STACK TEST REPORT

ETO PERFORMANCE TESTS OF:

Damas Scrubber

at

Sterilization Services of Tennessee (SST)
2396 Florida Street, Memphis, TN 38109.

Conducted by

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I conducted this work and prepared this report. I attest, as best I can, the information and data contained herein is complete and accurate.

L. Christopher Heilner
2/28/2016

EXECUTIVE SUMMARY

EtO emissions testing was conducted on February 24, 2016 at the Sterilization Services of Tennessee facility in Memphis Tennessee. The purpose of the testing was to demonstrate the performance of an Damas catalytic oxidizer pollution control system. Emissions testing was performed to proof the replacement parts and servicing and the unit was successful to demonstrate compliance..

The standard of performance of the Damas is to maintain outlet EtO emissions concentrations to be greater than 99% removal efficiency.

The average removal efficiency was greater than 99% on all three runs.

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TABLE OF CONTENTS

	Page
Executive Summary	1
Table of Contents	2
Introduction	3
Summary of Results	4
Operations for Testing	4
Test Procedures	4
EtO Sample Collection	5
Analytical Procedures	5
Calibration Curve	5
Gas Chromatograph Set Up and Operations	6
Retention Time	6
Chromatogram Log Sheets	6
Calibration Drift Assessment	7
Sample Bag Recovery Study	8
QA/QC Procedures	9

APPENDICES

Appendix 1	Field Data Sheets
Appendix 2	Process Data
Appendix 3	Chromatograms
Appendix 4	Calibration Data, Calibration Gas Certificates

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INTRODUCTION

Sterilization Services of Tennessee (SST) operates a commercial ethylene oxide (EtO) sterilizer at 2396 Florida Street, Memphis, TN 38109. The pollution control equipment associated with the sterilization process is regulated under 40 CFR 63.360 Subpart O National Emissions Standards for Hazardous Air Pollutants for Commercial EtO Sterilization Facilities.

Sterilization is a batch process whereby medical products are sterilized in a chamber by exposure to a gas mixture of EtO, humidification and nitrogen. The evacuation of EtO laiden sterilization chamber atmosphere is controlled by catalytically desorbing the gas stream into sulfuric acid scrubbing units, reducing it to ethylene glycol.

Three sample runs were conducted during the evacuation phase of the sterilization chamber. The inlet of the scrubber was calculated using partial pressures, temperature and mass of EtO used. The outlet was analyzed on site by GC FID. The resulting numbers were used to calculate removal efficiency.

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SUMMARY OF RESULTS

Test results showed the removal efficiency of EtO by the Damas outlet gas to be greater than 99%. Table 1 illustrates the results.

Table 1 – Summary of Results
Damas Scrubber Performance Test
Sterilization Services of Tennesse, Memphis
24-Feb-16

Run No.	Date	Chamber	Mass EtO Charged to Chambers (pounds)	Percent Chamber Gas Evacuated (%)	Scrubber Outlet Gas Volume (dscf)	Scrubber Outlet EtO Concentration (ppm)	Mass of EtO at Scrubber Inlet (pounds)	Mass of EtO at Scrubber Outlet (pounds)	DRE (%)
1	2/24/2016	1	65.6	50.81%	268.8	3017.5	33.33	0.09272	99.859%
		2	63.5	50.94%			32.35		
		total	129.1				65.68		
2	2/24/2016	1	63.2	50.86%	267.9	2231.7	32.15	0.06836	99.895%
		2	64.5	51.00%			32.89		
		total	127.7				65.04		
3	2/24/2016	1	63.0	50.89%	243.3	1913.8	32.06	0.05324	99.918%
		2	64.2	50.99%			32.74		
		total	127.2				64.79		
AVERAGE REMOVAL EFFICIENCY									99.891%

OPERATIONS FOR TESTING

The performance tests were conducted according to the EPA test methods presented in the CFR and Subpart O. Accordingly, there was no product in the sterilization chamber for the purpose of testing. This represents a worst-case scenario for emissions. The temperature and level of the scrubbing liquor are monitored.

TEST PROCEDURES

The performance tests were conducted according to the EPA test methods presented in the test protocol. Samples were obtained by the Direct Pump Sampling Procedure of Method 18. Teflon sample lines were connected to the outlet of the Damas. Samples were drawn through diaphragm pumps with Teflon internals into Teflon sample bags. All samples were analyzed by the GC's flame ionization detector (FID).

EtO SAMPLE COLLECTION

EtO samples were obtained by the Direct Pump Integrated Bag Procedure of EPA Method 18 Section 8.2.1.2. Teflon sample tubing from the sample probes was connected directly to clear Teflon sample bags. Gases were sampled at a rate of 0.3 liters per minute. Samples were injected into the GC's FID via a one milliliter sample loop.

The sample train was leak-checked by opening the valve full and capping the probe. The rotameter float was observed to settle at zero.

ANALYTICAL PROCEDURES

Samples were analyzed for EtO concentration by gas chromatography using a SRI 8610 Gas Chromatograph equipped with a flame ionization detector (FID).

Analyses were conducted with the GC in mid-range. The chromatograms were printed after each analysis.

CALIBRATION CURVE

A calibration curve was developed using the Excel chart function by constructing a linear graph (XY scatter) and solving for the equation of the line. The calibration curve was constructed using the results of the 1000, 5340 and 10000 ppm calibration standards, forcing the curve through a zero intercept. The equation of the calibration curve is:

$$Y = 0.6034 * X$$

Where Y is the calculated concentration of EtO
X is the instrument response in volt seconds

The R^2 value of the calibration curve was 0.9984. A value of 0.95 or greater is considered acceptable.

The calibration curve was developed to demonstrate the GC was operating properly. It was used to determine the outlet concentrations. The calibration curve is included with the cal gas certificates in the Appendix 4.

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GAS CHROMATOGRAPH SET UP AND OPERATIONS

The set up parameters for analysis are as follows:

Inj/Det temp	130 deg C
Analysis time	2:00 minutes
Peak algorithm	baseline projection
Detect Method	peak area
Units	volt seconds
FID carrier pressure	18 psi

RETENTION TIME

The retention time of EtO throughout the test series ranged between 0.950 and 1.050 minutes.

CHROMATOGRAM LOG SHEETS

A chromatogram log sheet was kept on Excel and updated for each chromatogram. It contains two sections: one for calibrations and the other for sample analysis. Chromatograms were logged by time of analysis. The calibration portion of the log sheet includes calculation of average values of three consecutive analyses along with evaluation whether or not each result falls within 5% of the average of the three. The sample portion of the log sheet includes calculation of the emission mass rate of EtO at the inlet and outlet using the instrument response, the calibration curve formula and volumetric flow rate from the velocity calculation spread sheets. The chromatogram log sheet is included with Appendix 3.

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CALIBRATION DRIFT ASSESSMENT

The results of initial and final response of the 103 ppm calibration standard established no calibration drift (5% allowable) occurred during testing. Table 2 summarizes the calibration drift data. The 103 ppm calibration standard was used for the initial calibration and also for the calibration drift assessment. The calibration drift assessment requires the difference in readings be no greater than 5%. The results of the calibration drift assessment are summarized in Table 3.

Table 3 Calibration Drift Assessment
Damas Performance Test
Sterilization Services of Tennessee, Memphis
January 24, 2016

Date	Unit Tested	Detector	Concentration EtO Standard (ppm)	Initial Response (millivolts)	Final Response (millivolts)	Calibration Drift (%)
24-Jan	Damas	FID	5340ppm	8812.7	8565.4	2.89%

SAMPLE BAG RECOVERY STUDY

The Sample Bag Recovery Study was used to assess matrix affects of the sample and stability of the sample over time. A spiked sample is added to one of the sample bags to change the concentration of the component in the sample bag. An initial bag spike concentration is analyzed. The bag is allowed to sit for the elapsed time period between collection and analysis, and is analyzed again to determine if the concentration of the components in the bag remain stable over time. No change in concentration over time was observed, confirming sample stability and the absence of matrix effects. Recovery value R, is summarized in Table 4.

TABLE 4 - BAG RECOVERY STUDY
Damas Test
Sterilization Services of Tennessee, Memphis
February 24, 2016

Test Date	Test Site	Run No.	Calc. Conc. EtO in Bag "u" (ppm)	Initial Spiked Bag EtO Conc. (ppm)	Conc. of Spike Added to Bag "s" (ppm)	Aged Bag EtO Conc. "t" (ppm)	R Value "R"
1/24/2016	Damas	1	3017.55	3248.4	230.89	3185.7	0.7285

Where: R= (t-u)/s acceptance criteria R must fall within .7 to 1.3

R = average fraction recovered
T = bag concentration after being spiked and allowed to "age"
U = bag concentration before being spiked
S = increase in bag concentration

QA/QC PROCEDURES

FIELD TESTING QUALITY ASSURANCE

The quality assurance quality control (QA/QC) procedures followed during the test program assure accurate and precise data is collected during the test program. These procedures include:

1. Trained, experienced test personnel
2. Use of equipment properly calibrated, maintained and leak-checked
3. Certified calibration standards of EtO in N_2 are used to set-up and calibrate the field GC.
4. Repeatability – GC analyses conducted in triplicate.
5. Calibration drift assessment
6. Recovery Study

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Appendix 1
Field Data Sheets

02/24/16

SST Memphis

NDM & LCK ONSITE 1000

Meet with Dave Connor
Jody Jefferson
Calvin
Jean Sturbridge
Steve Silas

Plan to test scrubber in afternoon
Set up GC hot and ready @ 1200

FID ~~0.4 minutes~~ 0.80 – 1.15 RET
PID 1.20 – 1.65 RET

1547 cubic feet chambers one & two

Run 1000, 500 & 103 cal curve on PID
PID R_2 = 0.9992 FID R_2 = 0.9965
PID x = 0.1743 FID x = 0.5051

103 ppm cal Run 1 Printer failure

Recalibrated with 10000, 5000 (5340), 1000 cal gasses
PID R_2 = 0.9914 FID R_2 = 0.9984
PID x = 0.279 FID x = 0.6034

24FEB2016

SST run 1

time	ΔP	T_s (°F)
1617	0.001	54.1
1618	0.001	56.2
1619	0.001	57.6
1620	0.001	58.4
1621	0.001	59.0
1622	0.001	59.3
1623	0.001	59.9
1624	0.001	60.4
1625	0.001	60.7
1626	0.001	61.1
1627	0.001	58.2

P_{bar} = 29.58
P_s = −0.05

run 2

time	ΔP	T_s (°F)
1829	0.001	58.7
1830	0.001	61.3
1831	0.001	61.7
1832	0.001	62.1
1833	0.001	62.2
1834	0.001	62.3
1835	0.001	62.8
1836	0.001	63.1
1837	0.001	63.5
~~1838~~ 1837.5	0.001	63.5
~~1839~~ 1838	0.001	60.1

P_{bar} = 29.58
P_s = −0.05

Run 1 Bag FID Avg ppm 3017.546

spike with 5340 ppm

Analyze, age, reanalyze AGIVE 1917 –

R2 FID 2231 ppm
PID 2513 ppm

Run 3

time	ΔP	T_s (°F)
2045	~~.001~~	59.7
2046	.001	62.6
2047	.001	62.7
2048	.001	62.8
2049	.001	62.9
2050	.001	63.1
2051	.001	63.6
2052	.001	63.8
2053	.001	64.2
~~2054~~ :33	.001	63.3

P_{bar} 29.59
P_s -0.05

Appendix 2
Process Data

RUN 1

STERILIZATION SERVICES OF TN
2946 FLORIDA ST
MEMPHIS, TN. 38109
(901) 947-0217
CHAMBER 0102

DATE 02/24/16 Wed CYCLE 77 PROGRAM VERSION 4B 4 CHECK VALUE 45207

CUSTOMER: STACK TEST PROCEDURE NUMBER: 1.1.1.111.11
RUN ID # 16055 01020 OPERATOR C. SPONCER
DRUM (A) E003413
DRUM (B) C000893
DT START TIME NA
P/T CHRT START NO
SCRUBBER UPGRADE 2/24/16

P R O C E S S P A R A M E T E R S

CHAMBER TEMP	55 C, LO TOL 5 C, HI TOL 6 C, ABORT 61 C
INITIAL EVACUATION A	1.4 INHGA, FAST
LEAK TEST	0:04 HH:MM, TOLERANCE 0.3 INHG
HUMIDITY INJECTION B	8.8 INHG
HUMIDITY DWELL	9:15 HH:MM, 2.1 INHGA, LO 1.7 INHGA, HI 2.5 INHGA, MAX 2.6 INHGA
STERILANT INJECTION	14.3 INHGA, FAST
NITROGEN BLANKET B	16.3 INHGA, FAST
EXPOSURE	0:10 HH:MM, 16.3 INHGA, LO 16.0 INHGA, HI 16.6 INHGA, ABORT 16.8 INHGA LO 3 C, HI 3 C, ABORT 59 C, MAXCUPS: STERILANT
STERILANT REMOVAL	EXHAUST 0.0 SKIP, EVACUATION 7.0 INHGA, FAST
NITROGEN WASH	2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 20.0 INHGA, LOWER 7.0 INHGA
AIR WASH A	2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 27.5 INHGA, LOWER 8.5 INHGA
FINAL AIRBREAK	28.0 INHGA, FAST

TIME	TEMP	PRESSURE	ED MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
		INITIAL EVACUATION A PHASE				
15:09	55.0	29.9 INHGA	0	26.3		
15:13	54.3	15.7 INHGA	0	26.2		
15:17	54.1	8.7 INHGA	0	26.1		
15:21	54.2	4.8 INHGA	0	26.2		
15:25	54.3	3.0 INHGA	0	26.2		
15:29	54.5	1.9 INHGA	0	26.2		
15:32	54.7	1.4 INHGA	0	26.2		
MAX:	55.0 C	29.5 INHG	0 MG/L		PHASE 0:12	PHASE ELAPSED 0:12
MIN:	54.1 C	(CHANGE)	0 MG/L			CYCLE 0:22
		LEAK TEST PHASE				
15:32	54.7	1.4 INHGA	0	26.2		
15:34	54.8	1.4 INHGA	0	26.2		
15:36	54.9	1.4 INHGA	0	26.2		

02/24/16 Wed CYCLE 77 RUN ID # 160055 010[illegible]

TIME	TEMP	PRESSURE	ED MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
15:36	54.9	1.4 INHGA	0	26.2		

MAX: 54.9 C 0.1 INHG 0 MG/L PHASE 0:04 PHASE ELAPSED 0:04
MIN: 54.7 C (CHANGE) 0 MG/L CYCLE 0:20

HUMIDITY INJECTION B (PRESS) PHASE

15:36	54.9	1.4 INHGA	0	26.2		
15:36	55.0	2.2 INHGA	0	26.2		

MAX: 55.0 C 0.8 INHG 0 MG/L PHASE 0:00 PHASE ELAPSED 0:00
MIN: 54.9 C (CHANGE) 0 MG/L CYCLE 0:27

HUMIDITY DWELL (PRESS) PHASE

15:36	55.0	2.3 INHGA	0	26.2		
15:41	55.3	2.3 INHGA	0	26.2		
15:46	55.5	2.3 INHGA	0	26.2		
15:51	55.6	2.2 INHGA	0	26.2		
15:51	55.6	2.2 INHGA	0	26.2		

MAX: 55.6 C 0.0 INHG 0 MG/L PHASE 0:15 PHASE ELAPSED 0:15
MIN: 55.0 C (CHANGE) 0 MG/L CYCLE 0:42

STERILANT INJECTION PHASE

15:51	55.0	2.2 INHGA	0	26.2		
15:56	56.4	9.0 INHGA	362	57.4		
16:00	57.2	14.3 INHGA	702	42.7		

MAX: 57.2 C 12.1 INHG 702 MG/L PHASE 0:08 PHASE ELAPSED 0:08
MIN: 55.6 C (CHANGE) 0 MG/L CYCLE 0:51
STERILANT USED THIS PHASE: 65.6 LB. CYCLE TOTAL: 65.6 LB

NITROGEN BLANKET B PHASE

16:00	57.2	14.5 INHGA	710	40.9		
16:02	57.1	16.3 INHGA	755	41.4		

MAX: 57.2 C 1.8 INHG 755 MG/L PHASE 0:01 PHASE ELAPSED 0:01
MIN: 57.1 C (CHANGE) 716 MG/L CYCLE 0:52

02/24/16 Wed CYCLE 77 RUN ID # 16055 01028

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			EXPOSURE PHASE			
16:02	57.0	16.3 INHGA	756	41.4		
16:07	55.7	16.2 INHGA	699	43.1		
16:11	55.4	16.2 INHGA	699	42.0		OPERATOR CYCLE STOP
16:12	55.3	16.2 INHGA	699	42.5		
16:17	55.1	16.2 INHGA	699	41.4		
16:17	55.1	16.2 INHGA	696	41.3		CYCLE CONTINUED
16:17	55.1	16.2 INHGA	696	41.3		

MAX: 57.0 C 0.2 INHG 756 MG/L PHASE 0:15 PHASE ELAPSED 0:15
MIN: 55.1 C (CHANGE) 696 MG/L CYCLE 1:00

			STERILANT REMOVAL PHASE			
16:17	55.1	16.2 INHGA	696	41.3		
16:17	55.1	16.2 INHGA	696	41.3		BEGIN EVACUATION
16:18	55.1	14.6 INHGA	650	41.0		OPERATOR CYCLE STOP
16:18	55.1	14.6 INHGA	635	41.0		CYCLE CONTINUED
16:21	54.6	10.2 INHGA	420	40.3		
16:25	54.5	7.1 INHGA	284	39.5		
16:26	54.5	7.0 INHGA	279	39.4		

MAX: 55.1 C 9.2 INHG 696 MG/L PHASE 0:07 PHASE ELAPSED 0:08
MIN: 54.5 C (CHANGE) 279 MG/L CYCLE 1:10

			NITROGEN WASH (WASH) PHASE			
16:26	54.5	7.0 INHGA	279	39.4		
16:26	54.5	7.0 INHGA	279	39.4		BEGIN NITROGEN 1
16:30	55.1	12.0 INHGA	303	38.7		
16:34	55.6	16.8 INHGA	303	38.1		
16:36	56.0	20.0 INHGA	303	37.7		BEGIN EVACUATION 1
16:38	55.4	14.9 INHGA	220	37.4		
16:42	54.8	8.7 INHGA	120	36.8		
16:43	54.8	7.0 INHGA	98	36.6		BEGIN NITROGEN 2
16:46	55.0	9.9 INHGA	102	36.2		
16:50	55.7	15.2 INHGA	102	35.7		

