



Testing Solutions for a Better World

STACK EMISSIONS STUDY
EPA 40 CFR PART 60, SUBPART JJJJ AND
EPA 40 CFR PART 63, SUBPART ZZZZ
FOR THE
JENBACHER, J620 SINGLE GS-J715, UNIT #G01,
SERIAL #1717997
PREPARED FOR
VOLTAGRID, LLC
AT THE
SAT-1 EGU
SAN ANTONIO, TEXAS
MARCH 2, 2026

RN No: 112050760

CN No: 606076008

Permit No: 177637

Report Date: March 22, 2026



Corporate Headquarters

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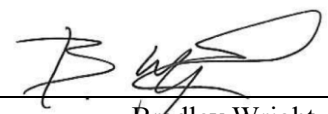
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certify that this testing was conducted and
this report was created in conformance
with the requirements of ASTM D7036

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**Stack Emissions Study
Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997
VoltaGrid, LLC
SAT-1 EGU
San Antonio, Texas
March 2, 2026**

1.0 INTRODUCTION

Air Hygiene International, Inc. (Air Hygiene) has completed the Stack Emissions Study for nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), formaldehyde (HCHO), and oxygen (O₂) from the exhaust of the Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997 for VoltaGrid, LLC at the SAT-1 EGU in San Antonio, Texas. This report details the background, results, process description, and the sampling/analysis methodology of the stack sampling survey conducted on March 2, 2026.

1.1 TEST PURPOSE AND OBJECTIVES

The purpose of the test was to conduct the periodic emission test to document levels of selected pollutants at maximum operation levels of the unit. The information will be used to confirm compliance with the air quality permit requirements. The specific objective was to determine the emission concentration of NO_x, CO, VOC, HCHO, and O₂ from the exhaust to the catalyst of VoltaGrid, LLC's Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997.

1.2 SUMMARY OF TEST PROGRAM

The following list details pertinent information related to this specific project:

- 1.2.1 Participating Organizations
 - Texas Commission on Environmental Quality (TCEQ)
 - VoltaGrid, LLC
 - Air Hygiene
- 1.2.2 Industry
 - Natural Gas Transmission and Storage
- 1.2.3 Air Permit and Federal Requirements
 - Permit Number: 177637
 - 40 CFR 60, Subpart JJJJ
 - 40 CFR 63, Subpart ZZZZ
- 1.2.4 Plant Location
 - SAT-1 EGU in San Antonio, Texas
 - GPS Coordinates [Latitude 29.413879, Longitude -98.788164]
 - Physical Address: 14720 Omicron Drive, San Antonio, Texas 78245

- 1.2.5 Equipment Tested
 - Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997
 - End of Test Engine Run Time Hours: 2,241
- 1.2.6 Emission Points
 - Exhaust from the Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997
 - For all gases, three sample points in the exhaust stack from the Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997, at 16.7, 50.0, and 83.3 percent of the diameter
- 1.2.7 Emission Parameters Measured
 - NO_x
 - CO
 - VOC
 - HCHO
 - O₂
- 1.2.8 Date of Emission Test
 - March 2, 2026
- 1.2.9 Federal and State Certifications
 - Stack Testing Accreditation Council AETB Certificate No. 3796.02
 - International Standard ISO/IEC 17025:2005 Certificate No. 3796.01
 - Texas NELAP Accreditation No. T104704523; Mobile Lab No. 1M104704523

1.3 KEY PERSONNEL

VoltaGrid, LLC:	Korby Bracken	[REDACTED]	307-630-1430
Air Hygiene:	Michael Plummer	[REDACTED]	918-307-8865
Air Hygiene:	Joseph Childers		918-307-8865

2.0 SUMMARY OF TEST RESULTS

Results from the sampling conducted on VoltaGrid, LLC's Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997 located at the SAT-1 EGU on March 2, 2026 are summarized in the following table and relate only to the items tested.

The results of all measured pollutant emissions were below the required limits. All testing was performed without any real or apparent errors. All testing was conducted according to the approved testing protocol.

TABLE 2.1: ENGINE EMISSIONS REPORT
VOLTAGRID, LLC
JENBACHER, J620 SINGLE GS-J715, UNIT #G01, SERIAL #1717997

Test Period:	Qtr 1 - 2026		Manufacturing or Rebuild Date		Air Permit Number:	177637
Location:	SAT-1 EGU				Unit Number:	G01
Date:	March 2, 2026		SEP 2024		Differential Pressure (mbar):	30
Project Number:	volt-26-sanantonio.tx-start#3				Discharge Pressure (psi):	--
Engine Manufacturer:	Jenbacher		Federal Regulatory Citation		Stack Exhaust Temperature (°F):	--
Engine Model:	J620 Single GS-J715				Rated kW (kW):	3,300
Engine Serial Number:	1717997				Brakehorsepower (bhp):	4,420
Analyzer Manufacturers:	TECO(NOx), TECO(CO), SERV(O2), VIG(VOC (as C ₃ H ₈)), MKS(HCHO)		Subpart JJJJ		Engine Fuel Flow (SCFH):	30,847
Analyzer Model Numbers:	42 series, 48 series, 1440, 210, 20302030				Specific Gravity:	0.5734
Date Analyzers Calibrated:	March 2, 2026		\$60.4233 and/or \$60.4243		Fuel Heating Value [HHV] (Btu/SCF):	989
Test Results and Calculations:	Appendix A				BSFC (Btu/hp*hr):	6,904
Emission Data Records:	Appendix B				Annual Hours Allowed to Operate:	8,760
Calibration Gas Certifications:	Appendix C				Engine Speed (rpm):	1,505
Quality Assurance and QC Data:	Appendix D				Air Manifold Temp (°F):	--
Fuel Analysis Records:	Appendix E				Air Manifold Pressure (psi):	--
Ambient Temperature (°F):	76.7				End of Test (operating hours):	2,241
Barometric Pressure (in. Hg):	29.26				Actual kW (kW):	3,296
Relative Humidity (%):	59				Rated Engine Speed (rpm):	1,500
Emission Test Results					Rated Manifold Pressure (in. Hg (abs)):	--
Pollutant (units)	Stack Test Results	State Limits	Federal Limits	Passing	Engine Load (%):	100
O ₂ (%)	10.68	--	--	--	Differential Pressure (in H ₂ O):	12
NOx (ppmvd)	1.12	--	--	--	-Actual kW available from engine panel and/or site personnel. -Load calculated using Actual kW vs Rated kW. -Brakehorsepower calculated from Actual kW	
CO (ppmvd)	3.84	--	--	--		
VOC (as C ₃ H ₈) (ppmvd)	0.14	--	--	--		
NOx (ppmvd@15%O ₂)	0.65	--	82.00	YES		
CO (ppmvd@15%O ₂)	2.21	--	270.00	YES		
VOC (as C ₃ H ₈) (ppmvd@15%O ₂)	0.08	--	60.00	YES		
NOx (lb/hr)	0.07	0.14	--	YES		
CO (lb/hr)	0.15	0.61	--	YES		
VOC (as C ₃ H ₈) (lb/hr)	0.01	0.07	--	YES		
NOx (ton/year)	0.32	0.62	--	YES		
CO (ton/year)	0.66	2.69	--	YES		
VOC (as C ₃ H ₈) (ton/year)	0.04	0.30	--	YES		
NOx (g/hp*hr)	0.01	--	1.00	YES		
CO (g/hp*hr)	0.02	--	2.00	YES		
VOC (as C ₃ H ₈) (g/hp*hr)	0.00	--	0.70	YES		
All testing conducted according to United States Environmental Protection Agency (EPA), Methods: 1, 3a, 4, 7e, 10, 19, 18/25a and 320.					Tested By: Air Hygiene International, Inc. Tester(s) / Test Unit(s): MP/JC	

3.0 SOURCE OPERATION

3.1 PROCESS DESCRIPTION

The unit tested was a Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997. The engine is rated at 4,601 horsepower. The engine emissions are vented to the atmosphere through an exhaust system extending from the engine.

3.2 SAMPLING LOCATION

The engine exhausts to the atmosphere through independent stack 31 inches in diameter at the test port which is approximately 42 ft above grade level with an exit elevation of approximately 45 ft above grade level. The test port is located approximately 8.4 ft downstream and approximately 2.8 ft upstream from the nearest disturbance. All outlet samples for gaseous emissions were continuously drawn from three points located at 16.7, 50, and 83.3 percent of the stack diameter using a multi-point rake probe. The probe extended at least 0.5 stack diameters from the exit to the atmosphere and at least 2.0 stack diameters from the upstream disturbance. All inlet samples for gaseous emissions were continuously drawn from a single point located approximately at the center of the inlet duct.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

The emission test on the Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997 at the SAT-1 EGU was performed following United States Environmental Protection Agency (EPA) methods described by the Code of Federal Regulations (CFR). Table 4.1 outlines the specific methods performed on March 2, 2026.

**TABLE 4.1
SUMMARY OF SAMPLING METHODS**

Pollutant or Parameter	Sampling Method	Analysis Method
Sample Point Location	EPA Method 1	Equal Area Method
Oxygen	EPA Method 3A	Paramagnetic Cell
Nitrogen Oxides	EPA Method 7E	Chemiluminescent Analyzer
Carbon Monoxide	EPA Method 10	Nondispersive Infrared Analyzer
Volatile Organic Compounds/ Total Hydrocarbons	EPA Method 18/25A	Gas Chromatograph and Flame Ionization Detector
Stack Flow Rate	EPA Method 19	Dry Oxygen F Factor
Calibration Gas Dilution	EPA Method 205	Mass Flow Controller
Formaldehyde	EPA Method 320	Fourier Transform Infrared

4.2 INSTRUMENT CONFIGURATION AND OPERATIONS FOR GAS ANALYSIS

The sampling and analysis procedures used during these tests conform with the methods outlined in the Code of Federal Regulations (CFR), Title 40, Part 60, Appendix A, Methods 1, 3A, 4, 7E, 10, 18/25A, 19; 40 CFR 51, Appendix M, Method 205; and 40 CFR 63, Appendix A, Method 320.

Figure 4.1 depicts the sample system used for the real-time gas analyzer tests. The gas sample was continuously pulled through the probe and transported, via heat-traced Teflon® tubing, to a heated head pump and into the FTIR then to a stainless-steel minimum-contact condenser designed to dry the sample. Transportation of the sample, through Teflon® tubing, continued into the sample manifold within the mobile laboratory via a stainless steel/Teflon® diaphragm pump. From the manifold, the sample was partitioned to the real-time analyzers through rotameters that controlled the flow rate of the sample.

Figure 4.1 shows that the sample system was also equipped with a separate path through which a calibration gas could be delivered to the probe and back through the entire sampling system. This allowed for convenient performance of system bias checks as required by the testing methods.

All instruments were housed in a climate controlled, trailer-mounted mobile laboratory. Gaseous calibration standards were provided in aluminum cylinders with concentrations certified by the vendor. EPA Protocol No. 1 was used to determine the cylinder concentrations where applicable (i.e., NO_x calibration gases).

Table 4.2 provides a description of the analyzers used for the instrument portion of the tests. All data from the continuous monitoring instruments were recorded on a Logic Beach Portable Data Logging System which retrieves calibrated electronic data from each instrument every one second and reports an average of the collected data every 30 seconds. For target compounds measured with the Fourier transform infrared (FTIR) spectrometer, interferograms consisting of 27 co-added scans were recorded continuously during the test periods and provided approximately 30-second average concentrations. Spectral data was analyzed by the MKS MG2000 software.

Three test runs of approximately 60 minutes each were conducted on the Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997 at the maximum test load for NO_x, CO, VOC, HCHO, and O₂ on the exhaust.

The stack gas analysis for O₂ concentrations was performed in accordance with procedures set forth in EPA Method 3A. The O₂ analyzer uses a paramagnetic cell detector.

EPA Method 7E was used to determine concentrations of NO_x. A chemiluminescent analyzer was used to determine the nitrogen oxides concentration in the gas stream. A NO₂ in air manufacturer-certified gas cylinder was used to verify at least a 90 percent NO₂ conversion on the day of the test.

CO emission concentrations were quantified in accordance with procedures set forth in EPA Method 10. A continuous nondispersive infrared (NDIR) analyzer was used for this purpose.

VOC emission concentrations were quantified in accordance with principles set forth in EPA Method 18 and 25A. A VIG 210 was used for this purpose. The VIG 210 includes both a conventional total hydrocarbon (THC) analyzer and an automated gas chromatograph (GC) for determining VOCs. Two FIDs (flame ionization detectors) were used for the measurements: one for the THC channel and the other for the automated GC which measured methane, ethane, and residual (VOCs). During each sample period gas sample is injected directly to the first FID. This detector responded to all hydrocarbons in the sample and is used as a traditional FID as needed. For VOC sampling, a heated gas sampling valve is used for direct injection of the gas on the GC column per Method 18, Section 8.2.2. The GC column separates hydrocarbon components based on their molecular configurations, weights, and boiling points. In this application, the analyzer used the gas chromatograph column

to separate methane and ethane from the heavier residual hydrocarbons (i.e., VOCs). Methane eluted from the sample first, it was immediately detected by the second FID; ethane eluted from the column second and was also detected by the second FID. The flow in the GC column was reversed (backflushed) and the residual components were recombined and detected by the second FID as residual VOCs. Peak residual (VOC) values are reported by the analyzer between each sample period. EPA Method 7E bias and drift check criterion was used to validate data instead of EPA Method 18 recovery studies as it has more stringent and comprehensive quality assurance procedures. EPA Protocol No. 1 traceable propane calibration gas was used to calibrate the residual channel of the analyzer and the calibration procedure followed the requirements of EPA Method 25A. In this application, the target compound was VOC (non-methane, non-ethane hydrocarbon); therefore, the methane, ethane, and total hydrocarbon channels of the analyzer were not formally calibrated.

A MKS Instruments - MultiGas™ Fourier Transform Infrared (FTIR) spectrometer, or equivalent, was used for HCHO analysis per EPA Method 320. The Max Acquisition or Series 2000 MultiGas Analyzer Software collects and processes all the infrared spectral data and uses a Classical Least Squares regression method for the quantitative analysis. The FTIR spectrometer spectral resolution was 0.5 cm^{-1} with a Medium Norton Beer Apodization. The system employed:

- a silicon carbide infrared source at 1200°C
- a helium neon reference laser
- potassium bromide (KBr), barium fluoride (BaF_2), or zinc selenide (ZnSe) cell window
- potassium bromide (KBr) beam splitter with germanium (Ge) coating
- front-surface optical transfer mirrors
- a 5.11 m multi-pass gas cell

A wide band MCT detector was utilized that allows measurements to be made from $600 - 5,000\text{ cm}^{-1}$, the detector was cooled with liquid nitrogen to maintain a constant temperature of 77 Kelvin. The MKS 5.11-meter multi-pass "white" cell incorporates aspheric, aberration-correcting mirrors to increase the optical throughput and the detection sensitivity. A Baratron® pressure transducer and thermocouples were connected directly to the insulated sample cells that provide the pressure and temperatures of the sample streams. During testing, the temperature of the absorption cells was set at 191°C . The elevated temperature prevented gas condensation within the cell and minimized compound adhesion to the cell walls and mirrors. The volume of the absorption cell was approximately 0.2 liters, so at a sample gas flow rate of 4.0 liters per minute, the sample gas in the cell is refreshed approximately four times each minute. Interferograms consisting of 30 co-added scans were recorded continuously during the test periods and provided approximately 30-second average concentrations.

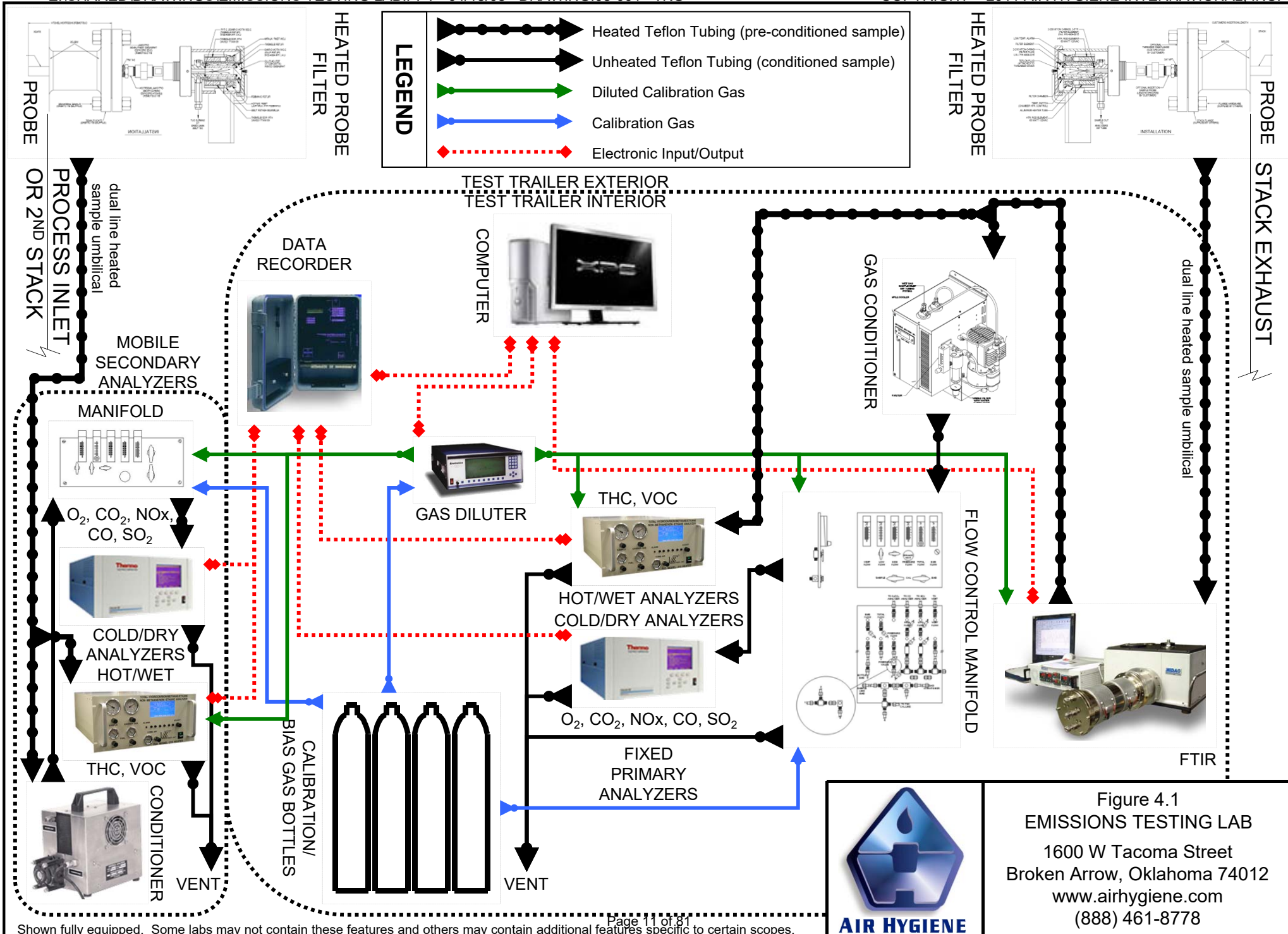
Daily quality checks included direct pre and post-test Calibration Transfer Standard (CTS) spectra, injecting a compound with known and stable concentration (i.e., CO_2 , CH_4 , or C_2H_4) through the FTIR to verify the average of five scans was within five percent of the expected concentration. Additional quality checks included, triplicate, dynamic spiking procedure that included a direct measurement of the spike target (i.e., HCHO, CH_4 , NH_3 , etc. at times with a SF_6 tracer gas) to determine the detectable concentration, followed by alternating four scan samples of native stack gas and spiked stack gas (e.g., stack gas displaced by a 10 percent volume of the known target). A successful dynamic spike returns the target compound between 70 and 130 percent of the expected concentration at a dilution ratio less than 0.1, when feasible.

The calibration gas dilutions were performed in accordance with procedures set forth in EPA Method 205. The gas dilutor uses a mass flow controller and processing software to create user specified blends and concentrations of target calibration gases. Per the method requirements field verification was performed by introducing a mid-level supply gas directly into the analyzer, bypassing the gas dilution system. The procedure was repeated for a total of three mid-level supply gas injections. The difference between the certified concentration of the mid-level supply gas and the average instrument response was within two percent. Also, documentation of the date of the

most recent dilution system calibration against flow standards and the name of the manufacturer who carried out the calibration is in the report.

TABLE 4.2
ANALYTICAL INSTRUMENTATION

Parameter	Manufacturer and Model	Range	Sensitivity	Detection Principle
NO _x	THERMO 42 series	User may select up to 5,000 ppm	0.1 ppm	Thermal reduction of NO ₂ to NO. Chemiluminescence of reaction of NO with O ₃ . Detection by PMT. Inherently linear for listed ranges.
CO	THERMO 48 series	User may select up to 10,000 ppm	0.1 ppm	Infrared absorption, gas filter correlation detector, microprocessor-based linearization.
HCHO	MKS 2030	User may select from multiple ranges	0.1 ppm	Fourier Transform Infrared – FTIR
Calibration Gas Dilution	ENVIRONICS 4040	User may select conc. and flow rate	0.1 ppm	Mass Flow Controller
VOC	VIG 210	User may select up to 10,000 ppm	0.1 ppm	GC Column and Flame Ionization Detector
O ₂	SERVOMEX 1440	0-25%	0.1%	Paramagnetic cell, inherently linear.



