**EMISSIONS COMPLIANCE STUDY**

*Performed At*
**Kern Energy**
**Panama Lane Facility**
**60 MMBTU/HR Tulsa Process Heater**
**Bakersfield, CA**

*Test Date*
**December 28, 2023**

*Report No.*
**TRC Environmental Corporation Report 583056**

*Report Submittal Date*
**January 4, 2024**

TRC Environmental Corporation
2820 Pegasus Drive, Suite 1
Bakersfield, California 93308
USA T (661) 399-1398

**Report Certification**

I certify that to the best of my knowledge:

- Testing data and all corresponding information have been checked for accuracy and completeness.
- Sampling and analysis have been conducted in accordance with the approved protocol and applicable reference methods (as applicable).
- All deviations, method modifications, or sampling and analytical anomalies are summarized in the appropriate report narrative(s).

James McSweeney

James McSweeney, QSTI
AMS Bakersfield Group Manager

January 3, 2024
Date

TRC was operating in conformance with the requirements of ASTM D7036-04 during this test program.

Bruce Randall
TRC Emission Testing Technical Director

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# 1.0 INTRODUCTION

TRC Environmental Corporation (TRC) performed an emissions compliance test program on the 60 MMBTU/HR Tulsa Process Heater at the Panama Lane Facility of Kern Energy in Bakersfield, CA on December 28, 2023. The tests were authorized by Tommy Landeros and performed for Kern Energy.

The purpose of this test program was to determine emissions of the pollutants specified in Section 2.0 during normal operating conditions. The results of the test program are used in order to determine compliance with San Joaquin Valley Air Pollution Control District (SJVAPCD, southern region) Authority to Construct number S-37-1-18. The test program was conducted according to the TRC Test Protocol number 583056P dated December 22, 2023.

## 1.1 Project Contact Information

| **Participants** | | |
|---|---|---|
| Test Facility | Kern Energy<br>7724 E. Panama Lane<br>Bakersfield, CA 93307 | Tommy Landeros<br>Environmental Advisor<br>(661) 623-9601<br>TLanderos@kernenergy.com |
| Air Emissions Testing Body (AETB) | TRC Environmental Corporation<br>2820 Pegasus Drive, Suite 1<br>Bakersfield, California 93308 | James McSweeney, QSTI<br>AMS Bakersfield Group Manager<br>(661) 619-3130 (phone)<br>JMcSweeney@trccompanies.com |

The tests were conducted by Jeff Harris and Bobby Hull of TRC. Documentation of the on-site ASTM D7036-04 Qualified Individual (QI) can be located in the appendix to this report.

The source test was not attended by personnel of the SJVAPCD for observation.

## 1.2 Facility and Process Description

Kern Energy uses a 60 MMBtu/hr Tulsa Heaters Inc. Process Heater at their Panama Lane and Weedpatch Highway location in Bakersfield, California.

The Heater burners are Clearsign model Core Low $NO_X$ burners. The heater was fired on refinery fuel gas.

## 2.0 SUMMARY OF RESULTS

The results of this test program are summarized in the table below. Detailed individual run results are presented in Section 6.0.

| Parameter | Average Emissions | Permitted Emission Limits |
|---|---|---|
| | Tulsa Heater Inc. (THI) | |
| **Nitrogen Oxides ($NO_X$ as $NO_2$)** | | |
| ppmvd @ 3% $O_2$ | 8.41 | 9 |
| lb/MMBtu | 0.0102 | 0.011 |
| **Carbon Monoxide (CO)[1]** | | |
| ppmvd @ 3% $O_2$ | < 1.22 | 150 |
| **Non-Methane Non-Ethane Hydrocarbons (VOC ref. as Methane)[2]** | | |
| lb/MMBtu | < 0.0002 | 0.0026 |

[1] "<" indicates CO concentration below the analytical detection limit, results calculated based on detection limit
[2] "<" indicates VOC concentration below the analytical detection limit, results calculated based on detection limit

The table below summarizes the test methods used, as well as the number and duration of each at the test location:

| Parameter Measured | Analytical Approach | Test Method | No. of Runs | Run Duration |
|---|---|---|---|---|
| Oxygen/Carbon Dioxide ($O_2$/$CO_2$) | Paramagnetic / NDIR | USEPA 3A | 3 | 30 min. |
| Nitrogen Oxide ($NO_X$) | Chemiluminescence | USEPA 7E | 3 | 30 min. |
| Carbon Monoxide (CO) | Gas filter correlation | USEPA 10 | 3 | 30 min. |
| Gaseous Organic Compounds (VOC ref. as Methane) | Gas Chromatography (GC) / Flame Ionization | USEPA 18 | 3 | 30 min. |
| $F_d$, HHV | Published and assumed values | USEPA 19<br>ASTM D-1945<br>ASTM D-3588 | -- | -- |

## 3.0 DISCUSSION OF RESULTS

No problems were encountered with the testing equipment during the test program. Source operation appeared normal during the entire test program. No changes or problems were encountered that required modification of any procedures presented in the test plan. No adverse test or environmental conditions were encountered during the conduct of this test program.

A stratification test was not conducted, previous stratification testing has showed that the Heater is not stratified. This is as per COM2030 Source Test Guidelines Condition IV, E. 4. A.

## 4.0 SAMPLING AND ANALYSIS PROCEDURES

All testing, sampling, analytical, and calibration procedures used for this test program were performed in accordance with the methods presented in the following sections. Where applicable, the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods, USEPA 600/R-94/038c, September 1994 was used to supplement procedures.

### 4.1 Determination of the Concentration of Gaseous Pollutants Using a Multi-Pollutant Sampling System

Concentrations of the pollutants in the following sub-sections were determined using one sampling system. A single point at which the sample was collected was determined in accordance with SJVAPCD Source Testing Guidelines Section IV.E.4, Boilers and Process Heaters.

A straight-extractive sampling system was used. Moisture was removed from the gas stream by a two Peltier Effect cooled stainless steel impingers. In place of a paper strip chart recorder, screenshots of the data logger's integrated electronic chart were used. A data logger continuously recorded pollutant concentrations and generated one-minute averages of those concentrations. All calibrations and system checks were conducted using USEPA Protocol gases. Three-point linearity checks were performed prior to sampling, and in the event of a failing system bias or drift test (and subsequent corrective action). System bias and drift checks were performed using the low-level gas and either the high- or mid-level gas (as specified in the appendices) prior to and following each test run.

The Low Concentration Analyzers (those that routinely operate with a calibration span of less than 20 ppm) used by TRC are ambient-level analyzers. Per Section 3.12 of Method 7E, a Manufacturer's Stability Test is not required for ambient-level analyzers. Analyzer interference tests were conducted in accordance with the regulations in effect at the time that TRC placed an analyzer model in service.

#### 4.1.1 $CO_2$ Determination by USEPA Method 3A

This method is applicable for the determination of $CO_2$ concentrations in controlled and uncontrolled emissions from stationary sources only when specified within the regulations. The $CO_2$ analyzer was equipped with a non-dispersive infrared (NDIR) detector.

#### 4.1.2 $O_2$ Determination by USEPA Method 3A

This method is applicable for the determination of $O_2$ concentrations in controlled and uncontrolled emissions from stationary sources only when specified within the regulations. The $O_2$ analyzer was equipped with a paramagnetic-based detector.

### 4.1.3 $NO_x$ Determination by USEPA Method 7E

This method is applicable for the determination of $NO_x$ concentrations in controlled and uncontrolled emissions from stationary sources only when specified within the regulations. The $NO_x$ analyzer utilized a photomultiplier tube to measure the linear and proportional luminescence caused by the reaction of nitric oxide and ozone.

### 4.1.4 CO Determination by USEPA Method 10

This method is applicable for the determination of CO concentrations in controlled and uncontrolled emissions from stationary sources only when specified within the regulations. The non-dispersive infrared analyzer (NDIR) CO analyzer was equipped with an internal gas correlation filter wheel, which eliminates potential detector interference. As such, use of an interference removal trap was not required.

## 4.2 Gaseous Organic Compound Determination by USEPA Method 18

This method is designed to measure gaseous organics emitted from an industrial source. This method will not determine compounds that (1) are polymeric (high molecular weight), (2) can polymerize before analysis, or (3) have very low vapor pressures at stack or instrument conditions.

An integrated sample of flue gas was collected in Tedlar® bags. The major organic components of the sample were separated by gas chromatography (GC) and individually quantified by flame ionization.

## 4.3 Fuel Factor Determination by ASTM D1945 & D1946

This method is used to collect refinery gas from the fuel line supply to a inline GC instrument using a modified Gas Processors Association (GPA) 2166-86 method for sampling of natural gas. Analysis is performed by ASTM D1945 and D5504 for $F_d$, HHV (GCV).

For analysis by ASTM D1945, components in a representative natural gas fuel sample are physically separated by GC and compared to calibration data obtained under identical operating conditions from a reference standard mixture of known composition. The numerous heavy end components of the sample are grouped into irregular peaks by reversing the direction of the carrier gas through the column at such time as to group the heavy ends either as C5 and heavier, C6 and heavier, or C7 and heavier. The composition of the sample is calculated by comparing either the peak heights, or the peak areas, or both, with the corresponding values obtained with the reference standard.

The analysis of a natural gas sample by ASTM 1946 is very similar to ASTM 1945. The components of hydrogen, oxygen, nitrogen, carbon monoxide, carbon dioxide, methane, ethane, and ethylene are determined by separation by gas chromatography (GC) and compared to calibration data obtained under identical operating conditions from a reference standard mixture of known composition.

ASTM D3588 calculates the heat value, compressibility factor, and relative density of the natural gas sample from the data provided by ASTM D1945 and D1946.

## 5.0 QUALITY ASSURANCE PROCEDURES

TRC integrates our Quality Management System (QMS) into every aspect of our testing service. We follow the procedures specified in current published versions of the test Method(s) referenced in this report. Any modifications or deviations are specifically identified in the body of the report. We routinely participate in independent, third-party audits of our activities, and maintain:

- Accreditation from the California Air Resources Board (CARB);
- Accreditation from the Stack Testing Accreditation Council (STAC) and the American Association for Laboratory Accreditation (A2LA) that our operations conform with the requirements of ASTM D 7036 as an Air Emission Testing Body (AETB).

These accreditations demonstrate that our systems for training, equipment maintenance and calibration, document control and project management will fully ensure that project objectives are achieved in a timely and efficient manner with a strict commitment to quality.

All calibrations are performed in accordance with the test Method(s) identified in this report. If a Method allows for more than one calibration approach, or if approved alternatives are available, the calibration documentation in the appendices specifies which approach was used. All measurement devices are calibrated or verified at set intervals against standards traceable to the National Institute of Standards and Technology (NIST). NIST traceability information is available upon request.

ASTM D7036-04 specifies that: *"AETBs shall have and shall apply procedures for estimating the uncertainty of measurement. Conformance with this section may be demonstrated by the use of approved test protocols for all tests. When such protocols are used, reference shall be made to published literature, when available, where estimates of uncertainty for test methods may be found."* TRC conforms with this section by using approved test protocols for all tests.

## 6.0 TEST RESULTS SUMMARY

### Emissions Compliance Data Summary
### THI Heater
### Stack Outlet
### Panama Lane Facility
### December 28, 2023

| Parameter | Run 1 | Run 2 | Run 3 | Average | Emission Limits |
|---|---|---|---|---|---|
| **Oxygen ($O_2$)** | | | | | |
| % | 6.16 | 6.25 | 6.24 | 6.22 | -- |
| **Carbon Dioxide ($CO_2$)** | | | | | |
| % | 9.26 | 9.25 | 9.22 | 9.24 | -- |
| **Nitrogen Oxides ($NO_X$ as $NO_2$)** | | | | | |
| ppmvd | 6.88 | 6.79 | 7.04 | 6.90 | -- |
| ppmvd @ 3% $O_2$ | 8.35 | 8.30 | 8.59 | 8.41 | 9 |
| lb/MMBtu | 0.0102 | 0.0101 | 0.0105 | 0.0102 | 0.011 |
| **Carbon Monoxide (CO)[1]** | | | | | |
| ppmvd | < 1.00 | < 1.00 | < 1.00 | < 1.00 | -- |
| ppmvd @ 3% $O_2$ | < 1.21 | < 1.22 | < 1.22 | < 1.22 | 150 |
| **Non-Methane Non-Ethane Hydrocarbons (VOC ref. as Methane)[2]** | | | | | |
| ppmvd | < 0.34 | < 0.34 | < 0.34 | < 0.34 | -- |
| ppmvd @ 3% $O_2$ | < 0.42 | < 0.42 | < 0.42 | < 0.42 | -- |
| lb/MMBtu | < 0.0002 | < 0.0002 | < 0.0002 | < 0.0002 | 0.0026 |

[1] "<" indicates CO concentration below the analytical detection limit, results calculated based on detection limit
[2] "<" indicates VOC concentration below the analytical detection limit, results calculated based on detection limit

**Fuel Gas Data Summary**
**THI Heater**
**Refinery Gas Line**
**Panama Lane Facility**
**December 28, 2023**

| Parameter | Run 1 | Run 2 | Run 3 | Average |
|---|---|---|---|---|
| **Refinery Gas Data** | | | | |
| F-Factor$_{dry}$, dscf/MMBtu @ 68 °F | 8,737 | 8,737 | 8,737 | 8,737 |
| **Fuel Gas Calorific Values** | | | | |
| GCV, BTU/lb | 22,433 | 22,433 | 22,433 | 22,433 |
| GCV, BTU/ft$^3$ | 1,638 | 1,638 | 1,638 | 1,638 |

# APPENDIX

# AETB and QI Information Summary

| | |
|---|---|
| **Facility Name:** | Panama Lane Facility |
| **Location:** | THI Heater |
| **Test Date:** | December 28, 2023 |

| | | |
|---|---|---|
| ***Test Parameters:*** | USEPA Method 3A, 7E, 10, & 18 | USEPA Method 18 |
| ***QI Last Name:*** | Harris | McSweeney |
| ***QI First Name:*** | Jeff | Jim |
| ***QI Middle Initial:*** | S | E. |
| ***AETB Name:*** | TRC Environmental Corporation | TRC Environmental Corporation |
| ***AETB Phone No:*** | (661) 477-3267 | (661) 399-1398 |
| ***AETB Email:*** | JHarris@trccompanies.com | @TRCCompanies.com |
| ***Group 3 Exam Date:*** | December 8, 2023 | September 22, 2021 |
| ***Provider Name:*** | Source Evaluation Society | Source Evaluation Society |
| ***Provider Email:*** | qstiprogram@gmail.com | qstiprogram@gmail.com |
| ***Misc. Method Internal Exam Date:*** | January 15, 2021 | January 28, 2021 |
| ***Provider Name:*** | TRC Environmental Corporation | TRC Environmental Corporation |
| ***Provider Email:*** | EMackinnon@TRCCompanies.com | EMackinnon@TRCCompanies.com |

STACK TESTING ACCREDITATION COUNCIL

American Association for Laboratory Accreditation

# *Accredited Air Emission Testing Body*

A2LA has accredited

## TRC Environmental Corporation

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 26th day of May 2023

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3711.01
Valid to May 31, 2025

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

December 19, 2023

Jim McSweeney
TRC
2820 Pegasus Drive, Suite 1
Bakersfield, California 93308
*JMcSweeney@trccompanies.com*

Dear Jim McSweeney:

I am pleased to inform you that the California Air Resources Board (CARB) has extended your approval, by means of enclosed Executive Order I-23-020 to perform CARB Test Methods 1, 2, 2A, 3, 4, 5, 20, and 100 (CO, $CO_2$, $NO_X$, $O_2$, $SO_2$, THC), Visible Emissions Evaluation, and U.S. Environmental Protection Agency Test Methods 18, 19 (determining the emission rate of $NO_X$, on an hourly basis, if the appropriate F factors can be determined from Table 19-2 of the method), 201A, 202, and 205. These approvals are valid through June 30, 2025, during which time additional audits of TRC's testing ability may be performed.

