CleanAir

CleanAir Engineering
500 W. Wood Street
Palatine, IL 60067-4975
800-627-0033
www.cleanair.com

VOLATILE ORGANIC COMPOUND (VOC) COMPLIANCE TEST REPORT

Scrubber Stack Exhaust

Vantage Specialty Chemicals
3938 Porett Drive
Gurnee, IL 60031
Client Reference No. 169421

CleanAir Project No. 13157
STAC Certificate No. 2007.002.0113.1217
Revision 0, Final Report
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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.

February 14, 2017

Ken Sullivan
Project Engineer
ksullivan@cleanair.com
(847) 654-4527

Date

February 14, 2017

Andrew Obuchowski
Midwest Engineering Group Leader
aobuchowski@cleanair.com
(847) 654-4537

Date

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

February 14, 2017

Andrew Obuchowski
Midwest Engineering Group Leader
aobuchowski@cleanair.com
(847) 654-4537

Date

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PROJECT PERSONNEL

Name	Affiliation	Project Responsibility
Don Wood	Vantage Specialty Chemicals	Client/Plant Contact
Richar Trzupek	Trinity Consultants	Client Contact
Chloe Reese	Trinity Consultants	Client Contact
Kevin Mattison	Illinois Environmental Protection Agency	Representative
Ken Sullivan	CleanAir	Project Manager
Anthony Milianti	CleanAir	Project Field Leader/FTIR Technician
Andrew Obuchowski	CleanAir	Independent Review of Report
Medel Cendaña	CleanAir	Field Technician

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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 H_2O (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)
ft^2 (square feet)
ft^3 (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)
H_2O (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. H_2O (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)
m^3 (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))
Nm^3 (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)
ppmdv (parts per million, dry volume)
ppmwv (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

Vantage Specialty Chemicals (Vantage) contracted CleanAir Engineering (CleanAir) to successfully complete testing on Scrubber R37 at the facility, located in Gurnee, Illinois. The test program included the following objectives:

- Perform EPA Method 320 to quantify VOC emission rates to demonstrate compliance with Illinois Environmental Protection Agency (IEPA) Clean Air Act Permit Program (CAAPP) Permit No. 96030159;
- Determine if Scrubber R37 qualifies as a low-emitting source per 35 IAC 218.960(d) and is therefore exempt from demonstrating compliance with the removal efficiency requirement in 35 IAC 218.966(a).

This test program occurred as an Illinois EPA-approved alternative to the testing required by CAAPP permit condition 4.3.2(a)(ii)(E) for scrubber removal efficiency.

A summary of the test program results is presented below. Section 2 Results provides a more detailed account of the test conditions and data analysis. Test program information, including the test parameters, on-site schedule and a project discussion, begin on page 2.

Table 1-1:
Summary of Results

Source Constituent	Sampling Method	Average Emission	Low-Emitting Limit
Scrubber Stack			
VOC[1] (ppmdv)	EPA M320	106	NA
VOC[1,2] (ton/yr)	EPA M320	0.39	1.0

[1]Considered to be the sum of ethylene oxide and propylene oxide.
[2]Ton/yr emission result based on a capacity of 8,760 hrs/year.

Test Program Details

Parameters

The test program included the following emissions measurements:

- volatile organic compounds (VOCs), considered to be the sum of ethylene oxide (C_2H_4O) and propylene oxide (C_3H_6O)
- flue gas composition (e.g., O_2, CO_2, H_2O)
- flue gas temperature
- flue gas flow rate

Schedule

Testing was performed on December 15 and 16, 2016. The on-site schedule followed during the test program is outlined in Table 1-2.

Table 1-2:
Test Schedule

Run Number	Location	Method	Analyte	Date (2016)	Start Time	End Time
1	Scrubber Stack	EPA 320	C_2H_4O, C_3H_6O	12/15 - 12/16	18:05	18:05
1	Scrubber Stack	EPA 2A	Volumetric Flow	12/15 - 12/16	18:05	18:05

Discussion

Determination of VOC Emission Rates

CleanAir conducted one (1) 24-hour test run. CleanAir utilized EPA Method 320, in conjunction with EPA Method 2A, to determine VOC emission rates in lb/hr and tons/yr. For this test program, VOC was assumed to be equivalent to the sum of ethylene oxide (C_2H_4O) and propylene oxide (C_3H_6O) emissions. Emission rates were determined for every 5-minute interval during the test run. The 24-hour test run result was determined by averaging each 5-minute interval emission rate.

EPA Method 320, “Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy,” was utilized to determine concentrations of ethylene oxide and propylene oxide in ppmwv. These concentrations were then converted to a dry basis using moisture content determined by the FTIR. Individual emission rates were then summed to yield a total VOC emission rate.

EPA Method 2A, “Direct Measurement of Gas Volume through Pipes and Small Ducts,” was utilized to determine volumetric flow rates that were used in calculations for lb/hr and ton/yr. Total volumes in acf were recorded from a turbine meter in five (5) minute intervals to yield a volumetric flow rate in acfm. Flow rates were converted to scfm by logging 5-minute average duct temperatures and determining duct absolute pressure from recording static and barometric pressures intermittently during the test run. Flow rates were then converted to dscfm using moisture content determined by the FTIR.

Ton/yr emission rates were determined utilizing 8,760 hr/yr as the capacity factor.

Sample calculations for all parameters and emission rates are presented in Appendix B.

Miscellaneous Notes

An on-site MDL analysis was performed for target analytes using procedures outlined in ASTM D 6348 A2.3. The MDL is calculated as three times the standard deviation of the concentrations from ten representative background spectra taken during the MDL analysis. The results of this study is shown in Appendix D of this report. The MDL concentration was used for ethylene oxide and propylene oxide resultant concentrations for any intervals that resulted in a concentration less than the MDL.

For reference only, oxygen (O_2) concentrations and duct velocity pressures were also recorded during the test run. O_2 concentrations were determined by conducting EPA Method 3A and were concurrent with FTIR resultant concentrations. Duct velocity pressures were continually logged via a Type-S pitot tube set in the middle of the duct connected to a pressure transducer and were concurrent with temperature data. As a reference, the average duct velocity pressure of 0.212 "H_2O correlates to approximately 130 dscfm. Raw O_2 concentration and duct velocity pressure data is presented in Appendix F of this report.

End of Section

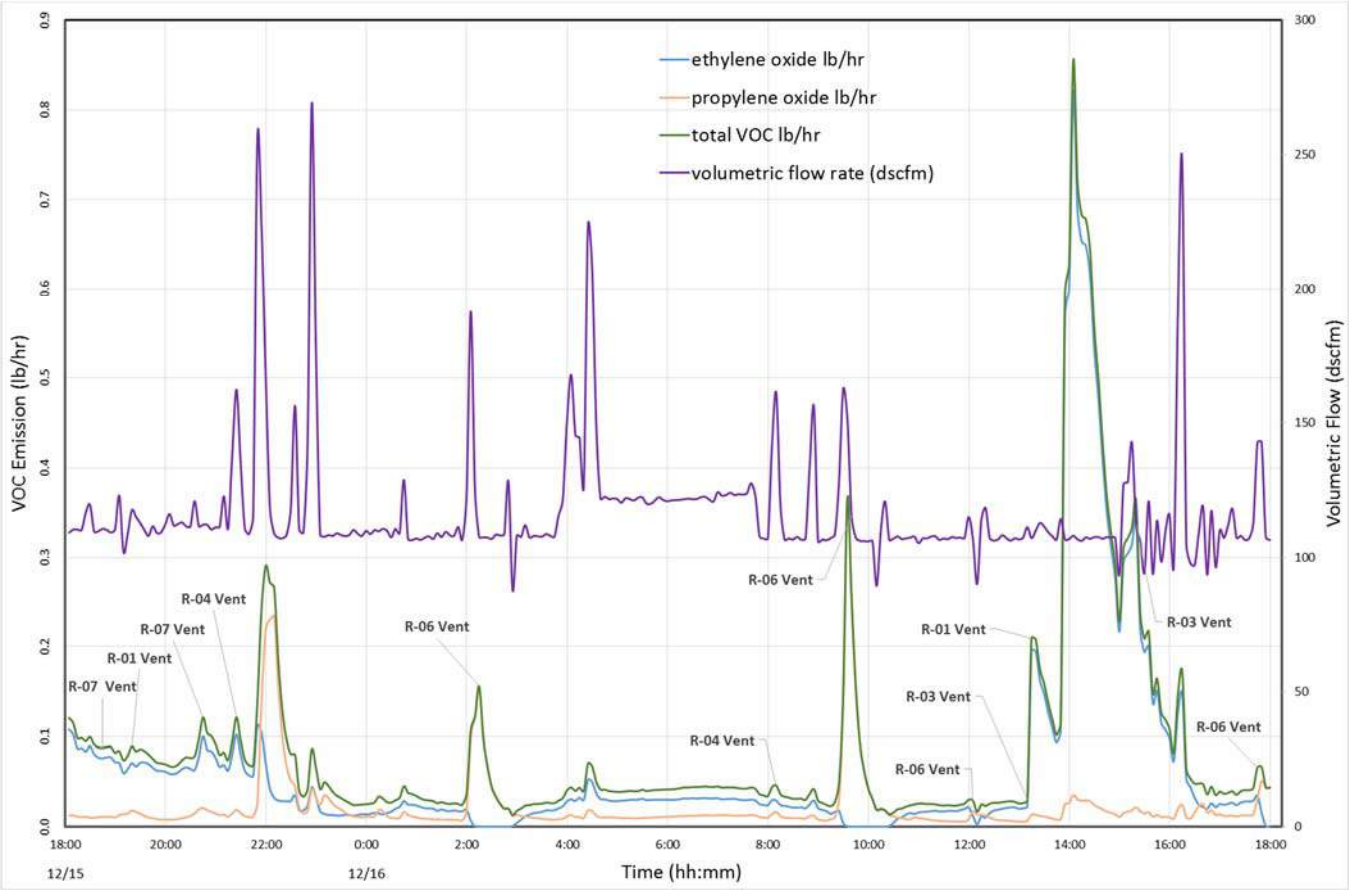
2. RESULTS

This section summarizes the test program results. Additional results are available in the report appendices, specifically Appendix C Parameters. Appendix C includes point by point 5-minute averages for VOC emissions and associated parameters. Appendix C also includes a larger version of Figure 2-1 presented on page 5. All results presented below, including process conditions, represent 24-hour test run averages.

Table 2-1:
Scrubber Stack – VOC

Run No.		**1**
Date (2016)		Dec 15 - Dec 16
Start Time (approx.)		18:05
Stop Time (approx.)		18:05
Process Conditions		
R_P	Scrubber Flow (GPM)	159.21
P_1	Pressure Drop ("H_2O)	0.21
P_2	pH	1.98
P_3	Gycol Content (%)	1.2
Cap	Capacity factor (hours/year)	8,760
Gas Conditions		
T_S	Sample Temperature (°F)	63.0
B_w	Actual water vapor in gas (% by volume)	2.4
Gas Flow Rate		
Q_a	Volumetric flow rate, actual (acfm)	120
Q_{std}	Volumetric flow rate, dry standard (dscfm)	117
Ethylene Oxide Results		
C_{sw}	Concentration (ppmwv)	82.4
C_{sd}	Concentration (ppmdv)	84.4
$E_{lb/hr}$	Emission Rate (lb/hr)	0.0657
Propylene Oxide Results		
C_{sw}	Concentration (ppmwv)	20.7
C_{sd}	Concentration (ppmdv)	21.2
$E_{lb/hr}$	Emission Rate (lb/hr)	0.0230
Total VOC Results		
C_{sw}	Concentration (ppmwv)	103
C_{sd}	Concentration (ppmdv)	106
$E_{lb/hr}$	Emission Rate (lb/hr)	0.0887
$E_{T/yr}$	Emission Rate (Ton/yr)	0.388

Figure 2-1:
Scrubber Stack – VOC Emissions & Volumetric Flow during Run 1



End of Section

3. DESCRIPTION OF INSTALLATION

Process Description

Vantage Specialties produces surfactants and cleaning products, lubricants, and food grade (kosher and non-kosher) ingredients in their batch chemical plant. The surfactants produced at the Gurnee Facility are used in products such as shampoo, conditioner, liquid and bar soaps, cleaning agents and degreasers.

The facility operates batch reactors that produce alkoxylation products. At times during the production process, and at the end of the batch, reactor vapor is vented to the scrubber, R37. Vantage Specialties also operates a vacuum system in the alkoxylation area of the plant, to remove excess water from the reactors. Vapors from the vacuum system for the reactors are also vented to the R37 scrubber via Hot Well 1. The scrubber removes organics from the vent streams and then exhausts out the scrubber stack.

The testing reported in this document was performed at a temporarily extended exhaust of the scrubber stack. A schematic of the process is shown in Figure 3-1.

Figure 3-1:
Process Schematic

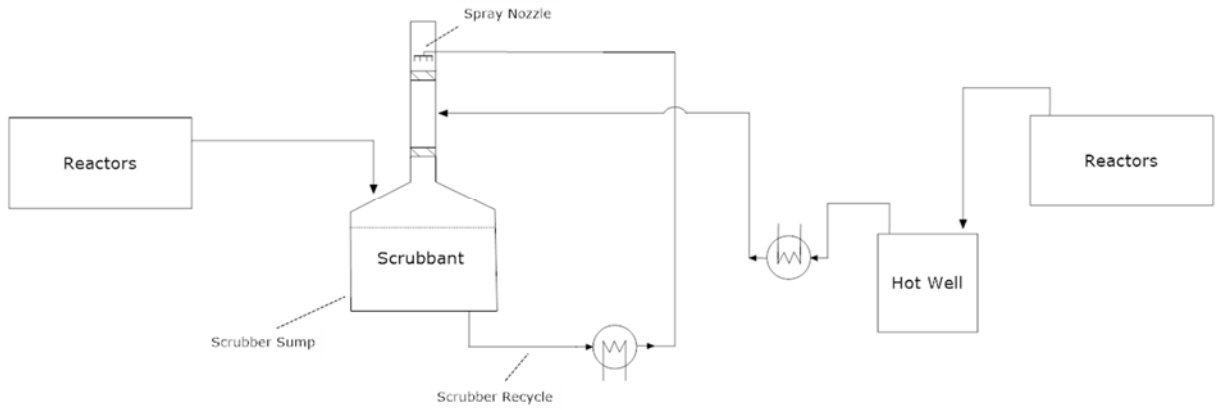


Table 3-1 indicates intervals during the 24-hour test run at which reactors were off-gassing to the scrubber.

Table 3-1:
Process Reactor Venting

Reactor	Initial Time (Date and Time)	Final Time (Date and Time)	Venting Time (min)
R-04	12/15/2016 21:20	12/15/2016 21:34	**14**
R-01	12/15/2016 19:18	12/15/2016 19:39	**21**
R-07	12/15/2016 18:50	12/15/2016 19:11	**21**
	12/15/2016 20:37	12/15/2016 20:40	**3**
R-06	12/16/2016 2:01	12/16/2016 2:12	**11**
	12/16/2016 9:26	12/16/2016 9:43	**17**
	12/16/2016 12:01	12/16/2016 12:06	**5**
	12/16/2016 17:42	12/16/2016 17:56	**14**
R-04	12/16/2016 8:07	12/16/2016 8:17	**10**
R-03	12/16/2016 13:10	12/16/2016 13:15	**5**
	12/16/2016 15:14	12/16/2016 15:18	**4**
R-01	12/16/2016 13:20	12/16/2016 13:42	**22**
		Vent to the scrubber accumulated time	**147**

Test Location

EPA Method 320 specifications determined the sample point location. Table 3-2 presents the sampling point information for the test location.

The sample location was not at the immediate exhaust of the stack. A flexible hose was attached at the outlet of the stack and ran to a lower platform. The flexible hose was connected to a 6" PVC conduit which in turn was connected to the turbine meter. A depiction of this set-up is presented in Figure 3-2 on page 8. A depiction of the temporary duct layout is presented in Figure 3-3 on page 9.

Table 3-2:
Sampling Point Information

Source Constituent	Method	Run No.	Ports	Points per Port	Hours per Point	Total Hours	Figure
Scrubber Stack							
VOC	EPA M320	1	1	1[1]	24	24	3-2

[1]Sampled at the approximate center of the duct.

Figure 3-2:
Sample Location Schematic

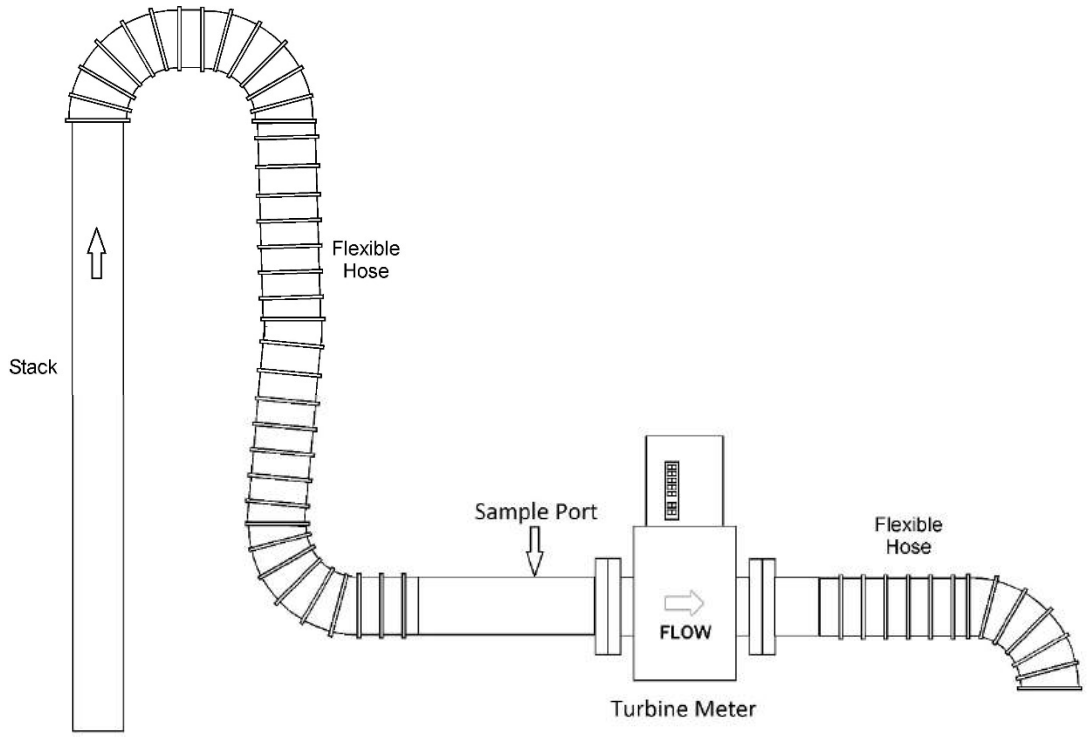
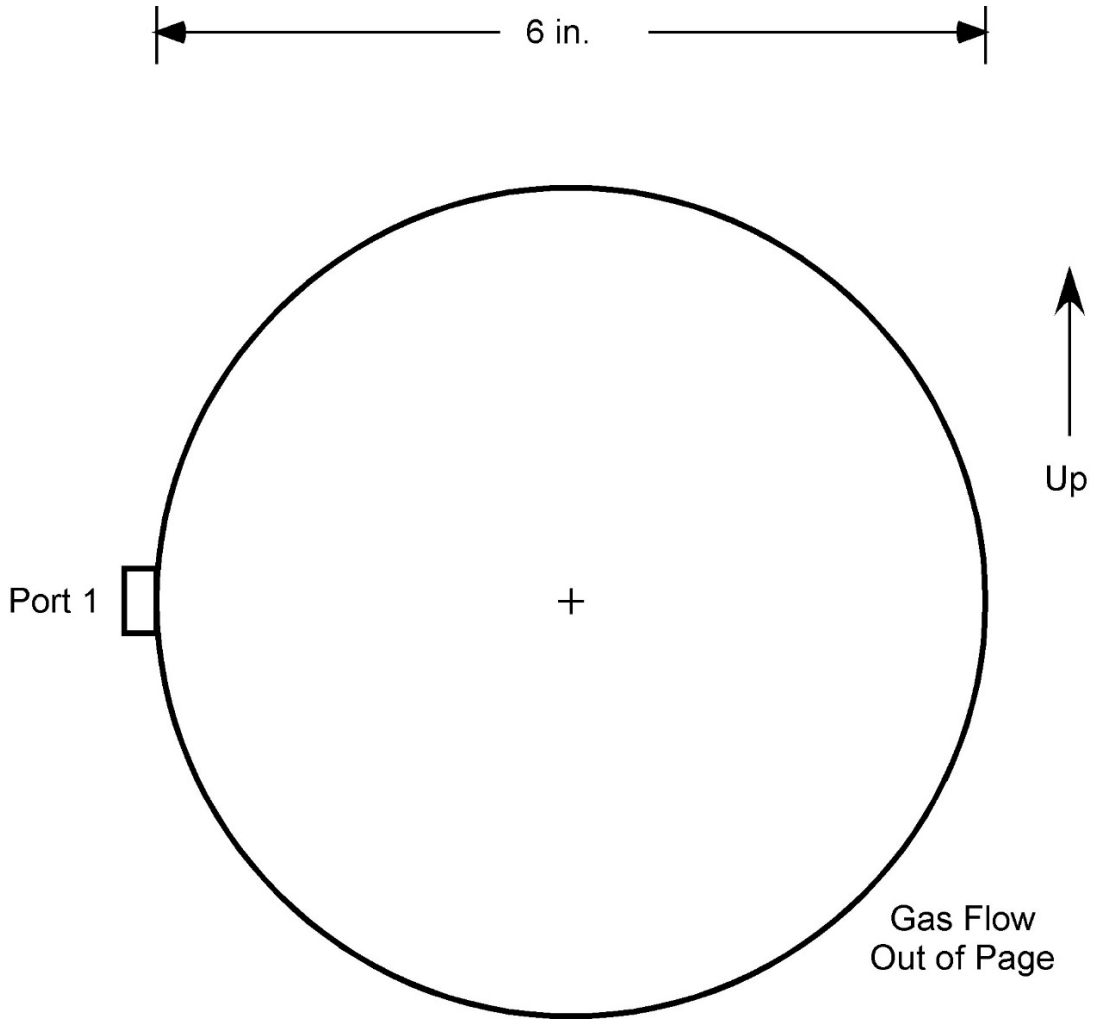


Figure 3-3:
Scrubber Extension Sample Point Layout (EPA Method 320)



Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
SpSp1	Approx. 50	Approx. 3.0

Duct diameters upstream from flow disturbance (A):	>2.0	Limit: 0.5
Duct diameters downstream from flow disturbance (B):	>8.0	Limit: 2.0

Note: Actual scrubber stack is 16" in diameter

End of Section

4. METHODOLOGY

The test program sampling measurements followed procedures and regulations outlined by the USEPA and IEPA. 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.

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 2A "Direct Measurement of Gas Volume through Pipes and Small Ducts"

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"

Methodology Discussion

EPA Method 320

The FTIR sampling system extracted effluent gas at a constant rate and utilized a stainless steel probe and heated filter box maintained at 375°F. The back-end of the probe was connected to a heated Teflon sample line maintained at approximately 375°F, which delivered the sample gas from the stack to the FTIR. The gas entered the FTIR on a hot-wet basis.

The FTIR was validated on-site per EPA Method 320 specifications. All calibration gas certificates are included in Appendix D of this report.

CleanAir incorporated guidelines as stated in 40 CFR 63, Appendix A, EPA Method 320, "Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy." Prior to testing, a calibration transfer standard (CTS) was used to demonstrate suitable agreement between sample spectra and reference spectra. The CTS was introduced at a point as close as practical to the probe tip right before the external particulate filter.

Subsequent to the test run, a spike and tracer gas was introduced into the sampled exhaust gas stream prior to the FTIR at a constant flow rate of no more than 10% of the total sample flow. The system "passed" the QA spike when the average spike concentration was within 0.7 to 1.3 times the expected concentration. The QA spike check is included in Appendices D and E of this test report. Sample calculations for the QA spike are presented in Appendix B.

Also following the test run, another CTS spectrum was recorded. The pre- and post-test CTS spectra were then compared. The peak absorbance in pre- and post-test CTS was compared to the required ±5% of the mean value for the run to be valid.

Each sample spectrum was documented with the sampling conditions, the sampling time (period when the cell is being filled), the time the spectrum was recorded, the instrumental conditions (path length, temperature, pressure, resolution and signal integration time) and a spectral filename.

EPA Method 2A

CleanAir utilized a gas volume turbine meter to measure the effluent gas directly. The turbine meter was leak-checked on-site. The turbine meter specifications are presented in Appendix A. The turbine meter calibration certification is presented in Appendix D.

Temperature and pressure measurements were collected to correct the volumetric flow to standard conditions. Temperature measurements were made continuously with a K-type thermocouple set in the middle of the duct which was connected to a temperature transducer. The transducer calibration is presented in Appendix D. Pressure measurements (static and barometric) were made intermittently seven times during the test run.

End of Section

5. APPENDIX

Appendix A: Test Method Specifications

Appendix B: Sample Calculations

Appendix C: Parameters

Appendix D: QA/QC Data

Appendix E: Raw FTIR Field Data

Appendix F: Raw Temperature, Velocity Pressure & O_2 Concentration Field Data

Appendix G: Facility Process Data

Appendix H: CleanAir Resumes and Certifications

APPENDIX A: TEST METHOD SPECIFICATIONS

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Specification Sheet for EPA Method 320

Source Location Name(s)	Scrubber Stack
Pollutant(s) to be Determined	Vapor Phase Organic and Inorganic Compounds
Also Measures	Moisture and CO2
Other Parameters to be Determined from Train	

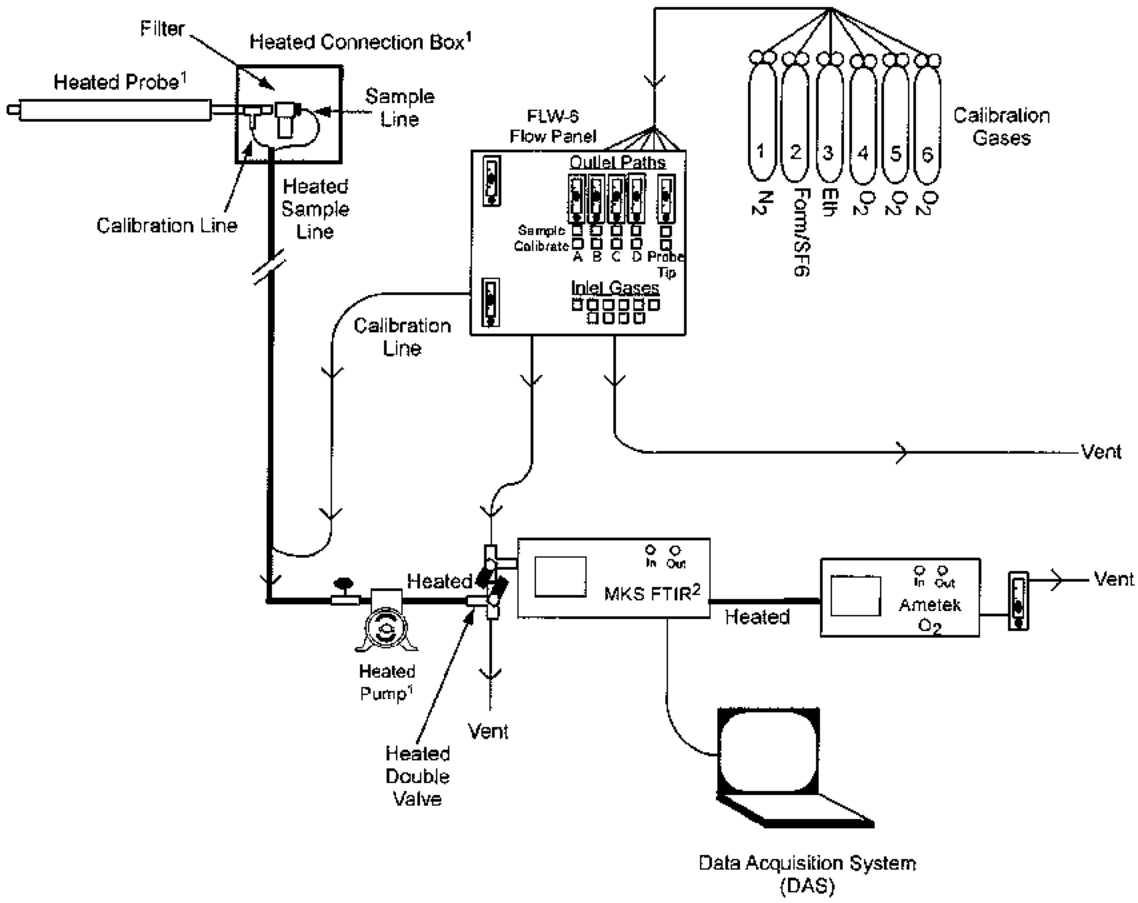
	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	24 Hours
No. of Sample Traverse Points	N/A	1
Sample Time per Point	N/A	24 Hours
Sampling Rate	Constant Rate	Constant Rate
Sampling Probe		
Nozzle Material	N/A	None
Nozzle Design	N/A	N/A
Probe Liner Material	Stainless Steel or Equivalent	Stainless Steel
Effective Probe Length	Sufficient to Traverse Points	12"
Probe Temperature Set-Point	Prevent Condensation (Min. 250°F)	375°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)	375°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)	375°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_2H_4O)	EPA Method 320 (FTIR)	EPA Method 320 (FTIR)
Propylene Oxide (C_3H_6O)	EPA Method 320 (FTIR)	EPA Method 320 (FTIR)
Hydrogen Chloride (HCl)	EPA Method 320 (FTIR)	EPA Method 320 (FTIR)
Carbon Dioxide (CO_2)	EPA Method 320 (FTIR)	EPA Method 320 (FTIR)
Sulfur Dioxide (SO_2)	EPA Method 320 (FTIR)	N/A
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

EPA Method 320

	Standard Method Specification	Actual Specification Used
Instrument Span Range		
Ethylene Oxide (C_2H_4O)	N/A	N/A
Propylene Oxide (C_3H_6O)	N/A	N/A
Hydrogen Chloride (HCl)	N/A	N/A
Carbon Dioxide (CO_2)	N/A	N/A
Sulfur Dioxide (SO_2)	N/A	N/A
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
Scan Rate	No Requirement (64 Scans ~ 1 minute)	64 Scans
Data Storage	Automatic	Automatic
Calibration Gas Specifications		
Ethylene Oxide (C_2H_4O)	Best Commercially Available Accuracy (±5%)	N/A
Propylene Oxide (C_3H_6O)	Best Commercially Available Accuracy (±5%)	N/A
Hydrogen Chloride (HCl)	Best Commercially Available Accuracy (±5%)	Best Commercial Accuracy (±5%)
Carbon Dioxide (CO_2)	N/A	EPA Protocol 1
Sulfur Dioxide (SO_2)	N/A	N/A
Nitrogen Dioxides (NO_2)	N/A	N/A
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
Sampling Train Configuration



[1] Sample delivery system maintained at 191C. / Heated umbilical length kept as short as possible.
[2] FTIR maintained at 191C.

CleanAir
INSTRUMENT RENTAL

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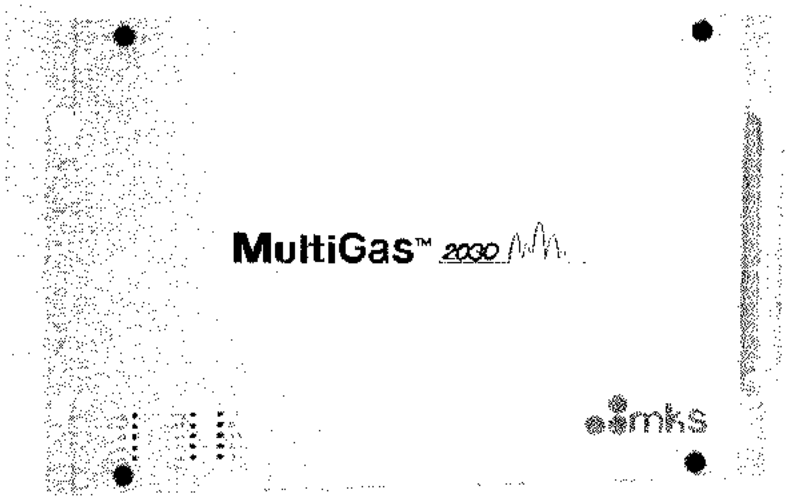
MKS MultiGas 2030 FTIR



Rental and Application Notes:

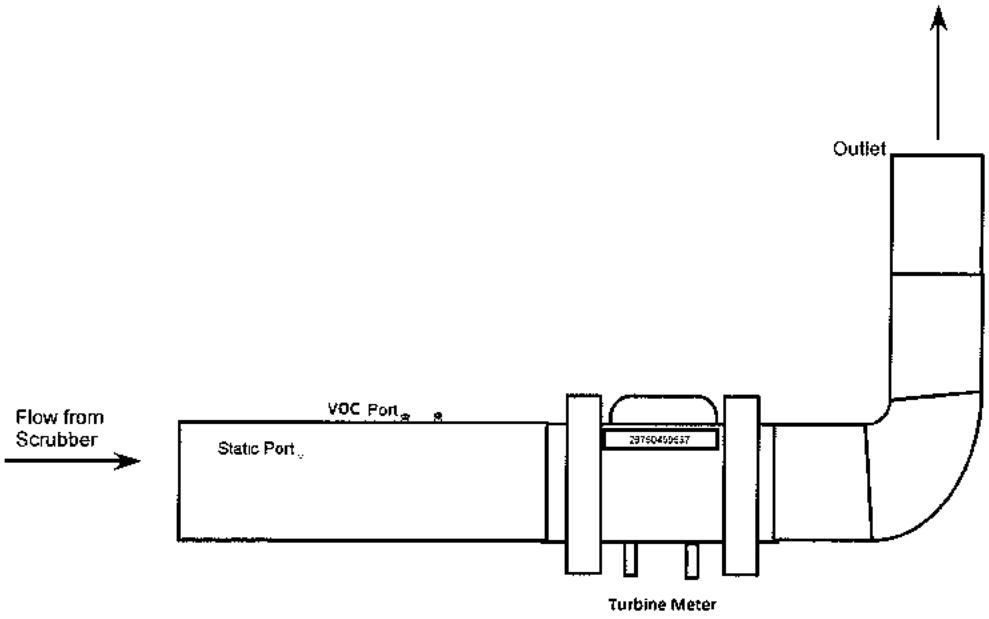
- Shipping Weight: 180 lbs.
- Designed to meet EPA Method 318, 320, 321 and various VOC and inorganic gas sampling including Formaldehyde, Ammonia and HCl.
- Nitrogen and Ethylene calibration gases are needed.
- Liquid Nitrogen is needed for most applications.
- Instrument rental of the MKS FTIR includes a laptop to run the MKS software.
- Rental is accompanied with an operator unless otherwise arranged through CleanAir Intstrument Rental.

Specifications:

- Dimensions: 17.5"W x 12.5"H x 25.5"D
  (19" rack-mountable support brackets available)
- Weight: 110 lbs.
- Power 120 or 240VAC, 50/60 Hz, 3amps.
- Measurement Technique: FTIR Spectrometry.
- 21µm 0.25mm LN_2 cooled detector, 7µm 0.25mm TE cooled also available.
- Reads most molecules except diatomics (N_2, H_2, O_2).
- Ranges: Full scale setting < 100ppb to 100% concentration.
- Averaging Time: 0.2 sec to 5 min.
- Spectral Range: 2µm - 20µm (500 - 5,000cm^{-1}).
- Temperature and pressure measured internally.
- Sample Flow: 0.2 - 10 L/min.
- Sample Pressure: 0.1 - 1.3 Atm (0-1000 Torr).
- N_2 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.

EPA Method 2A

Gas Volume Meter



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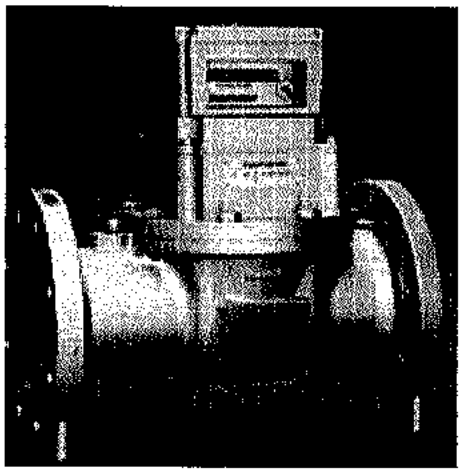
Equimeter 6" Mark II T-35 Turbo Meter Turbine Flow Meter



Rental and Application Notes:

- Shipping Weight: 75 lbs.

Specifications:

- Weight: approx. 60 lbs.
- Dimensions: 14" x 16" x 11".
- Temperature Range: -20°F to 165°F.
- Maximum Rated Operating Pressure: 175 PSIG.
- Minimum Acceptable Spin Time: 140 sec.
- Minimum Flow Rate (scfh) at 0.25 (psi): 1,700.
- Maximum Flow Rate (scfh) at 0.25 (psi): 30,000.
- Flanges: ansi B-16.1 (Aluminum) (Mating flanges not included).
- Ft3 per Revolution of Mechanical Output Shaft: 100.
- 45° Rotor Blade Angle.
- Body Material: Aluminum.

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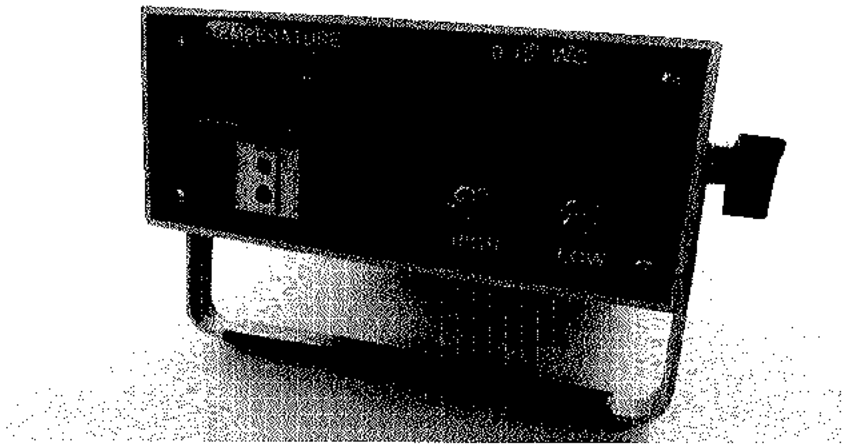
CleanAir Temperature & Pressure Transducer



Specifications:

- Weight: 5.4 lbs.
- Dimensions: 10.75" x 8.25" x 3.5".
- Power: 100 - 130VAC.
- Range: 0 - 0.25", 0 - 2", 0 - 10" wc upon request.
- Outputs: 0 - 10VDC.
- Temperature Range: 0°F - 1,000°F.

Rental and Application Notes:

- Shipping Weight: 9 lbs.
- Request transducer range when ordering.

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APPENDIX B: SAMPLE CALCULATIONS

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Vantage Specialty Chemicals

CleanAir Project No. 13157

Gurnee, IL

Scrubber Stack

CEM Emissions Sample Calculations for C2H4O Scrubber Stack

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.

021117 170055

1. C2H4O concentration (ppmdv)

$$C(ppmdv) = k_1 \times C_{DC} \quad if \quad dry \quad gas$$

$$C(ppmdv) = \frac{k_1 \times C_{DC}}{\left(1 - B_W / 100\right)} \quad if \quad wet \quad gas$$

Where:

C_{DC}	= drift corrected average concentration	=	141.353	ppmwv
B_w	= actual water vapor in gas (% v/v)	=	1.799	% v/v
100	= conversion factor to change percentage to decimal	=	100	
k_1	= ppm/% to ppm conversion factor for diluent gases	=	1	
C (ppmdv)	= C2H4O concentration (ppmdv)	=	143.942	ppmdv

2. C2H4O concentration (lb/dscf)

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

Where:

C (ppmdv)	= C2H4O concentration (ppmdv)	=	143.942	ppmdv
MW	= Molecular Weight of C2H4O 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)	= C2H4O concentration (lb/dscf)	=	1.646E-05	lb/dscf

3. C2H4O concentration (lb/scf)

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

Where:

C (lb/dscf)	= C2H4O concentration (lb/dscf)	=	1.646E-05	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	109.3032548	dscf/min
Q_s	= volumetric flow rate (standard cubic feet/min)	=	111.3051395	scf/min
C (lb/scf)	= C2H4O concentration (lb/scf)	=	1.616E-05	lb/scf

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Vantage Specialty Chemicals

CleanAir Project No. 13157

Gurnee, IL

Scrubber Stack

4. C2H4O concentration (lb/acf)

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

Where:

C (lb/dscf)	= C2H4O concentration (lb/dscf)	=	1.646E-05	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	109.3032548	dscf/min
Q_a	= volumetric flow rate (actual cubic feet/min)	=	111.2	acf/min
C (lb/acf)	= C2H4O concentration (lb/acf)	=	1.618E-05	lb/acf

5. C2H4O concentration (mg/dscm)

$$C\left(mg/dscm\right) = C\left(lb/dscf\right) \times k_2 \times 35.31$$

Where:

C (lb/dscf)	= C2H4O concentration (lb/dscf)	=	1.646E-05	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)	= C2H4O concentration (mg/dscm)	=	263.526	mg/dscm

6. C2H4O concentration (mg/Nm3 dry)

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

Where:

C (lb/dscf)	= C2H4O concentration (lb/dscf)	=	1.646E-05	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/Nm3 dry	= C2H4O concentration (mg/Nm3 dry)	=	282.809	mg/Nm^3 dry

7. C2H4O emission rate (lb/hr)

$$E_{lb\ /\ hr} = C\left(lb\ /\ dscf\right) \times Q_{std} \times 60$$

Where:

C (lb/dscf)	= C2H4O concentration (lb/dscf)	=	1.646E-05	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	109.3032548	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= C2H4O emission rate (lb/hr)	=	0.108	lb/hr

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Vantage Specialty Chemicals

CleanAir Project No. 13157

Gurnee, IL

Scrubber Stack

8. C2H4O emission rate (kg/hr)

$$E_{kg/hr} = C(lb/dscf) \times Q_{std} \times 60 \times 0.454$$

Where:

C (lb/dscf)	= C2H4O concentration (lb/dscf)	=	1.646E-05	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	109.3032548	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
0.454	= conversion factor (kg/lb)	=	0.454	kg/lb
$E_{kg/hr}$	= C2H4O emission rate (kg/hr)	=	0.049	kg/hr

9. C2H4O emission rate (gm/sec)

$$E_{gm/sec} = C(lb/dscf) \times Q_{std} \times \frac{454}{60}$$

Where:

C (lb/dscf)	= C2H4O concentration (lb/dscf)	=	1.646E-05	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	109.3032548	dscfm
60	= conversion factor (sec/min)	=	60	sec/min
454	= conversion factor (g/lb)	=	453.515	kg/lb
$E_{gm/sec}$	= C2H4O emission rate (gm/sec)	=	0.014	gm/sec

10. Total VOC emission rate (Ton/yr) (for 5-minute period)

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

Where:

C_{total} (lb/hr)	= sum of propylene oxide and ethylene oxide concentration	=	1.207E-01	lb/hr
Cap	= capacity factor for process (hours operated/year)	=	8760	hours/yr
2000	= conversion factor (lb/Ton)	=	2,000	lb/Ton
$E_{T/yr}$	= VOC emission rate (Ton/yr) (5-minute period)	=	0.529	Ton/yr

11. Total VOC emission rate (Ton/yr) (for entire test run, 24-hour period)

$$E_{T/yr} = \frac{\sum_{i=1}^{N} E_{T/yr\,(5\,\mathrm{min}),\ i}}{N}$$

Where:

			i=1	
$E_{T/yr\,(5\,min)}$	= Emission rate (Ton/yr) for individual ith 5-minute average	=	0.529	Ton/yr
N	= capacity factor for process (hours operated/year)	=	288	
$E_{T/yr}$	= VOC emission rate (Ton/yr) (entire test run)	=	0.3885	Ton/yr

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

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.