APPENDIX A

TEST RESULTS AND CALCULATIONS

EMISSION CALCULATIONS SUMMARY TABLES

Company: VoltaGrid, LLC
 Engine Tested: Jenbacher, J620 Single GS-J715, Unit #G01
 Engine Serial #: 1717997

Date: March 2, 2026
 Location: SAT-1 EGU

Stack Gas Flow Rate: Method 19

Test #	Brake Horsepower	O ₂ Conc. (%)	Fuel Heating [HHV] Value (Btu/SCF)	F Factor-Dry Oxy. (DSCFex/MMBtu)	Fuel Flow (SCF/hr)	Stack Flow (DSCF/hr)
1	4,413	10.65	989	8,650.91	30,872	538,515
2	4,417	10.69	989	8,650.91	30,760	539,048
3	4,431	10.69	989	8,650.91	30,909	541,515
Average	4,420	10.68	989	8,650.91	30,847	539,693

NOx Mass Emission Rate

Test #	Brake Horsepower	NOx Conc. (ppmvd)	MW	E (g/hp*hr)	E (lb/hr)	E (ton/yr)	NOx @15%O ₂ (ppmvd)
1	4,413	1.19	46.01	0.01	0.08	0.34	0.69
2	4,417	1.01	46.01	0.01	0.07	0.29	0.58
3	4,431	1.15	46.01	0.01	0.07	0.33	0.67
Average	4,420	1.12	46.01	0.01	0.07	0.32	0.65

CO Mass Emission Rate

Test #	Brake Horsepower	CO Conc. (ppmvd)	MW	E (g/hp*hr)	E (lb/hr)	E (ton/yr)	CO @15%O ₂ (ppmvd)
1	4,413	3.75	28.00	0.02	0.15	0.64	2.16
2	4,417	3.83	28.00	0.02	0.15	0.66	2.22
3	4,431	3.92	28.00	0.02	0.15	0.68	2.27
Average	4,420	3.84	28.00	0.02	0.15	0.66	2.21

VOC (as C₃H₈) Mass Emission Rate

Test #	Brake Horsepower	VOC (as C ₃ H ₈) Conc. (ppmvd)	MW	E (g/hp*hr)	E (lb/hr)	E (ton/yr)	VOC (as C ₃ H ₈) @15%O ₂ (ppmvd)
1	4,413	0.09	44.00	0.00	0.01	0.03	0.05
2	4,417	0.26	44.00	0.00	0.02	0.07	0.15
3	4,431	0.08	44.00	0.00	0.00	0.02	0.04
Average	4,420	0.14	44.00	0.00	0.01	0.04	0.08

HCHO Mass Emission Rate

Test #	Brake Horsepower	HCOH Conc. (ppmvd)	MW	E (g/hp*hr)	E (lb/hr)	E (ton/yr)	HCHO @15%O ₂ (ppmvd)
1	4,413	0.2	30.03	0.00	0.01	0.03	0.09
2	4,417	0.2	30.03	0.00	0.01	0.03	0.09
3	4,431	0.2	30.03	0.00	0.01	0.03	0.11
Average	4,420	0.17	30.03	0.00	0.01	0.03	0.10

Calculations, Formulas, and Constants

The following information supports the spreadsheets for this testing project.

Given Data:

Ideal Gas Conversion Factor = 385.23 SCF/lb-mol at 68 deg F & 14.696 psia

Fuel Heating Value is based upon Air Hygiene's fuel gas calculation sheet. All calculations are based upon a correction to 68 deg F & 14.696 psia

High Heating Values (HHV) are used for the Fuel Heating Value, F-Factor, and Fuel Flow Data per EPA requirements.

ASTM D 3588

Molecular Weight of NOx (lb/lb-mole) = 46.01
 Molecular Weight of CO (lb/lb-mole) = 28.00
 Molecular Weight of SO₂ (lb/lb-mole) = 64.00
 Molecular Weight of THC (propane) (lb/lb-mole) = 44.00
 Molecular Weight of VOC (methane) (lb/lb-mole) = 16.00
 Molecular Weight of NH₃ (lb/lb-mole) = 17.03
 Molecular Weight of HCHO (lb/lb-mole) = 30.03
 Molecular Weight of CO₂ and N₂O (lb/lb-mole) = 44.01

Formulas:

1. Corrected Raw Average (C_{Gas}), 40CFR60, App. A, RM 7E, Eq. 7E-5 (08/15/06)

$$C_{Gas} = (C_{Avg} - C_o) \times \left(\frac{C_M}{C_M - C_o} \right)$$

2. Correction to % O₂, 40CFR60, App. A, RM 20, Eq. 20-5 (11/26/02)

$$C_{adj} = C_{Gas(T_{avg}, et)} \times \left(\frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O_2)}} \right)$$

3. Correction to % O₂ and ISO Conditions

$$C_{ISO} = C_{adj} \times \sqrt{\frac{P_r}{P_o}} \times e^{(19 \times (H_o - 0.00633))} \times \left(\frac{288}{T_a} \right)^{1.53}$$

4. Method 19 stack exhaust flow (scfh) [ref. EPA EMC FAQ Method 19]

$$Q_s = \left(\frac{FFactor \times Q_f \times HHV}{1,000,000} \right) \times \left(\frac{20.9\%}{20.9\% - C_{Gas(O_2)}} \right)$$

RATA SHEET CALCULATIONS

d = Reference Method Data - CEMS Data

S_d = Standard Deviation

CC = Confident Coefficient

n = number of runs

t_{0.025} = 2.5 percent confidence coefficient T-values

RA = relative accuracy

ARA = alternative relative accuracy

BAF = Bias adjustment factor

1. Difference

$$d = \sum_{i=1}^n d_i$$

2. Standard Deviation

$$S_d = \sqrt{\frac{\sum_{i=1}^n d_i^2 - \frac{\left(\sum_{i=1}^n d_i \right)^2}{n}}{n-1}}$$

3. Confident Coefficient

$$CC = t_{0.025} \times \frac{S_d}{\sqrt{n}}$$

40CFR60, App. A, RM 19, Table 19-1

Conversion Constant for NOx = 0.0000001194351

Conversion Constant for CO = 0.0000000726839

Conversion Constant for SO₂ = 0.0000001661345

Conversion Constant for THC = 0.0000001142175

Conversion Constant for VOC (methane) = 0.0000000415336

Conversion Constant for NH₃ = 0.0000000442074

Conversion Constant for HCHO = 0.0000000779534

Conversion Constant for CO₂ and N₂O = 0.0000001142434

NOTE: units are lb/ppm*ft³

5. Emission Rate in lb/hr

$$E_{lb/hr} = \frac{C_{Gas}}{10^6} \times \frac{Q_s \times MW}{G}$$

6. Emission Rate in tons per year

$$E_{ton/yr} = \frac{E_{lb/hr} \times hr_{year}}{2000}$$

7. Emission Concentration in lb/MMBtu (O₂ based)

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_d Factor \times Conv_c \times 20.9\%}{20.9\% - C_{Gas(O_2)}}$$

8. Emission Concentration in g/hp*hr

$$E_{g/hp-hr} = \frac{E_{lb/hr} \times 453.6}{mw \times 1341.022} \text{ or } \frac{E_{lb/hr} \times 453.6}{hp}$$

n	t	n	t	n	t
2	12.706	7	2.447	12	2.201
3	4.303	8	2.365	13	2.179
4	3.182	9	2.306	14	2.160
5	2.776	10	2.262	15	2.145
6	2.571	11	2.228	16	2.131

4. Relative Accuracy

$$RA = \frac{|d_{AVG}| + |CC|}{RM_{AVG}} \times 100$$

5. Alternative Relative Accuracy

$$ARA = \frac{|d_{AVG}| + |CC|}{AS} \times 100$$

5. Bias Adjustment Factor

$$BAF = 1 + \left(\frac{|d_{AVG}|}{CEM_{AVG}} \right)$$

EXAMPLE CALCULATIONS (FFACTOR)

RM 19, (02-27-14),
2.0 Summary of Method,
2.1 Emission Rates. Oxygen (O₂)
or carbon dioxide (CO₂)
concentrations and appropriate F
factors (ratios of combustion gas
volumes to heat inputs) are used
to calculate pollutant emission
rates from pollutant
concentrations.

RM 19, (02-27-14),
12.2 Emission Rates of PM,
SO₂, and NO_x. Select from the
following sections the applicable
procedure to compute the PM,
SO₂, or NO_x emission rate (E) in
lb/MMBtu. The pollutant
concentration must be in lb/scf
and the F factor must be in
scf/MMBtu. If the pollutant
concentration (C) is not in the
appropriate units, use Table
19-1 in Section 17.0 to make the
proper conversion. An F factor is
the ratio of the gas volume of the
products of combustion to the
heat content of the fuel. The dry
F factor (F_d) includes all
components of combustion less
water, the wet F factor (F_w)
includes all components of
combustion, and the carbon F
factor (F_c) includes only carbon
dioxide.

Mark's Std Hdbk, 10th ed., pg 4-26

High Heat Value Dry (HHV_{dry}), calc for Methane (single component for the fuel gas)

$$HHV_{dry} (Btu / SCF) = \left[\left(\frac{M_{\%}}{100} \right) \times GCM \right] \quad HHV_{dry} = \frac{95.98 \%}{100.00} \times \frac{994.85 \text{ Btu}}{SCF} = \frac{954.83 \text{ Btu}}{SCF}$$

Mark's Std Hdbk, 10th ed., pg 4-26

Low Heat Value Dry (LHV_{dry}), calc for Methane (single component for the fuel gas)

$$LHV_{dry} (Btu / SCF) = \left[\left(\frac{M_{\%}}{100} \right) \times NCM \right] \quad LHV_{dry} = \frac{95.98 \%}{100.00} \times \frac{895.75 \text{ Btu}}{SCF} = \frac{859.72 \text{ Btu}}{SCF}$$

Civil Eng. Ref. Man., 7th Ed., pg 14-9/GPA Ref. Bulletin 181-86, App. C

High Heat Value Wet (HHV_{wet}), calc for entire sample (all components of the fuel gas)

$$HHV_{wet} (Btu / SCF) = \frac{HHV_{dry}}{W / D.factor} \quad HHV_{wet} = \frac{989.32 \text{ Btu/SCF}}{1.0236} = 966.51 \text{ Btu/SCF}$$

Civil Eng. Ref. Man., 7th Ed., pg 14-9/GPA Ref. Bulletin 181-86, App. C

Low Heat Value Wet (LHV_{wet}), calc for entire sample (all components of the fuel gas)

$$LHV_{wet} (Btu / SCF) = \frac{LHV_{dry}}{W / D.factor} \quad LHV_{wet} = \frac{891.29 \text{ Btu/SCF}}{1.0236} = 870.74 \text{ Btu/SCF}$$

Lbs Component per Lb-Mol of Gas (CM), calc for Methane (single component for the fuel gas)

$$CM (lb / lb - mol) = \left[\left(\frac{M_{\%}}{100} \right) \times MW \right] \quad CM = \frac{95.98 \%}{100.00} \times \frac{16.04 \text{ lb}}{lb - mol} = 15.40 \text{ lb/lb-mol}$$

ASTM D 3588

Fuel Molecular Weight (MW_{Fuel})

$$MW_{Fuel} (lb / lb - mol) = \sum (CM) \quad MW_{Fuel} = 15.40 \text{ lb/lb-mol} + 0.55 \text{ lb/lb-mol} + \text{etc.} = 16.608 \text{ lb/lb-mol}$$

Btu per Lb of Gas Gross (GCV)

$$GCV (Btu / lb) = \left[\frac{HHV_{dry} \times G}{MW_{Fuel}} \right] \quad GCV = \frac{989.32 \text{ Btu/SCF} \times 385.23 \text{ ft}^3/\text{lbmol}}{16.608 \text{ lb/lb-mol}} = 22,947.26 \text{ Btu/lb}$$

ASTM D 3588 (SG)

Specific Gravity

$$SG = \left[\frac{MW_{Fuel}}{MW_{AIR}} \right] \quad SG = \frac{16.61 \text{ lb/lb-mol}}{28.96 \text{ lb/lb-mol}} = 0.5734$$

Btu per Lb of Gas Net (NCV)

$$NCV (Btu / lb) = \left[\frac{LHV_{dry} \times G}{MW_{Fuel}} \right] \quad NCV = \frac{891.29 \text{ Btu/SCF} \times 385.23 \text{ ft}^3/\text{lbmol}}{16.608 \text{ lb/lb-mol}} = 20,673.47 \text{ Btu/lb}$$

Weight Percent of Component (C_%), methane

$$C_{\%} (\%) = \left[\left(\frac{CM}{MW_{Fuel}} \right) \times 100 \right] \quad C_{\%} = \frac{15.40 \text{ lb/lb-mol}}{16.61 \text{ lb/lb-mol}} \times 100 = 92.71 \%$$

Weight Percent of Volatile Organic Compounds (VOC_%)

$$VOC_{\%} (\%) = \left[\sum_{C_3H_8}^{C_8H_{18}} Wt_{\%} \right] \quad VOC_{\%} = 0.20 \% + 0.02 \% + 0.04 \% + \text{etc.} = 0.30 \%$$

RM 19, (02-27-14), 12.3.2 Determined **F Factors**. If the fuel burned is not listed in Table 19-2 or if the owner or operator chooses to determine an F factor rather than use the values in Table 19-2, use the procedure below: 12.3.2.1 Equations. Use the eq

RM 19, (02-27-14),

12.1 Nomenclature

K (scf/lb)/%

H 3.64

C 1.53

S 0.57

N₂ 0.14

O₂ 0.46

$$F_d = \frac{K(K_{hd} \%H + K_c \%C + K_s \%S + K_n \%N - K_o \%O)}{GCV} \quad \text{Eq. 19-13}$$

$$F_d = \frac{10^6 \text{ Btu}}{\text{MMBtu}} \times \left[\frac{3.64 \text{ SCF}}{\text{lb} \cdot \%} \times 24.02 \% + \frac{1.53 \text{ SCF}}{\text{lb} \cdot \%} \times 72.40 \% + \frac{0.57 \text{ SCF}}{\text{lb} \cdot \%} \times 0.00 \% + \frac{0.14 \text{ SCF}}{\text{lb} \cdot \%} \times 3.28 \% - \frac{0.46 \text{ SCF}}{\text{lb} \cdot \%} \times 0.30 \% \right] \times \frac{\text{lb}}{22,947.26 \text{ Btu}} = \frac{8,650.91 \text{ SCF}}{\text{MMBtu}}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (INFORMATION)

Specific Humidity (RH_{sp})

Note: RH_{sp} (gr/lb) calculated using temperature, relative humidity, and barometric pressure with psychrometric chart, psychrometric calculator, or built in psychrometric algorithm.

$$RH_{sp} (lb / lb) = \left[\left(\frac{gr}{lb} \right) \times \frac{lb}{7000 gr} \right]$$

$$RH_{sp} = \frac{82.22 \text{ gr}}{lb} \times \frac{1 lb}{7000 gr} = 0.011745 \frac{lb \text{ H}_2\text{O}}{lb \text{ Air}}$$

Calculated Stack Gas Moisture Content (B_{ws})

RM 4, (02-27-14), 16.4 Using F-factors to determine moisture is an acceptable alternative to Method 4 for a combustion stack not using a scrubber. If this option is selected, calculate the moisture content as follows: [with corrected equations from the Final Rule: Revisions to Test Methods and Testing Regulations]

$$B_{ws} (\%) = B_H (\%) + B_A (\%) + B_F (\%)$$

$$B_{ws} = 8.79 \% + 1.85 \% + 0.11 \% = 10.75 \%$$

$$B_{ws} (\%) = \left[\left(1 - \frac{F_d}{F_w} \right) \left(\frac{20.9 - O_2}{20.9} \right) \right] + \left[\left(\frac{\%RH}{100 \times P_{Bar}} \right) \times 10^{\left\{ 6.6912 - \left(\frac{3144}{T + 390.86} \right) \right\}} \right] + \left[\left(\frac{0.0036 \times \left\{ 2.36 \times \frac{18.015}{MW_{Gas}} \right\}^2 + 0.075 \times \left\{ 2.36 \times \frac{18.015}{MW_{Gas}} \right\}}{100} \right) \left(\frac{20.9 - O_2}{20.9} \right) \right]$$

B_H = mole fraction of moisture from the hydrogen in fuel

$$B_H (\%) = \left\{ 1 - \frac{8650.9}{10538.0} \right\} \left\{ \frac{20.9 - 10.65}{20.9} \right\} = 8.79 \%$$

$$W (\%, \text{ by weight}) = 2.36 \text{ mol\%} \times \frac{18.015}{16.608} = 2.5599 \%$$

2.36 mol% = %H₂O (mol%) at EPA Standard Conditions (68°F and 14.696psia); MW_{water} = 18.015 lb/lb-mol

B_A = mole fraction of moisture in the ambient air

$$B_A (\%) = \frac{70}{100 \times 29.90} \times \left\{ 6.6912 - \frac{3144}{72 + 390.86} \right\} = 1.85 \%$$

B_F = mole fraction of moisture from free water in the fuel

$$B_F (\%) = \left\{ \frac{0.0036 \times 2.5599^2 + 0.075 \times 2.5599}{100} \right\} \left\{ \frac{20.9 - 10.65}{20.9} \right\} = 0.11 \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (CALIBRATION)

Analyzer Calibration Error

RM 7E, (02-27-14), 12.2 Analyzer Calibration Error. For non-dilution systems, use Equation 7E-1 to calculate the analyzer calibration error for the low-, mid-, and high-level calibration gases. (calc for NO_x analyzer mid gas, if applicable)

$$ACE = \left(\frac{C_{Dir} - C_V}{CS} \right) \times 100 \quad \text{Eq. 7E-1}$$

$$ACE = \frac{5.29 \text{ ppm} - 5.00 \text{ ppm}}{10.00 \text{ ppm}} \times 100 = 2.90 \%$$

Calibration Error and Estimated Point, RM 25A, THC/VOC Analyzer

RM 25A, (02-27-14), 8.4 Calibration Error Test. Immediately prior to the test series (within 2 hours of the start of the test), introduce zero gas and high-level calibration gas at the calibration valve assembly. Adjust the analyzer output to the appropriate levels, if necessary. Calculate the predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level response. Then introduce low-level and mid-level calibration gases successively to the measurement system. ... These differences must be less than 5 percent of the respective calibration gas value. (calc for THC/VOC analyzer mid gas, if applicable)

$$E_P = \frac{C_{Dir(H)} - C_{Dir(Z)}}{C_{V(H)} - C_{V(Z)}} \times C_{Dir(M)} + C_{Dir(Z)}$$

Eq. of a line
y=mx+b

$$E_P = \frac{6.95 \text{ ppm} - -0.04 \text{ ppm}}{7.00 \text{ ppm} - 0.00 \text{ ppm}} \times 4.00 \text{ ppm} + -0.04 = 3.95 \text{ ppm}$$

$$ACE = \left(\frac{C_{Dir} - C_V}{CS} \right) \times 100 \quad \text{Eq. 7E-1}$$

$$ACE_{VOC} = \frac{4.06 \text{ ppm} - 3.95 \text{ ppm}}{4.00 \text{ ppm}} \times 100 = 2.64 \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (BIAS, DRIFT, AND CORRECTED RAW AVERAGE)

System Bias

RM 7E, (02-27-14), 12.3 System Bias. For non-dilution systems, use Equation 7E-2 to calculate the system bias separately for the low-level and upscale calibration gases. (calc for NOx analyzer upscale gas, Run 1 initial bias, if applicable)

$$SB = \left(\frac{C_S - C_{Dir}}{C_S} \right) \times 100 \quad \text{Eq. 7E-2} \quad SB = \frac{4.94 \text{ ppm} - 5.29 \text{ ppm}}{10.00 \text{ ppm}} \times 100 = -3.50 \%$$

Drift Assessment

RM 7E, (02-27-14), 12.5 Drift Assessment. Use Equation 7E-4 to separately calculate the low-level and upscale drift over each test run. (calc for NOx analyzer upscale drift, Run 1, if applicable)

$$D = |SB_{final} - SB_i| \quad \text{Eq. 7E-4} \quad D = | -3.20 \% - -3.50 \% | = 0.30 \%$$

Bias Adjusted Average

RM 7E, (02-27-14), 12.6 Effluent Gas Concentration. For each test run, calculate Cavg, the arithmetic average of all valid NOx concentration values (e.g., 1-minute averages). Then adjust the value of Cavg for bias, using Equation 7E-5b. (calc for NOx analyzer, Run 1, if applicable)

$$C_{Gas} = (C_{Avg} - C_O) \times \left(\frac{C_{Md}}{C_M - C_O} \right) \quad \text{Eq. 7E-5b} \quad C_{Gas} = \left(1.15 \text{ ppm} - -0.04 \text{ ppm} \right) \left(\frac{5.00 \text{ ppm}}{4.96 \text{ ppm} - -0.04 \text{ ppm}} \right) = 1.19 \text{ ppm}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

Using HHV with Q_f (SCFH)

$$BSFC \text{ (Btu / hp} \cdot \text{hr)} = \frac{HHV \times Q_f}{bhp}$$

$$BSFC = \frac{989 \text{ Btu}}{SCF} \times \frac{30,847 \text{ SCFH}}{4,420 \text{ hp}} = \frac{6,904 \text{ Btu}}{\text{hp} \cdot \text{hr}}$$

EXAMPLE CALCULATIONS (RUNS)

Stack Exhaust Flow (Q_s) - RM19

$$Q_s = \left(\frac{FFactor \times Q_f \times HHV}{1,000,000} \right) \times \left(\frac{20.9\%}{20.9\% - C_{Gas(O_2)}} \right)$$

Note: Equation presented in EPA Emission Measurement Center (EMC), Frequently Asked Questions (FAQ) for Method 19

$$Q_s = \frac{8,650.91 \text{ SCF}}{\text{MMBtu}} \times \frac{30,871.91 \text{ SCF}}{\text{hr}} \times \frac{989.32 \text{ Btu}}{\text{SCF}} \times \frac{\text{MMBtu}}{10^6 \text{ Btu}} \times \left(\frac{20.90\%}{20.9\% - 10.6\%} \right) = 538,514.52 \text{ SCFH}$$

Diluent-Corrected Pollutant Concentration, O_2 Based

RM 20, (11-26-02), 7.3.1 Correction of Pollutant Concentration Using O_2 Concentration. Calculate the O_2 corrected pollutant concentration, as follows: (calc for NOx gas, Run 1, if applicable) [now contained in applicable Subpart]

$$C_{adj} = C_{Gas(Targ)} \times \left(\frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O_2)}} \right) \quad \text{Eq. 20-4} \quad C_{adj} = 1.19 \text{ ppm} \times \left(\frac{20.9\% - 15.00\%}{20.9\% - 10.65\%} \right) = 0.69 \text{ ppm@15}\%O_2$$

EXAMPLE CALCULATIONS (RUNS)

Emissions Rate (lb/hr)

Calculation for pound per hour emission rate. Calculate, as follows: (calc for NOx gas Run 1, if applicable)

$$E_{lb/hr} = \frac{C_{Gas}}{10^6} \times \frac{Q_s \times MW}{G} \quad E_{lb/hr} = \frac{1.19 \text{ ppmvd}}{10^6 \text{ ppm/part}} \times \frac{538,515 \text{ DSCFH} \times 46.01 \text{ lb/lb-mol}}{385.23 \text{ SCF/lb-mol}} = \frac{0.08 \text{ lb}}{\text{hr}}$$

Emissions Rate (ton/year)

Calculation for tons per year emission rate based on 8760 hours per year. Calculate, as follows: (calc for NOx gas Run 1, if applicable)

$$E_{ton/yr} = \frac{E_{lb/hr} \times \text{hr}_{year}}{2000} \quad E_{ton/yr} = \frac{0.08 \text{ lb}}{\text{hr}} \times \frac{8,760 \text{ hr}}{\text{year}} \times \frac{\text{ton}}{2000 \text{ lb}} = \frac{0.34 \text{ ton}}{\text{year}}$$

Emissions Rate (g/hp-hr)

Calculation for grams per horsepower-hour. Calculate, as follows: (calc for NOx gas Run 1, if applicable)

$$E_{g/hp-hr} = \frac{E_{lb/hr} \times 453.6}{mw \times 1341.022} \text{ or } \frac{E_{lb/hr} \times 453.6}{hp} \quad E_{g/hp-hr} = \frac{0.08 \text{ lb}}{\text{hr}} \times \frac{453.6 \text{ g}}{\text{lb}} \times \frac{1}{4,413 \text{ hp}} = \frac{0.01 \text{ g}}{\text{hp} \cdot \text{hr}}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

RM 7E, (08-15-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:

ACE = Analyzer calibration error, percent of calibration span.
B_{WS} = Moisture content of sample gas as measured by Method 4 or other approved method, percent/100.
C_{Adj} = Average unadjusted gas concentration indicated by data recorder for the test run.
C_D = Pollutant concentration adjusted to dry conditions.
C_{Dir} = Measured concentration of a calibration gas (low, mid, or high) when introduced in direct calibration mode.
C_{Gas} = Average effluent gas concentration adjusted for bias.
C_M = Average of initial and final system calibration bias (or 2-point system calibration error) check responses for the upscale calibration gas.
C_{MA} = Actual concentration of the upscale calibration gas, ppmv.
C_O = Average of the initial and final system calibration bias (or 2-point system calibration error) check responses from the low-level (or zero) calibration gas.
C_S = Measured concentration of a calibration gas (low, mid, or high) when introduced in system calibration mode.
C_{SS} = Concentration of NO_x measured in the spiked sample.
C_{Spike} = Concentration of NO_x in the undiluted spike gas.
C_{Calc} = Calculated concentration of NO_x in the spike gas diluted in the sample.
C_V = Manufacturer certified concentration of a calibration gas (low, mid, or high).
C_W = Pollutant concentration measured under moist sample conditions, wet basis.
CS = Calibration span.
D = Drift assessment, percent of calibration span.
E_p = The predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level response.
Eff_{NO₂} = NO₂ to NO converter efficiency, percent.
H = High calibration gas, designator.
L = Low calibration gas, designator.
M = Mid calibration gas, designator.
NO_{Final} = The average NO concentration observed with the analyzer in the NO mode during the converter efficiency test in Section 16.2.2.
NO_xCorr = The NO_x concentration corrected for the converter efficiency.
NO_xFinal = The final NO_x concentration observed during the converter efficiency test in Section 16.2.2.
NO_xPeak = The highest NO_x concentration observed during the converter efficiency test in Section 16.2.2.
Q_{Spike} = Flow rate of spike gas introduced in system calibration mode, L/min.
Q_{Total} = Total sample flow rate during the spike test, L/min.
R = Spike recovery, percent.
SB = System bias, percent of calibration span.
SB_i = Pre-run system bias, percent of calibration span.
SB_f = Post-run system bias, percent of calibration span.
SB / D_{Alt} = Alternative absolute difference criteria to pass bias and/or drift checks.
SCE = System calibration error, percent of calibration span.
SCE_i = Pre-run system calibration error, percent of calibration span.
SCE_{Final} = Post-run system calibration error, percent of calibration span.
Z = Zero calibration gas, designator.