If you have questions or need further assistance, please contact the *Independent Contractor Program*[1].

Sincerely,

Walter Ham Digitally signed by Walter Ham
Date: 2023.12.20 12:56:58
-08'00'

Walter Ham, Ph.D., Chief, Monitoring and Laboratory Division

Enclosure

[1] icp@arb.ca.gov

# This is to Certify that:

# Jeffery Harris

**Is a Qualified Individual as defined in Section 8.3 of ASTM D7036-04 for the following test methods:**

EPA Methods 3A, 6C, 7E, 10, 10B, 19, 20, 25A.

CEM Performance Specifications PS2, PS3, PS4, PS4A, PS5, PS6, PS7, PS8, and PS15

**The individual has met the minimum experience requirements defined in Section 8.3.4.2 of ASTM D7036-04 and has successfully passed a comprehensive examination for the test methods designated above.**

**This certification is effective until:** 12-08-2028

Date of Issue: 12-21-2023

Certificate Number: 02064

Edward J MacKinnon
Air Measurements Practice Quality Manager

TRC

*This certificate is the exclusive property of TRC and is non-transferable.*

# This is to Certify that:

## Jeff Harris

**Is a Qualified Individual as defined in Section 8.3 of ASTM D7036-04 for the following test methods:**

EPA Method 18

**The individual has met the minimum experience requirements defined in Section 8.3.4.2 of ASTM D7036-04 and has successfully passed an internal comprehensive examination for the test methods designated above.**

**This certification is effective until:**

01-15-2026

Date of Issue: 01-18-2021

Certificate Number: 01628

Edward MacKinnon
Air Measurements Practice Quality Manager

TRC

*This certificate is the exclusive property of TRC and is non-transferable.*

# This is to Certify that:

# James McSweeney

**Is a Qualified Individual as defined in Section 8.3 of ASTM D7036-04 for the following test methods:**

EPA Methods 3A, 6C, 7E, 10, 10B, 19, 20, 25A.

CEM Performance Specifications PS2, PS3, PS4, PS4A, PS5, PS6, PS7, PS8, and PS15

**The individual has met the minimum experience requirements defined in Section 8.3.4.2 of ASTM D7036-04 and has successfully passed a comprehensive examination for the test methods designated above.**

**This certification is effective until:** 09-22-2026

Edward J MacKinnon
Air Measurements Practice Quality Manager

Date of Issue: 09-29-2021

Certificate Number: 01742

TRC

*This certificate is the exclusive property of TRC and is non-transferable.*

# This is to Certify that:

## James McSweeney

**Is a Qualified Individual as defined in Section 8.3 of ASTM D7036-04 for the following test methods:**

EPA Method 18

**The individual has met the minimum experience requirements defined in Section 8.3.4.2 of ASTM D7036-04 and has successfully passed an internal comprehensive examination for the test methods designated above.**

**This certification is effective until:**

01-28-2026

Date of Issue: 01-28-2021

Certificate Number: 01652

Edward MacKinnon
Air Measurements Practice Quality Manager

TRC

*This certificate is the exclusive property of TRC and is non-transferable.*

## NOMENCLATURE

$A_s$ = Cross-sectional area of stack ($ft^2$)
$A_n$ = Cross-sectional area of nozzle ($ft^2$)
$B_{ws}$ = Water vapor in the gas stream, proportion by volume (dimensionless)
$C_p$ = Pitot tube coefficient (dimensionless)
dH = Average pressure differential across the orifice meter (inches of water)
Md = Dry molecular weight of stack gas (lb/lb-mole)
Ms = Wet molecular weight of stack gas (lb/lb-mole)
N = Normality of titrant (milliequivalents/ml)
dP = Velocity pressure of stack gas (inches of water)
Pb = Barometric pressure at sampling site (in. Hg)
Ps = Absolute stack gas pressure (in. Hg)
Pstd = Standard absolute pressure (29.92 in. Hg)
Qs (std) = Dry volumetric stack gas flow rate, standard conditions (dscfm)
Ts = Stack temperature (ºF)
Vm = Dry gas volume as measured by dry gas meter (dcf)
Vm (std) = Dry gas volume as measured by dry gas meter, corrected to standard conditions (dscf)
Vw (std) = Volume of water vapor in the gas stream, corrected to standard conditions (scf)
Vlc = Volume of water vapor condensed in impingers and silica gel (ml)
T (std) = Standard temperature (ºF)
Tm = Meter temperature (ºF)
SQ.RT.dP = Square root of velocity pressure (dimensionless)
y = Dry gas meter calibration factor (dimensionless)
Pstatic = Static pressure of stack (in. $H_2O$)
Pstack = Static pressure of stack (in. Hg)
I = Isokinetic sample rate (percent)
vs = Average velocity of the stack gas (ft/sec)
Qs = Actual stack gas flow rate at stack conditions ($ft^3$/min)
~~O~~ = Total sampling time (min)
% $O_2$ = Percent oxygen by volume (dry basis)
% $CO_2$ = Percent carbon dioxide by volume (dry basis)
% CO = Percent carbon monoxide by volume (dry basis)
% $N_2$ = Percent nitrogen by volume (dry basis)
Zcf = Zero drift correction factor
Scf = Span drift correction factor
Cz = Zero correction concentration
MW = Molecular weight (lb/lb-mole)
ppmvd = parts per million by volume, dry
ppmvd @ X% $O_2$ = parts per million by volume, dry @ X% oxygen
lb/MMBtu = Emission concentration, pounds per million British thermal units
dscf/MMBtu = Fuel factor, dry standard cubic feet per million British thermal units
gr/scf = Emission concentration, grains per standard cubic foot
lb/hr = Emission rate, pounds per hour
FHW = Front Half Wash of sampling train
MF = Mass Filter of sampling train
BHW = Back Half Wash of Sampling train
gr/dscf = Emission concentration, grains per dry standard cubic foot
ng = Mass unit, nanograms

mg = Mass unit, milligrams
g = Mass unit, grams
ml = Unit of volume, milliliters
L = Unit of volume, liters
Ul = Unit of volume, microliters
$H_2SO_4$ = Chemical formula, sulfuric acid
$BaCl_2$ = Chemical formula, barium chloride
NaOH = Chemical formula, sodium hydroxide
$H_2S$ = Chemical formula, hydrogen sulfide
FHS = Front Half Sulfate of sampling train
BHS = Back Half Sulfate of sampling train
F-Factor = Fuel factor, volume of generated gases per unit of heat content (dscf/MMBtu)
ºF = Degrees Fahrenheit
ºR = Degrees Rankine
ºC = Degrees Celsius
98.076 = Molecular weight of sulfuric acid
64.062 = Molecular weight of sulfur dioxide
46.006 = Molecular weight of nitrogen dioxide
28.010 = Molecular weight of carbon monoxide
60 = Conversion factor, minutes per hour
460 = Conversion factor, ºF to ºR
15.432 = Conversion factor, grains per gram
0.000143 = Conversion factor, pounds per grain
32/98.076 = Conversion factor, equivalent weight of $SO_2$ to MW of $H_2SO_4$
1.60982 = Ideal Gas Law (lb-mole x dscf/dscf/ºR x mg)
0.00000137 = Ideal Gas Law (lb-mole x ºR/$ft^3$)
0.280 = Molecular weight of $N_2$ or CO, divided by 100
0.320 = Molecular weight of $O_2$, divided by 100
0.440 = Molecular weight of $CO_2$, divided by 100
18.0 = Molecular weight of $H_2O$
32.064 = Equivalent weight of $SO_2$
85.49 = Pitot tube constant, ft/sec x [(lb/lb-mole) x (in.Hg)/ ((ºR) x (in.$H_20$))]$^{0.5}$
8.223E-05 = Ideal gas constant (1.37E-06 lb-mole ºR/$ft^3$) x (60 min/hr)

# Reference Method Results Summary

| | | | |
|---|---|---|---|
| Project Number: | 583056 | Start Date: | 12/28/23 |
| Customer: | Kern Energy | End Date: | 12/28/23 |
| Unit Identification: | THI Heater | Facility: | Panama Lane |
| Sample Location: | Stack Outlet | Recorded by: | Jeff Harris |
| RM Probe Type | Extractive (Dry) | Fc Factor: | - |
| Load Level/Condition: | Normal | Fd Factor: | 8737 |

**Reference Method Concentrations - As Measured Moisture Basis**

| Run # | Date | Start Time | End Time | NOx ppmvd | SO2 ppmvd | CO ppmvd | CO2 % v/v dry | O2 % v/v dry |
|---|---|---|---|---|---|---|---|---|
| 1 | 12/28/23 | 12:14 | 12:43 | 6.88 | - | -0.03 | 9.26 | 6.16 |
| 2 | 12/28/23 | 12:58 | 13:27 | 6.79 | - | -0.01 | 9.25 | 6.25 |
| 3 | 12/28/23 | 13:41 | 14:10 | 7.04 | - | 0.00 | 9.22 | 6.24 |
| Average | | | | 6.90 | - | -0.01 | 9.24 | 6.22 |

**Moisture correction applied to "As Measured" data:** **None**

**Reference Method Pollutant Emission Rates***

| Run # | NOx lb/MMBtu | SO2 lb/MMBtu | CO lb/MMBtu | NOx lb/hr | SO2 lb/hr | CO lb/hr | Fc Factor | Fd Factor |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.0102 | - | 0.0000 | - | - | - | - | 8737 |
| 2 | 0.0101 | - | 0.0000 | - | - | - | - | 8737 |
| 3 | 0.0105 | - | 0.0000 | - | - | - | - | 8737 |
| Average | 0.0102 | - | 0.000 | - | - | - | - | 8737 |

* - lb/MMBtu based on measured concentrations and EPA F-Factor.

**Reference Method Results Corrected to $O_2$ Concentration**

| Run # | $NO_x$ ppmvd corrected to 3% Oxygen | $SO_2$ ppmvd corrected to % Oxygen | CO ppmvd corrected to 3% Oxygen |
|---|---|---|---|
| 1 | 8.35 | - | -0.03 |
| 2 | 8.30 | - | -0.02 |
| 3 | 8.59 | - | 0.00 |
| Average | 8.41 | - | -0.01 |

**Project Number:** 583056
**Client:** Kern Energy
**Facility:** Panama Lane
**Source:** THI Heater
**Test Date:** 12/28/2023

| | Run 1 | Run 2 | Run 3 | Average |
|---|---|---|---|---|
| Time: | 12:14 - 12:44 | 12:58 - 13:28 | 13:41 - 14:11 | |
| O2 reporting basis (%vol dry): | 3 | 3 | 3 | 3 |
| Flue gas O2 concentration (% vol dry): | 6.16 | 6.25 | 6.24 | 6.22 |
| Fuel factor (Fd, dscf/MMBtu) | 8,737 | 8,737 | 8,737 | 8,737 |
| Standard temperature ($^{o}$F): | 68 | 68 | 68 | 68 |
| Exhaust fractional moisture content *(Bws)* : | 0.126 | 0.125 | 0.125 | 0.125 |
| **Hydrocarbon Species Concentration** | | | | |
| Methane (ppm wet) | 0.30 | < 0.10 | 0.30 | < 0.23 |
| Ethane (ppm wet) | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| Propane (ppm wet) | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| **Non-Methane, Non-Ethane VOC Concentration** | | | | |
| As Methane (ppm wet) | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| As Methane (ppm dry) | < 0.34 | < 0.34 | < 0.34 | < 0.34 |
| As Methane @ 3 % Oxygen (ppm) | < 0.42 | < 0.42 | < 0.42 | < 0.42 |
| **Non-Methane, Non-Ethane VOC Emission Rate** | | | | |
| As Methane (lb/MMBtu) | < 0.0002 | < 0.0002 | < 0.0002 | < 0.0002 |

"<" indicates concentration below the analytical detection limit, results calculated based on detection limit

**Example Calculations - Effluent Gas Concentration Determination**

| | | | |
|---|---|---|---|
| Project Number: | 583056 | Test Date: | December 28, 2023 |
| Customer: | Kern Energy | Facility: | Panama Lane |
| Unit Identification: | THI Heater | Run #: | 1 |
| Sample Location: | Stack Outlet | | |

$$C_{gas} = (C - C_0) \times \frac{C_{ma}}{C_m - C_0}$$

Where:

$C_{gas}$ = Effluent gas concentration (ppm or %vol)

C = Average gas concentration indicated by analyzer (ppm or %vol)

$C_0$ = Average of pre- and post-test system bias checks using low range gas (ppm or % vol)

$C_m$ = Average of pre- and post-test system bias checks using upscale gas (ppm or % vol)

$C_{ma}$ = Actual concentration of upscale gas (ppm or % vol)

**$NO_X$**

C = 6.822 ppm  $C_0$ = 0.093 ppm

$C_m$ = 8.819 ppm  $C_{ma}$ = 8.920 ppm

**$C_{NOX}$ = 6.878 ppm**

**CO**

C = 0.022 ppm  $C_0$ = 0.048 ppm

$C_m$ = 4.671 ppm  $C_{ma}$ = 4.550 ppm

**$C_{CO}$ = -0.026 ppm**

**$CO_2$**

C = 9.113 %vol  $C_0$ = 0.086 %vol

$C_m$ = 10.941 %vol  $C_{ma}$ = 11.130 %vol

**$C_{CO2}$ = 9.256 %vol**

**$O_2$**

C = 6.091 %vol  $C_0$ = 0.002 %vol

$C_m$ = 11.019 %vol  $C_{ma}$ = 11.140 %vol

**$C_{O2}$ = 6.157 %vol**

Note: Interim results are not rounded.

**Example Calculations - Pollutant Concentration Corrected to a Reference % Oxygen**

| | | | |
|---|---|---|---|
| Project Number: | 583056 | Test Date: | December 28, 2023 |
| Customer: | Kern Energy | Facility: | Panama Lane |
| Unit Identification: | THI Heater | Run #: | 1 |

$$C_{gas} \text{ @ Reference } \%O_2 = C_{gas} \times \frac{(20.9 - \text{Ref } \%O_2)}{(20.9 - \%O_2)}$$

Where:

$C_{gas}$ = Effluent gas pollutant concentration (ppml)

%O2 = Effluent gas Oxygen concentration (ppm or %vol)

20.9 = Concentration of Oxygen in ambient air (%vol)

Ref %O2 = Reference Oxygen concentration

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **$NO_X$** | $C_{gas}$ = | 6.878 | ppmvd | | % $O_2$ = | 6.157 | % v/v dry |
| | Ref %$O_2$ = | 3 | | | | | |
| | **$C_{NOX}$ @ Ref %$O_2$ =** | **8.35** | **ppmvd** | | | | |
| **CO** | $C_{gas}$ = | -0.026 | ppmvd | | % $O_2$ = | 6.157 | % v/v dry |
| | Ref %$O_2$ = | 3 | | | | | |
| | **$C_{CO}$ @ Ref %$O_2$ =** | **0.00** | **ppmvd** | | | | |

Note: Interim results are not rounded.