011917 110107

1. Sample gas pressure (in. Hg)

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

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.60	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	0.00	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.60	in. Hg

2. Total flow of sample 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)	=	111.2	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	29.60	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	61.947	°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)	=	111.305	scfm

3. Dry flow of sample gas (dscfm)

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

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.017986	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	111.305	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	109.303	dscfm

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Vantage
Clean Air Project No. 13157

Scrubber Stack

EPA Method 320
FTIR QA/QC Sample Calcs

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.

012617 112155

1. Dilution Factor of Spike Gas

$$DF = \frac{SF6_{spike}}{SF6_{direct}}$$

Where:

$SF6_{spike}$	= diluted N2O concentration measured in spiked sample	=	0.482	ppmwv
$SF6_{direct}$	= N2O concentration measured directly in undiluted spike gas	=	4.936	ppmwv
DF	= dulution factor of spike gas	=	0.0977	

2. Concentration of Analyte Corrected for Dilution

$$Udil = Ua \times (1 - DF)$$

Where:

Ua	= concentration of analyte in unspiked sample	=	0.0000	ppmwv
DF	= dilution factor of spike gas	=	0.0977	
Udil	= concentration of analyte corrected for dilution	=	0.0000	ppmwv

3. Bias at spike level

$$B = Sa - Udil - Cs$$

Where:

Sa	= total concentration of analytes in spiked sample	=	7.1745	ppmwv
Udil	= concentration of analyte corrected for dilution	=	0.0000	ppmwv
Cs	= certified concentration of calibration standard * DF	=	9.3261	ppmwv
B	= bias at spike level	=	-2.1515	ppmwv

4. Expected in spiked sample (ppm)

$$X_E = (X_D)(DF) + (X_O)(1 - DF)$$

Where:

X_D	= response, direct to analyzer	=	95.4735	ppmwv
DF	= dilution factor (dimensionless)	=	0.0977	ppmwv
X_O	= native concentration in flue gas (ppm)	=	0.0000	ppmwv
X_E	= expected in spiked sample (ppm)	=	9.3261	ppmwv

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Clean Air Project No. 13157

Scrubber Stack

5. Spike recovery (%)

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

Where:

X_S	= spiked concentration (ppm)	=	7.1745	ppmwv
X_E	= expected in spiked sample (ppm)	=	9.3261	ppmwv
100	= conversion constant (%/decimal)	=		
%SR	= spike recovery (%)	=	76.9300	%

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APPENDIX C: PARAMETERS

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Vantage Specialty Chemicals
CleanAir Job No. 13157
Scrubber Stack

Sample Run Data (5-minute averages)

	General Data								Ethylene Oxide				Propylene Oxide				Totals	
Time	Accumulated Volume (acf)	Volume Difference (acf)	Volumetric Flow Rate (acfm)	Duct Temperature (° F)	Absolute Pressure (in. Hg)	Volumetric Flow Rate (scfm)	Moisture In Sample (% by volume)	Volumetric Flow Rate (dscfm)	ppmwv	ppmdv	lb/dscf	lb/hr	ppmwv	ppmdv	lb/dscf	lb/hr	lb/hr	ton/yr
18:05:00	25,892																	
18:10:00	26,448	556	111.2	61.9465	29.6000	111.3051	1.7986	109.3033	141.3591	143.9429	1.6456E-05	1.0792E-01	12.6857	12.8976	1.9442E-06	1.2750E-02	1.2067E-01	0.5285545
18:15:00	27,009	561	112.2	60.9196	29.6000	112.5275	1.8948	110.3953	132.3591	134.9155	1.5424E-05	1.0217E-01	12.5830	12.8260	1.9334E-06	1.2806E-02	1.1497317	0.5035825
18:20:00	27,571	562	112.4	61.1657	29.6000	112.6748	1.9942	110.4279	112.6875	114.9804	1.3145E-05	8.7097E-02	11.0541	11.2790	1.7002E-06	1.1265E-02	0.9836146	0.4308232
18:25:00	28,132	561	112.2	60.8819	29.6000	112.5356	1.9682	110.3207	113.2831	115.5576	1.3211E-05	8.7449E-02	10.9916	11.2123	1.6901E-06	1.1187E-02	0.9863609	0.4320261
18:30:00	28,727	595	119.0	61.7841	29.6000	119.1496	2.0444	116.7137	102.3910	104.5280	1.1950E-05	8.3686E-02	10.4592	10.6775	1.6095E-06	1.1271E-02	0.0949570 7	0.415912
18:35:00	29,335	608	121.6	60.0843	29.6000	122.1508	2.0734	119.6181	106.7783	109.0392	1.2466E-05	8.9470E-02	9.3138	9.5110	1.4337E-06	1.0290E-02	0.09975964	0.4369472
18:40:00	29,890	555	111.0	58.1653	29.6000	111.9157	1.9981	109.6795	105.2619	107.4080	1.2280E-05	8.0809E-02	10.2407	10.4495	1.5751E-06	1.0366E-02	0.0911748	0.3993456
18:45:00	30,448	558	111.6	60.4492	29.6000	112.0269	1.9504	109.8419	100.3216	102.3171	1.1698E-05	7.7093E-02	10.9084	11.1254	1.6770E-06	1.1053E-02	0.08814551	0.3860773
18:50:00	31,010	562	112.4	60.2823	29.6000	112.8661	1.9373	110.6796	98.3964	100.3403	1.1472E-05	7.6180E-02	11.0832	11.3021	1.7037E-06	1.1314E-02	0.08749381	0.3832229
18:55:00	31,572	562	112.4	61.5679	29.6000	112.5879	2.0344	110.2974	100.0507	102.1284	1.1676E-05	7.7270E-02	11.0205	11.2493	1.6957E-06	1.1222E-02	0.08849184	0.3875943
19:00:00	32,130	558	111.6	62.0584	29.6000	111.6816	2.0870	109.3508	100.9158	103.0668	1.1783E-05	7.7311E-02	11.1431	11.3807	1.7155E-06	1.1256E-02	0.08856614	0.3879197
19:05:00	32,693	563	112.6	61.3517	29.6000	112.8350	2.1097	110.4545	92.7094	94.7075	1.0828E-05	7.1757E-02	10.4437	10.6688	1.6082E-06	1.0658E-02	0.0824153	0.360979
19:10:00	33,318	625	125.0	59.8971	29.6000	125.6114	2.0990	122.9748	82.2543	84.0179	9.6055E-06	7.0874E-02	11.6287	11.8780	1.7905E-06	1.3211E-02	0.08408495	0.3682921
19:15:00	33,832	514	102.8	55.1712	29.6000	104.2505	2.0334	102.1306	83.5138	85.2472	9.7460E-06	5.9722E-02	15.1243	15.4383	2.3272E-06	1.4260E-02	0.07398245	0.3240431
19:20:00	34,375	543	108.6	52.1815	29.6000	110.7751	1.8491	108.7268	84.3550	85.5442	9.8257E-06	6.4095E-02	14.8765	15.1568	2.2847E-06	1.4905E-02	0.07900367	0.3460361
19:25:00	34,960	585	117.0	50.9596	29.6000	119.6288	1.7101	117.5830	86.3954	87.8985	1.0049E-05	7.0896E-02	16.8526	17.1458	2.5845E-06	1.8234E-02	0.08913036	0.390391
19:30:00	35,530	570	114.0	49.1839	29.6000	116.9680	1.5567	115.1471	83.6806	85.0039	9.7182E-06	6.7141E-02	15.7168	15.9653	2.4066E-06	1.6627E-02	0.08376819	0.3669047
19:35:00	36,086	556	111.2	47.3078	29.6000	114.5169	1.4847	112.8166	90.8646	92.2341	1.0545E-05	7.1378E-02	14.2873	14.5027	2.1861E-06	1.4798E-02	0.08617564	0.3774493
19:40:00	36,627	541	108.2	45.7506	29.6000	111.7705	1.3976	110.2085	93.4410	94.7655	1.0834E-05	7.1641E-02	12.3290	12.5038	1.8848E-06	1.2463E-02	0.08419462	0.3683782
19:45:00	37,155	528	105.6	43.6216	29.6000	109.5459	1.3181	108.1019	92.8502	94.0904	1.0757E-05	6.9771E-02	10.6548	10.7971	1.6276E-06	1.0557E-02	0.08032783	0.3518359
19:50:00	37,699	544	108.8	42.7465	29.6000	113.0619	1.2538	111.6443	84.7114	85.7871	9.8077E-06	6.5699E-02	9.5970	9.7189	1.4650E-06	9.8137E-03	0.07551232	0.330744
19:55:00	38,229	530	106.0	41.2931	29.6000	110.4716	1.2195	109.1244	82.4728	83.4910	9.5452E-06	6.2497E-02	8.8337	8.9428	1.3480E-06	8.8262E-03	0.07132318	0.3123955
20:00:00	38,760	531	106.2	41.2026	29.6000	110.7000	1.1350	109.4435	82.1527	83.0958	9.5001E-06	6.2383E-02	8.2509	8.3456	1.2580E-06	8.2609E-03	0.07064407	0.309421
20:05:00	39,305	545	109.0	41.3656	29.6000	113.5817	1.0742	112.3616	78.8609	79.7172	9.1138E-06	6.1442E-02	7.9403	8.0265	1.2099E-06	8.1569E-03	0.06959929	0.3048449
20:10:00	39,869	564	112.8	41.7278	29.6000	117.4566	1.0449	116.2293	73.4320	74.2074	8.4839E-06	5.9164E-02	7.7669	7.8489	1.1831E-06	8.2510E-03	0.06741545	0.2952797
20:15:00	40,413	544	108.8	42.1834	29.6000	113.1887	1.0577	111.9914	75.4230	76.2293	8.7150E-06	5.8561E-02	7.9586	8.0437	1.2125E-06	8.1474E-03	0.06670793	0.2921807
20:20:00	40,963	550	110.0	45.2425	29.6000	113.7442	1.1093	112.4824	77.4308	78.2994	8.9517E-06	6.0414E-02	8.4128	8.5071	1.2824E-06	8.6546E-03	6.9069E-02	0.3025226
20:25:00	41,518	555	111.0	46.6954	29.6000	114.4491	1.1038	113.0714	81.9941	82.9932	9.4883E-06	6.4371E-02	9.3856	9.4999	1.4320E-06	9.7152E-03	0.07408665	0.3244995
20:30:00	42,072	554	110.8	51.6938	29.6000	113.1269	1.3428	111.6079	85.3765	86.5385	9.8936E-06	6.6253E-02	10.7284	10.8744	1.6392E-06	1.0977E-02	0.07722939	0.3382647
20:35:00	42,630	558	111.6	54.7415	29.6000	113.2691	1.4856	111.5843	83.0170	84.2689	9.6342E-06	6.4502E-02	11.7826	11.9603	1.8029E-06	1.2071E-02	0.07657318	0.3353905
20:40:00	43,239	609	121.8	57.6110	29.6000	122.9363	1.6280	120.9350	74.9992	76.2403	8.7163E-06	6.3246E-02	13.5706	13.7952	2.0795E-06	1.5089E-02	0.07833522	0.3431083
20:45:00	43,803	564	112.8	57.9342	29.6000	113.7813	1.7739	111.7619	99.0560	100.8449	1.1529E-05	7.7313E-02	19.0644	19.4087	2.9257E-06	1.9619E-02	0.09693134	0.4245593
20:50:00	44,372	569	113.8	59.6608	29.6000	114.4086	1.8923	112.2437	127.7098	130.1730	1.4882E-05	1.0023E-01	20.4433	20.8376	3.1410E-06	2.1154E-02	0.12137997	0.5316443
20:55:00	44,942	570	114.0	60.3694	29.6000	114.4536	1.9865	112.1800	108.8535	111.0598	1.2697E-05	8.5461E-02	18.1009	18.4678	2.7838E-06	1.8737E-02	0.1041988	0.4563907
21:00:00	45,503	561	112.2	59.7329	29.6000	112.7844	2.0696	110.4502	108.3567	110.6466	1.2650E-05	8.3831E-02	16.4347	16.7820	2.5297E-06	1.6764E-02	0.10059508	0.4406064
21:05:00	46,068	565	113.0	59.1842	29.6000	113.7086	2.2214	111.2964	98.3993	100.5320	1.1493E-05	7.6751E-02	14.5245	14.8193	2.2369E-06	1.4937E-02	0.09168821	0.4015944
21:10:00	46,632	564	112.8	57.3829	29.6000	113.9026	2.0446	111.5737	85.3303	87.1114	9.9591E-06	6.6671E-02	12.8248	13.0925	1.9736E-06	1.3212E-02	0.07988253	0.3498855
21:15:00	47,250	618	123.6	56.0169	29.6000	125.1385	1.9228	122.7323	80.1218	81.6927	9.3396E-06	6.8776E-02	12.1304	12.3682	1.8644E-06	1.3729E-02	0.08250569	0.3613749
21:20:00	47,805	555	111.0	54.0087	29.6000	112.8207	1.8381	110.7470	80.9220	82.4372	9.4248E-06	6.2626E-02	11.3166	11.5285	1.7378E-06	1.1547E-02	0.07417322	0.3248787
21:25:00	48,498	693	138.6	54.8287	29.6000	140.6491	1.7820	138.1427	83.0854	84.5929	9.6712E-06	8.0160E-02	11.7849	11.9987	1.8087E-06	1.4991E-02	0.0951518	0.4167649
21:30:00	49,320	822	164.4	59.8406	29.6000	165.2221	1.7679	162.3012	90.3123	91.9376	1.0511E-05	1.0236E-01	12.7120	12.9408	1.9507E-06	1.8996E-02	0.12135186	0.5315211
21:35:00	50,008	688	137.6	61.6161	29.6000	137.8173	1.9285	135.1595	85.2806	86.9576	9.9416E-06	8.0622E-02	12.4742	12.7195	1.9173E-06	1.5549E-02	0.09617052	0.4212269
21:40:00	50,571	563	112.6	60.0176	29.6000	113.1245	2.0129	110.8475	80.8216	82.4819	9.4299E-06	6.2717E-02	11.7874	12.0296	1.8133E-06	1.2060E-02	0.07477682	0.3275225
21:45:00	51,123	552	110.4	59.4102	29.6000	111.0440	2.0993	108.7129	75.4188	77.0360	8.8073E-06	5.7448E-02	11.1836	11.4234	1.7220E-06	1.1232E-02	0.06867961	0.3008167
21:50:00	51,708	585	117.0	58.4345	29.6000	117.9040	2.0891	115.4408	69.9697	71.4627	8.1701E-06	5.6590E-02	10.9705	11.2046	1.6890E-06	1.1699E-02	0.06828821	0.2991024
21:55:00	53,020	1,312	262.4	64.9835	29.6000	261.1287	2.1557	255.4995	62.5719	63.9505	7.3112E-06	1.1208E-01	11.1000	11.3446	1.7101E-06	2.6215E-02	0.13829641	0.6057383
22:00:00	54,167	1,147	229.4	64.7780	29.6000	228.3780	2.3381	223.0382	66.4504	68.0413	7.7789E-06	1.0410E-01	67.2137	68.8228	1.0374E-05	1.3883E-01	0.24293222	1.0640431
22:05:00	55,026	859	171.8	63.4388	29.6000	171.4722	2.4311	167.3035	60.2505	61.7518	7.0599E-06	7.0868E-02	141.8067	145.3339	2.1908E-05	2.1991E-01	0.29078131	1.2736222
22:10:00	55,628	602	120.4	59.4347	29.6000	121.0966	2.3022	118.3087	50.9301	52.1303	5.9599E-06	4.2306E-02	209.8401	214.7849	3.2377E-05	2.2983E-01	0.27213233	1.1919396
22:15:00	56,179	551	110.2	56.5206	29.6000	111.4629	2.1344	109.0838	42.5060	43.4330	4.9655E-06	3.2500E-02	232.0651	237.1263	3.5744E-05	2.3395E-01	0.26644745	1.1670398
22:20:00	56,720	541	108.2	55.6424	29.6000	109.6264	2.0279	107.4032	39.1547	39.9651	4.5691E-06	2.9444E-02	156.1956	159.4287	2.4032E-05	1.5487E-01	0.18431238	0.8072882
22:25:00	57,258	538	107.6	53.6253	29.6000	109.4466	2.0420	107.2117	38.0914	38.8854	4.4456E-06	2.8597E-02	99.7792	101.8591	1.5354E-05	9.8769E-02	0.12736653	0.5578654
22:30:00	57,803	545	109.0	53.8511	29.6000	110.8219	2.0663	108.5320	37.6107	38.4043	4.3906E-06	2.8591E-02	67.3357	68.7564	1.0364E-05	6.7492E-02	0.09608301	0.4208436
22:35:00	58,388	595	119.0	55.2381	29.6000	120.6634	2.1029	118.3672	34.9599	35.6381	4.0744E-06	2.8936E-02	47.4072	48.3268	7.2848E-06	5.1737E-02	0.08067301	0.3533478
22:40:00	59,190	792	158.4	59.1618	29.6000	159.4002	1.9422	156.3043	32.1013	32.7371	3.7427E-06	3.5100E-02	31.2374	31.8561	4.8020E-06	4.5034E-02	0.08013438	0.3509886
22:45:00	59,746	556	111.2	55.6793	29.6000	112.6579	1.9601	110.4497	24.2840	24.7695	2.8318E-06	1.8766E-02	20.8266	21.2430	3.2022E-06	2.1221E-02	0.03998701	0.1751431
22:50:00	60,295	549	109.8	55.0408	29.6000	111.3774	1.9049	109.2558	24.1080	24.5762	2.8097E-06	1.8419E-02	15.1170	15.4105	2.3230E-06	1.5228E-02	0.03364654	0.1473718
22:55:00	61,011	716	143.2	56.4945	29.6000	144.8484	1.9433	142.0336	24.0297	24.5060	2.8017E-06	2.3876E-02	13.5503	13.8189	2.0831E-06	1.7752E-02	0.04162776	0.1823296
23:00:00	62,409	1,398	279.6	70.1247	29.6000	275.5469	2.3674	269.0237	23.3982	23.9656	2.7399E-06	4.4226E-02	16.9618	17.3731	2.6188E-06	4.2271E-02	0.08649734	0.3788584
23:05:00	63,329	920	184.0	66.3596	29.6000	182.6298	2.7905	177.5335	26.4105	27.1686	3.1061E-06	3.8086E-02	19.7235	20.2897	3.0585E-06	3.5779E-02	0.06566491	0.2876123
23:10:00	63,885	556	111.2	59.6388	29.6000	111.7994	2.9089	108.5473	22.8053	23.4886	2.6854E-06	1.7489E-02	24.3103	25.0386	3.7743E-06	2.4581E-02	0.04207085	0.1842703
23:15:00	64,437	552	110.4	60.0439	29.6000	110.9087	2.8292	107.7709	19.1234	19.6802	2.2500E-06	1.4549E-02	35.0880	36.1096	5.4431E-06	3.5197E-02	0.04974563	0.2178859
23:20:00	64,991	554	110.8	60.6262	29.6000	111.1860	2.5085	108.3969	17.5191	17.9698	2.0544E-06	1.3362E-02	32.0085	32.8320	4.9491E-06	3.2188E-02	0.04554961	0.1995073
23:25:00	65,542	551	110.2	59.9651	29.6000	110.7245	2.3920	108.0760	17.5246	17.9540	2.0526E-06	1.3310E-02	25.7374	26.3681	3.9747E-06	2.5774E-02	0.03908468	0.1711909
23:30:00	66,098	556	111.2	60.4637	29.6000	111.6222	2.3127	109.0408	16.5865	16.9792	1.9412E-06	1.2700E-02	21.8289	22.3457	3.3684E-06	2.2038E-02	0.03473754	0.1521504
23:35:00	66,652	554	110.8	61.6706	29.6000	110.9634	2.3099	108.4003	16.5860	16.9781	1.9411E-06	1.2625E-02	19.3709	19.8289	2.9890E-06	1.9443E-02	0.03206518	0.1404455
23:40:00	67,205	553	110.6	62.5368	29.6000	110.5795	2.3512	107.9796	17.9729	18.4057	2.1043E-06	1.3633E-02	15.5979	15.9735	2.4078E-06	1.5600E-02	0.02923285	0.1280399
23:45:00	67,760	555	111.0	61.8416	29.6000	111.1273	2.4059	108.4537	17.2376	17.6625	2.0193E-06	1.3140E-02	13.5150	13.8482	2.0875E-06	1.3584E-02	0.02672365	0.1170496
23:50:00	68,324	564	112.8	61.3807	29.6000	113.0292	2.4491	110.2609	16.3056	16.7150	1.9110E-06	1.2642E-02	11.3860	11.6718	1.7594E-06	1.1640E-02	0.02428194	0.1063549
23:55:00	68,880	556	111.2	61.0302	29.6000	111.5009	2.3842	108.8425	17.5480	17.9766	2.0552E-06	1.3422E-02	11.1875	11.4607	1.7276E-06	1.1282E-02	0.02470363	0.1082019
0:00:00	69,431	551	110.2	60.3027	29.6000	110.6527	2.3268	108.0780	18.6190	19.0626	2.1794E-06	1.4132E-02	10.7457	11.0017	1.6584E-06	1.0754E-02	0.02488655	0.1090031
0:05:00	69,992	561	112.2	60.8756	29.6000	112.5370	2.2848	109.9657	18.0972	18.5203	2.1174E-06	1.3970E-02	11.1834	11.4428	1.7249E-06	1.1381E-02	0.02535099	0.1110374
0:10:00	70,548	556	111.2	61.6414	29.6000	111.3702	2.3544	108.7481	18.9479	19.4047	2.2185E-06	1.4475E-02	11.2942	11.5666	1.7435E-06	1.1376E-02	0.0258517	0.1132305
0:15:00	71,112	564	112.8	61.7033	29.6000	112.9593	2.4450	110.1975	20.2373	20.7445	2.3716E-06	1.5681E-02	11.4371	11.7237	1.7672E-06	1.1685E-02	0.02736563	0.1198615
0:20:00	71,676	564	112.8	63.5521	29.6000	112.5604	2.4747	109.7749	19.4651	19.9591	2.2819E-06	1.5029E-02	18.3745	18.8408	2.8400E-06	1.8706E-02	0.03373535	0.1477608
0:25:00	72,245	569	113.8	63.8962	29.6000	113.4837	2.4519	110.7012	18.0517	18.5055	2.1157E-06	1.4052E-02	17.0481	17.4766	2.6344E-06	1.7498E-02	0.03155043	0.1381909
0:30:00	72,809	564	112.8	62.5924	29.6000	112.7671	2.4806	109.9698	19.9006	20.4068	2.3330E-06	1.5394E-02	11.8981	12.2008	1.8391E-06	1.2135E-02	0.02752882	0.1205762
0:35:00	73,361	552	110.4	63.1011	29.6000	110.2605	2.4435	107.5663	22.5992	23.1652	2.6484E-06	1.7093E-02	9.9997	10.2501	1.5451E-06	9.9720E-03	0.02706473	0.1185435
0:40:00	73,930	569	113.8	63.7294	29.6000	113.5198	2.4379	110.7523	26.0601	26.7113	3.0538E-06	2.0293E-02	9.3649	9.5989	1.4469E-06	9.6151E-03	0.02990811	0.1309975
0:45:00	74,491	561	112.2	63.7974	29.6000	111.9092	2.4868	109.1263	29.2534	29.9994	3.4297E-06	2.2456E-02	9.8487	10.0998	1.5224E-06	9.9683E-03	0.03242476	0.1420204
0:50:00	75,158	667	133.4	66.9360	29.6000	132.2618	2.5742	128.8571	31.7697	32.6091	3.7281E-06	2.8823E-02	13.8098	14.1747	2.1367E-06	1.6520E-02	0.04534302	0.1986024
0:55:00	75,710	552	110.4	65.2758	29.6000	109.8040	2.5540	106.9995	33.0062	33.8713	3.8724E-06	2.4861E-02	13.2803	13.6284	2.0543E-06	1.3189E-02	0.03804938	0.1666563
1:00:00	76,260	550	110.0	65.1991	29.6000	109.4221	2.6165	106.5591	33.0366	33.9242	3.8784E-06	2.4797E-02	11.9969	12.3192	1.8570E-06	1.1873E-02	0.03666979	0.1606137
1:05:00	76,812	552	110.4	64.6198	29.6000	109.9413	2.5542	107.1331	31.8315	32.6658	3.7346E-06	2.4006E-02	10.6642	10.9437	1.6497E-06	1.0604E-02	0.03460974	0.1515906
1:10:00	77,360	548	109.6	63.8568	29.6000	109.3036	2.4661	106.6081	29.5625	30.3099	3.4652E-06	2.2165E-02	9.6123	9.8553	1.4856E-06	9.5025E-03	0.03166781	0.138705
1:15:00	77,913	553	110.6	64.9780	29.6000	110.0653	2.4386	107.3813	27.7522	28.4459	3.2521E-06	2.0953E-02	9.2616	9.4931	1.4310E-06	9.2196E-03	0.03017266	0.1321562
1:20:00	78,469	556	111.2	64.8590	29.6000	110.6875	2.4796	107.9429	27.2808	27.9745	3.1982E-06	2.0714E-02	8.8856	9.1115	1.3735E-06	8.8954E-03	0.0296089	0.129687
1:25:00	79,020	551	110.2	64.8703	29.6000	109.6897	2.4941	106.9540	27.0311	27.7225	3.1684E-06	2.0139E-02	8.4862	8.7033	1.3119E-06	8.4190E-03	0.02875793	0.1259597
1:30:00	79,582	562	112.4	64.7813	29.6000	111.8985	2.5241	109.0741	23.5497	24.1595	2.7621E-06	1.8076E-02	8.2746	8.4888	1.2796E-06	8.3743E-03	0.02645056	0.1158535
1:35:00	80,137	555	111.0	64.8944	29.6000	110.4810	2.5454	107.6688	25.6679	26.3383	3.0112E-06	1.9452E-02	8.1389	8.3515	1.2589E-06	8.1327E-03	0.02758517	0.120823
1:40:00	80,702	565	113.0	65.0326	29.6000	112.4420	2.5393	109.5868	23.5945	24.2092	2.7678E-06	1.8199E-02	7.9718	8.1795	1.2330E-06	8.1071E-03	0.0263056	0.1152185
1:45:00	81,260	558	111.6	64.6059	29.6000	111.1393	2.5509	108.3042	23.0256	23.6284	2.7013E-06	1.7554E-02	7.9357	8.1434	1.2275E-06	7.9768E-03	0.02553086	0.1118252
1:50:00	81,817	557	111.4	65.0260	29.6000	110.8513	2.4751	108.1076	24.2599	24.8756	2.8439E-06	1.8447E-02	7.8745	8.0743	1.2171E-06	7.8948E-03	0.02634193	0.1153777
1:55:00	82,391	574	114.8	64.9864	29.6000	114.2432	2.4928	111.3953	22.3865	22.9589	2.6248E-06	1.7543E-02	7.7747	7.9734	1.2019E-06	8.0332E-03	0.0255767	0.112026
2:00:00	82,940	549	109.8	63.8032	29.6000	109.5143	2.4753	106.8035	23.1877	23.7762	2.7183E-06	1.7419E-02	7.6631	7.8576	1.1845E-06	7.5903E-03	0.02500938	0.1095411
2:05:00	83,574	634	126.8	64.3154	29.6000	126.3465	2.4834	123.2088	22.2097	22.7753	2.6038E-06	1.9249E-02	15.5238	15.9191	2.3996E-06	1.7739E-02	0.03698823	0.1620084
2:10:00	84,572	998	199.6	69.8614	29.6000	196.8043	2.7731	191.3467	5.1291	5.2754	6.0311E-07	6.9242E-03	56.3689	57.9766	8.7394E-06	1.0034E-01	0.10725937	0.469796
2:15:00	85,224	652	130.4	68.3791	29.6000	128.9343	2.8818	125.2187	0.4530	0.4664	5.3327E-08	4.0065E-04	104.1345	107.2245	1.6163E-05	1.2143E-01	0.12183513	0.5336379
2:20:00	85,782	558	111.6	65.8371	29.6000	110.8664	2.8037	107.7580	0.4530	0.4661	5.3284E-08	3.4451E-04	155.0003	159.4714	2.4039E-05	1.5542E-01	0.15576609	0.6822555
2:25:00	86,338	556	111.2	65.8509	29.6000	110.4787	2.6582	107.5420	0.4530	0.4654	5.3204E-08	3.4330E-04	98.3661	101.0522	1.5233E-05	9.8289E-02	0.09863181	0.4320073
2:30:00	86,892	554	110.8	64.8984	29.6000	110.2811	2.5359	107.4844	0.4530	0.4648	5.3137E-08	3.4269E-04	66.7922	68.5300	1.0330E-05	6.6620E-02	0.06696279	0.293297
2:35:00	87,442	550	110.0	64.0459	29.6000	109.6629	2.4653	106.9594	0.4530	0.4644	5.3099E-08	3.4077E-04	44.6473	45.7758	6.9002E-06	4.4283E-02	0.04462343	0.1954506
2:40:00	88,000	558	111.6	64.0847	29.6000	111.2498	2.4052	108.5740	0.4530	0.4642	5.3096E-08	3.4570E-04	33.1225	33.9387	5.1159E-06	3.3327E-02	0.03367303	0.1474879
2:45:00	88,558	558	111.6	65.4544	29.6000	110.9598	2.4308	108.2625	0.4530	0.4643	5.3080E-08	3.4480E-04	25.3923	26.0249	3.9230E-06	2.5483E-02	0.02582754	0.1131246
2:50:00	89,118	560	112.0	64.9963	29.6000	111.4546	2.4428	108.7320	0.4530	0.4643	5.3087E-08	3.4633E-04	19.9539	20.4535	3.0832E-06	2.0114E-02	0.02046061	0.0896175
2:55:00	89,778	660	132.0	64.5461	29.6000	131.4700	2.4338	128.2703	0.4530	0.4643	5.3082E-08	4.0853E-04	16.8007	17.2198	2.5957E-06	1.9977E-02	0.02038571	0.0892894
3:00:00	90,230	452	90.4	64.2218	29.6000	90.0927	2.4325	87.9012	1.5919	1.6315	1.8653E-07	9.8376E-04	15.0369	15.4118	2.3232E-06	1.2253E-02	0.01323635	0.0579752
3:05:00	90,786	556	111.2	64.0782	29.6000	110.8524	2.3932	108.1995	5.7301	5.8706	6.7117E-07	4.3572E-03	13.5055	13.8367	2.0857E

Vantage Specialty Chemicals
CleanAir Job No. 13157
Scrubber Stack

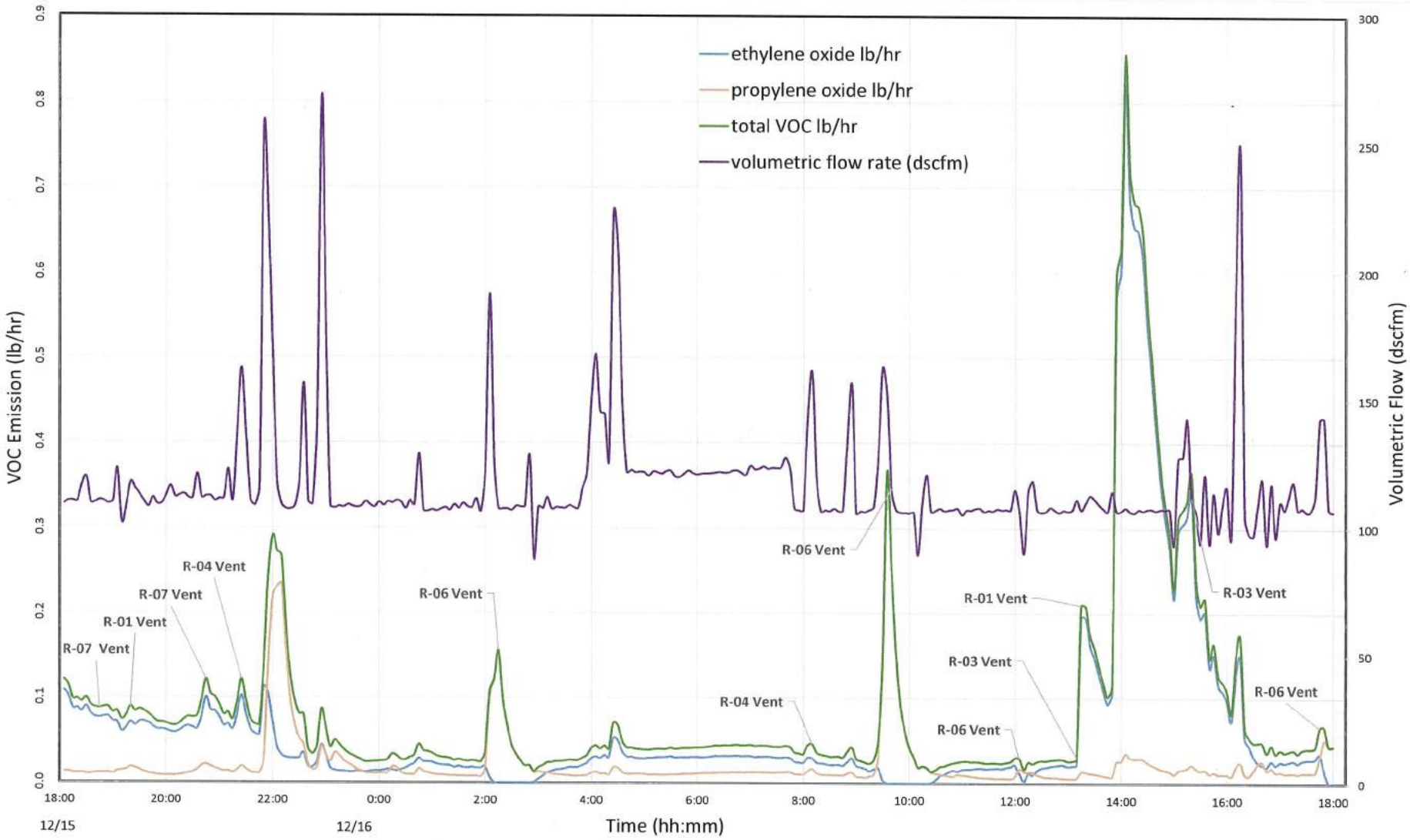
Sample Run Data (5-minute averages)

