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Not Submitted

REPORT ON PARTICULATE AND GASEOUS EMISSIONS TESTING

Performed for:

SOLVAY MINERALS, INC.
CA-3 (AQD #48) & CA 1&2 (AQD #17) CALCINER STACKS
GREEN RIVER, WYOMING

Client Reference No: 4500024582
CAE Project No: 8190-1
Revision 0: March 13, 1998

To the best of our knowledge, the data presented in this report are accurate and complete.

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Project Overview

SOLVAY2016_6_002178

PROJECT OVERVIEW

Solvay Minerals contracted Clean Air Engineering to perform an air emissions test program for gas fired calciners CA 1 & 2 and for gas fired calciner CA-3. The purpose of the test program was to gather baseline emissions data at an increased feed rate. The test program quantified total non-methane hydrocarbons, nitrogen oxides, carbon monoxide and particulate in the exhaust gas of the calciners. The testing took place at the CA-3 Calciner Stack on January 21, 1998 and at the CA 1 & 2 Calciner Stack January 22, 1998. EPA Methods performed were 1-5/202, 7E, 10, 18 and 25A.

Coordinating the field testing were:

D. Potter - Solvay Minerals, Inc.
T. Brown - Solvay Minerals, Inc.
M. Hynes - Clean Air Engineering

Source identifications are shown in Table 1-1 and Table 1-2.

Table 1-1:
CA-3 Calciner Profile

Unit Identification Number	AQD No. 48, CA-3
Process	Calciner
Fuel	Natural Gas
Heat Content	1061 Btu/ft^3.
Stack Height	180 feet
Stack Diameter	125.5 inches
Diameters to Upstream Disturbance	Approximately 9.0
Diameters to Downstream Disturbance	Approximately 5.5
Primary Control Equipment	Flakt ESP

Table 1-2:
CA 1&2 Calciner Profile

Unit Identification Number	AQD No. 17, CA 1 & 2
Process	Calciner
Fuel	Natural Gas
Heat Content	1060 Btu/ft^3
Stack Height	180.5 feet
Stack Diameter	144 inches
Diameters to Upstream Disturbance	Approximately 3.6
Diameters to Downstream Disturbance	Approximately 4.4
Primary Control Equipment	2-Buell ESP

Chemical abstract service (CAS) numbers and molecular weights are listed in Table 1-3.

PROJECT OVERVIEW

Table 1-3:
Compound (CAS) Numbers

Compound Name	Molecular Weight	CAS No.
Nitrogen Oxides (NO_x)	46.01	10102-44-0
Carbon Monoxide (CO)	28.01	630-08-0
THCs (as propane)	44.09	74-98-6
Methane	16.04	74-82-8

Table 1-4:
Summary of Test Results

Source Constituent	Sampling Method	Average Concentration (ppmdv)	Average Emission (lb/hr)	Average Emission (lb/ton of trona)
CA-3 Calciner				
Particulate (total inorganic)	EPA M 5/202	N/A	4.0	0.0219
Total Hydrocarbons (as propane)	EPA M 25A	297.7	154.3	0.8337
Methane	EPA M 18	359.3	67.7	0.3660
Total Non-Methane Hydrocarbons	EPA M 18&25A	--	86.5	0.4676
Nitrogen Oxides	EPA M 7E	22.7	12.2	0.0662
Carbon Monoxide	EPA M 10	761.6	250.7	1.3549
CA 1 & 2 Calciner Stack				
Particulate (total inorganic)	EPA M 5/202	N/A	8.3	0.0287
Total Hydrocarbons (as propane)	EPA M 25A	376.1	461.7	1.5885
Methane	EPA M 18	685.1	306.3	1.0535
Total Non-Methane Hydrocarbons	EPA M 18&25A	--	155.4	0.5351
Nitrogen Oxides	EPA M 7E	3.6	4.6	0.0157
Carbon Monoxide	EPA M 10	1131.5	882.9	3.0385

The test conditions and results of analysis are presented in Tables 2-1 through 2-6 on pages 2-1 through 2-6.

Results

RESULTS

Table 2-1:
CA-3 Calciner Stack - Particulate

Run No.		1	2	3	Average
Date (1998)		January 21	January 21	January 21	
Start Time (approx.)		09:55	11:45	13:24	
Stop Time (approx.)		11:04	12:54	14:31	
Process Conditions[1]					
	Feed Rate (tons/hr)	185	183	187	**185**
	Fuel flow (scfm)	2,980	2,954	2,975	**2,969**
Gas Conditions					
T_s	Temperature (°F)	312	314	315	**314**
B_{wo}	Moisture (volume %)	30.29	30.03	29.88	**30.07**
O_2	Oxygen (dry volume %)	11.3	11.4	11.3	**11.3**
CO_2	Carbon dioxide (dry volume %)	11.5	11.5	11.5	**11.5**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	199,500	200,200	201,600	**200,400**
Q_{std}	Standard conditions (dscfm)	75,040	75,370	75,930	**75,450**
Front Half Particulate					
C	Concentration (gr/dscf)	0.0011	0.0021	0.0025	**0.0019**
E	Emission rate (lb/hr)	0.7	1.4	1.6	**1.2**
E	Emission rate (lb/ton of trona)	0.0039	0.0075	0.0088	**0.0067**
Back Half Organic Particulate					
C	Concentration (gr/dscf)	0.0291	0.0244	0.0253	**0.0263**
E	Emission rate (lb/hr)	18.7	15.8	16.5	**17.0**
E	Emission rate (lb/ton of trona)	0.1009	0.0861	0.0883	**0.0918**
Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0041	0.0047	0.0042	**0.0043**
E	Emission rate (lb/hr)	2.7	3.0	2.7	**2.8**
E	Emission rate (lb/ton of trona)	0.0143	0.0166	0.0145	**0.0151**
Back Half Total Particulate					
C	Concentration (gr/dscf)	0.0332	0.0291	0.0295	**0.0306**
E	Emission rate (lb/hr)	21.3	18.8	19.2	**19.8**
E	Emission rate (lb/ton of trona)	0.12	0.10	0.10	**0.1069**
Front and Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0053	0.0068	0.0067	**0.0063**
E	Emission rate (lb/hr)	3.4	4.4	4.4	**4.0**
E	Emission rate (lb/ton of trona)	0.0183	0.0240	0.0233	**0.0219**

[1] Process conditions provided by Solvay Minerals, Inc.

RESULTS

Table 2-2:
CA-3 Calciner Stack - Total Non-Methane Hydrocarbons

Run No.		1	2	3	Average
Date (1998)		January 21	January 21	January 21	
Start Time (approx.)		09:55	11:45	13:24	
Stop Time (approx.)		10:55	12:45	14:24	
Process Conditions[1]					
Feed rate (ton/hr)		185	183	187	**185**
Fuel flow (scfm)		2,980	2,954	2,975	**2,969**
Gas Conditions[2]					
T_s	Temperature (°F)	312	314	315	**314**
O_2	Oxygen (dry volume %)	11.3	11.4	11.3	**11.3**
CO_2	Carbon Dioxide (dry volume %)	11.5	11.5	11.5	**11.5**
B_{wo}	Moisture (volume %)	30.29	30.03	29.88	**30.07**
Q_{std}	Standard conditions (dscfm)	75,040	75,370	75,930	**75,447**
Total Hydrocarbons (as propane)					
C	Concentration (ppmdv)	300.7	284.4	308.1	**297.7**
E	Emission rate (lb/hr)	155.0	147.2	160.6	**154.3**
E	Emission rate (lb/ton of trona)	0.8367	0.8034	0.8608	**0.8337**
Methane					
C	Concentration (ppmdv)	357.9	342.4	377.6	**359.3**
E	Emission rate (lb/hr)	67.1	64.5	71.6	**67.7**
E	Emission rate (lb/ton of trona)	0.3623	0.3519	0.3839	**0.3660**
Total Non-Methane Hydrocarbons					
E	Emission rate (lb/hr)	87.9	82.7	89.0	**86.5**
E	Emission rate (lb/ton of trona)	0.4744	0.4515	0.4770	**0.4676**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-3:
CA-3 Calciner Stack - Nitrogen Oxides & Carbon Monoxide

Run No.		1	2	3	Average
Date (1998)		January 21	January 21	January 21	
Start Time (approx.)		09:55	11:45	13:24	
Stop Time (approx.)		10:55	12:45	14:24	
Process Conditions[1]					
Feed rate (ton/hr)		185	183	187	**185**
Fuel flow (scfm)		2,980	2,954	2,975	**2,969**
Gas Conditions[2]					
T_s	Temperature (°F)	312	314	315	**314**
O_2	Oxygen (dry volume %)	11.3	11.4	11.3	**11.3**
CO_2	Carbon Dioxide (dry volume %)	11.5	11.5	11.5	**11.5**
B_{wo}	Moisture (volume %)	30.29	30.03	29.88	**30.07**
Q_{std}	Standard conditions (dscfm)	75,040	75,370	75,930	**75,447**
Nitrogen Oxides					
C	Concentration (ppmdv)	23.5	23.5	21.0	**22.7**
E	Emission rate (lb/hr)	12.7	12.7	11.4	**12.2**
E	Emission rate (lb/ton of trona)	0.0683	0.0692	0.0611	**0.0662**
Carbon Monoxide					
C	Concentration (ppmdv)	733.2	753.5	798.2	**761.6**
E	Emission rate (lb/hr)	240.0	247.7	264.4	**250.7**
E	Emission rate (lb/ton of trona)	1.2958	1.3521	1.4168	**1.3549**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-4:
CA 1&2 Calciner Stack - Particulate

Run No.		1	2	3	Average
Date (1998)		January 22	January 22	January 22	
Start Time (approx.)		08:55	11:05	12:50	
Stop Time (approx.)		10:04	12:11	14:04	
Process Conditions[1]					
	Feed rate (tons/hr)	295	289	287	**290**
	Fuel flow (scfm)	5,845	5,658	5,602	**5,702**
Gas Conditions					
T_s	Temperature (°F)	336	337	339	**337**
B_{wo}	Moisture (volume %)	23.75	22.73	22.57	**23.02**
O_2	Oxygen (dry volume %)	13.4	13.8	13.8	**13.7**
CO_2	Carbon dioxide (dry volume %)	8.4	8.0	8.0	**8.1**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	446,600	435,300	451,400	**444,400**
Q_{std}	Standard conditions (dscfm)	178,600	176,100	182,700	**179,100**
Front Half Particulate					
C	Concentration (gr/dscf)	0.0021	0.0027	0.0017	**0.0022**
E	Emission rate (lb/hr)	3.2	4.0	2.6	**3.3**
E	Emission rate (lb/ton of trona)	0.0110	0.0139	0.0092	**0.0114**
Back Half Organic Particulate					
C	Concentration (gr/dscf)	0.0182	0.0285	0.0174	**0.0214**
E	Emission rate (lb/hr)	27.9	43.0	27.2	**32.7**
E	Emission rate (lb/ton of trona)	0.0946	0.1487	0.0948	**0.1127**
Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0031	0.0044	0.0024	**0.0033**
E	Emission rate (lb/hr)	4.7	6.6	3.8	**5.0**
E	Emission rate (lb/ton of trona)	0.0161	0.0228	0.0131	**0.0173**
Back Half Total Particulate					
C	Concentration (gr/dscf)	0.0213	0.0328	0.0198	**0.0247**
E	Emission rate (lb/hr)	32.7	49.6	31.0	**37.7**
E	Emission rate (lb/ton of trona)	0.1107	0.1715	0.1080	**0.1300**
Front and Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0052	0.0070	0.0041	**0.0054**
E	Emission rate (lb/hr)	8.0	10.6	6.4	**8.3**
E	Emission rate (lb/ton of trona)	0.0271	0.0367	0.0223	**0.0287**

[1] Process conditions obtained from Solvay Minerals, Inc.

RESULTS

Table 2-5:
CA 1&2 Calciner Stack - Total Non-Methane Hydrocarbons

Run No.		1	2	3	Average
Date (1998)		January 22	January 22	January 22	
Start Time (approx.)		08:54	11:07	12:49	
Stop Time (approx.)		09:54	12:07	13:49	
Process Conditions[1]					
	Feed rate (tons/hr)	295	289	287	**290**
	Fuel flow (scfm)	5,845	5,658	5,602	**5,702**
Gas Conditions[2]					
T_s	Temperature (°F)	336	337	339	**337**
O_2	Oxygen (dry volume %)	13.4	13.8	13.8	**13.6**
CO_2	Carbon Dioxide (dry volume %)	8.4	8.0	8.0	**8.1**
B_{wo}	Moisture (volume %)	23.75	22.73	22.57	**23.02**
Q_{std}	Standard conditions (dscfm)	178,600	176,100	182,700	**179,133**
Total Hydrocarbons (as propane)					
C	Concentration (ppmdv)	401.6	416.2	310.3	**376.1**
E	Emission rate (lb/hr)	492.6	503.3	389.3	**461.7**
E	Emission rate (lb/ton of trona)	1.6683	1.7406	1.3568	**1.5885**
Methane					
C	Concentration (ppmdv)	788.7	662.0	604.5	**685.1**
E	Emission rate (lb/hr)	351.9	291.2	275.9	**306.3**
E	Emission rate (lb/ton of trona)	1.1918	1.0071	0.9615	**1.0535**
Total Non-Methane Hydrocarbons					
E	Emission rate (lb/hr)	140.7	212.1	113.4	**155.4**
E	Emission rate (lb/ton of trona)	0.4765	0.7335	0.3952	**0.5351**

[1] Process conditions obtained from Solvay Minerals, Inc.
[1] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-6:
CA 1&2 Calciner Stack - Nitrogen Oxides & Carbon Monoxide

Run No.		1	2	3	Average
Date (1998)		January 22	January 22	January 22	
Start Time (approx.)		08:54	11:07	12:49	
Stop Time (approx.)		09:54	12:07	13:49	
Process Conditions[1]					
	Feed rate (tons/hr)	295	289	287	**290**
	Fuel flow (scfm)	5,845	5,658	5,602	**5,702**
Gas Conditions[2]					
T_s	Temperature (°F)	336	337	339	**337**
O_2	Oxygen (dry volume %)	13.4	13.8	13.8	**13.6**
CO_2	Carbon Dioxide (dry volume %)	8.4	8.0	8.0	**8.1**
B_{wo}	Moisture (volume %)	23.75	22.73	22.57	**23.02**
Q_{std}	Standard conditions (dscfm)	178,600	176,100	182,700	**179,133**
Nitrogen Oxides					
C	Concentration (ppmdv)	4.2	3.1	3.4	**3.6**
E	Emission rate (lb/hr)	5.4	3.9	4.4	**4.6**
E	Emission rate (lb/ton of trona)	0.0183	0.0133	0.0154	**0.0157**
Carbon Monoxide					
C	Concentration (ppmdv)	1189.3	1212.7	992.4	**1131.5**
E	Emission rate (lb/hr)	926.5	931.5	790.9	**882.9**
E	Emission rate (lb/ton of trona)	3.1379	3.2215	2.7561	**3.0385**

[1] Process conditions obtained from Solvay Minerals, Inc.
[1] Gas conditions obtained from concurrent Method 5/202 testing.

Description of Installation

SOLVAY2016_6_002188

DESCRIPTION OF INSTALLATION

Solvay Minerals, Inc., located near Green River, Wyoming, is a mine and refinery with corporate offices in Houston, Texas. Soda ash operations at the Green River, Wyoming facility began initial production in May of 1982. On May 27, 1992 Solvay S.A. of Belgium purchased the Green River facilities from Tenneco, Inc. and changed the name to Solvay Minerals, Inc.

The primary raw material for the Green River facility is sodium sesquicarbonate which is commonly referred to as trona. The trona is mined at the plant site from an ore bed located 1,500 feet below the surface. The trona is hoisted to the surface before refining into soda ash and other sodium-based products.

The caustic/sulfite system is fed unfiltered saturated sodium carbonate solution from the soda ash process. Insolubles are separated by settling and filtration. At this point the caustic carbonate liquor is reacted with lime forming caustic soda. The remaining sodium carbonate liquor is reacted with sulfur dioxide forming sodium sulfite. At the completion of the refining process the caustic soda and the sodium sulfite are stored pending shipment.

The trona that is fed to the soda ash calciners is heated, resulting in thermal calcination of the sodium sesquicarbonate forming a crude soda ash. The crude soda ash is dissolved in water and the insolubles are separated from the solution by settling and filtration. The insolubles are disposed of in the mine void. The high-purity saturated solution of sodium carbonate is then fed to crystallizers where a large amount of water is removed and a slurry of sodium carbonate monohydrate crystals is formed. This slurry is then further dewatered and washed by a series of cyclones and centrifuges. The resulting monohydrate crystals are fed through dryers forming a high quality soda ash, which then is ready for storage and shipment.

The facility is equipped with baghouses, scrubbers and electrostatic precipitators (ESP) to control emissions.

A schematic of the process shown in Figure 3-1.

DESCRIPTION OF INSTALLATION

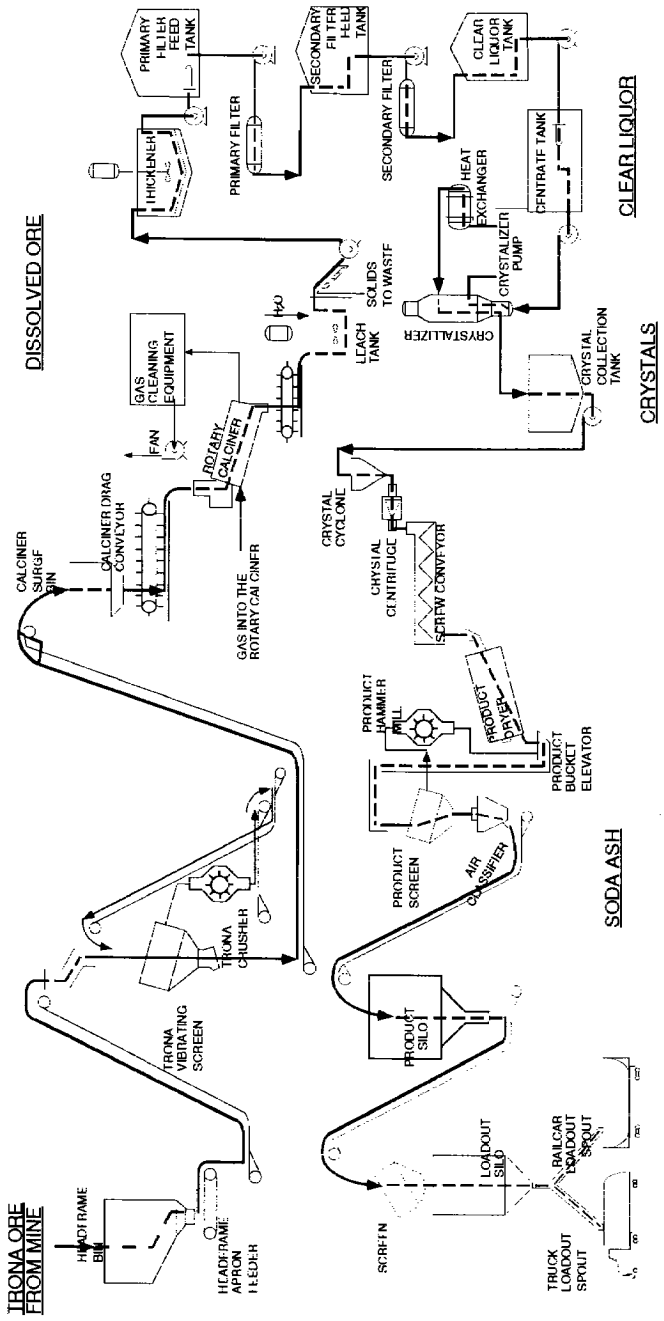


Figure 3-1: Process Schematic

Methodology

SOLVAY2016_6_002191

METHODOLOGY

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1, 2, 3A, 4, 5, 7E, 10, 18 and 25A. The following table summarizes the methods and their respective sources.

Table 4-1:
Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A	
Method 1	"Sample and Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"
Method 3A	"Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)"
Method 4	"Determination of Moisture Content in Stack Gases"
Method 5	"Determination of Particulate Emissions from Stationary Sources"
Method 7E	"Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)"
Method 10	"Determination of Carbon Monoxide Emissions from Stationary Sources"
Method 25A	"Determination of Total Gaseous Organic Concentrations using a Flame Ionization Analyzer (FIA)"
Title 40 CFR Part 51 Appendix M	
Method 202	"Determination of Condensible Particulate Emissions from Stationary Sources"

These methods appear in detail in Title 40 of the Code of Federal Regulations (CFR).

Major aspects of the sampling, recovery and analytical procedures are summarized on pages 4-2 through 4-12.

All equipment was calibrated at the Clean Air Engineering laboratory prior to shipment to the job site. A post calibration was performed on each meter box at the conclusion of testing to verify that calibration was maintained throughout the test program. Calibration sheets can be found in Appendix Section C.

METHODOLOGY

SAMPLING POINT DETERMINATION

Sampling point locations were determined according to EPA Method 1.

Table 4-2 outlines the sampling point configurations. Figure 4-1 through 4-2 illustrate the sampling points and orientation of sampling ports for each of the sources tested in the program.

Table 4-2:
Sampling Points

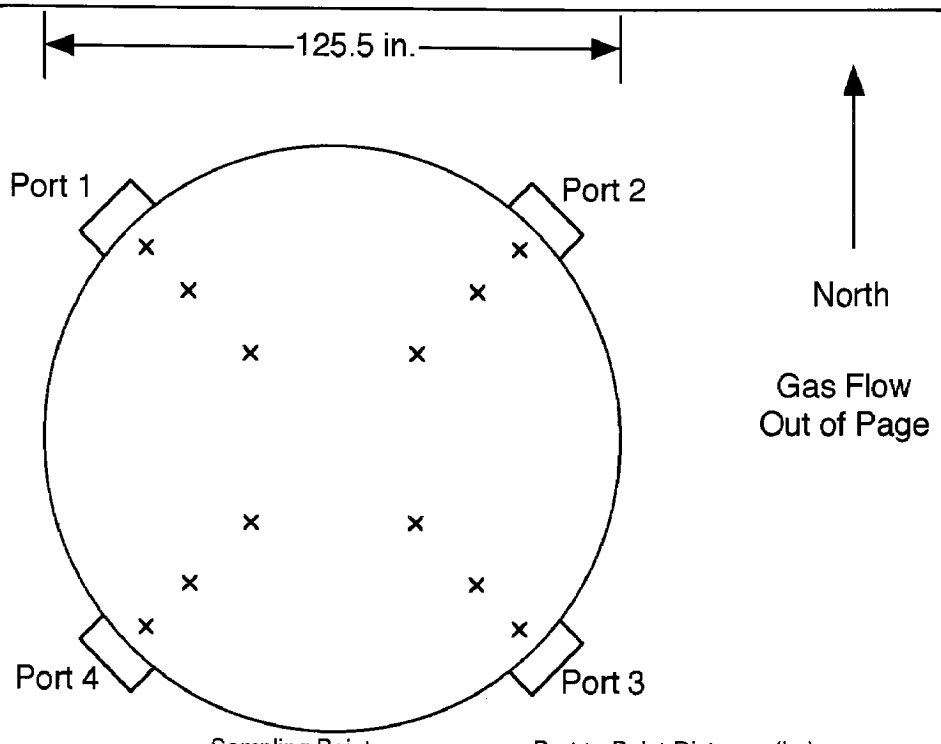
Location	Constituent	Method	Run No.	Ports	Points per Port	Minutes per Point	Total Minutes	Figure
CA-3 Stack	Particulate[1]	5/202	1-3	4	3	5	60	4-1
CA 1&2 Stack	Particulate[1]	5/202	1-3	4	6	2.5	60	4-2

[1] Gaseous compounds were continuously sampled from the approximate center of each stack.

SOLVAY2016-6-002193

METHODOLOGY

SAMPLING POINT DETERMINATION (CONTINUED)



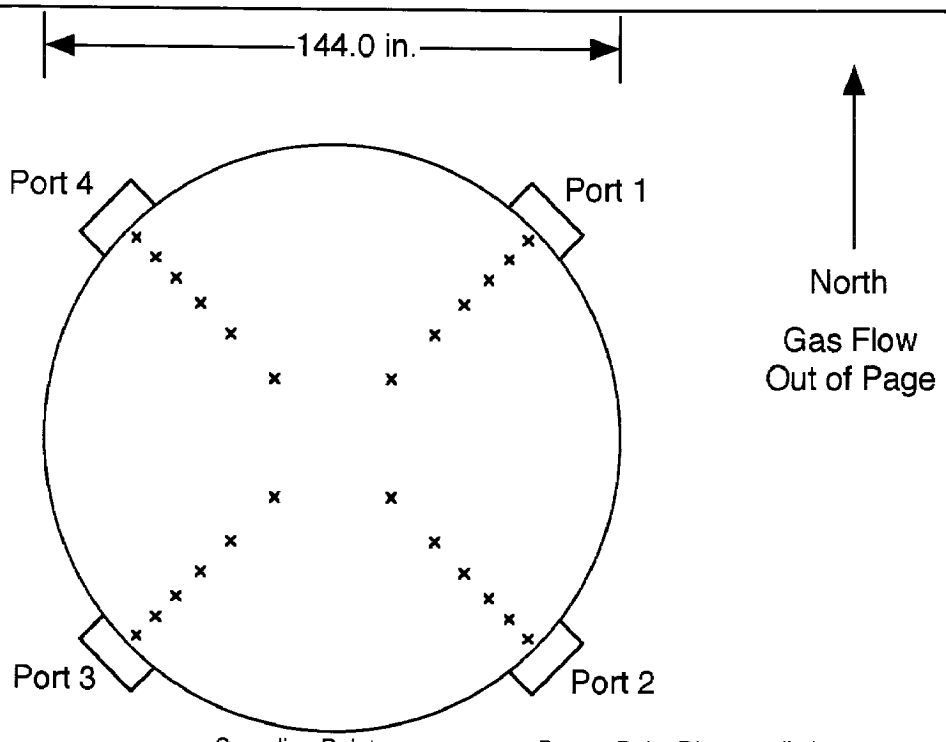
Sampling Point	Port to Point Distance (in.)
1	37.1
2	18.3
3	5.5

Diameters to upstream disturbance: 9.0 Limit: 2.0
Diameters to downstream disturbance: 5.5 Limit: 0.5

Figure 4-1: CA-3 Calciner Stack Particulate Sampling Point Determination (EPA Method 1)

METHODOLOGY

SAMPLING POINT DETERMINATION (CONTINUED)



Sampling Point	Port to Point Distance (in.)
1	51.3
2	36.0
3	25.5
4	17.0
5	9.6
6	3.0

Diameters to upstream disturbance: ~3.6 Limit: 2.0
Diameters to downstream disturbance: ~4.4 Limit: 0.5

Figure 4-2: CA 1&2 Calciner Stack Particulate Sampling Point Determination (EPA Method 1)

METHODOLOGY

VELOCITY AND VOLUMETRIC FLOW RATE - EPA METHOD 2

EPA Method 2 was used, in conjunction with particulate testing, to determine the gas velocity and flow rate at each Calciner Stack. Figure 4-3 includes the components of the EPA Method 2 sampling apparatus.

Each set of velocity determinations included the measurement of gas velocity pressure and gas temperature at each of the EPA Method 1 traverse points. The velocity pressures were measured with a Type S pitot tube. Gas temperature measurements were made using a Type K thermocouple and digital pyrometer.

MOISTURE CONTENT - EPA METHOD 4

The flue gas moisture content at the Calciner Stack locations was determined in accordance with EPA Method 4, in conjunction with particulate testing. Figure 4-3 includes the components of the EPA Method 4 sampling apparatus. The gas moisture was determined by quantitatively condensing the water in chilled impingers. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. The amount of water condensed and the volume of gas sampled were used to calculate the gas moisture content in accordance with EPA Method 4.

METHODOLOGY

TOTAL PARTICULATE AND BACK HALF CONDENSIBLES COMBINED EPA METHODS 5 AND 202

EPA Method 5 was used in conjunction with EPA Method 202 to measure total particulate matter at the Calciner Stacks. EPA Method 5 measures particulate collected in nozzle, probe, connecting glassware and filter. EPA Method 202 measures the condensible particulate matter collected in the impinger assembly.

Figure 4-3 illustrates the EPA Method 5/202 sampling apparatus which was used. The sampling apparatus consisted of a glass lined temperature-controlled probe equipped with a Type S pitot tube (for measuring stack gas flow rate) and a sharp-edged glass button-hook nozzle. The exit of the probe was connected to a high efficiency glass fiber filter supported in a glass filter holder inside an oven.

The exit of the filter holder connected to a series of four full size impingers. The first three impingers each contained 100 milliliters of distilled water. The fourth contained a tarred quantity of silica gel. The impingers were maintained at a temperature below 68°F for the duration of each test. In accordance with EPA Method 202 requirements, all glassware was cleaned prior to testing with soap and water, rinsed with water, acetone and finally methylene chloride.

Procedures for selecting sampling locations and for operation of the apparatus were derived from EPA Method 5/202 and associated EPA Methods 1 through 4. The sampling apparatus was leak-checked before and after each test run. Sampling was performed at an isokinetic rate greater than 90% and less than 110%.

Due to the flue gas desulfurization properties of soda ash and the processes being tested for condensible particulate, the sixty minute purge of the impingers was not required.

At the conclusion of each test run, the filter was removed from the filter holder and placed in container No. 1, a labeled petri dish. Any particles adhering to the filter holder gasket were also transferred to the dish. The probe liner, nozzle, probe fittings and front half of the filter holder was washed three times with distilled water to remove any particulate matter or condensate. These rinses were saved in the pre-cleaned glass sample container No. 2.

The first three impinger catches were measured, the weight recorded and the catch transferred to container No. 3. The weight gain was added to the silica gel weight gain of the fourth impinger to determine the stack gas moisture content. The impingers and all connecting glassware were rinsed twice with distilled water. These rinses were added to container No. 3. A final rinse, of the above components, with methylene chloride was saved in glass sample container No. 4.

METHODOLOGY

TOTAL PARTICULATE AND BACK-HALF CONDENSIBLES (CONTINUED)

Sample bottles were sealed, shaken and labeled, and the liquid level was marked. At this time, approximately 200-ml of distilled water and methylene chloride were prepared for analysis as reagent blanks.

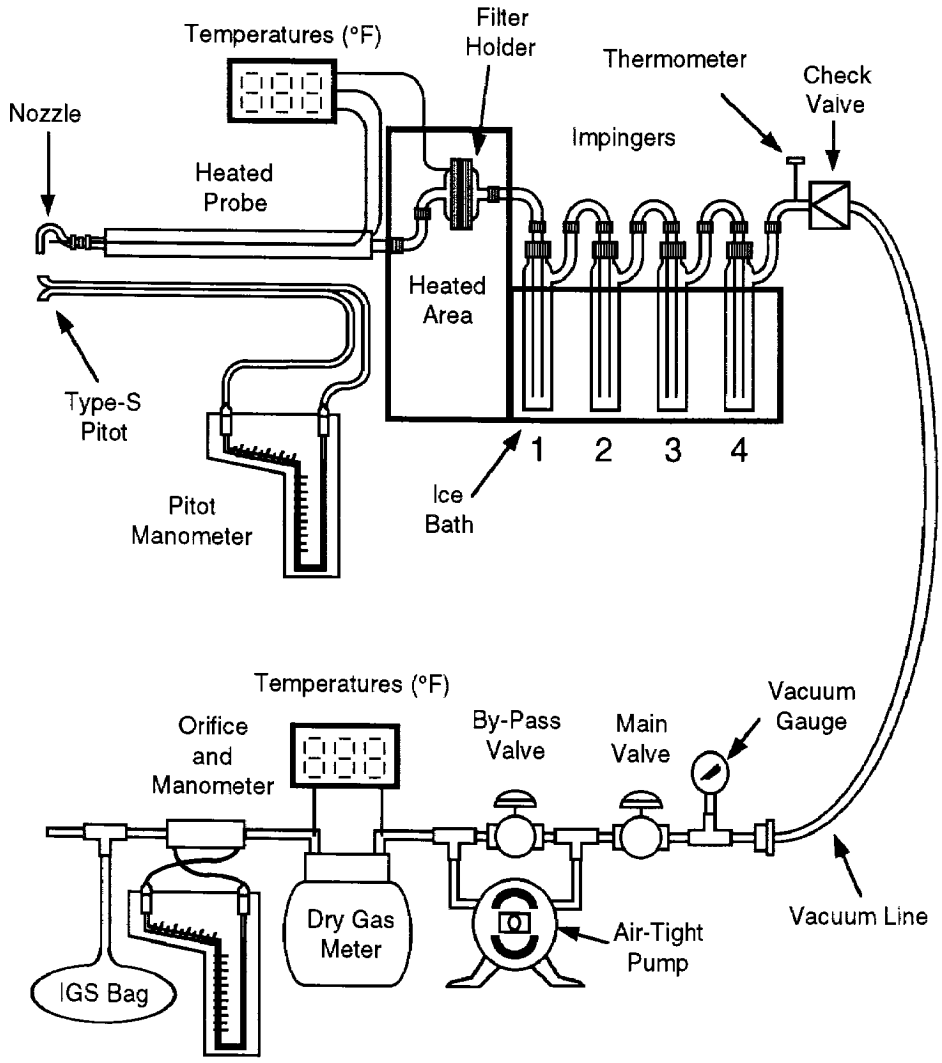
Particulate samples collected on the glass fiber filters were analyzed gravimetrically to a constant weight. The front half washes were transferred to tarred beakers, evaporated to dryness, and weighed to constant weights.

The impinger water was extracted by adding the contents of the methylene chloride rinse to the impinger water, and separating the layers in a separatory funnel. Two additional 75 milliliter portions of methylene chloride were added to the funnel to complete the extraction. The organic extract fraction was then placed into a tarred beaker and evaporated at room temperature to dryness. It was then desiccated for 24 hours and weighed to a constant weight. The aqueous inorganic fraction was taken to dryness at a slightly elevated temperature and allowed to air dry at room temperature. The residue was desiccated for 24 hours and weighed to a constant weight. The weight differentials for the organic and inorganic fractions were combined to determine the total condensible particulate matter.

The particulate analysis was performed by Clean Air Engineering located in Denver, Colorado and Palatine Illinois.

METHODOLOGY

TOTAL PARTICULATE AND BACK-HALF CONDENSIBLES (CONTINUED)



Impinger Contents
1) 100 ml distilled water
2) 100 ml distilled water
3) 100 ml distilled water
4) 300 g silica gel

Figure 4-3: Particulate Sampling Apparatus (EPA Method 5/202)

METHODOLOGY

CONTINUOUS EMISSIONS MONITORING

Monitoring of nitrogen oxides (NO_X), carbon monoxide (CO) and total hydrocarbons (THC) emissions at the Calciner Stacks was performed using a combination of EPA Methods 7E, 10 and 25A. In addition to the pollutant monitoring, oxygen (O_2) and carbon dioxide (CO_2) concentrations were also monitored using EPA Method 3A. A gas sample was continuously extracted from the stack and delivered to a series of gas analyzers which measured the pollutant or diluent concentrations in the gas. The analyzers were calibrated on-site using certified mixtures of calibration gases.

Figure 4-4 contains a general schematic of the continuous emissions monitoring (CEM) system. The system utilized a heated stainless steel probe for gas withdrawal. The end of the probe was connected to a heated Teflon sample line which delivered the sample gases from the stack to the CEM system. The heated sample line was designed to maintain the gas temperature above 250°F in order to prevent condensation of stack gas moisture within the line.

Table 4-3 lists the analyzers used to perform the continuous emissions monitoring.

Table 4-3
Gas Analyzers

GAS	METHOD	REFERENCE ANALYZER MANUFACTURER	PRINCIPLE OF OPERATION
O_2	EPA 3A	Servomex 1420B	Paramagnetic
CO_2	EPA 3A	Fuji ACS 3300	NDIR
NO_x	EPA 7E	TECO 10	Chemiluminescence
CO	EPA 10	TECO 48	Gas Filter Correlation NDIR
THC	EPA 25A	J.U.M. Engineering VE-7	Flame Ionization Detection (FID)

Determination of O_2, CO_2, NO_X and CO Concentrations
EPA Methods 3A, 7E and 10

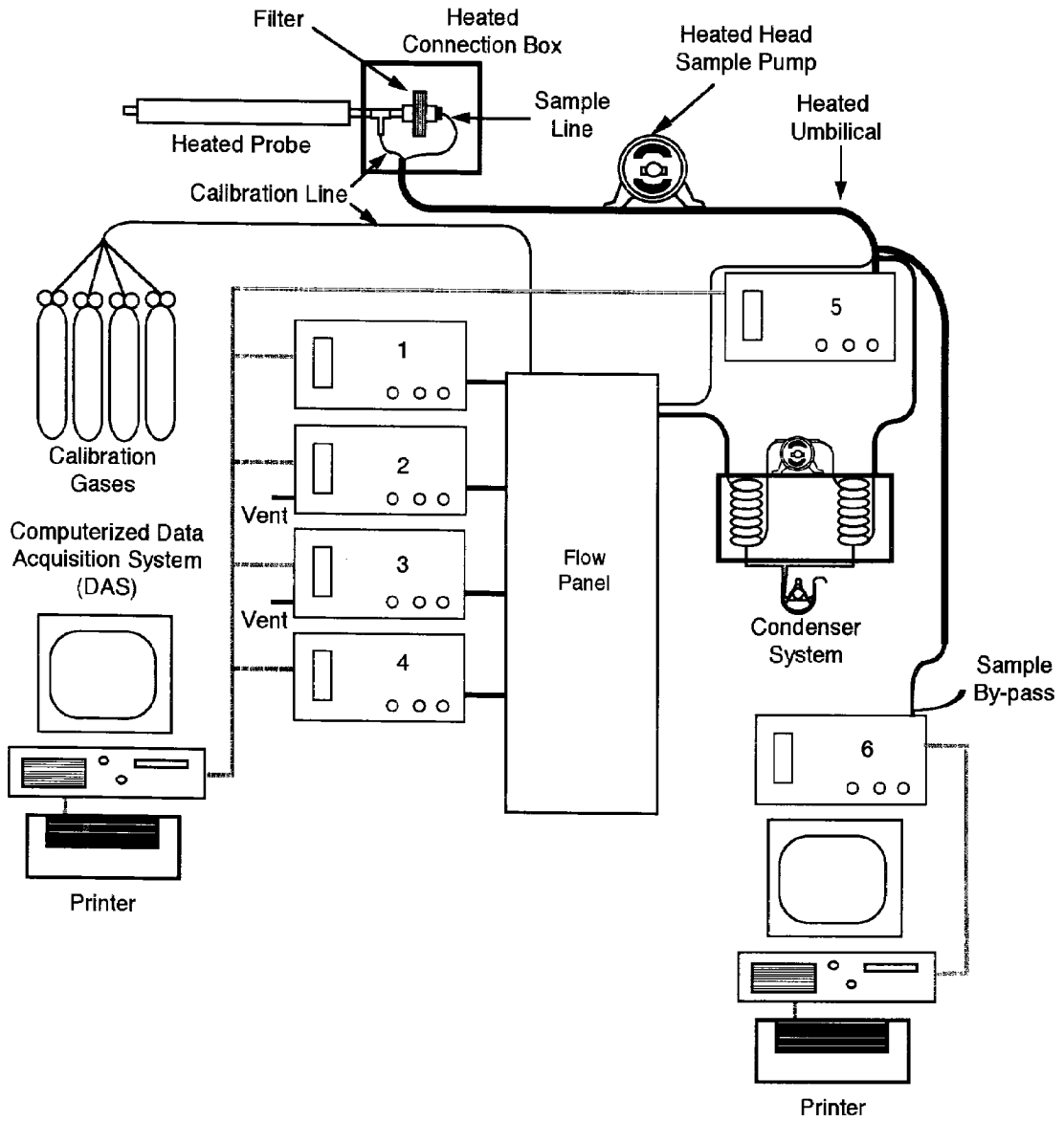
Before entering the analyzers, the gas sample was split into two streams. One stream passed directly into a refrigerated condenser which cooled the gas to approximately 35°F to remove the stack gas moisture. After passing through the condenser, the dry gas entered a Teflon-head diaphragm pump and a flow control panel which delivered the gas in series to the O_2, CO_2, NO_X and CO analyzers. Each of these analyzers measured the respective gas concentrations on a dry volumetric basis.

Determination of THC Concentrations - EPA Method 25A

The other gas stream remained heated and was transported through a Teflon line directly into the THC analyzer, which measured the gas on a wet volumetric basis. The THC analyzer contained a separate heated pump for gas delivery.

METHODOLOGY

CONTINUOUS EMISSIONS MONITORING (CONTINUED)



No	Gas	Monitor	Range Used	Calibration Gas Concentrations
1)	O_2	Servomex 1420B	0-25	0%, 10.2%, 21.4%
2)	CO2	Fuji ACS 3300	0-20	0%, 10.4%, 18.5%
3)	NOX	TECO 10	0-500	0 ppm, 227.0 ppm, 456.0 ppm
4)	CO	TECO 48	0-1,750	0 ppm, 598.7 ppm, 1515.0 ppm
5)	THC	J.U.M. Engineering VE-7	0-1,000	0 ppm, 283.0 ppm, 472.5 ppm, 852.2 ppm
6)	CH_4	HP-GC/FID	na	0 ppm, 249.5 ppm, 551.0 ppm, 905.2 ppm,

Figure 4-4: CEM Apparatus (EPA Methods 3A, 6C, 7E, 10 and 25A)

METHODOLOGY

CONTINUOUS EMISSIONS MONITORING (CONTINUED)

Each of the analyzers was calibrated according to the respective reference method procedures. Before testing, each analyzer was checked for calibration error by introducing a zero, mid-level and high-level certified calibration gas directly into the analyzer. All of the reference method criteria for calibration error were demonstrated for each analyzer before testing could proceed.

EPA Protocol No. 1 certified calibration mixtures were used to calibrate the analyzers. The THC analyzer was calibrated with propane. All calibration gases were blended with nitrogen.

Before and after each of the three test runs, the zero gas and one up-scale gas for each analyzer was introduced into the sampling line at the exit of the heated probe to check for sampling system bias and calibration drift. The demonstration of reference method criteria for bias (pre- and post-test) and calibration drift was required for a valid test run. The results of the pre-test and post-test bias checks were used to correct the average flue gas concentration measured during each test run for analyzer drift during that period.

METHODOLOGY

METHANE EMISSIONS TESTING - EPA METHOD 18

Methane concentrations Calciner Stacks were determined using an onsite gas chromatograph (GC)which was operated in accordance to EPA Method 18. A sample was continuously extracted from the stack and injected into the GC about once every 10 minutes during the test run. The GC was equipped with a Flame Ionization Detector (FID) which measure the methane concentrations on a wet basis. The GC was calibrated on-site using certified mixtures of calibration gases.

Figure 4-4 illustrates the CEM and methane monitoring system set up. As can be seen in the illustration the THC analyzer and the GC shared the same sampling system, which is described on Page 4-9.

The gas stream remained heated and was transported to the Hewlett Packard Benchtop Gas Chromatograph until it was injected into the GC through a gas sampling valve.

The GC was calibrated according to the reference method procedures using EPA certified gas mixtures of methane in air. Before testing, the GC was calibrated by injecting three calibration gases directly into the GC to develop a calibration curve. Then three recovery checks were performed by running a calibration gas through the entire sample system before being injected into the GC. To be acceptable the three recovery checks had to be within 5% of the direct injection calibration mean value. GC calibration data is in Appendix C of this report.

Data from the chromatographs was first reduced by identifying the methane peak. Peaks from the sample gas were matched with retention time of the peaks from the methane calibration gas. A computer integrator was used to determine the areas under the peaks which was used to calculated the methane concentration in ppm.

Appendix

APPENDIX

SAMPLE CALCULATIONS ..... A
PARAMETERS ..... B
CALIBRATION DATA C
FIELD DATA ..... D
FIELD DATA PRINTOUTS ..... E
LABORATORY DATA ..... F
CHAIN OF CUSTODY ..... G
OPERATING DATA ..... H

A

SAMPLE CALCULATIONS

A

SAMPLE CALCULATIONS
CA-3 CALCINER STACK - RUN 1

The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04707)(V_{lc})$$
$$= (0.04707)(248.0)$$
$$= 11.67\ wscf$$

Where:

V_{lc}	total volume of liquid collected in impingers and silica gel (ml)
V_{wstd}	volume of water collected at standard conditions (ft^3)
0.04707	conversion factor (ft^3/ml)

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)\left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$
$$= \frac{(17.64)(32.82)\left(23.64 + \frac{0.78}{13.6}\right)(1.0145)}{(460 + 58)}$$
$$= 26.86\ dscf$$

Where:

P_{bar}	barometric pressure (in. Hg)
T_m	average dry gas meter temperature (°F)
V_m	volume of gas sample through the dry gas meter at meter conditions (ft^3)
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
Y_d	gas meter correction factor (dimensionless)
ΔH	average pressure drop across meter box orifice (in. H_2O)
17.64	conversion factor (°R/in. Hg)
13.6	conversion factor (in. H_2O/in. Hg)
460	°F to °R conversion constant

SAMPLE CALCULATIONS (CONTINUED)

3. Sample gas pressure (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_g}{13.6}\right)$$

$$= 23.64 + \left(\frac{-0.5}{13.6}\right)$$

$$= 23.60\ in.\ Hg$$

Where:

P_{bar}	barometric pressure (in. Hg)
P_g	sample gas static pressure (in. H_2O)
P_s	absolute sample gas pressure (in. Hg)
13.6	conversion factor (in. H_2O/in. Hg)

4. Actual vapor pressure (in. Hg)[1]

$$P_v = P_s$$

$$= 23.60\ in.\ Hg$$

Where:

P_v	vapor pressure, actual (in. Hg)
P_s	absolute sample gas pressure (in. Hg)

5. Moisture content (%)

$$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$$

$$= \frac{11.67}{26.86 + 11.67}$$

$$= 0.3029$$

$$\times 100\% = 30.29\ \%$$

Where:

B_{wo}	proportion of water vapor in the gas stream by volume (%)
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
V_{wstd}	volume of water collected at standard conditions (ft^3)

[1] For effluent gas temperatures over 212°F, P_v is assumed to be equal to P_s.

SAMPLE CALCULATIONS (CONTINUED)

6. Saturated moisture content (%)

$$B_{ws} = \frac{(P_v)}{(P_s)}$$

$$= \frac{(23.60)}{(23.60)}$$

$$= 1.0$$

$$\times 100\% = 100.0\ \%$$

Where:

B_{ws}	proportion of water vapor in the gas stream by volume at saturated conditions (%)
P_s	absolute sample gas pressure (in. Hg)
P_v	vapor pressure, actual (in. Hg)

Whichever moisture value is smaller is used for B_{wo} in the following calculations.

7. Molecular weight of dry gas stream (lb/lb·mole)

$$M_d = M_{CO_2}\frac{(CO_2)}{(100)} + M_{O_2}\frac{(O_2)}{(100)} + M_{CO+N_2}\frac{(CO+N_2)}{(100)}$$

$$= 44.0\frac{(11.5)}{(100)} + 32.0\frac{(11.3)}{(100)} + 28.0\frac{(77.2)}{(100)}$$

$$= 30.29\frac{lb}{lb \cdot mole}$$

Where:

M_d	dry molecular weight of sample gas (lb/lb·mole)
M_{CO_2}	molecular weight of carbon dioxide (lb/lb·mole)
M_{O_2}	molecular weight of oxygen (lb/lb·mole)
M_{CO+N2}	molecular weight of carbon monoxide and nitrogen (lb/lb·mole)
CO_2	proportion of carbon dioxide in the gas stream by volume (%)
O_2	proportion of oxygen in the gas stream by volume (%)
$CO+N_2$	proportion of carbon monoxide and nitrogen in the gas stream by volume (%)
100	conversion factor (%)

SAMPLE CALCULATIONS (CONTINUED)

8. Molecular weight of sample gas (lb/lb·mole)

$$M_s = (M_d)(1 - B_{wo}) + (M_{H_2O})(B_{wo})$$
$$= (30.29)(1 - 0.3029) + (18.0)(0.3029)$$
$$= 26.57 \frac{lb}{lb \cdot mole}$$

Where:

B_{wo}	proportion of water vapor in the gas stream by volume
M_d	dry molecular weight of sample gas (lb/lb·mole)
M_{H_2O}	molecular weight of water (lb/lb·mole)
M_s	molecular weight of sample gas, wet basis (lb/lb·mole)

9. Velocity of sample gas (ft/sec)

$$V_s = (K_p)(C_P)(\overline{\sqrt{\Delta P}})\left(\sqrt{\frac{(\overline{T_s} + 460)}{(M_s)(P_s)}}\right)$$
$$= (85.49)(0.84)(0.486)\left(\sqrt{\frac{(312 + 460)}{(26.57)(23.60)}}\right)$$
$$= 38.7 \frac{ft}{\text{sec}}$$

Where:

K_p	velocity pressure coefficient (dimensionless)
C_p	pitot tube constant
M_s	molecular weight of sample gas, wet basis (lb/lb·mole)
P_s	absolute sample gas pressure (in. Hg)
T_s	average sample gas temperature (°F)
V_s	sample gas velocity (ft/sec)
$\overline{\sqrt{\Delta P}}$	average square roots of velocity heads of sample gas (in. H_2O)
460	°F to °R conversion constant

10. Total flow of sample gas (acfm)

$$Q_a = (60)(A_s)(V_s)$$
$$= (60)(85.90)(38.7)$$
$$= 199{,}500\ acfm$$

Where:

A_s	cross sectional area of sampling location (ft^2)
Q_a	volumetric flow rate at actual conditions (acfm)
V_s	sample gas velocity (ft/sec)
60	conversion factor (sec/min)

SAMPLE CALCULATIONS (CONTINUED)

11. Total flow of sample gas (dscfm)

$$Q_{std} = \frac{(Q_a)(P_s)(17.64)(1-B_{wo})}{(\overline{T_s}+460)}$$

$$= \frac{(199,500)(23.60)(17.64)(1-0.3029)}{(312+460)}$$

$$= 75,040\ dscfm$$

Where:

B_{wo}	proportion of water vapor in the gas stream by volume
P_s	absolute sample gas pressure (in. Hg)
Q_a	volumetric flow rate at actual conditions (acfm)
Q_{std}	volumetric flow rate at standard conditions, dry basis (dscfm)
T_s	average sample gas temperature (°F)
17.64	conversion factor (°R/in. Hg)
460	°F to °R conversion constant

12. Percent isokinetic (%)

$$I = \frac{(0.09450)(\overline{T_s}+460)(V_{mstd})}{(P_s)(V_s)\left(\frac{(D_n)^2(\pi)}{(144)(4)}\right)(\Theta)(1-B_{wo})}$$

$$= \frac{(0.09450)(312+460)(26.86)}{(23.60)(38.7)\left(\frac{(0.310)^2(\pi)}{(144)(4)}\right)(60)(1-0.3029)}$$

$$= 97.8\ \%$$

Where:

D_n	diameter of nozzle (in)
B_{wo}	proportion of water vapor in the gas stream by volume
I	percent of isokinetic sampling (%)
P_s	absolute sample gas pressure (in. Hg)
T_s	average sample gas temperature (°F)
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
V_s	sample gas velocity (ft/sec)
Θ	total sampling time (min)
0.09450	constant
460	°F to °R conversion constant

SAMPLE CALCULATIONS (CONTINUED)

13. Total inorganic particulate concentration (gr/dscf)

$$C_{gr/dscf} = \frac{(15.43)(m_n)}{V_{mstd}} = \frac{(15.43)(0.0092)}{(26.86)} = 0.0053\frac{gr}{dscf}$$

Where:

$C_{gr/dscf}$	measured concentration in the gas stream (gr/dscf)
m_n	total amount of particulate matter collected, corrected for applicable reagent blank (g)
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
15.43	conversion factor (gr/g)

14. Total inorganic particulate emission (lb/hr)

$$E_{lb/hr} = \frac{(C_{gr/dscf})(Q_{std})(60)}{7,000} = \frac{(0.0053)(75,040)(60)}{(7,000)} = 3.4\frac{lb}{hr}$$

Where:

$C_{gr/dscf}$	measured concentration in the gas stream (gr/dscf)
$E_{lb/hr}$	emission rate (lb/hr)
Q_{std}	volumetric flow rate at standard conditions, dry basis (dscfm)
60	conversion factor (min/hr)
7,000	conversion factor (gr/lb)

15. Total inorganic particulate emission (lb/ton of trona)[1]

$$E_{lb/tonoftrona} = \frac{lb/hr}{Feed\,rate\,(tons/hr)} = \frac{3.4}{185} = 0.0183\frac{lb}{ton}trona$$

Where:

$E_{lb/hr}$	emission rate (lb/hr)

[11] The calculations for oxygen, carbon dioxide, nitrogen oxides, carbon monoxide and total hydrocarbons are performed in a similar manner.

SAMPLE CALCULATIONS (CONTINUED)

16. Continuous emissions monitoring for total hydrocarbons (drift corrected in ppmwv)[1]

$$C_{gas} = \left((C_{avg}) - \left(\frac{C_{oi} + C_{of}}{2}\right)\right) \frac{(C_{ma})}{\left(\left(\frac{C_{mi} + C_{mf}}{2}\right) - \left(\frac{C_{oi} + C_{of}}{2}\right)\right)}$$

$$= \left((208.3) - \left(\frac{-4.9 + 4.9}{2}\right)\right) \frac{(283.0)}{\left(\left(\frac{282.9 + 279.4}{2}\right) - \left(\frac{-4.9 + 4.9}{2}\right)\right)}$$

$$= 209.6\ ppmwv$$

Where:

C_{gas}	concentration corrected for drift (ppmwv)
C_{avg}	measured concentration in the gas stream (ppmwv)
C_{ma}	actual concentration of the upscale calibration gas (ppm)
C_{mi}	initial system calibration bias check response for the upscale calibration gas (ppm)
C_{mf}	final system calibration bias check response for the upscale calibration gas (ppm)
C_{oi}	initial system calibration bias check response for the zero gas (ppm)
C_{of}	final system calibration bias check response for the zero gas (ppm)

17. Continuous emissions monitoring for total hydrocarbons as propane (moisture corrected to ppmdv)[2]

$$C_{ppmdv} = \frac{(C_{ppmwv})}{(1 - B_{wo})}$$

$$= \frac{(209.6)}{(1 - 0.3029)}$$

$$= 300.7\ ppmdv$$

Where:

B_{wo}	proportion of water vapor in the gas stream by volume
C_{ppmdv}	concentration calibrated for drift (ppmdv)
C_{ppmwv}	concentration calibrated for drift (ppmwv)

[1] The calculations for oxygen, carbon dioxide, nitrogen oxides, carbon monoxide and total hydrocarbons are performed in a similar manner.

[2] Thc calculations for methane are performed in a similar manner.

SAMPLE CALCULATIONS (CONTINUED)

18. Continuous emissions monitoring for total hydrocarbons (lb/hr)[1]

$$E_{lb/hr} = \frac{(C_{ppm})(M_{C_3H_8})(Q_{std})(60)}{(385.3)(10^6)}$$

$$= \frac{(300.7)(44.09)(75{,}040)(60)}{(385.3)(10^6)}$$

$$= 155.0 \frac{lb}{hr}$$

Where:

C	measured concentration in the gas stream (ppmdv)
$E_{lb/hr}$	emission rate (lb/hr)
Q_{std}	volumetric flow rate at standard conditions, dry basis (dscfm)
M_{C3H8}	molecular weight of total hydrocarbons
10^6	conversion factor (ppm)
385.3	conversion factor (ft^3/lb·mole)
60	conversion factor (min/hr)

19. Total non-methane hydrocarbons (lb/hr)

$$E_{lb/hr} = (E_{lb/hr\ THC's}) - (E_{lb/hr\ methane})$$

$$= (155.0) - (67.1)$$

$$= 87.9\ lb/hr\ total\ non-methane\ hydrocarbons$$

Where:

$E_{lb/hr}$	emission rate (lb/hr-total non-methane hydrocarbons)
$E_{lb/hr\ THC's}$	emission rate (total hydrocarbons)
$E_{lb/hr\ methane}$	emission rate (methane)

[1] The calculations for nitrogen oxides, carbon monoxide, methane and total hydrocarbons are performed in a similar manner, using their respective molecular weights.

SAMPLE CALCULATIONS (CONTINUED)

METHOD 18 SAMPLE CALCULATIONS
CA-3 CALCINER STACK - RUN 1
METHANE

20. Calibration standard G.C. response factor (ppm/units of area)

$$F_r = \frac{(C_s)}{(\bar{A})}$$

$$= \frac{(249.5)}{(388574)}$$

$$= 6.42\,E-04\ ppm/units\ of\ area$$

Where:

F_r	calibration standard G.C. response factor (ppm/units of area)
C_s	concentration of calibration standard (ppm)
$\bar{A}$	average peak area obtained from 3 injects (units of area)

Note: The above equation is used to obtain a response factor for each calibration. To calibrate the G.C., several calibrations with known concentrations are used. A calibration curve of concetration vs. area is then developed. A linear regression is used to determine the concentration from the peak area, as shown below.

