



REPORT ON ETHYLENE OXIDE TESTING

Atlanta Facility

Process Control System

Indoor Air Control System

Sterigenics US, LLC
2015 Spring Road, Suite 650
Oak Brook, IL 60523
Client Reference No. 172076-000-OJ

CleanAir Project No. 14004-2
A2LA ISO 17025 Certificate No. 4342.01
A2LA / STAC Certificate No. 4342.02
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July 27, 2020

COMMITMENT TO QUALITY

To the best of our knowledge, the data presented in this report are accurate, complete, error free and representative of the actual emissions during the test program. Clean Air Engineering operates in conformance with the requirements of ASTM D7036-04 Standard Practice for Competence of Air Emission Testing Bodies.

Report Submittal:



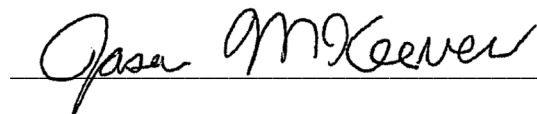
07/27/20

Kenny Sullivan
Project Manager
ksullivan@cleanair.com
(800) 627-0033 ext. 4527

Date

I hereby certify that the information contained within the final test report has been reviewed and, to the best of my ability, verified as accurate.

Independent Report and Appendix Review:



07/27/20

Jason McKeever, QSTI
Project Manager
jmckeever@cleanair.com
(800) 632-1619 ext. 2142

Date

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PROJECT PERSONNEL

Name	Affiliation	Project Responsibility
Kevin Wagner	Sterigenics US, LLC	Client Contact
Laura Hartman	Sterigenics US, LLC	Client Contact
Daryl Mosby	Sterigenics US, LLC	Plant Contact
Ray Shen	Georgia Department of Natural Resources, Environmental Protection Division	Representative
Joshua Pittman	Georgia Department of Natural Resources, Environmental Protection Division	Representative
Marcus Cureton	Georgia Department of Natural Resources, Environmental Protection Division	Representative
Kenny Sullivan	CleanAir	Project Manager / Field Test Leader / Starboost FTIR Technician
Jason McKeever	CleanAir	Independent Review of Report / FTIR Technician
Mohammad Khatib	CleanAir	Field Engineer / FTIR Technician
Josh Myers	CleanAir	Field Engineer

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ACRONYMS & ABBREVIATIONS

AAS (atomic absorption spectrometry)
 acfm (actual cubic feet per minute)
 ACI (activated carbon injection)
 ADL (above detection limit)
 AIG (ammonia injection grid)
 APC (air pollution control)
 AQCS (air quality control system(s))
 ASME (American Society of Mechanical Engineers)
 ASTM (American Society for Testing and Materials)
 BDL (below detection limit)
 Btu (British thermal units)
 CAM (compliance assurance monitoring)
 CARB (California Air Resources Board)
 CCM (Controlled Condensation Method)
 CE (capture efficiency)
 °C (degrees Celsius)
 CEMS (continuous emissions monitoring system(s))
 CFB (circulating fluidized bed)
 CFR (Code of Federal Regulations)
 cm (centimeter(s))
 COMS (continuous opacity monitoring system(s))
 CT (combustion turbine)
 CTI (Cooling Technology Institute)
 CTM (Conditional Test Method)
 CVAAS (cold vapor atomic absorption spectroscopy)
 CVAFS (cold vapor atomic fluorescence spectrometry)
 DI H₂O (de-ionized water)
 %dv (percent, dry volume)
 DLL (detection level limited)
 DE (destruction efficiency)
 DCI (dry carbon injection)
 DGM (dry gas meter)
 dscf (dry standard cubic feet)
 dscfm (dry standard cubic feet per minute)
 dscm (dry standard cubic meter)
 ESP (electrostatic precipitator)
 FAMS (flue gas adsorbent mercury speciation)
 °F (degrees Fahrenheit)
 FB (field blank)
 FCC (fluidized catalytic cracking)
 FCCU (fluidized catalytic cracking unit)
 FEGT (furnace exit gas temperatures)
 FF (fabric filter)
 FGD (flue gas desulfurization)
 FIA (flame ionization analyzer)
 FID (flame ionization detector)
 FPD (flame photometric detection)
 FRB (field reagent blank)
 FSTM (flue gas sorbent total mercury)
 ft (feet or foot)

ft² (square feet)
 ft³ (cubic feet)
 ft/sec (feet per second)
 FTIR (Fourier Transform Infrared Spectroscopy)
 FTRB (field train reagent blank)
 g (gram(s))
 GC (gas chromatography)
 GFAAS (graphite furnace atomic absorption spectroscopy)
 GFC (gas filter correlation)
 gr/dscf (grains per dry standard cubic feet)
 > (greater than)/ ≥ (greater than or equal to)
 g/s (grams per second)
 H₂O (water)
 HAP(s) (hazardous air pollutant(s))
 HI (heat input)
 hr (hour(s))
 HR GC/MS (high-resolution gas chromatography and mass spectrometry)
 HRVOC (highly reactive volatile organic compounds)
 HSRG(s) (heat recovery steam generator(s))
 HVT (high velocity thermocouple)
 IC (ion chromatography)
 IC/PCR (ion chromatography with post column reactor)
 ICP/MS (inductively coupled argon plasma mass spectroscopy)
 ID (induced draft)
 in. (inch(es))
 in. H₂O (inches water)
 in. Hg (inches mercury)
 IPA (isopropyl alcohol)
 ISE (ion-specific electrode)
 kg (kilogram(s))
 kg/hr (kilogram(s) per hour)
 < (less than)/ ≤ (less than or equal to)
 L (liter(s))
 lb (pound(s))
 lb/hr (pound per hour)
 lb/MMBtu (pound per million British thermal units)
 lb/TBtu (pound per trillion British thermal units)
 lb/lb-mole (pound per pound mole)
 LR GC/MS (low-resolution gas chromatography and mass spectrometry)
 m (meter)
 m³ (cubic meter)
 MACT (maximum achievable control technology)
 MASS® (Multi-Point Automated Sampling System)
 MATS (Mercury and Air Toxics Standards)
 MDL (method detection limit)
 µg (microgram(s))
 min. (minute(s))
 mg (milligram(s))

ml (milliliter(s))
 MMBtu (million British thermal units)
 MW (megawatt(s))
 NCASI (National Council for Air and Stream Improvement)
 ND (non-detect)
 NDIR (non-dispersive infrared)
 NDO (natural draft opening)
 NESHAP (National Emission Standards for Hazardous Air Pollutants)
 ng (nanogram(s))
 Nm³ (Normal cubic meter)
 % (percent)
 PEMS (predictive emissions monitoring systems)
 PFGC (pneumatic focusing gas chromatography)
 pg (picogram(s))
 PJFF (pulse jet fabric filter)
 ppb (parts per billion)
 PPE (personal protective equipment)
 ppm (parts per million)
 ppm_{dv} (parts per million, dry volume)
 ppm_{wv} (parts per million, wet volume)
 PSD (particle size distribution)
 psi (pound(s) per square inch)
 PTE (permanent total enclosure)
 PTFE (polytetrafluoroethylene)
 QA/QC (quality assurance/quality control)
 QI (qualified individual)
 QSTI (qualified source testing individual)
 QSTO (qualified source testing observer)
 RA (relative accuracy)
 RATA (relative accuracy test audit)
 RB (reagent blank)
 RE (removal or reduction efficiency)
 RM (reference method)
 scf (standard cubic feet)
 scfm (standard cubic feet per minute)
 SCR (selective catalytic reduction)
 SDA (spray dryer absorber)
 SNCR (selective non-catalytic reduction)
 STD (standard)
 STMS (sorbent trap monitoring system)
 TBtu (trillion British thermal units)
 TEOM (Tapered Element Oscillating Microbalance)
 TEQ (toxic equivalency quotient)
 ton/hr (ton per hour)
 ton/yr (ton per year)
 TSS (third stage separator)
 USEPA or EPA (United States Environmental Protection Agency)
 UVA (ultraviolet absorption)
 WFGD (wet flue gas desulfurization)
 %wv (percent, wet volume)

1. PROJECT OVERVIEW

TEST PROGRAM SUMMARY

INTRODUCTION

Sterigenics US, LLC (Sterigenics) contracted CleanAir Engineering (CleanAir) to conduct testing on the ethylene oxide (EtO) control systems at the facility, located in Atlanta, Georgia. EPA Reference Methods 320 and 1-4 were conducted to determine mass emissions at each sample location. Mass emissions were used to determine control device removal efficiencies and source emission removal for each applicable standard.

The main objectives of this test program are to demonstrate compliance for 40 CFR 63.7, Subpart O – “Ethylene Oxide Emissions Standards for Sterilization Facilities” § 63.362 (Subpart O), to provide information in response to a Georgia Department of Natural Resources (DNR) Environmental Protection Division (EPD) letter to Sterigenics, dated October 9, 2019, entitled “Re: Request for additional information regarding Application No. 27153 received July 31, 2019 Sterigenics U.S., LLC, Atlanta, AIRS No:06700093,” and to demonstrate compliance for Georgia Air Quality Permit (GA AQP) No. 7389-067-0093-S-05-0.

RESULTS SUMMARY

A summary of this test program results is presented in Table 1-1. Section 2 Results provides a more detailed account of the test conditions and data analysis.

**Table 1-1:
Summary of Results**

Source / Control System			Regulation
Parameter	Sampling Method	Results	Limit ¹
<u>Ceilcote Scrubber System</u>			
EtO Removal Efficiency (%)	EPA 320, EPA 1-4	99.9991	99
<u>AAT Scrubber System with Dry Bed Adsorber</u>			
EtO Removal Efficiency (%) ²	EPA 320, EPA 1-4	99.61	99
<u>Indoor Air Control System</u>			
Output EtO Concentration (ppb)	EPA 320	21.1	N/A
Output EtO Emission Rate (lb/hr)	EPA 320, EPA 1-4	0.00280	
Stack Height (ft)	N/A	80	N/A
Stack Diameter (in)	N/A	24	N/A
Stack Airflow (scfm)	EPA 1-4	19,300	N/A
<u>Sterilization Chamber Vent</u>			
EtO Removal (%)	EPA 320, EPA 1-4	99.999989	99
<u>Aeration Room Vent</u>			
EtO Removal (%)	EPA 320, EPA 1-4	99.85	99
<u>Chamber Exhaust Vent (Backvent)</u>			
EtO Removal (%)	EPA 320, EPA 1-4	99.87	N/A
<u>Total Process Control System³</u>			
EtO Removal Efficiency (%)	EPA 320, EPA 1-4	99.9987	99
Stack Height (ft)	N/A	80	N/A
Stack Diameter (in)	N/A	18	N/A
Stack Airflow (scfm)	EPA 1-4	10,410	N/A

¹ Standard limits and requirements applicable to DNR EPD letter, 40 CFR 63.362, and GA AQP No. 7389-067-0093-S-05-0.

² Average of removal during sterilization chamber, aeration room, and chamber exhaust vent testing.

³ Removal efficiency of EtO emissions sent to inlet of Ceilcote scrubber and EtO emissions routed to inlet of AAT scrubber.

TEST PROGRAM BACKGROUND

STERILIZATION PROCESS

The sterilization process begins with the start of a sterilization cycle evacuating air from a sterilization chamber and introducing nitrogen (N₂). While under negative pressure inside the sterilization chamber, a sterilant, i.e. EtO, is introduced into the chamber to sterilize the product. Once EtO is introduced, the dwell stage is triggered and can last from 30 minutes to up to several hours, according to the validated cycle for the product. Once exposure is complete, the sterilization chamber vacuum pumps remove most of the EtO from the chamber by exhausting and purging with N₂ and air. When EtO is released from the chamber it is routed to a control device. The length of time from which EtO is introduced to the inlet of the control device to when non-captured EtO exits the outlet of the control device is referred to as 'lag time.' Per Subpart O, the point through which the evacuation of EtO from the sterilization chamber by the vacuum pumps occurs following sterilization or fumigation, including any subsequent air washes is called the *sterilization chamber vent*. Testing associated with this process is called sterilization chamber vent testing or vacuum pump testing. Refer to Table 3-2 in this report for further sterilization cycle details.

Once the sterilization cycle process is complete and the chamber door is partially opened, the backvent fan activates to extract residual amounts of EtO from the chamber. This fan remains on while the chamber door is open and product is unloaded. Per Subpart O, the point through which EtO-laden air is removed from the sterilization chamber by backvents during chamber unloading following the completion of sterilization and associated air washes is called the *chamber exhaust vent*. Testing associated with this process is called chamber exhaust vent testing or backvent testing. After 15 minutes of unloading and backventing, the pallets of product are removed from the sterilization chamber and placed into aeration rooms to further off-gas residual EtO. Per Subpart O, the point through which the evacuation of EtO-laden air from an aeration room occurs is called the *aeration room vent*. Testing associated with this process is called aeration room vent testing or aeration testing.

Because the sterilization process described above is not a contained system, residual EtO has the potential to either be emitted from draft openings in the facility or accumulate within the process area of the facility. As requested by.... Sterigenics to provide an assessment of the capture of fugitive EtO emissions from the sterilization process. The facility includes a ventilation system that addresses process fugitive emissions. Testing associated with the assessment of fugitive emissions is called indoor air testing.

Table 1-2:
Sterilization Process Definitions

Emission Source	Alternate Emission Source Label	Definition
Sterilization Chamber Vent	Vacuum Pump	the point through which the evacuation of EtO from the sterilization chamber occurs following sterilization or fumigation, including any subsequent air washes
Aeration Room Vent	Aeration	the point(s) through which the evacuation of EtO-laden air from an aeration room occurs
Chamber Exhaust Vent	Backvent	the point(s) through which EtO-laden air is removed from the sterilization chamber during chamber unloading following the completion of sterilization and associated air washes
Facility Fugitive Emissions	Indoor Air	the points through which emissions from any sterilization process have the potential to be emitted from, or accumulate in, the facility

FACILITY PROCESS CONTROL SCHEMATIC

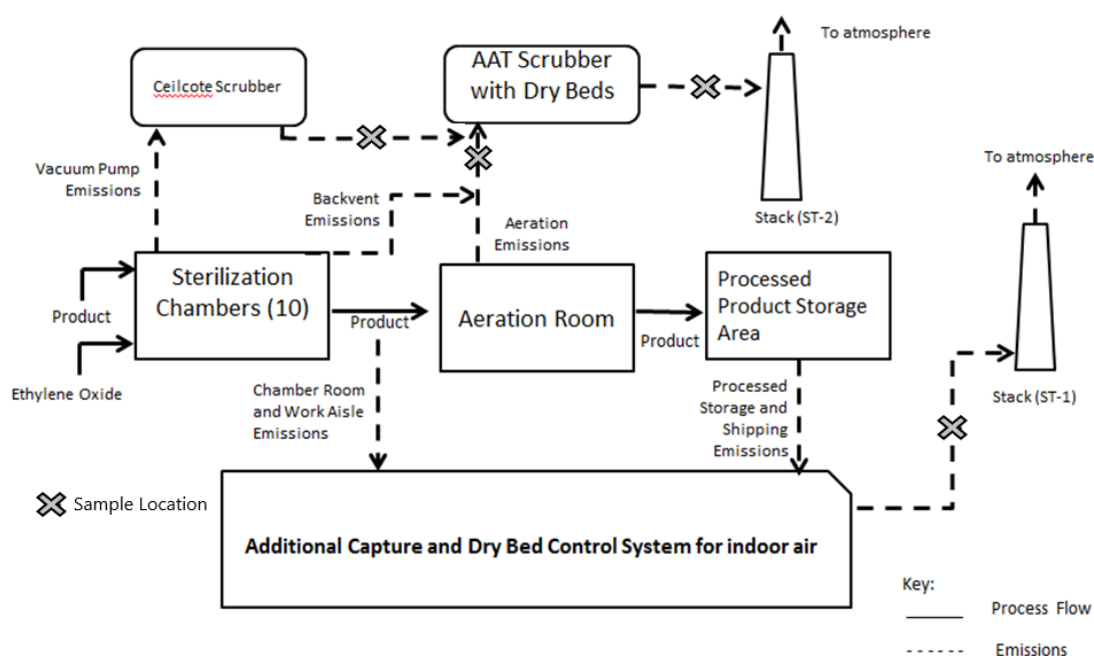
Sterilization chamber vent or vacuum pump emissions are routed to the Ceilcote wet acid scrubber (Ceilcote scrubber), which is routed to the existing Advanced Air Technologies wet acid scrubber (AAT scrubber) with dry bed reactor, then to additional polishing beds, and then finally to a common stack (Process Stack). The backvent and aeration room emissions are manifolded, ducted to the AAT and treated with dry bed reactors, then to polishing beds, and then to the Process Stack. The backvent/aeration room manifolded emissions and vacuum pump emissions are manifolded directly upstream of the inlet to the AAT scrubber. The indoor air emissions are routed to dry beds and then to a dedicated stack (Indoor Air Stack). The indoor air control system is independent of the process control system.

Testing occurred at the following locations:

- downstream of where the aeration and backvent emissions manifolded and upstream of where the aeration/backvent emissions and vacuum pump emissions manifolded prior to the AAT scrubber (Aeration/Backvent Outlet),
- downstream of the outlet of the Ceilcote scrubber and upstream of where the aeration/backvent emissions and vacuum pump emissions are manifolded (Ceilcote Outlet),
- downstream of the process AAT scrubber and polishing beds (Process Stack), and
- downstream of the indoor air polishing beds (Indoor Air Stack).

A schematic of the process is shown in Figure 1-1 below with sample locations indicated with an 'X'.

Figure 1-1:
Process Schematic



REGULATION STANDARDS

Testing described in this report follow the regulations and correspondence below;

- Georgia Department of Natural Resources (DNR) Environmental Protection Division (EPD) letter to Sterigenics, dated October 9, 2019, entitled “Re: Request for additional information regarding Application No. 27153 received July 31, 2019 Sterigenics U.S., LLC, Atlanta, AIRS No:06700093” (DNR EPD Letter),
- 40 CFR 63.7, Subpart O – “Ethylene Oxide Emissions Standards for Sterilization Facilities” § 63.362 (Subpart O), and
- Georgia Air Quality Permit (GA AQP) No. 7389-067-0093-S-05-0.

The applicable regulations contain standards that are both singular and shared.

Subpart O requires:

1. 99% emission reduction of sterilization chamber vent EtO
2. 1 ppm maximum outlet concentration or 99% emission reduction of aeration room vent EtO

The DNR EPD Letter requires:

1. 99% emission reduction of sterilization chamber vent EtO
2. 1 ppm maximum outlet concentration or 99% emission reduction of aeration room vent EtO
3. Removal efficiency of the facility Ceilcote scrubber, AAT scrubber, and total control system
4. An assessment of reduction of backvent emissions
5. An assessment of indoor air emissions
6. An assessment of stack characteristics (height, diameter, airflow)

The GA AQP requires:

1. 99% emission reduction of sterilization chamber vent EtO
2. 1 ppm maximum outlet concentration or 99% emission reduction of aeration room vent EtO
3. Removal efficiency of the facility AAT scrubber system (AAT scrubber and polisher dry beds)

TEST PROGRAM DETAILS

SCOPE

Parameters

The test program included the following measurements:

- ethylene oxide (EtO)
- effluent gas composition (e.g., O₂, CO₂, H₂O)
- effluent gas temperature
- effluent gas flow rate

The above measurements were collected from each of the following sample locations:

- Ceilcote Scrubber Outlet
- Aeration Room/Backvent Outlet
- Process Stack
- Indoor Air Stack

The above measurements were collected utilizing the following reference methods:

- EPA Method 320 (supplemented by ASTM 6348-12) for EtO
- EPA Method 1-4 for effluent gas composition, temperature, and flow rate

Test Program Framework

To demonstrate compliance with all applicable regulations, four (4) sets of testing were conducted:

1. Sterilization chamber vent / vacuum pump testing
2. Aeration room vent / aeration testing
3. Chamber exhaust vent / backvent testing
4. Fugitive emission / indoor air testing

During vacuum pump testing, EtO emissions were determined at the Aeration/Backvent Outlet, Ceilcote Outlet, and Process Stack sample locations by conducting EPA Reference Methods 320 and 1-4 concurrently. Three (3) runs were conducted at varying run durations. The run duration was defined as the first EtO evacuation phase duration plus the Ceilcote lag time duration. During vacuum pump testing, EtO emissions were also determined from the sterilization chamber vents by procedures outlined in 40 CFR 63.362(b)(1)(i)-(iii).

During aeration testing, EtO emissions were determined at the Aeration/Backvent Outlet, Ceilcote Outlet, and Process Stack sample locations by conducting EPA Reference Methods 320 and 1-4 concurrently. Three (3) runs approximately 60 minutes in duration were conducted.

During backvent testing, EtO emissions were determined at the Aeration/Backvent Outlet, Ceilcote Outlet, and Process Stack sample locations by conducting EPA Reference Methods 320 and 1-4 concurrently. Three (3) runs approximately 15 minutes in duration were conducted.

During indoor air testing, EtO emissions were determined at the Indoor Air Stack sample location only by conducting EPA Reference Methods 320 and 1-4. Three (3) runs approximately 60 minutes in duration were conducted.

Test Program Process Setup

For vacuum pump testing, Sterigenics demonstrated 'maximum loading' at the request of the GA DNR EPD instead of the 'typical' amount under 'normal operating conditions' as outlined in 40 CFR 63.362¹, which would produce less emissions. Sterigenics demonstrated maximum loading by performing vacuum pump testing at three maximum potential loadings and at three different operating scenarios. Run 1 was performed during the first EtO evacuation of one (1) chamber, Run 2 was performed during the first EtO evacuation of two (2) chambers, and Run 3 was performed during the first EtO evacuation of three (3) chambers. Six (6) separate chambers were used during testing to minimize the time required to perform testing. Since typically more EtO is used in larger chambers, testing was performed with the largest available chambers.

At the conclusion of a sterilization cycle, Sterigenics unloaded pallets from one (1) sterilization chamber during each run of backvent testing. Cycles were strategically chosen by Sterigenics so that pallets were unloaded from the largest available sterilization chamber. Cycles were timed so that chamber would stop sterilization and activate backventing every 15 minutes. Aeration testing then occurred subsequent to backvent testing while all pallets unloaded during backvent testing were aerating in the aeration room.

¹ This was approved by the USEPA Office of Air Quality Planning and Standards in a letter dated January 14, 2020.

For indoor air testing, Sterigenics strategically planned sterilization cycles so that pallet unloading and transfer was occurring during Runs 1 and 2. No pallets were being unloaded or transferred during Run 3 in order to provide comparative data.

SCHEDULE

Testing was performed June 24-26, 2020. The on-site schedule followed during the test program is outlined in Table 1-3 through 1-5.

**Table 1-3:
Test Schedule – Aeration/Backvent Testing**

Run Number	Testing	Location	Method	Parameter	Date	Start Time	End Time
1	Backvent	Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/24/20	11:32	11:48
2	Backvent	Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/24/20	11:48	12:04
3	Backvent	Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/24/20	12:04	12:19
1	Backvent	Process Stack	USEPA 2	Velocity & Temperature	06/24/20	11:43	11:50
1	Backvent	Ceilcote Outlet	USEPA 2	Velocity & Temperature	06/24/20	11:52	11:58
1	Backvent	Aeration/Backvent Outlet	USEPA 2	Velocity & Temperature	06/24/20	11:59	12:04
1	Aeration	Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/24/20	14:22	15:27
1	Aeration	Aeration/Backvent Outlet	USEPA 2	Velocity & Temperature	06/24/20	14:30	14:35
1	Aeration	Ceilcote Outlet	USEPA 2	Velocity & Temperature	06/24/20	14:37	14:42
1	Aeration	Process Stack	USEPA 2	Velocity & Temperature	06/24/20	14:43	14:48
2	Aeration	Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/24/20	15:44	16:48
2	Aeration	Process Stack	USEPA 2	Velocity & Temperature	06/24/20	15:53	15:58
2	Aeration	Ceilcote Outlet	USEPA 2	Velocity & Temperature	06/24/20	16:00	16:05
2	Aeration	Aeration/Backvent Outlet	USEPA 2	Velocity & Temperature	06/24/20	16:05	16:11
3	Aeration	Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/24/20	17:04	18:09
3	Aeration	Process Stack	USEPA 2	Velocity & Temperature	06/24/20	16:26	16:31
3	Aeration	Aeration/Backvent Outlet	USEPA 2	Velocity & Temperature	06/24/20	17:14	17:20
3	Aeration	Ceilcote Outlet	USEPA 2	Velocity & Temperature	06/24/20	17:20	17:23

Table 1-4:
Test Schedule – Vacuum Pump Testing

Run Number	Testing	Location	Method	Parameter	Date	Start Time	End Time
1 ¹	Vacuum Pump	Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/25/20	09:56	10:32
1	Vacuum Pump	Process Stack	USEPA 2	Velocity & Temperature	06/25/20	10:08	10:13
1	Vacuum Pump	Ceilcote Outlet	USEPA 2	Velocity & Temperature	06/25/20	10:15	10:18
1	Vacuum Pump	Aeration/Backvent Outlet	USEPA 2	Velocity & Temperature	06/25/20	10:19	10:24
2 ¹	Vacuum Pump	Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/25/20	11:48	12:22
2	Vacuum Pump	Aeration/Backvent Outlet	USEPA 2	Velocity & Temperature	06/25/20	11:56	12:01
2	Vacuum Pump	Ceilcote Outlet	USEPA 2	Velocity & Temperature	06/25/20	12:01	12:04
2	Vacuum Pump	Process Stack	USEPA 2	Velocity & Temperature	06/25/20	12:06	12:10
3 ¹	Vacuum Pump	Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/25/20	13:08	13:57
3	Vacuum Pump	Process Stack	USEPA 2	Velocity & Temperature	06/25/20	13:30	13:34
3	Vacuum Pump	Ceilcote Outlet	USEPA 2	Velocity & Temperature	06/25/20	13:37	13:40
3	Vacuum Pump	Aeration/Backvent Outlet	USEPA 2	Velocity & Temperature	06/25/20	13:40	13:44

¹ Test run defined as duration of sterilant evacuation plus lag time.

Table 1-5:
Test Schedule – Indoor Air Testing

Run Number	Testing	Location	Method	Parameter	Date	Start Time	End Time
1	Indoor Air	Indoor Air Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/26/20	10:00	11:02
1	Indoor Air	Indoor Air Stack	USEPA 2	Velocity & Temperature	06/26/20	10:04	10:11
2	Indoor Air	Indoor Air Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/26/20	12:36	13:37
2	Indoor Air	Indoor Air Stack	USEPA 2	Velocity & Temperature	06/26/20	12:41	12:46
3	Indoor Air	Indoor Air Stack	USEPA Methods 320, 4, 3A	EtO, Molecular Weight	06/26/20	13:59	15:00
3	Indoor Air	Indoor Air Stack	USEPA 2	Velocity & Temperature	06/26/20	14:33	14:38

REMOVAL EFFICIENCY & EMISSION REMOVAL DETERMINATIONS

Calculations

Ceilcote scrubber removal efficiency was determined during vacuum pump testing. Removal efficiency was determined by the following formula:

$$RE_C = [E_{IC} - E_{OC}] / E_{IC}$$

Where:

RE_C = Ceilcote scrubber removal efficiency (%)

E_{IC} = Emissions from sterilization chamber vents (lb)

E_{OC} = Emissions at the Ceilcote Outlet (lb)

AAT scrubber removal efficiency was determined during backvent, aeration, and vacuum pump testing. Final removal efficiency was calculated as the average removal efficiency from each testing. Removal efficiency was determined by the following formula:

$$RE_{AAT} = [(E_{A/BV} + E_{OC}) - E_{PS}] / (E_{A/BV} + E_{OC})$$

Where:

RE_{AAT} = AAT scrubber removal efficiency (%)

$E_{A/BV}$ = Emissions at the Aeration/Backvent Outlet (lb or lb/hr)

E_{OC} = Emissions at the Ceilcote Outlet (lb or lb/hr)

E_{PS} = Emissions at the Process Stack (lb or lb/hr)

Total process control system removal efficiency was determined during vacuum pump testing. Removal efficiency was determined by the following formula:

$$RE_T = [(E_{A/BV} + E_{IC}) - E_{PS}] / (E_{A/BV} + E_{IC})$$

Where:

RE_T = Total process control system removal efficiency (%)

$E_{A/BV}$ = Emissions at the Aeration/Backvent Outlet (lb)

E_{IC} = Emissions from sterilization chamber vents (lb)

E_{PS} = Emissions at the Process Stack (lb)

Sterilization chamber vent or vacuum pump emissions removal was determined during vacuum pump testing. Removal was determined by the following formula:

$$RE_{VP} = [E_{IC} - (E_{OC} \times (1 - RE_{AAT}))] / E_{IC}$$

Where:

RE_{VP} = Vacuum pump emissions removal (%)

E_{IC} = Emissions from sterilization chamber vents (lb)

E_{OC} = Emissions at the Ceilcote Outlet (lb)

RE_{AAT} = AAT scrubber removal efficiency (%) *during vacuum pump testing*

Aeration room vent or aeration emissions removal was determined during aeration testing. Aeration emissions removal was considered equivalent to AAT scrubber removal efficiency during aeration testing. Removal was determined by the following formula:

$$RE_{Aer} = [(E_{A/BV} + E_{OC}) - E_{PS}] / (E_{A/BV} + E_{OC})$$

Where:

RE_{Aer} = Aeration emissions removal (%)

$E_{A/BV}$ = Emissions at the Aeration/Backvent Outlet (lb/hr)

E_{OC} = Emissions at the Ceilcote Outlet (lb/hr)

E_{PS} = Emissions at the Process Stack (lb/hr)

Chamber exhaust vent or backvent emissions removal was determined during backvent testing. Backvent emissions removal was considered equivalent to AAT scrubber removal efficiency during backvent testing. Removal was determined by the following formula:

$$RE_{BV} = [(E_{A/BV} + E_{OC}) - E_{PS}] / (E_{A/BV} + E_{OC})$$

Where:

RE_{BV} = Backvent emissions removal (%)

$E_{A/BV}$ = Emissions at the Aeration/Backvent Outlet (lb/hr)

E_{OC} = Emissions at the Ceilcote Outlet (lb/hr)

E_{PS} = Emissions at the Process Stack (lb/hr)

Final Reporting

The final removal efficiencies were an average of three valid test runs based on units of lb or lb/hr. The final unit was contingent upon the type of testing or the removal efficiency being calculated.

Removal efficiency calculations that included EtO emissions from the sterilization chamber vent were reported in units of lb. The average lb/min emission rate for each run was integrated over the duration of the test run by multiplying the lb/min emission rate by the duration of the run (in minutes).

Results calculated from sample concentrations less than the detection limit are reported as 'less than' the detection limit.

Regarding removal and removal efficiencies reported in tables presented in Section 2 of this report:

- A '<' reported with a *concentration* indicates the respective average concentration includes at least one (1) EtO concentration that is below the detection limit.
- A '<' reported with a *mass emission* indicates the respective average mass emission was calculated based on an average concentration that includes at least one (1) EtO concentration that is below the detection limit.
- A '>' reported with an *emission removal or removal efficiency* indicates the removal or removal efficiency includes a mass emission *output* that was reported with a '<.' The actual removal or removal efficiency approximately equals the value reported however there is probability it is minimally greater than the value reported.
- A '<' reported with an *emission removal or removal efficiency* indicates the removal or removal efficiency includes a mass emission *input* that was reported with a '<.' The actual removal or removal efficiency approximately equals the value reported however there is probability it is minimally less than the value reported.
- A '~' reported with an *emission removal or removal efficiency* indicates the removal or removal efficiency includes a mass emission *input or output* that was reported with a combination of '<' and '>.' The actual removal or removal efficiency approximately equals the value reported however there is probability it is minimally less than or greater than the value reported.

DISCUSSION

Determination of EtO Emissions

Ceilcote Inlet

EtO emissions from the sterilization chamber vents were calculated in accordance with 40 CFR 63.362(b)(1)(i)-(iii). Sterigenics provided CleanAir initial and final first sterilant evacuation phase EtO concentrations for each applicable sterilization chamber. The mass of EtO released to the Ceilcote scrubber was considered the difference in mass-based concentrations (mg/l) multiplied by the volume of the respective chamber. Emissions were then converted to appropriate units; in this case pounds (lb).

Ceilcote Outlet

EPA Method 320 with supplementation from ASTM 6348-12 was conducted to determine the EtO concentration and moisture content of the effluent gas. Method 320 is an acceptable alternative for moisture determination per §16.3 of EPA Method 4.

An EtO stratification test was performed in accordance with Section 8.1.2 of EPA Method 7E during the first backvent testing run. Due to results confirming the absence of a stratified gas stream, relatively small stack diameter (10 inches ID), and relatively low EtO concentration (<0.5 ppm) during the stratification check, the gas sample was collected at a single point for the balance of the run and subsequent runs thereafter. The stratification testing performed is described further in Section 3, with results in Appendix D of this report.

EPA Methods 1, 2, and 3A were conducted to determine acceptable sampling locations/points, measure effluent gas velocity pressure, temperature, and O₂/CO₂ concentrations. These measurements were used to determine volumetric flow. EPA Method 3A was conducted concurrently with EPA Method 320. Except during backvent testing, one (1) EPA Method 2 traverse was conducted per sample location per run. During backvent testing, one (1) EPA Method 2 traverse for all three (3) runs was conducted at each sample location. This was due to the infeasibility of conducting three (3) runs at three (3) locations during the 48-minute backvent testing duration. Velocity/temperature and O₂/CO₂ data, respectively, are included in Appendices I and J of this report.

The methods described above were conducted in conjunction with Method 320 to calculate mass emissions in either lb or lb/hr. The final unit was contingent upon the type of testing or the removal efficiency being calculated.

Sample calculations are presented in Appendix B of this report.

[Aeration/Backvent Outlet, Process Stack, & Indoor Air Stack](#)

Similar methodology and instrumentation used for the Ceilcote Outlet testing was used to sample the Aeration/Backvent Outlet, Process Stack, and Indoor Air Stack. EtO and moisture determination were measured following Method 320 with supplementation from ASTM 6348-12. Flow and O₂/CO₂ measurements followed Method 2 and 3A procedures. Except during backvent testing for the Aeration/Backvent Outlet and Process stack as described above, flow measurements were collected during each Method 320 run. Mass emission rates in units of lb or lb/hr were determined from EtO concentrations and volumetric flow rates.

An EtO stratification test was performed in accordance with Section 8.1.2 of EPA Method 7E during the first backvent testing run. An EtO stratification test was performed in accordance with Section 8.1.2 of EPA Method 7E during the first indoor air testing run for the Indoor Air Stack. Due to results confirming the absence of a stratified gas stream (no point differed more than 0.5 ppm) and/or relatively low EtO concentration (<0.5 ppm) during the stratification check, the gas sample was collected at a single point for the balance of the run and subsequent runs thereafter.

[Equipment/Analyzers](#)

EtO concentrations at the Ceilcote Outlet and Aeration/Backvent Outlet were measured by a standard configuration MKS MultiGas 2030 Fourier transform infrared (FTIR) spectrometer. EtO at the stack locations were measured by an MKS MultiGas 2030 FTIR with MAX-StarBoost enhancement technology. The MAX-StarBoost algorithm narrows the spectral bands utilized to quantify EtO, creating increased sensitivity, linearity, and dynamic range. The technology specializes in readily quantifying parts per billion volume-based (ppbvdv) concentration levels in source testing applications. The MAX-StarBoost technology package includes the MAX-Analytics and MAX-Acquisition software. Refer to Appendix A for further details and specifications. EtO concentrations were measured on a wet volumetric basis.

Ceilcote Outlet and Aeration/Backvent Outlet CO₂ concentrations were measured by the FTIR. Ceilcote Outlet and Aeration/Backvent Outlet O₂ concentrations were measured by a wet Brand Gaus analyzer in series with, and subsequent to, the FTIR. Stack O₂ and CO₂ concentrations were measured by an O₂/CO₂ Servomex analyzer on a dry volumetric basis parallel to the stack FTIR.

Velocity pressure measurements were made using a wind tunnel-calibrated S-type pitot tube with attached thermocouple. The pitot tube was connected via an umbilical to a Shortridge digital micromanometer for pressure drop readings.

Stack Characteristics Determination

Process Stack and Indoor Air Stack heights were estimated on-site using trigonometric measurements and calculations. An inclinometer was used to measure the angle from the roof to the top of the stack at a specific distance away from the stack base. A walking measuring stick was used to measure the specific distance from the stack base. The stack heights were then calculated as the tangent of the angle measured by the inclinometer multiplied by the distance from the stack base plus the height of the person collecting measurements.

Measurements used to determine stack heights are presented below in Table 1-6.

**Table 1-6:
Stack Height Measurements**

Stack	Process	Indoor Air
Angle to top of stack (°)	32.5	42.5
Distance to base of stack (ft)	116	81
Height of measurer (ft)	5.83	5.83
Height of stack (ft)	~80	~80

Process Stack and Indoor Air Stack diameters were measured on-site by measuring the outer diameter of the respective stack with a tape measure and accounting for the thickness of the respective stack wall.

Process Stack and Indoor Air Stack airflow was measured during EtO testing. EPA Methods 320, 1, 2, and 3A described above were used to determine volumetric flow rate in units of scfm. The Process Stack airflow is the average airflow during backvent, aeration, and vacuum pump testing. The Indoor Air airflow is the average airflow during indoor air testing.

Notable Items

Run Duration Variances

Vacuum pump testing runs varied in duration contingent upon chamber sterilant evacuation phase duration and lag time. The run duration was defined as the length of time from the start of the first chamber first evacuation phase to the end of the last chamber first evacuation phase plus the lag time.

Table 1-7 presented on the following page outlines notable times during chamber vent testing.

Table 1-7:
Notable Chamber Vent Testing Times

Run No.	1	2	3
<u>Notable Times (hh:mm) (June 25)</u>			
Start Collecting Data	9:53	11:31	13:08
Start 1st Sterilant Evacuation	9:57	11:49	13:09
Stop 1st Sterilant Evacuation	10:06	12:10	13:42
Start of 1st EtO Spike	10:23	12:01	13:24
Ceilcote Scrubber Lag Time ¹	0:26	0:12	0:15
Run Start Time	9:56	11:48	13:08
Run Stop Time	10:32	12:22	13:57

¹ Defined as the breakthrough length of time from when the first EtO enters the scrubber to when non-captured EtO exits the scrubber.

Run 1 of backvent testing was extended to 18 minutes in duration to ensure sufficient amount of data points were collected for a stratification check that did not include concentrations affected by the EtO spike from the initial backvent activation. Consistent process during a stratification check is necessary to assess spatial concentration changes in the duct as opposed to temporal changes.

Run durations that are approximately 60 minutes had marginal variation in order to ensure that 60 discrete Method 320 data points were collected from each instrument during each run. FTIR data log timing is set by the number of scans and the scan rate of an individual FTIR. 'Minute' data points collected by an individual FTIR are not precisely one (1) minute.

O₂/CO₂ Data

EPA Method 3A requires data to be bias adjusted based on pre- and post-run calibration checks. Because of this bias adjustment, in some cases final O₂ concentrations for a run were greater than 20.9%dv and/or final CO₂ concentrations were less than 0%dv. In such cases, O₂ and CO₂ final concentrations were considered equivalent 20.9% and 0%, respectively, and considered as such for applicable calculations thereafter.

End of Section

2. RESULTS

This section summarizes the test program results. Additional results are available in the report appendices.

Table 2-1:
EtO Emissions – Sterilation Chamber Vents

Run	Chamber Number	Chamber Pallets	Chamber Volume (ft ³)	Chamber Volume (L)	Cycle	EO Injected (lb)	EO After Vac (start) (mg/l)	EO After Vac (end) (mg/l)	EO Used Vac (mg/l)	Total EO Used Vac (mg)	Total EO Used Vac (lb)
1	8	13	1,467.6	41,558	25	52.1	538.9	127.2	411.7	17,109,320	37.72
Total		13				52.1				17,109,320	37.72
2	6	13	1,345.5	38,100	81	50.4	585.5	121.9	463.6	17,663,278	38.94
2	10	30	5,136.2	145,441	63	166	532.1	72.2	459.9	66,888,200	147.5
Total		43				216.4				84,551,478	186.4
3	1	6	660.0	18,689	12	23.5	547.0	304.0	243	4,541,448	10.01
3	7	13	1,345.5	38,100	25	48	538.9	127.2	411.7	15,685,875	34.58
3	11	30	5,136.2	145,441	78	164	483.0	95.1	387.9	56,416,466	124.4
Total		49				235.5				76,643,789	169.0

**Table 2-2:
 EtO Removal Efficiency & Removal – Total Process System, Ceilcote Scrubber, AAT Scrubber, Vacuum Pump Testing**

Run No.		1	2	3	Average
Date (2020)		Jun 25	Jun 25	Jun 25	
Start Time (approx.)		09:56	11:48	13:08	
Stop Time (approx.)		10:32	12:22	13:57	
Run Duration (hh:mm)		00:36	00:34	00:49	
Process Conditions					
P ₁	Activated Sterilization Chamber(s)	1	2	3	
P ₂	Chamber Number(s)	8	6,10	1, 7, 11	
P ₃	Sterilization Cycle(s)	25	81, 63	12, 25, 78	
Ceilcote Inlet					
EtO Results					
E _{ic}	Emission (lb)	37.7	186	169	131
Aeration/Backvent Outlet					
Gas Conditions					
Q _s	Volumetric flow rate, standard (wscfm)	8,315	8,211	8,089	8,205
EtO Results					
C _{sw}	Concentration (ppmwv)	2.26	2.12	1.94	2.11
E _{lbmin}	Average Emission Rate (lb/min)	2.15E-03	1.99E-03	1.79E-03	1.98E-03
E _{A/BV}	Emission (lb)	7.77E-02	6.89E-02	8.89E-02	7.85E-02
Ceilcote Outlet					
Gas Conditions					
Q _s	Volumetric flow rate, standard (wscfm)	1,197	1,233	1,224	1,218
EtO Results					
C _{sw}	Concentration (ppmwv) ¹	<0.123	<0.114	<0.197	<0.145
E _{lbmin}	Average Emission Rate (lb/min) ²	<1.69E-05	<1.61E-05	<2.76E-05	<2.02E-05
E _{OC}	Emission (lb) ²	<6.11E-04	<5.60E-04	<1.37E-03	<8.46E-04
Process Stack					
Gas Conditions					
Q _s	Volumetric flow rate, standard (wscfm)	10,412	10,397	10,294	10,368
EtO Results					
C _{swb}	Concentration (ppbwv) ¹	29.8	12.1	<5.60	<15.8
E _{lbmin}	Average Emission Rate (lb/min) ²	3.55E-05	1.43E-05	<6.59E-06	<1.88E-05
E _{PS}	Emission (lb) ²	1.28E-03	4.97E-04	<3.26E-04	<7.02E-04
Process Control System					
IE _c	Ceilcote Scrubber Input Emission (lb)	37.7	186	169	131
OE _c	Ceilcote Scrubber Output Emission (lb) ²	<6.11E-04	<5.60E-04	<1.37E-03	<8.46E-04
IE _a	AAT Scrubber Input Emission (lb) ²	<7.83E-02	<6.95E-02	<9.02E-02	<7.93E-02
OE	System Output Emission (lb) ²	1.28E-03	4.97E-04	<3.26E-04	<7.02E-04
RE _c	Ceilcote Scrubber EtO Removal Efficiency (%) ³	>99.9984	>99.9997	>99.9992	>99.9991
RE _{AAT}	AAT Scrubber EtO Removal Efficiency (%) ^{4,5}	<98.36	<99.28	~99.64	~99.10
RE _{VP}	Vacuum Pump EtO Removal Efficiency (%) ⁵	~99.99997	~99.99998	~99.99997	~99.99989
LR	Vacuum Pump Log Removal ⁵	~6.6	~7.7	~7.5	~7.3
IE _T	Total Input Emission (lb) ⁴	37.80	186.5	169.1	131.1
RE _T	Total System EtO Removal Efficiency (%) ³	99.9966	99.9997	>99.9998	>99.9987

¹ '<' indicates at least one concentration measured was less than the MDC#2.

² '<' indicates at least one MDC#2 concentration was used in the calculations. '<MDC#2' is considered equal to the MDC#2.

³ '>' indicates at least one MDC#2 concentration was used in output emission calculations. The %RE is approximately equal, however minimally greater than, the result presented.

⁴ '<' indicates at least one MDC#2 concentration was used in input emission calculations. The %RE is approximately equal, however minimally less than, the result presented.

⁵ '~' indicates a '<' and '>' was used in %RE calculation. The %RE is approximately equal, however not precisely, the result presented.

Table 2-3:
EtO Removal Efficiency & Removal – AAT Scrubber, Aeration Testing

Run No.		1	2	3	Average
Date (2020)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		14:22	15:45	17:05	
Stop Time (approx.)		15:28	16:48	18:09	
Process Conditions					
P ₁	Sterilization Chamber(s) Producing Pallets	3	3	3	
P ₂	Chamber Number(s)	6, 8, 10	6, 8, 10	6, 8, 10	
P ₃	Sterilization Cycle(s)	81, 25, 63	81, 25, 63	81, 25, 63	
Aeration/Backvent Outlet					
Gas Conditions					
Q _s	Volumetric flow rate, standard (wscfm)	8,106	8,273	8,306	8,228
EtO Results					
C _{sw}	Concentration (ppmwv)	7.94	7.62	6.91	7.49
E _{A/BV}	Emission Rate (lb/hr)	0.442	0.432	0.394	0.423
Ceilecote Outlet					
Gas Conditions					
Q _s	Volumetric flow rate, standard (wscfm)	1,191	1,188	1,182	1,187
EtO Results					
C _{sw}	Concentration (ppmwv) ¹	<0.0894	<0.0915	<0.172	<0.118
E _{OC}	Emission Rate (lb/hr) ²	<7.31E-04	<7.46E-04	<1.39E-03	<9.57E-04
Process Stack					
Gas Conditions					
Q _s	Volumetric flow rate, standard (wscfm)	10,422	10,464	10,354	10,413
EtO Results					
C _{swb}	Concentration (ppbwv) ¹	<5.40	<8.60	11.9	<8.65
E _{PS}	Emission Rate (lb/hr) ²	<3.86E-04	<6.17E-04	8.48E-04	<6.17E-04
AAT Scrubber (Aeration Room Testing)					
IE	Total Input Emission (lb/hr) ²	<0.442	<0.433	<0.395	<0.424
OE	Total Output Emission (lb/hr) ²	<3.86E-04	<6.17E-04	8.48E-04	<6.17E-04
RE	EtO Removal Efficiency (%) ^{3,4}	~ 99.91	~ 99.86	<99.79	~ 99.85

¹ '<' indicates at least one concentration measured was less than the MDC#2.

² '<' indicates at least one MDC#2 concentration was used in the calculations. '<MDC#2' is considered equal to the MDC#2.

³ '<' indicates at least one MDC#2 concentration was used in input emission calculations. The %RE is approximately equal, however minimally less than, the result presented.

⁴ '~' indicates a combination of '<', '>', or '~' were used in %RE calculation. The %RE is approximately equal, however not precisely, the result presented.

Table 2-4:
EtO Removal Efficiency & Removal – AAT Scrubber, Backvent Testing

Run No.		1	2	3	Average
Date (2020)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		11:29	11:48	12:04	
Stop Time (approx.)		11:48	12:04	12:19	
Process Conditions					
P ₁	Activated Sterilization Chamber(s)	1	1	1	
P ₂	Chamber Number(s)	6	8	10	
P ₃	Sterilization Cycle(s)	81	25	63	
Aeration/Backvent Outlet					
Gas Conditions					
Q _s	Volumetric flow rate, standard (wscfm)	8,355	8,355	8,355	8,355
EtO Results					
C _{sw}	Concentration (ppmwv)	11.8	19.2	20.0	17.0
E _{A/BV}	Emission Rate (lb/hr)	0.675	1.10	1.14	0.973
Ceilecote Outlet					
Gas Conditions					
Q _s	Volumetric flow rate, standard (wscfm)	1,160	1,160	1,160	1,160
EtO Results					
C _{sw}	Concentration (ppmwv) ¹	<2.95	0.175	0.120	<1.08
E _{OC}	Emission Rate (lb/hr) ²	<2.35E-02	1.39E-03	9.51E-04	<8.62E-03
Process Stack					
Gas Conditions					
Q _s	Volumetric flow rate, standard (wscfm)	10,448	10,448	10,448	10,448
EtO Results					
C _{swb}	Concentration (ppbwv) ¹	21.9	15.3	<11.1	<16.1
E _{PS}	Emission Rate (lb/hr) ²	1.57E-03	1.09E-03	<7.94E-04	<1.15E-03
AAT Scrubber (Backvent Testing)					
IE	Total Input Emission (lb/hr) ²	< 0.699	1.10	1.15	< 0.981
OE	Total Output Emission (lb/hr) ²	1.57E-03	1.09E-03	<7.94E-04	<1.15E-03
RE	EtO Removal Efficiency (%) ^{3,4,5}	<99.78	99.90	>99.93	~ 99.87

Note: One (1) flow at each location was measured during backvent testing. Moisture data for the three (3) runs at each location were averaged.

¹ '<' indicates at least one concentration measured was less than the MDC#2.

² '<' indicates at least one MDC#2 concentration was used in the calculations. '<MDC#2' is considered equal to the MDC#2.

³ '<' indicates at least one MDC#2 concentration was used in input emission calculations. The %RE is approximately equal, however minimally less than, the result presented.

⁴ '>' indicates at least one MDC#2 concentration was used in output emission calculations. The %RE is approximately equal, however minimally greater than, the result presented.

⁵ '~' indicates a '<' and '>' was used in %RE calculation. The %RE is approximately equal, however not precisely, the result presented.

Table 2-5:
EtO Emissions – Indoor Air Testing

Run No.	1	2	3	Average
Date (2020)	Jun 26	Jun 26	Jun 26	
Start Time (approx.)	10:00	12:36	13:59	
Stop Time (approx.)	11:02	13:37	15:00	
Process Conditions				
P ₁ Activated Sterilization Chamber(s)	1	1	0	
P ₂ Chamber Number(s)	11	10	N/A	
P ₃ Sterilization Cycle(s)	78	63	N/A	
Indoor Air Stack				
Gas Conditions				
Q _s Volumetric flow rate, standard (wscfm)	19,388	19,184	19,330	19,300
EtO Results				
C _{swb} Concentration (ppbwv)	26.4	19.7	17.3	21.1
E _{lb/hr} Emission Rate (lb/hr)	3.51E-03	2.60E-03	2.29E-03	2.80E-03

End of Section

3. DESCRIPTION OF INSTALLATION

FACILITY DESCRIPTION

FACILITY BACKGROUND

Sterigenics US, LLC operates a commercial contract sterilization facility in Atlanta, Georgia, which utilizes EtO to sterilize its customers' product. It also has the ability to use propylene oxide to treat nutmeats.

When EtO is used for medical device sterilization, the medical devices must have a specifically defined sterilization process, which is validated for a specific sterilization chamber or chambers. The Atlanta facility uses 10 sterilization chambers ranging in size from 5 pallets to up to 30 pallets. While all 10 sterilization chambers are similar in design, each chamber may only process products approved for that chamber and cannot process other products that have not been validated and approved by the appropriate regulatory agency for that specific chamber.

FACILITY EQUIPMENT

The facility consists of ten (10) gas sterilizers; two 5-pallet, two 6-pallet, four 13-pallet, and two 30-pallet. Each gas sterilizer is equipped with a steam-heated sterilization chamber, recirculating vacuum pump chamber evacuation system, a backvent valve, and a fugitive emissions exhaust hood. The sterilizers are enclosed by the chamber room area. The facility has one aeration room, approximately 152,400 ft³ in volume, which is heated and exhausts to the AAT scrubber. Sterilized pallets are transferred via forklift from the chamber room area to the aeration room through a transfer corridor. The corridor is contained by the facility fugitive emission/indoor air system.

The indoor air system has been installed to capture air internally from chamber rooms, work aisles, processed product storage, and shipping areas. This captured air is ducted to a dry bed control system consisting of 18 dry beds and then to a dedicated stack.

Facility control devices include a Ceilcote packed-tower chemical scrubber (Ceilcote scrubber) and a two-stage Advanced Air Technologies Safe Cell emission-control system (AAT scrubber). The AAT scrubber is equipped with a packed-tower chemical scrubber, packed reaction/storage tank, and a dry bed scrubber. The dry bed scrubber is comprised of a bank of solid-bed reaction vessels installed immediately downstream of the packed-tower chemical scrubber.

The facility equipment list is presented in Table 3-1 below.

Table 3-1:
Facility Equipment List

Source Code	Description	Control Device
SEV-1, SEV-2, SEV-3, SEV-4, SEV-5, SEV-6, SEV-7, SEV-8, SEV-10, SEV-11	Sterilization chamber vents	Ceilcote Scrubber (EC3) AAT Scrubber (EC2)
AR-1	Aeration vents	AAT Scrubber (EC2)
CEV-1, CEV-2, CEV-3, CEV-4, CEV-5, CEV-6, CEV-7, CEV-8, CEV-10, CEV-11	Chamber exhaust vents	AAT Scrubber (EC2)
IA-1	Indoor Air System	Polisher dry bed

STERILIZATION PROCESS

The general sterilization process was described in Section 1 of this report. Table 3-2 details specific steps in the sterilization chamber cycle.

Table 3-2:
Chamber Cycle Steps

Step	Description
1	Initial Evacuation – Starting at atmospheric pressure the vacuum system evacuates the chamber pressure
2	Leak Test – The chamber control system performs a short vessel leak check by observing chamber pressure change over time.
3	Nitrogen Injection - Nitrogen is injected into the chamber then evacuated back down
4	Humidity Injection- Humidity is injected into the chamber
5	Humidity Dwell – Humidity Dwell is a timed step that is variable
6	Sterilant Injection – EO gas is injected into the chamber
7	EtO Dwell Phase – Exposure is a timed step that is variable
8	Sterilant Removal Phase – Vacuum system evacuates the chamber - this is the step that sends the bulk of the EO gas to the Ceilcote scrubber
9	Nitrogen Wash Phase – Nitrogen is injected then evacuated back down then nitrogen is injected again then evacuated back down
10	Air Wash Phase – Air inbleed is initiated, evacuated back, air inbleed back, then evacuated back.
11	Final Airbreak Phase – Air inbleed to atmospheric pressure. Cycle is complete.

PROCESS DATA COLLECTION

Sterigenics provided information initially and during each test run to identify the test sterilization chamber. Process data was recorded and provided to CleanAir for inclusion in this test report. Due to proprietary reasons, chamber-phase logs are withheld from this report. Chamber-phase logs are available upon request.

Sterilization Process Data

For each test run, Sterigenics provided the following process data:

- Sterilization test chamber number used
- Initial evacuation time
- End cycle time
- Backvent opening time
- Ending chamber EtO concentration
- Initial transfer time
- Ending transfer time

Emission Control Data

The emission control operating data collected during the test and the manufacturer design specifications were evaluated prior to setting new operating parameters. At the start and end of each test run, Sterigenics provided the following emission control data:

- For the Ceilcote wet acid scrubber:
 - ethylene glycol concentration
 - liquor tank level
 - pH

- For the AAT wet acid scrubber with dry bed reactor (WB1-Scrubber #2):
 - ethylene glycol concentration
 - liquor tank level
 - pH

TEST LOCATIONS

SAMPLING INFORMATION

Sampling information for each test location is presented in Table 3-3.

Table 3-3:
Test Location Sampling Information

Source				Points per		
Constituent	Method (USEPA)	Run No.	Ports	Port	Minutes per Point	Total Minutes
<u>Ceilcote Outlet</u>						
EtO	Strat. Check ¹	1	1	3	4	12
EtO, O ₂ , CO ₂ , H ₂ O	320, 4, 3A	1	1	3	Varied	18
EtO, O ₂ , CO ₂ , H ₂ O	320, 4, 3A	8	1	1	Varied	Varied
Velocity & Temperature ²	2	7	2	4	Varied	Varied
<u>Aeration Room/Backvent Outlet</u>						
EtO	Strat. Check ¹	1	1	3	4	12
EtO, O ₂ , CO ₂ , H ₂ O	320, 4, 3A	1	1	3	Varied	18
EtO, O ₂ , CO ₂ , H ₂ O	320, 4, 3A	8	1	1	Varied	Varied
Velocity & Temperature ²	2	7	2	8	Varied	Varied
<u>Process Stack</u>						
EtO	Strat. Check ¹	1	1	3	5	15
EtO, O ₂ , CO ₂ , H ₂ O	320, 4, 3A	1	1	3	Varied	18
EtO, O ₂ , CO ₂ , H ₂ O	320, 4, 3A	8	1	1	Varied	Varied
Velocity & Temperature ²	2	7	2	6	Varied	Varied
<u>Indoor Air Stack</u>						
EtO	Strat. Check ³	1	1	3	20	60
EtO, O ₂ , CO ₂ , H ₂ O	320, 4, 3A	1	1	3	20	60
EtO, O ₂ , CO ₂ , H ₂ O	320, 4, 3A	2	1	1	60	60
Velocity & Temperature	2	3	2	8	Varied	Varied

¹ Strat. Check = stratification check, conducted per procedures outlined in EPA Method 7E during Run 1 of backvent testing.

² One (1) traverse was conducted during backvent testing.

³ Strat. Check = stratification check, conducted per procedures outlined in EPA Method 7E during Run 1 of indoor air testing.

ETO SAMPLE POINTS

EtO sample points for each location were determined by performing a stratification check in accordance with Section 8.1.2 of EPA Method 7E. Each stratification check consisted of three points sampled at a minimum of twice the response time per point. The response time for each location was approximately 120 seconds.

An EtO stratification check was performed during Run 1 of backvent testing for the Ceilcote Outlet, Aeration/Backvent Outlet, and Process Stack and during Run 1 of indoor air testing for the Indoor Air Stack. Since these locations met the requirement of $<\pm 5\%$ the mean concentration or ± 0.5 ppm, the EtO probe was positioned at the sample point closest to the average EtO concentration measured during the stratification check for subsequent runs.

Data from stratification checks are presented in Appendix D of this report.

The figures shown on pages 23 through 26 represent the layouts of the EtO test locations and sample points.

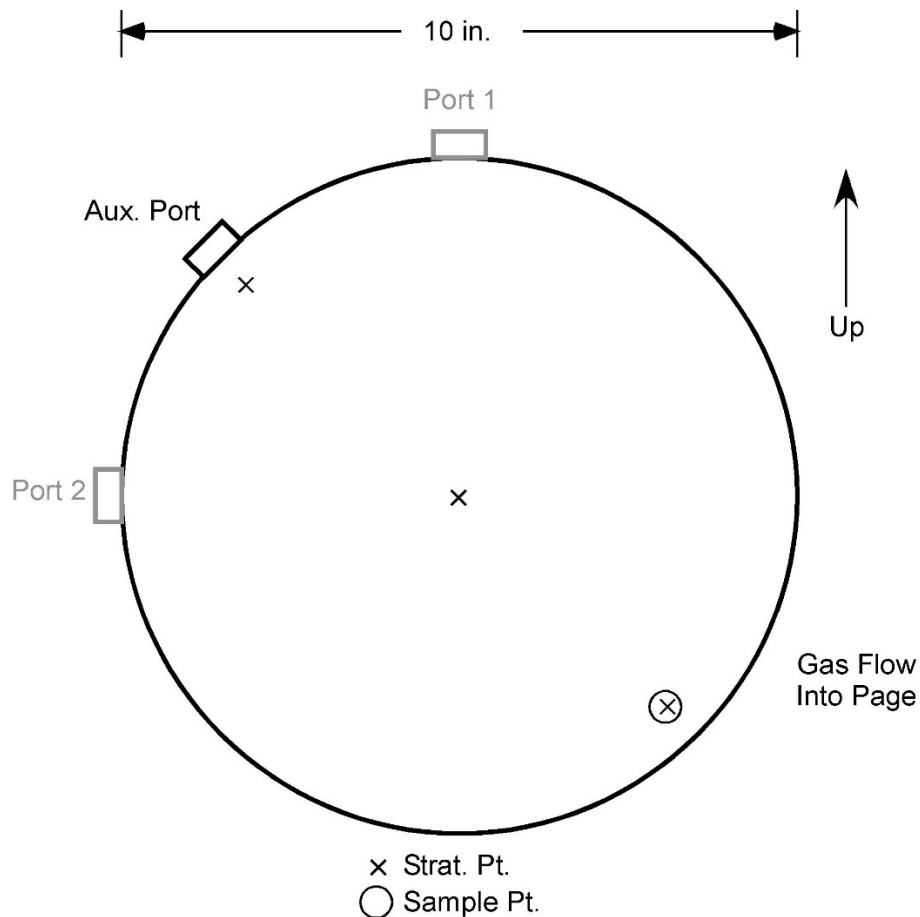
VELOCITY AND TEMPERATURE SAMPLE POINTS

EPA Methods 1 and 1A specifications determined the velocity and temperature traverse point locations. Method 1 analyses and verification of absence of cyclonic flow checks were conducted on-site prior to testing.

Method 1 and cyclonic flow check data sheets are presented in Appendix H of this report.

The figures shown on pages 27 through 30 represent the layouts of the velocity and temperature test locations and sample points.

Figure 3-1:
Ceilcote Outlet EtO Sample Point Layout (EPA Methods 7E and 320)



***Different cross-sectional plane than M2 ports. See EPA Method 1 analysis in Appendix D for details.

Traverse Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	83.3	8.3
2	50.0	5.0
3	16.7	1.7

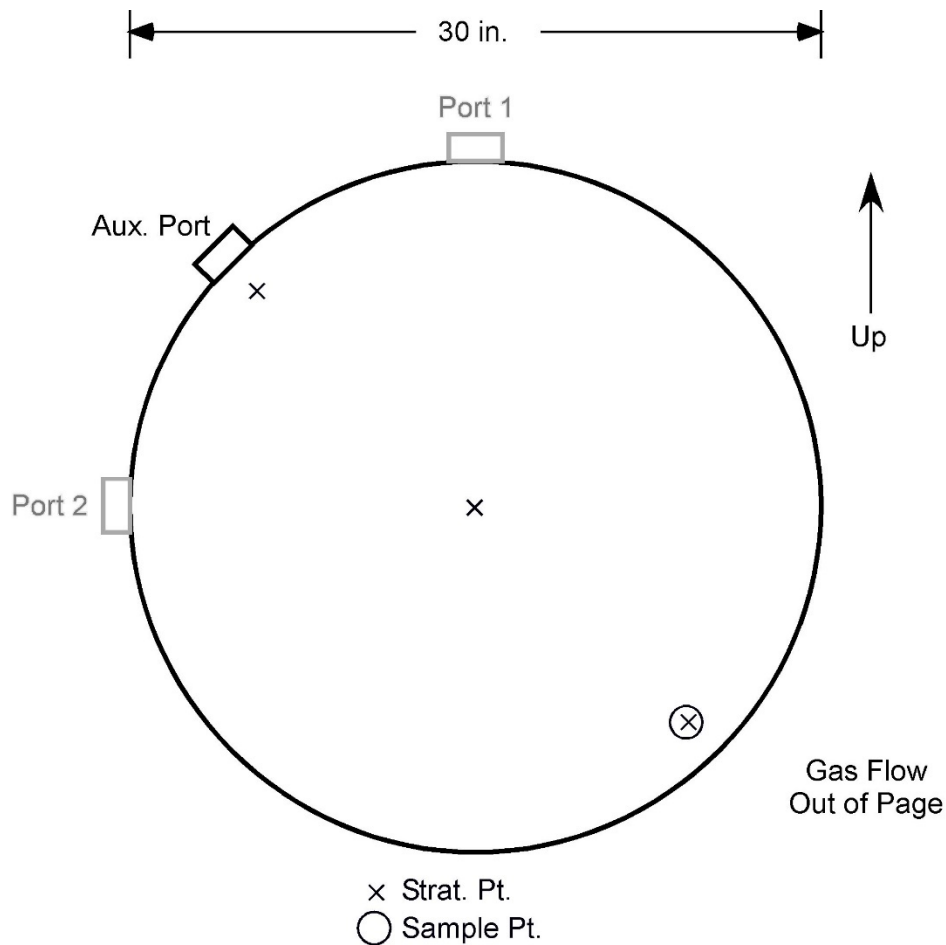
Duct diameters upstream from flow disturbance (A): 28.5

Limit: 0.5

Duct diameters downstream from flow disturbance (B): 12.5

Limit: 2.0

Figure 3-2:
Aeration/Backvent Outlet EtO Sample Point Layout (EPA Methods 7E and 320)



***Different cross-sectional plane than M2 ports. See EPA Method 1 analysis in Appendix D for details.

Traverse Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	83.3	25.0
2	50.0	15.0
3	16.7	5.0

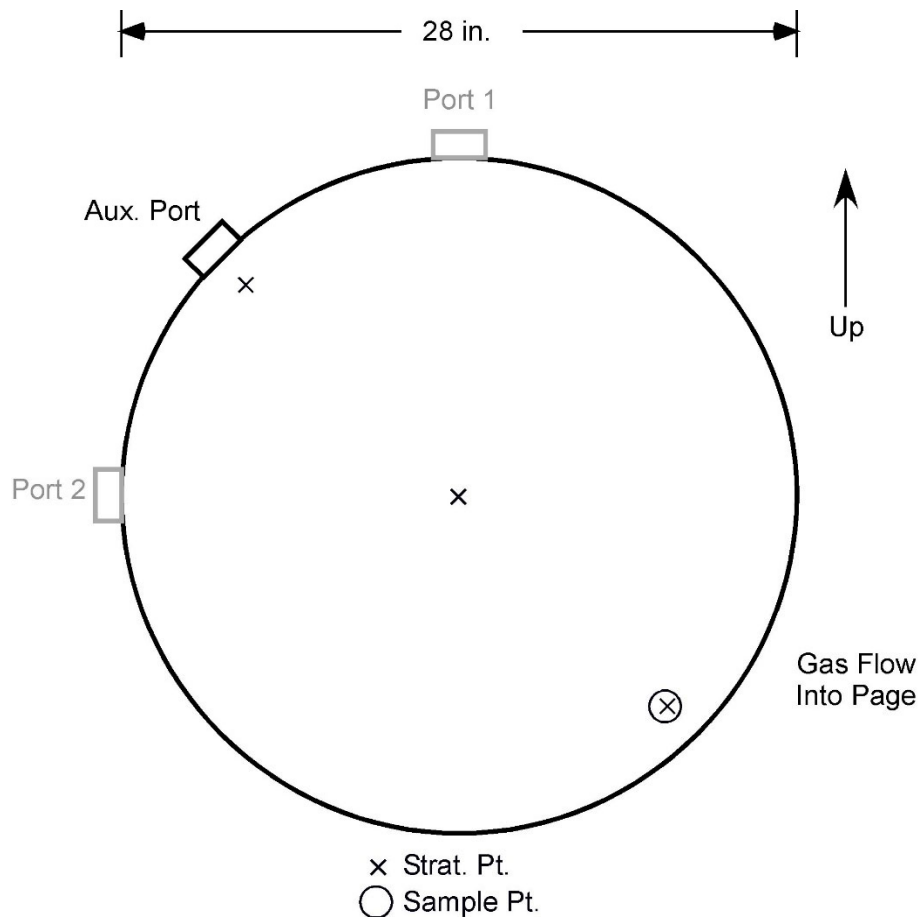
Duct diameters upstream from flow disturbance (A): 3.8

Limit: 0.5

Duct diameters downstream from flow disturbance (B): 6.3

Limit: 2.0

Figure 3-3:
Process Stack EtO Sample Point Layout (EPA Methods 7E and 320)



***Different cross-sectional plane than M2 ports. See EPA Method 1 analysis in Appendix D for details.

Traverse Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	83.3	23.3
2	50.0	14.0
3	16.7	4.7

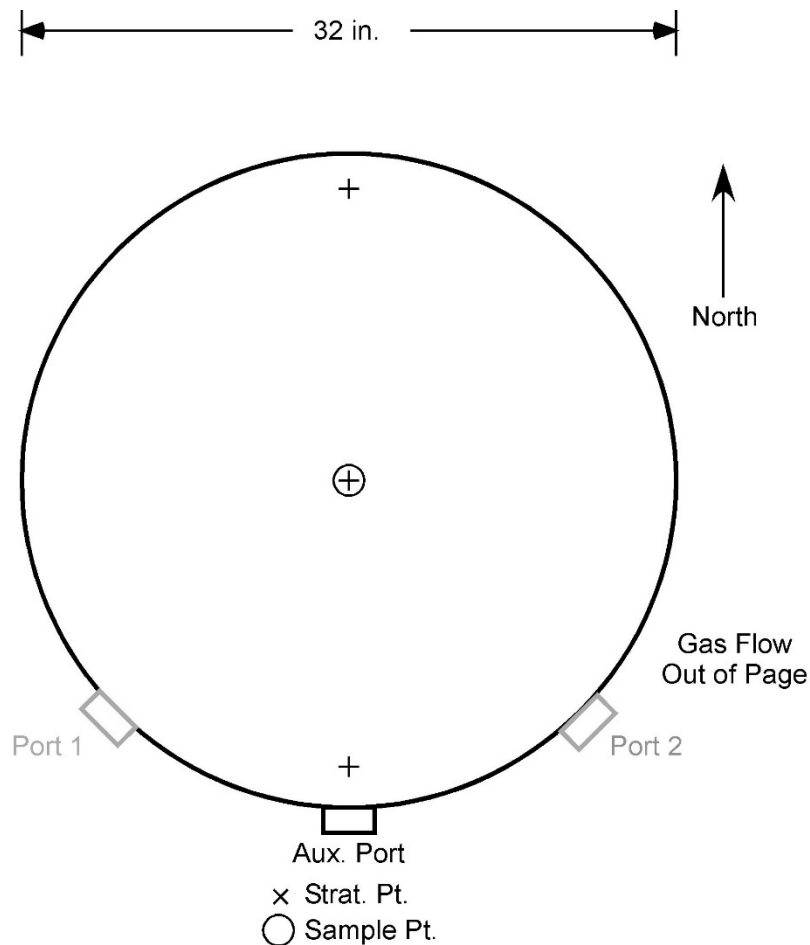
Duct diameters upstream from flow disturbance (A): 10.2

Limit: 0.5

Duct diameters downstream from flow disturbance (B): 26.7

Limit: 2.0

Figure 3-4:
Indoor Air Stack EtO Sample Point Layout (EPA Methods 7E and 320)

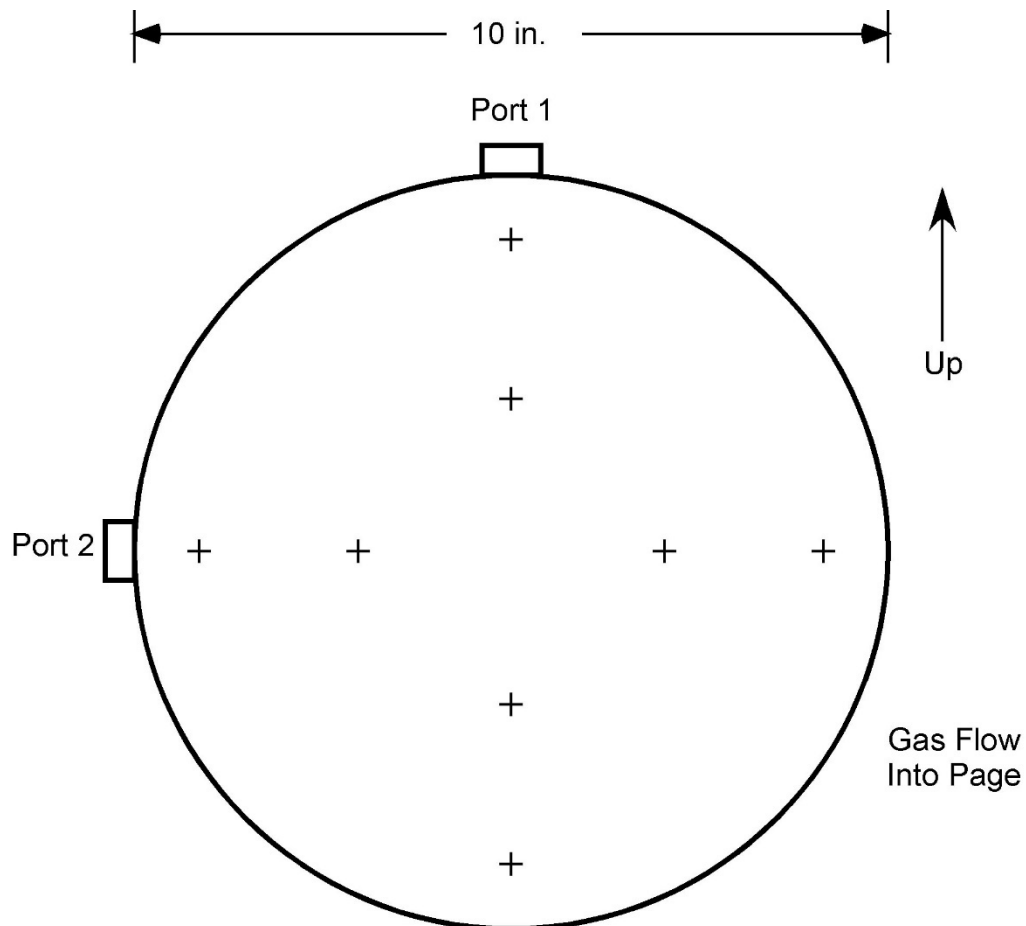


Traverse Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	83.3	26.7
2	50.0	16.0
3	16.7	5.3

Duct diameters upstream from flow disturbance (A): 1.66
Duct diameters downstream from flow disturbance (B): 3.375

Limit: 0.5
Limit: 2.0

Figure 3-5:
Ceilcote Outlet Velocity and Temperature Sample Point Layout (EPA Methods 1 and 2)



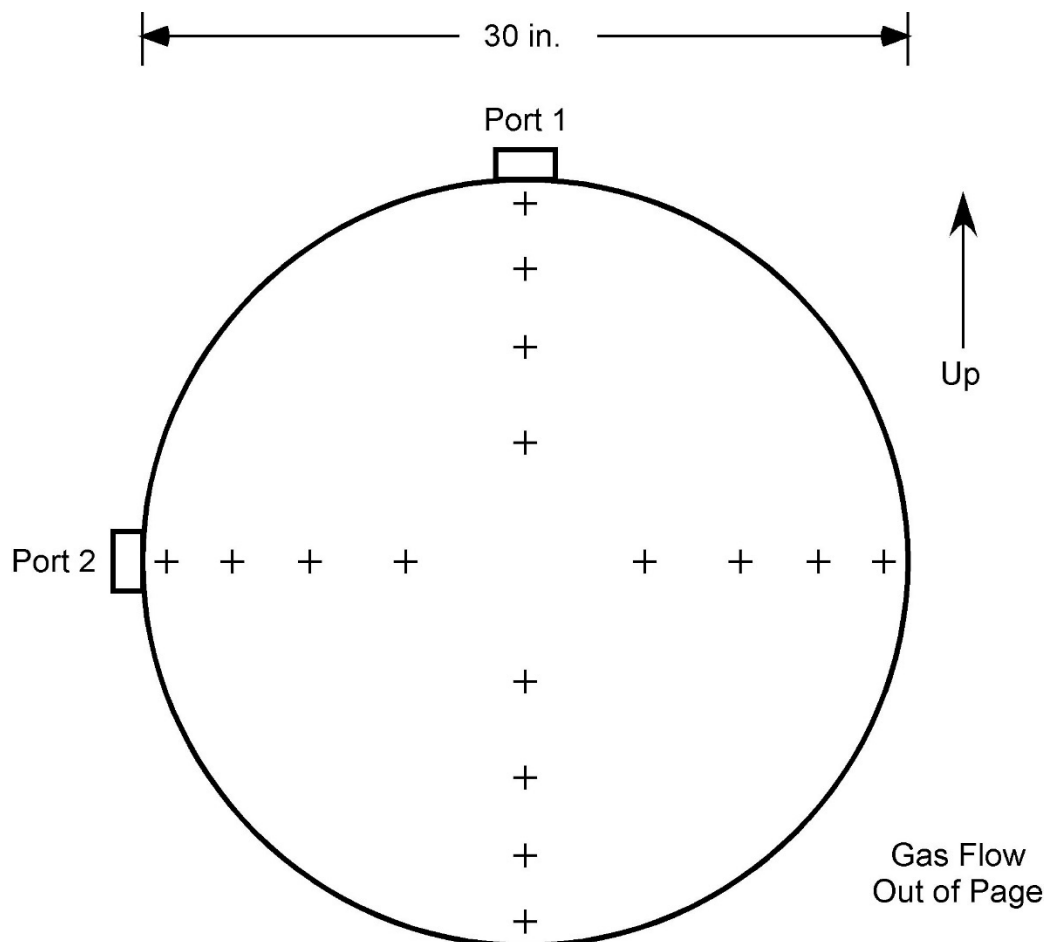
***Different cross-sectional plane than EtO port. See EPA Method 1 analysis in Appendix D for details.

Traverse Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	93.3	9.3
2	75.0	7.5
3	25.0	2.5
4	6.7	0.7

Duct diameters upstream from flow disturbance (A): 28.5
Duct diameters downstream from flow disturbance (B): 12.5

Limit: 0.5
Limit: 2.0

Figure 3-6:
Aeration/Backvent Outlet Velocity and Temperature Sample Point Layout (EPA Methods 1 and 2)



***Different cross-sectional plane than EtO port. See EPA Method 1 analysis in Appendix D for details.

Traverse Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	96.8	29.0
2	89.5	26.8
3	80.6	24.2
4	67.7	20.3
5	32.3	9.7
6	19.4	5.8
7	10.5	3.2
8	3.2	1.0

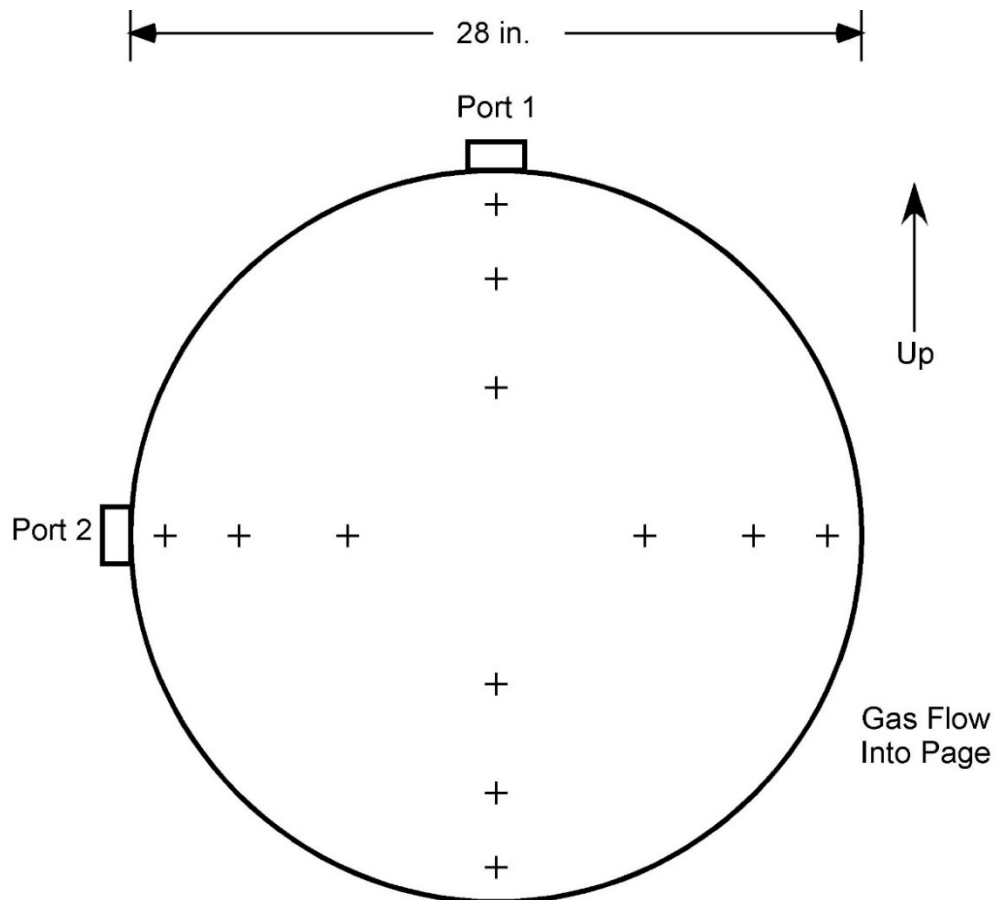
Duct diameters upstream from flow disturbance (A): 3.8

Limit: 0.5

Duct diameters downstream from flow disturbance (B): 6.3

Limit: 2.0

Figure 3-7:
Process Stack Velocity and Temperature Sample Point Layout (EPA Methods 1 and 2)



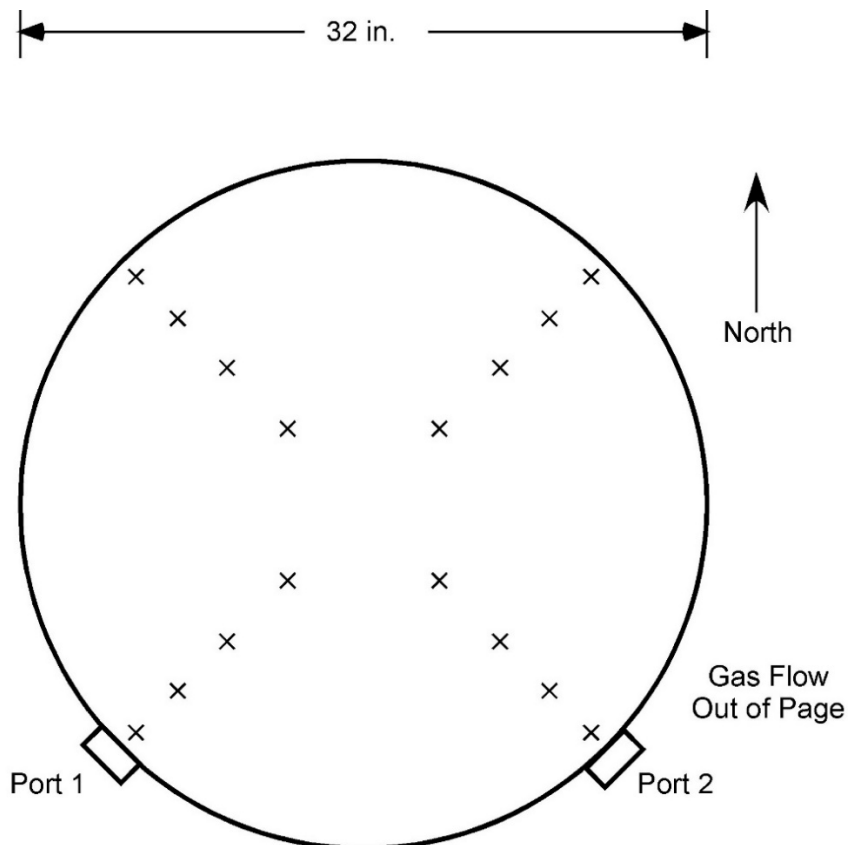
***Different cross-sectional plane than EtO port. See EPA Method 1 analysis in Appendix D for details.

Traverse Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	95.6	26.8
2	85.4	23.9
3	70.4	19.7
4	29.6	8.3
5	14.6	4.1
6	4.4	1.2

Duct diameters upstream from flow disturbance (A): 10.2
Duct diameters downstream from flow disturbance (B): 26.7

Limit: 0.5
Limit: 2.0

Figure 3-8:
Indoor Air Stack Velocity and Temperature Sample Point Layout (EPA Methods 1 and 2)



Traverse Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	96.8	31.0
2	89.5	28.6
3	80.6	25.8
4	67.7	21.7
5	32.3	10.3
6	19.4	6.2
7	10.5	3.4
8	3.2	1.0

Duct diameters upstream from flow disturbance (A): 1.66

Limit: 0.5

Duct diameters downstream from flow disturbance (B): 3.375

Limit: 2.0

End of Section

4. METHODOLOGY

PROCEDURES AND REGULATIONS

The test program sampling measurements followed procedures and regulations outlined by the USEPA and the Georgia EPD. These methods appear in detail in Title 40 of the CFR and at <https://www.epa.gov/emc>.

Appendix A includes diagrams of the sampling apparatus, as well as specifications for sampling and methodology. Any modifications to standard test methods are explicitly indicated in this appendix. In accordance with ASTM D7036 requirements, CleanAir included a description of any such modifications along with the full context of the objectives and requirements of the test program in the test protocol submitted prior to the measurement portion of this project. Modifications to standard methods are not covered by the ISO 17025 and TNI portions of CleanAir's A2LA accreditation.

CleanAir follows specific QA/QC procedures outlined in the individual methods and in USEPA "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III Stationary Source-Specific Methods," EPA/600/R-94/038C. Appendix D contains additional QA/QC measures, as outlined in CleanAir's internal Quality Manual.

TITLE 40 CFR PART 60, APPENDIX A

Method 1	"Sample and Velocity Traverses for Stationary Sources"
Method 1A	"Sample and Velocity Traverses for Stationary Sources with Small Stacks or Ducts"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"
Method 3	"Gas Analysis for the Determination of Dry Molecular Weight"
Method 3A	"Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)"
Method 4	"Determination of Moisture Content in Stack Gases"
Method 7E	"Determination of Nitrogen Oxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)"

TITLE 40 CFR PART 63, APPENDIX A

Method 301	"Field Validation of Pollutant Measurement Methods from Various Waste Media"
Method 320	"Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy"

AMERICAN SOCIETY FOR TESTING AND MATERIALS METHODS

ASTM D6348-12	"Standard Test Method for Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform Infrared (FTIR) Spectroscopy"

METHODOLOGY DISCUSSION

EPA METHOD 320 / ASTM D6348-12 – ETO AND H₂O TESTING

EtO emissions and moisture content were determined using an FTIR per EPA Method 320. EtO testing adhered to all specifications and procedures outlined in Method 320. Method 320 is an acceptable alternative for moisture determination per §16.3 of EPA Method 4. Procedures outlined in ASTM D6348-12, regarding dynamic spikes and spectral validation, were also followed. Approximately one-minute data points for EtO (wet basis) and H₂O were collected and logged during each test run. Each sample spectrum was documented with the sampling conditions, the sampling time (period when the cell was being filled), the time the spectrum was recorded, the instrumental conditions (path length, temperature, pressure, resolution, and signal integration time), and a spectral filename.

Sample Train

The stack sample systems utilized a MAX-StarBoost FTIR and the Ceilcote Outlet and Aeration/Backvent Outlet sample systems utilized a standard configuration FTIR without MAX-StarBoost enhancement. The sample systems mimicked each other upstream of the instrumentation. In accordance with the method, for each sample system, the effluent gas was continuously extracted through a heated stainless-steel probe, filter, and Teflon sample lines, and then directly interfaced with the instrumentation in a temperature-controlled setting. The sampling systems were assembled and leak-checked (<200 ml/min) each day of testing and were allowed to reach and stabilize at the operating temperature of approximately 300°F. Sample gas was extracted at a constant rate and delivered hot and wet to each FTIR. Refer to Appendix A for further sample train specifications.

QA/QC

A calibration transfer standard (CTS) was used to demonstrate suitable agreement between sample spectra and reference spectra. Methane was utilized as the CTS gas for stack sample trains and CO₂ was utilized as the CTS gas for the Ceilcote Outlet and Aeration/Backvent Outlet sample trains. Except for backvent testing, CTS gas system checks were conducted prior to each test run. Following the test run, another CTS spectrum was recorded. For backvent testing, CTS gas system checks were conducted prior to the first run and subsequent to the last run. The pre- and post-test CTS spectra were then compared. All peak absorbance pre- and post-test CTS met the required ±5% of the mean value validating the run. Data from the CTS checks are included in Appendices D (summary) and G (raw FTIR data) of this report.

Each day a dynamic spike was conducted per procedures outlined in Method 320 and ASTM D6348-12. A spike/tracer gas at a constant flow rate below 10% of the total sample flow was introduced into the sampled exhaust gas stream prior to the external filter. For the Ceilcote Outlet and Aeration/Backvent Outlet sample trains, a 100.1 ppm/5.011 ppm EtO/SF₆ spike/tracer gas was utilized, and for the stack sample trains, a 2.165 ppm/499.9 ppm EtO/Ethane spike/tracer gas was utilized. All QA spike checks met criteria per Method 320 specifications (70% to 130% expected value). Data from the QA spikes are included in Appendices D (summary) and G (raw FTIR data) of this report.

An on-site minimum detection limit (MDL) study for each sample train was performed for the target analyte using procedures outlined in ASTM D6348-12, A2.3.1. The MDL, labeled MDC#2 by the method, is calculated as three times the standard deviation of the concentrations from ten representative blank spectra collected while sampling effluent gas with a similar gas matrix to the source to be tested. In this case, ambient air was sampled as blank spectra since this was a non-combustive source. Results of the MDL study are presented in Appendix D of this report. Results calculated from sample concentrations less than the calculated MDC#2 are reported as

'less than' the MDL. Negative EtO concentrations presented in this report are an artifact of the FTIR analytical algorithm and indicate a concentration less than the MDC#2. This was verified in the manual validation process described below.

Spectral Analysis

Procedures outlined in ASTM D6348-12 Annex 8 were utilized to manually quantify and validate EtO concentrations from test runs. Post-mobilization, a random spectrum was selected from each location from each test run to determine the validity of EtO concentrations. The selected spectrum was manually quantified and then compared to the concentration outputted by the respective analytical algorithm/FTIR method. Except in cases where the outputted EtO concentration was less than the MDC#2 or the absolute difference was less than the MDC#2, all manual validations met ASTM D6348-12 criteria. Refer to Appendices D and E for manual validation summaries. In addition to manual validations, EtO reference spectra calibration curves, quantification regions, analytical methods, and spectral residuals are presented in Appendix E of this report.

EPA METHOD 3A – O₂/CO₂ TESTING

Ceilcote Outlet and Aeration/Backvent Outlet CO₂ concentrations were measured using the regular FTIR. Ceilcote Outlet and Aeration/Backvent Outlet O₂ concentrations were measured using a wet Brand Gaus O₂ analyzer in series subsequent to the regular FTIR. Stack CO₂ and O₂ concentrations were measured using a dry O₂/CO₂ Servomex in parallel with the MAX-StarBoost FTIR. The O₂/CO₂ was downstream of a gas conditioner. O₂/CO₂ testing adhered to all specifications and QA/QC procedures outlined in EPA Method 3A.

Calibration error checks were performed by introducing zero N₂, high range, and mid-range calibration gases to the inlet of each respective analyzer. Except for backvent testing, zero and upscale bias checks were performed before and after each valid test run by introducing calibration gas to the inlet of each respective sampling system's heated filter. For backvent testing, zero and upscale bias checks were conducted prior to the first run and subsequent to the last run. Minute data points for O₂/CO₂ (wet basis) were bias-adjusted per procedures outlined in Method 3A.

EPA METHODS 1 AND 2 – GAS VELOCITY TESTING

EPA Methods 1/1A and 2 of 40 CFR 60, Appendix A, were used to measure the average flow rate at each location. These methods were utilized to determine the velocity of the effluent gas stream. All flow rates were measured by a calibrated Type-S pitot probe and Shortridge digital micromanometer meeting all specifications of EPA Method 2. The temperature was also measured by a Type K thermocouple attached to the pitot probe. A determination of sampling points and verification of absence of cyclonic flow was performed for each location.

EPA METHOD 301 – METHOD VALIDATION

EPA Method 301 was conducted in a March 2020 test program at a commercial sterilization facility to validate the method being used to determine emissions from the sources described in this report. The same method validated in the March 2020 test program was used for this test program. Procedures outlined in EPA Method 320 and ASTM D6348-12 for dynamic spiking were used to determine statistical bias and precision per procedures and calculations presented in Method 301, Section 12. Calculations for bias and analyte percent recovery are presented in Appendix B of this report. Calculations for statistical validation are presented in Section 12 of Method 301. Data from the method validation is presented in Appendix L of this report.

METHOD VARIANCES

For an unknown reason, O₂/CO₂ data did not log during a mid-range calibration error conducted prior to backvent testing on June 24. The upscale bias check prior to the first backvent testing run, which used the same calibration standard, was used to verify the O₂ analyzer met EPA Method 3A criteria.

End of Section

5. *APPENDIX*

Appendix A: Test Method Specifications

Appendix B: Sample Calculations

Appendix C: Parameters

Appendix D: QA/QC Data – General

Appendix E: QAQC – FTIR Analyses

Appendix F: Calibration Gas Certifications

Appendix G: Raw FTIR Data

Appendix H: EPA Method 1 & Cyclonic Datasheets

Appendix I: Velocity & Temperature Data

Appendix J: O₂/CO₂ Data

Appendix K: Facility Process Data

Appendix L: EPA Method 301 Validation

Appendix M: CleanAir Resumes and Certifications

APPENDIX A: TEST METHOD SPECIFICATIONS

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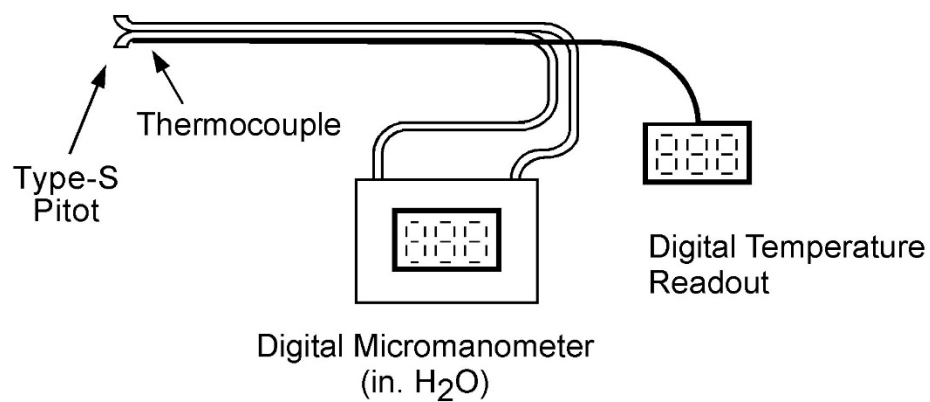
Specification Sheet for

EPA Method 2

Source Location Name(s) Aeration/Backvent Outlet, Ceilcote Outlet, Process Stack, Indoor Air Stack
 Pollutant(s) to be Determined None
 Other Parameters to be Determined from Train Flow Rate

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	Varied
No. of Sample Traverse Points	N/A	8, 12, or 16
Sample Time per Point	N/A	Varied
Sampling Rate	N/A	N/A
Sampling Probe		
Nozzle Material	N/A	N/A
Nozzle Design	N/A	N/A
Probe Liner Material	N/A	N/A
Effective Probe Length	Sufficient to Traverse Points	5 feet
Probe Temperature Set-Point	N/A	N/A
Velocity Measuring Equipment		
Pitot Tube Design	Type S	Type S
Pitot Tube Coefficient	N/A	0.832
Pitot Tube Calibration by	Geometric or Wind Tunnel	Wind Tunnel
Pitot Tube Attachment	Attached to Probe	Attached to Probe
Metering System Console		
Meter Type	Dry Gas Meter	N/A
Meter Accuracy	N/A	N/A
Meter Resolution	N/A	N/A
Meter Size	N/A	N/A
Meter Calibrated Against	N/A	N/A
Pump Type	N/A	N/A
Temperature Measurements	N/A	Type K Thermocouple/Pyrometer/Transducer
Temperature Resolution	5.4°F	1.0°F
ΔP Differential Pressure Gauge	Inclined Manometer or Equivalent	Digital Shortridge Micromanometer
ΔH Differential Pressure Gauge	Inclined Manometer or Equivalent	N/A
Barometer	Mercury or Aneroid	Digital Barometer calibrated w/Mercury Aneroid
Filter Description		
Filter Location	N/A	N/A
Filter Holder Material	N/A	N/A
Filter Support Material	N/A	N/A
Cyclone Material	N/A	N/A
Filter Heater Set-Point	N/A	N/A
Filter Material	N/A	N/A
Other Components		
Description	N/A	N/A
Location	N/A	N/A
Operating Temperature	N/A	N/A

EPA Method 2 Sampling Train Configuration



Shortridge AirData Multimeter ADM-860C



RENTAL AND APPLICATION NOTES:

- Shipping Weight: 21 lbs.
- Air velocity readings are displayed as local density, true air velocity or flow.
- Internal calibration, temperature compensation, range selection and zeroing are fully automatic with each reading. No external adjustments needed.
- Memory can hold up to 100 readings for individual recall and can give a reading total and average.
- The max. recommended length of pneumatic tubing for the measurement of airflow, velocity or differential pressure is 18 ft. Minimum is ID 3/16".

SPECIFICATIONS:

- Weight: 32 oz.
- Dimensions: 6" x 6.4" x 2.7".
- Power: 120VAC, 60 Hz, 8w.
- Output: RS-232.
- Response Time: 1 sec. at high pressure inputs, 7sec. at inputs less than 0.003wc. Extremely low pressure/flow/velocity inputs require longer sample times.
- Air Velocity: 25-29,000 fpm w/ standard pitot tube, 25-5,000 fpm w/ AirFoil probe, 25-2,500 fpm w/ VelGrid.
- Air Bleed: Each pressure measurement requires a small volume of air to pass through the meter. The pressure source must be capable of supplying this volume without significant depletion to ensure accurate measurements.
- Absolute Pressure: 10 - 40 in Hg. Max. safe pressure is 60 psi. Accuracy: $\pm 2\%$ of reading ± 0.1 in Hg from 14-40 in Hg.
- Differential Pressure: 0.0001-60.00wc. Max. safe pressure is 20 psid. Accuracy: $\pm 2\%$ of reading ± 0.001 wc from 0.05-50wc.
- Operational Temperature: 40°F - 104°F.
- Connections: 1/4" OD slip-on for 3/16" ID soft tubing.

Specification Sheet for

EPA Method 320 / 3A

Source Location Name(s)
Pollutant(s) to be Determined
Also Measures

Aeration/Backvent Outlet, Ceilcote Outlet
Ethylene Oxide (EtO)
O₂/CO₂, Moisture

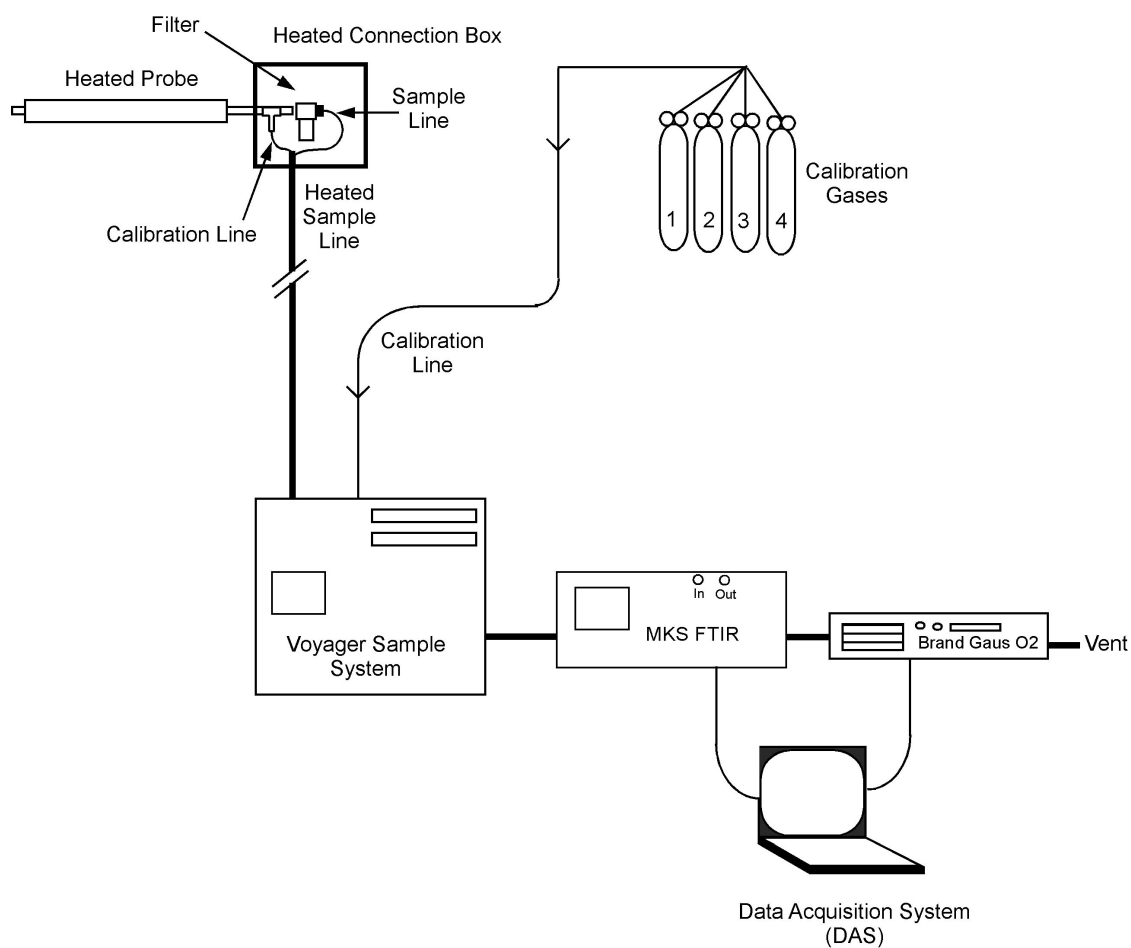
	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	Varied
No. of Sample Traverse Points	N/A	1 (3 for Strat. Checks)
Sample Time per Point	N/A	Varied
Sampling Rate	Constant Rate	Constant Rate, 5.0 lpm
Sampling Probe		
Nozzle Material	N/A	None
Nozzle Design	N/A	N/A
Probe Liner Material	Stainless Steel or Equivalent	Stainless Steel
Effective Probe Length	Sufficient to Traverse Points	5 feet
Probe Temperature Set-Point	Prevent Condensation (Min. 250°F)	300°F±10°F
Particulate Filter		
In-Stack Filter	Optional	N/A
In-Stack Filter Material	N/A	N/A
External Filter	Yes	Yes
External Filter Material	Glass Fiber Mat	Borosilicate Glass Fiber Mat
External Filter Set-Point	Prevent Condensation (Min. 250°F)	300°F±10°F
Sample Delivery System		
Heated Sample Line Material	Stainless Steel or Teflon	Teflon
Heated Sample Line Set-Point	Prevent Condensation (Min. 250°F)	300°F±10°F
Heated Sample Line Connections	Probe Exit to Pump to FTIR	Probe to Pump to FTIR
Moisture Removal System	N/A	N/A
Sample Pump Type	N/A	Diaphragm
Sample Pump Material	Non-reactive to sample gases	Teflon
Sample Flow Control	Constant Rate	Constant Rate
Non-Heated Sample Line Material	N/A	N/A
Non-Heated Sample Line Connections	N/A	N/A
Additional Filters	Optional	N/A
Additional Filter Type	N/A	N/A
Additional Filter Location	N/A	N/A
Filter Material	N/A	N/A
Analyzer Description		
Ethylene Oxide (C ₂ H ₄ O)	EPA Method 320 (FTIR)	EPA Method 320 (FTIR - traditional configuration)
Propylene Oxide (C ₃ H ₆ O)	EPA Method 320 (FTIR)	N/A
Water (H ₂ O)	EPA Method 320 (FTIR)	EPA Method 320 (FTIR - traditional configuration)
Carbon Dioxide (CO ₂)	EPA Method 3A (NDIR)	EPA Method 3A (FTIR)
Oxygen (O ₂)	EPA Method 3A (Paramagnetic)	EPA Method 3A (Zirconium Oxide)
Nitrogen Dioxides (NO ₂)	EPA Method 320 (FTIR)	N/A
Nitrogen Monoxides (NO)	EPA Method 320 (FTIR)	N/A
Carbon Monoxide (CO)	EPA Method 320 (FTIR)	N/A

Specification Sheet for

EPA Method 320 / 3A

	Standard Method Specification	Actual Specification Used
Calibration Gas Span		
Ethylene Oxide (C ₂ H ₄ O)	N/A	0-500 ppm
Propylene Oxide (C ₃ H ₆ O)	N/A	N/A
Water (H ₂ O)	N/A	0-53.9%
Carbon Dioxide (CO ₂)	N/A	0-100%
Oxygen (O ₂)	N/A	0-25%
Nitrogen Dioxides (NO ₂)	N/A	N/A
Nitrogen Monoxides (NO)	N/A	N/A
Carbon Monoxide (CO)	N/A	N/A
Data Acquisition		
Data Recorder	Computer with Software for Automated Collection	Analog Computer / Digital Recorder
Scan Rate	No Requirement (64 Scans ~ 1 minute)	64 Scans / 1 per second
Data Storage	Automatic	Automatic
Calibration Gas Specifications		
Ethylene Oxide (C ₂ H ₄ O) (QA)	Best Commercially Available Accuracy (±5%)	Best Commercial Accuracy (±1%)
Sulfur Hexafluoride (SF ₆) (Tracer)	Best Commercially Available Accuracy (±5%)	Best Commercial Accuracy (±1%)
Methane (CH ₄)	N/A	N/A
Zero Nitrogen	N/A	Ultra High Purity
Carbon Dioxide (CO ₂) (CTS)	EPA Protocol 1	EPA Protocol 1
Oxygen (O ₂)	EPA Protocol 1	EPA Protocol 1
Nitrogen Monoxides (NO)	N/A	N/A
Carbon Monoxide (CO)	N/A	N/A
* Note: M320 only requires that the gases used come with a certificate of accuracy		

EPA Method 320 / 3A (FTIR – Traditional Configuration) Sampling Train Configuration



MKS MultiGas 2030 FTIR



RENTAL AND APPLICATION NOTES:

- Shipping Weight: 120 lbs.
- Designed to meet EPA Method 318,320,321 and various VOC and inorganic gas sampling including Formaldehyde, Ammonia and HCl.
- Nitrogen and Ethylene calibration gases are needed.
- Liquid Nitrogen is needed for most applications.
- Instrument rental of the MKS FTIR is accompanied with an operator unless otherwise arranged through CleanAir Instrument Rental.

SPECIFICATIONS:

- Weight: 100 lbs.
- Power 120 or 240VAC, 50/60 Hz, 3amps.
- Measurement Technique: FTIR Spectrometry.
- 21 μ m 0.25mm LN₂ cooled detector, 7 μ m 0.25mm TE cooled also available.
- Ranges: Full scale setting < 100ppb to 100% concentration.
- Averaging Time: 0.2 sec to 5 min.
- Spectral Range: 2 μ m - 20 μ m (500 - 5,000cm⁻¹).
- Temperature and pressure measured internally.
- Sample Flow: 0.2 - 10 L/min.
- Sample Pressure: 0.01 - 4 Atm.
- N₂ Purge: 20psig (1.5 bar) max, 0.1 L/min.
- Gas Cell: Nickel coated Aluminum.
- Cell Temperature: Ambient to 191° C.
- Cell Mirrors: Nickel plated Aluminum Substrate with rugged gold coating.
- Cell Windows: KBr or ZnSe.



Model 4710 Oxygen Analyzer

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Oxygen Analyzer for Extractive CEMS and Process Control

Continuous Measurement of Oxygen Concentration using *Linear Output* Zirconium Oxide Technology

Precise, Compact, Rugged Oxygen Measurement

High performance and robust operation make the 4710 a great alternative to conventional zirconium oxide and paramagnetic oxygen analyzers in both process control applications and conventional extractive CEMS.

Building upon the success of our Model 4705, the Brand-Gaus Model 4710 Oxygen Analyzer is the ideal choice for measuring oxygen concentrations in the most demanding monitoring applications.



Remote Sensor - can be placed right at the source

Our compact, highly-engineered oxygen sensor offers maximum flexibility for placement right where it is needed.

- Can be located more than 50 feet from the analyzer
- Consumes only 10 Watts
- Small enough to fit in tight spaces, right next to process
- Can be directly in-line with heated sample line
- Can be used to measure O₂ in either dry or hot/wet sample streams



Remote Sensor with customer
supplied Swagelok fittings

NEW for the 4710

One fourth the rack space

Simplified calibration - no
screwdrivers or pots

Modbus over RS-485 and
Ethernet, along with 4-20mA
analog output

Linearity better than 0.1% O₂

Soft-start heater power,
increased resistance to thermal
shock

Longer sensor life due to higher
reference cell bias

Measurement Down to Zero Percent Oxygen

Our compact, highly-engineered oxygen sensor offers maximum flexibility for placement right where you need it.

Our unique linear output zirconium oxide sensor consists of two back-to-back zirconia cells in a single monolithic structure. Logarithmic response is avoided so the 4710 can measure down to zero oxygen concentration and nitrogen can be used to calibrate zero response.



Minimal Rack Space Required - one half rack unit

With the sensor remotely located, the analyzer only takes up only 1/2 of one rack unit - 1/4 the rack space of the Model 4705.

Two Model 4710's can be mounted side-by-side for a moisture determination by subtraction of wet and dry oxygen measurements - all taking only 1 ru of space.

Performance Specifications

Measurement range:
Adjustable between zero and 50% O₂

Precision: 0.01% O₂

Zero drift: $\pm 0.02\%$ O₂ per month

Span drift: $\pm 0.1\%$ O₂ per month

Linearity error: less than .1% O₂

Mechanical and Electrical

EIA 19" rackmount enclosure: 1 rack unit tall x 1/2
rack wide

9-3/8"x1-3/4"x 5-5/8" overall, 7 lbs.

Rackmount kits available for single or dual side-by-
side mounting

Power: 24V, 1A operation (external 115VAC power
supply available)

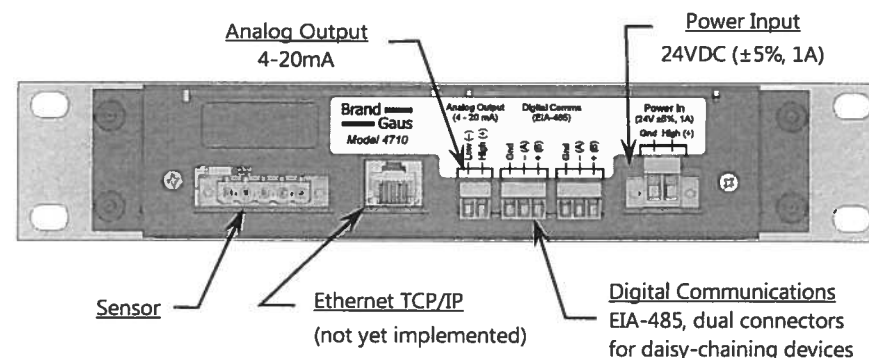
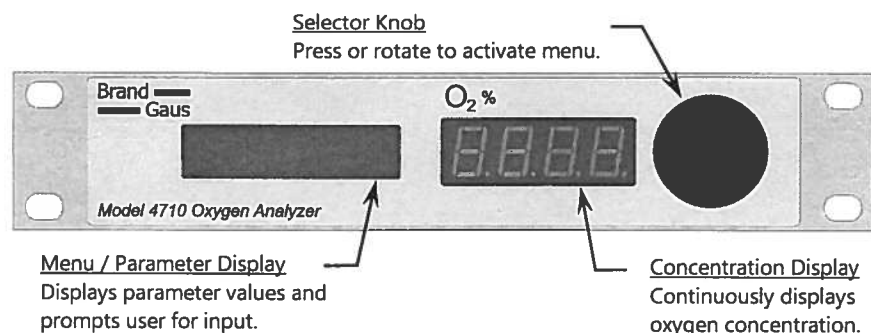
Absolute accuracy: 1% of value
Response time: T95: 10 seconds

Sensor Connections
1/4" NPT inlet and outlet ports
5-conductor cable, 24" long x .25 typical, extension cables available

Interface Specifications
Isolated Analog Output: 4-20 mA maps 0 to full scale concentration
Digital communications: MODBUS over RS-485 and Ethernet TCP/IP

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Cedar Park, Texas
Tel: 512-506-9655
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Connections and Power

Connect sensor, analog output (4-20mA) and/or digital communications cables to the back of the analyzer.

Connect sample or cal-gas lines to sensor via 1/4" NPT fittings

Apply 24VDC power, 1A max

Internal heater will slowly ramp current up until reaching about 1 amps, 10 Watts.

CAUTION: Outside of sensor can exceed 100C. Take measures to protect personnel and other equipment from the hot sensor surface.

It can take as long as 30 minutes for the sensor to fully stabilize.

Flow sample or cal-gas

Flow sample or cal-gas at a rate between 0.2 and 20 SLPM, near atmospheric pressure.

Calibration

Entering calibration bottle concentrations:

1. Rotate knob until "Bottle Conc Lo" (or "Bottle Conc Hi") appears.
2. Press and hold knob to enter edit mode (square [] brackets will appear).
3. Rotate knob until desired bottle concentration is displayed.
4. Press knob for long duration to store value (*> <*) brackets appear).
5. Repeat for high bottle concentration.

Calibrating the analyzer:

1. Flow low concentration gas and wait for stabilization, typically 2 to 5 minutes.
2. Rotate knob to select "Stored Signal Lo" (or "Stored Signal Hi").
3. Press knob and hold knob to enter edit mode (square [] brackets will appear).
4. Press knob for long duration to store low response (*> <*) brackets will appear).
5. Repeat for high cal-gas response.

Navigation

View a parameter or menu item:

Rotate knob to activate menu and scroll to desired parameter. Parameter title and value will be displayed.

Exit menu system or abort editing any parameter without storing new value:

Refrain from pressing or rotating knob for 5 seconds, menu will revert to blank screen.

Edit a currently displayed parameter:

1. Press knob for short duration until square brackets [] appear, indicating edit mode has been entered.
2. Rotate knob until desired value is displayed.
3. Press knob for long duration until *> <*) appear indicating the displayed value has been stored.

Special Commands

Force Analog Output to 0mA, 4mA, or 20mA temporarily:

1. Rotate knob until either "Force Analog Out" is displayed.
2. Press and hold knob until [0 mA] appears, indicating 0mA is being sent to the Analog Output.
3. Rotate knob to change currently forced output value to 0, 4, or 20mA.
4. Output will revert to live/process value if knob is not pressed or rotated for 5 seconds.
5. Forced output remains active if knob is pressed or rotated before 5 sec duration expires.

Restore Defaults to original factory values:

1. Rotate knob until Restore Defaults is displayed.
2. Press and hold knob until [Press for 3 sec] appears
3. Press and hold knob for 3 seconds to overwrite all parameters with factory default values.

Parameters and commands available from the front panel.

Parameter/Command	Description	Range of Values
Stored Signal Lo 0.48 mA	Select/edit to calibrate sensor to low-concentration cal-gas. Generally has +0.5 mA offset even if sensor shows 0.0 mA output.	-5 to + 15 mA (nominal .5 mA at 0 %O ₂)
Stored Signal Hi 4.45 mA	Select/edit to calibrate sensor to high-concentration cal-gas. Stored value approximately represents linearized sensor output when subjected to high concentration cal-gas. Generally has +0.5 mA offset even if sensor shows 0.0 mA output.	-5 to + 15 mA (nominal 4.0 mA at 20.9 %O ₂)
Bottle Conc Low 0.00 %O ₂	Concentration of low cal-gas (often zero) used to calibrate the sensor low signal.	0 %O ₂ to (High bottle conc – 5 %O ₂)
Bottle Conc High 25.00 %O ₂	Concentration of high cal-gas (often zero) used to calibrate the high sensor signal.	(Low bottle conc + 5 %O ₂) to 100 %O ₂
Aout: Conc @ 4mA 0.00 %O ₂	O ₂ concentration represented by 4mA analog output.	0 to 50 %O ₂
Aout: Conc @20mA 25.00 %O ₂	O ₂ concentration represented by 20 mA analog output.	10 to 100 %O ₂
Filtering Time 30 sec	Approximate averaging time of digital filter.	3 to 30 seconds
Sensor Corr Fact 1.00	Linearity correction factor. Factory default is 1.00 and should be sufficient for most installations	0 to 2.00

Parameter/Command	Description	Range of Values
Comm Parameters 38,400/8/N/1	ELA-485 serial port settings	38,400/8/N/1 if Modbus mode is: RTU: 8 bit, 1 stop bit; ASCII: 7 bit, 1 stop bit; if either RTU or ASCII: Select baud rate: 9600, 14400, 19200, 38400 and parity: Even/Odd/None
Modbus Address 1	Modbus slave address of the analyzer.	1 to 247
Modbus Mode RTU	Modbus character mode: RTU or ASCII.	RTU ASCII
Force Analog Out	Analog output can be temporarily forced to 0, 4, or 20mA output so that connecting hardware can be adjusted/verified.	0.0 mA 4.0 mA 20.0 mA
Restore Defaults	Factory defaults can be restored by selecting this parameter for edit, then pressing/holding knob for 3 seconds.	n/a
Sensor Status ON (normal)	Read-only. Sensor status will be ON (normal) when the heater voltage is within acceptable range. Otherwise, sensor status will be Off (fault).	ON (normal) Off (fault)
Firmware ID: 23, Ver: 1.0000	Read-only Firmware ID and version are displayed	n/a

Specification Sheet for

EPA Method 320 / 3A

Source Location Name(s)
Pollutant(s) to be Determined
Also Measures

Process Stack, Indoor Air Stack
Ethylene Oxide (EtO)
O₂/CO₂, Moisture

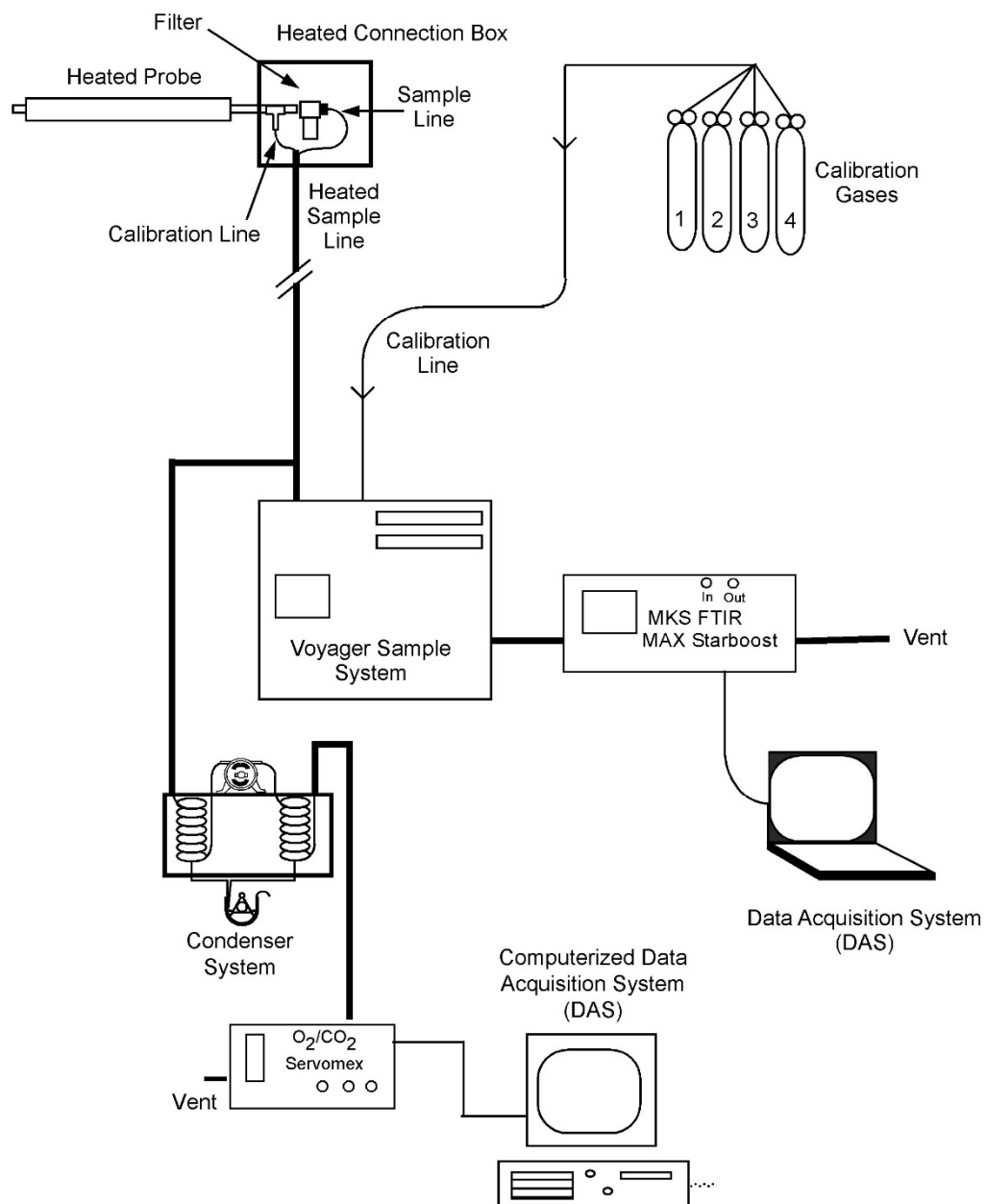
	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	Varied
No. of Sample Traverse Points	N/A	1 (3 for Strat. Checks)
Sample Time per Point	N/A	Varied
Sampling Rate	Constant Rate	Constant Rate, 5.0 lpm
Sampling Probe		
Nozzle Material	N/A	None
Nozzle Design	N/A	N/A
Probe Liner Material	Stainless Steel or Equivalent	Stainless Steel
Effective Probe Length	Sufficient to Traverse Points	5 feet
Probe Temperature Set-Point	Prevent Condensation (Min. 250°F)	300°F±10°F
Particulate Filter		
In-Stack Filter	Optional	N/A
In-Stack Filter Material	N/A	N/A
External Filter	Yes	Yes
External Filter Material	Glass Fiber Mat	Borosilicate Glass Fiber Mat
External Filter Set-Point	Prevent Condensation (Min. 250°F)	300°F±10°F
Sample Delivery System		
Heated Sample Line Material	Stainless Steel or Teflon	Teflon
Heated Sample Line Set-Point	Prevent Condensation (Min. 250°F)	300°F±10°F
Heated Sample Line Connections	Probe Exit to Pump to FTIR	Probe to Pump to FTIR
Moisture Removal System	N/A	Refrigerator-type condenser
Sample Pump Type	N/A	Diaphragm
Sample Pump Material	Non-reactive to sample gases	Teflon
Sample Flow Control	Constant Rate	Constant Rate
Non-Heated Sample Line Material	N/A	Teflon
Non-Heated Sample Line Connections	N/A	Moisture Removal to Diluent Analyzers
Additional Filters	Optional	N/A
Additional Filter Type	N/A	N/A
Additional Filter Location	N/A	N/A
Filter Material	N/A	N/A
Analyzer Description		
Ethylene Oxide (C ₂ H ₄ O)	EPA Method 320 (FTIR)	EPA Method 320 (FTIR - Starboost configuration)
Propylene Oxide (C ₃ H ₆ O)	EPA Method 320 (FTIR)	N/A
Water (H ₂ O)	EPA Method 320 (FTIR)	EPA Method 320 (FTIR - Starboost configuration)
Carbon Dioxide (CO ₂)	EPA Method 3A (NDIR)	EPA Method 3A (NDIR)
Oxygen (O ₂)	EPA Method 3A (Paramagnetic)	EPA Method 3A (Paramagnetic)
Nitrogen Dioxides (NO ₂)	EPA Method 320 (FTIR)	N/A
Nitrogen Monoxides (NO)	EPA Method 320 (FTIR)	N/A
Carbon Monoxide (CO)	EPA Method 320 (FTIR)	N/A

Specification Sheet for

EPA Method 320 / 3A

	Standard Method Specification	Actual Specification Used
Calibration Gas Span		
Ethylene Oxide (C ₂ H ₄ O)	N/A	0-55.158 ppm
Propylene Oxide (C ₃ H ₆ O)	N/A	N/A
Water (H ₂ O)	N/A	0-5.019%
Carbon Dioxide (CO ₂)	N/A	0-25%
Oxygen (O ₂)	N/A	0-25%
Nitrogen Dioxides (NO ₂)	N/A	N/A
Nitrogen Monoxides (NO)	N/A	N/A
Carbon Monoxide (CO)	N/A	N/A
Data Acquisition		
Data Recorder	Computer with Software for Automated Collection	Analog Computer / Digital Recorder
Scan Rate	No Requirement (64 Scans ~ 1 minute)	64 Scans / 1 per second
Data Storage	Automatic	Automatic
Calibration Gas Specifications		
Ethylene Oxide (C ₂ H ₄ O) (QA)	Best Commercially Available Accuracy (±5%)	Best Commercial Accuracy (±5%)
Ethane (C ₂ H ₆) (Tracer)	Best Commercially Available Accuracy (±5%)	Best Commercial Accuracy (±5%)
Methane (CH ₄) (CTS)	EPA Protocol 1	EPA Protocol 1
Zero Nitrogen	N/A	Ultra High Purity
Carbon Dioxide (CO ₂)	EPA Protocol 1	EPA Protocol 1
Oxygen (O ₂)	EPA Protocol 1	EPA Protocol 1
Nitrogen Monoxides (NO)	N/A	N/A
Carbon Monoxide (CO)	N/A	N/A
* Note: M320 only requires that the gases used come with a certificate of accuracy		

EPA Method 320 / 3A (FTIR – Starboost Configuration) Sampling Train Configuration



MKS MultiGas 2030 FTIR



RENTAL AND APPLICATION NOTES:

- Shipping Weight: 120 lbs.
- Designed to meet EPA Method 318,320,321 and various VOC and inorganic gas sampling including Formaldehyde, Ammonia and HCl.
- Nitrogen and Ethylene calibration gases are needed.
- Liquid Nitrogen is needed for most applications.
- Instrument rental of the MKS FTIR is accompanied with an operator unless otherwise arranged through CleanAir Instrument Rental.

SPECIFICATIONS:

- Weight: 100 lbs.
- Power 120 or 240VAC, 50/60 Hz, 3amps.
- Measurement Technique: FTIR Spectrometry.
- 21 μ m 0.25mm LN₂ cooled detector, 7 μ m 0.25mm TE cooled also available.
- Ranges: Full scale setting < 100ppb to 100% concentration.
- Averaging Time: 0.2 sec to 5 min.
- Spectral Range: 2 μ m - 20 μ m (500 - 5,000cm⁻¹).
- Temperature and pressure measured internally.
- Sample Flow: 0.2 - 10 L/min.
- Sample Pressure: 0.01 - 4 Atm.
- N₂ Purge: 20psig (1.5 bar) max, 0.1 L/min.
- Gas Cell: Nickel coated Aluminum.
- Cell Temperature: Ambient to 191° C.
- Cell Mirrors: Nickel plated Aluminum Substrate with rugged gold coating.
- Cell Windows: KBr or ZnSe.



MAX-StarBoost™ Technology

FTIR Reinvented

MAX StarBoost™ is a breakthrough commercial FTIR gas analyzer enhancement technology that dramatically increases sensitivity, linearity and dynamic range over narrow spectral bands of interest. Proven in demanding applications such as ethylene oxide and formaldehyde measurement, MAX StarBoost™ enables source testing, industrial process monitoring and IH Professionals a new level of real-time, in-process analytical capability. Supplied as a turnkey add-on to the widely used and accepted MKS MultiGas™ 2030 FTIR, MAX StarBoost™ is compliant with existing methods and is easy to deploy with a quick learning curve for testing professionals!

Max StarBoost™ Key Features

- Single digit ppb detection limits
- Quick learning curve for existing 2030 users
- Specificity over GC-FID
- EPA Method 320 & ASTM D6348 compliant
- Max-Acquisition™/ MAX-Analytics™ Software
- Spectral Regions:
 - Aldehyde filter – formaldehyde, acrolein, acetaldehyde, HCl
 - Aromatic filter – ethylene oxide, BTEX
- Ideal for CEM Applications
- Switch between standard FTIR & StarBoost™
- Available on all MultiGas™ 2030 config.



Shown with Optional Max
ASC-10-ST™ Sampler

MAX-Acquisition™ and MAX-Analytics™ Software are included (depending on package) to seamlessly integrate with MultiGas™ software providing state-of-the-art FTIR spectral analysis. See MAX-Acquisition™ and MAX-Analytics™ software product brochure for further information. Two spectral bands are included with optional bands available on request.

For more information on MAX StarBoost™ please contact our Applications Group to discuss your specific requirements at 860-386-6878 or email: applications@maxanalytical.com



MAX StarBoost™ Technology

Patent Pending, Max Analytical Technologies

MAX StarBoost™ Filter Bands

MAX StarBoost™ technology is available in several stock filter bands and can be deployed on any Max Analytical product utilizing the MKS MultiGas™ 2030. Available stock filter bands, compounds and detection limits are shown below. Custom filter and compounds are available on request.

Stock Filter Bands	Sample Stream	Compounds	Detection Limit (1min average)
Aldehyde	Combustion Source (8.8% Water)	Formaldehyde	9ppb
		HCl	8ppb
		Acetaldehyde	500ppb
		Methane	650ppb
		Ethane	550ppb
		Water	110ppb
Aromatic	Ambient Air	Methane	4ppb
		Ethane	50ppb
		Ethylene Oxide	Summer 2019

MAX-Acquisition™ Software

Real-time data analysis with MKS 2030 driver (available Summer 2019), AutoReference algorithm to eliminate baseline drift, manual validation and reporting functions. See MAX-Acquisition™ Software brochure for more detail.



Analytical Technologies

Max Analytical Technologies

32 North Road • East Windsor, CT 06088

1-860-386-6878 • info@maxanalytical.com

www.maxanalytical.com

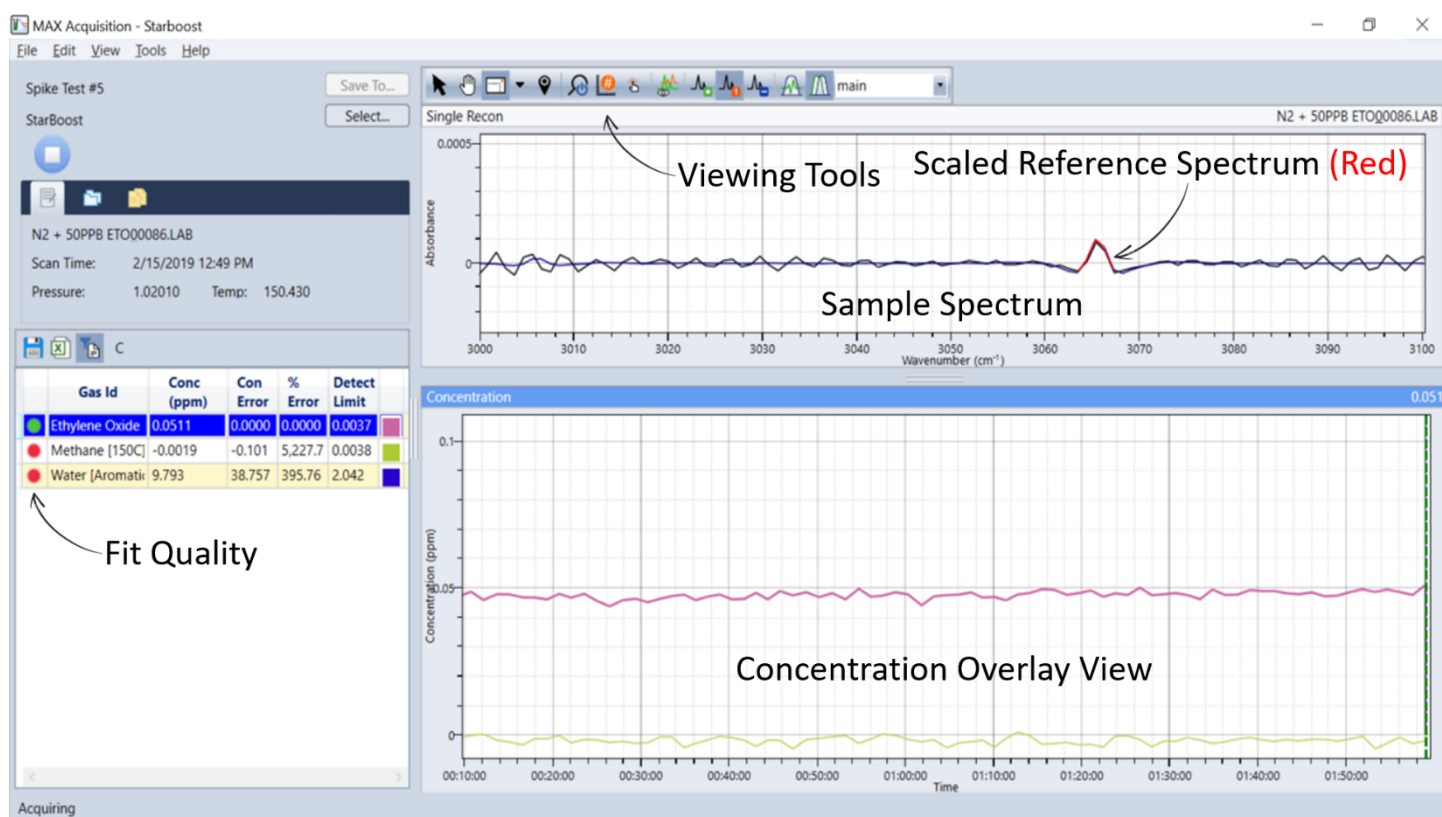
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MAX-Acquisition™ allows for seamless data acquisition using MAX-Crossmark™ GC-FTIR or the MKS MultiGas™ 2030 FTIR analyzer upgraded with MAX-StarBoost™ Technology. Designed for technicians and power users alike, MAX-Acquisition™ can control all data acquisition from a single user interface with flexible display options for fast and easy assessment of data quality. Advanced features include an updated AutoReference algorithm that, when used in conjunction with ultra-sensitive hardware configurations like MAX-StarBoost™, eliminates biases from baseline drift and does not require the user to collect a nitrogen background. Users can also view real-time data results and easily configure alarms to alert when a compound's concentration exceeds a selected threshold. **Whether in the field or in the lab, MAX-Acquisition™ maximizes instrument productivity and ensures high quality data collection.**



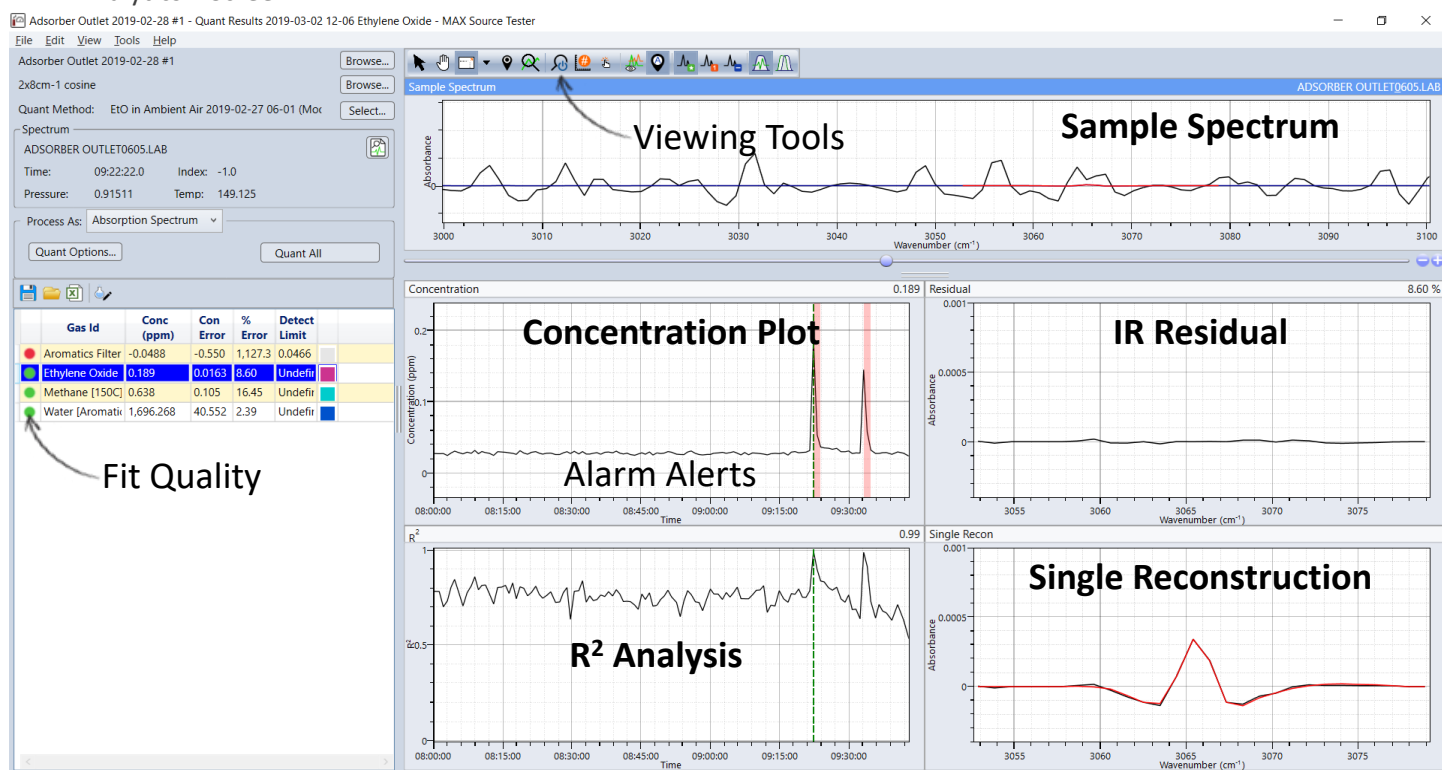
Getting the most out of FTIR spectra takes world class data analysis software to generate high confidence results. Contact our applications group today to arrange a demo at 1-860-386-6878 or software@maxanalytical.com.

Feature Specification

MAX Acquisition
Compatible with all MAX hardware configurations and MKS MultiGas 2030™
Instrument method includes data collection parameters & analysis method
Easily modify analysis method
Real-time quantification of FTIR data
Real-time chromatogram for GC-FTIR data
Control data acquisition on MKS MultiGas 2030™ in StarBoost™ or standard mode
Acquire Temperature and Pressure in real-time for FTIR data
AutoReference Mode
Store spectral data with Igrams and Sbeams
Store results summary file
Export results file to Excel reporting template
Automatically create a new summary results file and spectral folder at certain time of day for CEM applications
View real-time sample spectra
View real-time single reconstructions and residuals for FTIR data
View real-time fit quality metrics (R^2) for FTIR data
View sample spectrum with overlay of scaled reference spectra of gases in analysis method
Add a sample spectrum to method in real time for FTIR data
View real-time alarm alerts when concentration exceeds a selected threshold
Customize viewing options for either detailed analysis or concentration overlay for FTIR data

MAX-Analytics™ is the most powerful gas/liquid FTIR data analysis program commercially available. Providing a large suite of tools that seamlessly stores results in one file, MAX-Analytics™ can take your data reprocessing time from minutes to seconds, dramatically increasing productivity. For users analyzing samples with unknowns, the powerful Peak Matching function can quickly identify compounds using the included quantitative/qualitative libraries with over 5200 compounds. Other features such as adding conditional interferences, multiple quant regions, and editable fencing masks based on residual, reference spectrum, or sample spectrum are just a few of the included features. MAX-Analytics™ is also supplied with a standalone Gas Reference File Editor that provides features such as traceability documentation, gas aliases, spectral subtraction, baseline correction and automatic fencing masks just to name a few. A complete list of features is provided in the specification section of this document.

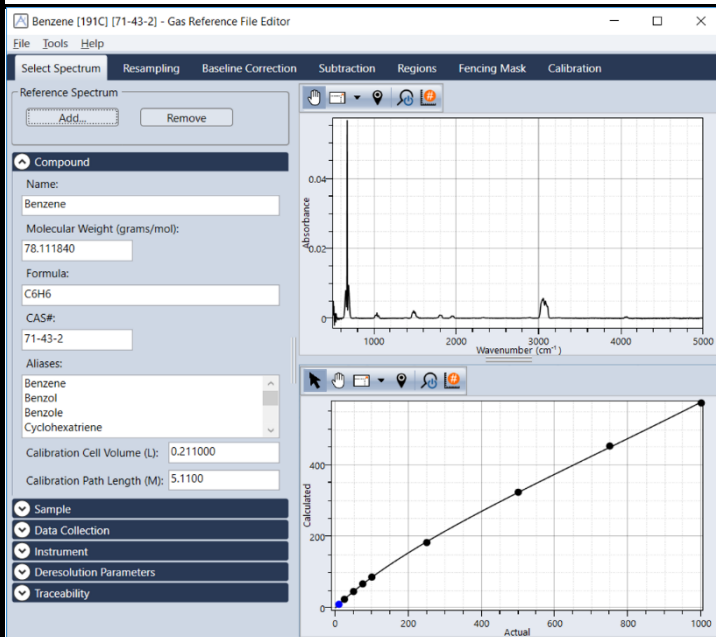
MAX-Analytics™ Screen



Getting the most out of FTIR spectra takes world class data analysis software to generate high confidence results. Contact our applications group today to arrange a demo at 1-860-386-6878 or software@maxanalytical.com.

Feature Specification (Available Summer 2019)

MAX-Analytics [™]	Gas Reference File Editor
Quantitative Gas Reference Library (200 compounds) Qualitative NIST & EPA Gas Reference Library (5500 compounds) Analyze FTIR, StarBoost[™] or GC-FTIR data Fast reprocessing of data Peak Matching Tool for identification of unknown compounds View and open previous results summary file Export results file to Excel spreadsheet Average spectra Manual Validation Mode Add conditional interferences to analysis method Multiple (Primary & Secondary) quantification regions Edit and save quantification regions in analysis method, without modifying gas library Edit and save fencing masks in analysis method, without modifying gas library Apply a fencing mask based on residual, reference spectrum, or sample spectrum Save a computed spectrum (averaged, residual, or single reconstruction) Easily add a sample spectrum to analysis method Search for compounds by aliases, formula or CAS number Add dataset and spectrum comments and save with results file Set Alarm Alerts when a concentration exceeds a selected threshold Customize viewing options for either detailed analysis or concentration overlay MAX[™] Algorithm for GC-FTIR data analysis with automated retention index search	Includes traceability documentation for all gases in library Automatic baseline correction of reference spectra Subtract interferences from reference spectra Define Primary & Secondary quantification regions Define Interference regions Deresolve reference spectra Automatically apply fencing mask using absorbance threshold Apply fencing mask to reference gas or interferences Units include both concentration (ppm) and mass (ng)



MAX
Analytical Technologies

Max Analytical Technologies
32 North Road • East Windsor, CT 06088

1-860-386-6878 • sales@maxanalytical.com
www.maxanalytical.com

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Servomex 1420C Oxygen Analyzer



The 1420C Includes:

- Analyzer
- Power cord
- Signal cable
- Manual
- Calibration sheet
- Instrument Rental Shipping Container

Specifications:

- Weight: 12 lbs.
- Dimensions: 9" x 5" x 7" (single unit)
- Range: 0-25 & 100% O₂.
- Accuracy: +/- 0.1%
- Linearity: +/- 0.1% O₂
- Repeatability: +/- 0.1% O₂
- Response time (T₉₀): 2.5 seconds at 200 ml/min; 2.0 seconds at 250 ml/min
- Zero Drift: <+/- .002% O₂/hour
- Span Drift: <+/- .002% O₂/hour
- Warm up time: typically 1 hour
- Electrical output: 0-1V non-isolated (min load 1K) or 4-20mA isolated (max load 600?).
- Display: 3.5 digit green LED display
- Display resolution: 0.1%
- AC Supply: 88-264VAC, 47-63 Hz
- Power required: 45 VA
- Operating ambient temperature: 32oF to 113oF (0oC to 45oC) as standard. 32oF to 104oF (0oC to 40oC) when fitted in bench top case.
- Storage temperature: -4oF to 158oF (-20oC to 70oC).
- Relative humidity: 0-90% non-condensing.

Rental/Application Notes:

- Effect of ambient temperature: <+/- 0.03% O₂/C zero; <+/- 0.10% O₂/C span
- Effect of barometric pressure: The analyzer measures the partial pressure of oxygen in the sample gas. Therefore, any change in sample pressure at the measuring cell will have an effect, which is proportional to the change in absolute pressure from time of calibration. An analyzer for oxygen purity (with pressure compensation) reduces error by a factor of approximately 5.
- Inlet pressure: 1-10 psig (7-70 kPag)
- Vent pressure: 11.6 to 15.9 psia (80-110 kPag)
- Flow rate: 1-6 lpm
- The Servomex 1420C/1415C can be plumbed together in a 19" rack mount (Model 1440C). The combined weight is 44 lbs. These units are compatible with the older 1400B series.
- When renting, equipment must be returned in its original packaging.



Servomex 1415C CO₂ Analyzer



The 1415C Includes:

- Analyzer
- Power cord
- Signal cable
- Manual
- Calibration sheet
- Instrument Rental Shipping Container

Specifications:

- Weight: 12 lbs.
- Dimensions: 9" x 5" x 7" (single unit)
- Range: 0-20 & 25% CO₂.
- Accuracy: 1% of selected range
- Linearity: 1% of selected range
- Repeatability: 1% of selected range
- Response time (T90): <10 seconds
- Zero Drift: 2% of full scale/week
- Span Drift: 1% of reading/day
- Warm up time: typically 1 hour
- Electrical output: 0-1V non-isolated (min load 1K) or 4-20mA isolated (max load 600?).
- Display: 3.5 digit green LED display reading.
- Display resolution: 0.1%
- AC Supply: 88-264VAC, 47-63 Hz
- Power required: 45 VA
- Operating ambient temperature: 32°F to 113°F (0°C to 45°C) as standard. 32°F to 104°F (0°C to 40°C) when fitted in bench top case.
- Storage temperature: -4°F to 158°F (-20°C to 70°C)
- Relative humidity: 0-90% non-condensing.

Rental/Application Notes:

- Effect of ambient temperature: 1% of full scale per 10°C change.
- Effect of barometric pressure: 0.15% of reading per mbar within specified range.
- Inlet pressure: 1-10 psig (7-70 kPag)
- Vent pressure: 11.6 to 15.9 psia (80-110 kPag)
- Flow rate: 1-6 lpm
- The Servomex 1420C/1415C can be plumbed together in a 19" rack mount (Model 1440C). The combined weight is 44 lbs. These units are compatible with the older 1400B series.
- Equipment must be returned in its original packaging.

