gas velocity and volumetric flow rate were determined according to the procedures outlined in EPA Method 2. Velocity head measurements (delta P) were made using Type S Pitot tubes conforming to the geometric specifications outlined in EPA Method 2. Accordingly, each has been assigned a coefficient of 0.84. Differential pressures were measured with Magnehelic gauges of appropriate range. Flue gas temperatures were measured with chromel-alumel thermocouples equipped with hand-held digital readouts.



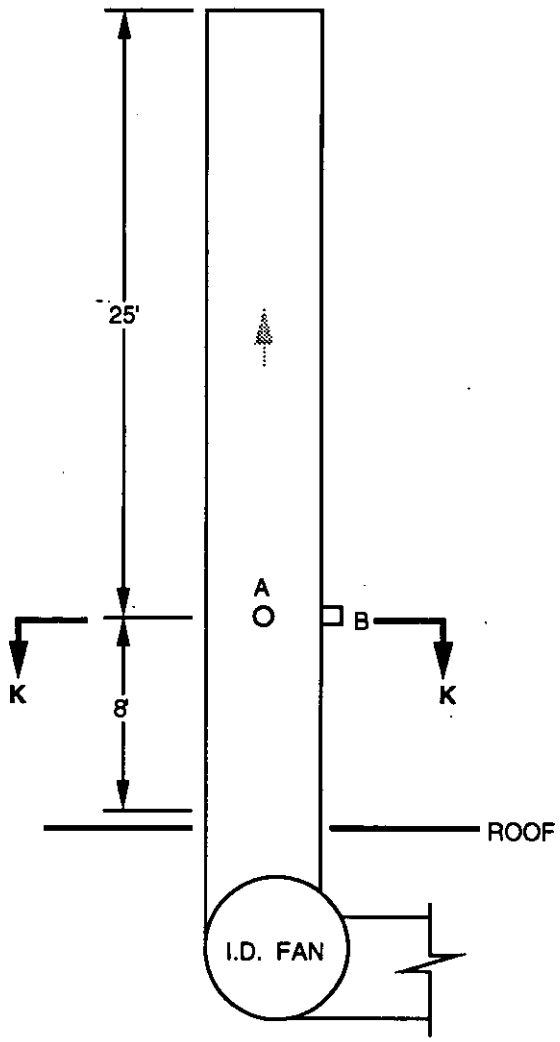


FIGURE 4-1. BRICK KILN NO. 2 STACK TEST LOCATION

4.4.2 Flue Gas Composition

Sample Collection. Flue gas samples were collected using the multipoint, integrated sampling technique outlined in EPA Method 3. A stainless steel probe and a peristaltic pump delivering 500 to 750 mL/min of flue gas were used to fill a Tedlar bag. Moisture was removed by means of a knockout jar located prior to the pump. Sampling was of the same duration (except purges following port changes) as the pollutant emissions runs.

Sample Analysis. Analysis for carbon dioxide and oxygen was performed using an Orsat apparatus. The analytical results were used to determine the flue gas composition, molecular weight, excess air, and emissions correction factor.

4.4.3 Flue Gas Moisture Content

The moisture content was determined in conjunction with the appropriate pollutant emissions methods discussed in the following sections.

4.5 Emissions Determinations

4.5.1 Carbon Monoxide, Sulfur Dioxide, Nitrogen Oxides, and Total Hydrocarbons

Continuous emissions monitoring (CEM) was conducted for sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and total hydrocarbons (THC) emissions. The sampling and analytical procedures for SO_2, NO_x, CO, and THC were in accordance with EPA Methods 6C, 7E, 10, and 25A, respectively.

The extractive monitors require that the effluent gas sample be conditioned to eliminate any possible interference (i.e., water vapor and/or particulate matter) before being transported and injected into each analyzer. All components of the sampling system which contacted the sample were constructed of Type 316 stainless steel or Teflon. The outputs from the monitors were connected to a computerized data acquisition system (DAS).

The SO_2, NO_x, and CO sample collection system consisted of a heated probe with an in-stack glass wool particulate filter, heated sample lines, a moisture removal trap, an out-of-stack secondary particulate filter, and a pump. The THC sample collection system was the same except no moisture removal trap or secondary particulate filter were used. All samples were routed through a distribution manifold board for delivery to the analyzers. The configuration of the sampling system allows for the injection of calibration gases directly to the analyzers or through the sampling system. All pretest and posttest calibration procedures were performed as outlined in the specific EPA methods. The operation of each analyzer and the DAS are described below.

Thermo Environmental Instrument Model 48/GFC CO Analyzer. The analyzer utilizes the gas filter correlation (GFC) technique to determine CO concentrations. The GFC technique involves the use of a high CO concentration filter which, when inserted into the infrared light beam, produces a reference beam, i.e., no further infrared radiation can be attenuated by the CO in the effluent sample. The CO filter is located on a modulated copper wheel which allows the use of a single infrared source and detector. A multiple pass optical bench/sample chamber of the white cell design provides improved sensitivity with a smaller chamber length.

Thermo Environmental Instrument Model 10 NO/NOx Analyzer. This analyzer automatically and continuously determines the concentration of the nitric oxide (NO) or nitrogen oxides (NO_x) in the effluent. The analytical technique is chemiluminescence. The sample is routed through a converter where the NO_2 is dissociated to form NO. The sample is then passed through a reaction chamber where the NO is quantitatively converted to NO_2 by gas phase oxidation with molecular ozone produced within the analyzer. In this reaction, the NO_2 molecules are elevated to an electronically excited state and immediately reverted to a nonexcited ground state. This reversion is accompanied by the emission of photons, which impinge on a photomultiplier detector and generate a low level DC current. The current is then amplified and used to drive a front panel meter and a data recorder. The NO_x concentration seen by the instrument includes the contributions of both the NO in the sample and the NO resulting from the dissociation of the NO_2 in the sample.

Western Research Model 721AT2 SO2 Analyzer. This analyzer provides continuous analysis of SO_2 in a gas stream. The basic analytical principle involves quantitative measurement of the absorption of UV radiation by SO_2 molecules. The analyzer uses a single light source which emits an appropriate wavelength, illuminating a cell through which the sample is continuously passed. Narrow band optical filters are rotated through the beam, and the radiation passed is detected by a single photodetector. The signal pulses from the photodetector are separated by a demultiplexor into a measuring channel and a reference channel. A log ratio amplifier computes the logarithm of the ratio of the input signals, producing a signal that is proportional to the concentration of the SO_2. An isolated 4-20 mA output signal is provided. In addition, SO_2 concentrations are displayed on the front panel digital display meter. Measurement ranges are 0-300 ppm and 0-2,000 ppm.

Ratfisch Model RS-55 THC Analyzer. This analyzer automatically and continuously monitors the THC concentrations in a flowing gas mixture. The theory of operation is based on the principle of flame ionization detection. In the flame ionization detector, hydrogen is mixed with the sample gas and is burned in a small jet. The ionization current in the hydrogen flame is measured. In a pure hydrogen flame, very few ions are produced, but if an organic component or hydrocarbon is burned in the flame, the ion current is greatly increased. The current provides a

quantitative measure of the amount of hydrocarbons in the flame. The current is converted to a voltage output. The hydrogen flame ionization detector is extremely sensitive and is capable of detecting hydrocarbon levels in the low parts per million range and is insensitive to inorganic gases such as nitrogen, carbon dioxide, and water vapor.

Data Acquisition System. The DAS uses an IBM-compatible computer with hard disk storage and an internal 12-bit analog-to-digital converter with a 16-channel multiplexer. In addition to providing an instantaneous display of analyzer responses, the DAS compiles the analyzer data collected once each second and averages them, calculates emission rates, and documents analyzer calibrations. The DAS integrates the real-time measurements and provides printouts of 1-minute, 15-minute, and 60-minute averaged emissions.

4.5.2 Metals

Sample Collection. Samples were withdrawn isokinetically from the source using an EPA Method 29 sampling train. The sampling train consisted of a glass nozzle, a heated glass probe with a Type S Pitot tube attached, a filter, seven chilled impingers, and a metering console. The particulate sample was collected on a Pallflex 2500QAT-UP quartz filter maintained at a temperature of 248°F ± 25°F. The first impinger remained empty, the second and third impingers each contained 100 mL of 5% nitric acid (HNO_3)/10% hydrogen peroxide (H_2O_2), the fourth remained empty, the fifth and sixth impingers each contained 100 mL of 4% potassium permanganate ($KMnO_4$)/10% sulfuric acid (H_2SO_4), and the seventh contained preweighed silica gel. Each of the 24 points was sampled for 2.5 minutes, resulting in net run times of 60 minutes.

Sample Recovery. A Teflon spatula and Teflon coated tweezers were used to remove the filter from the filter holder and place it in a 250 mL glass jar. The reagents were returned to the original bottles, weighed, the weights recorded on the labels, and the liquid levels marked. The silica gel was returned to the original container, weighed, and the weight recorded on the label. The volume of water vapor condensed in the impingers and the volume of water vapor collected in the silica gel were summed and entered into moisture content calculations.

The nozzle, probe, and fronthalf of the filter holder were rinsed with 100 mL of 0.1N HNO_3 into a 500 mL glass jar. A Teflon probe brush was used for cleaning the probe.

The backhalf of the filter holder and the first, second, and third impingers were rinsed with 100 mL of 0.1N HNO_3 into the bottle containing the HNO_3/H_2O_2 reagent. The fourth impinger was rinsed with 100 mL of 0.1N HNO_3 into a 500 mL glass jar. The fifth and sixth impingers were rinsed with 100 mL of acidified $KMnO_4$ followed by a rinse with 100 mL of DI water into the 500 mL bottle containing the $KMnO_4/H_2SO_4$ reagent. To remove residual brown deposits, the fifth and sixth impingers were rinsed with 25 mL of 8N HCl into a 500 mL glass jar containing 200 mL of water.

Sample Analyses. The fronthalf HNO_3 rinse was evaporated to near dryness in a Teflon beaker. The filter, loose particulate, 3 mL of concentrated HNO_3, and 5 mL of concentrated HF were added to the beaker. The sample was digested on a hotplate until brown fumes were evident, indicating the destruction of organic matter. After the addition of concentrated HNO_3, the reagent and impinger rinses were evaporated to near dryness in a Teflon beaker on a hotplate. After cooling, 3 mL of concentrated HNO_3 and 5 mL of concentrated HF were added to the beaker and the sample was fumed on a hotplate to destroy organic residue. The prepared filter and HNO_3/H_2O_2 reagent samples were combined, brought to a final volume of 100 mL with 10% HNO_3, and analyzed for all metals with a Perkin Elmer 3030 atomic absorption analyzer using the appropriate SW-846 methods. Cold vapor atomic absorption (CVAA) techniques were used to analyze the samples for mercury. The fourth impinger rinse, $KMnO_4/H_2SO_4$ reagent/rinse, and the HCl rinse were also analyzed for mercury by CVAA. Duplicate analyses were performed for approximately 10% of the emissions samples for all metals except mercury. For mercury, all samples were analyzed in duplicate.

4.5.3 Methane

Sample Collection. Flue gas samples were collected using the single-point, integrated sampling technique. A peristaltic pump delivering 500 to 750 mL/min of flue gas was used to fill a Tedlar bag. Moisture was removed by means of a knockout jar located prior to the pump. The sample was collected at a point approximately in the centroid of the cross section.

Sample Recovery. The Tedlar bag sample was transferred to an evacuated stainless steel tank to prevent any sample degradation that might occur during transport to the laboratory for analysis.

Sample Analysis. Sample analysis was performed according to EPA Method 18 with a GC/FID. Since an evacuated tank was used, a correction to the methane concentration as analyzed was made to adjust for the dilution of the sample caused by the pressurization procedures. EPA Method 10B temperature and pressure correction equations were used to make the "as analyzed" diluted methane results reflect the original undiluted sample concentration.

4.5.4 Particulate

Sample Collection. Samples were withdrawn isokinetically from the source using an EPA Method 5 sampling train. The sampling train consisted of a stainless steel nozzle, a heated glass probe with a Type S Pitot tube attached, a filter, four chilled impingers, and a metering console. The particulate sample was collected on a Whatman EPM2000 glass fiber filter maintained at a temperature of 248°F ± 25°F. The first two impingers each contained 100 mL of deionized, distilled

(DI) water, the third remained empty, and the fourth contained preweighed silica gel. Each of the 24 points was sampled for 2.5 minutes, resulting in net run times of 60 minutes.

Sample Recovery. The filter was removed from the filter holder and placed in a 250 mL glass jar. The DI water reagent was returned to the original 1000 mL glass jar, weighed, the weight recorded on the label, and the liquid level marked. The silica gel was returned to the original tared container, weighed, and the weight recorded on the label. The volume of water vapor condensed in the impingers and the volume of water vapor collected in the silica gel were summed and entered into moisture content calculations.

All fronthalf components of the sampling train including the nozzle, probe, and filter holder were rinsed with acetone into a 500 mL glass jar.

Sample Analysis. EPA Method 5 analytical procedures were used to analyze the filter and fronthalf acetone rinse for particulate.

4.5.5 Particulate ≤ 10 Microns and Condensible Particulate

Sample Collection. Samples were withdrawn isokinetically from the source using a combined EPA Method 201A and EPA Method 202 sampling train. The sampling train consisted of a precutter nozzle, an in situ sizing device (cyclone), a heated probe with a Type S Pitot tube attached, a heated filter, four chilled impingers, and a metering console.

The fine particulate filter was placed in the EPA Method 5 sampling box (as requested by Ron Meyers and John Brown of USEPA) so that the results would be more readily comparable to the EPA Method 5 results. The particulate with an aerodynamic size of ≤ 10 microns (PM10) was collected on a Whatman EPM2000 glass fiber filter maintained at a temperature of 248°F ± 25°F. The first two impingers each contained 100 mL of deionized, distilled (DI) water, the third remained empty, and the fourth contained preweighed silica gel.

The sampling time at each traverse point was adjusted proportionally to the velocity at that point to provide a velocity weighted sample. A preliminary velocity traverse was performed to determine which points were to be sampled and for how long. From this data, the average flue gas velocity was calculated. Based on the flue gas parameters, the appropriate ACFM into the nozzle was selected for the PM10 cut. The desired nozzle size was calculated, a nozzle with a diameter as close to the desired size was chosen, and the desired velocity into the nozzle was calculated. The sampling rate remained constant for the duration of each run.

Sample Recovery. At the conclusion of each run, the precutter nozzle/cyclone, probe, and filter were removed and the impinger contents were purged with nitrogen (N_2) to remove dissolved sulfur dioxide (SO_2) gases. The posttest nitrogen purge was at a rate of 20 L/min for a duration of 60 minutes.

After the nitrogen purge, the DI water reagent was returned to the original 1000 mL glass jar, weighed, the weight recorded on the label, and the liquid level marked. The silica gel was returned to the original tared container, weighed, and the weight recorded on the label. The volume of water vapor condensed in the impingers and the volume of water vapor collected in the silica gel were summed and entered into moisture content calculations.

The precutter nozzle and cyclone were rinsed with acetone into a 500 mL glass jar. The filter was removed from the filter holder and placed into a separate sample jar and the fronthalf of the filter holder was rinsed with acetone into the appropriate sample jar. The backhalf of the filter holder, impingers, and connecting glassware were rinsed twice with water into the 1000 mL jar containing the DI water reagent then twice with methylene chloride ($MeCl_2$) into a separate 500 mL glass jar.

Sample Analysis. EPA Method 5 analytical procedures were used to analyze the precutter nozzle, cyclone, and filter catch for filterable particulate. EPA Method 202 analytical procedures were used to analyze the combined DI water reagent/DI water rinses and $MeCl_2$ rinses for condensible particulate. The precutter nozzle and cyclone catch and nozzle/cyclone acetone rinse analytical results are reported as particulate > 10 microns. The filter catch and filters' fronthalf acetone rinses and the impingers DI water reagent and $MeCl_2$ rinse analytical results are reported as particulate ≤ 10 microns.

4.6 Equipment Calibration

Pertinent calibration data are provided in **Appendix D**.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

5.1 General

Entropy, Inc. (EI) is committed to the continued implementation of a Quality Assurance Program to assure the quality of sampling and analytical procedures of environmental measurement data. The Quality Assurance measures taken during this test project equal or exceed the minimum QA/QC recommendations as set forth by the U.S. Environmental Protection Agency (EPA) for a particular method.

The following sections outline the QA program implemented by EI to justify the validity of test procedures. As applicable, the QA system for the various test programs addresses the following areas:

- Preventive Maintenance & Equipment Calibration
- Sample Processing
- Analytical Instrument Calibration
- Blanks and Spiked Samples
- Internal/External System Checks
- Data Reduction & Validation
- QA/QC Summary

5.2 Preventive Maintenance and Equipment Calibration

An effective preventive maintenance program decreases downtime and thus increases data completeness and quality. Pretest and posttest equipment calibrations are conducted in a manner and at a frequency which meets or exceeds U.S. EPA specifications.

Each item transported to the field is inspected to detect equipment problems which may originate during periods of storage. All equipment returning from the field is cleaned, repaired, reconditioned, and recalibrated as necessary. Routine maintenance on equipment (dry gas meters, pumps, Magnehelics, manometers, Pitot tubes, and nozzles) is carried out periodically for leaks, corrosion, dents, or any other damage. **Table 5-1** shows the activities for equipment calibration.

TABLE 5-1
IN-HOUSE EQUIPMENT CALIBRATION

Apparatus	Calibration Method And Frequency	Specifications	Corrective Action
Type S Pitot Tubes	Standards contained in EPA Method 2	Coefficient of 0.84 ± 0.02	Refurbish or recalibrate
	Visual inspection prior to shipment to test site and again prior to each day of testing		
Manometers	Leak checked before and after each field use		Adjust or replace
Magnehelic Gauges	Initially calibrate over full range	0-10" water column	
	After each field use, checked against inclined manometer at average settings encountered during testing	Within ± 5%	Repair and Recalibrate
Thermometers - Impinger - Dry Gas Meter - Filter Box	After purchase and prior to each field use, using ASTM Hg-in-glass thermometer	Impinger = ± 2°F DGM = ± 5.4°F FB = ± 5.4°F	Adjust, determine correction factor, or reject
	After purchase and prior to each field use, using ASTM mercury-in-glass thermometer		
Thermocouple/ Potentiometer	After purchase. 3-point (ice bath, boiling water, and hot oil) using ASTM Hg-in-glass thermometer	± 1.5% of absolute temperature	Adjust, determine correction factor, or reject
	Before and after each field use, compared to ASTM Hg-in-glass thermometer at ambient conditions		
Dry Gas Meter and Orifice	Full calibration (every 6 months) over wide range of orifice settings to obtain calibration factor (isokinetic meter box) as per EPA Method 5	DGM = ± 0.02 from avg.coeff. for each run Orifice = ± 0.15" H_2O over delta H range of 0.4"-4.0"	Adjust or replace
	10-minute quick calibration before sending to test site and again prior to each day of field use (isokinetic)	± 3% of full calibration Υ ± 5% of full calibration Υ	Use if no backup Do not use
	Calculate Υqa* on-site for each test run to determine if the meter gamma (Υ) has changed (EPA Method 5 Section 5.3.2 Alternate Procedures as approved by Administrator)	Average Yqa must be within ±5% of full calibration Υ	Perform post test calibration at average delta H and highest vacuum encountered during testing to determine if meter gamma has changed (isokinetic)
	A post test isokinetic meter box calibration is performed after every job at the approximate average delta H to determine if meter gamma has changed (isokinetic) as per EPA Method 5	±5% of full calibration Gamma (initial or recalibration) that yields the lowest sample volume for the testing is used for calculations	Recalibrate or replace
Dry Gas Meter Transfer Standard	Annual calibrations conducted in triplicate using EPA wet test meter. Calibrations conducted at 7 flow rates from 0.25 to 1.40 cfm.	± 2% of average factor for each calibration run	Adjust and recalibrate

- See **Appendix D** for EMTIC guideline document

TABLE 5-1 (Continued)
IN-HOUSE EQUIPMENT CALIBRATION

Apparatus	Calibration Method And Frequency	Specifications	Corrective Action
Barometer	Before and after each field use against an aneroid barometer	± 0.1" mercury	Adjust to agree
	Reference barometer adjusted for elevation differences		
Probe Nozzle	Average of 5 I.D. measurements using a micrometer. Visual inspection before and after each field use	Difference between high and low measurement ≤ 0.004"	Repair and recalibrate

5.3 Sample Processing

Entropy, Inc. employs systems which ensure the integrity of an environmental sample from the time of acquisition, through analysis, and ultimately to proper disposal. These systems are necessary to allow valid conclusions to be drawn from analytical results separated in time and space from the sampling operation. In addition, these systems recognize that samples are occasionally of value even after analytical results have been reported.

Samples are collected, transported, and stored in clean containers which are constructed of materials inert to the analytical matrix. Containers are used which allow air tight seals. When necessary, containers are employed which prevent photochemical reactions. All sample containers are labeled with the following information:

- Unique source identifier
- Sample run identifier
- Analyte identifier
- Sample matrix identifier
- Sample analyst identifier

Additional information relating to the sample is recorded on the data sheet for the sampling run that afforded the subject sample. Accordingly, the sampling data sheet contains all the information listed above, plus the date and time the sample was acquired and supplemental information such as observations pertinent to the quality of the sample. For condensed samples, e.g., samples in liquid media, the sample levels are marked on the outside of the container; this mark is used to indicate sample loss, and as such, may serve as a reference in adjusting results accordingly.

For transport from the field to the laboratory, samples are stored in sealed containers and secured in a fashion which minimizes movement and thus prevents breakage of containers. Containers used for transporting glass are packed with foam. Samples which require chilling are kept cold until analyzed.

Samples remain in the custody of the sampler, from acquisition until conveyance to the sample custodian. All custody transfers are signed and documented on a record of custody form, which remains with the sample until turned over to the custodian.

Analytical data are identified in a manner identical to that of the sampling data. Accordingly, all data generated from the analysis of samples are documented with the following information:

- Source identifier
- Sample run identifier
- Analyte identifier
- Sample matrix identifier
- Analyst identifier
- Analysis date

Portions of samples remaining after analysis are returned to their original sample containers. These samples are stored in designated storage areas until their destruction is authorized.

5.4 Instrument Calibration

Instrument calibration is one of the most important functions in generating precise and accurate quality data. All of the contract laboratories involved in the analytical testing for the test program maintain rigorous QA programs for instrument calibration.

5.5 Blanks and Spikes

Field blanks, method blanks, trip blanks, lab-proof blanks and filter blanks are obtained, digested and analyzed when applicable. The blanks reflect the background contamination obtained from the various sources during the sampling and analysis. Thus, data adjustment or correction can be made accordingly.

In most cases, it is not necessary to digest and analyze the method blanks, reagent blanks or the lab-proof blanks unless the field blank shows a high level of contamination. If a high level of contamination is present, it is imperative to individually analyze the above blanks to help determine the cause of contamination.

Spiked samples are used to check on the performance of a routine analysis or the recovery efficiency of a method. During spiking, a known amount of stock solutions of the substance of interest is added to the sample prior to sample extraction, digestion, and analysis.

5.6 Internal/External System Audit Checks

System and performance audits are routine elements of all Entropy QA/QC programs.

Internal Systems Audit: The following sampling equipment checks were conducted prior to sample collection.

- All sampling equipment was thoroughly checked to ensure clean and operable components.
- Equipment was inspected for possible damage from shipment.
- The oil manometers or Magnehelic gauges were leveled and zeroed.
- The temperature measurement systems were checked for damage and operability by measuring the ambient temperature.

Performance Audits: Performance audits of the laboratory are conducted prior to the processing of any compliance samples for analysis. Audit materials typically include samples available from the EPA prior to new source testing. Also, samples of known concentration are prepared in-house or obtained from the EPA for Internal QA checks.

External Systems Audits: Entropy is subject to a system audit each time a test is conducted for any Air Pollution Control agency. This procedure entails an EPA observer on-site to do qualitative evaluation of performance to demonstrate compliance with the applicable regulations.

5.7 Data Reduction and Validation

The test team leader is responsible for reviewing and validating data as they are acquired. Each team leader has extensive knowledge of sampling methodology and the characteristics of the process being measured and is capable of evaluating the accuracy, representativeness, and completeness of raw data on-site. Action to replace inadequate data can be taken immediately.

Data obtained during calibrations and test runs are recorded on standardized forms which are checked twice for completeness and accuracy by the QA Director or his designated representative. Data reduction and consistency are achieved by using the standardized forms and using Entropy's in-house computer facilities.

5.8 QA/QC Summary

All chemicals used were American Chemical Society (ACS), High Performance Liquid Chromatography (HPLC), or pesticide grade. The deionized, distilled water utilized met or

exceeded the American Society for Testing and Materials (ASTM) specifications for Type-I reagent water. Pretest and posttest leak checks were conducted on each sampling train.

5.8.1 Carbon Monoxide, Nitrogen Oxides and Sulfur Dioxide

Three-point analyzer calibration error checks were conducted before initiating any testing. Zero and upscale calibration drift checks were conducted for each run. The calibration error, percent of span drift, and percent of span system calibration checks met the ±2%, ±3%, and ± 5%, respectively.

5.8.2 Metals

Filter and reagent blanks were prepared and analyzed for mercury; a matrix spike was conducted; and duplicate analyses were conducted. **Table 5-2** presents the results.

Filter and reagent blanks were prepared and analyzed for metals; a matrix spike was conducted; and duplicate analyses were conducted. **Table 5-3** presents the results.

5.8.3 Particulate

An acetone reagent blank was analyzed for particulate with 0.5 mg/300 mL detected.

5.8.4 Particulate ≤ 10 Microns and Condensible Particulate

An acetone reagent blank was analyzed for particulate with 0.5 mg/300 mL detected. A $MeCl_2$ reagent blank was analyzed for condensible particulate with 1.2 mg/285 mL detected. A DI H_2O reagent blank was analyzed for condensible particulate with 1.4 mg/295 mL detected.

5.8.5 Total Hydrocarbons

Pretest and posttest calibrations were performed for each test run. The 3-point linearity checks were all within 3% of the known cylinder gas concentrations.

TABLE 5-2
MERCURY DUPLICATE ANALYSES RESULTS
BRICK KILN NO. 2 STACK
OCTOBER, 1995

	First Analysis	Second Analysis	Relative % Difference
S-M29-1			
Front half	< 0.470	< 0.470	NA
Back half	< 1.79	< 1.79	NA
HNO_3	< 0.940	< 0.940	NA
$KMnO_4$	< 2.35	< 2.35	NA
HCl	< 2.35	< 2.35	NA
S-M29-2			
Front half	< 0.470	< 0.470	NA
Back half	< 1.76	< 1.76	NA
HNO_3	< 0.940	< 0.940	NA
$KMnO_4$	< 2.35	< 2.35	NA
HCl	< 2.35	< 2.35	NA
S-M29-3			
Front half	< 0.470	< 0.470	NA
Back half	< 1.74	< 1.74	NA
HNO_3	< 0.940	< 0.940	NA
$KMnO_4$	< 2.35	< 2.35	NA
HCl	< 2.35	< 2.35	NA
S-M29-FB			
Front half	< 0.470	< 0.470	NA
Back half	< 1.36	< 1.36	NA
HNO_3	< 0.940	< 0.940	NA
$KMnO_4$	< 2.35	< 2.35	NA
HCl	< 2.35	< 2.35	NA

* Not applicable if one or both results are below the detection limit.

TABLE 5-3
METALS (EXCEPT MERCURY) BLANKS, MATRIX SPIKES, AND DUPLICATE ANALYSES RESULTS
BRICK KILN NO. 2 STACK
OCTOBER, 1995

	Reagent Blank, µg[a]	Field Blank, µg[a]	Matrix Spike Recovery, % [b]	First Analysis, µg	Second Analysis, µg[c]	Relative % Difference[d]
Antimony	1.45	< 1.00	90.9	2.22	2.21	0.226
Arsenic	3.49	2.02	104	6.46	5.95	4.11
Beryllium	< 0.100	< 0.100	87.4	< 0.100	< 0.100	NA
Cadmium	< 0.400	< 0.400	102	1.71	1.66	1.48
Chromium	1.73	2.18	99.0	7.10	7.24	0.976
Cobalt	< 1.00	< 1.00	106	< 1.00	< 1.00	NA
Lead	< 1.00	< 1.00	82.4	3.03	2.83	3.41
Manganese	1.27	2.56	89.9	21.0	19.0	5.00
Nickel	1.06	2.97	90.9	5.62	5.74	1.06
Selenium	< 1.00	< 1.00	106	10.30	9.99	1.53

(a) Combined filter, fronthalf 0.1N HNO_3 rinse, acetone rinse, and HNO_3/H_2O_2 reagent.
(b) Conducted on repetition 3.
(c) Conducted on repetition 2.
(d) Not applicable if one or both results are below the detection limit.

APPENDIX A. TEST RESULTS

1. Brick Kiln No. 2 Stack

a. Carbon Monoxide, Nitrogen Oxides, Sulfur Dioxide, and Total Hydrocarbons

FIELD DATA AND RESULTS TABULATION

PLANT: Triangle Brick, Merry Oaks, NC
SAMPLING LOCATION: Brick Kiln No. 2 Stack
OPERATOR: Julie R. Ruff

			S-CEM-1		S-CEM-2		S-CEM-3
	Test Date		10/17/95		10/17/95		10/17/95
	Run Start Time		1010		1150		1330
	Run Finish Time		1110		1250		1430
Theta	Net Run Time, min		60.0		60.0		60.0
Pbar	Barometric Pressure, in Hg		30.50		30.50		30.50
Mfd	Dry Mole Fraction		0.929		0.928		0.929
$\%CO_2$	Carbon Dioxide, % by volume		2.4		2.4		2.4
$\%O_2$	Oxygen, % by volume		16.6		16.6		16.6
Pg	Flue Gas Static Pressure, in H_2O		-0.350		-0.350		-0.350
ts	Flue Gas Temperature, °F		510		517		508
Qsd	Volumetric Flow Rate, dry SCFM*		15,284		14,877		14,714
	Carbon Monoxide						
Fwt	Formula Weight, gm/gm-mole		28.01		28.01		28.01
ppm_{vd}	Concentration, ppmvd		92.8		91.8		95.6
lb/hr	Emission Rate, lb/hr		6.19		5.96		6.14
	Nitrogen Oxides as NO2						
Fwt	Formula Weight, gm/gm-mole		46.01		46.01		46.01
ppm_{vd}	Concentration, ppmvd		12.0		12.6		12.7
lb/hr	Emission Rate, lb/hr		1.31		1.34		1.34
	Sulfur Dioxide						
Fwt	Formula Weight, gm/gm-mole		64.06		64.06		64.06
ppm_{vd}	Concentration, ppmvd		5.1		4.2		4.0
lb/hr	Emission Rate, lb/hr		0.778		0.623		0.587
	THC as Carbon						
Fwt	Formula Weight, gm/gm-mole		12.01		12.01		12.01
ppm_{vw}	Concentration, ppmvw		19.0		20.0		20.8
ppm_{vd}	Concentration, ppmvd		20.5		21.6		22.4
lb/hr	Emission Rate, lb/hr		0.585		0.600		0.616
	Methane						
Fwt	Formula Weight, gm/gm-mole		16.04		16.04		16.04
ppm_{vd}	Concentration, ppmvd	<	1.98	<	1.91	<	1.92
lb/hr	Emission Rate, lb/hr	<	0.0756	<	0.0710	<	0.0706
	Total Non-methane Hydrocarbons as Carbon						
Fwt	Formula Weight, gm/gm-mole		12.01		12.01		12.01
ppm_{vd}	Concentration, ppmvd		20.5		21.6		22.4
lb/hr	Emission Rate, lb/hr		0.585		0.600		0.616

* 68°F (20°C) -- 29.92 inches of mercury

TOTAL HYDROCARBON MEASUREMENT RESULTS SUMMARY

PLANT NAME: Withers and Ravenel / Triangle Brick

TEST LOCATION: Brick Kiln #2 Stack

TEST DATE: 10-17-95

OPERATOR: Julie Ruff

---- Pre-Test Calibration Error Check ------

SPAN VALUE: 100 (ppm as C)	CALIBRATION GAS VALUE (ppmC)*	SYSTEM CAL. ERROR RESPONSE	CAL. ERROR %
THC Zero Gas	0.0	0.7	0.70
Low-Level Gas	29.8	28.7	-3.69
Mid-Level Gas	51.9	51.9	0.00
High-Level Gas	83.1	84.4	1.56

* ppmC values = ppmC3H8 values x 3

------ Drift Determinations ------

Run Number	2-M25A-1	2-M25A-2	2-M25A-3
Zero Sys.Cal.Response	0.7	0.7	0.7
Zero Drift Response	1.4	0.7	0.1
Zero Drift	0.7	0.0	-0.6
Upscale Sys.Cal.Resp.	51.9	51.9	51.9
Upscale Drift Response	50.5	50.9	50.4
Upscale Drift	-1.4	-1.0	-1.5

---------- Test Results----------

RUN NO.:	2-M25A-1	2-M25A-2	2-M25A-3
RUN TIME:	1010-1110	1150-1250	1330-1430
THC (ppmwC):	19.0	20.0	20.8
%H2O:	7.10	7.20	7.10
THC (ppmdC):	20.5	21.6	22.4
DSCFM:	15,284	14,877	14,714
THC (lb/hr C):	0.585	0.600	0.616

ppmd = ppmw / (1-(%H2O/100))

lb/hr = (ppmd x DSCFM x 60 x Mol.Wt.) / 385.3 E06

Where: Mol.Wt. Carbon = 12.01 lb/lb mole

$$\text{Cal.Error} = \frac{\text{System Cal.Response} - \text{Cal.Gas Value}}{\text{** Cal.Gas Value}} \times 100$$

$$\text{Drift} = \frac{\text{Drift Response} - \text{System Cal.Response}}{\text{Span Value}} \times 100$$

** For zero gas calibration error use span value

CALCULATION OF AVERAGE SO2, NOx AND CO EMISSIONS

COMPANY: Withers and Ravenel / Triangle Brick
SOURCE: Brick Kiln #2 Stack
RUN: 1 (10:10 - 11:10) DATE: 10/17/95

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm SO2	0.6	2.5	1.6
45.1 ppm SO2	41.2	42.9	42.1
0.0 ppm NOx	0.8	1.7	1.3
46.3 ppm NOx	42.8	42.1	42.5
0.0 ppm CO	1.3	3.6	2.5
59.9 ppm CO	59.7	61.5	60.6

Uncorrected Data: 6.2 ppm SO2
12.0 ppm NOx
92.5 ppm CO 15,284 DSCFM

==========

CORRECTED RESULTS

5.1 ppm SO2
12.0 ppm NOx
92.8 ppm CO 0.776 lb SO2/hr
1.31 lb NOx/hr
6.18 lb CO/hr

==========

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

lb/hr = (ppm pollutant)(DSCFM flow)(Conv. Factor)(60)

Where: SO2 Conv. Factor = 1.660E-07 lb SO2/DSCF - ppm SO2
NOx Conv. Factor = 1.194E-07 lb NO2/DSCF - ppm NO2
CO Conv. Factor = 7.263E-08 lb CO/DSCF - ppm CO

CALCULATION OF AVERAGE SO2, NOx AND CO EMISSIONS

COMPANY: Withers and Ravenel / Triangle Brick
SOURCE: Brick Kiln #2 Stack
RUN: 2 (11:50 - 12:50) DATE: 10/17/95

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm SO2	2.5	1.9	2.2
45.1 ppm SO2	42.9	42.9	42.9
0.0 ppm NOx	1.7	2.4	2.1
46.3 ppm NOx	42.1	41.5	41.8
0.0 ppm CO	3.6	1.2	2.4
59.9 ppm CO	61.5	58.9	60.2

Uncorrected Data: 6.0 ppm SO2
12.9 ppm NOx
91.0 ppm CO 14,877 DSCFM

==========

CORRECTED RESULTS

4.2 ppm SO2
12.6 ppm NOx
91.8 ppm CO

0.622 lb SO2/hr
1.34 lb NOx/hr
5.95 lb CO/hr

==========

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

lb/hr = (ppm pollutant)(DSCFM flow)(Conv. Factor)(60)

Where: SO2 Conv. Factor = 1.660E-07 lb SO2/DSCF - ppm SO2
NOx Conv. Factor = 1.194E-07 lb NO2/DSCF - ppm NO2
CO Conv. Factor = 7.263E-08 lb CO/DSCF - ppm CO
#VALUE!

CALCULATION OF AVERAGE SO2, NOx AND CO EMISSIONS

COMPANY: Withers and Ravenel / Triangle Brick
SOURCE: Brick Kiln #2 Stack
RUN: 3 (13:30 - 14:30) DATE: 10/17/95

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm SO2	1.9	1.7	1.8
45.1 ppm SO2	42.9	41.6	42.3
0.0 ppm NOx	2.4	3.5	3.0
46.3 ppm NOx	41.5	41.3	41.4
0.0 ppm CO	1.2	0.8	1.0
59.9 ppm CO	58.9	60.3	59.6

Uncorrected Data: 5.4 ppm SO2
13.5 ppm NOx
94.5 ppm CO 14,714 DSCFM

==========

CORRECTED RESULTS

4.0 ppm SO2
12.7 ppm NOx
95.6 ppm CO

0.586 lb SO2/hr
1.34 lb NOx/hr
6.13 lb CO/hr

==========

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

lb/hr = (ppm pollutant)(DSCFM flow)(Conv. Factor)(60)

Where: SO2 Conv. Factor = 1.660E-07 lb SO2/DSCF - ppm SO2
NOx Conv. Factor = 1.194E-07 lb NO2/DSCF - ppm NO2
CO Conv. Factor = 7.263E-08 lb CO/DSCF - ppm CO

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: Withers and Ravenel / Triangle Brick

SOURCE: Brick Kiln #2 Stack

TEST DATE: 10/17/95

RUN NUMBER: 1 (10:10 - 11:10)

SPAN VALUES: 100.0 ppm SO2
100.0 ppm NOx
100.0 ppm CO

>8>

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
SO2 ZERO GAS	0.4	0.6	0.20	2.5	2.10	1.90
SO2 UP-SCALE	46.1	41.2	-4.90	42.9	-3.20	1.70
NOx ZERO GAS	0.4	0.8	0.40	1.7	1.30	0.90
NOx UP-SCALE	46.1	42.8	-3.30	42.1	-4.00	-0.70
CO ZERO GAS	0.6	1.3	0.70	3.6	3.00	2.30
CO UP-SCALE	60.3	59.7	-0.60	61.5	1.20	1.80

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: Withers and Ravenel / Triangle Brick

SOURCE: Brick Kiln #2 Stack

TEST DATE: 10/17/95

RUN NUMBER: 2 (11:50 - 12:50)

SPAN VALUES: 100.0 ppm SO2
100.0 ppm NOx
100.0 ppm CO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
SO2 ZERO GAS	0.4	2.5	2.10	1.9	1.50	-0.60
SO2 UP-SCALE	46.1	42.9	-3.20	42.9	-3.20	0.00
NOx ZERO GAS	0.4	1.7	1.30	2.4	2.00	0.70
NOx UP-SCALE	46.1	42.1	-4.00	41.5	-4.60	-0.60
CO ZERO GAS	0.6	3.6	3.00	1.2	0.60	-2.40
CO UP-SCALE	60.3	61.5	1.20	58.9	-1.40	-2.60

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: Withers and Ravenel / Triangle Brick
SOURCE: Brick Kiln #2 Stack

TEST DATE: 10/17/95

RUN NUMBER: 3 (13:30 - 14:30)

SPAN VALUES: 100.0 ppm SO2
100.0 ppm NOx
100.0 ppm CO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
SO2 ZERO GAS	0.4	1.9	1.50	1.7	1.30	-0.20
SO2 UP-SCALE	46.1	42.9	-3.20	41.6	-4.50	-1.30
NOx ZERO GAS	0.4	2.4	2.00	3.5	3.10	1.10
NOx UP-SCALE	46.1	41.5	-4.60	41.3	-4.80	-0.20
CO ZERO GAS	0.6	1.2	0.60	0.8	0.20	-0.40
CO UP-SCALE	60.3	58.9	-1.40	60.3	0.00	1.40

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

APPENDIX A. TEST RESULTS

1. Brick Kiln No. 2 Stack

b. Metals

FIELD DATA AND RESULTS TABULATION

PLANT: Triangle Brick, Merry Oaks, NC

LOCATION: Brick Kiln No. 2 Stack

RUN #	DATE	OPERATOR
S-M29-1	10/17/95	Joseph P Daley
S-M29-2	10/17/95	Joseph P Daley
S-M29-3	10/17/95	Joseph P Daley

		S-M29-1	S-M29-2	S-M29-3
	Run Start Time	1010	1150	1330
	Run Finish Time	1117	1255	1436
	Net Traversing Points	24	24	24
Theta	Net Run Time, Minutes	60.00	60.00	60.00
Dia	Nozzle Diameter, Inches	0.313	0.313	0.306
Cp	Pitot Tube Coefficient	0.840	0.840	0.840
Y	Dry Gas Meter Calibration Factor	1.0013	1.0013	1.0013
Pbar	Barometric Pressure, Inches Hg	30.50	30.50	30.50
Delta-H	Avg. Pressure Differential of Orifice Meter, Inches H_2O	2.02	1.92	1.61
Vm	Volume Of Metered Gas Sample, Dry ACF	46.870	45.745	41.770
tm	Dry Gas Meter Temperature, Degrees F	91	96	89
Vmstd	Volume Of Metered Gas Sample, Dry SCF*	46.070	44.583	41.129
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, ml	74.7	73.5	66.6
Vwstd	Volume of Water Vapor, SCF*	3.516	3.460	3.135
$\%H_2O$	Moisture Content, Percent by Volume	7.1	7.2	7.1
Mfd	Dry Mole Fraction	0.929	0.928	0.929
$\%CO_2$	Carbon Dioxide, Percent By Volume, Dry	2.4	2.4	2.4
$\%O_2$	Oxygen, Percent By Volume, Dry	16.6	16.6	16.6
Fo	Fuel Factor	1.792	1.792	1.792
Md	Gas Molecular Weight, lb/lb-Mole, Dry	29.05	29.05	29.05
Ms	Gas Molecular Weight, lb/lb-Mole, Wet	28.26	28.25	28.27
Pg	Flue Gas Static Pressure, Inches H_2O	-0.35	-0.35	-0.35
Ps	Absolute Flue Gas Pressure, Inches Hg	30.47	30.47	30.47
ts	Flue Gas Temperature, Degrees F	510	517	508
Delta-p	Average Velocity Head, Inches H_2O	0.3531	0.3374	0.3263
vs	Flue Gas Velocity, Feet/Second	45.29	44.43	43.48
A	Stack/Duct Area, Square Inches	1,573	1,573	1,573
Qsd	Volumetric Air Flow Rate, Dry SCFM*	15,284	14,877	14,714
Qaw	Volumetric Air Flow Rate, Wet ACFM	29,680	29,114	28,491
%I	Isokinetic Sampling Rate, Percent	102.7	102.1	99.6

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg)

(Continued next page)

FIELD DATA AND RESULTS TABULATION
(Continued)

PLANT: Triangle Brick, Merry Oaks, NC

		S-M29-1	S-M29-2	S-M29-3
	Antimony			
fwt	Formula Weight, lb/lb-Mole	121.75	121.75	121.75
ug	Catch Weight, Micrograms	0	.77	42
ug/DSCM	Concentration, ug/DSCM	0.0	0.610	36.1
gr/DSCF	Concentration, grains/DSCF *	0.0	2.67E-007	1.58E-005
lb/hr	Emission Rate, lb/hr	0.0	3.40E-005	1.99E-003
	Arsenic			
fwt	Formula Weight, lb/lb-Mole	74.92	74.92	74.92
ug	Catch Weight, Micrograms	1.83	2.72	11.1
ug/DSCM	Concentration, ug/DSCM	1.40	2.15	9.53
gr/DSCF	Concentration, grains/DSCF *	6.13E-007	9.42E-007	4.16E-006
lb/hr	Emission Rate, lb/hr	8.03E-005	1.20E-004	5.25E-004
	Beryllium			
fwt	Formula Weight, lb/lb-Mole	9.01	9.01	9.01
ug	Catch Weight, Micrograms	< .1	< .1	< .1
ug/DSCM	Concentration, ug/DSCM	< 0.0766	< 0.0792	< 0.0859
gr/DSCF	Concentration, grains/DSCF *	< 3.35E-008	< 3.46E-008	< 3.75E-008
lb/hr	Emission Rate, lb/hr	< 4.39E-006	< 4.41E-006	< 4.73E-006
	Cadmium			
fwt	Formula Weight, lb/lb-Mole	112.41	112.41	112.41
ug	Catch Weight, Micrograms	.792	1.69	1.55
ug/DSCM	Concentration, ug/DSCM	0.607	1.34	1.33
gr/DSCF	Concentration, grains/DSCF *	2.65E-007	5.85E-007	5.82E-007
lb/hr	Emission Rate, lb/hr	3.48E-005	7.46E-005	7.34E-005
	Chromium			
fwt	Formula Weight, lb/lb-Mole	52.00	52.00	52.00
ug	Catch Weight, Micrograms	4.15	5.44	5.09
ug/DSCM	Concentration, ug/DSCM	3.18	4.31	4.37
gr/DSCF	Concentration, grains/DSCF *	1.39E-006	1.88E-006	1.91E-006
lb/hr	Emission Rate, lb/hr	1.82E-004	2.40E-004	2.41E-004
	Cobalt			
fwt	Formula Weight, lb/lb-Mole	58.93	58.93	58.93
ug	Catch Weight, Micrograms	< 1	< 1	< 1
ug/DSCM	Concentration, ug/DSCM	< 0.766	< 0.792	< 0.859
gr/DSCF	Concentration, grains/DSCF *	< 3.35E-007	< 3.46E-007	< 3.75E-007
lb/hr	Emission Rate, lb/hr	< 4.39E-005	< 4.41E-005	< 4.73E-005
	Lead			
fwt	Formula Weight, lb/lb-Mole	207.19	207.19	207.19
ug	Catch Weight, Micrograms	3.21	2.93	52.3
ug/DSCM	Concentration, ug/DSCM	2.46	2.32	44.9
gr/DSCF	Concentration, grains/DSCF *	1.08E-006	1.01E-006	1.96E-005
lb/hr	Emission Rate, lb/hr	1.41E-004	1.29E-004	2.48E-003
	Manganese			
fwt	Formula Weight, lb/lb-Mole	54.94	54.94	54.94
ug	Catch Weight, Micrograms	23.9	18.7	17.1
ug/DSCM	Concentration, ug/DSCM	18.3	14.8	14.7
gr/DSCF	Concentration, grains/DSCF *	8.01E-006	6.47E-006	6.42E-006
lb/hr	Emission Rate, lb/hr	1.05E-003	8.25E-004	8.09E-004

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg)

< Indicates the value is below the detection limit.

(Continued next page)

FIELD DATA AND RESULTS TABULATION
(Continued)

PLANT: Triangle Brick, Merry Oaks, NC

		S-M29-1	S-M29-2	S-M29-3
	Mercury			
fwt	Formula Weight, lb/lb-Mole	200.59	200.59	200.59
ug	Catch Weight, Micrograms	< 2.35	< 2.35	< 2.35
ug/DSCM	Concentration, ug/DSCM	< 1.80	< 1.86	< 2.02
gr/DSCF	Concentration, grains/DSCF *	< 7.87E-007	< 8.13E-007	< 8.82E-007
lb/hr	Emission Rate, lb/hr	< 1.03E-004	< 1.04E-004	< 1.11E-004
	Nickel			
fwt	Formula Weight, lb/lb-Mole	58.71	58.71	58.71
ug	Catch Weight, Micrograms	3.58	4.62	.98
ug/DSCM	Concentration, ug/DSCM	2.74	3.66	0.841
gr/DSCF	Concentration, grains/DSCF *	1.20E-006	1.60E-006	3.68E-007
lb/hr	Emission Rate, lb/hr	1.57E-004	2.04E-004	4.64E-005
	Selenium			
fwt	Formula Weight, lb/lb-Mole	78.96	78.96	78.96
ug	Catch Weight, Micrograms	11	10.15	9.03
ug/DSCM	Concentration, ug/DSCM	8.43	8.04	7.75
gr/DSCF	Concentration, grains/DSCF *	3.68E-006	3.51E-006	3.39E-006
lb/hr	Emission Rate, lb/hr	4.83E-004	4.48E-004	4.27E-004

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg)

< Indicates the value is below the detection limit.