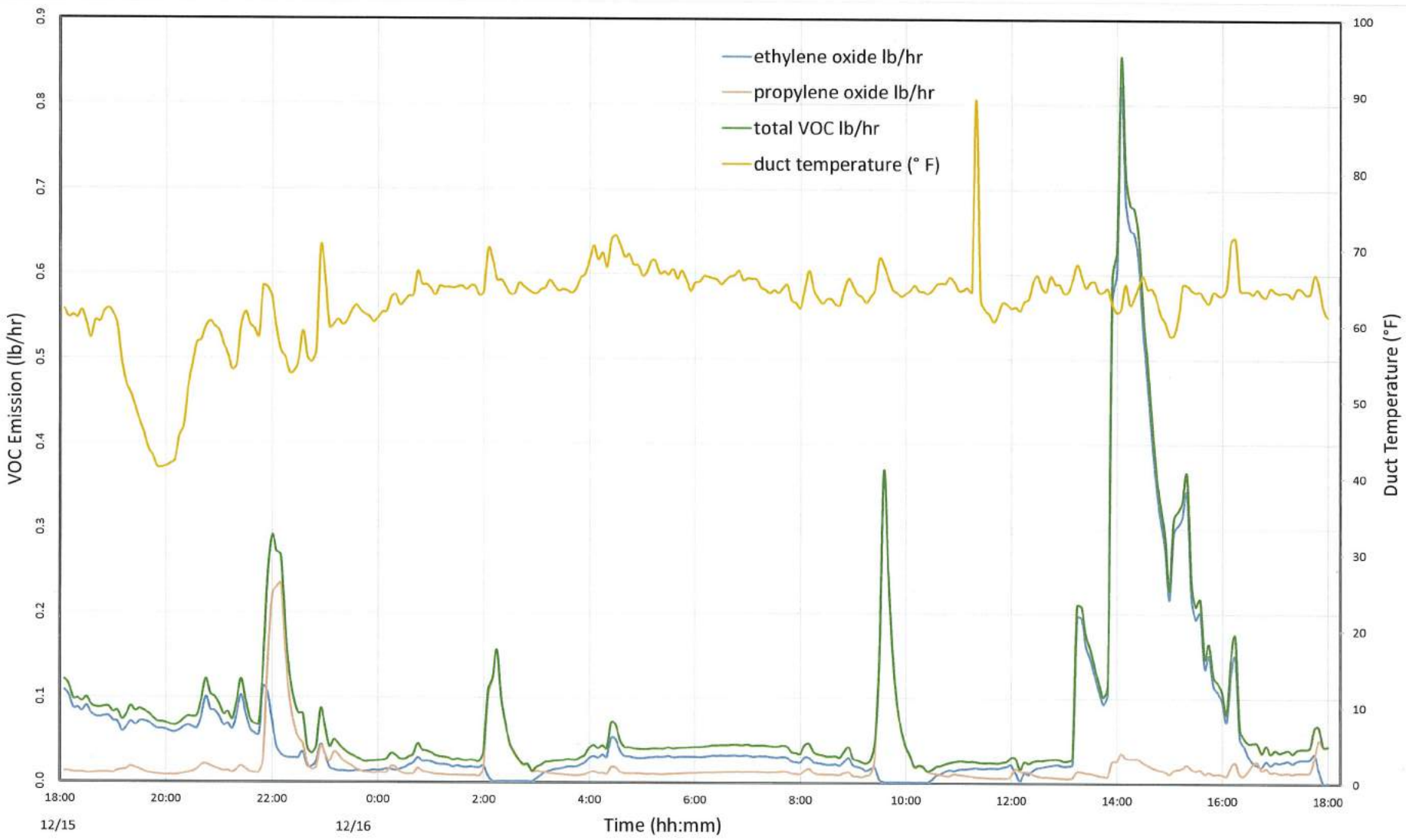
	General Data								Ethylene Oxide				Propylene Oxide				Totals	
Time	Accumulated Volume (acf)	Volume Difference (acf)	Volumetric Flow Rate (acfm)	Duct Temperature (° F)	Absolute Pressure (in. Hg)	Volumetric Flow Rate (scfm)	Moisture In Sample (% by volume)	Volumetric Flow Rate (dscfm)	ppmwv	ppmdv	lb/dscf	lb/hr	ppmwv	ppmdv	lb/dscf	lb/hr	lb/hr	ton/yr
4:30:00	102,030	1,170	234.0	71.1706	29.6000	230.1539	3.1117	222.9922	33.0901	34.1529	3.9046E-06	5.2241E-02	8.8294	9.1130	1.3737E-06	1.8379E-02	0.07062069	0.3095186
4:35:00	103,122	1,092	218.4	71.6842	29.6000	214.6028	3.2752	207.5741	33.9485	35.0981	4.0126E-06	4.9975E-02	9.0051	9.3100	1.4034E-06	1.7478E-02	0.06745359	0.2954467
4:40:00	103,903	781	156.2	70.5399	29.6000	153.8153	3.2908	148.7535	35.2239	36.4225	4.1641E-06	3.7165E-02	9.1388	9.4498	1.4245E-06	1.2714E-02	0.0498787	0.2184687
4:45:00	104,540	637	127.4	68.8517	29.6000	125.8554	3.1458	121.8962	35.9814	37.1501	4.2472E-06	3.1063E-02	9.4021	9.7075	1.4633E-06	1.0702E-02	0.0417656	0.1829333
4:50:00	105,180	640	128.0	69.2554	29.6000	126.3517	2.9442	122.6316	35.4656	36.5415	4.1777E-06	3.0739E-02	9.4278	9.7137	1.4642E-06	1.0774E-02	0.04151259	0.1818252
4:55:00	105,813	633	126.6	67.8711	29.6000	125.2974	2.8455	121.7321	34.2377	35.2405	4.0289E-06	2.9427E-02	9.4093	9.6849	1.4599E-06	1.0663E-02	0.04008993	0.1755939
5:00:00	106,447	634	126.8	67.7583	29.6000	125.5222	2.8278	121.9727	33.4172	34.3897	3.9316E-06	2.8773E-02	9.3607	9.6331	1.4521E-06	1.0627E-02	0.03940012	0.1725725
5:05:00	107,078	631	126.2	66.4261	29.6000	125.2444	2.8117	121.7229	33.4091	34.3756	3.9300E-06	2.8703E-02	9.1371	9.4015	1.4172E-06	1.0350E-02	0.03905275	0.171051
5:10:00	107,702	624	124.8	66.8104	29.6000	123.7647	2.7283	120.3880	34.4893	35.4566	4.0536E-06	2.9281E-02	8.7083	8.9525	1.3495E-06	9.7478E-03	0.03902834	0.1709441
5:15:00	108,337	635	127.0	68.3195	29.6000	125.5867	2.7793	122.0962	34.3241	35.3054	4.0363E-06	2.9569E-02	8.8451	9.0980	1.3714E-06	1.0047E-02	0.03961604	0.1735182
5:20:00	108,971	634	126.8	68.3088	29.6000	125.3914	2.9276	121.7205	35.1612	36.2216	4.1411E-06	3.0243E-02	8.6278	8.8880	1.3398E-06	9.7847E-03	0.04002802	0.1753227
5:25:00	109,600	629	125.8	66.7019	29.6000	124.7821	2.8486	121.2275	35.3201	36.3557	4.1564E-06	3.0232E-02	8.4902	8.7391	1.3173E-06	9.5818E-03	0.0398142	0.1743862
5:30:00	110,234	634	126.8	66.9293	29.6000	125.7197	2.7694	122.2380	35.2165	36.2196	4.1409E-06	3.0370E-02	8.4046	8.6440	1.3030E-06	9.5565E-03	0.03992672	0.174879
5:35:00	110,868	634	126.8	66.5589	29.6000	125.8081	2.7441	122.3558	36.3303	37.3553	4.2707E-06	3.1353E-02	8.7985	9.0468	1.3637E-06	1.0011E-02	0.04136422	0.1811753
5:40:00	111,491	623	124.6	67.2752	29.6000	123.4574	2.7397	120.0750	35.3697	36.3661	4.1576E-06	2.9953E-02	9.0186	9.2726	1.3977E-06	1.0070E-02	0.04002356	0.1753032
5:45:00	112,112	621	124.2	66.0266	29.6000	123.3532	2.7405	119.9727	35.6367	36.6408	4.1890E-06	3.0154E-02	9.4036	9.6685	1.4574E-06	1.0491E-02	0.04064517	0.1780258
5:50:00	112,741	629	125.8	67.0523	29.6000	124.6991	2.7901	121.2199	35.4598	36.4776	4.1704E-06	3.0332E-02	9.5802	9.8552	1.4856E-06	1.0805E-02	0.04113658	0.1801782
5:55:00	113,375	634	126.8	65.4855	29.6000	125.9692	2.7963	122.4468	35.0720	36.0809	4.1250E-06	3.0308E-02	9.5652	9.8403	1.4833E-06	1.0894E-02	0.04120334	0.1804706
6:00:00	114,001	626	125.2	64.4501	29.6000	124.7201	2.6984	121.3547	35.5603	36.5465	4.1782E-06	3.0423E-02	9.8616	10.1351	1.5278E-06	1.1124E-02	0.04154693	0.1819756
6:05:00	114,626	625	125.0	65.4707	29.6000	124.2790	2.6757	120.9537	35.6144	36.5935	4.1836E-06	3.0161E-02	10.1046	10.3824	1.5650E-06	1.1358E-02	0.04171919	0.18273
6:10:00	115,253	627	125.4	65.6677	29.6000	124.6300	2.6846	121.2841	35.3150	36.2893	4.1488E-06	3.0191E-02	10.3014	10.5856	1.5957E-06	1.1612E-02	0.04180297	0.183097
6:15:00	115,881	628	125.6	66.3723	29.6000	124.6617	2.6809	121.3196	35.4893	36.4669	4.1691E-06	3.0348E-02	10.6208	10.9133	1.6451E-06	1.1975E-02	0.04232268	0.1853733
6:20:00	116,510	629	125.8	66.2960	29.6000	124.8783	2.7270	121.4729	36.1025	37.1146	4.2432E-06	3.0926E-02	10.6795	10.9789	1.6549E-06	1.2062E-02	0.04298782	0.1882866
6:25:00	117,140	630	126.0	66.1146	29.6000	125.1200	2.7643	121.6613	37.0830	38.1372	4.3601E-06	3.1827E-02	10.8304	11.1383	1.6790E-06	1.2256E-02	0.04408326	0.1930847
6:30:00	117,771	631	126.2	65.9628	29.6000	125.3547	2.7423	121.9172	36.7201	37.7555	4.3165E-06	3.1575E-02	10.9112	11.2188	1.6911E-06	1.2371E-02	0.04394558	0.1924816
6:35:00	118,400	629	125.8	65.3134	29.6000	125.1119	2.7323	121.6934	37.3188	38.3671	4.3864E-06	3.2028E-02	10.9612	11.2691	1.6987E-06	1.2403E-02	0.04443082	0.194607
6:40:00	119,030	630	126.0	65.9264	29.6000	125.1647	2.7149	121.7666	36.8748	37.9039	4.3334E-06	3.1660E-02	11.1407	11.4516	1.7262E-06	1.2612E-02	0.04427156	0.1939094
6:45:00	119,664	634	126.8	66.3399	29.6000	125.8605	2.7201	122.4370	36.9756	38.0095	4.3455E-06	3.1923E-02	11.2070	11.5204	1.7366E-06	1.2757E-02	0.04468025	0.1956995
6:50:00	120,299	635	127.0	66.5188	29.6000	126.0162	2.7167	122.5927	37.2726	38.3135	4.3802E-06	3.2219E-02	11.2507	11.5649	1.7433E-06	1.2823E-02	0.04504206	0.1972842
6:55:00	120,929	630	126.0	67.0617	29.6000	124.8951	2.6811	121.5466	36.9315	37.9490	4.3386E-06	3.1640E-02	11.4028	11.7170	1.7662E-06	1.2881E-02	0.04452094	0.1950017
7:00:00	121,554	625	125.0	65.8779	29.6000	124.1828	2.6931	120.8385	37.3883	38.4230	4.3928E-06	3.1849E-02	11.2137	11.5240	1.7371E-06	1.2595E-02	0.04444364	0.1946632
7:05:00	122,197	643	128.6	66.1224	29.6000	127.6999	2.6625	124.2999	36.5114	37.5102	4.2884E-06	3.1983E-02	11.3462	11.6565	1.7571E-06	1.3104E-02	0.04508733	0.1974825
7:10:00	122,833	636	127.2	66.0453	29.6000	126.3282	2.6282	123.0081	35.4409	36.3975	4.1612E-06	3.0712E-02	11.4278	11.7363	1.7691E-06	1.3057E-02	0.04376859	0.1917064
7:15:00	123,470	637	127.4	65.9933	29.6000	126.5394	2.6170	123.2278	35.8036	36.7658	4.2033E-06	3.1078E-02	11.3385	11.6432	1.7551E-06	1.2977E-02	0.04405444	0.1929585
7:20:00	124,110	640	128.0	64.9202	29.6000	127.3952	2.5857	124.1012	35.6800	36.6271	4.1874E-06	3.1180E-02	11.1411	11.4368	1.7240E-06	1.2837E-02	0.04401694	0.1927942
7:25:00	124,745	635	127.0	64.6495	29.6000	126.4652	2.5718	123.2128	36.1263	37.0799	4.2392E-06	3.1340E-02	10.9769	11.2667	1.6983E-06	1.2555E-02	0.04389492	0.1922597
7:30:00	125,381	636	127.2	64.2013	29.6000	126.7726	2.5430	123.5489	35.1148	36.0331	4.1195E-06	3.0538E-02	10.9383	11.2237	1.6919E-06	1.2542E-02	0.04307948	0.1886881
7:35:00	126,017	636	127.2	64.5874	29.6000	126.6793	2.5534	123.4446	34.4580	35.3609	4.0427E-06	2.9943E-02	11.0706	11.3607	1.7125E-06	1.2684E-02	0.04262691	0.1867059
7:40:00	126,655	638	127.6	64.2301	29.6000	127.1643	2.5826	123.8802	34.3194	35.2293	4.0276E-06	2.9937E-02	11.1226	11.4175	1.7211E-06	1.2792E-02	0.04272902	0.1871531
7:45:00	127,313	658	131.6	64.8439	29.6000	130.9972	2.5981	127.5938	33.8141	34.7161	3.9690E-06	3.0385E-02	11.3925	11.6964	1.7631E-06	1.3498E-02	0.04388259	0.1922058
7:50:00	127,948	635	127.0	65.2378	29.6000	126.3235	2.6319	122.9988	34.1021	35.0239	4.0042E-06	2.9550E-02	11.3220	11.6281	1.7528E-06	1.2936E-02	0.04248607	0.186089
7:55:00	128,503	555	111.0	63.3106	29.6000	110.8153	2.6037	107.9301	33.3557	34.2474	3.9154E-06	2.5355E-02	11.0318	11.3267	1.7074E-06	1.1057E-02	0.03641199	0.1594845
8:00:00	129,053	550	110.0	62.9343	29.6000	109.8960	2.5496	107.0941	32.5936	33.4464	3.8238E-06	2.4570E-02	10.6885	10.9682	1.6533E-06	1.0624E-02	0.0351942	0.1541506
8:05:00	129,602	549	109.8	62.2233	29.6000	109.8456	2.4713	107.1309	32.0304	32.8420	3.7547E-06	2.4135E-02	10.3450	10.6072	1.5989E-06	1.0278E-02	0.03441238	0.1507262
8:10:00	130,334	732	146.4	64.7132	29.6000	145.7658	2.5354	142.0700	29.9338	30.7125	3.5113E-06	2.9931E-02	10.9136	11.1975	1.6879E-06	1.4388E-02	0.04431865	0.1941157
8:15:00	131,168	834	166.8	67.0888	29.6000	165.3289	2.6148	161.0058	25.8897	26.5848	3.0393E-06	2.9361E-02	11.2661	11.5685	1.7438E-06	1.6846E-02	0.04620726	0.2023878
8:20:00	131,785	617	123.4	64.7163	29.6000	122.8647	2.6228	119.6421	28.9084	29.6870	3.3940E-06	2.4364E-02	10.8103	11.1015	1.6734E-06	1.2013E-02	0.03637683	0.1593305
8:25:00	132,334	549	109.8	63.6084	29.6000	109.5550	2.5791	106.7295	31.2622	32.0898	3.6687E-06	2.3494E-02	10.4079	10.6835	1.6104E-06	1.0313E-02	0.03380638	0.1480719
8:30:00	132,884	550	110.0	62.8941	29.6000	109.9045	2.5136	107.1419	29.9768	30.7498	3.5155E-06	2.2600E-02	10.1108	10.3715	1.5634E-06	1.0050E-02	0.03264983	0.1430063
8:35:00	133,432	548	109.6	63.3937	29.6000	109.4003	2.4342	106.7372	28.6265	29.3407	3.3544E-06	2.1483E-02	9.8989	10.1459	1.5294E-06	9.7946E-03	0.03127706	0.1369935
8:40:00	133,985	553	110.6	63.4534	29.6000	110.3859	2.4181	107.7166	28.4369	29.1415	3.3317E-06	2.1532E-02	9.7951	10.0379	1.5131E-06	9.7792E-03	0.03131164	0.137145
8:45:00	134,532	547	109.4	62.7384	29.6000	109.3376	2.4355	106.6747	29.1810	29.9095	3.4194E-06	2.1886E-02	9.7097	9.9520	1.5002E-06	9.6018E-03	0.03148787	0.1379169
8:50:00	135,081	549	109.8	62.6389	29.6000	109.7582	2.3928	107.1319	27.5146	28.1891	3.2228E-06	2.0716E-02	9.4429	9.6744	1.4583E-06	9.3739E-03	0.03008953	0.1317921
8:55:00	135,771	690	138.0	64.7372	29.6000	137.3959	2.4660	134.0077	26.5779	27.2499	3.1154E-06	2.5049E-02	9.5104	9.7508	1.4698E-06	1.1818E-02	0.03686732	0.1614789
9:00:00	136,578	807	161.4	66.1189	29.6000	160.2714	2.6680	155.9953	26.8659	27.6024	3.1557E-06	2.9536E-02	8.7201	8.9591	1.3505E-06	1.2640E-02	0.0421765	0.1847331
9:05:00	137,125	547	109.4	65.1492	29.6000	108.8356	2.6597	105.9409	28.0474	28.8138	3.2942E-06	2.0939E-02	8.3991	8.6286	1.3007E-06	8.2677E-03	0.02920696	0.1279265
9:10:00	137,674	549	109.8	64.0583	29.6000	109.4609	2.5020	106.7222	25.3824	26.0337	2.9763E-06	1.9059E-02	7.7220	7.9202	1.1939E-06	7.6448E-03	0.02670336	0.1169607
9:15:00	138,221	547	109.4	63.7290	29.6000	109.1307	2.4295	106.4794	23.5187	24.1043	2.7558E-06	1.7606E-02	7.0991	7.2758	1.0968E-06	7.0069E-03	0.02461285	0.1078043
9:20:00	138,771	550	110.0	62.9948	29.6000	109.8833	2.4043	107.2414	19.3754	19.8528	2.2697E-06	1.4604E-02	8.6574	8.8706	1.3372E-06	8.6039E-03	0.02320824	0.1016521
9:25:00	139,329	558	111.6	63.7473	29.6000	111.3214	2.4285	108.6180	21.9517	22.4981	2.5721E-06	1.6763E-02	10.6968	10.9631	1.6526E-06	1.0770E-02	0.02753268	0.1205931
9:30:00	139,989	660	132.0	64.7635	29.6000	131.4155	2.4335	128.2176	19.8449	20.3419	2.3256E-06	1.7891E-02	26.0704	26.7207	4.0279E-06	3.0987E-02	0.04887774	0.2140845
9:35:00	140,825	846	169.2	68.6868	29.6000	167.2008	2.8191	162.4873	3.7046	3.8121	4.3582E-07	4.2490E-03	94.1145	96.8446	1.4598E-05	1.4232E-01	0.14657146	0.641983
9:40:00	141,622	787	157.4	67.8585	29.6000	155.7843	2.8155	151.3982	0.4530	0.4661	5.3290E-08	4.8408E-04	259.6116	267.1327	4.0267E-05	3.6579E-01	0.36626966	1.6042611
9:45:00	142,220	598	119.6	66.2489	29.6000	118.7344	2.7641	115.4525	0.4530	0.4659	5.3262E-08	3.6895E-04	236.3208	243.0385	3.6636E-05	2.5378E-01	0.25414885	1.113172
9:50:00	142,774	554	110.8	64.7316	29.6000	110.3161	2.5860	107.4634	0.4530	0.4650	5.3165E-08	3.4280E-04	155.9091	159.1240	2.3986E-05	1.5466E-01	0.15500168	0.6789074
9:55:00	143,321	547	109.4	64.2617	29.6000	109.0199	2.5170	106.2759	0.4530	0.4647	5.3127E-08	3.3877E-04	93.5816	95.9979	1.4471E-05	9.2273E-02	0.09261185	0.4056399
10:00:00	143,867	546	109.2	63.7948	29.6000	108.9176	2.5355	106.1559	0.4530	0.4648	5.3137E-08	3.3845E-04	63.4321	65.0823	9.8105E-06	6.2486E-02	0.06282487	0.2751729
10:05:00	144,412	545	109.0	64.1510	29.6000	108.6442	2.4517	105.9806	0.4530	0.4644	5.3092E-08	3.3760E-04	43.1080	44.1914	6.6614E-06	4.2359E-02	0.04269632	0.1870099
10:10:00	144,958	546	109.2	64.5974	29.6000	108.7509	2.4718	106.0628	0.4530	0.4645	5.3102E-08	3.3793E-04	31.3731	32.1682	4.8490E-06	3.0858E-02	0.031196	0.1366385
10:15:00	145,420	462	92.4	65.2137	29.6000	91.9082	2.5522	89.5626	0.4530	0.4649	5.3146E-08	2.8560E-04	22.6207	23.2131	3.4991E-06	1.8804E-02	0.0190891	0.0836103
10:20:00	145,986	566	113.3	64.5097	29.6000	112.8148	2.4725	110.0255	0.4530	0.4645	5.3103E-08	3.5056E-04	19.5082	20.0028	3.0152E-06	1.9905E-02	0.02025559	0.0887195
10:25:00	146,609	623	124.5	64.4393	29.6000	124.0673	2.5736	120.8743	0.4530	0.4650	5.3158E-08	3.8553E-04	16.1755	16.6028	2.5027E-06	1.8151E-02	0.01853622	0.0811887
10:30:00	147,158	549	109.8	64.1569	29.6000	109.4403	2.5285	106.6731	1.2502	1.2826	1.4663E-07	9.3852E-04	13.2091	13.5518	2.0428E-06	1.3075E-02	0.01401318	0.0613777
10:35:00	147,710	552	110.4	64.6372	29.6000	109.9376	2.5820	107.0991	5.7844	5.9377	6.7884E-07	4.3622E-03	11.7649	12.0767	1.8204E-06	1.1698E-02	0.01606021	0.0703437
10:40:00	148,267	557	111.4	65.3369	29.6000	110.7857	2.6250	107.8776	12.0062	12.3298	1.4096E-06	9.1240E-03	10.5659	10.8507	1.6356E-06	1.0587E-02	0.01971094	0.0863339
10:45:00	148,819	552	110.4	65.4999	29.6000	109.7572	2.5982	106.9055	14.2922	14.6735	1.6776E-06	1.0760E-02	9.7790	10.0399	1.5134E-06	9.7075E-03	0.02046796	0.0896497
10:50:00	149,373	554	110.8	65.5200	29.6000	110.1506	2.6742	107.2050	18.3470	18.8511	2.1552E-06	1.3863E-02	8.8100	9.0521	1.3645E-06	8.7769E-03	0.02263966	0.0991617
10:55:00	149,929	556	111.2	66.3050	29.6000	110.3834	2.6959	107.4076	20.5611	21.1308	2.4158E-06	1.5569E-02	8.4350	8.6667	1.3067E-06	8.4211E-03	0.02398965	0.1050747
11:00:00	150,486	557	111.4	65.7062	29.6000	110.7079	2.5802	107.8514	19.1004	19.6063	2.2415E-06	1.4505E-02	10.5685	10.8485	1.6353E-06	1.0582E-02	0.02508716	0.1098818
11:05:00	151,029	543	108.6	64.6176	29.6000	108.1492	2.5608	105.3797	21.8821	22.4572	2.5674E-06	1.6233E-02	9.9661	10.2280	1.5418E-06	9.7483E-03	0.02598167	0.1137997
11:10:00	151,581	552	110.4	64.6240	29.6000	109.9404	2.5549	107.1315	22.2051	22.7873	2.6052E-06	1.6746E-02	9.4812	9.7298	1.4667E-06	9.4276E-03	0.02617352	0.11464
11:15:00	152,133	552	110.4	64.9063	29.6000	109.8813	2.4822	107.1539	22.4181	22.9887	2.6282E-06	1.6897E-02	8.5576	8.7754	1.3228E-06	8.5046E-03	0.02540203	0.1112609
11:20:00	152,688	555	111.0	64.4103	29.6000	110.5829	2.4805	107.8399	23.3656	23.9599	2.7393E-06	1.7724E-02	7.9015	8.1025	1.2214E-06	7.9027E-03	0.02562679	0.1122453
11:25:00	153,270	582	116.4	89.4541	29.6000	110.6772	2.4427	107.9736	23.8177	24.4141	2.7912E-06	1.8082E-02	7.1282	7.3067	1.1014E-06	7.1353E-03	0.02521773	0.1104537
11:30:00	153,817	547	109.4	63.4531	29.6000	109.1883	2.3692	106.6013	23.2031	23.7662	2.7171E-06	1.7379E-02	6.8609	7.0274	1.0593E-06	6.7755E-03	0.02415427	0.1057957
11:35:00	154,365	548	109.6	62.0312	29.6000	109.6858	2.3363	107.1232	23.0008	23.5510	2.6925E-06	1.7306E-02	6.6589	6.8182	1.0278E-06	6.6059E-03	0.02391164	0.104733
11:40:00	154,911	546	109.2	61.5095	29.6000	109.3948	2.3425	106.8323	23.8059	24.3769	2.7849E-06	1.7864E-02	6.3893	6.5426	9.8622E-07	6.3216E-03	0.02418568	0.1059333
11:45:00	155,460	549	109.8	60.4733	29.6000	110.2149	2.2928	107.6879	23.6821	24.2378	2.7710E-06	1.7904E-02	5.9902	6.1308	9.2415E-07	5.9712E-03	0.02387557	0.104575
11:50:00	156,008	548	109.6	61.4097	29.6000	109.8166	2.2920	107.2995	23.3291	23.8764	2.7297E-06	1.7574E-02	6.1337	6.2776	9.4629E-07	6.0922E-03	0.02366593	0.1036568
11:55:00	156,559	551	110.2	62.9859	29.6000	110.0850	2.3629	107.4838	24.9137	25.5166	2.9172E-06	1.8813E-02	5.9953	6.1404	9.2560E-07	5.9693E-03	0.0247825	0.1085474
12:00:00	157,110	551	110.2	62.8284	29.6000	110.1181	2.4583	107.4111	26.4894	27.1570	3.1048E-06	2.0009E-02	5.8891	6.0375	9.1010E-07	5.8653E-03	0.02587444	0.1133301
12:05:00	157,700	590	118.0	62.2521	29.6000	118.0424	2.5142	115.0747	26.8807	27.5740	3.1524E-06	2.1766E-02	8.0437	8.2512	1.2438E-06	8.5876E-03	0.03035358	0.1329487
12:10:00	158,248	548	109.6	62.3966	29.6000	109.6091	2.5076	106.8605	16.3009	16.7202	1.9116E-06	1.2256E-02	17.2993	17.7443	2.6748E-06	1.7150E-02	0.02940581	0.1287975
12:15:00	158,710	462	92.4	61.9686	29.6000	92.4835	2.4517	90.2160	4.6985	4.8165	5.5046E-07	2.9807E-03	16.6821	17.1014	2.5779E-06	1.3954E-02	0.01693452	0.0741732
12:20:00	159,295	585	117.0	63.1656	29.6000	116.8377	2.4249	114.0045	14.5618	14.9236	1.7062E-06	1.1671E-02	12.6437	12.9579	1.9533E-06	1.3361E-02	0.02503152	0.1096581
12:25:00	159,904	609	121.8	63.5496	29.6000	121.5419	2.4900	118.5155	12.3402	12.6553	1.4468E-06	1.0288E-02	11.9069	12.2109	1.8407E-06	1.3089E-02	0.02337724	0.1023923
12:30:00	160,459	555	111.0	65.8207	29.6000	110.2863	2.6703	107.3614	20.6139	21.1794	2.4214E-06	1.5595E-02	10.3085	10.5861	1.5958E-06	1.0277E-02	0.0258722	0.1133202
12:35:00	161,010	551	110.2	66.5164	29.6000	109.3468	2.7399	106.3508	24.2855	24.9696	2.8547E-06	1.8216E-02	8.7747	9.0219	1.3600E-06	8.6780E-03	0.02689186	0.1177951
12:40:00	161,561	551	110.2	64.9182	29.6000	109.6797	2.6826	106.7375	25.5317	26.2355	2.9994E-06	1.9209E-02	7.6274	7.8376	1.1814E-06	7.5662E-03	0.02677524	0.1172755
12:45:00	162,120	559	111.8	64.5570	29.6000	111.3488	2.7086	108.3329	26.5279	27.2665	3.1173E-06	2.0262E-02	7.3688	7.5739	1.1417E-06	7.4209E-03	0.02768316	0.1212522
12:50:00	162,676	556	111.2	66.4492	29.6000	110.3490	2.7552	107.3086	27.8382	28.6270	3.2728E-06	2.1072E-02	7.1685	7.3665	1.1104E-06	7.1495E-03	0.02822157	0.1236105
12:55:00	163,226	550	110.0	65.4280	29.6000	109.3745	2.8145	106.2961	29.1687	30.0134	3.4313E-06	2.1884E-02	6.7716	6.9677	1.0503E-06	6.6987E-03	0.02858285	0.1251929
13:00:00	163,780	554	110.8	65.3666	29.6000	110.1828	2.7037	107.2038	28.8405	29.6420	3.3889E-06	2.1798E-02	6.2766	6.4511	9.7243E-07	6.2549E-03	0.02805282	0.1228714
13:05:00	164,330	550	110.0	64.2970	29.6000	109.6104	2.5818	106.7805	26.8906	27.6033	3.1558E-06	2.0219E-02	5.9725	6.1312	9.2421E-07	5.9213E-03	0.02613982	0.1144924
13:10:00	164,884	554	110.8	64.5146	29.6000	110.3618	2.6239	107.4660	27.5716	28.3146	3.2371E-06	2.0873E-02	5.8572	6.0150	9.0670E-07	5.8464E-03	0.02671911	0.1170297
13:15:00	165,460	576	115.2	66.0219	29.6000	114.4156	2.7130	111.3114	28.9883	29.7967	3.4066E-06	2.2751E-02	6.6846	6.8710	1.0357E-06	6.9173E-03	0.02966861	0.1299485
13:20:00	166,018	558	111.6	68.0079	29.6000	110.4232	2.8651	107.2595	258.5336	266.1592	3.0429E-05	1.9583E-01	13.1787	14.1831	2.1380E-06	1.3759E-02	0.20958721	0.917992
13:25:00	166,588	570	114.0	66.4318	29.6000	113.1356	2.7579	110.0154	250.9861	258.1044	2.9508E-05	1.9478E-01	13.1741	13.5477	2.0422E-06	1.3480E-02	0.20826344	0.9121851
13:30:00	167,170

Vantage Specialty Chemicals
CleanAir Job No. 13157
Scrubber Stack

Sample Run Data (5-minute averages)

General Data									Ethylene Oxide				Propylene Oxide				Totals	
Time	Accumulated Volume (acf)	Volume Difference (acf)	Volumetric Flow Rate (acfm)	Duct Temperature (° F)	Absolute Pressure (in. Hg)	Volumetric Flow Rate (scfm)	Moisture In Sample (% by volume)	Volumetric Flow Rate (dscfm)	ppmwv	ppmdv	lb/dscf	lb/hr	ppmwv	ppmdv	lb/dscf	lb/hr	lb/hr	ton/yr
14:55:00	176,627	549	109.8	61.5084	29.6000	109.9961	2.3336	107.4292	413.3956	423.2732	4.8391E-05	3.1192E-01	16.0432	16.4265	2.4761E-06	1.5961E-02	0.32787922	1.436111
15:00:00	177,174	547	109.4	60.4369	29.6000	109.8211	2.2660	107.3325	368.0032	376.5355	4.3048E-05	2.7723E-01	14.1805	14.5093	2.1871E-06	1.4085E-02	0.29131196	1.2759464
15:05:00	177,650	476	95.2	58.7681	29.6000	95.8738	2.1794	93.7843	329.2981	336.6347	3.8486E-05	2.1656E-01	12.7404	13.0242	1.9633E-06	1.1047E-02	0.227612	0.9969406
15:10:00	178,296	646	129.2	58.8160	29.6000	130.1025	2.1620	127.2896	331.3557	338.6780	3.8720E-05	2.9572E-01	13.1480	13.4385	2.0257E-06	1.5471E-02	0.31118943	1.3630097
15:15:00	178,949	653	130.6	61.0716	29.6000	130.9430	2.2687	127.9713	339.2219	347.0963	3.9682E-05	3.0469E-01	14.3319	14.6646	2.2105E-06	1.6973E-02	0.32166746	1.4089035
15:20:00	179,685	736	147.2	65.2985	29.6000	146.3990	2.5309	142.6937	313.3701	321.5073	3.6757E-05	3.1470E-01	13.9687	14.3314	2.1603E-06	1.8496E-02	0.33319365	1.4593882
15:25:00	180,264	579	115.8	65.2881	29.6000	115.1721	2.5971	112.1810	432.0678	443.5882	5.0714E-05	3.4135E-01	21.0244	21.5850	3.2537E-06	2.1900E-02	0.36324832	1.5910276
15:30:00	180,811	547	109.4	64.7092	29.6000	108.9269	2.6347	106.0570	292.6281	300.5466	3.4360E-05	2.1865E-01	17.7811	18.2622	2.7528E-06	1.7517E-02	0.23616738	1.0344131
15:35:00	181,297	486	97.2	64.4050	29.6000	96.8358	2.5110	94.4043	291.8396	299.3564	3.4224E-05	1.9386E-01	17.1853	17.6279	2.6572E-06	1.5051E-02	0.20890678	0.9150117
15:40:00	181,920	623	124.6	64.4360	29.6000	124.1258	2.5773	120.9267	235.4754	241.7047	2.7633E-05	2.0050E-01	14.5307	14.9151	2.2483E-06	1.6313E-02	0.21680876	0.9496224
15:45:00	182,403	483	96.6	63.5076	29.6000	96.4030	2.5420	93.9524	206.7798	212.1733	2.4257E-05	1.3674E-01	13.0012	13.3403	2.0109E-06	1.1336E-02	0.1480762	0.6485738
15:50:00	182,987	584	116.8	63.0425	29.6000	116.6655	2.4752	113.7778	188.6281	193.4155	2.2118E-05	1.5095E-01	12.7007	13.0230	1.9631E-06	1.3401E-02	0.16435614	0.7198799
15:55:00	183,494	507	101.4	64.4553	29.6000	101.0104	2.4824	98.5029	166.4679	170.7054	1.9516E-05	1.1534E-01	12.0733	12.3807	1.8663E-06	1.1030E-02	0.12637377	0.5535171
16:00:00	184,058	564	112.8	64.0783	29.6000	112.4474	2.4883	109.6493	139.4241	142.9819	1.6347E-05	1.0754E-01	11.0372	11.3188	1.7062E-06	1.1225E-02	0.11876875	0.5202071
16:05:00	184,654	596	119.2	64.0053	29.6000	118.8439	2.4808	115.8956	118.9681	121.9945	1.3947E-05	9.6985E-02	10.0798	10.3362	1.5581E-06	1.0834E-02	0.1078197	0.4722503
16:10:00	185,156	502	100.4	65.0461	29.6000	99.9017	2.5909	97.3133	106.9569	109.8018	1.2553E-05	7.3296E-02	10.2360	10.5083	1.5840E-06	9.2487E-03	0.08254465	0.3615456
16:15:00	186,162	1,006	201.2	71.0278	29.6000	197.9462	2.9819	192.0435	93.6965	96.5763	1.1041E-05	1.2722E-01	11.1731	11.5165	1.7360E-06	2.0003E-02	0.14722711	0.6448547
16:20:00	187,463	1,301	260.2	71.4023	29.6000	255.8116	3.2000	247.6256	84.2708	87.0567	9.9529E-06	1.4788E-01	10.6530	11.0052	1.6589E-06	2.4647E-02	0.17252279	0.7556498
16:25:00	188,006	543	108.6	64.7034	29.6000	108.1315	2.9427	104.9496	72.2380	74.4282	8.5091E-06	5.3582E-02	11.1430	11.4808	1.7306E-06	1.0898E-02	0.06447935	0.2824195
16:30:00	188,511	505	101.0	64.5888	29.6000	100.5863	2.7155	97.8549	64.0935	65.8826	7.5321E-06	4.4223E-02	10.4191	10.7099	1.6144E-06	9.4787E-03	0.05370196	0.2352146
16:35:00	189,014	503	100.6	64.5527	29.6000	100.1948	2.8916	97.2975	47.0227	48.4229	5.5360E-06	3.2318E-02	17.4816	18.0021	2.7136E-06	1.5842E-02	0.04816025	0.2109419
16:40:00	189,579	565	113.0	64.1734	29.6000	112.6263	2.9493	109.3047	31.9246	32.8948	3.7607E-06	2.4664E-02	23.1554	23.8591	3.5965E-06	2.3587E-02	0.04825098	0.2113393
16:45:00	190,194	615	123.0	64.8241	29.6000	122.4412	2.8890	118.9039	26.2633	27.0446	3.0919E-06	2.2058E-02	23.0263	23.7113	3.5742E-06	2.5499E-02	0.04755789	0.2083036
16:50:00	190,677	483	96.6	64.0158	29.6000	96.3095	2.7129	93.6968	30.4827	31.3327	3.5822E-06	2.0138E-02	18.4081	18.9214	2.8522E-06	1.6035E-02	0.03617274	0.1584366
16:55:00	191,282	605	121.0	63.8672	29.6000	120.6703	2.7070	117.4038	31.8663	32.7529	3.7445E-06	2.6377E-02	16.9268	17.3978	2.6225E-06	1.8474E-02	0.04485102	0.1964475
17:00:00	191,780	498	99.6	64.9761	29.6000	99.1188	2.6711	96.4712	32.4439	33.3343	3.8110E-06	2.2059E-02	14.9572	15.3677	2.3165E-06	1.3409E-02	0.03546776	0.1553488
17:05:00	192,348	568	113.6	64.5217	29.6000	113.1492	2.6422	110.1595	32.7593	33.6484	3.8469E-06	2.5426E-02	13.6852	14.0566	2.1189E-06	1.4005E-02	0.03943128	0.172709
17:10:00	192,901	553	110.6	64.2713	29.6000	110.2137	2.5893	107.3599	32.5289	33.3936	3.8178E-06	2.4593E-02	12.2731	12.5983	1.8991E-06	1.2233E-02	0.03682552	0.1612958
17:15:00	193,479	578	115.6	64.4177	29.6000	115.1641	2.6097	112.1587	32.5864	33.4595	3.8253E-06	2.5743E-02	11.7850	12.1008	1.8241E-06	1.2275E-02	3.8018E-02	0.1665172
17:20:00	194,088	609	121.8	64.2740	29.6000	121.3739	2.6372	118.1731	32.3546	33.2309	3.7992E-06	2.6938E-02	11.5038	11.8154	1.7811E-06	1.2628E-02	0.03956596	0.1732989
17:25:00	194,641	553	110.6	63.7713	29.6000	110.3189	2.6279	107.4199	31.9780	32.8410	3.7546E-06	2.4199E-02	11.6052	11.9184	1.7966E-06	1.1579E-02	0.03577841	0.1567094
17:30:00	195,199	558	111.6	64.5333	29.6000	111.0699	2.6488	108.1279	35.5973	36.5658	4.1804E-06	2.7121E-02	12.6456	12.9897	1.9581E-06	1.2703E-02	0.03982463	0.1744319
17:35:00	195,749	550	110.0	64.8154	29.6000	109.5021	2.6696	106.5788	37.6626	38.6956	4.4239E-06	2.8290E-02	12.9079	13.2619	1.9991E-06	1.2784E-02	0.04107356	0.1799022
17:40:00	196,301	552	110.4	64.2012	29.6000	110.0291	2.6459	107.1178	37.5111	38.5306	4.4051E-06	2.8312E-02	12.8226	13.1711	1.9854E-06	1.2760E-02	0.04107196	0.1798952
17:45:00	196,881	580	116.0	64.2938	29.6000	115.5898	2.6169	112.5650	36.9257	37.9180	4.3350E-06	2.9278E-02	13.3578	13.7168	2.0677E-06	1.3965E-02	0.04324311	0.1894048
17:50:00	197,620	739	147.8	66.6953	29.6000	146.6059	2.6605	142.7055	34.3820	35.3218	4.0382E-06	3.4577E-02	23.6605	24.3072	3.6641E-06	3.1373E-02	0.06594937	0.2888582
17:55:00	198,358	738	147.6	65.3884	29.6000	146.7717	2.7117	142.7917	15.6362	16.0720	1.8375E-06	1.5742E-02	38.3718	39.4413	5.9454E-06	5.0937E-02	0.06667938	0.2920557
18:00:00	198,911	553	110.6	62.2437	29.6000	110.6416	2.7168	107.6356	0.4530	1.3363	1.5278E-07	9.8664E-04	43.4046	44.6168	6.7255E-06	4.3434E-02	0.04442099	0.1945689
18:05:00	199,457	546	109.2	61.1843	29.6000	109.4631	2.6301064	106.5841	0.4530	1.3351	1.5264E-07	9.7613E-04	43.4864	44.6611	6.7322E-06	4.3053E-02	0.04402884	0.1928463
			120.5	**62.9683**	**29.6000**	**120.3474**	**2.435260171**	**117.4017**	**82.3983**	**84.4333**	**9.6530E-06**	**6.5680E-02**	**20.6851**	**21.2075**	**3.1968E-06**	**2.3018E-02**	**0.0887**	**0.3884975**
																		0.3884975


ethylene oxide lb/hr
propylene oxide lb/hr
total VOC lb/hr
volumetric flow rate (dscfm)
VOC Emission (lb/hr)
Volumetric Flow (dscfm)
Time (hh:mm)
12/15
12/16
R-07 Vent
R-01 Vent
R-07 Vent
R-04 Vent
R-06 Vent
R-04 Vent
R-06 Vent
R-01 Vent
R-03 Vent
R-06 Vent
R-03 Vent
R-06 Vent


ethylene oxide lb/hr
propylene oxide lb/hr
total VOC lb/hr
duct temperature (° F)
VOC Emission (lb/hr)
Duct Temperature (°F)
Time (hh:mm)
12/15
12/16
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
10
20
30
40
50
60
70
80
90
100
18:00
20:00
22:00
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00

Vantage Specially Chemicals
Clean Air Project No: 13157
Scrubber Stack

Duct Pressure Parameters

Run No.		1	2	3	4	5	6	7	Average
Date (2016)		Dec 15	Dec 15	Dec 15	Dec 16	Dec 16	Dec 16	Dec 16	
Start Time (approx.)		18:05	21:49	22:50	02:00	03:00	09:10	15:05	
Sampling Conditions									
P_g	Static pressure (in. H_2O)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0000**
P_{bar}	Barometric pressure (in. Hg)	29.60	29.60	29.60	29.60	29.60	29.60	29.60	**29.6000**
Flow Results									
P_s	Sample gas pressure, absolute (in. Hg)	29.6000	29.6000	29.6000	29.6000	29.6000	29.6000	29.6000	**29.6000**

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SS ISOKINETIC Version 2006-13a

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APPENDIX D: QA/QC DATA

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Client	Vantage
Site	Gurnee, IL
Test Location	Scrubber Stack
Project Number	13157

Analyte Spike Calculation

DATE	**12/16/2016**	
Number of Test Runs	1	
RUN	**Pre-check**	**Post-check**
QA Direct		95.473456
SF6 Direct		4.9362403
Native QA[1]		-0.02
Native SF6		0.04
CTS Direct	100.58	100.58
CTS Probe Tip	100.02	99.90
CTS Bias	0.565	0.686
System Flow (ccm)		300
Spike Flow (ccm)		30
Spike SF6 conc.		0.48
Dilution Factor		0.098
Expected QA		9.326
Recovered QA Spike		7.17
Percent Recovery		**76.93%**
Bias		-2.152

[1] Considered zero in calculations.

Vantage Specialty Chemicals
Clean Air Job No. 13157
Scrubber Stack

FTIR QA/QC

Spectrum	Date	Time	Ethylene oxide 150c	Propylene Oxide CAE_AM	CO2% (40) 191C	CO (500) 191C (1of2)	H2O% (40) 191C	HCl ppm (100) 191C	Ethylene (100,3000) 191C	SF6 (10) 191C	Temp (C)	Pressure (Atm)
SPC__0271BKG.LAB	12/15/2016	2:39:46 PM	0	0	0	0	0	0	0	0	191.5	1.015784
SPC__0272.LAB	12/15/2016	2:40:08 PM	0.68234	-0.087827	0.002086	0.117599	-0.004415	0.073093	0.003473	-0.012436	191.5	1.015826
SPC__0273.LAB	12/15/2016	2:40:24 PM	0.548689	0.205336	-0.011288	0.087957	-0.000116	-0.023013	0.011837	0.005863	191.4	1.015806
SPC__0274.LAB	12/15/2016	2:40:40 PM	0.328824	0.042317	-0.009291	-0.174477	0.000219	-0.008077	0.080333	-0.01031	191.5	1.015864
SPC__0275.LAB	12/15/2016	2:40:55 PM	-51.079296	119.089329	0.002664	0.064308	-0.006984	0.034445	5.3372	0.004152	191.5	1.015328
SPC__0276.LAB	12/15/2016	2:41:11 PM	-48.907119	346.101519	0.008046	-0.14299	-0.001781	0.713528	91.575769	-0.014958	191.5	1.014942
CTS Direct												
SPC__0277.LAB	12/15/2016	2:41:27 PM	-1.349408	17.647428	0.000007	-0.083638	-0.00237	-0.00355	100.319574	-0.020566	191.4	1.01489
SPC__0278.LAB	12/15/2016	2:41:42 PM	0.070749	9.261067	-0.005654	-0.361147	-0.002418	-0.012856	100.304482	-0.029786	191.3	1.014814
SPC__0279.LAB	12/15/2016	2:41:58 PM	-0.109094	7.186911	-0.004146	-0.142585	-0.002766	0.06544	100.54742	-0.013455	191.3	1.014857
SPC__0280.LAB	12/15/2016	2:42:14 PM	-1.095769	5.788009	-0.009035	-0.379029	-0.007243	-0.027512	101.048648	-0.006968	191.3	1.01491
SPC__0281.LAB	12/15/2016	2:42:29 PM	-0.461526	4.716726	0.005993	-0.211401	0.005464	-0.032111	100.776222	-0.01043	191.3	1.014857
SPC__0282.LAB	12/15/2016	2:42:45 PM	-0.165766	4.079763	0.000042	-0.344998	-0.0008	0.11483	100.294808	-0.002787	191.3	1.014792
SPC__0283.LAB	12/15/2016	2:43:00 PM	0.223812	3.111125	0.011543	-0.137793	-0.003273	-0.024458	100.948161	-0.007359	191.3	1.014857
SPC__0284.LAB	12/15/2016	2:43:16 PM	0.480652	2.554805	-0.002357	-0.130165	-0.000636	-0.005453	100.438737	-0.023941	191.3	1.014857
SPC__0285.LAB	12/15/2016	2:43:32 PM	2.369492	0.711005	-0.010668	-0.196993	0.004311	0.144272	16.607781	3.184293	191.3	1.01481
SPC__0286.LAB	12/15/2016	2:43:48 PM	-0.796839	0.413026	-0.013724	-0.10044	0.005516	10.825641	-0.325932	4.864613	191.3	1.014792
SPC__0287.LAB	12/15/2016	2:44:03 PM	-0.977782	0.495472	-0.014791	-0.291817	-0.004938	49.106245	-0.771775	4.903089	191.4	1.01475
SPC__0288.LAB	12/15/2016	2:44:19 PM	0.845971	0.658093	0.005587	-0.045087	-0.000445	68.256581	-0.774	4.952491	191.4	1.014786
SPC__0289.LAB	12/15/2016	2:44:34 PM	1.133421	0.839029	0.003927	-0.311099	-0.010589	75.856847	-0.653833	4.953398	191.4	1.01479
SPC__0290.LAB	12/15/2016	2:44:50 PM	-0.075769	0.683063	-0.003686	-0.209488	-0.004486	79.41066	-0.691258	4.942712	191.4	1.01475
SPC__0291.LAB	12/15/2016	2:45:06 PM	0.983558	0.762173	-0.000231	-0.02589	-0.003352	80.978391	-0.653105	4.90327	191.4	1.014707
SPC__0292.LAB	12/15/2016	2:45:21 PM	0.251623	0.890073	-0.010341	-0.243468	-0.003191	82.540827	-0.790132	4.908777	191.4	1.014771
SPC__0293.LAB	12/15/2016	2:45:37 PM	1.306127	0.759278	0.007077	-0.059706	-0.000251	84.085517	-0.820242	4.949955	191.4	1.014728
SPC__0294.LAB	12/15/2016	2:45:53 PM	1.144364	0.451847	-0.001442	-0.245995	0.000529	86.199961	-0.687874	4.924113	191.3	1.014664
SPC__0295.LAB	12/15/2016	2:46:08 PM	0.596152	0.607272	-0.003457	-0.100919	0.000182	86.623524	-0.665513	4.916039	191.3	1.014649
SPC__0296.LAB	12/15/2016	2:46:24 PM	-0.099011	0.661083	-0.006931	-0.189217	-0.001026	85.399645	-0.57892	4.898718	191.3	1.014642
SPC__0297.LAB	12/15/2016	2:46:40 PM	-0.010095	0.672156	-0.003111	-0.166513	-0.007974	86.411274	-0.6685	4.923302	191.3	1.014728
SPC__0298.LAB	12/15/2016	2:46:55 PM	-0.442359	0.538283	-0.004063	-0.161938	-0.001679	87.129356	-0.677552	4.915242	191.3	1.014557
SPC__0299.LAB	12/15/2016	2:47:11 PM	0.169891	0.465202	-0.002937	-0.142218	-0.000762	87.157957	-0.654859	4.92571	191.3	1.014578
SPC__0300.LAB	12/15/2016	2:47:27 PM	0.002171	0.694504	-0.004456	-0.247818	-0.000831	87.748053	-0.81135	4.958289	191.3	1.014549
SPC__0301.LAB	12/15/2016	2:47:42 PM	0.490834	0.878701	-0.006533	-0.414666	-0.002113	87.739791	-0.757691	4.943518	191.3	1.014514
SPC__0302.LAB	12/15/2016	2:47:58 PM	1.070202	0.528115	-0.010799	-0.306385	-0.005594	88.213992	-0.77057	4.922912	191.3	1.014471
SPC__0303.LAB	12/15/2016	2:48:14 PM	-0.774394	0.568988	0.009823	-0.181743	-0.000406	87.868264	-0.670163	4.901367	191.3	1.014549
SPC__0304.LAB	12/15/2016	2:48:29 PM	0.454255	0.610209	-0.003297	-0.291938	0.000509	90.070608	-0.752242	4.923824	191.3	1.01445
SPC__0305.LAB	12/15/2016	2:48:45 PM	-1.228136	12.415349	-0.012137	-0.332603	-0.004138	88.718037	-0.648583	4.917212	191.3	1.014471
SPC__0306.LAB	12/15/2016	2:49:00 PM	-1.390408	12.42665	0.002859	-0.025644	-0.003608	89.604115	-0.747931	4.948943	191.3	1.014514
SPC__0307.LAB	12/15/2016	2:49:16 PM	-1.207309	12.603403	-0.003229	-0.089813	0.003318	91.541527	-0.693812	4.926104	191.3	1.0149
SPC__0308.LAB	12/15/2016	2:49:32 PM	-1.117933	12.405981	-0.003223	-0.124919	0.002742	91.654643	-0.712279	4.938252	191.3	1.014468
SPC__0309.LAB	12/15/2016	2:49:47 PM	-1.404437	12.504481	-0.008615	-0.3249	-0.001677	90.023155	-0.830569	4.95851	191.3	1.01445
SPC__0310.LAB	12/15/2016	2:50:03 PM	-1.521722	12.667453	-0.004263	-0.177947	0.003816	92.195027	-0.82618	4.930647	191.4	1.014385
SPC__0311.LAB	12/15/2016	2:50:19 PM	-0.819961	12.915575	-0.001919	-0.192373	-0.000753	90.382996	-0.699541	4.931402	191.4	1.014428
SPC__0312.LAB	12/15/2016	2:50:34 PM	-1.027263	12.474207	-0.002219	-0.381362	-0.000308	89.692647	-0.745295	4.910993	191.4	1.014328
SPC__0313.LAB	12/15/2016	2:50:50 PM	-1.0578	12.495779	-0.011802	-0.077101	0.001655	91.802857	-0.609427	4.908782	191.5	1.014364
SPC__0314.LAB	12/15/2016	2:51:06 PM	-1.442667	12.607598	-0.005611	-0.291258	0.00105	91.937621	-0.622768	4.910227	191.4	1.014382
SPC__0315.LAB	12/15/2016	2:51:21 PM	-1.251971	12.398054	0.001641	-0.207155	-0.003236	90.304362	-0.602721	4.918364	191.4	1.014368
SPC__0316.LAB	12/15/2016	2:51:37 PM	-1.360074	12.547679	-0.002357	-0.348815	-0.006245	90.697834	-0.71827	4.902067	191.4	1.014257
SPC__0317.LAB	12/15/2016	2:51:53 PM	-1.106576	12.599866	-0.003837	-0.341283	0.006387	93.086302	-0.69823	4.927665	191.4	1.014214
SPC__0318.LAB	12/15/2016	2:52:08 PM	-0.764781	12.700667	0.005719	-0.125939	-0.000794	91.405446	-0.776875	4.940456	191.5	1.014288
SPC__0319.LAB	12/15/2016	2:52:24 PM	-0.988087	12.659538	-0.008087	-0.373624	-0.004419	91.249884	-0.901812	4.964782	191.5	1.014278
SPC__0320.LAB	12/15/2016	2:52:39 PM	-0.961423	12.600065	-0.004144	-0.130439	-0.001803	91.148871	-0.726265	4.944641	191.4	1.014193
SPC__0321.LAB	12/15/2016	2:52:55 PM	-1.014115	12.528085	0.005572	-0.196207	0.000018	93.28566	-0.681074	4.95724	191.4	1.014193
SPC__0322.LAB	12/15/2016	2:53:11 PM	-0.79607	12.59479	-0.005017	-0.187556	-0.001089	91.672163	-0.880207	4.948647	191.4	1.014171
SPC__0323.LAB	12/15/2016	2:53:26 PM	-0.743355	12.857945	-0.006984	-0.244251	-0.001936	91.674631	-0.827719	4.956059	191.4	1.014067
SPC__0324.LAB	12/15/2016	2:53:42 PM	-1.538199	12.673436	0.011868	-0.177897	-0.001545	91.7116	-0.829692	4.953703	191.4	1.014043
SPC__0325.LAB	12/15/2016	2:53:58 PM	-0.715521	12.579136	-0.006023	-0.302626	0.001007	93.326688	-0.758009	4.947702	191.4	1.014107
SPC__0326.LAB	12/15/2016	2:54:13 PM	-1.180217	12.702912	0.001197	-0.274307	-0.006239	92.187407	-0.753661	4.972667	191.4	1.014107
SPC__0327.LAB	12/15/2016	2:54:29 PM	-0.829514	12.627098	-0.000604	-0.226405	-0.004391	91.863993	-0.874044	4.955261	191.4	1.013957
SPC__0328.LAB	12/15/2016	2:54:45 PM	-1.166465	12.576884	-0.003542	-0.310553	0.001835	93.756318	-0.791526	4.952727	191.4	1.013957
SPC__0329.LAB	12/15/2016	2:55:00 PM	-1.344977	12.72376	0.002603	-0.151361	0.004338	93.795063	-0.669448	4.951864	191.4	1.013936
SPC__0330.LAB	12/15/2016	2:55:16 PM	-1.172095	12.660539	0.000125	-0.117903	0.004297	94.298108	-0.803174	4.950677	191.3	1.013866
SPC__0331.LAB	12/15/2016	2:55:32 PM	-0.921658	12.728279	-0.00638	-0.186919	-0.004893	92.075423	-0.751876	4.919688	191.4	1.013871
SPC__0332.LAB	12/15/2016	2:55:47 PM	-0.995312	12.668381	-0.00902	-0.130373	-0.002553	92.513474	-0.81959	4.960194	191.3	1.013786
SPC__0333.LAB	12/15/2016	2:56:03 PM	-0.974485	12.775467	-0.001631	-0.295258	-0.005975	92.522504	-0.794368	4.943562	191.4	1.013807
SPC__0334.LAB	12/15/2016	2:56:18 PM	-1.14592	12.650661	-0.003023	-0.220024	-0.001879	92.688635	-0.812052	4.941116	191.4	1.013786
SPC__0335.LAB	12/15/2016	2:56:34 PM	-1.002119	12.868057	-0.010073	-0.209586	-0.001807	92.908664	-0.756806	4.96316	191.5	1.013808
SPC__0336.LAB	12/15/2016	2:56:50 PM	-1.332133	12.745704	-0.006368	-0.190462	-0.005573	92.200533	-0.940314	4.964456	191.4	1.013829
SPC__0337.LAB	12/15/2016	2:57:05 PM	-1.353968	12.750291	-0.010875	-0.2965	0.001724	94.549462	-0.933337	4.953448	191.5	1.013786
SPC__0338.LAB	12/15/2016	2:57:21 PM	-1.222359	12.545094	-0.014845	-0.206922	0.000722	94.299444	-0.788095	4.92666	191.5	1.013764
SPC__0339.LAB	12/15/2016	2:57:37 PM	-1.276264	12.584264	0.004695	-0.219286	0.004338	94.141632	-0.652631	4.899102	191.5	1.013764
SPC__0340.LAB	12/15/2016	2:57:52 PM	-1.330403	12.50634	-0.008788	-0.400264	0.000476	94.747247	-0.656604	4.916859	191.5	1.013743
SPC__0341.LAB	12/15/2016	2:58:08 PM	-1.310482	12.506196	0.006478	-0.024689	-0.00328	93.02889	-0.86592	4.947469	191.5	1.013766
SPC__0342.LAB	12/15/2016	2:58:28 PM	-0.925252	12.492404	-0.002133	-0.231406	-0.010161	92.12235	-0.66923	4.920257	191.5	1.013643
SPC__0343.LAB	12/15/2016	2:58:44 PM	-1.397525	12.656373	0.001877	-0.301574	0.001415	94.861107	-0.850285	4.923814	191.5	1.013636
SPC__0344.LAB	12/15/2016	2:59:00 PM	-1.043678	12.709125	0.001879	-0.255079	0.002156	94.954304	-0.883921	4.945045	191.5	1.013679
SPC__0345.LAB	12/15/2016	2:59:15 PM	-1.002334	12.617122	-0.005363	-0.190933	0.001037	95.145451	-0.776461	4.956743	191.5	1.013721
SPC__0346.LAB	12/15/2016	2:59:31 PM	-1.187385	12.612509	0.000439	-0.105628	0.000664	94.012419	-0.680191	4.916297	191.5	1.013636
SPC__0347.LAB	12/15/2016	2:59:46 PM	-0.835185	12.595352	-0.018525	-0.201397	-0.001493	93.065098	-0.813525	4.942508	191.5	1.0137
SPC__0348.LAB	12/15/2016	3:00:02 PM	-1.286961	12.733697	-0.003951	-0.282976	0.000833	94.528387	-0.844192	4.958962	191.5	1.0137
SPC__0349.LAB	12/15/2016	3:00:18 PM	-1.369575	12.599056	-0.000051	-0.231501	-0.003636	92.955339	-0.671782	4.948428	191.5	1.013657
SPC__0350.LAB	12/15/2016	3:00:33 PM	-1.351169	12.656467	-0.010096	-0.190898	-0.001309	92.339187	-0.826753	4.966567	191.5	1.013507
SPC__0351.LAB	12/15/2016	3:00:49 PM	-1.01878	12.720921	-0.000719	-0.066092	0.004777	94.679321	-0.786173	4.948573	191.7	1.013645
SPC__0352.LAB	12/15/2016	3:01:05 PM	-1.687557	12.569301	0.001938	-0.224815	-0.001445	93.107504	-0.802693	4.943368	191.8	1.013614
SPC__0353.LAB	12/15/2016	3:01:20 PM	-1.555951	12.757903	-0.005871	-0.318593	-0.001558	93.219866	-0.91188	4.950279	192	1.013636
SPC__0354.LAB	12/15/2016	3:01:36 PM	-1.468779	12.644418	-0.003684	-0.222954	0.001264	95.24863	-0.837949	4.934727	192	1.013571
SPC__0355.LAB	12/15/2016	3:01:51 PM	-0.945165	12.734534	0.000291	-0.131155	0.00335	95.20833	-1.00625	4.943176	192	1.013636
SPC__0356.LAB	12/15/2016	3:02:07 PM	-1.526346	12.79445	-0.005373	-0.278936	0.004126	94.909187	-0.805372	4.945088	192.1	1.013571
SPC__0357.LAB	12/15/2016	3:02:23 PM	-1.662972	12.767296	-0.006338	-0.249608	-0.005386	93.256698	-0.882559	4.944041	192.1	1.013507
SPC__0358.LAB	12/15/2016	3:02:38 PM	-1.132768	12.763884	-0.000042	-0.291404	0.009464	94.6087	-0.979436	4.951401	192	1.013464
SPC__0359.LAB	12/15/2016	3:02:54 PM	-1.576368	12.860318	-0.014836	-0.169533	-0.001435	92.550861	-0.898412	4.912321	192	1.013529
SPC__0360.LAB	12/15/2016	3:03:10 PM	-1.568874	12.540479	-0.007602	-0.115804	0.001863	95.504638	-0.820774	4.946398	191.9	1.013565
SPC__0361.LAB	12/15/2016	3:03:25 PM	-1.378505	12.69044	0.000122	-0.17739	0.004723	95.861193	-0.776987	4.939197	191.9	1.013614
SPC__0362.LAB	12/15/2016	3:03:41 PM	-2.004099	12.698113	-0.003903	-0.218835	-0.002721	93.738533	-0.875038	4.947703	191.8	1.013529
SPC__0363.LAB	12/15/2016	3:03:57 PM	-1.296172	12.559791	0.003057	-0.232001	-0.005696	93.152317	-0.87159	4.933371	191.8	1.013464