40CFR60.355(b)(1), (09-20-06), Nomenclature. The terms used in the equations are defined as follows:

P_r = reference combustor inlet absolute pressure at 101.3 kilopascals ambient pressure, mm Hg
P_o = observed combustor inlet absolute pressure at test, mm Hg
H_o = observed humidity of ambient air, g H₂O/g air
e = transcendental constant, 2.718
T_a = ambient temperature, K

Small Engine and FTIR Nomenclature. The terms used in the equations are defined as follows:

bhp = brake horsepower
hp = horsepower
Q_{sys} = system flow (lpm)
Q_m = matrix spike flow (lpm)

RM 19, (07-29-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:

AdjFactor = Percent oxygen or carbon dioxide adjustment applied to a target pollutant
 B_{wa} = Moisture fraction of ambient air, percent.
 Btu = British thermal unit
 $\%C$ = Concentration of carbon from an ultimate analysis of fuel, weight percent.
 $\%CO_{2d}, \%CO_{2w}$ = Concentration of carbon dioxide on a dry and wet basis, respectively, percent.
 CIP / CDP = Combustor inlet pressure / compressor discharge pressure (mm Hg); note, some manufactures reference as PCD.
 E = Pollutant emission rate, ng/J (lb/million Btu).
 E_a = Average pollutant rate for the specified performance test period, ng/J (lb/million Btu).
 E_{aot}, E_{ai} = Average pollutant rate of the control device, outlet and inlet, respectively, for the performance test period, ng/J (lb/million Btu).
 E_{bi} = Pollutant rate from the steam generating unit, ng/J (lb/million Btu).
 E_{bo} = Pollutant emission rate from the steam generating unit, ng/J (lb/million Btu).
 E_{ci} = Pollutant rate in combined effluent, ng/J (lb/million Btu).
 E_{co} = Pollutant emission rate in combined effluent, ng/J (lb/million Btu).
 E_d = Average pollutant rate for each sampling period (e.g., 24-hr Method 6B sample or 24-hr fuel sample) or for each fuel lot (e.g., amount of fuel bunkered), ng/J (lb/million Btu).
 E_{di} = Average inlet SO_2 rate for each sampling period d, ng/J (lb/million Btu).
 E_g = Pollutant rate from gas turbine, ng/J (lb/million Btu).
 E_{ga} = Daily geometric average pollutant rate, ng/J (lbs/million Btu) or ppm corrected to 7 percent O_2 .
 $E_{j,e}$ = Matched pair hourly arithmetic average pollutant rate, outlet and inlet, respectively, ng/J (lb/million Btu) or ppm corrected to 7 percent O_2 .
 E_{ji} = Hourly average pollutant, ng/J (lb/million Btu).
 E_{hj} = Hourly arithmetic average pollutant rate for hour "j," ng/J (lb/million Btu) or ppm corrected to 7 percent O_2 .
 EXP = Natural logarithmic base (2.718) raised to the value enclosed by brackets.
 Fc = Ratio of the volume of carbon dioxide produced to the gross calorific value of the fuel from Method 19
 F_d, F_w, F_c = Volumes of combustion components per unit of heat content, scm/J (scf/million Btu).
 ft^3 = cubic feet
 G = ideal gas conversion factor
 (385.23 SCF/lb-mol at 68 deg F & 14.696 psia)
 GCM = gross Btu per SCF (constant, compound based)
 GCV = Gross calorific value of the fuel consistent with the ultimate analysis, kJ/kg (Btu/lb).
 GCV_p, GCV_r = Gross calorific value for the product and raw fuel lots, respectively, dry basis, kJ/kg (Btu/lb).
 $\%H$ = Concentration of hydrogen from an ultimate analysis of fuel, weight percent.
 H_b = Heat input rate to the steam generating unit from fuels fired in the steam generating unit, J/hr (million Btu/hr).
 H_g = Heat input rate to gas turbine from all fuels fired in the gas turbine, J/hr (million Btu/hr).
 $\%H_2O$ = Concentration of water from an ultimate analysis of fuel, weight percent.
 H_t = Total numbers of hours in the performance test period (e.g., 720 hours for 30-day performance test period).
 K = volume of combustion component per pound of component (constant)
 $K = \text{Conversion factor, } 10^{-5} \text{ (kJ/J)/(}\% \text{) [} 10^6 \text{ Btu/million Btu].}$
 $K_c = (9.57 \text{ scm/kg})/\% [(1.53 \text{ scf/lb})/\%]$.
 $K_{cc} = (2.0 \text{ scm/kg})/\% [(0.321 \text{ scf/lb})/\%]$.
 $K_{hd} = (22.7 \text{ scm/kg})/\% [(3.64 \text{ scf/lb})/\%]$.
 $K_{hw} = (34.74 \text{ scm/kg})/\% [(5.57 \text{ scf/lb})/\%]$.
 $K_n = (0.86 \text{ scm/kg})/\% [(0.14 \text{ scf/lb})/\%]$.
 $K_o = (2.85 \text{ scm/kg})/\% [(0.46 \text{ scf/lb})/\%]$.
 $K_s = (3.54 \text{ scm/kg})/\% [(0.57 \text{ scf/lb})/\%]$.
 $K_{sulfur} = 2 \times 10^4 \text{ Btu/wt}\% \text{-MMBtu}$
 $K_w = (1.30 \text{ scm/kg})/\% [(0.21 \text{ scf/lb})/\%]$.
 lb = pound
 ln = Natural log of indicated value.
 L_p, L_r = Weight of the product and raw fuel lots, respectively, metric ton (ton).
 $\%N$ = Concentration of nitrogen from an ultimate analysis of fuel, weight percent.
 $M\%$ = mole percent
 mol = mole
 MW = molecular weight (lb/lb-mol)
 MW_{AIR} = molecular weight of air (28.9625 lb/lb-mole)¹
 NCM = net Btu per SCF (constant based on compound)
 $\%O$ = Concentration of oxygen from an ultimate analysis of fuel, weight percent.
 $\%CO_{2d}, \%CO_{2w}$ = Concentration of oxygen on a dry and wet basis, respectively, percent.
 P_B = barometric pressure, in Hg
 P_s = Potential SO_2 emissions, percent.
 $\%S$ = Sulfur content of as-fired fuel lot, dry basis, weight percent.
 S_e = Standard deviation of the hourly average pollutant rates for each performance test period, ng/J (lb/million Btu).
 $\%S_r$ = Concentration of sulfur from an ultimate analysis of fuel, weight percent.
 $S(\text{wt}\%)$ = weight percent of sulfur, per lab analysis by appropriate ASTM standard
 S_i = Standard deviation of the hourly average inlet pollutant rates for each performance test period, ng/J (lb/million Btu).
 S_o = Standard deviation of the hourly average emission rates for each performance test period, ng/J (lb/million Btu).
 $\%S_p, \%S_r$ = Sulfur content of the product and raw fuel lots respectively, dry basis, weight percent.
 SCF = standard cubic feet
 SH = specific humidity, pounds of water per pound of air
 $t_{0.95}$ = Values shown in Table 19-3 for the indicated number of data points n.
 T_{amb} = ambient temperature, °F
 $W/D \text{ Factor} = 1.0236 = \text{conv. at } 14.696 \text{ psia and } 68 \text{ deg F (ref. Civil Eng. Ref. Manual, 7th Ed.)}$
 X_{CO_2} = CO_2 Correction factor, percent.
 X_k = Fraction of total heat input from each type of fuel k.

APPENDIX B

EMISSION DATA RECORDS

VoltaGrid, LLC	
Air Permit Number:	177637
Plant Name or Location:	SAT-1 EGU
Date:	March 2, 2026
Project Number:	volt-26-sanantonio.tx-start#3
Manufacturer & Equipment:	Jenbacher
Model:	J620 Single GS-J715
Serial Number:	1717997
Unit Number:	G01
Test Load:	>90
Tester(s) / Test Unit(s):	MP/JC

		RUN		
	UNITS	1	2	3
Start Time	hh:mm:ss	9:43:14	11:24:14	12:44:14
End Time	hh:mm:ss	10:42:44	12:23:44	13:43:44
Bar. Pressure	in. Hg	29.90	28.94	28.94
Amb. Temp.	°F	72	77	81
Rel. Humidity	%	70	57	51
Spec. Humidity	lb water / lb air	0.011745	0.011680	0.011922
Engine Fuel Flow	Nm3/hr	827.0	824.0	828.0
Engine Fuel Flow	SCFH	30,872	30,760	30,909
Stack Moisture	% Calculated	10.75	10.69	10.73
Brakehorsepower	bhp	4,413	4,417	4,431
Rated kW	kW	3,300	3,300	3,300
Rated Engine Speed	rpm	1,500	1,500	1,500
Actual kW	kW	3,291	3,294	3,304
Engine Load	%	99.7	99.8	100.1
Engine Speed	rpm	1,505	1,504	1,505
Differential Pressure	mbar	30.40	30.60	30.30
End of Test	operating hours	2,241		
Differential Pressure	in H ₂ O	12.2	12.3	12.2

-Actual kW available from engine panel and/or site personnel.

-Load calculated using Actual kW vs Rated kW.

-Brakehorsepower calculated from Actual kW

Created with Comp&RATA&Eng-AHI v20251002

VoltaGrid, LLC
 March 2, 2026
 Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997
 SAT-1 EGU

>90 Load, Run - 1

Date (mm/dd/yy)	Time (hh:mm:ss)	Elapsed Time (seconds)	O ₂ (%vd)	NOx (ppmvd)	CO (ppmvd)	VOC (as C ₃ H ₈) (ppmvw)	HCHO (ppmvw)	H ₂ O (%)
03/02/26	9:43:14	14630	10.59	1.52	3.75	0.68	0.03	11.47
03/02/26	9:43:44	14660	10.60	1.41	3.68	0.22	0.19	11.49
03/02/26	9:44:14	14690	10.60	1.23	3.72	0.21	0.25	11.45
03/02/26	9:44:44	14720	10.62	1.09	3.67	0.21	0.16	11.43
03/02/26	9:45:14	14750	10.60	1.06	3.76	0.21	0.15	11.43
03/02/26	9:45:44	14780	10.61	1.10	3.72	0.21	0.15	11.43
03/02/26	9:46:14	14810	10.61	1.07	3.72	0.18	0.14	11.48
03/02/26	9:46:44	14840	10.62	1.12	3.74	0.17	0.06	11.46
03/02/26	9:47:14	14870	10.61	1.14	3.75	0.17	0.19	11.45
03/02/26	9:47:44	14900	10.59	1.11	3.76	0.17	0.10	11.45
03/02/26	9:48:14	14930	10.62	1.11	3.72	0.17	0.17	11.44
03/02/26	9:48:44	14960	10.62	1.20	3.70	0.17	0.12	11.41
03/02/26	9:49:14	14990	10.62	1.19	3.75	0.17	0.05	11.42
03/02/26	9:49:44	15020	10.62	1.10	3.70	0.17	0.12	11.41
03/02/26	9:50:14	15050	10.63	1.13	3.72	0.04	0.07	11.41
03/02/26	9:50:44	15080	10.64	1.06	3.73	0.00	0.16	11.46
03/02/26	9:51:14	15110	10.63	1.04	3.70	0.00	0.21	11.46
03/02/26	9:51:44	15140	10.63	0.94	3.71	0.00	0.00	11.44
03/02/26	9:52:14	15170	10.64	0.92	3.72	0.00	0.18	11.49
03/02/26	9:52:44	15200	10.65	0.87	3.70	0.00	0.10	11.45
03/02/26	9:53:14	15230	10.66	0.83	3.70	0.00	0.09	11.49
03/02/26	9:53:44	15260	10.63	0.78	3.74	0.00	0.12	11.44
03/02/26	9:54:14	15290	10.64	0.78	3.71	0.00	0.27	11.43
03/02/26	9:54:44	15320	10.63	0.81	3.77	0.00	-0.07	11.46
03/02/26	9:55:14	15350	10.64	0.84	3.74	0.00	0.20	11.46
03/02/26	9:55:44	15380	10.64	0.83	3.71	0.00	0.21	11.46
03/02/26	9:56:14	15410	10.63	0.90	3.74	0.00	0.42	11.43
03/02/26	9:56:44	15440	10.62	0.92	3.74	0.00	0.11	11.42
03/02/26	9:57:14	15470	10.63	1.00	3.71	0.00	0.15	11.40
03/02/26	9:57:44	15500	10.64	1.10	3.72	0.00	0.07	11.43
03/02/26	9:58:14	15530	10.64	1.20	3.73	0.03	0.00	11.44
03/02/26	9:58:44	15560	10.63	1.23	3.73	0.04	-0.04	11.46
03/02/26	9:59:14	15590	10.63	1.27	3.74	0.04	0.14	11.43
03/02/26	9:59:44	15620	10.61	1.27	3.72	0.04	0.00	11.41
03/02/26	10:00:14	15650	10.60	1.40	3.78	0.04	0.14	11.40
03/02/26	10:00:44	15680	10.63	1.52	3.68	0.04	0.18	11.41
03/02/26	10:01:14	15710	10.62	1.56	3.77	0.04	0.08	11.37
03/02/26	10:01:44	15740	10.62	1.57	3.71	0.04	0.16	11.38
03/02/26	10:02:14	15770	10.61	1.54	3.73	0.01	0.41	11.38
03/02/26	10:02:44	15800	10.61	1.61	3.76	0.00	0.26	11.37
03/02/26	10:03:14	15830	10.61	1.65	3.76	0.00	0.10	11.45
03/02/26	10:03:44	15860	10.61	1.52	3.76	0.00	0.05	11.58
03/02/26	10:04:14	15890	10.64	1.28	3.73	0.00	0.03	11.65
03/02/26	10:04:44	15920	10.65	1.19	3.74	0.00	0.09	11.62
03/02/26	10:05:14	15950	10.63	1.14	3.74	0.00	0.19	11.53
03/02/26	10:05:44	15980	10.63	1.04	3.72	0.00	0.21	11.53
03/02/26	10:06:14	16010	10.65	1.03	3.70	0.00	-0.02	11.50
03/02/26	10:06:44	16040	10.63	1.12	3.77	0.00	0.13	11.51
03/02/26	10:07:14	16070	10.62	1.17	3.72	0.00	0.08	11.47
03/02/26	10:07:44	16100	10.62	1.14	3.75	0.00	0.24	11.44
03/02/26	10:08:14	16130	10.63	1.17	3.73	0.00	0.24	11.42
03/02/26	10:08:44	16160	10.63	1.17	3.75	0.00	0.02	11.46
03/02/26	10:09:14	16190	10.62	1.15	3.76	0.00	0.07	11.46
03/02/26	10:09:44	16220	10.62	1.15	3.75	0.00	0.18	11.45
03/02/26	10:10:14	16250	10.61	1.09	3.73	0.00	0.17	11.47
03/02/26	10:10:44	16280	10.60	1.05	3.75	0.00	0.35	11.47
03/02/26	10:11:14	16310	10.62	0.99	3.77	0.00	0.08	11.49
03/02/26	10:11:44	16340	10.60	0.98	3.75	0.00	0.05	11.50
03/02/26	10:12:14	16370	10.61	0.95	3.74	0.00	0.11	11.45
03/02/26	10:12:44	16400	10.60	0.87	3.76	0.00	0.11	11.47
03/02/26	10:13:14	16430	10.60	0.83	3.77	0.00	0.17	11.46
03/02/26	10:13:44	16460	10.62	0.81	3.72	0.00	0.06	11.47
03/02/26	10:14:14	16490	10.62	0.81	3.75	0.07	0.23	11.47
03/02/26	10:14:44	16520	10.64	0.85	3.72	0.10	0.22	11.46
03/02/26	10:15:14	16550	10.63	0.87	3.75	0.10	0.14	11.45
03/02/26	10:15:44	16580	10.64	0.88	3.78	0.10	0.14	11.44
03/02/26	10:16:14	16610	10.64	0.89	3.75	0.10	0.15	11.42
03/02/26	10:16:44	16640	10.66	0.93	3.72	0.10	0.08	11.40
03/02/26	10:17:14	16670	10.66	0.94	3.71	0.10	0.10	11.36
03/02/26	10:17:44	16700	10.66	0.99	3.75	0.10	0.24	11.29
03/02/26	10:18:14	16730	10.65	0.98	3.75	0.02	0.19	11.22
03/02/26	10:18:44	16760	10.65	1.07	3.71	0.00	0.09	11.23
03/02/26	10:19:14	16790	10.64	1.27	3.77	0.00	0.23	11.19
03/02/26	10:19:44	16820	10.66	1.37	3.76	0.00	0.23	11.20

VoltaGrid, LLC
 March 2, 2026
 Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997
 SAT-1 EGU

>90 Load, Run - 1

Date (mm/dd/yy)	Time (hh:mm:ss)	Elapsed Time (seconds)	O ₂ (%vd)	NOx (ppmvd)	CO (ppmvd)	VOC (as C ₃ H ₈) (ppmvw)	HCHO (ppmvw)	H ₂ O (%)
03/02/26	10:20:14	16850	10.66	1.59	3.79	0.00	0.11	11.23
03/02/26	10:20:44	16880	10.65	1.58	3.79	0.00	0.26	11.23
03/02/26	10:21:14	16910	10.63	1.52	3.74	0.00	0.21	11.44
03/02/26	10:21:44	16940	10.64	1.55	3.78	0.00	0.14	11.40
03/02/26	10:22:14	16970	10.64	1.67	3.72	0.00	0.15	11.46
03/02/26	10:22:44	17000	10.64	1.70	3.82	0.00	-0.03	11.41
03/02/26	10:23:14	17030	10.64	1.41	3.79	0.00	0.16	11.30
03/02/26	10:23:44	17060	10.63	1.24	3.76	0.00	0.11	11.30
03/02/26	10:24:14	17090	10.61	1.19	3.75	0.00	0.04	11.59
03/02/26	10:24:44	17120	10.61	1.17	3.76	0.00	0.19	11.35
03/02/26	10:25:14	17150	10.63	1.18	3.77	0.00	0.18	11.37
03/02/26	10:25:44	17180	10.65	1.21	3.76	0.00	0.14	11.29
03/02/26	10:26:14	17210	10.64	1.17	3.72	0.14	0.08	11.22
03/02/26	10:26:44	17240	10.65	1.19	3.75	0.18	0.18	11.51
03/02/26	10:27:14	17270	10.65	1.23	3.70	0.18	0.19	11.59
03/02/26	10:27:44	17300	10.66	1.20	3.75	0.18	0.15	11.54
03/02/26	10:28:14	17330	10.66	1.15	3.73	0.18	0.11	11.54
03/02/26	10:28:44	17360	10.66	1.15	3.71	0.18	0.06	11.48
03/02/26	10:29:14	17390	10.67	1.16	3.75	0.18	0.10	11.51
03/02/26	10:29:44	17420	10.68	1.13	3.76	0.18	0.06	11.46
03/02/26	10:30:14	17450	10.68	1.08	3.74	0.04	0.02	11.32
03/02/26	10:30:44	17480	10.68	1.06	3.77	0.00	0.07	11.31
03/02/26	10:31:14	17510	10.68	1.02	3.75	0.00	0.13	11.38
03/02/26	10:31:44	17540	10.68	1.08	3.73	0.00	0.19	11.42
03/02/26	10:32:14	17570	10.68	1.15	3.74	0.00	0.27	11.31
03/02/26	10:32:44	17600	10.68	1.14	3.76	0.00	0.17	11.29
03/02/26	10:33:14	17630	10.69	1.05	3.77	0.00	0.10	11.33
03/02/26	10:33:44	17660	10.67	1.02	3.79	0.00	0.15	11.23
03/02/26	10:34:14	17690	10.68	0.97	3.72	0.00	0.18	11.15
03/02/26	10:34:44	17720	10.68	1.02	3.74	0.00	0.20	11.32
03/02/26	10:35:14	17750	10.69	1.04	3.73	0.00	0.29	11.28
03/02/26	10:35:44	17780	10.68	1.02	3.72	0.00	0.14	11.18
03/02/26	10:36:14	17810	10.69	0.98	3.69	0.00	0.17	11.19
03/02/26	10:36:44	17840	10.67	0.93	3.66	0.00	0.30	11.26
03/02/26	10:37:14	17870	10.67	0.87	3.73	0.00	0.35	11.18
03/02/26	10:37:44	17900	10.68	1.01	3.73	0.00	0.26	11.12
03/02/26	10:38:14	17930	10.68	1.19	3.72	0.42	0.10	11.28
03/02/26	10:38:44	17960	10.67	1.16	3.75	0.54	0.17	11.24
03/02/26	10:39:14	17990	10.70	1.13	3.75	0.54	0.03	11.16
03/02/26	10:39:44	18020	10.70	1.19	3.71	0.55	0.10	11.14
03/02/26	10:40:14	18050	10.70	1.31	3.78	0.54	0.13	11.16
03/02/26	10:40:44	18080	10.69	1.44	3.81	0.55	0.20	11.17
03/02/26	10:41:14	18110	10.70	1.56	3.73	0.55	0.22	11.20
03/02/26	10:41:44	18140	10.70	1.53	3.68	0.55	0.10	11.03
03/02/26	10:42:14	18170	10.69	1.56	3.71	0.13	0.08	11.06
03/02/26	10:42:44	18200	10.69	1.54	3.74	0.00	0.12	11.06