APPENDIX A. TEST RESULTS

1. Brick Kiln No. 2 Stack

c. Particulate

FIELD DATA AND RESULTS TABULATION

PLANT: Triangle Brick, Merry Oaks, NC

LOCATION: Brick Kiln No. 2 Stack

RUN #	DATE	OPERATOR
S-M5-1	10/18/95	Joseph P Daley
S-M5-2	10/18/95	Joseph P Daley
S-M5-3	10/18/95	Joseph P Daley

		S-M5-1	S-M5-2	S-M5-3
	Run Start Time	0901	1039	1221
	Run Finish Time	1005	1142	1324
	Net Traversing Points	24	24	24
Theta	Net Run Time, Minutes	60.00	60.00	60.00
Dia	Nozzle Diameter, Inches	0.313	0.306	0.313
Cp	Pitot Tube Coefficient	0.840	0.840	0.840
Y	Dry Gas Meter Calibration Factor	1.0013	1.0013	1.0013
Pbar	Barometric Pressure, Inches Hg	30.53	30.50	30.53
Delta-H	Avg. Pressure Differential of Orifice Meter, Inches H_2O	1.69	1.84	1.84
Vm	Volume Of Metered Gas Sample, Dry ACF	42.407	44.945	45.098
tm	Dry Gas Meter Temperature, Degrees F	78	102	106
Vmstd	Volume Of Metered Gas Sample, Dry SCF*	42.663	43.266	43.146
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, ml	66.4	64.3	68.6
Vwstd	Volume of Water Vapor, SCF*	3.125	3.027	3.229
$\%H_2O$	Moisture Content, Percent by Volume	6.8	6.5	7.0
Mfd	Dry Mole Fraction	0.932	0.935	0.930
$\%CO_2$	Carbon Dioxide, Percent By Volume, Dry	2.4	2.4	2.4
$\%O_2$	Oxygen, Percent By Volume, Dry	16.6	16.6	16.6
Fo	Fuel Factor	1.792	1.792	1.792
Md	Gas Molecular Weight, lb/lb-Mole, Dry	29.05	29.05	29.05
Ms	Gas Molecular Weight, lb/lb-Mole, Wet	28.29	28.33	28.28
Pg	Flue Gas Static Pressure, Inches H_2O	-0.35	-0.35	-0.35
Ps	Absolute Flue Gas Pressure, Inches Hg	30.50	30.47	30.50
ts	Flue Gas Temperature, Degrees F	518	516	519
Delta-p	Average Velocity Head, Inches H_2O	0.3241	0.3681	0.3356
vs	Flue Gas Velocity, Feet/Second	43.51	46.33	44.32
A	Stack/Duct Area, Square Inches	1,573	1,573	1,573
Qsd	Volumetric Air Flow Rate, Dry SCFM*	14,628	15,634	14,856
Qaw	Volumetric Air Flow Rate, Wet ACFM	28,515	30,363	29,047
%I	Isokinetic Sampling Rate, Percent	99.4	98.6	98.9

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg)

(Continued next page)

FIELD DATA AND RESULTS TABULATION
(Continued)

PLANT: Triangle Brick, Merry Oaks, NC

		S-M5-1	S-M5-2	S-M5-3
	Filterable Particulate			
mg	Catch Weight, Milligrams	8.1	6.9	9.1
gr/DSCF	Concentration, grains/DSCF *	0.00293	0.00246	0.00325
lb/hr	Emission Rate, lb/hr	0.367	0.330	0.414

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg)

APPENDIX A. TEST RESULTS

1. Brick Kiln No. 2 Stack

d. Particulate ≤ 10 Microns and Condensible Particulate

FIELD DATA AND RESULTS TABULATION

Plant: Triangle Brick, Merry Oaks, NC
Sampling Location: Brick Kiln No. 2 Stack
Operator: Dennis D. Holzschuh

		S-M201A/202-1	S-M201A/202-2	S-M201A/202-3
	Test Date	10/18/95	10/18/95	10/18/95
	Run Start Time	901	1039	1210
	Run Finish Time	1006	1143	1322
	Net Traversing Points	12	12	12
Theta	Net Run Time, minutes	60.0	60.0	60.0
Dia	Nozzle Diameter, inches	0.252	0.249	0.249
Cp	Pitot Tube Coefficient	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	0.9776	0.9776	0.9776
Pbar	Barometric Pressure, in Hg	30.53	30.53	30.53
Delta H	Average Pressure Differential of Meter, inches H_2O	0.68	0.68	0.68
Vm	Volume of Metered Gas Sample, cu. feet	28.475	28.870	28.510
tm	Dry Gas Meter Temperature, °F	77	100	95
Vmstd	Volume of Metered Gas Sample, DSCF*	27.974	27.188	27.086
Vlc	Total Volume of Liquid Collected in Impingers and Silica Gel, ml	39.6	38.1	38.2
Vwstd	Volume of Water Vapor, SCF	1.864	1.793	1.798
$\%H_2O$	Moisture Content, % by volume	6.2 **	6.2 **	6.2 **
$\%H_2O$SAT	Moisture Sat. at Flue Gas Conditions, %	4979.2	5226.2	5225.6
Mfd	Dry Mole Fraction	0.938	0.938	0.938
$\%CO_2$	Carbon Dioxide, % by volume, dry	2.4	2.4	2.4
$\%O_2$	Oxygen, % by volume, dry	16.6	16.6	16.6
$\%CO+N_2$	$CO + N_2$, Percent by Volume, dry	81.0	81.0	81.0
Fo	Fuel Factor	1.792	1.792	1.792
Md	Gas Molecular Weight, Lb/Lb-Mole, dry	29.05	29.05	29.05
Ms	Gas Molecular Weight, Lb/Lb-Mole, wet	28.36	28.36	28.36
Pg	Flue Gas Static Pressure, in. H_2O	-0.35	-0.35	-0.30
Ps	Absolute Flue Gas Pressure, in. Hg	30.50	30.50	30.51
ts	Flue Gas Temperature, °F	505.0	510.4	510.4
Delta-p	Average Velocity Head, inches H_2O	0.3176	0.3176	0.3176
vs	Flue Gas Velocity, feet per second	42.74	42.86	42.86
A	Stack/Duct Area, square inches	1,573	1,573	1,573
Qsd	Volumetric Air Flow Rate, dry SCFM*	14,650	14,618	14,615
Qmsd	Volumetric Air Flow Rate, dry SCMM*	415	414	414
Qaw	Volumetric Air Flow Rate, wet ACFM*	28,012	28,091	28,091
%I	Isokinetic Sampling Rate, percent	100.4	100.1	99.8

* 68°F (20°C) – 29.92 inches of mercury
** Value used for calculations

FIELD DATA AND RESULTS TABULATION

Plant: Triangle Brick, Merry Oaks, NC
Sampling Location: Brick Kiln No. 2 Stack
Operator: Dennis D. Holzschuh

		S-M201A/202-1	S-M201A/202-2	S-M201A/202-3
	Test Date	10/18/95	10/18/95	10/18/95
	PM10 Calculations			
u_s	Stack Gas Viscosity	285.2	286.7	286.6
Qs	PM10 Flow, at Cyclone Conditions, ACFM	0.892	0.871	0.868
D50	Dia. of Particles in Cyclone, Microns	9.55	9.76	9.78
	Particulate Catch			
mg < D50	≤ 10 Microns, milligrams	8.1	6.7	7.4
mg > D50	> 10 Microns, milligrams	2.8	2.3	2.3
mg	Total Catch, milligrams	10.9	9.0	9.7
	Percent of Total Particulate			
% < D50	≤ 10 Microns, percent	74.3	74.4	76.3
% > D50	> 10 Microns, percent	25.7	25.6	23.7
	Particulate < 10 Microns			
mg	Catch Weight, milligrams	8.1	6.7	7.4
gr/DSCF	Concentration, grains/DSCF	0.00447	0.00380	0.00422
lb/hr	Emission Rate, lb/hr	0.561	0.477	0.528
	Condensible Particulate			
mg	Catch Weight, milligrams	22.2	29.1	29.4
gr/DSCF	Concentration, grains/DSCF	0.0122	0.0165	0.0168
lb/hr	Emission Rate, lb/hr	1.54	2.07	2.10

* 68°F (20°C) – 29.92 inches of mercury
** Value used for calculations

APPENDIX A. TEST RESULTS

2. Example Calculations

NOTE

The example values shown in these calculations have been rounded for presentation purposes. Any hand calculations conducted using these example values may produce slightly different results than those presented.

CONSTANTS, DEFINITIONS, NOMENCLATURE, AND UNITS

460	0 degrees Fahrenheit in degrees Rankin. The sum of 460 and the standard temperature (60, 68, 77, etc. in °F) gives Tstd in degrees Rankin.
273	0 degrees Celsius in degrees Kelvin. The sum of 273 and the standard temperature (18, 20, 25, etc. in °C) gives Tstd in degrees Kelvin.
29.92	Standard absolute pressure (Pstd), inches of mercury. English unit.
760	Standard absolute pressure (Pstd), millimeters of mercury. Metric unit.
*24.056**	Liters per gram-mole at standard conditions.
*385.3**	Molar volume cubic feet/pound-mole at standard conditions.
*0.04707**	Standard cubic feet per gram or mL of H20 at standard conditions.
7000	Grains per pound.
453.592	Grams per pound.
0.02832	Cubic meters per cubic foot.
28.32	Liters per cubic foot.
0.03531	Cubic feet per liter.
35.31	Cubic feet per cubic meter.
1000	Conversion from milligrams to grams, milliliters to liters, and liters to cubic meters.
10^6	Conversion factor for decimal fraction to parts per million.
144	Square inches per square foot.
60	Minutes per hour and seconds per minute.
13.6	Specific gravity of mercury (1 inch of mercury = 13.6 inches of H20).
20.9	Percent O2 by volume (dry basis) in ambient air.
85.49	Pitot tube constant (Kp): $\frac{feet}{second}\sqrt{\frac{(lb/lb-mole)\bullet(inches\ Mercury)}{(degrees\ Rankin)\bullet(inches\ H2O)}}$
A	Stack cross-sectional area, square inches.

* Where applicable, these constants must be corrected (if the standard temperature is not 68°F) by multiplying them by the ratio of the standard temperatures. For example to convert to 77° F: (460 + 77) / (460 + 68)

EXAMPLE TEST CALCULATIONS RUN S-M5-1

Brick Kiln No. 2 Stack

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

$$Vmstd = Y * Vm * \frac{Pbar + (Delta\ H/13.6)}{(460 + tm)} * \frac{460 + tstd}{Pstd}$$

$$Vmstd = 1.0013 * 42.407 * \frac{30.53 + (1.690/13.6)}{(460 + 78)} * \frac{460 + 68}{29.92} = 42.663 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

$$Vwstd = 0.04707 * Vlc * (460 + tstd)/528$$

$$Vwstd = 0.04707 * 66.4 * (460 + 68)/528 = 3.125 \text{ SCF}$$

PERCENT MOISTURE, BY VOLUME, AS MEASURED IN FLUE GAS

$$\%H_2O = 100 * Vwstd / (Vwstd + Vmstd)$$

$$\%H_2O = \frac{3.125}{3.125 + 42.663} * 100 = 6.8\ \%$$

ABSOLUTE FLUE GAS PRESSURE

$$Ps = Pbar + (Pg / 13.6)$$

$$Ps = 30.53 + (-0.35/13.6) = 30.50 \text{ inches Hg}$$

DRY MOLE FRACTION OF FLUE GAS

$$Mfd = 1 - \%H_2O / 100$$

$$Mfd = 1 - 6.8/100 = 0.932$$

DRY MOLECULAR WEIGHT OF FLUE GAS

$$Md = (\%CO_2/100 * 44) + (\%O_2/100 * 32) + ((100 - \%CO_2 - \%O_2)/100 * 28)$$

$$Md = (2.4/100 * 44) + (16.6/100 * 32) + ((100 - 2.4 - 16.6)/100 * 28)$$

$$Md = 29.05 \text{ lb/lb-Mole}$$

WET MOLECULAR WEIGHT OF FLUE GAS

$$Ms = (Md * Mfd) + (0.18 * \%H_2O)$$

$$Ms = (29.05 * 0.932) + (0.18 * 6.8) = 28.29 \text{ lb/lb-Mole}$$

AVERAGE FLUE GAS VELOCITY [Note: (Delta p)avg is square of average square root]

$$vs = 85.49 * Cp * \left[\frac{(Delta\ P)avg * (460 + ts)}{Ps * Ms} \right]^{1/2}$$

$$vs = 85.49 \bullet 0.840 * \left[\frac{0.3241 * (460 + 518)}{30.50 * 28.29} \right]^{1/2} = 43.51\ ft/sec$$

DRY VOLUMETRIC FLUE GAS FLOW RATE AT STANDARD CONDITIONS

$$Qsd = \frac{60}{144} * Mfd * vs * A * \frac{460 + tstd}{460 + ts} * \frac{Ps}{Pstd}$$

$$Qsd = \frac{60}{144} * 0.932 * 43.51 \bullet 1,572.8 * \frac{460 + 68}{460 + 518} * \frac{30.50}{29.92}$$

$$Qsd = 14,628\ \ DSCFM$$

WET VOLUMETRIC FLUE GAS FLOW RATE AT ACTUAL CONDITIONS

$$Qaw = 60 / 144 \bullet vs * A$$

$$Qaw = 60 / 144 \bullet 43.51 * 1,572.8 = 28,515\ \ ACFM$$

PERCENT ISOKINETIC OF SAMPLING RATE

$$\%I = \frac{Pstd}{460 + tstd} * \frac{100}{60} * \frac{(ts + 460) * Vmstd}{Ps * vs * Mfd * Theta * (\pi * (NozzleDia/2)^2/144)}$$

$$\%I = \frac{29.92}{460 + 68} * \frac{100}{60} * \frac{(518 + 460) * 42.663}{30.50 * 43.51 * 0.932 * 60.00 * (\pi * (0.313/2)^2/144)}$$

$$\%I = 99.4\ \ \%$$

CONCENTRATION, GRAINS PER DRY STANDARD CUBIC FOOT, FILTERABLE PARTICULATE

$$gr/DSCF = \frac{7,000}{453.592} * \frac{(mg / 10^3)}{Vmstd}$$

$$gr/DSCF = \frac{7,000}{453.592} * \frac{(8.1/10^3)}{42.663} = 0.00293\ \ gr/DSCF$$

EMISSION RATE, POUNDS PER HOUR, FILTERABLE PARTICULATE

$$lb/hr = \frac{60}{453.592} * \frac{(mg / 10^3)}{Vmstd} \bullet Qsd$$

$$lb/hr = \frac{60}{453.592} * \frac{(8.1/10^3)}{42.663} \bullet 14,628 = 0.367 \ lb/hr$$

EXAMPLE TEST CALCULATIONS RUN S-M29-1

Brick Kiln No. 2 Stack

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

$$Vmstd = Y * Vm * \frac{Pbar + (Delta\ H/13.6)}{(460 + tm)} * \frac{460 + tstd}{Pstd}$$

$$Vmstd = 1.0013 * 46.870 * \frac{30.50 + (2.020/13.6)}{(460 + 91)} * \frac{460 + 68}{29.92} = 46.070 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

$$Vwstd = 0.04707 \bullet Vlc * (460 + tstd)/528$$

$$Vwstd = 0.04707 \bullet 74.7 \bullet (460 + 68)/528 = 3.516 \text{ SCF}$$

PERCENT MOISTURE, BY VOLUME, AS MEASURED IN FLUE GAS

$$\%H_2O = 100 * Vwstd / (Vwstd + Vmstd)$$

$$\%H_2O = \frac{3.516}{3.516 + 46.070} \bullet 100 = 7.1\ \%$$

ABSOLUTE FLUE GAS PRESSURE

$$Ps = Pbar + (Pg / 13.6)$$

$$Ps = 30.50 + (-0.35/13.6) = 30.47 \text{ inches Hg}$$

DRY MOLE FRACTION OF FLUE GAS

$$Mfd = 1 - \%H_2O / 100$$

$$Mfd = 1 - 7.1/100 = 0.929$$

DRY MOLECULAR WEIGHT OF FLUE GAS

$$Md = (\%CO_2/100 \bullet 44) + (\%O_2/100 * 32) + ((100 - \%CO_2 - \%O_2)/100 * 28)$$

$$Md = (2.4/100 \bullet 44) + (16.6/100 * 32) + ((100 - 2.4 - 16.6)/100 * 28)$$

$$Md = 29.05 \text{ lb/lb-Mole}$$

WET MOLECULAR WEIGHT OF FLUE GAS

$$Ms = (Md \bullet Mfd) + (0.18 * \%H_2O)$$

$$Ms = (29.05 * 0.929) + (0.18 * 7.1) = 28.26 \text{ lb/lb-Mole}$$

AVERAGE FLUE GAS VELOCITY [Note: (Delta p)avg is square of average square root]

$$vs = 85.49 * Cp * \left[\frac{(Delta\ P)avg * (460 + ts)}{Ps * Ms} \right]^{1/2}$$

$$vs = 85.49 * 0.840 * \left[\frac{0.3531 \bullet (460 + 510)}{30.47 * 28.26} \right]^{1/2} = 45.29 \text{ ft/sec}$$

DRY VOLUMETRIC FLUE GAS FLOW RATE AT STANDARD CONDITIONS

$$Qsd = \frac{60}{144} * Mfd * vs * A * \frac{460 + tstd}{460 + ts} * \frac{Ps}{Pstd}$$

$$Qsd = \frac{60}{144} \bullet 0.929 \bullet 45.29 \bullet 1{,}572.8 * \frac{460 + 68}{460 + 510} * \frac{30.47}{29.92}$$

Qsd = 15,284 DSCFM

WET VOLUMETRIC FLUE GAS FLOW RATE AT ACTUAL CONDITIONS

$$Qaw = 60 / 144 \bullet vs \bullet A$$

$$Qaw = 60 / 144 \bullet 45.29 * 1{,}572.8 = 29{,}680 \text{ ACFM}$$

PERCENT ISOKINETIC OF SAMPLING RATE

$$\%I = \frac{Pstd}{460 + tstd} * \frac{100}{60} * \frac{(ts + 460) \bullet Vmstd}{Ps \bullet vs * Mfd * Theta * (\pi * (NozzleDia/2)^2/144)}$$

$$\%I = \frac{29.92}{460 + 68} * \frac{100}{60} * \frac{(510 + 460) \bullet 46.070}{30.47 * 45.29 \bullet 0.929 * 60.00 * (\pi \bullet (0.313/2)^2/144)}$$

%I = 102.7 %

CONCENTRATION, MICROGRAMS PER DRY STANDARD CUBIC METER, ANTIMONY

$$ug/DSCM = \frac{(ug / 10^6)}{Vmstd * 0.02832} * 10^6$$

$$ug/DSCM = \frac{(0.0/10^6)}{46.070 * 0.02832} * 10^6 = 0.0 \text{ ug/DSCM}$$

CONCENTRATION, GRAINS PER DRY STANDARD CUBIC FOOT, ANTIMONY

$$gr/DSCF = \frac{7,000}{453.592} * \frac{(ug / 10^6)}{Vmstd}$$

$$gr/DSCF = \frac{7,000}{453.592} * \frac{(0.0/10^6)}{46.070} = 0.0 \quad gr/DSCF$$

EMISSION RATE, POUNDS PER HOUR, ANTIMONY

$$lb/hr = \frac{60}{453.592} * \frac{(ug / 10^6)}{Vmstd} \bullet Qsd$$

$$lb/hr = \frac{60}{453.592} * \frac{(0.0/10^6)}{46.070} \bullet 15,284 = 0.0 \quad lb/hr$$

EXAMPLE TEST CALCULATIONS
Brick Kiln No. 2 Stack
Run Number: S-M201A/202-1

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

$$Vmstd = Y \bullet Vm \bullet \frac{(Pbar + Delta\ H / 13.6)}{(460 + tm)} * \frac{(460 + tstd)}{Pstd}$$

$$Vmstd = 0.9776 \bullet 28.475 \bullet \frac{(30.53 + 0.68 / 13.6)}{(460 + 77.0)} * \frac{(460 + 68)}{29.92}$$

Vmstd = 27.974 DSCF

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

$$Vwstd = 0.04707 * Vlc \bullet [(460 + tstd) / 528]$$

$$Vwstd = 0.04707 * 39.6 \bullet [(460 + 68) / 528]$$

Vwstd = 1.864 SCF

PERCENT MOISTURE, BY VOLUME, AS MEASURED IN FLUE GAS

$$\%H_2O = 100 \bullet Vwstd / (Vwstd + Vmstd)$$

$$\%H_2O = 100 * 1.864 / (1.864 + (27.974)$$

$\%H_2O$ = 6.2 %

MOISTURE SATURATION @ FLUE GAS CONDITIONS, %

$$H_2OSAT \quad \frac{100 * 10^{(6.691 - (3144 / (ts + 390.86)))}}{Ps}$$

$$H_2OSAT \quad \frac{100 \bullet 10^{(6.691 - (3144 / (505 + 390.86)))}}{30.53 + (-0.35 / 13.6)}$$

H_2OSAT 4,979.2 %

EXAMPLE TEST CALCULATIONS
Brick Kiln No. 2 Stack
Run Number: S-M201A/202-1

DRY MOLE FRACTION OF FLUE GAS

Mfd = 1 - ($\%H_2O$ / 100)

Mfd = 1 - (6.2 / 100)

Mfd = 0.938

GAS MOLECULAR WEIGHT, LB/LB-MOLE, DRY

Md = ($\%CO_2$ * fwt CO_2/100) + ($\%O_2$ * fwt O_2/100) + [(100 - $\%CO_2$ - $\%O_2$) * fwt CO&N_2/100)

Md = (2.4 • 44/100) + (16.6 • 32/100) + [(100 - 2.4 - 16.6) * 28/100)

Md = 29.05

GAS MOLECULAR WEIGHT, LB/LB-MOLE, WET

Ms = (Md • Mfd) + [fwt H2O * (%H2O / 100)]

Ms = (29.05 • 0.938) + [18.0 * (6.2 / 100)]

Ms = 28.36

ABSOLUTE FLUE GAS PRESSURE, INCHES MERCURY

Ps = Pbar + (Pg / 13.6)

Ps = 30.53 + (-0.35 / 13.6)

Ps = 30.50

AVERAGE FLUE GAS VELOCITY, FEET/SECOND

vs = 85.49 * Cp * SQRT[(Avg Delta p) • (460 + ts) / (Ps * Ms)]

vs = 85.49 • 0.84 • SQRT[(0.3176) * (460 + 505) / (30.50 • 28.36)]

vs = 42.74 feet/second

EXAMPLE TEST CALCULATIONS
Brick Kiln No. 2 Stack
Run Number: S-M201A/202-1

VOLUMETRIC AIR FLOW RATE, DRY STANDARD CUBIC FEET PER MINUTE (DRY SCFM)

Qsd = (60 / 100) * Mfd * vs * A * (460 + tstd) / (460 + ts) • (Ps / Pstd)

Qsd = (60 / 100) * 0.938 * 42.74 * 1572.81 * (460 + 68) / (460 + 505) * (30.50 / 29.92)

Qsd = 14,650 Dry SCFM

VOLUMETRIC AIR FLOW RATE, DRY STANDARD CUBIC METERS PER MINUTE (DRY SCMM)

Qmsd = Qsd • 0.02832

Qmsd = 14,650 • 0.02832

Qmsd = 415 Dry SCMM

VOLUMETRIC AIR FLOW RATE, WET ACTUAL CUBIC FEET PER MINUTE (WET SCFM)

Qaw = (60 / 144) • vs * A

Qaw = (60 / 144) * 42.74 * 1572.81

Qaw = 28,012 Dry SCFM

ISOKINETIC SAMPLING RATE, PERCENT

$$\%I = \frac{100}{60} \bullet \frac{Pstd}{(460 + tstd)} * \frac{(460 + ts)}{Ps} * \frac{Vmstd}{vs \bullet Mfd \bullet Theta \bullet [\, Pi \bullet (\text{nozzle diameter} / 2)\hat{}2 \;/\; 144}$$

$$\%I = \frac{100}{60} * \frac{29.92}{(460 + 68)} * \frac{(460 + 505)}{30.50} * \frac{27.974}{42.74 \bullet 0.938 \bullet 60.0 \bullet [\, Pi \bullet (0.252 / 2)\hat{}2 \;/\; 144}$$

%I = 100.4 %

STACK GAS VISCOSITY

μ_s = 51.05 + [0.207 * (460 + ts)] + [0.0000324 * (460 + ts)^2] + [53.147 * (%O2/100)] - [74.143 * (%H2O/100)]

μ_s = 51.05 + [0.207 * (460 + 505)] + [0.0000324 * (460 + 505)^2] + [53.147 * (16.6/100)] - [74.143 * (6.2/100)]

μ_s = 285.2

EXAMPLE TEST CALCULATIONS
Brick Kiln No. 2 Stack
Run Number: S-M201A/202-1

PM10 FLOW RATE, ACTUAL CUBIC FEET PER MINUTE AT CYCLONE CONDITIONS

Q_s = [(460 + ts) / (17.64 * Ps)] • [(Vmstd + Vwstd) / Theta]

Q_s = [(460 + 505) / (17.64 * 30.50)] * [(27.974 + 1.864) / 60.0]

Q_s = 0.892 ACFM

DIAMETER OF PARTICULES IN THE CYCLONE, MICRONS

D_{50} = 0.15625 • [(460 + ts) / (Ms • Ps)]^0.2091 • [u_s / Q_s]^0.7091

D_{50} = 0.15625 • [(460 + 505) / (28.36 • 30.50)]^0.2091 • [285.2 / 0.892]^0.7091

D_{50} = 9.55 Microns

CONCENTRATION, PARTICULATE < 10 MICRONS, gr/DSCF

gr/DSCF = (7000 / 453.592) * [(mg / 1000) / Vmstd]

gr/DSCF = (7000 / 453.592) • [(8.1 / 1000) / 27.974]

gr/DSCF = 0.00447 gr/DSCF

EMISSION RATE, PARTICULATE < 10 MICRONS, LB/HR

lb/hr = (60 / 453.592) • [(mg / 10^3) / (Vmstd)] * Qsd

lb/hr = (60 / 453.592) • [(8.1 / 10^3) / (27.974)] • 14,650

lb/hr = 0.561 lb/hr

EXAMPLE TEST CALCULATIONS
Brick Kiln No. 2 Stack
RUN NUMBER: S-CEM-1

EMISSION RATE, CARBON MONOXIDE, lb/hr

lb/hr = $(60 * ppm_{vd} * fwt * Qsd) / (385.3 * (460 + tstd)/528 * 10^6)$

lb/hr = (60 * 92.80 * 28.01 * 15,284) / (385.3 * (460 + 68)/528 * 10^6)

lb/hr = 6.19 lb/hr

APPENDIX B. FIELD DATA

1. Brick Kiln No. 2 Stack

a. Carbon Monoxide, Nitrogen Oxides, Sulfur Dioxide, and Total Hydrocarbons

CALIBRATION SUMMARY

SOURCE: Triangle Brick

REASON: CALIBRATION ERROR CHECK

DATE : 10-17-1995 TIME: 08:14 - 08:40

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
8	STACK2	ppmNOX	0.0	0.4
8	STACK2	ppmNOX	26.0	26.5
8	STACK2	ppmNOX	46.3	46.1
8	STACK2	ppmNOX	80.2	81.1
6	STACK2	ppmSO2	0.0	0.4
6	STACK2	ppmSO2	45.1	46.1
6	STACK2	ppmSO2	92.8	92.7

CALIBRATION SUMMARY

SOURCE: Triangle Brick

REASON: CALIBRATION ERROR CHECK CONTINUED

DATE : 10-17-1995 TIME: 08:41 - 08:47

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
7	STACK2	ppmCO	0.0	0.6
7	STACK2	ppmCO	30.2	31.2
7	STACK2	ppmCO	59.9	60.3
7	STACK2	ppmCO	90.9	89.4

CALIBRATION SUMMARY

SOURCE: Triangle Brick

REASON: SYSTEM BIAS CHECK

DATE : 10-17-1995 TIME: 09:14 - 09:52

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
8	STACK2	ppmNOX	0.0	0.8
8	STACK2	ppmNOX	46.3	42.8
7	STACK2	ppmCO	0.0	1.3
7	STACK2	ppmCO	59.9	59.7
6	STACK2	ppmSO2	0.0	0.6
6	STACK2	ppmSO2	45.1	41.2

CALIBRATION SUMMARY

SOURCE: Triangle Brick

REASON: SYSTEM BIAS CHECK

DATE : 10-17-1995 TIME: 09:53 - 10:01

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	STACK2	ppmTHC	0.0	0.7
1	STACK2	ppmTHC	29.8	28.7
1	STACK2	ppmTHC	51.9	51.9
1	STACK2	ppmTHC	83.1	84.4

Triangle Brick 10-17-1995

TIME	CHAN 8 STACK2 ppmNOX	CHAN 7 STACK2 ppmCO	CHAN 6 STACK2 ppmSO2	CHAN 1 STACK2 ppmTHC
10:11	12.0	91.5	5.6	18.5
10:12	12.1	92.3	5.7	19.3
10:13	12.2	92.9	5.9	19.4
10:14	12.2	93.4	6.0	19.6
10:15	12.3	94.0	6.1	19.7
10:16	12.3	94.4	6.1	19.5
10:17	12.3	94.7	6.2	20.6
10:18	12.4	95.1	6.3	20.0
10:19	12.5	94.5	6.4	19.5
10:20	12.4	94.4	6.5	19.1
10:21	12.3	94.8	6.5	19.7
10:22	12.3	94.8	6.4	19.9
10:23	12.2	94.9	6.2	19.5
10:24	12.2	94.7	5.8	19.0
10:25	12.2	94.6	5.7	18.7
10:26	12.3	95.1	5.6	19.2
10:27	12.3	94.7	5.5	18.7
10:28	12.2	94.8	5.6	18.3
10:29	12.3	94.5	5.7	18.1
10:30	10.7	67.8	5.8	17.0
10:31	6.0	96.2	5.2	16.7
10:32	13.3	90.4	5.0	16.7
10:33	11.7	90.4	5.3	17.7
10:34	11.8	91.0	5.5	18.5
10:35	11.9	91.7	5.8	18.5
10:36	12.1	92.3	6.2	19.3
10:37	12.1	92.7	6.4	19.4
10:38	12.2	93.1	6.7	19.6
10:39	12.3	93.5	6.9	19.7
10:40	12.4	93.8	6.8	19.4

AVERAGE VALUES FOR THE LAST 30 MINUTES

10:40	12.0	92.8	6.0	18.9
10:41	12.4	94.0	6.8	19.4
10:42	12.4	94.3	6.8	19.5
10:43	12.5	94.3	6.8	19.6
10:44	12.4	94.8	6.9	19.6
10:45	12.5	95.1	7.0	19.6
10:46	12.5	94.8	6.9	19.7
10:47	12.5	94.6	6.9	19.5
10:48	12.5	93.9	7.0	18.9
10:49	12.4	93.9	6.8	18.9
10:50	12.4	93.8	6.8	18.8
10:51	12.4	93.8	6.7	19.6
10:52	12.3	93.5	6.6	18.4
10:53	9.4	61.3	6.5	17.0
10:54	8.6	104.3	6.0	17.6
10:55	12.5	89.7	5.9	17.8
10:56	11.8	89.6	5.8	18.3
10:57	11.8	89.9	5.9	18.5

Triangle Brick 10-17-1995

TIME	CHAN 8 STACK2 ppmNOX	CHAN 7 STACK2 ppmCO	CHAN 6 STACK2 ppmSO2	CHAN 1 STACK2 ppmTHC
10:58	11.9	90.6	6.0	18.8
10:59	12.0	91.9	6.1	19.0
11:00	11.9	91.4	6.2	18.7
11:01	12.0	92.1	6.2	18.9
11:02	12.0	92.5	6.3	20.5
11:03	12.1	92.6	6.5	20.2
11:04	12.1	92.7	6.5	20.0
11:05	12.2	92.9	6.6	19.8
11:06	12.3	93.0	6.7	19.4
11:07	12.3	93.2	6.5	19.4
11:08	12.3	93.3	6.5	19.1
11:09	12.4	93.3	6.5	19.5
11:10	12.4	93.3	6.6	19.7

AVERAGE VALUES FOR THE LAST 30 MINUTES

11:10	12.0	92.3	6.5	19.1

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

11:10	12.0	92.5	6.2	19.0

11:11	12.4	93.2	6.4	19.8
11:12	12.4	93.1	6.5	19.4
11:13	12.4	93.1	6.5	19.2
11:14	12.3	93.1	6.3	19.0
11:15	12.4	92.9	6.3	18.1
11:16	8.0	60.0	6.2	17.1
11:17	10.7	104.4	5.8	17.8

CALIBRATION SUMMARY

SOURCE: Triangle Brick

REASON: SYSTEM BIAS CHECK - POST 2-CEM-1

DATE : 10-17-1995 TIME: 11:17 - 11:36

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
8	STACK2	ppmNOX	0.0	1.7
8	STACK2	ppmNOX	46.3	42.1
7	STACK2	ppmCO	0.0	3.6
7	STACK2	ppmCO	59.0	61.5
6	STACK2	ppmSO2	0.0	2.5
6	STACK2	ppmSO2	45.1	42.9
1	STACK2	ppmTHC	0.0	1.4
1	STACK2	ppmTHC	51.9	50.5

Triangle Brick 10-17-1995

TIME	CHAN 8 STACK2 ppmNOX	CHAN 7 STACK2 ppmCO	CHAN 6 STACK2 ppmSO2	CHAN 1 STACK2 ppmTHC
11:51	12.9	91.4	7.7	19.6
11:52	12.9	92.1	7.5	19.6
11:53	13.0	92.3	7.2	19.7
11:54	13.0	92.2	7.1	19.4
11:55	13.0	92.2	6.9	19.8
11:56	13.0	92.1	6.8	19.4
11:57	13.0	92.0	6.7	19.2
11:58	13.0	92.1	6.5	19.1
11:59	13.0	92.3	6.4	19.1
12:00	13.0	92.2	6.3	19.1
12:01	13.0	87.9	6.2	18.7
12:02	6.1	73.9	6.0	17.5
12:03	14.1	91.9	5.6	17.7
12:04	12.7	88.7	5.5	18.2
12:05	12.8	89.1	5.4	19.0
12:06	12.9	89.8	5.5	19.2
12:07	13.0	90.5	5.6	19.7
12:08	13.0	90.9	5.6	19.8
12:09	13.2	91.3	5.9	21.0
12:10	13.2	93.2	5.9	20.9
12:11	13.4	92.8	6.0	20.3
12:12	13.2	92.6	6.1	20.6
12:13	13.3	92.6	6.1	25.5
12:14	13.3	93.0	6.2	26.3
12:15	13.3	93.2	6.2	21.4
12:16	13.3	93.0	6.2	23.0
12:17	13.3	93.1	6.1	21.1
12:18	13.3	93.1	6.1	21.5
12:19	13.3	92.9	6.1	20.8
12:20	13.3	92.9	6.0	20.4

AVERAGE VALUES FOR THE LAST 30 MINUTES

12:20	12.9	91.2	6.2	20.2
12:21	13.2	92.8	6.0	20.8
12:22	13.2	92.7	6.0	20.3
12:23	13.2	92.5	5.9	20.1
12:24	13.2	81.8	5.8	20.1
12:25	4.8	80.0	5.6	18.6
12:26	15.8	91.2	5.1	18.7
12:27	12.9	89.6	5.1	19.2
12:28	13.0	90.2	5.2	19.6
12:29	13.1	90.7	5.3	20.8
12:30	13.3	91.2	5.6	20.2
12:31	13.3	91.6	5.8	20.1
12:32	13.4	92.2	5.9	20.1
12:33	13.4	92.3	6.0	19.9
12:34	13.4	92.6	6.2	20.8
12:35	13.5	92.6	6.3	20.5
12:36	13.5	92.8	6.3	20.0
12:37	13.5	93.5	6.3	20.4

Triangle Brick 10-17-1995

TIME	CHAN 8 STACK2 ppmNOX	CHAN 7 STACK2 ppmCO	CHAN 6 STACK2 ppmSO2	CHAN 1 STACK2 ppmTHC
12:38	13.5	93.5	6.3	20.2
12:39	13.5	95.8	6.3	19.8
12:40	13.5	93.4	6.4	19.5
12:41	13.5	93.4	6.3	20.1
12:42	13.5	93.2	6.2	19.8
12:43	13.5	93.8	6.1	19.7
12:44	13.5	93.6	6.0	19.1
12:45	13.5	93.5	5.9	19.3
12:46	13.5	93.4	5.8	19.8
12:47	13.2	74.7	5.7	17.9
12:48	4.6	85.9	5.3	17.9
12:49	16.5	91.2	4.8	18.5
12:50	13.1	90.0	4.8	19.2

AVERAGE VALUES FOR THE LAST 30 MINUTES

12:50	13.0	90.9	5.8	19.7

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

12:50	12.9	91.0	6.0	20.0

COMMENTS: END OF RUN 2

CALIBRATION SUMMARY

SOURCE: Triangle Brick

REASON: SYSTEM BIAS CHECK - POST RUN 2 PRE RUN 3

DATE : 10-17-1995 TIME: 12:50 - 13:04

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
8	STACK2	ppmNOX	0.0	2.4
8	STACK2	ppmNOX	46.3	41.5
7	STACK2	ppmCO	0.0	1.2
7	STACK2	ppmCO	59.9	58.9
6	STACK2	ppmSO2	0.0	1.9
6	STACK2	ppmSO2	45.1	42.9
1	STACK2	ppmTHC	0.0	0.7
1	STACK2	ppmTHC	51.9	50.9

Triangle Brick 10-17-1995

TIME	CHAN 8 STACK2 ppmNOX	CHAN 7 STACK2 ppmCO	CHAN 6 STACK2 ppmSO2	CHAN 1 STACK2 ppmTHC
13:31	13.5	95.5	6.0	19.4
13:32	13.5	95.4	6.0	20.1
13:33	12.0	68.2	5.8	18.6
13:34	7.9	99.7	5.2	18.9
13:35	14.8	93.8	4.9	19.2
13:36	13.3	93.1	5.0	19.4
13:37	13.4	93.4	5.1	19.9
13:38	13.5	94.0	5.5	20.1
13:39	13.6	94.4	5.7	20.1
13:40	13.7	95.0	5.9	20.6
13:41	13.8	95.6	6.0	20.5
13:42	13.9	95.8	6.0	22.8
13:43	13.8	95.9	6.1	37.5
13:44	13.9	96.6	6.0	22.1
13:45	14.0	96.8	6.0	21.6
13:46	13.9	96.5	6.0	21.5
13:47	13.9	96.8	5.9	20.7
13:48	13.9	96.7	5.9	20.8
13:49	13.9	96.8	5.9	20.4
13:50	13.9	96.4	5.9	20.7
13:51	13.9	96.5	6.0	20.3
13:52	13.9	96.6	-5.8	20.3
13:53	13.8	96.6	5.8	19.8
13:54	13.8	96.4	5.7	19.9
13:55	13.8	96.0	5.6	19.6
13:56	10.8	60.3	5.5	17.6
13:57	10.4	106.0	4.7	18.7
13:58	14.2	93.9	4.6	19.1
13:59	13.5	93.4	4.9	19.8
14:00	13.6	93.8	5.2	20.0

AVERAGE VALUES FOR THE LAST 30 MINUTES

14:00	13.3	93.9	5.6	20.7
14:01	13.6	94.0	5.4	20.2
14:02	13.7	94.2	5.7	20.3
14:03	13.7	94.6	5.8	20.2
14:04	13.8	95.1	5.9	20.6
14:05	13.8	95.2	5.9	21.1
14:06	13.8	95.4	6.0	20.8
14:07	13.9	95.4	6.0	20.7
14:08	13.9	96.0	6.0	20.6
14:09	13.9	96.3	5.8	21.2
14:10	13.9	96.3	5.8	21.2
14:11	13.8	96.1	5.6	21.3
14:12	13.8	96.1	5.5	20.9
14:13	13.7	96.2	5.5	20.6
14:14	13.8	96.1	5.3	20.4
14:15	13.8	96.3	5.2	20.3
14:16	13.8	96.4	5.0	20.2
14:17	13.9	96.5	4.8	20.7

Triangle Brick 10-17-1995

TIME	CHAN 8 STACK2 ppmNOX	CHAN 7 STACK2 ppmCO	CHAN 6 STACK2 ppmSO2	CHAN 1 STACK2 ppmTHC
14:18	13.8	96.1	4.7	21.1
14:19	9.6	67.5	4.4	19.0
14:20	12.3	109.0	3.6	20.0
14:21	13.9	94.2	3.7	20.5
14:22	13.8	94.1	3.9	20.9
14:23	13.9	94.6	4.3	21.5
14:24	14.0	94.9	4.5	21.0
14:25	14.2	95.4	4.8	21.1
14:26	14.3	96.0	5.0	21.5
14:27	14.3	96.4	5.2	22.5
14:28	14.3	96.3	5.4	22.8
14:29	14.3	96.7	5.4	21.9
14:30	14.3	97.4	5.4	21.7

AVERAGE VALUES FOR THE LAST 30 MINUTES

14:30	13.7	95.1	5.2	20.9

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

14:30	13.5	94.5	5.4	20.8

COMMENTS: END OF RUN 3

CALIBRATION SUMMARY

SOURCE: Triangle Brick

REASON: SYSTEM BIAS CHECK - POST RUN 3

DATE : 10-17-1995 TIME: 14:30 - 14:48

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
8	STACK2	ppmNOX	0.0	3.5
8	STACK2	ppmNOX	46.3	41.3
7	STACK2	ppmCO	0.0	0.8
7	STACK2	ppmCO	59.9	60.3
6	STACK2	ppmSO2	0.0	1.7
6	STACK2	ppmSO2	45.1	41.6
1	STACK2	ppmTHC	0.0	0.1
1	STACK2	ppmTHC	51.9	50.4

APPENDIX B. FIELD DATA

1. Brick Kiln No. 2 Stack

b. Metals

METHOD 3 (ORSAT) FIELD DATA

Client: Withers and Ravenel — Job No. 14448

Plant Name: Triangle Brick — Fuel Type: Nat. Gas

City/State: Merry Oaks N.C.

Sampling Location: Brick Kiln No. 2 Stack

Run/Sample No. S-M3-1 Date 10-17-95 Leak √ OK? ✓ Operator DDH

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)	Concurrent Runs to Share Orsat Data
1017	1305	2.4	19.0	—	16.6	—	
—		2.4	19.0	—	16.6	—	S-M29-1
1117	1315	2.4	19.0	—	16.6	—	
	Avg.	2.4		Avg.	16.6	—	

Orsat I.D. 1 Tedlar Bag I.D. _____ F_o _____

Run/Sample No. S-M3-2 Date 10-17-95 Leak √ OK? ✓ Operator DDH

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)	Concurrent Runs to Share Orsat Data
1150 ~~1010~~	1344 ~~1305~~	2.4	19.0	—	16.6	—	
—		2.4	19.0	—	16.6	—	S-M29-2
1255 ~~1117~~	1352 ~~1315~~	2.4	19.0	—	16.6	—	
	Avg.	2.4		Avg.	16.6	—	

Orsat I.D. 1 Tedlar Bag I.D. _____ F_o _____

Run/Sample No. S-M3-3 Date 10-17-95 Leak √ OK? ✓ Operator DDH

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)	Concurrent Runs to Share Orsat Data
1330	1440	2.4	19.0	—	16.6	—	
—	—	2.4	19.0	—	16.6	—	S-M29-3
1436	1450	2.4	19.0	—	16.6	—	
	Avg.	2.4		Avg.		—	

Orsat I.D. 1 Tedlar Bag I.D. _____ F_o _____

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SAMPLING DATA - METHOD(S) 29

CLIENT Withers and Ravenel
PLANT Triangle Brick
CITY/STATE Merry Oaks, NC
SAMPLING LOC. Brick Kiln #2 Stack
BAROMETRIC PRESSURE, IN. HG 30.05
STATIC PRESSURE, IN. H_2O -0.35
LEAK ✓, VACUUM IN. HG 15 4
LEAK RATE, CFM .007 .002

RUN NO. S-29-1
JOB NO. 14448
DATE 10/17/95
TIME START 1010
TIME FINISH 1117
TEST PERSONNEL JPD, DBW
POSTTEST POS PRESS LEAK ✓ OK? ♦ ✓

♦ CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS
- ✓ PITOT, PRETEST
- ✓ PITOT, POSTTEST
- ✓ NOZZLE, PRE/POST
- ✓ TC 63 °F PRE
- ✓ TC 66 °F POST
- ✓ ORSAT SYSTEM

FILTER/XAD	TARE WT.
N/A	N/A

EQUIPMENT I.D. NUMBERS

REAGENT BOX M 116 METER BOX N-14 Y 1.0013
PITOT S-24 C_p 0.84 NOZ'L GLP 1447 DIA. 0.313
TC READOUT F-14 TC PROBE R-385 UMBILICAL 11131
SAMPL'G BOX 54 ORSAT PUMP 7 TEDLAR BAG 25

NOMOGRAPH DATA

DELTA-Hø	1.928
METER TEMP.	80
EST. %H_2O	4
"C" FACTOR	1.060
STACK TEMP.	515
REF DELTA-P	0.320
"K" FACTOR	5.745

LEAK CHECKS

B 97.565	B
E 97.612	E
B	B
E	E
B	B
E	E

Fyrites, %	Yqa
5	96

<±5% OF CAL'D Y? (Y) ✓ (N)

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H_2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H_2O ACTUAL	ORIFICE SETTING, IN. H_2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**	✓
1	A-1	0	75.541	0.18	78	495	1.05	1.05	2	245	58	N/A	
2	2	2½	77.01	0.19	81	495	1.05	1.11	2	245	57		
3	3	5	78.45	0.25	82	498	1.36	1.46	2	242	53		
4	4	7½	80.05	0.25	83	506	1.35	1.45	2	240	52		
5	5	10	81.66	0.24	84	517	1.28	1.38	2	240	52		
6	6	12½	83.23	0.29	86	523	1.57	1.67	2	243	50		
7	7	15	84.95	0.40	87	528	2.19	2.29	2	245	50		
8	8	17½	86.89	0.41	89	532	2.24	2.34	2	245	50		
9	9	20	89.04	0.45	90	516	2.52	2.62	3	248	50		
10	10	22½	91.22	0.43	92	512	2.42	2.52	3	248	50		
11	11	25	93.36	0.42	92	510	2.37	2.47	2	250	50		
12	12	27½	95.48	0.38	94	514	2.13	2.23	2	253	52		
13	B-1	30/0	97.565	0.40	92	487	2.31	2.41	2	258	56		
14	2	2½	99.75	0.49	95	498	2.83	2.93	3	260	52		
15	3	5	102.04	0.53	96	501	3.06	3.16	3	264	49		
16	4	7½	104.52	0.56	96	510	3.21	3.31	3	265	49		
17	5	10	106.98	0.52	96	513	2.96	3.06	3	262	50		
18	6	12½	109.37	0.51	96	514	2.90	3.00	3	262	50		
19	7	15	111.74	0.35	97	517	1.96	2.06	2	260	52		
20	8	17½	113.74	0.30	96	516	1.67	1.77	2	260	53		
21	9	20	115.56	0.28	96	515	1.50	1.65	2	255	53		
22	10	22½	117.28	0.28	96	516	1.50	1.65	2	252	53		
23	11	25	119.01	0.31	95	517	1.67	1.82	2	246	53		
24	12	27½	120.79	0.26	94	496	1.41	1.56	2	240	53		
25	End	60	122.458										
	FINAL												

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.
** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

60	46.87	.35	91	510	2.02
Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH

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SAMPLING DATA - METHOD(S) 29

CLIENT Withers and Ravenel
PLANT Triangle Brick — RUN NO. 5-29-2
CITY/STATE Merry Oaks, NC — JOB NO. 14448 — DATE 10/17/95
SAMPLING LOC. Brick Kiln #2 Stack — TIME START 1150
BAROMETRIC PRESSURE, IN. HG 30.50 — STATIC PRESSURE, IN. H_2O -0.35 — TIME FINISH 1255
LEAK ✓, VACUUM IN. HG 15 5 — TEST PERSONNEL JPD, DBW
LEAK RATE, CFM .004 .002 — POSTTEST POS PRESS LEAK ✓ OK? • ✓

• CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS
✓ PITOT, PRETEST
✓ PITOT, POSTTEST
✓ NOZZLE, PRE/POST
✓ TC 68 °F PRE
✓ TC 70 °F POST
✓ ORSAT SYSTEM

FILTER/XAD	TARE WT.
N/A	N/A

EQUIPMENT I.D. NUMBERS
REAGENT BOX M116 — METER BOX N-14 — Y 1.0013
PITOT S-22 — C_p 0.84 — NOZ'L GLP1449 — DIA. 0.313
TC READOUT F-14 — TC PROBE R325 — UMBILICAL U131
SAMPL'G BOX 95 — ORSAT PUMP 7 — TEDLAR BAG 88

NOMOGRAPH DATA
DELTA-H@ 1.928
METER TEMP. 95
EST. $\%H_2O$ 4
"C" FACTOR 1.089
STACK TEMP. 515
REF DELTA-P 0.312
"K" FACTOR 5.905

LEAK CHECKS
B ___ B ___
E ___ E ___
B ___ B ___
E ___ E ___
B ___ B ___
E ___ E ___

Fyrites, %: ___ ___

Yga: ___
<±5% OF CAL'D Y? (Y)___ (N)___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H_2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H_2O ACTUAL	ORIFICE SETTING, IN. H_2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**	✓
1	A-12	0	122.698	0.38	88	515	2.11	2.21	3	235	60	N/A	
2	11	2½	124.68	0.40	89	520	2.21	2.31	3	239	56		
3	10	5	126.86	0.38	90	530	2.08	2.18	3	240	56		
4	9	7½	128.85	0.40	92	535	2.19	2.29	3	240	55		
5	8	10	130.85	0.40	92	512	2.25	2.35	4	238	55		
6	7	12½	132.89	0.37	93	518	2.06	2.16	3	235	55		
7	6	15	134.87	0.31	94	521	1.71	1.81	3	235	56		
8	5	17½	136.69	0.26	95	520	1.42	1.52	3	240	56		
9	4	20	138.35	0.23	95	521	1.25	1.35	2	244	57		
10	3	22½	139.93	0.24	95	519	1.31	1.41	2	246	56		
11	2	25	141.51	0.21	95	495	1.16	1.26	2	250	56		
12	1	27½	143.03	0.17	96	485	0.94	1.04	2	250	57		
13	B-12	30/0	144.392	0.28	94	512	1.55	1.65	3	245	58		
14	11	2½	146.13	0.28	96	509	1.56	1.66	3	245	56		
15	10	5	147.86	0.25	96	515	1.37	1.47	3	245	56		
16	9	7½	149.52	0.30	97	520	1.66	1.76	3	247	54		
17	8	10	151.29	0.34	98	516	1.91	2.01	3	248	52		
18	7	12½	153.23	0.42	99	529	2.35	2.45	4	248	52		
19	6	15	155.31	0.46	99	531	2.58	2.68	4	250	51		
20	5	17½	157.54	0.48	100	532	2.70	2.80	4	250	51		
21	4	20	159.82	0.52	100	535	2.92	3.02	5	250	50		
22	3	22½	162.17	0.48	100	513	2.75	2.85	4	252	50		
23	2	25	164.49	0.38	100	511	2.16	2.26	3	255	52		
24	1	27½	166.56	0.31	100	485	1.80	1.90	3	255	53		
25	End	60	168.443										
FINAL													

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.
** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH
60	45.745	.34	96	517	1.92 in

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SAMPLING DATA - METHOD(S) 29

CLIENT Withers and Ravenel
PLANT Triangle Brick — RUN NO. S-29-3
CITY/STATE Merry Oaks, NC — JOB NO. 14448 — DATE 10/17/95
SAMPLING LOC. Brick Kiln #2 Stack — TIME START 1330
BAROMETRIC PRESSURE, IN. HG 30.50 — STATIC PRESSURE, IN. H_2O -0.35 — TIME FINISH 1436
LEAK ✓, VACUUM IN. HG 15 5 — TEST PERSONNEL JPD, DRW
LEAK RATE, CFM .002 .000 — POSTTEST POS PRESS LEAK ✓ OK? * ___

* CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS

- ✓ PITOT, PRETEST
- ✓ PITOT, POSTTEST
- ✓ NOZZLE, PRE/POST
- ✓ TC 68 °F PRE
- ✓ TC 72 °F POST
- ✓ ORSAT SYSTEM

FILTER/XAD	TARE WT.
N/A	N/A

EQUIPMENT I.D. NUMBERS

REAGENT BOX M116 — METER BOX N-14 — Y 1.0013
PITOT 5-24 — C_p 0.84 — NOZ'L GLP714 — DIA. 0.306
TC READOUT F-14 — TC PROBE R385 — UMBILICAL 4131
SAMPL'G BOX 128 — ORSAT PUMP 7 — TEDLAR BAG 25

NOMOGRAPH DATA

DELTA-H@ 1.928
METER TEMP. 95
EST. %H_2O 7
"C" FACTOR 1.034
STACK TEMP. 515
REF DELTA-P 0.359
"K" FACTOR 5.121

LEAK CHECKS

B ___ E ___	B ___ E ___
B ___ E ___	B ___ E ___
B ___ E ___	B ___ E ___

Fyrites, %	Yga
	0.996
	<±5% OF CAL'D Y? (Y) ✓ (N) ___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H_2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H_2O ACTUAL	ORIFICE SETTING, IN. H_2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**	✓
1	A-12	0	168.692	0.36	88	521	1.80	1.90	3	260	62	N/A	
2	11	2½	170.51	0.34	86	511	1.71	1.81	3	260	60		
3	10	5	172.41	0.37	86	505	1.88	1.98	3	257	60		
4	9	7½	174.25	0.36	86	507	1.82	1.82	3	255	59		
5	8	10	176.11	0.38	85	510	1.82	1.92	3	260	59		
6	7	12½	177.92	0.37	85	513	1.76	1.86	3	264	59		
7	6	15	179.73	0.25	85	514	1.16	1.26	3	268	58		
8	5	17½	181.26	0.23	84	512	1.06	1.16	2	265	58		
9	4	20	182.69	0.22	84	512	1.01	1.11	2	262	58		
10	3	22½	184.09	0.22	84	498	1.02	1.12	2	255	58		
11	2	25	185.48	0.23	84	485	1.09	1.19	2	253	58		
12	1	27½	186.94	0.18	85	478	0.84	0.94	2	250	59		
13	B-12	30½	188.264	0.28	87	507	1.32	1.42	2	250	58		
14	11	2½	189.87	0.30	90	512	1.42	1.52	2	247	57		
15	10	5	191.52	0.29	91	518	1.37	1.47	2	248	57		
16	9	7½	193.16	0.27	92	521	1.26	1.36	2	255	57		
17	8	10	194.72	0.28	92	525	1.31	1.41	2	255	57		
18	7	12½	196.29	0.34	93	506	1.65	1.75	3	255	56		
19	6	15	198.05	0.44	94	510	2.16	2.26	4	256	54		
20	5	17½	200.05	0.45	96	513	2.20	2.30	4	260	54		
21	4	20	202.11	0.55	97	515	2.72	2.82	5	260	52		
22	3	22½	204.37	0.49	98	507	2.41	2.51	4	260	52		
23	2	25	206.55	0.40	98	493	2.00	2.10	4	262	53		
24	1	27½	208.54	0.38	97	488	1.90	2.00	4	264	53		
25	End	60	210.462										
	FINAL												

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.
** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

60	41.77	.33	89.5	508	1.61
Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH

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MOISTURE ANALYTICAL RESULTS FOR MULTIMETAL SAMPLING TRAINS AND/OR SAMPLING TRAINS USING $KMnO_4$ REAGENT FOR Hg

Client: Withers and Ravenel

Plant Name: Triangle Brick — Job No. ~~14884~~ 14448

City/State: Merry Oaks, N.C. — Sampling Loc.: Brick Kiln #2 Stack

Run Number	S-M29-1	S-M29-2	S-M29-3
Sampling Date	10/17/95	10/17/95	10/17/95
Analysis Date	10/17/95	10/17/95	10/17/95
Analyst	JRW	JRW	JRW
Reagent 200 mls ($5\%\ HNO_3/10\%\ H_2O_2$)			
Final Weight, g	316.5	332.5	315.0
Tared Weight, g	265.1	277.9	266.0
Water Catch, g	51.4	54.6	49.0
Reagent (3rd Impinger Cond.)			
Final Weight, g	225.6	221.4	220.9
Tared Weight, g	219.8	219.3	218.7
Water Catch, g	5.8	2.1	2.2
Reagent 200 mls ($4\%\ KMnO_4/10\%\ H_2SO_4$)			
Final Weight, g	442.6	447.2	443.3
Empty Tared Weight, g	217.6	219.7	218.7
Difference, g	225	227.5	224.6
mL used, $KMnO_4$, g *	(200 mL) = 220g	(200 mL) = 220g	(200 mL) = 220g
Water Catch, g	9.0	7.5	4.6
CONDENSED WATER, g	62.2	64.2	55.8

* Since 4% KMnO4/10% H2SO4 weighs 1.1 g/mL, multiply mL KMnO4 used * 1.1 g/mL = total g tare to be subtracted. Enter/deduct actual mL KMnO4 used.

