REPORT OF
AIR POLLUTION SOURCE TESTING
OF AN ETHYLENE OXIDE EMISSION-CONTROL SYSTEM
OPERATED BY STERIGENICS U.S., LLC.
IN SANTA TERESA, NEW MEXICO
ON NOVEMBER 5, 2020

Submitted to:

NEW MEXICO ENVIRONMENT DEPARTMENT
Air Quality Bureau
1301 Siler Road, Building B
Santa Fe, New Mexico 87507

Submitted by:

STERIGENICS U.S., LLC.
2400 Airport Road
Santa Teresa, New Mexico 88008

NSR Permit No. 0733-M15

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Prepared on:

November 26, 2020

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TEST DATE

November 5, 2020

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1.0 INTRODUCTION

On Thursday, November 5, 2020, ECSi performed air pollution source testing of an ethylene oxide (EtO) emission-control system operated by Sterigenics U.S., LLC. in Santa Teresa, New Mexico. The control device tested was a Donaldson Abator catalytic oxidizer, which is currently used to control emissions from two aeration rooms and thirteen sterilization chamber backvents. The purpose of the testing program was to evaluate continued compliance with EPA requirements under the current National Emissions Standards for Hazardous Air Pollutants (NESHAP), Subpart O - Ethylene Oxide Sterilization Facilities, and with requirements in the facility's NSR Permit No. 0733-M15 issued by the New Mexico Environment Department (NMED).

2.0 EQUIPMENT

The EtO gas-sterilization system is comprised of thirteen commercial sterilizers, all discharging through dry screw or liquid-ring vacuum pumps to a packed-tower Ceilcote acid scrubber emission control device. Two aeration rooms and thirteen sterilization chamber backvents are all discharged to a Donaldson Abator catalytic oxidizer emission-control device. The gas-sterilization and emission-control equipment consists of the following:

- Thirteen Gas Sterilizers, each comprised of a steam-heated sterilization chamber (varying in size from 13-30 pallet capacity), a liquid ring recirculating vacuum pump chamber evacuation system ("chamber vacuum vent"), and a backdraft valve ("chamber exhaust vent");

- Two aeration rooms, each comprised of a heated aeration chamber and an exhaust system

Sterilizer vacuum pump emissions are controlled by:

- One packed-tower chemical scrubber, equipped with a packed reaction/interface column, a scrubber fluid recirculation system, a scrubber fluid reaction/storage tank, and a dedicated blower exhaust system.

Aeration room and sterilizer backvent emissions are controlled by:

- One Donaldson EtO Abator catalytic oxidizer, 20,000 SCFM, equipped with a prefilter, a gas-fired heater, an exhaust gas heat exchanger, a reactive catalyst bed, and an exhaust blower.

3.0 TESTING

EtO source testing was performed in accordance with the procedures outlined in CARB Method 431, the USEPA approved alternate method to the procedures listed in 40 CFR, Part 63.365, subpart O. EtO concentration measurement for each test run will be conducted simultaneously at the inlet and outlet of the catalytic oxidizer during chamber backvent, and during a one-hour interval of the 24-hour aeration process. A total of three one-hour aeration test runs and one 15-minute backvent test run were performed.

During aeration and backvent testing, EtO concentration at the inlet and the outlet of the catalytic oxidizer was determined using direct source sample injection into the gas chromatograph (GC). All aeration and backvent testing was performed using recently sterilized product. The testing program was conducted in accordance with the procedures outlined in the following sections.

4.0 RULE/COMPLIANCE REQUIREMENTS

The facility's Donaldson Abator catalytic oxidizer system was tested to determine compliance with the current federal EPA National Emissions Standards for Hazardous Air Pollutants (NESHAP) in 40 CFR Part 63, Subpart O and the facility's NSR permit. Applicable provisions in the NESHAP standard include Sections 63.362(d) and 63.363(b)(4)(i). Specifically, the current testing was performed to demonstrate continued compliance with the following requirements:

- The emissions from the aeration process must be discharged to control equipment with an EtO emission-reduction efficiency of at least 99.0% by weight. {Section 63.362(d)}

- The emissions from the sterilizer backvents must be discharged to control equipment with an EtO emission-reduction efficiency of at least 99.0%. {NSR Permit Section A803 A.}

Testing is required to demonstrate compliance with these requirements. Source testing of the emission-control device is required annually, in accordance with Federal EPA and NMED requirements.

5.0 TEST METHOD REFERENCE

5.1 INTRODUCTION

EtO source testing was performed in accordance with the procedures outlined in CARB Method 431, the USEPA approved alternate method to the procedures listed in 40 CFR, Part 63.365, subpart O. EtO concentration measurement for each test run will be conducted simultaneously at the inlet and outlet of the catalytic oxidizer during chamber backvent, and during a one-hour interval of the 24-hour aeration process. A total of three one-hour aeration test runs and one 15-minute backvent test run were performed.

During aeration and backvent testing, EtO concentration at the inlet and the outlet of the catalytic oxidizer was determined using direct source sample injection into the gas chromatograph (GC). All aeration and backvent testing was performed using recently sterilized product.

Operation and documentation of process conditions were performed by personnel from Sterigenics using existing monitoring instruments installed by the manufacturer on the equipment to be tested. In accordance with USEPA CFR40, Part 63.364 (c), catalyst bed temperature was recorded, using the lone thermocouple installed by the equipment manufacturer to display the average/representative temperature immediately downstream of the bank of catalyst trays. Process conditions are recorded in Tables 1 & 2.

5.2 ETO CONTROL EFFICIENCY MEASUREMENT

During backvent and aeration testing, EtO concentration at the inlet and outlet of the catalytic oxidizer were determined using direct source sample injection into the GC. Since the source gas flow is identical at the inlet and outlet of the catalytic oxidizer control-efficiency of EtO during aeration and backvent was calculated by comparing the concentration of EtO vented to the system inlet to the concentration of EtO vented from the system outlet.

CARB Method 431, Appendix A, specifies that catalytic oxidizer emission-control devices may be tested, and control efficiency determined, without volumetric flow measurement as long as the following criteria are met:

1) There is no dilution between the inlet and outlet sampling locations

2) There is identical flow at the inlet and outlet sampling locations, and
3) There is constant flow throughout the duration of the compliance test.

These conditions were all met during the testing performed at Sterigenics. Specifically, condition 2 was met due to the extremely high flow rate of ambient air being drawn through the oxidizer (20,000 CFM) which, when compared to the relatively low flow rate of natural gas to the heater burner, renders the potential contribution of any fuel gas combustion products to the outlet flow rate to be extremely negligible. In addition, emissions testing for combustion products performed on similar gas-fired catalytic oxidizers used to control EtO emissions has demonstrated that the exhaust gas composition at the outlet of the oxidizer contains moisture, oxygen, carbon dioxide, and carbon monoxide at ambient levels, and that any deviations are at low ppmv levels. This is further proof that the potential contribution of any fuel gas combustion products to the outlet flow rate is insignificant.

During the backvent and aeration phases, vented gas was analyzed by an SRI, Model 8610, portable gas chromatograph (GC), equipped with the following: dual, heated sample loops and injectors; dual columns; and dual detectors. A flame ionization detector (FID) was used to quantify inlet EtO concentration, and a photoionization detector (PID) was used to quantify low-level EtO concentration at the emission-control device outlet.

5.3 SAMPLE TRANSPORT

Source gas was pumped to the GC at approximately 1000 cubic centimeters per minute (cc/min) from the sampling ports through two lengths of heated Teflon® sample line, each with a nominal volume of approximately 75 cubic centimeters (cc) and an outer diameter of 0.25 inch. At the inlet of the catalytic oxidizer, the sampling port was located in the plenum immediately upstream of the catalyst beds. At the outlet of the catalytic oxidizer, the sampling port was located in the plenum downstream of the catalyst beds.

5.4 GC INJECTION

Source-gas samples were then injected into the GC which was equipped with two heated sampling loops, each containing a volume of approximately 2cc and maintained at 100 degrees Celsius (C). Injections occurred at approximately one-minute intervals during backvent testing, and at approximately five-minute intervals during aeration testing. Helium was the carrier gas for both the FID and PID.

5.5 GC CONDITIONS

The packed columns for the GC were both operated at 90 degrees C. The columns were stainless steel, 6 feet long, 0.125-inch outer diameter, packed with 1 percent SP-1000 on 60/80 mesh Carbopack B.
During the analysis, the FID was operated at 250 degrees C. The support gases for the FID were helium (99.999% pure), hydrogen (99.995% pure) and air (99.9999% pure). Any unused sample gas was vented from the GC system back to the inlet of the control device being tested.

5.6 CALIBRATION STANDARDS

The FID was calibrated for mid-range part-per-million-by-volume (ppmv) level analysis using gas proportions similar to the following:

1) 100 ppmv EtO, balance nitrogen
2) 50 ppmv EtO, balance nitrogen (audit gas)
3) 10 ppmv EtO, balance nitrogen
4) 1 ppmv EtO, balance nitrogen

The PID was calibrated for low-range ppmv level analyses using gas proportions similar to the following:

1) 100 ppmv EtO, balance nitrogen
2) 50 ppmv EtO, balance nitrogen (audit gas)
3) 10 ppmv EtO, balance nitrogen
4) 1 ppmv EtO, balance nitrogen

Each of these calibration standards was in a separate, certified manufacturer's cylinder. Copies of the calibration gas laboratory certificates are attached as Appendix F.

5.7 SAMPLING DURATION

Backvent testing consisted of a one 15-minute test run, which encompassed the entire duration of a single cycle of the backvent process. Since aeration is a 24-hour process at this facility, with constant discharge flow from the aeration chambers to the Donaldson Abator emission-control system, aeration testing consisted of three (3), 1-hour test runs. Each test run was performed with freshly sterilized product in the sterilization chambers and/or aeration rooms.

5.8 CONTROL-EFFICIENCY CALCULATIONS

Control efficiency of EtO was calculated for aeration and backvent, using the following CARB-approved equation:

Efficiency = $(C_i - C_o / C_i)(100)$

Which is a mathematical simplification of the following equation from CARB Method 431, with the identical inlet/outlet flow value removed:

Efficiency = $(W_i - W_o / W_i)(100)$

Where:

W_i = Mass flow rate to the control device inlet, pounds, calculated as $(C_i)(F_i)$

Where:

C_i = EtO concentration at the control device inlet

F_i = Flow rate at the control device inlet

W_o = Mass flow rate from the control device outlet, pounds, calculated as $(C_o)(F_o)$

Where:

C_o = EtO concentration at the control device outlet

F_o = Flow rate at the control device outlet

Results of the control-efficiency testing are presented in Section 8.0, and in Tables 1 and 2.

6.0 TEST SCENARIO

Backvent and aeration testing was performed during normal process load conditions. One backvent test run and three aeration test runs were conducted in series to verify the performance of the emission-control device. The testing schedule was as follows:

1) Testing equipment was set up and calibrated.
2) Backvent Test Run #1 was conducted with freshly sterilized product in sterilization chamber. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
3) Aeration Test Run #1 was conducted with freshly sterilized product in aeration. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
4) Aeration Test Run #2 was conducted with freshly sterilized product in aeration. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
5) Aeration Test Run #3 was conducted with freshly sterilized product in aeration. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
6) Post calibration check was performed, testing equipment was packed.

7.0 QA/QC

7.1 FIELD TESTING QUALITY ASSURANCE

At the beginning of the test, the sampling system was leak checked at a vacuum of 15 inches of mercury. The sampling system was considered leak free when the flow indicated by the rotameters fell to zero.

At the beginning of the test, a system blank was analyzed to ensure that the sampling system was free of EtO. Ambient air was introduced at the end of the heated sample line and drawn through the sampling system to the GC for analysis. The resulting chromatogram also provided a background level for non-EtO components (i.e. ambient air, carbon dioxide, water vapor) which are present in the source gas stream due to the ambient dilution air which is drawn into the emission-control device, and due to the destruction of EtO by the emission-control device which produces carbon dioxide and water vapor. This chromatogram, designated AMB, is included with the calibration data in Appendix A.

7.2 CALIBRATION PROCEDURES

The GC system was calibrated at the beginning and conclusion of each day's testing. Using the Peaksimple II analytical software, a calibration curve was constructed for each detector. A gas cylinder of similar composition as the calibration gases, but certified by a separate supplier, was used to verify calibration gas composition and GC performance.

All calibration gases and support gases used were of the highest purity and quality available. A copy of the laboratory certification for each calibration gas is attached as Appendix F.

8.0 TEST RESULTS

The catalytic oxidizer was found to have an average EtO control efficiency of 99.982% for the backvent process, and 99.979% for the aeration process. During backvent and aeration testing the catalytic oxidizer was operated at 279 degrees F (i.e., bed outlet temperature). In accordance with state and federal requirements, backvent and aeration discharge streams must be vented to control equipment with an EtO emission-reduction efficiency of at least 99 percent by weight. The facility's Donaldson Abator catalytic oxidizer met this requirement.

The test results are summarized in Tables 1 and 2. These tables include results for EtO control efficiency of the emission-control device for backvent and aeration. Chromatograms and chromatographic supporting data are attached as Appendices A through E.

TABLES

TABLE 1
ETHYLENE OXIDE CONTROL EFFICIENCY - BACKVENT
OF AN ETHYLENE OXIDE EMISSION CONTROL DEVICE
OPERATED BY STERIGENICS U.S., LLC.
IN SANTA TERESA, NEW MEXICO
ON NOVEMBER 5, 2020

CYCLE PHASE	INJECTION TIME	INLET ETO CONC. (PPM)(1)	OUTLET ETO CONC. (PPM)(2)	ETO CONTROL EFFICIENCY
Backvent(3)	1402	55.8	0.011	99.9803
Backvent	1403	55.9	0.011	99.9803
Backvent	1404	88.1	0.011	99.9875
Backvent	1405	56.1	0.011	99.9804
Backvent	1407	59.9	0.011	99.9816
Backvent	1408	59.8	0.011	99.9816
Backvent	1409	58.7	0.011	99.9813
Backvent	1410	59.8	0.011	99.9816
Backvent	1412	57.6	0.011	99.9809
Backvent	1413	58.1	0.011	99.9811
Backvent	1414	58.1	0.011	99.9811
Backvent	1415	58.0	0.011	99.9810
Backvent	1416	57.5	0.011	99.9809
TIME-WEIGHTED AVERAGE:		**60.26**	**0.0110**	**99.9815**
		NMED REQUIRED CONTROL EFFICIENCY:		**99%**

Notes:
(1) - PPM = parts per million by volume
(2) - 0.01 ppm is the quantification limit for the detector used at the outlet.
(3) - The backvent phase test run started at 14:01, ended at 14:16.
(4) - The average catalyst bed temperature recorded during the test run was 279 degrees F.