RAW AVERAGE **10.64** **1.15** **3.74** **0.08** **0.14** **11.39**

	O ₂ (%)	NOx (ppmvd)	CO (ppmvd)	VOC (as C ₃ H ₈) (ppmvw)	HCHO (ppmvw)	H ₂ O (%)
Serial Number:	INST-22-0007	INST-NX-0027	INST-CO-0051	INST-VC-0006	510	510
Initial Zero	-0.01	-0.04	-0.06	-0.04		
Final Zero	0.02	-0.04	-0.04	-0.01		
Avg. Zero	0.01	-0.04	-0.05	-0.03		
Initial UpScale	11.98	4.94	10.08	1.96		
Final UpScale	11.93	4.97	10.01	2.00		
Avg. UpScale	11.96	4.96	10.05	1.98		
Upscale Cal Gas	11.96	5.00	10.00	2.00		

EMISSIONS DATA	O ₂	NOx	CO	VOC (as C ₃ H ₈)	HCHO
Corrected Raw Average (ppm/% [vol] dry basis)	10.65	1.19	3.75	0.09	0.16
Corrected Raw Average (ppm/% [vol] wet basis)	9.50	1.06	3.35	0.08	0.14

VoltaGrid, LLC
 March 2, 2026
 Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997
 SAT-1 EGU

>90 Load, Run - 2

Date (mm/dd/yy)	Time (hh:mm:ss)	Elapsed Time (seconds)	O ₂ (%vd)	NOx (ppmvd)	CO (ppmvd)	VOC (as C ₃ H ₈) (ppmvw)	HCHO (ppmvw)	H ₂ O (%)
03/02/26	11:24:14	20690	10.67	1.04	3.83	0.15	0.12	11.34
03/02/26	11:24:44	20720	10.66	0.99	3.82	0.15	0.09	11.31
03/02/26	11:25:14	20750	10.66	0.84	3.80	0.15	0.19	11.34
03/02/26	11:25:44	20780	10.67	0.89	3.79	0.15	0.26	11.33
03/02/26	11:26:14	20810	10.67	0.93	3.76	0.15	0.26	11.35
03/02/26	11:26:44	20840	10.66	0.91	3.77	0.15	0.23	11.35
03/02/26	11:27:14	20870	10.65	0.90	3.76	0.15	0.14	11.32
03/02/26	11:27:44	20900	10.65	0.95	3.79	0.41	0.15	11.28
03/02/26	11:28:14	20930	10.66	1.03	3.79	1.77	0.00	11.26
03/02/26	11:28:44	20960	10.66	1.04	3.80	1.77	0.09	11.23
03/02/26	11:29:14	20990	10.68	0.99	3.75	1.76	0.28	11.16
03/02/26	11:29:44	21020	10.68	0.98	3.75	1.77	0.19	11.18
03/02/26	11:30:14	21050	10.68	0.92	3.77	1.76	0.24	11.22
03/02/26	11:30:44	21080	10.70	0.88	3.77	1.77	0.08	11.27
03/02/26	11:31:14	21110	10.70	0.92	3.75	1.76	0.14	11.24
03/02/26	11:31:44	21140	10.68	1.01	3.83	1.47	0.10	11.23
03/02/26	11:32:14	21170	10.70	0.91	3.76	0.00	0.22	11.24
03/02/26	11:32:44	21200	10.70	0.85	3.73	0.00	0.16	11.23
03/02/26	11:33:14	21230	10.69	0.85	3.74	0.00	0.11	11.23
03/02/26	11:33:44	21260	10.71	0.84	3.76	0.00	0.14	11.25
03/02/26	11:34:14	21290	10.70	0.85	3.82	0.00	0.18	11.21
03/02/26	11:34:44	21320	10.70	0.84	3.80	0.00	0.08	11.18
03/02/26	11:35:14	21350	10.69	0.89	3.75	0.00	0.20	11.23
03/02/26	11:35:44	21380	10.70	0.94	3.75	0.00	0.11	11.26
03/02/26	11:36:14	21410	10.69	0.99	3.76	0.00	0.18	11.25
03/02/26	11:36:44	21440	10.68	1.05	3.74	0.00	0.09	11.17
03/02/26	11:37:14	21470	10.67	1.10	3.79	0.00	-0.07	11.13
03/02/26	11:37:44	21500	10.67	1.05	3.77	0.00	0.11	11.15
03/02/26	11:38:14	21530	10.69	1.05	3.76	0.00	0.17	11.19
03/02/26	11:38:44	21560	10.67	1.08	3.77	-0.01	0.09	11.23
03/02/26	11:39:14	21590	10.68	0.99	3.75	0.00	0.28	11.27
03/02/26	11:39:44	21620	10.67	0.93	3.76	0.25	0.11	11.25
03/02/26	11:40:14	21650	10.68	0.99	3.75	1.52	-0.05	11.26
03/02/26	11:40:44	21680	10.69	1.01	3.78	1.52	0.25	11.27
03/02/26	11:41:14	21710	10.67	1.02	3.74	1.52	0.23	11.34
03/02/26	11:41:44	21740	10.66	1.00	3.76	1.52	0.28	11.40
03/02/26	11:42:14	21770	10.68	0.84	3.70	1.52	-0.03	11.42
03/02/26	11:42:44	21800	10.68	0.96	3.75	1.52	0.10	11.40
03/02/26	11:43:14	21830	10.68	1.05	3.75	1.52	0.36	11.36
03/02/26	11:43:44	21860	10.68	0.97	3.70	1.26	0.18	11.33
03/02/26	11:44:14	21890	10.71	0.95	3.75	0.00	0.21	11.34
03/02/26	11:44:44	21920	10.71	0.96	3.74	0.00	0.22	11.32
03/02/26	11:45:14	21950	10.70	0.97	3.73	0.00	0.16	11.31
03/02/26	11:45:44	21980	10.70	0.98	3.82	0.00	0.03	11.26
03/02/26	11:46:14	22010	10.70	1.00	3.77	0.00	0.17	11.26
03/02/26	11:46:44	22040	10.69	1.03	3.76	0.00	0.01	11.29
03/02/26	11:47:14	22070	10.68	1.07	3.75	0.00	0.19	11.30
03/02/26	11:47:44	22100	10.68	1.06	3.78	0.00	0.21	11.30
03/02/26	11:48:14	22130	10.68	1.03	3.75	0.00	0.15	11.26
03/02/26	11:48:44	22160	10.68	0.95	3.77	0.00	0.12	11.27
03/02/26	11:49:14	22190	10.68	0.93	3.74	0.00	0.21	11.24
03/02/26	11:49:44	22220	10.68	0.90	3.78	0.00	0.13	11.21
03/02/26	11:50:14	22250	10.67	0.84	3.80	0.00	0.22	11.19
03/02/26	11:50:44	22280	10.68	0.87	3.78	0.00	0.07	11.17
03/02/26	11:51:14	22310	10.68	0.88	3.78	0.00	0.00	11.20
03/02/26	11:51:44	22340	10.67	0.86	3.75	0.00	0.13	11.21
03/02/26	11:52:14	22370	10.66	0.91	3.81	0.00	0.22	11.33
03/02/26	11:52:44	22400	10.67	0.94	3.77	0.00	0.13	11.38
03/02/26	11:53:14	22430	10.66	1.01	3.80	0.00	0.22	11.41
03/02/26	11:53:44	22460	10.67	1.00	3.77	0.00	0.14	11.35
03/02/26	11:54:14	22490	10.67	0.98	3.73	0.00	0.11	11.27
03/02/26	11:54:44	22520	10.68	0.93	3.76	0.00	0.12	11.27
03/02/26	11:55:14	22550	10.68	0.96	3.78	0.00	0.29	11.24
03/02/26	11:55:44	22580	10.70	0.97	3.75	0.00	0.07	11.29
03/02/26	11:56:14	22610	10.70	0.93	3.82	0.00	0.14	11.28
03/02/26	11:56:44	22640	10.67	0.93	3.80	0.00	0.05	11.28
03/02/26	11:57:14	22670	10.68	0.93	3.80	0.00	0.06	11.27
03/02/26	11:57:44	22700	10.68	0.97	3.82	0.00	0.05	11.29
03/02/26	11:58:14	22730	10.68	1.02	3.79	0.00	0.16	11.27
03/02/26	11:58:44	22760	10.68	0.98	3.75	0.00	0.09	11.27
03/02/26	11:59:14	22790	10.67	0.92	3.75	0.00	0.11	11.24
03/02/26	11:59:44	22820	10.68	0.91	3.79	0.00	0.16	11.24
03/02/26	12:00:14	22850	10.68	0.91	3.79	0.00	0.00	11.24
03/02/26	12:00:44	22880	10.68	0.96	3.75	0.00	0.08	11.27

VoltaGrid, LLC
 March 2, 2026
 Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997
 SAT-1 EGU

>90 Load, Run - 2

Date (mm/dd/yy)	Time (hh:mm:ss)	Elapsed Time (seconds)	O ₂ (%vd)	NOx (ppmvd)	CO (ppmvd)	VOC (as C ₃ H ₈) (ppmvw)	HCHO (ppmvw)	H ₂ O (%)
03/02/26	12:01:14	22910	10.69	0.97	3.81	0.00	0.06	11.26
03/02/26	12:01:44	22940	10.69	0.93	3.81	0.00	0.00	11.26
03/02/26	12:02:14	22970	10.69	0.89	3.81	0.00	0.16	11.26
03/02/26	12:02:44	23000	10.69	0.84	3.74	0.00	0.34	11.26
03/02/26	12:03:14	23030	10.69	0.82	3.81	0.00	0.05	11.26
03/02/26	12:03:44	23060	10.69	0.88	3.76	0.00	0.03	11.28
03/02/26	12:04:14	23090	10.69	0.91	3.72	0.00	0.05	11.27
03/02/26	12:04:44	23120	10.68	0.95	3.75	0.00	0.08	11.28
03/02/26	12:05:14	23150	10.68	0.91	3.78	0.00	0.13	11.23
03/02/26	12:05:44	23180	10.69	0.92	3.79	0.00	0.28	11.19
03/02/26	12:06:14	23210	10.68	0.94	3.78	0.00	0.25	11.20
03/02/26	12:06:44	23240	10.67	0.87	3.75	0.00	0.16	11.25
03/02/26	12:07:14	23270	10.69	0.85	3.75	0.00	0.23	11.31
03/02/26	12:07:44	23300	10.68	0.88	3.78	0.00	0.29	11.28
03/02/26	12:08:14	23330	10.67	0.90	3.77	0.00	0.00	11.26
03/02/26	12:08:44	23360	10.69	0.92	3.80	0.00	0.15	11.27
03/02/26	12:09:14	23390	10.66	0.99	3.82	0.00	0.21	11.27
03/02/26	12:09:44	23420	10.66	1.07	3.82	0.00	0.11	11.27
03/02/26	12:10:14	23450	10.66	0.99	3.80	0.00	0.18	11.29
03/02/26	12:10:44	23480	10.66	1.01	3.83	0.00	0.23	11.32
03/02/26	12:11:14	23510	10.66	0.98	3.81	0.00	0.19	11.29
03/02/26	12:11:44	23540	10.65	0.95	3.81	0.00	0.07	11.29
03/02/26	12:12:14	23570	10.67	0.97	3.77	0.01	0.07	11.28
03/02/26	12:12:44	23600	10.67	0.97	3.81	0.00	0.18	11.27
03/02/26	12:13:14	23630	10.67	0.91	3.80	0.00	0.30	11.25
03/02/26	12:13:44	23660	10.67	0.92	3.77	0.00	-0.01	11.24
03/02/26	12:14:14	23690	10.67	0.93	3.79	0.00	0.20	11.25
03/02/26	12:14:44	23720	10.68	0.92	3.76	0.00	0.09	11.25
03/02/26	12:15:14	23750	10.68	0.97	3.76	0.00	0.08	11.25
03/02/26	12:15:44	23780	10.68	0.91	3.77	0.00	0.13	11.26
03/02/26	12:16:14	23810	10.68	0.87	3.83	0.00	0.15	11.27
03/02/26	12:16:44	23840	10.68	0.87	3.78	0.00	0.15	11.25
03/02/26	12:17:14	23870	10.68	0.86	3.80	0.00	0.15	11.26
03/02/26	12:17:44	23900	10.68	0.85	3.74	0.00	0.28	11.28
03/02/26	12:18:14	23930	10.70	0.87	3.78	0.00	0.21	11.30
03/02/26	12:18:44	23960	10.70	0.84	3.77	0.00	0.27	11.31
03/02/26	12:19:14	23990	10.68	0.89	3.82	0.00	0.19	11.28
03/02/26	12:19:44	24020	10.70	0.91	3.81	0.00	0.04	11.26
03/02/26	12:20:14	24050	10.68	1.01	3.82	0.00	0.04	11.29
03/02/26	12:20:44	24080	10.67	1.02	3.82	0.00	0.24	11.31
03/02/26	12:21:14	24110	10.67	0.94	3.77	0.00	0.05	11.29
03/02/26	12:21:44	24140	10.68	0.95	3.81	0.00	0.12	11.26
03/02/26	12:22:14	24170	10.67	0.96	3.79	0.00	0.21	11.27
03/02/26	12:22:44	24200	10.67	0.90	3.82	0.00	0.16	11.31
03/02/26	12:23:14	24230	10.66	0.85	3.79	0.00	0.03	11.32
03/02/26	12:23:44	24260	10.68	0.85	3.80	0.32	0.18	11.30
RAW AVERAGE			10.68	0.94	3.78	0.23	0.14	11.27

Bias	O ₂		NOx		CO		VOC (as C ₃ H ₈)	HCHO	H ₂ O
	Serial Number:	INST-22-0007	INST-NX-0027	INST-CO-0051	INST-VC-0006	510	510		
		(%)	(ppmvd)	(ppmvd)	(ppmvw)				
	Initial Zero	0.02	-0.04	-0.04	-0.01				
	Final Zero	0.05	-0.12	-0.18	0.00				
	Avg. Zero	0.04	-0.08	-0.11	-0.01				
	Initial UpScale	11.93	4.97	10.01	2.00				
	Final UpScale	11.95	4.98	10.05	1.99				
	Avg. UpScale	11.94	4.98	10.03	2.00				
Upscale Cal Gas		11.96	5.00	10.00	2.00				

EMISSIONS DATA	O ₂	NOx	CO	VOC (as C ₃ H ₈)	HCHO
Corrected Raw Average (ppm/% [vol] dry basis)	10.69	1.01	3.83	0.26	0.16
Corrected Raw Average (ppm/% [vol] wet basis)	9.55	0.90	3.42	0.23	0.14

VoltaGrid, LLC
 March 2, 2026
 Jenbacher, J620 Single GS-J715, Unit #G01, Serial #1717997
 SAT-1 EGU

>90 Load, Run - 3

Date (mm/dd/yy)	Time (hh:mm:ss)	Elapsed Time (seconds)	O ₂ (%vd)	NOx (ppmvd)	CO (ppmvd)	VOC (as C ₃ H ₆) (ppmvw)	HCHO (ppmvw)	H ₂ O (%)
03/02/26	12:44:14	25490	10.67	1.65	3.79	0.00	0.00	11.20
03/02/26	12:44:44	25520	10.67	1.40	3.83	0.00	0.09	11.21
03/02/26	12:45:14	25550	10.67	1.27	3.82	0.00	0.10	11.23
03/02/26	12:45:44	25580	10.67	1.17	3.87	0.00	0.21	11.25
03/02/26	12:46:14	25610	10.66	1.08	3.83	0.00	0.19	11.23
03/02/26	12:46:44	25640	10.67	1.06	3.88	0.00	0.24	11.25
03/02/26	12:47:14	25670	10.64	1.02	3.85	0.00	0.13	11.23
03/02/26	12:47:44	25700	10.66	0.95	3.83	0.00	0.16	11.26
03/02/26	12:48:14	25730	10.67	0.94	3.83	0.00	0.18	11.24
03/02/26	12:48:44	25760	10.65	0.98	3.79	0.00	0.12	11.25
03/02/26	12:49:14	25790	10.66	0.93	3.81	0.00	0.17	11.28
03/02/26	12:49:44	25820	10.67	0.95	3.83	0.00	0.11	11.26
03/02/26	12:50:14	25850	10.65	0.98	3.75	0.00	0.14	11.24
03/02/26	12:50:44	25880	10.68	0.95	3.89	0.00	0.15	11.26
03/02/26	12:51:14	25910	10.67	0.96	3.85	0.00	0.35	11.24
03/02/26	12:51:44	25940	10.66	0.98	3.83	0.00	0.23	11.25
03/02/26	12:52:14	25970	10.67	0.99	3.82	0.00	0.21	11.24
03/02/26	12:52:44	26000	10.68	0.99	3.79	0.00	0.16	11.23
03/02/26	12:53:14	26030	10.67	1.06	3.89	0.00	0.08	11.27
03/02/26	12:53:44	26060	10.68	1.01	3.83	0.00	0.11	11.26
03/02/26	12:54:14	26090	10.70	0.98	3.80	0.00	0.15	11.23
03/02/26	12:54:44	26120	10.68	1.05	3.83	0.00	0.20	11.27
03/02/26	12:55:14	26150	10.69	1.05	3.80	0.00	0.22	11.26
03/02/26	12:55:44	26180	10.70	1.09	3.86	0.00	0.18	11.24
03/02/26	12:56:14	26210	10.68	1.14	3.82	0.00	0.23	11.24
03/02/26	12:56:44	26240	10.70	1.14	3.81	0.00	0.11	11.22
03/02/26	12:57:14	26270	10.70	1.12	3.83	0.00	0.12	11.20
03/02/26	12:57:44	26300	10.68	1.12	3.87	0.00	0.27	11.20
03/02/26	12:58:14	26330	10.69	1.08	3.82	0.00	0.15	11.22
03/02/26	12:58:44	26360	10.69	1.10	3.82	0.00	0.04	11.24
03/02/26	12:59:14	26390	10.67	1.10	3.86	0.00	0.10	11.25
03/02/26	12:59:44	26420	10.66	1.03	3.83	0.00	0.18	11.27
03/02/26	13:00:14	26450	10.68	0.99	3.85	0.00	0.27	11.28
03/02/26	13:00:44	26480	10.68	1.01	3.79	0.00	0.17	11.28
03/02/26	13:01:14	26510	10.68	0.99	3.85	0.00	0.24	11.25
03/02/26	13:01:44	26540	10.67	0.92	3.84	0.00	0.17	11.26
03/02/26	13:02:14	26570	10.66	0.95	3.84	0.00	0.11	11.25
03/02/26	13:02:44	26600	10.68	0.99	3.86	0.00	0.07	11.22
03/02/26	13:03:14	26630	10.69	1.04	3.84	0.00	0.05	11.21
03/02/26	13:03:44	26660	10.68	1.12	3.84	0.00	0.19	11.23
03/02/26	13:04:14	26690	10.67	1.19	3.86	0.00	0.04	11.26
03/02/26	13:04:44	26720	10.68	1.18	3.83	0.00	0.22	11.30
03/02/26	13:05:14	26750	10.68	1.25	3.84	0.00	0.11	11.27
03/02/26	13:05:44	26780	10.68	1.18	3.85	0.00	0.09	11.26
03/02/26	13:06:14	26810	10.69	1.13	3.83	0.00	0.07	11.23
03/02/26	13:06:44	26840	10.68	1.15	3.84	0.00	0.10	11.23
03/02/26	13:07:14	26870	10.68	1.13	3.82	0.00	0.15	11.24
03/02/26	13:07:44	26900	10.67	1.10	3.87	0.00	0.26	11.27
03/02/26	13:08:14	26930	10.67	1.03	3.88	0.00	0.09	11.28
03/02/26	13:08:44	26960	10.69	1.03	3.89	0.00	0.24	11.28
03/02/26	13:09:14	26990	10.68	1.06	3.84	0.00	0.15	11.28
03/02/26	13:09:44	27020	10.69	1.00	3.89	0.00	0.20	11.28
03/02/26	13:10:14	27050	10.68	0.99	3.87	0.00	0.31	11.27
03/02/26	13:10:44	27080	10.67	0.93	3.86	0.00	0.23	11.27
03/02/26	13:11:14	27110	10.67	0.88	3.87	0.00	0.10	11.27
03/02/26	13:11:44	27140	10.66	0.89	3.87	0.00	0.10	11.28
03/02/26	13:12:14	27170	10.65	0.96	3.85	0.00	0.15	11.27
03/02/26	13:12:44	27200	10.65	1.01	3.87	0.00	0.06	11.28
03/02/26	13:13:14	27230	10.67	1.00	3.87	0.00	0.16	11.30
03/02/26	13:13:44	27260	10.66	1.03	3.83	0.00	0.08	11.30
03/02/26	13:14:14	27290	10.65	1.00	3.92	0.00	0.11	11.33
03/02/26	13:14:44	27320	10.64	0.94	3.90	0.00	0.27	11.32
03/02/26	13:15:14	27350	10.66	1.03	3.84	0.00	0.13	11.31
03/02/26	13:15:44	27380	10.68	1.05	3.84	0.56	0.16	11.32
03/02/26	13:16:14	27410	10.67	1.12	3.85	1.05	0.14	11.29
03/02/26	13:16:44	27440	10.66	1.09	3.88	1.05	0.17	11.28
03/02/26	13:17:14	27470	10.65	1.06	3.88	1.05	0.25	11.28
03/02/26	13:17:44	27500	10.67	1.08	3.88	1.05	0.15	11.25
03/02/26	13:18:14	27530	10.66	1.14	3.89	1.05	0.19	11.26
03/02/26	13:18:44	27560	10.65	1.15	3.88	1.05	-0.09	11.31
03/02/26	13:19:14	27590	10.66	1.03	3.85	1.05	0.16	11.29
03/02/26	13:19:44	27620	10.68	1.03	3.85	0.49	0.10	11.28
03/02/26	13:20:14	27650	10.67	1.12	3.84	0.00	0.11	11.24
03/02/26	13:20:44	27680	10.67	1.15	3.89	0.00	0.18	11.24

>90 Load. Run - 3

RAW AVERAGE	10.67	1.06	3.86	0.07	0.16	11.26
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Upscale Cal Gas	11.96	5.00	10.00	2.00
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App. B

APPENDIX C

CALIBRATION GAS CERTIFICATIONS



Assay Laboratory: Red Ball TGS
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150

CERTIFICATE OF ANALYSIS (Zero Ambient Nitrogen)

Cylinder Number:	CC763118	Certification Date:	07/21/2025
Product ID Number:	121026	Expiration Date:	07/19/2033
Cylinder Pressure:	1900 PSIG	MFG Facility:	RBTGS-Shreveport-LA
COA #	CC763118.20250721-0	Lot Number:	CC763118.20250721
Customer PO. NO.:		Tracking Number:	108810215
Customer:		Previous Certification Dates:	

This mixture is for laboratory use only, not for drug, household or other use.	
This mixture is certified in Mole % to be within $\pm 2\%$ of the actual number reported with a confidence of 95%.	
This mixture was manufactured by scale; weights traceable to N.I.S.T. Certificate #822/266926-02.	
Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).	