End of Appendix Section

APPENDIX B: SAMPLE CALCULATIONS

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USEPA Method 2 (Velocity & Flow Rate) Sampling, Velocity and Moisture Sample Calculations

BV Testing

Sample data taken from Run 1

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

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1. Stack gas pressure (in. Hg)

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

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.10	in. Hg
P_g	= sample gas static pressure (in. H ₂ O)	=	-1.14	in. H ₂ O
13.6	= conversion factor (in. H ₂ O/in. Hg)	=	13.6	in. H ₂ O/in. Hg
P_s	= absolute stack gas pressure (in. Hg)	=	29.02	in. Hg

2. Actual water vapor pressure at stack gas temperature less than 212°F (in. Hg)

$$P_v = \frac{e^{\left(\frac{18.3036 - \frac{3816.44}{\frac{5}{9}(T_s - 32) + 273.15 - 46.13}}{25.4} \right)}}{25.4}$$

Where:

T_s	= average stack gas temperature (°F)	=	105.56	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
P_v	= vapor pressure, actual (in. Hg)	=	2.28	in. Hg

3. Water vapor pressure at stack gas temperature greater than 212°F (in. Hg)

$$P_v = P_s$$

Where:

$$P_s = \text{absolute stack gas pressure (in. Hg)} = 29.02 \text{ in. Hg}$$

$$P_v = \text{water vapor pressure, actual (in. Hg)} = \text{Previously Defined in. Hg}$$

4. Saturated moisture content (% by volume)

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

Where:

$$P_s = \text{absolute stack gas pressure (in. Hg)} = 29.02 \text{ in. Hg}$$

$$P_v = \text{water vapor pressure, actual (in. Hg)} = 2.28 \text{ in. Hg}$$

$$B_{ws} = \text{proportion of water vapor in the gas stream by volume at saturated conditions} = 0.0784 = 7.84 \%$$

5. Actual water vapor in gas (% by volume)

$$B_w = \text{MINIMUM} [B_{wo}, B_{ws}]$$

Where:

$$B_{ws} = \text{proportion of water vapor in the gas stream by volume at saturated conditions} = 0.0784$$

$$B_{wo} = \text{proportion of water measured in the gas stream by volume} = 0.0260$$

$$B_w = \text{actual water vapor in gas} = 0.0260 = 2.60 \%$$

6. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

$$CO_2 = \text{proportion of carbon dioxide in the gas stream by volume (\%)} = 0.0 \%$$

$$O_2 = \text{proportion of oxygen in the gas stream by volume (\%)} = 20.9 \%$$

$$100 = \text{conversion factor (\%)} = 100 \%$$

$$N_2+CO = \text{proportion of nitrogen and CO in the gas stream by volume (\%)} = 79.10 \%$$

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

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

Where:

M_{CO_2}	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M_{O_2}	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M_{N_2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	0.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	20.9	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	79.1	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	28.84	lb/lb·mole

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

$$M_s = (M_d)(1 - B_w) + (M_{H_2O})(B_w)$$

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.0260	
M_d	= dry molecular weight of stack gas (lb/lb·mole)	=	28.84	lb/lb·mole
M_{H_2O}	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
M_s	= molecular weight of stack gas, wet basis (lb/lb·mole)	=	28.55	lb/lb·mole

9. Velocity of stack gas (ft/sec)

$$V_s = (K_p)(C_p) \left(\sqrt{\Delta P} \right) \left(\sqrt{\frac{(T_s + 460)}{(M_s)(P_s)}} \right)$$

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.83	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	28.55	lb/lb·mole
P_s	= absolute stack pressure (in. Hg)	=	29.02	in. Hg
T_s	= average stack gas temperature (°F)	=	105.56	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H ₂ O)	=	0.533	$\sqrt{\text{in. H}_2\text{O}}$
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	31.33	ft/sec

10. Volumetric flow rate of stack gas at actual gas conditions (acfm)

$$Q_a = (60)(A_s)(V_s)$$

Where:

A_s	= cross sectional area of sampling location (ft ²)	=	4.91	ft ²
V_s	= stack gas velocity (ft/sec)	=	31.33	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	9,229	acfm

11. Total flow of stack gas (scfm)

$$Q_s = (Q_a) \left(\frac{P_s}{29.92} \right) \left(\frac{68 + 460}{T_s + 460} \right)$$

Where:

Q_a	= volumetric flow rate at actual conditions (acfm)	=	9,229	acfm
P_s	= absolute stack gas pressure (in. Hg)	=	29.02	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average stack gas temperature (°F)	=	105.6	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	8,355	scfm

12. Dry flow of stack gas (dscfm)

$$Q_{std} = (Q_s)(1 - B_w)$$

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.0260	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	8,355	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	8,138	dscfm

13. Hourly time basis conversion of volumetric flow rate (Q_{std} example)

$$Q_{std-hr} = (Q_{std-min})(60)$$

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft ³ /min)	=	8,138	dscfm
60	= conversion factor (min/hr)	=	60	min/hr

Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	488,286	dscf/hr

14. Metric Conversion of Gas Volumes (Q_{std} example)

$$Q_{std-metric} = (Q_{std-english}) \left(\frac{60}{35.31} \right)$$

Where:

$Q_{std-english}$	= volumetric flow rate, english units (ft ³ /min)	=	8,138	dscfm
35.31	= conversion factor (ft ³ /m ³)	=	35.31	ft ³ /m ³
60	= conversion factor (min/hr)	=	60	min/hr

$Q_{std-metric}$	= volumetric flow rate, metric units (m ³ /hr)	=	13,829	dry std m ³ /hr

15. Standard to Normal Conversion of Gas Volumes (Q_{std} example)

$$Q_{Normal} = (Q_{std-metric}) \left(\frac{32 + 460}{68 + 460} \right)$$

Where:

$Q_{std-metric}$	= volumetric flow rate, metric units (dry std m ³ /hr)	=	13,829	dry std m ³ /hr
32	= normal temperature (°F)	=	32	°F
68	= standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	

Q_{Normal}	= volumetric flow rate, metric units (dry Nm ³ /hr)	=	12,886	dry Nm ³ /hr

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CEM Emissions Sample Calculations for EtO Anguil TO Inlet

Sample data taken from Run 1

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

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1. EtO concentration (ppmdv)

$$C(ppmdv) = \frac{C_{ppmwv}}{(1 - B_w/100)}$$

Where:

C_{ppmwv}	= concentration	=	11.8	ppmwv
B_w	= actual water vapor in gas (% v/v)	=	2.60	% v/v
100	= conversion factor to change percentage to decimal	=	100	
$C(ppmdv)$	= EtO concentration (ppmdv)	=	12.1	ppmdv

2. EtO concentration (ppbwv)

$$C(ppbwv) = k_1 \times C_{ppmwv}$$

Where:

C_{ppmwv}	= concentration	=	11.8	ppmwv
k_1	= ppb to ppm conversion factor for diluent gases	=	1000	
$C(ppbwv)$	= EtO concentration (ppbwv)	=	11,800	ppbwv

3. EtO concentration (lb/dscf)

$$C(lb / dscf) = \frac{C(ppmdv) \times MW(gas)}{10^6 ppm \times 385.3}$$

Where:

$C(ppmdv)$	= EtO concentration (ppmdv)	=	12.1	ppmdv
MW	= Molecular Weight of EtO gas	=	44.05	lb/lb-mole
10^6	= conversion factor from decimal to ppm	=	1.00E+06	
385.3	= molar volume	=	385.3	dscf/lb-mole
$C(lb/dscf)$	= EtO concentration (lb/dscf)	=	1.38E-06	lb/dscf

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4. EtO concentration (lb/scf)

$$C \text{ (lb / scf)} = C \text{ (lb / dscf)} \times \frac{Q_{std}}{Q_s}$$

Where:

C (lb/dscf)	= EtO concentration (lb/dscf)	=	1.38E-06	lb/dscf
Q _{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	8,138	dscf/min
Q _s	= volumetric flow rate (standard cubic feet/min)	=	8,355	scf/min

C (lb/scf)	= EtO concentration (lb/scf)	=	1.35E-06	lb/scf

5. EtO concentration (lb/acf)

$$C \text{ (lb / acf)} = C \text{ (lb / dscf)} \times \frac{Q_{std}}{Q_a}$$

Where:

C (lb/dscf)	= EtO concentration (lb/dscf)	=	1.38E-06	lb/dscf
Q _{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	8,138	dscf/min
Q _a	= volumetric flow rate (actual cubic feet/min)	=	9,229	acf/min

C (lb/acf)	= EtO concentration (lb/acf)	=	1.22E-06	lb/acf

6. EtO concentration (mg/dscm)

$$C \text{ (mg / dscm)} = C \text{ (lb / dscf)} \times k_2 \times 35.31$$

Where:

C (lb/dscf)	= EtO concentration (lb/dscf)	=	1.38E-06	lb/dscf
k ₂	= conversion factor from lb to mg	=	453515	mg/lb
35.31	= conversion factor from dscf to dscm	=	35.31	ft ³ /m ³

C (mg/dscm)	= EtO concentration (mg/dscm)	=	22.1	mg/dscm

7. EtO concentration (mg/Nm³ dry)

$$C \text{ (mg / Nm}^3 \text{ dry)} = C \text{ (lb / dscf)} \times k_2 \times 35.31 \times \left(\frac{68 + 460}{32 + 460} \right)$$

Where:

C (lb/dscf)	= EtO concentration (lb/dscf)	=	1.38E-06	lb/dscf
k ₂	= conversion factor from lb to mg	=	453515	mg/lb
35.31	= conversion factor from dscf to dscm	=	35.31	ft ³ /m ³
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

C (mg/Nm ³ dry)	= EtO concentration (mg/Nm ³ dry)	=	2.38E+01	mg/Nm ³ dry

Sterigenics**CleanAir Project No. 14004****Atlanta Facility****Aeration/Backvent Outlet****8. EtO emission rate (lb/hr)**

$$E_{lb/hr} = C(lb/scf) \times Q_s \times 60$$

Where:

C (lb/scf)	= EtO concentration (lb/scf)	=	1.35E-06	lb/scf
Q _s	= volumetric flow rate at standard conditions, wet basis (wscfm)	=	8355	wscfm
60	= conversion factor (min/hr)	=	60	min/hr
E _{lb/hr}	= EtO emission rate (lb/hr)	=	0.675	lb/hr

9. EtO emission rate (Ton/yr)

$$E_{T/yr} = E(lb/hr) \times \left(\frac{Cap}{2000} \right)$$

Where:

E _{lb/hr}	= EtO emission rate (lb/hr)	=	0.675	lb/hr
Cap	= capacity factor for process (hours operated/year)	=	8760	hours/yr
2000	= conversion factor (lb/Ton)	=	2,000	lb/Ton
E _{T/yr}	= EtO emission rate (Ton/yr)	=	2.96	Ton/yr

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EPA Method 320 Field Sample Calculations

Run 1

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

072320 200035

1. Pre-/Post-run CTS Deviation (<5%)

$$E_{dev} = abs \left| \frac{C_{pre} - C_{post}}{C_{pre}} \right| \times 100$$

Where:

C_{pre}	= Average concentration of pre-run CTS	=	10.1	ppm
C_{post}	= Average concentration of post-run CTS	=	10.4	ppm
E_{dev}	= CTS system bias	=	2.92%	Pass

3. Dilution Factor of Spike Gas

$$DF = \frac{T_{spike} - T_{nat}}{T_{direct}}$$

Where:

T_{spike}	= Diluted tracer gas concentration measured in spiked sample	=	0.414	ppm
T_{direct}	= Tracer gas concentration measured directly	=	5.07	ppm
T_{nat}	= Native tracer gas concentration measured in effluent gas stream	=	0.004	ppm
DF	= Dilution factor of spike gas	=	0.0809	

4. Expected EtO in spiked sample

$$X_{Exp} = (X_{dir})(DF) + (X_{nat})(1 - DF)$$

Where:

X_{Dir}	= Average concentration of direct QA analyte	=	5.0110	ppm
DF	= Dilution factor (dimensionless)	=	0.0809	
X_{nat}	= Average concentration of native QA analyte in effluent stream	=	-0.106	ppm
X_E	= Expected concentration in spiked sample	=	7.9799	ppm

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5. Spike recovery (%) (70-130%)

$$\%SR = \left(\frac{X_S}{X_E} \right) \times 100$$

Where:

X_S = Concentration of QA analyte in spiked sample = 8.0968 ppm

X_E = Expected concentration in spiked sample = 7.9799 ppm

%SR = Spike recovery (%) = 101.5% **Pass**

CEM Field Sample Calculations for O2 Aeration/Backvent Outlet

Sample data taken from Run 1
and Channel 1

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

072320 200246

1. Average of a calibration series

$$C_{mce} = \frac{(C_1 + C_2 + C_3)}{3}$$

Where:

C_1, C_2, C_3 = concentrations of 3 consecutive gas samples that are representative of the calibration gas

C_{mce} = average concentration of a calibration series = 10.106 %wv
In this example the mid cal series for O2

2a. Calibration Error Check for Hydrocarbons (5% of actual calibration gas value error allowed by Method 25A)

$$E_{HC} = abs \left| \frac{C_{mce} - C_{ma}}{C_{ma}} \right| \leq l_{cal}$$

Where:

C_{mce} = average concentration of a calibration series = N/A %wv

C_{ma} = concentration of actual calibration gas value = N/A %wv

l_{cal} = limit for calibration error for hydrocarbons =

E_{HC} = calibration error check value = NA

2b. Calibration Error Check for non-Hydrocarbons (2% of Instrument Span)

$$E = abs \left| \frac{C_{mce} - C_{ma}}{Span} \right| \leq l_{cal}$$

Where:

C_{mce} = average concentration of a calibration series = 10.106 %wv
In this example the mid cal series for O2

C_{ma} = concentration of actual calibration gas value = 10.100 %wv

Span = instrument span value = 21.430

l_{cal} = limit for calibration error for non-hydrocarbons = 2.0%

E = calibration error check value = 0.03% **Pass**

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3. System Bias as Percent of Span Value (5% is allowed)

$$E_{Bias} = abs \left| \frac{C_{mf} - C_{mce}}{Span} \right| \leq l_{bias}$$

Where:

C_{mce}	= average concentration of a calibration series in this example the mid cal series for O2	=	10.106	%wv
C_{mf}	= upscale cal response concentration for CalBias01	=	9.994	%wv
Span	= instrument span value	=	21.430	%wv
l_{bias}	= limit for system bias error	=	5.0%	
E_{bias}	= upscale calibration bias error check value	=	0.52%	Pass

Note: zero calibration bias error check value is calculated in a similar manner.

4. System Drift as Percent of Span Value (3%)

$$E_{Drift} = abs \left| \frac{C_{mf} - C_{mi}}{Span} \right| \leq l_{drift}$$

Where:

C_{mf}	= cal response concentration for CalBias01 (final)	=	9.994	%wv
C_{mi}	= cal response concentration for CalBias00 (initial)	=	10.117	%wv
Span	= instrument span value	=	21.430	%wv
l_{drift}	= limit for system drift error	=	3.0%	
E_{drift}	= upscale calibration drift error check value	=	0.44%	Pass

Note: zero calibration drift error check value is calculated in a similar manner.

5. Average Concentration for an entire Run

$$C = \frac{\sum_{i=1}^N C_i}{N}$$

Where:

C_i	= all concentration readings for the entirety of Run 1 for the instrument analyzing O2 on channel 1	=	20.575	%wv
N	= total number of readings in Run 1	=	44	
C	= average O2 concentration for Run 1	=	20.543	%wv

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6. Drift-Corrected Average Concentration for an entire Run

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

C_{ma}	= concentration of actual calibration gas value	=	10.100	%wv
C	= average O2 concentration for Run 1	=	20.543	%wv
C_{mf}	= upscale response concentration for CalBias01 (final)	=	9.994	%wv
C_{mi}	= upscale response concentration for CalBias00 (initial)	=	10.117	%wv
C_{of}	= zero response concentration for CalBias01 (final)	=	0.069	%wv
C_{oi}	= zero response concentration for CalBias00 (initial)	=	0.219	%wv
C_{DC}	= drift average O2 concentration for Run 1	=	20.787	%wv

End of Appendix Section

APPENDIX C: PARAMETERS

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Clean Air Project No: 14004
Aeration/Backvent Outlet

USEPA Method 2 (Velocity & Flow Rate) Sampling, Velocity and Moisture Parameters

Run No.		1 - Backvent Testing	1 - Aeration Testing	2 - Aeration Testing	3 - Aeration Testing
Date (2020)		Jun 24	Jun 24	Jun 24	Jun 24
Start Time (approx.)		11:59	14:30	16:05	17:14
Stop Time (approx.)		12:04	14:35	16:11	17:20
Sampling Conditions					
C _p	Pitot tube coefficient	0.832	0.832	0.832	0.832
P _g	Static pressure (in. H ₂ O)	-1.135	-1.305	-1.315	-1.280
A _s	Sample location area (ft ²)	4.9087	4.9087	4.9087	4.9087
P _{bar}	Barometric pressure (in. Hg)	29.10	29.10	29.10	29.10
O ₂	Oxygen (dry volume %)	20.9000	20.9000	20.9000	20.9000
CO ₂	Carbon dioxide (dry volume %)	0.0000	0.0000	0.0000	0.0000
N ₂ +CO	Nitrogen plus carbon monoxide (dry volume %)	79.1000	79.1000	79.1000	79.1000
T _s	Stack temperature (°F)	105.5625	94.0625	99.6250	92.8750
Flow Results					
P _s	Stack gas pressure, absolute (in. Hg)	29.0165	29.0040	29.0033	29.0059
P _v	Vapor pressure, actual (in. Hg)	2.2761	1.6070	1.9057	1.5488
B _{wo}	Moisture measured in sample (% by volume) ¹	2.6016	2.6516	2.6629	2.7289
B _{ws}	Saturated moisture content (% by volume)	7.8441	5.5407	6.5706	5.3396
B _w	Actual water vapor in gas (% by volume)	2.6016	2.6516	2.6629	2.7289
√ΔP	Velocity head (√in. H ₂ O)	0.5332	0.5120	0.5252	0.5240
M _d	MW of stack gas, dry (lb/lb-mole)	28.8360	28.8360	28.8360	28.8360
M _s	MW of stack gas, wet (lb/lb-mole)	28.5541	28.5487	28.5474	28.5403
V _s	Stack gas velocity ft/sec)	31.3338	29.7919	30.7129	30.4605
Q _a	Volumetric flow rate, actual (acfm)	9,229	8,774	9,046	8,971
Q _s	Volumetric flow rate, standard (scfm)	8,355	8,106	8,273	8,306
Q _{std}	Volumetric flow rate, dry standard (dscfm)	8,138	7,891	8,053	8,079
Q _a	Volumetric flow rate, actual (acf/hr)	553,714	526,467	542,742	538,282
Q _s	Volumetric flow rate, standard (scf/hr)	501,329	486,343	496,382	498,358
Q _{std}	Volumetric flow rate, dry standard (dscf/hr)	488,286	473,447	483,164	484,758
Q _a	Volumetric flow rate, actual (m ³ /hr)	15,682	14,910	15,371	15,244
Q _s	Volumetric flow rate, standard (m ³ /hr)	14,198	13,774	14,058	14,114
Q _{std}	Volumetric flow rate, dry standard (dry m ³ /hr)	13,829	13,408	13,683	13,729
Q _s	Volumetric flow rate, normal (Nm ³ /hr)	13,230	12,834	13,099	13,151
Q _{std}	Volumetric flow rate, dry normal (Nm ³ /hr)	12,886	12,494	12,751	12,793

Note: O₂ concentrations greater than 20.9% were assumed equivalent to 20.9%. CO₂ concentrations less than 0% were assumed equivalent to 0.0%.

¹ Moisture obtained from M-320 FTIR data.

Sterigenics
Clean Air Project No: 14004
Aeration/Backvent Outlet

USEPA Method 2 (Velocity & Flow Rate) Sampling, Velocity and Moisture Parameters

Run No.	1 - Vacuum Pump Testing	2 - Vacuum Pump Testing	3 - Vacuum Pump Testing	Average
Date (2020)	Jun 25	Jun 25	Jun 25	
Start Time (approx.)	10:19	11:56	13:40	
Stop Time (approx.)	10:24	12:01	13:44	
Sampling Conditions				
C _p Pitot tube coefficient	0.832	0.832	0.832	
P _g Static pressure (in. H ₂ O)	-1.275	-1.195	-1.295	
A _s Sample location area (ft ²)	4.9087	4.9087	4.9087	
P _{bar} Barometric pressure (in. Hg)	29.08	29.08	29.08	29.0800
O ₂ Oxygen (dry volume %)	17.5244	20.9000	20.9000	19.7748
CO ₂ Carbon dioxide (dry volume %)	0.0147	0.0200	0.0198	0.0182
N ₂ +CO Nitrogen plus carbon monoxide (dry volume %)	82.4609	79.0800	79.0802	80.2070
T _s Stack temperature (°F)	92.1250	96.3125	103.5000	97.3125
Flow Results				
P _s Stack gas pressure, absolute (in. Hg)	28.9863	28.9921	28.9848	28.9877
P _v Vapor pressure, actual (in. Hg)	1.5130	1.7226	2.1410	1.7922
B _{wo} Moisture measured in sample (% by volume) ¹	2.6252	2.6100	2.6164	2.6172
B _{ws} Saturated moisture content (% by volume)	5.2196	5.9415	7.3865	6.1825
B _w Actual water vapor in gas (% by volume)	2.6252	2.6100	2.6164	2.6172
√ΔP Velocity head (√in. H ₂ O)	0.5234	0.5199	0.5155	0.5196
M _d MW of stack gas, dry (lb/lb-mole)	28.7033	28.8392	28.8392	28.7939
M _s MW of stack gas, wet (lb/lb-mole)	28.4223	28.5563	28.5556	28.5114
V _s Stack gas velocity ft/sec)	30.4742	30.3126	30.2558	30.3475
Q _a Volumetric flow rate, actual (acfm)	8,975	8,928	8,911	8,938
Q _s Volumetric flow rate, standard (scfm)	8,315	8,211	8,089	8,205
Q _{std} Volumetric flow rate, dry standard (dscfm)	8,097	7,996	7,877	7,990
Q _a Volumetric flow rate, actual (acf/hr)	538,524	535,668	534,664	536,285
Q _s Volumetric flow rate, standard (scf/hr)	498,922	492,639	485,321	492,294
Q _{std} Volumetric flow rate, dry standard (dscf/hr)	485,824	479,782	472,623	479,410
Q _a Volumetric flow rate, actual (m ³ /hr)	15,251	15,170	15,142	15,188
Q _s Volumetric flow rate, standard (m ³ /hr)	14,130	13,952	13,745	13,942
Q _{std} Volumetric flow rate, dry standard (dry m ³ /hr)	13,759	13,588	13,385	13,577
Q _s Volumetric flow rate, normal (Nm ³ /hr)	13,166	13,001	12,807	12,991
Q _{std} Volumetric flow rate, dry normal (Nm ³ /hr)	12,821	12,661	12,472	12,651

Note: O₂ concentrations greater than 20.9% were assumed equivalent to 20.9%. CO₂ concentrations less than 0% were assumed equivalent to 0.0%.

¹ Moisture obtained from M-320 FTIR data.

Parameters Table for EtO - Aeration/Backvent Outlet

Testing		Backvent				Aeration				Vacuum Pump			
Run No.		1	2	3	Average	1	2	3	Average	1	2	3	Average
Date (2020)		Jun 24	Jun 24	Jun 24		Jun 24	Jun 24	Jun 24		Jun 25	Jun 25	Jun 25	
Start Time (approx.)		11:29	11:48	12:04		14:22	15:45	17:05		09:56	11:48	13:08	
Stop Time (approx.)		11:48	12:04	12:19		15:28	16:48	18:09		10:32	12:22	13:57	
Process Conditions													
P ₁	Activated Sterilization Chamber(s)	1	1	1		3	3	3		1	2	3	
P ₂	Chamber Number(s)	6	8	10		6, 8, 10	6, 8, 10	6, 8, 10		8	6,10	1, 7, 11	
P ₃	Sterilization Cycle(s)	81	25	63		81, 25, 63	81, 25, 63	81, 25, 63		25	81, 63	12, 25, 78	
P ₄	Ceilcote Liquor Tank Level (in)	186	186	186	186	186	186	186	186	186	186	186	186
P ₅	Ceilcote pH	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
P ₆	Ceilcote Ethylene Glycol Conc. (%)	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
P ₇	AAT Liquor Tank Level (in)	123	123	123	123	123	123	123	123	123	123	123	123
P ₈	AAT pH	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
P ₉	AAT Ethylene Glycol Conc. (%)	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4
Aeration/Backvent Outlet													
Gas Conditions													
O ₂	Oxygen (bias adj., dry volume %)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	17.5	20.9	20.9	19.8
CO ₂	Carbon Dioxide (bias adj., dry volume %)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.02
T _S	Sample Temperature (°F)	105.6	105.6	105.6	105.6	94.1	99.6	92.9	95.5	92.1	96.3	103.5	97.3
B _w	Actual water vapor in gas (% by volume)	2.60	2.60	2.60	2.60	2.65	2.66	2.73	2.68	2.63	2.61	2.62	2.62
CH ₄	Methane (ppmwv)	2.62	2.62	2.55	2.60	2.75	2.81	2.96	2.84	2.83	2.51	2.48	2.61
Gas Flow Rate ¹													
Q _a	Volumetric flow rate, actual (acfm)	9,229	9,229	9,229	9,229	8,774	9,046	8,971	8,931	8,975	8,928	8,911	8,938
Q _s	Volumetric flow rate, standard (wscfm)	8,355	8,355	8,355	8,355	8,106	8,273	8,306	8,228	8,315	8,211	8,089	8,205
Q _{std}	Volumetric flow rate, dry standard (dscfm)	8,138	8,138	8,138	8,138	7,891	8,053	8,079	8,008	8,097	7,996	7,877	7,990
EtO Results													
C _{sw}	Concentration (ppmwv)	11.8	19.2	20.0	17.0	7.94	7.62	6.91	7.49	2.26	2.12	1.94	2.11
C _{sd}	Concentration (ppmdv)	12.1	19.7	20.5	17.4	8.16	7.83	7.11	7.70	2.32	2.17	1.99	2.16
C _{lb/dscf}	Concentration (lb/dscf)	1.38E-06	2.25E-06	2.34E-06	1.99E-06	9.33E-07	8.95E-07	8.13E-07	8.80E-07	2.65E-07	2.49E-07	2.28E-07	2.47E-07
C _{lb/scf}	Concentration (lb/scf)	1.35E-06	2.19E-06	2.28E-06	1.94E-06	9.08E-07	8.71E-07	7.90E-07	8.56E-07	2.58E-07	2.42E-07	2.22E-07	2.41E-07
C _{lb/acf}	Concentration (lb/acf)	1.22E-06	1.98E-06	2.07E-06	1.76E-06	8.39E-07	7.97E-07	7.32E-07	7.89E-07	2.39E-07	2.23E-07	2.01E-07	2.21E-07
C _{mg/dscm}	Concentration (mg/dscm)	22.1	36.0	37.5	31.9	14.9	14.3	13.0	14.1	4.25	3.98	3.65	3.96
C _{mg/scm}	Concentration (mg/scm)	21.6	35.1	36.6	31.1	14.5	13.9	12.7	13.7	4.14	3.88	3.55	3.86
C _{mg/acm}	Concentration (mg/acm)	19.5	31.8	33.1	28.1	13.4	12.8	11.7	12.6	3.83	3.57	3.22	3.54
E _{lb/hr}	Emission Rate (lb/hr)	0.675	1.10	1.14	0.973	0.442	0.432	0.394	0.423	0.129	0.119	0.108	0.119
E _{T/yr}	Emission Rate (Ton/yr)	2.96	4.81	5.01	4.26	1.93	1.89	1.73	1.85	0.565	0.522	0.471	0.520
E _{kg/hr}	Mass Rate (kg/hr)	0.306	0.498	0.519	0.441	0.200	0.196	0.179	0.192	0.058	0.054	0.049	0.054

¹ One flow conducted during backvent testing. Moisture data from the three runs was averaged.

Sterigenics
Clean Air Project No: 14004
Ceilcote Outlet

USEPA Method 2 (Velocity & Flow Rate) Sampling, Velocity and Moisture Parameters

Run No.		1 - Backvent Testing	1 - Aeration Testing	2 - Aeration Testing	3 - Aeration Testing
Date (2020)		Jun 24	Jun 24	Jun 24	Jun 24
Start Time (approx.)		11:52	14:37	16:00	17:20
Stop Time (approx.)		11:58	14:42	16:05	17:23
Sampling Conditions					
C _p	Pitot tube coefficient	0.832	0.832	0.832	0.832
P _g	Static pressure (in. H ₂ O)	-1.440	-1.550	-1.585	-1.740
A _s	Sample location area (ft ²)	0.5454	0.5454	0.5454	0.5454
P _{bar}	Barometric pressure (in. Hg)	29.10	29.10	29.10	29.10
O ₂	Oxygen (dry volume %)	20.9000	20.9000	20.9000	20.9000
CO ₂	Carbon dioxide (dry volume %)	0.0392	0.0289	0.0193	0.0213
N ₂ +CO	Nitrogen plus carbon monoxide (dry volume %)	79.0608	79.0711	79.0807	79.0787
T _s	Stack temperature (°F)	93.7500	99.5000	99.5000	100.5000
Flow Results					
P _s	Stack gas pressure, absolute (in. Hg)	28.9941	28.9860	28.9835	28.9721
P _v	Vapor pressure, actual (in. Hg)	1.5915	1.8985	1.8985	1.9568
B _{wo}	Moisture measured in sample (% by volume) ¹	2.8870	2.8389	2.7882	2.8060
B _{ws}	Saturated moisture content (% by volume)	5.4891	6.5497	6.5502	6.7540
B _w	Actual water vapor in gas (% by volume)	2.8870	2.8389	2.7882	2.8060
√ΔP	Velocity head (√in. H ₂ O)	0.6591	0.6806	0.6789	0.6763
M _d	MW of stack gas, dry (lb/lb-mole)	28.8423	28.8406	28.8391	28.8394
M _s	MW of stack gas, wet (lb/lb-mole)	28.5292	28.5329	28.5369	28.5353
V _s	Stack gas velocity ft/sec)	38.3595	39.8187	39.7157	39.6078
Q _a	Volumetric flow rate, actual (acfm)	1,255	1,303	1,300	1,296
Q _s	Volumetric flow rate, standard (scfm)	1,160	1,191	1,188	1,182
Q _{std}	Volumetric flow rate, dry standard (dscfm)	1,126	1,157	1,155	1,149
Q _a	Volumetric flow rate, actual (acf/hr)	75,319	78,184	77,982	77,770
Q _s	Volumetric flow rate, standard (scf/hr)	69,594	71,479	71,288	70,939
Q _{std}	Volumetric flow rate, dry standard (dscf/hr)	67,585	69,450	69,300	68,949
Q _a	Volumetric flow rate, actual (m ³ /hr)	2,133	2,214	2,208	2,202
Q _s	Volumetric flow rate, standard (m ³ /hr)	1,971	2,024	2,019	2,009
Q _{std}	Volumetric flow rate, dry standard (dry m ³ /hr)	1,914	1,967	1,963	1,953
Q _s	Volumetric flow rate, normal (Nm ³ /hr)	1,837	1,886	1,881	1,872
Q _{std}	Volumetric flow rate, dry normal (Nm ³ /hr)	1,784	1,833	1,829	1,820

Note: O₂ concentrations greater than 20.9% were assumed equivalent to 20.9%. CO₂ concentrations less than 0% were assumed equivalent to 0.0%.

¹ Moisture obtained from M-320 FTIR data.

Sterigenics
Clean Air Project No: 14004
Ceilcote Outlet

USEPA Method 2 (Velocity & Flow Rate) Sampling, Velocity and Moisture Parameters

Run No.		1 - Vacuum Pump Testing	2 - Vacuum Pump Testing	3 - Vacuum Pump Testing	Average
Date (2020)		Jun 25	Jun 25	Jun 25	
Start Time (approx.)		10:15	12:01	13:37	
Stop Time (approx.)		10:18	12:04	13:40	
Sampling Conditions					
C _p	Pitot tube coefficient	0.832	0.832	0.832	
P _g	Static pressure (in. H ₂ O)	-1.380	-1.535	-1.610	
A _s	Sample location area (ft ²)	0.5454	0.5454	0.5454	
P _{bar}	Barometric pressure (in. Hg)	29.08	29.08	29.08	29.0800
O ₂	Oxygen (dry volume %)	20.9000	20.5874	19.2266	20.2380
CO ₂	Carbon dioxide (dry volume %)	0.0000	0.0000	0.0000	0.0000
N ₂ +CO	Nitrogen plus carbon monoxide (dry volume %)	79.1000	79.4126	80.7734	79.7620
T _s	Stack temperature (°F)	87.3750	89.5000	94.6250	90.5000
Flow Results					
P _s	Stack gas pressure, absolute (in. Hg)	28.9785	28.9671	28.9616	28.9691
P _v	Vapor pressure, actual (in. Hg)	1.3022	1.3931	1.6353	1.4435
B _{wo}	Moisture measured in sample (% by volume) ¹	2.7590	2.8952	2.9866	2.8803
B _{ws}	Saturated moisture content (% by volume)	4.4936	4.8093	5.6463	4.9831
B _w	Actual water vapor in gas (% by volume)	2.7590	2.8952	2.9866	2.8803
√ΔP	Velocity head (√in. H ₂ O)	0.6768	0.6979	0.6956	0.6901
M _d	MW of stack gas, dry (lb/lb-mole)	28.8360	28.8235	28.7691	28.8095
M _s	MW of stack gas, wet (lb/lb-mole)	28.5370	28.5101	28.4474	28.4982
V _s	Stack gas velocity ft/sec)	39.1677	40.4892	40.5925	40.0831
Q _a	Volumetric flow rate, actual (acfm)	1,282	1,325	1,328	1,312
Q _s	Volumetric flow rate, standard (scfm)	1,197	1,233	1,224	1,218
Q _{std}	Volumetric flow rate, dry standard (dscfm)	1,164	1,197	1,188	1,183
Q _a	Volumetric flow rate, actual (acf/hr)	76,906	79,500	79,703	78,703
Q _s	Volumetric flow rate, standard (scf/hr)	71,849	73,957	73,447	73,084
Q _{std}	Volumetric flow rate, dry standard (dscf/hr)	69,867	71,816	71,253	70,979
Q _a	Volumetric flow rate, actual (m ³ /hr)	2,178	2,251	2,257	2,229
Q _s	Volumetric flow rate, standard (m ³ /hr)	2,035	2,095	2,080	2,070
Q _{std}	Volumetric flow rate, dry standard (dry m ³ /hr)	1,979	2,034	2,018	2,010
Q _s	Volumetric flow rate, normal (Nm ³ /hr)	1,896	1,952	1,938	1,929
Q _{std}	Volumetric flow rate, dry normal (Nm ³ /hr)	1,844	1,895	1,880	1,873

Note: O₂ concentrations greater than 20.9% were assumed equivalent to 20.9%. CO₂ concentrations less than 0% were assumed equivalent to 0.0%.

¹ Moisture obtained from M-320 FTIR data.

Parameters Table for EtO - Ceilcote Outlet

Testing		Backvent				Aeration				Vacuum Pump			
Run No.		1	2	3	Average	1	2	3	Average	1	2	3	Average
Date (2020)		Jun 24	Jun 24	Jun 24		Jun 24	Jun 24	Jun 24		Jun 25	Jun 25	Jun 25	
Start Time (approx.)		11:29	11:48	12:04		14:22	15:45	17:05		09:56	11:48	13:08	
Stop Time (approx.)		11:48	12:04	12:19		15:28	16:48	18:09		10:32	12:22	13:57	
Process Conditions													
P ₁	Activated Sterilization Chamber(s)	1	1	1		3	3	3		1	2	3	
P ₂	Chamber Number(s)	6	8	10		6, 8, 10	6, 8, 10	6, 8, 10		8	6,10	1, 7, 11	
P ₃	Sterilization Cycle(s)	81	25	63		81, 25, 63	81, 25, 63	81, 25, 63		25	81, 63	12, 25, 78	
P ₄	Ceilcote Liquor Tank Level (in)	186	186	186	186	186	186	186	186	186	186	186	186
P ₅	Ceilcote pH	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
P ₆	Ceilcote Ethylene Glycol Conc. (%)	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
P ₇	AAT Liquor Tank Level (in)	123	123	123	123	123	123	123	123	123	123	123	123
P ₈	AAT pH	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
P ₉	AAT Ethylene Glycol Conc. (%)	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4
Ceilcote Outlet													
Gas Conditions													
O ₂	Oxygen (bias adj., dry volume %)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.6	19.2	20.2
CO ₂	Carbon Dioxide (bias adj., dry volume %)	0.04	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.00	0.00	0.00	0.00
T _S	Sample Temperature (°F)	93.8	93.8	93.8	93.8	99.5	99.5	100.5	99.8	87.4	89.5	94.6	90.5
B _w	Actual water vapor in gas (% by volume)	2.89	2.89	2.89	2.89	2.84	2.79	2.81	2.81	2.76	2.90	2.84	2.83
CH ₄	Methane (ppmwv)	3.12	2.97	2.92	3.00	3.72	3.75	3.59	3.69	2.77	2.33	2.56	2.56
Gas Flow Rate¹													
Q _a	Volumetric flow rate, actual (acfm)	1,255	1,255	1,255	1,255	1,303	1,300	1,296	1,300	1,282	1,325	1,328	1,312
Q _s	Volumetric flow rate, standard (wscfm)	1,160	1,160	1,160	1,160	1,191	1,188	1,182	1,187	1,197	1,233	1,224	1,218
Q _{std}	Volumetric flow rate, dry standard (dscfm)	1,126	1,126	1,126	1,126	1,157	1,155	1,149	1,154	1,164	1,197	1,189	1,183
EtO Results													
C _{sw}	Concentration (ppmwv) ²	<2.95	0.175	0.120	<1.08	<0.0894	<0.0915	<0.172	<0.118	<0.123	<0.114	<0.197	<0.145
C _{sd}	Concentration (ppmdv) ³	<3.04	0.180	0.123	<1.115	<0.0920	<0.0941	<0.177	<0.121	<0.127	<0.118	<0.203	<0.149
C _{lb/dscf}	Concentration (lb/dscf) ³	<3.48E-07	2.06E-08	1.41E-08	<1.27E-07	<1.05E-08	<1.08E-08	<2.02E-08	<1.38E-08	<1.45E-08	<1.35E-08	<2.32E-08	<1.71E-08
C _{lb/scf}	Concentration (lb/scf) ³	<3.38E-07	2.00E-08	1.37E-08	<1.24E-07	<1.02E-08	<1.05E-08	<1.97E-08	<1.34E-08	<1.41E-08	<1.31E-08	<2.26E-08	<1.66E-08
C _{lb/acf}	Concentration (lb/acf) ³	<3.12E-07	1.85E-08	1.26E-08	<1.14E-07	<9.35E-09	<9.56E-09	<1.79E-08	<1.23E-08	<1.32E-08	<1.22E-08	<2.08E-08	<1.54E-08
C _{mg/dscm}	Concentration (mg/dscm) ³	<5.57	0.330	0.225	<2.042	<0.169	<0.172	<0.324	<0.222	<0.232	<0.216	<0.372	<0.273
C _{mg/scm}	Concentration (mg/scm) ³	<5.41	0.320	0.219	<1.983	<0.164	<0.168	<0.315	<0.215	<0.226	<0.210	<0.361	<0.266
C _{mg/acm}	Concentration (mg/acm) ³	<5.00	0.296	0.202	<1.832	<0.150	<0.153	<0.287	<0.197	<0.211	<0.195	<0.333	<0.246
E _{lb/hr}	Emission Rate (lb/hr) ³	<2.35E-02	1.39E-03	9.51E-04	<8.62E-03	<7.31E-04	<7.46E-04	<1.39E-03	<9.57E-04	<1.01E-03	<9.68E-04	<1.66E-03	<1.21E-03
E _{T/yr}	Emission Rate (Ton/yr) ³	<1.03E-01	6.09E-03	4.16E-03	<3.77E-02	<3.20E-03	<3.27E-03	<6.11E-03	<4.19E-03	<4.44E-03	<4.24E-03	<7.26E-03	<5.31E-03
E _{kg/hr}	Mass Rate (kg/hr) ³	<1.07E-02	6.31E-04	4.31E-04	<3.91E-03	<3.31E-04	<3.38E-04	<6.33E-04	<4.34E-04	<4.60E-04	<4.39E-04	<7.51E-04	<5.50E-04

¹ One flow conducted during backvent testing.² '<' indicates at least one concentration measured during run was less than the MDC#2.³ '<' indicates at least one MDC#2 concentration was used in the calculations. '<MDC#2' is considered equal to the MDC#2.

Sterigenics
Clean Air Project No: 14004
Process Stack

USEPA Method 2 (Velocity & Flow Rate) Sampling, Velocity and Moisture Parameters

Run No.		1 - Backvent Testing	1 - Aeration Testing	2 - Aeration Testing	3 - Aeration Testing
Date (2020)		Jun 24	Jun 24	Jun 24	Jun 24
Start Time (approx.)		11:43	14:37	15:53	16:26
Stop Time (approx.)		11:50	14:42	15:58	16:31
Sampling Conditions					
C _p	Pitot tube coefficient	0.832	0.832	0.832	0.832
P _g	Static pressure (in. H ₂ O)	-1.430	-1.500	-1.520	-1.620
A _s	Sample location area (ft ²)	4.2761	4.2761	4.2761	4.2761
P _{bar}	Barometric pressure (in. Hg)	29.10	29.10	29.10	29.10
O ₂	Oxygen (dry volume %)	20.9000	20.9000	20.9000	20.9000
CO ₂	Carbon dioxide (dry volume %)	0.0739	0.0772	0.0742	0.0753
N ₂ +CO	Nitrogen plus carbon monoxide (dry volume %)	79.0261	79.0228	79.0258	79.0247
T _s	Stack temperature (°F)	103.6667	102.7500	104.0000	102.5833
Flow Results					
P _s	Stack gas pressure, absolute (in. Hg)	28.9949	28.9897	28.9882	28.9809
P _v	Vapor pressure, actual (in. Hg)	2.1516	2.0936	2.1731	2.0832
B _{wo}	Moisture measured in sample (% by volume) ¹	2.9843	3.0974	3.1008	3.1077
B _{ws}	Saturated moisture content (% by volume)	7.4207	7.2218	7.4964	7.1881
B _w	Actual water vapor in gas (% by volume)	2.9843	3.0974	3.1008	3.1077
√ΔP	Velocity head (√in. H ₂ O)	0.7640	0.7613	0.7653	0.7564
M _d	MW of stack gas, dry (lb/lb-mole)	28.8478	28.8484	28.8479	28.8481
M _s	MW of stack gas, wet (lb/lb-mole)	28.5241	28.5123	28.5115	28.5109
V _s	Stack gas velocity ft/sec)	44.8600	44.6823	44.9665	44.3926
Q _a	Volumetric flow rate, actual (acfm)	11,509	11,464	11,537	11,390
Q _s	Volumetric flow rate, standard (scfm)	10,448	10,422	10,464	10,354
Q _{std}	Volumetric flow rate, dry standard (dscfm)	10,136	10,099	10,140	10,032
Q _a	Volumetric flow rate, actual (acf/hr)	690,566	687,831	692,206	683,370
Q _s	Volumetric flow rate, standard (scf/hr)	626,868	625,291	627,842	621,231
Q _{std}	Volumetric flow rate, dry standard (dscf/hr)	608,160	605,924	608,373	601,925
Q _a	Volumetric flow rate, actual (m ³ /hr)	19,557	19,480	19,604	19,353
Q _s	Volumetric flow rate, standard (m ³ /hr)	17,753	17,709	17,781	17,594
Q _{std}	Volumetric flow rate, dry standard (dry m ³ /hr)	17,223	17,160	17,229	17,047
Q _s	Volumetric flow rate, normal (Nm ³ /hr)	16,543	16,501	16,569	16,394
Q _{std}	Volumetric flow rate, dry normal (Nm ³ /hr)	16,049	15,990	16,055	15,885

Note: O₂ concentrations greater than 20.9% were assumed equivalent to 20.9%. CO₂ concentrations less than 0% were assumed equivalent to 0.0%.

¹ Moisture obtained from M-320 FTIR data.

Sterigenics
Clean Air Project No: 14004
Process Stack

USEPA Method 2 (Velocity & Flow Rate) Sampling, Velocity and Moisture Parameters

Run No.		1 - Vacuum Pump Testing	2 - Vacuum Pump Testing	3 - Vacuum Pump Testing	Average
Date (2020)		Jun 25	Jun 25	Jun 25	
Start Time (approx.)		10:08	12:06	13:30	
Stop Time (approx.)		10:13	12:10	13:34	
Sampling Conditions					
C _p	Pitot tube coefficient	0.832	0.832	0.832	
P _g	Static pressure (in. H ₂ O)	-1.420	-1.200	-1.355	
A _s	Sample location area (ft ²)	4.2761	4.2761	4.2761	
P _{bar}	Barometric pressure (in. Hg)	29.08	29.08	29.08	29.0800
O ₂	Oxygen (dry volume %)	20.9000	20.9000	20.9000	20.9000
CO ₂	Carbon dioxide (dry volume %)	0.0917	0.0774	0.0791	0.0827
N ₂ +CO	Nitrogen plus carbon monoxide (dry volume %)	79.0083	79.0226	79.0209	79.0173
T _s	Stack temperature (°F)	99.8333	102.4167	104.8333	102.3611
Flow Results					
P _s	Stack gas pressure, absolute (in. Hg)	28.9756	28.9918	28.9804	28.9826
P _v	Vapor pressure, actual (in. Hg)	1.9177	2.0728	2.2275	2.0727
B _{wo}	Moisture measured in sample (% by volume) ¹	2.9162	2.9911	3.0406	2.9826
B _{ws}	Saturated moisture content (% by volume)	6.6185	7.1496	7.6862	7.1514
B _w	Actual water vapor in gas (% by volume)	2.9162	2.9911	3.0406	2.9826
√ΔP	Velocity head (√in. H ₂ O)	0.7592	0.7595	0.7536	0.7574
M _d	MW of stack gas, dry (lb/lb-mole)	28.8507	28.8484	28.8487	28.8492
M _s	MW of stack gas, wet (lb/lb-mole)	28.5342	28.5239	28.5188	28.5256
V _s	Stack gas velocity ft/sec)	44.4332	44.5486	44.3124	44.4314
Q _a	Volumetric flow rate, actual (acfm)	11,400	11,430	11,369	11,399
Q _s	Volumetric flow rate, standard (scfm)	10,412	10,397	10,294	10,368
Q _{std}	Volumetric flow rate, dry standard (dscfm)	10,109	10,086	9,981	10,059
Q _a	Volumetric flow rate, actual (acf/hr)	683,997	685,773	682,137	683,969
Q _s	Volumetric flow rate, standard (scf/hr)	624,741	623,834	617,629	622,068
Q _{std}	Volumetric flow rate, dry standard (dscf/hr)	606,522	605,174	598,849	603,515
Q _a	Volumetric flow rate, actual (m ³ /hr)	19,371	19,421	19,319	19,370
Q _s	Volumetric flow rate, standard (m ³ /hr)	17,693	17,667	17,492	17,617
Q _{std}	Volumetric flow rate, dry standard (dry m ³ /hr)	17,177	17,139	16,960	17,092
Q _s	Volumetric flow rate, normal (Nm ³ /hr)	16,487	16,463	16,299	16,416
Q _{std}	Volumetric flow rate, dry normal (Nm ³ /hr)	16,006	15,970	15,803	15,927

Note: O₂ concentrations greater than 20.9% were assumed equivalent to 20.9%. CO₂ concentrations less than 0% were assumed equivalent to 0.0%.

¹ Moisture obtained from M-320 FTIR data.

Parameters Table for EtO - Process Stack

Testing		Backvent				Aeration				Vacuum Pump			
Run No.		1	2	3	Average	1	2	3	Average	1	2	3	Average
Date (2020)		Jun 24	Jun 24	Jun 24		Jun 24	Jun 24	Jun 24		Jun 25	Jun 25	Jun 25	
Start Time (approx.)		11:29	11:48	12:04		14:22	15:45	17:05		09:56	11:48	13:08	
Stop Time (approx.)		11:48	12:04	12:19		15:28	16:48	18:09		10:32	12:22	13:57	
Process Conditions													
P ₁	Activated Sterilization Chamber(s)	1	1	1		3	3	3		1	2	3	
P ₂	Chamber Number(s)	6	8	10		6, 8, 10	6, 8, 10	6, 8, 10		8	6,10	1, 7, 11	
P ₃	Sterilization Cycle(s)	81	25	63		81, 25, 63	81, 25, 63	81, 25, 63		25	81, 63	12, 25, 78	
P ₄	Ceilcote Liquor Tank Level (in)	186	186	186	186	186	186	186	186	186	186	186	186
P ₅	Ceilcote pH	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
P ₆	Ceilcote Ethylene Glycol Conc. (%)	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
P ₇	AAT Liquor Tank Level (in)	123	123	123	123	123	123	123	123	123	123	123	123
P ₈	AAT pH	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
P ₉	AAT Ethylene Glycol Conc. (%)	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4
Process Stack													
Gas Conditions													
O ₂	Oxygen (bias adj., dry volume %)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
CO ₂	Carbon Dioxide (bias adj., dry volume %)	0.07	0.07	0.07	0.07	0.08	0.07	0.08	0.08	0.09	0.08	0.08	0.08
T _S	Sample Temperature (°F)	103.7	103.7	103.7	103.7	102.8	104.0	102.6	103.1	99.8	102.4	104.8	102.4
B _w	Actual water vapor in gas (% by volume)	2.98	2.98	2.98	2.98	3.10	3.10	3.11	3.10	2.92	2.99	3.04	2.98
CH ₄	Methane (ppmwv)	3.36	3.31	3.27	3.31	3.02	3.08	3.20	3.10	3.37	3.09	2.71	3.06
Gas Flow Rate¹													
Q _a	Volumetric flow rate, actual (acfm)	11,509	11,509	11,509	11,509	11,464	11,537	11,390	11,463	11,400	11,430	11,369	11,399
Q _s	Volumetric flow rate, standard (wscfm)	10,448	10,448	10,448	10,448	10,422	10,464	10,354	10,413	10,412	10,397	10,294	10,368
Q _{std}	Volumetric flow rate, dry standard (dscfm)	10,136	10,136	10,136	10,136	10,099	10,140	10,032	10,090	10,109	10,086	9,981	10,059
EtO Results													
C _{sw}	Concentration (ppmwv) ²	0.0219	0.0153	<0.0111	<0.0161	<0.00540	<0.00860	0.0119	<0.00865	0.0298	0.0121	<0.0056	<0.0158
C _{sd}	Concentration (ppmdv) ³	0.0225	0.0157	<0.0114	<0.0166	<0.00557	<0.00888	0.0123	<0.00893	0.0307	0.0124	<0.0058	<0.0163
C _{lb/dscf}	Concentration (lb/dscf) ³	2.58E-09	1.80E-09	<1.31E-09	<1.89E-09	<6.37E-10	<1.01E-09	1.41E-09	<1.02E-09	3.51E-09	1.42E-09	<6.60E-10	<1.86E-09
C _{lb/scf}	Concentration (lb/scf) ³	2.50E-09	1.75E-09	<1.27E-09	<1.84E-09	<6.17E-10	<9.83E-10	1.37E-09	<9.89E-10	3.41E-09	1.38E-09	<6.40E-10	<1.81E-09
C _{lb/acf}	Concentration (lb/acf) ³	2.27E-09	1.58E-09	<1.15E-09	<1.67E-09	<5.61E-10	<8.92E-10	1.24E-09	<8.98E-10	3.11E-09	1.25E-09	<5.80E-10	<1.65E-09
C _{mg/dscm}	Concentration (mg/dscm) ³	0.0413	0.0288	<0.0209	<0.0303	<0.0102	<0.0162	0.0226	<0.0163	0.0562	0.0228	<0.0106	<0.0298
C _{mg/scm}	Concentration (mg/scm) ³	0.0400	0.0280	<0.0203	<0.0294	<0.0099	<0.0157	0.0219	<0.0158	0.0545	0.0221	<0.0103	<0.0290
C _{mg/acm}	Concentration (mg/acm) ³	0.0364	0.0254	<0.0184	<0.0267	<0.0090	<0.0143	0.0199	<0.0144	0.0498	0.0201	<0.0093	<0.0264
E _{lb/hr}	Emission Rate (lb/hr) ³	1.57E-03	1.09E-03	<7.94E-04	<1.15E-03	<3.86E-04	<6.17E-04	8.48E-04	<6.17E-04	2.13E-03	8.60E-04	<3.95E-04	<1.13E-03
E _{T/yr}	Emission Rate (Ton/yr) ³	6.87E-03	4.79E-03	<3.48E-03	<5.05E-03	<1.69E-03	<2.70E-03	3.72E-03	<2.70E-03	9.32E-03	3.77E-03	<1.73E-03	<4.94E-03
E _{kg/hr}	Mass Rate (kg/hr) ³	7.11E-04	4.96E-04	<3.60E-04	<5.22E-04	<1.75E-04	<2.80E-04	3.85E-04	<2.80E-04	9.65E-04	3.90E-04	<1.79E-04	<5.12E-04

¹ One flow conducted during backvent testing.² '<' indicates at least one concentration measured during run was less than the MDC#2.³ '<' indicates at least one MDC#2 concentration was used in the calculations. '<MDC#2' is considered equal to the MDC#2.

Sterigenics
Clean Air Project No: 14004
Indoor Air Control

USEPA Method 2 (Velocity & Flow Rate) Sampling, Velocity and Moisture Parameters

Run No.		1 - Indoor Air Testing	2 - Indoor Air Testing	3 - Indoor Air Testing	Average
Date (2020)		Jun 26	Jun 26	Jun 26	
Start Time (approx.)		10:04	12:41	14:33	
Stop Time (approx.)		10:11	12:46	14:38	
Sampling Conditions					
C _p	Pitot tube coefficient	0.832	0.832	0.832	
P _g	Static pressure (in. H ₂ O)	-18.20	-18.45	-18.40	
A _s	Sample location area (ft ²)	5.5851	5.5851	5.5851	
P _{bar}	Barometric pressure (in. Hg)	29.20	29.20	29.20	29.2000
O ₂	Oxygen (dry volume %)	20.9000	20.9000	20.9000	20.9000
CO ₂	Carbon dioxide (dry volume %)	0.0799	0.0781	0.0745	0.0775
N ₂ +CO	Nitrogen plus carbon monoxide (dry volume %)	79.0201	79.0219	79.0255	79.0225
T _s	Stack temperature (°F)	95.1250	102.0000	102.0000	99.7083
Flow Results					
P _s	Stack gas pressure, absolute (in. Hg)	27.8618	27.8434	27.8471	27.8507
P _v	Vapor pressure, actual (in. Hg)	1.6607	2.0471	2.0471	1.9183
B _{wo}	Moisture measured in sample (% by volume) ¹	2.2014	2.3253	2.3369	2.2878
B _{ws}	Saturated moisture content (% by volume)	5.9606	7.3521	7.3512	6.8880
B _w	Actual water vapor in gas (% by volume)	2.2014	2.3253	2.3369	2.2878
√ΔP	Velocity head (√in. H ₂ O)	1.1005	1.0957	1.1040	1.1001
M _d	MW of stack gas, dry (lb/lb-mole)	28.8488	28.8485	28.8479	28.8484
M _s	MW of stack gas, wet (lb/lb-mole)	28.6100	28.5962	28.5944	28.6002
V _s	Stack gas velocity ft/sec)	65.3226	65.4776	65.9677	65.5893
Q _a	Volumetric flow rate, actual (acfm)	21,890	21,942	22,106	21,979
Q _s	Volumetric flow rate, standard (scfm)	19,388	19,184	19,330	19,300
Q _{std}	Volumetric flow rate, dry standard (dscfm)	18,961	18,738	18,878	18,859
Q _a	Volumetric flow rate, actual (acf/hr)	1,313,389	1,316,506	1,326,360	1,318,751
Q _s	Volumetric flow rate, standard (scf/hr)	1,163,278	1,151,014	1,159,783	1,158,025
Q _{std}	Volumetric flow rate, dry standard (dscf/hr)	1,137,670	1,124,250	1,132,680	1,131,533
Q _a	Volumetric flow rate, actual (m ³ /hr)	37,196	37,284	37,563	37,348
Q _s	Volumetric flow rate, standard (m ³ /hr)	32,945	32,597	32,846	32,796
Q _{std}	Volumetric flow rate, dry standard (dry m ³ /hr)	32,219	31,839	32,078	32,046
Q _s	Volumetric flow rate, normal (Nm ³ /hr)	30,698	30,375	30,606	30,560
Q _{std}	Volumetric flow rate, dry normal (Nm ³ /hr)	30,023	29,669	29,891	29,861

Note: O₂ concentrations greater than 20.9% were assumed equivalent to 20.9%. CO₂ concentrations less than 0% were assumed equivalent to 0.0%.

¹ Moisture obtained from M-320 FTIR data.

Parameters Table for EtO - Indoor Air Stack

Testing		Indoor Air			Average
Run No.		1	2	3	
Date (2020)		Jun 26	Jun 26	Jun 26	
Start Time (approx.)		10:00	12:36	13:59	
Stop Time (approx.)		11:02	13:37	15:00	
Process Conditions					
P ₁	Activated Sterilization Chamber(s)	1	1	0	
P ₂	Chamber Number(s)	11	10	N/A	
P ₃	Sterilization Cycle(s)	78	63	N/A	
Indoor Air Stack					
Gas Conditions					
O ₂	Oxygen (bias adj., dry volume %)	20.9	20.9	20.9	20.9
CO ₂	Carbon Dioxide (bias adj., dry volume %)	0.08	0.08	0.07	0.08
T _s	Sample Temperature (°F)	95.1	102.0	102.0	99.7
B _w	Actual water vapor in gas (% by volume)	2.20	2.33	2.34	2.29
CH ₄	Methane (ppmwv)	3.09	2.82	3.20	3.04
Gas Flow Rate					
Q _a	Volumetric flow rate, actual (acfm)	21,890	21,942	22,106	21,979
Q _s	Volumetric flow rate, standard (wscfm)	19,388	19,184	19,330	19,300
Q _{std}	Volumetric flow rate, dry standard (dscfm)	18,961	18,738	18,878	18,859
EtO Results					
C _{sw}	Concentration (ppmwv)	0.0264	0.0197	0.0173	0.0211
C _{sd}	Concentration (ppmdv)	0.0270	0.0202	0.0177	0.0216
C _{lb/dscf}	Concentration (lb/dscf)	3.08E-09	2.31E-09	2.02E-09	2.47E-09
C _{lb/scf}	Concentration (lb/scf)	3.02E-09	2.26E-09	1.98E-09	2.42E-09
C _{lb/acf}	Concentration (lb/acf)	2.67E-09	1.97E-09	1.73E-09	2.12E-09
C _{mg/dscm}	Concentration (mg/dscm)	0.0494	0.0370	0.0324	0.0396
C _{mg/scm}	Concentration (mg/scm)	0.0483	0.0362	0.0317	0.0387
C _{mg/acm}	Concentration (mg/acm)	0.0428	0.0316	0.0277	0.0340
E _{lb/hr}	Emission Rate (lb/hr)	3.51E-03	2.60E-03	2.29E-03	2.80E-03
E _{T/yr}	Emission Rate (Ton/yr)	1.54E-02	1.14E-02	1.00E-02	1.23E-02
E _{kg/hr}	Mass Rate (kg/hr)	1.59E-03	1.18E-03	1.04E-03	1.27E-03

End of Appendix Section

APPENDIX D: QA/QC DATA – GENERAL

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Sterigenics

CleanAir Project No. 14004

Aeration/Backvent Outlet

QA/QC Summary - Aeration/Backvent Outlet Sample Train

General

Calibration Gas Data

Function	Compound	Concentration	Cylinder ID	Exp. Date	Uncertainty
Zero/Background	UHP N2	99.999%	T-17745	N/A	N/A
CTS	CO ₂	9.88%	EB0002340	12/26/2026	± 0.2 %/± 0.7 %
QA Analyte	EtO	100.1 ppm	CC716029	11/6/2021	± 1 %
Tracer	SF ₆	5.011 ppm	CC716029	11/6/2021	± 1 %
M-3A	O ₂ /CO ₂	21.43%/21.09%	CC49769	3/18/2025	± 0.1 %/± 0.3 %
M-3A	O ₂ /CO ₂	10.1%/9.88%	EB0002340	12/26/2026	± 0.2 %/± 0.7 %

Instrumentation

Intrument	Technology	Function
MKS FTIR	IR Spectroscopy	EtO, CO ₂ , H ₂ O, CH ₄
Brand Gaus	Zirconium Oxide	O ₂

EPA Method 320 / ASTM D6348-12

Calibration Transfer Standard (CTS)

Location	Testing	Run	CTS Gas	Cert. Value	Pre-Test	CertValue %Diff	Post-Test	CertValue% Diff	Pre-Post%Diff.	Limit (%)
Aeration/Backvent Outlet	Backvent	1	CO ₂	9.88	10.1	1.9%	10.4	4.9%	2.9%	< ±5
Aeration/Backvent Outlet	Backvent	2	CO ₂	9.88	10.1	1.9%	10.4	4.9%	2.9%	< ±5
Aeration/Backvent Outlet	Backvent	3	CO ₂	9.88	10.1	1.9%	10.4	4.9%	2.9%	< ±5
Aeration/Backvent Outlet	Aeration	1	CO ₂	9.88	10.4	4.9%	10.3	4.2%	-0.6%	< ±5
Aeration/Backvent Outlet	Aeration	2	CO ₂	9.88	10.3	4.2%	10.2	3.3%	-0.8%	< ±5
Aeration/Backvent Outlet	Aeration	3	CO ₂	9.88	10.2	3.3%	10.1	1.7%	-1.5%	< ±5
Aeration/Backvent Outlet	Vacuum Pump	1	CO ₂	9.88	10.0	1.3%	10.0	1.0%	-0.3%	< ±5
Aeration/Backvent Outlet	Vacuum Pump	2	CO ₂	9.88	10.0	1.0%	10.0	1.4%	0.4%	< ±5
Aeration/Backvent Outlet	Vacuum Pump	3	CO ₂	9.88	10.0	1.4%	10.0	1.7%	0.3%	< ±5

Dynamic Spiking

Spike No.	1	2
Spike Date (2020)	6/24	6/25
Location	Aer/BV Outlet	Aer/BV Outlet
Testing Interval	Aer/BV Pre-Run 1	Vac Pump Pre-Run 1
Spike Start Time	8:14:57	8:12:29
Spike Stop Time	8:21:28	8:27:12
QA Analyte	EtO	EtO
QA Cylinder Conc. (ppm)	100.1	100.1
Tracer	SF ₆	SF ₆
Tracer Cylinder Conc. (ppm)	5.011	5.011
QA Direct (ppm)	99.9	99.4
Tracer Direct (ppm)	5.07	5.06
QA Native Conc. (ppm)	-0.11	2.51
Tracer Native Conc. (ppm)	0.004	-0.001
QA Spike Conc. (ppm)	8.10	11.93
Tracer Spike Conc. (ppm)	0.414	0.476
Dilution Factor	0.081	0.094
Expected Spike Conc. (ppm)	7.98	11.65
Spike Bias (ppm)	0.12	0.28
Spike Recovery (%) (70-130%)	101.5%	102.4%

Manual Validation

Location	Testing	Run	SPC#	Date	Time	Analyte	Reported (ppmw)	Manual (ppmw)	Difference (ppmw)	%Error	Limit (%)
Aeration/Backvent Outlet	Backvent	1	0409	6/24	11:38	EtO	6.686	6.601	0.085	1.3%	< ±20
Aeration/Backvent Outlet	Backvent	2	0427	6/24	11:58	EtO	10.946	10.887	0.059	0.5%	< ±20
Aeration/Backvent Outlet	Backvent	3	0444	6/24	12:16	EtO	13.834	13.365	0.469	3.5%	< ±20
Aeration/Backvent Outlet	Aeration	1	0613	6/24	14:36	EtO	7.832	7.488	0.344	4.6%	< ±20
Aeration/Backvent Outlet	Aeration	2	0746	6/24	16:38	EtO	7.461	7.685	-0.224	-2.9%	< ±20
Aeration/Backvent Outlet	Aeration	3	0806	6/24	17:23	EtO	6.950	6.897	0.053	0.8%	< ±20
Aeration/Backvent Outlet	Vacuum Pump	1	1279	6/25	10:16	EtO	2.320	2.271	0.049	2.2%	< ±20
Aeration/Backvent Outlet	Vacuum Pump	2	1395	6/25	12:17	EtO	2.047	2.106	-0.059	-2.8%	< ±20
Aeration/Backvent Outlet	Vacuum Pump	3	1491	6/25	13:20	EtO	2.004	1.893	0.111	5.9%	< ±20

Sterigenics
CleanAir Project No. 14004
Ceillcote Outlet

QA/QC Summary - Inlet Sample Train

General

Calibration Gas Data

Function	Compound	Concentration	Cylinder ID	Exp. Date	Uncertainty
Zero/Background	UHP N2	99.999%	T-17745	N/A	N/A
CTS	CO ₂	9.88%	EB0002340	12/26/2026	± 0.2 %/± 0.7 %
QA Analyte	EtO	100.1 ppm	CC716029	11/6/2021	± 1 %
Tracer	SF ₆	5.011 ppm	CC716029	11/6/2021	± 1 %
M-3A	O ₂ /CO ₂	21.43%/21.09%	CC49769	3/18/2025	± 0.1 %/± 0.3 %
M-3A	O ₂ /CO ₂	10.1%/9.88%	EB0002340	12/26/2026	± 0.2 %/± 0.7 %

Instrumentation

Intrument	Technology	Function
MKS FTIR	IR Spectroscopy	EtO, CO ₂ , H ₂ O, CH ₄
Brand Gaus	Zirconium Oxide	O ₂

EPA Method 320 / ASTM D6348-12

Calibration Transfer Standard (CTS)

Location	Testing	Run	CTS Gas	Cert. Value	Pre-Test	CertValue %Diff	Post-Test	CertValue% Diff	Pre-Post%Diff.	Limit (%)
Ceillcote Outlet	Backvent	1	CO ₂	9.88	9.79	-0.9%	9.91	0.3%	1.3%	< ±5
Ceillcote Outlet	Backvent	2	CO ₂	9.88	9.79	-0.9%	9.91	0.3%	1.3%	< ±5
Ceillcote Outlet	Backvent	3	CO ₂	9.88	9.79	-0.9%	9.91	0.3%	1.3%	< ±5
Ceillcote Outlet	Aeration	1	CO ₂	9.88	9.91	0.3%	9.96	0.9%	0.5%	< ±5
Ceillcote Outlet	Aeration	2	CO ₂	9.88	9.96	0.9%	9.94	0.7%	-0.2%	< ±5
Ceillcote Outlet	Aeration	3	CO ₂	9.88	9.94	0.7%	9.89	0.1%	-0.5%	< ±5
Ceillcote Outlet	Vacuum Pump	1	CO ₂	9.88	9.90	0.2%	9.90	0.2%	0.0%	< ±5
Ceillcote Outlet	Vacuum Pump	2	CO ₂	9.88	9.90	0.2%	9.89	0.1%	0.0%	< ±5
Ceillcote Outlet	Vacuum Pump	3	CO ₂	9.88	9.89	0.1%	9.92	0.4%	0.3%	< ±5

Dynamic Spiking

Spike No.	1	2
Spike Date (2020)	6/24	6/25
Location	Ceillcote Outlet	Ceillcote Outlet
Testing Interval	Aer/BV Pre-Run 1	Vac Pump Pre-Run 1
Spike Start Time	8:55:42	8:30:13
Spike Stop Time	9:14:17	8:37:02
QA Analyte	EtO	EtO
QA Cylinder Conc. (ppm)	100.1	100.1
Tracer	SF ₆	SF ₆
Tracer Cylinder Conc. (ppm)	5.011	5.011
QA Direct (ppm)	96.2	95.6
Tracer Direct (ppm)	5.10	5.10
QA Native Conc. (ppm)	0.00	-0.02
Tracer Native Conc. (ppm)	0.007	0.006
QA Spike Conc. (ppm)	7.98	8.70
Tracer Spike Conc. (ppm)	0.418	0.461
Dilution Factor	0.081	0.089
Expected Spike Conc. (ppm)	7.75	8.51
Spike Bias (ppm)	0.23	0.18
Spike Recovery (%) (70-130%)	102.9%	102.2%

Manual Validation

Location	Testing	Run	SPC#	Date	Time	Analyte	Reported (ppmwv)	Manual (ppmwv)	Difference (ppmwv)	%Error	Limit (%)
Ceilcote Outlet	Backvent	1	0544	6/24	11:38	EtO	0.091	0.110	-0.019	-17.6%	< ±20
Ceilcote Outlet	Backvent	2	0556	6/24	11:50	EtO	0.386	0.358	0.028	7.9%	< ±20
Ceilcote Outlet	Backvent	3	0580	6/24	12:15	EtO	0.148	0.167	-0.019	-11.1%	< ±20
Ceilcote Outlet ¹	Aeration	1	0767	6/24	15:02	EtO	0.070	0.113	-0.043	-38.0%	< ±20
Ceilcote Outlet	Aeration	2	0877	6/24	16:16	EtO	0.095	0.116	-0.021	-18.4%	< ±20
Ceilcote Outlet	Aeration	3	0995	6/24	17:49	EtO	0.215	0.254	-0.039	-15.5%	< ±20
Ceilcote Outlet	Vacuum Pump	1	0389	6/25	10:11	EtO	0.051	<MDC#2 ²	N/A	<MDC#2 ²	< ±20
Ceilcote Outlet	Vacuum Pump	2	0518	6/25	12:01	EtO	0.181	0.159	0.022	13.5%	< ±20
Ceilcote Outlet	Vacuum Pump	3	0631	6/25	13:18	EtO	0.085	0.094	-0.009	-10.0%	< ±20

²%Error >20% but difference was <MDC#2.¹MDC#2 = 58 ppb. No detectable improvement from 0.000 ppm in residuals less than MDC#2.

Sterigenics

CleanAir Project No. 14004

Process Stack & Indoor Air Stack

QA/QC Summary - Starboost Sample Train

General

Calibration Gas Data

Function	Compound	Concentration	Cylinder ID	Exp. Date	Uncertainty
Zero/Background	UHP N2	99.999%	T-17745	N/A	N/A
CTS	Methane	85.5 ppm	CC31745	8/13/2027	± 0.5 %
CTS	Methane	87.2 ppm	CC19053	3/6/2025	± 0.7 %
QA Analyte	EtO	2.165 ppm	AAL072570	12/20/2020	± 5 %
Tracer	Ethane	499.9 ppm	AAL072570	12/20/2020	± 2 %
M-3A	O ₂ /CO ₂	21.43%/21.09%	CC49769	3/18/2025	± 0.1 %/± 0.3 %
M-3A	O ₂ /CO ₂	10.1%/9.88%	EB0002340	12/26/2026	± 0.2 %/± 0.7 %

Instrumentation

Intrument	Technology	Function
MKS Starboost FTIR	IR Spectroscopy with aromatic optical filter	EtO, H ₂ O, CH ₄ , C ₂ H ₆
Servomex 1420C	Paramagnetic	O ₂
Servomex 1415C	NDIR	CO ₂

EPA Method 320 / ASTM D6348-12

Calibration Transfer Standard (CTS)

Location	Testing	Run	CTS Gas	Cert. Value	Pre-Test	CertValue %Diff	Post-Test	CertValue% Diff	Pre-Post%Diff.	Limit (%)
Process Stack	Backvent	1	CH ₃	85.5	85.1	-0.5%	85.3	-0.2%	0.2%	< ± 5
Process Stack	Backvent	2	CH ₃	85.5	85.1	-0.5%	85.3	-0.2%	0.2%	< ± 5
Process Stack	Backvent	3	CH ₃	85.5	85.1	-0.5%	85.3	-0.2%	0.2%	< ± 5
Process Stack	Aeration	1	CH ₃	85.5	85.3	-0.2%	84.9	-0.7%	-0.4%	< ± 5
Process Stack	Aeration	2	CH ₃	85.5	84.9	-0.7%	85.0	-0.6%	0.0%	< ± 5
Process Stack	Aeration	3	CH ₃	85.5	85.0	-0.6%	85.0	-0.6%	0.0%	< ± 5
Process Stack	Vacuum Pump	1	CH ₃	85.5	84.8	-0.8%	84.5	-1.2%	-0.4%	< ± 5
Process Stack	Vacuum Pump	2	CH ₃	87.2	86.7	-0.6%	86.7	-0.5%	0.1%	< ± 5
Process Stack	Vacuum Pump	3	CH ₃	87.2	86.7	-0.5%	86.7	-0.6%	-0.1%	< ± 5
Indoor Air Stack	Indoor Air	1	CH ₃	87.2	86.6	-0.7%	86.8	-0.5%	0.2%	< ± 5
Indoor Air Stack	Indoor Air	2	CH ₃	87.2	86.8	-0.5%	86.6	-0.6%	-0.2%	< ± 5
Indoor Air Stack	Indoor Air	3	CH ₃	87.2	86.6	-0.6%	86.8	-0.4%	0.2%	< ± 5

Dynamic Spiking

Spike No.	1	2	3
Spike Date (2020)	6/24	6/25	6/26
Location	Process Stack	Process Stack	IA Stack
Testing	Aer/BV	Vac Pump	IA
Interval	Pre-Run 1	Pre-Run 1	Pre-Run 1
Spike Start Time	08:20:37	09:18:35	07:55:10
Spike Stop Time	08:31:20	09:24:10	08:01:44
QA Analyte	EtO	EtO	EtO
QA Cylinder Conc. (ppm)	2.165	2.165	2.165
Tracer	Ethane	Ethane	Ethane
Tracer Cylinder Conc. (ppm)	499.9	499.9	499.9
QA Direct (ppm)	2.134	2.125	2.123
Tracer Direct (ppm)	519.6	517.2	517.1
QA Native Conc. (ppm)	0.017	0.024	0.031
Tracer Native Conc. (ppm)	0.25	0.25	0.02
QA Spike Conc. (ppm)	0.199	0.171	0.210
Tracer Spike Conc. (ppm)	49.8	43.4	49.4
Dilution Factor	0.095	0.083	0.096
Expected Spike Conc. (ppm)	0.219	0.200	0.231
Spike Bias (ppm)	-0.020	-0.029	-0.021
Spike Recovery (%) (70-130%)	90.8%	85.7%	90.8%

Manual Validation

Location	Testing	Run	SPC#	Date	Time	Analyte	Reported (ppmw)	Manual (ppmw)	Difference (ppmw)	%Error	Limit (%)
Process Stack	Backvent	1	0765	6/24	11:36	EtO	0.0366	0.0378	-0.0012	-3.2%	< ±20
Process Stack	Backvent	2	0785	6/24	11:57	EtO	0.0066	0.0060	0.0006	10.0%	< ±20
Process Stack	Backvent	3	0801	6/24	12:14	EtO	0.0191	0.0184	0.0007	3.8%	< ±20
Process Stack	Aeration	1	0043	6/24	15:00	EtO	-0.0030	<MDC#2 ¹	N/A	<MDC#2 ¹	< ±20
Process Stack ²	Aeration	2	0167	6/24	16:42	EtO	0.0146	0.0121	0.0025	20.7%	< ±20
Process Stack	Aeration	3	0218	6/24	17:08	EtO	0.0084	0.0096	-0.0012	-12.5%	< ±20
Process Stack	Vacuum Pump	1	0477	6/25	10:24	EtO	0.0321	0.0342	-0.0021	-6.1%	< ±20
Process Stack	Vacuum Pump	2	0627	6/25	11:50	EtO	0.0127	0.0124	0.0003	2.4%	< ±20
Process Stack ²	Vacuum Pump	3	0747	6/25	13:35	EtO	0.0031	0.0068	-0.0037	-54.4%	< ±20
Indoor Air Stack	Indoor Air	1	0183	6/26	10:45	EtO	0.0271	0.0247	0.0024	9.7%	< ±20
Indoor Air Stack	Indoor Air	2	0349	6/26	13:21	EtO	0.0208	0.0236	-0.0028	-11.9%	< ±20
Indoor Air Stack	Indoor Air	3	0442	6/26	14:36	EtO	0.0182	0.0185	-0.0003	-1.6%	< ±20

¹MDC#2 = 4.9 ppb. No detectable improvement from 0.000 ppm in residuals less than MDC#2.

²%Error >20% but difference was <MDC#2.

Sterigenics
CleanAir Project No. 14004
Aeration/Backvent Outlet

June 24, 2020
Start Time 12:52
Stop Time 13:02

MDC#2 Study

MDC#2 Study for EtO - Aeration/Backvent Outlet Sample Train

Analysis Description: Starboost FTIR
Asset #: 210735

FTIR Cell Volume (ml): 200
Sample Flow Rate (lpm): 5.0
Min. Spectra Acquisition (s-1): 15
Min. Indep. Samples per Spectrum: 6.25

		H2O (ppmwv)	CO2 (%wv)	EtO (ppmwv)	Methane (ppmwv)
3 x RMS		0.1	0.0089	0.1836	0.1086
Date	Time				
072320 201702					
6/24	12:52:52	2.429	0.0143	-0.2361	1.874
6/24	12:53:58	2.433	0.0158	-0.2458	1.816
6/24	12:55:02	2.429	0.0136	-0.1475	1.819
6/24	12:56:07	2.457	0.0144	-0.2848	1.848
6/24	12:57:11	2.458	0.0157	-0.1966	1.842
6/24	12:58:18	2.473	0.0128	-0.2114	1.815
6/24	12:59:22	2.428	0.0158	-0.2510	1.875
6/24	13:00:25	2.417	0.0173	-0.3863	1.845
6/24	13:01:30	2.416	0.0183	-0.2244	1.913
6/24	13:02:33	2.406	0.0069	-0.2950	1.921

* Per ref. method procedures in ASTM D6348-12, the MCD#2 for EtO is 183.6 ppb

EtO Stratification Check

Deviation Basis

% deviation from avg.

Point	2-02	2-01	2-03
Average Concentration	6.854	6.424	6.265
% deviation ($\pm 5\%$)	5.2	-1.4	-3.8

Sampled at each point for at least
2 x system response time

Response Time (sec) 120

Results

Mean ppmwv	6.514
Max. difference	-0.340 <0.5 ppm
Number of points $\pm 5\%$	1
Number of points $\pm 10\%$	0
Number of points > 0.5 ppm	0

* Per Referencing USEPA Method 7E, sampling can occur at a single point.

* Long Line Sampling Points = 16.7, 50.0 and 83.3 % of the measurement line (stack diameter)

Channel 1
EtO
Outlet
ppmwv

Date	Time	ppmwv	
072320	201702		
6/24	11:36:32	7.1989	Port 2, Point 2
6/24	11:37:38	6.8521	
6/24	11:38:42	6.6864	
6/24	11:39:47	6.6793	
6/24	11:40:51	6.5077	Port 2, Point 1
6/24	11:41:55	6.4258	
6/24	11:42:59	6.3795	
6/24	11:44:03	6.3813	
6/24	11:45:07	6.3925	Port 2, Point 3
6/24	11:46:12	6.1278	
6/24	11:47:16	6.3248	
6/24	11:48:22	6.2156	

Sterigenics
CleanAir Project No. 14004
Ceilcote Outlet

June 24, 2020
Start Time 12:52
Stop Time 13:01

MDC#2 Study

MDC#2 Study for EtO - Ceilcote Outlet Sample Train

Analysis Description: Starboost FTIR
Asset #: 210736

FTIR Cell Volume (ml): 200
Sample Flow Rate (lpm): 5.0
Min. Spectra Acquisition (s-1): 15
Min. Indep. Samples per Spectrum: 6.25

		H2O (ppmwv)	CO2 (%wv)	EtO (ppmwv)	Methane (ppmwv)
3 x RMS		0.1	0.0107	0.0580	0.0769
Date	Time				
072320 201702					
6/24	12:52:23	2.470	0.0336	-0.0569	1.751
6/24	12:53:26	2.447	0.0236	-0.0542	1.754
6/24	12:54:28	2.446	0.0341	-0.0455	1.802
6/24	12:55:31	2.471	0.0271	-0.0498	1.815
6/24	12:56:34	2.486	0.0265	-0.0732	1.797
6/24	12:57:37	2.495	0.0246	-0.0208	1.761
6/24	12:58:40	2.475	0.0292	-0.0280	1.812
6/24	12:59:43	2.442	0.0266	-0.0832	1.816
6/24	13:00:45	2.439	0.0231	-0.0772	1.779
6/24	13:01:49	2.423	0.0280	-0.0651	1.758

* Per ref. method procedures in ASTM D6348-12, the MCD#2 for EtO is 58 ppb

Sterigenics
CleanAir Project No. 14004
Ceilcote Outlet

June 24, 2020
Start Time 11:33
Stop Time 11:45

EtO Stratification Check

Deviation Basis

% deviation from avg.

Point	2-02	2-01	2-03
Average Concentration	0.070	0.094	0.208
% deviation ($\pm 5\%$)	-43.2	-24.3	67.6

Sampled at each point for at least
2 x system response time

Response Time (sec) 120

Results

Mean ppmwv	0.124
Max. difference	-0.084 <0.5 ppm
Number of points $\pm 5\%$	3
Number of points $\pm 10\%$	3
Number of points > 0.5 ppm	0

* Per Referencing USEPA Method 7E, sampling can occur at a single point.

* Long Line Sampling Points = 16.7, 50.0 and 83.3 % of the measurement line (stack diameter)

Channel 1
EtO
Outlet
ppmwv

Date	Time		
072320 201702			
6/24	11:33:59	0.0511	Port 2, Point 2
6/24	11:35:01	0.0708	
6/24	11:36:04	0.0606	
6/24	11:37:07	0.0993	
6/24	11:38:10	0.0906	Port 2, Point 1
6/24	11:39:13	0.0834	
6/24	11:40:16	0.0903	
6/24	11:41:18	0.1113	
6/24	11:42:21	0.0889	Port 2, Point 3
6/24	11:43:24	0.1150	
6/24	11:44:27	0.0747	
6/24	11:45:30	0.5531	

EtO Stratification Check

Deviation Basis

% deviation from avg.

Point	2-02	2-01	2-03
Average Concentration	0.031	0.018	0.011
% deviation ($\pm 5\%$)	55.5	-9.8	-45.7

Sampled at each point for at least
2 x system response time

Response Time (sec) 120

Results

<i>Mean ppmwv</i>	<i>0.020</i>	
<i>Max. difference</i>	<i>-0.020</i>	<0.5 ppm

Number of points $\pm 5\%$ **3**

Number of points $\pm 10\%$ **2**

* Per Referencing USEPA Method 7E, sampling can occur at a single point.

* Long Line Sampling Points = 16.7, 50.0 and 83.3 % of the measurement line (stack diameter)

Channel 1
EtO
Outlet
ppmwv

Date	Time		
072320 201702			
6/24	11:33:32	0.0372	Port 2, Point 2
6/24	11:34:38	0.0268	
6/24	11:35:37	0.0203	
6/24	11:36:46	0.0366	
6/24	11:37:49	0.0350	
6/24	11:38:51	0.0261	Port 2, Point 1 => Closest to Average
6/24	11:39:50	0.0200	
6/24	11:40:49	0.0171	
6/24	11:41:52	0.0138	
6/24	11:42:55	0.0134	
6/24	11:43:54	0.0113	Port 2, Point 3
6/24	11:45:04	0.0105	
6/24	11:46:03	0.0121	
6/24	11:47:09	0.0119	
6/24	11:48:08	0.0086	

EtO Stratification Check

Deviation Basis

% deviation from avg.

Point	1-02	1-01	1-03
Average Concentration	0.024	0.032	0.023
% deviation ($\pm 5\%$)	-9.5	21.8	-12.3

Sampled at each point for at least
2 x system response time

Response Time (sec) 120

Results

<i>Mean ppmwv</i>	0.026	
<i>Max. difference</i>	0.008	<0.5 ppm
Number of points $\pm 5\%$	3	
Number of points $\pm 10\%$	2	

* Per Referencing USEPA Method 7E, sampling can occur at a single point.

* Long Line Sampling Points = 16.7, 50.0 and 83.3 % of the measurement line (stack diameter)

		Channel	1	
		EtO Outlet ppmwv		
Date	Time			
072320 201702				
6/26	10:01:13	0.0163	Port 1, Point 2 => closest to the average	
6/26	10:02:15	0.0190		
6/26	10:03:18	0.0187		
6/26	10:04:17	0.0170		
6/26	10:05:23	0.0161		
6/26	10:06:22	0.0202		
6/26	10:07:21	0.0207		
6/26	10:08:20	0.0217		
6/26	10:09:30	0.0200		
6/26	10:10:32	0.0225		
6/26	10:11:35	0.0264		
6/26	10:12:41	0.0263		
6/26	10:13:47	0.0301		
6/26	10:14:46	0.0287		
6/26	10:15:52	0.0265		
6/26	10:16:55	0.0265		
6/26	10:17:54	0.0311		
6/26	10:18:56	0.0314		
6/26	10:19:59	0.0269		
6/26	10:21:01	0.0316		
6/26	10:22:00	0.0328	Port 1, Point 1	
6/26	10:23:03	0.0307		
6/26	10:24:09	0.0306		
6/26	10:25:12	0.0337		
6/26	10:26:14	0.0318		
6/26	10:27:17	0.0345		
6/26	10:28:20	0.0329		
6/26	10:29:29	0.0324		
6/26	10:30:32	0.0314		
6/26	10:31:38	0.0334		
6/26	10:32:37	0.0333		
6/26	10:33:50	0.0305		
6/26	10:34:52	0.0317		
6/26	10:35:55	0.0351		

EtO Stratification Check

Deviation Basis

% deviation from avg.

Sampled at each point for at least
2 x system response time

	Point	1-02	1-01	1-03
6/26	10:37:01	0.0334	Port 1, Point 3	
6/26	10:38:07	0.0323		
6/26	10:39:06	0.0307		
6/26	10:40:12	0.0314		
6/26	10:41:15	0.0292		
6/26	10:42:17	0.0306		
6/26	10:43:20	0.0287		
6/26	10:44:22	0.0291		
6/26	10:45:25	0.0271		
6/26	10:46:27	0.0274		
6/26	10:47:34	0.0267		
6/26	10:48:36	0.0281		
6/26	10:49:35	0.0242		
6/26	10:50:34	0.0236		
6/26	10:51:33	0.0228		
6/26	10:52:36	0.0227		
6/26	10:53:35	0.0187		
6/26	10:54:48	0.0235		
6/26	10:55:51	0.0210		
6/26	10:56:50	0.0203		
6/26	10:57:52	0.0214		
6/26	10:58:55	0.0237		
6/26	10:59:54	0.0186		
6/26	11:00:56	0.0191		
6/26	11:01:59	0.0174		
6/26	11:02:58	0.0189		

Sterigenics
CleanAir Project No. 14004
Process Stack & Indoor Air Stack

June 24, 2020
Start Time 12:58:20
Stop Time 13:07:44

MDC#2 Study

MDC#2 Study for EtO - Process Stack & Indoor Air Stack Sample Train

Analysis Description: Starboost FTIR
Asset #: 211136

FTIR Cell Volume (ml): 200
Sample Flow Rate (lpm): 5.0
Min. Spectra Acquisition (s-1): 15
Min. Indep. Samples per Spectrum: 6.25

		H2O (ppmwv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)
3 x RMS		430.9	0.0135	0.0049	0.0366
Date	Time				
072320 201702					
6/24	12:58:20	21936	0.0053	-0.0028	2.318
6/24	12:59:23	21683	0.0024	-0.0007	2.318
6/24	13:00:22	21758	-0.0012	-0.0003	2.307
6/24	13:01:31	21519	0.0000	0.0000	2.292
6/24	13:02:30	21650	0.0058	-0.0022	2.302
6/24	13:03:29	21737	0.0024	-0.0007	2.315
6/24	13:04:35	21623	0.0021	0.0033	2.298
6/24	13:05:35	21585	-0.0086	-0.0005	2.290
6/24	13:06:38	21601	-0.0063	0.0001	2.301
6/24	13:07:44	21986	0.0033	-0.0025	2.330

* Per ref. method procedures in ASTM D6348-12, the MCD#2 for EtO is 4.9 ppb

Sterigenics

CleanAir Project No. 14004

Aeration/Backvent Outlet - Aeration/Backvent Testing

CleanAir Reference Method CEMS QA/QC Results

Channel:	1	2
Constituent:	O2	CO2
Location:	Aeration/ Backvent	Aeration/ Backvent
	Outlet	Outlet
Analyzer Calibration Error as Percent of Calibration Span Value ($\pm 2\%$) (07:33 - 08:14)		
Zero	-0.1%	0.1%
Low	N/A	N/A
Mid	0.0%	0.9%
High	0.1%	-1.2%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 00 (08:08 - 08:14)		
Zero	1.1%	0.8%
Upscale	0.0%	0.0%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 01 (12:40 - 12:43)		
Zero	0.4%	0.2%
Upscale	-0.5%	1.5%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	-0.7%	-0.7%
Upscale	-0.6%	1.5%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 02 (15:31 - 15:35)		
Zero	0.4%	0.1%
Upscale	-1.0%	1.2%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	-0.4%	-0.4%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 03 (16:55 - 16:59)		
Zero	0.3%	0.1%
Upscale	-1.2%	0.7%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	-0.2%	-0.5%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 04 (18:14 - 18:18)		
Zero	0.3%	0.1%
Upscale	-1.3%	-0.1%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	-0.1%	-0.8%

Sterigenics

CleanAir Project No. 14004

Aeration/Backvent Outlet - Vacuum Pump Testing

CleanAir Reference Method CEMS QA/QC Results

Channel:	1	2
Constituent:	O2	CO2
Location:	Aeration/ Backvent Outlet	Aeration/ Backvent Outlet
Analyzer Calibration Error as Percent of Calibration Span Value ($\pm 2\%$) (07:37 - 07:47)		
Zero	0.1%	0.2%
Low	N/A	N/A
Mid	0.3%	1.1%
High	-0.2%	-2.0%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 00 (08:00 - 08:04)		
Zero	0.2%	-0.1%
Upscale	0.1%	-0.6%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 01 (11:10 - 11:13)		
Zero	0.2%	-0.2%
Upscale	-0.4%	-0.6%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	-0.1%
Upscale	-0.5%	-0.1%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 02 (12:55 - 12:59)		
Zero	0.2%	-0.1%
Upscale	-0.4%	-0.4%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.1%	0.1%
Upscale	-0.1%	0.2%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 03 (14:18 - 14:23)		
Zero	0.2%	-0.2%
Upscale	-0.5%	-0.3%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	-0.1%	-0.1%
Upscale	-0.1%	0.1%

Sterigenics

CleanAir Project No. 14004

Ceillcote Outlet - Aeration/Backvent Testing

CleanAir Reference Method CEMS QA/QC Results

Channel:	1	2
Constituent:	O2	CO2
Location:	Ceillcote	Ceillcote
	Outlet	Outlet
Analyzer Calibration Error as Percent of Calibration Span Value ($\pm 2\%$) (07:54 - 08:00)		
Zero	0.0%	-0.1%
Low	N/A	N/A
Mid	0.1%	1.0%
High	0.2%	-0.9%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 00 (08:04 - 08:08)		
Zero	0.5%	0.0%
Upscale	0.0%	-1.3%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 01 (12:41 - 12:45)		
Zero	0.4%	0.0%
Upscale	0.4%	-0.8%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	-0.1%	0.1%
Upscale	0.4%	0.6%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 02 (15:32 - 15:36)		
Zero	0.5%	0.1%
Upscale	0.3%	-0.6%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.1%	0.0%
Upscale	-0.1%	0.1%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 03 (16:56 - 17:00)		
Zero	0.4%	0.1%
Upscale	0.4%	-0.6%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	-0.1%	0.0%
Upscale	0.2%	0.0%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 04 (18:14 - 18:20)		
Zero	0.4%	0.1%
Upscale	0.4%	-0.8%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	0.0%	-0.2%

Sterigenics
CleanAir Project No. 14004
Ceilcote Outlet - Vacuum Pump Testing

CleanAir Reference Method CEMS QA/QC Results

Channel:	1	2
Constituent:	O2	CO2
Location:	Ceilcote Outlet	Ceilcote Outlet
Analyzer Calibration Error as Percent of Calibration Span Value ($\pm 2\%$) (07:34 - 07:44)		
Zero	0.1%	0.0%
Low	N/A	N/A
Mid	0.2%	0.7%
High	0.4%	-1.2%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 00 (07:58 - 08:04)		
Zero	0.6%	0.3%
Upscale	0.5%	-0.6%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 01 (11:05 - 11:10)		
Zero	0.6%	0.3%
Upscale	0.5%	-0.6%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	0.0%	-0.1%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 02 (12:55 - 12:59)		
Zero	0.5%	0.1%
Upscale	0.5%	-0.6%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	-0.1%	-0.1%
Upscale	0.0%	0.0%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 03 (14:18 - 14:22)		
Zero	0.5%	0.2%
Upscale	0.5%	-0.6%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	0.0%	0.0%

Sterigenics

CleanAir Project No. 14004

Process Stack - Aeration/Backvent Testing

CleanAir Reference Method CEMS QA/QC Results

Channel:	1	2
Constituent:	O2	CO2
Location:	Process Stack	Process Stack
Analyzer Calibration Error as Percent of Calibration Span Value ($\pm 2\%$) (07:38 - 07:45)		
Zero	0.0%	0.1%
Low	N/A	N/A
Mid	-1.3%	-0.7%
High	0.4%	1.0%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 00 (06:50 - 08:11)		
Zero	0.0%	0.0%
Upscale	-1.0%	-1.7%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 01 (12:35 - 12:47)		
Zero	0.0%	-0.1%
Upscale	-1.0%	-1.5%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	-0.1%
Upscale	-0.1%	0.2%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 02 (15:29 - 15:43)		
Zero	0.1%	0.0%
Upscale	-1.0%	-1.5%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.1%	0.1%
Upscale	0.1%	0.0%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 03 (16:50 - 17:03)		
Zero	0.1%	-0.1%
Upscale	-1.0%	-1.6%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	0.0%	-0.1%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 04 (18:17 - 18:23)		
Zero	0.0%	0.0%
Upscale	-0.9%	-1.6%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	0.1%	0.0%

Sterigenics
CleanAir Project No. 14004
Process Stack - Vacuum Pump Testing

CleanAir Reference Method CEMS QA/QC Results

Channel:	1	2
Constituent:	O2	CO2
Location:	Process Stack	Process Stack
Analyzer Calibration Error as Percent of Calibration Span Value ($\pm 2\%$) (07:27 - 07:35)		
Zero	0.1%	0.0%
Low	N/A	N/A
Mid	-0.8%	-0.5%
High	1.0%	0.9%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 00 (07:47 - 07:54)		
Zero	0.2%	0.0%
Upscale	-2.4%	-4.0%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 01 (11:02 - 11:17)		
Zero	0.2%	0.0%
Upscale	-1.7%	-2.4%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	0.8%	1.6%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 02 (12:52 - 13:05)		
Zero	0.0%	0.0%
Upscale	-2.0%	-2.1%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	-0.1%	0.0%
Upscale	-0.3%	0.3%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 03 (14:14 - 14:27)		
Zero	0.0%	0.0%
Upscale	-2.0%	-2.3%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	0.0%	-0.2%

Sterigenics
CleanAir Project No. 14004
Indoor Air Stack - Indoor Air Testing

CleanAir Reference Method CEMS QA/QC Results

Channel:	1	2
Constituent:	O2	CO2
Location:	Indoor Air	Indoor Air
	Stack	Stack
Analyzer Calibration Error as Percent of Calibration Span Value ($\pm 2\%$) (07:25 - 07:32)		
Zero	0.1%	0.1%
Low	N/A	N/A
Mid	-0.5%	0.4%
High	0.7%	1.5%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 00 (07:32 - 07:48)		
Zero	0.2%	0.0%
Upscale	-2.4%	-3.5%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 01 (11:03 - 11:17)		
Zero	0.1%	0.0%
Upscale	-2.3%	-3.5%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	0.1%	0.0%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 02 (13:39 - 13:51)		
Zero	0.2%	0.0%
Upscale	-2.4%	-3.6%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.1%	0.0%
Upscale	-0.1%	-0.1%
System Bias as Percent of Calibration Span Value ($\pm 5\%$) - Bias 03 (15:01 - 15:20)		
Zero	0.2%	0.0%
Upscale	-2.4%	-3.5%
Drift Assessment as Percent of Calibration Span Value ($\pm 3\%$)		
Zero	0.0%	0.0%
Upscale	0.1%	0.1%



Sample Probe Calibration

Probe Type: S-Type Pitot I.D. Number: 67-5P-6
 Project Number: 14042

Thermocouple Calibration

Reference Type: Thermocouple Type K 1/8 inch No. Calibration Due Date: Units: °F
 Fisher Scientific Model No: 15-078-39 Pyrometer I.D. No: 80512890 Calibration Due Date: 12/14/2018

Point No.	Target Temp.	Reference Temp.	UUT Temp.*	Temp. Difference	% Difference**	Specification
1	Ambient					
2	200°F-250°F					%Difference ≤ 1.5

*UUT = Unit Under Test Temp.

** Based on Absolute Temperature (Rankine)

Does thermocouple assembly meet specifications? →

Pitot Tube Calibration (Wind Tunnel Method @ 49 ft/sec)

Transducer Asset No: 204543 Calibration Date: 2/10/2020 Cal. Due Date: 2/10/2021
 Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

Pitot Side 'A' :				Abs. Deviation from Avg. C _{p(A)} **	Specification Avg. C _p Deviations ≤ 0.01
Trial No.	Reference ΔP	Probe ΔP	Probe C _{p(S)} *		
1	0.541	0.772	0.829	0.001	
2	0.545	0.773	0.831	0.002	
3	0.542	0.774	0.829	0.001	
Side 'A' Average Probe C _{p(A)} =			0.8296	0.0012	

Pitot Side 'B' :				Abs. Deviation from Avg. C _{p(B)} **	Specification Avg. C _p Deviations ≤ 0.01
Trial No.	Reference ΔP	Probe ΔP	Probe C _{p(S)} *		
1	0.549	0.765	0.838	0.003	
2	0.552	0.773	0.837	0.001	
3	0.556	0.790	0.831	0.004	
Side 'B' Average Probe C _{p(B)} =			0.8354	0.0028	

'A' Average C _p	—	'B' Average C _p	=	Difference	Specification
0.830		0.835		-0.005	Difference ≤ 0.01

Does assembly meet specifications? →

YES

If "Yes", C_p = Average of Side 'A' and 'B' C_p values. If "No", Pitot must be replaced.

$$*C_{P(S)} = C_{P(STD)} \sqrt{\frac{\Delta P_{(STD)}}{\Delta P_{(S)}}}$$

$$***Deviation = |C_{P(S)} - \overline{C_{P(A \text{ or } B)}}|$$

All specifications are from EPA-600/9-76-005, section 3.1

Probe Cp= 0.832 Calibrated by: Jason Fugiel Date: 03/10/2020

Geometric Probe Calibration

Probe Type: S-Type Pitot

I.D. Number: 67-5P-6

Project Number: 14004

Thermocouple Calibration

Reference Type: Thermocouple Reference I.D. No: TT#1 Pyrometer I.D. No: 66-12 Units: °F

Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	Specification*
1	Ambient	73.0	72.8	0.2	±2 °F

* Based on ALT 011

Geometric Pitot Calibration

Is pitot assembly in good repair? ☒ Yes ☐ No If no, explain:

"S" Pitot

Dimensions	Dimensions	Specifications	Within Spec?
$\alpha 1 = 0$	$\alpha 2 = 1$	$\leq 10^\circ$	Yes
$\beta 1 = 2$	$\beta 2 = 0$	$\leq 5^\circ$	Yes
$\gamma = 0$	$\theta = 1$	None	N/A
$A = 0.744$		None	N/A
$Dt = 0.249$		$0.1875" \leq Dt \leq 0.375"$	Yes

Calculations	Specifications	Within Spec?
$A/2 = Pa = Pb = 0.372$ inches	None	N/A
$Pa/Dt = Pb/Dt = 1.494$ inches	$1.05 < P/Dt < 1.5$	Yes
$z = A \tan \gamma = 0.0000$ inches	$\leq 0.125"$	Yes
$w = A \tan \theta = 0.01299$ inches	$\leq 0.03125"$	Yes

Pitot $C_p = 0.84$ according to 40 CFR 60 section 10.1

Standard Pitot

	Measurement	Specification	Calculation	Within Spec?
Tube O.D.		None		
Static Hole I.D.		within 10% of (0.1*O.D.)		
Tip to Static		$\geq 6 \times O.D.$		
Static to Bend		$\geq 8 \times O.D.$		

Pitot $C_p =$

Calibrated by: K Sullivan

Date: 6/18/2020

AIRDATA MULTIMETER CERTIFICATE OF RECALIBRATION

Customer ID: 007814 S/N: M18554
 Customer: CLEAN AIR INSTRUMENT RENTAL City: PALATINE State: IL
 As-Received Model #: ADM-860C Converted to Model #: _____ Order #: R193607
 PO #: _____ Customer Eqpt ID#: _____ Calibration Due Date: _____

This instrument has been calibrated using Calibration Standards which are traceable to NIST (National Institute of Standards and Technology). Test accuracy ratio is 4:1 for pressures and temperature. Quality Assurance Program and calibration procedures meet the requirements for ANSI/NCSS Z540-1, ISO 17025, MIL-STD 45662A and manufacturer's specifications. Calibration accuracy is certified when meters are used with properly functioning accessories only. All Uncertainties are expressed in expanded terms (twice the calculated uncertainty). This report shall not be reproduced, except in full, without the written approval of Shortridge Instruments, Inc. Results relate only to the item calibrated. For limitations on use, see Shortridge Instruments, Inc. Instruction Manual for the use of AirData Multimeters. Procedure used: Procedure for Differential Pressure, Absolute Pressure and Temperature Recalibration of AirData Multimeters SIP-CP02
 Revision: 30 Dated: 04/04/16

Calibration Technician(s): M. LaBash S. Laubmeier Calibration Date: 12/12/2019
 Calibration Approved by: m. Diddens Title: Cal Tech Date: 12-13-2019

AS-Received By: me
 Date: 12/10/2019 Rh: 38%
 Ambient Temperature: 74 °F
 Barometric Pressure: 28.74 in Hg
 All within spec: YES NO NA

Final Test By: YK
 Date: 12/12/2019 Rh: 35%
 Ambient Temperature: 73 °F
 Barometric Pressure: 28.72 in Hg
 All within spec: YES NO

Test By: _____
 Date: NA Rh: _____ %
 Ambient Temperature: _____ °F
 Barometric Pressure: _____ in Hg
 All within spec: YES NO

ABSOLUTE PRESSURE TEST (in Hg)

TEST METER TOLERANCE = $\pm 2.0\% \pm 1$ in Hg AS-RECEIVED TEST WITHIN SPEC YES NO N/A See Notes

Pressure Standard: Heise #02-R S/N: 41741/42451 As-Rcvd <u>Test 2</u> Test 3	Pressure Standard: Heise #12A-R S/N: 45805/48491 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #04-R S/N: 41743/42453 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #14-R S/N: 43412/45043-2 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #06-R S/N: 41742/42452-1 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #16-R S/N: 43413/45044 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #08-R S/N: 42186/43328 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #18-R S/N: 44581/46845 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #10-R S/N: 42203/43352 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #20-R S/N: 44582/46847 As-Rcvd Test 2 Test 3

Approx Set Pt	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff
14.0	14.11	14.0	-0.78	14.26	14.2	-0.42			
28.4	28.74	28.7	-0.14	28.72	28.7	-0.07	NA		
40.0	40.04	40.0	-0.10	40.35	40.4	0.12			

DIFFERENTIAL PRESSURE TEST (in wc)

TEST METER TOLERANCE = $\pm 2.0\% \pm 0.001$ in wc AS-RECEIVED TEST WITHIN SPEC YES NO N/A See Notes

Pressure Standard: Heise #01-L S/N: 41739/42449 As-Rcvd <u>Test 2</u> Test 3	Pressure Standard: Heise #11-L S/N: 43165/44551-1 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #01-R S/N: 41739/42446 As-Rcvd <u>Test 2</u> Test 3	Pressure Standard: Heise #11-R S/N: 43165/44730 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #02-L S/N: 41741/42454 As-Rcvd <u>Test 2</u> Test 3	Pressure Standard: Heise #12A-L S/N: 45605/48490 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #03A-L S/N: 45570/48461 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #13-L S/N: 43415/45041 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #03A-R S/N: 45570/48460 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #13-R S/N: 43415/45039 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #04-L S/N: 41743/42456 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #14-L S/N: 43412/45045 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #05-L S/N: 41740/42450 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #15-L S/N: 43416/45042 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #05-R S/N: 41740/42447 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #15-R S/N: 43416/45040 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #06-L S/N: 41742/42455 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #16-L S/N: 43413/45046 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #07-L S/N: 42185/42186 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #17-L S/N: 44579/46842 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #07-R S/N: 42185/43326 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #17-R S/N: 44579/46841 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #08-L S/N: 42186/43329 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #18-L S/N: 44581/46846 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #09-L S/N: 42202/43351 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #19-L S/N: 44580/46844 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #09-R S/N: 42202/43350 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #19-R S/N: 44580/46843 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #10-L S/N: 42203/43353 As-Rcvd Test 2 Test 3	Pressure Standard: Heise #20-L S/N: 44582/46848 As-Rcvd Test 2 Test 3

Approx Set Pt	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff
.0500	.0502	.0502	0	.0522	.0522	0			
.1250	.1253	.1252	-0.08	.1270	.1269	-0.08			
.2250	.2254	.2253	-0.04	.2277	.2277	0			
1.000	1.005	1.004	-0.10	1.033	1.032	-0.10			
2.000	2.026	2.023	-0.15	2.017	2.011	-0.30	NA		
3.600	3.619	3.613	-0.17	3.634	3.623	-0.30			
4.400	4.418	4.426	0.18	4.404	4.405	0.02			
27.00	27.30	27.31	0.04	27.60	27.61	0.04			
50.00	50.29	50.22	-0.14	49.92	49.89	-0.06			
Overage	NA	✓	NA	NA	✓	NA	NA		NA

Shortridge Instruments, Inc.

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CleanAir
 This certification corresponds
 to CleanAir asset # 210809

AIRDATA MULTIMETER CERTIFICATE OF RECALIBRATION

S/N: M18554
Order #: R193607

LOW VELOCITY CONFIRMATION (FPM)

TEST METER TOLERANCE = $\pm 3.0\% \pm 7$ FPM

AS-RECEIVED TEST WITHIN SPEC YES NO N/A See Notes

Vel Eqv Trans Std: S/N: M02009	As-Rcvd	<u>Test 2</u>	Test 3	Vel Eqv Trans Std: S/N: M10897	<u>As-Rcvd</u>	Test 2	Test 3
Vel Eqv Trans Std: S/N: M02903	As-Rcvd	<u>Test 2</u>	Test 3	Vel Eqv Trans Std: S/N: M10901	As-Rcvd	Test 2	Test 3
Vel Eqv Trans Std: S/N: M10839	As-Rcvd	Test 2	Test 3	Vel Eqv Trans Std: S/N: M13492	As-Rcvd	Test 2	Test 3
Vel Eqv Trans Std: S/N: M10840	As-Rcvd	Test 2	Test 3	Vel Eqv Trans Std: S/N: M19325	As-Rcvd	Test 2	Test 3

Approx Set Point	Standard	Test Meter	Diff	Standard	Test Meter	Diff	Standard	Test Meter	Diff
100	108	108	0	106.2	105	-1.2	NA		
500	513	513	0	511.8	510	-1.8			

ADM-880C, ADM-870/870C and ADM-860/860C models are read in AirFoil Mode. ADM-850/850L models are read in Pitot Tube Mode.

TEMPERATURE TEST - AIRDATA MULTIMETER (° F)

TEST METER TOLERANCE = $\pm 0.2^\circ$ F

AS-RECEIVED TEST WITHIN SPEC YES NO N/A See Notes

RTD Simulator: S/N 249	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 250	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 253	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 254	<u>As-Rcvd</u>	<u>Test 2</u>	Test 3	Set Point: <u>35.6° F</u>	95° F	154.4° F
RTD Simulator: S/N 256	<u>As-Rcvd</u>	<u>Test 2</u>	Test 3	Set Point: 35.6° F	<u>95° F</u>	154.4° F
RTD Simulator: S/N 257	<u>As-Rcvd</u>	<u>Test 2</u>	Test 3	Set Point: 35.6° F	95° F	<u>154.4° F</u>
RTD Simulator: S/N 292	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 293	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 294	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 313	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 314	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 315	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 316	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 317	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 318	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F

RTD Simulator Temperature Equivalent Set Point	Test Meter	Difference	Test Meter	Difference	Test Meter	Difference
35.60	35.6	0	35.6	0	NA	
95.00	94.9	-0.1	94.9	-0.1		
154.40	154.4	0	154.4	0		

NOTES: _____

The enclosed ADM Calibration Standards for Pressure and Temperature form(s) is/are an integral part of this calibration and must remain with this Certificate of Calibration. Note: There may be more than one such form included that pertains to this calibration.



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Shortridge Instruments, Inc. AirData Multimeter Calibration Equipment

Order Number: R193607 Serial Number: M18554 Test Type: Initial As-Received **Final**

ABSOLUTE PRESSURE STANDARDS

ADM #02-R	S/N: 41741/42451	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/30/19	Due Date: 04/2020
ADM #04-R	S/N: 41743/42453	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/07/19	Due Date: 11/2020
ADM #06-R	S/N: 41742/42452-1	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/21/19	Due Date: 08/2020
ADM #08-R	S/N: 42186/43328	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/22/19	Due Date: 03/2020
ADM #10-R	S/N: 42203/43352	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/21/19	Due Date: 01/2020
ADM #12A-R	S/N: 45805/48491	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/16/19	Due Date: 07/2020
ADM #14-R	S/N: 43412/45043-2	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 10/07/19	Due Date: 09/2020
ADM #16-R	S/N: 43413/45044	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/20/19	Due Date: 02/2020
ADM #18-R	S/N: 44581/46845	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 05/17/19	Due Date: 05/2020
ADM #20-R	S/N: 44582/46847	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/20/19	Due Date: 06/2020
#02-R, 04-R, 06-R, 08-R, 10-R, 12A-R, 14-R, 16-R	Rated Accuracy: 0.05% fs (0.0305 in Hg) Range: 0-30 psia				Resolution: 0.01	Uncertainty: < 0.0358
#18-R, 20-R	Rated Accuracy: 0.05% fs (0.0305 in Hg) Range: 0-60 in Hg				Resolution: 0.001	Uncertainty: < 0.0358

DIFFERENTIAL PRESSURE STANDARDS

ADM #01-L	S/N: 41739/42449	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 05/01/19	Due Date: 04/2020
ADM #01-R	S/N: 41739/42446	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 05/01/19	Due Date: 04/2020
ADM #02-L	S/N: 41741/42454	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 05/01/19	Due Date: 04/2020
ADM #03A-L	S/N: 45570/48461	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/11/19	Due Date: 11/2020
ADM #03A-R	S/N: 45570/48460	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/11/19	Due Date: 11/2020
ADM #04-L	S/N: 41743/42456	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/08/19	Due Date: 11/2020
ADM #05-L	S/N: 41740/42450	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/28/19	Due Date: 08/2020
ADM #05-R	S/N: 41740/42447	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/28/19	Due Date: 08/2020
ADM #06-L	S/N: 41742/42455	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/26/19	Due Date: 08/2020
ADM #07-L	S/N: 42185/42186	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/26/19	Due Date: 03/2020
ADM #07-R	S/N: 42185/43326	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/26/19	Due Date: 03/2020
ADM #08-L	S/N: 42186/43329	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/25/19	Due Date: 03/2020
ADM #09-L	S/N: 42202/43351	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/23/19	Due Date: 01/2020
ADM #09-R	S/N: 42202/43350	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/23/19	Due Date: 01/2020
ADM #10-L	S/N: 42203/43353	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/23/19	Due Date: 01/2020
ADM #11-L	S/N: 43185/44551-1	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/15/19	Due Date: 07/2020
ADM #11-R	S/N: 43185/44730	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/15/19	Due Date: 07/2020
ADM #12A-L	S/N: 45805/48490	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/16/19	Due Date: 07/2020
ADM #13-L	S/N: 43415/45041	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/19/19	Due Date: 09/2020
ADM #13-R	S/N: 43415/45039	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/19/19	Due Date: 09/2020
ADM #14-L	S/N: 43412/45045	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/19/19	Due Date: 09/2020
ADM #15-L	S/N: 43416/45042	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/22/19	Due Date: 02/2020
ADM #15-R	S/N: 43416/45040	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/22/19	Due Date: 02/2020
ADM #16-L	S/N: 43413/45046	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/21/19	Due Date: 02/2020
ADM #17-L	S/N: 44579/46842	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 05/16/19	Due Date: 05/2020
ADM #17-R	S/N: 44579/46841	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 05/21/19	Due Date: 05/2020
ADM #18-L	S/N: 44581/46846	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 05/16/19	Due Date: 05/2020
ADM #19-L	S/N: 44580/46844	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 07/15/19	Due Date: 06/2020
ADM #19-R	S/N: 44580/46843	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 07/15/19	Due Date: 06/2020
ADM #20-L	S/N: 44582/46848	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/18/19	Due Date: 06/2020
#01-L, 03A-L, 05-L, 07-L, 09-L, 11-L, 13-L, 15-L, 17-L, 19-L	Rated Accuracy: > 0.07% fs (0.000175 in wc) Range: 0.0-0.25 in wc				Res.: 0.00001	Uncertainty: < 0.00035
#01-R, 03A-R, 05-R, 07-R, 09-R, 11-R, 13-R, 15-R, 17-R, 19-R	Rated Accuracy: > 0.06% fs (0.003 in wc) Range: 0.0-5.0 in wc				Res.: 0.0001	Uncertainty: < 0.00348
#02-L, 04-L, 06-L, 08-L, 10-L, 12A-L, 14-L, 16-L, 18-L, 20-L	Rated Accuracy: > 0.08% fs (0.03 in wc) Range: 0.0-50.0 in wc				Res.: 0.001	Uncertainty: < 0.0346



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Shortridge Instruments, Inc. AirData Multimeter Calibration Equipment

Customer Order Number, Meter Serial Number, and Test Type are referenced on page 1

LOW VELOCITY EQUIVALENT CONFIRMATION STANDARDS

Vel Eqv Transfer Standard S/N: M02009	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M02903	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M10839	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M10840	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M10897	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 01/17/19	Due Date: 01/2020
Vel Eqv Transfer Standard S/N: M10901	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M13492	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 08/08/19	Due Date: 08/2020
Vel Eqv Transfer Standard S/N: M19325	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 06/21/19	Due Date: 06/2020
Rated Accuracy: Velocity $\pm 1.5\%$ ± 3.5 fpm		Range: 100-5000 fpm Resolution: 0.1	Uncertainty: <5.00 fpm at 100 fpm; <7.50 fpm at 500 fpm	

TEMPERATURE STANDARDS

RTD Simulator S/N: 249	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/16	Due Date: 03/2020
RTD Simulator S/N: 250	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/16	Due Date: 03/2020
RTD Simulator S/N: 253	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/16	Due Date: 03/2020
RTD Simulator S/N: 254	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/07/16	Due Date: 04/2020
RTD Simulator S/N: 256	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/07/16	Due Date: 04/2020
RTD Simulator S/N: 257	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/07/16	Due Date: 04/2020
RTD Simulator S/N: 292	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 12/21/15	Due Date: 12/2019
RTD Simulator S/N: 293	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 12/21/15	Due Date: 12/2019
RTD Simulator S/N: 294	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 12/21/15	Due Date: 12/2019
RTD Simulator S/N: 313	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/18	Due Date: 03/2022
RTD Simulator S/N: 314	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/18	Due Date: 03/2022
RTD Simulator S/N: 315	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/18	Due Date: 03/2022
RTD Simulator S/N: 316	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 04/2022
RTD Simulator S/N: 317	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 04/2022
RTD Simulator S/N: 318	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 04/2022
Rated Accuracy: 0.025% of setting		Range: 100.00 Ω to 11111.10 Ω	Resolution: 0.01 Ω	Uncertainty: ≤ 32 ppm	

Thermometer #1 S/N 8A089/Thermistor S/N A410660	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 08/27/19	Due Date: 08/2021
Thermometer #2 S/N 8B104/Thermistor S/N 871507	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 11/07/18	Due Date: 10/2020
Thermometer #5 S/N B11780/Thermistor S/N B10505	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 03/07/19	Due Date: 03/2021
Thermometer #6 S/N B11782/Thermistor S/N B10509	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 02/20/18	Due Date: 02/2020
Thermometer #7 S/N B49938/Thermistor S/N B482202	Model 1504/5610	Mfgd and Calibrated by Fluke		Calibration Date: 09/26/19	Due Date: 09/2021
Rated Accuracy(Combined): 0.0324° F		Range: 32° F to 176° F	Resolution: 0.001° F	Combined Uncertainty with Baths: $\leq 0.040^\circ$ F	

Temp Transfer Standard S/N M00136	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/02/19	Due Date: 10/2020
Temp Transfer Standard S/N M96100	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 03/07/19	Due Date: 03/2020
Rated Accuracy: 0.03° F	Range: 33° F to 158° F	Resolution: 0.01° F	Uncertainty: < 0.023° F	
Total combined Uncertainty for MultiTemp and TempProbe testing : ≤ 0.048° F				

This form must remain with the Certificate of Calibration corresponding to the Customer Order Number and Meter Serial Number referenced on page 1.

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Shortridge Instruments, Inc. AirData Multimeter Calibration Equipment

Order Number: R193607 Serial Number: M18554 Test Type: Initial As-Received Final

ABSOLUTE PRESSURE STANDARDS

ADM #02-R	S/N: 41741/42451	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 04/30/19	Due Date: 04/2020
ADM #04-R	S/N: 41743/42453	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/28/18	Due Date: 11/2019
ADM #06-R	S/N: 41742/42452-1	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/21/19	Due Date: 08/2020
ADM #08-R	S/N: 42186/43328	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/22/19	Due Date: 03/2020
ADM #10-R	S/N: 42203/43352	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/21/19	Due Date: 01/2020
ADM #12A-R	S/N: 45805/48491	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/16/19	Due Date: 07/2020
ADM #14-R	S/N: 43412/45043-2	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 10/07/19	Due Date: 09/2020
ADM #16-R	S/N: 43413/45044	Heise Model: PPM-2	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/20/19	Due Date: 02/2020
ADM #18-R	S/N: 44581/46845	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 05/17/19	Due Date: 05/2020
ADM #20-R	S/N: 44582/46847	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/20/19	Due Date: 06/2020
#02-R, 04-R, 06-R, 08-R, 10-R, 12A-R, 14-R, 16-R	Rated Accuracy: 0.05% fs (0.0305 in Hg)			Range: 0-30 psia	Resolution: 0.01	Uncertainty: < 0.0358
#18-R, 20-R	Rated Accuracy: 0.05% fs (0.0305 in Hg)			Range: 0-60 in Hg	Resolution: 0.001	Uncertainty: < 0.0358

DIFFERENTIAL PRESSURE STANDARDS

ADM #01-L	S/N: 41739/42449	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 05/01/19	Due Date: 04/2020
ADM #01-R	S/N: 41739/42446	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 05/01/19	Due Date: 04/2020
ADM #02-L	S/N: 41741/42454	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 05/01/19	Due Date: 04/2020
ADM #03A-L	S/N: 45570/48461	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/28/18	Due Date: 11/2019
ADM #03A-R	S/N: 45570/48460	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/28/18	Due Date: 11/2019
ADM #04-L	S/N: 41743/42456	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 11/28/18	Due Date: 11/2019
ADM #05-L	S/N: 41740/42450	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/26/19	Due Date: 08/2020
ADM #05-R	S/N: 41740/42447	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/28/19	Due Date: 08/2020
ADM #06-L	S/N: 41742/42455	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 08/26/19	Due Date: 08/2020
ADM #07-L	S/N: 42185/42186	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/26/19	Due Date: 03/2020
ADM #07-R	S/N: 42185/43328	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/26/19	Due Date: 03/2020
ADM #08-L	S/N: 42186/43329	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 03/25/19	Due Date: 03/2020
ADM #09-L	S/N: 42202/43351	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/23/19	Due Date: 01/2020
ADM #09-R	S/N: 42202/43350	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/23/19	Due Date: 01/2020
ADM #10-L	S/N: 42203/43353	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 01/23/19	Due Date: 01/2020
ADM #11-L	S/N: 43165/44551-1	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/15/19	Due Date: 07/2020
ADM #11-R	S/N: 43165/44730	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/15/19	Due Date: 07/2020
ADM #12A-L	S/N: 45805/48490	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 07/16/19	Due Date: 07/2020
ADM #13-L	S/N: 43415/45041	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/19/19	Due Date: 09/2020
ADM #13-R	S/N: 43415/45039	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/19/19	Due Date: 09/2020
ADM #14-L	S/N: 43412/45045	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 09/19/19	Due Date: 09/2020
ADM #15-L	S/N: 43416/45042	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/22/19	Due Date: 02/2020
ADM #15-R	S/N: 43416/45040	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/22/19	Due Date: 02/2020
ADM #16-L	S/N: 43413/45046	Heise Model: PPM-1	Mfgd by Dresser Industries	Calibrated by Ashcroft	Calibration Date: 02/21/19	Due Date: 02/2020
ADM #17-L	S/N: 44579/46842	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 05/16/19	Due Date: 05/2020
ADM #17-R	S/N: 44579/46841	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 05/21/19	Due Date: 05/2020
ADM #18-L	S/N: 44581/46846	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 05/16/19	Due Date: 05/2020
ADM #19-L	S/N: 44580/46844	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 07/15/19	Due Date: 06/2020
ADM #19-R	S/N: 44580/46843	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 07/15/19	Due Date: 06/2020
ADM #20-L	S/N: 44582/46848	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.		Calibration Date: 06/18/19	Due Date: 06/2020
#01-L, 03A-L, 05-L, 07-L, 09-L, 11-L, 13-L, 15-L, 17-L, 19-L	Rated Accuracy: > 0.07% fs (0.000175 in wc)			Range: 0.0-0.25 in wc	Res.: 0.00001	Uncertainty: < 0.00035
#01-R, 03A-R, 05-R, 07-R, 09-R, 11-R, 13-R, 15-R, 17-R, 19-R	Rated Accuracy: > 0.06% fs (0.003 in wc)			Range: 0.0-5.0 in wc	Res.: 0.0001	Uncertainty: < 0.00348
#02-L, 04-L, 06-L, 08-L, 10-L, 12A-L, 14-L, 16-L, 18-L, 20-L	Rated Accuracy: > 0.06% fs (0.03 in wc)			Range: 0.0-50.0 in wc	Res.: 0.001	Uncertainty: < 0.0346



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Shortridge Instruments, Inc. AirData Multimeter Calibration Equipment

Customer Order Number, Meter Serial Number, and Test Type are referenced on page 1

LOW VELOCITY EQUIVALENT CONFIRMATION STANDARDS

Vel Eqv Transfer Standard S/N: M02009	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/07/18	Due Date: 12/2019
Vel Eqv Transfer Standard S/N: M02903	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/07/18	Due Date: 12/2019
Vel Eqv Transfer Standard S/N: M10839	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/07/18	Due Date: 12/2019
Vel Eqv Transfer Standard S/N: M10840	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/07/18	Due Date: 12/2019
Vel Eqv Transfer Standard S/N: M10897	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 01/17/19	Due Date: 01/2020
Vel Eqv Transfer Standard S/N: M10901	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/07/18	Due Date: 12/2019
Vel Eqv Transfer Standard S/N: M13492	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 08/08/19	Due Date: 08/2020
Vel Eqv Transfer Standard S/N: M19325	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 06/21/19	Due Date: 06/2020
Rated Accuracy: Velocity $\pm 1.5\% \pm 3.5$ fpm		Range: 100-5000 fpm Resolution: 0.1	Uncertainty: <5.00 fpm at 100 fpm; <7.50 fpm at 500 fpm	

TEMPERATURE STANDARDS

RTD Simulator S/N: 249	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/16	Due Date: 03/2020
RTD Simulator S/N: 250	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/16	Due Date: 03/2020
RTD Simulator S/N: 253	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/16	Due Date: 03/2020
RTD Simulator S/N: 254	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/07/16	Due Date: 04/2020
RTD Simulator S/N: 256	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/07/16	Due Date: 04/2020
RTD Simulator S/N: 257	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/07/16	Due Date: 04/2020
RTD Simulator S/N: 292	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 12/21/15	Due Date: 12/2019
RTD Simulator S/N: 293	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 12/21/15	Due Date: 12/2019
RTD Simulator S/N: 294	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 12/21/15	Due Date: 12/2019
RTD Simulator S/N: 313	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/18	Due Date: 03/2022
RTD Simulator S/N: 314	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/18	Due Date: 03/2022
RTD Simulator S/N: 315	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/18	Due Date: 03/2022
RTD Simulator S/N: 316	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 04/2022
RTD Simulator S/N: 317	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 04/2022
RTD Simulator S/N: 318	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 04/2022
Rated Accuracy: 0.025% of setting		Range: 100.00 Ω to 11111.10 Ω	Resolution: 0.01 Ω	Uncertainty: ≤ 32 ppm	

Thermometer #1 S/N 8A089/Thermistor S/N A410660	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 08/27/19	Due Date: 08/2021
Thermometer #2 S/N 8B104/Thermistor S/N 871507	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 11/07/18	Due Date: 10/2020
Thermometer #5 S/N B11780/Thermistor S/N B10505	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 03/07/19	Due Date: 03/2021
Thermometer #6 S/N B11782/Thermistor S/N B10509	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 02/20/18	Due Date: 02/2020
Thermometer #7 S/N B49938/Thermistor S/N B482202	Model 1504/5610	Mfgd and Calibrated by Fluke	Calibration Date: 09/28/19	Due Date: 09/2021	
Rated Accuracy(combined): 0.0324° F		Range: 32° F to 176° F	Resolution: 0.001° F	Combined Uncertainty with Baths: ≤ 0.040 ° F	

Temp Transfer Standard S/N M00136	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/02/19	Due Date: 10/2020
Temp Transfer Standard S/N M96100	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 03/07/19	Due Date: 03/2020
Rated Accuracy: 0.03° F	Range: 33° F to 158° F	Resolution: 0.01° F	Uncertainty: < 0.023° F	
Total combined Uncertainty for MultiTemp and TempProbe testing : ≤ 0.046° F				

This form must remain with the Certificate of Calibration corresponding to the Customer Order Number and Meter Serial Number referenced on page 1.

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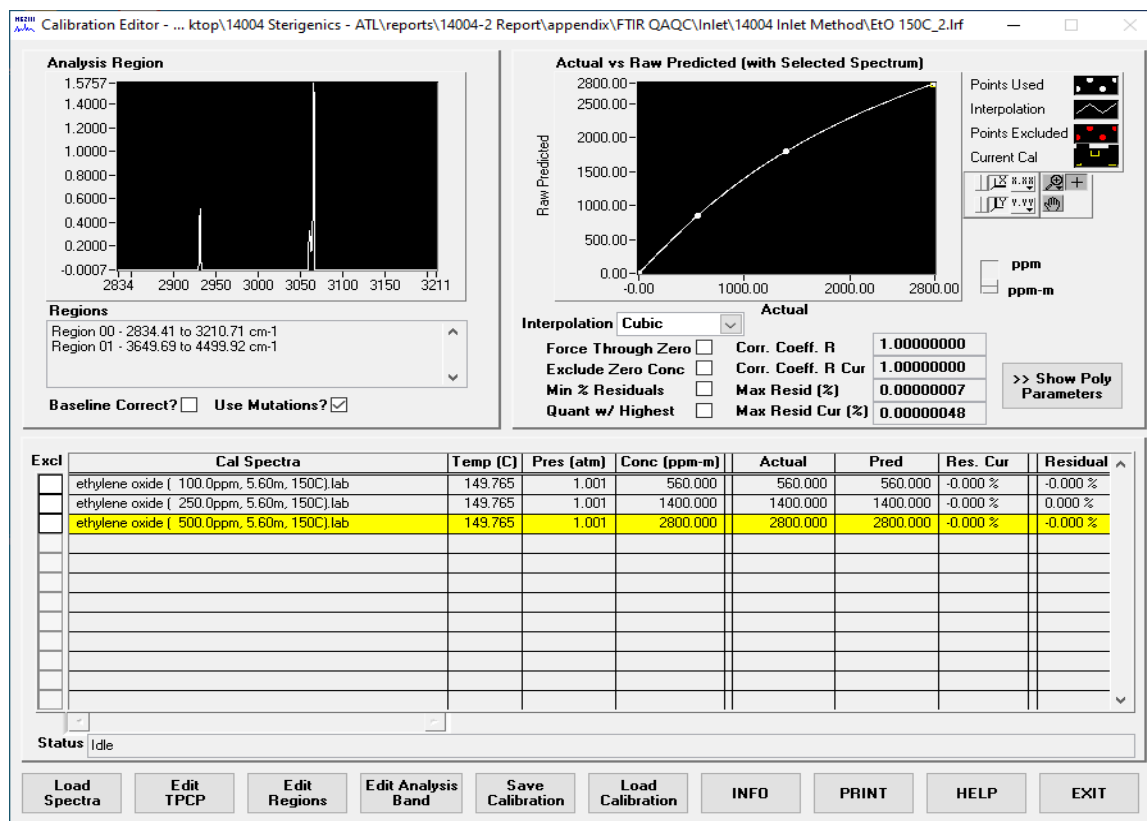
End of Appendix Section

APPENDIX E: QAQC – FTIR ANALYSES

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Aer/BV Outlet & Ceilcote Outlet (regular) FTIR Spectral Analysis

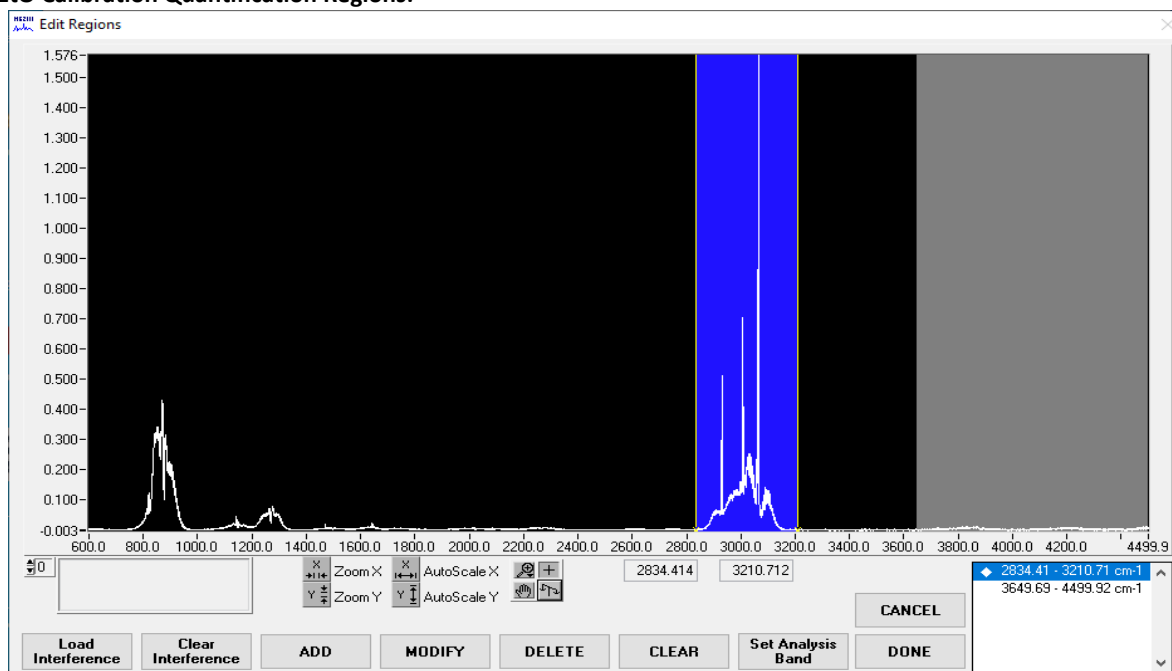
EtO Calibration Data:



Notes:

MKS calibration was altered to be optimized for this source and concentration levels. The 4 highest calibration points were excluded and the 3 remaining calibration points were refined to produced the least amount of residuals at concentrations 500ppm and below.

EtO Calibration Quantification Regions:

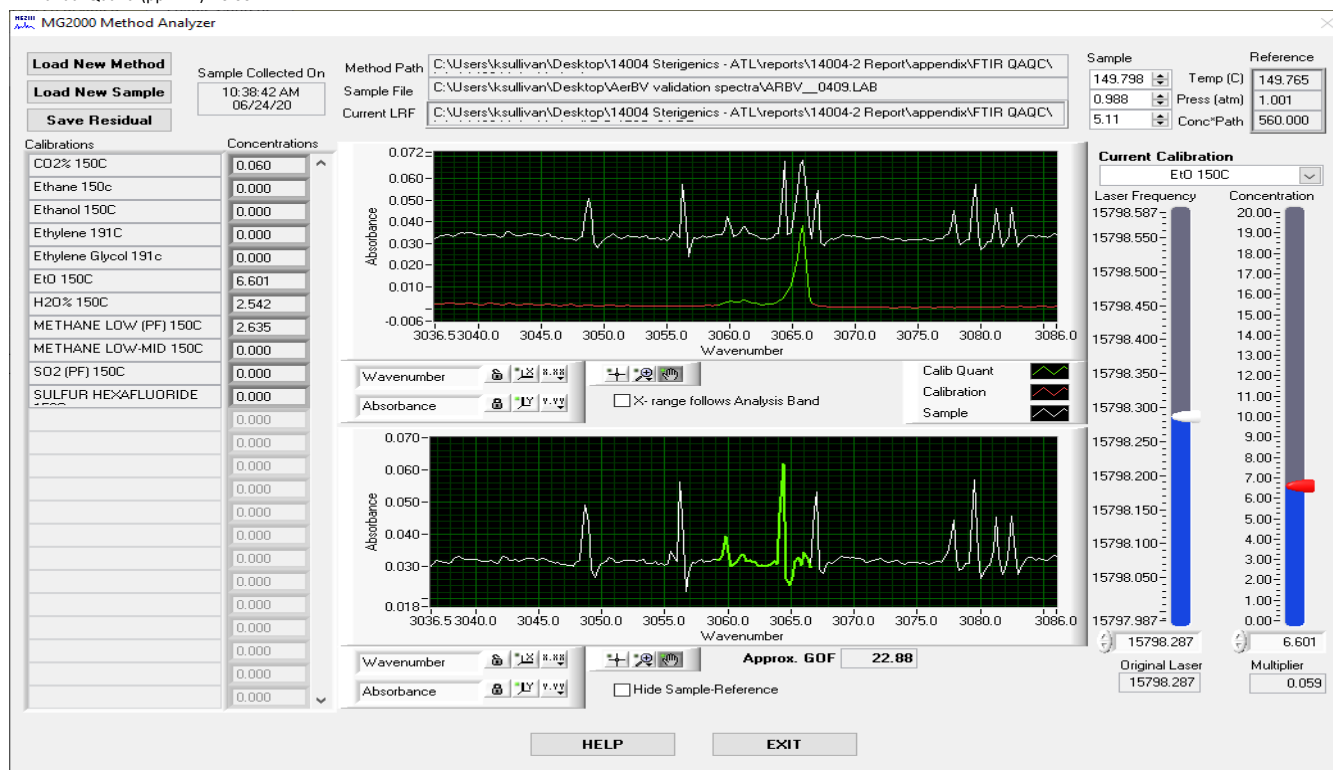


Notes:

MKS calibration was altered to be optimized for this source and concentration levels. Quantification regions were reduced to 2. The primary quantification region was changed to minimized interference for this source.

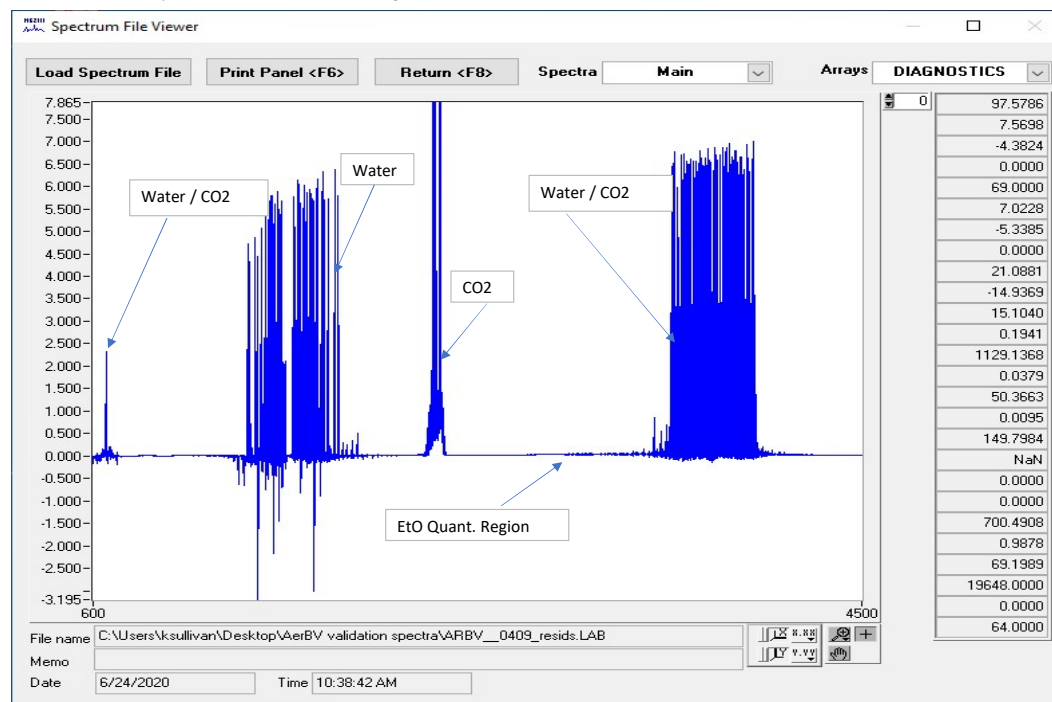
Manual Validation Example:

SPC#: 0409 Date: 6/24
 Description: Aer/BV Outlet, BV Testing, R1 Time: 11:38
 Reported (ppmwv): 6.686
 Manual Quant. (ppmwv): 6.601



Manual Validation Residual Spectrum Example

SPC#: 0409 Date: 6/24
 Description: Aer/BV Outlet, BV Testing, R1 Time: 11:38



Notes:
 Residuals mostly water and CO2.

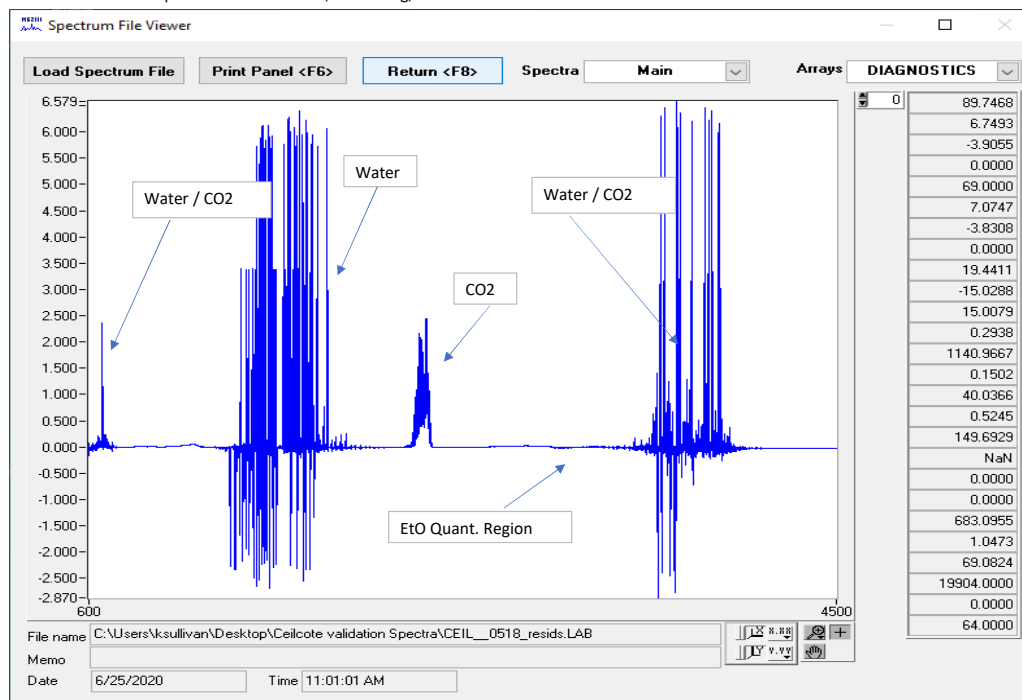
Manual Validation Example:

SPC#: 0518 Date: 6/25
 Description: Ceilcote Outlet, VP Testing, R2 Time: 12:01
 Reported (ppmwv): 0.181
 Manual Quant. (ppmwv): 0.159



Manual Validation Residual Spectrum Example

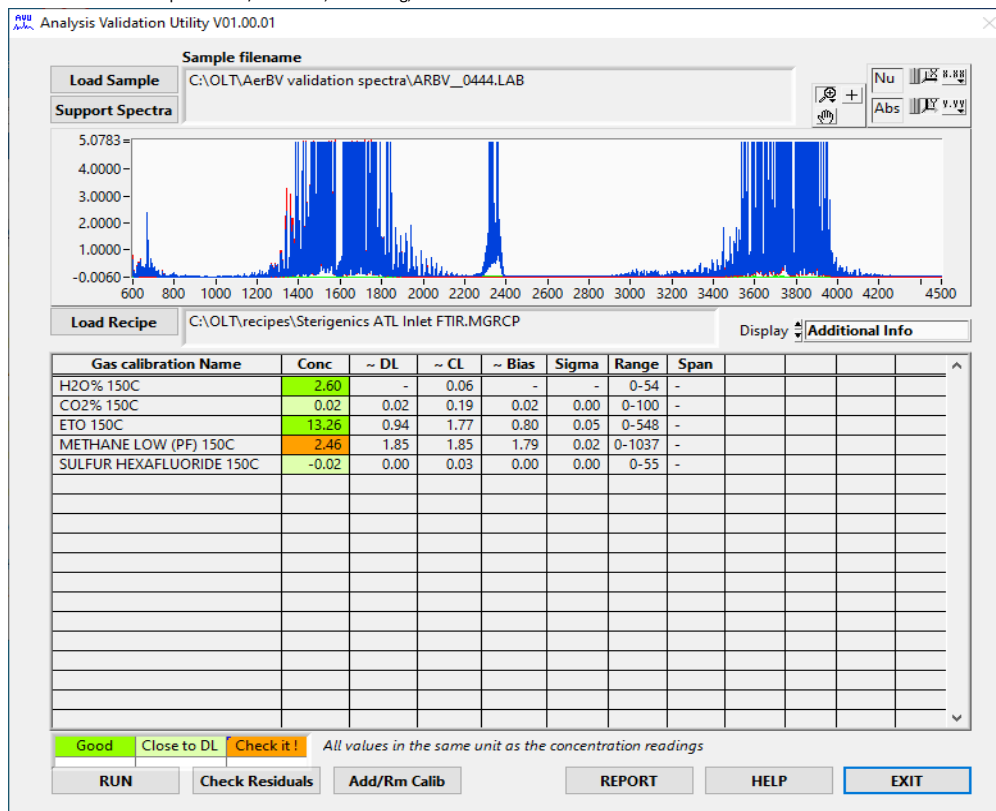
SPC#: 0518 Date: 6/25
 Description: Ceilcote Outlet, VP Testing, R2 Time: 12:01



Notes:
 Residuals mostly water and CO2.

Analysis Validation Utility (AVU) Example:

SPC#: 0444 Date: 6/24
Description: Aer/BV Outlet, BV Testing, R3 Time: 12:16

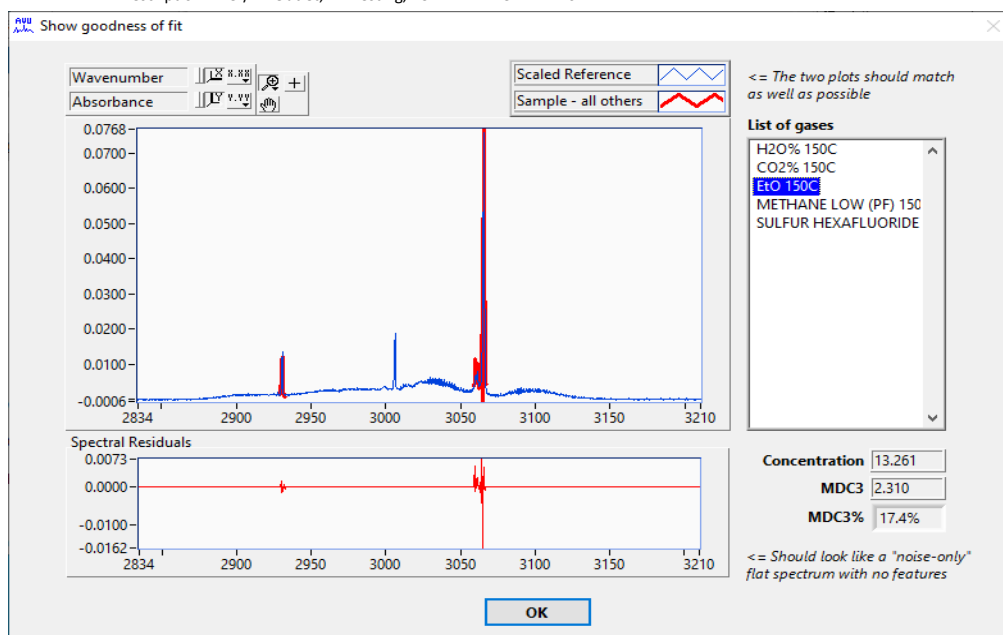


Notes:

Methane was checked and validated. Interference caused by water/CO2.

AVU Residual Example:

SPC#: 0444 Date: 6/24
Description: Aer/BV Outlet, BV Testing, R3 Time: 12:16



MKS FTIR Checkout

Asset #210735

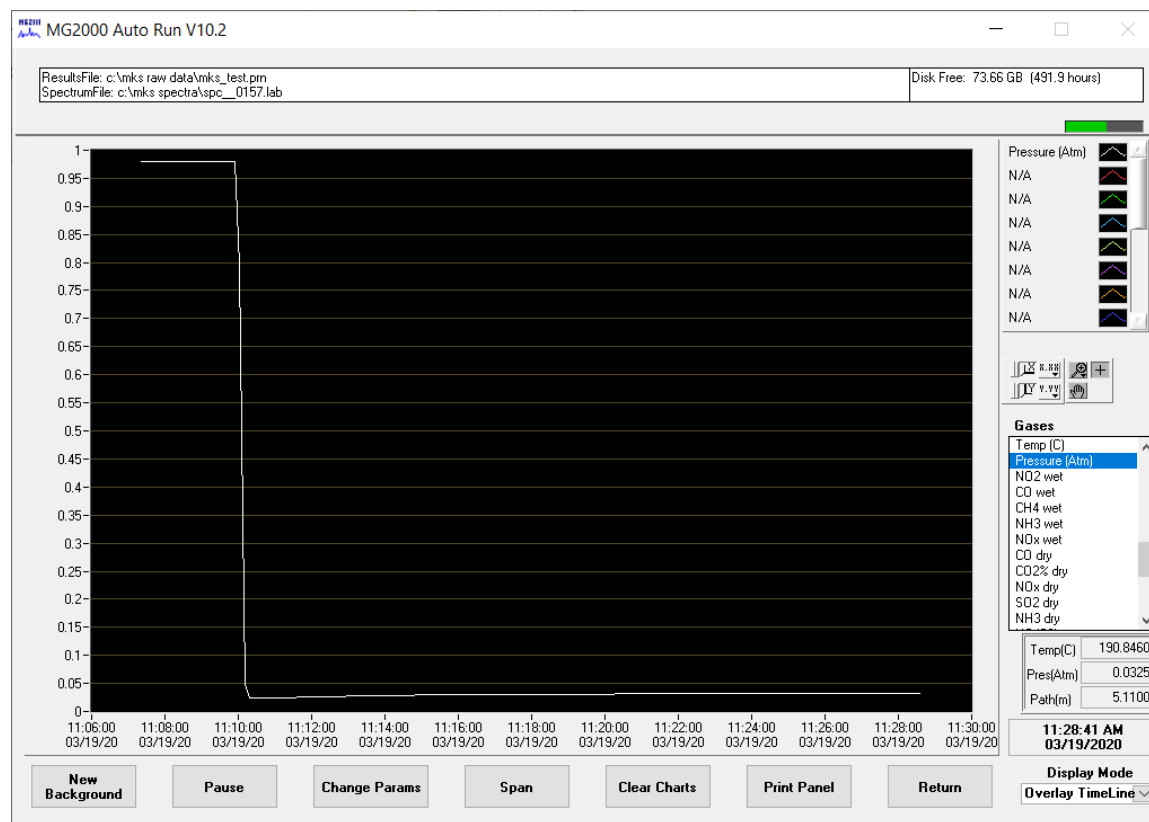
Laptop # 210161

Daniel Velazquez

3/19/20

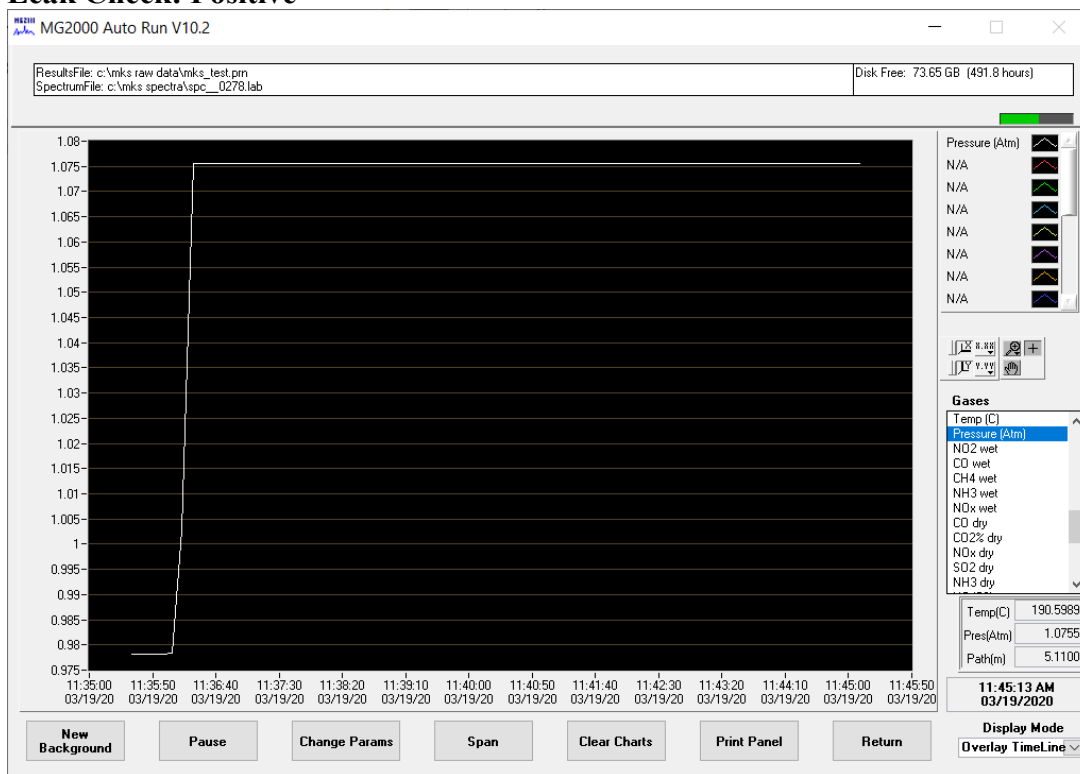
The unit came back from week and a half long rental. Removed gas cell and cleaned mirrors, gas cell, and replaced O-rings. Reinstalled everything turned on and let heaters get to 191C purged with N2, performed a leak check with positive and negative pressure leak check which passed both. All stats look good.