STERILIZATION SERVICES OF TN
2350 FLORIDA ST
MEMPHIS, TN. 38109
(901) 947 2217
CHAMBER 0103

DATE 02/24/10 Wed CYCLE 77 PROGRAM VERSION 48.4 CHECK VALUE 40410

CUSTOMER: STACK TEST PROCEDURE NUMBER: 1.1.1.111.11
RUN ID # 16055 01030 OPERATOR C. SPENCER
DRUM (A) E001562
DRUM (B) C084194
DT START TIME NA
P/T CHRT START NA
STACK TEST SCRUBBER UPGRADE

P R O C E S S P A R A M E T E R S

CHAMBER TEMP 55 C, LO TOL 3 C, HI TOL 3 C, ABORT 59 C
INITIAL EVACUATION A 1.4 INHGA, FAST
LEAK TEST 0:04 HH:MM, TOLERANCE 0.3 INHG
HUMIDITY INJECTION B 0.8 INHG
HUMIDITY DWELL 0:15 HH:MM, 2.1 INHGA, LO 1.7 INHGA, HI 2.5 INHGA, MAX 2.6 INHGA
STERILANT INJECTION 14.3 INHGA, FAST
NITROGEN BLANKET B 16.3 INHGA, FAST
EXPOSURE 0:10 HH:MM, 16.3 INHGA, LO 16.0 INHGA, HI 16.6 INHGA, ABORT 16.6 INHGA
LO 3 C, HI 3 C, ABORT 59 C, MAXCUPS: STERILANT
STERILANT REMOVAL EXHAUST 0.0 SKIP, EVACUATION 7.0 INHGA, FAST
NITROGEN WASH 2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 28.0 INHGA, LOWER 7.0 INHGA
AIR WASH A 2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 27.5 INHGA, LOWER 8.5 INHGA
FINAL AIRBREAK 28.0 INHGA, FAST

TIME	TEMP	PRESSURE	ED MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			INITIAL EVACUATION A PHASE			
15:09	54.4	29.9 INHGA	0	33.0		
15:13	53.7	15.4 INHGA	0	32.7		
15:17	53.4	8.7 INHGA	0	32.[illegible]		
15:21	53.4	5.3 INHGA	0	32.6		
15:25	53.6	3.5 INHGA	0	32.[illegible]		
15:29	53.8	2.4 INHGA	0	33.1		
15:33	54.2	1.7 INHGA	0	30.[illegible]		
15:36	54.4	1.4 INHGA	0	35.7		

MAX: 54.4 C 29.5 INHG 0 MG/L PHASE 0:26 PHASE ELAPSED 0:26
MIN: 53.4 C (CHANGE) 0 MG/L CYCLE 0:2[illegible]

			LEAK TEST PHASE			
15:36	54.4	1.4 INHGA	0	35.7		
15:38	54.6	1.4 INHGA	0	35.4		
15:40	54.7	1.4 INHGA	0	35.1		

02/24/16 Wed CYCLE 77 RUN ID 9 16055 01070

TIME	TEMP	PRESSURE	ED MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
15:40	54.7	1.4 INHGA	0	35.1		

MAX: 54.7 C 0.0 INHG 0 MG/L PHASE 0:04 PHASE ELAPSED 0:04
MIN: 54.4 C (CHANGE) 0 MG/L CYCLE 0:34

HUMIDITY INJECTION B (PRESS) PHASE

15:40	54.7	1.4 INHGA	0	35.1		
15:41	54.8	2.2 INHGA	0	81.6		

MAX: 54.8 C 0.8 INHG 0 MG/L PHASE 0:00 PHASE ELAPSED 0:00
MIN: 54.7 C (CHANGE) 0 MG/L CYCLE 0:31

HUMIDITY DWELL (PRESS) PHASE

15:41	54.9	2.3 INHGA	0	81.6		
15:46	55.5	2.4 INHGA	0	53.2		
15:51	55.8	2.3 INHGA	0	49.[illegible]		
15:56	56.0	2.3 INHGA	0	46.3		
15:58	56.0	2.3 INHGA	0	46.[illegible]		

MAX: 56.0 C 0.1 INHG 0 MG/L PHASE 0:15 PHASE ELAPSED 0:15
MIN: 54.9 C (CHANGE) 0 MG/L CYCLE 0:46

STERILANT INJECTION PHASE

15:58	56.0	2.3 INHGA	0	46.3		
16:01	56.4	7.0 INHGA	032	69.0		
16:06	56.6	12.1 INHGA	571	62.[illegible]		
16:08	56.6	14.3 INHGA	658	60.4		

MAX: 56.6 C 12.0 INHG 658 MG/L PHASE 0:12 PHASE ELAPSED 0:12
MIN: 56.0 C (CHANGE) 0 MG/L CYCLE 0:58
STERILANT USED THIS PHASE: 63.5 LB, CYCLE TOTAL: 63.5 LB

NITROGEN BLANKET A PHASE

16:08	56.6	14.4 INHGA	673	60.2		
16:09	56.7	16.3 INHGA	728	59.7		

MAX: 56.7 C 1.9 INHG 728 MG/L PHASE 0:00 PHASE ELAPSED 0:00
MIN: 56.6 C (CHANGE) 069 MG/L CYCLE 0:59

02/24/16 Wed CYCLE 77 RUN ID # 16055 0100

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			EXPOSURE PHASE			
16:09	56.7	16.4	INHGA 728	59.6		
16:14	56.5	16.3	INHGA 689	54.2		
16:17	56.3	16.3	INHGA 676	51.8		OPERATOR CYCLE STOP
16:18	56.3	16.3	INHGA 679	51.3		CYCLE CONTINUED
16:19	56.2	16.3	INHGA 678	50.7		
16:19	56.2	16.3	INHGA 678	50.7		
MAX:	56.7 C	0.1	INHG 728	MG/L	PHASE 0:18	PHASE ELAPSED 0:10
MIN:	56.2 C	(CHANGE)	676	MG/L		CYCLE 1:09
			STERILANT REMOVAL PHASE			
16:19	56.2	16.3	INHGA 678	50.7		
16:19	56.2	16.3	INHGA 678	50.7		BEGIN EVACUATION
16:23	55.9	10.2	INHGA 414	48.8		
16:27	55.6	7.0	INHGA 271	47.1		
MAX:	56.2 C	9.3	INHG 678	MG/L	PHASE 0:07	PHASE ELAPSED 0:07
MIN:	55.6 C	(CHANGE)	271	MG/L		CYCLE 1:17
			NITROGEN WASH (WASH) PHASE			
16:27	55.6	7.0	INHGA 270	47.1		
16:27	55.6	7.0	INHGA 270	47.1		BEGIN NITROGEN 1
16:31	55.8	14.7	INHGA 289	45.7		
16:34	56.1	28.0	INHGA 289	44.8		BEGIN EVACUATION 1
16:35	56.1	10.8	INHGA 240	44.4		
16:39	55.6	9.9	INHGA 123	43.1		
16:42	55.3	7.0	INHGA 85	42.1		BEGIN NITROGEN 2
16:43	55.3	9.2	INHGA 87	42.2		
16:47	55.7	17.3	INHGA 87	41.1		
16:48	55.9	28.0	INHGA 86	40.9		BEGIN EVACUATION 2
16:51	55.7	13.4	INHGA 48	40.3		

STERILIZATION SERVICES OF TN
2396 FLORIDA ST
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(901) 947 2217
CHAMBER 0102

Run 2

DATE 02/24/16 Wed CYCLE 77 PROGRAM VERSION 4G 4 CHECK VALUE 45227

CUSTOMER: STACK TEST PROCEDURE NUMBER: 1.1.1.111.11
RUN ID # 16055-0102D OPERATOR C. SPENCER
DRUM (A)
DRUM (B)
DT START TIME
P/T CHRT START
STACK TEST B

PROCESS PARAMETERS

CHAMBER TEMP	55 C, LO TOL 5 C, HI TOL 6 C, ABORT 61 C
INITIAL EVACUATION A	1.4 INHGA, FAST
LEAK TEST	0:04 HH:MM, TOLERANCE 0.3 INHG
HUMIDITY INJECTION B	0.8 INHG
HUMIDITY DWELL	0:15 HH:MM, 2.1 INHGA, LO 1.7 INHGA, HI 2.5 INHGA, MAX 2.6 INHGA
STERILANT INJECTION	14.3 INHGA, FAST
NITROGEN BLANKET B	16.3 INHGA, FAST
EXPOSURE	0:10 HH:MM, 16.3 INHGA, LO 16.0 INHGA, HI 16.6 INHGA, ABORT 16.8 INHGA LO 3 C, HI 3 C, ABORT 59 C, MAXCUPS: STERILANT
STERILANT REMOVAL	EXHAUST 0.0 SKIP, EVACUATION 7.0 INHGA, FAST
NITROGEN WASH	2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 20.0 INHGA, LOWER 7.0 INHGA
AIR WASH A	2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 27.5 INHGA, LOWER 0.5 INHGA
FINAL AIRBREAK	28.0 INHGA, FAST

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			INITIAL EVACUATION A PHASE			
17:24	56.8	29.9 INHGA	0	32.5		
17:28	55.3	15.8 INHGA	0	32.2		
17:32	54.6	8.7 INHGA	0	31.9		
17:36	54.4	4.9 INHGA	0	31.6		
17:40	54.3	3.0 INHGA	0	31.4		
17:44	54.4	1.9 INHGA	0	31.1		
17:47	54.5	1.4 INHGA	0	30.9		

MAX: 56.8 C 28.5 INHG 0 MG/L PHASE 0:02 MASH ELAPSED 0:22
MIN: 54.3 C (CHANGE) 0 MG/L CYCLE 0:2?

			LEAK TEST PHASE		
17:47	54.5	1.4 INHGA	0	30.9	
17:49	54.5	1.4 INHGA	0	30.7	
17:51	54.6	1.4 INHGA	0	30.6	

02/24/16 Wed CYCLE 77 RUN ID # 16055 0102B

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
17:51	54.6	1.4 INHGA	0	30.6		

MAX: 54.6 C 0.0 INHG 0 MG/L PHASE 0:04 PHASE ELAPSED 0:04
MIN: 54.5 C (CHANGE) 0 MG/L CYCLE 0:26

HUMIDITY INJECTION B (PRESS) PHASE

17:51	54.6	1.4 INHGA	0	30.6		
17:51	54.7	2.2 INHGA	0	30.6		

MAX: 54.7 C 0.8 INHG 0 MG/L PHASE 0:00 PHASE ELAPSED 0:00
MIN: 54.6 C (CHANGE) 0 MG/L CYCLE 0:27

HUMIDITY DWELL (PRESS) PHASE

17:51	54.7	2.2 INHGA	0	30.6		
17:56	54.9	2.4 INHGA	0	30.4		
18:01	55.1	2.4 INHGA	0	30.1		
18:06	55.3	2.4 INHGA	0	30.0		
18:06	55.3	2.4 INHGA	0	30.0		

MAX: 55.3 C 0.1 INHG 0 MG/L PHASE 0:15 PHASE ELAPSED 0:15
MIN: 54.7 C (CHANGE) 0 MG/L CYCLE 0:42

STERILANT INJECTION PHASE

18:06	55.3	2.4 INHGA	0	30.0		
18:11	56.2	9.2 INHGA	382	56.9		
18:15	57.1	14.3 INHGA	697	39.0		

MAX: 57.1 C 11.9 INHG 697 MG/L PHASE 0:08 PHASE ELAPSED 0:08
MIN: 55.3 C (CHANGE) 0 MG/L CYCLE 0:51
STERILANT USED THIS PHASE: 63.2 LB, CYCLE TOTAL: 63.2 LB

NITROGEN BLANKET B PHASE

18:15	57.1	14.5 INHGA	710	38.7		
18:16	56.9	16.3 INHGA	754	40.6		

MAX: 57.1 C 1.8 INHG 754 MG/L PHASE 0:01 PHASE ELAPSED 0:01
MIN: 56.9 C (CHANGE) 710 MG/L CYCLE 0:52

02/24/16 Wed CYCLE 77 RUN ID # 16055 0102B

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			EXPOSURE PHASE			
18:16	56.9	16.3 INHGA	754	40.6		
18:21	55.7	16.2 INHGA	700	41.7		
18:25	55.5	16.2 INHGA	693	41.2		OPERATOR CYCLE STOP
18:26	55.4	16.2 INHGA	691	41.1		
18:29	55.3	16.2 INHGA	691	40.5		CYCLE CONTINUED
18:29	55.3	16.2 INHGA	691	40.5		

MAX: 56.9 C -0.2 INHG 754 MG/L PHASE 0:12 PHASE ELAPSED 0:12
MIN: 55.3 C (CHANGE) 691 MG/L CYCLE 1:05

			STERILANT REMOVAL PHASE			
18:29	55.3	16.2 INHGA	691	40.5		
18:29	55.3	16.2 INHGA	691	40.5		BEGIN EVACUATION
18:33	54.8	9.9 INHGA	400	39.0		
18:37	54.6	7.0 INHGA	278	38.8		

MAX: 55.3 C -9.2 INHG 691 MG/L PHASE 0:07 PHASE ELAPSED 0:07
MIN: 54.6 C (CHANGE) 278 MG/L CYCLE 1:13

			NITROGEN WASH (WASH) PHASE			
18:37	54.6	7.0 INHGA	278	38.8		
18:37	54.6	7.0 INHGA	278	38.8		BEGIN NITROGEN 1
18:41	55.2	11.8 INHGA	303	38.1		
18:45	55.7	16.8 INHGA	303	37.4		
18:47	56.2	20.0 INHGA	303	37.1		BEGIN EVACUATION 1
18:49	55.6	14.9 INHGA	229	36.8		

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2390 FLORIDA ST
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CHAMBER 0103

ZCN2

DATE 02/24/16 Wed CYCLE 77 PROGRAM VERSION 4G 4 CHECK VALUE 40410

CUSTOMER: STACK TEST PROCEDURE NUMBER: 1.1.1.111.11
RUN ID # OPERATOR
DRUM (A)
DRUM (B)
DT START TIME
P/T CHRT START Y
STACK SCRUBBER UPGRADE AT SST

PROCESS PARAMETERS

CHAMBER TEMP	55 C, LO TOL 3 C, HI TOL 3 C, ABORT 59 C
INITIAL EVACUATION A	1.4 INHGA, FAST
LEAK TEST	0:04 HH:MM, TOLERANCE 0.3 INHG
HUMIDITY INJECTION B	0.8 INHG
HUMIDITY DWELL	0:15 HH:MM, 2.1 INHGA, LO 1.7 INHGA, HI 2.5 INHGA, MAX 2.6 INHGA
STERILANT INJECTION	14.3 INHGA, FAST
NITROGEN BLANKET B	16.3 INHGA, FAST
EXPOSURE	0:10 HH:MM, 16.3 INHGA, LO 16.0 INHGA, HI 16.6 INHGA, ABORT 16.8 INHGA LO 3 C, HI 3 C, ABORT 59 C, MAKEUPS: STERILANT
STERILANT REMOVAL	EXHAUST 0.0 SKIP, EVACUATION 7.0 INHGA, FAST
NITROGEN WASH	2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 20.0 INHGA, LOWER 7.0 INHGA
AIR WASH A	2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 27.5 INHGA, LOWER 8.5 INHGA
FINAL AIRBREAK	28.0 INHGA, FAST

TIME	TEMP	PRESSURE	ED MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			INITIAL EVACUATION A PHASE			
17:21	55.3	29.9 INHGA		0	36.3	
17:25	54.5	15.5 INHGA		0	36.0	
17:29	54.1	8.7 INHGA		0	35.7	
17:33	54.0	5.3 INHGA		0	35.4	
17:37	54.2	3.5 INHGA		0	35.2	
17:41	54.3	2.4 INHGA		0	34.9	
17:45	54.5	1.7 INHGA		0	34.7	
17:47	54.6	1.4 INHGA		0	34.7	

MAX: 55.3 C 28.6 INHG 0 MG/L PHASE 0:26 PHASE ELAPSED 0:26
MIN: 54.0 C (CHANGE) 0 MG/L CYCLE 0:20

			LEAK TEST PHASE			
17:47	54.6	1.4 INHGA		0	34.7	
17:49	54.7	1.4 INHGA		0	34.5	
17:51	54.8	1.4 INHGA		0	34.4	

02/24/16 Wed CYCLE 77 RUN ID #

TIME	TEMP	PRESSURE	ED MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
17:51	54.8	1.4 INHGA	0	34.4		

MAX: 54.8 C 0.0 INHG 0 MG/L PHASE 0:04 PHASE ELAPSED 0:04
MIN: 54.6 C (CHANGE) 0 MG/L CYCLE 0:30

HUMIDITY INJECTION B (PRESS) PHASE

17:51	54.8	1.4 INHGA	0	34.4		
17:51	54.9	2.2 INHGA	0	79.7		

MAX: 54.9 C 0.8 INHG 0 MG/L PHASE 0:00 PHASE ELAPSED 0:00
MIN: 54.8 C (CHANGE) 0 MG/L CYCLE 0:30

HUMIDITY DWELL (PRESS) PHASE

17:51	54.9	2.2 INHGA	0	79.7		
17:56	55.3	2.3 INHGA	0	52.1		
18:01	55.5	2.3 INHGA	0	49.0		
18:06	55.7	2.3 INHGA	0	46.2		
18:06	55.7	2.3 INHGA	0	46.2		

MAX: 55.7 C 0.1 INHG 0 MG/L PHASE 0:15 PHASE ELAPSED 0:15
MIN: 54.9 C (CHANGE) 0 MG/L CYCLE 0:45

STERILANT INJECTION PHASE

18:06	55.7	2.3 INHGA	0	46.2		
18:11	56.1	7.1 INHGA	243	67.1		
18:16	56.3	12.1 INHGA	525	60.9		
18:18	56.4	14.3 INHGA	665	57.7		

MAX: 56.4 C 12.0 INHG 665 MG/L PHASE 0:12 PHASE ELAPSED 0:12
MIN: 55.7 C (CHANGE) 0 MG/L CYCLE 0:57
STERILANT USED THIS PHASE: 64.5 LB, CYCLE TOTAL: 64.5 LB