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TABLE 2
ETHYLENE OXIDE CONTROL EFFICIENCY - AERATION OF AN ETHYLENE OXIDE EMISSION CONTROL DEVICE OPERATED BY STERIGENICS U.S., LLC. IN SANTA TERESA, NEW MEXICO ON NOVEMBER 5, 2020

RUN NUMBER	INJECTION TIME	INLET ETO CONC. (PPM)(1)	OUTLET ETO CONC. (PPM)(2)	ETO CONTROL EFFICIENCY
1(3)	1202	54.0	0.011	99.9796
1	1207	52.7	0.011	99.9791
1	1212	53.4	0.011	99.9794
1	1217	53.1	0.011	99.9793
1	1222	53.3	0.011	99.9794
1	1227	52.6	0.011	99.9791
1	1232	52.9	0.011	99.9792
1	1237	52.6	0.011	99.9791
1	1242	52.1	0.011	99.9789
1	1247	52.6	0.011	99.9791
1	1252	53.3	0.011	99.9794
1	1257	52.5	0.011	99.9790
2(4)	1302	52.9	0.011	99.9792
2	1307	53.8	0.011	99.9796
2	1312	52.4	0.011	99.9790
2	1317	51.7	0.011	99.9787
2	1322	51.4	0.011	99.9786
2	1327	52.6	0.011	99.9791
2	1232	53.4	0.011	99.9794
2	1337	55.3	0.011	99.9801
2	1342	53.7	0.011	99.9795
2	1347	55.5	0.011	99.9802
2	1352	56.0	0.011	99.9804
2	1357	53.2	0.011	99.9793
3(5)	1418	55.9	0.011	99.9803
3	1423	52.8	0.011	99.9792
3	1428	53.4	0.011	99.9794
3	1433	53.5	0.011	99.9794
3	1438	52.7	0.011	99.9791
3	1443	51.6	0.011	99.9787
3	1448	51.6	0.011	99.9787
3	1453	50.8	0.011	99.9783
3	1458	50.9	0.011	99.9784
3	1503	51.3	0.011	99.9786
3	1508	50.9	0.011	99.9784
3	1513	51.2	0.011	99.9785
TIME-WEIGHTED AVERAGE:		**52.88**	**0.0110**	**99.9792**
		NMED REQUIRED CONTROL EFFICIENCY:		**99%**

Notes:
(1) - PPM = parts per million by volume
(2) - 0.01 ppm is the quantification limit for the detector used at the outlet.
(3) - Aeration Phase Test Run #1 started at 12:00, ended at 13:00.
(4) - Aeration Phase Test Run #2 started at 13:00, ended at 14:00.
(5) - Aeration Phase Test Run #3 started at 14:18, ended at 15:18.
(6) - During aeration testing, the average recorded catalyst bed temperature was 279 deg F

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APPENDICES

APPENDIX A

Calibration Data

LOD Calculation EtO

Sterigenics - Santa Teresa, NM

11/5/2020

			Y =	A	+	m	x
Outlet			ppm =	1.37E-02	+	0.82658	x area
Lowest Cal Gas							
	Area	**Calc ppm**			LOD =	A+3s	
	1.29	1.083	ppm		LOD =	0.022	ppm
	1.30	1.088	ppm				
	1.30	1.088	ppm				
AVG		**1.087**	ppm				
Std Dev		**0.003**	ppm				

1/2 LOD = 0.011 ppm

			Y =	A	+	m	x
Inlet			ppm =	0.01	+	2.16	x area
Lowest Cal Gas							
	Area	**Calc ppm**			LOD =	A+3s	
	0.495	1.076	ppm		LOD =	0.033	ppm
	0.503	1.094	ppm				
	0.497	1.081	ppm				
AVG		**1.084**	ppm				
Std Dev		**0.009**	ppm				

1/2 LOD = 0.016 ppm

SDAPCD-CARB EtO Calibration Worksheet

Site: Sterigenics - Santa Teresa, NM

Date: 11/5/2020

INLET - FID

ppm	0	1.08	10.6	100	1,000	10,100
Area 1	0	0.495	4.84	46.0		
Area 2	0	0.503	4.94	46.4		
Area 3	0	0.497	4.90	46.3		
AVG.	0	0.4983	4.893	46.23		

	AUDIT	POST CAL
	52.0	52.0
	READS	READS
	52.1	52.4
Dev.	0.2%	0.8%

OUTLET - PID

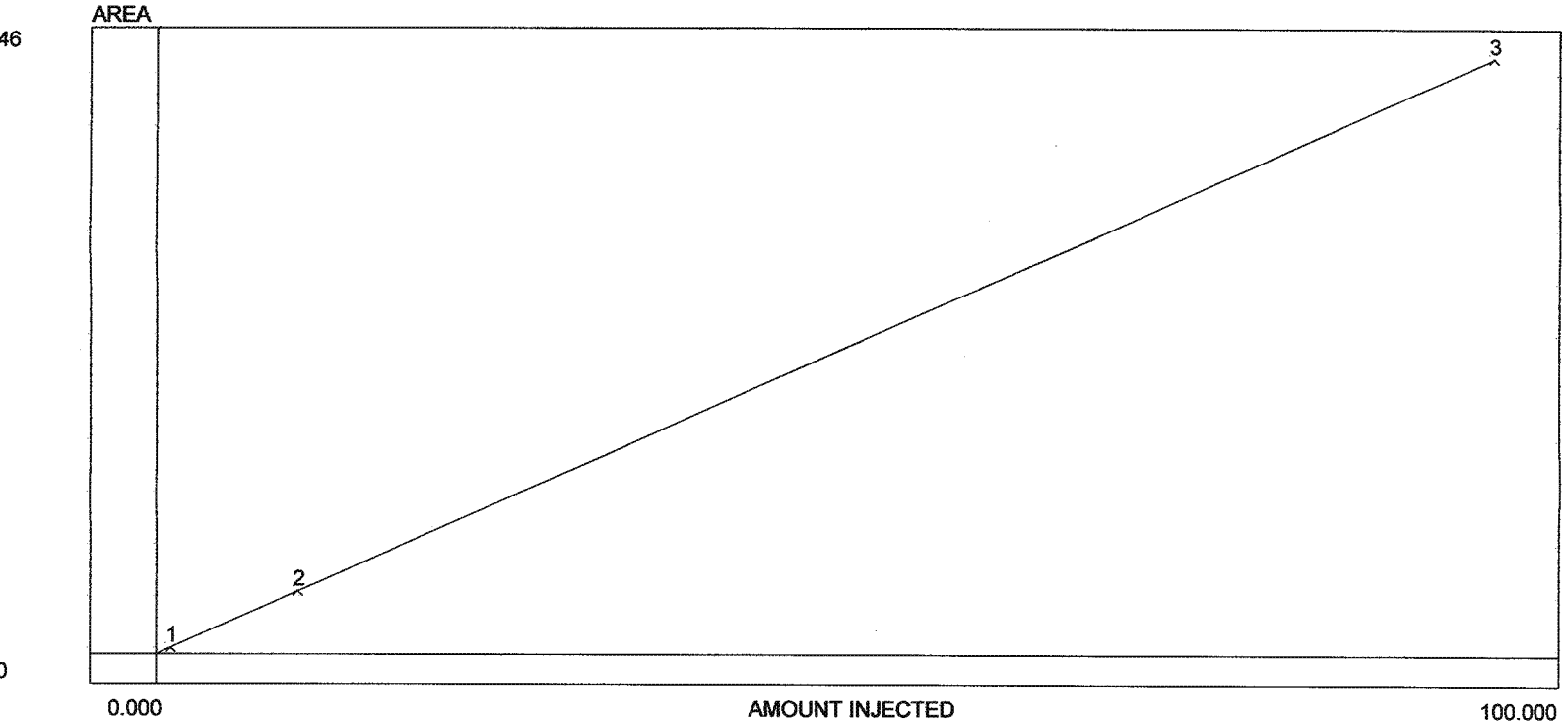
ppm	0	1.08	10.6	100
Area 1	0	1.29	12.8	120
Area 2	0	1.30	12.7	121
Area 3	0	1.30	12.8	122
AVG.	0	1.298	12.78	121.0

	AUDIT	POST CAL
	52.0	52.0
	READS	READS
	52.0	51.6
Dev.	0.0%	-0.8%

Component file: eto1-100.cpt

Peak	Name	Start	End	Calibration	Int.Std	Units
1	Dead Vol / Air	0.000	0.280		0.000	
2	Ambient H2O	0.280	0.400		0.000	
3	Ethylene Oxide	0.400	0.550	C:\peak454-64bit\0.000\1SppmT2020.CAL		
4	Acetaldehyde	0.550	1.000		0.000	

Calibration file: C:\peak454-64bitWin10\1SterST2020.CAL



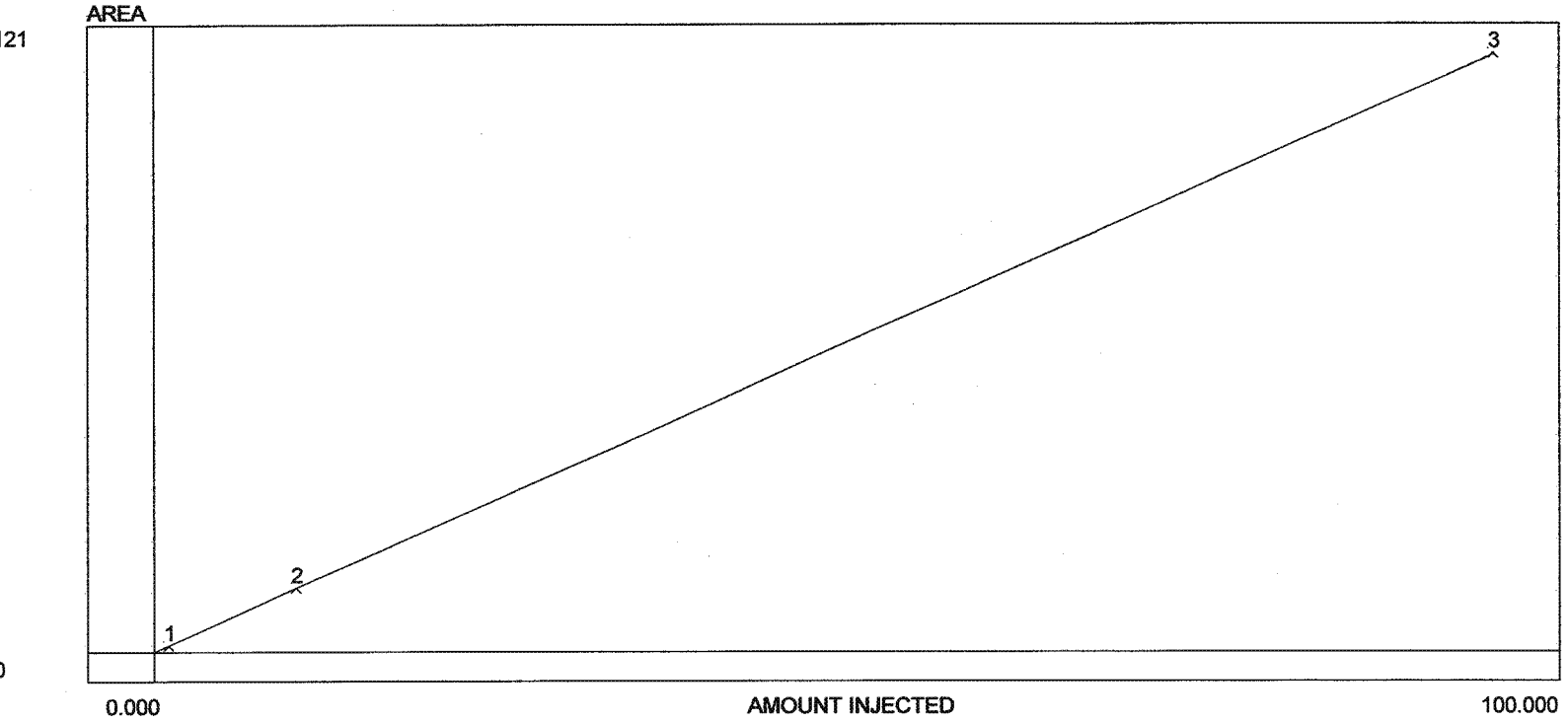
Avg slope of curve: 0.46
Y-axis intercept: 0.00
Linearity: 1.00
Number of levels: 3
SD/rel SD of CF's: 0.0/0.1
Y=0.4615X
r2: 1.0000
Last calibrated: Thu Nov 05 15:51:15 2020

Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	0.498	1.080	0.461	0.498	N/A	N/A
2	4.890	10.600	0.461	4.890	N/A	N/A
3	46.200	100.000	0.462	46.200	N/A	N/A

Component file: eto2-100.cpt

Peak	Name	Start	End	Calibration	Int.Std	Units
1	Dead Vol / Air	0.000	0.280		0.000	
2	Ambient H2O	0.280	0.400		0.000	
3	Ethylene Oxide	0.400	0.550	C:\peak454-64bit\0.000\2SppmT2020.CAL		
4	Acetaldehyde	0.550	1.000		0.000	

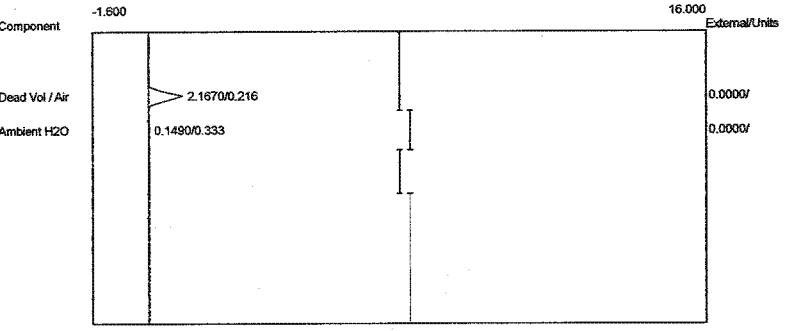
Calibration file: C:\peak454-64bitWin10\2SterST2020.CAL



Avg slope of curve: 1.21
Y-axis intercept: 0.00
Linearity: 1.00
Number of levels: 3
SD/rel SD of CF's: 0.0/0.3
Y=1.2071X
r2: 1.0000
Last calibrated: Thu Nov 05 15:49:34 2020

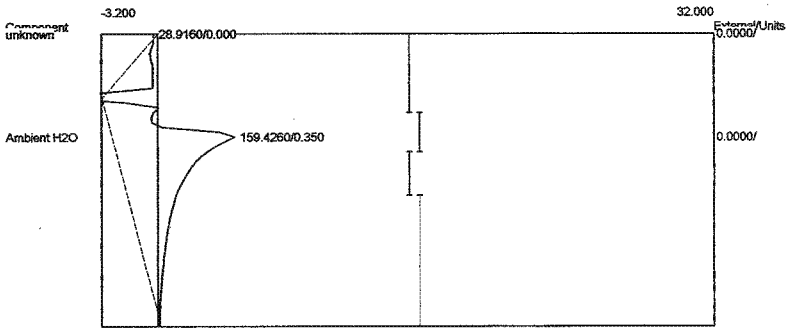
Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	1.300	1.080	1.204	1.300	N/A	N/A
2	12.800	10.600	1.208	12.800	N/A	N/A
3	121.000	100.000	1.210	121.000	N/A	N/A

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: PreCal
Analysis date: 11/05/2020 11:00:13
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-Amb.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



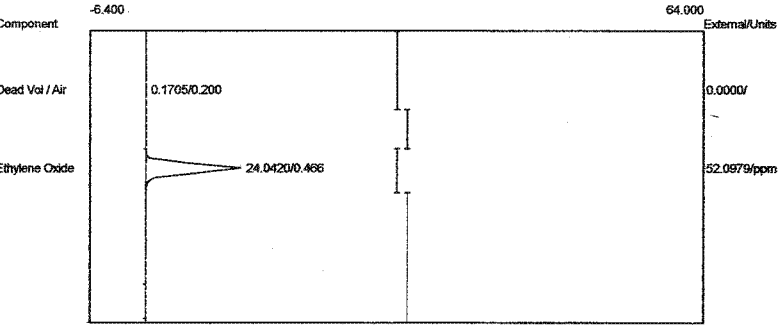
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1670	0.0000	
Ambient H2O	0.333	0.1490	0.0000	
		2.3160	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: PreCal
Analysis date: 11/05/2020 11:00:13
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-Amb.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



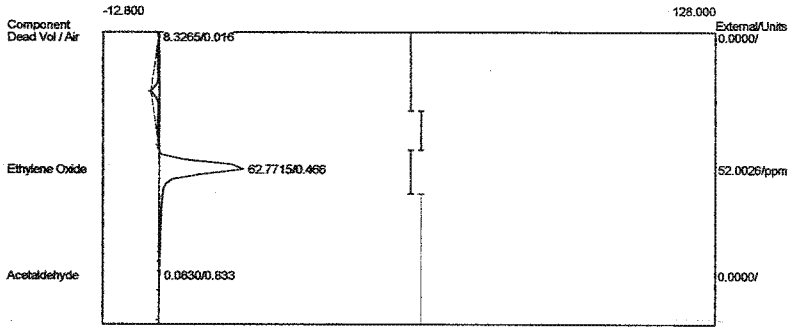
Component	Retention	Area	External	Units
Ambient H2O	0.350	159.4260	0.0000	
		159.4260	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: PreCal
Analysis date: 11/05/2020 11:34:44
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-Audit.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



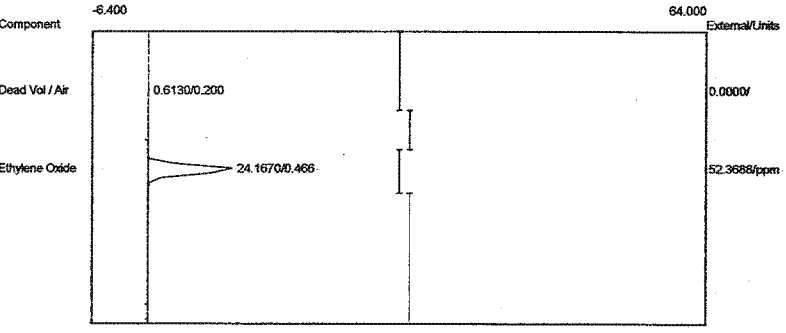
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	0.1705	0.0000	
Ethylene Oxide	0.466	24.0420	52.0979	ppm
		24.2125	52.0979	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: PreCal
Analysis date: 11/05/2020 11:34:44
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-Audit.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



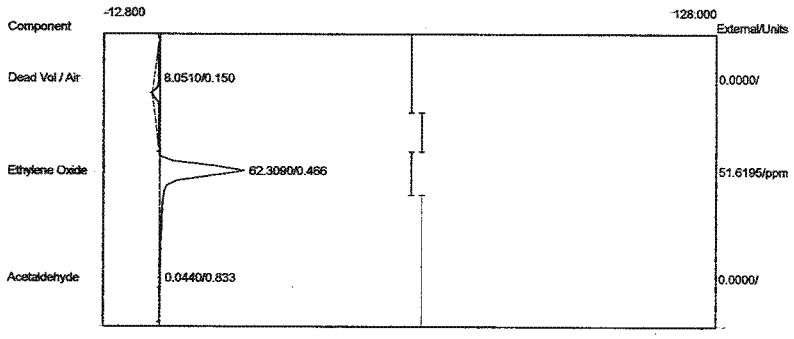
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	8.3265	0.0000	
Ethylene Oxide	0.466	62.7715	52.0026	ppm
Acetaldehyde	0.833	0.0830	0.0000	
		71.1810	52.0026	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: PostCal
Analysis date: 11/05/2020 15:51:47
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-PAudit.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.200	0.6130	0.0000	
Ethylene Oxide	0.466	24.1670	52.3688	ppm
		24.7800	52.3688	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: PostCal
Analysis date: 11/05/2020 15:51:47
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-PAudit.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer

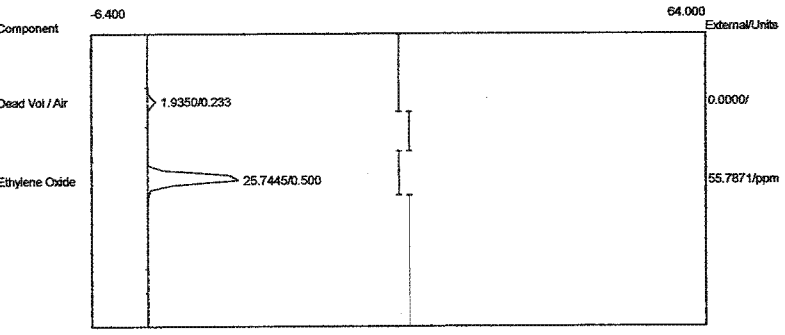


Component	Retention	Area	External	Units
Dead Vol / Air	0.150	8.0510	0.0000	
Ethylene Oxide	0.466	62.3090	51.6195	ppm
Acetaldehyde	0.833	0.0440	0.0000	
		70.4040	51.6195	

APPENDIX B

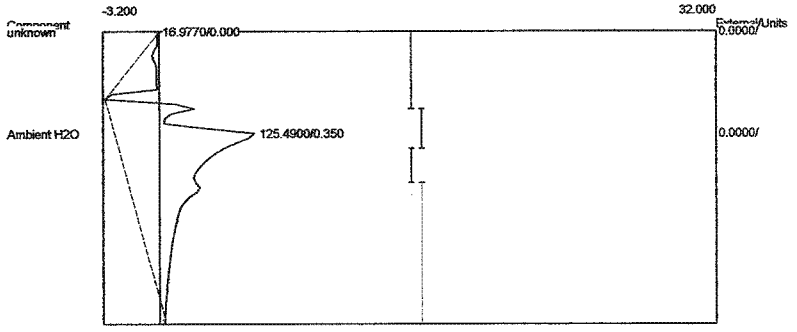
Chromatograms – Backvent

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:02:01
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B01.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



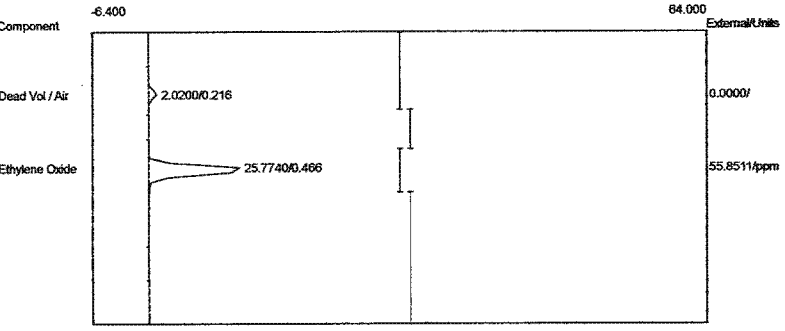
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.9350	0.0000	
Ethylene Oxide	0.500	25.7445	55.7871	ppm
		27.6795	55.7871	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:02:01
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B01.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



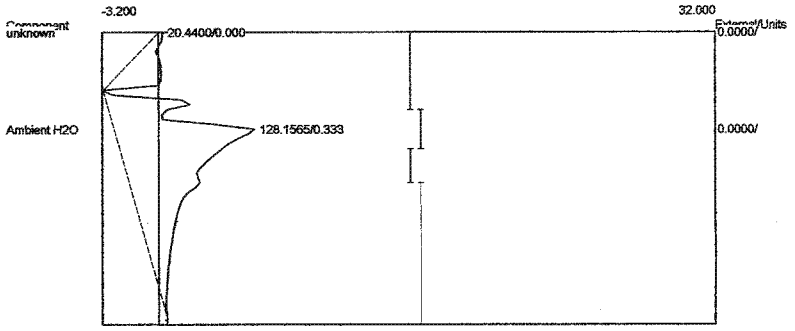
Component	Retention	Area	External	Units
Ambient H2O	0.350	125.4900	0.0000	
		125.4900	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:03:04
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B02.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



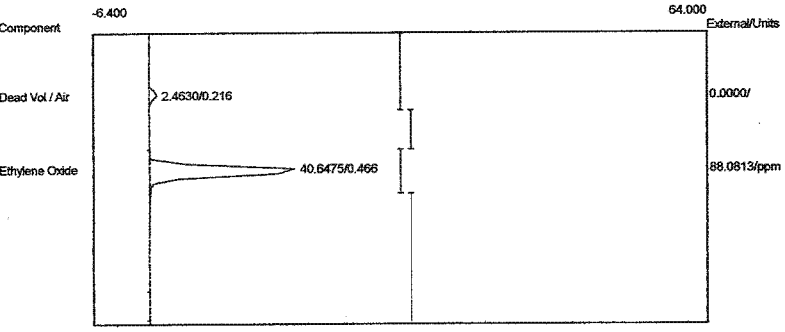
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.0200	0.0000	
Ethylene Oxide	0.466	25.7740	55.8511	ppm
		27.7940	55.8511	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:03:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B02.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



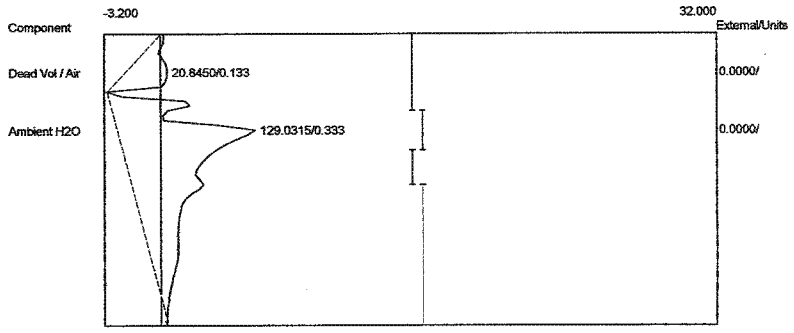
Component	Retention	Area	External	Units
Ambient H2O	0.333	128.1565	0.0000	
		128.1565	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:04:25
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B03.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



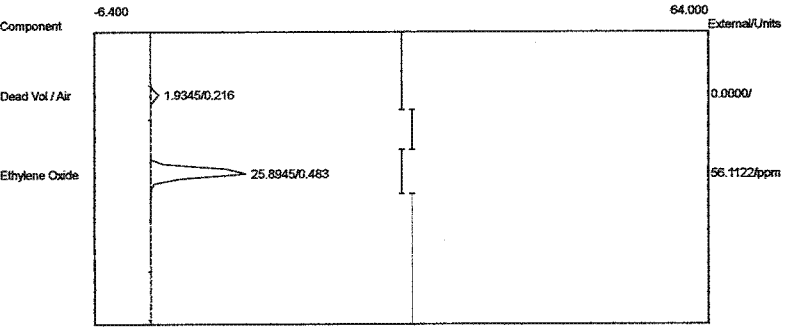
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.4630	0.0000	
Ethylene Oxide	0.466	40.6475	88.0813	ppm
		43.1105	88.0813	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:04:25
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B03.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



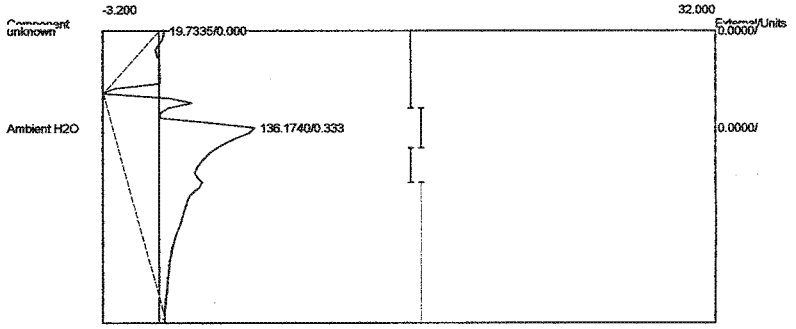
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	20.8450	0.0000	
Ambient H2O	0.333	129.0315	0.0000	
		149.8765	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:05:55
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B04.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



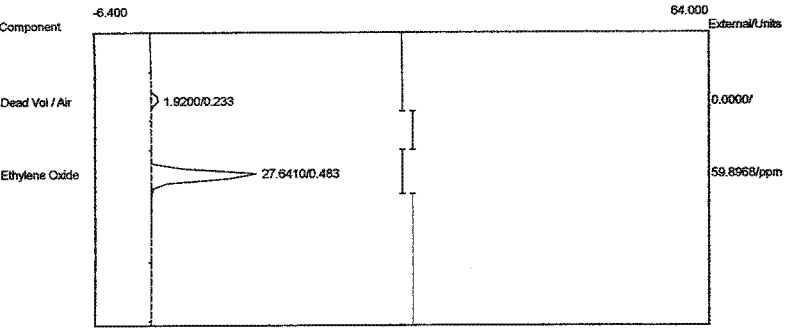
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9345	0.0000	
Ethylene Oxide	0.483	25.8945	56.1122	ppm
		27.8290	56.1122	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:05:55
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B04.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



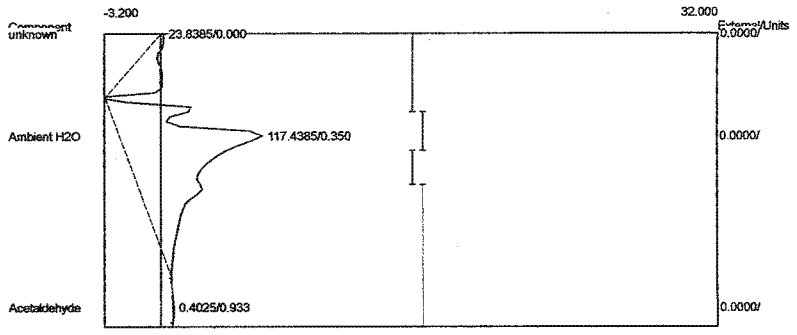
Component	Retention	Area	External	Units
Ambient H2O	0.333	136.1740	0.0000	
		136.1740	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:07:05
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B05.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



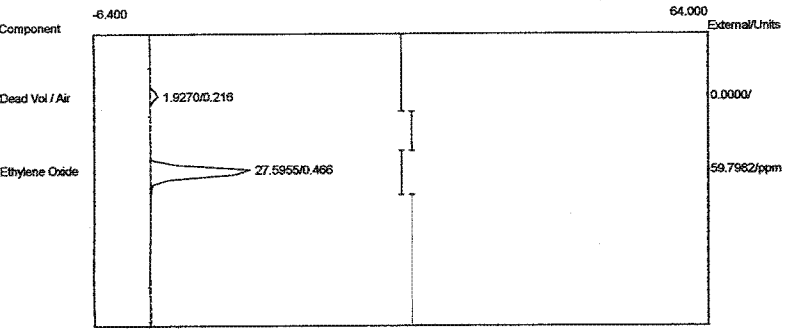
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.9200	0.0000	
Ethylene Oxide	0.483	27.6410	59.8968	ppm
		29.5610	59.8968	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:07:05
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B05.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



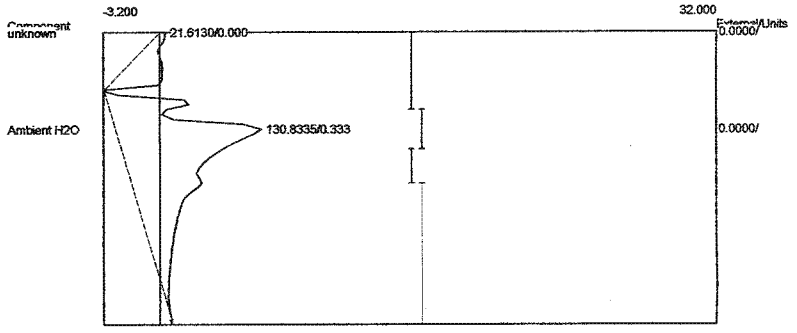
Component	Retention	Area	External	Units
Ambient H2O	0.350	117.4385	0.0000	
Acetaldehyde	0.933	0.4025	0.0000	
		117.8410	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:08:10
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B06.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



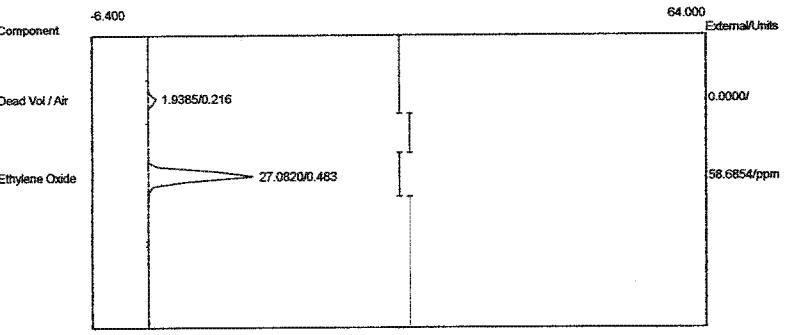
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9270	0.0000	
Ethylene Oxide	0.466	27.5955	59.7982	ppm
		29.5225	59.7982	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:08:10
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B06.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



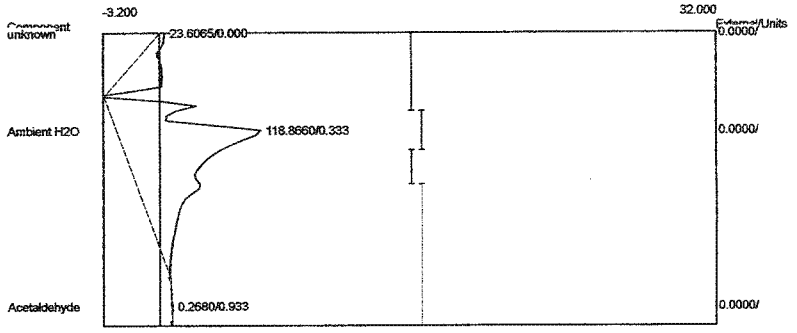
Component	Retention	Area	External	Units
Ambient H2O	0.333	130.8335	0.0000	
		130.8335	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:09:20
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B07.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



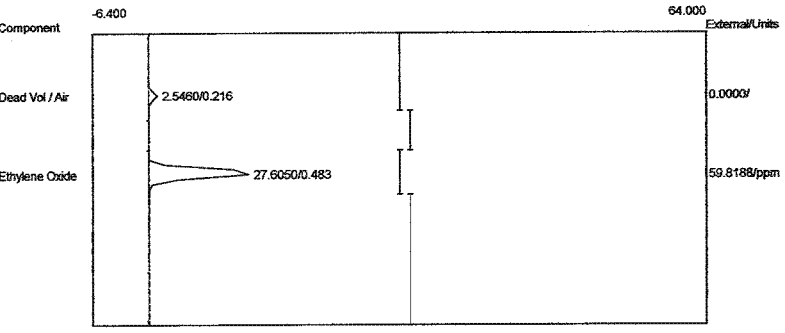
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9385	0.0000	
Ethylene Oxide	0.483	27.0820	58.6854	ppm
		29.0205	58.6854	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:09:20
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B07.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



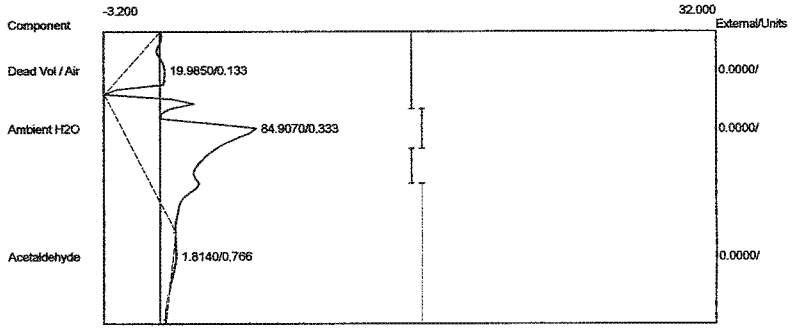
Component	Retention	Area	External	Units
Ambient H2O	0.333	118.8660	0.0000	
Acetaldehyde	0.933	0.2680	0.0000	
		119.1340	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:10:39
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B08.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