Leak check: Vauum



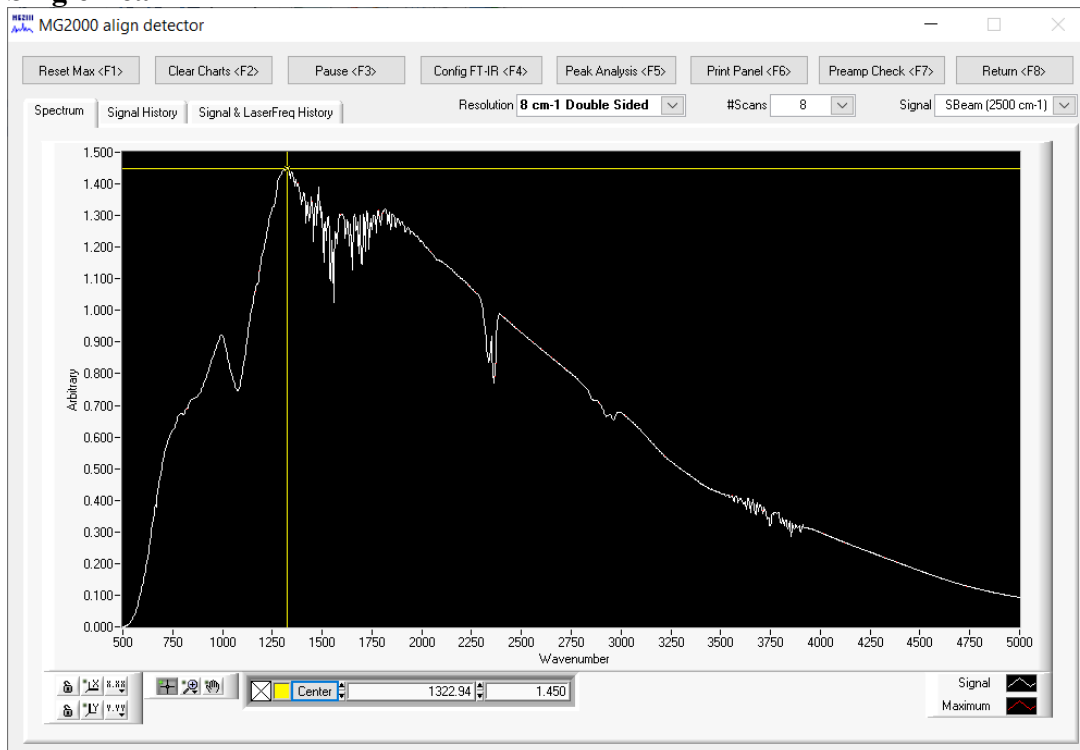
Stayed below .04 ATM over 10 min

Leak Check: Positive



Held above 1.075 for 10 min looks good

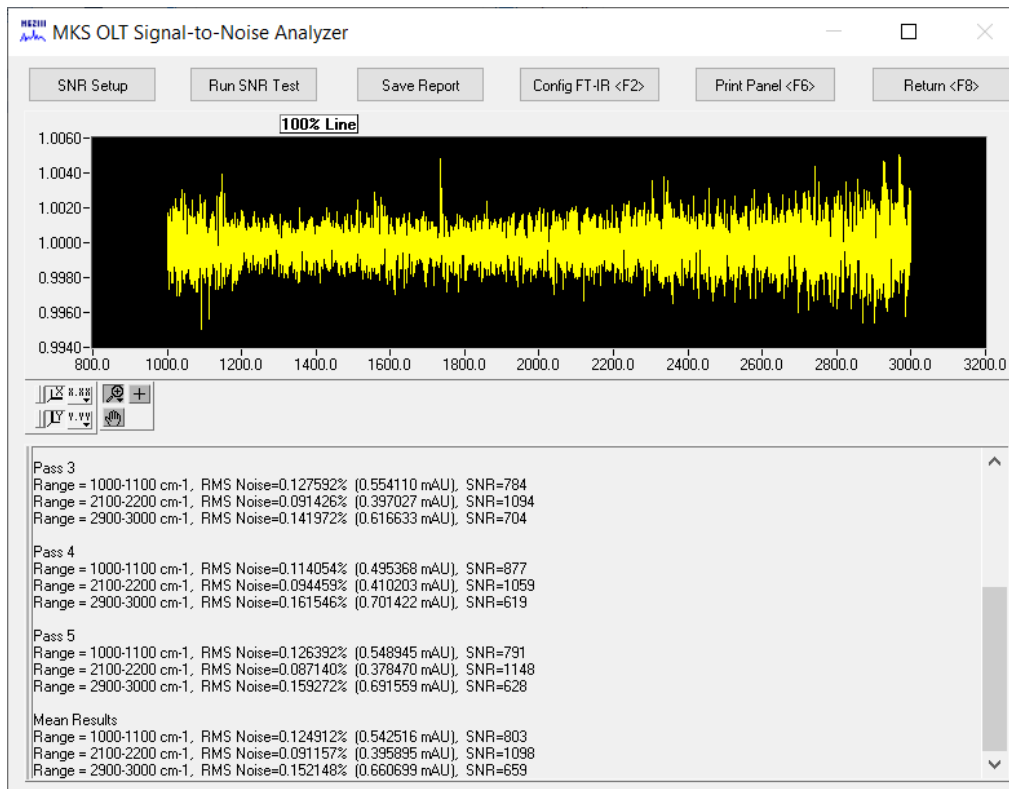
Single Beam



Peak: 1.449 @ 1322 cm⁻¹
Last: 1.442 @ 1327 cm⁻¹

0.675 @ 3000 cm⁻¹
0.731 @ 3000 cm⁻¹

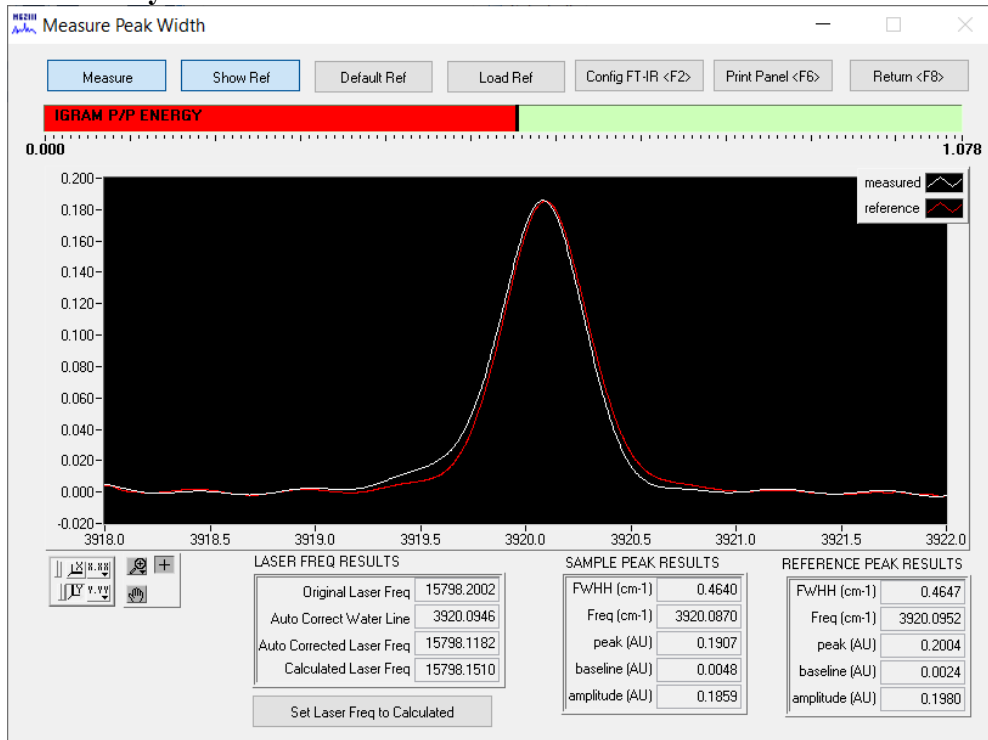
SNR Test



Mean Results 803/ 1098/ 659

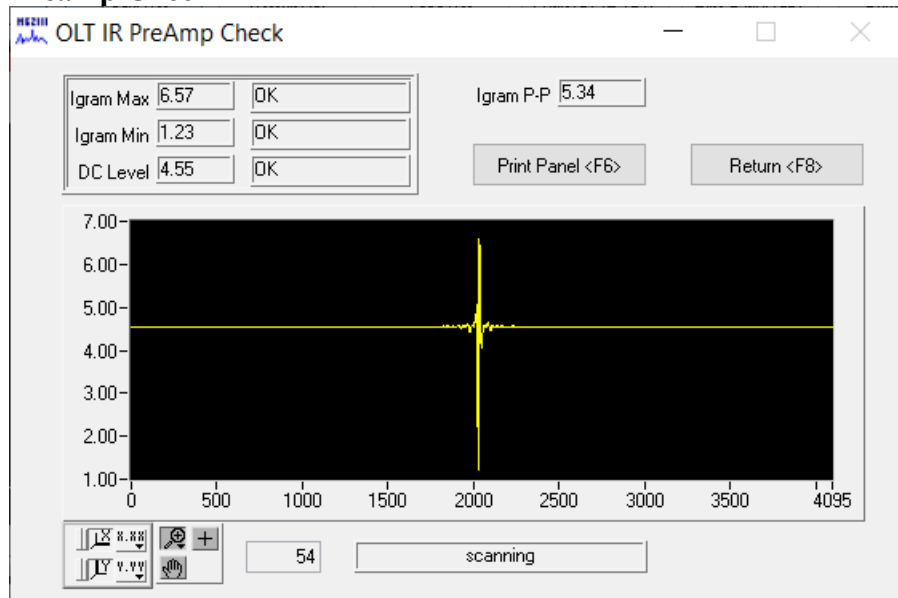
Last Time: 803/ 1141/ 711

Peak Analysis



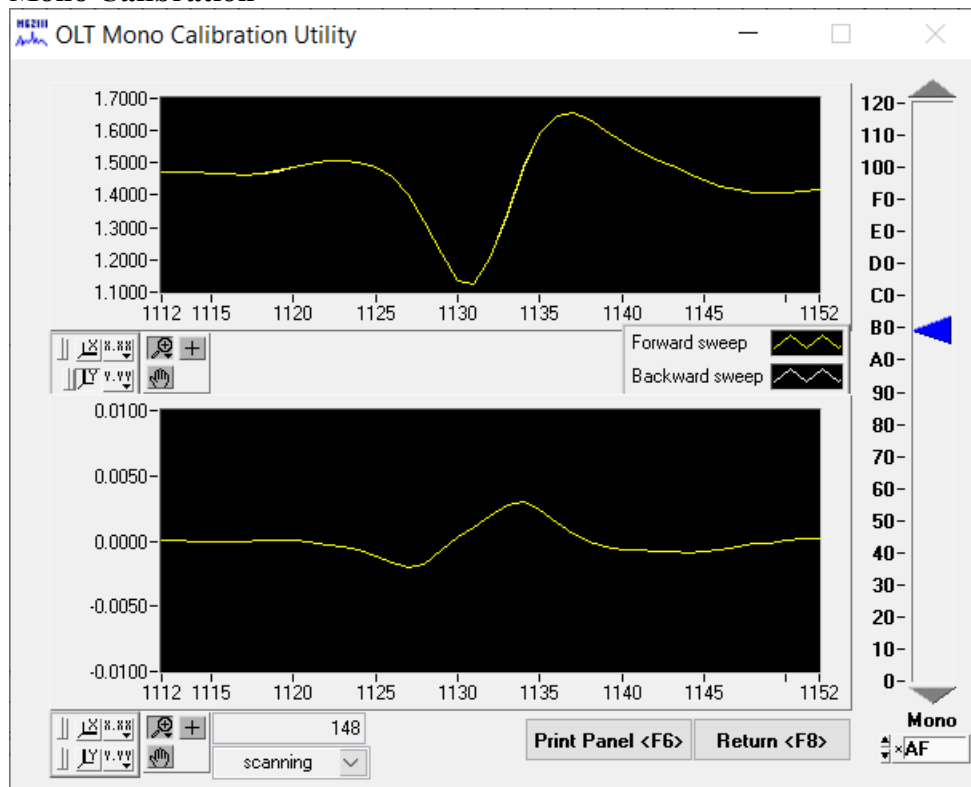
Freq and FWHH look good

Preamp Check



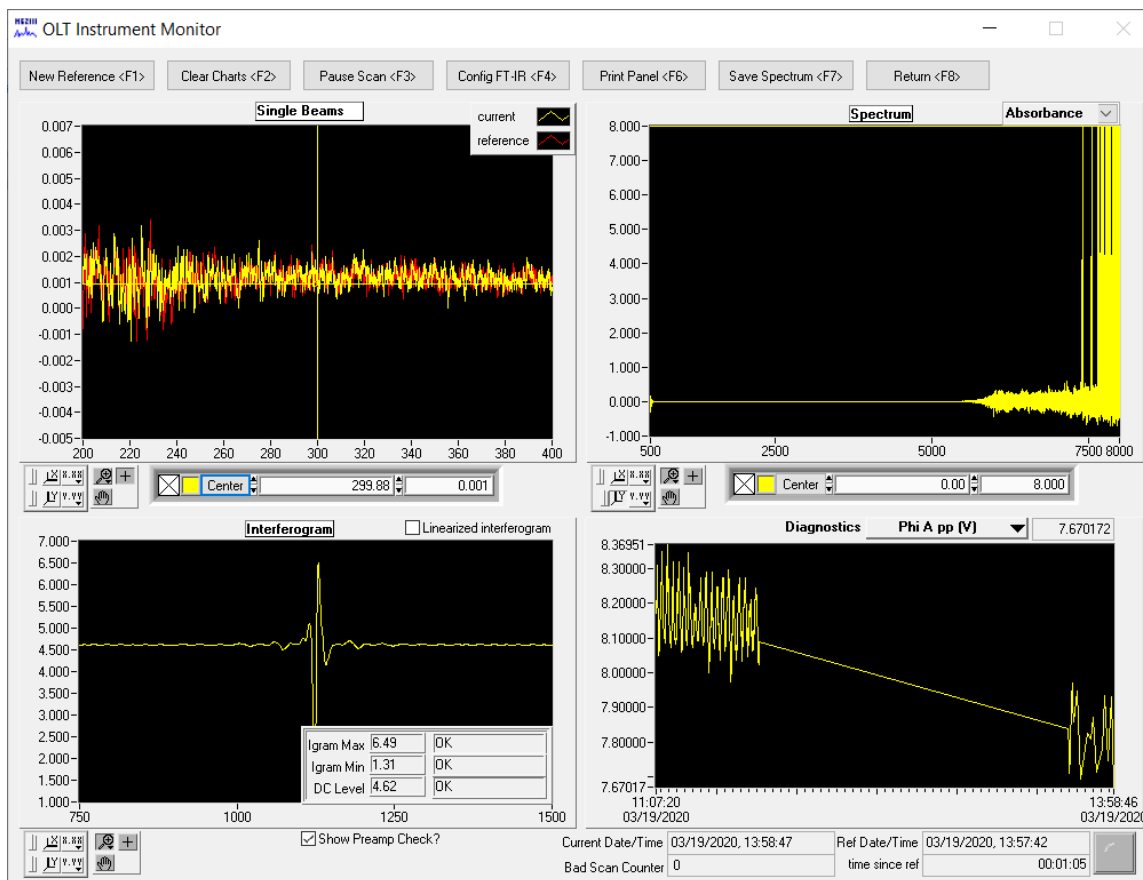
Looks Good

Mono Calibration



Changed from AC to AF

Instrument Monitor



Phase angle 94.46 degrees everything looks fine

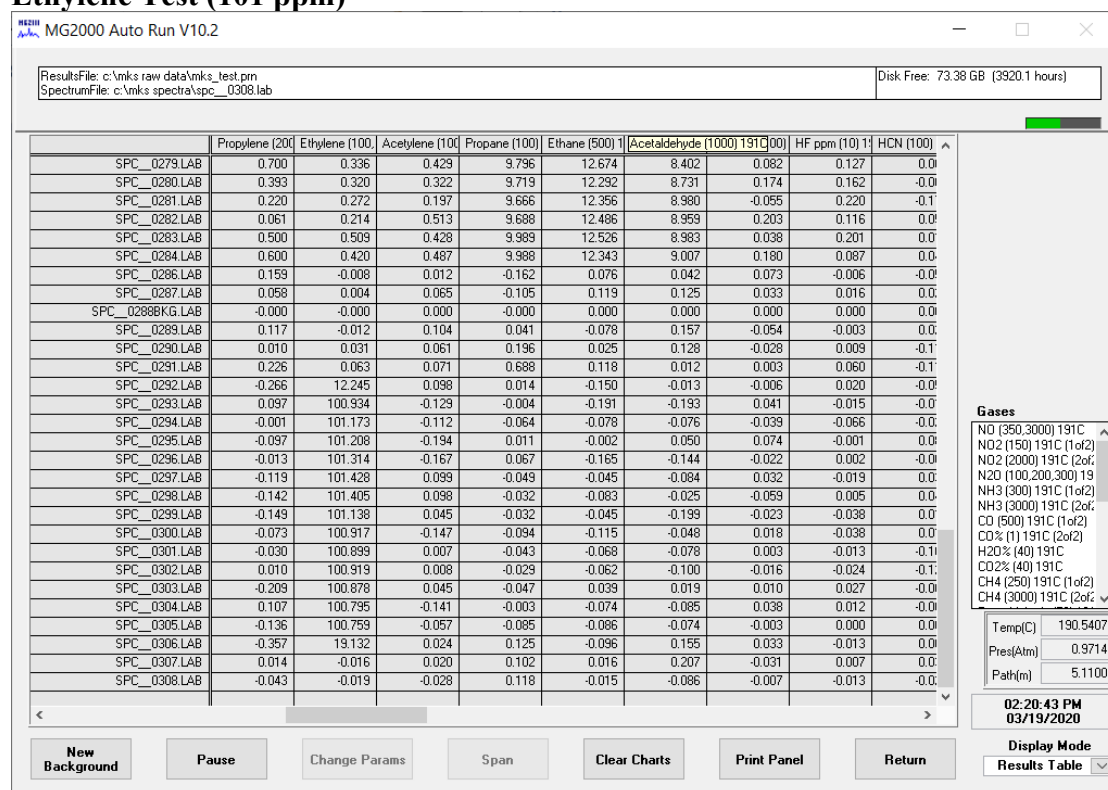
Linearizer settings

The screenshot displays the NVS modify dialog box. It is divided into two columns: 'Current configuration' and 'NVS stored configuration'. The settings are as follows:

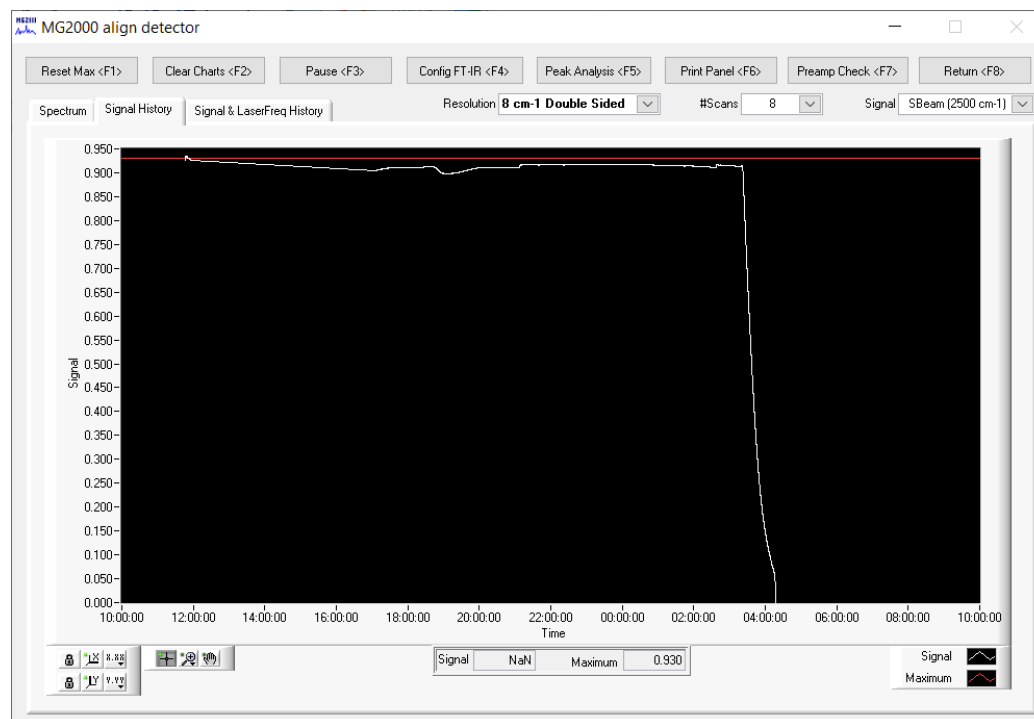
Current configuration	NVS stored configuration
Linearizer Offset: 1314	Linearizer Offset: 1314
Linearizer Linear: 1000	Linearizer Linear: 1000
Linearizer Quad: 467	Linearizer Quad: 467
Linearizer Cubic: 117	Linearizer Cubic: 117
Mono Value: ×AF	Mono Value: ×AC
Laser Frequency: 15798.200	Laser Frequency: 15798.200
pressure offset: 0.007	pressure offset: 0.007
pressure max tor: 1000.000	pressure max tor: 1000.000
temperature offset: -50.200	temperature offset: -50.200
O2 sensor present: ☐	O2 sensor present: ☐
O2 offset: 0.000	O2 offset: 0.000
O2 constant: 0.000	O2 constant: 0.000

At the bottom, there are three buttons: 'Send to NVS', 'Read from NVS', and 'Return'.

Ethylene Test (101 ppm)



Looks good
LN2 Detector Vacuum



filled at 11Am lasted till 3am about 16 hours looks good

MKS FTIR Checkout

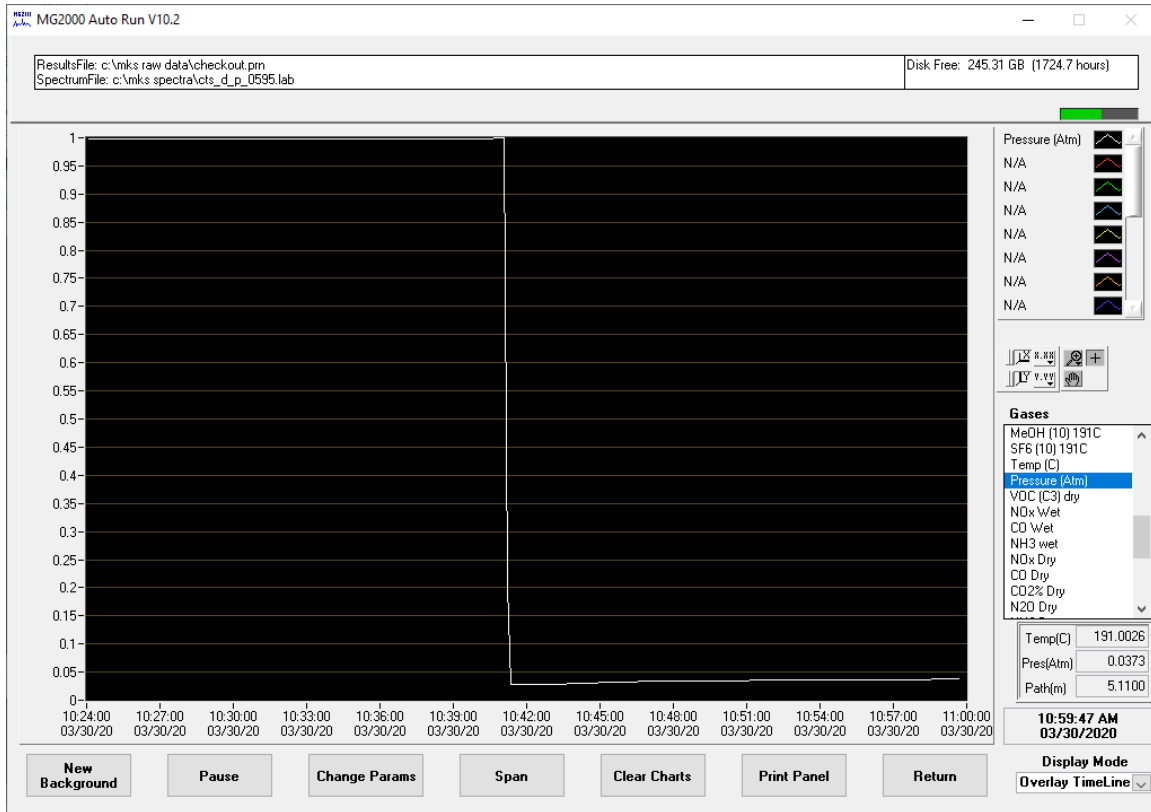
Asset #210736

Laptop # 210379

Daniel Velazquez Jr

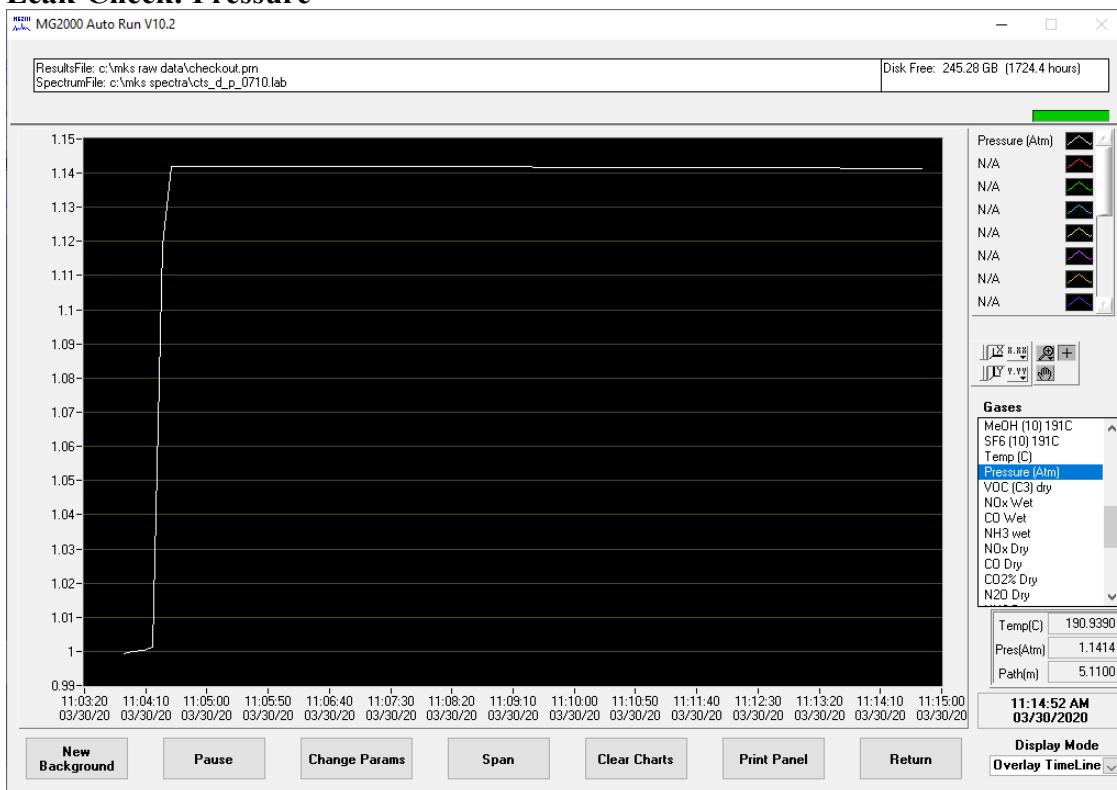
3/30/20

Leak Check: Vacuum



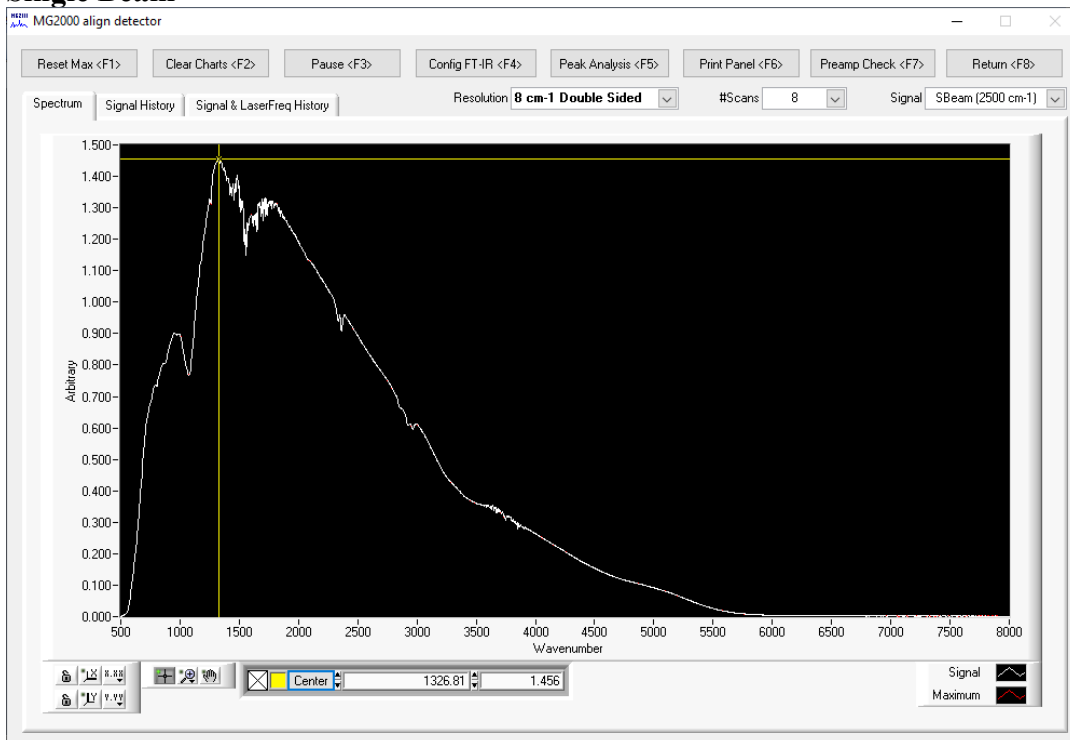
Held above .04 ATM for over 10 min

Leak-Check: Pressure



Held above 1.14 ATM for over 10 minutes

Single Beam



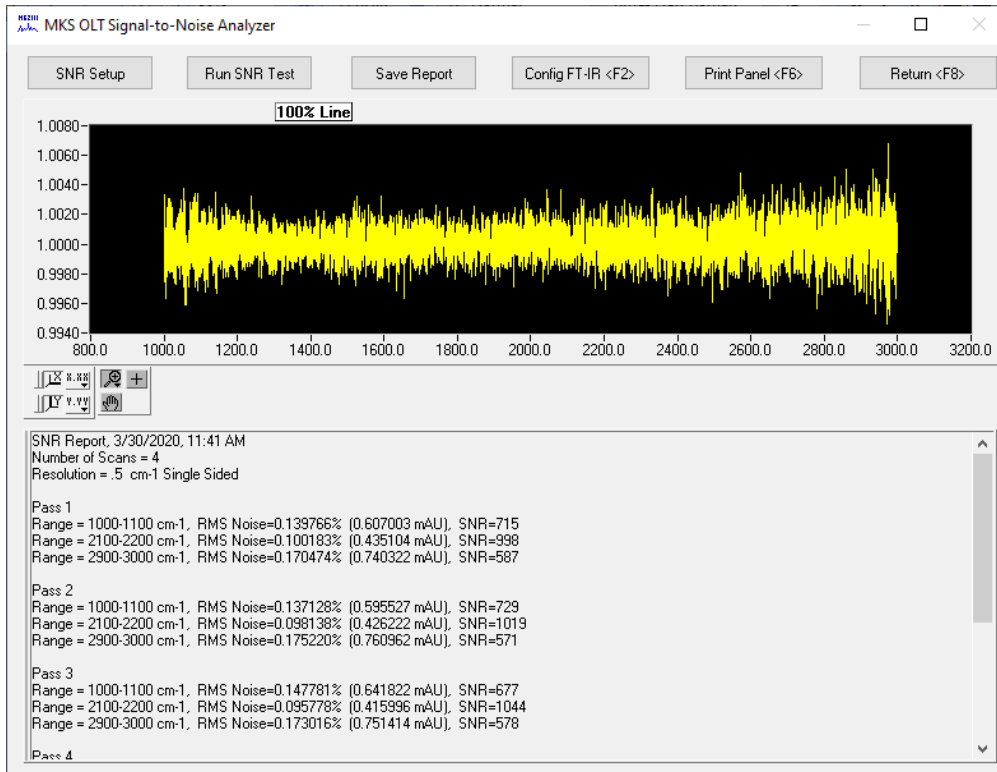
Peak at 1.458 @ 1326cm-1

Last at 1.437 @ 1327cm-1

0.627 @ 3000cm-1

0.692 @ 3000cm-1

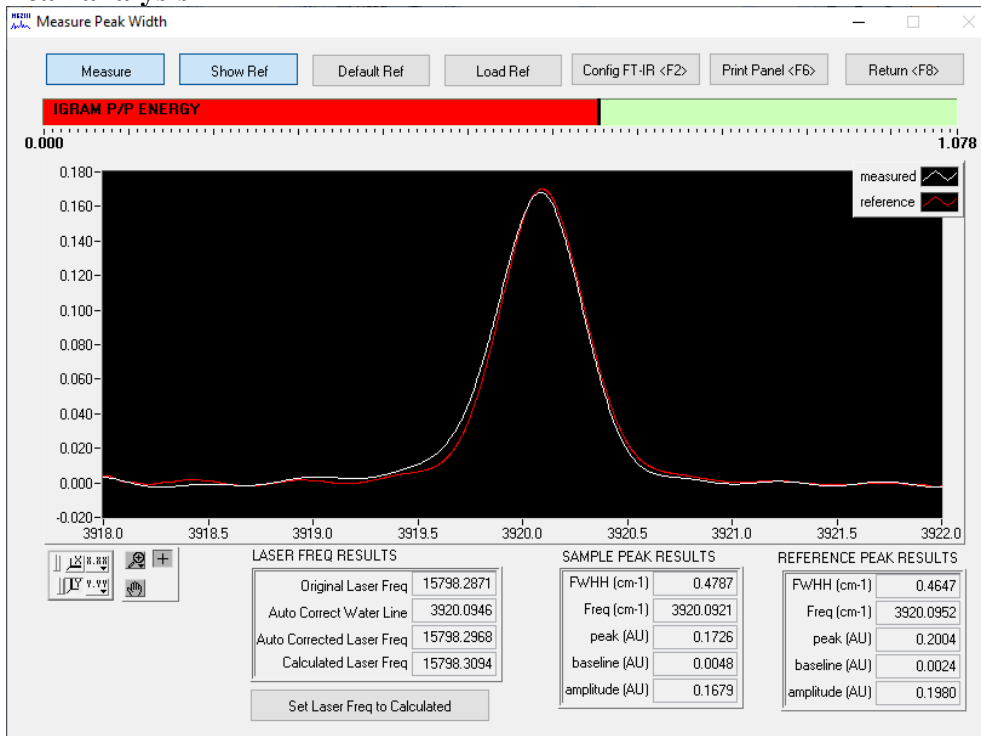
SNR Test



Mean Results: 677 / 1044 / 578

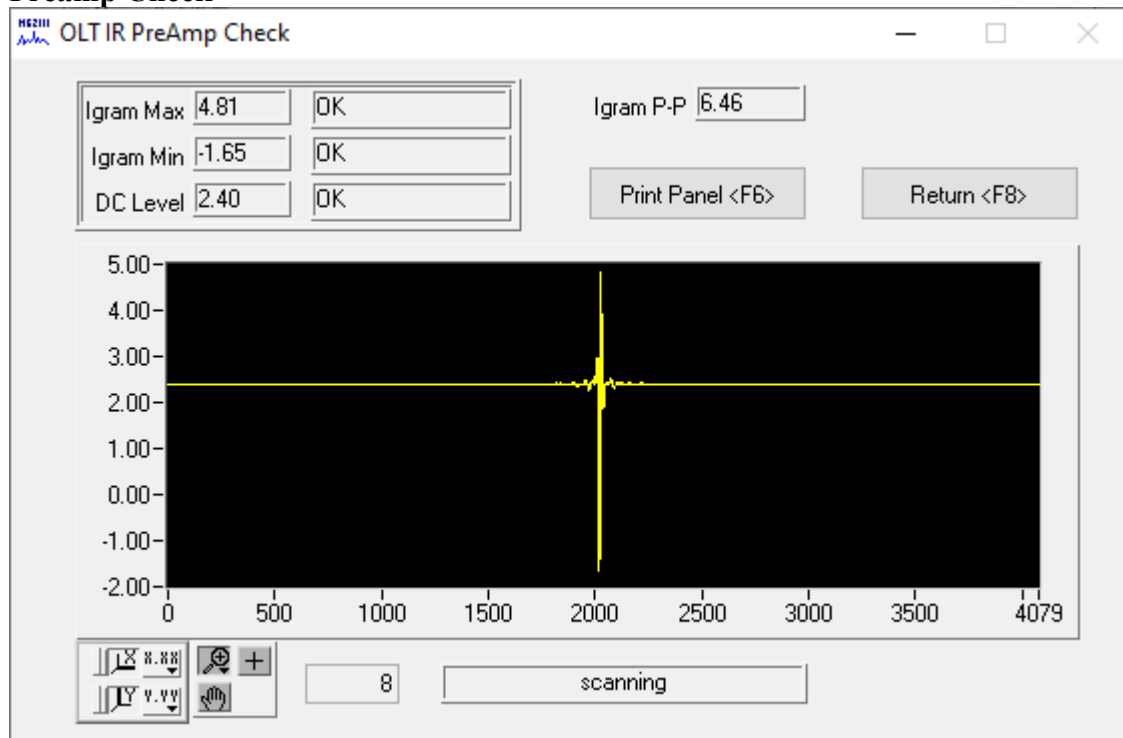
Last: 691 / 1000 / 588

Peak analysis



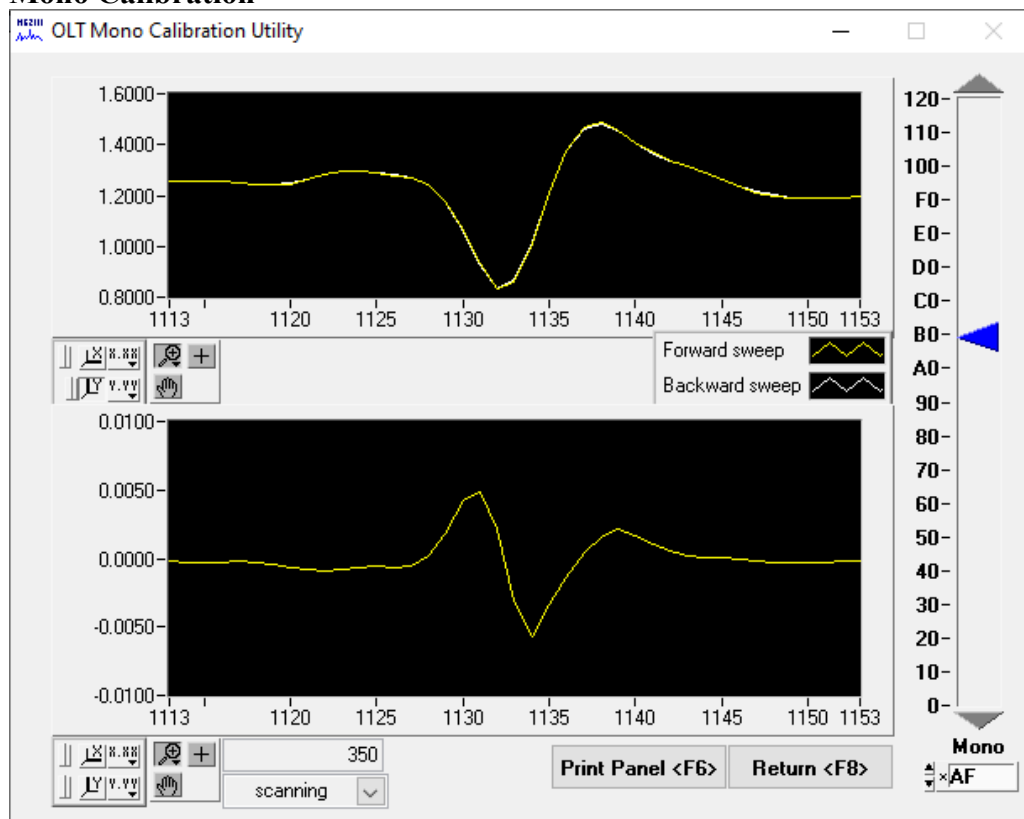
Freq and FWHH look good

Preamp Check



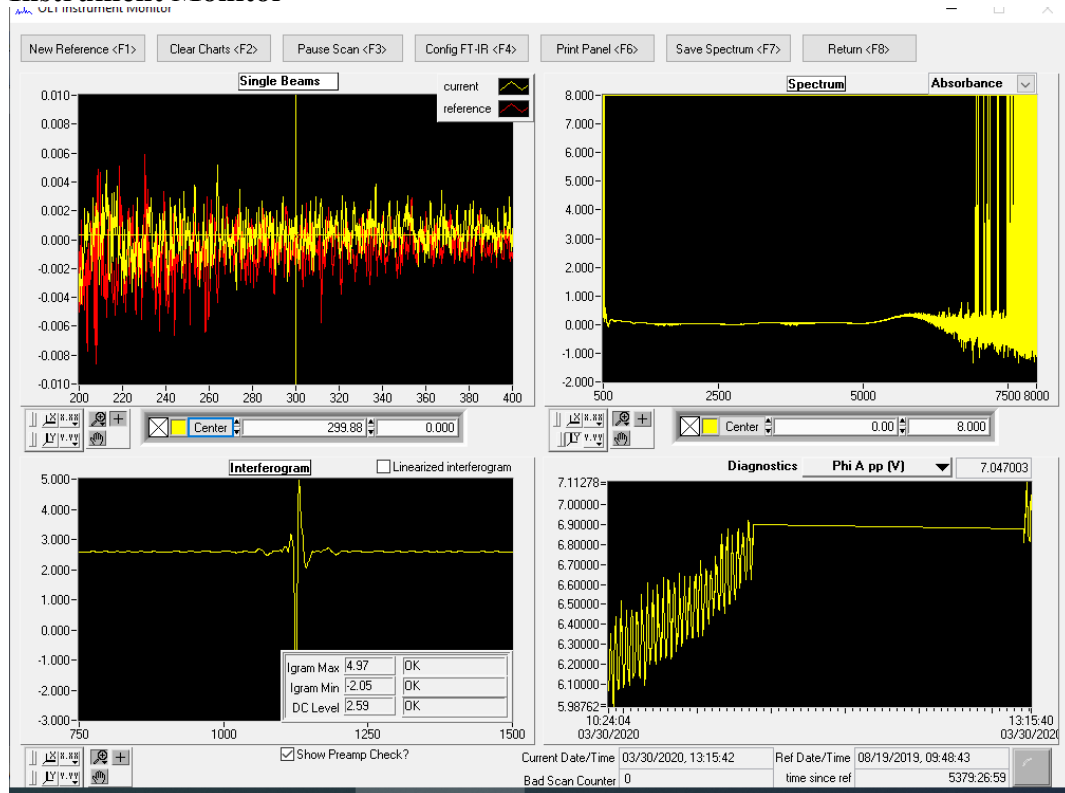
Looks good

Mono Calibration



Kept at AF

Instrument Monitor



Phase angle: 89.94 degrees

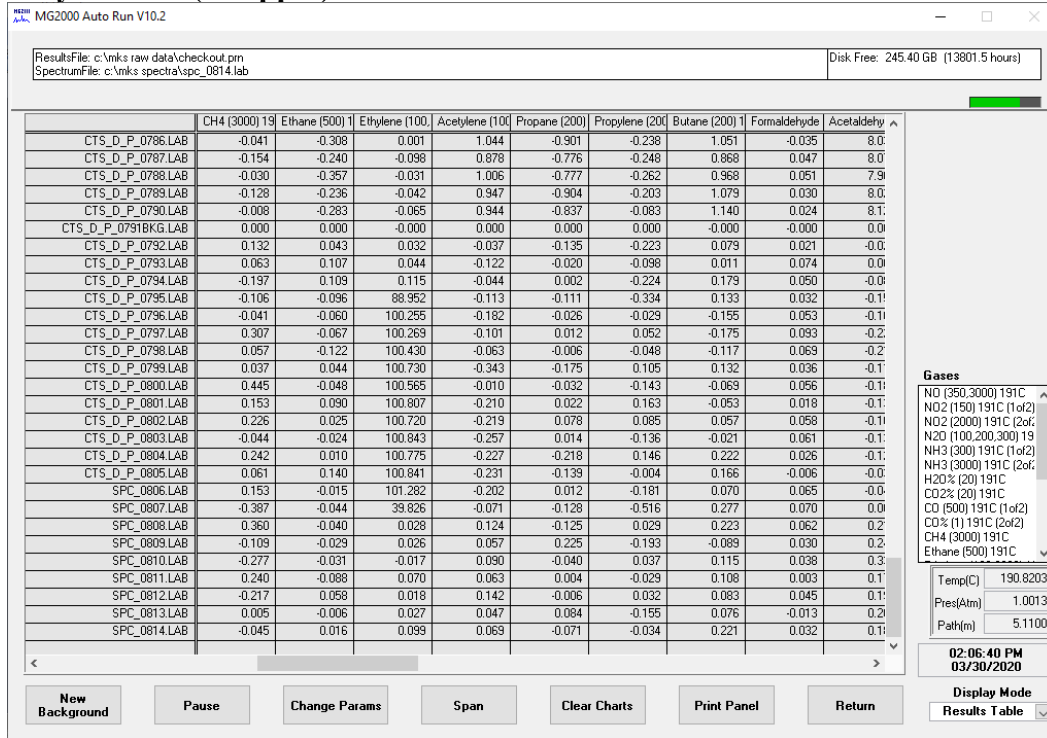
Linearizer settings

The NVS modify window displays two columns of settings: Current configuration and NVS stored configuration.

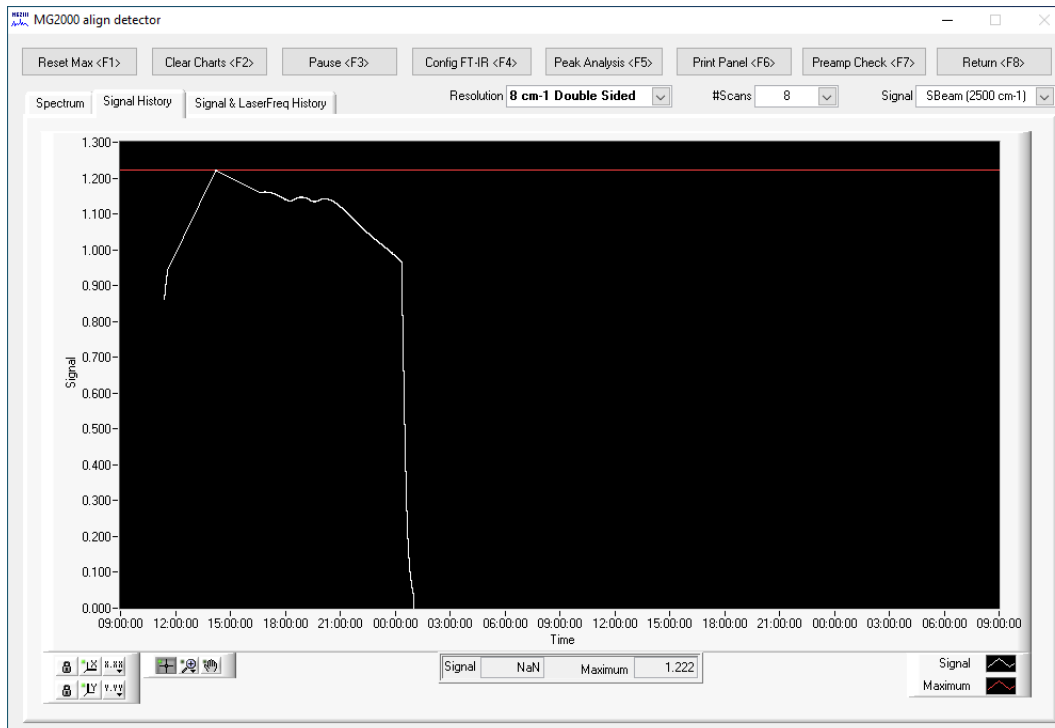
Current configuration	NVS stored configuration
Linearizer Offset: 1006	Linearizer Offset: 993
Linearizer Linear: 1000	Linearizer Linear: 1000
Linearizer Quad: 403	Linearizer Quad: 405
Linearizer Cubic: 65	Linearizer Cubic: 66
Mono Value: ×AF	Mono Value: ×B4
Laser Frequency: 15798.287	Laser Frequency: 15798.287
pressure offset: 0.002	pressure offset: 0.002
pressure max tor: 1000.000	pressure max tor: 1000.000
temperature offset: -49.700	temperature offset: -49.700
O2 sensor present: ☐	O2 sensor present: ☐
O2 offset: 0.000	O2 offset: 0.000
O2 constant: 0.000	O2 constant: 0.000

Buttons at the bottom: Send to NVS, Read from NVS, Return.

Ethylene test (101 ppm)



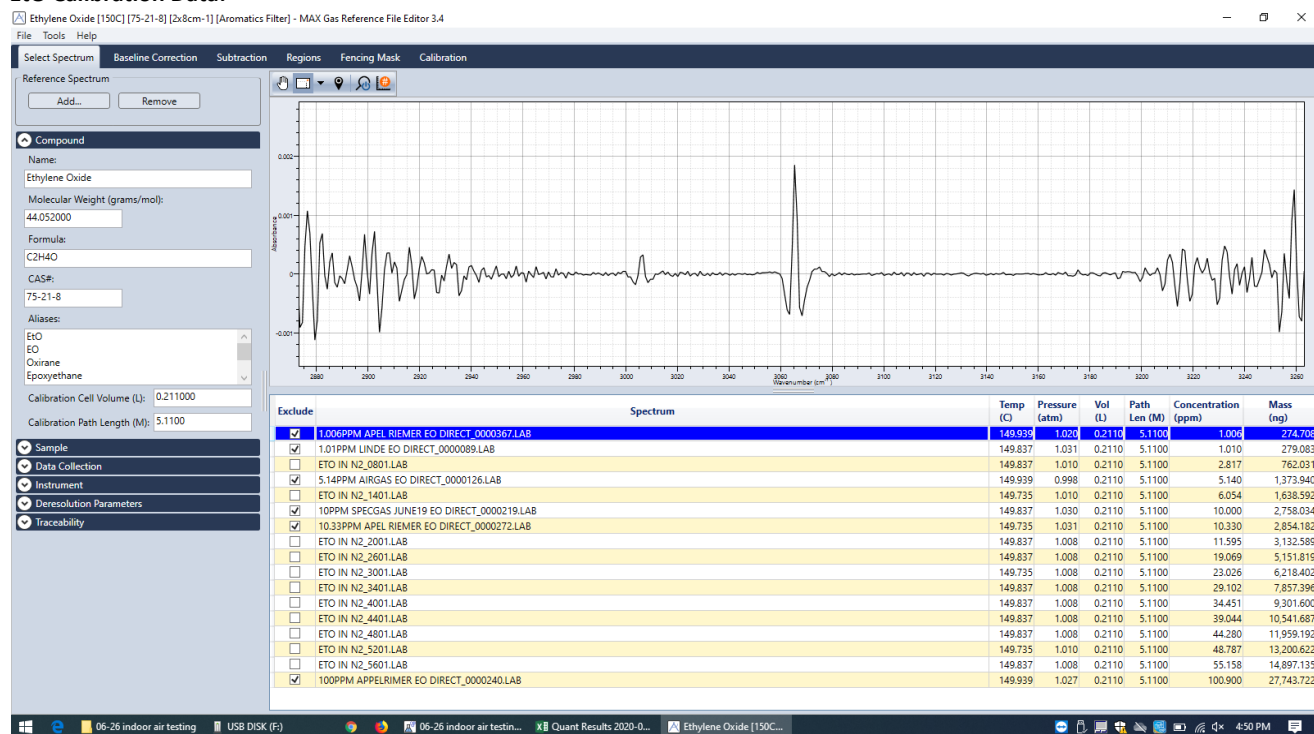
Reading about 100.5 ppm Ethylene Detector Vacuum test



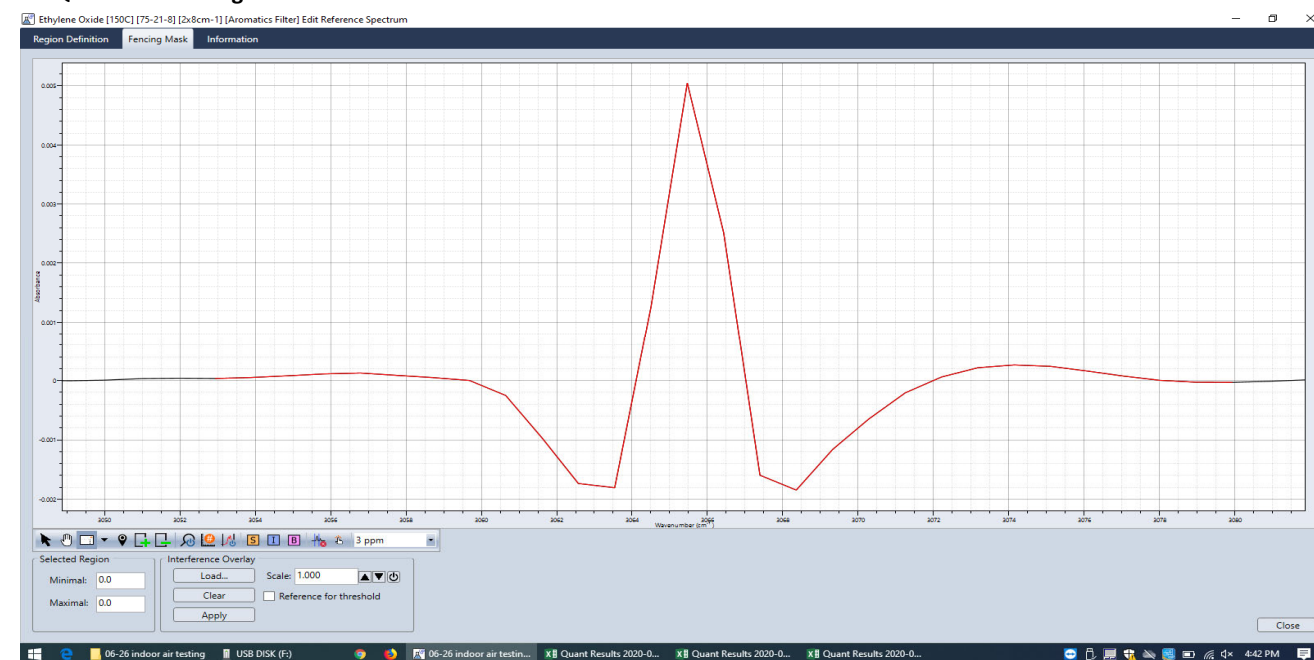
Filled at 9am lasted till about midnight (14 hours)

Process & Indoor Air Stack (Starboost) FTIR Spectral Analysis

EtO Calibration Data:



EtO Quantification Region:

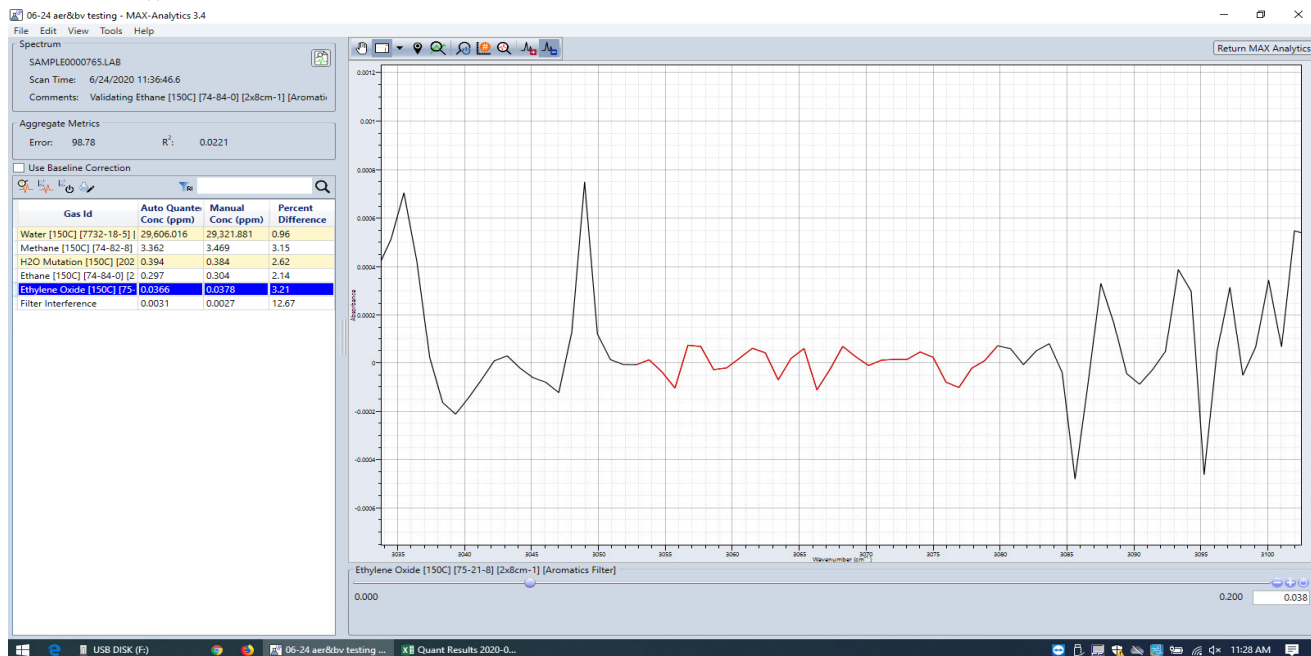


Notes:

Quant region from 3049 - 3080 cm⁻¹.

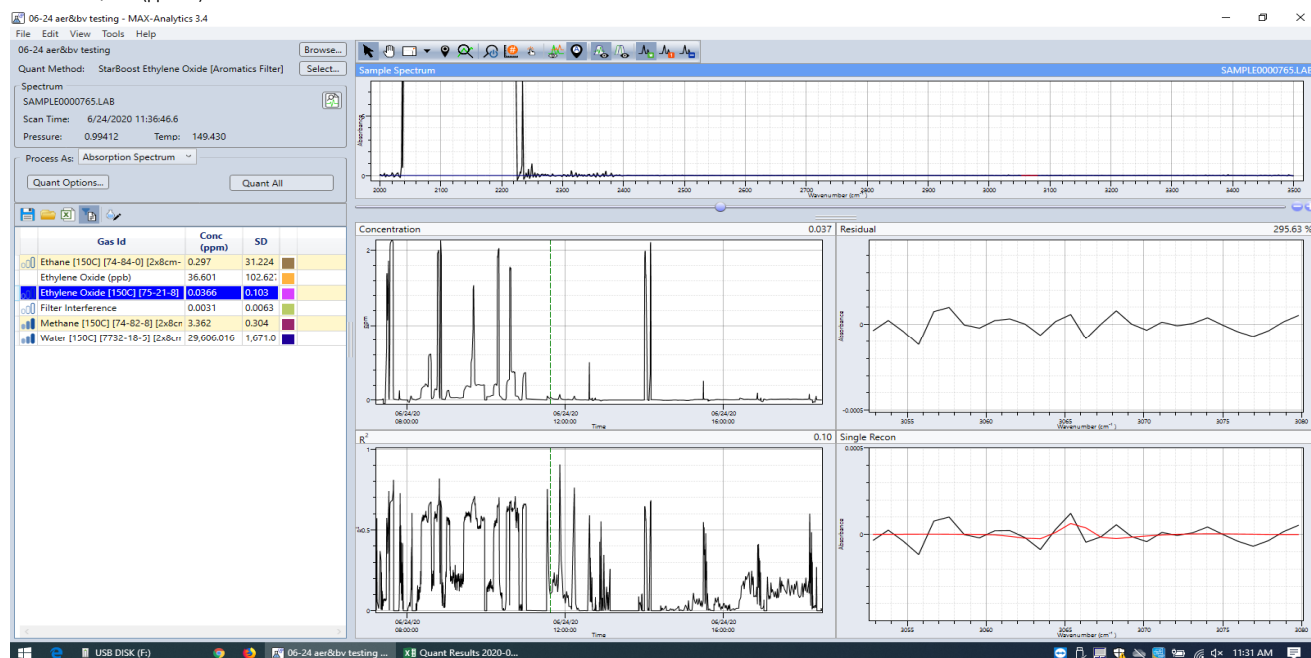
Manual Validation Example:

SPC#: 0765 Date: 6/24
 Description: Process Stack, BV Testing, R1 Time: 11:36
 Reported (ppmw): 0.0366
 Manual Quant. (ppmw): 0.0378



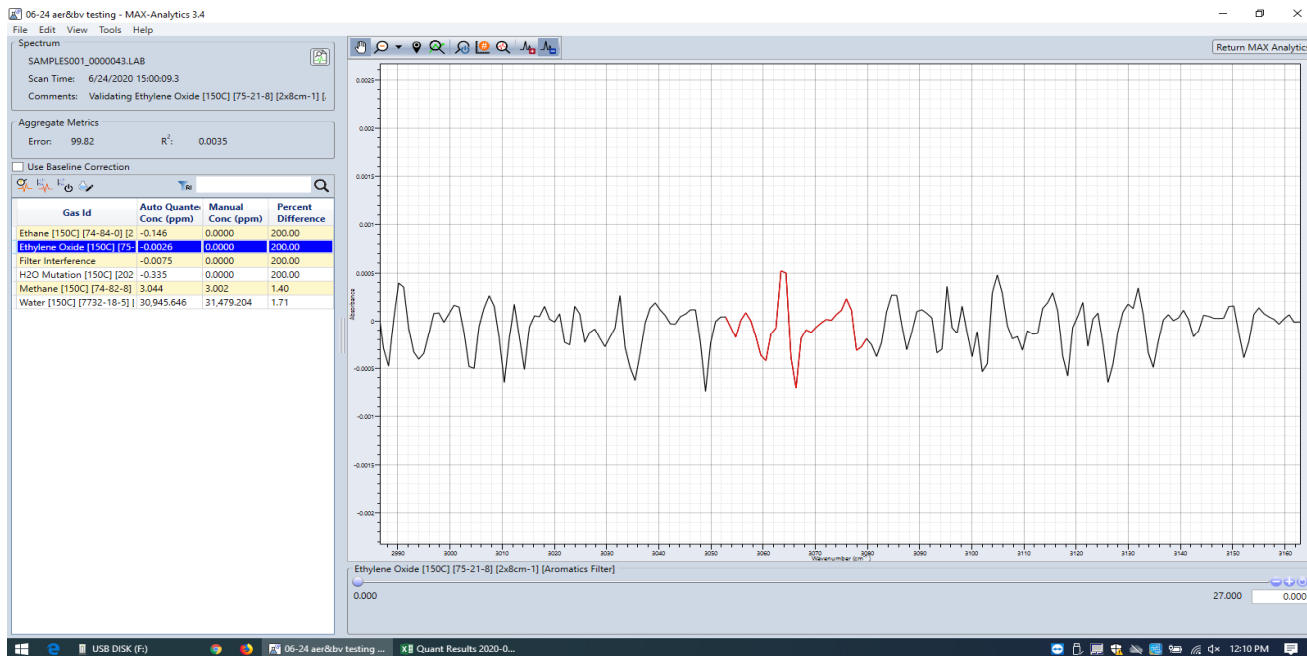
Manual Validation Residual Spectrum & Quant. Method Example:

SPC#: 0765 Date: 6/24
 Description: Process Stack, BV Testing, R1 Time: 11:36
 Reported (ppmw): 0.0366
 Manual Quant. (ppmw): 0.0378



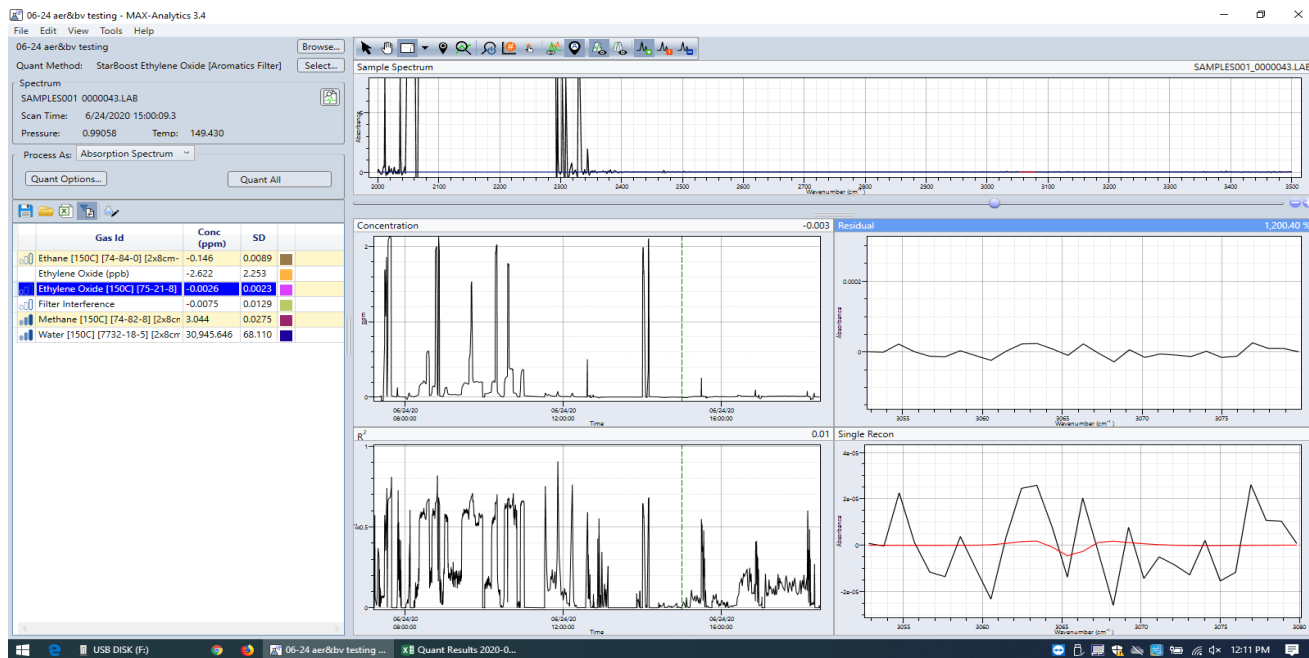
Manual Validation Example:

SPC#: 0043 Date: 6/24
 Description: Process Stack, Aer Testing, R1 Time: 15:00
 Reported (ppmw): -0.0030
 Manual Quant. (ppmw): <MDC#2



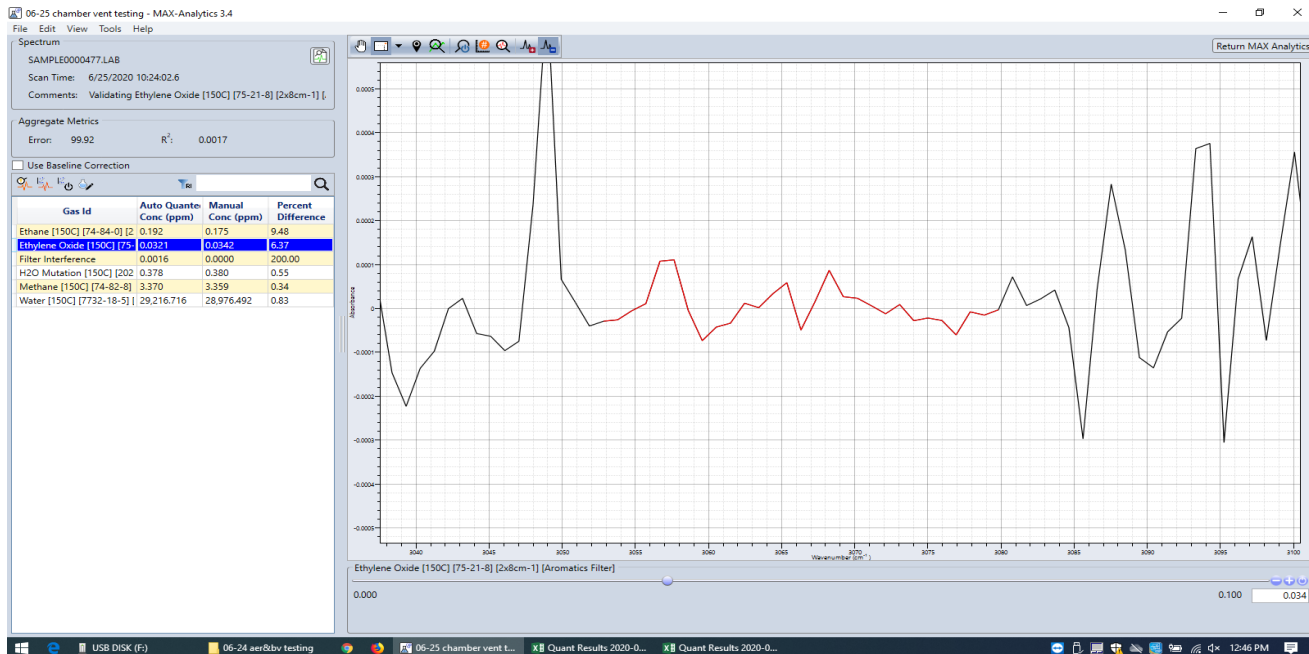
Manual Validation Residual Spectrum & Quant. Method Example:

SPC#: 0043 Date: 6/24
 Description: Process Stack, Aer Testing, R1 Time: 15:00
 Reported (ppmw): -0.0030
 Manual Quant. (ppmw): <MDC#2



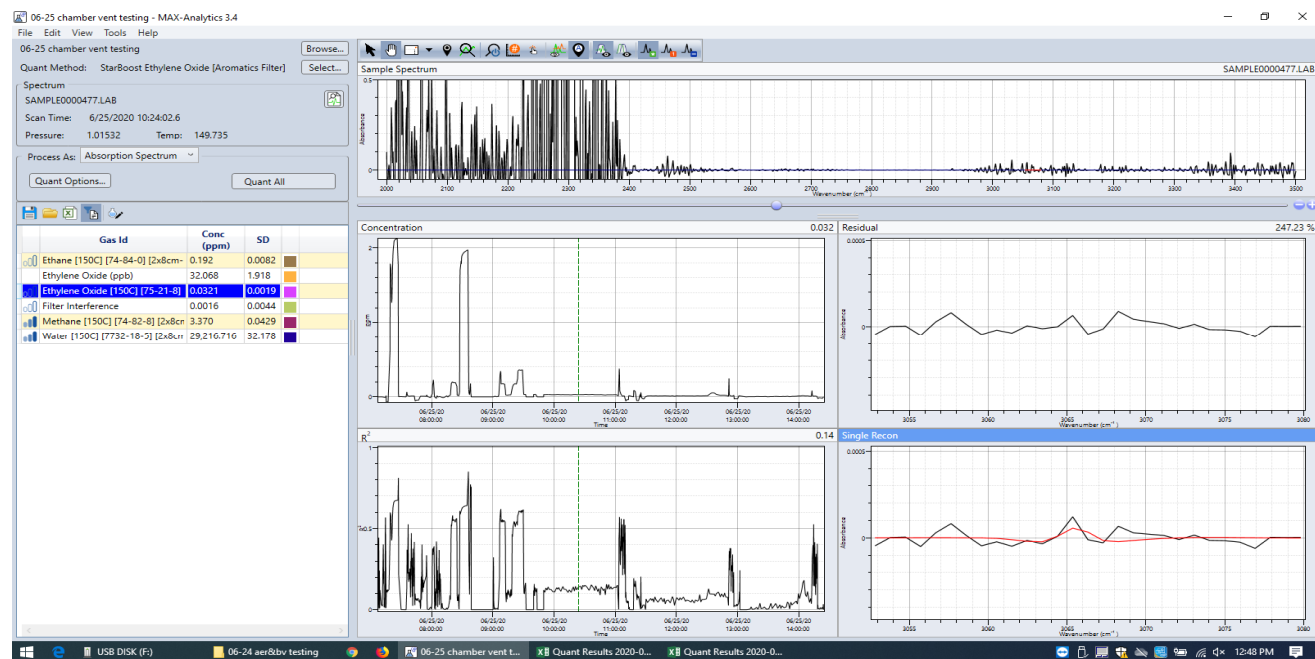
Manual Validation Example:

SPC#: 0477 Date: 6/25
 Description: Process Stack, VP Testing, R1 Time: 10:24
 Reported (ppmw): 0.0321
 Manual Quant. (ppmw): 0.0342



Manual Validation Residual Spectrum & Quant. Method Example:

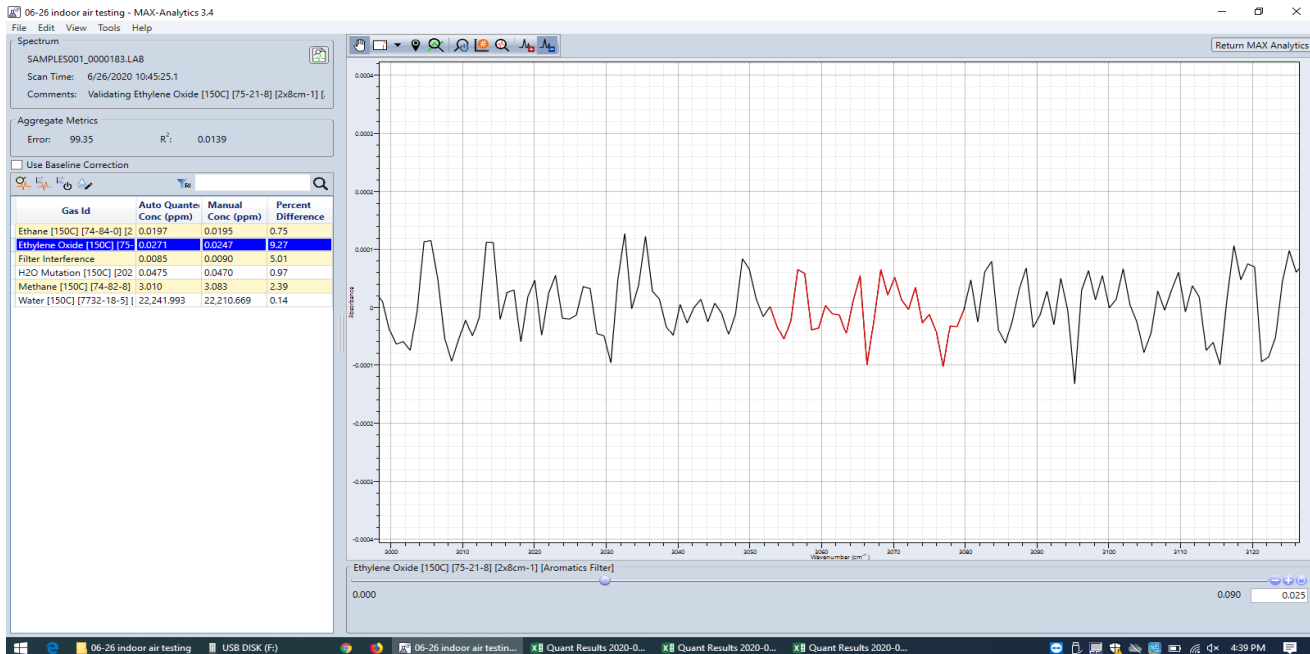
SPC#: 0477 Date: 6/25
 Description: Process Stack, VP Testing, R1 Time: 10:24
 Reported (ppmw): 0.0321
 Manual Quant. (ppmw): 0.0342



Manual Validation Example:

SPC#: 0183
 Description: IA Stack, IA Testing, R1
 Reported (ppmw): 0.0271
 Manual Quant. (ppmw): 0.0247

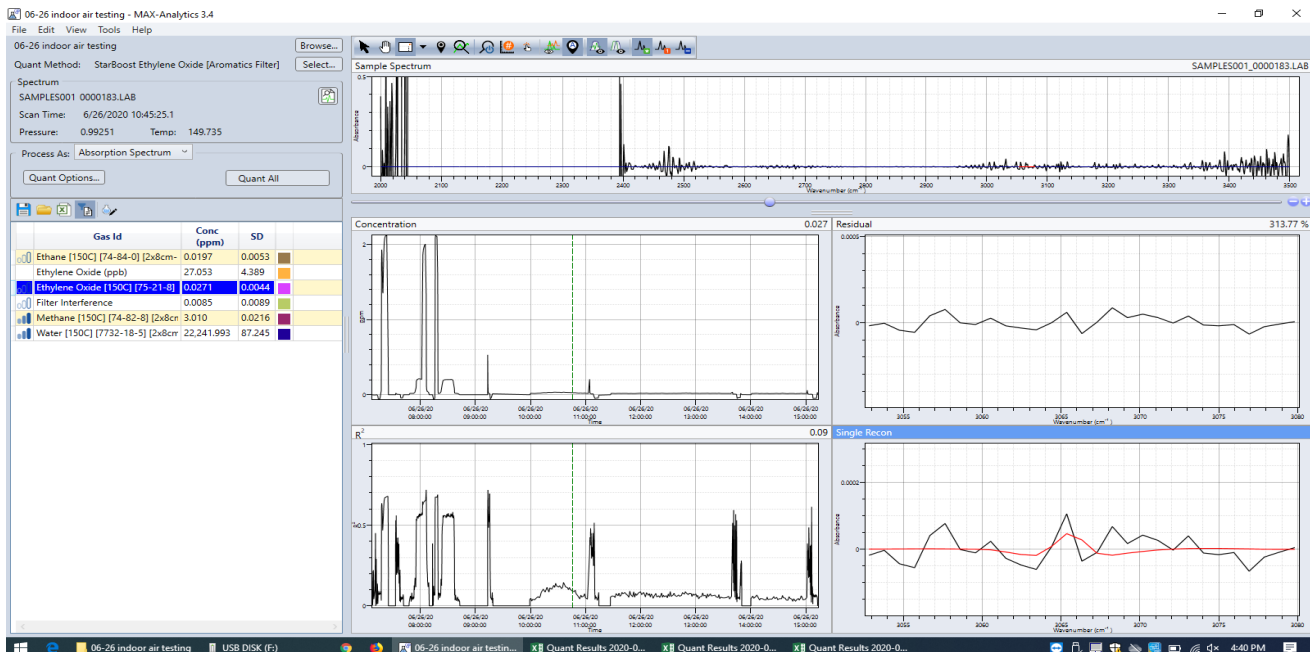
Date: 6/26
 Time: 10:45



Manual Validation Residual Spectrum & Quant. Method Example:

SPC#: 0183
 Description: IA Stack, IA Testing, R1
 Reported (ppmw): 0.0271
 Manual Quant. (ppmw): 0.0247

Date: 6/26
 Time: 10:45



MKS Starboost FTIR Checkout

Asset #211136

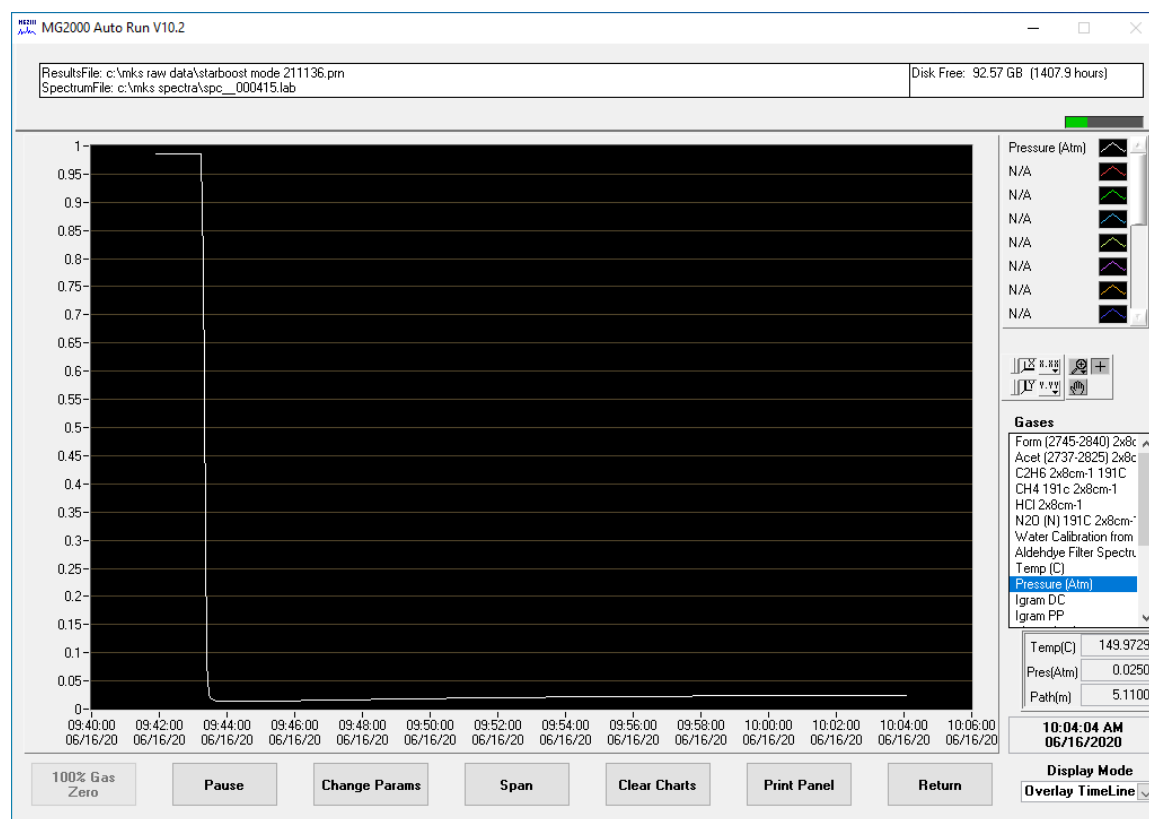
Laptop #210764

Jay Clites

6/16/20

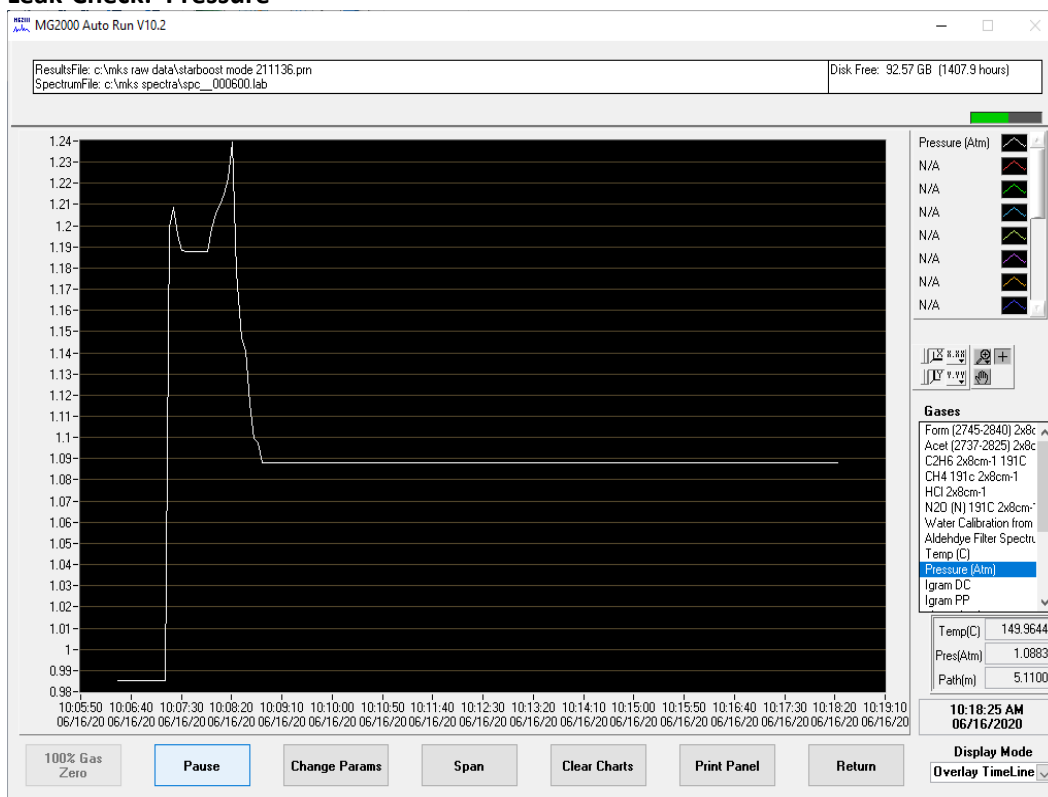
This Starboost was last used with the EtO (Aromatics) filter. When it came back we checked the cell and cleaned the obj mirror, it had a few smudges, then replaced the cell orings and put the cell back together. After it heated up to 150C we did a leak-check, then did a software checkout with MG2000 and MAX Acquisition

Leak-Check: Vacuum



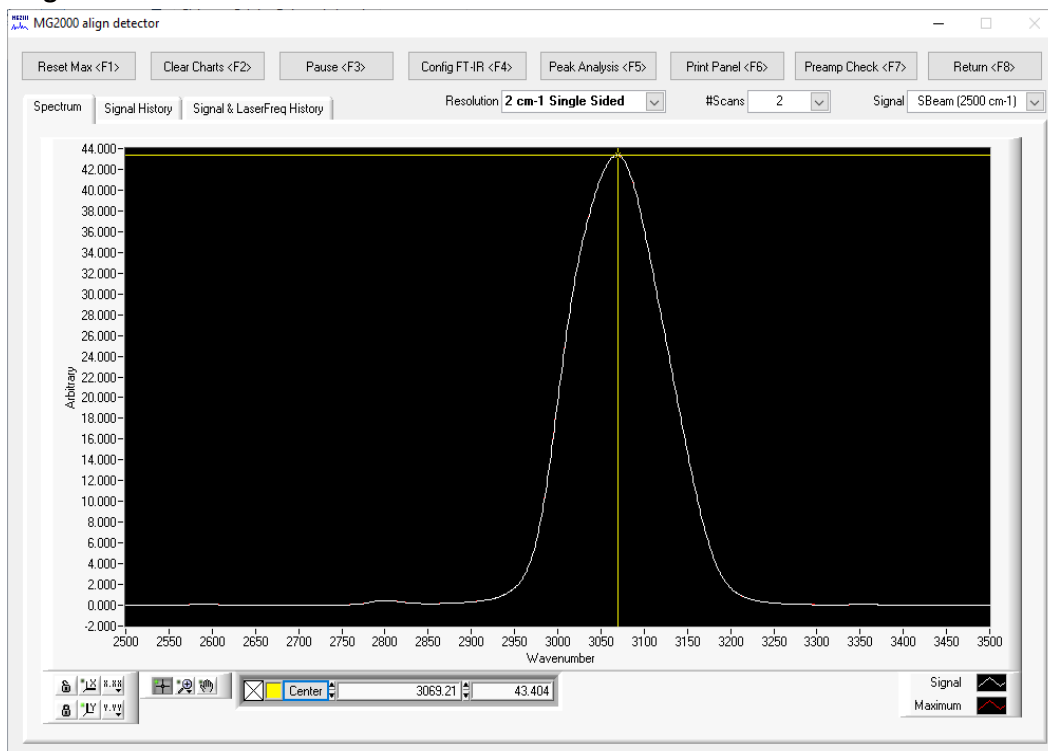
Held below 0.03Atm for > 20 minutes. Looks good.

Leak-Check: Pressure



Held about 1.09Atm for > 8 minutes. Looks good.

Single Beam

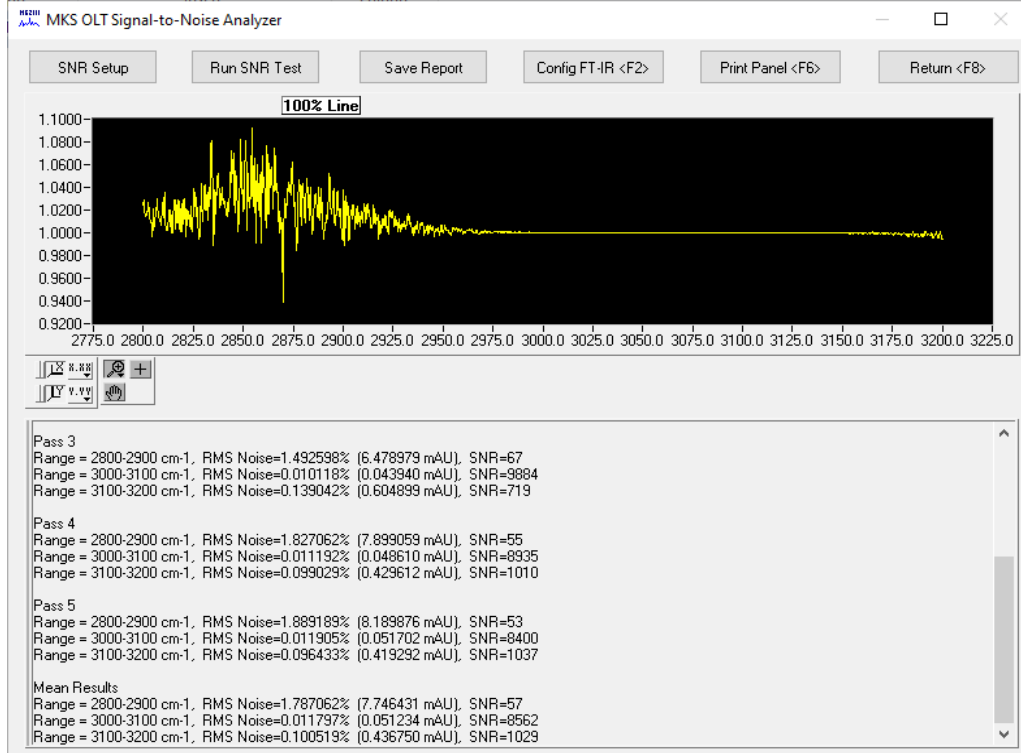


Peak: 43.404 @ 3069cm-1

(Good signal ~2950-3200cm-1)

Last: 40.614 @ 3070

SNR Test (0.5cm-1 Resolution, 4 scans)



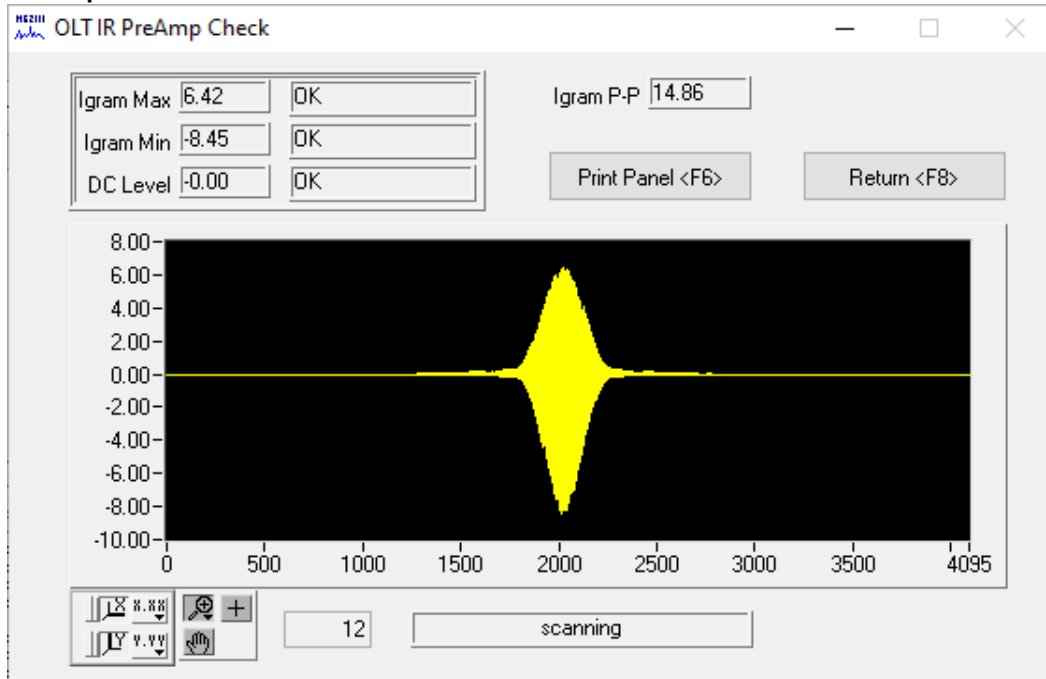
Mean Results: 57 / 8562 / 1029 (2800-2900, 3000-3100, 3100-3200 regions)
 Last time: 49 / 8646 / 1035 (0.5cm-1 resolution)

SNR Test (2cm-1 resolution, 4 scans)



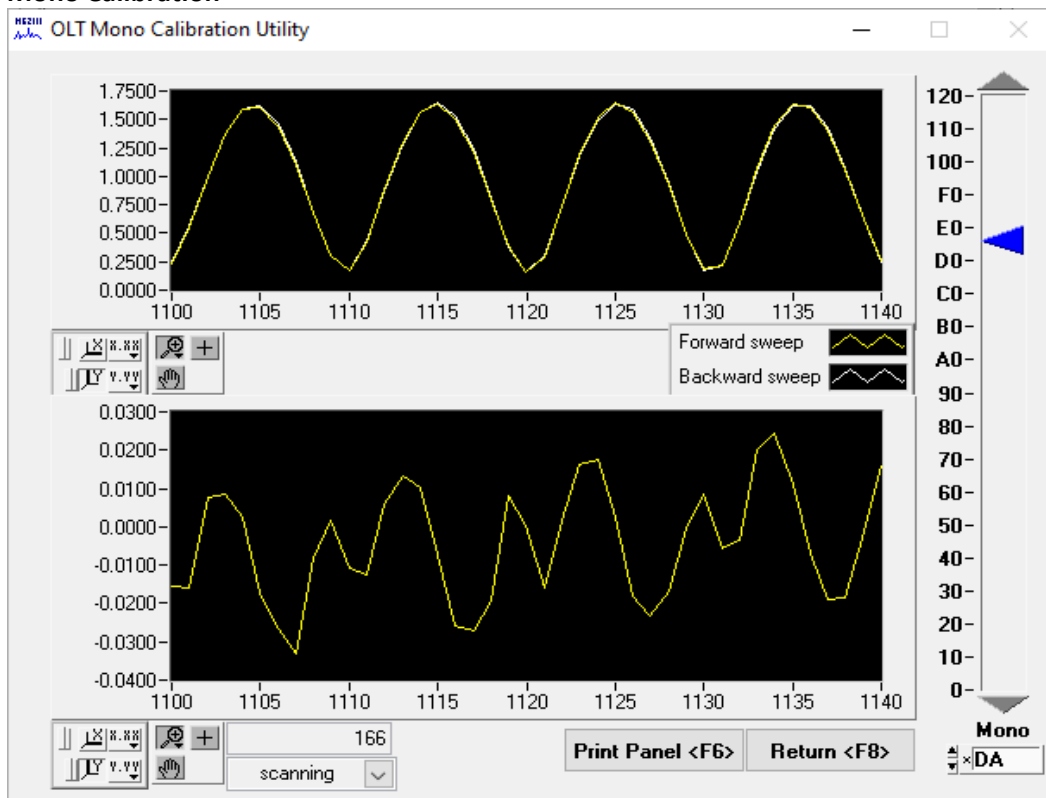
Mean Results: 70 / 14670 / 1746
 Last time: 77 / 14733 / 2469 (2cm-1 resolution, 4 scans)

Preamp Check



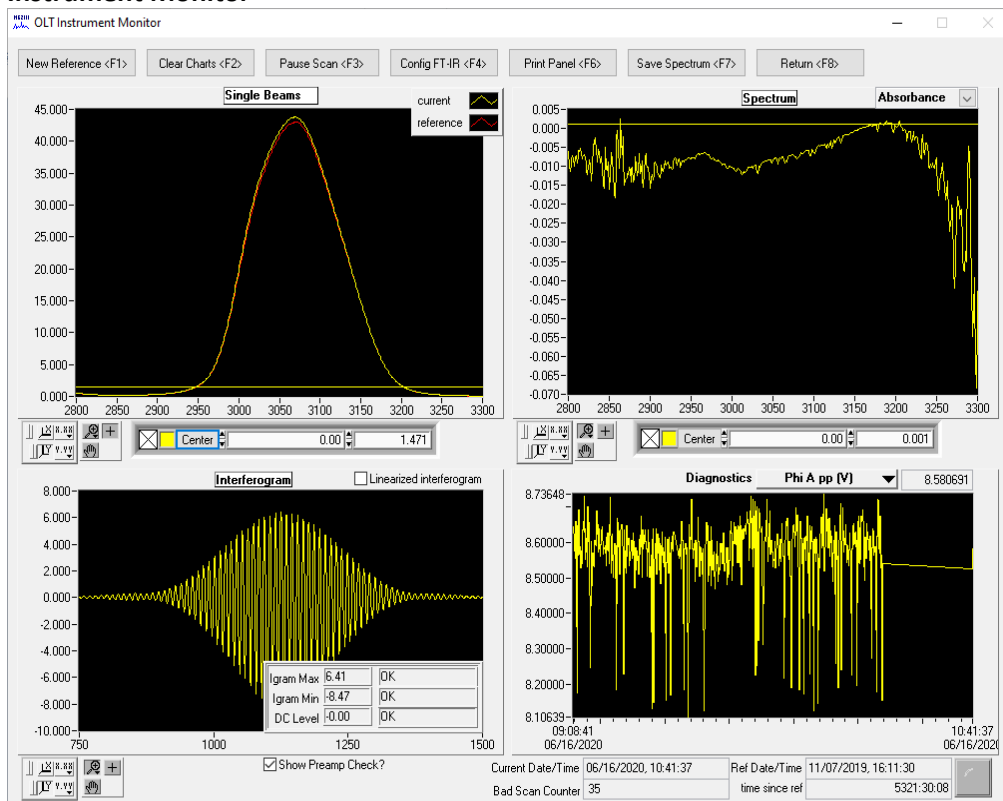
Last time 13.87V pk-pk, better signal this time.

Mono Calibration



Same mono value as last time for EtO filter.

Instrument Monitor



Phase Angle 87.4 degrees. All diagnostics here look good.

Linearizer Settings

The screenshot shows the NVS modify Linearizer Settings dialog box. It is divided into two columns: 'Current configuration' and 'NVS stored configuration'.

Current configuration	NVS stored configuration
Linearizer Offset: 0	Linearizer Offset: 1443
Linearizer Linear: 1000	Linearizer Linear: 1000
Linearizer Quad: 0	Linearizer Quad: 453
Linearizer Cubic: 0	Linearizer Cubic: 122
Mono Value: × DA	Mono Value: × B4
Laser Frequency: 15798.284	Laser Frequency: 15798.284
pressure offset: -0.001	pressure offset: -0.001
pressure max tor: 1000.000	pressure max tor: 1000.000
temperature offset: -50.000	temperature offset: -50.000
O2 sensor present: ☐	O2 sensor present: ☐
O2 offset: 0.000	O2 offset: 0.000
O2 constant: 0.000	O2 constant: 0.000

At the bottom, there are three buttons: 'Send to NVS', 'Read from NVS', and 'Return'.

Same as last time. Left side is current setup (Starboost mode). The right side is for FTIR mode.

MAX Acquisition Checkout

Ethylene Oxide - background test

Spectrum	Date-Time	Ethane [150C]	Ethylene Oxide [150C]	Filter Interfer	Methane [150C]	Water [150C]
ZERO DIRECT_0000020.LAB	6/16/2020 11:13:28 AM	-0.007	-0.002	-0.006	-0.003	-0.867
ZERO DIRECT_0000021.LAB	6/16/2020 11:14:30 AM	-0.016	-0.001	-0.001	0.009	1.794
ZERO DIRECT_0000022.LAB	6/16/2020 11:15:29 AM	-0.011	-0.002	0.001	0.005	0.988
ZERO DIRECT_0000023.LAB	6/16/2020 11:16:32 AM	-0.011	0.001	-0.080	0.004	0.384
ZERO DIRECT_0000024.LAB	6/16/2020 11:17:34 AM	-0.008	-0.001	0.000	0.004	-0.869
ZERO DIRECT_0000025.LAB	6/16/2020 11:18:37 AM	-0.015	-0.001	0.002	0.002	0.613
ZERO DIRECT_0000026.LAB	6/16/2020 11:19:36 AM	0.002	0.001	-0.008	0.002	1.156
ZERO DIRECT_0000027.LAB	6/16/2020 11:20:38 AM	-0.002	0.000	0.000	-0.002	-1.631
ZERO DIRECT_0000028.LAB	6/16/2020 11:21:41 AM	-0.005	0.002	-0.001	-0.002	-0.869
ZERO DIRECT_0000029.LAB	6/16/2020 11:22:44 AM	-0.013	-0.001	-0.024	0.001	1.139
ZERO DIRECT_0000030.LAB	6/16/2020 11:23:50 AM	-0.005	0.001	0.005	-0.002	-1.387

The data table contains unaveraged values. These values may differ from those in the quant summary view.

Edit Span... ☒ Track Active Spectrum Close

EtO reading varying from -.002 to .002 ppm. (200 scans, 1-min avg time)

Methane Test (101ppm)

Spectrum	Date-Time	Ethane [150C]	Ethylene Oxide [150C]	Filter Interfer	Methane [150C]	Water [150C]
CTS DIRECT_0000098.LAB	6/16/2020 12:10:08 PM	0.309	-0.110	0.005	99.558	90.081
CTS DIRECT_0000099.LAB	6/16/2020 12:10:23 PM	0.330	-0.113	-0.003	99.565	93.436
CTS DIRECT_0000100.LAB	6/16/2020 12:10:41 PM	0.313	-0.114	0.032	99.562	91.913
CTS DIRECT_0000101.LAB	6/16/2020 12:10:56 PM	0.299	-0.109	0.008	99.542	91.367
CTS DIRECT_0000102.LAB	6/16/2020 12:11:10 PM	0.328	-0.115	0.005	99.525	90.732
CTS DIRECT_0000103.LAB	6/16/2020 12:11:25 PM	0.316	-0.117	0.003	99.552	96.113
CTS DIRECT_0000104.LAB	6/16/2020 12:11:40 PM	0.308	-0.116	-0.008	99.552	89.731
CTS DIRECT_0000105.LAB	6/16/2020 12:11:55 PM	0.319	-0.116	0.002	99.572	95.113
CTS DIRECT_0000106.LAB	6/16/2020 12:12:09 PM	0.330	-0.117	0.873	99.552	91.713
CTS DIRECT_0000107.LAB	6/16/2020 12:12:24 PM	0.322	-0.117	-0.031	99.545	91.674
PRE-ZERO_0000001.LAB	6/16/2020 11:00:03 AM	-0.002	-0.002	-0.001	0.013	1.796

The data table contains unaveraged values. These values may differ from those in the quant summary view.

Edit Span... ☒ Track Active Spectrum Close

Methane reading about 99.6ppm. Looks fine. (50 scans, 15-sec avg time)

End of Appendix Section

APPENDIX F: CALIBRATION GAS CERTIFICATIONS

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG HILLSIDE IL HS
12000 ROOSEVELT RD
HILLSIDE IL 60162-2004

Certificate Issuance Date: 08/14/2019

Praxair Order Number: 71041922

Part Number: NI ME85ME-AS

Customer PO Number: 79026510

Fill Date: 07/22/2019

Lot Number: 700019203UA

Cylinder Style & Outlet: AS

CGA 350

Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

Expiration Date:	08/13/2027	NIST Traceable
Cylinder Number:	CC31745	Expanded Uncertainty
85.5 ppm	Methane	± 0.5 %
Balance	Nitrogen	

ProSpec EZ Cert



Certification Information:

Certification Date: 08/13/2019

Term: 96 Months

Expiration Date: 08/13/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component:

Methane

Requested Concentration: 85.0 ppm

Certified Concentration: 85.5 ppm

Instrument Used: MKS 2030

Analytical Method: FTIR

Last Multipoint Calibration: 08/02/2019

Reference Standard: Type / Cylinder #: GMIS / CC99733

Concentration / Uncertainty: 101.5 ppm ±0.5%

Expiration Date: 05/25/2024

Traceable to: SRM # / Sample # / Cylinder #: 2751 / 212-C-04 / FF23181

SRM Concentration / Uncertainty: 98.28 PPM / ±0.51 PPM

SRM Expiration Date: 06/01/2018

First Analysis Data:				Date
Z:	0	R:	92.3	08/13/2019
R:	92.1	Z:	0	
Z:	0	C:	77.7	
		R:	92.1	
		C:	77.4	
		Conc:	85.6	
		Conc:	85.2	
		Conc:	85.6	
UOM:	ppm	Mean Test Assay:	85.5	ppm

Second Analysis Data:				Date
Z:	0	R:	0	
R:	0	Z:	0	
Z:	0	C:	0	
		R:	0	
		C:	0	
		Conc:	0	
		Conc:	0	
		Conc:	0	
UOM:	ppm	Mean Test Assay:		ppm

Analyzed By

Mike Monnette
Mike Monnette

Certified By

Edward E Zucal



Praxair Distribution, Inc,
6055 Brent Drive
Toledo, OH 43611
Tel: (419) 729-7732 Fax: (419) 729-2411
PGVP ID: F12017

DocNumber: 000021123

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR PKG HILLSIDE IL HS
12000 ROOSEVELT RD
HILLSIDE IL 60162

Praxair Order Number: 70214385
Customer P. O. Number:
Customer Reference Number:

Fill Date: 2/23/2017
Part Number: NI ME85ME-AS
Lot Number: 70001705481
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu ft

Certified Concentration:

Expiration Date:	3/6/2025	NIST Traceable
Cylinder Number:	CC19053	Analytical Uncertainty:
87.2 ppm	METHANE	± 0.7 %
Balance	NITROGEN	

Certification Information: Certification Date: 3/6/2017 Term: 96 Months Expiration Date: 3/6/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: METHANE

Requested Concentration 85.0 ppm
Certified Concentration 87.2 ppm
Instrument Used 2030
Analytical Method FOURIER-TRANSFORM INFRAR
Last Multipoint Calibration 3/6/2017

First Analysis Data:				Date:	3/6/2017
Z:	0	R:	99.9	C:	84
R:	99.8	Z:	0	C:	84
Z:	0	C:	84	R:	99.9
UOM:	PPM	Mean Test Assay:	87.224	PPM	

Analyzed by:

Mike Monnette

Reference Standard Type: GMIS
Ref. Std. Cylinder #: EB0001183
Ref. Std. Conc: 103.7 ppm
Ref. Std. Traceable to SRM #: 2751
SRM Sample #: 212-C-04
SRM Cylinder #: FF23181

Second Analysis Data:				Date:	
Z:	0	R:	0	C:	0
R:	0	Z:	0	C:	0
Z:	0	C:	0	R:	0
UOM:	PPM	Mean Test Assay:	0	PPM	

Certified by:

Rolonda Kaywood

CERTIFICATE OF ANALYSIS

Grade of Product: PRIMARY STANDARD

Part Number:	X03NI99P15A00T0	Reference Number:	160-401638069-1
Cylinder Number:	CC716029	Cylinder Volume:	144.4 Cubic Feet
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Nov 06, 2019	Valve Outlet:	350SS
Lot Number:	160-401638069-1		

Primary Standard Gas Mixtures are traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

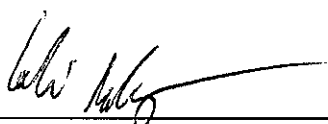
ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration	Analytical Uncertainty
		(Mole %)	
SULFUR HEXAFLUORIDE	5.000 PPM	5.011 PPM	+/- 1%
ETHYLENE OXIDE	100.0 PPM	100.1 PPM	+/- 1%
NITROGEN	Balance		

Notes:

Expiration Date: 11-6-21





Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer:	CLEAN AIR ENGINEERING	Reference Number:	160-401671982-1
Part Number:	X03NI99C15A02L8	Cylinder Volume:	144.4 CF
Cylinder Number:	AAL072570	Cylinder Pressure:	2015 PSIG
Laboratory:	124 - Plumsteadville - PA	Valve Outlet:	350SS
Analysis Date:	Dec 20, 2019		
Lot Number:	160-401671982-1		

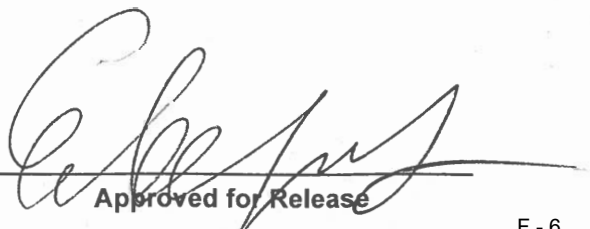
Expiration Date: Dec 20, 2020

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
ETHYLENE OXIDE	2.000 PPM	2.165 PPM	+/- 5%
ETHANE	500.0 PPM	499.9 PPM	+/- 2%
NITROGEN	Balance		




Approved for Release



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG HILLSIDE IL HS
12000 ROOSEVELT RD
HILLSIDE IL 60162-2004

Certificate Issuance Date: 12/26/2018

Praxair Order Number: 70814575

Part Number: NI CD10010E-AS

Fill Date: 12/13/2018

Lot Number: 700018347F3

Cylinder Style & Outlet: AS

Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

Expiration Date:	12/26/2026	NIST Traceable
Cylinder Number:	EB0002340	Expanded Uncertainty
9.88 %	Carbon dioxide	± 0.7 %
10.1 %	Oxygen	± 0.2 %
Balance	Nitrogen	

ProSpec EZ Cert



Certification Information:

Certification Date: 12/26/2018

Term: 96 Months

Expiration Date: 12/26/2026

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Carbon dioxide

Requested Concentration: 10 %
Certified Concentration: 9.88 %
Instrument Used: Horbia VA-3000
Analytical Method: NDIR
Last Multipoint Calibration: 11/26/2018

First Analysis Data:				Date	12/26/2018
Z:	0	R:	20.2	C:	9.88
R:	20.2	Z:	0	C:	9.9
Z:	0	C:	9.9	R:	20.2
UOM:	%	Mean Test Assay:	9.88	%	

Reference Standard: Type / Cylinder #: GMIS / EB0101485

Concentration / Uncertainty: 20.17 % ±0.238%

Expiration Date: 01/13/2026

Traceable to: SRM # / Sample # / Cylinder #: PRM# 3222577.01 / n/a / FF27613

SRM Concentration / Uncertainty: 20.008% / ±0.02%

SRM Expiration Date: 04/01/2020

Second Analysis Data:				Date	
Z:	0	R:	0	C:	0
R:	0	Z:	0	C:	0
Z:	0	C:	0	R:	0
UOM:	%	Mean Test Assay:		%	

2. Component: Oxygen

Requested Concentration: 10 %
Certified Concentration: 10.1 %
Instrument Used: Servomex 575
Analytical Method: Paramagnetic
Last Multipoint Calibration: 12/05/2018

First Analysis Data:				Date	12/26/2018
Z:	0	R:	22.5	C:	10.1
R:	22.5	Z:	0	C:	10.1
Z:	0	C:	10.1	R:	22.5
UOM:	%	Mean Test Assay:	10.1	%	

Reference Standard: Type / Cylinder #: GMIS / CC348007

Concentration / Uncertainty: 22.53 % ±0.2%

Expiration Date: 11/17/2025

Traceable to: SRM # / Sample # / Cylinder #: 2659a / 71-D-04 / CAL015785

SRM Concentration / Uncertainty: 20.72% / ±0.043%

SRM Expiration Date: 08/23/2021

Second Analysis Data:				Date	
Z:	0	R:	0	C:	0
R:	0	Z:	0	C:	0
Z:	0	C:	0	R:	0
UOM:	%	Mean Test Assay:		%	

Analyzed By

Anthony Cekic

Certified By

Edward E. Zucal



Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax: (714) 542-6689
PGVPID: F22017

DocNumber: 000105935

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR PKG HILLSIDE IL HS
12000 ROOSEVELT RD
HILLSIDE IL 60162

Praxair Order Number: 70214303
Customer P. O. Number:
Customer Reference Number:

Fill Date: 2/28/2017
Part Number: NI CD2103E-AS
Lot Number: 109705903
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	3/18/2025	NIST Traceable
Cylinder Number:	CC49769	Analytical Uncertainty:
21.09 %	CARBON DIOXIDE	± 0.3 %
21.43 %	OXYGEN	± 0.1 %
Balance	NITROGEN	

Certification Information: Certification Date: 3/18/2017 Term: 96 Months Expiration Date: 3/18/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: CARBON DIOXIDE

Requested Concentration: 21 %
Certified Concentration: 21.09 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 3/10/2017

Reference Standard Type: GMIS
Ref. Std. Cylinder #: SA10234
Ref. Std. Conc: 20.02 %
Ref. Std. Traceable to SRM #: RGM#CC28
SRM Sample #: N/A
SRM Cylinder #: RGM#CC28033

First Analysis Data:	Date:	3/18/2017
Z: 0 R: 20.05 C: 21.13 Conc: 21.116		
R: 20.03 Z: 0 C: 21.09 Conc: 21.076		
Z: 0 C: 21.1 R: 20.02 Conc: 21.086		
UOM: %	Mean Test Assay:	21.093 %

Second Analysis Data:	Date:	
Z: 0 R: 0 C: 0 Conc: 0		
R: 0 Z: 0 C: 0 Conc: 0		
Z: 0 C: 0 R: 0 Conc: 0		
UOM: %	Mean Test Assay:	0 %

2. Component: OXYGEN

Requested Concentration: 21 %
Certified Concentration: 21.43 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 3/3/2017

Reference Standard Type: GMIS
Ref. Std. Cylinder #: CC112100
Ref. Std. Conc: 19.74 %
Ref. Std. Traceable to SRM #: 2659a
SRM Sample #: 71-E-19
SRM Cylinder #: FF22331

First Analysis Data:	Date:	3/18/2017
Z: 0 R: 19.74 C: 21.42 Conc: 21.434		
R: 19.72 Z: 0 C: 21.42 Conc: 21.434		
Z: 0 C: 21.42 R: 19.72 Conc: 21.434		
UOM: %	Mean Test Assay:	21.434 %

Second Analysis Data:	Date:	
Z: 0 R: 0 C: 0 Conc: 0		
R: 0 Z: 0 C: 0 Conc: 0		
Z: 0 C: 0 R: 0 Conc: 0		
UOM: %	Mean Test Assay:	0 %

Analyzed by:

Chemist 1
Ying Yu

Certified by:

Chemist 2
Nelson Ma

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: Ultra Pure Carrier

Part Number:	NI UPC300	Reference Number:	136-401530078-1
Cylinder Analyzed:	T-17745	Cylinder Volume:	304.0 CF
Laboratory:	192 - Elk Grove (SAP) - IL	Cylinder Pressure:	2640 PSIG
Analysis Date:	Jun 19, 2019	Valve Outlet:	580
Lot Number:	136-401530078-1		

ANALYTICAL RESULTS

Component	Requested Purity	Certified Concentration
NITROGEN	99.9993 %	99.9993 %
CO + CO2	< 1 PPM	<LDL 0.12 PPM
Moisture	< 1 PPM	0.366 PPM
Oxygen	< 1 PPM	0.19 PPM
THC	< 0.5 PPM	<LDL 0.04 PPM

Cylinders in Batch:

02075, 1188702Y, 2803745Y, 300-20530, 3007773, 50944, 5771231Y, 914978, 983927, CE20937, HP-T-052265, T-17745, T-645327, T-696782, T8168132, TWC-454263, TWC-52268, W396556, W423586, W489363ARCO

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Signature on file

Approved for Release

End of Appendix Section

APPENDIX G: RAW FTIR DATA

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Raw FTIR Data
Aeration/Backvent Outlet
Aeration/Backvent Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
Pre-Test Calibrations (6/24) - Aeration/Backvent Outlet								
ARBV_0001.LAB	6/24	7:03:10	-0.015911	0.009228	0.217271	0.090847	-0.000214	
ARBV_0002.LAB	6/24	7:03:26	-0.018316	-0.000132	0.088753	0.094649	-0.000488	
ARBV_0003BKG.LAB	6/24	7:05:53	0	0	0	0	0	
ARBV_0004.LAB	6/24	7:06:18	0.000218	-0.010947	-0.21106	-0.132606	0.001035	
ARBV_0005.LAB	6/24	7:06:35	0.000978	-0.006045	-0.095094	-0.119734	0.00065	
ARBV_0006.LAB	6/24	7:06:51	-0.000604	-0.004538	0.024827	-0.060018	0.000266	
ARBV_0007.LAB	6/24	7:07:06	0.013154	-0.002416	-0.086849	-0.182095	0.001246	
ARBV_0008.LAB	6/24	7:07:22	0.001286	-0.01622	-0.036339	-0.057348	0.00045	
ARBV_0009BKG.LAB	6/24	7:09:43	0	0	0	0	0	Background
ARBV_0010.LAB	6/24	7:10:08	0.001931	-0.010546	-0.06383	-0.021145	0.000375	Direct Zero
ARBV_0011.LAB	6/24	7:10:24	0.003992	-0.001051	-0.007252	-0.015269	0.000934	
ARBV_0012.LAB	6/24	7:10:40	0.002321	-0.003909	-0.043905	-0.055086	-0.000251	
ARBV_0013.LAB	6/24	7:10:56	0.002834	0.010058	-0.043334	-0.10251	0.002082	
ARBV_0014.LAB	6/24	7:11:12	0.003529	0.004251	-0.040589	-0.103863	0.00188	
ARBV_0015.LAB	6/24	7:11:29	0.000161	0.005124	-0.058676	-0.093008	0.000437	
ARBV_0016.LAB	6/24	7:11:45	0.006666	-0.001033	-0.067033	-0.095665	0.000699	
ARBV_0017.LAB	6/24	7:12:00	0.001541	0.009852	-0.086422	-0.049634	0.000031	
ARBV_0018.LAB	6/24	7:12:16	0.00447	0.001129	-0.114706	-0.094139	0.001674	
ARBV_0019.LAB	6/24	7:12:32	0.004878	0.004738	-0.012253	-0.107638	0.001547	
ARBV_0020.LAB	6/24	7:12:48	0.004393	-0.004682	0.079812	-0.062726	0.000608	
ARBV_0021.LAB	6/24	7:15:05	0.004749	-0.001965	0.013776	-0.020029	0.000409	
ARBV_0022.LAB	6/24	7:16:11	0.001189	0.00911	0.006401	-0.014311	0.000924	
ARBV_0023.LAB	6/24	7:17:14	0.004686	0.00255	-0.035684	-0.069017	0.001314	
ARBV_0024.LAB	6/24	7:18:19	0.00545	0.00192	-0.023701	-0.081867	0.001237	
ARBV_0025.LAB	6/24	7:19:24	0.001784	0.001939	-0.033934	-0.060783	0.000367	
ARBV_0026.LAB	6/24	7:20:28	0.000776	-0.003005	-0.070513	-0.111921	0.002306	
ARBV_0027.LAB	6/24	7:21:31	0.003059	-0.002327	-0.014369	-0.107962	0.000903	
ARBV_0028.LAB	6/24	7:22:37	0.002419	-0.000464	-0.051525	-0.071023	0.000947	
ARBV_0029.LAB	6/24	7:23:44	-0.000868	-0.001558	-0.028638	-0.065754	0.001232	
ARBV_0030.LAB	6/24	7:24:50	0.003192	0.004296	-0.029043	-0.043329	0.00105	
ARBV_0031.LAB	6/24	7:25:32	0.003454	0.016875	0.090674	-0.044988	0.002042	
ARBV_0032.LAB	6/24	7:25:48	0.023896	-0.000274	0.057321	4.262276	0.002286	
ARBV_0033.LAB	6/24	7:26:04	0.023627	-0.003183	-0.16086	79.904567	0.000996	
ARBV_0034.LAB	6/24	7:26:21	0.005677	-0.006775	-0.299958	86.922098	0.00145	
ARBV_0035.LAB	6/24	7:26:36	0.000223	0.008283	-0.213032	87.295238	0.001331	
ARBV_0036.LAB	6/24	7:26:52	0.006392	-0.000008	-0.136509	87.54472	0.002032	Direct CTS
ARBV_0037.LAB	6/24	7:27:09	-0.001329	0.01547	-0.211756	87.572123	0.001066	CH4 Avg: 87.6
ARBV_0038.LAB	6/24	7:27:24	-0.000187	0.002895	-0.112578	87.591991	0.001266	
ARBV_0039.LAB	6/24	7:27:40	0.000656	-0.005508	-0.215564	87.596433	0.002693	
ARBV_0040.LAB	6/24	7:27:56	0.005683	-0.001096	-0.22197	87.512671	0.00234	
ARBV_0041.LAB	6/24	7:28:12	-0.002095	-0.001782	-0.205051	87.377629	0.001177	
ARBV_0042.LAB	6/24	7:28:29	-0.001096	-0.002715	-0.155479	87.730353	0.002488	
ARBV_0043.LAB	6/24	7:28:45	0.001802	-0.001707	-0.107394	87.62949	0.001107	
ARBV_0044.LAB	6/24	7:29:00	0.000682	0.005641	-0.10177	87.70629	0.002872	
ARBV_0045.LAB	6/24	7:29:17	0.006896	0.001428	-0.159534	87.605881	0.002167	
ARBV_0046.LAB	6/24	7:29:33	0.005627	0.006144	0.030758	87.174612	0.024362	
ARBV_0047.LAB	6/24	7:29:48	0.224529	0.011183	12.059134	49.529911	1.977463	
ARBV_0048.LAB	6/24	7:30:04	0.234262	0.016694	12.394515	46.425073	2.123046	
ARBV_0049.LAB	6/24	7:30:21	0.239556	0.018683	12.502073	46.019738	2.14324	
ARBV_0050.LAB	6/24	7:30:36	0.240498	0.020437	12.531707	45.538197	2.15603	
ARBV_0051.LAB	6/24	7:30:52	0.24266	0.004289	12.568456	45.143505	2.170678	
ARBV_0052.LAB	6/24	7:31:08	0.232158	0.005658	19.295458	37.417454	2.551531	
ARBV_0053.LAB	6/24	7:31:24	0.018956	0.019285	98.592154	0.213795	5.044855	
ARBV_0054.LAB	6/24	7:31:40	0.006569	0.015161	99.550024	-0.017929	5.063505	Direct QA/Tracer
ARBV_0055.LAB	6/24	7:31:55	0.004384	0.025677	99.769083	0.021333	5.05863	EtO Avg: 99.9
ARBV_0056.LAB	6/24	7:32:12	0.002462	0.024991	99.104476	0.064618	5.059277	SF6 Avg: 5.07
ARBV_0057.LAB	6/24	7:32:29	0.004337	0.003934	99.945379	0.04678	5.067262	
ARBV_0058.LAB	6/24	7:32:46	0.007321	0.012218	99.696988	0.038973	5.066009	
ARBV_0059.LAB	6/24	7:33:02	-0.007031	0.018472	99.519437	0.000541	5.069814	
ARBV_0060.LAB	6/24	7:33:19	0.000535	0.007165	100.009447	0.000688	5.070105	
ARBV_0061.LAB	6/24	7:33:35	-0.00102	0.018407	100.043043	0.007088	5.068803	
ARBV_0062.LAB	6/24	7:33:51	-0.002504	0.006834	100.324608	-0.017969	5.070917	
ARBV_0063.LAB	6/24	7:34:06	0.002225	0.011051	100.905491	-0.050703	5.071341	
ARBV_0064.LAB	6/24	7:34:23	-0.005815	0.023002	101.042268	0.069584	5.072193	
ARBV_0080.LAB	6/24	7:40:26	3.317627	-0.004073	0.075867	2.171595	0.006577	
ARBV_0081.LAB	6/24	7:40:41	3.27486	-0.020063	0.013	2.122899	0.003571	
ARBV_0082.LAB	6/24	7:40:57	3.0214	-0.019202	-0.149601	2.006007	0.001441	
ARBV_0083.LAB	6/24	7:41:14	3.276422	-0.032361	-0.0132	2.016915	0.002136	
ARBV_0084.LAB	6/24	7:41:29	3.595203	-0.035961	0.038495	2.11733	0.002385	
ARBV_0085.LAB	6/24	7:41:47	3.846636	-0.436366	-0.366159	6.620484	0.002964	
ARBV_0086.LAB	6/24	7:42:03	3.174221	-0.23138	-0.257111	5.055715	0.0032	
ARBV_0087.LAB	6/24	7:42:19	2.462721	-0.032065	-0.311882	2.557295	0.001392	
ARBV_0088.LAB	6/24	7:42:35	2.400674	0.016568	-0.121871	2.247557	0.002762	
ARBV_0089.LAB	6/24	8:01:48	1.806177	-0.130769	-0.161261	1.619283	0.001121	
ARBV_0090.LAB	6/24	8:02:04	2.295578	0.016357	-0.182176	1.829578	0.000552	
ARBV_0091.LAB	6/24	8:02:20	0.981809	0.203213	-0.017994	0.853282	0.001988	
ARBV_0092.LAB	6/24	8:02:36	0.135727	0.013356	-0.068896	-0.111221	0.001163	
ARBV_0093.LAB	6/24	8:02:52	0.100012	0.014109	-0.128832	-0.046899	0.002384	
ARBV_0094.LAB	6/24	8:03:08	0.081106	0.01486	-0.086174	-0.02999	0.000554	
ARBV_0095.LAB	6/24	8:03:24	0.084395	0.009416	-0.078861	-0.031228	0.00101	
ARBV_0096.LAB	6/24	8:03:39	0.080336	-0.00055	-0.028363	-0.028365	0.001548	

Raw FTIR Data
Aeration/Backvent Outlet
Aeration/Backvent Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
ARBV_0097.LAB	6/24	8:03:56	0.08434	0.001146	-0.00893	-0.129778	0.000079	
ARBV_0098.LAB	6/24	8:04:13	0.071393	-0.000704	-0.067221	-0.044852	0.000264	
ARBV_0099.LAB	6/24	8:04:29	0.072258	0.004281	-0.123095	-0.020661	0.002404	
ARBV_0100.LAB	6/24	8:04:45	0.075435	-0.000415	-0.082177	-0.03905	0.00213	
ARBV_0101.LAB	6/24	8:05:01	0.069218	-0.002473	-0.122004	-0.034641	0.002685	System Zero
ARBV_0102.LAB	6/24	8:05:17	0.073416	-0.004205	0.021188	-0.024847	0.001948	
ARBV_0103.LAB	6/24	8:05:33	0.075446	0.008001	-0.114578	-0.022369	0.001431	
ARBV_0104.LAB	6/24	8:05:50	0.07183	-0.004444	-0.032835	-0.064811	0.00041	
ARBV_0105.LAB	6/24	8:06:07	0.072274	0.002849	-0.144854	-0.082341	0.001653	
ARBV_0106.LAB	6/24	8:06:23	0.070983	0.004945	-0.080499	-0.048609	0.000974	
ARBV_0107.LAB	6/24	8:06:39	0.07346	0.016333	-0.062076	-0.03905	0.002464	
ARBV_0108.LAB	6/24	8:06:55	0.077778	0.02075	-0.065031	-0.134937	0.002513	
ARBV_0109.LAB	6/24	8:07:11	0.075846	0.026013	-0.126661	-0.037615	0.001222	
ARBV_0110.LAB	6/24	8:07:26	0.079508	0.029356	-0.000292	-0.027241	0.004108	
ARBV_0111.LAB	6/24	8:07:42	0.073234	0.01624	0.048662	-0.044127	0.001755	
ARBV_0112.LAB	6/24	8:07:59	0.076314	0.03365	-0.048919	0.009841	0.002939	
ARBV_0113.LAB	6/24	8:08:14	0.07988	0.019381	-0.034233	-0.179339	0.000595	
ARBV_0114.LAB	6/24	8:08:30	0.089231	0.027749	-0.151896	-0.131662	0.001202	
ARBV_0115.LAB	6/24	8:08:46	0.082067	0.07041	-0.139016	-0.084148	0.002429	
ARBV_0116.LAB	6/24	8:09:03	0.088565	0.21421	0.045259	0.030655	0.002107	
ARBV_0117.LAB	6/24	8:09:19	0.088608	0.247695	-0.10533	-0.065707	0.000645	
ARBV_0118.LAB	6/24	8:09:35	0.187146	0.09289	-0.082581	0.002242	0.003244	
ARBV_0119.LAB	6/24	8:09:51	0.808592	0.028712	-0.127225	0.571605	0.00263	
ARBV_0120.LAB	6/24	8:10:07	0.561369	3.154832	-0.268795	0.093019	-0.000659	
ARBV_0121.LAB	6/24	8:10:22	0.375908	9.154566	-0.12228	0.153006	0.000543	
ARBV_0122.LAB	6/24	8:10:38	0.225743	9.79494	-0.040302	-0.040996	0.001335	
ARBV_0123.LAB	6/24	8:10:55	0.104318	10.02449	-0.165091	-0.024548	-0.000824	
ARBV_0124.LAB	6/24	8:11:11	0.088486	10.035075	-0.086822	-0.050438	0.001651	System CTS CO2 Avg: 10.07
ARBV_0125.LAB	6/24	8:11:28	0.079774	10.050927	-0.101851	-0.042685	0.000271	
ARBV_0126.LAB	6/24	8:11:44	0.08386	10.06089	-0.021745	-0.089487	-0.000405	
ARBV_0127.LAB	6/24	8:12:01	0.077543	10.067707	-0.061277	-0.083383	0.000215	
ARBV_0128.LAB	6/24	8:12:16	0.079703	10.075445	-0.029556	-0.061847	0.00005	
ARBV_0129.LAB	6/24	8:12:32	0.078193	10.086609	-0.012177	-0.133839	-0.000054	
ARBV_0130.LAB	6/24	8:12:49	0.076963	10.09082	-0.108923	-0.052075	-0.000102	
ARBV_0131.LAB	6/24	8:13:04	0.07918	10.081366	-0.114014	-0.059699	0.000743	
ARBV_0132.LAB	6/24	8:13:21	0.079753	10.04439	-0.016537	-0.104695	0.001182	
ARBV_0133.LAB	6/24	8:13:36	0.070678	10.066756	-0.036885	-0.04413	-0.000026	
ARBV_0134.LAB	6/24	8:13:52	1.119475	3.614106	-0.043275	0.992394	0.000224	
ARBV_0135.LAB	6/24	8:14:08	1.993984	1.164299	-0.182413	1.576895	0.000519	
ARBV_0136.LAB	6/24	8:14:25	1.712203	2.415348	-0.227585	1.337721	-0.001167	
ARBV_0137.LAB	6/24	8:14:41	1.941913	1.493863	-0.182716	1.504623	-0.000483	
ARBV_0138.LAB	6/24	8:14:57	2.005397	1.141653	-0.203758	1.525488	0.007138	
ARBV_0139.LAB	6/24	8:15:13	2.05706	0.519195	3.807161	1.593904	0.276794	
ARBV_0140.LAB	6/24	8:15:29	2.073934	0.185046	7.217487	1.573127	0.402199	
ARBV_0141.LAB	6/24	8:15:45	2.09355	0.1135	7.835781	1.584379	0.411309	
ARBV_0142.LAB	6/24	8:16:02	2.128251	0.085202	7.874769	1.624384	0.415081	
ARBV_0143.LAB	6/24	8:16:17	2.118849	0.079186	7.841669	1.653088	0.414064	
ARBV_0144.LAB	6/24	8:16:34	2.100911	0.088439	7.976692	1.699005	0.414523	
ARBV_0145.LAB	6/24	8:16:51	2.100063	0.068444	7.917409	1.607131	0.413712	
ARBV_0146.LAB	6/24	8:17:07	2.108062	0.054184	7.967894	1.756917	0.416622	
ARBV_0147.LAB	6/24	8:17:23	2.117895	0.056378	8.046634	1.691992	0.41435	Dynamic Spike EtO Avg: 8.10 SF6 Avg: 0.414
ARBV_0148.LAB	6/24	8:17:39	2.117888	0.04171	8.060822	1.711579	0.416334	
ARBV_0149.LAB	6/24	8:17:55	2.120826	0.051139	8.056885	1.621065	0.416112	
ARBV_0150.LAB	6/24	8:18:11	2.125916	0.052236	8.064447	1.633594	0.415903	
ARBV_0151.LAB	6/24	8:18:28	2.133645	0.039495	8.046186	1.626521	0.416141	
ARBV_0152.LAB	6/24	8:18:45	2.131155	0.046607	8.123866	1.604552	0.41498	
ARBV_0153.LAB	6/24	8:19:01	2.128326	0.03754	8.069309	1.64506	0.414711	
ARBV_0154.LAB	6/24	8:19:17	2.134538	0.046041	8.116445	1.614396	0.413444	
ARBV_0155.LAB	6/24	8:19:34	2.142412	0.036764	8.153614	1.647386	0.412994	
ARBV_0156.LAB	6/24	8:19:51	2.123728	0.036229	8.13879	1.632615	0.413497	
ARBV_0157.LAB	6/24	8:20:07	2.122105	0.026686	8.090906	1.618184	0.411699	
ARBV_0158.LAB	6/24	8:20:23	2.120765	0.029335	8.086688	1.616453	0.412649	
ARBV_0159.LAB	6/24	8:20:40	2.117845	0.030396	8.117799	1.677865	0.41092	
ARBV_0160.LAB	6/24	8:20:56	2.131781	0.028155	8.182848	1.697162	0.413913	
ARBV_0161.LAB	6/24	8:21:11	2.119643	0.038579	8.120505	1.660848	0.411087	
ARBV_0162.LAB	6/24	8:21:28	2.224475	0.017863	4.077227	1.761677	0.201259	
ARBV_0163.LAB	6/24	8:21:44	2.303252	0.023511	0.028475	1.805626	0.009129	Native EtO EtO Avg: -0.106 SF6 Avg: 0.00
ARBV_0164.LAB	6/24	8:22:00	2.301777	0.014238	-0.082409	1.821308	0.00346	
ARBV_0165.LAB	6/24	8:22:17	2.296503	0.019668	-0.189393	1.807319	0.004521	
ARBV_0166.LAB	6/24	8:22:32	2.296546	0.013459	-0.139057	1.779389	0.003579	
ARBV_0167.LAB	6/24	8:22:50	2.30495	0.019387	-0.174121	1.800248	0.003019	
ARBV_0168.LAB	6/24	8:23:06	2.312045	0.015353	-0.121436	1.787278	0.003583	
ARBV_0169.LAB	6/24	8:23:22	2.316975	0.028707	-0.061039	1.75192	0.003727	
ARBV_0170.LAB	6/24	8:44:36	2.437918	0.018544	5.661462	2.971863	-0.003585	
ARBV_0171.LAB	6/24	8:44:52	2.433592	0.018327	5.687149	2.979778	-0.001598	
ARBV_0172.LAB	6/24	8:45:08	2.436196	0.018994	5.714748	3.03247	-0.002631	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%v)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
Run 1 - Aeration/Backvent Outlet - Backvent Testing								
ARBV_0401.LAB	6/24	11:30:07	2.561424	0.00448	5.164059	2.561054	-0.002909	*temporal changes, not spacial changes
ARBV_0402.LAB	6/24	11:31:09	2.570625	0.015803	21.704565	2.771342	-0.052973	
ARBV_0403.LAB	6/24	11:32:15	2.578768	0.022404	46.735663	2.717687	-0.076128	
ARBV_0404.LAB	6/24	11:33:20	2.590147	0.015489	43.029898	2.673531	-0.048796	
ARBV_0405.LAB	6/24	11:34:24	2.573662	0.006894	9.512464	2.558062	-0.006515	
ARBV_0406.LAB	6/24	11:35:29	2.571699	0.006827	7.763587	2.564788	-0.004421	
ARBV_0407.LAB	6/24	11:36:32	2.570265	0.016983	7.198924	2.552466	-0.005235	
ARBV_0408.LAB	6/24	11:37:38	2.570987	0.018277	6.852055	2.683258	-0.00401	
ARBV_0409.LAB	6/24	11:38:42	2.56656	0.014262	6.686439	2.611436	-0.003926	
ARBV_0410.LAB	6/24	11:39:47	2.563788	0.024318	6.679337	2.6197	-0.00384	
ARBV_0411.LAB	6/24	11:40:51	2.571169	0.016532	6.507653	2.578219	-0.005228	Point 2
ARBV_0412.LAB	6/24	11:41:55	2.566841	0.01165	6.425757	2.599102	-0.004032	ETO Avg: 6.854
ARBV_0413.LAB	6/24	11:42:59	2.588826	0.019925	6.379538	2.625849	-0.004202	Stratification Check
ARBV_0414.LAB	6/24	11:44:03	2.589661	0.018784	6.38132	2.610759	-0.004166	
ARBV_0415.LAB	6/24	11:45:07	2.586047	0.014494	6.392542	2.559738	-0.003621	
ARBV_0416.LAB	6/24	11:46:12	2.579307	0.013659	6.127753	2.580791	-0.004478	
ARBV_0417.LAB	6/24	11:47:16	2.585637	0.020689	6.324828	2.659518	-0.004454	
ARBV_0418.LAB	6/24	11:48:22	2.586843	0.017292	6.215587	2.607391	-0.005036	
Average			2.576	0.015	11.782	2.619	-0.014	
								ETO Avg: 6.424
ARBV_0419.LAB	6/24	11:49:27	2.587126	0.019488	6.146207	2.56697	-0.004574	Point 3
ARBV_0420.LAB	6/24	11:50:32	2.781315	0.038154	91.003814	2.668667	-0.155336	
ARBV_0421.LAB	6/24	11:51:36	2.696007	0.026297	52.912927	2.628474	-0.058164	
ARBV_0422.LAB	6/24	11:52:40	2.629188	0.020688	16.26444	2.676664	-0.013373	
ARBV_0423.LAB	6/24	11:53:44	2.620796	0.007069	13.235507	2.559846	-0.010833	
ARBV_0424.LAB	6/24	11:54:51	2.614544	0.009417	12.024188	2.575776	-0.01018	
ARBV_0425.LAB	6/24	11:55:55	2.614058	0.015665	11.573555	2.627734	-0.009688	
ARBV_0426.LAB	6/24	11:57:01	2.611368	0.016278	11.309673	2.526549	-0.008343	ETO Avg: 6.265
ARBV_0427.LAB	6/24	11:58:07	2.611732	0.018074	10.946281	2.570483	-0.008409	
ARBV_0428.LAB	6/24	11:59:12	2.609523	0.019696	10.794367	2.645884	-0.008863	
ARBV_0429.LAB	6/24	12:00:17	2.605662	0.023226	10.651757	2.613929	-0.007681	
ARBV_0430.LAB	6/24	12:01:21	2.604125	0.009859	10.422552	2.609619	-0.008112	
ARBV_0431.LAB	6/24	12:02:27	2.597823	0.015419	10.121225	2.583185	-0.008136	
ARBV_0432.LAB	6/24	12:03:33	2.601403	0.022258	10.053758	2.629558	-0.007894	
ARBV_0433.LAB	6/24	12:04:39	2.598788	0.022858	9.95767	2.575807	-0.008221	End Strat Check
Average			2.576	0.015	11.782	2.619	-0.014	ETO Avg: 6.514
Run 2 - Aeration/Backvent Outlet - Backvent Testing								
ARBV_0419.LAB	6/24	11:49:27	2.587126	0.019488	6.146207	2.56697	-0.004574	
ARBV_0420.LAB	6/24	11:50:32	2.781315	0.038154	91.003814	2.668667	-0.155336	
ARBV_0421.LAB	6/24	11:51:36	2.696007	0.026297	52.912927	2.628474	-0.058164	
ARBV_0422.LAB	6/24	11:52:40	2.629188	0.020688	16.26444	2.676664	-0.013373	
ARBV_0423.LAB	6/24	11:53:44	2.620796	0.007069	13.235507	2.559846	-0.010833	
ARBV_0424.LAB	6/24	11:54:51	2.614544	0.009417	12.024188	2.575776	-0.01018	
ARBV_0425.LAB	6/24	11:55:55	2.614058	0.015665	11.573555	2.627734	-0.009688	
ARBV_0426.LAB	6/24	11:57:01	2.611368	0.016278	11.309673	2.526549	-0.008343	
ARBV_0427.LAB	6/24	11:58:07	2.611732	0.018074	10.946281	2.570483	-0.008409	
ARBV_0428.LAB	6/24	11:59:12	2.609523	0.019696	10.794367	2.645884	-0.008863	
ARBV_0429.LAB	6/24	12:00:17	2.605662	0.023226	10.651757	2.613929	-0.007681	
ARBV_0430.LAB	6/24	12:01:21	2.604125	0.009859	10.422552	2.609619	-0.008112	
ARBV_0431.LAB	6/24	12:02:27	2.597823	0.015419	10.121225	2.583185	-0.008136	
ARBV_0432.LAB	6/24	12:03:33	2.601403	0.022258	10.053758	2.629558	-0.007894	
ARBV_0433.LAB	6/24	12:04:39	2.598788	0.022858	9.95767	2.575807	-0.008221	
Average			2.626	0.019	19.161	2.604	-0.022	
Run 3 - Aeration/Backvent Outlet - Backvent Testing								
ARBV_0434.LAB	6/24	12:05:42	2.596972	0.019806	9.863971	2.577759	-0.007482	
ARBV_0435.LAB	6/24	12:06:46	2.602507	0.023921	9.485277	2.666709	-0.007728	
ARBV_0436.LAB	6/24	12:07:52	2.598434	0.022452	9.416961	2.605212	-0.007031	
ARBV_0437.LAB	6/24	12:08:57	2.60174	0.020101	9.259908	2.618305	-0.007092	
ARBV_0438.LAB	6/24	12:10:01	2.604714	0.016423	9.156191	2.534123	-0.00668	
ARBV_0439.LAB	6/24	12:11:07	2.603392	0.011027	9.082363	2.655025	-0.006438	
ARBV_0440.LAB	6/24	12:12:11	2.657864	0.028939	60.422342	2.618012	-0.114383	
ARBV_0441.LAB	6/24	12:13:15	2.65481	0.02314	73.18743	2.550319	-0.07869	
ARBV_0442.LAB	6/24	12:14:21	2.602001	0.021693	21.400285	2.460646	-0.018369	
ARBV_0443.LAB	6/24	12:15:26	2.600522	0.02442	14.836172	2.528015	-0.011943	
ARBV_0444.LAB	6/24	12:16:31	2.599313	0.018248	13.834051	2.413799	-0.010998	
ARBV_0445.LAB	6/24	12:17:35	2.598457	0.015159	13.500901	2.529392	-0.010404	
ARBV_0446.LAB	6/24	12:18:40	2.599994	0.006047	13.091921	2.465577	-0.009726	
ARBV_0447.LAB	6/24	12:19:44	2.600359	0.020727	13.026242	2.47301	-0.01085	
Average			2.609	0.019	19.969	2.550	-0.022	
Post-Test Calibration Check								
ARBV_BIAS_1_0462.LAB	6/24	12:36:27	2.605469	0.011406	11.090282	2.540382	-0.002755	
ARBV_BIAS_1_0463.LAB	6/24	12:36:43	2.275448	3.24727	25.37194	1.166474	1.595355	
ARBV_BIAS_1_0464.LAB	6/24	12:36:59	0.177284	10.065937	1.203395	0.019375	0.029608	
ARBV_BIAS_1_0465.LAB	6/24	12:37:15	0.109633	10.243556	0.491338	0.159594	0.004312	
ARBV_BIAS_1_0466.LAB	6/24	12:37:30	0.099271	10.263027	0.318893	-0.049797	0.002025	
ARBV_BIAS_1_0467.LAB	6/24	12:37:46	0.087833	10.317373	0.400974	0.009687	0.000865	
ARBV_BIAS_1_0468.LAB	6/24	12:38:02	0.074067	10.313479	0.313559	-0.19833	0.000789	
ARBV_BIAS_1_0469.LAB	6/24	12:38:18	0.068006	10.295906	0.124067	0.016888	0.001875	
ARBV_BIAS_1_0470.LAB	6/24	12:38:34	0.072723	10.324119	0.071753	-0.170388	0.000298	
ARBV_BIAS_1_0471.LAB	6/24	12:38:50	0.065485	10.332465	0.196501	0.0239	0.002196	
ARBV_BIAS_1_0472.LAB	6/24	12:39:07	0.06735	10.324681	0.12368	-0.114783	-0.000316	
ARBV_BIAS_1_0473.LAB	6/24	12:39:23	0.06261	10.33522	0.430555	-0.055017	0.000546	
ARBV_BIAS_1_0474.LAB	6/24	12:39:39	0.065501	10.331655	0.117503	0.014445	0.000914	
ARBV_BIAS_1_0475.LAB	6/24	12:39:56	0.062193	10.361831	0.260667	-0.053835	0.001531	
ARBV_BIAS_1_0476.LAB	6/24	12:40:13	0.059847	10.36949	0.257046	0.125865	-0.000421	
ARBV_BIAS_1_0477.LAB	6/24	12:40:31	0.055361	10.353987	0.026306	0.028098	-0.000346	
ARBV_BIAS_1_0478.LAB	6/24	12:40:46	0.05792	10.398624	0.217428	0.019375	0.000976	
ARBV_BIAS_1_0479.LAB	6/24	12:41:02	0.052612	10.399355	0.10934	0.056922	0.001316	
ARBV_BIAS_1_0480.LAB	6/24	12:41:18	0.056971	10.390239	0.273149	-0.039776	-0.000723	
ARBV_BIAS_1_0481.LAB	6/24	12:41:34	0.057091	10.406731	0.109293	-0.073161	0.000008	
ARBV_BIAS_1_0482.LAB	6/24	12:41:50	0.063086	2.751616	-0.081621	-0.050118	-0.000039	
ARBV_BIAS_1_0483.LAB	6/24	12:42:06	0.050434	0.213993	0.106445	0.152288	0.000481	
ARBV_BIAS_1_0484.LAB	6/24	12:42:22	0.053109	0.134784	0.143715	-0.005623	0.001175	
ARBV_BIAS_1_0485.LAB	6/24	12:42:38	0.054458	0.093869	0.186574	0.019913	0.000878	
ARBV_BIAS_1_0486.LAB	6/24	12:42:54	0.048877	0.091291	-0.037818	-0.014708	0.001336	
								System CTS
								CO2 Avg: 10.36
								System Zero