21. Concentration of analyte in gas stream per inject (ppmwv-inject 1)

$$C_i = \frac{(A-b)}{m}$$

$$= \frac{(383040-(-7.47E-12))}{(1.56E+03)}$$

$$= 246\ ppmwv$$

Where:

C_i	measured concentration of analyte in gas stream per inject (ppmwv)
A	peak area (units of area)
b	y-intercept from linear regression equation (units of area)
m	slope from linear regression equation (units of area/ppmwv)

SAMPLE CALCULATIONS (CONTINUED)

22. Concentration of analyte in gas stream per run (ppmwv)

$$C = \frac{(C_1 + C_2 + \ldots + C_n)}{n}$$

$$= 249.5\, ppmwv$$

Where:

C	average run concentration obtained from 4 injects per run (ppmwv)
C_n	measured concentration of analyte in gas stream per inject (ppmwv)
n	number of injects

B

PARAMETERS

B

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack

PARTICULATE
VELOCITY AND MOISTURE PARAMETERS

Run No.		1	2	3
Date (1998)		January 21	January 21	January 21
Start Time (approx.)		09:55	11:45	13:24
Stop Time (approx.)		11:04	12:54	14:31
Sampling Conditions				
Y_c	Dry gas meter correction factor	1.0145	1.0145	1.0145
C_p	Pitot tube coefficient	0.84	0.84	0.84
P_g	Static pressure (in. H_2O)	-0.5	-0.5	-0.5
A_s	Sample location area (ft^2)	85.90	85.90	85.90
P_{bar}	Barometric pressure (in. Hg)	23.64	23.64	23.64
D_n	Nozzle diameter (in.)	0.310	0.310	0.310
O_2	Oxygen (dry volume %)	11.3	11.4	11.3
CO_2	Carbon dioxide (dry volume %)	11.5	11.5	11.5
V_{lc}	Liquid collected (ml)	248.0	253.1	253.8
V_m	Volume metered, meter conditions (ft^3)	32.82	34.23	34.67
T_m	Dry gas meter temperature (°F)	58	63	65
T_s	Sample temperature (°F)	312	314	315
ΔH	Meter box orifice pressure drop (in. H_2O)	0.78	0.83	0.86
Θ	Total sampling time (min)	60	60	60
Flow Results				
V_{wstd}	Volume of water collected (ft^3)	11.67	11.91	11.95
V_{mstd}	Volume metered, standard (ft^3)	26.86	27.76	28.03
P_s	Sample gas pressure, absolute (in. Hg)	23.60	23.60	23.60
P_v	Vapor pressure, actual (in. Hg)	23.60	23.60	23.60
B_{wo}	Moisture in sample (% by volume)	30.29	30.03	29.88
B_{ws}	Saturated moisture (% by volume)	100.00	100.00	100.00
$\sqrt{\Delta P}$	Velocity head ($\sqrt{\text{in. } H_2O}$)	0.486	0.487	0.490
M_d	MW of sample gas, dry (lb/lb-mole)	30.29	30.30	30.29
M_s	MW of sample gas, wet (lb/lb-mole)	26.57	26.60	26.62
V_s	Velocity of sample (ft/sec)	38.7	38.8	39.1
%I	Isokinetic sampling (%)	97.8	100.6	100.9
Q_a	Volumetric flow rate, actual (acfm)	199,500	200,200	201,600
Q_{std}	Volumetric flow rate, standard (dscfm)	75,040	75,370	75,930

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack

CEM PARAMETERS

Run No.		1	2	3
Date (1998)		January 21	January 21	January 21
Start Time (approx.)		09:55	11:45	13:24
Stop Time (approx.)		10:55	12:45	14:24
Gas Conditions				
O_2	Oxygen (dry volume %)	11.3	11.4	11.3
CO_2	Carbon Dioxide (dry volume %)	11.5	11.5	11.5
B_{wo}	Moisture in sample (% by volume)	30.29	30.03	29.88
Q_{std}	Volumetric flow rate, standard (dscfm)	75,040	75,370	75,930
OXYGEN				
Data Acquisition				
C	Effluent gas concentration (dry volume %)	11.2	11.2	11.2
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	0.0	-0.1	0.0
C_{mi}	Calibration bias check, initial upscale gas	10.1	10.1	10.1
C_{of}	Calibration bias check, final zero gas	-0.1	0.0	0.0
C_{mf}	Calibration bias check, final upscale gas	10.1	10.1	10.1
C_{ma}	Actual concentration of upscale gas	10.20	10.20	10.20
Calculated Results				
C_{gas}	Concentration drift corrected (dry volume %)	11.3	11.4	11.3
CARBON DIOXIDE				
Data Acquisition				
C	Effluent gas concentration (dry volume %)	11.2	11.1	11.1
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	0.0	0.0	0.0
C_{mi}	Calibration bias check, initial upscale gas	10.1	10.1	10.1
C_{of}	Calibration bias check, final zero gas	0.0	0.0	0.0
C_{mf}	Calibration bias check, final upscale gas	10.1	10.1	10.1
C_{ma}	Actual concentration of upscale gas	10.400	10.400	10.400
Calculated Results				
C_{gas}	Concentration drift corrected (dry volume %)	11.5	11.5	11.5

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack

CEM PARAMETERS

Run No.		1	2	3
Date (1998)		January 21	January 21	January 21
Start Time (approx.)		09:55	11:45	13:24
Stop Time (approx.)		10:55	12:45	14:24
Gas Conditions				
O_2	Oxygen (dry volume %)	11.3	11.4	11.3
CO_2	Carbon Dioxide (dry volume %)	11.5	11.5	11.5
B_{wo}	Moisture in sample (% by volume)	30.29	30.03	29.88
Q_{std}	Volumetric flow rate, standard (dscfm)	75,040	75,370	75,930
TOTAL HYDROCARBONS (as propane)				
Data Acquisition				
C	Effluent gas concentration (ppmwv)	208.3	198.4	215.2
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	-4.9	4.9	5.0
C_{mi}	Calibration bias check, initial upscale gas	282.9	279.4	280.8
C_{of}	Calibration bias check, final zero gas	4.9	5.0	7.0
C_{mf}	Calibration bias check, final upscale gas	279.4	280.8	279.4
C_{ma}	Actual concentration of upscale gas	283.0	283.0	283.0
Calculated Results				
C_{gas}	Concentration drift corrected (ppmwv)	209.6	199.0	216.0
C_{gas}	Concentration moisture corrected (ppmdv)	300.7	284.4	308.1
E	Emission rate (lb/hr)	155.0	147.2	160.6
METHANE				
Data Acquisition				
C	Effluent gas concentration (ppmwv)	249.5	239.6	264.8
Calculated Results				
C_{gas}	Concentration moisture corrected (ppmdv)	357.9	342.4	377.6
E	Emission rate (lb/hr)	67.1	64.5	71.6

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack

CEM PARAMETERS

Run No.		1	2	3
Date (1998)		January 21	January 21	January 21
Start Time (approx.)		09:55	11:45	13:24
Stop Time (approx.)		10:55	12:45	14:24
Gas Conditions				
O_2	Oxygen (dry volume %)	11.3	11.4	11.3
CO_2	Carbon Dioxide (dry volume %)	11.5	11.5	11.5
B_{wo}	Moisture in sample (% by volume)	30.29	30.03	29.88
Q_{std}	Volumetric flow rate, standard (dscfm)	75,040	75,370	75,930
NITROGEN OXIDES				
Data Acquisition				
C	Effluent gas concentration (ppmdv)	24.4	24.6	22.1
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	0.4	1.1	0.9
C_{mi}	Calibration bias check, initial upscale gas	228.0	230.6	228.2
C_{of}	Calibration bias check, final zero gas	1.1	0.9	1.3
C_{mf}	Calibration bias check, final upscale gas	230.6	228.2	227.7
C_{ma}	Actual concentration of upscale gas	227.0	227.0	227.0
Calculated Results				
C_{gas}	Concentration drift corrected (ppmdv)	23.5	23.5	21.0
E	Emission rate (lb/hr)	12.7	12.7	11.4
CARBON MONOXIDE				
Data Acquisition				
C	Effluent gas concentration (ppmdv)	736.6	754.0	794.1
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	7.2	7.3	7.3
C_{mi}	Calibration bias check, initial upscale gas	603.0	602.7	598.5
C_{of}	Calibration bias check, final zero gas	7.3	7.3	7.3
C_{mf}	Calibration bias check, final upscale gas	602.7	598.5	596.4
C_{ma}	Actual concentration of upscale gas	598.7	598.7	598.7
Calculated Results				
C_{gas}	Concentration drift corrected (ppmdv)	733.2	753.5	798.2
E	Emission rate (lb/hr)	240.0	247.7	264.4

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1 & 2 Calciner Stack

PARTICULATE
VELOCITY AND MOISTURE PARAMETERS

Run No.		1	2	3
Date (1998)		January 22	January 22	January 22
Start Time (approx.)		08:55	11:05	12:50
Stop Time (approx.)		10:04	12:11	14:04
Sampling Conditions				
Y_d	Dry gas meter correction factor	1.0145	1.0145	1.0145
C_p	Pitot tube coefficient	0.84	0.84	0.84
P_g	Static pressure (in. H_2O)	-0.3	-0.2	-0.2
A_s	Sample location area (ft^2)	113.10	113.10	113.10
P_{bar}	Barometric pressure (in. Hg)	23.68	23.68	23.68
D_n	Nozzle diameter (in.)	0.250	0.250	0.250
O_2	Oxygen (dry volume %)	13.4	13.8	13.8
CO_2	Carbon dioxide (dry volume %)	8.4	8.0	8.0
V_{lc}	Liquid collected (ml)	213.9	192.9	199.3
V_m	Volume metered, meter conditions (ft^3)	38.01	38.42	39.85
T_m	Dry gas meter temperature (°F)	40	69	66
T_s	Sample temperature (°F)	336	337	339
ΔH	Meter box orifice pressure drop (in. H_2O)	1.08	1.02	1.11
Θ	Total sampling time (min)	60	60	60
Flow Results				
V_{wstd}	Volume of water collected (ft^3)	10.07	9.08	9.38
V_{mstd}	Volume metered, standard (ft^3)	32.32	30.87	32.19
P_s	Sample gas pressure, absolute (in. Hg)	23.66	23.67	23.67
P_v	Vapor pressure, actual (in. Hg)	23.66	23.67	23.67
B_{wo}	Moisture in sample (% by volume)	23.75	22.73	22.57
B_{ws}	Saturated moisture (% by volume)	100.00	100.00	100.00
$\sqrt{\Delta P}$	Velocity head ($\sqrt{\text{in. } H_2O}$)	0.822	0.802	0.831
M_d	MW of sample gas, dry (lb/lb-mole)	29.88	29.83	29.83
M_s	MW of sample gas, wet (lb/lb-mole)	27.06	27.14	27.16
V_s	Velocity of sample (ft/sec)	65.8	64.1	66.5
%I	Isokinetic sampling (%)	100.1	96.9	97.4
Q_a	Volumetric flow rate, actual (acfm)	446,600	435,300	451,400
Q_{std}	Volumetric flow rate, standard (dscfm)	178,600	176,100	182,700

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack

CEM PARAMETERS

Run No.		1	2	3
Date (1998)		January 22	January 22	January 22
Start Time (approx.)		08:54	11:07	12:49
Stop Time (approx.)		09:54	12:07	13:49
Gas Conditions				
O_2	Oxygen (dry volume %)	13.4	13.8	13.8
CO_2	Carbon Dioxide (dry volume %)	8.4	8.0	8.0
B_{wo}	Moisture in sample (% by volume)	23.75	22.73	22.57
Q_{std}	Volumetric flow rate, standard (dscfm)	178,600	176,100	182,700
OXYGEN				
Data Acquisition				
C	Effluent gas concentration (dry volume %)	13.2	13.6	13.6
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	-0.1	0.0	0.0
C_{mi}	Calibration bias check, initial upscale gas	10.1	10.1	10.1
C_{of}	Calibration bias check, final zero gas	0.0	0.0	-0.1
C_{mf}	Calibration bias check, final upscale gas	10.1	10.1	10.0
C_{ma}	Actual concentration of upscale gas	10.2	10.2	10.2
Calculated Results				
C_{gas}	Concentration drift corrected (dry volume %)	13.4	13.8	13.8
CARBON DIOXIDE				
Data Acquisition				
C	Effluent gas concentration (dry volume %)	8.3	7.8	7.9
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	0.0	0.0	0.0
C_{mi}	Calibration bias check, initial upscale gas	10.2	10.2	10.2
C_{of}	Calibration bias check, final zero gas	0.0	0.0	0.0
C_{mf}	Calibration bias check, final upscale gas	10.2	10.2	10.2
C_{ma}	Actual concentration of upscale gas	10.4	10.4	10.4
Calculated Results				
C_{gas}	Concentration drift corrected (dry volume %)	8.4	8.0	8.0

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack

CEM PARAMETERS

Run No.		1	2	3
Date (1998)		January 22	January 22	January 22
Start Time (approx.)		08:54	11:07	12:49
Stop Time (approx.)		09:54	12:07	13:49
Gas Conditions				
O_2	Oxygen (dry volume %)	13.4	13.8	13.8
CO_2	Carbon Dioxide (dry volume %)	8.4	8.0	8.0
B_{wo}	Moisture in sample (% by volume)	23.75	22.73	22.57
Q_{std}	Volumetric flow rate, standard (dscfm)	178,600	176,100	182,700
TOTAL HYDROCARBONS (as propane)				
Data Acquisition				
C	Effluent gas concentration (ppmwv)	305.9	321.1	245.4
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	-0.2	4.4	7.5
C_{mi}	Calibration bias check, initial upscale gas	286.5	279.2	287.3
C_{of}	Calibration bias check, final zero gas	4.4	7.5	4.5
C_{mf}	Calibration bias check, final upscale gas	279.2	287.3	288.6
C_{ma}	Actual concentration of upscale gas	283.0	283.0	283.0
Calculated Results				
C_{gas}	Concentration drift corrected (ppmwv)	306.2	321.6	240.3
C_{gas}	Concentration moisture corrected (ppmdv)	401.6	416.2	310.3
E	Emission rate (lb/hr)	492.6	503.3	389.3
METHANE				
Data Acquisition				
C	Effluent gas concentration (ppmwv)	601.4	511.5	468.1
Calculated Results				
C_{gas}	Concentration moisture corrected (ppmdv)	788.7	662.0	604.5
E	Emission rate (lb/hr)	351.9	291.2	275.9

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack

CEM PARAMETERS

Run No.		1	2	3
Date (1998)		January 22	January 22	January 22
Start Time (approx.)		08:54	11:07	12:49
Stop Time (approx.)		09:54	12:07	13:49
Gas Conditions				
O_2	Oxygen (dry volume %)	13.4	13.8	13.8
CO_2	Carbon Dioxide (dry volume %)	8.4	8.0	8.0
B_{wo}	Moisture in sample (% by volume)	23.75	22.73	22.57
Q_{std}	Volumetric flow rate, standard (dscfm)	178,600	176,100	182,700
NITROGEN OXIDES				
Data Acquisition				
C	Effluent gas concentration (ppmdv)	4.8	3.7	3.9
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	0.4	0.8	0.7
C_{mi}	Calibration bias check, initial upscale gas	227.6	222.5	219.4
C_{of}	Calibration bias check, final zero gas	0.8	0.7	0.5
C_{mf}	Calibration bias check, final upscale gas	222.5	219.4	223.9
C_{ma}	Actual concentration of upscale gas	227.0	227.0	227.0
Calculated Results				
C_{gas}	Concentration drift corrected (ppmdv)	4.2	3.1	3.4
E	Emission rate (lb/hr)	5.4	3.9	4.4
CARBON MONOXIDE				
Data Acquisition				
C	Effluent gas concentration (ppmdv)	1160.2	1171.9	969.2
Calibration Gases				
C_{oi}	Calibration bias check, initial zero gas	7.3	5.0	4.9
C_{mi}	Calibration bias check, initial upscale gas	593.2	581.0	581.1
C_{of}	Calibration bias check, final zero gas	5.0	4.9	7.3
C_{mf}	Calibration bias check, final upscale gas	581.0	581.1	593.2
C_{ma}	Actual concentration of upscale gas	598.7	598.7	598.7
Calculated Results				
C_{gas}	Concentration drift corrected (ppmdv)	1189.3	1212.7	992.4
E	Emission rate (lb/hr)	926.5	931.5	790.9

CALIBRATION DATA

C

SOLVAY MINERALS, INC.
CAE Job No. 8190-1
1/20/98
Calciner Stacks

Target Compounds

Compound	Phase	Mol. Wt.	Density	Source	Stock No.	Lot No.	CAS No.
Methane	gas	16.04	na	Scott			74-82-8

GC Operating Conditions

Column: 3% SP1500 on 80/120 Carbopack B, .125 dia SS, 10 ft length

Carrier: Zero grade nitrogen, at 30 cc/min

Sample: 1cc teflon

Inj Temp: 200 C
Det Temp: 250 C

Oven: 50 C 3 min, 15 C/min to 200 C, hold 2 min

SOLVAY2016_6_002230

Revision 0

SOLVAY MINERALS, INC.
CAE Job No. 8190-1
1/21/98

Calciner 3, 1-21-98
Methane Analysis

Calibration Summary

Methane Cal Gas Conc, ppm		**551**	**249.5**
	Area 1	856058	393314
	Area 2	857910	386890
	Area 3	855728	385520
	avg	**856565.3**	**388574.7**
	% RSD	**0.14**	**1.07**

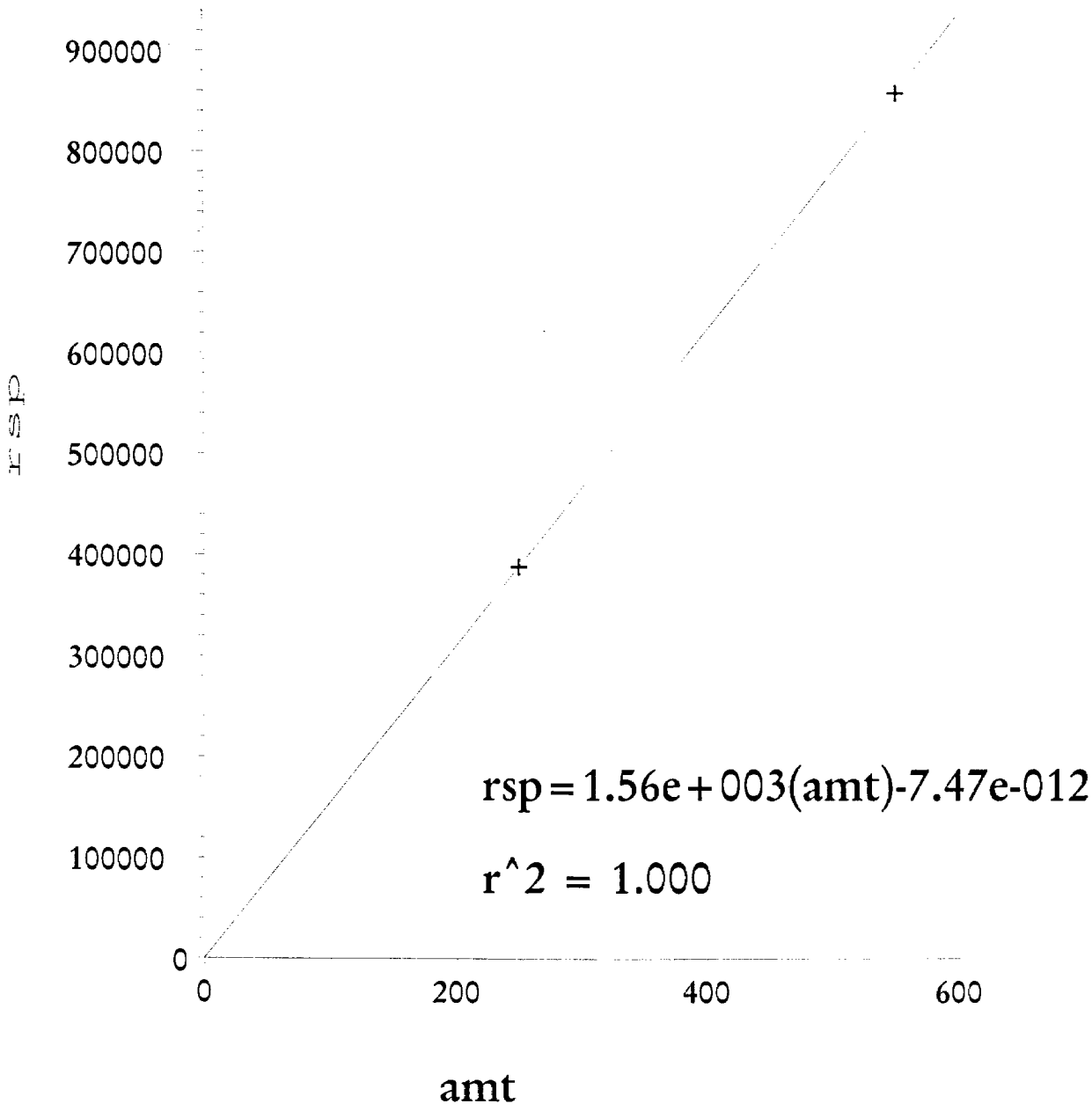
Recovery Check

The recovery check compared area counts for the 249.5ppm Methane calibration gas introduced directly to the GC and flowed to the probe and through the entire sampling system

	Direct	**Probe**
Area 1	393314	375019
Area 2	386890	369684
Area 3	385520	378592
avg	**388574.7**	**374431.7**

% Recovery **96.36%**

Methane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600000
500000
400000
300000
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rsp
0
200
400
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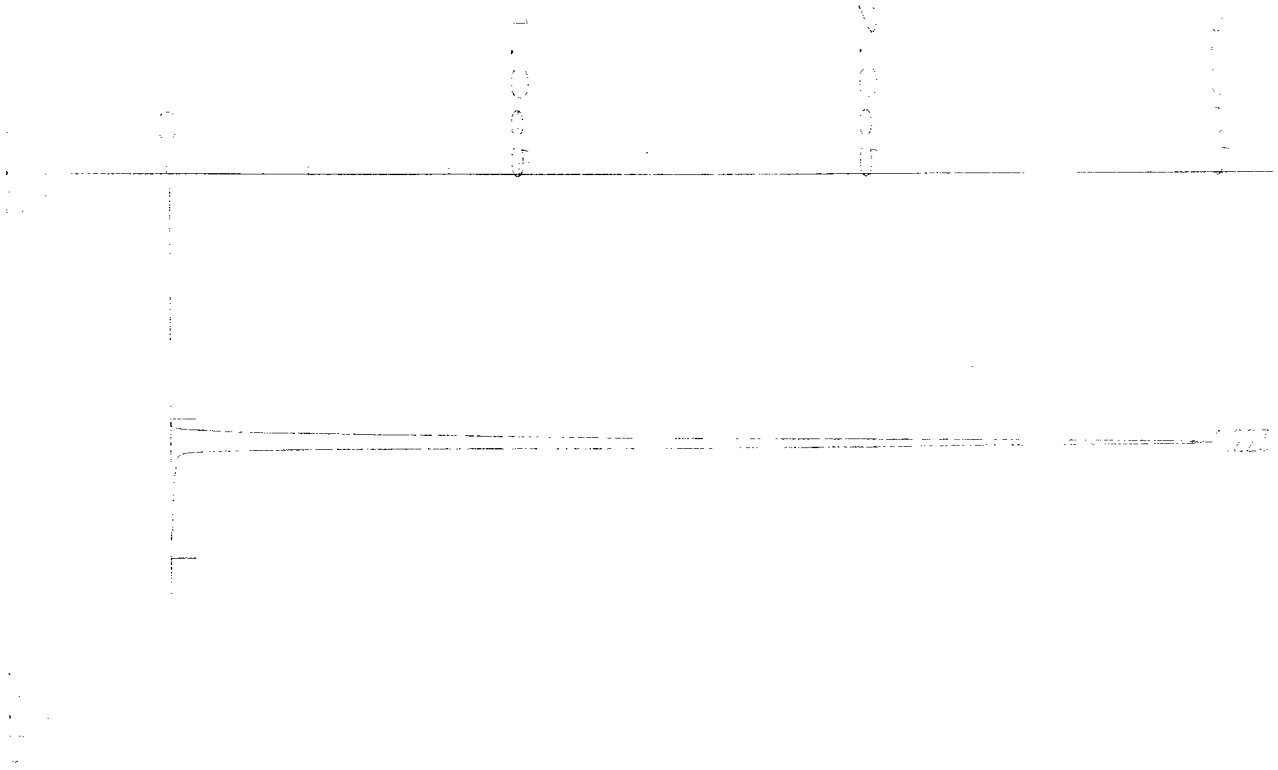
r^2 = 1.000



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==============================================================================
                          External Standard Report
==============================================================================

Data File Name    : C:\HPCHEM\1\DATA\CA3\CAL1_001.D
Operator          : John Chapman                  Page Number       : 1
Instrument        : INSTRUMEN                     Vial Number       :
Sample Name       : directcal                     Injection Number  :
Run Time Bar Code:                                Sequence Line     :
Acquired on       : 21 Jan 98  07:56 AM           Instrument Method: SOLV.MTH
Report Created on: 21 Jan 98  08:01 AM            Analysis Method   : SOLV.MTH
Last Recalib on   : 21 Jan 98  08:00 AM           Sample Amount     : 0
Multiplier        : 1                             ISTD Amount       :

Sig. 1 in C:\HPCHEM\1\DATA\CA3\CAL1_001.D
Ret Time     Area     Type Width Ref#  ppm                    Name
|-------|------------|----|-----|-----|--------|------------------------------|
   1.223       856058 BB   0.045  1-R   551.000 Methane


       Time Reference Peak      Expected RT    Actual RT     Difference
                 1                   1.223         1.223           0.0%

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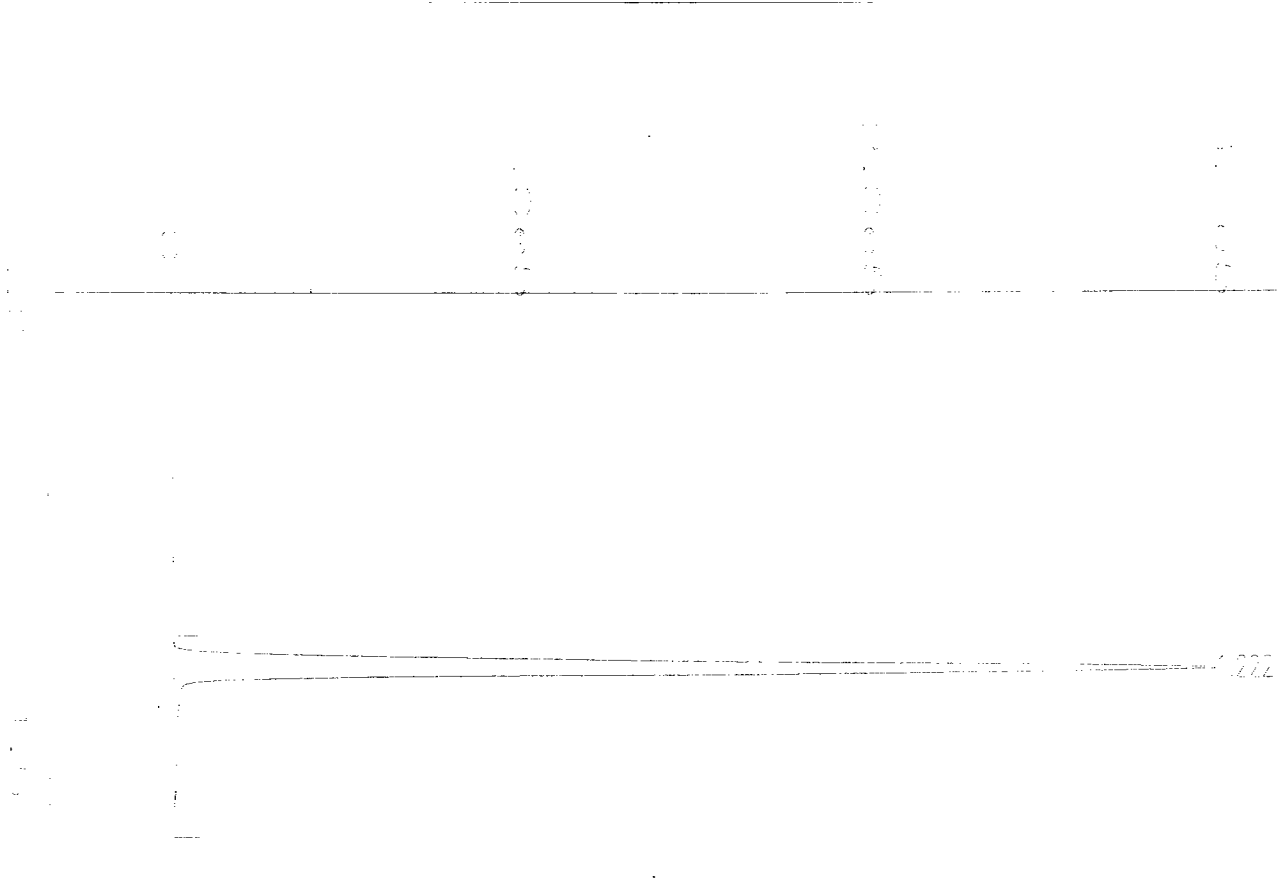
SOLVAY2016_6_002233



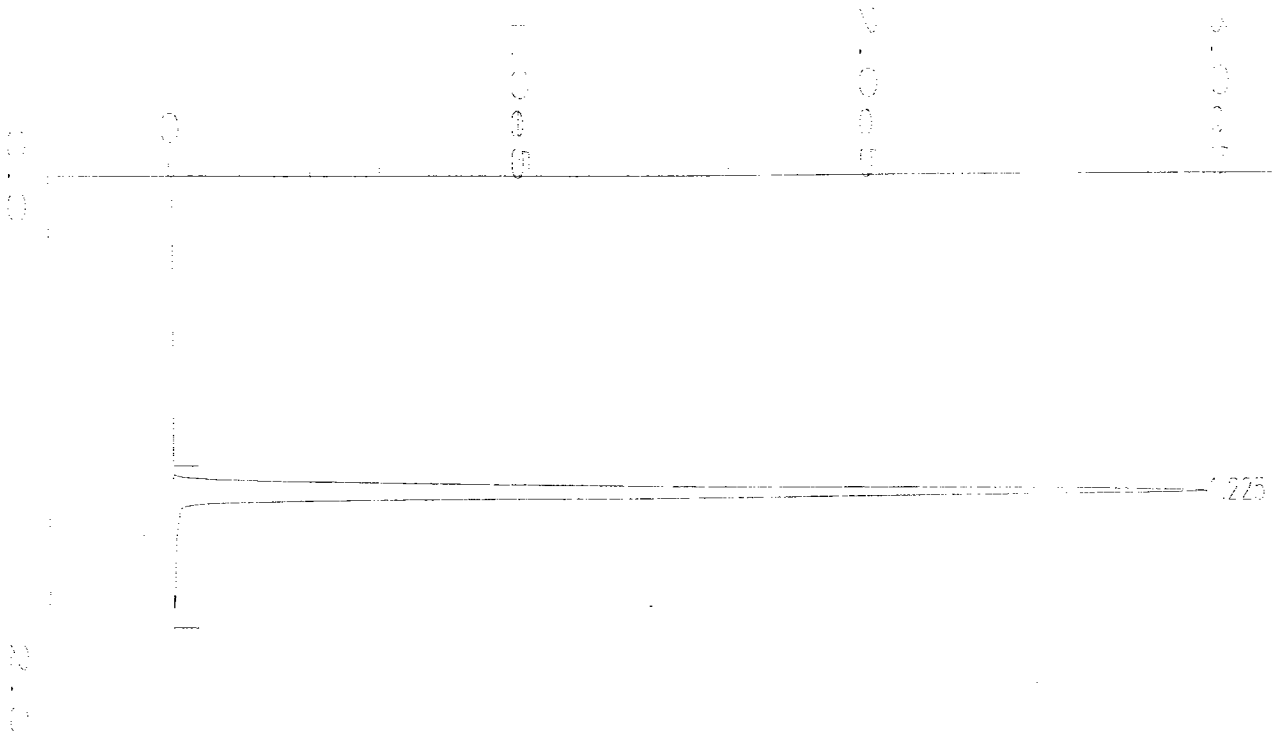
External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA3\CAL1_002.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: directcal	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 21 Jan 98 08:01 AM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 08:03 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:00 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\CAL1_002.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.222	857910	BB	0.045	1-R	552.192	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.223	1.222	0.0%

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==============================================================================
                          External Standard Report
==============================================================================

Data File Name    : C:\HPCHEM\1\DATA\CA3\CAL1_003.D
Operator          : John Chapman                    Page Number       : 1
Instrument        : INSTRUMEN                       Vial Number       :
Sample Name       : directcal                       Injection Number  :
Run Time Bar Code:                                  Sequence Line     :
Acquired on       : 21 Jan 98  08:03 AM             Instrument Method: SOLV.MTH
Report Created on: 21 Jan 98  08:06 AM              Analysis Method   : SOLV.MTH
Last Recalib on   : 21 Jan 98  08:00 AM             Sample Amount     : 0
Multiplier        : 1                               ISTD Amount       :

Sig. 1 in C:\HPCHEM\1\DATA\CA3\CAL1_003.D
Ret Time     Area     Type Width Ref#  ppm                    Name
|-------|------------|----|-----|-----|--------|------------------------------|
   1.225       855728 BB   0.045  1-R   550.787 Methane


       Time Reference Peak      Expected RT    Actual RT     Difference
                 1                   1.223         1.225           0.2%

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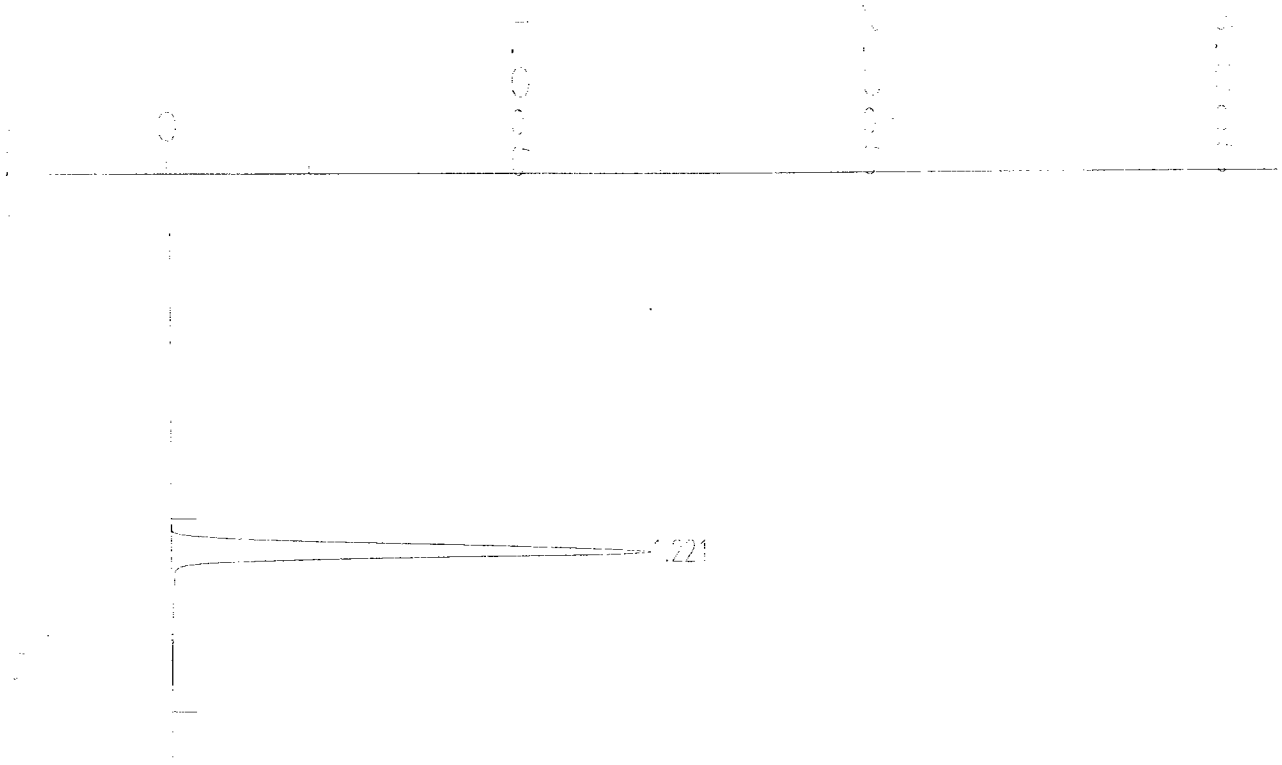


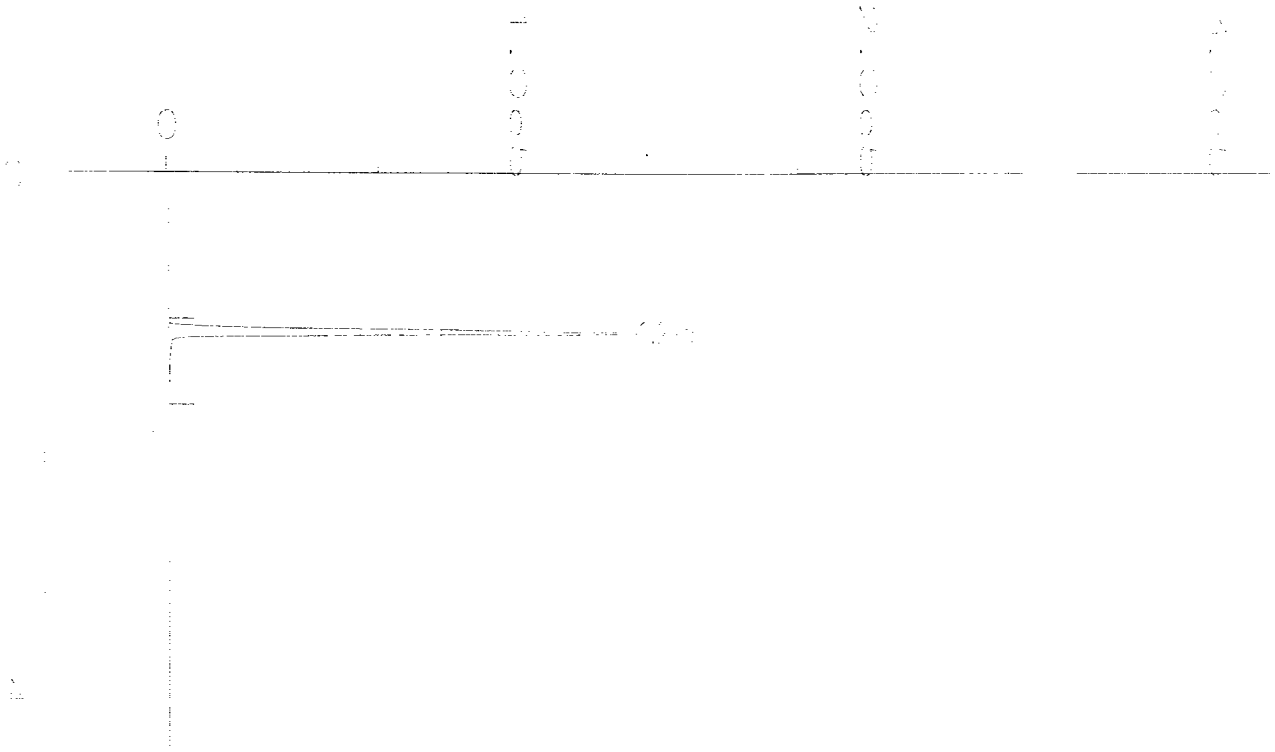
External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA3\CAL2_001.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: directcal249	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 08:10 AM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 08:12 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:07 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\CAL2_001.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.221	393314	BB	0.045	1-R	253.006	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.223	1.221	-0.2%



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA3\CAL2_002.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: directcal249	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 08:12 AM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 08:17 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:07 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\CAL2_002.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.225	386890	BB	0.046	1-R	248.874	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.223	1.225	0.1%

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External Standard Report

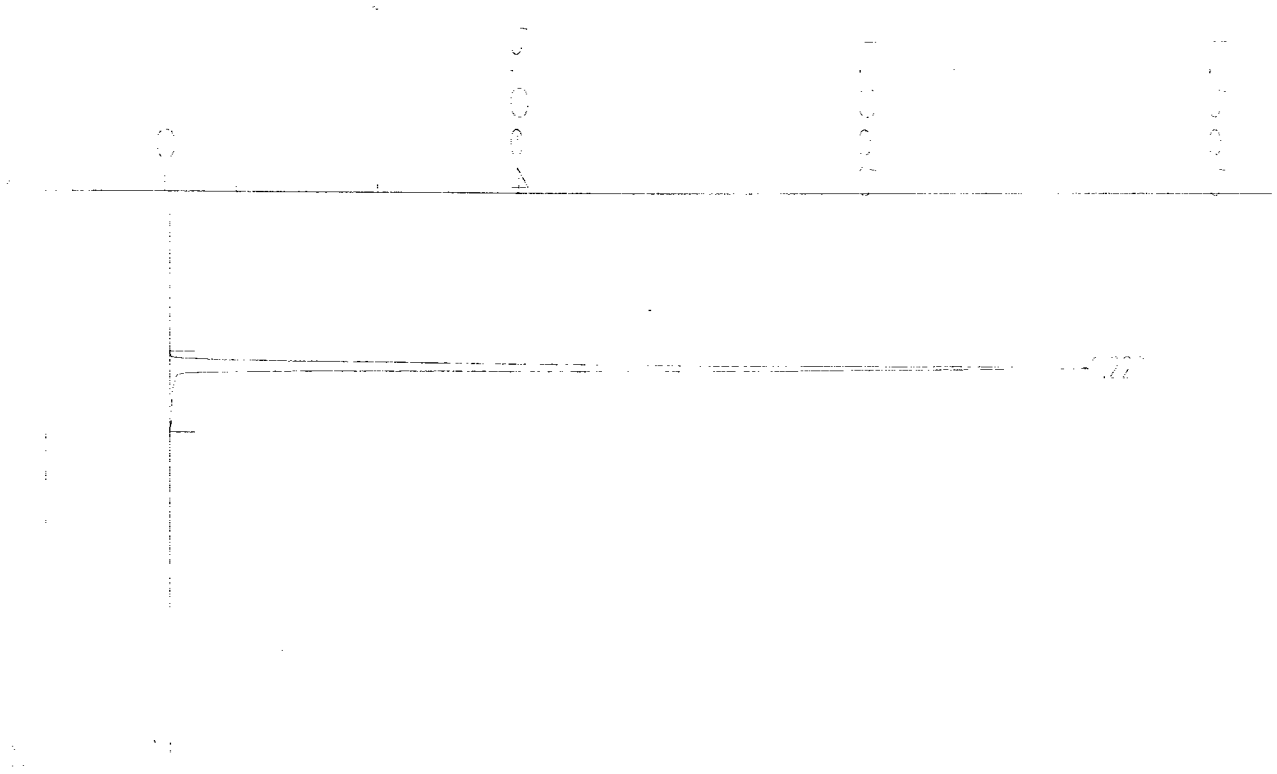
Data File Name	: C:\HPCHEM\1\DATA\CA3\CAL2_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: directcal249	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 08:19 AM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 08:21 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:07 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\CAL2_003.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.216	385520	BB	0.045	1-R	247.992	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.223	1.216	-0.6%

SOLVAY2016_6_002238



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R1_005.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 21 Jan 98 11:08 AM	Instrument Method:	SOLV.MTH
Report Created on:	21 Jan 98 11:12 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R1_005.D

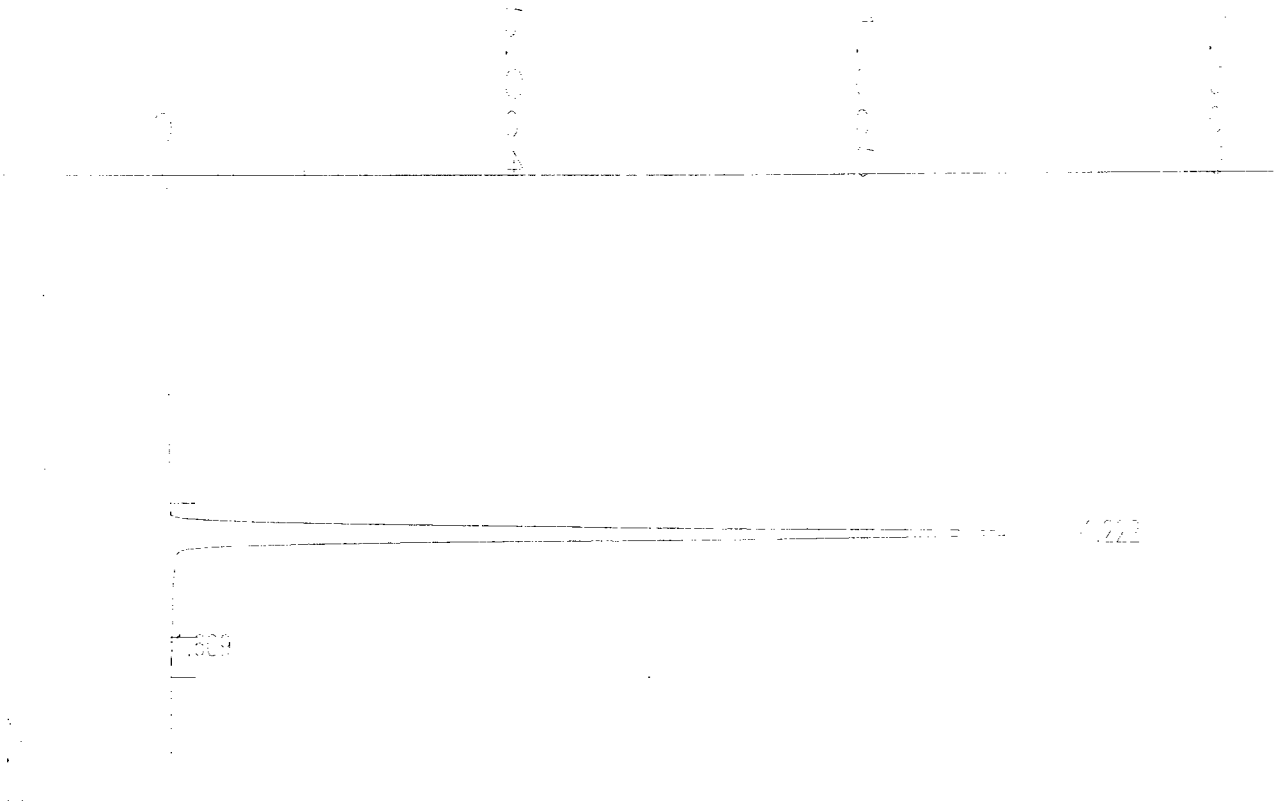
Ret Time	Area	Type	Width	Ref#	ppm	Name
1.220	375019	BB	0.045	1-R	240.796	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.220	-0.1%

==========

Recovery Check

SOLVAY2016_6_002239



External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R1_007.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: recoverycheck	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 11:35 AM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 11:37 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

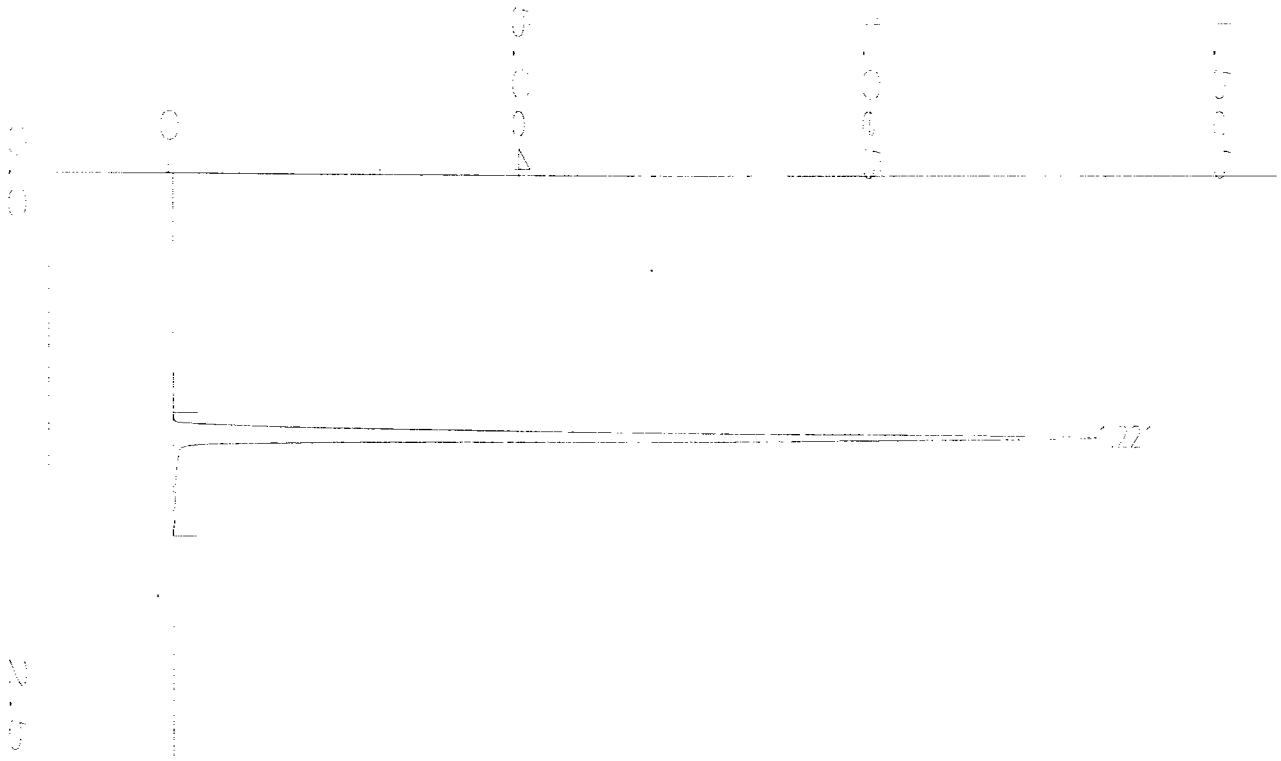
Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R1_007.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.222	369684	BV	0.045	1-R	237.371	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.222	0.0%

Recovery check

SOLVAY2016_6_002240



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R2_006.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 21 Jan 98 01:03 PM	Instrument Method:	SOLV.MTH
Report Created on:	21 Jan 98 01:06 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R2_006.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.221	378592	BB	0.045	1-R	243.090	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.221	0.0%

==========

Recovery check

SOLVAY2016_6_002241

SOLVAY MINERALS, INC.
CAE Job No. 8190-1
1/22/98

Calciners 1&2, 1-22-98
Methane Analysis

Calibration Summary

Methane Cal Gas Conc, ppm		**905.2**	**551.0**	**249.5**
	Area 1	1337647	844487	384020
	Area 2	1360164	850527	385377
	Area 3	1360447	844250	385800
	avg	**1352752.7**	**846421.3**	**385065.667**
	% RSD	**0.97**	**0.42**	**0.24**

Recovery Check

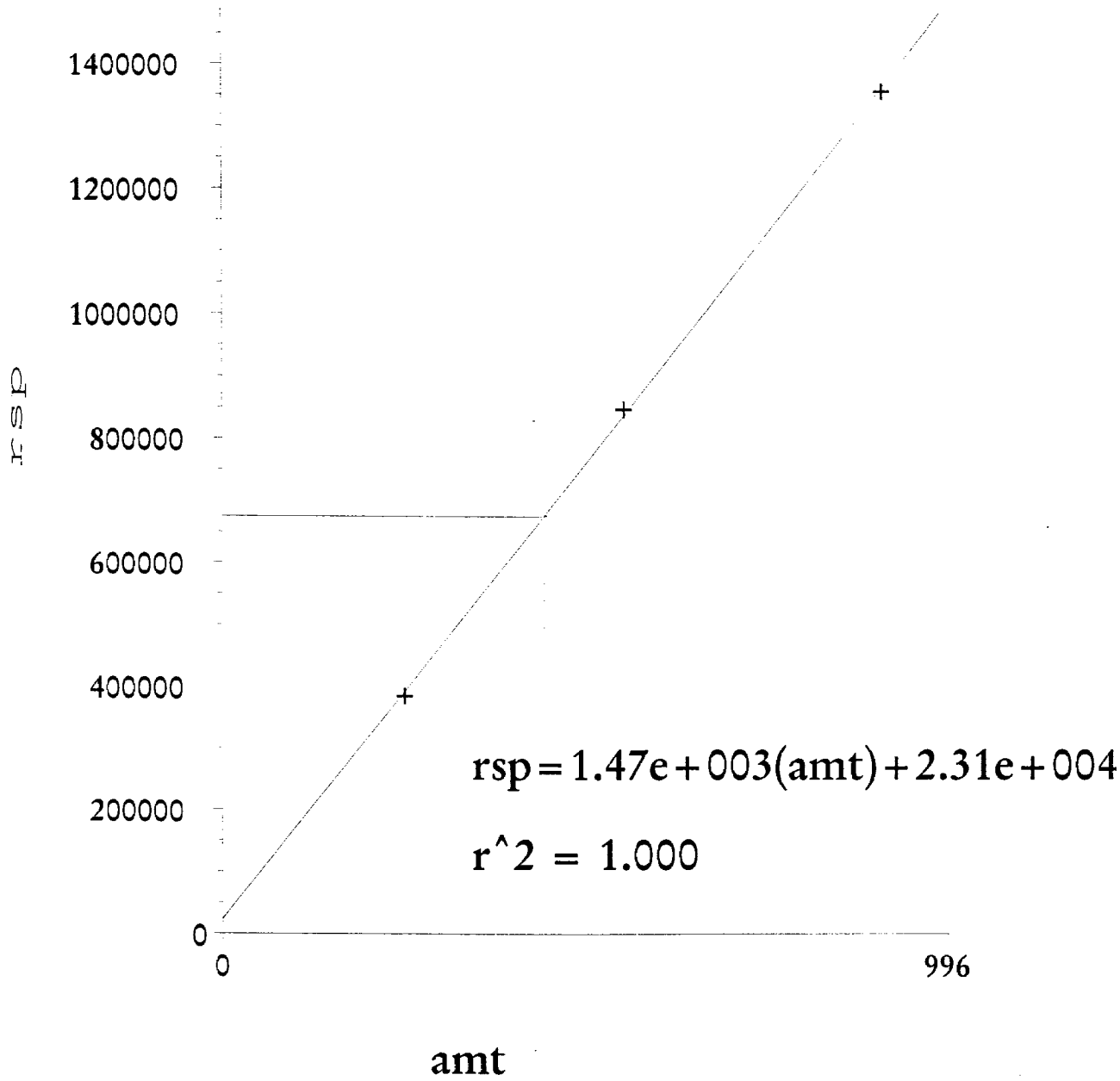
The recovery check compared area counts for the 551ppm Methane calibration gas introduced directly to the GC and flowed to the probe and through the entire sampling system

	Direct	**Probe**
Area 1	844487	814219
Area 2	850527	821144
Area 3	844250	826053
avg	**846421.3**	**820472.0**

% Recovery **96.93%**

C.7 1+2

Methane



SOLVAY2016_6_002243

External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA1\CAL1_001.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: direct249	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 07:29 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 07:36 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:33 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\CAL1_001.D

Ret Time	Area	Type	Width	Ref#	ng/ul	Name
1.272	384020	BBA	0.048	1-R	249.500	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.272	0.0%

SOLVAY2016_6_002244

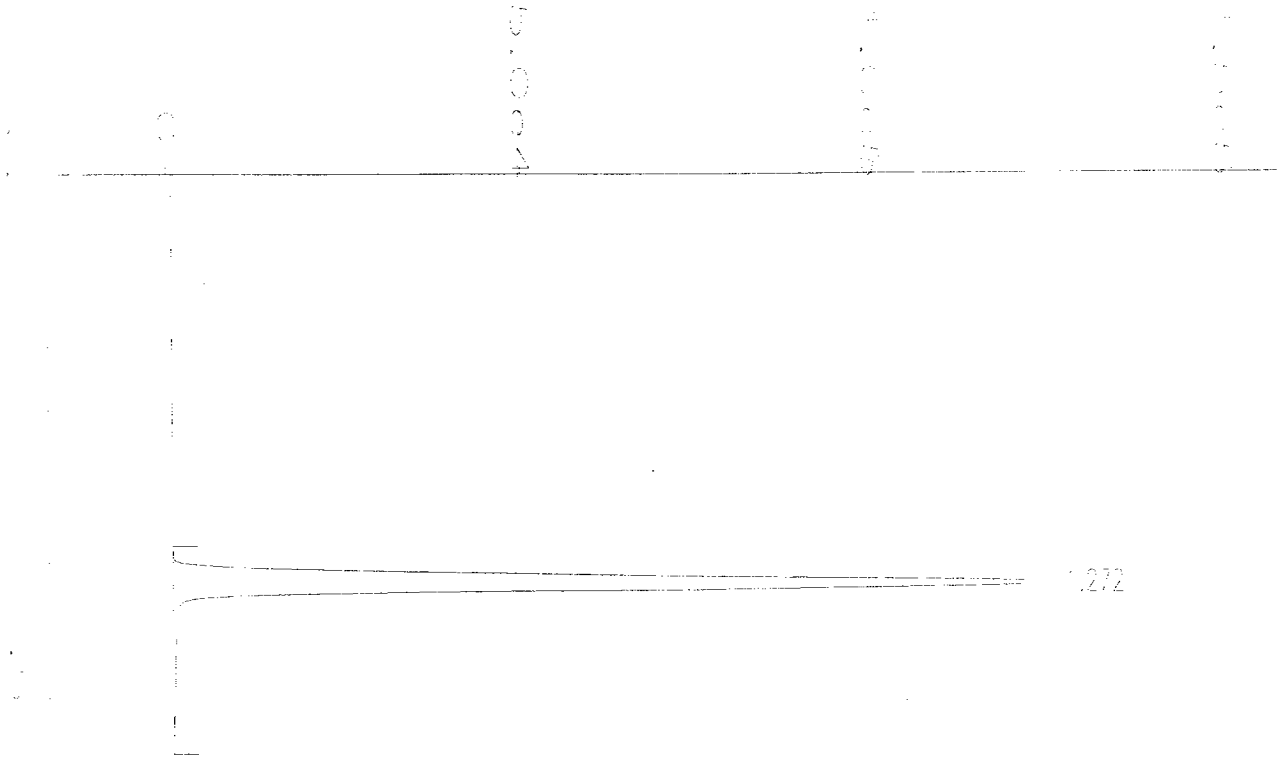
External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA1\CAL1_002.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: direct249	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 22 Jan 98 07:33 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 07:36 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:33 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\CAL1_002.D

Ret Time	Area	Type	Width	Ref#	ng/ul	Name
1.272	385377	BB	0.048	1-R	250.382	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.272	0.0%



External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA1\CAL1_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: direct249	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 07:37 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 07:39 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:36 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\CAL1_003.D

Ret Time	Area	Type	Width	Ref#	ng/ul	Name
1.272	385800	BBA	0.048	1-R	250.215	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.272	0.0%

SOLVAY2016_6_002246

External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA1\CAL2_001.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: direct551	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 07:40 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 07:42 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:39 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\CAL2_001.D

Ret Time	Area	Type	Width	Ref#	ng/ul	Name
1.272	844487	BB	0.048	1-R	547.178	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.272	0.0%

SOLVAY2016_6_002247

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\CA1\CAL2_002.D
Operator : John Chapman
Instrument : INSTRUMEN
Sample Name : direct551
Run Time Bar Code:
Acquired on : 22 Jan 98 07:44 AM
Report Created on: 22 Jan 98 07:48 AM
Last Recalib on : 22 Jan 98 07:43 AM
Multiplier : 1

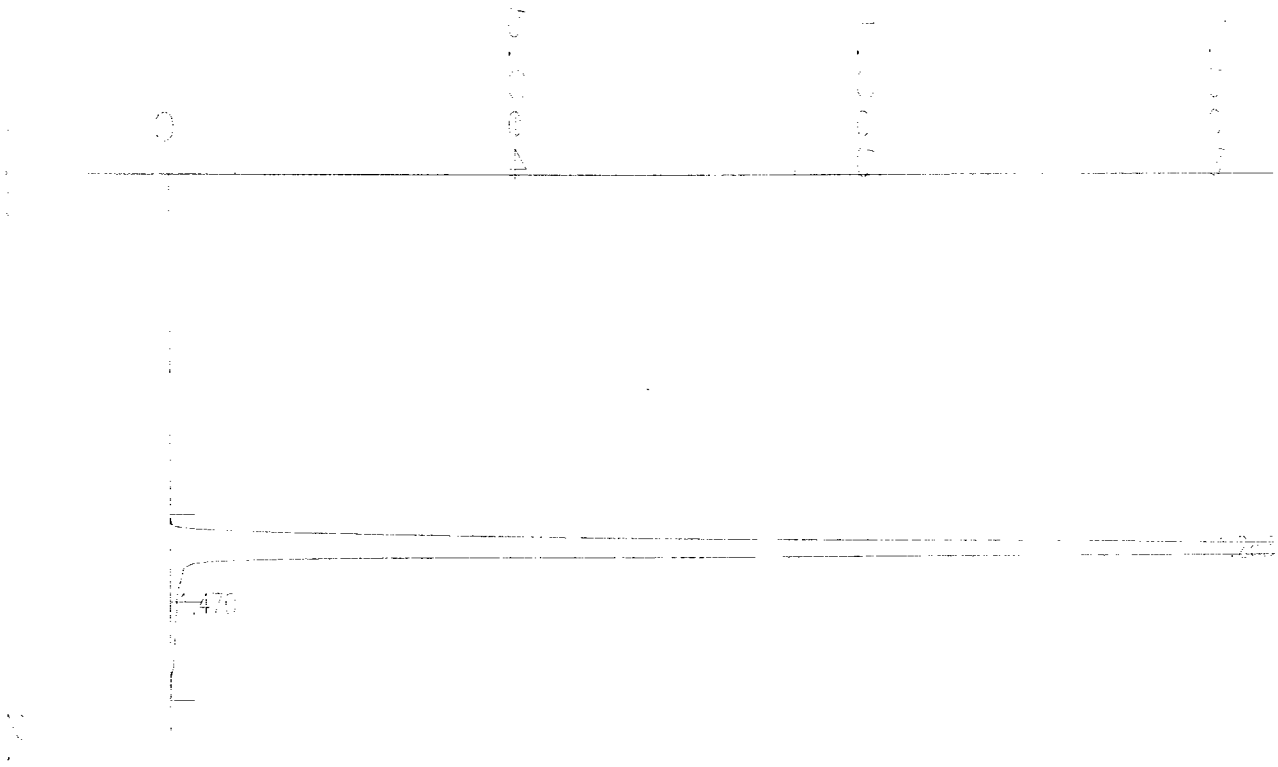
Page Number : 1
Vial Number :
Injection Number :
Sequence Line :
Instrument Method: SOLV.MTH
Analysis Method : SOLV.MTH
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\CA1\CAL2_002.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.273	850527	BB	0.048	1-R	554.963	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.273	0.1%