NITROGEN BLANKET B PHASE

18:19	56.4	14.4 INHGA	674	57.4		
18:19	56.4	16.3 INHGA	731	57.2		

MAX: 56.4 C 1.9 INHG 731 MG/L PHASE 0:00 PHASE ELAPSED 0:00
MIN: 56.4 C (CHANGE) 674 MG/L CYCLE 0:58

02/24/16 Wed CYCLE 77 RUN ID #

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			EXPOSURE PHASE			
18:19	56.4	16.4 INHGA	735	57.2		
18:24	56.3	16.3 INHGA	682	52.6		
18:29	56.1	16.2 INHGA	684	50.0		OPERATOR CYCLE STOP
18:29	56.1	16.2 INHGA	680	49.5		
18:30	56.1	16.2 INHGA	679	49.5		CYCLE CONTINUED
18:30	56.1	16.2 INHGA	679	49.5		

MAX: 56.4 C 0.1 INHG 735 MG/L PHASE 0:10 PHASE ELAPSED 0:10
MIN: 56.1 C (CHANGE) 679 MG/L CYCLE 1:09

			STERILANT REMOVAL PHASE			
18:30	56.1	16.2 INHGA	679	49.4		
18:30	56.1	16.2 INHGA	679	49.4		BEGIN EVACUATION
18:34	55.6	10.2 INHGA	418	47.7		
18:38	55.3	7.0 INHGA	272	46.2		

MAX: 56.1 C 9.2 INHG 679 MG/L PHASE 0:07 PHASE ELAPSED 0:07
MIN: 55.3 C (CHANGE) 272 MG/L CYCLE 1:17

			NITROGEN WASH (WASH) PHASE			
18:38	55.3	7.0 INHGA	272	46.2		
18:38	55.3	7.0 INHGA	272	46.2		BEGIN NITROGEN 1
18:42	55.7	14.6 INHGA	299	45.0		
18:44	56.0	20.0 INHGA	289	44.1		BEGIN EVACUATION 1
18:46	56.0	16.8 INHGA	246	43.7		
18:50	55.5	9.9 INHGA	126	42.5		

R3

STERILIZATION SERVICES OF TN
2396 FLORIDA ST
MEMPHIS, TN. 38109
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CHAMBER 0102

DATE 02/24/16 Wed CYCLE 77 PROGRAM VERSION 10 4 CHECK VALUE 45227

CUSTOMER: STACK TEST PROCEDURE NUMBER: 1.1.1.111.11
RUN ID 0 OPERATOR
DRUM (A)
DRUM (B)
DT START TIME
P/T CHRT START Y
STACK TEST C

P R O C E S S P A R A M E T E R S

CHAMBER TEMP 55 C, LO TOL 5 C, HI TOL 6 C, ABORT 61 C
INITIAL EVACUATION A 1.1 INHGA, FAST
LEAK TEST 0:04 HH:MM, TOLERANCE 0.3 INHG
HUMIDITY INJECTION B 0.8 INHG
HUMIDITY DWELL 0:15 HH:MM, 2.1 INHGA, LO 1.7 INHGA, HI 2.5 INHGA, MAX 2.6 INHGA
STERILANT INJECTION 14.3 INHGA, FAST
NITROGEN BLANKET B 16.3 INHGA, FAST
EXPOSURE 0:10 HH:MM, 16.3 INHGA, LO 16.0 INHGA, HI 16.6 INHGA, ABORT 16.6 INHGA
LO 3 C, HI 3 C, ABORT 39 C, MAKEUPS: STERILANT
STERILANT REMOVAL EXHAUST 0.0 INHG, EVACUATION 7.0 INHGA, FAST
NITROGEN WASH 2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 20.0 INHGA, LOWER 7.0 INHGA
AIR WASH A 2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 27.[illegible] INHGA, LOWER 6.5 INHGA
FINAL AIRBREAK 28.0 INHGA, FAST

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
		INITIAL EVACUATION A PHASE				
19:35	56.9	30.0 INHGA	0	32.		
19:39	55.3	15.9 INHGA	0	32.[illegible]		
19:43	54.5	8.7 INHGA	0	31.		
19:47	54.2	4.9 INHGA	0	31.[illegible]		
19:51	54.2	3.0 INHGA	0	31.[illegible]		
19:55	54.2	1.9 INHGA	0	30.[illegible]		
19:58	54.3	1.4 INHGA	0	30.[illegible]		

MAX: 56.9 C 28.6 INHG 0 MG/L PHASE 0:22 PHASE ELAPSED 0:22
MIN: 54.2 C (CHANGE) 0 MG/L CYCLE 0:2[illegible]

		LEAK TEST PHASE		
19:58	54.3	1.4 INHGA	0	30.7
20:00	54.4	1.4 INHGA	0	30.[illegible]
20:02	54.4	1.4 INHGA	0	30.[illegible]

02/24/16 Wed CYCLE 77 RUN [illegible] P3

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
20:02	54.4	1.4 INHGA	0	30.[illegible]		

MAX: 54.4 C 0.0 INHG 0 MG/L PHASE 0:[illegible] PHASE ELAPSED 0:24
MIN: 54.3 C (CHANGE) 0 MG/L CYCLE 0:2[illegible]

HUMIDITY INJECTION B (PRESS) PHASE

20:02	54.4	1.4 INHGA	0	30.5		
20:02	54.5	2.2 INHGA	0	30.5		

MAX: 54.5 C 0.8 INHG 0 MG/L PHASE 0:00 PHASE ELAPSED 0:00
MIN: 54.4 C (CHANGE) 0 MG/L CYCLE 0:2[illegible]

HUMIDITY DWELL (PRESS) PHASE

20:02	54.5	2.2 INHGA	0	30.5		
20:07	54.8	2.3 INHGA	0	30.[illegible]		
20:12	55.0	2.3 INHGA	0	30.[illegible]		
20:17	55.2	2.3 INHGA	0	29.[illegible]		
20:17	55.2	2.3 INHGA	0	29.[illegible]		

MAX: 55.2 C 0.1 INHG 0 MG/L PHASE 0:15 PHASE ELAPSED 0:15
MIN: 54.5 C (CHANGE) 0 MG/L CYCLE 0:4[illegible]

STERILANT INJECTION PHASE

20:17	55.2	2.3 INHGA	0	29.8		
20:22	56.3	9.2 INHGA	37[illegible]	56.[illegible]		
20:23	56.6	10.5 INHGA	457	52.[illegible]	STERILANT DROPPING EMPTY	
20:26	57.3	14.3 INHGA	701	36.[illegible]		

MAX: 57.3 C 12.0 INHG 701 MG/L PHASE 0:08 PHASE ELAPSED 0:08
MIN: 55.2 C (CHANGE) 0 MG/L CYCLE 0:51
STERILANT USED THIS PHASE: 63.0 LB. CYCLE TOTAL: 63.0 LB

NITROGEN BLANKET B PHASE

20:26	57.3	14.5 INHGA	719	3[illegible]		
20:27	57.0	16.3 INHGA	757	36.3		

MAX: 57.3 C 1.8 INHG 757 MG/L PHASE 0:01 PHASE ELAPSED 0:01
MIN: 57.0 C (CHANGE) 714 MG/L CYCLE 0:5[illegible]

02/24/16 Wed CYCLE 77 RUN [illegible] R3

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			EXPOSURE PHASE			
20:27	57.0	16.3 INHGA	757	[illegible]		
20:31	56.1	16.2 INHGA	700	[illegible]		OPERATOR CYCLE STOP
20:32	55.9	16.2 INHGA	698	38.2		
20:37	55.6	16.2 INHGA	697	38.4		
20:42	55.4	16.2 INHGA	69[illegible]	[illegible]		
20:45	55.5	16.2 INHGA	699	36.[illegible]		CYCLE CONTINUED
20:45	55.5	16.2 INHGA	699	36.9		

MAX: 57.0 C 0.2 INHG 757 MG/L PHASE 0:17 PHASE ELAPSED 0:17
MIN: 55.4 C (CHANGE) 69[illegible] MG/L CYCLE 1:1[illegible]

			STERILANT REMOVAL PHASE			
20:45	55.5	16.2 INHGA	699	36.9		
20:45	55.5	16.2 INHGA	699	36.[illegible]		BEGIN EVACUATION
20:49	55.0	9.9 INHGA	41[illegible]	3[illegible]		
20:53	54.8	7.0 INHGA	280	35.[illegible]		

MAX: 55.5 C 9.2 INHG 699 MG/L PHASE 0:07 PHASE ELAPSED 0:07
MIN: 54.8 C (CHANGE) 282 MG/L CYCLE 1:16

			NITROGEN WASH (WASH) PHASE			
20:53	54.8	7.0 INHGA	280	35.5		
20:53	54.8	7.0 INHGA	280	35.[illegible]		BEGIN NITROGEN 1
20:57	55.3	11.7 INHGA	305	25.0		
21:01	55.9	16.8 INHGA	303	34.6		
21:03	56.2	20.0 INHGA	307	34.[illegible]		BEGIN EVACUATION 1
21:05	55.6	14.9 INHGA	230	3[illegible]		
21:09	55.0	8.7 INHGA	132	33.[illegible]		
21:11	54.9	7.0 INHGA	101	3[illegible].6		BEGIN NITROGEN 2
21:13	55.1	9.9 INHGA	10[illegible]	32.[illegible]		

2396 FLORIDA ST
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R3

DATE 02/24/16 Wed CYCLE 77 PROGRAM VERSION 4G 4 CHECK VALUE 40410

CUSTOMER: STACK TEST PROCEDURE NUMBER: 1.1.1.111.11
RUN ID # OPERATOR
DRUM (A)
DRUM (B)
DT START TIME
P/T CHRT START Y
STACK TEST - C

PROCESS PARAMETERS

CHAMBER TEMP	55 C, LO TOL 3 C, HI TOL 3 C, ABORT 59 C
INITIAL EVACUATION A	1.4 INHGA, FAST
LEAK TEST	0:04 HH:MM, TOLERANCE 0.3 INHG
HUMIDITY INJECTION B	0.8 INHG
HUMIDITY DWELL	0:15 HH:MM, 2.1 INHGA, LO 1.7 INHGA, HI 2.5 INHGA, MAX 2.6 INHGA
STERILANT INJECTION	14.3 INHGA, FAST
NITROGEN BLANKET B	16.3 INHGA, FAST
EXPOSURE	0:10 HH:MM, 16.3 INHGA, LO 16.0 INHGA, HI 16.6 INHGA, ABORT 16.8 INHGA LO 3 C, HI 3 C, ABORT 59 C, MAKEUPS: STERILANT
STERILANT REMOVAL	EXHAUST 0.0 SKIP, EVACUATION 7.0 INHGA, FAST
NITROGEN WASH	2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 20.0 INHGA, LOWER 7.0 INHGA
AIR WASH A	2 CYCLES, EVAC DWELL 0:00 HH:MM, UPPER 27.5 INHGA, LOWER 8.5 INHGA
FINAL AIRBREAK	28.0 INHGA, FAST

TIME	TEMP	PRESSURE	ED MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			INITIAL EVACUATION A PHASE			
19:35	55.2	30.0 INHGA	0	36.1		
19:39	54.5	15.6 INHGA	0	35.8		
19:43	54.1	8.8 INHGA	0	35.5		
19:47	54.1	5.4 INHGA	0	35.0		
19:51	54.1	3.5 INHGA	0	34.9		
19:55	54.3	2.4 INHGA	0	34.7		
19:59	54.5	1.7 INHGA	0	34.5		
20:02	54.6	1.4 INHGA	0	34.3		

MAX: 55.2 C 28.6 INHG 0 MG/L PHASE 0:06 PHASE ELAPSED 0:26
MIN: 54.1 C (CHANGE) 0 MG/L CYCLE 0:26

			LEAK TEST PHASE			
20:02	54.6	1.4 INHGA	0	34.3		
20:04	54.7	1.4 INHGA	0	34.0		
20:06	54.9	1.4 INHGA	0	34.1		

02/24/16 Wed CYCLE 77 RUN ID 0 R3

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
20:06	54.9	1.4 INHGA	0	34.2		

MAX: 54.9 C 0.0 INHG 0 MG/L PHASE 0:04 PHASE ELAPSED 0:04
MIN: 54.6 C (CHANGE) 0 MG/L CYCLE 0:30

HUMIDITY INJECTION B (PRESS) PHASE

20:06	54.9	1.4 INHGA	0	34.2		
20:06	54.9	2.2 INHGA	0	76.5		

MAX: 54.9 C 0.8 INHG 0 MG/L PHASE 0:00 PHASE ELAPSED 0:00
MIN: 54.9 C (CHANGE) 0 MG/L CYCLE 0:30

HUMIDITY DWELL (PRESS) PHASE

20:06	54.9	2.3 INHGA	0	84.6		
20:11	55.4	2.4 INHGA	0	50.4		
20:16	55.6	2.4 INHGA	0	48.[illegible]		
20:21	55.7	2.4 INHGA	0	46.0		
20:21	55.7	2.4 INHGA	0	46.0		

MAX: 55.7 C 0.1 INHG 0 MG/L PHASE 0:15 PHASE ELAPSED 0:15
MIN: 54.9 C (CHANGE) 0 MG/L CYCLE 0:45

STERILANT INJECTION PHASE

20:21	55.7	2.4 INHGA	0	46.0		
20:26	56.1	7.1 INHGA	238	67.1		
20:31	56.4	12.2 INHGA	529	60.[illegible]		
20:33	56.5	14.3 INHGA	660	57.0		

MAX: 56.5 C 11.9 INHG 660 MG/L PHASE 0:12 PHASE ELAPSED 0:12
MIN: 55.7 C (CHANGE) 0 MG/L CYCLE 0:58
STERILANT USED THIS PHASE: 64.2 LB, CYCLE TOTAL: 64.2 LB

NITROGEN BLANKET B PHASE

20:34	56.5	14.4 INHGA	674	56.9		
20:34	56.5	16.3 INHGA	728	56.7		

MAX: 56.5 C 1.9 INHG 728 MG/L PHASE 0:00 PHASE ELAPSED 0:00
MIN: 56.5 C (CHANGE) 670 MG/L CYCLE 0:58

TIME	TEMP	PRESSURE	EO MG/L	GAS INJ	ALARMS & MESSAGES	ACTION TAKEN
			EXPOSURE PHASE			
20:34	56.5	16.4 INHGA	728	56.7		
20:39	56.3	16.3 INHGA	679	52.2		
20:41	56.3	16.3 INHGA	679	51.5		OPERATOR CYCLE STOP
20:44	56.1	16.3 INHGA	676	49.2		
20:45	56.1	16.3 INHGA	676	48.7		CYCLE CONTINUED
20:45	56.1	16.3 INHGA	676	48.7		

MAX: 56.5 C 0.1 INHG 728 MG/L PHASE 0:11 PHASE ELAPSED 0:11
MIN: 56.1 C (CHANGE) 676 MG/L CYCLE 1:10

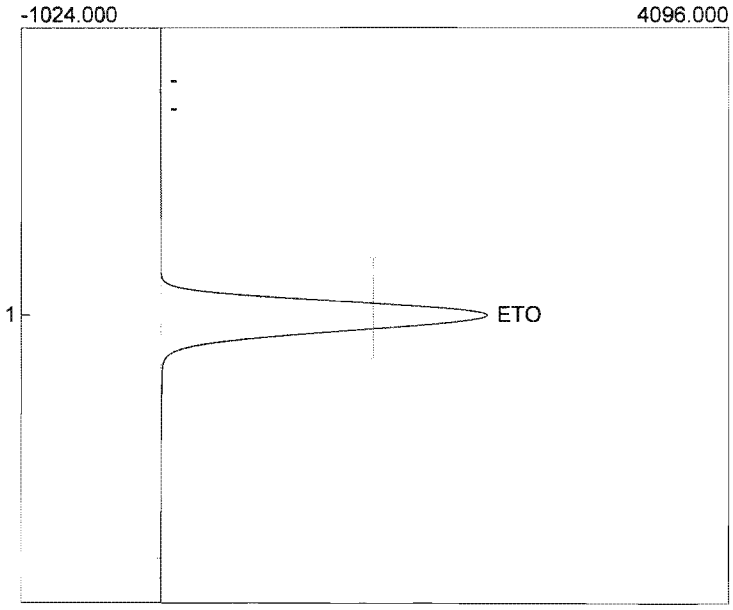
			STERILANT REMOVAL PHASE			
20:46	56.1	16.3 INHGA	676	48.7		
20:46	56.1	16.3 INHGA	676	48.7		BEGIN EVACUATION
20:50	55.6	10.2 INHGA	412	47.1		
20:53	55.3	7.0 INHGA	268	45.6		

MAX: 56.1 C 9.3 INHG 676 MG/L PHASE 0:07 PHASE ELAPSED 0:07
MIN: 55.3 C (CHANGE) 268 MG/L CYCLE 1:18

			NITROGEN WASH (WASH) PHASE			
20:53	55.3	7.0 INHGA	268	45.6		
20:53	55.3	7.0 INHGA	268	45.6	BEGIN NITROGEN	1
20:57	55.7	14.7 INHGA	292	44.0		
21:00	56.0	20.0 INHGA	289	43.7	BEGIN EVACUATION	1
21:01	55.9	10.8 INHGA	241	43.2		
21:05	55.4	9.9 INHGA	124	42.1		
21:09	55.2	7.0 INHGA	85	41.3	BEGIN NITROGEN	2
21:09	55.2	9.2 INHGA	85	41.5		

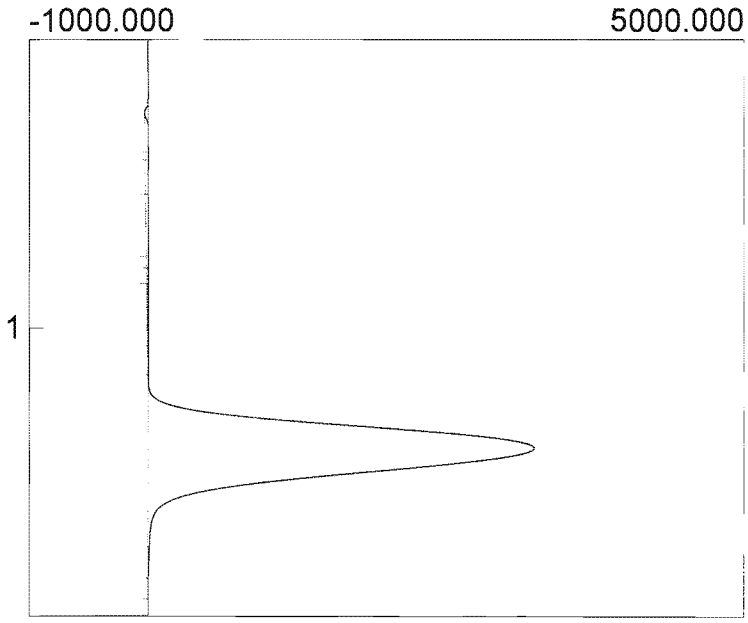
Appendix 3
Chromatograms

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:39:47
Method: CI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 10000ppm cal gas