Vantage Specialty Chemicals
Clean Air Job No. 13157
Scrubber Stack

FTIR QA/QC

Spectrum	Date	Time	Ethylene oxide 150c	Propylene Oxide CAE_AM	CO2% (40) 191C	CO (500) 191C (1of2)	H2O% (40) 191C	HCl ppm (100) 191C	Ethylene (100,3000) 191C	SF6 (10) 191C	Temp (C)	Pressure (Atm)
SPC__0364.LAB	12/15/2016	3:04:12 PM	-1.362985	12.764746	-0.003679	-0.308076	-0.001071	93.523811	-0.787579	4.932061	191.7	1.013486
SPC__0365.LAB	12/15/2016	3:04:28 PM	-1.044839	12.619617	-0.011284	-0.308497	0.006435	95.124897	-0.920479	4.93607	191.7	1.013486
SPC__0366.LAB	12/15/2016	3:04:43 PM	-1.802067	12.659933	0.002316	-0.258719	-0.000086	93.98044	-0.793412	4.946255	191.7	1.013443
SPC__0367.LAB	12/15/2016	3:04:59 PM	-1.589585	12.505875	-0.004739	-0.098077	0.002696	96.22205	-0.93956	4.965301	191.7	1.013229
QA/SF6 Direct												
SPC__0368.LAB	12/15/2016	3:05:15 PM	-1.520003	12.475963	0.005278	-0.356092	0.006814	96.160539	-0.904349	4.950671	191.7	1.013525
SPC__0369.LAB	12/15/2016	3:05:30 PM	-1.448653	12.519098	0.003423	-0.257312	-0.001598	94.199341	-0.946178	4.949315	191.7	1.013487
SPC__0370.LAB	12/15/2016	3:05:46 PM	-1.34817	12.802172	0.002514	-0.235745	-0.005919	94.106874	-0.790653	4.929221	191.8	1.013443
SPC__0371.LAB	12/15/2016	3:06:02 PM	-1.800034	12.8158	-0.00158	-0.002426	0.001668	95.288778	-0.774543	4.946086	191.8	1.013299
SPC__0372.LAB	12/15/2016	3:06:17 PM	-1.94065	12.930998	0.002987	-0.273627	-0.000118	93.395376	-0.76796	4.932086	191.7	1.013344
SPC__0373.LAB	12/15/2016	3:06:33 PM	-1.964252	12.583691	-0.010171	-0.254022	-0.000041	93.976986	-0.699624	4.929476	191.6	1.013336
SPC__0374.LAB	12/15/2016	3:06:49 PM	-1.410809	12.654492	-0.006038	-0.227693	0.001523	95.780684	-0.706683	4.942682	191.6	1.013314
SPC__0375.LAB	12/15/2016	3:07:04 PM	-1.754915	12.566537	0.000117	-0.054807	-0.003015	94.114011	-0.73583	4.940228	191.6	1.013357
SPC__0376.LAB	12/15/2016	3:07:20 PM	-1.56357	12.841284	0.001561	-0.017418	-0.001654	94.633383	-0.813729	4.933844	191.6	1.013336
SPC__0377.LAB	12/15/2016	3:07:36 PM	-1.617307	12.490968	0.010605	-0.171543	0.001725	95.542823	-0.851872	4.921966	191.5	1.013486
SPC__0378.LAB	12/15/2016	3:07:51 PM	-1.224962	12.614596	0.00095	-0.322377	0.00213	96.231605	-0.818997	4.940896	191.5	1.013464
SPC__0379.LAB	12/15/2016	3:08:07 PM	-2.139878	12.541808	-0.004799	-0.22009	0.000488	95.939012	-0.865416	4.949829	191.5	1.013293
SPC__0380.LAB	12/15/2016	3:08:23 PM	-1.595378	12.666891	0.004345	-0.234845	-0.001311	93.606557	-0.720293	4.954299	191.4	1.013379
SPC__0381.LAB	12/15/2016	3:08:38 PM	-1.476416	12.703172	-0.001513	-0.264852	0.001202	95.037227	-0.681879	4.951705	191.5	1.013243
SPC__0382.LAB	12/15/2016	3:08:54 PM	-1.7036	12.773304	-0.002267	-0.144023	0.005257	94.87878	-0.663563	4.907953	191.3	1.013357
SPC__0383.LAB	12/15/2016	3:09:10 PM	-1.809781	12.581372	-0.001099	-0.033789	0.009456	95.199445	-0.615126	4.923065	191.4	1.013272
SPC__0384.LAB	12/15/2016	3:09:25 PM	-1.67179	12.490388	-0.003583	-0.177953	-0.002058	93.604463	-0.711423	4.938727	191.3	1.01325
SPC__0385.LAB	12/15/2016	3:09:41 PM	-1.82942	12.639109	-0.003065	-0.336665	-0.002279	93.037846	-0.66526	4.906904	191.3	1.013263
SPC__0386.LAB	12/15/2016	3:09:57 PM	-1.959093	12.445114	-0.004369	-0.347701	0.002055	95.569487	-0.854956	4.953233	191.3	1.01325
SPC__0387.LAB	12/15/2016	3:10:12 PM	-1.815006	12.605312	-0.002298	-0.229018	0.001372	95.38805	-0.74324	4.92547	191.3	1.013212
SPC__0388.LAB	12/15/2016	3:10:28 PM	-1.644475	12.769936	-0.007149	-0.092601	0.006201	94.944209	-0.627573	4.916392	191.2	1.013314
SPC__0389.LAB	12/15/2016	3:10:43 PM	-2.136768	12.649748	0.001128	-0.222572	0.002884	95.380472	-0.729696	4.926551	191.2	1.013122
SPC__0390.LAB	12/15/2016	3:10:59 PM	-1.648482	12.562162	-0.006227	-0.229627	-0.001314	93.990652	-0.749491	4.947212	191.3	1.013103
SPC__0391.LAB	12/15/2016	3:11:15 PM	-1.968065	12.803686	-0.002507	-0.272538	-0.003368	93.988159	-0.785872	4.931643	191.3	1.013164
SPC__0392.LAB	12/15/2016	3:11:30 PM	-1.588194	12.539342	0.003398	-0.271824	-0.000834	94.323422	-0.784245	4.928375	191.3	1.0131
SPC__0393.LAB	12/15/2016	3:11:46 PM	-1.857781	12.708921	0.000179	-0.182813	-0.002591	93.316728	-0.700719	4.918661	191.3	1.013057
SPC__0394.LAB	12/15/2016	3:12:02 PM	-1.832068	12.633854	-0.009862	-0.025406	0.00376	95.894213	-0.778959	4.97014	191.4	1.012993
SPC__0395.LAB	12/15/2016	3:12:17 PM	-2.036811	12.717195	-0.001965	-0.175866	0.003777	95.660072	-0.763022	4.944293	191.4	1.012972
SPC__0396.LAB	12/15/2016	3:12:33 PM	-2.188206	12.510891	0.001614	-0.205484	0.002432	95.881015	-0.630595	4.908161	191.4	1.012993
SPC__0397.LAB	12/15/2016	3:12:49 PM	-2.099095	12.617398	-0.005757	-0.210692	0.001011	95.905452	-0.702003	4.941248	191.4	1.013002
SPC__0398.LAB	12/15/2016	3:13:04 PM	-2.037265	12.645739	0.003937	-0.267939	0.009907	96.211164	-0.748557	4.923436	191.4	1.012959
SPC__0399.LAB	12/15/2016	3:13:20 PM	-2.101084	12.536276	-0.01619	-0.126142	0.00428	95.529053	-0.657149	4.925944	191.5	1.01295
SPC__0400.LAB	12/15/2016	3:13:35 PM	-1.880251	12.565829	-0.003377	-0.286562	0.003885	95.090416	-0.721397	4.912286	191.4	1.012862
SPC__0401.LAB	12/15/2016	3:13:51 PM	-1.578113	12.598	-0.001651	-0.229052	0.006076	95.341001	-0.774842	4.905263	191.3	1.012907
SPC__0402.LAB	12/15/2016	3:14:07 PM	-2.254764	12.623543	-0.001297	-0.161425	0.000092	95.978434	-0.714115	4.938516	191.3	1.0128
SPC__0403.LAB	12/15/2016	3:14:22 PM	-2.243283	12.703248	0.001042	-0.374716	-0.001003	93.588697	-0.632611	4.930495	191.2	1.012865
SPC__0404.LAB	12/15/2016	3:14:38 PM	-2.189769	12.515107	0.003985	-0.227898	-0.001277	94.129701	-0.558502	4.918127	191.2	1.01295
SPC__0405.LAB	12/15/2016	3:14:54 PM	-2.207977	12.560364	-0.000359	-0.326028	0.004588	95.994066	-0.836961	4.941212	191.2	1.0128
SPC__0406.LAB	12/15/2016	3:15:09 PM	-1.680788	12.62269	0.007046	-0.28628	0.006495	96.137799	-0.891859	4.955896	191.2	1.012741
SPC__0407.LAB	12/15/2016	3:15:25 PM	-2.042136	12.694977	-0.005811	-0.21931	-0.004667	94.157116	-0.755577	4.957179	191.2	1.012672
SPC__0408.LAB	12/15/2016	3:15:41 PM	-1.978138	12.464543	-0.004264	-0.14186	-0.003066	93.446285	-0.713665	4.926577	191.1	1.012865
SPC__0409.LAB	12/15/2016	3:15:56 PM	-2.004959	12.710228	-0.005131	-0.327701	0.008511	97.450641	-0.808192	4.935693	191.1	1.012776
SPC__0410.LAB	12/15/2016	3:16:12 PM	-2.154901	12.318511	-0.025078	-0.412993	0.004335	95.740198	-0.496279	4.918283	191.2	1.012581
SPC__0411.LAB	12/15/2016	3:16:27 PM	-1.751855	12.583495	-0.00696	-0.336795	0.002375	95.844428	-0.610013	4.920819	191.2	1.012546
SPC__0412.LAB	12/15/2016	3:16:43 PM	-2.380783	12.626804	-0.007088	-0.314659	-0.000536	93.90306	-0.747483	4.916724	191.2	1.012681
SPC__0413.LAB	12/15/2016	3:16:59 PM	-2.181935	12.673271	0.002505	-0.219773	0.007622	95.42054	-0.526713	4.932267	191.2	1.01265
SPC__0414.LAB	12/15/2016	3:17:14 PM	-1.51089	12.747545	0.000897	-0.130844	0.00665	95.415063	-0.70298	4.930933	191.2	1.012543
SPC__0415.LAB	12/15/2016	3:17:30 PM	-2.321314	12.46281	-0.005457	-0.218983	0.010198	95.401806	-0.759117	4.907625	191.3	1.012607
SPC__0416.LAB	12/15/2016	3:17:46 PM	-2.324456	12.667341	-0.007671	-0.357119	0.008186	95.88083	-0.785209	4.930072	191.2	1.012372
SPC__0417.LAB	12/15/2016	3:18:01 PM	-2.02198	12.721373	0.000082	-0.246709	0.001141	95.588947	-0.686524	4.936563	191.3	1.012479
SPC__0418.LAB	12/15/2016	3:18:17 PM	-1.927085	12.573545	-0.002359	-0.136761	0.003667	97.302945	-0.725118	4.946925	191.3	1.012457
SPC__0419.LAB	12/15/2016	3:18:33 PM	-2.577857	12.697503	-0.0031	-0.15333	0.001675	96.687193	-0.893693	4.971899	191.3	1.0125
SPC__0420.LAB	12/15/2016	3:18:48 PM	-2.288393	12.500109	-0.00889	-0.297339	0.0046	97.122397	-0.72633	4.938188	191.3	1.013605
SPC__0421.LAB	12/15/2016	3:19:04 PM	-2.354536	12.470226	-0.015926	-0.216481	0.012253	95.918772	-0.652915	4.903367	191.3	1.013893
SPC__0422.LAB	12/15/2016	3:19:19 PM	-2.303873	12.736212	0.003945	-0.284816	0.006531	97.121429	-0.804921	4.919173	191.3	1.013992
SPC__0423.LAB	12/15/2016	3:19:35 PM	-2.014696	12.457969	-0.002458	-0.298732	0.001658	97.655624	-0.674201	4.912497	191.3	1.013605
SPC__0424.LAB	12/15/2016	3:19:51 PM	-2.26629	12.669566	0.011594	-0.240258	0.002571	98.164303	-0.824674	4.968144	191.3	1.013871
SPC__0425.LAB	12/15/2016	3:20:06 PM	-2.194691	12.757331	-0.018198	-0.260881	0.003183	97.654367	-0.833824	4.957508	191.3	1.013807
SPC__0426.LAB	12/15/2016	3:20:22 PM	-2.47279	12.768833	0.00034	-0.273242	0.000874	98.089069	-0.674586	4.949687	191.3	1.013486
SPC__0427.LAB	12/15/2016	3:20:38 PM	-2.548538	12.693609	0.002537	-0.249403	0.004737	98.213651	-0.944548	4.952668	191.3	1.013186
SPC__0428.LAB	12/15/2016	3:20:53 PM	-2.315282	12.471204	-0.003109	-0.252143	0.002638	97.747601	-0.737686	4.94462	191.3	1.013229
SPC__0429.LAB	12/15/2016	3:21:09 PM	-2.428363	12.598535	-0.010968	-0.247938	0.011132	97.967901	-0.871715	4.956249	191.3	1.013293
SPC__0430.LAB	12/15/2016	3:21:25 PM	-2.250047	12.776388	0.00482	-0.218317	0.005513	97.131291	-0.803001	4.987534	191.3	1.002775
SPC__0431.LAB	12/15/2016	3:21:40 PM	-2.870303	12.239134	0.011078	-0.232048	-0.005263	93.975995	-0.868529	4.957033	191.3	0.996049
SPC__0432.LAB	12/15/2016	3:21:56 PM	-2.060146	12.412886	0.005512	-0.063897	0.004921	93.586688	-0.839848	4.96193	191.3	0.995942
SPC__0433.LAB	12/15/2016	3:22:11 PM	-2.575291	12.511667	-0.00489	-0.149667	0.005706	91.944361	-0.725035	4.961948	191.3	0.996515
SPC__0791.LAB	12/15/2016	4:55:24 PM	-6.616746	19.817289	11.350196	1.713204	0.034247	0.956549	35.253769	-0.000191	191.2	1.002154
SPC__0792.LAB	12/15/2016	4:55:39 PM	-6.813725	20.176483	11.366889	1.790886	0.026186	1.010837	35.458071	0.016181	191.2	1.002047
SPC__0793.LAB	12/15/2016	4:55:55 PM	-6.619402	20.291601	11.336412	2.208321	0.032754	0.977521	35.434953	0.011525	191.2	1.002004
SPC__0794.LAB	12/15/2016	4:56:10 PM	-6.750008	20.287213	11.317858	2.389737	0.032235	1.096638	35.296011	0.021902	191.2	1.002068
SPC__0795.LAB	12/15/2016	4:56:26 PM	-6.244855	20.274454	11.285713	2.480853	0.021054	1.112008	35.417784	0.014668	191.3	1.002111
SPC__0796.LAB	12/15/2016	4:56:41 PM	-6.254326	20.727282	11.315033	2.644526	0.036747	1.020482	35.521218	0.023337	191.3	1.002047
SPC__0797.LAB	12/15/2016	4:56:57 PM	-6.195177	20.832812	11.301098	3.040576	0.03375	1.099244	35.636828	0.014135	191.3	1.002068
SPC__0798.LAB	12/15/2016	4:57:13 PM	-6.231991	20.848171	11.270571	3.109416	0.032902	1.039011	35.271465	0.03215	191.4	1.00209
SPC__0799.LAB	12/15/2016	4:57:29 PM	-5.889051	20.877404	11.297913	3.288529	0.030825	1.20419	35.491914	0.009111	191.5	1.002098
SPC__0800.LAB	12/15/2016	4:57:44 PM	-6.263865	20.81637	11.269266	3.412384	0.029556	1.173451	35.335414	0.024552	191.6	1.002068
SPC__0801.LAB	12/15/2016	4:58:00 PM	-6.080796	20.896095	11.264132	3.690289	0.033118	1.205765	35.507555	0.006938	191.7	1.002111
SPC__0802.LAB	12/15/2016	4:58:15 PM	2.039628	10.922457	10.55822	3.15474	0.166725	1.302128	17.897341	0.013	191.8	1.012522
SPC__0803.LAB	12/15/2016	4:58:31 PM	6.765845	0.883508	10.049523	1.928025	0.283658	1.164839	1.391528	0.018226	191.8	1.013636
SPC__0804.LAB	12/15/2016	4:58:47 PM	5.51538	0.123895	10.035042	1.849837	0.27681	0.966763	0.159966	0.011074	191.8	1.013936
SPC__0805.LAB	12/15/2016	4:59:03 PM	4.383812	0.005862	10.036374	1.967266	0.25569	0.837489	0.165357	0.018114	191.8	1.014268
SPC__0806.LAB	12/15/2016	4:59:18 PM	3.790665	-0.141192	10.03689	1.978379	0.238606	0.636623	0.054691	0.027923	191.7	1.014514
SPC__0807.LAB	12/15/2016	4:59:34 PM	2.92434	-0.01866	10.044732	2.05473	0.231938	0.656314	0.183791	0.022293	191.7	1.014107
SPC__0808.LAB	12/15/2016	4:59:49 PM	2.409226	-0.147626	10.047309	1.886094	0.222585	0.620509	0.20889	0.020916	191.6	1.013657
SPC__0809.LAB	12/15/2016	5:00:05 PM	2.053727	0.129123	10.02617	1.992619	0.201037	0.636016	0.171413	0.032601	191.6	1.014043
SPC__0810.LAB	12/15/2016	5:00:21 PM	0.665029	0.108367	9.413089	1.96048	0.186235	0.604326	0.178441	0.01504	191.5	1.012865
SPC__0811.LAB	12/15/2016	5:00:36 PM	-2.355798	-0.129503	3.431158	2.377984	0.164337	0.517829	0.129134	0.027314	191.5	1.013336
SPC__0812.LAB	12/15/2016	5:00:52 PM	-5.202946	-0.162559	2.192992	1.378332	0.160214	0.528481	-0.052611	0.025123	191.5	1.01415
SPC__0813.LAB	12/15/2016	5:01:08 PM	-6.058299	-0.046685	2.074735	1.413982	0.149071	0.505451	-0.074653	0.030902	191.5	1.014707

Vantage Specialty Chemicals
Clean Air Job No. 13157
Scrubber Stack

FTIR QA/QC

Spectrum	Date	Time	Ethylene oxide 150c	Propylene Oxide CAE_AM	CO2% (40) 191C	CO (500) 191C (1of2)	H2O% (40) 191C	HCl ppm (100) 191C	Ethylene (100,3000) 191C	SF6 (10) 191C	Temp (C)	Pressure (Atm)
SPC__0814.LAB	12/15/2016	5:01:23 PM	-6.280443	-0.252054	2.05352	1.747643	0.144215	0.484904	0.036969	0.023327	191.5	1.014985
SPC__0815.LAB	12/15/2016	5:01:48 PM	-6.559813	-0.088014	2.038519	1.395799	0.135923	0.430138	-0.084239	0.019251	191.4	1.014683
SPC__0816.LAB	12/15/2016	5:02:04 PM	-7.506693	-0.201048	2.031802	1.445352	0.126764	0.465604	0.030441	0.021162	191.4	1.01491
SPC__0817.LAB	12/15/2016	5:02:20 PM	-7.188066	-0.121328	2.031043	1.521018	0.122083	0.417758	-0.033039	0.038867	191.3	1.012757
SPC__0818.LAB	12/15/2016	5:02:35 PM	-7.185487	-0.019438	2.023518	1.669702	0.114253	0.408595	-0.065548	0.023985	191.3	1.015114
SPC__0819.LAB	12/15/2016	5:02:51 PM	-7.589055	-0.26818	2.002771	1.745972	0.108561	0.42502	0.13929	0.029686	191.2	1.014471
SPC__0820.LAB	12/15/2016	5:03:06 PM	51.931154	5.090225	0.987647	3.299923	0.705596	0.842994	0.082	0.029321	191.2	1.014064
SPC__0821.LAB	12/15/2016	5:03:22 PM	118.207876	9.911316	0.152993	4.301441	1.393007	1.205602	0.152717	0.03051	191.1	1.014407
SPC__0822.LAB	12/15/2016	5:03:38 PM	124.165897	10.511593	0.095426	4.399987	1.493383	1.244495	-0.035667	0.016409	191.1	1.014685
SPC__0823.LAB	12/15/2016	5:03:53 PM	124.944132	10.753396	0.065905	4.487396	1.530629	1.221936	-0.079878	0.021145	191	1.014364
SPC__0824.LAB	12/15/2016	5:04:09 PM	66.899423	6.693573	1.085469	3.124448	1.130208	1.042658	4.635655	0.045638	191	1.013505
SPC__0825.LAB	12/15/2016	5:04:25 PM	14.072154	2.915432	0.416463	2.456475	0.554797	0.735742	79.897521	0.044416	191	1.014665
SPC__0826.LAB	12/15/2016	5:04:40 PM	-1.851132	0.316285	0.071061	2.401393	0.261978	0.608649	98.216922	0.02324	191	1.014578
SPC__0827.LAB	12/15/2016	5:04:56 PM	-6.703975	-0.050746	0.039382	2.069972	0.162376	0.572029	99.609785	0.026691	191	1.013207
SPC__0828.LAB	12/15/2016	5:05:11 PM	-8.291206	-0.027427	0.038191	2.309291	0.127594	0.429539	99.479143	-0.009759	191	1.014664
SPC__0829.LAB	12/15/2016	5:05:27 PM	-9.169195	-0.08559	0.027082	2.349605	0.124006	0.469866	99.724488	0.019668	191.1	1.014343
SPC__0830.LAB	12/15/2016	5:05:43 PM	-8.80231	-0.247206	0.030961	2.312897	0.117697	0.435221	99.948498	0.030551	191.1	1.01385
SPC__0831.LAB	12/15/2016	5:05:58 PM	-9.610671	-0.077696	0.024102	2.346179	0.112041	0.428424	99.852014	-0.000368	191.1	1.014086
SPC__0832.LAB	12/15/2016	5:06:14 PM	-9.550305	-0.321759	0.014081	2.352196	0.114535	0.339658	99.925022	0.019552	191.1	1.013807
SPC__0833.LAB	12/15/2016	5:06:30 PM	-9.131273	-0.147406	0.015606	2.276413	0.109999	0.414702	99.812716	0.006625	191.1	1.01445
Pre CTS System												
SPC__0834.LAB	12/15/2016	5:06:45 PM	-9.01741	-0.06137	0.020285	2.294369	0.104271	0.338919	99.918149	0.026275	191.1	1.013906
SPC__0835.LAB	12/15/2016	5:07:01 PM	-9.376394	-0.202515	0.020863	2.241155	0.102409	0.348851	100.025263	0.010167	191.1	1.015135
SPC__0836.LAB	12/15/2016	5:07:17 PM	-9.290938	-0.157168	0.020952	2.195431	0.10027	0.363296	99.910809	0.009941	191.1	1.013507
SPC__0837.LAB	12/15/2016	5:07:32 PM	-9.154417	-0.199517	0.013556	2.362041	0.100605	0.381279	100.020988	0.025567	191.1	1.01445
SPC__0838.LAB	12/15/2016	5:07:48 PM	-9.720845	-0.163533	0.022056	2.277948	0.104983	0.328888	100.169893	0.02503	191	1.014086
SPC__0839.LAB	12/15/2016	5:08:04 PM	-9.592628	-0.098726	0.013975	2.324548	0.102061	0.272808	100.19067	0.021237	191.1	1.014428
SPC__0840.LAB	12/15/2016	5:08:19 PM	-8.932366	-0.43275	0.020853	2.373734	0.10634	0.425807	99.703774	0.026432	191	1.01475
SPC__0841.LAB	12/15/2016	5:08:35 PM	-9.674591	-0.523121	0.006397	2.285629	0.097256	0.366444	100.119498	0.014898	191.1	1.013936
SPC__0842.LAB	12/15/2016	5:08:51 PM	-9.202509	-0.33381	0.007822	2.149536	0.094512	0.372299	100.099136	0.016188	191	1.014557
SPC__0843.LAB	12/15/2016	5:09:06 PM	-9.630991	-0.193547	0.020333	2.335998	0.085233	0.440197	100.025818	0.026107	191.1	1.014557
SPC__0844.LAB	12/15/2016	5:09:22 PM	-9.51456	-0.293709	0.014618	2.240515	0.094775	0.415726	100.027492	0.00663	191.1	1.015007
SPC__0845.LAB	12/15/2016	5:09:38 PM	-1.545572	0.449371	0.024035	2.477391	0.164192	0.4212	91.04384	-0.005697	191.1	1.014685
SPC__0846.LAB	12/15/2016	5:09:53 PM	94.422448	8.265379	0.049432	4.107352	1.182874	0.757181	22.349693	0.003987	191.1	1.015028
SPC__0847.LAB	12/15/2016	5:10:09 PM	115.471099	10.12662	0.05318	4.366044	1.493981	0.988236	9.725748	0.008769	191.1	1.013614
SPC__0848.LAB	12/15/2016	5:10:25 PM	117.440284	10.535938	0.061048	4.419765	1.559174	1.050763	8.953629	0.02549	191.1	1.014707
SPC__0849.LAB	12/15/2016	5:10:40 PM	116.799111	10.505689	0.068984	4.542888	1.579537	1.0294	8.745076	0.011194	191.1	1.014127
SPC__0850.LAB	12/15/2016	5:10:56 PM	116.616288	10.481914	0.05029	4.389384	1.592772	1.064704	8.523968	0.006862	191.1	1.015285
SPC__0851.LAB	12/15/2016	5:11:11 PM	115.538591	10.351742	0.051876	4.393282	1.602237	1.050933	8.550474	0.018699	191.1	1.014321
SPC__0852.LAB	12/15/2016	5:11:27 PM	114.955535	10.331264	0.055474	4.422595	1.606362	1.076039	8.620624	0.024162	191.1	1.014685
SPC__0853.LAB	12/15/2016	5:11:43 PM	113.196715	10.345899	0.070779	4.285289	1.601224	0.994727	8.455314	0.011611	191.1	1.015285
SPC__0854.LAB	12/15/2016	5:11:58 PM	112.32358	10.199835	0.054892	4.384969	1.600953	0.918913	7.397591	0.052074	191.1	1.015521
SPC__0855.LAB	12/15/2016	5:12:14 PM	112.033072	10.163559	0.058442	4.348818	1.602281	0.997988	2.446347	0.313149	191.1	1.014193
SPC__0856.LAB	12/15/2016	5:12:29 PM	112.094566	9.955475	0.066314	4.473452	1.597328	0.8985	0.550061	0.41573	191.2	1.014728
SPC__0857.LAB	12/15/2016	5:12:45 PM	106.430149	9.212829	0.064934	4.404411	1.490508	0.913197	0.254476	0.708825	191.1	1.014578
SPC__0858.LAB	12/15/2016	5:13:01 PM	103.927582	8.864911	0.059916	4.202744	1.46162	0.93785	0.084614	0.791613	191.2	1.014578
SPC__0859.LAB	12/15/2016	5:13:16 PM	103.785338	9.042502	0.04376	4.196025	1.459873	0.851474	0.04426	0.809986	191.1	1.013936
SPC__0860.LAB	12/15/2016	5:13:32 PM	103.378093	8.991454	0.056052	4.327005	1.468364	0.865094	-0.076041	0.785075	191.2	1.014288
SPC__0861.LAB	12/15/2016	5:13:48 PM	103.272691	9.209818	0.064776	4.23069	1.498993	0.914791	-0.084875	0.68742	191.1	1.014385
SPC__0952.LAB	12/15/2016	5:39:42 PM	-0.081194	0.008645	0.000664	0.054965	0.003509	-0.073871	-0.065613	0.002442	191.2	1.012866
SPC__0953BKG.LAB	12/15/2016	5:42:03 PM	0	0	0	0	0	0	0	0	191.1	1.012751
SPC__0954.LAB	12/15/2016	5:42:25 PM	0.274118	-0.133606	-0.001433	-0.056785	0.006205	0.039683	-0.033853	0.011337	191.1	1.012661
SPC__0955.LAB	12/15/2016	5:42:41 PM	-0.054012	0.038302	0.00173	0.169557	-0.005518	-0.035221	0.002757	0.001944	191.1	1.012715
SPC__0956.LAB	12/15/2016	5:42:57 PM	-0.063004	-0.177857	-0.000926	0.102409	-0.006539	-0.008311	-0.005005	0.008305	191.2	1.012672
SPC__0957.LAB	12/15/2016	5:43:12 PM	-0.147427	-0.009816	0.002044	0.031589	0.001656	-0.021063	-0.020091	0.006534	191.1	1.012581
SPC__0958.LAB	12/15/2016	5:43:28 PM	-0.580164	-0.057001	0.003344	-0.033747	-0.003269	-0.047734	0.090039	-0.001135	191.2	1.012607
SPC__0959BKG.LAB	12/15/2016	5:45:55 PM	0	0	0	0	0	0	0	0	191.1	1.012626
SPC__0960.LAB	12/15/2016	5:48:18 PM	-0.29726	-0.067385	-0.00033	-0.067819	-0.000872	-0.035758	0.013505	-0.003412	191.2	1.012565
SPC__0961BKG.LAB	12/15/2016	5:48:45 PM	0	0	0	0	0	0	0	0	191.1	1.012503
MDL												
SPC__0962.LAB	12/15/2016	5:49:07 PM	0.177112	-0.014952	0.004663	0.019857	0.007536	0.029543	0.075979	0.002285	191	1.012388
SPC__0963.LAB	12/15/2016	5:49:23 PM	0.192391	-0.127142	0.00155	0.103208	-0.001199	-0.0069	0.070897	-0.001282	191	1.0125
SPC__0964.LAB	12/15/2016	5:49:39 PM	0.514117	-0.09037	-0.011332	0.008722	-0.001571	-0.030555	0.111608	-0.016235	191.1	1.0124
SPC__0965.LAB	12/15/2016	5:49:55 PM	0.132522	0.164419	-0.005949	-0.01802	0.000978	-0.033017	0.017506	0.001886	191.1	1.012457
SPC__0966.LAB	12/15/2016	5:50:10 PM	0.237161	0.052756	0.00136	-0.140638	-0.002198	-0.03749	0.00322	-0.00563	191.2	1.012479
SPC__0967.LAB	12/15/2016	5:50:26 PM	0.380199	0.100248	-0.009411	0.064578	-0.002366	-0.00988	-0.073265	-0.005205	191.1	1.01236
SPC__0968.LAB	12/15/2016	5:50:41 PM	0.348381	-0.180258	-0.000571	-0.201007	-0.001319	-0.037553	0.049207	-0.000649	191.1	1.012286
SPC__0969.LAB	12/15/2016	5:50:57 PM	0.077998	0.166898	-0.007793	0.233393	-0.002668	-0.025129	-0.086597	0.000522	191.2	1.01235
SPC__0970.LAB	12/15/2016	5:51:13 PM	0.173213	0.029091	0.004663	0.021291	-0.000354	-0.062718	0.062475	-0.006858	191.2	1.012286
SPC__0971.LAB	12/15/2016	5:51:28 PM	0.394599	0.045439	-0.011609	0.101075	0.000467	-0.034815	0.076589	0.018793	191.2	1.012329
SPC__0972.LAB	12/15/2016	5:51:44 PM	0.018296	0.032287	0.012796	0.137618	0.004529	-0.068107	-0.01647	0.000757	191.2	1.01238
SPC__0973.LAB	12/15/2016	5:52:00 PM	1.9409	0.057086	0.012029	8.658544	0.007838	-0.029945	-0.010213	-0.002781	191.2	1.011943
SPC__0974.LAB	12/15/2016	5:52:15 PM	138.577919	15.230545	0.0204	2530.84828	1.195722	0.621262	0.455025	-0.004736	191.1	1.015252
SPC__0975.LAB	12/15/2016	5:52:31 PM	171.177113	20.373292	0.033179	3405.40589	1.618117	0.70083	0.482438	-0.007929	191.1	1.016506
SPC__0976.LAB	12/15/2016	5:52:47 PM	158.904244	19.988556	0.033277	3403.83695	1.647984	0.687071	0.611644	0.002479	191.1	1.014569
SPC__0977.LAB	12/15/2016	5:53:02 PM	157.61594	20.15481	0.083286	3332.9257	1.67529	0.551458	0.647702	-0.00975	191.1	1.014835
Native Concentration												
SPC__2391.LAB	12/16/2016	6:05:45 PM	-35.66981	42.673691	0.057671	149.785799	2.592352	-0.022842	1.124403	0.004124	190.9	1.006503
SPC__2392.LAB	12/16/2016	6:06:47 PM	-37.159373	41.787257	0.056814	138.931419	2.58101	-0.059841	1.051827	-0.007978	191	1.006601
SPC__2393.LAB	12/16/2016	6:07:50 PM	-37.025259	40.85858	0.058135	129.054759	2.549875	0.004293	0.980946	-0.001526	191.1	1.006524
SPC__2394.LAB	12/16/2016	6:08:52 PM	-36.204805	39.595985	0.059943	119.37887	2.540721	-0.019659	0.900913	-0.004753	191.6	1.006438
SPC__2395.LAB	12/16/2016	6:09:55 PM	-34.578453	38.331947	0.06058	110.974633	2.531809	-0.002728	0.85957	0.001376	191.9	1.00619
SPC__2396.LAB	12/16/2016	6:10:57 PM	-33.611139	37.229697	0.067637	103.288799	2.52836	-0.022944	0.720108	-0.005949	192	1.006197
SPC__2397.LAB	12/16/2016	6:12:00 PM	-32.008461	36.011912	0.058127	96.010703	2.501852	0.007312	0.75301	-0.00882	192	1.006538
SPC__2398.LAB	12/16/2016	6:13:02 PM	-31.985585	35.027903	0.058841	89.623414	2.469781	-0.031128	0.683286	-0.009927	191.7	1.006449
SPC__2399.LAB	12/16/2016	6:14:05 PM	-31.017289	33.992592	0.05871	83.735619	2.434971	-0.044875	0.594525	-0.012705	191.2	1.006176
SPC__2400.LAB	12/16/2016	6:15:08 PM	-30.862607	33.210754	0.064174	78.360011	2.402535	-0.047989	0.535492	-0.008709	190.8	1.006453
SPC__2401.LAB	12/16/2016	6:16:10 PM	-29.884238	32.305689	0.06106	73.322111	2.382549	-0.029685	0.504422	0.001801	190.7	1.006529
SPC__2402.LAB	12/16/2016	6:17:12 PM	-28.498435	31.49207	0.064221	68.489978	2.358194	-0.009782	0.49253	-0.006838	190.7	1.006148
SPC__2403.LAB	12/16/2016	6:18:15 PM	-27.306977	30.567114	0.061609	64.022746	2.332531	-0.043635	0.451195	-0.0015	190.7	1.006347
SPC__2404.LAB	12/16/2016	6:19:18 PM	-25.651994	29.625973	0.060551	60.167977	2.312404	-0.01493	0.398713	-0.003427	190.8	1.006037
SPC__2405.LAB	12/16/2016	6:20:28 PM	-22.862257	28.538321	0.066835	65.198284	2.281158	-0.041123	0.351742	0.05573	190.9	1.005937
SPC__2406.LAB	12/16/2016	6:21:31 PM	-20.156566	27.818978	0.079753	95.676514	2.258647	0.010331	0.593244	0.113893	191.2	1.006021
SPC__2407.LAB	12/16/2016	6:22:33 PM	-18.034748	26.780346	0.077623	89.243213	2.239265	-0.018014	0.53291	0.197474	191.1	1.006137