SOLVAY2016_6_002248



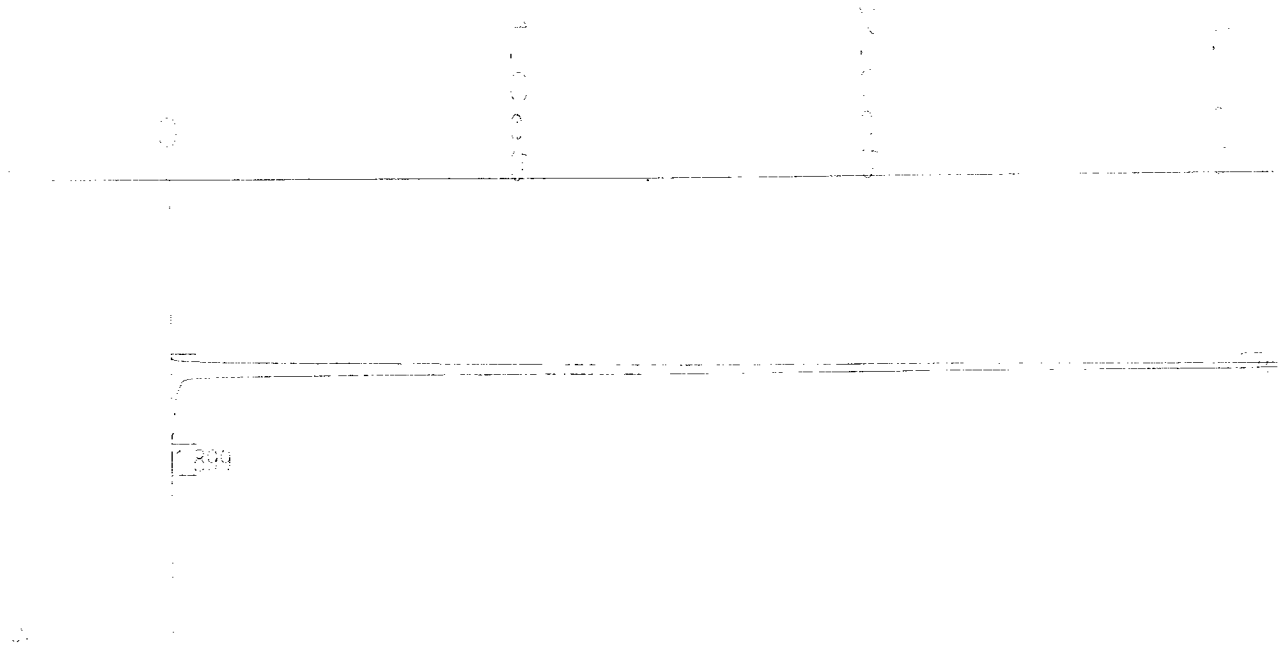
External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA1\CAL2_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: direct551	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 22 Jan 98 07:49 AM	Instrument Method	: SOLV.MTH
Report Created on:	22 Jan 98 07:51 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:48 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\CAL2_003.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.263	844250	BV	0.047	1-R	548.877	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.263	-0.7%



External Standard Report

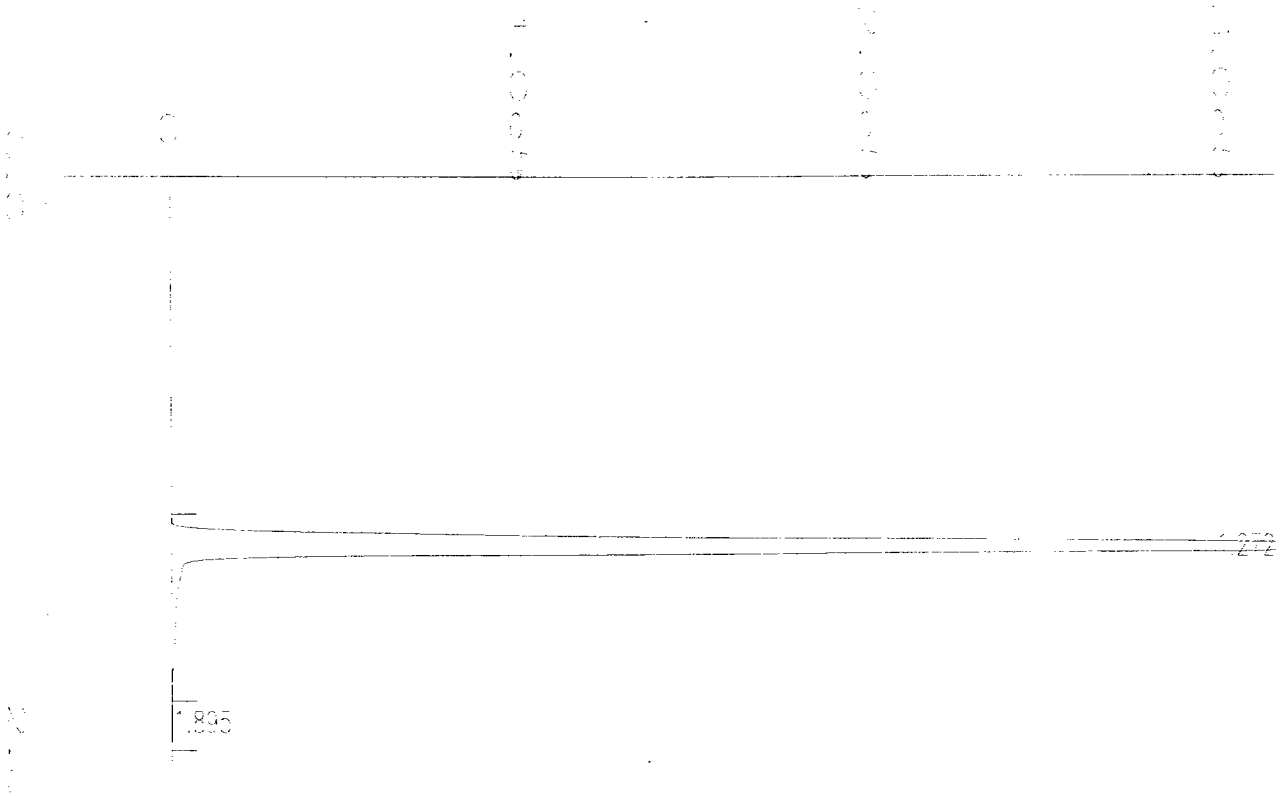
Data File Name	: C:\HPCHEM\1\DATA\CA1\CAL3_001.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: direct905.2	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 10:26 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 10:30 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\CAL3_001.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.276	1337647	BV	0.048	1-R	872.020	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.276	0.5%

SOLVAY2016_6_002250



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\CAL3_002.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: direct905.2	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 10:31 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 10:33 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:30 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\CAL3_002.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.272	1360164	BV	0.048	1-R	915.798	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.272	0.2%

==========

SOLVAY2016_6_002251

External Standard Report

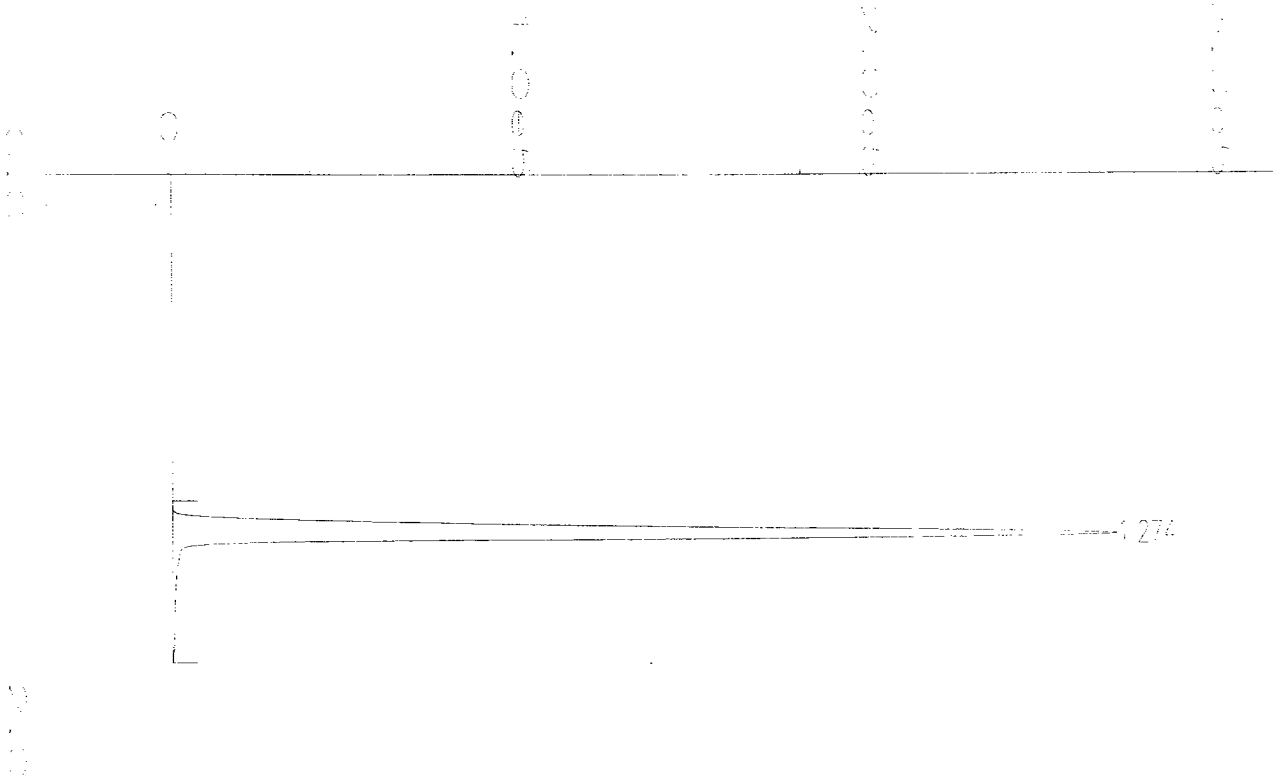
Data File Name	: C:\HPCHEM\1\DATA\CA1\CAL3_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: direct905.2	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 10:34 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 10:39 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:33 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\CAL3_003.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.278	1360447	BV	0.048	1-R	909.275	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.271	1.278	0.6%

SOLVAY2016_6_002252



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1RC_005.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: recoverycheck551	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 22 Jan 98 10:16 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 10:18 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

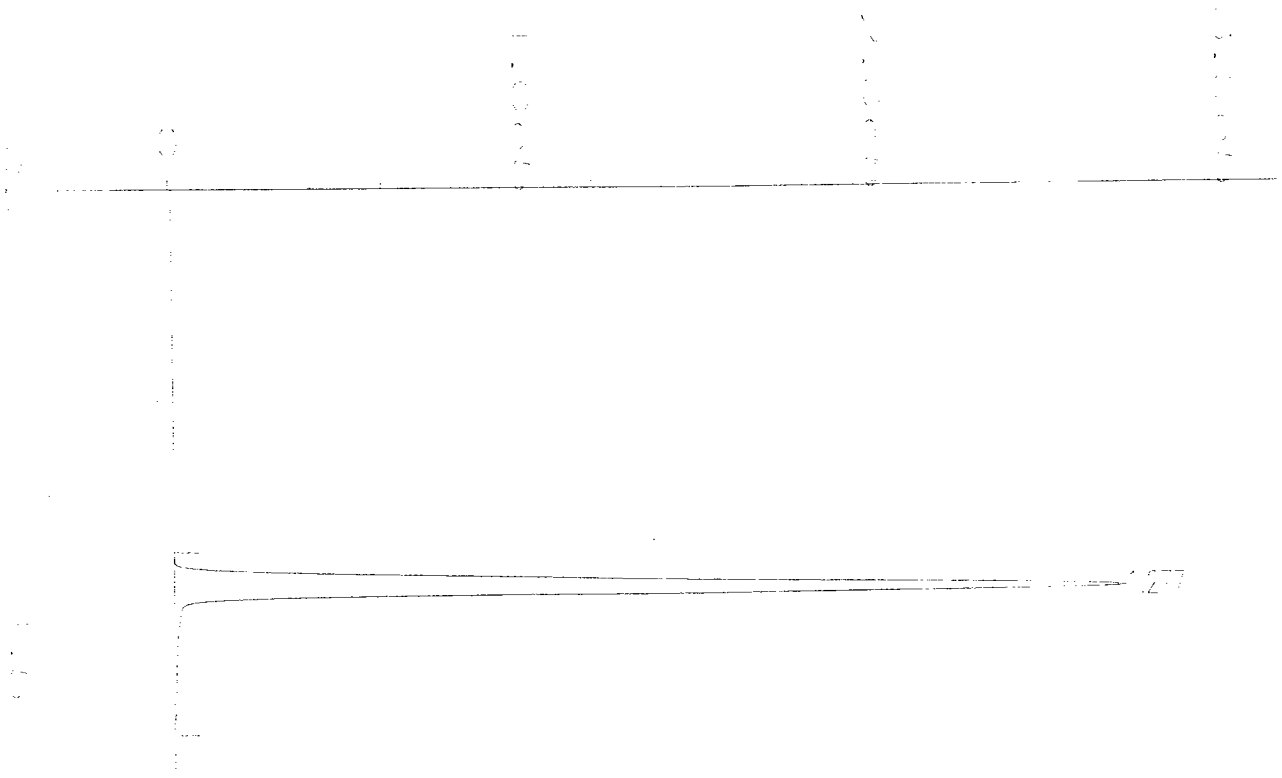
Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1RC_005.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.274	814219	BV	0.047	1-R	529.956	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.274	0.3%

==========

Recovery Check



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1RC_006.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: recoverycheck551	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 10:18 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 10:20 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1RC_006.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.277	821144	BV	0.048	1-R	534.481	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.277	0.6%

==========

RECOVERY CHECK

SOLVAY2016_6_002254

External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA1\C1RC_007.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: recoverycheck551	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 10:21 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 10:23 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1RC_007.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.279	826053	BB	0.048	1-R	537.689	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.279	0.7%

RECOVERY CHECK

SOLVAY2016_6_002255

Meter Box Full Test Calibration

DATE: 1/6/98 Operator: R. Lindberg

Meter Box No: D-6				Meter Box ΔH@: 1.6747						Meter Box Yd: 1.0145						Barometric Pressure: 25.00		
				Standard Meter Gas Volume			Meter Box Gas Volume (ft³)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)					
Q	ΔH	ΔP	Yds	Initial	Final	Vds	Initial	Final	Vd	Inlet	Outlet	Tds	Inlet	To	Td	Time	Yd	H@
0.38	0.50	-0.70	1.0000	0.000	5.070	5.070	667.172	672.208	5.036	63.0	63.0	63.0	67	65	66.0	11.33	1.0090	1.6600
0.38	0.50	-0.70	1.0000	0.000	5.071	5.071	672.208	677.255	5.047	63.0	63.0	63.0	67	65	66.0	11.35	1.0070	1.6652
0.65	1.50	-1.70	1.0000	0.000	10.193	10.193	687.080	697.142	10.062	63.0	63.0	63.0	75	66	70.5	13.14	1.0179	1.6540
0.65	1.50	-1.70	1.0000	0.000	10.117	10.117	700.067	710.083	10.016	63.0	63.0	63.0	76	67	71.5	13.09	1.0169	1.6631
0.92	3.00	-2.50	1.0000	0.000	10.178	10.178	719.033	729.066	10.033	63.0	63.0	63.0	80	68	74.0	9.35	1.0192	1.6736
0.90	3.00	-2.50	1.0000	0.000	10.272	10.272	729.066	739.202	10.136	63.0	63.0	63.0	79	68	73.5	9.60	1.0172	1.7321
																AVERAGE	1.0145	1.6747

Nomenclature

P_b	Barometric Pressure (in. Hg)
Q	Flow Rate (cfm)
ΔH	Orifice Pressure Differential (in. H_20)
ΔP	Inlet Pressure Differential (in. H_20)
V_d	Gas Meter Volume - Dry (ft^3)
V_{ds}	Standard Meter Volume - Dry (ft^3)
T_d	Average Meter Box Temperature (°F)
T_o	Outlet Meter Box Temperature (°F)
T_{ds}	Average Standard Meter Temperature (°F)
Y_d	Meter Correction Factor (unitless)
Y_{ds}	Standard Meter Correction Factor (unitless)
ΔH@	Orifice Pressure Differential giving 0.75 cfm of air at 68°F and 29.92 in. Hg (in. H_20)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d + 460}{T_{ds} + 460}\right]\left[\frac{P_b + \Delta P / 13.6}{P_b + \Delta H / 13.6}\right]$$

$$\Delta H@ = \frac{0.0319(\Delta H)}{P_b(T_o + 460)}\left[\frac{(T_{ds} + 460)\,\Theta}{(V_{ds})\,(Y_{ds})}\right]^2$$

$$Q = \frac{17.64\,(V_{ds})\,(P_b)}{(T_{ds} + 460)\,(\Theta)}$$

Vacuum Gauge

Standard (in. Hg)	Vacuum Gauge
3.0	3.0
5.0	5.0
7.5	7.5
10.0	9.8
12.5	12.3
15.0	15.0

Clean Air Engineering

SOLVAY2016_6_002256

Meter Box Critical Orifice Post-Test Calibration Data

CAE Project No: 8190
Client: Solvay Minerals
Date: 1/27/98
Operator Name: R. Lindberg

Meter No. D-6
Meter Y_d 1.0145
Meter $\Delta H_@$ 1.6747
Full-Test Cal. Date 1/6/98

Orifice I.D. B-3
Orifice K' 0.4645
Orifice Cal. Date 9/23/97

Leak Checks

Negative Pressure
No Movement of Meter in 1 minute [x] Pass [ ] Fail

Positive Pressure
No Movement of Manometer in 1 minute [x] Pass [ ] Fail

Important: All leak checks must pass in order for calibration to be valid.

Barom. Press. (P_b) 24.83 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp.- T_{amb} (°F)	Orifice ΔH (in.W.C.)	Vacuum (in. Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run - T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation - ΔY_i
	0.0	985.80	68	63								
1	5.0	988.79	68	63	74	0.89	17	5.0	2.99	65.5	0.9987	-0.3%
2	10.0	991.77	69	64	74	0.89	17	5.0	2.98	66.0	1.0030	0.1%
3	15.0	994.75	69	64	74	0.89	17	5.0	2.98	66.5	1.0040	0.2%

Average Y_i	1.0019
Cal.Error	-1.2%

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \Delta H/13.6\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

Clean Air Engineering

CS 005 Critical Orifice
EXCL/D68.R3-10/15/95

C-28

SOLVAY2016_6_002257

Pyrometer Calibration Sheet

Pyrometer No.: Meter D-6
Calibrated By: R. Lindberg
Date: Jan. 26, 1998

Office: Denver
Client: Solvay Minerals
Job or Reference No. 65-8190

Temperature Scale Used: X **Fahrenheit** __ Celsius

Calibration: __ Pre-Test X **Post Test**

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading	Calibration Reference Settings for Celsius Scale
50° F	51°	25° C
100° F	99°	50° C
150° F	149°	75° C
200° F	200°	100° C
250° F	250°	125° C
300° F	300°	150° C
350° F	349°	175° C
400° F	398°	200° C
450° F	448°	225° C
500° F	498°	250° C
550° F	548°	275° C
600° F	599°	300° C

Calibration Reference Information

Reference Used: Omega Serial No: T-87031

Calibrated By: R&R INSTRM. Date Calibrated: 1/30/97

Calibration Report No.: 62306-1

Clean Air Engineering

SOLVAY2016_6_002258

Nozzle Calibration Sheet

Client: SOLVAY

Calibrated by: [illegible]

Date: 1-21-98

Job or Ref No: 8190-65

Unit: CA 3 - CA

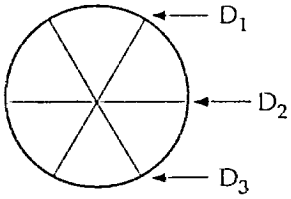
Runs:

	Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	ΔD_{ave} (inches)
CA-3	65- GLASS TAP	.311	.311	.309	.002	.310
CA 1&2	65 GLASS TAP.	.251	.250	.250	.001	.250
mH	65-2	0.250	0.250	0.250	0.000	0.250

D_1, D_2, D_3 = three nozzle diameter measurements

ΔD = maximum difference between any two diameters
$\Delta D \leq 0.004$ inches*

ΔD_{avg} = average of D_1, D_2, D_3



* (40 CFR 60, Appendix A, Method 5, Section 5.1)

CS 006 Nozzle
CNVS/TRG.R1-2/7/94

Clean Air Engineering

SOLVAY2016_6_002259

TYPE S PITOT TUBE INSPECTION DATA

DATE 8-19-97 PITOT NUMBER M-6-1

Pitot Tube Assembly Level Yes

Pitot Tube openings damaged? NO (Yes(explain, see comments) or No)

α_1 = 1 deg. (<10), α_2 = 2 deg. (<10), β_1 = 2 deg. (<5), β_2 = 1 deg. (<5)

Y = 1 deg., θ = 1 deg., A = .711 in.

Z = A sin Y = .012 in.; <1/8 in.

W = A sin θ = .012 in.; <1/32 in.

Pa .355 in. Pb .356

P = (Pa +Pb)/2 .355 in.

Dt (tube dia.) = .250 in.

P/Dt = 1.42 (≥ 1.05 and ≤ 1.50)

COMMENTS: 6' EFF M5 Probe Cp = .84

WIND TUNNEL CALIBRATION REQUIRED? NO (Yes or No)

CALIBRATION BY: EM

SOLVAY2016_6_002260

TYPE S PITOT TUBE INSPECTION DATA

DATE 12-15-97 PITOT NUMBER M-4-4

Pitot Tube Assembly Level YES

Pitot Tube openings damaged? NO (Yes(explain, see comments) or No)

α_1 = 0 deg. (<10), α_2 = 0 deg. (<10), β_1 = 0 deg. (<5), β_2 = 1 deg. (<5)

Y = 2 deg., θ = 1 deg., A = 0.742 in.

Z = A sin Y = 0.03 in.; <1/8 in.

W = A sin θ = 0.013 in.; <1/32 in.

Pa 0.371 in. Pb 0.371

P = (Pa +Pb)/2 0.371 in.

Dt (tube dia.) = 0.250 in.

P/Dt = 1.48 (≥ 1.05 and ≤ 1.50)

COMMENTS: MEETS GEOMETRIC CALIBRATION REQUIREMENTS

WIND TUNNEL CALIBRATION REQUIRED? _____ (Yes or No)

CALIBRATION BY: M. Atty

SOLVAY2016_6_002261

Reference Method
Sampling System

Client: SOLVAY MINERALS, INC
Plant: GREEN RIVER
Unit: CA3 / CA4-2
Location: STACKS
Run #'s:

Job #: 8190
Operator: M. HYNES
Date: 1/21 - 1
Data Acquisition: Chart / Computer
File Names:

Instrumentation Data for Reference Method:

#	Constituent	Manufacturer	Serial/Asset#	Range Used	Oper. Principle	Units Reported
1	NO_x	TECO	1653	0-500	CHEMI	
2	CO	TECO	10825	0-1750	NDIR	
3	THC	SUM	2531	0-1000	FID	
4	O_2	SERVOMEX		0-25	MAGNETIC	
5	CO_2	ACS		0-20	NDIR	
6						

Reference Method System Performance Checks:

System Leak Check Passed: System Response Time:

Calibration Error Check Passed:

RATA: Yes No (circle one)

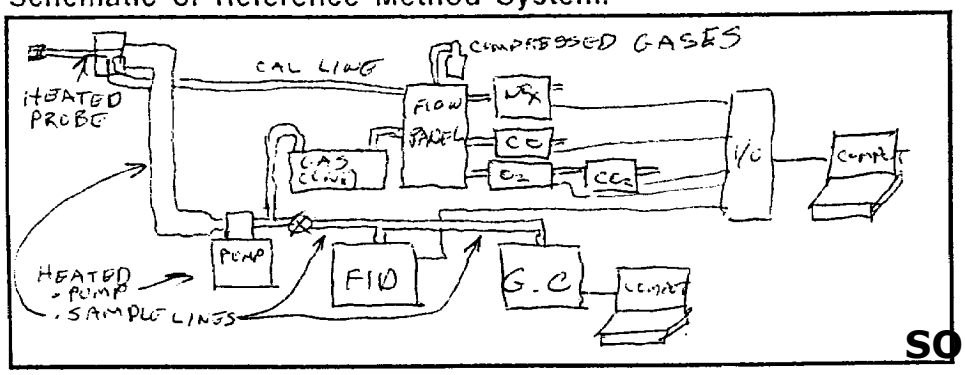
If yes, circle the units the RATA is based on, and include DS 077 to describe the facility's CEM system.

Calibration Materials Data:

#	Constituent	Concentration	Cylinder ID	Protocol?
1	NO_x	456.0		YES / NO
2	NO_x	227.0		YES / NO
3	CO	1515		YES / NO
4	CO	598.7		YES / NO
5	O_2/CO_2	21.4/18.5		YES / NO
6	O_2/CO_2	10.2/10.4		YES / NO
7	PROPANE	852.2		YES / NO
8	PROPANE	472.5		YES / NO
9	PROPANE	283.0		YES / NO
10				YES / NO
11				YES / NO
12				YES / NO
13				YES / NO
14				YES / NO

Comments:

Schematic of Reference Method System:



Scott Specialty Gases

500 WEAVER PARK RD,LONGMONT,CO 80501
Phone: 303-442-4700 Fax: 303-772-7673

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
CLEAN AIR ENGINEERING

7000 NORTH BROADWAY
BUILDING 2, UNIT 200
DENVER,CO 80221

Assay Laboratory

SCOTT SPECIALTY GASES
500 WEAVER PARK RD
LONGMONT,CO 80501

Project No.: 08-42263-001
P.O. No.: 6784-65

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM044509
Cylinder Pressure*:** 1980 PSIG
Certification Date: 1/14/98
Exp. Date: 1/14/2001

COMPONENT	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY**
CARBON DIOXIDE	18.5 %	+/- 1% NIST TRACEABLE
OXYGEN	21.4 %	+/- 1% NIST TRACEABLE
NITROGEN	BALANCE	

*** 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. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2622	2/07/98	ALM047777	17.95 %	CARBON DIOXIDE
NTRM 2659	1/02/01	ALM032009	20.72 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
MTI/QUADH/150710	12/31/97	TCD
MTI/QUADH/150710	01/14/98	TCD

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

CARBON DIOXIDE

First Triad Analysis

Date: 01/14/98 Response Unit: PCT

Z1 = 0.0000	R1 = 17.950	T1 = 18.520
R2 = 17.940	Z2 = 0.0000	T2 = 18.540
Z3 = 0.0000	T3 = 18.530	R3 = 17.960

Avg. Concentration: 15.53 PPM

Second Triad Analysis

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = .999979
Constants: A = -0.028747
B = 0 C = 0
D = 0 E = 0

OXYGEN

First Triad Analysis

Date: 01/14/98 Response Unit: PCT

Z1 = 0.0000	R1 = 20.720	T1 = 21.420
R2 = 20.720	Z2 = 0.0000	T2 = 21.430
Z3 = 0.0000	T3 = 21.420	R3 = 20.720

Avg. Concentration: 21.42 %

Second Triad Analysis

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = .999995
Constants: A = 3.4735E-02
B = 2.9840E-08 C = 0
D = 0 E = 0

Special Notes: CGA 590 1980 PSIG

ANALYST: Christie Marsh
CHRISTIE MARSH

SOLVAY2016_6_002263

Scott Specialty Gases

500 WEAVER PARK RD,LONGMONT,CO 80501 Phone: 303-442-4700 Fax: 303-772-7673

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
CLEAN AIR ENGINEERING

7000 NORTH BROADWAY
BUILDING 2, UNIT 200
DENVER,CO 80221

Assay Laboratory

SCOTT SPECIALTY GASES
500 WEAVER PARK RD
LONGMONT,CO 80501

Project No.: 08-39239-001
P.O. No.: 2073-6500

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM002501 **Certification Date:** 10/23/97 **Exp. Date:** 10/23/2000
Cylinder Pressure*:** 1968 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**
CARBON DIOXIDE	10.4	%	+/- 1% NIST TRACEABLE
OXYGEN	10.2	%	+/- 1% NIST TRACEABLE
NITROGEN		BALANCE	

*** 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. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 18000	4/12/01	ALM047777	17.95 %	CARBON DIOXIDE
NTRM 2659	1/02/01	ALM032009	20.72 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
MTI/QUADH/150710	10/23/97	TCD
MTI/QUADH/150710	10/23/97	TCD

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

CARBON DIOXIDE

First Triad Analysis			Second Triad Analysis	Calibration Curve	
Date: 10/23/97	Response Unit: PCT			Concentration = A + Bx + Cx2 + Dx3 + Ex4	
Z1 = 0.0000	R1 = 17.900	T1 = 10.340		r = 0.999996	18000
R2 = 17.930	Z2 = 0.0000	T2 = 10.400		Constants:	A = 0
Z3 = 0.0000	T3 = 10.420	R3 = 18.010		B = 0	C = 0
Avg. Concentration:	10.39	%		D = 0	E = 0

OXYGEN

First Triad Analysis			Second Triad Analysis	Calibration Curve	
Date: 10/23/97	Response Unit: PCT			Concentration = A + Bx + Cx2 + Dx3 + Ex4	
Z1 = 0.0000	R1 = 20.730	T1 = 10.240		r = 0.999997	2659
R2 = 20.720	Z2 = 0.0000	T2 = 10.230		Constants:	A = -.019680
Z3 = 0.0000	T3 = 10.230	R3 = 20.710		B = 0	C = 0
Avg. Concentration:	10.23	%		D = 0	E = 0

Special Notes: CGA 590 1968 PSIG

SOLVAY2016_6_002264

C-35

ANALYST: SUSAN L. BRANDON

Scott Specialty Gases

500 WEAVER PARK RD,LONGMONT,CO 80501 Phone: 303-442-4700 Fax: 303-772-7673

CERTIFICATE OF ANALYSIS: Interference-Free™ Multi-Component EPA Protocol Gas

Customer
CLEAN AIR ENGINEERING

7000 NORTH BROADWAY
BUILDING 2, UNIT 200
DENVER,CO 80221

Assay Laboratory

SCOTT SPECIALTY GASES
500 WEAVER PARK RD
LONGMONT,CO 80501

Project No.: 08-39239-006
P.O. No.: 2073-6500

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM038612 **Certification Date:** 10/21/97 **Exp. Date:** 10/21/1999
Cylinder Pressure*:** 1894 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**
NITRIC OXIDE	456	PPM	+/- 1% NIST Traceable
OXIDES OF NITROGEN	456	PPM	Reference Value
NITROGEN - OXYGEN FREE		BALANCE	

*** 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. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1687	7/12/98	ALM048903	1002. PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400251	09/25/97	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

NITRIC OXIDE

First Triad Analysis

Date: 10/13/97	Response Unit: PPM	
Z1 = 0.1288	R1 = 1002.2	T1 = 455.33
R2 = 1002.0	Z2 = 0.3506	T2 = 455.72
Z3 = -0.030	T3 = 454.91	R3 = 1001.8
Avg. Concentration:	455.3	PPM

Second Triad Analysis

Date: 10/21/97	Response Unit: PPM	
Z1 = -0.153	R1 = 1001.4	T1 = 456.10
R2 = 1001.6	Z2 = -0.036	T2 = 457.24
Z3 = 0.4090	T3 = 457.27	R3 = 1002.9
Avg. Concentration:	456.9	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

ANALYST: Devon VonFeldt
Devon VonFeldt

SOLVAY2016_6_002265

C-36

Scott Specialty Gases

500 WEAVER PARK RD,LONGMONT,CO 80501 Phone: 303-442-4700 Fax: 303-772-7673

CERTIFICATE OF ANALYSIS: Interference-Free™ Multi-Component EPA Protocol Gas

Customer
CLEAN AIR ENGINEERING

7000 NORTH BROADWAY
BUILDING 2, UNIT 200
DENVER,CO 80221

Assay Laboratory

SCOTT SPECIALTY GASES
500 WEAVER PARK RD
LONGMONT,CO 80501

Project No.: 08-39239-005
P.O. No.: 2073-6500

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM037822 **Certification Date:** 10/21/97 **Exp. Date:** 10/21/1999
Cylinder Pressure*:** 1872 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**
NITRIC OXIDE	227	PPM	+/- 1% NIST Traceable
OXIDES OF NITROGEN	227	PPM	Reference Value
NITROGEN - OXYGEN FREE		BALANCE	

*** 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. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1685	7/10/01	ALM048499	247.5 PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400251	09/25/97	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

NITRIC OXIDE

First Triad Analysis

Date: 10/13/97	Response Unit: PPM	
Z1 = 0.0299	R1 = 247.19	T1 = 227.39
R2 = 247.87	Z2 = 0.0348	T2 = 227.06
Z3 = 0.0730	T3 = 226.75	R3 = 247.45
Avg. Concentration:	227.1	PPM

Second Triad Analysis

Date: 10/21/97	Response Unit: PPM	
Z1 = -0.019	R1 = 247.22	T1 = 226.32
R2 = 247.70	Z2 = -0.061	T2 = 226.59
Z3 = -0.045	T3 = 226.79	R3 = 247.58
Avg. Concentration:	226.6	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

ANALYST: Devon VonFeldt
Devon VonFeldt

SOLVAY2016_6_002266

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL 60067

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : 14474-71500
Scott Project # : 500236

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 : ALM059794
Cylinder Pressure +: 1900 psig
Certificate Date : 8/12/96
Previous Certificate Date : None
Expiration Date : 8/12/99

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Carbon Monoxide	598.7 PPM	+1% NIST Directly Traceable

Balance Gas: Nitrogen

+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 process.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM2637	4/3/98	ALM059632	2513 PPM Carbon Monoxide in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Horiba OPE-135	8/13/96	Non-dispersive Infrared

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components
Carbon Monoxide

First Triad Analysis

Date: 8/5/96 Response Units: mv

Z1=0.00	R1=0.00	T1=62.40
R2=0.00	Z2=0.00	T2=62.40
Z3=0.00	T3=62.40	R3=0.00

Avg. Conc. of Cust. Cyl: 598.1 PPM

Second Triad Analysis

Date: 8/12/96 Response Units: mv

Z1=0.00	R1=0.00	T1=62.40
R2=0.00	Z2=0.00	T2=62.30
Z3=0.00	T3=62.30	R3=0.00

Avg. Conc. of Cust. Cyl: 598.2 PPM

Calibration Curve

Concentration=A+Bx+Cx^2+Dx^3+Ex^4

r=1.00000	NTRM2637
Constants:	A=-0.169934000
B=0.576656000	C=-0.010080559
D=0.000531053	E=-0.000000000

Special Notes

Cylinder

Analyst

SOLVAY2016_6_002267

MSPA-1

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL 60067

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : 15612-71500
Scott Project # : 501873

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 : AAL9940
Cylinder Pressure + : 1900 psig

Certificate Date : 9/20/96
Previous Certificate Date : None

Expiration Date : 9/20/99

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Carbon Monoxide	1515 ppm	±1% NIST Directly Traceable

Balance Gas: Nitrogen

+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	Expiration Date	Cylinder Number	Concentration
NTRM2637	4/3/98	ALM059632	2513 ppm Carbon Monoxide in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
CO: Horiba/OPE-135/565607092	9/20/96	Non-dispersive Infrared

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components
Carbon Monoxide

First Trind Analysis

Date: 9/13/96	Response Units: mv	
Z1=0.00	R1=145.00	T1=112.70
R2=145.00	Z2=0.00	T2=112.70
Z3=0.00	T3=112.70	R3=145.00
Avg. Conc. of Cust. Cyl. 1515 ppm		

Second Triad Analysis

Date: 9/20/96	Response Units: mv	
Z1=0.00	R1=145.00	T1=112.70
R2=145.00	Z2=0.00	T2=112.70
Z3=0.00	T3=112.70	R3=145.00
Avg. Conc. of Cust. Cyl. 1515 ppm		

Calibration Curve

Concentration=A+Bx+Cx²+Dx³+Ex⁴	
r=1.00000	NTRM2637
Constants	A=-0.188834000
B=8.675558000	C=-0.016680560
D=0.000531363	E=0.000000000

SOLVAY2016_6_002268

500 WEAVER PARK RD,LONGMONT,CO 80501 Phone: 303-442-4700 Fax: 303-772-7673

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
CLEAN AIR ENGINEERING

7000 NORTH BROADWAY
BUILDING 2, UNIT 200
DENVER,CO 80221

Assay Laboratory

SCOTT SPECIALTY GASES
500 WEAVER PARK RD
LONGMONT,CO 80501

Project No.: 08-42538-001
P.O. No.: 6784-05

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards: Procedure #G1, September, 1993

Cylinder Number: 1L2848 Certification Date: 2/07/96 Exp. Date: 2/07/1999

Cylinder Pressure***: 2000 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**
PROPANE	283	PPM	+/- 1% NIST TRACEABLE
NITROGEN		BALANCE	

*** 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.

Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2646	10/12/96	AAL18942	973.0 PPM	PROPANE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
HPGC5890/1115A34623	02/07/96	FID

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

PROPANE

Date: 02/07/96	Response Unit: PPM	
Z1 = 0.0000	R1 = 973.00	T1 = 283.90
R2 = 974.00	Z2 = 0.0000	T2 = 283.00
Z3 = 0.0000	T3 = 282.40	R3 = 973.60
Avg. Concentration	283.4	PPM

Second Triad Analysis

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = .9999978	
Constants:	A = 3.26263
B = 6.09063	C = 0
D = 0	E = 0

Special Notes: CGA 350 2000 PSIG

ANALYST: SUSAN J. BRANDON

SOLVAY2016_6_002269

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL 60067

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : 15283-71500
Scott Project # : 98220

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 : ALM058457
Cylinder Pressure +: 2000 psig
Certificate Date : 6/26/96
Previous Certificate Date : None
Expiration Date : 6/26/99

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	472.5 PPM	±1% NIST Directly Traceable

Balance Gas: Nitrogen

+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	Expiration Date	Cylinder Number	Concentration
SRM2648A	7/24/99	SX20435	99.1 PPM Propane in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
C3: Varain 1400/08982426	6/26/96	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components
Propane

First Triad Analysis

Date: 6/26/96 Response Units: mv
Z1=0.00 R1=2,619.35
T1=2,590.00
R2=2,619.35 Z2=0.00 T2=2,597.00
Z3=0.00 T3=2,609.00
R3=2,619.35
Avg. Conc. of Cust. Cyl. 472.5 PPM

Second Triad Analysis

Calibration Curve

Concentration=A+Bx+Cx^2+Dx^3+Ex^4
r=1.00000 SRM2648A
Constants: A=0.795101000
B=0.101351000 C=0.000000000
D=0.000000000 E=0.000000000

Special Notes

Mail

Analyst

SOLVAY2016_6_002270

MISP/P-1

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL 60067

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : 14478-71500
Scott Project # : 590306

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 : ALM058541
Cylinder Pressure + : 2000 psig
Certificate Date : 1/4/96
Previous Certificate Date : None
Expiration Date : 1/4/99

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	852.2 PPM	±1% NIST Directly Traceable

Balance Gas: Nitrogen

+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	Expiration Date	Cylinder Number	Concentration
NTRM1668	6/7/96	ALM032015	95.5 PPM Propane in Air

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
C3H8: VARIAN 1400/08982426	1/4/96	Gas Chromatography

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: 1/4/96 Response Units: mv Z1=0.00 R1=100.00 T1=4,666.38 R2=100.00 Z2=0.00 T2=4,673.52 Z3=0.00 T3=4,660.20 R3=100.00 Avg. Conc. of Cust. Cyl. 852.2 PPM		Concentration=A+Bx+Cx^2+Dx^3+Ex^4 r=1.00000 NTRM1668 Constants: A=0.130667400 B=0.102486400 C=0.000000000 D=0.000000000 E=0.000000000

Special Notes

Cylinder

Analyst

SOLVAY2016_6_002271

Scott Specialty Gases, Inc.

Shipped From: 1290 COMBERMERE STREET
TROY MI 48083
Phone: 810-589-2950 Fax: 810-589-2134

C E R T I F I C A T E O F A N A L Y S I S

C A E INSTRUMENT RENTAL

246 WOODWORK LANE

PALATINE IL 60067

PROJECT #: 05-74408-009
PO#: 71500
ITEM #: 05022712 2AL
DATE:12/06/94

CYLINDER #: ALM004739
FILL PRESSURE: 2000PSIA
BLEND TYPE : ACUBLEND MASTER GAS

ANALYTICAL ACCURACY: +/-1%

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
METHANE	250.	PPM	249.5	PPM
AIR		BALANCE		BALANCE

ACUBLEND MASTER GAS
ALM030846 ALM028244

ANALYST:

SOLVAY2016_6_002272

Scott Specialty Gases

Shipped From: 1290 COMBERMERE STREET
TROY MI 48083
Phone: 810-589-2950 Fax: 810-589-2134

C E R T I F I C A T E O F A N A L Y S I S

C A E INSTRUMENT RENTAL

500 WEST WOOD STREET

PALATINE IL 60067

PROJECT #: 05-13086-013
PO#: 1634-71500
ITEM #: 05022712 4AL
DATE: 5/27/97

CYLINDER #: ALM013138
FILL PRESSURE: 2060 PSIG
BLEND TYPE : CERTIFIED MASTER GAS

ANALYTICAL ACCURACY: +-2%
PRODUCT EXPIRATION: 5/28/2000

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
METHANE	550.	PPM	551.	PPM
AIR		BALANCE		BALANCE

CERTIFIED MASTER GAS
ALM047754

ANALYST: CM

SOLVAY2016_6_002273

Scott Specialty Gases, Inc.

Shipped From: 1290 COMBERMERE STREET
TROY MI 48083
Phone: 810-589-2950 Fax: 810-589-2134

CERTIFICATE OF ANALYSIS

C A E INSTRUMENT RENTAL

246 WOODWORK LANE

PALATINE IL 60067

PROJECT #: 05-98808-001
PO#: 15365-71500
ITEM #: 05022712 2AL
DATE: 6/25/96

CYLINDER #: ALM060357
FILL PRESSURE: 1950 PSI
BLEND TYPE : ACUBLEND MASTER GAS

ANALYTICAL ACCURACY: +-1%
PRODUCT EXPIRATION: 6/26/99

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
METHANE	900.	PPM	905.2	PPM
AIR		BALANCE		BALANCE

ACUBLEND MASTER GAS

ALM060339 ALM060357

ANALYST:

Reference Method
Sampling System

Client: CAE
Job #: 6500
~~Plant:~~ INTERFERANCE CHECK
Operator: E. McGREFICK
~~Unit:~~
Date: FEB 10, 1998
Location:
Data Acquisition: Chart / Computer
Run #'s:
File Names:

Instrumentation Data for Reference Method:

#	Constituent	Manufacturer	Serial/Asset#	Range Used	Oper. Principle	Units Reported
1	NOx	Teco 10	10	0-500	Chemo	
2	O_2	Servo		0-25	Paramag	
3	CO_2	ACS		0-20	IR	
4	CO	Teco 48H		0-1000	IR	
5						
6						

Reference Method System Performance Checks:

System Leak Check Passed:
System Response Time:
Calibration Error Check Passed:

RATA: Yes No (circle one)
If yes, circle the units the RATA is based on, and include DS 077 to describe the facility's CEM system.

Calibration Materials Data:

#	Constituent	Concentration	Cylinder ID	Protocol?
1	NOx	1156.0	ALM038612	YES / NO
2	NOx	227.0	ALM037822	YES / NO
3	O_2 / CO_2	21.4 / 18.5	ALM044509	YES / NO
4	O_2 / CO_2	10.2 / 10.4	ALM000501	YES / NO
5	CO	598.7	ALM059794	YES / NO
6	CO	275.3	ALM030933	YES / NO
7	~~O_2~~ N_2	~~0~~	ALM034992	YES / NO
8	SO_2	228.0	ALM054570	YES / NO
9				YES / NO
10				YES / NO
11				YES / NO
12				YES / NO
13				YES / NO
14				YES / NO

Comments:

Schematic of Reference Method System:

SOLVAY2016_6_002275

CAE Interference Check
CAE Project No. 6500
2-10-1998
10:46

Clean Air Engineering
Run Data

Time	NOx ppm	SO2 ppm	THC ppm	O2 %	CO2 %	CO ppm	
10:47	0.4	0.0	0.1	21.9	0.0	3.4	
10:48	366.2	0.0	0.1	21.9	0.0	2.8	
10:49	461.9	0.0	0.1	21.9	0.0	3.7	
10:50	467.4	0.0	0.1	21.9	0.0	3.3	
10:51	463.3	0.0	0.0	21.9	0.0	3.4	
10:52	457.4	0.0	0.5	1.9	0.0	2.9	
10:53	456.1	0.0	0.3	-0.1	0.0	3.1	
10:54	455.2	0.0	0.0	-0.1	0.0	-8.2	
10:55	456.9	0.0	0.1	-0.1	0.0	-65.9	
10:56	453.3	0.0	0.1	-0.1	0.0	-8.4	
10:57	396.0	0.0	0.0	0.0	0.0	-0.3	
10:58	210.1	0.0	0.1	-0.1	0.0	0.4	
10:59	226.7	0.0	-0.1	-0.1	0.0	0.5	
11:00	227.2	0.0	0.1	-0.1	0.0	0.2	
11:01	227.5	0.0	0.2	-0.1	0.0	0.2	
11:02	83.5	0.0	0.4	13.8	12.0	0.9	
11:03	1.8	0.0	0.1	22.1	20.0	-2.1	
11:04	3.2	0.0	0.1	21.5	19.0	-2.9	
11:05	3.1	0.0	0.3	21.5	18.5	-2.4	
11:06	1.5	0.0	0.3	21.5	18.5	-2.9	
11:07	0.6	0.0	0.5	21.5	18.6	-2.7	
11:08	1.3	0.0	0.7	13.7	12.7	-1.0	
11:09	0.4	0.0	0.4	10.2	10.4	-1.7	
11:10	0.3	0.0	1.0	10.2	10.4	-1.8	
11:11	0.3	0.0	0.8	10.2	10.4	-1.3	
11:12	0.4	0.0	1.3	6.2	6.2	47.1	
11:23	0.1	0.0	1.1	-0.2	0.0	590.1	
11:24	0.2	0.0	0.8	-0.2	0.0	588.8	
11:25	0.2	0.0	1.2	-0.2	0.0	590.0	
11:26	0.1	0.0	0.2	0.0	0.1	457.1	
11:27	0.2	0.0	0.3	0.0	0.0	268.4	
11:28	0.2	0.0	0.2	0.0	0.0	266.9	
11:29	0.1	0.0	0.0	0.0	0.0	267.4	
11:30	0.2	0.0	0.1	0.0	0.0	223.6	
11:31	0.3	0.0	0.3	-0.2	0.0	11.2	
11:32	0.1	0.0	0.1	-0.2	0.0	1.1	Ran Zero N2
11:33	0.1	0.0	0.3	-0.2	0.0	1.0	Ran Zero N2
11:34	0.1	0.0	0.5	-0.2	0.0	0.7	Ran Zero N2
11:35	199.0	0.0	0.2	-0.1	0.0	1.8	
11:36	238.3	0.0	0.1	-0.2	0.0	1.0	
11:37	238.7	0.0	0.3	-0.2	0.0	1.0	
11:38	226.6	0.0	0.3	-0.2	0.0	1.0	Ran 227. NOx
11:39	226.6	0.0	0.2	-0.2	0.0	1.2	Ran 227. NOx
11:40	226.3	0.0	0.1	-0.2	0.0	0.7	Ran 227. NOx
11:41	226.2	0.0	0.4	-0.2	0.0	1.5	
11:42	28.3	0.0	0.6	8.6	8.8	0.4	
11:43	0.8	0.0	0.1	10.2	10.4	-1.2	Ran 10.2/10.4 O2/CO:
11:44	0.5	0.0	0.7	10.2	10.4	-1.3	Ran 10.2/10.4 O2/CO:
11:45	0.4	0.0	0.1	10.2	10.4	-1.6	Ran 10.2/10.4 O2/CO:
11:46	0.3	0.0	0.7	1.6	1.6	129.5	
11:47	0.3	0.0	0.4	0.0	0.0	266.5	Ran 275.3 CO
11:48	0.3	0.0	0.0	0.0	0.0	266.4	Ran 275.3 CO
11:49	0.2	0.0	0.5	0.0	0.0	266.6	Ran 275.3 CO
11:50	1.2	0.0	0.6	0.0	0.0	266.0	
11:51	1.9	0.0	0.3	0.0	0.0	266.0	
11:52	1.6	0.0	0.3	4.1	0.0	261.5	
11:53	4.4	0.0	0.7	21.0	0.0	50.2	
15:02	0.1	0.0	-0.1	-0.1	0.0	-1.1	Ran 228 SO2
15:03	0.0	0.0	0.0	-0.1	0.0	-1.4	Ran 228 SO2
15:04	-0.1	0.0	-0.1	-0.1	0.0	-1.4	Ran 228 SO2
15:05	0.1	0.0	-0.1	-0.1	-0.1	2.0	
15:06	-0.1	0.0	-0.1	-0.1	0.0	-1.4	
15:07	0.1	0.0	0.1	-0.2	0.0	-1.1	
15:08	0.0	0.0	-0.1	-0.2	0.0	-1.2	
15:09	0.0	0.0	-0.1	-0.2	0.0	-0.6	

CAE Denver NOx Conversion Efficiency
CAE Project No. 6500
2-10-1998
13:45

Time	NOx ppm		
13:46	188.8		
13:47	189.0		
13:48	189.0		
13:49	189.1		
13:50	189.1		
13:51	189.1		
13:52	188.9	190.8	max
13:53	189.3	188.3	min
13:54	189.1	2.4	dif
13:55	188.8	1.3	%dif
13:56	188.8	98.7	% Conversion Efficiency
13:57	189.1		
13:58	188.9		
13:59	189.6		
14:00	189.5		
14:01	189.6		
14:02	189.4		
14:03	189.6		
14:04	189.6		
14:05	189.3		
14:06	189.0		
14:07	188.5		
14:08	189.1		
14:09	188.8		
14:10	188.7		
14:11	189.0		
14:12	188.9		
14:13	188.3		
14:14	189.2		
14:15	189.7		
14:16	189.5		
14:17	189.7		
14:18	189.5		
14:19	189.6		
14:20	190.8		

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack

CEM CALIBRATION DATA SHEET

January 21, 1998
Run 1

	A	B	C	D*	E	F	G	H	I
Oxygen									
Zero	0.0	0.0	0.0	0.0%	0.0	0.0%	-0.1	-0.4%	-0.4%
Mid Span	10.2	10.3	0.1	0.4%	10.1	-0.8%	10.1	-0.8%	0.0%
High Span	21.4	21.2	0.2	0.8%					
Carbon Dioxide									
Zero	0.0	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0%
Mid Span	10.4	10.3	0.1	0.5%	10.1	-1.0%	10.1	-1.0%	0.0%
High Span	18.5	18.4	0.1	0.5%					
Nitrogen Oxides									
Zero	0.0	0.0	0.0	0.0%	0.4	0.1%	1.1	0.2%	0.1%
Mid Span	227.0	222.7	4.3	0.9%	228.0	1.1%	230.6	1.6%	0.5%
High Span	456.0	461.7	5.7	1.1%					
Carbon Monoxide									
Zero	0.0	-4.9	4.9	0.3%	7.2	0.7%	7.3	0.7%	0.0%
Mid Span	598.7	600.4	1.7	0.1%	603.0	0.1%	602.7	0.1%	0.0%
High Span	1515.0	1507.4	7.6	0.4%					
Total Hydrocarbons									
Zero	0.0	-4.9	4.9	0.5%	-4.9	0.0%	4.9	1.0%	1.0%
Low Span	283.0	282.9	0.1	0.0%	282.9	0.0%	279.4	-0.4%	-0.4%
Mid Span	472.5	476.5	4.0	0.8%	476.5	0.0%			
High Span	852.2	843.4	8.8	1.0%	843.4	0.0%			

Calibration Error Check
A - Cylinder Value
B - Analyzer Calibration Response
C- Absolute Difference
D - Difference (% of Span)
*THC- Difference (% of Gas)

System Bias Check
E - System Calibration Response (Pre Test)
F - System Calibration Bias (% of Span) (Pre Test)
G - System Calibration Response (Post Test)
H - System Calibration Bias (% of Span) (Post Test)
I - Drift (% of Span)

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack

CEM CALIBRATION DATA SHEET

January 21, 1998
Run 2

	A	B	C	D*	E	F	G	H	I
Oxygen									
Zero	0.0	0.0	0.0	0.0%	-0.1	-0.4%	0.0	0.0%	0.4%
Mid Span	10.2	10.3	0.1	0.4%	10.1	-0.8%	10.1	-0.8%	0.0%
High Span	21.4	21.2	0.2	0.8%					
Carbon Dioxide									
Zero	0.0	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0%
Mid Span	10.4	10.3	0.1	0.5%	10.1	-1.0%	10.1	-1.0%	0.0%
High Span	18.5	18.4	0.1	0.5%					
Nitrogen Oxides									
Zero	0.0	0.0	0.0	0.0%	1.1	0.2%	0.9	0.2%	0.0%
Mid Span	227.00	222.7	4.3	0.9%	230.6	1.6%	228.2	1.1%	-0.5%
High Span	456.0	461.7	5.7	1.1%					
Carbon Monoxide									
Zero	0.0	-4.9	4.9	0.3%	7.3	0.7%	7.3	0.7%	0.0%
Mid Span	598.7	600.4	1.7	0.1%	602.7	0.1%	598.5	-0.1%	-0.2%
High Span	1515.0	1507.4	7.6	0.4%					
Total Hydrocarbons									
Zero	0.0	-4.9	4.9	0.5%	4.9	1.0%	5.0	1.0%	0.0%
Low Span	283.0	282.9	0.1	0.0%	279.4	-0.4%	280.8	-0.2%	0.1%
Mid Span	472.5	476.5	4.0	0.8%					
High Span	852.20	843.4	8.8	1.0%					

Calibration Error Check
A - Cylinder Value
B - Analyzer Calibration Response
C- Absolute Difference
D - Difference (% of Span)
*THC- Difference (% of Gas)

System Bias Check
E - System Calibration Response (Pre Test)
F - System Calibration Bias (% of Span) (Pre Test)
G - System Calibration Response (Post Test)
H - System Calibration Bias (% of Span) (Post Test)
I - Drift (% of Span)

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack

CEM CALIBRATION DATA SHEET

January 21, 1998
Run 3

	A	B	C	D*	E	F	G	H	I
Oxygen									
Zero	0.0	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0%
Mid Span	10.2	10.3	0.1	0.4%	10.1	-0.8%	10.1	-0.8%	0.0%
High Span	21.4	21.2	0.2	0.8%					
Carbon Dioxide									
Zero	0.0	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0%
Mid Span	10.4	10.3	0.1	0.5%	10.1	-1.0%	10.1	-1.0%	0.0%
High Span	18.5	18.4	0.1	0.5%					
Nitrogen Oxides									
Zero	0.0	0.0	0.0	0.0%	0.9	0.2%	1.3	0.3%	0.1%
Mid Span	227.00	222.7	4.3	0.9%	228.2	1.1%	227.7	1.0%	-0.1%
High Span	456.0	461.7	5.7	1.1%					
Carbon Monoxide									
Zero	0.0	-4.9	4.9	0.3%	7.3	0.7%	7.3	0.7%	0.0%
Mid Span	598.7	600.4	1.7	0.1%	598.5	-0.1%	596.4	-0.2%	-0.1%
High Span	1515.0	1507.4	7.6	0.4%					
Total Hydrocarbons									
Zero	0.0	-4.9	4.9	0.5%	5.0	1.0%	7.0	1.2%	0.2%
Low Span	283.0	282.9	0.1	0.0%	280.8	-0.2%	279.4	-0.4%	-0.1%
Mid Span	472.5	476.5	4.0	0.4%					
High Span	852.2	843.4	8.8	0.9%					

Calibration Error Check
A - Cylinder Value
B - Analyzer Calibration Response
C- Absolute Difference
D - Difference (% of Span)
*THC- Difference (% of Gas)

System Bias Check
E - System Calibration Response (Pre Test)
F - System Calibration Bias (% of Span) (Pre Test)
G - System Calibration Response (Post Test)
H - System Calibration Bias (% of Span) (Post Test)
I - Drift (% of Span)

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack

CEM CALIBRATION DATA SHEET

January 22, 1998
Run 1

	A	B	C	D*	E	F	G	H	I
Oxygen									
Zero	0.0	-0.1	0.1	0.4%	-0.1	0.0%	0.0	0.4%	0.4%
Mid Span	10.2	10.2	0.0	0.0%	10.1	-0.4%	10.2	0.0%	0.4%
High Span	21.4	21.3	0.1	0.4%					
Carbon Dioxide									
Zero	0.0	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0%
Mid Span	10.4	10.3	0.1	0.5%	10.2	-0.5%	10.2	-0.5%	0.0%
High Span	18.5	18.6	0.1	0.5%					
Nitrogen Oxides									
Zero	0.0	-0.1	0.1	0.0%	0.4	0.1%	0.8	0.2%	0.1%
Mid Span	227.0	225.9	1.1	0.2%	227.6	0.3%	222.5	-0.7%	-1.0%
High Span	456.0	463.7	7.7	1.5%					
Carbon Monoxide									
Zero	0.0	7.3	7.3	0.4%	7.3	0.0%	5.0	-0.1%	-0.1%
Mid Span	598.7	592.9	5.8	0.3%	593.2	0.0%	581.0	-0.7%	-0.7%
High Span	1515.0	1489.3	25.7	1.5%					
Total Hydrocarbons									
Zero	0.0	-0.2	0.2	0.0%	-0.2	0.0%	4.4	0.5%	0.5%
Low Span	283.0	286.5	3.5	1.2%	286.5	0.0%	279.2	-0.7%	-0.7%
Mid Span	472.5	482.1	9.6	2.0%	482.1	0.0%			
High Span	852.2	849.1	3.1	0.4%	849.1	0.0%			

Calibration Error Check
A - Cylinder Value
B - Analyzer Calibration Response
C- Absolute Difference
D - Difference (% of Span)
*THC- Difference (% of Gas)

System Bias Check
E - System Calibration Response (Pre Test)
F - System Calibration Bias (% of Span) (Pre Test)
G - System Calibration Response (Post Test)
H - System Calibration Bias (% of Span) (Post Test)
I - Drift (% of Span)

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack

CEM CALIBRATION DATA SHEET

January 22, 1998
Run 2

	A	B	C	D*	E	F	G	H	I
Oxygen									
Zero	0.0	-0.1	0.1	0.4%	0.0	0.4%	0.0	0.4%	0.0%
Mid Span	10.2	10.2	0.0	0.0%	10.2	0.0%	10.2	0.0%	0.0%
High Span	21.4	21.3	0.1	0.4%					
Carbon Dioxide									
Zero	0.0	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0%
Mid Span	10.4	10.3	0.1	0.5%	10.2	-0.5%	10.2	-0.5%	0.0%
High Span	18.5	18.6	0.1	0.5%					
Nitrogen Oxides									
Zero	0.0	-0.1	0.1	0.0%	0.4	0.1%	0.7	0.2%	0.1%
Mid Span	227.0	225.9	1.1	0.2%	227.6	0.3%	219.4	-1.3%	-1.6%
High Span	456.0	463.7	7.7	1.5%					
Carbon Monoxide									
Zero	0.0	7.3	7.3	0.4%	5.0	-0.1%	4.9	-0.1%	0.0%
Mid Span	598.7	592.9	5.8	0.3%	581.0	-0.7%	581.1	-0.7%	0.0%
High Span	1515.0	1489.3	25.7	1.5%					
Total Hydrocarbons									
Zero	0.0	-0.2	0.2	0.0%	4.4	0.5%	7.5	0.8%	0.3%
Low Span	283.0	286.5	3.5	1.2%	279.2	-0.7%	287.3	0.1%	0.8%
Mid Span	472.5	482.1	9.6	2.0%					
High Span	852.20	849.1	3.1	0.4%					

Calibration Error Check
A - Cylinder Value
B - Analyzer Calibration Response
C- Absolute Difference
D - Difference (% of Span)
*THC- Difference (% of Gas)

System Bias Check
E - System Calibration Response (Pre Test)
F - System Calibration Bias (% of Span) (Pre Test)
G - System Calibration Response (Post Test)
H - System Calibration Bias (% of Span) (Post Test)
I - Drift (% of Span)

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack

CEM CALIBRATION DATA SHEET

January 22, 1998
Run 3

	A	B	C	D*	E	F	G	H	I
Oxygen									
Zero	0.0	-0.1	0.1	0.4%	0.0	0.4%	0.0	0.4%	0.0%
Mid Span	10.2	10.2	0.0	0.0%	10.2	0.0%	10.2	0.0%	0.0%
High Span	21.4	21.3	0.1	0.4%					
Carbon Dioxide									
Zero	0.0	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0%
Mid Span	10.4	10.3	0.1	0.5%	10.2	-0.5%	10.2	-0.5%	0.0%
High Span	18.5	18.6	0.1	0.5%					
Nitrogen Oxides									
Zero	0.0	-0.1	0.1	0.0%	0.7	0.2%	0.5	0.1%	0.0%
Mid Span	227.0	225.9	1.1	0.2%	219.4	-1.3%	223.9	-0.4%	0.9%
High Span	456.0	463.7	7.7	1.5%					
Carbon Monoxide									
Zero	0.0	7.3	7.3	0.4%	4.9	-0.1%	7.3	0.0%	0.1%
Mid Span	598.7	592.9	5.8	0.3%	581.1	-0.7%	593.2	0.0%	0.7%
High Span	1515.0	1489.3	25.7	1.5%					
Total Hydrocarbons									
Zero	0.0	-0.2	0.2	0.0%	7.5	0.8%	4.5	0.5%	-0.3%
Low Span	283.0	286.5	3.5	1.2%	287.3	0.1%	288.6	0.2%	0.1%
Mid Span	472.5	482.1	9.6	1.0%					
High Span	852.2	849.1	3.1	0.3%					

Calibration Error Check
A - Cylinder Value
B - Analyzer Calibration Response
C- Absolute Difference
D - Difference (% of Span)
*THC- Difference (% of Gas)

System Bias Check
E - System Calibration Response (Pre Test)
F - System Calibration Bias (% of Span) (Pre Test)
G - System Calibration Response (Post Test)
H - System Calibration Bias (% of Span) (Post Test)
I - Drift (% of Span)

D

FIELD DATA

D

TEST LOCATION: STACK

UNIT: CA-3 RUN: 1

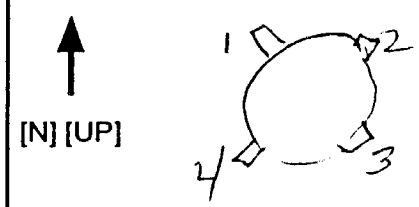
PARTICULATE TESTING FIELD DATA SHEET

METHOD: 5/202 PAGE 1 OF 1

Client: SOLVAY	Project No.: 8190
Plant: GR. WV	Date: 1-21-98
Meter Operator: RON LINDBERG	
Probe Operator: ED M	

Meter Box No.: D-6	Sample Box No.: D-5
Meter Yd: 1.0145	Meter ΔH@: 1.6746
K Factor: 3.3	Pitot Cp: .84
Leak Rate Before: .003 [cfm] [Lpm] @ 13 (in.Hg)	
Leak Rate After: .002 [cfm] [Lpm] @ 8 (in.Hg)	
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.) 125.5			
Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-.5	5 1/2		

Amb. Temp. (°F): 38	Bar. Press.: 23.64 (in. Hg) [mbar]
Probe I.D. No.: M-4-4	
Liner Material: GLASS	

Filter No.: 085100	
Thimble No.: —	
Nozzle Diameter: .310	Nozzle I.D.: 65

H_2O: 239.7 [ml] [gm]	Silica Gel (gm): 8.3
Total V_{lc}: 248	

Start Time: 0955	Stop Time: 1104

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft^3] [L] 739.73	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
1-1	5	.24	.79	742.46	313	253	235	47	49	46	5	N/A	
2	10	.22	.73	745.08	312	249	243	41	54	48	5		
3	15	.18	.59	747.46	309	248	248	38	57	49	4		
2-1	20	.31	1.0	750.55	315	249	251	37	61	52	6		
2	25	.30	.99	753.61	314	249	250	38	63	53	6		
3	30	.20	.66	756.17	310	249	249	40	64	55	4		
3-1	35	.30	.99	759.25	314	247	251	39	63	56	6		
2	40	.27	.89	762.19	313	251	251	42	65	57	6		
3	45	.21	.69	764.83	309	250	250	45	67	58	5		
4-1	50	.25	.83	767.62	310	250	247	44	66	59	5		
2	55	.21	.69	770.22	313	249	251	43	67	59	5		
3	60	.17	.56	772.55	308	248	250	43	67	60	4		
	Total	*		32.82									
	Average	.4859	.7842		312				58				

SOLVAY2016_6_002289

DS-001 General
CNVS/TRG.R3-4/6/94

* Sum of square roots.