Composing Material: Zero Ambient Nitrogen, Cert., Sz152

Component	Specification	Concentration
Nitrogen	Balance	Balance
Oxygen as Impurity	<1.0 PPM	<1.0 PPM
Carbon Dioxide as Impurity	<0.5 PPM	<0.5 PPM
Carbon Monoxide as Impurity	<0.5 PPM	<0.5 PPM
Total Oxides of Nitrogen as Impurity	<0.1 PPM	<0.1 PPM
Sulfur Dioxide as Impurity	<0.1 PPM	<0.1 PPM
Total Hydrocarbons as Impurity	<0.1 PPM	<0.1 PPM

Red Ball Technical Gas Service
PGVP Vendor ID # G12025
Information and Ordering
800-551-8150
Fax (318-425-6309)



Brittany Johnson

Brittany Johnson
Analytical Chemist

Version 02-B, Revised on 2015-05-27



Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12022

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0032353	Certification Date:	09/12/2022
Product ID Number:	125537	Expiration Date:	09/10/2030
Cylinder Pressure:	1900 PSIG	MFG Facility:	- Shreveport - LA
COA #	EB0032353.20220830-0	Lot Number:	EB0032353.20220830
Customer PO. NO.:		Tracking Number:	056558832
Customer:		Previous Certification Dates:	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Propane	25.5 PPM	±0.2 PPM	FTIR	09/12/2022
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
EB0102888	EB0102888.20171121	05/12/2026	GMIS	N2	C3H8	242 PPM	0.429	2644a

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
C3H8	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	08/29/2022

SMART-CERT



This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

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Jasmine Godfrey

Jasmine Godfrey
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-J, Revised on 2018-09-17



Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0060652	Certification Date:	09/18/2024
Product ID Number:	125416	Expiration Date:	09/18/2027
Cylinder Pressure:	1900 PSIG	MFG Facility:	- Shreveport - LA
COA #	EB0060652.20240905-0	Lot Number:	EB0060652.20240905
Customer PO. NO.:		Tracking Number:	083008306
Customer:		Previous Certification Dates:	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Monoxide	25.4 PPM	±0.18 PPM	GCF	09/11/2024
Nitric Oxide	24.9 PPM	±0.11 PPM	Chemiluminescence	09/09/2024, 09/18/2024
Total Oxides of Nitrogen	25.2 PPM			
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
APE1782168	APE1782168	09/27/2026	PRM	N2	NO	99.95 PPM	0.3	C2384201.01A
CC736784	CC736784.20220728	10/18/2031	GMIS	N2	CO	47.75 PPM	0.265	SRM 2636a
EB0016824	EB0016824.20221108	04/28/2032	GMIS	N2	CO	47.59 PPM	0.227	SRM 2636a
EB0078033	EB0078033.20221130	01/09/2027	GMIS	N2	NO	29.46 PPM	0.412	C2281801.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
NO	Chemiluminescence	Thermo	42IQ-HL	12321229099	08/21/2024
CO	GCF	Thermo	T48i	11708001	09/10/2024
NO	Chemiluminescence	Thermo	42IQ-HL	12321229099	09/13/2024

SMART-CERT



This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

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Timothy Davis
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07



Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12025

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0080848	Certification Date:	01/22/2025
Product ID Number:	124605	Expiration Date:	01/20/2033
Cylinder Pressure:	1900 PSIG	MFG Facility:	- Shreveport - LA
COA #	EB0080848.20250107-0	Lot Number:	EB0080848.20250107
Customer PO. NO.:		Tracking Number:	084094054
Customer:		Previous Certification Dates:	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	19.0 %	±0.13 %	FTIR	01/22/2025
Oxygen	20.98 %	±0.07 %	MPA	01/15/2025
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
D245724	D245724	06/03/2029	PRM	N2	O2	24.531 %	0.1019	C2459101.03
EB0005425	EB0005425.20230816	07/09/2032	GMIS	N2	CO2	19.62 %	0.335	C2281801.04
EB0010822	EB0010822.20230816	07/09/2032	GMIS	N2	CO2	24.84 %	0.292	C2190301.03
RR04304	RR04304.20240208	10/20/2032	GMIS	N2	O2	12 %	0.192	SRM 2659a

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	01/06/2025
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	01/05/2025

SMART-CERT



This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

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Gabriel Ouma

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-N, Revised on 2024-11-03



Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12025

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC719156	Certification Date:	06/11/2025
Product ID Number:	124606	Expiration Date:	06/09/2033
Cylinder Pressure:	1900 PSIG	MFG Facility:	- Shreveport - LA
COA #	CC719156.20250606-0	Lot Number:	CC719156.20250606
Customer PO. NO.:		Tracking Number:	098490547
Customer:		Previous Certification Dates:	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	8.96 %	±0.08 %	NDIR	06/10/2025
Oxygen	11.96 %	±0.02 %	MPA	06/11/2025
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC770489	CC770489.20240512	02/09/2033	GMIS	N2	O2	24.01 %	0.145	C2459101.03
EB0005425	EB0005425.20230816	07/09/2032	GMIS	N2	CO2	19.62 %	0.335	C2281801.04
EB0021935	EB0021935.20230816	09/18/2032	GMIS	N2	CO2	9.5 %	0.176	C2281801.04

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
CO2	NDIR	Thermo	410i	1162980025	06/02/2025
O2	MPA	Thermo	410i	1162980025	06/10/2025

SMART-CERT



This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-N, Revised on 2024-11-03

SPECGAS, INC.

CERTIFICATE

SPECGAS, Inc.
86 Vincent Circle
Warminster, PA. 18974
Tel. 215 443 2600
Fax. 215 443 2665
WWW.SPECGASINC.COM



ANALYTICAL REPORT-PRODUCT CERTIFICATION

SOLD TO: Red Ball Oxygen
555 Craig Kennedy Way
Shreveport, LA. 71107

SHIP TO: Air Hygiene Broken Arrow
1600 West Tacoma Street
Broken Arrow, OK 74012

DATE: 10/30/25
PO#: 4090001

CERTIFIED STANDARD MIXTURE

CYLINDER #
CC517653

Component		Nominal	Actual
FORMALDEHYDE	CH ₂ O	30.0 ppm	30.3 ppm
NITROGEN	N ₂	Balance	Balance

Blend Tolerance: +/- 20 %

Analytical Tolerance: +/- 5 %

PRESSURE: 1335 psia

VALVE: CGA 350 s/s

CYL. SIZE: 150A "SGS" COC

ANALYSIS DATE: 10/30/25

EXPIRATION DATE: 4/30/26

UN 1956, Compressed Gas N.O.S.

(Formaldehyde, Nitrogen) 2.2

Emergency Phone #: 1 800 535 5053

N.I.S.T.: Mixture was blended on a high resolution Scale (Sartorius Combics 1, Serial # 29503041) Traceable to N.I.S.T. through test # 38643-008982-01
ASTM Class 1, S/N 553M, ID# 10-J
4kg wt. (Serial #85424) Standards traceable to N.I.S.T. through weight & measures test #LWS20250701



Warning

Contains gas under pressure
May explode if heated
May displace oxygen and cause rapid suffocation

ANALYST

[Signature]

DATE

10/30/25



Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0003147	Certification Date:	12/05/2024
Product ID Number:	125205	Expiration Date:	12/03/2032
Cylinder Pressure:	1900 PSIG	MFG Facility:	- Shreveport - LA
COA #	EB0003147.20241127-0	Lot Number:	EB0003147.20241127
Customer PO. NO.:		Tracking Number:	6033392
Customer:		Previous Certification Dates:	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Methane	30.0 PPM	±0.17 PPM	FTIR	12/05/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
EB0046492	EB0046492.20230908	07/10/2032	GMIS	N2	CH4	60.88 PPM	0.412	C2413001.05

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
CH4	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	11/06/2024

SMART-CERT



This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

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Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-N, Revised on 2024-11-03

APPENDIX D

QUALITY ASSURANCE AND QUALITY CONTROL DATA

QA/QC PROGRAM

AIR HYGIENE ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by an internal QA team and encompasses six major areas:

1. Field Qualifications
2. QA reviews of reports, laboratory work, and field testing
3. Equipment calibration and maintenance
4. Chain-of-custody
5. Training
6. Knowledge of current test methods

Field Qualifications

Air Hygiene personnel are required to gain and maintain competence with testing methods and techniques according to their job titles and the roles they play during field testing events. Qualifications for each job description include:

Staff Technician - An entry level position with responsibility to test on the stack by performing duties that include keep trucks and trailers stocked and clean, travel to and from job site, be the “hands of the test” on the stack; stay on a stack during the sample test, set up and tear down equipment on-site, perform maintenance on equipment in the shop and on-site.

Test Technician or Specialist - Acts as the “hands of the test” on the stack by performing duties that include: stay on a stack during the sample test, migrate to the testing trailer and learn the different analyzers and testing methods used on site, set up and tear down testing equipment on site, learn the system for testing from Testing Managers and Project Managers, travel to and from job site; including driving responsibilities under DOT requirements, follow directions of Testing Managers and Project Managers, learn the proper way to conduct on-site test of stationary stacks

Test Manager or Engineer - Directs and coordinates all aspects of a successful test by performing the following duties personally or through subordinate supervisors including: operating analyzers and consoles during testing along with QA/QC procedures, supervise set up and tear down of equipment on site, writing, reviewing, and revising final test reports, working with the client or state personnel while on the job site, managing pre-test checklists and onsite testing procedures, diagnose and repair any problems that may arise with the equipment, safely operate a man lift and drive a truck with or without a trailer, act as crew leader in the field, write protocols and reports, maintain project log of services performed on the job, verify all equipment needed for a job was loaded on the trailer. Test Managers must hold at least one QSTI certificate.

Project Manager - Directs and coordinates all aspects of a successful test by performing the following duties personally or through subordinate supervisors including: operating analyzers and consoles during testing along with QA/QC procedures, supervise set up and tear down of equipment on site, writing, reviewing, and revising final test reports, working with the client or state personnel while on the job site, managing pre-test checklists and onsite testing procedures, diagnose and repair any problems that may arise with the equipment, safely operate a man lift and drive a truck with or without a trailer, act as crew leader in the field, write protocols and reports, maintain project log of services performed on the job, verify all equipment needed for a job was loaded on the trailer. Project Managers typically hold QSTI certificates in Groups 1 through 4.

QA Reviews

Air Hygiene’s review procedure includes review of each source test report, along with laboratory and fieldwork, by the QA Team. The most important review is the one that takes place before a test program begins. The QA Team works closely with technical division personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance

The equipment used to conduct the emission measurements is maintained according to the manufacturer’s instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined by the Environmental Protection Agency. Quality control checks are also conducted in the field for each test program. In conformance with ASTM D7036 Section 15.3.15, all metering and monitoring equipment meets or exceeds the uncertainty criteria contained in the method language that pertains to that equipment.

Chain-of-Custody

Air Hygiene maintains full chain-of-custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, Air Hygiene documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.). Samples are stored in a locked area to which only Air Hygiene personnel have access. Field data sheets are secured at Air Hygiene's offices upon return from the field.

Training

Personnel's training is essential to ensure quality testing. Air Hygiene has formal and informal training programs, which include:

1. Attendance at EPA-sponsored training courses
2. Enrollment in EPA correspondence courses
3. A requirement for all technicians to read and understand Air Hygiene's QA manual.
4. In-house training and QA meetings on a regular basis
5. Maintenance of training records

Knowledge of Current Test Methods

With the constant updating of standard test methods and the wide variety of emerging test procedures, it is essential that any qualified source tester keep abreast of new developments. Air Hygiene subscribes to services, which provide updates on EPA reference methods, rules, and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences. Air Hygiene personnel maintain membership in the Air and Waste Management Association and the American Industrial Hygiene Association.

Reproduction and Distribution Policy

Reproducing portions of this test report may omit critical or substantial documentation or be taken out of context and due care must be exercised in this regard. Furthermore, this test report and its associated data shall not be reproduced in full or in part without the written consent of the customer.

Data Provided by Client

Data provided by the Client is clearly identified in the report. Air Hygiene accepts data provided by the Client as accurate.

COMBUSTION TESTING QUALITY ASSURANCE ACTIVITIES

In conformance with ASTM D7036 Section 15.3.11 and 13, all testing was performed without any real or apparent errors, except for those that would be listed in Section 2.0 of this report. In addition, all testing was conducted according to the approved testing protocol, test methods, Air Hygiene Quality Manual, or ASTM D7036, except for specifics noted in Section 2.0 of this report. Several quality assurance activities were undertaken before, during, and after this testing project. This section of the report combined with the documentation in Appendix C describes each of those activities.

Each instrument's response was checked and adjusted in the field prior to the collection of data via multi-point calibration. The instrument's linearity was checked by adjusting its zero and span responses to zero nitrogen and an upscale calibration gas in the range of the expected concentrations. The instrument response was then challenged with other calibration gases of known concentration and accepted as being linear if the response of the other calibration gases agreed within plus or minus two percent of the range of predicted values.

After each test run, the analyzers were checked for zero and span drift. This allowed each test run to be bracketed by calibrations and documents the precision of the data just collected. The criterion for acceptable data is that the instrument drift is no more than three percent of the full-scale response. The quality assurance worksheets in the following pages summarize all multipoint calibration checks and zero to span checks performed during the tests. These worksheets (as prepared from the data records of Appendix A) show that no drifts of more than three percent occurred in the zero to span checks following each test run.

The sampling systems were leak checked by demonstrating that a vacuum greater than 10 in Hg could be held for at least one minute with a decline of less than one inch of Hg. A leak test was conducted after the sample system was set up and before the system was dismantled. This test was conducted to ensure that ambient air had not diluted the sample. Any leakage detected prior to the tests would be repaired and another leak check conducted before testing commenced. No leaks were found during the pre or post-test leak checks.

The absence of leaks in the sampling system was also verified by a sampling system bias check. The sampling system's integrity was tested by comparing the responses of the analyzers to the calibration gases introduced via two paths. The first path was directly into the analyzer and the second path via the sample system at the sample probe. Any difference in the instrument responses by these two methods was attributed to sampling system bias or leakage. The criterion for acceptance is agreement within five percent of the span of the analyzer. The control gases used to calibrate the instruments were analyzed and certified by the compressed gas vendors to plus or minus one percent accuracy for all gases. EPA Protocol No. 1 was used, where applicable, to assign the concentration values traceable to the National Institute of Standards and Technology (NIST), Standard Reference Materials (SRM's). The gas calibration sheets as prepared by the vendor are contained in Appendix C.

Air Hygiene collected and reported the enclosed test data in accordance with the procedures and quality assurance activities described in this test report. Air Hygiene makes no warranty as to the suitability of the test methods. Air Hygiene also assumes no liability relating to the interpretation and use of the test data.

INSTRUMENTAL ANALYSIS QUALITY ASSURANCE DATA

Date: March 2, 2026
Company: VoltaGrid, LLC
Location: San Antonio, Texas
Techs: MP/JC

Sample System Leak Check

Date	Sample System	Leak Rate (l/min)
March 2, 2026	1	0

Accredited Air Emission Testing Body

A2LA has accredited

AIR HYGIENE INTERNATIONAL, INC.

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 27th day of January 2026.



A blue ink signature of the Vice President of the Accreditation Council.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3796.02
Valid to August 31, 2027

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.



Accredited Laboratory

AIR HYGIENE INTERNATIONAL, INC.

A2LA has accredited

Broken Arrow, OK

for technical competence in the field of

Environmental Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of This laboratory also meets the requirements of A2LA R219 – *Specific Requirements – TNI Field Sampling and Measurement Organization Accreditation*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system
(refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 27th day of January 2026.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3796.01
Valid to August 31, 2027

For the tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

AIR HYGIENE INTERNATIONAL, INC.
1600 W Tacoma St
Broken Arrow, OK 74012
Mr. Jake Fahlenkamp Phone: 918-307-8865
[REDACTED]

ENVIRONMENTAL

Valid To: August 31, 2027

Certificate Number: 3796.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with The NELAC Institute's National Environmental Field Activities Program (NEFAP) Field Sampling and Measurement Organization Volume 1 Standard (TNI FSMO V1 2014 Rev 2.0) and A2LA R219 – *Specific Requirements – TNI Field Sampling and Measurement Organization Accreditation Program*), accreditation is granted to this organization to perform recognized methods using the following sampling and measurement technologies:

Matrix: Air

Sampling Technologies:

Filter – EPA Methods 5, 5A, 5B, 5D, 5E, 5F, 5H, 5I, 13A, 13B, 15A, 16A, 17, 23, 26, 26A, 29 and 201A;
CARB Method 5

Gas Analyzer – EPA Methods 3A, 6C, 7E, 10, 16C, 20, 25A, 318, 320, and 321; ASTM 6348, 6522;
CTM-022 and 030; CARB Method 100; SCAQMD Method 100.1

Absorption in Impinger Solution – EPA Methods 8A (CTM-013), 11, 12, 13A, 13B, 15A, 16A, 17, 23,
26, 26A, 29, 202, 306, 308 and 316; CTM-013B; CTM-027; BAAQMD ST-1B; ASTM D6784

Tedlar Bag or Stainless Canisters – EPA Methods 18, TO-1, TO-2, TO-3, TO-5, TO-11, TO-12, TO-13,
TO-14 and TO-15

Sorbent Trap – 30B

<u>Technology</u>	<u>Test Method(s)¹</u>
Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography	GPA 2261 ASTM1945
Representative Measurement of Pollutants	EPA Methods 1, 1A; CARB Method 1; SCAQMD Method 1

<u>Technology</u>	<u>Test Method(s)¹</u>
Flow Rate Measurements	EPA Methods 2, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H; CARB Method 2; SCAQMD 2; CTM-041
Paramagnetic Cell	EPA Methods 3A, 20; CARB Method 100; SCAQMD Method 100.1
Non-Dispersive Infrared	EPA Methods 3A, 10; CARB Method 100; SCAQMD Method 100.1
Gravimetric	EPA Methods 4, 5, 5A, 5B, 5D, 5E, 5F, 5H, 5I, 17, 201A, 202; CARB Method 4, CARB 5; SCAQMD Method 4
Ultraviolet	EPA Methods 6C, 16C, 20; CARB Method 100; SCAQMD Method 100.1
Chemiluminescence	EPA Methods 7E, 20; EPA Alt-013; CARB Method 100; SCAQMD Method 100.1
Ion Chromatography (Modified for Sulfate)	EPA Methods 8A, 15A, 16A CTM-013 NCASI 8A
Visual Observation	EPA Methods 9, 22
Iodometric	EPA Method 11
Ion Specific Electrode	EPA Methods 13B, 350.3; BAAQMD LAB-1A
Flame Ionization	EPA Method 25A
Ion Chromatography	EPA Methods 26, 26A; CTM-013B, CTM 027
Thermal	EPA Method 30B
Fourier Transform Infrared Spectroscopy	EPA Methods 318, 320, 321; ASTM D6348-12



<u>Technology</u>	<u>Test Method(s)¹</u>
Dilution System	EPA Method 205
UV-VIS	NCASI 98.01
Electrochemical	CTM-022, CTM-030; ASTM 6522-00; ODEQ's Guidance for Portable Electrochemical Analyzer Testing
Calculations and Performance Specifications	Performance Specifications 1, 2, 3, 4, 4A, 4B, 5, 6, 7, 8, 8A, 11, 12A, 12B, 15, 16, 18; EPA Method 19 EPA Method 3 CARB Method 3 SCAQMD Method 3

¹Accreditation covers the organization listed above as well as the following AETB and FSMO entities:
(Mobile Trailer Unit #s 207, 211, 215, 216, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 701, 703, 704, 705, 706, 707, 802, 803, 304/191, 305/1102)



Brooke T. Paup, *Chairwoman*
Catarina R. Gonzales, *Commissioner*
Tonya R. Miller, *Commissioner*
Kelly Keel, *Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 11, 2026

Dr. Sean Barnes
Air Hygiene International, Inc.
1600 West Tacoma
Broken Arrow, OK 74102-1483

Subject: Texas NELAP accreditation renewal

Dear Dr. Barnes:

I am pleased to advise you the Texas Commission on Environmental Quality is renewing your laboratory's NELAP accreditation. The accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the standards for accreditation and requirements of the state of Texas.

I am enclosing an accreditation certificate and listing of your laboratory's fields of accreditation. Please review the enclosures for accuracy and completeness.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

A handwritten signature in blue ink, appearing to read "Frank Jamison", with a long horizontal flourish extending to the right.