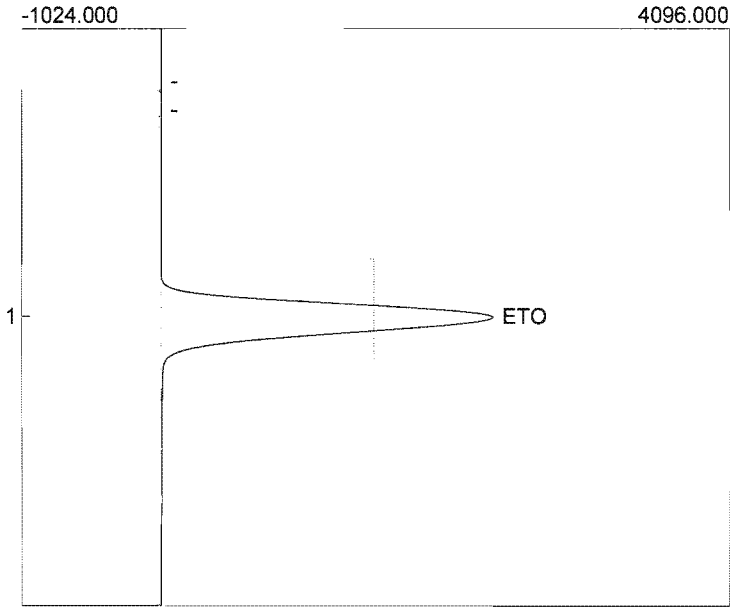
ɜntion	Area	Height	Component
0.996	16488.6772	2357.410	ETO
	16488.6772		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:39:47
Method: CI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 10000ppm cal gas



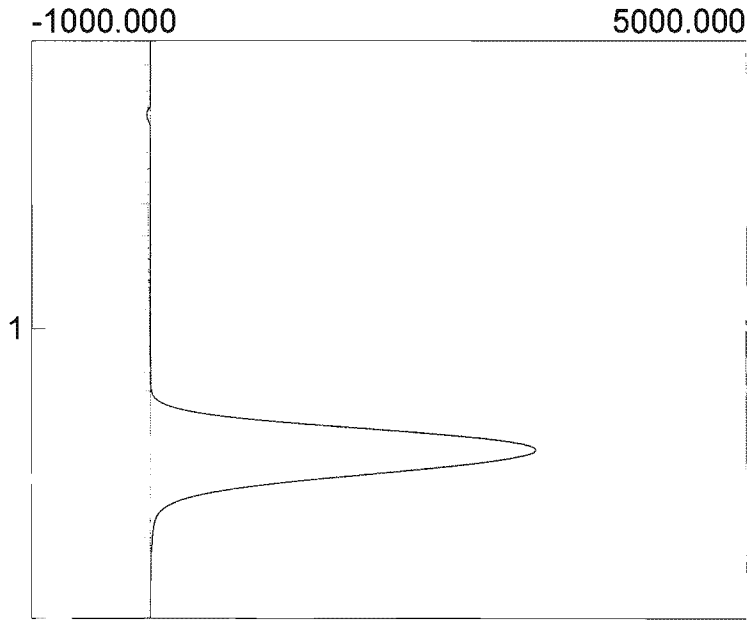
Retention	Height	Area
1.413	3233.687	35033.3354
		35033.3354

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:43:40
Method: CI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 10000ppm cal gas



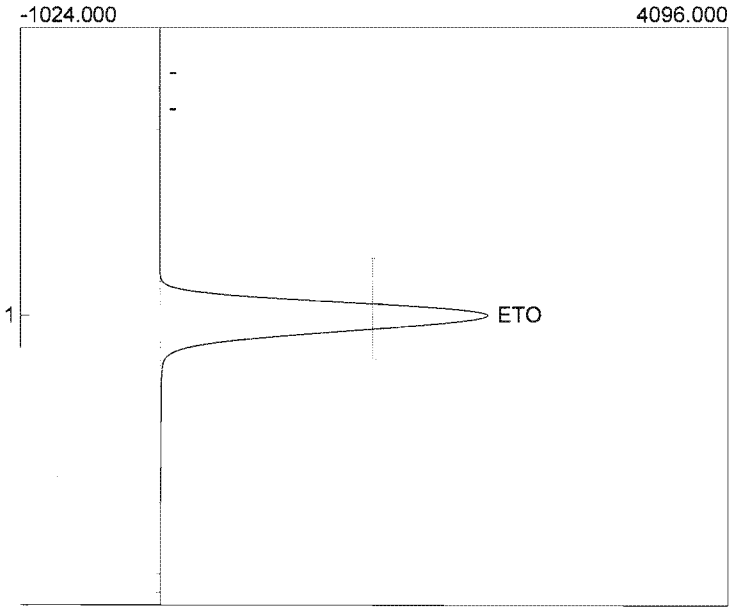
ention	Area	Height	Component
1.000	16559.3905	2394.778	ETO
	16559.3905		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:43:40
Method: CI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 10000ppm cal gas



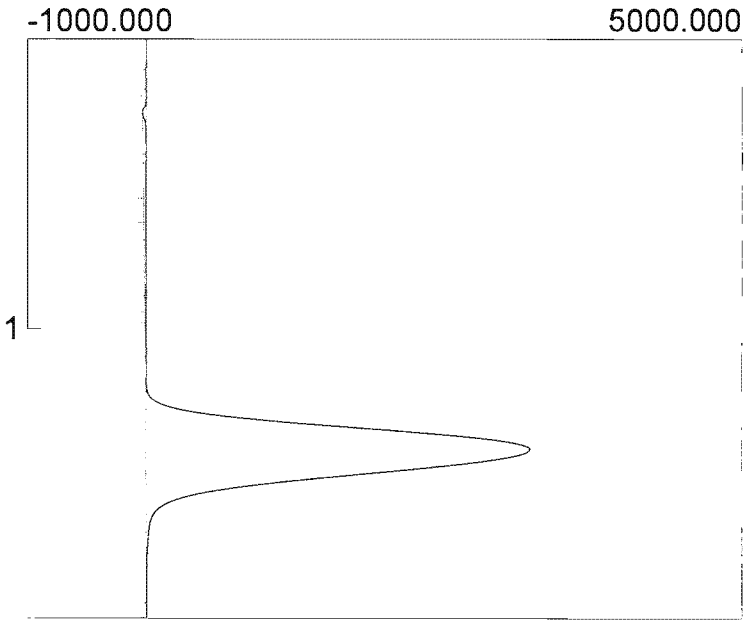
Retention	Height	Area
1.416	3228.160	35029.8240
		35029.8240

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:46:07
Method: CI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 10000ppm cal gas



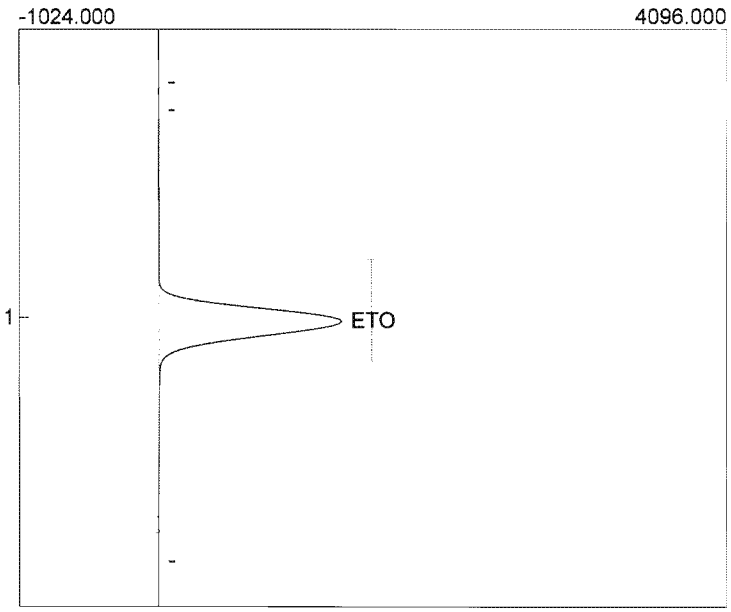
ention	Area	Height	Component
0.996	16571.8503	2366.764	ETO
	16571.8503		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:46:07
Method: CI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 10000ppm cal gas



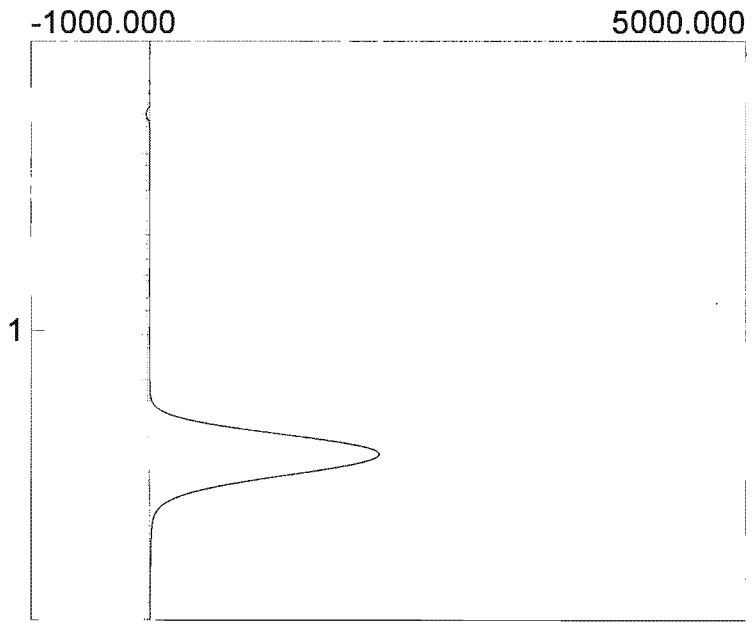
Retention	Height	Area
1.416	3217.190	35037.2834
		35037.2834

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:56:02
Method: CI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 5340ppm cal gas



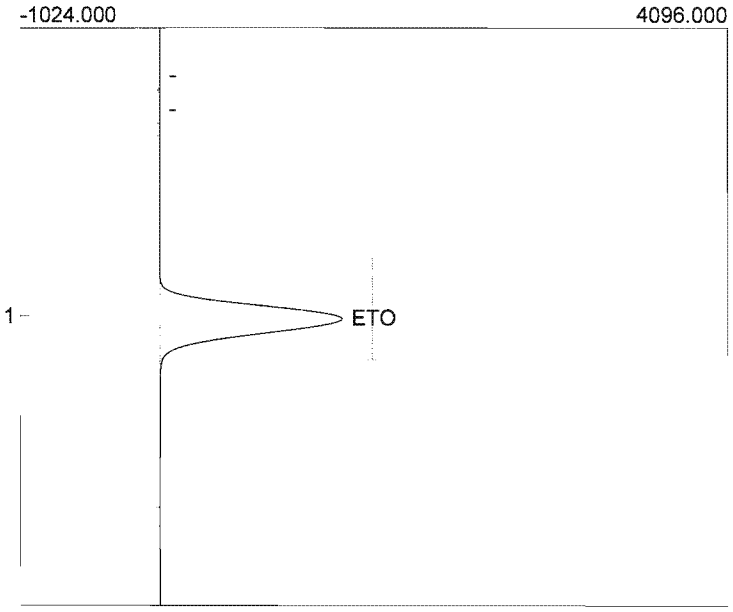
ɜntion	Area	Height	Component
1.010	8868.5336	1319.390	ETO
	8868.5336		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:56:02
Method: CI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 5340ppm cal gas



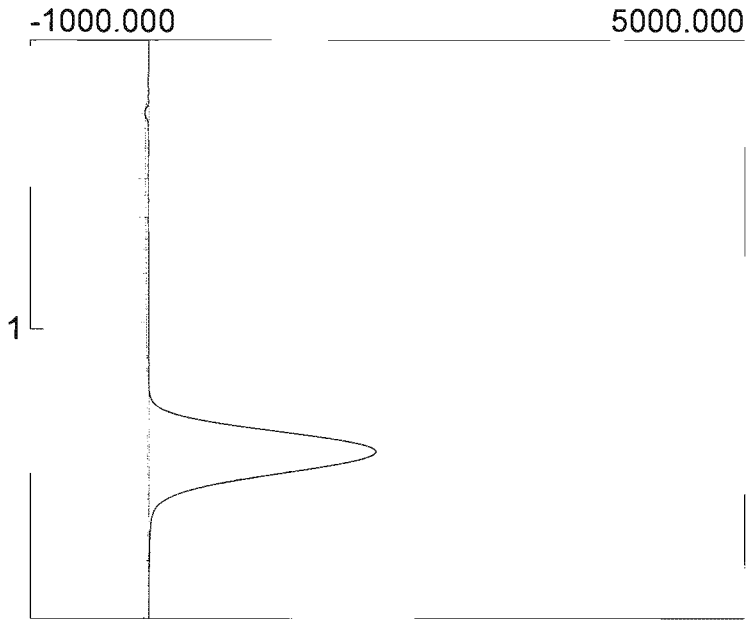
Retention	Height	Area
1.430	1936.188	20133.7630
		20133.7630

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:59:00
Method: CI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 5340ppm cal gas



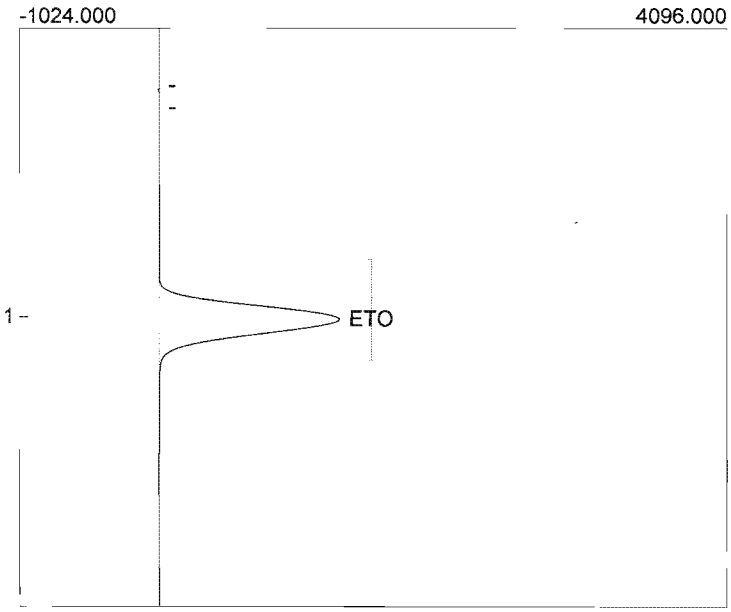
ɜntion	Area	Height	Component
1.006	8807.4495	1317.578	ETO
	8807.4495		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 17:59:00
Method: CI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 5340ppm cal gas



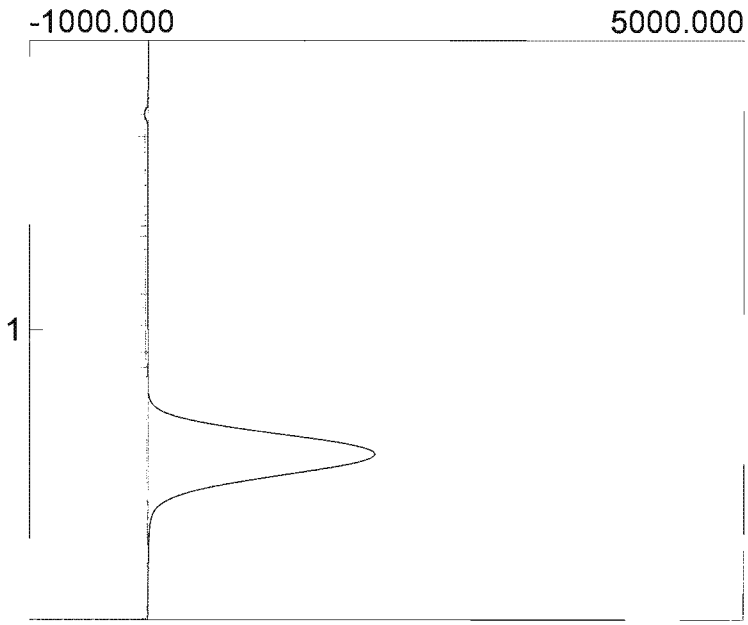
Retention	Height	Area
1.426	1916.170	20083.2700
		20083.2700

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:01:51
Method: CI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 5340ppm cal gas



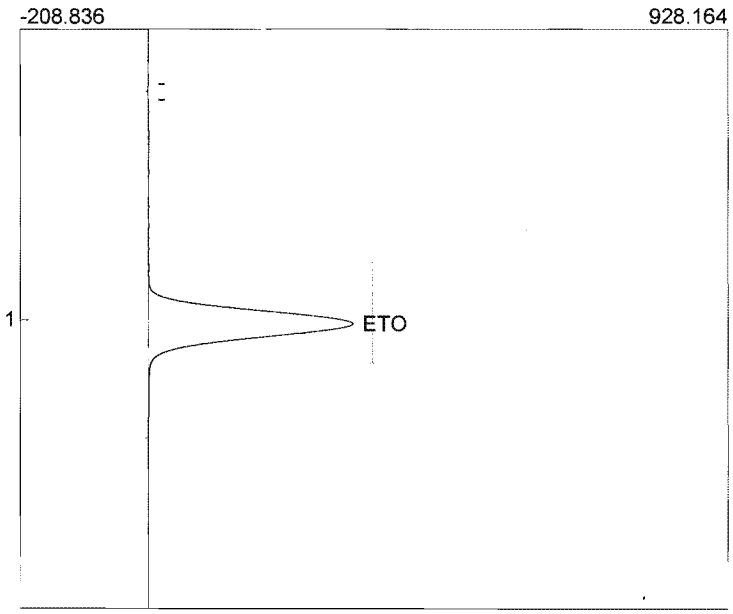
ɜntion	Area	Height	Component
1.006	8762.0816	1304.009	ETO
	8762.0816		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:01:51
Method: CI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 5340ppm cal gas