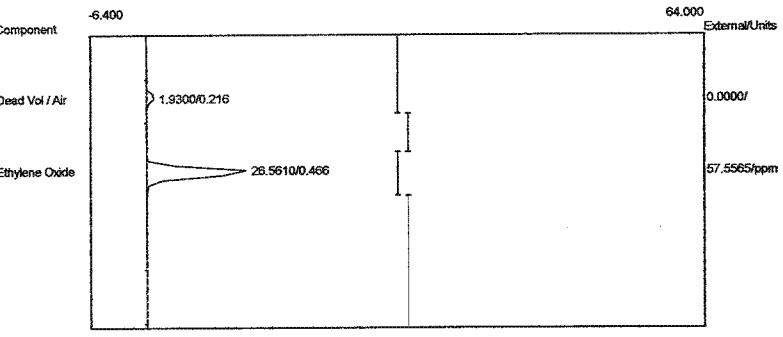
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.5460	0.0000	
Ethylene Oxide	0.483	27.6050	59.8188	ppm
		30.1510	59.8188	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:10:39
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B08.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



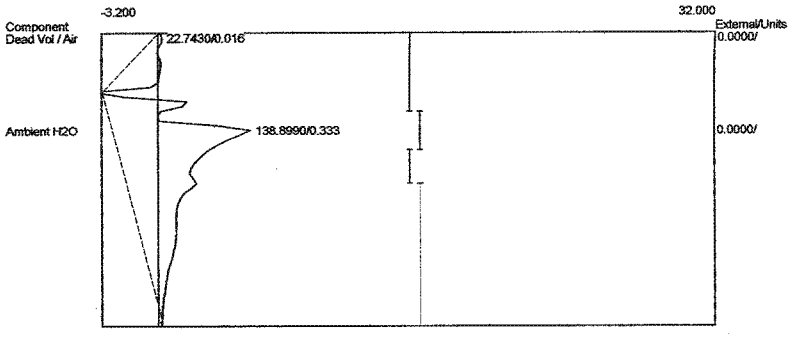
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	19.9850	0.0000	
Ambient H2O	0.333	84.9070	0.0000	
Acetaldehyde	0.766	1.8140	0.0000	
		106.7060	0.0000	

Lab name: ECSI
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:12:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B09.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



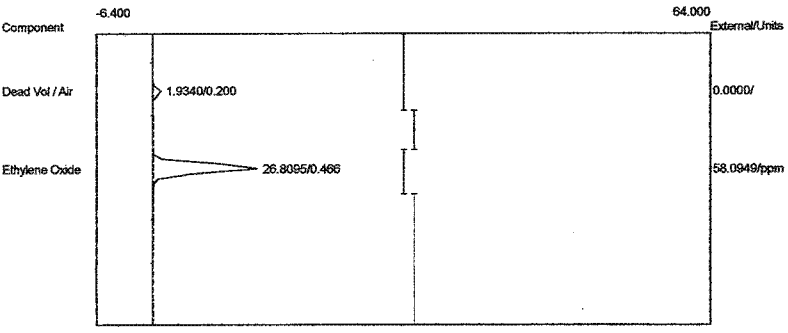
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9300	0.0000	
Ethylene Oxide	0.466	26.5610	57.5565	ppm
		28.4910	57.5565	

Lab name: ECSI
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:12:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B09.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



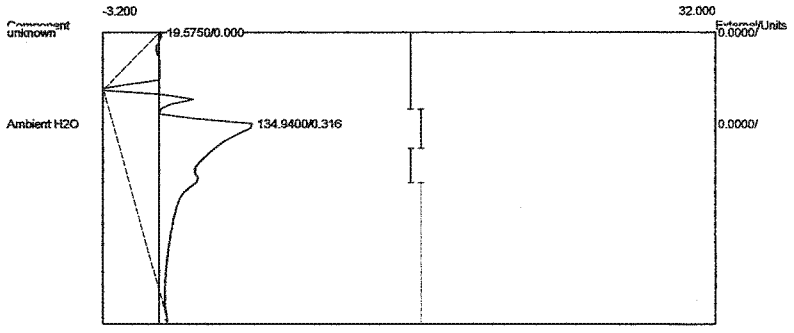
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	22.7430	0.0000	
Ambient H2O	0.333	138.8990	0.0000	
		161.6420	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:13:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B10.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



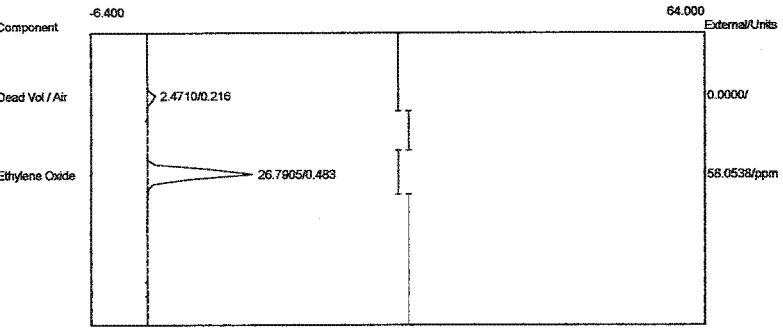
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	1.9340	0.0000	
Ethylene Oxide	0.466	26.8095	58.0949	ppm
		28.7435	58.0949	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:13:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B10.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



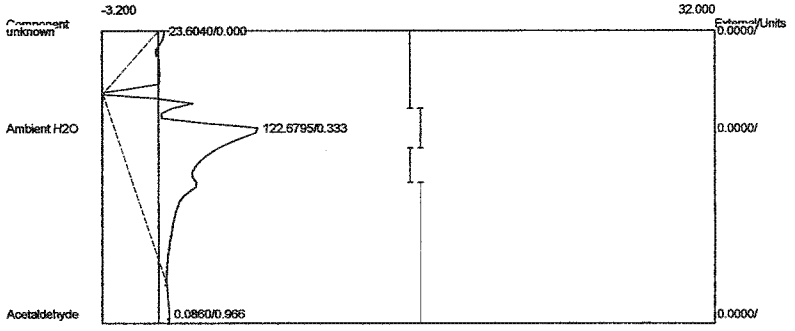
Component	Retention	Area	External	Units
Ambient H2O	0.316	134.9400	0.0000	
		134.9400	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:14:15
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B11.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



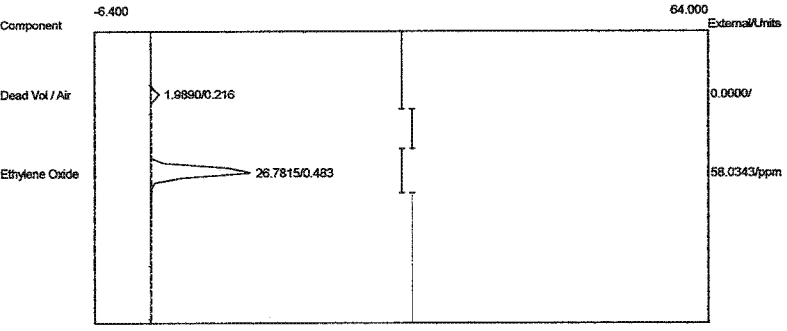
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.4710	0.0000	
Ethylene Oxide	0.483	26.7905	58.0538	ppm
		29.2615	58.0538	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:14:15
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B11.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



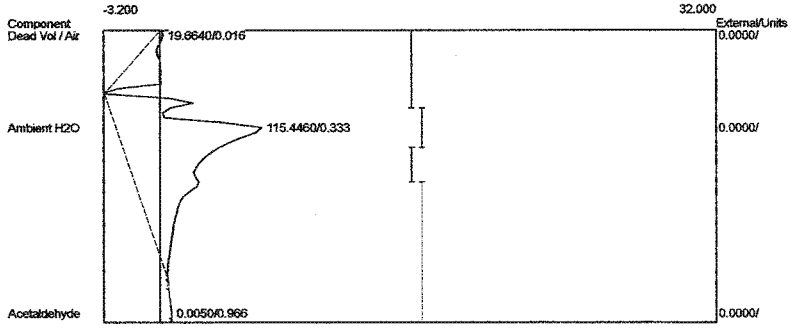
Component	Retention	Area	External	Units
Ambient H2O	0.333	122.6795	0.0000	
Acetaldehyde	0.966	0.0860	0.0000	
		122.7655	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:15:22
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B12.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



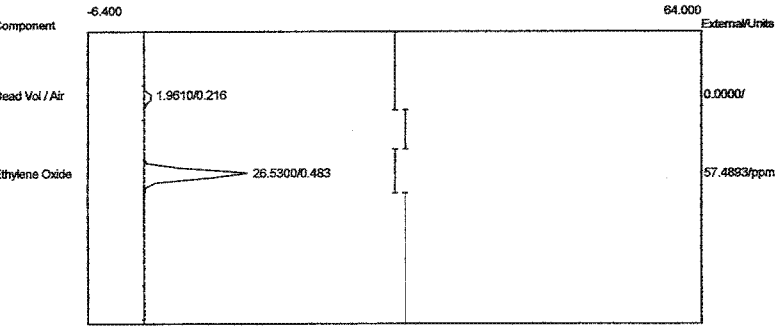
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9890	0.0000	
Ethylene Oxide	0.483	26.7815	58.0343	ppm
		28.7705	58.0343	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:15:22
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B12.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



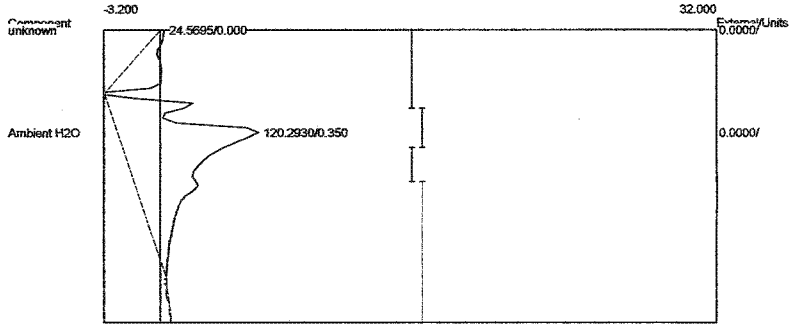
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	19.6640	0.0000	
Ambient H2O	0.333	115.4460	0.0000	
Acetaldehyde	0.966	0.0050	0.0000	
		135.1150	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2BV
Analysis date: 11/05/2020 14:16:30
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-B13.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9610	0.0000	
Ethylene Oxide	0.483	26.5300	57.4893	ppm
		28.4910	57.4893	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#BV
Analysis date: 11/05/2020 14:16:30
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-B13.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer

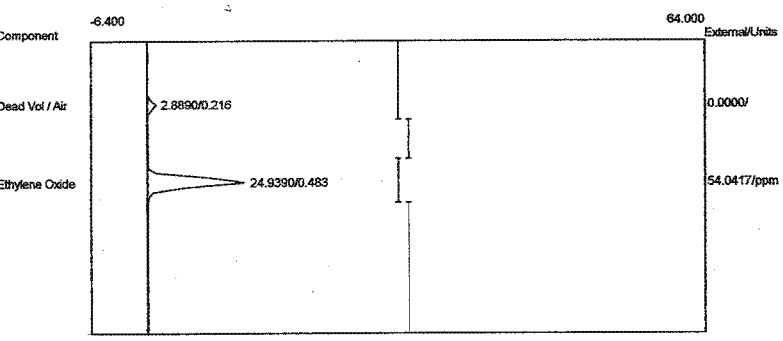


Component	Retention	Area	External	Units
Ambient H2O	0.350	120.2930	0.0000	
		120.2930	0.0000	

APPENDIX C

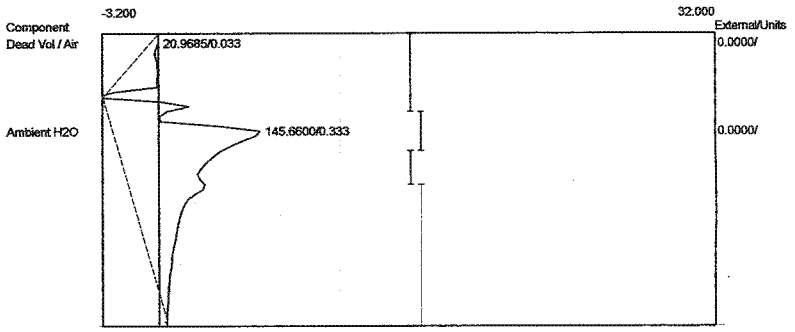
Run #1 Chromatograms – Aeration

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:02:48
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A01.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



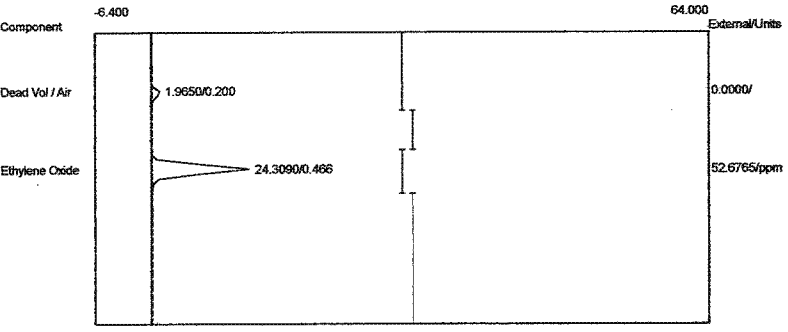
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.8890	0.0000	
Ethylene Oxide	0.483	24.9390	54.0417	ppm
		27.8280	54.0417	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:02:48
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A01.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



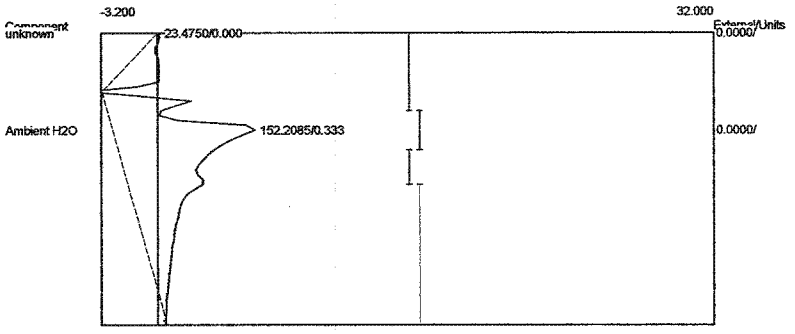
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	20.9685	0.0000	
Ambient H2O	0.333	145.6600	0.0000	
		166.6285	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:08:04
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A02.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



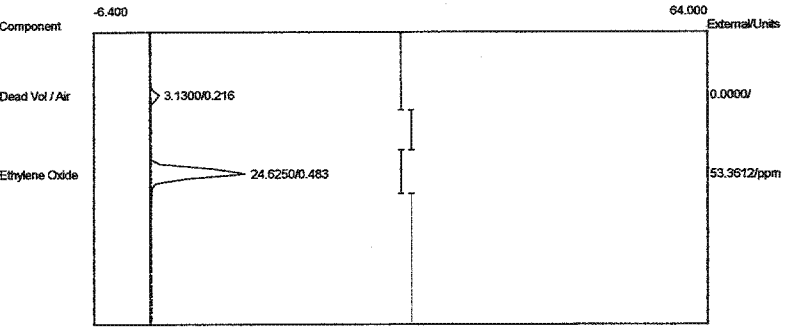
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	1.9650	0.0000	
Ethylene Oxide	0.466	24.3090	52.6765	ppm
		26.2740	52.6765	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:08:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A02.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



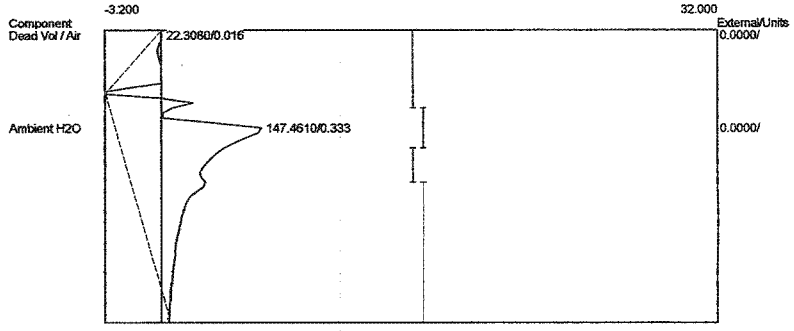
Component	Retention	Area	External	Units
Ambient H2O	0.333	152.2085	0.0000	
		152.2085	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:12:20
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A03.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



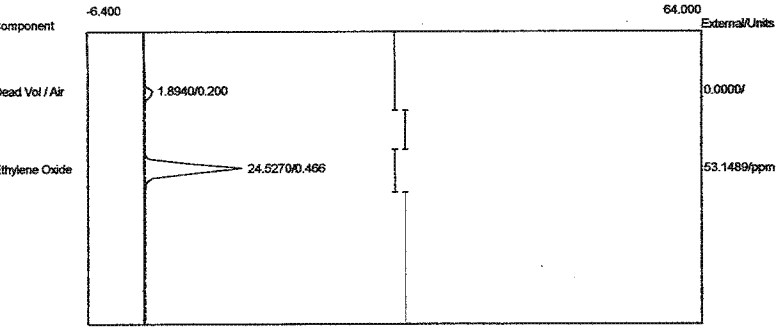
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	3.1300	0.0000	
Ethylene Oxide	0.483	24.6250	53.3612	ppm
		27.7550	53.3612	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:12:20
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A03.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