Frank Jamison
Data and Records Specialist

Enclosures



Texas Commission on
Environmental Quality

Certificate of Accreditation



Accreditation is hereby granted to

Air Hygiene International, Inc.
1600 West Tacoma,
Broken Arrow, OK 74102-1483

State Lab ID: T104704523
Effective Date: 03/01/2026
Expiration Date: 02/28/2027
Certificate ID: TX-C26-00044

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation (FoA) specifically listed on the subsequent page(s) of this certificate. Accreditation is for NELAP Standards EL-V1-2016 and EL-V2-2016 and all versions of a method approved per 40 CFR 136, 40 CFR 141 and/or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Note: For the attached FoA table, matrices may include DW (drinking water), NPW (non-potable water), S (solid and chemical materials), A (air), and/or BT (biological tissue).

A handwritten signature in black ink, appearing to read "K Keel".

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2026

Laboratory Fields of Accreditation

Matrix	Method	Analyte	Analyte Code	AB
A	EPA CTM-027	Ammonia as N	1515	LA-DEQ
A	EPA Method 17	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 26	Hydrobromic Acid (Hydrogen Bromide)	1768	LA-DEQ
A	EPA Method 26	Hydrochloric acid (Hydrogen chloride (gas only))	1770	LA-DEQ
A	EPA Method 26	Hydrogen fluoride (Hydrofluoric acid)	1775	LA-DEQ
A	EPA Method 26A	Hydrobromic Acid (Hydrogen Bromide)	1768	LA-DEQ
A	EPA Method 26A	Hydrochloric acid (Hydrogen chloride (gas only))	1770	LA-DEQ
A	EPA Method 26A	Hydrogen fluoride (Hydrofluoric acid)	1775	LA-DEQ
A	EPA Method 5	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	Particulate Matter	3915	LA-DEQ
A	EPA Method 5E	Particulate Matter	3915	LA-DEQ
A	EPA Method 5F	Particulate Matter	3915	LA-DEQ
A	EPA Method 5H	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	Particulate Matter	3915	LA-DEQ
NPW	EPA 350.3	Ammonia as N	1515	LA-DEQ

Mobile Laboratories:

OK6782JZ



69 Industrial Park Rd E, Tolland CT 06084
<https://www.environics.com/service-request>
(860) 872-1111 info@environics.com

ENVIRONICS FLOW CONTROLLER CALIBRATION REPORT

Unit Summary		Std Conditions		MFC Summary	
Model #:	4040	Temp:	32°F	MFC #:	1
Unit SN :	4446	Pressure:	29.92 in. Hg	MFC FS Flow:	10000
		Gas:	NITROGEN	MFC S/N:	4569900001

Flow Calibration Data is not performance data. This data is used by the system operating mode to improve the flow accuracy. The Flow Verification Data is performance data.

Flow Calibration Data

	Set Flow	True Flow
5%	500	528.414
10%	1000	1070.654
20%	2000	2135.931
30%	3000	3178.322
40%	4000	4206.251
50%	5000	5223.861
60%	6000	6232.509
70%	7000	7238.629
80%	8000	8222.406
90%	9000	9221.494
100%	10000	10253.423

All values in SCCM

Flow Verification Data

	Set Flow	True Flow	% dev
99%	9900	9911.847	0.12%
85%	8500	8510.361	0.12%
55%	5500	5515.268	0.28%
25%	2500	2509.226	0.37%
10%	1000	1003.850	0.39%

All values in SCCM

This calibration complies with ISO 17025-2005 [non-accredited] and is traceable to the National Institute of Standards and Technology (NIST). Calibration and verification are accomplished exclusively by qualified personnel following controlled procedures under ISO 9001:2015. For questions or concerns, contact Customer Service via our website, email or by phone, weekdays from 8AM - 4PM.

Verified by: Paul Stanse

Date: 3/25/25



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ENVIRONICS FLOW CONTROLLER CALIBRATION REPORT

Unit Summary		Std Conditions		MFC Summary	
Model #:	4040	Temp:	32°F	MFC #:	2
Unit SN :	4446	Pressure:	29.92 in. Hg	MFC FS Flow:	10000
		Gas:	NITROGEN	MFC S/N:	4569900002

Flow Calibration Data is not performance data. This data is used by the system operating mode to improve the flow accuracy. The Flow Verification Data is performance data.

Flow Calibration Data

	Set Flow	True Flow
5%	500	487.207
10%	1000	997.553
20%	2000	2039.288
30%	3000	3059.030
40%	4000	4073.441
50%	5000	5086.803
60%	6000	6093.926
70%	7000	7116.561
80%	8000	8114.060
90%	9000	9142.101
100%	10000	10182.565

All values in SCCM

Flow Verification Data

	Set Flow	True Flow	% dev
99%	9900	9943.505	0.44%
85%	8500	8519.338	0.23%
55%	5500	5520.815	0.38%
25%	2500	2498.826	-0.05%
10%	1000	999.152	-0.08%

All values in SCCM

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Verified by:

Paul Stansel

Date:

3/25/25



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ENVIRONICS FLOW CONTROLLER CALIBRATION REPORT

Unit Summary		Std Conditions		MFC Summary	
Model #:	4040	Temp:	32°F	MFC #:	3
Unit SN :	4446	Pressure:	29.92 in. Hg	MFC FS Flow:	1000
		Gas:	NITROGEN	MFC S/N:	4523300001

Flow Calibration Data is not performance data. This data is used by the system operating mode to improve the flow accuracy. The Flow Verification Data is performance data.

Flow Calibration Data

	Set Flow	True Flow
5%	50	49.387
10%	100	99.885
20%	200	201.110
30%	300	302.047
40%	400	402.681
50%	500	502.546
60%	600	602.223
70%	700	704.181
80%	800	805.538
90%	900	910.829
100%	1000	1017.127

All values in SCCM

Flow Verification Data

	Set Flow	True Flow	% dev
99%	990	991.476	0.15%
85%	850	850.512	0.06%
55%	550	551.147	0.21%
25%	250	250.575	0.23%
10%	100	100.343	0.34%

All values in SCCM

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Verified by: Paul Stansel

Date: 3/25/25



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ENVIRONICS FLOW CONTROLLER CALIBRATION REPORT

Unit Summary		Std Conditions		MFC Summary	
Model #:	4040	Temp:	32°F	MFC #:	4
Unit SN :	4446	Pressure:	29.92 in. Hg	MFC FS Flow:	100
		Gas:	NITROGEN	MFC S/N:	4523500001

Flow Calibration Data is not performance data. This data is used by the system operating mode to improve the flow accuracy. The Flow Verification Data is performance data.

Flow Calibration Data

	Set Flow	True Flow
5%	5	5.056
10%	10	10.295
20%	20	20.748
30%	30	31.088
40%	40	41.449
50%	50	51.603
60%	60	61.770
70%	70	71.858
80%	80	81.944
90%	90	91.848
100%	100	101.922

All values in SCCM

Flow Verification Data

	Set Flow	True Flow	% dev
99%	99	99.304	0.31%
85%	85	85.065	0.08%
55%	55	55.166	0.30%
25%	25	25.054	0.22%
10%	10	10.032	0.32%

All values in SCCM

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Verified by: Paul Stansel

Date: 3/25/25



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<https://www.environics.com/service-request>
(860) 872-1111 info@environics.com

SERVICE REPORT

ATTN: MIKE PLUMMER, AIR HYGIENE INTERNATIONAL INC.

DATE OF SERVICE: 3/25/2025

MODEL NUMBER: S-4040

SERIAL NUMBER: 4446

SERVICE TYPE: RECALIBRATION

NEXT CALIBRATION DUE: 3/26/2026

CONDITIONS AS OBSERVED AND WORK PERFORMED:

- Unit powers up properly.
- Unit cleaned and Purged, data verified.
- All valves checked, ok.
- Checked for any software updates
- Voltages checked – 5v, -15v, +15v, 24v.
- Battery voltages checked.
- Unit leak tested.
- Tested all MFC's with each port.
- Zeros on each MFC checked.
- Spans checked on all MFCs.
- Incoming verification run on all MFCs.
- All MFCs recalibrated.
- Verified all MFCs @ 5 standard points, passed within 0.5%
- All cables and screw/nuts tightened, ok.



Service Technician

QUALITY ASSURANCE AND QUALITY CONTROL DATA

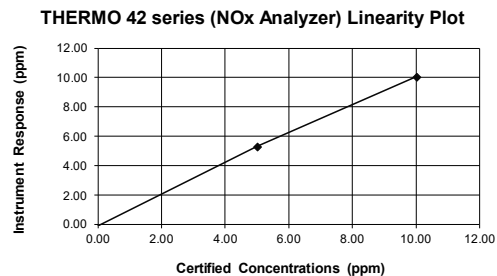
Reference Method Analyzer Daily Calibration Data

Calibration Date: March 2, 2026
Client: VoltaGrid, LLC

Location: SAT-1 EGU - Unit G01

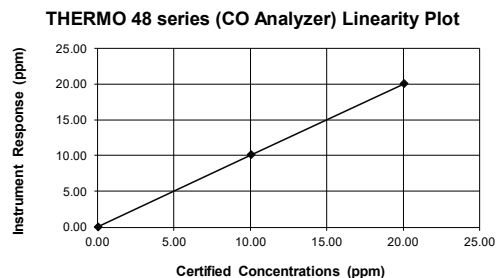
NOx Span (ppm) = 10.00

THERMO 42 series (NOx Analyzer)						
Certified Concentration (ppm)	Instrument Response (ppm)	Cylinder Number	Expiration Date	Calibration Error (%)	Absolute Conc. (ppm)	Pass (±2%, ≤0.5ppm)
0.00	-0.09	CC763118	07/19/2033	-0.90	0.09	YES (%)
5.00	5.29	EB0060652	09/18/2027	2.90	0.29	YES (abs)
10.00	10.06	EB0060652	09/18/2027	0.60	0.06	YES (%)
Linearity = 0.984						



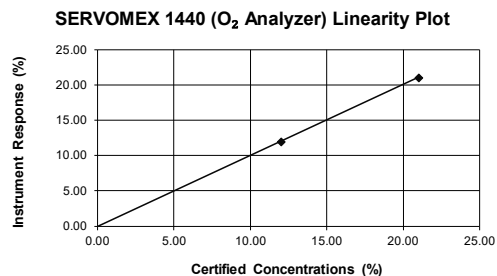
CO Span (ppm) = 20.00

THERMO 48 series (CO Analyzer)						
Certified Concentration (ppm)	Instrument Response (ppm)	Cylinder Number	Expiration Date	Calibration Error (%)	Absolute Conc. (ppm)	Pass (±2%, ≤0.5ppm)
0.00	0.03	CC763118	07/19/2033	0.15	0.03	YES (%)
10.00	10.08	EB0060652	09/18/2027	0.40	0.08	YES (%)
20.00	20.05	EB0060652	09/18/2027	0.25	0.05	YES (%)
Linearity = 0.999						



O₂ Span (%) = 20.98

SERVOMEX 1440 (O ₂ Analyzer)						
Certified Concentration (%)	Instrument Response (%)	Cylinder Number	Expiration Date	Calibration Error (%)	Absolute Conc. (%)	Pass (±2%, ≤0.5%)
0.00	-0.02	CC763118	07/19/2033	-0.10	0.02	YES (%)
11.96	12.02	CC719156	06/09/2033	0.29	0.06	YES (%)
20.98	21.05	EB0080848	01/20/2033	0.33	0.07	YES (%)
Linearity = 0.996						

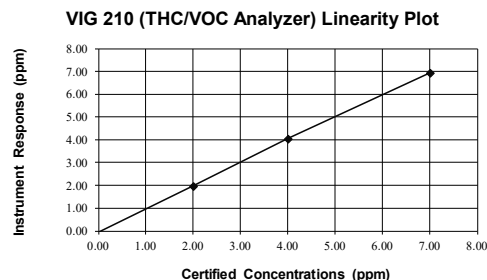


VOC (as C₃H₈) Range (ppm) =

8

VIG 210 (THC/VOC Analyzer)						
Certified Concentration (ppm)	Instrument Response (ppm)	Cylinder Number	Expiration Date	Calibration Error (%)	Estimated Point (ppm)	Pass (±2.5%) ¹
0.00	-0.04	CC763118	07/19/2033	-0.50	N/A	YES
2.00	1.96	EB0032353	09/10/2030	0.14	1.96	YES
4.00	4.06	EB0032353	09/10/2030	2.64	3.95	YES
7.00	6.95	EB0032353	09/10/2030	-0.62	N/A	YES
Linearity = 1.004						

¹zero/high based on 2% of span, low/mid based on 5% of concentration



NOx Converter Efficiency

Date: March 2, 2026

Analyzer: INST-NX-0027

RM 7E, (02-27-14), Sections 7.1.4; 8.2.4.1; 12.7; and 13.5 Introduce NO₂ to the analyzer and record the NOx concentration displayed. ... Calculate the converter efficiency using Equation 7E-7. The specification for converter efficiency must be met. ... Air Hygiene also references ALT-0013 for specific NO₂ concentration (40-60 ppm) and EPA Traceability Protocol requirements (±2%).

Cylinder Number CC716456
Expiration Date 03/26/2028

Audit Gas: NO₂ Concentration (C_v), ppmvd **49.10**

Converter Efficiency Calculations:

Analyzer Reading, NO Channel, ppmvd **8.63**
Analyzer Reading, NOx Channel, ppmvd **54.23**
Analyzer Reading, NO₂ Channel (C_{Dir(NO₂)}), ppmvd **45.60**
Converter Efficiency, % **92.87**

RM 7E, (02-27-14), 13.5 NO₂ to NO Conversion Efficiency Test (as applicable). The NO₂ to NO conversion efficiency, calculated according to Equation 7E-7, must be greater than or equal to 90 percent.

$$Eff_{NO_2} = \left(\frac{C_{Dir}}{C_v} \right) \times 100 \quad \text{Eq. 7E-7} = \frac{45.60 \text{ ppmvd}}{49.10 \text{ ppmvd}} \times 100 = 92.87\%$$

Date	Time	Elapsed Time	NOx	NO
mm/dd/yy	hh:mm:ss	Seconds	ppmvd	ppmvd
03/02/26	5:56:04	1000	53.15	8.92
03/02/26	5:56:14	1010	54.10	9.03
03/02/26	5:56:24	1020	54.06	8.75
03/02/26	5:56:34	1030	54.02	8.97
03/02/26	5:56:44	1040	54.03	8.73
03/02/26	5:56:54	1050	54.11	8.80
03/02/26	5:57:04	1060	54.11	8.74
03/02/26	5:57:14	1070	54.08	8.75
03/02/26	5:57:24	1080	54.22	8.75
03/02/26	5:57:34	1090	54.16	8.53
03/02/26	5:57:44	1100	54.23	8.63
03/02/26	5:57:54	1110	54.02	8.56
03/02/26	5:58:04	1120	54.17	8.61
03/02/26	5:58:14	1130	54.07	8.52
03/02/26	5:58:24	1140	53.95	8.61
03/02/26	5:58:34	1150	54.15	8.46
03/02/26	5:58:44	1160	54.24	8.33
03/02/26	5:58:54	1170	54.31	8.37
03/02/26	5:59:04	1180	54.36	8.13
03/02/26	5:59:14	1190	54.13	8.46

DRIFT AND BIAS CHECK				
>90 Load, Run - 1	O ₂	NOx	CO	VOC (as C ₃ H ₈)
Raw Average	10.64	1.15	3.74	0.08
Corrected Average	10.65	1.19	3.75	0.09
Initial Zero	-0.01	-0.04	-0.06	-0.04
Final Zero	0.02	-0.04	-0.04	-0.01
Avg. Zero	0.01	-0.04	-0.05	-0.03
Initial UpScale	11.98	4.94	10.08	1.96
Final UpScale	11.93	4.97	10.01	2.00
Avg. UpScale	11.96	4.96	10.05	1.98
Sys Resp (Zero)	-0.02	-0.09	0.03	-0.04
Sys Resp (Upscale)	12.02	5.29	10.08	1.96
Upscale Cal Gas	11.96	5.00	10.00	2.00
Initial Zero Bias	0.05%	0.50%	-0.45%	0.00%
Final Zero Bias	0.19%	0.50%	-0.35%	0.38%
Zero Drift	0.14%	0.00%	0.10%	0.38%
Initial Upscale Bias	-0.19%	-3.50%	0.00%	0.00%
Final Upscale Bias	-0.43%	-3.20%	-0.35%	0.50%
Upscale Drift	0.24%	0.30%	0.35%	0.50%
Alternative Specification Abs Diff	Initial Zero	0.01	0.05	0.09
	Final Zero	0.04	0.05	0.07
	Initial Upscale	0.04	0.35	0.00
	Final Upscale	0.09	0.32	0.07
Calibration Span	20.98	10.00	20.00	8.00
3% of Cal. Span (drift)	0.63	0.30	0.60	0.24
5% of Cal. Span (bias)	1.05	0.50	1.00	0.40

DRIFT AND BIAS CHECK				
>90 Load, Run - 2	O ₂	NOx	CO	VOC (as C ₃ H ₈)
Raw Average	10.68	0.94	3.78	0.23
Corrected Average	10.69	1.01	3.83	0.26
Initial Zero	0.02	-0.04	-0.04	-0.01
Final Zero	0.05	-0.12	-0.18	0.00
Avg. Zero	0.04	-0.08	-0.11	-0.01
Initial UpScale	11.93	4.97	10.01	2.00
Final UpScale	11.95	4.98	10.05	1.99
Avg. UpScale	11.94	4.98	10.03	2.00
Sys Resp (Zero)	-0.02	-0.09	0.03	-0.04
Sys Resp (Upscale)	12.02	5.29	10.08	1.96
Upscale Cal Gas	11.96	5.00	10.00	2.00
Initial Zero Bias	0.19%	0.50%	-0.35%	0.38%
Final Zero Bias	0.33%	-0.30%	-1.05%	0.50%
Zero Drift	0.14%	0.80%	0.70%	0.13%
Initial Upscale Bias	-0.43%	-3.20%	-0.35%	0.50%
Final Upscale Bias	-0.33%	-3.10%	-0.15%	0.38%
Upscale Drift	0.10%	0.10%	0.20%	0.13%
Alternative Specification Abs Diff	Initial Zero	0.04	0.05	0.07
	Final Zero	0.07	0.03	0.21
	Initial Upscale	0.09	0.32	0.07
	Final Upscale	0.07	0.31	0.03
Calibration Span	20.98	10.00	20.00	8.00
3% of Cal. Span (drift)	0.63	0.30	0.60	0.24
5% of Cal. Span (bias)	1.05	0.50	1.00	0.40

DRIFT AND BIAS CHECK				
>90 Load, Run - 3	O ₂	NO _x	CO	VOC (as C ₃ H ₈)
Raw Average	10.67	1.06	3.86	0.07
Corrected Average	10.69	1.15	3.92	0.08
Initial Zero	0.05	-0.12	-0.18	0.00
Final Zero	0.04	-0.07	-0.05	0.00
Avg. Zero	0.05	-0.10	-0.12	0.00
Initial UpScale	11.95	4.98	10.05	1.99
Final UpScale	11.92	4.87	9.96	1.99
Avg. UpScale	11.94	4.93	10.01	1.99
Sys Resp (Zero)	-0.02	-0.09	0.03	-0.04
Sys Resp (Upscale)	12.02	5.29	10.08	1.96
Upscale Cal Gas	11.96	5.00	10.00	2.00
Initial Zero Bias	0.33%	-0.30%	-1.05%	0.50%
Final Zero Bias	0.29%	0.20%	-0.40%	0.50%
Zero Drift	0.05%	0.50%	0.65%	0.00%
Initial Upscale Bias	-0.33%	-3.10%	-0.15%	0.38%
Final Upscale Bias	-0.48%	-4.20%	-0.60%	0.38%
Upscale Drift	0.14%	1.10%	0.45%	0.00%
Alternative Specification Abs Diff	Initial Zero	0.07	0.03	0.21
	Final Zero	0.06	0.02	0.08
	Initial Upscale	0.07	0.31	0.03
	Final Upscale	0.10	0.42	0.12
Calibration Span	20.98	10.00	20.00	8.00
3% of Cal. Span (drift)	0.63	0.30	0.60	0.24
5% of Cal. Span (bias)	1.05	0.50	1.00	0.40

Method 205 Gas Diluter Validation Daily Test Procedure

Calibration Date: March 2, 2026

Client: VoltaGrid, LLC

Target Analyzer Serial No: INST-22-0007

Dilution System Serial No: LABS-GM-0004 / 4446

Step 1	Calibrate Oxygen analyzer per normal procedure using EPA protocol gases (~ 21.0% and ~12.0%) - RM 205-3.2
---------------	---

Step 2	Using diluter, send a programmed mid (11.0%) and high (18.0%) diluted gas made with the EPA protocol high gas (~21.0%) and nitrogen. Repeat 3 times and complete validation tables below for each diluted gas. - RM 205-3.2.1 - 3.2.5
---------------	---

High Level Diluted Gas Validation Table

Trial #	Diluter Output (18.0%)	Instrument Response (%)	% Error	% Drift
1	18.00	17.98	0.11%	0.04%
2	18.00	17.99	0.06%	0.09%
3	18.00	17.95	0.28%	-0.13%
AVG	18.00	17.97	0.15%	

If Mid Level Protocol Gas = 11.96 ppm then $\pm 10\%$ = 10.764 to 13.156
--

Mid Level Diluted Gas Validation Table (within 10% Mid level Protocol Gas)

Trial #	Diluter Output (11.0%)	Instrument Response (%)	% Error	% Drift
1	11.00	11.07	-0.64%	0.15%
2	11.00	11.03	-0.27%	-0.21%
3	11.00	11.06	-0.55%	0.06%
AVG	11.00	11.05	-0.48%	

Step 3	Introduce the EPA protocol gas directly to the analyzer bypassing the diluter. Repeat 3 times and complete validation table below. RM 205-3.2.6
---------------	---

Mid Level Protocol Gas Validation Table

Trial #	Certified Value (%)	Instrument Response (%)	% Error	% Drift
1	11.96	12.05	-0.75%	0.11%
2	11.96	12.02	-0.50%	-0.14%
3	11.96	12.04	-0.67%	0.03%
AVG	11.96	12.04	-0.64%	

Step 4	If diluter passes all %Error and %Difference (< 2.0%) it is certified for use throughout the field test.
---------------	--