Vantage Specialty Chemicals
Clean Air Job No. 13157
Scrubber Stack

FTIR QA/QC

Spectrum	Date	Time	Ethylene oxide 150c	Propylene Oxide CAE_AM	CO2% (40) 191C	CO (500) 191C (1of2)	H2O% (40) 191C	HCl ppm (100) 191C	Ethylene (100,3000) 191C	SF6 (10) 191C	Temp (C)	Pressure (Atm)
SPC__2408.LAB	12/16/2016	6:23:36 PM	-15.776846	24.973865	0.070023	79.389055	2.200173	-0.061356	0.434771	0.447719	190.9	1.00578
SPC__2409.LAB	12/16/2016	6:24:38 PM	-14.271916	22.27431	0.06619	68.067225	2.038833	0.643047	0.160362	1.118594	190.8	1.006011
SPC__2410.LAB	12/16/2016	6:25:41 PM	-2.536883	21.21223	0.047731	58.391474	1.789551	3.208568	-0.08401	1.724549	190.8	1.006428
SPC__2411.LAB	12/16/2016	6:26:43 PM	13.323967	19.216642	0.038729	49.727805	1.538005	5.865087	-0.208065	2.22839	190.7	1.006401
SPC__2412.LAB	12/16/2016	6:27:46 PM	3.808201	14.103846	0.019075	21.802347	0.668417	40.870379	-0.357481	3.804636	190.9	0.996676
SPC__2413.LAB	12/16/2016	6:28:48 PM	1.722096	11.565756	-0.005367	5.310259	0.157922	77.618262	-0.858494	4.894745	191	0.991459
SPC__2414.LAB	12/16/2016	6:29:51 PM	0.700465	11.795014	0.001158	5.433657	0.133964	40.817294	-0.833727	4.849987	191	0.991199
SPC__2415.LAB	12/16/2016	6:30:53 PM	6.436647	18.388727	0.047236	26.002321	1.355997	24.173631	0.200064	0.665352	191	0.991492
SPC__2416.LAB	12/16/2016	6:31:56 PM	22.676413	12.037165	0.04804	22.934834	1.434155	8.972346	0.855878	0.472842	191	0.991208
SPC__2417.LAB	12/16/2016	6:32:59 PM	35.740936	3.774258	0.052001	6.812062	1.180569	7.938458	-0.114591	0.496937	190.9	0.991199
QA Dynamic Spike												
SPC__2418.LAB	12/16/2016	6:34:01 PM	36.096831	2.952806	0.053055	6.444737	1.102888	7.238328	-0.179938	0.49241	190.7	0.991144
SPC__2419.LAB	12/16/2016	6:35:04 PM	36.181099	2.330553	0.049226	6.161096	1.075057	7.145739	-0.162091	0.489289	190.7	0.991701
SPC__2420.LAB	12/16/2016	6:35:59 PM	34.128324	1.654988	0.037974	6.0657	0.920515	6.895175	-0.215972	0.482196	190.9	0.990988
SPC__2421.LAB	12/16/2016	6:36:15 PM	33.805424	1.617607	0.042281	5.979499	0.864821	7.152051	-0.114626	0.491377	191	0.990929
SPC__2422.LAB	12/16/2016	6:36:30 PM	32.679154	1.323414	0.043158	6.22652	0.838698	7.250178	-0.164568	0.490252	191.2	0.990894
SPC__2423.LAB	12/16/2016	6:36:46 PM	32.333136	1.360708	0.047974	6.123891	0.833884	7.240204	-0.174192	0.490926	191.3	0.991036
SPC__2424.LAB	12/16/2016	6:37:26 PM	35.04278	1.495298	0.048333	6.048063	0.942498	7.004449	-0.160032	0.470305	191.1	0.991079
SPC__2425.LAB	12/16/2016	6:37:41 PM	34.052422	1.385246	0.040936	6.166958	0.883179	6.729519	-0.177833	0.472753	191	0.991486
SPC__2426.LAB	12/16/2016	6:37:57 PM	31.407281	1.128461	0.04574	6.111052	0.798102	6.98111	-0.248844	0.486181	191	0.991144
SPC__2427.LAB	12/16/2016	6:38:13 PM	30.85973	1.311475	0.053424	6.091337	0.767008	7.467489	-0.152979	0.49024	191	0.991272
SPC__2428.LAB	12/16/2016	6:38:28 PM	29.216995	1.103482	0.037583	5.841419	0.722526	7.343079	-0.2044	0.484675	191	0.991636
SPC__2429.LAB	12/16/2016	6:38:44 PM	29.638264	1.216435	0.033881	6.09969	0.740204	7.744233	-0.165457	0.470553	191.1	0.991508
SPC__2430.LAB	12/16/2016	6:39:00 PM	32.18785	1.331261	0.043146	5.894509	0.818541	7.470923	-0.180278	0.474799	191.2	0.991208
SPC__2431.LAB	12/16/2016	6:39:15 PM	33.42949	1.249157	0.046259	6.088745	0.877167	7.218322	-0.219992	0.481506	191.3	0.990771
SPC__2432.LAB	12/16/2016	6:39:31 PM	33.779536	1.297697	0.026278	6.055837	0.881385	7.003594	-0.171506	0.490752	191.5	0.991229
SPC__2433.LAB	12/16/2016	6:39:47 PM	32.321086	0.98741	0.049318	5.751869	0.797173	6.869253	-0.252492	0.475561	191.6	0.990929
SPC__2434.LAB	12/16/2016	6:40:02 PM	30.417401	0.929486	0.040783	5.981639	0.739301	7.213657	-0.138867	0.473346	191.6	0.991186
SPC__2435.LAB	12/16/2016	6:40:18 PM	13.830233	5.495367	0.023894	6.988155	0.457123	14.086623	30.435627	1.309826	191.7	0.991679
SPC__2436.LAB	12/16/2016	6:40:33 PM	-0.87737	1.962955	-0.005566	5.274739	0.162022	10.374851	90.889653	0.178597	191.7	0.991615
SPC__2437.LAB	12/16/2016	6:40:49 PM	-3.461132	0.447388	0.001849	5.159691	0.097209	7.634004	98.783545	0.026335	191.8	0.991165
Post CTS System												
SPC__2438.LAB	12/16/2016	6:41:05 PM	-3.409139	-0.216613	0.009129	5.09688	0.078462	5.648036	99.698782	0.018638	191.8	0.991186
SPC__2439.LAB	12/16/2016	6:41:20 PM	-4.180968	-0.349466	0.007964	5.035642	0.069217	4.451259	99.824742	-0.012355	191.7	0.991229
SPC__2440.LAB	12/16/2016	6:41:36 PM	-4.374683	-0.540079	0.000097	5.116836	0.06886	3.61292	99.725026	-0.018891	191.6	0.991208
SPC__2441.LAB	12/16/2016	6:41:52 PM	-4.087958	-0.714165	-0.000855	5.111402	0.067871	3.051285	99.647034	0.00286	191.5	0.991144
SPC__2442.LAB	12/16/2016	6:42:07 PM	-4.077999	-0.73557	0.008697	5.195752	0.06034	2.736581	100.150344	-0.005663	191.4	0.990671
SPC__2443.LAB	12/16/2016	6:42:23 PM	-4.504437	-0.950487	-0.008052	5.161118	0.066336	2.398294	100.065718	-0.01044	191.3	0.990951
SPC__2444.LAB	12/16/2016	6:42:39 PM	-4.966826	-0.904115	-0.002081	5.159789	0.056277	2.108163	99.665468	-0.000272	191.2	0.990501
SPC__2445.LAB	12/16/2016	6:42:54 PM	-4.942324	-0.86635	0.003821	5.285154	0.052242	1.938899	99.643788	-0.000898	191.1	0.990672
SPC__2446.LAB	12/16/2016	6:43:10 PM	-4.87819	-0.999485	-0.003997	5.097588	0.056481	1.815387	99.665026	-0.015656	191	0.990972
SPC__2447.LAB	12/16/2016	6:43:25 PM	-4.990596	-0.629385	0.011358	5.07913	0.050195	1.697403	100.088695	0.006341	190.9	0.990972
SPC__2448.LAB	12/16/2016	6:43:41 PM	-4.97789	-0.891497	-0.002837	5.069376	0.049857	1.534522	100.327917	-0.012487	190.8	0.990501
SPC__2449.LAB	12/16/2016	6:43:57 PM	-5.034469	-1.004132	-0.010926	5.150704	0.057644	1.466016	100.037189	-0.000653	190.7	0.990844
SPC__2450.LAB	12/16/2016	6:44:12 PM	-4.901108	-1.027327	-0.001556	5.215389	0.051036	1.483304	99.995392	-0.00239	190.7	0.990737
SPC__2451.LAB	12/16/2016	6:44:28 PM	-5.030943	-1.002931	-0.007129	5.327802	0.048841	1.292624	100.057664	-0.014448	190.7	0.990629
SPC__2452.LAB	12/16/2016	6:44:44 PM	-4.593447	-1.060011	0.009785	5.078528	0.049691	1.2237	100.2208	-0.003618	190.6	0.990565
SPC__2453.LAB	12/16/2016	6:44:59 PM	-4.437318	-0.99238	0.002715	5.174583	0.058344	1.186943	96.987965	-0.023438	190.6	0.991208
SPC__2454.LAB	12/16/2016	6:45:15 PM	0.601929	-0.612842	0.881444	4.941267	0.158271	1.567476	41.754342	-0.033419	190.5	0.991722

MDL Data

Spectrum	Date	Time	Ethylene oxide 150c	Propylene Oxide CAE_AM	CO2% (40) 191C	CO (500) 191C (1of2)	CO% (1) 191C (2of2)	Acetaldehyde (1000) 191C	Formaldehyde (70) 191C	H2O% (40) 191C	MeOH (10) 191C	HCl ppm (100) 191C	Ethylene (100,3000) 191C	SF6 (10) 191C	Temp (C)	Pressure (Atm)
SPC__0962.LAB	12/15/2016	5:49:07 PM	0.177112	-0.01495	0.004663	0.019857	0.000075	-0.026357	-0.137556	0.007536	0.006477	0.029543	0.075979	0.002285	191.0366	1.012388
SPC__0963.LAB	12/15/2016	5:49:23 PM	0.192391	-0.12714	0.00155	0.103208	0.000036	0.047566	-0.077122	-0.0012	0.269063	-0.0069	0.070897	-0.00128	191.0383	1.0125
SPC__0964.LAB	12/15/2016	5:49:39 PM	0.514117	-0.09037	-0.01133	0.008722	-4.3E-05	0.178465	-0.119542	-0.00157	0.195333	-0.03056	0.111608	-0.01624	191.0532	1.0124
SPC__0965.LAB	12/15/2016	5:49:55 PM	0.132522	0.164419	-0.00595	-0.01802	-0.00012	-0.015671	-0.103283	0.000978	-0.13283	-0.03302	0.017505	0.001886	191.0587	1.012457
SPC__0966.LAB	12/15/2016	5:50:10 PM	0.237161	0.052756	0.00136	-0.14064	-5E-06	0.067062	-0.029133	-0.0022	-0.12727	-0.03749	0.00322	-0.00563	191.1604	1.012479
SPC__0967.LAB	12/15/2016	5:50:26 PM	0.380199	0.100248	-0.00941	0.064578	-8.5E-05	0.041985	0.044395	-0.00237	0.133465	-0.00988	-0.07327	-0.00521	191.1231	1.01236
SPC__0968.LAB	12/15/2016	5:50:41 PM	0.348381	-0.18026	-0.00057	-0.20101	0.000023	-0.192635	-0.132067	-0.00132	0.010633	-0.03755	0.049207	-0.00065	191.1469	1.012286
SPC__0969.LAB	12/15/2016	5:50:57 PM	0.077998	0.166898	-0.00779	0.233393	0.000005	-0.123874	-0.011602	-0.00267	0.018158	-0.02513	-0.0866	0.000522	191.1604	1.01235
SPC__0970.LAB	12/15/2016	5:51:13 PM	0.173213	0.029091	0.004663	0.021291	0.000004	-0.007037	-0.076403	-0.00035	0.046216	-0.06272	0.062475	-0.00686	191.1808	1.012286
SPC__0971.LAB	12/15/2016	5:51:28 PM	0.394599	0.045439	-0.01161	0.101075	-8.9E-05	0.197436	-0.133431	0.000467	0.024187	-0.03482	0.076539	0.018793	191.1536	1.012329
SPC__0972.LAB	12/15/2016	5:51:44 PM	0.018296	0.032287	0.012796	0.137618	-0.0001	-0.067265	-0.005878	0.004529	-0.30542	-0.06811	-0.01647	0.000757	191.1867	1.01238
		Std Dev	0.151023	0.112174												
		3x Std Dev	0.453068	0.336521												

PRAXAIR

Praxair Distribution, Inc.
6055 Brent Drive
Toledo, OH 43611
Tel: (419) 729-7732 Fax:(419) 729-2411
PGVP ID: F12016

DocNumber: 000016673

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR PKG HILLSIDE IL HS
12000 ROOSEVELT RD
HILLSIDE IL 60162

Praxair Order Number: 70088189
Customer P. O. Number:
Customer Reference Number:

Fill Date: 7/14/2016
Part Number: NI CD2O6E-AS
Lot Number: 0714GE16
Cylinder Style & Outlet: AS CGA 580
Cylinder Pressure & Volume: 2000 psig 140 cu ft

Certified Concentration:

Expiration Date:		7/27/2024	NIST Traceable
Cylinder Number:		CC254179	Analytical Uncertainty:
2.00	%	CARBON DIOXIDE	± 1.6 %
2.02	%	OXYGEN	± 0.6 %
	Balance	NITROGEN	

Certification Information: *Certification Date:* 7/27/2016 *Term:* 96 Months *Expiration Date:* 7/27/2024

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: 2.00 %
Certified Concentration: 2.00 %
Instrument Used: Horiba VA-3000
Analytical Method: NDIR
Last Multipoint Calibration: 7/23/2016

Reference Standard Type: GMIS
Ref. Std Cylinder #: CC340252
Ref. Std Conc: 7.01 %
Ref Std Traceable to SRM #: 1674b
SRM Sample #: 7-6-22
SRM Cylinder #: CAL017007

First Analysis Data: Date: 7/27/2016

Z:	0	R:	7.06	C:	2.01	Conc:	1.997
R:	7.05	Z:	0	C:	2.02	Conc:	2.007
Z:	0	C:	2	R:	7.06	Conc:	1.987

UOM: % Mean Test Assay: 1.997 %

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: 2.00 %
Certified Concentration: 2.02 %
Instrument Used: Servomex 575
Analytical Method: Paramagnetic
Last Multipoint Calibration: 7/23/2016

Reference Standard Type: GMIS
Ref Std Cylinder #: EB0023945
Ref Std Conc: 5.03%
Ref. Std Traceable to SRM #: 2658a
SRM Sample #: 72-D-38
SRM Cylinder #: CAL016952

First Analysis Data: Date: 7/27/2016

Z:	0	R:	5.03	C:	2.02	Conc:	2.02
R:	5.03	Z:	0	C:	2.02	Conc:	2.02
Z:	0	C:	2.02	R:	5.03	Conc:	2.02

UOM: % Mean Test Assay: 2.02 %

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: Mike Monnette

Certified by: Rolonda Kaywood

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.

PRAXAIR

Praxair Distribution, Inc.
6055 Brent Drive
Toledo, OH 43611
Tel: +1 (419) 729-7732
Fax: +1 (419) 729-2411

10/19/2016

PRAXAIR PKG HILLSIDE IL HS
12000 ROOSEVELT RD
HILLSIDE, IL 60162

Work Order No. **70124170**
Customer Reference No. **78120505**

Product Lot/Batch No. **700016286S1**
Product Part No. **NI HC100S1C-AS**

CERTIFICATE OF ANALYSIS
Certified Standard

Component	Requested Concentration	Certified Concentration	Analytical Principle	Analytical Accuracy
Hydrogen chloride	**100 ppm**	**99.9 ppm**	**V**	**± 2%**
Sulfur hexafluoride	**5.00 ppm**	**5.00 ppm**	**V**	**± 5%**
Nitrogen	**balance**	**balance**		

Analytical Instruments: **N/A**
Cylinder Style: **AS**
Cylinder Pressure @70F: **2000 psig**
Cylinder Volume: **145 ft3**
Valve Outlet Connection: **330**
Cylinder No(s): **CC96392**
Comments: **Values not valid below 150 psig.**

Filling Method: **Gravimetric**
Date of Fill: **10/12/2016**
Expiration Date: **10/12/2017**

QA Reviewer: **Rolonda Kaywood**

Approved Signer: **Tera Thomas**

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

Note All expressions for concentration (e g , % or ppm) are for gas phase, by volume (e g , ppmv) unless otherwise noted

Key to Analytical Techniques

A	Flame Ionization with Methanizer	B	Gas Chromatography with Discharge Ionization Detector	C	Gas Chromatography with Electrolytic Conductivity Detector	D	Gas Chromatography with Flame Ionization Detector
E	Gas Chromatography with Flame Photometric Detector	F	Gas Chromatography with Helium Ionization Detector	G	Gas Chromatography with Methanizer Carbonizer	H	Gas Chromatography with Photoionization Detector
I	Gas Chromatography with Reduction Gas Analyzer	J	Gas Chromatography with Thermal Conductivity Detector	K	Binary Gas Analyzer with Thermal Conductivity Detector	L	Infrared - FTIR or NDIR
M	Mass Spectrometry - MS or GC/MS	N	By Difference of Typical Impurities	O	Paramagnetic	P	Specific Water Analyzer
Q	Total Hydrocarbon Analyzer	R	Wet Chemical	S	Detector Tube	T	Odor
U	Chemiluminescence	V	Gravimetric	W	Electrolytic Cell/Electrochemical	X	UV Spectrometry
Y	Vendor Analysis						

IMPORTANT
The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information

Pg.1 of 1

Issue Date: **November 3, 2016**

To: CLEAN AIR INSTR. RENTAL
500 W WOOD ST.
PALATINE, IL 60067
Attn:

CERTIFICATE OF CONFORMANCE

Business Confidential

Dear Customer:

This is to advise that Nitrogen 4.8 Zero AS, supplied by Praxair Distribution, meets or exceeds the following minimum purity specification:

Nitrogen 4.8 Zero

Purity > 99.998%
Oxygen < 5 PPM
Water < 3 PPM
Total Hydrocarbons < 0.5 PPM

Cylinder(s) Shipped
CC28160, ALM015293, EB0003853, CC179289

Approved Signer

Alexis Easter
Operations Supervisor

Issue Date: **November 3, 2016**

To: CLEAN AIR INSTR. RENTAL
500 W WOOD ST.
PALATINE, IL 60067
Attn:

CERTIFICATE OF CONFORMANCE

Business Confidential

Dear Customer:

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Nitrogen 4.8 Zero

Purity > 99.998%
Oxygen < 5 PPM
Water < 3 PPM
Total Hydrocarbons < 0.5 PPM

Cylinder(s) Shipped
CC28160, ALM015293, EB0003853, CC179289

Approved Signer

Alexis Easter
Operations Supervisor

2

PRAXAIR

Praxair Distribution, Inc,
6055 Brent Drive
Toledo, OH 43611
Tel: (419) 729-7732 Fax:(419) 729-2411
PGVP ID: F12016

DocNumber: 000017649

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR PKG HILLSIDE IL HS
12000 ROOSEVELT RD
HILLSIDE IL 60162

Praxair Order Number: 70107924
Customer P. O. Number:
Customer Reference Number:

Fill Date: 9/2/2016
Part Number: NI CD10010E-AS
Lot Number: 0902FE16
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu ft

Certified Concentration:

Expiration Date:		9/13/2024	NIST Traceable
Cylinder Number:		EB0046626	Analytical Uncertainty:
9.89	%	CARBON DIOXIDE	± 0.3 %
9.94	%	OXYGEN	± 0.2 %
	Balance	NITROGEN	

Certifcation Information: *Certification Date:* 9/13/2016 *Term:* 96 Months *Expiration Date:* 9/13/2024

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 10.0 %
Certified Concentration 9.89 %
Instrument Used Horiba VA-3000
Analytical Method NDIR
Last Multipoint Calibration 8/23/2016

Reference Standard Type GMIS
Ref Std Cylinder # CC239069
Ref Std Conc 19.97%
Ref. Std Traceable to SRM # : 2745
SRM Sample # 9-C-03
SRM Cylinder # CAL016000

First Analysis Data:						Date:	9/13/2016
Z:	0	R:	19.97	C:	9.89	Conc:	9.89
R:	19.96	Z:	0	C:	9.9	Conc:	9.9
Z:	0	C:	9.89	R:	19.98	Conc:	9.89
UOM:	%			Mean Test Assay:			9.893 %

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 10.0 %
Certified Concentration 9.94 %
Instrument Used Servomex 575
Analytical Method Paramagnetic
Last Multipoint Calibration 8/23/2016

Reference Standard Type GMIS
Ref Std Cylinder # : CC231986
Ref Std Conc. 22.29
Ref Std Traceable to SRM # : 2659a
SRM Sample # 71-D-04
SRM Cylinder # CAL015785

First Analysis Data:						Date:	9/13/2016
Z:	0	R:	22.29	C:	9.94	Conc:	9.939
R:	22.29	Z:	0	C:	9.95	Conc:	9.949
Z:	0	C:	9.95	R:	22.3	Conc:	9.949
UOM:	%			Mean Test Assay:			9.945 %

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: Mike Monnette

Certified by: Rolonda Kaywood

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22016

DocNumber: 000097250

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PXPKG HILLSIDE IL P
12000 ROOSEVELT RD
HILLSIDE IL 60162

Praxair Order Number: 34583855
Customer P. O. Number: 72240610-799700
Customer Reference Number:

Fill Date: 7/15/2016
Part Number: NI CD2103E-AS
Lot Number: 109619706
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	7/22/2024	NIST Traceable
Cylinder Number:	CC431541	Analytical Uncertainty:
20.72 %	CARBON DIOXIDE	± 0.3 %
21.14 %	OXYGEN	± 0.2 %
Balance	NITROGEN	

Certification Information: *Certification Date:* 7/22/2016 *Term:* 96 Months *Expiration Date:* 7/22/2024

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.

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: 20.72 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 7/18/2016

First Analysis Data: Date: 7/22/2016

Z:	0	R:	20.02	C:	20.73	Conc:	20.706
R:	20.02	Z:	0	C:	20.74	Conc:	20.716
Z:	0	C:	20.75	R:	20.03	Conc:	20.726

Reference Standard Type: GMIS
Ref. Std. Cylinder #: CC243865
Ref. Std. Conc: 20.00%
Ref. Std. Traceable to SRM #: N/A
SRM Sample #: N/A
SRM Cylinder #: RGM#CC28033

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: 21.14 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 7/29/2016

First Analysis Data: Date: 7/22/2016

Z:	0	R:	20	C:	21.14	Conc:	21.129
R:	20.02	Z:	0	C:	21.16	Conc:	21.149
Z:	0	C:	21.16	R:	20.04	Conc:	21.149

UOM: % Mean Test Assay: 21.143 %

Ref. Std. Conc: 20.01 %
Ref. Std. Traceable to SRM #: 2659a
SRM Sample #: 71-E-19
SRM Cylinder #: FF22331

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: Maria Soberanis

Certified by: Ying Yu 11/1/20

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Praxair Distribution, Inc.
6055 Brent Drive
Toledo, OH 43611
Tel: +1 (419) 729-7732
Fax: +1 (419) 729-2411

10/19/2016

PRAXAIR PKG HILLSIDE IL HS
12000 ROOSEVELT RD
HILLSIDE, IL 60162

Work Order No. **70124170**
Customer Reference No. **78120505**

Product Lot/Batch No. **700016287S2**
Product Part No. **NI EY100P-AS**

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration	Certified Concentration	Analytical Principle	Analytical Accuracy
Ethylene	**100 ppm**	**101 ppm**	**V**	**± 1%**
Nitrogen	**balance**	**balance**		

Analytical Instruments: **California Analytical~300S-HFID~~**
Cylinder Style: **AS**
Cylinder Pressure @70F: **2000 psig**
Cylinder Volume: **145 ft3**
Valve Outlet Connection: **350**
Cylinder No(s): **EB0025772**
Comments: **Values not valid below 150 psig.**

Filling Method: **Gravimetric**
Date of Fill: **10/13/2016**
Expiration Date: **10/18/2021**

QA Reviewer: **Rolonda Kaywood**

Approved Signer: **Tera Thomas**

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

Note All expressions for concentration (e g , % or ppm) are for gas phase, by volume (e g , ppmv) unless otherwise noted

Key to Analytical Techniques.

A	Flame Ionization with Methanizer	B	Gas Chromatography with Discharge Ionization Detector	C	Gas Chromatography with Electrolytic Conductivity Detector	D	Gas Chromatography with Flame Ionization Detector
E	Gas Chromatography with Flame Photometric Detector	F	Gas Chromatography with Helium Ionization Detector	G	Gas Chromatography with Methanizer Carbonizer	H	Gas Chromatography with Photoionization Detector
I	Gas Chromatography with Reduction Gas Analyzer	J	Gas Chromatography with Thermal Conductivity Detector	K	Binary Gas Analyzer with Thermal Conductivity Detector	L	Infrared - FTIR or NDIR
M	Mass Spectrometry - MS or GC/MS	N	By Difference of Typical Impurities	O	Paramagnetic	P	Specific Water Analyzer
Q	Total Hydrocarbon Analyzer	R	Wet Chemical	S	Detector Tube	T	Odor
U	Chemiluminescence	V	Gravimetric	W	Electrolytic Cell/Electrochemical	X	UV Spectrometry
Y	Vendor Analysis						

IMPORTANT
The information contained herein has been prepared at your request by personnel within Praxair Distribution Inc While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user In no event shall liability of Praxair Distribution, Inc arising out of the use of the information contained herein exceed the fee established for providing such information

Pg.1 of 1

CERTIFICATE OF CALIBRATION

This certifies that your American 6" Gas Turbine Meter
Serial No. 91-52863
Has been calibrated with an ROOTS Model #5 Prover
Serial No. 81668

Rate of Flow	% Proof
10,000 CFH	**100.0 %**
6,000 CFH	**99.8 %**

Calibrated by Carl Poe Co., Inc.
4600 Allen Street Houston. Texas 77007
(713) 861-3816 * Fax: (713) 861-8299

August 12, 2016
Date

CleanAir.
This certification corresponds to CleanAir asset # 209270

Charles Cook
Signature

CleanAir.

CleanAir Instrument Rental
500 W. Wood Street
Palatine, IL 60067-4975
800-553-5511
www.cleanair.com

Pressure/Temperature Transducer Calibration

Asset # 209967

Pressure Transducer

% of Scale	Δ P Manometer	Δ P Transducer	Output Voltage
100	2.003	2.005	10.03
80	1.601	1.601	8.01
60	1.201	1.202	6.01
40	0.798	0.798	3.992
20	0.401	0.402	2.01
0	0.0005	0,000	0.001

Temperature Transducer

Temperature °F	Reading	Output Voltage
1000	1000	10.00
750	749	7.49
500	499	4.992
250	249	2.490
0	-1	-0.010

Certified by: Dillon Eaton

Date: 12/21/16

v1cg07/08

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APPENDIX E: RAW FTIR FIELD DATA

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Vantage Specialty Chemicals
Clean Air Job No. 13157
Scrubber Stack

Raw FTIR Data (5-min averages)

Time	Count of 5 Minute Intervals	Average of Ethylene oxide 150c	Average of Propylene Oxide C&E_AM	Average of CO2% (40) 191C	Average of CO (500) 191C (1of2)	Average of H2O% (40) 191C
12/15/16 18:05	5	155	14.1	0.0382	984.4619	1.7030
12/15/16 18:10	4	141	12.7	0.0455	699.9161	1.7985
12/15/16 18:15	6	132	12.6	0.0426	457.6203	1.8946
12/15/16 18:20	5	113	11.1	0.0477	282.9361	1.9942
12/15/16 18:25	4	113	11.0	0.0366	197.5877	1.9682
12/15/16 18:30	5	102	10.5	0.0364	236.0149	2.0444
12/15/16 18:35	5	107	9.3	0.0533	82.6200	2.0734
12/15/16 18:40	5	105	10.2	0.0533	58.1016	1.9981
12/15/16 18:45	5	100	10.9	0.0535	46.4128	1.9504
12/15/16 18:50	4	98	11.1	0.0524	36.0098	1.9373
12/15/16 18:55	5	100	11.0	0.0525	28.7165	2.0344
12/15/16 19:00	5	101	11.1	0.0510	23.0622	2.0870
12/15/16 19:05	5	93	10.4	0.0545	23.7752	2.1097
12/15/16 19:10	5	82	11.6	0.0379	1680.8864	2.0990
12/15/16 19:15	4	84	15.1	-0.0034	4150.0808	2.0334
12/15/16 19:20	5	84	14.9	0.0004	4058.2185	1.8491
12/15/16 19:25	5	86	16.9	0.0062	3374.3711	1.7101
12/15/16 19:30	5	84	15.7	0.0092	2330.6760	1.5567
12/15/16 19:35	4	91	14.3	0.0110	1519.3113	1.4847
12/15/16 19:40	5	93	12.3	0.0201	976.5035	1.3976
12/15/16 19:45	5	93	10.7	0.0338	581.6526	1.3181
12/15/16 19:50	5	85	9.6	0.0248	334.1643	1.2538
12/15/16 19:55	5	82	8.8	0.0293	222.1314	1.2195
12/15/16 20:00	4	82	8.3	0.0316	169.0729	1.1350
12/15/16 20:05	5	79	7.9	0.0347	126.8147	1.0742
12/15/16 20:10	5	73	7.8	0.0274	89.0242	1.0449
12/15/16 20:15	5	75	8.0	0.0316	64.8843	1.0577
12/15/16 20:20	5	77	8.4	0.0337	47.4315	1.1093
12/15/16 20:25	4	82	9.4	0.0379	37.2432	1.2088
12/15/16 20:30	5	85	10.7	0.0382	31.8628	1.3428
12/15/16 20:35	5	83	11.8	0.0358	27.9920	1.4856
12/15/16 20:40	5	75	13.6	0.0333	902.4601	1.6280
12/15/16 20:45	5	99	19.1	0.0187	3226.0825	1.7739
12/15/16 20:50	4	128	20.4	0.0233	3181.7465	1.8923
12/15/16 20:55	5	109	18.1	0.0230	2565.2453	1.9865
12/15/16 21:00	5	108	16.4	0.0289	1822.5726	2.0696
12/15/16 21:05	5	98	14.5	0.0348	1204.3402	2.1214
12/15/16 21:10	5	85	12.8	0.0343	876.6868	2.0446
12/15/16 21:15	4	80	12.1	0.0335	692.8613	1.9228
12/15/16 21:20	5	81	11.3	0.0390	400.9828	1.8381
12/15/16 21:25	5	83	11.8	0.0360	557.9077	1.7820
12/15/16 21:30	5	90	12.7	0.0370	650.7898	1.7679
12/15/16 21:35	5	85	12.5	0.0339	526.3450	1.9285
12/15/16 21:40	4	81	11.8	0.0422	295.9128	2.0129
12/15/16 21:45	5	75	11.2	0.0419	181.3001	2.0993
12/15/16 21:50	5	70	11.0	0.0411	138.6728	2.0891
12/15/16 21:55	5	63	11.1	0.0346	65.3923	2.1557
12/15/16 22:00	5	66	67.2	0.0313	24.7211	2.3381
12/15/16 22:05	4	60	141.6	0.0371	13.9562	2.4311
12/15/16 22:10	5	51	209.8	0.0436	10.6013	2.3022
12/15/16 22:15	5	43	232.1	0.0484	9.6794	2.1344
12/15/16 22:20	5	39	156.2	0.0484	8.8246	2.0179
12/15/16 22:25	5	38	99.8	0.0502	8.7028	2.0420
12/15/16 22:30	4	38	67.3	0.0535	8.6907	2.0663
12/15/16 22:35	5	35	47.4	0.0499	10.1619	1.9029
12/15/16 22:40	5	32	31.2	0.0464	9.5353	1.9422
12/15/16 22:45	5	24	20.8	0.0365	10.6029	1.9601
12/15/16 22:50	5	24	15.1	0.0380	10.0009	1.9049
12/15/16 22:55	4	24	13.6	0.0396	331.7794	1.9433
12/15/16 23:00	5	23	17.0	0.0060	2580.1502	2.3674
12/15/16 23:05	5	26	19.7	-0.0222	4128.5909	2.7905
12/15/16 23:10	5	23	24.3	-0.0391	4759.9302	2.9089
12/15/16 23:15	5	19	35.1	-0.0528	5897.2502	2.8292
12/15/16 23:20	4	18	32.0	-0.0153	4472.4229	2.5085
12/15/16 23:25	5	18	25.7	0.0184	2848.3636	2.3920
12/15/16 23:30	5	17	21.8	0.0323	1742.0086	2.3127
12/15/16 23:35	5	17	19.4	0.0378	1084.0618	2.3099
12/15/16 23:40	5	18	15.6	0.0499	641.4245	2.3512
12/15/16 23:45	4	17	13.5	0.0450	417.3902	2.4059
12/15/16 23:50	5	16	11.4	0.0534	242.6428	2.4491
12/15/16 23:55	5	18	11.2	0.0570	228.4587	2.3842
12/16/16 0:00	5	19	10.7	0.0555	209.6520	2.3268
12/16/16 0:05	4	18	11.2	0.0569	226.9395	2.2848
12/16/16 0:10	5	19	11.3	0.0585	222.6554	2.3544
12/16/16 0:15	5	20	11.4	0.0560	212.4486	2.4450
12/16/16 0:20	5	19	18.4	0.0606	646.7290	2.4747
12/16/16 0:25	5	18	17.0	0.0653	541.1156	2.4519
12/16/16 0:30	4	20	11.9	0.0633	220.6467	2.4806
12/16/16 0:35	5	23	10.0	0.0619	103.9401	2.4435
12/16/16 0:40	5	26	9.4	0.0557	54.5702	2.4379
12/16/16 0:45	5	29	9.8	0.0557	138.5350	2.4868
12/16/16 0:50	5	32	13.8	0.0366	762.0039	2.5742
12/16/16 0:55	4	33	13.3	0.0544	639.1353	2.5540
12/16/16 1:00	5	33	12.0	0.0515	468.4243	2.6165
12/16/16 1:05	5	32	10.7	0.0549	314.1402	2.5542
12/16/16 1:10	5	30	9.6	0.0525	208.3225	2.4661
12/16/16 1:15	5	28	9.3	0.0543	144.0351	2.4386
12/16/16 1:20	4	27	8.9	0.0568	100.2681	2.4796
12/16/16 1:25	5	27	8.5	0.0519	70.8572	2.4941
12/16/16 1:30	5	24	8.3	0.0404	47.5882	2.5241
12/16/16 1:35	5	26	8.1	0.0430	35.3543	2.5454
12/16/16 1:40	5	24	8.0	0.0386	26.4176	2.5393
12/16/16 1:45	4	23	7.9	0.0382	20.7859	2.5509
12/16/16 1:50	5	24	7.9	0.0459	17.2199	2.4751
12/16/16 1:55	5	22	7.8	0.0417	14.1251	2.4928
12/16/16 2:00	5	23	7.7	0.0425	12.4196	2.4753
12/16/16 2:05	5	22	15.5	0.0424	365.4219	2.4834
12/16/16 2:10	4	5	56.4	0.0303	681.0746	2.7731
12/16/16 2:15	5	-40	104.1	0.0311	442.8374	2.8818
12/16/16 2:20	5	-134	155.0	0.0399	222.0832	2.8037

Vantage Specialty Chemicals
Clean Air Job No. 13157
Scrubber Stack

Raw FTIR Data (5-min averages)

Time	Count of 5 Minute Intervals	Average of Ethylene oxide 150c	Average of Propylene Oxide CAE_AM	Average of CO2% (40) 191C	Average of CO (500) 191C (1of2)	Average of H2O% (40) 191C
12/16/16 2:25	5	-101	98.4	0.0435	129.1587	2.6582
12/16/16 2:30	5	-83	66.8	0.0452	82.4818	2.5259
12/16/16 2:35	4	-59	44.6	0.0432	57.2115	2.4653
12/16/16 2:40	5	-42	33.1	0.0437	41.3719	2.4052
12/16/16 2:45	5	-28	25.4	0.0475	29.9027	2.4308
12/16/16 2:50	5	-14	20.0	0.0478	22.2274	2.4428
12/16/16 2:55	5	-5	16.8	0.0501	17.1740	2.4333
12/16/16 3:00	4	2	15.0	0.0514	14.0773	2.4325
12/16/16 3:05	5	6	13.5	0.0500	12.0842	2.3932
12/16/16 3:10	5	11	12.3	0.0482	10.5542	2.4206
12/16/16 3:15	5	15	11.4	0.0486	9.7603	2.4807
12/16/16 3:20	5	18	10.7	0.0502	8.9233	2.4856
12/16/16 3:25	4	20	10.0	0.0499	8.4588	2.5077
12/16/16 3:30	5	21	9.6	0.0458	8.2148	2.5448
12/16/16 3:35	5	22	9.1	0.0460	7.9628	2.5015
12/16/16 3:40	5	24	8.6	0.0481	7.8732	2.4996
12/16/16 3:45	5	24	8.2	0.0504	7.9344	2.4418
12/16/16 3:50	4	24	8.1	0.0522	8.0868	2.4459
12/16/16 3:55	5	26	8.0	0.0502	9.7566	2.5086
12/16/16 4:00	5	27	8.1	0.0500	9.4623	2.5531
12/16/16 4:05	5	27	8.5	0.0451	9.7672	2.4815
12/16/16 4:10	4	26	8.4	0.0422	9.0366	2.4350
12/16/16 4:15	5	28	8.2	0.0468	8.8240	2.5301
12/16/16 4:20	5	32	8.3	0.0436	8.4197	2.7461
12/16/16 4:25	5	34	8.3	0.0457	9.1859	2.9311
12/16/16 4:30	5	33	8.8	0.0388	9.6548	3.1117
12/16/16 4:35	4	34	9.0	0.0373	9.0943	3.2752
12/16/16 4:40	5	35	9.1	0.0427	8.5081	3.2908
12/16/16 4:45	5	36	9.4	0.0522	8.4159	3.1458
12/16/16 4:50	5	35	9.4	0.0520	8.6164	2.9442
12/16/16 4:55	5	34	9.4	0.0516	8.8419	2.8455
12/16/16 5:00	4	33	9.4	0.0525	8.9440	2.8278
12/16/16 5:05	5	33	9.1	0.0519	9.0569	2.8117
12/16/16 5:10	5	34	8.7	0.0547	9.1252	2.7283
12/16/16 5:15	5	34	8.8	0.0511	9.2242	2.7793
12/16/16 5:20	5	35	8.6	0.0548	9.3104	2.9276
12/16/16 5:25	4	35	8.5	0.0540	9.4034	2.8486
12/16/16 5:30	5	35	8.4	0.0564	9.8921	2.7694
12/16/16 5:35	5	36	8.8	0.0561	10.5740	2.7441
12/16/16 5:40	5	35	9.0	0.0532	10.5539	2.7397
12/16/16 5:45	5	36	9.4	0.0523	10.2727	2.7405
12/16/16 5:50	4	35	9.6	0.0536	10.1558	2.7901
12/16/16 5:55	5	35	9.6	0.0550	10.0544	2.7963
12/16/16 6:00	5	36	9.9	0.0533	10.0270	2.6984
12/16/16 6:05	5	36	10.1	0.0564	10.0605	2.6757
12/16/16 6:10	5	35	10.3	0.0545	10.0828	2.6846
12/16/16 6:15	4	35	10.6	0.0556	10.0711	2.6809
12/16/16 6:20	5	36	10.7	0.0569	10.1115	2.7270
12/16/16 6:25	5	37	10.8	0.0540	10.1289	2.7643
12/16/16 6:30	5	37	10.9	0.0567	10.1865	2.7423
12/16/16 6:35	5	37	11.0	0.0569	10.2351	2.7323
12/16/16 6:40	4	37	11.1	0.0559	10.3126	2.7149
12/16/16 6:45	5	37	11.2	0.0570	10.3419	2.7201
12/16/16 6:50	5	37	11.3	0.0563	10.3823	2.7167
12/16/16 6:55	5	37	11.4	0.0563	10.4453	2.6811
12/16/16 7:00	5	37	11.2	0.0565	10.5185	2.6931
12/16/16 7:05	4	37	11.3	0.0517	10.6881	2.6625
12/16/16 7:10	5	35	11.4	0.0475	10.6910	2.6282
12/16/16 7:15	5	36	11.3	0.0528	10.6049	2.6170
12/16/16 7:20	5	36	11.1	0.0531	10.4459	2.5857
12/16/16 7:25	5	36	11.0	0.0571	10.3224	2.5718
12/16/16 7:30	4	35	10.9	0.0570	10.3047	2.5430
12/16/16 7:35	5	34	11.1	0.0555	10.3304	2.5534
12/16/16 7:40	5	34	11.1	0.0527	10.3535	2.5826
12/16/16 7:45	5	34	11.4	0.0554	10.4782	2.5981
12/16/16 7:50	5	34	11.3	0.0570	10.2400	2.6319
12/16/16 7:55	4	33	11.0	0.0537	9.8681	2.6037
12/16/16 8:00	5	33	10.7	0.0591	9.8451	2.5496
12/16/16 8:05	5	32	10.3	0.0577	10.0135	2.4713
12/16/16 8:10	5	30	10.9	0.0559	310.9486	2.5354
12/16/16 8:15	5	26	11.3	0.0441	867.1472	2.6148
12/16/16 8:20	4	29	10.8	0.0491	669.1378	2.6228
12/16/16 8:25	5	31	10.4	0.0533	405.8767	2.5791
12/16/16 8:30	5	30	10.1	0.0612	241.8699	2.5138
12/16/16 8:35	5	29	9.9	0.0556	149.6414	2.4342
12/16/16 8:40	5	28	9.8	0.0629	96.3956	2.4181
12/16/16 8:45	4	29	9.7	0.0615	66.8623	2.4355
12/16/16 8:50	5	28	9.4	0.0629	53.6206	2.3928
12/16/16 8:55	5	27	9.5	0.0561	42.2476	2.4660
12/16/16 9:00	5	27	8.7	0.0548	12.6159	2.6680
12/16/16 9:05	4	28	8.4	0.0601	5.5815	2.6597
12/16/16 9:10	5	25	7.7	0.0570	5.4983	2.5020
12/16/16 9:15	5	24	7.1	0.0581	5.4133	2.4295
12/16/16 9:20	5	19	8.7	0.0397	5.5658	2.4043
12/16/16 9:25	5	22	10.7	0.0405	6.3272	2.4285
12/16/16 9:30	4	20	26.1	0.0375	178.3390	2.4335
12/16/16 9:35	5	4	94.1	0.0373	555.3080	2.8191
12/16/16 9:40	5	-127	259.6	0.0276	396.1358	2.8155
12/16/16 9:45	5	-183	236.3	0.0514	147.1274	2.7641
12/16/16 9:50	5	-160	155.0	0.0327	82.4716	2.5860
12/16/16 9:55	4	-111	93.6	0.0519	63.4092	2.5170
12/16/16 10:00	5	-90	63.4	0.0567	48.9651	2.5355
12/16/16 10:05	5	-64	43.1	0.0584	33.1281	2.4517
12/16/16 10:10	5	-46	31.4	0.0596	22.8309	2.4718
12/16/16 10:15	5	-24	22.6	0.0596	16.6251	2.5522
12/16/16 10:20	4	-19	19.5	0.0574	13.2181	2.4725
12/16/16 10:25	5	-8	16.2	0.0609	10.6807	2.5736
12/16/16 10:30	5	1	13.2	0.0586	8.8651	2.5285
12/16/16 10:35	5	6	11.8	0.0609	7.6436	2.5820
12/16/16 10:40	5	12	10.6	0.0628	6.9553	2.6250

Vantage Specialty Chemicals
Clean Air Job No. 13157
Scrubber Stack

Raw FTIR Data (5-min averages)