Circle correct bracketed units on data sheet.

Clean Air Engineering

TEST LOCATION: Stack

PARTICULATE TESTING FIELD DATA SHEET

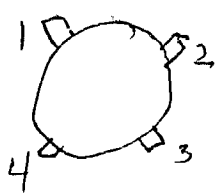
METHOD: 5/202 **PAGE** 1 **OF** 1

UNIT: CA-3 **RUN:** 2

Client: SOLVAY	Project No.: 8190
Plant: GR. LAKE	Date: 1-21-98
Meter Operator: Ron LINDBERG	
Probe Operator: ED MCGAFFICK	

Meter Box No.: D-6	Sample Box No.:
Meter Yd: 1.0145	Meter ΔH@: 1.6747
K Factor: 3.3 ~~.016~~	Pitot Cp: .84
Leak Rate Before: .016 (cfm) [Lpm] @ 13 (in.Hg)	
Leak Rate After: .008 (cfm) [Lpm] @ 8 (in.Hg)	
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.)	125.5		
Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-.5	5.5/12		

Amb. Temp. (°F): 36	Bar. Press: 23.64 [in. Hg] [mbar]	
Probe I.D. No.: M-4-4		
Liner Material: GLASS		

Filter No.: 085101		
Thimble No.: N/A		
Nozzle Diameter: .310	Nozzle I.D.: 65	

H_2O: 244.7 [ml] [gm]	Silica Gel (gm): 8.4
Total V_{lc}: 253.1	

Start Time: 1145	Stop Time: 1234

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft^3] [L] 773.84	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
4-1	5 ~~.25~~	.83	.83	776.72	314	252	234	36	61	60	5	N/A	ΔP = .25
2	10	.23	.76	779.46	312	249	236	37	64	60	5		
3	15	.18	.63	781.95	310	248	241	38	65	60	4		K = 3.5
3-1	20	.31	.1	785.15	314	250	250	39	65	60	6		
2	25	.28	.98	788.25	315	250	250	41	66	60	6		
3	30	.23	.81	791.09	312	250	249	44	65	59	5		
1	35	.28	.98	794.19	316	248	246	44	65	59	6		
2	40	.28	.98	797.28	317	247	242	44	66	60	6		
3	45	.22	.77	800.14	313	249	250	44	67	60	5		
1	50	.23	.81	802.92	314	256	253	41	66	61	5		
2	55	.21	.74	805.62	316	247	256	39	69	62	5		
3	60	.17	.60	808.27	312	248	250	42	70	63	4		
	Total*			34.23									
	Average	.4872	.8325		314				63				

DS 001 General
CNVS/TRG.R3-4/6/94

* Sum of square roots.

Circle correct bracketed units on data sheet.

Clean Air Engineering

SOLVAY2016_6_00228

TEST LOCATION: Stack

PARTICULATE TESTING FIELD DATA SHEET

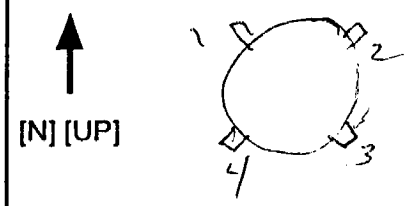
METHOD: 5/202 PAGE 1 OF 1

UNIT: CA 3 RUN: 3

Client SOLVAY	Project No. 8190
Plant GR! W/	Date 1-21-98
Meter Operator KON LINDBERG	
Probe Operator ED MCGAFFICK	

Meter Box No. D-6	Sample Box No.
Meter Yd 1.0145	Meter ΔH@ 1.6747
K Factor 3.5	Pitot Cp .84
Leak Rate Before .007 [cfm] [Lpm] @ 12 (in.Hg)	
Leak Rate After .005 [cfm] [Lpm] @ 10 (in.Hg)	
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.) 125.5			
Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-.5	5.5/12		

Amb. Temp. (°F) 30	Bar. Press. 23.64 (in. Hg) [mbar]	
Probe I.D. No. M-4-4		
Liner Material GLASS		

Filter No. 08502			
Thimble No. —			
Nozzle Diameter .310	Nozzle I.D. .65		

H_2O 243.6 [ml] [gm]	Silica Gel (gm) 10.2
Total V_{lc} 253.8	

Start Time: 1324	Stop Time: 1451

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft³] [L] 808.26	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points .250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
1-1	5	.23	.81	811.12	314	250	230	33	60	60	6	N/A	
2	10	.24	.84	814.00	313	250	241	34	64	61	6		
3	15	.18	.63	816.49	310	247	243	35	66	62	5		
2-1	20	.31	1.1	819.73	314	252	250	35	67	63	8		
2	25	.29	1.0	822.88	317	249	248	38	68	63	7		
3	30	.27	.95	825.96	316	249	248	38	69	63	7		
3-1	35	.30	1.1	829.20	317	251	253	37	66	63	8		
2	40	.27	.95	832.23	318	248	250	41	68	63	7		
3	45	.22	.77	835.01	313	248	247	43	68	63	6		
4-1	50	.23	.81	837.85	318	251	246	43	67	63	6		
2	55	.20	.70	840.48	317	249	241	40	69	63	6		
3	60	.17	.60	842.93	314	246	240	42	68	63	5		
	Total			34.67									
	Average	.4903	.8550		315				65				

* Sum of square roots.

Circle correct bracketed units on data sheet.

DS-001 General
CNVS/TRG.R3-4/6/94

Clean Air Engineering

SOLVAY2016_6_002288

TRAIN SET-UP DATA
M/ 5/202

CA-3

CLIENT Solvay

JOB # 8190

RUN # 1 BOX # D-5 FILTER # 085100

		Gross	Tare	Net	Total
Imp. 1	100ml DI	685.9	528.4	157.5	
Imp. 2	"	606.6	537.9	68.7	
Imp. 3	MT	437.8	424.3	13.5	239.7
Imp. 4	Silica Gel	749.4	741.1	8.3	
					248.0

RUN # 2 BOX # D-6 FILTER # 085101

		Gross	Tare	Net	Total
Imp. 1	100ml DI	699.4	534.4	165	
Imp. 2	"	610.9	541.3	69.6	
Imp. 3	MT	442.4	432.3	10.1	244.7
Imp. 4	Silica Gel	738.7	730.3	8.4	
					253.1

RUN # 3 BOX # D-5 FILTER # 085102

		Gross	Tare	Net	Total
Imp. 1	100ml DI	744.9	534.4	210.5	
Imp. 2	"	613.7	539.0	74.7	
Imp. 3	~~MT~~ 100ml DI	488.8	530.4	-41.6	243.6
Imp. 4	Silica Gel	736.8	726.6	10.2	
					253.8

SOLVAY2016_6_002289

TEST LOCATION: Stack

ARTICULATE TESTING FIELD DATA SHEET

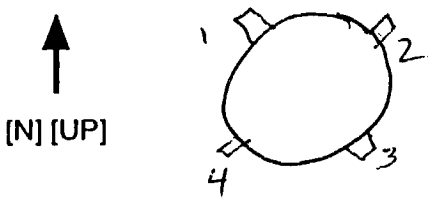
METHOD: 5/202 PAGE 1 OF 2

UNIT: CA 1/2 RUN: 1

Client SOLVAY	Project No. 8190
Plant GR. NJ	Date 1-22-98
Meter Operator RON LINDBERG	
Probe Operator ED MCGAFFIGAN	

Meter Box No. S-6	Sample Box No.
Meter Yd 1.0145	Meter ΔH@ 1.6747
K Factor 1.5	Pitot Cp .84
Leak Rate Before .008	[cfm] [Lpm] @ 14 (in.Hg)
Leak Rate After .006	[cfm] [Lpm] @ 10 (in.Hg)
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.)			
Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-.3	6		

Amb. Temp. (°F) 20	Bar. Press. 23.68 [in. Hg] [mbar]
Probe I.D. No. M-6-1	
Liner Material GLASS	

Filter No. 035103		
Thimble No. —		
Nozzle Diameter .250	Nozzle I.D. .65	

H_2O 200.1 [ml] [gm]	Silica Gel (gm) 138
Total V_{lc} 213.9	

Start Time: 0855	Stop Time: 1004

Traverse Point Number	Min/pt 2.5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft^3] [L] 842.415	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
1-1	2.5	.69	1.1	845.07	337	248	249	40	30	27	7	N/A	
2	5.0	.71	1.1	846.64	335	248	250	36	32	27	7		
3	7.5	.71	1.1	848.20	333	248	250	34	35	28	7		
4	10.0	.67	1.0	849.70	331	248	250	34	37	28	7		
5	12.5	.59	.94	851.16	329	248	250	34	39	29	6		K= 1.6
6	15.0	.49	.78	852.50	328	247	250	34	40	30	5		
2-1	17.5	.73	1.2	854.15	338	249	248	34	40	31	8		
2	20.0	.78	1.2	855.80	343	248	238	34	43	32	8		
3	22.5	.80	1.3	857.55	344	248	234	34	45	32	9		
4	25.0	.74	1.2	859.21	346	254	234	37	46	34	8		
5	27.5	.68	1.1	860.86	346	256	232	39	46	34	7		
6	30.0	.55	.88	862.20	344	258	230	43	47	35	6		
	Total	*19.12	25.09	38.01	889					827			
	Average	.818	1.075		335.8				40.3				

SOLVAY2016_6_00229

DS 001 General
CNVS/TRG.R3-4/6/94

*Sum of square roots: (8220) ~~(1.1044)~~ 1.(1.008)

Circle correct bracketed units on data sheet.

338

35

Clean Air Engineering

TEST LOCATION: Stack

UNIT: CA / U2 RUN: 1

PARTICULATE TESTING FIELD DATA SHEET

METHOD: 5/202 PAGE 2 OF 2

Client Solvay	Project No. 8190
Plant GR. W/.	Date 1-22-95
Meter Operator R.L.	
Probe Operator E.M.	

Meter Box No. D-6	Sample Box No.
Meter Yd	Meter ΔH@
K Factor	Pitot Cp
Leak Rate Before	[cfm] [Lpm] @ (in.Hg)
Leak Rate After	[cfm] [Lpm] @ (in.Hg)
Pitot Leak Check Before: ☐	After: Good ☐ Bad ☐

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-.3			

Amb. Temp. (°F)	Bar. Press. [in. Hg] [mbar]
Probe I.D. No.	
Liner Material	

Filter No. 085103		
Thimble No.		
Nozzle Diameter .250	Nozzle I.D.	

H_2O 200.1 [ml] [gm]	Silica Gel (gm) 13.8
Total V_{lc} 213.9	

Start Time: 0855	Stop Time: 1004

Traverse Point Number	Min/pt 2.5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft^3] [L]	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
3 1	32.5	.73	1.2	863.87	340	255	230	44	47	35	9	N/A	
2	35.0	.78	1.2	865.56	340	257	233	44	48	36	9		
3	37.5	.78	1.2	867.23	344	258	233	47	49	36	9		
4	40.0	.75	1.2	868.92	345	258	230	50	RT 250	37	9		
5	42.5	.64	1.0	870.45	346	258	230	52	50	38	7		
6	45.0	.53	.85	871.86	345	255	230	55	50	38	6		
4 1	47.5	.68	1.1	873.51	328	258	235	54	49	39	8		
2	50.0	.72	1.2	875.20	327	257	235	58	51	40	9		
3	52.5	.72	1.2	876.89	325	258	232	60	52	40	9		
4	55.0	.70	1.1	878.53	323	258	230	62	54	41	8		
5	57.5	.62	.99	880.00	322	258	229	62	54	42	7		
6	60.0	.50	.80	881.46	320	250	228	62	54	43	6		
	Total	* 9.868	13.04		405								
	Average												

SOLVAY2016_6_00229

DS1001 General
CNVS/TRG.R3-4/6/94

* Sum of square roots.

Circle correct bracketed units on data sheet.

Clean Air Engineering

TEST LOCATION: STACK

UNIT: SA-1/2 RUN: 2

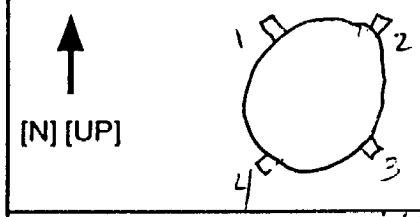
PARTICULATE TESTING FIELD DATA SHEET

METHOD: 5/202 PAGE 1 OF 2

Client	SOLVAY	Project No.	8190
Plant	GR. WY	Date	1-22-98
Meter Operator	KN. LINDBERG		
Probe Operator	ED MCGAFFICK		

Meter Box No.	D-6	Sample Box No.	
Meter Yd	1.0145	Meter ΔH@	1.6147
K Factor	1.6	Pitot Cp	.54
Leak Rate Before	.008	[cfm] [Lpm] @ 14	(in.Hg)
Leak Rate After	.006	[cfm] [Lpm] @ 11	(in.Hg)
Pitot Leak Check Before: ☒	After: Good ☒	Bad ☐	

Cross-Section of Test Location



Duct Dimensions (in.)	144.0		
Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-.2	6.0		

Amb. Temp. (°F)		Bar. Press. 23.68 [in. Hg] [mbar]	
Probe I.D. No.	M-6-1		
Liner Material	GLASS		

Filter No.	055104		
Thimble No.	—		
Nozzle Diameter	.25	Nozzle I.D.	.65

H_2O	186.1 [ml] [gm]	Silica Gel (gm)	6.8
Total V_{lc}	192.9		

Start Time:	1105	Stop Time:	1211

Traverse Point Number	Min/pt 2.5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft^3] [L] 881.65	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
1-1	2.5	.65	1.0	883.21	331	258	246	52	60	56	6	N/A	
2	5.0	.65	1.0	884.78	333	257	249	45	62	56	6		
3	7.5	.67	1.1	886.43	332	258	246	43	64	57	6		
4	10.0	.64	1.0	887.98	330	258	242	43	67	58	6		
5	12.5	.59	.94	889.51	329	258	246	42	69	59	6		
6	15.0	.46	.74	890.87	328	258	247	43	70	60	5		
2-1	17.5	.68	1.1	892.55	342	258	248	42	71	61	7		
2	20.0	.71	1.1	894.23	342	257	240	42	73	62	7		
3	22.5	.71	1.1	895.93	344	257	245	43	74	64	7		
4	25.0	.70	1.0	897.57	344	258	245	44	75	65	7		
5	27.5	.63	1.0	899.14	344	258	245	45	75	65	6		
6	30	.49	.78	900.54	340	258	247	45	76	67	5		
	Total	.8017	1.012	33.42									
	Average	.7931	.7583		338				69				

General 23-4/6/94

* Sum of square roots.

Circle correct bracketed units on data sheet.

337

65

Clean Air Engineering

SOLVAY2016_6_0022292

TEST LOCATION: Stack

UNIT: CA. 1 & 2 RUN: 2

Particulate TESTING FIELD DATA SHEET

METHOD: 5/202 PAGE 2 OF 2

Client: SOLVAY	Project No.: 8190
Plant: GR. WY.	Date: 1-22-98
Meter Operator: RL	
Probe Operator: EM	

Meter Box No.: D-6	Sample Box No.
Meter Yd	Meter ΔH@
K Factor	Pitot Cp
Leak Rate Before	[cfm] [Lpm] @ (in.Hg)
Leak Rate After	[cfm] [Lpm] @ (in.Hg)
Pitot Leak Check Before: ☐	After: Good ☐ Bad ☐

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]

Amb. Temp. (°F)	Bar. Press. [in. Hg] [mbar]
Probe I.D. No.	
Liner Material	

Filter No.: 085104		
Thimble No.: —		
Nozzle Diameter: .250	Nozzle I.D.	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time: 1105	Stop Time: 1211

Traverse Point Number	Min/pt 2.5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft^3] [L]	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
3-1	32.5	.67	1.1	902.20	335	258	244	46	75	67	7	N/A	
2	35.0	.71	1.1	903.87	335	259	245	44	76	68	7		
3	37.5	.73	1.2	905.61	339	257	246	43	76	68	8		
4	40.0	.73	1.2	907.35	339	257	239	43	77	69	8		
5	42.5	.65	1.0	908.96	340	255	242	44	77	69	7		
6	45.0	.50	.80	910.39	339	258	241	44	77	70	5		
4-1	47.5	.65	1.0	911.96	336	256	239	43	76	70	6		
2	50.0	.71	1.1	913.62	337	255	237	43	77	71	7		
3	52.5	.72	1.2	915.36	338	255	237	42	77	71	8		
4	55.0	.71	1.1	917.05	338	257	234	42	77	71	7		
5	57.5	.63	1.0	918.63	340	257	235	42	77	71	7		
6	60.0	.50	.80	920.07	338	252	235	42	76	71	5		
	Total	*											
	Average												

DS 001 General
CNVS/TRG.R3-4/6/94

* Sum of square roots.

.503 1.05

Circle correct bracketed units on data sheet.

Clean Air Engineering

SOLVAY2016_6_00229

TEST LOCATION: Stack

Particulate TESTING FIELD DATA SHEET

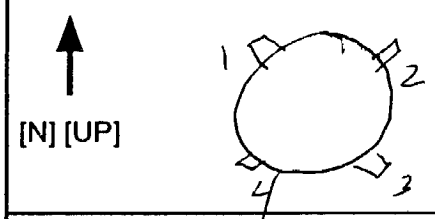
METHOD: 5/202 PAGE 1 OF 2

UNIT: CA 142 RUN: 3

Client Solvay	Project No. 8190
Plant GR. NY	Date 1-22-95
Meter Operator Ron Lindberg	
Probe Operator Ed McGatrick	

Meter Box No. D-6	Sample Box No.
Meter Yd 1.0145	Meter ΔH@ 1.6747
K Factor 1.6	Pitot Cp .84
Leak Rate Before .005 [cfm] [Lpm] @ 13 (in.Hg)	
Leak Rate After .004 [cfm] [Lpm] @ 12 (in.Hg)	
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.) 144.0

Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-.2	6		

Amb. Temp. (°F) 20	Bar. Press. 23.68 [in. Hg] [mbar]	
Probe I.D. No. M-6-1		
Liner Material GLASS		

Filter No. 085105		
Thimble No. —		
Nozzle Diameter .35	Nozzle I.D. .65	

H_2O 192.2 [ml] [gm]	Silica Gel (gm) 7.1
Total V_{lc} 199.3	

Start Time: 1250	Stop Time: 1404

Traverse Point Number	Min/pt 2.5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft^3] [L] 920.25	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
1-1	2.5	.67	1.1	921.93	333	251	234	39	63	65	7	N/A	
2	5.0	.67	1.1	923.58	332	259	236	39	64	64	7		
3	7.5	.68	1.1	925.23	331	258	235	40	65	64	7		
4	10.0	.69	1.1	926.86	329	258	236	40	65	64	7		
5	12.5	.63	1.0	928.44	329	258	237	39	66	63	6		
6	15.0	.48	.77	929.83	326	258	242	38	66	63	5		
2-1	17.5	.70	1.1	931.50	342	259	244	38	66	63	7		
2	20.0	.73	1.2	933.23	345	257	246	39	66	63	8		
3	22.5	.73	1.2	934.95	346	258	245	39	67	62	8		
4	25.0	.71	1.1	936.59	346	258	238	41	67	62	7		
5	27.5	.65	1.0	938.18	346	257	240	41	67	62	6		
6	30.0	.51	.82	939.66	344	258	242	42	68	62	5		
	Total	.8310	1.1075	39.85	339								
	Average	.8311	1.1117		338				67				

.8073 1.0492 337 66

* Sum of square roots.

Circle correct bracketed units on data sheet.

DS 001 General
CNVS/TRG.R3-4/6/94

Clean Air Engineering

SOLVAY2016_6_00229

TEST LOCATION: Stack

UNIT: CA 1+2 RUN: 3

PARTICULATE TESTING FIELD DATA SHEET

METHOD: 5/202 PAGE 2 OF 2

Client SOLVAY	Project No. 8190
Plant GR. W	Date 1-22-98
Meter Operator RL	
Probe Operator EM	

Meter Box No. D-6	Sample Box No.
Meter Yd	Meter ΔH@
K Factor 3.15	Pitot Cp
Leak Rate Before	[cfm] [Lpm] @ (in.Hg)
Leak Rate After .003	(cfm) [Lpm] @ 13 (in.Hg)
Pitot Leak Check Before: ☐	After: Good ☐ Bad ☐

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]

Amb. Temp. (°F)	Bar. Press. [in. Hg] [mbar]
Probe I.D. No.	
Liner Material GLASS	

Filter No. 085105		
Thimble No. —		
Nozzle Diameter .25	Nozzle I.D.	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time: 1250	Stop Time: 1404

Traverse Point Number	Min/pt 2.5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft³] [L] 939.70	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
3-1	32.5	.74	1.2*	941.41	335	258	235	37	67	63	8	N/A	*NEW Start Vol
2	35.0	.77	1.2	943.16	340	258	235	39	68	63	8		939.70
3	37.5	.80	1.3	944.96	341	258	236	40	70	63	9		(-.1)
4	40.0	.80	1.3	946.77	342	257	239	41	71	64	9		
5	42.5	.71	1.1	948.45	342	257	240	42	72	64	8		
6	45.0	.57	.91	949.96	341	257	241	42	72	64	6		
4-1	47.5	.75	1.2	951.68	336	257	242	43	72	65	8		
2	50.0	.76	1.2	953.42	338	258	237	43	74	65	8		
3	52.5	.78	1.2	955.16	340	258	235	43	74	66	8		
4	55.0	.80	1.3	956.95	341	258	235	43	75	66	8		
5	57.5	.70	1.1	958.65	342	258	230	44	75	67	8		
6	60.0	.61	.98	960.20	341	256	230	45	76	67	6		
	Total	*											
	Average												

SOLVAY2016_6_00229

DS 001 General
CNVS/TRG.R3-4/6/94

* Sum of square roots.

Circle correct bracketed units on data sheet.

Clean Air Engineering

TRAIN SET-UP DATA
M/ 5/202

CLIENT SOLVAY

CA 1+2

JOB # 8190

RUN # ~~K~~ MH 1 BOX # D6 FILTER # 085103

		Gross	Tare	Net	Total
Imp. 1	100 H_2O	622.8	535.5	87.3	
Imp. 2	100 H_2O	679.1	545.0	134.1	
Imp. 3	100 H_2O	513.9	535.2	-21.3	200.1
Imp. 4	Silica Gel	710.7	696.9	13.8	
					213.9

RUN # MH ~~5~~ 2 BOX # D5 FILTER # 085104

		Gross	Tare	Net	Total
Imp. 1	100 H_2O	643.2	534.7	108.5	
Imp. 2	100 H_2O	609.3	543.7	65.6	
Imp. 3	100 H_2O	542.0	530.0	12.0	186.1
Imp. 4	Silica Gel	682.8	676.0	6.8	
					192.9

RUN # MH ~~6~~ 3 BOX # D6 FILTER # 085105

		Gross	Tare	Net	Total
Imp. 1	100 H_2O	664.0	535.2	128.8	
Imp. 2	100 H_2O	645.8	545.2	100.6	
Imp. 3	100 H_2O	497.0	534.2	-37.2	192.2
Imp. 4	Silica Gel	684.2	677.1	7.1	
					199.3

SOLVAY2016_6_002296

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
1-21-1998
08:54:36

Clean Air Engineering
Calibration Data

Calibration Error

Time	NOx ppm	SO2 ppm	THC ppm	O2 %	CO2 %	CO ppm	SO2 In ppm	O2 In %	CO2 In %
08:54:51	222.9	0.0	-3.0	20.5	0.0	-4.9	0.0	0.0	0.0
08:55:06	222.7	0.0	-3.1	20.5	0.0	-4.9	0.0	0.0	0.0
08:55:21	222.5	0.0	-3.0	20.5	0.0	-4.9	0.0	0.0	0.0
08:55:36	222.8	0.0	-3.0	20.5	0.0	-4.9	0.0	0.0	0.0
08:55:51	223.4	0.0	-3.0	20.5	0.0	-4.9	0.0	0.0	0.0
08:56:06	223.9	0.0	-3.0	20.5	0.0	-4.9	0.0	0.0	0.0
08:56:21	423.5	0.0	-3.0	20.5	0.0	-4.9	0.0	0.0	0.0
08:56:36	461.3	0.0	-2.9	20.5	0.0	-4.9	0.0	0.0	0.0
08:56:51	461.7	0.0	-3.0	20.7	0.0	-4.9	0.0	0.0	0.0
08:57:06	462.1	0.0	-3.0	20.9	0.0	-4.9	0.0	0.0	0.0
08:57:21	462.2	0.0	-2.9	20.9	0.0	-4.9	0.0	0.0	0.0
08:57:36	461.5	0.0	-2.7	20.9	0.0	-4.9	0.0	0.0	0.0
08:57:51	227.1	0.0	-0.6	20.9	0.0	-4.9	0.0	0.0	0.0
08:58:06	4.1	0.0	-2.9	20.9	0.0	-4.6	0.0	0.0	0.0
08:58:21	1.4	0.0	-1.9	20.9	0.0	15.6	0.0	0.0	0.0
08:58:36	0.6	0.0	-2.7	20.9	0.0	270.7	0.0	0.0	0.0
08:58:51	0.4	0.0	-2.6	20.9	0.0	901.9	0.0	0.0	0.0
08:59:06	0.3	0.0	-2.4	20.9	0.0	1307.1	0.0	0.0	0.0
08:59:21	0.3	0.0	-2.5	20.9	0.0	1432.1	0.0	0.0	0.0
08:59:36	0.2	0.0	-1.4	20.9	0.0	1430.5	0.0	0.0	0.0
08:59:51	0.2	0.0	-3.2	20.9	0.0	1427.9	0.0	0.0	0.0
09:00:06	-0.4	0.0	-3.3	20.9	0.0	1427.1	0.0	0.0	0.0
09:00:21	0.1	0.0	-3.1	20.9	0.0	1417.3	0.0	0.0	0.0
09:00:36	0.1	0.0	-2.9	20.9	0.0	1436.2	0.0	0.0	0.0
09:00:51	0.6	0.0	-3.0	20.9	0.0	1438.5	0.0	0.0	0.0
09:01:06	0.2	0.0	-2.9	20.9	0.0	1457.8	0.0	0.0	0.0
09:01:21	0.1	0.0	-3.0	20.9	0.0	1491.7	0.0	0.0	0.0
09:01:36	0.1	0.0	-2.9	20.9	0.0	1497.4	0.0	0.0	0.0
09:01:51	0.1	0.0	-3.1	20.9	0.0	1501.6	0.0	0.0	0.0
09:02:06	0.1	0.0	-3.1	20.9	0.0	1507.8	0.0	0.0	0.0
09:02:21	0.1	0.0	-3.0	20.9	0.0	1506.8	0.0	0.0	0.0
09:02:36	0.0	0.0	-3.0	20.9	0.0	1507.6	0.0	0.0	0.0
09:02:51	0.6	0.0	-3.0	20.9	0.0	1507.6	0.0	0.0	0.0
09:03:06	0.0	0.0	-3.1	20.9	0.0	1506.3	0.0	0.0	0.0
09:03:21	0.0	0.0	-3.1	20.9	0.0	1439.0	0.0	0.0	0.0
09:03:36	0.0	0.0	-3.0	20.9	0.0	1140.9	0.0	0.0	0.0
09:03:51	0.0	0.0	-2.8	20.9	0.0	784.2	0.0	0.0	0.0
09:04:06	0.0	0.0	-2.8	20.9	0.0	655.6	0.0	0.0	0.0
09:04:21	0.0	0.0	-2.7	20.9	0.0	629.9	0.0	0.0	0.0
09:04:36	0.0	0.0	-2.7	20.9	0.0	628.7	0.0	0.0	0.0
09:04:51	0.0	0.0	-2.7	20.9	0.0	629.4	0.0	0.0	0.0
09:05:06	-0.1	0.0	-2.2	20.9	0.0	626.6	0.0	0.0	0.0
09:05:21	0.0	0.0	-2.1	20.9	0.0	623.7	0.0	0.0	0.0
09:05:36	0.0	0.0	-1.6	20.9	0.0	627.3	0.0	0.0	0.0
09:05:51	0.0	0.0	-1.8	20.9	0.0	620.1	0.0	0.0	0.0
09:06:06	0.0	0.0	-2.0	20.9	0.0	620.1	0.0	0.0	0.0
09:06:21	-0.1	0.0	-1.5	20.9	0.0	620.1	0.0	0.0	0.0
09:06:36	0.5	0.0	-3.0	20.9	0.0	620.1	0.0	0.0	0.0
09:06:51	-0.1	0.0	-2.9	20.9	0.0	617.2	0.0	0.0	0.0
09:07:06	-0.1	0.0	-2.3	20.9	0.0	615.7	0.0	0.0	0.0
09:07:21	-0.1	0.0	-1.6	20.9	0.0	625.2	0.0	0.0	0.0
09:07:36	-0.1	0.0	-1.9	20.9	0.0	639.8	0.0	0.0	0.0

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
1-21-1998
08:54:36

Clean Air Engineering
Calibration Data

Calibration Error

Time	NOx ppm	SO2 ppm	THC ppm	O2 %	CO2 %	CO ppm	SO2 In ppm	O2 In %	CO2 In %
09:07:51	-0.1	0.0	-2.1	20.9	0.0	628.7	0.0	0.0	0.0
09:08:06	-0.1	0.0	-2.3	20.9	0.0	628.9	0.0	0.0	0.0
09:08:21	-0.1	0.0	-2.8	20.9	0.0	626.0	0.0	0.0	0.0
09:08:36	-0.1	0.0	-2.4	20.9	0.0	618.7	0.0	0.0	0.0
09:08:51	-0.1	0.0	-1.9	20.9	0.0	615.4	0.0	0.0	0.0
09:09:06	-0.1	0.0	-2.2	20.9	0.0	614.7	0.0	0.0	0.0
09:09:21	-0.1	0.0	-2.9	20.9	0.0	612.8	0.0	0.0	0.0
09:09:36	-0.1	0.0	-3.1	20.9	0.0	612.8	0.0	0.0	0.0
09:09:51	-0.1	0.0	-3.1	20.9	0.0	632.0	0.0	0.0	0.0
09:10:06	-0.1	0.0	-2.0	20.9	0.0	793.8	0.0	0.0	0.0
09:10:21	-0.1	0.0	-3.2	20.9	0.0	1134.3	0.0	0.0	0.0
09:10:36	-0.1	0.0	-3.3	20.9	0.0	1345.5	0.0	0.0	0.0
09:10:51	-0.1	0.0	-3.6	20.9	0.0	1408.7	0.0	0.0	0.0
09:11:06	-0.2	0.0	-2.9	20.9	0.0	1413.9	0.0	0.0	0.0
09:11:21	-0.2	0.0	-3.3	20.9	0.0	1408.4	0.0	0.0	0.0
09:11:36	-0.2	0.0	-3.1	20.9	0.0	1912.6	0.0	0.0	0.0
09:11:51	-0.2	0.0	-2.8	20.9	0.0	6655.1	0.0	0.0	0.0
09:12:06	-0.2	0.0	-2.9	20.9	0.0	1717.8	0.0	0.0	0.0
09:12:21	-0.2	0.0	-2.8	20.9	0.0	1683.6	0.0	0.0	0.0
09:12:36	-0.2	0.0	-2.7	20.9	0.0	1645.3	0.0	0.0	0.0
09:12:51	-0.2	0.0	-2.6	20.9	0.0	1575.0	0.0	0.0	0.0
09:13:06	-0.2	0.0	-3.0	20.9	0.0	1530.1	0.0	0.0	0.0
09:13:21	-0.2	0.0	-3.3	20.9	0.0	1515.8	0.0	0.0	0.0
09:13:36	-0.2	0.0	-2.7	20.9	0.0	1506.7	0.0	0.0	0.0
09:13:51	-0.2	0.0	-2.2	20.9	0.0	1508.0	0.0	0.0	0.0
09:14:06	-0.2	0.0	-2.2	20.9	0.0	1506.7	0.0	0.0	0.0
09:14:21	-0.2	0.0	-2.2	20.9	0.0	1507.0	0.0	0.0	0.0
09:14:36	-1.0	0.0	-2.0	20.9	0.0	1506.7	0.0	0.0	0.0
09:14:51	-0.3	0.0	-2.0	20.8	0.0	1515.5	0.0	0.0	0.0
09:15:06	-0.2	0.0	-2.6	20.8	0.0	1521.0	0.0	0.0	0.0
09:15:21	-0.2	0.0	-2.3	20.8	0.0	1487.5	0.0	0.0	0.0
09:15:36	-0.2	0.0	-2.6	20.9	0.0	1488.0	0.0	0.0	0.0
09:15:51	-0.3	0.0	-3.0	20.8	0.0	1493.5	0.0	0.0	0.0
09:16:06	-0.2	0.0	-2.9	20.9	0.0	1487.3	0.0	0.0	0.0
09:16:21	-0.2	0.0	-3.2	20.8	0.0	1496.1	0.0	0.0	0.0
09:16:36	-0.2	0.0	-3.6	20.9	0.0	1516.6	0.0	0.0	0.0
09:16:51	-0.2	0.0	-3.5	20.8	0.0	1508.1	0.0	0.0	0.0
09:17:06	-0.2	0.0	-3.6	20.6	0.0	1500.3	0.0	0.0	0.0
09:17:21	-0.2	0.0	-3.5	20.6	0.0	1501.6	0.0	0.0	0.0
09:17:36	-0.2	0.0	-3.5	20.6	0.0	1508.8	0.0	0.0	0.0
09:17:51	-0.2	0.0	-3.9	20.6	0.0	1504.2	0.0	0.0	0.0
09:18:06	-0.2	0.0	-3.5	20.6	0.0	1451.7	0.0	0.0	0.0
09:18:21	-0.2	0.0	-3.4	20.6	0.0	1389.2	0.0	0.0	0.0
09:18:36	-0.2	0.0	-3.3	20.6	0.0	1373.5	0.0	0.0	0.0
09:18:51	-0.2	0.0	-3.4	20.6	0.0	840.0	0.0	0.0	0.0
09:19:06	-0.2	0.0	-3.6	20.6	0.0	601.2	0.0	0.0	0.0
09:19:21	-0.2	0.0	-3.5	20.6	0.0	602.2	0.0	0.0	0.0
09:19:36	-0.3	0.0	-3.3	20.6	0.0	602.7	0.0	0.0	0.0
09:19:51	-0.3	0.0	-3.2	20.6	0.0	601.4	0.0	0.0	0.0
09:20:06	-0.3	0.0	-3.1	20.6	0.0	601.7	0.0	0.0	0.0
09:20:21	-0.3	0.0	-3.1	19.6	0.0	598.1	0.0	0.0	0.0
09:20:36	-0.3	0.0	-2.9	13.4	0.0	513.0	0.0	0.0	0.0

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
1-21-1998
08:54:36

Clean Air Engineering
Calibration Data

Calibration Error

Time	NOx ppm	SO2 ppm	THC ppm	O2 %	CO2 %	CO ppm	SO2 In ppm	O2 In %	CO2 In %
09:20:51	-0.3	0.0	-3.4	19.9	1.9	237.6	0.0	0.0	0.0
09:21:06	-0.3	0.0	-3.5	20.9	8.1	68.5	0.0	0.0	0.0
09:21:21	-0.3	0.0	-3.2	21.0	13.4	12.9	0.0	0.0	0.0
09:21:36	-0.3	0.0	-3.0	21.0	16.2	6.2	0.0	0.0	0.0
09:21:51	-0.3	0.0	-3.4	21.0	17.3	-4.2	0.0	0.0	0.0
09:22:06	-0.3	0.0	-3.7	21.1	17.8	-2.8	0.0	0.0	0.0
09:22:21	-0.3	0.0	-3.9	21.3	18.0	7.0	0.0	0.0	0.0
09:22:36	-0.3	0.0	-3.8	21.2	18.1	-0.8	0.0	0.0	0.0
09:22:51	-0.3	0.0	-3.9	21.3	18.2	-3.1	0.0	0.0	0.0
09:23:06	-0.3	0.0	-3.9	21.2	18.3	4.4	0.0	0.0	0.0
09:23:21	-0.4	0.0	-2.6	21.2	18.4	6.7	0.0	0.0	0.0
09:23:36	-0.3	0.0	-3.7	21.2	18.4	-0.7	0.0	0.0	0.0
09:23:51	-0.3	0.0	-3.4	21.3	18.4	-3.6	0.0	0.0	0.0
09:24:06	-0.3	0.0	-3.6	19.2	18.4	4.1	0.0	0.0	0.0
09:24:21	-0.3	0.0	-3.4	11.9	13.9	7.0	0.0	0.0	0.0
09:24:36	-0.3	0.0	-3.5	10.4	10.3	6.5	0.0	0.0	0.0
09:24:51	-0.4	0.0	-3.7	10.3	10.2	-3.3	0.0	0.0	0.0
09:25:06	-0.3	0.0	-3.7	10.3	10.2	-3.4	0.0	0.0	0.0
09:25:21	-0.3	0.0	-3.5	10.3	10.2	7.0	0.0	0.0	0.0
09:25:36	-0.3	0.0	-3.6	10.3	10.2	7.0	0.0	0.0	0.0
09:25:51	-0.3	0.0	-3.4	10.3	10.2	3.1	0.0	0.0	0.0
09:26:06	-0.3	0.0	-3.5	10.3	10.2	4.4	0.0	0.0	0.0
Zero Gas	0.0				0.0	-4.9			
Mid Gas	222.7			10.3	10.2	600.4			
High Gas	461.7			21.2	18.4	1507.4			

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
January 21, 1998

CALIBRATION BIAS 0

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
09:29:25	227.9	0.0	-4.9	0.0	0.0	7.3	0.0	0.0	0.0
09:29:40	228.0	0.0	-4.9	0.0	0.0	7.0	0.0	0.0	0.0
09:29:55	228.1	0.0	-4.9	0.0	0.0	7.3	0.0	0.0	0.0
09:30:10	228.0	0.0	-4.9	0.0	0.0	7.3	0.0	0.0	0.0
09:30:25	228.3	0.0	-0.7	0.0	0.0	7.3	0.0	0.0	0.0
09:30:40	223.0	0.0	351.2	0.0	0.0	7.3	0.0	0.0	0.0
09:30:55	41.3	0.0	509.5	-0.1	-0.1	7.3	0.0	0.0	0.0
09:31:10	1.6	0.0	473.9	-0.1	-0.1	7.3	0.0	0.0	0.0
09:31:25	0.7	0.0	475.1	-0.1	-0.1	7.3	0.0	0.0	0.0
09:31:40	0.4	0.0	476.0	-0.1	0.0	7.3	0.0	0.0	0.0
09:31:55	0.2	0.0	476.0	-0.1	0.0	7.3	0.0	0.0	0.0
09:32:10	0.6	0.0	477.6	0.0	-0.1	7.3	0.0	0.0	0.0
09:32:25	0.1	0.0	476.9	-0.1	-0.1	7.0	0.0	0.0	0.0
09:32:40	0.0	0.0	476.8	-0.1	-0.1	7.3	0.0	0.0	0.0
09:32:55	0.0	0.0	508.2	-0.1	-0.1	7.3	0.0	0.0	0.0
09:33:10	3.4	0.0	833.4	0.2	0.1	7.3	0.0	0.0	0.0
09:33:25	0.2	0.0	839.5	0.1	0.0	7.3	0.0	0.0	0.0
09:33:40	-0.1	0.0	841.2	0.0	0.0	7.3	0.0	0.0	0.0
09:33:55	-0.1	0.0	841.2	0.0	-0.1	7.3	0.0	0.0	0.0
09:34:10	-0.1	0.0	841.4	0.0	-0.1	7.3	0.0	0.0	0.0
09:34:25	-0.2	0.0	843.0	0.0	-0.1	7.3	0.0	0.0	0.0
09:34:40	-0.2	0.0	842.5	0.1	-0.1	7.3	0.0	0.0	0.0
09:34:55	-0.2	0.0	843.5	0.2	-0.1	7.3	0.0	0.0	0.0
09:35:10	-0.2	0.0	843.0	0.1	-0.1	7.3	0.0	0.0	0.0
09:35:25	-0.3	0.0	843.7	0.0	-0.1	7.3	0.0	0.0	0.0
09:35:40	-0.3	0.0	611.8	0.0	-0.1	7.3	0.0	0.0	0.0
09:35:55	-0.1	0.0	21.8	5.9	-0.1	7.3	0.0	0.0	0.0
09:36:10	-0.2	0.0	499.3	18.3	0.0	7.3	0.0	0.0	0.0
09:36:25	-0.3	0.0	284.6	4.7	0.0	7.3	0.0	0.0	0.0
09:36:40	-0.3	0.0	283.6	0.2	-0.1	7.3	0.0	0.0	0.0
09:36:55	-0.3	0.0	283.0	-0.1	-0.1	7.3	0.0	0.0	0.0
09:37:10	-0.3	0.0	282.8	-0.1	-0.1	7.3	0.0	0.0	0.0
09:37:25	-0.3	0.0	282.4	-0.1	-0.1	7.3	0.0	0.0	0.0
09:37:40	-0.3	0.0	282.4	-0.1	-0.1	7.3	0.0	0.0	0.0
09:37:55	-0.3	0.0	282.4	-0.1	-0.1	7.3	0.0	0.0	0.0
09:38:10	-0.3	0.0	282.4	-0.1	-0.1	7.3	0.0	0.0	0.0
09:38:25	-0.4	0.0	282.4	-0.1	-0.1	7.3	0.0	0.0	0.0
09:38:40	-0.4	0.0	282.6	-0.1	-0.1	7.3	0.0	0.0	0.0
09:38:55	-0.3	0.0	282.8	-0.1	-0.1	7.3	0.0	0.0	0.0
09:39:10	-0.4	0.0	282.9	-0.1	-0.1	7.3	0.0	0.0	0.0
09:39:25	-0.4	0.0	282.9	-0.1	-0.1	7.3	0.0	0.0	0.0
09:39:40	-0.4	0.0	282.8	-0.1	-0.1	7.3	0.0	0.0	0.0
09:39:55	-0.4	0.0	266.7	-0.1	-0.1	7.3	0.0	0.0	0.0
09:40:10	-0.4	0.0	17.2	0.0	0.0	13.8	0.0	0.0	0.0
09:40:25	-0.4	0.0	12.4	-0.1	0.0	172.0	0.0	0.0	0.0
09:40:40	-0.3	0.0	11.3	-0.1	-0.1	921.5	0.0	0.0	0.0
09:40:55	-0.4	0.0	10.6	-0.1	-0.1	1,380.2	0.0	0.0	0.0
09:41:10	-0.3	0.0	10.7	-0.1	-0.1	1,492.0	0.0	0.0	0.0
09:41:25	-0.4	0.0	7.4	-0.1	0.0	1,498.9	0.0	0.0	0.0
09:41:40	-0.4	0.0	4.7	-0.1	0.0	1,387.0	0.0	0.0	0.0
09:41:55	-0.4	0.0	4.3	-0.1	-0.1	1,013.0	0.0	0.0	0.0
09:42:10	-0.4	0.0	5.1	-0.1	-0.1	658.4	0.0	0.0	0.0
09:42:25	-0.4	0.0	3.8	-0.1	-0.1	606.3	0.0	0.0	0.0
09:42:40	-0.4	0.0	3.6	-0.1	-0.1	603.0	0.0	0.0	0.0
09:42:55	-0.4	0.0	3.5	-0.1	-0.1	603.0	0.0	0.0	0.0
09:43:10	-0.4	0.0	3.3	-0.1	-0.1	603.0	0.0	0.0	0.0
09:43:25	-0.4	0.0	3.1	-0.1	-0.1	603.0	0.0	0.0	0.0
09:43:40	-0.4	0.0	3.0	-0.1	-0.1	595.2	0.0	0.0	0.0
09:43:55	-0.4	0.0	1.9	-0.1	-0.2	601.4	0.0	0.0	0.0
09:44:10	-0.3	0.0	1.0	3.2	2.9	591.6	0.0	0.0	0.0
09:44:25	-0.4	0.0	-0.2	9.6	9.2	476.4	0.0	0.0	0.0
09:44:40	-0.3	0.0	-0.3	10.1	9.9	157.4	0.0	0.0	0.0
09:44:55	-0.4	0.0	-0.2	10.1	10.0	33.4	0.0	0.0	0.0
09:45:10	-0.4	0.0	-0.3	10.1	10.1	7.3	0.0	0.0	0.0
09:45:25	-0.4	0.0	-0.3	10.1	10.1	7.3	0.0	0.0	0.0
09:45:40	-0.4	0.0	-0.3	10.1	10.1	7.3	0.0	0.0	0.0
09:45:55	-0.4	0.0	0.7	10.1	10.1	7.3	0.0	0.0	0.0
09:46:10	-0.4	0.0	-0.3	10.2	10.1	7.3	0.0	0.0	0.0
Zero Gas	0.4		-4.9	0.0	0.0	7.2			
Cal Gas	228.0		282.9	10.1	10.1	603.0			
Cal Gas			476.5						
Cal Gas			843.4						

Revision 0

SOLVAY2016_6_002300

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
January 21, 1998

REFERENCE METHOD RUN 1

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
09:56	27.9	0.0	149.4	11.4	11.0	651.3	0.0	0.0	0.0
09:57	25.5	0.0	169.7	11.3	11.0	665.3	0.0	0.0	0.0
09:58	24.8	0.0	174.5	11.3	11.1	668.8	0.0	0.0	0.0
09:59	25.6	0.0	171.1	11.2	11.2	668.5	0.0	0.0	0.0
10:00	25.2	0.0	177.5	11.2	11.2	668.4	0.0	0.0	0.0
10:01	26.1	0.0	162.8	11.2	11.2	666.8	0.0	0.0	0.0
10:02	26.0	0.0	180.5	11.3	11.1	668.3	0.0	0.0	0.0
10:03	25.5	0.0	178.1	11.2	11.2	668.0	0.0	0.0	0.0
10:04	24.5	0.0	181.8	11.3	11.1	666.9	0.0	0.0	0.0
10:05	25.8	0.0	164.9	11.2	11.2	667.0	0.0	0.0	0.0
10:06	25.7	0.0	171.6	11.1	11.3	667.0	0.0	0.0	0.0
10:07	24.9	0.0	179.9	11.2	11.2	669.2	0.0	0.0	0.0
10:08	24.9	0.0	184.0	11.3	11.2	666.7	0.0	0.0	0.0
10:09	25.2	0.0	175.9	11.2	11.3	668.4	0.0	0.0	0.0
10:10	25.3	0.0	172.7	11.2	11.2	666.5	0.0	0.0	0.0
10:11	25.1	0.0	185.4	11.2	11.2	668.5	0.0	0.0	0.0
10:12	23.9	0.0	186.5	11.2	11.2	666.5	0.0	0.0	0.0
10:13	23.4	0.0	189.0	11.3	11.1	666.6	0.0	0.0	0.0
10:14	25.3	0.0	166.8	11.3	11.2	667.7	0.0	0.0	0.0
10:15	25.1	0.0	174.7	11.2	11.2	666.5	0.0	0.0	0.0
10:16	25.1	0.0	188.4	11.2	11.2	666.3	0.0	0.0	0.0
10:17	24.6	0.0	199.2	11.2	11.2	666.8	0.0	0.0	0.0
10:18	23.7	0.0	195.2	11.3	11.2	666.7	0.0	0.0	0.0
10:19	23.7	0.0	198.0	11.3	11.1	667.0	0.0	0.0	0.0
10:20	24.3	0.0	197.0	11.2	11.2	666.4	0.0	0.0	0.0
10:21	24.2	0.0	204.6	11.2	11.2	666.5	0.0	0.0	0.0
10:22	24.3	0.0	192.1	11.2	11.3	666.8	0.0	0.0	0.0
10:23	24.6	0.0	197.3	11.2	11.3	666.7	0.0	0.0	0.0
10:24	23.9	0.0	199.8	11.2	11.3	666.8	0.0	0.0	0.0
10:25	22.7	0.0	213.1	11.3	11.1	667.3	0.0	0.0	0.0
10:26	22.5	0.0	215.7	11.4	11.0	667.1	0.0	0.0	0.0
10:27	24.0	0.0	194.7	11.2	11.2	666.6	0.0	0.0	0.0
10:28	24.1	0.0	200.6	11.2	11.2	667.9	0.0	0.0	0.0
10:29	24.7	0.0	210.9	11.1	11.3	668.1	0.0	0.0	0.0
10:30	24.3	0.0	207.1	11.1	11.4	666.8	0.0	0.0	0.0
10:31	23.9	0.0	214.3	11.1	11.3	667.2	0.0	0.0	0.0
10:32	24.4	0.0	203.0	11.2	11.2	666.8	0.0	0.0	0.0
10:33	23.9	0.0	214.5	11.2	11.2	667.1	0.0	0.0	0.0
10:34	23.9	0.0	218.8	11.2	11.2	667.1	0.0	0.0	0.0
10:35	24.7	0.0	219.7	11.1	11.3	667.2	0.0	0.0	0.0
10:36	24.2	0.0	225.6	11.1	11.3	667.2	0.0	0.0	0.0
10:37	23.4	0.0	217.4	11.2	11.2	667.0	0.0	0.0	0.0
10:38	23.8	0.0	221.1	11.3	11.1	745.0	0.0	0.0	0.0
10:39	23.9	0.0	236.5	11.3	11.1	850.2	0.0	0.0	0.0
10:40	23.4	0.0	240.4	11.3	11.1	858.2	0.0	0.0	0.0
10:41	23.3	0.0	235.5	11.2	11.1	866.9	0.0	0.0	0.0
10:42	24.4	0.0	220.2	11.1	11.2	876.0	0.0	0.0	0.0
10:43	24.3	0.0	228.6	11.1	11.2	883.3	0.0	0.0	0.0
10:44	24.6	0.0	239.3	11.2	11.2	881.3	0.0	0.0	0.0
10:45	24.2	0.0	248.8	11.2	11.2	896.4	0.0	0.0	0.0
10:46	23.0	0.0	264.9	11.3	11.0	914.8	0.0	0.0	0.0
10:47	23.5	0.0	256.2	11.2	11.1	930.1	0.0	0.0	0.0
10:48	23.9	0.0	255.6	11.2	11.2	921.7	0.0	0.0	0.0
10:49	24.3	0.0	255.8	11.2	11.2	926.8	0.0	0.0	0.0
10:50	24.6	0.0	251.7	11.1	11.2	925.3	0.0	0.0	0.0
10:51	24.2	0.0	274.4	11.2	11.2	931.8	0.0	0.0	0.0
10:52	24.2	0.0	246.2	11.3	11.1	941.9	0.0	0.0	0.0
10:53	24.0	0.0	263.5	11.2	11.1	947.9	0.0	0.0	0.0
10:54	23.5	0.0	267.5	11.2	11.1	940.8	0.0	0.0	0.0
10:55	24.3	0.0	266.1	11.2	11.1	952.5	0.0	0.0	0.0
Average	24.4		208.3	11.2	11.2	736.6			

SOLVAY2016_6_002301

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
January 21, 1998

CALIBRATION BIAS 1

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
10:58:18	230.7	0.0	15.4	0.0	0.0	7.3	0.0	0.0	0.0
10:58:33	231.0	0.0	14.3	-0.1	0.0	7.3	0.0	0.0	0.0
10:58:48	230.7	0.0	13.3	-0.1	0.0	7.3	0.0	0.0	0.0
10:59:03	230.1	0.0	12.7	-0.1	0.0	7.3	0.0	0.0	0.0
10:59:18	230.2	0.0	12.0	-0.1	0.0	7.3	0.0	0.0	0.0
10:59:33	230.8	0.0	11.6	-0.1	0.0	7.3	0.0	0.0	0.0
10:59:48	230.3	0.0	10.3	-0.1	0.0	7.0	0.0	0.0	0.0
11:00:03	127.0	0.0	8.2	1.5	0.8	7.3	0.0	0.0	0.0
11:00:18	4.7	0.0	8.0	8.8	7.3	7.3	0.0	0.0	0.0
11:00:33	1.3	0.0	7.8	10.0	9.6	7.3	0.0	0.0	0.0
11:00:48	1.0	0.0	7.6	10.1	9.9	17.4	0.0	0.0	0.0
11:01:03	0.8	0.0	7.4	10.1	10.0	7.3	0.0	0.0	0.0
11:01:18	0.7	0.0	7.1	10.1	10.1	7.3	0.0	0.0	0.0
11:01:33	0.6	0.0	6.9	10.1	10.1	7.3	0.0	0.0	0.0
11:01:48	0.5	0.0	6.6	10.1	10.1	7.3	0.0	0.0	0.0
11:02:03	0.4	0.0	6.5	10.1	10.1	7.3	0.0	0.0	0.0
11:02:18	0.4	0.0	6.2	10.1	10.1	7.3	0.0	0.0	0.0
11:02:33	0.4	0.0	7.3	9.8	9.9	7.3	0.0	0.0	0.0
11:02:48	0.3	0.0	6.9	2.7	3.9	52.2	0.0	0.0	0.0
11:03:03	0.3	0.0	6.7	0.1	0.8	233.9	0.0	0.0	0.0
11:03:18	0.2	0.0	6.4	0.0	0.3	478.4	0.0	0.0	0.0
11:03:33	0.2	0.0	6.2	-0.1	0.1	579.8	0.0	0.0	0.0
11:03:48	0.4	0.0	5.9	-0.1	0.0	602.2	0.0	0.0	0.0
11:04:03	0.6	0.0	5.6	-0.1	0.0	595.9	0.0	0.0	0.0
11:04:18	0.0	0.0	5.6	-0.1	0.0	602.4	0.0	0.0	0.0
11:04:33	-0.1	0.0	4.6	-0.1	-0.1	599.1	0.0	0.0	0.0
11:04:48	-0.1	0.0	5.3	-0.1	0.0	600.1	0.0	0.0	0.0
11:05:03	-0.1	0.0	5.2	-0.1	0.0	592.6	0.0	0.0	0.0
11:05:18	-0.1	0.0	5.0	-0.1	0.0	602.4	0.0	0.0	0.0
11:05:33	-0.1	0.0	4.9	-0.1	0.0	603.0	0.0	0.0	0.0
11:05:48	-0.1	0.0	4.8	-0.1	0.0	593.3	0.0	0.0	0.0
11:06:03	-0.1	0.0	8.6	-0.1	0.0	598.8	0.0	0.0	0.0
11:06:18	7.8	0.0	77.4	0.7	0.0	600.4	0.0	0.0	0.0
11:06:33	1.3	0.0	79.8	15.5	0.0	550.8	0.0	0.0	0.0
11:06:48	-0.1	0.0	79.9	20.1	0.0	327.5	0.0	0.0	0.0
11:07:03	-0.2	0.0	80.0	20.4	0.0	113.8	0.0	0.0	0.0
11:07:18	-0.1	0.0	80.1	20.4	0.0	24.3	0.0	0.0	0.0
11:07:33	-0.2	0.0	80.0	20.4	0.0	7.3	0.0	0.0	0.0
11:07:48	-0.2	0.0	80.0	20.4	0.0	7.3	0.0	0.0	0.0
11:08:03	-0.2	0.0	80.1	20.4	0.0	7.3	0.0	0.0	0.0
11:08:18	-0.3	0.0	80.1	20.4	0.0	7.3	0.0	0.0	0.0
11:08:33	-0.2	0.0	80.1	20.4	0.0	7.3	0.0	0.0	0.0
11:08:48	-0.2	0.0	80.0	20.4	0.0	7.3	0.0	0.0	0.0
11:09:03	-0.2	0.0	80.1	20.4	0.0	7.3	0.0	0.0	0.0
11:09:18	-0.3	0.0	80.0	20.4	0.0	7.3	0.0	0.0	0.0
11:09:33	-0.2	0.0	80.1	20.4	0.0	7.3	0.0	0.0	0.0
11:09:48	-0.3	0.0	80.2	20.4	0.0	7.3	0.0	0.0	0.0
11:10:03	-0.2	0.0	80.0	20.4	0.0	7.3	0.0	0.0	0.0
11:10:18	-0.3	0.0	80.0	20.4	0.0	7.3	0.0	0.0	0.0
11:10:33	-0.3	0.0	80.0	20.4	0.0	7.3	0.0	0.0	0.0
11:10:48	-0.3	0.0	187.6	20.5	0.0	7.3	0.0	0.0	0.0
11:11:03	-0.3	0.0	276.6	13.0	0.0	7.3	0.0	0.0	0.0
11:11:18	-0.3	0.0	278.5	1.0	-0.1	7.3	0.0	0.0	0.0
11:11:33	-0.3	0.0	279.2	0.1	-0.1	7.3	0.0	0.0	0.0
11:11:48	-0.3	0.0	279.5	0.0	-0.1	7.3	0.0	0.0	0.0
11:12:03	-0.3	0.0	279.5	0.0	-0.1	7.3	0.0	0.0	0.0
11:12:18	-0.3	0.0	279.4	0.0	-0.1	7.3	0.0	0.0	0.0
11:12:33	-0.3	0.0	279.4	0.0	-0.1	7.3	0.0	0.0	0.0
Zero Gas	1.1		4.9	-0.1	0.0	7.3			
Cal Gas	230.6		279.4	10.1	10.1	602.7			