QUALITY ASSURANCE AND QUALITY CONTROL DATA

Fourier Transform Infrared Analyzer Daily QA Data

Voltagrid
March 2, 2026
Jenbacher , J620, Unit #Unit 1
SAT-1 EGU

Analyzer MDL Determination					FTIR: 510		
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO ₂ (%vw)	H ₂ O (%)	HCHO (ppmvw)
03/02/26	6:03:13	SPC_0000030.LAB	190.7	0.981	-0.0025	-0.0057	0.0170
03/02/26	6:03:43	SPC_0000031.LAB	190.6	0.981	0.0095	-0.0030	-0.1454
03/02/26	6:04:14	SPC_0000032.LAB	190.7	0.981	-0.0127	0.0007	-0.1753
03/02/26	6:04:44	SPC_0000033.LAB	190.6	0.981	-0.0028	-0.0012	0.0367
03/02/26	6:05:14	SPC_0000034.LAB	190.7	0.982	-0.0002	0.0029	-0.1152
03/02/26	6:05:45	SPC_0000035.LAB	190.8	0.981	0.0082	0.0022	0.0987
03/02/26	6:06:15	SPC_0000036.LAB	190.8	0.982	-0.0129	-0.0033	0.0830
03/02/26	6:06:45	SPC_0000037.LAB	190.9	0.981	-0.0021	-0.0003	-0.0553
03/02/26	6:07:16	SPC_0000038.LAB	190.9	0.981	-0.0149	-0.0069	-0.1445
03/02/26	6:07:46	SPC_0000039.LAB	191.0	0.981	0.0014	-0.0053	0.0691
03/02/26	6:08:16	SPC_0000040.LAB	190.9	0.981	-0.0021	-0.0025	0.0181
03/02/26	6:08:47	SPC_0000041.LAB	190.9	0.981	-0.0009	-0.0094	-0.1667
Average			190.8	0.981	-0.0027	-0.0026	-0.0400
Standard Deviation					0.0077	0.0037	0.1049
t-value (99% interval)			(n - 1 = 11)		2.7181	2.7181	2.7181
MDL_{99%} = StDev x t-value_{99%}					0.0208	0.0102	0.2852

Voltagrid
March 2, 2026
Jenbacher , J620, Unit #Unit 1
SAT-1 EGU

Sampling System Leak Check	Flow (LPM)	Date (mm/dd/yy)	Time (hh:mm)
	≤0.2	03/02/26	5:45

FTIR No: 510
Make Model: MKS 2030

Analytical System Leak Checks

Vacuum Leak Check

Spectrum	Date (mm/dd/yy)	Time (hh:mm:ss)	Vacuum (atm)
SPC_0000002.LAB	03/02/26	5:46:38	0.56219
SPC_0000003.LAB	03/02/26	5:47:08	0.59593
SPC_0000004.LAB	03/02/26	5:47:38	0.62453
SPC_0000005.LAB	03/02/26	5:48:09	0.65152
SPC_0000006.LAB	03/02/26	5:48:39	0.67690
SPC_0000007.LAB	03/02/26	5:49:09	0.70036
SPC_0000008.LAB	03/02/26	5:49:40	0.72221
SPC_0000009.LAB	03/02/26	5:50:10	0.74277
SPC_0000010.LAB	03/02/26	5:50:40	0.76205
SPC_0000011.LAB	03/02/26	5:51:11	0.78005

Pressure Elements	Vacuum (atm)
Average, P _s	0.68185
Maximum	0.78005
Minimum	0.56219
Difference, ΔP _v	0.21785

Time Elements	Results (min)
Signal Integration, t _{ss}	0.51
Test Duration, t _d	4.60

Analytical System Leak Checks

Pressure Leak Check

Spectrum	Date (mm/dd/yy)	Time (hh:mm:ss)	Pressure (atm)
SPC_0000015.LAB	03/02/26	5:53:12	1.20579
SPC_0000016.LAB	03/02/26	5:53:42	1.20579
SPC_0000017.LAB	03/02/26	5:54:12	1.20579
SPC_0000018.LAB	03/02/26	5:54:43	1.20579
SPC_0000019.LAB	03/02/26	5:55:13	1.20579
SPC_0000020.LAB	03/02/26	5:55:43	1.20579
SPC_0000021.LAB	03/02/26	5:56:14	1.20579
SPC_0000022.LAB	03/02/26	5:56:44	1.20579
SPC_0000023.LAB	03/02/26	5:57:14	1.20579
SPC_0000024.LAB	03/02/26	5:57:45	1.20579

Pressure Elements	Pressure (atm)
Average, P _s	1.20579
Maximum	1.20579
Minimum	1.20579
Difference, ΔP _p	0.00000

Station Pressure (in. Hg)	28.98
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Time Elements	Results (min)
Signal Integration, t _{ss}	0.51
Test Duration, t _d	4.50

Parameter	Vacuum	Pressure	Max ΔP
Test Duration, t _d	4.60	4.50	4.60
Signal Integ., t _{ss}	0.51	0.51	0.51
Difference, ΔP	0.21785	0.00000	0.21785
Average, P _s	0.68185	1.20579	0.68185
Leak Volume, %V _L	3.511	0.000	3.511
Pass, ≤4%	yes	yes	yes

$$\%V_L = \frac{100\%}{t_d} t_{ss} \frac{\Delta P_{max}}{P_s}$$

Method 320, Section 8.2.2.4, Equation 2
expanded to account for sample duration

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Protocol No. 1, CO₂ Cylinder Concentration:	19 %vd
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Pre-Test Background						FTIR: 510
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)
03/02/26	6:02:30	SPC_0000029BKG.LAB	190.7	0.981	0.0000	0.0000

Pre-Test Direct Zero						
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)
03/02/26	6:03:13	SPC_0000030.LAB	190.7	0.981	-0.0025	-0.0057
03/02/26	6:03:43	SPC_0000031.LAB	190.6	0.981	0.0095	-0.0030
03/02/26	6:04:14	SPC_0000032.LAB	190.7	0.981	-0.0127	0.0007

Pre-Test Direct Calibration Transfer Spectra						
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)
03/02/26	6:37:04	SPC_0000097.LAB	191.0	0.981	18.8606	-0.0069
03/02/26	6:37:34	SPC_0000098.LAB	191.1	0.981	18.8837	0.0009
03/02/26	6:38:04	SPC_0000099.LAB	190.9	0.981	18.8581	-0.0105
03/02/26	6:38:35	SPC_0000100.LAB	190.9	0.981	18.9391	-0.0105
03/02/26	6:39:05	SPC_0000101.LAB	190.9	0.981	18.8804	-0.0049
Average			191.0	0.981	18.8844	-0.0064

Pre-Test System Zero						
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)
03/02/26	6:53:44	SPC_0000130.LAB	190.9	0.979	0.0037	0.0044
03/02/26	6:54:14	SPC_0000131.LAB	190.8	0.979	0.0061	0.0015
03/02/26	6:54:45	SPC_0000132.LAB	190.8	0.980	0.0132	0.0039

Pre-Test System Calibration Transfer Spectra						
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)
03/02/26	6:43:08	SPC_0000109.LAB	190.7	0.980	18.6797	0.9541
03/02/26	6:43:38	SPC_0000110.LAB	190.7	0.981	18.7639	0.5344
03/02/26	6:44:08	SPC_0000111.LAB	190.6	0.980	18.8093	0.3093
03/02/26	6:44:38	SPC_0000112.LAB	190.7	0.981	18.8235	0.2054
03/02/26	6:45:09	SPC_0000113.LAB	190.6	0.980	18.8054	0.1336
Average			190.7	0.980	18.7764	0.4274

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Post-Test System Zero						
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO₂ (%vw)	H₂O (%)
03/02/26	18:23:34	SPC_0001493.LAB	190.9	0.981	0.0084	-0.0018
03/02/26	18:24:04	SPC_0001494.LAB	191.0	0.981	0.0186	0.0005
03/02/26	18:24:34	SPC_0001495.LAB	190.9	0.980	0.0066	0.0079

Post-Test System Calibration Transfer Spectra						
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO₂ (%vw)	H₂O (%)
03/02/26	18:29:37	SPC_0001505.LAB	190.4	0.981	18.6906	0.0040
03/02/26	18:30:08	SPC_0001506.LAB	190.6	0.980	18.8142	0.0058
03/02/26	18:30:38	SPC_0001507.LAB	190.5	0.981	18.7783	0.0064
03/02/26	18:31:08	SPC_0001508.LAB	190.4	0.980	18.8192	0.0036
03/02/26	18:31:39	SPC_0001509.LAB	190.6	0.981	18.7997	0.0008
Average			190.5	0.980	18.7804	0.0041

Post-Test Direct Calibration Transfer Spectra						
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO₂ (%vw)	H₂O (%)
03/02/26	18:48:19	SPC_0001542.LAB	190.9	0.981	18.8670	-0.0087
03/02/26	18:48:49	SPC_0001543.LAB	190.9	0.981	18.7455	-0.0098
03/02/26	18:49:19	SPC_0001544.LAB	190.9	0.981	18.7606	-0.0040
03/02/26	18:49:49	SPC_0001545.LAB	190.9	0.981	18.7639	-0.0089
03/02/26	18:50:20	SPC_0001546.LAB	190.9	0.981	18.7646	-0.0079
Average			190.9	0.981	18.7803	-0.0079

Post-Test Direct Zero						
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO₂ (%vw)	H₂O (%)
03/02/26	18:52:51	SPC_0001551.LAB	190.9	0.981	0.0142	-0.0111
03/02/26	18:53:21	SPC_0001552.LAB	190.9	0.981	0.0153	-0.0087
03/02/26	18:53:52	SPC_0001553.LAB	191.0	0.981	0.0232	-0.0104

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Post-Test Background						
Date	Time	Spectrum	Cell Temp	Cell Press	CO₂	H₂O
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)

CTS Results	Protocol No. 1 Concentration	FTIR CO ₂ Average	Error (%)	Pass (≤5%)
Pre-Test Direct	19.00	18.88	0.61	YES
Post-Test Direct	19.00	18.78	1.16	YES
Pre-Test System	19.00	18.78	1.18	YES
Post-Test System	19.00	18.78	1.16	YES

Pre / Post Comparison	FTIR CO ₂ Maximum	FTIR CO ₂ Pre/Post Mean	Error (%)	Pass (≤5%)
Pre-Test Direct	18.94	18.83	0.56	YES
Post-Test Direct	18.87		0.18	YES
Pre-Test System	18.82	18.83	0.05	YES
Post-Test System	18.82		0.07	YES

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Certified, HCHO Cylinder Concentration:	22.2 ppmvd
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Pre-Test Background						FTIR: 510	
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)
03/02/26	6:02:30	SPC_0000029BKG.LAB	190.7	0.981	0.0000	0.0000	0.0000

Pre-Test Direct Zero							
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)
03/02/26	6:03:13	SPC_0000030.LAB	190.7	0.981	-0.0025	-0.0057	0.0170
03/02/26	6:03:43	SPC_0000031.LAB	190.6	0.981	0.0095	-0.0030	-0.1454
03/02/26	6:04:14	SPC_0000032.LAB	190.7	0.981	-0.0127	0.0007	-0.1753

Pre-Test Direct Calibration Transfer Spectra							
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)
03/02/26	6:28:29	SPC_0000080.LAB	190.8	0.981	0.0128	-0.0091	22.1099
03/02/26	6:28:59	SPC_0000081.LAB	190.7	0.981	-0.0067	-0.0074	22.0967
03/02/26	6:29:29	SPC_0000082.LAB	190.7	0.981	-0.0068	-0.0028	22.2199
03/02/26	6:30:00	SPC_0000083.LAB	190.7	0.981	-0.0106	0.0031	22.1353
03/02/26	6:30:30	SPC_0000084.LAB	190.8	0.981	-0.0064	-0.0022	22.1464
Average			190.8	0.981	-0.0035	-0.0037	22.1416

Pre-Test System Zero							
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)
03/02/26	6:53:44	SPC_0000130.LAB	190.9	0.979	0.0037	0.0044	-0.0584
03/02/26	6:54:14	SPC_0000131.LAB	190.8	0.979	0.0061	0.0015	-0.1222
03/02/26	6:54:45	SPC_0000132.LAB	190.8	0.980	0.0132	0.0039	-0.0904

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Post-Test System Zero							
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO₂ (%vw)	H₂O (%)	HCHO (ppm)
03/02/26	18:23:34	SPC_0001493.LAB	190.9	0.981	0.0084	-0.0018	0.0790
03/02/26	18:24:04	SPC_0001494.LAB	191.0	0.981	0.0186	0.0005	0.0263
03/02/26	18:24:34	SPC_0001495.LAB	190.9	0.980	0.0066	0.0079	0.1442

Post-Test Direct Calibration Transfer Spectra							
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO₂ (%vw)	H₂O (%)	HCHO (ppm)
03/02/26	18:41:14	SPC_0001528.LAB	190.9	0.981	0.0156	0.0039	21.7230
03/02/26	18:41:45	SPC_0001529.LAB	190.9	0.981	0.0045	-0.0039	21.8961
03/02/26	18:42:15	SPC_0001530.LAB	190.8	0.981	-0.0084	-0.0076	22.1615
03/02/26	18:42:45	SPC_0001531.LAB	190.7	0.981	0.0096	-0.0060	22.2897
03/02/26	18:43:16	SPC_0001532.LAB	190.7	0.981	0.0133	-0.0128	22.2958
Average			190.8	0.981	0.0069	-0.0053	22.0732

Post-Test Direct Zero							
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO₂ (%vw)	H₂O (%)	HCHO (ppm)
03/02/26	18:52:51	SPC_0001551.LAB	190.9	0.981	0.0142	-0.0111	-0.0280
03/02/26	18:53:21	SPC_0001552.LAB	190.9	0.981	0.0153	-0.0087	0.0396
03/02/26	18:53:52	SPC_0001553.LAB	191.0	0.981	0.0232	-0.0104	-0.0481

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Post-Test Background							
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)

CTS Results	Certified Concentration	FTIR HCHO Average	Error (%)	Pass (≤5%)
Pre-Test Direct	22.20	22.14	0.26	YES
Post-Test Direct	22.20	22.07	0.57	YES

Pre / Post Comparison	FTIR Maximum	FTIR Pre/Post Mean	Error (%)	Pass (≤5%)
Pre-Test Direct	22.22	22.11	0.51	YES
Post-Test Direct	22.30		0.84	YES

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Protocol No. 1, CH ₄ Cylinder Concentration:	30 ppmvd
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Pre-Test Background						FTIR: 510	
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	CH ₄
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)
03/02/26	6:02:30	SPC_0000029BKG.LAB	190.7	0.981	0.0000	0.0000	0.0000

Pre-Test Direct Zero							
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	CH ₄
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)
03/02/26	6:03:13	SPC_0000030.LAB	190.7	0.981	-0.0025	-0.0057	0.0380
03/02/26	6:03:43	SPC_0000031.LAB	190.6	0.981	0.0095	-0.0030	0.3962
03/02/26	6:04:14	SPC_0000032.LAB	190.7	0.981	-0.0127	0.0007	0.3455

Pre-Test Direct Calibration Transfer Spectra							
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	CH ₄
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)
03/02/26	6:14:20	SPC_0000052.LAB	190.7	0.981	-0.0014	0.0131	29.4209
03/02/26	6:14:50	SPC_0000053.LAB	190.7	0.981	-0.0086	0.0033	29.5053
03/02/26	6:15:21	SPC_0000054.LAB	190.7	0.981	0.0014	-0.0030	29.2096
03/02/26	6:15:51	SPC_0000055.LAB	190.7	0.981	-0.0134	-0.0033	28.9613
03/02/26	6:16:21	SPC_0000056.LAB	190.7	0.981	-0.0067	-0.0014	29.0802
Average			190.7	0.981	-0.0057	0.0017	29.2355

Pre-Test System Zero							
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	CH ₄
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)
03/02/26	6:53:44	SPC_0000130.LAB	190.9	0.979	0.0037	0.0044	-0.6332
03/02/26	6:54:14	SPC_0000131.LAB	190.8	0.979	0.0061	0.0015	-0.1961
03/02/26	6:54:45	SPC_0000132.LAB	190.8	0.980	0.0132	0.0039	0.2888

Pre-Test System Calibration Transfer Spectra							
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	CH ₄
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)
03/02/26	6:47:10	SPC_0000117.LAB	190.9	0.980	0.0163	0.0526	30.0434
03/02/26	6:47:40	SPC_0000118.LAB	190.8	0.981	0.0267	0.0387	29.7409
03/02/26	6:48:11	SPC_0000119.LAB	191.0	0.981	0.0191	0.0302	29.0846
03/02/26	6:48:41	SPC_0000120.LAB	191.0	0.981	0.0158	0.0255	29.6899
03/02/26	6:49:11	SPC_0000121.LAB	191.0	0.980	0.0203	0.0207	29.9063
Average			191.0	0.980	0.0196	0.0336	29.6930

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Post-Test System Zero							
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO ₂ (%vw)	H ₂ O (%)	CH ₄ (ppm)
03/02/26	18:23:34	SPC_0001493.LAB	190.9	0.981	0.0084	-0.0018	1.3269
03/02/26	18:24:04	SPC_0001494.LAB	191.0	0.981	0.0186	0.0005	1.2529
03/02/26	18:24:34	SPC_0001495.LAB	190.9	0.980	0.0066	0.0079	0.6106

Post-Test System Calibration Transfer Spectra							
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO ₂ (%vw)	H ₂ O (%)	CH ₄ (ppm)
03/02/26	18:37:12	SPC_0001520.LAB	190.9	0.980	0.0214	0.0053	30.2074
03/02/26	18:37:42	SPC_0001521.LAB	191.0	0.981	0.0198	0.0066	30.1343
03/02/26	18:38:13	SPC_0001522.LAB	191.0	0.980	0.0194	-0.0006	29.5725
03/02/26	18:38:43	SPC_0001523.LAB	191.1	0.981	0.0162	-0.0021	30.1554
03/02/26	18:39:13	SPC_0001524.LAB	191.1	0.980	0.0186	-0.0011	29.8096
Average			191.1	0.980	0.0191	0.0016	29.9759

Post-Test Direct Calibration Transfer Spectra							
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO ₂ (%vw)	H ₂ O (%)	CH ₄ (ppm)
03/02/26	18:44:46	SPC_0001535.LAB	190.7	0.981	0.0028	-0.0030	29.2646
03/02/26	18:45:17	SPC_0001536.LAB	190.7	0.981	-0.0040	-0.0108	29.0774
03/02/26	18:45:47	SPC_0001537.LAB	190.6	0.981	0.0000	-0.0046	29.0362
03/02/26	18:46:17	SPC_0001538.LAB	190.6	0.982	-0.0036	-0.0073	29.0186
03/02/26	18:46:48	SPC_0001539.LAB	190.7	0.981	0.0045	-0.0048	28.5128
Average			190.7	0.981	-0.0001	-0.0061	28.9819

Post-Test Direct Zero							
Date (mm/dd/yy)	Time (hh:mm:ss)	Spectrum (File Name)	Cell Temp (°C)	Cell Press (atm)	CO ₂ (%vw)	H ₂ O (%)	CH ₄ (ppm)
03/02/26	18:52:51	SPC_0001551.LAB	190.9	0.981	0.0142	-0.0111	-0.0954
03/02/26	18:53:21	SPC_0001552.LAB	190.9	0.981	0.0153	-0.0087	-0.1161
03/02/26	18:53:52	SPC_0001553.LAB	191.0	0.981	0.0232	-0.0104	-0.2294

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Post-Test Background							
Date	Time	Spectrum	Cell Temp	Cell Press	CO₂	H₂O	CH₄
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppm)

CTS Results	Protocol No. 1 Concentration	FTIR CH ₄ Average	Error (%)	Pass (≤5%)
Pre-Test Direct	30.00	29.24	2.55	YES
Post-Test Direct	30.00	28.98	3.39	YES
Pre-Test System	30.00	29.69	1.02	YES
Post-Test System	30.00	29.98	0.08	YES

Pre / Post Comparison	FTIR Maximum	FTIR Pre/Post Mean	Error (%)	Pass (≤5%)
Pre-Test Direct	29.51	29.11	1.34	YES
Post-Test Direct	29.26		0.53	YES
Pre-Test System	30.04	29.11	3.11	YES
Post-Test System	30.21		3.64	YES

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Trial #1		Spike Gas Direct Verification				FTIR: 510	
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppmvw)
03/02/26	6:28:29	SPC_0000080.LAB	190.8	0.981	0.0128	-0.0091	22.1099
03/02/26	6:28:59	SPC_0000081.LAB	190.7	0.981	-0.0067	-0.0074	22.0967
03/02/26	6:29:29	SPC_0000082.LAB	190.7	0.981	-0.0068	-0.0028	22.2199
03/02/26	6:30:00	SPC_0000083.LAB	190.7	0.981	-0.0106	0.0031	22.1353
Average			190.8	0.981	-0.0028	-0.0040	22.1404

Trial #1		Pre-Spike - Native Samples					
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppmvw)
03/02/26	17:59:31	SPC_0001446.LAB	190.9	0.981	4.6007	10.3394	0.2547
03/02/26	18:00:01	SPC_0001447.LAB	190.9	0.980	4.6106	10.3535	0.2619
03/02/26	18:00:31	SPC_0001448.LAB	190.9	0.980	4.6134	10.3751	0.1888
03/02/26	18:01:02	SPC_0001449.LAB	190.8	0.981	4.6291	10.3669	0.3001
Average			190.9	0.980	4.6135	10.3587	0.2514

Trial #1		Spiked Samples					
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppmvw)
03/02/26	18:05:34	SPC_0001458.LAB	190.6	0.981	4.1540	9.2914	1.8297
03/02/26	18:06:05	SPC_0001459.LAB	190.4	0.981	4.1337	9.2580	1.8670
03/02/26	18:06:35	SPC_0001460.LAB	190.6	0.981	4.1237	9.2504	1.8538
03/02/26	18:07:05	SPC_0001461.LAB	190.7	0.981	4.1268	9.2228	1.7894
Average			190.6	0.981	4.1346	9.2557	1.8350

Trial #2		Spike Gas Direct Verification				FTIR: 510	
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppmvw)
03/02/26	6:28:29	SPC_0000080.LAB	190.8	0.98	0.0128	-0.0091	22.1099
03/02/26	6:28:59	SPC_0000081.LAB	190.7	0.98	-0.0067	-0.0074	22.0967
03/02/26	6:29:29	SPC_0000082.LAB	190.7	0.98	-0.0068	-0.0028	22.2199
03/02/26	6:30:00	SPC_0000083.LAB	190.7	0.98	-0.0106	0.0031	22.1353
Average			190.8	0.981	-0.0028	-0.0040	22.1404

Trial #2		Pre-Spike - Native Samples					
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppmvw)
03/02/26	18:08:36	SPC_0001464.LAB	190.8	0.981	4.6034	10.3355	0.2490
03/02/26	18:09:07	SPC_0001465.LAB	190.7	0.981	4.5921	10.3417	0.1816
03/02/26	18:09:37	SPC_0001466.LAB	190.9	0.981	4.6051	10.3392	0.1646
03/02/26	18:10:07	SPC_0001467.LAB	190.8	0.981	4.6089	10.3364	0.1960
Average			190.8	0.981	4.6024	10.3382	0.1978