Silica Gel			
Final Weight, g	197.2	199.2	206.4
Tared Weight, g	184.7	189.9	195.6
ADSORBED WATER, g	12.5	9.3	10.8

TOTAL WATER COLLECTED, g	74.7	73.5	66.6

Balance No. EEI13 Type (✓) Triple Beam ✓ Electronic ___ Reagent Box No. M116

Balance located in stable, draft-free area (✓)? Yes ✓ No ___ (If "No", explain below.)

Comments ___

RECORD OF CUSTODY, CONTAINER No. M116

Client The Brick Association Job No. 14884

Plant Name Triangle Brick

City/State Merry Oaks, N.C.

Sampling Method(s) EPA M29 (EPA, NIOSH, etc.)

Container Type (√) Reagent Box ✓ Cooler __ Other (specify) _____

Seal No. or "PC"	Date	Time	*	Full Signature	Reason for Breaking Seal**
608	10/13	1622	S	[illegible]	
	10/16	1130	B	[illegible]	change trains
2518	10/18	0932	S	[illegible]	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

PC = Personal Custody * S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Container Received by Entropy Sample Custodian			Seal Intact?**
[illegible] Signature	10/23/95 Date	10:20 Time	Yes ✓ No __ NA __

As Applicable:

All liquid levels at mark (√) YES __ NO __ (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:

TUBE SAMPLES put in freezer by _____ Date _____ Time _____

CONDENSATE SAMPLES put in refrige. by _____ Date _____ Time _____

REMARKS _____

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FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. M116 Assembly Date 10/13/95 Assembled By JK

Client The Brick Association Job No. 14884

Plant Triangle Brick City/State Merry Oaks, N.C.

Sampling Loc. ~~Stack~~ Brick Kiln #2 Stack Method EPA 29

Individual Tare Of Reagent 200 (Ml)(~~gm~~) of 5% HNO_3 / 10% H_2O_2 K

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Sil. Gel _____ Gm _____ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
S-M29-1	10/17	~~AH~~ unnumbered	untared	✓	JRW	10/17	30	✓	JRW
S-M29-2	10/17	unnumbered	untared	✓	JRW	10/17	30	✓	JRW
S-M29-3	10/17	unnumbered	untared	✓	JRW	10/17	30	✓	JRW

Filter Appearance* very light coating, some small granules

Reagents Appearance* clear / purple

Filter Appearance* see above

Reagents Appearance* clear / purple

Filter Appearance* see above

Reagents Appearance* clear / purple

Filter Appearance*

Reagents Appearance*

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS _____

Q-1002 rev. 5-93

RECORD OF CUSTODY, CONTAINER No. M151

Client Withers and Ravenel Job No. 14448

Plant Name Triangle Brick

City/State Merry Oaks, N.C.

Sampling Method(s) EPA M29 (EPA, NIOSH, etc.)

Container Type (√) Reagent Box ☒ Cooler __ Other (specify) _____

Seal No. or "PC"	Date	Time	*	Full Signature	Reason for Breaking Seal**
416	9/18	1621	S	[illegible]	
1525	10/17	0835	B	Joe Wisler	label jars
2732	10/18	0954	S	Joe Wisler	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

PC = Personal Custody * S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Container Received by Entropy Sample Custodian

Signature _____ Date 10/23/95 Time 1023

Seal Intact?** Yes ✓ No __ NA __

As Applicable:

All liquid levels at mark (√) YES __ NO __ (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:

TUBE SAMPLES put in freezer by _____ Date _____ Time _____

CONDENSATE SAMPLES put in refrige. by _____ Date _____ Time _____

REMARKS _____

L-0023 rev. 8-93

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. M151 Assembly Date 9-18-95 Assembled By JVS

Client Withers and Ravenel Job No. 14448

Plant Triangle Brick City/State Cherry Oaks, N.C.

Sampling Loc. Brick Kiln #2 Stack Method EPA M29

Individual Tare Of Reagent 200 (Ml) (gm) Of 5% HNO_3/10% H_2O_2 K

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Sil. Gel _____ Gm _____ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
5-M29--FB	10/17	unnumbered unitared		✓	JRM	10/17	NA	✓	JRM
				Filter Appearance* clear					
				Reagents Appearance* clear/purple					
				Filter Appearance*					
				Reagents Appearance*					
				Filter Appearance*					
				Reagents Appearance*					
				Filter Appearance*					
				Reagents Appearance*					

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS _____

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RECORD OF CUSTODY, CONTAINER No. 1008

Client The Brick Association Job No. ~~14839~~ 14448

Plant Name Triangle Brick

City/State Merry Oaks, N.C.

Sampling Method(s) EPA M29 (EPA, NIOSH, etc.)

Container Type (√) Reagent Box ✓ Cooler __ Other (specify) _____

Seal No. or "PC"	Date	Time	*	Full Signature	Reason for Breaking Seal**
2239	10/18	0943	S	Jim Windsor	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

PC = Personal Custody * S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Container Received by Entropy Sample Custodian			Seal Intact?**
Signature	Date 10/23/95	Time 1021	Yes ✓ No __ NA __

As Applicable:

All liquid levels at mark (√) YES __ NO __ (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:

TUBE SAMPLES put in freezer by _____ Date _____ Time _____

CONDENSATE SAMPLES put in refrige. by _____ Date _____ Time _____

REMARKS _____

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FIELD SAMPLE QUALITY CONTROL

14-CAPACITY CONTAINER

Box No. 1008 Assembly Date _____ Assembled By _____

Client The Brick Association Job No. 14448 ~~14884~~

Plant Triangle Brick City/State Merry Oaks, N.C.

Run/Sample ID	Component*	Recovery Date	Recovery Time	Recovery Initials
S-M29-1	KMnO4 Reagent	10/17	NA	JRW
S-M29-1	HCl Rinse	10/17		JRW
S-M29-2	KMnO4 Reagent	10/17		JRW
S-M29-2	HCl Rinse	10/17		JRW
S-M29-3	KMnO4 Reagent	10/17		JRW
S-M29-3	HCl Rinse	10/17		JRW
S-M29-FB	KMnO4 Reagent	10/17		JRW
S-M29-FB	HCl Rinse	10/17		JRW
M29-RB	KMnO4 Reagent	10/17	✓	JRW

* Component = rinses, reagents, etc. (e.g., H_2SO_4 Rinse, NaOH Rinse, H_2SO_4 Reagent, Probe Rinse, etc.)

All liqud levels at mark (check)? Yes ___ No ___
(estimate loss if not at mark; use REMARKS section).

Remarks

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APPENDIX B. FIELD DATA

1. Brick Kiln No. 2 Stack

c. Methane

EVACUATED TANK PARAMETERS

Client Withers and Ravenel

Plant Name Triangle Brick Job No. 14884

City/State Merry Oaks, N.C. Sampling Loc. Brick Kiln #2 Stack

Tank No. 183 Tank Volume, liters 4.59 Sampling Time Start 1010

From Sampling Run No. S-M29-1 Sampling Time Finish 1117

Sample Transfer Run No. S-M18MOD-1 Sample Transfer Date & Time 10/17/95, 1130

Parameter	Barometric Pressure * In. Hg	mm Hg	Tank Temp. * °F	°C	Tank Pressure Gauge * In. Hg	mm Hg	Leak Check cm Hg change Tank	System
Pretest	30.5	774.7	58		- ~~752~~	-752	0.00	0.00
Posttest	30.5	774.7	58		-	- 12	0.00	0.00
1st (Field) Pressurization					+		JRW Operator	

Tank No. 233 Tank Volume, liters 4.51 Sampling Time Start 1150

From Sampling Run No. S-M29-2 Sampling Time Finish 1255

Sample Transfer Run No. ~~S-M29-2~~ S-M18MOD-2 Sample Transfer Date & Time 10/17/95, 1324

Parameter	Barometric Pressure * In. Hg	mm Hg	Tank Temp. * °F	°C	Tank Pressure Gauge * In. Hg	mm Hg	Leak Check cm Hg change Tank	System
Pretest	30.5	774.7	62		-	-756	0.00	0.00
Posttest	30.5	774.7	62		-	0	0.00	0.00
1st (Field) Pressurization					+		JRW Operator	

Tank No. 242 Tank Volume, liters 4.51 Sampling Time Start 1330

From Sampling Run No. S-M29-3 Sampling Time Finish 1436

Sample Transfer Run No. S-M18MOD-3 Sample Transfer Date & Time

Parameter	Barometric Pressure * In. Hg	mm Hg	Tank Temp. * °F	°C	Tank Pressure Gauge * In. Hg	mm Hg	Leak Check cm Hg change Tank	System
Pretest	30.5	774.7	65		-	-756	0.00	0.00
Posttest	30.5	774.7	65		-	0	0.00	0.00
1st (Field) Pressurization					+		JRW Operator	

* As applicable, use In. Hg or mm Hg, and °F or °C. Note: mm Hg = In. Hg * 25.401

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APPENDIX B. FIELD DATA

1. Brick Kiln No. 2 Stack

d. Particulate

SAMPLING DATA - METHOD(S) 5

CLIENT Withers and Ravenel
PLANT Triangle Brick — RUN NO. 5-MS-1
CITY/STATE Merry Oaks, NC — JOB NO. 14448 — DATE 10/18/95
SAMPLING LOC. Brick Kiln #2 Stack — TIME START 0901
BAROMETRIC PRESSURE, IN. HG 30.53 — STATIC PRESSURE, IN. H_2O -0.35 — TIME FINISH 1005
LEAK ✓, VACUUM IN. HG 15 10" — TEST PERSONNEL JPD, DDH
LEAK RATE, CFM .003 0.003 — POSTTEST POS PRESS LEAK ✓ OK? • ___

• CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS
✓ PITOT, PRETEST
✓ PITOT, POSTTEST
✓ NOZZLE, PRE/POST
✓ TC 56 °F PRE
✓ TC 66 °F POST
✓ ORSAT SYSTEM

FILTER/XAD	TARE WT.
TGF036	0.4633

EQUIPMENT I.D. NUMBERS
REAGENT BOX 0210 — METER BOX N-14 — Y 1.0013
PITOT 5-22 — C_p 0.84 — NOZ'L GLP1449 — DIA. 0.313
TC READOUT F-14 — TC PROBE R-325 — UMBILICAL U131
SAMPL'G BOX 95 — ORSAT PUMP 7 — TEDLAR BAG 88

NOMOGRAPH DATA
DELTA-H@ 1.928
METER TEMP. 85
EST. %H_2O 7
"C" FACTOR 1.015
STACK TEMP. 515
REF DELTA-P 0.334
"K" FACTOR ~~5.505~~ JPD 5.505

LEAK CHECKS
B ___ B ___
E ___ E ___
B ___ B ___
E ___ E ___
B ___ B ___
E ___ E ___

Fyrites, % ___ ___

Yqa .962
<±5% OF CAL'D Y? (Y) ✓ (N) ___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H_2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H_2O ACTUAL	IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**	✓
1	B-12	0	210.726	0.22	61	512	1.06	1.16	2	260	60	N/A	
2	11	2½	212.17	0.23	62	510	1.12	1.22	2	260	57		
3	10	5	213.62	0.23	62	515	1.11	1.21	2	257	56		
4	9	7½	215.05	0.22	64	519	1.06	1.16	2	256	56		
5	8	10	216.46	0.24	66	522	1.16	1.26	2	256	56		
6	7	12½	217.94	0.27	66	527	1.32	1.42	2	255	56		
7	6	15	219.50	0.39	68	531	1.94	2.04	3	258	54		
8	5	17½	221.38	0.46	68	535	2.30	2.40	4	260	52		
9	4	20	223.44	0.49	73	513	2.53	2.63	5	260	52		
10	3	22½	225.61	0.52	73	512	2.70	2.80	5	260	52		
11	2	25	227.87	0.46	80	502	2.43	2.53	5	262	53		
12	1	27½	230.03	0.39	82	500	2.06	2.16	4	264	54		
13	A-12	30/0	231.982	0.36	80	510	1.87	1.97	3	264	58		
14	11	2½	233.87	0.38	83	522	1.96	2.06	3	265	55		
15	10	5	235.76	0.37	86	529	1.91	2.01	3	263	55		
16	9	7½	237.67	0.40	87	534	2.06	2.16	3	260	55		
17	8	10	239.62	0.40	88	511	2.12	2.22	4	257	54		
18	7	12½	241.63	0.39	90	517	2.05	2.15	4	256	54		
19	6	15	243.59	0.30	90	520	1.55	1.65	3	256	55		
20	5	17½	245.35	0.25	90	522	1.28	1.38	2	254	56		
21	4	20	246.92	0.26	90	522	1.33	1.43	2	250	56		
22	3	22½	248.53	0.27	90	523	1.39	1.49	2	250	54		
23	2	25	250.17	0.23	90	515	1.18	1.28	2	250	55		
24	1	27½	251.68	0.21	92	502	1.09	1.19	2	248	55		
25	End	60	253.133										
FINAL													

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.
** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH
60	42.407	.32	78	518	1.69

75

SAMPLING DATA - METHOD(S) 5

CLIENT Withers and Ravenel
PLANT Triangle Brick
CITY/STATE Merry Oaks, NC
SAMPLING LOC. Brick Kiln #2 Stack
BAROMETRIC PRESSURE, IN. HG 30.50 STATIC PRESSURE, IN. H_2O -0.35
LEAK ✓, VACUUM IN. HG 15 10"
LEAK RATE, CFM .002 0.002

RUN NO. 5-M5-2
JOB NO. 14448 DATE 10/18/95
TIME START 1039
TIME FINISH 1142
TEST PERSONNEL JPD, DDH
POSTTEST POS PRESS LEAK ✓ OK? •

• CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS
- ✓ PITOT, PRETEST
- ✓ PITOT, POSTTEST
- ✓ NOZZLE, PRE/POST
- ✓ TC 70 °F PRE
- ✓ TC 76 °F POST
- ✓ ORSAT SYSTEM

EQUIPMENT I.D. NUMBERS
REAGENT BOX 0210 METER BOX N-14 Y 1.0033
PITOT 5-24 C_p 0.84 NOZ'L GLP714 DIA. 0.306
TC READOUT F-14 TC PROBE R-385 UMBILICAL U131
SAMPL'G BOX 128 ORSAT PUMP 7 TEDLAR BAG 66

NOMOGRAPH DATA
DELTA-H@ 1.928
METER TEMP. 95
EST. $\%H_2O$ 7
"C" FACTOR 1.034
STACK TEMP. 515
REF DELTA-P 0.359
"K" FACTOR 5.121

LEAK CHECKS
B ___ E ___ B ___ E ___
B ___ E ___ B ___ E ___
B ___ E ___ B ___ E ___
B ___ E ___ B ___ E ___

FILTER/XAD	TARE WT.
TGF060	0.4707

Fyrites, %: ___

Yqa: .969
<±5% OF CAL'D Y? (Y) ✓ (N) ___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H_2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H_2O ACTUAL	ORIFICE SETTING, IN. H_2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**	✓
1	B-12	0	253.302	0.28	92	515	1.33	1.43	2	265	62	N/A	
2	11	2½	254.95	0.29	94	517	1.38	1.48	2	262	61		
3	10	5	256.54	0.33	96	520	1.58	1.68	2	260	58		
4	9	7½	258.28	0.31	98	525	1.48	1.58	2	260	58		
5	8	10	259.98	0.32	98	529	1.52	1.62	2	262	58		
6	7	12½	261.69	0.37	98	531	1.80	1.90	3	265	56		
7	6	15	263.56	0.48	100	514	2.38	2.48	4	263	53		
8	5	17½	265.67	0.55	102	518	2.73	2.83	4	260	52		
9	4	20	267.95	0.56	104	519	2.79	2.89	4	259	52		
10	3	22½	270.28	0.57	104	512	2.86	2.96	4	255	52		
11	2	25	272.64	0.47	106	510	2.35	2.45	4	255	53		
12	1	27½	274.78	0.42	106	508	2.10	2.20	3	255	53		
13	A-12	30/0	276.797	0.40	102	518	1.96	2.06	3	250	57		
14	11	2½	278.78	0.42	105	511	2.09	2.19	3	250	55		
15	10	5	280.78	0.38	106	509	1.89	1.99	3	251	54		
16	9	7½	282.69	0.41	106	510	2.05	2.15	3	252	54		
17	8	10	284.71	0.39	106	513	1.93	2.03	3	250	54		
18	7	12½	286.64	0.40	106	518	1.98	2.08	3	247	54		
19	6	15	288.59	0.37	106	521	1.81	1.91	3	246	55		
20	5	17½	290.47	0.27	106	521	1.30	1.40	2	248	55		
21	4	20	292.10	0.28	104	522	1.34	1.44	2	248	56		
22	3	22½	293.72	0.26	104	522	1.24	1.34	2	249	56		
23	2	25	295.29	0.27	104	511	1.31	1.41	2	247	56		
24	1	27½	296.91	0.19	103	512	0.89	0.99	2	247	57		
25	End	60	298.247										
FINAL													

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.
** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH
60	44.94	.37	102	516	1.83

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SAMPLING DATA - METHOD(S) 5

CLIENT Withers and Ravenel
PLANT Triangle Brick — RUN NO. 5-M5-3
CITY/STATE Merry Oaks, NC — JOB NO. 14448 — DATE 10/18/95
SAMPLING LOC. Brick Kiln #2 Stack — TIME START 1221
BAROMETRIC PRESSURE, IN. HG 30.53 — STATIC PRESSURE, IN. H_2O -0.35 — TIME FINISH 1324
LEAK ✓, VACUUM IN. HG 15 10" — TEST PERSONNEL JPD, DDH
LEAK RATE, CFM .006 0.006 — POSTTEST POS PRESS LEAK ✓ OK? * ___

* CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS
- ✓ PITOT, PRETEST
- ✓ PITOT, POSTTEST
- ✓ NOZZLE, PRE/POST
- ✓ TC 76 °F PRE
- ✓ TC 77 °F POST
- ✓ ORSAT SYSTEM

FILTER/XAD	TARE WT.
E4512	0.4491

EQUIPMENT I.D. NUMBERS
REAGENT BOX 0210 — METER BOX N-14 — Y 1.0013
PITOT S-22 — C_p 0.84 — NOZ'L GLP 1449 — DIA. 0.313
TC READOUT F-14 — TC PROBE R-325 — UMBILICAL U131
SAMPL'G BOX 95 — ORSAT PUMP 7 — TEDLAR BAG 25

NOMOGRAPH DATA
DELTA-Ha 1.928
METER TEMP. 100
EST. $\%H_2O$ 7
"C" FACTOR 1.043
STACK TEMP. 515
REF DELTA-P 0.325
"K" FACTOR 5.657

LEAK CHECKS
B ___ B ___
E ___ E ___
B ___ B ___
E ___ E ___
B ___ B ___
E ___ E ___

Fyrites, % ___ ___ ___ ___

Yqa ___
<±5% OF CAL'D Y? (Y)___ (N)___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H_2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H_2O ACTUAL	ORIFICE SETTING, IN. H_2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**	✓
1	B-12	0	298.566	0.30	99	522	1.58	1.68	2	238	63	N/A	
2	11	2½	300.26	0.32	101	518	1.70	1.80	2	240	61		
3	10	5	302.05	0.29	102	513	1.55	1.65	2	244	59		
4	9	7½	303.80	0.28	102	511	1.49	1.59	2	245	59		
5	8	10	305.51	0.27	102	515	1.43	1.53	2	245	59		
6	7	12½	307.19	0.26	104	518	1.37	1.47	2	247	58		
7	6	15	308.84	0.28	104	523	1.48	1.58	2	250	58		
8	5	17½	310.54	0.46	106	529	2.49	2.59	4	250	55		
9	4	20	312.71	0.47	106	531	2.53	2.63	4	250	54		
10	3	22½	314.93	0.53	107	532	2.87	2.97	5	251	52		
11	2	25	317.29	0.57	107	513	3.15	3.25	5	250	51		
12	1	27½	319.79	0.35	108	508	1.91	2.01	4	252	53		
13	A-12	30/0	321.775	0.35	105	513	1.90	2.00	4	253	56		
14	11	2½	323.67	0.39	106	517	2.12	2.22	4	253	55		
15	10	5	325.69	0.36	108	522	1.94	2.04	4	251	54		
16	9	7½	327.66	0.39	108	528	2.10	2.20	4	250	54		
17	8	10	329.66	0.38	109	532	2.04	2.14	4	250	54		
18	7	12½	331.66	0.40	110	536	2.15	2.25	4	252	54		
19	6	15	333.69	0.35	111	525	1.89	1.99	4	251	54		
20	5	17½	335.65	0.26	110	512	1.40	1.50	3	251	55		
21	4	20	337.34	0.27	110	514	1.45	1.55	3	253	55		
22	3	22½	339.03	0.26	109	514	1.39	1.49	3	254	55		
23	2	25	340.69	0.23	109	509	1.23	1.33	2	254	56		
24	1	27½	342.29	0.18	108	506	0.94	1.04	2	253	56		
25	End	60	343.664										
FINAL													

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.
** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

60	45.098	.34	106	519	1.84
Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH

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MOISTURE ANALYTICAL RESULTS

Client Withers and Ravenel

Plant Name Triangle Brick Job No. ~~14884~~ 14448

City/State Merry Oaks, N.C. Sampling Loc. Brick Kiln #2 Stack

Run Number	S-MS-1	S-MS-2	S-MS-3
Sampling Date	10/18/95	10/18/95	10/18/95
Analysis Date	10/18/95	10/18/95	10/18/95
Analyst	JRW	JRW	JRW
Reagent 1 (200 mL DI H_2O)			
Final Weight, g	745.8	740.9	749.2
Tared Weight, g	693.2	689.3	690.6
Water Catch, g	52.6	51.6	58.6
Reagent 2 (_____)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
Reagent 3 (_____)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g			
Silica Gel			
Final Weight, g	205.5	208.9	201.8
Tared Weight, g	191.7	196.2	191.8
ADSORBED WATER, g	13.8	12.7	10.0
TOTAL WATER COLLECTED, g	66.4	64.3	68.6

Balance No. EEI13 Type (√) Triple Beam ✓ Electronic ___ Reagent Box No. 0210

Balance located in stable, draft-free area (√)? Yes ✓ No ___ (If "No", explain below.)

Comments

L-0036 rev. 5-93

RECORD OF CUSTODY, CONTAINER No. 210

Client Withers & Ravenel Job No. 14884

Plant Name Triangle Brick

City/State Merry Oaks, N.C.

Sampling Method(s) EPA Method 5 (EPA, NIOSH, etc.)

Container Type (√) Reagent Box ✓ Cooler __ Other (specify) _____

Seal No. or "PC"	Date	Time	*	Full Signature	Reason for Breaking Seal**
911	9/26	1544	S	[illegible]	
	10/16/95	1535	B	Joe Winslow	label jars
2361	10/18/95	1520	S	Joe Winslow	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

PC = Personal Custody * S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Container Received by Entropy Sample Custodian

Sean Daley (Signature) 10/24/95 (Date) 1320 (Time)

Seal Intact?** Yes ✓ No __ NA __

As Applicable:

All liquid levels at mark (√) YES __ NO __ (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:

TUBE SAMPLES put in freezer by _____ Date _____ Time _____

CONDENSATE SAMPLES put in refrige. by _____ Date _____ Time _____

REMARKS _____

L-0023 rev. 8-93

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 210 Assembly Date 9.26.95 Assembled By JVS

Client Withers and Ravenel Job No. 14884

Plant Triangle Brick City/State Merry Oaks, NC

Sampling Loc. Brick Kiln #2 Stack Method EPA M5

Individual Tare Of Reagent 200 (Ml)(~~gm~~) Of DI H_2O

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Sil. Gel _____ Gm _____

other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
S-M5-1	10/18	TGF036	0.4673	✓	JRW	10/18	50	✓	JRW
				Filter Appearance*					
				very light coating w/ small granules					
				Reagents Appearance*					
				~~light coa~~ clear					
S-M5-2	10/18	TGF060	0.4708	✓	JRW	10/18/95	60	✓	JRW
				Filter Appearance*					
				light coating					
				Reagents Appearance*					
				clear					
S-M5-3	10/18	F4512	0.4491	✓	JRW	10/18	50	✓	JRW
				Filter Appearance*					
				very light coating					
				Reagents Appearance*					
				clear					
				Filter Appearance*					
				Reagents Appearance*					

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS _____

Q-1002 rev. 5-93

RECORD OF CUSTODY, CONTAINER No. 565

Client Withers and Ravenel Job No. 14448

Plant Name Triangle Brick

City/State Merry Oaks, N.C.

Sampling Method(s) EPA M5, 201A, 202 (EPA, NIOSH, etc.)

Container Type (✓) Reagent Box ✓ Cooler __ Other (specify) _____

Seal No. or "PC"	Date	Time	*	Full Signature	Reason for Breaking Seal**
14	9/26	1544	S	[illegible]	
	10/17/95	0930	B	Jean Windsor	label jars
2135	10/18/95	1519	S	Jean Windsor	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

PC = Personal Custody * S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Container Received by Entropy Sample Custodian

Sean Daley (Signature) 10/24/95 (Date) 1315 (Time)

Seal Intact?** Yes ✓ No __ NA __

As Applicable:

All liquid levels at mark (✓) YES __ NO __ (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:

TUBE SAMPLES put in freezer by _____ Date _____ Time _____

CONDENSATE SAMPLES put in refrige. by _____ Date _____ Time _____

REMARKS _____

L-0023 rev. 8-93

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 565 Assembly Date 9.26.95 Assembled By JVS

Client Withers and Ravenel Job No. 14448

Plant Triangle Brick City/State Merry Oaks, NC

Sampling Loc. Brick Kiln #2 Stack Method EPA 5, 201A, 202

Individual Tare Of Reagent 200 (Ml)(~~gm~~) Of DI H_2O

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Sil. Gel _____ Gm _____ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
–									
Reagent Blanks: Acetone, DI H_2O, KeCl				Filter Appearance*					
				Reagents Appearance*					
				Filter Appearance*					
				Reagents Appearance*					
				Filter Appearance*					
				Reagents Appearance*					
				Filter Appearance*					
				Reagents Appearance*					

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS _____

Q-1002 rev. 5-93

APPENDIX B. FIELD DATA

1. Brick Kiln No. 2 Stack

e. Particulate ≤ 10 Microns and Condensible Particulate

Sampling and Velocity Traverse Point Determination
EPA Method 1

CLIENT Withers & Ravenel
PLANT NAME Triangle Brick
CITY, STATE Merry Oaks N.C.
SAMPLING LOCATION Brick Kiln No. 2 Stack

NO. OF PORTS AVAILABLE 2
NO. OF PORTS USED 2
PORT INSIDE DIAMETER 6"

DISTANCE FROM FAR WALL TO OUTSIDE OF PORT 53
NIPPLE LENGTH AND/OR WALL THICKNESS 8 1/4
DEPTH OF STACK OR DUCT 44 3/4
STACK OR DUCT WIDTH (IF RECTANGULAR) ___

EQUIVALENT DIAMETER:

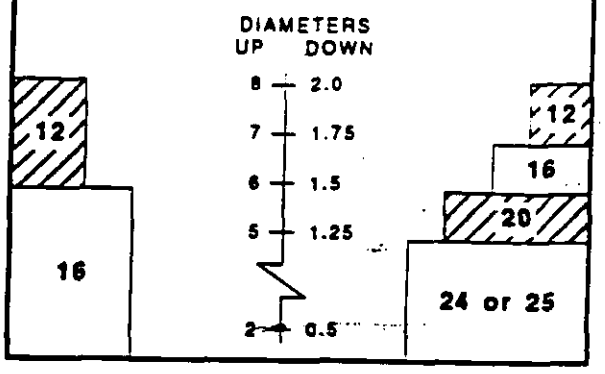
$$D_E = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2(\_\_)(\_\_)}{(\_\_ + \_\_)} = \_\_\_$$

DISTANCE FROM PORTS TO FLOW DISTURBANCES	UPSTREAM	DOWNSTREAM
	6'	25'
DIAMETERS	2.14	6.7

STACK/DUCT AREA = $\pi(22.37)^2$ = 1572.81 IN²

DRAW HORIZONTAL LINE THROUGH DIAMETERS

If more than 8 and 2 diameters and if duct dia. is less than 24", use 8 or 9 points.



PITOT USED (✓) TYPE "S" ___ STANDARD ___

POINT	% OF DUCT DEPTH	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT	P M 10
1	~~4.4~~	1.969	9 1/8 = 7 1/2	10 1/4
2	14.6	6.5335	11 1/4	14 3/4
3	29.6	13.246	13 1/2	21 1/2
4	70.4	31.504	16 1/8	39 3/4
5	85.4	38.265	19 1/2	46 1/2
6	95.6	42.781	24 1/8	51 —
7			37	
8			41 3/4	
9			45	
10			47 3/4	
11			50	
12			52	
13				
14				
15				
16				
17	PM10			
18				
19				
20				
21				
22				
23				
24				
25				

LOCATION OF POINTS IN CIRCULAR STACKS OR DUCTS

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	76.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.6
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	76.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

LOCATION OF POINTS IN RECTANGULAR STACKS OR DUCTS

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

F-0016 rev. 8-93

AIR FLOW RATE DETERMINATIONS

Client Withers and Ravenel Job No. 14448

Plant Triangle Brick Run No. S-M2-1

City/State Merry Oaks, NC Date 10/16/95

Test Location Brick Kiln #2 Stack Personnel JPD

Barometric Pressure (Pbar) 30.12 "Hg Static Presure (Pg) -0.33 "H_2O

Pitot/Orifice ID DP72-5 Pitot Coef. (C_p) 0.84 Pres. Gauge Set ID MS-37

Thermocouple ID R 140 Duct Depth/Diameter 48" Width N/A

---Specify inches (") or feet (')---

VELOCITY TRAVERSES
Start-Finish Times: 1400 - 1420

Point No.	ΔP In. H_2O	Temp. °F
A-1	0.20	510
2	0.25	511
3	0.27	513
4	0.27	512
5	0.30	515
6	0.28	516
7	0.34	516
8	0.35	519
9	0.35	518
10	0.33	515
11	0.31	514
12	0.27	512
B-1	0.38	510
2	0.48	513
3	0.53	515
4	0.52	516
5	0.48	513
6	0.43	512
7	0.33	508
8	0.31	506
9	0.24	526
10	0.24	522
11	0.23	521
12	0.20	509
Avg.*		

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	CO (C) Reading	%CO (C-B)
	Average					

Orsat ID _____ Bag ID _____ F_o _____

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd =		SCFM
Wet at Stack Conditions, Qaw =		ACFM

ADDITIONAL DATA

* ΔP average is square of average square root.

F-1023 rev. 9-93

METHOD 3 (ORSAT) FIELD DATA

Client: Withers and Ravenel — Job No. 14448

Plant Name: Triangle Brick — Fuel Type: Nat. GAS

City/State: Merry Oaks N.C

Sampling Location: Brick Kiln No. 2 Stack

Run/Sample No. S-M3-1 Date 10/18/95 Leak ✓ OK? ✓ Operator DDH

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)	Concurrent Runs to Share Orsat Data
0901	1330	2.4	19.0	—	16.6	—	
—	—	2.4	19.0	—	16.6	—	S-M5-1
1005	1340	2.4	19.0	—	16.6	—	S-M201A/202-1
	Avg.	2.4		Avg.	16.6	—	

Orsat I.D. 1 Tedlar Bag I.D. 88 F_o ____

Run/Sample No. S-M3-2 Date 10/18/95 Leak ✓ OK? ✓ Operator DDH

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)	Concurrent Runs to Share Orsat Data
1039	1340	2.4	19.0	—	16.6	—	
—	—	2.4	19.0	—	16.6	—	S-M5-2
1142	1350	2.4	19.0	—	16.6	—	S-M201A/202-2
	Avg.	2.4		Avg.	16.6	—	

Orsat I.D. 1 Tedlar Bag I.D. 66 F_o ____

Run/Sample No. S-M3-3 Date 10/18/95 Leak ✓ OK? ✓ Operator DDH

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)	Concurrent Runs to Share Orsat Data
1221	1350	2.4	19.0	—	16.6	—	
—	—	2.4	19.0	—	16.6	—	S-M5-3
1324	1400	2.4	19.0	—	16.6	—	S-M201A/202-3
	Avg.	2.4		Avg.	16.6	—	

Orsat I.D. 1 Tedlar Bag I.D. 25 F_o ____

F-1009 rev. 11-93

SAMPLING DATA - METHOD(S) 201A/202

CLIENT Withers and Ravenel
PLANT Triangle Brick — RUN NO. S-M201A-1
CITY/STATE Merry-Oaks N.C — JOB NO. 14448 — DATE 10-18-95
SAMPLING LOC. Brick Kiln No. 2 Stack — TIME START 901
BAROMETRIC PRESSURE, IN. HG 30.53 — STATIC PRESSURE, IN. H2O -.35 — TIME FINISH 1006
LEAK ✓, VACUUM IN. HG 15" 10" — TEST PERSONNEL DDH JPD
LEAK RATE, CFM 0.000 0.00 — POSTTEST POS PRESS LEAK ✓ OK? • ✓

• CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS
✓ PITOT, PRETEST
✓ PITOT, POSTTEST
✓ NOZZLE, PRE/POST
✓ TC 56 °F PRE
✓ TC ____ °F POST
N/A ORSAT SYSTEM

EQUIPMENT I.D. NUMBERS
REAGENT BOX 0237 METER BOX N-8 Y .9776
PITOT DP-725 Cp .84 NOZ'L 2004 DIA. .252
TC READOUT F-53 TC PROBE R394 UMBILICAL U103
SAMPL'G BOX 33 ORSAT PUMP N/A TEDLAR BAG N/A

LEAK CHECKS
B ____ B ____
E ____ E ____
B ____ B ____
E ____ E ____
B ____ B ____
E ____ E ____

FILTER/XAD	TARE WT.
TGF 042	0.4757

NOMOGRAPH DATA

DELTA-H@	1.900
METER TEMP.	80
EST. %H2O	7
"C" FACTOR	N/A
STACK TEMP.	505
REF DELTA-P	.318
"K" FACTOR	N/A

Fyrites, % ____ ____
Yqa ____
<±5% OF CAL'D Y? (Y)___ (N)___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H2O ACTUAL	ORIFICE SETTING, IN. H2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**	✓
1	A 1	0	465.425	.25	70	480	.68	.68	2	250	48	N/A	
2	2	4½	467.51	.23	64	485	.68	.68	2	250	49		
3	3	8¾	469.51	.24	68	500	.68	.68	2	250	49		
4	4	13	471.525	.34	71	510	.68	.68	2	250	49		
5	5	18¼	474.000	.37	74	515	.68	.68	2	250	50		
6	6	23¾	476.632	.35	77	525	.68	.68	2	250	50		
7	B 1	29	479.100	.40	78	515	.68	.68	2	250	51		
8	2	34½	481.732	.43	82	510	.68	.68	2	250	51		
9	3	40¼	484.425	.38	84	510	.68	.68	2	255	52		
10	4	45¾	487.45	.30	84	505	.68	.68	2	255	51		
11	5	50½	489.200	.28	84	500	.68	.68	2	260	50		
12	6	55¼	491.615	.28	84	510	.68	.68	2	260	51		
13	END	60	493.900										
14												✓	
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
FINAL													

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.
** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH
60	28.475	.318	77	505	.68

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SAMPLING DATA - METHOD(S) 201A/202

CLIENT Withers and Ravenel
PLANT Triangle Brick — RUN NO. S-M201A/202-2
CITY/STATE Merry-Oaks N.C. — JOB NO. 14448 — DATE 10-18-95
SAMPLING LOC. Brick Kiln No. 2 Stack — TIME START 1039
BAROMETRIC PRESSURE, IN. HG 30.53 — STATIC PRESSURE, IN. H_2O -.35 — TIME FINISH 1143
LEAK ✓, VACUUM IN. HG 15" 10" — TEST PERSONNEL DDH, JPD
LEAK RATE, CFM 0.000 0.000 — POSTTEST POS PRESS LEAK ✓ OK? ♦ ✓

♦ CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS
- ✓ PITOT, PRETEST
- ✓ PITOT, POSTTEST
- ✓ NOZZLE, PRE/POST
- ✓ TC 64 °F PRE
- ✓ TC 64 °F POST
- N/A ORSAT SYSTEM

FILTER/XAD	TARE WT.
TGE-0099	.4700

EQUIPMENT I.D. NUMBERS
REAGENT BOX 0237 METER BOX N-8 Y .9776
PITOT DP-72-5 C_p .84 NOZ'L ~~2004~~ DIA. ~~.252~~ .249
TC READOUT F-53 TC PROBE R364 UMBILICAL U103
SAMPL'G BOX 49 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA
DELTA-H@ 1.900
METER TEMP. 80
EST. %H_2O 7
"C" FACTOR N/A
STACK TEMP. 505
REF DELTA-P .31
"K" FACTOR N/A

LEAK CHECKS
B ___ B ___
E .249 E ___
B ___ B ___
E ___ E ___
B ___ B ___
E ___ E ___

Fyrites, % ___ Yga ___
<±5% OF CAL'D Y? (Y)___ (N)___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H_2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H2O ACTUAL	ORIFICE SETTING, IN. H2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**	✓
1	A1	0	494.130	.25	88	480	.68	.68	2	250	49	N/A	
2	2	4½	496.322	.23	92	490	.68	.68	2	250	50		
3	3	8¾	498.392	.24	94	520	.68	.68	2	260	51		
4	4	13	500.460	.34	96	510	.68	.68	2	260	51		
5	5	18¼	502.950	.37	100	515	.68	.68	2	260	52		
6	6	23¾	505.715	.35	102	525	.68	.68	2	260	51		
7	B1	29	508.255	.40	102	515	.68	.68	2	260	52		
8	2	34½	510.862	.43	104	510	.68	.68	2	260	52		
9	3	40¼	513.160	.38	106	523	.68	.68	2	260	50		
10	4	45¾	516.230	.30	106	505	.68	.68	2	260	51		
11	5	50½	518.653	.28	106	520	.68	.68	2	250	52		
12	6	55¼	520.730	.28	106	510	.68	.68	2	250	52		
13		60	523.000										
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
FINAL													

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.
** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH
60	28.87	.3176	100.2	510.4	.68

F-1112 (Page 1) rev. 9-94

SAMPLING DATA - METHOD(S) 201A

CLIENT Withers & Ravenel
PLANT Triangle Brick — RUN NO. 5 - M201A/200 - 5
CITY/STATE Mount Oaks N.C — JOB NO. 14448 — DATE 10-18-95
SAMPLING LOC. Brick Kiln No 2 Stack — TIME START 1228
BAROMETRIC PRESSURE, IN. HG 30.53 — STATIC PRESSURE, IN. H_2O -.30 — TIME FINISH 1322
LEAK ✓, VACUUM IN. HG 15" — TEST PERSONNEL DDH, JPD
LEAK RATE, CFM 0.000 — POSTTEST POS PRESS LEAK ✓ OK? • ✓

• CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS
✓ PITOT, PRETEST
✓ PITOT, POSTTEST
✓ NOZZLE, PRE/POST
✓ TC ____ °F PRE
✓ TC ____ °F POST
N/A ORSAT SYSTEM

FILTER/XAD	TARE WT.

EQUIPMENT I.D. NUMBERS
REAGENT BOX 0237 METER BOX N-8 Y .9776
PITOT DP-725 Cp .84 NOZ'L 3004 DIA. .249
TC READOUT F-53 TC PROBE R.344 UMBILICAL U103
SAMPL'G BOX 33 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA
DELTA-Hø 1.900
METER TEMP. 80
EST. %H_2O 7
"C" FACTOR N/A
STACK TEMP. 505
REF DELTA-P .31
"K" FACTOR N/A

LEAK CHECKS
B ____ B ____
E ____ E ____
B ____ B ____
E ____ E ____
B ____ B ____
E ____ E ____

Fyrites, %

Yqa
<±5% OF CAL'D Y? (Y)___ (N)___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H_2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H_2O ACTUAL	ORIFICE SETTING, IN. H_2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**	✓
1	A1	0	523.148	.25	90	490	.68	.68	2	250	49	N/A	
2	2	4½	525.340	.23	92	490	.68	.68	2	250	49		
3	3	8¾	527.255	.24	92	521	.68	.68	2	250	50		
4	4	13	529.242	.34	92	510	.68	.68	2	255	51		
5	5	18½	531.743	.37	94	515	.68	.68	2	260	52		
6	6	23¾	534.350	.35	96	525	.68	.68	2	260	50		
7	B1	29/0	536.776	.40	96	515	.68	.68	2	260	50		
8	2	34½	539.422	.43	97	510	.68	.68	2	260	50		
9	3	40¼	542.215	.38	98	523	.68	.68	2	260	51		
10	4	45¾	544.850	.30	99	505	.68	.68	2	260	52		
11	5	50½	547.142	.28	99	521	.68	.68	2	260	50		
12	6	55¼	549.530	.28	99	510	.68	.68	2	260	51		
13		60	551.658										
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
FINAL													

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.
** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	$\Delta H_@$
60	283.510	0.3176	96.3	510.4	0.68

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MOISTURE ANALYTICAL RESULTS

Client Withers and Ravenel

Plant Name Triangle Brick — Job No. ~~14884~~ 14448

City/State Merry Oaks, NC. — Sampling Loc. Brick Kiln #2 Stack

Run Number	S-M201A/202-1	S-M201A/202-2	S-M201A/202-3
Sampling Date	10/18/95	10/18/95	10/18/95
Analysis Date	10/18/95	10/18/95	10/18/95
Analyst	JRW	JRW	JRW
Reagent 1 (300 mls DI H_2O)			
Final Weight, g	798.5	796.6	807.4
Tared Weight, g	776.4	775.3	782.1
Water Catch, g	22.1	21.3	25.3
Reagent 2 (_____)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
Reagent 3 (_____)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g			
Silica Gel			
Final Weight, g	223.0	226.1	223.3
Tared Weight, g	205.5	209.3	210.4
ADSORBED WATER, g	17.5	16.8	12.9
TOTAL WATER COLLECTED, g	39.6	38.1	38.2

Balance No. EEI 13 Type (✓) Triple Beam ✓ Electronic ___ Reagent Box No. 0237

Balance located in stable, draft-free area (✓)? Yes ✓ No ___ (If "No", explain below.)

Comments

L-0036 rev. 5-93

RECORD OF CUSTODY, CONTAINER No. 237

Client The Brick Association Job No. ~~14184~~ 14448

Plant Name Triangle Brick

City/State Merry Oaks, N.C.

Sampling Method(s) EPA M 201A/202 (EPA, NIOSH, etc.)

Container Type (√) Reagent Box ✓ Cooler __ Other (specify) _____

Seal No. or "PC"	Date	Time	*	~~Full Signature~~	Reason for Breaking Seal**
264	9/26	1544	S	[illegible]	
	10/16/95	1507	B	Joe Winder	label jars
2309	10/18/95	1518	S	Joe Winder	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

PC = Personal Custody * S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Container Received by Entropy Sample Custodian

Sean Daley — Signature; 10/24/95 — Date; 1310 — Time

Seal Intact?** Yes ✓ No __ NA __

As Applicable:

All liquid levels at mark (√) YES __ NO __ (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:

TUBE SAMPLES put in freezer by _____ Date _____ Time _____

CONDENSATE SAMPLES put in refrige. by _____ Date _____ Time _____

REMARKS _____

L-0023 rev. 8-93

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 237 Assembly Date 9.26.95 Assembled By JVS

Client The Brick Association Job No. 14448

Plant Triangle Brick City/State Merry Oaks, NC

Sampling Loc. Brick Kiln #2 Stack Method EPA 201A/202

Individual Tare Of Reagent 200 (Ml)(~~gm~~) Of DI H_2O

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Reagent _____ (Ml)(gm) Of _____

Individual Tare Of Sil. Gel _____ Gm _____

other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
S-M201A/202-1	10/18	JGF042	~~0.57~~	✓	JRW	10/18	30	✓	JRW
			0.4757	Filter Appearance* clear					
				Reagents Appearance* clear					
S-M201A/202-2	10/18	TGF055	0.4700	✓	JRW	10/18	30	✓	JRW
				Filter Appearance* clear					
				Reagents Appearance* clear					
S-M201A/202-3	10/18	E4513	0.4520	✓	JRW	10/18	30	✓	JRW
				Filter Appearance* clear					
				Reagents Appearance* clear					
				Filter Appearance*					
				Reagents Appearance*					

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS _____

Q-1002 rev. 5-93

APPENDIX B. FIELD DATA

2. Sampling Point Determinations and Cyclonic Flow Checks

Sampling and Velocity Traverse Point Determination
EPA Method 1

CLIENT Withers and Ravenel
PLANT NAME Triangle Brick
CITY, STATE Merry Oaks NC
SAMPLING LOCATION Brick Kiln No. 2 Stack

NO. OF PORTS AVAILABLE 2
NO. OF PORTS USED 2
PORT INSIDE DIAMETER 6"

DISTANCE FROM FAR WALL TO OUTSIDE OF PORT 53"
NIPPLE LENGTH AND/OR WALL THICKNESS 8 1/4"
DEPTH OF STACK OR DUCT 44 3/4"
STACK OR DUCT WIDTH (IF RECTANGULAR) ——

EQUIVALENT DIAMETER:
$D_E = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2(\_\_)(\_\_)}{(\_\_ + \_\_)} = \_\_$

DISTANCE FROM PORTS TO FLOW DISTURBANCES	UPSTREAM	DOWNSTREAM
	8'	25'
DIAMETERS	2.14	6.70

STACK/DUCT AREA = π(22.37)² = 1572.81 IN²

LOCATION OF POINTS IN CIRCULAR STACKS OR DUCTS

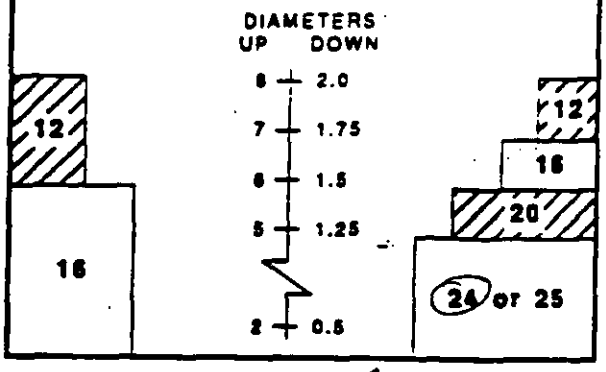
	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.8	28.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.6	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.6
13						94.3	87.5	81.2	75.0	68.5	60.2
14						96.2	91.5	86.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

LOCATION OF POINTS IN RECTANGULAR STACKS OR DUCTS

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

DRAW HORIZONTAL LINE THROUGH DIAMETERS

If more than 8 and 2 diameters and if duct dia. is less than 24", use 8 or 9 points.