SOLVAY2016_6_002302

Revision 0

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
January 21, 1998

REFERENCE METHOD RUN 2

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
11:46	24.5	0.0	213.2	11.2	11.1	785.9	0.0	0.0	0.0
11:47	25.4	0.0	210.9	11.1	11.3	789.5	0.0	0.0	0.0
11:48	25.2	0.0	214.1	11.1	11.3	778.9	0.0	0.0	0.0
11:49	25.1	0.0	200.4	11.2	11.2	789.9	0.0	0.0	0.0
11:50	24.7	0.0	206.5	11.3	11.1	790.8	0.0	0.0	0.0
11:51	25.0	0.0	205.1	11.2	11.2	782.0	0.0	0.0	0.0
11:52	26.1	0.0	205.1	11.1	11.3	782.3	0.0	0.0	0.0
11:53	25.8	0.0	214.3	11.1	11.3	783.1	0.0	0.0	0.0
11:54	25.1	0.0	196.3	11.2	11.2	785.0	0.0	0.0	0.0
11:55	24.6	0.0	198.5	11.3	11.1	780.2	0.0	0.0	0.0
11:56	25.0	0.0	210.6	11.2	11.2	774.7	0.0	0.0	0.0
11:57	25.7	0.0	204.1	11.1	11.3	803.6	0.0	0.0	0.0
11:58	25.3	0.0	209.2	11.1	11.3	782.1	0.0	0.0	0.0
11:59	25.2	0.0	213.0	11.1	11.3	791.4	0.0	0.0	0.0
12:00	26.1	0.0	189.6	11.1	11.3	792.6	0.0	0.0	0.0
12:01	25.2	0.0	197.3	11.2	11.2	766.8	0.0	0.0	0.0
12:02	24.5	0.0	203.9	11.3	11.1	760.3	0.0	0.0	0.0
12:03	24.4	0.0	208.0	11.2	11.2	776.6	0.0	0.0	0.0
12:04	25.1	0.0	202.1	11.2	11.2	761.8	0.0	0.0	0.0
12:05	25.2	0.0	201.1	11.1	11.3	752.4	0.0	0.0	0.0
12:06	24.9	0.0	187.2	11.1	11.3	754.9	0.0	0.0	0.0
12:07	24.6	0.0	188.5	11.2	11.1	748.9	0.0	0.0	0.0
12:08	24.7	0.0	199.5	11.2	11.1	758.1	0.0	0.0	0.0
12:09	24.7	0.0	201.2	11.2	11.1	750.9	0.0	0.0	0.0
12:10	24.2	0.0	208.0	11.3	11.1	743.9	0.0	0.0	0.0
12:11	24.2	0.0	201.0	11.2	11.1	748.8	0.0	0.0	0.0
12:12	24.2	0.0	181.8	11.2	11.1	759.4	0.0	0.0	0.0
12:13	24.1	0.0	190.6	11.3	11.1	742.9	0.0	0.0	0.0
12:14	24.9	0.0	198.1	11.3	11.1	729.1	0.0	0.0	0.0
12:15	24.9	0.0	203.2	11.3	11.1	733.3	0.0	0.0	0.0
12:16	24.7	0.0	199.5	11.3	11.1	732.3	0.0	0.0	0.0
12:17	24.6	0.0	190.1	11.3	11.1	741.0	0.0	0.0	0.0
12:18	24.6	0.0	189.6	11.2	11.1	756.2	0.0	0.0	0.0
12:19	24.6	0.0	190.6	11.2	11.1	729.2	0.0	0.0	0.0
12:20	22.9	0.0	229.6	11.3	11.1	757.4	0.0	0.0	0.0
12:21	24.5	0.0	190.4	11.2	11.2	763.3	0.0	0.0	0.0
12:22	25.5	0.0	183.6	11.2	11.2	722.2	0.0	0.0	0.0
12:23	23.7	0.0	224.7	11.2	11.2	753.7	0.0	0.0	0.0
12:24	23.4	0.0	212.2	11.2	11.2	774.0	0.0	0.0	0.0
12:25	23.5	0.0	196.4	11.3	11.1	748.1	0.0	0.0	0.0
12:26	24.2	0.0	193.3	11.3	11.1	726.7	0.0	0.0	0.0
12:27	23.9	0.0	205.7	11.3	11.1	734.7	0.0	0.0	0.0
12:28	23.6	0.0	195.5	11.4	11.0	745.3	0.0	0.0	0.0
12:29	24.7	0.0	187.5	11.3	11.1	736.1	0.0	0.0	0.0
12:30	24.7	0.0	187.2	11.2	11.2	725.3	0.0	0.0	0.0
12:31	25.0	0.0	173.8	11.2	11.1	721.6	0.0	0.0	0.0
12:32	24.8	0.0	185.2	11.3	11.1	725.4	0.0	0.0	0.0
12:33	24.5	0.0	192.7	11.3	11.1	725.4	0.0	0.0	0.0
12:34	24.7	0.0	190.2	11.3	11.1	733.4	0.0	0.0	0.0
12:35	25.0	0.0	186.3	11.2	11.2	737.0	0.0	0.0	0.0
12:36	24.4	0.0	178.9	11.2	11.1	742.0	0.0	0.0	0.0
12:37	23.9	0.0	191.6	11.4	11.0	727.7	0.0	0.0	0.0
12:38	24.1	0.0	194.6	11.3	11.0	729.7	0.0	0.0	0.0
12:39	24.6	0.0	192.4	11.3	11.1	727.2	0.0	0.0	0.0
12:40	23.9	0.0	202.6	11.3	11.0	731.7	0.0	0.0	0.0
12:41	23.6	0.0	205.1	11.3	11.0	750.6	0.0	0.0	0.0
12:42	24.1	0.0	182.0	11.3	11.1	744.3	0.0	0.0	0.0
12:43	24.3	0.0	188.7	11.3	11.0	733.4	0.0	0.0	0.0
12:44	23.5	0.0	203.1	11.4	11.0	745.9	0.0	0.0	0.0
12:45	23.7	0.0	201.3	11.4	11.0	737.2	0.0	0.0	0.0
Average	24.6		198.4	11.2	11.1	754.0			

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
January 21, 1998

CALIBRATION BIAS 2

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
12:51:33	228.3	0.0	11.6	0.0	0.0	7.3	0.0	0.0	0.0
12:51:48	228.1	0.0	10.8	0.0	0.0	7.3	0.0	0.0	0.0
12:52:03	228.3	0.0	10.4	-0.1	0.0	7.3	0.0	0.0	0.0
12:52:18	228.3	0.0	9.8	-0.1	0.0	7.3	0.0	0.0	0.0
12:52:33	228.0	0.0	9.3	-0.1	0.0	7.3	0.0	0.0	0.0
12:52:48	228.1	0.0	8.9	-0.1	0.0	7.3	0.0	0.0	0.0
12:53:03	228.3	0.0	7.9	-0.1	0.0	7.3	0.0	0.0	0.0
12:53:18	100.7	0.0	6.5	2.3	1.4	7.2	0.0	0.0	0.0
12:53:33	3.5	0.0	6.2	9.1	7.9	7.2	0.0	0.0	0.0
12:53:48	1.2	0.0	6.0	10.0	9.7	7.3	0.0	0.0	0.0
12:54:03	0.9	0.0	5.8	10.1	10.0	7.3	0.0	0.0	0.0
12:54:18	0.6	0.0	5.7	10.1	10.0	7.3	0.0	0.0	0.0
12:54:33	0.5	0.0	5.5	10.1	10.1	7.3	0.0	0.0	0.0
12:54:48	0.4	0.0	5.3	10.1	10.1	7.3	0.0	0.0	0.0
12:55:03	0.4	0.0	5.2	10.1	10.1	7.3	0.0	0.0	0.0
12:55:18	19.6	0.0	6.2	10.0	10.0	7.3	0.0	0.0	0.0
12:55:33	17.5	0.0	6.2	3.4	4.6	17.7	0.0	0.0	0.0
12:55:48	0.5	0.0	6.2	0.1	0.9	157.2	0.0	0.0	0.0
12:56:03	0.3	0.0	6.0	0.0	0.3	397.1	0.0	0.0	0.0
12:56:18	0.3	0.0	5.9	-0.1	0.1	557.1	0.0	0.0	0.0
12:56:33	0.3	0.0	5.8	-0.1	0.0	593.3	0.0	0.0	0.0
12:56:48	0.2	0.0	5.7	-0.1	0.0	592.9	0.0	0.0	0.0
12:57:03	0.3	0.0	5.6	-0.1	0.0	597.8	0.0	0.0	0.0
12:57:18	0.3	0.0	5.4	-0.1	0.0	613.4	0.0	0.0	0.0
12:57:33	0.2	0.0	5.1	-0.1	0.0	603.0	0.0	0.0	0.0
12:57:48	0.2	0.0	5.0	-0.1	0.0	595.5	0.0	0.0	0.0
12:58:03	0.1	0.0	4.8	-0.1	0.0	603.0	0.0	0.0	0.0
12:58:18	0.1	0.0	4.7	-0.1	0.0	603.0	0.0	0.0	0.0
12:58:33	0.1	0.0	18.3	-0.1	0.0	603.0	0.0	0.0	0.0
12:58:48	0.1	0.0	140.7	2.1	0.0	593.9	0.0	0.0	0.0
12:59:03	0.0	0.0	277.8	13.5	0.0	555.5	0.0	0.0	0.0
12:59:18	0.0	0.0	280.2	1.9	0.0	341.3	0.0	0.0	0.0
12:59:33	-0.1	0.0	280.6	0.0	0.0	118.7	0.0	0.0	0.0
12:59:48	-0.1	0.0	280.7	-0.1	0.0	21.6	0.0	0.0	0.0
13:00:03	-0.1	0.0	280.9	-0.1	0.0	7.0	0.0	0.0	0.0
13:00:18	-0.2	0.0	280.9	0.0	0.0	7.3	0.0	0.0	0.0
Zero Gas	0.9		5.0	0.0	0.0	7.3			
Cal Gas	228.2		280.8	10.1	10.1	598.5			

SOLVAY2016_6_002304

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
January 21, 1998

REFERENCE METHOD RUN 3

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
13:25	23.1	0.0	158.8	11.2	11.2	745.4	0.0	0.0	0.0
13:26	23.2	0.0	189.4	11.2	11.2	747.4	0.0	0.0	0.0
13:27	22.1	0.0	197.1	11.2	11.2	756.4	0.0	0.0	0.0
13:28	21.7	0.0	199.0	11.2	11.2	768.8	0.0	0.0	0.0
13:29	22.4	0.0	201.5	11.1	11.3	769.9	0.0	0.0	0.0
13:30	22.3	0.0	203.3	11.1	11.3	766.0	0.0	0.0	0.0
13:31	21.9	0.0	179.2	11.1	11.3	767.0	0.0	0.0	0.0
13:32	22.7	0.0	189.5	11.2	11.2	764.2	0.0	0.0	0.0
13:33	21.9	0.0	195.5	11.2	11.2	764.2	0.0	0.0	0.0
13:34	21.0	0.0	207.7	11.2	11.2	770.4	0.0	0.0	0.0
13:35	20.2	0.0	252.2	11.1	11.3	798.5	0.0	0.0	0.0
13:36	20.6	0.0	226.3	11.1	11.3	872.4	0.0	0.0	0.0
13:37	20.9	0.0	187.6	11.1	11.3	815.2	0.0	0.0	0.0
13:38	22.2	0.0	201.7	11.2	11.2	805.5	0.0	0.0	0.0
13:39	22.3	0.0	209.0	11.1	11.3	792.7	0.0	0.0	0.0
13:40	21.6	0.0	216.3	11.2	11.2	794.7	0.0	0.0	0.0
13:41	21.9	0.0	221.0	11.1	11.3	814.5	0.0	0.0	0.0
13:42	21.7	0.0	215.4	11.1	11.3	828.9	0.0	0.0	0.0
13:43	21.8	0.0	215.0	11.1	11.3	834.8	0.0	0.0	0.0
13:44	22.2	0.0	192.5	11.1	11.2	819.0	0.0	0.0	0.0
13:45	22.9	0.0	219.7	11.1	11.2	820.7	0.0	0.0	0.0
13:46	22.3	0.0	218.3	11.1	11.2	821.0	0.0	0.0	0.0
13:47	22.1	0.0	223.1	11.1	11.2	807.5	0.0	0.0	0.0
13:48	21.9	0.0	227.0	11.1	11.2	828.7	0.0	0.0	0.0
13:49	21.3	0.0	235.1	11.1	11.2	831.7	0.0	0.0	0.0
13:50	18.2	0.0	341.2	11.2	11.1	896.7	0.0	0.0	0.0
13:51	21.1	0.0	247.3	11.2	11.1	1,045.5	0.0	0.0	0.0
13:52	22.5	0.0	230.8	11.1	11.2	878.6	0.0	0.0	0.0
13:53	23.0	0.0	219.4	11.0	11.3	830.0	0.0	0.0	0.0
13:54	22.0	0.0	227.7	11.1	11.2	820.5	0.0	0.0	0.0
13:55	21.3	0.0	224.3	11.2	11.1	818.9	0.0	0.0	0.0
13:56	22.3	0.0	199.9	11.2	11.1	797.9	0.0	0.0	0.0
13:57	23.2	0.0	208.8	11.1	11.2	780.1	0.0	0.0	0.0
13:58	22.8	0.0	214.8	11.1	11.1	775.1	0.0	0.0	0.0
13:59	23.3	0.0	218.4	11.1	11.2	779.8	0.0	0.0	0.0
14:00	22.6	0.0	208.2	11.1	11.2	785.7	0.0	0.0	0.0
14:01	22.6	0.0	194.1	11.1	11.1	770.0	0.0	0.0	0.0
14:02	22.4	0.0	217.5	11.3	11.0	765.5	0.0	0.0	0.0
14:03	21.4	0.0	225.8	11.3	11.0	758.0	0.0	0.0	0.0
14:04	20.8	0.0	221.4	11.4	10.9	762.4	0.0	0.0	0.0
14:05	21.1	0.0	216.5	11.4	10.9	761.4	0.0	0.0	0.0
14:06	21.7	0.0	203.6	11.2	11.1	770.1	0.0	0.0	0.0
14:07	22.1	0.0	182.1	11.2	11.1	762.6	0.0	0.0	0.0
14:08	23.1	0.0	193.7	11.3	11.0	743.4	0.0	0.0	0.0
14:09	21.8	0.0	200.9	11.4	10.9	735.2	0.0	0.0	0.0
14:10	22.8	0.0	226.4	11.3	11.0	712.2	0.0	0.0	0.0
14:11	16.5	0.0	424.1	11.5	10.9	865.5	0.0	0.0	0.0
14:12	18.4	0.0	263.5	11.4	10.9	1,063.7	0.0	0.0	0.0
14:13	22.3	0.0	192.3	11.3	11.1	809.6	0.0	0.0	0.0
14:14	23.6	0.0	186.9	11.2	11.1	728.5	0.0	0.0	0.0
14:15	23.5	0.0	201.2	11.2	11.1	720.9	0.0	0.0	0.0
14:16	23.4	0.0	202.9	11.2	11.1	717.3	0.0	0.0	0.0
14:17	23.9	0.0	187.1	11.2	11.2	724.2	0.0	0.0	0.0
14:18	23.4	0.0	191.6	11.2	11.2	743.7	0.0	0.0	0.0
14:19	22.5	0.0	216.8	11.3	11.1	753.9	0.0	0.0	0.0
14:20	22.7	0.0	206.1	11.3	11.0	768.7	0.0	0.0	0.0
14:21	24.0	0.0	185.8	11.2	11.1	762.9	0.0	0.0	0.0
14:22	24.0	0.0	208.1	11.2	11.2	766.2	0.0	0.0	0.0
14:23	23.2	0.0	216.7	11.2	11.2	781.0	0.0	0.0	0.0
14:24	22.2	0.0	227.3	11.3	11.1	784.8	0.0	0.0	0.0
Average	22.1		215.2	11.2	11.1	794.1			

SOLVAY2016_6_002305

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack
January 21, 1998

CALIBRATION BIAS 3

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
14:26:27	227.4	0.0	16.2	0.0	0.1	34.0	0.0	0.0	0.0
14:26:42	227.6	0.0	15.0	0.0	0.0	7.3	0.0	0.0	0.0
14:26:57	227.7	0.0	14.0	0.0	0.0	7.3	0.0	0.0	0.0
14:27:12	227.8	0.0	13.0	0.0	0.0	7.3	0.0	0.0	0.0
14:27:27	227.8	0.0	13.4	-0.1	0.0	7.3	0.0	0.0	0.0
14:27:42	228.0	0.0	11.7	-0.1	0.0	7.3	0.0	0.0	0.0
14:27:57	227.8	0.0	11.2	-0.1	0.0	7.3	0.0	0.0	0.0
14:28:12	222.9	0.0	9.2	-0.1	0.0	7.3	0.0	0.0	0.0
14:28:27	48.9	0.0	8.0	4.3	2.8	7.3	0.0	0.0	0.0
14:28:42	2.2	0.0	8.2	9.6	8.7	7.3	0.0	0.0	0.0
14:28:57	1.0	0.0	9.1	10.0	9.8	7.3	0.0	0.0	0.0
14:29:12	0.7	0.0	7.4	10.1	10.0	7.3	0.0	0.0	0.0
14:29:27	0.5	0.0	7.2	10.1	10.0	7.3	0.0	0.0	0.0
14:29:42	0.4	0.0	6.9	10.1	10.1	7.3	0.0	0.0	0.0
14:29:57	0.3	0.0	6.8	10.1	10.1	7.3	0.0	0.0	0.0
14:30:12	0.3	0.0	7.3	10.1	10.1	7.3	0.0	0.0	0.0
14:30:27	0.3	0.0	7.6	6.8	7.5	12.5	0.0	0.0	0.0
14:30:42	0.2	0.0	7.7	0.5	1.7	109.4	0.0	0.0	0.0
14:30:57	0.2	0.0	7.7	0.0	0.5	337.6	0.0	0.0	0.0
14:31:12	0.1	0.0	7.5	0.0	0.2	531.6	0.0	0.0	0.0
14:31:27	0.2	0.0	7.4	-0.1	0.1	589.2	0.0	0.0	0.0
14:31:42	0.1	0.0	7.3	-0.1	0.0	607.9	0.0	0.0	0.0
14:31:57	0.1	0.0	7.2	-0.1	0.0	596.5	0.0	0.0	0.0
14:32:12	0.1	0.0	6.8	-0.1	0.0	598.5	0.0	0.0	0.0
14:32:27	0.1	0.0	206.0	-0.1	0.0	594.2	0.0	0.0	0.0
14:32:42	0.1	0.0	276.3	0.4	0.0	590.3	0.0	0.0	0.0
14:32:57	0.1	0.0	277.8	0.0	0.0	461.4	0.0	0.0	0.0
14:33:12	0.1	0.0	278.4	-0.1	0.0	211.6	0.0	0.0	0.0
14:33:27	0.1	0.0	278.8	-0.1	0.0	58.9	0.0	0.0	0.0
14:33:42	0.1	0.0	279.2	-0.1	0.0	12.5	0.0	0.0	0.0
14:33:57	0.0	0.0	279.4	-0.1	0.0	7.3	0.0	0.0	0.0
14:34:12	0.1	0.0	279.6	-0.1	0.0	7.3	0.0	0.0	0.0
Zero Gas	1.3		7.0	0.0	0.0	7.3			
Cal Gas	227.7		279.4	10.1	10.1	596.4			

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1 & 2
1-22-1998

Clean Air Engineering
Calibration Data

Calibration Error

Time	NOx ppm	SO2 ppm	THC ppm	O2 %	CO2 %	CO ppm	SO2 In ppm	O2 In %	CO2 In %
07:27:59	472.4	0.0	1.2	21.0	0.0	7.3	0.0	0.0	0.0
07:28:14	463.4	0.0	0.2	21.0	0.0	7.3	0.0	0.0	0.0
07:28:29	464.1	0.0	0.2	21.0	0.0	7.3	0.0	0.0	0.0
07:28:44	463.6	0.0	1.3	21.0	0.0	7.3	0.0	0.0	0.0
07:28:59	463.7	0.0	0.4	21.0	0.0	7.3	0.0	0.0	0.0
07:29:14	463.8	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:29:29	276.8	0.0	1.2	21.0	0.0	7.3	0.0	0.0	0.0
07:29:44	79.7	0.0	1.2	21.0	0.0	7.3	0.0	0.0	0.0
07:29:59	89.1	0.0	0.2	21.0	0.0	7.3	0.0	0.0	0.0
07:30:14	108.9	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:30:29	129.2	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:30:44	152.6	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:30:59	177.4	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:31:14	191.5	0.0	-0.8	21.0	0.0	7.3	0.0	0.0	0.0
07:31:29	197.6	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:31:44	203.1	0.0	0.2	21.0	0.0	7.3	0.0	0.0	0.0
07:31:59	208.9	0.0	0.1	21.1	0.0	7.3	0.0	0.0	0.0
07:32:14	212.7	0.0	1.2	21.0	0.0	7.3	0.0	0.0	0.0
07:32:29	215.6	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:32:44	218.1	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:32:59	219.7	0.0	1.1	21.0	0.0	7.3	0.0	0.0	0.0
07:33:14	221.1	0.0	0.0	21.0	0.0	7.3	0.0	0.0	0.0
07:33:29	222.3	0.0	1.2	21.0	0.0	7.3	0.0	0.0	0.0
07:33:44	223.5	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:33:59	224.4	0.0	0.3	21.0	0.0	7.3	0.0	0.0	0.0
07:34:14	225.0	0.0	0.1	21.0	0.0	7.3	0.0	0.0	0.0
07:34:29	225.3	0.0	2.2	21.0	0.0	7.3	0.0	0.0	0.0
07:34:44	225.8	0.0	0.1	18.8	0.0	7.3	0.0	0.0	0.0
07:34:59	226.6	0.0	0.1	1.6	0.0	7.3	0.0	0.0	0.0
07:35:14	228.2	0.0	0.1	0.0	-0.1	7.3	0.0	0.0	0.0
07:35:29	228.9	0.0	0.1	0.0	-0.1	7.3	0.0	0.0	0.0
07:35:44	229.6	0.0	0.1	-0.1	-0.1	7.3	0.0	0.0	0.0
07:35:59	144.3	0.0	0.1	0.6	0.2	7.3	0.0	0.0	0.0
07:36:14	0.8	0.0	1.2	8.9	7.1	7.3	0.0	0.0	0.0
07:36:29	0.2	0.0	0.1	10.1	9.8	7.3	0.0	0.0	0.0
07:36:44	0.0	0.0	0.2	10.2	10.1	7.3	0.0	0.0	0.0
07:36:59	-0.1	0.0	0.1	10.2	10.2	7.3	0.0	0.0	0.0
07:37:14	-0.1	0.0	-0.4	10.2	10.3	7.3	0.0	0.0	0.0
07:37:29	-0.2	0.0	0.7	10.2	10.3	1.1	0.0	0.0	0.0
07:37:44	-0.2	0.0	0.1	10.2	10.3	4.7	0.0	0.0	0.0
07:37:59	23.0	0.0	1.2	11.4	9.9	7.3	0.0	0.0	0.0
07:38:14	0.0	0.0	1.1	20.2	15.7	7.3	0.0	0.0	0.0
07:38:29	-0.1	0.0	0.1	21.3	18.4	7.3	0.0	0.0	0.0
07:38:44	-0.2	0.0	0.1	21.3	18.7	7.3	0.0	0.0	0.0
07:38:59	-0.2	0.0	0.2	21.3	18.7	5.4	0.0	0.0	0.0
07:39:14	-0.2	0.0	0.1	21.3	18.8	10.4	0.0	0.0	0.0
07:39:29	-0.3	0.0	0.1	21.3	18.8	31.2	0.0	0.0	0.0
07:39:44	-0.3	0.0	0.1	21.3	18.8	14.8	0.0	0.0	0.0

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1 & 2
1-22-1998

Clean Air Engineering
Calibration Data

Calibration Error

Time	NOx ppm	SO2 ppm	THC ppm	O2 %	CO2 %	CO ppm	SO2 In ppm	O2 In %	CO2 In %
07:39:59	-0.3	0.0	0.1	20.2	18.1	7.3	0.0	0.0	0.0
07:40:14	-0.2	0.0	1.2	2.3	4.5	102.5	0.0	0.0	0.0
07:40:29	-0.2	0.0	0.0	0.1	0.7	660.5	0.0	0.0	0.0
07:40:44	-0.4	0.0	1.1	0.0	0.2	1175.3	0.0	0.0	0.0
07:40:59	-0.3	0.0	2.2	0.0	0.1	1432.5	0.0	0.0	0.0
07:41:14	-0.2	0.0	0.1	-0.1	0.0	1481.4	0.0	0.0	0.0
07:41:29	-0.3	0.0	1.1	-0.1	0.0	1489.3	0.0	0.0	0.0
07:41:44	-0.3	0.0	0.1	-0.1	0.0	1489.3	0.0	0.0	0.0
07:41:59	-0.3	0.0	1.1	-0.1	0.0	1489.3	0.0	0.0	0.0
07:42:14	-0.3	0.0	0.1	0.1	0.1	1489.3	0.0	0.0	0.0
07:42:29	-0.3	0.0	0.1	0.1	0.3	1412.4	0.0	0.0	0.0
07:42:44	-0.4	0.0	0.1	-0.1	0.0	1091.0	0.0	0.0	0.0
07:42:59	-0.3	0.0	0.1	-0.1	0.0	727.7	0.0	0.0	0.0
07:43:14	-0.3	0.0	0.1	-0.1	0.0	614.4	0.0	0.0	0.0
07:43:29	-0.3	0.0	1.2	-0.1	0.0	593.9	0.0	0.0	0.0
07:43:44	-0.4	0.0	0.1	-0.1	0.0	592.9	0.0	0.0	0.0
07:43:59	-0.3	0.0	1.2	-0.1	0.0	593.3	0.0	0.0	0.0
07:44:14	-0.3	0.0	1.2	-0.1	0.0	592.6	0.0	0.0	0.0
07:44:29	-0.3	0.0	0.1	-0.1	0.0	593.3	0.0	0.0	0.0
07:44:44	-0.4	0.0	1.1	-0.1	0.0	593.3	0.0	0.0	0.0
07:44:59	-0.4	0.0	1.2	-0.1	0.0	592.9	0.0	0.0	0.0
Zero Gas	-0.1			-0.1	0.0	7.3			
Mid Gas	225.9			10.2	10.3	592.9			
High Gas	463.7			21.3	18.6	1489.3			

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack
January 22, 1998

CALIBRATION BIAS 0

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
07:48:47	227.6	0.0	-0.2	0.0	0.0	7.3	0.0	0.0	0.0
07:49:02	227.6	0.0	-0.2	-0.1	0.0	7.3	0.0	0.0	0.0
07:49:17	227.4	0.0	-0.2	-0.1	0.0	7.3	0.0	0.0	0.0
07:49:32	227.7	0.0	-0.3	-0.1	0.0	7.3	0.0	0.0	0.0
07:49:47	227.7	0.0	-0.2	-0.1	0.0	7.3	0.0	0.0	0.0
07:50:02	228.4	0.0	-0.9	-0.1	-0.1	6.5	0.0	0.0	0.0
07:50:17	227.8	0.0	-0.5	-0.1	-0.1	6.8	0.0	0.0	0.0
07:50:32	109.0	0.0	-0.4	1.7	0.8	7.3	0.0	0.0	0.0
07:50:47	4.2	0.0	-0.4	8.8	6.9	7.3	0.0	0.0	0.0
07:51:02	0.8	0.0	-0.5	10.0	9.7	7.3	0.0	0.0	0.0
07:51:17	0.3	0.0	-0.5	10.1	10.1	7.3	0.0	0.0	0.0
07:51:32	0.1	0.0	-0.5	10.1	10.2	7.3	0.0	0.0	0.0
07:51:47	0.0	0.0	-0.5	10.1	10.2	7.3	0.0	0.0	0.0
07:52:02	0.5	0.0	-0.5	10.1	10.2	7.3	0.0	0.0	0.0
07:52:17	-0.1	0.0	-0.5	10.1	10.2	5.4	0.0	0.0	0.0
07:52:32	-0.1	0.0	-0.4	10.1	10.2	-0.3	0.0	0.0	0.0
07:52:47	-0.1	0.0	0.7	8.5	9.2	9.4	0.0	0.0	0.0
07:53:02	-0.1	0.0	1.0	1.2	2.9	71.3	0.0	0.0	0.0
07:53:17	-0.2	0.0	-0.9	0.0	0.7	307.0	0.0	0.0	0.0
07:53:32	-0.2	0.0	0.3	0.0	0.3	493.2	0.0	0.0	0.0
07:53:47	-0.2	0.0	0.4	-0.1	0.1	576.2	0.0	0.0	0.0
07:54:02	-0.2	0.0	0.4	-0.1	0.1	593.3	0.0	0.0	0.0
07:54:17	-0.2	0.0	0.5	-0.1	0.0	593.3	0.0	0.0	0.0
07:54:32	-0.2	0.0	0.5	-0.1	0.0	592.9	0.0	0.0	0.0
07:54:47	-0.2	0.0	0.6	-0.1	0.0	593.3	0.0	0.0	0.0
07:55:02	-0.2	0.0	1.7	-0.1	0.0	593.3	0.0	0.0	0.0
07:55:17	-0.2	0.0	387.9	-0.1	0.0	592.9	0.0	0.0	0.0
07:55:32	3.8	0.0	847.5	0.1	0.0	592.4	0.0	0.0	0.0
07:55:47	0.0	0.0	846.9	0.1	0.0	490.2	0.0	0.0	0.0
07:56:02	-0.3	0.0	837.7	0.0	0.0	282.9	0.0	0.0	0.0
07:56:17	-0.3	0.0	845.6	0.0	0.0	78.8	0.0	0.0	0.0
07:56:32	-0.3	0.0	848.6	0.0	0.0	15.1	0.0	0.0	0.0
07:56:47	-0.4	0.0	848.4	0.0	-0.1	5.7	0.0	0.0	0.0
07:57:02	-0.2	0.0	849.1	0.0	-0.1	7.0	0.0	0.0	0.0
07:57:17	-0.3	0.0	849.8	0.1	0.0	7.3	0.0	0.0	0.0
07:57:32	-0.3	0.0	850.2	0.0	0.0	7.3	0.0	0.0	0.0
07:57:47	-0.4	0.0	721.6	0.0	0.0	7.3	0.0	0.0	0.0
07:58:02	1.1	0.0	486.1	0.0	0.0	7.3	0.0	0.0	0.0
07:58:17	-0.2	0.0	484.5	-0.1	0.0	7.3	0.0	0.0	0.0
07:58:32	-0.4	0.0	482.5	-0.1	0.0	7.3	0.0	0.0	0.0
07:58:47	-0.3	0.0	482.2	-0.1	0.0	7.3	0.0	0.0	0.0
07:59:02	-0.4	0.0	483.1	-0.1	0.0	7.3	0.0	0.0	0.0
07:59:17	-0.3	0.0	482.0	-0.1	0.0	7.3	0.0	0.0	0.0
07:59:32	-0.4	0.0	482.1	-0.1	0.0	7.3	0.0	0.0	0.0
07:59:47	-0.3	0.0	482.2	-0.1	0.0	7.3	0.0	0.0	0.0
08:00:02	-0.3	0.0	443.1	-0.1	0.0	7.3	0.0	0.0	0.0
08:00:17	-0.3	0.0	287.0	0.2	0.0	7.3	0.0	0.0	0.0
08:00:32	-0.3	0.0	287.0	0.4	0.0	7.3	0.0	0.0	0.0
08:00:47	-0.4	0.0	286.4	-0.1	0.0	7.3	0.0	0.0	0.0
08:01:02	-0.4	0.0	287.3	-0.1	0.0	7.3	0.0	0.0	0.0
08:01:17	-0.3	0.0	286.1	-0.1	0.0	7.3	0.0	0.0	0.0
08:01:32	-0.4	0.0	286.0	-0.1	0.0	7.3	0.0	0.0	0.0
Zero Gas	0.4		-0.2	-0.1	0.0	7.3			
Cal Gas	227.6		286.5	10.1	10.2	593.2			
Cal Gas			482.1						
Cal Gas			849.1						

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Revision 0

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack
January 22, 1998

REFERENCE METHOD RUN 1

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
08:55	5.4	0.0	313.4	13.1	8.4	1,184.3	0.0	0.0	0.0
08:56	6.3	0.0	254.4	13.1	8.4	1,183.8	0.0	0.0	0.0
08:57	5.3	0.0	334.8	13.2	8.4	1,211.4	0.0	0.0	0.0
08:58	5.3	0.0	328.6	13.2	8.4	1,213.5	0.0	0.0	0.0
08:59	5.5	0.0	317.6	13.1	8.4	1,208.4	0.0	0.0	0.0
09:00	5.2	0.0	328.7	13.1	8.4	1,225.4	0.0	0.0	0.0
09:01	5.0	0.0	319.8	13.1	8.4	1,229.4	0.0	0.0	0.0
09:02	5.4	0.0	305.4	13.2	8.4	1,196.7	0.0	0.0	0.0
09:03	5.3	0.0	308.2	13.1	8.4	1,171.6	0.0	0.0	0.0
09:04	4.9	0.0	314.6	13.1	8.3	1,154.1	0.0	0.0	0.0
09:05	4.8	0.0	320.7	13.2	8.3	1,153.8	0.0	0.0	0.0
09:06	5.2	0.0	300.2	13.1	8.4	1,155.5	0.0	0.0	0.0
09:07	5.4	0.0	270.3	13.1	8.4	1,153.2	0.0	0.0	0.0
09:08	5.5	0.0	309.1	13.1	8.4	1,137.5	0.0	0.0	0.0
09:09	5.1	0.0	311.6	13.1	8.3	1,149.8	0.0	0.0	0.0
09:10	5.1	0.0	303.6	13.1	8.4	1,139.3	0.0	0.0	0.0
09:11	5.3	0.0	309.9	13.1	8.3	1,152.2	0.0	0.0	0.0
09:12	4.9	0.0	315.1	13.2	8.3	1,158.1	0.0	0.0	0.0
09:13	5.0	0.0	307.0	13.2	8.3	1,146.1	0.0	0.0	0.0
09:14	4.5	0.0	321.7	13.2	8.3	1,164.0	0.0	0.0	0.0
09:15	4.7	0.0	285.0	13.2	8.3	1,206.4	0.0	0.0	0.0
09:16	5.1	0.0	304.7	13.2	8.3	1,233.0	0.0	0.0	0.0
09:17	4.3	0.0	326.4	13.2	8.3	1,219.5	0.0	0.0	0.0
09:18	4.4	0.0	321.7	13.2	8.3	1,218.3	0.0	0.0	0.0
09:19	4.5	0.0	315.5	13.2	8.3	1,205.2	0.0	0.0	0.0
09:20	4.6	0.0	296.4	13.2	8.3	1,188.4	0.0	0.0	0.0
09:21	4.6	0.0	313.9	13.2	8.2	1,181.3	0.0	0.0	0.0
09:22	4.5	0.0	321.7	13.2	8.2	1,182.8	0.0	0.0	0.0
09:23	4.2	0.0	324.1	13.2	8.2	1,186.3	0.0	0.0	0.0
09:24	4.4	0.0	298.4	13.3	8.2	1,146.4	0.0	0.0	0.0
09:25	4.7	0.0	306.9	13.2	8.2	1,147.2	0.0	0.0	0.0
09:26	4.1	0.0	327.0	13.3	8.2	1,161.4	0.0	0.0	0.0
09:27	4.4	0.0	315.4	13.2	8.3	1,174.5	0.0	0.0	0.0
09:28	5.2	0.0	268.7	13.2	8.3	1,186.0	0.0	0.0	0.0
09:29	4.9	0.0	305.5	13.2	8.3	1,197.7	0.0	0.0	0.0
09:30	4.5	0.0	304.1	13.2	8.3	1,179.0	0.0	0.0	0.0
09:31	4.8	0.0	290.5	13.2	8.3	1,169.0	0.0	0.0	0.0
09:32	5.1	0.0	282.3	13.2	8.3	1,153.2	0.0	0.0	0.0
09:33	4.7	0.0	306.5	13.3	8.2	1,137.9	0.0	0.0	0.0
09:34	5.1	0.0	289.9	13.2	8.3	1,139.8	0.0	0.0	0.0
09:35	4.8	0.0	303.9	13.2	8.3	1,128.2	0.0	0.0	0.0
09:36	4.5	0.0	284.2	13.3	8.2	1,113.2	0.0	0.0	0.0
09:37	5.2	0.0	280.9	13.3	8.2	1,103.3	0.0	0.0	0.0
09:38	4.8	0.0	295.1	13.2	8.2	1,109.9	0.0	0.0	0.0
09:39	4.5	0.0	319.1	13.3	8.2	1,134.1	0.0	0.0	0.0
09:40	4.4	0.0	312.8	13.3	8.2	1,162.3	0.0	0.0	0.0
09:41	4.6	0.0	310.4	13.2	8.2	1,169.6	0.0	0.0	0.0
09:42	4.4	0.0	295.3	13.3	8.2	1,140.9	0.0	0.0	0.0
09:43	4.7	0.0	316.2	13.2	8.3	1,137.9	0.0	0.0	0.0
09:44	4.5	0.0	315.0	13.2	8.3	1,157.9	0.0	0.0	0.0
09:45	4.2	0.0	320.9	13.3	8.2	1,141.3	0.0	0.0	0.0
09:46	4.3	0.0	311.3	13.3	8.2	1,138.9	0.0	0.0	0.0
09:47	4.5	0.0	277.4	13.3	8.2	1,140.1	0.0	0.0	0.0
09:48	5.0	0.0	291.4	13.3	8.2	1,124.7	0.0	0.0	0.0
09:49	4.3	0.0	313.9	13.3	8.2	1,113.2	0.0	0.0	0.0
09:50	4.3	0.0	304.9	13.3	8.2	1,098.7	0.0	0.0	0.0
09:51	3.9	0.0	319.3	13.4	8.1	1,079.5	0.0	0.0	0.0
09:52	4.1	0.0	305.3	13.3	8.1	1,087.7	0.0	0.0	0.0
09:53	4.7	0.0	272.2	13.3	8.2	1,110.4	0.0	0.0	0.0
09:54	4.5	0.0	304.3	13.3	8.2	1,117.4	0.0	0.0	0.0
Average	4.8		305.9	13.2	8.3	1,160.2			

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack
January 22, 1998

CALIBRATION BIAS 1

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
09:57:45	222.1	0.0	9.2	0.0	0.0	6.7	0.0	0.0	0.0
09:58:00	222.2	0.0	8.6	-0.1	0.0	6.0	0.0	0.0	0.0
09:58:15	222.7	0.0	8.1	-0.1	0.0	6.3	0.0	0.0	0.0
09:58:30	222.5	0.0	7.8	0.0	0.0	2.6	0.0	0.0	0.0
09:58:45	222.1	0.0	7.5	-0.1	0.0	3.3	0.0	0.0	0.0
09:59:00	222.5	0.0	7.0	-0.1	0.0	6.2	0.0	0.0	0.0
09:59:15	222.3	0.0	6.7	-0.1	0.0	6.2	0.0	0.0	0.0
09:59:30	207.3	0.0	5.0	0.0	0.0	-4.6	0.0	0.0	0.0
09:59:45	32.4	0.0	4.7	4.9	3.0	2.9	0.0	0.0	0.0
10:00:00	1.6	0.0	4.5	9.7	8.7	6.7	0.0	0.0	0.0
10:00:15	0.6	0.0	4.4	10.0	9.9	6.3	0.0	0.0	0.0
10:00:30	0.3	0.0	4.3	10.0	10.1	-4.2	0.0	0.0	0.0
10:00:45	0.2	0.0	4.2	10.1	10.2	-4.6	0.0	0.0	0.0
10:01:00	0.1	0.0	4.1	10.1	10.2	-4.6	0.0	0.0	0.0
10:01:15	0.0	0.0	3.9	10.1	10.2	-4.6	0.0	0.0	0.0
10:01:30	0.0	0.0	3.8	10.1	10.2	-4.6	0.0	0.0	0.0
10:01:45	-0.1	0.0	4.6	10.1	10.2	-4.6	0.0	0.0	0.0
10:02:00	-0.1	0.0	4.6	5.8	7.2	2.8	0.0	0.0	0.0
10:02:15	-0.1	0.0	4.6	0.4	1.6	62.3	0.0	0.0	0.0
10:02:30	-0.2	0.0	4.6	0.0	0.5	234.5	0.0	0.0	0.0
10:02:45	-0.2	0.0	4.4	-0.1	0.2	386.6	0.0	0.0	0.0
10:03:00	-0.2	0.0	4.4	0.0	0.1	515.0	0.0	0.0	0.0
10:03:15	-0.2	0.0	4.3	-0.1	0.0	563.2	0.0	0.0	0.0
10:03:30	-0.2	0.0	4.2	-0.1	0.0	581.1	0.0	0.0	0.0
10:03:45	-0.3	0.0	4.1	-0.1	0.0	580.7	0.0	0.0	0.0
10:04:00	-0.4	0.0	3.9	-0.1	0.0	580.7	0.0	0.0	0.0
10:04:15	-0.2	0.0	4.9	-0.1	0.0	581.1	0.0	0.0	0.0
10:04:30	-0.2	0.0	3.8	-0.1	0.0	580.9	0.0	0.0	0.0
10:04:45	-0.2	0.0	24.3	-0.1	0.0	580.9	0.0	0.0	0.0
10:05:00	-0.2	0.0	270.1	0.0	0.0	581.1	0.0	0.0	0.0
10:05:15	-0.3	0.0	275.6	0.3	0.0	575.2	0.0	0.0	0.0
10:05:30	-0.3	0.0	277.9	-0.1	0.0	462.7	0.0	0.0	0.0
10:05:45	-0.3	0.0	278.7	-0.1	0.0	298.0	0.0	0.0	0.0
10:06:00	-0.3	0.0	279.0	-0.1	0.0	118.3	0.0	0.0	0.0
10:06:15	-0.3	0.0	279.2	-0.1	0.0	49.3	0.0	0.0	0.0
10:06:30	-0.3	0.0	279.3	-0.1	0.0	6.0	0.0	0.0	0.0
Zero Gas	0.8		4.4	0.0	0.0	5.0			
Cal Gas	222.5		279.2	10.1	10.2	581.0			

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack
January 22, 1998

REFERENCE METHOD RUN 2

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
11:08	3.5	0.0	365.2	13.7	7.6	1,247.5	0.0	0.0	0.0
11:09	3.5	0.0	375.2	13.7	7.6	1,254.8	0.0	0.0	0.0
11:10	3.3	0.0	379.6	13.7	7.6	1,242.0	0.0	0.0	0.0
11:11	3.5	0.0	365.5	13.7	7.6	1,266.0	0.0	0.0	0.0
11:12	3.3	0.0	371.7	13.7	7.6	1,268.1	0.0	0.0	0.0
11:13	3.3	0.0	366.9	13.7	7.6	1,252.7	0.0	0.0	0.0
11:14	3.4	0.0	348.6	13.7	7.6	1,260.2	0.0	0.0	0.0
11:15	3.6	0.0	334.8	13.7	7.6	1,239.4	0.0	0.0	0.0
11:16	3.7	0.0	344.1	13.7	7.6	1,215.8	0.0	0.0	0.0
11:17	3.5	0.0	357.5	13.7	7.6	1,211.5	0.0	0.0	0.0
11:18	3.5	0.0	351.2	13.7	7.7	1,221.9	0.0	0.0	0.0
11:19	3.3	0.0	356.3	13.7	7.7	1,233.0	0.0	0.0	0.0
11:20	3.6	0.0	330.6	13.6	7.7	1,234.4	0.0	0.0	0.0
11:21	3.8	0.0	320.0	13.6	7.8	1,237.6	0.0	0.0	0.0
11:22	3.8	0.0	344.0	13.6	7.8	1,244.2	0.0	0.0	0.0
11:23	3.4	0.0	344.5	13.7	7.7	1,216.4	0.0	0.0	0.0
11:24	3.6	0.0	342.4	13.6	7.8	1,212.9	0.0	0.0	0.0
11:25	3.7	0.0	327.7	13.6	7.8	1,213.5	0.0	0.0	0.0
11:26	3.8	0.0	321.8	13.6	7.8	1,236.9	0.0	0.0	0.0
11:27	3.8	0.0	328.9	13.6	7.8	1,239.4	0.0	0.0	0.0
11:28	3.6	0.0	331.2	13.6	7.8	1,215.6	0.0	0.0	0.0
11:29	3.8	0.0	324.2	13.6	7.8	1,220.4	0.0	0.0	0.0
11:30	3.8	0.0	311.1	13.6	7.9	1,234.4	0.0	0.0	0.0
11:31	3.9	0.0	322.4	13.6	7.8	1,219.0	0.0	0.0	0.0
11:32	3.8	0.0	326.3	13.6	7.9	1,219.7	0.0	0.0	0.0
11:33	3.8	0.0	324.7	13.6	7.9	1,225.7	0.0	0.0	0.0
11:34	4.0	0.0	320.7	13.5	8.0	1,217.3	0.0	0.0	0.0
11:35	3.7	0.0	323.1	13.5	8.0	1,209.6	0.0	0.0	0.0
11:36	3.9	0.0	308.9	13.5	8.0	1,190.1	0.0	0.0	0.0
11:37	4.0	0.0	307.4	13.5	8.0	1,201.6	0.0	0.0	0.0
11:38	4.0	0.0	326.9	13.5	8.0	1,206.1	0.0	0.0	0.0
11:39	4.0	0.0	305.1	13.5	8.0	1,173.0	0.0	0.0	0.0
11:40	4.0	0.0	318.5	13.5	8.0	1,162.6	0.0	0.0	0.0
11:41	3.9	0.0	315.9	13.5	8.0	1,155.3	0.0	0.0	0.0
11:42	4.0	0.0	310.4	13.5	8.0	1,160.2	0.0	0.0	0.0
11:43	3.9	0.0	301.2	13.5	8.0	1,164.1	0.0	0.0	0.0
11:44	4.1	0.0	297.7	13.5	8.0	1,170.9	0.0	0.0	0.0
11:45	3.8	0.0	302.5	13.5	8.0	1,163.0	0.0	0.0	0.0
11:46	4.1	0.0	291.5	13.5	8.0	1,139.7	0.0	0.0	0.0
11:47	4.0	0.0	310.5	13.5	8.0	1,143.5	0.0	0.0	0.0
11:48	3.7	0.0	312.4	13.5	7.9	1,126.6	0.0	0.0	0.0
11:49	3.7	0.0	311.9	13.5	8.0	1,132.5	0.0	0.0	0.0
11:50	3.7	0.0	313.4	13.6	7.9	1,120.1	0.0	0.0	0.0
11:51	3.8	0.0	301.7	13.5	7.9	1,130.9	0.0	0.0	0.0
11:52	3.8	0.0	306.9	13.5	8.0	1,135.1	0.0	0.0	0.0
11:53	3.7	0.0	307.5	13.6	7.9	1,108.3	0.0	0.0	0.0
11:54	3.6	0.0	300.7	13.6	7.8	1,083.7	0.0	0.0	0.0
11:55	3.8	0.0	296.0	13.6	7.8	1,068.4	0.0	0.0	0.0
11:56	3.9	0.0	295.7	13.5	7.9	1,081.2	0.0	0.0	0.0
11:57	3.8	0.0	304.3	13.6	7.9	1,096.7	0.0	0.0	0.0
11:58	3.7	0.0	300.1	13.6	7.8	1,091.1	0.0	0.0	0.0
11:59	3.9	0.0	273.2	13.6	7.8	1,080.9	0.0	0.0	0.0
12:00	4.5	0.0	286.1	13.6	7.8	1,061.9	0.0	0.0	0.0
12:01	3.9	0.0	305.3	13.6	7.8	1,072.8	0.0	0.0	0.0
12:02	3.9	0.0	302.9	13.6	7.9	1,070.1	0.0	0.0	0.0
12:03	3.8	0.0	303.8	13.6	7.8	1,065.6	0.0	0.0	0.0
12:04	3.7	0.0	303.6	13.6	7.8	1,061.9	0.0	0.0	0.0
12:05	3.9	0.0	286.8	13.5	7.9	1,066.5	0.0	0.0	0.0
12:06	3.7	0.0	299.3	13.6	7.8	1,059.3	0.0	0.0	0.0
12:07	3.8	0.0	296.4	13.6	7.8	1,058.6	0.0	0.0	0.0
Average	3.7		321.1	13.6	7.8	1,171.9			

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack
January 22, 1998

CALIBRATION BIAS 2

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
12:09:36	218.9	0.0	16.3	0.0	0.0	4.9	0.0	0.0	0.0
12:09:51	219.3	0.0	15.4	0.0	0.0	4.9	0.0	0.0	0.0
12:10:06	219.5	0.0	14.6	0.0	0.0	4.9	0.0	0.0	0.0
12:10:21	219.5	0.0	13.9	0.0	0.0	4.9	0.0	0.0	0.0
12:10:36	219.1	0.0	13.3	-0.1	0.0	4.9	0.0	0.0	0.0
12:10:51	219.2	0.0	12.8	-0.1	0.0	0.3	0.0	0.0	0.0
12:11:06	218.3	0.0	10.9	-0.1	0.0	-3.6	0.0	0.0	0.0
12:11:21	65.4	0.0	11.2	3.0	1.6	4.9	0.0	0.0	0.0
12:11:36	2.4	0.0	10.4	9.3	7.8	5.2	0.0	0.0	0.0
12:11:51	1.0	0.0	9.6	10.0	9.8	0.3	0.0	0.0	0.0
12:12:06	0.8	0.0	9.0	10.0	10.1	-4.9	0.0	0.0	0.0
12:12:21	0.4	0.0	8.6	10.1	10.2	-4.9	0.0	0.0	0.0
12:12:36	0.2	0.0	8.4	10.1	10.2	-4.9	0.0	0.0	0.0
12:12:51	0.1	0.0	8.0	10.1	10.2	-4.9	0.0	0.0	0.0
12:13:06	0.1	0.0	7.8	10.1	10.2	-4.9	0.0	0.0	0.0
12:13:21	0.0	0.0	8.6	10.1	10.2	-5.2	0.0	0.0	0.0
12:13:36	0.1	0.0	9.2	7.1	8.1	2.0	0.0	0.0	0.0
12:13:51	0.1	0.0	8.9	0.6	2.0	106.8	0.0	0.0	0.0
12:14:06	0.0	0.0	8.6	0.0	0.6	336.6	0.0	0.0	0.0
12:14:21	-0.1	0.0	8.3	0.0	0.2	523.8	0.0	0.0	0.0
12:14:36	-0.2	0.0	8.1	-0.1	0.1	577.1	0.0	0.0	0.0
12:14:51	-0.2	0.0	8.1	-0.1	0.1	581.1	0.0	0.0	0.0
12:15:06	-0.3	0.0	7.8	-0.1	0.0	581.1	0.0	0.0	0.0
12:15:21	-0.3	0.0	7.7	-0.1	0.0	581.1	0.0	0.0	0.0
12:15:36	-0.3	0.0	7.5	-0.1	0.0	581.1	0.0	0.0	0.0
12:15:51	-0.3	0.0	7.3	-0.1	0.0	581.1	0.0	0.0	0.0
12:16:06	-0.3	0.0	150.4	-0.1	0.0	581.1	0.0	0.0	0.0
12:16:21	-0.3	0.0	284.8	0.3	0.0	577.5	0.0	0.0	0.0
12:16:36	-0.4	0.0	286.4	0.0	0.0	485.4	0.0	0.0	0.0
12:16:51	-0.4	0.0	287.1	-0.1	0.0	244.6	0.0	0.0	0.0
12:17:06	-0.3	0.0	287.3	-0.1	0.0	64.0	0.0	0.0	0.0
12:17:21	-0.5	0.0	287.6	-0.1	0.0	10.7	0.0	0.0	0.0
Zero Gas	0.7		7.5	0.0	0.0	4.9			
Cal Gas	219.4		287.3	10.1	10.2	581.1			

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack
January 22, 1998

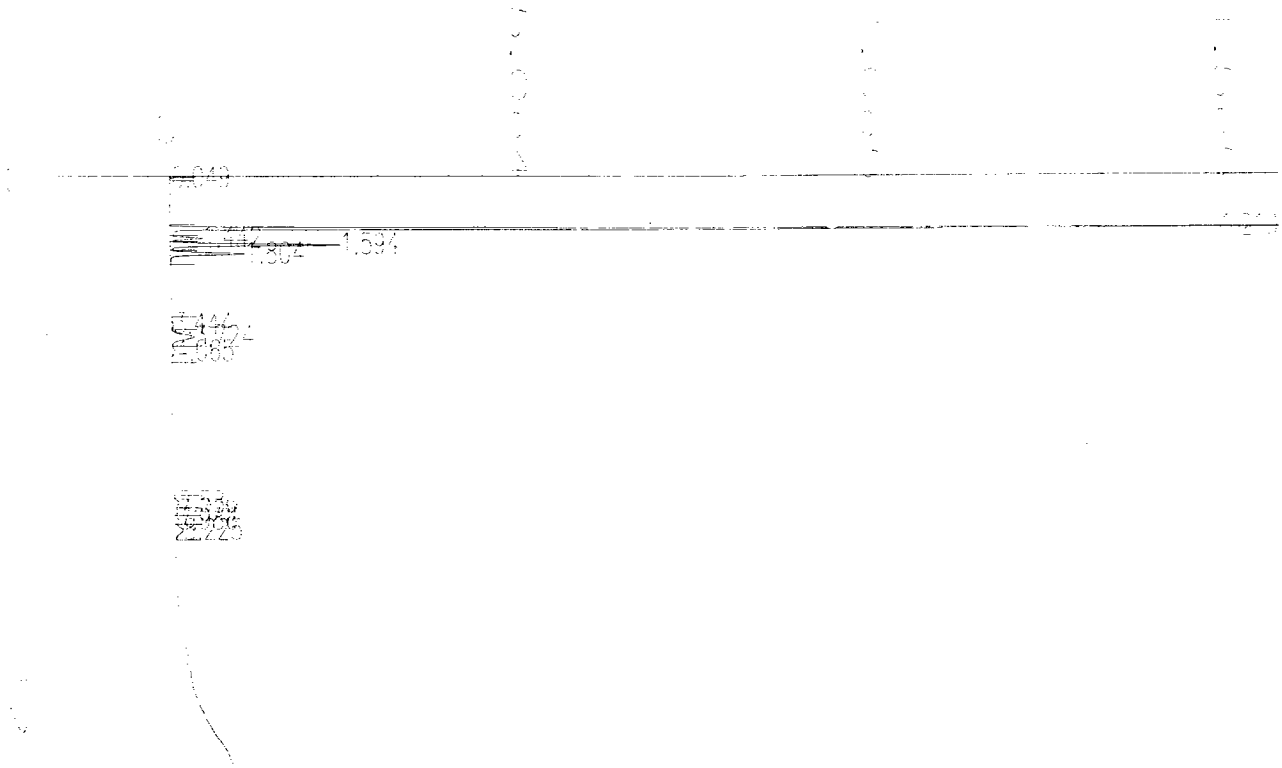
REFERENCE METHOD RUN 3

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
12:50	4.9	0.0	248.4	13.1	8.5	1,019.5	0.0	0.0	0.0
12:51	5.1	0.0	245.0	13.1	8.5	1,024.4	0.0	0.0	0.0
12:52	5.0	0.0	246.7	13.2	8.5	1,000.6	0.0	0.0	0.0
12:53	4.4	0.0	264.6	13.3	8.4	983.2	0.0	0.0	0.0
12:54	4.4	0.0	255.0	13.3	8.3	956.3	0.0	0.0	0.0
12:55	4.6	0.0	247.0	13.3	8.3	960.3	0.0	0.0	0.0
12:56	4.4	0.0	254.4	13.4	8.2	967.5	0.0	0.0	0.0
12:57	3.9	0.0	268.5	13.4	8.1	974.3	0.0	0.0	0.0
12:58	4.0	0.0	246.9	13.5	8.0	984.4	0.0	0.0	0.0
12:59	4.2	0.0	251.7	13.5	8.0	971.5	0.0	0.0	0.0
13:00	3.5	0.0	252.9	13.6	7.9	960.5	0.0	0.0	0.0
13:01	3.9	0.0	240.4	13.6	7.8	988.2	0.0	0.0	0.0
13:02	3.4	0.0	276.9	13.6	7.8	974.9	0.0	0.0	0.0
13:03	3.4	0.0	270.8	13.7	7.7	961.0	0.0	0.0	0.0
13:04	3.4	0.0	264.5	13.7	7.7	957.9	0.0	0.0	0.0
13:05	3.5	0.0	258.5	13.7	7.7	986.9	0.0	0.0	0.0
13:06	3.4	0.0	261.0	13.7	7.7	988.2	0.0	0.0	0.0
13:07	3.4	0.0	256.6	13.7	7.6	960.9	0.0	0.0	0.0
13:08	3.6	0.0	251.1	13.7	7.7	975.3	0.0	0.0	0.0
13:09	3.6	0.0	238.3	13.7	7.7	964.6	0.0	0.0	0.0
13:10	3.9	0.0	245.0	13.7	7.7	964.2	0.0	0.0	0.0
13:11	3.4	0.0	264.7	13.8	7.6	953.7	0.0	0.0	0.0
13:12	3.5	0.0	251.8	13.7	7.6	970.3	0.0	0.0	0.0
13:13	3.4	0.0	257.6	13.7	7.7	985.2	0.0	0.0	0.0
13:14	3.1	0.0	261.9	13.8	7.6	983.6	0.0	0.0	0.0
13:15	3.4	0.0	253.2	13.7	7.6	988.0	0.0	0.0	0.0
13:16	3.2	0.0	259.8	13.7	7.6	986.3	0.0	0.0	0.0
13:17	3.3	0.0	251.4	13.8	7.6	987.5	0.0	0.0	0.0
13:18	3.6	0.0	251.3	13.7	7.7	994.4	0.0	0.0	0.0
13:19	3.3	0.0	255.3	13.7	7.6	989.5	0.0	0.0	0.0
13:20	3.6	0.0	241.4	13.7	7.6	984.1	0.0	0.0	0.0
13:21	3.4	0.0	266.9	13.7	7.6	983.4	0.0	0.0	0.0
13:22	3.2	0.0	262.1	13.8	7.6	965.1	0.0	0.0	0.0
13:23	3.3	0.0	263.0	13.7	7.6	979.0	0.0	0.0	0.0
13:24	3.7	0.0	214.5	13.7	7.6	941.3	0.0	0.0	0.0
13:25	4.3	0.0	238.2	13.7	7.7	953.9	0.0	0.0	0.0
13:26	3.5	0.0	260.1	13.7	7.7	957.0	0.0	0.0	0.0
13:27	3.8	0.0	248.1	13.7	7.7	949.6	0.0	0.0	0.0
13:28	3.8	0.0	246.2	13.6	7.8	953.4	0.0	0.0	0.0
13:29	3.5	0.0	240.6	13.7	7.7	961.5	0.0	0.0	0.0
13:30	3.8	0.0	242.7	13.7	7.8	974.5	0.0	0.0	0.0
13:31	3.8	0.0	242.3	13.6	7.8	988.5	0.0	0.0	0.0
13:32	4.0	0.0	233.1	13.6	7.9	988.4	0.0	0.0	0.0
13:33	3.6	0.0	242.6	13.6	7.8	990.6	0.0	0.0	0.0
13:34	3.9	0.0	229.9	13.6	7.8	981.7	0.0	0.0	0.0
13:35	4.3	0.0	213.8	13.5	7.9	978.2	0.0	0.0	0.0
13:36	4.6	0.0	208.6	13.5	8.0	956.1	0.0	0.0	0.0
13:37	4.4	0.0	229.7	13.6	7.9	938.2	0.0	0.0	0.0
13:38	4.1	0.0	231.4	13.6	7.9	937.5	0.0	0.0	0.0
13:39	4.1	0.0	235.2	13.5	8.0	925.2	0.0	0.0	0.0
13:40	4.3	0.0	225.3	13.5	8.0	955.3	0.0	0.0	0.0
13:41	4.7	0.0	214.4	13.5	8.0	951.3	0.0	0.0	0.0
13:42	4.4	0.0	226.0	13.5	8.0	947.9	0.0	0.0	0.0
13:43	4.3	0.0	233.4	13.6	8.0	930.1	0.0	0.0	0.0
13:44	4.4	0.0	239.3	13.5	8.0	936.6	0.0	0.0	0.0
13:45	4.2	0.0	227.6	13.6	8.0	952.0	0.0	0.0	0.0
13:46	4.7	0.0	210.8	13.5	8.0	951.4	0.0	0.0	0.0
13:47	4.7	0.0	233.7	13.5	8.0	964.0	0.0	0.0	0.0
13:48	4.7	0.0	231.0	13.5	8.0	958.3	0.0	0.0	0.0
13:49	4.5	0.0	242.0	13.5	8.0	955.4	0.0	0.0	0.0
Average	3.9		245.4	13.6	7.9	969.2			