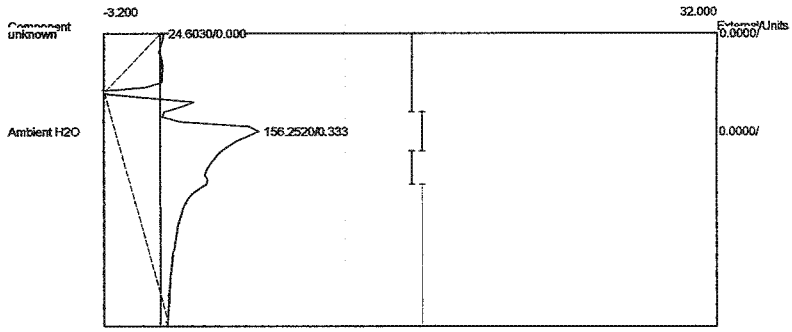
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	22.3080	0.0000	
Ambient H2O	0.333	147.4610	0.0000	
		169.7690	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:17:52
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A04.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



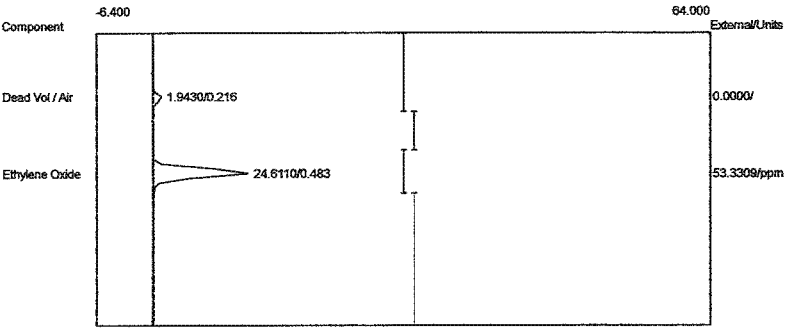
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	1.8940	0.0000	
Ethylene Oxide	0.466	24.5270	53.1489	ppm
		26.4210	53.1489	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:17:52
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A04.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



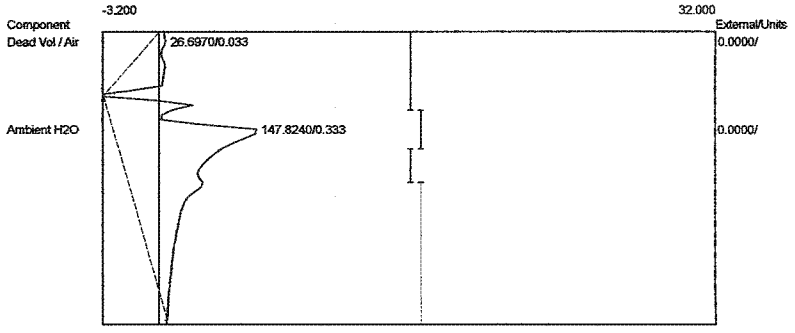
Component	Retention	Area	External	Units
Ambient H2O	0.333	156.2520	0.0000	
		156.2520	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:22:50
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A05.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



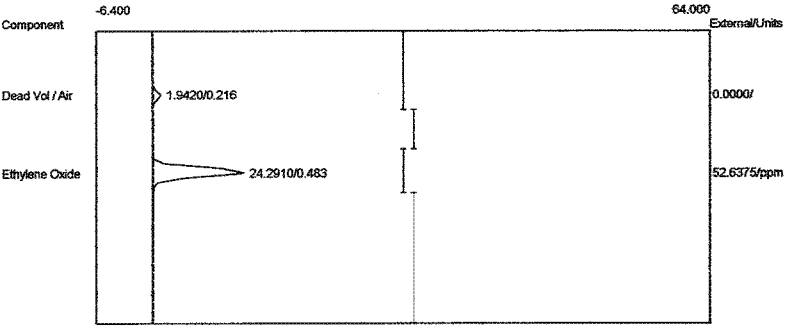
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9430	0.0000	
Ethylene Oxide	0.483	24.6110	53.3309	ppm
		26.5540	53.3309	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:22:50
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A05.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



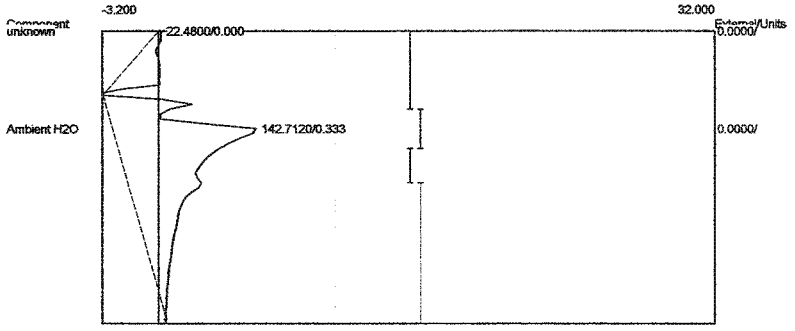
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	26.6970	0.0000	
Ambient H2O	0.333	147.8240	0.0000	
		174.5210	0.0000	

Lab name: ECSI
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:27:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A06.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



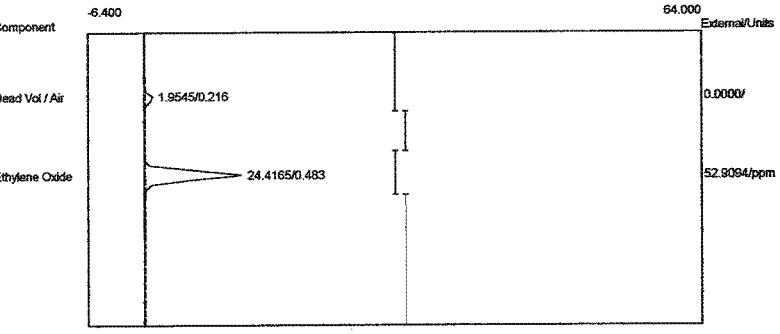
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9420	0.0000	
Ethylene Oxide	0.483	24.2910	52.6375	ppm
		26.2330	52.6375	

Lab name: ECSI
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:27:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A06.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



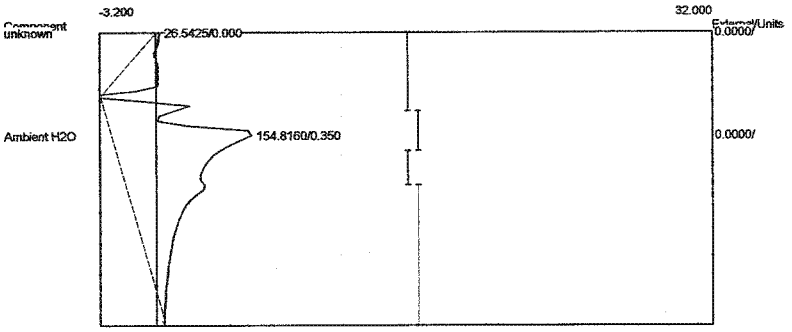
Component	Retention	Area	External	Units
Ambient H2O	0.333	142.7120	0.0000	
		142.7120	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:32:34
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A07.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



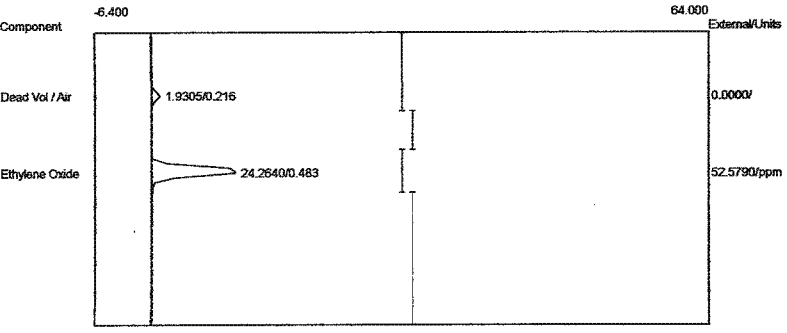
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9545	0.0000	
Ethylene Oxide	0.483	24.4165	52.9094	ppm
		26.3710	52.9094	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:32:34
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A07.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



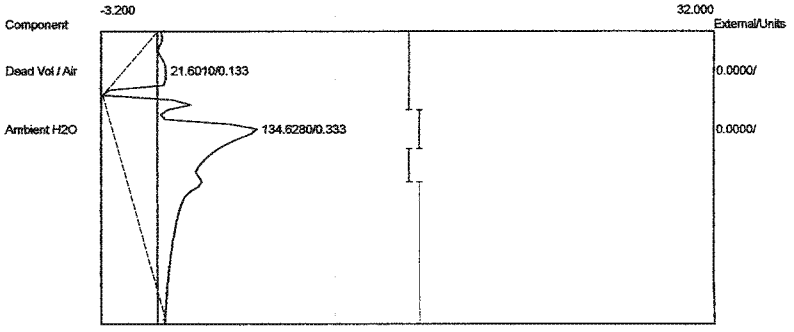
Component	Retention	Area	External	Units
Ambient H2O	0.350	154.8160	0.0000	
		154.8160	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:37:28
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A08.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



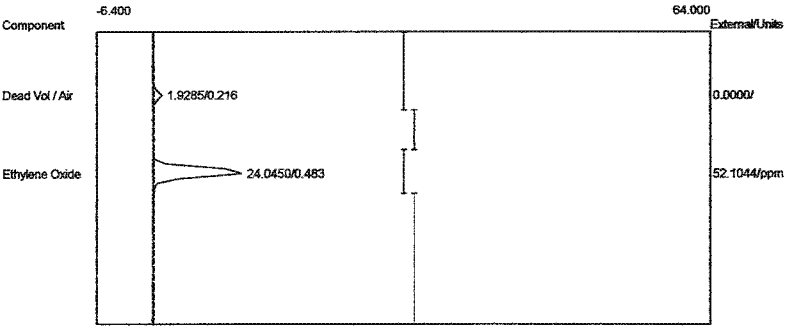
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9305	0.0000	
Ethylene Oxide	0.483	24.2640	52.5790	ppm
		26.1945	52.5790	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:37:28
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A08.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



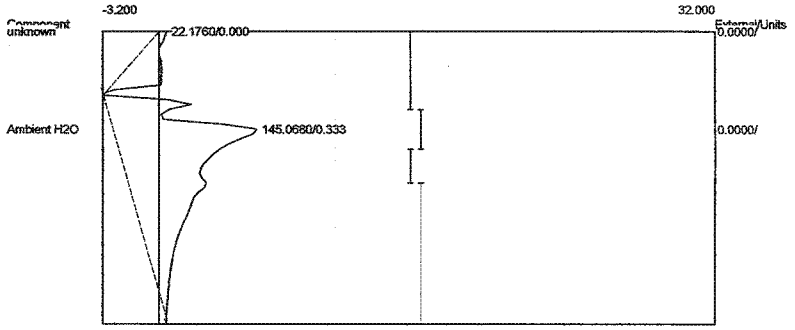
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	21.6010	0.0000	
Ambient H2O	0.333	134.6280	0.0000	
		156.2290	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:42:55
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A09.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



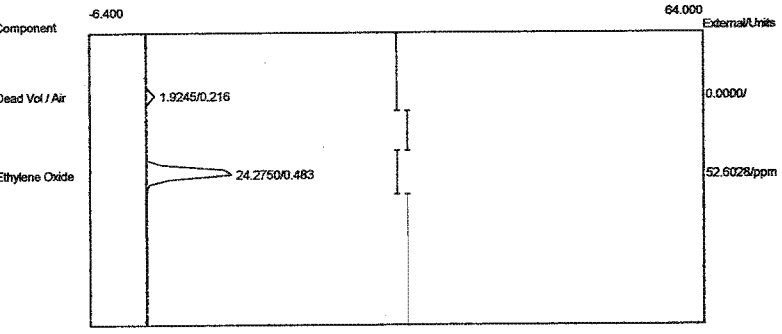
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9285	0.0000	
Ethylene Oxide	0.483	24.0450	52.1044	ppm
		25.9735	52.1044	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:42:55
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A09.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



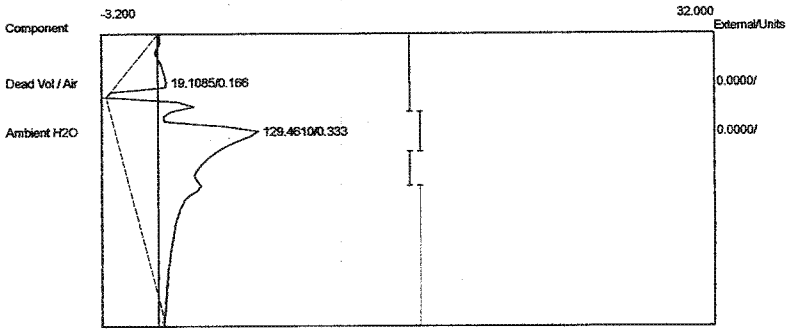
Component	Retention	Area	External	Units
Ambient H2O	0.333	145.0680	0.0000	
		145.0680	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:47:47
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A10.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



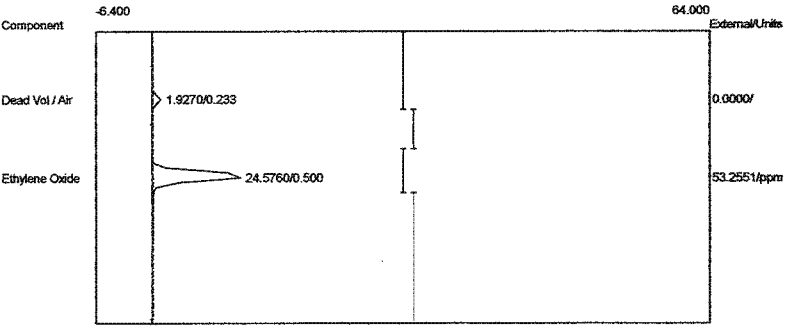
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9245	0.0000	
Ethylene Oxide	0.483	24.2750	52.6028	ppm
		26.1995	52.6028	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:47:47
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A10.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



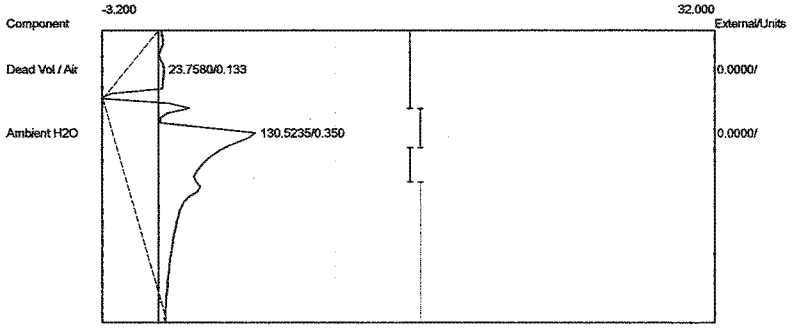
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	19.1085	0.0000	
Ambient H2O	0.333	129.4610	0.0000	
		148.5695	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:52:44
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A11.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



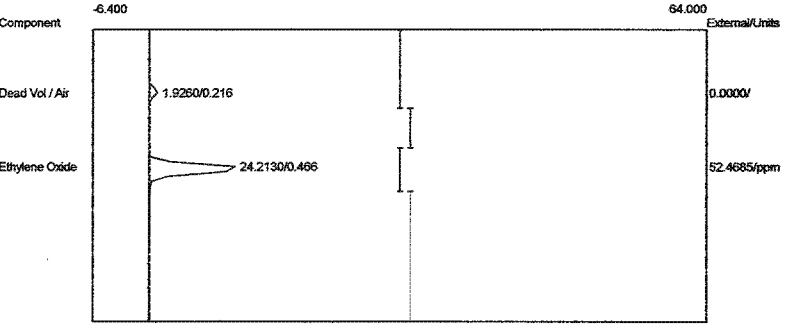
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.9270	0.0000	
Ethylene Oxide	0.500	24.5760	53.2551	ppm
		26.5030	53.2551	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:52:44
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A11.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



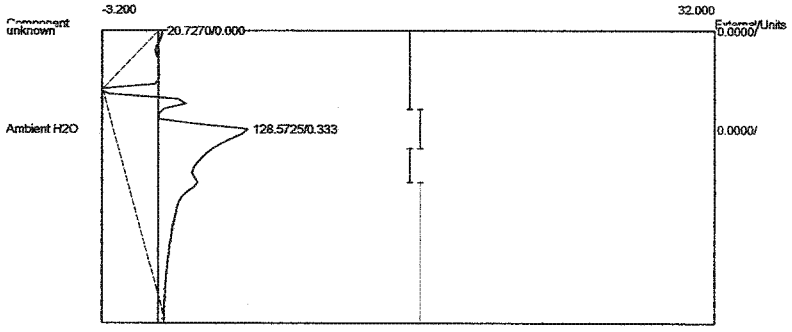
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	23.7580	0.0000	
Ambient H2O	0.350	130.5235	0.0000	
		154.2815	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:57:51
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-1A12.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9260	0.0000	
Ethylene Oxide	0.466	24.2130	52.4685	ppm
		26.1390	52.4685	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#1Aer
Analysis date: 11/05/2020 12:57:51
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-1A12.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer

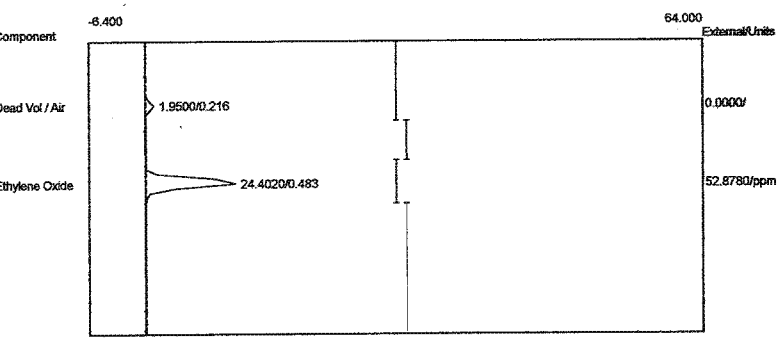


Component	Retention	Area	External	Units
Ambient H2O	0.333	128.5725	0.0000	
		128.5725	0.0000	

APPENDIX D

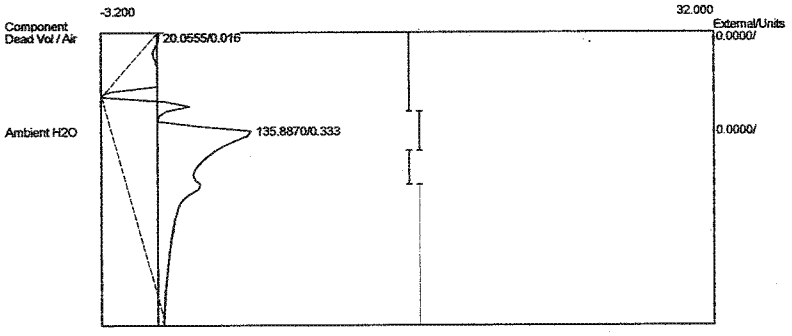
Run #2 Chromatograms – Aeration

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:02:09
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A01.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



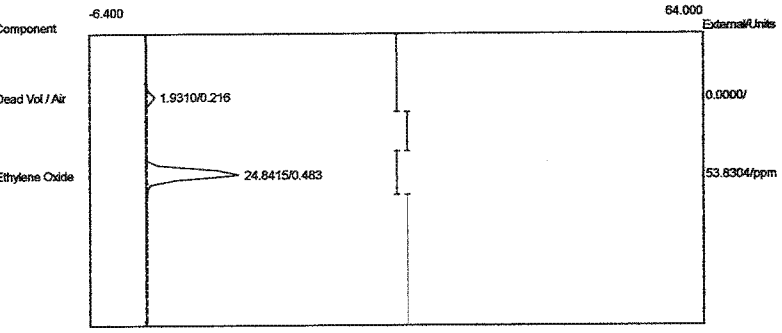
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9500	0.0000	
Ethylene Oxide	0.483	24.4020	52.8780	ppm
		26.3520	52.8780	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:02:09
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A01.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



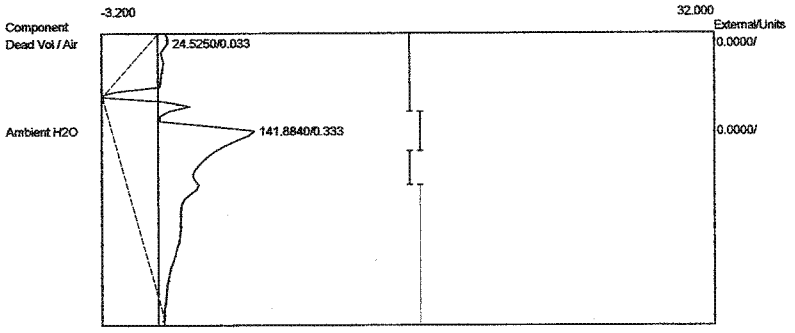
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	20.0555	0.0000	
Ambient H2O	0.333	135.8870	0.0000	
		155.9425	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:07:30
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A02.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



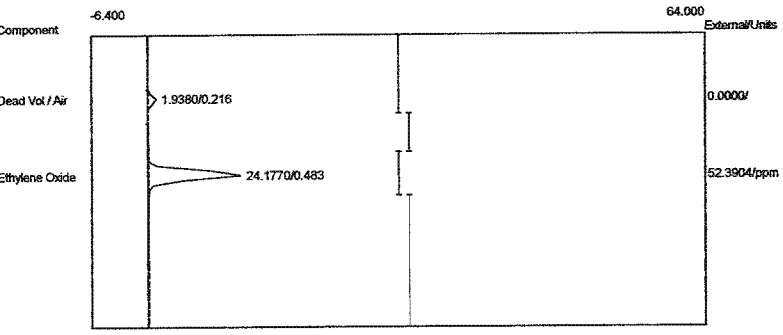
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9310	0.0000	
Ethylene Oxide	0.483	24.8415	53.8304	ppm
		26.7725	53.8304	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:07:30
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A02.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



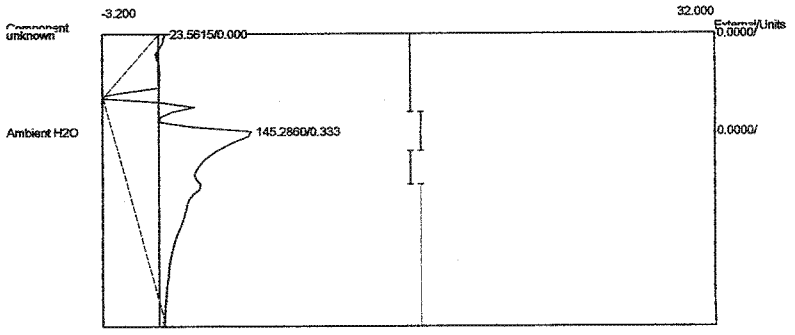
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	24.5250	0.0000	
Ambient H2O	0.333	141.8840	0.0000	
		166.4090	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:12:57
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A03.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



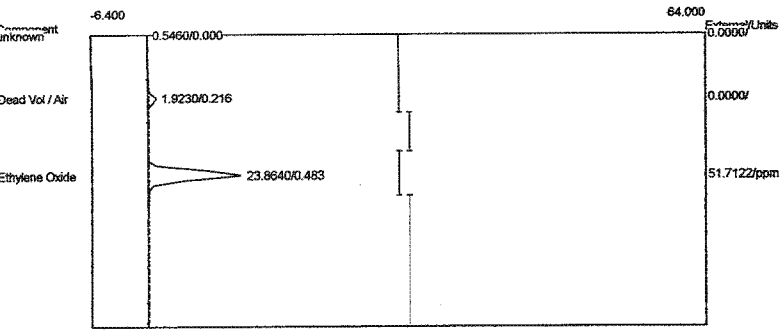
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9380	0.0000	
Ethylene Oxide	0.483	24.1770	52.3904	ppm
		26.1150	52.3904	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:12:57
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A03.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



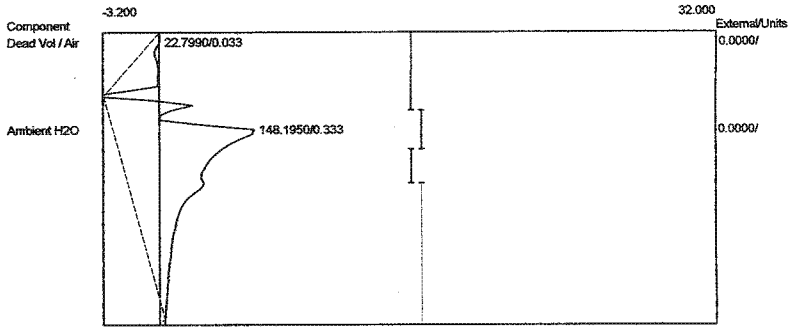
Component	Retention	Area	External	Units
Ambient H2O	0.333	145.2860	0.0000	
		145.2860	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:17:31
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A04.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



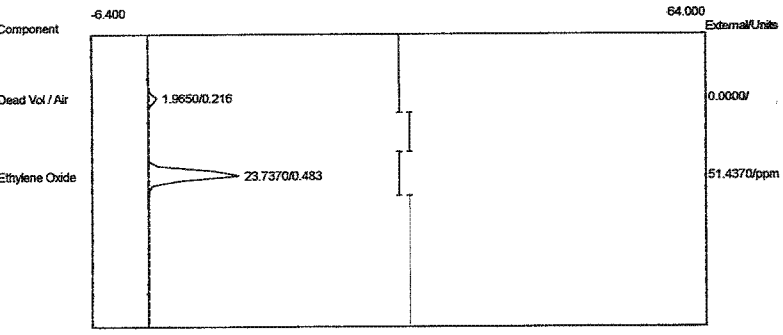
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9230	0.0000	
Ethylene Oxide	0.483	23.8640	51.7122	ppm
		25.7870	51.7122	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:17:31
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A04.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



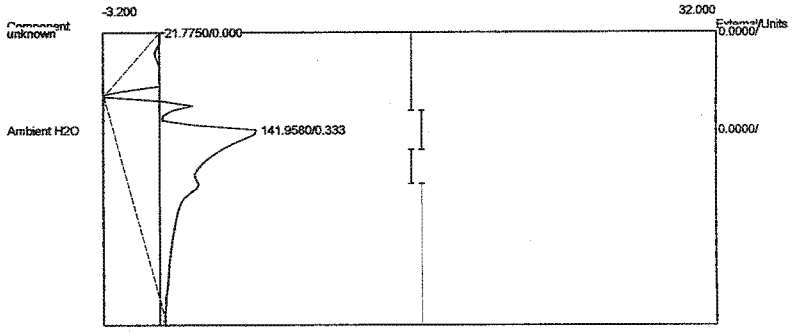
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	22.7990	0.0000	
Ambient H2O	0.333	148.1950	0.0000	
		170.9940	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:22:12
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A05.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



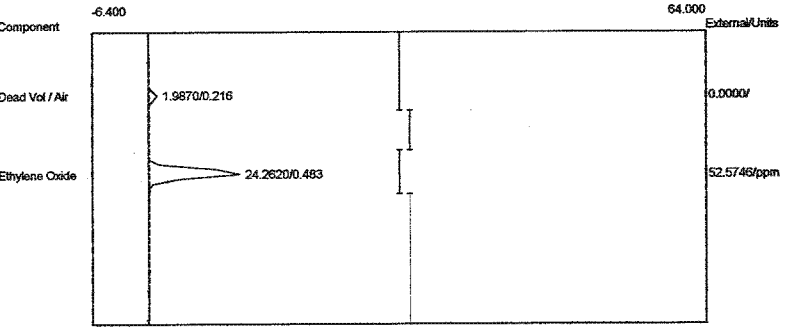
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9650	0.0000	
Ethylene Oxide	0.483	23.7370	51.4370	ppm
		25.7020	51.4370	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:22:12
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A05.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



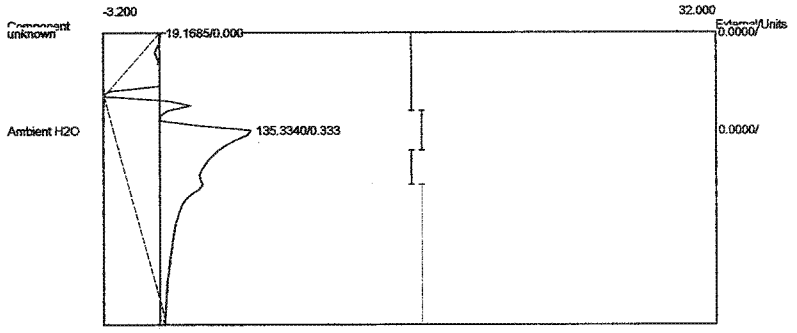
Component	Retention	Area	External	Units
Ambient H2O	0.333	141.9580	0.0000	
		141.9580	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:27:39
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A06.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



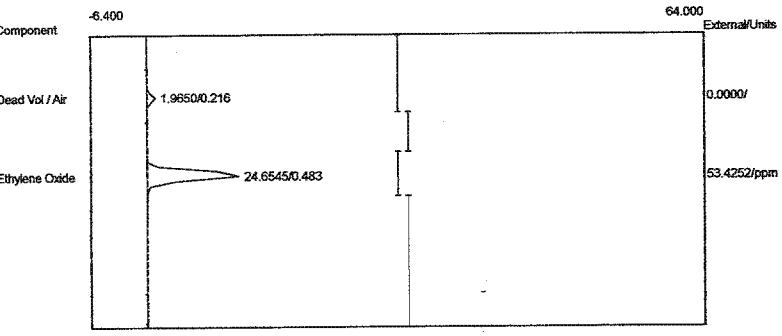
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9870	0.0000	
Ethylene Oxide	0.483	24.2620	52.5746	ppm
		26.2490	52.5746	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:27:39
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A06.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



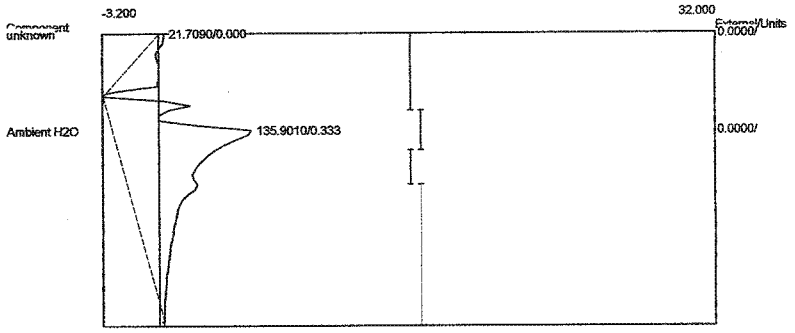
Component	Retention	Area	External	Units
Ambient H2O	0.333	135.3340	0.0000	
		135.3340	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:32:42
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A07.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



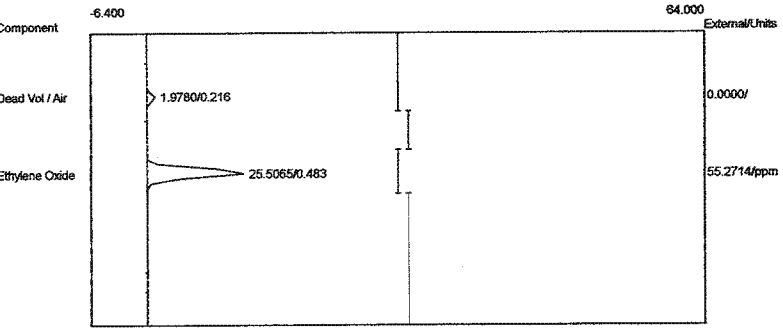
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9650	0.0000	
Ethylene Oxide	0.483	24.6545	53.4252	ppm
		26.6195	53.4252	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:32:42
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A07.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



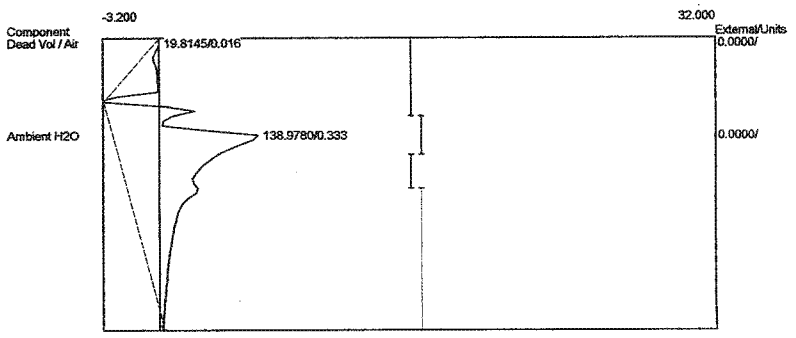
Component	Retention	Area	External	Units
Ambient H2O	0.333	135.9010	0.0000	
		135.9010	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:37:25
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A08.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



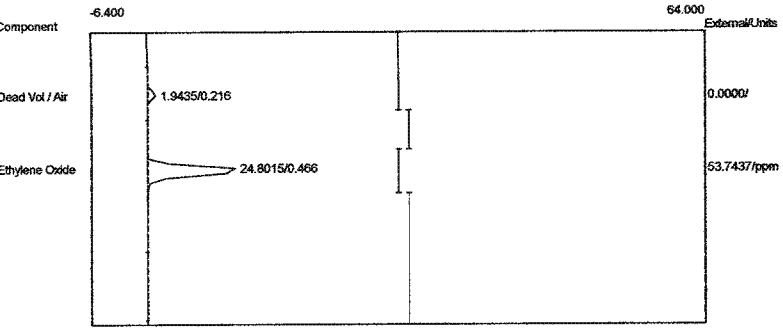
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9780	0.0000	
Ethylene Oxide	0.483	25.5065	55.2714	ppm
		27.4845	55.2714	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:37:25
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A08.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