PITOT USED (✓) TYPE "S" ✓ STANDARD ——

POINT	% OF DUCT DEPTH	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT
1	2.1	1.0	9 1/4"
2	6.7	3.0	11 1/4"
3	11.8	5.28	13 1/2"
4	17.7	7.92	16 1/8"
5	25.0	11.19	19 1/2"
6	35.6	15.93	24 1/8"
7	64.4	28.82	37 1/8"
8	75.0	33.56	41 7/8"
9	82.3	36.83	45 1/8"
10	88.2	39.47	47 3/4"
11	93.3	41.75	50"
12	97.9	43.75	52"
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

F-0015 rev. 8-93

CYCLONIC FLOW DETERMINATIONS

Client Withers and Ravenel

Plant Name Triangle Brick | Job No. 14448

City/State Merry Oaks, NC | Date 10/16/95

Test Loc. Brick Kiln #2 Stack | Personnel JPD

Barometric Pres. (Pbar) 30.12 In. Hg | Static Pres. (Pg) -0.35 In. H_2O

Pitot/Orifice ID DP72-5 | Pitot Coef. (C_p) 0.84 | Pres. Gauge Set ID MS-37

Thermocouple ID R-190 | Duct Depth/Diameter 48" | Width N/A

----Specify inches (") or feet (')----

Horizontal Duct Flyash/Dust Buildup > 1" Depth (✓)? Yes ____ No ✓

PRELIMINARY TRAVERSES

Start - Finish Times: ____ - ____

Test Pt.	Yaw Ang.° ϕ	ΔP "H_2O	Temp. °F
B-1	-15		
2	-10		
3	-6		
4	-4		
5	-4		
6	-5		
7	-5		
8	-7		
9	-8		
10	-9		
11	-11		
12	-8		
A-1	-10		
2	-12		
3	-6		
4	-5		
5	-2		
6	-4		
7	-7		
8	-9		
9	-9		
10	-8		
11	-9		
12	-8		
Avg.	7.5		

ALIGNMENT APPROACH DATA

(OMIT IF AVERAGE OF YAW ANGLES ≤ 20°)

Run No.* ____		Run No.* ____		Run No.* ____	
Base Time	Min./Point**	Base Time	Min./Point**	Base Time	Min./Point**
Avg. ΔP_v***		Avg. ΔP_v***		Avg. ΔP_v***	

Note: Yaw angle average is sum of the absolute values divided by number of measurements, and must be ≤ 20°.

ΔP average is square of average square root.

* From isokinetic sampling field data sheet.

** Minutes/Point = cos ϕ (Base Time).

*** Average $\Delta P_v = [(\Sigma \cos\phi \sqrt{\Delta P}) / n]^2$.

F-1107 rev. 7-93

APPENDIX C. ANALYTICAL DATA

1. Condensible Particulate

Corrections to mr according to the SO4 results of the ALIQUOT

x Correct for NH4+ resulting from the reaction of NH3 with H2SO4
Correct for NH4+ (as above) and the water associated with H2SO4

K 0.184

Run Number	S-M201A/202-1	S-M201A/202-2	S-M201A/202-3
Sulfates Analysis			
Vb, aliquot volume, mL	10	10	10
SO4 Concentration (CSO4), mg/ml	0.00361	0.00362	0.00438
Final Volume (Vlc), ml	485.0	480.0	480.0
mc, correction mass [a]	0.3222	0.3198	0.3868
Inorganic Condensible Particulate			
Uncorrected Catch Weight (mr), mg [b]	19.8	28.8	25.9
Corrected Catch Weight (mi), mg [c]	19.9	29.1	26.1
Organic Condensible Particulate			
Catch Weight (mo-mb), mg [b]	2.3	0.0	3.3
Total Condensible Particulate			
Catch Weight cpm, mg [d]	22.2	29.1	29.4

[a] mc = K*CSO4*Vlc

[b] From laboratory data sheet.

[c] mi = mr*[Vlc/(Vlc-Vb)]-mc

[d] cpm = mi + mo

TRIANGLE LABS

FAX COVER SHEET

From: Nancy Bragg, Senior Project Scientist
Direct Phone Line: (919) 544-8348
TL-RTP Main Number: (919) 544-5729

Date: 3 November 1995

To: Company: Entropy

Name: Alan Senzel

Fax Number: 787-8442

Subject: Gravimetric Results for Project: 346838

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Environmental Division
801 Capitola Drive
Durham, NC 27713-4411
919-544-5729
P.O. Box 13485
Research Triangle Park, NC 27709-3485
Fax # 919-544-5491

Entropy, Inc.

TLI Project: 34683-B **NSPS Method 202**

Client Project:	Triangle Brick 11989-14448-18		
Matrix:	Methylene Chloride Rinse & DI Water	Date Received:	10/24/95

TLI Number	TLI Blank #2	TLI Blank #3	108-89-1	108-89-2
Sample ID		DI Water Blank 108-89-4C	S-M201A/202-1	S-M201A/202-2
Baggie Tare Wt., g:		3.2736	3.4268	3.8136
Raw Weight, g:		3.2750	3.4466	3.8424
INORGANIC CATCH, g:		0.0014	0.0198	0.0288
Sample ID	MeCl2 Blank 108-89-4B		S-M201A/202-1	S-M201A/202-2
Tare Wt., g:	3.3779		3.3713	3.1594
Raw Weight, g:	3.3791		3.3756	3.1614
ORGANIC CATCH, g:	0.0012		0.0043	0.0020
Inorganic Catch, mg:		1.4	19.8	28.8
Organic Catch, mg:	1.2		4.3	2.0
Subtract Blank Residue, mg:			2.0	2.0
Condensable Particulate, mg:	**1.2**	**1.4**	**22.1**	**28.8**

VISUAL ANALYSIS OF WATERS

Color:	white brown	brown	brown
Texture:	stain tint	stain	stain
Foreign Matter:	none	none	none
Rel. Comp.:	equal	equal	x2
Volume, mL:	295	485	480
Cloudy:	no	no	no
Baggie Number:	441	442	443

VISUAL ANALYSIS OF RINSES

Color:	white	brown	brown
Texture:	film	stain oily	oily residue
Foreign Matter:	none	none	none
Rel. Comp.:	equal	x2	equal
Volume, mL:	285	150	150
Baggie Number:	448	438	439

PRDGRV v2.13. MILES v4.11.05

Triangle Laboratories, Inc.®
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Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 10:05 11/03/95
Page: 1 of 2

Entropy, Inc.

TLI Project: 34683-B **NSPS Method 202**

Client Project:	Triangle Brick 11989-14448-18		
Matrix:	Methylene Chloride Rinse & DI Water	Date Received:	10/24/95

TLI Number: [illegible]

Sample ID: [illegible]

Baggie Tare Wt., g:	3.4057
Raw Weight, g:	3.4316
INORGANIC CATCH, g:	0.0259

Sample ID: [illegible]

Tare Wt., g:	3.4181
Raw Weight, g:	3.4234
ORGANIC CATCH, g:	0.0053
Inorganic Catch, mg:	25.9
Organic Catch, mg:	5.3
Subtract Blank Residue, mg:	2.0
Condensable Particulate, mg:	**29.2**

VISUAL ANALYSIS OF WATERS

Color:	brown
Texture:	stain
Foreign Matter:	none
Rel. Comp.:	x2
Volume, mL:	480
Cloudy:	no
Baggie Number:	444

VISUAL ANALYSIS OF RINSES

Color:	brown
Texture:	oily residue
Foreign Matter:	none
Rel. Comp.:	x1.5 [illegible]
Volume, mL:	150
Baggie Number:	440

PRDGRV v2.13, MILES v4.11.05

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TRIANGLE LABS

CASE NARRATIVE

Analysis of Samples for the Presence of

Ammonium Sulfate

by

Ion Chromatography

METHOD 300.0

Date : November 07, 1995

Client ID : Entropy, Inc.

TLI Project Number : 34683C

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Triangle Laboratories, Inc.
801 Capitola Drive
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919-544-5729
P.O. Box 13485
Research Triangle Park, NC 27709-3485
Fax # 919-544-5491

Triangle Laboratories, Inc.
Case Narrative

November 8, 1995
34683C

Objective: Analysis of three deionized water train portion samples and one deionized water blank for ammonium sulfate by Method 300.0.

Method: Four train samples were received by Triangle Laboratories, Inc. on October 24, 1995 without coolant at ambient temperature and in good condition. The deionized water samples were analyzed for ammonium sulfate content by ion chromatography using Method 300.0 with suppressed conductivity detection. The results reported relate only to the items tested.

The analysis conditions are listed below:

Instrument: Dionex DX300 Ion Chromatograph with a PED-II Conductivity Detector
Eluent flow: 1.5 mL/min. (1.8 mM sodium carbonate/1.7mM sodium bicarbonate)
Suppressor: Anion self-regenerating suppressor-1
Sample Loop: 50 uL
Detection: Conductivity - suppressed ion
Data Recording: Dionex AI 450 software

Report: Enclosed with the case narrative are copies of the client paperwork, sample log-in sheets, and log book pages. The data are reported as quantitation reports and chromatograms. Two five point calibration curves were performed ranging from 1.0 ppm to 100 ppm both before and after sample analysis. Reported concentrations are mean values determined from duplicate analyses.

Results: Ammonium sulfate was detected in all samples except the DI BLANK sample at levels within the calibration range. Ammonium sulfate was not detected in the laboratory blank.

The data in this package has been judged to be valid according to the guidelines of Method 300.0 except as noted above. Should you have any questions, please feel free to contact our Project Scientist, Nancy Bragg at (919) 544-8348.

For Triangle Laboratories, Inc.,

Report Preparation:

Amy Wall 11/08/95

Amy Wall
Report Preparation Chemist

Quality Control:

Selena Armistead

Selena Armistead
Report Preparation Chemist

The total number of pages in this data package is _____.

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

34683C

PO#:11989 - 14448-18

Customer Name: Withers and Ravenel
Triangle Brick

Laboratory: TLI

Date Transmitted: 10/24/95

Results Due By: 11/07/95

Sample Matrix: Method 201A

PM: VJT

Analysis: Analyze samples for PM10 Particulate according to EPA Method 201A, and Condensibles according to EPA Method 202.

Sample #	Sample ID	Components/Comments
1	S-M201A/202-1	DI H2O, MeCl2, F1/2 Ace, Noz.Ace, Filter
2	S-M201A/202-2	DI H2O, MeCl2, F1/2 Ace, Noz.Ace, Filter
3	S-M201A/202-3	DI H2O, MeCl2, F1/2 Ace, Noz.Ace, Filter
4	Blanks	DI H2O, MeCl2, Acetone

Submitted By:

SAMPLE TRANSFER RECORD OF CUSTODY

Please include this form with the final (typed) results, and whenever the final results are faxed to Entropy.

The samples referenced in Entropy Environmentalists Inc. RFA or purchase order No. 11989-14448-18 were shipped by Entropy on 10/24/95 (date) via PERSONAL CUSTUDY (mode) to TLI (laboratory) by Sam Deley (signature)

The samples were received for analysis on 10/24/95 (date) at Triangle Labs (laboratory) by John Gunter (signature)

As applicable, note any broken seals, leakage, spillage, or damage to samples. If discrepancy, specify seal No., jar No., sample No., etc.

L-0012 rev. 8-92

ENTROPY

4

Custody Seal : Absent	Sample Seals: Absent	TLI Project Number : 34683	Book
Chain of Custody : Present			
Sample Tags : Present		Client: EEI01 : Entropy, Inc.	108
Sample Tag Numbers: Listed			
SMO Forms : N/A		Date Received : 10/24/95 : By J. Guertin	Page
Box	NO COOLANT	Carrier and Number : SEAM OALEY	89

TLI Number mR/H:CPM	Client ID	Matrix Location	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init
108-89-1A	S-M201A/202-1	FILTER / GRAV LAB								
108-89-1B	S-M201A/202-1	FH/ACE / GRAV LAB								
108-89-1C	S-M201A/202-1	BH/MECL2 / GRAV LAB								
108-89-1D	S-M201A/202-1	NOZ.ACE / GRAV LAB								
108-89-1E	S-M201A/202-1	DI H2O / GRAV LAB								
108-89-2A	S-M201A/202-2	FILTER / GRAV LAB								
108-89-2B	S-M201A/202-2	FH/ACE / GRAV LAB								
108-89-2C	S-M201A/202-2	BH/MECL2 / GRAV LAB								
108-89-2D	S-M201A/202-2	NOZ.ACE / GRAV LAB								
108-89-2E	S-M201A/202-2	DI H2O / GRAV LAB								

Receiving Remarks:

109

Archive Remarks:

Custody Seal : Absent	Sample Seals: Absent	TLI Project Number : 34683	Book
Chain of Custody : Present			
Sample Tags : Present		Client: EEI01 : Entropy, Inc.	108
Sample Tag Numbers: Listed			
SMO Forms : N/A		Date Received : 10/24/95 : By	Page
Box	NO COOLANT	Carrier and Number : SEAN DALEY	89

TLI Number mR/H:CPM	Client ID	Matrix Location	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init
108-89-3A	S-M201A/202-3	FILTER / GRAV LAB								
108-89-3B	S-M201A/202-3	FH/ACE / GRAV LAB								
108-89-3C	S-M201A/202-3	BH/MECL2 / GRAV LAB								
108-89-3D	S-M201A/202-3	NOZ.ACE / GRAV LAB								
108-89-3E	S-M201A/202-3	DI H20 / GRAV LAB								
108-89-4A	BLANK	ACETONE / GRAV LAB								
108-89-4B	BLANK	MECL2 / GRAV LAB								
108-89-4C	BLANK	DI H20 / GRAV LAB								

Receiving Remarks:

110

Archive Remarks:

TRIANGLE LABORATORIES, INC.

Sample Preparation Tracking & Management Form

Project: 34683C

Client: Entropy, Inc. (EEI01)

Sample Information

Method: 300

Extraction Date: 11/6/95

Solvent/Acids(): _____

Lot: _____

Sample #	crd	TLI SAMPLE ID / CLIENT SAMPLE ID	Sample Wgt / Vol g / ml	Final Volume ml	pH						
C 001		TLI Blank #3 DI Water Blank 108-89-4C		285	7						
C 003		108-89-1E S-M201A/202-1		485	2						
C 005		108-89-2E S-M201A/202-2		480	3						
C 007		108-89-3E S-M201A/202-3		480	3						

Comments: Timothy Bellamy

REV 07/26/93 (PSTMP 7)

DIONEX SCHEDULE - C:\DX\SCHEDULE\34683C.SCH

Inj#	Sample Name	Method	Data File	Vol.	Dil.	Int.Std.
1	STD 1.0 PPM	..\7ANION.m	STD001	1	1	1
2	STD 1.0 PPM	..\7ANION.m	STD001	1	1	1
3	STD 3.0 PPM	..\7ANION.m	STD003	1	1	1
4	STD 3.0 PPM	..\7ANION.m	STD003	1	1	1
5	STD 10.0 PPM	..\7ANION.m	STD010	1	1	1
6	STD 10.0 PPM	..\7ANION.m	STD010	1	1	1
7	STD 30.0 PPM	..\7ANION.m	STD030	1	1	1
8	STD 30.0 PPM	..\7ANION.m	STD030	1	1	1
9	STD 100.0 PPM	..\7ANION.m	STD100	1	1	1
10	STD 100.0 PPM	..\7ANION.m	STD100	1	1	1
11	H2O BLANK	..\7ANION.m	H2OBLK	1	1	1
12	H2O BLANK	..\7ANION.m	H2OBLK	1	1	1
13	QC	..\7ANION.m	QC	1	1	1
14	QC	..\7ANION.m	QC	1	1	1
15	DI WATER BLANK	..\7ANION.m	108894C	1	1	1
16	DI WATER BLANK	..\7ANION.m	108894C	1	1	1
17	S-M201A/202-1	..\7ANION.m	108891E	1	1	1
18	S-M201A/202-1	..\7ANION.m	108891E	1	1	1
19	S-M201A/202-2	..\7ANION.m	108892E	1	1	1
20	S-M201A/202-2	..\7ANION.m	108892E	1	1	1
21	S-M201A/202-3	..\7ANION.m	108893E	1	1	1
22	S-M201A/202-3	..\7ANION.m	108893E	1	1	1
23	STD 1.0 PPM	..\7ANION.m	STD001	1	1	1
24	STD 1.0 PPM	..\7ANION.m	STD001	1	1	1
25	STD 3.0 PPM	..\7ANION.m	STD003	1	1	1
26	STD 3.0 PPM	..\7ANION.m	STD003	1	1	1
27	STD 10.0 PPM	..\7ANION.m	STD010	1	1	1
28	STD 10.0 PPM	..\7ANION.m	STD010	1	1	1
29	STD 30.0 PPM	..\7ANION.m	STD030	1	1	1
30	STD 30.0 PPM	..\7ANION.m	STD030	1	1	1
31	STD 100.0 PPM	..\7ANION.m	STD100	1	1	1
32	STD 100.0 PPM	..\7ANION.m	STD100	1	1	1
33	END	..\STANDCL.	..\END	1	1	1

Comment:
11-06-95 PROJECT #34683C ANALYZED ON THIS FOR ((NH4)2 SO4)BY (M-300) SCHEDULE. (STD"S) FOR THIS PROJECT ARE ICS-109-4-5 AND ICS-110-1 THRU-3 QC LOT# K-ION02093 , ANION ELUENT 103095 TIMOTHY BELLAMY. LOOP SIZE (25 uL)

TLI# 34683C-AMMONIUM SULFATE
CLIENT SAMPLES
ENTROPY , INC.
06-NOVEMBER-95

TLI ID	CLIENT ID	RT	AREA	LOG AREA	RUN CONC (ppm)	DILUTION FACTOR	SAMPLE CONC (ppm)	AVG CONC (ppm)	RPD	TOTAL mL	TOTAL ug SO4	TOTAL ug (NH4)2SO4	PH
108-89-4C	D I WATER BLANK	ND ND	ND ND	ND ND	ND ND	1 1	ND ND	ND	ND	285	ND	ND	7
108-89-1E	S-M201A/202-1	9.70 9.70	16556172 16364009	7.22 7.21	3.63 3.59	1 1	3.63 3.59	3.61	1.1	485	1751	2408	2
108-89-2E	S-M201A/202-2	9.69 9.69	16556660 16448330	7.22 7.22	3.63 3.61	1 1	3.63 3.61	3.62	0.6	480	1738	2389	3
108-89-3E	S-M201A/202-3	9.70 9.69	20266747 20217947	7.31 7.31	4.38 4.37	1 1	4.38 4.37	4.38	0.2	480	2102	2890	3

*TOTAL ug (NH4)2SO4 = (f.w. (NH4)2SO4 / m.w. SO4) x [SO4]
ND = NONE DETECTED

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Data Reprocessed On 11/07/1995 08:40:22

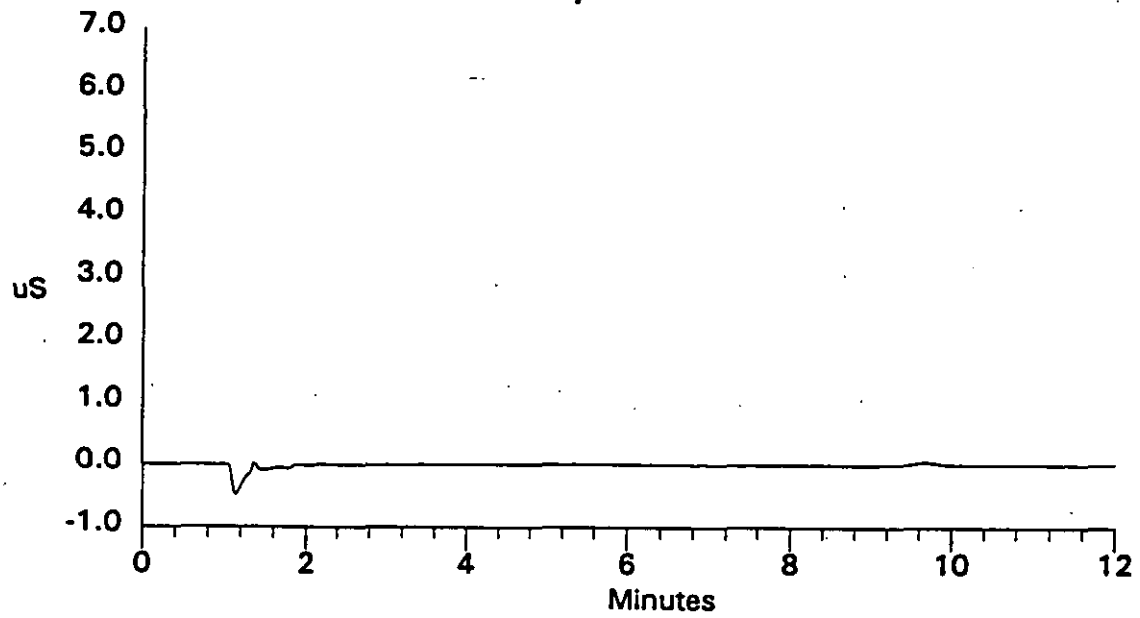
Sample Name: DI WATER BLANK	Date: 11/06/1995 20:45:04
Data File : C:\DX\DATA\34683C\108894C1.D15	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 15	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00		1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
0	0.00	SULFATE	0.000	0	0	0	0.00
		Totals	0.000	0	0		

File: 108894C1.D15 Sample: DI WATER BLANK



Data Reprocessed On 11/07/1995 08:41:06

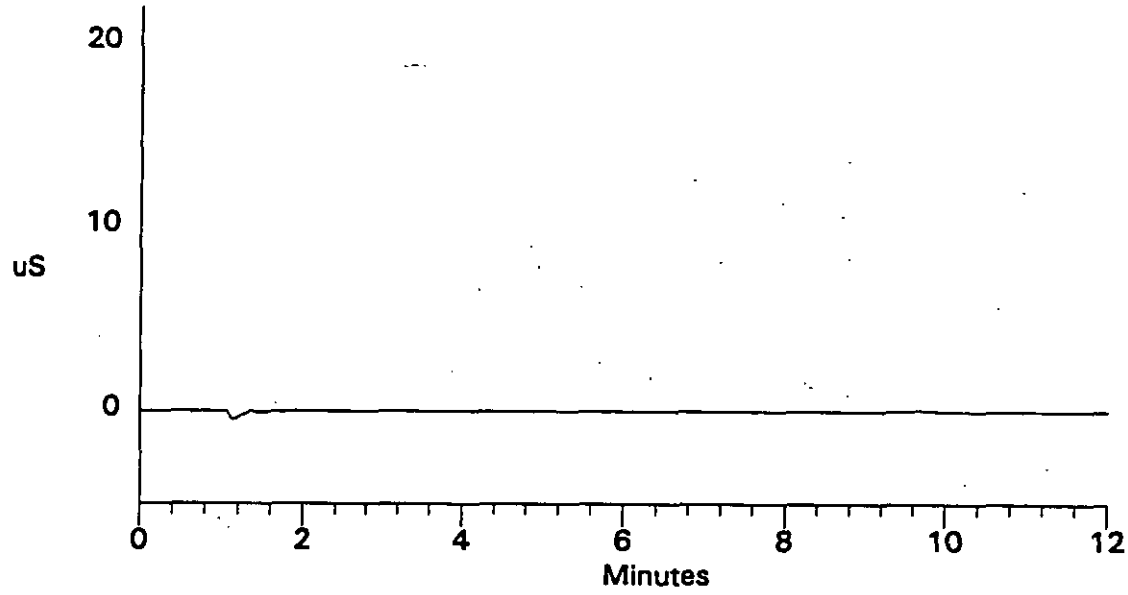
Sample Name: DI WATER BLANK Date: 11/06/1995 20:58:51
Data File : C:\DX\DATA\34683C\108894C1.D16
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 16 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00	1000	

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
0	0.00	SULFATE	0.000	0	0	0	0.00
		Totals	0.000	0	0		

File: 108894C1.D16 Sample: DI WATER BLANK



Data Reprocessed On 11/07/1995 08:21:44

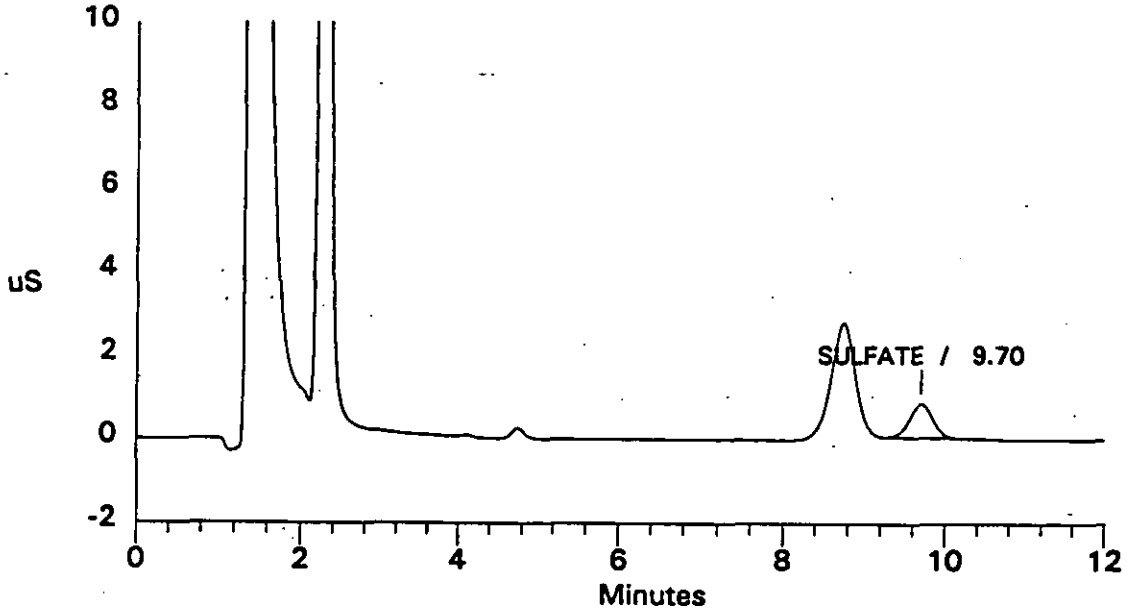
Sample Name: S-M201A/202-1 Date: 11/06/1995 21:12:39
Data File : C:\DX\DATA\34683C\108891E1.D17
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 17 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00	1000	

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.70	SULFATE	0.000	808391	16556172	1	-0.21
		Totals	0.000	808391	16556172		

File: 108891E1.D17 Sample: S-M201A/202-1



Data Reprocessed On 11/07/1995 08:26:41

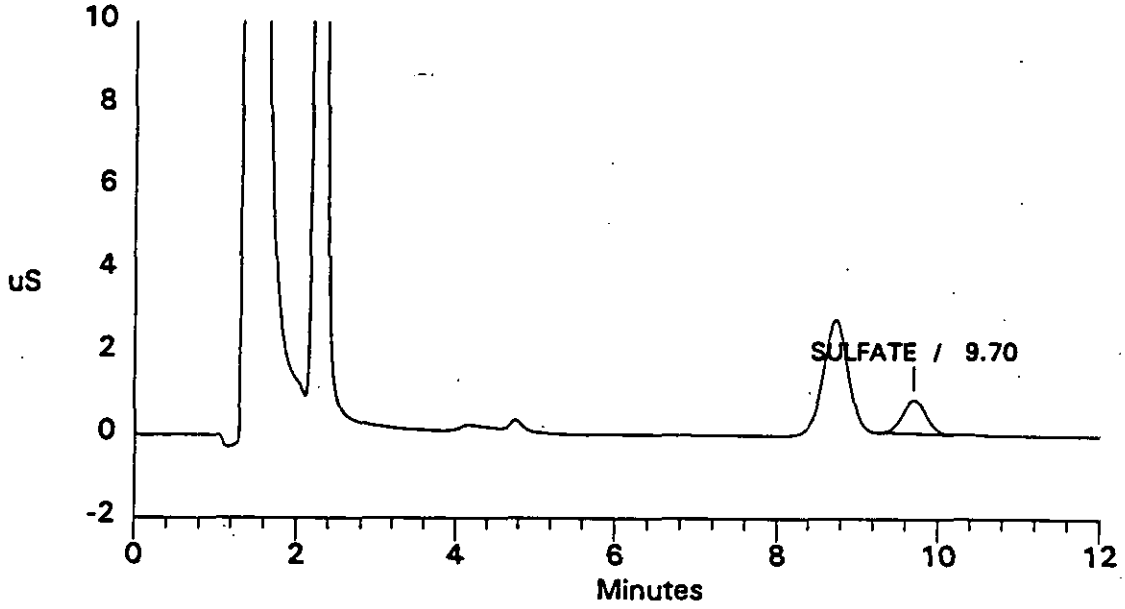
Sample Name: S-M201A/202-1 Date: 11/06/1995 21:26:27
Data File : C:\DX\DATA\34683C\108891E1.D18
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 18 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00		1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.70	SULFATE	0.000	806137	16364009	1	-0.24
		Totals	0.000	806137	16364009		

File: 108891E1.D18 Sample: S-M201A/202-1



Data Reprocessed On 11/07/1995 08:29:54

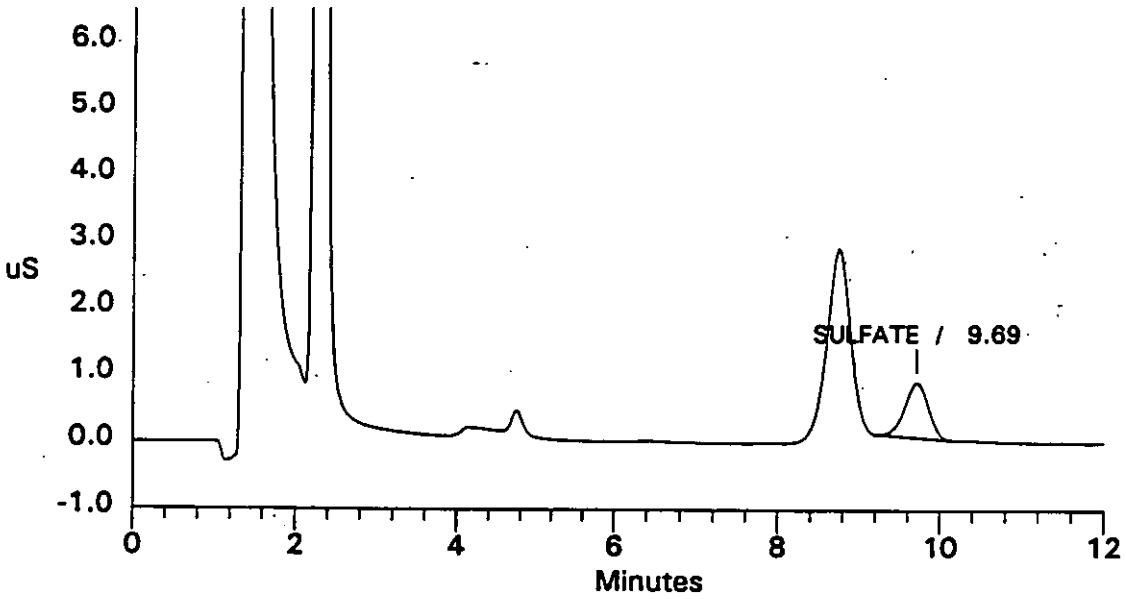
Sample Name: S-M201A/202-2	Date: 11/06/1995 21:40:15
Data File : C:\DX\DATA\34683C\108892E1.D19	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 19	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00	1000	

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.69	SULFATE	0.000	816087	16558660	1	-0.27
		Totals	0.000	816087	16558660		

File: 108892E1.D19 Sample: S-M201A/202-2



Data Reprocessed On 11/07/1995 08:37:29

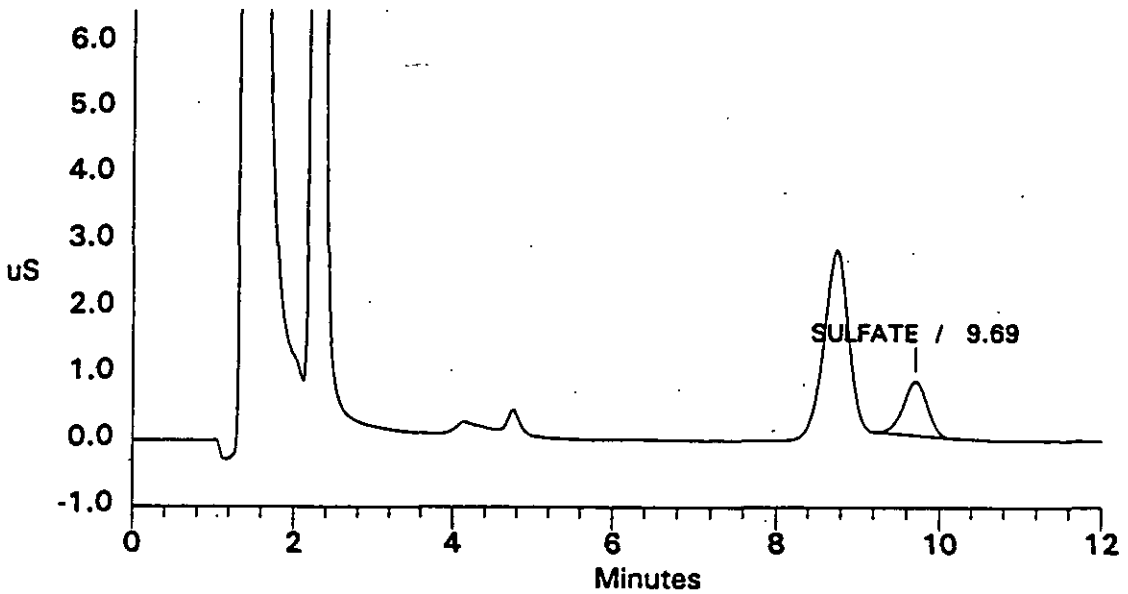
Sample Name: S-M201A/202-2 Date: 11/06/1995 21:54:02
Data File : C:\DX\DATA\34683C\108892E1.D20
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 20 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00		1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.69	SULFATE	0.000	814205	16448330	1	-0.31
		Totals	0.000	814205	16448330		

File: 108892E1.D20 Sample: S-M201A/202-2



Data Reprocessed On 11/07/1995 08:38:46

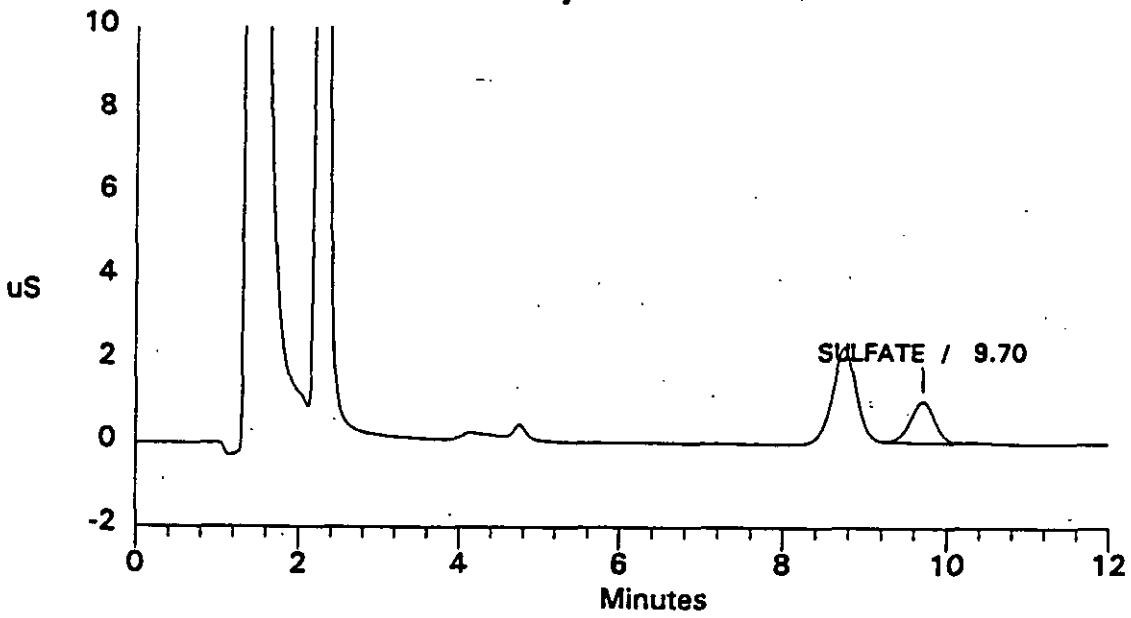
Sample Name: S-M201A/202-3 Date: 11/06/1995 22:07:50
Data File : C:\DX\DATA\34683C\108893E1.D21
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 21 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1	3600	5Hz	0.00	12.00	1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.70	SULFATE	0.000	990220	20266747	1	-0.24
		Totals	0.000	990220	20266747		

File: 108893E1.D21 Sample: S-M201A/202-3



Data Reprocessed On 11/07/1995 08:39:23

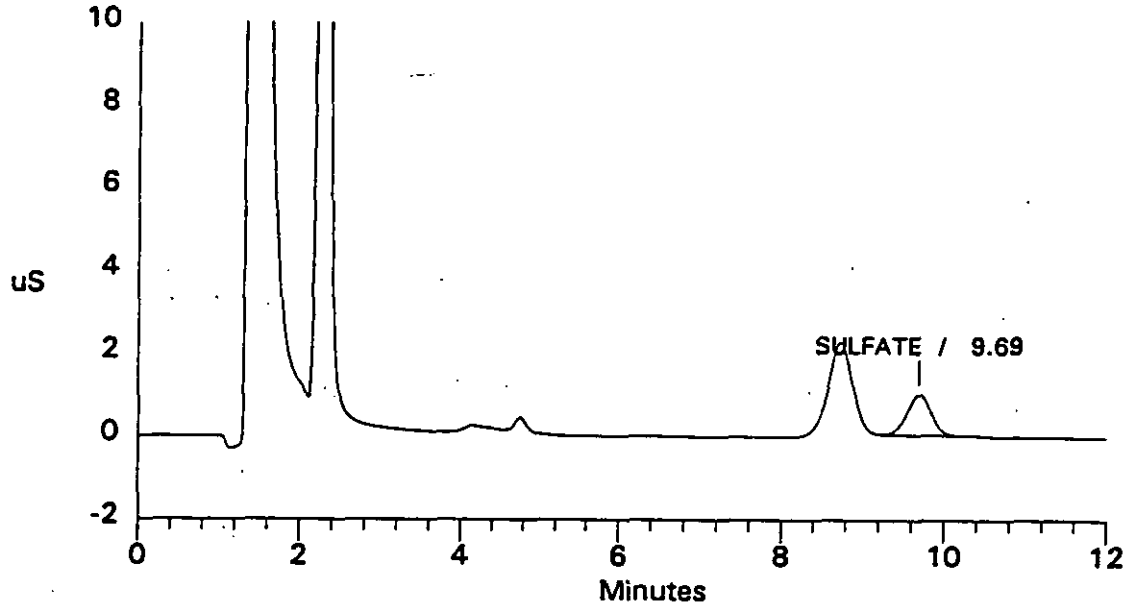
Sample Name: S-M201A/202-3 Date: 11/06/1995 22:21:38
Data File : C:\DX\DATA\34683C\108893E1.D22
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 22 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00		1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.69	SULFATE	0.000	980159	20217947	1	-0.27
		Totals	0.000	980159	20217947		

File: 108893E1.D22 Sample: S-M201A/202-3



TLI# 34683C-AMMONIUM SULFATE
CALIBRATION
06-07-NOVEMBER-95

CONC (ppm)	RT	AREA	LOG CONC	LOG AREA	PREDICTED (ppm)	%DIFF	RESPONSE (CONC/AREA)
100	9.41	600505086	2.000	8.779	103.33	3.2	1.67E-07
30	9.58	155380964	1.477	8.191	29.29	-2.4	1.93E-07
10	9.63	48573136	1.000	7.686	9.91	-1.0	2.06E-07
3	9.65	12931835	0.477	7.112	2.88	-4.0	2.32E-07
1	9.68	4330129	0.000	6.637	1.04	3.6	2.31E-07
100	9.40	603040038	2.000	8.780	103.73	3.8	1.66E-07
30	9.58	156082998	1.477	8.193	29.42	-2.0	1.92E-07
10	9.62	48009322	1.000	7.681	9.80	-2.1	2.08E-07
3	9.64	12736862	0.477	7.105	2.84	-5.5	2.36E-07
1	9.64	4422430	0.000	6.646	1.06	5.7	2.26E-07

Regression Output:

Constant		6.61840
Std Err of Y Est		0.01897
R Squared		0.99950
No. of Observations		10
Degrees of Freedom		6
X Coefficient(s)	1.07243	
Std Err of Coef.	0.00848	

EXTERNAL CALIBRATION CHECK

CONC (ppm)	RT	AREA	LOG AREA	PREDICTED (ppm)	%DIFF
30.0	9.56	149698778	8.175	28.29	-6.0
30.0	9.58	147861657	8.170	27.97	-7.3

BLANKS

TYPE	RT	AREA	AVERAGE AREA
H2O		ND	
H2O		ND	

MATRIX SPIKE

SAMPLE ID	RT	AVG. CONC UNSPIKED (PPM)	AVG. CONC SPIKED (PPM)	% RECOVERY OF SPIKE
93-07-250-05 MS 1PPM				0

% RECOVERY=[(AVG. CONC SPIKED - AVG. CONC UNSPIKED)/(ADDED SPIKE VALUE OF 10PPM)] X 100

Data Reprocessed On 11/07/1995 08:17:38

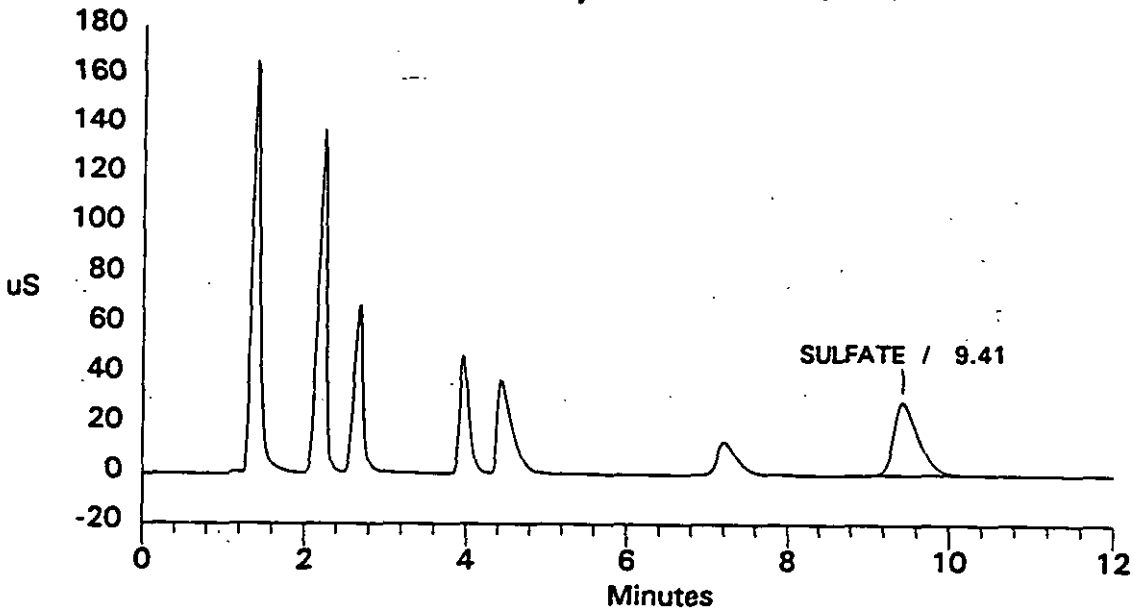
Sample Name: STD 100.0 PPM Date: 11/06/1995 19:36:07
Data File : C:\DX\DATA\34683C\STD10001.D10
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 10 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00		1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.41	SULFATE	0.000	29091848	600505086	1	-3.16
		Totals	0.000	29091848	600505086		

File: STD10001.D10 Sample: STD 100.0 PPM



Data Reprocessed On 11/07/1995 08:15:13

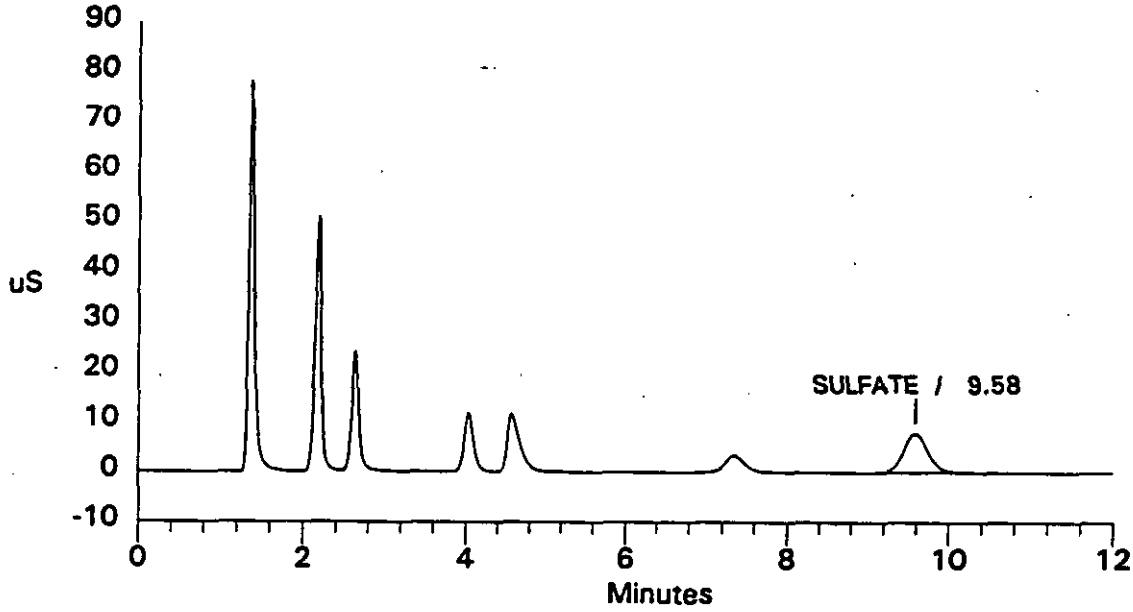
Sample Name: STD 30.0 PPM Date: 11/06/1995 19:08:33
Data File : C:\DX\DATA\34683C\STD03001.D08
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 8 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00		1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.58	SULFATE	0.000	7668245	155380964	1	-1.47
		Totals	0.000	7668245	155380964		

File: STD03001.D08 Sample: STD 30.0 PPM



Data Reprocessed On 11/07/1995 08:13:14

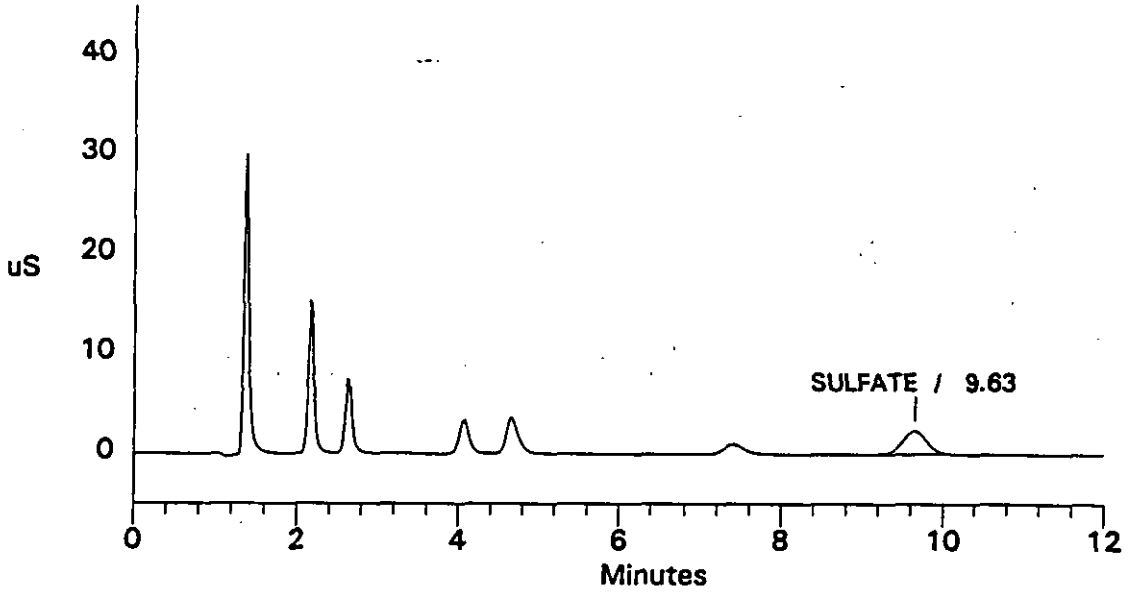
Sample Name: STD 10.0 PPM	Date: 11/06/1995 18:40:59
Data File : C:\DX\DATA\34683C\STD01001.D06	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 6	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00	1000	

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.63	SULFATE	0.000	2345067	48573136	1	-0.93
		Totals	0.000	2345067	48573136		