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1&2 Calciner Stack
January 22, 1998

CALIBRATION BIAS 3

Time	NO_x (ppm)	SO_2 (ppm)	THC (ppm)	O_2 (%)	CO_2 (%)	CO (ppm)	SO_2 In (ppm)	O_2 In (%)	CO_2 In (%)
13:52:41	223.2	0.0	10.2	0.0	0.0	7.3	0.0	0.0	0.0
13:52:56	223.5	0.0	8.8	-0.1	0.0	7.3	0.0	0.0	0.0
13:53:11	223.9	0.0	8.5	-0.1	0.0	7.3	0.0	0.0	0.0
13:53:26	224.2	0.0	8.1	-0.1	0.1	7.3	0.0	0.0	0.0
13:53:41	224.0	0.0	7.9	-0.1	0.0	7.3	0.0	0.0	0.0
13:53:56	223.8	0.0	7.6	-0.1	0.0	7.3	0.0	0.0	0.0
13:54:11	220.2	0.0	6.1	-0.1	0.0	7.3	0.0	0.0	0.0
13:54:26	49.0	0.0	5.3	3.8	2.2	7.3	0.0	0.0	0.0
13:54:41	2.1	0.0	5.1	9.5	8.3	7.3	0.0	0.0	0.0
13:54:56	0.9	0.0	4.9	10.0	9.9	7.3	0.0	0.0	0.0
13:55:11	0.4	0.0	4.8	10.0	10.1	7.3	0.0	0.0	0.0
13:55:26	0.4	0.0	4.7	10.0	10.2	4.1	0.0	0.0	0.0
13:55:41	0.2	0.0	4.6	10.0	10.2	-2.4	0.0	0.0	0.0
13:55:56	0.2	0.0	4.5	10.0	10.2	0.8	0.0	0.0	0.0
13:56:11	0.1	0.0	4.4	10.0	10.2	7.3	0.0	0.0	0.0
13:56:26	0.1	0.0	4.8	10.0	10.2	0.8	0.0	0.0	0.0
13:56:41	0.0	0.0	5.4	7.6	8.6	7.3	0.0	0.0	0.0
13:56:56	0.1	0.0	5.3	0.7	2.3	103.8	0.0	0.0	0.0
13:57:11	0.0	0.0	6.3	0.0	0.7	315.4	0.0	0.0	0.0
13:57:26	-0.2	0.0	5.2	0.0	0.3	523.3	0.0	0.0	0.0
13:57:41	-0.1	0.0	5.1	-0.1	0.1	577.0	0.0	0.0	0.0
13:57:56	-0.1	0.0	5.1	-0.1	0.1	593.3	0.0	0.0	0.0
13:58:11	-0.1	0.0	5.0	-0.1	0.0	593.3	0.0	0.0	0.0
13:58:26	0.5	0.0	4.9	-0.1	0.0	592.9	0.0	0.0	0.0
13:58:41	-0.1	0.0	4.9	-0.1	0.0	593.3	0.0	0.0	0.0
13:58:56	-0.1	0.0	4.8	-0.1	0.0	592.4	0.0	0.0	0.0
13:59:11	0.0	0.0	141.3	-0.1	0.0	593.1	0.0	0.0	0.0
13:59:26	0.0	0.0	284.9	0.3	0.0	590.0	0.0	0.0	0.0
13:59:41	0.0	0.0	286.9	0.0	0.0	535.6	0.0	0.0	0.0
13:59:56	-0.1	0.0	288.1	-0.1	0.0	334.6	0.0	0.0	0.0
14:00:11	-0.1	0.0	288.7	-0.1	0.0	154.9	0.0	0.0	0.0
14:00:26	-0.2	0.0	289.0	-0.1	0.0	38.2	0.0	0.0	0.0
Zero Gas	0.5		4.5	-0.1	0.0	7.3			
Cal Gas	223.9		288.6	10.0	10.2	593.2			



External Standard Report

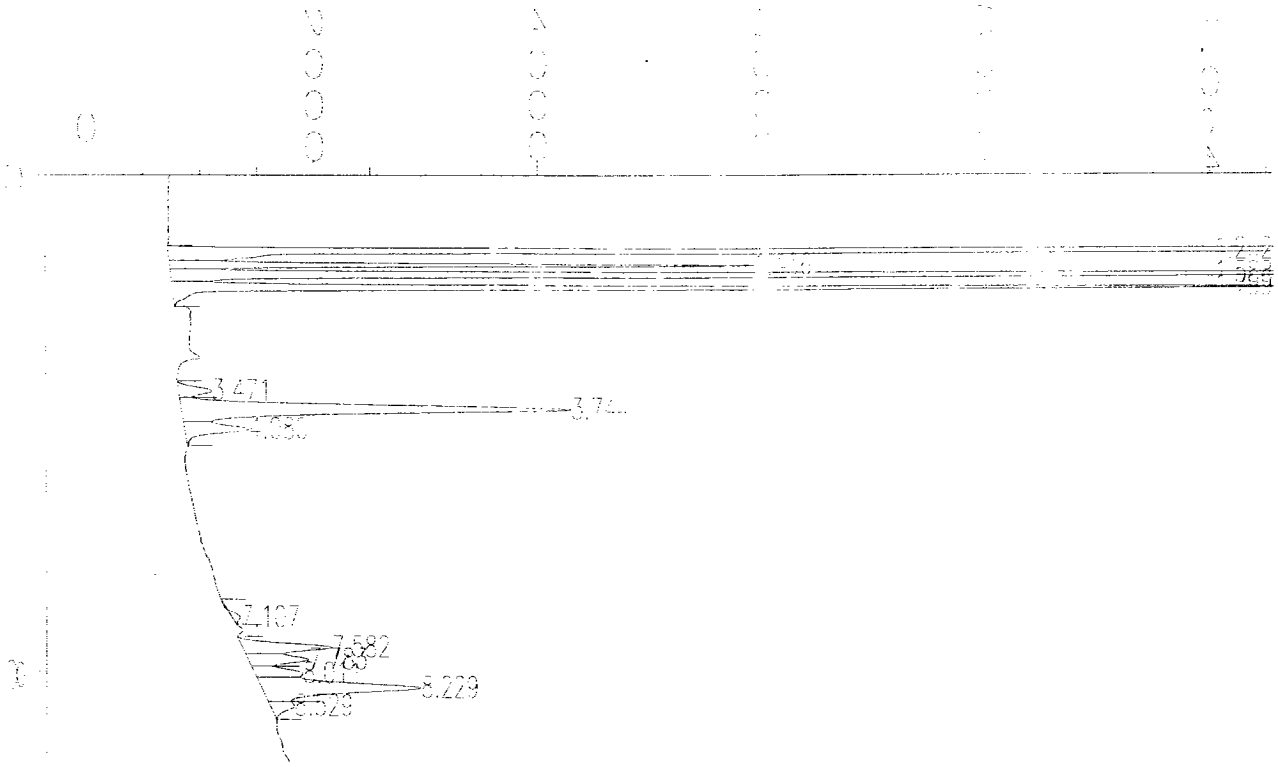
Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R1_001.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 09:55 AM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 10:08 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R1_001.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.210	383040	BV	0.038	1-R	245.946	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.210	-1.0%

SOLVAY2016_6_002316



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R1_002.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 21 Jan 98 10:14 AM	Instrument Method	: SOLV.MTH
Report Created on:	21 Jan 98 10:24 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R1_002.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.202	372243	BV	0.037	1-R	239.014	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.202	-1.6%

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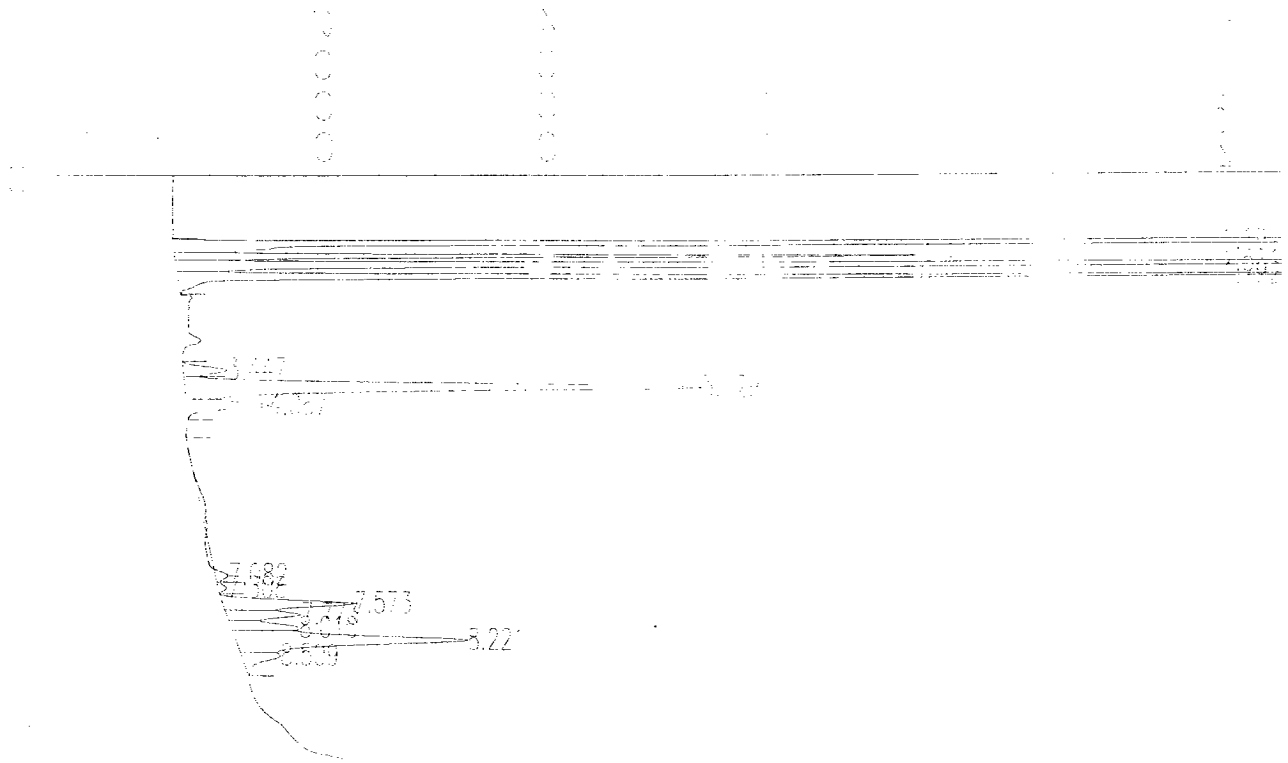
SOLVAY2016_6_002317



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R1_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 10:25 AM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 10:38 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R1_003.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.197	420374	BV	0.037	1-R	269.986	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.197	-2.0%

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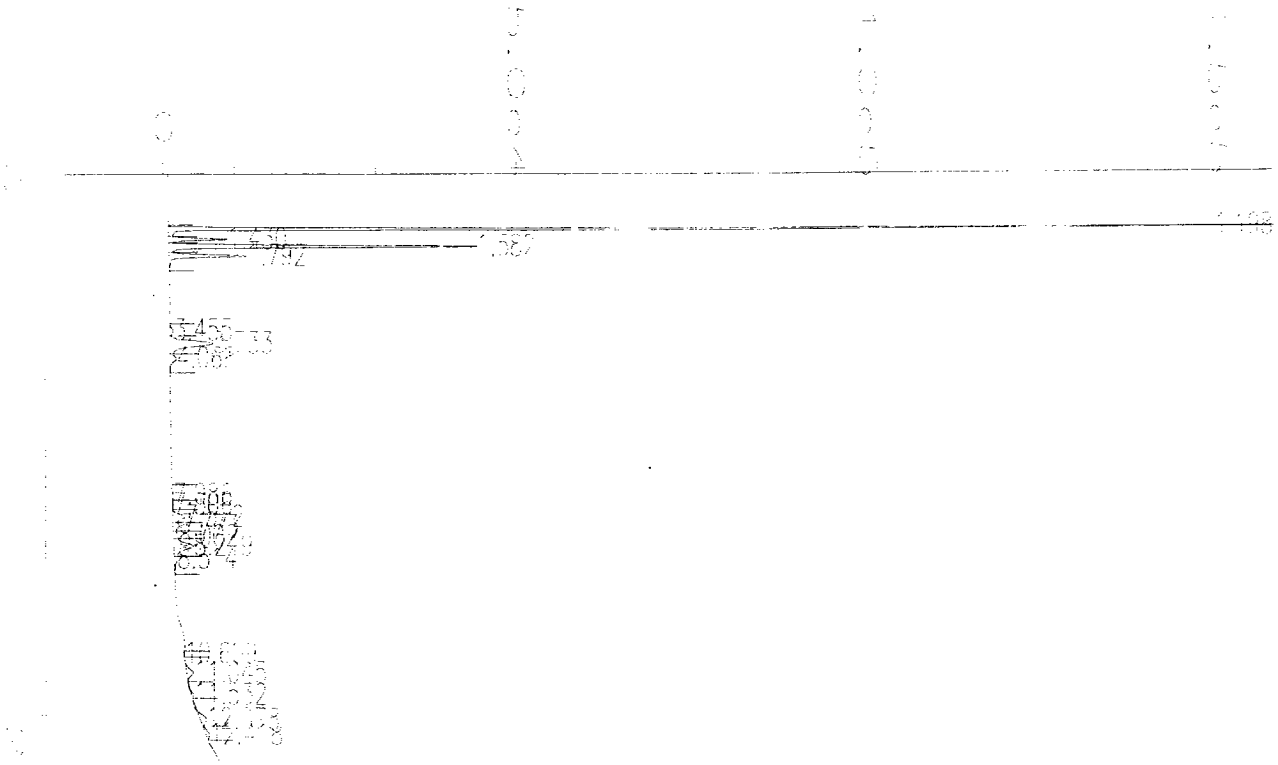
SOLVAY2016_6_002318



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R1_004.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 21 Jan 98 10:39 AM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 10:56 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R1_004.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.198	378568	BV	0.037	1-R	243.075	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.198	-1.9%

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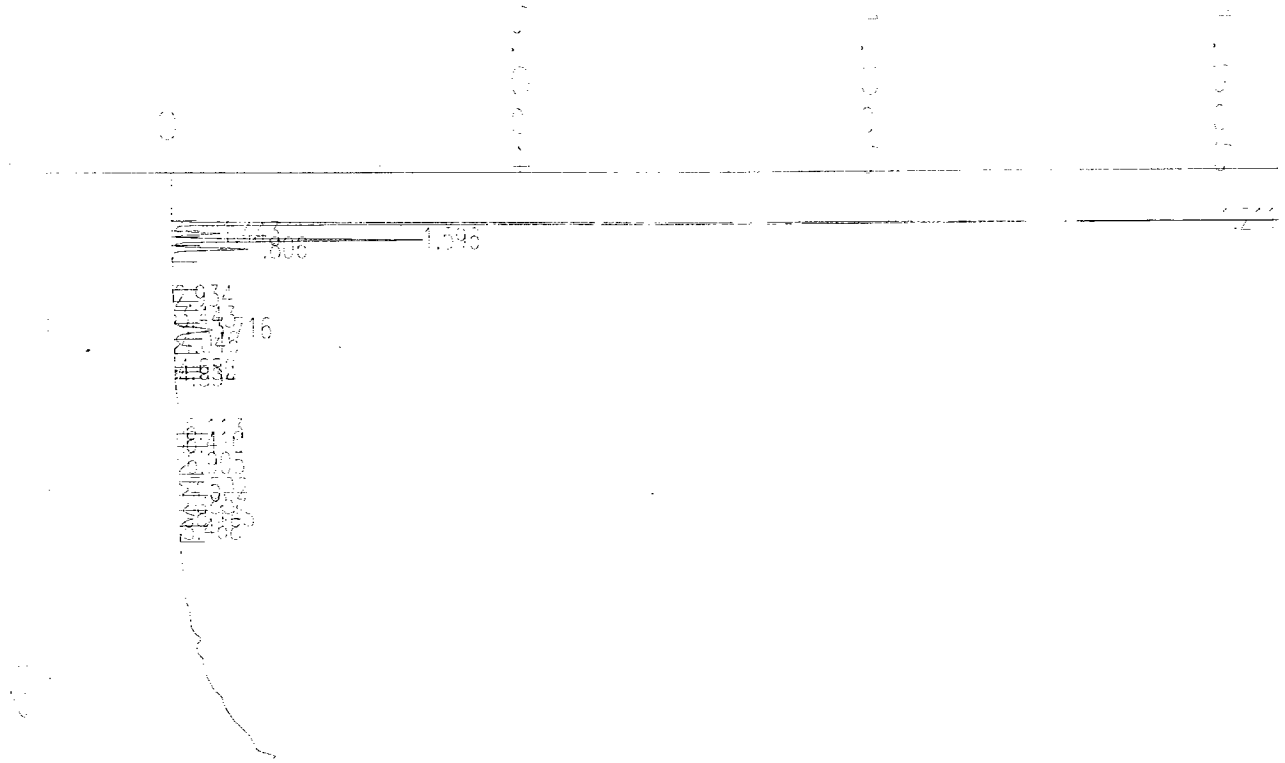
SOLVAY2016_6_002319



External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R1_008.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: recoverycheck	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 11:45 AM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 11:59 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

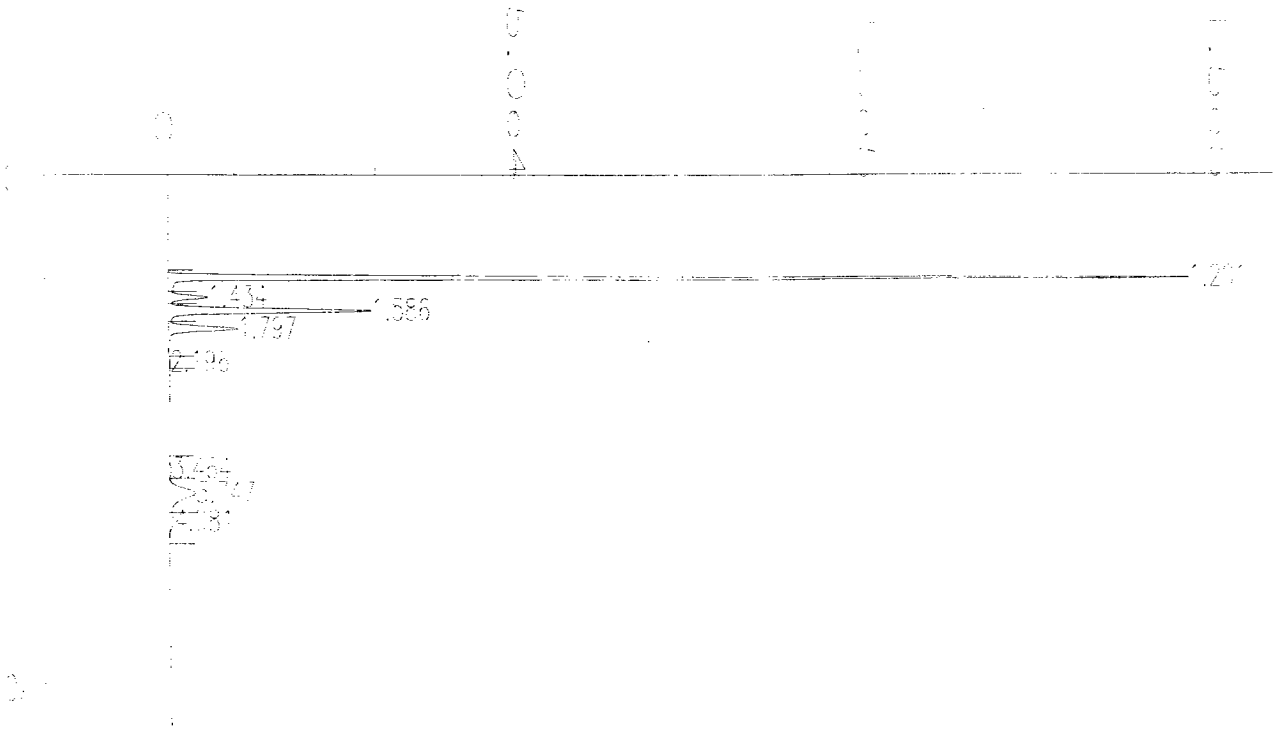
Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R1_008.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.211	389742	BV	0.038	1-R	250.252	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.211	-0.9%

Run 2 001

SOLVAY2016_6_002320



External Standard Report

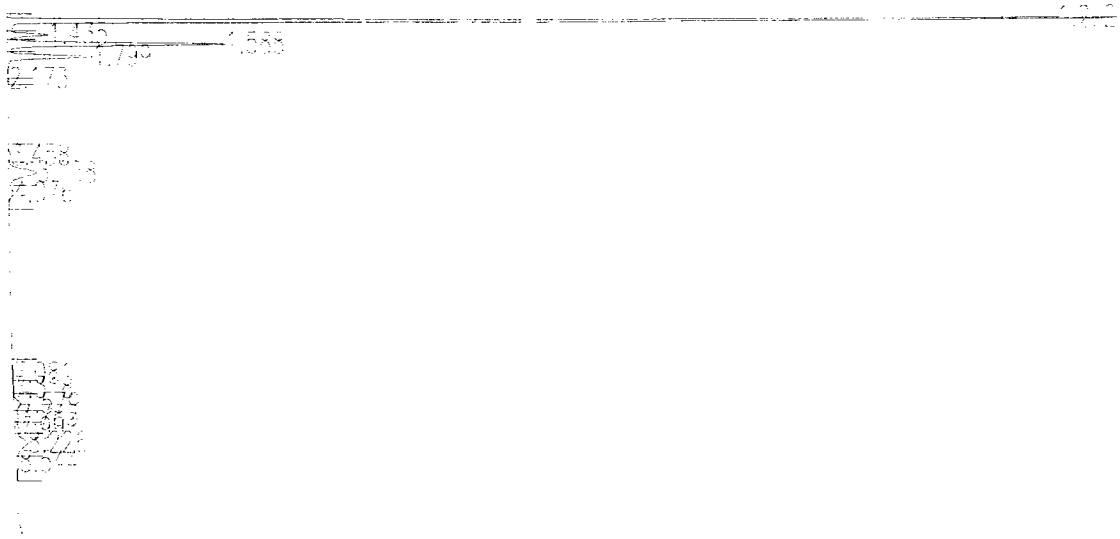
Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R2_002.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 12:03 PM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 12:12 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R2_002.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.201	347439	BV	0.037	1-R	223.087	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.201	-1.7%

SOLVAY2016_6_002321



External Standard Report

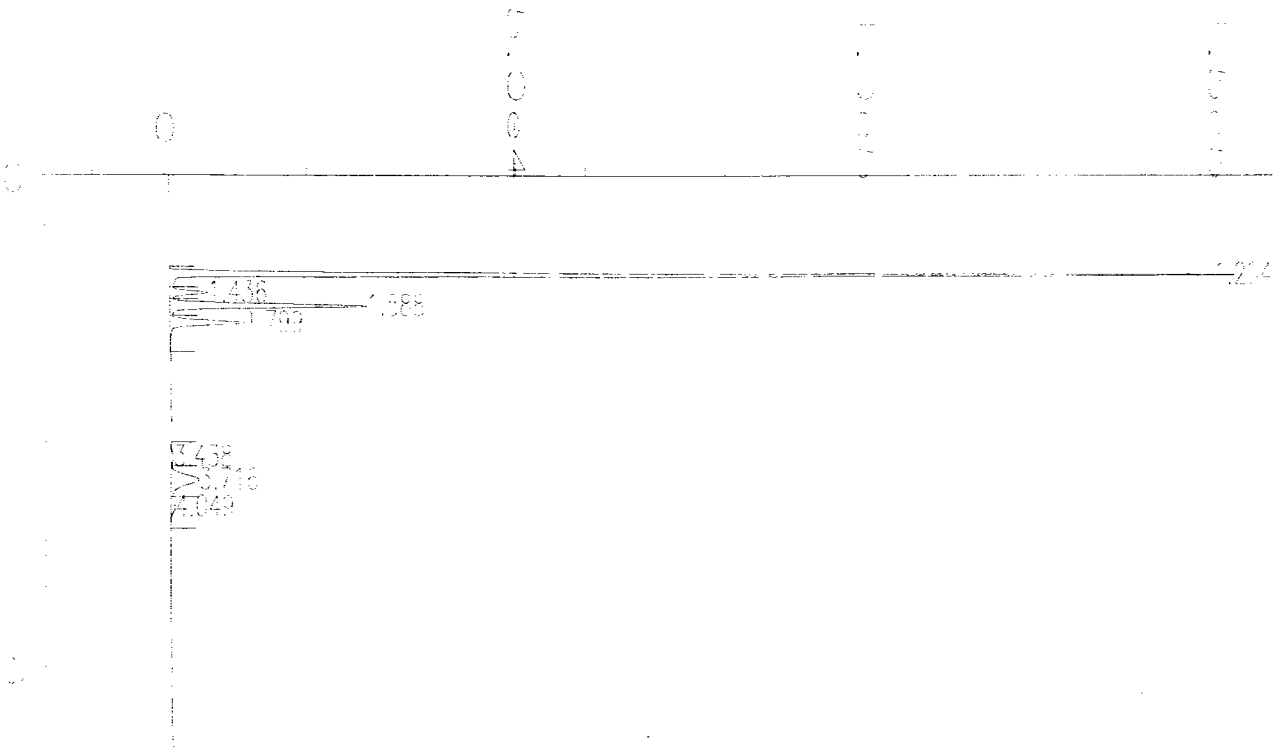
Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R2_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 12:15 PM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 12:25 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R2_003.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.202	422869	BV	0.038	1-R	271.594	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.202	-1.6%

SOLVAY2016_6_002322



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R2_004.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 12:31 PM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 12:38 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R2_004.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.204	361580	BV	0.037	1-R	232.167	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.204	-1.5%

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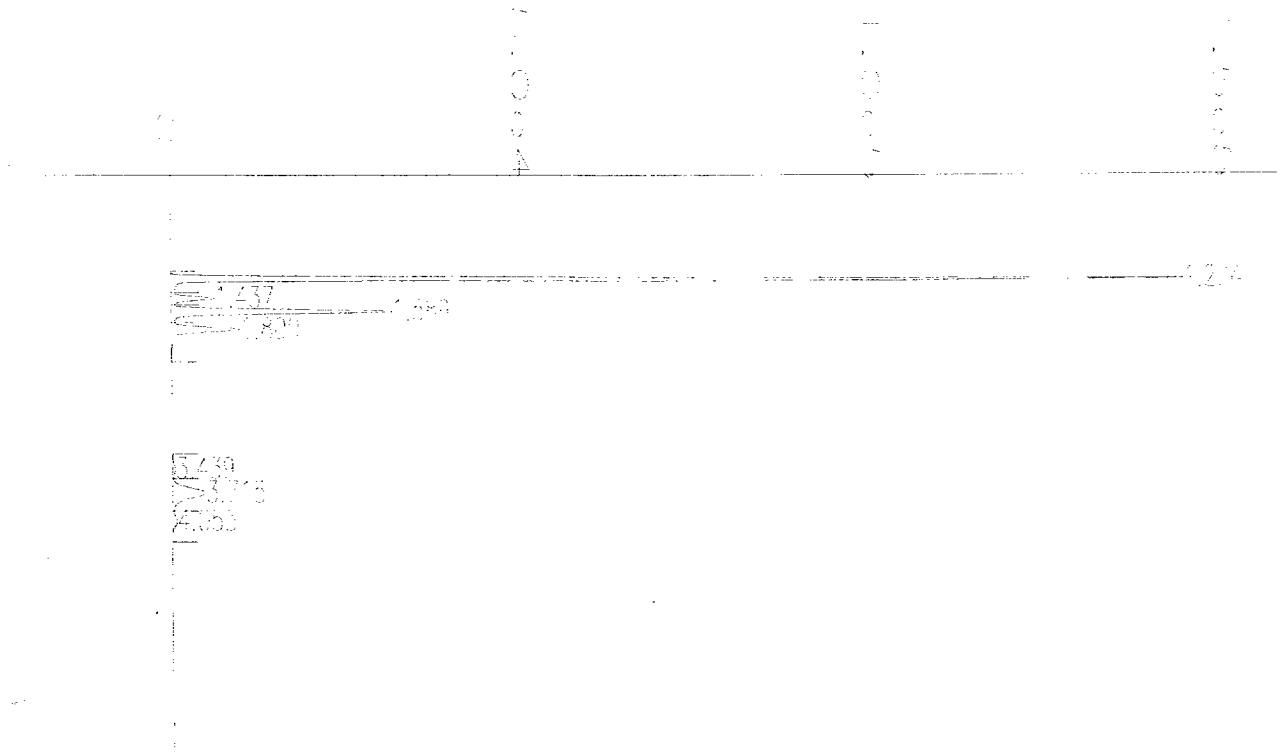
SOLVAY2016_6_002323



External Standard Report

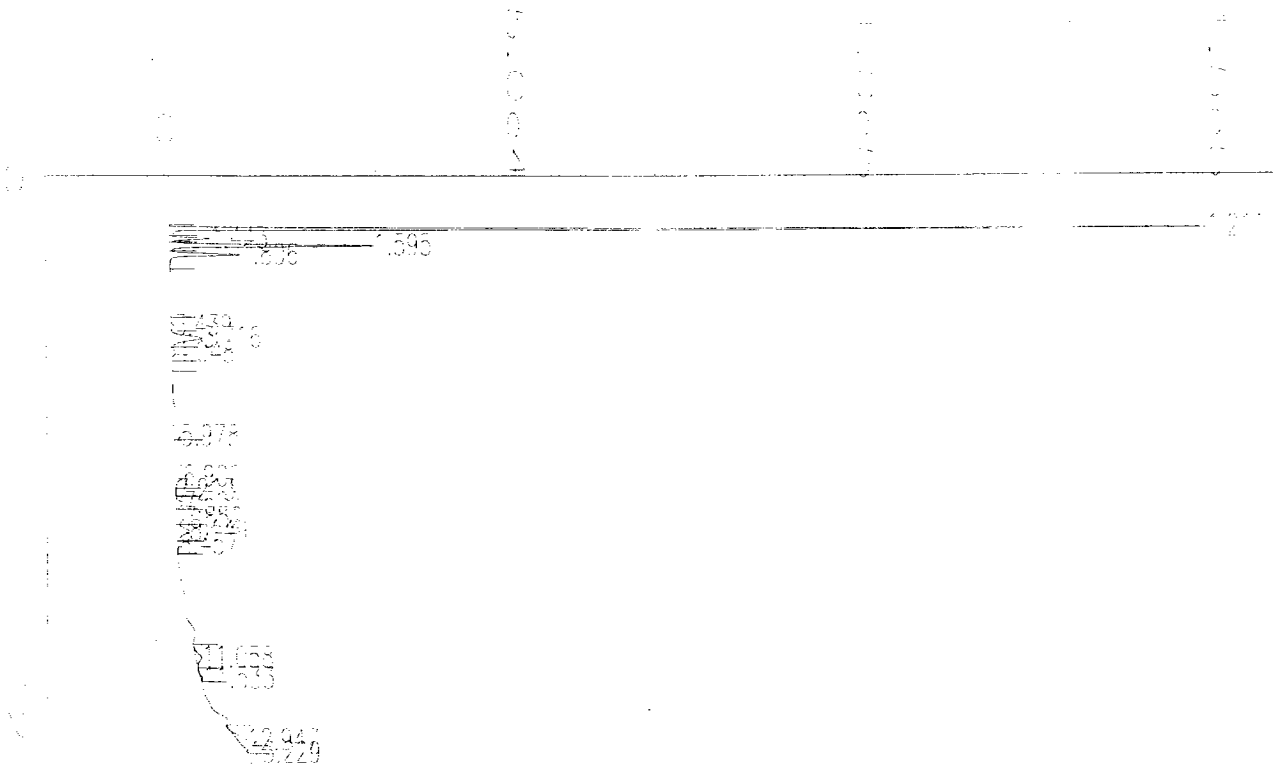
Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R2_005.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 12:42 PM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 12:49 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R2_005.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.204	344421	BV	0.037	1-R	221.149	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.204	-1.5%

SOLVAY2016_6_002324



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External Standard Report

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Data File Name : C:\HPCHEM\1\DATA\CA3\C3R3_001.D
Operator : John Chapman
Instrument : INSTRUMEN
Sample Name : stacksample
Run Time Bar Code:
Acquired on : 21 Jan 98 01:25 PM
Report Created on: 21 Jan 98 01:38 PM
Last Recalib on : 21 Jan 98 08:24 AM
Multiplier : 1

Page Number : 1
Vial Number :
Injection Number :
Sequence Line :
Instrument Method: SOLV.MTH
Analysis Method : SOLV.MTH
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R3_001.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.211	354963	BV	0.038	1-R	227.919	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.211	-0.9%

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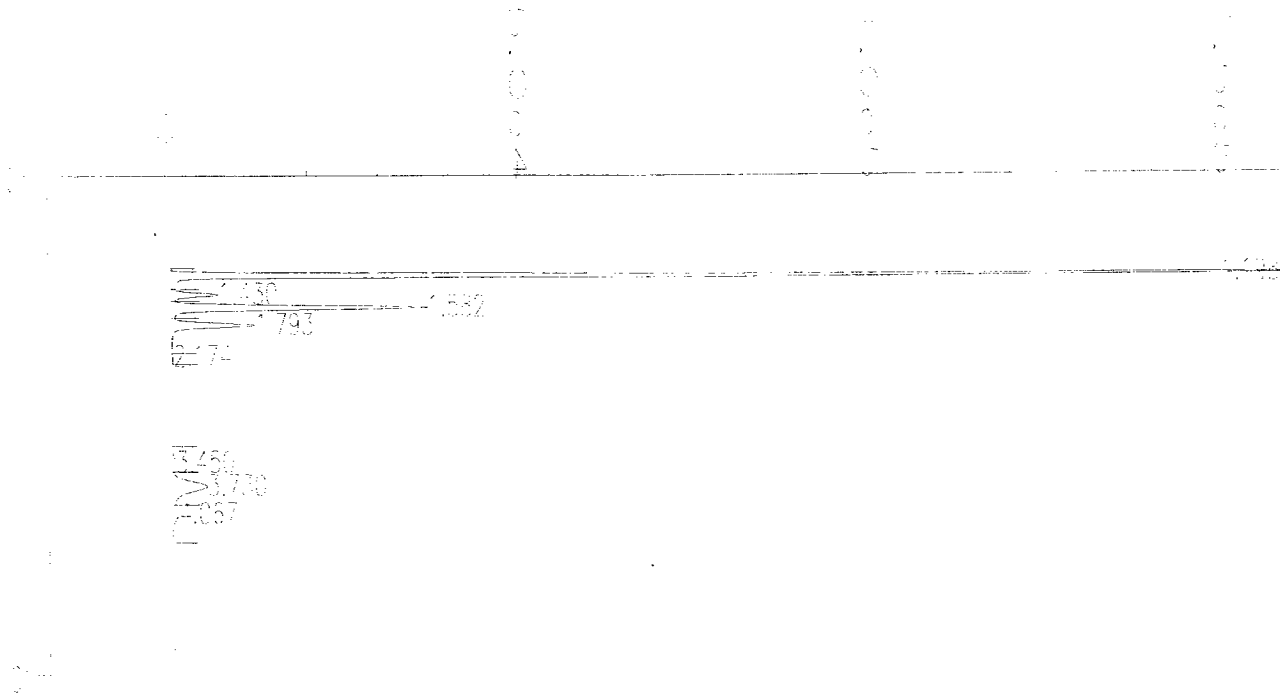
SOLVAY2016_6_002325



External Standard Report

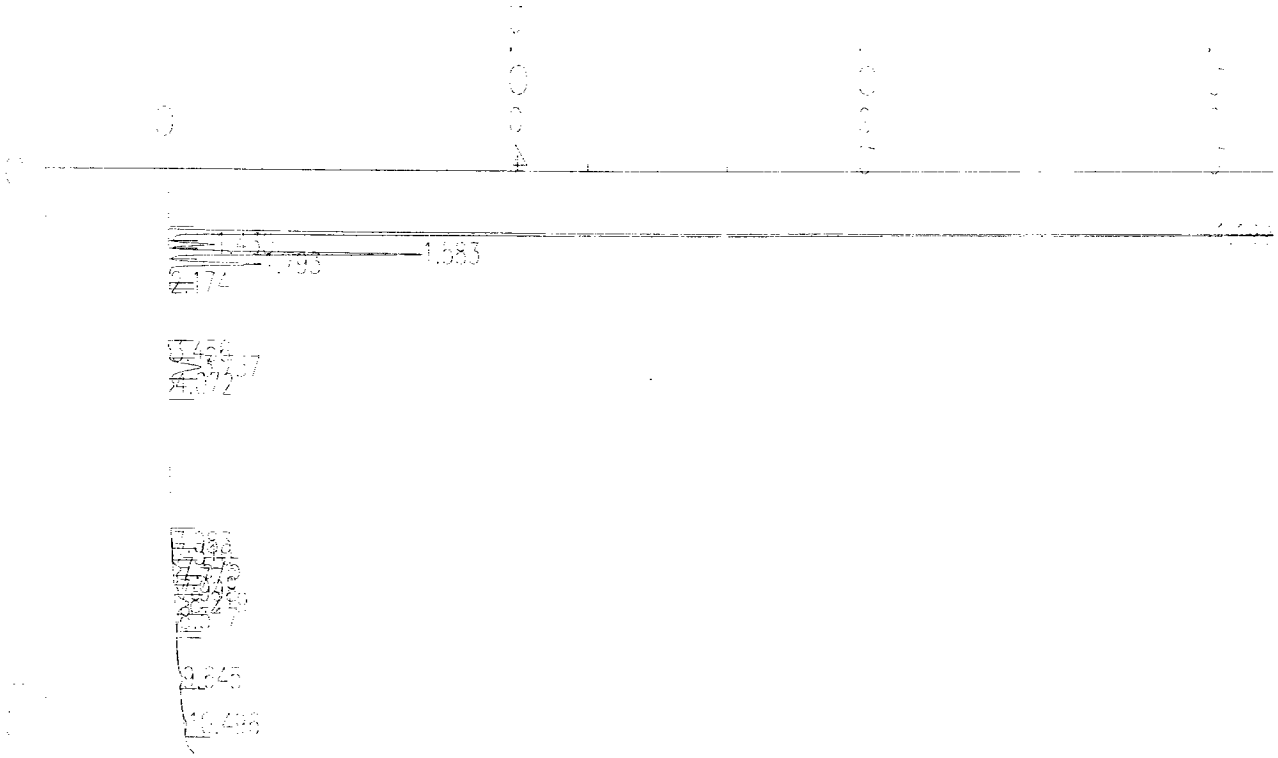
Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R3_002.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 01:42 PM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 01:51 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R3_002.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.198	412920	BV	0.037	1-R	265.185	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.198	-1.9%

SOLVAY2016_6_002326



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R3_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 21 Jan 98 01:52 PM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 02:05 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R3_003.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.199	466420	BV	0.038	1-R	299.652	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.199	-1.9%

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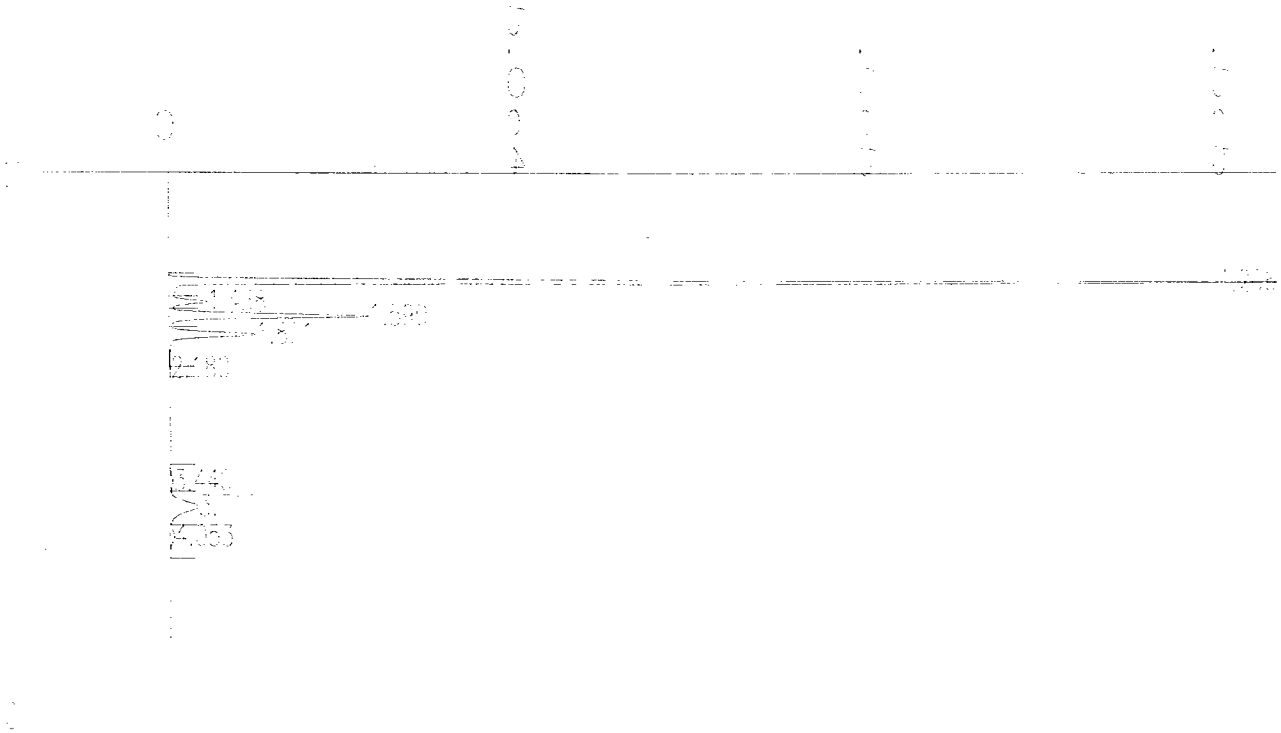
SOLVAY2016_6_002327



External Standard Report

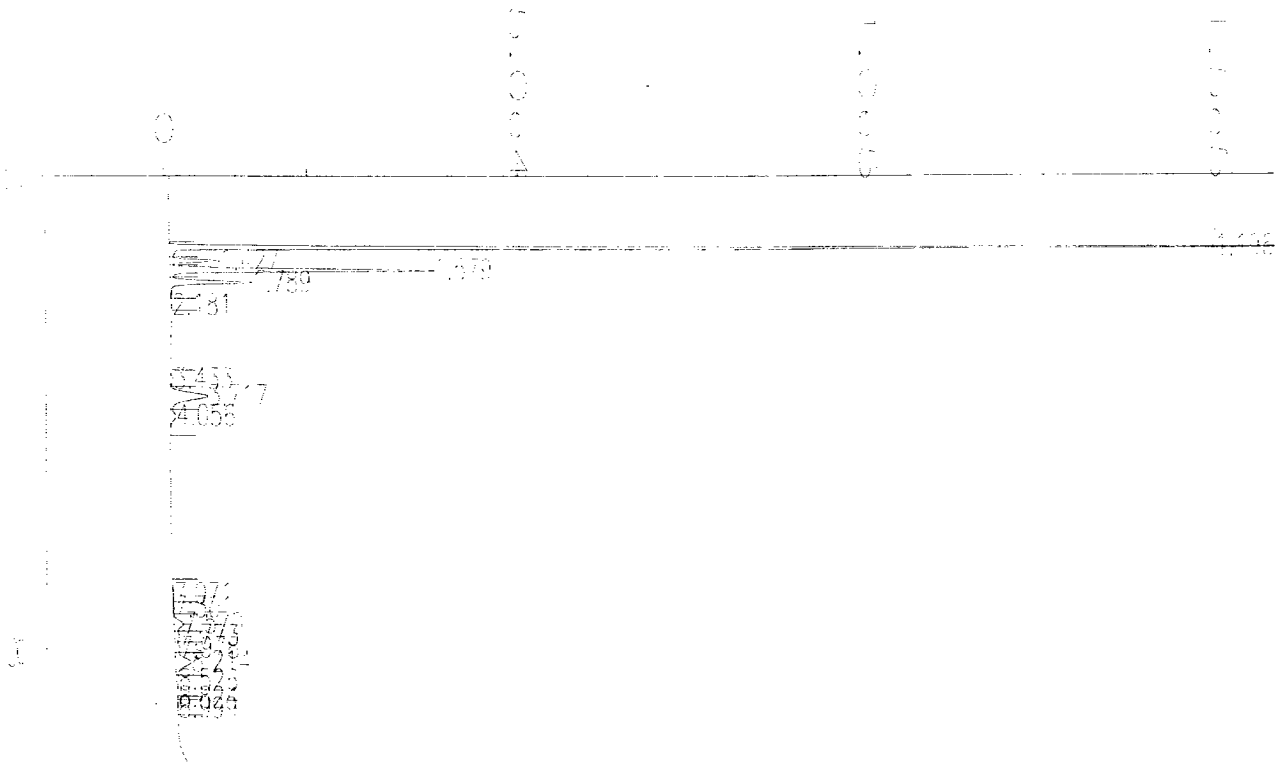
Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R3_004.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 21 Jan 98 02:12 PM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 02:19 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R3_004.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.206	420146	BV	0.037	1-R	269.840	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.206	-1.3%

SOLVAY2016_6_002328



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA3\C3R3_005.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stacksample	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 21 Jan 98 02:20 PM	Instrument Method	: SOLV.MTH
Report Created on	: 21 Jan 98 02:31 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 21 Jan 98 08:24 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA3\C3R3_005.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.196	406042	BV	0.038	1-R	260.754	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.222	1.196	-2.1%

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SOLVAY2016_6_002329

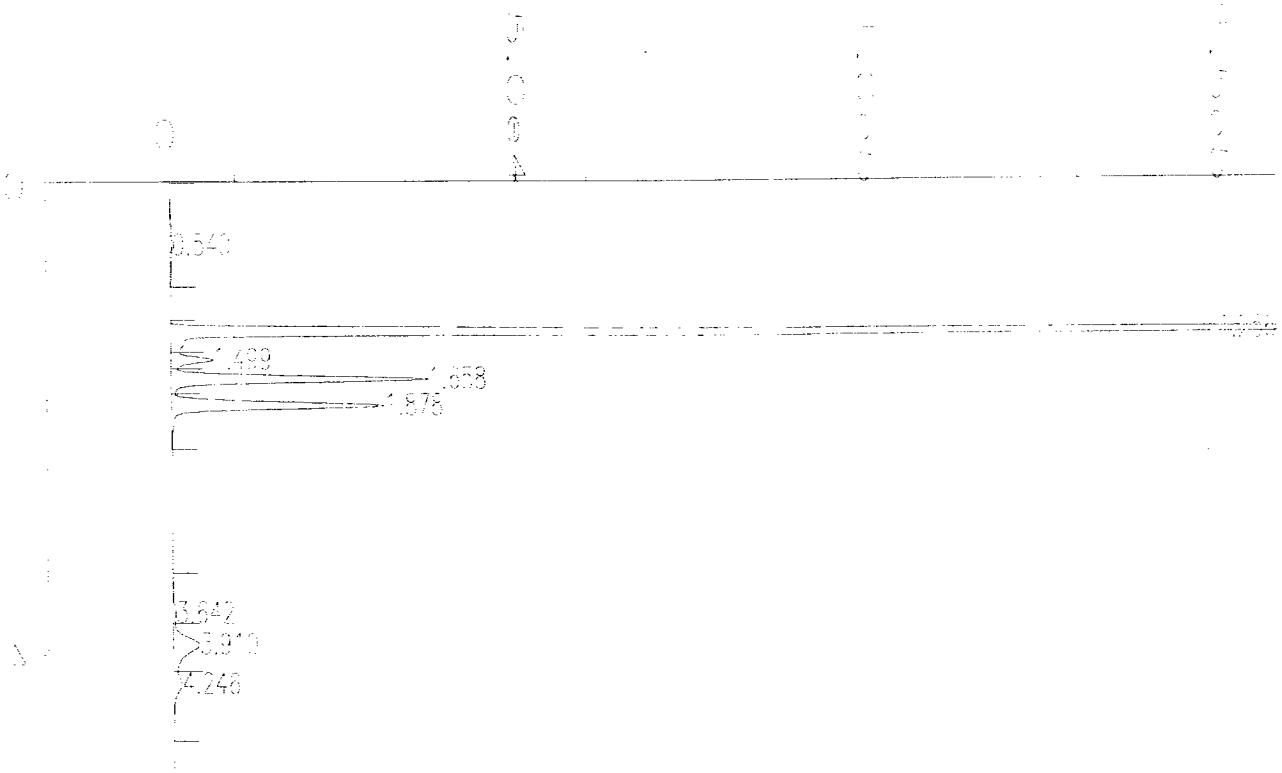
External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R1_001.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 08:56 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 09:03 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R1_001.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.271	1008530	BV	0.041	1-R	656.939	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.271	0.1%



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R1_002.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 09:05 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 09:10 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R1_002.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.256	976726	BV	0.041	1-R	636.155	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.256	-1.1%

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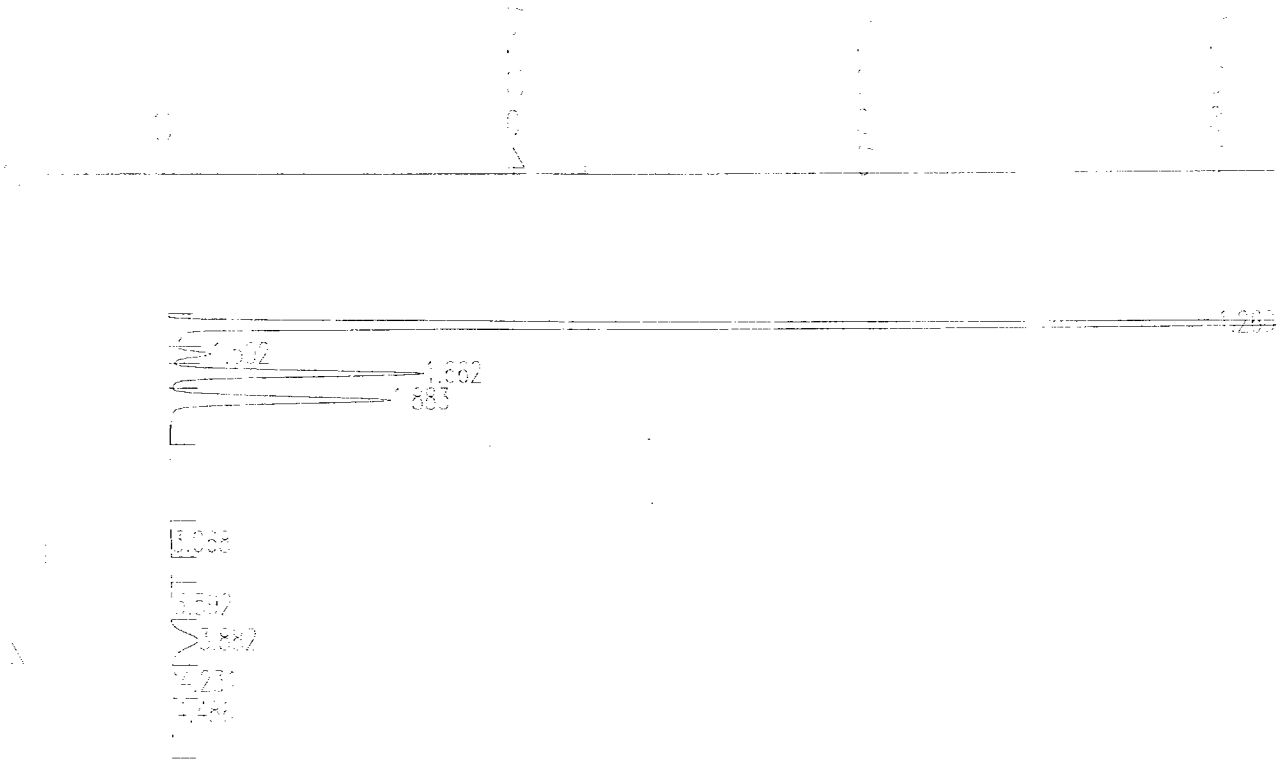
SOLVAY2016_6_002331



External Standard Report

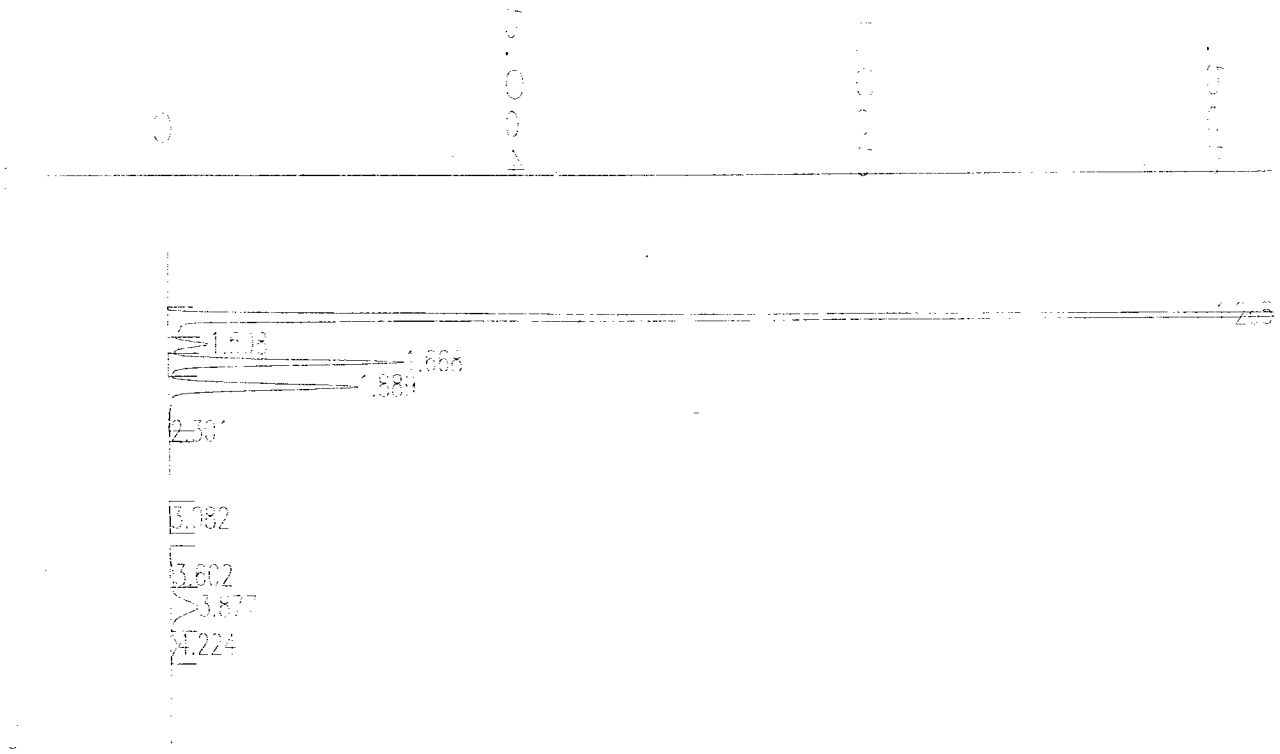
Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R1_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 22 Jan 98 09:12 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 09:17 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R1_003.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.260	979605	BV	0.041	1-R	638.036	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.260	-0.8%

SOLVAY2016_6_002332



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External Standard Report

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Data File Name : C:\HPCHEM\1\DATA\CA1\C1R1_004.D
Operator : John Chapman
Instrument : INSTRUMEN
Sample Name : stackgas
Run Time Bar Code:
Acquired on : 22 Jan 98 09:20 AM
Report Created on: 22 Jan 98 09:26 AM
Last Recalib on : 22 Jan 98 07:53 AM
Multiplier : 1

Page Number : 1
Vial Number :
Injection Number :
Sequence Line :
Instrument Method: SOLV.MTH
Analysis Method : SOLV.MTH
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R1_004.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.265	863957	BV	0.040	1-R	562.459	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.265	-0.4%