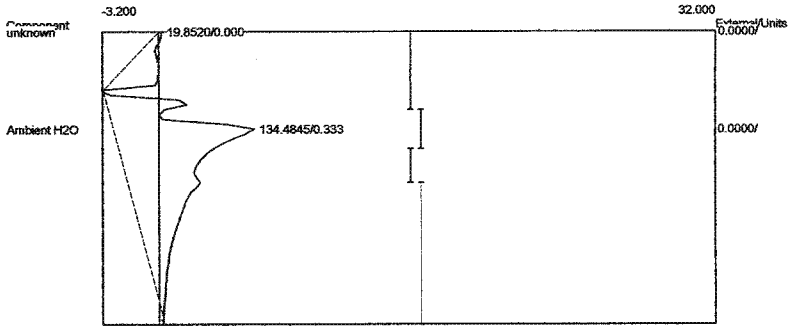
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	19.8145	0.0000	
Ambient H2O	0.333	138.9780	0.0000	
		158.7925	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:42:50
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A09.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



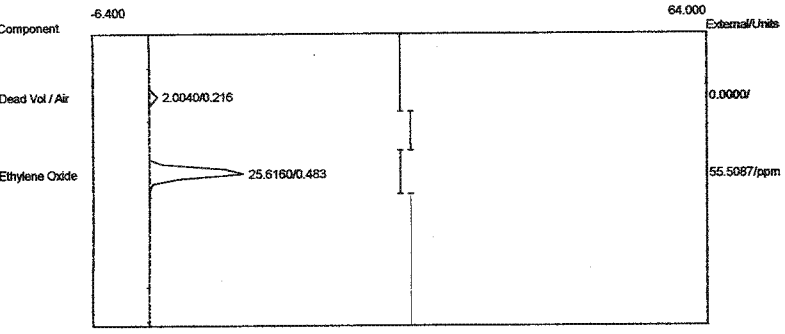
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9435	0.0000	
Ethylene Oxide	0.466	24.8015	53.7437	ppm
		26.7450	53.7437	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:42:50
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A09.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



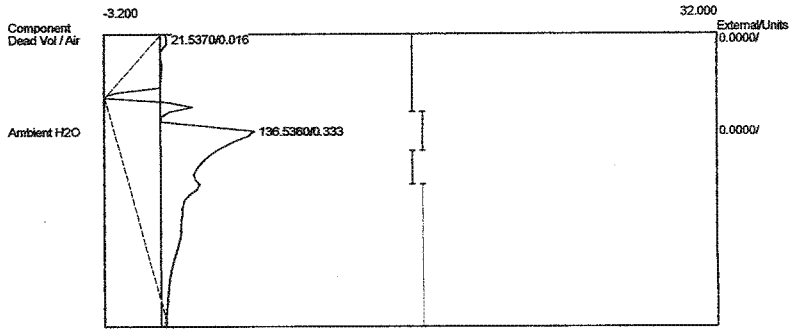
Component	Retention	Area	External	Units
Ambient H2O	0.333	134.4845	0.0000	
		134.4845	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:47:11
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A10.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



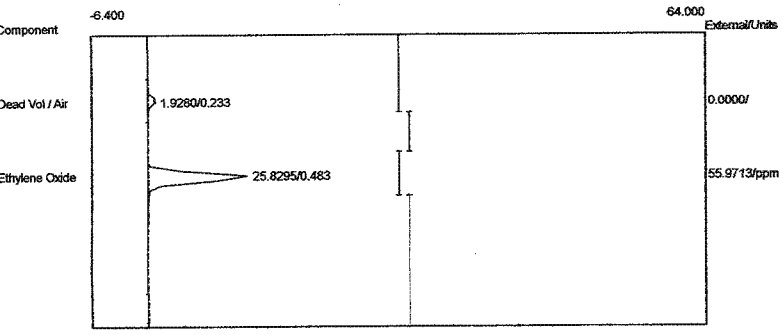
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.0040	0.0000	
Ethylene Oxide	0.483	25.6160	55.5087	ppm
		27.6200	55.5087	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:47:11
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A10.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



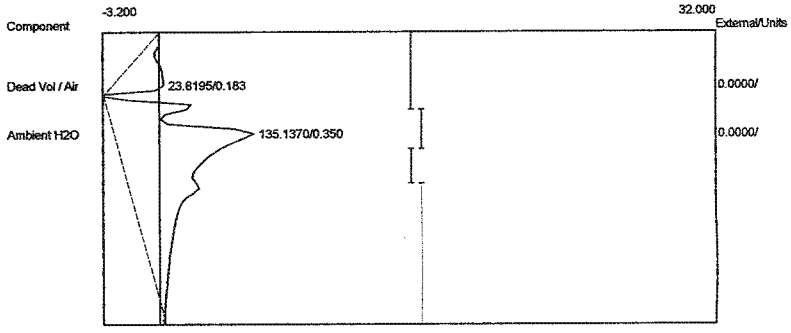
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	21.5370	0.0000	
Ambient H2O	0.333	136.5360	0.0000	
		158.0730	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:52:02
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A11.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



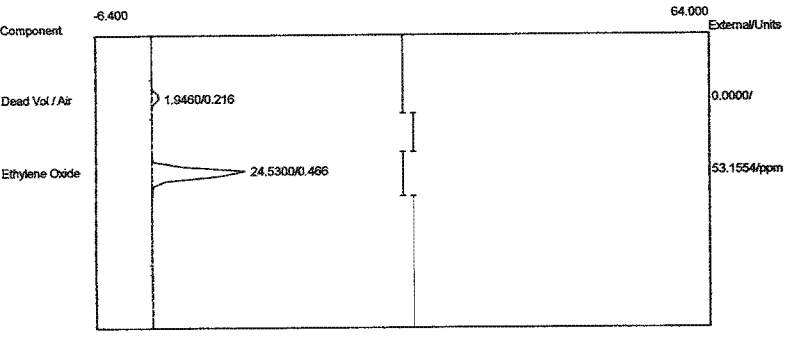
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.9280	0.0000	
Ethylene Oxide	0.483	25.8295	55.9713	ppm
		27.7575	55.9713	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:52:02
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A11.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



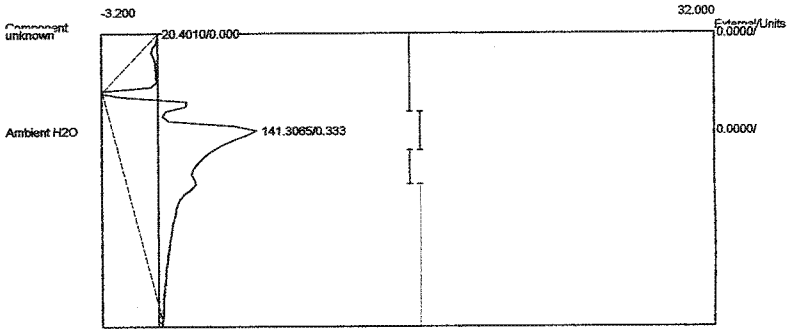
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	23.8195	0.0000	
Ambient H2O	0.350	135.1370	0.0000	
		158.9565	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:57:46
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-2A12.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9460	0.0000	
Ethylene Oxide	0.466	24.5300	53.1554	ppm
		26.4760	53.1554	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#2Aer
Analysis date: 11/05/2020 13:57:46
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-2A12.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer

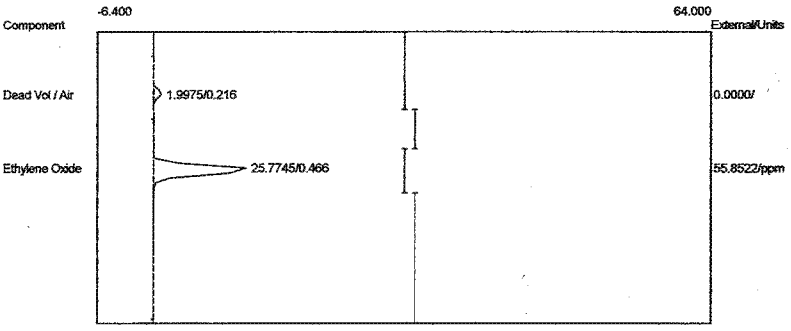


Component	Retention	Area	External	Units
Ambient H2O	0.333	141.3065	0.0000	
		141.3065	0.0000	

APPENDIX E

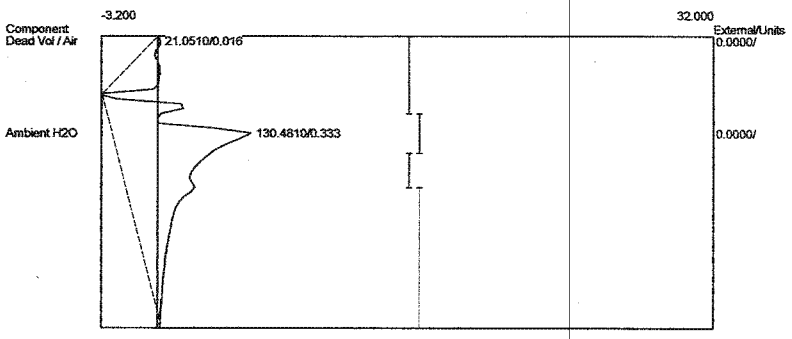
Run #3 Chromatograms – Aeration

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:18:32
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A01.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



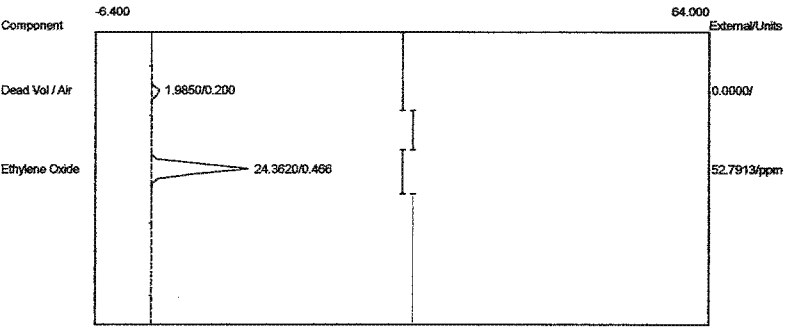
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9975	0.0000	
Ethylene Oxide	0.466	25.7745	55.8522	ppm
		27.7720	55.8522	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:18:32
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A01.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



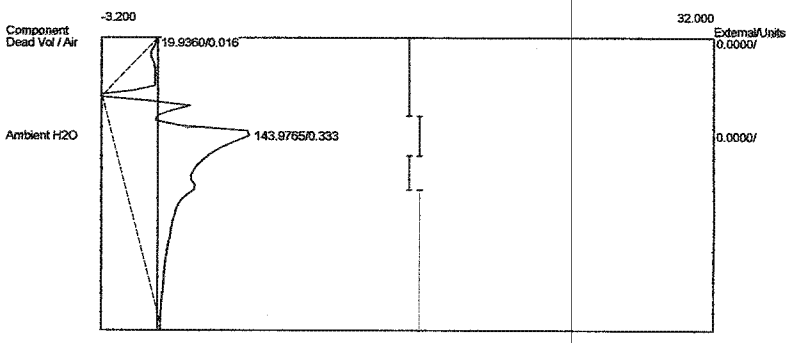
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	21.0510	0.0000	
Ambient H2O	0.333	130.4810	0.0000	
		151.5320	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:23:49
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A02.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



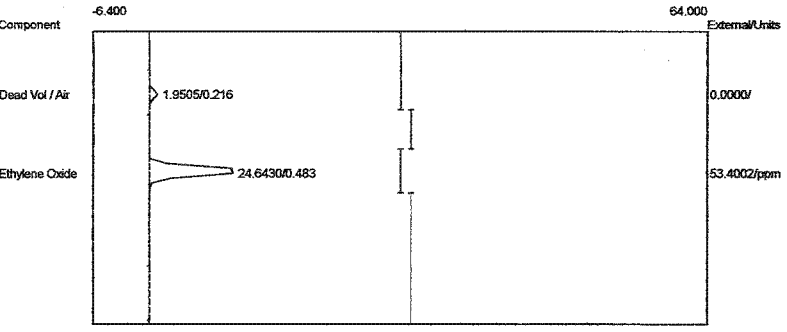
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	1.9850	0.0000	
Ethylene Oxide	0.466	24.3620	52.7913	ppm
		26.3470	52.7913	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:23:49
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A02.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



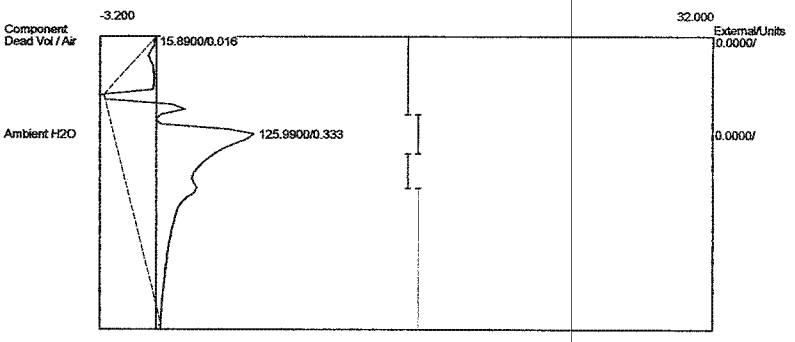
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	19.9360	0.0000	
Ambient H2O	0.333	143.9765	0.0000	
		163.9125	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:28:50
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A03.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



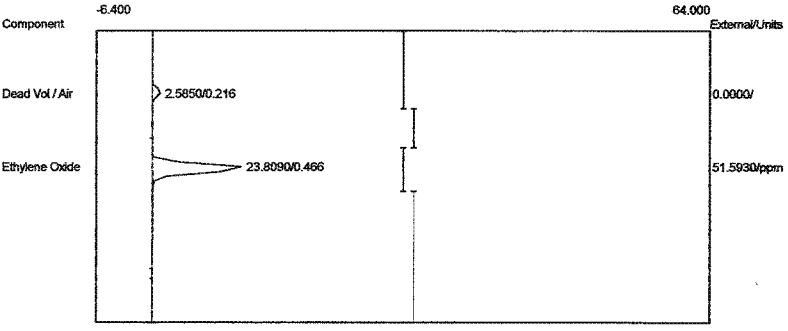
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9505	0.0000	
Ethylene Oxide	0.483	24.6430	53.4002	ppm
		26.5935	53.4002	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:28:50
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A03.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



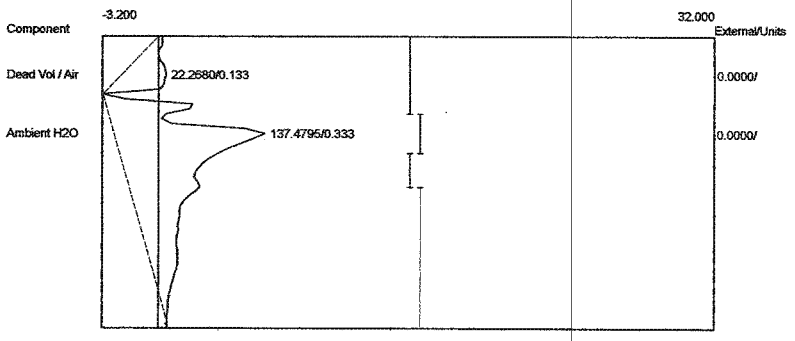
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	15.8900	0.0000	
Ambient H2O	0.333	125.9900	0.0000	
		141.8800	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:43:14
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A06.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



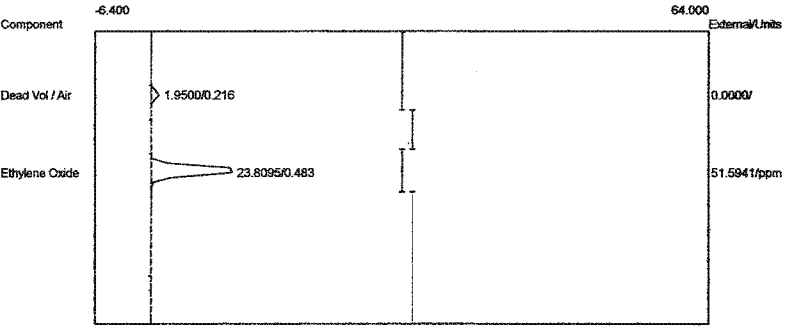
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.5850	0.0000	
Ethylene Oxide	0.466	23.8090	51.5930	ppm
		26.3940	51.5930	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:43:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A06.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



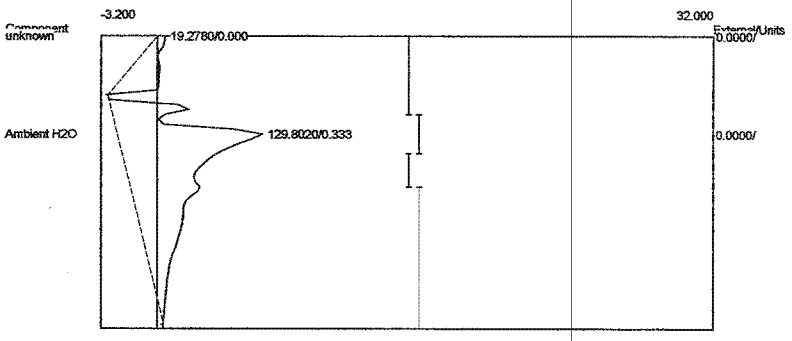
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	22.2680	0.0000	
Ambient H2O	0.333	137.4795	0.0000	
		159.7475	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:48:38
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A07.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