File: STD01001.D06 Sample: STD 10.0 PPM



Data Reprocessed On 11/07/1995 08:10:23

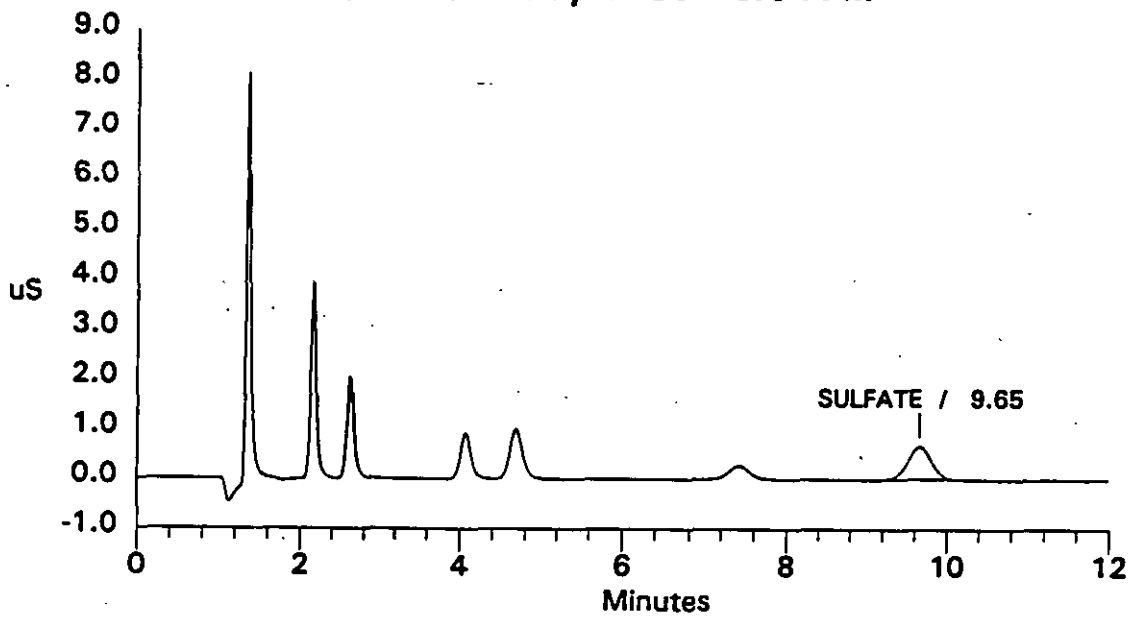
Sample Name: STD 3.0 PPM	Date: 11/06/1995 18:13:25
Data File : C:\DX\DATA\34683C\STD00301.D04	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 4	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00	1000	

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.65	SULFATE	0.000	648082	12931835	1	-0.69
		Totals	0.000	648082	12931835		

File: STD00301.D04 Sample: STD 3.0 PPM



Data Reprocessed On 11/07/1995 08:09:20

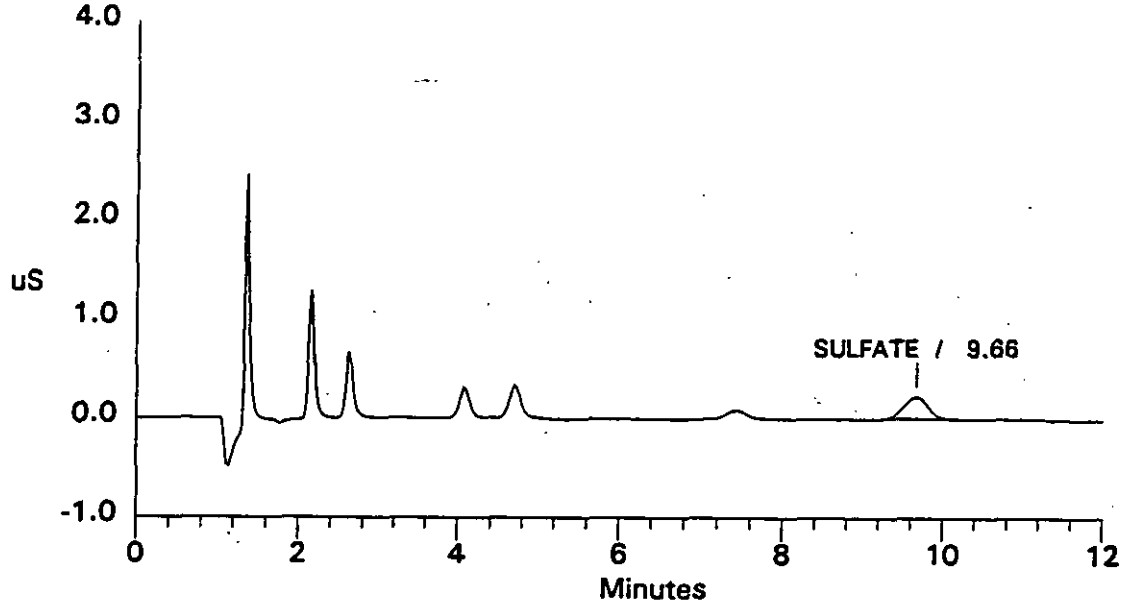
Sample Name: STD 1.0 PPM	Date: 11/06/1995 17:45:51
Data File : C:\DX\DATA\34683C\STD00101.D02	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 2	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1	3600	5Hz	0.00	12.00	1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.66	SULFATE	0.000	217307	4330129	1	-0.58
		Totals	0.000	217307	4330129		

File: STD00101.D02 Sample: STD 1.0 PPM



Data Reprocessed On 11/07/1995 08:18:47

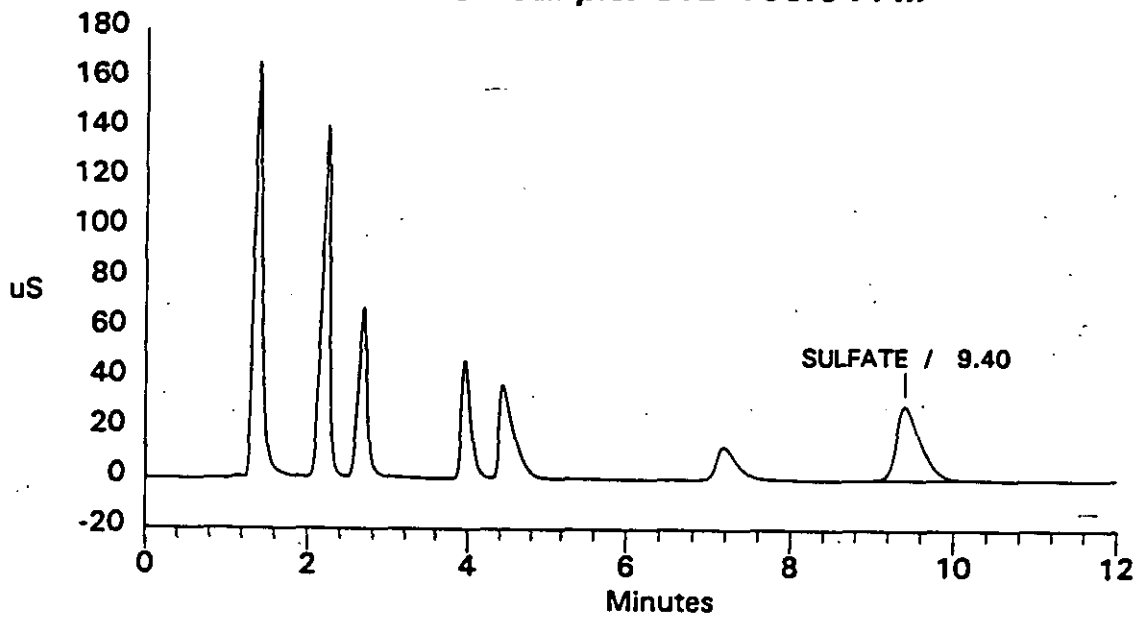
Sample Name: STD 100.0 PPM	Date: 11/07/1995 00:39:31
Data File : C:\DX\DATA\34683C\STD10001.D32	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 32	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1	3600	5Hz	0.00	12.00	1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.40	SULFATE	0.000	29349972	603040038	1	-3.33
		Totals	0.000	29349972	603040038		

File: STD10001.D32 Sample: STD 100.0 PPM



Data Reprocessed On 11/07/1995 08:16:13

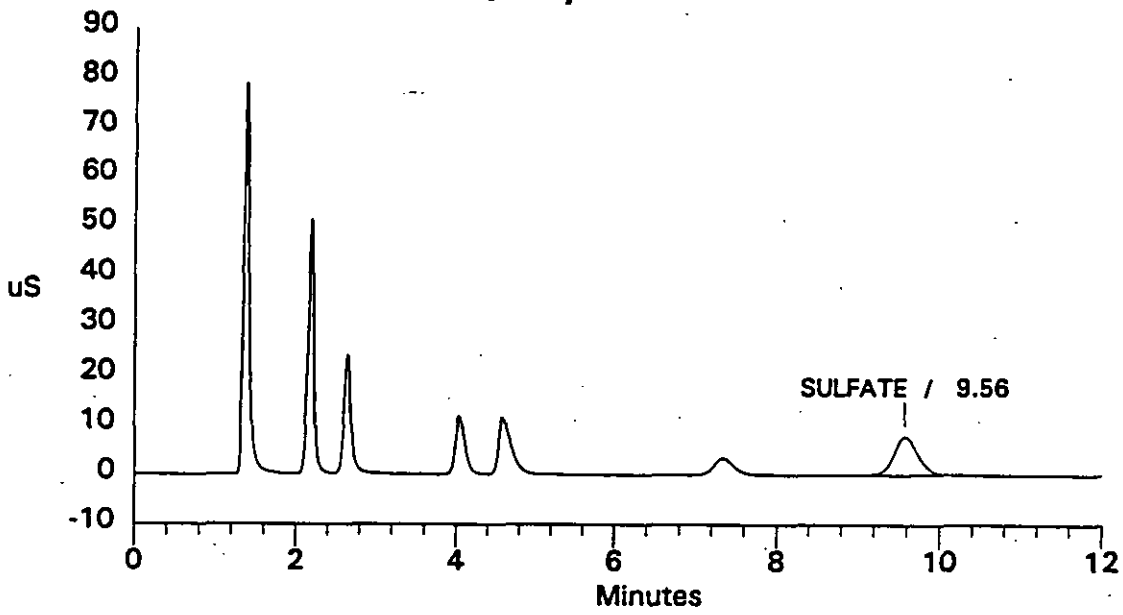
Sample Name: STD 30.0 PPM	Date: 11/07/1995 00:11:57
Data File : C:\DX\DATA\34683C\STD03001.D30	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 30	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00	1000	

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.56	SULFATE	0.000	7770477	156082998	1	-1.61
		Totals	0.000	7770477	156082998		

File: STD03001.D30 Sample: STD 30.0 PPM



Data Reprocessed On 11/07/1995 08:14:22

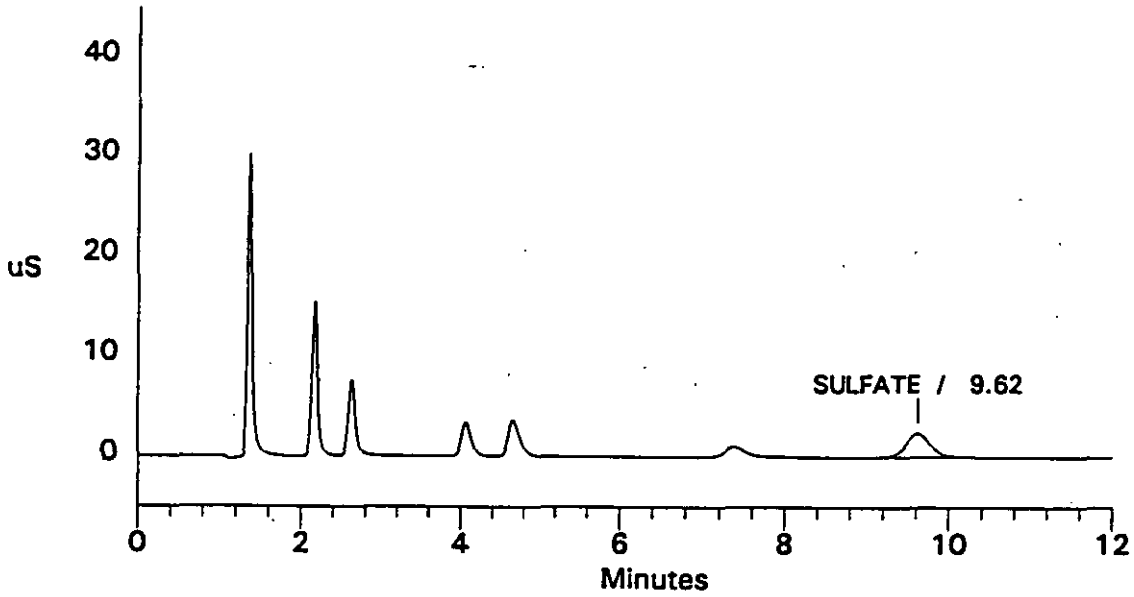
Sample Name: STD 10.0 PPM	Date: 11/06/1995 23:44:23
Data File : C:\DX\DATA\34683C\STD01001.D28	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 28	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00		1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.62	SULFATE	0.000	2355181	48009322	1	-1.03
		Totals	0.000	2355181	48009322		

File: STD01001.D28 Sample: STD 10.0 PPM



Data Reprocessed On 11/07/1995 08:12:00

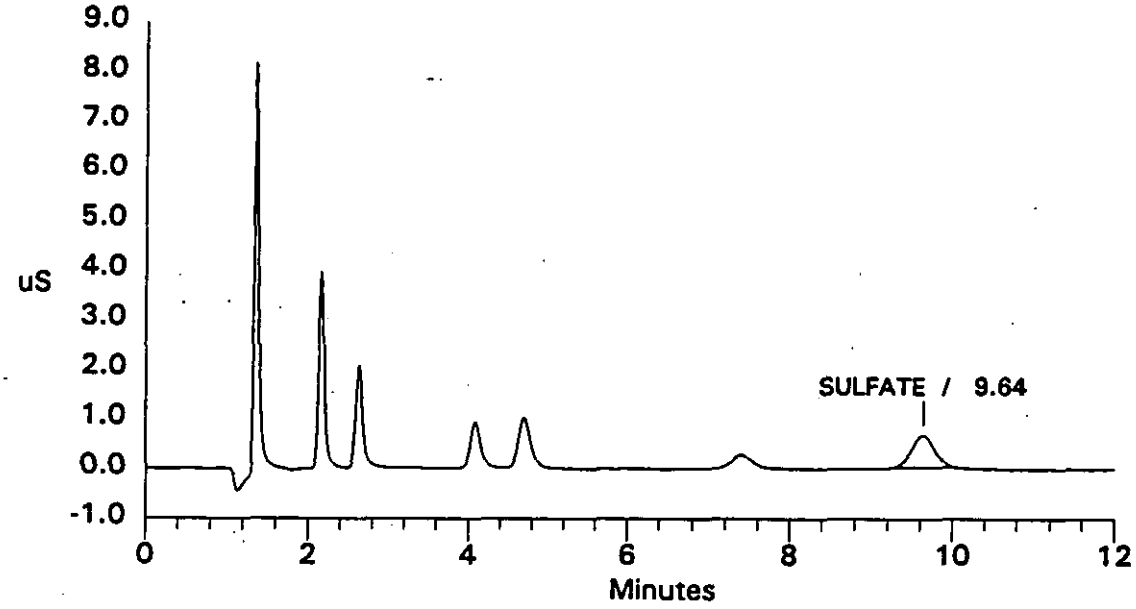
Sample Name: STD 3.0 PPM	Date: 11/06/1995 23:16:47
Data File : C:\DX\DATA\34683C\STD00301.D26	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 26	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00		1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.64	SULFATE	0.000	648249	12736862	1	-0.86
		Totals	0.000	648249	12736862		

File: STD00301.D26 Sample: STD 3.0 PPM



Data Reprocessed On 11/07/1995 08:08:45

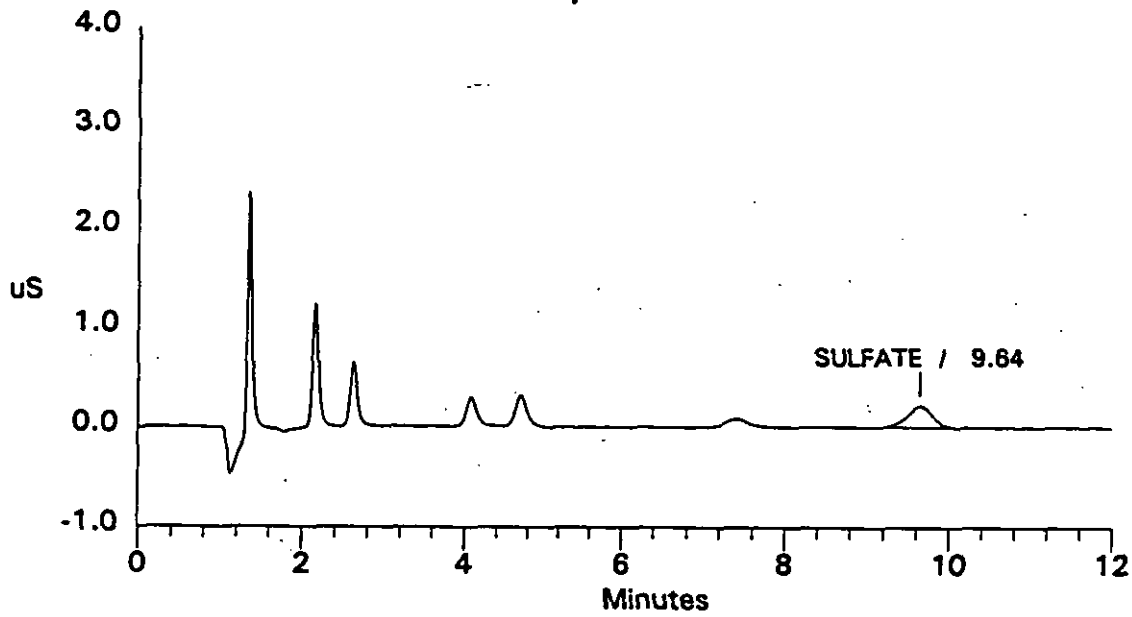
Sample Name: STD 1.0 PPM	Date: 11/06/1995 22:49:11
Data File : C:\DX\DATA\34683C\STD00101.D24	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 24	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00	1000	

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.64	SULFATE	0.000	212067	4422430	1	-0.86
		Totals	0.000	212067	4422430		

File: STD00101.D24 Sample: STD 1.0 PPM



Data Reprocessed On 11/07/1995 08:56:53

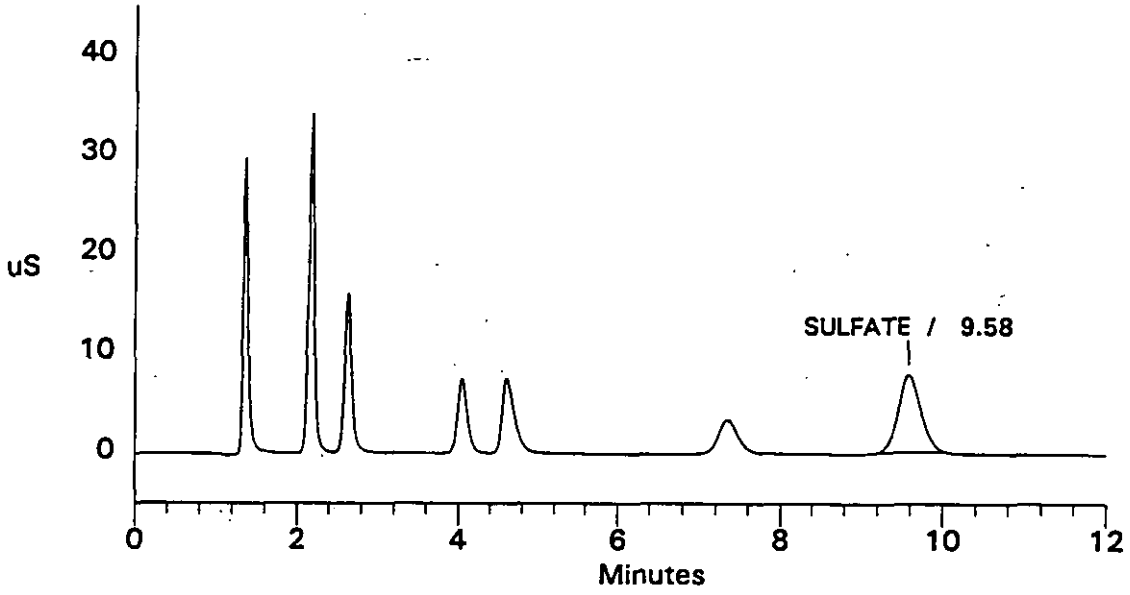
Sample Name: QC	Date: 11/06/1995 20:17:30
Data File : C:\DX\DATA\34683C\QC000001.D13	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 13	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	12.00	1000	

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.58	SULFATE	0.000	7707287	149698778	1	-1.47
		Totals	0.000	7707287	149698778		

File: QC000001.D13 Sample: QC



Data Reprocessed On 11/07/1995 08:58:15

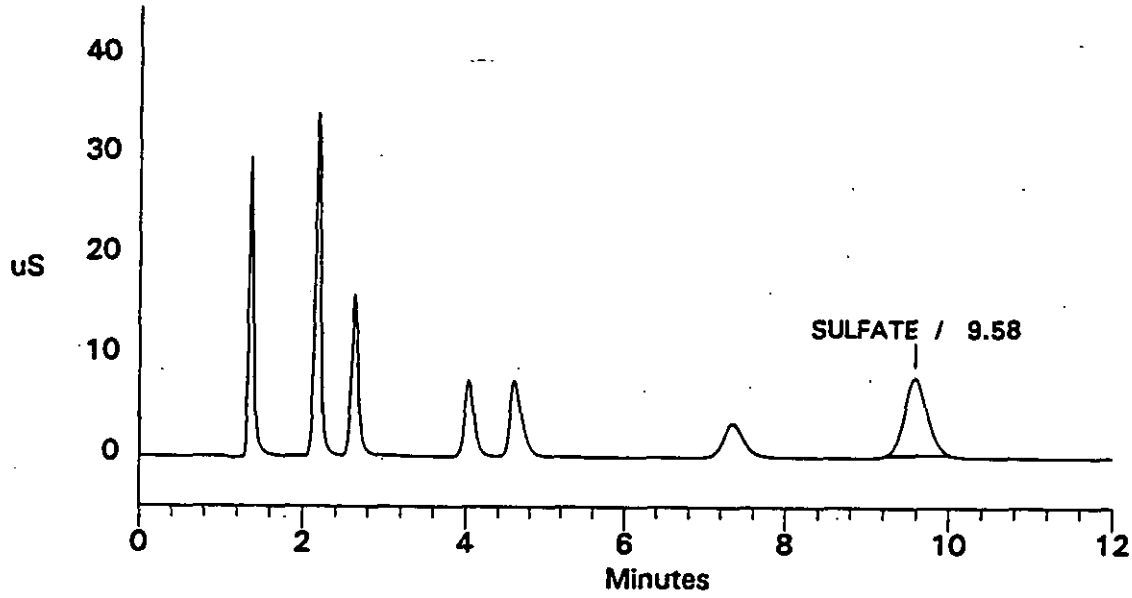
Sample Name: QC	Date: 11/06/1995 20:31:17
Data File : C:\DX\DATA\34683C\QC000001.D14	
Method : C:\DX\METHOD\7ANION.met	
ACI Address: 1 System: 1 Inject#: 14	Detector:PED-Cond.
Analyst : Column:	

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1	3600	5Hz	0.00	12.00	1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
1	9.58	SULFATE	0.000	7671049	147861657	1	-1.47
		Totals	0.000	7671049	147861657		

File: QC000001.D14 Sample: QC



Data Reprocessed On 11/07/1995 08:19:44

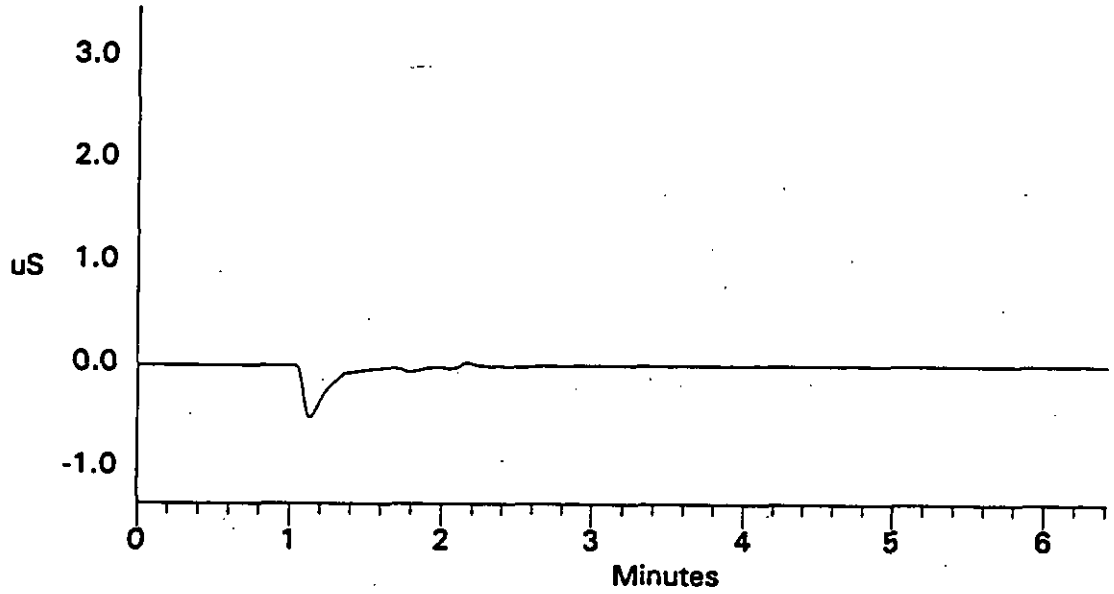
Sample Name: H2O BLANK Date: 11/06/1995 19:49:54
Data File : C:\DX\DATA\34683C\H2OBLK01.D11
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 11 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	1	3600	5Hz	0.00	6.42		1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
0	0.00	SULFATE	0.000	0	0	0	0.00
		Totals	0.000	0	0		

File: H2OBLK01.D11 Sample: H2O BLANK



Data Reprocessed On 11/07/1995 08:20:29

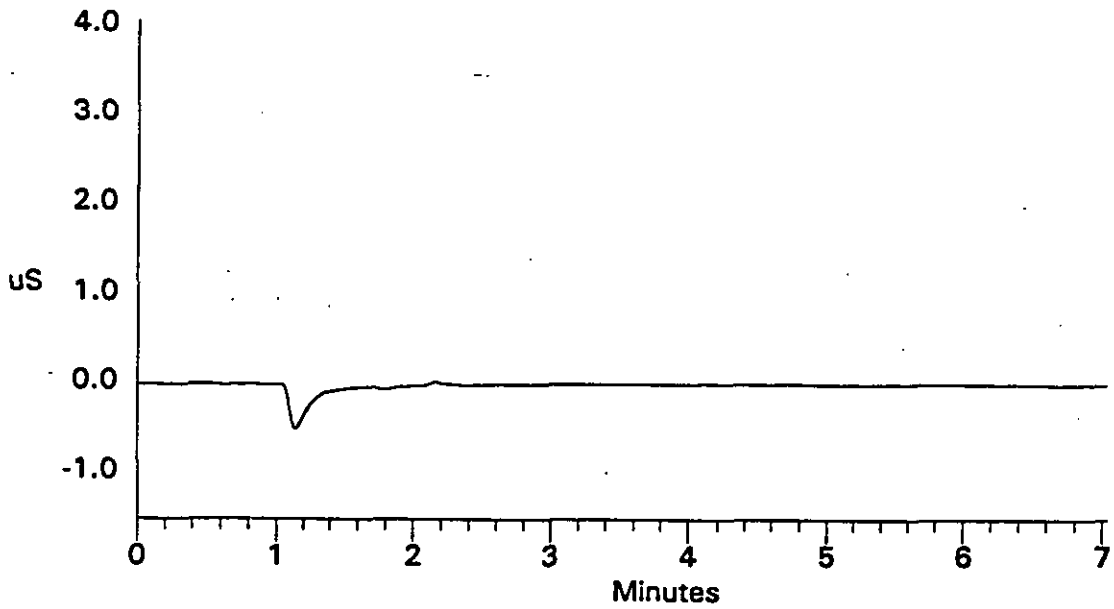
Sample Name: H2O BLANK Date: 11/06/1995 20:03:42
Data File : C:\DX\DATA\34683C\H2OBLK01.D12
Method : C:\DX\METHOD\7ANION.met
ACI Address: 1 System: 1 Inject#: 12 Detector:PED-Cond.
Analyst : Column:

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1	3600	5Hz	0.00	7.04	1000

********** Component Report: All Components **********

Pk. Num	Ret Time	Component Name	Concentration	Height	Area	Bl. Code	%Delta
0	0.00	FLUORIDE	0.000	0	0	0	0.00
0	0.00	CHLORIDE	0.000	0	0	0	0.00
0	0.00	NITRITE	0.000	0	0	0	0.00
0	0.00	BROMIDE	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
0	0.00	SULFATE	0.000	0	0	0	0.00
		Totals	0.000	0	0		

File: H2OBLK01.D12 Sample: H2O BLANK



APPENDIX C. ANALYTICAL DATA

2. Metals

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 10-24-95
DATE REPORTED 11-09-95
95W1638

ENTROPY ENVIRONMENTALIST INC.
P. O. BOX 12291
RESEARCH TRIANGLE PARK, NC 27709-2291

P.O. # 11973-14448-18

ATTENTION: ALAN SENZEL

SAMPLE DESCRIPTION: METHOD 29

1. S-M29-1
2. S-M29-2
3. S-M29-2 DUPLICATE
4. S-M29-3
5. S-M29-3 MATRIX SPIKE % RECOVERY
6. S-M29-FB

RESULTS

	1	2	3	4	5	6
Antimony, as Sb, Total ug	1.26	2.22	2.21	43.4	90.9%	<1.00
Arsenic, as As, Total ug	5.32	6.46	5.95	14.6	104%	2.02
Beryllium, as Be, Total ug	<.100	<.100	<.100	<.100	87.4%	<.100
Cadmium, as Cd, Total ug	.792	1.71	1.66	1.55	102%	<.400
Chromium, as Cr, Total ug	5.88	7.10	7.24	6.82	99.0%	2.18
Cobalt, as Co, Total ug	<1.00	<1.00	<1.00	<1.00	106%	<1.00
Lead, as Pb, Total ug	3.21	3.03	2.83	52.3	82.4%	<1.00
Manganese, as Mn, Total ug	25.2	21.0	19.0	18.4	89.9%	2.56
Nickel, as Ni, Total ug	4.64	5.62	5.74	2.04	90.9%	2.97
Selenium, as Se, Total ug	11.0	10.3	9.99	9.03	106%	<1.00

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 10-24-95
DATE REPORTED 11-09-95
95W1638

ENTROPY ENVIRONMENTALIST INC.
P. O. BOX 12291
RESEARCH TRIANGLE PARK, NC 27709-2291

P.O. # 11973-14448-18

ATTENTION: ALAN SENZEL

SAMPLE DESCRIPTION: METHOD 29

1. S-M29-1
2. S-M29-2
3. S-M29-2 DUPLICATE
4. S-M29-3
5. S-M29-3 MATRIX SPIKE % RECOVERY
6. S-M29-FB

RESULTS

	1	2	3	4	5	6
RESULTS: FOR MERCURY, TOTAL-UG						
Mercury, Front 1/2, T ug	<.470	<.470	X	<.470	100%	<.470
Mercury, Front 1/2, T ug	<.470	<.470	X	<.470	X	<.470
Mercury, Back 1/2, T ug	<1.79	<1.76	X	<1.74	107%	<1.36
Mercury, Back 1/2, T ug	<1.79	<1.76	X	<1.74	X	<1.36
Mercury, HNO3, T ug	<.940	<.940	X	<.940	102%	<.940
Mercury, HNO3, T ug	<.940	<.940	X	<.940	X	<.940
Mercury, KMNO4, T ug	<2.35	<2.35	X	<2.35	102%	<2.35
Mercury, KMNO4, T ug	<2.35	<2.35	X	<2.35	X	<2.35
Mercury, HCL, T ug	<2.35	<2.35	X	<2.35	101%	<2.35
Mercury, HCL, T ug	<2.35	<2.35	X	<2.35	X	<2.35

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 10-24-95
DATE REPORTED 11-09-95
95W1638

ENTROPY ENVIRONMENTALIST INC.
P. O. BOX 12291
RESEARCH TRIANGLE PARK, NC 27709-2291

P.O. # 11973-14448-18

ATTENTION: ALAN SENZEL

SAMPLE DESCRIPTION: METHOD 29

7. REAGENT BLANKS
8. METHOD CODE - SW846

RESULTS

	7	8
Antimony, as Sb, Total ug	1.45	7041
Arsenic, as As, Total ug	3.49	7060
Beryllium, as Be, Total ug	<.100	7091
Cadmium, as Cd, Total ug	<.400	7131
Chromium, as Cr, Total ug	1.73	7191
Cobalt, as Co, Total ug	<1.00	7201
Lead, as Pb, Total ug	<1.00	7421
Manganese, as Mn, Total ug	1.27	7461
Nickel, as Ni, Total ug	1.06	GF
Selenium, as Se, Total ug	<1.00	7740

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ENTROPY ENVIRONMENTALIST INC.
P. O. BOX 12291
RESEARCH TRIANGLE PARK, NC 27709-2291

P.O. # 11973-14448-18

ATTENTION: ALAN SENZEL

SAMPLE DESCRIPTION: METHOD 29

7. REAGENT BLANKS
8. METHOD CODE - SW846

RESULTS

RESULTS: FOR MERCURY, TOTAL UG	7	8
Mercury, Front 1/2, T ug	<.470	7470
Mercury, Front 1/2, T ug	<.470	7470
Mercury, Back 1/2, T ug	<1.41	7470
Mercury, Back 1/2, T ug	<1.41	7470
Mercury, HNO3, T ug	X	7470
Mercury, HNO3, T ug	X	7470
Mercury, KMNO4, T ug	<2.35	7470
Mercury, KMNO4, T ug	<2.35	7470
Mercury, HCL, T ug	<2.35	7470
Mercury, HCL, T ug	<2.35	7470

Roger C. Oxford

ROGER C. OXFORD, CHEMIST

SAMPLE TRANSFER RECORD OF CUSTODY

Please include this form with the final (typed) results, and whenever the final results are faxed to Entropy.

The samples referenced in Entropy Environmentalists Inc. RFA or purchase order No. 11973-1448-18 were shipped by Entropy on 10/23/95 (date) via Pony Express (mode) to Oxford Labs (laboratory) by [signature] (signature)

The samples were received for analysis on 10-24-95 (date) at OLI (laboratory) by M. Congleton (signature)

As applicable, note any broken seals, leakage, spillage, or damage to samples. If discrepancy, specify seal No., jar No., sample No., etc.

L-0012 rev. 8-92

ENTROPY

(3)

OXFORD LABORATORY INC.

SAMPLE NARRATIVE SUMMARY OLI #: 95W1638
REPORT DATE: 11-02-95

CLIENT: ENTROPY
PROJECT #: 11973-14448-18
SAMPLE ARRIVAL DATE: 10-24-95 CHAIN OF CUSTODY: YES
SAMPLE ARRIVAL CONDITION/COMMENT: SHIPPED via PONY EXPRESS, NO PROBLEMS NOTED.
OBSERVED DISCREPANCY/COMMENT: ALL VOLUMES MARKED; UNABLE TO READ THE VOLUME MARKED ON THE KMnO4 DUE TO SOME SAMPLE LEAKAGE
REQUESTED METHOD OF ANALYSIS: METHOD 29

SAMPLE PREPARATION PER: METHOD 29 (Front Half & Back Half Combined)
SAMPLE ANALYSIS PER: SW-846-7000 series

INSTRUMENTATION USED:
PE 3030 FAA.....NO
PE 5100 FAA.....YES (CVAA Hg)
PE ZEEMAN 5100 GFAA.....YES (All Others)
PE ICP-MS ELAN 5000.....NO

QC REQUIREMENTS: SPIKE RECOVERY OF 90-110 PERCENT HAS BEEN MET WITH THE FOLLOWING EXCEPTION; #5 Be @ 87.4%, #5 Mn @ 89.9%, #5 Pb @ 82.4%
FOR DUPLICATES: RELATIVE PERCENT DIFFERENCE OF + OR - 10 PERCENT WAS MET
SAMPLE NOTE: #6(FB) As @ 2.02ug, #7(Blks) As @ 3.49ug, #7(Blks) Sb @ 1.45ug, #6(FB) Ni @ 2.97ug, #7(Blks) Ni @ 1.06ug, #6(FB) Mn @ 2.56ug, #7(Blks) Mn @ 1.27ug, #6(FB) Cr @ 2.18ug, #7(Blks) Cr @ 1.73ug
LABORATORY CONTROL BLANK: ALL LESS THAN

LABORATORY CONTROL SPIKE: 90-110 PERCENT HAS BEEN MET WITH THE FOLLOWING EXCEPTION; Sb @ 116%
DETECTION LIMIT: ALL HAVE BEEN MET WITH THE FOLLOWING EXCEPTION; As @ 5.6ug/ml (112%) As was also analyzed at 4.83ug/ml
CALIBRATION VERIFICATION: OUTSIDE QC WAS MET (90% TO 110%)

CALIBRATION COEFFICIENT: ALL ELEMENTS AT LEAST .996

THIS DATA PACKAGE CONTAINS 16 SUMMARY PAGES TO INCLUDE THE NARRATIVE SUMMARY; ALL PERTINENT DATA ON FILE AT OLI.

FRONT HALF & BACK HALF COMBINED FINAL VOLUMES ARE 100ml * 2

Hg VOLUMES:		BEGINNING VOLUME	FINAL VOLUME
BH	#1	380ml	380ml
BH	#2 & #3	375ml	375ml
BH	#4 & #5	370ml	370ml
BH	#6	290ml	290ml
BH	#7	300ml	300ml
FH	#1	79ml	100ml
FH	#2 & #3	98ml	100ml
FH	#4 & #5	110ml	100ml
FH	#6	75ml	100ml
FH	#7	100ml	100ml
HNO3	#1	65ml	200ml
HNO3	#2 & #3	65ml	200ml
HNO3	#4 & #5	65ml	200ml
HNO3	#6	50ml	200ml
HNO3	#7	-----	-----
KMnO4	#1	360ml	500ml
KMnO4	#2 & #3	350ml	500ml
KMnO4	#4 & #5	375ml	500ml
KMnO4	#6	290ml	500ml
KMnO4	#7	200ml	500ml
HCl	#1	225ml	500ml
HCl	#2 & #3	220ml	500ml
HCl	#4 & #5	220ml	500ml
HCl	#6	230ml	500ml
HCl	#7	225ml	500ml

CALCULATION FOR TOTAL uG REPORTED:

GFAA uG/L * DILUTION FACTOR * FINAL VOLUME / 1000 = TOTAL uG

Hg uG * DILUTION FACTOR * FINAL VOLUME / ALIQUOT USED = TOTAL uG

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A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-14448-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 10/30/95

	x	
WT. STDS		
CONC STDS		
INST LIMIT	5.000	ug/L
SPK LEVEL	6.25	ug/L
MAX ALIQUOT	1.00	
METHOD DET.	1	TOTAL ug

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	Sb	.0267456	6.3	1	200	1.26		
1638-002	Sb	.0465523	11.09	1	200	2.22		
1638-003-#2dup	Sb	.0463784	11.05	1	200	2.21		
1638-004	Sb	.0455156	10.84	1	4000	43.4		
1638-005-#4spk	Sb	.0675929	16.52	1	4000	66.1	90.9	6.25
1638-006	Sb	.0177401	4.16	1	200 <		1.00	
1638-007	Sb	.0306414	7.23	1	200	1.45		
OLI 0ug	Sb	.0076545	1.79	1	100 <		.500	
OLI 5ug spk	Sb	.0499699	11.94	1	500	5.97	116	10

						ug/ml		
Blank	Sb	-.000087	-.02	1	1 <		.005	
D.L.=.005ug/ml	Sb	.0227996	5.36	1	1	.0054		
Known=.010ug/ml	Sb	.0430009	10.22	1	1	.0102		
QC=12.5ug/L	Sb	.0495118	11.83	1	1	.0118		
QC=12.5ug/L	Sb	.0540864	12.98	1	1	.0130		
QC=12.5ug/L	Sb	.0492777	11.77	1	1	.0118		
Std Blank	Sb	.0015349						
Std 1=5.00ug/L	Sb	.0219335						
Std 2=10.0ug/L	Sb	.0401485	9.15					
Std 3=15.0ug/L	Sb	.0607176	16.89					
Std 4=20.0ug/L	Sb	.0803404	21.13					
Std 5=25.0ug/L	Sb	.0956695	24.75					

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A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-14448-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 10/27/95

	x	
WT. STDS		
CONC STDS	5.000	INST LIMIT ug/L
	8.33	SPK LEVEL ug/L
	1.00	MAX ALIQUOT
	1	METHOD DET. TOTAL ug

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	As	.0761336	13.3	1	400	5.32		
1638-002	As	.0621823	10.76	1	600	6.46		
1638-003-#2dup	As	.0574772	9.92	1	600	5.95		
1638-006	As	.0393894	6.72	1	300	2.02		
1638-007	As	.0669509	11.63	1	300	3.49		
						ug/ml		
Blank	As	.0046549	.78	1	1 <		.005	
D.L.=.005ug/ml	As	.0285246	4.83	1	1	.0048		
Known=.010ug/ml	As	.0553705	9.54	1	1	.0095		
QC=12.5ug/L	As	.0683587	11.88	1	1	.0119		
QC=12.5ug/L	As	.065416	11.35	1	1	.0114		
QC=12.5ug/L	As	.0704053	12.25	1	1	.0123		
Std Blank	As	.001789	.31					
Std 1=5.00ug/L	As	.0298856	5.12					
Std 2=10.0ug/L	As	.0581026	9.72					
Std 3=15.0ug/L	As	.0822398	14.51					
Std 4=20.0ug/L	As	.1125602	39.45					
Std 5=25.0ug/L	As	.1388108	25.79					
						TOTAL ug		
1638-004	As	.0786918	14.55	1	1000	14.6		
1638-005-#4spk	As	.1256721	23.21	1	1000	23.2	104	8.33
OLI 0ug	As	.0151518	2.81	1	100 <		.500	
OLI 5ug spk	As	.0535447	9.91	1	500	4.96	93.5	10
						ug/ml		
Blank	As	.0009163	.17	1	1 <		.005	
D.L.=.005ug/ml	As	.0302033	5.6	1	1	.0056		
QC=12.5ug/L	As	.0675428	12.5	1	1	.0125		
QC=12.5ug/L	As	.0718465	13.29	1	1	.0133		
Std Blank	As	-.001883	-.23					
Std 1=5.00ug/L	As	.0266486	3.65					
Std 2=10.0ug/L	As	.0548689	10.29					
Std 3=15.0ug/L	As	.0814606	14.46					
Std 4=20.0ug/L	As	.1074471	19.49					
Std 5=25.0ug/L	As	.135333	24.96					

A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-14448-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 10/30/95

x	WT. STDS CONC STDS	
.500	INST LIMIT	ug/L
1.67	SPK LEVEL	ug/L
1.00	MAX ALIQUOT	
.1	METHOD DET.	TOTAL ug

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	Be	.0047452	.08	1	200	<	.100	
1638-002	Be	.0056079	.1	1	200	<	.100	
1638-003-#2dup	Be	.0052067	.09	1	200	<	.100	
1638-004	Be	.0041633	.07	1	200	<	.100	
1638-005-#4spk	Be	.086373	1.53	1	200	.306	87.4	1.67
1638-006	Be	.0021502	.04	1	200	<	.100	
1638-007	Be	.0005819	.01	1	200	<	.100	
OLI 0ug	Be	.0002241	0	1	100	<	.050	
OLI 5ug spk	Be	.055725	.97	1	5000	4.85	97.0	1

						ug/ml
D.L.=.0005ug/ml	Be	.0274411	.47	1	1	.00047
Known=.010ug/ml	Be	.0902187	1.61	1	6	.00966
QC=2.50ug/L	Be	.1353096	2.47	1	1	.00247
QC=2.50ug/L	Be	.1357209	2.47	1	1	.00247
QC=2.50ug/L	Be	.1383259	2.53	1	1	.00253
QC=2.50ug/L	Be	.1356306	2.47	1	1	.00247
Std Blank	Be	.0034778				
Std 1=1.00ug/L	Be	.0587948				
Std 2=2.00ug/L	Be	.1084905	1.85			
Std 3=3.00ug/L	Be	.1591191	3.21			
Std 4=4.00ug/L	Be	.2077849	4.19			
Std 5=5.00ug/L	Be	.2630584	5.18			

A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-14448-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 11/01/95

x	WT. STDS CONC STDS
2.000	INST LIMIT ug/L
3.33	SPK LEVEL ug/L
1.00	MAX ALIQUOT
.4	METHOD DET. TOTAL ug

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	Cd	.3689539	3.96	1	200	.792		
1638-002	Cd	.3886034	4.28	1	400	1.71		
1638-003-#2dup	Cd	.3808988	4.15	1	400	1.66		
1638-004	Cd	.3629881	3.87	1	400	1.55		
1638-005-#4spk	Cd	.5323133	7.28	1	400	2.91	102	3.33
1638-006	Cd	.03647	.29	1	200 <		.400	
1638-007	Cd	.0130752	.1	1	200 <		.400	
OLI 0ug	Cd	.002819	.02	1	100 <		.200	
OLI 5ug spk	Cd	.4162151	4.75	1	1000	4.75	95.0	5

						ug/ml
D.L.=.002ug/ml	Cd	.2113162	1.92	1	1	.0019
Known=.010ug/ml	Cd	.6221708	10.24	1	1	.0102
QC=5.00ug/L	Cd	.4172183	4.77	1	1	.0048
QC=5.00ug/L	Cd	.4293438	4.99	1	1	.0050
QC=5.00ug/L	Cd	.4190776	4.8	1	1	.0048

Std Blank	Cd	.0005819	0
Std 1=2.00ug/L	Cd	.2178337	2.11
Std 2=4.00ug/L	Cd	.3767421	3.46
Std 3=6.00ug/L	Cd	.4721541	5.53
Std 4=8.00ug/L	Cd	.5543672	9.88
Std 5=10.0ug/L	Cd	.6222377	11.24

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A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-14448-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 10/31/95

	x	
WT. STDS		
CONC STDS		
INST LIMIT	5.000	ug/L
SPK LEVEL	6.25	ug/L
MAX ALIQUOT	1.00	
METHOD DET.	1	TOTAL ug

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	Cr	.3325641	14.69	1	400	5.88		
1638-002	Cr	.2749799	11.83	1	600	7.10		
1638-003-#2dup	Cr	.2797585	12.06	1	600	7.24		
1638-006	Cr	.2556513	10.9	1	200	2.18		
1638-007	Cr	.2079186	8.67	1	200	1.73		
OLI 0ug	Cr	.0259129	.99	1	100 <		.500	
OLI 5ug spk	Cr	.2498595	10.63	1	500	5.32	104	10
						ug/ml		
D.L.=.005ug/ml	Cr	.1138744	4.55	1	1	.0046		
Known=.010ug/ml	Cr	.2221374	9.33	1	1	.0093		
QC=12.5ug/L	Cr	.280638	12.1	1	1	.0121		
QC=12.5ug/L	Cr	.2941378	12.76	1	1	.0128		
Std Blank	Cr	-.018549	-.81					
Std 1=5.00ug/L	Cr	.1247826	5.55					
Std 2=10.0ug/L	Cr	.2390716	9.58					
Std 3=15.0ug/L	Cr	.3333934	14.47					
Std 4=20.0ug/L	Cr	.4298554	24.03					
Std 5=25.0ug/L	Cr	.5261469	26.81					
						TOTAL ug		
1638-004	Cr	.27397	11.37	1	600	6.82		
1638-005-#4spk	Cr	.3984449	17.56	1	600	10.5	99.0	6.25
D.L.=.005ug/ml	Cr	.1202949	4.65	1	1	.0047		
Known=.010ug/ml	Cr	.2465288	10.1	1	1	.0101		
QC=12.5ug/L	Cr	.2843164	11.85	1	1	.0119		
QC=12.5ug/L	Cr	.3098213	13.07	1	1	.0131		
Std Blank	Cr	.0011202	.04					
Std 1=5.00ug/L	Cr	.1260968	4.83					
Std 2=10.0ug/L	Cr	.2564405	10.17					
Std 3=15.0ug/L	Cr	.3327982	12.85					
Std 4=20.0ug/L	Cr	.450555	21.07					
Std 5=25.0ug/L	Cr	.5280831	24.75					

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A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-14448-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 10/30/95

	x	
WT. STDS		
CONC STDS		
INST LIMIT	5.000	ug/L
SPK LEVEL	8.33	ug/L
MAX ALIQUOT	1.00	
METHOD DET. TOTAL ug	1	

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	Co	.0106608	1.13	1	200 <		1.00	
1638-002	Co	.0089453	.94	1	200 <		1.00	
1638-003-#2dup	Co	.0103631	1.1	1	200 <		1.00	
1638-004	Co	.0055009	.58	1	200 <		1.00	
1638-005-#4spk	Co	.0876404	9.42	1	200	1.88	106	8.33
1638-006	Co	.0028157	.3	1	200 <		1.00	
1638-007	Co	.0012005	.13	1	200 <		1.00	
OLI 0ug	Co	.0013844	.15	1	100 <		.500	
OLI 5ug spk	Co	.1000134	10.78	1	500	5.39	108	10

						ug/ml
D.L.=.005ug/ml	Co	.0461777	4.92	1	1	.0049
Known=.010ug/ml	Co	.0921147	9.91	1	1	.0099
QC=12.5ug/L	Co	.1227361	13.29	1	1	.0133
QC=12.5ug/L	Co	.1098214	11.86	1	1	.0119

Std Blank	Co	.0021402	.21
Std 1=5.00ug/L	Co	.0467563	4.6
Std 2=10.0ug/L	Co	.093566	10.01
Std 3=15.0ug/L	Co	.1360553	14.53
Std 4=20.0ug/L	Co	.1867342	20.83
Std 5=25.0ug/L	Co	.2225889	—

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A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-14448-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 11/01/95

	x	WT. STDS CONC STDS	
	5.000	INST LIMIT	ug/L
	13.33	SPK LEVEL	ug/L
	1.00	MAX ALIQUOT	
	1	METHOD DET.	TOTAL ug

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	Pb	.045101	8.02	1	400	3.21		
1638-002	Pb	.0824103	15.14	1	200	3.03		
1638-003-#2dup	Pb	.0775214	14.17	1	200	2.83		
1638-004	Pb	.0582631	10.46	1	5000	52.3		
1638-005-#4spk	Pb	.1123796	21.45	1	5000	107	82.4	13.33
1638-006	Pb	.011343	1.98	1	200 <		1.00	
1638-007	Pb	.0153056	2.67	1	200 <		1.00	
OLI 0ug	Pb	.0021001	.36	1	100 <		.500	
OLI 5ug spk	Pb	.0552267	9.9	1	500	4.95	98.3	10

						ug/ml
D.L.=.005ug/ml	Pb	.0275448	4.84	1	1	.0048
Known=.010ug/ml	Pb	.0549826	9.85	1	1	.0099
QC=12.5ug/L	Pb	.0746154	13.6	1	1	.0136
QC=12.5ug/L	Pb	.0684223	12.4	1	1	.0124
QC=12.5ug/L	Pb	.0667636	12.08	1	1	.0121
QC=12.5ug/L	Pb	.0711209	12.92	1	1	.0129
QC=12.5ug/L	Pb	.0677936	12.28	1	1	.0123