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%v)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
ARBV_BIAS_1_0487.LAB	6/24	12:43:10	0.054499	0.066231	0.385382	0.107934	0.001988	EtO Zero
ARBV_BIAS_1_0488.LAB	6/24	12:43:25	0.053162	0.058391	-0.138203	0.02199	0.002013	
ARBV_BIAS_1_0489.LAB	6/24	12:43:41	0.047911	0.043301	0.341773	0.109832	0.000474	
ARBV_BIAS_1_0490.LAB	6/24	12:43:57	0.053611	0.03856	0.015106	0.140835	0.001748	
ARBV_BIAS_1_0491.LAB	6/24	12:44:12	0.046444	0.035973	0.158056	0.126378	0.001758	
ARBV_BIAS_1_0492.LAB	6/24	12:44:28	0.049588	0.056224	0.00907	-0.031349	0.000092	
ARBV_BIAS_1_0493.LAB	6/24	12:44:44	0.051209	0.040014	0.036045	-0.144677	0.001322	
ARBV_BIAS_1_0494.LAB	6/24	12:45:01	0.044701	0.009568	-0.087125	0.041255	0.000591	
ARBV_BIAS_1_0495.LAB	6/24	12:45:18	0.049621	0.031372	0.217064	-0.031832	0.001659	
ARBV_BIAS_1_0496.LAB	6/24	12:45:34	0.049063	0.025954	0.362766	-0.030496	0.001662	
ARBV_BIAS_1_0497.LAB	6/24	12:45:51	0.055867	0.009993	0.035807	-0.046757	0.002672	
MDC#2 Study								
ARBV_MDC_0516.LAB	6/24	12:52:52	2.428561	0.014265	-0.236089	1.873677	0.000629	Sampling Ambient Air
ARBV_MDC_0517.LAB	6/24	12:53:58	2.433094	0.015751	-0.245796	1.816203	-0.000188	MDC#2
ARBV_MDC_0518.LAB	6/24	12:55:02	2.429193	0.013638	-0.147516	1.818835	0.000528	EtO Stdev: 0.061
ARBV_MDC_0519.LAB	6/24	12:56:07	2.456878	0.014405	-0.284795	1.847883	0.000691	EtO MDC#2: 0.184
ARBV_MDC_0520.LAB	6/24	12:57:11	2.458407	0.015715	-0.196622	1.841617	0.000631	
ARBV_MDC_0521.LAB	6/24	12:58:18	2.473236	0.012802	-0.211445	1.815227	0.000035	
ARBV_MDC_0522.LAB	6/24	12:59:22	2.428069	0.015819	-0.250997	1.874562	0.002028	
ARBV_MDC_0523.LAB	6/24	13:00:25	2.416587	0.017272	-0.386263	1.845489	0.000671	
ARBV_MDC_0524.LAB	6/24	13:01:30	2.416006	0.018324	-0.224405	1.91285	0.001432	
ARBV_MDC_0525.LAB	6/24	13:02:33	2.405762	0.006906	-0.294966	1.92085	0.00126	
ARBV_MDC_0526.LAB	6/24	13:03:36	2.406417	0.010004	-0.302668	1.88746	0.001335	
ARBV_MDC_0527.LAB	6/24	13:04:40	2.416772	0.007796	-0.379309	1.853705	0.001467	
ARBV_MDC_0528.LAB	6/24	13:05:45	2.397387	0.006194	-0.358828	1.829197	0.001369	
ARBV_MDC_0529.LAB	6/24	13:06:49	2.405538	0.020549	-0.214789	1.886039	0.000861	
ARBV_MDC_0530.LAB	6/24	13:07:52	2.422834	0.02411	-0.281502	1.871869	0.00156	
Run 1 - Aeration/Backvent Outlet - AerationTesting								
ARBV_MDC_0601.LAB	6/24	14:23:26	2.670793	0.026844	7.660416	2.70398	-0.005914	
ARBV_MDC_0602.LAB	6/24	14:24:32	2.666041	0.013605	7.857204	2.764833	-0.006578	
ARBV_MDC_0603.LAB	6/24	14:25:37	2.667755	0.025112	7.738587	2.73986	-0.005069	
ARBV_MDC_0604.LAB	6/24	14:26:41	2.665071	0.015156	7.7548	2.714105	-0.006718	
ARBV_MDC_0605.LAB	6/24	14:27:45	2.661313	0.017848	7.767482	2.751291	-0.005733	
ARBV_MDC_0606.LAB	6/24	14:28:50	2.667314	0.014411	7.823598	2.579571	-0.005481	
ARBV_MDC_0607.LAB	6/24	14:29:54	2.658896	0.011272	7.793415	2.658357	-0.006602	
ARBV_MDC_0608.LAB	6/24	14:30:57	2.656417	0.017726	7.748844	2.664702	-0.006394	
ARBV_MDC_0609.LAB	6/24	14:32:00	2.65502	0.009899	7.747828	2.666987	-0.00668	
ARBV_MDC_0610.LAB	6/24	14:33:04	2.655168	0.015824	7.81673	2.653309	-0.005847	
ARBV_MDC_0611.LAB	6/24	14:34:08	2.654493	0.016719	7.767012	2.74043	-0.00616	
ARBV_MDC_0612.LAB	6/24	14:35:11	2.658035	0.00774	7.745751	2.676792	-0.006924	
ARBV_MDC_0613.LAB	6/24	14:36:15	2.651592	0.017184	7.831674	2.688389	-0.006509	
ARBV_MDC_0614.LAB	6/24	14:37:19	2.655794	0.02398	7.727209	2.736355	-0.006978	
ARBV_MDC_0615.LAB	6/24	14:38:23	2.658019	0.009116	7.803691	2.719843	-0.006862	
ARBV_MDC_0616.LAB	6/24	14:39:27	2.659688	0.019971	7.880774	2.707799	-0.006517	
ARBV_MDC_0617.LAB	6/24	14:40:30	2.655004	0.003823	7.988977	2.696463	-0.007101	
ARBV_MDC_0618.LAB	6/24	14:41:34	2.656041	0.00631	7.9221	2.781689	-0.007443	
ARBV_MDC_0619.LAB	6/24	14:42:39	2.657051	0.010986	7.93395	2.714936	-0.007546	
ARBV_MDC_0620.LAB	6/24	14:43:43	2.65856	0.014892	7.892978	2.771379	-0.006889	
ARBV_MDC_0621.LAB	6/24	14:44:49	2.659527	0.01144	7.885489	2.773729	-0.006511	
ARBV_MDC_0622.LAB	6/24	14:45:53	2.658143	0.018994	7.983814	2.780803	-0.00828	
ARBV_MDC_0623.LAB	6/24	14:46:58	2.661001	0.01363	7.99998	2.725321	-0.007342	
ARBV_MDC_0624.LAB	6/24	14:48:02	2.662674	0.018835	8.033184	2.756917	-0.008205	
ARBV_MDC_0625.LAB	6/24	14:49:05	2.670381	0.007423	8.020834	2.756242	-0.007175	
ARBV_MDC_0626.LAB	6/24	14:50:11	2.666923	0.017008	7.900417	2.856802	-0.007681	
ARBV_MDC_0627.LAB	6/24	14:51:15	2.665898	0.011371	7.896571	2.805451	-0.006518	
ARBV_MDC_0628.LAB	6/24	14:52:18	2.664433	0.019171	8.006373	2.83523	-0.006359	
ARBV_MDC_0629.LAB	6/24	14:53:22	2.6571	0.019784	8.036141	2.873327	-0.007416	
ARBV_MDC_0630.LAB	6/24	14:54:27	2.6553	0.011158	7.9732	2.749856	-0.007256	
ARBV_MDC_0631.LAB	6/24	14:55:31	2.657373	0.012977	7.966844	2.830082	-0.007283	
ARBV_MDC_0632.LAB	6/24	14:56:35	2.656488	0.019862	7.984062	2.805223	-0.006389	
ARBV_MDC_0633.LAB	6/24	14:57:40	2.657081	0.015682	8.080189	2.81766	-0.007136	
ARBV_MDC_0634.LAB	6/24	14:58:43	2.655402	0.018235	8.053472	2.883971	-0.006782	
ARBV_MDC_0635.LAB	6/24	14:59:48	2.663195	0.020687	8.102934	2.864997	-0.007111	
ARBV_MDC_0636.LAB	6/24	15:00:52	2.66018	0.013827	7.986116	2.893306	-0.006841	
ARBV_MDC_0637.LAB	6/24	15:01:55	2.658228	0.012085	7.973301	2.799833	-0.006939	
ARBV_MDC_0638.LAB	6/24	15:02:58	2.661191	0.012749	8.048752	2.81463	-0.005446	
ARBV_MDC_0639.LAB	6/24	15:04:01	2.653833	0.020148	7.995973	2.790885	-0.006069	
ARBV_MDC_0640.LAB	6/24	15:05:06	2.658506	0.025654	8.003401	2.84153	-0.006599	
ARBV_MDC_0641.LAB	6/24	15:06:10	2.655959	0.01668	8.055324	2.824147	-0.006205	
ARBV_MDC_0642.LAB	6/24	15:07:14	2.654426	0.020251	8.14092	2.875813	-0.005497	
ARBV_MDC_0643.LAB	6/24	15:08:18	2.6456	0.015419	8.10891	2.879364	-0.005992	
ARBV_MDC_0644.LAB	6/24	15:09:22	2.640813	0.008988	8.119036	2.813774	-0.005728	
ARBV_MDC_0645.LAB	6/24	15:10:26	2.643903	0.015059	8.083459	2.848045	-0.005876	
ARBV_MDC_0646.LAB	6/24	15:11:29	2.651149	0.014277	8.060077	2.765945	-0.005875	
ARBV_MDC_0647.LAB	6/24	15:12:33	2.642358	0.020418	8.102869	2.801611	-0.005767	
ARBV_MDC_0648.LAB	6/24	15:13:37	2.65053	0.021459	8.079225	2.752434	-0.006364	
ARBV_MDC_0649.LAB	6/24	15:14:40	2.64622	0.017249	7.954573	2.76767	-0.00595	
ARBV_MDC_0650.LAB	6/24	15:15:46	2.651903	0.018344	8.135393	2.807056	-0.006331	
ARBV_MDC_0651.LAB	6/24	15:16:49	2.64865	0.015268	8.019166	2.807384	-0.006306	
ARBV_MDC_0652.LAB	6/24	15:17:54	2.645268	0.012802	8.013852	2.783728	-0.00649	
ARBV_MDC_0653.LAB	6/24	15:18:58	2.648672	0.011812	8.073705	2.784619	-0.00616	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
ARBV_MDC_0654.LAB	6/24	15:20:03	2.650194	0.017936	8.193149	2.846007	-0.005953	
ARBV_MDC_0655.LAB	6/24	15:21:07	2.650804	0.016596	8.058237	2.787209	-0.005809	
ARBV_MDC_0656.LAB	6/24	15:22:12	2.660639	0.0258	8.089926	2.877065	-0.006807	
ARBV_MDC_0657.LAB	6/24	15:23:16	2.654541	0.010258	7.971066	2.868539	-0.006072	
ARBV_MDC_0658.LAB	6/24	15:24:19	2.662317	0.019284	8.006943	2.818505	-0.006565	
ARBV_MDC_0659.LAB	6/24	15:25:23	2.656905	0.011608	7.893086	2.826278	-0.006371	
ARBV_MDC_0660.LAB	6/24	15:26:27	2.655805	0.022526	7.832774	2.82543	-0.006642	
ARBV_BIAS_2_0661.LAB	6/24	15:28:19	2.342382	2.553869	7.328539	1.11793	0.080738	
Average			2.652	0.057	7.942	2.752	-0.005	
Post-Test Calibration Check								
ARBV_BIAS_2_0662.LAB	6/24	15:28:35	0.183999	10.000253	0.332948	-0.039879	0.000498	
ARBV_BIAS_2_0663.LAB	6/24	15:28:51	0.103233	10.216015	0.066364	0.047545	-0.001208	
ARBV_BIAS_2_0664.LAB	6/24	15:29:06	0.082701	10.250094	0.069577	0.021933	-0.001116	
ARBV_BIAS_2_0665.LAB	6/24	15:29:22	0.07792	10.285777	-0.042741	0.073376	-0.001035	System CTS
ARBV_BIAS_2_0666.LAB	6/24	15:29:38	0.073686	10.2906	0.10544	-0.147811	-0.001486	CO2 Avg: 10.30
ARBV_BIAS_2_0667.LAB	6/24	15:29:54	0.06883	10.286168	0.097971	-0.067785	-0.002674	
ARBV_BIAS_2_0668.LAB	6/24	15:30:10	0.060739	10.272095	0.056794	-0.160839	0.000267	
ARBV_BIAS_2_0669.LAB	6/24	15:30:26	0.060518	10.301975	0.017639	-0.08449	-0.001228	
ARBV_BIAS_2_0670.LAB	6/24	15:30:42	0.065305	10.297094	-0.086739	-0.08154	-0.001206	
ARBV_BIAS_2_0671.LAB	6/24	15:30:58	0.057886	10.306114	0.086043	0.102896	-0.001734	
ARBV_BIAS_2_0672.LAB	6/24	15:31:14	0.052546	10.310394	0.082957	0.086173	-0.001327	
ARBV_BIAS_2_0673.LAB	6/24	15:31:29	0.058186	10.299917	0.095127	0.092692	-0.001924	
ARBV_BIAS_2_0674.LAB	6/24	15:31:45	0.051178	10.301326	0.089542	-0.005844	-0.001906	
ARBV_BIAS_2_0675.LAB	6/24	15:32:01	0.0569	10.297239	0.080454	-0.006977	-0.00012	
ARBV_BIAS_2_0676.LAB	6/24	15:32:18	0.054974	10.328795	-0.060911	-0.061318	-0.002399	
ARBV_BIAS_2_0677.LAB	6/24	15:32:34	0.055569	10.319691	-0.010977	-0.024586	-0.001316	
ARBV_BIAS_2_0678.LAB	6/24	15:32:50	0.050355	10.309295	-0.037814	-0.009471	-0.003617	
ARBV_BIAS_2_0679.LAB	6/24	15:33:06	0.049076	7.894504	-0.108201	0.10347	0.000333	
ARBV_BIAS_2_0680.LAB	6/24	15:33:22	0.051263	0.441581	0.066825	-0.160471	-0.000919	System Zero
ARBV_BIAS_2_0681.LAB	6/24	15:33:38	0.050523	0.166618	0.042808	-0.028933	-0.000395	EtO Zero
ARBV_BIAS_2_0682.LAB	6/24	15:33:55	0.04354	0.103085	0.000385	-0.023012	-0.000092	
ARBV_BIAS_2_0683.LAB	6/24	15:34:13	0.04455	0.083245	0.190577	-0.04156	-0.001348	
ARBV_BIAS_2_0684.LAB	6/24	15:34:30	0.043806	0.069314	-0.114935	-0.011968	-0.000291	
ARBV_BIAS_2_0685.LAB	6/24	15:34:48	0.04472	0.045035	0.073145	0.028612	0.000134	
ARBV_BIAS_2_0686.LAB	6/24	15:35:04	0.041281	0.042946	0.153186	0.070469	0.000745	
ARBV_BIAS_2_0687.LAB	6/24	15:35:20	0.048767	0.04512	-0.051408	0.087581	-0.0008	
ARBV_BIAS_2_0688.LAB	6/24	15:35:36	0.049097	0.029363	-0.016889	0.087868	0.000817	
ARBV_BIAS_2_0689.LAB	6/24	15:35:51	0.048295	0.029705	-0.09369	-0.127696	0.000377	
ARBV_BIAS_2_0690.LAB	6/24	15:36:07	0.041677	0.023726	0.133627	-0.126789	0.000688	
ARBV_BIAS_2_0691.LAB	6/24	15:36:23	0.041346	0.018156	-0.088091	-0.083998	-0.001909	
ARBV_BIAS_2_0692.LAB	6/24	15:36:40	0.047553	0.034579	0.03351	0.029317	-0.000152	
ARBV_BIAS_2_0693.LAB	6/24	15:36:59	0.052535	0.006055	0.187679	-0.044864	-0.000657	
ARBV_BIAS_2_0694.LAB	6/24	15:37:16	0.046142	0.001372	-0.148144	-0.066789	-0.001503	
ARBV_0695.LAB	6/24	15:42:02	2.611592	0.015737	7.792402	2.807653	-0.006863	
ARBV_0696.LAB	6/24	15:43:06	2.640063	0.014114	7.812751	2.802342	-0.008348	
ARBV_0697.LAB	6/24	15:44:11	2.632005	0.011862	12.563854	2.819007	-0.011128	
Run 2 - Aeration/Backvent Outlet - Aeration Testing								
ARBV_RUN_3_0698.LAB	6/24	15:46:15	2.648834	0.018511	7.969485	2.86379	-0.006949	
ARBV_RUN_3_0699.LAB	6/24	15:47:18	2.647918	0.015869	8.065544	2.813727	-0.007284	
ARBV_RUN_3_0700.LAB	6/24	15:48:23	2.646784	0.023694	7.995683	2.842	-0.006951	
ARBV_RUN_3_0701.LAB	6/24	15:49:28	2.651059	0.023196	7.930715	2.816066	-0.007855	
ARBV_RUN_3_0702.LAB	6/24	15:50:32	2.647456	0.020342	7.938596	2.840268	-0.007572	
ARBV_RUN_3_0703.LAB	6/24	15:51:37	2.645039	0.019797	7.923334	2.807459	-0.00728	
ARBV_RUN_3_0704.LAB	6/24	15:52:42	2.646875	0.0255	7.916889	2.784102	-0.006746	
ARBV_RUN_3_0705.LAB	6/24	15:53:45	2.646838	0.014719	7.757719	2.798279	-0.006723	
ARBV_RUN_3_0706.LAB	6/24	15:54:51	2.647518	0.0178	7.779947	2.786374	-0.007756	
ARBV_RUN_3_0707.LAB	6/24	15:55:57	2.643953	0.01364	7.797362	2.754626	-0.007437	
ARBV_RUN_3_0708.LAB	6/24	15:57:00	2.650509	0.013458	7.848496	2.784297	-0.006727	
ARBV_RUN_3_0709.LAB	6/24	15:58:06	2.653191	0.020272	7.824063	2.831414	-0.007029	
ARBV_RUN_3_0710.LAB	6/24	15:59:10	2.648843	0.022976	7.754052	2.784822	-0.007198	
ARBV_RUN_3_0711.LAB	6/24	16:00:13	2.652826	0.016053	7.684189	2.810642	-0.006605	
ARBV_RUN_3_0712.LAB	6/24	16:01:18	2.651304	0.016142	7.739278	2.77299	-0.007331	
ARBV_RUN_3_0713.LAB	6/24	16:02:24	2.654632	0.01591	7.674554	2.721707	-0.007203	
ARBV_RUN_3_0714.LAB	6/24	16:03:31	2.65234	0.018613	7.696802	2.770333	-0.007306	
ARBV_RUN_3_0715.LAB	6/24	16:04:37	2.650902	0.018803	7.751626	2.776974	-0.007367	
ARBV_RUN_3_0716.LAB	6/24	16:05:43	2.651785	0.012894	7.702907	2.826054	-0.006984	
ARBV_RUN_3_0717.LAB	6/24	16:06:49	2.658773	0.018922	7.774709	2.767507	-0.006399	
ARBV_RUN_3_0718.LAB	6/24	16:07:56	2.653624	0.006718	7.673007	2.774288	-0.006804	
ARBV_RUN_3_0719.LAB	6/24	16:09:02	2.655381	0.017081	7.643402	2.816579	-0.007165	
ARBV_RUN_3_0720.LAB	6/24	16:10:08	2.656275	0.020245	7.748007	2.795923	-0.007133	
ARBV_RUN_3_0721.LAB	6/24	16:11:15	2.655809	0.021369	7.613258	2.817744	-0.007199	
ARBV_RUN_3_0722.LAB	6/24	16:12:21	2.660744	0.019833	7.618631	2.823385	-0.00687	
ARBV_RUN_3_0723.LAB	6/24	16:13:28	2.655927	0.016718	7.619168	2.83086	-0.00698	
ARBV_RUN_3_0724.LAB	6/24	16:14:33	2.659292	0.022036	7.647291	2.795051	-0.007035	
ARBV_RUN_3_0725.LAB	6/24	16:15:41	2.665916	0.017326	7.631629	2.813849	-0.007025	
ARBV_RUN_3_0726.LAB	6/24	16:16:47	2.665001	0.015541	7.5662	2.822965	-0.007139	
ARBV_RUN_3_0727.LAB	6/24	16:17:54	2.669082	0.025124	7.641867	2.782351	-0.007265	
ARBV_RUN_3_0728.LAB	6/24	16:19:01	2.659694	0.018225	7.588066	2.796266	-0.007204	
ARBV_RUN_3_0729.LAB	6/24	16:20:07	2.660788	0.017323	7.577226	2.846378	-0.006857	
ARBV_RUN_3_0730.LAB	6/24	16:21:16	2.658072	0.01336	7.5431	2.896085	-0.00726	
ARBV_RUN_3_0731.LAB	6/24	16:22:22	2.660635	0.01553	7.469863	2.876528	-0.007154	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
ARBV_RUN 3_0732.LAB	6/24	16:23:29	2.657176	0.013655	7.519685	2.820298	-0.006574	
ARBV_RUN 3_0733.LAB	6/24	16:24:35	2.663429	0.006938	7.534912	2.746465	-0.007268	
ARBV_RUN 3_0734.LAB	6/24	16:25:41	2.667602	0.021307	7.428132	2.79449	-0.007345	
ARBV_RUN 3_0735.LAB	6/24	16:26:47	2.668006	0.010939	7.509122	2.796759	-0.006647	
ARBV_RUN 3_0736.LAB	6/24	16:27:53	2.670897	0.021419	7.494367	2.800338	-0.006362	
ARBV_RUN 3_0737.LAB	6/24	16:29:00	2.6676	0.016455	7.350425	2.808225	-0.007087	
ARBV_RUN 3_0738.LAB	6/24	16:30:06	2.676772	0.027009	7.426997	2.870147	-0.006611	
ARBV_RUN 3_0739.LAB	6/24	16:31:13	2.676567	0.010548	7.508194	2.885358	-0.006556	
ARBV_RUN 3_0740.LAB	6/24	16:32:18	2.680734	0.014664	7.528845	2.752503	-0.006469	
ARBV_RUN 3_0741.LAB	6/24	16:33:23	2.674233	0.016	7.442429	2.860111	-0.007192	
ARBV_RUN 3_0742.LAB	6/24	16:34:29	2.673411	0.016575	7.440932	2.75818	-0.007348	
ARBV_RUN 3_0743.LAB	6/24	16:35:34	2.675819	0.012514	7.423492	2.789217	-0.006087	
ARBV_RUN 3_0744.LAB	6/24	16:36:40	2.673338	0.015943	7.514168	2.76881	-0.007519	
ARBV_RUN 3_0745.LAB	6/24	16:37:46	2.678408	0.009651	7.410565	2.753654	-0.007622	
ARBV_RUN 3_0746.LAB	6/24	16:38:53	2.677721	0.013367	7.461003	2.853441	-0.006639	
ARBV_RUN 3_0747.LAB	6/24	16:39:59	2.678676	0.021757	7.470054	2.871453	-0.006814	
ARBV_RUN 3_0748.LAB	6/24	16:41:04	2.675842	0.020112	7.416237	2.849859	-0.00619	
ARBV_RUN 3_0749.LAB	6/24	16:42:11	2.681765	0.013713	7.433151	2.797641	-0.006676	
ARBV_RUN 3_0750.LAB	6/24	16:43:18	2.682236	0.014457	7.33744	2.774549	-0.007025	
ARBV_RUN 3_0751.LAB	6/24	16:44:24	2.681996	0.016897	7.422925	2.758983	-0.006725	
ARBV_RUN 3_0752.LAB	6/24	16:45:31	2.682795	0.008913	7.429132	2.828082	-0.007391	
ARBV_RUN 3_0753.LAB	6/24	16:46:37	2.682018	0.017265	7.467175	2.807867	-0.007023	
ARBV_RUN 3_0754.LAB	6/24	16:47:46	2.685163	0.024624	7.423581	2.812929	-0.006467	
ARBV_RUN 3_0755.LAB	6/24	16:48:54	2.682885	0.023388	7.393817	2.828648	-0.005717	
Average			2.663	0.017	7.619	2.807	-0.007	
Post-Test Calibration Check								
ARBV_RUN 3_0756.LAB	6/24	16:50:01	2.686717	0.024218	7.378905	2.7796	-0.007521	
ARBV_RUN 3_0757.LAB	6/24	16:51:09	2.690358	0.011832	7.417471	2.801075	-0.006365	
ARBV_BIAS 3_0758.LAB	6/24	16:52:31	0.20698	9.582496	0.296494	0.097022	-0.001467	
ARBV_BIAS 3_0759.LAB	6/24	16:52:47	0.09505	10.121709	0.120277	0.04684	-0.001634	
ARBV_BIAS 3_0760.LAB	6/24	16:53:04	0.073441	10.170194	0.034954	0.04625	-0.001162	
ARBV_BIAS 3_0761.LAB	6/24	16:53:20	0.067473	10.20149	-0.00873	0.00535	-0.002063	System CTS
ARBV_BIAS 3_0762.LAB	6/24	16:53:37	0.055357	10.184077	-0.241572	-0.115748	-0.001436	CO2 Avg: 10.21
ARBV_BIAS 3_0763.LAB	6/24	16:53:53	0.052789	10.197749	0.007311	0.027617	-0.003454	
ARBV_BIAS 3_0764.LAB	6/24	16:54:10	0.057587	10.214222	0.013935	-0.052042	-0.003814	
ARBV_BIAS 3_0765.LAB	6/24	16:54:26	0.054196	10.217804	-0.003562	-0.000749	-0.001267	
ARBV_BIAS 3_0766.LAB	6/24	16:54:43	0.050969	10.248229	-0.028675	-0.051688	-0.002383	
ARBV_BIAS 3_0767.LAB	6/24	16:55:00	0.042174	10.199009	-0.127083	-0.002083	-0.001567	
ARBV_BIAS 3_0768.LAB	6/24	16:55:17	0.045584	10.226441	0.151386	-0.221922	0.000116	
ARBV_BIAS 3_0769.LAB	6/24	16:55:34	0.047521	10.176854	-0.074196	-0.11118	-0.002322	
ARBV_BIAS 3_0770.LAB	6/24	16:55:50	0.037551	10.212025	0.009465	-0.124059	-0.002902	
ARBV_BIAS 3_0771.LAB	6/24	16:56:07	0.043202	10.20126	-0.025096	-0.092272	-0.003279	
ARBV_BIAS 3_0772.LAB	6/24	16:56:24	0.041917	10.200105	0.188451	-0.162323	-0.002674	
ARBV_BIAS 3_0773.LAB	6/24	16:56:41	0.050384	10.24018	0.047908	0.03955	-0.002177	
ARBV_BIAS 3_0774.LAB	6/24	16:56:58	0.037639	6.998314	-0.095984	0.050244	-0.001034	
ARBV_BIAS 3_0775.LAB	6/24	16:57:14	0.037656	0.3305	0.016404	0.010739	-0.001119	
ARBV_BIAS 3_0776.LAB	6/24	16:57:30	0.038706	0.135315	0.021123	-0.105222	-0.000582	System Zero
ARBV_BIAS 3_0777.LAB	6/24	16:57:47	0.037603	0.101044	0.029145	-0.03255	0.001016	EtO Zero
ARBV_BIAS 3_0778.LAB	6/24	16:58:02	0.037636	0.078381	-0.124342	0.047602	-0.002693	
ARBV_BIAS 3_0779.LAB	6/24	16:58:18	0.0341	0.064315	-0.167928	-0.07901	-0.002106	
ARBV_BIAS 3_0780.LAB	6/24	16:58:35	0.037462	0.044186	0.13086	-0.038907	0.000359	
ARBV_BIAS 3_0781.LAB	6/24	16:58:52	0.032938	0.050415	0.04172	-0.018127	-0.00036	
ARBV_BIAS 3_0782.LAB	6/24	16:59:08	0.037781	0.039365	0.04047	-0.015444	0.000227	
ARBV_BIAS 3_0783.LAB	6/24	16:59:24	0.033384	0.040993	-0.158446	-0.091141	0.000226	
ARBV_BIAS 3_0784.LAB	6/24	16:59:41	0.034899	0.023174	0.053472	0.141831	0.00047	
ARBV_BIAS 3_0785.LAB	6/24	16:59:57	0.037823	0.027937	0.075616	0.01979	-0.001454	
Run 3 - Aeration/Backvent Outlet - Aeration Testing								
ARBV_RUN 4_0790.LAB	6/24	17:06:11	2.690375	0.022823	7.155456	2.708545	-0.006893	
ARBV_RUN 4_0791.LAB	6/24	17:07:15	2.691256	0.02128	7.223319	2.747211	-0.007361	
ARBV_RUN 4_0792.LAB	6/24	17:08:20	2.692929	0.026192	7.131275	2.837807	-0.006859	
ARBV_RUN 4_0793.LAB	6/24	17:09:26	2.696948	0.019096	7.25237	2.760842	-0.006715	
ARBV_RUN 4_0794.LAB	6/24	17:10:31	2.691623	0.016316	7.133645	2.803968	-0.007185	
ARBV_RUN 4_0795.LAB	6/24	17:11:35	2.689271	0.023003	7.073488	2.756105	-0.007964	
ARBV_RUN 4_0796.LAB	6/24	17:12:40	2.696781	0.019108	7.129993	2.762945	-0.007594	
ARBV_RUN 4_0797.LAB	6/24	17:13:45	2.698241	0.021756	7.121743	2.80389	-0.007368	
ARBV_RUN 4_0798.LAB	6/24	17:14:51	2.698549	0.026455	7.134651	2.816819	-0.006746	
ARBV_RUN 4_0799.LAB	6/24	17:15:55	2.704412	0.022263	7.157412	2.81013	-0.006116	
ARBV_RUN 4_0800.LAB	6/24	17:17:01	2.70595	0.020122	7.125032	2.809263	-0.007223	
ARBV_RUN 4_0801.LAB	6/24	17:18:05	2.708501	0.020608	7.071985	2.809248	-0.00713	
ARBV_RUN 4_0802.LAB	6/24	17:19:09	2.710052	0.022262	7.015986	2.823369	-0.007691	
ARBV_RUN 4_0803.LAB	6/24	17:20:14	2.71301	0.019352	6.996036	2.798515	-0.007047	
ARBV_RUN 4_0804.LAB	6/24	17:21:19	2.707398	0.020875	7.02486	2.830612	-0.00717	
ARBV_RUN 4_0805.LAB	6/24	17:22:24	2.707676	0.021306	7.009983	2.84209	-0.006719	
ARBV_RUN 4_0806.LAB	6/24	17:23:28	2.710984	0.022939	6.950327	2.854117	-0.006556	
ARBV_RUN 4_0807.LAB	6/24	17:24:34	2.707978	0.023084	7.010491	2.835139	-0.007249	
ARBV_RUN 4_0808.LAB	6/24	17:25:40	2.712338	0.01669	6.978891	2.829335	-0.006425	
ARBV_RUN 4_0809.LAB	6/24	17:26:46	2.716188	0.022017	6.966287	2.864201	-0.007436	
ARBV_RUN 4_0810.LAB	6/24	17:27:51	2.713386	0.018892	6.879122	2.86146	-0.00676	
ARBV_RUN 4_0811.LAB	6/24	17:28:57	2.718803	0.020359	6.950073	2.911801	-0.00658	
ARBV_RUN 4_0812.LAB	6/24	17:30:00	2.721773	0.018113	6.985083	2.907638	-0.007001	
ARBV_RUN 4_0813.LAB	6/24	17:31:06	2.722106	0.019103	6.916478	2.914328	-0.0075	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
ARBV_RUN 4_0814.LAB	6/24	17:32:10	2.722103	0.025001	6.948532	2.917591	-0.007045	
ARBV_RUN 4_0815.LAB	6/24	17:33:15	2.722377	0.023009	6.875484	2.910569	-0.0079	
ARBV_RUN 4_0816.LAB	6/24	17:34:19	2.727992	0.023968	6.898009	2.926498	-0.007035	
ARBV_RUN 4_0817.LAB	6/24	17:35:22	2.727451	0.020457	6.854822	2.920823	-0.007113	
ARBV_RUN 4_0818.LAB	6/24	17:36:27	2.728289	0.019508	6.851512	2.96253	-0.006247	
ARBV_RUN 4_0819.LAB	6/24	17:37:31	2.72397	0.023451	6.913954	2.946971	-0.007097	
ARBV_RUN 4_0820.LAB	6/24	17:38:36	2.72722	0.020911	6.885625	2.948783	-0.006721	
ARBV_RUN 4_0821.LAB	6/24	17:39:41	2.728464	0.014629	6.806924	3.012548	-0.00671	
ARBV_RUN 4_0822.LAB	6/24	17:40:47	2.724195	0.023984	6.762784	3.010241	-0.007146	
ARBV_RUN 4_0823.LAB	6/24	17:41:51	2.722334	0.01818	6.731266	3.011128	-0.007362	
ARBV_RUN 4_0824.LAB	6/24	17:42:56	2.73579	0.018522	6.824064	3.052968	-0.006856	
ARBV_RUN 4_0825.LAB	6/24	17:44:02	2.733252	0.016983	6.818889	3.044833	-0.007651	
ARBV_RUN 4_0826.LAB	6/24	17:45:07	2.732152	0.019801	6.748003	3.047578	-0.007123	
ARBV_RUN 4_0827.LAB	6/24	17:46:11	2.732518	0.018191	6.798986	3.056835	-0.007201	
ARBV_RUN 4_0828.LAB	6/24	17:47:17	2.735566	0.013022	6.839381	3.045684	-0.006653	
ARBV_RUN 4_0829.LAB	6/24	17:48:22	2.731695	0.020754	6.77239	3.104371	-0.00752	
ARBV_RUN 4_0830.LAB	6/24	17:49:26	2.737293	0.01968	6.803903	3.094611	-0.007083	
ARBV_RUN 4_0831.LAB	6/24	17:50:33	2.741407	0.017997	6.76726	3.043518	-0.00807	
ARBV_RUN 4_0832.LAB	6/24	17:51:37	2.752537	0.019581	6.811417	3.062876	-0.006331	
ARBV_RUN 4_0833.LAB	6/24	17:52:40	2.720046	0.02156	6.80505	3.095519	-0.006922	
ARBV_RUN 4_0834.LAB	6/24	17:53:45	2.774918	0.025079	6.839138	3.073294	-0.006486	
ARBV_RUN 4_0835.LAB	6/24	17:54:50	2.736134	0.018237	6.810159	3.095783	-0.007167	
ARBV_RUN 4_0836.LAB	6/24	17:55:55	2.794478	0.021705	6.883671	3.083569	-0.006651	
ARBV_RUN 4_0837.LAB	6/24	17:56:59	2.74894	0.018451	6.813904	3.105122	-0.005832	
ARBV_RUN 4_0838.LAB	6/24	17:58:04	2.797531	0.018324	6.79791	3.064656	-0.006703	
ARBV_RUN 4_0839.LAB	6/24	17:59:08	2.746505	0.017659	6.79089	3.05975	-0.007286	
ARBV_RUN 4_0840.LAB	6/24	18:00:12	2.792555	0.018011	6.828241	3.047113	-0.005928	
ARBV_RUN 4_0841.LAB	6/24	18:01:18	2.746311	0.019497	6.841911	3.062021	-0.006732	
ARBV_RUN 4_0842.LAB	6/24	18:02:27	2.752506	0.017017	6.815597	3.078412	-0.006197	
ARBV_RUN 4_0843.LAB	6/24	18:03:31	2.749987	0.0236	6.731335	3.116801	-0.006363	
ARBV_RUN 4_0844.LAB	6/24	18:04:34	2.751368	0.017196	6.747827	3.105846	-0.006398	
ARBV_RUN 4_0845.LAB	6/24	18:05:39	2.738741	0.025462	6.788911	3.125723	-0.006112	
ARBV_RUN 4_0846.LAB	6/24	18:06:44	2.787061	0.02038	6.837152	3.124333	-0.007138	
ARBV_RUN 4_0847.LAB	6/24	18:07:50	2.745901	0.016447	6.813108	3.138274	-0.006724	
ARBV_RUN 4_0848.LAB	6/24	18:08:53	2.763693	0.018737	6.827495	3.084635	-0.007062	
ARBV_RUN 4_0849.LAB	6/24	18:09:56	2.776534	0.02087	6.757007	3.101161	-0.005727	
Average			2.729	0.020	6.914	2.956	-0.007	
Post-Test Calibration Check								
ARBV_BIAS 4_0850.LAB	6/24	18:11:10	0.144035	9.598625	0.163492	-0.037973	-0.002337	System CTS CO2 Avg: 10.05
ARBV_BIAS 4_0851.LAB	6/24	18:11:26	0.070192	9.953455	0.102458	-0.053503	-0.002892	
ARBV_BIAS 4_0852.LAB	6/24	18:11:42	0.056343	10.028278	0.050588	-0.055305	-0.002247	
ARBV_BIAS 4_0853.LAB	6/24	18:11:58	0.045833	10.031468	0.026313	-0.0529	-0.002541	
ARBV_BIAS 4_0854.LAB	6/24	18:12:14	0.042948	10.040831	0.060895	-0.018373	-0.002128	
ARBV_BIAS 4_0855.LAB	6/24	18:12:30	0.04116	10.062655	0.050677	-0.073255	-0.001967	
ARBV_BIAS 4_0856.LAB	6/24	18:12:46	0.035462	10.066277	-0.087964	-0.075017	-0.001785	
ARBV_BIAS 4_0857.LAB	6/24	18:13:02	0.031105	10.042499	-0.057603	-0.082571	-0.001625	
ARBV_BIAS 4_0858.LAB	6/24	18:13:18	0.034163	10.062791	-0.004344	-0.109158	-0.001786	
ARBV_BIAS 4_0859.LAB	6/24	18:13:34	0.033547	10.046368	-0.015702	-0.091595	-0.001109	
ARBV_BIAS 4_0860.LAB	6/24	18:13:50	0.027594	10.050994	0.056153	-0.14516	-0.003072	System Zero EtO Zero
ARBV_BIAS 4_0861.LAB	6/24	18:14:07	0.026631	10.044182	-0.07891	-0.061288	-0.002692	
ARBV_BIAS 4_0862.LAB	6/24	18:14:23	0.028181	10.052612	-0.005192	-0.091257	-0.000625	
ARBV_BIAS 4_0863.LAB	6/24	18:14:39	0.02991	10.038109	0.047486	-0.075175	-0.003495	
ARBV_BIAS 4_0864.LAB	6/24	18:14:55	0.026231	10.051773	0.127328	-0.109557	-0.001663	
ARBV_BIAS 4_0865.LAB	6/24	18:15:11	0.022724	10.048938	0.097845	-0.052506	-0.003432	
ARBV_BIAS 4_0866.LAB	6/24	18:15:27	0.022045	10.082469	0.074348	-0.060396	-0.001086	
ARBV_BIAS 4_0867.LAB	6/24	18:15:42	0.02901	3.919192	0.030867	-0.055523	-0.001362	
ARBV_BIAS 4_0868.LAB	6/24	18:15:59	0.01971	0.213314	0.028576	-0.015408	-0.002631	
ARBV_BIAS 4_0869.LAB	6/24	18:16:14	0.025371	0.119207	0.055829	-0.063641	-0.001554	
ARBV_BIAS 4_0870.LAB	6/24	18:16:30	0.019133	0.083392	0.05559	-0.035065	-0.001626	
ARBV_BIAS 4_0871.LAB	6/24	18:16:46	0.018138	0.075124	0.093736	-0.09752	-0.000111	
ARBV_BIAS 4_0872.LAB	6/24	18:17:02	0.015302	0.043508	0.117357	-0.10465	-0.000902	
ARBV_BIAS 4_0873.LAB	6/24	18:17:18	0.017862	0.052879	0.127705	-0.116359	-0.001728	
ARBV_BIAS 4_0874.LAB	6/24	18:17:34	0.016927	0.043339	0.004045	-0.033021	-0.00108	
ARBV_BIAS 4_0875.LAB	6/24	18:17:51	0.021827	0.026364	0.01133	-0.114967	-0.001103	
ARBV_BIAS 4_0876.LAB	6/24	18:18:07	0.021714	0.033731	-0.018405	-0.096118	-0.001838	
ARBV_BIAS 4_0877.LAB	6/24	18:18:22	0.019898	0.024972	0.040605	-0.078479	-0.001925	
ARBV_BIAS 4_0878.LAB	6/24	18:18:39	0.015835	0.032553	0.091954	-0.031403	-0.00263	
ARBV_BIAS 4_0879.LAB	6/24	18:18:54	0.019324	0.013445	0.036695	-0.072976	-0.001838	
ARBV_BIAS 4_0880.LAB	6/24	18:19:10	0.017866	0.014395	0.047003	-0.095582	-0.00083	
ARBV_BIAS 4_0881.LAB	6/24	18:19:27	0.015597	0.016339	0.133778	-0.056066	-0.001576	
ARBV_BIAS 4_0882.LAB	6/24	18:19:42	0.021502	0.01562	-0.057845	-0.063636	-0.000795	
ARBV_BIAS 4_0883.LAB	6/24	18:19:59	0.020594	0.0114	0.049712	-0.06991	0.000621	
ARBV_BIAS 4_0884.LAB	6/24	18:20:15	0.014086	0.010667	0.055585	-0.045925	-0.000644	
ARBV_BIAS 4_0885.LAB	6/24	18:20:30	0.017669	0.017613	0.135895	-0.056749	-0.001382	
ARBV_BIAS 4_0886.LAB	6/24	18:20:47	0.001796	0.009922	0.097649	-0.08397	-0.00183	

Raw FTIR Data
Aeration/Backvent Outlet
Vacuum Pump Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
Pre-Test Calibrations (6/25) - Aeration/Backvent Outlet								
ARBV_MDL_0887.LAB	6/25	7:15:12	0.001267	-0.010918	0.120606	0.049021	-0.000865	Background Direct Zero
ARBV_MDL_0888.LAB	6/25	7:15:28	-0.006206	0.000448	-0.034328	0.06161	-0.000874	
ARBV_MDL_0889.LAB	6/25	7:15:45	-0.00924	0.006816	0.062733	0.035044	-0.001224	
ARBV_MDL_0890.LAB	6/25	7:16:02	-0.001739	-0.000108	0.035261	0.081346	-0.002318	
ARBV_MDL_0891BKG.LAB	6/25	7:18:37	0	0	0	0	0	Note: The spectrum label does not necessarily indicate /correspond to the exact calibration action at that moment
ARBV_MDL_0892.LAB	6/25	7:19:02	-0.006978	0.007506	-0.017254	0.02067	0.00112	
ARBV_MDL_0893.LAB	6/25	7:19:18	-0.002264	-0.005552	0.082036	0.098159	0.000023	
ARBV_MDL_0894.LAB	6/25	7:19:34	0.000743	-0.004669	0.066384	0.011703	-0.001189	
ARBV_MDL_0895.LAB	6/25	7:19:51	-0.004671	-0.020384	0.094131	0.016363	0.000587	
ARBV_MDL_0896.LAB	6/25	7:20:07	-0.001942	-0.011634	0.04826	-0.012009	0.000402	
ARBV_MDL_0897.LAB	6/25	7:20:23	-0.005229	-0.012476	0.123812	-0.028345	0.000754	
ARBV_MDL_0898.LAB	6/25	7:20:39	0.000696	-0.002865	0.047132	-0.046483	-0.000458	
ARBV_MDL_0899.LAB	6/25	7:20:55	-0.002155	-0.016724	-0.002374	-0.013065	0.001068	
ARBV_MDL_0900.LAB	6/25	7:21:12	-0.000891	0.000114	-0.103306	-0.03096	0.000566	
ARBV_MDL_0901.LAB	6/25	7:21:28	0.000867	-0.001492	0.020317	0.063531	0.000846	Direct CTS CO2 Avg: 10.14
ARBV_MDL_0902.LAB	6/25	7:21:44	0.00041	-0.016998	0.038432	-0.01424	-0.001352	
ARBV_MDL_0903.LAB	6/25	7:22:00	0.001897	-0.006125	-0.110929	-0.049605	0.000073	
ARBV_MDL_0904.LAB	6/25	7:22:16	0.000609	-0.003968	0.02978	-0.032408	-0.001392	
ARBV_BIAS_0_0953.LAB	6/25	7:41:09	0.004405	10.179725	0.030009	-0.095319	-0.000048	
ARBV_BIAS_0_0954.LAB	6/25	7:41:25	0.009827	10.16605	-0.030925	-0.014593	-0.000059	
ARBV_BIAS_0_0955.LAB	6/25	7:41:41	0.001825	10.166711	-0.079291	-0.030398	-0.001167	
ARBV_BIAS_0_0956.LAB	6/25	7:41:56	0.00399	10.157015	0.047646	-0.071916	0.0006	
ARBV_BIAS_0_0957.LAB	6/25	7:42:13	0.001455	10.167767	0.04759	-0.008653	-0.002049	
ARBV_BIAS_0_0958.LAB	6/25	7:42:28	0.006086	10.136029	0.001087	-0.050828	-0.000546	
ARBV_BIAS_0_0959.LAB	6/25	7:42:44	0.009618	10.14239	0.006076	0.018358	-0.000916	Direct QA/Tracer EtO Avg: 99.4 SF6 Avg: 5.06
ARBV_BIAS_0_0960.LAB	6/25	7:43:00	0.006196	10.147864	0.083066	-0.036814	0.000608	
ARBV_BIAS_0_0961.LAB	6/25	7:43:15	0.002147	10.142261	-0.018078	-0.030516	-0.000534	
ARBV_BIAS_0_0962.LAB	6/25	7:43:31	0.002454	10.138512	-0.02919	-0.043993	0.000406	
ARBV_BIAS_0_0963.LAB	6/25	7:43:47	0.001256	10.162355	0.015445	-0.0853	-0.000259	
ARBV_BIAS_0_0964.LAB	6/25	7:44:03	0.002178	10.148029	0.043928	-0.033096	-0.001655	
ARBV_BIAS_0_0965.LAB	6/25	7:44:18	0.008203	10.138917	0.042004	-0.024779	-0.000849	
ARBV_BIAS_0_0966.LAB	6/25	7:44:34	0.002269	10.135649	0.054455	-0.072927	-0.000629	
ARBV_BIAS_0_0967.LAB	6/25	7:44:50	0.006047	10.122802	0.004403	-0.03674	-0.002248	
ARBV_BIAS_0_0968.LAB	6/25	7:45:06	0.003436	10.104973	0.000088	-0.070831	0.00109	
ARBV_BIAS_0_0969.LAB	6/25	7:45:22	0.031675	9.364315	3.153322	-0.076868	0.316449	Direct QA/Tracer EtO Avg: 99.4 SF6 Avg: 5.06
ARBV_BIAS_0_0970.LAB	6/25	7:45:38	0.032722	0.732949	87.050484	-0.132547	4.660144	
ARBV_BIAS_0_0971.LAB	6/25	7:45:53	-0.003262	0.095829	97.891942	-0.08587	5.028449	
ARBV_BIAS_0_0972.LAB	6/25	7:46:09	-0.002167	0.058307	97.665069	-0.08078	5.034722	
ARBV_BIAS_0_0973.LAB	6/25	7:46:26	-0.005228	0.057169	98.451503	-0.035444	5.052736	
ARBV_BIAS_0_0974.LAB	6/25	7:46:42	-0.005866	0.024284	98.88458	-0.055348	5.046961	
ARBV_BIAS_0_0975.LAB	6/25	7:46:58	-0.003654	0.038242	99.702055	-0.111309	5.060381	
ARBV_BIAS_0_0976.LAB	6/25	7:47:14	-0.010434	0.033207	99.107025	-0.037779	5.060271	
ARBV_BIAS_0_0977.LAB	6/25	7:47:30	-0.004911	0.032357	99.301854	-0.031329	5.058242	
ARBV_BIAS_0_0978.LAB	6/25	7:47:45	-0.010702	0.035713	99.656441	-0.093717	5.061893	
ARBV_BIAS_0_0979.LAB	6/25	7:48:01	-0.012137	0.016555	99.400244	-0.062681	5.058622	Direct QA/Tracer EtO Avg: 99.4 SF6 Avg: 5.06
ARBV_BIAS_0_0980.LAB	6/25	7:48:17	-0.001046	0.016508	99.936227	-0.038661	5.060133	
ARBV_BIAS_0_0981.LAB	6/25	7:48:32	-0.013861	0.014561	99.609598	-0.078843	5.057446	
ARBV_BIAS_0_0982.LAB	6/25	7:48:49	-0.006027	0.012167	99.246515	-0.038001	5.056304	
ARBV_BIAS_0_0983.LAB	6/25	7:49:05	-0.010051	0.021213	99.814049	-0.081416	5.062538	
ARBV_BIAS_0_0984.LAB	6/25	7:49:21	-0.00639	0.008274	100.050516	-0.068086	5.065513	
ARBV_BIAS_0_0985.LAB	6/25	7:49:37	-0.006044	0.013715	99.622652	-0.056269	5.056631	
ARBV_BIAS_0_0986.LAB	6/25	7:49:53	-0.005987	0.021034	99.543057	-0.084387	5.06154	
ARBV_BIAS_0_0987.LAB	6/25	7:50:09	-0.010084	0.013344	99.316195	-0.07683	5.058794	
ARBV_BIAS_0_0988.LAB	6/25	7:50:24	-0.01274	0.013268	99.363865	-0.020786	5.061369	
ARBV_BIAS_0_0989.LAB	6/25	7:50:40	-0.000699	0.000689	99.436506	-0.075848	5.056772	Direct QA/Tracer EtO Avg: 99.4 SF6 Avg: 5.06
ARBV_BIAS_0_0990.LAB	6/25	7:50:58	-0.009908	0.006711	99.34626	-0.062964	5.058915	
ARBV_BIAS_0_0991.LAB	6/25	7:51:14	-0.008373	0.022245	99.459486	-0.048018	5.059613	
ARBV_BIAS_0_0992.LAB	6/25	7:51:30	-0.012366	0.009587	99.610174	-0.017611	5.056634	
ARBV_BIAS_0_0993.LAB	6/25	7:51:46	-0.009154	0.002939	99.148191	-0.078094	5.055193	
ARBV_BIAS_0_0994.LAB	6/25	7:52:03	-0.002547	0.013195	98.940844	-0.053936	5.054617	
ARBV_BIAS_0_0995.LAB	6/25	7:52:21	-0.008937	0.021626	99.094809	-0.0457	5.055751	
ARBV_BIAS_0_0996.LAB	6/25	7:52:38	-0.008368	0.001939	99.642909	-0.06763	5.062675	
ARBV_BIAS_0_0997.LAB	6/25	7:52:53	-0.00832	0.007805	99.415098	-0.083998	5.06502	
ARBV_BIAS_0_0998.LAB	6/25	7:53:09	-0.000202	0.006402	99.670738	-0.016402	5.06213	
ARBV_BIAS_0_0999.LAB	6/25	7:53:25	-0.008008	0.015289	99.900667	0.010456	5.066889	Direct QA/Tracer EtO Avg: 99.4 SF6 Avg: 5.06
ARBV_BIAS_0_1000.LAB	6/25	7:53:40	-0.000026	0.013816	99.889072	-0.013296	5.068286	
ARBV_BIAS_0_1001.LAB	6/25	7:53:56	-0.010787	0.009562	99.846021	-0.059066	5.067786	
ARBV_BIAS_0_1002.LAB	6/25	7:54:12	0.054153	2.38164	72.150687	-0.042916	4.003099	
ARBV_BIAS_0_1003.LAB	6/25	7:54:28	0.512343	18.570416	1.281589	0.075679	0.067704	
ARBV_BIAS_0_1004.LAB	6/25	7:54:44	0.73931	18.441152	-0.116896	0.67625	0.000853	
ARBV_BIAS_0_1005.LAB	6/25	7:55:00	2.283901	2.322646	-0.208949	1.632965	0.001001	
ARBV_BIAS_0_1006.LAB	6/25	7:55:17	2.653495	0.235786	-0.119738	3.407612	0.000594	
ARBV_BIAS_0_1007.LAB	6/25	7:55:33	2.213862	3.57093	-0.12321	3.466049	0.001542	
ARBV_BIAS_0_1008.LAB	6/25	7:55:49	0.733667	6.19538	7.220222	0.775001	0.364082	
ARBV_BIAS_0_1009.LAB	6/25	7:56:05	0.940218	0.320037	0.567581	0.794154	0.020942	Direct QA/Tracer EtO Avg: 99.4 SF6 Avg: 5.06
ARBV_BIAS_0_1010.LAB	6/25	7:56:20	1.075876	0.190522	0.038542	0.771573	0.005742	
ARBV_BIAS_0_1011.LAB	6/25	7:56:36	1.171469	0.156139	0.051115	0.70421	0.005454	
ARBV_BIAS_0_1012.LAB	6/25	7:56:52	1.167097	0.126753	-0.017964	0.748548	0.004206	
ARBV_BIAS_0_1013.LAB	6/25	7:57:08	1.195834	0.115693	-0.028454	0.753982	0.003314	
ARBV_BIAS_0_1014.LAB	6/25	7:57:24	1.194315	0.096357	-0.161255	0.729748	0.003336	
ARBV_BIAS_0_1015.LAB	6/25	7:57:40	1.168701	0.085534	-0.109244	0.727873	0.003264	

Raw FTIR Data
Aeration/Backvent Outlet
Vacuum Pump Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
ARBV_BIAS_0_1016.LAB	6/25	7:57:56	1.191694	0.0918	-0.097774	0.721731	0.003265	
ARBV_BIAS_0_1017.LAB	6/25	7:58:12	1.209329	0.080111	-0.058183	0.768861	0.002897	
ARBV_BIAS_0_1018.LAB	6/25	7:58:28	0.628872	0.064288	0.040006	0.330658	0.004763	
ARBV_BIAS_0_1019.LAB	6/25	7:58:44	0.057821	0.0454	0.065779	-0.00555	0.003439	
ARBV_BIAS_0_1020.LAB	6/25	7:59:01	0.04768	0.029405	0.021526	-0.044595	0.003159	System Zero
ARBV_BIAS_0_1021.LAB	6/25	7:59:17	0.033474	0.035721	0.011992	-0.083645	0.002813	
ARBV_BIAS_0_1022.LAB	6/25	7:59:32	0.035268	0.028186	0.055661	0.048803	0.001856	
ARBV_BIAS_0_1023.LAB	6/25	7:59:49	0.029986	0.035077	-0.042952	-0.018063	0.00227	
ARBV_BIAS_0_1024.LAB	6/25	8:00:04	0.030548	0.038513	-0.042722	-0.029852	0.002573	
ARBV_BIAS_0_1025.LAB	6/25	8:00:20	0.022004	0.013819	-0.02234	-0.090349	0.001159	
ARBV_BIAS_0_1026.LAB	6/25	8:00:36	0.030846	0.025272	0.028991	-0.068073	0.000911	
ARBV_BIAS_0_1027.LAB	6/25	8:00:52	0.025506	0.013997	0.072981	-0.016738	0.000759	
ARBV_BIAS_0_1028.LAB	6/25	8:01:08	0.028799	0.019321	-0.006169	-0.07172	0.00102	
ARBV_BIAS_0_1029.LAB	6/25	8:01:24	0.024481	0.009639	0.032746	-0.043389	0.002232	
ARBV_BIAS_0_1030.LAB	6/25	8:01:40	0.021536	0.023556	0.024273	-0.094866	0.002261	
ARBV_BIAS_0_1031.LAB	6/25	8:01:55	0.028896	4.092376	0.057833	-0.052601	0.004608	
ARBV_BIAS_0_1032.LAB	6/25	8:02:12	0.026557	9.98395	0.013015	-0.009589	0.002585	
ARBV_BIAS_0_1033.LAB	6/25	8:02:28	0.033497	9.919586	-0.040177	-0.076082	0.000135	
ARBV_BIAS_0_1034.LAB	6/25	8:02:44	0.028588	9.972414	-0.028223	-0.061017	0.001262	
ARBV_BIAS_0_1035.LAB	6/25	8:02:59	0.028181	9.990414	-0.021927	-0.057288	0.000948	
ARBV_BIAS_0_1036.LAB	6/25	8:03:15	0.030485	9.988584	-0.039079	-0.030645	0.001105	
ARBV_BIAS_0_1037.LAB	6/25	8:03:32	0.028191	9.982457	-0.02262	-0.049694	0.002675	System CTS
ARBV_BIAS_0_1038.LAB	6/25	8:03:47	0.02942	9.998522	-0.085933	-0.036868	0.000918	CO2 Avg: 10.01
ARBV_BIAS_0_1039.LAB	6/25	8:04:04	0.028453	10.023159	-0.033448	-0.036034	0.000689	
ARBV_BIAS_0_1040.LAB	6/25	8:04:19	0.027298	10.024882	-0.061974	-0.064128	0.000948	
ARBV_BIAS_0_1041.LAB	6/25	8:04:35	0.023259	9.994386	-0.064474	-0.104801	-0.00084	
ARBV_BIAS_0_1042.LAB	6/25	8:04:51	0.022432	9.996678	0.007071	-0.101756	0.000926	
ARBV_BIAS_0_1043.LAB	6/25	8:05:06	0.029517	10.018699	0.049911	-0.066449	0.001569	
ARBV_BIAS_0_1044.LAB	6/25	8:05:23	0.025223	10.026319	-0.081946	-0.053927	-0.000561	
ARBV_BIAS_0_1045.LAB	6/25	8:05:38	0.025604	10.012031	0.055033	-0.054945	-0.000082	
ARBV_BIAS_0_1046.LAB	6/25	8:05:54	0.026898	9.986249	0.21429	-0.057426	0.014285	
ARBV_BIAS_0_1047.LAB	6/25	8:06:10	0.026102	10.014575	-0.010834	-0.050001	0.000537	
ARBV_SPIKE_1048.LAB	6/25	8:07:07	2.534454	0.122975	2.586532	2.798205	-0.001227	
ARBV_SPIKE_1049.LAB	6/25	8:07:22	2.559527	0.080544	2.524583	2.782293	-0.001428	
ARBV_SPIKE_1050.LAB	6/25	8:07:38	2.239126	1.33124	2.206841	2.451488	-0.001494	
ARBV_SPIKE_1051.LAB	6/25	8:07:54	2.427121	0.535789	2.479325	2.765306	-0.001705	
ARBV_SPIKE_1052.LAB	6/25	8:08:10	2.555276	0.078569	2.609051	2.948253	-0.002272	
ARBV_SPIKE_1053.LAB	6/25	8:08:26	2.559887	0.068703	2.556672	2.917567	-0.002544	
ARBV_SPIKE_1054.LAB	6/25	8:08:41	2.551344	0.06082	2.581728	2.923507	-0.002026	
ARBV_SPIKE_1055.LAB	6/25	8:08:57	2.559601	0.046565	2.588781	2.884025	-0.001594	
ARBV_SPIKE_1056.LAB	6/25	8:09:13	2.561371	0.046747	2.610885	2.897389	-0.001427	
ARBV_SPIKE_1057.LAB	6/25	8:09:29	2.566253	0.038221	2.517995	2.821274	-0.000107	
ARBV_SPIKE_1058.LAB	6/25	8:09:46	2.563191	0.036273	2.624297	2.851232	0.000249	
ARBV_SPIKE_1059.LAB	6/25	8:10:03	2.56762	0.036669	2.60744	2.801632	-0.00102	Native EtO
ARBV_SPIKE_1060.LAB	6/25	8:10:19	2.57379	0.039517	2.528438	2.780929	0.000278	EtO Avg: 2.512
ARBV_SPIKE_1061.LAB	6/25	8:10:36	2.569222	0.03462	2.608992	2.891385	-0.000891	SF6 Avg: 0.00
ARBV_SPIKE_1062.LAB	6/25	8:10:52	2.569963	0.039146	2.623046	2.847722	0.00011	
ARBV_SPIKE_1063.LAB	6/25	8:11:08	2.578837	0.029903	2.569659	2.912511	-0.000628	
ARBV_SPIKE_1064.LAB	6/25	8:11:24	2.585643	0.036051	2.570345	2.871607	-0.001158	
ARBV_SPIKE_1065.LAB	6/25	8:11:40	2.587338	0.030314	2.578566	2.859088	-0.00053	
ARBV_SPIKE_1066.LAB	6/25	8:11:56	2.577046	0.034235	2.62362	2.900514	-0.000651	
ARBV_SPIKE_1067.LAB	6/25	8:12:13	2.416585	0.661022	2.390635	2.622999	-0.001565	
ARBV_SPIKE_1068.LAB	6/25	8:12:29	2.008274	2.163938	2.020675	2.122455	-0.001576	
ARBV_SPIKE_1069.LAB	6/25	8:12:45	2.171606	1.470581	2.397461	2.404183	0.023949	
ARBV_SPIKE_1070.LAB	6/25	8:13:02	2.280956	0.44678	8.87851	2.571336	0.416686	
ARBV_SPIKE_1071.LAB	6/25	8:13:17	2.302699	0.223955	10.627138	2.635815	0.461879	
ARBV_SPIKE_1072.LAB	6/25	8:13:33	2.315339	0.100461	11.441913	2.615577	0.482315	
ARBV_SPIKE_1073.LAB	6/25	8:13:49	2.334161	0.072163	11.753131	2.588019	0.481469	
ARBV_SPIKE_1074.LAB	6/25	8:14:04	2.343323	0.058228	11.749192	2.618295	0.478845	
ARBV_SPIKE_1075.LAB	6/25	8:14:21	2.333491	0.055522	11.73152	2.585049	0.477816	
ARBV_SPIKE_1076.LAB	6/25	8:14:36	2.328783	0.051931	11.735099	2.637132	0.477956	
ARBV_SPIKE_1077.LAB	6/25	8:14:52	2.330941	0.048346	11.843897	2.657174	0.477042	
ARBV_SPIKE_1078.LAB	6/25	8:15:08	2.335533	0.050996	11.839212	2.647129	0.477706	
ARBV_SPIKE_1079.LAB	6/25	8:15:24	2.342005	0.037378	11.803619	2.662437	0.477744	
ARBV_SPIKE_1080.LAB	6/25	8:15:39	2.333795	0.038787	11.880441	2.654008	0.474562	
ARBV_SPIKE_1081.LAB	6/25	8:15:55	2.32799	0.040209	11.810975	2.623313	0.475469	
ARBV_SPIKE_1082.LAB	6/25	8:16:11	2.33785	0.042825	11.878782	2.595861	0.477651	
ARBV_SPIKE_1083.LAB	6/25	8:16:27	2.338455	0.032681	11.910404	2.594252	0.478283	
ARBV_SPIKE_1084.LAB	6/25	8:16:44	2.338597	0.03521	11.895303	2.58028	0.479137	
ARBV_SPIKE_1085.LAB	6/25	8:17:00	2.329686	0.037447	11.912528	2.579327	0.47865	
ARBV_SPIKE_1086.LAB	6/25	8:17:16	2.338085	0.03813	11.919649	2.639688	0.479442	Dynamic Spike
ARBV_SPIKE_1087.LAB	6/25	8:17:32	2.343663	0.034545	11.858645	2.540989	0.477982	EtO Avg: 11.93
ARBV_SPIKE_1088.LAB	6/25	8:17:48	2.341533	0.032616	11.978818	2.614588	0.479017	SF6 Avg: 0.476
ARBV_SPIKE_1089.LAB	6/25	8:18:04	2.344708	0.033242	11.837609	2.611844	0.476221	
ARBV_SPIKE_1090.LAB	6/25	8:18:20	2.3416	0.024181	11.888406	2.584832	0.476358	
ARBV_SPIKE_1091.LAB	6/25	8:18:36	2.338876	0.022185	11.960332	2.608041	0.476876	
ARBV_SPIKE_1092.LAB	6/25	8:18:52	2.344406	0.03988	11.971185	2.610447	0.476208	
ARBV_SPIKE_1093.LAB	6/25	8:19:09	2.339622	0.029087	11.881628	2.597606	0.474185	
ARBV_SPIKE_1094.LAB	6/25	8:19:25	2.342608	0.032651	11.93632	2.673124	0.473101	
ARBV_SPIKE_1095.LAB	6/25	8:19:42	2.33884	0.024065	12.052247	2.627435	0.474482	
ARBV_SPIKE_1096.LAB	6/25	8:19:58	2.343504	0.035774	11.987468	2.594694	0.473889	
ARBV_SPIKE_1097.LAB	6/25	8:20:14	2.351059	0.030524	11.937996	2.598915	0.476228	

Raw FTIR Data
Aeration/Backvent Outlet
Vacuum Pump Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
Run 1 - Aeration/Backvent Outlet - Vacuum Pump Testing								
ARBV_RUN_1_1262.LAB	6/25	9:57:06	2.639043	0.014147	2.21852	2.989163	-0.000104	
ARBV_RUN_1_1263.LAB	6/25	9:58:13	2.636901	0.017769	2.233559	2.995927	-0.001007	
ARBV_RUN_1_1264.LAB	6/25	9:59:21	2.642625	0.021404	2.207606	2.98892	-0.000477	
ARBV_RUN_1_1265.LAB	6/25	10:00:32	2.641837	0.025305	2.187171	2.982985	-0.00086	
ARBV_RUN_1_1266.LAB	6/25	10:01:42	2.634552	0.016668	2.257055	2.92055	-0.001611	
ARBV_RUN_1_1267.LAB	6/25	10:02:49	2.634919	0.013052	2.195711	2.9095	-0.00071	
ARBV_RUN_1_1268.LAB	6/25	10:03:57	2.628543	0.024144	2.185815	2.915777	-0.000515	
ARBV_RUN_1_1269.LAB	6/25	10:05:05	2.622904	0.015459	2.171625	2.932694	-0.001117	
ARBV_RUN_1_1270.LAB	6/25	10:06:13	2.620945	0.022399	2.244585	2.894706	-0.000577	
ARBV_RUN_1_1271.LAB	6/25	10:07:20	2.6222	0.016853	2.295858	2.900838	-0.000044	
ARBV_RUN_1_1272.LAB	6/25	10:08:28	2.618815	0.015842	2.238653	2.87802	-0.001083	
ARBV_RUN_1_1273.LAB	6/25	10:09:36	2.627388	0.015524	2.236462	2.876508	-0.000889	
ARBV_RUN_1_1274.LAB	6/25	10:10:44	2.620283	0.015297	2.296029	2.840916	-0.001312	
ARBV_RUN_1_1275.LAB	6/25	10:11:51	2.616222	0.015839	2.326645	2.821627	-0.000959	
ARBV_RUN_1_1276.LAB	6/25	10:12:58	2.616371	0.014557	2.329036	2.796298	-0.001011	
ARBV_RUN_1_1277.LAB	6/25	10:14:06	2.617402	0.018042	2.321084	2.798976	-0.00122	
ARBV_RUN_1_1278.LAB	6/25	10:15:12	2.621852	0.012358	2.314878	2.827798	-0.00111	
ARBV_RUN_1_1279.LAB	6/25	10:16:18	2.619739	0.016804	2.320275	2.763358	-0.000908	
ARBV_RUN_1_1280.LAB	6/25	10:17:26	2.623768	0.015094	2.270434	2.791171	-0.000685	
ARBV_RUN_1_1281.LAB	6/25	10:18:35	2.62393	0.018089	2.286213	2.824876	-0.000942	
ARBV_RUN_1_1282.LAB	6/25	10:19:42	2.627282	0.012358	2.318605	2.771957	-0.001306	
ARBV_RUN_1_1283.LAB	6/25	10:20:55	2.624475	0.016471	2.341539	2.769164	-0.001468	
ARBV_RUN_1_1284.LAB	6/25	10:22:03	2.630698	0.019619	2.277763	2.761383	-0.001645	
ARBV_RUN_1_1285.LAB	6/25	10:23:11	2.627075	0.016901	2.299637	2.782252	-0.001745	
ARBV_RUN_1_1286.LAB	6/25	10:24:18	2.624765	0.016027	2.25631	2.780938	-0.001453	
ARBV_RUN_1_1287.LAB	6/25	10:25:26	2.628524	0.014654	2.249366	2.729687	-0.001537	
ARBV_RUN_1_1288.LAB	6/25	10:26:31	2.623798	0.012928	2.257185	2.76012	-0.001105	
ARBV_RUN_1_1289.LAB	6/25	10:27:37	2.621281	0.020259	2.246403	2.719262	-0.001636	
ARBV_RUN_1_1290.LAB	6/25	10:28:46	2.624526	0.01684	2.25584	2.749113	-0.002042	
ARBV_RUN_1_1291.LAB	6/25	10:29:53	2.621561	0.014981	2.241135	2.699602	-0.001294	
ARBV_RUN_1_1292.LAB	6/25	10:31:01	2.611097	0.016935	2.171269	2.697515	0.000336	
ARBV_RUN_1_1293.LAB	6/25	10:32:08	2.612458	0.005641	2.285023	2.688461	0.000039	
Average			2.625	0.017	2.261	2.830	-0.001	
Post-Test Calibration Check								
ARBV_BIAS_1_1328.LAB	6/25	11:07:53	0.041679	-0.010256	0.264137	-0.108929	0.00287	
ARBV_BIAS_1_1329.LAB	6/25	11:08:09	0.039584	-0.009252	0.247029	-0.08049	0.00555	
ARBV_BIAS_1_1330.LAB	6/25	11:08:27	0.03185	-0.00657	0.108245	-0.155167	0.004188	
ARBV_BIAS_1_1331.LAB	6/25	11:08:44	0.042125	-0.000193	0.047014	-0.124719	0.003337	System Zero EtO Zero
ARBV_BIAS_1_1332.LAB	6/25	11:09:02	0.03799	-0.010546	0.090019	-0.111694	0.002826	
ARBV_BIAS_1_1333.LAB	6/25	11:09:18	0.034197	-0.010951	0.139519	-0.071852	0.003094	
ARBV_BIAS_1_1334.LAB	6/25	11:09:35	0.035596	0.004673	0.14116	-0.053497	0.004776	
ARBV_BIAS_1_1335.LAB	6/25	11:09:53	0.037179	-0.000296	0.17786	0.005614	0.003277	
ARBV_BIAS_1_1336.LAB	6/25	11:10:11	0.034297	-0.007731	0.253204	-0.03348	0.001719	
ARBV_BIAS_1_1337.LAB	6/25	11:10:29	0.037078	-0.01068	0.162859	-0.102939	0.002498	
ARBV_BIAS_1_1338.LAB	6/25	11:10:46	0.033177	-0.012267	0.072112	-0.139421	0.002851	
ARBV_BIAS_1_1339.LAB	6/25	11:11:04	0.039687	0.096019	0.135969	-0.064739	0.007705	
ARBV_BIAS_1_1340.LAB	6/25	11:11:21	0.038736	9.774926	0.078956	-0.089327	0.004939	
ARBV_BIAS_1_1341.LAB	6/25	11:11:38	0.03555	9.913678	0.092575	-0.052947	0.003671	
ARBV_BIAS_1_1342.LAB	6/25	11:11:56	0.034586	9.950529	0.061804	-0.112881	0.003395	System CTS CO2 Avg: 9.98
ARBV_BIAS_1_1343.LAB	6/25	11:12:12	0.037429	9.965541	0.089502	-0.13104	0.003229	
ARBV_BIAS_1_1344.LAB	6/25	11:12:30	0.033267	9.987149	0.026494	-0.144522	0.004252	
ARBV_BIAS_1_1345.LAB	6/25	11:12:47	0.033667	9.971236	0.105662	-0.137823	0.003781	
ARBV_BIAS_1_1346.LAB	6/25	11:13:05	0.031393	9.980672	0.071789	-0.198327	0.004499	
ARBV_BIAS_1_1347.LAB	6/25	11:13:21	0.03669	9.978613	-0.00437	-0.088862	0.002826	
ARBV_BIAS_1_1348.LAB	6/25	11:13:38	0.036665	9.996619	0.061214	-0.05775	0.00229	
ARBV_BIAS_1_1349.LAB	6/25	11:13:56	0.034502	9.989701	-0.005683	-0.099508	0.000061	
ARBV_BIAS_1_1350.LAB	6/25	11:14:13	0.033495	9.983382	0.075417	-0.136594	0.004841	
ARBV_BIAS_1_1351.LAB	6/25	11:14:30	0.030263	9.9859	0.075177	-0.153103	0.002977	
ARBV_BIAS_1_1352.LAB	6/25	11:14:48	0.038429	9.972865	0.118032	-0.069089	0.004843	
Run 2 - Aeration/Backvent Outlet - Vacuum Pump Testing								
ARBV_RUN2_1370.LAB	6/25	11:49:41	2.597984	0.014916	2.014855	2.538814	-0.000827	
ARBV_RUN2_1371.LAB	6/25	11:50:48	2.605122	0.017887	2.06266	2.532146	-0.001071	
ARBV_RUN2_1372.LAB	6/25	11:51:56	2.609076	0.013771	2.111312	2.536357	-0.000783	
ARBV_RUN2_1373.LAB	6/25	11:53:04	2.607136	0.017888	2.11657	2.53852	-0.001636	
ARBV_RUN2_1374.LAB	6/25	11:54:12	2.607268	0.014762	2.13351	2.49518	-0.000876	
ARBV_RUN2_1375.LAB	6/25	11:55:20	2.612094	0.018521	2.168082	2.518226	-0.001657	
ARBV_RUN2_1376.LAB	6/25	11:56:29	2.60713	0.01603	2.184047	2.518357	-0.001074	
ARBV_RUN2_1377.LAB	6/25	11:57:37	2.604611	0.014691	2.149323	2.507675	-0.001533	
ARBV_RUN2_1378.LAB	6/25	11:58:46	2.609793	0.022405	2.20168	2.496689	-0.001487	
ARBV_RUN2_1379.LAB	6/25	11:59:54	2.609138	0.020473	2.210682	2.494552	-0.001217	
ARBV_RUN2_1380.LAB	6/25	12:01:02	2.609681	0.015046	2.18617	2.477827	-0.00236	
ARBV_RUN2_1381.LAB	6/25	12:02:11	2.612035	0.017245	2.193123	2.503129	-0.001385	
ARBV_RUN2_1382.LAB	6/25	12:03:19	2.62127	0.017551	2.185476	2.519686	-0.001519	
ARBV_RUN2_1383.LAB	6/25	12:04:27	2.614497	0.020914	2.209842	2.516395	-0.001727	
ARBV_RUN2_1384.LAB	6/25	12:05:36	2.616586	0.015669	2.18259	2.514409	-0.000958	
ARBV_RUN2_1385.LAB	6/25	12:06:42	2.618484	0.016799	2.13549	2.532992	-0.001607	
ARBV_RUN2_1386.LAB	6/25	12:07:49	2.618665	0.020508	2.148138	2.49265	-0.001417	
ARBV_RUN2_1387.LAB	6/25	12:08:52	2.611199	0.017545	2.163057	2.486027	-0.001286	
ARBV_RUN2_1388.LAB	6/25	12:09:56	2.603063	0.018936	2.129931	2.524289	-0.001227	

Raw FTIR Data
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Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
ARBV_RUN2_1389.LAB	6/25	12:11:00	2.612016	0.011476	2.091126	2.480935	-0.001234	
ARBV_RUN2_1390.LAB	6/25	12:12:04	2.619274	0.01721	2.098149	2.495911	-0.001861	
ARBV_RUN2_1391.LAB	6/25	12:13:07	2.612061	0.0156	2.084052	2.496831	-0.00105	
ARBV_RUN2_1392.LAB	6/25	12:14:12	2.612008	0.018566	2.07671	2.50415	-0.000998	
ARBV_RUN2_1393.LAB	6/25	12:15:15	2.599749	0.015373	2.081811	2.491531	-0.000925	
ARBV_RUN2_1394.LAB	6/25	12:16:19	2.607795	0.016305	2.064127	2.491573	-0.001341	
ARBV_RUN2_1395.LAB	6/25	12:17:23	2.607686	0.018843	2.046552	2.534437	-0.000781	
ARBV_RUN2_1396.LAB	6/25	12:18:26	2.609086	0.017305	2.076965	2.5192	-0.001276	
ARBV_RUN2_1397.LAB	6/25	12:19:31	2.611047	0.016814	2.082797	2.49357	-0.00083	
ARBV_RUN2_1398.LAB	6/25	12:20:34	2.605759	0.017364	2.03925	2.520979	-0.001036	
ARBV_RUN2_1399.LAB	6/25	12:21:37	2.609787	0.017046	2.034329	2.489748	-0.002075	
ARBV_RUN2_1400.LAB	6/25	12:22:41	2.607431	0.019159	1.989881	2.488797	-0.001854	
Average			2.610	0.017	2.118	2.508	-0.001	

Post-Test Calibration Check

ARBV_BIAS 2_1429.LAB	6/25	12:53:10	0.062153	0.014758	0.001448	-0.106981	0.001669	System Zero EtO Zero
ARBV_BIAS 2_1430.LAB	6/25	12:53:26	0.058265	0.013405	0.069764	-0.099085	0.00142	
ARBV_BIAS 2_1431.LAB	6/25	12:53:42	0.05781	0.021428	0.079999	-0.19293	0.000181	
ARBV_BIAS 2_1432.LAB	6/25	12:53:58	0.058342	0.018761	-0.010379	-0.093308	0.000946	
ARBV_BIAS 2_1433.LAB	6/25	12:54:14	0.04722	0.008827	-0.027247	-0.05734	0.001674	
ARBV_BIAS 2_1434.LAB	6/25	12:54:31	0.047872	0.013543	0.015453	-0.107324	-0.001182	
ARBV_BIAS 2_1435.LAB	6/25	12:54:47	0.044112	0.010519	0.035454	-0.103786	0.000892	
ARBV_BIAS 2_1436.LAB	6/25	12:55:04	0.050891	0.007945	0.018179	-0.113684	0.000991	
ARBV_BIAS 2_1437.LAB	6/25	12:55:20	0.042452	0.006287	-0.019736	-0.082897	0.001545	
ARBV_BIAS 2_1438.LAB	6/25	12:55:36	0.040218	0.005177	-0.09242	-0.149873	0.00116	
ARBV_BIAS 2_1439.LAB	6/25	12:55:52	0.046327	0.003856	0.040154	-0.094975	-0.001194	System CTS CO2 Avg: 10.02
ARBV_BIAS 2_1440.LAB	6/25	12:56:08	0.040323	0.002555	0.003932	-0.109313	-0.000044	
ARBV_BIAS 2_1441.LAB	6/25	12:56:26	0.046068	1.560756	-0.070987	-0.081495	-0.000279	
ARBV_BIAS 2_1442.LAB	6/25	12:56:42	0.044968	9.620438	-0.021744	-0.098998	0	
ARBV_BIAS 2_1443.LAB	6/25	12:56:59	0.045927	9.911328	0.009905	-0.066412	0.001735	
ARBV_BIAS 2_1444.LAB	6/25	12:57:16	0.052568	9.937788	0.107657	-0.088839	0.000308	
ARBV_BIAS 2_1445.LAB	6/25	12:57:34	0.045927	9.989039	0.022231	-0.090695	0.000878	
ARBV_BIAS 2_1446.LAB	6/25	12:57:50	0.048634	9.993374	0.034397	-0.054644	-0.000634	
ARBV_BIAS 2_1447.LAB	6/25	12:58:07	0.042944	9.99085	-0.060182	-0.038623	0.001285	
ARBV_BIAS 2_1448.LAB	6/25	12:58:23	0.051859	10.014757	0.045731	-0.089799	-0.000164	
ARBV_BIAS 2_1449.LAB	6/25	12:58:39	0.046006	10.018325	-0.015748	-0.084729	-0.000471	Direct Methane CH3 Avg: 88.4
ARBV_BIAS 2_1450.LAB	6/25	12:58:55	0.045157	10.031579	0.048906	-0.097313	0.002639	
ARBV_BIAS 2_1451.LAB	6/25	12:59:11	0.042103	10.030761	-0.033388	-0.118602	-0.00047	
ARBV_BIAS 2_1452.LAB	6/25	12:59:26	0.047673	10.034157	-0.016978	-0.150238	0.000052	
ARBV_BIAS 2_1453.LAB	6/25	12:59:42	0.045093	10.029836	0.041236	-0.10996	-0.002457	
ARBV_BIAS 2_1454.LAB	6/25	12:59:58	0.049836	10.002565	0.063326	-0.088717	0.000433	
ARBV_BIAS 2_1455.LAB	6/25	13:00:14	0.050773	10.037009	-0.011159	-0.108657	-0.000081	
ARBV_BIAS 2_1456.LAB	6/25	13:00:30	0.19297	8.931033	0.185949	0.119895	0.001536	
ARBV_BIAS 2_1457.LAB	6/25	13:00:46	2.359098	6.659009	1.787751	2.313357	0.001304	
ARBV_BIAS 2_1458.LAB	6/25	13:01:02	1.492792	3.2951	1.050798	8.147518	-0.00254	
ARBV_BIAS 2_1459.LAB	6/25	13:01:18	0.107945	0.477353	-0.211221	84.461375	0.000437	Direct Methane CH3 Avg: 88.4
ARBV_BIAS 2_1460.LAB	6/25	13:01:36	0.063049	0.110313	-0.194331	88.035099	0.00211	
ARBV_BIAS 2_1461.LAB	6/25	13:01:52	0.046628	0.07682	-0.24704	88.169179	0.001563	
ARBV_BIAS 2_1462.LAB	6/25	13:02:08	0.045605	0.052058	-0.226005	88.232708	0.001949	
ARBV_BIAS 2_1463.LAB	6/25	13:02:24	0.046437	0.057595	-0.207531	88.297884	0.001858	
ARBV_BIAS 2_1464.LAB	6/25	13:02:40	0.042996	0.048466	-0.195121	88.298715	0.001023	
ARBV_BIAS 2_1465.LAB	6/25	13:02:56	0.046086	0.032155	-0.259065	88.520849	0.001158	
ARBV_BIAS 2_1466.LAB	6/25	13:03:13	0.042649	0.028333	-0.259099	88.495047	-0.000553	
ARBV_BIAS 2_1467.LAB	6/25	13:03:30	0.04405	0.026157	-0.169444	87.9714	0.000807	
ARBV_BIAS 2_1468.LAB	6/25	13:03:47	0.041897	0.022871	-0.237658	88.484049	0.000972	
ARBV_BIAS 2_1469.LAB	6/25	13:04:03	0.039376	0.029695	-0.236251	88.574156	0.001203	Direct Methane CH3 Avg: 88.4
ARBV_BIAS 2_1470.LAB	6/25	13:04:19	0.042489	0.023586	-0.232957	88.65144	0.002427	
ARBV_BIAS 2_1471.LAB	6/25	13:04:35	0.040501	0.016111	-0.265708	88.601615	0.001636	
ARBV_BIAS 2_1472.LAB	6/25	13:04:53	0.042615	0.051902	-0.197171	88.25772	0.001716	
ARBV_BIAS 2_1473.LAB	6/25	13:05:08	0.039632	0.010878	-0.263405	88.477578	0.000013	
ARBV_BIAS 2_1474.LAB	6/25	13:05:24	0.044206	0.013365	-0.174205	88.324114	0.000989	
ARBV_BIAS 2_1475.LAB	6/25	13:05:40	1.671349	0.021617	1.306819	22.184889	-0.001653	

Run 3 - Aeration/Backvent Outlet - Vacuum Pump Testing

ARBV_RUN 3_1481.LAB	6/25	13:09:50	2.618553	0.019114	1.978331	2.509082	-0.001404	
ARBV_RUN 3_1482.LAB	6/25	13:10:57	2.6073	0.014474	1.989229	2.510681	-0.000696	
ARBV_RUN 3_1483.LAB	6/25	13:12:03	2.608926	0.017946	1.957181	2.493057	-0.000938	
ARBV_RUN 3_1484.LAB	6/25	13:13:08	2.611128	0.021084	1.927496	2.501455	-0.000663	
ARBV_RUN 3_1485.LAB	6/25	13:14:13	2.615041	0.015159	1.976419	2.478951	-0.00138	
ARBV_RUN 3_1486.LAB	6/25	13:15:18	2.612778	0.016101	1.955988	2.510625	-0.001652	
ARBV_RUN 3_1487.LAB	6/25	13:16:22	2.615337	0.018647	1.972993	2.484277	-0.000494	
ARBV_RUN 3_1488.LAB	6/25	13:17:30	2.618607	0.015021	1.996495	2.474019	-0.001416	
ARBV_RUN 3_1489.LAB	6/25	13:18:35	2.62965	0.018617	1.980616	2.493427	-0.001611	
ARBV_RUN 3_1490.LAB	6/25	13:19:39	2.630581	0.022268	1.956383	2.457974	-0.000916	
ARBV_RUN 3_1491.LAB	6/25	13:20:44	2.609539	0.016843	2.004042	2.527158	-0.000616	
ARBV_RUN 3_1492.LAB	6/25	13:21:48	2.599775	0.017656	1.902153	2.442464	-0.000288	
ARBV_RUN 3_1493.LAB	6/25	13:22:53	2.608408	0.013032	2.002423	2.473295	-0.000932	
ARBV_RUN 3_1494.LAB	6/25	13:23:57	2.607298	0.011011	2.031619	2.460644	-0.000136	
ARBV_RUN 3_1495.LAB	6/25	13:25:03	2.612518	0.016554	1.992713	2.428005	-0.000424	
ARBV_RUN 3_1496.LAB	6/25	13:26:07	2.609332	0.014404	1.938116	2.471037	-0.001221	
ARBV_RUN 3_1497.LAB	6/25	13:27:12	2.607089	0.017366	1.977805	2.45091	-0.001544	
ARBV_RUN 3_1498.LAB	6/25	13:28:18	2.608247	0.014508	1.979903	2.413533	-0.000164	
ARBV_RUN 3_1499.LAB	6/25	13:29:24	2.603964	0.017125	1.974994	2.446433	-0.00154	

Raw FTIR Data
Aeration/Backvent Outlet
Vacuum Pump Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
ARBV_RUN 3_1500.LAB	6/25	13:30:29	2.602376	0.017208	1.938781	2.434976	-0.000797	
ARBV_RUN 3_1501.LAB	6/25	13:31:34	2.6037	0.019296	1.892019	2.431404	-0.000787	
ARBV_RUN 3_1502.LAB	6/25	13:32:41	2.60864	0.015121	1.919464	2.431511	-0.00073	
ARBV_RUN 3_1503.LAB	6/25	13:33:46	2.612936	0.022883	1.975956	2.450281	-0.000534	
ARBV_RUN 3_1504.LAB	6/25	13:34:52	2.610885	0.017039	1.93303	2.446318	-0.001225	
ARBV_RUN 3_1505.LAB	6/25	13:35:57	2.613915	0.015016	1.893491	2.467286	-0.00142	
ARBV_RUN 3_1506.LAB	6/25	13:37:03	2.622106	0.021289	1.958035	2.48217	-0.001074	
ARBV_RUN 3_1507.LAB	6/25	13:38:09	2.624261	0.02119	1.897018	2.452362	-0.001952	
ARBV_RUN 3_1508.LAB	6/25	13:39:14	2.621224	0.016768	1.873844	2.43802	-0.001259	
ARBV_RUN 3_1509.LAB	6/25	13:40:20	2.623606	0.01763	1.907307	2.468066	-0.002047	
ARBV_RUN 3_1510.LAB	6/25	13:41:25	2.621363	0.021135	1.896138	2.429253	-0.00074	
ARBV_RUN 3_1511.LAB	6/25	13:42:29	2.617379	0.022927	1.925163	2.44408	-0.000895	
ARBV_RUN 3_1512.LAB	6/25	13:43:33	2.616906	0.017557	1.918437	2.437356	-0.001277	
ARBV_RUN 3_1513.LAB	6/25	13:44:39	2.617414	0.018584	1.879546	2.43844	-0.001023	
ARBV_RUN 3_1514.LAB	6/25	13:45:45	2.625516	0.023444	1.86917	2.410912	-0.002086	
ARBV_RUN 3_1515.LAB	6/25	13:46:49	2.634299	0.017681	1.899824	2.436807	-0.001386	
ARBV_RUN 3_1516.LAB	6/25	13:47:54	2.629333	0.018793	1.920067	2.448767	-0.001682	
ARBV_RUN 3_1517.LAB	6/25	13:48:58	2.615864	0.019162	1.968177	2.45272	-0.000433	
ARBV_RUN 3_1518.LAB	6/25	13:50:02	2.614362	0.011056	1.923833	2.454537	-0.000839	
ARBV_RUN 3_1519.LAB	6/25	13:51:05	2.628458	0.015395	1.936502	2.497785	-0.000838	
ARBV_RUN 3_1520.LAB	6/25	13:52:10	2.622154	0.017314	1.899578	2.522533	-0.000339	
ARBV_RUN 3_1521.LAB	6/25	13:53:13	2.622225	0.013169	1.913845	2.591859	-0.000899	
ARBV_RUN 3_1522.LAB	6/25	13:54:18	2.633313	0.017571	1.899014	2.631615	-0.000786	
ARBV_RUN 3_1523.LAB	6/25	13:55:23	2.620568	0.01692	1.917592	2.621989	-0.000696	
ARBV_RUN 3_1524.LAB	6/25	13:56:29	2.618797	0.014405	1.898249	2.648665	-0.000779	
ARBV_RUN 3_1525.LAB	6/25	13:57:33	2.622913	0.012496	1.937899	2.664513	-0.001435	
Average			2.616	0.017	1.940	2.481	-0.001	
Post-Test Calibration Check								
ARBV_BIAS 3_1544.LAB	6/25	14:15:46	0.055758	0.006178	0.046435	-0.043093	-0.001332	System Zero EtO Zero
ARBV_BIAS 3_1545.LAB	6/25	14:16:03	0.055677	-0.005403	-0.044441	-0.066772	-0.000339	
ARBV_BIAS 3_1546.LAB	6/25	14:16:20	0.052776	-0.008037	-0.109382	-0.09234	0.000952	
ARBV_BIAS 3_1547.LAB	6/25	14:16:36	0.051593	0.001304	0.013282	-0.041396	-0.000804	
ARBV_BIAS 3_1548.LAB	6/25	14:16:53	0.059965	-0.009654	-0.044027	-0.106111	0.00027	
ARBV_BIAS 3_1549.LAB	6/25	14:17:11	0.05443	0.007419	-0.085263	-0.009648	0.002293	
ARBV_BIAS 3_1550.LAB	6/25	14:17:29	0.050207	-0.011486	-0.030801	-0.160629	0.00137	
ARBV_BIAS 3_1551.LAB	6/25	14:17:46	0.057353	-0.003576	-0.103448	-0.076241	0.001278	
ARBV_BIAS 3_1552.LAB	6/25	14:18:04	0.05144	-0.013238	-0.132195	-0.080614	0.002199	
ARBV_BIAS 3_1553.LAB	6/25	14:18:22	0.056491	-0.003793	-0.050052	-0.055097	0.001244	
ARBV_BIAS 3_1554.LAB	6/25	14:18:38	0.054395	-0.01304	-0.074447	-0.0836	-0.001242	System CTS CO2 Avg: 10.05
ARBV_BIAS 3_1555.LAB	6/25	14:18:55	0.052025	-0.00569	-0.03642	-0.037536	-0.000391	
ARBV_BIAS 3_1556.LAB	6/25	14:19:11	0.056948	7.648094	0.011534	-0.021391	-0.000984	
ARBV_BIAS 3_1557.LAB	6/25	14:19:27	0.054485	9.86994	0.011443	-0.131848	-0.000587	
ARBV_BIAS 3_1558.LAB	6/25	14:19:44	0.050998	9.959845	0.056323	-0.123384	-0.000528	
ARBV_BIAS 3_1559.LAB	6/25	14:20:00	0.059494	9.985994	-0.005092	-0.098592	-0.001834	
ARBV_BIAS 3_1560.LAB	6/25	14:20:16	0.052799	10.009077	0.053891	-0.098192	-0.000381	
ARBV_BIAS 3_1561.LAB	6/25	14:20:32	0.056488	10.004557	-0.063921	-0.134508	-0.001171	
ARBV_BIAS 3_1562.LAB	6/25	14:20:48	0.053352	10.023733	-0.008848	-0.111424	-0.000041	
ARBV_BIAS 3_1563.LAB	6/25	14:21:05	0.050548	10.035469	-0.100191	-0.087779	-0.001741	
ARBV_BIAS 3_1564.LAB	6/25	14:21:20	0.05522	10.039901	-0.037369	-0.094254	-0.000638	System CTS CO2 Avg: 10.05
ARBV_BIAS 3_1565.LAB	6/25	14:21:36	0.057392	10.044712	-0.078344	-0.082463	-0.000038	
ARBV_BIAS 3_1566.LAB	6/25	14:21:52	0.048712	10.040174	-0.056339	-0.019801	0.000801	
ARBV_BIAS 3_1567.LAB	6/25	14:22:09	0.056449	10.026267	-0.019375	-0.077908	-0.001237	
ARBV_BIAS 3_1568.LAB	6/25	14:22:26	0.055013	10.03244	-0.074638	-0.092532	0.00009	
ARBV_BIAS 3_1569.LAB	6/25	14:22:42	0.047244	10.031315	-0.070241	-0.120501	0.000388	
ARBV_BIAS 3_1570.LAB	6/25	14:22:58	0.053753	10.044897	0.03007	-0.106189	0.001553	
ARBV_BIAS 3_1571.LAB	6/25	14:23:15	0.052253	10.055411	-0.018915	-0.118842	0.001214	
ARBV_BIAS 3_1572.LAB	6/25	14:23:32	0.044676	10.075361	-0.034512	-0.028341	0.000897	
ARBV_BIAS 3_1573.LAB	6/25	14:23:48	0.057729	10.045455	-0.058806	-0.097591	-0.000435	
ARBV_BIAS 3_1574.LAB	6/25	14:24:05	0.047337	10.056469	-0.083068	-0.110553	0.000803	Direct Methane CH3 Avg: 89.0
ARBV_BIAS 3_1575.LAB	6/25	14:24:21	0.049601	10.047597	0.028533	-0.048118	0.000192	
ARBV_BIAS 3_1576.LAB	6/25	14:24:38	0.050462	10.04826	0.007283	-0.100987	-0.000864	
ARBV_BIAS 3_1577.LAB	6/25	14:24:54	0.053155	3.851486	-0.253113	47.607133	0.001587	
ARBV_BIAS 3_1578.LAB	6/25	14:25:11	0.046823	0.221546	-0.317385	87.8449	0.001996	
ARBV_BIAS 3_1579.LAB	6/25	14:25:27	0.048455	0.112803	-0.200927	88.331297	0	
ARBV_BIAS 3_1580.LAB	6/25	14:25:44	0.046279	0.08363	-0.201063	88.610973	0.002548	
ARBV_BIAS 3_1581.LAB	6/25	14:26:00	0.042596	0.074325	-0.204055	88.787113	0.000748	
ARBV_BIAS 3_1582.LAB	6/25	14:26:17	0.046674	0.048891	-0.181136	88.708011	0.00211	
ARBV_BIAS 3_1583.LAB	6/25	14:26:34	0.047394	0.033448	-0.305726	88.836524	0.001186	
ARBV_BIAS 3_1584.LAB	6/25	14:26:50	0.04718	0.039807	-0.227346	88.757099	0.000945	Direct Methane CH3 Avg: 89.0
ARBV_BIAS 3_1585.LAB	6/25	14:27:07	0.04607	0.037181	-0.193118	88.976223	0.001409	
ARBV_BIAS 3_1586.LAB	6/25	14:27:24	0.048425	0.026613	-0.230952	88.740043	0.000889	
ARBV_BIAS 3_1587.LAB	6/25	14:27:41	0.037575	0.021047	-0.159692	88.327942	0.002645	
ARBV_BIAS 3_1588.LAB	6/25	14:27:57	0.044457	0.009099	-0.228179	88.710659	-0.000437	
ARBV_BIAS 3_1589.LAB	6/25	14:28:13	0.046672	0.023437	-0.184494	88.90636	0.001891	
ARBV_BIAS 3_1590.LAB	6/25	14:28:30	0.04601	0.028118	-0.280659	88.9441	0.001171	
ARBV_BIAS 3_1591.LAB	6/25	14:28:46	0.040178	0.016631	-0.192184	88.860958	0.001274	
ARBV_BIAS 3_1592.LAB	6/25	14:29:03	0.053981	0.023027	-0.231516	89.069085	0.001078	
ARBV_BIAS 3_1593.LAB	6/25	14:29:18	0.04447	0.0029	-0.184067	88.756989	-0.001156	
ARBV_BIAS 3_1594.LAB	6/25	14:29:34	0.048227	0.006804	-0.220568	88.745296	-0.000479	Direct Methane CH3 Avg: 89.0
ARBV_BIAS 3_1595.LAB	6/25	14:29:51	0.040883	0.012143	-0.280292	88.657181	0.000351	
ARBV_BIAS 3_1596.LAB	6/25	14:30:08	0.043509	0.006002	-0.227261	88.682735	-0.000121	
ARBV_BIAS 3_1597.LAB	6/25	14:30:24	0.04208	0.002738	-0.120336	88.942841	0.001846	

Raw FTIR Data
Aeration/Backvent Outlet
Vacuum Pump Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
ARBV_BIAS 3_1598.LAB	6/25	14:30:41	0.040171	0.000605	-0.334261	89.14339	0.001701	
ARBV_BIAS 3_1599.LAB	6/25	14:30:58	0.044816	0.002603	-0.284668	89.107592	0.000087	
ARBV_BIAS 3_1600.LAB	6/25	14:31:16	0.044447	0.0032	-0.211042	89.018027	0.000873	
ARBV_BIAS 3_1601.LAB	6/25	14:31:34	0.040426	0.00634	-0.158201	88.918789	0.000057	
ARBV_BIAS 3_1602.LAB	6/25	14:31:51	0.040815	0.001837	-0.194316	88.907817	0.00048	
ARBV_BIAS 3_1603.LAB	6/25	14:32:07	0.046848	0.001842	-0.274037	88.79489	0.001096	
ARBV_BIAS 3_1604.LAB	6/25	14:32:24	0.042519	-0.005725	-0.248696	89.110167	-0.001317	
ARBV_BIAS 3_1605.LAB	6/25	14:32:41	0.043434	0.012596	-0.240205	89.125311	-0.001029	
ARBV_BIAS 3_1606.LAB	6/25	14:32:57	1.690603	0.010173	-0.300099	16.619771	-0.000247	
ARBV_BIAS 3_1607.LAB	6/25	14:33:14	2.289514	0.010828	-0.285398	2.158737	0.001092	
ARBV_BIAS 3_1608.LAB	6/25	14:33:30	2.329917	0.013145	-0.292884	2.044445	0.001402	
ARBV_BIAS 3_1609.LAB	6/25	14:33:46	2.328965	0.023748	-0.311806	1.982639	0.000138	
ARBV_BIAS 3_1610.LAB	6/25	14:34:02	2.350458	0.003446	-0.290025	1.873662	0.00054	
ARBV_BIAS 3_1611.LAB	6/25	14:34:18	0.984826	0.02935	-0.045196	38.661414	0.005799	
ARBV_BIAS 3_1612.LAB	6/25	14:34:34	0.003493	-0.016803	-0.127412	89.021554	0.0011	
ARBV_BIAS 3_1613.LAB	6/25	14:34:50	0.00253	0.012575	-0.202272	88.843752	0.001608	
ARBV_BIAS 3_1614.LAB	6/25	14:35:06	0.001865	0.00836	-0.12616	88.58042	0.000805	
ARBV_BIAS 3_1615.LAB	6/25	14:35:24	-0.001377	-0.003714	-0.18257	88.570356	0.001287	
ARBV_BIAS 3_1616.LAB	6/25	14:35:42	0.004988	0.0003	-0.181287	88.728435	0.000332	
ARBV_BIAS 3_1617.LAB	6/25	14:35:59	-0.002103	0.00213	-0.116478	88.874996	0.00102	
ARBV_BIAS 3_1618.LAB	6/25	14:36:18	-0.003263	0.005445	-0.121705	89.145108	0.000513	
ARBV_BIAS 3_1619.LAB	6/25	14:36:36	-0.004454	-0.006679	-0.246591	89.180912	-0.000495	
ARBV_BIAS 3_1620.LAB	6/25	14:36:53	-0.0026	0.002423	-0.230703	89.23458	0.001047	
ARBV_BIAS 3_1621.LAB	6/25	14:37:10	-0.003256	0.001522	-0.175751	89.091034	-0.000285	System Methane
ARBV_BIAS 3_1622.LAB	6/25	14:37:26	-0.005041	0.001387	-0.229395	89.092197	0.000997	CH3 Avg: 89.0
ARBV_BIAS 3_1623.LAB	6/25	14:37:41	0.000653	-0.000502	-0.1432	89.069982	0.001097	
ARBV_BIAS 3_1624.LAB	6/25	14:37:57	-0.004334	-0.002534	-0.236996	88.991006	0.001328	
ARBV_BIAS 3_1625.LAB	6/25	14:38:13	-0.001877	-0.013587	-0.164804	89.056223	0.000612	
ARBV_BIAS 3_1626.LAB	6/25	14:38:29	0.002123	-0.006784	-0.217256	89.101255	0.002973	
ARBV_BIAS 3_1627.LAB	6/25	14:38:45	-0.00297	0.002214	-0.248926	88.92597	0.000412	
ARBV_BIAS 3_1628.LAB	6/25	14:39:01	-0.003298	-0.018218	-0.199553	89.036409	-0.000272	
ARBV_BIAS 3_1629.LAB	6/25	14:39:17	-0.008497	0.0034	-0.297421	88.972116	0.001886	
ARBV_BIAS 3_1630.LAB	6/25	14:39:34	-0.001065	-0.008403	-0.196483	88.859877	-0.000945	
ARBV_BIAS 3_1631.LAB	6/25	14:39:51	1.032231	0.013841	-0.204046	38.408348	0.000881	
ARBV_BIAS 3_1632.LAB	6/25	14:40:10	1.91166	0.019213	-0.163586	4.869251	0.001292	
ARBV_BIAS 3_1633.LAB	6/25	14:40:27	0.008629	-0.005799	-0.02316	1.060356	0.000755	
ARBV_BIAS 3_1634.LAB	6/25	14:40:46	-0.003348	-0.006974	0.006764	0.242838	0.001155	
ARBV_BIAS 3_1635.LAB	6/25	14:41:04	1.623689	-0.022396	-0.262125	1.684564	0.00107	
ARBV_BIAS 3_1636.LAB	6/25	14:41:22	2.410686	-0.012313	-0.260028	2.980068	0.000211	
ARBV_BIAS 3_1637.LAB	6/25	14:41:40	0.14045	0.006821	-0.024221	0.555257	0.001194	
ARBV_BIAS 3_1638.LAB	6/25	14:41:57	-0.004895	0.009136	0.013134	-0.072408	0.001895	
ARBV_BIAS 3_1639.LAB	6/25	14:42:13	-0.001252	0.001748	-0.067027	-0.029717	0.002206	
ARBV_BIAS 3_1640.LAB	6/25	14:42:29	-0.005577	-0.006648	0.011647	-0.017087	0.002361	
ARBV_BIAS 3_1641.LAB	6/25	14:42:45	0.001723	-0.009723	-0.041621	-0.054948	0.001564	
ARBV_BIAS 3_1642.LAB	6/25	14:43:02	0.004027	-0.014146	-0.108477	-0.080371	0.00134	
ARBV_BIAS 3_1643.LAB	6/25	14:43:18	-0.000124	0.002556	0.013557	-0.010181	0.001794	
ARBV_BIAS 3_1644.LAB	6/25	14:43:34	-0.001688	-0.003447	-0.1077	-0.056506	0.002813	
ARBV_BIAS 3_1645.LAB	6/25	14:43:50	0.005847	-0.006819	-0.100235	-0.077745	0.002619	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%v)	EtO (ppmw)	Methane (ppmw)	SF ₆ (ppmw)	Notes
Pre-Test Calibrations (6/24) - Ceilcote Outlet								
CEIL__0001.LAB	6/24	6:55:54	-0.004905	0.008082	0.000649	0.299959	0.000816	
CEIL__0002BKG.LAB	6/24	7:04:33	0	0	0	0	0	
CEIL__0003.LAB	6/24	7:05:43	0.006651	0.000897	0.011314	-0.055548	-0.000791	
CEIL__0004BKG.LAB	6/24	7:08:00	0	0	0	0	0	
CEIL__0005.LAB	6/24	7:09:10	0.000438	0.002623	-0.030463	0.002581	0.000522	
CEIL__0006.LAB	6/24	7:11:44	-0.029409	0.000328	0.011055	-0.032452	-0.001084	
CEIL__0007.LAB	6/24	7:12:47	-0.024611	0.001863	0.034544	-0.032207	0.000425	
CEIL__0008.LAB	6/24	7:13:50	-0.029038	-0.002816	0.022161	-0.058569	-0.00162	
CEIL__0009BKG.LAB	6/24	7:16:22	0	0	0	0	0	
CEIL__0010.LAB	6/24	7:17:32	-0.003392	-0.009279	0.003144	0.048952	0.000679	
CEIL__0011BKG.LAB	6/24	7:19:48	0	0	0	0	0	
CEIL__0012.LAB	6/24	7:20:57	0.000732	-0.002612	0.044893	-0.042457	-0.000871	
CEIL__0013BKG.LAB	6/24	7:23:26	0	0	0	0	0	Background
CEIL__0014.LAB	6/24	7:24:58	-0.005651	-0.008037	-0.02605	-0.000712	-0.0007	Direct Zero
CEIL__0015.LAB	6/24	7:25:13	-0.005231	0.001429	-0.012197	-0.036104	-0.001141	
CEIL__0016.LAB	6/24	7:25:29	0.003568	0.00612	-0.012984	0.013781	-0.000445	
CEIL__0017.LAB	6/24	7:25:45	-0.002401	0.000316	-0.124957	0.043844	-0.00173	
CEIL__0018.LAB	6/24	7:26:01	-0.000114	0.00135	-0.020007	-0.03318	0.000534	
CEIL__0019.LAB	6/24	7:26:16	-0.00572	-0.006794	0.047395	0.013132	-0.000447	
CEIL__0020.LAB	6/24	7:26:32	-0.001402	-0.000598	-0.039722	-0.016409	-0.001757	
CEIL__0021.LAB	6/24	7:26:48	-0.000283	0.01218	-0.061097	0.00841	0.000489	
CEIL__0022.LAB	6/24	7:27:04	-0.002941	0.000153	-0.059561	-0.097107	-0.000265	
CEIL__0023.LAB	6/24	7:27:19	-0.005278	-0.003506	-0.00306	-0.081248	0.000328	
CEIL__0024.LAB	6/24	7:28:55	-0.00159	-0.005827	-0.005911	-0.056288	0.00037	
CEIL__0025.LAB	6/24	7:29:57	-0.001462	0.002565	0.014178	-0.035401	0.000248	
CEIL__0026.LAB	6/24	7:31:00	-0.002338	-0.002937	0.034185	-0.037261	0.000118	
CEIL__0027.LAB	6/24	7:32:03	-0.002681	-0.004111	0.006147	-0.039156	0.000848	
CEIL__0028.LAB	6/24	7:33:06	-0.002349	-0.000954	-0.010696	-0.048687	0.000556	
CEIL__0029.LAB	6/24	7:34:08	-0.001901	-0.006419	0.026901	-0.044418	-0.000016	
CEIL__0030.LAB	6/24	7:35:12	0.000287	0.000961	0.051309	-0.042569	0.000558	
CEIL__0031.LAB	6/24	7:36:14	-0.001338	-0.002444	0.044025	-0.042621	0.000776	
CEIL__0032.LAB	6/24	7:37:17	-0.001513	-0.004011	0.006168	-0.026764	-0.000489	
CEIL__0033.LAB	6/24	7:38:20	0.002076	-0.00374	0.049601	-0.029124	0.000533	
CEIL__0034.LAB	6/24	7:39:02	0.006319	-0.003765	0.013715	82.201931	0.001315	
CEIL__0035.LAB	6/24	7:39:19	0.003808	-0.017282	-0.129295	83.869169	0.000623	
CEIL__0036.LAB	6/24	7:39:34	-0.001481	-0.018746	-0.022804	84.116753	0.001262	Direct CTS
CEIL__0037.LAB	6/24	7:39:50	0.000759	0.001453	0.018184	84.162608	0.00099	CH4 Avg: 84.3
CEIL__0038.LAB	6/24	7:40:05	0.001122	-0.005105	-0.071489	84.286316	0.000244	
CEIL__0039.LAB	6/24	7:40:21	-0.004662	-0.004692	-0.020921	84.172256	-0.000335	
CEIL__0040.LAB	6/24	7:40:37	-0.001067	-0.000779	-0.056768	84.158479	0.000631	
CEIL__0041.LAB	6/24	7:40:52	0.001631	-0.003522	-0.000622	84.295196	0.001615	
CEIL__0042.LAB	6/24	7:41:08	-0.006304	0.003657	-0.069032	84.347756	0.000133	
CEIL__0043.LAB	6/24	7:41:24	0.00092	0.00276	0.040721	84.354902	0.001676	
CEIL__0044.LAB	6/24	7:41:40	0.00003	0.00591	0.022526	84.382162	-0.000867	
CEIL__0045.LAB	6/24	7:41:55	-0.000704	-0.004485	0.024912	84.360097	0.000689	
CEIL__0046.LAB	6/24	7:42:11	0.653424	-0.004354	-0.058597	57.196507	-0.001111	
CEIL__0047.LAB	6/24	7:42:27	3.545687	-0.585248	-0.156699	12.794795	-0.000041	
CEIL__0048.LAB	6/24	7:42:42	3.207824	-0.118455	-0.136451	2.7165	-0.001155	
CEIL__0049.LAB	6/24	7:42:58	2.793712	-0.032947	0.051723	2.505295	-0.001494	
CEIL__0050.LAB	6/24	7:43:14	2.650911	-0.097702	6.014461	2.253001	0.897395	
CEIL__0051.LAB	6/24	7:43:29	2.839727	-0.314112	14.532809	3.167183	1.930066	
CEIL__0052.LAB	6/24	7:43:45	0.615416	-0.022776	68.223751	1.00876	4.159659	
CEIL__0053.LAB	6/24	7:44:01	0.001875	0.011691	95.094385	0.096189	5.074653	
CEIL__0054.LAB	6/24	7:44:17	-0.006467	0.023803	96.255296	0.039967	5.088647	
CEIL__0055.LAB	6/24	7:44:32	-0.011037	0.022042	96.129036	0.092314	5.095647	
CEIL__0056.LAB	6/24	7:44:48	-0.007636	0.015676	96.359712	0.01768	5.100128	Direct QA/Tracer
CEIL__0057.LAB	6/24	7:45:04	-0.006631	0.007209	95.976206	-0.046857	5.104367	EtO Avg: 96.2
CEIL__0058.LAB	6/24	7:45:19	-0.010829	0.00374	96.024155	-0.06653	5.105683	SF6 Avg: 5.10
CEIL__0059.LAB	6/24	7:45:35	-0.009255	0.013523	96.051022	0.022989	5.103057	
CEIL__0060.LAB	6/24	7:45:51	-0.008936	0.012372	96.485694	-0.018511	5.105828	
CEIL__0061.LAB	6/24	7:46:06	-0.005311	0.01087	96.30371	-0.136572	5.104703	
CEIL__0062.LAB	6/24	7:46:23	-0.007611	0.012216	96.419127	-0.002982	5.10777	
CEIL__0063.LAB	6/24	7:46:38	-0.00882	0.001835	96.071861	-0.092622	5.10425	
CEIL__0064.LAB	6/24	7:46:54	-0.000702	0.003638	96.020006	-0.02702	5.104152	
CEIL__0065.LAB	6/24	7:47:10	-0.007522	0.016509	96.391212	-0.032971	5.101108	
CEIL__0066.LAB	6/24	7:47:25	0.030576	13.231159	18.281428	0.112392	1.185961	
CEIL__0101.LAB	6/24	7:58:49	0.022686	9.598922	0.016032	0.979464	-0.000338	
CEIL__0102.LAB	6/24	7:59:05	0.026129	9.679708	-0.012723	0.996793	-0.000362	
CEIL__0103.LAB	6/24	7:59:21	0.004791	10.094375	-0.026362	-0.024133	-0.001445	Direct CTS
CEIL__0104.LAB	6/24	7:59:37	0.017657	10.090143	-0.041215	-0.019891	-0.003352	CO2 Avg: 10.09
CEIL__0105.LAB	6/24	7:59:52	0.006418	10.09062	-0.071798	-0.041921	-0.002945	
CEIL__0106.LAB	6/24	8:00:08	0.006209	10.099104	0.011762	0.041648	-0.001725	
CEIL__0107.LAB	6/24	8:00:24	0.01183	10.084207	0.033371	-0.010717	-0.000529	
CEIL__0108.LAB	6/24	8:00:39	0.005458	10.07215	-0.060903	-0.006496	-0.002899	
CEIL__0109.LAB	6/24	8:00:55	2.343745	2.197418	9.655305	13.104516	1.261453	
CEIL__0110.LAB	6/24	8:01:11	2.77496	-0.231152	31.337951	5.510485	2.479699	
CEIL__0111.LAB	6/24	8:01:27	1.659524	-0.034373	43.436403	1.282513	2.720709	
CEIL__0112.LAB	6/24	8:01:42	1.034319	0.000612	40.511517	1.213896	2.449897	
CEIL__0113.LAB	6/24	8:01:58	2.110972	-0.000536	4.314183	1.736489	0.178035	
CEIL__0114.LAB	6/24	8:02:13	1.309672	0.135844	48.416664	0.783849	3.133079	
CEIL__0115.LAB	6/24	8:02:29	0.345858	0.061493	6.077649	0.035667	0.164132	

Raw FTIR Data
Ceilcote Outlet
Aeration/Backvent Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL_0116.LAB	6/24	8:02:45	0.165342	0.001163	1.617316	0.118384	0.024988	System Zero
CEIL_0117.LAB	6/24	8:03:01	0.127343	-0.004008	1.039751	0.032758	0.013506	
CEIL_0118.LAB	6/24	8:03:16	0.108939	-0.020133	0.792518	0.124827	0.010514	
CEIL_0119.LAB	6/24	8:03:32	0.095819	-0.016535	0.628328	0.051725	0.007573	
CEIL_0120.LAB	6/24	8:03:48	0.089984	-0.019369	0.586889	0.064272	0.008944	
CEIL_0121.LAB	6/24	8:04:03	0.081438	-0.016772	0.454995	0.132239	0.006168	
CEIL_0122.LAB	6/24	8:04:19	0.08107	-0.019743	0.415606	0.070097	0.005301	
CEIL_0123.LAB	6/24	8:04:35	0.082153	-0.01621	0.380041	0.093082	0.003091	
CEIL_0124.LAB	6/24	8:04:51	0.074885	-0.008515	0.389325	0.025774	0.004475	
CEIL_0125.LAB	6/24	8:05:06	0.07465	-0.019741	0.271731	0.107204	0.003861	
CEIL_0126.LAB	6/24	8:05:22	0.073991	-0.022342	0.202016	0.020622	0.005627	
CEIL_0127.LAB	6/24	8:05:38	0.066377	-0.014658	0.191836	0.164637	0.004488	
CEIL_0128.LAB	6/24	8:05:53	0.061658	-0.03054	0.195814	0.108681	0.003892	
CEIL_0129.LAB	6/24	8:06:09	0.308085	-0.001947	0.713998	2.981185	0.00254	
CEIL_0130.LAB	6/24	8:06:25	1.295522	-0.016495	0.550477	2.10351	0.003785	System CTS CO2 Avg: 9.79
CEIL_0131.LAB	6/24	8:06:41	0.75713	0.111828	0.471125	0.921958	0.006134	
CEIL_0132.LAB	6/24	8:06:56	0.546197	6.153541	0.380192	0.788291	0.005859	
CEIL_0133.LAB	6/24	8:07:12	0.378733	9.121868	0.282444	0.285414	0.004976	
CEIL_0134.LAB	6/24	8:07:28	0.191964	9.619505	0.202979	0.095316	0.005673	
CEIL_0135.LAB	6/24	8:07:43	0.151615	9.716378	0.284022	0.060136	0.004363	
CEIL_0136.LAB	6/24	8:07:59	0.130356	9.752077	0.21823	0.092145	0.003547	
CEIL_0137.LAB	6/24	8:08:15	0.118458	9.773822	0.227778	0.124541	0.00353	
CEIL_0138.LAB	6/24	8:08:30	0.108465	9.774882	0.186349	0.081881	0.004599	
CEIL_0139.LAB	6/24	8:08:46	0.101044	9.83994	0.143555	0.144159	0.003597	
CEIL_0140.LAB	6/24	8:09:02	0.097909	9.815864	0.13485	0.117034	0.002187	
CEIL_0141.LAB	6/24	8:09:18	0.098533	9.870349	0.11903	0.116686	0.002563	
CEIL_0142.LAB	6/24	8:09:33	0.091321	9.860923	0.139585	0.042931	0.00246	
CEIL_0143.LAB	6/24	8:09:49	0.095506	9.84999	0.017515	0.048794	0.002157	
CEIL_0144.LAB	6/24	8:10:05	0.483309	3.008416	0.369825	1.398087	0.000535	Native EtO EtO Avg: -0.004 SF6 Avg: 0.01
CEIL_0145.LAB	6/24	8:10:20	1.949109	0.289825	0.165069	1.78811	-0.000456	
CEIL_0146.LAB	6/24	8:10:36	2.21565	0.158457	-0.029961	1.755312	0.000216	
CEIL_0147.LAB	6/24	8:10:52	2.311874	0.091194	-0.026242	1.864523	-0.000241	
CEIL_0148.LAB	6/24	8:11:07	2.329743	0.050448	-0.030884	1.840567	-0.000215	
CEIL_0197.LAB	6/24	8:44:43	2.570529	0.000541	0.051873	3.934254	0.003988	
CEIL_0198.LAB	6/24	8:44:58	2.576468	-0.002323	0.007254	3.972949	0.005436	
CEIL_0199.LAB	6/24	8:45:14	2.573167	0.000107	-0.008034	4.018076	0.005575	
CEIL_0200.LAB	6/24	8:45:29	2.568339	0.003936	-0.068263	4.036741	0.007306	
CEIL_0201.LAB	6/24	8:45:45	2.574519	0.001191	-0.001428	3.977569	0.00739	
CEIL_0202.LAB	6/24	8:46:01	2.568025	0.000729	-0.005528	3.905071	0.005223	
CEIL_0203.LAB	6/24	8:46:17	2.567572	0.012178	0.121966	4.029782	0.007293	
CEIL_0204.LAB	6/24	8:46:32	2.552684	0.003629	0.066995	4.025617	0.0057	
CEIL_0205.LAB	6/24	8:46:48	2.55043	-0.00794	-0.012072	4.000453	0.007291	
CEIL_0206.LAB	6/24	8:47:04	2.558508	0.008273	-0.031532	3.98146	0.006794	Native EtO EtO Avg: -0.004 SF6 Avg: 0.01
CEIL_0207.LAB	6/24	8:47:19	2.553292	-0.010353	-0.062422	4.009326	0.004782	
CEIL_0208.LAB	6/24	8:47:35	2.567008	0.000475	-0.015197	4.024269	0.008114	
CEIL_0209.LAB	6/24	8:47:51	2.568006	0.00208	-0.016744	4.017188	0.006089	
CEIL_0210.LAB	6/24	8:48:06	2.568751	0.003983	-0.021412	4.082112	0.006911	
CEIL_0211.LAB	6/24	8:48:22	2.570703	0.003537	-0.034384	4.132052	0.005579	
CEIL_0212.LAB	6/24	8:48:38	2.565929	0.001749	-0.034898	4.046639	0.006471	
CEIL_0213.LAB	6/24	8:48:54	2.564075	-0.000038	0.060651	4.067072	0.007098	
CEIL_0214.LAB	6/24	8:49:09	2.566128	-0.004033	0.052191	4.014025	0.007104	
CEIL_0215.LAB	6/24	8:49:25	2.561635	-0.001341	0.01867	4.08732	0.005276	
CEIL_0216.LAB	6/24	8:49:41	2.569213	0.004048	-0.01009	4.122018	0.006523	
CEIL_0217.LAB	6/24	8:49:57	2.572566	0.007033	-0.039975	4.17098	0.008812	
CEIL_0218.LAB	6/24	8:50:12	3.109147	-0.025584	0.001642	5.463201	0.173838	
CEIL_0219.LAB	6/24	8:50:28	3.257117	-0.013768	-0.076779	6.114715	0.211925	
CEIL_0220.LAB	6/24	8:50:44	3.091275	-0.004748	8.788762	5.977779	0.669547	
CEIL_0221.LAB	6/24	8:51:00	2.80983	-0.001537	8.521854	5.488473	0.585583	
CEIL_0222.LAB	6/24	8:51:15	2.99632	-0.026674	7.67276	7.172353	0.608721	
CEIL_0223.LAB	6/24	8:51:31	2.878815	-0.032782	7.67552	5.772687	0.566507	
CEIL_0224.LAB	6/24	8:51:46	3.021457	-0.014784	7.726963	5.608274	0.609817	
CEIL_0225.LAB	6/24	8:52:02	2.90358	-0.037388	7.67152	5.018238	0.576997	
CEIL_0226.LAB	6/24	8:52:18	2.99745	0.089836	7.136523	4.841024	0.543183	
CEIL_0227.LAB	6/24	8:52:34	2.8928	0.69457	1.872253	4.546963	0.190352	
CEIL_0228.LAB	6/24	8:52:49	2.945491	0.720179	0.722807	4.512124	0.178899	
CEIL_0229.LAB	6/24	8:53:05	2.923961	0.744162	0.508921	4.277484	0.163907	
CEIL_0230.LAB	6/24	8:53:21	2.929827	0.758428	0.483219	4.372688	0.165476	
CEIL_0231.LAB	6/24	8:53:36	2.918535	0.767777	0.396669	4.236631	0.158902	
CEIL_0232.LAB	6/24	8:53:52	2.908171	0.796913	0.423305	4.329522	0.16078	
CEIL_0233.LAB	6/24	8:54:08	3.531327	0.802167	0.285067	5.062646	0.372145	
CEIL_0234.LAB	6/24	8:54:24	3.129069	0.821796	0.372256	4.353718	0.214053	
CEIL_0235.LAB	6/24	8:54:39	2.876142	0.807403	0.517412	4.148403	0.146644	
CEIL_0236.LAB	6/24	8:54:55	2.868581	0.81914	0.434297	4.185083	0.151696	
CEIL_0237.LAB	6/24	8:55:11	3.566979	0.82305	0.715809	4.303641	0.350212	
CEIL_0238.LAB	6/24	8:55:27	2.966302	0.820981	0.893595	3.86164	0.160868	
CEIL_0239.LAB	6/24	8:55:42	3.049926	0.811604	1.091024	4.014179	0.201077	
CEIL_0240.LAB	6/24	8:55:58	2.998433	1.0042	0.99551	4.003048	0.209915	
CEIL_0241.LAB	6/24	8:56:13	3.68213	0.930486	1.945218	3.961471	0.375145	
CEIL_0242.LAB	6/24	8:56:29	3.033549	0.862443	1.717017	3.734695	0.173189	
CEIL_0243.LAB	6/24	8:56:45	2.991742	0.860585	1.526323	3.831053	0.176609	
CEIL_0244.LAB	6/24	8:57:01	3.112899	0.85747	1.525549	3.942543	0.235496	
CEIL_0245.LAB	6/24	8:57:16	3.573629	0.857337	2.282405	3.770719	0.336319	
CEIL_0246.LAB	6/24	8:57:32	2.984791	0.823613	2.055703	3.858908	0.200715	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes	
CEIL__0247.LAB	6/24	8:57:48	2.92136	0.229608	7.096866	3.922774	0.530573		
CEIL__0248.LAB	6/24	8:58:04	3.063764	0.074283	8.999933	4.074308	0.658459		
CEIL__0249.LAB	6/24	8:58:19	3.581239	0.050141	9.862488	3.834799	0.780554		
CEIL__0250.LAB	6/24	8:58:35	2.927545	0.040176	10.160821	3.793262	0.641513		
CEIL__0251.LAB	6/24	8:58:51	2.815632	0.025639	10.426872	3.788775	0.642036		
CEIL__0252.LAB	6/24	8:59:06	2.979922	0.011579	10.357621	4.089056	0.703761		
CEIL__0253.LAB	6/24	8:59:22	3.355368	0.018522	10.504746	4.068834	0.794868		
CEIL__0254.LAB	6/24	8:59:38	2.815775	0.01512	10.167382	3.814017	0.638671		
CEIL__0255.LAB	6/24	8:59:53	2.734109	0.010693	10.22891	3.855366	0.628375		
CEIL__0256.LAB	6/24	9:00:09	3.010924	0.002409	10.299715	4.269952	0.717484		
CEIL__0257.LAB	6/24	9:00:25	3.194402	0.00522	10.301201	4.038528	0.748508		
CEIL__0258.LAB	6/24	9:00:41	2.736477	0.008316	9.959492	3.848832	0.616542		
CEIL__0259.LAB	6/24	9:00:56	2.69521	0.000768	9.509998	3.974712	0.583307		
CEIL__0260.LAB	6/24	9:01:12	3.175075	0.000188	9.503296	4.44986	0.718034		
CEIL__0261.LAB	6/24	9:01:28	3.049648	-0.005416	9.585189	4.033289	0.678808		
CEIL__0262.LAB	6/24	9:01:43	2.681048	0.014405	9.388748	3.858508	0.57805		
CEIL__0263.LAB	6/24	9:01:59	2.690635	-0.000479	9.303006	4.0102	0.582709		
CEIL__0264.LAB	6/24	9:02:15	3.132549	-0.010527	9.433647	4.426355	0.703283		
CEIL__0265.LAB	6/24	9:02:30	3.049783	0.002159	9.459037	4.0363	0.666814		
CEIL__0266.LAB	6/24	9:02:46	2.643932	-0.004395	9.331911	3.868017	0.567705		
CEIL__0267.LAB	6/24	9:03:02	2.702097	-0.011756	9.355237	4.050069	0.58818		
CEIL__0268.LAB	6/24	9:03:17	3.043589	-0.018265	9.331211	4.529493	0.679794		
CEIL__0269.LAB	6/24	9:03:33	2.913604	0.001508	9.311628	4.147531	0.636875		
CEIL__0270.LAB	6/24	9:03:49	2.583738	-0.009844	9.114288	4.073924	0.547332		
CEIL__0271.LAB	6/24	9:04:05	2.812774	-0.013127	8.786022	4.32518	0.58438		
CEIL__0272.LAB	6/24	9:04:20	3.000733	-0.021163	8.773982	4.5946	0.622795		
CEIL__0273.LAB	6/24	9:04:36	2.9013	-0.020091	8.726501	4.416169	0.599542		
CEIL__0274.LAB	6/24	9:04:52	2.593446	0.007447	8.683057	4.10597	0.519455		
CEIL__0275.LAB	6/24	9:05:08	2.814292	0.002371	8.681912	4.255401	0.578433		
CEIL__0276.LAB	6/24	9:05:23	2.880543	-0.017842	8.71759	4.534927	0.596175		
CEIL__0277.LAB	6/24	9:05:39	2.852984	-0.002817	8.739889	4.397772	0.590938		
CEIL__0278.LAB	6/24	9:05:55	2.638388	-0.01486	8.736893	4.102087	0.52994		
CEIL__0279.LAB	6/24	9:06:10	2.768922	-0.007282	8.643758	4.337394	0.568721		
CEIL__0280.LAB	6/24	9:06:26	2.781089	-0.006531	8.637104	4.407249	0.569679		
CEIL__0281.LAB	6/24	9:06:42	2.601603	-0.000859	8.737746	4.08867	0.521451		
CEIL__0282.LAB	6/24	9:06:57	2.562395	-0.007587	8.725012	4.113614	0.514229		
CEIL__0283.LAB	6/24	9:07:13	2.635843	-0.00788	8.139724	4.120267	0.484692		
CEIL__0284.LAB	6/24	9:07:29	2.552319	-0.010809	8.043791	4.162859	0.47578		
CEIL__0285.LAB	6/24	9:07:44	2.605364	-0.005567	8.08059	4.098388	0.472378		
CEIL__0286.LAB	6/24	9:08:01	2.529092	-0.004934	8.088141	4.125791	0.468348		
CEIL__0287.LAB	6/24	9:08:16	2.581101	0.00331	8.075385	4.069778	0.468003		
CEIL__0288.LAB	6/24	9:08:32	2.565958	-0.01	7.963978	4.025775	0.461329		
CEIL__0289.LAB	6/24	9:08:47	2.550713	-0.002926	7.950851	4.073202	0.458893		
CEIL__0290.LAB	6/24	9:09:03	2.531945	-0.009346	8.039398	4.047802	0.454843		
CEIL__0291.LAB	6/24	9:09:19	2.514969	-0.001248	8.008563	4.005772	0.453688		
CEIL__0292.LAB	6/24	9:09:34	2.520166	0.008711	7.967115	4.180807	0.448826		
CEIL__0293.LAB	6/24	9:09:50	2.42875	0.004857	8.069705	3.892311	0.429609		
CEIL__0294.LAB	6/24	9:10:06	2.396885	0.004586	8.010586	3.921097	0.420706		
CEIL__0295.LAB	6/24	9:10:22	2.401435	0.004186	7.918257	3.99467	0.421184		
CEIL__0296.LAB	6/24	9:10:37	2.401208	-0.009613	8.072246	3.999378	0.419149		
CEIL__0297.LAB	6/24	9:10:53	2.40412	0.004005	8.040283	4.060012	0.419996		
CEIL__0298.LAB	6/24	9:11:09	2.400503	0.001206	7.977283	3.967679	0.41957		
CEIL__0299.LAB	6/24	9:11:24	2.397402	-0.002208	7.953878	4.052565	0.421383	Dynamic Spike EtO Avg: 7.98 SF6 Avg: 0.418	
CEIL__0300.LAB	6/24	9:11:40	2.399799	0.001672	7.961195	4.054449	0.418382		
CEIL__0301.LAB	6/24	9:11:56	2.395436	-0.009113	7.907133	4.110849	0.417811		
CEIL__0302.LAB	6/24	9:12:12	2.396951	-0.008715	8.011312	4.071598	0.418878		
CEIL__0303.LAB	6/24	9:12:27	2.392347	0.001349	8.021431	3.999611	0.418976		
CEIL__0304.LAB	6/24	9:12:43	2.397352	-0.005633	7.972969	4.053066	0.420113		
CEIL__0305.LAB	6/24	9:12:59	2.392109	0.00902	8.07947	4.027477	0.416957		
CEIL__0306.LAB	6/24	9:13:14	2.388824	-0.001353	7.96589	4.006621	0.417215		
CEIL__0307.LAB	6/24	9:13:30	2.394942	0.004446	7.922308	3.996807	0.415442		
CEIL__0308.LAB	6/24	9:13:46	2.397859	0.006781	8.025514	3.985915	0.418728		
CEIL__0309.LAB	6/24	9:14:01	2.398783	0.000094	8.050095	4.006678	0.416676		
CEIL__0310.LAB	6/24	9:14:17	2.423356	0.002542	6.277258	4.078815	0.321245		
Run 1 - Ceilcote Outlet - Backvent Testing									
CEIL__0537.LAB	6/24	11:30:50	2.729459	0.035158	<0.0580	3.0639	0.0011	Point 2 EtO Avg: 0.043	Stratification Check
CEIL__0538.LAB	6/24	11:31:53	2.740684	0.034688	<0.0580	3.083561	0.00154		
CEIL__0539.LAB	6/24	11:32:56	2.736598	0.023495	<0.0580	3.078479	0.000373		
CEIL__0540.LAB	6/24	11:33:59	2.745071	0.026191	<0.0580	3.005003	0.00081		
CEIL__0541.LAB	6/24	11:35:01	2.753798	0.028753	0.0708	3.012133	0.001759		
CEIL__0542.LAB	6/24	11:36:04	2.749381	0.02693	0.0606	2.966983	0.001742		
CEIL__0543.LAB	6/24	11:37:07	2.759395	0.024328	0.0993	2.987571	0.000764		
CEIL__0544.LAB	6/24	11:38:10	2.755094	0.027537	0.0906	2.964186	0.001561	Point 1 EtO Avg: 0.094	
CEIL__0545.LAB	6/24	11:39:13	2.761341	0.032344	0.0834	2.939894	0.001866		
CEIL__0546.LAB	6/24	11:40:16	2.763442	0.032968	0.0903	2.95505	0.001198		
CEIL__0547.LAB	6/24	11:41:18	2.762432	0.025732	0.1113	2.942423	0.001763		
CEIL__0548.LAB	6/24	11:42:21	2.764932	0.023676	0.0889	2.96198	0.001916	Point 3 EtO Avg: 0.208	
CEIL__0549.LAB	6/24	11:43:24	2.7584	0.030718	0.1150	2.955176	0.001139		
CEIL__0550.LAB	6/24	11:44:27	2.752585	0.02548	0.0747	2.946283	0.00101		
CEIL__0551.LAB	6/24	11:45:30	3.467004	0.002788	0.5531	6.870168	0.237707		
CEIL__0552.LAB	6/24	11:46:33	4.490256	0.035452	18.7283	2.664731	0.379469	End Strat Check EtO Avg: 0.115	
CEIL__0553.LAB	6/24	11:47:35	4.525622	0.032988	20.2427	2.22384	0.380292		

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL_0554.LAB	6/24	11:48:39	3.851527	0.032701	12.5396	2.508639	0.272971	
Average			3.048	0.028	2.954	3.118	0.072	
Run 2 - Ceilcote Outlet - Backvent Testing								
CEIL_0555.LAB	6/24	11:49:41	2.804691	0.030015	0.373792	2.911917	0.011391	
CEIL_0556.LAB	6/24	11:50:44	2.787292	0.027033	0.386372	2.945919	0.008636	
CEIL_0557.LAB	6/24	11:51:47	2.791874	0.026319	0.342086	2.940468	0.008183	
CEIL_0558.LAB	6/24	11:52:49	2.786465	0.029808	0.281394	2.909625	0.007899	
CEIL_0559.LAB	6/24	11:53:52	2.779437	0.025513	0.142312	2.909074	0.00756	
CEIL_0560.LAB	6/24	11:54:55	2.783191	0.024555	0.123928	2.960376	0.007217	
CEIL_0561.LAB	6/24	11:55:58	2.78474	0.02636	0.097272	2.961855	0.007535	
CEIL_0562.LAB	6/24	11:57:01	2.788142	0.026876	0.134706	2.980866	0.007497	
CEIL_0563.LAB	6/24	11:58:04	2.79175	0.028933	0.129265	2.967484	0.007166	
CEIL_0564.LAB	6/24	11:59:07	2.788709	0.030275	0.101301	2.953471	0.007563	
CEIL_0565.LAB	6/24	12:00:09	2.791965	0.030321	0.093061	2.991766	0.007525	
CEIL_0566.LAB	6/24	12:01:12	2.793495	0.029397	0.112684	3.000298	0.007561	
CEIL_0567.LAB	6/24	12:02:15	2.792536	0.025767	0.06806	3.03557	0.007718	
CEIL_0568.LAB	6/24	12:03:18	2.790911	0.021708	0.099862	3.037745	0.006942	
CEIL_0569.LAB	6/24	12:04:21	2.780817	0.027796	0.136412	3.006848	0.005621	
Average			2.789	0.027	0.1748	2.968	0.008	
Run 3 - Ceilcote Outlet - Backvent Testing								
CEIL_0570.LAB	6/24	12:05:24	2.775519	0.028108	0.124388	2.980802	0.004899	
CEIL_0571.LAB	6/24	12:06:27	2.778776	0.026645	0.107754	2.951633	0.003147	
CEIL_0572.LAB	6/24	12:07:30	2.782553	0.030031	0.13885	2.90988	0.002126	
CEIL_0573.LAB	6/24	12:08:32	2.776122	0.02618	0.126482	2.919203	0.001469	
CEIL_0574.LAB	6/24	12:09:35	2.78416	0.026201	0.097686	2.898861	0.001838	
CEIL_0575.LAB	6/24	12:10:38	2.779244	0.02621	0.126257	2.9306	0.001425	
CEIL_0576.LAB	6/24	12:11:41	2.782931	0.023573	0.080451	2.886014	0.001874	
CEIL_0577.LAB	6/24	12:12:43	2.787841	0.031683	0.129155	2.889402	0.001769	
CEIL_0578.LAB	6/24	12:13:46	2.787898	0.030726	0.075525	2.910998	0.002888	
CEIL_0579.LAB	6/24	12:14:49	2.785728	0.031155	0.117985	2.899459	0.0013	
CEIL_0580.LAB	6/24	12:15:52	2.790526	0.02459	0.148484	2.911229	0.00129	
CEIL_0581.LAB	6/24	12:16:55	2.794837	0.023696	0.102124	2.884455	0.001592	
CEIL_0582.LAB	6/24	12:17:57	2.793322	0.027502	0.130548	2.943426	0.00191	
CEIL_0583.LAB	6/24	12:19:01	2.788705	0.023608	0.167363	2.90965	0.001469	
Average			2.785	0.027	0.1195	2.916	0.002	
Post-Test Calibration Check								
CEIL_0607.LAB	6/24	12:37:39	0.092563	-0.002327	-0.030187	-0.002405	0.001523	
CEIL_0608.LAB	6/24	12:37:54	0.08367	-0.011311	0.03118	0.007149	0.000197	
CEIL_0609.LAB	6/24	12:38:10	0.077984	-0.000272	0.036785	0.084777	-0.00053	
CEIL_0610.LAB	6/24	12:38:26	0.082106	-0.006331	0.057156	0.022523	0.001311	
CEIL_0611.LAB	6/24	12:38:41	0.071697	-0.00594	0.001376	-0.014333	0.001309	System Zero
CEIL_0612.LAB	6/24	12:38:57	0.072072	0.005293	-0.00001	-0.016994	0.00048	EtO Zero
CEIL_0613.LAB	6/24	12:39:13	0.070532	-0.007928	-0.050644	-0.019777	0.000291	
CEIL_0614.LAB	6/24	12:39:28	0.066985	-0.000597	0.055093	-0.024238	-0.000849	
CEIL_0615.LAB	6/24	12:39:44	0.065875	-0.009419	0.0433	-0.004987	-0.00075	
CEIL_0616.LAB	6/24	12:40:00	0.062759	-0.000804	-0.008385	-0.038365	0.001279	
CEIL_0617.LAB	6/24	12:40:16	0.063668	-0.001313	0.039391	-0.037961	0.000614	
CEIL_0618.LAB	6/24	12:40:31	0.059167	-0.012577	0.020289	-0.036071	-0.000596	
CEIL_0619.LAB	6/24	12:40:47	0.060443	-0.014791	-0.020571	-0.021557	-0.001209	
CEIL_0620.LAB	6/24	12:41:03	0.063077	-0.010565	0.026879	-0.000086	0.00042	
CEIL_0621.LAB	6/24	12:41:18	0.062839	-0.007298	0.026435	0.071702	0.000199	
CEIL_0622.LAB	6/24	12:41:34	0.055225	0.003583	0.027795	-0.044147	0.000476	
CEIL_0623.LAB	6/24	12:41:50	0.06019	1.643346	0.021423	0.031705	-0.00208	
CEIL_0624.LAB	6/24	12:42:06	0.061856	9.506409	-0.017412	0.056137	0.001398	
CEIL_0625.LAB	6/24	12:42:21	0.066163	9.770813	0.027407	0.040165	0.000906	
CEIL_0626.LAB	6/24	12:42:37	0.064094	9.832778	0.039618	-0.043546	0.001552	
CEIL_0627.LAB	6/24	12:42:52	0.060816	9.865481	0.05995	-0.054272	0.002609	
CEIL_0628.LAB	6/24	12:43:08	0.059479	9.8703	0.046553	-0.007588	0.001143	System CTS
CEIL_0629.LAB	6/24	12:43:24	0.057123	9.877803	-0.057786	0.014914	0.002521	CO2 Avg: 9.91
CEIL_0630.LAB	6/24	12:43:40	0.058209	9.892136	-0.011726	-0.010956	0.000727	
CEIL_0631.LAB	6/24	12:43:55	0.060583	9.922856	0.070462	-0.049428	0.002032	
CEIL_0632.LAB	6/24	12:44:12	0.057714	9.915529	-0.045063	-0.02754	0.002856	
CEIL_0633.LAB	6/24	12:44:27	0.058824	9.92418	-0.048503	-0.009718	-0.000219	
CEIL_0634.LAB	6/24	12:44:43	0.058015	9.920499	0.028114	-0.03765	0.003207	
CEIL_0635.LAB	6/24	12:44:59	0.063501	9.918333	-0.043003	0.022427	0.000921	
CEIL_0636.LAB	6/24	12:45:14	0.056768	9.937444	-0.038018	-0.008428	0.000787	
CEIL_0637.LAB	6/24	12:45:30	0.056613	9.923148	-0.001566	-0.012842	0.002132	
CEIL_0638.LAB	6/24	12:45:45	0.060933	9.169778	-0.032494	0.220695	0.002995	
CEIL_0639.LAB	6/24	12:46:01	0.218749	8.470579	-0.005183	0.437918	0.003696	
CEIL_0640.LAB	6/24	12:46:17	0.396673	8.472001	-0.128168	0.421129	0.001995	
CEIL_0641.LAB	6/24	12:46:32	1.023885	4.726067	-0.002977	1.385523	0.00155	
CEIL_0642.LAB	6/24	12:46:48	2.701054	0.197577	0.032137	2.838455	0.002149	
MDC#2 Study								
CEIL_0643.LAB	6/24	12:52:23	2.46952	0.033553	-0.056904	1.751477	0.001234	Sampling Ambient Air
CEIL_0644.LAB	6/24	12:53:26	2.44733	0.023558	-0.054206	1.753655	0.001051	MDC#2
CEIL_0645.LAB	6/24	12:54:28	2.44575	0.034094	-0.045486	1.801861	0.000348	EtO Stddev: 0.019
CEIL_0646.LAB	6/24	12:55:31	2.470764	0.02709	-0.049783	1.815462	0.001003	EtO MDC#2: 0.058
CEIL_0647.LAB	6/24	12:56:34	2.486268	0.026463	-0.073161	1.797225	0.000042	
CEIL_0648.LAB	6/24	12:57:37	2.495182	0.024566	-0.020763	1.760541	0.000691	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL__0649.LAB	6/24	12:58:40	2.475052	0.029224	-0.027951	1.812406	0.000654	
CEIL__0650.LAB	6/24	12:59:43	2.441975	0.026586	-0.083167	1.816292	0.001539	
CEIL__0651.LAB	6/24	13:00:45	2.43921	0.023144	-0.077245	1.779004	0.000476	
CEIL__0652.LAB	6/24	13:01:49	2.423387	0.027984	-0.065084	1.757942	0.001423	
CEIL__0653.LAB	6/24	13:02:51	2.424969	0.023175	-0.07555	1.786482	0.000569	
CEIL__0654.LAB	6/24	13:03:54	2.418392	0.025347	-0.086986	1.756602	0.001336	
Run 1 - Ceilcote Outlet - Aeration Testing								
CEIL__0730.LAB	6/24	14:23:29	2.896981	0.033027	0.1094	3.671649	0.001616	
CEIL__0731.LAB	6/24	14:24:32	2.899534	0.029882	0.1517	3.665096	0.00157	
CEIL__0732.LAB	6/24	14:25:35	2.900831	0.02945	0.1181	3.73342	0.002514	
CEIL__0733.LAB	6/24	14:26:37	2.897926	0.030899	0.1268	3.822462	0.001931	
CEIL__0734.LAB	6/24	14:27:40	2.894215	0.02658	0.1249	3.84158	0.002355	
CEIL__0735.LAB	6/24	14:28:43	2.896587	0.030483	0.1380	3.83478	0.002023	
CEIL__0736.LAB	6/24	14:29:46	2.89073	0.025911	0.1042	3.765039	0.00148	
CEIL__0737.LAB	6/24	14:30:48	2.88854	0.023827	0.1013	3.734256	0.00186	
CEIL__0738.LAB	6/24	14:31:51	2.8896	0.023021	0.1347	3.715483	0.001585	
CEIL__0739.LAB	6/24	14:32:54	2.884638	0.023857	0.1112	3.733222	0.001839	
CEIL__0740.LAB	6/24	14:33:57	2.876155	0.020458	0.1126	3.737221	0.001141	
CEIL__0741.LAB	6/24	14:35:00	2.873703	0.027907	0.1210	3.728822	0.001547	
CEIL__0742.LAB	6/24	14:36:03	2.879708	0.022476	0.0764	3.702867	0.001524	
CEIL__0743.LAB	6/24	14:37:05	2.861008	0.021553	0.1160	3.648991	0.002086	
CEIL__0744.LAB	6/24	14:38:08	2.860697	0.024826	0.1023	3.724715	0.001367	
CEIL__0745.LAB	6/24	14:39:11	2.857831	0.027196	0.0879	3.661799	0.001725	
CEIL__0746.LAB	6/24	14:40:14	2.847174	0.026707	0.0691	3.702682	0.001271	
CEIL__0747.LAB	6/24	14:41:17	2.837392	0.028598	<0.0580	3.710324	0.001352	
CEIL__0748.LAB	6/24	14:42:20	2.848632	0.026556	0.0591	3.663607	0.001462	
CEIL__0749.LAB	6/24	14:43:23	2.850896	0.024736	0.0945	3.683529	0.001112	
CEIL__0750.LAB	6/24	14:44:25	2.846917	0.027045	0.0829	3.714476	0.001005	
CEIL__0751.LAB	6/24	14:45:28	2.839895	0.030394	0.0894	3.741379	0.001549	
CEIL__0752.LAB	6/24	14:46:31	2.843543	0.023272	0.1032	3.828206	0.001288	
CEIL__0753.LAB	6/24	14:47:34	2.836176	0.024774	<0.0580	3.873994	0.001749	
CEIL__0754.LAB	6/24	14:48:37	2.835393	0.027788	0.1127	3.880559	0.002201	
CEIL__0755.LAB	6/24	14:49:39	2.837074	0.024839	0.0987	3.795464	0.001022	
CEIL__0756.LAB	6/24	14:50:42	2.827577	0.031385	0.0977	3.762955	0.000864	
CEIL__0757.LAB	6/24	14:51:45	2.834949	0.031762	0.0662	3.736249	0.001239	
CEIL__0758.LAB	6/24	14:52:48	2.82527	0.030503	0.0601	3.715327	0.001545	
CEIL__0759.LAB	6/24	14:53:51	2.836633	0.020632	0.0819	3.731531	0.001569	
CEIL__0760.LAB	6/24	14:54:53	2.832497	0.01914	<0.0580	3.728605	0.001268	
CEIL__0761.LAB	6/24	14:55:56	2.829534	0.030594	<0.0580	3.723752	0.001207	
CEIL__0762.LAB	6/24	14:56:59	2.824566	0.025051	0.0932	3.693001	0.00146	
CEIL__0763.LAB	6/24	14:58:02	2.825098	0.027081	0.0942	3.710811	0.000994	
CEIL__0764.LAB	6/24	14:59:05	2.829313	0.030673	0.0943	3.696679	0.001246	
CEIL__0765.LAB	6/24	15:00:08	2.827914	0.027311	0.0964	3.742121	0.000282	
CEIL__0766.LAB	6/24	15:01:11	2.828456	0.019814	<0.0580	3.774769	-0.000038	
CEIL__0767.LAB	6/24	15:02:13	2.817021	0.026299	0.0700	3.728507	0.00168	
CEIL__0768.LAB	6/24	15:03:16	2.824895	0.028449	<0.0580	3.708293	0.000796	
CEIL__0769.LAB	6/24	15:04:19	2.822865	0.027189	0.0799	3.626123	0.001346	
CEIL__0770.LAB	6/24	15:05:22	2.819938	0.023544	0.0934	3.549765	0.000466	
CEIL__0771.LAB	6/24	15:06:25	2.81419	0.02251	0.0714	3.541498	0.000839	
CEIL__0772.LAB	6/24	15:07:27	2.816748	0.027362	0.0764	3.540857	0.002064	
CEIL__0773.LAB	6/24	15:08:30	2.807904	0.021929	<0.0580	3.565695	0.000513	
CEIL__0774.LAB	6/24	15:09:33	2.82146	0.025383	0.0843	3.630639	0.000362	
CEIL__0775.LAB	6/24	15:10:36	2.819449	0.028512	0.0966	3.668812	0.00138	
CEIL__0776.LAB	6/24	15:11:39	2.815953	0.022782	0.1157	3.743448	0.001223	
CEIL__0777.LAB	6/24	15:12:42	2.814529	0.023526	0.0843	3.674771	0.001077	
CEIL__0778.LAB	6/24	15:13:44	2.818558	0.021315	0.0830	3.684492	0.001241	
CEIL__0779.LAB	6/24	15:14:47	2.818272	0.020945	0.0797	3.666169	0.00058	
CEIL__0780.LAB	6/24	15:15:50	2.809864	0.028033	0.0862	3.634951	0.000938	
CEIL__0781.LAB	6/24	15:16:53	2.808719	0.025661	<0.0580	3.612648	0.001172	
CEIL__0782.LAB	6/24	15:17:56	2.809515	0.021469	0.0610	3.643981	0.001171	
CEIL__0783.LAB	6/24	15:18:59	2.807768	0.026882	0.0824	3.612071	0.001791	
CEIL__0784.LAB	6/24	15:20:02	2.805037	0.02005	0.0689	3.675555	0.000991	
CEIL__0785.LAB	6/24	15:21:04	2.804693	0.022784	<0.0580	3.751707	0.000997	
CEIL__0786.LAB	6/24	15:22:07	2.802511	0.024879	0.0912	3.744484	0.000964	
CEIL__0787.LAB	6/24	15:23:10	2.812379	0.022719	0.0779	3.804391	0.00119	
CEIL__0788.LAB	6/24	15:24:13	2.809932	0.015106	<0.0580	3.847527	0.00018	
CEIL__0789.LAB	6/24	15:25:16	2.802471	0.023273	0.0936	3.858698	0.001217	
CEIL__0790.LAB	6/24	15:26:19	2.804936	0.026676	<0.0580	3.846568	0.001729	
CEIL__0791.LAB	6/24	15:27:52	2.80928	0.027219	0.1806	3.862078	0.001858	
Average			2.839	0.026	0.089	3.719	0.001	
Post-Test Calibration Check								
CEIL__0792.LAB	6/24	15:28:08	2.809948	0.017492	0.123154	3.875401	0.001371	
CEIL__0793.LAB	6/24	15:28:24	2.812259	0.016624	0.110859	3.855883	0.000041	
CEIL__0794.LAB	6/24	15:28:39	2.643893	2.452757	2.977825	2.554207	0.059673	
CEIL__0795.LAB	6/24	15:28:55	0.926408	0.38557	0.414558	-0.078686	0.007515	
CEIL__0796.LAB	6/24	15:29:11	0.248973	0.046936	-0.173961	-0.060789	0.001501	
CEIL__0797.LAB	6/24	15:29:26	0.155537	0.018327	-0.199229	-0.132785	0.001964	
CEIL__0798.LAB	6/24	15:29:42	0.133027	0.010149	-0.19503	-0.104217	-0.000693	
CEIL__0799.LAB	6/24	15:29:58	0.111351	0.03414	-0.129813	-0.053251	-0.000501	
CEIL__0800.LAB	6/24	15:30:14	0.092683	0.01994	-0.073612	-0.092716	0.001132	
CEIL__0801.LAB	6/24	15:30:29	0.090169	0.014113	-0.070134	-0.103748	0.00032	

Raw FTIR Data
Ceilcote Outlet
Aeration/Backvent Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL__0802.LAB	6/24	15:30:45	0.084146	0.00725	-0.120022	-0.096692	0.000164	
CEIL__0803.LAB	6/24	15:31:01	0.080954	0.000962	0.097332	-0.078569	-0.001021	System Zero
CEIL__0804.LAB	6/24	15:31:17	0.073207	0.01756	-0.075066	-0.048943	-0.001105	EtO Zero
CEIL__0805.LAB	6/24	15:31:33	0.069299	0.0097	-0.099072	-0.111453	0.00025	
CEIL__0806.LAB	6/24	15:31:48	0.069614	0.001588	-0.073379	-0.049574	-0.000875	
CEIL__0807.LAB	6/24	15:32:04	0.063189	0.010732	-0.104205	-0.128807	-0.000791	
CEIL__0808.LAB	6/24	15:32:20	0.062183	0.002558	-0.04315	-0.157087	0.00064	
CEIL__0809.LAB	6/24	15:32:35	0.066637	0.000743	-0.108422	-0.138528	-0.000295	
CEIL__0810.LAB	6/24	15:32:51	0.059033	-0.004983	-0.055674	-0.080614	-0.000719	
CEIL__0811.LAB	6/24	15:33:06	0.055231	0.013262	-0.057762	-0.083029	0.000645	
CEIL__0812.LAB	6/24	15:33:22	0.060853	0.017576	-0.158277	-0.123655	-0.000236	
CEIL__0813.LAB	6/24	15:33:38	0.068032	7.240081	-0.102913	-0.092793	0.00095	
CEIL__0814.LAB	6/24	15:33:54	0.058898	9.710635	0.009093	-0.009167	-0.000552	
CEIL__0815.LAB	6/24	15:34:09	0.065991	9.814889	-0.124566	-0.108554	0.000741	
CEIL__0816.LAB	6/24	15:34:25	0.058738	9.861742	-0.128117	0.033539	-0.000471	
CEIL__0817.LAB	6/24	15:34:41	0.061236	9.909629	-0.022024	-0.049872	-0.001228	
CEIL__0818.LAB	6/24	15:34:57	0.057543	9.916564	-0.063826	-0.007779	-0.000878	
CEIL__0819.LAB	6/24	15:35:12	0.063872	9.925426	-0.104891	-0.061023	-0.001639	
CEIL__0820.LAB	6/24	15:35:28	0.060702	9.925852	-0.109534	-0.099783	-0.001671	
CEIL__0821.LAB	6/24	15:35:43	0.059318	9.932088	0.02291	-0.129659	-0.000704	
CEIL__0822.LAB	6/24	15:35:59	0.056554	9.945146	-0.079512	-0.020479	-0.002285	System CTS
CEIL__0823.LAB	6/24	15:36:15	0.060609	9.938509	-0.033068	-0.103838	0.000061	CO2 Avg: 9.96
CEIL__0824.LAB	6/24	15:36:31	0.064825	9.968808	-0.084347	-0.032311	0.000495	
CEIL__0825.LAB	6/24	15:36:46	0.059148	9.958753	-0.081182	-0.047216	0.000829	
CEIL__0826.LAB	6/24	15:37:02	0.05757	9.958248	0.028236	-0.027549	-0.001267	
CEIL__0827.LAB	6/24	15:37:18	0.059662	9.96785	-0.16974	-0.066447	-0.000113	
CEIL__0828.LAB	6/24	15:37:33	0.062868	9.954047	0.023718	-0.116398	0.000343	
CEIL__0829.LAB	6/24	15:37:49	0.053496	9.975965	0.00965	-0.079189	-0.000716	
CEIL__0830.LAB	6/24	15:38:05	0.061124	9.974113	-0.056937	-0.112126	-0.001114	
CEIL__0831.LAB	6/24	15:38:20	0.061314	9.999407	-0.070385	-0.11158	0.000646	
CEIL__0832.LAB	6/24	15:38:36	0.052584	9.701029	-0.053	0.058289	-0.001307	
CEIL__0833.LAB	6/24	15:38:52	1.353202	1.540682	0.018066	3.148899	-0.001299	