**Example Calculations - Pollutant Emission Rate, Oxygen-Based Fuel Factor**

| | | | |
|---|---|---|---|
| Project Number: | 583056 | Test Date: | December 28, 2023 |
| Customer: | Kern Energy | Facility: | Panama Lane |
| Unit Identification: | THI Heater | Run #: | 1 |

ER = Pollutant emission rate (lb/MMBtu)

$C_{gas}$ = Pollutant concentration (ppm dry basis)

MW = Pollutant molecular weight (gr/gr-mole)

$F_d$ = Oxygen-based fuel factor (dscf/MMBtu)

$\%O_2$ = Concentration of oxygen in effluent gas (%vol dry basis)

1.194E-07 = Conversion constant for NOx. From Table 19-1 of Method 19, 40CFR, Appendix A

7.269E-08 = Conversion constant for CO. Derived based on Table 19-1 of Method 19, 40CFR60, App. A

For NOx $ER = C_{gas} \times 1.194E\text{-}07 \times F_d \times (20.9/(20.9-\%O_2))$

**NOx** $C_{gas}$ = 6.878 ppm $\%O_2$ = 6.157 %vol

$F_d$ = 8737 dscf/MMBtu

**$ER_{NOX}$ = 0.0102 lb/MMBtu**

For CO ER = Cgas x 7.269E-08 x Fd x (20.9/(20.9-%O2))

**CO** $C_{gas}$ = -0.0260 ppm $\%O_2$ = 6.157 %vol

$F_d$ = 8737 dscf/MMBtu

**$ER_{CO}$ = 0.0000 lb/MMBtu**

Note: Interim results are not rounded.

| | | | |
|---|---|---|---|
| Project Number: | 583056 | Source: | THI Heater |
| Client: | Kern Energy | Test Date: | 12/28/2023 |
| Facility: | Panama Lane | Run #: | 1 |

**Example Calculations - Non-Methane, Non-Ethane VOC concentration as methane**

NMNEVOC as CH4 = (3/4 x CC3H8) + (4/4 * CC4H10) + (5/4 x CC5H10) + (6/4 x CC6H12)

NMNEVOC as CH4 = Non-Methane, Non-EthaneVOC concentration as methane (ppm, wet basis)
$C_{C3H8}$ = flue gas propane concentartion (ppm, wet basis)
$C_{C4H10}$ = flue gas butane concentration (ppm, wet basis)
$C_{C5H12}$ = flue gas pentane concentration (ppm, wet basis)
$C_{C6H14}$ = flue gas hexane concentration (ppm, wet basis)

NMNEVOC as CH4 = (3 x 0.1 )+ (4 x 0 )+ (5 x 0 )+ (6 x 0 )

**NMNEVOC as CH4 = 0.3 ppm, wet basis**

**Example Calculations - VOC concentration corrected to dry basis**

$$\text{VOC as CxHy (dry)} = \frac{\text{VOC as CxHy}}{(1-\text{Bws})}$$

VOC as CxHy = VOC concentration (T, NM or NMNE; as Methane, Propane or Butane; ppm, wet basis)
Bws = fractional exhaust gas moisture content

**Example for: Total VOC as Methane - Run 1**

$$\text{TVOC as CH4 (dry)} = \frac{0.8}{(1 - 0.126)}$$

**TVOC as CH4 (dry) = 0.9 ppm, dry basis**

**Example Calculations - VOC concentration corrected to 3% O2**

$$\text{VOC as CxHy @ 3\% O2} = \text{VOC as CxHy (dry)} \times \frac{(20.9 - 3)}{(20.9 - \%\,O2)}$$

VOC as CxHy = VOC concentration (T, NM or NMNE; as Methane, Propane or Butane; ppm, wet basis)
Bws = fractional exhaust gas moisture content
% O2 = flue gas oxygen concentration (% vol, dry basis)

**Example for: Total VOC as Methane - Run 1**

$$\text{TVOC as CH4 @ 3\% O2} = 0.9 \times \frac{(20.9 - 3)}{(20.9 - 6.157)}$$

**TVOC as CH4 @ 3% O2 = 1.0 ppm**

| | | | |
|---|---|---|---|
| Project Number: | 583056 | Source: | THI Heater |
| Client: | Kern Energy | Test Date: | 12/28/2023 |
| Facility: | Panama Lane | Run #: | 1 |

**Example Calculations - VOC emission rate, pounds per unit heat input**

ER2 = VOC as CxHy (dry) x MW x Fd x K x 20.9/(20.9-%O2)

ER2 = VOC emission rate (T, NM or NMNE; as methane, propane or butane; lb/MMBtu)
VOC as CxHy = VOC concentration as (T, NM or NMNE; as methane, propane or butane; ppm, dry basis)
MW = Reporting basis Molecular Weight (gr/gr-mole): 16.04 for Methane (CH4)
44.1 for Propane (C3H8)
58.12 for Butane (C4H10)
Fd = EPA Method 19 fuel O2-based fuel factor (dscf/MMBtu)
K = conversion constant: 2.639 E-09 @ 60 deg F
2.595 E-09 @ 68 deg F
2.585 E-09 @ 70 deg F
% O2 = flue gas oxygen concentration (% vol, dry basis)

**Example for: Total VOC as Methane at standard temperature of 68 deg F, Run 1:**

$$ER\ 2 = \frac{0.9}{} \times 16.04 \times \frac{8737}{} \times \frac{2.595E\text{-}09}{} \times \frac{20.9}{(20.9 - 6.157)}$$

**ER2 = 0.000 lb/MMBtu as methane**

# EPA Method 18 Example Calculations

| | | | |
|---|---|---|---|
| Project Number: | 583056.0000 | Test Date: | 12/28/2023 |
| Company: | Kern Energy | Run #: | 1 |
| Facility: | Panama Lane | | |
| Unit/Location: | THI Heater | | |

**Methane Calibration Standard Concentrations and Gas Chromatoghraph Responses**

$C_1$ = Low concen. std. (ppmv)
$C_2$ = Mid concen. std.(ppmv)
$C_3$ = High concen. Std.(ppmv)

$R_1$ = 3 Inj Avg Low GC Response (area counts)
$R_2$ = 3 Inj Avg Mid GC Response (area counts)
$R_3$ = 3 Inj Avg High GC Response (area counts)

| | | | | | |
|---|---|---|---|---|---|
| $C_1$ = | 4.99 | ppmv | $R_1$ = | 20.78 | area counts |
| $C_2$ = | 15 | ppmv | $R_2$ = | 63 | area counts |
| $C_3$ = | 50.1 | ppmv | $R_3$ = | 211.41 | area counts |

**Linear Regression Analysis**

| | (X) | (Y) | ($X^2$) | ($Y^2$) | (XY) | $(x-Ax)^2$ | $(y-Ay)^2$ |
|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 307.0380063 | 5446.071006 |
| | 4.99 | 20.78 | 24.9001 | 431.8084 | 103.6922 | 157.0635563 | 2810.855306 |
| | 15 | 63 | 225 | 3969 | 945 | 6.36300625 | 116.5860063 |
| | 50.1 | 211.41 | 2510.01 | 44694.1881 | 10591.641 | 1061.293506 | 18937.20016 |
| | (∑x) | (∑y) | ($\sum x^2$) | ($\sum y^2$) | (∑xy) | $\sum(x-Ax)^2$ | $\sum(y-Ay)^2$ |
| Sum = | 70.09 | 295.19 | 2759.9101 | 49094.9965 | 11640.3332 | 1531.758075 | 27310.71248 |
| | (Ax) | (Ay) | ($Ax^2$) | ($Ay^2$) | | | |
| Average = | 17.5225 | 73.7975 | 689.977525 | 12273.74913 | | | |

Where:

X = Calibration Standard (ppmv)
Y = GC Response (area counts)
(∑x) = sum of x values
(∑y) = sum of y values
($\sum x^2$) = sum of $x^2$ values
($\sum y^2$) = sum of $y^2$ values
(∑xy) = sum of product of x and y values
(Ax) = average of x values
(Ay) = average of y values
($Ax^2$) = average of $x^2$ values
($Ay^2$) = average of $y^2$ values

# EPA Method 18 Example Calculations (Cont.)

| | | | |
|---|---|---|---|
| Project Number: | 583056.0000 | Test Date: | 12/28/2023 |
| Company: | Kern Energy | Run #: | 1 |
| Facility: | Panama Lane | | |
| Unit/Location: | THI Heater | | |

**Linear Regression - Slope (Forced Through Origin)**

$$M = \frac{\sum xy}{\sum x^2}$$

Where:

M = Slope

n = number of calibration data sets

(∑xy) = 11640.3332 (∑x²) = 2759.9101

**M = 4.218**

**Linear Regression - Coefficient of Determination R²**

$$R^2 = \frac{((n * \sum xy) - (\sum x * \sum y))^{\wedge 2}}{(n * \sum x^2 - (\sum x)^2)\ (n * \sum y^2 - (\sum y)^2)}$$

Where:

$R^2$ = Coefficient of Determination

(∑xy) = 11640.3332 (∑x²) = 2759.9101

(∑x) = 70.09 (∑y²) = 49094.9965

(∑y) = 295.19 n = 4

**$R^2$ = 1.0000**

# EPA Method 18 Example Calculations (Cont.)

| | | | |
|---|---|---|---|
| Project Number: | 583056.0000 | Test Date: | 12/28/2023 |
| Company: | Kern Energy | Run #: | 1 |
| Facility: | Panama Lane | | |
| Unit/Location: | THI Heater | | |

**Methane Concentration Calculation**

$$\textbf{Methane Concentration} = \frac{R_c}{M}$$

Where:

$R_C$ = 3 Inj Avg Methane GC Response (area counts)

M = slope of GC response vs concentration

**$R_C$ =** 1.15 **M =** 4.218

**Methane Concentration = 0.3**

# Instrumental Reference Method Field Data

| | | | |
|---|---|---|---|
| Project Number: | 583056 | Start Date: | 12/28/2023 |
| Customer: | Kern Energy | Facility: | Panama Lane |
| Unit Identification: | THI Heater | Recorded by: | Jeff Harris |
| Sample Location: | Stack Outlet | Fc Factor: | - |
| Load Level/Condition: | Normal | Fd Factor: | 8737 |

| RM Analyzer Information | | | |
|---|---|---|---|
| Reference Method Probe Type (Moisture Basis): | | | Extractive (Dry) |
| Pollutant | Manufacturer | Model # | Serial Number |
| $NO_X$ | Teledyne | T200H | 822 |
| CO | Teledyne | T300 | 137 |
| $CO_2$ | California Analytical | 702LX | 2203041 |
| $O_2$ | California Analytical | 702LX | 2203041 |

583056 Kern Energy Test 1 Configuration Summary
Configuration Sum 583056 Kern Energy Test 1

File & Test Information:

| | |
|---|---|
| Path | C:\Users\Admin\Documents\ProRATA Data\Panama Lane Facility\583056 Kern Energy Test 1\583056 Kern Energy Test 1.prc |
| Test | 583056 Kern Energy Test 1 at Panama Lane Facility : Stack Outlet |
| Source ID | THI Heater |
| Operator | Jeff Harris |

Test Properties:

| | |
|---|---|
| Run Length | 30 min |
| Response Time | System: 1.5 min Direct: 0 min |
| Stability | Less than 2% change over 0.5 minutes. |
| Traversing | Off |

Channels:

| # | Channel | Units | Method | Range Val | Range Volts | Zero V | Span |
|---|---|---|---|---|---|---|---|
| 1 | O2 | % | EPA 7E | 25 | 5 | 0 | 21.54 |
| 2 | CO2 | % | EPA 7E | 25 | 5 | 0 | 22.07 |
| 3 | NOx | ppm | EPA 7E | 25 | 5 | 0 | 21.33 |
| 4 | CO | ppm | EPA 7E | 10 | 5 | 0 | 8.57 |

Cylinders:

| Valve# | Cylinder ID | Expiration | Contents |
|---|---|---|---|
| 1 | CC146489 | 12/28/2031 | 0% O2 |
| | | | 0% CO2 |
| | | | 0 ppm NOx |
| 2 | CC65982 | 6/30/2031 | 21.54% O2 |
| | | | 22.07% CO2 |
| 3 | ALM036586 | 7/27/2031 | 11.14% O2 |
| | | | 11.13% CO2 |
| | | | 0 ppm CO |
| 4 | | | |
| 5 | EB0061497 | 11/30/2025 | 20.89 ppm CO |
| | | | 21.33 ppm NOx |
| 6 | CC503450 | 2/22/2024 | 8.3 NO2 |
| 7 | | | |
| 8 | DT0022596 | 12/2/2024 | 8.57 ppm CO |
| | | | 8.92 ppm NOx |
| 9 | DT0045374 | 11/17/2026 | 4.55 ppm CO |
| | | | 4.42 ppm NOx |

Default References:

| Channel | Zero | Low | Mid | High |
|---|---|---|---|---|
| O2 | 0.00 % : cyl 1 | | 11.14 % : cyl 3 | 21.54 % : cyl 2 |
| CO2 | 0.00 % : cyl 1 | | 11.13 % : cyl 3 | 22.07 % : cyl 2 |
| NOx | 0.00 ppm : cyl 1 | | 8.92 ppm : cyl 8 | 21.33 ppm : cyl 5 |
| CO | 0.00 ppm : cyl 3 | | 4.55 ppm : cyl 9 | 8.57 ppm : cyl 8 |

Run averages corrected for bias
Operator: Jeff Harris
Plant Name: Panama Lane Facility
Location: Stack Outlet

| Run | Date | Start Time | End Time | O2 % | CO2 % | NOx ppm | CO ppm |
|---|---|---|---|---|---|---|---|
| 1 | 12/28/2023 | 12:14:00 | 12:44:00 | 6.157 | 9.256 | 6.878 | -0.026 |
| 2 | 12/28/2023 | 12:58:00 | 13:28:00 | 6.25 | 9.246 | 6.791 | -0.013 |
| 3 | 12/28/2023 | 13:41:00 | 14:11:00 | 6.24 | 9.223 | 7.037 | 0.004 |

583056 Kern Energy Test 1 Initial Calibration Error Test
583056 Kern Energy Test 1
Initial Calibration Error Test

| | | |
|---|---|---|
| Date/Time: | 12/28/2023 | 11:28:44 |
| Result: | PASS | |

| | |
|---|---|
| Operator: | Jeff Harris |
| Plant: | Panama Lane Facility |
| Location: | Stack Outlet |
| Source ID: | THI Heater |