Std Blank	Pb	.0016386	.26
Std 1=5.00ug/L	Pb	.0288891	4.8
Std 2=10.0ug/L	Pb	.0542335	9.39
Std 3=15.0ug/L	Pb	.0821161	16.31
Std 4=20.0ug/L	Pb	.1055778	20.04
Std 5=25.0ug/L	Pb	.1287051	—

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A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-14448-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 10/31/95

	x	WT. STDS CONC STDS	
	5.000	INST LIMIT	ug/L
	6.25	SPK LEVEL	ug/L
	1.00	MAX ALIQUOT	
	1	METHOD DET. TOTAL ug	

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	Mn	.2569957	12.6	1	2000	25.2		
1638-002	Mn	.225448	10.51	1	2000	21.0		
1638-003-#2dup	Mn	.2089386	9.52	1	2000	19.0		
1638-004	Mn	.2033941	9.21	1	2000	18.4		
1638-005-#4spk	Mn	.2858914	14.83	1	2000	29.7	89.9	6.25
1638-006	Mn	.2596909	12.79	1	200	2.56		
1638-007	Mn	.1492509	6.37	1	200	1.27		
OLI 0ug	Mn	.0165061	.64	1	100	<	.500	
OLI 5ug spk	Mn	.231688	10.9	1	500	5.45	108	10

						ug/ml
D.L.=.005ug/ml	Mn	.1261269	5.28	1	1	.0053
Known=.010ug/ml	Mn	.214493	9.85	1	1	.0099
QC=12.5ug/L	Mn	.2708801	13.62	1	1	.0136
QC=12.5ug/L	Mn	.2516552	12.22	1	1	.0122
QC=12.5ug/L	Mn	.2612693	12.9	1	1	.0129
QC=12.5ug/L	Mn	.2687834	13.46	1	1	.0135

Std Blank	Mn	.0035781	.13
Std 1=5.00ug/L	Mn	.1199973	4.78
Std 2=10.0ug/L	Mn	.2175929	9.07
Std 3=15.0ug/L	Mn	.2885566	14.33
Std 4=20.0ug/L	Mn	.333049	19.64
Std 5=25.0ug/L	Mn	.3705958	27.23

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A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-14448-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 10/31/95

	WT. STDS	
x	CONC STDS	
5.000	INST LIMIT	ug/L
8.33	SPK LEVEL	ug/L
1.00	MAX ALIQUOT	
1	METHOD DET.	TOTAL ug

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	Ni	.0580992	7.74	1	600	4.64		
1638-002	Ni	.0701478	9.37	1	600	5.62		
1638-003-#2dup	Ni	.0715222	9.56	1	600	5.74		
1638-004	Ni	.076264	10.2	1	200	2.04		
1638-005-#4spk	Ni	.1313168	17.77	1	200	3.55	90.9	8.33
1638-006	Ni	.1102193	14.85	1	200	2.97		
1638-007	Ni	.0400682	5.32	1	200	1.06		
OLI 0ug	Ni	.0023876	.31	1	100 <		.500	
OLI 5ug spk	Ni	.0780063	10.44	1	500	5.22	104	10

						ug/ml
D.L.=.005ug/ml	Ni	.0404895	5.37	1	1	.0054
Known=.010ug/ml	Ni	.0718599	9.6	1	1	.0096
QC=12.5ug/L	Ni	.0948769	12.74	1	1	.0127
QC=12.5ug/L	Ni	.0922619	12.38	1	1	.0124
QC=12.5ug/L	Ni	.0920178	12.35	1	1	.0124
Std Blank	Ni	.0014413	.3			
Std 1=5.00ug/L	Ni	.0372826	7.87			
Std 2=10.0ug/L	Ni	.0761403	10.21			
Std 3=15.0ug/L	Ni	.1104467	14.25			
Std 4=20.0ug/L	Ni	.1477929	20.01			
Std 5=25.0ug/L	Ni	.1821528	24.8			

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A.A. SUMMARY REPORT

CLIENT: ENTROPY
P.O.#/PROJECT #: 11973-1444B-18
ANALYST: SYLVIA THOMPSON/KEN SMITH
DATE: 10/27/95

	WT. STDS	
x	CONC STDS	
5.000	INST LIMIT	ug/L
8.33	SPK LEVEL	ug/L
1.00	MAX ALIQUOT	
1	METHOD DET.	TOTAL ug

SAMPLE I.D.	EL	MEAN ABS	uG/L INSTRU READING	SAMPLE ALIQUOT	F.V. X DILUTION	TOTAL ug	% REC OR <	ug/L SPK
1638-001	Se	.0389814	11	1	1000	11.0		
1638-002	Se	.0365403	10.27	1	1000	10.3		
1638-003-#2dup	Se	.0355872	9.99	1	1000	9.99		
1638-004	Se	.0522171	15.05	1	600	9.03		
1638-005-#4spk	Se	.0793171	23.89	1	600	14.3	106	8.33
1638-006	Se	.0091392	2.46	1	200 <		1.00	
1638-007	Se	.0032939	.88	1	200 <		1.00	
OLI 0ug	Se	-.001073	-.29	1	100 <		.500	
OLI 5ug spk	Se	.0362594	10.19	1	500	5.10	102	10

						ug/ml
D.L.=.005ug/ml	Se	.0166934	4.55	1	1	.0046
Known=.010ug/ml	Se	.0338483	9.48	1	1	.0095
QC=12.5ug/L	Se	.0441847	12.57	1	1	.0126
QC=12.5ug/L	Se	.0431481	12.26	1	1	.0123

Std Blank	Se	-.003391	-.37
Std 1=5.00ug/L	Se	.0185995	3.94
Std 2=10.0ug/L	Se	.0338316	9.09
Std 3=15.0ug/L	Se	.0536717	18.23
Std 4=20.0ug/L	Se	.0682985	19.92
Std 5=25.0ug/L	Se	.0816212	24.28

HG1020.WKS

A.A. SUMMARY REPORT

CLIENT:ENTROPY
P.O.#/PROJECT #:11973-14448-18
ANALYST: KEN SMITH/SC/AJ
DATE: 11/01/95

X	WT. STDS CONC STDS	
.047	INST LIMIT	uG
.2	SPK LEVEL	uG
10.00	MAX ALIQUOT	mL
.047	M.D.L.	uG/mL
		.2

SAMPLE I.D.	EL	MEAN ABS	uG INSTR READ	mL SAMPLE ALIQUOT	F.V. X DILUTION		TOTAL uG ANSWER	% REC OR < uG SPK
-1638-001	Hg	.0019061	.008	10	200	<	.940	.2
-1638-001	Hg	.0013042	.006	10	200	<	.940	.2
-1638-002	Hg	.0005016	.002	10	200	<	.940	.2
-1638-002	Hg	.0006019	.003	10	200	<	.940	.2
-1638-004	Hg	.0005016	.002	10	200	<	.940	.2
-1638-004	Hg	.0011035	.005	10	200	<	.940	.2
-1638-005-SPK	Hg	.0472512	.203	10	200		4.06 102	.2
-1638-005-SPK	Hg	.045947	.198	10	200		3.96 99.0	.2
-1638-006	Hg	.0009029	.004	10	200	<	.940	.2
-1638-006	Hg	.0010032	.004	10	200	<	.940	.2
-1638-001	Hg	.0044141	.019	10	500	<	2.35	.2
-1638-001	Hg	.0043138	.019	10	500	<	2.35	.2
-1638-002	Hg	.0042135	.018	10	500	<	2.35	.2
-1638-002	Hg	.0040128	.018	10	500	<	2.35	.2
-1638-004	Hg	.0029093	.013	10	500	<	2.35	.2
-1638-004	Hg	.0032103	.014	10	500	<	2.35	.2
-1638-005-SPK	Hg	.0456461	.196	10	500		9.80 98.0	.2
-1638-005-SPK	Hg	.0471509	.203	10	500		10.2 102	.2
-1638-006	Hg	.0013042	.006	10	500	<	2.35	.2
-1638-006	Hg	.0017055	.007	10	500	<	2.35	.2
-1638-007	Hg	.0010032	.004	10	500	<	2.35	.2
-1638-007	Hg	.0014045	.006	10	500	<	2.35	.2
H-1638-001	Hg	.0088282	.039	10	380	<	1.79	.2
H-1638-001	Hg	.0083266	.036	10	380	<	1.79	.2
H-1638-002	Hg	.0083266	.036	10	375	<	1.76	.2
H-1638-002	Hg	.008126	.035	10	375	<	1.76	.2
H-1638-004	Hg	.0077247	.034	10	370	<	1.74	.2
H-1638-004	Hg	.0071228	.031	10	370	<	1.74	.2
H-1638-005-SPK	Hg	.0523676	.225	10	370		8.33 113	.2
H-1638-005-SPK	Hg	.0497592	.214	10	370		7.92 107	.2
H-1638-006	Hg	.0040128	.018	10	290	<	1.36	.2
H-1638-006	Hg	.002809	.012	10	290	<	1.36	.2
H-1638-007	Hg	.0034109	.015	10	300	<	1.41	.2
H-1638-007	Hg	.00311	.014	10	300	<	1.41	.2
-1638-001	Hg	.0004013	.002	10	500	<	2.35	.2
-1638-001	Hg	-.001104	-.005	10	500	<	2.35	.2
-1638-002	Hg	.0004013	.002	10	500	<	2.35	.2
-1638-002	Hg	.0006019	.003	10	500	<	2.35	.2
-1638-004	Hg	.0004013	.002	10	500	<	2.35	.2
-1638-004	Hg	.0002006	.001	10	500	<	2.35	.2
-1638-005-SPK	Hg	.0475522	.205	10	500		10.3 103	.2
-1638-005-SPK	Hg	.0467496	.201	10	500		10.1 101	.2
-1638-006	Hg	.0016051	.007	10	500	<	2.35	.2
-1638-006	Hg	.0009029	.004	10	500	<	2.35	.2
-1638-007	Hg	.0009029	.004	10	500	<	2.35	.2
-1638-007	Hg	.0006019	.003	10	500	<	2.35	.2
H-1638-001	Hg	.000301	.001	10	100	<	.470	.2
H-1638-001	Hg	.000301	.001	10	100	<	.470	.2
H-1638-002	Hg	-.000301	-.001	10	100	<	.470	.2
H-1638-002	Hg	-.000301	-.001	10	100	<	.470	.2
H-1638-004	Hg	.000301	.001	10	100	<	.470	.2

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FH-1638-004	Hg	.0007022	.003	10	100	<		.470	.2
FH-1638-005-SPK	Hg	.046248	.199	10	100		1.99	100	.2
FH-1638-005-SPK	Hg	.0463483	.199	10	100		1.99	100	.2
FH-1638-006	Hg	.000301	.001	10	100	<		.470	.2
FH-1638-006	Hg	.0002006	.001	10	100	<		.470	.2
FH-1638-007	Hg	.0005016	.002	10	100	<		.470	.2
FH-1638-007	Hg	.0014045	.006	10	100	<		.470	.2
STANDARD BLANK	Hg	.0018058	.009						
STANDARD .1uG	Hg	.0220706	.103						
STANDARD .2uG	Hg	.048756	.221						
STANDARD .3uG	Hg	.0709269	.27						
STANDARD .4uG	Hg	.0933989	.376						
STANDARD .5uG	Hg	.1184791	.491						
STD #2	Hg	.0481541	.207	1	1		.207		.2
STD #2	Hg	.0445425	.192	1	1		.192		.2
Std .1uG	Hg	.0233748	.101	1	1		.101		.2
Std .1uG	Hg	.0227729	.099	1	1		.099		.2
Std .2uG	Hg	.0446428	.192	1	1		.192		.2
Std .4uG	Hg	.0881822	.374	1	1		.374		.2
Std .5uG	Hg	.1183788	.496	1	1		.496		.2
Std .5uG	Hg	.1040329	.438	1	1		.438		.2
STD BLANK	Hg	-.000803	-.004						
STD BLANK	Hg	.000301	.001						
STD BLANK	Hg	.0005016	.002						
STD BLANK	Hg	-.001404	-.006						
STD BLANK	Hg	.0002006	.001						
STD BLANK	Hg	.0015048	.007						
WASH	Hg	.0001003	0						
Blank-Std	Hg	-.000201	-.001						
Blank-Std	Hg	.0010032	.004						
Det Lmt=.02 uG	Hg	.0047151	.021	1	1	<		.047	.2
Det Lmt=.02 uG	Hg	.0050161	.022	1	1	<		.047	.2
Det Lmt=.02 uG	Hg	.0052167	.023	1	1	<		.047	.2

Mercury Duplicate Analyses Results

Plant: Triangle Brick
Job #: 14448

	First Analysis	Second Analysis	Average	Relative % Difference
Brick Kiln Stack				
S-M29-1				
Front half	< 0.470	< 0.470	< 0.470	NA
Back half	< 1.79	< 1.79	< 1.79	NA
HNO_3	< 0.940	< 0.940	< 0.940	NA
$KMnO_4$	< 2.35	< 2.35	< 2.35	NA
HCl	< 2.35	< 2.35	< 2.35	NA
		SUM	0.0	
S-M29-2				
Front half	< 0.470	< 0.470	< 0.470	NA
Back half	< 1.76	< 1.76	< 1.76	NA
HNO_3	< 0.940	< 0.940	< 0.940	NA
$KMnO_4$	< 2.35	< 2.35	< 2.35	NA
HCl	< 2.35	< 2.35	< 2.35	NA
		SUM	0.0	
S-M29-3				
Front half	< 0.470	< 0.470	< 0.470	NA
Back half	< 1.74	< 1.74	< 1.74	NA
HNO_3	< 0.940	< 0.940	< 0.940	NA
$KMnO_4$	< 2.35	< 2.35	< 2.35	NA
HCl	< 2.35	< 2.35	< 2.35	NA
		SUM	0.0	
S-M29-FB				
Front half	< 0.470	< 0.470	< 0.470	NA
Back half	< 1.36	< 1.36	< 1.36	NA
HNO_3	< 0.940	< 0.940	< 0.940	NA
$KMnO_4$	< 2.35	< 2.35	< 2.35	NA
HCl	< 2.35	< 2.35	< 2.35	NA
		SUM	0.0	

METALS BLANK CORRECTION CALCULATIONS
Revised: 2/15/94

COMBINED

Run Number, Metal	Filter Diameter (Inches)	p r e	Catch Weight (mt)	p r e	Blank Catch (mtb)	Corrected Result (m)	1 + 1.4*Area (A')	5% mt (5mt)	Result to Use
S-M29-1, Antimony	3.346		1.26		1.45	-0.19	13.310	0.063	0.00
S-M29-2, Antimony	3.346		2.22		1.45	0.77	13.310	0.111	0.770
S-M29-3, Antimony	3.346		43.4		1.45	41.95	13.310	2.17	42.0
S-M29-1, Arsenic	3.346		5.32		3.49	1.83	13.310	0.266	1.83
S-M29-2, Arsenic	3.346		6.21		3.49	2.72	13.310	0.311	2.72
S-M29-3, Arsenic	3.346		14.6		3.49	11.11	13.310	0.73	11.1
S-M29-1, Chromium	3.346		5.88		1.73	4.15	13.310	0.294	4.15
S-M29-2, Chromium	3.346		7.17		1.73	5.44	13.310	0.359	5.44
S-M29-3, Chromium	3.346		6.82		1.73	5.09	13.310	0.341	5.09
S-M29-1, Manganese	3.346		25.2		1.27	23.93	13.310	1.26	23.9
S-M29-2, Manganese	3.346		20		1.27	18.73	13.310	1	18.7
S-M29-3, Manganese	3.346		18.4		1.27	17.13	13.310	0.92	17.1
S-M29-1, Nickel	3.346		4.64		1.06	3.58	13.310	0.232	3.58
S-M29-2, Nickel	3.346		5.68		1.06	4.62	13.310	0.284	4.62
S-M29-3, Nickel	3.346		2.04		1.06	0.98	13.310	0.102	0.980

Metals Duplicate Analyses Results

Plant: Triangle Brick
Job #: 14448

	Reagent Blank [1]	Field Blank	Matrix Spike [2]	First Analysis [3]	Second Analysis	Average	Relative % Difference [4]
Antimony	1.45	< 1.00	90.9	2.22	2.21	2.22	0.226
Arsenic	3.49	2.02	104	6.46	5.95	6.21	4.11
Beryllium	< 0.100	< 0.100	87.4	< 0.100	< 0.100	< 0.100	NA
Cadmium	< 0.400	< 0.400	102	1.71	1.66	1.69	1.48
Chromium	1.73	2.18	99.0	7.10	7.24	7.17	0.976
Cobalt	< 1.00	< 1.00	106	< 1.00	< 1.00	< 1.00	NA
Lead	< 1.00	< 1.00	82.4	3.03	2.83	2.93	3.41
Manganese	1.27	2.56	89.9	21.0	19.0	20.0	5.00
Nickel	1.06	2.97	90.9	5.62	5.74	5.68	1.06
Selenium	< 1.00	< 1.00	106	10.30	9.99	10.15	1.53

[1] Combined filter, fronthalf 0.1N HNO_3 rinse, acetone rinse, and HNO_3/H_2O_2 reagent.

[2] Performed on repetition 3.

[3] Performed on repetition 2.

[4] Not applicable if one or both results are below the detection limit.

APPENDIX C. ANALYTICAL DATA

3. Methane

Entropy/Withers & Ravenel (14448)

Analytical Report
(1095-18)

Location: S

Compound: Methane

Enthalpy Analytical, Inc.
3211 Bramer Drive
Raleigh, NC 27604
919/850-4392

Request for Analysis

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

PO#:11988 - 14448-18

Customer Name: Withers and Ravenel
Triangle Brick

Laboratory: ENT

Date Transmitted: 10/24/95

Results Due By: 11/07/95

Sample Matrix: Method 18

PM: VJT

Analysis: Analyze samples for Methane according to EPA Method 18.

Sample #	Sample ID	Components/Comments
1	S-M18MOD-1	Tank #183, 4.591
2	S-M18MOD-2	Tank #233, 4.511
3	S-M18MOD-3	Tank #242, 4.511

Submitted By:

Summary of Results

Company:	Entropy/Withers & Ravenel	Enthalpy #:	1095-18
Analyst:	DMB	Sampled:	10/17/95
Parameters:	Methane	Received:	10/24/95
# Samples:	3	Analyzed:	10/25/95

Compound	Concentration (PPMV)
	Methane
S-M18MOD-1	< 1.98
S-M18MOD-2	< 1.91
S-M18MOD-3	< 1.92

Results

CH4 MDL: 1 ppm
CH4 LOQ: 5 ppm
CH4 Curve Values (64, 128, 513, 1025 ppmv)

Company:	Entropy/Withers & Ravenel	Client #:	14448
Analyst:	DMB	Enthalpy #:	1095-18
Parameters:	Methane	PO #:	11988-14448-18
# Samples:	3	Date:	10/31/95

Reviewed: JJC
Date: 11/16/95

Sample Identification	Retention Time (min.)		Percent Difference	Concentration		% Difference of Mean	As Analyzed Concentration	Cal. Curve	Dilution Factor	As Sampled PPMV
	Inj. # 1	Inj. # 2		Inj. # 1	Inj. # 2					
S-M18MOD-1	NA	NA	NA	< 1.00	< 1.00	0.00	< 1.00	1095-18	1.983	< 1.98
S-M18MOD-2	NA	NA	NA	< 1.00	< 1.00	0.00	< 1.00	1095-18	1.907	< 1.91
S-M18MOD-3	NA	NA	NA	< 1.00	< 1.00	0.00	< 1.00	1095-18	1.921	< 1.92

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ENTHALPY analytical, inc.

D:\ENTHALPY\TEMPLATE\TANKCV.WB2 11:49 AM 11/16

Narrative Summary

Enthalpy Analytical Narrative Summary

Company:	Entropy/Withers & Ravenel
Client #:	14448
PO #	11988-14448-18

Enthalpy #:	1095-18
Analyst:	DMB
Parameters	Methane

Custody

Samples were picked up from Les Murray of Entropy by Scott Grosshandler of Enthalpy on 10/24/95. No apparent container problems were noted upon receipt. Prior to and during analysis, the samples were kept under lock with access only to authorized personnel of Enthalpy Analytical, Inc.

Analysis

Tank pressures were measured upon receipt. Each tank was then pressurized to around 600 mmHg. A dilution ratio was calculated for each tank based on the temperature and pressure after sample transfer and the final temperature and pressure (see Reporting Notes).

Each tank was analyzed for Methane using a Hewlett Packard 5980 Series II gas chromatograph equipped with a flame ionization detector. All samples were separated using a Restek 2.0 m x 1.0 ID HayeSep-S Micropacked column. Hydrogen was used as the carrier gas. Samples were injected into the GC using a VICI ten port valve with a 0.2 mL gas sample loop.

Methane eluted at the approximate retention time listed below:

Methane 1.04 min

The following chromatographic conditions were present during analysis:

Detector temperature: 250° C
Initial Oven Temp. - 45°C for 2.00 minutes
Level 1 - 10°C/minute to 150°C hold 2.00 minutes
Net Run Time: 14.50 minutes
Pressure Constant: 11.0 psi at 45°C

Labeling

OK

Reproducibility

All standards were within 10% of their tag value.

Reporting Notes

The symbols MDL and LOQ represent the Minimum Detection Limit and the Limit of Quantification. The values that are between the MDL and the LOQ are represent by a tilde (~).

All tanks were adjusted from "as analyzed" concentrations to "as sampled" concentrations using a dilution factor which was calculated based on the following formula:

$$\frac{(\text{Final mmHg} + (\text{Pbar} * 25.401))}{(\text{Initial mmHg} + (\text{Pbar} * 25.401))} * \frac{(\text{Temp. Initial} + 460)}{(\text{Temp. Final} + 460)}$$

ENTHALPY analytical, inc.

Pressurization Data is as follows:

Barometric Pressure = 758 mm Hg Temperature = 72 degrees F

Run ID	Initial mmHg	Final mmHg
Run 1	33	764
Run 2	25	699
Run 3	22	704

Sample Custody

ENTHALPY analytical, inc.

SAMPLE TRANSFER RECORD OF CUSTODY

Please include this form with the final (typed) results, and whenever the final results are faxed to Entropy.

The samples referenced in Entropy Environmentalists Inc. RFA or purchase order No. 11988-14448-18 were shipped by Entropy on 10/24/95 (date) via Personal Custody (mode) to Enthalpy (laboratory) by [signature] (signature)

The samples were received for analysis on 10-24-95 (date) at Entropy (laboratory) by Scott [illegible] (signature)

As applicable, note any broken seals, leakage, spillage, or damage to samples. If discrepancy, specify seal No., jar No., sample No., etc.

L-0012 rev. 8-92

ENTROPY

ENTROPY/ Withers & Ravenel

Pbar 758
T (F) 72

Sample #	Sample ID	P initial	P final	Dilution
1	S-M18MOD-1	33	764	1.92
2	S-M18MOD-2	25	699	1.86
3	S-M18MOD-3	22	704	1.87

EVACUATED TANK PARAMETERS

Client Withers and Ravenel

Plant Name Triangle Brick Job No. 14884

City/State Merry Oaks, N.C. Sampling Loc. Brick Kiln #2 Stack

Tank No. 183 Tank Volume, liters 4.59 Sampling Time Start 1010

From Sampling Run No. S-M29-1 Sampling Time Finish 1117

Sample Transfer Run No. S-M18MOD-1 Sample Transfer Date & Time 10/17/95 1130

Parameter	Barometric Pressure * In. Hg	mm Hg	Tank Temp. * °F	°C	Tank Pressure Gauge * In. Hg	mm Hg	Leak Check cm Hg change Tank	System
Pretest	30.5	774.7	58		- ~~751~~	-752	0.00	0.00
Posttest	30.5	774.7	58		-	- 12	0.00	0.00
1st (Field) Pressurization					+		JRW Operator	

Tank No. 233 Tank Volume, liters 4.51 Sampling Time Start 1150

From Sampling Run No. S-M29-2 Sampling Time Finish 1255

Sample Transfer Run No. ~~S-M29-2~~ S-M18MOD-2 Sample Transfer Date & Time 10/17/95 1324

Parameter	Barometric Pressure * In. Hg	mm Hg	Tank Temp. * °F	°C	Tank Pressure Gauge * In. Hg	mm Hg	Leak Check cm Hg change Tank	System
Pretest	30.5	774.7	62		-	-756	0.00	0.00
Posttest	30.5	774.7	62		-	0	0.00	0.00
1st (Field) Pressurization					+		JRW Operator	

Tank No. 242 Tank Volume, liters 4.51 Sampling Time Start 1330

From Sampling Run No. S-M29-3 Sampling Time Finish 1436

Sample Transfer Run No. S-M18MOD-3 Sample Transfer Date & Time

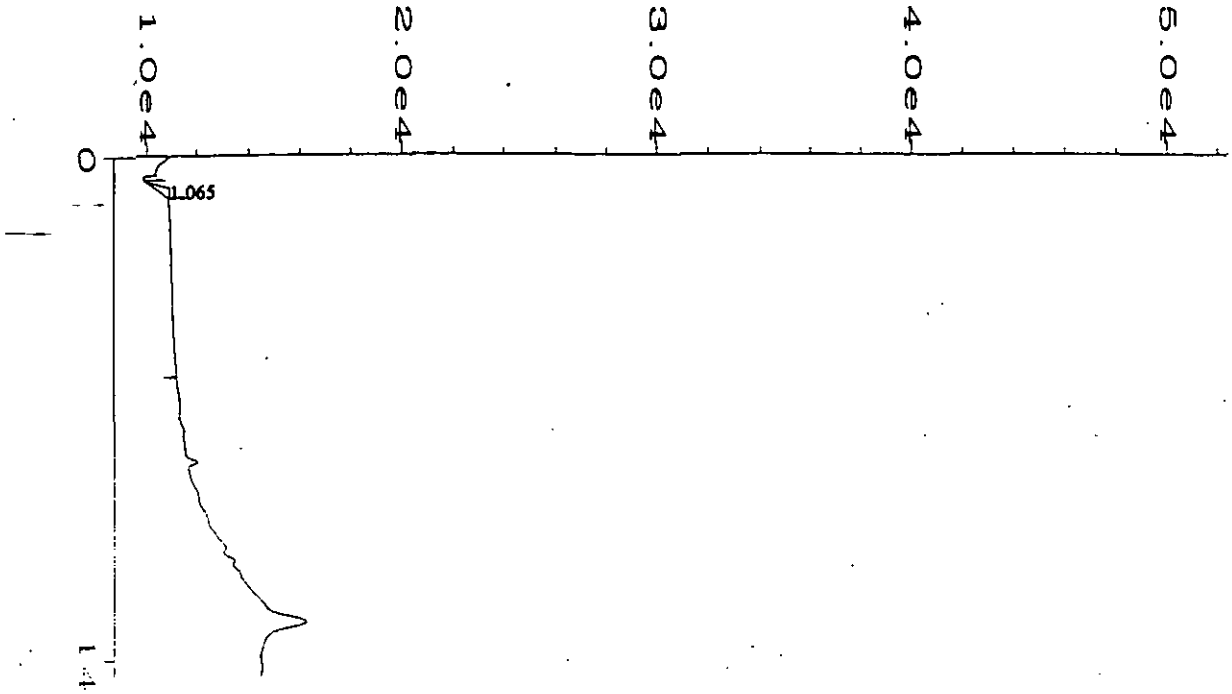
Parameter	Barometric Pressure * In. Hg	mm Hg	Tank Temp. * °F	°C	Tank Pressure Gauge * In. Hg	mm Hg	Leak Check cm Hg change Tank	System
Pretest	30.5	774.7	65		-	-756	0.00	0.00
Posttest	30.5	774.7	65		-		0.00	0.00
1st (Field) Pressurization					+		JRW Operator	

* As applicable, use In. Hg or mm Hg, and °F or °C. Note: mm Hg = In. Hg * 25.401

F-1070 rev. 11-93

Chromatograms

ENTHALPY analytical, inc.



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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0110.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: S-M18MOD-1	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 01:00 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 02:31 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0110.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.065	7682	BB	0.420	1	5.005	Methane

DB 10/26/95

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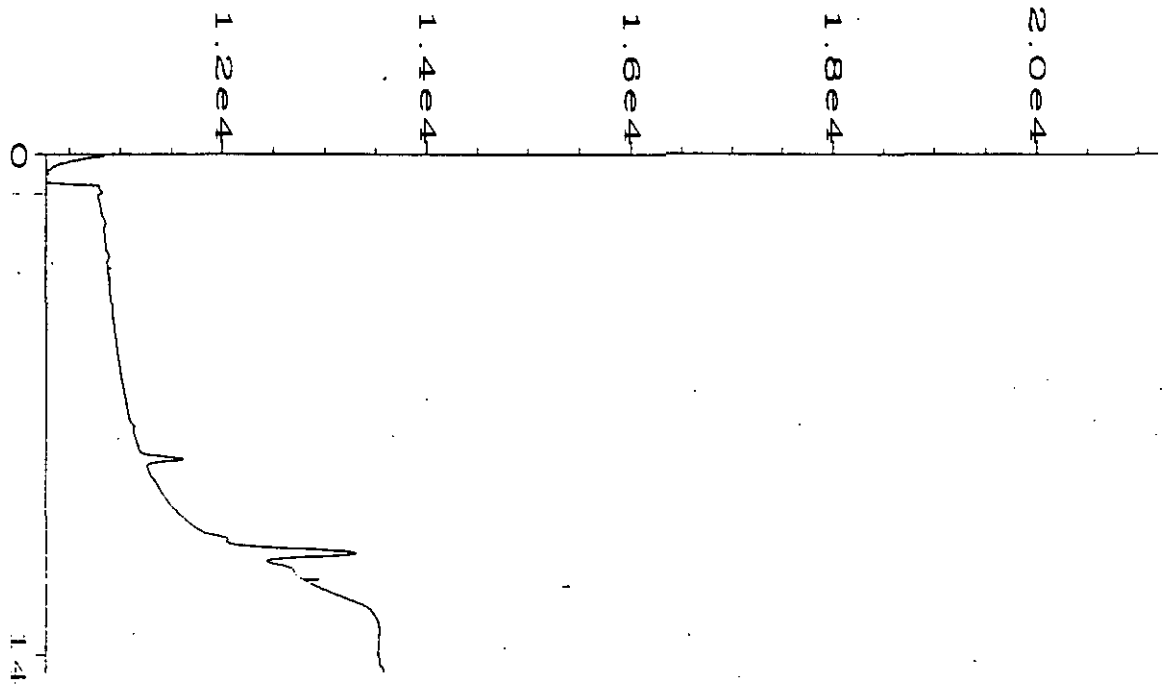

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0111.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: S-M18MOD-1	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 01:37 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 02:31 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0111.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.040	* not found *				1	Methane

Not all calibrated peaks were found

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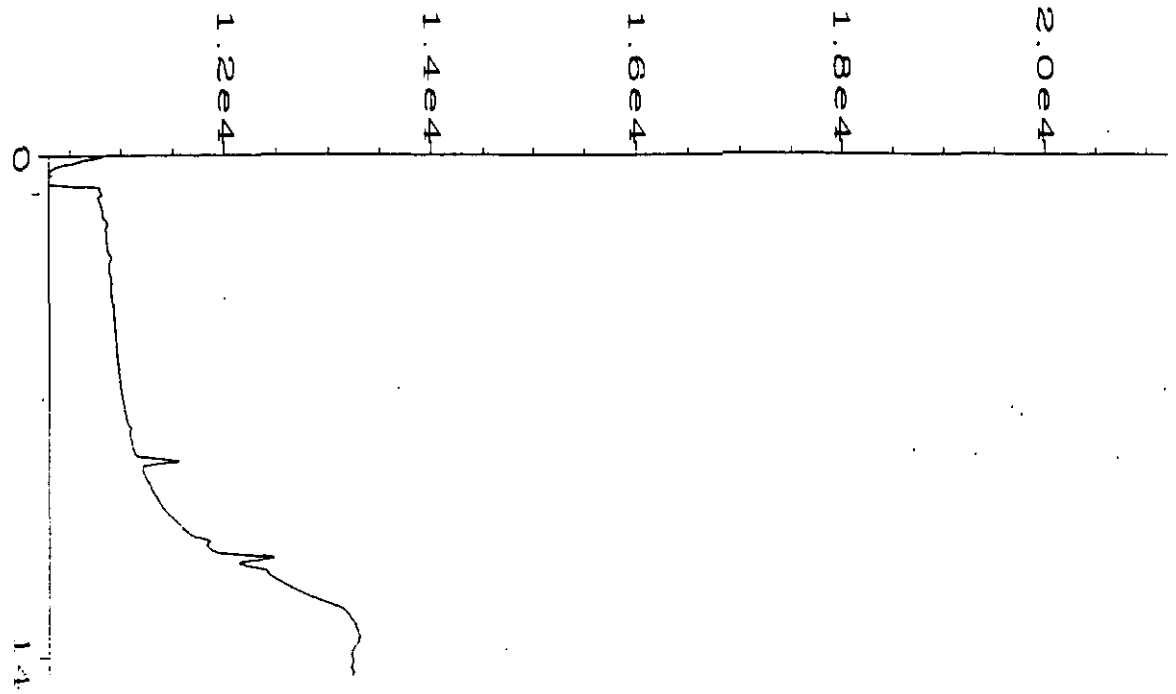

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0112.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: S-M18MOD-2	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 02:03 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 02:31 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0112.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.040	* not found *			1		Methane

Not all calibrated peaks were found

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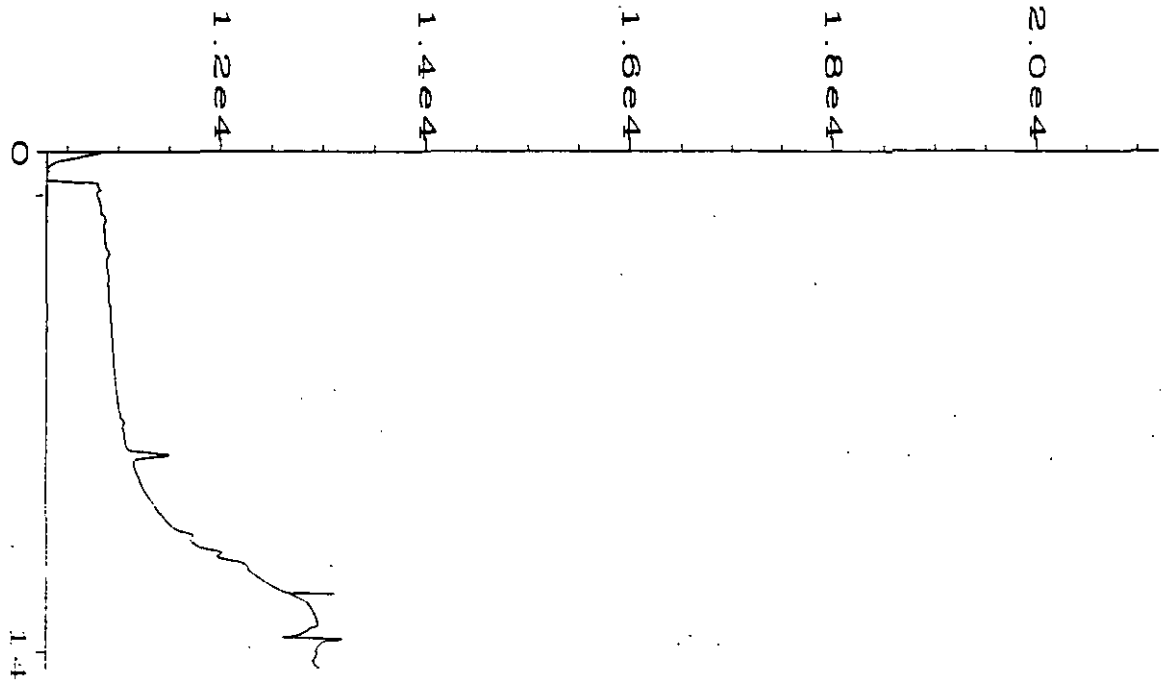

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0113.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: S-M18MOD-2	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 02:26 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 03:01 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0113.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.040	* not found *			1		Methane

Not all calibrated peaks were found

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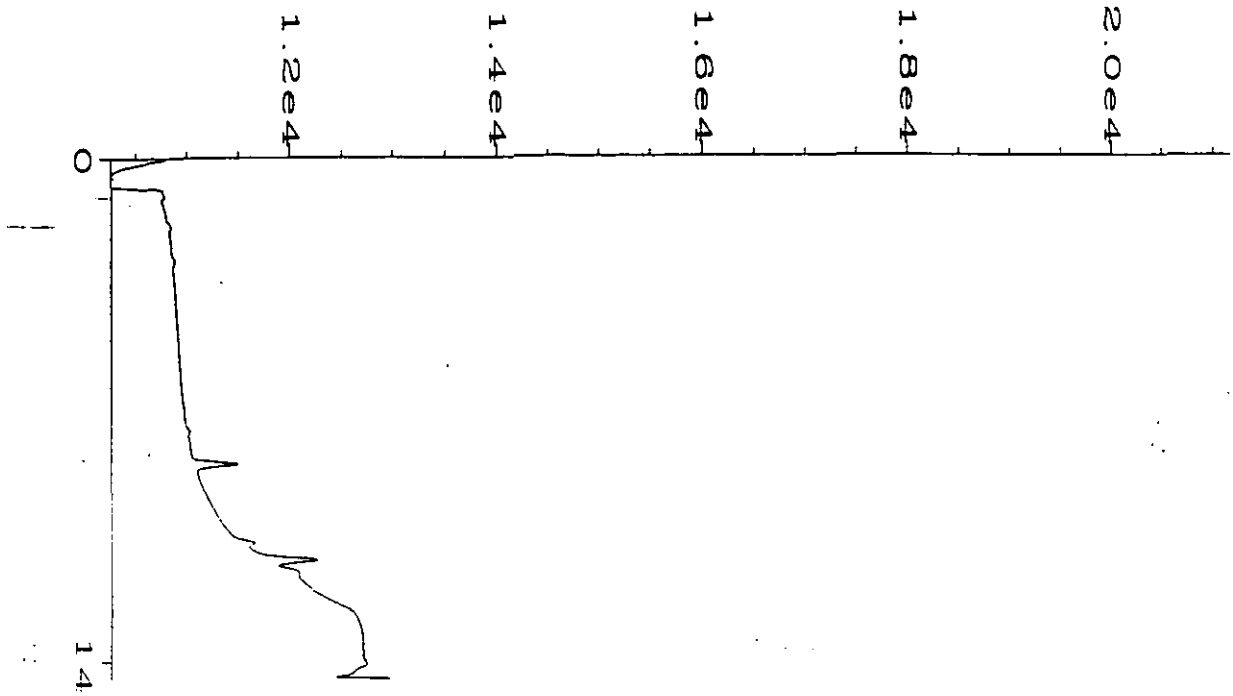

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0114.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: S-M18MOD-3	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 02:46 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 03:01 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0114.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.040	* not found *			1		Methane

Not all calibrated peaks were found

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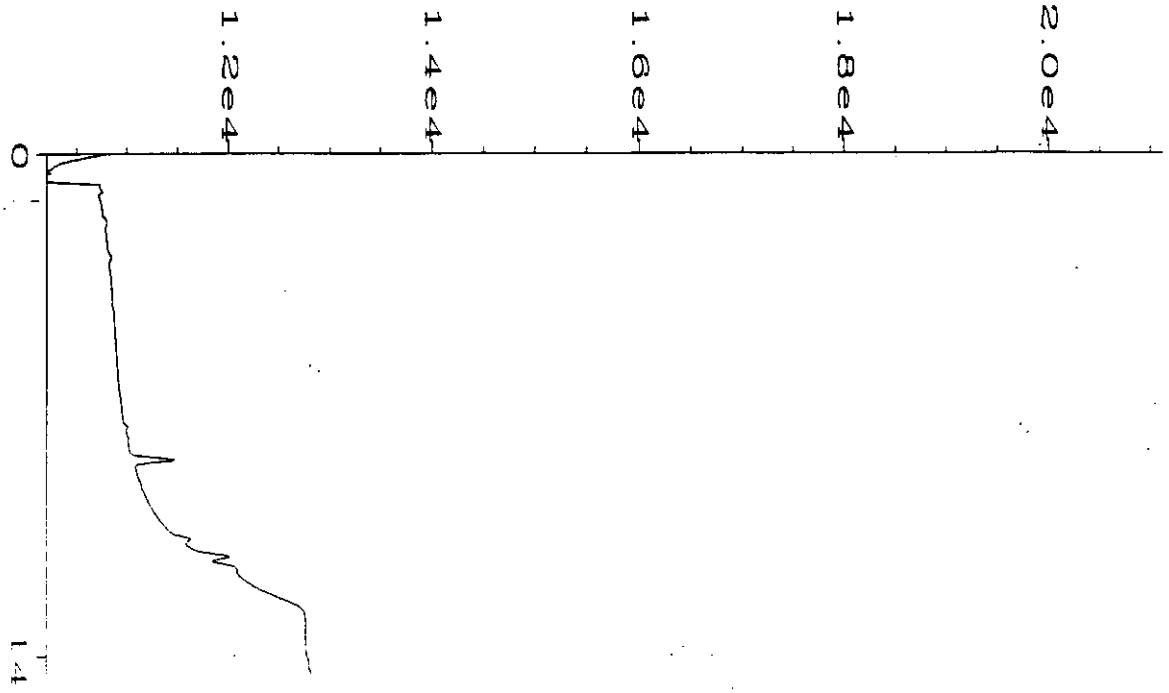

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0115.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: S-M18MOD-3	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 03:04 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 03:30 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0115.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.040	* not found *			1		Methane

Not all calibrated peaks were found

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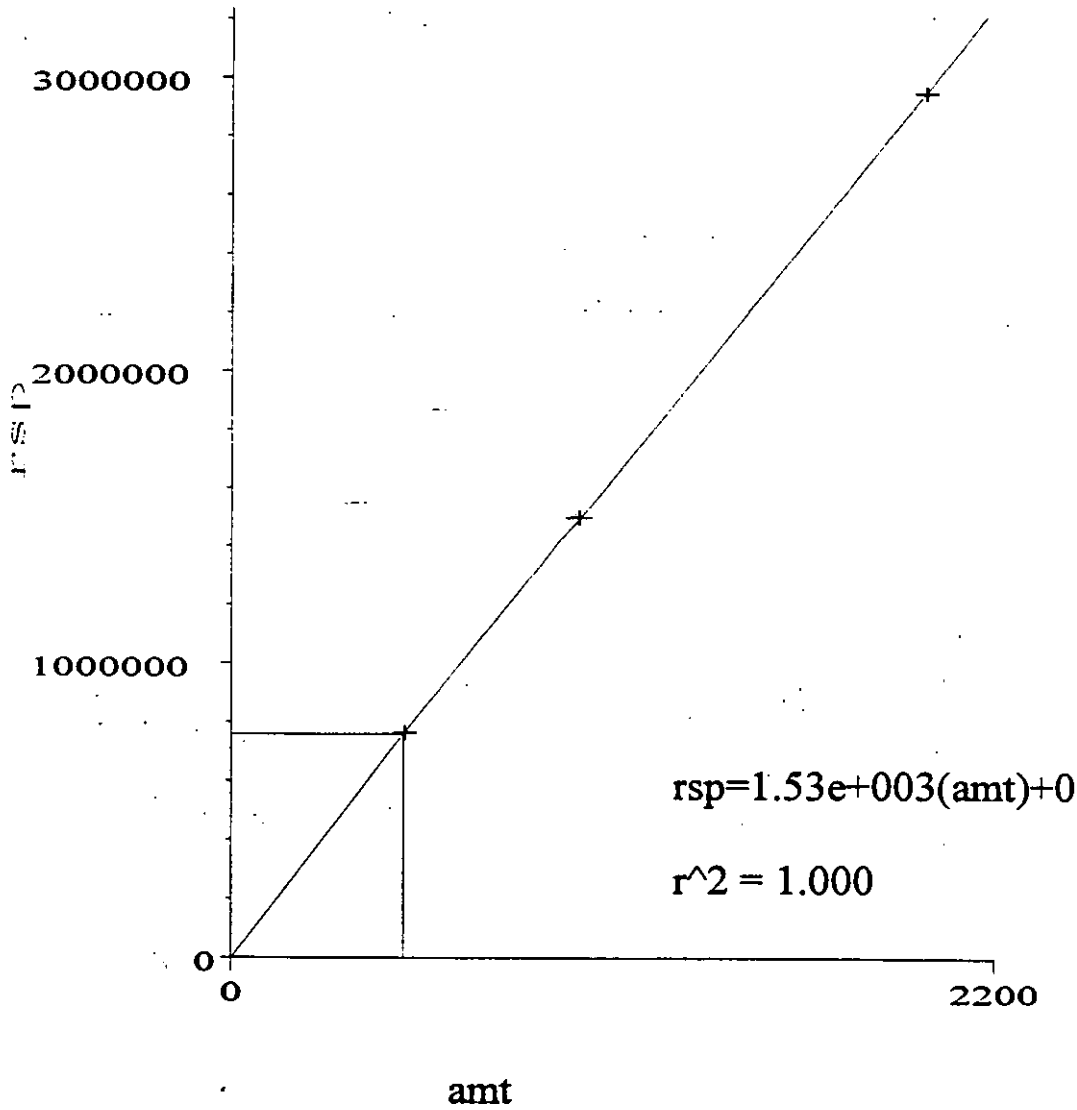
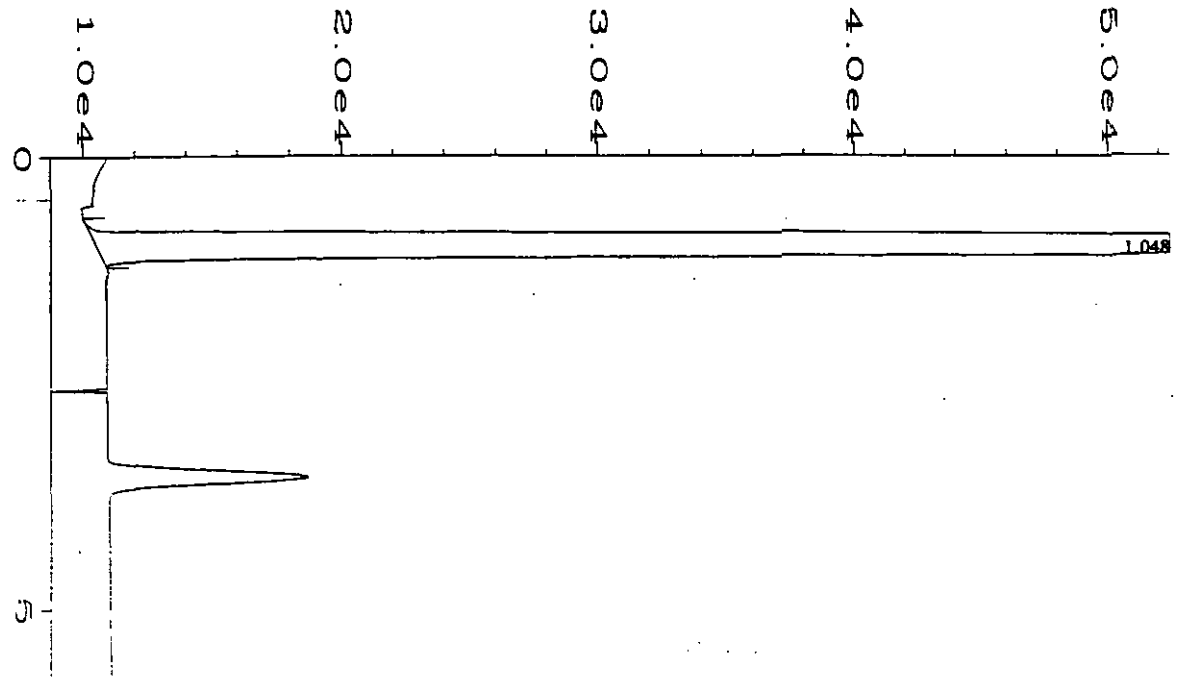
Curve # 1

Method Name	1095-18
Date	10/26/95
Directory	1095-18
Vial #	Concentration
04/05	2000
06/07	1000
08/09	500
Rt~1.05	

Methane





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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0109.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 500 ppm CH4	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 12:51 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 02:07 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0109.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.048	760818	BV	0.232	1	495.746	Methane

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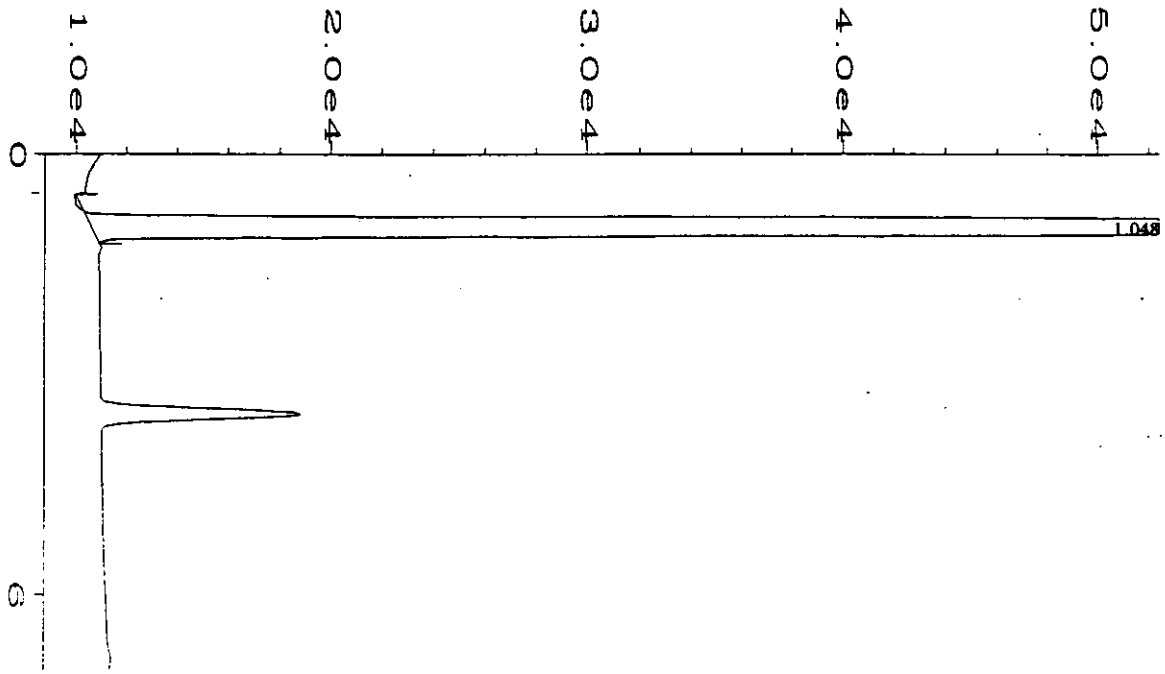