Run 2 - Ceilcote Outlet - Aeration Testing

CEIL__0848.LAB	6/24	15:45:48	2.814631	0.028971	0.1398	3.675096	0.0015	
CEIL__0849.LAB	6/24	15:46:50	2.808287	0.035252	<0.0580	3.722235	0.000286	
CEIL__0850.LAB	6/24	15:47:53	2.807806	0.032321	0.0705	3.790331	0.000685	
CEIL__0851.LAB	6/24	15:48:56	2.803092	0.02975	0.1257	3.811276	0.000271	
CEIL__0852.LAB	6/24	15:49:59	2.801506	0.020839	0.1216	3.811308	0.000795	
CEIL__0853.LAB	6/24	15:51:02	2.800083	0.015059	<0.0580	3.813693	0.000536	
CEIL__0854.LAB	6/24	15:52:05	2.797656	0.020148	0.0970	3.782463	-0.000145	
CEIL__0855.LAB	6/24	15:53:07	2.793611	0.028983	0.0955	3.829163	0.000631	
CEIL__0856.LAB	6/24	15:54:10	2.790061	0.025351	0.0876	3.877041	0.001019	
CEIL__0857.LAB	6/24	15:55:13	2.785169	0.019617	0.0975	3.803247	0.00055	
CEIL__0858.LAB	6/24	15:56:16	2.78129	0.025609	0.0674	3.832412	0.0008	
CEIL__0859.LAB	6/24	15:57:19	2.788736	0.016104	0.1577	3.79574	0.000438	
CEIL__0860.LAB	6/24	15:58:22	2.787139	0.028431	0.0666	3.780346	0.000566	
CEIL__0861.LAB	6/24	15:59:25	2.784702	0.022529	0.0712	3.757057	0.000934	
CEIL__0862.LAB	6/24	16:00:27	2.776478	0.01956	0.1356	3.712852	0.001692	
CEIL__0863.LAB	6/24	16:01:30	2.778428	0.019273	0.0962	3.696441	0.001272	
CEIL__0864.LAB	6/24	16:02:33	2.769327	0.024196	0.1177	3.693963	0.00093	
CEIL__0865.LAB	6/24	16:03:36	2.772021	0.023752	0.1054	3.681755	0.001009	
CEIL__0866.LAB	6/24	16:04:39	2.776699	0.023193	<0.0580	3.803497	0.001031	
CEIL__0867.LAB	6/24	16:05:42	2.787798	0.024364	0.1031	3.755553	0.000912	
CEIL__0868.LAB	6/24	16:06:44	2.783197	0.023266	0.0795	3.67412	0.000994	
CEIL__0869.LAB	6/24	16:07:47	2.778876	0.015847	<0.0580	3.730997	0.000798	
CEIL__0870.LAB	6/24	16:08:50	2.779912	0.02423	0.1303	3.812995	0.001151	
CEIL__0871.LAB	6/24	16:09:53	2.78444	0.020384	0.1190	3.749622	0.000496	
CEIL__0872.LAB	6/24	16:10:55	2.786485	0.022542	0.1542	3.798119	0.000164	
CEIL__0873.LAB	6/24	16:11:58	2.787893	0.020731	0.0739	3.727157	0.000645	
CEIL__0874.LAB	6/24	16:13:01	2.790768	0.017282	0.0953	3.745654	-0.000182	
CEIL__0875.LAB	6/24	16:14:04	2.787318	0.020359	0.1133	3.742325	0.000271	
CEIL__0876.LAB	6/24	16:15:07	2.787966	0.019543	0.0954	3.757758	0.000403	
CEIL__0877.LAB	6/24	16:16:10	2.78591	0.020933	0.0946	3.70435	0.001061	
CEIL__0878.LAB	6/24	16:17:12	2.783407	0.016727	0.0820	3.73673	0.000006	
CEIL__0879.LAB	6/24	16:18:15	2.787871	0.013421	0.1240	3.714475	0.000422	
CEIL__0880.LAB	6/24	16:19:18	2.79297	0.0193	0.0665	3.707986	0.000628	
CEIL__0881.LAB	6/24	16:20:21	2.780101	0.017137	0.0595	3.674959	0.00011	
CEIL__0882.LAB	6/24	16:21:24	2.78454	0.013122	0.0718	3.738537	0.000307	
CEIL__0883.LAB	6/24	16:22:27	2.780999	0.021478	0.0753	3.718444	0.000962	
CEIL__0884.LAB	6/24	16:23:29	2.787179	0.02208	0.0906	3.806072	-0.000183	
CEIL__0885.LAB	6/24	16:24:32	2.789407	0.024373	0.1210	3.824663	0.000407	
CEIL__0886.LAB	6/24	16:25:35	2.791319	0.018273	0.0616	3.801076	-0.000404	
CEIL__0887.LAB	6/24	16:26:38	2.790956	0.025718	0.1116	3.825793	-0.000495	
CEIL__0888.LAB	6/24	16:27:41	2.786464	0.018846	0.0769	3.855793	0.001772	
CEIL__0889.LAB	6/24	16:28:43	2.787266	0.021355	0.0724	3.790672	0.001075	
CEIL__0890.LAB	6/24	16:29:46	2.782986	0.014696	0.0822	3.760261	0.00088	
CEIL__0891.LAB	6/24	16:30:49	2.784955	0.017281	0.1187	3.797558	0.001041	
CEIL__0892.LAB	6/24	16:31:52	2.790525	0.012859	0.0606	3.767832	0.00089	
CEIL__0893.LAB	6/24	16:32:55	2.789232	0.016488	<0.0580	3.775444	0.001272	
CEIL__0894.LAB	6/24	16:33:58	2.788713	0.019736	0.1117	3.761964	0.00122	
CEIL__0895.LAB	6/24	16:35:01	2.785144	0.02046	0.1017	3.78355	0.000953	
CEIL__0896.LAB	6/24	16:36:03	2.789336	0.02106	0.1177	3.664976	0.001049	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL_0897.LAB	6/24	16:37:06	2.783301	0.018382	0.0716	3.626596	0.00055	
CEIL_0898.LAB	6/24	16:38:09	2.785877	0.017764	0.0947	3.630212	0.002108	
CEIL_0899.LAB	6/24	16:39:12	2.787486	0.021077	0.0833	3.696448	0.000774	
CEIL_0900.LAB	6/24	16:40:15	2.78723	0.020052	0.1116	3.744581	0.000711	
CEIL_0901.LAB	6/24	16:41:17	2.792678	0.021478	<0.0580	3.740589	0.001606	
CEIL_0902.LAB	6/24	16:42:21	2.792669	0.021268	0.0766	3.723424	0.001303	
CEIL_0903.LAB	6/24	16:43:23	2.789331	0.017522	<0.0580	3.691305	0.00034	
CEIL_0904.LAB	6/24	16:44:26	2.785209	0.018989	0.0981	3.671072	0.000175	
CEIL_0905.LAB	6/24	16:45:29	2.789853	0.018289	0.0901	3.685605	0.001822	
CEIL_0906.LAB	6/24	16:46:32	2.788143	0.010591	0.0588	3.710611	0.000335	
CEIL_0907.LAB	6/24	16:47:34	2.791947	0.020328	0.1016	3.73614	0.001531	
CEIL_0908.LAB	6/24	16:48:37	2.798366	0.019132	0.0727	3.747705	0.001753	
Average			2.788	0.021	0.092	3.750	0.001	

Post-Test Calibration Check

CEIL_0909.LAB	6/24	16:49:40	2.79472	0.026571	0.096301	3.685999	0.000434	
CEIL_0910.LAB	6/24	16:50:43	2.425695	0.058194	0.135625	3.171478	0.001635	
CEIL_0911.LAB	6/24	16:51:54	2.771051	0.197049	0.01965	3.61037	0.002221	
CEIL_0912.LAB	6/24	16:52:10	1.520481	3.753028	0.814503	0.667118	0.020637	
CEIL_0913.LAB	6/24	16:52:25	0.248692	0.101314	-0.041519	-0.026772	-0.000715	
CEIL_0914.LAB	6/24	16:52:41	0.142213	0.050014	-0.147297	-0.132519	0.000421	
CEIL_0915.LAB	6/24	16:52:57	0.112364	0.047791	-0.131972	-0.062001	0.001157	
CEIL_0916.LAB	6/24	16:53:13	0.090128	0.027992	-0.079528	-0.123272	-0.001415	
CEIL_0917.LAB	6/24	16:53:28	0.079803	0.03217	-0.126361	-0.046377	-0.001199	
CEIL_0918.LAB	6/24	16:53:44	0.068859	0.018034	0.01207	-0.116789	0.000739	
CEIL_0919.LAB	6/24	16:54:00	0.062446	0.016915	-0.133079	-0.103093	-0.000308	
CEIL_0920.LAB	6/24	16:54:15	0.057228	0.021201	-0.039957	-0.154517	-0.000569	System Zero
CEIL_0921.LAB	6/24	16:54:31	0.05546	0.009916	-0.070169	-0.125313	0.000134	EtO Zero
CEIL_0922.LAB	6/24	16:54:47	0.051018	0.022446	0.033882	-0.099741	-0.000135	
CEIL_0923.LAB	6/24	16:55:03	0.050903	0.007254	0.098745	-0.150646	0.001046	
CEIL_0924.LAB	6/24	16:55:18	0.04816	0.014663	0.011174	-0.109834	-0.001028	
CEIL_0925.LAB	6/24	16:55:34	0.052296	0.015044	-0.045918	-0.104305	0.000148	
CEIL_0926.LAB	6/24	16:55:50	0.03895	0.001418	-0.066608	-0.053356	-0.000718	
CEIL_0927.LAB	6/24	16:56:05	0.044952	0.010445	-0.200553	-0.209303	0.000094	
CEIL_0928.LAB	6/24	16:56:21	0.045524	0.005128	-0.046145	-0.099032	0.000274	
CEIL_0929.LAB	6/24	16:56:37	0.041162	0.000925	-0.111297	-0.145918	-0.001565	
CEIL_0930.LAB	6/24	16:56:53	0.034603	0.006096	-0.00525	-0.086082	0.000385	
CEIL_0931.LAB	6/24	16:57:08	0.042802	4.073766	0.017573	-0.144635	0.00084	
CEIL_0932.LAB	6/24	16:57:24	0.043078	9.718635	0.020329	-0.106627	0.002053	
CEIL_0933.LAB	6/24	16:57:40	0.044571	9.832053	-0.124882	-0.111599	0.000978	
CEIL_0934.LAB	6/24	16:57:55	0.039646	9.855338	0.053527	-0.197453	0.002488	
CEIL_0935.LAB	6/24	16:58:11	0.042375	9.902515	-0.091519	-0.1752	0.001693	
CEIL_0936.LAB	6/24	16:58:27	0.039705	9.918739	0.004542	-0.112316	0.0002	
CEIL_0937.LAB	6/24	16:58:43	0.04147	9.929378	-0.036129	-0.070959	0.001544	System CTS
CEIL_0938.LAB	6/24	16:58:58	0.042584	9.930673	0.042472	-0.087861	0.000108	CO2 Avg: 9.94
CEIL_0939.LAB	6/24	16:59:14	0.039536	9.95128	0.026108	-0.193662	-0.001577	
CEIL_0940.LAB	6/24	16:59:29	0.037281	9.952535	-0.095929	-0.060927	0.000753	
CEIL_0941.LAB	6/24	16:59:45	0.040191	9.948377	0.089369	0.00565	0.00105	
CEIL_0942.LAB	6/24	17:00:01	0.041423	9.971179	0.017164	-0.10583	0.001874	
CEIL_0943.LAB	6/24	17:00:17	0.036231	9.958063	-0.058829	-0.026421	0.001644	
CEIL_0944.LAB	6/24	17:00:33	0.035634	9.87962	-0.05071	-0.107822	0.001837	
CEIL_0945.LAB	6/24	17:00:48	0.039803	9.965817	-0.037349	-0.142918	0.000518	
CEIL_0946.LAB	6/24	17:01:04	0.038153	9.960626	0.06648	-0.110121	-0.00053	
CEIL_0947.LAB	6/24	17:01:20	0.056335	5.122829	-0.039359	1.770025	0.002428	
CEIL_0948.LAB	6/24	17:01:35	2.544686	0.396979	0.081694	3.66572	-0.000031	
CEIL_0949.LAB	6/24	17:01:51	2.720429	0.13064	0.099428	3.629241	0.001232	
CEIL_0950.LAB	6/24	17:02:07	2.745342	0.094727	0.042905	3.660033	0.001165	
CEIL_0951.LAB	6/24	17:03:37	2.780843	0.055075	0.070677	3.576157	0.001417	
CEIL_0952.LAB	6/24	17:04:40	2.786099	0.051793	0.084435	3.620646	0.000741	

Run 3 - Ceilcote Outlet - Aeration Testing

CEIL_0953.LAB	6/24	17:05:43	2.794032	0.03728	< 0.0580	3.522652	0.000731	
CEIL_0954.LAB	6/24	17:06:45	2.790894	0.04298	0.1121	3.491276	0.000757	
CEIL_0955.LAB	6/24	17:07:49	2.788317	0.028642	0.1251	3.464136	0.001047	
CEIL_0956.LAB	6/24	17:08:51	2.793055	0.022424	0.1275	3.383442	0.001315	
CEIL_0957.LAB	6/24	17:09:54	2.789921	0.026531	0.1377	3.333505	0.000859	
CEIL_0958.LAB	6/24	17:10:57	2.792187	0.026507	0.1132	3.35276	0.000798	
CEIL_0959.LAB	6/24	17:12:00	2.795086	0.02835	< 0.0580	3.376251	0.001952	
CEIL_0960.LAB	6/24	17:13:02	2.804571	0.024692	0.1022	3.384807	0.001067	
CEIL_0961.LAB	6/24	17:14:05	2.806214	0.027831	0.0740	3.441121	0.00121	
CEIL_0962.LAB	6/24	17:15:08	2.805632	0.026506	0.1356	3.4118	0.001295	
CEIL_0963.LAB	6/24	17:16:11	2.808688	0.032647	0.1347	3.412435	0.000691	
CEIL_0964.LAB	6/24	17:17:14	2.814957	0.031593	0.1245	3.473929	0.001021	
CEIL_0965.LAB	6/24	17:18:17	2.811781	0.024818	0.0616	3.489764	0.000803	
CEIL_0966.LAB	6/24	17:19:20	2.816843	0.023452	0.0721	3.567931	0.000902	
CEIL_0967.LAB	6/24	17:20:22	2.813686	0.023921	0.1113	3.580182	0.000697	
CEIL_0968.LAB	6/24	17:21:25	2.813842	0.026427	0.0615	3.56581	0.001413	
CEIL_0969.LAB	6/24	17:22:28	2.81151	0.027735	0.0900	3.585937	0.001126	
CEIL_0970.LAB	6/24	17:23:31	2.817069	0.023954	0.0636	3.565296	0.001063	
CEIL_0971.LAB	6/24	17:24:33	2.813761	0.033936	0.0723	3.567974	0.000716	
CEIL_0972.LAB	6/24	17:25:36	2.815347	0.026985	0.1146	3.588376	0.001715	
CEIL_0973.LAB	6/24	17:26:39	2.815866	0.025519	0.0993	3.589783	0.000689	
CEIL_0974.LAB	6/24	17:27:42	2.814323	0.033543	0.1088	3.609767	0.000792	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL__0975.LAB	6/24	17:28:45	2.811173	0.023995	0.1251	3.569169	0.000839	
CEIL__0976.LAB	6/24	17:29:48	2.809686	0.030975	0.1559	3.574389	0.000738	
CEIL__0977.LAB	6/24	17:30:50	2.808738	0.023779	0.1589	3.531778	0.00129	
CEIL__0978.LAB	6/24	17:31:53	2.810241	0.024703	0.1521	3.613101	0.00063	
CEIL__0979.LAB	6/24	17:32:56	2.809047	0.026411	0.1620	3.649811	0.000807	
CEIL__0980.LAB	6/24	17:33:59	2.812916	0.024085	0.1702	3.631509	0.001492	
CEIL__0981.LAB	6/24	17:35:02	2.812896	0.027138	0.2261	3.616305	0.000583	
CEIL__0982.LAB	6/24	17:36:05	2.810585	0.02542	0.2052	3.666871	0.001283	
CEIL__0983.LAB	6/24	17:37:07	2.811724	0.024243	0.2323	3.660832	0.00044	
CEIL__0984.LAB	6/24	17:38:10	2.806337	0.029702	0.2164	3.648346	0.000558	
CEIL__0985.LAB	6/24	17:39:13	2.807362	0.015802	0.2456	3.696795	0.000658	
CEIL__0986.LAB	6/24	17:40:16	2.80762	0.025197	0.2099	3.705089	0.000748	
CEIL__0987.LAB	6/24	17:41:19	2.809043	0.027613	0.1844	3.711583	0.000351	
CEIL__0988.LAB	6/24	17:42:22	2.806439	0.021128	0.2370	3.685154	0.001027	
CEIL__0989.LAB	6/24	17:43:25	2.806602	0.029441	0.1337	3.711971	0.00069	
CEIL__0990.LAB	6/24	17:44:27	2.807211	0.029712	0.1811	3.739056	0.000358	
CEIL__0991.LAB	6/24	17:45:30	2.810414	0.024817	0.1666	3.749937	0.000879	
CEIL__0992.LAB	6/24	17:46:33	2.806485	0.028328	0.1538	3.761292	0.001405	
CEIL__0993.LAB	6/24	17:47:36	2.810546	0.026779	0.2571	3.755601	0.001616	
CEIL__0994.LAB	6/24	17:48:39	2.810036	0.022914	0.2128	3.752401	0.001655	
CEIL__0995.LAB	6/24	17:49:41	2.80741	0.02552	0.2146	3.763791	0.000861	
CEIL__0996.LAB	6/24	17:50:44	2.805228	0.027555	0.2101	3.754553	0.001925	
CEIL__0997.LAB	6/24	17:51:47	2.810838	0.024199	0.2224	3.770922	0.000505	
CEIL__0998.LAB	6/24	17:52:50	2.810982	0.0216	0.2440	3.722009	0.001313	
CEIL__0999.LAB	6/24	17:53:53	2.805819	0.024574	0.2102	3.702055	0.001284	
CEIL__1000.LAB	6/24	17:54:56	2.803194	0.027516	0.2372	3.710705	0.000714	
CEIL__1001.LAB	6/24	17:55:58	2.802594	0.030435	0.2259	3.668818	0.001483	
CEIL__1002.LAB	6/24	17:57:01	2.805146	0.028384	0.2543	3.713004	0.001563	
CEIL__1003.LAB	6/24	17:58:04	2.802069	0.030049	0.2737	3.675642	0.001903	
CEIL__1004.LAB	6/24	17:59:07	2.804303	0.031722	0.2325	3.663358	0.001791	
CEIL__1005.LAB	6/24	18:00:10	2.807214	0.033979	0.2574	3.636114	0.002166	
CEIL__1006.LAB	6/24	18:01:12	2.809659	0.029426	0.2486	3.634278	0.00142	
CEIL__1007.LAB	6/24	18:02:15	2.80323	0.028541	0.1961	3.61244	0.001285	
CEIL__1008.LAB	6/24	18:03:19	2.803045	0.028162	0.2267	3.569556	0.002823	
CEIL__1009.LAB	6/24	18:04:21	2.80085	0.032282	0.2600	3.57061	0.002901	
CEIL__1010.LAB	6/24	18:05:24	2.794986	0.026131	0.2518	3.549567	0.001915	
CEIL__1011.LAB	6/24	18:06:27	2.790527	0.02749	0.2339	3.481981	0.002691	
CEIL__1012.LAB	6/24	18:07:30	2.794936	0.026441	0.2534	3.455395	0.001593	
CEIL__1013.LAB	6/24	18:08:33	2.797763	0.028536	0.2516	3.48311	0.001503	
CEIL__1014.LAB	6/24	18:09:35	2.796789	0.032385	0.2139	3.409328	0.001478	
Average			2.806	0.027	0.172	3.593	0.001	
Post-Test Calibration Check								
CEIL__1015.LAB	6/24	18:10:31	1.849621	3.102155	0.302811	0.802411	0.010335	
CEIL__1016.LAB	6/24	18:10:46	0.301056	0.093032	-0.049017	-0.108784	-0.000707	
CEIL__1017.LAB	6/24	18:11:02	0.142884	0.034371	-0.087166	-0.124967	0.000928	
CEIL__1018.LAB	6/24	18:11:18	0.096038	0.016874	-0.070873	-0.126984	-0.000635	
CEIL__1019.LAB	6/24	18:11:33	0.076961	0.016221	-0.067403	-0.135595	-0.000166	
CEIL__1020.LAB	6/24	18:11:49	0.064607	0.022622	-0.014458	-0.022226	-0.000002	
CEIL__1021.LAB	6/24	18:12:05	0.056762	0.021358	-0.041644	-0.18225	-0.001661	
CEIL__1022.LAB	6/24	18:12:21	0.053869	0.014679	-0.045555	-0.08697	-0.000121	
CEIL__1023.LAB	6/24	18:12:36	0.041596	0.004872	-0.003272	-0.171885	0.000976	
CEIL__1024.LAB	6/24	18:12:52	0.039529	0.028102	-0.042808	-0.152452	-0.001187	
CEIL__1025.LAB	6/24	18:13:08	0.038461	0.006125	-0.068311	-0.116429	-0.00072	
CEIL__1026.LAB	6/24	18:13:23	0.031992	0.008022	0.031611	-0.100907	0.000643	
CEIL__1027.LAB	6/24	18:13:39	0.038199	0.005077	0.029521	-0.168256	-0.000012	
CEIL__1028.LAB	6/24	18:13:55	0.038257	-0.003094	-0.04699	-0.141548	0.001111	
CEIL__1029.LAB	6/24	18:14:11	0.0336	0.010868	-0.094397	-0.167106	0.00025	System Zero
CEIL__1030.LAB	6/24	18:14:26	0.027453	-0.000214	-0.079735	-0.14067	-0.000721	EtO Zero
CEIL__1031.LAB	6/24	18:14:42	0.030403	0.01739	-0.004544	-0.206928	0.000687	
CEIL__1032.LAB	6/24	18:14:58	0.027365	-0.005778	0.073427	-0.103569	-0.000007	
CEIL__1033.LAB	6/24	18:15:13	0.024012	-0.007383	-0.041815	-0.10095	0.001671	
CEIL__1034.LAB	6/24	18:15:29	0.024226	0.016732	0.052863	0.204201	0.001933	
CEIL__1035.LAB	6/24	18:15:45	1.556765	0.028735	0.12429	3.13115	0.001345	
CEIL__1036.LAB	6/24	18:16:00	2.541853	0.023239	0.02271	2.049798	0.002722	
CEIL__1037.LAB	6/24	18:16:17	2.61875	0.026704	-0.02273	1.606456	0.001458	
CEIL__1038.LAB	6/24	18:16:32	2.650867	0.037655	0.054523	1.585914	0.001528	
CEIL__1039.LAB	6/24	18:16:48	2.683712	0.030864	0.058914	1.609254	0.001601	
CEIL__1040.LAB	6/24	18:17:03	1.466209	1.224664	-0.054409	0.083028	0.001851	
CEIL__1041.LAB	6/24	18:17:19	0.211672	9.491436	-0.122914	-0.102231	0.002916	
CEIL__1042.LAB	6/24	18:17:35	0.114394	9.783528	-0.086384	-0.091065	0.002007	System CTS
CEIL__1043.LAB	6/24	18:17:51	0.081765	9.851308	-0.119011	-0.160398	0.001005	CO2 Avg: 9.89
CEIL__1044.LAB	6/24	18:18:06	0.065994	9.886213	-0.063561	-0.057317	0.001417	
CEIL__1045.LAB	6/24	18:18:22	0.059273	9.892746	-0.125399	-0.105364	0.001253	
CEIL__1046.LAB	6/24	18:18:38	0.050163	9.89977	-0.024765	-0.134415	0.002639	
CEIL__1047.LAB	6/24	18:18:53	0.049078	9.904582	-0.056742	-0.160474	0.00295	
CEIL__1048.LAB	6/24	18:19:09	0.045903	9.893482	-0.068419	-0.156742	0.003165	
CEIL__1049.LAB	6/24	18:19:25	0.031873	9.93176	0.042817	-0.078398	0.000422	
CEIL__1050.LAB	6/24	18:19:40	0.033679	9.947935	0.031556	-0.191528	0.000112	
CEIL__1051.LAB	6/24	18:19:56	0.035558	9.942891	0.057036	-0.159797	0.000532	
CEIL__1052.LAB	6/24	18:20:12	0.036614	9.875455	0.038802	-0.147284	-0.001669	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%v)	EtO (ppmw)	Methane (ppmw)	SF ₆ (ppmw)	Notes
Pre-Test Calibrations (6/25) - Ceilcote Outlet								
CEIL__0001.LAB	6/25	7:05:27	0.006446	0.002426	0.122194	0.188816	0.001104	
CEIL__0002.LAB	6/25	7:05:43	-0.007695	0.001001	0.027177	0.231916	0.000888	
CEIL__0003.LAB	6/25	7:05:59	0.002375	-0.001668	0.066673	0.236641	0.000905	
CEIL__0004.LAB	6/25	7:06:14	-0.000406	-0.000161	0.043516	0.19396	0.000432	
CEIL__0005.LAB	6/25	7:06:30	0.001811	0.010433	0.091583	0.107055	0.001077	
CEIL__0006.LAB	6/25	7:06:46	-0.004162	-0.008126	0.140427	0.200253	0.000078	
CEIL__0007.LAB	6/25	7:07:02	-0.001215	-0.003572	0.125808	0.202023	0.000909	
CEIL__0008.LAB	6/25	7:07:17	-0.002784	0.0039	0.129201	0.152837	0.000166	
CEIL__0009.LAB	6/25	7:07:33	0.003326	0.005681	0.111752	0.184691	0.001933	
CEIL__0010BKG.LAB	6/25	7:09:53	0	0	0	0	0	
CEIL__0011.LAB	6/25	7:10:16	-0.003588	0.005984	0.057273	-0.012019	-0.001634	
CEIL__0012.LAB	6/25	7:10:31	0.001553	0.006549	0.081103	-0.024789	0.000625	
CEIL__0013.LAB	6/25	7:10:47	-0.001035	0.018529	-0.019677	-0.067326	0.000211	
CEIL__0014BKG.LAB	6/25	7:13:03	0	0	0	0	0	Background
CEIL__0015.LAB	6/25	7:13:25	0.002435	-0.003462	0.025646	0.054025	0.000493	Direct Zero
CEIL__0016.LAB	6/25	7:13:41	0.003065	0.003309	-0.005472	-0.012357	0.000708	
CEIL__0017.LAB	6/25	7:13:56	-0.005302	0.003769	-0.068898	0.017744	-0.000187	
CEIL__0018.LAB	6/25	7:14:12	-0.000717	-0.002761	0.029583	0.024384	0.000526	
CEIL__0019.LAB	6/25	7:14:28	-0.00669	-0.003673	-0.038629	-0.068789	0.00049	
CEIL__0020.LAB	6/25	7:14:44	0.000436	0.004975	-0.027764	0.009535	0.001066	
CEIL__0021.LAB	6/25	7:14:59	-0.002313	0.002607	-0.033218	0.06998	0.000619	
CEIL__0022.LAB	6/25	7:15:15	0.00041	-0.002158	0.004856	-0.037234	0.001109	
CEIL__0023.LAB	6/25	7:15:31	-0.001519	0.003379	-0.038415	0.006736	0.000778	
CEIL__0024.LAB	6/25	7:15:47	0.003681	0.000848	-0.024776	0.017511	0.000911	
CEIL__0025.LAB	6/25	7:16:02	-0.003351	0.011829	0.000232	-0.043612	0.000695	
CEIL__0026.LAB	6/25	7:16:18	0.000916	0.004521	0.033629	-0.025159	0.001164	
CEIL__0027.LAB	6/25	7:16:34	-0.001485	-0.000018	-0.0609	-0.040912	-0.000296	
CEIL__0028.LAB	6/25	7:16:50	-0.00528	0.007062	0.011723	-0.034653	0.00066	
CEIL__0029.LAB	6/25	7:17:05	0.000211	0.000597	0.053431	-0.024166	0.000584	
CEIL__0077.LAB	6/25	7:40:49	0.003323	10.131368	0.024218	-0.015794	-0.001345	
CEIL__0078.LAB	6/25	7:41:05	0.007028	10.102577	0.00697	0.005331	-0.001187	
CEIL__0079.LAB	6/25	7:41:20	0.00688	10.092313	0.01632	-0.005111	-0.000708	
CEIL__0080.LAB	6/25	7:41:36	-0.001492	10.080756	0.062448	0.046086	-0.001882	
CEIL__0081.LAB	6/25	7:41:52	0.002277	10.046516	0.01981	-0.045034	-0.000704	
CEIL__0082.LAB	6/25	7:42:07	0.000021	10.06918	0.011229	0.01967	0.000423	
CEIL__0083.LAB	6/25	7:42:23	0.002134	10.080037	0.054742	-0.030812	0.000552	Direct CTS
CEIL__0084.LAB	6/25	7:42:39	0.000196	10.066925	0.005658	0.03464	-0.000173	CO2 Avg: 10.05
CEIL__0085.LAB	6/25	7:42:55	0.001347	10.052609	-0.059976	-0.008603	-0.001249	
CEIL__0086.LAB	6/25	7:43:11	0.003239	10.045604	0.051166	-0.057976	-0.000565	
CEIL__0087.LAB	6/25	7:43:26	0.000889	10.055196	0.015295	0.010067	-0.000505	
CEIL__0088.LAB	6/25	7:43:42	0.008095	10.061633	-0.047283	0.012525	0.001165	
CEIL__0089.LAB	6/25	7:43:57	0.003896	10.045659	0.065609	-0.005919	-0.000475	
CEIL__0090.LAB	6/25	7:44:13	0.00131	10.024369	0.07156	-0.032204	-0.000455	
CEIL__0091.LAB	6/25	7:44:29	0.000537	10.044026	-0.003199	0.017556	-0.001049	
CEIL__0092.LAB	6/25	7:44:44	0.00414	10.054209	-0.010407	0.034689	-0.001002	
CEIL__0093.LAB	6/25	7:45:01	0.271235	3.083892	29.938381	0.023602	3.166705	
CEIL__0094.LAB	6/25	7:45:16	0.044413	0.14358	90.620134	-0.011039	5.031633	
CEIL__0095.LAB	6/25	7:45:32	0.005781	0.06347	93.344468	0.028225	5.076335	
CEIL__0096.LAB	6/25	7:45:47	-0.010002	0.053459	94.435234	-0.008205	5.088905	
CEIL__0097.LAB	6/25	7:46:03	-0.002793	0.037182	94.391961	-0.035411	5.089104	
CEIL__0098.LAB	6/25	7:46:19	-0.00488	0.030671	93.939607	-0.036891	5.083393	
CEIL__0099.LAB	6/25	7:46:34	-0.002204	0.050585	94.942485	0.013618	5.07739	
CEIL__0100.LAB	6/25	7:46:50	-0.002417	0.037652	95.143798	-0.051552	5.090065	
CEIL__0101.LAB	6/25	7:47:06	-0.004135	0.02994	95.379278	0.014153	5.085922	
CEIL__0102.LAB	6/25	7:47:22	-0.00939	0.023374	95.674571	-0.0631	5.096354	Direct QA/Tracer
CEIL__0103.LAB	6/25	7:47:37	-0.002599	0.024271	95.710909	-0.07869	5.101155	EtO Avg: 95.6
CEIL__0104.LAB	6/25	7:47:53	-0.011137	0.031383	95.315976	-0.010533	5.092375	SF6 Avg: 5.10
CEIL__0105.LAB	6/25	7:48:09	-0.013625	0.030359	95.530518	-0.079833	5.091871	
CEIL__0106.LAB	6/25	7:48:25	-0.002513	0.024691	95.516046	-0.051712	5.092263	
CEIL__0107.LAB	6/25	7:48:40	-0.005429	0.029268	95.755992	-0.026489	5.093937	
CEIL__0108.LAB	6/25	7:48:56	-0.007863	0.027112	95.910299	-0.053178	5.095931	
CEIL__0109.LAB	6/25	7:49:11	-0.004033	0.013021	95.933036	0.006896	5.105294	
CEIL__0110.LAB	6/25	7:49:27	-0.005111	0.011201	95.557989	-0.047078	5.098587	
CEIL__0111.LAB	6/25	7:49:43	-0.006318	0.015175	95.044481	-0.125486	5.088028	
CEIL__0112.LAB	6/25	7:49:59	1.805518	-0.083978	23.524655	5.06304	1.41114	
CEIL__0113.LAB	6/25	7:50:14	2.956483	-0.176809	0.056271	3.678358	0.005191	
CEIL__0114.LAB	6/25	7:50:30	4.735916	0.052633	-0.020268	1.834973	0.001649	
CEIL__0115.LAB	6/25	7:50:46	3.582299	0.033896	-0.145069	1.83239	0.000154	
CEIL__0116.LAB	6/25	7:51:01	3.241452	0.047301	-0.099239	1.804884	0.002621	
CEIL__0117.LAB	6/25	7:51:17	3.145457	0.030533	0.014041	1.809055	-0.000038	
CEIL__0118.LAB	6/25	7:51:33	3.099095	0.040502	0.066543	1.786833	0.000669	
CEIL__0119.LAB	6/25	7:51:49	3.053376	0.028576	0.096049	1.807507	0.001	
CEIL__0120.LAB	6/25	7:52:04	3.03382	0.026367	0.088155	1.838566	0.000281	
CEIL__0121.LAB	6/25	7:52:20	3.013408	0.029015	0.156982	1.785288	0.000644	
CEIL__0122.LAB	6/25	7:52:36	2.952185	0.023012	-0.034171	1.819612	0.001232	
CEIL__0123.LAB	6/25	7:52:51	2.869605	0.031793	-0.060433	1.804874	0.000955	
CEIL__0124.LAB	6/25	7:53:07	2.845296	0.036747	-0.050999	1.722892	0.000422	
CEIL__0125.LAB	6/25	7:54:05	2.761989	0.024724	-0.016944	1.779554	0.000508	
CEIL__0126.LAB	6/25	7:54:21	2.726645	0.030878	-0.026302	1.81488	0.000448	
CEIL__0127.LAB	6/25	7:54:37	2.727109	0.027274	0.050142	1.814684	0.000735	
CEIL__0128.LAB	6/25	7:54:53	2.71692	0.028273	0.053954	1.79919	0.000468	

Raw FTIR Data
Ceilcote Outlet
Vacuum Pump Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL__0129.LAB	6/25	7:55:09	2.718693	0.031353	0.024186	1.819652	0.00079	
CEIL__0130.LAB	6/25	7:55:24	2.713506	0.029393	-0.102409	1.947086	0.001623	
CEIL__0131.LAB	6/25	7:55:40	2.565929	0.646291	0.306377	1.663451	0.006204	
CEIL__0132.LAB	6/25	7:55:55	2.609894	0.186436	0.906802	4.58573	0.085863	
CEIL__0133.LAB	6/25	7:56:12	2.16043	3.350051	1.842941	1.476459	0.09398	
CEIL__0134.LAB	6/25	7:56:27	1.802867	3.699125	0.0393	1.286203	0.008157	
CEIL__0135.LAB	6/25	7:56:43	1.758763	3.656682	0.008143	1.086441	0.005952	
CEIL__0136.LAB	6/25	7:56:58	1.523442	4.867158	0.006533	0.772637	0.005105	
CEIL__0137.LAB	6/25	7:57:14	0.303435	9.582817	-0.028141	0.093166	0.008725	
CEIL__0138.LAB	6/25	7:57:30	0.166184	9.797696	-0.034706	0.075148	0.004213	
CEIL__0139.LAB	6/25	7:57:45	0.143585	9.85386	-0.026964	0.043806	0.003895	
CEIL__0140.LAB	6/25	7:58:01	0.134486	9.836722	-0.139758	0.103145	0.00349	
CEIL__0141.LAB	6/25	7:58:17	0.12163	9.856461	-0.048327	0.064857	0.002073	
CEIL__0142.LAB	6/25	7:58:33	0.117954	9.902167	-0.12708	0.084099	0.003135	
CEIL__0143.LAB	6/25	7:58:49	0.112035	9.881105	-0.060874	0.053703	0.003547	
CEIL__0144.LAB	6/25	7:59:04	0.110043	9.871749	-0.124116	-0.027535	0.005366	System CTS
CEIL__0145.LAB	6/25	7:59:20	0.100228	9.872481	-0.099161	-0.031648	0.004494	CO2 Avg: 9.90
CEIL__0146.LAB	6/25	7:59:36	0.096776	9.873432	-0.085775	0.025985	0.003381	
CEIL__0147.LAB	6/25	7:59:51	0.089343	9.879743	-0.012452	0.10231	0.00128	
CEIL__0148.LAB	6/25	8:00:07	0.092653	9.905345	0.060992	0.113448	0.001324	
CEIL__0149.LAB	6/25	8:00:22	0.084617	9.934248	-0.001666	0.036592	0.001206	
CEIL__0150.LAB	6/25	8:00:38	0.089887	9.926384	-0.037383	0.100261	0.001405	
CEIL__0151.LAB	6/25	8:00:54	0.086797	9.913748	-0.039938	0.023244	0.001589	
CEIL__0152.LAB	6/25	8:01:10	0.079518	9.91976	-0.045699	0.008663	0.002054	
CEIL__0153.LAB	6/25	8:01:25	0.079466	9.922874	-0.120743	0.004577	0.00281	
CEIL__0154.LAB	6/25	8:01:41	0.080013	4.508736	0.191565	0.004498	0.012766	
CEIL__0155.LAB	6/25	8:01:57	0.070485	0.27389	-0.044949	0.024862	0.000105	
CEIL__0156.LAB	6/25	8:02:13	0.070367	0.162795	-0.074897	0.00908	0.000017	System Zero
CEIL__0157.LAB	6/25	8:02:28	0.066743	0.127444	0.01303	0.069672	0.00099	
CEIL__0158.LAB	6/25	8:02:44	0.068102	0.088553	-0.040649	0.124737	-0.000159	
CEIL__0159.LAB	6/25	8:03:00	0.062873	0.082536	-0.100124	-0.008436	0.001741	
CEIL__0160.LAB	6/25	8:03:15	0.064421	0.072869	-0.119364	0.065653	-0.000711	
CEIL__0161.LAB	6/25	8:03:31	0.068921	0.056498	-0.027487	0.075277	0.000754	
CEIL__0162.LAB	6/25	8:03:47	0.058522	0.06641	-0.046155	-0.019102	0.001088	
CEIL__0163.LAB	6/25	8:04:02	0.064962	0.039894	-0.022167	0.012562	0.001745	
CEIL__0164.LAB	6/25	8:04:18	0.056713	0.053258	-0.001218	0.104665	0.001299	
CEIL__0165.LAB	6/25	8:04:34	0.063639	0.042284	-0.117317	0.011683	-0.000375	
CEIL__0166.LAB	6/25	8:04:50	0.062438	0.039893	-0.077009	0.026824	-0.000972	
CEIL__0167.LAB	6/25	8:05:05	0.060541	0.023388	-0.050168	0.03627	0.000564	
CEIL__0245.LAB	6/25	8:25:30	3.377907	0.031141	0.049703	3.384983	0.019858	
CEIL__0246.LAB	6/25	8:25:46	3.386293	0.030474	0.026548	3.41053	0.019266	
CEIL__0247.LAB	6/25	8:26:02	3.391623	0.037199	-0.003335	3.298625	0.019561	
CEIL__0248.LAB	6/25	8:26:18	3.403133	0.040547	0.022544	3.338207	0.019053	
CEIL__0249.LAB	6/25	8:26:33	3.382024	0.034704	0.013355	3.401986	0.016238	
CEIL__0250.LAB	6/25	8:26:49	3.392202	0.024726	-0.007585	3.360694	0.01569	
CEIL__0251.LAB	6/25	8:27:05	3.419334	0.038797	-0.003843	3.300811	0.015036	Native EtO
CEIL__0252.LAB	6/25	8:27:21	3.397577	0.023081	-0.021347	3.351441	0.013884	EtO Avg: -0.022
CEIL__0253.LAB	6/25	8:27:36	3.392442	0.03628	-0.001386	3.319476	0.012688	SF6 Avg: 0.01
CEIL__0254.LAB	6/25	8:27:52	3.399515	0.03258	-0.070133	3.379935	0.006745	
CEIL__0255.LAB	6/25	8:28:08	3.410877	0.032564	0.036658	3.350446	0.003484	
CEIL__0256.LAB	6/25	8:28:23	3.389474	0.039761	0.031409	3.323714	0.001057	
CEIL__0257.LAB	6/25	8:28:39	3.389549	0.030369	-0.029521	3.345169	0.000862	
CEIL__0258.LAB	6/25	8:28:55	3.39765	0.036216	-0.108384	3.332359	0.002142	
CEIL__0259.LAB	6/25	8:29:10	3.399208	0.02744	-0.030111	3.285233	0.00164	
CEIL__0260.LAB	6/25	8:29:26	3.374044	0.032759	-0.023824	3.318028	0.002413	
CEIL__0261.LAB	6/25	8:29:42	3.387752	0.022583	-0.049762	3.306688	0.002898	
CEIL__0262.LAB	6/25	8:29:58	3.401952	0.027289	-0.053689	3.291377	0.002175	
CEIL__0263.LAB	6/25	8:30:13	3.273117	0.043834	3.974724	3.119513	0.242084	
CEIL__0264.LAB	6/25	8:30:29	3.112468	0.073179	8.117809	2.938795	0.450883	
CEIL__0265.LAB	6/25	8:30:45	3.114147	0.042376	7.998125	2.990793	0.436286	
CEIL__0266.LAB	6/25	8:31:00	3.106452	0.03565	7.921026	2.942435	0.431537	
CEIL__0267.LAB	6/25	8:31:16	3.105093	0.040905	7.962863	2.975574	0.43282	
CEIL__0268.LAB	6/25	8:31:32	3.08832	0.037323	7.913547	2.977369	0.431892	
CEIL__0269.LAB	6/25	8:31:47	3.073	0.035495	7.99557	2.960377	0.432574	
CEIL__0270.LAB	6/25	8:32:03	3.088537	0.03729	7.817925	2.911696	0.437638	
CEIL__0271.LAB	6/25	8:32:19	3.073504	0.039704	8.005339	2.875062	0.443661	
CEIL__0272.LAB	6/25	8:32:35	3.076288	0.029315	8.539203	2.877846	0.444835	
CEIL__0273.LAB	6/25	8:32:50	3.074077	0.023435	8.604178	2.911283	0.446815	
CEIL__0274.LAB	6/25	8:33:06	3.075359	0.042232	8.587002	2.876779	0.44646	
CEIL__0275.LAB	6/25	8:33:22	3.068742	0.035037	8.641476	2.955244	0.448385	
CEIL__0276.LAB	6/25	8:33:38	3.100316	0.039795	8.587261	2.819555	0.457223	
CEIL__0277.LAB	6/25	8:33:53	3.135963	0.030439	8.588311	2.844565	0.470175	Dynamic Spike
CEIL__0278.LAB	6/25	8:34:09	3.119326	0.027602	8.596511	2.863234	0.46345	EtO Avg: 8.70
CEIL__0279.LAB	6/25	8:34:25	3.101089	0.017837	8.798246	2.875877	0.463294	SF6 Avg: 0.461
CEIL__0280.LAB	6/25	8:34:41	3.15139	0.023482	8.638561	2.875943	0.479121	
CEIL__0281.LAB	6/25	8:34:56	3.083447	0.041421	8.718127	2.800745	0.45298	
CEIL__0282.LAB	6/25	8:35:12	3.099414	0.034084	8.730682	2.758275	0.448791	
CEIL__0283.LAB	6/25	8:35:27	3.106454	0.041251	8.72148	2.815827	0.448589	
CEIL__0284.LAB	6/25	8:35:43	3.178767	0.024666	8.687117	2.844524	0.480859	
CEIL__0285.LAB	6/25	8:35:59	3.125045	0.032893	8.76843	2.778156	0.451469	
CEIL__0286.LAB	6/25	8:36:15	3.112102	0.041039	8.718996	2.809071	0.449063	
CEIL__0287.LAB	6/25	8:36:31	3.264978	0.044841	3.937129	2.970877	0.184508	
CEIL__0288.LAB	6/25	8:36:46	3.51014	0.016953	0.228022	3.211897	0.056336	

Raw FTIR Data
Ceilcote Outlet
Vacuum Pump Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL__0289.LAB	6/25	8:37:02	3.437331	0.026354	0.112331	3.145267	0.007904	
CEIL__0290.LAB	6/25	8:37:18	3.411339	0.03309	0.109051	3.211457	0.005425	
CEIL__0291.LAB	6/25	8:37:33	3.420837	0.034394	0.054561	3.329829	0.008258	
CEIL__0292.LAB	6/25	8:37:49	3.485459	0.026603	0.054387	3.408288	0.055227	
Run 1 - Ceilcote Outlet - Vacuum Pump Testing								
CEIL__0375.LAB	6/25	9:57:10	2.710257	0.032562	0.0762	3.22732	0.000742	
CEIL__0376.LAB	6/25	9:58:13	2.709677	0.03665	0.0856	3.132581	0.000624	
CEIL__0377.LAB	6/25	9:59:16	2.829222	0.016238	0.0613	3.710306	0.039992	
CEIL__0378.LAB	6/25	10:00:18	2.837462	0.01066	<0.0580	3.691733	0.042307	
CEIL__0379.LAB	6/25	10:01:21	2.786466	0.019436	<0.0580	3.371275	0.027858	
CEIL__0380.LAB	6/25	10:02:24	2.756118	0.023248	0.0611	3.018296	0.012712	
CEIL__0381.LAB	6/25	10:03:27	2.736651	0.030798	<0.0580	2.936366	0.009785	
CEIL__0382.LAB	6/25	10:04:30	2.725327	0.029034	0.0689	2.898627	0.007078	
CEIL__0383.LAB	6/25	10:05:33	2.716766	0.030796	<0.0580	2.821831	0.006158	
CEIL__0384.LAB	6/25	10:06:35	2.716006	0.02823	<0.0580	2.805449	0.004906	
CEIL__0385.LAB	6/25	10:07:38	2.7031	0.029363	0.0756	2.708622	0.001998	
CEIL__0386.LAB	6/25	10:08:41	2.703393	0.036474	0.0646	2.656657	0.002036	
CEIL__0387.LAB	6/25	10:09:44	2.702931	0.030059	<0.0580	2.623407	0.00174	
CEIL__0388.LAB	6/25	10:10:47	2.704555	0.031279	<0.0580	2.623274	0.001437	
CEIL__0389.LAB	6/25	10:11:49	2.69824	0.022515	<0.0580	2.611611	0.001945	
CEIL__0390.LAB	6/25	10:12:52	2.702321	0.029918	0.0740	2.575292	0.00033	
CEIL__0391.LAB	6/25	10:13:55	2.701665	0.035077	0.0773	2.575552	0.001346	
CEIL__0392.LAB	6/25	10:14:58	2.695499	0.027999	0.0902	2.559682	0.001892	
CEIL__0393.LAB	6/25	10:16:01	2.698503	0.028815	0.1035	2.536368	0.001505	
CEIL__0394.LAB	6/25	10:17:04	2.691066	0.033881	<0.0580	2.531145	0.002383	
CEIL__0395.LAB	6/25	10:18:07	2.696627	0.032042	0.0629	2.484729	0.001328	
CEIL__0396.LAB	6/25	10:19:09	2.696433	0.029729	0.0717	2.489615	0.001993	
CEIL__0397.LAB	6/25	10:20:12	2.702249	0.033972	<0.0580	2.509255	0.001369	
CEIL__0398.LAB	6/25	10:21:15	2.700505	0.028652	<0.0580	2.516727	0.001848	
CEIL__0399.LAB	6/25	10:22:18	2.79624	0.019687	0.2912	2.856883	0.031075	
CEIL__0400.LAB	6/25	10:23:21	2.770152	0.021575	0.2296	2.742649	0.022838	
CEIL__0401.LAB	6/25	10:24:23	2.811802	0.017333	0.2812	3.023972	0.039473	
CEIL__0402.LAB	6/25	10:25:26	2.826114	0.015676	0.2740	3.056774	0.046985	
CEIL__0403.LAB	6/25	10:26:29	2.837278	0.020918	0.3351	2.955595	0.047986	
CEIL__0404.LAB	6/25	10:27:32	2.848115	0.021073	0.2810	2.730387	0.050582	
CEIL__0405.LAB	6/25	10:28:35	2.856978	0.0254	0.2521	2.593024	0.051273	
CEIL__0406.LAB	6/25	10:29:38	2.866959	0.01808	0.2486	2.477811	0.054466	
CEIL__0407.LAB	6/25	10:30:41	2.870509	0.020707	0.1645	2.38175	0.054001	
CEIL__0408.LAB	6/25	10:31:43	2.884182	0.028488	0.1598	2.340518	0.055375	
CEIL__0409.LAB	6/25	10:32:46	2.877301	0.031176	0.1913	2.329324	0.054039	
Average			2.759	0.027	0.123	2.774	0.020	
Post-Test Calibration Check								
CEIL__0438.LAB	6/25	11:03:27	3.024308	0.02345	0.018501	2.115457	0.076394	
CEIL__0439.LAB	6/25	11:03:43	2.80099	0.456677	29.97149	1.662391	2.278808	
CEIL__0440.LAB	6/25	11:03:59	0.319858	9.27125	3.658505	-0.003993	0.163639	
CEIL__0441.LAB	6/25	11:04:14	0.133268	9.768011	0.58923	-0.069273	0.018264	
CEIL__0442.LAB	6/25	11:04:30	0.102321	9.813429	0.350277	-0.110687	0.012647	
CEIL__0443.LAB	6/25	11:04:45	0.091094	9.818344	0.264206	-0.126503	0.011239	
CEIL__0444.LAB	6/25	11:05:01	0.077593	9.820189	0.249612	-0.065839	0.008935	
CEIL__0445.LAB	6/25	11:05:17	0.08157	9.849674	0.277959	-0.007794	0.005561	System CTS
CEIL__0446.LAB	6/25	11:05:33	0.070992	9.899496	0.248761	-0.060381	0.005378	CO2 Avg: 9.90
CEIL__0447.LAB	6/25	11:05:48	0.075317	9.900138	0.159655	-0.119466	0.00713	
CEIL__0448.LAB	6/25	11:06:04	0.067101	9.883731	0.209381	-0.130864	0.005563	
CEIL__0449.LAB	6/25	11:06:20	0.069191	9.90845	0.209609	-0.088388	0.006243	
CEIL__0450.LAB	6/25	11:06:35	0.062878	9.90653	0.11657	-0.036911	0.005538	
CEIL__0451.LAB	6/25	11:06:51	0.063295	9.907232	0.161958	-0.060525	0.00407	
CEIL__0452.LAB	6/25	11:07:07	0.057926	9.903224	0.176468	-0.05754	0.005211	
CEIL__0453.LAB	6/25	11:07:22	0.05929	9.905327	0.038045	-0.068499	0.004455	
CEIL__0454.LAB	6/25	11:07:38	0.064348	9.920794	0.100043	-0.091685	0.004054	
CEIL__0455.LAB	6/25	11:07:54	0.054429	9.591241	0.167311	-0.127957	0.011043	
CEIL__0456.LAB	6/25	11:08:10	0.049031	0.861233	0.203858	-0.137849	0.010307	
CEIL__0457.LAB	6/25	11:08:26	0.060759	0.177605	0.089896	-0.117297	0.003254	System Zero
CEIL__0458.LAB	6/25	11:08:41	0.054036	0.133763	0.07897	-0.089665	0.002979	
CEIL__0459.LAB	6/25	11:08:57	0.052164	0.091329	0.078617	-0.156701	0.002274	
CEIL__0460.LAB	6/25	11:09:13	0.046608	0.072759	0.034492	-0.129448	0.002757	
CEIL__0461.LAB	6/25	11:09:28	0.05422	0.06938	0.068667	-0.061367	0.004009	
CEIL__0462.LAB	6/25	11:09:44	0.048136	0.060875	0.045263	-0.089873	0.002073	
CEIL__0463.LAB	6/25	11:10:00	0.048246	0.041572	0.047407	-0.107734	0.001666	
CEIL__0464.LAB	6/25	11:10:15	0.050131	0.03576	0.096284	-0.207731	0.000536	
CEIL__0465.LAB	6/25	11:10:31	0.053757	0.049356	0.079479	-0.066944	0.001326	
CEIL__0466.LAB	6/25	11:10:47	0.049387	0.041379	-0.003365	-0.157514	0.001696	
CEIL__0467.LAB	6/25	11:11:02	0.04879	0.031599	0.066668	-0.147032	0.001467	
Run 2 - Ceilcote Outlet - Vacuum Pump Testing								
CEIL__0507.LAB	6/25	11:49:29	3.001221	0.002937	<0.0580	3.201022	0.070235	
CEIL__0508.LAB	6/25	11:50:32	3.105707	0.00143	<0.0580	3.46967	0.097427	
CEIL__0509.LAB	6/25	11:51:35	3.006838	0.015051	0.0800	2.723872	0.071339	
CEIL__0510.LAB	6/25	11:52:38	2.997765	0.020778	0.0601	2.377824	0.069994	
CEIL__0511.LAB	6/25	11:53:41	3.007307	0.024365	0.0587	2.214222	0.07189	
CEIL__0512.LAB	6/25	11:54:44	3.00338	0.025063	0.0880	2.144221	0.072139	
CEIL__0513.LAB	6/25	11:55:46	3.001601	0.022676	0.0603	2.094682	0.072162	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL_0514.LAB	6/25	11:56:49	2.997189	0.022436	<0.0580	2.124457	0.071714	
CEIL_0515.LAB	6/25	11:57:52	2.995958	0.019796	<0.0580	2.115206	0.070748	
CEIL_0516.LAB	6/25	11:58:55	2.997713	0.016623	0.0929	2.087587	0.070127	
CEIL_0517.LAB	6/25	11:59:58	2.975234	0.020894	0.1805	2.113146	0.065446	
CEIL_0518.LAB	6/25	12:01:01	3.012875	0.025075	0.1550	2.091132	0.075151	
CEIL_0519.LAB	6/25	12:02:04	3.008104	0.020611	0.1518	2.095103	0.075459	
CEIL_0520.LAB	6/25	12:03:06	2.976265	0.024187	0.4084	2.107831	0.068078	
CEIL_0521.LAB	6/25	12:04:09	2.949007	0.025532	0.3488	2.121241	0.060166	
CEIL_0522.LAB	6/25	12:05:12	2.924852	0.02755	0.1996	2.164282	0.053309	
CEIL_0523.LAB	6/25	12:06:15	2.891776	0.024998	0.1762	2.243842	0.039807	
CEIL_0524.LAB	6/25	12:07:18	2.885124	0.026455	0.1793	2.266719	0.038039	
CEIL_0525.LAB	6/25	12:08:20	2.86848	0.028723	0.1454	2.316353	0.034598	
CEIL_0526.LAB	6/25	12:09:23	2.855403	0.027712	0.1379	2.308313	0.030677	
CEIL_0527.LAB	6/25	12:10:26	2.839246	0.027225	<0.0580	2.337611	0.026324	
CEIL_0528.LAB	6/25	12:11:29	2.757103	0.03187	0.0735	2.324675	0.001421	
CEIL_0529.LAB	6/25	12:12:32	2.758719	0.027723	<0.0580	2.35533	0.001715	
CEIL_0530.LAB	6/25	12:13:34	2.759568	0.032123	0.1062	2.278293	0.001918	
CEIL_0531.LAB	6/25	12:14:37	2.761992	0.031739	<0.0580	2.310948	0.001944	
CEIL_0532.LAB	6/25	12:15:40	2.754101	0.028792	0.0778	2.301212	0.002297	
CEIL_0533.LAB	6/25	12:16:43	2.75728	0.026012	0.1123	2.299398	0.002408	
CEIL_0534.LAB	6/25	12:17:46	2.759433	0.029104	0.0718	2.302708	0.002391	
CEIL_0535.LAB	6/25	12:18:49	2.757213	0.027732	<0.0580	2.325836	0.002499	
CEIL_0536.LAB	6/25	12:19:51	2.757222	0.023719	0.0900	2.315914	0.002753	
CEIL_0537.LAB	6/25	12:20:54	2.752803	0.027909	0.0944	2.334614	0.002422	
CEIL_0538.LAB	6/25	12:21:57	2.752303	0.026471	0.1078	2.344339	0.003134	
CEIL_0539.LAB	6/25	12:23:00	2.91162	0.026878	<0.0580	2.658616	0.05086	
Average			2.895	0.024	0.114	2.329	0.042	
Post-Test Calibration Check								
CEIL_0567.LAB	6/25	12:52:09	3.066465	0.049374	4.154848	1.662634	0.10269	
CEIL_0568.LAB	6/25	12:52:24	0.665218	7.347366	2.445931	0.253118	0.048014	
CEIL_0569.LAB	6/25	12:52:40	0.150388	9.732539	0.044177	-0.123666	0.00355	
CEIL_0570.LAB	6/25	12:52:55	0.115964	9.770938	-0.015269	-0.092231	0.000842	
CEIL_0571.LAB	6/25	12:53:11	0.102108	9.841352	-0.008051	-0.095555	0.002276	
CEIL_0572.LAB	6/25	12:53:27	0.09194	9.865404	-0.031051	-0.041799	0.003369	
CEIL_0573.LAB	6/25	12:53:43	0.084341	9.849209	0.021585	-0.137628	0.002163	
CEIL_0574.LAB	6/25	12:53:58	0.080068	9.858863	-0.030933	-0.151092	0.001781	System CTS
CEIL_0575.LAB	6/25	12:54:14	0.071171	9.886931	-0.012962	-0.096418	0.002811	CO2 Avg: 9.89
CEIL_0576.LAB	6/25	12:54:30	0.074511	9.884018	-0.05819	-0.179449	0.003254	
CEIL_0577.LAB	6/25	12:54:45	0.075473	9.904831	-0.020827	-0.110511	0.002717	
CEIL_0578.LAB	6/25	12:55:01	0.072134	9.889512	0.046462	-0.143833	0.004649	
CEIL_0579.LAB	6/25	12:55:17	0.071552	9.902725	-0.090531	-0.100123	0.002066	
CEIL_0580.LAB	6/25	12:55:32	0.074788	9.893936	-0.036656	-0.051539	0.002046	
CEIL_0581.LAB	6/25	12:55:48	0.068157	9.903604	-0.015451	-0.070271	0.002284	
CEIL_0582.LAB	6/25	12:56:04	0.073887	9.907495	0.006609	-0.136059	0.00227	
CEIL_0583.LAB	6/25	12:56:20	0.069812	9.907951	-0.109005	-0.165752	0.003716	
CEIL_0584.LAB	6/25	12:56:35	0.063813	2.179784	-0.119433	-0.198953	-0.000258	
CEIL_0585.LAB	6/25	12:56:51	0.067532	0.198843	-0.022874	-0.153093	0.000231	
CEIL_0586.LAB	6/25	12:57:07	0.060833	0.136229	-0.076675	-0.165452	0.001463	
CEIL_0587.LAB	6/25	12:57:22	0.064784	0.111808	-0.03628	-0.123415	0.002087	
CEIL_0588.LAB	6/25	12:57:38	0.055997	0.075337	-0.04556	-0.055974	-0.000011	System Zero
CEIL_0589.LAB	6/25	12:57:54	0.060738	0.066069	-0.064071	-0.0705	-0.000971	
CEIL_0590.LAB	6/25	12:58:10	0.064394	0.06044	-0.093124	-0.104872	0.001648	
CEIL_0591.LAB	6/25	12:58:25	0.057034	0.05051	-0.040164	-0.098979	0.000898	
CEIL_0592.LAB	6/25	12:58:41	0.063214	0.039135	0.025998	-0.129584	0.00069	
CEIL_0593.LAB	6/25	12:58:57	0.061346	0.035024	-0.040683	-0.091492	0.002629	
CEIL_0594.LAB	6/25	12:59:12	0.057343	0.018703	-0.029037	-0.110124	0.001895	
CEIL_0595.LAB	6/25	12:59:28	0.061508	0.030811	-0.111938	-0.169175	-0.000532	
CEIL_0596.LAB	6/25	12:59:44	0.063334	0.038325	-0.109957	-0.116196	0.001858	
CEIL_0597.LAB	6/25	13:00:00	0.066388	0.044255	0.044061	-0.100305	0.001223	
CEIL_0598.LAB	6/25	13:00:15	0.060292	0.028382	-0.039227	-0.116062	0.001519	
CEIL_0599.LAB	6/25	13:00:31	0.090852	0.023922	-0.070624	0.060162	-0.000516	
CEIL_0600.LAB	6/25	13:00:47	2.278055	0.038085	0.069465	2.001892	-0.002327	
CEIL_0601.LAB	6/25	13:01:02	0.519551	0.044447	-0.224856	23.137523	0.001284	
CEIL_0602.LAB	6/25	13:01:18	0.111347	0.022741	-0.055706	84.595668	0.000568	
CEIL_0603.LAB	6/25	13:01:34	0.07892	0.01564	-0.087731	85.257412	0.000358	
CEIL_0604.LAB	6/25	13:01:49	0.067566	0.013605	-0.191387	85.427689	0.001999	
CEIL_0605.LAB	6/25	13:02:05	0.068743	0.015429	-0.144212	85.582394	0.000749	
CEIL_0606.LAB	6/25	13:02:21	0.066478	0.004331	-0.145247	85.623112	0.000413	
CEIL_0607.LAB	6/25	13:02:37	0.064124	0.011833	-0.150233	85.572834	0.000964	
CEIL_0608.LAB	6/25	13:02:52	0.066537	0.011204	-0.168179	85.484812	0.000501	
CEIL_0609.LAB	6/25	13:03:08	0.067408	0.00894	-0.053529	85.690895	0.000316	
CEIL_0610.LAB	6/25	13:03:24	0.065778	0.000684	-0.158512	85.775424	-0.0006	Direct Methane
CEIL_0611.LAB	6/25	13:03:39	0.063153	0.010504	-0.130966	85.697866	0.000816	Avg CH4: 85.7
CEIL_0612.LAB	6/25	13:03:55	0.057067	0.018208	-0.133488	85.723132	0.001273	
CEIL_0613.LAB	6/25	13:04:11	0.068238	0.009637	-0.08686	85.714763	0.000079	
CEIL_0614.LAB	6/25	13:04:27	0.067873	0.00654	-0.0955	85.719283	-0.000189	
CEIL_0615.LAB	6/25	13:04:42	0.06735	-0.000805	-0.140138	85.65276	0.000079	
CEIL_0616.LAB	6/25	13:04:58	0.060511	0.003517	-0.074503	85.709238	0.000416	
CEIL_0617.LAB	6/25	13:05:14	0.062721	0.00526	-0.072032	85.784159	0.000162	
CEIL_0618.LAB	6/25	13:05:29	0.060545	0.00907	-0.125996	85.914006	0.000463	
CEIL_0619.LAB	6/25	13:05:45	0.067488	0.001758	-0.118043	85.726612	0.00019	
CEIL_0620.LAB	6/25	13:06:01	0.070213	0.006031	-0.160654	85.753465	0.001723	

Raw FTIR Data
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Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL_0621.LAB	6/25	13:08:11	0.063231	0.003909	-0.110913	85.389742	-0.000652	
Run 3 - Ceilcote Outlet - Vacuum Pump Testing								
CEIL_0622.LAB	6/25	13:09:14	0.063517	0.00082	-0.077457	85.646119	0.000347	Points excluded. Methane calibration gas most likely not purged out of sample line.
CEIL_0623.LAB	6/25	13:10:17	0.061421	0.001721	-0.062827	85.753941	0.001003	
CEIL_0624.LAB	6/25	13:11:20	2.161808	0.022797	0.040409	13.730874	-0.000444	
CEIL_0625.LAB	6/25	13:12:23	2.773648	0.035405	<0.0580	2.514535	-0.000071	
CEIL_0626.LAB	6/25	13:13:26	2.78642	0.032445	0.0653	2.426335	0.000447	
CEIL_0627.LAB	6/25	13:14:29	2.789157	0.029835	<0.0580	2.373039	0.001177	
CEIL_0628.LAB	6/25	13:15:31	2.797315	0.029911	<0.0580	2.354261	0.000621	
CEIL_0629.LAB	6/25	13:16:34	2.801223	0.030585	0.0692	2.342625	0.000729	
CEIL_0630.LAB	6/25	13:17:37	2.803954	0.029167	<0.0580	2.342537	0.00109	
CEIL_0631.LAB	6/25	13:18:40	2.809048	0.027183	0.0846	2.341747	0.001107	
CEIL_0632.LAB	6/25	13:19:42	2.813702	0.034262	<0.0580	2.327652	0.000738	
CEIL_0633.LAB	6/25	13:20:46	2.912431	0.025387	0.0624	2.86755	0.025074	
CEIL_0634.LAB	6/25	13:21:48	3.430746	-0.014999	0.1032	6.511223	0.164658	
CEIL_0635.LAB	6/25	13:22:51	3.145266	0.021263	0.2827	3.164125	0.086238	
CEIL_0636.LAB	6/25	13:23:54	3.143499	0.016374	0.1590	2.483415	0.086122	
CEIL_0637.LAB	6/25	13:24:57	3.144893	0.021187	0.1620	2.257256	0.0872	
CEIL_0638.LAB	6/25	13:25:59	3.152964	0.025192	0.1659	2.183558	0.087841	
CEIL_0639.LAB	6/25	13:27:03	3.156722	0.025044	0.2018	2.140076	0.08871	
CEIL_0640.LAB	6/25	13:28:05	3.159993	0.029729	0.1463	2.105405	0.089474	
CEIL_0641.LAB	6/25	13:29:08	3.158267	0.026689	0.1115	2.134774	0.088282	
CEIL_0642.LAB	6/25	13:30:11	3.13232	0.025474	0.1338	2.112451	0.079046	
CEIL_0643.LAB	6/25	13:31:14	3.137599	0.022368	0.1528	2.112999	0.083341	
CEIL_0644.LAB	6/25	13:32:17	3.095092	0.022861	0.1056	2.142757	0.072661	
CEIL_0645.LAB	6/25	13:33:20	3.072167	0.024588	0.0812	2.194168	0.062471	
CEIL_0646.LAB	6/25	13:34:22	3.176827	0.024152	0.3070	2.180997	0.08967	
CEIL_0647.LAB	6/25	13:35:25	3.09546	0.029028	1.2696	2.165183	0.067186	
CEIL_0648.LAB	6/25	13:36:28	3.096852	0.022856	1.4844	2.175028	0.068447	
CEIL_0649.LAB	6/25	13:37:30	3.083794	0.021023	0.7717	2.19177	0.066378	
CEIL_0650.LAB	6/25	13:38:34	3.046423	0.024659	0.3552	2.218233	0.057785	
CEIL_0651.LAB	6/25	13:39:36	3.006718	0.02936	0.2334	2.205222	0.04895	
CEIL_0652.LAB	6/25	13:40:39	2.974923	0.030808	0.1541	2.209666	0.043703	
CEIL_0653.LAB	6/25	13:41:42	2.867533	0.029068	0.0942	2.25664	0.012705	
CEIL_0654.LAB	6/25	13:42:45	2.831367	0.030465	0.0646	2.262844	0.001372	
CEIL_0655.LAB	6/25	13:43:47	2.826397	0.025193	0.0646	2.316443	0.001485	
CEIL_0656.LAB	6/25	13:44:50	2.824512	0.031492	0.0588	2.298641	0.00199	
CEIL_0657.LAB	6/25	13:45:53	2.819318	0.024996	0.0580	2.282317	0.000549	
CEIL_0658.LAB	6/25	13:46:56	2.828356	0.031235	<0.2210	2.299316	0.001456	
CEIL_0659.LAB	6/25	13:47:59	2.822415	0.032543	<0.0580	2.274702	0.001189	
CEIL_0660.LAB	6/25	13:49:02	2.9661	0.024569	0.1350	2.444307	0.034838	
CEIL_0661.LAB	6/25	13:50:05	2.918588	0.02482	0.1176	2.405872	0.027382	
CEIL_0662.LAB	6/25	13:51:08	2.951962	0.02493	0.1660	2.645156	0.03918	
CEIL_0663.LAB	6/25	13:52:10	2.972136	0.023289	0.1085	2.986439	0.045498	
CEIL_0664.LAB	6/25	13:53:13	2.992935	0.023958	0.1276	3.190051	0.047832	
CEIL_0665.LAB	6/25	13:54:16	3.014151	0.025511	0.1236	3.478591	0.052488	
CEIL_0666.LAB	6/25	13:55:18	3.022699	0.026731	0.1005	3.699464	0.05363	
CEIL_0667.LAB	6/25	13:56:21	3.023841	0.025914	0.1057	3.630278	0.054016	
CEIL_0668.LAB	6/25	13:57:24	3.031909	0.027812	0.1283	3.524343	0.054766	
Average			2.987	0.026	0.197	2.563	0.045	
Post-Test Calibration Check								
CEIL_0683.LAB	6/25	14:15:03	0.091417	9.89746	-0.094648	-0.059082	0.002825	System CTS CO2 Avg: 9.92
CEIL_0684.LAB	6/25	14:15:19	0.088572	9.902585	-0.065178	-0.098004	0.003256	
CEIL_0685.LAB	6/25	14:15:35	0.093987	9.900052	-0.060745	-0.065901	0.002369	
CEIL_0686.LAB	6/25	14:15:51	0.084394	9.894658	-0.014605	-0.068385	0.003214	
CEIL_0687.LAB	6/25	14:16:06	0.0865	9.924283	-0.056031	-0.049271	0.003531	
CEIL_0688.LAB	6/25	14:16:22	0.086174	9.922454	-0.057208	-0.062745	0.003182	
CEIL_0689.LAB	6/25	14:16:38	0.081381	9.929549	-0.044846	-0.166279	0.003143	
CEIL_0690.LAB	6/25	14:16:54	0.078564	9.923	-0.137053	-0.110036	0.00231	
CEIL_0691.LAB	6/25	14:17:09	0.078164	9.921724	-0.072826	-0.09709	0.003605	
CEIL_0692.LAB	6/25	14:17:25	0.077434	9.929576	-0.116543	-0.122836	0.001834	
CEIL_0693.LAB	6/25	14:17:41	0.078872	9.916493	-0.100918	-0.144833	0.002392	
CEIL_0694.LAB	6/25	14:17:56	0.080189	9.900144	-0.106982	-0.136911	0.004073	
CEIL_0695.LAB	6/25	14:18:12	0.073402	9.91215	-0.08954	-0.118933	0.003436	
CEIL_0696.LAB	6/25	14:18:28	0.077213	9.913466	-0.093747	-0.15401	0.003485	
CEIL_0697.LAB	6/25	14:18:43	0.074536	9.919191	-0.10545	-0.133584	0.003985	
CEIL_0698.LAB	6/25	14:18:59	0.074783	8.572766	-0.031659	-0.058017	0.002229	
CEIL_0699.LAB	6/25	14:19:15	0.074269	0.468599	-0.062897	-0.092301	0.000751	
CEIL_0700.LAB	6/25	14:19:30	0.067761	0.177198	-0.012259	-0.176719	0.001788	
CEIL_0701.LAB	6/25	14:19:46	0.067221	0.126495	-0.103785	-0.134118	0.001474	
CEIL_0702.LAB	6/25	14:20:02	0.069965	0.099293	-0.019601	-0.181554	0.000288	System Zero
CEIL_0703.LAB	6/25	14:20:17	0.062506	0.08086	0.035654	-0.131826	0.000553	
CEIL_0704.LAB	6/25	14:20:34	0.064424	0.084462	-0.032126	-0.158496	0.000847	
CEIL_0705.LAB	6/25	14:20:49	0.069143	0.058032	-0.012116	-0.138674	-0.000041	
CEIL_0706.LAB	6/25	14:21:05	0.066309	0.047784	-0.056361	-0.117134	0.000148	
CEIL_0707.LAB	6/25	14:21:21	0.065568	0.042448	-0.055065	-0.14706	-0.000613	
CEIL_0708.LAB	6/25	14:21:36	0.068557	0.044488	-0.023266	-0.180006	-0.000669	
CEIL_0709.LAB	6/25	14:21:52	0.06709	0.041024	-0.130597	-0.150436	0.00016	
CEIL_0710.LAB	6/25	14:22:07	0.063971	0.039659	-0.044472	-0.15747	-0.000631	
CEIL_0711.LAB	6/25	14:22:23	0.061773	0.035365	-0.036076	-0.156277	-0.000325	
CEIL_0712.LAB	6/25	14:22:39	0.066899	0.025013	-0.092349	-0.092132	-0.001374	

Raw FTIR Data
Ceilcote Outlet
Vacuum Pump Testing



Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (%)	CO ₂ (%wv)	EtO (ppmwv)	Methane (ppmwv)	SF ₆ (ppmwv)	Notes
CEIL_0713.LAB	6/25	14:22:55	0.066143	0.029329	-0.066577	-0.218706	0.000175	
CEIL_0714.LAB	6/25	14:23:11	0.060971	0.022787	-0.079486	-0.170153	-0.000194	
CEIL_0715.LAB	6/25	14:23:26	0.060847	0.028208	-0.041893	-0.145498	0.000282	
CEIL_0716.LAB	6/25	14:23:42	0.063215	0.022624	-0.024276	-0.139561	-0.001206	
CEIL_0717.LAB	6/25	14:23:57	0.064818	0.011281	-0.122201	-0.129579	0.000106	
CEIL_0718.LAB	6/25	14:24:13	0.061899	0.016576	-0.143485	-0.136248	0.000291	
CEIL_0719.LAB	6/25	14:24:29	0.060323	0.036033	-0.089282	-0.160609	0.001079	
CEIL_0720.LAB	6/25	14:24:45	0.059889	0.023162	-0.115315	30.37385	0.000279	
CEIL_0721.LAB	6/25	14:25:00	0.063375	0.019881	-0.205318	84.661061	0.000664	
CEIL_0722.LAB	6/25	14:25:16	0.060715	0.012901	-0.241935	85.201297	-0.000362	
CEIL_0723.LAB	6/25	14:25:32	0.056177	-0.001398	-0.165657	85.444074	0.000394	
CEIL_0724.LAB	6/25	14:25:47	0.062579	0.015808	-0.120442	85.58606	0.001245	
CEIL_0725.LAB	6/25	14:26:03	0.05736	0.006271	-0.152646	85.545574	-0.000404	Direct Methane
CEIL_0726.LAB	6/25	14:26:19	0.062489	0.006507	-0.161926	85.539788	0.000515	Avg CH4: 85.6
CEIL_0727.LAB	6/25	14:26:35	0.063598	0.007933	-0.234982	85.263222	-0.000259	
CEIL_0728.LAB	6/25	14:26:50	0.06085	0.012744	-0.193621	85.305797	0.000913	
CEIL_0729.LAB	6/25	14:27:06	0.0626	0.00691	-0.068087	85.397257	-0.00201	
CEIL_0730.LAB	6/25	14:27:22	0.065923	0.010076	-0.145824	85.383417	0.001051	
CEIL_0731.LAB	6/25	14:27:37	0.061051	0.009355	-0.078939	85.610902	0.000044	
CEIL_0732.LAB	6/25	14:27:53	0.061861	0.013615	-0.079947	85.77716	-0.000027	
CEIL_0733.LAB	6/25	14:28:09	0.064812	0.00734	-0.168673	85.860679	0.000281	
CEIL_0734.LAB	6/25	14:28:25	0.066199	0.006055	-0.222006	85.895488	0.000759	
CEIL_0735.LAB	6/25	14:28:40	0.060052	0.009858	-0.176037	85.760976	0.001715	
CEIL_0736.LAB	6/25	14:28:56	0.059876	0.011511	-0.111989	85.754902	-0.000181	
CEIL_0737.LAB	6/25	14:29:12	0.05834	0.002577	-0.069111	85.855626	0.000057	
CEIL_0738.LAB	6/25	14:29:27	0.059062	0.004127	-0.124433	85.886016	-0.000986	
CEIL_0739.LAB	6/25	14:29:43	0.054122	0.00934	-0.026328	85.825625	0.000636	
CEIL_0740.LAB	6/25	14:29:59	0.056344	-0.000621	-0.134805	86.057359	0.001099	
CEIL_0741.LAB	6/25	14:30:15	0.057517	0.01474	-0.146665	85.951919	0.000407	
CEIL_0742.LAB	6/25	14:30:30	0.056726	0.007874	-0.124673	86.04227	0.000241	
CEIL_0743.LAB	6/25	14:33:59	-0.001834	-0.002335	-0.033833	-0.187859	0.001598	
CEIL_0744.LAB	6/25	14:34:14	-0.004375	0.005668	-0.016483	-0.190792	0.000966	
CEIL_0745.LAB	6/25	14:34:30	-0.001313	0.004277	-0.027211	-0.199518	0.001152	
CEIL_0746.LAB	6/25	14:34:46	-0.006021	-0.002143	-0.045532	-0.196173	-0.000928	
CEIL_0747.LAB	6/25	14:35:02	0.003485	0.003422	-0.035348	-0.152444	0.000307	
CEIL_0748.LAB	6/25	14:35:17	-0.003139	0.005015	0.084647	-0.183402	0.00114	
CEIL_0749.LAB	6/25	14:35:33	0.007046	0.001536	0.024291	-0.173119	-0.001294	
CEIL_0750.LAB	6/25	14:35:49	0.001835	0.000094	-0.065216	65.320561	-0.000804	
CEIL_0751.LAB	6/25	14:36:05	-0.001616	0.00589	-0.084488	84.640255	0.000353	
CEIL_0752.LAB	6/25	14:36:20	0.001027	-0.00452	-0.048492	85.108854	-0.000397	
CEIL_0753.LAB	6/25	14:36:36	-0.000267	-0.003867	-0.044748	85.297331	-0.000665	
CEIL_0754.LAB	6/25	14:36:52	0.004003	0.005324	-0.083352	85.290392	0.000353	
CEIL_0755.LAB	6/25	14:37:07	0.003472	0.001336	0.002029	85.470117	-0.000279	
CEIL_0756.LAB	6/25	14:37:23	-0.004652	-0.017493	-0.009065	85.310421	0.000167	
CEIL_0757.LAB	6/25	14:37:38	-0.000463	0.004028	0.00476	85.439046	-0.000827	System Methane
CEIL_0758.LAB	6/25	14:37:54	-0.001642	-0.002556	-0.150512	85.565069	-0.000516	Avg CH4: 85.6
CEIL_0759.LAB	6/25	14:38:10	0.0084	0.003178	-0.052924	85.297877	0.0014	
CEIL_0760.LAB	6/25	14:38:26	-0.001946	0.001881	-0.051819	85.450622	0.000782	
CEIL_0761.LAB	6/25	14:38:41	0.000275	0.000206	0.056239	85.389775	0.000648	
CEIL_0762.LAB	6/25	14:38:57	0.001789	-0.002004	-0.050123	85.660596	-0.000075	
CEIL_0763.LAB	6/25	14:39:13	-0.00654	-0.002668	-0.013787	85.629255	0.00121	
CEIL_0764.LAB	6/25	14:39:28	0.000082	-0.009509	-0.129117	85.888118	0.000575	
CEIL_0765.LAB	6/25	14:39:44	0.001954	-0.002155	-0.102288	85.833558	0.001717	
CEIL_0766.LAB	6/25	14:40:00	-0.008066	0.003284	-0.157212	85.924467	0.000015	
CEIL_0767.LAB	6/25	14:40:16	-0.002642	0.006748	-0.0854	34.577101	-0.000279	
CEIL_0768.LAB	6/25	14:40:31	-0.001747	-0.006704	0.108177	0.734217	0.001152	
CEIL_0769.LAB	6/25	14:40:47	0.001898	0.005318	0.045835	0.08382	0.000458	
CEIL_0770.LAB	6/25	14:41:03	0.001724	0.003175	0.087061	0.020681	0.001704	
CEIL_0771.LAB	6/25	14:41:18	0.000527	0.007549	-0.034678	-0.069093	0.001586	
CEIL_0772.LAB	6/25	14:41:34	0.001544	0.00605	0.003035	-0.073428	-0.000442	
CEIL_0773.LAB	6/25	14:41:50	0.000086	-0.003711	-0.083427	-0.091205	-0.000389	
CEIL_0774.LAB	6/25	14:42:05	-0.00503	0.015129	-0.01546	-0.130872	0.002561	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
Pre-Test Calibrations (6/24) - Process Stack								
PRE-ZERO_0000001.LAB	6/24	07:12:00	5.462529349	-0.002847	-0.001176606	0.00492825	-0.006570393	Note: The spectrum label does not necessarily indicate /correspond to the exact calibration action at that moment
PRE-ZERO_0000002.LAB	6/24	07:12:15	5.107255743	-0.012896	0.000658418	-0.0010836	0.001208852	
PRE-ZERO_0000003.LAB	6/24	07:12:33	7.859435009	-0.005525	-0.001098378	-0.0080793	-0.473880086	
PRE-ZERO_0000004.LAB	6/24	07:12:48	-1.54106197	-0.00574	-0.000404889	-0.0117978	0.002952428	
PRE-ZERO_0000005.LAB	6/24	07:13:03	-0.66589855	-0.025154	0.003671568	-0.0018468	-0.009849892	
PRE-ZERO_0000006.LAB	6/24	07:13:18	0.43059586	-0.006878	0.004407037	0.00998347	-0.008844645	
PRE-ZERO_0000007.LAB	6/24	07:13:33	1.438164346	0.0198484	0.007932501	0.00579178	-0.005372815	
PRE-ZERO_0000008.LAB	6/24	07:13:54	0.142933836	-0.014641	-0.002186568	-0.0022255	-0.022446844	
PRE-ZERO_0000009.LAB	6/24	07:14:09	-0.29726243	0.0004882	-0.001391876	0.00341203	-0.010524816	
ZERO DIRECT_0000010.LAB	6/24	07:15:23	9.36981E-14	-1.32E-16	3.64377E-17	-2.11E-16	1	Filter Interference Direct Zero
Filter Interference.LAB	6/24	07:15:23	9.36981E-14	-1.32E-16	3.64377E-17	-2.11E-16	1	
ZERO DIRECT_0000011.LAB	6/24	07:16:22	1.725201402	-0.001949	-0.000543474	-0.0017602	-0.013154307	Direct CTS CH4 Avg: 85.0
ZERO DIRECT_0000012.LAB	6/24	07:17:25	2.04432852	0.0012646	-0.001798126	-0.0018961	-0.01680368	
ZERO DIRECT_0000013.LAB	6/24	07:18:24	-0.76252766	-0.016236	0.003598322	6.1938E-05	-0.005828186	
PRE-ZERO_0000014.LAB	6/24	07:19:55	0.692247594	0.007581	-0.004060803	-0.0024981	-0.047083477	
PRE-ZERO_0000015.LAB	6/24	07:20:10	1.908331743	-0.024251	-0.000756668	0.00598147	-0.032248317	
PRE-ZERO_0000016.LAB	6/24	07:20:28	3.778043749	-0.002744	-0.000350318	-0.0042701	-0.007494162	
PRE-ZERO_0000017.LAB	6/24	07:20:43	5.990977175	-0.000826	0.003962616	0.00039649	-0.023666272	
PRE-ZERO_0000018.LAB	6/24	07:20:58	9.867358023	-0.010601	0.001903569	-0.0047623	-0.002990385	
PRE-ZERO_0000019.LAB	6/24	07:21:13	6.418295414	-0.002097	0.00054591	-0.0053384	-0.000686508	
PRE-ZERO_0000020.LAB	6/24	07:21:31	5.103140533	-0.021275	-0.002334261	-0.0061171	0.000589752	
PRE-ZERO_0000021.LAB	6/24	07:21:46	7.588518064	0.0005163	-0.002946059	-0.0008071	-0.004691245	Direct CTS CH4 Avg: 85.0
PRE-ZERO_0000022.LAB	6/24	07:22:00	1.422801166	-0.028423	-0.000429364	9.9877E-06	-0.011251496	
PRE-ZERO_0000023.LAB	6/24	07:22:15	-0.90119503	-0.017825	0.003621992	-0.0035593	-0.00636573	
PRE-ZERO_0000024.LAB	6/24	07:22:30	4.029335055	-0.01937	0.002737567	-0.0005477	-0.034718163	
PRE-ZERO_0000025.LAB	6/24	07:22:45	-7.00506812	-0.03639	0.001048926	0.00242362	0.002453713	
CTS DIRECT_0000026.LAB	6/24	07:23:10	153.8453985	-0.304607	0.017591632	19.6903835	-0.00383474	
CTS DIRECT_0000027.LAB	6/24	07:23:28	254.5974347	-0.044074	-0.046045109	83.3260765	-0.011527486	
CTS DIRECT_0000028.LAB	6/24	07:23:47	185.3423716	-0.006673	-0.041136415	84.6853886	-0.001756574	
CTS DIRECT_0000029.LAB	6/24	07:24:05	158.7489229	-0.040758	-0.049493805	84.8278821	-0.069341424	
CTS DIRECT_0000030.LAB	6/24	07:24:20	150.8346092	-0.015528	-0.048280755	84.8719257	6.69444E-05	
CTS DIRECT_0000031.LAB	6/24	07:24:34	138.2877109	0.0051419	-0.045809371	84.8774065	-0.010165486	Direct CTS CH4 Avg: 85.0
CTS DIRECT_0000032.LAB	6/24	07:24:49	135.909025	-0.03339	-0.047746596	84.8866884	-0.009940505	
CTS DIRECT_0000033.LAB	6/24	07:25:04	128.2492362	-0.011637	-0.046394907	84.9260562	0.001314516	
CTS DIRECT_0000034.LAB	6/24	07:25:19	124.7034419	-0.010817	-0.048522485	84.9141657	-0.030349128	
CTS DIRECT_0000035.LAB	6/24	07:25:33	121.5499977	-0.03116	-0.044934263	84.9341198	0.000847165	
CTS DIRECT_0000036.LAB	6/24	07:25:48	112.9404672	-0.036666	-0.040711828	84.94447	-0.092608515	
CTS DIRECT_0000037.LAB	6/24	07:26:10	121.3570212	-0.033476	-0.051115633	84.9805195	-0.371694568	
CTS DIRECT_0000038.LAB	6/24	07:26:25	116.4523348	-0.042999	-0.049960533	84.9609412	0.002691745	
CTS DIRECT_0000039.LAB	6/24	07:26:39	121.7716789	-0.035416	-0.047324764	84.9723866	-0.003981408	
CTS DIRECT_0000040.LAB	6/24	07:26:58	121.4530249	-0.018319	-0.044770358	84.9891	0.002252945	
CTS DIRECT_0000041.LAB	6/24	07:27:19	123.0606029	-0.033149	-0.046767805	84.9796609	0.0025375	Direct QA/Tracer EtO Avg: 2.13 C2H6 Avg: 519.62
CTS DIRECT_0000042.LAB	6/24	07:27:34	122.3099005	-0.006559	-0.047863292	85.0033931	-0.000992567	
CTS DIRECT_0000043.LAB	6/24	07:27:49	110.8317963	-0.014358	-0.046919785	85.006546	-0.000649181	
CTS DIRECT_0000044.LAB	6/24	07:28:07	117.2989864	-0.010479	-0.048543963	84.9819195	0.001124519	
CTS DIRECT_0000045.LAB	6/24	07:28:22	1103.901319	121.76642	0.705059684	46.7592369	-0.033242416	
CTS DIRECT_0000046.LAB	6/24	07:28:37	-290.551177	510.16766	1.665359865	-0.0723117	0.00082003	
CTS DIRECT_0000047.LAB	6/24	07:28:52	-328.384017	515.85176	1.697943209	-0.9010467	-0.009674731	
CTS DIRECT_0000048.LAB	6/24	07:29:10	-343.687958	516.75414	1.671794096	-1.0131108	-0.032754638	
CTS DIRECT_0000049.LAB	6/24	07:29:28	-333.741946	517.11981	1.488411086	-1.0864827	-0.006234425	
CTS DIRECT_0000050.LAB	6/24	07:29:43	-343.969537	517.47426	1.24982917	-1.1143728	-0.003084658	
CTS DIRECT_0000051.LAB	6/24	07:29:58	-364.05554	517.69069	1.071395739	-1.1306336	0.001302771	Direct QA/Tracer EtO Avg: 2.13 C2H6 Avg: 519.62
CTS DIRECT_0000052.LAB	6/24	07:30:17	-350.190071	517.60403	1.105472216	-1.1404455	-0.004945067	
CTS DIRECT_0000053.LAB	6/24	07:30:31	-354.278942	517.58033	1.286545711	-1.1716879	-0.007618509	
CTS DIRECT_0000054.LAB	6/24	07:30:46	-352.640028	518.02608	1.504385415	-1.1935844	0.002757177	
CTS DIRECT_0000055.LAB	6/24	07:31:04	-351.762643	518.27768	1.697995437	-1.2280713	0.005756791	
CAL DIRECT_0000056.LAB	6/24	07:31:19	-346.495699	518.06117	1.863296254	-1.2203498	0.001524559	
CAL DIRECT_0000057.LAB	6/24	07:31:34	-11.6420717	375.2358	1.558245782	-0.6078898	0.050367459	
CAL DIRECT_0000058.LAB	6/24	07:31:49	-39.9634362	9.5272578	0.045601099	0.01942123	0.002310099	
CAL DIRECT_0000059.LAB	6/24	07:32:10	13.89729839	1.2315426	0.008023301	0.00606403	-0.001662909	
CAL DIRECT_0000060.LAB	6/24	07:32:29	-1.77701858	0.5436717	-0.000453082	0.01779711	-0.004632086	
CAL DIRECT_0000061.LAB	6/24	07:32:43	5.646554951	0.3954854	-0.000279068	0.02320655	-0.011631922	Direct QA/Tracer EtO Avg: 2.13 C2H6 Avg: 519.62
CAL DIRECT_0000062.LAB	6/24	07:32:58	7.305654902	0.3243245	0.004828257	0.02238218	-0.006324404	
CAL DIRECT_0000063.LAB	6/24	07:33:16	773.1666301	106.52317	0.732123681	-0.3085846	-0.044389756	
CAL DIRECT_0000064.LAB	6/24	07:33:31	-348.158322	515.49449	2.00643223	-1.2653377	-0.006019088	
CAL DIRECT_0000065.LAB	6/24	07:33:49	-343.337982	518.45906	2.070064811	-1.2940055	-0.013918097	
CAL DIRECT_0000066.LAB	6/24	07:34:04	-334.741758	518.97989	2.094012521	-1.2811785	-0.001230175	
CAL DIRECT_0000067.LAB	6/24	07:34:19	-329.500357	519.08774	2.106314948	-1.2926859	0.000482167	
CAL DIRECT_0000068.LAB	6/24	07:34:34	-323.141016	519.39161	2.106394246	-1.2928861	0.003697734	
CAL DIRECT_0000069.LAB	6/24	07:34:52	-334.935082	519.20594	2.106725494	-1.2798169	0.000188418	
CAL DIRECT_0000070.LAB	6/24	07:35:07	-329.111685	519.46823	2.110172354	-1.2932183	-0.022386993	
CAL DIRECT_0000071.LAB	6/24	07:35:21	-325.410849	519.52982	2.122027068	-1.2890766	-0.026159426	Direct QA/Tracer EtO Avg: 2.13 C2H6 Avg: 519.62
CAL DIRECT_0000072.LAB	6/24	07:35:40	-330.614943	519.53052	2.127274718	-1.3038846	-0.011102334	
CAL DIRECT_0000073.LAB	6/24	07:35:58	-320.194963	519.63683	2.120370539	-1.2961513	-0.009443777	
CAL DIRECT_0000074.LAB	6/24	07:36:13	-322.194406	519.5778	2.128985665	-1.3014689	-0.024198407	
CAL DIRECT_0000075.LAB	6/24	07:36:31	-326.072022	519.38985	2.130409878	-1.2962927	-0.017833214	
CAL DIRECT_0000076.LAB	6/24	07:36:49	-326.080343	519.60548	2.137279509	-1.3001158	0.0023331	
CAL DIRECT_0000077.LAB	6/24	07:37:04	-329.367687	519.66534	2.140958271	-1.3016747	-0.005407316	
CAL DIRECT_0000078.LAB	6/24	07:37:22	-318.854254	519.7421	2.140131735	-1.289327	-0.003653317	
CAL DIRECT_0000079.LAB	6/24	07:37:37	-336.866309	519.6194	2.13638522	-1.2982809	0.001224701	
CAL DIRECT_0000080.LAB	6/24	07:37:52	-335.821028	519.69667	2.143119894	-1.3007712	-0.001212772	
CAL DIRECT_0000081.LAB	6/24	07:38:07	-340.408015	519.76281	2.1382556	-1.3030065	-0.00594756	Direct QA/Tracer EtO Avg: 2.13 C2H6 Avg: 519.62
CAL DIRECT_0000082.LAB	6/24	07:38:21	-360.026433	506.84952	2.101757409	-1.2787238	-0.02139488	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
CAL DIRECT_0000083.LAB	6/24	07:38:36	-188.581668	30.80925	0.178562228	-0.1041962	-0.088015662	
CAL DIRECT_0000084.LAB	6/24	07:38:51	7.059739708	1.9401832	0.01418678	0.00177139	-0.00166137	
CAL DIRECT_0000085.LAB	6/24	07:39:09	1.977438357	0.7509419	0.006137992	-0.0014442	-0.002718679	
ZERO SYSTEM_0000086.LAB	6/24	07:47:02	21813.289	0.0607883	0.009238348	3.56625998	0.00472632	
ZERO SYSTEM_0000087.LAB	6/24	07:47:24	21429.05563	0.0151864	0.011062431	2.93521689	-0.003667075	
ZERO SYSTEM_0000088.LAB	6/24	07:47:38	21267.487	-0.000601	0.018585108	2.35197423	0.002151188	
ZERO SYSTEM_0000089.LAB	6/24	07:47:53	21491.7835	39.587531	0.128088768	14.4682734	-0.003306997	
ZERO SYSTEM_0000090.LAB	6/24	07:48:08	4444.426643	8.5435147	0.073011784	3.03439411	0.001461807	
ZERO SYSTEM_0000091.LAB	6/24	07:48:23	1343.318859	0.5075052	0.020206356	0.32990479	-0.000825204	
ZERO SYSTEM_0000092.LAB	6/24	07:48:37	962.2606318	0.2885127	0.012927083	0.27743734	0.004128711	
ZERO SYSTEM_0000093.LAB	6/24	07:48:56	760.1184164	0.2173208	0.015028153	0.27015964	-0.007123787	
ZERO SYSTEM_0000094.LAB	6/24	07:49:11	659.0314141	0.1671512	0.008615581	0.25822251	-0.001590004	
ZERO SYSTEM_0000095.LAB	6/24	07:49:29	599.4294158	0.1487095	0.005482783	0.2674105	-0.002218269	
ZERO SYSTEM_0000096.LAB	6/24	07:49:48	544.2634879	0.1370131	0.008766184	0.2481493	-0.019236376	
ZERO SYSTEM_0000097.LAB	6/24	07:50:02	512.9883996	0.1380828	0.010234458	0.2519329	-0.00496879	
ZERO SYSTEM_0000098.LAB	6/24	07:50:17	491.192402	0.1129014	0.006893004	0.24284293	-0.05032063	
ZERO SYSTEM_0000099.LAB	6/24	07:50:32	469.763383	0.1109865	0.008433861	0.23666738	-0.003842428	
ZERO SYSTEM_0000100.LAB	6/24	07:50:47	457.8333395	0.1281497	0.003720101	0.24953113	-0.00658916	System Zero
ZERO SYSTEM_0000101.LAB	6/24	07:51:01	442.4205771	0.0944168	0.004483967	0.24236459	-0.002813656	
ZERO SYSTEM_0000102.LAB	6/24	07:51:16	428.0201324	0.1039827	0.007443538	0.24112409	-0.005834121	
ZERO SYSTEM_0000103.LAB	6/24	07:51:31	425.8364089	0.08619	0.001981776	0.2444463	-0.027212669	
ZERO SYSTEM_0000104.LAB	6/24	07:51:46	414.0506041	0.0662986	0.00630426	0.24769083	-0.00265948	
ZERO SYSTEM_0000105.LAB	6/24	07:52:00	407.4864143	0.0765412	0.007543363	0.24685633	-0.000954823	
ZERO SYSTEM_0000106.LAB	6/24	07:52:15	405.1468078	0.0683228	0.002596235	0.23756679	-0.068601776	
ZERO SYSTEM_0000107.LAB	6/24	07:52:30	395.9166897	0.0734113	0.009931793	0.23614399	-0.012166921	
ZERO SYSTEM_0000108.LAB	6/24	07:52:45	392.0912746	0.0570615	0.006108075	0.23961675	-0.004322766	
ZERO SYSTEM_0000109.LAB	6/24	07:52:59	388.4067232	0.087229	0.001267865	0.2381139	-0.000653559	
ZERO SYSTEM_0000110.LAB	6/24	07:53:14	383.6712148	0.0647797	0.004925552	0.23453635	-0.000159275	
ZERO SYSTEM_0000111.LAB	6/24	07:53:29	379.9542151	0.050934	-0.001275993	0.22695843	0.001625434	
ZERO SYSTEM_0000112.LAB	6/24	07:53:44	372.4356729	0.0319312	0.002271969	0.23734257	-0.004083059	
CTS SYSTEM_0000113.LAB	6/24	08:00:43	726.4293455	0.0434207	-0.019789939	84.9269227	-0.115868956	
CTS SYSTEM_0000114.LAB	6/24	08:00:58	633.7252807	0.0413167	-0.023285708	84.9982571	-0.01181176	
CTS SYSTEM_0000115.LAB	6/24	08:01:13	581.4196712	0.0409078	-0.023840568	85.0126859	0.001221705	
CTS SYSTEM_0000116.LAB	6/24	08:01:28	543.6827957	0.0634859	-0.023163328	85.0240462	0.001481071	
CTS SYSTEM_0000117.LAB	6/24	08:01:42	519.7604441	0.0442229	-0.027609066	85.019861	-0.111184645	
CTS SYSTEM_0000118.LAB	6/24	08:02:01	497.4145677	0.0657834	-0.028600238	85.0452986	0.001458002	
CTS SYSTEM_0000119.LAB	6/24	08:02:19	488.7625303	0.0426853	-0.025073487	85.0615752	-0.000305885	
CTS SYSTEM_0000120.LAB	6/24	08:02:37	473.463401	0.0497714	-0.03094905	85.067869	-0.000989983	
CTS SYSTEM_0000121.LAB	6/24	08:02:52	470.2537834	0.0402879	-0.032754204	85.0650469	0.002270073	System CTS
CTS SYSTEM_0000122.LAB	6/24	08:03:14	455.8246692	0.0426858	-0.03898624	85.0724903	-0.033206264	CH3 Avg: 85.1
CTS SYSTEM_0000123.LAB	6/24	08:03:29	452.3906088	0.0532884	-0.035310856	85.0979217	-0.004696608	
CTS SYSTEM_0000124.LAB	6/24	08:03:43	448.5507556	0.0366585	-0.026426795	85.1026935	0.003029808	
CTS SYSTEM_0000125.LAB	6/24	08:03:58	444.541342	0.0748821	-0.028383554	85.0979009	-0.002001894	
CTS SYSTEM_0000126.LAB	6/24	08:04:13	444.0381051	0.0258605	-0.030728912	85.1093405	-0.002437986	
CTS SYSTEM_0000127.LAB	6/24	08:04:28	442.6260923	0.0200833	-0.034378727	85.0918842	-0.001488025	
CTS SYSTEM_0000128.LAB	6/24	08:04:42	440.4905954	0.0607332	-0.031653653	85.111848	-0.014607497	
CTS SYSTEM_0000129.LAB	6/24	08:04:57	437.9545786	0.0458862	-0.030627608	85.0885191	-0.003379464	
CTS SYSTEM_0000130.LAB	6/24	08:05:12	442.0115889	0.0347456	-0.031836548	85.0522735	-0.007523144	
CTS SYSTEM_0000131.LAB	6/24	08:05:27	6317.859792	0.1380004	0.057241885	52.6408229	-0.007484222	
CTS SYSTEM_0000132.LAB	6/24	08:05:42	17340.31644	0.1069363	0.070899247	12.3197293	0.004577634	
CTS SYSTEM_0000133.LAB	6/24	08:05:56	13864.48418	0.0081806	0.070975197	3.40244468	-0.001048628	
CTS SYSTEM_0000134.LAB	6/24	08:06:15	3342.3813	-0.026783	0.038291823	1.13929982	0.00523129	
CTS SYSTEM_0000135.LAB	6/24	08:06:29	1394.299352	0.0121708	0.017959072	0.80312553	-0.002507942	
CTS SYSTEM_0000136.LAB	6/24	08:06:44	1005.36394	0.0043371	0.00612174	0.74614009	0.00016645	
CTS SYSTEM_0000137.LAB	6/24	08:06:59	836.4701033	0.0209157	0.014921519	0.69590789	0.000833452	
CTS SYSTEM_0000138.LAB	6/24	08:07:14	744.2309169	0.0493859	0.007192566	0.65090863	0.003732821	
NATIVE_0000139.LAB	6/24	08:12:53	28255.54278	0.2099999	0.002024113	3.67720679	-0.012274125	
NATIVE_0000140.LAB	6/24	08:13:08	28266.94381	0.2103294	0.009642574	3.68216589	0.00226527	
NATIVE_0000141.LAB	6/24	08:13:26	28292.38084	0.2458861	0.006280728	3.68226076	0.000591933	
NATIVE_0000142.LAB	6/24	08:13:41	28290.94648	0.2283026	0.005583316	3.66079867	-0.237307584	
NATIVE_0000143.LAB	6/24	08:13:56	28294.76588	0.2339441	0.00440382	3.66565811	-0.008457661	
NATIVE_0000144.LAB	6/24	08:14:11	28306.70602	0.2120019	0.001752379	3.65110437	0.001212724	
NATIVE_0000145.LAB	6/24	08:14:25	28288.24739	0.2275622	0.009599018	3.64023774	-0.007827303	
NATIVE_0000146.LAB	6/24	08:14:44	28192.79584	0.2114724	0.008547101	3.61017277	-0.034886157	
NATIVE_0000147.LAB	6/24	08:14:58	28377.9365	0.2611624	0.012612848	3.61489874	-0.019958424	
NATIVE_0000148.LAB	6/24	08:15:17	28366.03731	0.2255882	0.014131297	3.55161743	-0.003330639	
NATIVE_0000149.LAB	6/24	08:15:31	28348.45108	0.2180415	0.020934987	3.544997	0.000408616	
NATIVE_0000150.LAB	6/24	08:15:46	28356.40748	0.225781	0.013283575	3.5183828	-0.118794357	
NATIVE_0000151.LAB	6/24	08:16:04	28364.91339	0.2504276	0.012184125	3.5271267	-0.005710787	
NATIVE_0000152.LAB	6/24	08:16:19	28362.4239	0.2038309	0.011914157	3.56438104	-0.000328944	
NATIVE_0000153.LAB	6/24	08:16:34	28356.73635	0.2496668	0.015949542	3.55651626	-0.01806661	
NATIVE_0000154.LAB	6/24	08:16:49	28367.84085	0.2515308	0.017421099	3.54741268	0.000138189	
NATIVE_0000155.LAB	6/24	08:17:04	28374.97029	0.2387062	0.013574693	3.56281572	-0.000498596	Native EtO
NATIVE_0000156.LAB	6/24	08:17:18	28386.77535	0.2234668	0.012970424	3.58035264	-0.001528804	EtO Avg: 0.017
NATIVE_0000157.LAB	6/24	08:17:33	28363.88071	0.2226014	0.017782295	3.5735638	0.001924084	C2H6 Avg: 0.25
NATIVE_0000158.LAB	6/24	08:17:48	28378.34161	0.2548466	0.014078932	3.57711337	-0.001520051	
NATIVE_0000159.LAB	6/24	08:18:03	28243.39117	0.2425336	0.01353549	3.54019773	-0.003870753	
NATIVE_0000160.LAB	6/24	08:18:21	28416.46102	0.2428214	0.02118598	3.57468332	-0.023625333	
SPIKE_0000161.LAB	6/24	08:18:36	28419.42289	0.2819438	0.019995926	3.56617944	-0.044793851	
SPIKE_0000162.LAB	6/24	08:18:51	28408.83401	0.2489809	0.019983126	3.55797996	0.000200331	
SPIKE_0000163.LAB	6/24	08:19:05	28409.43045	0.2633215	0.019879871	3.60476935	-0.032041434	
SPIKE_0000164.LAB	6/24	08:19:20	28404.08113	0.2721576	0.02161896	3.54781913	-0.004311803	
SPIKE_0000165.LAB	6/24	08:19:35	28121.5322	0.2906094	0.020094322	3.46822599	-0.001174884	
SPIKE_0000166.LAB	6/24	08:19:50	27096.35581	0.4324989	0.028575326	3.3397008	0.000749818	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
SPIKE_0000167.LAB	6/24	08:20:04	26872.4267	0.4512916	0.034810993	3.36861769	0.002167181	
SPIKE_0000168.LAB	6/24	08:20:19	26746.89527	0.47558	0.029779262	3.41041585	-0.009055056	
SPIKE_0000169.LAB	6/24	08:20:37	26643.70375	0.5237449	0.028654862	3.78536475	-0.010550862	
SPIKE_0000170.LAB	6/24	08:20:52	26415.87232	4.8334832	0.0453139	3.42322735	-0.007241259	
SPIKE_0000171.LAB	6/24	08:21:07	26360.5071	34.49219	0.134282519	3.26802927	-0.002869749	
SPIKE_0000172.LAB	6/24	08:21:22	26296.58737	39.679913	0.145606435	3.19736661	-0.011844301	
SPIKE_0000173.LAB	6/24	08:21:36	26251.86068	40.911149	0.15146375	3.13233145	0.000592597	
SPIKE_0000174.LAB	6/24	08:21:51	26228.68551	41.684098	0.156107581	3.12788238	-0.009134944	
SPIKE_0000175.LAB	6/24	08:22:06	26222.55157	42.092493	0.157571454	3.17080145	-0.063573491	
SPIKE_0000176.LAB	6/24	08:22:21	26214.97518	42.389851	0.157403774	3.14355919	-0.001915668	
SPIKE_0000177.LAB	6/24	08:22:35	26199.60941	42.735527	0.159736978	3.10814334	-0.009881913	
SPIKE_0000178.LAB	6/24	08:23:01	26197.95542	42.827525	0.160768892	3.12906778	-0.000358647	
SPIKE_0000179.LAB	6/24	08:23:23	26195.51351	42.931434	0.157685722	3.15994354	-0.007063913	
SPIKE_0000180.LAB	6/24	08:23:41	26201.91929	42.732159	0.167750728	3.15918876	-0.013492675	
SPIKE_0000181.LAB	6/24	08:23:56	26191.23631	42.852964	0.162286762	3.20749346	0.002553987	
SPIKE_0000182.LAB	6/24	08:24:10	26243.04761	42.730572	0.177996889	3.25557932	0.000572249	
SPIKE_0000183.LAB	6/24	08:24:29	26044.75881	45.635185	0.185490111	3.06892022	-0.014049924	
SPIKE_0000184.LAB	6/24	08:24:50	26233.14538	43.471849	0.179101389	3.121863	0.000976279	
SPIKE_0000185.LAB	6/24	08:25:05	26245.24131	43.775015	0.179555187	3.1635806	-0.006701107	
SPIKE_0000186.LAB	6/24	08:25:20	26208.22975	43.824769	0.179841056	3.09595384	0.001143884	
SPIKE_0000187.LAB	6/24	08:25:35	26214.73705	43.820968	0.181332405	3.09503967	-0.012185507	
SPIKE_0000188.LAB	6/24	08:25:49	26231.64759	43.901963	0.183293182	3.1147678	-0.001852327	
SPIKE_0000189.LAB	6/24	08:26:08	26233.93878	43.87651	0.186039794	3.18186391	0.004972631	
SPIKE_0000190.LAB	6/24	08:26:22	26221.7147	43.719445	0.186601672	3.13572827	0.002714727	
SPIKE_0000191.LAB	6/24	08:26:37	26227.32506	43.837036	0.188250907	3.1211711	-0.018223983	
SPIKE_0000192.LAB	6/24	08:26:52	26230.29622	43.720665	0.19619039	3.19118031	-0.002559908	
SPIKE_0000193.LAB	6/24	08:27:10	26218.27505	44.666317	0.196865845	3.15803608	-0.088235996	
SPIKE_0000194.LAB	6/24	08:27:25	25853.86035	51.832441	0.217011104	3.05786756	0.001131559	
SPIKE_0000195.LAB	6/24	08:27:43	25836.71581	51.826269	0.218849205	3.06071286	-3.3046E-05	
SPIKE_0000196.LAB	6/24	08:28:02	25821.79965	52.045586	0.227771084	3.04953591	-0.319020297	
SPIKE_0000197.LAB	6/24	08:28:16	25834.68688	51.995916	0.216420228	3.0103316	0.000672429	
SPIKE_0000198.LAB	6/24	08:28:35	25839.96876	52.024574	0.215512508	3.00844225	-0.001674749	Dynamic Spike
SPIKE_0000199.LAB	6/24	08:28:49	25851.05475	52.193681	0.213915871	3.00907444	-0.003423209	EtO Avg: 0.199
SPIKE_0000200.LAB	6/24	08:29:04	25871.91136	51.917081	0.210737959	3.01347624	-0.00955526	C2H6 Avg: 49.774
SPIKE_0000201.LAB	6/24	08:29:22	26010.25899	48.974047	0.202107904	3.05732132	-0.013762512	
SPIKE_0000202.LAB	6/24	08:29:44	26001.2239	48.718073	0.196413363	3.06704051	0.003220805	
SPIKE_0000203.LAB	6/24	08:29:59	25999.60937	48.742839	0.191993718	3.05805675	-0.005820838	
SPIKE_0000204.LAB	6/24	08:30:14	26001.62507	48.813606	0.190754165	3.04711106	0.000915663	
SPIKE_0000205.LAB	6/24	08:30:28	26029.43346	48.825826	0.190043334	3.04886606	-0.005762101	
SPIKE_0000206.LAB	6/24	08:30:43	26015.55123	48.779682	0.190609286	3.04447376	-0.013483909	
SPIKE_0000207.LAB	6/24	08:30:58	26005.54493	48.753931	0.188827234	3.06019895	-0.000757099	
SPIKE_0000208.LAB	6/24	08:31:20	25900.02303	48.661206	0.172052859	3.03849244	0.0022298	
SPIKE_0000209.LAB	6/24	08:31:34	25221.99374	63.972086	0.220761748	2.9027346	-0.011592627	
SPIKE_0000210.LAB	6/24	08:31:49	23628.42382	97.128457	0.325589979	2.57437906	0.00282285	
Run 1 - Process Stack - Backvent Testing								
SAMPLE_0000760.LAB	6/24	11:31:23	29575.79179	0.3047806	0.014948807	3.36370318	-0.001094818	Stratification Check
SAMPLE_0000761.LAB	6/24	11:32:29	29613.78172	0.280457	0.055977003	3.37861571	-0.001954692	
SAMPLE_0000762.LAB	6/24	11:33:32	29624.18835	0.2961935	0.037192936	3.35392739	-0.001749269	
SAMPLE_0000763.LAB	6/24	11:34:38	29632.97438	0.2774191	0.026842601	3.31972733	0.002987686	
SAMPLE_0000764.LAB	6/24	11:35:37	29645.83919	0.2913575	0.020311822	3.3128448	-0.023087497	
SAMPLE_0000765.LAB	6/24	11:36:46	29606.01621	0.2973758	0.036601448	3.36162943	0.003079461	
SAMPLE_0000766.LAB	6/24	11:37:49	29628.41586	0.2852803	0.035049875	3.35798635	-0.00350261	
SAMPLE_0000767.LAB	6/24	11:38:51	29634.7428	0.2750127	0.026116752	3.34067318	-0.001228673	
SAMPLE_0000768.LAB	6/24	11:39:50	29651.78561	0.2952056	0.020016849	3.31748264	0.001624712	
SAMPLE_0000769.LAB	6/24	11:40:49	29653.84563	0.2838091	0.017109236	3.30408741	-0.007858824	
SAMPLE_0000770.LAB	6/24	11:41:52	29661.12643	0.2896706	0.013806786	3.29886473	0.001454349	Stratification Check
SAMPLE_0000771.LAB	6/24	11:42:55	29660.83286	0.2976912	0.0133857	3.29181397	-0.004894265	
SAMPLE_0000772.LAB	6/24	11:43:54	29676.66828	0.2985921	0.011292059	3.28007692	-0.00719718	
SAMPLE_0000773.LAB	6/24	11:45:04	29692.22773	0.2988047	0.010502834	3.28848442	0.001046918	
SAMPLE_0000774.LAB	6/24	11:46:03	29717.25527	0.3043975	0.012147945	3.83696983	-0.001493447	
SAMPLE_0000775.LAB	6/24	11:47:09	29725.56402	0.308622	0.011905784	3.37766647	0.000635441	
SAMPLE_0000776.LAB	6/24	11:48:08	29747.06806	0.2913276	0.008627305	3.31407651	-0.043031311	
Average			29655.8	0.293	0.0219	3.359	-0.005	EtO Avg: 0.020
Run 2 - Process Stack - Backvent Testing								
SAMPLE_0000777.LAB	6/24	11:49:07	29752.72727	0.3027276	0.010825931	3.3090298	-0.014175735	Stratification Check
SAMPLE_0000778.LAB	6/24	11:50:17	29780.57707	0.2834304	0.016568666	3.28913154	-0.010000605	
SAMPLE_0000779.LAB	6/24	11:51:26	29775.5219	0.2858236	0.076737152	3.33836702	-0.00176006	
SAMPLE_0000780.LAB	6/24	11:52:26	29791.95686	0.288918	0.027297742	3.32452711	-0.65550635	
SAMPLE_0000781.LAB	6/24	11:53:25	29816.96285	0.271387	0.01613906	3.32115576	0.001581113	
SAMPLE_0000782.LAB	6/24	11:54:27	29834.87979	0.301619	0.013175839	3.3264904	-0.003768523	
SAMPLE_0000783.LAB	6/24	11:55:26	29850.60364	0.2997437	0.010942315	3.3185387	-0.002331482	
SAMPLE_0000784.LAB	6/24	11:56:32	29859.72411	0.2788207	0.006760763	3.31273883	-0.002379533	
SAMPLE_0000785.LAB	6/24	11:57:31	29859.64751	0.2960571	0.006588403	3.31761655	-0.000982073	
SAMPLE_0000786.LAB	6/24	11:58:30	29872.64028	0.2895906	0.007906284	3.30640167	0.001256671	
SAMPLE_0000787.LAB	6/24	11:59:40	29876.76506	0.2946296	0.005192157	3.30891366	-0.002163437	Stratification Check
SAMPLE_0000788.LAB	6/24	12:00:49	29889.82493	0.3035236	0.004936893	3.31085828	-0.000541922	
SAMPLE_0000789.LAB	6/24	12:01:49	29900.34857	0.288426	0.009309579	3.29836975	-0.001833115	
SAMPLE_0000790.LAB	6/24	12:02:55	29914.81445	0.2937843	0.0069618	3.3025093	-0.007069257	
SAMPLE_0000791.LAB	6/24	12:04:08	29935.43949	0.2846064	0.009738118	3.30333655	-0.011248213	
Average			29847.5	0.291	0.0153	3.313	-0.047	
Run 3 - Process Stack - Backvent Testing								
SAMPLE_0000792.LAB	6/24	12:05:11	29968.51522	0.3070168	<0.0049	3.29108485	-0.003245779	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
SAMPLE_0000793.LAB	6/24	12:06:13	29976.85426	0.2919317	<0.0049	3.33419344	0.001825903	
SAMPLE_0000794.LAB	6/24	12:07:12	29996.50475	0.2973685	<0.0049	3.31267203	-0.010453455	
SAMPLE_0000795.LAB	6/24	12:08:15	30001.07151	0.307627	0.0050	3.30349429	-0.02801647	
SAMPLE_0000796.LAB	6/24	12:09:18	30002.24364	0.3083013	<0.0049	3.29815887	-0.010222406	
SAMPLE_0000797.LAB	6/24	12:10:20	30034.94798	0.3030823	<0.0049	3.2969988	0.002957082	
SAMPLE_0000798.LAB	6/24	12:11:19	30049.42343	0.3142606	<0.0049	3.29675797	-0.000145724	
SAMPLE_0000799.LAB	6/24	12:12:25	30045.93007	0.3073546	0.0294	3.26165865	-0.001198011	
SAMPLE_0000800.LAB	6/24	12:13:28	30062.31723	0.3071186	0.0550	3.22689856	0.001018606	
SAMPLE_0000801.LAB	6/24	12:14:30	30069.80725	0.2928718	0.0191	3.23678116	-0.004332435	
SAMPLE_0000802.LAB	6/24	12:15:33	30098.10265	0.3041099	0.0070	3.23062274	-0.001189282	
SAMPLE_0000803.LAB	6/24	12:16:43	30106.75518	0.3129269	0.0066	3.22940989	0.000923469	
SAMPLE_0000804.LAB	6/24	12:17:42	30105.34174	0.3036891	<0.0049	3.2226214	-0.010131987	
SAMPLE_0000805.LAB	6/24	12:18:48	30122.22455	0.3122326	<0.0049	3.23037897	-0.004436088	
SAMPLE_0000806.LAB	6/24	12:19:54	30136.85872	0.3016601	<0.0049	3.22878253	-6.80834E-05	
Average			30051.8	0.305	<0.0111	3.267	-0.004	
Post-Test Calibration Check								
POST ZERO SYST_0000822.LAB	6/24	12:36:21	11573.79431	115.35941	0.5027974	4.16466559	-2.89286E-05	
POST ZERO SYST_0000823.LAB	6/24	12:36:36	1857.967533	2.6899908	0.034959835	0.36190102	-0.006492945	
POST ZERO SYST_0000824.LAB	6/24	12:36:54	1241.816253	0.9785075	0.019110235	0.32948262	0.00073863	
POST ZERO SYST_0000825.LAB	6/24	12:37:09	1054.470749	0.7136388	0.015163498	0.33531552	-0.006461486	
POST ZERO SYST_0000826.LAB	6/24	12:37:23	958.4022904	0.5937891	0.009985278	0.32688012	-0.000196001	
POST ZERO SYST_0000827.LAB	6/24	12:37:38	883.7464274	0.5128994	0.004902943	0.33155797	0.001199981	
POST ZERO SYST_0000828.LAB	6/24	12:37:56	836.6541807	0.452733	0.014716791	0.34966592	0.000736697	System Zero
POST ZERO SYST_0000829.LAB	6/24	12:38:11	803.0461423	0.4029539	0.00807706	0.33391935	0.003682913	EtO Zero
POST ZERO SYST_0000830.LAB	6/24	12:38:26	772.9319353	0.3564403	0.009855489	0.33798308	-0.015825295	
POST ZERO SYST_0000831.LAB	6/24	12:38:41	755.1522913	0.339067	0.004594862	0.34066968	0.002089108	
POST ZERO SYST_0000832.LAB	6/24	12:38:55	737.4256032	0.2844192	0.006047258	0.3342639	0.001022546	
POST ZERO SYST_0000833.LAB	6/24	12:39:10	722.7170726	0.233796	0.007286336	0.3287227	-0.001558514	
POST ZERO SYST_0000834.LAB	6/24	12:39:25	715.6781703	0.2461283	0.005020433	0.33682933	-0.041048698	
POST ZERO SYST_0000835.LAB	6/24	12:39:40	702.6529597	0.2209299	0.00720474	0.32949606	-0.001479166	
POST ZERO SYST_0000836.LAB	6/24	12:39:55	696.5189736	0.2567386	0.006922898	0.34338342	-0.008106894	
POST ZERO SYST_0000837.LAB	6/24	12:40:20	683.6066321	0.2026913	0.009768549	0.32497124	-0.003462529	
POST ZERO SYST_0000838.LAB	6/24	12:40:35	685.8465955	0.2026488	0.003131271	0.33866027	-0.015960519	
POST ZERO SYST_0000839.LAB	6/24	12:40:49	753.0632745	0.058458	0.029124542	26.224489	-0.003929749	
POST ZERO SYST_0000840.LAB	6/24	12:41:04	784.4744476	0.1300487	-0.008575602	83.6014005	-0.00514952	
POST ZERO SYST_0000841.LAB	6/24	12:41:19	773.3053889	0.1531923	-0.00440418	84.8265186	-0.007699704	
POST ZERO SYST_0000842.LAB	6/24	12:41:34	772.3787512	0.1750114	-0.007443258	84.960304	0.004020664	
POST ZERO SYST_0000843.LAB	6/24	12:41:49	763.0524974	0.1561882	-0.007001939	85.0571441	0.000947441	
POST ZERO SYST_0000844.LAB	6/24	12:42:04	752.9263571	0.1440016	-0.009904876	85.1256368	0.00284037	
POST ZERO SYST_0000845.LAB	6/24	12:42:22	750.6364467	0.1771316	-0.009392647	85.1483703	0.001531313	
POST ZERO SYST_0000846.LAB	6/24	12:42:37	754.5402353	0.1637319	-0.002815046	85.1860724	-0.015095656	
POST ZERO SYST_0000847.LAB	6/24	12:42:51	738.4569051	0.1439474	-0.010659472	85.2053787	-0.023047929	System CTS
POST ZERO SYST_0000848.LAB	6/24	12:43:10	733.5028489	0.1593547	-0.012212867	85.2558601	-0.000226186	CH4 Avg: 85.3
POST ZERO SYST_0000849.LAB	6/24	12:43:24	730.9453458	0.1493509	-0.001912886	85.2792482	0.000801882	
POST ZERO SYST_0000850.LAB	6/24	12:43:39	737.3871338	0.1118857	-0.002140176	85.303806	-0.024998645	
POST ZERO SYST_0000851.LAB	6/24	12:43:57	728.8832407	0.1296756	-0.007641741	85.2812022	-0.009154615	
POST ZERO SYST_0000852.LAB	6/24	12:44:12	726.1395961	0.1417624	-0.00658292	85.3237318	0.005592166	
POST ZERO SYST_0000853.LAB	6/24	12:44:27	720.7185742	0.1088844	-0.00629962	85.3125031	-0.003817236	
POST ZERO SYST_0000854.LAB	6/24	12:44:42	720.7346177	0.1149841	-0.017764567	85.3168666	-0.002103164	
POST ZERO SYST_0000855.LAB	6/24	12:45:00	724.4933446	0.1150424	-0.002431213	85.3084637	0.001549579	
POST ZERO SYST_0000856.LAB	6/24	12:45:15	727.8795318	0.118171	-0.000355124	85.3079107	0.001064277	
POST ZERO SYST_0000857.LAB	6/24	12:45:29	747.3523041	0.0592703	0.03021811	21.869455	0.004246247	
POST ZERO SYST_0000858.LAB	6/24	12:45:44	671.047423	0.1032587	0.002782617	1.36622307	0.001928092	
POST ZERO SYST_0000859.LAB	6/24	12:45:59	652.9809327	0.1102148	-9.72999E-06	0.89757381	-0.003988628	
POST ZERO SYST_0000860.LAB	6/24	12:46:14	652.9404074	0.0874744	0.003742619	0.73126546	-0.002003876	
POST CTS SYST_0000861.LAB	6/24	12:46:29	642.40251	0.0585637	0.002707062	0.6091649	0.000597304	
MDC#2 Study								
AMBIENT_0000862.LAB	6/24	12:51:32	24998.09289	0.1139908	0.004425988	2.71214149	0.002620732	
AMBIENT_0000863.LAB	6/24	12:51:47	22240.12803	0.0020084	0.001705996	2.39633419	0.001283503	
AMBIENT_0000864.LAB	6/24	12:52:06	22181.79057	0.000753	-0.008422585	2.35476726	-0.029044443	
AMBIENT_0000865.LAB	6/24	12:52:21	22132.36369	0.006879	-0.002437743	2.33640853	-0.001274377	
AMBIENT_0000866.LAB	6/24	12:52:35	22280.30074	0.0204865	0.00573527	2.38138185	-0.0023204	
AMBIENT_0000867.LAB	6/24	12:52:50	21900.13756	0.0214275	-0.00374154	2.37763225	-0.004889422	
AMBIENT_0000868.LAB	6/24	12:53:05	21949.55407	0.0067801	-0.003588641	2.44438016	-0.013368088	
AMBIENT_0000869.LAB	6/24	12:53:19	21952.52782	0.0084924	-0.003329828	2.33198438	-0.000358314	
AMBIENT_0000870.LAB	6/24	12:53:34	21857.70898	0.0192542	2.70263E-05	2.31906265	-0.004177833	
AMBIENT_0000871.LAB	6/24	12:53:56	21772.92065	-0.009016	-0.01332043	2.30707621	0.000389	
AMBIENT_0000872.LAB	6/24	12:55:16	21817.20819	-0.005659	0.000158032	2.31598734	-0.006147125	
AMBIENT_0000873.LAB	6/24	12:56:18	22102.81713	0.0164246	-0.002899593	2.35747405	-0.142324128	
AMBIENT_0000874.LAB	6/24	12:57:21	22219.61162	0.020846	-5.62204E-05	2.36749061	-0.013009555	
AMBIENT_0000875.LAB	6/24	12:58:20	21936.27589	0.0052696	-0.002769845	2.31823855	-0.010108704	Sampling Ambient Air
AMBIENT_0000876.LAB	6/24	12:59:23	21682.54964	0.0023932	-0.000658657	2.31776465	0.003123166	MDC#2
AMBIENT_0000877.LAB	6/24	13:00:22	21758.42613	-0.00117	-0.000301739	2.3065675	-0.010280382	EtO Stdev: 0.0016
AMBIENT_0000878.LAB	6/24	13:01:31	21519.20215	-2.75E-07	-4.60277E-08	2.29199995	-0.014347885	EtO MDC#2: 0.0049
AMBIENT_0000879.LAB	6/24	13:02:30	21649.62418	0.0058074	-0.002159315	2.30222171	-0.002840911	
AMBIENT_0000880.LAB	6/24	13:03:29	21736.75035	0.0024193	-0.000681456	2.31522585	-0.007894592	
AMBIENT_0000881.LAB	6/24	13:04:35	21622.67712	0.0021491	0.003267673	2.2977764	0.000114622	
AMBIENT_0000882.LAB	6/24	13:05:35	21585.23891	-0.008644	-0.000450452	2.29025964	-0.008058948	
AMBIENT_0000883.LAB	6/24	13:06:38	21600.99503	-0.00627	0.000143257	2.30092592	-0.001199829	
AMBIENT_0000884.LAB	6/24	13:07:44	21986.01573	0.0033115	-0.002520631	2.32996552	-0.002298793	
PRE-ZERO_0000885.LAB	6/24	13:51:14	85.79856617	0.0045111	-0.008082608	0.01974945	0.002125234	
Run 1 - Process Stack - Aeration Testing								