Reference Cylinder IDs

| | Zero ID: | Low ID: | Mid ID: | High ID: |
|---|---|---|---|---|
| O2 | CC146489 | | ALM036586 | CC65982 |
| CO2 | CC146489 | | ALM036586 | CC65982 |
| NOx | CC146489 | | DT0022596 | EB0061497 |
| CO | ALM036586 | | DT0045374 | DT0022596 |

Calibration Error Results

| Channel: | O2 | CO2 | NOx | CO |
|---|---|---|---|---|
| Units: | % | % | ppm | ppm |
| Span: | 21.54 | 22.07 | 21.33 | 8.57 |
| Range: | 25 | 25 | 25 | 10 |
| Method: | EPA 7E | EPA 7E | EPA 7E | EPA 7E |
| Zero Ref: | 0 | 0 | 0 | 0 |
| Zero Cal: | -0.02 | -0.026 | 0.051 | -0.002 |
| Zero Error: | -0.10% | -0.10% | 0.20% | 0.00% |
| Low Ref: | | | | |
| Low Cal: | | | | |
| Low Error: | | | | |
| Mid Ref: | 11.14 | 11.13 | 8.92 | 4.55 |
| Mid Cal: | 11.133 | 11.13 | 8.784 | 4.698 |
| Mid Error: | 0.00% | 0.00% | -0.60% | 1.70% |
| High Ref: | 21.54 | 22.07 | 21.33 | 8.57 |
| High Cal: | 21.571 | 22.107 | 21.309 | 8.598 |
| High Error: | 0.10% | 0.20% | -0.10% | 0.30% |
| Cal Result: | PASSED | PASSED | PASSED | PASSED |

583056 Kern Energy Test 1 Initial NOX CE Test
583056 Kern Energy Test 1
Initial NOX CE Test

| | | |
|---|---|---|
| Date/Time: | 12/28/2023 | 11:34:41 |
| Result: | PASS | |

| | |
|---|---|
| Operator: | Jeff Harris |
| Plant: | Panama Lane Facility |
| Location: | Stack Outlet |
| Source ID: | THI Heater |

Reference Cylinder IDs

| | NOx (NO2) ID |
|---|---|
| NOx | CC503450 |

NOx Converter Efficiency Results

| | |
|---|---|
| Channel: | NOx |
| Units: | ppm |
| Span: | 21.33 |
| Range: | 25 |
| Method: | EPA 7E |

| | |
|---|---|
| NOx Ref: | 8.3 |
| NOx Cal: | 7.915 |
| NOx Error: | -4.60% |

Cal Result: PASSED

583056 Kern Energy Test 1 Initial System Bias Check
583056 Kern Energy Test 1
Initial System Bias Check

| | | |
|---|---|---|
| Date/Time: | 12/28/2023 | 11:52:46 |
| Result: | PASS | |

| | |
|---|---|
| Operator: | Jeff Harris |
| Plant: | Panama Lane Facility |
| Location: | Stack Outlet |
| Source ID: | THI Heater |

Reference Cylinder IDs

| | Low ID | Upscale ID | Span ID |
|---|---|---|---|
| O2 | CC146489 | ALM036586 | CC65982 |
| CO2 | CC146489 | ALM036586 | CC65982 |
| NOx | CC146489 | DT0022596 | EB0061497 |
| CO | ALM036586 | DT0045374 | DT0022596 |

System Bias Check Results

| Analyte: | O2 | CO2 | NOx | CO |
|---|---|---|---|---|
| Units: | % | % | ppm | ppm |
| Span: | 21.54 | 22.07 | 21.33 | 8.57 |
| Range: | 25 | 25 | 25 | 10 |
| Method: | EPA 7E | EPA 7E | EPA 7E | EPA 7E |
| Low Cal: | -0.02 | -0.026 | 0.051 | -0.002 |
| Low Sys: | 0.006 | 0.096 | 0.07 | 0.054 |
| Low Bias: | 0.10% | 0.60% | 0.10% | 0.70% |
| Upscale Cal: | 11.133 | 11.13 | 8.784 | 4.698 |
| Upscale Sys: | 11.03 | 11.039 | 8.789 | 4.701 |
| Upscale Bias | -0.50% | -0.40% | 0.00% | 0.00% |
| Bias Result: | PASSED | PASSED | PASSED | PASSED |

583056 Kern Energy Test 1 Response Time
Response Time 583056 Kern Energy Test 1
Date/Time: 12/28/2023 12:01:36

Operator: Jeff Harris
Plant: Panama Lane Facility
Location: Stack Outlet
Source ID: THI Heater

Response Time Results

| Analyte: | O2 | | CO2 | | NOx | | CO | |
|---|---|---|---|---|---|---|---|---|
| Units: | % | | % | | ppm | | ppm | |
| Span: | 21.54 | | 22.07 | | 21.33 | | 8.57 | |
| Range: | 25 | | 25 | | 25 | | 10 | |
| Method: | EPA 7E | | EPA 7E | | EPA 7E | | EPA 7E | |
| | | | | | | | | |
| Upscale Lvl: | 10.479 | | 10.487 | | 8.289 | | 4.201 | |
| Dnscale Lvl: | 1.077 | | 1.104 | | 1.067 | | 0.5 | |
| | | | | | | | | |
| Upscale (s): | 0:37 | | 0:36 | | 1:15 | | 1:22 | |
| Dnscale (s): | 0:35 | | 0:35 | | 1:06 | | 1:35 | |
| | Upscale | Dnscale | Upscale | Dnscale | Upscale | Dnscale | Upscale | Dnscale |
| | 0.002 | 10.879 | 0.085 | 10.871 | 0.075 | 8.691 | 1.568 | 4.422 |
| | 0.003 | 10.909 | 0.085 | 10.897 | 0.069 | 8.667 | 1.487 | 4.444 |
| | 0.004 | 10.932 | 0.085 | 10.917 | 0.069 | 8.665 | 1.412 | 4.455 |
| | 0.002 | 10.951 | 0.085 | 10.933 | 0.073 | 8.696 | 1.341 | 4.481 |
| | 0.002 | 10.961 | 0.085 | 10.947 | 0.074 | 8.719 | 1.253 | 4.494 |
| | 0.004 | 10.976 | 0.085 | 10.952 | 0.057 | 8.706 | 1.209 | 4.492 |
| | 0.004 | 10.983 | 0.085 | 10.957 | 0.054 | 8.71 | 1.185 | 4.487 |
| | 0.004 | 10.991 | 0.085 | 10.96 | 0.057 | 8.717 | 1.114 | 4.501 |
| | 0.004 | 10.996 | 0.085 | 10.963 | 0.06 | 8.699 | 1.06 | 4.527 |
| | 0.003 | 11.001 | 0.085 | 10.968 | 0.074 | 8.696 | 1 | 4.532 |
| | 0.002 | 11.007 | 0.085 | 10.971 | 0.07 | 8.747 | 0.969 | 4.54 |
| | 0.002 | 11.008 | 0.085 | 10.975 | 0.058 | 8.76 | 0.895 | 4.553 |
| | 0.004 | 11.01 | 0.085 | 10.977 | 0.066 | 8.765 | 0.863 | 4.592 |
| | 0.003 | 11.012 | 0.085 | 10.979 | 0.076 | 8.755 | 0.825 | 4.6 |
| | 0.002 | 11.013 | 0.085 | 10.98 | 0.059 | 8.75 | 0.812 | 4.604 |
| | 0.002 | 11.016 | 0.084 | 10.981 | 0.064 | 8.751 | 0.771 | 4.606 |
| | 0.002 | 11.02 | 0.084 | 10.983 | 0.064 | 8.754 | 0.748 | 4.606 |
| | 0.002 | 11.021 | 0.085 | 10.985 | 0.058 | 8.759 | 0.728 | 4.597 |
| | 0.002 | 11.022 | 0.085 | 10.988 | 0.066 | 8.755 | 0.705 | 4.597 |
| | 0.002 | 11.022 | 0.085 | 10.989 | 0.066 | 8.748 | 0.685 | 4.612 |
| | 0.003 | 11.024 | 0.085 | 10.99 | 0.083 | 8.753 | 0.655 | 4.619 |
| | 0.039 | 11.02 | 0.086 | 10.99 | 0.064 | 8.767 | 0.632 | 4.612 |
| | 0.387 | 10.801 | 0.091 | 10.981 | 0.061 | 8.762 | 0.629 | 4.604 |
| | 1.183 | 9.907 | 0.112 | 10.938 | 0.063 | 8.765 | 0.62 | 4.609 |
| | 2.557 | 8.329 | 0.883 | 9.63 | 0.072 | 8.753 | 0.615 | 4.604 |
| | 4.168 | 6.895 | 3.793 | 6.806 | 0.059 | 8.751 | 0.625 | 4.571 |
| | 5.453 | 5.477 | 5.37 | 5.386 | 0.062 | 8.766 | 0.643 | 4.547 |
| | 6.687 | 4.299 | 6.493 | 4.206 | 0.06 | 8.75 | 0.656 | 4.536 |
| | 7.542 | 3.391 | 7.546 | 3.306 | 0.067 | 8.743 | 0.652 | 4.522 |
| | 8.171 | 2.663 | 8.348 | 2.626 | 0.067 | 8.759 | 0.68 | 4.486 |
| | 8.768 | 2.126 | 8.913 | 2.09 | 0.057 | 8.765 | 0.704 | 4.454 |
| | 9.26 | 1.661 | 9.415 | 1.718 | 0.053 | 8.762 | 0.738 | 4.397 |
| | 9.661 | 1.346 | 9.743 | 1.362 | 0.061 | 8.762 | 0.773 | 4.382 |
| | 9.946 | 1.11 | 10.037 | 1.127 | 0.07 | 8.762 | 0.81 | 4.311 |
| | 10.15 | 0.942 | 10.228 | 0.903 | 0.055 | 8.752 | 0.897 | 4.262 |
| | 10.295 | | 10.4 | | 0.058 | 8.755 | 0.947 | 4.157 |
| | 10.455 | | 10.529 | | 0.074 | 8.772 | 1 | 4.107 |
| | 10.582 | | | | 0.072 | 8.775 | 1.077 | 3.973 |
| | | | | | 0.061 | 8.78 | 1.154 | 3.899 |
| | | | | | 0.067 | 8.796 | 1.235 | 3.79 |
| | | | | | 0.081 | 8.781 | 1.286 | 3.72 |

| | | | |
|---|---|---|---|
| 0.079 | 8.781 | 1.392 | 3.646 |
| 0.063 | 8.783 | 1.48 | 3.511 |
| 1.438 | 8.775 | 1.598 | 3.429 |
| 1.712 | 7.501 | 1.667 | 3.325 |
| 1.718 | 7.454 | 1.821 | 3.234 |
| 1.715 | 7.453 | 1.892 | 3.114 |
| 1.713 | 7.474 | 1.957 | 3.001 |
| 1.713 | 7.474 | 2.076 | 2.917 |
| 2.328 | 7.458 | 2.14 | 2.786 |
| 3.941 | 7.449 | 2.281 | 2.72 |
| 5.584 | 7.449 | 2.343 | 2.576 |
| 5.579 | 7.451 | 2.454 | 2.514 |
| 5.569 | 7.462 | 2.535 | 2.349 |
| 5.567 | 7.469 | 2.655 | 2.278 |
| 5.569 | 7.467 | 2.725 | 2.219 |
| 5.571 | 6.595 | 2.82 | 2.114 |
| 5.569 | 3.549 | 2.899 | 2.042 |
| 5.571 | 3.545 | 2.985 | 1.925 |
| 5.582 | 3.546 | 3.071 | 1.861 |
| 5.584 | 3.556 | 3.11 | 1.778 |
| 5.582 | 3.549 | 3.18 | 1.706 |
| 5.585 | 3.543 | 3.273 | 1.617 |
| 5.58 | 3.566 | 3.316 | 1.543 |
| 7.753 | 3.554 | 3.416 | 1.493 |
| 8.198 | 0.908 | 3.465 | 1.422 |
| 8.21 | | 3.577 | 1.358 |
| 8.201 | | 3.619 | 1.307 |
| 8.193 | | 3.686 | 1.28 |
| 8.203 | | 3.735 | 1.255 |
| 8.214 | | 3.817 | 1.187 |
| 8.208 | | 3.854 | 1.148 |
| 8.204 | | 3.901 | 1.096 |
| 8.195 | | 3.945 | 1.056 |
| 8.216 | | 3.988 | 0.977 |
| 8.631 | | 4.018 | 0.949 |
| | | 4.044 | 0.909 |
| | | 4.079 | 0.881 |
| | | 4.125 | 0.825 |
| | | 4.146 | 0.806 |
| | | 4.175 | 0.771 |
| | | 4.19 | 0.747 |
| | | 4.253 | 0.727 |
| | | | 0.699 |
| | | | 0.681 |
| | | | 0.654 |
| | | | 0.622 |
| | | | 0.598 |
| | | | 0.588 |
| | | | 0.579 |
| | | | 0.546 |
| | | | 0.525 |
| | | | 0.509 |
| | | | 0.501 |
| | | | 0.477 |

583056 Kern Energy Test 1 Test Run 1_full
583056 Kern Energy Test 1
Test Run 1
Start: 12/28/2023 12:14:00
End: 12/28/2023 12:44:00

Operator: Jeff Harris
Plant: Panama Lane Facility
Location: Stack Outlet
Source ID: THI Heater

| Time | Entry | O2 % | CO2 % | NOx ppm | CO ppm |
|---|---|---|---|---|---|
| 12:14:00 | Test Started | | | | |
| 12:14:59 | 1min avg: | 6.122 | 9.134 | 6.65 | 0.057 |
| 12:15:59 | 1min avg: | 6.077 | 9.164 | 6.752 | 0.029 |
| 12:16:59 | 1min avg: | 6.094 | 9.159 | 6.826 | 0.048 |
| 12:17:59 | 1min avg: | 6.079 | 9.154 | 6.794 | 0.036 |
| 12:18:59 | 1min avg: | 6.075 | 9.155 | 6.828 | 0.037 |
| 12:19:59 | 1min avg: | 6.101 | 9.135 | 6.79 | 0.019 |
| 12:20:59 | 1min avg: | 6.183 | 9.085 | 6.731 | 0.032 |
| 12:21:59 | 1min avg: | 6.265 | 9.02 | 6.638 | 0.018 |
| 12:22:59 | 1min avg: | 6.236 | 9.029 | 6.564 | 0.007 |
| 12:23:59 | 1min avg: | 6.167 | 9.06 | 6.51 | 0.019 |
| 12:24:59 | 1min avg: | 6.152 | 9.08 | 6.662 | 0.025 |
| 12:25:59 | 1min avg: | 6.105 | 9.103 | 6.716 | 0.009 |
| 12:26:59 | 1min avg: | 6.115 | 9.106 | 6.727 | 0.011 |
| 12:27:59 | 1min avg: | 6.138 | 9.093 | 6.729 | 0.009 |
| 12:28:59 | 1min avg: | 6.03 | 9.129 | 6.728 | 0.015 |
| 12:29:59 | 1min avg: | 6.024 | 9.159 | 7.024 | 0.017 |
| 12:30:59 | 1min avg: | 6.01 | 9.158 | 7.044 | 0.023 |
| 12:31:59 | 1min avg: | 6.1 | 9.113 | 6.988 | 0.023 |
| 12:32:59 | 1min avg: | 6.093 | 9.106 | 6.822 | 0.016 |
| 12:33:59 | 1min avg: | 6.072 | 9.115 | 6.837 | 0.011 |
| 12:34:59 | 1min avg: | 6.059 | 9.121 | 6.85 | 0.033 |
| 12:35:59 | 1min avg: | 6.04 | 9.134 | 6.891 | 0.018 |
| 12:36:59 | 1min avg: | 6.005 | 9.154 | 6.981 | 0.006 |
| 12:37:59 | 1min avg: | 6.094 | 9.116 | 6.984 | 0.024 |
| 12:38:59 | 1min avg: | 6.112 | 9.081 | 6.79 | 0.021 |
| 12:39:59 | 1min avg: | 5.81 | 9.236 | 6.898 | 0.011 |
| 12:40:59 | 1min avg: | 5.795 | 9.304 | 7.537 | 0.014 |
| 12:41:59 | 1min avg: | 6.101 | 9.118 | 7.337 | 0.021 |
| 12:42:59 | 1min avg: | 6.359 | 8.925 | 6.744 | 0.031 |
| 12:43:59 | 1min avg: | 6.116 | 8.946 | 6.286 | 0.009 |
| 12:44:00 | Sampling Finished | | | | |
| 12:44:00 | Test Complete | | | | |
| 12:44:00 | Test Avgs: | 6.091 | 9.113 | 6.822 | 0.022 |