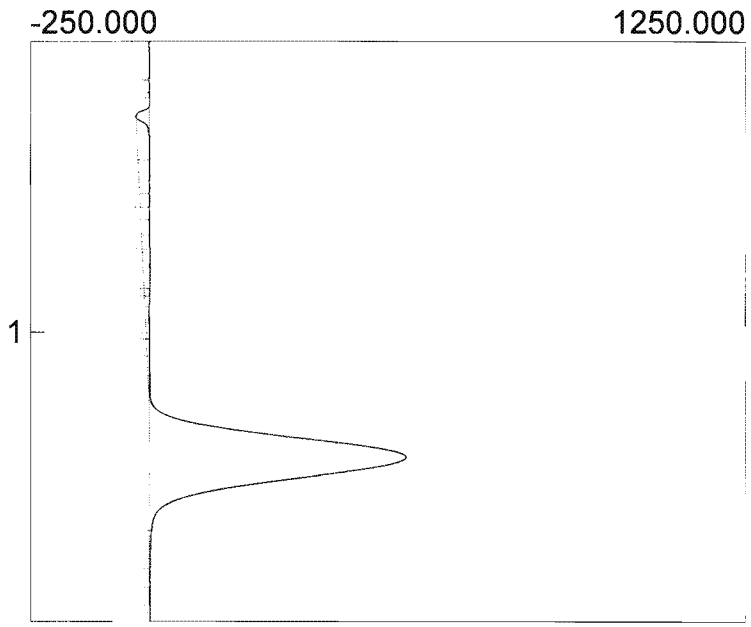
Retention	Height	Area
1.426	1911.211	20095.3347
		20095.3347

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:11:58
Method: CI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 1000ppm cal gas



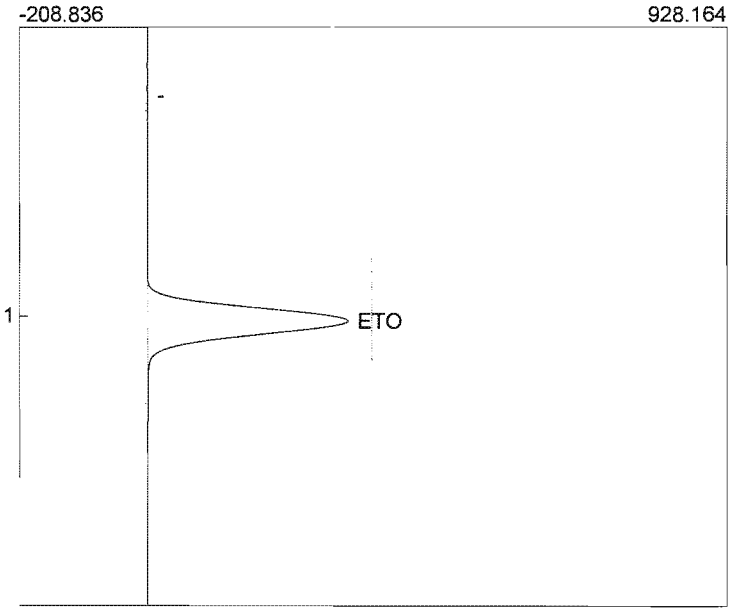
ention	Area	Height	Component
1.013	2120.4080	328.486	ETO
	2120.4080		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:11:58
Method: CI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 1000ppm cal gas



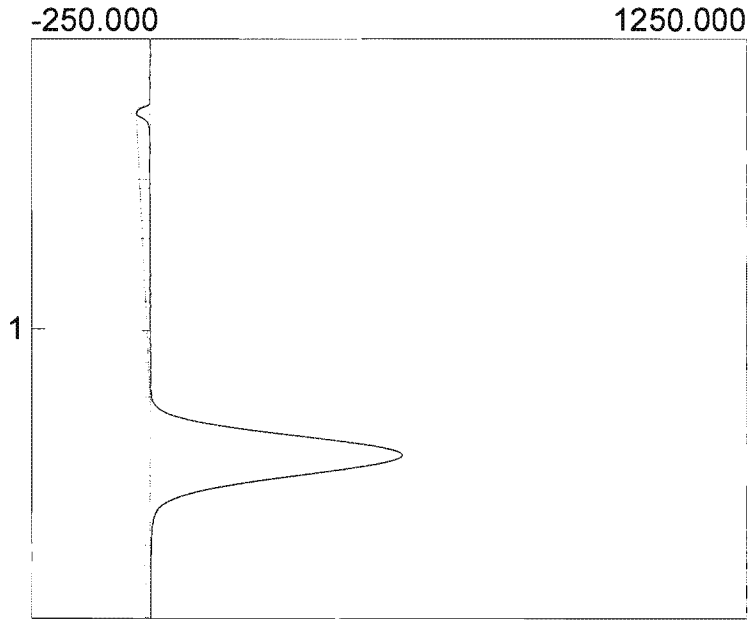
Retention	Height	Area
1.433	537.641	5359.8454
		5359.8454

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:15:12
Method: CI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 1000ppm cal gas



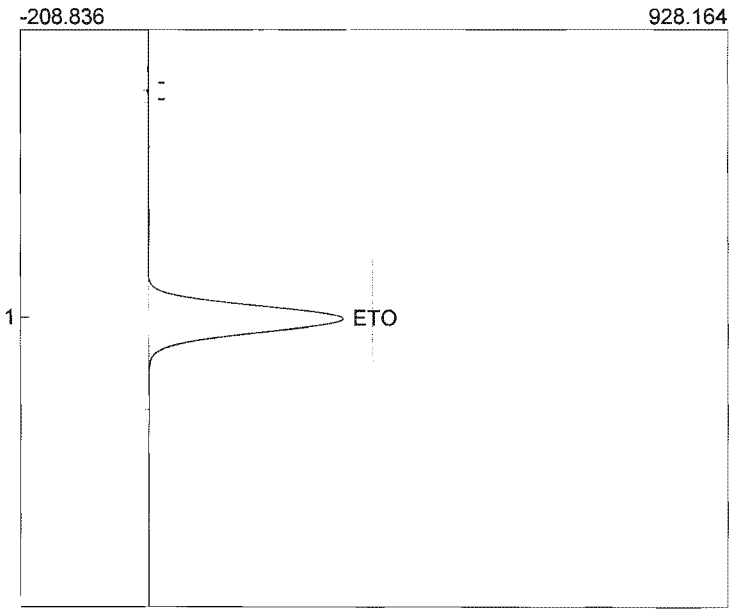
ention	Area	Height	Component
1.016	2077.8196	321.713	ETO
	2077.8196		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:15:12
Method: CI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 1000ppm cal gas



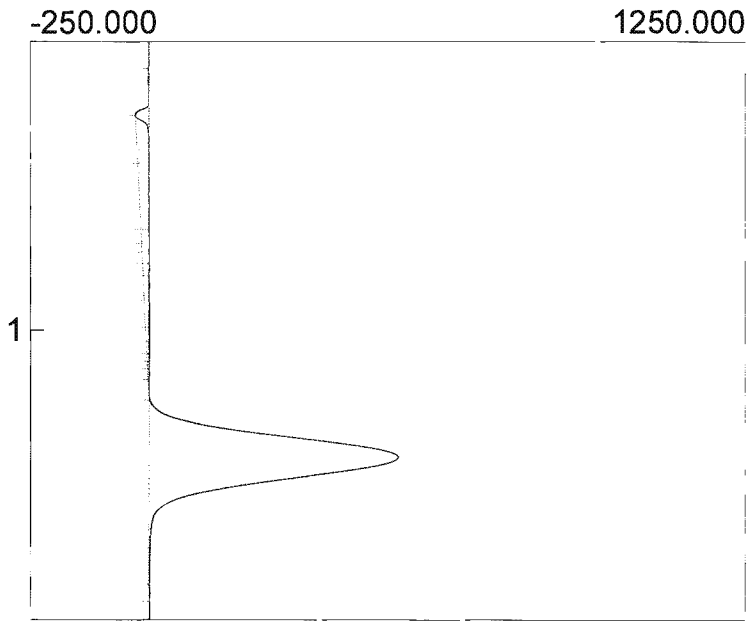
Retention	Height	Area
1.436	528.074	5282.4268
		5282.4268

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:18:14
Method: CI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 1000ppm cal gas



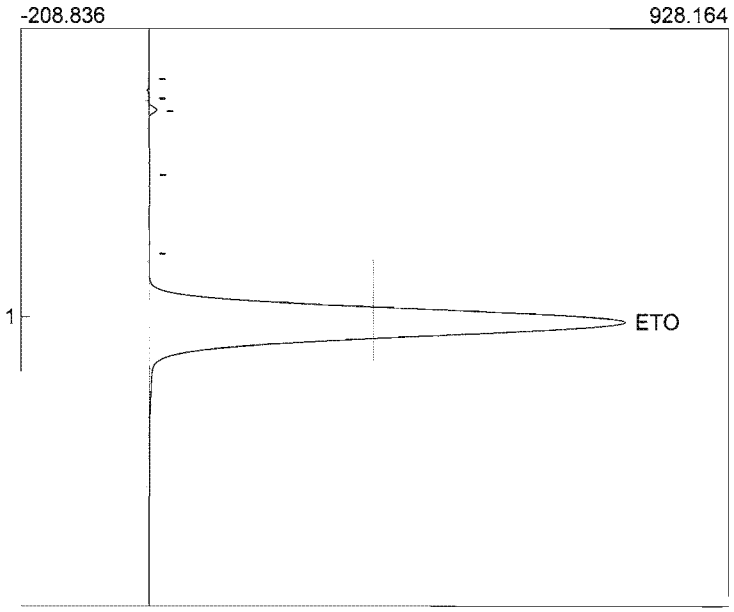
ɜntion	Area	Height	Component
1.003	2040.1098	312.756	ETO
	2040.1098		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:18:14
Method: CI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: 1000ppm cal gas



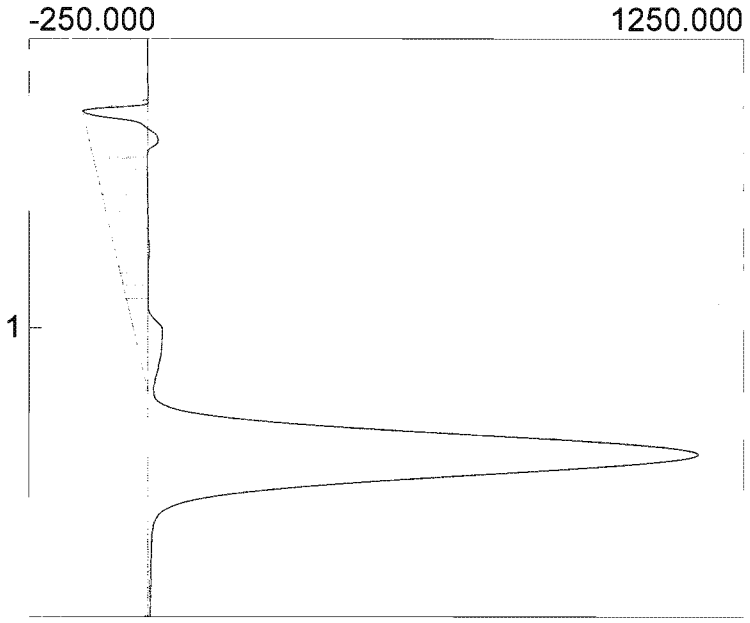
Retention	Height	Area
1.436	522.570	5221.1084
		5221.1084

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:45:42
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 1



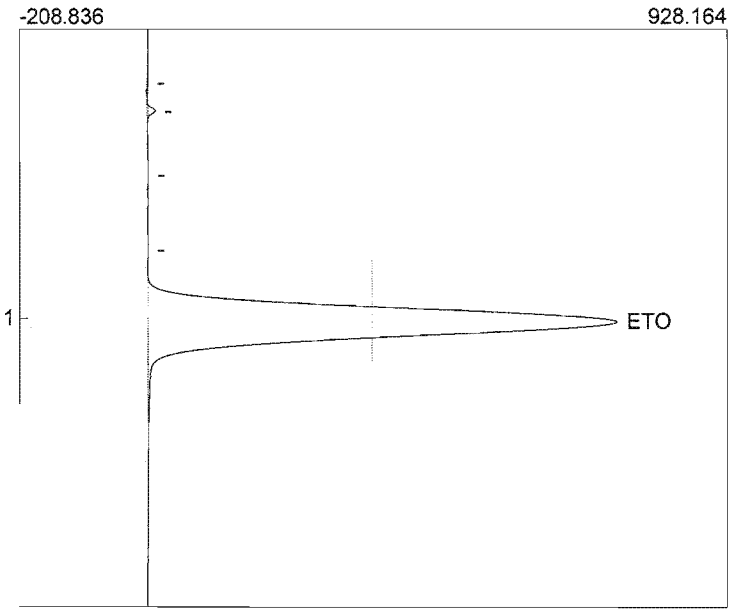
ention	Area	Height	Component
1.016	5068.4494	763.297	ETO
	5068.4494		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:45:42
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 1



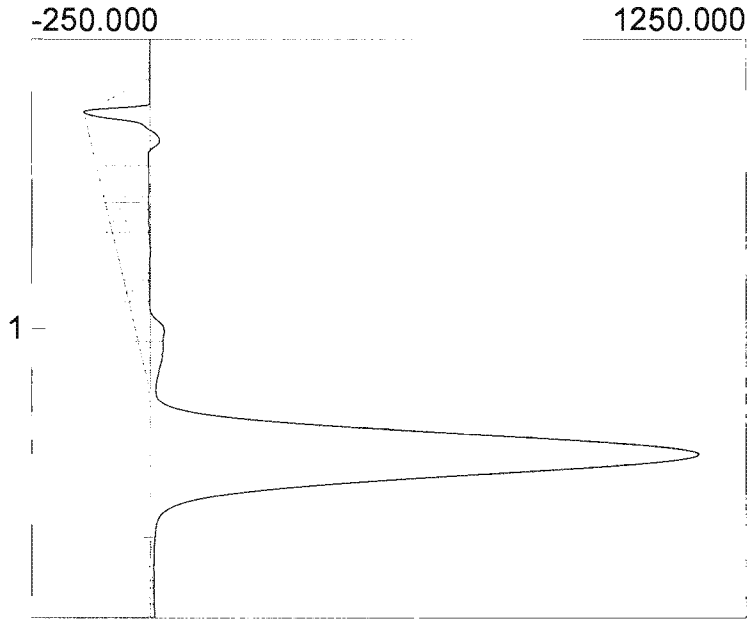
Retention	Height	Area
1.433	1153.420	11841.4982
		11841.4982

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:51:13
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 1



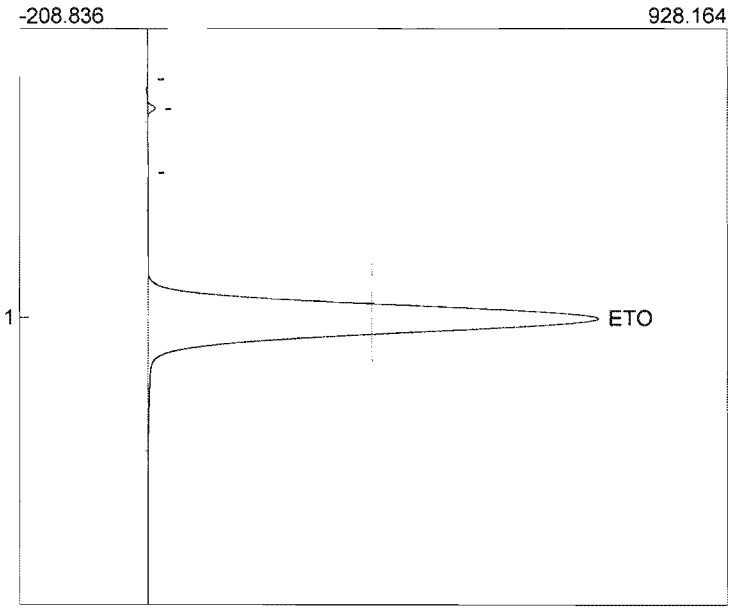
ention	Area	Height	Component
1.010	5023.3226	752.008	ETO
	5023.3226		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:51:13
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 1



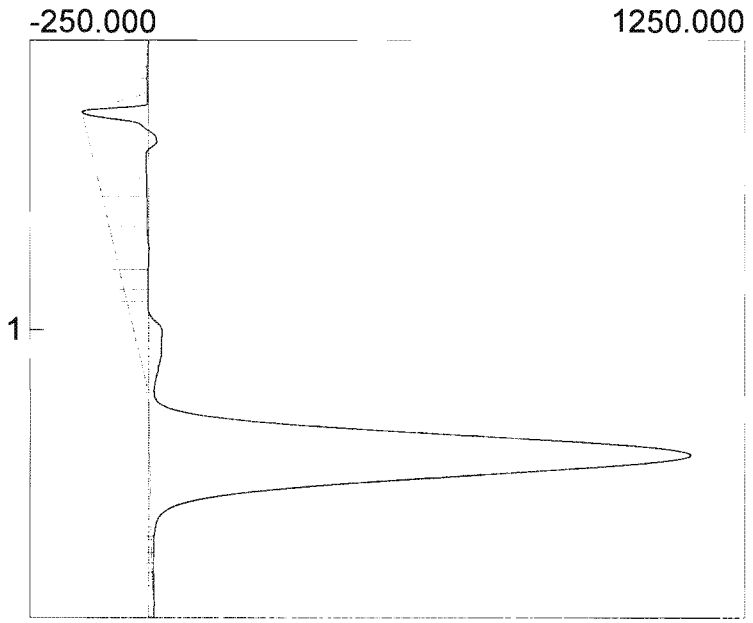
Retention	Height	Area
1.433	1149.756	11758.1574
		11758.1574

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:54:16
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 1



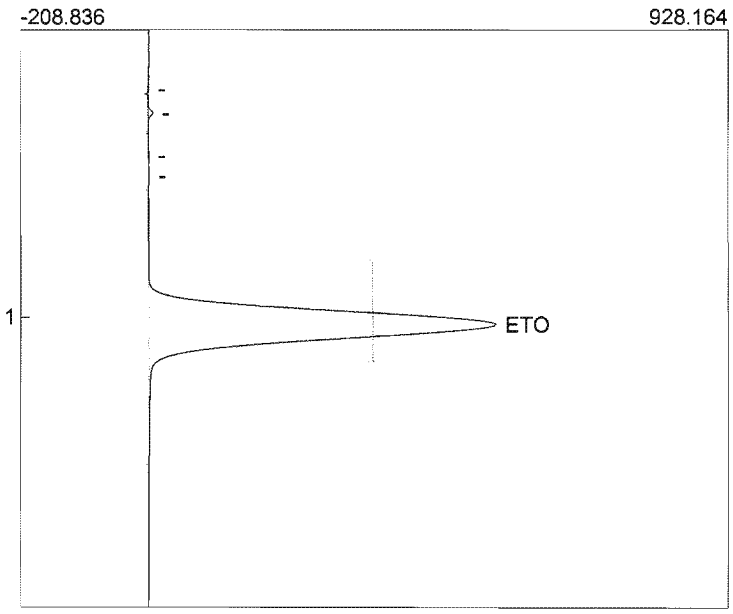
ɜntion	Area	Height	Component
1.003	4910.9434	722.079	ETO
	4910.9434		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 18:54:16
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 1