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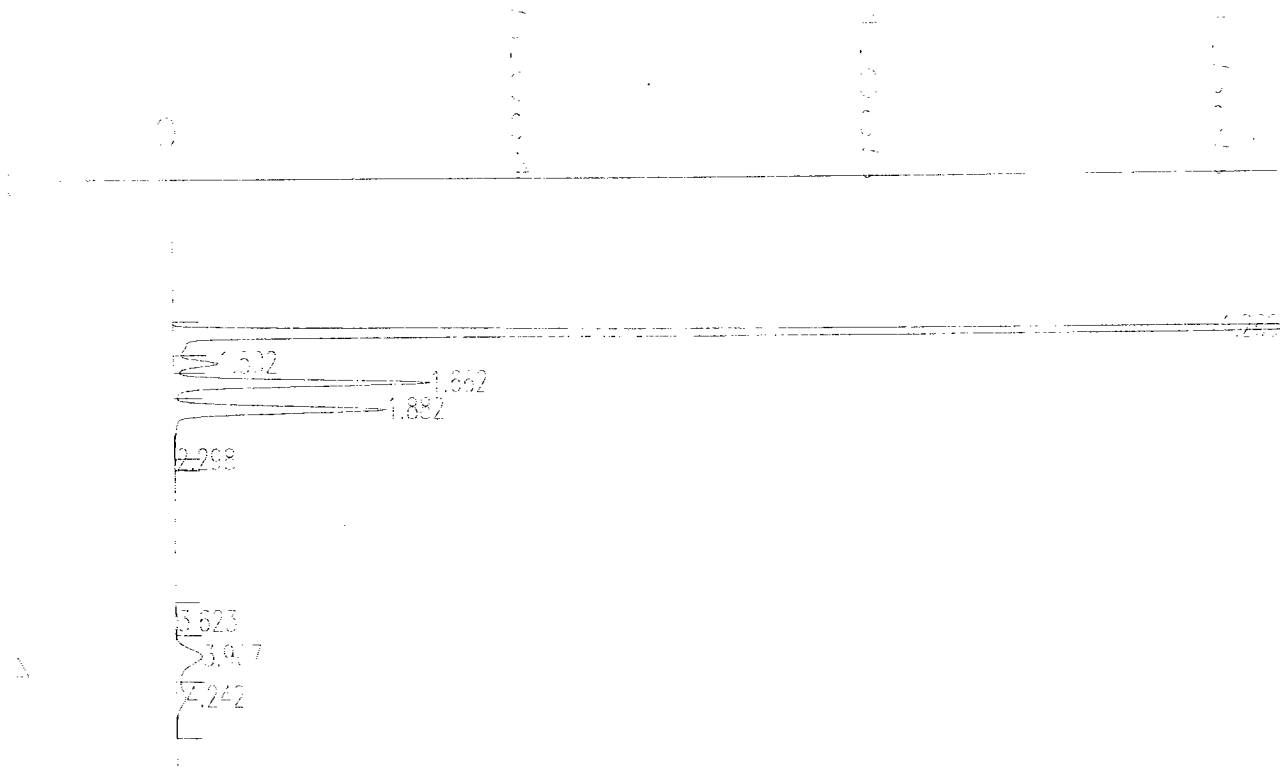
SOLVAY2016_6_002333



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R1_005.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 09:28 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 09:32 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R1_005.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.260	964132	BV	0.041	1-R	627.925	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.260	-0.8%

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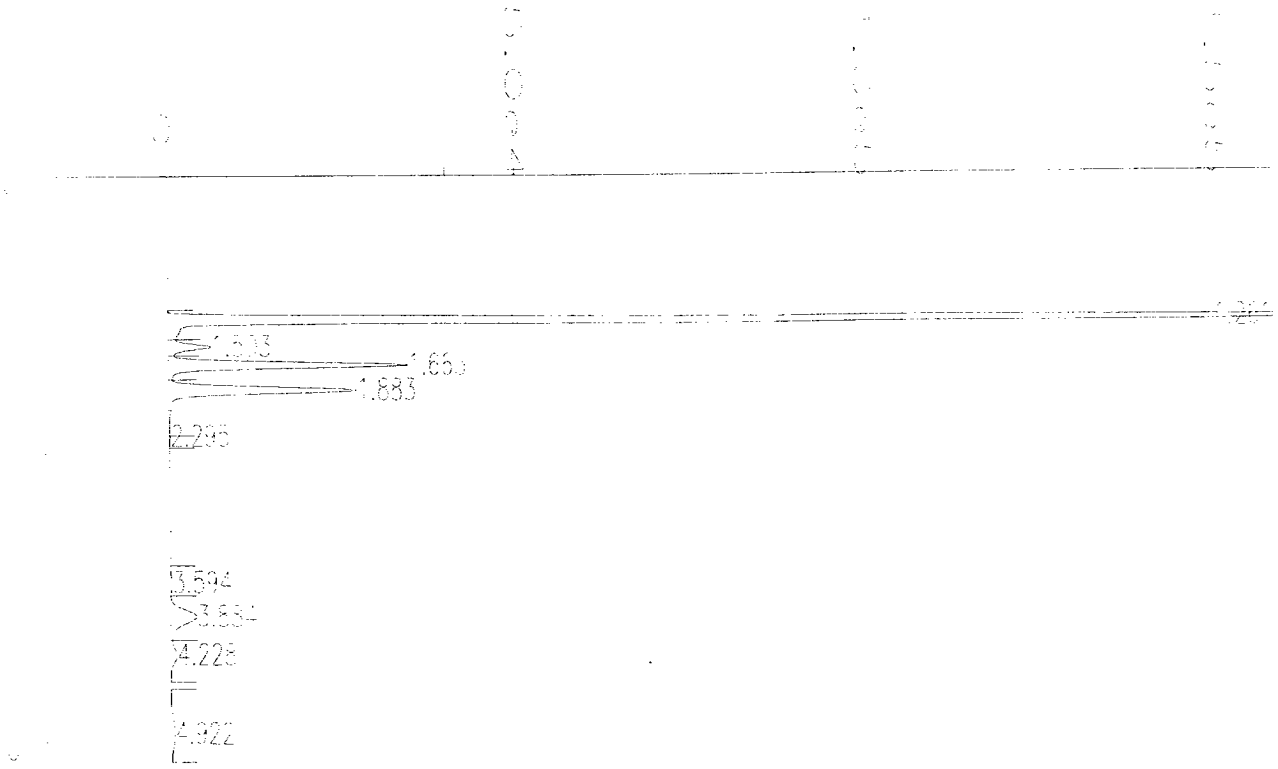
SOLVAY2016_6_002334



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R1_006.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 09:34 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 09:39 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R1_006.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.261	838132	BV	0.041	1-R	545.583	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.261	-0.7%

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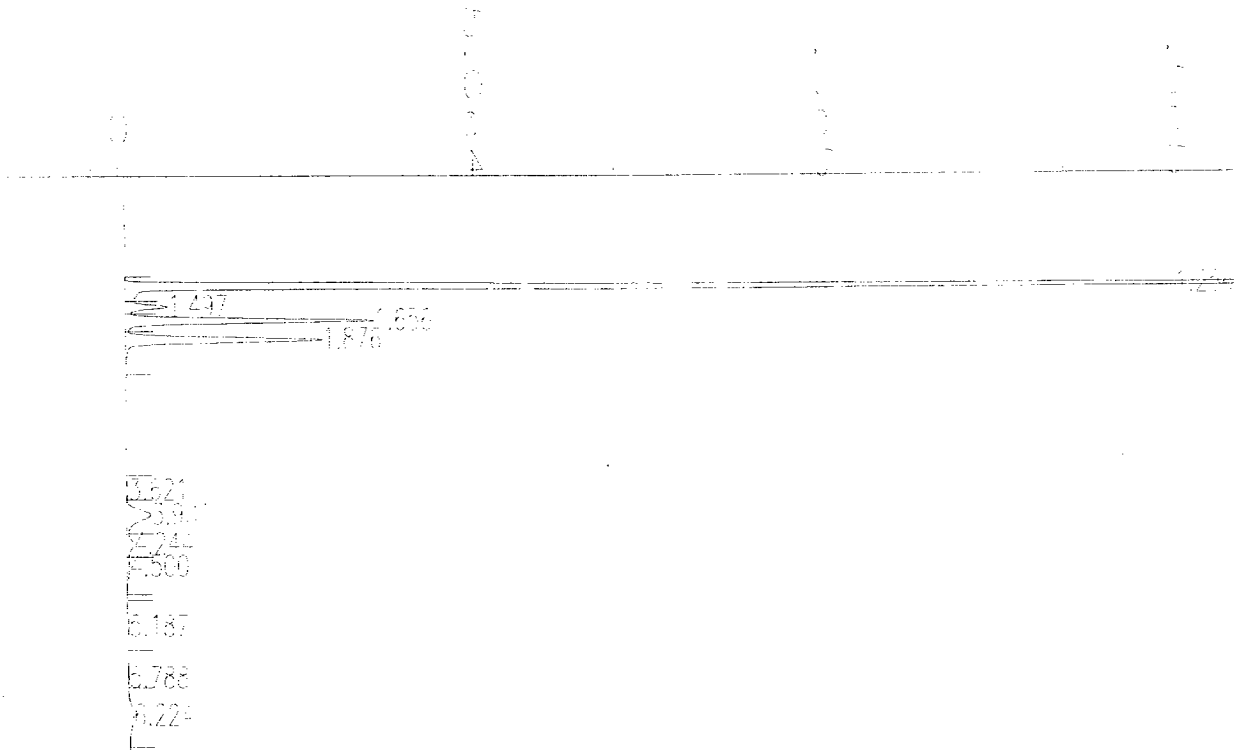
SOLVAY2016_6_002335



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R1_007.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 09:40 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 09:48 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R1_007.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.256	892248	BV	0.041	1-R	580.948	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.256	-1.1%

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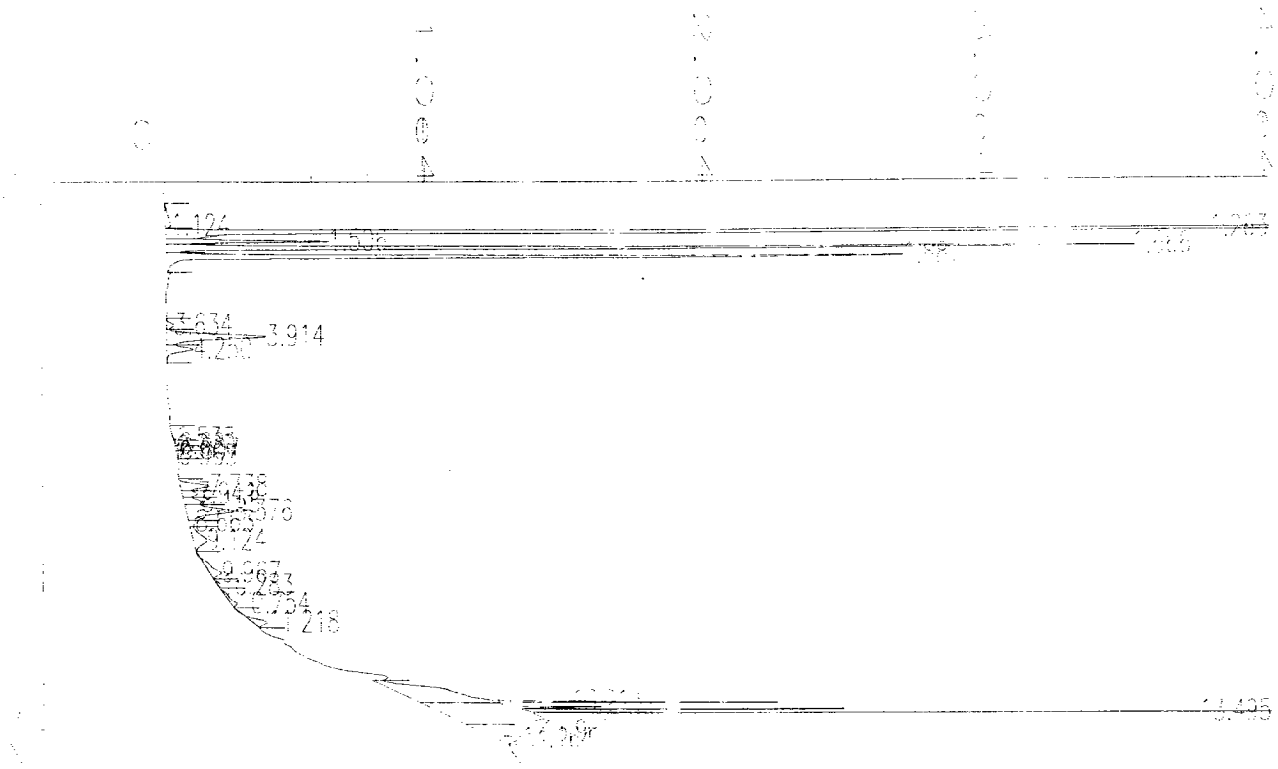
SOLVAY2016_6_002336



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R1_008.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 09:51 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 10:06 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 07:53 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R1_008.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.263	866666	VV	0.041	1-R	564.230	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.270	1.263	-0.6%

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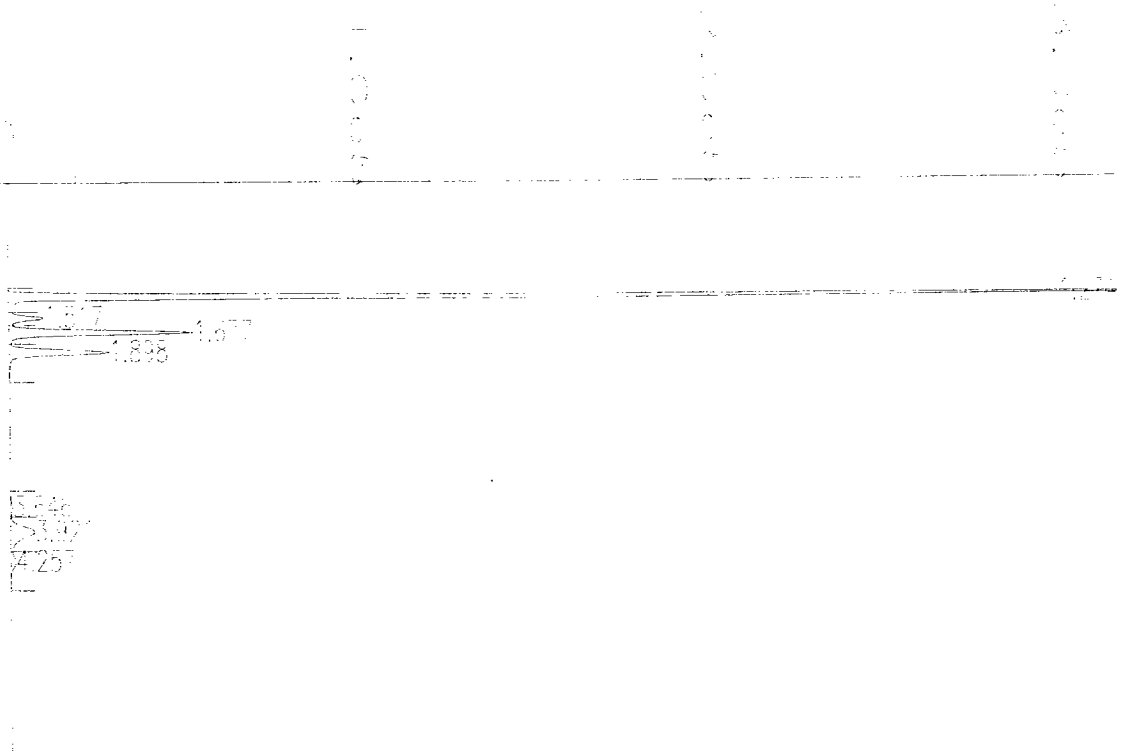
SOLVAY2016_6_002337



External Standard Report

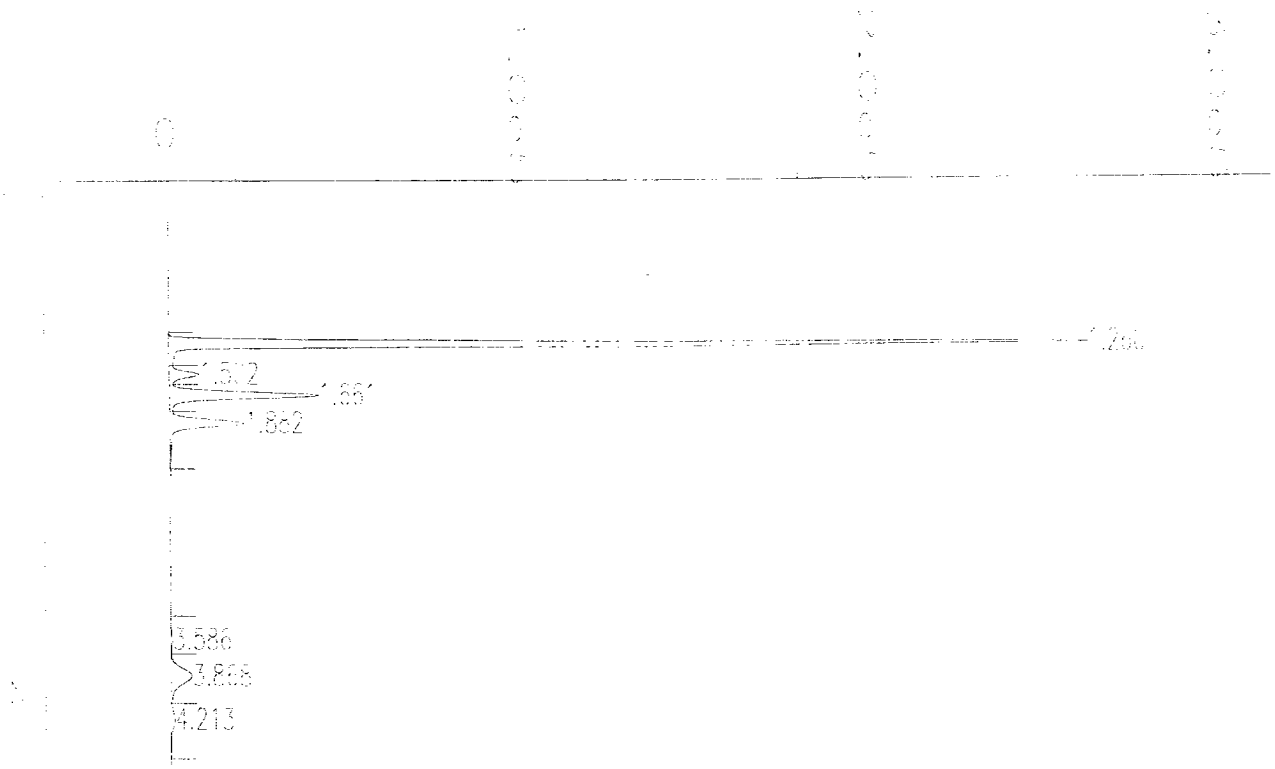
Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R2_001.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 11:11 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 11:18 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R2_001.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.274	895539	BV	0.041	1-R	591.711	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.274	0.1%

SOLVAY2016_6_002338



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R2_002.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 22 Jan 98 11:21 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 11:26 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

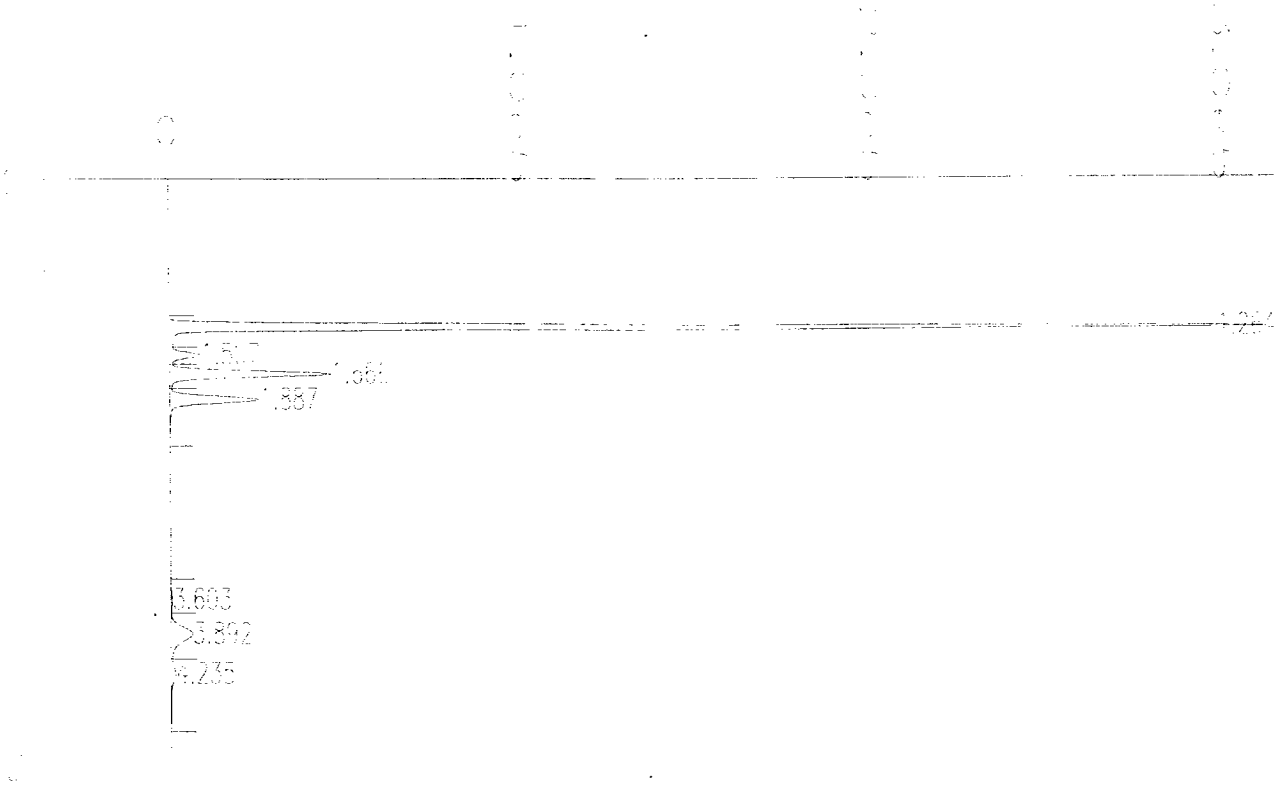
Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R2_002.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.260	674863	PV	0.040	1-R	442.047	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.260	-1.0%

==========

SOLVAY2016_6_002339



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R2_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 11:27 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 11:32 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

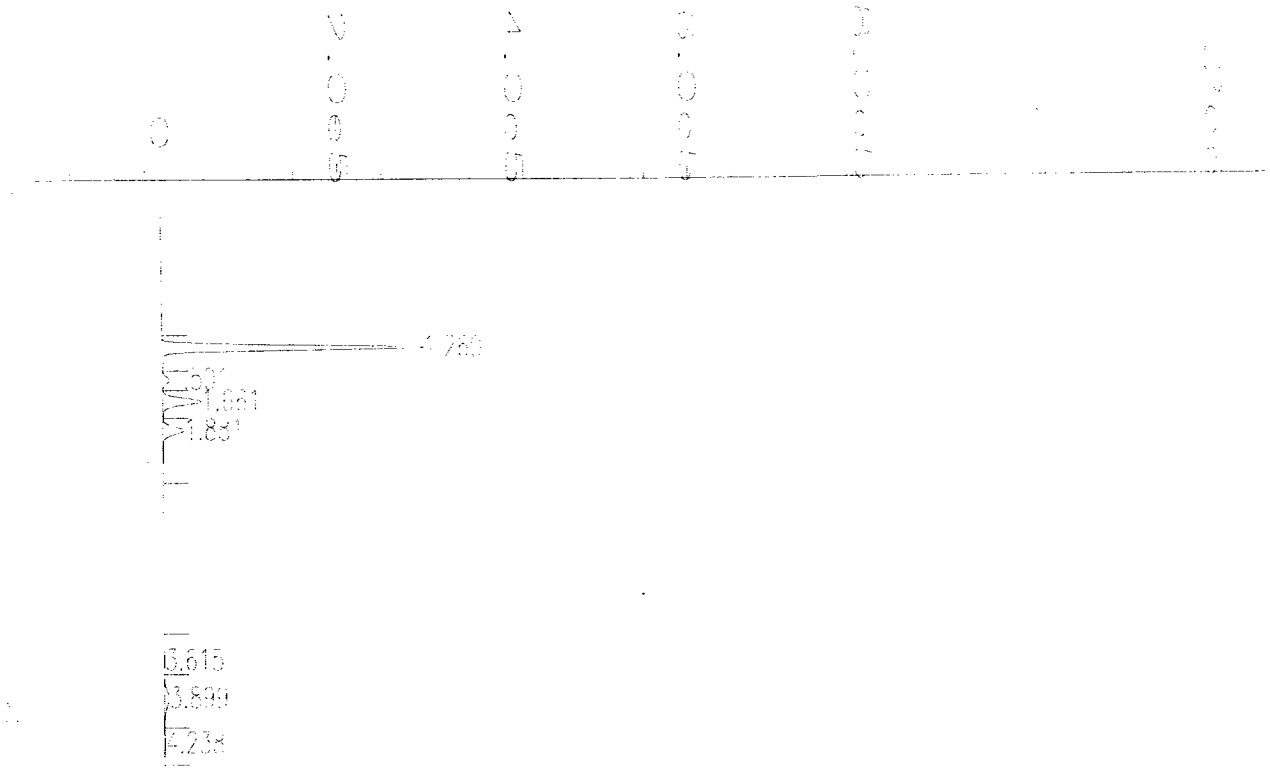
Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R2_003.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.264	814877	BV	0.041	1-R	537.006	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.264	-0.6%

==========

SOLVAY2016_6_002340



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R2_004.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 11:34 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 11:39 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

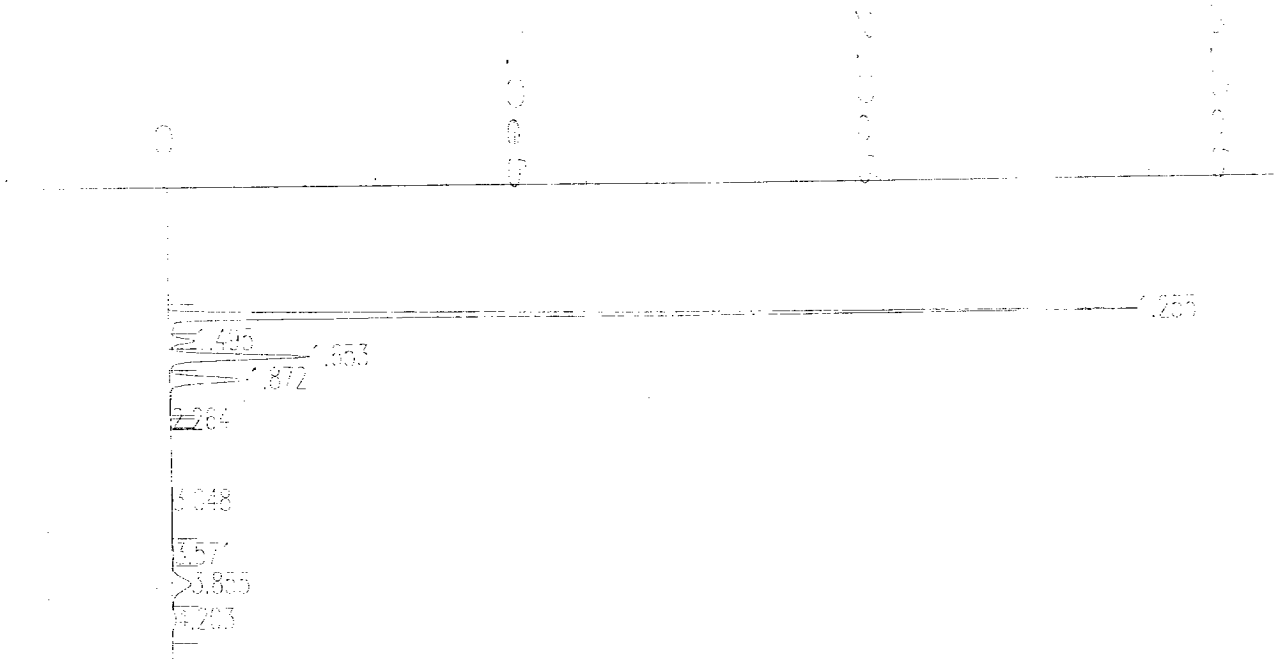
Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R2_004.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.260	772282	BV	0.041	1-R	508.117	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.260	-0.9%

==========

SOLVAY2016_6_002341



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R2_005.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 11:40 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 11:45 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

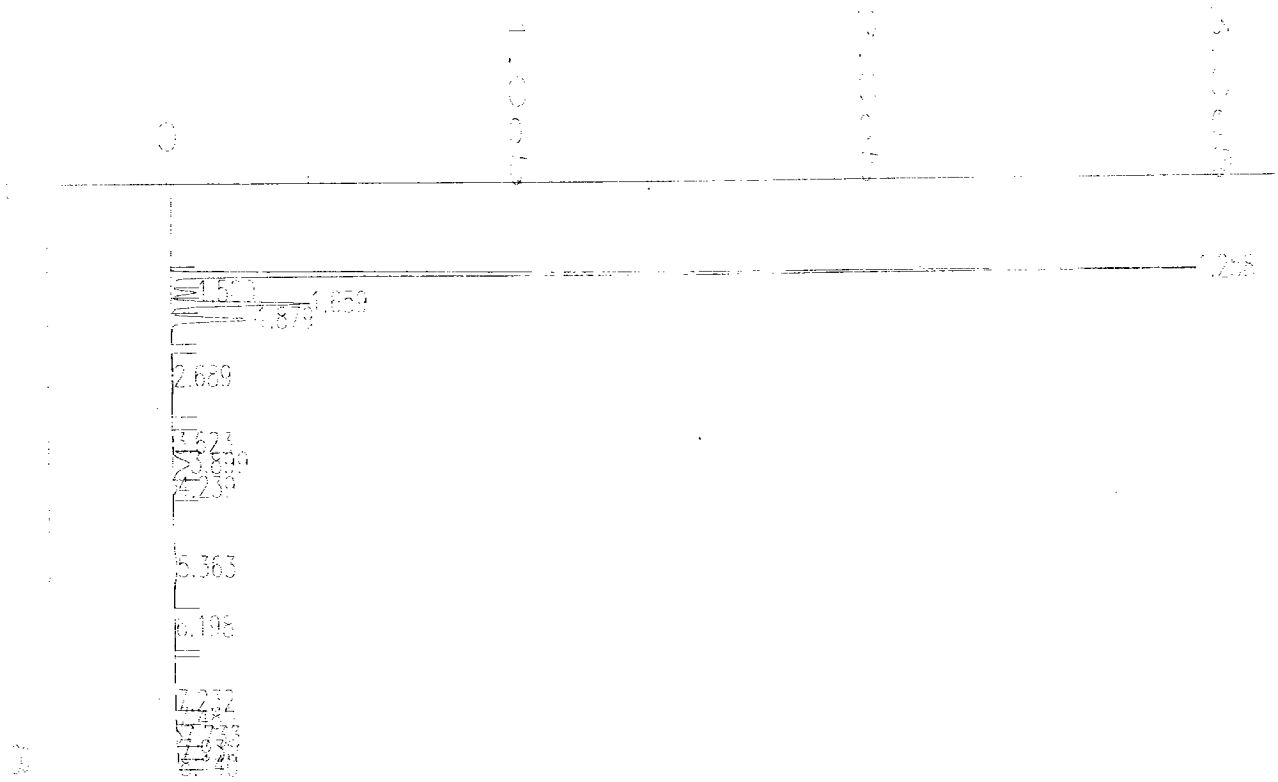
Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R2_005.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.255	712614	BV	0.040	1-R	467.650	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.255	-1.3%

==========

SOLVAY2016_6_002342



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R2_006.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 11:47 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 11:56 AM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

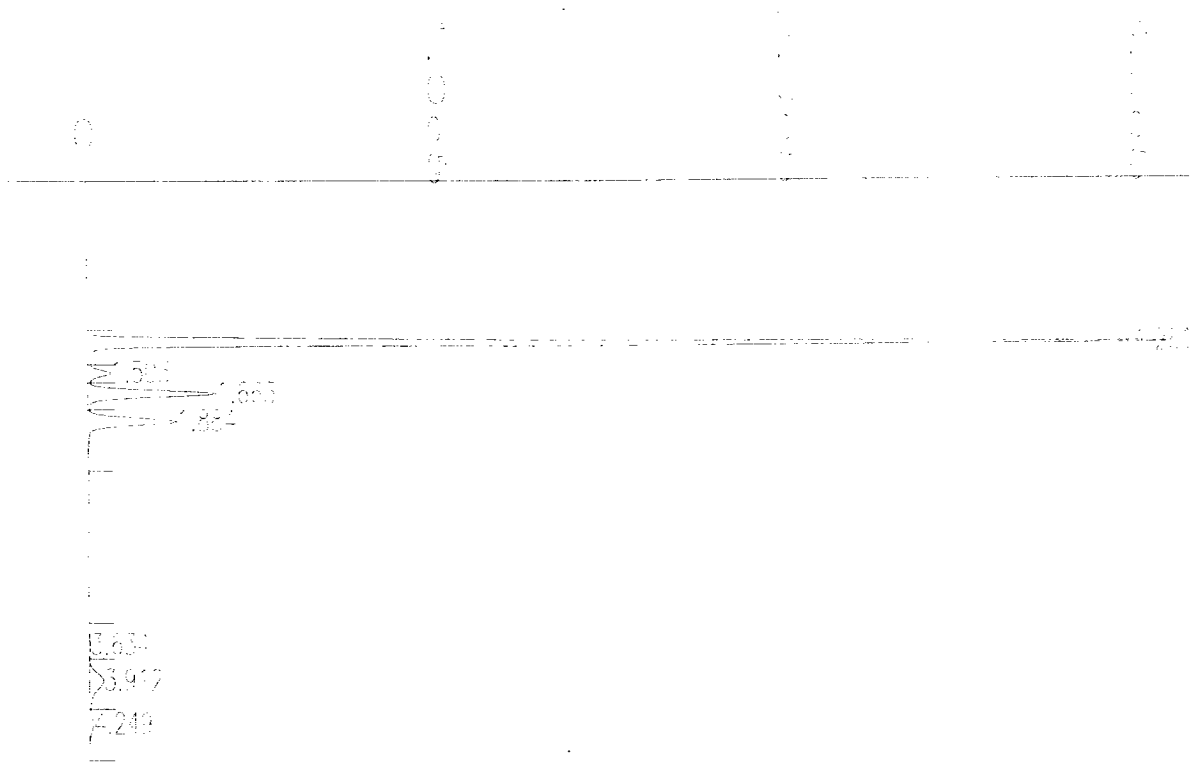
Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R2_006.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.258	764279	BV	0.041	1-R	502.689	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.258	-1.1%

==========

SOLVAY2016_6_002343



External Standard Report

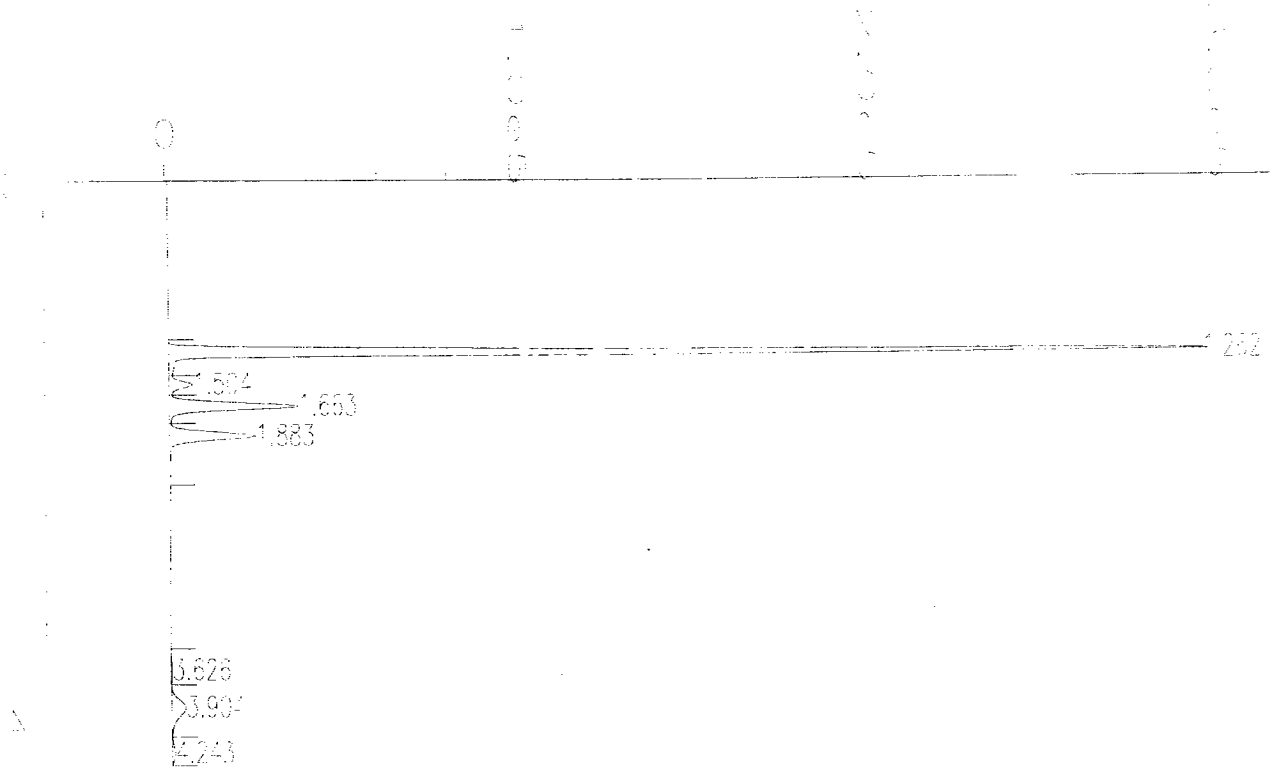
Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R2_007.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgas	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 22 Jan 98 11:56 AM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 12:04 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R2_007.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.261	804976	BV	0.041	1-R	530.291	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.261	-0.9%

SOLVAY2016_6_002344

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==============================================================================
                          External Standard Report
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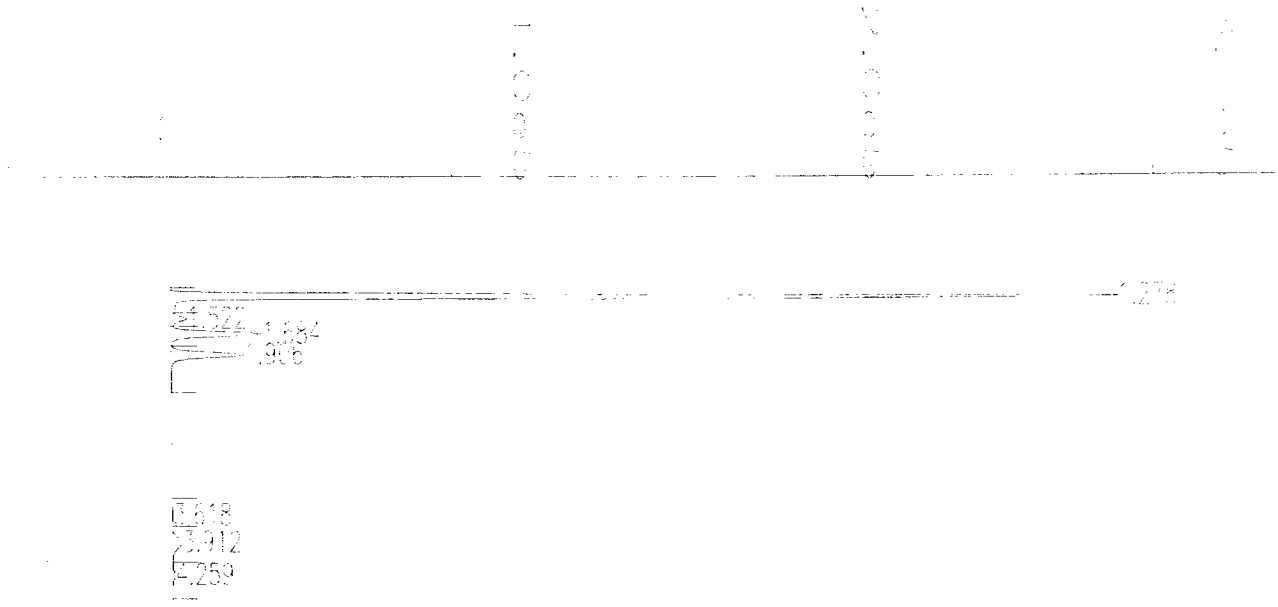
Data File Name    : C:\HPCHEM\1\DATA\CA1\C1R2_008.D
Operator          : John Chapman                    Page Number       : 1
Instrument        : INSTRUMEN                       Vial Number       :
Sample Name       : stackgas                        Injection Number  :
Run Time Bar Code:                                  Sequence Line     :
Acquired on       : 22 Jan 98  12:04 PM             Instrument Method: SOLV.MTH
Report Created on: 22 Jan 98  12:10 PM              Analysis Method   : SOLV.MTH
Last Recalib on   : 22 Jan 98  10:40 AM             Sample Amount     : 0
Multiplier        : 1                               ISTD Amount       :

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R2_008.D
Ret Time     Area      Type Width Ref#  ppm                    Name
|-------|------------|----|-----|-----|--------|------------------------------|
   1.262       779804 BV   0.041  1-R   513.218 Methane


       Time Reference Peak       Expected RT    Actual RT     Difference
                 1                    1.272         1.262          -0.8%

==============================================================================
```

SOLVAY2016_6_002345



External Standard Report

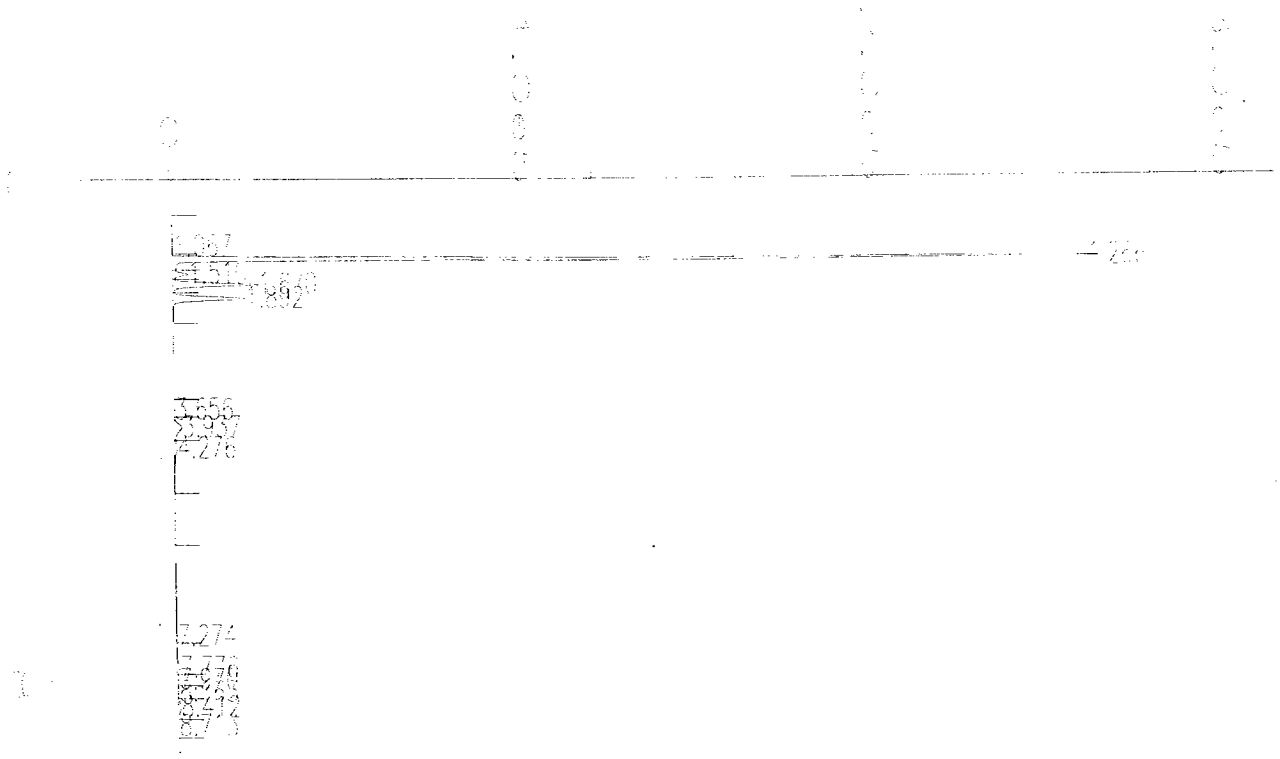
Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R3_001.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgasrun3	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 12:50 PM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 12:57 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R3_001.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.278	713406	BV	0.041	1-R	468.187	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.278	0.5%

SOLVAY2016_6_002346



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==============================================================================
                          External Standard Report
==============================================================================

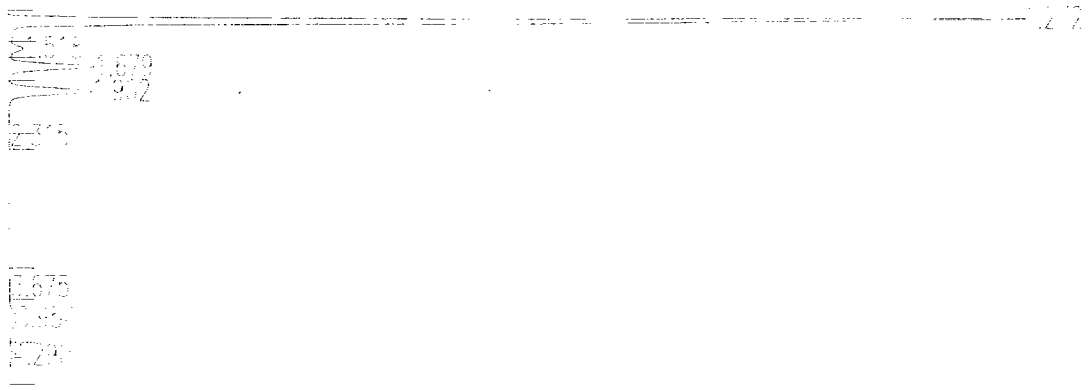
Data File Name    : C:\HPCHEM\1\DATA\CA1\C1R3_002.D
Operator          : John Chapman                    Page Number       : 1
Instrument        : INSTRUMEN                       Vial Number       :
Sample Name       : stackgasrun3                    Injection Number  :
Run Time Bar Code:                                  Sequence Line     :
Acquired on       : 22 Jan 98  12:57 PM             Instrument Method: SOLV.MTH
Report Created on: 22 Jan 98  01:08 PM              Analysis Method   : SOLV.MTH
Last Recalib on   : 22 Jan 98  10:40 AM             Sample Amount     : 0
Multiplier        : 1                               ISTD Amount       :

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R3_002.D
Ret Time     Area      Type Width Ref#  ppm                    Name
|-------|------------|----|-----|-----|--------|------------------------------|
   1.266       696910 VV   0.042  1-R   456.999 Methane


       Time Reference Peak       Expected RT    Actual RT     Difference
                 1                   1.272         1.266          -0.5%

==============================================================================
```

SOLVAY2016_6_002347



External Standard Report

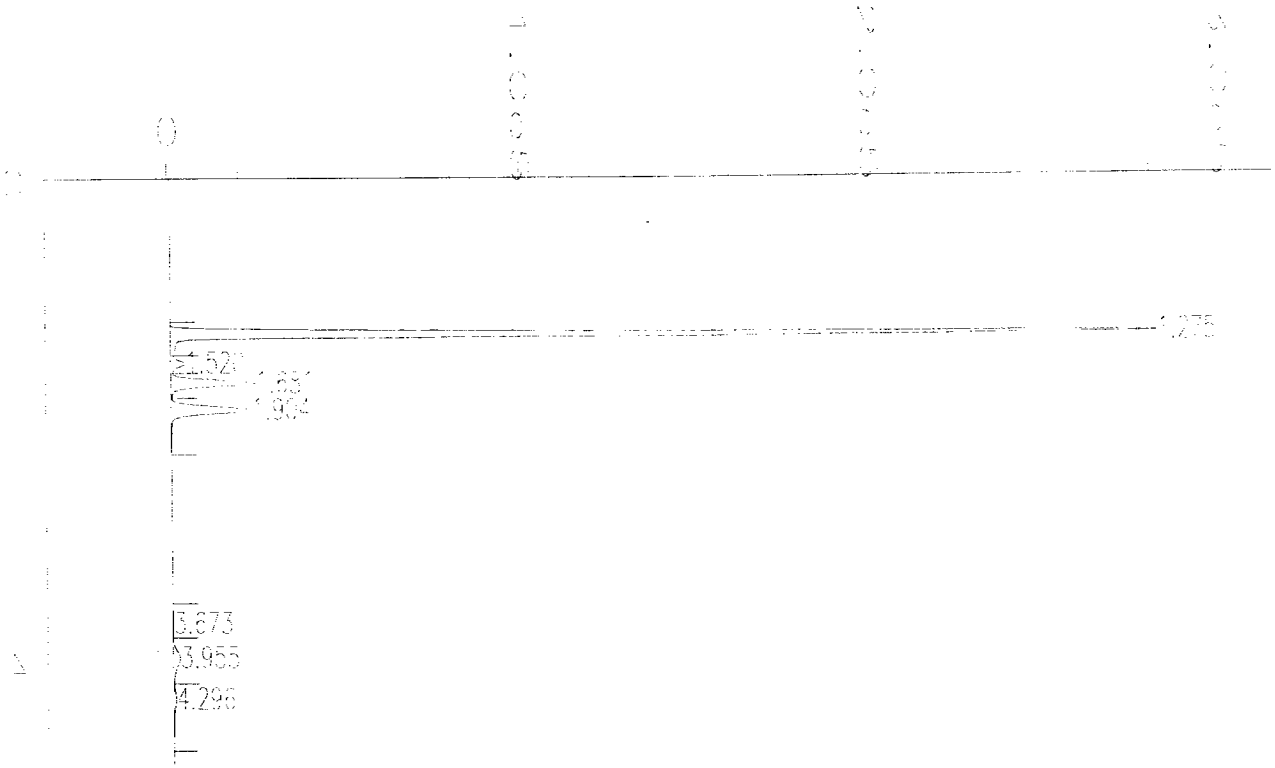
Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R3_003.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgasrun3	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 22 Jan 98 01:08 PM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 01:18 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R3_003.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.272	768320	BV	0.042	1-R	505.430	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.272	0.0%

SOLVAY2016_6_002348



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External Standard Report

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Data File Name : C:\HPCHEM\1\DATA\CA1\C1R3_004.D
Operator : John Chapman
Instrument : INSTRUMEN
Sample Name : stackgasrun3
Run Time Bar Code:
Acquired on : 22 Jan 98 01:18 PM
Report Created on: 22 Jan 98 01:24 PM
Last Recalib on : 22 Jan 98 10:40 AM
Multiplier : 1

Page Number : 1
Vial Number :
Injection Number :
Sequence Line :
Instrument Method: SOLV.MTH
Analysis Method : SOLV.MTH
Sample Amount : 0
ISTD Amount :

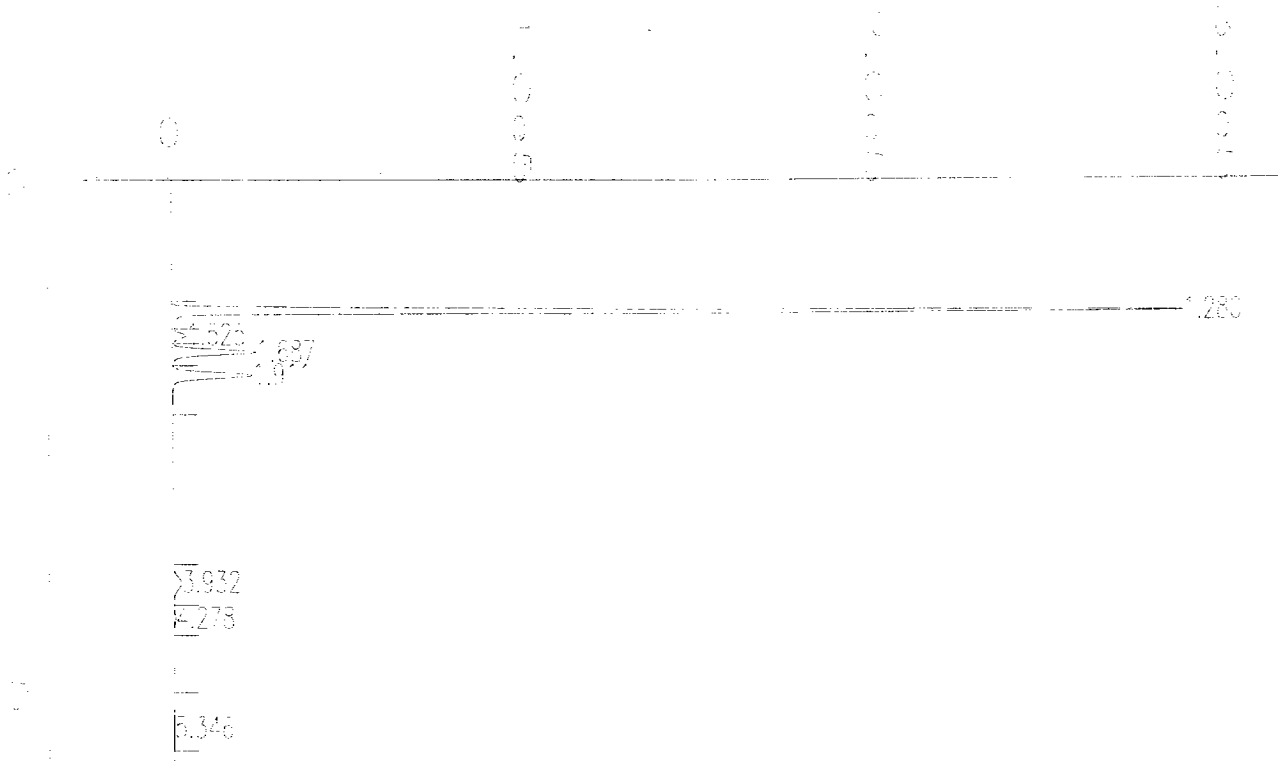
Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R3_004.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.275	751066	BV	0.042	1-R	493.728	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.275	0.2%

==========

SOLVAY2016_6_002349

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==============================================================================
                          External Standard Report
==============================================================================

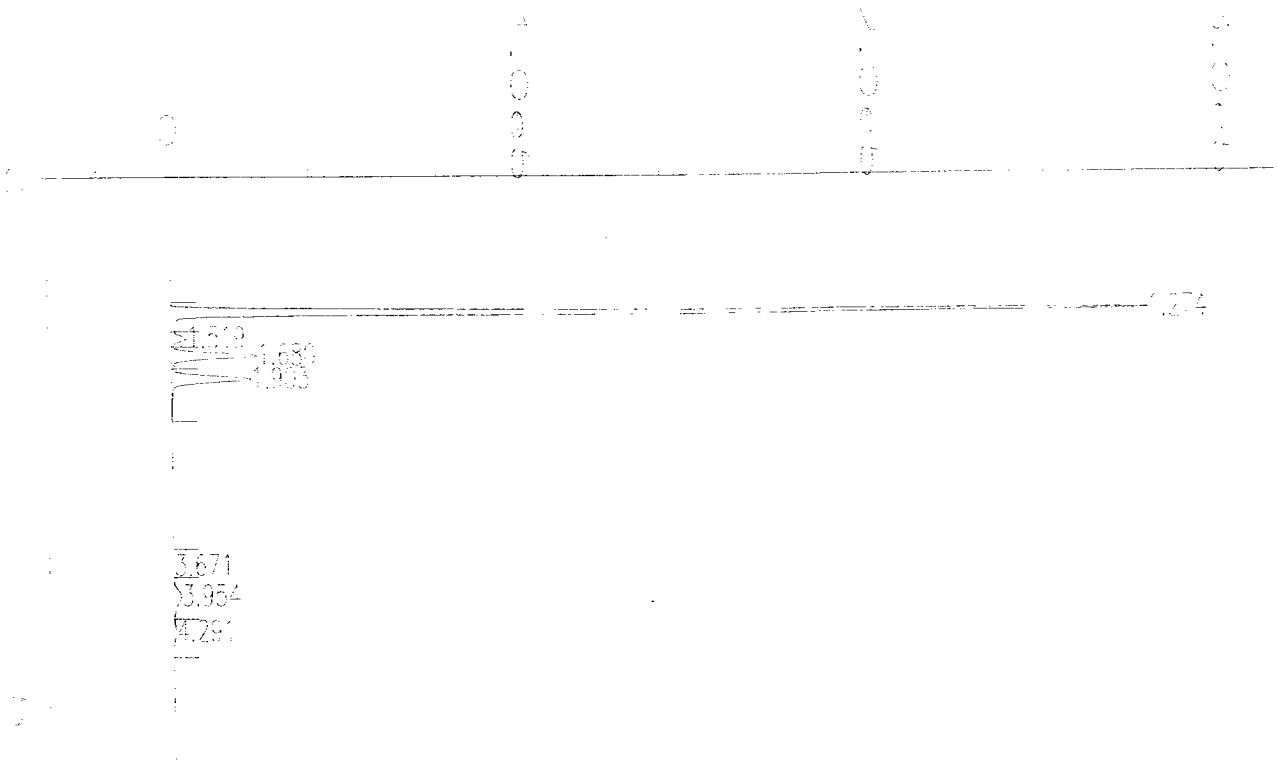
Data File Name    : C:\HPCHEM\1\DATA\CA1\C1R3_005.D
Operator          : John Chapman                    Page Number       : 1
Instrument        : INSTRUMEN                       Vial Number       :
Sample Name       : stackgasrun3                    Injection Number  :
Run Time Bar Code:                                  Sequence Line     :
Acquired on       : 22 Jan 98  01:26 PM             Instrument Method: SOLV.MTH
Report Created on: 22 Jan 98  01:32 PM              Analysis Method   : SOLV.MTH
Last Recalib on   : 22 Jan 98  10:40 AM             Sample Amount     : 0
Multiplier        : 1                               ISTD Amount       :

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R3_005.D
Ret Time     Area      Type Width Ref#  ppm                    Name
-------|------------|----|-----|-----|--------|------------------------------|
  1.280       762255 BV   0.042  1-R   501.317 Methane


      Time Reference Peak      Expected RT    Actual RT     Difference
                1                   1.272         1.280          0.6%