583056 Kern Energy Test 1 Run 1 Final Bias & Drift Check

583056 Kern Energy Test 1 Run 1

Run 1 Final Bias & Drift Check

| | | |
|---|---|---|
| Date/Time: | 12/28/2023 | 12:54:11 |
| Result: | PASS | |

| | |
|---|---|
| Operator: | Jeff Harris |
| Plant: | Panama Lane Facility |
| Location: | Stack Outlet |
| Source ID: | THI Heater |

Reference Cylinder IDs

| | Low ID | Upscale ID | Span ID |
|---|---|---|---|
| O2 | CC146489 | ALM036586 | CC65982 |
| CO2 | CC146489 | ALM036586 | CC65982 |
| NOx | CC146489 | DT0022596 | EB0061497 |
| CO | ALM036586 | DT0045374 | DT0022596 |

System Bias Check Results

| Analyte: | O2 | CO2 | NOx | CO |
|---|---|---|---|---|
| Units: | % | % | ppm | ppm |
| Span: | 21.54 | 22.07 | 21.33 | 8.57 |
| Range: | 25 | 25 | 25 | 10 |
| Method: | EPA 7E | EPA 7E | EPA 7E | EPA 7E |
| | | | | |
| Low Cal: | -0.02 | -0.026 | 0.051 | -0.002 |
| Low Sys: | -0.001 | 0.077 | 0.117 | 0.042 |
| Low Bias: | 0.10% | 0.50% | 0.30% | 0.50% |
| | | | | |
| Upscale Cal: | 11.133 | 11.13 | 8.784 | 4.698 |
| Upscale Sys: | 11.007 | 10.843 | 8.849 | 4.641 |
| Upscale Bias | -0.60% | -1.30% | 0.30% | -0.70% |
| | | | | |
| Bias Result: | PASSED | PASSED | PASSED | PASSED |

System Bias Drift Results

| | | | | |
|---|---|---|---|---|
| Low Drift: | 0.00% | -0.10% | 0.20% | -0.10% |
| Mid Drift: | -0.10% | -0.90% | 0.30% | -0.70% |
| Drift Result: | PASSED | PASSED | PASSED | PASSED |
| | | | | |
| Cal Result: | OK | OK | OK | OK |

Test Run 1 Bias Correction Calculations:

| | O2 | CO2 | NOx | CO |
|---|---|---|---|---|
| Low init: | 0.006 | 0.096 | 0.07 | 0.054 |
| Low final: | -0.001 | 0.077 | 0.117 | 0.042 |
| Mid Init: | 11.03 | 11.039 | 8.789 | 4.701 |
| Mid Final: | 11.007 | 10.843 | 8.849 | 4.641 |
| Run Avg: | 6.091 | 9.113 | 6.822 | 0.022 |
| Co: | 0.002 | 0.086 | 0.093 | 0.048 |
| Cm: | 11.019 | 10.941 | 8.819 | 4.671 |
| Coa: | 0 | 0 | 0 | 0 |
| Cma: | 11.14 | 11.13 | 8.92 | 4.55 |
| Corrected: | 6.157 | 9.256 | 6.878 | -0.026 |

583056 Kern Energy Test 1 Test Run 2_full
583056 Kern Energy Test 1
Test Run 2
Start: 12/28/2023 12:58:00
End: 12/28/2023 13:28:00

Operator: Jeff Harris
Plant: Panama Lane Facility
Location: Stack Outlet
Source ID: THI Heater

| Time | Entry | O2 % | CO2 % | NOx ppm | CO ppm |
|---|---|---|---|---|---|
| 12:57:18 | Sampling Started | | | | |
| 12:58:00 | Test Started | | | | |
| 12:59:00 | 1min avg: | 5.873 | 9.144 | 6.914 | 0.005 |
| 13:00:00 | 1min avg: | 6.03 | 9.088 | 7.01 | 0.006 |
| 13:01:00 | 1min avg: | 6.124 | 9.034 | 6.685 | 0.01 |
| 13:02:00 | 1min avg: | 6.283 | 8.952 | 6.494 | 0.006 |
| 13:03:00 | 1min avg: | 6.316 | 8.921 | 6.237 | 0.014 |
| 13:04:00 | 1min avg: | 6.3 | 8.937 | 6.274 | 0.006 |
| 13:05:00 | 1min avg: | 6.355 | 8.906 | 6.292 | 0.009 |
| 13:06:00 | 1min avg: | 6.357 | 8.898 | 6.204 | 0.01 |
| 13:07:00 | 1min avg: | 6.267 | 8.943 | 6.252 | 0.011 |
| 13:08:00 | 1min avg: | 6.122 | 9.008 | 6.431 | 0.006 |
| 13:09:00 | 1min avg: | 5.941 | 9.126 | 6.84 | 0.005 |
| 13:10:00 | 1min avg: | 5.916 | 9.157 | 7.211 | 0.006 |
| 13:11:00 | 1min avg: | 6.033 | 9.092 | 7.208 | 0.004 |
| 13:12:00 | 1min avg: | 6.087 | 9.051 | 7.047 | 0.017 |
| 13:13:00 | 1min avg: | 6.118 | 9.018 | 6.952 | 0.01 |
| 13:14:00 | 1min avg: | 6.217 | 8.962 | 6.911 | 0.015 |
| 13:15:00 | 1min avg: | 6.305 | 8.884 | 6.675 | 0.029 |
| 13:16:00 | 1min avg: | 6.279 | 8.882 | 6.56 | 0.009 |
| 13:17:00 | 1min avg: | 6.213 | 8.901 | 6.707 | 0.003 |
| 13:18:00 | 1min avg: | 6.021 | 9.007 | 6.896 | 0.004 |
| 13:19:00 | 1min avg: | 6.02 | 9.014 | 7.303 | 0.015 |
| 13:20:00 | 1min avg: | 6.117 | 8.969 | 7.293 | 0.006 |
| 13:21:00 | 1min avg: | 6.212 | 8.895 | 6.992 | 0.011 |
| 13:22:00 | 1min avg: | 6.214 | 8.878 | 6.879 | 0.006 |
| 13:23:00 | 1min avg: | 6.228 | 8.88 | 6.898 | 0.007 |
| 13:24:00 | 1min avg: | 6.275 | 8.846 | 6.849 | 0.005 |
| 13:25:00 | 1min avg: | 6.287 | 8.82 | 6.748 | 0.005 |
| 13:26:00 | 1min avg: | 6.2 | 8.869 | 6.764 | 0.002 |
| 13:27:00 | 1min avg: | 6.2 | 8.878 | 6.897 | 0.006 |
| 13:28:00 | 1min avg: | 6.238 | 8.864 | 6.876 | 0.008 |
| 13:28:00 | Sampling Finished | | | | |
| 13:28:00 | Test Complete | | | | |
| 13:28:00 | Test Avgs: | 6.172 | 8.961 | 6.777 | 0.009 |

583056 Kern Energy Test 1 Run 2 Final Bias & Drift Check

583056 Kern Energy Test 1 Run 2

Run 2 Final Bias & Drift Check

| | | |
|---|---|---|
| Date/Time: | 12/28/2023 | 13:36:56 |
| Result: | PASS | |

| | |
|---|---|
| Operator: | Jeff Harris |
| Plant: | Panama Lane Facility |
| Location: | Stack Outlet |
| Source ID: | THI Heater |

Reference Cylinder IDs

| | Low ID | Upscale ID | Span ID |
|---|---|---|---|
| O2 | CC146489 | ALM036586 | CC65982 |
| CO2 | CC146489 | ALM036586 | CC65982 |
| NOx | CC146489 | DT0022596 | EB0061497 |
| CO | ALM036586 | DT0045374 | DT0022596 |

System Bias Check Results

| Analyte: | O2 | CO2 | NOx | CO |
|---|---|---|---|---|
| Units: | % | % | ppm | ppm |
| Span: | 21.54 | 22.07 | 21.33 | 8.57 |
| Range: | 25 | 25 | 25 | 10 |
| Method: | EPA 7E | EPA 7E | EPA 7E | EPA 7E |
| | | | | |
| Low Cal: | -0.02 | -0.026 | 0.051 | -0.002 |
| Low Sys: | -0.007 | 0.048 | 0.074 | 0.001 |
| Low Bias: | 0.10% | 0.30% | 0.10% | 0.00% |
| | | | | |
| Upscale Cal: | 11.133 | 11.13 | 8.784 | 4.698 |
| Upscale Sys: | 10.998 | 10.706 | 8.892 | 4.568 |
| Upscale Bias | -0.60% | -1.90% | 0.50% | -1.50% |
| | | | | |
| Bias Result: | PASSED | PASSED | PASSED | PASSED |

System Bias Drift Results

| | | | | |
|---|---|---|---|---|
| Low Drift: | 0.00% | -0.10% | -0.20% | -0.50% |
| Mid Drift: | 0.00% | -0.60% | 0.20% | -0.80% |
| Drift Result: | PASSED | PASSED | PASSED | PASSED |
| | | | | |
| Cal Result: | OK | OK | OK | OK |

Test Run 2 Bias Correction Calculations:

| | O2 | CO2 | NOx | CO |
|---|---|---|---|---|
| Low init: | -0.001 | 0.077 | 0.117 | 0.042 |
| Low final: | -0.007 | 0.048 | 0.074 | 0.001 |
| Mid Init: | 11.007 | 10.843 | 8.849 | 4.641 |
| Mid Final: | 10.998 | 10.706 | 8.892 | 4.568 |
| Run Avg: | 6.172 | 8.961 | 6.777 | 0.009 |
| Co: | -0.004 | 0.063 | 0.095 | 0.021 |
| Cm: | 11.003 | 10.775 | 8.871 | 4.604 |
| Coa: | 0 | 0 | 0 | 0 |
| Cma: | 11.14 | 11.13 | 8.92 | 4.55 |
| Corrected: | 6.25 | 9.246 | 6.791 | -0.013 |

583056 Kern Energy Test 1 Test Run 3_full
583056 Kern Energy Test 1
Test Run 3
Start: 12/28/2023 13:41:00
End: 12/28/2023 14:11:00

Operator: Jeff Harris
Plant: Panama Lane Facility
Location: Stack Outlet
Source ID: THI Heater

| Time | Entry | O2 % | CO2 % | NOx ppm | CO ppm |
|---|---|---|---|---|---|
| 13:40:06 | Sampling Started | | | | |
| 13:41:00 | Test Started | | | | |
| 13:41:59 | 1min avg: | 6.257 | 8.825 | 6.944 | 0.011 |
| 13:42:59 | 1min avg: | 6.347 | 8.77 | 6.709 | 0.016 |
| 13:43:59 | 1min avg: | 6.329 | 8.766 | 6.536 | 0.004 |
| 13:44:59 | 1min avg: | 6.118 | 8.87 | 6.608 | 0.005 |
| 13:45:59 | 1min avg: | 6.067 | 8.941 | 7.043 | 0.004 |
| 13:46:59 | 1min avg: | 6.117 | 8.917 | 7.093 | 0.005 |
| 13:47:59 | 1min avg: | 6.217 | 8.856 | 6.959 | 0.004 |
| 13:48:59 | 1min avg: | 6.221 | 8.836 | 6.797 | 0.008 |
| 13:49:59 | 1min avg: | 6.202 | 8.846 | 6.799 | 0.005 |
| 13:50:59 | 1min avg: | 6.123 | 8.895 | 6.938 | 0.009 |
| 13:51:59 | 1min avg: | 6.127 | 8.899 | 7.062 | 0.008 |
| 13:52:59 | 1min avg: | 6.264 | 8.83 | 6.988 | 0.015 |
| 13:53:59 | 1min avg: | 6.307 | 8.779 | 6.72 | 0.004 |
| 13:54:59 | 1min avg: | 6.133 | 8.869 | 6.746 | 0.005 |
| 13:55:59 | 1min avg: | 6.101 | 8.913 | 7.119 | 0.003 |
| 13:56:59 | 1min avg: | 6.135 | 8.884 | 7.071 | 0.004 |
| 13:57:59 | 1min avg: | 6.213 | 8.839 | 6.935 | 0.004 |
| 13:58:59 | 1min avg: | 6.31 | 8.77 | 6.734 | 0.012 |
| 13:59:59 | 1min avg: | 6.254 | 8.799 | 6.616 | 0.005 |
| 14:00:59 | 1min avg: | 6.214 | 8.813 | 6.823 | 0.006 |
| 14:01:59 | 1min avg: | 6.164 | 8.853 | 6.911 | 0.007 |
| 14:02:59 | 1min avg: | 6.188 | 8.841 | 7.048 | 0.006 |
| 14:03:59 | 1min avg: | 6.134 | 8.856 | 7.036 | 0.015 |
| 14:04:59 | 1min avg: | 6.061 | 8.91 | 7.227 | 0.004 |
| 14:05:59 | 1min avg: | 6.036 | 8.921 | 7.356 | 0.005 |
| 14:06:59 | 1min avg: | 5.959 | 8.961 | 7.391 | 0.004 |
| 14:07:59 | 1min avg: | 5.902 | 9.001 | 7.678 | 0.003 |
| 14:08:59 | 1min avg: | 5.936 | 8.993 | 7.848 | 0.004 |
| 14:09:59 | 1min avg: | 6.126 | 8.891 | 7.633 | 0.005 |
| 14:10:59 | 1min avg: | 6.208 | 8.819 | 7.219 | 0.003 |
| 14:11:00 | Sampling Finished | | | | |
| 14:11:00 | Test Complete | | | | |
| 14:11:00 | Test Avgs: | 6.159 | 8.865 | 7.02 | 0.007 |