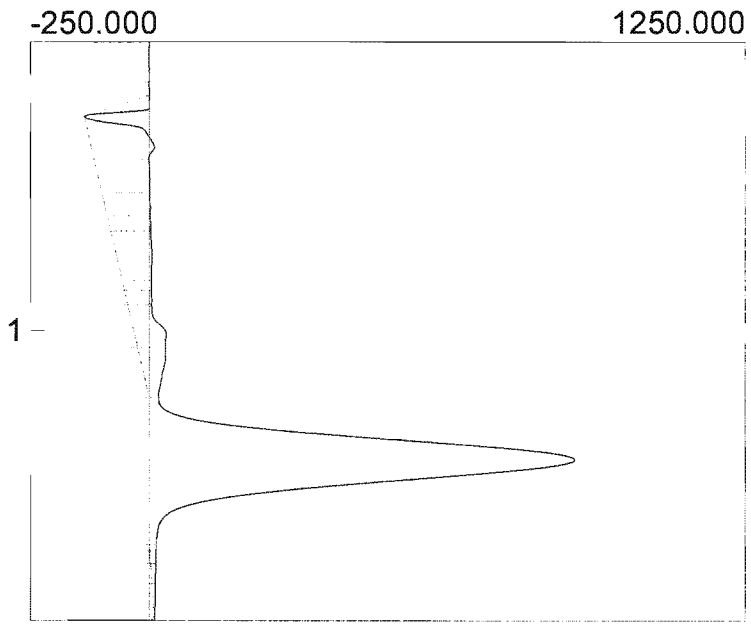
Retention	Height	Area
1.433	1133.004	11579.3884
		11579.3884

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:03:31
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 2



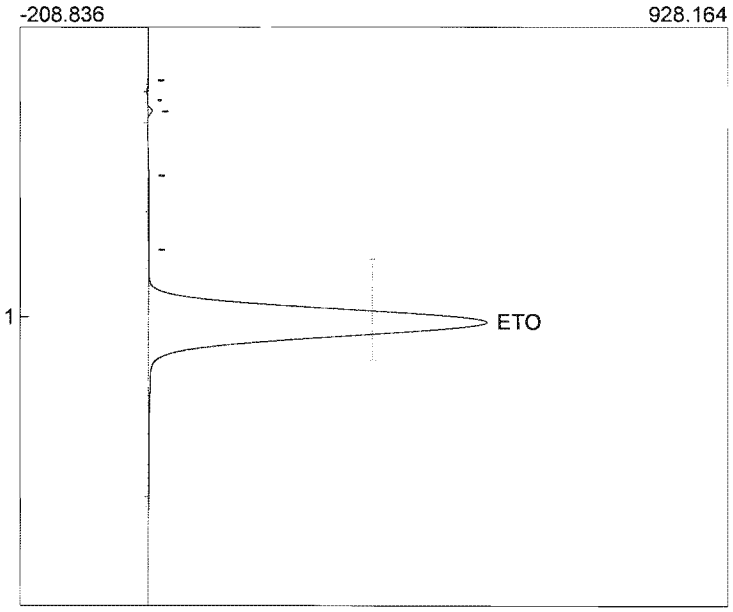
ention	Area	Height	Component
1.023	3728.2722	556.191	ETO
	3728.2722		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:03:31
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 2



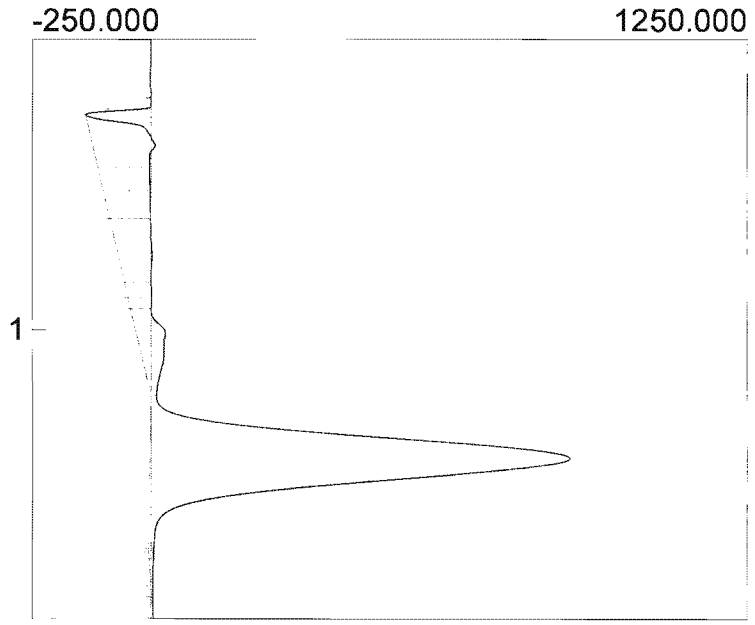
Retention	Height	Area
1.443	890.727	9248.7340
		9248.7340

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:06:16
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 2



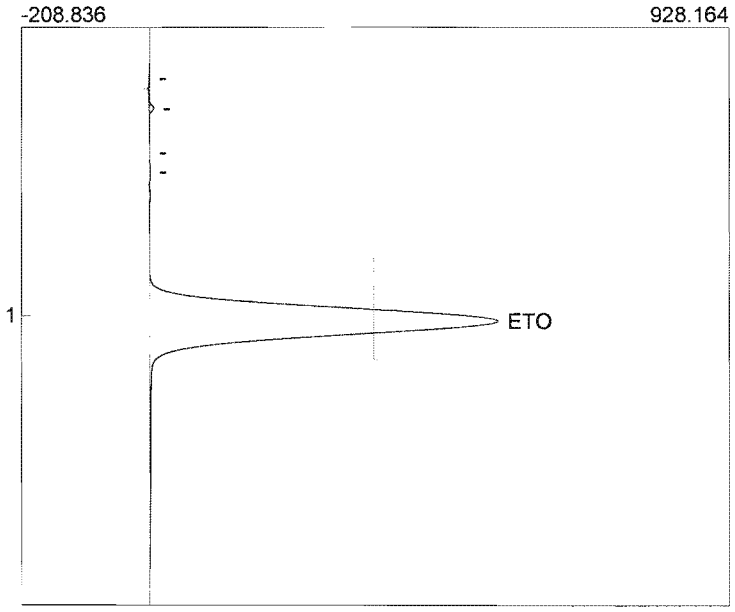
ention	Area	Height	Component
1.016	3667.6991	542.939	ETO
	3667.6991		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:06:16
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 2



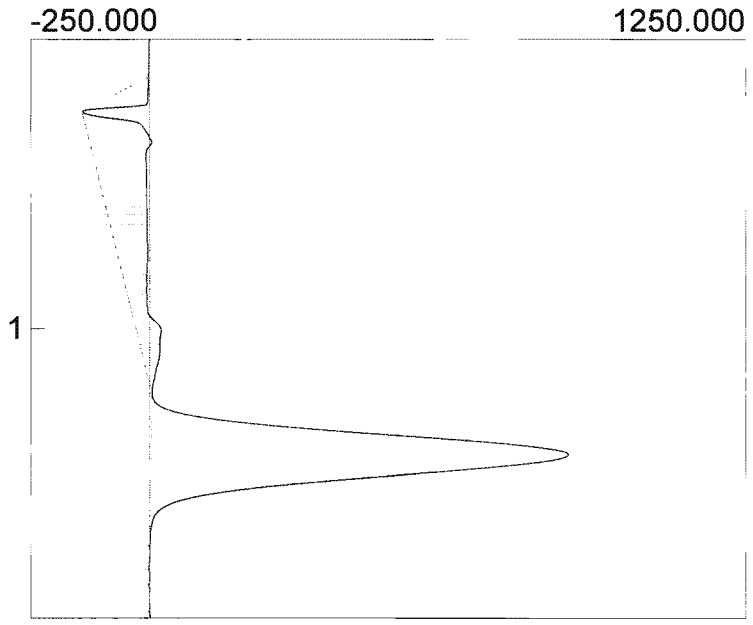
Retention	Height	Area
1.446	878.268	9026.5950
		9026.5950

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:08:42
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 2



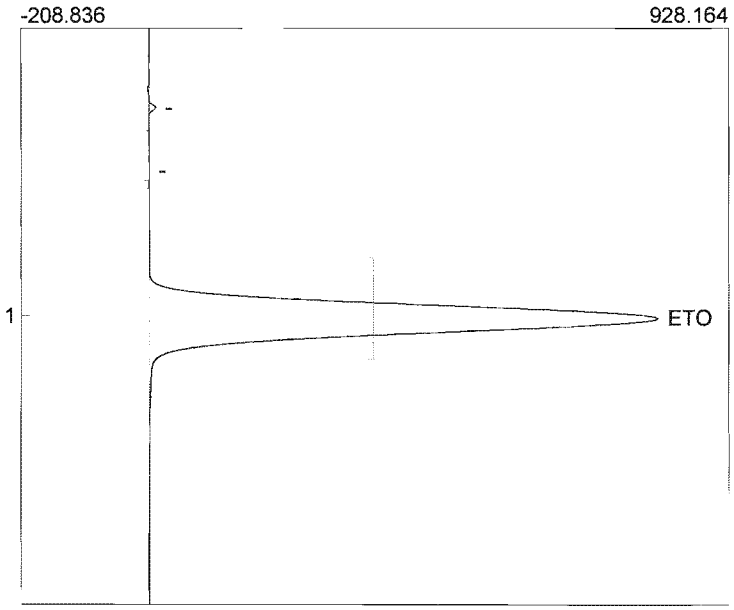
ention	Area	Height	Component
1.016	3699.8639	557.950	ETO
	3699.8639		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:08:42
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 2



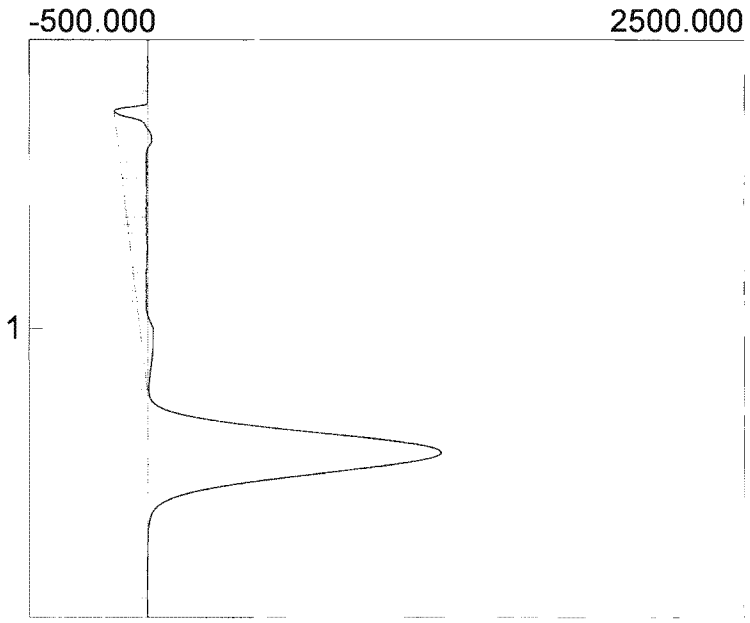
Retention	Height	Area
1.436	873.082	8750.6566
		8750.6566

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:17:13
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Initia



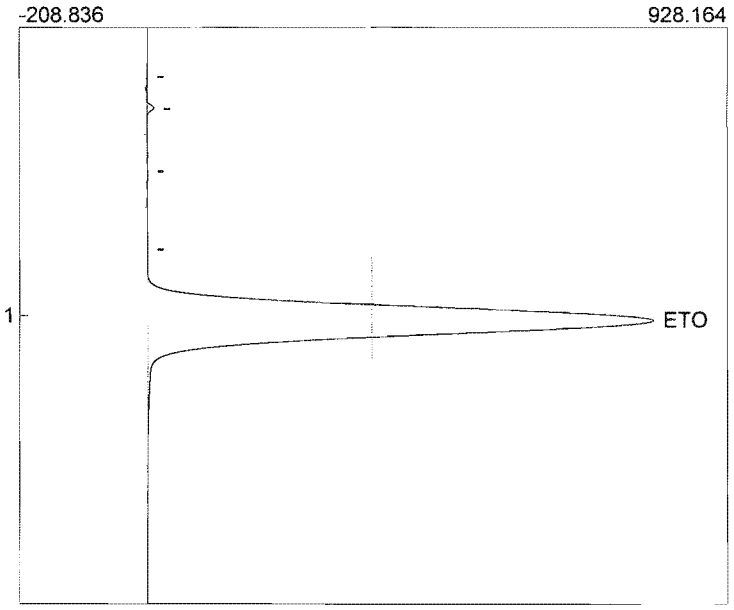
ention	Area	Height	Component
1.006	5447.7366	815.053	ETO
	5447.7366		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:17:13
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Intiti



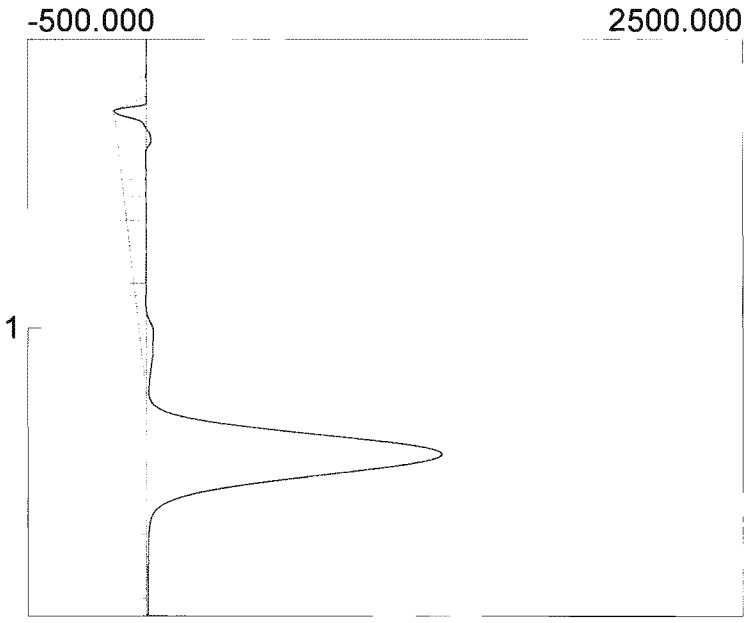
Retention	Height	Area
1.430	1227.056	12438.5342
		12438.5342

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:20:31
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Initia



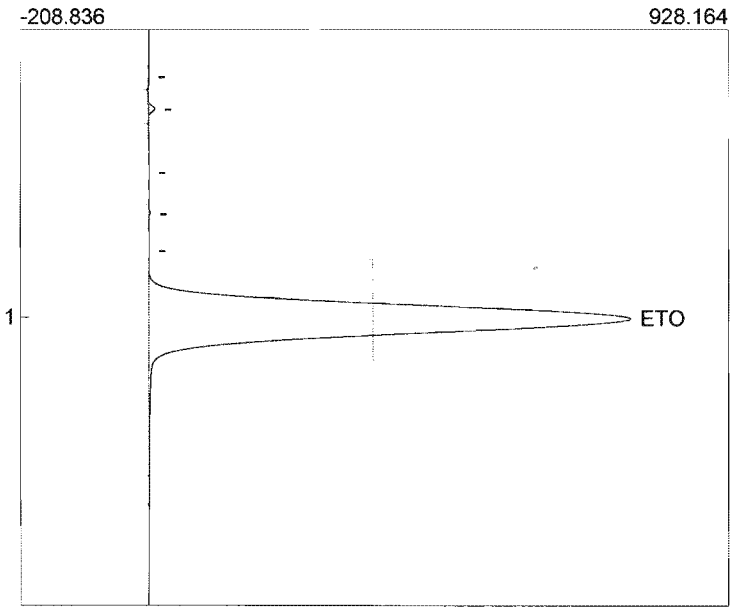
ention	Area	Height	Component
1.013	5454.5114	810.390	ETO
	5454.5114		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:20:31
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Intiti



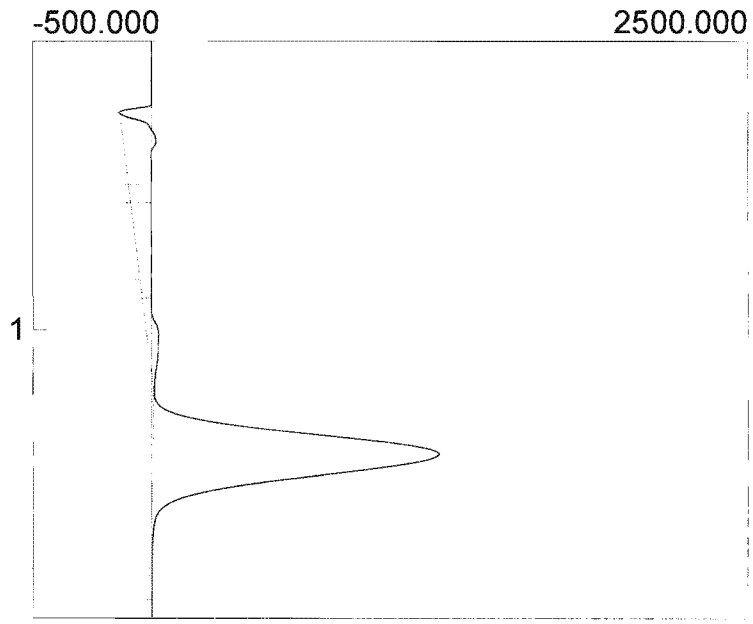
Retention	Height	Area
1.436	1236.817	12694.8670
		12694.8670

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:23:25
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Initia