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
SAMPLE_S001_0000010.LAB	6/24	14:24:43	30941.39885	-0.13404	<0.0049	2.95431861	0.002773524	
SAMPLE_S001_0000011.LAB	6/24	14:25:49	30946.37729	-0.150919	<0.0049	2.95684037	0.000487826	
SAMPLE_S001_0000012.LAB	6/24	14:26:58	30959.51503	-0.14964	<0.0049	2.96195721	0.003336081	
SAMPLE_S001_0000013.LAB	6/24	14:28:04	30942.58611	-0.131683	<0.0049	2.96352527	0.000625644	
SAMPLE_S001_0000014.LAB	6/24	14:29:07	30952.51472	-0.142795	<0.0049	2.96495923	-0.00129877	
SAMPLE_S001_0000015.LAB	6/24	14:30:17	30947.81869	-0.151539	<0.0049	2.94867399	0.003526809	
SAMPLE_S001_0000016.LAB	6/24	14:31:27	30953.34073	-0.153072	<0.0049	2.9398241	-0.102986168	
SAMPLE_S001_0000017.LAB	6/24	14:32:36	30961.82587	-0.137093	<0.0049	2.95055997	0.000346573	
SAMPLE_S001_0000018.LAB	6/24	14:33:39	30968.31865	-0.140805	<0.0049	2.96257642	0.000541367	
SAMPLE_S001_0000019.LAB	6/24	14:34:38	30965.53802	-0.144803	<0.0049	2.96870835	-0.019941592	
SAMPLE_S001_0000020.LAB	6/24	14:35:48	30962.7514	-0.154493	<0.0049	2.9652687	-0.005174988	
SAMPLE_S001_0000021.LAB	6/24	14:36:54	30967.84552	-0.155492	<0.0049	2.97382183	-0.008913017	
SAMPLE_S001_0000022.LAB	6/24	14:37:53	30984.32641	-0.155863	<0.0049	2.97983734	0.001319319	
SAMPLE_S001_0000023.LAB	6/24	14:38:56	30997.04407	-0.143111	<0.0049	2.99422377	0.00234628	
SAMPLE_S001_0000024.LAB	6/24	14:39:55	30977.0438	-0.147346	<0.0049	2.98885988	-0.003155351	
SAMPLE_S001_0000025.LAB	6/24	14:41:11	30970.81894	-0.144946	<0.0049	2.98145301	-0.00862244	
SAMPLE_S001_0000026.LAB	6/24	14:42:14	30980.44198	-0.152078	<0.0049	2.97650237	-0.00172941	
SAMPLE_S001_0000027.LAB	6/24	14:43:16	31003.82648	-0.134975	<0.0049	2.97421409	0.000534141	
SAMPLE_S001_0000028.LAB	6/24	14:44:22	31002.03461	-0.135254	<0.0049	2.99190865	-0.002674455	
SAMPLE_S001_0000029.LAB	6/24	14:45:25	30991.38703	-0.148343	<0.0049	2.99738771	-0.005337347	
SAMPLE_S001_0000030.LAB	6/24	14:46:34	30984.14729	-0.143357	<0.0049	3.00552921	-0.004421252	
SAMPLE_S001_0000031.LAB	6/24	14:47:33	30938.2623	-0.150857	<0.0049	3.00391786	-0.00289146	
SAMPLE_S001_0000032.LAB	6/24	14:48:36	30918.47047	-0.148735	<0.0049	3.00544079	-0.022819843	
SAMPLE_S001_0000033.LAB	6/24	14:49:39	30906.51291	-0.150247	<0.0049	2.99407458	0.000612209	
SAMPLE_S001_0000034.LAB	6/24	14:50:48	30911.42374	-0.149243	<0.0049	3.00498325	-0.010334484	
SAMPLE_S001_0000035.LAB	6/24	14:51:47	30895.03362	-0.140883	<0.0049	3.00339027	-0.002840686	
SAMPLE_S001_0000036.LAB	6/24	14:52:50	30880.12923	-0.146103	<0.0049	2.99600256	-0.005670942	
SAMPLE_S001_0000037.LAB	6/24	14:53:49	30884.83591	-0.144356	<0.0049	3.01674242	-0.010191193	
SAMPLE_S001_0000038.LAB	6/24	14:54:52	30876.68337	-0.154846	<0.0049	3.00685311	0.00707259	
SAMPLE_S001_0000039.LAB	6/24	14:55:51	30882.67544	-0.145285	<0.0049	3.01756681	0.000120976	
SAMPLE_S001_0000040.LAB	6/24	14:57:04	30909.74892	-0.15112	<0.0049	3.02674479	-0.004966926	
SAMPLE_S001_0000041.LAB	6/24	14:58:04	30928.5263	-0.145374	<0.0049	3.03657762	-0.005963797	
SAMPLE_S001_0000042.LAB	6/24	14:59:03	30941.39784	-0.149854	<0.0049	3.04983895	-0.004012839	
SAMPLE_S001_0000043.LAB	6/24	15:00:09	30945.64636	-0.145591	<0.0049	3.04417877	-0.007543713	
SAMPLE_S001_0000044.LAB	6/24	15:01:18	30970.93023	-0.146994	<0.0049	3.05190692	0.004409302	
SAMPLE_S001_0000045.LAB	6/24	15:02:21	30998.12105	-0.147084	<0.0049	3.06102627	-0.007844811	
SAMPLE_S001_0000046.LAB	6/24	15:03:35	31017.7594	-0.142043	<0.0049	3.03801859	4.69514E-05	
SAMPLE_S001_0000047.LAB	6/24	15:04:34	31074.13265	-0.119914	<0.0049	3.04557817	0.00185366	
SAMPLE_S001_0000048.LAB	6/24	15:05:43	31048.97911	-0.122941	<0.0049	3.04896434	-0.001338203	
SAMPLE_S001_0000049.LAB	6/24	15:06:49	31050.26643	-0.136168	<0.0049	3.05561449	-0.000207162	
SAMPLE_S001_0000050.LAB	6/24	15:07:48	31042.18688	-0.135216	<0.0049	3.05920142	0.000783174	
SAMPLE_S001_0000051.LAB	6/24	15:08:47	31042.21767	-0.134833	<0.0049	3.07275001	-0.003085399	
SAMPLE_S001_0000052.LAB	6/24	15:10:00	31022.75503	-0.149345	<0.0049	3.0831991	-5.2405E-05	
SAMPLE_S001_0000053.LAB	6/24	15:10:59	31016.80582	-0.137892	<0.0049	3.08347102	-0.057976862	
SAMPLE_S001_0000054.LAB	6/24	15:12:13	30991.76731	-0.142777	<0.0049	3.08492584	0.001388347	
SAMPLE_S001_0000055.LAB	6/24	15:13:19	31001.02439	-0.126276	<0.0049	3.06352319	0.000141151	
SAMPLE_S001_0000056.LAB	6/24	15:14:22	31014.4985	-0.11806	0.0083	3.07241099	-0.002497023	
SAMPLE_S001_0000057.LAB	6/24	15:15:21	31023.70387	-0.118707	0.0068	3.05835909	0.000826525	
SAMPLE_S001_0000058.LAB	6/24	15:16:23	31000.9872	-0.122378	0.0076	3.06103494	0.001314069	
SAMPLE_S001_0000059.LAB	6/24	15:17:22	31004.28375	-0.109911	0.0059	3.07347789	-0.00269046	
SAMPLE_S001_0000060.LAB	6/24	15:18:28	30986.89122	-0.124895	0.0068	3.06530455	0.000619251	
SAMPLE_S001_0000061.LAB	6/24	15:19:45	31001.57379	-0.131279	0.0080	3.06737534	-0.00262672	
SAMPLE_S001_0000062.LAB	6/24	15:20:51	31003.32086	-0.12002	0.0058	3.07247802	0.000529628	
SAMPLE_S001_0000063.LAB	6/24	15:21:57	30998.2303	-0.12703	0.0068	3.11179684	0.000977186	
SAMPLE_S001_0000064.LAB	6/24	15:22:57	30992.15298	-0.127937	0.0080	3.09817729	0.000766647	
SAMPLE_S001_0000065.LAB	6/24	15:23:59	30987.90354	-0.126037	0.0094	3.09554551	0.001751681	
SAMPLE_S001_0000066.LAB	6/24	15:25:09	30987.27192	-0.123226	0.0058	3.09338734	0.002156163	
SAMPLE_S001_0000067.LAB	6/24	15:26:18	30994.70431	-0.126413	0.0089	3.09787828	0.004026359	
SAMPLE_S001_0000068.LAB	6/24	15:27:21	31001.17404	-0.143029	0.0053	3.10032107	-0.000260535	
Average			30973.8	-0.140	<0.0054	3.024	-0.005	
Post-Test Calibration Check								
POST ZERO SYST_S001_0000070.LAB	6/24	15:29:03	31017.71201	-0.137668	0.0084929	3.09876031	0.001538464	
POST ZERO SYST_S001_0000071.LAB	6/24	15:29:18	30906.09055	0.9658816	0.018480347	3.09557583	-0.054747347	
POST ZERO SYST_S001_0000072.LAB	6/24	15:29:33	13136.55752	31.787286	0.25426043	6.83170547	-0.001959136	
POST ZERO SYST_S001_0000073.LAB	6/24	15:29:47	1817.775023	1.1565531	0.029444113	0.41068093	-0.000563786	
POST ZERO SYST_S001_0000074.LAB	6/24	15:30:02	1190.759407	0.5543875	0.014070661	0.34751661	0.002530801	
POST ZERO SYST_S001_0000075.LAB	6/24	15:30:20	938.4363098	0.3753624	0.013296816	0.34418916	0.00243607	
POST ZERO SYST_S001_0000076.LAB	6/24	15:30:39	809.2773682	0.3235509	0.009713551	0.34762491	0.000535653	
POST ZERO SYST_S001_0000077.LAB	6/24	15:30:57	727.7827174	0.2645919	0.00924126	0.33515717	0.001480015	
POST ZERO SYST_S001_0000078.LAB	6/24	15:31:12	683.2822161	0.2086606	0.011628072	0.34471688	-0.011895705	
POST ZERO SYST_S001_0000079.LAB	6/24	15:31:27	648.4166512	0.2202258	0.008593567	0.33982237	0.002707601	
POST ZERO SYST_S001_0000080.LAB	6/24	15:31:41	621.3806526	0.2013593	0.006243307	0.32734395	0.002102612	System Zero
POST ZERO SYST_S001_0000081.LAB	6/24	15:31:56	603.0714661	0.1806737	0.002452024	0.33885336	-0.004023369	EtO Zero
POST ZERO SYST_S001_0000082.LAB	6/24	15:32:14	581.9158605	0.1572884	0.003058412	0.33726132	0.001190307	
POST ZERO SYST_S001_0000083.LAB	6/24	15:32:32	570.2422787	0.1528489	0.003034224	0.34711718	-0.000400834	
POST ZERO SYST_S001_0000084.LAB	6/24	15:32:47	562.6484256	0.1297254	0.00383071	0.33633765	0.005181511	
POST ZERO SYST_S001_0000085.LAB	6/24	15:33:02	548.8567664	0.1504051	0.009793893	0.34857402	0.001272967	
POST ZERO SYST_S001_0000086.LAB	6/24	15:33:17	553.2476993	0.1368203	0.009228036	0.34509034	0.000537779	
POST ZERO SYST_S001_0000087.LAB	6/24	15:33:39	542.9157826	0.0974884	0.00557717	0.34226816	-0.001906414	
POST ZERO SYST_S001_0000088.LAB	6/24	15:33:54	531.6848038	0.1190456	0.005339111	0.33882924	-0.001192989	
POST ZERO SYST_S001_0000089.LAB	6/24	15:34:12	524.3249895	0.1104247	0.007263658	0.33942789	-0.00173154	
POST ZERO SYST_S001_0000090.LAB	6/24	15:34:27	524.5318554	0.0882269	0.00665994	0.33928881	0.000658608	
POST ZERO SYST_S001_0000091.LAB	6/24	15:34:41	15850.52663	0.077761	0.005756913	2.2903612	-0.006663857	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
POST ZERO SYST_0000092.LAB	6/24	15:34:56	30536.17893	0.3015409	0.006111894	3.5769276	-0.031260629	
POST ZERO SYST_0000093.LAB	6/24	15:35:14	30485.96909	-0.171308	0.008978812	3.0465526	-0.003925151	
POST ZERO SYST_0000094.LAB	6/24	15:35:33	30636.37926	-0.137775	0.0099355	3.06672359	0.001603486	
POST ZERO SYST_0000095.LAB	6/24	15:35:47	30715.34925	-0.149918	0.01053431	3.0748367	0.000541171	
POST ZERO SYST_0000096.LAB	6/24	15:36:02	30740.83905	-0.118158	0.011408664	3.06257163	0.00210672	
POST ZERO SYST_0000097.LAB	6/24	15:36:17	30775.46402	-0.161451	0.006791649	3.0525203	-0.007825441	
POST ZERO SYST_0000098.LAB	6/24	15:36:32	30793.72427	-0.150088	0.005499874	3.0498199	-0.000482012	
POST ZERO SYST_0000099.LAB	6/24	15:36:50	13967.82473	-0.172275	-0.017671206	33.6214235	-0.000453163	
POST ZERO SYST_0000100.LAB	6/24	15:37:05	1535.227353	0.0777003	0.007152604	84.0020441	-0.014297383	
POST ZERO SYST_0000101.LAB	6/24	15:37:27	1008.760136	0.0465144	-0.000222821	84.6302136	-0.002353456	
POST ZERO SYST_0000102.LAB	6/24	15:37:41	855.2194244	0.0273009	-0.003409426	84.7966964	-0.019612379	System CTS
POST CTS SYST_0000103.LAB	6/24	15:37:56	775.9994108	0.0186882	-0.008966398	84.8471791	0.003273808	CH4 Avg: 84.9
POST CTS SYST_0000104.LAB	6/24	15:38:11	730.9835037	0.0159769	-0.011027632	84.8859794	0.000856576	
POST CTS SYST_0000105.LAB	6/24	15:38:29	688.0196153	0.0422505	-0.010831307	84.9109514	-0.001066163	
POST CTS SYST_0000106.LAB	6/24	15:38:48	665.9664342	0.0185524	-0.005128005	84.9247229	0.002077653	
POST CTS SYST_0000107.LAB	6/24	15:39:02	647.306008	0.0470349	-0.016313195	84.98189	0.002267778	
POST CTS SYST_0000108.LAB	6/24	15:39:17	628.2414708	0.0163716	-0.013725498	84.9716697	0.001178358	
POST CTS SYST_0000109.LAB	6/24	15:39:35	620.7333871	0.0272652	-0.008901862	84.9789861	0.003609811	
POST CTS SYST_0000110.LAB	6/24	15:39:54	609.1049805	0.0165943	-0.011912559	85.0293127	-0.002939455	
POST CTS SYST_0000111.LAB	6/24	15:40:08	599.0671588	0.0248404	-0.014236232	85.0375798	0.005788186	
POST CTS SYST_0000112.LAB	6/24	15:40:23	593.4073208	0.0399306	-0.012397265	85.0426656	-0.003472591	
Run 2 - Process Stack - Aeration Testing								
SAMPLE_0001_0000113.LAB	6/24	15:45:34	30883.45335	-0.1388	0.0067	3.08724186	-0.004390595	
SAMPLE_0001_0000114.LAB	6/24	15:46:33	30948.97372	-0.13653	0.0058	3.09966018	0.001811795	
SAMPLE_0001_0000115.LAB	6/24	15:47:43	30962.33858	-0.127545	0.0092	3.08355114	8.34551E-05	
SAMPLE_0001_0000116.LAB	6/24	15:48:45	30966.85319	-0.130919	0.0075	3.07529679	-0.000777895	
SAMPLE_0001_0000117.LAB	6/24	15:49:48	30991.2453	-0.147696	0.0071	3.07252934	-0.000891939	
SAMPLE_0001_0000118.LAB	6/24	15:50:47	30991.33921	-0.134808	0.0064	3.07979682	0.00054448	
SAMPLE_0001_0000119.LAB	6/24	15:51:53	31008.4063	-0.131101	0.0094	3.09415663	0.002065663	
SAMPLE_0001_0000120.LAB	6/24	15:52:59	30988.15883	-0.138799	0.0054	3.09535093	-4.73869E-05	
SAMPLE_0001_0000121.LAB	6/24	15:54:05	30965.20099	-0.131241	0.0068	3.06699903	0.124350334	
SAMPLE_0001_0000122.LAB	6/24	15:55:08	30992.39799	-0.128279	<0.0049	3.05228669	-0.001827367	
SAMPLE_0001_0000123.LAB	6/24	15:56:10	30987.75381	-0.143307	<0.0049	3.0530609	0.004133189	
SAMPLE_0001_0000124.LAB	6/24	15:57:13	30998.07893	-0.143006	0.0055	3.0553945	0.00385765	
SAMPLE_0001_0000125.LAB	6/24	15:58:23	30966.18324	-0.140901	<0.0049	3.05617713	0.005853705	
SAMPLE_0001_0000126.LAB	6/24	15:59:36	30966.20114	-0.14151	0.0061	3.05602688	0.000534256	
SAMPLE_0001_0000127.LAB	6/24	16:00:35	30955.94708	-0.133064	0.0069	3.03051789	0.001690986	
SAMPLE_0001_0000128.LAB	6/24	16:01:41	30961.59549	-0.141308	0.0065	3.03544211	-0.000443237	
SAMPLE_0001_0000129.LAB	6/24	16:02:44	30964.65992	-0.149888	<0.0049	3.04473638	0.001998789	
SAMPLE_0001_0000130.LAB	6/24	16:03:50	30958.6774	-0.13667	0.0055	3.04452789	0.000649326	
SAMPLE_0001_0000131.LAB	6/24	16:04:49	30962.84947	-0.139056	<0.0049	3.04759485	-0.005860021	
SAMPLE_0001_0000132.LAB	6/24	16:05:58	30946.71164	-0.129247	<0.0049	3.04178321	0.000587348	
SAMPLE_0001_0000133.LAB	6/24	16:07:04	30962.23922	-0.117063	0.0059	3.04250542	0.003564551	
SAMPLE_0001_0000134.LAB	6/24	16:08:04	30951.6312	-0.163841	<0.0049	3.03353268	0.003295675	
SAMPLE_0001_0000135.LAB	6/24	16:09:13	30965.32421	-0.160108	0.0066	3.06524789	0.000397158	
SAMPLE_0001_0000136.LAB	6/24	16:10:19	30947.92161	-0.161091	<0.0049	3.06440878	-0.003141874	
SAMPLE_0001_0000137.LAB	6/24	16:11:22	30957.30294	-0.159583	<0.0049	3.06143726	0.003013551	
SAMPLE_0001_0000138.LAB	6/24	16:12:24	30947.75649	-0.144729	<0.0049	3.06713352	0.002839361	
SAMPLE_0001_0000139.LAB	6/24	16:13:27	30964.26328	-0.152959	<0.0049	3.05035331	0.000789763	
SAMPLE_0001_0000140.LAB	6/24	16:14:26	30979.34575	-0.162473	<0.0049	3.04192377	-0.001908857	
SAMPLE_0001_0000141.LAB	6/24	16:15:25	30988.20516	-0.162415	<0.0049	3.04864055	0.00030158	
SAMPLE_0001_0000142.LAB	6/24	16:16:28	30979.13554	-0.158028	<0.0049	3.05608954	0.004524738	
SAMPLE_0001_0000143.LAB	6/24	16:17:28	30998.92456	-0.151434	<0.0049	3.0669876	-0.00422684	
SAMPLE_0001_0000144.LAB	6/24	16:18:30	30998.83644	-0.154808	<0.0049	3.05425479	-0.002299386	
SAMPLE_0001_0000145.LAB	6/24	16:19:36	31012.96421	-0.160519	<0.0049	3.06621694	0.00159971	
SAMPLE_0001_0000146.LAB	6/24	16:20:46	31010.43429	-0.151231	0.0052	3.09483107	0.000557845	
SAMPLE_0001_0000147.LAB	6/24	16:21:48	31016.65981	-0.162311	<0.0049	3.10133019	0.000543679	
SAMPLE_0001_0000148.LAB	6/24	16:23:01	31014.70943	-0.1705	<0.0049	3.09988281	-0.00423608	
SAMPLE_0001_0000149.LAB	6/24	16:24:04	31025.69806	-0.14765	0.0071	3.10600092	-0.0036092	
SAMPLE_0001_0000150.LAB	6/24	16:25:03	31019.59631	-0.163796	0.0270	3.18896949	0.002281232	
SAMPLE_0001_0000151.LAB	6/24	16:26:13	31033.27203	-0.168097	0.0231	3.15921505	0.002216305	
SAMPLE_0001_0000152.LAB	6/24	16:27:15	31019.87131	-0.170378	0.0214	3.14382586	0.000757614	
SAMPLE_0001_0000153.LAB	6/24	16:28:14	31025.06537	-0.151929	0.0188	3.12683346	-0.000709714	
SAMPLE_0001_0000154.LAB	6/24	16:29:20	31033.90318	-0.140406	0.0140	3.11045669	-0.001166578	
SAMPLE_0001_0000155.LAB	6/24	16:30:27	31053.81263	-0.133022	0.0105	3.08793582	-0.000625989	
SAMPLE_0001_0000156.LAB	6/24	16:31:26	31068.24781	-0.146503	0.0092	3.08524026	0.004086202	
SAMPLE_0001_0000157.LAB	6/24	16:32:28	31060.10079	-0.145206	0.0095	3.07452444	-0.000423625	
SAMPLE_0001_0000158.LAB	6/24	16:33:34	31059.05631	-0.130317	0.0131	3.09071576	0.00258781	
SAMPLE_0001_0000159.LAB	6/24	16:34:40	31067.47696	-0.140798	0.0120	3.09236991	-0.001700584	
SAMPLE_0001_0000160.LAB	6/24	16:35:43	31043.76509	-0.131521	0.0112	3.08927609	0.002550568	
SAMPLE_0001_0000161.LAB	6/24	16:36:42	31066.22962	-0.130282	0.0118	3.08471244	-0.006649545	
SAMPLE_0001_0000162.LAB	6/24	16:37:41	31077.78703	-0.147661	0.0132	3.07974813	0.000703153	
SAMPLE_0001_0000163.LAB	6/24	16:38:50	31090.64628	-0.147097	0.0139	3.09850337	0.000713311	
SAMPLE_0001_0000164.LAB	6/24	16:39:49	31091.2882	-0.140655	0.0107	3.10589351	0.000739021	
SAMPLE_0001_0000165.LAB	6/24	16:40:48	31069.88497	-0.137046	0.0088	3.10108495	0.000621195	
SAMPLE_0001_0000166.LAB	6/24	16:41:48	31069.78816	-0.132589	0.0111	3.09192727	0.000273451	
SAMPLE_0001_0000167.LAB	6/24	16:42:54	31067.31885	-0.137147	0.0146	3.09191363	0.000118796	
SAMPLE_0001_0000168.LAB	6/24	16:43:56	31068.39716	-0.138774	0.0108	3.08048443	-0.000850525	
SAMPLE_0001_0000169.LAB	6/24	16:45:02	31073.90999	-0.135602	0.0131	3.08681095	-0.000471814	
SAMPLE_0001_0000170.LAB	6/24	16:46:01	31096.44503	-0.136568	0.0084	3.09040696	0.001997735	
SAMPLE_0001_0000171.LAB	6/24	16:47:11	31077.98713	-0.13328	0.0087	3.09832669	0.001513255	
SAMPLE_0001_0000172.LAB	6/24	16:48:21	31071.10545	-0.137655	0.0085	3.09111098	0.00149856	
Average			31008.2	-0.144	<0.0086	3.079	0.002	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
Post-Test Calibration Check								
SAMPLE_S001_0000173.LAB	6/24	16:49:27	31080.94773	-0.14431	0.008491564	3.09176513	-0.000309616	
SAMPLE_S001_0000174.LAB	6/24	16:50:29	31082.89435	-0.137806	0.011623492	3.08393842	0.001171395	
POST ZERO SYST_S001_0000175.LAB	6/24	16:51:11	31089.15189	-0.124295	0.00970854	3.07980308	-0.003517908	
POST ZERO SYST_S001_0000176.LAB	6/24	16:51:26	31084.49279	-0.124974	0.005620801	3.08276044	-0.061184879	
POST ZERO SYST_S001_0000177.LAB	6/24	16:51:40	13685.49323	2.3515719	0.096483962	4.17716341	0.00425404	
POST ZERO SYST_S001_0000178.LAB	6/24	16:51:59	1654.571668	-0.012155	0.022689759	0.38962253	0.001139949	
POST ZERO SYST_S001_0000179.LAB	6/24	16:52:13	1049.884726	-0.017493	0.010823243	0.34676814	-0.008982801	
POST ZERO SYST_S001_0000180.LAB	6/24	16:52:32	853.5997596	-0.020331	0.010156339	0.33316556	-0.001292523	
POST ZERO SYST_S001_0000181.LAB	6/24	16:52:46	730.4633932	-0.019271	0.010269274	0.34311797	0.000146627	
POST ZERO SYST_S001_0000182.LAB	6/24	16:53:01	659.5777933	-0.01426	0.004625208	0.33837905	0.000306935	
POST ZERO SYST_S001_0000183.LAB	6/24	16:53:19	614.0412291	-0.0152	0.009056628	0.33031937	0.001033079	
POST ZERO SYST_S001_0000184.LAB	6/24	16:53:38	565.9140254	-0.04327	0.006858099	0.33258895	0.002319433	
POST ZERO SYST_S001_0000185.LAB	6/24	16:53:53	542.2789537	-0.019828	0.006077715	0.34622788	0.000875756	System Zero
POST ZERO SYST_S001_0000186.LAB	6/24	16:54:11	530.5912889	-0.017754	0.008603127	0.33619001	-0.001187144	EtO Zero
POST ZERO SYST_S001_0000187.LAB	6/24	16:54:25	514.6591873	-0.019854	0.005629462	0.32473309	0.000236758	
POST ZERO SYST_S001_0000188.LAB	6/24	16:54:40	499.7509039	-0.02336	0.004335189	0.32585994	0.00558697	
POST ZERO SYST_S001_0000189.LAB	6/24	16:54:55	493.0267125	-0.00895	0.002053509	0.3376823	0.001209251	
POST ZERO SYST_S001_0000190.LAB	6/24	16:55:10	481.3441686	-0.004901	0.00669794	0.32665901	-0.002781018	
POST ZERO SYST_S001_0000191.LAB	6/24	16:55:28	477.4506972	-0.017847	-0.002839777	0.34283292	0.001055067	
POST ZERO SYST_S001_0000192.LAB	6/24	16:55:43	470.5010229	-0.01778	0.00557242	0.33584793	0.000798902	
POST ZERO SYST_S001_0000193.LAB	6/24	16:55:58	470.8746786	-0.005552	0.005982817	0.33408833	0.000113763	
POST ZERO SYST_S001_0000194.LAB	6/24	16:56:16	458.5086877	-0.025606	0.006508288	0.33285994	0.005445924	
POST ZERO SYST_S001_0000195.LAB	6/24	16:56:31	459.5996482	-0.006431	0.003671142	0.32869738	-0.000883143	
POST ZERO SYST_S001_0000196.LAB	6/24	16:56:49	559.1834251	-0.035247	0.031062682	59.1985062	0.000669864	
POST ZERO SYST_S001_0000197.LAB	6/24	16:57:11	539.0360296	-0.006697	-0.016154361	84.2227846	-0.00298725	
POST ZERO SYST_S001_0000198.LAB	6/24	16:57:26	531.0405575	-0.007242	-0.014534837	84.6907653	-0.008755798	
POST ZERO SYST_S001_0000199.LAB	6/24	16:57:41	529.2876231	-0.006464	-0.013731124	84.7830635	0.000474473	
POST ZERO SYST_S001_0000200.LAB	6/24	16:57:55	521.8486311	0.0103138	-0.011037713	84.8232466	-0.004109982	
POST ZERO SYST_S001_0000201.LAB	6/24	16:58:10	523.2038481	0.0217744	-0.017286811	84.8854193	0.000383774	
POST ZERO SYST_S001_0000202.LAB	6/24	16:58:25	523.1656367	0.0045703	-0.01633971	84.8463611	0.001942326	System CTS
POST ZERO SYST_S001_0000203.LAB	6/24	16:58:40	523.162387	-0.015573	-0.016980146	84.9209476	0.000369986	CH4 Avg: 85.0
POST ZERO SYST_S001_0000204.LAB	6/24	16:58:55	511.7790226	0.0106689	-0.019278965	84.9333074	-0.000493645	
POST ZERO SYST_S001_0000205.LAB	6/24	16:59:09	510.4163402	0.0177603	-0.012951652	84.9551512	-0.000228966	
POST ZERO SYST_S001_0000206.LAB	6/24	16:59:24	512.1565828	0.0117664	-0.017725729	84.9687721	0.001518229	
POST ZERO SYST_S001_0000207.LAB	6/24	16:59:39	512.4557599	0.0141785	-0.018600509	84.9788878	-0.007569329	
POST ZERO SYST_S001_0000208.LAB	6/24	16:59:57	507.6620044	9.845E-06	-0.020580404	85.0343604	-0.000198577	
POST ZERO SYST_S001_0000209.LAB	6/24	17:00:12	504.5832567	0.0330708	-0.020386488	85.010263	0.002691529	
POST ZERO SYST_S001_0000210.LAB	6/24	17:00:30	505.9641896	0.0111657	-0.019411123	85.0069441	-4.95999E-05	
POST ZERO SYST_S001_0000211.LAB	6/24	17:00:45	510.6007742	-0.023997	-0.017610779	85.0718002	-0.003580646	
POST ZERO SYST_S001_0000212.LAB	6/24	17:01:00	502.2567967	0.0065427	-0.018731033	84.9346198	0.002409866	
POST ZERO SYST_S001_0000213.LAB	6/24	17:01:14	496.3303374	-0.194117	0.015524654	18.7509729	-0.003191	
POST ZERO SYST_S001_0000214.LAB	6/24	17:01:29	442.6254462	-0.039607	0.002767535	1.33553859	-0.014031914	
Run 3 - Process Stack - Aeration Testing								
SAMPLE_S001_0000215.LAB	6/24	17:05:47	30945.08972	-0.152474	0.007382814	3.06766657	-0.000459178	
SAMPLE_S001_0000216.LAB	6/24	17:06:46	31003.29765	-0.145637	0.01307575	3.0675874	-0.002139228	
SAMPLE_S001_0000217.LAB	6/24	17:07:52	31021.01768	-0.136723	0.010217037	3.04953876	0.000386901	
SAMPLE_S001_0000218.LAB	6/24	17:08:54	31029.91613	-0.142275	0.008372229	3.04313058	0.000795521	
SAMPLE_S001_0000219.LAB	6/24	17:09:57	31051.11026	-0.142349	0.010052728	3.04847809	0.003576509	
SAMPLE_S001_0000220.LAB	6/24	17:11:03	31060.45396	-0.143453	0.008235236	3.02979537	-0.002924	
SAMPLE_S001_0000221.LAB	6/24	17:12:02	31077.05738	-0.145627	0.013439909	3.03190572	-0.00027188	
SAMPLE_S001_0000222.LAB	6/24	17:13:05	31083.80505	-0.140227	0.010272082	3.03056785	0.001601653	
SAMPLE_S001_0000223.LAB	6/24	17:14:18	31080.66644	-0.130821	0.011166282	3.05800378	-4.14727E-05	
SAMPLE_S001_0000224.LAB	6/24	17:15:25	31064.37553	-0.146931	0.011217871	3.0535653	0.00022937	
SAMPLE_S001_0000225.LAB	6/24	17:16:24	31058.97393	-0.142826	0.009512301	3.05705706	0.003034964	
SAMPLE_S001_0000226.LAB	6/24	17:17:23	31090.21331	-0.143145	0.008290201	3.06324219	0.000511063	
SAMPLE_S001_0000227.LAB	6/24	17:18:36	31114.1942	-0.15105	0.010674519	3.0703327	0.000555509	
SAMPLE_S001_0000228.LAB	6/24	17:19:42	31102.97363	-0.139468	0.010868526	3.09951182	0.000677655	
SAMPLE_S001_0000229.LAB	6/24	17:20:45	31104.87858	-0.141201	0.009582534	3.10609035	0.000327779	
SAMPLE_S001_0000230.LAB	6/24	17:21:44	31108.90606	-0.137269	0.012477232	3.11526333	-0.003703975	
SAMPLE_S001_0000231.LAB	6/24	17:22:43	31134.56037	-0.136277	0.010028168	3.12172961	0.00028178	
SAMPLE_S001_0000232.LAB	6/24	17:23:46	31137.25701	-0.142958	0.010352018	3.11213836	0.000926647	
SAMPLE_S001_0000233.LAB	6/24	17:24:52	31143.91047	-0.139984	0.012986124	3.11261976	-0.001118331	
SAMPLE_S001_0000234.LAB	6/24	17:25:58	31152.76082	-0.13485	0.014887875	3.11534091	-2.33867E-05	
SAMPLE_S001_0000235.LAB	6/24	17:27:04	31149.62867	-0.133079	0.010950324	3.13392773	0.003313408	
SAMPLE_S001_0000236.LAB	6/24	17:28:17	31147.81608	-0.139502	0.014242822	3.16404072	0.000132774	
SAMPLE_S001_0000237.LAB	6/24	17:29:23	31130.11336	-0.14131	0.012956763	3.1718439	0.000759432	
SAMPLE_S001_0000238.LAB	6/24	17:30:30	31142.68702	-0.131119	0.013945583	3.16351478	0.000633427	
SAMPLE_S001_0000239.LAB	6/24	17:31:36	31126.81277	-0.13541	0.012760409	3.1585837	0.00053857	
SAMPLE_S001_0000240.LAB	6/24	17:32:42	31151.76212	-0.128089	0.012855811	3.1753569	0.000692561	
SAMPLE_S001_0000241.LAB	6/24	17:33:44	31146.67041	-0.128612	0.011977072	3.19266342	0.001210243	
SAMPLE_S001_0000242.LAB	6/24	17:34:50	31132.06281	-0.134111	0.013421152	3.19102228	0.002260726	
SAMPLE_S001_0000243.LAB	6/24	17:35:57	31123.44129	-0.124807	0.011004991	3.1913912	7.34917E-05	
SAMPLE_S001_0000244.LAB	6/24	17:37:03	31125.73367	-0.131974	0.014627805	3.2046605	-0.000328054	
SAMPLE_S001_0000245.LAB	6/24	17:38:09	31132.60817	-0.132218	0.015590287	3.2004437	-0.000319208	
SAMPLE_S001_0000246.LAB	6/24	17:39:15	31142.09466	-0.126169	0.01401957	3.23049354	-0.002688333	
SAMPLE_S001_0000247.LAB	6/24	17:40:18	31126.36661	-0.124948	0.011616414	3.24018049	0.000648528	
SAMPLE_S001_0000248.LAB	6/24	17:41:17	31123.57235	-0.133482	0.009934465	3.24742845	0.000373524	
SAMPLE_S001_0000249.LAB	6/24	17:42:26	31121.13471	-0.128144	0.011127192	3.26170434	0.000295351	
SAMPLE_S001_0000250.LAB	6/24	17:43:25	31128.5294	-0.131554	0.01341589	3.27566938	-0.003531124	
SAMPLE_S001_0000251.LAB	6/24	17:44:32	31138.22421	-0.116905	0.012682622	3.2991843	0.000485723	
SAMPLE_S001_0000252.LAB	6/24	17:45:37	31144.14324	-0.131641	0.011304544	3.28868482	0.000144692	
SAMPLE_S001_0000253.LAB	6/24	17:46:47	31142.2416	-0.104003	0.010236408	3.29193825	0.002111036	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
SAMPLE_S001_0000254.LAB	6/24	17:47:53	31152.3379	-0.119845	0.013422527	3.30472254	0.000147312	
SAMPLE_S001_0000255.LAB	6/24	17:49:03	31131.48765	-0.131171	0.011997006	3.31607683	0.003477806	
SAMPLE_S001_0000256.LAB	6/24	17:50:09	31116.28647	-0.131319	0.011465949	3.31049243	0.001957181	
SAMPLE_S001_0000257.LAB	6/24	17:51:08	31112.46169	-0.139885	0.013732845	3.30840553	0.000630918	
SAMPLE_S001_0000258.LAB	6/24	17:52:11	31085.51727	-0.122998	0.013784499	3.32637258	-0.000982159	
SAMPLE_S001_0000259.LAB	6/24	17:53:20	31092.99339	-0.134104	0.011697528	3.31333166	0.001214275	
SAMPLE_S001_0000260.LAB	6/24	17:54:26	31072.80863	-0.118053	0.010514948	3.3118521	0.000306596	
SAMPLE_S001_0000261.LAB	6/24	17:55:29	31085.88082	-0.121551	0.009641871	3.33345254	-0.000378053	
SAMPLE_S001_0000262.LAB	6/24	17:56:32	31088.83902	-0.121972	0.009682505	3.32274055	0.001004556	
SAMPLE_S001_0000263.LAB	6/24	17:57:34	31056.98586	-0.125527	0.010753737	3.30468279	0.000697779	
SAMPLE_S001_0000264.LAB	6/24	17:58:44	31029.6257	-0.118706	0.012635602	3.30458781	-0.001433091	
SAMPLE_S001_0000265.LAB	6/24	17:59:43	30994.2893	-0.127991	0.014273338	3.29861296	0.002115132	
SAMPLE_S001_0000266.LAB	6/24	18:00:46	30986.82196	-0.11635	0.009952837	3.30384355	0.001165335	
SAMPLE_S001_0000267.LAB	6/24	18:01:45	30996.83768	-0.118971	0.013108578	3.2953968	-0.001578671	
SAMPLE_S001_0000268.LAB	6/24	18:02:58	30988.1422	-0.142771	0.014520585	3.32497314	0.001180962	
SAMPLE_S001_0000269.LAB	6/24	18:04:01	30967.09163	-0.116424	0.012129957	3.34355776	0.001816627	
SAMPLE_S001_0000270.LAB	6/24	18:05:07	30935.82548	-0.131708	0.017309348	3.32944049	0.000739995	
SAMPLE_S001_0000271.LAB	6/24	18:06:06	30908.09689	-0.125711	0.013142772	3.32503762	0.000421087	
SAMPLE_S001_0000272.LAB	6/24	18:07:13	30864.0944	-0.122929	0.011576815	3.31683615	-0.000421561	
SAMPLE_S001_0000273.LAB	6/24	18:08:19	30895.88353	-0.122108	0.01423449	3.32539322	0.000563524	
SAMPLE_S001_0000274.LAB	6/24	18:09:25	30897.12679	-0.131354	0.015424589	3.32481093	0.000569866	
Average			31076.7	-0.132	0.012	3.203	0.000	
Post-Test Calibration Check								
POST ZERO SYST_S001_0000275.LAB	6/24	18:09:46	30882.22058	-0.131254	0.01692195	3.32682556	-0.000762784	
POST ZERO SYST_S001_0000276.LAB	6/24	18:10:01	30885.39854	-0.129807	0.012419656	3.31933858	0.002238147	
POST ZERO SYST_S001_0000277.LAB	6/24	18:10:19	13088.93212	1.0686573	0.080986264	3.8947158	-0.002215786	
POST ZERO SYST_S001_0000278.LAB	6/24	18:10:34	1619.232481	-0.027136	0.022625973	0.37954745	-0.004290087	
POST ZERO SYST_S001_0000279.LAB	6/24	18:10:52	925.7999343	-0.046335	0.017168014	0.31611837	0.001446608	
POST ZERO SYST_S001_0000280.LAB	6/24	18:11:07	679.63162	-0.012895	0.013505352	0.32330472	-0.000874338	
POST ZERO SYST_S001_0000281.LAB	6/24	18:11:22	573.6288479	-0.029419	0.005037458	0.32160453	0.001381981	
POST ZERO SYST_S001_0000282.LAB	6/24	18:11:37	496.7365743	-0.034812	0.006003437	0.32671497	0.000202634	
POST ZERO SYST_S001_0000283.LAB	6/24	18:11:55	444.0408516	-0.025079	0.00826981	0.32119318	0.001032	
POST ZERO SYST_S001_0000284.LAB	6/24	18:12:10	405.811035	-0.009235	0.003641815	0.32367407	0.00118382	
POST ZERO SYST_S001_0000285.LAB	6/24	18:12:28	372.8898581	-0.014135	0.002170649	0.32127835	0.003576297	System Zero
POST ZERO SYST_S001_0000286.LAB	6/24	18:12:43	352.2268335	-0.054778	0.007221941	0.32381492	0.003075794	EtO Zero
POST ZERO SYST_S001_0000287.LAB	6/24	18:13:01	338.1172835	-0.002426	0.00413529	0.3209976	0.004203035	
POST ZERO SYST_S001_0000288.LAB	6/24	18:13:16	316.0369842	-0.009939	0.002855421	0.3108692	-0.002792203	
POST ZERO SYST_S001_0000289.LAB	6/24	18:13:37	308.824437	-0.002746	0.009020444	0.32035055	-0.001447031	
POST ZERO SYST_S001_0000290.LAB	6/24	18:13:52	294.519541	-0.002068	0.005880519	0.31503622	-0.009304231	
POST ZERO SYST_S001_0000291.LAB	6/24	18:14:07	295.3430403	-0.001333	0.006397313	0.31118117	-0.009617518	
POST ZERO SYST_S001_0000292.LAB	6/24	18:14:29	288.68098	-0.026066	0.000849505	0.3187106	0.00197663	
POST ZERO SYST_S001_0000293.LAB	6/24	18:14:44	279.8003031	-0.028961	0.00472869	0.3148143	-0.007615839	
POST ZERO SYST_S001_0000294.LAB	6/24	18:14:59	272.1650984	-0.017999	0.005130009	0.30233631	-0.0134033	
POST ZERO SYST_S001_0000295.LAB	6/24	18:15:13	272.6408721	-0.012972	0.001104375	0.86936157	-0.003429303	
POST ZERO SYST_S001_0000296.LAB	6/24	18:15:28	323.2098541	-0.346352	-0.039627424	69.8096865	0.002903797	
POST ZERO SYST_S001_0000297.LAB	6/24	18:15:43	354.6008007	-0.002978	-0.024732983	84.2726872	0.000622982	
POST ZERO SYST_S001_0000298.LAB	6/24	18:15:58	344.2728146	-0.023945	-0.023486899	84.6185012	0.000949266	
POST ZERO SYST_S001_0000299.LAB	6/24	18:16:16	339.95494	0.0073152	-0.022035379	84.7416894	-0.001153285	
POST ZERO SYST_S001_0000300.LAB	6/24	18:16:34	338.4985897	0.0052256	-0.020365129	84.805587	0.000991886	
POST ZERO SYST_S001_0000301.LAB	6/24	18:16:56	335.2445318	0.0157863	-0.024034511	84.858213	0.001056851	
POST ZERO SYST_S001_0000302.LAB	6/24	18:17:15	329.4750597	-0.010869	-0.025477142	84.9299697	0.001872689	System CTS
POST CTS SYST_S001_0000303.LAB	6/24	18:17:29	329.5341095	0.0036579	-0.018777274	84.929587	0.001599263	CH4 Avg: 85.0
POST CTS SYST_S001_0000304.LAB	6/24	18:17:44	321.8686208	0.0215775	-0.024955653	84.9238233	-0.001571705	
POST CTS SYST_S001_0000305.LAB	6/24	18:17:59	323.1320064	-0.007791	-0.025936445	84.9424449	-0.00450873	
POST CTS SYST_S001_0000306.LAB	6/24	18:18:14	322.1518748	0.0109894	-0.026548602	84.9563677	-0.011010091	
POST CTS SYST_S001_0000307.LAB	6/24	18:18:28	317.5258721	0.0186613	-0.025718465	85.0211427	-0.000981075	
POST CTS SYST_S001_0000308.LAB	6/24	18:18:47	317.246703	0.0119347	-0.02568834	84.9783367	0.000334574	
POST CTS SYST_S001_0000309.LAB	6/24	18:19:01	316.226058	-0.000495	-0.028642342	84.9902304	0.001763683	
POST CTS SYST_S001_0000310.LAB	6/24	18:19:20	314.3815157	0.0100191	-0.028444432	85.0163361	-8.86275E-05	
POST CTS SYST_S001_0000311.LAB	6/24	18:19:34	316.7179924	-0.000623	-0.026027344	85.0140674	0.005596866	
POST CTS SYST_S001_0000312.LAB	6/24	18:19:49	310.2489	0.0003609	-0.031996136	84.9952626	-0.002391066	
POST CTS SYST_S001_0000313.LAB	6/24	18:20:08	3900.834767	-0.130391	0.032537181	61.6166332	0.000113631	
POST CTS SYST_S001_0000314.LAB	6/24	18:20:26	21253.34583	-0.049504	0.013335505	4.16093425	-0.015102321	
POST CTS SYST_S001_0000315.LAB	6/24	18:20:41	17518.88325	-0.248757	0.054776409	20.8998881	0.000125534	
POST CTS SYST_S001_0000316.LAB	6/24	18:20:55	1908.904754	-0.095305	0.025938429	7.53891481	0.004874732	
POST CTS SYST_S001_0000317.LAB	6/24	18:21:14	695.5331271	-0.034129	0.00862139	0.76200372	-0.00089364	
POST CTS SYST_S001_0000318.LAB	6/24	18:21:29	512.1117461	-0.014475	0.00744744	0.63393315	-0.003865558	
POST CTS SYST_S001_0000319.LAB	6/24	18:21:47	421.6632801	-0.032159	0.003007439	0.57938774	0.004837225	
PRE-ZERO_S002_0000001.LAB	6/24	18:28:21	22950.96199	0.0161986	0.006497167	2.28353746	-0.002287493	
PRE-ZERO_S002_0000002.LAB	6/24	18:28:36	23144.86903	0.0534015	0.007165523	2.29499204	0.002633898	
PRE-ZERO_S002_0000003.LAB	6/24	18:28:54	22685.62419	0.0201823	0.008110248	2.278423	0.002375559	
PRE-ZERO_S002_0000004.LAB	6/24	18:29:09	22604.06475	0.0246027	0.007351685	2.26874918	-0.057664382	

Spectrum	Date (hh:mm:ss (m/dd)	Time	H ₂ O (ppmv)	Ethane (ppmv)	EtO (ppmwv)	Methane (ppmwv)	Interference (ppm)	Notes
Pre-Test Calibrations (6/25) - Process Stack								
PRE-ZERO_0000001.LAB	6/25	07:07:13	4.142610021	-0.012634	-0.004446314	-0.0022128	-0.017228079	Note: The spectrum label does not necessarily indicate /correspond to the exact calibration action at that moment
PRE-ZERO_0000002.LAB	6/25	07:07:28	1.494365825	-0.025839	-0.000703881	-0.0097428	-0.000648459	
PRE-ZERO_0000003.LAB	6/25	07:07:43	-0.0536122	-0.021882	0.00368744	-0.0052326	0.003498268	
PRE-ZERO_0000004.LAB	6/25	07:07:58	1.054594752	-0.003749	-0.006471727	0.00205071	0.005959415	
PRE-ZERO_0000005.LAB	6/25	07:08:12	-0.09892509	-0.012065	-0.001741267	0.00947242	-0.059757254	
PRE-ZERO_0000006.LAB	6/25	07:08:27	4.434727527	0.010951	-0.000907706	-0.0015734	0.001297267	
PRE-ZERO_0000007.LAB	6/25	07:08:42	-2.70738351	0.0043891	0.003771075	0.00087283	-0.010702743	
PRE-ZERO_0000008.LAB	6/25	07:08:57	2.99598354	0.0099699	-0.000794179	-0.0066179	0.002171497	
PRE-ZERO_0000009.LAB	6/25	07:09:11	-0.53318839	-0.016221	-0.003159891	-0.0006324	-0.003195057	
ZERO DIRECT_0000010.LAB	6/25	07:10:19	-7.835E-14	-1.59E-17	0	-2.541E-17	1	
Filter Interference.LAB	6/25	07:10:19	-7.835E-14	-1.59E-17	0	-2.541E-17	1	Filter Interference
ZERO DIRECT_0000011.LAB	6/25	07:11:25	-2.13152385	-0.000373	-0.000459158	9.5763E-05	0.002416318	Direct Zero
ZERO DIRECT_0000012.LAB	6/25	07:12:25	0.367343443	0.0071601	-0.004246697	-0.0090014	-0.008452464	
PRE-ZERO_0000013.LAB	6/25	07:12:48	1.408496997	-0.022198	-0.004441142	-0.0072124	-0.01711695	
PRE-ZERO_0000014.LAB	6/25	07:13:02	2.841261679	-0.006659	-0.003960803	0.00024397	0.002122669	
PRE-ZERO_0000015.LAB	6/25	07:13:17	0.819527728	0.018479	-0.00088361	-0.0039296	-0.003140027	
PRE-ZERO_0000016.LAB	6/25	07:13:32	0.71565695	-0.005174	0.001122668	-0.0068017	-0.001026853	
PRE-ZERO_0000017.LAB	6/25	07:13:47	1.233381613	-0.018185	-0.002209207	-0.0055343	-0.002491565	
PRE-ZERO_0000018.LAB	6/25	07:14:05	-0.55585482	0.0038153	-0.001006255	0.00159421	0.002966256	
PRE-ZERO_0000019.LAB	6/25	07:14:20	-0.89578084	-0.005627	-0.00562606	0.00525835	-0.000156467	
PRE-ZERO_0000020.LAB	6/25	07:14:34	0.552008449	0.009774	-0.005263649	-0.0046955	0.00159088	
PRE-ZERO_0000021.LAB	6/25	07:14:50	1.688168185	0.0048277	-0.004909564	-0.006348	-0.001783879	
PRE-ZERO_0000022.LAB	6/25	07:15:08	96.98500558	-0.335836	0.016006992	27.9352439	-0.00488787	
PRE-ZERO_0000023.LAB	6/25	07:15:23	128.149459	0.0027945	-0.068167937	84.0468027	-0.01538692	
PRE-ZERO_0000024.LAB	6/25	07:15:37	104.1744948	0.0270847	-0.067475388	84.594355	-0.029124833	
PRE-ZERO_0000025.LAB	6/25	07:15:52	98.45924914	0.0260362	-0.066157657	84.7192975	0.003170165	
PRE-ZERO_0000026.LAB	6/25	07:16:07	94.88968366	0.0230133	-0.067582915	84.7621962	0.000644157	
PRE-ZERO_0000027.LAB	6/25	07:16:22	84.44049515	0.0416069	-0.062805088	84.7678396	-0.000971914	Direct CTS
PRE-ZERO_0000028.LAB	6/25	07:16:36	85.67787574	0.039892	-0.069391839	84.7941571	-0.01975247	CH4 Avg: 84.8
PRE-ZERO_0000029.LAB	6/25	07:16:51	79.87487402	0.0378352	-0.064753772	84.7938833	-0.017216385	
PRE-ZERO_0000030.LAB	6/25	07:17:06	79.43269169	0.0256963	-0.067446734	84.8152756	-0.002789758	
PRE-ZERO_0000031.LAB	6/25	07:17:21	80.44419595	0.0536841	-0.063524667	84.8451469	0.001278177	
PRE-ZERO_0000032.LAB	6/25	07:17:39	73.4371172	0.0461866	-0.064095578	84.8516548	-0.001391498	
PRE-ZERO_0000033.LAB	6/25	07:17:57	78.28860673	0.0357875	-0.069749492	84.8663547	-0.0022405	
PRE-ZERO_0000034.LAB	6/25	07:18:12	76.27303064	0.0384302	-0.066729993	84.8720594	0.002405429	
PRE-ZERO_0000035.LAB	6/25	07:18:27	73.58131709	0.0283099	-0.067637603	84.8838686	-0.017304522	
PRE-ZERO_0000036.LAB	6/25	07:18:41	75.85734425	0.0546859	-0.068183045	84.8808583	-0.006889079	
PRE-ZERO_0000037.LAB	6/25	07:19:00	642.9740802	124.87415	0.599503468	44.7018386	-0.002462616	
PRE-ZERO_0000038.LAB	6/25	07:19:14	-270.499797	509.62459	1.789150016	-0.4599079	-0.000399161	
PRE-ZERO_0000039.LAB	6/25	07:19:33	-308.946737	512.6112	1.79997316	-0.889337	0.000284156	
PRE-ZERO_0000040.LAB	6/25	07:19:55	-307.583716	513.48496	1.726079933	-1.0045623	0.006343152	
PRE-ZERO_0000041.LAB	6/25	07:20:09	-314.140002	513.56093	1.579591448	-1.0485584	-0.000537848	
PRE-ZERO_0000042.LAB	6/25	07:20:24	-314.85895	513.96033	1.384841867	-1.0565631	-0.007709722	
PRE-ZERO_0000043.LAB	6/25	07:20:39	-309.372042	513.94909	1.267422577	-1.0704375	0.001537039	
PRE-ZERO_0000044.LAB	6/25	07:20:54	-317.231808	513.9473	1.316648936	-1.0932815	-0.005918614	
PRE-ZERO_0000045.LAB	6/25	07:21:08	-314.217132	513.9579	1.474868598	-1.1237445	0.002353182	
PRE-ZERO_0000046.LAB	6/25	07:21:23	-313.011943	514.27499	1.649292638	-1.1376577	0.002067664	
PRE-ZERO_0000047.LAB	6/25	07:21:38	-316.472295	514.24232	1.797809543	-1.1454371	-0.014554277	
PRE-ZERO_0000048.LAB	6/25	07:21:53	-322.231102	514.13538	1.908918591	-1.1514257	-0.00317974	
PRE-ZERO_0000049.LAB	6/25	07:22:07	-320.729319	514.43614	1.975793015	-1.1649089	-0.077872547	
PRE-ZERO_0000050.LAB	6/25	07:22:26	-319.155033	514.23581	2.016609843	-1.1702798	-0.008992677	
PRE-ZERO_0000051.LAB	6/25	07:22:40	-301.495362	512.02999	2.041737972	-1.1651221	-0.001010093	
PRE-ZERO_0000052.LAB	6/25	07:22:55	-293.499437	516.70925	2.083605228	-1.1960966	0.008358031	
PRE-ZERO_0000053.LAB	6/25	07:23:10	-295.334465	516.714	2.098148178	-1.2112842	-0.001120447	
PRE-ZERO_0000054.LAB	6/25	07:23:28	-293.020508	516.65743	2.103807193	-1.2101736	-0.002108948	
PRE-ZERO_0000055.LAB	6/25	07:23:43	-300.300618	517.11089	2.113803518	-1.2147867	-0.001843081	
PRE-ZERO_0000056.LAB	6/25	07:23:58	-292.453071	517.00885	2.109088963	-1.2190328	-0.014825162	
PRE-ZERO_0000057.LAB	6/25	07:24:13	-295.523182	517.0273	2.113437666	-1.2142136	0.003974885	
PRE-ZERO_0000058.LAB	6/25	07:24:31	-292.16886	517.20289	2.117534365	-1.2084489	-0.02042598	Direct QA/Tracer
PRE-ZERO_0000059.LAB	6/25	07:24:46	-293.072401	517.15185	2.115873666	-1.2202179	-0.002455802	EtO Avg: 2.12
PRE-ZERO_0000060.LAB	6/25	07:25:04	-290.760516	517.04865	2.117648317	-1.2200071	0.001826396	C2H6 Avg: 517.23
PRE-ZERO_0000061.LAB	6/25	07:25:19	-294.533028	517.11918	2.122474242	-1.216083	-0.006243877	
PRE-ZERO_0000062.LAB	6/25	07:25:34	-298.500564	517.19781	2.12201065	-1.2157568	-0.00459533	
PRE-ZERO_0000063.LAB	6/25	07:25:49	-295.029525	517.26107	2.122033514	-1.2160971	0.000336567	
PRE-ZERO_0000064.LAB	6/25	07:26:03	-297.169826	517.34455	2.131655033	-1.2234956	-0.006422762	
PRE-ZERO_0000065.LAB	6/25	07:26:18	-294.938789	517.40765	2.132206167	-1.2115646	-0.048105169	
PRE-ZERO_0000066.LAB	6/25	07:26:33	-287.34909	517.33938	2.131789094	-1.2255698	-0.027572116	
PRE-ZERO_0000067.LAB	6/25	07:26:48	-298.817196	517.23269	2.132784568	-1.2335717	-0.002894454	
PRE-ZERO_0000068.LAB	6/25	07:27:02	-21.6469907	383.88582	1.785959903	-0.8196431	-0.018277429	
PRE-ZERO_0000069.LAB	6/25	07:27:17	-35.8354193	8.0327458	0.047686965	-0.011128	0.000427905	
PRE-ZERO_0000070.LAB	6/25	07:27:32	-1.94890179	0.9305442	0.002488753	0.00707248	-0.000100915	
CTS SYSTEM_0000071.LAB	6/25	07:29:53	23777.87811	0.0949183	0.003435681	3.84277693	0.002850837	
CAL DIRECT_0000072.LAB	6/25	07:30:08	23221.50777	0.0560444	0.005263208	3.25703828	-0.106473286	
ZERO SYSTEM_0000073.LAB	6/25	07:34:47	23047.61231	0.0272202	0.000174898	3.18949755	-0.00764716	
ZERO SYSTEM_0000074.LAB	6/25	07:35:02	23026.41567	0.0320813	0.005055995	3.10250818	0.003149996	
ZERO SYSTEM_0000075.LAB	6/25	07:35:17	22959.3756	0.0224064	-4.18623E-05	2.92787316	-0.00482515	
ZERO SYSTEM_0000076.LAB	6/25	07:35:32	17790.78542	2.2426792	0.065532518	9.45353529	-0.008743517	
ZERO SYSTEM_0000077.LAB	6/25	07:35:46	3781.592333	0.400337	0.049020919	1.3252532	-0.00200972	
ZERO SYSTEM_0000078.LAB	6/25	07:36:05	1691.105371	0.0446824	0.019628957	0.42368382	-0.007429865	
ZERO SYSTEM_0000079.LAB	6/25	07:36:19	1201.172097	0.0797212	0.011611669	0.4040965	0.00156551	
ZERO SYSTEM_0000080.LAB	6/25	07:36:34	1025.278297	0.0590301	0.01625555	0.38807539	-0.0060133	

Raw FTIR Data
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Spectrum	Time		H ₂ O (ppmv)	Ethane (ppmw)	EtO (ppmw)	Methane (ppmw)	Interference (ppm)	Notes
	Date (m/dd)	(hh:mm:ss)						
ZERO SYSTEM_0000081.LAB	6/25	07:36:49	923.3913005	0.0333466	0.016224457	0.39795498	0.002181836	
ZERO SYSTEM_0000082.LAB	6/25	07:37:04	881.6076787	0.0464947	0.008808314	0.45429673	-0.004435278	
ZERO SYSTEM_0000083.LAB	6/25	07:37:18	850.0506585	0.0359671	0.008574225	0.46877531	0.000534012	
ZERO SYSTEM_0000084.LAB	6/25	07:37:37	843.943733	0.045408	0.007523492	0.47204833	-0.000432663	
ZERO SYSTEM_0000085.LAB	6/25	07:37:51	824.5210008	0.0392001	0.009522078	0.46246302	0.000806161	
ZERO SYSTEM_0000086.LAB	6/25	07:38:06	810.5658216	0.0547635	0.007955299	0.45403299	-0.0033378	
ZERO SYSTEM_0000087.LAB	6/25	07:38:21	791.5370245	0.0376153	0.00911916	0.45871589	-0.002290735	
ZERO SYSTEM_0000088.LAB	6/25	07:38:36	780.0569156	0.059686	0.010973263	0.46594521	0.001255607	
ZERO SYSTEM_0000089.LAB	6/25	07:38:50	767.5882506	0.0368904	0.007882278	0.45438529	-0.00413192	
ZERO SYSTEM_0000090.LAB	6/25	07:39:09	757.132705	0.0490863	0.004176279	0.46556266	-0.00793782	
ZERO SYSTEM_0000091.LAB	6/25	07:39:23	747.0796645	0.0293114	0.010369617	0.46670653	0.000955887	
ZERO SYSTEM_0000092.LAB	6/25	07:39:38	738.6271862	0.0354248	0.01144865	0.45133554	0.00104128	
ZERO SYSTEM_0000093.LAB	6/25	07:39:56	729.4559372	0.0333827	0.013294553	0.45882365	-0.000165963	
ZERO SYSTEM_0000094.LAB	6/25	07:40:15	722.9656265	0.01282	0.008403813	0.46038417	0.001754543	
ZERO SYSTEM_0000095.LAB	6/25	07:40:33	722.8382336	0.0333179	0.005637052	0.45626107	-0.000794907	
ZERO SYSTEM_0000096.LAB	6/25	07:40:48	715.7370075	0.0461329	0.004530883	0.45227702	-0.001277996	System Zero
ZERO SYSTEM_0000097.LAB	6/25	07:41:03	711.7281687	0.0337101	0.010247772	0.45403513	0.001346892	
ZERO SYSTEM_0000098.LAB	6/25	07:41:17	705.5282844	0.0077644	0.002418998	0.44269123	0.002595659	
ZERO SYSTEM_0000099.LAB	6/25	07:41:32	707.9792318	0.0051858	0.012281483	0.45042284	0.002246015	
ZERO SYSTEM_0000100.LAB	6/25	07:41:50	700.7557564	0.0219885	0.008147002	0.45071486	0.001962199	
ZERO SYSTEM_0000101.LAB	6/25	07:42:05	700.886859	0.0204226	0.005948468	0.44823024	0.003583984	
ZERO SYSTEM_0000102.LAB	6/25	07:42:20	695.6381501	0.0279855	0.008655975	0.4447557	0.003506505	
ZERO SYSTEM_0000103.LAB	6/25	07:42:35	694.7573539	0.0131689	0.007406503	0.4507056	0.001114214	
ZERO SYSTEM_0000104.LAB	6/25	07:42:49	691.9141442	0.0401145	0.011219158	0.45062675	0.001221766	
ZERO SYSTEM_0000105.LAB	6/25	07:43:04	692.3119527	-0.011332	0.004055158	0.45298148	0.002511536	
ZERO SYSTEM_0000106.LAB	6/25	07:43:23	715.8614867	-0.148953	0.012550926	17.221279	0.002944603	
ZERO SYSTEM_0000107.LAB	6/25	07:43:38	728.934432	-0.038237	-0.053774342	78.7670831	-0.000156968	
ZERO SYSTEM_0000108.LAB	6/25	07:43:52	728.55477	0.0403619	-0.049027163	83.8444732	0.003882659	
ZERO SYSTEM_0000109.LAB	6/25	07:44:11	731.7826026	0.0419623	-0.050867122	84.2265696	-0.014287247	
ZERO SYSTEM_0000110.LAB	6/25	07:44:26	728.0559421	0.0588762	-0.045118884	84.395369	-0.001147429	
ZERO SYSTEM_0000111.LAB	6/25	07:44:44	726.6749533	0.0394422	-0.04588421	84.4852445	-0.004901971	
ZERO SYSTEM_0000112.LAB	6/25	07:44:59	723.8249468	0.0541889	-0.047073017	84.5523827	-4.8236E-05	
ZERO SYSTEM_0000113.LAB	6/25	07:45:14	726.1823859	0.0623279	-0.042136682	84.5931289	0.003052849	
ZERO SYSTEM_0000114.LAB	6/25	07:45:29	720.6137733	0.0475934	-0.041061632	84.6064218	-0.002650174	
ZERO SYSTEM_0000115.LAB	6/25	07:45:43	718.1883378	0.0417798	-0.043144937	84.6481419	0.001031513	
ZERO SYSTEM_0000116.LAB	6/25	07:45:58	718.5053028	0.0555116	-0.041388256	84.6812872	-0.041603612	
ZERO SYSTEM_0000117.LAB	6/25	07:46:13	716.3247516	0.038595	-0.044381585	84.7457623	0.000237714	System CTS
ZERO SYSTEM_0000118.LAB	6/25	07:46:32	716.3794971	0.0425679	-0.049184955	84.7325637	0.005470792	CH3 Avg: 84.8
ZERO SYSTEM_0000119.LAB	6/25	07:46:46	713.0231914	0.0345426	-0.044897408	84.7575349	0.001062032	
ZERO SYSTEM_0000120.LAB	6/25	07:47:01	710.592183	0.0500694	-0.044378151	84.783835	0.003144207	
ZERO SYSTEM_0000121.LAB	6/25	07:47:16	706.1984882	0.0663215	-0.045972163	84.7931323	0.003493208	
ZERO SYSTEM_0000122.LAB	6/25	07:47:30	711.8713803	0.0707826	-0.048079263	84.7973176	0.002135695	
ZERO SYSTEM_0000123.LAB	6/25	07:47:49	707.9812194	0.0525544	-0.042581691	84.8278091	-2.18705E-05	
ZERO SYSTEM_0000124.LAB	6/25	07:48:04	703.9618613	0.0456778	-0.03893033	84.8449114	0.000821161	
ZERO SYSTEM_0000125.LAB	6/25	07:48:22	705.9197767	0.060233	-0.046237169	84.834839	0.001028094	
ZERO SYSTEM_0000126.LAB	6/25	07:48:37	706.8599872	0.0712667	-0.045308803	84.8464486	-0.000962326	
ZERO SYSTEM_0000127.LAB	6/25	07:48:51	731.8700017	-0.24301	0.008567488	37.4937703	-0.000533613	
ZERO SYSTEM_0000128.LAB	6/25	07:49:06	705.6737621	-0.021401	0.003357611	3.00930359	0.000881404	
ZERO SYSTEM_0000129.LAB	6/25	07:49:24	693.5226332	0.0104656	0.007094272	1.36341216	-0.00488461	
ZERO SYSTEM_0000130.LAB	6/25	07:49:39	688.4063561	-0.024864	0.008251964	1.06879722	0.001964613	
SPIKE_0000363.LAB	6/25	09:15:05	29090.26415	0.2711408	0.022677297	3.52686864	-0.002672318	
SPIKE_0000364.LAB	6/25	09:15:24	29039.52413	0.2761821	0.024822525	3.53167262	0.002588318	
SPIKE_0000365.LAB	6/25	09:15:38	29026.3164	0.2597937	0.02406555	3.51735957	-0.000485695	
SPIKE_0000366.LAB	6/25	09:15:53	29015.85079	0.2346993	0.026295853	3.53641165	-0.000374735	Native EtO
SPIKE_0000367.LAB	6/25	09:16:11	29026.60069	0.2408244	0.022736219	3.51202394	0.003368221	EtO Avg: 0.0244
SPIKE_0000368.LAB	6/25	09:16:26	29069.75887	0.2349118	0.023953162	3.5502449	0.00037759	C2H6 Avg: 0.25
SPIKE_0000369.LAB	6/25	09:16:48	29096.35956	0.239123	0.021576727	3.568634	-0.002971708	
SPIKE_0000370.LAB	6/25	09:17:03	29100.45779	0.2281777	0.023799584	3.57072551	0.001912977	
SPIKE_0000371.LAB	6/25	09:17:17	29068.03765	0.2392587	0.024232745	3.58946489	0.002478444	
SPIKE_0000372.LAB	6/25	09:17:36	29070.51203	0.2289996	0.027478076	3.57422624	0.002426641	
SPIKE_0000373.LAB	6/25	09:17:50	29078.69095	0.2886367	0.023433119	3.59433178	-0.004360088	
SPIKE_0000374.LAB	6/25	09:18:05	29051.14601	0.3199861	0.02629839	3.58829049	-0.001097901	
SPIKE_0000375.LAB	6/25	09:18:20	29054.07808	0.253609	0.024137997	3.60333991	0.001287831	
SPIKE_0000376.LAB	6/25	09:18:35	28955.19085	2.5021704	0.034543929	3.59006955	0.000697138	
SPIKE_0000377.LAB	6/25	09:18:50	27777.9426	24.830663	0.111696601	3.40856358	-0.012250196	
SPIKE_0000378.LAB	6/25	09:19:05	27506.40573	29.927864	0.122851713	3.34673618	0.001195702	
SPIKE_0000379.LAB	6/25	09:19:19	27305.26705	33.29298	0.137335396	3.35001347	-0.001502788	
SPIKE_0000380.LAB	6/25	09:19:34	27172.34853	35.958402	0.142614528	3.37080909	0.000101206	
SPIKE_0000381.LAB	6/25	09:19:49	26999.73944	37.120581	0.15108674	3.25582918	0.004492463	
SPIKE_0000382.LAB	6/25	09:20:03	26911.23451	39.588988	0.16132463	3.22743858	-0.003160399	
SPIKE_0000383.LAB	6/25	09:20:22	26832.60461	41.199188	0.166851388	3.19699751	-0.00596053	
SPIKE_0000384.LAB	6/25	09:20:37	26778.903	42.201429	0.171066503	3.18924617	0.000569286	
SPIKE_0000385.LAB	6/25	09:20:51	26757.6239	42.753314	0.170701553	3.17950094	-0.001603612	
SPIKE_0000386.LAB	6/25	09:21:06	26701.33944	43.184016	0.174229438	3.15450791	0.001861367	
SPIKE_0000387.LAB	6/25	09:21:25	26701.44642	43.360043	0.176198357	3.13025797	0.001390683	Dynamic Spike
SPIKE_0000388.LAB	6/25	09:21:43	26684.54355	43.511772	0.172216044	3.12610115	0.002497413	EtO Avg: 0.171
SPIKE_0000389.LAB	6/25	09:21:58	26686.79836	43.460898	0.168765719	3.137656	-0.001362131	C2H6 Avg: 43.407
SPIKE_0000390.LAB	6/25	09:22:12	26661.94792	43.583934	0.172240069	3.1231366	0.000341775	
SPIKE_0000391.LAB	6/25	09:22:31	26663.31481	43.464767	0.169138001	3.16157174	0.002357365	
SPIKE_0000392.LAB	6/25	09:22:45	26660.27968	43.498828	0.171150815	3.1587086	0.00140967	
SPIKE_0000393.LAB	6/25	09:23:00	26643.82844	43.512945	0.171021988	3.15388703	0.000976325	
SPIKE_0000394.LAB	6/25	09:23:22	26664.25184	43.194261	0.169885273	3.13912617	0.002356832	
SPIKE_0000395.LAB	6/25	09:23:37	26641.14176	43.276166	0.172292396	3.1351106	0.000908573	

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Raw FTIR Data
Process Stack
Vacuum Pump Testing



Spectrum	Time		H ₂ O (ppmv)	Ethane (ppmw)	EtO (ppmw)	Methane (ppmw)	Filter Interference (ppm)	Notes
	Date (m/dd)	(hh:mm:ss)						
CTS DIRECT_0000556.LAB	6/25	11:17:52	27245.42961	1.1669694	0.010431937	3.32293908	0.001706821	
CTS DIRECT_0000557.LAB	6/25	11:18:06	9128.263835	3.56516	0.086048558	16.8397284	-0.004812471	
CTS DIRECT_0000558.LAB	6/25	11:18:21	8760.605344	3.4925689	0.080294237	18.1986627	0.003676432	
CTS DIRECT_0000559.LAB	6/25	11:18:36	8628.985652	3.4797549	0.082643001	18.5786328	0.004812551	
CTS DIRECT_0000560.LAB	6/25	11:18:54	8519.136427	3.4796894	0.073637918	18.8642323	0.001044018	
CTS DIRECT_0000561.LAB	6/25	11:19:09	8442.693101	3.4650668	0.07802952	19.1086998	0.000862156	
CTS DIRECT_0000562.LAB	6/25	11:19:27	8380.341458	3.4447816	0.074420145	19.2815185	-0.006807465	
CTS DIRECT_0000563.LAB	6/25	11:19:42	8346.698124	3.4502113	0.084824327	19.4071295	0.002710977	
CTS DIRECT_0000564.LAB	6/25	11:19:57	8316.571447	3.4387958	0.081699812	19.4730057	0.001257666	
CTS DIRECT_0000565.LAB	6/25	11:21:00	166.2785747	0.0901344	-0.049765104	86.8508265	0.001888625	
CTS DIRECT_0000566.LAB	6/25	11:21:19	105.1239842	0.0279826	-0.042349313	87.0689297	0.000911328	
CTS DIRECT_0000567.LAB	6/25	11:21:34	97.01347709	0.0186098	-0.054964352	87.094247	0.002208742	Direct CTS
CTS DIRECT_0000568.LAB	6/25	11:21:48	91.52938744	0.0319084	-0.051626753	87.0746068	0.001136331	CH4 Avg: 87.1
CTS DIRECT_0000569.LAB	6/25	11:22:03	81.925463	0.0374222	-0.052124592	87.0908884	0.001406684	
CTS DIRECT_0000570.LAB	6/25	11:22:18	80.94550803	0.0131172	-0.05071452	87.0741241	0.001785196	
CTS DIRECT_0000571.LAB	6/25	11:22:32	77.852869	0.0141312	-0.047047443	87.0591315	0.0012414	
CTS DIRECT_0000572.LAB	6/25	11:22:51	77.2699001	0.0481149	-0.050825929	87.0661945	0.002947618	
CTS DIRECT_0000573.LAB	6/25	11:23:06	73.45648363	0.0474166	-0.050638688	87.0780362	0.002068816	
CTS DIRECT_0000574.LAB	6/25	11:23:20	72.07228174	0.0201024	-0.049970442	87.0958224	-0.00095838	
CTS DIRECT_0000575.LAB	6/25	11:23:35	72.99525012	0.0370038	-0.053932044	87.0856187	0.003473285	
CTS DIRECT_0000576.LAB	6/25	11:23:50	70.51131621	0.0405111	-0.051212915	87.0747854	-0.007952105	
CTS DIRECT_0000577.LAB	6/25	11:24:05	808.7825238	-0.00666	-0.054098874	84.7467237	0.000645535	
CTS DIRECT_0000578.LAB	6/25	11:24:19	23818.07993	-0.032486	0.032278002	15.6425932	-0.002201241	
CTS DIRECT_0000579.LAB	6/25	11:24:34	29624.51545	0.0667313	-0.006992276	3.73417748	0.001266281	
CTS DIRECT_0000580.LAB	6/25	11:24:49	29781.29209	0.0833717	-0.003363838	3.34677314	-0.001852531	
CTS DIRECT_0000581.LAB	6/25	11:25:04	21845.12254	1.6225569	0.059000034	6.10195609	0.002600124	
CTS DIRECT_0000582.LAB	6/25	11:25:22	4454.538764	0.4708052	0.022639268	71.1550845	0.000587622	
CTS DIRECT_0000583.LAB	6/25	11:25:37	1879.551999	0.0742694	-0.000657884	85.7802933	-0.000909684	
CTS DIRECT_0000584.LAB	6/25	11:25:51	1486.027811	0.1119484	-0.016132732	86.1974588	-0.001780791	
CTS DIRECT_0000585.LAB	6/25	11:26:06	1290.165592	0.0509305	-0.018409953	86.3563728	-0.007475401	
CTS DIRECT_0000586.LAB	6/25	11:26:24	1156.862665	0.0677086	-0.02156218	86.4753751	0.002563556	
CTS DIRECT_0000587.LAB	6/25	11:26:39	1069.875222	0.0848027	-0.02334361	86.5511381	-0.001181662	
CTS DIRECT_0000588.LAB	6/25	11:26:54	1012.493488	0.0969402	-0.030287946	86.5917845	0.001006084	
CTS DIRECT_0000589.LAB	6/25	11:27:09	976.5279908	0.0790265	-0.025157836	86.6299326	-0.000497384	System CTS
CTS DIRECT_0000590.LAB	6/25	11:27:24	941.0143762	0.1189993	-0.027616496	86.6580228	0.000694589	CH4 Avg: 86.7
CTS DIRECT_0000591.LAB	6/25	11:27:39	923.859217	0.0825342	-0.029976934	86.671594	0.001555553	
CTS DIRECT_0000592.LAB	6/25	11:27:53	900.592283	0.0980984	-0.029024613	86.6899406	0.001619709	
CTS DIRECT_0000593.LAB	6/25	11:28:08	887.0087972	0.0745254	-0.030179839	86.7078222	0.000313764	
CTS DIRECT_0000594.LAB	6/25	11:28:26	869.2098291	0.0695855	-0.030550757	86.7302482	0.000707242	
CTS DIRECT_0000595.LAB	6/25	11:28:41	851.2698701	0.1863102	-0.028768047	86.6673709	-0.001817338	
CTS DIRECT_0000596.LAB	6/25	11:28:56	847.6348914	0.0909394	-0.029548172	86.6872735	0.000595081	
CTS DIRECT_0000597.LAB	6/25	11:29:11	842.6163805	0.096065	-0.030467652	86.6784594	0.000775148	
CTS DIRECT_0000598.LAB	6/25	11:29:26	839.2242908	0.0704617	-0.030751243	86.7393548	-8.26518E-05	
CTS DIRECT_0000599.LAB	6/25	11:29:40	10842.67353	-0.317599	0.002509791	40.4988712	0.001526345	
CTS DIRECT_0000600.LAB	6/25	11:29:55	26662.45369	0.0438619	-0.001032747	5.18126677	0.002289337	
CTS DIRECT_0000601.LAB	6/25	11:30:10	29447.13983	0.1786283	0.015780364	3.59192177	0.003770553	

Run 2 - Process Stack - Vacuum Pump Testing								
SAMPLE_0000619.LAB	6/25	11:49:00	29827.28835	0.1829272	0.009032984	3.08535289	0.000198993	
SAMPLE_0000620.LAB	6/25	11:49:59	29833.80964	0.1933582	0.012437796	3.27117445	-0.001306532	
SAMPLE_0000621.LAB	6/25	11:50:58	29844.57771	0.1786049	0.012696416	3.19812295	0.00099702	
SAMPLE_0000622.LAB	6/25	11:51:57	29852.30638	0.1884129	0.012083877	3.13336313	0.001377768	
SAMPLE_0000623.LAB	6/25	11:52:56	29852.86725	0.1849476	0.011994669	3.12019949	0.002322605	
SAMPLE_0000624.LAB	6/25	11:53:55	29873.13648	0.1810209	0.009857102	3.08345956	-0.000149862	
SAMPLE_0000625.LAB	6/25	11:54:58	29879.99349	0.1814834	0.009866905	3.08313217	0.00187009	
SAMPLE_0000626.LAB	6/25	11:56:00	29895.80651	0.1945042	0.01388957	3.08500056	0.000801117	
SAMPLE_0000627.LAB	6/25	11:57:03	29889.80349	0.1776786	0.012138466	3.07314975	-0.000612113	
SAMPLE_0000628.LAB	6/25	11:58:02	29903.82383	0.1840952	0.007764526	3.06867328	0.001790261	
SAMPLE_0000629.LAB	6/25	11:59:12	29903.89091	0.179646	0.011202399	3.06842699	-0.000152932	
SAMPLE_0000630.LAB	6/25	12:00:21	29890.86058	0.196642	0.014021006	3.07519333	0.000952733	
SAMPLE_0000631.LAB	6/25	12:01:20	29881.21685	0.1866396	0.012658224	3.07369557	-0.001982609	
SAMPLE_0000632.LAB	6/25	12:02:26	29870.14612	0.1772296	0.011540215	3.06712046	0.002128651	
SAMPLE_0000633.LAB	6/25	12:03:32	29848.7836	0.1937162	0.012991992	3.08190412	0.001775964	
SAMPLE_0000634.LAB	6/25	12:04:42	29856.58346	0.1730506	0.012323133	3.08372615	-0.002521488	
SAMPLE_0000635.LAB	6/25	12:05:44	29874.9293	0.1908126	0.013076325	3.08142037	-0.003062346	
SAMPLE_0000636.LAB	6/25	12:06:51	29897.14064	0.1969041	0.014214976	3.09443143	-0.000859455	
SAMPLE_0000637.LAB	6/25	12:07:50	29901.89887	0.1837248	0.01371644	3.08708037	-0.000112374	
SAMPLE_0000638.LAB	6/25	12:08:56	29920.32743	0.1869654	0.011470087	3.08712291	0.001587747	
SAMPLE_0000639.LAB	6/25	12:09:55	29925.11042	0.1841207	0.012278351	3.08963942	-0.000458846	
SAMPLE_0000640.LAB	6/25	12:10:57	29928.07292	0.179006	0.011844711	3.08143614	0.001191857	
SAMPLE_0000641.LAB	6/25	12:12:00	29935.57169	0.1884477	0.011739809	3.07448544	-0.001254155	
SAMPLE_0000642.LAB	6/25	12:13:10	29938.30274	0.1795609	0.011649503	3.0783129	0.000346621	
SAMPLE_0000643.LAB	6/25	12:14:19	29938.88252	0.1817565	0.010475204	3.08227949	0.00078114	
SAMPLE_0000644.LAB	6/25	12:15:22	29937.90379	0.1919524	0.012558638	3.09136845	0.001417081	
SAMPLE_0000645.LAB	6/25	12:16:21	29946.08247	0.1909515	0.012325377	3.09035522	0.001342293	
SAMPLE_0000646.LAB	6/25	12:17:24	29958.87984	0.1872515	0.01028551	3.0924178	0.001609777	
SAMPLE_0000647.LAB	6/25	12:18:33	29984.52093	0.2069701	0.01250567	3.09200625	-0.001543998	
SAMPLE_0000648.LAB	6/25	12:19:40	30012.20286	0.1859942	0.012452788	3.09139954	0.001038899	
SAMPLE_0000649.LAB	6/25	12:20:38	30008.7314	0.2050727	0.011864623	3.09150716	-0.000906809	
SAMPLE_0000650.LAB	6/25	12:21:52	30014.85956	0.1871968	0.012982861	3.08851763	0.000944348	
SAMPLE_0000651.LAB	6/25	12:22:51	30031.48401	0.1822486	0.016147829	3.08920311	0.002879571	
Average			29910.9	0.187	0.0121	3.095	0.000	

Spectrum	Date (m/dd)	Time (hh:mm:ss)	H ₂ O (ppmv)	Ethane (ppmv)	EtO (ppmv)	Methane (ppmv)	Interference (ppm)	Notes
Post-Test Calibration Check								
POST ZERO SYST_0000682.LAB	6/25	12:52:02	1294.154827	0.0263949	0.014574084	0.47300896	-0.007369539	System Zero EtO Zero
POST ZERO SYST_0000683.LAB	6/25	12:52:17	1053.870796	-0.010862	0.0143447	0.43855351	-0.001491263	
POST ZERO SYST_0000684.LAB	6/25	12:52:31	925.8170434	-0.018837	0.013178469	0.36231714	0.003120108	
POST ZERO SYST_0000685.LAB	6/25	12:52:46	837.9051968	0.001397	0.010765146	0.34384807	-0.01368062	
POST ZERO SYST_0000686.LAB	6/25	12:53:04	773.4216949	0.0019072	0.012386674	0.33329605	0.000170698	
POST ZERO SYST_0000687.LAB	6/25	12:53:19	732.7538984	0.0247892	0.009061861	0.31973811	-0.013758883	
POST ZERO SYST_0000688.LAB	6/25	12:53:34	703.6777023	-0.008294	0.005430843	0.3150714	-0.001654793	
POST ZERO SYST_0000689.LAB	6/25	12:53:49	687.9777348	0.0068755	0.006996859	0.31646726	0.003956895	
POST ZERO SYST_0000690.LAB	6/25	12:54:07	665.976878	-0.010249	0.007826441	0.30644423	0.004048696	
POST ZERO SYST_0000691.LAB	6/25	12:54:22	652.9533021	0.0010292	0.00804841	0.30165832	0.002347677	
POST ZERO SYST_0000692.LAB	6/25	12:54:37	642.2181078	-0.001291	0.008140018	0.29194967	-0.002304785	
POST ZERO SYST_0000693.LAB	6/25	12:54:51	632.3174001	-0.002173	0.008900289	0.28660511	-0.000804601	
POST ZERO SYST_0000694.LAB	6/25	12:55:06	626.9048266	-0.007252	0.009517025	0.28929045	0.000462208	
POST ZERO SYST_0000695.LAB	6/25	12:55:21	626.377162	0.0088726	0.00471398	0.27716402	-0.00458745	
POST ZERO SYST_0000696.LAB	6/25	12:55:36	618.4214521	-0.025473	0.00604742	0.29133834	0.00067148	
POST ZERO SYST_0000697.LAB	6/25	12:55:50	619.1757289	0.0018694	0.005076648	0.27849288	-0.008946027	
POST ZERO SYST_0000698.LAB	6/25	12:56:05	614.1455144	0.0128061	0.006511196	0.26368255	0.001540789	
POST ZERO SYST_0000699.LAB	6/25	12:56:20	676.9828782	-0.3052	0.019811219	45.606246	0.00105655	
POST ZERO SYST_0000700.LAB	6/25	12:56:38	669.8627021	0.0571671	-0.027527642	85.5457093	0.0001294	
POST ZERO SYST_0000701.LAB	6/25	12:56:53	665.8438665	0.0968954	-0.032377017	86.3380686	0.000273741	
POST ZERO SYST_0000702.LAB	6/25	12:57:11	660.0454807	0.0799091	-0.029048953	86.4984912	0.001986313	
POST ZERO SYST_0000703.LAB	6/25	12:57:30	657.847814	0.0708434	-0.025041181	86.5379862	-0.009030293	
POST ZERO SYST_0000704.LAB	6/25	12:57:44	656.8275576	0.1277887	-0.028457708	86.6009745	-0.005184071	
POST ZERO SYST_0000705.LAB	6/25	12:57:59	657.7046412	0.082964	-0.029591512	86.622949	-0.000529023	System CTS
POST ZERO SYST_0000706.LAB	6/25	12:58:21	659.694864	0.1049789	-0.024454444	86.6672781	-0.00583922	CH4 Avg: 86.7
POST CTS SYST_0000707.LAB	6/25	12:58:36	654.2445613	0.0850366	-0.024805082	86.7143152	-0.003989126	
POST CTS SYST_0000708.LAB	6/25	12:58:54	656.9311267	0.0740283	-0.027029322	86.7265165	0.001065316	
POST CTS SYST_0000709.LAB	6/25	12:59:12	655.2759639	0.0924763	-0.032022854	86.7333755	-0.000395115	
POST CTS SYST_0000710.LAB	6/25	12:59:27	659.3010672	0.0883212	-0.02633573	86.7579736	0.00410212	
POST CTS SYST_0000711.LAB	6/25	12:59:42	656.5546103	0.0999755	-0.023881657	86.753671	9.28324E-05	
POST CTS SYST_0000712.LAB	6/25	12:59:56	658.2550753	0.0865612	-0.028227123	86.7763156	-0.005042426	
POST CTS SYST_0000713.LAB	6/25	13:00:11	662.5113198	0.0854695	-0.023706013	86.8021664	0.00195554	
POST CTS SYST_0000714.LAB	6/25	13:00:26	657.9363147	0.0750675	-0.024734875	86.7706664	-0.004097214	
POST CTS SYST_0000715.LAB	6/25	13:00:41	660.5315615	0.1148245	-0.028189763	86.7860996	0.001161407	
POST CTS SYST_0000716.LAB	6/25	13:00:59	665.2311881	0.0545114	-0.033125514	85.1848808	0.002985043	
POST CTS SYST_0000717.LAB	6/25	13:01:14	660.2676159	-0.078521	0.014602926	13.3408596	-0.008693525	
Run 3 - Process Stack - Vacuum Pump Testing								
SAMPLE_0000723.LAB	6/25	13:09:19	30543.18703	0.1949186	<0.0049	3.15019142	-0.000425754	
SAMPLE_0000724.LAB	6/25	13:10:18	30558.03763	0.1900135	<0.0049	3.14104068	-0.002109482	
SAMPLE_0000725.LAB	6/25	13:11:17	30566.81711	0.1830958	<0.0049	3.12386303	-0.00200347	
SAMPLE_0000726.LAB	6/25	13:12:16	30600.29995	0.189645	<0.0049	3.12557702	-0.000179107	
SAMPLE_0000727.LAB	6/25	13:13:15	30628.37722	0.1920736	0.0050	3.12413359	0.000775109	
SAMPLE_0000728.LAB	6/25	13:14:18	30657.86122	0.1860979	<0.0049	3.11672958	-0.004773378	
SAMPLE_0000729.LAB	6/25	13:15:24	30683.03565	0.1788206	<0.0049	3.13151963	0.001881535	
SAMPLE_0000730.LAB	6/25	13:16:34	30708.33364	0.2045318	<0.0049	3.12707788	-0.002586094	
SAMPLE_0000731.LAB	6/25	13:17:36	30199.19553	-0.101242	<0.0049	2.55856171	8.6193E-05	
SAMPLE_0000732.LAB	6/25	13:18:39	30219.1572	-0.115487	<0.0049	2.55826004	0.001088024	
SAMPLE_0000733.LAB	6/25	13:19:48	30231.6732	-0.090464	<0.0049	2.5526477	-0.001677371	
SAMPLE_0000734.LAB	6/25	13:20:55	30235.26886	-0.118505	<0.0049	2.56792238	0.00186264	
SAMPLE_0000735.LAB	6/25	13:21:54	30242.54185	-0.08976	0.0086	3.1278504	0.002178284	
SAMPLE_0000736.LAB	6/25	13:23:00	30246.48362	-0.103104	<0.0049	2.71280788	7.13115E-06	
SAMPLE_0000737.LAB	6/25	13:24:06	30247.34542	-0.106809	<0.0049	2.62647077	-0.000539656	
SAMPLE_0000738.LAB	6/25	13:25:05	30251.95448	-0.114172	<0.0049	2.57670086	0.000296735	
SAMPLE_0000739.LAB	6/25	13:26:08	30254.84927	-0.113889	<0.0049	2.56555288	-0.006516613	
SAMPLE_0000740.LAB	6/25	13:27:13	30258.81772	-0.106416	0.0054	2.56460129	-0.002048305	
SAMPLE_0000741.LAB	6/25	13:28:23	30268.68198	-0.101522	<0.0049	2.55852084	-0.010565083	
SAMPLE_0000742.LAB	6/25	13:29:29	30280.16969	-0.110813	<0.0049	2.54382999	6.3115E-05	
SAMPLE_0000743.LAB	6/25	13:30:35	30292.51598	-0.114428	<0.0049	2.55110548	-0.007314495	
SAMPLE_0000744.LAB	6/25	13:31:41	30299.03715	-0.107413	<0.0049	2.55903933	-0.007390265	
SAMPLE_0000745.LAB	6/25	13:32:40	30290.48274	-0.11593	0.0066	2.55208408	-0.011663477	
SAMPLE_0000746.LAB	6/25	13:33:54	30293.83012	-0.105753	<0.0049	2.5616637	-0.0041234	
SAMPLE_0000747.LAB	6/25	13:35:03	30320.06099	-0.097799	<0.0049	2.56148104	-0.000559216	
SAMPLE_0000748.LAB	6/25	13:36:13	30335.31175	-0.108318	0.0054	2.55970725	-0.003299577	
SAMPLE_0000749.LAB	6/25	13:37:16	30359.64134	-0.094054	0.0068	2.56276606	0.002333803	
SAMPLE_0000750.LAB	6/25	13:38:15	30383.01283	-0.116874	0.0061	2.56332294	-0.026969129	
SAMPLE_0000751.LAB	6/25	13:39:17	30400.51081	-0.114395	<0.0049	2.55902347	-0.006194226	
SAMPLE_0000752.LAB	6/25	13:40:23	30414.10122	-0.097912	<0.0049	2.56083968	0.00058687	
SAMPLE_0000753.LAB	6/25	13:41:26	30426.26925	-0.095991	0.0062	2.56875207	0.002842643	
SAMPLE_0000754.LAB	6/25	13:42:29	30431.86365	-0.108953	<0.0049	2.56146105	-0.021757363	
SAMPLE_0000755.LAB	6/25	13:43:28	30426.2651	-0.104672	0.0057	2.55719586	-0.000577417	
SAMPLE_0000756.LAB	6/25	13:44:30	30434.16432	-0.107915	0.0059	2.54470457	0.000366216	
SAMPLE_0000757.LAB	6/25	13:45:33	30424.57311	-0.109782	<0.0049	2.54470668	-0.034178426	
SAMPLE_0000758.LAB	6/25	13:46:35	30420.82386	-0.103879	<0.0049	2.53891253	-0.000237209	
SAMPLE_0000759.LAB	6/25	13:47:38	30426.89586	-0.10933	<0.0049	2.5429399	-0.006483947	
SAMPLE_0000760.LAB	6/25	13:48:51	30428.28263	-0.100257	0.0082	2.56025312	-0.002949544	
SAMPLE_0000761.LAB	6/25	13:49:54	30426.57126	-0.118992	0.0071	2.59244901	-0.001136918	
SAMPLE_0000762.LAB	6/25	13:51:03	30429.91341	-0.102511	<0.0049	2.63629901	-0.013758804	
SAMPLE_0000763.LAB	6/25	13:52:13	30433.11031	-0.097442	0.0079	2.70998169	0.00370091	
SAMPLE_0000764.LAB	6/25	13:53:12	30464.27192	-0.109205	0.0064	2.75703999	0.002431684	
SAMPLE_0000765.LAB	6/25	13:54:18	30519.08769	-0.089908	0.0058	2.82334841	-0.012026296	

Spectrum	Time		H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
	Date (m/dd)	(hh:mm:ss)						
SAMPLE_0000766.LAB	6/25	13:55:17	30542.41677	-0.087465	0.0073	2.87336689	-0.002614996	
SAMPLE_0000767.LAB	6/25	13:56:27	30570.03243	-0.075708	0.0075	2.88859417	-0.032470255	
SAMPLE_0000768.LAB	6/25	13:57:29	30601.41971	-0.090778	0.0086	2.85791434	0.000364051	
Average			30406.0	-0.053	<0.0056	2.711	-0.005	
Post-Test Calibration Check								
POST ZERO SYST_0000782.LAB	6/25	14:12:21	30913.3604	-0.06003	0.007639122	2.93981335	-0.004779862	
POST ZERO SYST_0000783.LAB	6/25	14:12:40	30911.8457	-0.076442	0.012740034	2.96597769	-0.071865801	
POST ZERO SYST_0000784.LAB	6/25	14:12:58	16857.6179	1.2226913	0.08290431	3.86408125	-0.014613931	
POST ZERO SYST_0000785.LAB	6/25	14:13:13	2309.136304	-0.040552	0.025291593	0.31693077	-0.003139914	
POST ZERO SYST_0000786.LAB	6/25	14:13:31	1392.246482	-0.028555	0.015559532	0.22889201	0.004285439	
POST ZERO SYST_0000787.LAB	6/25	14:13:46	1189.149781	-0.031291	0.014749407	0.23690116	-0.003079273	
POST ZERO SYST_0000788.LAB	6/25	14:14:01	1065.756519	-0.024099	0.014723618	0.23938875	-0.002315352	
POST ZERO SYST_0000789.LAB	6/25	14:14:19	978.4268225	-0.006892	0.007980358	0.23736014	-0.001865631	
POST ZERO SYST_0000790.LAB	6/25	14:14:34	899.9925243	-0.010528	0.014561435	0.23703561	-0.01232206	
POST ZERO SYST_0000791.LAB	6/25	14:14:55	859.3924805	-0.029387	0.012114802	0.23338985	-0.001549688	
POST ZERO SYST_0000792.LAB	6/25	14:15:10	816.9733475	-0.035717	0.00968408	0.23519555	-0.022226897	
POST ZERO SYST_0000793.LAB	6/25	14:15:25	800.6479725	-0.000429	0.005888565	0.22522827	-0.061230314	
POST ZERO SYST_0000794.LAB	6/25	14:15:40	779.4736201	-0.022964	0.009236694	0.22848458	0.005934172	System Zero
POST ZERO SYST_0000795.LAB	6/25	14:15:55	766.3520046	-0.01809	0.011239609	0.23370303	-0.014447231	EtO Zero
POST ZERO SYST_0000796.LAB	6/25	14:16:10	753.4398238	-0.01407	0.006842064	0.23425852	-0.017063965	
POST ZERO SYST_0000797.LAB	6/25	14:16:28	740.7669605	9.122E-05	0.004055283	0.23578393	0.000357545	
POST ZERO SYST_0000798.LAB	6/25	14:16:43	730.6641241	-0.021981	0.009808628	0.23441466	0.000560167	
POST ZERO SYST_0000799.LAB	6/25	14:16:58	721.2297528	-0.0242	0.008198625	0.24361001	-0.002303384	
POST ZERO SYST_0000800.LAB	6/25	14:17:13	717.788836	-0.020065	0.010269607	0.24363953	-0.011907876	
POST ZERO SYST_0000801.LAB	6/25	14:17:27	705.8926495	-0.011665	0.008105581	0.23402104	-0.00419843	
POST ZERO SYST_0000802.LAB	6/25	14:17:42	705.798251	-0.016569	0.006915059	0.22992117	-0.002103526	
POST ZERO SYST_0000803.LAB	6/25	14:17:57	701.3040516	0.0011982	0.008041199	0.24431981	-0.002795495	
POST ZERO SYST_0000804.LAB	6/25	14:18:12	694.7891292	-0.00481	0.009800014	0.23000014	-0.007078475	
POST ZERO SYST_0000805.LAB	6/25	14:18:26	703.4390763	-0.010159	0.001152513	2.82054453	0.000825382	
POST ZERO SYST_0000806.LAB	6/25	14:18:41	739.7478882	-0.197087	-0.022872384	75.6342738	0.001529642	
POST ZERO SYST_0000807.LAB	6/25	14:18:56	740.0122702	0.0512455	-0.012865037	85.9431766	-0.006384831	
POST ZERO SYST_0000808.LAB	6/25	14:19:11	733.2684005	0.0726762	-0.013964599	86.233072	-0.01476532	
POST ZERO SYST_0000809.LAB	6/25	14:19:25	727.4903612	0.0454831	-0.012580884	86.3791192	-0.011543344	
POST ZERO SYST_0000810.LAB	6/25	14:19:44	722.7421597	0.0635724	-0.008690663	86.4460582	0.001243773	
POST ZERO SYST_0000811.LAB	6/25	14:19:59	717.1347691	0.072078	-0.011199711	86.5055363	-0.002081607	
POST ZERO SYST_0000812.LAB	6/25	14:20:13	714.7141952	0.0529919	-0.011993685	86.5419281	0.001622569	
POST ZERO SYST_0000813.LAB	6/25	14:20:32	713.588362	0.0716002	-0.008730774	86.5643896	-0.010905292	
POST ZERO SYST_0000814.LAB	6/25	14:20:50	702.2627244	0.0760153	-0.010936757	86.5912034	-0.026637283	
POST ZERO SYST_0000815.LAB	6/25	14:21:05	702.7843327	0.0660742	-0.017521274	86.616775	-0.004188941	System CTS
POST ZERO SYST_0000816.LAB	6/25	14:21:20	698.6584366	0.0644088	-0.010840742	86.6477457	-0.014803523	CH4 Avg: 86.7
POST ZERO SYST_0000817.LAB	6/25	14:21:34	692.3828687	0.0736683	-0.01403207	86.6702207	-0.004683187	
POST ZERO SYST_0000818.LAB	6/25	14:21:49	692.6362243	0.0929777	-0.013868048	86.6600223	-0.000388332	
POST ZERO SYST_0000819.LAB	6/25	14:22:04	688.4893434	0.0687903	-0.010911343	86.6651749	-0.001703052	
POST ZERO SYST_0000820.LAB	6/25	14:22:22	685.364424	0.0542939	-0.011325727	86.6841801	-0.002164602	
POST ZERO SYST_0000821.LAB	6/25	14:22:37	685.3053437	0.0641205	-0.011273883	86.7034616	-0.016070289	
POST ZERO SYST_0000822.LAB	6/25	14:22:55	678.2602736	0.0868734	-0.007258103	86.6885273	-0.002395342	
POST ZERO SYST_0000823.LAB	6/25	14:23:10	677.3307272	0.0682854	-0.018364853	86.6882904	-0.028688021	
POST ZERO SYST_0000824.LAB	6/25	14:23:28	679.7769021	0.0783943	-0.017674168	86.6933749	-0.043504288	
POST ZERO SYST_0000825.LAB	6/25	14:23:46	675.3217515	0.0472434	-0.009133821	86.7180086	0.001474627	
POST ZERO SYST_0000826.LAB	6/25	14:24:01	671.1811486	-0.503676	-0.025935897	62.9092878	-0.011332	
POST CTS SYST_0000827.LAB	6/25	14:24:16	639.5845386	-0.088255	-0.006256533	3.45974995	0.00027255	

Spectrum	Time		H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
	Date (hh:mm:ss)	(m/dd)						
Pre-Test Calibrations (6/26) - Indoor Air Stack								
PRE-ZERO_0000001.LAB	6/26	07:07:04	8.629727851	0.008143	0.0006309	-0.0059564	0.001911116	Note: The spectrum label does not necessarily indicate /correspond to the exact calibration action at that moment
PRE-ZERO_0000002.LAB	6/26	07:07:18	4.214705839	0.0156722	0.0032334	-0.0085286	-0.003066124	
PRE-ZERO_0000003.LAB	6/26	07:07:33	4.096729116	0.0198766	0.0012082	-0.0087831	-0.012360737	
PRE-ZERO_0000004.LAB	6/26	07:07:48	0.843605996	0.0022871	-0.000432	0.00271496	0.002662993	
PRE-ZERO_0000005.LAB	6/26	07:08:03	-3.051305835	0.0234456	-0.000245	0.00215642	0.000819203	
PRE-ZERO_0000006.LAB	6/26	07:08:21	3.798309587	0.0136888	0.0023756	-0.0078208	-0.000875514	
PRE-ZERO_0000007.LAB	6/26	07:08:36	2.350270786	-0.02388	-0.00343	-0.0129244	-0.005447792	
PRE-ZERO_0000008.LAB	6/26	07:08:50	-3.053090476	0.0116332	-0.002043	0.00440718	0.000922797	
PRE-ZERO_0000009.LAB	6/26	07:09:09	1.105574476	0.0279448	0.0009081	-0.0028852	-0.00164225	
Filter Interference.LAB	6/26	07:10:19	3.14074E-14	3.928E-17	-4.87E-17	-7.215E-17	1	Filter Interference
ZERO DIRECT_0000010.LAB	6/26	07:10:19	3.14074E-14	3.928E-17	-4.87E-17	-7.215E-17	1	Direct Zero
PRE-ZERO_0000011.LAB	6/26	07:10:40	-1.760693879	-0.010324	-0.003595	-0.000438	0.000447227	Direct CTS CH4 Avg: 86.8
PRE-ZERO_0000012.LAB	6/26	07:10:55	-1.257799276	-0.011355	-0.008782	-0.0078339	-0.005091003	
PRE-ZERO_0000013.LAB	6/26	07:11:13	-0.213843254	-0.000497	-0.000155	0.00118362	-0.006305989	
PRE-ZERO_0000014.LAB	6/26	07:11:28	-0.75650048	-0.015904	0.0030393	3.6347E-05	0.001320755	
PRE-ZERO_0000015.LAB	6/26	07:11:43	0.155832288	0.0080837	0.0045409	-0.0022608	0.003469603	
PRE-ZERO_0000016.LAB	6/26	07:11:58	-0.612177754	0.000822	0.002514	-0.0061695	0.000382637	
PRE-ZERO_0000017.LAB	6/26	07:12:12	0.761826823	-0.007637	-0.000844	-0.0089942	0.006772076	
PRE-ZERO_0000018.LAB	6/26	07:12:27	-3.999667085	0.0012178	0.0007865	0.00371215	-2.25385E-05	
PRE-ZERO_0000019.LAB	6/26	07:12:42	1.754897927	-0.001419	-0.002303	-0.0042588	2.09971E-05	
PRE-ZERO_0000020.LAB	6/26	07:12:57	-1.928338027	0.0098424	0.003304	0.0026091	-0.050927575	
PRE-ZERO_0000021.LAB	6/26	07:13:11	0.063597769	0.0012252	-0.003005	-0.0042528	0.001389523	
PRE-ZERO_0000022.LAB	6/26	07:13:33	129.2660674	-0.484654	-0.01761	34.3870229	-0.002905137	
PRE-ZERO_0000023.LAB	6/26	07:13:48	172.039451	0.0332098	-0.050969	85.9998539	0.002273503	
PRE-ZERO_0000024.LAB	6/26	07:14:03	137.2613514	0.0534786	-0.054595	86.5285937	0.002335025	
PRE-ZERO_0000025.LAB	6/26	07:14:21	122.3706536	0.0768849	-0.055299	86.6879128	0.000148904	
PRE-ZERO_0000026.LAB	6/26	07:14:36	110.49143	0.060403	-0.060239	86.7442481	-0.003258042	
PRE-ZERO_0000027.LAB	6/26	07:14:54	105.0941398	0.0638991	-0.050305	86.7572974	0.001161588	
PRE-ZERO_0000028.LAB	6/26	07:15:09	104.3404759	0.0574883	-0.056263	86.7965271	0.000978893	
PRE-ZERO_0000029.LAB	6/26	07:15:23	99.84053664	0.0598675	-0.052981	86.8178273	0.000218277	
PRE-ZERO_0000030.LAB	6/26	07:15:42	100.1381776	0.0568635	-0.05428	86.8109816	0.002770437	
PRE-ZERO_0000031.LAB	6/26	07:15:56	96.14451041	0.0642107	-0.058791	86.8124024	-0.004150004	
PRE-ZERO_0000032.LAB	6/26	07:16:11	92.86836788	0.0620137	-0.055408	86.8537553	0.000734927	
PRE-ZERO_0000033.LAB	6/26	07:16:26	94.08344596	0.0527811	-0.050364	86.8525838	-0.000236117	
PRE-ZERO_0000034.LAB	6/26	07:16:41	96.18065659	0.0453569	-0.058765	86.8525322	-0.008316451	
PRE-ZERO_0000035.LAB	6/26	07:16:59	91.20539125	0.0795962	-0.055425	86.8870398	-0.004728077	
PRE-ZERO_0000036.LAB	6/26	07:17:14	393.9715006	31.624277	0.0557213	75.3246353	-0.000121286	
PRE-ZERO_0000037.LAB	6/26	07:17:29	-34.50841706	488.57828	1.7618442	3.02224017	0.007919181	
PRE-ZERO_0000038.LAB	6/26	07:17:43	-330.7536948	513.53902	1.9304581	-0.7028387	-0.041013519	
PRE-ZERO_0000039.LAB	6/26	07:17:58	-347.1262755	514.92058	1.883573	-0.9225745	0.001336118	
PRE-ZERO_0000040.LAB	6/26	07:18:13	-348.1714878	515.30819	1.7414286	-0.995626	0.000149938	
PRE-ZERO_0000041.LAB	6/26	07:18:31	-352.8862881	515.68035	1.5777243	-1.0479509	0.000156953	
PRE-ZERO_0000042.LAB	6/26	07:18:46	-359.3091141	515.92755	1.3725878	-1.0755032	0.000698114	
PRE-ZERO_0000043.LAB	6/26	07:19:04	-357.6698112	515.96802	1.3522074	-1.0859498	0.000982542	
CAL DIRECT_0000044.LAB	6/26	07:19:33	-366.3278958	516.37341	1.6607793	-1.1336757	-0.003708119	
CAL DIRECT_0000045.LAB	6/26	07:19:48	-353.6243203	516.56792	1.8020695	-1.163605	0.002147959	
CAL DIRECT_0000046.LAB	6/26	07:20:03	-349.1071796	516.71446	1.912236	-1.1677953	0.000521472	
CAL DIRECT_0000047.LAB	6/26	07:20:18	-350.3503703	516.55098	1.9891982	-1.1901731	-0.008344589	
CAL DIRECT_0000048.LAB	6/26	07:20:32	-347.0759039	516.60958	2.0354358	-1.1869069	0.001034393	
CAL DIRECT_0000049.LAB	6/26	07:20:47	-353.7967051	516.71836	2.066695	-1.1994635	0.0015087	
CAL DIRECT_0000050.LAB	6/26	07:21:02	-350.157798	516.86767	2.0894637	-1.1918057	0.004584133	
CAL DIRECT_0000051.LAB	6/26	07:21:17	-352.344448	516.93087	2.1015197	-1.2088222	-0.003113065	
CAL DIRECT_0000052.LAB	6/26	07:21:31	-362.8395613	516.90619	2.0995046	-1.2179997	-0.006157804	
CAL DIRECT_0000053.LAB	6/26	07:21:46	-360.7279006	516.81447	2.112132	-1.2252447	-0.010531588	
CAL DIRECT_0000054.LAB	6/26	07:22:01	-366.0579901	516.93355	2.1176623	-1.2248731	-0.06416117	
CAL DIRECT_0000055.LAB	6/26	07:22:16	-356.0394037	517.07918	2.1155593	-1.2342398	0.001047799	
CAL DIRECT_0000056.LAB	6/26	07:22:34	-349.3821995	517.06098	2.1152654	-1.2253301	-0.000339863	Direct QA/Tracer EtO Avg: 2.12 C2H6 Avg: 517.11
CAL DIRECT_0000057.LAB	6/26	07:22:52	-359.2842955	517.0381	2.1199015	-1.2358035	0.001228142	
CAL DIRECT_0000058.LAB	6/26	07:23:10	-353.2006957	517.06444	2.1255804	-1.2424331	-0.000128942	
CAL DIRECT_0000059.LAB	6/26	07:23:25	-356.9098503	517.27841	2.1271959	-1.2360321	4.49035E-05	
CAL DIRECT_0000060.LAB	6/26	07:23:40	-350.8851181	517.16534	2.1245832	-1.2477707	-0.008543018	
CAL DIRECT_0000061.LAB	6/26	07:23:55	-350.8338284	517.29933	2.1262807	-1.2430272	0.000302398	
CAL DIRECT_0000062.LAB	6/26	07:24:10	-358.6818127	517.06392	2.1294859	-1.2461416	-0.004025389	
CAL DIRECT_0000063.LAB	6/26	07:24:24	-361.6326477	517.08278	2.1316045	-1.2411983	-0.03432574	
CAL DIRECT_0000064.LAB	6/26	07:24:43	16880.70344	66.972568	0.5902079	6.4610376	0.002146994	
CAL DIRECT_0000065.LAB	6/26	07:25:01	21341.22379	0.2374104	0.0430048	2.79531122	0.001871276	
ZERO SYSTEM_0000066.LAB	6/26	07:32:47	1132.169658	0.6660943	0.0176622	0.22374011	0.00530146	
ZERO SYSTEM_0000067.LAB	6/26	07:33:02	845.6641747	0.4659034	0.0213361	0.22443629	0.000427967	
ZERO SYSTEM_0000068.LAB	6/26	07:33:17	706.0475578	0.3988498	0.0078886	0.20818596	0.001503332	
ZERO SYSTEM_0000069.LAB	6/26	07:33:32	611.3244439	0.3585011	0.0145167	0.19578714	-0.003690475	
ZERO SYSTEM_0000070.LAB	6/26	07:33:47	559.6338421	0.3036924	0.0051125	0.18819695	-0.000769857	
ZERO SYSTEM_0000071.LAB	6/26	07:34:01	516.4350873	0.2710571	0.0091078	0.20614144	-0.011942605	
ZERO SYSTEM_0000072.LAB	6/26	07:34:16	492.1825558	0.2828364	0.0067212	0.20196062	-0.000512571	
ZERO SYSTEM_0000073.LAB	6/26	07:34:31	467.0179015	0.2620918	0.0083899	0.20392783	0.010762755	
ZERO SYSTEM_0000074.LAB	6/26	07:34:46	447.1744812	0.233998	0.0060218	0.20050184	-0.002619013	
ZERO SYSTEM_0000075.LAB	6/26	07:35:04	432.4944733	0.198195	0.0073304	0.18990037	0.001752305	
ZERO SYSTEM_0000076.LAB	6/26	07:35:26	411.5689518	0.2032712	0.0073977	0.18876316	-0.000248873	
ZERO SYSTEM_0000077.LAB	6/26	07:35:41	399.3664284	0.1790719	0.0070526	0.19941386	-0.000976996	
ZERO SYSTEM_0000078.LAB	6/26	07:35:55	398.6097618	0.171148	0.006578	0.18851309	0.000843761	
ZERO SYSTEM_0000079.LAB	6/26	07:36:10	391.427797	0.1775486	0.0055294	0.19012465	-0.030591505	

Raw FTIR Data
Indoor Air Stack
Indoor Air Testing



Spectrum	Time		H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
	Date (m/dd)	(hh:mm:ss)						
ZERO_SYSTEM_0000080.LAB	6/26	07:36:25	379.6497413	0.1771671	0.0078857	0.18510554	-0.000642198	System CTS CH3 Avg: 86.6
ZERO_SYSTEM_0000081.LAB	6/26	07:36:40	380.0437059	0.1788635	0.0036712	0.18514333	-0.000490282	
ZERO_SYSTEM_0000082.LAB	6/26	07:36:54	375.316401	0.1580471	0.005329	0.19095082	-0.006182275	
ZERO_SYSTEM_0000083.LAB	6/26	07:37:09	368.5796442	0.1567586	0.0049563	0.18033924	0.004600099	
ZERO_SYSTEM_0000084.LAB	6/26	07:37:24	370.8052998	0.1485921	0.0023812	0.19080154	-0.001818983	
ZERO_SYSTEM_0000085.LAB	6/26	07:37:39	362.8572883	0.1353729	0.0047102	0.18829926	-0.009600022	
ZERO_SYSTEM_0000086.LAB	6/26	07:37:57	362.6790982	0.1251732	0.002752	0.1956065	-0.007757873	
ZERO_SYSTEM_0000087.LAB	6/26	07:38:12	398.2750319	0.2348453	0.0151778	20.2983714	-0.001949343	
ZERO_SYSTEM_0000088.LAB	6/26	07:38:26	416.8787692	0.2261461	-0.041237	84.1461627	0.00274547	
ZERO_SYSTEM_0000089.LAB	6/26	07:38:45	420.3124437	0.1819564	-0.04501	86.1857401	0.007291567	
CTS_SYSTEM_0000090.LAB	6/26	07:38:59	420.9139993	0.175196	-0.046385	86.402836	0.002888924	
CTS_SYSTEM_0000091.LAB	6/26	07:39:14	411.7430793	0.1770094	-0.034728	86.3870986	-0.008319064	
CTS_SYSTEM_0000092.LAB	6/26	07:39:29	413.4370696	0.1797066	-0.041356	86.3959746	-0.012106137	
CTS_SYSTEM_0000093.LAB	6/26	07:39:47	412.7731867	0.1504114	-0.038564	86.4832664	3.60187E-05	
CTS_SYSTEM_0000094.LAB	6/26	07:40:05	410.36852	0.1706451	-0.03652	86.5392543	0.002481353	
CTS_SYSTEM_0000095.LAB	6/26	07:40:20	406.2843757	0.1662197	-0.041846	86.5778707	-0.012196128	
CTS_SYSTEM_0000096.LAB	6/26	07:40:35	410.0450274	0.1692849	-0.036058	86.592191	-0.006463212	
CTS_SYSTEM_0000097.LAB	6/26	07:40:50	412.9765878	0.1400713	-0.042075	86.7653926	0.001684342	
CTS_SYSTEM_0000098.LAB	6/26	07:41:05	415.2969554	0.1402502	-0.047984	86.6867783	-0.007185291	
CTS_SYSTEM_0000099.LAB	6/26	07:41:19	417.0601993	0.1317069	-0.040526	86.6909684	-0.009228555	
CTS_SYSTEM_0000100.LAB	6/26	07:41:34	419.2247485	0.12822	-0.042755	86.7152363	-0.005725508	
NATIVE_0000101.LAB	6/26	07:47:29	20364.44262	-0.105817	0.0069781	2.34953185	-0.146803968	
NATIVE_0000102.LAB	6/26	07:47:44	20502.62957	-0.049178	0.0117901	2.19249257	0.000638452	
NATIVE_0000103.LAB	6/26	07:47:59	20427.06077	-0.05399	0.0103465	2.16304894	0.000665462	
NATIVE_0000104.LAB	6/26	07:48:14	20449.62586	-0.042059	0.0102055	2.17181818	-0.024076913	
NATIVE_0000105.LAB	6/26	07:48:28	20155.10614	-0.024112	0.0181065	2.53593821	0.000540813	
NATIVE_0000106.LAB	6/26	07:48:43	20865.75619	0.0006487	0.0194249	3.36087095	-0.008011997	
NATIVE_0000107.LAB	6/26	07:48:58	20973.88954	-0.010682	0.021253	3.38431201	1.674366274	
NATIVE_0000108.LAB	6/26	07:49:13	20999.20207	-0.000114	0.0196505	3.383385	-0.008355147	
NATIVE_0000109.LAB	6/26	07:49:31	21019.75599	-0.024126	0.0194877	3.36910785	0.004696599	
NATIVE_0000110.LAB	6/26	07:49:46	21037.48769	0.0022947	0.0131665	3.37691857	0.000857146	
NATIVE_0000111.LAB	6/26	07:50:04	21050.15436	-0.001173	0.0170543	3.37443968	0.007159571	
NATIVE_0000112.LAB	6/26	07:50:19	21069.61545	-0.002492	0.0179922	3.39289609	-0.003800242	
NATIVE_0000113.LAB	6/26	07:50:33	21068.22791	-0.019249	0.0242463	3.39670795	-0.002084905	
NATIVE_0000114.LAB	6/26	07:50:48	21074.95659	0.0073936	0.0203645	3.53684382	-0.003776509	
NATIVE_0000115.LAB	6/26	07:51:03	21093.47551	-0.012763	0.0200084	3.65957597	0.001460669	
NATIVE_0000116.LAB	6/26	07:51:18	21095.2952	0.0256531	0.0166353	3.64669554	-0.001843476	
NATIVE_0000117.LAB	6/26	07:51:32	21097.40298	-0.007387	0.01526	3.55628462	-0.00833627	
NATIVE_0000118.LAB	6/26	07:51:47	21103.47389	0.0078663	0.0171888	3.50213931	-0.000306701	
NATIVE_0000119.LAB	6/26	07:52:02	21102.30463	0.0121099	0.0198602	3.49061426	-0.006161168	
NATIVE_0000120.LAB	6/26	07:52:17	21106.37795	0.0180213	0.0185261	3.43891732	-0.015031025	
NATIVE_0000121.LAB	6/26	07:52:35	21114.11105	0.0267904	0.0211156	3.46410937	-0.004055855	
NATIVE_0000122.LAB	6/26	07:52:50	20679.23544	0.0231745	0.0190072	3.39725143	0.000507788	
NATIVE_0000123.LAB	6/26	07:53:05	21273.23063	0.0322499	0.0341949	3.45223991	-0.003179757	
NATIVE_0000124.LAB	6/26	07:53:19	21197.43895	0.0327978	0.0278067	3.38214345	-0.003073263	
NATIVE_0000125.LAB	6/26	07:53:34	21189.53202	0.0334775	0.0299833	3.36826624	-0.013006112	
NATIVE_0000126.LAB	6/26	07:53:49	21197.24915	-0.005852	0.0299474	3.33107375	-0.005774569	
NATIVE_0000127.LAB	6/26	07:54:03	20397.87364	0.0226861	0.0413416	3.2063576	-0.002586947	
NATIVE_0000128.LAB	6/26	07:54:22	19921.68033	0.0205443	0.0362173	3.13415614	-0.016841371	
NATIVE_0000129.LAB	6/26	07:54:37	19726.32453	-0.00443	0.0390455	3.20599826	-0.001266682	
NATIVE_0000130.LAB	6/26	07:54:52	19599.01321	0.0337621	0.0340524	3.16381315	0.00184962	
SPIKE_0000131.LAB	6/26	07:55:10	19452.38241	18.054029	0.0955009	3.05977575	-0.001224927	
SPIKE_0000132.LAB	6/26	07:55:28	19438.78885	43.572746	0.1800913	2.89898788	-0.007408013	
SPIKE_0000133.LAB	6/26	07:55:47	19369.8619	46.999729	0.1917003	2.83261349	0.007457769	
SPIKE_0000134.LAB	6/26	07:56:01	19335.64052	48.101076	0.1991401	2.83662579	-0.007129806	
SPIKE_0000135.LAB	6/26	07:56:16	19298.22272	48.932337	0.2077473	2.89975019	-0.006155224	
SPIKE_0000136.LAB	6/26	07:56:31	19312.28981	49.357277	0.2026821	3.00051836	0.001780027	
SPIKE_0000137.LAB	6/26	07:56:49	19304.95959	49.616759	0.2074428	3.04998189	0.004272317	
SPIKE_0000138.LAB	6/26	07:57:04	19280.4341	50.02328	0.2094547	2.96552772	-0.00408954	
SPIKE_0000139.LAB	6/26	07:57:23	19283.61639	50.174181	0.2071311	2.92690724	0.006248632	
SPIKE_0000140.LAB	6/26	07:57:37	19284.03402	50.198279	0.211148	2.88962377	-0.00375706	
SPIKE_0000141.LAB	6/26	07:57:52	19293.05074	50.014008	0.2107197	2.88515051	-0.026408863	
SPIKE_0000142.LAB	6/26	07:58:14	19285.75206	50.151814	0.2147279	2.91764079	-0.00530948	
SPIKE_0000143.LAB	6/26	07:58:29	19291.63544	49.995624	0.2083073	2.88626001	0.000142351	
SPIKE_0000144.LAB	6/26	07:58:43	19310.59415	49.852244	0.2114418	2.89208219	-0.005876722	
SPIKE_0000145.LAB	6/26	07:58:58	19305.13844	49.920762	0.2064608	2.90304555	0.008356596	
SPIKE_0000146.LAB	6/26	07:59:13	19314.1996	49.745631	0.2112159	2.88187188	-0.002679385	
SPIKE_0000147.LAB	6/26	07:59:28	19308.62748	49.796736	0.2121287	2.86915403	-0.000162816	
SPIKE_0000148.LAB	6/26	07:59:42	19314.99617	49.587423	0.2092249	2.87311582	-0.021212943	
SPIKE_0000149.LAB	6/26	08:00:01	19325.97313	49.60968	0.209908	2.84625971	-0.004861986	
SPIKE_0000150.LAB	6/26	08:00:15	19331.32927	49.498958	0.2121008	2.83755943	-0.003406702	
SPIKE_0000151.LAB	6/26	08:00:30	19342.3221	49.358546	0.2091755	2.83020884	0.00324903	
SPIKE_0000152.LAB	6/26	08:00:45	19335.56673	49.115171	0.2130633	2.83515385	0.004766199	
SPIKE_0000153.LAB	6/26	08:01:00	19359.5067	49.134664	0.2083264	2.84411004	-0.011819842	
SPIKE_0000154.LAB	6/26	08:01:14	19366.10543	49.107685	0.2046018	2.81934695	0.005110757	
SPIKE_0000155.LAB	6/26	08:01:29	19357.70036	49.254586	0.2091689	2.84501608	-0.004184393	
SPIKE_0000156.LAB	6/26	08:01:44	19355.1662	49.055013	0.2051798	2.89333228	0.001195385	
SPIKE_0000157.LAB	6/26	08:02:02	19289.81878	50.174375	0.2096818	2.94471596	-0.003736118	
SPIKE_0000158.LAB	6/26	08:02:17	6887.046358	381.47375	1.523254	-0.0691899	0.002006347	
Run 1 - Indoor Air Stack - Indoor Air Testing								
SAMPLE_S001_0000141.LAB	6/26	10:01:13	21676.19863	0.0213558	0.0162728	3.33578446	0.010483001	Point 2 Stratification Check

Spectrum	Time		H ₂ O (ppmv)	Ethane (ppmv)	EtO (ppmv)	Methane (ppmv)	Filter Interference (ppm)	Notes	
	Date (m/dd)	(hh:mm:ss)							
SAMPLE_S001_0000142.LAB	6/26	10:02:15	21684.07713	0.017453	0.0190016	3.32070044	-0.023809673	EtO Avg:	0.020
SAMPLE_S001_0000143.LAB	6/26	10:03:18	21688.15143	0.0176066	0.018655	3.29394061	-0.020502139		
SAMPLE_S001_0000144.LAB	6/26	10:04:17	21698.35781	0.0142171	0.0169737	3.25114495	0.001800144		
SAMPLE_S001_0000145.LAB	6/26	10:05:23	21708.03909	0.0192428	0.0161499	3.21937013	-0.034512448		
SAMPLE_S001_0000146.LAB	6/26	10:06:22	21706.66426	0.00856	0.0201524	3.21160663	-0.001273469		
SAMPLE_S001_0000147.LAB	6/26	10:07:21	21710.84696	0.0034617	0.0206747	3.20160797	0.001372025		
SAMPLE_S001_0000148.LAB	6/26	10:08:20	21711.47648	0.0155167	0.0216875	3.20611145	-0.014372466		
SAMPLE_S001_0000149.LAB	6/26	10:09:30	21707.02743	0.0182405	0.0199515	3.1961754	-0.000564744		
SAMPLE_S001_0000150.LAB	6/26	10:10:32	21747.91738	0.027268	0.0224546	3.21873354	-0.047889692		
SAMPLE_S001_0000151.LAB	6/26	10:11:35	21760.2414	0.0099804	0.0263852	3.18821903	0.004842042		
SAMPLE_S001_0000152.LAB	6/26	10:12:41	21775.92056	0.0265581	0.0262621	3.20228071	0.005530418		
SAMPLE_S001_0000153.LAB	6/26	10:13:47	21784.96574	0.01248	0.0300928	3.16230545	-0.0243745		
SAMPLE_S001_0000154.LAB	6/26	10:14:46	21806.53694	0.0187963	0.0287289	3.16216935	0.004300451		
SAMPLE_S001_0000155.LAB	6/26	10:15:52	21812.18027	0.0170888	0.0264836	3.15240352	0.003303399		
SAMPLE_S001_0000156.LAB	6/26	10:16:55	21822.30976	0.0106938	0.0264575	3.14484502	-0.010536626		
SAMPLE_S001_0000157.LAB	6/26	10:17:54	21834.99984	0.0099476	0.0311284	3.16116433	1.162295931		
SAMPLE_S001_0000158.LAB	6/26	10:18:56	21835.06242	0.0165501	0.0313805	3.14816094	0.005862217		
SAMPLE_S001_0000159.LAB	6/26	10:19:59	21848.39836	0.0073854	0.0269113	3.13026157	0.003196136		
SAMPLE_S001_0000160.LAB	6/26	10:21:01	21856.44608	0.0158005	0.0315561	3.13985023	-0.035724179		
SAMPLE_S001_0000161.LAB	6/26	10:22:00	21860.92345	0.0180284	0.0328271	3.13456655	-0.013700866	Point 1	
SAMPLE_S001_0000162.LAB	6/26	10:23:03	21874.66351	0.0275753	0.0306668	3.13255388	-0.015486085	EtO Avg:	0.013
SAMPLE_S001_0000163.LAB	6/26	10:24:09	21889.34883	0.0109313	0.0306364	3.11472889	-0.001495991		
SAMPLE_S001_0000164.LAB	6/26	10:25:12	21911.58018	0.0003194	0.033705	3.1079786	-0.00856528		
SAMPLE_S001_0000165.LAB	6/26	10:26:14	21933.78662	0.0046833	0.0318383	3.0988185	-0.011984302		
SAMPLE_S001_0000166.LAB	6/26	10:27:17	21949.64063	0.0147373	0.0345241	3.1261098	-0.009657498		
SAMPLE_S001_0000167.LAB	6/26	10:28:20	21957.70556	0.0053982	0.0328588	3.07069426	0.000815286		
SAMPLE_S001_0000168.LAB	6/26	10:29:29	21976.35146	0.0258555	0.0324399	3.06913798	-0.005505738		
SAMPLE_S001_0000169.LAB	6/26	10:30:32	21986.52157	0.0123154	0.0314364	3.10663837	-0.013535987		
SAMPLE_S001_0000170.LAB	6/26	10:31:38	21993.99424	0.0094458	0.0334009	3.07919535	-0.018913755		
SAMPLE_S001_0000171.LAB	6/26	10:32:37	22010.08639	0.0069371	0.0333083	3.06886388	-0.036859681		
SAMPLE_S001_0000172.LAB	6/26	10:33:50	22016.94481	0.0171246	0.0305129	3.05291613	-0.003673569		
SAMPLE_S001_0000173.LAB	6/26	10:34:52	22032.82502	0.0052951	0.0316744	3.05516125	-0.001552437		
SAMPLE_S001_0000174.LAB	6/26	10:35:55	22045.73389	0.0159798	0.0351253	3.05623555	-0.006564968		
SAMPLE_S001_0000175.LAB	6/26	10:37:01	22071.70414	0.0047419	0.0333968	3.05284136	-0.001279029		
SAMPLE_S001_0000176.LAB	6/26	10:38:07	22094.65785	0.0190829	0.0323307	3.06208187	-0.007410675		
SAMPLE_S001_0000177.LAB	6/26	10:39:06	22112.12143	0.0209863	0.0307252	3.02905263	-5.89934E-05		
SAMPLE_S001_0000178.LAB	6/26	10:40:12	22139.22077	0.0103831	0.0313922	3.04896731	0.004365012		
SAMPLE_S001_0000179.LAB	6/26	10:41:15	22163.25344	0.0130518	0.0291502	3.03629077	-0.011193501		
SAMPLE_S001_0000180.LAB	6/26	10:42:17	22174.62699	0.0126208	0.0306426	3.03136837	-0.003559845		
SAMPLE_S001_0000181.LAB	6/26	10:43:20	22199.70885	0.0166753	0.0287316	3.02993252	-0.008716149	Point 3	
SAMPLE_S001_0000182.LAB	6/26	10:44:22	22230.32559	0.0237354	0.0290813	3.01775484	-0.024843694	EtO Avg:	0.017
SAMPLE_S001_0000183.LAB	6/26	10:45:25	22241.99336	0.0196761	0.027053	3.01041101	0.008513985		
SAMPLE_S001_0000184.LAB	6/26	10:46:27	22255.56406	0.018515	0.0273945	3.00240854	-0.027011519		
SAMPLE_S001_0000185.LAB	6/26	10:47:34	22264.65079	0.0176288	0.0266541	3.01366585	0.002774939		
SAMPLE_S001_0000186.LAB	6/26	10:48:36	22273.07718	0.0190626	0.0280837	3.01013236	-0.000883665		
SAMPLE_S001_0000187.LAB	6/26	10:49:35	22276.49252	0.0106976	0.0241807	3.01487557	-0.00683716		
SAMPLE_S001_0000188.LAB	6/26	10:50:34	22278.36971	0.0181963	0.0235866	3.02636877	-0.001186178		
SAMPLE_S001_0000189.LAB	6/26	10:51:33	22289.28645	0.0215743	0.0228201	3.00197105	0.000873037		
SAMPLE_S001_0000190.LAB	6/26	10:52:36	22288.84285	0.0183169	0.0226557	3.01397608	-0.016944283		
SAMPLE_S001_0000191.LAB	6/26	10:53:35	22279.52802	0.0225562	0.0186545	2.99623831	-0.007509482		
SAMPLE_S001_0000192.LAB	6/26	10:54:48	22271.29226	0.0222968	0.0234977	3.02990267	-0.000104113		
SAMPLE_S001_0000193.LAB	6/26	10:55:51	22271.45753	0.014632	0.0210017	2.98311258	-0.001718711		
SAMPLE_S001_0000194.LAB	6/26	10:56:50	22265.1545	0.011246	0.0203465	2.97429883	-0.015156206		
SAMPLE_S001_0000195.LAB	6/26	10:57:52	22277.7079	0.0040256	0.021379	2.98954166	-0.025535067		
SAMPLE_S001_0000196.LAB	6/26	10:58:55	22281.86035	0.0193442	0.023657	2.96834498	0.001796191		
SAMPLE_S001_0000197.LAB	6/26	10:59:54	22284.65686	0.0125924	0.0186321	2.95416288	-0.000811941		
SAMPLE_S001_0000198.LAB	6/26	11:00:56	22298.58093	0.0149388	0.0191259	2.95627849	0.009947041		
SAMPLE_S001_0000199.LAB	6/26	11:01:59	22311.89012	0.0172803	0.0174368	2.94288655	-0.000781517		
SAMPLE_S001_0000200.LAB	6/26	11:02:58	22324.47842	0.0219007	0.0188685	2.94957455	0.005316221	End Strat Check	
Average			22013.9	0.015	0.026	3.091	0.012	EtO Avg:	0.026
Post-Test Calibration Check									
POST ZERO SYST_S001_0000201.LAB	6/26	11:04:19	8111.127208	7.3700062	0.2063669	20.533935	-0.003099654		
POST ZERO SYST_S001_0000202.LAB	6/26	11:04:37	1534.799232	0.1601028	0.023255	0.64799161	0.002542076		
POST ZERO SYST_S001_0000203.LAB	6/26	11:04:52	1021.288044	0.065196	0.0145111	0.32129914	0.00214246		
POST ZERO SYST_S001_0000204.LAB	6/26	11:05:10	847.1816733	0.0456809	0.0104316	0.28821674	-0.020629857		
POST ZERO SYST_S001_0000205.LAB	6/26	11:05:25	750.5362282	0.0456373	0.0155365	0.24835325	-0.002667428		
POST ZERO SYST_S001_0000206.LAB	6/26	11:05:43	693.3232721	0.0286801	0.0116474	0.23807602	-0.002934464		
POST ZERO SYST_S001_0000207.LAB	6/26	11:05:58	649.3032717	0.0141193	0.0139693	0.23218183	0.00939135		
POST ZERO SYST_S001_0000208.LAB	6/26	11:06:13	621.9127446	0.0034476	0.0100861	0.21388029	-0.001927292		
POST ZERO SYST_S001_0000209.LAB	6/26	11:06:27	600.033908	0.0195623	0.0071758	0.21349548	-0.030771221		
POST ZERO SYST_S001_0000210.LAB	6/26	11:06:42	585.0465651	0.0282592	0.0090494	0.21755367	-0.005102191		
POST ZERO SYST_S001_0000211.LAB	6/26	11:07:04	572.308333	0.0121415	0.0111239	0.19559681	-0.00067234	System Zero	
POST ZERO SYST_S001_0000212.LAB	6/26	11:07:19	557.355842	0.0417372	0.0080918	0.20423934	-0.017752443	EtO Zero	
POST ZERO SYST_S001_0000213.LAB	6/26	11:07:33	547.1543403	0.0185476	0.0077295	0.1952367	0.000851592		
POST ZERO SYST_S001_0000214.LAB	6/26	11:07:48	547.6152933	0.0090277	0.0099223	0.1819748	-0.028383493		
POST ZERO SYST_S001_0000215.LAB	6/26	11:08:03	537.8506317	0.0102679	0.0130924	0.1914687	-0.024009876		
POST ZERO SYST_S001_0000216.LAB	6/26	11:08:18	530.0971942	0.020955	0.0079821	0.18502054	-0.18266654		
POST ZERO SYST_S001_0000217.LAB	6/26	11:08:33	529.1207718	0.0017913	0.0073535	0.1862717	-0.000287115		
POST ZERO SYST_S001_0000218.LAB	6/26	11:08:47	521.8684962	0.0059328	0.0106965	0.17310731	0.001181672		
POST ZERO SYST_S001_0000219.LAB	6/26	11:09:02	525.1263113	0.0248282	0.00802	0.18126957	-0.055109993		
POST ZERO SYST_S001_0000220.LAB	6/26	11:09:20	514.9032473	0.0020672	0.0105549	0.17616712	-0.017716845		

Spectrum	Time		H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
	Date (hh:mm:ss (m/dd))							
POST ZERO SYST_S001_0000221.LAB	6/26	11:09:35	514.7489773	0.022693	0.0082837	0.47361289	-0.007740468	System CTS CH4 Avg: 86.8
POST ZERO SYST_S001_0000222.LAB	6/26	11:09:57	569.5571364	-0.266805	-0.048012	74.6491934	-0.007644973	
POST ZERO SYST_S001_0000223.LAB	6/26	11:10:15	571.0643335	0.1037041	-0.036854	86.3517273	0.006508605	
POST ZERO SYST_S001_0000224.LAB	6/26	11:10:30	567.3322241	0.0905119	-0.04852	86.5324712	0.002287213	
POST ZERO SYST_S001_0000225.LAB	6/26	11:10:48	563.9358702	0.1215921	-0.04211	86.5995254	-0.017070202	
POST ZERO SYST_S001_0000226.LAB	6/26	11:11:03	561.5662843	0.065002	-0.045346	86.6868407	-0.016206809	
POST ZERO SYST_S001_0000227.LAB	6/26	11:11:18	565.7195935	0.095589	-0.044708	86.7488142	0.002016545	
POST ZERO SYST_S001_0000228.LAB	6/26	11:11:33	562.1284173	0.0820351	-0.045342	86.7029467	0.002093031	
POST ZERO SYST_S001_0000229.LAB	6/26	11:11:51	554.9475945	0.0894123	-0.042317	86.7727011	-0.030629442	
POST ZERO SYST_S001_0000230.LAB	6/26	11:12:09	551.379387	0.0956876	-0.042656	86.7598363	0.006784641	
POST ZERO SYST_S001_0000231.LAB	6/26	11:12:24	551.1265213	0.0907772	-0.041587	86.8169181	0.013827768	
POST ZERO SYST_S001_0000232.LAB	6/26	11:12:42	555.7403412	0.0796783	-0.034917	86.7814582	0.005547314	
POST ZERO SYST_S001_0000233.LAB	6/26	11:12:57	553.6074598	0.1166923	-0.03562	86.8143965	-0.008688431	
POST ZERO SYST_S001_0000234.LAB	6/26	11:13:12	548.2874803	0.0897731	-0.040337	86.8172453	1.067016501	
POST ZERO SYST_S001_0000235.LAB	6/26	11:13:26	545.3994823	0.0958891	-0.040362	86.8230025	0.004213584	
POST ZERO SYST_S001_0000236.LAB	6/26	11:13:41	546.2305379	0.080197	-0.04328	86.8074722	-0.02600726	
POST ZERO SYST_S001_0000237.LAB	6/26	11:13:59	552.036449	0.0870516	-0.043136	86.8335016	0.002874911	
POST ZERO SYST_S001_0000238.LAB	6/26	11:14:14	540.3846215	-0.38408	-0.044372	67.4121653	0.002450864	
POST ZERO SYST_S001_0000239.LAB	6/26	11:14:29	532.2268717	-0.081116	-0.005008	3.72083719	0.21569075	
Run 2 - Indoor Air Stack - Indoor Air Testing								
SAMPLE_S001_0000307.LAB	6/26	12:37:21	23135.2717	0.0499724	0.0195661	2.81482907	0.002311522	
SAMPLE_S001_0000308.LAB	6/26	12:38:20	23127.89968	0.0311009	0.0193709	2.82737523	-0.001456897	
SAMPLE_S001_0000309.LAB	6/26	12:39:19	23140.0784	0.0460231	0.0190093	2.90866456	0.001409421	
SAMPLE_S001_0000310.LAB	6/26	12:40:22	23143.61453	0.0489337	0.0195961	2.90668141	0.002259204	
SAMPLE_S001_0000311.LAB	6/26	12:41:21	23149.58008	0.0431448	0.0205937	2.83163288	0.002556366	
SAMPLE_S001_0000312.LAB	6/26	12:42:24	23115.51092	0.0280714	0.0188327	2.83114263	-0.006201925	
SAMPLE_S001_0000313.LAB	6/26	12:43:26	23140.80498	0.0331205	0.0200232	2.80508179	-0.002584224	
SAMPLE_S001_0000314.LAB	6/26	12:44:29	23144.88323	0.0385875	0.0208067	2.82784048	0.003236489	
SAMPLE_S001_0000315.LAB	6/26	12:45:31	23154.26043	0.0291865	0.0224542	2.80842983	-0.002117829	
SAMPLE_S001_0000316.LAB	6/26	12:46:30	23172.09513	0.0442774	0.0233342	2.81490118	-0.000872847	
SAMPLE_S001_0000317.LAB	6/26	12:47:36	23183.15338	0.0471358	0.0223644	2.83118998	-0.001377148	
SAMPLE_S001_0000318.LAB	6/26	12:48:42	23200.5122	0.0416305	0.0246869	2.84068523	0.004246481	
SAMPLE_S001_0000319.LAB	6/26	12:49:45	23197.8576	0.0279859	0.0235398	2.81758748	0.00159335	
SAMPLE_S001_0000320.LAB	6/26	12:50:47	23194.65521	0.0380145	0.0225473	2.85201541	0.003282293	
SAMPLE_S001_0000321.LAB	6/26	12:51:53	23204.81184	0.0349398	0.0210138	2.84437996	-0.000540214	
SAMPLE_S001_0000322.LAB	6/26	12:52:56	23215.69255	0.0420594	0.0220821	2.84176007	0.001603442	
SAMPLE_S001_0000323.LAB	6/26	12:53:55	23219.68912	0.0366273	0.0229351	2.8424387	-0.00595422	
SAMPLE_S001_0000324.LAB	6/26	12:54:58	23219.52574	0.0345683	0.0214948	2.82097028	-0.00235281	
SAMPLE_S001_0000325.LAB	6/26	12:55:57	23227.73965	0.0311039	0.0187642	2.80857314	-0.001306271	
SAMPLE_S001_0000326.LAB	6/26	12:57:03	23222.78169	0.0436587	0.0219228	2.83903659	0.001697363	
SAMPLE_S001_0000327.LAB	6/26	12:58:05	23219.65564	0.0316182	0.0200492	2.82250914	0.000550847	
SAMPLE_S001_0000328.LAB	6/26	12:59:05	23219.26628	0.024862	0.0193138	2.82481042	0.000991356	
SAMPLE_S001_0000329.LAB	6/26	13:00:07	23233.77098	0.0436294	0.0214726	2.80782301	0.001846643	
SAMPLE_S001_0000330.LAB	6/26	13:01:06	23242.53973	0.0267845	0.0183332	2.78803609	0.005248723	
SAMPLE_S001_0000331.LAB	6/26	13:02:05	23242.22431	0.0186574	0.0198486	2.81651461	0.000414972	
SAMPLE_S001_0000332.LAB	6/26	13:03:15	23242.77169	0.0286354	0.0162498	2.81488099	0.000660093	
SAMPLE_S001_0000333.LAB	6/26	13:04:28	23258.59681	0.0303023	0.0181375	2.82052054	-0.000672974	
SAMPLE_S001_0000334.LAB	6/26	13:05:31	23267.69289	0.0405249	0.0196844	2.81972012	0.003306519	
SAMPLE_S001_0000335.LAB	6/26	13:06:37	23267.64609	0.0319507	0.0198813	2.81531983	0.0008683	
SAMPLE_S001_0000336.LAB	6/26	13:07:36	23273.93818	0.0072581	0.022849	2.80593625	-0.0009129	
SAMPLE_S001_0000337.LAB	6/26	13:08:35	23283.74339	0.0020165	0.0195858	2.79750202	-0.005565621	
SAMPLE_S001_0000338.LAB	6/26	13:09:34	23290.61212	0.0164734	0.0185304	2.79950641	0.002041234	
SAMPLE_S001_0000339.LAB	6/26	13:10:37	23286.01473	0.0003867	0.0201999	2.80396153	0.00183213	
SAMPLE_S001_0000340.LAB	6/26	13:11:39	23292.5215	0.0007907	0.0173938	2.82153445	-0.000230651	
SAMPLE_S001_0000341.LAB	6/26	13:12:53	23292.72427	0.0265589	0.0218818	2.80186793	-0.005438594	
SAMPLE_S001_0000342.LAB	6/26	13:13:52	23296.68022	0.0340754	0.0194089	2.80199276	0.001951541	
SAMPLE_S001_0000343.LAB	6/26	13:14:54	23297.34162	0.0157093	0.0187446	2.77721669	-0.001782699	
SAMPLE_S001_0000344.LAB	6/26	13:15:57	23299.44456	0.0144008	0.0229047	2.85277209	-0.00501485	
SAMPLE_S001_0000345.LAB	6/26	13:16:56	23302.05975	0.0069461	0.019704	2.83849294	-0.003011431	
SAMPLE_S001_0000346.LAB	6/26	13:18:02	23317.61306	0.0168465	0.0203569	2.8362071	0.004846848	
SAMPLE_S001_0000347.LAB	6/26	13:19:01	23328.34702	0.0100281	0.019929	2.82288914	-0.00339313	
SAMPLE_S001_0000348.LAB	6/26	13:20:04	23333.65177	0.01482	0.0212944	2.83016101	-0.001931412	
SAMPLE_S001_0000349.LAB	6/26	13:21:03	23334.26016	0.0149119	0.0207514	2.82243392	-0.007603486	
SAMPLE_S001_0000350.LAB	6/26	13:22:09	23336.16293	0.0184557	0.0195767	2.812137	-0.001290526	
SAMPLE_S001_0000351.LAB	6/26	13:23:12	23325.42844	0.0080127	0.0185482	2.84259701	-0.000126979	
SAMPLE_S001_0000352.LAB	6/26	13:24:14	23313.93082	0.0201765	0.0184265	2.8074181	0.002817008	
SAMPLE_S001_0000353.LAB	6/26	13:25:13	23305.78489	0.0097807	0.0218304	2.82391526	-0.003567409	
SAMPLE_S001_0000354.LAB	6/26	13:26:12	23307.16536	0.0071539	0.0166478	2.83380596	-0.013942214	
SAMPLE_S001_0000355.LAB	6/26	13:27:18	23305.90759	0.0079785	0.0184232	2.80659131	0.002264376	
SAMPLE_S001_0000356.LAB	6/26	13:28:21	23305.67673	0.0158774	0.0179101	2.83007857	0.010355326	
SAMPLE_S001_0000357.LAB	6/26	13:29:30	23306.86088	0.025946	0.0172179	2.81404646	0.000506333	
SAMPLE_S001_0000358.LAB	6/26	13:30:40	23310.10765	0.003243	0.0174513	2.82429235	0.003354727	
SAMPLE_S001_0000359.LAB	6/26	13:31:39	23305.05273	0.0084511	0.0168245	2.82324363	-7.7594E-06	
SAMPLE_S001_0000360.LAB	6/26	13:32:45	23300.82948	0.0121422	0.0171088	2.81235122	-0.007891059	
SAMPLE_S001_0000361.LAB	6/26	13:33:44	23305.94971	0.0058138	0.0172177	2.82944546	-0.000835062	
SAMPLE_S001_0000362.LAB	6/26	13:34:54	23300.38511	0.0184876	0.0165346	2.81940137	0.000493359	
SAMPLE_S001_0000363.LAB	6/26	13:35:53	23299.86264	0.0062184	0.0184868	2.81003429	0.003621612	
SAMPLE_S001_0000364.LAB	6/26	13:36:55	23316.85996	-0.003822	0.0156137	2.81829779	0.000228693	
SAMPLE_S001_0000365.LAB	6/26	13:37:58	23328.29466	0.0044893	0.0159269	2.80851809	0.009102372	
Average			23252.7	0.024	0.020	2.823	0.000	

Spectrum	Time		H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
	Date (hh:mm:ss)	(m/dd)						
Post-Test Calibration Check								
SAMPLE_S001_0000366.LAB	6/26	13:39:01	23332.45607	0.0331675	0.0188568	2.83899435	0.000234179	
POST ZERO SYST_S001_0000367.LAB	6/26	13:39:59	2363.147209	0.0878912	0.0353408	0.34335863	-0.006227081	
POST ZERO SYST_S001_0000368.LAB	6/26	13:40:14	1169.154857	-0.003862	0.0204204	0.14929943	-0.009643652	
POST ZERO SYST_S001_0000369.LAB	6/26	13:40:29	903.1772714	-0.014923	0.0092505	0.1408712	0.003049948	
POST ZERO SYST_S001_0000370.LAB	6/26	13:40:47	747.3024879	-0.030925	0.0114362	0.1433514	-0.001501992	
POST ZERO SYST_S001_0000371.LAB	6/26	13:41:05	668.0522957	-0.014751	0.0057134	0.14755298	0.000995474	
POST ZERO SYST_S001_0000372.LAB	6/26	13:41:20	602.0842567	0.0070525	0.0107365	0.15122374	0.001670127	
POST ZERO SYST_S001_0000373.LAB	6/26	13:41:35	573.8635181	-0.015733	0.0046176	0.14186731	0.005426445	
POST ZERO SYST_S001_0000374.LAB	6/26	13:41:50	539.8416173	-0.003199	0.0089221	0.14159967	0.00079046	
POST ZERO SYST_S001_0000375.LAB	6/26	13:42:04	524.4272849	-0.012564	0.0079799	0.13932002	0.000899238	System Zero
POST ZERO SYST_S001_0000376.LAB	6/26	13:42:23	505.4537526	-0.01707	0.008906	0.14713806	-0.000710517	EtO Zero
POST ZERO SYST_S001_0000377.LAB	6/26	13:42:37	491.6395743	0.0127178	0.0045069	0.13902843	0.000230895	
POST ZERO SYST_S001_0000378.LAB	6/26	13:42:52	484.5833063	-0.017609	0.0027427	0.14659906	0.003881269	
POST ZERO SYST_S001_0000379.LAB	6/26	13:43:07	468.0399001	-0.002587	0.0063257	0.13888518	-0.001949002	
POST ZERO SYST_S001_0000380.LAB	6/26	13:43:22	459.5226545	0.0276461	0.0034408	0.13219414	-0.026617909	
POST ZERO SYST_S001_0000381.LAB	6/26	13:43:36	461.7237123	0.0238723	0.0116842	0.14833144	-0.000659598	
POST ZERO SYST_S001_0000382.LAB	6/26	13:43:55	456.3759807	-0.006322	0.0025147	0.13603243	-0.000783472	
POST ZERO SYST_S001_0000383.LAB	6/26	13:44:10	446.9316614	-0.002776	0.0082218	0.14238111	3.00155E-05	
POST ZERO SYST_S001_0000384.LAB	6/26	13:44:24	445.7204318	-0.001763	0.0060658	0.14314534	-0.001444771	
POST ZERO SYST_S001_0000385.LAB	6/26	13:44:39	436.3358108	-0.032399	0.0096271	0.13838653	0.001024178	
POST ZERO SYST_S001_0000386.LAB	6/26	13:44:54	468.3881013	-0.264457	0.0125956	16.5371816	-0.006087747	
POST ZERO SYST_S001_0000387.LAB	6/26	13:45:08	496.4875208	0.0032352	-0.048415	83.4904364	-0.005584966	
POST ZERO SYST_S001_0000388.LAB	6/26	13:45:27	499.4077904	0.0761674	-0.03715	86.1257186	-0.003922798	
POST ZERO SYST_S001_0000389.LAB	6/26	13:45:41	490.7625992	0.0834737	-0.041373	86.3577583	-0.005090234	
POST ZERO SYST_S001_0000390.LAB	6/26	13:46:03	483.5623464	0.059156	-0.043848	86.4362385	0.001080239	
POST ZERO SYST_S001_0000391.LAB	6/26	13:46:18	477.8090134	0.0607808	-0.037856	86.5260135	0.002310117	System CTS
POST ZERO SYST_S001_0000392.LAB	6/26	13:46:33	476.1035142	0.0807051	-0.035995	86.5828091	0.007418863	CH4 Avg: 86.6
POST ZERO SYST_S001_0000393.LAB	6/26	13:46:48	478.5495053	0.0679116	-0.037119	86.5923021	0.002581431	
POST ZERO SYST_S001_0000394.LAB	6/26	13:47:02	472.4952473	0.0716181	-0.040145	86.6210941	0.000105629	
POST ZERO SYST_S001_0000395.LAB	6/26	13:47:17	468.9301007	0.0576411	-0.042029	86.6237267	0.002143781	
POST ZERO SYST_S001_0000396.LAB	6/26	13:47:32	470.1708049	0.0638781	-0.04035	86.6503728	0.002316443	
POST ZERO SYST_S001_0000397.LAB	6/26	13:47:47	464.7389617	0.0855046	-0.041622	86.6648756	-0.007535442	
POST ZERO SYST_S001_0000398.LAB	6/26	13:48:01	461.7936235	0.0720847	-0.034403	86.6711825	-0.000365303	
POST ZERO SYST_S001_0000399.LAB	6/26	13:48:16	467.9503022	0.0680774	-0.039226	86.7019583	-0.001929499	
POST ZERO SYST_S001_0000400.LAB	6/26	13:48:34	462.2884237	0.0996683	-0.036769	86.7192166	-0.00517623	
POST ZERO SYST_S001_0000401.LAB	6/26	13:48:53	464.2865867	-0.287916	0.0170549	16.6496255	-0.002374965	
POST ZERO SYST_S001_0000402.LAB	6/26	13:49:11	419.6780602	-0.036208	0.0075759	1.00087314	-0.01691938	
POST ZERO SYST_S001_0000403.LAB	6/26	13:49:29	415.4594292	0.0013005	0.0050111	0.64080982	0.003307617	
POST ZERO SYST_S001_0000404.LAB	6/26	13:49:44	415.612679	-0.005089	0.0063288	0.51618915	-0.010363794	
POST ZERO SYST_S001_0000405.LAB	6/26	13:49:59	413.2789206	-0.007284	0.007589	0.44406325	-0.00512274	
POST ZERO SYST_S001_0000406.LAB	6/26	13:50:14	413.1882386	-0.004849	0.0026834	0.40538912	-0.008250595	
Run 3 - Indoor Air Stack - Indoor Air Testing								
SAMPLE_S001_0000407.LAB	6/26	14:00:08	23500.6645	0.039874	0.0167794	3.14534105	0.001091388	
SAMPLE_S001_0000408.LAB	6/26	14:01:07	23520.50288	0.0288577	0.0180689	3.04351834	0.003379777	
SAMPLE_S001_0000409.LAB	6/26	14:02:13	23542.89061	0.0317247	0.0197771	3.03453845	-0.000431306	
SAMPLE_S001_0000410.LAB	6/26	14:03:16	23548.10139	0.0228444	0.0176219	3.14540147	0.003874329	
SAMPLE_S001_0000411.LAB	6/26	14:04:18	23562.44709	0.0359961	0.0180754	3.17461302	-0.001304342	
SAMPLE_S001_0000412.LAB	6/26	14:05:25	23579.67607	0.0451932	0.0197709	3.1337343	-0.001313744	
SAMPLE_S001_0000413.LAB	6/26	14:06:31	23578.73424	0.0392233	0.0209503	3.14986383	-0.000373745	
SAMPLE_S001_0000414.LAB	6/26	14:07:37	23576.57289	0.0244836	0.0192029	3.1051107	-0.002603586	
SAMPLE_S001_0000415.LAB	6/26	14:08:36	23585.81017	0.0398004	0.0188537	3.32924327	0.002267178	
SAMPLE_S001_0000416.LAB	6/26	14:09:35	23581.7593	0.0413444	0.0152742	3.25857578	0.002232381	
SAMPLE_S001_0000417.LAB	6/26	14:10:37	23581.53583	0.0237193	0.0166855	3.2310402	0.003812079	
SAMPLE_S001_0000418.LAB	6/26	14:11:40	23563.41669	0.0416932	0.0181907	3.20093039	-0.003319957	
SAMPLE_S001_0000419.LAB	6/26	14:12:49	23552.49749	0.0396471	0.0172668	3.17766978	-0.002948217	
SAMPLE_S001_0000420.LAB	6/26	14:13:48	23532.02111	0.0354597	0.016704	3.1393415	0.0046586	
SAMPLE_S001_0000421.LAB	6/26	14:14:47	23506.80136	0.0346917	0.0158794	3.24806838	0.000127531	
SAMPLE_S001_0000422.LAB	6/26	14:15:46	23483.19435	0.0378585	0.0156331	3.25775294	-0.00107861	
SAMPLE_S001_0000423.LAB	6/26	14:16:45	23468.13179	0.0311678	0.0154655	3.18211552	-0.001342775	
SAMPLE_S001_0000424.LAB	6/26	14:17:48	23453.60267	0.0257032	0.0186459	3.20398145	-0.000435849	
SAMPLE_S001_0000425.LAB	6/26	14:18:50	23437.23852	0.0194131	0.0160583	3.21126886	0.003846546	
SAMPLE_S001_0000426.LAB	6/26	14:19:49	23422.30446	0.0196528	0.0149945	3.16984898	-0.011725279	
SAMPLE_S001_0000427.LAB	6/26	14:20:48	23405.09318	0.0242913	0.0168176	3.19713632	-0.006558169	
SAMPLE_S001_0000428.LAB	6/26	14:21:51	23393.68485	0.0255116	0.0156864	3.3058138	-0.007637289	
SAMPLE_S001_0000429.LAB	6/26	14:22:57	23376.02074	0.0139485	0.0163148	3.19232099	-0.010798902	
SAMPLE_S001_0000430.LAB	6/26	14:24:10	23356.1889	0.0357077	0.0159903	3.21656544	0.002905471	
SAMPLE_S001_0000431.LAB	6/26	14:25:13	23352.28694	0.0218844	0.0203201	3.12278877	0.001412318	
SAMPLE_S001_0000432.LAB	6/26	14:26:19	23344.17954	0.0200051	0.0175432	3.15132084	0.000765107	
SAMPLE_S001_0000433.LAB	6/26	14:27:18	23333.7258	0.0462803	0.0169746	3.31371854	0.005942836	
SAMPLE_S001_0000434.LAB	6/26	14:28:20	23333.18083	0.0276987	0.0195127	3.21971849	-0.000826416	
SAMPLE_S001_0000435.LAB	6/26	14:29:19	23334.71841	0.0361185	0.0171658	3.2007678	0.001151042	
SAMPLE_S001_0000436.LAB	6/26	14:30:22	23321.71771	0.0306061	0.0159249	3.17951646	-0.000572608	
SAMPLE_S001_0000437.LAB	6/26	14:31:21	23314.25174	0.0125221	0.0170782	3.12076467	-0.000515336	
SAMPLE_S001_0000438.LAB	6/26	14:32:23	23313.6887	0.0204236	0.0168293	3.07957142	0.000812236	
SAMPLE_S001_0000439.LAB	6/26	14:33:33	23306.86222	0.0363317	0.0171339	3.23259149	-0.00143242	
SAMPLE_S001_0000440.LAB	6/26	14:34:32	23270.74744	0.0243251	0.0212016	3.23917442	-0.00398883	
SAMPLE_S001_0000441.LAB	6/26	14:35:35	23298.14406	0.0291027	0.0191098	3.23451525	-0.001481015	
SAMPLE_S001_0000442.LAB	6/26	14:36:34	23287.08588	0.0287775	0.0181874	3.17330267	0.001121466	
SAMPLE_S001_0000443.LAB	6/26	14:37:33	23295.20002	0.0288251	0.018139	3.13524704	0.002541161	

Spectrum	Time		H ₂ O (ppmv)	Ethane (ppmwv)	EtO (ppmwv)	Methane (ppmwv)	Filter Interference (ppm)	Notes
	Date (hh:mm:ss)	(m/dd)						
SAMPLE_S001_0000444.LAB	6/26	14:38:36	23287.91	0.0218198	0.0160349	3.20073801	-0.010039122	
SAMPLE_S001_0000445.LAB	6/26	14:39:35	23271.11747	0.030343	0.0171442	3.27688877	-0.00352039	
SAMPLE_S001_0000446.LAB	6/26	14:40:37	23266.67688	0.0281832	0.0152279	3.18134012	-0.007905362	
SAMPLE_S001_0000447.LAB	6/26	14:41:40	23262.39383	0.0221207	0.0203934	3.18072979	-0.012023718	
SAMPLE_S001_0000448.LAB	6/26	14:42:46	23260.14813	0.0392748	0.0182667	3.19274164	0.006013264	
SAMPLE_S001_0000449.LAB	6/26	14:43:49	23254.97254	0.0086508	0.017235	3.1648761	0.013149802	
SAMPLE_S001_0000450.LAB	6/26	14:44:48	23269.9263	0.0354826	0.0169699	3.21645522	-0.028612697	
SAMPLE_S001_0000451.LAB	6/26	14:45:47	23274.5974	0.0269488	0.0134119	3.25769005	-0.049126859	
SAMPLE_S001_0000452.LAB	6/26	14:46:46	23270.86737	0.0341042	0.0174891	3.25655504	0.006172549	
SAMPLE_S001_0000453.LAB	6/26	14:47:45	23264.0741	0.0139009	0.0171074	3.2151749	-0.01531691	
SAMPLE_S001_0000454.LAB	6/26	14:48:48	23257.47356	0.0211132	0.014302	3.18257132	-0.009777385	
SAMPLE_S001_0000455.LAB	6/26	14:49:50	23256.48554	0.0303815	0.0166355	3.16424566	0.006274662	
SAMPLE_S001_0000456.LAB	6/26	14:50:49	23269.30359	0.021219	0.016231	3.24103286	0.003507185	
SAMPLE_S001_0000457.LAB	6/26	14:51:52	23260.1811	0.0248032	0.0173227	3.26700704	0.005969482	
SAMPLE_S001_0000458.LAB	6/26	14:52:55	23254.13672	0.0420553	0.0156721	3.28090368	-0.018150347	
SAMPLE_S001_0000459.LAB	6/26	14:54:01	23247.16711	0.0262622	0.0178361	3.18554793	-0.001067923	
SAMPLE_S001_0000460.LAB	6/26	14:55:00	23238.83233	0.0244894	0.0202484	3.1974643	0.008102028	
SAMPLE_S001_0000461.LAB	6/26	14:56:02	23231.58011	0.0236635	0.0182838	3.18383842	-0.00329957	
SAMPLE_S001_0000462.LAB	6/26	14:57:05	23227.41139	0.016111	0.0159205	3.16606367	-0.004800919	
SAMPLE_S001_0000463.LAB	6/26	14:58:04	23215.04937	0.0331911	0.0164873	3.27698626	-0.000587192	
SAMPLE_S001_0000464.LAB	6/26	14:59:07	23211.24693	0.0239314	0.0162969	3.27923118	0.000614595	
SAMPLE_S001_0000465.LAB	6/26	15:00:09	23191.26888	0.0198813	0.0161209	3.26440028	-0.003514804	
Average			23368.8	0.029	0.017	3.198	-0.002	
Post-Test Calibration Check								
SAMPLE_S001_0000466.LAB	6/26	15:01:08	23173.08773	0.0289798	0.0192417	3.1881559	0.005380551	
POST ZERO SYST_S001_0000467.LAB	6/26	15:01:32	16836.23183	0.566054	0.0597546	3.55366722	-0.003482522	
POST ZERO SYST_S001_0000468.LAB	6/26	15:01:47	2385.331569	0.0111788	0.0352607	0.40241227	-1.190527349	
POST ZERO SYST_S001_0000469.LAB	6/26	15:02:02	1057.566764	0.0099899	0.0150659	0.14275855	-0.033224411	
POST ZERO SYST_S001_0000470.LAB	6/26	15:02:17	784.1751245	-0.012115	0.0084058	0.13501198	0.001244773	
POST ZERO SYST_S001_0000471.LAB	6/26	15:02:31	649.8469084	-0.010517	0.0102055	0.14798974	-0.012351141	
POST ZERO SYST_S001_0000472.LAB	6/26	15:02:46	563.0842232	-0.018288	0.0069768	0.14109369	-0.00851312	
POST ZERO SYST_S001_0000473.LAB	6/26	15:03:01	511.9517584	-0.013161	0.0056155	0.13951171	-0.005159965	
POST ZERO SYST_S001_0000474.LAB	6/26	15:03:16	471.7728114	-0.013877	0.0118955	0.14009603	-0.012288364	
POST ZERO SYST_S001_0000475.LAB	6/26	15:03:30	437.6384474	-0.038143	0.0092662	0.13525218	0.000972106	
POST ZERO SYST_S001_0000476.LAB	6/26	15:03:45	423.2040537	-0.000291	0.0040862	0.13328288	-0.037111212	
POST ZERO SYST_S001_0000477.LAB	6/26	15:04:00	401.8171728	0.0056728	0.0065705	0.1443072	-0.001251324	
POST ZERO SYST_S001_0000478.LAB	6/26	15:04:15	384.6960507	-0.02112	0.0075235	0.13253647	-0.005076743	
POST ZERO SYST_S001_0000479.LAB	6/26	15:04:36	372.7767782	-0.002709	0.0056975	0.13041033	0.004620243	
POST ZERO SYST_S001_0000480.LAB	6/26	15:04:51	346.7395313	-0.027256	0.0084913	0.13412281	0.001137596	
POST ZERO SYST_S001_0000481.LAB	6/26	15:05:06	335.4908501	-0.00575	0.0093371	0.12816512	0.006965997	System Zero
POST ZERO SYST_S001_0000482.LAB	6/26	15:05:21	328.1350463	-0.034401	0.0025827	0.12640068	0.006799206	EtO Zero
POST ZERO SYST_S001_0000483.LAB	6/26	15:05:35	322.4621758	-0.008248	0.0081698	0.1333559	-0.004478148	
POST ZERO SYST_S001_0000484.LAB	6/26	15:05:50	321.532462	-0.008411	0.005434	0.12278809	-0.008590055	
POST ZERO SYST_S001_0000485.LAB	6/26	15:06:05	313.2903938	-0.01405	0.0019312	0.13100664	0.005056464	
POST ZERO SYST_S001_0000486.LAB	6/26	15:06:20	309.3186587	-0.03034	0.0096075	0.12193294	-0.0009651	
POST ZERO SYST_S001_0000487.LAB	6/26	15:06:35	308.4291652	0.0005156	0.0060424	0.13040325	0.152427422	
POST ZERO SYST_S001_0000488.LAB	6/26	15:06:49	308.5374889	-0.014528	0.0030237	0.12468572	-0.025183894	
POST ZERO SYST_S001_0000489.LAB	6/26	15:07:07	305.4163736	-0.02481	0.0040878	0.13089208	-0.004509811	
POST ZERO SYST_S001_0000490.LAB	6/26	15:07:22	303.7220576	0.0218946	0.0030027	0.13267749	-0.048763714	
POST ZERO SYST_S001_0000491.LAB	6/26	15:07:37	344.8674804	-0.300972	0.0145666	24.9516962	-0.002027361	
POST ZERO SYST_S001_0000492.LAB	6/26	15:07:52	353.448712	0.0521961	-0.048823	84.9862812	-0.003588562	
POST ZERO SYST_S001_0000493.LAB	6/26	15:08:06	352.6190567	0.0620546	-0.04919	86.2876819	0.000970546	
POST ZERO SYST_S001_0000494.LAB	6/26	15:08:21	355.6377615	0.0703513	-0.042004	86.4904131	-0.000182847	
POST ZERO SYST_S001_0000495.LAB	6/26	15:08:40	353.9012258	0.0791746	-0.047161	86.5600513	-0.011960729	
POST ZERO SYST_S001_0000496.LAB	6/26	15:08:54	355.2069956	0.080527	-0.043654	86.6330222	0.003561643	
POST ZERO SYST_S001_0000497.LAB	6/26	15:09:09	350.1262615	0.051951	-0.041241	86.6725172	0.001847084	
POST ZERO SYST_S001_0000498.LAB	6/26	15:09:31	350.4575731	0.0717597	-0.042682	86.7089898	-0.007110239	
POST ZERO SYST_S001_0000499.LAB	6/26	15:09:46	344.7545313	0.0684988	-0.045638	86.7317575	-0.004261207	
POST ZERO SYST_S001_0000500.LAB	6/26	15:10:00	341.7030551	0.0732197	-0.040927	86.7568081	-0.006295925	System CTS
POST ZERO SYST_S001_0000501.LAB	6/26	15:10:15	346.7925663	0.0898867	-0.040824	86.7762219	-0.003376921	CH4 Avg: 86.8
POST ZERO SYST_S001_0000502.LAB	6/26	15:10:33	340.1472035	0.081152	-0.047295	86.7903819	0.005998414	
POST ZERO SYST_S001_0000503.LAB	6/26	15:10:48	339.6556751	0.0643203	-0.041633	86.8416392	-6.21933E-05	
POST ZERO SYST_S001_0000504.LAB	6/26	15:11:06	339.8269011	0.0626988	-0.043369	86.7930601	-0.069492703	
POST ZERO SYST_S001_0000505.LAB	6/26	15:11:21	341.7596544	0.0707744	-0.047899	86.8203441	-0.017035099	
POST ZERO SYST_S001_0000506.LAB	6/26	15:11:36	339.6101225	0.0813299	-0.046931	86.8508733	-0.035106448	
POST ZERO SYST_S001_0000507.LAB	6/26	15:11:51	338.3232405	0.0777067	-0.048437	86.8397338	0.007905515	
POST ZERO SYST_S001_0000508.LAB	6/26	15:12:05	334.837267	0.0963808	-0.0503	86.8425053	-0.045414965	
POST ZERO SYST_S001_0000509.LAB	6/26	15:12:20	330.0640358	0.0539833	-0.043396	86.8500128	-0.034144147	
POST ZERO SYST_S001_0000510.LAB	6/26	15:12:35	343.4951287	-0.390419	0.0318731	43.5399055	0.003330608	
POST ZERO SYST_S001_0000511.LAB	6/26	15:12:50	278.4234507	-0.016263	0.0017041	1.44073286	0.004797603	

End of Appendix Section

APPENDIX H: EPA METHOD 1 & CYCLONIC DATASHEETS

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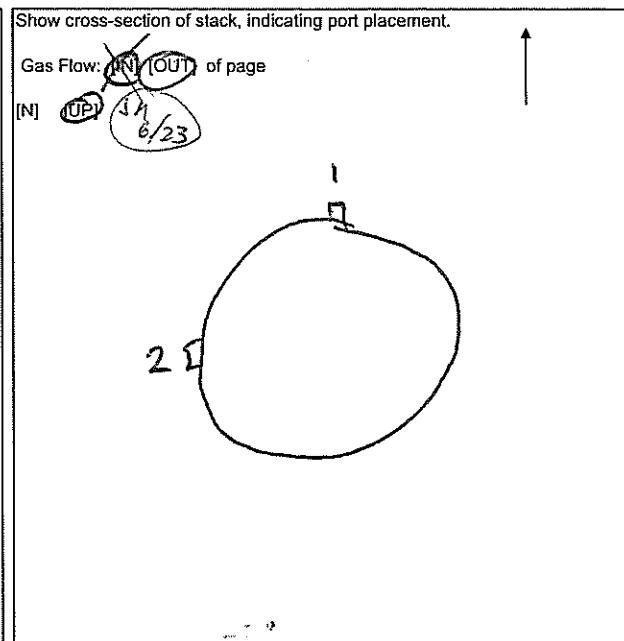
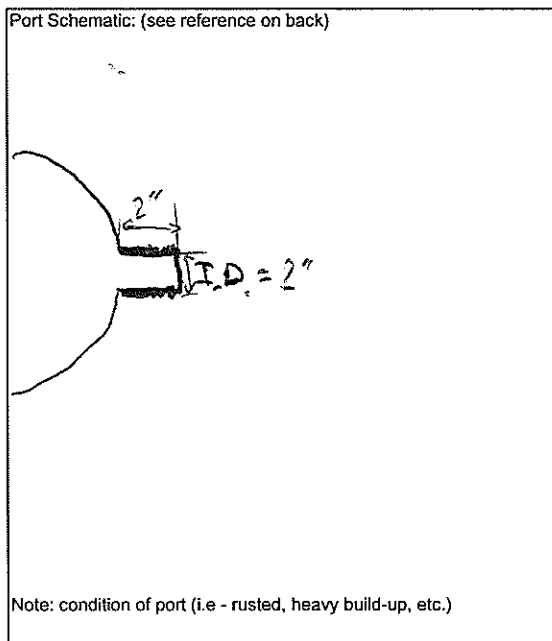
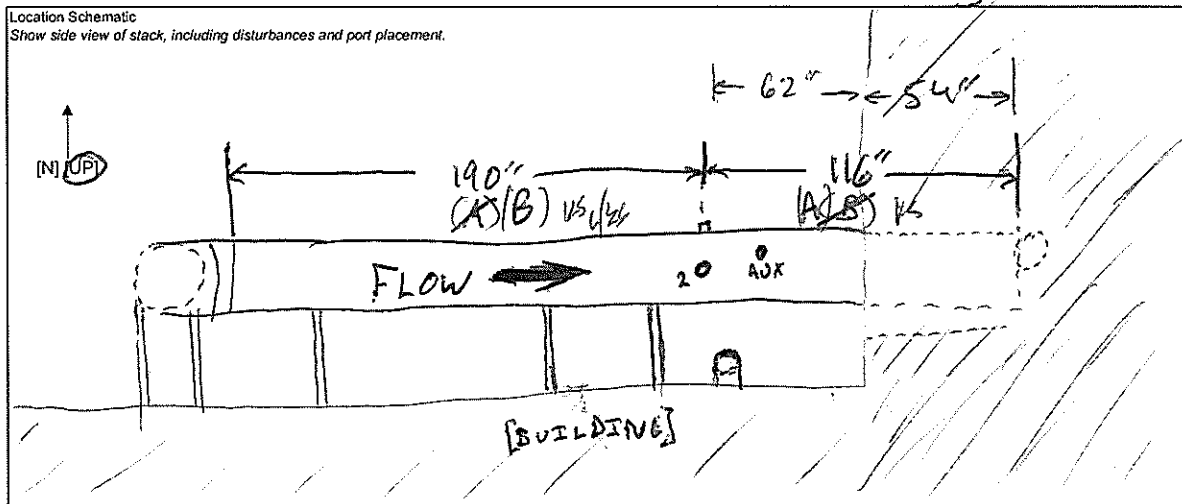
METHOD 1 FIELD DATA SHEET

TEST LOCATION: Roof Ductwork
UNIT: Aeration/Backvent Outlet

Data Recorded By: J. Myers

Client	<u>Sterigenics</u>	Project No.	<u>14004</u>
Plant	<u>Atlanta, GA</u>	Date	<u>6/23/2020</u>
Source of Dimensional Info. ☒ Field Meas. ☐ Drawings ☐ Other:			
Duct Dimensions	<u>30 in</u> (in.)	Area	<u>4.9087</u> (ft ²)
Port Length	<u>2</u> (in.)	Port Diameter	<u>2</u> (in.)
Equivalent Diameter (Rectangular Ducts) $Deq=2LW/(L+W)$		<u>NA</u> (in.)	
Disturbance to Port Distance Upstream (A)	<u>3.8</u>	x D	
Disturbance to Port Distance Downstream (B)	<u>6.3</u>	x D	
Number of Points Required	<u>16</u>		
Number of Points / Port Required	<u>8</u>		

Point	% Diameter	Point Distance	Probe Mark
	Round Stacks Only	X	X + Port Depth
1	46.8	24.0	31.0
2	89.5	26.8	28.8
3	80.6	24.2	26.2
4	67.7	20.3	22.3
5	32.3	9.7	11.7
6	19.4	5.8	7.8
7	10.5	3.1	5.1
8	3.2	0.96	2.96



Circle correct bracketed directions on diagrams.