583056 Kern Energy Test 1 Run 3 Final Bias & Drift Check

583056 Kern Energy Test 1 Run 3

Run 3 Final Bias & Drift Check

| | | |
|---|---|---|
| Date/Time: | 12/28/2023 | 14:19:27 |
| Result: | PASS | |

| | |
|---|---|
| Operator: | Jeff Harris |
| Plant: | Panama Lane Facility |
| Location: | Stack Outlet |
| Source ID: | THI Heater |

Reference Cylinder IDs

| | Low ID | Upscale ID | Span ID |
|---|---|---|---|
| O2 | CC146489 | ALM036586 | CC65982 |
| CO2 | CC146489 | ALM036586 | CC65982 |
| NOx | CC146489 | DT0022596 | EB0061497 |
| CO | ALM036586 | DT0045374 | DT0022596 |

System Bias Check Results

| Analyte: | O2 | CO2 | NOx | CO |
|---|---|---|---|---|
| Units: | % | % | ppm | ppm |
| Span: | 21.54 | 22.07 | 21.33 | 8.57 |
| Range: | 25 | 25 | 25 | 10 |
| Method: | EPA 7E | EPA 7E | EPA 7E | EPA 7E |
| | | | | |
| Low Cal: | -0.02 | -0.026 | 0.051 | -0.002 |
| Low Sys: | 0.001 | 0.107 | 0.104 | 0.004 |
| Low Bias: | 0.10% | 0.60% | 0.20% | 0.10% |
| | | | | |
| Upscale Cal: | 11.133 | 11.13 | 8.784 | 4.698 |
| Upscale Sys: | 10.998 | 10.659 | 8.856 | 4.602 |
| Upscale Bias | -0.60% | -2.10% | 0.30% | -1.10% |
| | | | | |
| Bias Result: | PASSED | PASSED | PASSED | PASSED |

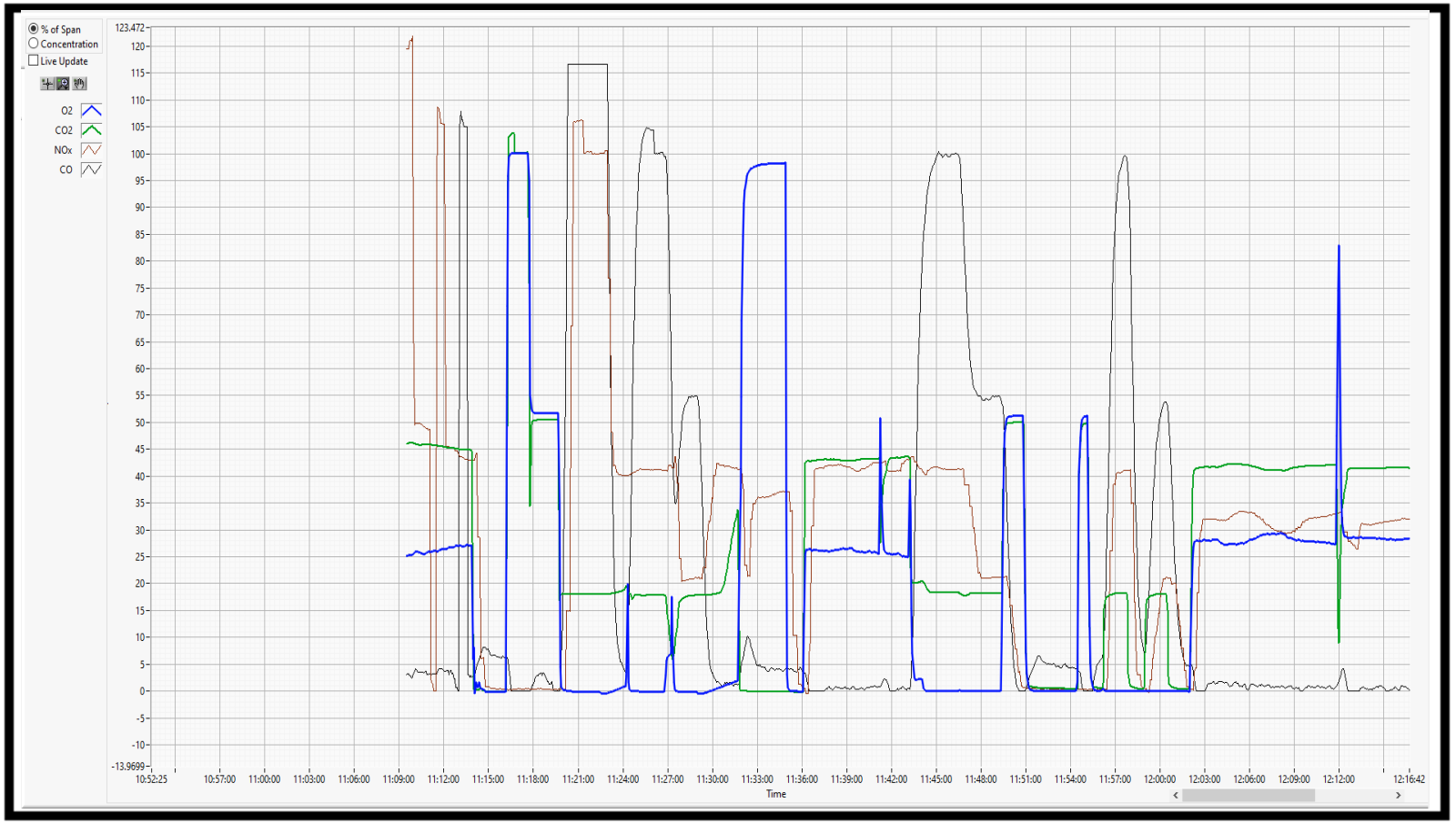
System Bias Drift Results

| | | | | |
|---|---|---|---|---|
| Low Drift: | 0.00% | 0.30% | 0.10% | 0.00% |
| Mid Drift: | 0.00% | -0.20% | -0.20% | 0.40% |
| Drift Result: | PASSED | PASSED | PASSED | PASSED |
| | | | | |
| Cal Result: | OK | OK | OK | OK |

Test Run 3 Bias Correction Calculations:

| | O2 | CO2 | NOx | CO |
|---|---|---|---|---|
| Low init: | -0.007 | 0.048 | 0.074 | 0.001 |
| Low final: | 0.001 | 0.107 | 0.104 | 0.004 |
| Mid Init: | 10.998 | 10.706 | 8.892 | 4.568 |
| Mid Final: | 10.998 | 10.659 | 8.856 | 4.602 |
| Run Avg: | 6.159 | 8.865 | 7.02 | 0.007 |
| Co: | -0.003 | 0.078 | 0.089 | 0.003 |
| Cm: | 10.998 | 10.682 | 8.874 | 4.585 |
| Coa: | 0 | 0 | 0 | 0 |
| Cma: | 11.14 | 11.13 | 8.92 | 4.55 |
| Corrected: | 6.24 | 9.223 | 7.037 | 0.004 |

Kern Energy-Panama Lane Facility THI Heater
Initial Calibrations 12/28/2023 11:28:44




Initial Calibration Error Response

| | Zero | Mid | High |
|---|---|---|---|
| O2 | -0.02 | 11.133 | 21.571 |
| CO2 | -0.026 | 11.13 | 22.107 |
| NOx | 0.051 | 8.784 | 21.309 |
| CO | -0.002 | 4.698 | 8.598 |

NO2 Converter Effeciency
Response= 7.915

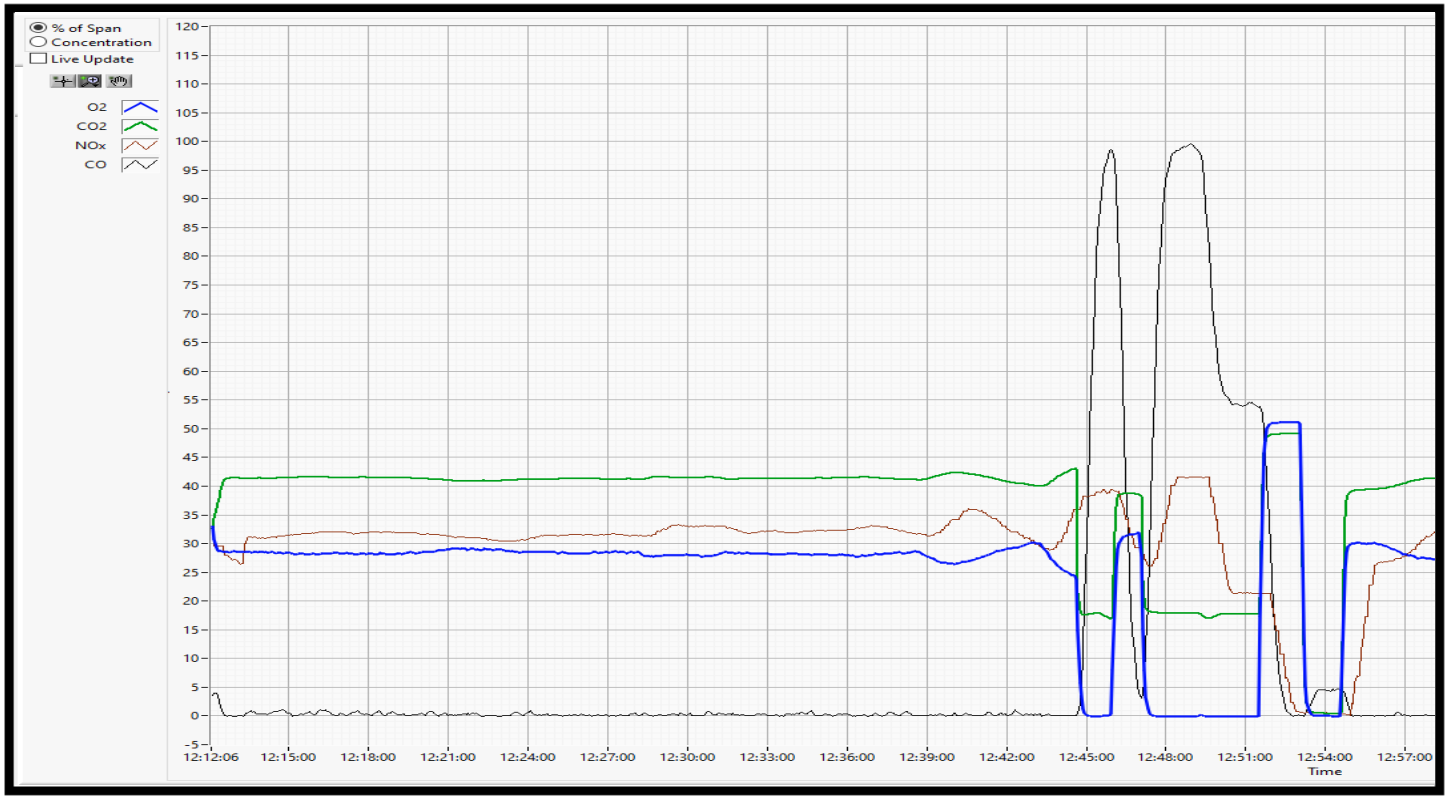
System Response Times

| | Dnscale (S) | Upscale (S) |
|---|---|---|
| O2 | 35 | 37 |
| CO2 | 35 | 36 |
| NOx | 66 | 75 |
| CO | 95 | 82 |

Initial System Bias Response

| | Zero | Span |
|---|---|---|
| O2 | 0.006 | 11.03 |
| CO2 | 0.096 | 11.039 |
| NOx | 0.07 | 8.789 |
| CO | 0.054 | 4.701 |

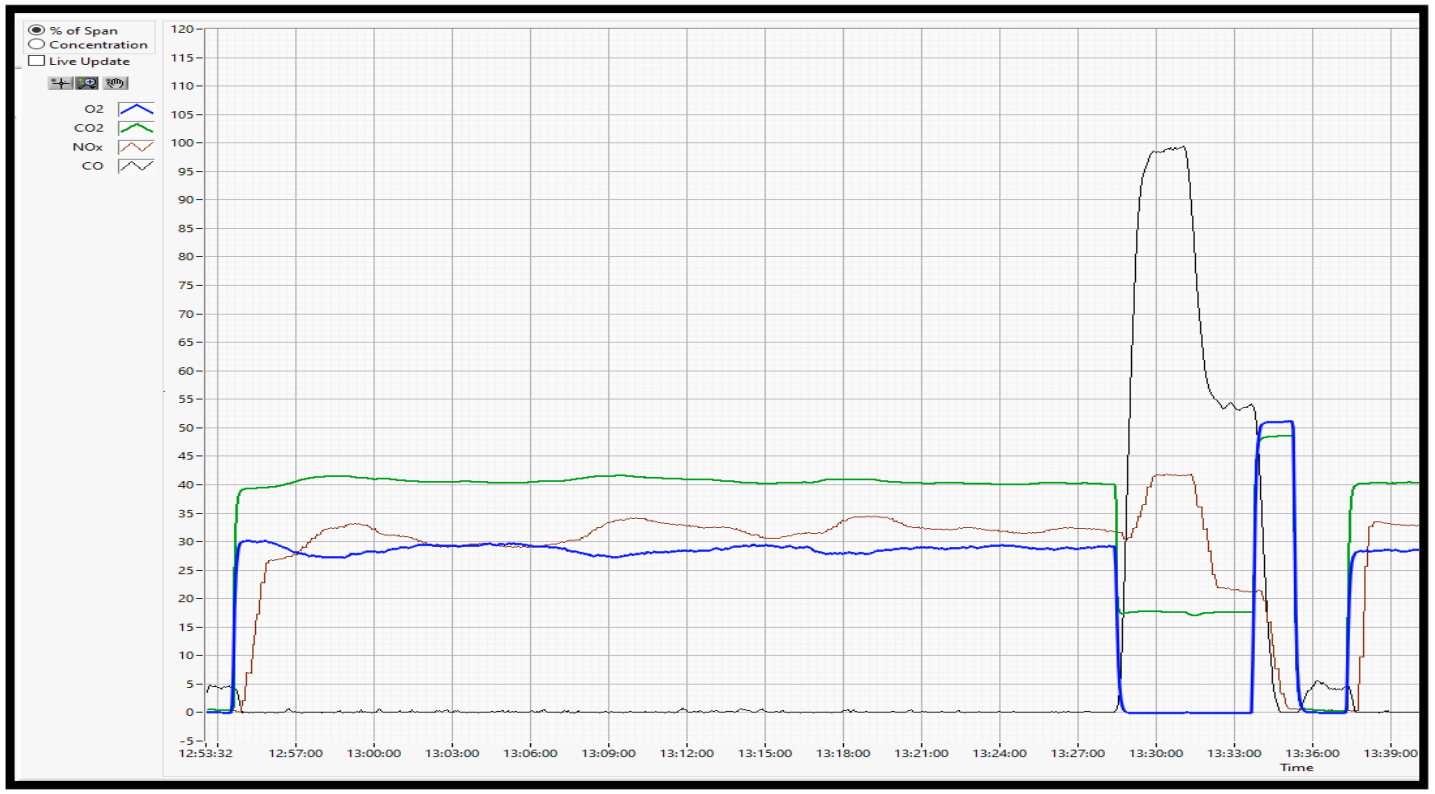
Kern Energy-Panama Lane Facility THI Heater
Test Run 1 12/28/2023 12:14:00-12:44:00