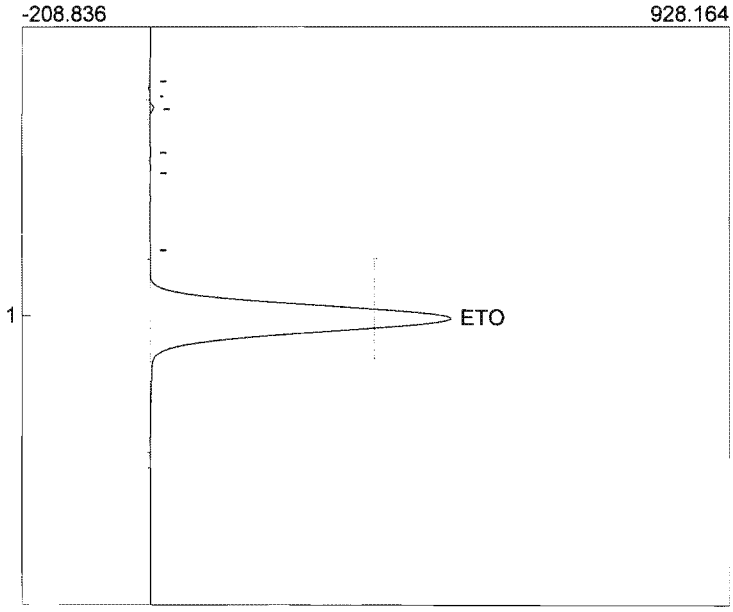
ention	Area	Height	Component
1.003	5248.3986	771.817	ETO
	5248.3986		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 19:23:25
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Intiti



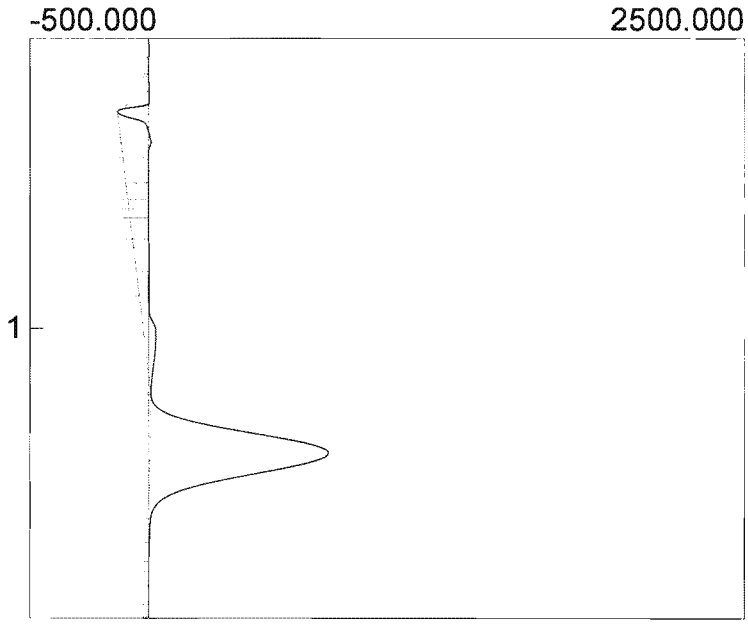
Retention	Height	Area
1.433	1197.223	12128.0636
		12128.0636

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 20:59:47
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 3



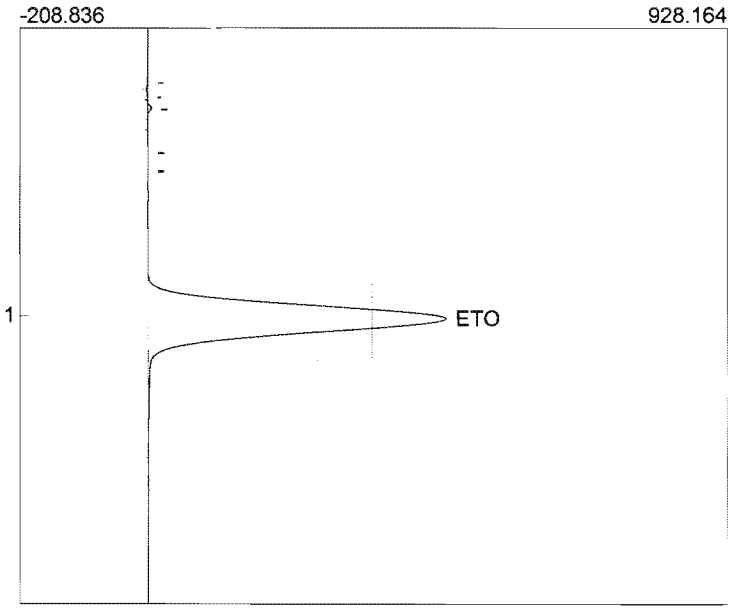
ention	Area	Height	Component
1.006	3165.6814	482.676	ETO
	3165.6814		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 20:59:47
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 3



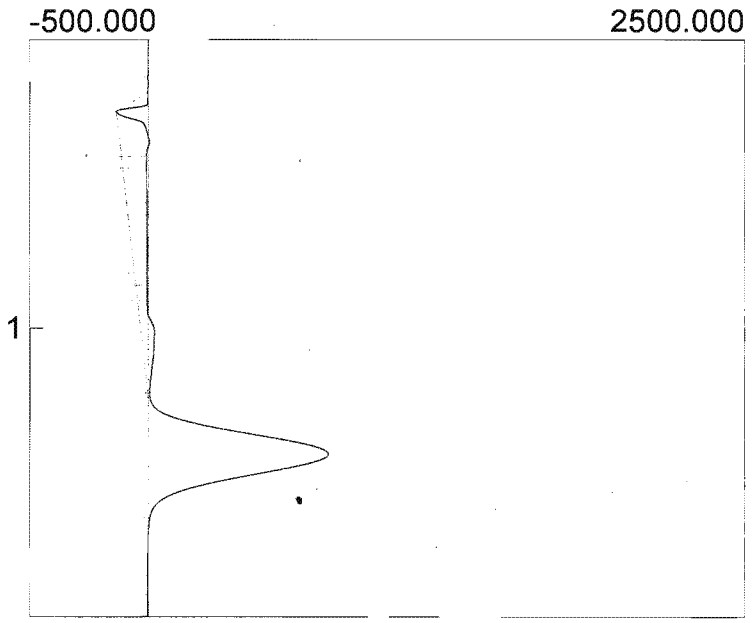
Retention	Height	Area
1.430	748.154	7488.4372
		7488.4372

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:02:12
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 3



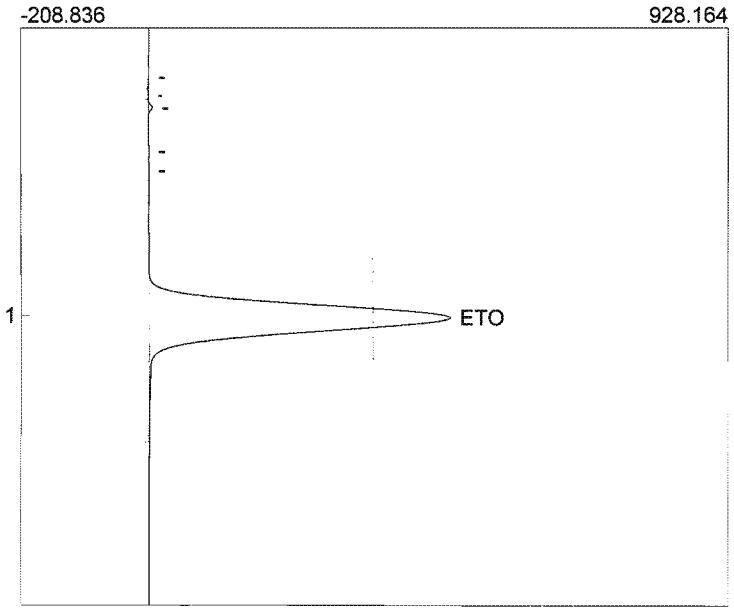
ɜntion	Area	Height	Component
1.010	3181.8328	478.282	ETO
	3181.8328		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:02:12
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 3



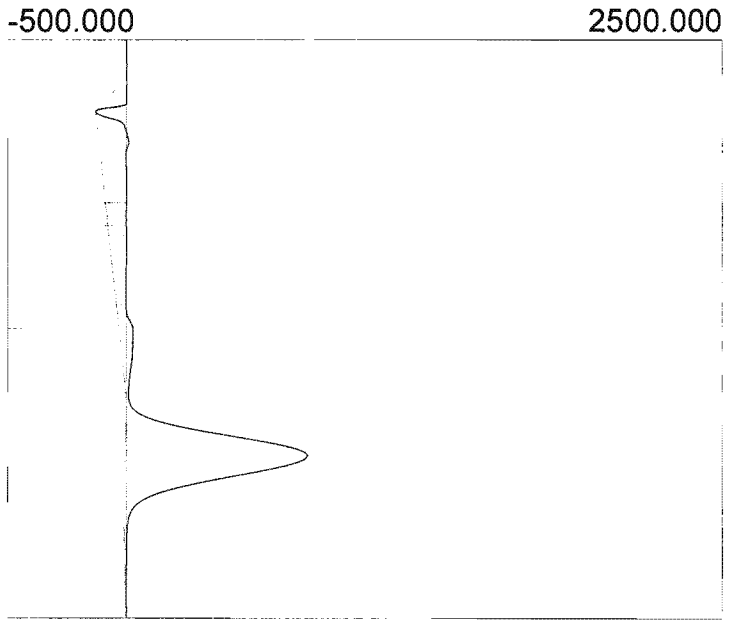
Retention	Height	Area
1.436	754.227	7556.4948
		7556.4948

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:04:37
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 3



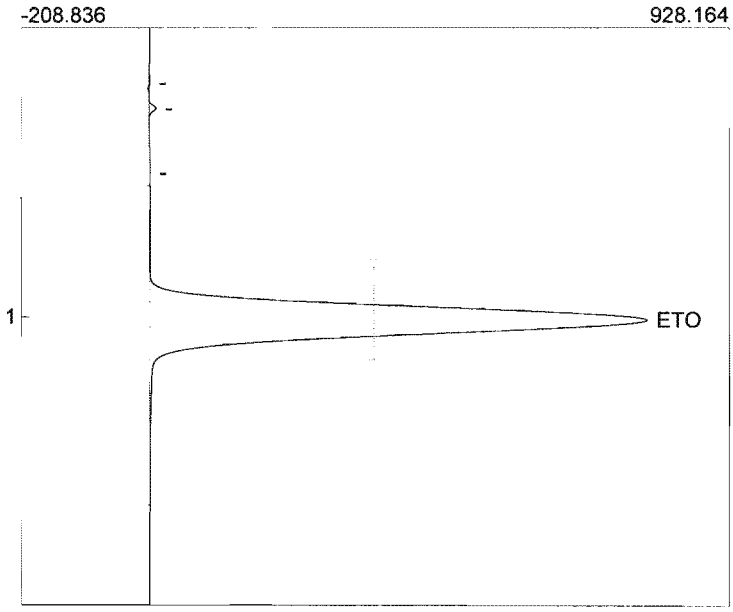
ention	Area	Height	Component
1.006	3167.3975	483.306	ETO
	3167.3975		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:04:37
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Run 3



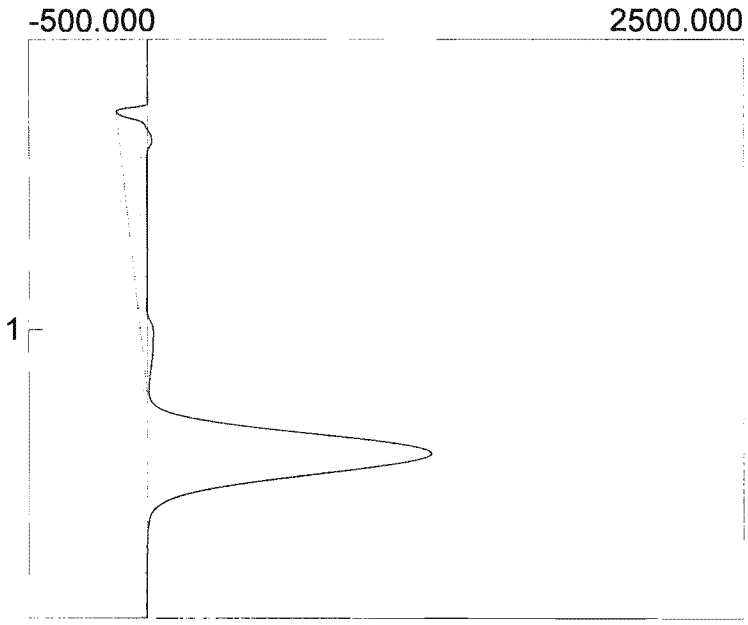
Retention	Height	Area
1.436	763.470	7794.6100
		7794.6100

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:10:26
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Pos



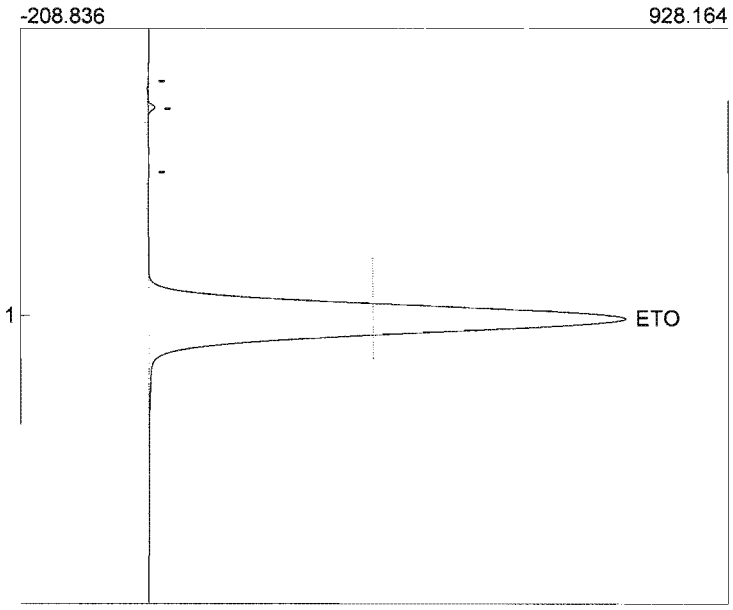
ɜntion	Area	Height	Component
1.010	5276.5640	796.576	ETO
	5276.5640		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:10:26
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Pos



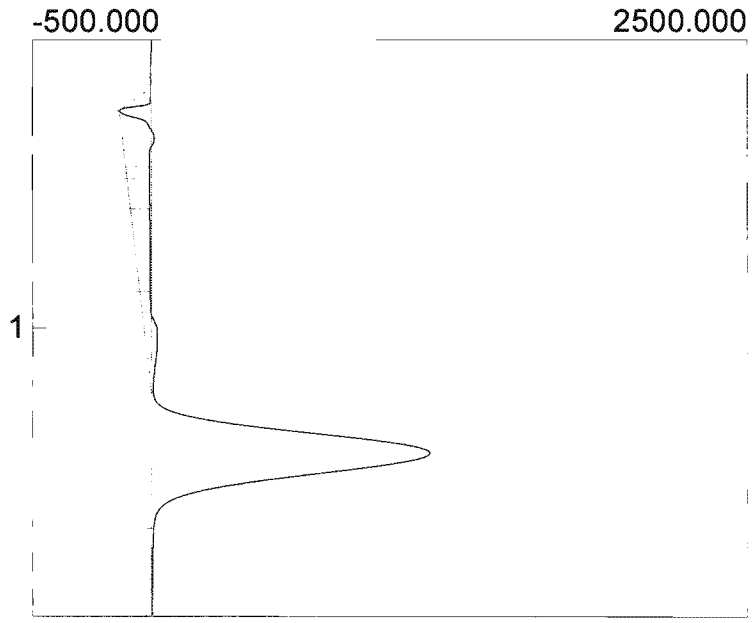
Retention	Height	Area
1.433	1189.131	12028.6538
		12028.6538

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:13:44
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Pos



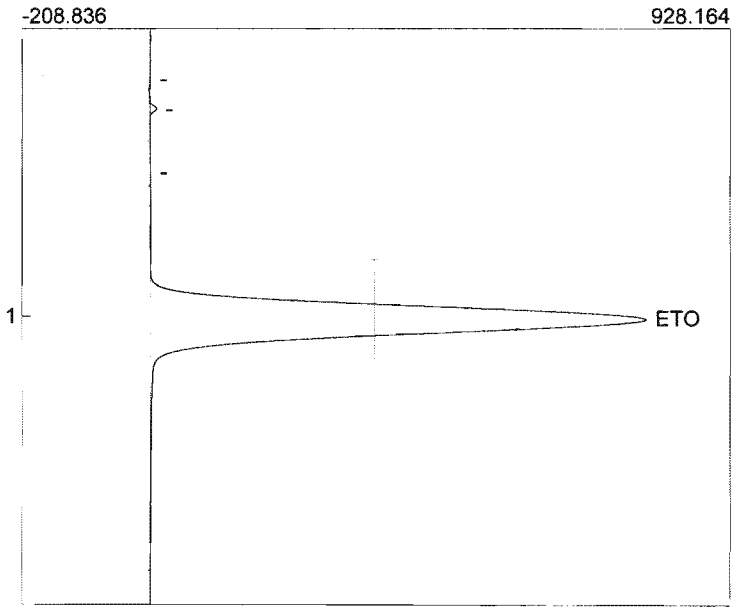
ɜntion	Area	Height	Component
1.010	5154.4925	764.233	ETO
	5154.4925		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:13:44
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Pos



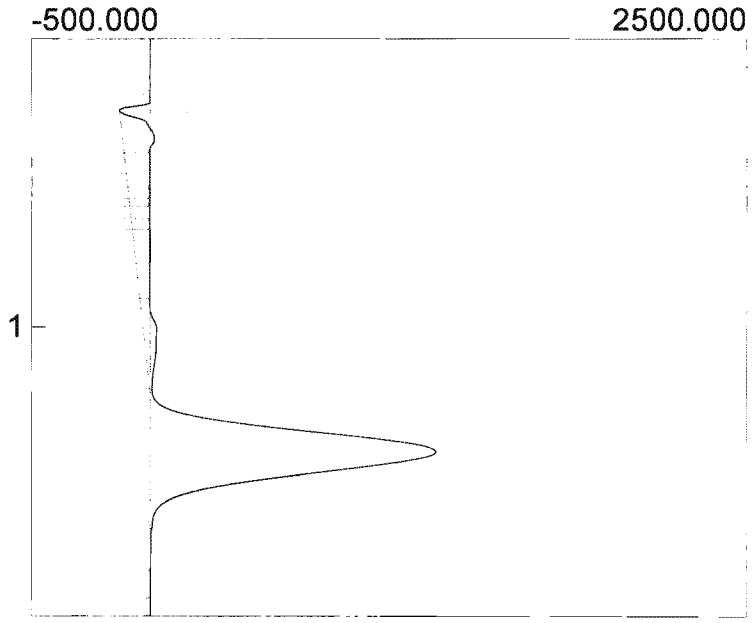
Retention	Height	Area
1.433	1165.848	11914.9334
		11914.9334