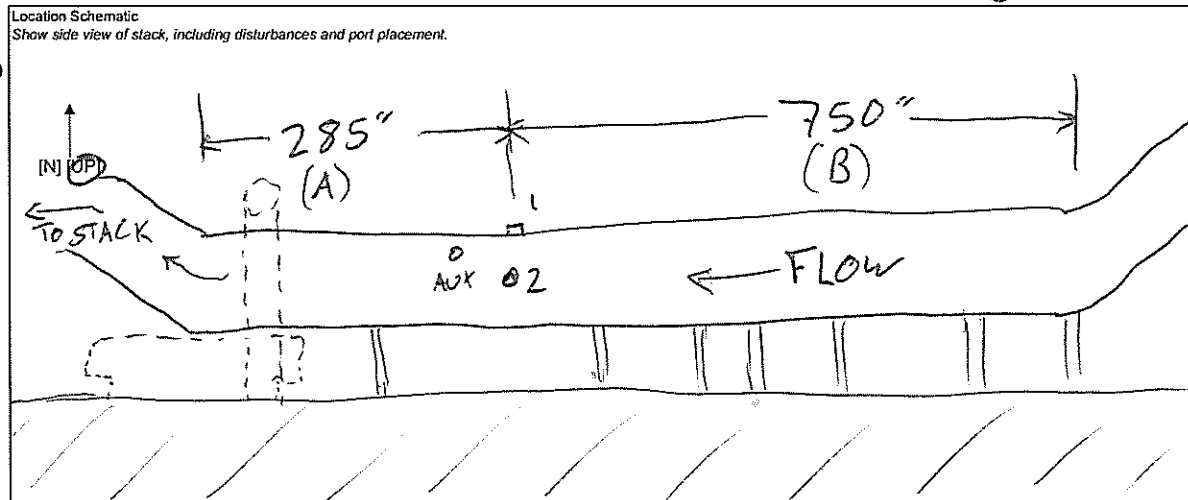
METHOD 1 FIELD DATA SHEET

TEST LOCATION: Roof Ductwork
UNIT: Process Stack

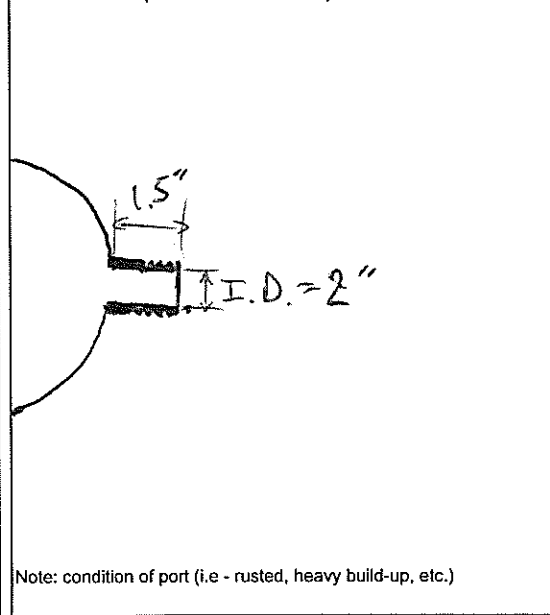
Data Recorded By: J. Myers

Client <u>Sterigenics</u>	Project No. <u>14004</u>
Plant <u>Atlanta, GA</u>	Date <u>6/24/20</u>
Source of Dimensional Info. ☒ Field Meas. ☐ Drawings ☐ Other: <u>6/24</u>	
Duct Dimensions <u>32.5" x 28" (in.)</u>	Area <u>4,276 (ft²)</u>
Port Length <u>1.5 (in.)</u>	Port Diameter <u>2 (in.)</u>
Equivalent Diameter (Rectangular Ducts) $Deq=2LW/(L+W)$ <u>NA (in.)</u>	
Disturbance to Port Distance Upstream (A) <u>285" = 10.2 x D</u>	
Disturbance to Port Distance Downstream (B) <u>750" = 26.7 x D</u>	
Number of Points Required <u>12</u>	
Number of Points / Port Required <u>6</u>	

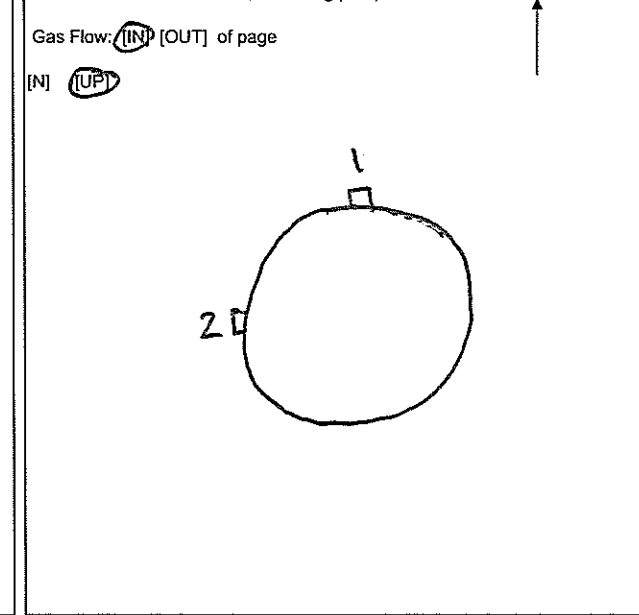
Point	% Diameter	Point Distance	Probe Mark
	Round Stacks Only	X	X + Port Depth
1	95.6	26.76	28.3
2	85.4	23.9	25.4
3	70.4	19.7	21.2
4	29.6	8.3	9.8
5	14.6	4.1	5.6
6	4.4	1.2	2.7



Port Schematic: (see reference on back)



Show cross-section of stack, indicating port placement.



Circle correct bracketed directions on diagrams.

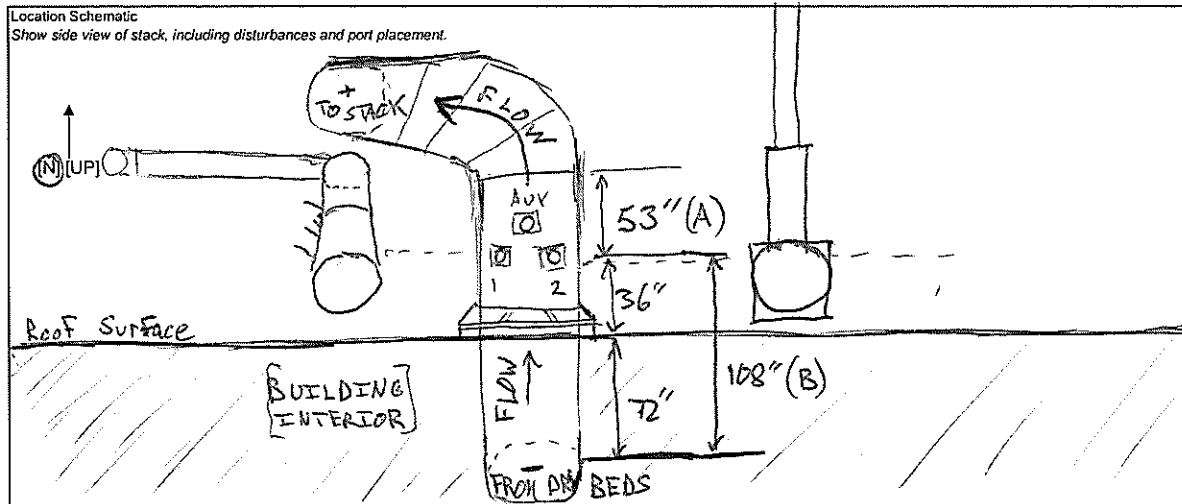
METHOD 1 FIELD DATA SHEET

TEST LOCATION: Roof Ductwork
UNIT: Indoor Air Control System

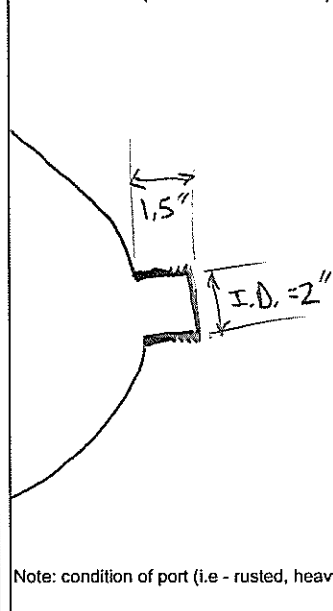
Data Recorded By: J. Myers

Client	<u>Sterigenics</u>	Project No.	<u>14004</u>
Plant	<u>Atlanta, GA</u>	Date	<u>6/26/20</u>
Source of Dimensional Info. ☒ Field Meas. ☐ Drawings ☐ Other:			
Duct Dimensions	<u>32</u> (in.)	Area	<u>5.5851</u> (ft ²)
Port Length	<u>1.5</u> (in.)	Port Diameter	<u>2</u> (in.)
Equivalent Diameter (Rectangular Ducts) $Deq=2LW/(L+W)$		<u>NA</u>	(in.)
Disturbance to Port Distance Upstream (A)		<u>1.66</u>	x D
Disturbance to Port Distance Downstream (B)		<u>4.28</u>	x D
Number of Points Required		<u>16</u>	
Number of Points / Port Required		<u>8</u>	

Point	% Diameter	Point Distance	Probe Mark
	Round Stacks Only	X	X + Port Depth
1	96.8	30.98	32.48
2	89.5	28.64	30.14
3	80.6	25.79	27.29
4	67.7	21.66	23.16
5	32.3	10.34	11.84
6	19.4	6.21	7.71
7	10.5	3.36	4.86
8	3.2	1.02	2.52



Port Schematic: (see reference on back)

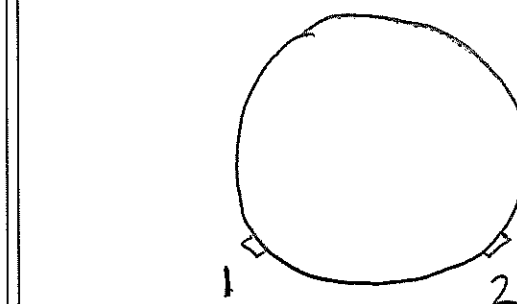


Note: condition of port (i.e - rusted, heavy build-up, etc.)

Show cross-section of stack, indicating port placement.

Gas Flow: (IN) (OUT) of page

(IN) (UP)



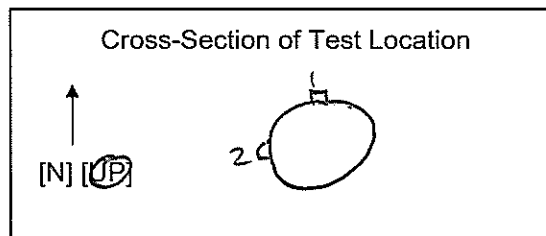
Circle correct bracketed directions on diagrams.

TEST LOCATION: RonF Ductwork
 UNIT: Aeration/Backvent Outlet

CYCLONIC AND VELOCITY FIELD DATA SHEET

PAGE 1 OF 1

Client <u>Starigenics</u>	Project No. <u>14004</u>
Plant <u>Atlanta, GA</u>	Date <u>6/23/2020</u>
Meter Operator <u>J. Myers</u>	Employee # <u>670</u>
Probe Operator <u>M. Khatib</u>	Employee # <u>599</u>
Source of Moisture and Molecular Weight Data <u>FTIR/H4</u>	



Amb. Temp. (°F) <u>90</u>	Bar. Press. <u>29.00</u> (in. Hg) (mbar)
Pitot Cp <u>0.832</u>	Probe I.D. No. <u>67-SP-6</u>
Duct Diameters from Disturbance	
Downstream <u>6.3</u>	Upstream <u>3.8</u>
First point all the way (In) [Out]	Port Len. (in.) <u>2</u>
Gas Flow (In) [Out] of page	
Duct Dimensions (in.) <u>30</u>	

Run <u>PRELIM.</u>		Load ☒		Pitot Leak Check: Pre ☒ Post: Pass ☒ Fail ☐			Run		Load		Pitot Leak Check: Pre ☐ Post: Pass ☐ Fail ☐		
Start Time <u>1405</u>		Stop Time <u>1420</u>		Post Pitot Condition Check:			Start Time		Stop Time		Post Pitot Condition Check:		
Static Press. (in. H ₂ O) <u>-0.13506</u>		Post-Test ALT-011:		N/A ☐ Good ☒ Bad ☐			Static Press. (in. H ₂ O)		Post-Test ALT-011:		N/A ☐ Good ☐ Bad ☐		
Traverse Point Number	Velocity Head ΔP (in. H ₂ O)	Stack Temp. T _s (°F)	Veclocity Pressure at 0° (in. H ₂ O)	Rotation Angle α giving 0 v.p.	Notes	Traverse Point Number	Velocity Head ΔP (in. H ₂ O)	Stack Temp. T _s (°F)	Veclocity Pressure at 0° (in. H ₂ O)	Rotation Angle α giving 0 v.p.	Notes		
2-1	0.2080	110	0.0305	11°	STATIC PRESSURE = -1.35								
2	0.2545	111	0.0335	4°									
3	0.2925	111	0.0700	6°									
4	0.2985	112	0.0405	2°									
5	0.2870	112	0.0185	5°									
6	0.2755	112	0.0045	0°									
7	0.2505	111	0.0015	0°									
8	0.3105	110	0.0405	7°	4.161766								
1-1	0.1951	110	0.0310	4°									
2	0.2350	111	0.0210	5°									
3	0.2050	110	0.0105	5°									
4	0.2230	110	0.0105	4°									
5	0.2795	110	0.0075	8°									
6	0.4355	110	0.0230	5°									
7	0.2260	110	0.0210	0°									
8	0.2150	110	0.0100	5°									
Total	8.1409	1770	—	71		Total	*		—	**			
Average	0.5088	110.6250	—	4.4375		Average							

Sum of square roots.

** Sum of the absolute values

Circle correct bracketed units on data sheet.

Sum of square roots.

** Sum of the absolute values

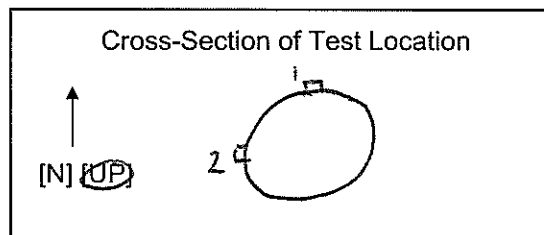
NIST Thermocouple ID#
F.S.T.T. #1



TEST LOCATION: Roof Ductwork **CYCLONIC AND VELOCITY**
UNIT: Leilcote Outlet **FIELD DATA SHEET**

PAGE 1 OF 1

Client <u>Sterigenics</u>	Project No. <u>14004</u>
Plant <u>Atlanta, GA</u>	Date <u>6/24/2020</u>
Meter Operator <u>J. Myers</u>	Employee # <u>670</u>
Probe Operator <u>M. Khalib</u>	Employee # <u>599</u>
Source of Moisture and Molecular Weight Data <u>FTIR / M4</u>	



Amb. Temp. (°F) <u>80</u>	Bar. Press. <u>29.10</u> in. Hg (mbar)
Pitot Cp <u>0.832</u>	Probe I.D. No. <u>67-SP-6</u>
Duct Diameters from Disturbance	
Downstream <u>12.5</u>	Upstream <u>28.5</u>
First point all the way <u>(in)</u> [Out]	Port Len. (in.) <u>2</u>
Gas Flow <u>(in)</u> [Out] of page	
Duct Dimensions (in.) <u>10</u>	

Run	PRELIM	Load	☒	Pitot Leak Check: Pre	☒	Post: Pass	☒	Fail	☐	Run		Load		Pitot Leak Check: Pre	☐	Post: Pass	☐	Fail	☐		
Start Time	0750	Stop Time	0815	Post Pitot Condition Check:		Good	☒	Bad	☐	Start Time		Stop Time		Post Pitot Condition Check:		Good	☐	Bad	☐		
Static Press. (in. H ₂ O)	-1.7			Post-Test ALT-011:		N/A	☐	Good	☒	Bad	☐	Static Press. (in. H ₂ O)		Post-Test ALT-011:		N/A	☐	Good	☐	Bad	☐
Traverse Point Number	Velocity Head ΔP (in. H ₂ O)	Stack Temp. T _s (°F)	Veclocity Pressure at 0° (in. H ₂ O)	Rotation Angle α giving 0 v.p.	Notes					Traverse Point Number	Velocity Head ΔP (in. H ₂ O)	Stack Temp. T _s (°F)	Veclocity Pressure at 0° (in. H ₂ O)	Rotation Angle α giving 0 v.p.	Notes						
2-1	0.5410	88	0.0025	1°																	
2	0.5035	88	0.0015	4°																	
3	0.4620	88	0.0085	3°																	
4	0.4300	88	0.0090	5°																	
L-1	0.6155	88	0.0010	8°																	
2	0.5725	88	0.0035	7°																	
3	0.6040	88	0.0070	5°																	
4	0.4875	87	0.0000	0°																	

* Sum of square roots.

** Sum of the absolute values

Circle correct bracketed units on data sheet.

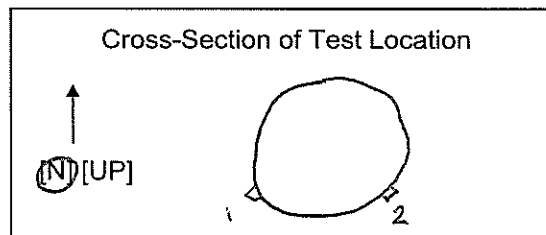
* Sum of square roots.

** Sum of the absolute values



TEST LOCATION: Roof DuctworkUNIT: Indoor Air Control SystemCYCLONIC AND VELOCITY
FIELD DATA SHEETPAGE 1 OF 1

Client <u>Sterigenics</u>	Project No. <u>14004</u>
Plant <u>Atlanta, GA</u>	Date <u>6/26/20</u>
Meter Operator <u>J. Myers</u>	Employee # <u>670</u>
Probe Operator <u>M. Khatib</u>	Employee # <u>599</u>
Source of Moisture and Molecular Weight Data <u>FTIR / M4</u>	



Amb. Temp. (°F) <u>75</u>	Bar. Press. <u>29.20</u> [in. Hg] [mbar]
Pitot Cp <u>0.832</u>	Probe I.D. No. <u>67-5P-6</u>
Duct Diameters from Disturbance	
Downstream <u>3.375</u>	Upstream <u>1.66</u>
First point all the way [In] [Out]	Port Len. (in.) <u>1.5</u>
Gas Flow [In] <u>Out</u> of page	
Duct Dimensions (in.) <u>32</u>	

Run PRELIM		Load ☒		Pitot Leak Check: Pre ☒ Post: Pass ☒ Fail ☐		Run		Load		Pitot Leak Check: Pre ☐ Post: Pass ☐ Fail ☐	
Start Time 0802		Stop Time 0810		Post Pitot Condition Check: Good ☒ Bad ☐		Start Time		Stop Time		Post Pitot Condition Check: Good ☐ Bad ☐	
Static Press. (in. H ₂ O) -18.80		Post-Test ALT-011: N/A ☐ Good ☒ Bad ☐				Static Press. (in. H ₂ O)		Post-Test ALT-011: N/A ☐ Good ☐ Bad ☐			
Traverse Point Number	Velocity Head ΔP (in.H ₂ O)	Stack Temp. T _s (°F)	Veclocity Pressure at 0° (in. H ₂ O)	Rotation Angle α giving 0 v.p.	Notes	Traverse Point Number	Velocity Head ΔP (in.H ₂ O)	Stack Temp. T _s (°F)	Veclocity Pressure at 0° (in. H ₂ O)	Rotation Angle α giving 0 v.p.	Notes
1-1	1.350	94	0.0185	1°							
2	1.220	94	0.1705	1°							
3	1.190	94	0.2310	5°							
4	1.270	94	0.1750	1°							
5	1.195	94	0.1900	4°							
6	1.510	94	0.3150	2°							
7	1.230	94	0.2170	2°							
8	1.175	93	0.0855	4°	8.99 9254						
2-1	1.340	94	0.0905	2°							
2	1.180	94	0.1725	2°							
3	1.105	94	0.2105	3°							
4	1.165	94	0.2205	4°							
5	1.555	94	0.2335	5°							
6	1.720	94	0.1770	1°							
7	1.235	94	0.1970	3°							
8	1.335	92	0.1525	1°							
Total	18.1989	1501	—	41		Total	*			**	NIST Thermocouple ID#
Average	1.1374	93.8125	—	2.5625		Average					F.S.T.T. #

* Sum of square roots.

** Sum of the absolute values

Circle correct bracketed units on data sheet.

* Sum of square roots.

** Sum of the absolute values

QA/QC JM
Date 6/26/20

End of Appendix Section

APPENDIX I: VELOCITY & TEMPERATURE DATA

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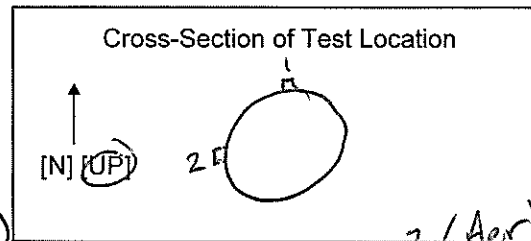
* Aeration & Backvent Testing

Aer = Aeration testing
BV = Backvent testing

TEST LOCATION: Roof Ductwork VELOCITY DETERMINATION
UNIT: Aeration/Backvent Outlet FIELD DATA SHEET

PAGE 1 OF 1

Client <u>Sterigenics</u>	Project No. <u>14004</u>
Plant <u>Atlanta, GA</u>	Date <u>6/24/20</u>
Meter Operator <u>J. Myers</u>	
Probe Operator <u>M. Khatib</u>	
Source of Moisture and Molecular Weight Data <u>FTIR/AA</u>	



Amb. Temp. (°F) <u>80</u>	P _{bar} <u>29.10</u> (in. Hg) [mbar]
Pitot Cp <u>0.832</u>	Probe I.D. No. <u>67-SP-6</u>
Duct Diameters from Disturbance Downstream <u>6.3</u> Upstream <u>3.8</u>	
First point all the way [In] [Out]	Port Len. (in.) <u>2</u>
Gas Flow [In] [Out] of page	
Duct Dimensions (in.) <u>30</u> (Aer)	

Run 1 (BV)	ALT-011 Ck. ☒ or NA ☐	Run 2 (Aer)	ALT-011 Ck. ☒ or NA ☐	Run 3 (Aer)	ALT-011 Ck. ☒ or NA ☐	Run 4 (Aer)	ALT-011 Ck. ☒ or NA ☐
Start Time 1159	Stop Time 1204	Start Time 1430	Stop Time 1435	Start Time 1605	Stop Time 1611	Start Time 1714	Stop Time 1720
Static Press. (in. H ₂ O) -1.135		Static Press. (in. H ₂ O) -1.305		Static Press. (in. H ₂ O) -1.315		Static Press. (in. H ₂ O) -1.280	
Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐	
Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐	
Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes
2-1	106	0.2570	Notes	2-1	95	0.2245	
2	106	0.2865		2	95	0.2660	
3	106	0.3100		3	95	0.3250	
4	107	0.3170		4	95	0.3040	
5	107	0.3305		5	95	0.2835	
6	107	0.3360		6	95	0.2815	
7	105	0.2670		7	94	0.2470	
8	102	0.2035	4.284389	8	93	0.2115	4.130911
1-1	106	0.2220		1-1	93	0.2145	
2	106	0.2805		2	93	0.2830	
3	106	0.3190		3	94	0.2835	
4	106	0.3045		4	94	0.2835	
5	106	0.3300		5	94	0.3045	
6	105	0.3080		6	94	0.2785	
7	105	0.2730		7	93	0.2540	
8	103	0.2280		8	93	0.2185	
Total	1689	8.5312	—	—	1505	8.1926	—
Average	104.6275	0.5332	—	—	94.0625	0.5120	—

Run 1 (BV)	ALT-011 Ck. ☒ or NA ☐	Run 2 (Aer)	ALT-011 Ck. ☒ or NA ☐	Run 3 (Aer)	ALT-011 Ck. ☒ or NA ☐	Run 4 (Aer)	ALT-011 Ck. ☒ or NA ☐
Start Time 1159	Stop Time 1204	Start Time 1430	Stop Time 1435	Start Time 1605	Stop Time 1611	Start Time 1714	Stop Time 1720
Static Press. (in. H ₂ O) -1.135		Static Press. (in. H ₂ O) -1.305		Static Press. (in. H ₂ O) -1.315		Static Press. (in. H ₂ O) -1.280	
Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐	
Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐	
Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes
2-1	106	0.2570	Notes	2-1	99	0.2340	
2	106	0.2865		2	100	0.2815	
3	106	0.3100		3	100	0.3180	
4	107	0.3170		4	100	0.2920	
5	107	0.3305		5	100	0.3100	
6	107	0.3360		6	100	0.3220	
7	105	0.2670		7	100	0.2760	
8	102	0.2035	4.284389	8	98	0.2045	4.220387
1-1	106	0.2220		1-1	100	0.2090	
2	106	0.2805		2	100	0.2730	
3	106	0.3190		3	100	0.3000	
4	106	0.3045		4	100	0.3155	
5	106	0.3300		5	100	0.3015	
6	105	0.3080		6	100	0.2960	
7	105	0.2730		7	99	0.2575	
8	103	0.2280		8	98	0.2435	
Total	1689	8.5312	—	—	1594	8.4035	—
Average	104.6275	0.5332	—	—	99.6250	0.5252	—

Run 1 (BV)	ALT-011 Ck. ☒ or NA ☐	Run 2 (Aer)	ALT-011 Ck. ☒ or NA ☐	Run 3 (Aer)	ALT-011 Ck. ☒ or NA ☐	Run 4 (Aer)	ALT-011 Ck. ☒ or NA ☐
Start Time 1159	Stop Time 1204	Start Time 1430	Stop Time 1435	Start Time 1605	Stop Time 1611	Start Time 1714	Stop Time 1720
Static Press. (in. H ₂ O) -1.135		Static Press. (in. H ₂ O) -1.305		Static Press. (in. H ₂ O) -1.315		Static Press. (in. H ₂ O) -1.280	
Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐	
Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐	
Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes
2-1	106	0.2570	Notes	2-1	93	0.2355	
2	106	0.2865		2	93	0.2760	
3	106	0.3100		3	93	0.3090	
4	107	0.3170		4	93	0.2870	
5	107	0.3305		5	93	0.3140	
6	107	0.3360		6	93	0.3140	
7	105	0.2670		7	93	0.2600	
8	102	0.2035	4.284389	8	92	0.2160	4.197616
1-1	106	0.2220		1-1	93	0.2120	
2	106	0.2805		2	93	0.2890	
3	106	0.3190		3	93	0.3260	
4	106	0.3045		4	93	0.3205	
5	106	0.3300		5	93	0.3085	
6	105	0.3080		6	93	0.2845	
7	105	0.2730		7	93	0.2575	
8	103	0.2280		8	92	0.2075	
Total	1689	8.5312	—	—	1486	8.3845	—
Average	104.6275	0.5332	—	—	92.8750	0.5240	—

Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC JH
Date 6/24/2020

NIST Thermocouple Serial Number:

F.S.T.T. #1

CleanAir
ENGINEERING

1 - 4

1 - 5

* Vacuum Pump Testing

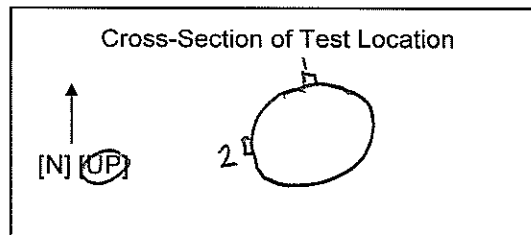
TEST LOCATION: Roof Ductwork

VELOCITY DETERMINATION FIELD DATA SHEET

PAGE 1 OF 1

UNIT: Aeration/Backvent Outlet

Client <u>Sterigenics</u>	Project No. <u>14004</u>
Plant <u>Atlanta, GA</u>	Date <u>6/25/20</u>
Meter Operator <u>J. Myers</u>	
Probe Operator <u>M. Khatib</u>	
Source of Moisture and Molecular Weight Data <u>FTIR/M4</u>	



Amb. Temp. (°F) <u>77</u>	P _{bar} <u>29.08</u> (in. Hg) [mbar]
Pitot Cp <u>0.832</u>	Probe I.D. No. <u>67-5P-6</u>
Duct Diameters from Disturbance	
Downstream <u>6.3</u>	Upstream <u>3.8</u>
First point all the way [In] [Out]	Port Len. (in.) <u>2</u>
Gas Flow [In] <u>(Out)</u> of page	
Duct Dimensions (in.) <u>30</u>	

Run	ALT-011 Ck. ☒ or NA ☐	Run	ALT-011 Ck. ☒ or NA ☐	Run	ALT-011 Ck. ☒ or NA ☐	Run	ALT-011 Ck. ☐ or NA ☐								
Start Time 1014	Stop Time 1024	Start Time 1156	Stop Time 1201	Start Time 1340	Stop Time 1344	Start Time	Stop Time								
Static Press. (in. H ₂ O) - 1.275		Static Press. (in. H ₂ O) - 1.195		Static Press. (in. H ₂ O) - 1.295		Static Press. (in. H ₂ O)									
Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☒ Fail ☐		Post-Test Leak Check: Pass ☐ Fail ☐									
Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☒ Bad ☐		Post-Test Pitot Check: Good ☐ Bad ☐									
Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes
2-1	92	0.2385		2-1	96	0.2230		2-1	102	0.2435					
2	92	0.2675		2	96	0.2615		2	103	0.3175					
3	92	0.2935		3	96	0.3105		3	103	0.3190					
4	93	0.2920		4	96	0.3120		4	103	0.3180					
5	93	0.3035		5	96	0.3070		5	103	0.3085					
6	93	0.2755		6	97	0.2885		6	104	0.2775					
7	93	0.2550		7	97	0.2575		7	104	0.2485					
8	92	0.2060	4.122332	8	96	0.2035		8	103	0.2050					
1-1	92	0.2050		1-1	96	0.2000		1-1	103	0.2065					
2	92	0.2480		2	96	0.2635		2	103	0.2700					
3	92	0.3075		3	97	0.2960		3	104	0.2870					
4	92	0.3200		4	97	0.2910		4	104	0.2945					
5	92	0.3305		5	97	0.3215		5	104	0.2945					
6	92	0.3180		6	96	0.3035		6	104	0.2275					
7	92	0.2720		7	96	0.2735		7	105	0.2600					
8	90	0.2230		8	96	0.2345		8	104	0.2310					
Total	1474	8.3738	—	—	1541	8.3183	—	—	1656	8.2485	—	—			
Average	92.1250	0.5234	—	—	96.3125	0.5199	—	—	103.5000	0.5155	—	—			

Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC JH
Date 6/25/20

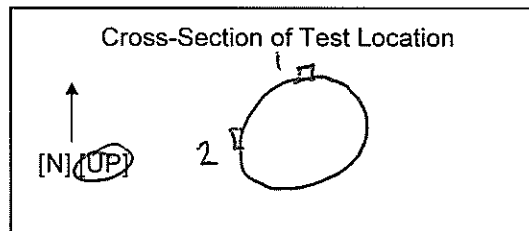
NIST Thermocouple Serial Number:

F.S.T.T.# 1



UNIT: Leilcote Outlet

Client	Sterigenics	Project No.	14004
Plant	Ahanta, GA	Date	6/25/20
Meter Operator	J. Myers		
Probe Operator	M. Khatib		
Source of Moisture and Molecular Weight Data			
FTIR/M4			



Amb. Temp. (°F)	77	P _{bar}	29.08 (in. Hg) (mbar)
Pitot Cp	0.832	Probe I.D. No.	67-5D-6
Duct Diameters from Disturbance			
Downstream	12.5	Upstream	28.5
First point all the way (in.)	[in.]	Port Len. (in.)	2
Gas Flow [In] 100% of page			
Duct Dimensions (in.) 10			

Run 1				Run 2				Run 3				Run 4			
Start Time		Stop Time		Start Time		Stop Time		Start Time		Stop Time		Start Time		Stop Time	
Static Press. (in. H ₂ O)				Static Press. (in. H ₂ O)				Static Press. (in. H ₂ O)				Static Press. (in. H ₂ O)			
Post-Test Leak Check:				Post-Test Leak Check:				Post-Test Leak Check:				Post-Test Leak Check:			
Post-Test Pitot Check:				Post-Test Pitot Check:				Post-Test Pitot Check:				Post-Test Pitot Check:			
Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in. H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in. H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in. H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in. H ₂ O)	Notes
2-1	88	0.5400		2-1	90	0.5430		2-1	95	0.5170					
2	88	0.5200		2	90	0.5345		2	95	0.5170					
3	88	0.4210		3	90	0.4435		3	95	0.4920					
4	86	0.4105		4	88	0.4395		4	93	0.4090					
1-1	88	0.5210		1-1	90	0.4710		1-1	95	0.5175					
2	88	0.5040		2	90	0.5045		2	95	0.5125					
3	88	0.4345		3	90	0.4460		3	95	0.5130					
4	85	0.3345		4	88	0.4645		4	94	0.4020					
Total	699	5.4148	—	—	716	5.5829	—	—	757	5.5646	—	—			
Average	87.3750	0.6768	—	—	89.5000	0.6979	—	—	94.6250	0.6956	—	—			

Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC JM
Date 6/25/20

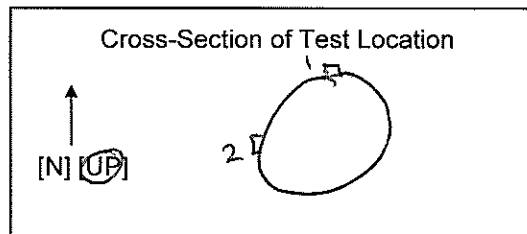
NIST Thermocouple Serial Number:

F.S.T.T.#



CleanAir
ENGINEERING

Client	Sterigenics	Project No.	14004
Plant	Atlanta, GA	Date	6/25/20
Meter Operator	J. Myers		
Probe Operator	M. Khatab		
Source of Moisture and Molecular Weight Data			
FTIR/14			



Amb. Temp. (°F)	77	P _{bar}	29.08	(In. Hg) (mbar)
Pitot Cp	0.832	Probe I.D. No.	67-5P-6	
Duct Diameters from Disturbance				
Downstream	26.7	Upstream	10.2	
First point all the way (In)	[In]	[Out]	Port Len. (in.)	1.5
Gas Flow (In)	[In]	[Out]	of page	
Duct Dimensions (in.)	28			

Run	ALT-011 Ck.	or NA	Run	ALT-011 Ck.	or NA	Run	ALT-011 Ck.	or NA	Run	ALT-011 Ck.	or NA				
Start Time 1008	Stop Time 1013	Static Press. (in. H ₂ O) - 1.420	Post-Test Leak Check: Pass ☒ Fail ☐	Post-Test Pitot Check: Good ☒ Bad ☐	Start Time 1206	Stop Time 1210	Static Press. (in. H ₂ O) - 1.200	Post-Test Leak Check: Pass ☒ Fail ☐	Post-Test Pitot Check: Good ☒ Bad ☐	Start Time 1330	Stop Time 1334	Static Press. (in. H ₂ O) - 1.355	Post-Test Leak Check: Pass ☒ Fail ☐	Post-Test Pitot Check: Good ☒ Bad ☐	
Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes
2-1	100	0.5285		2-1	103	0.5115		2-1	105	0.5125					
2	100	0.6040		2	103	0.6375		2	105	0.6160					
3	100	0.6850		3	103	0.6775		3	105	0.6605					
4	100	0.7110		4	103	0.6800		4	105	0.6680					
5	100	0.6045		5	103	0.5580		5	105	0.5545					
6	99	0.4500		6	101	0.4620		6	104	0.4060					
1-1	100	0.4880		1-1	103	0.4790		1-1	104	0.5215					
2	100	0.6025		2	103	0.6110		2	105	0.6205					
3	100	0.6890		3	103	0.7000		3	105	0.6660					
4	100	0.7060		4	103	0.6835		4	105	0.6605					
5	100	0.5780		5	101	0.5835		5	105	0.5860					
6	99	0.3380		6	100	0.3900		6	105	0.3925					
Total	1198	9.1100	—	—	1329	9.1136	—	—	1258	9.0433	—	—			
Average	(99.8333)	(0.7592)	—	—	(102.4167)	(0.7595)	—	—	(104.8333)	(0.7536)	—	—			

Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC JM
Date 6/25/20

NIST Thermocouple Serial Number:

F.S.T.T.#1



Indoor Air Testing

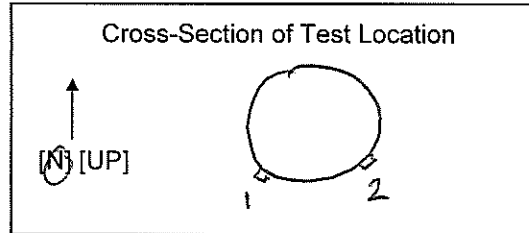
TEST LOCATION: Roof Ductwork

VELOCITY DETERMINATION FIELD DATA SHEET

PAGE 1 OF 1

UNIT: Indoor Air Control

Client <u>Sterigenics</u>	Project No. <u>14004</u>
Plant <u>Atlanta, GA</u>	Date <u>6/26/20</u>
Meter Operator <u>J. Myers</u>	
Probe Operator <u>M. Khatib</u>	
Source of Moisture and Molecular Weight Data <u>FTIR/M4</u>	



Amb. Temp. (°F) <u>75</u>	P _{bar} <u>29.20</u> (in. Hg) (mbar)
Pitot Cp <u>0.832</u>	Probe I.D. No. <u>67-SP-6</u>
Duct Diameters from Disturbance	
Downstream <u>3.375</u>	Upstream <u>1.66</u>
First point all the way (In) (Out)	Port Len. (in.) <u>1.5</u>
Gas Flow (In) (Out) of page	
Duct Dimensions (in.) <u>32</u>	

Run 1		ALT-011 Ck. ☒ or NA ☐		Run 2		ALT-011 Ck. ☒ or NA ☐		Run 3		ALT-011 Ck. ☒ or NA ☐		Run		ALT-011 Ck. ☐ or NA ☐									
Start Time 1004		Stop Time 1011		Start Time 1241		Stop Time 1246		Start Time 1433		Stop Time 1438		Start Time		Stop Time									
Static Press. (in. H ₂ O) -18.20						Static Press. (in. H ₂ O) -18.45						Static Press. (in. H ₂ O) -18.40						Static Press. (in. H ₂ O)					
Post-Test Leak Check: Pass ☒ Fail ☐						Post-Test Leak Check: Pass ☒ Fail ☐						Post-Test Leak Check: Pass ☒ Fail ☐						Post-Test Leak Check: Pass ☐ Fail ☐					
Post-Test Pitot Check: Good ☒ Bad ☐						Post-Test Pitot Check: Good ☒ Bad ☐						Post-Test Pitot Check: Good ☒ Bad ☐						Post-Test Pitot Check: Good ☐ Bad ☐					
Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes	Traverse Point Number	Stack Temp. T _s (°F)	Velocity Head ΔP (in.H ₂ O)	Notes								
1-1	96	1.315		1-1	102	1.475		1-1	102	1.395													
2	96	1.365		2	102	1.375		2	102	1.330													
3	96	1.225		3	102	1.275		3	102	1.250													
4	96	1.225		4	102	1.305		4	102	1.245													
5	96	1.415		5	102	1.365		5	102	1.325													
6	96	1.400		6	102	1.340		6	102	1.440													
7	95	1.210		7	102	1.100		7	102	1.200													
8	94	0.7825		8	102	1.160		8	102	1.145													
2-1	94	1.330		2-1	102	0.9420		2-1	102	1.355													
2	94	1.020		2	102	1.035		2	102	0.9510													
3	95	0.7110		3	102	0.7345		3	102	0.7370													
4	95	0.6845		4	102	0.7975		4	102	0.8370													
5	95	1.555		5	102	1.520		5	102	1.515													
6	95	1.620		6	102	1.400		6	102	1.510													
7	95	1.575		7	102	1.295		7	102	1.170													
8	94	1.240		8	102	1.275		8	102	1.265													
Total	1522	17.608	—	—	1632	17.5316	—	—	1632	*	—	—	*										
Average	95.1250	1.1005	—	—	102.0000	1.0957	—	—	102.0000		—	—											

Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC JK
Date 6/26/20

NIST Thermocouple Serial Number:

F.S.T.T.#



USEPA Method 3 Laboratory Data

Location: Aeration/Backvent Outlet

Client: Sterigenics

Project No: 14004

Method: EPA Method 3A

Fuel Type: Non-Combustion

F_o for Fuel: N/A

Test Method:

Analyte:

USEPA Method 2
Velocity & Flow Rate

Analyst: K. Sullivan

Analyst Emp No: 579

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 - Backvent Testing	1							
	2							
	3							
	Avg.							
CEM or Other Avg:		0.00000		20.90000	79.10000	28.83600		☐ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 - Aeration Testing	1							
	2							
	3							
	Avg.							
CEM or Other Avg:		0.00000		20.90000	79.10000	28.83600		☐ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
2 - Aeration Testing	1							
	2							
	3							
	Avg.							
CEM or Other Avg:		0.00000		20.90000	79.10000	28.83600		☐ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
3 - Aeration Testing	1							
	2							
	3							
	Avg.							
CEM or Other Avg:		0.00000		20.90000	79.10000	28.83600		☐ Fo value within expected range.

072320 203804
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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Aeration/Backvent Outlet

Test Run: 1 - Backvent Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.90874

Bar. Press. (in. Hg): 29.10

Static P: -1.135

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 11:59

Stop Time: 12:04

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.26			106			0.51		
2-02		0.29			106			0.54		
2-03		0.31			106			0.56		
2-04		0.32			107			0.56		
2-05		0.33			107			0.57		
2-06		0.34			107			0.58		
2-07		0.27			105			0.52		
2-08		0.20			102			0.45		
1-01		0.22			106			0.47		
1-02		0.28			106			0.53		
1-03		0.32			106			0.56		
1-04		0.30			106			0.55		
1-05		0.33			106			0.57		
1-06		0.31			105			0.55		
1-07		0.27			105			0.52		
1-08		0.23			103			0.48		
Final					105.56250			0.53320		

16 points sampled	Sq.Rt.ΔP
QC-Check: Field Averages	0.5332
	105.5625
☒ Avg. OK	☐ Avg. OK
☐ Avg. OK	☒ Avg. OK
☐ Avg. OK	☐ Avg. OK

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Field Data Printout

Test Method:

Analyte:

**USEPA Method 2
Velocity & Flow Rate**

Location: Aeration/Backvent Outlet

Test Run: 1 - Aeration Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.90874

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 14:30

Stop Time: 14:35

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.10

Static P: -1.305

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.22			95			0.47		
2-02		0.27			95			0.52		
2-03		0.33			95			0.57		
2-04		0.30			95			0.55		
2-05		0.28			95			0.53		
2-06		0.28			95			0.53		
2-07		0.25			94			0.50		
2-08		0.21			93			0.46		
1-01		0.21			93			0.46		
1-02		0.23			93			0.48		
1-03		0.28			94			0.53		
1-04		0.28			94			0.53		
1-05		0.30			94			0.55		
1-06		0.28			94			0.53		
1-07		0.25			93			0.50		
1-08		0.22			93			0.47		
Final					94.06250			0.51204		

16 points sampled	Sq.Rt.ΔP
QC-Check: Field Averages	0.5120
☒ Avg. OK	☐ Avg. OK
☐ Avg. OK	☒ Avg. OK
☐ Avg. OK	☐ Avg. OK

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Field Data Printout

Test Method:

USEPA Method 2

Analyte:

Velocity & Flow Rate

Location: Aeration/Backvent Outlet

Test Run: 2 - Aeration Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.90874

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 16:05

Stop Time: 16:11

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.10

Static P: -1.315

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.23			99			0.48		
2-02		0.28			100			0.53		
2-03		0.32			100			0.56		
2-04		0.29			100			0.54		
2-05		0.31			100			0.56		
2-06		0.32			100			0.57		
2-07		0.28			100			0.53		
2-08		0.20			98			0.45		
1-01		0.21			100			0.46		
1-02		0.27			100			0.52		
1-03		0.30			100			0.55		
1-04		0.32			100			0.56		
1-05		0.30			100			0.55		
1-06		0.30			100			0.54		
1-07		0.26			99			0.51		
1-08		0.24			98			0.49		
Final					99.62500			0.52522		

16 points sampled	Sq.Rt.ΔP
QC-Check: Field Averages	0.5252
☒ Avg. OK	☐ Avg. OK
☐ Avg. OK	☒ Avg. OK
☐ Avg. OK	☐ Avg. OK

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Field Data Printout

Test Method:

Analyte:

**USEPA Method 2
Velocity & Flow Rate**

Location: Aeration/Backvent Outlet

Test Run: 3 - Aeration Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.90874

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 17:14

Stop Time: 17:20

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.10

Static P: -1.280

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.24			93			0.49		
2-02		0.28			93			0.53		
2-03		0.31			93			0.56		
2-04		0.29			93			0.54		
2-05		0.31			93			0.56		
2-06		0.31			93			0.56		
2-07		0.26			93			0.51		
2-08		0.22			92			0.46		
1-01		0.21			93			0.46		
1-02		0.29			93			0.54		
1-03		0.33			93			0.57		
1-04		0.32			93			0.57		
1-05		0.31			93			0.56		
1-06		0.28			93			0.53		
1-07		0.26			93			0.51		
1-08		0.21			92			0.46		
Final					92.87500	#DIV/0!		0.52403		

16 points sampled	Sq.Rt.ΔP				
QC-Check: Field Averages	0.5240			92.8750	
	☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK

072320 203804

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USEPA Method 3 Laboratory Data

Test Method:
Analyte:

USEPA Method 2
Velocity & Flow Rate

Location: Aeration/Backvent Outlet

Client: Sterigenics

Project No: 14004

Method: EPA Method 3A

Fuel Type: Non-Combustion

F_o for Fuel: N/A

Analyst: K. Sullivan
Analyst Emp No: 579

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 -	1							
Vacuum	2							
Pump	3							
Testing	Avg.							
CEM or Other Avg:		0.01470		17.52436	82.46094	28.70333	229.7	☐ Fo value within expected range.
2 -	1							
Vacuum	2							
Pump	3							
Testing	Avg.							
CEM or Other Avg:		0.01996		20.90000	79.08004	28.83919	0.0	☒ Fo value within expected range.
3 -	1							
Vacuum	2							
Pump	3							
Testing	Avg.							
CEM or Other Avg:		0.01984		20.90000	79.08016	28.83917	0.0	☒ Fo value within expected range.

Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Aeration/Backvent Outlet

Test Run: 1 - Vacuum Pump Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.90874

Bar. Press. (in. Hg): 29.08

Static P: -1.275

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/25/20

Start Time: 10:19

Stop Time: 10:24

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.24			92			0.49		
2-02		0.27			92			0.52		
2-03		0.29			92			0.54		
2-04		0.29			93			0.54		
2-05		0.30			93			0.55		
2-06		0.28			93			0.52		
2-07		0.26			93			0.50		
2-08		0.21			92			0.45		
1-01		0.21			92			0.45		
1-02		0.30			92			0.55		
1-03		0.31			92			0.55		
1-04		0.32			92			0.57		
1-05		0.33			92			0.57		
1-06		0.32			92			0.56		
1-07		0.27			92			0.52		
1-08		0.22			90			0.47		
Final					92.12500			0.52336		

16 points sampled	Sq.Rt.ΔP				
QC-Check: Field Averages	0.5234			92.1250	
	☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK

072320 203804

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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Aeration/Backvent Outlet

Test Run: 2 - Vacuum Pump Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.90874

Bar. Press. (in. Hg): 29.08

Static P: -1.195

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/25/20

Start Time: 11:56

Stop Time: 12:01

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.22			96			0.47		
2-02		0.26			96			0.51		
2-03		0.31			96			0.56		
2-04		0.31			96			0.56		
2-05		0.31			96			0.55		
2-06		0.29			97			0.54		
2-07		0.26			97			0.51		
2-08		0.20			96			0.45		
1-01		0.20			96			0.45		
1-02		0.26			96			0.51		
1-03		0.30			97			0.54		
1-04		0.29			97			0.54		
1-05		0.32			97			0.57		
1-06		0.30			96			0.55		
1-07		0.27			96			0.52		
1-08		0.23			96			0.48		
Final					96.31250			0.51990		

16 points sampled	Sq.Rt.ΔP				
QC-Check: Field Averages	0.5199			96.3125	
	☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK

072320 203804

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Field Data Printout

Test Method:

Analyte:

**USEPA Method 2
Velocity & Flow Rate**

Location: Aeration/Backvent Outlet

Test Run: 3 - Vacuum Pump Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.90874

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/25/20

Start Time: 13:40

Stop Time: 13:44

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.08

Static P: -1.295

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.24			102			0.49		
2-02		0.32			103			0.56		
2-03		0.32			103			0.56		
2-04		0.32			103			0.56		
2-05		0.31			103			0.56		
2-06		0.28			104			0.53		
2-07		0.25			104			0.50		
2-08		0.21			103			0.45		
1-01		0.21			103			0.45		
1-02		0.27			103			0.52		
1-03		0.29			104			0.54		
1-04		0.29			104			0.54		
1-05		0.26			104			0.51		
1-06		0.23			104			0.48		
1-07		0.26			105			0.51		
1-08		0.23			104			0.48		
Final					103.50000			0.51553		

16 points sampled	Sq.Rt.ΔP
QC-Check: Field Averages	0.5155
	103.5000
☒ Avg. OK	☐ Avg. OK
☐ Avg. OK	☒ Avg. OK
☐ Avg. OK	☐ Avg. OK

072320 203804

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USEPA Method 3 Laboratory Data

Test Method:
Analyte:

USEPA Method 2
Velocity & Flow Rate

Location: Ceilcote Outlet

Client: Sterigenics

Project No: 14004

Method: EPA Method 3A

Fuel Type: Non-Combustion

F_o for Fuel: N/A

Analyst: K. Sullivan
Analyst Emp No: 579

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 - Backvent Testing	1 2 3							
Avg.								
CEM or Other Avg:		0.03918		20.90000	79.06082	28.84227	0.00000	☒ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 - Aeration Testing	1 2 3							
Avg.								
CEM or Other Avg:		0.02886		20.90000	79.07114	28.84062	0.00000	☒ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
2 - Aeration Testing	1 2 3							
Avg.								
CEM or Other Avg:		0.01929		20.90000	79.08071	28.83909	0.00000	☒ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
3 - Aeration Testing	1 2 3							
Avg.								
CEM or Other Avg:		0.02126		20.90000	79.07874	28.83940	0.00000	☒ Fo value within expected range.

072320 203804
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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Ceilcote Outlet

Test Run: 1 - Backvent Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 0.54542

Bar. Press. (in. Hg): 29.10

Static P: -1.440

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 11:52

Stop Time: 11:58

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter T _{m-in} T _{m-out} (°F) (°F)		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
2-01		0.51			95			0.71		
2-02		0.47			95			0.69		
2-03		0.45			95			0.67		
2-04		0.40			92			0.63		
1-01		0.48			94			0.69		
1-02		0.48			94			0.69		
1-03		0.41			94			0.64		
1-04		0.29			91			0.54		
Final					93.75000			0.65914		

8 points sampled

Sq.Rt.ΔP

QC-Check: Field Averages

0.6591

93.7500

☒ Avg. OK

☐ Avg. OK

☐ Avg. OK

☒ Avg. OK

☐ Avg. OK

072320 203804

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Field Data Printout

Test Method:

Analyte:

**USEPA Method 2
Velocity & Flow Rate**

Location: Ceilcote Outlet

Test Run: 1 - Aeration Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 0.54542

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 14:37

Stop Time: 14:42

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.10

Static P: -1.550

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter T _{m-in} T _{m-out} (°F) (°F)		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
2-01		0.52			101			0.72		
2-02		0.52			101			0.72		
2-03		0.46			100			0.68		
2-04		0.45			97			0.67		
1-01		0.51			100			0.71		
1-02		0.51			100			0.71		
1-03		0.42			100			0.65		
1-04		0.34			97			0.58		
Final					99.50000			0.68064		

8 points sampled

Sq.Rt.ΔP

QC-Check: Field Averages

0.6806

99.5000

☒ Avg. OK

☐ Avg. OK

☐ Avg. OK

☒ Avg. OK

☐ Avg. OK

072320 203804

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Field Data Printout

Test Method:

Analyte:

**USEPA Method 2
Velocity & Flow Rate**

Location: Ceilcote Outlet

Test Run: 2 - Aeration Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 0.54542

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 16:00

Stop Time: 16:05

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.10

Static P: -1.585

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter T _{m-in} T _{m-out} (°F) (°F)		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
2-01		0.50			100			0.70		
2-02		0.51			100			0.72		
2-03		0.48			100			0.69		
2-04		0.42			98			0.65		
1-01		0.51			100			0.71		
1-02		0.48			100			0.69		
1-03		0.43			100			0.65		
1-04		0.38			98			0.61		
Final					99.50000			0.67889		

8 points sampled

Sq.Rt.ΔP

QC-Check: Field Averages

0.6789

99.5000

☒ Avg. OK

☐ Avg. OK

☐ Avg. OK

☒ Avg. OK

☐ Avg. OK

072320 203804

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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Ceilcote Outlet

Test Run: 3 - Aeration Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 0.54542

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 17:20

Stop Time: 17:23

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.10

Static P: -1.740

O₂ (dry volume %): 20.90

CO₂ (dry volume %): 0.02

N₂+CO (dry volume %): 79.08

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

H₂O (condensate, ml or gm):

H₂O (silica, g):

Actual Moisture (%): 2.81

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter T _{m-in} T _{m-out} (°F) (°F)		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
2-01		0.52			101			0.72		
2-02		0.50			101			0.70		
2-03		0.50			101			0.71		
2-04		0.40			100			0.63		
1-01		0.51			101			0.71		
1-02		0.52			101			0.72		
1-03		0.43			101			0.65		
1-04		0.32			98			0.56		
Final					100.50000	#DIV/0!		0.67629		

8 points sampled

Sq.Rt.ΔP

QC-Check: Field Averages

0.6763

100.5000

☒ Avg. OK

☐ Avg. OK

☐ Avg. OK

☒ Avg. OK

☐ Avg. OK

072320 203804

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USEPA Method 3 Laboratory Data

Test Method:
Analyte:

USEPA Method 2
Velocity & Flow Rate

Location: Ceilcote Outlet

Client: Sterigenics

Project No: 14004

Method: EPA Method 3A

Fuel Type: Non-Combustion

F_o for Fuel: N/A

Analyst: K. Sullivan
Analyst Emp No: 579

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 -	1							
Vacuum	2							
Pump	3							
Testing	Avg.							
CEM or Other Avg:		0.00000		20.90000	79.10000	28.83600		☐ Fo value within expected range.
2 -	1							
Vacuum	2							
Pump	3							
Testing	Avg.							
CEM or Other Avg:		0.00000		20.58738	79.41262	28.82350		☐ Fo value within expected range.
3 -	1							
Vacuum	2							
Pump	3							
Testing	Avg.							
CEM or Other Avg:		0.00000		19.22661	80.77339	28.76906		☐ Fo value within expected range.

Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Ceilcote Outlet

Test Run: 1 - Vacuum Pump Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 0.54542

Bar. Press. (in. Hg): 29.08

Static P: -1.380

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/25/20

Start Time: 10:15

Stop Time: 10:18

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter T _{m-in} T _{m-out} (°F) (°F)		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
2-01		0.54			88			0.73		
2-02		0.52			88			0.72		
2-03		0.42			88			0.65		
2-04		0.41			86			0.64		
1-01		0.52			88			0.72		
1-02		0.50			88			0.71		
1-03		0.43			88			0.66		
1-04		0.33			85			0.58		
Final					87.37500			0.67685		

8 points sampled

Sq.Rt.ΔP

QC-Check: Field Averages

0.6768

87.3750

☒ Avg. OK

☐ Avg. OK

☐ Avg. OK

☒ Avg. OK

☐ Avg. OK

072320 203804

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Field Data Printout

Test Method:

Analyte:

USEPA Method 2
Velocity & Flow Rate

Location: Ceilcote Outlet

Test Run: 2 - Vacuum Pump Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 0.54542

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/25/20

Start Time: 12:01

Stop Time: 12:04

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.08

Static P: -1.535

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter T _{m-in} T _{m-out} (°F) (°F)		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
2-01		0.54			90			0.74		
2-02		0.53			90			0.73		
2-03		0.49			90			0.70		
2-04		0.44			88			0.66		
1-01		0.47			90			0.69		
1-02		0.51			90			0.71		
1-03		0.45			90			0.67		
1-04		0.46			88			0.68		
Final					89.50000			0.69786		

8 points sampled

Sq.Rt.ΔP

QC-Check: Field Averages

0.6979

89.5000

☒ Avg. OK

☐ Avg. OK

☐ Avg. OK

☒ Avg. OK

☐ Avg. OK

072320 203804

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Field Data Printout

Test Method:

Analyte:

**USEPA Method 2
Velocity & Flow Rate**

Location: Ceilcote Outlet

Test Run: 3 - Vacuum Pump Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 0.54542

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/25/20

Start Time: 13:37

Stop Time: 13:40

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.08

Static P: -1.610

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter T _{m-in} T _{m-out} (°F) (°F)		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
2-01		0.52			95			0.72		
2-02		0.52			95			0.72		
2-03		0.49			95			0.70		
2-04		0.41			93			0.64		
1-01		0.52			95			0.72		
1-02		0.51			95			0.72		
1-03		0.51			95			0.72		
1-04		0.40			94			0.63		
Final					94.62500			0.69557		

8 points sampled

Sq.Rt.ΔP

QC-Check: Field Averages

0.6956

94.6250

☒ Avg. OK

☐ Avg. OK

☐ Avg. OK

☒ Avg. OK

☐ Avg. OK

072320 203804

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USEPA Method 3 Laboratory Data

Test Method:
Analyte:

USEPA Method 2
Velocity & Flow Rate

Location: Process Stack

Client: Sterigenics

Project No: 14004

Method: EPA Method 3A

Fuel Type: Non-Combustion

F_o for Fuel: N/A

Analyst: K. Sullivan
Analyst Emp No: 579

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 - Backvent Testing	1 2 3							
Avg.								
CEM or Other Avg:		0.074		20.900	79.02606	28.84783	0.00000	☒ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 - Aeration Testing	1 2 3							
Avg.								
CEM or Other Avg:		0.077		20.900	79.02281	28.84835	0.00000	☒ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
2 - Aeration Testing	1 2 3							
Avg.								
CEM or Other Avg:		0.074		20.900	79.02583	28.84787	0.00000	☒ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
3 - Aeration Testing	1 2 3							
Avg.								
CEM or Other Avg:		0.075		20.900	79.02467	28.84805	0.00000	☒ Fo value within expected range.

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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Process Stack

Test Run: 1 - Backvent Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.27606

Bar. Press. (in. Hg): 29.10

Static P: -1.430

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 11:43

Stop Time: 11:50

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.57			104			0.75		
2-02		0.64			104			0.80		
2-03		0.68			104			0.82		
2-04		0.67			104			0.82		
2-05		0.51			104			0.71		
2-06		0.44			103			0.66		
1-01		0.54			103			0.74		
1-02		0.60			103			0.78		
1-03		0.69			104			0.83		
1-04		0.67			104			0.82		
1-05		0.60			104			0.77		
1-06		0.44			103			0.66		
Final					103.66667			0.76397		
12 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7640			103.6667					
		☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK				

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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Process Stack

Test Run: 1 - Aeration Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.27606

Bar. Press. (in. Hg): 29.10
Static P: -1.500

Nozzle ID No: N/A
Nozzle Diameter (D_n): N/A
Probe ID No: 67-5P-6
Pitot C_p: 0.832
Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670
Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 14:37

Stop Time: 14:42

Leak Rate Before: N/A cfm N/A
Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A
Meter ΔH@: N/A
Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.57			103			0.75		
2-02		0.63			103			0.79		
2-03		0.72			104			0.85		
2-04		0.66			104			0.81		
2-05		0.51			103			0.72		
2-06		0.46			103			0.67		
1-01		0.46			102			0.68		
1-02		0.62			102			0.78		
1-03		0.67			103			0.82		
1-04		0.66			103			0.81		
1-05		0.56			103			0.75		
1-06		0.48			100			0.69		
Final					102.75000			0.76134		
12 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7613			102.7500					
		☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK				

072320 203804

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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Process Stack

Test Run: 2 - Aeration Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.27606

Bar. Press. (in. Hg): 29.10
Static P: -1.520

Nozzle ID No: N/A
Nozzle Diameter (D_n): N/A
Probe ID No: 67-5P-6
Pitot C_p: 0.832
Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670
Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 15:53

Stop Time: 15:58

Leak Rate Before: N/A cfm N/A
Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A
Meter ΔH@: N/A
Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.54			104			0.73		
2-02		0.66			104			0.81		
2-03		0.70			104			0.84		
2-04		0.67			104			0.82		
2-05		0.55			104			0.74		
2-06		0.47			103			0.68		
1-01		0.44			104			0.66		
1-02		0.61			104			0.78		
1-03		0.68			104			0.82		
1-04		0.65			104			0.81		
1-05		0.59			105			0.77		
1-06		0.52			104			0.72		
Final					104.00000			0.76530		
12 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7653			104.0000					
		☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK				

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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Process Stack

Test Run: 3 - Aeration Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.27606

Bar. Press. (in. Hg): 29.10

Static P: -1.620

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/24/20

Start Time: 16:26

Stop Time: 16:31

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP_s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T_s (°F)	Dry Gas Meter		$\sqrt{\Delta P_s}$ (calculated) ($\sqrt{\text{in. H}_2\text{O}}$)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T_{m-in} (°F)	T_{m-out} (°F)			
2-01		0.55			103			0.74		
2-02		0.63			103			0.79		
2-03		0.64			103			0.80		
2-04		0.66			103			0.81		
2-05		0.56			103			0.75		
2-06		0.46			102			0.68		
1-01		0.44			102			0.66		
1-02		0.60			102			0.78		
1-03		0.66			103			0.81		
1-04		0.67			103			0.82		
1-05		0.59			102			0.77		
1-06		0.44			102			0.66		
Final					102.58333	#DIV/0!		0.75638		
12 points sampled										
QC-Check: Field Averages		Sq.Rt.ΔP								
		0.7564						102.5833		
		☒ Avg. OK ☐ Avg. OK ☐ Avg. OK			☒ Avg. OK ☐ Avg. OK					

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USEPA Method 3 Laboratory Data

Test Method:
Analyte:

USEPA Method 2
Velocity & Flow Rate

Location: Process Stack

Client: Sterigenics

Project No: 14004

Method: EPA Method 3A

Fuel Type: Non-Combustion

F_o for Fuel: N/A

Analyst: K. Sullivan
Analyst Emp No: 579

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 -	1							
Vacuum	2							
Pump	3							
Testing	Avg.							
CEM or Other Avg:		0.092		20.900	79.00835	28.85066	0.00000	☒ Fo value within expected range.
2 -	1							
Vacuum	2							
Pump	3							
Testing	Avg.							
CEM or Other Avg:		0.077		20.900	79.02262	28.84838	0.00000	☒ Fo value within expected range.
3 -	1							
Vacuum	2							
Pump	3							
Testing	Avg.							
CEM or Other Avg:		0.079		20.900	79.02088	28.84866	0.00000	☒ Fo value within expected range.

Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Process Stack

Test Run: #REF!

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.27606

Bar. Press. (in. Hg): 29.08

Static P: -1.420

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/25/20

Start Time: 10:08

Stop Time: 10:13

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.53			100			0.73		
2-02		0.60			100			0.78		
2-03		0.69			100			0.83		
2-04		0.71			100			0.84		
2-05		0.60			100			0.78		
2-06		0.45			99			0.67		
1-01		0.49			100			0.70		
1-02		0.60			100			0.78		
1-03		0.69			100			0.83		
1-04		0.71			100			0.84		
1-05		0.58			100			0.76		
1-06		0.34			99			0.58		
Final					99.83333			0.75917		
12 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7592			99.8333					
		☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK				

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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Process Stack

Test Run: #REF!

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.27606

Bar. Press. (in. Hg): 29.08

Static P: -1.200

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/25/20

Start Time: 12:06

Stop Time: 12:10

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.51			103			0.72		
2-02		0.64			103			0.80		
2-03		0.68			103			0.82		
2-04		0.68			103			0.82		
2-05		0.56			103			0.75		
2-06		0.46			101			0.68		
1-01		0.48			103			0.69		
1-02		0.61			103			0.78		
1-03		0.70			103			0.84		
1-04		0.68			103			0.83		
1-05		0.58			101			0.76		
1-06		0.39			100			0.62		
Final					102.41667			0.75947		
12 points sampled										
QC-Check: Field Averages		Sq.Rt.ΔP								
		0.7595			102.4167					
☒ Avg. OK ☐ Avg. OK ☐ Avg. OK ☒ Avg. OK ☐ Avg. OK										

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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Process Stack

Test Run: #REF!

Client: Sterigenics

Project No: 14004

Source Area (ft²): 4.27606

Bar. Press. (in. Hg): 29.08

Static P: -1.355

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/25/20

Start Time: 13:30

Stop Time: 13:34

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		0.51			105			0.72		
2-02		0.62			105			0.78		
2-03		0.66			105			0.81		
2-04		0.67			105			0.82		
2-05		0.55			105			0.74		
2-06		0.41			104			0.64		
1-01		0.52			104			0.72		
1-02		0.62			105			0.79		
1-03		0.67			105			0.82		
1-04		0.66			105			0.81		
1-05		0.59			105			0.77		
1-06		0.39			105			0.63		
Final					104.83333			0.75361		
12 points sampled										
QC-Check: Field Averages		Sq.Rt.ΔP								
		0.7536			104.8333					
☒ Avg. OK ☐ Avg. OK ☐ Avg. OK ☒ Avg. OK ☐ Avg. OK										

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USEPA Method 3 Laboratory Data

Test Method:
Analyte:

USEPA Method 2
Velocity & Flow Rate

Location: Indoor Air Control

Client: Sterigenics

Project No: 14004

Method: EPA Method 3A

Fuel Type: Non-Combustion

F_o for Fuel: N/A

Analyst: K. Sullivan
Analyst Emp No: 579

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
1 - Indoor	1							
Air	2							
Testing	3							
Avg.								
CEM or Other Avg:		0.080		20.900	79.02011	28.84878	0.00000	☒ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
2 - Indoor	1							
Air	2							
Testing	3							
Avg.								
CEM or Other Avg:		0.078		20.900	79.02195	28.84849	0.00000	☒ Fo value within expected range.

Run Number	Trial	Percent CO ₂	Percent O ₂ +CO ₂	Percent O ₂	Percent N ₂	Dry Mol. Weight	F _o	Method of Analysis: CEM
3 - Indoor	1							
Air	2							
Testing	3							
Avg.								
CEM or Other Avg:		0.075		20.900	79.02546	28.84793	0.00000	☒ Fo value within expected range.

Field Data Printout

Test Method:

USEPA Method 2

Analyte:

Velocity & Flow Rate

Location: Indoor Air Control

Test Run: 1 - Indoor Air Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 5.58505

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/26/20

Start Time: 10:04

Stop Time: 10:11

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.20

Static P: -18.20

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
1-01		1.32			96			1.15		
1-02		1.37			96			1.17		
1-03		1.23			96			1.11		
1-04		1.23			96			1.11		
1-05		1.42			96			1.19		
1-06		1.40			96			1.18		
1-07		1.21			95			1.10		
1-08		0.78			94			0.88		
2-01		1.33			94			1.15		
2-02		1.02			94			1.01		
2-03		0.71			95			0.84		
2-04		0.68			95			0.83		
2-05		1.56			95			1.25		
2-06		1.62			95			1.27		
2-07		1.58			95			1.25		
2-08		1.24			94			1.11		
Final					95.12500			1.10051		

16 points sampled	Sq.Rt.ΔP				
QC-Check: Field Averages	1.1005			95.1250	
	☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK

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Field Data Printout

Test Method:

USEPA Method 2
Velocity & Flow Rate

Analyte:

Location: Indoor Air Control

Test Run: 2 - Indoor Air Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 5.58505

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/26/20

Start Time: 12:41

Stop Time: 12:46

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.20

Static P: -18.45

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
1-01		1.48			102			1.21		
1-02		1.38			102			1.17		
1-03		1.28			102			1.13		
1-04		1.31			102			1.14		
1-05		1.37			102			1.17		
1-06		1.34			102			1.16		
1-07		1.10			102			1.05		
1-08		1.16			102			1.08		
2-01		0.94			102			0.97		
2-02		1.04			102			1.02		
2-03		0.73			102			0.86		
2-04		0.80			102			0.89		
2-05		1.52			102			1.23		
2-06		1.40			102			1.18		
2-07		1.30			102			1.14		
2-08		1.28			102			1.13		
Final					102.00000			1.09572		

16 points sampled	Sq.Rt.ΔP				
QC-Check: Field Averages	1.0957			102.0000	
	☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK

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Field Data Printout

Test Method:

Analyte:

**USEPA Method 2
Velocity & Flow Rate**

Location: Indoor Air Control

Test Run: 3 - Indoor Air Testing

Client: Sterigenics

Project No: 14004

Source Area (ft²): 5.58505

Meter Operator: J. Myers 670

Probe Operator: M. Khatib 599

Test Date: 6/26/20

Start Time: 14:33

Stop Time: 14:38

Leak Rate Before: N/A cfm N/A

Leak Rate After: N/A cfm N/A

Bar. Press. (in. Hg): 29.20

Static P: -18.40

Nozzle ID No: N/A

Nozzle Diameter (D_n): N/A

Probe ID No: 67-5P-6

Pitot C_p: 0.832

Pitot Leak Check: ☒ Pass ☐ Fail

Meter Box ID. No: N/A

Meter ΔH@: N/A

Meter Y_d: N/A

Traverse Point	Run Time 5.0 min/read	Pitot ΔP _s (in. H ₂ O)	Sample ΔH (in. H ₂ O)	Metered (dcf)	Stack T _s (°F)	Dry Gas Meter		√ΔP _s (calculated) (√in. H ₂ O)	Volume (calculated) (ft ³)	Isokinetics (calculated) (%)
						T _{m-in} (°F)	T _{m-out} (°F)			
2-01		1.40			102			1.18		
2-02		1.33			102			1.15		
2-03		1.25			102			1.12		
2-04		1.25			102			1.12		
2-05		1.33			102			1.15		
2-06		1.44			102			1.20		
2-07		1.20			102			1.10		
2-08		1.15			102			1.07		
1-01		1.36			102			1.16		
1-02		0.95			102			0.98		
1-03		0.74			102			0.86		
1-04		0.84			102			0.91		
1-05		1.52			102			1.23		
1-06		1.51			102			1.23		
1-07		1.17			102			1.08		
1-08		1.27			102			1.12		
Final					102.00000			1.10396		

16 points sampled	Sq.Rt.ΔP				
QC-Check: Field Averages	1.1040			102.0000	
	☒ Avg. OK	☐ Avg. OK	☐ Avg. OK	☒ Avg. OK	☐ Avg. OK

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End of Appendix Section

APPENDIX J: O₂/CO₂ DATA

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CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv

Instrument Information

Manufacturer:	Servomex	Servomex
Model:	5200	1415C
Detection:	Paramagn	NDIR
Asset or Serial No:	BG-1	210735

Calibration Span Value (CS)

21.430	21.090

System Response Time (seconds)

90	90

Manufacturer Certified Cylinder Value (C_v)

Zero	0.000	0.000
Low		
Mid	10.100	9.880
High	21.430	21.090

Actual gas to be used for bias checks

10.100	9.880

Cylinder ID

Zero	TWC-687369	TWC-687369
Low		
Mid	EB0002340	EB0002340
High	CC49769	CC49769

Analyzer Calibration Response (C_{Dir})

Zero	-0.013	0.014
Low		
Mid	10.106	10.072
High	21.456	20.837

Analyzer Calibration Error (ACE) (Limit = 2%, Method 25A limit = 5% of gas value)

Zero	-0.1%	0.1%
Low	N/A	N/A
Mid	0.0%	0.9%
High	0.1%	-1.2%

Calibration Error Status

Zero	OK	OK
Low	N/A	N/A
Mid	OK	OK
High	OK	OK

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07:54:07	-0.013
07:54:22	-0.013
07:54:38	-0.013
07:54:54	-0.013
07:55:09	-0.013
07:55:25	-0.013
07:55:41	4.331
07:55:57	13.888

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv
07:56:12	19.119	
07:56:28	20.306	
07:56:44	20.550	
07:56:59	21.406	
07:57:15	21.431	
07:57:31	21.444	
07:57:46	21.463	
07:58:02	21.463	
07:58:18	21.044	
07:58:34	16.631	
07:58:49	11.956	
07:59:05	10.244	
07:59:21	9.875	
07:59:37	10.063	
07:59:52	10.106	
08:00:08	10.106	
08:00:24	10.106	
08:00:39	10.106	
08:00:55	10.213	
07:33:02		0.018
07:33:19		0.007
07:33:35		0.018
07:33:51		0.007
07:34:06		0.011
07:34:23		0.023
07:34:39		2.262
07:34:57		19.442
07:35:14		20.631
07:35:30		20.713
07:35:46		20.691
07:36:03		20.709
07:36:19		20.723
07:36:34		20.788
07:36:50		20.806
07:37:07		20.829
07:37:24		20.834
07:37:39		20.847
07:37:55		18.223
07:39:54		0.687
07:40:10		0.159
07:40:26		-0.004
08:09:35		0.093
08:09:51		0.029
08:10:07		3.155
08:10:22		9.155
08:10:38		9.795
08:10:55		10.024
08:11:11		10.035
08:11:28		10.051
08:11:44		10.061
08:12:01		10.068

Sterigenics
CleanAir Project No. 14004
Atlanta Facility
Aeration/Backvent Outlet

Jun 24, 2020
Start Time 07:33
Stop Time 08:14

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv
08:12:16		10.075
08:12:32		10.087
08:12:49		10.091
08:13:04		10.081
08:13:21		10.044
08:13:36		10.067
08:13:52		3.614
08:14:08		1.164
08:14:25		2.415

CALIBRATION BIAS 00

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.219	0.185
C _{uf} Upscale gas	10.117	10.072

Analyzer Calibration Error Reponses (C_{Dir})

C _{oce} Zero gas	-0.013	0.014
C _{mce} Upscale gas	10.106	10.072

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	1.1%	0.8%
Upscale gas	0.0%	0.0%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Previous System Response to Calibration Gases (C_S)

C _{oi} Zero gas	N/A	N/A
C _{ui} Upscale gas	N/A	N/A

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	N/A	N/A
Upscale gas	N/A	N/A

Drift Assessment Status

Zero gas	N/A	N/A
Upscale gas	N/A	N/A

072320 211252

08:08:30	0.194	0.028
08:08:46	0.231	0.070
08:09:02	0.244	0.214
08:09:18	0.200	0.248
08:09:33	0.213	0.093
08:09:49	1.638	0.029
08:10:05	4.931	3.155
08:10:20	7.150	9.155
08:10:36	8.925	9.795
08:10:52	9.925	10.024
08:11:07	10.069	10.035
08:11:23	10.100	10.051
08:11:39	10.106	10.061
08:11:55	10.113	10.068
08:12:10	10.113	10.075
08:12:26	10.113	10.087
08:12:42	10.119	10.091
08:12:57	10.113	10.081
08:13:13	10.119	10.044
08:13:29	10.138	10.067
08:13:45	10.644	3.614
08:14:00	14.969	1.164
08:14:16	18.506	2.415

REFERENCE METHOD RUN 1-3

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv

Calibration Checks

Bias 00	C _{oi}	Initial zero	0.219	0.185
Stop 08:14	C _{ui}	Initial upscale	10.117	10.072
Bias 01	C _{of}	Final zero	0.069	0.047
Start 12:40	C _{uf}	Final upscale	9.994	10.396
	C _{ma}	Actual gas value	10.100	9.880

Analyzer Averages (concentrations)

C _{Avg}	Average conc.	20.543	0.018
C _{Gas}	Bias adjusted	20.787	-0.096
C _{Gas}	Bias adjusted (%dv)	21.342	-0.098

Clock Time (at end of sample period)

072320 211252

11:30	20.588	0.004	BV RUN 1
11:31	20.556	0.016	
11:32	20.563	0.022	
11:33	20.575	0.015	
11:35	20.575	0.007	
11:36	20.575	0.007	
11:37	20.575	0.017	
11:38	20.575	0.018	
11:39	20.563	0.014	
11:40	20.569	0.024	
11:41	20.569	0.017	
11:42	20.563	0.012	
11:43	20.556	0.020	
11:44	20.556	0.019	
11:45	20.556	0.014	
11:46	20.556	0.014	
11:47	20.556	0.021	
11:48	20.556	0.017	
11:49	20.556	0.019	BV RUN 2
11:50	20.456	0.038	
11:51	20.538	0.026	
11:52	20.544	0.021	
11:53	20.544	0.007	
11:54	20.544	0.009	
11:55	20.544	0.016	
11:57	20.544	0.016	
11:58	20.544	0.018	
11:59	20.544	0.020	
12:00	20.538	0.023	
12:01	20.538	0.010	
12:02	20.538	0.015	
12:03	20.538	0.022	
12:04	20.538	0.023	
12:05	20.538	0.020	BV RUN 3
12:06	20.538	0.024	

Sterigenics
CleanAir Project No. 14004
Backvent Testing
Aeration/Backvent Outlet

Jun 24, 2020
Start Time 11:29
Stop Time 12:19

REFERENCE METHOD RUN 1-3

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv
12:07	20.538	0.022
12:08	20.525	0.020
12:09	20.525	0.016
12:10	20.525	0.011
12:11	20.525	0.029
12:12	20.463	0.023
12:13	20.513	0.022
12:14	20.519	0.024
12:15	20.519	0.018
12:16	20.519	0.015
12:17	20.519	0.006
12:19	20.519	0.021

CALIBRATION BIAS 01

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv

System Response to Calibration Gasses (C_S)

C _{of}	Zero gas	0.069	0.047
C _{uf}	Upscale gas	9.994	10.396

Analyzer Calibration Error Reponses (C_{Dir})

C _{oce}	Zero gas	-0.013	0.014
C _{mce}	Upscale gas	10.106	10.072

Actual Upscale Gas Value (C_{MA})

C _{ma}	Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.4%	0.2%
Upscale gas	-0.5%	1.5%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 00

Previous System Response to Calibration Gases (C_S)

C _{oi}	Zero gas	0.219	0.185
C _{ui}	Upscale gas	10.117	10.072

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	-0.7%	-0.7%
Upscale gas	-0.6%	1.5%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

12:40:16	9.994	10.369
12:40:31	9.994	10.354
12:40:47	9.994	10.399
12:41:03	9.994	10.399
12:41:18	9.994	10.390
12:41:34	9.994	10.407
12:41:50	8.000	2.752
12:42:06	3.556	0.214
12:42:21	0.625	0.135
12:42:37	0.175	0.094
12:42:52	0.106	0.091
12:43:08	0.081	0.066
12:43:24	0.075	0.058
12:43:40	0.069	0.043
12:43:55	0.063	0.039

REFERENCE METHOD RUN 1

Channel			1	2
			O2	CO2
			Aeration/Ba ckvent Outlet %wv	Aeration/Ba ckvent Outlet %wv
Calibration Checks				
Bias 01	C _{oi}	Initial zero	0.069	0.047
Stop 12:43	C _{ui}	Initial upscale	9.994	10.396
Bias 02	C _{of}	Final zero	0.065	0.039
Start 15:31	C _{uf}	Final upscale	9.900	10.319
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	20.337	0.016
	C _{Gas}	Bias adjusted	20.721	-0.026
	C _{Gas}	Bias adjusted (%dv)	21.286	-0.027
Clock Time (at end of sample period)				
072320 211252				
		14:23	20.381	0.014
		14:24	20.381	0.009
		14:25	20.381	0.027
		14:26	20.381	0.014
		14:27	20.381	0.025
		14:28	20.381	0.015
		14:29	20.381	0.018
		14:30	20.381	0.014
		14:31	20.369	0.011
		14:32	20.369	0.018
		14:33	20.369	0.010
		14:35	20.369	0.016
		14:36	20.369	0.017
		14:37	20.369	0.008
		14:38	20.369	0.017
		14:39	20.369	0.024
		14:40	20.363	0.009
		14:41	20.363	0.020
		14:42	20.363	0.004
		14:43	20.363	0.006
		14:44	20.356	0.011
		14:45	20.356	0.015
		14:46	20.356	0.011
		14:47	20.356	0.019
		14:48	20.356	0.014
		14:49	20.344	0.019
		14:50	20.350	0.007
		14:51	20.344	0.017
		14:52	20.344	0.011
		14:53	20.344	0.019
		14:54	20.338	0.020
		14:55	20.338	0.011
		14:56	20.338	0.013
		14:58	20.331	0.020
		14:59	20.331	0.016
			Avg. Moisture Content: 2.65%	

REFERENCE METHOD RUN 1

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv
15:00	20.331	0.018
15:01	20.331	0.021
15:02	20.325	0.014
15:03	20.325	0.012
15:04	20.325	0.013
15:05	20.325	0.020
15:06	20.313	0.026
15:07	20.313	0.017
15:08	20.313	0.020
15:09	20.313	0.015
15:10	20.306	0.009
15:11	20.306	0.015
15:12	20.306	0.014
15:13	20.300	0.020
15:14	20.300	0.021
15:15	20.300	0.017
15:16	20.300	0.018
15:17	20.300	0.015
15:18	20.300	0.013
15:20	20.294	0.012
15:21	20.294	0.018
15:22	20.294	0.017
15:23	20.294	0.026
15:24	20.294	0.010
15:25	20.294	0.019
15:26	20.288	0.012
15:27	20.288	0.023

CALIBRATION BIAS 02

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv

System Response to Calibration Gasses (C_S)

C _{of}	Zero gas	0.065	0.039
C _{uf}	Upscale gas	9.900	10.319

Analyzer Calibration Error Reponses (C_{Dir})

C _{oce}	Zero gas	-0.013	0.014
C _{mce}	Upscale gas	10.106	10.072

Actual Upscale Gas Value (C_{MA})

C _{ma}	Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.4%	0.1%
Upscale gas	-1.0%	1.2%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 01

Previous System Response to Calibration Gases (C_S)

C _{oi}	Zero gas	0.069	0.047
C _{ui}	Upscale gas	9.994	10.396

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	-0.4%	-0.4%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

15:31:33	9.900	10.300
15:31:48	9.900	10.301
15:32:04	9.900	10.297
15:32:20	9.900	10.329
15:32:35	9.900	10.320
15:32:51	9.900	10.309
15:33:06	9.438	7.895
15:33:22	5.800	0.442
15:33:38	1.356	0.167
15:33:54	0.288	0.103
15:34:09	0.131	0.083
15:34:25	0.094	0.069
15:34:41	0.075	0.045
15:34:57	0.069	0.043
15:35:12	0.063	0.045
15:35:28	0.063	0.029

REFERENCE METHOD RUN 2

Channel				1	2
				O2	CO2
				Aeration/Ba ckvent Outlet %wv	Aeration/Ba ckvent Outlet %wv
Calibration Checks					
Bias 02	C _{oi}	Initial zero		0.065	0.039
Stop 15:35	C _{ui}	Initial upscale		9.900	10.319
Bias 03	C _{of}	Final zero		0.058	0.035
Start 16:55	C _{uf}	Final upscale		9.856	10.214
	C _{ma}	Actual gas value		10.100	9.880
Analyzer Averages (concentrations)					
	C _{Avg}	Average conc.		20.241	0.017
	C _{Gas}	Bias adjusted		20.762	-0.019
	C _{Gas}	Bias adjusted (%dv)		21.330	-0.019
Clock Time (at end of sample period)					
072320 211252					
		15:45	20.288	0.012	
		15:46	20.288	0.019	
		15:47	20.288	0.016	
		15:48	20.288	0.024	
		15:49	20.288	0.023	
		15:51	20.281	0.020	
		15:52	20.288	0.020	
		15:53	20.288	0.026	
		15:54	20.275	0.015	
		15:55	20.275	0.018	
		15:56	20.275	0.014	
		15:57	20.275	0.013	
		15:58	20.269	0.020	
		15:59	20.269	0.023	
		16:00	20.269	0.016	
		16:01	20.269	0.016	
		16:02	20.263	0.016	
		16:03	20.263	0.019	
		16:04	20.263	0.019	
		16:05	20.263	0.013	
		16:06	20.250	0.019	
		16:07	20.250	0.007	
		16:08	20.250	0.017	
		16:09	20.256	0.020	
		16:10	20.250	0.021	
		16:11	20.250	0.020	
		16:13	20.250	0.017	
		16:14	20.244	0.022	
		16:15	20.244	0.017	
		16:16	20.244	0.016	
		16:17	20.238	0.025	
		16:18	20.238	0.018	
		16:19	20.238	0.017	
		16:20	20.238	0.013	
		16:21	20.238	0.016	
				Avg. Moisture Content:	2.66%

REFERENCE METHOD RUN 2

Channel	1	2
	O2	CO2
	Aeration/Backvent Outlet %wv	Aeration/Backvent Outlet %wv
16:22	20.238	0.014
16:23	20.238	0.007
16:24	20.238	0.021
16:25	20.225	0.011
16:26	20.225	0.021
16:27	20.225	0.016
16:28	20.225	0.027
16:29	20.219	0.011
16:30	20.219	0.015
16:31	20.219	0.016
16:32	20.219	0.017
16:33	20.213	0.013
16:35	20.213	0.016
16:36	20.213	0.010
16:37	20.206	0.013
16:38	20.206	0.022
16:39	20.206	0.020
16:40	20.206	0.014
16:41	20.206	0.014
16:42	20.194	0.017
16:43	20.194	0.009
16:44	20.194	0.017
16:45	20.194	0.025
16:46	20.188	0.023
16:47	20.188	0.024
16:48	20.188	0.012

CALIBRATION BIAS 03

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv

System Response to Calibration Gasses (C_S)

C _{of}	Zero gas	0.058	0.035
C _{uf}	Upscale gas	9.856	10.214

Analyzer Calibration Error Reponses (C_{Dir})

C _{oce}	Zero gas	-0.013	0.014
C _{mce}	Upscale gas	10.106	10.072

Actual Upscale Gas Value (C_{MA})

C _{ma}	Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.3%	0.1%
Upscale gas	-1.2%	0.7%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 02

Previous System Response to Calibration Gases (C_S)

C _{oi}	Zero gas	0.065	0.039
C _{ui}	Upscale gas	9.900	10.319

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	-0.2%	-0.5%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

16:55:18	9.863	10.226
16:55:34	9.856	10.177
16:55:50	9.856	10.212
16:56:05	9.856	10.201
16:56:21	9.856	10.200
16:56:37	9.856	10.240
16:56:53	9.838	6.998
16:57:08	6.738	0.331
16:57:24	2.238	0.135
16:57:40	0.406	0.101
16:57:55	0.156	0.078
16:58:11	0.100	0.064
16:58:27	0.081	0.044
16:58:43	0.069	0.050
16:58:58	0.063	0.039
16:59:14	0.063	0.041
16:59:29	0.050	0.023

REFERENCE METHOD RUN 3

Channel				1	2
				O2	CO2
				Aeration/Backvent Outlet %wv	Aeration/Backvent Outlet %wv
Calibration Checks					
Bias 03	C _{oi}	Initial zero		0.058	0.035
Stop 16:59	C _{ui}	Initial upscale		9.856	10.214
Bias 04	C _{of}	Final zero		0.054	0.028
Start 18:14	C _{uf}	Final upscale		9.825	10.046
	C _{ma}	Actual gas value		10.100	9.880
Analyzer Averages (concentrations)					
	C _{Avg}	Average conc.		20.123	0.020
	C _{Gas}	Bias adjusted		20.714	-0.011
	C _{Gas}	Bias adjusted (%dv)		21.296	-0.011

Clock Time (at end of sample period)

072320 211252

17:05	20.175	0.023
17:06	20.181	0.021
17:07	20.181	0.026
17:08	20.181	0.019
17:09	20.181	0.016
17:10	20.175	0.023
17:12	20.175	0.019
17:13	20.175	0.022
17:14	20.175	0.026
17:15	20.175	0.022
17:16	20.163	0.020
17:17	20.163	0.021
17:18	20.163	0.022
17:19	20.163	0.019
17:20	20.156	0.021
17:21	20.156	0.019
17:22	20.156	0.021
17:23	20.156	0.021
17:24	20.150	0.023
17:25	20.150	0.023
17:26	20.150	0.017
17:27	20.150	0.022
17:28	20.144	0.019
17:29	20.144	0.020
17:30	20.144	0.018
17:31	20.144	0.019
17:32	20.131	0.025
17:33	20.131	0.023
17:35	20.131	0.024
17:36	20.131	0.020
17:37	20.125	0.020
17:38	20.125	0.023
17:39	20.125	0.021
17:40	20.119	0.015
17:41	20.119	0.024

Avg. Moisture Content: 2.73%

REFERENCE METHOD RUN 3

Channel	1	2
	O2	CO2
	Aeration/Backvent	Aeration/Backvent
	Outlet	Outlet
	%wv	%wv
17:42	20.119	0.018
17:43	20.119	0.019
17:44	20.106	0.017
17:45	20.106	0.020
17:46	20.106	0.018
17:47	20.106	0.013
17:48	20.100	0.021
17:49	20.100	0.020
17:50	20.100	0.018
17:51	20.094	0.020
17:52	20.094	0.022
17:53	20.088	0.025
17:54	20.088	0.018
17:55	20.075	0.022
17:57	20.075	0.018
17:58	20.075	0.018
17:59	20.075	0.018
18:00	20.075	0.018
18:01	20.069	0.019
18:02	20.069	0.017
18:03	20.069	0.024
18:04	20.069	0.017
18:05	20.069	0.025
18:06	20.063	0.020
18:07	20.063	0.016
18:08	20.056	0.019
18:09	20.056	0.021

CALIBRATION BIAS 04

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%wv	%wv

System Response to Calibration Gasses (C_S)

C _{of}	Zero gas	0.054	0.028
C _{uf}	Upscale gas	9.825	10.046

Analyzer Calibration Error Reponses (C_{Dir})

C _{oce}	Zero gas	-0.013	0.014
C _{mce}	Upscale gas	10.106	10.072

Actual Upscale Gas Value (C_{MA})

C _{ma}	Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.3%	0.1%
Upscale gas	-1.3%	-0.1%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 03

Previous System Response to Calibration Gases (C_S)

C _{oi}	Zero gas	0.058	0.035
C _{ui}	Upscale gas	9.856	10.214

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	-0.1%	-0.8%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

18:14:42	9.825	10.038
18:14:58	9.825	10.052
18:15:13	9.825	10.049
18:15:29	9.813	10.082
18:15:45	7.813	3.919
18:16:00	2.831	0.213
18:16:17	0.500	0.119
18:16:32	0.169	0.083
18:16:48	0.100	0.075
18:17:03	0.081	0.044
18:17:19	0.069	0.053
18:17:35	0.063	0.043
18:17:51	0.063	0.026
18:18:06	0.050	0.034
18:18:22	0.050	0.025

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%dv	%dv

Instrument Information

Manufacturer:	Servomex	Servomex
Model:	5200	1415C
Detection:	Paramagn	NDIR
Asset or Serial No:	BG-1	210735

Calibration Span Value (CS)

21.430	21.090

System Response Time (seconds)

90	90

Manufacturer Certified Cylinder Value (C_v)

Zero	0.000	0.000
Low		
Mid	10.100	9.880
High	21.430	21.090

Actual gas to be used for bias checks

10.100	9.880

Cylinder ID

Zero	TWC-687369	TWC-687369
Low		
Mid	EB0002340	EB0002340
High	CC49769	CC49769

Analyzer Calibration Response (C_{Dir})

Zero	0.017	0.035
Low		
Mid	10.165	10.121
High	21.394	20.658

Analyzer Calibration Error (ACE) (Limit = 2%, Method 25A limit = 5% of gas value)

Zero	0.1%	0.2%
Low	N/A	N/A
Mid	0.3%	1.1%
High	-0.2%	-2.0%

Calibration Error Status

Zero	OK	OK
Low	N/A	N/A
Mid	OK	OK
High	OK	OK

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07:37:56	20.025	20.459
07:38:12	20.013	20.624
07:38:28	20.025	20.661
07:38:43	20.031	20.661
07:38:59	20.031	20.653
07:39:15	21.394	20.632
07:39:30	21.394	20.643
07:39:46	21.394	20.648

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%dv	%dv
07:40:02	21.394	20.651
07:40:17	21.394	20.646
07:40:33	19.269	20.439
07:40:49	14.100	11.383
07:41:05	10.950	10.239
07:41:20	10.381	10.180
07:41:36	10.244	10.166
07:41:52	10.200	10.167
07:42:07	10.194	10.157
07:42:23	10.188	10.168
07:42:39	10.181	10.136
07:42:55	10.181	10.142
07:43:11	10.181	10.148
07:43:26	10.181	10.142
07:43:42	10.169	10.139
07:43:57	10.169	10.162
07:44:13	10.169	10.148
07:44:29	10.169	10.139
07:44:44	10.169	10.136
07:45:01	10.163	10.123
07:45:16	10.163	10.105
07:45:32	8.925	9.364
07:45:47	4.931	0.733
07:46:03	1.000	0.096
07:46:19	0.231	0.058
07:46:34	0.081	0.057
07:46:50	0.044	0.024
07:47:06	0.025	0.038
07:47:22	0.013	0.033
07:47:37	0.013	0.032

CALIBRATION BIAS 00

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.050	0.014
C _{uf} Upscale gas	10.185	10.001

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.017	0.035
C _{mce} Upscale gas	10.165	10.121

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.2%	-0.1%
Upscale gas	0.1%	-0.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Previous System Response to Calibration Gases (C_S)

C _{oi} Zero gas	N/A	N/A
C _{ui} Upscale gas	N/A	N/A

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	N/A	N/A
Upscale gas	N/A	N/A

Drift Assessment Status

Zero gas	N/A	N/A
Upscale gas	N/A	N/A

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08:00:54	0.050	0.014
08:01:10	0.050	0.019
08:01:25	0.050	0.010
08:01:41	0.044	0.024
08:01:57	1.350	4.092
08:02:13	6.331	9.798
08:02:28	9.475	9.920
08:02:44	10.050	9.972
08:03:00	10.144	9.990
08:03:15	10.169	9.989
08:03:31	10.181	9.982
08:03:47	10.188	9.999
08:04:02	10.188	10.023

REFERENCE METHOD RUN 1

Channel				1	2
				O2	CO2
				Aeration/Backvent Outlet %dv	Aeration/Backvent Outlet %dv
Calibration Checks					
Bias 00	C _{oi}	Initial zero		0.050	0.014
Stop 08:04	C _{ui}	Initial upscale		10.185	10.001
Bias 01	C _{of}	Final zero		0.050	-0.010
Start 11:10	C _{uf}	Final upscale		10.088	9.988
	C _{ma}	Actual gas value		10.100	9.880
Analyzer Averages (concentrations)					
	C _{Avg}	Average conc.		17.091	0.017
	C _{Gas}	Bias adjusted		17.064	0.014
	C _{Gas}	Bias adjusted (%dv)		17.524	0.015

Clock Time (at end of sample period)

072320 211252					
	09:57	20.519	0.014		
	09:58	20.519	0.018		
	09:59	19.388	0.021		
	10:00	6.100	0.025		
	10:01	9.419	0.020		
	10:02	8.056	0.017		
	10:03	3.788	0.013		
	10:04	13.044	0.024		
	10:05	8.781	0.015		
	10:06	5.075	0.022		
	10:07	10.550	0.017		
	10:08	12.569	0.016		
	10:09	19.288	0.016		
	10:10	19.338	0.015		
	10:11	17.169	0.015		
	10:12	19.900	0.016		
	10:13	19.625	0.015		
	10:14	18.831	0.018		
	10:16	20.500	0.012		
	10:17	20.506	0.017		
	10:18	20.506	0.015		
	10:19	20.506	0.018		
	10:20	18.625	0.015		
	10:21	20.506	0.012		
	10:22	20.506	0.016		
	10:23	20.506	0.020		
	10:24	20.319	0.017		
	10:25	20.500	0.016		
	10:26	20.500	0.015		
	10:27	20.500	0.013		
	10:28	20.263	0.020		
	10:29	20.500	0.017		
	10:30	20.500	0.015		
	10:31	20.500	0.017		
	10:32	20.500	0.006		
				Avg. Moisture Content:	2.63%

CALIBRATION BIAS 01

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of}	Zero gas	0.050	-0.010
C _{uf}	Upscale gas	10.088	9.988

Analyzer Calibration Error Reponses (C_{Dir})

C _{oce}	Zero gas	0.017	0.035
C _{mce}	Upscale gas	10.165	10.121

Actual Upscale Gas Value (C_{MA})

C _{ma}	Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.2%	-0.2%
Upscale gas	-0.4%	-0.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 00

Previous System Response to Calibration Gases (C_S)

C _{oi}	Zero gas	0.050	0.014
C _{ui}	Upscale gas	10.185	10.001

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	-0.1%
Upscale gas	-0.5%	-0.1%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

11:10:15	0.050	-0.008
11:10:31	0.050	-0.011
11:10:47	0.050	-0.012
11:11:02	0.763	4.096
11:11:18	4.875	9.775
11:11:34	9.025	9.914
11:11:49	9.888	9.951
11:12:05	10.044	9.966
11:12:21	9.938	9.987
11:12:37	10.081	9.971
11:12:52	10.081	9.981
11:13:08	10.075	9.979
11:13:24	10.088	9.997
11:13:40	10.100	9.990

REFERENCE METHOD RUN 2

Channel				1	2
				O2	CO2
				Aeration/Backvent Outlet %dv	Aeration/Backvent Outlet %dv
Calibration Checks					
Bias 01	C _{oi}	Initial zero		0.050	-0.010
Stop 11:13	C _{ui}	Initial upscale		10.088	9.988
Bias 02	C _{of}	Final zero		0.067	0.005
Start 12:55	C _{uf}	Final upscale		10.075	10.032
	C _{ma}	Actual gas value		10.100	9.880
Analyzer Averages (concentrations)					
	C _{Avg}	Average conc.		20.416	0.017
	C _{Gas}	Bias adjusted		20.514	0.019
	C _{Gas}	Bias adjusted (%dv)		21.064	0.020
Clock Time (at end of sample period)					
072320 211252					
		11:49	20.425	0.015	Avg. Moisture Content: 2.61%
		11:50	20.425	0.018	
		11:51	20.419	0.014	
		11:52	20.425	0.016	
		11:53	20.419	0.018	
		11:54	20.419	0.015	
		11:55	20.419	0.019	
		11:56	20.419	0.016	
		11:57	20.419	0.015	
		11:58	20.419	0.022	
		11:59	20.419	0.020	
		12:01	20.419	0.017	
		12:02	20.419	0.015	
		12:03	20.419	0.017	
		12:04	20.419	0.018	
		12:05	20.419	0.021	
		12:06	20.413	0.016	
		12:07	20.413	0.017	
		12:08	20.413	0.021	
		12:09	20.413	0.018	
		12:10	20.413	0.019	
		12:11	20.413	0.011	
		12:12	20.413	0.017	
		12:13	20.413	0.016	
		12:14	20.413	0.019	
		12:15	20.413	0.015	
		12:16	20.413	0.016	
		12:17	20.413	0.019	
		12:18	20.413	0.017	
		12:19	20.413	0.017	
		12:20	20.413	0.017	
		12:21	20.413	0.017	
		12:22	20.406	0.019	

CALIBRATION BIAS 02

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of}	Zero gas	0.067	0.005
C _{uf}	Upscale gas	10.075	10.032

Analyzer Calibration Error Reponses (C_{Dir})

C _{oce}	Zero gas	0.017	0.035
C _{mce}	Upscale gas	10.165	10.121

Actual Upscale Gas Value (C_{MA})

C _{ma}	Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.2%	-0.1%
Upscale gas	-0.4%	-0.4%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 01

Previous System Response to Calibration Gases (C_S)

C _{oi}	Zero gas	0.050	-0.010
C _{ui}	Upscale gas	10.088	9.988

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.1%	0.1%
Upscale gas	-0.1%	0.2%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

12:55:32	0.069	0.006
12:55:48	0.069	0.005
12:56:04	0.063	0.004
12:56:20	0.056	0.003
12:56:35	2.119	1.561
12:56:51	6.919	9.620
12:57:07	9.581	9.911
12:57:22	9.963	9.938
12:57:38	10.038	9.989
12:57:54	10.050	9.993
12:58:10	10.063	9.991
12:58:25	10.069	10.015
12:58:41	10.069	10.018
12:58:57	10.075	10.032
12:59:12	10.075	10.031
12:59:28	10.075	10.034
12:59:44	10.075	10.030

REFERENCE METHOD RUN 3

Channel				1	2
				O2	CO2
				Aeration/Ba	Aeration/Ba
				ckvent	ckvent
				Outlet	Outlet
				%dv	%dv
Calibration Checks					
Bias 02	C _{oi}	Initial zero		0.067	0.005
Stop 12:59	C _{ui}	Initial upscale		10.075	10.032
Bias 03	C _{of}	Final zero		0.050	-0.010
Start 14:18	C _{uf}	Final upscale		10.063	10.059
	C _{ma}	Actual gas value		10.100	9.880
Analyzer Averages (concentrations)					
	C _{Avg}	Average conc.		20.365	0.017
	C _{Gas}	Bias adjusted		20.489	0.019
	C _{Gas}	Bias adjusted (%dv)		21.039	0.020
Clock Time (at end of sample period)					
072420 122231					
		13:09	20.388	0.019	
		13:10	20.388	0.014	Avg. Moisture Content: 2.62%
		13:11	20.388	0.018	
		13:12	20.388	0.021	
		13:13	20.388	0.015	
		13:14	20.388	0.016	
		13:15	20.388	0.019	
		13:16	20.388	0.015	
		13:17	20.381	0.019	
		13:18	20.381	0.022	
		13:19	20.381	0.017	
		13:20	20.381	0.018	
		13:21	20.381	0.013	
		13:22	20.381	0.011	
		13:23	20.369	0.017	
		13:24	20.369	0.016	
		13:25	20.369	0.014	
		13:27	20.369	0.017	
		13:28	20.369	0.015	
		13:29	20.369	0.017	
		13:30	20.369	0.017	
		13:31	20.369	0.019	
		13:32	20.369	0.015	
		13:33	20.363	0.023	
		13:34	20.363	0.017	
		13:35	20.363	0.015	
		13:36	20.363	0.021	
		13:37	20.363	0.021	
		13:38	20.363	0.017	
		13:39	20.363	0.018	
		13:40	20.356	0.021	
		13:41	20.356	0.023	
		13:42	20.356	0.018	
		13:43	20.356	0.019	
		13:44	20.356	0.023	
		13:45	20.356	0.018	

REFERENCE METHOD RUN 3

Channel	1	2
	O2	CO2
	Aeration/Backvent Outlet %dv	Aeration/Backvent Outlet %dv
13:46	20.350	0.019
13:47	20.350	0.019
13:49	20.350	0.014
13:50	20.350	0.011
13:51	20.350	0.015
13:52	20.350	0.017
13:53	20.338	0.013
13:54	20.338	0.018
13:55	20.338	0.017
13:56	20.338	0.014
13:57	20.338	0.012

REFERENCE METHOD RUN 3

Channel	1	2
	O2	CO2
	Aeration/Backvent Outlet %dv	Aeration/Backvent Outlet %dv
13:46	20.350	0.019
13:47	20.350	0.019
13:49	20.350	0.014
13:50	20.350	0.011
13:51	20.350	0.015
13:52	20.350	0.017
13:53	20.338	0.013
13:54	20.338	0.018
13:55	20.338	0.017
13:56	20.338	0.014
13:57	20.338	0.012

CALIBRATION BIAS 03

Channel	1	2
	O2	CO2
	Aeration/Ba	Aeration/Ba
	ckvent	ckvent
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.050	-0.010
C _{uf} Upscale gas	10.063	10.059

Analyzer Calibration Error Reponses (C_{Dir})

C _{oce} Zero gas	0.017	0.035
C _{mce} Upscale gas	10.165	10.121

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.2%	-0.2%
Upscale gas	-0.5%	-0.3%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 02

Previous System Response to Calibration Gases (C_S)

C _{oi} Zero gas	0.067	0.005
C _{ui} Upscale gas	10.075	10.032

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	-0.1%	-0.1%
Upscale gas	-0.1%	0.1%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072420 121127

14:18:12	0.050	-0.013
14:18:28	0.050	-0.004
14:18:43	0.050	-0.013
14:18:59	0.356	-0.006
14:19:15	3.950	7.648
14:19:30	8.363	9.870
14:19:46	9.750	9.960
14:20:02	9.988	9.986
14:20:17	10.019	10.009
14:20:34	10.038	10.005
14:20:49	10.044	10.024
14:21:05	10.050	10.035
14:21:21	10.050	10.040
14:21:36	10.050	10.045
14:21:52	10.050	10.040
14:22:07	10.063	10.026
14:22:23	10.063	10.032
14:22:39	10.063	10.031
14:22:55	10.063	10.045
14:23:11	10.063	10.055
14:23:26	10.063	10.075
14:23:42	10.063	10.045

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv

Instrument Information

Manufacturer:	Servomex	Servomex
Model:	5200	1415C
Detection:	Paramagn	NDIR
Asset or Serial No:	BG-2	210736

Calibration Span Value (CS)

21.430	21.090

System Response Time (seconds)

90	90

Manufacturer Certified Cylinder Value (C_v)

Zero	0.000	0.000
Low		
Mid	10.100	9.880
High	21.430	21.090

Actual gas to be used for bias checks

10.100	9.880

Cylinder ID

Zero	TWC-687369	TWC-687369
Low		
Mid	EB0002340	EB0002340
High	CC49769	CC49769

Analyzer Calibration Response (C_{Dir})

Zero	0.002	-0.014
Low		
Mid	10.115	10.086
High	21.481	20.905

Analyzer Calibration Error (ACE) (Limit = 2%, Method 25A limit = 5% of gas value)

Zero	0.0%	-0.1%
Low	N/A	N/A
Mid	0.1%	1.0%
High	0.2%	-0.9%

Calibration Error Status

Zero	OK	OK
Low	N/A	N/A
Mid	OK	OK
High	OK	OK

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07:54:22	0.006	-0.017
07:54:38	0.000	-0.011
07:54:54	0.000	-0.014
07:55:09	0.000	-0.022
07:55:25	1.750	6.636
07:55:41	16.394	19.854
07:55:57	20.500	20.302
07:56:12	21.306	20.368
07:56:28	21.506	20.430

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv
07:56:44	21.563	20.467
07:56:59	21.450	20.994
07:57:15	21.469	20.903
07:57:31	21.475	20.907
07:57:46	21.481	20.905
07:58:02	21.488	20.504
07:58:18	20.206	15.148
07:58:34	12.925	10.287
07:58:49	10.625	9.600
07:59:05	9.744	9.681
07:59:21	10.038	10.096
07:59:37	10.113	10.091
07:59:52	10.119	10.092
08:00:08	10.119	10.100
08:00:24	10.113	10.086
08:00:39	10.113	10.073
08:00:55	12.919	2.084

CALIBRATION BIAS 00

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv
System Response to Calibration Gasses (C_S)		
C _{of} Zero gas	0.108	-0.016
C _{uf} Upscale gas	10.119	9.810
Analyzer Calibration Error Responses (C_{Dir})		
C _{oce} Zero gas	0.002	-0.014
C _{mce} Upscale gas	10.115	10.086
Actual Upscale Gas Value (C_{MA})		
C _{ma} Upscale gas	10.100	9.880
Calibration Span Value (CS)		
	21.430	21.090
System Bias as Percent of Calibration Span Value (SB) (5%)		
Zero gas	0.5%	0.0%
Upscale gas	0.0%	-1.3%
System Bias Status		
Zero gas	OK	OK
Upscale gas	OK	OK
Previous System Response to Calibration Gasses (C_S)		
C _{oi} Zero gas	N/A	N/A
C _{ui} Upscale gas	N/A	N/A
Drift Assessment as Percent of Calibration Span Value (D) (3%)		
Zero gas	N/A	N/A
Upscale gas	N/A	N/A
Drift Assessment Status		
Zero gas	N/A	N/A
Upscale gas	N/A	N/A

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08:04:35	0.119	-0.020
08:04:51	0.113	-0.022
08:05:06	0.113	-0.015
08:05:22	0.113	-0.031
08:05:38	0.106	-0.002
08:05:53	0.106	-0.016
08:06:09	5.744	0.112
08:06:25	12.938	6.154
08:06:41	8.713	9.122
08:06:56	8.319	9.620
08:07:12	10.600	9.716
08:07:28	10.194	9.752
08:07:43	10.119	9.774
08:07:59	10.119	9.775
08:08:15	10.119	9.840
08:08:30	10.119	9.816

REFERENCE METHOD RUN 1-3

Channel			1	2
			O2	CO2
			Ceilcote	Ceilcote
			Outlet	Outlet
			%dv	%dv
Calibration Checks				
Bias 00	C _{oi}	Initial zero	0.108	-0.016
Stop 08:08	C _{ui}	Initial upscale	10.119	9.810
Bias 01	C _{of}	Final zero	0.081	-0.005
Start 12:41	C _{uf}	Final upscale	10.200	9.926
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	20.923	0.028
	C _{Gas}	Bias adjusted	20.902	0.038
	C _{Gas}	Bias adjusted (%dv)	21.523	0.039

Clock Time (at end of sample period)

072320 211252

11:30	20.963	0.035	BV RUN 1 Avg. Moisture Content: 2.89% (average of all three runs)
11:31	20.963	0.035	
11:32	20.963	0.023	
11:33	20.963	0.026	
11:35	20.963	0.029	
11:36	20.963	0.027	
11:37	20.956	0.024	
11:38	20.963	0.028	
11:39	20.956	0.032	
11:40	20.956	0.033	
11:41	20.956	0.026	
11:42	20.956	0.024	
11:43	20.956	0.031	
11:44	20.956	0.025	
11:45	20.244	0.003	
11:46	20.650	0.035	
11:47	20.656	0.033	
11:48	20.838	0.033	BV RUN 2
11:49	20.950	0.030	
11:50	20.956	0.027	
11:51	20.950	0.026	
11:52	20.950	0.030	
11:53	20.956	0.026	
11:54	20.956	0.025	
11:55	20.950	0.026	
11:57	20.950	0.027	
11:58	20.950	0.029	
11:59	20.950	0.030	
12:00	20.950	0.030	BV RUN 3
12:01	20.950	0.029	
12:02	20.950	0.026	
12:03	20.944	0.022	
12:04	20.950	0.028	
12:05	20.950	0.028	
12:06	20.950	0.027	
12:07	20.950	0.030	
12:08	20.950	0.026	
12:09	20.950	0.026	
12:10	20.950	0.026	

Sterigenics
CleanAir Project No. 14004
Backvent Testing
Ceilcote Outlet

Jun 24, 2020
Start Time 11:29
Stop Time 12:19

REFERENCE METHOD RUN 1-3

Channel	1 O2 Ceilcote Outlet %dv	2 CO2 Ceilcote Outlet %dv
12:11	20.950	0.024
12:12	20.950	0.032
12:13	20.950	0.031
12:14	20.956	0.031
12:15	20.950	0.025
12:16	20.950	0.024
12:17	20.950	0.028
12:19	20.956	0.024

CALIBRATION BIAS 01

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.081	-0.005
C _{uf} Upscale gas	10.200	9.926

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.002	-0.014
C _{mce} Upscale gas	10.115	10.086

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.4%	0.0%
Upscale gas	0.4%	-0.8%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 00

Previous System Response to Calibration Gasses (C_S)

C _{oi} Zero gas	0.108	-0.016
C _{ui} Upscale gas	10.119	9.810

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	-0.1%	0.1%
Upscale gas	0.4%	0.6%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

12:41:03	0.081	-0.011
12:41:18	0.081	-0.007
12:41:34	0.081	0.004
12:41:50	0.269	1.643
12:42:06	7.194	9.506
12:42:21	9.700	9.771
12:42:37	10.056	9.833
12:42:52	10.138	9.865
12:43:08	10.163	9.870
12:43:24	10.175	9.878
12:43:40	10.181	9.892
12:43:55	10.181	9.923
12:44:12	10.188	9.916
12:44:27	10.194	9.924
12:44:43	10.200	9.920
12:44:59	10.200	9.918
12:45:14	10.200	9.937
12:45:30	10.200	9.923
12:45:45	10.425	9.170

REFERENCE METHOD RUN 1

Channel			1	2		
			O2	CO2		
			Ceilcote	Ceilcote		
			Outlet	Outlet		
			%dv	%dv		
Calibration Checks						
Bias 01	C _{oi}	Initial zero	0.081	-0.005		
Stop 12:45	C _{ui}	Initial upscale	10.200	9.926		
Bias 02	C _{of}	Final zero	0.113	-0.001		
Start 15:32	C _{uf}	Final upscale	10.169	9.951		
	C _{ma}	Actual gas value	10.100	9.880		
Analyzer Averages (concentrations)						
	C _{Avg}	Average conc.	20.871	0.026		
	C _{Gas}	Bias adjusted	20.800	0.028		
	C _{Gas}	Bias adjusted (%dv)	21.408	0.029		
Clock Time (at end of sample period)						
072320 211252						
		14:23	20.863	0.033	Avg. Moisture Content:	2.84%
		14:24	20.863	0.030		
		14:25	20.863	0.029		
		14:26	20.863	0.031		
		14:27	20.863	0.027		
		14:28	20.863	0.030		
		14:29	20.863	0.026		
		14:30	20.863	0.024		
		14:31	20.863	0.023		
		14:32	20.863	0.024		
		14:33	20.863	0.020		
		14:35	20.863	0.028		
		14:36	20.869	0.022		
		14:37	20.869	0.022		
		14:38	20.869	0.025		
		14:39	20.869	0.027		
		14:40	20.869	0.027		
		14:41	20.881	0.029		
		14:42	20.869	0.027		
		14:43	20.869	0.025		
		14:44	20.869	0.027		
		14:45	20.875	0.030		
		14:46	20.875	0.023		
		14:47	20.869	0.025		
		14:48	20.881	0.028		
		14:49	20.875	0.025		
		14:50	20.875	0.031		
		14:51	20.881	0.032		
		14:52	20.875	0.031		
		14:53	20.875	0.021		
		14:54	20.881	0.019		
		14:55	20.881	0.031		
		14:56	20.875	0.025		
		14:58	20.875	0.027		
		14:59	20.875	0.031		
		15:00	20.881	0.027		

Prepared by Clean Air Engineering Consultants, Seattle

REFERENCE METHOD RUN 1

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv
15:01	20.875	0.020
15:02	20.875	0.026
15:03	20.875	0.028
15:04	20.881	0.027
15:05	20.875	0.024
15:06	20.875	0.023
15:07	20.875	0.027
15:08	20.875	0.022
15:09	20.875	0.025
15:10	20.875	0.029
15:11	20.875	0.023
15:12	20.875	0.024
15:13	20.875	0.021
15:14	20.869	0.021
15:15	20.875	0.028
15:16	20.875	0.026
15:17	20.875	0.021
15:18	20.875	0.027
15:20	20.875	0.020
15:21	20.875	0.023
15:22	20.875	0.025
15:23	20.875	0.023
15:24	20.875	0.015
15:25	20.875	0.023
15:26	20.875	0.027
15:27	20.794	0.027

CALIBRATION BIAS 02

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.113	-0.001
C _{uf} Upscale gas	10.169	9.951

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.002	-0.014
C _{mce} Upscale gas	10.115	10.086

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.5%	0.1%
Upscale gas	0.3%	-0.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 01

Previous System Response to Calibration Gasses (C_S)

C _{oi} Zero gas	0.081	-0.005
C _{ui} Upscale gas	10.200	9.926

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.1%	0.0%
Upscale gas	-0.1%	0.1%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

15:32:20	0.113	0.003
15:32:35	0.113	0.001
15:32:51	0.113	-0.005
15:33:06	0.113	0.013
15:33:22	0.106	0.018
15:33:38	4.669	7.240
15:33:54	9.363	9.711
15:34:09	9.975	9.815
15:34:25	10.094	9.862
15:34:41	10.125	9.910
15:34:57	10.144	9.917
15:35:12	10.150	9.925
15:35:28	10.163	9.926
15:35:43	10.163	9.932
15:35:59	10.169	9.945
15:36:15	10.169	9.939
15:36:31	10.169	9.969
15:36:46	10.169	9.959

REFERENCE METHOD RUN 2

Channel				1	2
				O2	CO2
				Ceilcote	Ceilcote
				Outlet	Outlet
				%dv	%dv
Calibration Checks					
Bias 02	C _{oi}	Initial zero		0.113	-0.001
Stop 15:36	C _{ui}	Initial upscale		10.169	9.951
Bias 03	C _{of}	Final zero		0.088	0.004
Start 16:56	C _{uf}	Final upscale		10.206	9.959
	C _{ma}	Actual gas value		10.100	9.880
Analyzer Averages (concentrations)					
	C _{Avg}	Average conc.		20.795	0.021
	C _{Gas}	Bias adjusted		20.721	0.019
	C _{Gas}	Bias adjusted (%dv)		21.315	0.019

Clock Time (at end of sample period)

072320 211252

15:45	20.794	0.029
15:46	20.794	0.035
15:47	20.794	0.032
15:48	20.794	0.030
15:49	20.794	0.021
15:51	20.794	0.015
15:52	20.794	0.020
15:53	20.794	0.029
15:54	20.794	0.025
15:55	20.800	0.020
15:56	20.800	0.026
15:57	20.800	0.016
15:58	20.794	0.028
15:59	20.794	0.023
16:00	20.800	0.020
16:01	20.800	0.019
16:02	20.800	0.024
16:03	20.800	0.024
16:04	20.800	0.023
16:05	20.800	0.024
16:06	20.800	0.023
16:07	20.800	0.016
16:08	20.800	0.024
16:09	20.794	0.020
16:10	20.800	0.023
16:11	20.794	0.021
16:13	20.800	0.017
16:14	20.794	0.020
16:15	20.794	0.020
16:16	20.794	0.021
16:17	20.794	0.017
16:18	20.794	0.013
16:19	20.794	0.019
16:20	20.800	0.017
16:21	20.794	0.013
16:22	20.794	0.021
16:23	20.794	0.022
16:24	20.794	0.024
16:25	20.794	0.018

Avg. Moisture Content: 2.79%

REFERENCE METHOD RUN 2

Channel	1 O2 Ceilcote Outlet %dv	2 CO2 Ceilcote Outlet %dv
16:26	20.794	0.026
16:27	20.794	0.019
16:28	20.794	0.021
16:29	20.794	0.015
16:30	20.794	0.017
16:31	20.794	0.013
16:32	20.794	0.016
16:33	20.794	0.020
16:35	20.794	0.020
16:36	20.794	0.021
16:37	20.794	0.018
16:38	20.794	0.018
16:39	20.794	0.021
16:40	20.794	0.020
16:41	20.794	0.021
16:42	20.794	0.012
16:43	20.794	0.018
16:44	20.794	0.019
16:45	20.794	0.018
16:46	20.794	0.011
16:47	20.794	0.020
16:48	20.794	0.019

CALIBRATION BIAS 03

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.088	0.004
C _{uf} Upscale gas	10.206	9.959

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.002	-0.014
C _{mce} Upscale gas	10.115	10.086

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.4%	0.1%
Upscale gas	0.4%	-0.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 02

Previous System Response to Calibration Gasses (C_S)

C _{oi} Zero gas	0.113	-0.001
C _{ui} Upscale gas	10.169	9.951

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	-0.1%	0.0%
Upscale gas	0.2%	0.0%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

16:56:05	0.094	0.010
16:56:21	0.088	0.005
16:56:37	0.088	0.001
16:56:53	0.088	0.006
16:57:08	1.294	4.074
16:57:24	8.394	9.719
16:57:40	9.894	9.832
16:57:55	10.106	9.855
16:58:11	10.163	9.903
16:58:27	10.175	9.919
16:58:43	10.181	9.929
16:58:58	10.194	9.931
16:59:14	10.200	9.951
16:59:29	10.206	9.953
16:59:45	10.206	9.948
17:00:01	10.206	9.971
17:00:17	10.206	9.958

REFERENCE METHOD RUN 3

Channel				1	2
				O2	CO2
				Ceilcote	Ceilcote
				Outlet	Outlet
				%dv	%dv
Calibration Checks					
Bias 03	C _{oi}	Initial zero		0.088	0.004
Stop 17:00	C _{ui}	Initial upscale		10.206	9.959
Bias 04	C _{of}	Final zero		0.088	0.009
Start 18:14	C _{uf}	Final upscale		10.206	9.924
	C _{ma}	Actual gas value		10.100	9.880
Analyzer Averages (concentrations)					
	C _{Avg}	Average conc.		20.869	0.027
	C _{Gas}	Bias adjusted		20.743	0.021
	C _{Gas}	Bias adjusted (%dv)		21.342	0.021

Clock Time (at end of sample period)

072320 211252

17:05	20.875	0.037
17:06	20.875	0.043
17:07	20.875	0.029
17:08	20.875	0.022
17:09	20.888	0.027
17:10	20.875	0.027
17:12	20.875	0.028
17:13	20.875	0.025
17:14	20.875	0.028
17:15	20.875	0.027
17:16	20.875	0.033
17:17	20.875	0.032
17:18	20.875	0.025
17:19	20.875	0.023
17:20	20.875	0.024
17:21	20.875	0.026
17:22	20.875	0.028
17:23	20.875	0.024
17:24	20.875	0.034
17:25	20.875	0.027
17:26	20.875	0.026
17:27	20.875	0.034
17:28	20.869	0.024
17:29	20.869	0.031
17:30	20.869	0.024
17:31	20.869	0.025
17:32	20.869	0.026
17:33	20.869	0.024
17:35	20.869	0.027
17:36	20.869	0.025
17:37	20.869	0.024
17:38	20.875	0.030
17:39	20.869	0.016
17:40	20.869	0.025
17:41	20.869	0.028
17:42	20.869	0.021
17:43	20.869	0.029
17:44	20.869	0.030
17:45	20.869	0.025

Avg. Moisture Content: 2.81%

REFERENCE METHOD RUN 3

Channel	1 O2 Ceilcote Outlet %dv	2 CO2 Ceilcote Outlet %dv
17:46	20.869	0.028
17:47	20.863	0.027
17:48	20.863	0.023
17:49	20.863	0.026
17:50	20.863	0.028
17:51	20.863	0.024
17:52	20.863	0.022
17:53	20.863	0.025
17:54	20.863	0.028
17:55	20.863	0.030
17:57	20.863	0.028
17:58	20.863	0.030
17:59	20.863	0.032
18:00	20.863	0.034
18:01	20.863	0.029
18:02	20.863	0.029
18:03	20.863	0.028
18:04	20.863	0.032
18:05	20.863	0.026
18:06	20.863	0.027
18:07	20.863	0.026
18:08	20.863	0.029
18:09	20.863	0.032

CALIBRATION BIAS 04

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.088	0.009
C _{uf} Upscale gas	10.206	9.924

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.002	-0.014
C _{mce} Upscale gas	10.115	10.086

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.4%	0.1%
Upscale gas	0.4%	-0.8%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 03

Previous System Response to Calibration Gasses (C_S)

C _{oi} Zero gas	0.088	0.004
C _{ui} Upscale gas	10.206	9.959

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	0.0%	-0.2%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

18:14:11	0.088	0.011
18:14:26	0.088	0.000
18:14:42	0.088	0.017
18:14:58	0.106	-0.006
18:15:13	0.081	-0.007
18:15:29	0.181	0.017
18:15:45	12.875	0.029
18:16:00	19.656	0.023
18:16:17	20.638	0.027
18:16:32	20.819	0.038
18:16:48	20.856	0.031
18:17:03	11.850	1.225
18:17:19	8.844	9.491
18:17:35	9.988	9.784
18:17:51	10.175	9.851
18:18:06	10.200	9.886
18:18:22	10.200	9.893
18:18:38	10.206	9.900
18:18:53	10.206	9.905
18:19:09	10.206	9.893
18:19:25	10.206	9.932
18:19:40	10.206	9.948
18:19:56	10.206	9.943
18:20:12	10.150	9.875

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv
Instrument Information		
Manufacturer:	Servomex	Servomex
Model:	5200	1415C
Detection:	Paramagn	NDIR
Asset or Serial No:	BG-2	210736
Calibration Span Value (CS)		
	21.430	21.090
System Response Time (seconds)		
	90	90
Manufacturer Certified Cylinder Value (C_v)		
Zero	0.000	0.000
Low		
Mid	10.100	9.880
High	21.430	21.090
Actual gas to be used for bias checks		
	10.100	9.880
Cylinder ID		
Zero	TWC-687369	TWC-687369
Low		
Mid	EB0002340	EB0002340
High	CC49769	CC49769
Analyzer Calibration Response (C_{Dir})		
Zero	0.013	-0.002
Low		
Mid	10.133	10.038
High	21.506	20.841
Analyzer Calibration Error (ACE) (Limit = 2%, Method 25A limit = 5% of gas value)		
Zero	0.1%	0.0%
Low	N/A	N/A
Mid	0.2%	0.7%
High	0.4%	-1.2%
Calibration Error Status		
Zero	OK	OK
Low	N/A	N/A
Mid	OK	OK
High	OK	OK

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07:34:01	0.013	0.018
07:34:16	0.013	0.006
07:34:32	0.013	-0.012
07:34:48	0.013	0.001
07:35:03	0.181	0.338
07:35:19	0.263	0.046
07:35:35	0.069	1.340
07:35:51	10.750	18.469
07:36:06	19.613	20.259

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv
07:36:22	21.000	20.353
07:36:38	21.319	20.380
07:36:53	21.406	20.406
07:37:09	21.438	20.467
07:37:25	21.456	20.482
07:37:40	21.463	20.507
07:37:56	21.488	20.492
07:38:12	21.488	20.499
07:38:28	21.488	20.504
07:38:43	21.488	20.842
07:38:59	21.494	20.813
07:39:15	21.494	20.861
07:39:30	21.506	20.851
07:39:46	21.506	20.513
07:40:02	21.506	19.576
07:40:17	21.506	19.572
07:40:33	15.038	10.849
07:40:49	11.113	10.131
07:41:05	10.356	10.103
07:41:20	10.213	10.092
07:41:36	10.175	10.081
07:41:52	10.169	10.047
07:42:07	10.150	10.069
07:42:23	10.144	10.080
07:42:39	10.144	10.067
07:42:55	10.144	10.053
07:43:11	10.144	10.046
07:43:26	10.131	10.055
07:43:42	10.131	10.062
07:43:57	10.131	10.046
07:44:13	10.138	10.024
07:44:29	10.131	10.044
07:44:44	10.131	10.054

CALIBRATION BIAS 00

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv
System Response to Calibration Gasses (C_S)		
C _{of} Zero gas	0.144	0.053
C _{uf} Upscale gas	10.244	9.920
Analyzer Calibration Error Responses (C_{Dir})		
C _{oce} Zero gas	0.013	-0.002
C _{mce} Upscale gas	10.133	10.038
Actual Upscale Gas Value (C_{MA})		
C _{ma} Upscale gas	10.100	9.880
Calibration Span Value (CS)		
	21.430	21.090
System Bias as Percent of Calibration Span Value (SB) (5%)		
Zero gas	0.6%	0.3%
Upscale gas	0.5%	-0.6%
System Bias Status		
Zero gas	OK	OK
Upscale gas	OK	OK
Previous System Response to Calibration Gasses (C_S)		
C _{oi} Zero gas	N/A	N/A
C _{ui} Upscale gas	N/A	N/A
Drift Assessment as Percent of Calibration Span Value (D) (3%)		
Zero gas	N/A	N/A
Upscale gas	N/A	N/A
Drift Assessment Status		
Zero gas	N/A	N/A
Upscale gas	N/A	N/A

072320 211252

07:58:01	10.288	9.837
07:58:17	10.269	9.856
07:58:33	10.263	9.902
07:58:49	10.256	9.881
07:59:04	10.256	9.872
07:59:20	10.256	9.872
07:59:36	10.256	9.873
07:59:51	10.244	9.880
08:00:07	10.244	9.905
08:00:22	10.244	9.934
08:00:38	10.244	9.926
08:00:54	10.244	9.914
08:01:10	10.244	9.920
08:01:25	10.244	9.923
08:01:41	8.869	4.509
08:01:57	1.813	0.274
08:02:13	0.481	0.163
08:02:28	0.263	0.127
08:02:44	0.200	0.089
08:03:00	0.175	0.083
08:03:15	0.156	0.073
08:03:31	0.150	0.056
08:03:47	0.144	0.066
08:04:02	0.144	0.040
08:04:18	0.144	0.053

REFERENCE METHOD RUN 1

Channel			1	2		
			O2	CO2		
			Ceilcote	Ceilcote		
			Outlet	Outlet		
			%dv	%dv		
Calibration Checks						
Bias 00	C _{oi}	Initial zero	0.144	0.053		
Stop 08:04	C _{ui}	Initial upscale	10.244	9.920		
Bias 01	C _{of}	Final zero	0.150	0.057		
Start 11:05	C _{uf}	Final upscale	10.244	9.905		
	C _{ma}	Actual gas value	10.100	9.880		
Analyzer Averages (concentrations)						
	C _{Avg}	Average conc.	20.781	0.027		
	C _{Gas}	Bias adjusted	20.640	-0.029		
	C _{Gas}	Bias adjusted (%dv)	21.226	-0.030		
Clock Time (at end of sample period)						
072320 211252						
		09:57	20.925	0.033	Avg. Moisture Content:	2.76%
		09:58	20.931	0.037		
		09:59	19.769	0.016		
		10:00	19.981	0.011		
		10:01	20.475	0.019		
		10:02	20.663	0.023		
		10:03	20.769	0.031		
		10:04	20.831	0.029		
		10:05	20.856	0.031		
		10:06	20.875	0.028		
		10:07	20.925	0.029		
		10:08	20.931	0.036		
		10:09	20.931	0.030		
		10:10	20.925	0.031		
		10:11	20.931	0.023		
		10:12	20.931	0.030		
		10:13	20.931	0.035		
		10:14	20.931	0.028		
		10:16	20.931	0.029		
		10:17	20.931	0.034		
		10:18	20.931	0.032		
		10:19	20.931	0.030		
		10:20	20.931	0.034		
		10:21	20.931	0.029		
		10:22	20.738	0.020		
		10:23	20.838	0.022		
		10:24	20.806	0.017		
		10:25	20.800	0.016		
		10:26	20.825	0.021		
		10:27	20.819	0.021		
		10:28	20.806	0.025		
		10:29	20.806	0.018		
		10:30	20.769	0.021		
		10:31	20.619	0.028		
		10:32	20.400	0.031		

CALIBRATION BIAS 01

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.150	0.057
C _{uf} Upscale gas	10.244	9.905

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.013	-0.002
C _{mce} Upscale gas	10.133	10.038

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.6%	0.3%
Upscale gas	0.5%	-0.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 00

Previous System Response to Calibration Gasses (C_S)

C _{oi} Zero gas	0.144	0.053
C _{ui} Upscale gas	10.244	9.920

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	0.0%	-0.1%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

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11:05:48	10.256	9.900
11:06:04	10.256	9.884
11:06:20	10.244	9.908
11:06:35	10.244	9.907
11:06:51	10.244	9.907
11:07:07	10.244	9.903
11:07:22	10.244	9.905
11:07:38	10.244	9.921
11:07:54	10.244	9.591
11:08:10	4.644	0.861
11:08:26	1.038	0.178
11:08:41	0.356	0.134
11:08:57	0.225	0.091
11:09:13	0.181	0.073
11:09:28	0.156	0.069
11:09:44	0.150	0.061
11:10:00	0.144	0.042
11:10:15	0.138	0.036

REFERENCE METHOD RUN 2

Channel				1	2
				O2	CO2
				Ceilmote	Ceilmote
				Outlet	Outlet
				%dv	%dv
Calibration Checks					
Bias 01	C _{oi}	Initial zero		0.150	0.057
Stop 11:10	C _{ui}	Initial upscale		10.244	9.905
Bias 02	C _{of}	Final zero		0.123	0.028
Start 12:55	C _{uf}	Final upscale		10.244	9.906
	C _{ma}	Actual gas value		10.100	9.880
Analyzer Averages (concentrations)					
	C _{Avg}	Average conc.		20.142	0.024
	C _{Gas}	Bias adjusted		19.991	-0.019
	C _{Gas}	Bias adjusted (%dv)		20.587	-0.019

Clock Time (at end of sample period)

072320 211252

11:49	18.300	0.003
11:50	20.019	0.001
11:51	20.175	0.015
11:52	20.400	0.021
11:53	20.263	0.024
11:54	19.994	0.025
11:55	19.769	0.023
11:56	19.675	0.022
11:57	19.581	0.020
11:58	19.594	0.017
11:59	19.569	0.021
12:01	19.306	0.025
12:02	19.350	0.021
12:03	19.519	0.024
12:04	19.694	0.026
12:05	19.844	0.028
12:06	20.119	0.025
12:07	20.113	0.026
12:08	20.206	0.029
12:09	20.294	0.028
12:10	20.375	0.027
12:11	20.919	0.032
12:12	20.919	0.028
12:13	20.900	0.032
12:14	20.900	0.032
12:15	20.894	0.029
12:16	20.894	0.026
12:17	20.894	0.029
12:18	20.888	0.028
12:19	20.894	0.024
12:20	20.888	0.028
12:21	20.888	0.026
12:22	18.663	0.027

Avg. Moisture Content: 2.90%

CALIBRATION BIAS 02

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.123	0.028
C _{uf} Upscale gas	10.244	9.906

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.013	-0.002
C _{mce} Upscale gas	10.133	10.038

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.5%	0.1%
Upscale gas	0.5%	-0.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 01

Previous System Response to Calibration Gasses (C_S)

C _{oi} Zero gas	0.150	0.057
C _{ui} Upscale gas	10.244	9.905

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	-0.1%	-0.1%
Upscale gas	0.0%	0.0%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

12:55:32	10.244	9.894
12:55:48	10.244	9.904
12:56:04	10.244	9.907
12:56:20	10.244	9.908
12:56:35	6.756	2.180
12:56:51	1.206	0.199
12:57:07	0.400	0.136
12:57:22	0.219	0.112
12:57:38	0.181	0.075
12:57:54	0.156	0.066
12:58:10	0.144	0.060
12:58:25	0.138	0.051
12:58:41	0.138	0.039
12:58:57	0.125	0.035
12:59:12	0.125	0.019
12:59:28	0.119	0.031
12:59:44	0.119	0.038

REFERENCE METHOD RUN 3

Channel			1	2		
			O2	CO2		
			Ceilcote	Ceilcote		
			Outlet	Outlet		
			%dv	%dv		
Calibration Checks						
Bias 02	C _{oi}	Initial zero	0.123	0.028		
Stop 12:59	C _{ui}	Initial upscale	10.244	9.906		
Bias 03	C _{of}	Final zero	0.117	0.039		
Start 14:18	C _{uf}	Final upscale	10.242	9.915		
	C _{ma}	Actual gas value	10.100	9.880		
Analyzer Averages (concentrations)						
	C _{Avg}	Average conc.	18.814	0.025		
	C _{Gas}	Bias adjusted	18.652	-0.009		
	C _{Gas}	Bias adjusted (%dv)	19.227	-0.009		
Clock Time (at end of sample period)						
072420 122231						
		13:09	0.075	0.001	Avg. Moisture Content:	2.99%
		13:10	0.081	0.002		
		13:11	20.700	0.023		
		13:12	20.894	0.035		
		13:13	20.906	0.032		
		13:14	20.919	0.030		
		13:15	20.919	0.030		
		13:16	20.919	0.031		
		13:17	20.919	0.029		
		13:18	20.919	0.027		
		13:19	20.919	0.034		
		13:20	19.625	0.025		
		13:21	19.625	-0.015		
		13:22	18.313	0.021		
		13:23	18.131	0.016		
		13:24	18.313	0.021		
		13:25	18.575	0.025		
		13:27	18.856	0.025		
		13:28	18.975	0.030		
		13:29	19.100	0.027		
		13:30	19.375	0.025		
		13:31	19.431	0.022		
		13:32	19.550	0.023		
		13:33	19.669	0.025		
		13:34	18.975	0.024		
		13:35	19.138	0.029		
		13:36	19.338	0.023		
		13:37	19.538	0.021		
		13:38	19.738	0.025		
		13:39	19.894	0.029		
		13:40	20.038	0.031		
		13:41	20.894	0.029		
		13:42	20.913	0.030		
		13:43	20.906	0.025		
		13:44	20.919	0.031		
		13:45	20.919	0.025		

Prepared by: Clean Air Engineering Reporting Software

Sterigenics
CleanAir Project No. 14004
Vacuum Pump Testing
Ceilcote Outlet

Jun 25, 2020
Start Time 13:08
Stop Time 13:57

REFERENCE METHOD RUN 3

Channel	1 O2 Ceilcote Outlet %dv	2 CO2 Ceilcote Outlet %dv
13:46	20.906	0.031
13:47	20.906	0.033
13:49	19.313	0.025
13:50	19.075	0.025
13:51	18.163	0.025
13:52	17.931	0.023
13:53	17.913	0.024
13:54	17.981	0.026
13:55	18.169	0.027
13:56	18.438	0.026
13:57	18.575	0.028

Sterigenics
CleanAir Project No. 14004
Vacuum Pump Testing
Ceilcote Outlet

Jun 25, 2020
Start Time 13:08
Stop Time 13:57

REFERENCE METHOD RUN 3

Channel	1 O2 Ceilcote Outlet %dv	2 CO2 Ceilcote Outlet %dv
13:46	20.906	0.031
13:47	20.906	0.033
13:49	19.313	0.025
13:50	19.075	0.025
13:51	18.163	0.025
13:52	17.931	0.023
13:53	17.913	0.024
13:54	17.981	0.026
13:55	18.169	0.027
13:56	18.438	0.026
13:57	18.575	0.028

CALIBRATION BIAS 03

Channel	1	2
	O2	CO2
	Ceilcote	Ceilcote
	Outlet	Outlet
	%dv	%dv

System Response to Calibration Gasses (C_S)

C _{of} Zero gas	0.117	0.039
C _{uf} Upscale gas	10.242	9.915

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.013	-0.002
C _{mce} Upscale gas	10.133	10.038

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.5%	0.2%
Upscale gas	0.5%	-0.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 02

Previous System Response to Calibration Gasses (C_S)

C _{oi} Zero gas	0.123	0.028
C _{ui} Upscale gas	10.244	9.906

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	0.0%	0.0%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072420 121740

14:18:12	10.238	9.912
14:18:28	10.244	9.913
14:18:43	10.244	9.919
14:18:59	10.194	8.573
14:19:15	3.763	0.469
14:19:30	0.856	0.177
14:19:46	0.300	0.126
14:20:02	0.194	0.099
14:20:17	0.169	0.081
14:20:34	0.150	0.084
14:20:49	0.138	0.058
14:21:05	0.138	0.048
14:21:21	0.125	0.042
14:21:36	0.125	0.044
14:21:52	0.119	0.041
14:22:07	0.119	0.040
14:22:23	0.113	0.035
14:22:39	0.113	0.025

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Process Stack %dv	Process Stack %dv
Instrument Information		
Manufacturer:	Servomex	Servomex
Model:	5200	1415C
Detection:	Paramagn	NDIR
Asset or Serial No:	207491	207176
Calibration Span Value (CS)		
	21.430	21.090
System Response Time (seconds)		
	90	90
Manufacturer Certified Cylinder Value (C_v)		
Zero	0.000	0.000
Low		
Mid	10.100	9.880
High	21.430	21.090
Actual gas to be used for bias checks		
	10.100	9.880
Cylinder ID		
Zero	TWC-687369	TWC-687369
Low		
Mid	EB0002340	EB0002340
High	CC49769	CC49769
Analyzer Calibration Response (C_{Dir})		
Zero	0.005	0.022
Low		
Mid	9.824	9.740
High	21.524	21.301
Analyzer Calibration Error (ACE) (Limit = 2%, Method 25A limit = 5% of gas value)		
Zero	0.0%	0.1%
Low	N/A	N/A
Mid	-1.3%	-0.7%
High	0.4%	1.0%
Calibration Error Status		
Zero	OK	OK
Low	N/A	N/A
Mid	OK	OK
High	OK	OK

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07:38:00	15.762	1.012
07:38:15	0.097	-0.306
07:38:30	0.017	-0.377
07:38:45	0.102	-0.262
07:39:00	0.106	-0.076
07:39:15	0.103	-0.023
07:39:30	0.103	-0.023
07:39:45	0.102	-0.025

CALIBRATION ERROR

Channel	1	2
	O2	CO2
Process Stack	Process Stack	
	%dv	%dv
07:40:00	0.102	-0.024
07:40:15	0.102	-0.025
07:40:30	0.101	-0.024
07:40:45	0.100	0.008
07:41:00	0.030	0.020
07:41:15	0.006	0.020
07:41:30	0.004	0.019
07:41:45	0.012	0.028
07:42:00	0.000	0.020
07:42:15	13.775	11.370
07:42:30	21.504	21.277
07:42:45	21.516	21.289
07:43:00	21.518	21.292
07:43:15	21.520	21.299
07:43:30	21.522	21.301
07:43:45	21.524	21.299
07:44:00	21.526	21.303
07:44:15	21.519	21.304
07:44:30	12.662	12.309
07:44:45	9.840	9.752
07:45:00	9.828	9.743
07:45:15	9.823	9.739
07:45:30	9.820	9.738
07:45:45	9.817	9.739

CALIBRATION BIAS 00

Channel	1	2
	O2	CO2
Process Stack	Process Stack	
%dv	%dv	
System Response to Calibration Gasses (C_s)		
C _{of} Zero gas	0.008	0.018
C _{uf} Upscale gas	9.618	9.380
Analyzer Calibration Error Responses (C_{Dir})		
C _{oce} Zero gas	0.005	0.022
C _{mce} Upscale gas	9.824	9.740
Actual Upscale Gas Value (C_{MA})		
C _{ma} Upscale gas	10.100	9.880
Calibration Span Value (CS)		
	21.430	21.090
System Bias as Percent of Calibration Span Value (SB) (5%)		
Zero gas	0.0%	0.0%
Upscale gas	-1.0%	-1.7%
System Bias Status		
Zero gas	OK	OK
Upscale gas	OK	OK
Previous System Response to Calibration Gasses (C_s)		
C _{oi} Zero gas	N/A	N/A
C _{ui} Upscale gas	N/A	N/A
Drift Assessment as Percent of Calibration Span Value (D) (3%)		
Zero gas	N/A	N/A
Upscale gas	N/A	N/A
Drift Assessment Status		
Zero gas	N/A	N/A
Upscale gas	N/A	N/A

072320 211252

07:55:24	0.011	0.018
07:55:39	0.010	0.018
07:55:54	0.009	0.018
07:56:09	0.009	0.018
07:56:24	0.009	0.018
07:56:39	0.008	0.018
07:56:54	0.006	0.018
07:57:09	0.006	0.018
07:57:24	0.006	0.018
07:57:39	0.006	0.018
07:57:54	0.009	0.018
08:05:39	11.456	0.758
08:05:54	14.877	3.145
08:06:09	11.622	6.876
08:06:24	9.798	8.977
08:06:39	9.622	9.278
08:06:54	9.614	9.336
08:07:09	9.616	9.364
08:07:24	9.618	9.381
08:07:39	9.620	9.395
08:07:54	9.622	9.406

REFERENCE METHOD RUN 1-3

Channel		1	2
		O2	CO2
Process Stack		Process Stack	Process Stack
		%dv	%dv
Calibration Checks			
Bias 00	C _{oi} Initial zero	0.008	0.018
Stop 08:11	C _{ui} Initial upscale	9.618	9.380
Bias 01	C _{of} Final zero	0.010	-0.002
Start 12:35	C _{uf} Final upscale	9.600	9.415
	C _{ma} Actual gas value	10.100	9.880
Analyzer Averages (concentrations)			
	C _{Avg} Average conc.	20.160	0.078
	C _{Gas} Bias adjusted	21.200	0.074

Lock Time (at end of sample period)

072320 211252

11:30	20.097	0.078	BV RUN 1
11:31	20.088	0.078	
11:32	20.094	0.078	
11:33	20.091	0.079	
11:34	20.094	0.078	
11:35	20.093	0.078	
11:36	20.093	0.078	
11:37	20.094	0.079	
11:38	20.093	0.078	
11:39	20.094	0.079	
11:40	20.095	0.079	
11:41	20.095	0.079	
11:42	20.094	0.079	
11:43	20.093	0.079	
11:44	20.094	0.079	
11:45	20.070	0.079	
11:46	20.081	0.079	BV RUN 2
11:47	20.094	0.079	
11:48	20.093	0.080	
11:49	20.096	0.080	
11:50	20.090	0.079	
11:51	20.093	0.079	
11:52	20.095	0.079	
11:53	20.096	0.078	
11:54	20.097	0.079	
11:55	20.096	0.078	
11:56	20.098	0.079	
11:57	20.098	0.078	
11:58	20.100	0.078	
11:59	20.100	0.078	
12:00	20.099	0.078	
12:01	20.099	0.078	
12:02	20.099	0.078	
12:03	20.100	0.078	
12:04	20.103	0.078	BV RUN 3
12:05	20.104	0.078	

REFERENCE METHOD RUN 1-3

Channel	1	2
	O2	CO2
	Process Stack %dv	Process Stack %dv
12:06	20.108	0.078
12:07	20.113	0.078
12:08	20.122	0.078
12:09	20.134	0.078
12:10	20.160	0.078
12:11	20.344	0.078
12:12	20.345	0.078
12:13	20.367	0.078
12:14	20.466	0.078
12:15	20.524	0.078
12:16	20.364	0.077
12:17	20.516	0.077
12:18	20.638	0.078
12:19	20.373	0.077

CALIBRATION BIAS 01

Channel 1 2
O2 CO2

Process Stack Process Stack
%dv %dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.010	-0.002
C _{uf} Upscale gas	9.600	9.415

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.005	0.022
C _{mce} Upscale gas	9.824	9.740

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.0%	-0.1%
Upscale gas	-1.0%	-1.5%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 00

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.008	0.018
C _{ui} Upscale gas	9.618	9.380

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	-0.1%
Upscale gas	-0.1%	0.2%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

12:42:57	0.011	-0.002
12:43:12	0.012	-0.003
12:43:27	0.011	-0.002
12:43:42	0.010	-0.002
12:43:57	0.011	-0.002
12:44:12	0.011	-0.002
12:44:27	0.011	-0.002
12:44:42	0.010	-0.002
12:44:57	0.010	-0.002
12:45:12	0.011	-0.003
12:45:27	2.540	1.863
12:45:42	8.541	8.012
12:45:57	9.489	9.204
12:46:12	9.561	9.328
12:46:27	9.582	9.369
12:46:42	9.592	9.395
12:46:57	9.597	9.407
12:47:12	9.600	9.415
12:47:27	9.603	9.424
12:47:42	9.612	9.429
12:47:57	13.873	6.371

REFERENCE METHOD RUN 1

Channel			1	2
			O2	CO2
Process Stack			Process Stack	Process Stack
			%dv	%dv
Calibration Checks				
Bias 01	C _{oi}	Initial zero	0.010	-0.002
Stop 12:47	C _{ui}	Initial upscale	9.600	9.415
Bias 02	C _{of}	Final zero	0.023	0.012
Start 15:29	C _{uf}	Final upscale	9.612	9.416
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	20.086	0.078
	C _{Gas}	Bias adjusted	21.138	0.077

Clock Time (at end of sample period)

072320 211252		
14:23	20.074	0.074
14:24	20.075	0.074
14:25	20.077	0.074
14:26	20.078	0.074
14:27	20.080	0.074
14:28	20.081	0.074
14:29	20.084	0.075
14:30	20.085	0.075
14:31	20.085	0.075
14:32	20.086	0.075
14:33	20.085	0.075
14:34	20.084	0.076
14:35	20.085	0.076
14:36	20.083	0.076
14:37	20.083	0.077
14:38	20.086	0.077
14:39	20.085	0.077
14:40	20.086	0.077
14:41	20.086	0.078
14:42	20.086	0.077
14:43	20.084	0.078
14:44	20.084	0.078
14:45	20.082	0.078
14:46	20.083	0.078
14:47	20.084	0.078
14:48	20.083	0.078
14:49	20.082	0.078
14:50	20.083	0.078
14:51	20.083	0.079
14:52	20.082	0.079
14:53	20.083	0.079
14:54	20.085	0.079
14:55	20.084	0.079
14:56	20.084	0.079
14:57	20.085	0.079
14:58	20.084	0.079