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0108.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 500 ppm CH4	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 26 Oct 95 12:42 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 02:07 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0108.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.048	765476	BV	0.231	1	498.781	Methane

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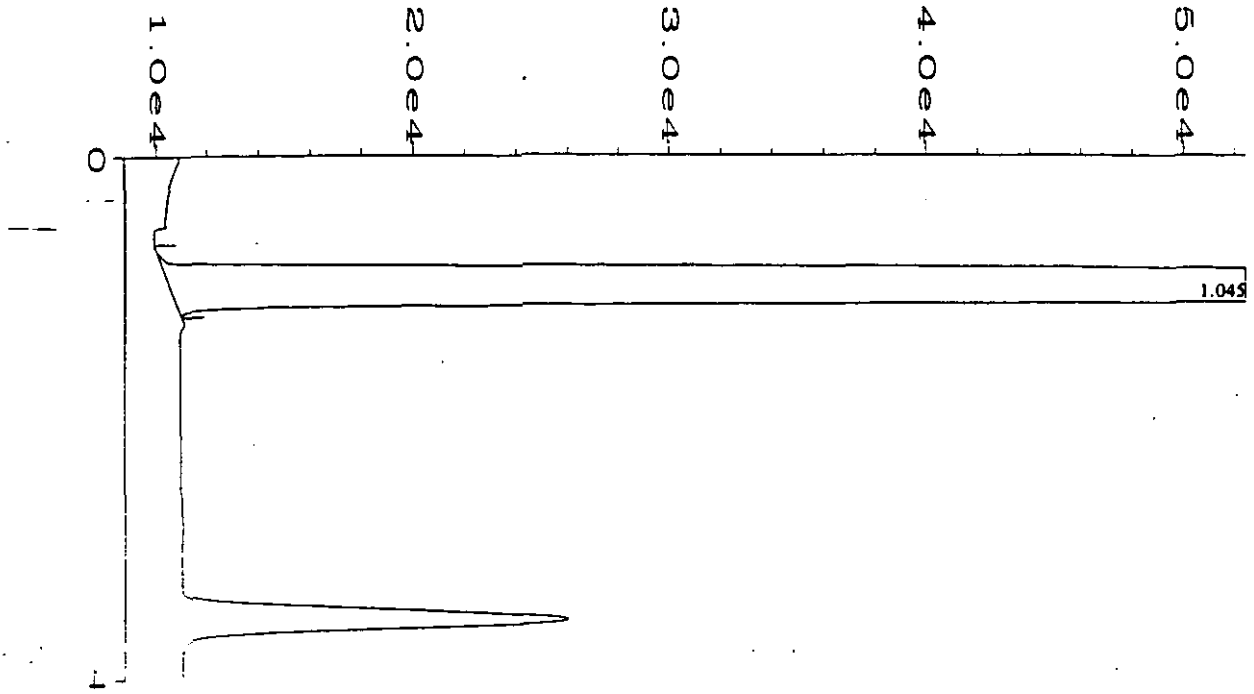

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0107.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 2000 ppm CH4	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 26 Oct 95 12:36 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 02:07 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0107.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.045	1487478	BV	0.232	1	996.145	Methane

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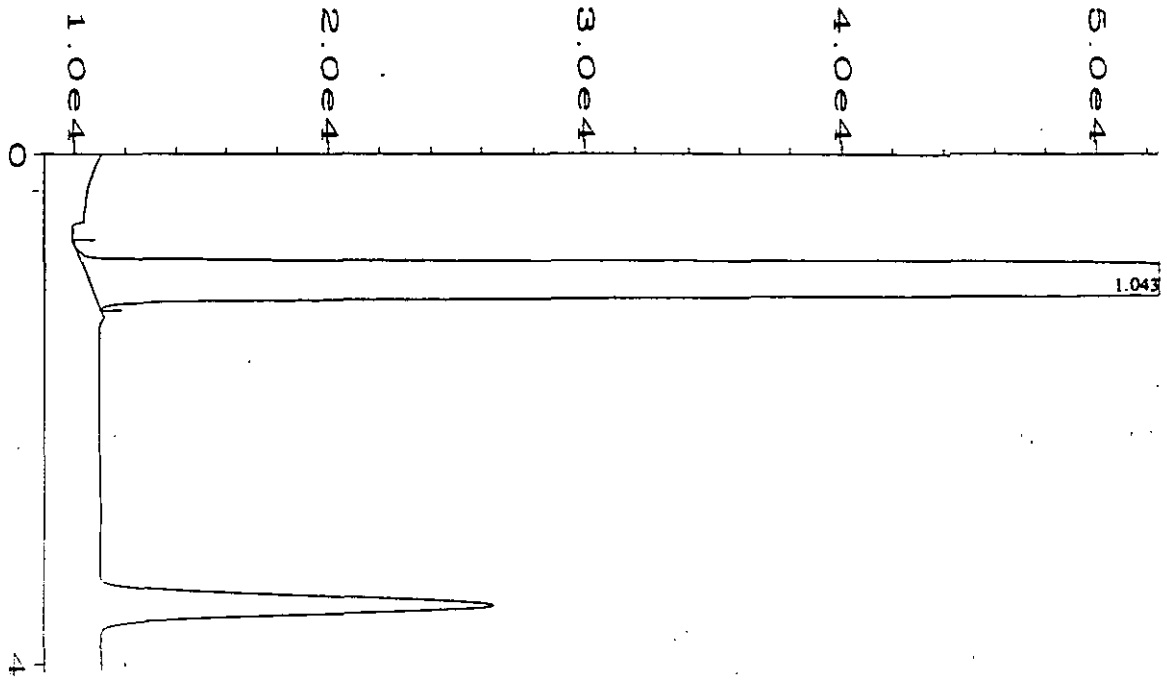

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0106.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 2000 ppm CH4	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 12:30 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 02:07 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0106.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.043	1511267	BV	0.232	1	1012.536	Methane

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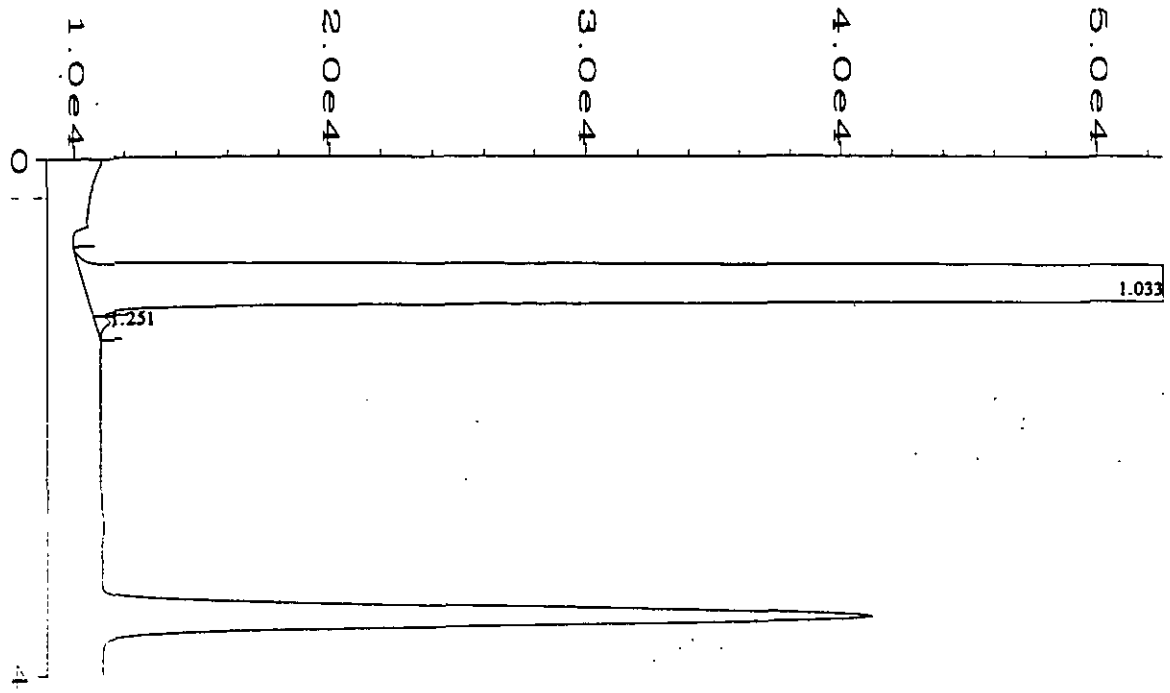

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0105.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 2000 ppm CH4	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 12:24 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 02:07 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0105.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.033	2906199	BV	0.234	1	1973.596	Methane

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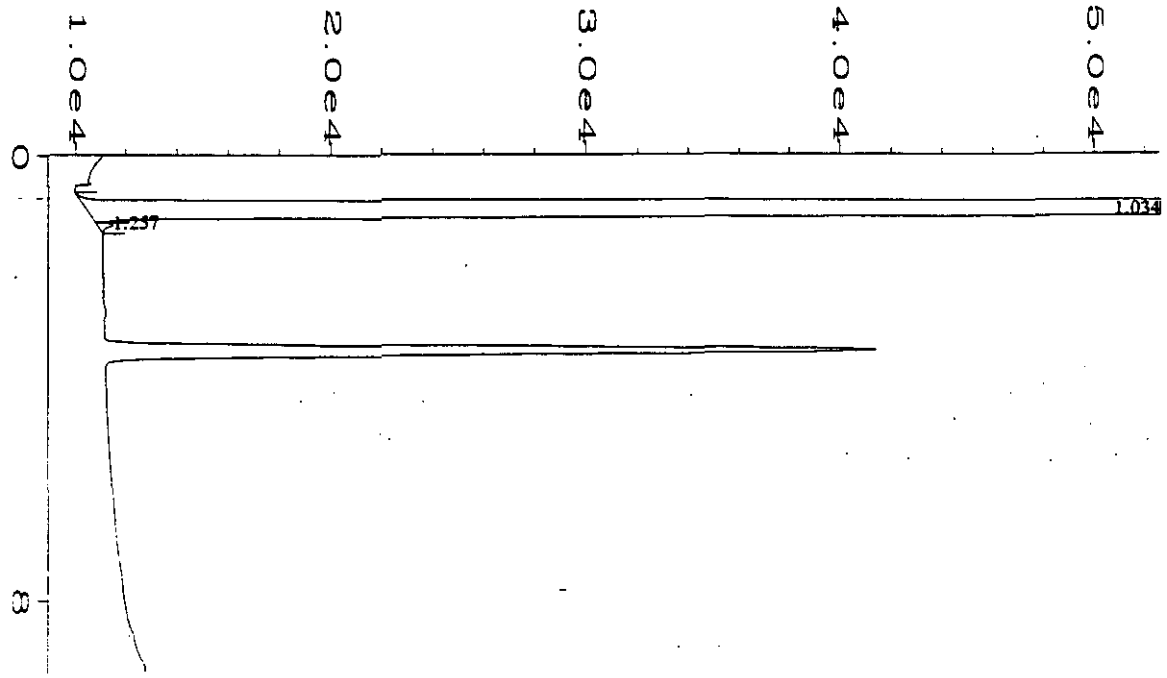

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0104.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 2000 ppm CH4	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 12:13 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 02:08 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0104.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.034	2978648	BV	0.233	1	2023.511	Methane

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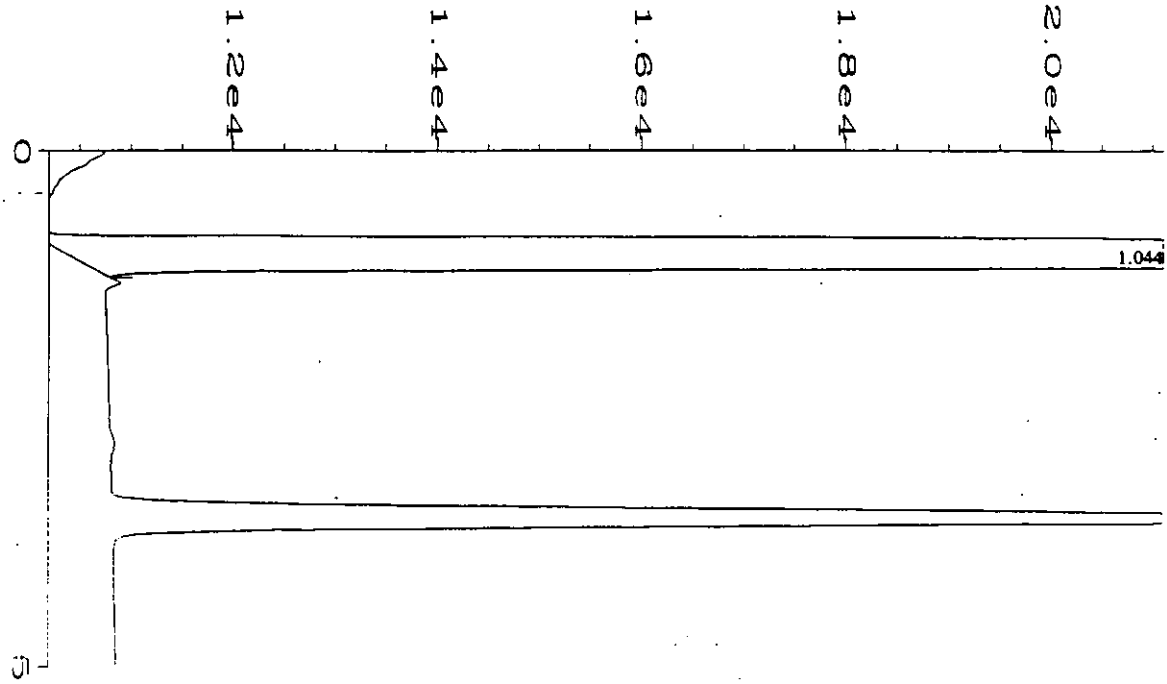
QA Standards (10 %)



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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0116.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 1000 PPM CH4	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 26 Oct 95 03:23 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 03:30 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0116.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.044	1325485	BV	0.232	1	884.538	Methane

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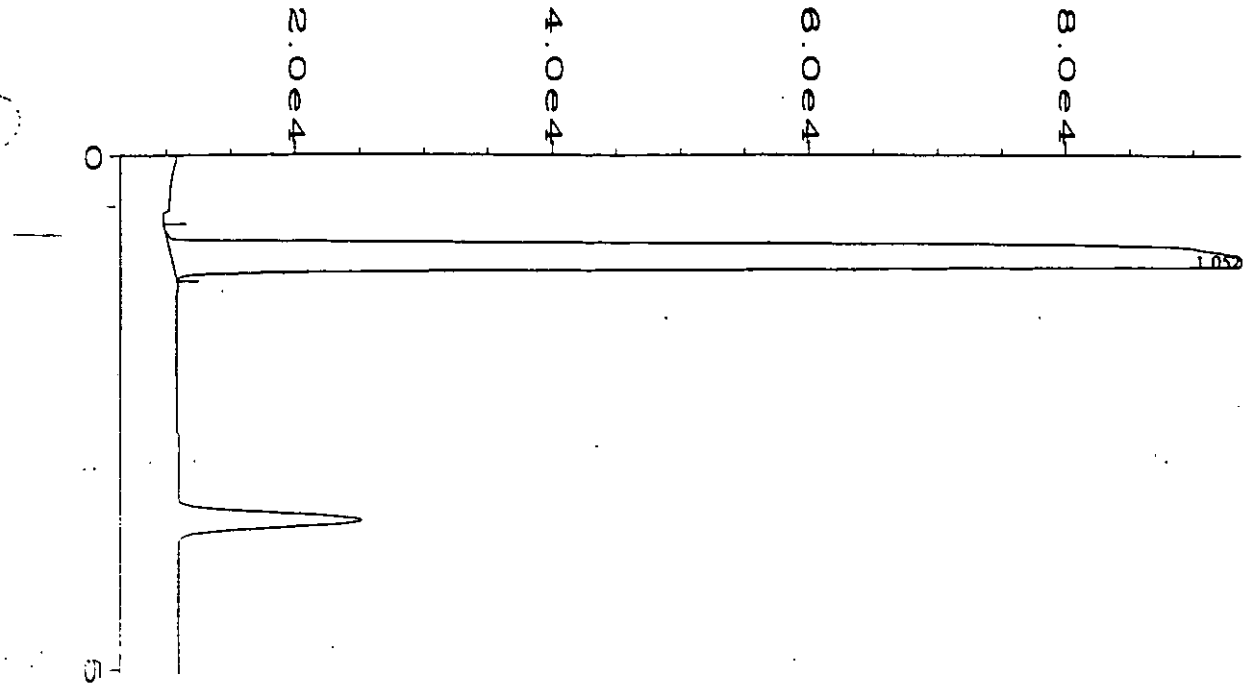

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0117.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 1000 PPM CH4	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 26 Oct 95 03:29 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 03:35 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0117.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.052	1298972	BV	0.230	1	866.272	Methane

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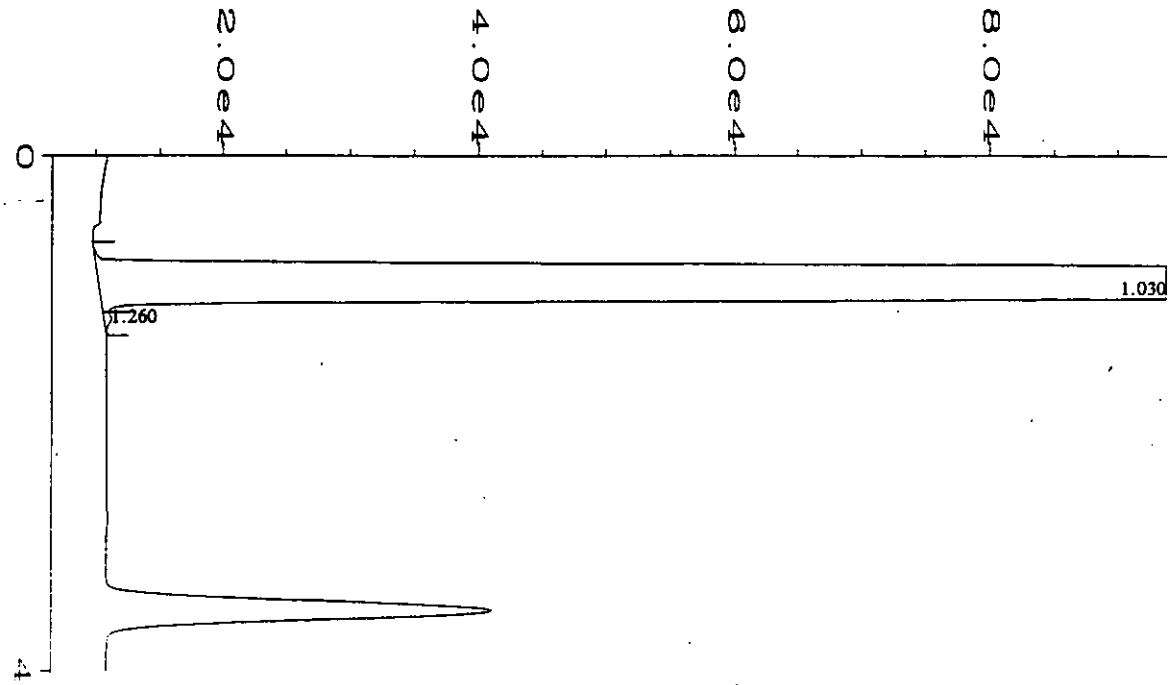

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External Standard Report

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Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 2000 PPM CH4	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 26 Oct 95 03:37 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 03:41 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0118.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.030	2975280	BV	0.234	1	2021.190	Methane

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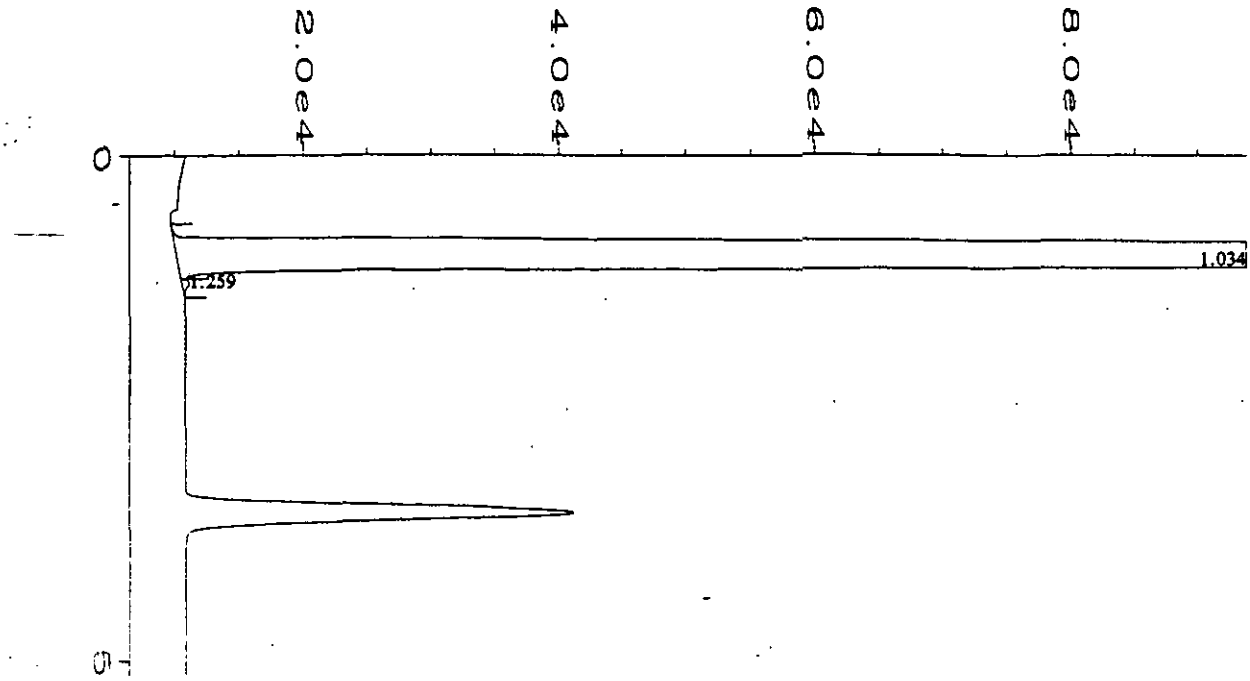

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External Standard Report

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a File Name	: C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0119.D		
Operator	: dmb	Page Number	: 1
Instrument	: TELLER	Vial Number	:
Sample Name	: 2000 PPM CH4	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 26 Oct 95 03:43 PM	Instrument Method	: 1095-18.MTH
Report Created on	: 26 Oct 95 03:48 PM	Analysis Method	: 1095-18A.MTH
Last Recalib on	: 26 Oct 95 02:06 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\OCT95\1095-18\NV-F0119.D

Ret Time	Area	Type	Width	Ref#	ppmv	Name
1.034	2993951	BV	0.208	1	2034.054	Methane

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Tank Samples

Methyl chloride was quantified using a modification of EPA Method 18. This procedure is based upon the Evacuated Flask Procedure; however, instead of using a flask, a stainless steel canister was used. Prior to the field mobilization, all numbered canisters were first leak-tested (pressurized and allowed to stand for 24 hours), then analyzed by GC/FID to certify a less than 1.0 ppm concentration of total organic constituents. Upon completion of sample collection, the tanks were be transported from the site, under sample custody, to Enthalpy Analytical, Inc. for analysis. At the lab, the initial tank vacuum, barometric pressure, and temperature were measured and recorded. The tanks were then pressurized to ~ 600 mmHg and the final tank pressure measured and recorded. These initial and final tank pressures, barometric pressure, and temperature recordings are used to convert the "as analyzed" concentrations to "as sampled" concentrations using a dilution factor which is calculated based: on the following formula

$$\frac{(\text{Final mmHg} + (\text{Pbar} * 25.401))}{(\text{Initial mmHg} + (\text{Pbar} * 25.401))} * \frac{(\text{Temp. Initial} + 460)}{(\text{Temp. Final} + 460)}$$

In the lab, all samples were introduced into the GC/FID using a heated VICI gas phase ten-port valve. Method 18 section 7.4.4 Quality Assurance criteria were met; including: duplicate injection of each sample aliquot with agreement of both injections to within 5% of the mean; three point calibration curves for methyl chloride (based on least squared regression analysis), calibration curves each day; and all calibration points agreed with the theoretical value within 10%.

Tube Samples

To determine the emissions of epichlorohydrin, octane, 1,3 dichloropropane, and octanol the adsorbent tube procedure of EPA Method 18 was used. Three chacoal tubes were placed in series. During sampling, moisture condensation was observed in the sample probe. The moisture was revovered into a zero headspace VOA vial at the end of the run. A disparger was placed in the probe for the second run. Again, the disparger contents were recovered into a zero headspace VOA vial at the end of the run. The water fractions were analyzed and added to the charcoal catches. The first charcoal tube was desorbed in carbon disulfide with 5%dimethyl formamide and analyzed by GC/FID. The second tube in series was split into two fractions and desorbed and analyzed in the same manner. The samples were analyzed on a Hewlett Packard Series II gas chromatograph coupled with a flame ionization detector. The compounds were separated using a Restek 60m x 0.53 RTX Volatiles capillary column. The quality assurance procedures are the same as mentioned above.
Desorption efficiencies were determined for each compound by spiking charcoal tubes then processing them in the same manner as the samples. Catch weights are adjusted for desorption efficiency.

APPENDIX C. ANALYTICAL DATA

4. Particulate

Case Narrative
Triangle Laboratories, Inc.
801 Capitola Drive
Durham, NC 27713
Phone: (919) 544-5729
Fax: (919) 544-5491

Project Number: 34684

Date: October 31, 1995

Objective: Analysis of three filter and acetone rinse samples and one acetone blank sample for filterable particulate according to the guidelines of Method 5.

Three filter and acetone rinse samples were received on October 24, 1995 by Triangle Laboratories, Inc. in good condition. The acetone blank received with TLI project number 34683A was utilized for the acetone blank analysis with this project, also. The pre-tared filters and rinses were transferred to tared Teflon baggies and desiccated for a minimum of 24 hours. After this time period, each baggie was weighed using a Mettler AT 100 analytical balance. All weights were recorded to the nearest 0.1 milligram. Each baggie was then desiccated for at least an additional six hours and weighed again. The process was continued until two consecutive weights agreed within +/- 0.5 milligrams. Results reported relate only to the items tested.

The filterable particulate results are reported in units of milligrams (mg) and are the sum of the filter and rinse catches. The lowest weight obtained for each fraction was used in the calculations. Any particulate catch found in the acetone blank was adjusted based on the relative volume of the blank and sample.

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The data in this package has been judged to be valid according to the guidelines of Method 201A except as noted above. If there are questions about the data, please feel free to contact Project Scientist, Nancy Bragg at 919/544-8348.

For Triangle Laboratories, Inc.:

Report Preparation

Patricia C. Berkowitz 10/31/95
Patricia C. Berkowitz
Report Preparation Chemist

Quality Control

10/31/95
Jerry P. Roach
Report Preparation Chemist

The total number of pages in this data package is: 9

Entropy, Inc.

TLI Project: 34684 — NSPS Method 5

Client Project: Triangle Brick 11990-1448-18
Matrix: Filters and FH-Acetone Rinses — Date Received: 10/24/95

TLI Number:	TLI Blank #1	108-90-1	108-90-2	108-90-3
Sample ID:		S-M5-1	S-M5-2	S-M5-3
Filter Tare Wt., g:		0.4633	0.4707	0.4491
Baggie Tare Wt., g:		3.3659	3.2786	3.2757
Raw Weight, g:		3.8342	3.7515	3.7304
FILTER SAMPLE WEIGHT, g:		0.0050	0.0022	0.0056
Sample ID:	Acetone Blank 108-89-4A	S-M5-1	S-M5-2	S-M5-3
Tare Wt., g:	3.2773	3.2852	3.1371	3.1689
Raw Weight, g:	3.2778	3.2886	3.1420	3.1726
RINSE SAMPLE WEIGHT, g:	0.0005	0.0034	0.0049	0.0037
Filter Catch, mg:	--	5.0	2.2	5.6
Rinse Catch, mg:	0.5	3.4	4.9	3.7
Rinse Blank Residue, mg:	--	0.3	0.2	0.2
Net Rinse Catch, mg:	0.5	3.1	4.7	3.5
Filterable Particulate, mg:	**0.5**	**8.1**	**6.9**	**9.1**

VISUAL ANALYSIS OF FILTERS

Color:	llight brown	llight brown	brown
Texture:	stain	stain	stain
Foreign Matter:	none	none	none
Rel. Comp.:	equal	equal	equal
Baggie Number:	421	423	425

VISUAL ANALYSIS OF RINSES

Color:	colorless	brown	l brown	brown
Texture:	n\a	stain	stain	stain
Foreign Matter:	none	none	glass	none
Rel. Comp.:	equal	equal	equal	equal
Volume, mL:	300	150	100	100
Fragments:	no	no	no	no
Baggie Number:	436	422	424	426

PRDGRV v2.13. MILES v4.11.02

Triangle Laboratories, Inc.®
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 08:12 10/31/95

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS 34684

PO#:11990 - 14448-19 Customer Name: Withers and Ravenel Triangle Brick

Laboratory: TLI

Date Transmitted: 10/24/95 Results Due By: 11/07/95

Sample Matrix: Method 5 PM: VJT

Analysis: Analyze samples for Particulate according to EPA Method 5. Use Acetone Blank from Method 201A/202's.

(34683A) HB 10-24-95

Sample #	Sample ID	Components/Comments
1	S-M5-1	Acetone, Filter
2	S-M5-2	Acetone, Filter
3	S-M5-3	Acetone, Filter

203

Submitted By:

3

SAMPLE TRANSFER RECORD OF CUSTODY

Please include this form with the final (typed) results, and whenever the final results are faxed to Entropy.

The samples referenced in Entropy Environmentalists Inc. RFA or purchase order No. 1199D-14448-18 were shipped by Entropy on 10/24/95 (date) via PERSONAL CUSTUDY (mode) to TLI (laboratory) by Sean Deley (signature)

The samples were received for analysis on 10/24/95 (date) at Triangle Labs (laboratory) by John Guenther (signature)

As applicable, note any broken seals, leakage, spillage, or damage to samples. If discrepancy, specify seal No., jar No., sample No., etc.

L-0012 rev. 8-92

ENTROPY

4

Custody Seal : Absent	Sample Seals: Absent	TLI Project Number	34684	Book
Chain of Custody : Present				
Sample Tags : Present		Client: SEI01	Entropy, Inc.	108
Sample Tag Numbers: Listed				
SMO Forms : N/A		Date Received	10/24/95 By [illegible]	Page
Box	NO COOLANT	Carrier and Number	SEAN DALEY	90

TLI Number mR/H:CPM	Client ID	Matrix Location	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init
108-90-1A	S-M5-1	Filter / GRAV LAB								
108-90-1B	S-M5-1	FH Acetone Rinse / GRAV LAB								
108-90-2A	S-M5-2	Filter / GRAV LAB								
108-90-2B	S-M5-2	FH Acetone Rinse / GRAV LAB								
108-90-3A	S-M5-3	Filter / GRAV LAB								
108-90-3B	S-M5-3	FH Acetone Rinse / GRAV LAB								

Receiving Remarks:

205

Archive Remarks:

5

TRIANGLE LABORATORIES, INC.--CHAIN OF CUSTODY--REVISED 02/17/95

Custody Seal : Absent	Sample Seals: Absent	TLI Project Number : 34683	Book
Chain of Custody : Present			
Sample Tags : Present		Client: EEI01 : Entropy, Inc.	108
Sample Tag Numbers: Listed			
SMO Forms : N/A		Date Received : 10/24/95 : By J. Guerthe	Page
Box	NO COOLANT	Carrier and Number : SEAN DALEY	89

TLI Number mR/H:CPM Client ID	Matrix Location	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init
108-89-1A S-M201A/202-1	FILTER								
	GRAV LAB								
108-89-1B S-M201A/202-1	FH/ACE								
	GRAV LAB								
108-89-1C S-M201A/202-1	BH/MECL2								
	GRAV LAB								
108-89-1D S-M201A/202-1	NOZ.ACE								
	GRAV LAB								
108-89-1E S-M201A/202-1	DI H2O								
	GRAV LAB								
108-89-2A S-M201A/202-2	FILTER								
	GRAV LAB								
108-89-2B S-M201A/202-2	FH/ACE								
	GRAV LAB								
108-89-2C S-M201A/202-2	BH/MECL2								
	GRAV LAB								
108-89-2D S-M201A/202-2	NOZ.ACE								
	GRAV LAB								
108-89-2E S-M201A/202-2	DI H2O								
	GRAV LAB								

Receiving Remarks:

206

Archive Remarks:

Custody Seal : Absent	Sample Seals: Absent	TLI Project Number : 34683	Book
Chain of Custody : Present			
Sample Tags : Present		Client: EEI01 : Entropy, Inc.	108
Sample Tag Numbers: Listed			
SMO Forms : N/A		Date Received : 10/24/95 : By [signature]	Page
Box	NO COOLANT	Carrier and Number : SEAN DALEY	89

TLI Number mR/H:CPM	Client ID	Matrix Location	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init
108-89-3A	S-M201A/202-3	FILTER GRAV LAB								
108-89-3B	S-M201A/202-3	FH/ACE GRAV LAB								
108-89-3C	S-M201A/202-3	BH/MECL2 GRAV LAB								
108-89-3D	S-M201A/202-3	HOZ.ACE GRAV LAB								
108-89-3E	S-M201A/202-3	DI H2O GRAV LAB								
108-89-4A	BLANK	ACETONE GRAV LAB								
108-89-4B	BLANK	MECL2 GRAV LAB								
108-89-4C	BLANK	DI H2O GRAV LAB								

Receiving Remarks:

207

Archive Remarks:

TRIANGLE LABORATORIES, INC.

Gravimetrics Sample Tracking & Management Form

Project: 34684

Client: Entropy, Inc. (EEI01)

Sample Information

Method: 5

Solvent/Acids(): Acetone

Start Date: 10/25/95

Lot: 953042

Temperature: 72 | 66 | 71

Humidity: 21 | 53 | 41

Sample #	crd	TLI SAMPLE ID / CLIENT SAMPLE ID	Baggie Weight (g)	Baggie Number	Filter Number & Tare Weight (g)	Solvent Volume (mL)	Sample Weight 8:20AM 10/27/95 (g) L.B	9:20AM 10/30/95 (g) L.B.	7:36AM 10/31/95 (g) L.B	(g)
000	TLI Blank #1	Acetone Blank 108-89-4A	3.2773	436		300		3.2778	3.2778	
001	108-90-1A	S-M5-1	3.3659	421	0.4633		3.8342	3.8343		
002	108-90-1B	S-M5-1	3.2852	422		150	3.2886	3.2886		
003	108-90-2A	S-M5-2	3.2786	423	0.4707		3.7521	3.7515	3.7517	
004	108-90-2B	S-M5-2	3.1371	424		100	3.14[illegible]	3.1420		
005	108-90-3A	S-M5-3	3.2757	425	0.4491		3.7304	3.7304		
006	108-90-3B	S-M5-3	3.1689	426		100	3.1726	3.1726		

Comments: 1) Redish Brown Residue. sample #2, 4, and 6 have yellow or gold spots.

REV 07/13/95 (PSTMP 8)

8

EEIØ1-Entropy, Inc.
S-M5-1
Project: 34684
1Ø8-9Ø-1A

[redacted] TGF 056
.4633

Qorpak
QORPAK
CORPORATE ONE WEST
1195 WASHINGTON PIKE
BRIDGEVILLE, PA 15017-285
412-257-3100 800-922-755

SITE NAME	DATE
[illegible]	[illegible]
ANALYSIS	TIME
S-M5-	[illegible]
	PRESERVATIVE

[illegible]

[redacted]

EEIØ1-Entropy, Inc.
S-M5-1
Project: 34684
1Ø8-9Ø-1B

Qorpak®
QORPAK®
CORPORATE ONE WEST
1195 WASHINGTON PIKE
BRIDGEVILLE, PA 15017-2[illegible]
412-257-3100 800-922-755

SITE NAME	DATE
[illegible]	10/18/95
ANALYSIS	TIME
S-M5-1	14448
	PRESERVATIVE

LOT# [illegible]

EEIØ1-Entropy, Inc.
S-M5-2
Project: 34684
1Ø8-9Ø-2A

[redacted] TGF 060
.4707

Qorpak®
QORPAK®
CORPORATE ONE WEST
1195 WASHINGTON PIKE
BRIDGEVILLE, PA 15017-28[illegible]
412-257-3100 800-92[illegible]

SITE NAME	DATE
[illegible]	[illegible]
ANALYSIS	TIME
[illegible]	[illegible]
	PRESERVATIVE

LOT# Filter [illegible]

SPECIALLY CLEANED CONTAINER

EEIØ1-Entropy, Inc.
S-M5-2
Project: 34684
1Ø8-9Ø-2B

[redacted]

PLANT: Triangle Brick
JOB #: 14448 DATE: 10/18/95
RUN #: S-M5-2

Front ½ Rinse w/ Ace.

MARK LIQ
IF APPLI.

EEIØ1-Entropy, Inc.
S-M5-3
Project: 34684
1Ø8-9Ø-3A

Qorpak®
QORPAK®
CORPORATE ONE WEST
1195 WASHINGTON PIKE
BRIDGEVILLE, PA 15017-[illegible]
412-257-3100 800-922-755

SITE NAME	DATE
[illegible]	[illegible]
ANALYSIS	TIME
[illegible]	[illegible]
	PRESERVATIVE

LOT# [illegible]

SPECIALLY CLEANED CONTAINER

[redacted] 14512
[illegible]

EEIØ1-Entropy, Inc.
S-M5-3
Project: 34684
1Ø8-9Ø-3B

PLANT: Triangle Brick
JOB #: 14448 DATE: 10/18/95
RUN #: S-M5-3

Front ½ Rinse w/ Acetone

MARK LIQUID LEVEL ON LABEL
IF APPLICABLE

209

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APPENDIX C. ANALYTICAL DATA

5. Particulate ≤ 10 Microns

Case Narrative
Triangle Laboratories, Inc.
801 Capitola Drive
Durham, NC 27713
Phone: (919) 544-5729
Fax: (919) 544-5491

Project Number: 34683A

Date: October 31, 1995

Objective: Analysis of three filter, acetone rinse and nozzle & cyclone rinse samples and one acetone blank sample for filterable particulate according to the guidelines of Method 201A.

Three filter, acetone rinse, and nozzle & cyclone rinse samples and one blank were received on October 24, 1995 by Triangle Laboratories, Inc. in good condition. The pre-tared filters and rinses were transferred to tared Teflon baggies and desiccated for a minimum of 24 hours. After this time period, each baggie was weighed using a Mettler AT 100 analytical balance. All weights were recorded to the nearest 0.1 milligram. Each baggie was then desiccated for at least an additional six hours and weighed again. The process was continued until two consecutive weights agreed within +/- 0.5 milligrams. Results reported relate only to the items tested.

The filterable particulate results are reported in units of milligrams (mg) and are the sum of the filter and rinse catches. The lowest weight obtained for each fraction was used in the calculations. Any particulate catch found in the acetone blank was adjusted based on the relative volume of the blank and sample.

The filter and acetone rinse results are reported for particles ≤ 10 micrograms (μg). The nozzle/cyclone rinse results are reported for particles > 10 μg.

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The data in this package has been judged to be valid according to the guidelines of Method 201A except as noted above. If there are questions about the data, please feel free to contact Project Scientist, Nancy Bragg at 919/544-8348.

For Triangle Laboratories, Inc.:

Report Preparation

Patricia C. Berkowitz 10/31/95
Patricia C. Berkowitz
Report Preparation Chemist

Quality Control

for Selena Armstead 10/31/95
Jerry P. Roach
Report Preparation Chemist

The total number of pages in this data package is: 10

1

Entropy, Inc.

TLI Project: 34683-A

NSPS Method 201A

Client Project: Triangle Brick 11989-14448-18
Matrix: Filters, Acetone, Nozzle/Cyclone

Date Received: 10/24/95

TLI Number:	TLI Blank #1	108-89-1	108-89-1D	108-89-2
Sample ID:		S-M201A/202-1		S-M201A/202-2
Filter Tare Wt., g:		0.4757		0.4700
Baggie Tare Wt., g:		3.3184		3.2853
Raw Weight, g:		3.7976		3.7582
FILTER SAMPLE WEIGHT, g:		0.0035		0.0029

Sample ID:	Acetone Blank 108-89-4A	S-M201A/202-1	S-M201A/202-1	S-M201A/202-2
Tare Wt., g:	3.2773	3.8711	3.4408	3.2660
Raw Weight, g:	3.2778	3.8760	3.4438	3.2701
RINSE SAMPLE WEIGHT, g:	0.0005	0.0049	0.0030	0.0041
Filter Catch, mg:		3.5		2.9
Rinse Catch, mg:	0.5	4.9	3.0	4.1
Rinse Blank Residue, mg:	--	0.3	0.2	0.3
Net Rinse Catch, mg:	0.5	4.6	2.8	3.8
Filterable Particulate, mg:	**0.5**	**8.1**	**2.8**	**6.7**
Size:	n/a	≤10μm	>10μm	≤10μm

VISUAL ANALYSIS OF FILTERS

Color:	Llight brown	Llight brown
Texture:	stain	stain
Foreign Matter:	none	none
Rel. Comp.:	equal	equal
Baggie Number:	427	430

VISUAL ANALYSIS OF RINSES

Color:	colorless	brown	redish brown	brown
Texture:	n\a	stain	stain	stain
Foreign Matter:	none	none	none	none
Rel. Comp.:	equal	equal	equal	equal
Volume, mL:	300	170	100	150
Fragments:	no	no	no	no
Baggie Number:	436	428	429	431

Triangle Laboratories, Inc.®
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

2

Entropy, Inc.

TLI Project: 34683-A

NSPS Method 201A

Client Project: Triangle Brick 11989-14448-18
Matrix: Filters, Acetone, Nozzle/Cyclone
Date Received: 10/24/95

TLI Number:	108-89-2	108-89-3	108-89-3
Sample ID:		S-M201A/202-3	

Filter Tare Wt., g:	0.4520
Baggie Tare Wt., g:	3.2393
Raw Weight, g:	3.6959
FILTER SAMPLE WEIGHT, g:	0.0046

Sample ID:	S-M201A/202-2	S-M201A/202-3	S-M201A/202-3
Tare Wt., g:	3.4533	3.3887	3.3892
Raw Weight, g:	3.4557	3.3918	3.3916
RINSE SAMPLE WEIGHT, g:	0.0024	0.0031	0.0024
Filter Catch, mg:		4.6	
Rinse Catch, mg:	2.4	3.1	2.4
Rinse Blank Residue, mg:	0.1	0.3	0.1
Net Rinse Catch, mg:	2.3	2.8	2.3
Filterable Particulate, mg:	**2.3**	**7.4**	**2.3**
Size:	>10µm	≤10µm	>10µm

VISUAL ANALYSIS OF FILTERS

Color:	Llight brown
Texture:	stain
Foreign Matter:	none
Rel. Comp.:	equal
Baggie Number:	433

VISUAL ANALYSIS OF RINSES

Color:	redish brown	brwon	redish brown
Texture:	stain	stain	stain
Foreign Matter:	none	none	none
Rel. Comp.:	equal	equal	equal
Volume, mL:	55	180	50
Fragments:	no	no	no
Baggie Number:	432	434	435

PRDGRV v2.13, MILES v4.11.02

Triangle Laboratories, Inc.®
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

34683A

PO#:11989 - 14448-18

Customer Name: Withers and Ravenel
Triangle Brick

Laboratory: TLI

Date Transmitted: 10/24/95

Results Due By: 11/07/95

Sample Matrix: Method 201A

PM: VJT

Analysis: Analyze samples for PM10 Particulate according to EPA Method 201A, and Condensibles according to EPA Method 202.

Sample #	Sample ID	Components/Comments
1	S-M201A/202-1	DI H2O, MeCl2, F1/2 Ace, Noz.Ace, Filter
2	S-M201A/202-2	DI H2O, MeCl2, F1/2 Ace, Noz.Ace, Filter
3	S-M201A/202-3	DI H2O, MeCl2, F1/2 Ace, Noz.Ace, Filter
4	Blanks	DI H2O, MeCl2, Acetone

Submitted By:

4

SAMPLE TRANSFER RECORD OF CUSTODY

Please include this form with the final (typed) results, and whenever the final results are faxed to Entropy.

The samples referenced in Entropy Environmentalists Inc. RFA or purchase order No. 11989-14448-18 were shipped by Entropy on 10/24/95 (date) via PERSONAL CUSTUDY (mode) to TLI (laboratory) by Sean Deley (signature)

The samples were received for analysis on 10/24/95 (date) at Triangle Labs (laboratory) by John Gunter (signature)

As applicable, note any broken seals, leakage, spillage, or damage to samples. If discrepancy, specify seal No., jar No., sample No., etc.

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ENTROPY

5

Custody Seal : Absent	Sample Seals: Absent	TLI Project Number : 34683	Book
Chain of Custody : Present			
Sample Tags : Present		Client: EEI01 : Entropy, Inc.	108
Sample Tag Numbers: Listed			
SMO Forms : N/A		Date Received : 10/24/95 : By J. Guenther	Page
Box	NO COOLANT	Carrier and Number : SEAN DALEY	89

TLI Number mR/H:CPM	Client ID	Matrix Location	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init
108-89-1A	S-M201A/202-1	FILTER								
		GRAV LAB								
108-89-1B	S-M201A/202-1	FH/ACE								
		GRAV LAB								
108-89-1C	S-M201A/202-1	BH/MECL2								
		GRAV LAB								
108-89-1D	S-M201A/202-1	NOZ.ACE								
		GRAV LAB								
108-89-1E	S-M201A/202-1	DI H2O								
		GRAV LAB								
108-89-2A	S-M201A/202-2	FILTER								
		GRAV LAB								
108-89-2B	S-M201A/202-2	FH/ACE								
		GRAV LAB								
108-89-2C	S-M201A/202-2	BH/MECL2								
		GRAV LAB								
108-89-2D	S-M201A/202-2	NOZ.ACE								
		GRAV LAB								
108-89-2E	S-M201A/202-2	DI H2O								
		GRAV LAB								

Receiving Remarks:

218

Archive Remarks:

Custody Seal : Absent	Sample Seals: Absent	TLI Project Number : 34683	Book
Chain of Custody : Present			
Sample Tags : Present		Client: EEI01 : Entropy, Inc.	108
Sample Tag Numbers: Listed			
SMO Forms : N/A		Date Received : 10/24/95 : By [signature]	Page
Box	NO COOLANT	Carrier and Number : SEAN DALEY	89

TLI Number mR/H:CPM	Client ID	Matrix Location	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init
108-89-3A	S-M201A/202-3	FILTER GRAV LAB								
108-89-3B	S-M201A/202-3	FH/ACE GRAV LAB								
108-89-3C	S-M201A/202-3	BH/MECL2 GRAV LAB								
108-89-3D	S-M201A/202-3	NOZ.ACE GRAV LAB								
108-89-3E	S-M201A/202-3	DI H2O GRAV LAB								
108-89-4A	BLANK	ACETONE GRAV LAB								
108-89-4B	BLANK	MECL2 GRAV LAB								
108-89-4C	BLANK	DI H2O GRAV LAB								

Receiving Remarks:

219

Archive Remarks:

TRIANGLE LABORATORIES, INC.

Gravimetrics Sample Tracking & Management Form

Project: 34683A

Client: Entropy, Inc. (EEI01)

Sample Information

Method: 201-A

Solvent/Acids(): Acetone

Start Date: 10/25/92

Lot: 953542

Temperature: 72 | 68 | 71

Humidity: 48 → 49 | 31 → 33 | 41 → 42

Sample #	TLI SAMPLE ID / CLIENT SAMPLE ID	Baggie Weight (g)	Baggie Number	Filter Number & Tare Weight (g)	Solvent Volume (mL)	Sample Weight 8:35AM 10/27/95 (g) L.B.	9:05AM 10/30/95 (g) L.B.	1:41AM 10/31/95 (g) L.B.	/ / (g)
A 000	TLI Blank #1 / Acetone Blank 108-89-4A	3.2773	436		300		3.2778	3.2778	
A 001	108-89-1A / S-M201A/202-1	3.3184	427	0.4757		3.7977	3.7976		
A 002	108-89-1B / S-M201A/202-1	3.8711	428		170		3.8761	3.8760	
A 003	108-89-1D / S-M201A/202-1	3.4408	429		100	3.4438	3.4438		
A 004	108-89-2A / S-M201A/202-2	3.2853	430	0.4700		3.7583	3.7582		
A 005	108-89-2B / S-M201A/202-2	3.2666	431		150	3.2701	3.2703		
A 006	108-89-2D / S-M201A/202-2	3.4533	432		55	3.4557	3.4561		
A 007	108-89-3A / S-M201A/202-3	3.2373	433	0.4520		3.6959	3.6959		
A 008	108-89-3B / S-M201A/202-3	3.3887	434		180	3.3918	3.3922		
A 009	108-89-3D / S-M201A/202-3	3.3892	435		50	3.3916	3.3918		

Comments:

220

REV 07/13/95 (PSTMF 8)

8

EKI01-Entropy, Inc.
S-M201A/202-1
Project:34683
108-89-1A

TGF 042
.4757

[redacted]

I-CHEM

CLIENT/SOURCE	☐ GRAB ☐ COMPOSITE OTHER:
SITE NAME	DATE
SAMPLE #	TIME
ANALYSIS	PRESERVATIVE
	COLL BY

EKI01-Entropy, Inc.
S-M201A/202-1
Project:34683
108-89-1B

[redacted]

Qorpak® QORPAK® CORPORATE ONE W... 1195 WASHINGTON PI... BRIDGEVILLE, PA 150... 412-257-3100 800-92...