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:16:14
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Pos



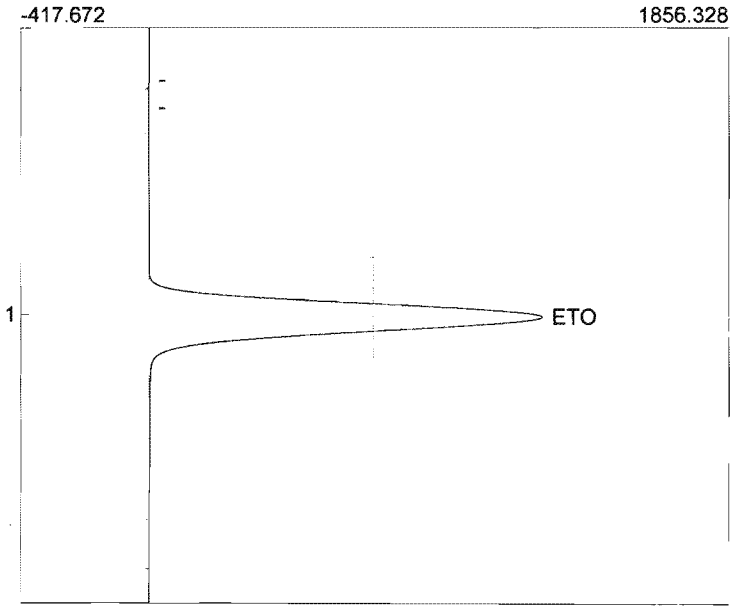
ɜntion	Area	Height	Component
1.006	5307.9380	793.386	ETO
	5307.9380		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:16:14
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber Recovery Study Pos



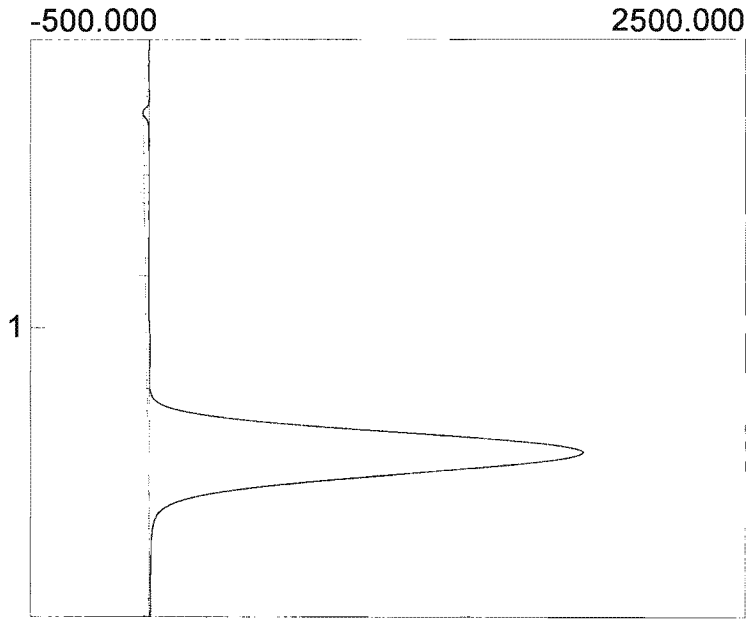
Retention	Height	Area
1.433	1194.849	12129.9206
		12129.9206

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:22:10
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber 5340ppm Post Cal D



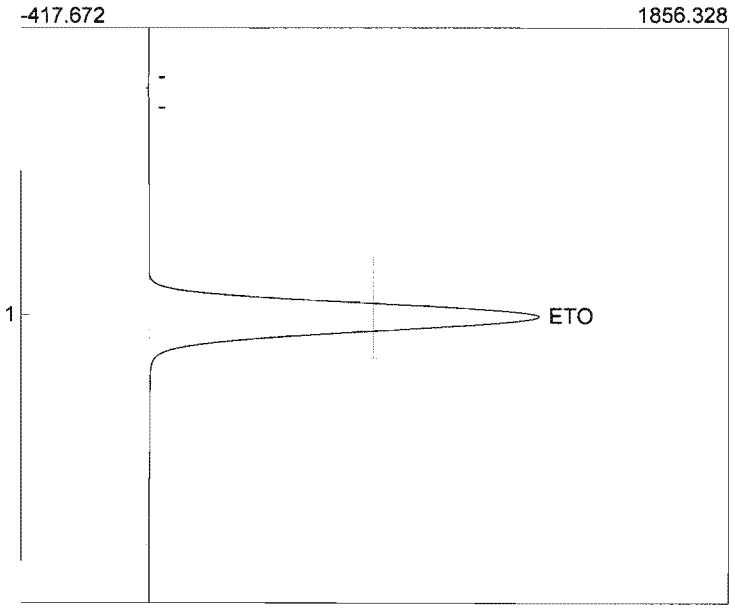
ention	Area	Height	Component
1.006	8525.6869	1260.022	ETO
	8525.6869		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:22:10
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber 5340ppm Post Cal D



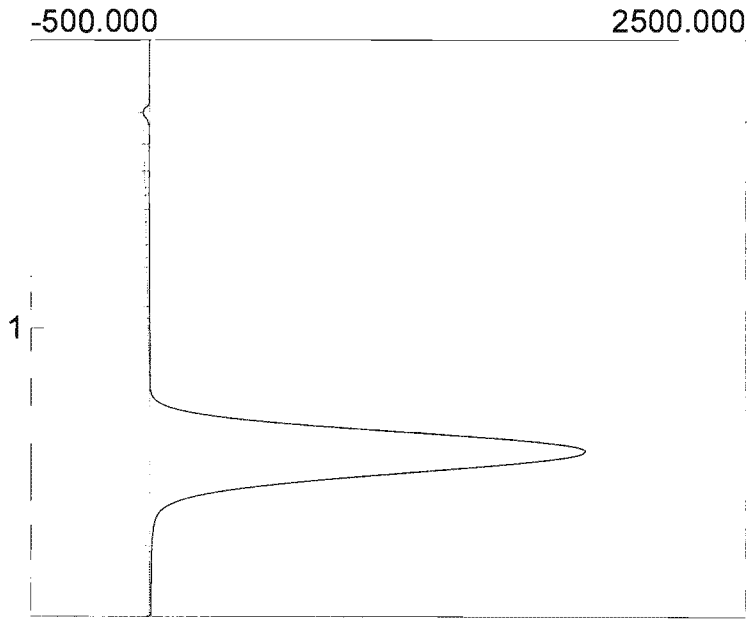
Retention	Height	Area
1.430	1819.766	18946.1828
		18946.1828

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:25:11
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber 5340ppm Post Cal D



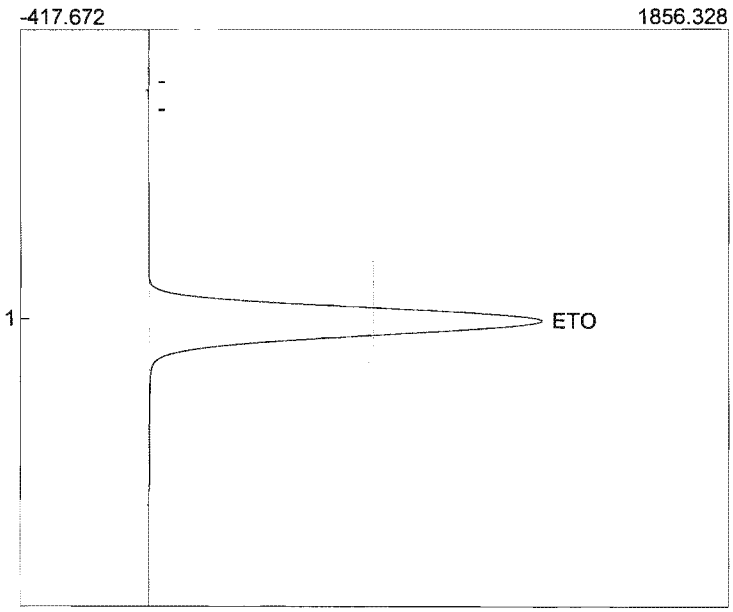
ention	Area	Height	Component
1.003	8575.6626	1251.197	ETO
	8575.6626		

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:25:11
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber 5340ppm Post Cal D



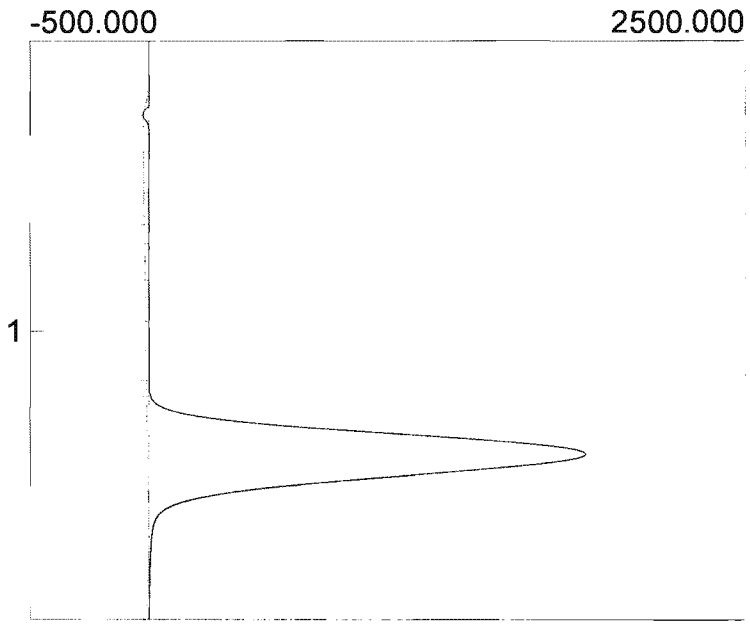
Retention	Height	Area
1.426	1821.503	18910.9914
		18910.9914

Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:28:01
Method: BI
Description: SST Memphis FID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber 5340ppm Post Cal D



ɜntion	Area	Height	Component
1.006	8594.9071	1260.987	ETO
	8594.9071		

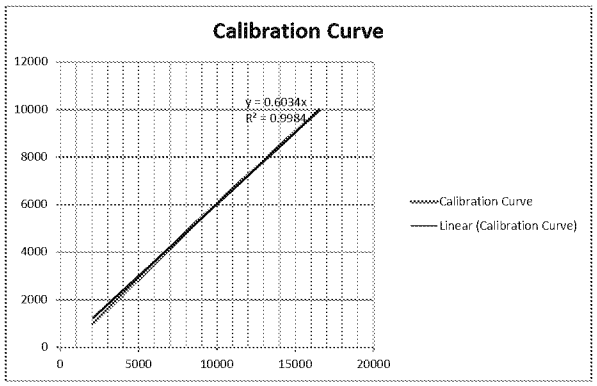
Lab name: LCH Consulting Associates, LLC
Client: SST Memphis
Analysis date: 02/24/2016 21:28:01
Method: BI
Description: SST Memphis PID
Column: Haysep D
Carrier: HELIUM AT 18 PSI
Sample: Damas Scrubber 5340ppm Post Cal D



Retention	Height	Area
1.430	1830.990	19049.7448
		19049.7448

Appendix 4
Calibration Data, Calibration Gas Certificates

Client	SST
Location	Memphis, TN
Date	24-Feb



Calibration Standard	Instrument Response	STD
10000	16488.68	99.69%
10000	16559.39	100.12%
10000 Average	16571.85	100.19%
Response	16539.97	

Calibration Standard	Instrument Response	STD
5340	8868.534	100.63%
5340	8807.450	99.94%
5340 Average	8762.082	99.43%
Response	8812.688	

Calibration Standard	Instrument Response	STD
1000	2120.4080	101.97%
1000	2077.8196	99.92%
1000 Average	2040.1098	98.11%
Response	2079.446	

Run 1	Instrument Response	STD
1	5068.449	101.35%
2	5023.323	100.45%
3 Average	4910.943	98.20%
Response	5000.905	
	3017.546 ppm	

Run 2	Instrument Response	STD
1	3728.272	100.80%
2	3667.699	99.16%
3 Average	3699.864	100.03%
Response	3698.612	
	2231.742 ppm	

Run 3	Instrument Response	STD
1	3165.681	99.81%
2	3181.833	100.32%
3 Average	3167.398	99.87%
Response	3171.637	
	1913.766 ppm	

Recovery Study Pre	Instrument Response	STD
1	5447.737	101.19%
2	5454.511	101.32%
3 Average	5248.399	97.49%
Response	5383.549	

Recovery Study Post	Instrument Response	STD
1	5276.564	99.94%
2	5254.493	99.52%
3 Average	5307.938	100.54%
Response	5279.665	
	98% recovery	

5340ppm Cal Drift	Instrument Response	STD
1	8525.687	99.54%
2	8575.663	100.12%
3 Average	8594.907	100.34%
Response	8565.419	
	97% cal drift	

CERTIFICATE OF ANALYSIS

CERTIFIED STANDARD

Global Calibration Gases
Sarasota, FL

Customer:	EnviroMechanics	Reference#:	021015SY-E
CGA:	180	Certification Date:	02/10/2015
Customer PO#:	150202	Expiration Date:	02/10/2017
Cylinder #:	EP0041644	Pressure, psig:	1000

Analyzed Cylinder-

Components	Certified Concentration	Analytical Accuracy
Ethylene Oxide	5340 ppm	±2%
Nitrogen	Balance	-

Instrument-

Instrument/ Model	Serial Number	Last Date Calibrated	Analytical Method
Troemner/ ASTM1	7210-1	3/27/2014	Gravimetric

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights.

We certify that the weights are calibrated to ASTM E617-97 Class 1 tolerances. This calibration is referenced by serial # 7210-1, Certificate # 14000305 and NIST Inst # 822/272103-06.

This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service. Assayed at Global Calibration Gases LLC, Sarasota, Florida.
*Do not use this standard when cylinder pressure is below 150 psig.

Produced by:
Global Calibration Gases LLC.
1090 Commerce Blvd N.
Sarasota, Florida 34243
PGVP Vendor ID.: N22015

Principal Analyst: _____
Date: 02/10/2015

Principal Reviewer: _____
Date: 02/10/2015

Global Calibration Gases
Sarasota, FL

CERTIFICATE OF ANALYSIS

CERTIFIED STANDARD

Customer:	EnviroMechanics	Reference#:	021015SY-D
CGA:	180	Certification Date:	02/10/2015
Customer PO#:	150202	Expiration Date:	02/10/2017
Cylinder #:	EP0038128	Pressure, psig:	1000

Analyzed Cylinder-

Components	Certified Concentration	Analytical Accuracy
Ethylene Oxide	1000 ppm	±2%
Nitrogen	Balance	-

Instrument-

Instrument/ Model	Serial Number	Last Date Calibrated	Analytical Method
Troemner/ ASTM1	7210-1	3/27/2014	Gravimetric

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights.

We certify that the weights are calibrated to ASTM E617-97 Class 1 tolerances. This calibration is referenced by serial # 7210-1, Certificate # 14000305 and NIST Inst # 822/272103-06.

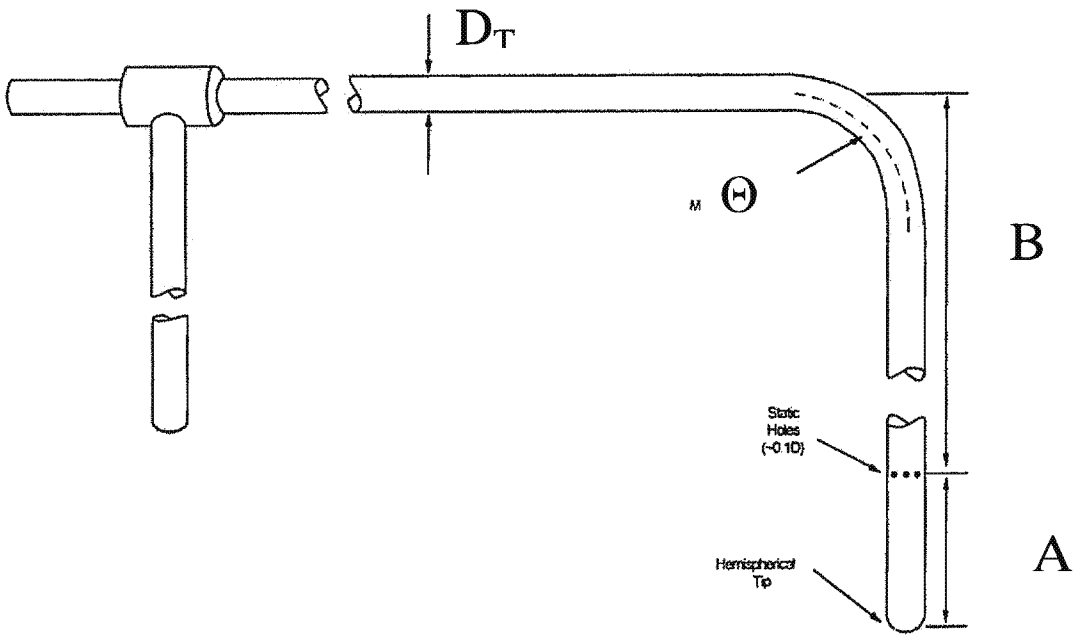
This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service. Assayed at Global Calibration Gases LLC, Sarasota, Florida.
*Do not use this standard when cylinder pressure is below 150 psig.

Produced by:
Global Calibration Gases LLC.
1090 Commerce Blvd N.
Sarasota, Florida 34243
PGVP Vendor ID.: N22015

Principal Analyst: _____
Date: 02/10/2015

Principal Reviewer: _____
Date: 02/10/2015

Standard Pitot Tube Inspection Data Sheet



Allowable Range/Parameter	*Value*
Obstruction?	Y☐ N☑
Damaged?	Y☐ N☑
θ 90° Bend	Y☑ N☐
D_T inside diameter .05"	.119 OD"
Static Holes – 0.1 of D_T	.0035"
Static Holes – equally spaced in a piezometer ring	Y☑ N☐
A = ≥ 6 x D_T YES	0.589"
B = ≥ 8 x D_T YES	0.760"

Certification:

I certify that the Standard Pitot Tube/Probe ID# 6-1 calibrated by Caliper ID# C1 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a Pitot tube calibration factor C_P of 0.99 ± 0.01.

Checked by: T. C. 11/20/15
(Signature / Date)