Final System Bias Check Run 1

| | Zero | Span |
|---|---|---|
| O2 | -0.001 | 11.007 |
| CO2 | 0.077 | 10.843 |
| NOx | 0.117 | 8.849 |
| CO | 0.042 | 4.641 |

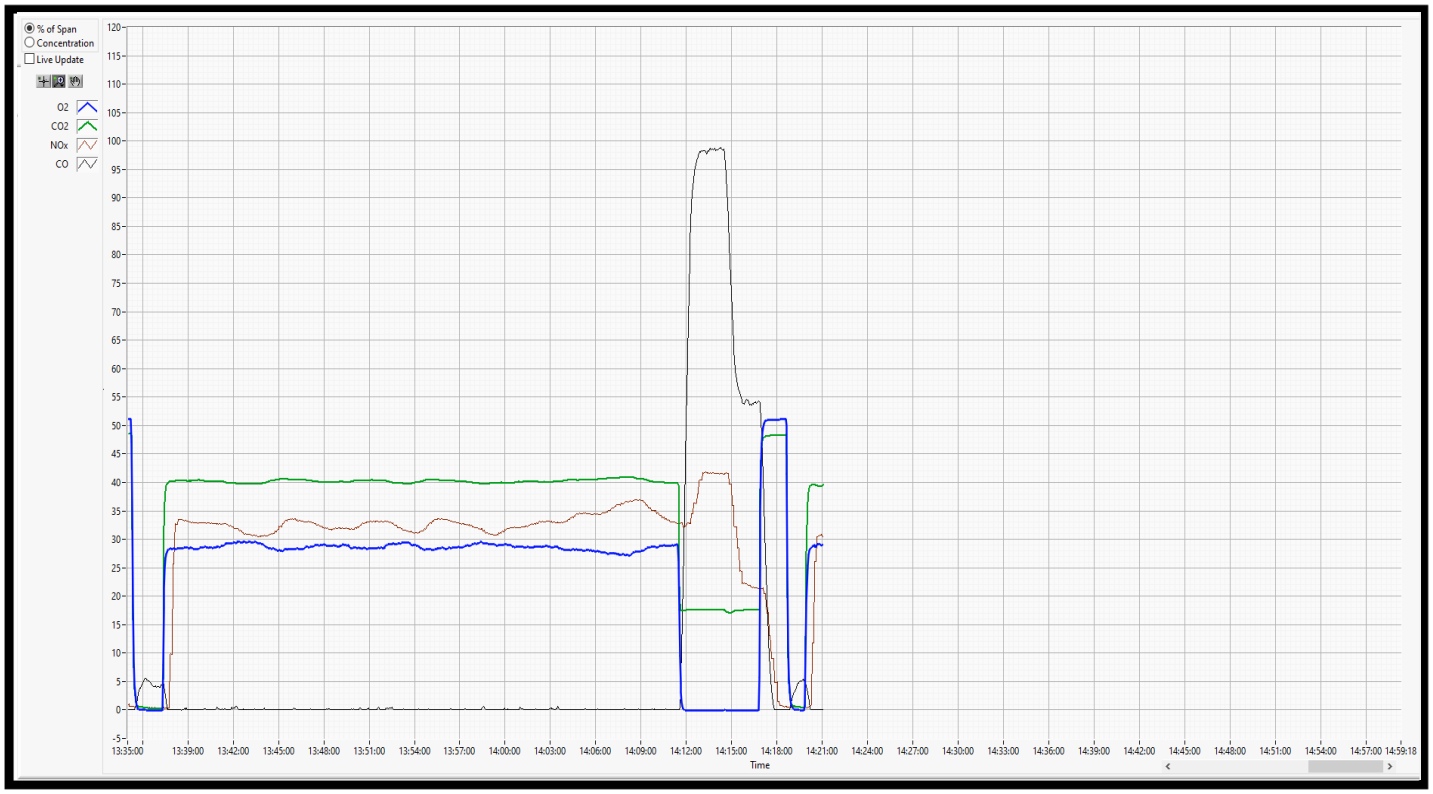
Kern Energy-Panama Lane Facility THI Heater
Test Run 2 12/28/2023 12:58:00-13:28:00




Final System Bias Check Run 2

| | Zero | Span |
|---|---|---|
| O2 | -0.007 | 10.998 |
| CO2 | 0.048 | 10.706 |
| NOx | 0.074 | 8.892 |
| CO | 0.001 | 4.568 |

Kern Energy-Panama Lane Facility THI Heater
Test Run 3 12/28/2023 13:41:00-14:11:00




Final System Bias Check Run 3

| | Zero | Span |
|---|---|---|
| O2 | 0.001 | 10.998 |
| CO2 | 0.107 | 10.659 |
| NOx | 0.104 | 8.856 |
| CO | 0.004 | 4.602 |

**Airgas Specialty Gases**
Airgas USA LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

# CERTIFICATE OF BATCH ANALYSIS

## Grade of Product: CEM-CAL ZERO

| | | | |
|---|---|---|---|
| Part Number: | NI CZ15A | Reference Number: | 48-402844636-1 |
| Cylinder Analyzed: | ALM-038895 | Cylinder Volume: | 142.0 CF |
| Laboratory: | 124 - Los Angeles (SAP) - CA | Cylinder Pressure: | 2000 PSIG |
| Analysis Date: | Sep 13, 2023 | Valve Outlet: | 580 |
| Lot Number: | 48-402844636-1 | | |

**Expiration Date: Sep 13, 2031**

## ANALYTICAL RESULTS

| Component | Requested Purity | | Certified Concentration |
|---|---|---|---|
| NITROGEN | 99.9995 % | | 99.9995 % |
| NOx | 0.1 PPM | <LDL | 0.018 PPM |
| SO2 | 0.1 PPM | <LDL | 0.095 PPM |
| THC | 0.1 PPM | <LDL | 0.006 PPM |
| CARBON MONOXIDE | 0.5 PPM | <LDL | 0.012 PPM |
| CARBON DIOXIDE | 1.0 PPM | | 0.100 PPM |

**Permanent Notes:** Airgas certifies that the contents of this cylinder meet the requirements of 40 CFR 72.2

**Cylinders in Batch:**

ALM-038895, B0097322, C C 146752, C C 712555, CC123610, CC141722, CC146489, CC152345, CC194476, CC27887, CC512588, CC712565, XC021278B, XC026157B

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

TRC ~~Project 583050~~

**Signature on file**
**Approved for Release**

**Airgas Specialty Gases**
Airgas USA LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA PROTOCOL STANDARD

| | | | |
|---|---|---|---|
| Part Number: | E03NI78E15A0225 | Reference Number: | 48-402799332-1 |
| Cylinder Number: | ALM036586 | Cylinder Volume: | 152.0 CF |
| Laboratory: | 124 - Los Angeles (SAP) - CA | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B32023 | Valve Outlet: | 590 |
| Gas Code: | CO2,O2,BALN | Certification Date: | Jul 27, 2023 |

**Expiration Date: Jul 27, 2031**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

### ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| CARBON DIOXIDE | 11.00 % | 11.13 % | G1 | +/- 0.6% NIST Traceable | 07/27/2023 |
| OXYGEN | 11.00 % | 11.14 % | G1 | +/- 0.9% NIST Traceable | 07/27/2023 |
| NITROGEN | Balance | | | | |

### CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| NTRM | 13060402 | CC411643 | 7.489 % CARBON DIOXIDE/NITROGEN | +/- 0.6% | May 14, 2025 |
| NTRM | 98051002 | SG9150866BAL | 12.05 % OXYGEN/NITROGEN | +/- 0.7% | Dec 14, 2023 |

### ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| SIEMENS 6E CO2 | NDIR | Jun 30, 2023 |
| SIEMENS OXYMAT 6 | PARAMAGNETIC | Jul 24, 2023 |

**Triad Data Available Upon Request**

TRC ~~Project 583050~~

**Signature on file**
**Approved for Release**

**Airgas Specialty Gases**
Airgas USA LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA PROTOCOL STANDARD

| | | | |
|---|---|---|---|
| Part Number: | E03NI57E15A3973 | Reference Number: | 48-402783836-1 |
| Cylinder Number: | CC65982 | Cylinder Volume: | 161.0 CF |
| Laboratory: | 124 - Los Angeles (SAP) - CA | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B32023 | Valve Outlet: | 590 |
| Gas Code: | CO2,O2,BALN | Certification Date: | Jun 30, 2023 |

**Expiration Date: Jun 30, 2031**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

### ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| CARBON DIOXIDE | 21.50 % | 22.07 % | G1 | +/- 0.6% NIST Traceable | 06/30/2023 |
| OXYGEN | 21.50 % | 21.54 % | G1 | +/- 0.6% NIST Traceable | 06/30/2023 |
| NITROGEN | Balance | | | | |

### CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| NTRM | 12061520 | CC354777 | 19.87 % CARBON DIOXIDE/NITROGEN | +/- 0.6% | Jan 11, 2024 |
| NTRM | 08010228 | K016648 | 23.20 % OXYGEN/NITROGEN | +/- 0.2% | Jun 01, 2024 |

### ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| SIEMENS 6E CO2 | NDIR | Jun 30, 2023 |
| SIEMENS OXYMAT 6 | PARAMAGNETIC | Jun 22, 2023 |

**Triad Data Available Upon Request**

TRC ~~Project 583056~~

**Signature on file**
**Approved for Release**

Making our world more productive

**DocNumber: 442458**

**Linde Gas & Equipment Inc.**
**5700 S. Alameda Street**
**Los Angeles CA 90058**
**Tel: 323-585-2154**
**Fax: 714-542-6689**
**PGVP ID: F22021**

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

***Customer & Order Information***

LGEPKG BAKERSFIELD CA HPS
3505 BUCK OWENS BLVD
BAKERSFIELD CA 93308-4919

*Certificate Issuance Date:* 12/02/2021
*Linde Order Number:* 71858027
*Part Number:* NI CD4CN14E-AS
*Customer PO Number:* 79858076

*Fill Date:* 11/15/2021
*Lot Number:* 70086131908
*Cylinder Style & Outlet:* AS CGA 660
*Cylinder Pressure and Volume:* 2000 psig 140 ft3

## *Certified Concentration*

***ProSpec EZ Cert***

| Expiration Date: | **12/02/2024** | NIST Traceable |
|---|---|---|
| Cylinder Number: | **DT0022596** | Expanded Uncertainty |
| **4.00 %** | **Carbon dioxide** | **± 0.02 %** |
| **8.57 ppm** | **Carbon monoxide** | **± 0.07 ppm** |
| **8.88 ppm** | **Nitric oxide** | **± 0.05 ppm** |
| **Balance** | **Nitrogen** | |

***For Reference Only:*** *NOx 8.92 ppm*

***Certification Information:*** *Certification Date:* 12/02/2021 *Term:* 36 Months *Expiration Date:* 12/02/2024

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

CO responses have been corrected for CO2 interference. NO reponses have been corrected for CO2 quenching.

## *Analytical Data:*

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

**1. *Component:*** **Carbon dioxide**

Requested Concentration: 4 %
Certified Concentration: 4.00 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 10/21/2021

**First Analysis Data:** **Date** 11/19/2021

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 5.03 | **C:** | 4 | **Conc:** | 4 |
| **R:** | 5.03 | **Z:** | 0 | **C:** | 4.01 | **Conc:** | 4.01 |
| **Z:** | 0 | **C:** | 4 | **R:** | 5.03 | **Conc:** | 4 |

**UOM:** % **Mean Test Assay:** 4 %

**Reference Standard:** Type / Cylinder #: GMIS / CC86370
Concentration / Uncertainty: 5.03 % ±0.02 %
Expiration Date: 04/17/2022
**Traceable to:** SRM # / Sample # / Cylinder #: SRM 1674b / 7-H-07 / FF10631
SRM Concentration / Uncertainty: 6.944% / ±0.013%
SRM Expiration Date: 06/17/2019

**Second Analysis Data:** **Date**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 0 | **C:** | 0 | **Conc:** | 0 |
| **R:** | 0 | **Z:** | 0 | **C:** | 0 | **Conc:** | 0 |
| **Z:** | 0 | **C:** | 0 | **R:** | 0 | **Conc:** | 0 |

**UOM:** % **Mean Test Assay:** %

**2. *Component:*** **Carbon monoxide**

Requested Concentration: 8.5 ppm
Certified Concentration: 8.57 ppm
Instrument Used: Horiba VIA-510 S/N 43627990042
Analytical Method: NDIR
Last Multipoint Calibration: 10/28/2021

**First Analysis Data:** **Date** 11/19/2021

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 96.7 | **C:** | 84.5 | **Conc:** | 8.57 |
| **R:** | 98.6 | **Z:** | 0 | **C:** | 85.4 | **Conc:** | 8.66 |
| **Z:** | 0 | **C:** | 83.6 | **R:** | 97.5 | **Conc:** | 8.48 |

**UOM:** mV **Mean Test Assay:** 8.57 ppm

**Reference Standard:** Type / Cylinder #: GMIS / CC707397
Concentration / Uncertainty: 9.897 ppm ±0.048 ppm
Expiration Date: 09/05/2026
**Traceable to:** SRM # / Sample # / Cylinder #: SRM 1677c / 5-J-42 / CAL015337
SRM Concentration / Uncertainty: 9.825 PPM / ±0.047 PPM
SRM Expiration Date: 06/24/2024

**Second Analysis Data:** **Date**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 0 | **C:** | 0 | **Conc:** | 0 |
| **R:** | 0 | **Z:** | 0 | **C:** | 0 | **Conc:** | 0 |
| **Z:** | 0 | **C:** | 0 | **R:** | 0 | **Conc:** | 0 |

**UOM:** mV **Mean Test Assay:** ppm

**3. *Component:*** **Nitric oxide**

Requested Concentration: 8.5 ppm
Certified Concentration: 8.88 ppm
Instrument Used: Thermo Electron 42i-LS S/N 1030645077
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 11/29/2021

**First Analysis Data:** **Date** 11/19/2021

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 10.3 | **C:** | 8.88 | **Conc:** | 8.88 |
| **R:** | 10.29 | **Z:** | 0 | **C:** | 8.91 | **Conc:** | 8.91 |
| **Z:** | 0 | **C:** | 8.89 | **R:** | 10.31 | **Conc:** | 8.89 |

**UOM:** ppm **Mean Test Assay:** 8.89 ppm

**Reference Standard:** Type / Cylinder #: GMIS / DT0035998
Concentration / Uncertainty: 10.30 ppm ±0.05 ppm
Expiration Date: 11/11/2024
**Traceable to:** SRM # / Sample # / Cylinder #: PRM / C1837210.02 / APEX1324301
SRM Concentration / Uncertainty: 10.00 ppm / ±0.05 ppm
SRM Expiration Date: 04/17/2022

**Second Analysis Data:** **Date** 12/02/2021

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 10.3 | **C:** | 8.87 | **Conc:** | 8.87 |
| **R:** | 10.3 | **Z:** | 0 | **C:** | 8.86 | **Conc:** | 8.86 |
| **Z:** | 0 | **C:** | 8.85 | **R:** | 10.29 | **Conc:** | 8.85 |

**UOM:** ppm **Mean Test Assay:** 8.86 ppm

Analyzed By **Henry Koung**

Certified By **Lissette Morales**

Making our world more productive

DocNumber: 560541

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22023

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

**Customer & Order Information**

LGEPKG BAKERSFIELD CA HPS
3505 BUCK OWENS BLVD
BAKERSFIELD CA 93308-4919

*Certificate Issuance Date:* 11/17/2023
*Linde Order Number:* 72565302
*Part Number:* NI CD4CN13E-AS
*Customer PO Number:* 80575497

*Fill Date:* 11/03/2023
*Lot Number:* 70086330705
*Cylinder Style & Outlet:* AS CGA 660
*Cylinder Pressure and Volume:* 2000 psig 140 ft3

## Certified Concentration

ProSpec EZ Cert

| Expiration Date: 11/17/2026 | | NIST Traceable |
|---|---|---|
| Cylinder Number: DT0045374 | | Expanded Uncertainty |
| 4.00 % | Carbon dioxide | ± 0.04 % |
| 4.55 ppm | Carbon monoxide | ± 0.03 ppm |
| 4.39 ppm | Nitric oxide | ± 0.02 ppm |
| Balance | Nitrogen | |

***For Reference Only:*** *NOx 4.42 ppm*

***Certification Information:*** *Certification Date:* 11/17/2023 *Term:* 36 Months *Expiration Date:* 11/17/2026

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

CO responses have been corrected for CO2 interference. NO reponses have been corrected for CO2 quenching.