SITE NAME	DATE
Triangle Brick	10/18/95
ANALYSIS	TIME 1441
S-M201A/202-1	PRESERVATIVE
COTS Plant Nozzle Rinse	

EKI01-Entropy, Inc.
S-M201A/202-1
Project:34683
108-89-1D

PLANT: Triangle Brick
JOB #: 14448
DATE: 10/18/95
RUN #: S-M201A/202-1
Nozzle & Cyclone Rinse

MARK LIQUID LEVEL ON LABEL IF APPLICABLE

EKI01-Entropy, Inc.
S-M201A/202-2
Project:34683
108-89-2A

TGF 055
.4700

[redacted]

CHEM

SOURCE	
SITE NAME	DATE
SAMPLE #	TIME
ANALYSIS	PRESERVATIVE
	COLL BY

EKI01-Entropy, Inc.
S-M201A/202-2
Project:34683
108-89-2B

Qorpak® QORPAK CORPOR... 1195 WAS... BRIDGEV... 412-257-3...

[redacted]

SITE NAME	
Triangle Brick	
ANALYSIS	TIME 1444
S-M201A/202-2	PRESERVATIVE
COTS Plant Nozzle Rinse	

EKI01-Entropy, Inc.
S-M201A/202-2
Project:34683
108-89-2D

[redacted]

PLANT: Triangle Brick
JOB #: 14448
DATE: 10/18/95
RUN #: S-M201A/202-2
Nozzle & Cyclone Rinse

EKI01-Entropy, Inc.
S-M201A/202-3
Project:34683
108-89-3A

[redacted]

I-CHEM

CLIENT/SOURCE	☐ GR
SITE NAME	DATE
SAMPLE #	TIME
ANALYSIS	PRESERVATIVE

EKI01-Entropy, Inc.
S-M201A/202-3
Project: 34683
108-89-3B

Qorpak®
QORPAK® CORPORATE ONE WEST
1195 WASHINGTON PD
BRIDGEVILLE, PA 150
412-257-3100

SITE NAME	DATE
Triangle Brick	10/18/95
ANALYSIS	1444
S-M201A/202-3	PRES[redacted]
LOT# Front ½ Rinse	

[redacted]

EKI01-Entropy, Inc.
S-M201A/202-3
Project: 34683
108-89-3D

PLANT: Triangle Brick
JOB #: 14448 DATE: 10/18/95
RUN #: S-M201A/202-3
Nozzle & Cyclone Rinse

MARK LIQUID[redacted]
IF APPLICAB[redacted]

EKI01-Entropy, Inc.
BLANK
Project: 34683
108-89-4A

PLANT: Triangle Brick
JOB #: 14448 DATE: 10/18/95
RUN #: M9/201A Acetone Reagent Blank

[redacted]

10

APPENDIX D. CALIBRATION DATA

SAMPLING EQUIPMENT AUDIT

Client Withers and Ravenel

Plant Triangle Brick — Job No. 14448

City/State Merry Oaks, NC — Team Leader JPD

Test Location Brick Kiln #2 Stack

BAROMETER

Barometer (Van) No. _____ Checked OK? (✓) ___ Shop Auditor _____

Entropy In-House Ref. Barometer _____ "Hg vs Van Barometer _____ "Hg

Date Compared _____ Dev. _____ "Hg (Max. Allowable Dev.: ± 0.1 "Hg)

Test Loc. Elevation Above Ground (Van) _____ Ft. Date _____ Field Auditor _____

Field Barometric Pressure Reduced for Test Location Elevation by _____ "Hg

Ref. Therm. Initial Ambient Temp., °F ___

Date _____ Auditor _____

	Allowable Deviation From Ambient	Ambient Temperature, °F				✓ OK
THERMOMETERS						
Dry Gas Meter	± 5.4 °F	____	(Meterbox I.D. _____)			___
Impinger Exit	± 2.0 °F	____	____	____	____	___
Filter Box	± 5.4 °F	____	____	____	____	___

THERMOCOUPLES

TC No. / °F	✓ OK	TC No. / °F	✓ OK	TC No. / °F	✓ OK	TC No. / °F	✓ OK	TC No. / °F	✓ OK
/ (Including Temp. Change and Direction)	___	/ (Including Temp. Change and Direction)	___	/ (Including Temp. Change and Direction)	___	/ (Including Temp. Change and Direction)	___	/ (Including Temp. Change and Direction)	___
Auditor ____		Auditor ____		Auditor ____		Auditor ____		Auditor ____	

Allowable Deviation from Ambient: ± 8.0°F * (or ± 2.0°F) **

* ± 8.0 °F = ± 1.5% of ambient absolute temperature.

** (± 2.0 °F if used in saturated or water droplet-laden gas stream.)

ISOKINETIC METERBOX

I.D. N-8 Gamma (Y) 0.9776 ΔH@ 1.900

As Applicable (check): Zero Magnehelics? ✓ Zero/Level Manometer? N/A

Barometric Pressure (P_{bar}) 30.12 Auditor J Date 10/16/95

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final 465.292	Final 96	0.96 * Y = 0.9384
Initial 457.507	Initial 94	1.04 * Y = 1.0167

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10)	
		(Minutes)	(Seconds)
Vm = 7.773	Tm = 95	10	0

$$Y_c = \frac{[10 + (0 / 60)]}{7.773} * \left[\frac{0.0319\ (95 + 460)}{30.12}\right]^{.5} = 0.9863$$

Audit Gamma

Audit Gamma Acceptable (between lower & upper limits)? (✓) Yes ✓ No ___

Ideal Sampling Rate = 0.75

Positive Pressure Leak Check OK? Yes ___ No ___

f-1113 rev. 5-93

SAMPLING EQUIPMENT AUDIT

Client Withers and Ravenel

Plant Triangle Brick — Job No. 14448

City/State Merry Oaks, NC — Team Leader JPD

Test Location Brick Kiln #2 Stack

BAROMETER

Barometer (Van) No. _____ Checked OK? (✓) ___ Shop Auditor _____

Entropy In-House Ref. Barometer _____ "Hg vs Van Barometer _____ "Hg

Date Compared _____ Dev. _____ "Hg (Max. Allowable Dev.: ± 0.1 "Hg)

Test Loc. Elevation Above Ground (Van) _____ Ft. Date _____ Field Auditor _____

Field Barometric Pressure Reduced for Test Location Elevation by _____ "Hg

Ref. Therm. Initial Ambient Temp., °F ____

Date _____ Auditor _____

	Allowable Deviation From Ambient	Ambient Temperature, °F				✓ OK
THERMOMETERS						
Dry Gas Meter	± 5.4 °F	____	(Meterbox I.D. _____)			___
Impinger Exit	± 2.0 °F	____	____	____	____	___
Filter Box	± 5.4 °F	____	____	____	____	___

THERMOCOUPLES

TC No./ °F	✓ OK	TC No./ °F	✓ OK	TC No./ °F	✓ OK	TC No./ °F	✓ OK	TC No./ °F	✓ OK
/	___	/	___	/	___	/	___	/	___
(Including Temp. Change and Direction)		(Including Temp. Change and Direction)		(Including Temp. Change and Direction)		(Including Temp. Change and Direction)		(Including Temp. Change and Direction)	
Auditor ____		Auditor ____		Auditor ____		Auditor ____		Auditor ____	

Allowable Deviation from Ambient: ± 8.0°F * (or ± 2.0°F) **

* ± 8.0 °F = ± 1.5% of ambient absolute temperature.

** (± 2.0 °F if used in saturated or water droplet-laden gas stream.)

ISOKINETIC METERBOX

I.D. N-14 Gamma (Y) 1.0013 ΔH@ 1.928

As Applicable (check): Zero Magnehelics? ✓ Zero/Level Manometer? N/A

Barometric Pressure (P_{bar}) 30.12 Auditor JPD Date 10/16/95

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final 66.656	Final 84	0.96 * Y = 0.9612
Initial 58.982	Initial 78	1.04 * Y = 1.0143

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10)	
		(Minutes)	(Seconds)
Vm = 7.674	Tm = 81	10	0

$$Y_c = \frac{[10 + (0 / 60)]}{7.674} * \left[\frac{0.0319\ (81 + 460)}{30.12}\right]^{.5} = 0.9863$$

Audit Gamma

Audit Gamma Acceptable (between lower & upper limits)? (✓) Yes ✓ No ___

Ideal Sampling Rate = 0.75

Positive Pressure Leak Check OK? Yes ___ No ___

f-1113 rev. 5-93

NOZZLE CALIBRATION

NOZZLE NUMBER GLP714

Date	Calib. By	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
5/14/91	DCW	.306	.308	.307	.306	.307	.306

Note: 1. All diameters measured in inches.
2. Maximum 0.004 inches from lowest to highest diameter.

R-0033 rev. 1-90

ENTROPY

NOZZLE CALIBRATION

NOZZLE NUMBER GLP 1447

Date	Calib. By	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
6-14-93	PFD	.312	.317	.313	.314	.312	0.313

Note: 1. All diameters measured in inches.
2. Maximum 0.004 inches from lowest to highest diameter.

R-0033a rev. 3-91

ENTROPY

NOZZLE CALIBRATION

NOZZLE NUMBER GLP1448

Date	Calib. By	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
6-14-93	PFD	.313	.313	.313	.312	.312	0.313

Note: 1. All diameters measured in inches.
2. Maximum 0.004 inches from lowest to highest diameter.

R-0033a rev. 3-91

ENTROPY

NOZZLE CALIBRATION

NOZZLE NUMBER GLP1449

Date	Calib. By	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
6-14-93	PFD	.314	.315	.312	.313	.313	0.313

Note: 1. All diameters measured in inches.
2. Maximum 0.004 inches from lowest to highest diameter.

R-0033a rev. 3-91

ENTROPY

NOZZLE NUMBER: 1004

Date	Initials	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
10-26-88	SRD	.234	.233	.234	.233	.233	.233
11/15/88	BKG	.243	.241	.243	.242	.243	.242
5-17-90	SRD	.250	.252	.252	.253	.252	.252
3-6-92	JPW	.248	.248	.250	.248	.250	.249
5-7-93	CCB	.249	.248	.248	.250	.249	.249

NOTE: All diameters measured in inches.

NOZZLE CALIBRATION

NOZZLE NUMBER 2004

Date	Calib. By	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
3-6-92	JPW	.252	.252	.251	.251	.252	.252
5-7-93	[illegible]	.251	.250	.251	.252	.254	.252

Note: 1. All diameters measured in inches.
2. Maximum 0.004 inches from lowest to highest diameter.

R-0033a rev. 3-91

ENTROPY

NOZZLE CALIBRATION

NOZZLE NUMBER 3004

Date	Calib. By	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
3-6-92	JPW	.250	.247	.248	.248	.249	.248
5.7.93	GM	.250	.249	.248	.249	.248	.249

Note: 1. All diameters measured in inches.
2. Maximum 0.004 inches from lowest to highest diameter.

R-0033a rev. 3-91

ENTROPY

STANDARD DRY GAS METER CALIBRATION

Meter Number 1017057

Date 10-5-94 Auditor(s) PJ/MC Barometric Press. (P_{bar}) 29.64

Spirometer		Dry Gas Meter						
Gas Volume Cubic Feet (V_s)	Temp. °F (t_s)	Gas Volume Cubic Feet (V_{ds})	Temp. °F (t_{ds})	Pressure In. H_2O (ΔP)	Time Min. (θ)	Aprox. Flow Rate cfm	Calc'd Flow Rate cfm (Q)	Meter Coeff. Gamma (Y_{ds})
2.823	71.6	2.793	64	-.34	10	.2793	.2777	.9972
2.714	↓	2.723	69	-.35	↓	.2723	.2669	.9927
2.687	↓	2.696	69.5	-.35	↓	.2696	.2642	.9925
5.009	75.2	5.103	74.5	-.795	↓	.5103	.4894	.9823
4.973	↓	5.113	76	-.795	↓	.5113	.4858	.9759
5.064	↓	5.106	76.5	-.795	↓	.5106	.4947	.9961
8.488	75.2	8.697	77	-1.7	↓	.8697	.8292	.9834
8.470	77	8.649	78	-1.7	↓	.8649	.8247	.9853
8.452	77	8.638	77.5	-1.7	↓	.8638	.8229	.9835
12.213	80.6	12.562	78	-3.4	↓	1.2562	1.1812	.9758
12.350	↓	12.592	↓	-3.4	↓	1.2592	1.1944	.9843
12.295	↓	12.583	↓	-3.4	↓	1.2583	1.1891	.9724
13.953	↓	14.286	↓	-4.2	↓	1.4286	1.3495	.9822
13.971	↓	14.305	↓	-4.2	↓	1.4305	1.3512	.9822
13.934	↓	14.262	↓	-4.2	↓	1.4262	1.3477	.9826
							Average	.9846

$$Y_{ds} = \frac{(V_s)\ (t_{ds} + 460)\ (P_{bar})}{(V_{ds})\ (t_s + 460)\ [P_{bar} + (\Delta P / 13.6)]}$$

$$Q = (17.64)\ \left[\frac{(P_b)\ (V_s)}{(t_s + 460)\ (\theta)}\right]$$

R-0047 rev. 7-94

ISOKINETIC METERBOX FULLTEST CALIBRATION RESULTS

Meterbox No.: **N8** Date: 10-11-95 Calibrated By: P. JUDD

Standard Meter No: 1017057 Barometric Pressure, Pb, In. Hg: 29.74

Standard Meter Coefficient, Yds: 0.9846 Meterbox Vacuum, In. Hg: 0

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (Vds) cf	Temp. (tds) °F	Time (theta) Min.	Orifice Setting (Delta H) In. H2O	Gas Volume (Vd) cf	Temp. (td) °F	Coeff. (Yd)	Delta H@ in. H2O @ 68°F
4.977	71	13	0.5	5.367	109.5	0.9780	1.867
4.937	71	13	0.5	5.386	113.5	0.9736	1.884
5.268	71	7	2	5.772	119	0.9750	1.901
5.264	71	7	2	5.824	122.5	0.9714	1.893
9.186	71	8	4.8	10.082	128.5	0.9826	1.928
5.722	71	5	4.8	6.313	133	0.9849	1.927
					Average:	0.9776	1.900

$$Yd = \frac{Yds * Vds * (td + 460) * Pb}{Vd * (tds + 460) * (Pb + (delta\ H / 13.6))}$$

$$delta\ H@ = \frac{0.0319 * delta\ H}{Pb * (tds + 460)} * \left[\frac{(td + 460) * theta}{Yds * Vds}\right]^2$$

ISOKINETIC METERBOX POSTTEST CALIBRATION RESULTS

Meterbox No.:	N8	Date:	10/20/95	Calibrated By:	P. JUDD
Job Number:	14448	Plant:	WITHERS		
Standard Meter No:	1017057	Barometric Pressure, Pb, In. Hg:			29.6
Standard Meter Coefficient, Yds:	0.9846	Meterbox Vacuum, In. Hg:			2

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (Vds) cf	Temp. (tds) °F	Time (theta) Min.	Orifice Setting (Delta H) In. H2O	Gas Volume (Vd) cf	Temp. (td) °F	Coeff. (Yd)	Delta H@ in. H2O @ 68°F
4.983	71	8	1.3	5.241	87	0.9612	1.919
4.953	71	8	1.3	5.233	93.5	0.9683	1.919
4.941	71	8	1.3	5.242	99.5	0.9747	1.908
					Average:	0.9681	1.915

Fulltest Yd: 0.9776 Date: 10/11/95 % Deviation*: -1.0%

* maximum allowed deviation = ±5%

$$Yd = \frac{Yds \cdot Vds \cdot (td + 460) \cdot Pb}{Vd \cdot (tds + 460) \cdot (Pb + (delta\ H / 13.6))}$$

$$delta\ H@ = \frac{0.0319 \cdot delta\ H}{Pb \cdot (tds + 460)} * \left[\frac{(td + 460) \cdot theta}{Yds * Vds}\right]^2$$

ISOKINETIC METERBOX FULLTEST CALIBRATION RESULTS

Meterbox No.: **N14** Date: 10-12-95 Calibrated By: P. JUDD

Standard Meter No: 1017057 Barometric Pressure, Pb, In. Hg: 29.77

Standard Meter Coefficient, Yds: 0.9846 Meterbox Vacuum, In. Hg: 0

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (Vds) cf	Temp. (tds) °F	Time (theta) Min.	Orifice Setting (Delta H) In. H2O	Gas Volume (Vd) cf	Temp. (td) °F	Coeff. (Yd)	Delta H@ in. H2O @ 68°F
4.981	69	13	0.5	5.147	97.5	1.0029	1.888
4.907	69	13	0.5	5.159	105.5	0.9999	1.918
5.201	69	7	2	5.52	114.5	1.0025	1.949
5.195	69	7	2	5.549	119	1.0040	1.938
5.714	69	5	4.8	6.169	125.5	0.9976	1.940
5.708	69	5	4.8	6.177	129	1.0012	1.933
					Average:	1.0013	1.928

$$Yd = \frac{Yds * Vds * (td + 460) * Pb}{Vd * (tds + 460) * (Pb + (delta\ H / 13.6))}$$

$$delta\ H@ = \frac{0.0319 * delta\ H}{Pb * (tds + 460)} * \left[\frac{(td + 460) * theta}{Yds * Vds}\right]^2$$

ISOKINETIC METERBOX POSTTEST CALIBRATION RESULTS

Meterbox No.: N14 Date: 10/20/95 Calibrated By: P. JUDD

Job Number: 14448 Plant: WITHERS

Standard Meter No: 1017057 Barometric Pressure, Pb, In. Hg: 29.6

Standard Meter Coefficient, Yds: 0.9846 Meterbox Vacuum, In. Hg: 2

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (Vds) cf	Temp. (tds) °F	Time (theta) Min.	Orifice Setting (Delta H) In. H2O	Gas Volume (Vd) cf	Temp. (td) °F	Coeff. (Yd)	Delta H@ in. H2O @ 68°F
4.999	71	8	1.3	5.151	96	0.9973	1.875
4.991	71	8	1.3	5.185	101.5	0.9990	1.863
5.582	71	9	1.3	5.858	107.5	0.9995	1.865
					Average:	0.9986	1.868

Fulltest Yd: 1.0013 Date: 10/12/95 % Deviation*: -0.3%

* maximum allowed deviation = ±5%

$$Yd = \frac{Yds * Vds * (td + 460) * Pb}{Vd * (tds + 460) * (Pb + \{delta\ H / 13.6\})}$$

$$delta\ H@ = \frac{0.0319 * delta\ H}{Pb * (tds + 460)} * \left[\frac{(td + 460) * theta}{Yds * Vds}\right]^2$$

THERMOCOUPLE CALIBRATION

Thermocouple No.: R325

Date: 3/26/92

Calibrated By: JPW

Barometric Pressure, Inches Hg: 29.32

Ambient Temperature, °F: 72.0

Mercury-In-Glass Thermometer I.D. No.: 7121K

Calibration System Used	Potentiometer I.D. Number	Reference Thermometer Temperature T_o °F	Reference Thermometer Temperature T_c °F	Mean Temperature of Hg Column T_m °F	Thermocouple Thermometer Temperature T_t °F	Temperature Diff., % (Allowable: ≤ 1.5 %)
Ice Bath	F64	32.0	31.96	69.0	32.0	-.01
		32.0	31.96	69.0	32.0	-.01
		32.0	31.96	69.0	33.0	-.22
Boiling Water	F64	210.0	211.71	110.0	210.6	.17
		210.0	211.71	110.0	210.4	.20
		210.0	211.71	110.0	210.4	.20
Boiling Oil	F64	409.0	418.98	124.0	409.8	1.04
		409.0	418.98	124.0	410.0	1.02
		409.0	418.98	124.0	409.8	1.04

$$\text{Corrected Temperature} = T_c = T_o + [(.00009) \cdot (T_o - 20) \cdot (T_o - T_m)]$$

$$\text{Temperature Difference} = \frac{[(T_c + 460) - (T_t + 460)]}{(T_c + 460)} \cdot 100$$

R-0023 Rev. 8-90

ENTROPY

THERMOCOUPLE CALIBRATION

Thermocouple No.: R364

Date: 6/17/93

Calibrated By: CCB

Barometric Pressure, Inches Hg: 29.80

Ambient Temperature, °F: 72.0

Mercury-In-Glass Thermometer I.D. No.: T2/T3

Calibration System Used	Potentiometer I.D. Number	Reference Thermometer Temperature T_o °F	Reference Thermometer Temperature T_c °F	Mean Temperature of Hg Column T_m °F	Thermocouple Thermometer Temperature T_t °F	Temperature Diff., % (Allowable: ≤ 1.5 %)
Ice Bath	F64	32.0	31.96	68.0	31.9	.01
		32.0	31.96	68.0	31.8	.03
		32.0	31.96	68.0	31.8	.03
Boiling Water	F64	211.2	212.93	110.9	211.3	.24
		211.2	212.93	110.9	211.2	.26
		211.2	212.93	110.9	211.2	.26
Boiling Oil	F64	396.1	405.65	114.0	393.6	1.39
		396.1	405.65	114.0	393.6	1.39
		396.1	405.65	114.0	393.4	1.41

Corrected Temperature $= T_c = T_o + [(.00009) * (T_o - 20) * (T_o - T_m)]$

$$\text{Temperature Difference} = \frac{[(T_c + 460) - (T_t + 460)]}{(T_c + 460)} * 100$$

R-0023 Rev. 8-90

THERMOCOUPLE CALIBRATION

THERMOCOUPLE No. R385

Date 7-29-94 Calibrated By MC

Barometric Pressure, "Hg 29.57 Ambient Temperature, °F 71

Calibration System Used	Ref. Digital Thermometer & Thermocouple I.D. Nos.	Reference Thermocouple Temperature (T_r °F)	Test Digital Thermometer I.D. No.	Test Thermocouple Temperature (T_t °F)	Temperature Diff., % (Allowable: ≤ 1.5 %)
ICE BATH	T-102829	31.4	HH-97	32.4	0.2
	T-0	31.3		32.4	0.2
		31.2		32.4	0.2
BOILING WATER		212.6		213.2	0.1
		212.5		213.0	0.1
		212.5		210.2	0.3
BOILING OIL		404.6		400.2	0.5
		413.9		411.2	0.3
		413.1		409.6	0.4

$$\text{Temperature Difference} = \frac{T_r - T_t}{T_r + 460} \cdot 100$$

R-0023 Rev. 11-93

THERMOCOUPLE CALIBRATION

THERMOCOUPLE No. R394

Date 7-29-94 Calibrated By MC

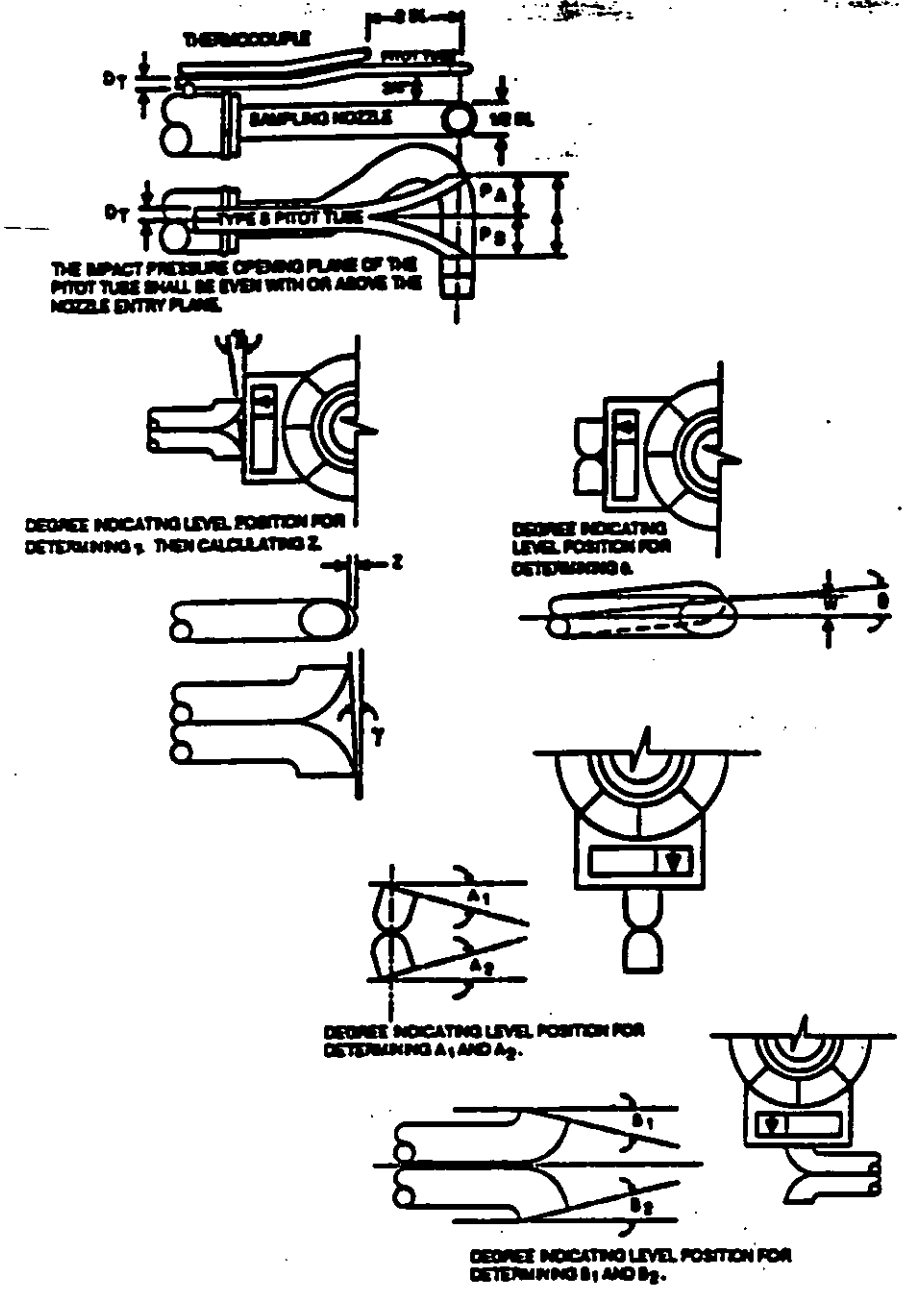
Barometric Pressure, "Hg 29.57 Ambient Temperature, °F 71

Calibration System Used	Ref. Digital Thermometer & Thermocouple I.D. Nos.	Reference Thermocouple Temperature (T_r °F)	Test Digital Thermometer I.D. No.	Test Thermocouple Temperature (T_t °F)	Temperature Diff., % (Allowable: ≤ 1.5 %)
ICE BATH	T-102829	31.3	HH-97	32.4	0.2
	T-0	31.3		32.2	0.2
		31.2		32.6	0.3
BOILING WATER		212.6		210.4	0.3
		212.6		209.5	0.5
		212.5		212.8	0
BOILING OIL		414.6		409.6	0.6
		413.7		408.6	0.6
		413.5		406.0	0.9

$$\text{Temperature Difference} = \frac{T_r - T_t}{T_r + 460} * 100$$

R-0023 Rev. 11-93

PITOT TUBE INSPECTION



level?	yes
obstructions?	NONE
damaged?	NONE
$-10° < \alpha_1 < +10°$	0
$-10° < \alpha_2 < +10°$	0
$-5° < B1 < +5°$	0
$-5° < B2 < +5°$	0
γ	0
θ	0
A	.945
$1.05\ D_t < P_a < 1.5\ D_t$	.476
$1.05\ D_t < P_b < 1.5\ D_t$	.469
$3/16" < D_t < 3/8"$	.375
$A \tan \gamma < 0.125"$	0
$A \tan \theta < 0.03125"$	0
$P_a = P_b \pm 0.063"$	yes .007

See 40 CFR 60, Vol. 42 No. 160 EPA Method 2. Verify the minimum 2-inch setback of the thermocouple and the minimum 3/4-inch separation between the pitot tube and the nozzle as shown at the top of this page.

Comments: _____

I certify that pitot tube/probe number 5-22 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84.

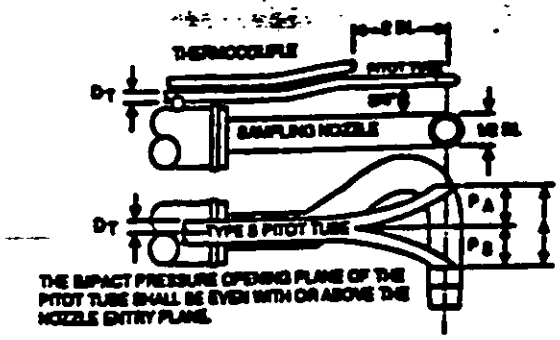
Signature W.L. Shewell

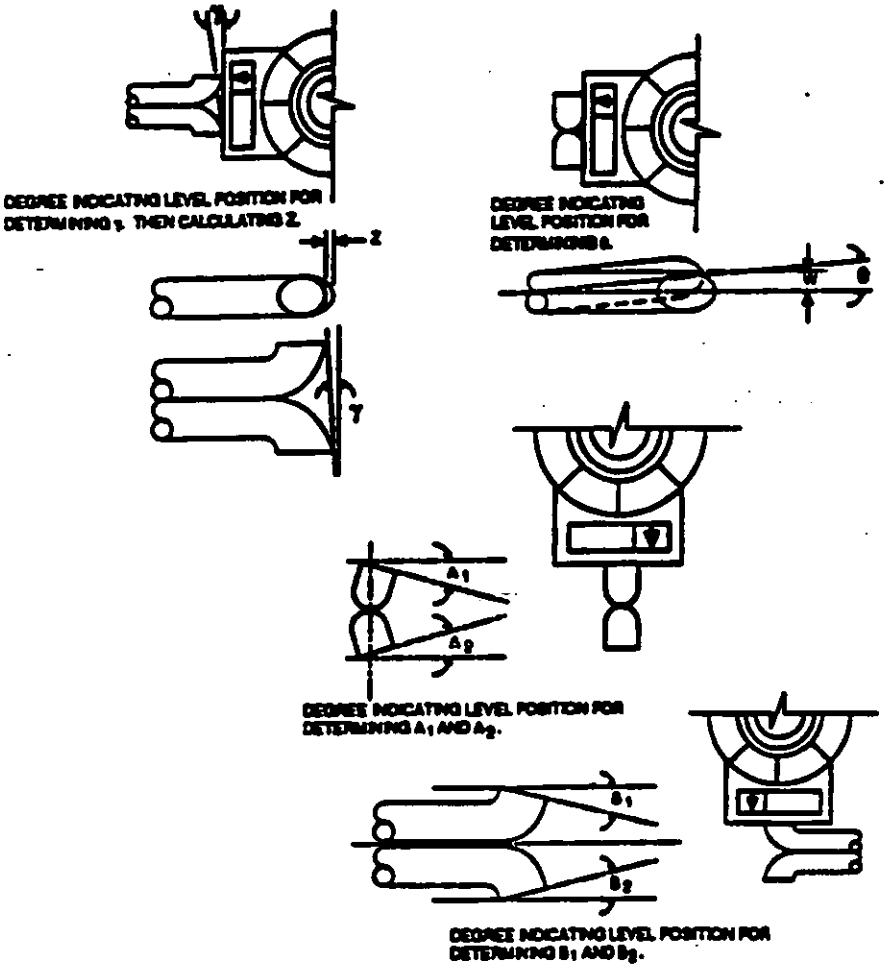
Date 12-30-91

R-0028 rev. 3/90

ENTROPY

PITOT TUBE INSPECTION





level?	yes
obstructions?	NONE
damaged?	NONE
$-10° < \alpha_1 < +10°$	0
$-10° < \alpha_2 < +10°$	0
$-5° < B1 < +5°$	0
$-5° < B2 < +5°$	0
γ	1°
θ	0
A	.926
$1.05\ D_t < P_a < 1.5\ D_t$	.459
$1.05\ D_t < P_b < 1.5\ D_t$	.467
$3/16" < D_t < 3/8"$	.375
$A \tan \gamma < 0.125"$	.014
$A \tan \theta < 0.03125"$	0
$P_a = P_b \pm 0.063"$	yes .008

See 40 CFR 60, Vol. 42 No. 160 EPA Method 2. Verify the minimum 2-inch setback of the thermocouple and the minimum 3/4-inch separation between the pitot tube and the nozzle as shown at the top of this page.

Comments: _____

I certify that pitot tube/probe number 5-24 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84.

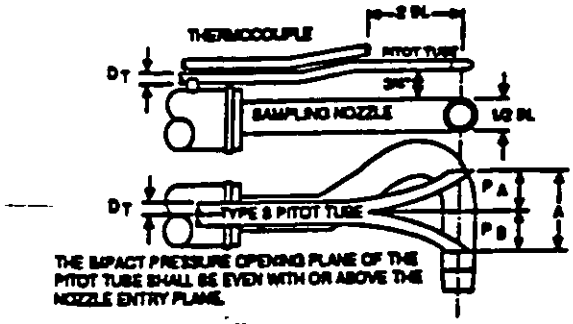
Signature W. L. Shull

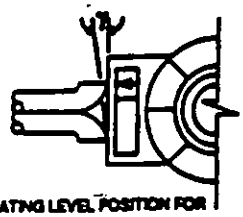
Date 12-30-91

R-0028 rev. 3/90

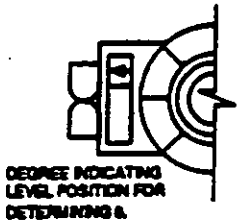
ENTROPY

PITOT TUBE INSPECTION

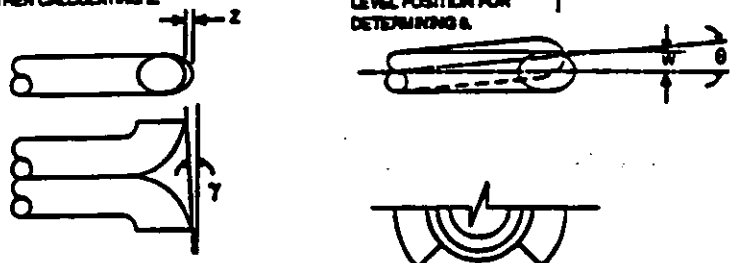


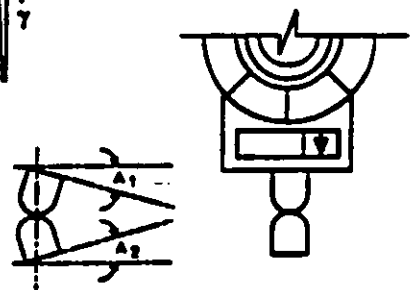


DEGREE INDICATING LEVEL POSITION FOR DETERMINING γ, THEN CALCULATING Z.

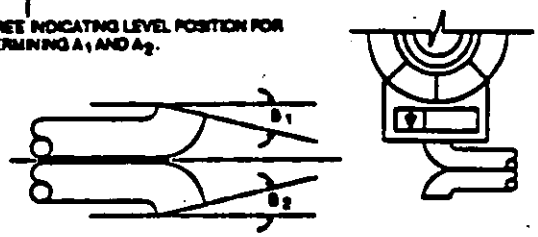


DEGREE INDICATING LEVEL POSITION FOR DETERMINING θ.





DEGREE INDICATING LEVEL POSITION FOR DETERMINING A_1 AND A_2.



DEGREE INDICATING LEVEL POSITION FOR DETERMINING B_1 AND B_2.

level?	yes
obstructions?	NONE
damaged?	NONE
$-10° < \alpha_1 < +10°$	1°
$-10° < \alpha_2 < +10°$	1°
$-5° < B1 < +5°$	0
$-5° < B2 < +5°$	0
γ	2°
θ	1°
A	1.63
$1.05\ D_t < P_a < 1.5\ D_t$	.815
$1.05\ D_t < P_b < 1.5\ D_t$	.815
$3/16" < D_t < 3/8"$	.375
$A \tan \gamma < 0.125"$	.0512
$A \tan \theta < 0.03125"$	.026
$P_a = P_b \pm 0.063"$	yes 0

See 40 CFR 60, Vol. 42 No. 160 EPA Method 2. Verify the minimum 2-inch setback of the thermocouple and the minimum 3/4-inch separation between the pitot tube and the nozzle as shown at the top of this page.

Comments: NEW

I certify that pitot tube/probe number OP-72-5 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84.

Signature [signature]

Date 3-3-92

R-0028 rev. 3/90

ENTROPY

Scott Specialty Gases

6141 Easton Road, PO Box 310 Plumsteadville PA 18949-0310 PHONE: (215) 766-8861 FAX: (215) 766-0320

CERTIFICATE OF ANALYSIS: Interference-Free™ EPA Protocol Gas

Customer
ENTROPY ENVIRONMENTALISTS
ATT: J. MAXWELL/ACCTS PAY.
P O BOX 12291
RESEARCH TRIANGLE PARK, NC 27709

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
Plumsteadville, PA 18949

Purchase Order *5011-MAXWELL*
Scott Project # *7122922B*

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1, September, 1993.

Cylinder Number *ALM031872* **Previous Certification Dates** **Certification Date** *8/25/95*

Cylinder Pressure+ *1915 psig* **Expiration Date** *2/25/96*

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Accuracy*
Sulfur Dioxide	45.1 ppm	± 1% Directly NIST Traceable
Nitrogen	Balance Gas	

+ Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.*

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
NTRM1693	*2/21/97*	*ALM021561*	*47.1 ppm SO2 in N2*

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Method
Nicolet FTIR/8220/AAB9300174	*8/10/95 :SO2*	*Scott Enhanced FTIR*

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components *SO2*

First Triad Analysis

Date: 8/18/95	Resp. Units: ppm	
Z1= 0.05	R1= 47.1	T1= 45.3
R2= 47.5	Z2= 0.05	T2= 45.3
Z3= 0.03	T3= 45.3	R3= 47.5
Avg. Concentration: 45.3 ppm		

Second Triad Analysis

Date: 8/25/95	Resp. Units: ppm	
Z1= 0.001	R1= 47.1	T1= 44.8
R2= 47.2	Z2= 0.00	T2= 45.1
Z3= 0.00	T3= 44.9	R3= 47.1
Avg. Concentration: 44.9 ppm		

Calibration Curve

Concentration = A+Bx+Cx2+Dx3+Ex4	
R= 0.99999	ALM021561
Constants:	A= 5.08E-02
B= 1.02E-00	C= -3.55E-03
D= 4.30E-05	E= 0.0E+00

Special Notes:

Analyst: Garren R. Knoll

Scott Specialty Gases

6141 Easton Road, PO Box 310 Plumsteadville PA 18949-0310 PHONE: (215) 766-8861 FAX: (215) 766-0320

CERTIFICATE OF ANALYSIS: Interference-Free™ EPA Protocol Gas

Customer
ENTROPY ENVIRONMENTALISTS
ATT:J. MAXWELL, ACCTS. PAY.
P. O. BOX 12291
RESEARCH TRIANGLE PA.,NC 27709

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
Plumsteadville, PA 18949

Purchase Order *5011-MAXWELJ*
Scott Project # *7122928B*

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September, 1993.

Cylinder Number *AAL17344* **Previous Certification Dates** **Certification Date** *8/24/95*

Cylinder Pressure+ *1905 psig* **Expiration Date** *8/24/97*

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Accuracy*
Sulfur Dioxide	92.8 ppm	± 1% Directly NIST Traceable
Nitrogen	Balance Gas	

+ Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.*

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
NTRM1694	*5/11/97*	*ALM040139*	*94.4 ppm SO2 in N2*

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Method
Nicolet FTIR/8220/AAB9300174	*8/10/95 :SO2*	*Scott Enhanced FTIR*

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
SO2	Date: 8/17/95 Resp. Units: ppm Z1= 0.00 R1= 94.4 T1= 93.2 R2= 94.3 Z2= 0.00 T2= 92.7 Z3= 0.00 T3= 92.7 R3= 94.3 Avg. Concentration: 92.9 ppm	Date: 8/24/95 Resp. Units: ppm Z1= 0.00 R1= 94.4 T1= 92.8 R2= 94.1 Z2= 0.00 T2= 92.6 Z3= 0.02 T3= 92.7 R3= 94.5 Avg. Concentration: 92.7 ppm	Concentration = A+Bx+Cx2+Dx3+Ex4 R= 0.99999 ALM031875 Constants: A= 3.09E-01 B= 9.59E-01 C= 7.73E-06 D= 0.0E+00 E= 0.0E+00

Special Notes:

Analyst: Garren R. Knoll

Scott Specialty Gases

6141 EASTON ROAD, P.O. BOX 310, PLUMSTEADVILLE, PA 18949-0310 (215) 766-8861 FAX: (215) 766-0320

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
Cern Division
8724 Glenwood Avenue
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
P.O. Box 310
Plumsteadville, PA 18949-0310

Purchase Order: 5011-MAXWELLJ
Scott Project # 01-70629-001

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; 1 Procedure #G1, Section Number 3.0.4; September, 1993.

Cylinder Number ALM035396
Cylinder Pressure 2000 psig+
Certification Date 08-14-95
Previous Certification Dates None
Expiration Date 08-14-97

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	25.9 ppm	±1% NIST Traceable
Total Oxides of Nitrogen	26.0 ppm	Reference Value Only
Balance Gas: Nitrogen		

Do not use when cylinder is less than 150 psig.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM29629	11-21-96	KLM001188	19.87 ppm NO in N_2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NO_x Teco/10/9741111S	08-14-95	Chemiluminescent

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Nitric Oxide

First Triad Analysis

Date: 08-07-95 Response Units: Volts
Z1=0.0022 R1=1.9942 T1=2.5996
R2=2.0054 Z2=0.0028 T2=2.6220
Z3=0.0281 T3=2.5900 R3=1.9936
Avg. Conc. of Cust. Cyl. 25.9 ppm

Second Triad Analysis

Date: 08-14-95 Response Units: Volts
Z1=0.0184 R1=1.5185 T1=1.9735
R2=1.5050 Z2=0.0138 T2=1.9680
Z3=0.0041 T3=1.9529 R3=1.5135
Avg. Conc. of Cust. Cyl. 25.9 ppm

Calibration Curve

Concentration= $A+Bx+Cx^2+Dx^3+Ex^4$
r=1.00000 NTRM29629
Constants A=-1.885E-01
B=1.5871E+01 C=0.0000E+00
D=0.0000E+00 E=0.0000E+00

Special Notes:

Analyst Wesley Bleider

Scott Specialty Gases

6141 EASTON ROAD, P.O. BOX 310, PLUMSTEADVILLE, PA 18949-0310 (215) 766-8861 FAX (215) 766-0320

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
Cem Division
8724 Glenwood Avenue
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
P.O. Box 310
Plumsteadville, PA 18949-0310

Purchase Order 5011-MAXWELLJ
Scott Project # 01-70629-002

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; 1 Procedure #G1, Section Number 3.0.4; September, 1993.

Cylinder Number AAL14755
Cylinder Pressure 2000 psig+
Certification Date 08-14-95
Previous Certification Dates None
Expiration Date 08-14-97

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	46.3 ppm	±1% NIST Traceable
Total Oxides of Nitrogen	46.3 ppm	Reference Value Only
Balance Gas: Nitrogen		

+Do not use when cylinder is less than 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NIST/EPA 648B	07-10-97	ALM047706	94.4 ppm NO in N_2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NO_x Teco/10/9741111S	08-14-95	Chemiluminescent

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Nitric Oxide

First Triad Analysis
Date: 08-07-95 Response Units: Volts
Z1=0.0143 R1=2.0042 T1=4.6877
R2=2.0225 T2=0.0018 T2=4.7119
Z3=0.0159 T3=4.6976 R3=2.0110
Avg. Conc. of Cust. Cyl. 46.5 ppm

Second Triad Analysis
Date: 08-14-95 Response Units: Volts
Z1=0.0312 R1=7.3591 T1=3.5961
R2=7.4276 Z2=0.0411 T2=3.6104
Z3=0.0282 T3=3.5910 R3=7.3324
Avg. Conc. of Cust. Cyl. 46.0 ppm

Calibration Curve
Concentration= $A+Bx+Cx^2+Dx^3+Ex^4$
r=1.00000 NTRM2629
Constants A=-1.0834E-01
B=1.3871E+01 C=0.0000E+00
D=0.0000E+00 E=0.0000E+00

Special Notes:

Analyst Wesley Blasser

Scott Specialty Gases

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy Environmentalists
Attn: K. Spears
P.O. Box 12291
Research Triangle Park, NC 27709

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 4922
Scott Project # 12-11576

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	ALM-024066	**Certification Date**	05-10-95	**Expiration Date**	05-10-97
Cylinder Pressure	1901 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	80.2 PPM	+/- 1% NIST Directly Traceable
NOX	80.2 PPM	Reference Value Only
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM# 1685	08-96	ALM-025103	245.3 PPM NO Balance in N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NICOLET / 8220 / AAB9400252	05-04-95	FTIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Nitric Oxide	Date: 05-03-95 Response Units: PPM Z1=0.546 R2=245.5 Z3=0.511 R1=245.3 Z2=1.942 T3=80.2 T1=79.8 T2=80.3 R3=246.2	Date: 05-10-95 Response Units: PPM Z1=0.666 R2=245.1 Z3=0.631 R1=245.3 Z2=1.856 T3=80.4 T1=80.3 T2=79.9 R3=245.4	Date: 05-04-95
	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date:
	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date:

M. Morris
Analyst M. Morris

Scott Specialty Gases, Inc.

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
Attn: Mr. John Maxwell
CEM Division
8724 Glenwood Avenue
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 4739-MAXWELLJ
Scott Project # 12-09458

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number ALM-037394 **Certification Date** 12-19-94 **Expiration Date** 12-19-97
Cylinder Pressure 2000 PSIG **Previous Certification** None

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Carbon Monoxide	30.2 PPM	+/- 1% NIST Directly Traceable
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM# 1678	07-96	ALM-000901	45.76 PPM Balance in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
LOW CO: Horiba/AIA23AS/850658012	12-12-94	NDIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Carbon Monoxide	Date: 12-11-94 Response Units: PPM Z1=0.1 R2=46.1 Z3=0.2 R1=46.1 Z2=0.3 T3=30.4 T1=30.4 T2=30.5 R3=46.0	Date: 12-19-94 Response Units: PPM Z1=0.1 R2=45.7 Z3=0.1 R1=45.6 Z2=0.1 T3=30.1 T1=30.1 T2=30.1 R3=45.7	Date: 12-12-94
	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date:
	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date:

Analyst K. Cooke

Scott Specialty Gases, Inc.

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
Attn: Mr. John Maxwell
CEM Division
8724 Glenwood Avenue
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 4739-MAXWELLJ
Scott Project # 12-09458

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	AAL-12512	**Certification Date**	12-16-94	**Expiration Date**	12-16-97
Cylinder Pressure	2000 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Carbon Monoxide	**59.9 PPM**	**+/- 1% NIST Directly Traceable**
Nitrogen		**Balance**

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM# 1679	04-96	ALM-024772	96.2 PPM Balance in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
LOW CO: Horiba/AIA23AS/850658012	12-12-94	NDIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Carbon Monoxide	Date: 12-05-94 Response Units: PPM Z1=0.1 R2=96.3 Z3=0.1 R1=96.3 Z2=0.1 T3=60.0 T1=60.1 T2=59.9 R3=96.3	Date: 12-16-94 Response Units: PPM Z1=0.1 R2=96.2 Z3=0.1 R1=96.2 Z2=0.1 T3=59.8 T1=59.9 T2=59.9 R3=96.3	Date: 12-12-94
	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date:
	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date:

Analyst K. Cooke

Scott Specialty Gases

6141 Easton Road, PO Box 310 Plumsteadville PA 18949-0310 PHONE: (215) 766-8861 FAX: (215) 766-0320

CERTIFICATE OF ANALYSIS: Interference-Free™ EPA Protocol Gas

Customer
ENTROPY
ATTN: MR. J.MAXWELL/CEM DIV.
8724 GLENWOOD AVE.
RALEIGH, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
Plumsteadville, PA 18949

Purchase Order *4886-MAXWELL.J*
Scott Project # *6710705B*

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September, 1993.

Cylinder Number *ALM045962* **Previous Certification Dates** **Certification Date** *4/25/95*

Cylinder Pressure+ *1850 psig* **Expiration Date** *4/25/98*

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Accuracy*
Carbon Monoxide	90.9 ppm	± 1% Directly NIST Traceable
Nitrogen	Balance Gas	

+ Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.*

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
NTRM1697	*8/11/96*	*ALM041943*	*97.1 ppm CO in N2*

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Method
Nicolet FTIR/8220/AAB9300174	*3/29/95*	*Scott Enhanced FTIR*

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components *CO*

First Triad Analysis

Date: 4/18/95	Resp. Units: ppm	
Z1= 0.00	R1= 97.10	T1= 90.64
R2= 96.78	Z2= 0.00	T2= 90.91
Z3= 0.00	T3= 90.72	R3= 96.73
Avg. Concentration: 90.76	ppm	

Second Triad Analysis

Date: 4/25/95	Resp. Units: ppm	
Z1= 0.00	R1= 97.10	T1= 91.17
R2= 96.97	Z2= 0.00	T2= 90.80
Z3= 0.00	T3= 90.94	R3= 97.07
Avg. Concentration: 90.97	ppm	

Calibration Curve

Concentration = A+Bx+Cx2+Dx3+Ex4	
R= 0.99999	ALM019933
Comments:	A= -7.99E-01
B= 2.62E-01	C= 1.60E-04
D= 4.36E-06	E= -3.94E-09

Special Notes:

Analyst: Garren R. Knoll

Scott Specialty Gases

6141 EASTON ROAD, P.O. BOX 310, PLUMSTEADVILLE, PA 18949-0310 (215) 766-8861 FAX (215) 766-0320

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
8724 Glenwood Ave
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
P.O. Box 310
Plumsteadville, PA 18949-0310

Purchase Order 4783-MAXWELJ
Scott Project # 01-63890-008

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1, Section Number 3.0.4

Cylinder Number ALM026207 **Certification Date** 01-11-95 **Expiration Date** 01-11-98
Cylinder Pressure 2000 psig+ **Previous Certification Dates** None

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	27.7 ppm	±1% NIST Traceable
Balance Gas: Air		

+Do not use when cylinder is less than 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM1668	06-07-96	ALM032011	95.5 ppm C_3H_8 in N_2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
C3H8: Varian/VA3300/7945	01-10-95	FID

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Propane	Date: 01-11-95 Response Units: Area Z1=000000 R1=100658 T1=029170 R2=100553 Z2=000000 T2=029119 Z3=000000 T3=029040 R3=100308 Avg. Conc. of Cust. Cyl. 27.7 ppm		Concentration=A+Bx+Cx^2+Dx^3+Ex^4 r=1.00000 NTRM1668 Constants: A=-1.6316E-02 B=9.6052E-04 C=0.0000E+00 D=0.0000E+00 E=0.0000E+00

Special Notes:
☐ Check this box if certified concentration has been corrected for analytical differences.

Analyst Robert K. Kurovich