==============================================================================
```

SOLVAY2016_6_002350



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External Standard Report

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Data File Name : C:\HPCHEM\1\DATA\CA1\C1R3_006.D
Operator : John Chapman
Instrument : INSTRUMEN
Sample Name : stackgasrun3
Run Time Bar Code:
Acquired on : 22 Jan 98 01:33 PM
Report Created on: 22 Jan 98 01:40 PM
Last Recalib on : 22 Jan 98 10:40 AM
Multiplier : 1

Page Number : 1
Vial Number :
Injection Number :
Sequence Line :
Instrument Method: SOLV.MTH
Analysis Method : SOLV.MTH
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R3_006.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.274	740949	BV	0.042	1-R	486.867	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.274	0.2%

==========

SOLVAY2016_6_002351

External Standard Report

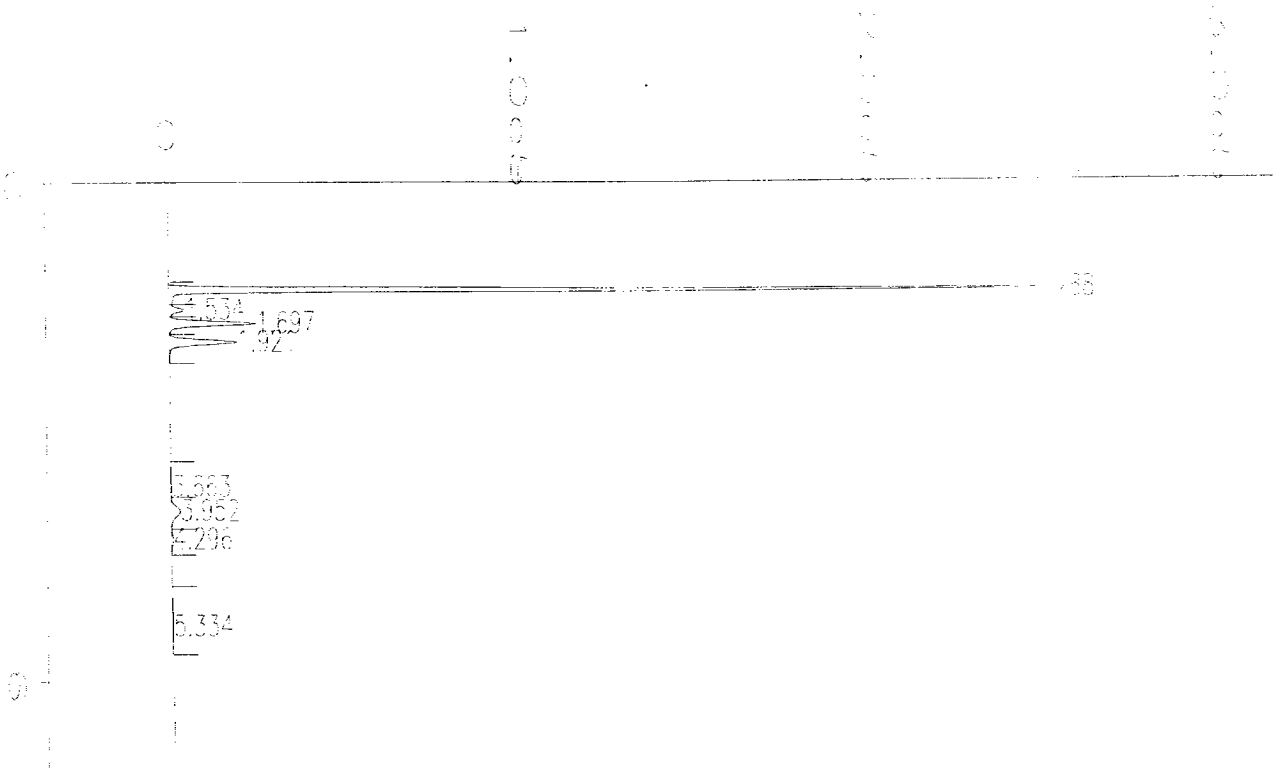
Data File Name	: C:\HPCHEM\1\DATA\CA1\C1R3_007.D		
Operator	: John Chapman	Page Number	: 1
Instrument	: INSTRUMEN	Vial Number	:
Sample Name	: stackgasrun3	Injection Number	:
Run Time Bar Code:		Sequence Line	:
Acquired on	: 22 Jan 98 01:41 PM	Instrument Method	: SOLV.MTH
Report Created on	: 22 Jan 98 01:47 PM	Analysis Method	: SOLV.MTH
Last Recalib on	: 22 Jan 98 10:40 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R3_007.D

Ret Time	Area	Type	Width	Ref#	ppm	Name
1.274	611148	BV	0.041	1-R	398.834	Methane

Time Reference Peak	Expected RT	Actual RT	Difference
1	1.272	1.274	0.2%

SOLVAY2016_6_002352




```
==============================================================================
                          External Standard Report
==============================================================================

Data File Name    : C:\HPCHEM\1\DATA\CA1\C1R3_008.D
Operator          : John Chapman                    Page Number       : 1
Instrument        : INSTRUMEN                       Vial Number       :
Sample Name       : stackgasrun3                    Injection Number  :
Run Time Bar Code:                                  Sequence Line     :
Acquired on       : 22 Jan 98  01:51 PM             Instrument Method: SOLV.MTH
Report Created on: 22 Jan 98  01:58 PM              Analysis Method   : SOLV.MTH
Last Recalib on   : 22 Jan 98  10:40 AM             Sample Amount     : 0
Multiplier        : 1                               ISTD Amount       :

Sig. 1 in C:\HPCHEM\1\DATA\CA1\C1R3_008.D
Ret Time     Area      Type Width Ref#  ppm                    Name
|-------|------------|----|-----|-----|--------|------------------------------|
   1.288       662463 BV   0.042  1-R   433.637 Methane


       Time Reference Peak       Expected RT    Actual RT     Difference
                 1                    1.272         1.288           1.3%

==============================================================================
```

FIELD DATA PRINTOUTS

E

Field Data Printout

Location: CA-3 Calciner Stack
Test Run: 1
Client: Solvay Minerals, Inc.
Project No: 8190-1
Test Date: 1/21/98
Meter ΔH@: 1.6746
Meter Y_d: 1.0145
Pitot C_p: 0.84
Static P: -0.5
Leak Rate Before: 0.003 cfm @ 13 "Hg
Leak Rate After: 0.002 cfm @ 8 "Hg

Method: 5/202
Testing Type: Particulate
Area (ft^2): 85.90
Filter No: 085100
F 1/2 Beaker No: F38
B 1/2 In Beaker No: G34
B 1/2 Org. Beaker No: T5

Bar. Press. (in. Hg): 23.64
Actual Moisture (%): 30.3
Nozzle Diameter (D_n): 0.310
O_2 (dry volume %): 11.3
CO_2 (dry volume %): 11.5
Start Time (approx.): 09:55
Stop Time (approx.): 11:04
H_2O (condensate, ml): 239.7
H_2O (silica, g): 8.3

Traverse Point	Run Time	Pitot ΔP_s (in. H_2O)	Sample ΔH (in. H_2O)	Metered (ft^3)	Stack T_s (°F)	Dry Gas Meter $T_{m\ in}$ (°F)	Dry Gas Meter $T_{m\ out}$ (°F)	$\sqrt{\Delta P_s}$ (calculated) ($\sqrt{in.\ H_2O}$)	Volume (calculated) (ft^3)	Isokinetics (calculated) (%)
	0.0			739.73						
1-01	5.0	0.24	0.79	742.46	313	49	46	0.49	2.73	98.9
1-02	10.0	0.22	0.73	745.08	312	54	48	0.47	2.62	98.4
1-03	15.0	0.18	0.59	747.46	309	57	49	0.42	2.38	98.2
2-01	20.0	0.31	1.00	750.55	315	61	52	0.56	3.09	97.0
2-02	25.0	0.30	0.99	753.61	314	63	53	0.55	3.06	97.3
2-03	30.0	0.20	0.66	756.17	310	64	55	0.45	2.56	99.1
3-01	35.0	0.30	0.99	759.25	314	63	56	0.55	3.08	97.7
3-02	40.0	0.27	0.89	762.19	313	65	57	0.52	2.94	97.9
3-03	45.0	0.21	0.69	764.83	309	67	58	0.46	2.64	99.1
4-01	50.0	0.25	0.83	767.62	310	66	59	0.50	2.79	96.1
4-02	55.0	0.21	0.69	770.22	313	67	59	0.46	2.60	97.7
4-03	60.0	0.17	0.56	772.55	308	67	60	0.41	2.33	96.9
Final	60.0	0.49	0.78	32.82	312	58				

Field Data Printout

Location:	CA-3 Calciner Stack	Method:	5/202	Bar. Press. (in. Hg):	23.64
Test Run:	2	Testing Type:	Particulate	Actual Moisture (%):	30.0
Client:	Solvay Minerals, Inc.				
Project No:	8190-1	Area (ft^2):	85.90	Nozzle Diameter (D_n):	0.310
Test Date:	1/21/98			O_2 (dry volume %):	11.4
Meter ΔH@:	1.6746	Filter No:	085101	CO_2 (dry volume %):	11.5
Meter Y_d:	1.0145	F 1/2 Beaker No:	X62	Start Time (approx.):	11:45
Pitot C_p:	0.84	B 1/2 In Beaker No:	B66	Stop Time (approx.):	12:54
Static P:	-0.5	B 1/2 Org. Beaker No:	XX87	H_2O (condensate, ml):	244.7
Leak Rate Before:	0.016 cfm @ 13 "Hg			H_2O (silica, g):	8.4
Leak Rate After:	0.008 cfm @ 8 "Hg				

Traverse Point	Run Time	Pitot ΔP_s	Sample ΔH	Metered (ft^3)	Stack T_s	Dry Gas Meter $T_{m\ in}$	Dry Gas Meter $T_{m\ out}$	$\sqrt{\Delta P_s}$ (calculated)	Volume (calculated)	Isokinetics (calculated)
	0.0	(in. H_2O)	(in. H_2O)	773.84	(°F)	(°F)	(°F)	($\sqrt{in.\ H_2O}$)	(ft^3)	(%)
4-01	5.0	0.25	0.83	776.72	314	61	60	0.50	2.88	99.5
4-02	10.0	0.23	0.76	779.46	312	64	60	0.48	2.74	98.3
4-03	15.0	0.18	0.63	781.95	310	65	60	0.42	2.49	100.7
3-01	20.0	0.31	1.10	785.15	314	65	60	0.56	3.20	99.0
3-02	25.0	0.28	0.98	788.25	315	66	60	0.53	3.10	100.8
3-03	30.0	0.23	0.81	791.09	312	65	59	0.48	2.84	101.9
2-01	35.0	0.28	0.98	794.19	316	65	59	0.53	3.10	101.1
2-02	40.0	0.28	0.98	797.28	317	66	60	0.53	3.09	100.6
2-03	45.0	0.22	0.77	800.14	313	67	60	0.47	2.86	104.6
1-01	50.0	0.23	0.81	802.92	314	66	61	0.48	2.78	99.5
1-02	55.0	0.21	0.74	805.62	316	69	62	0.46	2.70	100.9
1-03	60.0	0.17	0.60	808.07	312	70	63	0.41	2.45	101.3
Final	60.0	0.49	0.83	34.23	314	63				

Field Data Printout

Location:	CA-3 Calciner Stack	Method:	5/202	Bar. Press. (in. Hg):	23.64
Test Run:	3	Testing Type:	Particulate	Actual Moisture (%):	29.9
Client:	Solvay Minerals, Inc.				
Project No:	8190-1	Area (ft^2):	85.90	Nozzle Diameter (D_n):	0.310
Test Date:	1/21/98			O_2 (dry volume %):	11.3
Meter ΔH@:	1.6746	Filter No:	085102	CO_2 (dry volume %):	11.5
Meter Y_d:	1.0145	F 1/2 Beaker No:	F57	Start Time (approx.):	13:24
Pitot C_p:	0.84	B 1/2 In Beaker No:	F56	Stop Time (approx.):	14:31
Static P:	-0.5	B 1/2 Org. Beaker No:	X71	H_2O (condensate, ml):	243.6
Leak Rate Before:	0.007 cfm @ 12 "Hg			H_2O (silica, g):	10.2
Leak Rate After:	0.005 cfm @ 10 "Hg				

Traverse Point	Run Time	Pitot ΔP_s	Sample ΔH	Metered	Stack T_s	Dry Gas Meter $T_{m\ in}$	Dry Gas Meter $T_{m\ out}$	$\sqrt{\Delta P_s}$ (calculated)	Volume (calculated)	Isokinetics (calculated)
	0.0	(in. H_2O)	(in. H_2O)	(ft^3) 808.26	(°F)	(°F)	(°F)	($\sqrt{in.\ H_2O}$)	(ft^3)	(%)
1-01	5.0	0.23	0.81	811.12	314	60	60	0.48	2.86	102.9
1-02	10.0	0.24	0.84	814.00	313	64	61	0.49	2.88	100.9
1-03	15.0	0.18	0.63	816.49	310	66	62	0.42	2.49	100.2
2-01	20.0	0.31	1.10	819.73	314	67	63	0.56	3.24	99.6
2-02	25.0	0.29	1.00	822.88	317	68	63	0.54	3.15	100.1
2-03	30.0	0.27	0.95	825.96	316	69	63	0.52	3.08	101.3
3-01	35.0	0.30	1.10	829.20	317	66	63	0.55	3.24	101.5
3-02	40.0	0.27	0.95	832.23	318	68	63	0.52	3.03	99.9
3-03	45.0	0.22	0.77	835.01	313	68	63	0.47	2.78	101.1
4-01	50.0	0.23	0.81	837.85	318	67	63	0.48	2.84	101.5
4-02	55.0	0.20	0.70	840.48	317	69	63	0.45	2.63	100.5
4-03	60.0	0.17	0.60	842.93	314	68	63	0.41	2.45	101.4
Final	60.0	0.49	0.86	34.67	315	65				

Field Data Printout

Location: CA 1 & 2 Calciner Stack
Method: 5/202
Bar. Press. (in. Hg): 23.68
Test Run: 1
Testing Type: Particulate
Actual Moisture (%): 23.8
Client: Solvay Minerals, Inc.
Project No: 8190-1
Area (ft^2): 113.10
Nozzle Diameter (D_n): 0.250
Test Date: 1/22/98
O_2 (dry volume %): 13.4
Meter ΔH@: 1.6747
Filter No: 085103
CO_2 (dry volume %): 8.4
Meter Y_d: 1.0145
F 1/2 Beaker No: XX49
Start Time (approx.): 08:55
Pitot C_p: 0.84
B 1/2 In Beaker No: X90
Stop Time (approx.): 10:04
Static P: -0.3
B 1/2 Org. Beaker No: XX9
H_2O (condensate, ml): 200.1
Leak Rate Before: 0.008 cfm @ 14 "Hg
H_2O (silica, g): 13.8
Leak Rate After: 0.006 cfm @ 10 "Hg

Traverse Point	Run Time	Pitot ΔP_s	Sample ΔH	Metered	Stack T_s	Dry Gas Meter $T_{m\ in}$	Dry Gas Meter $T_{m\ out}$	$\sqrt{\Delta P_s}$ (calculated)	Volume (calculated)	Isokinetics (calculated)
	0.0	(in. H_2O)	(in. H_2O)	843.45 (ft^3)	(°F)	(°F)	(°F)	($\sqrt{in.\ H_2O}$)	(ft^3)	(%)
1-01	2.5	0.69	1.10	845.07	337	30	27	0.83	1.62	103.8
1-02	5.0	0.71	1.10	846.64	335	32	27	0.84	1.57	98.8
1-03	7.5	0.71	1.10	848.20	333	35	28	0.84	1.56	97.7
1-04	10.0	0.67	1.00	849.70	331	37	28	0.82	1.50	96.3
1-05	12.5	0.59	0.94	851.16	329	39	29	0.77	1.46	99.5
1-06	15.0	0.49	0.78	852.50	328	40	30	0.70	1.34	99.9
2-01	17.5	0.73	1.20	854.15	338	40	31	0.85	1.65	101.4
2-02	20.0	0.78	1.20	855.80	343	43	32	0.88	1.65	98.0
2-03	22.5	0.80	1.30	857.55	344	45	32	0.89	1.75	102.6
2-04	25.0	0.74	1.20	859.21	346	46	34	0.86	1.66	100.9
2-05	27.5	0.68	1.10	860.80	346	46	34	0.82	1.59	100.8
2-06	30.0	0.55	0.88	862.20	344	47	35	0.74	1.40	98.3
3-01	32.5	0.73	1.20	863.87	340	47	35	0.85	1.67	101.7
3-02	35.0	0.78	1.20	865.56	340	48	36	0.88	1.69	99.3
3-03	37.5	0.78	1.20	867.23	344	49	36	0.88	1.67	98.3
3-04	40.0	0.75	1.20	868.92	345	50	37	0.87	1.69	101.3
3-05	42.5	0.64	1.00	870.45	346	50	38	0.80	1.53	99.2
3-06	45.0	0.53	0.85	871.86	345	50	38	0.73	1.41	100.3
4-01	47.5	0.68	1.10	873.51	328	49	39	0.82	1.65	102.6
4-02	50.0	0.72	1.20	875.20	327	51	40	0.85	1.69	101.8
4-03	52.5	0.72	1.20	876.89	325	52	40	0.85	1.69	101.6
4-04	55.0	0.70	1.10	878.53	323	54	41	0.84	1.64	99.5
4-05	57.5	0.62	0.99	880.00	322	54	42	0.79	1.47	94.6
4-06	60.0	0.50	0.80	881.46	320	54	43	0.71	1.46	104.3
Final	60.0	0.82	1.08	38.01	336	40				

Field Data Printout

Location: CA 1 & 2 Calciner Stack
Test Run: 2
Client: Solvay Minerals, Inc.
Project No: 8190-1
Test Date: 1/22/98
Meter ΔH@: 1.6747
Meter Y_d: 1.0145
Pitot C_p: 0.84
Static P: -0.2
Leak Rate Before: 0.008 cfm @ 14 "Hg
Leak Rate After: 0.006 cfm @ 11 "Hg

Method: 5/202
Testing Type: Particulate
Area (ft^2): 113.10
Filter No: 085104
F 1/2 Beaker No: T16
B 1/2 In Beaker No: G21
B 1/2 Org. Beaker No: X1

Bar. Press. (in. Hg): 23.68
Actual Moisture (%): 22.7
Nozzle Diameter (D_n): 0.250
O_2 (dry volume %): 13.8
CO_2 (dry volume %): 8.0
Start Time (approx.): 11:05
Stop Time (approx.): 12:11
H_2O (condensate, ml): 186.1
H_2O (silica, g): 6.8

Traverse Point	Run Time	Pitot ΔP_s (in. H_2O)	Sample ΔH (in. H_2O)	Metered (ft^3)	Stack T_s (°F)	Dry Gas Meter $T_{m\ in}$ (°F)	Dry Gas Meter $T_{m\ out}$ (°F)	$\sqrt{\Delta P_s}$ (calculated) ($\sqrt{in.\ H_2O}$)	Volume (calculated) (ft^3)	Isokinetics (calculated) (%)
	0.0			881.65						
1-01	2.5	0.65	1.00	883.21	331	60	56	0.81	1.56	95.6
1-02	5.0	0.65	1.00	884.78	333	62	56	0.81	1.57	96.1
1-03	7.5	0.67	1.10	886.43	332	64	57	0.82	1.65	99.2
1-04	10.0	0.64	1.00	887.98	330	67	58	0.80	1.55	94.8
1-05	12.5	0.59	0.94	889.51	329	69	59	0.77	1.53	97.1
1-06	15.0	0.46	0.74	890.87	328	70	60	0.68	1.36	97.5
2-01	17.5	0.68	1.10	892.55	342	71	61	0.82	1.68	99.8
2-02	20.0	0.71	1.10	894.23	342	73	62	0.84	1.68	97.4
2-03	22.5	0.71	1.10	895.93	344	74	64	0.84	1.70	98.4
2-04	25.0	0.70	1.00	897.57	344	75	65	0.84	1.64	95.4
2-05	27.5	0.63	1.00	899.14	344	75	65	0.79	1.57	96.3
2-06	30.0	0.49	0.78	900.54	340	76	67	0.70	1.40	96.8
3-01	32.5	0.67	1.10	902.20	335	75	67	0.82	1.66	98.0
3-02	35.0	0.71	1.10	903.87	338	76	68	0.84	1.67	95.8
3-03	37.5	0.73	1.20	905.61	339	76	68	0.85	1.74	98.5
3-04	40.0	0.73	1.20	907.35	339	77	69	0.85	1.74	98.3
3-05	42.5	0.65	1.00	908.96	340	77	69	0.81	1.61	96.4
3-06	45.0	0.50	0.80	910.39	339	77	70	0.71	1.43	97.4
4-01	47.5	0.65	1.00	911.96	336	76	70	0.81	1.57	93.8
4-02	50.0	0.71	1.10	913.62	337	77	71	0.84	1.66	94.8
4-03	52.5	0.72	1.20	915.36	338	77	71	0.85	1.74	98.8
4-04	55.0	0.71	1.10	917.05	338	77	71	0.84	1.69	96.6
4-05	57.5	0.63	1.00	918.63	340	77	71	0.79	1.58	95.9
4-06	60.0	0.50	0.80	920.07	338	76	71	0.71	1.44	98.0
Final	60.0	0.80	1.02	38.42	337	69				

Field Data Printout

Location: CA 1 & 2 Calciner Stack
Method: 5/202
Bar. Press. (in. Hg): 23.68
Test Run: 3
Testing Type: Particulate
Actual Moisture (%): 22.6
Client: Solvay Minerals, Inc.
Project No: 8190-1
Area (ft^2): 113.10
Nozzle Diameter (D_n): 0.250
Test Date: 1/22/98
O_2 (dry volume %): 13.8
Meter ΔH@: 1.6747
Filter No: 085105
CO_2 (dry volume %): 8.0
Meter Y_d: 1.0145
F 1/2 Beaker No: XX75
Start Time (approx.): 12:50
Pitot C_p: 0.84
B 1/2 In Beaker No: F71
Stop Time (approx.): 14:04
Static P: -0.2
B 1/2 Org. Beaker No: X22
H_2O (condensate, ml): 192.2
Leak Rate Before: 0.005 cfm @ 13 "Hg
H_2O (silica, g): 7.1
Leak Rate After: 0.004 cfm @ 12 "Hg

Traverse Point	Run Time	Pitot ΔP_s	Sample ΔH	Metered	Stack T_s	Dry Gas Meter $T_{m\ in}$	Dry Gas Meter $T_{m\ out}$	$\sqrt{\Delta P_s}$ (calculated)	Volume (calculated)	Isokinetics (calculated)
	0.0	(in. H_2O)	(in. H_2O)	(ft^3) 920.25	(°F)	(°F)	(°F)	($\sqrt{in.\ H_2O}$)	(ft^3)	(%)
1-01	2.5	0.67	1.10	921.93	333	63	65	0.82	1.68	100.2
1-02	5.0	0.67	1.10	923.58	332	64	64	0.82	1.65	98.4
1-03	7.5	0.68	1.10	925.23	331	65	64	0.82	1.65	97.5
1-04	10.0	0.69	1.10	926.86	329	65	64	0.83	1.63	95.5
1-05	12.5	0.63	1.00	928.44	329	66	63	0.79	1.58	96.8
1-06	15.0	0.48	0.77	929.83	326	66	63	0.69	1.39	97.3
2-01	17.5	0.70	1.10	931.50	342	66	63	0.84	1.67	97.9
2-02	20.0	0.73	1.20	933.23	345	66	63	0.85	1.73	99.5
2-03	22.5	0.73	1.20	934.95	346	67	62	0.85	1.72	99.0
2-04	25.0	0.71	1.10	936.59	346	67	62	0.84	1.64	95.7
2-05	27.5	0.65	1.00	938.18	346	67	62	0.81	1.59	96.9
2-06	30.0	0.51	0.82	939.60	344	68	62	0.71	1.42	97.5
Leak Check	31.0			939.70					-0.10	
3-01	32.5	0.74	1.20	941.41	335	67	63	0.86	1.81	102.7
3-02	35.0	0.77	1.20	943.16	340	68	63	0.88	1.75	97.5
3-03	37.5	0.80	1.30	944.96	341	70	63	0.89	1.80	98.3
3-04	40.0	0.80	1.30	946.77	342	71	64	0.89	1.81	98.8
3-05	42.5	0.71	1.10	948.45	342	72	64	0.84	1.68	97.1
3-06	45.0	0.57	0.91	949.96	341	72	64	0.75	1.51	97.3
4-01	47.5	0.75	1.20	951.68	336	72	65	0.87	1.72	96.3
4-02	50.0	0.76	1.20	953.42	338	74	65	0.87	1.74	96.8
4-03	52.5	0.78	1.20	955.16	340	74	66	0.88	1.74	95.5
4-04	55.0	0.80	1.30	956.95	341	75	66	0.89	1.79	97.1
4-05	57.5	0.70	1.10	958.65	342	75	67	0.84	1.70	98.4
4-06	60.0	0.61	0.98	960.20	341	76	67	0.78	1.55	96.0
Final	60.0	0.831	1.1075	39.85	339	66				

SOLVAY MINERALS, INC.
CAE Job No. 8190-1
1/21/98

Sampling Run Results
Methane 1/21/1998
CA 3

	Run 1			Run 2			Run 3		
	Conc, ppmw	Time	Area	Conc, ppmw	Time	Area	Conc, ppmw	Time	Area
Inj 1	246	9:55	383040	250	11:45	389742	228	13:25	354963
Inj 2	239	10:14	372243	223	12:03	347439	265	13:42	412920
Inj 3	270	10:25	420374	272	12:15	422869	300	13:52	466420
Inj 4	243	10:39	378568	232	12:31	361580	270	14:12	420146
Inj 5				221	12:42	344421	261	14:20	406042
Average	**249.5**			**239.6**			**264.8**		

SOLVAY2016_6_002362

SOLVAY MINERALS, INC.
CAE Job No. 8190-1
1/22/98

Sampling Run Results
Methane 1/22/1998
CA 1&2

	Run 1			Run 2			Run 3		
	Conc, ppmw	Time	Area	Conc, ppmw	Time	Area	Conc, ppmw	Time	Area
Inj 1	657	8:56	1008530	592	11:11	895539	468	12:50	713406
Inj 2	636	9:05	976726	442	11:21	674863	457	12:57	696910
Inj 3	638	9:12	979605	537	11:27	814877	505	13:08	768320
Inj 4	562	9:20	863957	508	11:34	772282	494	13:18	751066
Inj 5	627	9:28	964132	467	11:40	712614	501	13:26	762255
Inj 6	546	9:34	838132	503	11:47	764279	487	13:33	740949
Inj 7	581	9:40	892248	530	11:56	804976	399	13:41	611148
Inj 8	564	9:51	866666	513	12:04	779804	434	13:51	662463
Average	**601.4**			**511.5**			**468.1**		

SOLVAY2016_6_002363

F

LABORATORY DATA

F

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA-3 Calciner Stack

PARTICULATE WEIGHT SHEET

Run No.	Blank	1	2	3
Date (1998)		January 21	January 21	January 21
Start Time (approx.)		09:55	11:45	13:24
Stop Time (approx.)		11:04	12:54	14:31
Front Half DI H_2O Wash				
ID Identifier	F52	F38	X62	F57
Sample volume (ml)	200	170	155	200
Aliquot used (ml)	200	170	155	200
Tare weight (g)	122.3401	122.3161	114.0854	122.3076
Gross weight (g)	122.3406	122.3171	114.0882	122.3101
Correction factor (g)		0.0004	0.0004	0.0005
m_n Net weight (g)	0.0005	0.0006	0.0024	0.0020
Front Half Particulate Filter				
ID Identifier		085100	085101	085102
Tare weight (g)		0.3730	0.3677	0.3738
Gross weight (g)		0.3744	0.3691	0.3764
m_n Net weight (g)		0.0014	0.0014	0.0026
Total Front Half Particulate				
m_n Matter collected (g)		0.0020	0.0038	0.0046
Back Half Inorganic Particulate				
ID Identifier	F52	G34	B66	F56
Sample volume (ml)	200	685	825	860
H_2O Condensate		240	245	244
Sample volume minus-H_2O		445	580	616
Aliquot used (ml)	200	685	825	860
Tare weight (g)	122.3401	106.5879	104.4895	123.4815
Gross weight (g)	122.3406	106.5962	104.4994	123.4906
Correction factor (g)		0.0011	0.0015	0.0015
m_n Net weight (g)	0.0005	0.0072	0.0084	0.0076
Back Half Organic Particulate				
ID Identifier	X66	T5	XX87	X71
Sample volume (ml)	200	410	370	405
Aliquot used (ml)	200	410	370	405
Tare weight (g)	110.8292	106.4874	109.8344	112.0079
Gross weight (g)	110.8295	106.5386	109.8789	112.0545
Correction factor (g)		0.0006	0.0006	0.0006
m_n Net weight (g)	0.0003	0.0506	0.0439	0.0460
Total Back Half Particulate				
m_n Matter collected (g)		0.0578	0.0524	0.0536
Total Particulate				
m_n Matter collected (g)		0.0597	0.0562	0.0582

The back half fractions are the soluble fractions.
The total particulate includes all of the front half and back half fractions.

SOLVAY MINERALS, INC.
CAE Project No: 8190-1
CA 1 & 2 Calciner Stack

PARTICULATE WEIGHT SHEET

Run No.	Blank	1	2	3
Date (1998)		January 22	January 22	January 22
Start Time (approx.)		08:55	11:05	12:50
Stop Time (approx.)		10:04	12:11	14:04
Front DI H_2O Wash				
ID Identifier	F52	XX49	T16	XX75
Sample volume (ml)	200	145	190	110
Aliquot used (ml)	200	145	190	110
Tare weight (g)	122.3401	106.7337	107.5267	106.7998
Gross weight (g)	122.3406	106.7357	107.5294	106.8018
Correction factor (g)		0.0004	0.0005	0.0003
m_n Net weight (g)	0.0005	0.0016	0.0022	0.0017
Front Half Particulate Filter				
ID Identifier		085103	085104	085105
Tare weight (g)		0.3728	0.3748	0.3714
Gross weight (g)		0.3756	0.3779	0.3732
m_n Net weight (g)		0.0028	0.0031	0.0018
Total Front Half Particulate				
m_n Matter collected (g)		0.0044	0.0053	0.0035
Back Half Inorganic Particulate				
ID Identifier	F52	X90	G21	F71
Sample volume (ml)	200	762	772	785
H_2O Condensate		200	186	192
Sample volume minus-H_2O		562	586	593
Aliquot used (ml)	200	762	772	785
Tare weight (g)	122.3401	105.3634	108.5419	122.7495
Gross weight (g)	122.3406	105.3713	108.5521	122.7560
Correction factor (g)		0.0014	0.0015	0.0015
m_n Net weight (g)	0.0005	0.0065	0.0087	0.0050
Back Half Organic Particulate				
ID Identifier	X66	XX9	X1	X22
Sample volume (ml)	200	385	420	430
Aliquot used (ml)	200	385	420	430
Tare weight (g)	110.8292	110.2880	113.8470	112.3180
Gross weight (g)	110.8295	110.3268	113.9046	112.3549
Correction factor (g)		0.0006	0.0006	0.0006
m_n Net weight (g)	0.0003	0.0382	0.0570	0.0363
Total Back Half Particulate				
m_n Matter collected (g)		0.0447	0.0657	0.0413
Total Particulate				
m_n Matter collected (g)		0.0492	0.0710	0.0448

The back half fractions are the soluble fractions.
The total particulate includes all of the front half and back half fractions.

Particulate Testing
Weight Sheet

Page 1 of 1

Client SOLVAY MINERALS	Project Number 8190	Analyst M. HYNES
Plant GREEN RIVER, WY	Unit CA1&2 AND CA3	Balance AND
Test Date JAN 21&22, 1998		

Description	Wt. No.	I.D. and Sample Description[1]	Sample volume (ml)[2]	Date/ Time	Gross Weight (g)	Tare Weight (g)	Date/ Time	Net Weight (g)
Type FILTER	1	085100		1/27 0900	0.3744	0.3730	1/28 0952	
Run 1		TAN		1/28 0935	0.3744	0.3729	1/9 1051	
Location CA-3			T F B		0.3744	0.3730		
Type FILTER	2	085101		1/27 0901	0.3671	0.3676	1/8 0951	
Run 2		TAN		1/28 0936	0.3680	0.6677	1/9 1052	
Location CA-3			T F B		0.3691	0.6677		
Type FILTER	3	085102		1/27 0902	0.3764	0.3737	1/8 0952	
Run 3		TAN		1/28 0937	0.3763	0.3738	1/9 1049	
Location CA3			T F B		0.3764	0.3738		
Type FILTER	4	085103		1/27 0903	0.3756	0.3727	1/8 0954	
Run 1		TAN		1/28 0938	0.3755	0.3728	1/9 1049	
Location CA1&2			T F B		0.3756	0.3728		
Type FILTER	5	085104		1/27 0904	0.3780	0.3748	1/8 0955	
Run 2		TAN		1/28 0939	0.3778	0.3748	1/9 1048	
Location CA1&2			T F B		0.3779	0.3748		
Type FILTER	6	085105		1/27 0905	0.3731	0.3714	1/8 0956	
Run 3		TAN		1/28 0940	0.3732	0.3714	1/9 1048	
Location CA1&2			T F B		0.3732	0.3714		
Type	7							
Run								
Location			T F B					
Type	8							
Run								
Location			T F B					
Type	9							
Run								
Location			T F B					
Type	10							
Run								
Location			T F B					

[1] Note appearance of particulate
[2] Two volumes (e.g. 500/100) indicate an aliquot was taken.
Indicate (T)himble, (F)ilter, or (B)eaker in box below.

CAE P4 ver 1.0
D:\vpforms\weight

SOLVAY2016-8-302368

Particulate Testing
Weight Sheet

Client	Solvay Minerals	Project Number	8190	Analyst	D. Rhoades
Plant	Grainger, WY	Unit	Calciners	Balance	Ohaus GA 200D
Test Date	1/23/98	Method	5/202		

Description		I.D. and Sample Description*	Sample volume (ml)**	Date/Time		Gross Weight (g)	Tare Weight (g)	Date/Time		Net Weight (g)
Type	Front 1/2 H_2O Rinsate	F52	200	1/29	12:55	122.3407	122.3401	1/23	14:50	
Run	Blank	Clean		1/30	13:00	122.3405				
Location	All	-01	Beaker			122.3405				0.0004
Type	Front 1/2 H_2O Rinsate	XX49	145	1/29	12:55	106.7355	106.7337	1/26	09:40	
Run	1	Brown Particulate		1/30	13:00	106.7358				
Location	Calciner 1 & 2	-02	Beaker			106.7358				0.0021
Type	Front 1/2 H_2O Rinsate	T16	190	1/29	12:45	107.5291	107.5267	1/23	14:45	
Run	2	Brown Particulate		1/30	13:05	107.5296				
Location	Calciner 1 & 2	-03	Beaker			107.5296				0.0029
Type	Front 1/2 H_2O Rinsate	XX75	110	1/29	12:45	106.8016	106.7998	1/23	14:45	
Run	3	Brown Particulate		1/30	13:05	106.8020				
Location	Calciner 1 & 2	-04	Beaker			106.8020				0.0022
Type	Front 1/2 H_2O Rinsate	F38	170	1/29	12:55	122.3171	122.3161	1/26	09:35	
Run	1	Brown Particulate		1/30	13:05	122.3171				
Location	Calciner 3	-08	Beaker			122.3171				0.0010
Type	Front 1/2 H_2O Rinsate	X62	155	1/29	12:45	114.0884	114.0854	1/26	09:35	
Run	2	Brown Particulate		1/30	13:05	114.0880				
Location	Calciner 3	-09	Beaker			114.0880				0.0026
Type	Front 1/2 H_2O Rinsate	F57	200	1/29	12:45	122.3102	122.3076	1/26	09:35	
Run	3	Brown Particulate		1/30	13:05	122.3099				
Location	Calciner 3	-10	Beaker			122.3099				0.0023
Type										
Run										
Location										
Type										
Run										
Location										
Type										
Run										
Location										

*Description of Particulate

Analyst Signature: D. J. Rhoades

** Two volumes (e.g. 500/100) indicate an aliquot was taken.
Indicate (T)himble, (F)ilter, or (B)eaker in box below.

CAE
Clean Air Engineering

SOLVAY2016_6_002369

Particulate Testing
Weight Sheet

Client	Solvay Minerals	Project Number	8190	Analyst	D. Rhoades
Plant	Grainger, WY	Unit	Calciners	Balance	Ohaus GA 200D
Test Date	1/23/98	Method	5/202		

Description		I.D. and Sample Description*	Sample volume (ml)**	Date/Time		Gross Weight (g)	Tare Weight (g)	Date/Time		Net Weight (g)
Type	Back 1/2 H_2O	X90	762	2/3	08:30	105.3713	105.3634	1/23	14:45	
Run	1	Brown Particulate		2/3	14:30	105.3712				
Location	Calciner 1 & 2	-05	Beaker			105.3712				0.0078
Type	Back 1/2 H_2O	G21	772	2/3	08:30	108.5522	108.5419	1/23	14:40	
Run	2	Brown Particulate		2/3	14:30	108.5520				
Location	Calciner 1 & 2	-06	Beaker			108.5520				0.0101
Type	Back 1/2 H_2O	F71	785	2/3	08:30	122.7562	122.7495	1/21	09:35	
Run	3	Brown Particulate		2/3	14:35	122.7557				
Location	Calciner 1 & 2	-07	Beaker			122.7557				0.0062
Type	Back 1/2 H_2O	G34	685	2/3	08:30	106.5960	106.5879	1/23	14:35	
Run	1	Brown Particulate		2/3	14:30	106.5964				
Location	Calciner 3	-11	Beaker			106.5964				0.0085
Type	Back 1/2 H_2O	B66	825	2/3	08:30	104.4991	104.4895	11/12	08:50	
Run	2	Brown Particulate		2/3	14:30	104.4996				
Location	Calciner 3	-12	Beaker			104.4996				0.0101
Type	Back 1/2 H_2O	F56	860	2/3	08:30	123.4908	123.4815	1/21	09:40	
Run	3	Brown Particulate		2/3	14:30	123.4903				
Location	Calciner 3	-13	Beaker			123.4903				0.0088
Type										
Run										
Location										
Type										
Run										
Location										
Type										
Run										
Location										
Type										
Run										
Location										

*Description of Particulate

Analyst Signature: [signature]

** Two volumes (e.g. 500/100) indicate an aliquot was taken.
Indicate (T)himble, (F)ilter, or (B)eaker in box below.

CAE
Clean Air Engineering

SOLVAY2016_6_002370

Particulate Testing
Weight Sheet

Client	Solvay Minerals	Project Number	8190	Analyst	D. Rhoades
Plant	Grainger, WY	Unit	Calciners	Balance	Ohaus GA 200D
Test Date	1/23/98	Method	5/202		

Description		I.D. and Sample Description*	Sample volume (ml)**	Date/Time		Gross Weight (g)	Tare Weight (g)	Date/Time		Net Weight (g)
Type	Back 1/2 MeCl	X66	200	2/3	08:35	110.8297	110.8292	1/23	11:45	
Run	Blank	Clean		2/3	14:35	110.8293				
Location	All	-14	Beaker			110.8293				0.0001
Type	Back 1/2 MeCl	XX9	385	2/3	08:35	110.3268	110.2880	1/26	09:35	
Run	1	Oily Brown Particulate		2/3	14:35	110.3268				
Location	Calciner 1 & 2	-15	Beaker			110.3268				0.0388
Type	Back 1/2 MeCl	X1	420	2/3	08:35	113.9048	113.8470	1/23	14:40	
Run	2	Oily Brown Particulate		2/3	14:35	113.9044				
Location	Calciner 1 & 2	-16	Beaker			113.9044				0.0574
Type	Back 1/2 MeCl	X22	430	2/3	08:30	112.3554	112.3180	1/23	14:30	
Run	3	Oily Brown Particulate		2/3	14:35	112.3549				
Location	Calciner 1 & 2	-17	Beaker			112.3549				0.0369
Type	Back 1/2 MeCl	T5	410	2/3	08:35	106.5387	106.4874	1/23	14:40	
Run	1	Oily Brown Particulate		2/3	14:35	106.5384				
Location	Calciner 3	-18	Beaker			106.5384				0.0510
Type	Back 1/2 MeCl	XX87	370	2/3	08:35	109.8790	109.8344	1/21	09:45	
Run	2	Oily Brown Particulate		2/3	14:35	109.8787				
Location	Calciner 3	-19	Beaker			109.8787				0.0443
Type	Back 1/2 MeCl	X71	405	2/3	08:35	112.0543	112.0079	1/23	14:35	
Run	3	Oily Brown Particulate		2/3	14:35	112.0547				
Location	Calciner 3	-20	Beaker			112.0547				0.0468
Type										
Run										
Location										
Type										
Run										
Location										
Type										
Run										
Location										

*Description of Particulate

Analyst Signature: D. Rhoades

** Two volumes (e.g. 500/100) indicate an aliquot was taken.
Indicate (T)himble, (F)ilter, or (B)eaker in box below.

CAE
Clean Air Engineering

G

CHAIN OF CUSTODY

G

CHAIN OF CUSTODY RECORD

№ 11031

PROJ. NO. 8190
DEPT. NO. 65
PROJECT NAME: SOLVAY MINERALS, INC
SAMPLERS: (Signature) Martin Hayes

LAB NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	NO. OF CONTAINERS	FILTER 5/20z*	F½ H2O 5/20z	B½ H2O 5/20z	F½ MeCl2 ARCHIVE** 5/20z	B½ MeCl2 5/20z		REMARKS
	R1	1/21/98	0955	CA3	5	1	1	1	1	1		FILTER No 085100
	R2	1/21/98	1145	CA3	5	1	1	1	1	1		" " 085101
	R3	1/21/98	1324	CA3	5	1	1	1	1	1		" " 085102
	R1	1/22/98	0855	CA1+2	5	1	1	1	1	1		FILTER No. 085103
	R2	1/22/98	1105	CA 1+2	5	1	1	1	1	1		" " 085104
	R3	1/22/98	1255	CA 1+2	5	1	1	1	1	1		" " 085105
												*FILTER ANALYSIS TO BE PERFORDED BY CAE DENVER
												**F½ MeCl2 ARCHIVED AT CAE DENVER

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Martin Hayes	1/26/98 1400				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by:	Date / Time		

REMARKS:

CAE
Clean Air Engineering
500 W. Wood Street
Palatine, IL 60067
708/991-3300

WHITE-PRINT FILE COPY YELLOW-RECORD FILE COPY PINK- RETAIN COPY GOLD-CUSTOMER COPY

G-1

SOLVAY2016_6_0028874

H

OPERATING DATA

H

CA-3	RUN #1	9:55-11:04
STACK TEST	RUN #2	11:45-12:54
1/21/98	RUN #3	13:24-14:31

TIME	ORE FEED RATE TPH	FUEL FLOW SCFM	SPILL TEMP. ^0F	OFF GAS TEMP. ^0F	CALCINER DRAFT H_20	OFF GAS O_2	OFF GAS CH_4	CALCINER AMPS	ELEVATOR AMPS
0:00	181.62	3019.10	307.49	423.52	-2.50	NA	NA	141.78	22.88
1:00	184.91	2996.34	303.11	422.65	-2.50	NA	NA	141.75	22.75
2:00	185.40	3036.36	297.34	421.79	-2.49	NA	NA	143.18	22.78
3:00	185.49	3044.24	301.77	421.76	-2.51	NA	NA	139.21	22.63
4:00	192.23	3159.61	304.80	424.62	-2.49	NA	NA	136.13	22.90
5:00	199.50	3125.88	306.15	421.33	-2.50	NA	NA	140.88	22.17
6:00	182.91	2901.65	294.32	415.53	-2.51	NA	NA	149.62	22.15
7:00	182.34	3003.56	300.36	421.66	-2.49	NA	NA	144.99	22.33
8:00	192.87	3136.92	303.55	427.27	-2.50	NA	NA	138.33	22.24
9:00	190.75	3026.90	297.69	417.87	-2.50	NA	NA	144.83	22.48
10:00	185.22	2993.61	302.01	422.74	-2.50	NA	NA	143.93	22.51
11:00	185.45	2980.06	306.72	420.59	-2.50	NA	NA	141.20	22.89
12:00	183.18	2953.60	300.99	418.61	-2.49	NA	NA	145.91	22.85
13:00	188.32	3037.99	305.70	426.92	-2.50	NA	NA	141.14	22.88
14:00	184.79	2911.25	302.46	418.59	-2.51	NA	NA	144.59	23.19
15:00	186.79	2985.34	301.43	418.19	-2.49	NA	NA	146.84	23.35
16:00	190.73	3079.84	299.74	428.19	-2.50	NA	NA	140.34	23.21
17:00	192.57	3069.50	303.54	429.75	-2.50	NA	NA	144.71	23.37
18:00	190.94	3075.46	293.72	422.30	-2.49	NA	NA	144.58	22.75
19:00	191.77	3158.32	297.61	430.09	-2.51	NA	NA	137.21	22.87
20:00	199.76	3248.62	301.29	435.29	-2.50	NA	NA	134.76	22.91
21:00	186.93	3057.50	305.26	425.37	-2.49	NA	NA	140.57	22.93
22:00	188.55	3113.25	314.83	435.26	-2.50	NA	NA	139.19	23.01
23:00	191.92	3168.25	310.37	436.58	-2.50	NA	NA	140.20	22.88

SOLVAY2016_6_002377

Current Date : 01-22-1998
Current Time : 09:03:25

Daily Parameter Report - Auxiliary Averages
Solvay Minerals, Inc.

Logger Name : SOLVAY1
Logger Id : 01

Stack :
Boiler/Unit : SM05

Parameter : OP_SM05
Units : PERCENT

CA-3 OPACITY

Date	Time 006M	Minute 00	06	12	18	24	30	36	42	48	54
01/21/98	00:00	5.5	5.5	5.5	5.6	5.5	C	C	5.5	5.5	5.5
01/21/98	01:00	5.5	5.4	5.5	5.4	5.4	5.5	5.4	5.5	5.5	5.4
01/21/98	02:00	5.5	5.4	5.5	5.5	5.4	5.4	5.5	5.5	5.6	5.4
01/21/98	03:00	5.5	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4
01/21/98	04:00	5.5	5.4	5.6	5.6	5.5	5.6	5.6	5.5	5.4	5.5
01/21/98	05:00	5.6	5.5	5.5	5.6	5.5	5.5	5.5	5.5	5.6	5.5
01/21/98	06:00	5.7	5.7	5.8	5.7	5.5	5.7	5.5	5.5	5.5	5.4
01/21/98	07:00	5.4	5.5	5.6	5.5	5.4	5.6	5.5	5.6	5.6	5.5
01/21/98	08:00	5.5	5.6	5.5	5.6	5.5	C	C	5.5	5.5	5.4
01/21/98	09:00	5.5	5.4	5.4	5.4	5.4	5.5	5.5	5.7	5.5	5.6
01/21/98	10:00	5.6	5.4	5.5	5.5	5.5	5.4	5.5	5.6	5.5	5.4
01/21/98	11:00	5.4	5.5	5.5	5.4	5.4	5.5	5.5	5.5	5.5	5.5
01/21/98	12:00	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
01/21/98	13:00	5.5	5.5	5.6	5.6	5.6	5.6	5.5	5.5	5.6	5.5
01/21/98	14:00	5.6	5.5	5.6	5.6	5.5	5.6	5.4	5.5	5.6	5.5
01/21/98	15:00	5.6	5.5	5.6	5.6	5.5	5.5	5.5	5.6	5.6	5.5
01/21/98	16:00	5.6	5.5	5.6	5.5	5.4	C	C	5.6	5.6	5.6
01/21/98	17:00	5.7	5.5	5.6	5.7	5.5	5.5	5.4	5.5	5.5	5.4
01/21/98	18:00	5.5	5.4	5.5	5.5	5.4	5.5	5.3	5.5	5.5	5.4
01/21/98	19:00	5.4	5.4	5.6	5.5	5.5	5.5	5.4	5.5	5.5	5.4
01/21/98	20:00	5.5	5.5	5.6	5.6	5.5	5.6	5.6	5.7	5.7	5.7
01/21/98	21:00	5.7	5.6	5.6	5.5	5.4	5.5	5.5	5.5	5.6	5.5
01/21/98	22:00	5.5	5.3	5.5	5.5	5.5	5.5	5.5	5.6	5.5	5.5
01/21/98	23:00	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6

Max	5.8
Min	5.3
Mean	5.5
Records	234

Status: '<' - Less than ##% Data, 'P' - Power Fail, 'D' - Disabled, 'T' - Out-of-Control, 'F' - Boiler Off-Line,
Flags: 'B' - Bad Status, 'C' - Calibration, 'M' - Maintenance, 'O' - Analog Over, 'A' - Arithmetic Error,
'U' - Analog Underrange, '+' - Maximum, '-' - Minimum, 'R' - Rate of Change, 'H' - High-High Alrm,
'L' - Low-Low Alarm, 'h' - High Alarm, 'l' - Low Alarm, 'J' - High Rate of Change, 'j' - Low Rate of Change,
'V' - DIS #1 Obs, 'W' - DIS #2 Obs, 'X' - DIS #3 Obs, 'Y' - DIS #4 Obs, 'Z' - DIS #5 Obs.

SOLVAY2016_6_002378

STACK TEST
CA3 1/21/98

run #1	1	2	3	4	5	6
	9:55-11:04					
ac volts	250	320	240	300	320	320
ac amp	150	320	180	330	320	310
dc kv	38	40	38	36	40	42
dcmillamp	500	1750	800	1750	1750	1750
%	30	100	60	100	100	100
run #2	11:45-12:54					
ac volts	220	310	240	300	320	320
ac amp	110	320	240	320	315	310
dc kv	38	41	36	37	41	42
dcmillamp	600	1740	800	1750	1700	1750
%	29	100	50	100	100	100
run #3	13:44-14:31					
ac volts	220	310	240	320	320	320
ac amp	110	310	240	320	310	320
dc kv	38	42	36	37	41	42
dcmillamp	600	1750	800	1700	1700	1750
%	30	100	65	100	100	100

during run #3 the vibrators were turned off and bottom of precip was filled with product
operator turned on vibrators and got a sharp decrease in nox and a increase in co and voc on instrum
possible an increase of O2 into the system

CA-1/2	RUN #1	8:55-10:04						
STACK TEST	RUN #2	11:05-12:11						
1/22/98	RUN #3	12:50-14:04						
TIME	ORE FEED RATE	FUEL FLOW	SPILL TEMP.	OFF GAS TEMP.	CALCINER DRAFT	DRAG CONVEYOR	OFF GAS	OFF GAS
	TPH	SCFM	^0F	^0F	H_2O	AMPS	O_2	CH_4
0:00	144.71	2600.20	318.46	369.21	-2.42	33.30	10.49	0.03
1:00	46.64	2564.22	291.68	309.40	-2.65	29.35	14.91	0.03
2:00	149.49	1178.13	288.33	352.91	-2.49	32.83	10.13	0.03
3:00	149.40	2329.72	303.46	369.70	-2.39	34.46	9.70	0.03
4:00	149.20	2657.11	312.20	366.25	-2.61	33.80	10.11	0.03
5:00	147.42	2644.28	314.73	367.32	-2.40	33.33	9.85	0.03
6:00	146.36	2623.18	318.90	369.82	-2.55	33.09	10.23	0.03
7:00	154.74	2548.19	302.84	364.81	-2.45	33.73	9.79	0.03
8:00	155.98	2666.72	290.93	366.35	-2.52	34.14	10.03	0.03
9:00	156.26	2687.61	285.29	368.00	-2.49	34.07	10.11	0.03
10:00	150.95	2695.29	292.41	369.74	-2.46	33.28	10.40	0.03
11:00	150.15	2627.86	317.69	363.27	-2.63	32.89	10.41	0.03
12:00	149.69	2512.22	301.88	372.94	-2.37	34.28	10.42	0.03
13:00	147.95	2622.87	314.45	375.11	-2.63	33.55	10.82	0.03
14:00	139.54	2590.64	332.18	377.27	-2.37	32.58	11.00	0.03
15:00	139.68	2422.96	322.32	374.84	-2.55	32.79	11.32	0.03
16:00	139.41	2475.09	325.13	376.16	-2.52	32.75	11.11	0.03
17:00	139.81	2473.07	327.18	375.37	-2.47	32.67	11.29	0.03
18:00	140.98	2463.28	330.91	373.93	-2.57	33.08	11.39	0.04
19:00	136.63	2473.62	324.42	372.36	-2.40	32.56	11.44	0.04
20:00	129.00	2489.46	333.77	368.87	-2.60	31.14	11.00	0.04
21:00	128.31	2251.43	331.03	369.86	-2.41	32.50	10.91	0.04
22:00	128.14	2269.39	335.72	364.55	-2.58	32.30	10.93	0.04
23:00	128.21	2172.76	330.44	357.77	-2.42	32.84	10.88	0.04
TIME	ORE FEED RATE	FUEL FLOW	SPILL TEMP.	OFF GAS TEMP.	CALCINER DRAFT	DRAG CONVEYOR	OFF GAS	OFF GAS
	TPH*	SCFM	^0F	^0F	H_2O	AMPS	O_2	CH_4
0:00	139.00	2190.95	291.25	415.45	-2.43	39.09	9.83	0.01
1:00	139.00	2891.86	267.38	337.17	-2.65	34.35	15.70	0.01
2:00	139.00	1255.83	239.75	348.08	-2.50	38.32	10.43	0.01
3:00	139.00	2530.89	277.62	404.82	-2.39	39.90	9.71	0.01
4:00	139.00	3017.24	293.39	435.94	-2.61	39.28	9.73	0.01
5:00	139.00	3078.04	309.22	438.44	-2.40	38.66	9.87	0.01
6:00	139.00	3040.75	309.87	438.65	-2.55	38.30	9.86	0.01
7:00	139.00	2991.89	300.21	430.14	-2.45	39.03	9.62	0.01
8:00	139.00	3096.94	285.86	436.18	-2.52	39.51	9.57	0.01
9:00	139.00	3157.04	285.53	438.73	-2.50	39.54	9.55	0.01
10:00	139.00	3173.32	298.81	440.19	-2.46	38.56	9.67	0.01
11:00	139.00	3030.31	319.01	430.96	-2.63	38.24	9.69	0.01
12:00	139.00	2931.76	298.32	431.01	-2.37	38.94	9.74	0.01
13:00	139.00	2979.01	300.95	432.06	-2.63	38.90	9.71	0.01
14:00	139.00	2955.29	323.54	429.53	-2.37	37.67	10.02	0.01
15:00	139.00	2759.54	314.94	424.34	-2.55	38.23	9.89	0.01
16:00	139.00	2765.25	319.23	427.13	-2.52	38.16	9.95	0.01
17:00	139.00	2774.12	324.75	425.14	-2.46	37.92	9.91	0.01
18:00	139.00	2754.93	320.30	414.22	-2.57	38.39	9.99	0.01
19:00	139.00	2737.87	320.94	419.12	-2.40	37.87	9.90	0.01
20:00	139.00	2801.69	335.37	416.63	-2.60	36.67	10.31	0.01
21:00	139.00	2554.58	325.73	409.56	-2.41	37.27	10.19	0.01
22:00	139.00	2562.15	331.26	404.68	-2.58	37.25	10.34	0.01
23:00	139.00	2468.64	325.24	394.98	-2.42	37.98	10.26	0.01
	FEED RATE CALCULATED VOLUMETRICALLY							

SOLVAY2016_6_002380

C[redacted]t D[redacted] 01-[redacted]998 [redacted]
Current Time : 09:19:47

Daily Parameter Report - Auxiliary Averages
Solvay Minerals, Inc.

Logger Name : SOLVAY1
Logger Id : 01

Stack :
Boiler/Unit : SM03

Parameter : OP_SM03
Units : PERCENT

CA-1/2 OPACITY

Date	Time 006M	00	06	12	18	24	30	36	42	48	54
01/22/98	00:00	2.8	2.8	2.8	C	C	3.0	2.9	3.0	2.8	2.7
01/22/98	01:00	2.7	2.6	2.5	2.5	2.5	2.6	2.7	2.7	2.7	5.2
01/22/98	02:00	3.5	5.7	5.5	5.2	5.9	4.3	3.5	4.4	3.2	3.1
01/22/98	03:00	3.3	3.2	3.3	3.2	3.0	3.2	3.1	3.0	3.2	3.0
01/22/98	04:00	3.0	3.2	3.1	3.1	3.2	3.2	3.2	3.3	3.1	3.0
01/22/98	05:00	3.1	3.1	3.1	3.1	3.1	3.2	3.1	3.2	3.2	3.2
01/22/98	06:00	3.3	3.3	3.4	3.4	3.4	3.4	3.5	3.4	3.0	3.0
01/22/98	07:00	2.9	2.8	2.8	2.9	2.9	2.9	2.9	3.0	3.1	3.1
01/22/98	08:00	3.2	3.0	3.1	C	C	3.1	3.1	3.1	3.0	2.9
01/22/98	09:00	3.0	3.0	3.0	3.0	3.0	3.0	2.9	2.8	2.7	2.7
01/22/98	10:00	2.7	2.7	2.8	2.8	2.8	2.9	2.8	2.8	2.7	2.7
01/22/98	11:00	2.8	2.8	2.8	2.8	2.9	2.9	2.8	2.7	2.5	2.4
01/22/98	12:00	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.1
01/22/98	13:00	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1
01/22/98	14:00	2.3	2.2	2.3	2.2	2.2	2.1	2.2	2.3	2.1	2.3
01/22/98	15:00	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0
01/22/98	16:00	2.1	2.2	2.3	C	C	2.3	2.2	2.3	2.3	2.3
01/22/98	17:00	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.4
01/22/98	18:00	2.5	2.5	2.5	2.5	2.4	2.3	2.3	2.3	2.3	2.2
01/22/98	19:00	2.2	2.2	2.1	2.0	2.1	2.0	2.0	2.0	1.9	2.0
01/22/98	20:00	1.9	2.0	1.9	2.0	2.0	1.9	1.9	1.8	1.8	1.8
01/22/98	21:00	1.8	1.8	1.8	2.0	1.9	1.9	1.9	2.0	2.0	1.9
01/22/98	22:00	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.0
01/22/98	23:00	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Max	5.9
Min	1.8
Mean	2.6
Records	234

Status: '<' - Less than ##% Data, 'P' - Power Fail, 'D' - Disabled, 'T' - Out-of-Control, 'F' - Boiler Off-Line,
Flags: 'B' - Bad Status, 'C' - Calibration, 'M' - Maintenance, 'O' - Analog Over, 'A' - Arithmetic Error,
'U' - Analog Underrange, '+' - Maximum, '-' - Minimum, 'R' - Rate of Change, 'H' - High-High Alrm,
'L' - Low-Low Alarm, 'h' - High Alarm, 'l' - Low Alarm, 'J' - High Rate of Change, 'j' - Low Rate of Change,
'V' - DIS #1 Obs, 'W' - DIS #2 Obs, 'X' - DIS #3 Obs, 'Y' - DIS #4 Obs, 'Z' - DIS #5 Obs.

SOLVAY2016_6_002381

SOURCE: CA-1/2
AQD #17
TEST DATE: 1/22/98

RUN #1 8:55-10:04	FIELD	AMP	VOLT	MA	KV	SCR	KW	S/M
	1A	114	344	869	31	45	39	0
	1B	180	384	1359	41	25	70	0
	1C	173	377	1280	39	45	65	0
	1D	156	403	1219	42	0	63	0
	1E	180	367	1403	39	37	67	0
	1F	187	451	1399	39	45	84	0
	2A	5	134	23	19	144	2	12
	2B	126	395	802	40	66	43	17
	2C	187	465	1399	39	46	87	0
	2D	182	419	1407	33	53	76	0
	2E	188	433	1407	34	56	80	0
	2F	187	432	1399	28	59	81	0
RUN #2 11:05-12:11	FIELD							
	1A	115	343	877	31	45	39	0
	1B	179	388	1335	41.4	25	69	0
	1C	171	381	1256	39.6	45	64	0
	1D	151	408	1180	42.3	0	62	0
	1E	179	373	1403	39.7	33	67	0
	1F	187	453	1403	39.8	34	83	0
	2A	6	140	47	10.8	146	1	13
	2B	154	415	1122	39.8	58	51	17
	2C	187	460	1399	37.5	52	86	0
	2D	186	422	1407	32.7	52	79	0
	2E	188	435	1403	34.5	53	81	0
	2F	185	430	1403	28.2	58	81	0
RUN #3 12:55-14:04	FIELD							
	1A	116	336	885	30.6	45	39	0
	1B	184	378	1391	40	25	0	0
	1C	178	373	1312	38.4	45	66	0
	1D	161	400	1266	41.4	0	65	0
	1E	183	363	1403	38.7	40	66	0
	1F	187	449	1391	39	50	84	0
	2A	6	126	79	23.9	147	2	12
	2B	141	400	830	39.3	74	47	16
	2C	182	463	1407	38.3	49	86	0
	2D	184	424	1407	32.4	56	79	0
	2E	188	432	1391	34.2	55	80	0
	2F	187	431	1407	27.8	59	80	0