REFERENCE METHOD RUN 1

Channel	1 O2	2 CO2
	Process Stack %dv	Process Stack %dv
14:59	20.085	0.080
15:00	20.085	0.079
15:01	20.085	0.080
15:02	20.085	0.080
15:03	20.086	0.080
15:04	20.087	0.079
15:05	20.088	0.079
15:06	20.088	0.079
15:07	20.088	0.080
15:08	20.088	0.080
15:09	20.089	0.080
15:10	20.088	0.080
15:11	20.089	0.080
15:12	20.088	0.080
15:13	20.089	0.080
15:14	20.090	0.080
15:15	20.091	0.080
15:16	20.091	0.081
15:17	20.092	0.081
15:18	20.093	0.081
15:19	20.092	0.081
15:20	20.091	0.081
15:21	20.093	0.081
15:22	20.094	0.081
15:23	20.092	0.081
15:24	20.094	0.082
15:25	20.094	0.082
15:26	20.094	0.082
15:27	20.095	0.082

CALIBRATION BIAS 02

Channel	1	2
	O2	CO2

Process Stack	Process Stack
%dv	%dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.023	0.012
C _{uf} Upscale gas	9.612	9.416

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.005	0.022
C _{mce} Upscale gas	9.824	9.740

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.1%	0.0%
Upscale gas	-1.0%	-1.5%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 01

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.010	-0.002
C _{ui} Upscale gas	9.600	9.415

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.1%	0.1%
Upscale gas	0.1%	0.0%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

15:32:47	0.029	0.013
15:33:02	0.027	0.012
15:33:17	0.025	0.012
15:33:32	0.023	0.012
15:33:47	0.022	0.012
15:34:02	0.023	0.012
15:34:17	0.036	0.011
15:34:32	7.789	0.035
15:34:47	18.562	0.076
15:35:02	19.844	0.081
15:36:02	19.997	0.081
15:36:17	20.003	0.081
15:40:32	0.022	0.009
15:40:47	3.099	2.357
15:41:02	8.736	8.230
15:41:17	9.511	9.215
15:41:32	9.574	9.326
15:41:47	9.590	9.363
15:42:02	9.599	9.383
15:42:17	9.605	9.397
15:42:32	9.609	9.408
15:42:47	9.612	9.417
15:43:02	9.614	9.423
15:43:17	10.966	8.662
15:43:32	18.068	2.387

REFERENCE METHOD RUN 2

Channel			1	2
			O2	CO2
Process Stack			Process Stack	Process Stack
			%dv	%dv
Calibration Checks				
Bias 02	C _{oi}	Initial zero	0.023	0.012
Stop 15:43	C _{ui}	Initial upscale	9.612	9.416
Bias 03	C _{of}	Final zero	0.017	0.012
Start 16:50	C _{uf}	Final upscale	9.603	9.405
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	20.089	0.082
	C _{Gas}	Bias adjusted	21.141	0.074

Clock Time (at end of sample period)

072320 211252

15:45	20.060	0.133
15:46	20.079	0.105
15:47	20.087	0.095
15:48	20.090	0.090
15:49	20.091	0.087
15:50	20.092	0.086
15:51	20.092	0.085
15:52	20.093	0.085
15:53	20.092	0.085
15:54	20.093	0.084
15:55	20.092	0.084
15:56	20.093	0.084
15:57	20.092	0.084
15:58	20.092	0.083
15:59	20.094	0.083
16:00	20.094	0.083
16:01	20.094	0.083
16:02	20.093	0.082
16:03	20.093	0.082
16:04	20.093	0.082
16:05	20.094	0.082
16:06	20.092	0.081
16:07	20.092	0.081
16:08	20.093	0.081
16:09	20.093	0.081
16:10	20.095	0.080
16:11	20.096	0.080
16:12	20.095	0.080
16:13	20.094	0.080
16:14	20.095	0.080
16:15	20.094	0.079
16:16	20.093	0.079
16:17	20.093	0.079
16:18	20.092	0.079
16:19	20.092	0.079
16:20	20.092	0.079

REFERENCE METHOD RUN 2

Channel	1 O2	2 CO2
	Process Stack %dv	Process Stack %dv
16:21	20.090	0.079
16:22	20.090	0.079
16:23	20.090	0.079
16:24	20.090	0.079
16:25	20.089	0.079
16:26	20.090	0.079
16:27	20.090	0.079
16:28	20.090	0.079
16:29	20.089	0.079
16:30	20.088	0.079
16:31	20.086	0.080
16:32	20.085	0.079
16:33	20.084	0.079
16:34	20.085	0.079
16:35	20.083	0.079
16:36	20.082	0.079
16:37	20.082	0.080
16:38	20.082	0.080
16:39	20.081	0.080
16:40	20.083	0.080
16:41	20.082	0.080
16:42	20.083	0.080
16:43	20.082	0.080
16:44	20.082	0.080
16:45	20.083	0.081
16:46	20.084	0.080
16:47	20.085	0.081
16:48	20.084	0.081

CALIBRATION BIAS 03

Channel 1 2
O2 CO2

Process Stack Process Stack
%dv %dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.017	0.012
C _{uf} Upscale gas	9.603	9.405

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.005	0.022
C _{mce} Upscale gas	9.824	9.740

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

	21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.1%	-0.1%
Upscale gas	-1.0%	-1.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 02

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.023	0.012
C _{ui} Upscale gas	9.612	9.416

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	0.0%	-0.1%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

16:58:36	0.017	0.013
16:58:51	0.019	0.013
16:59:06	0.018	0.012
16:59:21	0.018	0.012
16:59:36	0.017	0.012
16:59:51	0.017	0.012
17:00:06	0.017	0.012
17:00:21	0.017	0.011
17:00:36	0.017	0.012
17:00:51	0.104	0.037
17:01:06	5.257	4.402
17:01:21	9.171	8.771
17:01:36	9.532	9.254
17:01:51	9.570	9.329
17:02:06	9.584	9.356
17:02:21	9.591	9.376
17:02:36	9.597	9.388
17:02:51	9.600	9.398
17:03:06	9.603	9.405
17:03:21	9.607	9.413
17:03:36	13.216	6.905

REFERENCE METHOD RUN 3

Channel			1	2
			O2	CO2
Process Stack			Process Stack	Process Stack
			%dv	%dv
Calibration Checks				
Bias 03	C _{oi}	Initial zero	0.017	0.012
Stop 17:03	C _{ui}	Initial upscale	9.603	9.405
Bias 04	C _{of}	Final zero	0.014	0.014
Start 18:17	C _{uf}	Final upscale	9.622	9.401
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	20.086	0.085
	C _{Gas}	Bias adjusted	21.122	0.075

Clock Time (at end of sample period)

072320 211252		
17:05	20.045	0.133
17:06	20.065	0.105
17:07	20.071	0.095
17:08	20.075	0.090
17:09	20.078	0.087
17:10	20.081	0.086
17:11	20.081	0.085
17:12	20.082	0.085
17:13	20.082	0.085
17:14	20.083	0.084
17:15	20.085	0.085
17:16	20.087	0.084
17:17	20.088	0.084
17:18	20.090	0.084
17:19	20.090	0.084
17:20	20.089	0.084
17:21	20.088	0.084
17:22	20.088	0.084
17:23	20.088	0.084
17:24	20.088	0.084
17:25	20.090	0.084
17:26	20.089	0.084
17:27	20.088	0.084
17:28	20.088	0.084
17:29	20.088	0.084
17:30	20.087	0.083
17:31	20.088	0.083
17:32	20.087	0.083
17:33	20.087	0.083
17:34	20.088	0.083
17:35	20.088	0.082
17:36	20.089	0.082
17:37	20.090	0.082
17:38	20.090	0.082
17:39	20.089	0.082
17:40	20.089	0.082

REFERENCE METHOD RUN 3

Channel	1 O2	2 CO2
	Process Stack %dv	Process Stack %dv
17:41	20.089	0.082
17:42	20.089	0.082
17:43	20.089	0.082
17:44	20.089	0.082
17:45	20.089	0.082
17:46	20.087	0.082
17:47	20.087	0.082
17:48	20.085	0.082
17:49	20.085	0.082
17:50	20.086	0.083
17:51	20.088	0.083
17:52	20.087	0.082
17:53	20.086	0.082
17:54	20.086	0.082
17:55	20.087	0.082
17:56	20.089	0.082
17:57	20.090	0.083
17:58	20.091	0.083
17:59	20.091	0.083
18:00	20.090	0.083
18:01	20.088	0.083
18:02	20.088	0.083
18:03	20.089	0.084
18:04	20.090	0.084
18:05	20.093	0.084
18:06	20.093	0.084
18:07	20.094	0.084
18:08	20.093	0.084
18:09	20.093	0.084

CALIBRATION BIAS 04

Channel 1 2
O2 CO2

Process Stack Process Stack
%dv %dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.014	0.014
C _{uf} Upscale gas	9.622	9.401

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.005	0.022
C _{mce} Upscale gas	9.824	9.740

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.0%	0.0%
Upscale gas	-0.9%	-1.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 03

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.017	0.012
C _{ui} Upscale gas	9.603	9.405

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	0.1%	0.0%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

18:17:00	0.018	0.015
18:17:15	0.017	0.016
18:17:30	0.017	0.015
18:17:45	0.017	0.015
18:18:00	0.018	0.015
18:18:15	0.017	0.014
18:18:30	0.016	0.015
18:18:45	0.015	0.014
18:19:00	0.014	0.015
18:19:15	0.013	0.014
18:19:30	0.014	0.014
18:19:45	0.014	0.015
18:20:00	5.000	0.028
18:20:15	17.673	0.073
18:20:30	17.920	0.120
18:20:45	9.830	4.781
18:21:00	9.575	8.842
18:21:15	9.614	9.270
18:21:30	9.616	9.336
18:21:45	9.617	9.361
18:22:00	9.620	9.379
18:22:15	9.621	9.392
18:22:30	9.622	9.401
18:22:45	9.624	9.408
18:23:00	9.622	9.414

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Process Stack %dv	Process Stack %dv
Instrument Information		
Manufacturer:	Servomex	Servomex
Model:	5200	1415C
Detection:	Paramagn	NDIR
Asset or Serial No:	207491	207176
Calibration Span Value (CS)		
	21.430	21.090
System Response Time (seconds)		
	90	90
Manufacturer Certified Cylinder Value (C_v)		
Zero	0.000	0.000
Low		
Mid	10.100	9.880
High	21.430	21.090
Actual gas to be used for bias checks		
	10.100	9.880
Cylinder ID		
Zero	TWC-687369	TWC-687369
Low		
Mid	EB0002340	EB0002340
High	CC49769	CC49769
Analyzer Calibration Response (C_{Dir})		
Zero	0.022	0.005
Low		
Mid	9.938	9.785
High	21.653	21.271
Analyzer Calibration Error (ACE) (Limit = 2%, Method 25A limit = 5% of gas value)		
Zero	0.1%	0.0%
Low	N/A	N/A
Mid	-0.8%	-0.5%
High	1.0%	0.9%
Calibration Error Status		
Zero	OK	OK
Low	N/A	N/A
Mid	OK	OK
High	OK	OK

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07:27:33	0.060	0.019
07:27:48	0.002	-0.008
07:28:03	0.008	0.001
07:28:18	0.031	0.006
07:28:33	0.023	0.005
07:28:48	0.022	0.006
07:29:03	0.022	0.005
07:29:18	0.022	0.005

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Process Stack	Process Stack
	%dv	%dv
07:29:33	12.254	9.118
07:29:48	22.301	22.487
07:30:03	22.307	22.488
07:30:18	22.309	22.491
07:30:33	22.310	21.765
07:30:48	22.248	21.276
07:31:03	21.734	21.275
07:31:18	21.651	21.272
07:31:33	21.652	21.271
07:31:48	21.652	21.270
07:32:03	21.654	21.271
07:32:18	13.804	14.329
07:32:33	9.952	9.807
07:32:48	9.943	9.795
07:33:03	9.939	9.789
07:33:18	9.938	9.785
07:33:33	9.938	9.785
07:33:48	9.938	9.785
07:34:03	4.797	5.414
07:34:18	0.035	0.022
07:34:33	-0.054	0.047
07:34:48	10.048	0.097
07:35:03	19.520	0.101

CALIBRATION BIAS 00

Channel	1	2
	O2	CO2
Process Stack	Process Stack	
%dv	%dv	
System Response to Calibration Gasses (C_s)		
C _{of} Zero gas	0.055	0.011
C _{uf} Upscale gas	9.420	8.946
Analyzer Calibration Error Responses (C_{Dir})		
C _{oce} Zero gas	0.022	0.005
C _{mce} Upscale gas	9.938	9.785
Actual Upscale Gas Value (C_{MA})		
C _{ma} Upscale gas	10.100	9.880
Calibration Span Value (CS)		
	21.430	21.090
System Bias as Percent of Calibration Span Value (SB) (5%)		
Zero gas	0.2%	0.0%
Upscale gas	-2.4%	-4.0%
System Bias Status		
Zero gas	OK	OK
Upscale gas	OK	OK
Previous System Response to Calibration Gasses (C_s)		
C _{oi} Zero gas	N/A	N/A
C _{ui} Upscale gas	N/A	N/A
Drift Assessment as Percent of Calibration Span Value (D) (3%)		
Zero gas	N/A	N/A
Upscale gas	N/A	N/A
Drift Assessment Status		
Zero gas	N/A	N/A
Upscale gas	N/A	N/A

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07:47:43	0.055	0.011	zeros
07:47:58	0.055	0.011	
07:48:13	0.054	0.011	
07:48:28	0.113	0.029	
07:48:43	3.588	2.752	
07:48:58	8.090	7.306	
07:49:13	9.132	8.490	
07:49:28	9.282	8.704	
07:49:43	9.316	8.767	
07:49:58	9.337	8.802	
07:50:13	9.394	8.870	
07:50:28	9.402	8.890	
07:50:43	9.407	8.900	
07:52:13	9.417	8.931	
07:52:28	9.418	8.934	
07:52:43	9.418	8.937	
07:52:58	9.418	8.939	
07:53:13	9.419	8.941	
07:53:28	9.420	8.942	
07:53:43	9.420	8.944	
07:53:58	9.420	8.946	
07:54:13	9.420	8.946	

REFERENCE METHOD RUN 1

Channel			1	2
			O2	CO2
Process Stack			Process Stack	Process Stack
			%dv	%dv
Calibration Checks				
Bias 00	C _{oi}	Initial zero	0.055	0.011
Stop 07:54	C _{ui}	Initial upscale	9.420	8.946
Bias 01	C _{of}	Final zero	0.062	0.008
Start 11:02	C _{uf}	Final upscale	9.584	9.282
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	19.833	0.094
	C _{Gas}	Bias adjusted	21.149	0.092
Clock Time (at end of sample period)				
072320 211252				
	10:04	19.851	0.395	=> DAS error, No O2/CO2 Data from 09:56 to 10:03
	10:05	19.848	0.083	
	10:06	19.851	0.083	
	10:07	19.853	0.083	
	10:08	19.858	0.083	
	10:09	19.860	0.083	
	10:10	19.859	0.083	
	10:11	19.860	0.083	
	10:12	19.860	0.083	
	10:13	19.861	0.083	
	10:14	19.861	0.083	
	10:15	19.862	0.083	
	10:16	19.863	0.083	
	10:17	19.863	0.083	
	10:18	19.864	0.083	
	10:19	19.863	0.083	
	10:20	19.865	0.083	
	10:21	19.866	0.083	
	10:22	19.866	0.083	
	10:23	19.817	0.083	
	10:24	19.833	0.083	
	10:25	19.800	0.083	
	10:26	19.789	0.083	
	10:27	19.783	0.083	
	10:28	19.770	0.083	
	10:29	19.761	0.083	
	10:30	19.757	0.082	
	10:31	19.754	0.082	
	10:32	19.749	0.082	

CALIBRATION BIAS 01

Channel 1 2
O2 CO2

Process Stack Process Stack
%dv %dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.062	0.008
C _{uf} Upscale gas	9.584	9.282

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.022	0.005
C _{mce} Upscale gas	9.938	9.785

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.2%	0.0%
Upscale gas	-1.7%	-2.4%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 00

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.055	0.011
C _{ui} Upscale gas	9.420	8.946

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	0.8%	1.6%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

11:10:52	0.053	0.007
11:11:07	0.054	0.007
11:11:22	0.058	0.007
11:11:37	0.060	0.008
11:11:52	0.061	0.007
11:12:07	0.062	0.008
11:12:22	0.063	0.007
11:12:37	0.063	0.008
11:12:52	0.062	0.007
11:13:07	0.062	0.007
11:13:22	3.360	0.017
11:13:37	16.862	0.068
11:13:52	19.434	0.079
11:14:07	19.710	0.081
11:14:22	18.398	0.083
11:14:37	9.440	3.926
11:14:52	9.528	8.638
11:15:07	9.609	9.129
11:15:22	9.597	9.207
11:15:37	9.588	9.243
11:15:52	9.582	9.265
11:16:07	9.585	9.284
11:16:22	9.585	9.297
11:16:37	9.582	9.305
11:16:52	10.106	9.084

REFERENCE METHOD RUN 2

Channel			1	2
			O2	CO2
Process Stack			Process Stack	Process Stack
			%dv	%dv
Calibration Checks				
Bias 01	C _{oi}	Initial zero	0.062	0.008
Stop 11:17	C _{ui}	Initial upscale	9.584	9.282
Bias 02	C _{of}	Final zero	0.032	0.001
Start 12:52	C _{uf}	Final upscale	9.516	9.338
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	19.783	0.077
	C _{Gas}	Bias adjusted	20.977	0.077

Clock Time (at end of sample period)

072320 211252

11:49	19.770	0.078
11:50	19.569	0.077
11:51	19.712	0.078
11:52	19.738	0.077
11:53	19.748	0.077
11:54	19.735	0.077
11:55	19.724	0.077
11:56	19.725	0.077
11:57	19.727	0.077
11:58	19.727	0.077
11:59	19.730	0.077
12:00	19.738	0.077
12:01	19.704	0.077
12:02	19.713	0.077
12:03	19.730	0.077
12:04	19.746	0.077
12:05	19.760	0.077
12:06	19.787	0.077
12:07	19.787	0.077
12:08	19.795	0.077
12:09	19.805	0.077
12:10	19.810	0.077
12:11	19.858	0.077
12:12	19.865	0.077
12:13	19.864	0.077
12:14	19.863	0.077
12:15	19.864	0.077
12:16	19.864	0.077
12:17	19.864	0.077
12:18	19.863	0.077
12:19	19.864	0.077
12:20	19.863	0.077
12:21	19.863	0.077
12:22	19.862	0.077

CALIBRATION BIAS 02

Channel 1 2
O2 CO2

Process Stack Process Stack
%dv %dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.032	0.001
C _{uf} Upscale gas	9.516	9.338

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.022	0.005
C _{mce} Upscale gas	9.938	9.785

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.0%	0.0%
Upscale gas	-2.0%	-2.1%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 01

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.062	0.008
C _{ui} Upscale gas	9.584	9.282

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	-0.1%	0.0%
Upscale gas	-0.3%	0.3%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

12:59:19	0.034	0.001
12:59:34	0.034	0.001
12:59:49	0.033	0.001
13:00:04	0.033	0.001
13:00:19	0.032	0.001
13:00:34	0.032	0.001
13:00:49	0.032	0.001
13:01:04	0.033	0.001
13:01:19	0.751	0.389
13:01:34	7.299	6.545
13:01:49	9.321	8.993
13:02:04	9.452	9.199
13:02:19	9.476	9.247
13:02:34	9.490	9.273
13:02:49	9.499	9.292
13:03:04	9.504	9.307
13:03:19	9.507	9.317
13:03:34	9.512	9.327
13:03:49	9.514	9.333
13:04:04	9.516	9.337
13:04:19	9.517	9.343
13:04:34	9.714	9.278
13:04:49	16.101	4.240
13:05:04	19.505	0.525
13:05:19	19.772	0.215

REFERENCE METHOD RUN 3

Channel			1	2
			O2	CO2
Process Stack			Process Stack	Process Stack
			%dv	%dv
Calibration Checks				
Bias 02	C _{oi}	Initial zero	0.032	0.001
Stop 13:05	C _{ui}	Initial upscale	9.516	9.338
Bias 03	C _{of}	Final zero	0.029	-0.001
Start 14:14	C _{uf}	Final upscale	9.520	9.298
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	19.778	0.075
	C _{Gas}	Bias adjusted	21.023	0.079

Clock Time (at end of sample period)

072320 211252

13:09	19.858	0.084
13:10	19.861	0.081
13:11	19.862	0.079
13:12	19.863	0.078
13:13	19.864	0.077
13:14	19.864	0.077
13:15	19.864	0.076
13:16	19.863	0.076
13:17	19.863	0.076
13:18	19.864	0.076
13:19	19.863	0.076
13:20	19.863	0.076
13:21	19.834	0.076
13:22	19.458	0.074
13:23	19.705	0.075
13:24	19.696	0.075
13:25	19.692	0.075
13:26	19.688	0.074
13:27	19.687	0.074
13:28	19.687	0.074
13:29	19.692	0.074
13:30	19.701	0.074
13:31	19.700	0.074
13:32	19.709	0.074
13:33	19.733	0.073
13:34	19.733	0.074
13:35	19.706	0.073
13:36	19.712	0.073
13:37	19.717	0.073
13:38	19.730	0.073
13:39	19.749	0.073
13:40	19.764	0.073
13:41	19.775	0.073
13:42	19.833	0.074
13:43	19.859	0.074
13:44	19.859	0.074

REFERENCE METHOD RUN 3

Channel	1 O2	2 CO2
	Process Stack %dv	Process Stack %dv
13:45	19.860	0.074
13:46	19.860	0.073
13:47	19.859	0.074
13:48	19.858	0.074
13:49	19.843	0.074
13:50	19.801	0.073
13:51	19.795	0.073
13:52	19.766	0.073
13:53	19.751	0.073
13:54	19.745	0.073
13:55	19.735	0.073
13:56	19.733	0.073
13:57	19.736	0.073

CALIBRATION BIAS 03

Channel 1 2
O2 CO2

Process Stack Process Stack
%dv %dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.029	-0.001
C _{uf} Upscale gas	9.520	9.298

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.022	0.005
C _{mce} Upscale gas	9.938	9.785

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.0%	0.0%
Upscale gas	-2.0%	-2.3%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 02

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.032	0.001
C _{ui} Upscale gas	9.516	9.338

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	0.0%	-0.2%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

14:22:36	0.030	0.000
14:22:51	0.032	0.000
14:23:06	0.032	-0.001
14:23:21	0.031	-0.001
14:23:36	0.029	-0.001
14:23:51	0.029	-0.001
14:24:06	0.029	-0.001
14:24:21	2.637	1.931
14:24:36	8.590	8.069
14:24:51	9.395	9.111
14:25:06	9.455	9.220
14:25:21	9.478	9.261
14:25:36	9.489	9.282
14:25:51	9.493	9.298
14:26:06	9.498	9.309
14:26:21	9.502	9.318
14:26:36	9.505	9.319
14:26:51	9.513	9.309
14:27:06	9.521	9.298
14:27:21	9.526	9.288
14:27:36	9.925	9.107
14:27:51	16.369	3.962

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Indoor Air Stack	Indoor Air Stack
	%dv	%dv
Instrument Information		
Manufacturer:	Servomex	Servomex
Model:	5200	1415C
Detection:	Paramagn	NDIR
Asset or Serial No:	207491	207176
Calibration Span Value (CS)		
	21.430	21.090
System Response Time (seconds)		
	90	90
Manufacturer Certified Cylinder Value (C_v)		
Zero	0.000	0.000
Low		
Mid	10.100	9.880
High	21.430	21.090
Actual gas to be used for bias checks		
	10.100	9.880
Cylinder ID		
Zero	TWC-687369	TWC-687369
Low		
Mid	EB0002340	EB0002340
High	CC49769	CC49769
Analyzer Calibration Response (C_{Dir})		
Zero	0.023	0.011
Low		
Mid	9.983	9.972
High	21.585	21.406
Analyzer Calibration Error (ACE) (Limit = 2%, Method 25A limit = 5% of gas value)		
Zero	0.1%	0.1%
Low	N/A	N/A
Mid	-0.5%	0.4%
High	0.7%	1.5%
Calibration Error Status		
Zero	OK	OK
Low	N/A	N/A
Mid	OK	OK
High	OK	OK

072320 211252

07:25:06	-0.005	-0.016
07:25:21	-0.021	-0.020
07:25:36	0.033	-0.015
07:25:51	0.024	0.010
07:26:06	0.022	0.011
07:26:21	0.022	0.011
07:26:36	9.097	6.028
07:26:51	22.034	22.368

CALIBRATION ERROR

Channel	1	2
	O2	CO2
	Indoor Air	Indoor Air
	Stack	Stack
	%dv	%dv
07:27:06	22.047	22.102
07:27:21	22.048	21.460
07:27:36	21.899	21.406
07:27:51	21.698	21.406
07:28:06	21.577	21.406
07:28:21	21.578	21.408
07:28:36	21.579	21.409
07:28:51	21.581	21.405
07:29:06	21.586	21.408
07:29:21	21.587	21.406
07:29:36	13.557	14.274
07:29:51	9.998	9.995
07:30:06	9.990	9.985
07:30:21	9.988	9.980
07:30:36	9.986	9.977
07:30:51	9.983	9.974
07:31:06	9.984	9.973
07:31:21	9.983	9.972
07:31:36	9.982	9.971
07:31:51	10.352	9.629
07:32:06	18.653	1.389

CALIBRATION BIAS 00

Channel	1	2
	O2	CO2
	Indoor Air	Indoor Air
	Stack	Stack
	%dv	%dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.064	0.017
C _{uf} Upscale gas	9.466	9.241

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.023	0.011
C _{mce} Upscale gas	9.983	9.972

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.2%	0.0%
Upscale gas	-2.4%	-3.5%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	N/A	N/A
C _{ui} Upscale gas	N/A	N/A

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	N/A	N/A
Upscale gas	N/A	N/A

Drift Assessment Status

Zero gas	N/A	N/A
Upscale gas	N/A	N/A

072320 211252

07:41:12	0.060	0.017
07:41:27	0.061	0.017
07:41:42	0.065	0.017
07:41:57	0.065	0.017
07:42:12	0.063	0.017
07:42:27	0.284	0.088
07:42:42	6.223	5.222
07:42:57	9.110	8.593
07:43:12	9.294	8.872
07:43:27	9.322	8.926
07:43:42	9.335	8.954
07:43:57	9.344	8.987
07:44:12	9.348	9.041
07:44:27	9.396	9.112
07:44:42	9.451	9.181
07:44:57	9.454	9.221
07:45:12	9.457	9.225
07:45:27	9.458	9.229
07:45:42	9.459	9.234
07:45:57	9.462	9.235
07:46:12	9.464	9.238
07:46:27	9.466	9.241
07:46:42	9.468	9.244
07:46:57	9.724	9.156
07:47:12	16.306	3.923

REFERENCE METHOD RUN 1

Channel			1	2
			O2	CO2
			Indoor Air	Indoor Air
			Stack	Stack
			%dv	%dv
Calibration Checks				
Bias 00	C _{oi}	Initial zero	0.064	0.017
Stop 07:48	C _{ui}	Initial upscale	9.466	9.241
Bias 01	C _{of}	Final zero	0.055	0.013
Start 11:03	C _{uf}	Final upscale	9.484	9.233
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	19.712	0.090
	C _{Gas}	Bias adjusted	21.082	0.080

Clock Time (at end of sample period)

072320 211252

10:01	19.715	0.089
10:02	19.715	0.089
10:03	19.716	0.089
10:04	19.716	0.089
10:05	19.716	0.089
10:06	19.715	0.089
10:07	19.716	0.090
10:08	19.717	0.089
10:09	19.714	0.090
10:10	19.715	0.089
10:11	19.715	0.090
10:12	19.714	0.090
10:13	19.715	0.090
10:14	19.714	0.090
10:15	19.715	0.090
10:16	19.715	0.090
10:17	19.714	0.090
10:18	19.715	0.090
10:19	19.716	0.090
10:20	19.717	0.090
10:21	19.716	0.090
10:22	19.714	0.090
10:23	19.713	0.090
10:24	19.714	0.090
10:25	19.714	0.090
10:26	19.713	0.090
10:27	19.713	0.090
10:28	19.712	0.090
10:29	19.713	0.090
10:30	19.712	0.090
10:31	19.712	0.090
10:32	19.711	0.090
10:33	19.710	0.090
10:34	19.710	0.090
10:35	19.711	0.090
10:36	19.712	0.090

REFERENCE METHOD RUN 1

Channel	1 O2 Indoor Air Stack %dv	2 CO2 Indoor Air Stack %dv
10:37	19.712	0.090
10:38	19.711	0.090
10:39	19.710	0.090
10:40	19.709	0.090
10:41	19.711	0.090
10:42	19.711	0.090
10:43	19.710	0.090
10:44	19.710	0.090
10:45	19.711	0.090
10:46	19.711	0.090
10:47	19.710	0.090
10:48	19.710	0.090
10:49	19.710	0.090
10:50	19.710	0.090
10:51	19.712	0.089
10:52	19.712	0.089
10:53	19.712	0.089
10:54	19.712	0.089
10:55	19.711	0.089
10:56	19.710	0.089
10:57	19.709	0.088
10:58	19.709	0.088
10:59	19.709	0.088
11:00	19.708	0.088
11:01	19.708	0.088
11:02	19.708	0.088

CALIBRATION BIAS 01

Channel	1	2
	O2	CO2
	Indoor Air	Indoor Air
	Stack	Stack
	%dv	%dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.055	0.013
C _{uf} Upscale gas	9.484	9.233

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.023	0.011
C _{mce} Upscale gas	9.983	9.972

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.1%	0.0%
Upscale gas	-2.3%	-3.5%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 00

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.064	0.017
C _{ui} Upscale gas	9.466	9.241

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	0.1%	0.0%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

11:11:43	0.058	0.013
11:11:58	0.057	0.013
11:12:13	0.055	0.013
11:12:28	0.055	0.013
11:12:43	0.054	0.013
11:12:58	0.054	0.013
11:13:13	0.055	0.013
11:13:28	0.055	0.013
11:13:43	0.056	0.013
11:13:58	0.054	0.013
11:14:13	0.055	0.013
11:14:28	0.282	0.085
11:14:43	6.363	5.417
11:14:58	9.253	8.833
11:15:13	9.431	9.102
11:15:28	9.462	9.155
11:15:43	9.477	9.181
11:15:58	9.486	9.198
11:16:13	9.488	9.211
11:16:28	9.481	9.220
11:16:43	9.493	9.228
11:16:58	9.491	9.233
11:17:13	9.467	9.238
11:17:28	9.626	9.194
11:17:43	16.023	4.179

REFERENCE METHOD RUN 2

Channel			1	2
			O2	CO2
			Indoor Air	Indoor Air
			Stack	Stack
			%dv	%dv
Calibration Checks				
Bias 01	C _{oi}	Initial zero	0.055	0.013
Stop 11:17	C _{ui}	Initial upscale	9.484	9.233
Bias 02	C _{of}	Final zero	0.073	0.014
Start 13:39	C _{uf}	Final upscale	9.464	9.212
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	19.728	0.086
	C _{Gas}	Bias adjusted	21.106	0.078

Clock Time (at end of sample period)

072320 211252

12:37	19.730	0.087
12:38	19.730	0.087
12:39	19.727	0.087
12:40	19.726	0.087
12:41	19.724	0.087
12:42	19.724	0.087
12:43	19.723	0.087
12:44	19.724	0.087
12:45	19.723	0.087
12:46	19.724	0.087
12:47	19.725	0.087
12:48	19.725	0.087
12:49	19.725	0.087
12:50	19.725	0.087
12:51	19.724	0.087
12:52	19.724	0.087
12:53	19.726	0.086
12:54	19.725	0.086
12:55	19.724	0.086
12:56	19.724	0.086
12:57	19.724	0.087
12:58	19.726	0.087
12:59	19.727	0.086
13:00	19.728	0.087
13:01	19.726	0.087
13:02	19.727	0.087
13:03	19.727	0.087
13:04	19.726	0.087
13:05	19.728	0.087
13:06	19.730	0.087
13:07	19.729	0.087
13:08	19.730	0.087
13:09	19.730	0.087
13:10	19.730	0.087
13:11	19.730	0.087
13:12	19.730	0.087

REFERENCE METHOD RUN 2

Channel	1 O2 Indoor Air Stack %dv	2 CO2 Indoor Air Stack %dv
13:13	19.730	0.087
13:14	19.730	0.087
13:15	19.730	0.087
13:16	19.731	0.087
13:17	19.730	0.087
13:18	19.729	0.087
13:19	19.729	0.087
13:21	19.729	0.086
13:22	19.729	0.087
13:23	19.728	0.086
13:24	19.729	0.086
13:25	19.730	0.086
13:26	19.729	0.086
13:27	19.731	0.086
13:28	19.731	0.086
13:29	19.731	0.086
13:30	19.731	0.086
13:31	19.730	0.086
13:32	19.729	0.086
13:33	19.730	0.086
13:34	19.730	0.085
13:35	19.730	0.085
13:36	19.729	0.085
13:37	19.729	0.085

CALIBRATION BIAS 02

Channel	1	2
	O2	CO2
	Indoor Air	Indoor Air
	Stack	Stack
	%dv	%dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.073	0.014
C _{uf} Upscale gas	9.464	9.212

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.023	0.011
C _{mce} Upscale gas	9.983	9.972

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.2%	0.0%
Upscale gas	-2.4%	-3.6%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 01 Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.055	0.013
C _{ui} Upscale gas	9.484	9.233

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.1%	0.0%
Upscale gas	-0.1%	-0.1%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

13:47:23	0.075	0.015
13:47:38	0.075	0.015
13:47:53	0.075	0.014
13:48:08	0.074	0.015
13:48:23	0.073	0.014
13:48:38	0.073	0.014
13:48:53	0.109	0.021
13:49:08	5.141	4.176
13:49:23	9.125	8.681
13:49:38	9.402	9.081
13:49:53	9.435	9.143
13:50:08	9.446	9.171
13:50:23	9.454	9.189
13:50:38	9.459	9.203
13:50:53	9.464	9.213
13:51:08	9.468	9.220
13:51:23	11.641	7.882
13:51:38	18.552	1.483

REFERENCE METHOD RUN 3

Channel			1	2
			O2	CO2
			Indoor Air	Indoor Air
			Stack	Stack
			%dv	%dv
Calibration Checks				
Bias 02	C _{oi}	Initial zero	0.073	0.014
Stop 13:51	C _{ui}	Initial upscale	9.464	9.212
Bias 03	C _{of}	Final zero	0.076	0.021
Start 15:01	C _{uf}	Final upscale	9.477	9.231
	C _{ma}	Actual gas value	10.100	9.880
Analyzer Averages (concentrations)				
	C _{Avg}	Average conc.	19.777	0.087
	C _{Gas}	Bias adjusted	21.179	0.075

Clock Time (at end of sample period)

072320 211252

14:00	19.729	0.086
14:01	19.730	0.086
14:02	19.729	0.086
14:03	19.729	0.086
14:04	19.730	0.086
14:05	19.728	0.086
14:06	19.728	0.086
14:07	19.728	0.086
14:08	19.729	0.086
14:09	19.731	0.086
14:10	19.732	0.086
14:11	19.731	0.087
14:12	19.731	0.087
14:13	19.733	0.086
14:14	19.732	0.087
14:15	19.732	0.087
14:16	19.734	0.087
14:17	19.733	0.087
14:18	19.733	0.087
14:19	19.733	0.087
14:20	19.734	0.087
14:21	19.735	0.087
14:22	19.733	0.087
14:23	19.733	0.087
14:24	19.733	0.087
14:25	19.732	0.087
14:26	19.732	0.087
14:27	19.733	0.086
14:28	19.731	0.086
14:29	19.733	0.086
14:30	19.736	0.086
14:31	19.739	0.086
14:32	19.740	0.086
14:33	19.741	0.086
14:34	19.741	0.086
14:35	19.743	0.087

REFERENCE METHOD RUN 3

Channel	1	2
	O2	CO2
	Indoor Air	Indoor Air
	Stack	Stack
	%dv	%dv
14:36	19.746	0.087
14:37	19.753	0.087
14:38	19.778	0.087
14:39	19.983	0.087
14:40	19.849	0.087
14:41	19.833	0.087
14:42	19.838	0.087
14:43	19.827	0.087
14:44	19.837	0.088
14:45	19.775	0.088
14:46	19.767	0.088
14:47	19.796	0.087
14:48	20.064	0.088
14:49	19.891	0.088
14:50	19.798	0.088
14:51	19.793	0.088
14:52	19.799	0.088
14:53	19.814	0.088
14:54	19.859	0.088
14:55	20.068	0.089
14:56	19.997	0.088
14:57	19.827	0.088
14:58	19.777	0.088
14:59	19.766	0.088
15:00	19.754	0.089

CALIBRATION BIAS 03

Channel	1	2
	O2	CO2
	Indoor Air	Indoor Air
	Stack	Stack
	%dv	%dv

System Response to Calibration Gasses (C_s)

C _{of} Zero gas	0.076	0.021
C _{uf} Upscale gas	9.477	9.231

Analyzer Calibration Error Responses (C_{Dir})

C _{oce} Zero gas	0.023	0.011
C _{mce} Upscale gas	9.983	9.972

Actual Upscale Gas Value (C_{MA})

C _{ma} Upscale gas	10.100	9.880

Calibration Span Value (CS)

21.430	21.090

System Bias as Percent of Calibration Span Value (SB) (5%)

Zero gas	0.2%	0.0%
Upscale gas	-2.4%	-3.5%

System Bias Status

Zero gas	OK	OK
Upscale gas	OK	OK

Bias 02

Previous System Response to Calibration Gasses (C_s)

C _{oi} Zero gas	0.073	0.014
C _{ui} Upscale gas	9.464	9.212

Drift Assessment as Percent of Calibration Span Value (D) (3%)

Zero gas	0.0%	0.0%
Upscale gas	0.1%	0.1%

Drift Assessment Status

Zero gas	OK	OK
Upscale gas	OK	OK

072320 211252

15:11:04	0.078	0.021
15:11:19	0.078	0.021
15:11:34	0.077	0.021
15:11:49	0.077	0.021
15:12:04	0.076	0.020
15:12:19	0.076	0.021
15:12:34	0.076	0.021
15:12:49	1.152	0.669
15:13:04	7.827	7.098
15:13:19	9.351	8.986
15:13:34	9.434	9.130
15:13:49	9.450	9.169
15:14:04	9.461	9.192
15:14:19	9.467	9.205
15:14:34	9.471	9.217
15:14:49	9.474	9.224
15:15:04	9.478	9.232
15:15:19	9.479	9.237
15:15:34	9.482	9.242
15:15:49	11.019	8.371
15:16:04	18.212	1.920
15:16:19	19.603	0.310
15:16:34	19.683	0.208

End of Appendix Section

APPENDIX K: FACILITY PROCESS DATA

Due to proprietary reasons, chamber-phase logs are withheld from this report. Chamber-phase logs are available upon request.

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24 and 25 Jun 2020

Ceilcote Readings during Stack Testing:

T2 = 186

PH = 0.8

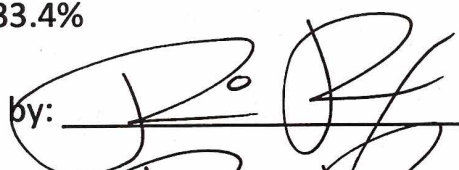
Glycol = 36.0%

AAT Readings during Stack Testing:

T2 = 123

PH = 0.8

Glycol = 33.4%

Recorded by:  Date: 24 Jun 2020

Recorded by:  Date: 25 Jun 2020

End of Appendix Section

APPENDIX L: EPA METHOD 301 VALIDATION

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Method 301 Validation Summary



Analysis Description:	FTIR with aromatic optical filter and MAX Analytical proprietary algorithm
CAE Asset #:	211136

Response Time (sec):	0:01:47
FTIR Cell Volume (ml):	200
Sample Flow Rate (lpm):	5.0
Min. Spectra Acquisition (s^{-1}):	15
Min. Indep. Samples per Spectrum:	6.25
QA Gas:	EtO
QA Direct (ppm):	2.20
Tracer Gas:	Ethane
Tracer Direct (ppm):	512

Sample Group #	Unspiked Concentration (M) (ppm)	Spiked Concentration (S) (ppm)	Tracer Concentration (ppm)	Dilution Factor (DF)	Calculated Spike Level (CS) (ppm)	Sample Bias (B) (ppm)	Relative Bias (B_R) (%)
1	0.357	0.457	36.8	0.072	0.489	-0.032	6.46
2	0.363	0.465	36.3	0.071	0.493	-0.027	5.58
3	0.323	0.444	36.9	0.072	0.457	-0.014	3.04
4	0.322	0.488	42.3	0.082	0.476	0.012	2.43
5	0.323	0.465	42.5	0.083	0.478	-0.013	2.76
6	0.328	0.452	43.3	0.085	0.486	-0.035	7.11
7	0.311	0.461	44.4	0.087	0.474	-0.013	2.84
8	0.285	0.438	45.1	0.088	0.454	-0.015	3.39
9	0.282	0.443	45.2	0.088	0.451	-0.008	1.79
10	0.291	0.418	45.6	0.089	0.460	-0.042	9.11
11	0.291	0.435	45.8	0.089	0.462	-0.026	5.72
12	0.269	0.406	46.0	0.090	0.442	-0.036	8.17
Average	0.312	0.448	42.5	0.083	0.469	-0.021	4.87

Bias Std. Dev. (ppm):	0.0150
Calc. t-stat	4.834
Critical t-stat	2.201
Spiked Sample Std. Dev. (ppm)	0.022
Relative Bias (%)	-4.46
RSD (%)	4.95
M-301 Passing Criteria:	
Calc. t-stat < Critical t-stat? (Y/N)	N
B_R <30%? (Y/N)	Y
B_R <10%? (Y/N)	Y
Correction Factor (CF):	N/A
RSD <20%? (Y/N)	Y

Evaluation:	B_R is <10% and the RSD is <20%. Method is acceptable and a CF is not required for this source.

Method 301 Validation Raw Data



Spectrum	Date	Time	Temp (°C)	Pressure (ATM)	Ethane (ppm)	Ethylene Oxide (ppm)	Methane (ppm)	Water (ppm)	Action / Notes
PRE -METHOD 301 VALIDATION CALIBRATIONS									
ZERO DIRECT_0000001.LAB	3/9/2020	12:42:18	150.0	0.995	0.010	-0.001	0.010	2.458	Note: The spectrum label does not necessarily indicate /correspond to the exact calibration action at that moment
ZERO DIRECT_0000002.LAB	3/9/2020	12:42:32	150.0	0.995	0.023	-0.001	-0.005	-1.708	
ZERO DIRECT_0000003.LAB	3/9/2020	12:42:47	150.0	0.995	0.019	-0.005	0.004	11.681	
ZERO DIRECT_0000004.LAB	3/9/2020	12:43:02	149.9	0.995	0.025	0.000	0.005	-3.955	
ZERO DIRECT_0000005.LAB	3/9/2020	12:43:17	149.9	0.995	0.021	0.000	0.005	-4.005	
ZERO DIRECT_0000006.LAB	3/9/2020	12:43:32	150.0	0.995	0.054	0.004	0.009	2.359	Direct Zero
ZERO DIRECT_0000007.LAB	3/9/2020	12:43:46	150.0	0.995	0.022	0.004	0.000	-1.307	
ZERO DIRECT_0000008.LAB	3/9/2020	12:44:01	150.0	0.995	0.010	-0.006	-0.001	3.688	
ZERO DIRECT_0000009.LAB	3/9/2020	12:44:16	150.0	0.995	0.048	-0.002	0.008	6.967	
ZERO DIRECT_0000010.LAB	3/9/2020	12:44:31	150.0	0.995	0.028	-0.001	0.002	7.140	
ZERO DIRECT_0000011.LAB	3/9/2020	12:44:45	150.0	0.995	-0.003	-0.003	0.002	-9.628	
ZERO DIRECT_0000012.LAB	3/9/2020	12:45:00	150.0	0.995	-0.003	-0.008	0.000	-4.041	
ZERO DIRECT_0000013.LAB	3/9/2020	12:45:15	150.0	0.995	0.028	-0.002	0.006	2.967	
ZERO DIRECT_0000014.LAB	3/9/2020	12:45:30	150.0	0.995	-0.031	-0.006	0.005	-0.403	
ZERO DIRECT_0000015.LAB	3/9/2020	12:45:48	149.9	0.995	0.031	0.002	0.013	-6.835	
ZERO DIRECT_0000016.LAB	3/9/2020	12:46:03	149.9	0.995	-0.004	0.003	0.001	8.813	
ZERO DIRECT_0000017.LAB	3/9/2020	12:46:17	150.0	0.995	0.022	0.000	0.006	-2.681	
ZERO DIRECT_0000018.LAB	3/9/2020	12:46:32	150.0	0.995	0.015	0.002	0.004	5.903	
ZERO DIRECT_0000019.LAB	3/9/2020	12:46:47	149.9	0.995	0.004	0.002	0.001	0.688	
ZERO DIRECT_0000020.LAB	3/9/2020	12:48:56	149.9	0.995	0.000	0.000	0.000	0.000	
ZERO DIRECT_0000021.LAB	3/9/2020	12:50:16	150.0	0.995	0.036	-0.003	0.006	0.533	
ZERO DIRECT_0000022.LAB	3/9/2020	12:50:45	149.9	0.995	-0.008	-0.002	0.007	-1.091	
ZERO DIRECT_0000023.LAB	3/9/2020	12:51:15	149.9	0.995	0.004	0.001	-0.001	-3.261	
ZERO DIRECT_0000024.LAB	3/9/2020	12:51:44	150.0	0.995	0.019	-0.001	0.008	-9.869	
ZERO DIRECT_0000025.LAB	3/9/2020	12:52:14	149.8	0.995	0.013	0.002	-0.004	-0.451	
ZERO DIRECT_0000026.LAB	3/9/2020	12:52:43	149.9	0.995	-0.024	0.000	0.012	7.492	
ZERO DIRECT_0000027.LAB	3/9/2020	12:53:13	149.9	0.995	-0.023	0.000	0.004	-3.018	
ZERO DIRECT_0000028.LAB	3/9/2020	12:53:42	150.0	0.995	-0.002	0.000	0.005	-7.722	
ZERO DIRECT_0000029.LAB	3/9/2020	12:54:12	149.9	0.995	0.007	-0.002	0.008	1.116	
ZERO DIRECT_0000030.LAB	3/9/2020	12:54:41	150.0	0.995	-0.005	0.001	0.010	-0.294	
ZERO DIRECT_0000031.LAB	3/9/2020	12:55:11	149.9	0.995	-0.004	0.001	0.005	-1.940	
ZERO DIRECT_0000032.LAB	3/9/2020	12:55:40	149.9	0.995	-0.009	-0.002	-0.001	-10.187	
ZERO DIRECT_0000033.LAB	3/9/2020	12:56:10	149.9	0.995	0.014	0.001	0.003	-4.648	
ZERO DIRECT_0000034.LAB	3/9/2020	12:56:39	150.0	0.995	-0.001	0.000	0.005	-10.308	
ZERO DIRECT_0000035.LAB	3/9/2020	12:57:09	150.0	0.995	-0.003	-0.003	-0.007	-11.577	
ZERO DIRECT_0000036.LAB	3/9/2020	12:57:39	149.9	0.995	0.010	0.002	0.006	0.890	
ZERO DIRECT_0000037.LAB	3/9/2020	12:58:08	149.9	0.995	9.444	0.479	42.913	220.403	
ZERO DIRECT_0000038.LAB	3/9/2020	12:58:38	149.9	0.995	0.064	0.754	85.205	157.832	Direct CTS
ZERO DIRECT_0000039.LAB	3/9/2020	12:59:08	149.9	0.995	0.002	0.756	85.360	130.589	
ZERO DIRECT_0000040.LAB	3/9/2020	12:59:37	149.9	0.995	0.008	0.753	85.404	125.611	
ZERO DIRECT_0000041.LAB	3/9/2020	13:00:07	150.0	0.994	-0.015	0.758	85.479	123.324	
ZERO DIRECT_0000042.LAB	3/9/2020	13:00:36	149.9	0.994	0.008	0.759	85.443	112.687	
ZERO DIRECT_0000043.LAB	3/9/2020	13:01:06	149.9	0.994	-0.027	0.755	85.460	119.946	
ZERO DIRECT_0000044.LAB	3/9/2020	13:01:35	149.9	0.994	-0.020	0.761	85.480	117.587	
CTS DIRECT_0000045.LAB	3/9/2020	13:02:01	149.9	0.994	-0.001	0.753	85.495	115.758	
CTS DIRECT_0000046.LAB	3/9/2020	13:02:15	149.9	0.994	-0.024	0.759	85.476	120.800	
CTS DIRECT_0000047.LAB	3/9/2020	13:02:30	149.9	0.994	0.001	0.760	85.484	106.673	
CTS DIRECT_0000048.LAB	3/9/2020	13:02:45	149.9	0.994	-0.035	0.756	85.483	112.408	
CTS DIRECT_0000049.LAB	3/9/2020	13:03:00	149.9	0.994	0.004	0.760	85.458	107.822	
CTS DIRECT_0000050.LAB	3/9/2020	13:03:15	149.9	0.994	-0.041	0.760	85.464	104.629	
CTS DIRECT_0000051.LAB	3/9/2020	13:03:29	149.9	0.994	-0.021	0.757	85.452	115.039	
CTS DIRECT_0000052.LAB	3/9/2020	13:03:44	149.8	1.074	10.729	1.136	72.828	192.843	
ZERO SYSTEM_0000005.LAB	3/9/2020	14:26:27	149.8	0.996	-0.013	0.000	0.004	437.323	System Zero
ZERO SYSTEM_0000006.LAB	3/9/2020	14:26:42	149.8	0.996	-0.015	-0.003	0.006	393.635	
ZERO SYSTEM_0000007.LAB	3/9/2020	14:26:57	149.8	0.996	0.012	-0.005	0.022	356.562	
ZERO SYSTEM_0000008.LAB	3/9/2020	14:27:12	149.8	0.996	-0.007	-0.005	0.019	328.282	
ZERO SYSTEM_0000009.LAB	3/9/2020	14:27:26	149.8	0.996	-0.006	-0.006	0.021	317.073	
ZERO SYSTEM_0000010.LAB	3/9/2020	14:27:41	149.8	0.996	-0.022	-0.006	0.003	301.543	
ZERO SYSTEM_0000011.LAB	3/9/2020	14:27:56	149.8	0.996	-0.020	-0.001	0.009	281.632	
ZERO SYSTEM_0000012.LAB	3/9/2020	14:28:14	149.8	0.996	0.001	-0.008	0.016	292.845	
ZERO SYSTEM_0000013.LAB	3/9/2020	14:28:29	149.8	0.996	0.010	-0.007	0.017	313.302	
ZERO SYSTEM_0000014.LAB	3/9/2020	14:28:44	149.8	0.996	-0.020	-0.010	0.009	346.897	
ZERO SYSTEM_0000015.LAB	3/9/2020	14:28:59	149.8	0.996	0.018	-0.006	0.019	379.846	
ZERO SYSTEM_0000016.LAB	3/9/2020	14:29:17	149.8	0.996	0.022	0.000	0.008	406.554	
ZERO SYSTEM_0000017.LAB	3/9/2020	14:29:32	149.8	0.996	-0.007	-0.008	0.019	420.240	
ZERO SYSTEM_0000018.LAB	3/9/2020	14:29:46	149.8	0.996	-0.002	-0.004	0.019	439.720	
ZERO SYSTEM_0000019.LAB	3/9/2020	14:30:01	149.8	0.996	-0.011	-0.007	0.017	445.845	
ZERO SYSTEM_0000020.LAB	3/9/2020	14:30:16	149.8	0.996	-0.002	-0.009	0.182	455.446	
ZERO SYSTEM_0000021.LAB	3/9/2020	14:30:31	149.8	0.996	0.152	0.609	61.369	551.487	System CTS
ZERO SYSTEM_0000022.LAB	3/9/2020	14:30:45	149.8	0.996	-0.005	0.740	83.569	563.778	
ZERO SYSTEM_0000023.LAB	3/9/2020	14:31:00	149.8	0.996	-0.016	0.742	83.919	566.763	
ZERO SYSTEM_0000024.LAB	3/9/2020	14:31:15	149.9	0.996	-0.006	0.736	84.041	555.823	
ZERO SYSTEM_0000025.LAB	3/9/2020	14:31:30	149.8	0.996	-0.005	0.748	83.937	569.915	
ZERO SYSTEM_0000026.LAB	3/9/2020	14:31:44	149.8	0.996	0.000	0.734	83.958	555.213	
ZERO SYSTEM_0000027.LAB	3/9/2020	14:31:59	149.9	0.996	0.014	0.735	84.359	539.799	

Spectrum	Date	Time	Temp (°C)	Pressure (ATM)	Ethane (ppm)	Ethylene Oxide (ppm)	Methane (ppm)	Water (ppm)	Action / Notes
ZERO SYSTEM_0000028.LAB	3/9/2020	14:32:18	149.9	0.996	0.013	0.753	84.792	444.257	
ZERO SYSTEM_0000029.LAB	3/9/2020	14:32:32	149.8	0.996	-0.035	0.740	84.762	413.788	
ZERO SYSTEM_0000030.LAB	3/9/2020	14:32:47	149.8	0.996	0.000	0.744	84.700	412.546	
ZERO SYSTEM_0000031.LAB	3/9/2020	14:33:05	149.9	0.996	-0.006	0.746	84.838	406.323	
CTS SYSTEM_0000032.LAB	3/9/2020	14:33:20	149.8	0.996	-0.013	0.748	84.830	390.192	
CTS SYSTEM_0000033.LAB	3/9/2020	14:33:35	149.8	0.996	-0.019	0.748	84.846	394.140	
CTS SYSTEM_0000034.LAB	3/9/2020	14:33:53	149.8	0.996	-0.019	0.743	84.848	380.332	
CTS SYSTEM_0000035.LAB	3/9/2020	14:34:12	149.8	0.996	-0.033	0.746	84.828	369.370	
CTS SYSTEM_0000036.LAB	3/9/2020	14:34:30	149.8	0.996	0.007	0.749	84.827	363.120	
CTS SYSTEM_0000037.LAB	3/9/2020	14:34:45	149.8	0.996	-0.014	0.747	84.853	357.364	
CTS SYSTEM_0000038.LAB	3/9/2020	14:34:59	149.8	0.996	0.001	0.748	84.845	347.587	
CTS SYSTEM_0000039.LAB	3/9/2020	14:35:14	149.8	0.996	-0.025	0.745	84.852	337.148	
CTS SYSTEM_0000040.LAB	3/9/2020	14:35:33	149.8	0.996	0.024	0.748	84.849	329.742	
CTS SYSTEM_0000041.LAB	3/9/2020	14:35:51	149.8	0.996	-0.015	0.742	84.858	326.313	
CTS SYSTEM_0000042.LAB	3/9/2020	14:36:06	149.8	0.996	-0.016	0.731	82.711	314.528	
CTS SYSTEM_0000043.LAB	3/9/2020	14:36:20	149.8	0.996	-0.063	0.129	9.923	237.271	
CTS SYSTEM_0000044.LAB	3/9/2020	14:36:35	149.8	0.996	-0.030	0.002	0.623	211.981	
CTS SYSTEM_0000045.LAB	3/9/2020	14:36:57	149.8	0.996	-0.008	0.005	0.274	212.354	
CTS SYSTEM_0000046.LAB	3/9/2020	14:37:12	149.8	0.996	-0.012	0.000	0.204	208.741	
SPIKE_0000170.LAB	3/9/2020	15:23:42	149.9	1.013	48.481	0.196	1.886	7718.912	
SPIKE_0000171.LAB	3/9/2020	15:24:01	150.0	1.013	49.617	0.204	1.883	7610.480	
SPIKE_0000172.LAB	3/9/2020	15:24:15	150.0	1.013	50.216	0.203	1.882	7508.061	
SPIKE_0000173.LAB	3/9/2020	15:24:30	150.0	1.013	50.658	0.205	1.886	7559.268	
SPIKE_0000174.LAB	3/9/2020	15:24:45	149.9	1.013	50.936	0.208	1.875	7579.700	
SPIKE_0000175.LAB	3/9/2020	15:25:00	150.0	1.013	51.186	0.207	1.889	7554.132	
SPIKE_0000176.LAB	3/9/2020	15:25:14	149.9	1.013	51.269	0.209	1.895	7647.112	
SPIKE_0000177.LAB	3/9/2020	15:25:29	149.9	1.013	51.308	0.204	1.866	7686.417	
SPIKE_0000178.LAB	3/9/2020	15:25:44	149.9	1.013	51.417	0.211	1.869	7692.445	
SPIKE_0000179.LAB	3/9/2020	15:25:59	149.9	0.990	142.573	0.606	1.474	6633.821	
SPIKE_0000180.LAB	3/9/2020	15:26:17	149.9	0.990	471.430	1.732	0.038	1684.790	
SPIKE_0000181.LAB	3/9/2020	15:26:32	149.9	0.990	508.810	1.886	-0.571	877.110	
SPIKE_0000182.LAB	3/9/2020	15:26:46	149.8	0.990	510.754	1.906	-0.575	769.962	
SPIKE_0000183.LAB	3/9/2020	15:27:01	149.8	0.990	510.965	1.925	-0.591	708.167	
SPIKE_0000184.LAB	3/9/2020	15:27:16	149.8	0.990	511.128	1.940	-0.578	706.490	
SPIKE_0000185.LAB	3/9/2020	15:27:31	149.8	0.990	511.235	1.951	-0.591	657.158	
SPIKE_0000186.LAB	3/9/2020	15:27:45	149.8	0.990	511.151	1.961	-0.583	651.299	
SPIKE_0000187.LAB	3/9/2020	15:28:00	149.8	0.990	511.266	1.964	-0.586	637.963	
SPIKE_0000188.LAB	3/9/2020	15:28:15	149.8	0.990	511.291	1.972	-0.582	607.366	
SPIKE_0000189.LAB	3/9/2020	15:28:30	149.8	0.990	511.318	1.973	-0.589	601.517	
SPIKE_0000190.LAB	3/9/2020	15:28:44	149.8	0.990	511.353	1.987	-0.603	597.782	
SPIKE_0000191.LAB	3/9/2020	15:28:59	149.8	0.990	511.584	1.992	-0.600	578.667	
SPIKE_0000192.LAB	3/9/2020	15:29:14	149.8	0.990	511.251	1.993	-0.590	566.815	
SPIKE_0000193.LAB	3/9/2020	15:29:32	149.8	0.991	511.647	2.069	-0.599	549.874	
SPIKE_0000194.LAB	3/9/2020	15:29:47	149.8	0.991	511.980	2.118	-0.593	514.504	
SPIKE_0000195.LAB	3/9/2020	15:30:02	149.8	0.991	512.043	2.124	-0.597	522.301	
SPIKE_0000196.LAB	3/9/2020	15:30:17	149.8	0.991	512.067	2.121	-0.596	520.361	
SPIKE_0000197.LAB	3/9/2020	15:30:35	149.8	0.991	512.154	2.115	-0.597	508.010	
SPIKE_0000198.LAB	3/9/2020	15:30:50	149.8	0.991	512.000	2.121	-0.595	519.474	
SPIKE_0000199.LAB	3/9/2020	15:31:05	149.8	0.991	512.083	2.126	-0.601	495.259	
SPIKE_0000200.LAB	3/9/2020	15:31:19	149.8	0.991	511.988	2.131	-0.596	507.172	
SPIKE_0000201.LAB	3/9/2020	15:31:34	149.7	0.991	512.036	2.119	-0.606	501.163	
SPIKE_0000202.LAB	3/9/2020	15:31:49	149.7	0.991	511.869	2.118	-0.604	509.036	
SPIKE_0000203.LAB	3/9/2020	15:32:04	149.8	0.991	512.174	2.124	-0.599	513.095	
SPIKE_0000204.LAB	3/9/2020	15:32:18	149.7	0.991	511.879	2.123	-0.602	489.778	
SPIKE_0000205.LAB	3/9/2020	15:32:33	149.7	0.998	509.750	2.134	-0.596	498.491	
SPIKE_0000206.LAB	3/9/2020	15:32:48	149.7	0.998	512.561	2.190	-0.608	495.240	Direct QA / Tracer
SPIKE_0000207.LAB	3/9/2020	15:33:03	149.7	0.998	512.418	2.190	-0.600	512.556	
SPIKE_0000208.LAB	3/9/2020	15:33:17	149.7	0.998	512.412	2.195	-0.602	497.797	
SPIKE_0000209.LAB	3/9/2020	15:33:32	149.7	0.998	512.406	2.200	-0.600	486.105	
SPIKE_0000210.LAB	3/9/2020	15:33:47	149.8	0.998	512.575	2.197	-0.609	481.264	
SPIKE_0000211.LAB	3/9/2020	15:34:02	149.8	0.998	512.403	2.199	-0.600	501.771	
SPIKE_0000212.LAB	3/9/2020	15:34:17	149.8	0.998	512.373	2.202	-0.607	481.858	
SPIKE_0000213.LAB	3/9/2020	15:34:31	149.8	0.998	512.459	2.201	-0.608	489.428	
SPIKE_0000214.LAB	3/9/2020	15:34:50	149.8	0.998	512.369	2.207	-0.603	489.732	
SPIKE_0000215.LAB	3/9/2020	15:35:08	149.8	1.014	492.244	2.130	-0.546	669.829	
SPIKE_0000216.LAB	3/9/2020	15:35:23	149.8	1.013	117.759	0.607	1.548	7824.816	
SPIKE_0000217.LAB	3/9/2020	15:35:37	149.8	1.007	57.501	0.239	1.886	7801.567	
SPIKE_0000302.LAB	3/9/2020	15:57:08	149.8	0.988	0.485	-0.024	2.169	8249.728	
SPIKE_0000303.LAB	3/9/2020	15:57:22	149.8	0.991	435.039	1.892	0.059	1919.178	
SPIKE_0000304.LAB	3/9/2020	15:57:37	149.7	0.991	510.273	2.021	-0.573	786.168	System QA / Tracer
SPIKE_0000305.LAB	3/9/2020	15:57:52	149.7	0.991	510.446	2.064	-0.590	681.372	
SPIKE_0000306.LAB	3/9/2020	15:58:07	149.8	0.991	510.691	2.073	-0.587	632.195	
SPIKE_0000307.LAB	3/9/2020	15:58:22	149.7	0.991	510.734	2.082	-0.594	591.894	
SPIKE_0000308.LAB	3/9/2020	15:58:36	149.7	0.991	510.645	2.089	-0.596	576.359	
SPIKE_0000309.LAB	3/9/2020	15:58:51	149.7	0.991	510.748	2.088	-0.597	564.237	
SPIKE_0000310.LAB	3/9/2020	15:59:06	149.7	0.991	510.584	2.098	-0.604	553.468	
SPIKE_0000311.LAB	3/9/2020	15:59:24	149.7	0.991	362.566	1.744	0.049	699.358	
SPIKE_0000312.LAB	3/9/2020	15:59:39	149.8	0.991	15.054	0.111	0.027	167.631	
SPIKE_0000313.LAB	3/9/2020	15:59:54	149.7	0.991	1.150	0.015	0.003	122.731	
SPIKE_0000314.LAB	3/9/2020	16:00:12	149.8	0.991	0.703	0.004	0.008	93.053	
SPIKE_0000315.LAB	3/9/2020	16:00:27	149.8	0.991	0.597	0.003	-0.006	72.671	
SPIKE_0000372.LAB	3/9/2020	16:15:25	149.8	0.998	-0.156	-0.016	2.082	8789.450	
SPIKE_0000373.LAB	3/9/2020	16:15:40	149.8	0.998	-0.206	-0.020	2.078	8718.402	Ambient
SPIKE_0000374.LAB	3/9/2020	16:15:58	149.8	0.998	-0.191	-0.020	2.087	8735.850	
SPIKE_0000375.LAB	3/9/2020	16:16:13	149.8	0.998	-0.166	-0.021	2.084	8720.663	

Spectrum	Date	Time	Temp (°C)	Pressure (ATM)	Ethane (ppm)	Ethylene Oxide (ppm)	Methane (ppm)	Water (ppm)	Action / Notes
SPIKE_0000376.LAB	3/9/2020	16:16:28	149.8	0.998	-0.204	-0.021	2.075	8727.330	
SPIKE_0000377.LAB	3/9/2020	16:16:49	149.8	0.998	-0.192	-0.026	2.077	8659.322	
SPIKE_0000378.LAB	3/9/2020	16:17:04	149.8	0.998	-0.172	-0.019	2.076	8586.719	
SPIKE_0000379.LAB	3/9/2020	16:17:23	149.8	0.998	-0.193	-0.018	2.075	8643.890	
SPIKE_0000380.LAB	3/9/2020	16:17:37	149.8	0.998	-0.173	-0.019	2.078	8715.642	
SPIKE_0000381.LAB	3/9/2020	16:17:52	149.8	0.998	-0.200	-0.019	2.079	8787.669	
SPIKE_0000382.LAB	3/9/2020	16:18:07	149.8	0.998	-0.175	-0.023	2.080	8831.206	
SPIKE_0000383.LAB	3/9/2020	16:18:22	149.8	0.998	-0.208	-0.022	2.086	8839.667	
SPIKE_0000384.LAB	3/9/2020	16:18:36	149.8	0.998	-0.187	-0.014	2.073	8973.987	
SPIKE_0000385.LAB	3/9/2020	16:18:51	149.8	0.998	0.075	-0.014	2.132	10730.459	
SPIKE_0000386.LAB	3/9/2020	16:19:06	149.8	0.998	0.409	-0.005	2.115	9394.624	
SPIKE_0000387.LAB	3/9/2020	16:19:21	149.8	0.998	137.983	0.611	1.434	7928.263	QA Dynamic Spike (Ambient Air)
SPIKE_0000388.LAB	3/9/2020	16:19:35	149.8	0.998	66.237	0.290	1.830	7425.866	
SPIKE_0000389.LAB	3/9/2020	16:19:50	149.8	0.998	43.539	0.147	1.922	8060.879	
SPIKE_0000390.LAB	3/9/2020	16:20:05	149.8	0.998	43.138	0.142	1.933	8084.586	
SPIKE_0000391.LAB	3/9/2020	16:20:20	149.8	0.998	43.207	0.144	1.929	8124.022	
SPIKE_0000392.LAB	3/9/2020	16:20:34	149.8	0.998	43.164	0.143	1.932	8073.317	
SPIKE_0000393.LAB	3/9/2020	16:20:53	149.8	0.998	43.147	0.143	1.941	8042.869	
SPIKE_0000394.LAB	3/9/2020	16:21:11	149.8	0.998	43.119	0.143	1.928	8098.527	
SPIKE_0000395.LAB	3/9/2020	16:21:29	149.8	0.998	43.072	0.141	1.948	8056.605	
SPIKE_0000396.LAB	3/9/2020	16:21:44	149.8	0.998	42.947	0.141	1.938	8086.765	
SPIKE_0000397.LAB	3/9/2020	16:22:02	149.8	0.998	7.968	0.014	2.049	8433.892	
SPIKE_0000398.LAB	3/9/2020	16:22:17	149.7	0.998	0.081	-0.020	2.083	8602.571	
SPIKE_0000399.LAB	3/9/2020	16:22:36	149.8	0.998	-0.045	-0.019	2.077	8585.543	
SPIKE_0000400.LAB	3/9/2020	16:22:50	149.8	0.998	-0.102	-0.017	2.100	8588.880	Ambient
SPIKE_0000401.LAB	3/9/2020	16:23:05	149.8	0.998	-0.105	-0.022	2.084	8610.260	
SPIKE_0000402.LAB	3/9/2020	16:23:27	149.8	0.998	-0.131	-0.019	2.079	8610.793	
SPIKE_0000403.LAB	3/9/2020	16:23:42	149.8	0.998	-0.148	-0.018	2.084	8595.716	
SPIKE_0000404.LAB	3/9/2020	16:23:56	149.8	0.998	-0.133	-0.019	2.102	8625.771	
SPIKE_0000405.LAB	3/9/2020	16:24:11	149.8	0.998	-0.136	-0.017	2.087	8635.147	
SPIKE_0000406.LAB	3/9/2020	16:24:26	149.8	0.998	-0.141	-0.019	2.106	8609.887	
SPIKE_0000407.LAB	3/9/2020	16:24:44	149.8	0.998	-0.179	-0.020	2.096	8633.551	
SPIKE_0000408.LAB	3/9/2020	16:24:59	149.8	0.998	-0.150	-0.024	2.091	8578.270	
SPIKE_0000409.LAB	3/9/2020	16:25:21	149.8	0.998	-0.175	-0.020	2.097	8606.954	
SPIKE_0000410.LAB	3/9/2020	16:25:39	149.7	0.998	-0.174	-0.020	2.070	8643.224	
SPIKE_0000411.LAB	3/9/2020	16:25:54	149.7	0.998	-0.160	-0.024	2.089	8679.977	
SPIKE_0000412.LAB	3/9/2020	16:26:08	149.8	0.998	-0.131	-0.021	2.080	8629.562	
SPIKE_0000413.LAB	3/9/2020	16:26:23	149.8	0.998	-0.195	-0.019	2.078	8616.809	
SPIKE_0000414.LAB	3/9/2020	16:26:42	149.8	0.998	-0.163	-0.018	2.083	8604.331	
SPIKE_0000415.LAB	3/9/2020	16:27:00	149.8	0.998	-0.191	-0.024	2.081	8557.008	
SPIKE_0000416.LAB	3/9/2020	16:27:14	149.8	0.998	-0.184	-0.026	2.087	8659.357	
SPIKE_0000417.LAB	3/9/2020	16:27:29	149.8	0.998	-0.169	-0.021	2.086	8724.518	
SPIKE_0000418.LAB	3/9/2020	16:27:44	149.8	0.998	-0.185	-0.025	2.093	8619.472	
SPIKE_0000419.LAB	3/9/2020	16:27:59	149.8	0.998	-0.181	-0.022	2.089	8624.647	
SPIKE_0000420.LAB	3/9/2020	16:28:14	149.8	0.998	-0.168	-0.022	2.087	8627.867	
SPIKE_0000421.LAB	3/9/2020	16:28:28	149.8	0.998	-0.208	-0.017	2.091	8671.875	
SPIKE_0000422.LAB	3/9/2020	16:28:43	149.8	0.998	-0.171	-0.020	2.093	8636.902	
SPIKE_0000423.LAB	3/9/2020	16:28:58	149.8	0.998	-0.218	-0.022	2.093	8610.161	
SPIKE_0000424.LAB	3/9/2020	16:29:13	149.8	0.998	-0.187	-0.022	2.082	8678.251	
SPIKE_0000425.LAB	3/9/2020	16:29:27	149.8	0.998	-0.194	-0.021	2.082	8733.513	
SPIKE_0000426.LAB	3/9/2020	16:29:42	149.8	0.998	-0.160	-0.020	2.076	8692.324	
SPIKE_0000427.LAB	3/9/2020	16:29:57	149.8	0.998	-0.206	-0.020	2.080	8686.375	
METHOD 301 VALIDATION									
SAMPLE_0000210.LAB	3/9/2020	19:45:07	149.8	0.997	-0.184	0.358	4.198	13631.833	Unspiked #1
SAMPLE_0000211.LAB	3/9/2020	19:45:22	149.8	0.997	-0.193	0.359	4.204	13566.924	
SAMPLE_0000212.LAB	3/9/2020	19:45:44	149.8	0.997	-0.173	0.360	4.192	13534.663	
SAMPLE_0000213.LAB	3/9/2020	19:45:59	149.8	0.997	-0.173	0.373	4.181	13511.280	
SAMPLE_0000214.LAB	3/9/2020	19:46:13	149.8	0.997	-0.184	0.364	4.202	13502.741	
SAMPLE_0000215.LAB	3/9/2020	19:46:28	149.8	0.997	-0.195	0.367	4.185	13485.480	
SAMPLE_0000216.LAB	3/9/2020	19:46:43	149.9	0.997	-0.190	0.363	4.193	13480.394	
SAMPLE_0000217.LAB	3/9/2020	19:46:58	149.9	0.997	-0.196	0.363	4.156	13468.411	
SAMPLE_0000218.LAB	3/9/2020	19:47:13	149.8	0.997	-0.196	0.360	4.176	13497.286	
SAMPLE_0000219.LAB	3/9/2020	19:47:27	149.8	0.997	-0.174	0.372	4.159	13614.579	
SAMPLE_0000220.LAB	3/9/2020	19:47:46	149.9	0.997	-0.208	0.368	4.187	13714.837	
SAMPLE_0000221.LAB	3/9/2020	19:48:01	149.8	0.997	-0.196	0.374	4.191	13714.004	
SAMPLE_0000222.LAB	3/9/2020	19:48:15	149.8	0.987	-0.120	0.392	4.210	13724.160	
SAMPLE_0000223.LAB	3/9/2020	19:48:30	149.8	0.987	-0.012	0.387	4.192	13591.441	
SAMPLE_0000224.LAB	3/9/2020	19:48:45	149.8	0.997	0.183	0.384	4.200	13560.828	
SAMPLE_0000225.LAB	3/9/2020	19:49:03	149.8	0.997	-0.181	0.388	4.187	13554.959	
SAMPLE_0000226.LAB	3/9/2020	19:49:18	149.8	0.997	-0.208	0.358	4.193	13485.644	
SAMPLE_0000227.LAB	3/9/2020	19:49:36	149.8	0.997	-0.199	0.355	4.188	13562.923	
SAMPLE_0000228.LAB	3/9/2020	19:49:51	149.8	0.997	12.429	0.386	4.062	13499.667	Start Response Time (RT) Calc.
SAMPLE_0000229.LAB	3/9/2020	19:50:06	149.8	0.997	25.977	0.412	3.985	13325.258	
SAMPLE_0000230.LAB	3/9/2020	19:50:20	149.8	0.997	29.431	0.412	3.939	13322.066	
SAMPLE_0000231.LAB	3/9/2020	19:50:35	149.8	0.997	32.220	0.415	3.905	13122.612	
SAMPLE_0000232.LAB	3/9/2020	19:50:50	149.8	0.997	34.301	0.409	3.910	12928.841	
SAMPLE_0000233.LAB	3/9/2020	19:51:08	149.8	0.997	35.946	0.426	3.950	12833.646	Spiked #1
SAMPLE_0000234.LAB	3/9/2020	19:51:23	149.8	0.997	37.186	0.439	3.937	12746.142	
SAMPLE_0000235.LAB	3/9/2020	19:51:38	149.8	0.997	37.918	0.446	3.908	12796.520	Stop RT Calc.
SAMPLE_0000236.LAB	3/9/2020	19:51:52	149.8	0.997	38.800	0.444	3.861	12834.753	
SAMPLE_0000237.LAB	3/9/2020	19:52:07	149.8	0.997	39.264	0.461	3.897	12885.993	
SAMPLE_0000238.LAB	3/9/2020	19:52:22	149.8	0.997	39.494	0.465	3.862	12902.219	
SAMPLE_0000239.LAB	3/9/2020	19:52:37	149.8	0.997	39.595	0.474	3.883	12915.775	
SAMPLE_0000240.LAB	3/9/2020	19:52:51	149.8	0.997	39.677	0.477	3.907	12826.967	
SAMPLE_0000241.LAB	3/9/2020	19:53:06	149.9	0.997	39.604	0.475	3.919	12753.334	

Spectrum	Date	Time	Temp (°C)	Pressure (ATM)	Ethane (ppm)	Ethylene Oxide (ppm)	Methane (ppm)	Water (ppm)	Action / Notes
SAMPLE_0000242.LAB	3/9/2020	19:53:21	149.8	0.997	39.591	0.476	3.894	12723.478	
SAMPLE_0000243.LAB	3/9/2020	19:53:36	149.8	0.997	39.485	0.472	3.868	12732.472	
SAMPLE_0000244.LAB	3/9/2020	19:53:51	149.8	0.997	39.387	0.470	3.857	12813.324	
SAMPLE_0000245.LAB	3/9/2020	19:54:05	149.8	0.997	39.360	0.486	3.857	12876.318	
SAMPLE_0000246.LAB	3/9/2020	19:54:20	149.8	0.997	39.280	0.476	3.855	12914.524	
SAMPLE_0000247.LAB	3/9/2020	19:54:38	149.8	0.997	39.039	0.464	3.838	12934.518	
SAMPLE_0000248.LAB	3/9/2020	19:54:53	149.8	0.997	38.986	0.460	3.841	12957.518	
SAMPLE_0000249.LAB	3/9/2020	19:55:08	149.8	0.997	38.843	0.447	3.847	12952.437	
SAMPLE_0000250.LAB	3/9/2020	19:55:30	149.8	0.997	38.749	0.462	3.902	12845.050	
SAMPLE_0000251.LAB	3/9/2020	19:55:44	149.9	0.997	38.688	0.461	3.938	12731.026	
SAMPLE_0000252.LAB	3/9/2020	19:56:03	149.8	0.997	38.545	0.447	3.899	12745.864	
SAMPLE_0000253.LAB	3/9/2020	19:56:17	149.9	0.997	38.490	0.454	3.853	12849.980	
SAMPLE_0000254.LAB	3/9/2020	19:56:32	149.8	0.997	38.351	0.433	3.881	12908.272	
SAMPLE_0000255.LAB	3/9/2020	19:56:47	149.8	0.997	38.320	0.438	3.862	12945.063	
SAMPLE_0000256.LAB	3/9/2020	19:57:06	149.8	0.997	38.244	0.430	3.849	12955.888	
SAMPLE_0000257.LAB	3/9/2020	19:57:20	149.8	0.997	38.151	0.431	3.865	12966.004	
SAMPLE_0000258.LAB	3/9/2020	19:57:35	149.8	0.997	38.170	0.440	3.928	12932.067	
SAMPLE_0000259.LAB	3/9/2020	19:57:50	149.9	0.997	38.101	0.462	3.966	12837.927	
SAMPLE_0000260.LAB	3/9/2020	19:58:08	149.8	0.997	38.021	0.449	3.946	12745.064	
SAMPLE_0000261.LAB	3/9/2020	19:58:23	149.8	0.997	37.939	0.460	3.900	12781.957	
SAMPLE_0000262.LAB	3/9/2020	19:58:38	149.8	0.997	37.872	0.454	3.897	12862.401	
SAMPLE_0000263.LAB	3/9/2020	19:58:52	149.8	0.997	37.798	0.439	3.894	12899.257	
SAMPLE_0000264.LAB	3/9/2020	19:59:11	149.8	0.997	37.801	0.456	3.891	12915.934	
SAMPLE_0000265.LAB	3/9/2020	19:59:25	149.8	0.997	37.694	0.452	3.858	12921.071	
SAMPLE_0000266.LAB	3/9/2020	19:59:40	149.8	0.997	37.594	0.451	3.867	12910.675	
SAMPLE_0000267.LAB	3/9/2020	19:59:55	149.8	0.997	37.559	0.457	3.876	12918.443	
SAMPLE_0000268.LAB	3/9/2020	20:00:10	149.8	0.997	37.513	0.459	3.874	12917.461	
SAMPLE_0000269.LAB	3/9/2020	20:00:24	149.8	0.997	37.467	0.475	3.879	12928.365	
SAMPLE_0000270.LAB	3/9/2020	20:00:39	149.8	0.997	37.436	0.476	3.893	12939.779	
SAMPLE_0000271.LAB	3/9/2020	20:00:57	149.8	0.997	37.320	0.476	3.871	12976.501	
SAMPLE_0000272.LAB	3/9/2020	20:01:12	149.8	0.997	37.295	0.470	3.932	12914.458	
SAMPLE_0000273.LAB	3/9/2020	20:01:30	149.8	0.997	37.234	0.478	3.951	12808.498	
SAMPLE_0000274.LAB	3/9/2020	20:01:45	149.8	0.997	37.218	0.461	3.951	12715.569	
SAMPLE_0000275.LAB	3/9/2020	20:02:00	149.8	0.997	37.181	0.462	3.886	12737.492	
SAMPLE_0000276.LAB	3/9/2020	20:02:15	149.8	0.997	37.119	0.453	3.891	12793.851	
SAMPLE_0000277.LAB	3/9/2020	20:02:30	149.8	0.997	37.105	0.442	3.902	12839.702	
SAMPLE_0000278.LAB	3/9/2020	20:02:45	149.8	0.997	37.023	0.430	3.857	12827.096	
SAMPLE_0000279.LAB	3/9/2020	20:02:59	149.8	0.997	36.984	0.438	3.873	12798.057	
SAMPLE_0000280.LAB	3/9/2020	20:03:18	149.9	0.997	36.952	0.453	3.845	12829.676	
SAMPLE_0000281.LAB	3/9/2020	20:03:32	149.8	0.997	36.834	0.455	3.874	12841.898	
SAMPLE_0000282.LAB	3/9/2020	20:03:47	149.8	0.997	36.829	0.456	3.884	12864.162	
SAMPLE_0000283.LAB	3/9/2020	20:04:02	149.8	0.997	36.808	0.459	3.860	12857.954	
SAMPLE_0000284.LAB	3/9/2020	20:04:17	149.8	0.997	20.321	0.404	4.025	13084.326	
SAMPLE_0000285.LAB	3/9/2020	20:04:31	149.8	0.997	0.239	0.352	4.273	13532.164	
SAMPLE_0000286.LAB	3/9/2020	20:04:46	149.8	0.997	-0.075	0.341	4.264	13418.950	
SAMPLE_0000287.LAB	3/9/2020	20:05:01	149.8	0.997	-0.164	0.343	4.229	13396.814	Unspiked #2
SAMPLE_0000288.LAB	3/9/2020	20:05:16	149.8	0.997	-0.132	0.349	4.176	13478.190	
SAMPLE_0000289.LAB	3/9/2020	20:05:57	149.8	0.997	-0.165	0.366	4.171	13579.649	
SAMPLE_0000290.LAB	3/9/2020	20:06:27	149.8	0.997	-0.199	0.378	4.161	13646.569	
SAMPLE_0000291.LAB	3/9/2020	20:06:57	149.8	0.997	-0.215	0.379	4.159	13663.600	
SAMPLE_0000292.LAB	3/9/2020	20:07:26	149.8	0.997	-0.197	0.371	4.225	13655.711	
SAMPLE_0000293.LAB	3/9/2020	20:07:55	149.7	0.997	-0.201	0.359	4.256	13464.976	
SAMPLE_0000294.LAB	3/9/2020	20:08:25	149.8	0.997	-0.218	0.361	4.203	13524.011	
SAMPLE_0000295.LAB	3/9/2020	20:08:58	149.8	0.997	-0.219	0.363	4.179	13791.045	
SAMPLE_0000296.LAB	3/9/2020	20:09:31	149.8	0.997	-0.209	0.348	4.160	13752.696	
SAMPLE_0000297.LAB	3/9/2020	20:10:04	149.8	0.997	-0.220	0.353	4.169	13658.083	
SAMPLE_0000298.LAB	3/9/2020	20:10:34	149.8	0.997	-0.211	0.353	4.155	13622.926	
SAMPLE_0000299.LAB	3/9/2020	20:11:03	149.7	0.997	-0.222	0.351	4.174	13611.341	
SAMPLE_0000300.LAB	3/9/2020	20:11:33	149.8	0.997	-0.218	0.362	4.157	13592.686	
SAMPLE_0000301.LAB	3/9/2020	20:12:06	149.8	0.997	-0.208	0.364	4.148	13690.771	
SAMPLE_0000302.LAB	3/9/2020	20:12:36	149.8	0.997	14.587	0.417	4.042	13583.821	
SAMPLE_0000303.LAB	3/9/2020	20:13:05	149.8	0.997	28.767	0.444	3.959	13167.757	
SAMPLE_0000304.LAB	3/9/2020	20:13:35	149.8	0.997	33.301	0.437	3.943	12910.875	
SAMPLE_0000305.LAB	3/9/2020	20:14:04	149.8	0.997	35.853	0.455	3.907	12824.190	
SAMPLE_0000306.LAB	3/9/2020	20:14:37	149.8	0.997	37.205	0.455	3.871	12848.089	Spiked #2
SAMPLE_0000307.LAB	3/9/2020	20:15:07	149.8	0.997	37.686	0.452	3.883	12933.856	
SAMPLE_0000308.LAB	3/9/2020	20:15:37	149.8	0.997	37.854	0.468	3.916	12834.748	
SAMPLE_0000309.LAB	3/9/2020	20:16:17	149.8	0.997	37.681	0.474	3.896	12718.078	
SAMPLE_0000310.LAB	3/9/2020	20:16:53	149.8	0.997	37.442	0.484	3.856	12839.618	
SAMPLE_0000311.LAB	3/9/2020	20:17:23	149.8	0.997	37.165	0.484	3.862	12920.978	
SAMPLE_0000312.LAB	3/9/2020	20:17:52	149.9	0.997	37.001	0.497	3.913	12827.541	
SAMPLE_0000313.LAB	3/9/2020	20:18:25	149.8	0.997	36.860	0.486	3.920	12678.212	
SAMPLE_0000314.LAB	3/9/2020	20:18:58	149.8	0.997	36.685	0.472	3.846	12751.204	
SAMPLE_0000315.LAB	3/9/2020	20:19:31	149.8	0.997	36.556	0.457	3.840	12873.857	
SAMPLE_0000316.LAB	3/9/2020	20:20:01	149.8	0.997	36.482	0.454	3.873	12873.973	
SAMPLE_0000317.LAB	3/9/2020	20:20:30	149.8	0.997	36.425	0.451	3.937	12687.001	
SAMPLE_0000318.LAB	3/9/2020	20:21:04	149.9	0.997	36.348	0.464	3.886	12650.234	
SAMPLE_0000319.LAB	3/9/2020	20:21:33	149.8	0.997	36.299	0.467	3.880	12796.827	
SAMPLE_0000320.LAB	3/9/2020	20:22:02	149.8	0.997	18.608	0.414	3.992	13094.301	
SAMPLE_0000321.LAB	3/9/2020	20:22:32	149.9	0.997	-0.067	0.361	4.156	13655.821	
SAMPLE_0000322.LAB	3/9/2020	20:23:02	149.8	0.997	-0.175	0.364	4.212	13635.770	
SAMPLE_0000323.LAB	3/9/2020	20:23:31	149.8	0.997	-0.179	0.356	4.233	13452.280	Unspiked #3
SAMPLE_0000324.LAB	3/9/2020	20:24:01	149.8	0.997	-0.204	0.344	4.139	13481.963	
SAMPLE_0000325.LAB	3/9/2020	20:24:30	149.8	0.997	-0.194	0.336	4.133	13582.938	
SAMPLE_0000326.LAB	3/9/2020	20:25:00	149.8	0.997	-0.196	0.342	4.136	13640.182	

Spectrum	Date	Time	Temp (°C)	Pressure (ATM)	Ethane (ppm)	Ethylene Oxide (ppm)	Methane (ppm)	Water (ppm)	Action / Notes
SAMPLE_0000327.LAB	3/9/2020	20:25:29	149.8	0.997	-0.213	0.341	4.206	13573.493	
SAMPLE_0000328.LAB	3/9/2020	20:25:59	149.8	0.997	-0.209	0.335	4.142	13402.171	
SAMPLE_0000329.LAB	3/9/2020	20:26:28	149.9	0.997	-0.203	0.340	4.133	13445.910	
SAMPLE_0000330.LAB	3/9/2020	20:26:58	149.8	0.997	-0.220	0.347	4.147	13538.719	
SAMPLE_0000331.LAB	3/9/2020	20:27:28	149.8	0.997	-0.214	0.348	4.133	13565.031	
SAMPLE_0000332.LAB	3/9/2020	20:27:57	149.8	0.997	-0.226	0.352	4.143	13598.443	
SAMPLE_0000333.LAB	3/9/2020	20:28:27	149.8	0.997	-0.197	0.358	4.188	13562.174	
SAMPLE_0000334.LAB	3/9/2020	20:29:00	149.9	0.997	-0.207	0.347	4.227	13382.740	
SAMPLE_0000335.LAB	3/9/2020	20:29:29	149.9	0.997	-0.202	0.334	4.131	13385.875	
SAMPLE_0000336.LAB	3/9/2020	20:30:02	149.8	0.997	-0.222	0.324	4.113	13451.290	
SAMPLE_0000337.LAB	3/9/2020	20:30:32	149.9	0.997	-0.206	0.322	4.111	13502.883	
SAMPLE_0000338.LAB	3/9/2020	20:31:05	149.8	0.997	-0.224	0.323	4.191	13477.191	
SAMPLE_0000339.LAB	3/9/2020	20:31:35	149.8	0.997	18.467	0.384	4.060	13068.291	
SAMPLE_0000340.LAB	3/9/2020	20:32:04	149.8	0.997	29.618	0.436	3.906	12818.854	
SAMPLE_0000341.LAB	3/9/2020	20:32:34	149.8	0.997	33.766	0.457	3.889	12729.058	Spiked #3
SAMPLE_0000342.LAB	3/9/2020	20:33:03	149.8	0.997	36.067	0.478	3.878	12707.883	
SAMPLE_0000343.LAB	3/9/2020	20:33:40	149.8	0.997	37.255	0.493	3.829	12689.169	
SAMPLE_0000344.LAB	3/9/2020	20:34:09	149.9	0.997	37.740	0.494	3.842	12691.274	
SAMPLE_0000345.LAB	3/9/2020	20:34:43	149.8	0.997	37.746	0.470	3.830	12697.383	
SAMPLE_0000346.LAB	3/9/2020	20:35:12	149.8	0.997	37.530	0.446	3.901	12702.309	
SAMPLE_0000347.LAB	3/9/2020	20:35:42	149.8	0.997	37.398	0.433	3.977	12534.919	
SAMPLE_0000348.LAB	3/9/2020	20:36:11	149.9	0.997	37.224	0.437	3.877	12515.016	
SAMPLE_0000349.LAB	3/9/2020	20:36:44	149.8	0.997	36.955	0.436	3.888	12595.600	
SAMPLE_0000350.LAB	3/9/2020	20:37:14	149.8	0.997	36.779	0.451	3.871	12630.104	
SAMPLE_0000351.LAB	3/9/2020	20:37:47	149.8	0.997	28.881	0.436	3.937	12675.856	
SAMPLE_0000352.LAB	3/9/2020	20:38:20	149.8	0.997	0.073	0.338	4.153	13236.515	
SAMPLE_0000353.LAB	3/9/2020	20:38:49	149.8	0.997	-0.142	0.345	4.179	13382.267	Unspiked #4
SAMPLE_0000354.LAB	3/9/2020	20:39:26	149.9	0.997	-0.183	0.350	4.185	13444.628	
SAMPLE_0000355.LAB	3/9/2020	20:39:56	149.8	0.997	-0.192	0.349	4.180	13462.142	
SAMPLE_0000356.LAB	3/9/2020	20:40:25	149.8	0.997	-0.196	0.340	4.174	13478.038	
SAMPLE_0000357.LAB	3/9/2020	20:41:02	149.8	0.997	-0.203	0.335	4.194	13467.986	
SAMPLE_0000358.LAB	3/9/2020	20:41:31	149.8	0.997	-0.194	0.329	4.306	13348.556	
SAMPLE_0000359.LAB	3/9/2020	20:42:01	149.8	0.997	-0.189	0.313	4.175	13256.528	
SAMPLE_0000360.LAB	3/9/2020	20:42:34	149.8	0.997	0.195	0.330	4.178	13525.511	
SAMPLE_0000361.LAB	3/9/2020	20:43:03	149.8	0.997	23.039	0.406	4.047	13723.717	
SAMPLE_0000362.LAB	3/9/2020	20:43:37	149.8	0.997	30.717	0.421	3.973	13130.103	
SAMPLE_0000363.LAB	3/9/2020	20:44:06	149.8	0.997	34.587	0.448	3.959	12846.430	
SAMPLE_0000364.LAB	3/9/2020	20:44:39	149.7	0.997	36.562	0.460	3.941	12763.613	
SAMPLE_0000365.LAB	3/9/2020	20:45:09	149.8	0.997	37.562	0.468	3.941	12710.737	
SAMPLE_0000366.LAB	3/9/2020	20:45:38	149.8	0.997	44.536	0.480	3.825	12591.976	
SAMPLE_0000367.LAB	3/9/2020	20:46:11	149.8	0.997	44.446	0.468	3.837	12640.482	Spiked #4
SAMPLE_0000368.LAB	3/9/2020	20:46:44	149.7	0.997	44.027	0.460	3.894	12488.074	
SAMPLE_0000369.LAB	3/9/2020	20:47:17	149.7	0.997	43.734	0.452	3.897	12378.221	
SAMPLE_0000370.LAB	3/9/2020	20:47:47	149.8	0.997	43.349	0.449	3.876	12379.406	
SAMPLE_0000371.LAB	3/9/2020	20:48:16	149.8	0.997	43.208	0.460	3.826	12509.870	
SAMPLE_0000372.LAB	3/9/2020	20:48:46	149.8	0.997	42.884	0.471	3.846	12603.785	
SAMPLE_0000373.LAB	3/9/2020	20:49:22	149.8	0.997	42.652	0.487	3.915	12468.270	
SAMPLE_0000374.LAB	3/9/2020	20:49:52	149.8	0.997	42.466	0.492	3.882	12359.970	
SAMPLE_0000375.LAB	3/9/2020	20:50:28	149.8	0.997	42.344	0.494	3.841	12487.841	
SAMPLE_0000376.LAB	3/9/2020	20:50:58	149.8	0.997	42.192	0.482	3.828	12601.400	
SAMPLE_0000377.LAB	3/9/2020	20:51:27	149.7	0.997	32.060	0.434	3.967	12660.805	
SAMPLE_0000378.LAB	3/9/2020	20:51:57	149.8	0.997	0.126	0.305	4.223	13261.281	
SAMPLE_0000379.LAB	3/9/2020	20:52:26	149.8	0.997	-0.068	0.293	4.151	13405.235	Unspiked #5
SAMPLE_0000380.LAB	3/9/2020	20:52:56	149.7	0.997	-0.028	0.305	4.144	13451.448	
SAMPLE_0000381.LAB	3/9/2020	20:53:25	149.8	0.997	-0.008	0.303	4.154	13455.889	
SAMPLE_0000382.LAB	3/9/2020	20:53:55	149.8	0.997	-0.032	0.315	4.160	13460.234	
SAMPLE_0000383.LAB	3/9/2020	20:54:25	149.8	0.997	-0.062	0.319	4.267	13331.829	
SAMPLE_0000384.LAB	3/9/2020	20:54:54	149.8	0.997	-0.109	0.322	4.181	13207.860	
SAMPLE_0000385.LAB	3/9/2020	20:55:27	149.8	0.997	-0.140	0.334	4.157	13323.369	
SAMPLE_0000386.LAB	3/9/2020	20:55:57	149.8	0.997	-0.145	0.340	4.128	13400.395	
SAMPLE_0000387.LAB	3/9/2020	20:56:26	149.8	0.997	-0.188	0.337	4.134	13435.566	
SAMPLE_0000388.LAB	3/9/2020	20:56:59	149.8	0.997	-0.172	0.330	4.139	13447.408	
SAMPLE_0000389.LAB	3/9/2020	20:57:29	149.8	0.997	-0.196	0.316	4.116	13458.670	
SAMPLE_0000390.LAB	3/9/2020	20:57:58	149.8	0.997	9.346	0.337	4.089	13247.170	
SAMPLE_0000391.LAB	3/9/2020	20:58:28	149.8	0.997	31.173	0.412	3.998	12610.977	
SAMPLE_0000392.LAB	3/9/2020	20:58:57	149.9	0.997	37.192	0.434	3.852	12454.500	
SAMPLE_0000393.LAB	3/9/2020	20:59:31	149.9	0.997	40.867	0.448	3.820	12456.674	
SAMPLE_0000394.LAB	3/9/2020	21:00:00	149.8	0.997	42.559	0.455	3.811	12458.275	Spiked #5
SAMPLE_0000395.LAB	3/9/2020	21:00:30	149.8	0.997	43.412	0.459	3.826	12443.509	
SAMPLE_0000396.LAB	3/9/2020	21:00:59	149.8	0.997	43.686	0.467	3.814	12463.696	
SAMPLE_0000397.LAB	3/9/2020	21:01:32	149.8	0.997	43.666	0.473	3.829	12475.562	
SAMPLE_0000398.LAB	3/9/2020	21:02:05	149.8	0.997	43.522	0.460	3.825	12495.702	
SAMPLE_0000399.LAB	3/9/2020	21:02:35	149.8	0.997	43.322	0.450	3.895	12490.365	
SAMPLE_0000400.LAB	3/9/2020	21:03:04	149.8	0.997	43.128	0.440	3.914	12315.997	
SAMPLE_0000401.LAB	3/9/2020	21:03:34	149.8	0.997	42.908	0.440	3.831	12336.337	
SAMPLE_0000402.LAB	3/9/2020	21:04:03	149.8	0.997	42.783	0.443	3.820	12521.937	
SAMPLE_0000403.LAB	3/9/2020	21:04:36	149.8	0.997	42.721	0.457	3.861	12574.070	
SAMPLE_0000404.LAB	3/9/2020	21:05:06	149.8	0.997	42.640	0.463	3.869	12460.086	
SAMPLE_0000405.LAB	3/9/2020	21:05:35	149.7	0.997	42.527	0.463	3.843	12413.629	
SAMPLE_0000406.LAB	3/9/2020	21:06:05	149.8	0.998	42.436	0.467	3.859	12393.329	
SAMPLE_0000407.LAB	3/9/2020	21:06:38	149.7	0.998	41.691	0.464	3.864	12396.361	
SAMPLE_0000408.LAB	3/9/2020	21:07:07	149.8	0.998	2.157	0.336	4.118	13330.034	
SAMPLE_0000409.LAB	3/9/2020	21:07:37	149.8	0.998	-0.106	0.310	4.151	13503.892	
SAMPLE_0000410.LAB	3/9/2020	21:08:06	149.8	0.998	-0.145	0.302	4.206	13343.178	Unspiked #6
SAMPLE_0000411.LAB	3/9/2020	21:08:36	149.7	0.998	-0.162	0.288	4.203	13238.768	

Spectrum	Date	Time	Temp (°C)	Pressure (ATM)	Ethane (ppm)	Ethylene Oxide (ppm)	Methane (ppm)	Water (ppm)	Action / Notes
SAMPLE_0000412.LAB	3/9/2020	21:09:05	149.8	0.998	-0.183	0.293	4.140	13280.564	
SAMPLE_0000413.LAB	3/9/2020	21:09:35	149.7	0.998	-0.167	0.292	4.132	13445.899	
SAMPLE_0000414.LAB	3/9/2020	21:10:05	149.8	0.998	-0.175	0.302	4.187	13481.525	
SAMPLE_0000415.LAB	3/9/2020	21:10:34	149.8	0.998	-0.201	0.305	4.257	13300.507	
SAMPLE_0000416.LAB	3/9/2020	21:11:07	149.8	0.998	-0.175	0.318	4.229	13207.204	
SAMPLE_0000417.LAB	3/9/2020	21:11:37	149.8	0.998	-0.210	0.320	4.157	13314.509	
SAMPLE_0000418.LAB	3/9/2020	21:12:10	149.8	0.998	-0.196	0.330	4.155	13427.005	
SAMPLE_0000419.LAB	3/9/2020	21:12:43	149.8	0.998	-0.204	0.335	4.188	13495.999	
SAMPLE_0000420.LAB	3/9/2020	21:13:16	149.8	0.998	-0.194	0.321	4.299	13349.272	
SAMPLE_0000421.LAB	3/9/2020	21:13:45	149.9	0.997	18.469	0.361	4.083	12917.955	
SAMPLE_0000422.LAB	3/9/2020	21:14:15	149.8	0.997	33.834	0.414	3.892	12744.699	
SAMPLE_0000423.LAB	3/9/2020	21:14:51	149.9	0.998	39.512	0.424	3.841	12631.216	
SAMPLE_0000424.LAB	3/9/2020	21:15:21	149.9	0.997	42.338	0.433	3.821	12591.814	
SAMPLE_0000425.LAB	3/9/2020	21:15:51	149.8	0.997	43.650	0.437	3.893	12516.122	Spiked #6
SAMPLE_0000426.LAB	3/9/2020	21:16:20	149.8	0.997	44.315	0.451	3.894	12321.798	
SAMPLE_0000427.LAB	3/9/2020	21:16:49	149.8	0.997	44.460	0.453	3.812	12352.749	
SAMPLE_0000428.LAB	3/9/2020	21:17:19	149.8	0.997	44.384	0.462	3.827	12445.846	
SAMPLE_0000429.LAB	3/9/2020	21:17:49	149.8	0.997	44.196	0.464	3.838	12477.025	
SAMPLE_0000430.LAB	3/9/2020	21:18:18	149.8	0.997	44.005	0.459	3.830	12469.710	
SAMPLE_0000431.LAB	3/9/2020	21:18:51	149.8	0.997	43.854	0.448	3.807	12481.644	
SAMPLE_0000432.LAB	3/9/2020	21:19:24	149.9	0.997	43.658	0.438	3.827	12494.648	
SAMPLE_0000433.LAB	3/9/2020	21:19:57	149.8	0.998	43.510	0.432	3.813	12497.126	
SAMPLE_0000434.LAB	3/9/2020	21:20:27	149.8	0.998	43.379	0.442	3.879	12464.513	
SAMPLE_0000435.LAB	3/9/2020	21:20:56	149.8	0.998	43.265	0.462	3.932	12290.150	
SAMPLE_0000436.LAB	3/9/2020	21:21:26	149.9	0.998	28.868	0.422	3.944	12578.398	
SAMPLE_0000437.LAB	3/9/2020	21:21:56	149.8	0.998	0.039	0.317	4.141	13458.324	
SAMPLE_0000438.LAB	3/9/2020	21:22:25	149.8	0.998	-0.113	0.329	4.166	13456.637	
SAMPLE_0000439.LAB	3/9/2020	21:22:55	149.8	0.998	-0.100	0.329	4.153	13378.229	
SAMPLE_0000440.LAB	3/9/2020	21:23:24	149.8	0.998	-0.160	0.323	4.148	13304.326	Unspiked #7
SAMPLE_0000441.LAB	3/9/2020	21:23:54	149.8	0.998	-0.177	0.313	4.133	13280.324	
SAMPLE_0000442.LAB	3/9/2020	21:24:23	149.8	0.998	-0.175	0.299	4.160	13278.715	
SAMPLE_0000443.LAB	3/9/2020	21:24:56	149.8	0.998	-0.176	0.296	4.093	13458.562	
SAMPLE_0000444.LAB	3/9/2020	21:25:26	149.8	0.998	-0.165	0.291	4.189	13471.061	
SAMPLE_0000445.LAB	3/9/2020	21:25:55	149.8	0.997	-0.178	0.294	4.189	13340.322	
SAMPLE_0000446.LAB	3/9/2020	21:26:25	149.9	0.997	-0.200	0.299	4.166	13292.410	
SAMPLE_0000447.LAB	3/9/2020	21:26:58	149.8	0.997	-0.207	0.306	4.127	13434.762	
SAMPLE_0000448.LAB	3/9/2020	21:27:31	149.9	0.997	-0.206	0.316	4.146	13535.498	
SAMPLE_0000449.LAB	3/9/2020	21:28:00	149.9	0.997	17.009	0.366	4.089	13074.783	
SAMPLE_0000450.LAB	3/9/2020	21:28:33	149.8	0.997	34.199	0.434	3.919	12656.272	
SAMPLE_0000451.LAB	3/9/2020	21:29:10	149.8	0.997	40.477	0.458	3.825	12615.250	
SAMPLE_0000452.LAB	3/9/2020	21:29:43	149.8	0.997	43.518	0.455	3.826	12586.920	
SAMPLE_0000453.LAB	3/9/2020	21:30:16	149.8	0.997	44.949	0.439	3.880	12393.738	Spiked #7
SAMPLE_0000454.LAB	3/9/2020	21:30:45	149.8	0.997	45.362	0.438	3.802	12313.096	
SAMPLE_0000455.LAB	3/9/2020	21:31:15	149.8	0.997	45.413	0.432	3.774	12428.025	
SAMPLE_0000456.LAB	3/9/2020	21:31:48	149.8	0.997	45.297	0.438	3.775	12492.882	
SAMPLE_0000457.LAB	3/9/2020	21:32:17	149.8	0.998	45.106	0.447	3.814	12523.464	
SAMPLE_0000458.LAB	3/9/2020	21:32:47	149.8	0.998	44.878	0.451	3.905	12384.097	
SAMPLE_0000459.LAB	3/9/2020	21:33:24	149.8	0.998	44.710	0.455	3.827	12320.118	
SAMPLE_0000460.LAB	3/9/2020	21:33:53	149.8	0.998	44.495	0.463	3.790	12465.431	
SAMPLE_0000461.LAB	3/9/2020	21:34:23	149.8	0.998	44.284	0.459	3.792	12545.930	
SAMPLE_0000462.LAB	3/9/2020	21:34:52	149.8	0.998	26.560	0.405	3.924	12852.829	
SAMPLE_0000463.LAB	3/9/2020	21:35:22	149.9	0.998	0.002	0.298	4.254	13397.619	
SAMPLE_0000464.LAB	3/9/2020	21:35:55	149.9	0.998	-0.128	0.283	4.237	13264.787	Unspiked #8
SAMPLE_0000465.LAB	3/9/2020	21:36:24	150.0	0.998	-0.165	0.289	4.136	13344.443	
SAMPLE_0000466.LAB	3/9/2020	21:36:57	149.9	0.998	-0.178	0.301	4.148	13430.326	
SAMPLE_0000467.LAB	3/9/2020	21:37:31	149.9	0.998	-0.196	0.309	4.149	13480.513	
SAMPLE_0000468.LAB	3/9/2020	21:38:00	149.9	0.998	-0.208	0.311	4.137	13493.414	
SAMPLE_0000469.LAB	3/9/2020	21:38:33	149.9	0.998	-0.206	0.314	4.165	13483.952	
SAMPLE_0000470.LAB	3/9/2020	21:39:03	150.0	0.998	-0.196	0.317	4.246	13316.154	
SAMPLE_0000471.LAB	3/9/2020	21:39:32	149.9	0.998	-0.198	0.309	4.145	13329.897	
SAMPLE_0000472.LAB	3/9/2020	21:40:05	149.8	0.998	-0.231	0.303	4.127	13402.600	
SAMPLE_0000473.LAB	3/9/2020	21:40:38	149.9	0.998	-0.215	0.294	4.131	13437.285	
SAMPLE_0000474.LAB	3/9/2020	21:41:08	149.9	0.998	-0.226	0.276	4.152	13446.651	
SAMPLE_0000475.LAB	3/9/2020	21:41:37	149.8	0.998	17.872	0.338	3.998	13140.130	
SAMPLE_0000476.LAB	3/9/2020	21:42:10	149.9	0.998	35.582	0.401	3.902	12762.545	
SAMPLE_0000477.LAB	3/9/2020	21:42:40	149.9	0.998	40.953	0.418	3.860	12610.486	
SAMPLE_0000478.LAB	3/9/2020	21:43:09	149.9	0.998	43.760	0.437	3.948	12409.755	
SAMPLE_0000479.LAB	3/9/2020	21:43:39	149.9	0.998	45.242	0.447	3.834	12279.717	Spiked #8
SAMPLE_0000480.LAB	3/9/2020	21:44:12	149.8	0.998	45.834	0.464	3.799	12431.646	
SAMPLE_0000481.LAB	3/9/2020	21:44:41	149.8	0.998	45.942	0.470	3.780	12575.751	
SAMPLE_0000482.LAB	3/9/2020	21:45:11	149.8	0.998	45.862	0.454	3.808	12482.506	
SAMPLE_0000483.LAB	3/9/2020	21:45:40	149.8	0.998	45.759	0.454	3.801	12418.447	
SAMPLE_0000484.LAB	3/9/2020	21:46:10	149.8	0.998	45.713	0.452	3.815	12402.546	
SAMPLE_0000485.LAB	3/9/2020	21:46:40	149.8	0.998	45.515	0.442	3.840	12399.129	
SAMPLE_0000486.LAB	3/9/2020	21:47:09	149.8	0.998	45.315	0.433	3.822	12470.940	
SAMPLE_0000487.LAB	3/9/2020	21:47:39	149.8	0.998	45.231	0.437	3.829	12639.362	
SAMPLE_0000488.LAB	3/9/2020	21:48:08	149.8	0.998	45.053	0.440	3.879	12586.921	
SAMPLE_0000489.LAB	3/9/2020	21:48:38	149.8	0.998	27.191	0.390	4.034	12705.576	
SAMPLE_0000490.LAB	3/9/2020	21:49:07	149.8	0.998	-0.009	0.295	4.281	13339.774	
SAMPLE_0000491.LAB	3/9/2020	21:49:37	149.8	0.998	-0.141	0.300	4.220	13443.393	
SAMPLE_0000492.LAB	3/9/2020	21:50:06	149.8	0.998	-0.175	0.312	4.197	13597.009	Unspiked #9
SAMPLE_0000493.LAB	3/9/2020	21:50:36	149.9	0.998	-0.177	0.312	4.303	13531.921	
SAMPLE_0000494.LAB	3/9/2020	21:51:09	149.9	0.998	-0.196	0.301	4.304	13389.723	
SAMPLE_0000495.LAB	3/9/2020	21:51:38	149.8	0.998	-0.204	0.287	4.204	13416.502	
SAMPLE_0000496.LAB	3/9/2020	21:52:08	149.9	0.998	-0.211	0.281	4.169	13562.718	

Spectrum	Date	Time	Temp (°C)	Pressure (ATM)	Ethane (ppm)	Ethylene Oxide (ppm)	Methane (ppm)	Water (ppm)	Action / Notes
SAMPLE_0000497.LAB	3/9/2020	21:52:37	149.9	0.998	-0.211	0.279	4.174	13631.904	
SAMPLE_0000498.LAB	3/9/2020	21:53:07	149.8	0.998	-0.212	0.278	4.300	13542.226	
SAMPLE_0000499.LAB	3/9/2020	21:53:37	149.8	0.998	-0.218	0.286	4.236	13411.345	
SAMPLE_0000500.LAB	3/9/2020	21:54:14	149.8	0.998	-0.181	0.305	4.197	13513.982	
SAMPLE_0000501.LAB	3/9/2020	21:54:43	149.8	0.998	8.824	0.338	4.082	13551.952	
SAMPLE_0000502.LAB	3/9/2020	21:55:13	149.8	0.998	32.825	0.410	3.907	13110.021	
SAMPLE_0000503.LAB	3/9/2020	21:55:43	149.8	0.998	39.323	0.446	3.958	12829.470	
SAMPLE_0000504.LAB	3/9/2020	21:56:12	149.9	0.998	43.185	0.445	3.904	12554.445	
SAMPLE_0000505.LAB	3/9/2020	21:56:45	149.8	0.998	45.293	0.438	3.833	12562.358	Spiked #9
SAMPLE_0000506.LAB	3/9/2020	21:57:15	149.8	0.998	46.251	0.431	3.805	12602.297	
SAMPLE_0000507.LAB	3/9/2020	21:57:44	149.9	0.998	46.553	0.427	3.819	12627.643	
SAMPLE_0000508.LAB	3/9/2020	21:58:24	149.8	0.998	46.458	0.428	3.814	12644.126	
SAMPLE_0000509.LAB	3/9/2020	21:58:54	149.8	0.998	46.364	0.429	3.938	12508.992	
SAMPLE_0000510.LAB	3/9/2020	21:59:24	149.8	0.998	46.125	0.433	3.880	12441.344	
SAMPLE_0000511.LAB	3/9/2020	21:59:53	149.9	0.998	45.984	0.441	3.849	12556.585	
SAMPLE_0000512.LAB	3/9/2020	22:00:23	149.9	0.998	45.710	0.452	3.839	12629.449	
SAMPLE_0000513.LAB	3/9/2020	22:00:52	149.9	0.998	45.620	0.455	3.826	12653.072	
SAMPLE_0000514.LAB	3/9/2020	22:01:22	149.9	0.998	45.493	0.463	3.952	12592.896	
SAMPLE_0000515.LAB	3/9/2020	22:01:51	149.9	0.998	45.315	0.454	3.924	12463.095	
SAMPLE_0000516.LAB	3/9/2020	22:02:21	150.0	0.998	45.257	0.448	3.880	12556.376	
SAMPLE_0000517.LAB	3/9/2020	22:02:57	149.8	0.998	45.146	0.439	3.864	12660.469	
SAMPLE_0000518.LAB	3/9/2020	22:03:27	149.8	0.998	20.665	0.365	4.041	12852.513	
SAMPLE_0000519.LAB	3/9/2020	22:03:56	149.8	0.998	-0.048	0.280	4.184	13387.993	
SAMPLE_0000520.LAB	3/9/2020	22:04:26	149.8	0.998	-0.132	0.275	4.203	13548.473	Unspiked #10
SAMPLE_0000521.LAB	3/9/2020	22:04:56	149.9	0.998	-0.179	0.284	4.200	13568.071	
SAMPLE_0000522.LAB	3/9/2020	22:05:25	149.8	0.998	-0.183	0.282	4.213	13564.660	
SAMPLE_0000523.LAB	3/9/2020	22:05:58	149.8	0.998	-0.182	0.290	4.218	13561.021	
SAMPLE_0000524.LAB	3/9/2020	22:06:28	149.9	0.998	-0.191	0.297	4.163	13568.415	
SAMPLE_0000525.LAB	3/9/2020	22:06:57	149.9	0.998	-0.198	0.306	4.180	13681.156	
SAMPLE_0000526.LAB	3/9/2020	22:07:27	149.9	0.998	-0.194	0.296	4.251	13719.297	
SAMPLE_0000527.LAB	3/9/2020	22:07:56	149.8	0.998	-0.217	0.285	4.242	13643.452	
SAMPLE_0000528.LAB	3/9/2020	22:08:26	149.9	0.998	10.250	0.312	4.149	13570.694	
SAMPLE_0000529.LAB	3/9/2020	22:08:55	149.8	0.998	33.049	0.375	3.940	13075.834	
SAMPLE_0000530.LAB	3/9/2020	22:09:28	149.8	0.998	39.561	0.396	3.877	12946.646	
SAMPLE_0000531.LAB	3/9/2020	22:09:58	149.8	0.998	43.430	0.422	3.900	12764.191	
SAMPLE_0000532.LAB	3/9/2020	22:10:28	149.9	0.998	45.297	0.436	3.889	12619.604	Spiked #10
SAMPLE_0000533.LAB	3/9/2020	22:10:57	149.9	0.998	46.191	0.440	3.844	12555.550	
SAMPLE_0000534.LAB	3/9/2020	22:11:27	149.8	0.998	46.514	0.461	3.804	12673.965	
SAMPLE_0000535.LAB	3/9/2020	22:12:00	149.8	0.998	46.480	0.470	3.867	12732.804	
SAMPLE_0000536.LAB	3/9/2020	22:12:29	149.8	0.998	46.428	0.465	3.874	12621.445	
SAMPLE_0000537.LAB	3/9/2020	22:12:59	149.8	0.998	46.201	0.448	3.829	12562.402	
SAMPLE_0000538.LAB	3/9/2020	22:13:35	149.8	0.998	46.007	0.433	3.798	12682.763	
SAMPLE_0000539.LAB	3/9/2020	22:14:05	149.9	0.998	45.782	0.424	3.773	12757.806	
SAMPLE_0000540.LAB	3/9/2020	22:14:38	149.9	0.998	45.702	0.418	3.868	12745.164	
SAMPLE_0000541.LAB	3/9/2020	22:15:11	149.9	0.998	45.487	0.419	3.891	12566.059	
SAMPLE_0000542.LAB	3/9/2020	22:15:44	149.8	0.998	13.509	0.332	4.038	12786.429	
SAMPLE_0000543.LAB	3/9/2020	22:16:14	149.9	0.998	-0.071	0.284	4.155	13423.523	Unspiked #11
SAMPLE_0000544.LAB	3/9/2020	22:16:43	149.8	0.998	-0.149	0.289	4.258	13671.093	
SAMPLE_0000545.LAB	3/9/2020	22:17:13	149.8	0.998	-0.158	0.299	4.304	13598.949	
SAMPLE_0000546.LAB	3/9/2020	22:17:46	149.8	0.998	-0.156	0.295	4.184	13537.611	
SAMPLE_0000547.LAB	3/9/2020	22:18:15	149.8	0.998	-0.193	0.299	4.154	13635.403	
SAMPLE_0000548.LAB	3/9/2020	22:18:48	149.9	0.998	-0.204	0.285	4.156	13720.571	
SAMPLE_0000549.LAB	3/9/2020	22:19:18	149.9	0.998	-0.197	0.294	4.198	13742.702	
SAMPLE_0000550.LAB	3/9/2020	22:19:47	149.9	0.998	-0.203	0.288	4.273	13655.557	
SAMPLE_0000551.LAB	3/9/2020	22:20:17	149.9	0.998	16.038	0.341	4.100	13466.105	Spiked #11
SAMPLE_0000552.LAB	3/9/2020	22:20:46	149.9	0.998	34.436	0.382	3.900	13050.092	
SAMPLE_0000553.LAB	3/9/2020	22:21:19	149.8	0.998	40.542	0.405	3.850	12900.623	
SAMPLE_0000554.LAB	3/9/2020	22:21:49	149.8	0.998	43.834	0.432	3.881	12824.396	
SAMPLE_0000555.LAB	3/9/2020	22:22:18	149.9	0.998	45.468	0.439	3.937	12665.314	
SAMPLE_0000556.LAB	3/9/2020	22:22:51	149.9	0.998	46.253	0.443	3.855	12519.612	
SAMPLE_0000557.LAB	3/9/2020	22:23:24	149.9	0.998	46.512	0.447	3.832	12609.192	
SAMPLE_0000558.LAB	3/9/2020	22:23:54	149.8	0.998	46.282	0.443	3.825	12718.731	
SAMPLE_0000559.LAB	3/9/2020	22:24:23	149.8	0.998	45.329	0.427	3.846	12828.509	
SAMPLE_0000560.LAB	3/9/2020	22:24:53	149.8	0.998	2.051	0.271	4.175	13135.373	
SAMPLE_0000561.LAB	3/9/2020	22:25:22	149.8	0.998	-0.116	0.261	4.230	13588.619	Unspiked #12
SAMPLE_0000562.LAB	3/9/2020	22:25:52	149.9	0.998	-0.190	0.270	4.270	13643.848	
SAMPLE_0000563.LAB	3/9/2020	22:26:21	149.9	0.998	-0.183	0.271	4.214	13658.765	
SAMPLE_0000564.LAB	3/9/2020	22:26:54	149.9	0.998	-0.187	0.278	4.280	13832.446	
SAMPLE_0000565.LAB	3/9/2020	22:27:24	149.9	0.998	-0.224	0.305	4.270	15021.859	
SAMPLE_0000566.LAB	3/9/2020	22:27:53	149.9	0.998	-0.199	0.311	4.266	14781.054	
SAMPLE_0000567.LAB	3/9/2020	22:28:23	149.9	0.998	-0.083	0.317	4.214	13846.005	
SAMPLE_0000568.LAB	3/9/2020	22:28:53	149.9	0.998	-0.021	0.302	4.226	13737.303	
SAMPLE_0000569.LAB	3/9/2020	22:29:22	149.9	0.998	-0.052	0.299	4.229	13724.278	
SAMPLE_0000570.LAB	3/9/2020	22:29:52	149.8	0.998	-0.038	0.273	4.275	13698.706	
SAMPLE_0000571.LAB	3/9/2020	22:30:21	149.9	0.998	-0.102	0.265	4.416	13673.046	
SAMPLE_0000572.LAB	3/9/2020	22:30:51	149.9	0.998	11.378	0.301	4.314	13484.565	
SAMPLE_0000573.LAB	3/9/2020	22:31:20	149.9	0.998	33.887	0.362	4.045	13155.016	
SAMPLE_0000574.LAB	3/9/2020	22:31:50	149.8	0.998	40.263	0.364	4.040	12890.525	
SAMPLE_0000575.LAB	3/9/2020	22:32:19	149.9	0.998	43.998	0.386	3.891	12678.601	Spiked #12
SAMPLE_0000576.LAB	3/9/2020	22:32:49	149.8	0.998	45.876	0.400	3.810	12579.754	
SAMPLE_0000577.LAB	3/9/2020	22:33:18	149.9	0.998	46.812	0.411	3.805	12570.741	
SAMPLE_0000578.LAB	3/9/2020	22:33:48	149.8	0.998	47.158	0.414	3.724	12723.734	
SAMPLE_0000579.LAB	3/9/2020	22:34:17	149.9	0.998	47.140	0.417	3.747	12770.710	
SAMPLE_0000580.LAB	3/9/2020	22:34:47	149.8	0.998	46.922	0.404	3.769	12632.270	
SAMPLE_0000581.LAB	3/9/2020	22:35:16	149.9	0.998	46.621	0.392	3.779	12594.376	

Spectrum			Temp	Pressure	Ethane	Ethylene Oxide	Methane	Water	Action / Notes
	Date	Time	(°C)	(ATM)	(ppm)	(ppm)	(ppm)	(ppm)	
SAMPLE_0000582.LAB	3/9/2020	22:35:46	150.0	0.998	46.484	0.396	3.830	12732.298	
SAMPLE_0000583.LAB	3/9/2020	22:36:16	149.9	0.998	46.266	0.397	3.831	12791.643	
SAMPLE_0000584.LAB	3/9/2020	22:36:48	149.9	0.998	46.035	0.402	3.817	12807.232	
SAMPLE_0000585.LAB	3/9/2020	22:37:18	150.0	0.998	45.916	0.410	3.936	12696.794	
SAMPLE_0000586.LAB	3/9/2020	22:37:48	149.9	0.998	23.602	0.380	4.051	13012.502	
SAMPLE_0000587.LAB	3/9/2020	22:38:17	150.0	0.998	-0.019	0.299	4.167	13743.088	
SAMPLE_0000588.LAB	3/9/2020	22:38:50	150.0	0.998	-0.157	0.290	4.115	13840.898	
SAMPLE_0000589.LAB	3/9/2020	22:39:20	149.9	0.998	-0.183	0.298	4.100	13874.046	
SAMPLE_0000590.LAB	3/9/2020	22:39:49	149.9	0.998	-0.193	0.292	4.171	13888.940	

EPA Method 301 Sample Calculations

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

072320 213038

1. CTS System Bias as Percent of Direct CTS

$$E_{Bias} = abs \left| \frac{C_{sys} - C_{dir}}{C_{dir}} \right| \times 100$$

Where:

C_{sys} = Average concentration of system CTS = 43.969 ppm

C_{dir} = Average concentration of direct CTS = 43.622 ppm

E_{bias} = CTS system bias = 0.79%

2. Pre-/Post-run CTS Deviation (<5%)

$$E_{dev} = abs \left| \frac{C_{pre} - C_{post}}{C_{pre}} \right| \times 100$$

Where:

C_{pre} = Average concentration of pre-run CTS = 43.969 ppm

C_{post} = Average concentration of post-run CTS = 43.447 ppm

E_{dev} = CTS system bias = 1.19% **Pass**

3. Dilution Factor of Spike Gas

$$DF = \frac{T_{spike}}{T_{direct}}$$

Where:

T_{spike} = Diluted tracer gas concentration measured in spiked sample = 0.487 ppm

T_{direct} = Tracer gas concentration measured directly = 5.165 ppm

T_{nat} = Native tracer gas concentration measured in effluent gas stream = -0.001 ppm

DF = Dilution factor of spike gas = 0.0944

Sterilization Services of Georgia
CleanAir Project No. 14113
Atlanta Facility
Anguil TO Outlet

4. Expected in spiked sample (ppm)

$$X_{Exp} = (X_{dir})(DF) + (X_{nat})(1 - DF)$$

Where:

X_D	= Average concentration of direct QA analyte	=	52.6972	ppm
DF	= Dilution factor (dimensionless)	=	0.0944	
X_O	= Average concentration of native QA analyte in effluent stream	=	0.4145	ppm
X_E	= Expected concentration in spiked sample	=	5.3508	ppm

5. Spike recovery (%) (70-130%)

$$\%SR = \left(\frac{X_S}{X_E} \right) \times 100$$

Where:

X_S	= Concentration of QA analyte in spiked sample	=	4.9544	ppm
X_E	= Expected concentration in spiked sample	=	5.3508	ppm
%SR	= Spike recovery (%)	=	92.59%	Pass

End of Appendix Section

APPENDIX M: CLEANAIR RESUMES AND CERTIFICATIONS

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Ken Sullivan

Project Manager

Professional Profile

Mr. Sullivan has 10 years of experience in wet method and instrumental testing for engineering, diagnostic, performance guarantee, and compliance purposes. Initially hired as a field technician in 2009, Mr. Sullivan started leading test programs in 2011, and has been project managing since 2014. Mr. Sullivan has been involved with projects utilizing EPA Methods 1 through 29, 201, 201A, 202, 320, Conditional Test Method (CTM) 027, CTM-013, and Other Test Methods (OTM) 027 and OTM-028, from the planning stage to field testing and reporting. In addition, Mr. Sullivan has extensive experience leading Engineers and Field Technicians to execute applicable EPA methods for numerous projects worth hundreds of thousands of dollars to clients. Through his experience, he has attained valuable testing skills, such as setting up and operating continuous emissions monitoring systems (CEMS) for various pollutants, on-site mercury analysis with an Ohio Lumex spectrometer, on-site laboratory analysis for numerous methods, experience in Micro GC (gas chromatography), and in FTIR (Fourier Transform Infrared Spectrometer) analysis.

Mr Sullivan has been responsible for compliance and diagnostic test programs performed in a multitude of states across the country. He has also been responsible for engineering and consulting studies performed in Canada, Netherlands, Spain, and South Africa.

Relevant Experience

Coal Industry; Labadie and Meramec, MO

Led a large field crew in executing various EPA methods, including 30B, 5/202, 29, 26, 3A, 7E, and 10 at multiple locations to determine design variables for retrofitted wet scrubbers. Set-up and operated a CEMS showing real-time NO_x, O₂, CO₂, and CO emissions. Performed on-site mercury analysis with an Ohio Lumex spectrometer in accordance with EPA Method 30B. Assisted in determining the concentration deviation between elemental and oxidized mercury at the stack to establish scrubber performance, carbon injection interference, and other design constraints.

Natural Gas Delivery (Pipeline); Middlebourne, WV

Project managed a test program to determine sources and locations of black powder along various points of the pipeline, by utilizing a personally designed modified EPA Method 17 sampling apparatus. Led field execution, collected samples and recovered sample filters on-site while maintaining communication with the client and several other parties involved to resolve the issue of equipment malfunction and degradation due to the black powder buildup.

Manufacturing Industry; Apeldoorn, Netherlands

Planned, managed, led, and executed this job from start to finish. Ran an FTIR and performed EPA Methods 320 and 25A to provide the client with carbon monoxide, hydrocarbon, and formaldehyde diagnostic data at several key points along the process line. Processed and analyzed a plethora of raw data into utile and interpretable formats and drafted an in-depth report.

Carbon Capture; Cohasset, MN

Project managed a test program designed to determine the input/output chemistry of a non-commercial scale carbon capture system prototype. The test program included measurements for over 20 compounds of interest, utilizing FTIR, GC-FPD, Micro GC, FID, UV, and photometric technologies. Developed extensive analysis that included studies in atom balance, removal, minimum detection limit, and exponential decay.

Coal Industry; Secunda, South Africa

Aided in accumulating dust concentration data and mass loading at various points in the Fluidized Catalytic Cracking Unit (FCCU), utilizing EPA Method 17. Was involved in on-site recovery and particle size analysis, and used a TESTO 350XL to determine effluent gas composition. Also trained a South African testing company how to efficiently and accurately execute methods concerning filterable particulate matter (FPM) collection.

Oil Refining Industry; Detroit, MI

Aided multi-million net-worth client in meeting new emission limits required by a permit issued by the Michigan Department of Environmental Quality (MDEQ) and Sierra Club due to implications of the Detroit Heavy Oil Upgrade Project (DHOUP). Executed several different methods, including EPA Methods 1, 2, 3A, 4, 5/202, 6C, 7E, 25A, 10, and 18, and ASTM Draft CCM, at various locations throughout the Detroit refinery. Managed every test program from planning to reporting.

Professional Certifications & Qualifications

OSHA 10-Hour

NSC CPR/AED Certification

NSC First-Aid Certification

Qualified Source Testing Individual (QSTI) Test Exams (Certificate No. 2012-711):

- Group 1 (Manual Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods) – exam passed on 10/22/2015 (certification attached)
- Group 2 (Manual Gaseous Pollutants Source Sampling Methods) – exam passed on 4/28/2016 (certification attached)
- Group 3 (Gaseous Pollutants Source Sampling Methods) – exam passed on 4/27/2016 (certification attached)
- Group 4 (Hazardous Metals Measurement Methods) – exam passed on 6/1/2017 (certification attached)

Qualified Individual (QI)

Field Test Leader	Ohio Lumex (EPA Method 30B Analysis)	EPA Methods 320/321 (Extractive FTIR)	Field Laboratory
Project Manager	Modified EPA Conditional Test Method 013 / Draft ASTM Controlled Condensation Method		

Education

Bachelor of Science in Civil Engineering with a focus in Environmental and Atmospheric Sciences (with honors), 2009

University of Illinois; Urbana-Champaign

Bachelor of Science in Physics, 2006

Elmhurst College; Elmhurst, Illinois

SOURCE EVALUATION SOCIETY



Qualified Source Testing Individual

LET IT BE KNOWN THAT

KENNETH J. SULLIVAN

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED
EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES
ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

**MANUAL GAS VOLUME MEASUREMENTS AND ISOKINETIC PARTICULATE
SAMPLING METHODS**

ISSUED THIS 22ND DAY OF OCTOBER 2015 AND EFFECTIVE UNTIL OCTOBER 21ST, 2020

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills, QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE
NO.
2012-711



SOURCE EVALUATION SOCIETY



Qualified Source Testing Individual

LET IT BE KNOWN THAT

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EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES
ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

GASEOUS POLLUTANTS INSTRUMENTAL SAMPLING METHODS

ISSUED THIS 27TH DAY OF APRIL 2016 AND EFFECTIVE UNTIL APRIL 26TH, 2021

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills, QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE
NO.
2012-711



Joshua Childers, E.I.T.
Project Manager/Field Test Leader

Professional Profile

Mr. Childers has ten years of experience as a Field Engineer, Field Test Leader and Project Manager for Clean Air Engineering. He has been involved with equipment servicing, calibration and design/fabrication. Field Test Leader experience has included field crew supervision and safety, project execution, data reduction, sample preparation and client coordination. He has been involved in all phases of project management including, but not limited to, proposal and protocol development, test schedule coordination, test plan creation and report submittal.

Project experience has involved numerous projects utilizing USEPA Methods 1 through 29, as well as Methods 30B, 30B Modified (speciated mercury), 201A, 202, 320 and 321. He also has experience with Modified CTM-013/Draft ASTM CCM testing, high pressure FCC testing, and other various ASTM methodologies. Additional experience includes compressor station engine testing (Subparts JJJJ/ZZZZ & GP-5 testing) along with well-site testing (Subparts OOOO and OOOOa) including LDAR requirements. Mr. Childers has acted as Project Manager or Field Test Leader for many FTIR/CEMS projects as well as high pressure, high temperature refinery work in 13 different countries.

Proposals, Test Protocols and Source Specific Test Plans

Mr. Childers assists with proposal generation by providing technical advice to meet testing requirements. Also, test protocols are created and submitted to the client or regulatory agency for review and approval, when required, prior to field execution of test program. Experience includes participating in active discussions with multiple regulatory agencies or interest groups in order to develop the best technical approach. Each project requires a unique test plan in order to accurately convey all testing requirements to everyone involved. This is also a requirement for CleanAir's STAC Accreditation. Mr. Childers develops test plans for all projects when acting as Project Manager and often when acting as the Field Test Leader.

Standard Operating Procedures (SOPs), Training and Reporting Development

Mr. Childers has developed the CleanAir SOPs for FTIR testing as required by EPA Methods 320 and 321 along with ASTM D6348-12. EPA Method 301 for field validation is also involved with these SOPs. He has also developed the CleanAir Qualified Individual (QI) Exam required for FTIR Source Testing. Training experience includes development of a field training program for qualified FTIR personnel. He has also created FTIR workbooks to take raw field data and provide data reduction, analysis, QA/QC verification, results and calculations. Additional experience includes performing independent validation/review of FTIR spectra and test reports.

Site Inspections

As necessary, Mr. Childers participates in site inspections prior to project execution to identify any potential safety hazards, obstructions or technical issues with a proposed test plan. Site visits have also served as a chance to meet key project stakeholders, inspect a process or control device first-hand and participate in development of test program designs.

Project Experience

As a Field Test Leader or Project Manager, Mr. Childers has led and directed regulatory compliance projects, performance guarantee projects, diagnostic and engineering programs, engine tuning and compliance, gas RATAs, process or equipment efficiency. Relevant project experiences are grouped below following a recent and representative project description.

Real-Time (FTIR/CEMS) Compliance, Diagnostic & Engineering Projects

Xcel Energy; Hayden Generating Station; Unit 2 SCR Outlet; Hayden, Colorado.

Project Manager and Field Test Leader. The objective of this project was to perform diagnostic guarantee testing for ammonia slip and NO_x distribution at a newly-installed SCR Outlet. FTIR measurements were used with a specially designed and passivated sampling system to perform analyte traverses. Data was used to create plots for NH₃, NO_x, SO₂, CO, H₂O, O₂ and CO₂. Other analytes were monitored but not required for the guarantee testing. Data was provided on-site to the client to validate performance criteria and forgo wet-method testing as validation.

Mr. Childers has planned and executed real-time measurement projects utilizing an FTIR and CEMS (including mercury) on several different process types measuring a wide range of analytes. Field validation of the method setup (Method 301) and field calculations for minimum detection limits/uncertainties are performed on each project to ensure high quality data and low residuals across the IR spectrum. FTIR test data has been validated by concurrent wet method or thermal oxidation test data.

- *Xcel Energy; Hayden Generating Station; Unit 1 SCR Outlet; Hayden, Colorado.*
- *Cormetech Inc.; Suez Energy Generation NA; Ennis, Texas*
- *Chemours, Washington Works; Washington, West Virginia*
- *Cone Midstream Partners LP; Compressor Stations; West Virginia & Pennsylvania*
- *AMEC Power and Process America; Bremon Bluff Generating Station; Bremon Bluff, Virginia*
- *Nol-Tec, DuPont Washington Works; Washington, West Virginia*
- *Wärtsilä Finland Oy; Bermeo Test Facility; Bermeo, Spain*
- *Williams Midstream; Compressor Stations; Pennsylvania*
- *Holcim (US) Inc, Kiln Stack; Hagerstown, Maryland*
- *General Electric Power Generation; Rhodes, Greece*
- *General Electric Power Generation, Ghorashal Power Plant; Ghorashal, Bangladesh*
- *Eastern Kentucky Power Cooperative; Maysville, Kentucky*

High Pressure, High Temperature Refinery Testing – FCC(U), SCC, TSS, FSS

Shell; Deer Park Refinery; FCC Unit; Deer Park, Texas

Project Manager and Field Test Leader. The purpose of this test program was perform isokinetic measurements at various points along the process including the TSS Inlet, Outlet and Underflow. This data was required to provide particulate concentration, mass loading, particle size distribution data and volumetric flow rate results in order to inspect efficiency of the process operations. Project objectives were completed and results were sent to laboratories for analysis.

Additional relevant experience, below, includes international projects with similar objectives but included operation of a field laboratory to provide on-site particulate results (on-site results).

Refinery test objectives have included measurements at the inlet and outlet of third stage separators, fourth stage separators, expanders, underflow cyclones, CO boilers and baghouses. Projects have also included measurements at the stack location.

- *Gestor Contratos TSA PCS; Refineria de Cartagena (Reficar); Cartagena, Colombia*
- *Technip; GALP Energia – Sines Refinery; Sines, Portugal.*
- *R.A.M; Raffineria di Milazzo; Milazzo, Italy.*
- *CEPSA; Refineria de Gibraltar-San Roque; San Roque, Spain.*
- *INA; Rijeka Refinery; Zagreb, Croatia.*
- *Engen; Engen Refinery (Enref); Durban, South Africa.*
- *Reliant Industries; Jamnagar Refinery; Jamnagar, India.*
- *Preem Petroleum, Lysekil Refinery; Västra Götaland, Sweden*
- *CTCI Corporation, CPC Talin RFC; Kaohsiung, Taiwan*
- *SASOL Synfuels, SCC; Secunda, South Africa*
- *Envirox, NATREF FCCU; Sasolburg, South Africa*

Compliance Projects

Covanta Energy; Essex County Resource Recovery Facility; Newark, New Jersey.

Project Manager. The purpose of this test program was to complete regulatory compliance testing at a municipal waste incinerator. Compliance testing was performed on multiple units and at inlet/stack locations. Measurements included HCl, Dioxin/Furans, Ammonia and Mercury/Metals. Testing was performed in the presence of New Jersey DEP.

Similar experiences below include compliance projects at coal-fired power plants, natural gas-fired power plants, coke battery operations, cement kiln processes, barge loading operations/flare evaluation, municipal waste incinerators and compressor stations. Test locations have been anywhere from the outlet of a boiler/inlet of first CD to the stack location. Measurement objectives have included FPM/CPM, PM10/2.5, SO₃/H₂SO₄, VOCs, NSPM, and Benzene.

- *Arrow Material Services; Barge Loading Operations Flare; Belpre, Ohio*
- *CEMEX; Kiln Stacks; Odessa, Texas*
- *DTE Energy, EES Coke Battery – Zug Island; Underfire Combustion Stack; Detroit, Michigan*
- *DTE Energy, EES Coke Battery – Zug Island; PECS Stack; Detroit, Michigan*
- *Covanta Energy; Camden County Energy Recovery Center; Camden, New Jersey.*
- *First Energy Corporation, Bayshore Power Plant; Oregon, Ohio*
- *Holcim (US) Inc, Kiln Stack; Hagerstown, Maryland*
- *Eastern Kentucky Power Cooperative, Spurlock Generating Station; Maysville, Kentucky*
- *Proctor and Gamble Paper Products, Mehoopany, Pennsylvania*
- *Severstal Wheeling, Inc., Mountain State Carbon, LLC*

Gas RATAs

DTE Energy, EES Coke Battery – Zug Island; Underfire Combustion Stack; Detroit, Michigan
Project Manager. Completed the project objectives by performing a gas yearly gas RATA at the Underfire Combustion Stack for O₂, CO₂, NO_x and CO (ppm and lb/hr). Flow data was measured by another test company and CleanAir performed moisture testing in order to determine volumetric flow rates. RATA results were provided to the client and regulatory agency prior to the end of the test day.

Additional experience includes RATAs performed for the following projects which have also included flow, moisture, SO₂ and THC RATAs:

- *CEMEX; Kiln Stacks & Raw Mill Stacks; Odessa, Texas*
- *Covanta Energy; Essex County Resource Recovery Facility; Newark, New Jersey.*
- *Proctor and Gamble Paper Products, Mehoopany, Pennsylvania*
- *Holcim (US) Inc, Kiln Stack; Hagerstown, Maryland*

Additional Diagnostic & Engineering Projects

Xcel Energy; Hayden Generating Station; Unit 2; Hayden, Colorado.

Project Manager. The objective of this test program was to determine PM (corrected) pre- and post-retrofit concentrations for a new SCR installation. In order to demonstrate to the Colorado APCD the addition of the SCR did not adversely affect the overall unit emissions compared to their operating limits, pre- and post-retrofit testing occurred. EPA Methodology was modified, with Colorado APCD approval, to stoichiometrically correct results based on IC data from condensable particulate and controlled condensation sampling.

Other examples of diagnostic testing or engineering evaluations include experience with dry sorbent injection (DSI) systems with monitoring of total particulate (FPM/CPM), HCl, NH₃, Hg and SO₃/H₂SO₄. DSI monitoring includes coal additives as well as monitoring of multiple products at different injection points and rates along the process.

- *Xcel Energy; Hayden Generating Station; Unit 1; Hayden, Colorado.*
- *Babcock Power Environmental; Big Rivers Electric Corporation; Green Generating Station; Robards, Kentucky*
- *ADA-ES, Inc.; LG&E Trimble County; Bedford, Kentucky*
- *Babcock Power Services; Jim Bridger Power Plant; Point of Rocks, Wyoming*
- *Nol-Tec, DuPont Washington Works; Washington, West Virginia*
- *NRG Energy, Limestone (LMS) Generating Station; Thompsons, Texas*
- *NRG Energy, W.A. Parish Generating Station; Jewett, Texas*

Air Emissions Method Experience

Sampling experience on projects acting as Project Manager or Field Test Leader includes test methodology from the Code of Federal Regulations (CFR).

Title 40 CFR Part 60, Appendix A

Title 40 CFR Part 60, Appendix B Performance Specifications

Title 40 CFR Part 51, Appendix M

Title 40 CFR Part 63, Appendix A

Title 40 CFR Part 75, Appendix A

CTM-013 (Mod.)/Draft ASTM Controlled Condensation Method (Draft ASTM CCM)

SW-846 Methods

Conditional Test Methods

American Society for Testing and Materials Methods

Source Sampling Workshops

PIOGA Air Quality Compliance Training – May 2016

Presenter of “A Field Guide to Subpart OOOO Testing”

Air Quality Workshop, Boiler MACT and MATS Compliance – October 2016

PIOGA Air Quality Compliance Training – December 2016

Presenter of “A Field Guide to Subpart OOOOa Testing”

Dry Hydrate Users Group – March 2017

Presenter of “Review of Dry Sorbent Injection Performance Test Methodology and Capture Results at Coal-Fired Electric Generating Units”

Dry Hydrate Users Group – March 2018

Stationary Source Sampling and Analysis for Air Pollutants – March 2018

Presenter of “Review of Best Practices to Improve Particulate Matter Sampling”

Professional Affiliations

Source Evaluation Society (SES)

Project Management Institute (PMI)

Pennsylvania Independent Oil and Gas Association (PIOGA)

Professional Certifications

Qualified Source Testing Individual (QSTI) Groups I, II, III, IV, Application No. 2011-547

E.I.T. Certificate #10001

MKS FTIR Training Certificate

PMI Project Management (35 hour PDUs)

Education

Bachelor of Science in Mechanical Engineering

Bachelor of Science in Aerospace Engineering

West Virginia University; Morgantown, West Virginia

SOURCE EVALUATION SOCIETY



Qualified Source Testing Individual

LET IT BE KNOWN THAT

JOSHUA A. CHILDERS

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED
EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES
ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

**MANUAL GAS VOLUME MEASUREMENTS AND ISOKINETIC PARTICULATE
SAMPLING METHODS**

ISSUED THIS 17TH DAY OF JANUARY 2019 AND EFFECTIVE UNTIL JANUARY 16TH, 2024

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

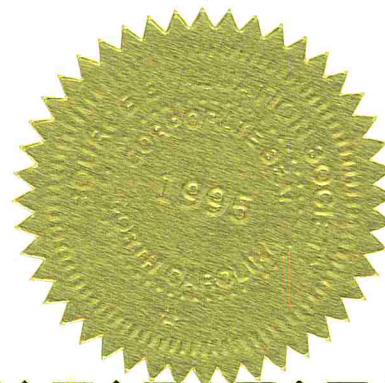
Tina Sanderson, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills, QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE
NO.
2011-547



SOURCE EVALUATION SOCIETY



Qualified Source Testing Individual

LET IT BE KNOWN THAT

JOSHUA A. CHILDERS

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED
EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES
ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

GASEOUS POLLUTANTS INSTRUMENTAL SAMPLING METHODS

ISSUED THIS 23RD DAY OF DECEMBER 2019 AND EFFECTIVE UNTIL DECEMBER 22ND, 2024

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

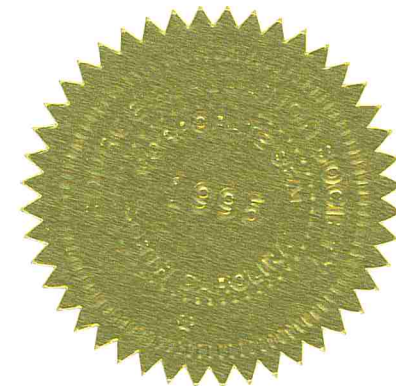
Tina Sanderson, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills, QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE
NO.
2011-547



Accredited Air Emission Testing Body

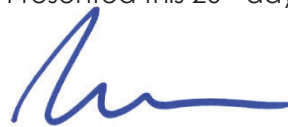
A2LA has accredited

CLEAN AIR ENGINEERING

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.



Presented this 20th day of February 2018



Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4342.02
Valid to August 31, 2020
Revised June 29, 2020

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

CLEAN AIR ENGINEERING
500 West Wood Street
Palatine, IL 60067
Mr. Scott Brown Phone: 847-654-4544
sbrown@cleanair.com

ENVIRONMENTAL^{1,2}

Valid To: August 31, 2020

Certificate Number: 4342.01

In recognition of the successful completion of the A2LA evaluation process, including an evaluation of the laboratory's compliance with ISO/IEC 17025:2005 and the NELAC Institute Field Sampling and Measurement Organization Volume 1 (TNI FSMO V1 2007, Rev 2.0) accreditation is granted to this organization to perform recognized methods using the following sampling and measurement technologies:

FSMO Type: Commercial

Mobile Units: Mobile Trailer Units

Sampling:

<u>Matrix</u>	<u>Technology(ies)</u>	<u>Methods</u>
Air	Filter	EPA Methods 5, 5A, 5B, 5D, 5E, 5F, 5H, 5I, 12, 13B, 14, 14A, 17, 23, 29, PS11, 101, 101A, 102, 104, 106, 201, 201A, 306, 316; Conditional Test Methods 013; SW-846 Methods, 0010, 0011, 0023A, 0060, 0061; CARB Methods 425, 426, 428, 429, 430, 501; ASTM D6784-02, D6831-02; Other Test Method (OTM) 029
Air	Absorption in Impinger Solution	EPA Methods 6, 6B, 7C, 7D, 8, 12, 13A, 13B, 14, 14A, 15, 15A, 16, 16A, 23, 26, 26A, 29, 101, 101A,, 102, 104, 106, 202, 306, 316; Conditional Test Methods 013, 027; SW-846 Methods 0011, 0023A, 0030, 0031, 0050, 0051, 0060, 0061; CARB Methods 425, 426, 428, 429, 430, 431; ASTM D6735-01, D6831-02; NCASI Method 8A, ISS/FP-A105.01; Other Test Method (OTM) 029
Air	Absorption in Sorbent Trap and Impinger Solution	NCASI Methods: CI/SG/Pulp-94.02; SI/CG/Pulp 94.03
Air	Absorption in Sorbent Trap	EPA 30B, PS12A, PS12B,
Air	Tedlar Bags or Stainless Canisters	EPA 18, 25, 10B, 106

Measurement:

<u>Matrix</u>	<u>Test</u>	<u>Technology(ies)</u>	<u>Methods</u>
Air	Moisture Content	N/A	EPA 4, 6A, 320; Psychrometric Moisture; Part 75 CEMS
Air	Molecular Weight	N/A	EPA 3
Air	Correction Factor	Calculation	EPA 3B
Air	Continuous Emissions	Electromagnetic, Infrared, Ultraviolet, Non-Dispersive Infrared, Fluorescence, FTIR, Chemiluminescence	EPA 3A, 6C, 7E, 10, 10A, 10B, 20, 30A, PS2, PS3, PS4, PS4A, PS7, PS16, PS18, 205, Part 75 CEMS; Conditional Test Method 0030
Air	Continuous Emissions in conjunction with an Absorbing Solution	Infrared, Ultraviolet, Non-Dispersive Infrared, Fluorescence	EPA 16C, PS5
Air	Continuous Emissions (VOCs)	Flame Ionization Detection	EPA 25A, 25B, 25C, 25D, 25E, 204, B, 204C, 204D, PS8,
Air	Continuous Emissions (FTIR)	FTIR	EPA 318, 320, 321, PS15; ASTM D6348-03
Air	Air Flow	Pitot tube	EPA 1, 1A, 2,2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, PS6, Part 75 CEMS
Air	Visual and Fugitive Emissions	N/A	EPA 9, 22, PS 1
Air	Verification of Temporary or Permanent Enclosure	N/A	EPA 204, 204B

Field Analysis/Testing:

<u>Matrix</u>	<u>Technology</u>	<u>Analyte(s)</u>
Air	Ion Chromatography	HCl, CL2, HF, F2, HBr, Br2, SO4, NH3, NO2, NO3, PO4, Li, Ma, K, Mg, Ca
Air	Gas Chromatography	TRS, Gaseous Organic Compounds, Performance Spec. 9, EPA 18, 106
Air	Ion Specific Electrode	NH3
Air	Ohio Lumex (Thermal Atomic Absorption)	Hg

¹ All sampling and analysis is performed in the field.

Location 2:
110 Technology Drive
Pittsburgh, PA 15275-1004

Location 3:
13720 24th Washington Street East
Units 102 and 109. Building E
Sumner, WA 98390

² Mobile Lab Units:

Mobile Lab VINs:

1WC200G2811097523

1WC200G2811097148

1WC200G2841107312

1WC200G2641107311

1WC200G2441109073

1WC200J2381120774

1WC200G2611097147

1wc200j2791124568

1WC200G291114451

5NHUAMV249V327844

1WC200J20C1192704





Accredited Laboratory

A2LA has accredited

CLEAN AIR ENGINEERING

Palatine, IL

for technical competence in the field of

Environmental Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of R219 - *Specific Requirements - TNI Field Sampling and Measurement Organization Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 20th day of February 2018

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4342.01
Valid to August 31, 2020
Revised June 29, 2020

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

End of Appendix Section