Time	Count of 5 Minute Intervals	Average of Ethylene oxide 150c	Average of Propylene Oxide CAE_AM	Average of CO2% (40) 191C	Average of CO (500) 191C (1of2)	Average of H2O% (40) 191C
12/16/16 10:45	4	14	9.8	0.0603	6.4479	2.5982
12/16/16 10:50	5	18	8.8	0.0599	6.1591	2.6742
12/16/16 10:55	5	21	8.4	0.0595	5.9084	2.6959
12/16/16 11:00	5	19	10.6	0.0586	5.7034	2.5802
12/16/16 11:05	5	22	10.0	0.0512	5.5085	2.5608
12/16/16 11:10	4	22	9.5	0.0505	5.6393	2.5549
12/16/16 11:15	5	22	8.6	0.0524	5.6840	2.4822
12/16/16 11:20	5	23	7.9	0.0521	5.8766	2.4805
12/16/16 11:25	5	24	7.1	0.0497	5.8075	2.4427
12/16/16 11:30	5	29	6.9	0.0535	5.7180	2.3692
12/16/16 11:35	4	23	6.7	0.0510	5.6678	2.3353
12/16/16 11:40	5	24	6.4	0.0513	6.1779	2.3425
12/16/16 11:45	5	24	6.0	0.0542	7.2206	2.2928
12/16/16 11:50	5	23	6.1	0.0508	7.3543	2.2920
12/16/16 11:55	5	25	6.0	0.0511	7.1568	2.3628
12/16/16 12:00	4	26	5.9	0.0506	6.8190	2.4583
12/16/16 12:05	5	27	8.0	0.0515	22.1841	2.5142
12/16/16 12:10	5	16	17.3	0.0529	31.1935	2.5076
12/16/16 12:15	5	5	16.7	0.0542	23.1731	2.4517
12/16/16 12:20	5	15	12.6	0.0506	17.5492	2.4249
12/16/16 12:25	4	12	11.9	0.0513	14.1131	2.4900
12/16/16 12:30	5	21	10.3	0.0551	11.6825	2.6703
12/16/16 12:35	5	24	8.8	0.0548	9.7272	2.7399
12/16/16 12:40	5	26	7.6	0.0541	8.4767	2.6826
12/16/16 12:45	5	27	7.4	0.0533	7.7627	2.7086
12/16/16 12:50	4	28	7.2	0.0548	7.3414	2.7552
12/16/16 12:55	5	29	6.8	0.0554	6.9467	2.8145
12/16/16 13:00	5	29	6.3	0.0526	6.7145	2.7037
12/16/16 13:05	5	27	6.0	0.0532	6.5320	2.5818
12/16/16 13:10	5	28	5.9	0.0507	6.4853	2.6239
12/16/16 13:15	4	29	6.7	0.0544	6.5101	2.7130
12/16/16 13:20	5	259	13.8	0.0552	6.4316	2.8651
12/16/16 13:25	5	251	33.2	0.0524	9.4377	2.7579
12/16/16 13:30	5	205	11.7	0.0538	14.0128	2.5725
12/16/16 13:35	5	187	11.3	0.0544	17.3166	2.7311
12/16/16 13:40	4	164	10.3	0.0564	17.5901	2.7370
12/16/16 13:45	5	144	9.2	0.0540	14.7316	2.6067
12/16/16 13:50	5	124	8.4	0.0536	12.4868	2.7152
12/16/16 13:55	5	134	8.2	0.0543	10.9193	2.6389
12/16/16 14:00	5	756	25.8	0.0751	8.6660	2.4617
12/16/16 14:05	4	799	26.7	0.0701	17.1482	2.3824
12/16/16 14:10	5	1,078	35.3	0.0534	16.4532	2.4212
12/16/16 14:15	5	916	30.9	0.0806	16.7447	2.5492
12/16/16 14:20	5	874	29.7	0.0778	13.2501	2.4730
12/16/16 14:25	5	856	29.4	0.0787	11.7270	2.5785
12/16/16 14:30	4	814	28.9	0.0742	10.5734	2.7303
12/16/16 14:35	5	703	24.6	0.0715	9.2000	2.6423
12/16/16 14:40	5	628	22.0	0.0682	8.1234	2.5669
12/16/16 14:45	5	542	19.7	0.0633	7.3337	2.5771
12/16/16 14:50	5	463	17.2	0.0555	7.1332	2.4704
12/16/16 14:55	4	413	16.0	0.0514	6.9031	2.3336
12/16/16 15:00	5	368	14.2	0.0579	6.7486	2.2660
12/16/16 15:05	5	329	12.7	0.0599	6.6232	2.1794
12/16/16 15:10	5	331	13.1	0.0568	7.0883	2.1620
12/16/16 15:15	5	339	14.3	0.0526	7.5387	2.2687
12/16/16 15:20	4	313	14.0	0.0570	6.6641	2.5309
12/16/16 15:25	5	432	21.0	0.0643	6.5869	2.5971
12/16/16 15:30	5	293	17.8	0.0483	8.5935	2.6347
12/16/16 15:35	5	292	17.1	0.0486	6.6038	2.5110
12/16/16 15:40	5	235	14.5	0.0597	6.5481	2.5773
12/16/16 15:45	4	207	13.0	0.0642	6.4672	2.5420
12/16/16 15:50	5	189	12.7	0.0644	7.1286	2.4752
12/16/16 15:55	5	166	12.1	0.0644	6.4609	2.4824
12/16/16 16:00	5	139	11.0	0.0644	6.4293	2.4883
12/16/16 16:05	5	119	10.1	0.0621	6.3135	2.4808
12/16/16 16:10	4	107	10.2	0.1262	40.5033	2.5909
12/16/16 16:15	5	94	11.2	0.2471	122.9237	2.9819
12/16/16 16:20	5	84	10.7	0.1253	39.4743	3.2000
12/16/16 16:25	5	72	11.1	0.1008	17.5986	2.9427
12/16/16 16:30	5	64	10.4	0.0850	13.7963	2.7155
12/16/16 16:35	4	47	17.5	0.1836	76.9847	2.8916
12/16/16 16:40	5	32	23.2	0.1487	46.9317	2.9493
12/16/16 16:45	5	26	23.0	0.1023	19.6139	2.8890
12/16/16 16:50	5	30	18.4	0.0845	13.2068	2.7129
12/16/16 16:55	4	32	16.9	0.0781	11.3994	2.7070
12/16/16 17:00	5	32	15.0	0.0751	10.4142	2.6711
12/16/16 17:05	5	33	13.7	0.0746	10.8172	2.6422
12/16/16 17:10	5	33	12.3	0.0714	10.0322	2.5893
12/16/16 17:15	5	33	11.8	0.0700	9.7863	2.6097
12/16/16 17:20	4	32	11.5	0.0671	9.6821	2.6372
12/16/16 17:25	5	32	11.6	0.0635	9.9142	2.6279
12/16/16 17:30	5	36	12.6	0.0663	11.7595	2.6489
12/16/16 17:35	5	38	12.9	0.0651	12.6864	2.6696
12/16/16 17:40	5	38	12.8	0.0660	13.3248	2.6459
12/16/16 17:45	4	37	13.4	0.0647	39.4745	2.6169
12/16/16 17:50	5	34	23.7	0.0592	120.2769	2.6605
12/16/16 17:55	5	16	38.4	0.0569	230.5860	2.7117
12/16/16 18:00	5	-14	43.4	0.0537	206.4972	2.7168
12/16/17 18:05	5	-29	48.5	0.0555	174.0495	2.6301

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APPENDIX F: RAW TEMPERATURE, VELOCITY PRESSURE & O_2 CONCENTRATION FIELD DATA

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Vantage Specialty Chemicals
CleanAir Project No. 13157
Gurnee, IL
Stack Exhaust

Dec 15 & 16, 2016
Start Time 18:05
Stop time 18:05

REFERENCE METHOD RUN 1

		Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
Calibration Checks				
C_{oi}	Initial zero	2.034		
C_{ui}	Initial upscale	9.714		
C_{of}	Final zero	1.925		
C_{uf}	Final upscale	9.516		
C_{ma}	Actual gas value	9.940		
Analyzer Averages (concentrations)				
C_{Avg}	Average conc.	14.910	0.212	62.968
C_{Gas}	Bias adjusted	16.832		

Clock Time (at end of sample period)

012617 112533

18:06	17.492	0.164	61.825
18:07	18.587	0.165	62.287
18:08	18.868	0.164	62.315
18:09	18.946	0.163	61.902
18:10	18.992	0.165	61.403
18:11	18.988	0.165	61.067
18:12	18.884	0.165	60.891
18:13	18.812	0.165	60.987
18:14	18.838	0.166	60.869
18:15	18.760	0.167	60.784
18:16	18.553	0.168	60.983
18:17	17.980	0.169	60.965
18:18	17.126	0.167	61.459
18:19	16.234	0.167	61.452
18:20	15.610	0.165	60.970
18:21	15.251	0.165	61.056
18:22	15.000	0.164	60.797
18:23	14.809	0.167	60.929
18:24	14.870	0.168	61.003
18:25	14.121	0.172	60.625
18:26	13.044	0.174	60.617
18:27	12.059	0.171	61.468
18:28	10.636	0.166	61.911
18:29	9.321	0.192	62.210
18:30	9.083	0.251	62.714
18:31	10.381	0.264	62.441
18:32	11.157	0.207	61.706
18:33	11.810	0.158	59.730
18:34	13.619	0.157	58.776
18:35	16.689	0.159	57.768
18:36	17.866	0.160	57.768
18:37	18.226	0.161	57.655
18:38	18.410	0.161	58.06715
18:39	18.546	0.162	58.3007
18:40	18.965	0.164	59.036
18:41	18.995	0.165	59.615
18:42	18.974	0.164	60.033
18:43	18.983	0.163	60.631
18:44	19.015	0.167	61.103
18:45	19.043	0.164	60.863
18:46	19.085	0.166	60.455
18:47	19.148	0.166	60.355
18:48	19.202	0.168	60.337
18:49	19.258	0.164	60.081
18:50	19.325	0.166	60.184
18:51	19.379	0.168	61.285
18:52	19.428	0.166	61.797
18:53	19.465	0.167	61.715
18:54	19.515	0.169	61.6703667

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
18:55	19.576	0.167	61.3724333
18:56	19.620	0.169	61.26375
18:57	19.659	0.167	61.532
18:58	19.693	0.165	62.148
18:59	19.717	0.165	62.739
19:00	19.748	0.163	62.609
19:01	19.765	0.162	61.944
19:02	19.794	0.166	61.600
19:03	19.813	0.165	61.734
19:04	19.820	0.163	61.008
19:05	19.833	0.171	60.473
19:06	19.869	0.166	61.153
19:07	19.879	0.168	60.734
19:08	19.910	0.169	59.7868167
19:09	19.911	0.281	59.042
19:10	19.903	0.306	58.768
19:11	19.936	0.165	57.411
19:12	19.900	0.134	56.071
19:13	19.808	0.117	54.974
19:14	19.225	0.120	54.10865
19:15	17.948	0.129	53.291
19:16	16.744	0.145	52.954
19:17	16.111	0.159	52.765
19:18	15.944	0.165	52.259
19:19	16.044	0.163	51.672
19:20	16.295	0.170	51.257
19:21	16.548	0.196	51.443
19:22	16.674	0.166	51.244
19:23	16.730	0.168	51.127
19:24	16.762	0.188	50.732
19:25	16.899	0.196	50.251
19:26	16.866	0.159	49.718
19:27	16.361	0.175	49.280
19:28	15.639	0.212	49.474
19:29	15.004	0.163	49.059
19:30	14.545	0.151	48.387
19:31	14.034	0.167	47.614
19:32	13.163	0.171	47.707
19:33	12.069	0.150	47.403
19:34	10.882	0.154	47.005
19:35	9.777	0.178	46.810
19:36	8.925	0.165	46.615
19:37	8.408	0.153	46.340
19:38	8.234	0.158	45.790
19:39	8.354	0.147	45.442
19:40	8.717	0.147	44.565
19:41	9.248	0.150	43.891
19:42	9.890	0.152	43.728
19:43	10.669	0.154	43.728
19:44	11.582	0.153	43.591
19:45	12.514	0.154	43.171
19:46	13.421	0.173	43.072
19:47	14.270	0.163	43.162
19:48	15.002	0.153	42.979
19:49	15.574	0.148	42.634
19:50	15.571	0.148	41.886
19:51	14.838	0.150	41.408
19:52	13.687	0.151	41.338
19:53	12.474	0.150	41.426
19:54	11.455	0.152	41.202
19:55	10.710	0.155	41.092
19:56	10.234	0.155	41.479
19:57	10.064	0.153	41.521
19:58	10.151	0.150	41.166
19:59	10.446	0.155	40.913
20:00	10.864	0.155	40.935
20:01	11.386	0.157	40.974
20:02	12.070	0.158	41.212
20:03	12.870	0.161	41.389

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
20:04	13.697	0.168	41.623
20:05	14.467	0.174	41.630
20:06	15.147	0.164	41.727
20:07	15.747	0.155	41.619
20:08	16.048	0.157	41.386
20:09	15.585	0.213	41.773
20:10	14.483	0.153	42.133
20:11	13.141	0.157	41.680
20:12	11.903	0.161	41.689
20:13	10.897	0.164	42.059
20:14	10.212	0.164	42.453
20:15	9.831	0.163	43.036
20:16	9.693	0.163	43.933
20:17	9.741	0.164	44.744
20:18	9.952	0.164	45.570
20:19	10.264	0.162	46.013
20:20	10.623	0.162	45.953
20:21	11.003	0.162	45.931
20:22	11.386	0.165	45.762
20:23	11.745	0.170	46.212
20:24	12.093	0.169	47.090
20:25	12.419	0.166	48.483
20:26	12.708	0.164	49.988
20:27	12.969	0.162	50.967
20:28	13.186	0.165	51.709
20:29	13.410	0.168	52.645
20:30	13.656	0.166	53.159
20:31	13.939	0.163	53.660
20:32	14.019	0.164	53.976
20:33	13.696	0.165	54.478
20:34	13.131	0.166	55.315
20:35	12.564	0.166	56.279
20:36	12.080	0.165	56.878
20:37	11.747	0.168	57.293
20:38	11.563	0.166	57.193
20:39	11.495	0.279	57.768
20:40	11.533	0.208	58.922
20:41	11.683	0.166	57.498
20:42	11.973	0.167	57.397
20:43	12.267	0.169	57.751
20:44	12.543	0.167	58.285
20:45	12.798	0.168	58.740
20:46	13.032	0.169	59.016
20:47	13.246	0.169	59.676
20:48	13.439	0.169	59.939
20:49	13.753	0.169	59.788
20:50	14.002	0.168	59.884
20:51	14.213	0.168	60.160
20:52	14.368	0.170	60.389
20:53	14.450	0.169	60.566
20:54	14.519	0.169	60.191
20:55	14.576	0.169	60.541
20:56	14.608	0.163	60.515
20:57	14.653	0.163	59.558
20:58	14.681	0.165	59.360
20:59	14.697	0.165	59.899
21:00	14.698	0.168	59.333
21:01	14.725	0.167	59.322
21:02	14.749	0.167	59.618
21:03	14.773	0.164	59.542
21:04	14.804	0.164	59.061
21:05	14.839	0.163	58.378
21:06	14.860	0.164	58.186
21:07	14.878	0.163	58.076
21:08	14.888	0.164	57.427
21:09	14.903	0.164	56.885
21:10	14.966	0.213	56.341
21:11	15.041	0.197	56.562
21:12	15.173	0.217	55.985

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
21:13	15.262	0.238	56.415
21:14	15.294	0.172	55.890
21:15	15.239	0.163	55.233
21:16	15.109	0.162	55.439
21:17	14.978	0.161	54.835
21:18	14.876	0.160	53.845
21:19	14.793	0.159	53.125
21:20	14.724	0.160	52.600
21:21	14.692	0.162	52.369
21:22	14.678	0.549	53.858
21:23	14.655	0.368	57.311
21:24	14.634	0.158	55.647
21:25	14.488	0.202	54.958
21:26	14.118	0.727	59.234
21:27	13.779	0.227	60.580
21:28	13.555	0.161	58.718
21:29	13.147	0.260	58.195
21:30	12.605	0.674	62.476
21:31	12.305	0.213	63.276
21:32	12.246	0.162	61.136
21:33	11.996	0.338	60.693
21:34	11.691	0.246	62.484
21:35	11.653	0.163	60.490
21:36	11.770	0.164	59.670
21:37	11.785	0.165	59.778
21:38	11.840	0.165	60.055
21:39	12.034	0.163	60.510
21:40	12.280	0.162	60.075
21:41	12.564	0.164	59.503
21:42	12.829	0.165	59.424
21:43	13.085	0.165	59.622
21:44	13.309	0.164	59.500
21:45	13.506	0.163	59.002
21:46	13.677	0.164	58.533
21:47	13.827	0.162	58.238
21:48	13.980	0.166	57.998
21:49	14.099	0.166	58.262
21:50	14.192	0.344	59.141
21:51	14.299	0.702	63.320
21:52	14.386	1.231	64.986
21:53	14.399	1.181	66.896
21:54	14.089	0.676	65.273
21:55	13.297	0.582	64.443
21:56	12.190	0.518	64.037
21:57	11.230	0.469	63.263
21:58	10.495	0.516	63.216
21:59	9.946	1.080	66.044
22:00	9.580	0.845	67.330
22:01	9.255	0.643	66.168
22:02	8.739	0.340	64.513
22:03	8.237	0.271	62.792
22:04	7.948	0.253	62.204
22:05	7.914	0.237	61.517
22:06	8.188	0.223	60.947
22:07	8.621	0.202	60.254
22:08	9.123	0.158	59.475
22:09	9.632	0.158	58.593
22:10	10.119	0.157	57.903
22:11	10.601	0.155	57.160
22:12	11.020	0.155	56.536
22:13	11.289	0.155	56.326
22:14	11.458	0.153	56.439
22:15	11.623	0.153	56.142
22:16	11.836	0.153	56.006
22:17	12.151	0.154	55.795
22:18	12.642	0.153	55.657
22:19	13.288	0.154	55.334
22:20	14.001	0.154	55.420
22:21	14.694	0.150	54.841

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
22:22	15.355	0.150	53.830
22:23	15.951	0.154	53.196
22:24	16.449	0.154	53.105
22:25	16.885	0.153	53.154
22:26	17.256	0.156	53.406
22:27	17.578	0.155	53.816
22:28	17.844	0.154	54.100
22:29	18.089	0.153	53.811
22:30	18.302	0.155	54.122
22:31	18.452	0.155	54.433
22:32	18.564	0.157	54.523
22:33	18.684	0.156	54.982
22:34	18.788	0.154	55.174
22:35	18.892	0.564	57.079
22:36	18.963	0.759	61.885
22:37	19.038	0.403	61.836
22:38	18.965	0.149	58.778
22:39	18.347	0.155	57.089
22:40	17.403	0.151	56.221
22:41	16.665	0.154	55.435
22:42	16.394	0.163	55.993
22:43	16.403	0.168	56.109
22:44	16.579	0.159	55.610
22:45	16.783	0.153	55.249
22:46	16.500	0.153	55.278
22:47	15.372	0.153	55.480
22:48	13.886	0.154	55.118
22:49	12.458	0.153	54.912
22:50	11.374	0.152	54.416
22:51	10.732	0.151	54.311
22:52	10.481	0.151	54.590
22:53	10.551	0.153	54.472
22:54	10.953	0.431	55.179
22:55	11.740	1.106	63.920
22:56	12.731	1.013	68.418
22:57	13.585	0.966	70.143
22:58	13.659	0.939	71.110
22:59	13.063	0.895	70.763
23:00	12.238	0.854	70.189
23:01	11.306	0.808	70.042
23:02	10.390	0.601	68.977
23:03	9.626	0.326	67.095
23:04	9.070	0.156	63.895
23:05	8.814	0.170	61.789
23:06	8.923	0.160	60.989
23:07	9.452	0.151	60.096
23:08	9.893	0.151	59.038
23:09	9.546	0.151	59.033
23:10	8.842	0.153	59.039
23:11	8.178	0.155	59.377
23:12	7.832	0.156	59.930
23:13	7.821	0.155	60.332
23:14	8.024	0.155	60.365
23:15	8.309	0.156	60.216
23:16	8.576	0.156	60.412
23:17	8.878	0.157	60.713
23:18	9.263	0.157	60.963
23:19	9.725	0.158	60.661
23:20	10.253	0.158	60.383
23:21	10.791	0.157	60.067
23:22	11.333	0.157	59.890
23:23	11.867	0.156	59.980
23:24	12.387	0.157	59.894
23:25	12.894	0.155	59.994
23:26	13.380	0.157	59.948
23:27	13.834	0.157	60.267
23:28	14.278	0.158	60.098
23:29	14.668	0.159	60.657
23:30	14.981	0.159	61.348
23:31	15.248	0.158	61.402
23:32	15.398	0.158	61.607
23:33	15.542	0.158	61.559
23:34	15.640	0.158	61.794
23:35	15.724	0.158	61.992

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
23:36	15.820	0.158	62.552
23:37	15.880	0.159	62.639
23:38	15.937	0.155	62.508
23:39	16.005	0.156	62.502
23:40	16.101	0.156	62.484
23:41	16.255	0.156	62.251
23:42	16.489	0.157	61.660
23:43	16.821	0.156	61.538
23:44	17.189	0.166	61.568
23:45	17.562	0.162	62.190
23:46	17.877	0.158	61.700
23:47	18.058	0.160	61.291
23:48	17.520	0.163	61.453
23:49	16.355	0.160	61.148
23:50	15.119	0.160	61.312
23:51	14.115	0.159	61.812
23:52	13.414	0.158	61.545
23:53	13.086	0.157	61.179
23:54	13.051	0.158	60.543
23:55	13.250	0.158	60.072
23:56	13.593	0.159	59.953
23:57	14.079	0.158	60.177
23:58	14.585	0.156	60.185
23:59	15.163	0.159	60.153
00:00	15.766	0.159	61.046
00:01	16.354	0.160	61.530
00:02	16.960	0.159	61.058
00:03	17.459	0.159	60.581
00:04	17.892	0.163	60.593
00:05	18.227	0.163	60.616
00:06	18.531	0.161	61.433
00:07	18.777	0.159	61.642
00:08	19.008	0.158	61.589
00:09	19.140	0.159	61.784
00:10	19.265	0.159	61.758
00:11	19.365	0.166	61.356
00:12	19.463	0.163	61.546
00:13	19.523	0.163	61.551
00:14	19.583	0.163	61.787
00:15	19.620	0.162	62.276
00:16	19.581	0.160	62.998
00:17	19.422	0.160	63.690
00:18	19.260	0.163	63.655
00:19	19.147	0.162	63.591
00:20	19.100	0.171	63.827
00:21	19.089	0.168	63.753
00:22	19.107	0.165	63.488
00:23	19.002	0.164	64.006
00:24	18.513	0.163	64.114
00:25	17.799	0.162	64.120
00:26	17.138	0.162	63.964
00:27	16.629	0.162	62.999
00:28	16.314	0.162	62.190
00:29	16.100	0.162	61.885
00:30	15.987	0.161	61.924
00:31	15.888	0.161	62.127
00:32	15.840	0.161	62.664
00:33	15.797	0.161	63.156
00:34	15.799	0.162	63.709
00:35	15.851	0.161	63.850
00:36	15.959	0.161	63.475
00:37	16.119	0.160	63.278
00:38	16.267	0.161	63.546
00:39	16.357	0.160	64.162
00:40	16.410	0.159	64.186
00:41	16.422	0.158	63.654
00:42	16.437	0.160	63.577
00:43	16.433	0.160	63.498
00:44	16.450	0.159	63.749
00:45	16.431	0.218	64.509
00:46	16.440	0.209	66.233
00:47	16.431	0.384	67.540
00:48	16.472	0.216	66.342
00:49	16.447	0.154	66.813
00:50	16.339	0.154	65.751

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
00:51	16.053	0.154	65.188
00:52	15.864	0.157	65.120
00:53	15.818	0.157	65.085
00:54	15.883	0.155	65.441
00:55	15.986	0.156	65.546
00:56	16.074	0.156	65.890
00:57	16.100	0.153	65.800
00:58	16.099	0.153	64.930
00:59	16.091	0.154	64.623
01:00	16.168	0.156	64.753
01:01	16.295	0.155	65.219
01:02	16.485	0.155	64.865
01:03	16.677	0.154	64.587
01:04	16.810	0.154	64.361
01:05	16.885	0.153	64.066
01:06	16.905	0.152	63.729
01:07	16.884	0.153	63.617
01:08	16.838	0.152	63.886
01:09	16.847	0.155	63.802
01:10	16.912	0.157	64.251
01:11	17.014	0.157	64.509
01:12	17.087	0.155	64.700
01:13	17.090	0.155	65.275
01:14	17.035	0.155	65.200
01:15	16.951	0.159	65.206
01:16	16.860	0.157	64.775
01:17	16.751	0.154	64.521
01:18	16.580	0.154	64.397
01:19	16.263	0.155	64.941
01:20	15.898	0 155	65.662
01:21	15.687	0.156	65.100
01:22	15.637	0.155	64.571
01:23	15.700	0.154	64.665
01:24	15.788	0.153	65.228
01:25	15.883	0.153	64.788
01:26	15.997	0.171	64.640
01:27	16.139	0.160	64.907
01:28	16.346	0.156	64.606
01:29	16.223	0.154	64.813
01:30	15.241	0.154	64.940
01:31	13.771	0.155	65.146
01:32	12.336	0.155	65.138
01:33	11.261	0.156	64.791
01:34	10.642	0.158	64.576
01:35	10.453	0.155	64.821
01:36	10.579	0.157	64.681
01:37	11.039	0.157	65.092
01:38	11.714	0.157	65.209
01:39	12.458	0.177	65.110
01:40	13.164	0.163	65.071
01:41	13.776	0.155	64.862
01:42	14.019	0.154	64.482
01:43	13.394	0.155	64.364
01:44	12.197	0.155	64.695
01:45	10.935	0.155	64.627
01:46	9.988	0.157	64.833
01:47	9.464	0.155	65.337
01:48	9.305	0.157	65.204
01:49	9.426	0.157	64.878
01:50	9.782	0.158	64.878
01:51	10.390	0.159	65.048
01:52	11.156	0.173	65.059
01:53	11.955	0.180	65.051
01:54	12.710	0.162	65.070
01:55	13.339	0.155	64.703
01:56	13.366	0.152	64.407
01:57	12.713	0.151	64.245
01:58	11.742	0.151	63.713
01:59	10.721	0.152	63.438
02:00	9.930	0.151	63.213
02:01	9.602	0.149	63.096
02:02	9.718	0.151	62.958
02:03	10.195	0.221	63.448
02:04	10.971	0.274	65.683
02:05	11.931	0.314	66.392

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
02:06	12.831	0.399	66.810
02:07	13.469	0.472	68.567
02:08	13.825	0.548	70.706
02:09	13.712	0.577	71.659
02:10	12.835	0.559	71.565
02:11	11.557	0.363	71.528
02:12	10.178	0.150	68.941
02:13	8.903	0.153	67.652
02:14	7.871	0.153	67.138
02:15	7.189	0.153	66.636
02:16	6.927	0.154	65.790
02:17	6.956	0.154	65.892
02:18	7.233	0.155	65.832
02:19	7.641	0.156	65.846
02:20	8.106	0.156	66.126
02:21	8.556	0.155	66.239
02:22	8.958	0.154	66.208
02:23	9.290	0.154	65.891
02:24	9.581	0.154	65.651
02:25	9.828	0.153	65.265
02:26	10.034	0.154	64.978
02:27	10.214	0.152	64.499
02:28	10.378	0.153	64.738
02:29	10.519	0.152	65.180
02:30	10.644	0.152	65.096
02:31	10.747	0.151	64.778
02:32	10.846	0.153	64.556
02:33	10.935	0.153	64.062
02:34	11.027	0.153	63.573
02:35	11.168	0.154	63.260
02:36	11.345	0.155	63.349
02:37	11.516	0.156	63.658
02:38	11.662	0.153	64.637
02:39	11.726	0.156	64.448
02:40	11.730	0.157	64.331
02:41	11.847	0.158	64.561
02:42	12.104	0.159	65.331
02:43	12.385	0.158	66.016
02:44	12.672	0.157	65.753
02:45	12.974	0.158	65.611
02:46	13.254	0.158	65.976
02:47	13.513	0.158	65.473
02:48	13.722	0.157	64.838
02:49	13.907	0.157	64.487
02:50	14.061	0.156	64.208
02:51	14.187	0.156	64.407
02:52	14.293	0.155	64.444
02:53	14.382	0.156	64.392
02:54	14.449	0.156	64.599
02:55	14.520	0.157	64.888
02:56	14.634	0.157	64.463
02:57	14.748	0.156	64.432
02:58	14.865	0.153	64.271
02:59	14.950	0.154	64.081
03:00	14.944	0.154	63.862
03:01	14.959	0.154	63.899
03:02	15.004	0.154	64.286
03:03	15.077	0.152	64.424
03:04	15.127	0.153	63.828
03:05	15.136	0.155	63.953
03:06	15.122	0.155	64.578
03:07	15.103	0.155	64.781
03:08	15.068	0.156	64.569
03:09	15.026	0.156	64.748
03:10	14.986	0.155	64.460
03:11	14.955	0.155	64.206
03:12	14.928	0.155	64.530
03:13	14.895	0.156	64.710
03:14	14.866	0.181	64.632
03:15	14.852	0.194	66.105
03:16	14.827	0.156	66.455
03:17	14.845	0.156	66.580
03:18	14.870	0.156	65.961
03:19	14.927	0.155	64.943
03:20	15.031	0.156	65.087

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
03:21	15.123	0.156	65.927
03:22	15.164	0.154	65.502
03:23	15.167	0.155	64.486
03:24	15.127	0.156	64.440
03:25	15.079	0.156	64.896
03:26	15.031	0.156	65.100
03:27	15.006	0.155	65.082
03:28	14.966	0.157	64.469
03:29	14.942	0.157	64.112
03:30	14.913	0.154	63.543
03:31	14.855	0.155	63.367
03:32	14.537	0.155	63.800
03:33	13.949	0.157	64.527
03:34	13.429	0.157	65.593
03:35	13.136	0.157	65.826
03:36	13.034	0.156	65.195
03:37	13.088	0.157	64.383
03:38	13.221	0.157	64.317
03:39	13.391	0.156	64.314
03:40	13.607	0.156	64.179
03:41	13.877	0.158	63.954
03:42	14.157	0.157	64.432
03:43	14.424	0.156	64.117
03:44	14.654	0.157	64.061
03:45	14.788	0.156	64.354
03:46	14.865	0.157	64.236
03:47	14.915	0.156	64.275
03:48	14.928	0.157	64.727
03:49	14.932	0.158	65.007
03:50	14.928	0.157	65.460
03:51	14.913	0.157	65.785
03:52	14.900	0.158	65.697
03:53	14.903	0.192	66.039
03:54	14.887	0.206	66.682
03:55	14.869	0.201	66.549
03:56	14.846	0.201	66.243
03:57	14.791	0.201	66.184
03:58	14.709	0.198	66.900
03:59	14.590	0.198	66.973
04:00	14.440	0.198	66.501
04:01	14.300	0.199	66.753
04:02	14.213	0.240	66.903
04:03	14.186	0.316	68.662
04:04	14.131	0.441	69.400
04:05	14.054	0.495	70.535
04:06	13.856	0.493	71.219
04:07	13.471	0.484	70.944
04:08	12.958	0.426	71.193
04:09	12.392	0.201	69.622
04:10	11.828	0.201	68.709
04:11	11.300	0.200	68.292
04:12	10.908	0.198	67.823
04:13	10.743	0.203	67.661
04:14	10.751	0.586	67.942
04:15	10.884	0.384	70.777
04:16	11.060	0.187	69.070
04:17	11.222	0.197	68.270
04:18	11.199	0.681	69.372
04:19	11.245	0.306	71.256
04:20	11.553	0.191	68.986
04:21	11.920	0.192	68.164
04:22	11.997	0.196	67.214
04:23	12.106	0.201	67.156
04:24	12.408	0.238	67.469
04:25	12.840	0.325	67.596
04:26	13.274	0.788	69.096
04:27	13.638	0.903	70.962
04:28	13.912	0.715	71.279
04:29	13.967	0.626	72.175
04:30	13.648	0.542	72.341
04:31	13.112	0.554	72.773
04:32	12.569	0.590	71.777
04:33	12.107	0.614	71.664
04:34	11.742	0.630	71.099
04:35	11.440	0.638	71.107

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
04:36	11.159	0.522	71.261
04:37	10.886	0.381	71.627
04:38	10.636	0.163	70.687
04:39	10.444	0.204	69.685
04:40	10.365	0.207	69.439
04:41	10.470	0.207	68.849
04:42	10.848	0.207	68.584
04:43	11.365	0.207	68.395
04:44	11.972	0.209	69.119
04:45	12.577	0.208	69.311
04:46	13.153	0.209	69.348
04:47	13.680	0.209	69.137
04:48	14.161	0.210	69.388
04:49	14.569	0.208	69.560
04:50	14.932	0.205	68.843
04:51	15.257	0.207	67.828
04:52	15.522	0.207	67.580
04:53	15.760	0.209	68.223
04:54	15.953	0.208	68.040
04:55	16.122	0.208	67.684
04:56	16.264	0.206	67.749
04:57	16.387	0.207	67.607
04:58	16.484	0.206	67.857
04:59	16.587	0.206	68.103
05:00	16.662	0.228	67.475
05:01	16.719	0.245	67.152
05:02	16.770	0.241	66.854
05:03	16.820	0.180	66.403
05:04	16.857	0.080	66.050
05:05	16.898	-0.012	65.673
05:06	16.923	0.113	65.813
05:07	16.950	0.199	66.555
05:08	16.976	0.201	67.457
05:09	17.006	0.202	67.240
05:10	17.039	0.202	66.987
05:11	17.060	0.207	67.320
05:12	17.079	0.209	67.347
05:13	17.094	0.208	68.323
05:14	17.108	0.202	69.143
05:15	17.130	0.203	69.464
05:16	17.139	0.203	69.476
05:17	17.143	0.203	69.228
05:18	17.154	0.202	68.646
05:19	17.156	0.202	67.569
05:20	17.170	0.203	66.626
05:21	17.154	0.204	66.352
05:22	17.156	0.204	66.723
05:23	17.153	0.200	66.786
05:24	17.156	0.201	66.613
05:25	17.150	0.201	67.035
05:26	17.149	0.205	67.284
05:27	17.141	0.209	67.291
05:28	17.180	0.209	67.036
05:29	17.173	0.207	66.819
05:30	17.184	0.206	66.216
05:31	17.186	0.206	65.582
05:32	17.167	0.205	65.663
05:33	17.158	0.205	66.350
05:34	17.161	0.201	67.149
05:35	17.166	0.203	68.051
05:36	17.151	0.202	68.510
05:37	17.149	0.202	68.240
05:38	17.144	0.202	67.155
05:39	17.158	0.196	66.722
05:40	17.149	0.196	65.749
05:41	17.166	0.197	65.699
05:42	17.165	0.198	65.818
05:43	17.163	0.201	66.172
05:44	17.165	0.200	66.173
05:45	17.162	0.201	66.272
05:46	17.156	0.200	66.758
05:47	17.142	0.196	66.962
05:48	17.137	0.206	66.899
05:49	17.145	0.212	67.295
05:50	17.160	0.214	67.347

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
05:51	17.173	0.219	67.308
05:52	17.183	0.201	66.499
05:53	17.189	0.203	65.727
05:54	17.178	0.201	65.313
05:55	17.153	0.199	64.581
05:56	17.120	0.200	64.100
05:57	17.103	0.201	64.054
05:58	17.091	0.202	64.552
05:59	17.080	0.200	64.615
06:00	17.070	0.203	64.929
06:01	17.078	0.204	65.615
06:02	17.081	0.201	65.805
06:03	17.089	0.150	65.237
06:04	17.081	0.064	65.416
06:05	17.084	-0.027	65.281
06:06	17.076	0.032	65.247
06:07	17.097	-0.025	65.335
06:08	17.076	-0.025	65.793
06:09	17.083	0.013	66.004
06:10	17.093	0.066	65.959
06:11	17.077	0.014	65.484
06:12	17.091	-0.031	65.930
06:13	17.078	-0.024	66.328
06:14	17.083	0.089	66.928
06:15	17.083	0.195	67.192
06:16	17.077	0.243	67.103
06:17	17.071	0.267	66.503
06:18	17.073	0.247	66.078
06:19	17.077	0.304	66.178
06:20	17.069	0.293	65.617
06:21	17.065	0.322	65.965
06:22	17.062	0.329	66.654
06:23	17.059	0.240	66.361
06:24	17.070	0.241	65.962
06:25	17.049	0.146	65.630
06:26	17.049	0.167	65.698
06:27	17.037	0.211	66.452
06:28	17.018	0.240	66.285
06:29	17.026	0.251	65.644
06:30	17.023	0.302	65.736
06:31	17.013	0.342	65.629
06:32	17.030	0.306	64.911
06:33	17.026	0.313	65.342
06:34	17.033	0.346	65.598
06:35	17.033	0.279	65.087
06:36	17.031	0.319	65.580
06:37	17.045	0.358	65.777
06:38	17.030	0.365	66.245
06:39	17.030	0.340	66.247
06:40	17.027	0.341	65.783
06:41	17.036	0.384	66.039
06:42	17.023	0.416	66.460
06:43	17.023	0.455	66.476
06:44	17.009	0.483	66.442
06:45	17.005	0.474	66.282
06:46	17.000	0.522	66.394
06:47	16.998	0.546	66.296
06:48	17.011	0.568	66.480
06:49	17.004	0.601	66.751
06:50	17.006	0.605	66.673
06:51	17.010	0.607	66.221
06:52	17.010	0.651	67.120
06:53	17.002	0.673	67.528
06:54	16.995	0.616	67.560
06:55	16.993	0.621	66.880
06:56	16.992	0.617	66.353
06:57	16.997	0.614	65.645
06:58	17.010	0.654	65.666
06:59	17.018	0.689	65.573
07:00	17.039	0.736	66.151
07:01	17.055	0.776	66.447
07:02	17.070	0.769	66.333
07:03	17.080	0.721	65.554
07:04	17.077	0.699	66.013
07:05	17.081	0.683	66.265

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
07:06	17.076	0.676	66.261
07:07	17.037	0.669	66.288
07:08	16.847	0.673	66.100
07:09	16.556	0.631	65.992
07:10	16.231	0.632	65.685
07:11	15.992	0.671	65.862
07:12	15.816	0.629	65.593
07:13	15.719	0.679	66.359
07:14	15.680	0.696	66.193
07:15	15.680	0.754	65.959
07:16	15.725	0.725	65.411
07:17	15.805	0.685	65.081
07:18	15.899	0.688	64.840
07:19	16.019	0.650	64.431
07:20	16.136	0.652	64.839
07:21	16.234	0.611	64.786
07:22	16.344	0.614	65.427
07:23	16.434	0.594	64.597
07:24	16.513	0.593	64.352
07:25	16.601	0.546	64.085
07:26	16.655	0.552	64.153
07:27	16.721	0.584	64.185
07:28	16.775	0.641	64.189
07:29	16.820	0.718	64.374
07:30	16.862	0.744	64.105
07:31	16.895	0.743	64.360
07:32	16.916	0.774	64.807
07:33	16.944	0.744	64.926
07:34	16.953	0.691	64.442
07:35	16.979	0.695	64.402
07:36	16.987	0.695	64.819
07:37	16.998	0.203	64.473
07:38	17.023	0.204	63.791
07:39	17.020	0.207	63.941
07:40	17.024	0.202	64.126
07:41	17.026	0.206	63.823
07:42	17.010	0.204	64.249
07:43	16.988	0.270	64.793
07:44	16.959	0.228	66.160
07:45	16.928	0.201	65.195
07:46	16.933	0.204	65.533
07:47	16.886	0.206	65.810
07:48	16.817	0.205	65.484
07:49	16.756	0.200	65.047
07:50	16.733	0.195	64.315
07:51	16.743	0.150	64.208
07:52	16.757	0.153	63.048
07:53	16.774	0.154	62.797
07:54	16.815	0.156	63.183
07:55	16.878	0.153	63.317
07:56	16.992	0.155	63.410
07:57	17.133	0.157	63.406
07:58	17.294	0.158	63.197
07:59	17.468	0.159	62.564
08:00	17.639	0.156	62.094
08:01	17.799	0.155	62.433
08:02	17.956	0.156	62.214
08:03	18.114	0.157	62.487
08:04	18.263	0.157	62.146
08:05	18.388	0.156	61.836
08:06	18.502	0.155	62.291
08:07	18.608	0.156	63.077
08:08	18.699	0.156	63.352
08:09	18.791	0.506	64.958
08:10	18.873	0.789	69.888
08:11	18.927	0.251	69.020
08:12	18.982	0.155	65.602
08:13	18.770	0.322	65.066
08:14	18.224	0.581	67.341
08:15	17.670	0.423	68.415
08:16	17.290	0.264	66.663
08:17	16.900	0.176	65.290
08:18	16.338	0.152	64.266
08:19	15.771	0.155	63.879
08:20	15.373	0.151	63.484

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
08:21	15.166	0.153	63.757
08:22	15.169	0.154	63.670
08:23	15.330	0.156	63.389
08:24	15.589	0.155	63.626
08:25	15.861	0.156	63.600
08:26	16.187	0.152	63.651
08:27	16.489	0.152	63.008
08:28	16.797	0.155	62.770
08:29	17.080	0.153	62.537
08:30	17.336	0.156	62.504
08:31	17.571	0.158	62.791
08:32	17.801	0.155	63.218
08:33	17.994	0.153	63.322
08:34	18.174	0.154	63.686
08:35	18.329	0.152	63.942
08:36	18.478	0.153	63.285
08:37	18.607	0.153	63.335
08:38	18.720	0.156	63.815
08:39	18.811	0.153	63.576
08:40	18.907	0.155	63.256
08:41	18.994	0.153	63.318
08:42	19.074	0.152	62.865
08:43	19.139	0.152	62.353
08:44	19.195	0.153	62.285
08:45	19.240	0.156	62.871
08:46	19.295	0.155	63.175
08:47	19.346	0.154	63.105
08:48	19.368	0.154	62.542
08:49	19.404	0.150	62.254
08:50	19.442	0 152	62.118
08:51	19.474	0.459	63.065
08:52	19.496	0.489	67.855
08:53	19.517	0.148	65.344
08:54	19.524	0.150	63.948
08:55	19.389	0.324	63.473
08:56	19.076	0.548	67.353
08:57	18.751	0.145	64.781
08:58	18.572	0.151	64.047
08:59	18.230	0.367	64.953
09:00	17.728	0.517	69.460
09:01	15.396	0.147	66.958
09:02	12.743	0.153	65.329
09:03	16.328	0.154	64.679
09:04	17.175	0.152	64.428
09:05	17.473	0.154	64.352
09:06	17.667	0.152	64.141
09:07	17.480	0.152	64.142
09:08	17.221	0.150	64.051
09:09	17.529	0.152	63.900
09:10	17.826	0.155	64.057
09:11	18.017	0.154	63.397
09:12	18.241	0.152	63.602
09:13	18.338	0.153	63.863
09:14	18.384	0.154	64.173
09:15	18.466	0.150	63.610
09:16	18.529	0.150	62.947
09:17	18.564	0.153	63.072
09:18	18.613	0.154	63.272
09:19	18.646	0.154	62.782
09:20	18.691	0.171	62.902
09:21	18.397	0.161	63.659
09:22	9.370	0.155	63.661
09:23	5.732	0.156	63.369
09:24	4.884	0.151	63.769
09:25	5.562	0.154	64.278
09:26	8.080	0.150	63.983
09:27	10.041	0.167	63.180
09:28	10.320	0.265	64.195
09:29	10.645	0.299	65.433
09:30	11.116	0.328	67.027
09:31	11.780	0.342	68.276
09:32	12.192	0.359	68.249
09:33	3.575	0.367	68.191
09:34	4.175	0.367	69.014
09:35	5.388	0.350	69.703