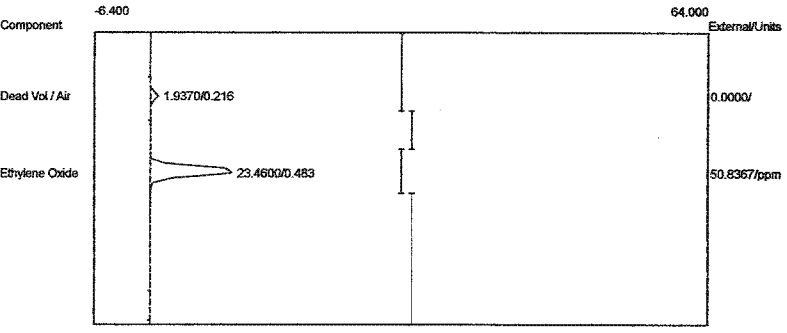
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9500	0.0000	
Ethylene Oxide	0.483	23.8095	51.5941	ppm
		25.7595	51.5941	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:48:38
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A07.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



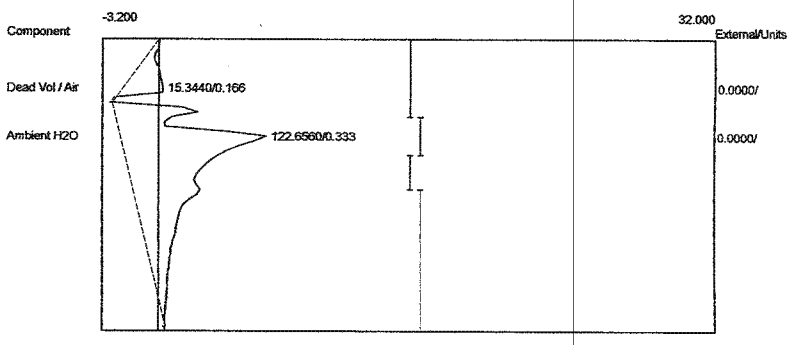
Component	Retention	Area	External	Units
Ambient H2O	0.333	129.8020	0.0000	
		129.8020	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:53:28
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A08.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



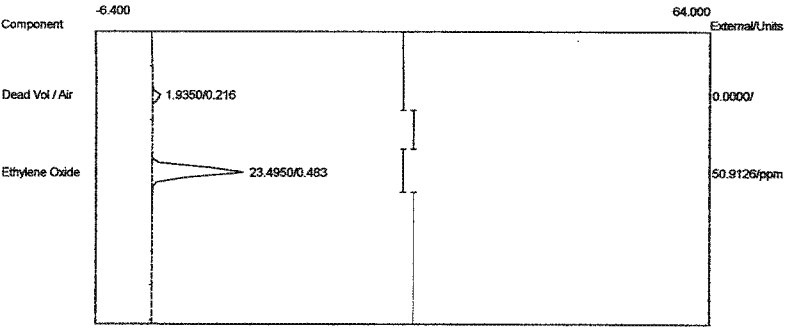
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9370	0.0000	
Ethylene Oxide	0.483	23.4600	50.8367	ppm
		25.3970	50.8367	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:53:28
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A08.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



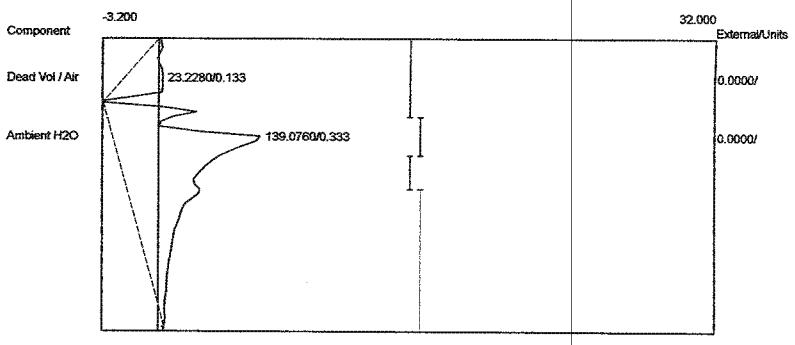
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	15.3440	0.0000	
Ambient H2O	0.333	122.6560	0.0000	
		138.0000	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:58:25
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A09.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



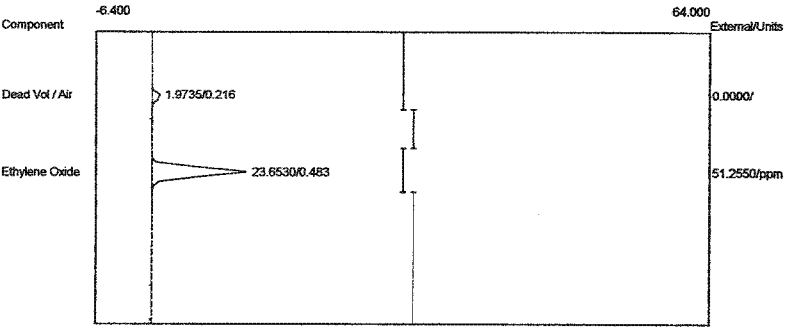
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9350	0.0000	
Ethylene Oxide	0.483	23.4950	50.9126	ppm
		25.4300	50.9126	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 14:58:25
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A09.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



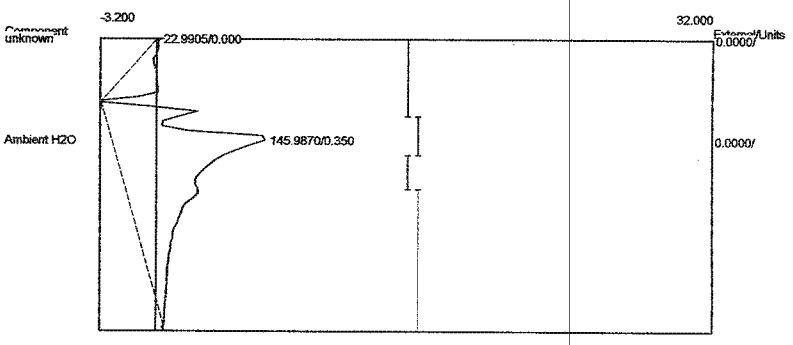
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	23.2280	0.0000	
Ambient H2O	0.333	139.0760	0.0000	
		162.3040	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 15:03:02
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A10.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



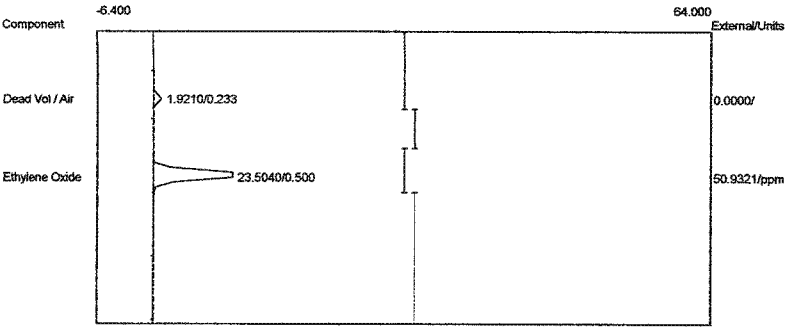
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9735	0.0000	
Ethylene Oxide	0.483	23.6530	51.2550	ppm
		25.6265	51.2550	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 15:03:02
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A10.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



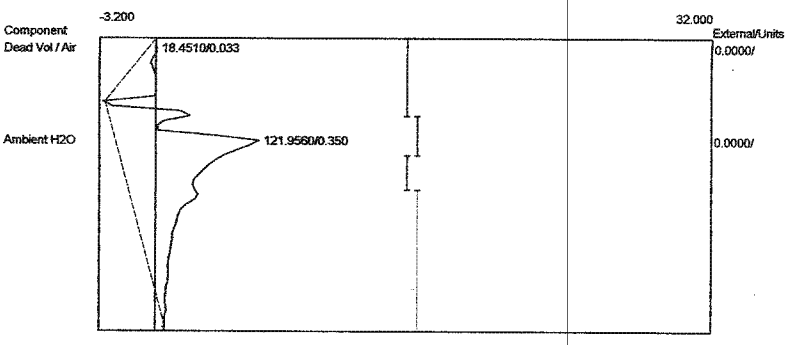
Component	Retention	Area	External	Units
Ambient H2O	0.350	145.9870	0.0000	
		145.9870	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 15:08:44
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A11.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



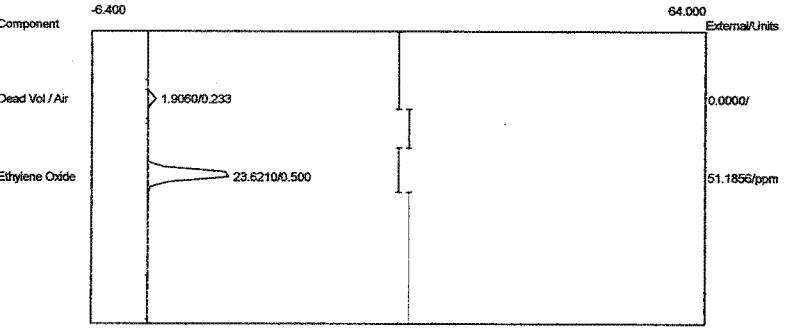
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.9210	0.0000	
Ethylene Oxide	0.500	23.5040	50.9321	ppm
		25.4250	50.9321	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 15:08:44
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A11.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



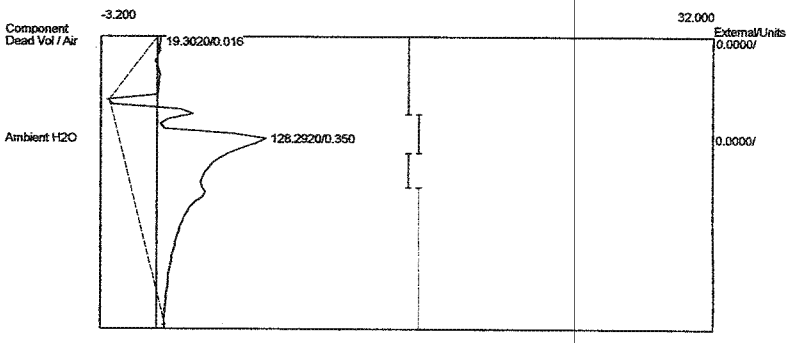
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	18.4510	0.0000	
Ambient H2O	0.350	121.9560	0.0000	
		140.4070	0.0000	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 15:13:15
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterST2020-3A12.CHR (c:\peak359)
Sample: Abator Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.9060	0.0000	
Ethylene Oxide	0.500	23.6210	51.1856	ppm
		25.5270	51.1856	

Lab name: ECSi
Client: Sterigenics - Santa Teresa
Client ID: Run#3Aer
Analysis date: 11/05/2020 15:13:15
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterST2020-3A12.CHR (c:\peak359)
Sample: Abator Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	19.3020	0.0000	
Ambient H2O	0.350	128.2920	0.0000	
		147.5940	0.0000	

APPENDIX F

Calibration Gas Certificates

PRAXAIR
Making our planet more productive

Praxair Distribution. Inc.
ISO 9001 Registered
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705-4907

Praxair Order Number: **71418069**
Customer PO Number: **79410708**

Certificate Issuance Date: **8/5/2020**

Certification Date: **8/5/2020**
Lot Number: **70340 0217 6D**
Part Number: **NI EO1MP-A3**
DocNumber: **237283**
Expiration Date: **8/5/2022**

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide	**1 ppm**	**1.08 ppm**	**1**	**± 5 %**
Nitrogen	**Balance**	**Balance**		

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **2000 psig**
Cylinder Volume: **27.5 ft3**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **FF63980**

Fill Date: **8/4/2020**
Analysis Date: **8/5/2020**

Filling Method: **Gravimetric**

Analyst: **Ronnie Popularas**

QA Reviewer: **Kristen Hanna**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are traceable to the International System of Units (SI) through either weights traceable to the National Institute of Standards and Technology (NIST) or Measurement Canada, or through NIST Standard Reference Materials or equivalent where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

IMPORTANT
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Geismar, LA 70734
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Fax: 225-673-3531

Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705-4907

Praxair Order Number: **71423449**
Customer PO Number: **79416198**

Certificate Issuance Date: **8/20/2020**

Certification Date: **8/20/2020**
Lot Number: **70340 0231 1E**
Part Number: **NI EO10MP-A3**
DocNumber: **240056**
Expiration Date: **8/19/2022**

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide	**10 ppm**	**10.6 ppm**	**1**	**± 1 %**
Nitrogen	**Balance**	**Balance**		

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **2000 psig**
Cylinder Volume: **28 ft3**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **EA0011733**

Fill Date: **8/18/2020**
Analysis Date: **8/19/2020**

Filling Method: **Gravimetric**

Analyst: **Ronnie Popularas**

QA Reviewer: **Jim Maurin**

Key to Analytical Techniques:

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37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705

Praxair Order Number: **70953858**
Customer PO Number: **78936543**

Certificate Issuance Date: **5/6/2019**

Certification Date: **5/6/2019**
Lot Number: **70340 9119 1F**
Part Number: **NI EO100P-A3**
DocNumber: **71177**
Expiration Date: **4/30/2021**

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide	**100 ppm**	**100 ppm**	**1**	**± 1 %**
Nitrogen	**Balance**	**Balance**		

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **2000 psig**
Cylinder Volume: **28.7 ft3**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **EA0023428**

Fill Date: **4/29/2019**
Analysis Date: **4/30/2019**

Filling Method: **Gravimetric**

Analyst: **Ronnie Popularas**

QA Reviewer: **Blayne Griffin**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

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Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertanity is expressed as a Relative % unless otherwise noted.

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37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

Certificate Issuance Date: **4/7/2020**

Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705-4907

Praxair Order Number: **71317148**
Customer PO Number: **Verbal**

Certification Date: **4/7/2020**
Lot Number: **70340 2517 4F**
Part Number: **NI EO1000P-A3**
DocNumber: **197405**
Expiration Date: **4/7/2022**

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide		1,000 ppm	1	± 1 %
Nitrogen		Balance		

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **1100 psig**
Cylinder Volume: **30 ft3**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **CLM002810**

Fill Date: **Recert.**
Analysis Date: **4/6/2020**

Filling Method: **Gravimetric**

Analyst: **Ronnie Popularas**

QA Reviewer: **Jim Maurin**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

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37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

Certificate Issuance Date: 4/7/2020

Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705-4907

Praxair Order Number: 71317148
Customer PO Number: Verbal

Certification Date: 4/7/2020
Lot Number: 70340 2517 4F
Part Number: NI EO10000P-A3
DocNumber: 197406
Expiration Date: 4/7/2022

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide		10.100 ppm	1	± 1 %
Nitrogen		Balance		

Cylinder Style: A3
Cylinder Pressure @ 70 F: 600 psig
Cylinder Volume: 30 ft3
Valve Outlet Connection: CGA 350
Cylinder Number(s): CLM005787

Fill Date: Recert.
Analysis Date: 4/6/2020

Filling Method: Gravimetric

Analyst: Ronnie Popularas

QA Reviewer: Jim Maurin

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

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CERTIFICATE OF ANALYSIS

Customer Name:	Environmental Compliance Specialists, Inc	**Cylinder Number:**	CAL-4448
Stock / Analyzer Tag #:	A006-1040-50PNC	**Product Class**	Certified Standard
Customer Reference:	Verbal Dan	**Cylinder Contents (1):**	28 CF @ 2000 PSI
MESA Reference:	124691	**Cylinder CGA:**	A006-HP-350/BR
Date of Certification:	April 17, 2019	**Analysis Method:**	GC-TCD
Recommended Shelf Life:	2 Years	**Preparation Method:**	Gravimetric

Component	**Requested Concentration (2)**	**Reported Concentration (2,3)**
Ethylene Oxide	50 ppm	52 ppm
Nitrogen	Balance	Balance

Authorized Signature: _____

(1) The fill pressure shown on the COA is as originally quoted. The fill pressure measured by the customer may differ from the fill pressure originally quoted due to temperature effects, compressibility of the individual components when blended together in the cylinder, gauge accuracy or reduction in content volume before shipping as a result of samples withdrawn for laboratory QC necessary to ensure product quality.
(2) Unless otherwise stated, concentrations are given in molar units.
(3) Vapor pressure mixes are blended at a sufficiently low pressure so as to eliminate phase separation under most low temperature conditions encountered during transport or storage. However, it is generally recommended that cylinders containing vapor pressure restricted mixes be placed on the floor in a horizontal position and rolled back and forth to improve homogeneity of the gas phase mixture before being put into service.

Analytical Gas Standards are prepared and analyzed using combinations of NIST traceable weights, SRM's provided by NIST, or internal gas standards that have been verified for accuracy using procedures published by the US-EPA. Pure gases are analyzed and certified for purity using minor component Analytical Gas Standards prepared according to the methods specified above. Balances are calibrated to NIST test weights covered by NIST test number 822/278982-10. Reference Certification #'s:1072/Z, 833/AB and 3280/H.
Calibration methods are in conformance with MIL-STD 45662A.

MESA Specialty Gases & Equipment
division of MESA International Technologies, Inc.
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On-line Catalog at www.mesagas.com