Trial #2		Spiked Samples					
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppmvw)
03/02/26	18:11:38	SPC_0001470.LAB	190.9	0.981	4.1373	9.3095	1.9512
03/02/26	18:12:08	SPC_0001471.LAB	191.0	0.980	4.1321	9.2844	2.0957
03/02/26	18:12:39	SPC_0001472.LAB	191.0	0.980	4.1390	9.2576	2.0479
03/02/26	18:13:09	SPC_0001473.LAB	191.0	0.981	4.1322	9.2801	2.0567
Average			191.0	0.980	4.1352	9.2829	2.0379

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Trial #3		Spike Gas Direct Verification			FTIR: 510		
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppmvw)
03/02/26	6:28:29	SPC_0000080.LAB	190.8	0.98	0.0128	-0.0091	22.1099
03/02/26	6:28:59	SPC_0000081.LAB	190.7	0.98	-0.0067	-0.0074	22.0967
03/02/26	6:29:29	SPC_0000082.LAB	190.7	0.98	-0.0068	-0.0028	22.2199
03/02/26	6:30:00	SPC_0000083.LAB	190.7	0.98	-0.0106	0.0031	22.1353
Average			190.8	0.981	-0.0028	-0.0040	22.1404

Trial #3		Pre-Spike - Native Samples					
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppmvw)
03/02/26	18:14:10	SPC_0001475.LAB	190.9	0.980	4.6200	10.3897	0.1827
03/02/26	18:14:40	SPC_0001476.LAB	190.7	0.981	4.6067	10.3814	0.3394
03/02/26	18:15:10	SPC_0001477.LAB	190.7	0.980	4.6021	10.3731	0.1185
03/02/26	18:15:40	SPC_0001478.LAB	190.7	0.980	4.6196	10.3877	0.2055
Average			190.8	0.980	4.6121	10.3830	0.2115

Trial #3		Spiked Samples					
Date	Time	Spectrum	Cell Temp	Cell Press	CO ₂	H ₂ O	HCHO
(mm/dd/yy)	(hh:mm:ss)	(File Name)	(°C)	(atm)	(%vw)	(%)	(ppmvw)
03/02/26	18:17:11	SPC_0001481.LAB	190.7	0.981	4.1461	9.3139	2.2050
03/02/26	18:17:42	SPC_0001482.LAB	190.5	0.980	4.1369	9.3045	2.2281
03/02/26	18:18:12	SPC_0001483.LAB	190.6	0.981	4.1470	9.3104	2.1863
03/02/26	18:18:42	SPC_0001484.LAB	190.4	0.980	4.1546	9.3389	2.2619
Average			190.6	0.980	4.1461	9.3169	2.2203

Parameter	Units	Trial #1	Trial #2	Trial #3
Direct Verified Concentration of Formaldehyde (HCHO)	(ppmvw)	22.1404	22.1404	22.1404
Stack (Native, Unspiked) CO ₂ Concentration	(%vw)	4.6135	4.6024	4.6121
Stack (Native, Unspiked) H ₂ O Concentration	(%)	10.3587	10.3382	10.3830
Stack (Native, Unspiked) HCHO Concentration	(ppmvw)	0.2514	0.1978	0.2115
Stack + Spike CO ₂ Concentration	(%vw)	4.1346	4.1352	4.1461
Stack + Spike H ₂ O Concentration	(%)	9.2557	9.2829	9.3169
Stack + Spike HCHO Concentration	(ppmvw)	1.8350	2.0379	2.2203
Dilution Factor, calc. from CO ₂ (%vw)		0.104	0.102	0.101
Dilution Factor, as the ratio of dir to spk	(ratio)	9.6 : 1	9.9 : 1	9.9 : 1
Expected Concentration of the HCHO Spike+Native, CS	(ppmvw)	2.5236	2.4253	2.4270
Method 320 Spiked / Expected HCHO	%	72.71	84.03	91.48
Method 320 Passing HCHO (70-130%)		YES	YES	YES

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FTIR Example Calculations

Method 320 Equation 3, Dilution Factor (DF)

(example calculation for Trial #1, where applicable)

$$DF = \frac{SF_6(\text{spk})}{SF_6(\text{dir})} = \frac{(SF_6(\text{spk}+\text{native}) - SF_6(\text{native}))}{SF_6(\text{dir})} \text{ OR } \frac{(CO_2(\text{native}) - CO_2(\text{spk}+\text{native}))}{CO_2(\text{native})}$$

$$DF (CO_2) = \frac{4.6135 - 4.1346 \text{ ppmvw}}{4.61 \text{ ppmvw}} = 0.1038$$

Test Method 320, Section 9.0 Quality Control

Where,

$SF_{6(\text{dir})}$ = SF_6 (or tracer gas) concentration measured directly in undiluted spike gas

$SF_{6(\text{spk})}$ = Diluted SF_6 (or tracer gas) concentration measured in a spiked sample

$$SF_{6(\text{spk})} = SF_{6(\text{spk}+\text{native})} - SF_{6(\text{native})}$$

$SF_{6(\text{spk}+\text{native})}$ = Diluted SF_6 (or tracer gas) concentration measured in a spiked sample in stack gas

$SF_{6(\text{native})}$ = SF_6 (or tracer gas) concentration measured in a native stack gas sample

Unspike = Native concentration of analytes in unspiked samples

$Spike_{\text{dir}}$ = Concentration of the analyte in the spike standard measured by filling the FTIR cell directly

Dilution Factor Ratio

(example calculation for Trial #1, where applicable)

$$DF \text{ Ratio} = \frac{SF_6(\text{dir})}{SF_6(\text{spk})} = \frac{SF_6(\text{dir})}{(SF_6(\text{spk}+\text{native}) - SF_6(\text{native}))} \text{ OR } \frac{CO_2(\text{native})}{CO_2(\text{native}) - CO_2(\text{spk}+\text{native})} \geq 10$$

$$DF \text{ Ratio} = \frac{4.61 \text{ ppmvw}}{4.6135 - 4.1346 \text{ ppmvw}} =$$

$$Spike \text{ Ratio} = 9.6 : 1$$

Method 320 Equation 4 [Method 321 Equation 2], Excepted Concentration of the Spiked Samples

Ideal Spike Yield

(example calculation for Trial #1 (HCHO), where applicable)

$$CS = DF \times Spike_{\text{dir}} + Unspike (1 - DF)$$

$$CS = 0.1038 \times 22.1404 \text{ ppmvw} + 0.2514 \text{ ppmvw} \times [1 - 0.1038] = 2.5236 \text{ ppmvw}$$

Method 320 Spiked vs Expected

$$Spiked \text{ vs Expected} = \frac{\text{Actual Spike Yield}}{\text{Ideal Spike Yield}} \times 100 \quad \text{(example calculation for Trial \#1 (HCHO), where applicable)}$$

$$\% \text{ Recovery} = \frac{1.8350 \text{ ppmvw}}{2.5236 \text{ ppmvw}} \times 100 = 72.713 \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

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FTIR Example Calculations

Method 320 Equation 3, Dilution Factor (DF)

(example calculation for Trial #2, where applicable)

$$DF = \frac{SF_6(spik)}{SF_6(dir)} = \frac{(SF_6(spik+native) - SF_6(native))}{SF_6(dir)} \text{ OR } \frac{(CO_2(native) - CO_2(spik+native))}{CO_2(native)}$$

$$DF (CO_2) = \frac{4.6024 - 4.1352 \text{ ppmvw}}{4.60 \text{ ppmvw}} = 0.1015$$

Test Method 320, Section 9.0 Quality Control

Where,

$SF_{6(dir)}$ = SF_6 (or tracer gas) concentration measured directly in undiluted spike gas

$SF_{6(spik)}$ = Diluted SF_6 (or tracer gas) concentration measured in a spiked sample

$$SF_{6(spik)} = SF_{6(spik+native)} - SF_{6(native)}$$

$SF_{6(spik+native)}$ = Diluted SF_6 (or tracer gas) concentration measured in a spiked sample in stack gas

$SF_{6(native)}$ = SF_6 (or tracer gas) concentration measured in a native stack gas sample

Dilution Factor Ratio

(example calculation for Trial #2, where applicable)

$$DF \text{ Ratio} = \frac{SF_6(dir)}{SF_6(spik)} = \frac{SF_6(dir)}{(SF_6(spik+native) - SF_6(native))} \text{ OR } \frac{CO_2(native)}{CO_2(native) - CO_2(spik+native)} \geq 10$$

$$DF \text{ Ratio} = \frac{4.60 \text{ ppmvw}}{4.6024 - 4.1352 \text{ ppmvw}} =$$

$$Spike \text{ Ratio} = 9.9 : 1$$

Unspike = Native concentration of analytes in unspiked samples

$Spike_{dir}$ = Concentration of the analyte in the spike standard measured by filling the FTIR cell directly

Method 320 Equation 4 [Method 321 Equation 2], Expected Concentration of the Spiked Samples

Ideal Spike Yield

(example calculation for Trial #2 (HCHO), where applicable)

$$CS = DF \times Spike_{dir} + Unspike (1 - DF)$$

$$CS = 0.1015 \times 22.1404 \text{ ppmvw} + 0.1978 \text{ ppmvw} \times [1 - 0.1015] = 2.4253 \text{ ppmvw}$$

Method 320 Spiked vs Expected

$$Spiked \text{ vs Expected} = \frac{Actual \text{ Spike Yield}}{Ideal \text{ Spike Yield}} \times 100 \quad (example \text{ calculation for Trial \#2 (HCHO), where applicable})$$

$$\% \text{ Recovery} = \frac{2.0379 \text{ ppmvw}}{2.4253 \text{ ppmvw}} \times 100 = 84.026 \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

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SAT-1 EGU
FTIR Example Calculations

Method 320 Equation 3, Dilution Factor (DF)

(example calculation for Trial #3, where applicable)

$$DF = \frac{SF_6(sp)}{SF_6(dir)} = \frac{(SF_6(sp+native) - SF_6(native))}{SF_6(dir)} \text{ OR } \frac{(CO_2(native) - CO_2(sp+native))}{CO_2(native)}$$

$$DF(CO_2) = \frac{4.6121 - 4.1461 \text{ ppmvw}}{4.61 \text{ ppmvw}} = 0.1010$$

Test Method 320, Section 9.0 Quality Control

Where,

$SF_{6(dir)}$ = SF_6 (or tracer gas) concentration measured directly in undiluted spike gas

$SF_{6(sp)}$ = Diluted SF_6 (or tracer gas) concentration measured in a spiked sample

$$SF_{6(sp)} = SF_{6(sp+native)} - SF_{6(native)}$$

$SF_{6(sp+native)}$ = Diluted SF_6 (or tracer gas) concentration measured in a spiked sample in stack gas

$SF_{6(native)}$ = SF_6 (or tracer gas) concentration measured in a native stack gas sample

Unspike = Native concentration of analytes in unspiked samples

$Spike_{dir}$ = Concentration of the analyte in the spike standard measured by filling the FTIR cell directly

Dilution Factor Ratio

(example calculation for Trial #3, where applicable)

$$DF \text{ Ratio} = \frac{SF_6(dir)}{SF_6(sp)} = \frac{SF_6(dir)}{(SF_6(sp+native) - SF_6(native))} \text{ OR } \frac{CO_2(native)}{CO_2(native) - CO_2(sp+native)} \geq 10$$

$$DF \text{ Ratio} = \frac{4.61 \text{ ppmvw}}{4.6121 - 4.1461 \text{ ppmvw}} =$$

$$Spike \text{ Ratio} = 9.9 : 1$$

Method 320 Equation 4 [Method 321 Equation 2], Excepted Concentration of the Spiked Samples

Ideal Spike Yield

(example calculation for Trial #3 (HCHO), where applicable)

$$CS = DF \times Spike_{dir} + Unspike (1 - DF)$$

$$CS = 0.1010 \times 22.1404 \text{ ppmvw} + 0.2115 \text{ ppmvw} \times (1 - 0.1010) = 2.4270 \text{ ppmvw}$$

Method 320 Spiked vs Expected

$$Spiked \text{ vs Expected} = \frac{Actual \text{ Spike Yield}}{Ideal \text{ Spike Yield}} \times 100 \quad (example \text{ calculation for Trial \#3 (HCHO), where applicable})$$

$$\% \text{ Recovery} = \frac{2.2203 \text{ ppmvw}}{2.4270 \text{ ppmvw}} \times 100 = 91.482 \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

APPENDIX E

FUEL ANALYSIS RECORDS

Client: VoltaGrid, LLC
Location: SAT-1 EGU
Date: March 2, 2026
Project #: volt-26-sanantonio.tx-start#3

Natural Gas - Fuel Analysis

Standardized to 68 deg F and 14.696 psia - EPA Standards

Gas Component		Mole (%)	Molecular ¹ Weight (lb/lb-mole)	Lbs Component per Lb-Mole of Gas	Wt. % of Component	Ideal Gross ^{1,3} Heating Value (Btu/ft ³)	Fuel Heat Value [HHV] (Btu/SCF)	Ideal Net ^{1,3} Heating Value (Btu/ft ³)	Fuel Heat Value [LHV] (Btu/SCF)
Methane	CH ₄	95.978	16.0430	15.40	92.71	994.85	954.83	895.75	859.72
Ethane	C ₂ H ₆	1.820	30.0700	0.55	3.29	1,743.15	31.72	1,594.41	29.02
Propane	C ₃ H ₈	0.076	44.0970	0.03	0.20	2,478.35	1.87	2,280.17	1.72
iso-Butane	iC ₄ H ₁₀	0.005	58.1230	0.00	0.02	3,203.11	0.16	2,955.38	0.15
n-Butane	nC ₄ H ₁₀	0.011	58.1230	0.01	0.04	3,213.35	0.34	2,965.62	0.31
Iso-Pentane	iC ₅ H ₁₂	0.002	72.1500	0.00	0.01	3,940.87	0.06	3,643.50	0.06
n-Pentane	nC ₅ H ₁₂	0.001	72.1500	0.00	0.01	3,948.75	0.06	3,648.32	0.05
Hexanes	C ₆ H ₁₄	0.006	86.1770	0.01	0.03	4,684.54	0.28	4,337.82	0.26
Heptanes	C ₇ H ₁₆	0.000	100.2040	0.00	0.00	5,419.94	0.00	5,023.77	0.00
Octanes	C ₈ H ₁₈	0.000	114.2310	0.00	0.00	6,155.14	0.00	5,709.23	0.00
Carbon Dioxide	CO ₂	0.155	44.0100	0.07	0.41	0.00	0.00	0.00	0.00
Nitrogen	N ₂	1.947	28.0134	0.55	3.28	0.00	0.00	0.00	0.00
Hydrogen Sulfide	H ₂ S	0.000	34.0800	0.00	0.00	627.54	0.00	578.00	0.00
Oxygen	O ₂	0.000	31.9988	0.00	0.00	0.00	0.00	0.00	0.00
Helium	He	0.000	4.0026	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen	H ₂	0.000	2.0159	0.00	0.00	319.34	0.00	269.82	0.00
Totals		100.000		16.61	100.00	dry	989.32	dry	891.29
						wet^{2,5}	966.51	wet^{2,5}	870.74

Characteristics of Fuel Gas		
Molecular Weight of gas =	16.608	lb/lb-mole
Btu per lb. of gas ⁴ =	22,947.257	gross (HHV)
Btu per lb. of gas ⁴ =	20,673.471	net (LHV)
Density of fuel gas ² =	0.0431	lb/cu. ft
Wt % VOC in fuel gas =	0.30	%
Specific Gravity ¹ =	0.5734	

Component	Wt%
carbon	72.40
oxygen	0.30
hydrogen	24.02
nitrogen	3.28
helium	0.00
sulfur	0.00
Total	100.00

F-Factor (SCF dry exhaust per MMBtu [HHV]) = 8,650.91
 (Based on EPA RM-19) at 68 deg F and 14.696 psia

F-Factor Calculation:

$$\text{F-Factor} = 1,000,000 \times ((3.64\% \text{H}) + (1.53\% \text{C}) + (0.57\% \text{S}) + (0.14\% \text{N}) - (0.46\% \text{O})) / \text{GCV}$$

GCV = Gross Btu per lb. of gas (HHV)

%H, %C, %S, %N, & %O are percent weight values calculated from fuel analysis and have units of (scf/lb)/%

Density of natural gas based on specific gravity multiplied by density of air at 68 deg F and 14.696 psia.

References:

¹ ASTM D 3588

² Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg

³ Mark's Standard Handbook for Mechanical Engineers, 10th ed. - Eugene A. Avallone, Theodore Baumeister III

⁴ Introduction to Fluid Mechanics, 3rd ed. - William S. Janna

⁵ GPA Reference Bulletin 181-86, revised 1986, reprinted 1995

								Iso		Iso		Neo								
/Time	Btu	Gravity	Co2	N2	Methane	Ethane	Propane	Butane	Butane	Pntn	Pntn	Pntn	C6 Plus	Hexane	Heptane	Octane	Nonane	Decane	HCDP	
09:00	1008.6	0.5747	0.1977	1.9211	95.9149	1.8928	0.0572	0.0038	0.0069	0.0004	0.0002	0.0000	0.0050		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1010.0	0.5746	0.1745	1.8634	95.9443	1.9243	0.0729	0.0052	0.0095	0.0010	0.0002	0.0000	0.0047		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1009.4	0.5738	0.1595	1.8468	96.0928	1.8164	0.0654	0.0048	0.0088	0.0008	0.0002	0.0000	0.0045		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1009.5	0.5740	0.1742	1.8350	96.0865	1.8124	0.0680	0.0054	0.0107	0.0019	0.0009	0.0000	0.0050		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1010.7	0.5747	0.1854	1.8183	95.9645	1.9213	0.0842	0.0058	0.0114	0.0021	0.0014	0.0000	0.0056		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1010.2	0.5748	0.1695	1.8813	95.9042	1.9432	0.0763	0.0055	0.0115	0.0020	0.0013	0.0000	0.0052		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1009.2	0.5748	0.1399	1.9811	95.8279	1.9797	0.0551	0.0037	0.0079	0.0005	0.0004	0.0000	0.0038		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1009.1	0.5744	0.1333	1.9650	95.9113	1.9120	0.0610	0.0039	0.0084	0.0004	0.0002	0.0000	0.0045		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1011.9	0.5764	0.1695	1.9285	95.7374	1.9733	0.1257	0.0123	0.0268	0.0063	0.0066	0.0000	0.0136		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1011.8	0.5759	0.1711	1.8895	95.8278	1.9431	0.1062	0.0099	0.0220	0.0062	0.0066	0.0000	0.0176		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1010.0	0.5745	0.1459	1.8995	95.9323	1.9308	0.0685	0.0046	0.0095	0.0012	0.0011	0.0000	0.0066		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1012.9	0.5766	0.1613	1.8958	95.7199	2.0195	0.1328	0.0129	0.0282	0.0068	0.0072	0.0000	0.0156		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1007.7	0.5735	0.1486	1.9422	96.0946	1.7471	0.0546	0.0030	0.0060	0.0003	0.0002	0.0000	0.0034		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1005.6	0.5735	0.1486	2.0632	96.0462	1.6957	0.0404	0.0017	0.0034	0.0000	0.0000	0.0000	0.0008		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1005.6	0.5731	0.1445	2.0310	96.1393	1.6363	0.0406	0.0021	0.0043	0.0001	0.0000	0.0000	0.0018		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1008.1	0.5738	0.1592	1.9334	96.0488	1.7831	0.0604	0.0037	0.0073	0.0004	0.0001	0.0000	0.0036		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1007.7	0.5736	0.1484	1.9452	96.0800	1.7614	0.0502	0.0030	0.0061	0.0005	0.0006	0.0000	0.0046		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1008.0	0.5737	0.1529	1.9362	96.0402	1.8127	0.0466	0.0025	0.0050	0.0000	0.0000	0.0000	0.0039		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1007.6	0.5735	0.1430	1.9509	96.0849	1.7652	0.0458	0.0022	0.0042	0.0000	0.0000	0.0000	0.0038		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1008.1	0.5736	0.1263	1.9612	96.0435	1.8025	0.0540	0.0029	0.0059	0.0001	0.0000	0.0000	0.0036		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1008.5	0.5732	0.1269	1.8998	96.1902	1.6850	0.0720	0.0056	0.0119	0.0018	0.0018	0.0000	0.0050		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1008.0	0.5738	0.1341	1.9704	96.0194	1.8126	0.0507	0.0027	0.0055	0.0004	0.0002	0.0000	0.0040		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1010.6	0.5749	0.1447	1.9016	95.9939	1.7921	0.1120	0.0100	0.0226	0.0055	0.0058	0.0000	0.0118		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1008.3	0.5732	0.1372	1.8957	96.2748	1.5545	0.0907	0.0089	0.0193	0.0045	0.0038	0.0000	0.0106		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1008.0	0.5733	0.1507	1.8982	96.2777	1.5278	0.0980	0.0092	0.0199	0.0045	0.0039	0.0000	0.0101		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1009.5	0.5763	0.2096	2.0013	95.7672	1.8173	0.1581	0.0102	0.0206	0.0038	0.0031	0.0000	0.0088		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1009.2	0.5755	0.1537	2.0325	95.7470	1.9312	0.1188	0.0045	0.0079	0.0002	0.0000	0.0000	0.0042		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1008.2	0.5754	0.1605	2.0695	95.7547	1.9006	0.0954	0.0043	0.0091	0.0009	0.0004	0.0000	0.0046		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1007.3	0.5745	0.1480	2.0566	95.9057	1.7972	0.0779	0.0034	0.0067	0.0003	0.0002	0.0000	0.0040		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1005.8	0.5737	0.1500	2.0716	96.0230	1.6933	0.0520	0.0023	0.0043	0.0001	0.0001	0.0000	0.0033		0.0000	0.0000	0.0000	0.0000	0.0000	
09:00	1005.5	0.5736	0.1492	2.0854	96.0336	1.6686	0.0541	0.0024	0.0047	0.0000	0.0000	0.0000	0.0020		0.0000	0.0000	0.0000	0.0000	0.0000	
AVG:	1008.8	0.5744	0.1551	1.9473	95.9775	1.8198	0.0756	0.0051	0.0106	0.0016	0.0014	0.0000	0.0059		0.0000	0.0000	0.0000	0.0000	0.0000	
GPM:						0.4875	0.0209	0.0017	0.0033	0.0006	0.0005	0.0000	0.0026		0.0000	0.0000	0.0000	0.0000	TOTAL GPM: 0.5	

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end of report