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
09:36	6.348	0.331	69.260
09:37	10.120	0.314	67.979
09:38	11.640	0.310	67.775
09:39	11.847	0.302	67.406
09:40	5.001	0.275	66.673
09:41	0.770	0.258	67.501
09:42	0.903	0.147	67.414
09:43	2.460	0.146	65.852
09:44	4.572	0.156	65.608
09:45	6.295	0.148	64.870
09:46	9.620	0.146	65.256
09:47	14.482	0.148	64.812
09:48	16.160	0.172	64.560
09:49	16.739	0.161	64.540
09:50	7.503	0.155	64.489
09:51	0.832	0.153	65.110
09:52	0.684	0.155	65.439
09:53	1.969	0.157	63.878
09:54	3.214	0.151	63.481
09:55	3.665	0.151	63.401
09:56	3.469	0.145	63.570
09:57	2.869	0.148	63.894
09:58	3.989	0.150	64.330
09:59	8.734	0.158	63.853
10:00	13.806	0.152	63.326
10:01	15.246	0.149	63.783
10:02	15.601	0.151	64.405
10:03	15.842	0.152	63.740
10:04	16.049	0.151	64.114
10:05	16.215	0.148	64.713
10:06	16.388	0.157	64.094
10:07	16.567	0.152	64.395
10:08	16.703	0.157	64.973
10:09	16.853	0.152	64.716
10:10	17.000	0.153	64.810
10:11	17.117	0.154	64.802
10:12	17.228	0.157	64.624
10:13	17.327	0.154	65.335
10:14	17.464	0.159	65.642
10:15	17.100	0.161	65.665
10:16	15.917	0.161	64.488
10:17	17.166	0.158	64.297
10:18	18.013	0.155	64.961
10:19	18.357	0.160	64.639
10:20	18.508	0.159	64.163
10:21	18.552	0.163	64.308
10:22	18.589	0.153	63.937
10:23	18.580	0.150	64.576
10:24	18.620	0.160	64.867
10:25	18.601	0.157	64.508
10:26	18.628	0.157	64.329
10:27	18.686	0.154	64.153
10:28	18.714	0.154	64.110
10:29	18.722	0.155	63.975
10:30	18.739	0.157	64.217
10:31	18.736	0.154	64.171
10:32	18.731	0.157	64.550
10:33	18.768	0.155	64.680
10:34	18.767	0.156	64.864
10:35	18.774	0.159	64.921
10:36	18.783	0.157	64.865
10:37	18.724	0.157	65.262
10:38	18.778	0.157	65.317
10:39	18.797	0.153	65.792
10:40	18.831	0.157	65.447
10:41	18.799	0.154	64.970
10:42	18.851	0.155	65.305
10:43	18.807	0.154	65.340
10:44	18.799	0.155	65.586
10:45	18.818	0.155	65.299
10:46	18.816	0.155	65.609
10:47	18.828	0.158	65.551
10:48	18.824	0.157	65.576
10:49	18.841	0.157	65.505
10:50	18.799	0.156	65.360

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
10:51	18.786	0.157	65.810
10:52	18.813	0.158	66.500
10:53	18.823	0.160	66.938
10:54	18.768	0.162	66.222
10:55	18.797	0.157	66.055
10:56	18.781	0.163	65.843
10:57	18.796	0.155	65.319
10:58	18.807	0.163	65.632
10:59	18.777	0.162	65.851
11:00	7.551	0.130	65.887
11:01	-0.001	0.124	65.464
11:02	-0.002	0.132	65.202
11:03	-0.001	0.144	64.912
11:04	0.305	0.152	63.879
11:05	2.535	0.149	63.631
11:06	3.289	0.149	64.482
11:07	3.854	0.149	64.913
11:08	4.721	0.151	65.099
11:09	5.598	0.152	64.323
11:10	6.450	0.156	64.303
11:11	7.280	0.155	65.430
11:12	8.060	0.156	65.285
11:13	8.808	0.157	65.023
11:14	9.469	0.157	64.630
11:15	10.003	0.158	64.163
11:16	10.383	0.158	64.258
11:17	10.658	0.158	64.898
11:18	10.889	0.159	65.163
11:19	11.155	0.160	64.287
11:20	11.391	0.156	63.446
11:21	11.616	0.156	63.587
11:22	11.800	0.219	64.100
11:23	11.941	0.205	84.741
11:24	11.821	0.149	117.433
11:25	12.349	0.152	117.410
11:26	13.385	0.152	67.651
11:27	13.668	0.157	63.685
11:28	13.480	0.159	63.231
11:29	12.884	0.160	61.688
11:30	12.852	0.158	61.010
11:31	12.920	0.158	60.993
11:32	13.028	0.156	62.183
11:33	13.081	0.156	61.850
11:34	13.192	0.157	62.832
11:35	13.335	0.162	62.298
11:36	13.473	0.156	61.952
11:37	13.600	0.157	61.951
11:38	13.692	0.163	61.513
11:39	13.743	0.161	61.225
11:40	13.809	0.160	60.906
11:41	13.944	0.162	60.725
11:42	14.114	0.156	60.162
11:43	14.289	0.159	60.821
11:44	14.367	0.161	60.556
11:45	14.451	0.153	60.103
11:46	14.563	0.154	60.346
11:47	15.154	0.153	60.436
11:48	15.507	0.155	60.954
11:49	15.618	0.160	62.192
11:50	15.569	0.157	63.122
11:51	15.049	0.160	63.241
11:52	14.835	0.157	63.207
11:53	14.849	0.158	62.858
11:54	14.903	0.159	63.267
11:55	14.921	0.159	62.355
11:56	14.960	0.159	62.843
11:57	15.011	0.160	63.246
11:58	15.046	0.157	63.416
11:59	15.036	0.155	62.592
12:00	15.013	0.156	62.045
12:01	14.933	0.157	61.914
12:02	14.872	0.156	62.233
12:03	14.895	0.194	62.243
12:04	14.879	0.224	62.436
12:05	14.683	0.178	62.435

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
12:06	14.410	0.159	62.083
12:07	14.454	0.159	62.492
12:08	14.526	0.156	62.445
12:09	14.901	0.154	63.198
12:10	15.280	0.154	61.764
12:11	15.458	0.155	61.035
12:12	15.467	0.156	61.234
12:13	15.124	0.160	62.451
12:14	14.790	0.160	62.942
12:15	14.752	0.158	62.181
12:16	14.752	0.160	62.690
12:17	14.752	0.157	62.175
12:18	14.772	0.157	62.825
12:19	14.807	0.157	64.119
12:20	14.854	0.156	64.018
12:21	14.917	0.156	63.551
12:22	14.959	0.154	63.162
12:23	14.965	0.156	63.710
12:24	14.932	0.167	63.437
12:25	14.929	0.157	63.889
12:26	14.997	0.160	64.073
12:27	14.971	0.160	65.418
12:28	14.982	0.166	66.492
12:29	15.000	0.158	66.970
12:30	14.995	0.157	66.151
12:31	15.157	0.156	66.558
12:32	15.604	0.157	67.020
12:33	15.741	0.157	66.622
12:34	15.802	0.158	66.408
12:35	15.568	0.155	65.974
12:36	15.123	0.157	65.497
12:37	15.035	0.159	65.257
12:38	15.003	0.157	64.875
12:39	15.020	0.162	64.625
12:40	15.032	0.161	64.337
12:41	15.059	0.159	64.184
12:42	15.029	0.155	64.280
12:43	15.062	0.155	64.026
12:44	15.079	0.158	64.565
12:45	15.062	0.159	65.731
12:46	15.024	0.162	66.622
12:47	15.046	0.163	66.474
12:48	15.101	0.162	66.774
12:49	15.081	0.162	66.496
12:50	15.101	0.161	65.980
12:51	15.107	0.163	65.602
12:52	15.118	0.167	64.828
12:53	15.168	0.162	64.994
12:54	15.747	0.160	65.556
12:55	15.932	0.161	66.159
12:56	15.925	0.158	66.000
12:57	15.723	0.157	66.189
12:58	15.312	0.161	65.618
12:59	15.199	0.158	64.652
13:00	15.214	0.159	64.374
13:01	15.204	0.153	64.520
13:02	15.230	0.151	64.222
13:03	15.271	0.152	64.085
13:04	15.282	0.158	64.328
13:05	15.339	0.153	64.330
13:06	15.348	0.161	64.600
13:07	15.305	0.165	65.097
13:08	15.271	0.163	64.805
13:09	15.273	0.160	64.247
13:10	15.302	0.160	63.824
13:11	15.274	0.159	64.559
13:12	15.239	0.175	65.194
13:13	15.224	0.201	66.436
13:14	15.058	0.172	66.894
13:15	14.950	0.161	67.027
13:16	15.507	0.165	67.531
13:17	15.789	0.167	68.079
13:18	15.929	0.166	68.580
13:19	15.704	0.164	68.279
13:20	15.248	0.161	67.571

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
13:21	15.157	0.160	67.160
13:22	15.028	0.197	67.456
13:23	14.904	0.169	66.978
13:24	14.772	0.165	66.420
13:25	14.765	0.170	64.146
13:26	14.901	0.203	64.379
13:27	15.001	0.161	64.741
13:28	14.832	0.165	64.754
13:29	14.879	0.170	64.873
13:30	14.858	0.201	66.136
13:31	14.839	0.162	65.783
13:32	14.708	0.166	65.642
13:33	14.850	0.174	64.912
13:34	14.924	0.202	66.181
13:35	14.849	0.166	65.866
13:36	14.708	0.162	65.621
13:37	14.808	0.173	65.560
13:38	15.020	0.194	66.504
13:39	15.324	0.165	65.884
13:40	15.416	0.166	64.853
13:41	15.559	0.162	64.374
13:42	15.260	0.160	64.090
13:43	14.983	0.159	64.992
13:44	14.975	0.162	64.595
13:45	15.000	0.159	63.897
13:46	15.025	0.157	64.161
13:47	15.085	0.158	64.768
13:48	15.156	0.160	64.898
13:49	15.207	0.160	64.037
13:50	15.167	0.159	64.668
13:51	15.168	0.160	64.938
13:52	15.134	0.205	64.386
13:53	15.124	0.221	65.818
13:54	15.021	0.172	65.322
13:55	14.790	0.152	63.610
13:56	14.797	0.154	63.170
13:57	15.000	0.156	63.087
13:58	15.052	0.156	62.435
13:59	15.040	0.155	62.682
14:00	15.200	0.154	62.694
14:01	15.292	0.152	62.405
14:02	15.555	0.154	61.496
14:03	15.958	0.156	61.280
14:04	15.368	0.155	61.672
14:05	14.777	0.154	61.950
14:06	14.277	0.159	61.433
14:07	14.395	0.164	60.898
14:08	14.610	0.165	61.315
14:09	14.578	0.164	62.877
14:10	14.499	0.160	64.536
14:11	14.230	0.163	65.725
14:12	14.030	0.163	65.398
14:13	14.237	0.158	65.379
14:14	14.465	0.160	65.682
14:15	14.537	0.155	64.805
14:16	14.500	0.160	63.780
14:17	14.363	0.159	62.443
14:18	14.336	0.159	62.169
14:19	14.425	0.160	62.272
14:20	14.523	0.158	63.254
14:21	14.567	0.157	63.041
14:22	14.840	0.158	63.135
14:23	15.471	0.158	63.641
14:24	15.617	0.160	64.161
14:25	15.652	0.159	64.258
14:26	15.252	0.159	64.456
14:27	14.726	0.161	64.876
14:28	14.669	0.163	64.829
14:29	14.620	0.162	65.189
14:30	14.584	0.160	66.550
14:31	14.552	0.157	67.029
14:32	14.608	0.157	66.989
14:33	14.643	0.155	66.485
14:34	14.640	0.158	66.276
14:35	14.696	0.159	65.710

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
14:36	14.702	0.159	65.001
14:37	14.727	0.158	65.090
14:38	14.694	0.158	64.845
14:39	14.722	0.156	64.708
14:40	14.744	0.156	64.853
14:41	14.714	0.159	64.731
14:42	14.753	0.157	65.563
14:43	14.780	0.155	65.110
14:44	15.048	0.157	64.915
14:45	15.849	0.158	63.928
14:46	16.048	0.158	63.667
14:47	16.078	0.156	63.904
14:48	15.798	0.158	63.534
14:49	15.234	0.158	63.614
14:50	15.149	0.156	63.244
14:51	15.091	0.156	62.291
14:52	15.097	0.155	61.891
14:53	15.127	0.157	61.584
14:54	15.113	0.156	60.941
14:55	15.096	0.153	60.836
14:56	15.105	0.155	60.659
14:57	15.712	0.156	60.192
14:58	16.632	0.155	60.621
14:59	17.578	0.155	60.577
15:00	17.973	0.156	60.136
15:01	18.206	0.156	59.663
15:02	18.326	0.153	58.809
15:03	18.385	0.154	58.549
15:04	18.442	0.157	58.528
15:05	18.492	0.155	58.291
15:06	18.548	0.156	58.636
15:07	18.582	0.158	58.814
15:08	18.633	0.178	58.467
15:09	18.671	0.209	59.046
15:10	18.617	0.191	59.116
15:11	18.351	0.195	59.763
15:12	18.261	0.191	60.186
15:13	18.128	0.195	60.879
15:14	17.999	0.208	61.273
15:15	17.844	0.622	63.258
15:16	16.945	0.457	66.434
15:17	12.386	0.207	65.511
15:18	12.373	0.192	64.598
15:19	14.937	0.196	65.073
15:20	15.889	0.194	64.876
15:21	16.127	0.198	65.672
15:22	16.265	0.162	65.686
15:23	16.340	0.157	64.960
15:24	16.775	0.159	64.901
15:25	17.135	0.159	65.221
15:26	17.233	0.161	64.683
15:27	17.292	0.158	64.865
15:28	17.413	0.158	64.424
15:29	17.559	0.168	64.628
15:30	17.722	0.169	64.946
15:31	16.057	0.162	64.357
15:32	11.267	0.159	64.119
15:33	10.243	0.158	64.216
15:34	10.671	0.157	64.809
15:35	11.791	0.154	64.524
15:36	12.608	0.157	64.391
15:37	13.621	0.159	64.788
15:38	14.273	0.156	64.430
15:39	14.884	0.158	64.357
15:40	15.397	0.154	64.214
15:41	16.003	0.152	63.427
15:42	17.228	0.155	63.795
15:43	17.881	0.154	63.977
15:44	18.098	0.150	63.606
15:45	18.183	0.155	62.733
15:46	18.267	0.155	62.193
15:47	18.305	0.157	62.659
15:48	18.324	0.158	63.247
15:49	18.389	0.154	63.754
15:50	18.432	0.164	63.359

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
15:51	18.466	0.157	64.066
15:52	18.455	0.163	64.711
15:53	18.520	0.162	64.650
15:54	18.548	0.161	64.417
15:55	18.554	0.161	64.432
15:56	18.576	0.163	64.745
15:57	18.604	0.176	64.374
15:58	18.625	0.174	63.647
15:59	18.501	0.162	63.676
16:00	17.782	0.152	63.950
16:01	17.348	0.155	64.460
16:02	17.318	0.155	64.349
16:03	17.510	0.156	63.372
16:04	17.702	0.151	64.016
16:05	17.899	0.154	63.830
16:06	18.119	0.155	64.453
16:07	18.393	0.158	65.165
16:08	18.624	0.158	65.440
16:09	18.721	0.160	65.143
16:10	18.762	0.158	65.029
16:11	18.772	0.452	66.238
16:12	18.699	0.927	70.398
16:13	14.955	0.879	72.484
16:14	9.183	0.856	72.390
16:15	7.783	0.843	73.629
16:16	7.554	0.828	73.071
16:17	7.575	0.772	73.323
16:18	7.647	0.516	72.290
16:19	8.610	0.339	69.932
16:20	10.589	0.169	68.396
16:21	12.453	0.158	65.952
16:22	14.919	0.152	65.083
16:23	16.587	0.161	64.259
16:24	17.173	0.155	64.146
16:25	17.356	0.164	64.077
16:26	17.501	0.156	64.074
16:27	17.670	0.160	64.313
16:28	17.787	0.161	64.566
16:29	17.911	0.168	65.203
16:30	18.019	0.157	64.788
16:31	18.082	0.157	64.591
16:32	18.150	0.156	64.569
16:33	18.220	0.159	64.830
16:34	18.328	0.169	64.591
16:35	18.270	0.152	64.182
16:36	14.432	0.153	64.198
16:37	9.025	0.150	64.092
16:38	7.323	0.153	63.656
16:39	8.097	0.150	63.960
16:40	9.554	0.156	64.961
16:41	10.887	0.151	64.537
16:42	11.999	0.156	64.382
16:43	12.867	0.151	64.667
16:44	13.565	0.154	64.974
16:45	14.086	0.155	65.560
16:46	14.482	0.154	65.158
16:47	14.786	0.156	64.787
16:48	15.126	0.153	63.676
16:49	15.637	0.157	63.120
16:50	15.992	0.155	63.339
16:51	16.210	0.157	63.599
16:52	16.169	0.155	63.628
16:53	15.984	0.157	64.014
16:54	15.901	0.156	63.958
16:55	15.858	0.157	64.137
16:56	15.861	0.158	64.298
16:57	15.877	0.157	65.111
16:58	15.894	0.158	65.780
16:59	15.898	0.155	64.859
17:00	15.927	0.158	64.833
17:01	15.940	0.158	64.678
17:02	15.958	0.157	64.609
17:03	15.976	0.159	64.575
17:04	15.976	0.160	64.412
17:05	15.945	0.159	64.335

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	Channel 1 O2 Stack Exhaust %dv	Channel 2 Δp Stack Exhaust inWC	Channel 3 Ts Stack Exhaust degF
17:06	15.935	0.159	64.624
17:07	15.911	0.164	64.340
17:08	15.916	0.157	63.635
17:09	15.905	0.158	64.255
17:10	15.940	0.158	64.503
17:11	16.188	0.160	63.906
17:12	16.431	0.157	64.283
17:13	16.560	0.157	64.893
17:14	16.518	0.159	64.702
17:15	16.251	0.159	64.304
17:16	16.055	0.158	64.663
17:17	15.960	0.159	64.690
17:18	15.922	0.157	64.532
17:19	15.903	0.155	63.876
17:20	15.888	0.159	63.609
17:21	15.869	0.157	63.364
17:22	15.859	0.157	63.508
17:23	15.856	0.157	64.005
17:24	15.861	0.156	64.067
17:25	15.870	0.159	63.913
17:26	15.885	0.157	64.195
17:27	15.926	0.158	65.180
17:28	16.064	0.158	65.439
17:29	16.092	0.154	65.033
17:30	16.098	0.158	64.820
17:31	16.117	0.155	64.491
17:32	16.086	0.157	64.700
17:33	16.099	0.156	64.970
17:34	16.105	0.157	65.077
17:35	16.101	0.158	64.839
17:36	16.090	0.158	64.569
17:37	16.095	0.156	63.774
17:38	16.100	0.156	63.737
17:39	16.096	0.158	64.587
17:40	16.088	0.157	64.340
17:41	16.100	0.156	64.450
17:42	16.098	0.155	63.715
17:43	16.099	0.156	63.646
17:44	16.106	0.186	64.146
17:45	16.115	0.260	65.512
17:46	16.114	0.268	65.714
17:47	16.108	0.278	66.198
17:48	16.114	0.281	67.045
17:49	16.127	0.284	67.342
17:50	16.125	0.285	67.177
17:51	16.134	0.283	66.630
17:52	16.148	0.280	66.029
17:53	16.149	0.274	65.396
17:54	16.137	0.269	64.683
17:55	16.160	0.231	64.205
17:56	16.148	0.152	62.609
17:57	16.153	0.154	62.630
17:58	16.152	0.154	62.394
17:59	16.150	0.155	61.700
18:00	16.151	0.153	61.885
18:01	16.145	0.153	61.982
18:02	16.150	0.154	61.361
18:03	16.136	0.153	61.329
18:04	16.110	0.152	60.727
18:05	16.101	0.154	60.523

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End of Appendix

APPENDIX G: FACILITY PROCESS DATA

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	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content	
	GPM	Inches H2O		%	
Default	P31AI2	P31AI2	P31AI4	SCRUB	
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT09098	GLYCOL_CALC	
Start Time = 18:05:00	PNT	PNT	PNT	RO01	
Total Time = 1days					
Period = 2mins lin	P91001	P91001	P91001	P91001	
	hst101	hst101	hst101	hst101	
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**	
12/15/2016 18:05	160.43956	0.178266183	2.01709	0.846069336	
12/15/2016 18:07	160.43956	0.205128208	2.01709	0.846069336	
12/15/2016 18:09	160.43956	0.205128208	2.01709	0.846069336	
12/15/2016 18:11	160.43956	0.205128208	2.03419	0.846069336	
12/15/2016 18:13	160.43956	0.205128208	2.03419	0.846069336	
12/15/2016 18:15	160.43956	0.166056171	2.03419	0.846069336	
12/15/2016 18:17	160.43956	0.192918196	2.03419	0.846069336	
12/15/2016 18:19	160.43956	0.219780222	2.03419	0.846069336	
12/15/2016 18:21	160.43956	0.219780222	2.03419	0.846069336	
12/15/2016 18:23	160.43956	0.185592189	2.03419	0.846069336	
12/15/2016 18:25	160.43956	0.185592189	2.03419	0.846069336	
12/15/2016 18:27	160.43956	0.222222224	2.03419	0.846069336	
12/15/2016 18:29	160.43956	0.202686206	2.03419	0.846069336	
12/15/2016 18:31	160.43956	0.17582418	2.03419	0.846069336	
12/15/2016 18:33	160.43956	0.202686206	2.03419	0.846069336	
12/15/2016 18:35	160.43956	0.163614169	2.03419	0.846069336	
12/15/2016 18:37	160.43956	0.219780222	2	0.846069336	
12/15/2016 18:39	160.43956	0.190476194	2	0.846069336	
12/15/2016 18:41	160.43956	0.180708185	2.01709	0.846069336	
12/15/2016 18:43	160.43956	0.185592189	2.01709	0.846069336	
12/15/2016 18:45	160.43956	0.148962155	2.01709	0.846069336	
12/15/2016 18:47	160.43956	0.20757021	2.01709	0.846069336	
12/15/2016 18:49	160.43956	0.180708185	2.01709	0.846069336	
12/15/2016 18:51	**160.43956**	**0.170940176**	**2.01709**	**0.846069336**	**R-07 Venting**
12/15/2016 18:53	**160.43956**	**0.170940176**	**2.01709**	**0.846069336**	
12/15/2016 18:55	**160.43956**	**0.197802201**	**2.01709**	**0.846069336**	
12/15/2016 18:57	**160.43956**	**0.168498173**	**2.01709**	**0.846069336**	
12/15/2016 18:59	**160.43956**	**0.197802201**	**2.01709**	**0.846069336**	
12/15/2016 19:01	**160.43956**	**0.197802201**	**2.01709**	**0.846069336**	
12/15/2016 19:03	**160.43956**	**0.197802201**	**2.01709**	**0.846069336**	
12/15/2016 19:05	**160.43956**	**0.197802201**	**2.01709**	**0.846069336**	
12/15/2016 19:07	**160.43956**	**0.170940176**	**2**	**0.846069336**	
12/15/2016 19:09	**160.43956**	**0.170940176**	**2.01709**	**0.846069336**	
12/15/2016 19:11	**160.43956**	**0.224664226**	**2.03419**	**0.846069336**	
12/15/2016 19:13	160.43956	0.192918196	2.03419	1.39642	
12/15/2016 19:15	160.43956	0.192918196	2.03419	1.39642	
12/15/2016 19:17	160.43956	0.166056171	2.03419	1.39642	
12/15/2016 19:19	**160.43956**	**0.166056171**	**2.03419**	**1.94861**	**R-01 Venting**
12/15/2016 19:21	**160.43956**	**0.192918196**	**2.03419**	**1.94861**	
12/15/2016 19:23	**160.43956**	**0.192918196**	**2.03419**	**1.94861**	
12/15/2016 19:25	**160.43956**	**0.166056171**	**2**	**2.49921**	
12/15/2016 19:27	**160.43956**	**0.163614169**	**1.98291**	**2.49921**	
12/15/2016 19:29	**160.43956**	**0.163614169**	**1.98291**	**2.49921**	
12/15/2016 19:31	**160.43956**	**0.190476194**	**1.98291**	**2.49921**	
12/15/2016 19:33	**160.43956**	**0.190476194**	**1.96581**	**2.49921**	
12/15/2016 19:35	**160.43956**	**0.156288162**	**1.96581**	**3.05157**	
12/15/2016 19:37	**160.43956**	**0.190476194**	**1.94872**	**3.05157**	
12/15/2016 19:39	**160.43956**	**0.190476194**	**1.94872**	**3.05157**	
12/15/2016 19:41	160.43956	0.190476194	1.94872	3.05157	
12/15/2016 19:43	160.43956	0.190476194	1.93162	3.05157	
12/15/2016 19:45	160.43956	0.190476194	1.93162	3.05157	
12/15/2016 19:47	160.43956	0.190476194	1.93162	3.05157	
12/15/2016 19:49	160.43956	0.190476194	1.91453	3.60162	
12/15/2016 19:51	160.43956	0.190476194	1.91453	3.60162	
12/15/2016 19:53	160.43956	0.190476194	1.91453	3.60162	
12/15/2016 19:55	160.43956	0.217338219	1.89744	3.60162	
12/15/2016 19:57	160.43956	0.217338219	1.89744	3.60162	
12/15/2016 19:59	160.43956	0.217338219	1.88034	3.60162	
12/15/2016 20:01	160.43956	0.190476194	1.88034	3.60162	
12/15/2016 20:03	160.43956	0.190476194	1.86325	3.60162	
12/15/2016 20:05	160.43956	0.190476194	1.86325	3.60162	
12/15/2016 20:07	160.43956	0.190476194	1.86325	3.60162	

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content	
	GPM	inches H2O		%	
Default	P31AI2	P31AI2	P31AI4	SCRUB	
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37ATD909B	GLYCOL_CALC	
Start Time = 18:05:00	PNT	PNT	PNT	RO01	
Total Time = 1days					
Period = 2mins lin	P91001	P91001	P91001	P91001	
	hst101	hst101	hst101	hst101	
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**	
12/15/2016 20:09	160.43956	0.222222224	1.86325	3.60162	
12/15/2016 20:11	160.43956	0.222222224	1.84615	3.60162	
12/15/2016 20:13	160.43956	0.183150187	1.84615	3.60162	
12/15/2016 20:15	160.43956	0.236874253	1.84615	3.60162	
12/15/2016 20:17	160.43956	0.236874253	1.84615	3.60162	
12/15/2016 20:19	160.43956	0.236874253	1.84615	3.60162	
12/15/2016 20:21	160.43956	0.20757021	1.84615	3.60162	
12/15/2016 20:23	160.43956	0.20757021	1.84615	3.60162	
12/15/2016 20:25	160.43956	0.231990233	1.82906	3.60162	
12/15/2016 20:27	160.43956	0.195360199	1.82906	3.60162	
12/15/2016 20:29	160.43956	0.222222224	1.84615	3.60162	
12/15/2016 20:31	160.43956	0.222222224	1.84615	3.60162	
12/15/2016 20:33	160.43956	0.188034192	1.84615	3.05011	
12/15/2016 20:35	160.43956	0.219780222	1.82906	2.49194	
12/15/2016 20:37	**160.43956**	**0.219780222**	**1.84615**	**2.49194**	**R-07 Venting**
12/15/2016 20:39	**160.43956**	**0.173382178**	**1.86325**	**1.94116**	
12/15/2016 20:41	**160.43956**	**0.163614169**	**1.88034**	**1.94116**	
12/15/2016 20:43	160.43956	0.224664226	1.89744	1.94116	
12/15/2016 20:45	160.43956	0.197802201	1.91453	1.94116	
12/15/2016 20:47	160.43956	0.224664226	1.93162	1.94116	
12/15/2016 20:49	160.43956	0.190476194	1.94872	1.94116	
12/15/2016 20:51	160.43956	0.217338219	1.94872	1.94116	
12/15/2016 20:53	160.43956	0.217338219	1.94872	1.94116	
12/15/2016 20:55	160.43956	0.192918196	1.96581	1.94116	
12/15/2016 20:57	160.43956	0.190476194	1.96581	1.39111	
12/15/2016 20:59	160.43956	0.190476194	1.96581	1.39111	
12/15/2016 21:01	160.43956	0.217338219	1.98291	1.39111	
12/15/2016 21:03	160.43956	0.190476194	1.98291	1.39111	
12/15/2016 21:05	160.43956	0.246642262	1.98291	1.39111	
12/15/2016 21:07	160.43956	0.20757021	1.98291	1.39111	
12/15/2016 21:09	160.43956	0.20757021	1.98291	1.39111	
12/15/2016 21:11	160.43956	0.244200259	1.98291	1.39111	
12/15/2016 21:13	160.43956	0.166056171	2.00342	1.39111	
12/15/2016 21:15	160.43956	0.158730164	1.98632	1.94183	
12/15/2016 21:17	160.43956	0.192918196	1.98632	1.94183	
12/15/2016 21:19	160.43956	0.219780222	1.98632	1.94183	
12/15/2016 21:21	**160.43956**	**0.219780222**	**1.98632**	**1.94183**	**R-04 Venting**
12/15/2016 21:23	**160.43956**	**0.200244203**	**1.98632**	**1.94183**	
12/15/2016 21:25	**160.43956**	**0.173382178**	**1.96923**	**1.94183**	
12/15/2016 21:27	**160.43956**	**0.271062285**	**1.96923**	**1.94183**	
12/15/2016 21:29	**160.43956**	**0.246642262**	**1.96923**	**1.94183**	
12/15/2016 21:31	**160.43956**	**0.278388292**	**1.95214**	**1.94183**	
12/15/2016 21:33	**160.43956**	**0.229548231**	**1.93504**	**1.94183**	
12/15/2016 21:35	**160.43956**	**0.229548231**	**1.93504**	**1.94183**	
12/15/2016 21:37	160.43956	0.200244203	1.91795	1.94183	
12/15/2016 21:39	160.43956	0.170940176	1.93504	1.94183	
12/15/2016 21:41	160.43956	0.197802201	1.93504	1.94183	
12/15/2016 21:43	160.43956	0.197802201	1.95214	1.94183	
12/15/2016 21:45	160.43956	0.192918196	1.95214	1.94183	
12/15/2016 21:47	160.43956	0.219780222	1.95214	1.39081	
12/15/2016 21:49	160.43956	0.192918196	1.96923	1.39081	
12/15/2016 21:51	160.43956	0.178266183	1.98632	1.39081	
12/15/2016 21:53	160.43956	0.332112342	1.98632	1.39081	
12/15/2016 21:55	160.43956	0.302808315	1.98632	1.39081	
12/15/2016 21:57	160.43956	0.214896217	1.98632	1.39081	
12/15/2016 21:59	160.43956	0.205128208	1.98632	1.39081	
12/15/2016 22:01	160.43956	0.280830294	1.96923	1.39081	
12/15/2016 22:03	160.43956	0.190476194	1.95214	1.39081	
12/15/2016 22:05	160.43956	0.190476194	1.96923	1.39081	
12/15/2016 22:07	160.43956	0.190476194	1.96923	1.39081	
12/15/2016 22:09	160.43956	0.161172166	1.96923	1.39081	
12/15/2016 22:11	160.43956	0.188034192	1.96923	1.39081	

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content
	GPM	inches H2O		%
Default	P31AI2	P31AI2	P31AI4	SCRUB
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT09098	GLYCOL_CALC
Start Time = 18:05:00	PNT	PNT	PNT	RO01
Total Time = 1days				
Period = 2mins lin	P91001	P91001	P91001	P91001
	hst101	hst101	hst101	hst101
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**
12/15/2016 22:13	160.43956	0.227106228	1.96923	1.39081
12/15/2016 22:15	160.43956	0.227106228	1.96923	1.39081
12/15/2016 22:17	160.43956	0.227106228	1.96923	1.39081
12/15/2016 22:19	160.43956	0.200244203	1.96923	1.39081
12/15/2016 22:21	160.43956	0.200244203	1.96923	1.94232
12/15/2016 22:23	160.43956	0.200244203	1.96923	1.94232
12/15/2016 22:25	160.43956	0.156288162	1.96923	1.94232
12/15/2016 22:27	160.43956	0.183150187	1.96923	1.94232
12/15/2016 22:29	160.43956	0.20757021	1.96923	1.94232
12/15/2016 22:31	160.43956	0.192918196	1.96923	1.94232
12/15/2016 22:33	153.96826	0.219780222	1.95214	1.94232
12/15/2016 22:35	158.97437	0.183150187	1.95214	1.94232
12/15/2016 22:37	158.97437	0.205128208	1.95214	1.94232
12/15/2016 22:39	158.97437	0.200244203	1.95214	1.94232
12/15/2016 22:41	158.97437	0.200244203	1.93504	1.94232
12/15/2016 22:43	158.97437	0.200244203	1.93504	1.94232
12/15/2016 22:45	158.97437	0.200244203	1.93504	1.94232
12/15/2016 22:47	158.97437	0.200244203	1.93504	1.94232
12/15/2016 22:49	158.97437	0.200244203	1.95214	1.94232
12/15/2016 22:51	158.97437	0.227106228	1.95214	1.94232
12/15/2016 22:53	158.97437	0.180708185	1.95214	1.94232
12/15/2016 22:55	158.97437	0.210012212	1.95214	1.94232
12/15/2016 22:57	158.97437	0.317460328	1.95214	1.94232
12/15/2016 22:59	158.97437	0.290598303	1.95214	1.94232
12/15/2016 23:01	158.97437	0.251526266	1.95214	1.94232
12/15/2016 23:03	158.97437	0.23443225	1.95214	1.94232
12/15/2016 23:05	158.97437	0.170940176	1.93504	1.94232
12/15/2016 23:07	158.97437	0.197802201	1.91795	1.39124
12/15/2016 23:09	158.97437	0.197802201	1.93504	1.39124
12/15/2016 23:11	158.97437	0.195360199	1.95214	1.39124
12/15/2016 23:13	158.97437	0.224664226	1.96923	1.39124
12/15/2016 23:15	158.97437	0.170940176	1.96923	1.39124
12/15/2016 23:17	158.97437	0.197802201	1.96923	1.39124
12/15/2016 23:19	158.97437	0.197802201	1.96923	1.39124
12/15/2016 23:21	158.97437	0.197802201	1.96923	1.39124
12/15/2016 23:23	158.97437	0.197802201	1.96923	1.39124
12/15/2016 23:25	158.97437	0.224664226	1.98632	1.39124
12/15/2016 23:27	158.97437	0.210012212	1.98632	1.39124
12/15/2016 23:29	158.97437	0.205128208	1.98632	1.39124
12/15/2016 23:31	158.97437	0.231990233	1.98632	1.39124
12/15/2016 23:33	158.97437	0.192918196	1.98632	1.39124
12/15/2016 23:35	158.97437	0.158730164	1.98632	1.39124
12/15/2016 23:37	158.97437	0.214896217	1.98632	1.39124
12/15/2016 23:39	158.97437	0.214896217	1.98632	1.39124
12/15/2016 23:41	158.97437	0.163614169	1.98632	1.39124
12/15/2016 23:43	158.97437	0.168498173	1.98632	1.39124
12/15/2016 23:45	158.97437	0.195360199	1.98632	1.39124
12/15/2016 23:47	158.97437	0.222222224	1.98632	1.39124
12/15/2016 23:49	158.97437	0.195360199	1.98632	1.39124
12/15/2016 23:51	158.97437	0.170940176	1.98632	1.39124
12/15/2016 23:53	158.97437	0.197802201	1.98632	1.39124
12/15/2016 23:55	158.97437	0.197802201	1.98632	1.39124
12/15/2016 23:57	158.97437	0.197802201	1.98632	1.39124
12/15/2016 23:59	158.97437	0.200244203	1.98632	1.39124
12/16/2016 0:01	158.97437	0.227106228	2.00342	1.39124
12/16/2016 0:03	158.97437	0.200244203	2.00342	1.39124
12/16/2016 0:05	158.97437	0.200244203	2.00342	1.39124
12/16/2016 0:07	158.97437	0.229548231	2.00342	1.39124
12/16/2016 0:09	158.97437	0.190476194	2.00342	1.39124
12/16/2016 0:11	158.97437	0.190476194	2.00342	1.39124
12/16/2016 0:13	158.97437	0.219780222	1.98632	1.39124
12/16/2016 0:15	158.97437	0.246642262	1.98632	1.39124

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content	
	GPM	Inches H2O		%	
Default	P31AI2	P31AI2	P31AI4	SCRUB	
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT0909B	GLYCOL_CALC	
Start Time = 18:05:00	PNT	PNT	PNT	RO01	
Total Time = 1days					
Period = 2mins lin	P91001	P91001	P91001	P91001	
	hst101	hst101	hst101	hst101	
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**	
12/16/2016 0:17	158.97437	0.227106228	1.98632	1.39124	
12/16/2016 0:19	158.97437	0.173382178	1.98632	1.39124	
12/16/2016 0:21	158.97437	0.173382178	1.98632	1.39124	
12/16/2016 0:23	158.97437	0.173382178	1.98632	1.39124	
12/16/2016 0:25	158.97437	0.200244203	1.98632	1.39124	
12/16/2016 0:27	158.97437	0.200244203	1.98632	1.39124	
12/16/2016 0:29	158.97437	0.200244203	1.98632	1.39124	
12/16/2016 0:31	158.97437	0.200244203	1.98632	1.39124	
12/16/2016 0:33	158.97437	0.227106228	1.98632	1.39124	
12/16/2016 0:35	158.97437	0.195360199	2.00342	1.39124	
12/16/2016 0:37	157.63126	0.195360199	2.00342	1.39124	
12/16/2016 0:39	157.63126	0.222222224	2.00342	1.39124	
12/16/2016 0:41	157.63126	0.192918196	2.00342	1.39124	
12/16/2016 0:43	157.63126	0.183150187	2.00342	1.39124	
12/16/2016 0:45	157.63126	0.210012212	2.00342	1.39124	
12/16/2016 0:47	157.63126	0.20757021	2.00342	1.39124	
12/16/2016 0:49	157.63126	0.212454215	2.00342	1.39124	
12/16/2016 0:51	157.63126	0.212454215	2.00342	1.39124	
12/16/2016 0:53	157.63126	0.212454215	2.00342	1.39124	
12/16/2016 0:55	157.63126	0.183150187	1.98632	1.39124	
12/16/2016 0:57	157.63126	0.210012212	1.98632	1.39124	
12/16/2016 0:59	157.63126	0.210012212	1.98632	1.39124	
12/16/2016 1:01	157.63126	0.210012212	1.98632	1.39124	
12/16/2016 1:03	157.63126	0.183150187	1.98632	1.39124	
12/16/2016 1:05	157.63126	0.183150187	2.00342	1.39124	
12/16/2016 1:07	157.63126	0.210012212	2.00342	1.39124	
12/16/2016 1:09	157.63126	0.210012212	2.00342	1.39124	
12/16/2016 1:11	157.63126	0.212454215	2.00342	1.39124	
12/16/2016 1:13	157.63126	0.239316255	2.00342	1.39124	
12/16/2016 1:15	157.63126	0.180708185	2.00342	1.39124	
12/16/2016 1:17	157.63126	0.20757021	2.00342	1.39124	
12/16/2016 1:19	157.63126	0.202686206	2.00342	1.39124	
12/16/2016 1:21	157.63126	0.202686206	2.00342	1.39124	
12/16/2016 1:23	157.63126	0.188034192	1.98632	1.39124	
12/16/2016 1:25	157.63126	0.219780222	1.98632	1.39124	
12/16/2016 1:27	157.63126	0.219780222	1.98632	1.39124	
12/16/2016 1:29	157.63126	0.219780222	1.98632	1.39124	
12/16/2016 1:31	157.63126	0.183150187	2.00342	1.39124	
12/16/2016 1:33	157.63126	0.210012212	2.00342	1.39124	
12/16/2016 1:35	157.63126	0.210012212	2.00342	1.39124	
12/16/2016 1:37	157.63126	0.195360199	2.00342	1.39124	
12/16/2016 1:39	157.63126	0.222222224	2.00342	1.39124	
12/16/2016 1:41	157.63126	0.222222224	2.00342	1.39124	
12/16/2016 1:43	157.63126	0.178266183	2.00342	1.39124	
12/16/2016 1:45	157.63126	0.210012212	2.00342	1.39124	
12/16/2016 1:47	157.63126	0.239316255	2.00342	1.39124	
12/16/2016 1:49	157.63126	0.202686206	2.00342	1.39124	
12/16/2016 1:51	157.63126	0.202686206	2.00342	1.39124	
12/16/2016 1:53	157.63126	0.202686206	2.00342	1.39124	
12/16/2016 1:55	157.63126	0.229548231	2.00342	1.39124	
12/16/2016 1:57	157.63126	0.158730164	2.00342	1.39124	
12/16/2016 1:59	157.63126	0.163614169	2.00342	1.39124	
12/16/2016 2:01	**157.63126**	**0.163614169**	**2.00342**	**1.39124**	**R-06 Venting**
12/16/2016 2:03	**157.63126**	**0.163614169**	**2.00342**	**1.39124**	
12/16/2016 2:05	**157.63126**	**0.192918196**	**2.00342**	**1.39124**	
12/16/2016 2:07	**157.63126**	**0.192918196**	**2.00342**	**1.39124**	
12/16/2016 2:09	**157.63126**	**0.192918196**	**2.00342**	**1.39124**	
12/16/2016 2:11	**157.63126**	**0.246642262**	**2.00342**	**1.39124**	
12/16/2016 2:13	**157.63126**	**0.190476194**	**2.00342**	**1.39124**	
12/16/2016 2:15	157.63126	0.190476194	2.00342	1.39124	
12/16/2016 2:17	157.63126	0.190476194	2.00342	1.39124	
12/16/2016 2:19	157.63126	0.190476194	2.00342	1.39124	

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content
	GPM	Inches H2O		%
Default	P31AI2	P31AI2	P31AI4	SCRUB
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT0909B	GLYCOL_CALC
Start Time = 18:05:00	PNT	PNT	PNT	RO01
Total Time = 1days				
Period = 2mins lin	P91001	P91001	P91001	P91001
	hst101	hst101	hst101	hst101
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**
12/16/2016 2:21	157.63126	0.217338219	2.00342	1.39124
12/16/2016 2:23	157.63126	0.217338219	2.00342	1.39124
12/16/2016 2:25	157.63126	0.190476194	2.00342	1.39124
12/16/2016 2:27	157.63126	0.217338219	2.00342	1.39124
12/16/2016 2:29	157.63126	0.173382178	2.00342	1.39124
12/16/2016 2:31	157.63126	0.231990233	2.00342	1.39124
12/16/2016 2:33	157.63126	0.17582418	2.00342	1.39124
12/16/2016 2:35	157.63126	0.17582418	2.00342	1.39124
12/16/2016 2:37	157.63126	0.17582418	2.00342	1.39124
12/16/2016 2:39	157.63126	0.205128208	2.00342	1.39124
12/16/2016 2:41	157.63126	0.205128208	2.00342	1.39124
12/16/2016 2:43	157.63126	0.178266183	2.00342	1.39124
12/16/2016 2:45	157.63126	0.178266183	2.00342	1.39124
12/16/2016 2:47	157.63126	0.178266183	2.00342	1.39124
12/16/2016 2:49	157.63126	0.205128208	2.00342	1.39124
12/16/2016 2:51	157.63126	0.163614169	2.00342	1.39124
12/16/2016 2:53	157.63126	0.163614169	2.00342	1.39124
12/16/2016 2:55	157.63126	0.190476194	2.00342	1.39124
12/16/2016 2:57	157.63126	0.190476194	2.00342	1.39124
12/16/2016 2:59	157.63126	0.217338219	2.00342	1.39124
12/16/2016 3:01	157.63126	0.205128208	2.00342	1.39124
12/16/2016 3:03	157.63126	0.195360199	2.00342	1.39124
12/16/2016 3:05	157.63126	0.168498173	2.00342	1.39124
12/16/2016 3:07	157.63126	0.168498173	2.00342	1.39124
12/16/2016 3:09	157.63126	0.168498173	2.00342	1.39124
12/16/2016 3:11	157.63126	0.195360199	2.00342	1.39124
12/16/2016 3:13	157.63126	0.195360199	2.00342	1.39124
12/16/2016 3:15	157.63126	0.195360199	2.00342	1.39124
12/16/2016 3:17	157.63126	0.224664226	2.00342	1.39124
12/16/2016 3:19	157.63126	0.224664226	2.00342	1.39124
12/16/2016 3:21	157.63126	0.197802201	2.00342	1.39124
12/16/2016 3:23	157.63126	0.168498173	2.00342	1.39124
12/16/2016 3:25	157.63126	0.197802201	2.00342	1.39124
12/16/2016 3:27	157.63126	0.224664226	2.00342	1.39124
12/16/2016 3:29	157.63126	0.224664226	2.00342	1.39124
12/16/2016 3:31	157.63126	0.195360199	2.00342	1.39124
12/16/2016 3:33	157.63126	0.188034192	2.00342	1.39124
12/16/2016 3:35	157.63126	0.200244203	2.00342	1.39124
12/16/2016 3:37	157.63126	0.173382178	2.00342	1.39124
12/16/2016 3:39	157.63126	0.200244203	2.00342	1.39124
12/16/2016 3:41	157.63126	0.200244203	2.00342	1.39124
12/16/2016 3:43	157.63126	0.200244203	2.00342	1.39124
12/16/2016 3:45	157.63126	0.227106228	2.00342	1.39124
12/16/2016 3:47	157.63126	0.227106228	2.00342	1.39124
12/16/2016 3:49	157.63126	0.210012212	2.00342	1.39124
12/16/2016 3:51	157.63126	0.183150187	2.00342	1.39124
12/16/2016 3:53	157.63126	0.210012212	2.00342	1.39124
12/16/2016 3:55	157.63126	0.231990233	2.00342	1.39124
12/16/2016 3:57	157.63126	0.202686206	2.00342	1.39124
12/16/2016 3:59	157.63126	0.202686206	2.00342	1.39124
12/16/2016 4:01	157.63126	0.195360199	2.00342	1.39124
12/16/2016 4:03	157.63126	0.195360199	2.00342	1.39124
12/16/2016 4:05	157.63126	0.188034192	2.00342	1.39124
12/16/2016 4:07	155.18925	0.244200259	2.00342	1.39124
12/16/2016 4:09	155.18925	0.244200259	2.00342	1.39124
12/16/2016 4:11	155.18925	0.20757021	2.00342	1.39124
12/16/2016 4:13	155.18925	0.20757021	2.00342	1.39124
12/16/2016 4:15	155.18925	0.20757021	2.00342	1.39124
12/16/2016 4:17	158.97437	0.195360199	2.00342	1.39124
12/16/2016 4:19	158.97437	0.244200259	2.00342	1.39124
12/16/2016 4:21	158.97437	0.183150187	2.00342	1.39124
12/16/2016 4:23	158.97437	0.210012212	2.00342	1.39124

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content
	GPM	Inches H2O		%
Default	P31AI2	P31AI2	P31AI4	SCRU8
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT0909B	GLYCOL_CALC
Start Time = 18:05:00	PNT	PNT	PNT	RO01
Total Time = 1days				
Period = 2mins lin	P91001	P91001	P91001	P91001
	hst101	hst101	hst101	hst101
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**
12/16/2016 4:25	158.97437	0.210012212	2.00342	1.39124
12/16/2016 4:27	158.97437	0.283272296	2.00342	1.39124
12/16/2016 4:29	158.97437	0.249084264	2.00342	1.39124
12/16/2016 4:31	158.97437	0.200244203	2.00342	1.39124
12/16/2016 4:33	158.97437	0.246642262	2.00342	1.39124
12/16/2016 4:35	158.97437	0.273504287	1.98632	0.836669922
12/16/2016 4:37	158.97437	0.214896217	1.96923	0.28125
12/16/2016 4:39	158.97437	0.217338219	1.98632	0.28125
12/16/2016 4:41	158.97437	0.168498173	1.98632	0.28125
12/16/2016 4:43	158.97437	0.222222224	2.00342	0.28125
12/16/2016 4:45	158.97437	0.222222224	2.02051	0.28125
12/16/2016 4:47	158.97437	0.222222224	2.02051	0.28125
12/16/2016 4:49	158.97437	0.222222224	2.02051	0.28125
12/16/2016 4:51	158.97437	0.222222224	2.02051	0.28125
12/16/2016 4:53	158.97437	0.197802201	2.02051	0.28125
12/16/2016 4:55	158.97437	0.195360199	2.02051	0.28125
12/16/2016 4:57	158.97437	0.222222224	2.02051	0.28125
12/16/2016 4:59	158.97437	0.222222224	2.02051	0.28125
12/16/2016 5:01	158.97437	0.183150187	2.02051	0.28125
12/16/2016 5:03	158.97437	0.210012212	2.02051	0.28125
12/16/2016 5:05	158.97437	0.210012212	2.02051	0.28125
12/16/2016 5:07	158.97437	0.236874253	2.02051	0.831665039
12/16/2016 5:09	158.97437	0.190476194	2.00342	0.831665039
12/16/2016 5:11	158.97437	0.217338219	2.00342	0.831665039
12/16/2016 5:13	158.97437	0.214896217	2.00342	0.831665039
12/16/2016 5:15	158.97437	0.214896217	2.00342	0.831665039
12/16/2016 5:17	158.97437	0.195360199	2.00342	0.831665039
12/16/2016 5:19	158.97437	0.195360199	2.00342	0.831665039
12/16/2016 5:21	158.97437	0.195360199	2.00342	0.831665039
12/16/2016 5:23	158.97437	0.222222224	1.98632	0.831665039
12/16/2016 5:25	158.97437	0.222222224	2.00342	0.831665039
12/16/2016 5:27	158.97437	0.222222224	2.00342	0.831665039
12/16/2016 5:29	158.97437	0.202686206	2.00342	0.831665039
12/16/2016 5:31	158.97437	0.229548231	2.00342	0.831665039
12/16/2016 5:33	158.97437	0.200244203	2.00342	0.831665039
12/16/2016 5:35	158.97437	0.227106228	2.00342	0.831665039
12/16/2016 5:37	158.97437	0.227106228	2.00342	0.831665039
12/16/2016 5:39	158.97437	0.227106228	1.98632	0.831665039
12/16/2016 5:41	158.97437	0.227106228	1.98632	0.831665039
12/16/2016 5:43	158.97437	0.227106228	1.98632	0.831665039
12/16/2016 5:45	158.97437	0.168498173	1.98632	0.831665039
12/16/2016 5:47	158.97437	0.195360199	1.98632	0.831665039
12/16/2016 5:49	158.97437	0.222222224	1.98632	0.831665039
12/16/2016 5:51	158.97437	0.210012212	1.98632	0.831665039
12/16/2016 5:53	158.97437	0.219780222	1.98632	0.831665039
12/16/2016 5:55	158.97437	0.219780222	1.98632	0.831665039
12/16/2016 5:57	158.97437	0.219780222	1.98632	0.831665039
12/16/2016 5:59	158.97437	0.246642262	1.98632	0.831665039
12/16/2016 6:01	158.97437	0.212454215	2.00342	0.831665039
12/16/2016 6:03	158.97437	0.239316255	2.00342	0.831665039
12/16/2016 6:05	158.97437	0.212454215	2.00342	0.831665039
12/16/2016 6:07	158.97437	0.212454215	2.00342	0.831665039
12/16/2016 6:09	158.97437	0.212454215	1.98632	0.831665039
12/16/2016 6:11	158.97437	0.146520153	1.98632	0.831665039
12/16/2016 6:13	158.97437	0.229548231	1.98632	0.831665039
12/16/2016 6:15	158.97437	0.229548231	1.98632	0.831665039
12/16/2016 6:17	158.97437	0.188034192	1.98632	0.831665039
12/16/2016 6:19	158.97437	0.214896217	1.98632	0.831665039
12/16/2016 6:21	158.97437	0.185592189	1.98632	0.831665039
12/16/2016 6:23	158.97437	0.205128208	1.98632	0.831665039
12/16/2016 6:25	158.97437	0.202686206	1.98632	0.831665039
12/16/2016 6:27	158.97437	0.229548231	1.98632	0.831665039

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content	
	GPM	Inches H2O		%	
Default	P31AI2	P31AI2	P31AI4	SCRUB	
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT0909B	GLYCOL_CALC	
Start Time = 18:05:00	PNT	PNT	PNT	RO01	
Total Time = 1days					
Period = 2mins lin	P91001	P91001	P91001	P91001	
	hst101	hst101	hst101	hst101	
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**	
12/16/2016 6:29	158.97437	0.229548231	1.98632	0.831665039	
12/16/2016 6:31	158.97437	0.229548231	1.98632	0.831665039	
12/16/2016 6:33	158.97437	0.229548231	1.98632	0.831665039	
12/16/2016 6:35	158.97437	0.185592189	1.98632	0.831665039	
12/16/2016 6:37	158.97437	0.212454215	1.98632	0.831665039	
12/16/2016 6:39	158.97437	0.239316255	1.98632	0.831665039	
12/16/2016 6:41	158.97437	0.239316255	1.98632	0.831665039	
12/16/2016 6:43	158.97437	0.192918196	1.98632	0.831665039	
12/16/2016 6:45	158.97437	0.192918196	1.98632	0.831665039	
12/16/2016 6:47	158.97437	0.246642262	1.98632	0.831665039	
12/16/2016 6:49	158.97437	0.214896217	1.98632	0.831665039	
12/16/2016 6:51	158.97437	0.214896217	1.98632	0.831665039	
12/16/2016 6:53	158.97437	0.205128208	1.98632	0.831665039	
12/16/2016 6:55	158.97437	0.231990233	1.98632	0.831665039	
12/16/2016 6:57	158.97437	0.231990233	1.98632	0.831665039	
12/16/2016 6:59	158.97437	0.17582418	1.98632	0.831665039	
12/16/2016 7:01	158.97437	0.202686206	1.98632	0.831665039	
12/16/2016 7:03	158.97437	0.202686206	1.98632	0.831665039	
12/16/2016 7:05	158.97437	0.202686206	1.98632	0.831665039	
12/16/2016 7:07	158.97437	0.200244203	1.98632	0.831665039	
12/16/2016 7:09	158.97437	0.200244203	1.98632	0.831665039	
12/16/2016 7:11	158.97437	0.227106228	1.98632	0.831665039	
12/16/2016 7:13	158.97437	0.227106228	1.98632	0.831665039	
12/16/2016 7:15	158.97437	0.190476194	1.98632	0.831665039	
12/16/2016 7:17	158.97437	0.217338219	1.98632	0.831665039	
12/16/2016 7:19	158.97437	0.246642262	1.98632	0.831665039	
12/16/2016 7:21	158.97437	0.246642262	1.98632	0.831665039	
12/16/2016 7:23	158.97437	0.246642262	1.98632	0.831665039	
12/16/2016 7:25	158.97437	0.219780222	1.98632	0.831665039	
12/16/2016 7:27	158.97437	0.205128208	1.98632	0.831665039	
12/16/2016 7:29	158.97437	0.202686206	1.98632	0.831665039	
12/16/2016 7:31	158.97437	0.229548231	1.98632	0.831665039	
12/16/2016 7:33	158.97437	0.222222224	1.98632	0.831665039	
12/16/2016 7:35	158.97437	0.222222224	1.98632	0.831665039	
12/16/2016 7:37	158.97437	0.222222224	1.98632	0.831665039	
12/16/2016 7:39	158.97437	0.200244203	1.98632	0.831665039	
12/16/2016 7:41	158.97437	0.227106228	1.98632	0.831665039	
12/16/2016 7:43	158.97437	0.217338219	1.98632	0.831665039	
12/16/2016 7:45	158.97437	0.227106228	1.98632	0.831665039	
12/16/2016 7:47	158.97437	0.227106228	1.98632	0.831665039	
12/16/2016 7:49	158.97437	0.227106228	1.98632	0.831665039	
12/16/2016 7:51	158.97437	0.200244203	1.98632	0.831665039	
12/16/2016 7:53	158.97437	0.227106228	1.98632	0.831665039	
12/16/2016 7:55	158.97437	0.180708185	1.98632	0.831665039	
12/16/2016 7:57	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 7:59	158.97437	0.23443225	1.98632	0.831665039	
12/16/2016 8:01	158.97437	0.205128208	1.98632	0.831665039	
12/16/2016 8:03	158.97437	0.205128208	1.98632	0.831665039	
12/16/2016 8:05	158.97437	0.205128208	1.98632	0.831665039	
12/16/2016 8:07	**158.97437**	**0.195360199**	**1.98632**	**0.831665039**	**R-04 Venting**
12/16/2016 8:09	**158.97437**	**0.195360199**	**1.98632**	**0.831665039**	
12/16/2016 8:11	**158.97437**	**0.317460328**	**1.98632**	**0.831665039**	
12/16/2016 8:13	**158.97437**	**0.222222224**	**1.98632**	**0.831665039**	
12/16/2016 8:15	**158.97437**	**0.222222224**	**1.98632**	**0.831665039**	
12/16/2016 8:17	**158.97437**	**0.214896217**	**1.98632**	**0.831665039**	
12/16/2016 8:19	158.97437	0.202686206	1.98632	0.831665039	
12/16/2016 8:21	158.97437	0.17582418	1.98632	0.831665039	
12/16/2016 8:23	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 8:25	158.97437	0.180708185	1.98632	0.831665039	
12/16/2016 8:27	158.97437	0.17582418	1.98632	0.831665039	
12/16/2016 8:29	158.97437	0.202686206	1.96923	0.831665039	
12/16/2016 8:31	158.97437	0.231990233	1.96923	0.831665039	

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content	
	GPM	Inches H2O		%	
Default	P31AI2	P31AI2	P31AI4	SCRUB	
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT0909B	GLYCOL_CALC	
Start Time = 18:05:00	PNT	PNT	PNT	RO01	
Total Time = 1days					
Period = 2mins lin	P91001	P91001	P91001	P91001	
	hst101	hst101	hst101	hst101	
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**	
12/16/2016 8:33	158.97437	0.20757021	1.96923	0.831665039	
12/16/2016 8:35	158.97437	0.20757021	1.96923	0.831665039	
12/16/2016 8:37	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 8:39	158.97437	0.23443225	1.98632	0.831665039	
12/16/2016 8:41	158.97437	0.23443225	1.98632	0.831665039	
12/16/2016 8:43	158.97437	0.23443225	1.98632	0.831665039	
12/16/2016 8:45	158.97437	0.224664226	1.98632	0.831665039	
12/16/2016 8:47	158.97437	0.190476194	1.98632	0.831665039	
12/16/2016 8:49	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 8:51	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 8:53	158.97437	0.190476194	1.98632	0.831665039	
12/16/2016 8:55	158.97437	0.217338219	1.98632	0.831665039	
12/16/2016 8:57	158.97437	0.249084264	1.98632	0.831665039	
12/16/2016 8:59	158.97437	0.202686206	1.98632	0.831665039	
12/16/2016 9:01	158.97437	0.136752144	1.98632	0.831665039	
12/16/2016 9:03	158.97437	0.222222224	1.98632	0.831665039	
12/16/2016 9:05	158.97437	0.249084264	1.98632	0.831665039	
12/16/2016 9:07	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 9:09	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 9:11	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 9:13	158.97437	0.205128208	1.98632	0.831665039	
12/16/2016 9:15	158.97437	0.205128208	1.98632	0.831665039	
12/16/2016 9:17	158.97437	0.231990233	1.98632	0.831665039	
12/16/2016 9:19	158.97437	0.180708185	1.98632	0.831665039	
12/16/2016 9:21	158.97437	0.210012212	1.98632	0.831665039	
12/16/2016 9:23	158.97437	0.202686206	1.98632	0.831665039	
12/16/2016 9:25	158.97437	0.229548231	1.98632	0.831665039	
12/16/2016 9:27	**158.97437**	**0.229548231**	**1.98632**	**0.831665039**	**R-06 Venting**
12/16/2016 9:29	**158.97437**	**0.202686206**	**1.96923**	**0.831665039**	
12/16/2016 9:31	**158.97437**	**0.229548231**	**1.96923**	**0.831665039**	
12/16/2016 9:33	**158.97437**	**0.229548231**	**1.96923**	**0.831665039**	
12/16/2016 9:35	**158.97437**	**0.219780222**	**1.96923**	**0.831665039**	
12/16/2016 9:37	**158.97437**	**0.246642262**	**1.98632**	**0.831665039**	
12/16/2016 9:39	**158.97437**	**0.205128208**	**1.98632**	**0.831665039**	
12/16/2016 9:41	**158.97437**	**0.231990233**	**1.98632**	**0.831665039**	
12/16/2016 9:43	**158.97437**	**0.17582418**	**1.98632**	**0.831665039**	
12/16/2016 9:45	158.97437	0.202686206	1.98632	0.831665039	
12/16/2016 9:47	158.97437	0.202686206	1.98632	0.831665039	
12/16/2016 9:49	158.97437	0.180708185	1.98632	0.831665039	
12/16/2016 9:51	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 9:53	158.97437	0.23443225	1.98632	0.831665039	
12/16/2016 9:55	158.97437	0.173382178	1.98632	0.831665039	
12/16/2016 9:57	158.97437	0.231990233	1.98632	0.831665039	
12/16/2016 9:59	158.97437	0.231990233	1.98632	0.831665039	
12/16/2016 10:01	158.97437	0.205128208	1.98632	0.831665039	
12/16/2016 10:03	158.97437	0.205128208	1.98632	0.831665039	
12/16/2016 10:05	158.97437	0.195360199	1.98632	0.831665039	
12/16/2016 10:07	158.97437	0.222222224	1.98632	0.831665039	
12/16/2016 10:09	158.97437	0.249084264	1.98632	0.831665039	
12/16/2016 10:11	158.97437	0.219780222	1.98632	0.831665039	
12/16/2016 10:13	158.97437	0.192918196	1.98632	0.831665039	
12/16/2016 10:15	158.97437	0.219780222	1.98632	0.831665039	
12/16/2016 10:17	158.97437	0.219780222	1.98632	0.831665039	
12/16/2016 10:19	158.97437	0.178266183	1.98632	0.831665039	
12/16/2016 10:21	158.97437	0.23443225	1.98632	0.831665039	
12/16/2016 10:23	158.97437	0.236874253	1.98632	0.831665039	
12/16/2016 10:25	158.97437	0.236874253	1.98632	0.831665039	
12/16/2016 10:27	158.97437	0.20757021	1.98632	0.831665039	
12/16/2016 10:29	158.97437	0.23443225	1.98632	0.831665039	
12/16/2016 10:31	158.97437	0.185592189	1.98632	0.831665039	
12/16/2016 10:33	158.97437	0.212454215	1.96923	0.831665039	
12/16/2016 10:35	158.97437	0.244200259	1.98632	0.831665039	

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content	
	GPM	Inches H2O		%	
Default	P31AI2	P31AI2	P31AI4	SCRUB	
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT0909B	GLYCOL_CALC	
Start Time = 18:05:00	PNT	PNT	PNT	RO01	
Total Time = 1days					
Period = 2mins lin	P91001	P91001	P91001	P91001	
	hst101	hst101	hst101	hst101	
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**	
12/16/2016 10:37	158.97437	0.244200259	1.98632	0.831665039	
12/16/2016 10:39	158.97437	0.192918196	1.98632	0.831665039	
12/16/2016 10:41	161.29427	0.139194146	1.98632	0.831665039	
12/16/2016 10:43	161.29427	0.227106228	1.98632	0.831665039	
12/16/2016 10:45	161.29427	0.192918196	1.98632	0.831665039	
12/16/2016 10:47	161.29427	0.222222224	1.98632	0.831665039	
12/16/2016 10:49	161.29427	0.249084264	1.98632	0.831665039	
12/16/2016 10:51	161.29427	0.249084264	1.98632	0.831665039	
12/16/2016 10:53	161.29427	0.185592189	1.98632	0.831665039	
12/16/2016 10:55	161.29427	0.214896217	1.98632	0.831665039	
12/16/2016 10:57	161.29427	0.214896217	2.00342	0.831665039	
12/16/2016 10:59	161.29427	0.195360199	2.00342	0.831665039	
12/16/2016 11:01	161.29427	0.15384616	2.00342	0.831665039	
12/16/2016 11:03	161.29427	0.15384616	1.98632	0.831665039	
12/16/2016 11:05	161.29427	0.180708185	1.98632	0.831665039	
12/16/2016 11:07	161.29427	0.178266183	2.00342	0.831665039	
12/16/2016 11:09	161.29427	0.178266183	2.00342	0.831665039	
12/16/2016 11:11	161.29427	0.205128208	2.00342	0.831665039	
12/16/2016 11:13	161.29427	0.166056171	2.00342	0.831665039	
12/16/2016 11:15	161.29427	0.192918196	2.00342	0.831665039	
12/16/2016 11:17	161.29427	0.192918196	2.00342	0.831665039	
12/16/2016 11:19	161.29427	0.219780222	2.00342	0.831665039	
12/16/2016 11:21	161.29427	0.180708185	2.00342	0.831665039	
12/16/2016 11:23	161.29427	0.20757021	2.00342	0.831665039	
12/16/2016 11:25	161.29427	0.188034192	2.00342	0.831665039	
12/16/2016 11:27	161.29427	0.188034192	2.00342	0.831665039	
12/16/2016 11:29	161.29427	0.214896217	1.98632	0.831665039	
12/16/2016 11:31	161.29427	0.229548231	1.98632	0.831665039	
12/16/2016 11:33	161.29427	0.229548231	1.98632	0.831665039	
12/16/2016 11:35	161.29427	0.229548231	1.98632	0.831665039	
12/16/2016 11:37	161.29427	0.202686206	1.98632	0.831665039	
12/16/2016 11:39	156.04396	0.202686206	1.98632	0.831665039	
12/16/2016 11:41	156.04396	0.205128208	1.98632	0.831665039	
12/16/2016 11:43	156.04396	0.231990233	1.98632	0.831665039	
12/16/2016 11:45	156.04396	0.231990233	1.98632	0.831665039	
12/16/2016 11:47	156.04396	0.231990233	1.98632	0.831665039	
12/16/2016 11:49	156.04396	0.231990233	1.98632	0.831665039	
12/16/2016 11:51	156.04396	0.185592189	1.96923	0.831665039	
12/16/2016 11:53	156.04396	0.212454215	1.96923	0.831665039	
12/16/2016 11:55	156.04396	0.183150187	1.96923	0.831665039	
12/16/2016 11:57	156.04396	0.210012212	1.96923	1.38257	
12/16/2016 11:59	156.04396	0.236874253	1.96923	1.38257	
12/16/2016 12:01	**156.04396**	**0.236874253**	**1.96923**	**1.38257**	**R-06 Venting**
12/16/2016 12:03	**156.04396**	**0.190476194**	**1.96923**	**1.38257**	
12/16/2016 12:05	**156.04396**	**0.217338219**	**1.96923**	**1.38257**	
12/16/2016 12:07	**159.70695**	**0.20757021**	**1.96923**	**1.38257**	
12/16/2016 12:09	159.70695	0.23443225	1.96923	1.38257	
12/16/2016 12:11	159.70695	0.23443225	1.96923	1.38257	
12/16/2016 12:13	159.70695	0.23443225	1.96923	1.38257	
12/16/2016 12:15	159.70695	0.23443225	1.96923	1.38257	
12/16/2016 12:17	159.70695	0.23443225	1.96923	1.38257	
12/16/2016 12:19	159.70695	0.20757021	1.96923	1.38257	
12/16/2016 12:21	159.70695	0.23443225	1.96923	1.38257	
12/16/2016 12:23	159.70695	0.23443225	1.96923	1.38257	
12/16/2016 12:25	159.70695	0.210012212	1.96923	1.38257	
12/16/2016 12:27	159.70695	0.197802201	1.95214	1.38257	
12/16/2016 12:29	159.70695	0.185592189	1.95214	1.38257	
12/16/2016 12:31	159.70695	0.212454215	1.96923	0.831970215	
12/16/2016 12:33	159.70695	0.14407815	1.96923	0.831970215	
12/16/2016 12:35	159.70695	0.202686206	1.96923	0.831970215	
12/16/2016 12:37	159.70695	0.202686206	1.96923	0.831970215	
12/16/2016 12:39	159.70695	0.231990233	1.96923	0.831970215	

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content	
	GPM	Inches H2O		%	
Default	P31AI2	P31AI2	P31AI4	SCRUB	
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT0909B	GLYCOL_CALC	
Start Time = 18:05:00	PNT	PNT	PNT	RO01	
Total Time = 1days					
Period = 2mins lin	P91001	P91001	P91001	P91001	
	hst101	hst101	hst101	hst101	
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**	
12/16/2016 12:41	159.70695	0.197802201	1.98632	0.831970215	
12/16/2016 12:43	154.45665	0.20757021	2.00342	0.831970215	
12/16/2016 12:45	160.56166	0.183150187	2.00342	0.831970215	
12/16/2016 12:47	160.56166	0.210012212	2.00342	0.831970215	
12/16/2016 12:49	160.56166	0.239316255	2.00342	0.831970215	
12/16/2016 12:51	160.56166	0.170940176	2.00342	0.831970215	
12/16/2016 12:53	160.56166	0.217338219	2.00342	0.831970215	
12/16/2016 12:55	160.56166	0.200244203	2.00342	0.831970215	
12/16/2016 12:57	160.56166	0.200244203	1.98632	0.831970215	
12/16/2016 12:59	160.56166	0.200244203	1.98632	0.831970215	
12/16/2016 13:01	160.56166	0.227106228	1.98632	0.831970215	
12/16/2016 13:03	160.56166	0.227106228	1.98632	0.831970215	
12/16/2016 13:05	160.56166	0.188034192	2.00342	0.831970215	
12/16/2016 13:07	160.56166	0.214896217	2.00342	0.831970215	
12/16/2016 13:09	160.56166	0.214896217	2.00342	0.831970215	
12/16/2016 13:11	**160.56166**	**0.212454215**	**2.00342**	**0.831970215**	**R-03 Venting**
12/16/2016 13:13	**160.56166**	**0.212454215**	**2.00342**	**0.831970215**	
12/16/2016 13:15	**160.56166**	**0.197802201**	**2.00342**	**0.831970215**	
12/16/2016 13:17	160.56166	0.227106228	2.00342	0.831970215	
12/16/2016 13:19	160.56166	0.178266183	2.00342	0.831970215	
12/16/2016 13:21	**160.56166**	**0.20757021**	**1.98632**	**0.831970215**	**R-01 Venting**
12/16/2016 13:23	**160.56166**	**0.180708185**	**1.98632**	**0.831970215**	
12/16/2016 13:25	**160.56166**	**0.20757021**	**1.96923**	**0.831970215**	
12/16/2016 13:27	**160.56166**	**0.20757021**	**1.96923**	**0.281188965**	
12/16/2016 13:29	**160.56166**	**0.236874253**	**1.98632**	**0.281188965**	
12/16/2016 13:31	**160.56166**	**0.236874253**	**2.00342**	**0.281188965**	
12/16/2016 13:33	**160.56166**	**0.227106228**	**2.00342**	**0.281188965**	
12/16/2016 13:35	**160.56166**	**0.227106228**	**2.00342**	**0.281188965**	
12/16/2016 13:37	**160.56166**	**0.190476194**	**2.00342**	**0.281188965**	
12/16/2016 13:39	**160.56166**	**0.217338219**	**2.00342**	**0.281188965**	
12/16/2016 13:41	**160.56166**	**0.170940176**	**2.00342**	**0.281188965**	
12/16/2016 13:43	**160.56166**	**0.224664226**	**2.00342**	**0.281188965**	
12/16/2016 13:45	160.56166	0.180708185	1.98632	0.281188965	
12/16/2016 13:47	160.56166	0.180708185	1.98632	0.281188965	
12/16/2016 13:49	160.56166	0.180708185	1.98632	0.281188965	
12/16/2016 13:51	160.56166	0.20757021	2.00342	0.833129883	
12/16/2016 13:53	160.56166	0.20757021	2.00342	0.833129883	
12/16/2016 13:55	160.56166	0.253968269	2.00342	0.833129883	
12/16/2016 13:57	160.56166	0.227106228	2.00342	0.833129883	
12/16/2016 13:59	160.56166	0.227106228	2.00342	0.833129883	
12/16/2016 14:01	160.56166	0.227106228	2.00342	0.833129883	
12/16/2016 14:03	160.56166	0.214896217	2.00342	0.833129883	
12/16/2016 14:05	160.56166	0.214896217	1.98632	0.833129883	
12/16/2016 14:07	160.56166	0.241758257	1.98632	0.833129883	
12/16/2016 14:09	160.56166	0.241758257	1.98632	1.38373	
12/16/2016 14:11	160.56166	0.229548231	1.98632	1.38373	
12/16/2016 14:13	160.56166	0.229548231	1.98632	1.38373	
12/16/2016 14:15	160.56166	0.229548231	1.96923	1.38373	
12/16/2016 14:17	160.56166	0.200244203	1.96923	1.38373	
12/16/2016 14:19	160.56166	0.200244203	1.93504	0.829833984	
12/16/2016 14:21	160.56166	0.222222224	1.95214	0.829833984	
12/16/2016 14:23	160.56166	0.222222224	1.96923	0.829833984	
12/16/2016 14:25	160.56166	0.217338219	1.96923	0.829833984	
12/16/2016 14:27	160.56166	0.244200259	1.98632	0.829833984	
12/16/2016 14:29	160.56166	0.188034192	1.98632	0.829833984	
12/16/2016 14:31	160.56166	0.244200259	1.98632	0.829833984	
12/16/2016 14:33	160.56166	0.217338219	1.98632	0.829833984	
12/16/2016 14:35	160.56166	0.190476194	1.98632	0.829833984	
12/16/2016 14:37	160.56166	0.190476194	1.98632	0.829833984	
12/16/2016 14:39	154.70085	0.217338219	1.96923	0.829833984	
12/16/2016 14:41	154.70085	0.217338219	1.98632	0.829833984	
12/16/2016 14:43	154.70085	0.170940176	1.98632	0.829833984	

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content	
	GPM	Inches H2O		%	
Default	P31AI2	P31AI2	P31AI4	SCRUB	
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT09098	GLYCOL_CALC	
Start Time = 18:05:00	PNT	PNT	PNT	RO01	
Total Time = 1days					
Period = 2mins lin	P91001	P91001	P91001	P91001	
	hst101	hst101	hst101	hst101	
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**	
12/16/2016 14:45	154.70085	0.197802201	2.00342	0.829833984	
12/16/2016 14:47	154.70085	0.197802201	2.00342	0.829833984	
12/16/2016 14:49	154.70085	0.197802201	2.00342	0.829833984	
12/16/2016 14:51	154.70085	0.224664226	2.00342	0.829833984	
12/16/2016 14:53	154.70085	0.224664226	2.00342	0.829833984	
12/16/2016 14:55	154.70085	0.224664226	2.00342	0.829833984	
12/16/2016 14:57	154.70085	0.224664226	2.00342	0.829833984	
12/16/2016 14:59	154.70085	0.224664226	2.00342	1.38043	
12/16/2016 15:01	154.70085	0.197802201	2.00342	1.38043	
12/16/2016 15:03	159.70695	0.224664226	1.98632	1.38043	
12/16/2016 15:05	159.70695	0.224664226	1.98632	1.38043	
12/16/2016 15:07	159.70695	0.224664226	1.96923	1.38043	
12/16/2016 15:09	159.70695	0.224664226	1.96923	1.38043	
12/16/2016 15:11	159.70695	0.222222224	1.96923	1.93213	
12/16/2016 15:13	159.70695	0.241758257	1.96923	1.93213	
12/16/2016 15:15	**159.70695**	**0.236874253**	**1.96923**	**1.93213**	**R-03 Venting**
12/16/2016 15:17	**159.70695**	**0.249084264**	**1.95214**	**1.93213**	
12/16/2016 15:19	**159.70695**	**0.231990233**	**1.93504**	**1.93213**	
12/16/2016 15:21	159.70695	0.231990233	1.93504	1.93213	
12/16/2016 15:23	159.70695	0.258852273	1.93504	1.93213	
12/16/2016 15:25	159.70695	0.229548231	1.91795	1.37805	
12/16/2016 15:27	159.70695	0.212454215	1.91795	1.37805	
12/16/2016 15:29	159.70695	0.239316255	1.93504	1.37805	
12/16/2016 15:31	159.70695	0.239316255	1.93504	1.37805	
12/16/2016 15:33	159.70695	0.239316255	1.95214	1.37805	
12/16/2016 15:35	159.70695	0.23443225	1.95214	1.37805	
12/16/2016 15:37	159.70695	0.23443225	1.96923	1.37805	
12/16/2016 15:39	159.70695	0.23443225	1.96923	1.37805	
12/16/2016 15:41	159.70695	0.23443225	1.96923	1.37805	
12/16/2016 15:43	159.70695	0.23443225	1.96923	1.37805	
12/16/2016 15:45	159.70695	0.202686206	1.96923	1.37805	
12/16/2016 15:47	159.70695	0.23443225	1.96923	1.37805	
12/16/2016 15:49	159.70695	0.210012212	1.96923	1.37805	
12/16/2016 15:51	159.70695	0.236874253	1.98632	1.37805	
12/16/2016 15:53	159.70695	0.210012212	1.98632	1.37805	
12/16/2016 15:55	159.70695	0.224664226	1.98632	1.37805	
12/16/2016 15:57	159.70695	0.251526266	1.98632	1.37805	
12/16/2016 15:59	159.70695	0.224664226	1.96923	1.37805	
12/16/2016 16:01	159.70695	0.210012212	1.96923	1.37805	
12/16/2016 16:03	159.70695	0.236874253	1.96923	0.82635498	
12/16/2016 16:05	159.70695	0.241758257	1.96923	0.82635498	
12/16/2016 16:07	159.70695	0.241758257	1.96923	0.82635498	
12/16/2016 16:09	159.70695	0.241758257	1.98632	0.82635498	
12/16/2016 16:11	159.70695	0.271062285	1.98632	0.82635498	
12/16/2016 16:13	159.70695	0.29792431	1.98632	0.82635498	
12/16/2016 16:15	159.70695	0.275946289	1.98632	0.82635498	
12/16/2016 16:17	159.70695	0.251526266	1.98632	0.82635498	
12/16/2016 16:19	159.70695	0.263736278	1.98632	0.82635498	
12/16/2016 16:21	159.70695	0.197802201	1.98632	0.82635498	
12/16/2016 16:23	159.70695	0.224664226	1.98632	0.82635498	
12/16/2016 16:25	159.70695	0.210012212	1.98632	0.82635498	
12/16/2016 16:27	159.70695	0.236874253	1.98632	0.82635498	
12/16/2016 16:29	159.70695	0.229548231	1.98632	0.82635498	
12/16/2016 16:31	159.70695	0.200244203	1.98632	0.82635498	
12/16/2016 16:33	159.70695	0.229548231	1.98632	0.82635498	
12/16/2016 16:35	159.70695	0.229548231	1.98632	0.82635498	
12/16/2016 16:37	159.70695	0.256410271	1.98632	0.82635498	
12/16/2016 16:39	159.70695	0.224664226	1.98632	0.82635498	
12/16/2016 16:41	159.70695	0.224664226	1.98632	0.82635498	
12/16/2016 16:43	159.70695	0.224664226	1.98632	0.82635498	
12/16/2016 16:45	159.70695	0.251526266	1.98632	0.82635498	
12/16/2016 16:47	159.70695	0.195360199	1.98632	0.82635498	

	Scrubber Flow	Pressure Column Differential	pH - 1	Glycol content	
	GPM	Inches H2O		%	
Default	P31AI2	P31AI2	P31AI4	SCRUB	
Start Date = 12/16/16	R37FT0908	R37DPT0904	R37AT09098	GLYCOL_CALC	
Start Time = 18:05:00	PNT	PNT	PNT	RO01	
Total Time = 1days					
Period = 2mins lin	P91001	P91001	P91001	P91001	
	hst101	hst101	hst101	hst101	
Average	**159.2134747**	**0.209805323**	**1.983597569**	**1.211944148**	
12/16/2016 16:49	159.70695	0.195360199	1.98632	0.82635498	
12/16/2016 16:51	159.70695	0.222222224	1.98632	0.82635498	
12/16/2016 16:53	159.70695	0.222222224	1.98632	0.82635498	
12/16/2016 16:55	159.70695	0.222222224	1.98632	0.82635498	
12/16/2016 16:57	159.70695	0.249084264	1.98632	0.82635498	
12/16/2016 16:59	159.70695	0.217338219	1.98632	0.82635498	
12/16/2016 17:01	159.70695	0.217338219	1.98632	0.82635498	
12/16/2016 17:03	159.70695	0.217338219	1.98632	0.82635498	
12/16/2016 17:05	159.70695	0.244200259	1.98632	0.82635498	
12/16/2016 17:07	159.70695	0.244200259	1.98632	0.82635498	
12/16/2016 17:09	159.70695	0.188034192	1.98632	0.82635498	
12/16/2016 17:11	159.70695	0.214896217	1.98632	0.82635498	
12/16/2016 17:13	159.70695	0.241758257	1.98632	0.82635498	
12/16/2016 17:15	159.70695	0.241758257	1.98632	0.82635498	
12/16/2016 17:17	159.70695	0.241758257	1.98632	0.82635498	
12/16/2016 17:19	159.70695	0.241758257	1.98632	0.82635498	
12/16/2016 17:21	159.70695	0.241758257	1.98632	0.82635498	
12/16/2016 17:23	159.70695	0.241758257	1.98632	0.82635498	
12/16/2016 17:25	159.70695	0.241758257	1.98632	0.82635498	
12/16/2016 17:27	159.70695	0.183150187	2.00342	0.82635498	
12/16/2016 17:29	159.70695	0.210012212	2.00342	0.82635498	
12/16/2016 17:31	159.70695	0.210012212	2.00342	0.82635498	
12/16/2016 17:33	159.70695	0.236874253	2.00342	0.82635498	
12/16/2016 17:35	159.70695	0.200244203	1.98632	0.82635498	
12/16/2016 17:37	159.70695	0.200244203	1.98632	0.82635498	
12/16/2016 17:39	159.70695	0.227106228	1.98632	0.82635498	
12/16/2016 17:41	159.70695	0.227106228	1.98632	0.82635498	
12/16/2016 17:43	**159.70695**	**0.190476194**	**2.00342**	**0.82635498**	**R-06 Venting**
12/16/2016 17:45	**159.70695**	**0.185592189**	**2.00342**	**0.82635498**	
12/16/2016 17:47	**159.70695**	**0.239316255**	**2.00342**	**0.82635498**	
12/16/2016 17:49	**159.70695**	**0.239316255**	**2.00342**	**0.82635498**	
12/16/2016 17:51	**159.70695**	**0.188034192**	**2.00342**	**0.82635498**	
12/16/2016 17:53	**159.70695**	**0.214896217**	**2.00342**	**0.82635498**	
12/16/2016 17:55	**159.70695**	**0.214896217**	**2.00342**	**0.82635498**	
12/16/2016 17:57	**159.70695**	**0.200244203**	**2.00342**	**0.82635498**	
12/16/2016 17:59	159.70695	0.197802201	2.00342	0.82635498	
12/16/2016 18:01	159.70695	0.227106228	2.00342	0.82635498	
12/16/2016 18:03	159.70695	0.227106228	2.00342	0.82635498	

End of Appendix

APPENDIX H: CLEANAIR RESUMES AND CERTIFICATIONS

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CleanAir

Kenny Sullivan
Field Engineer/Project Manager

Professional Profile

Mr. Sullivan started working for Clean Air Engineering in June of 2009. He was hired as a Field Engineer. Since starting, Mr. Sullivan has been involved with projects utilizing EPA Methods 1 through 29, 201, 201A, 202, Conditional Test Method (CTM) 027, and Other Test Methods (OTM) 027 and 028, from the planning stage through field testing. He has valuable on-site experience leading Engineers and Field Technicians to execute applicable EPA methods for numerous projects worth hundreds of thousands of dollars to our clients. Has been a field job leader since June of 2010 and has been a project manager since January of 2014. Other skills acquired over Mr. Sullivan's four plus years of experience include 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, and experience in FTIR (Fourier Transform Infrared Spectrometer) analysis.

Relevant Experience

Big Rivers Electric Corporation (BREC); Hawesville, KY
Worked in correlation with Noltec Systems and ADA at the Green, Wilson, and Coleman power generating stations to reduce mercury emissions with powder activated carbon (PAC) and lime injection. Made sure BREC was still within particulate limits despite carbon injection by executing EPA method 5/202. Accumulated diagnostic sulfur trioxide data through the Draft ASTM CCM method to maximize PAC efficiency. Performed on-site mercury analysis with the Ohio Lumex spectrometer and on-site laboratory analysis for particulate matter and sulfates.

Sasol Synfuels (Pty) Ltd.; Secunda, South Africa
Aided in accumulating dust concentration data and mass loading at various points in the Fluidized Catalytic Cracking Unit (FCCU). Performed 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 collection.

Marathon Petroleum Company; Detroit, MI
Aided MPC 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's 1, 2, 3A, 4, 5/202, 6C, 7E, 25A, 10, and 18, and ASTM's Draft CCM at various locations throughout the Detroit refinery. Set up and operated CEMS and performed on-site lab analysis while leading the job and taking care of administrative duties.

Owens Corning Science & Tech; Apeldoorn, Netherlands
Planned, managed, led, and executed this job from the beginning to the end. Ran an FTIR and performed EPA methods 320 and 25A to provide carbon monoxide, hydrocarbon, and formaldehyde diagnostic data to Owens Corning at several key points along their process line. Processed and analyzed a plethora of raw data into utile and interpretable formats, and drafted an in-depth report.

Equistar Chemicals, LP; Morris, IL
Conducted a test program to demonstrate that the uncontrolled emissions from Low Density Polyethylene Lines (LDPE) and operation of the recently installed valveless regenerative thermal oxidizer (VRTO) are in compliance with 40 CFR 60 Subpart DDD, 40 CFR 63 Subpart FFFF, as well as state construction permits. Set up and ran inlet/outlet total hydrocarbon analyzers to determine oxidizing efficiency while continuously tracking pressure and temperature in the ducts through the use of P/T transducers. Also collected wet bulb/dry bulb moisture and static data while crew members ran gas chromatography analyzers.

Southern Company Generation; Smyrna, GA
Set up and ran an FTIR along with its associated MKS 2030 program to test for formaldehyde at the stack exit of a combustion turbine in order to show compliance with a permit (40CFR Part 63, Subpart YYYY) limit of 91 ppbdv at 15% oxygen. Performed EPA Method 320 combined with 3A to determine the formaldehyde, moisture, and oxygen concentrations while partnering with Southern's testing department. Downloaded and exported raw data into a custom spreadsheet for readable and presentable interpretation and analysis.

Wausau Paper; Rhinelander, WI
Led a field crew in executing an annual CEMS RATA and particulate testing. Set up and operated CEMS equipment utilizing EPA Method 7E and PS-2 with the use of a Thermo 42i NO_X analyzer while conducting all job administrative duties and logistics. Processed CEMS and plant operational data to submit real-time updates of the RATA status.

Ameren UE; Labadie, MO & 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 system showing real-time NO_X, O_2, CO_2,, 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.

Black & Veatch; Springfield, IL
Led a small crew to utilize real-time analyzers to determine SO_2, O_2, and CO_2 concentrations at the Stack and Absorber Inlet for tuning and diagnostic purposes. Also, conducted flow and temperature traverses to ensure mass balance while evaluating field data to obtain preliminary results and coordinating on-site meetings with the clients and plant managers.

Professional Certifications

Qualified Stack Testing Individual (QSTI) Groups I, II, III and IV, Application No. 2012-711

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 31st DAY OF JULY 2012 AND EFFECTIVE UNTIL JULY 30TH, 2017

Peter R. Westlin, QSTI/QSTO Review Board

C. David Bagwell, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

LeRoy Owens, QSTI/QSTO Review Board

Glenn C. England, QSTI/QSTO Review Board

APPLICATION NO. 2012-711

SOURCE EVALUATION SOCIETY CORPORATE SEAL 1995 NORTH CAROLINA

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

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MANUAL GASEOUS POLLUTANTS SOURCE SAMPLING METHODS

ISSUED THIS 31st DAY OF JULY 2012 AND EFFECTIVE UNTIL JULY 30TH, 2017

Peter R. Westlin, QSTI/QSTO Review Board

C. David Bagwell, QSTI/QSTO Review Board

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SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

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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 31st DAY OF JULY 2012 AND EFFECTIVE UNTIL JULY 30TH, 2017

Peter R. Westlin, QSTI/QSTO Review Board

C. David Bagwell, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

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LeRoy Owens, QSTI/QSTO Review Board

Glenn C. England, QSTI/QSTO Review Board

APPLICATION NO. 2012-711

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

HAZARDOUS METALS MEASUREMENT SAMPLING METHODS

ISSUED THIS 31st DAY OF JULY 2012 AND EFFECTIVE UNTIL JULY 30TH, 2017

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

LeRoy Owens, QSTI/QSTO Review Board

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