## Analytical Data:

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

**1. *Component:*** **Carbon dioxide**

Requested Concentration: 4 %
Certified Concentration: 4.00 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 10/31/2023

**First Analysis Data:** **Date** 11/10/2023

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 7.01 | **C:** | 4 | **Conc:** | 4 |
| **R:** | 7.01 | **Z:** | 0 | **C:** | 4.01 | **Conc:** | 4.01 |
| **Z:** | 0 | **C:** | 4 | **R:** | 7.02 | **Conc:** | 4 |

**UOM:** % **Mean Test Assay:** 4 %

**Reference Standard:** Type / Cylinder #: NTRM / DT0030197
Concentration / Uncertainty: 7.011 % ±0.058 %
Expiration Date: 01/27/2027
**Traceable to:** SRM # / Sample # / Cylinder #: NTRM#DT0030296 / 190702 / DT0030296
SRM Concentration / Uncertainty: 7.011 / ±0.058
SRM Expiration Date: 01/27/2027

**Second Analysis Data:** **Date**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 0 | **C:** | 0 | **Conc:** | 0 |
| **R:** | 0 | **Z:** | 0 | **C:** | 0 | **Conc:** | 0 |
| **Z:** | 0 | **C:** | 0 | **R:** | 0 | **Conc:** | 0 |

**UOM:** % **Mean Test Assay:** %

**2. *Component:*** **Carbon monoxide**

Requested Concentration: 4.5 ppm
Certified Concentration: 4.55 ppm
Instrument Used: Horiba VIA-510 S/N 43627990042
Analytical Method: NDIR
Last Multipoint Calibration: 10/25/2023

**First Analysis Data:** **Date** 11/10/2023

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 49.2 | **C:** | 44.8 | **Conc:** | 4.53 |
| **R:** | 49.6 | **Z:** | 0 | **C:** | 45.2 | **Conc:** | 4.57 |
| **Z:** | 0 | **C:** | 45.1 | **R:** | 49.4 | **Conc:** | 4.56 |

**UOM:** mV **Mean Test Assay:** 4.55 ppm

**Reference Standard:** Type / Cylinder #: GMIS / CC87399
Concentration / Uncertainty: 4.993 ppm ±0.024 ppm
Expiration Date: 08/16/2030
**Traceable to:** SRM # / Sample # / Cylinder #: 1677C / 5-J-42 / CAL015337
SRM Concentration / Uncertainty: 9.825 / ±0.047
SRM Expiration Date: 06/24/2024

**Second Analysis Data:** **Date**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 0 | **C:** | 0 | **Conc:** | 0 |
| **R:** | 0 | **Z:** | 0 | **C:** | 0 | **Conc:** | 0 |
| **Z:** | 0 | **C:** | 0 | **R:** | 0 | **Conc:** | 0 |

**UOM:** mV **Mean Test Assay:** ppm

**3. *Component:*** **Nitric oxide**

Requested Concentration: 4.5 ppm
Certified Concentration: 4.39 ppm
Instrument Used: Thermo Electron 42i-LS S/N 1030645077
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 10/18/2023

**First Analysis Data:** **Date** 11/10/2023

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 5.43 | **C:** | 4.38 | **Conc:** | 4.38 |
| **R:** | 5.44 | **Z:** | 0 | **C:** | 4.4 | **Conc:** | 4.4 |
| **Z:** | 0 | **C:** | 4.39 | **R:** | 5.42 | **Conc:** | 4.39 |

**UOM:** ppm **Mean Test Assay:** 4.39 ppm

**Reference Standard:** Type / Cylinder #: GMIS / DT0037199
Concentration / Uncertainty: 5.43 ppm ±0.03 ppm
Expiration Date: 12/15/2024
**Traceable to:** SRM # / Sample # / Cylinder #: PRM / C2268801 / APEX1429266
SRM Concentration / Uncertainty: 10.01 ppm / ±0.05 ppm
SRM Expiration Date: 09/30/2024

**Second Analysis Data:** **Date** 11/17/2023

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Z:** | 0 | **R:** | 5.43 | **C:** | 4.39 | **Conc:** | 4.39 |
| **R:** | 5.43 | **Z:** | 0 | **C:** | 4.39 | **Conc:** | 4.39 |
| **Z:** | 0 | **C:** | 4.4 | **R:** | 5.44 | **Conc:** | 4.4 |

**UOM:** ppm **Mean Test Assay:** 4.39 ppm

Analyzed By **Henry Koung**

Certified By **Lissette Morales**

Airgas
an Air Liquide company

**Airgas Specialty Gases**
Airgas USA LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA PROTOCOL STANDARD

| | | | |
|---|---|---|---|
| Part Number: | E04NI95E15A0045 | Reference Number: | 48-402596463-1 |
| Cylinder Number: | EB0061497 | Cylinder Volume: | 146.0 CF |
| Laboratory: | 124 - Los Angeles (SAP) - CA | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B32022 | Valve Outlet: | 660 |
| Gas Code: | CO2,CO,NO,NOX,BALN | Certification Date: | Nov 30, 2022 |

**Expiration Date: Nov 30, 2025**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

### ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| NOX | 21.00 PPM | 21.33 PPM | G1 | +/- 1.4% NIST Traceable | 11/17/2022, 11/30/2022 |
| CARBON MONOXIDE | 21.00 PPM | 20.89 PPM | G1 | +/- 0.9% NIST Traceable | 11/17/2022 |
| NITRIC OXIDE | 21.00 PPM | 21.14 PPM | G1 | +/- 1.4% NIST Traceable | 11/17/2022, 11/30/2022 |
| CARBON DIOXIDE | 4.000 % | 3.959 % | G1 | +/- 0.7% NIST Traceable | 11/17/2022 |
| NITROGEN | Balance | | | | |

### CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| NTRM | 14060711 | CC432223 | 49.88 PPM CARBON MONOXIDE/NITROGEN | +/- 0.6% | Feb 13, 2026 |
| PRM | 12409 | D913660 | 15.01 PPM NITROGEN DIOXIDE/AIR | +/- 1.5% | Feb 17, 2023 |
| NTRM | 20060403 | ND46720 | 20.72 PPM NITRIC OXIDE/NITROGEN | +/- 1.0% | Apr 27, 2023 |
| GMIS | 1534012021101 | ND73001 | 4.947 PPM NITROGEN DIOXIDE/NITROGEN | +/- 1.6% | Jun 15, 2025 |
| NTRM | 13060432 | CC413737 | 7.489 % CARBON DIOXIDE/NITROGEN | +/- 0.6% | May 14, 2025 |

The SRM, NTRM, PRM, or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

### ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| Nicolet iS50 AUP2010243 CO2 HIGH | FTIR | Nov 03, 2022 |
| Nicolet iS50 AUP2010243 CO | FTIR | Oct 23, 2022 |
| Nicolet iS50 AUP2010243 NO | FTIR | Oct 31, 2022 |
| Nicolet iS50 AUP2010243 NO2 | FTIR | Nov 07, 2022 |

**Triad Data Available Upon Request**

TRC ~~Project 583050~~ **Signature on file**
**Approved for Release**

Airgas
an Air Liquide company

**Airgas Specialty Gases**
Airgas USA LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA PROTOCOL STANDARD

| | | | |
|---|---|---|---|
| Part Number: | E02AI99E15W0038 | Reference Number: | 48-402012663-1 |
| Cylinder Number: | CC503450 | Cylinder Volume: | 146.2 CF |
| Laboratory: | 124 - Los Angeles (SAP) - CA | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B32021 | Valve Outlet: | 660 |
| Gas Code: | NO2,BALN | Certification Date: | Feb 22, 2021 |

**Expiration Date: Feb 22, 2024**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

### ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| NITROGEN DIOXIDE | 8.500 PPM | 8.300 PPM | G1 | +/- 2.1% NIST Traceable | 02/15/2021, 02/22/2021 |
| AIR | Balance | | | | |

### CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| GMIS | 4014238391058 | CC508987 | 9.023 PPM NITROGEN DIOXIDE/NITROGEN | +/- 2.1% | Feb 10, 2023 |
| PRM | 12386 | D685025 | 9.91 PPM NITROGEN DIOXIDE/AIR | +/- 2.0% | Feb 20, 2020 |

The SRM, NTRM, PRM, or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

### ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| MKS FTIR NO2 018335821 | FTIR | Feb 13, 2021 |

**Triad Data Available Upon Request**

TRC ~~Project 583050~~

**Signature on file**
**Approved for Release**

# $NO_2$ Converter Efficiency Verification

| | | | |
|---|---|---|---|
| Project Number: | 583056 | Stack Test Date: | 12/28/2023 |
| Customer: | Kern Energy | Facility: | Panama Lane |
| Unit Ientification: | THI Heater | Recorded By: | Jeff Harris |
| Sample Location: | Stack Outlet | CE Test Date: | 12/28/2023 |
| NOx Analyzer Model #: | T200H | Converter Temp: | 315 |
| NOx Analyzer Serial #: | 822 | | |

**Option I: Cylinder gas verification**

| | |
|---|---|
| $NO_2$ Gas Certified Concentration: | 8.300 |
| $NO_2$ Gas Cylinder ID: | CC503450 |
| $NO_2$ Gas Expiration Date: | 02/22/24 |

| | |
|---|---|
| Analyzer Response to $NO_2$ Gas: | 7.9 |
| Converter Efficiency: | 95.4 |
| Converter Status: | Pass |

# Response Time Verification

| | | | |
|---|---|---|---|
| Project Number: | 583056 | Test Date: | 12/28/23 |
| Customer: | Kern Energy | Facility: | Panama Lane |
| Unit Identification: | THI Heater | Recorded By: | Jeff Harris |
| Sample Location: | Stack Outlet | | |

| Upscale Response Check | | | | | | | |
|---|---|---|---|---|---|---|---|
| Pollutant | Cal Gas Level | Cal Gas Conc. | Start Time | Stable Response | Upscale Target Response | Time at Target | Response Time |
| $NO_X$ | Mid | 8.92 | 0:00:00 | 8.29 | 7.87 | 1:15 | 1:15 |
| CO | Mid | 4.55 | 0:00:00 | 4.20 | 3.99 | 1:22 | 1:22 |
| $CO_2$ | Mid | 11.13 | 0:00:00 | 10.49 | 9.96 | 0:36 | 0:36 |
| $O_2$ | Mid | 11.14 | 0:00:00 | 10.48 | 9.96 | 0:37 | 0:37 |

Target Response is 95% of the Pre 1 System Response from the Upscale Bias Test

Start time is the time at which gas is introduced upstream of the probe.

Time at target is the time at which the required target response is achieved.

Response time is the difference between the two.

| Downscale Response Check | | | | | | |
|---|---|---|---|---|---|---|
| Pollutant | Cal Gas Level | Cal Gas Conc. | Start Time | Downscale Target Response | Time at Target | Response Time |
| $NO_X$ | Mid | 8.9 | 0:00:00 | 0.45 | 1:06 | 1:06 |
| CO | Mid | 4.6 | 0:00:00 | 0.23 | 1:35 | 1:35 |
| $CO_2$ | Mid | 11.1 | 0:00:00 | 0.56 | 0:35 | 0:35 |
| $O_2$ | Mid | 11.1 | 0:00:00 | 0.56 | 0:35 | 0:35 |

Target Response is 0.5 ppm or 5.0 percent of the upscale gas concentration (whichever is less restrictive)

| **System Response Times** | |
|---|---|
| **Pollutant** | **Response Time** |
| **$NO_X$** | **1:15:00** |
| **CO** | **1:35:00** |
| **$CO_2$** | **0:36:00** |
| **$O_2$** | **0:37:00** |

System response is the longer of the responses to zero and upscale gas.

TRC



# 40 CFR 60 Method 1 -- TRAVERSE POINT LOCATIONS

| | | | |
|---|---|---|---|
| **Project No.** 583056P | | **Date** 12/28/23 | |
| **Client** Kern Oil | | **Operator** BBH | |
| **Facility** Kern Refinery | **Source** THI | | |

**Dimensions**

Circular / Rectangular

| | | | |
|---|---|---|---|
| Far Wall to Outside of Port (in.) | 90.25 | Stack Width (in.) | |
| Port Length (in.) | 8.00" | Depth (in.) | |
| Stack Diameter or Depth (in.) | 82.25 | Equiv. Stack Diameter (in.) | |

| Point No. | A Internal Dimension (in.) | B Percentage of Internal Dimension (%) | (A x B) Distance from Inside Wall (in.) | C Port Length (in.) | (A x B) + C Point Location (in.) |
|---|---|---|---|---|---|
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**Comments:**

**Stack / Ports** Stack Type: X Circular ___ Rectangular

Number and Type of Ports Available: Two Flange

Port Inside Diameter (in.): 3"

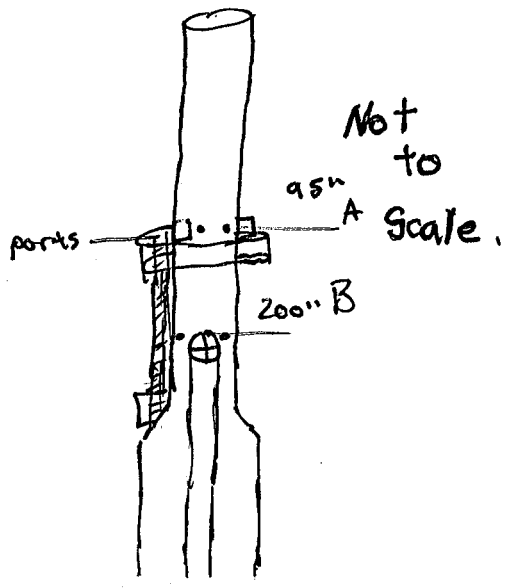
**Distance to Flow Disturb.** Reference: ___ Disturbance ___ Port

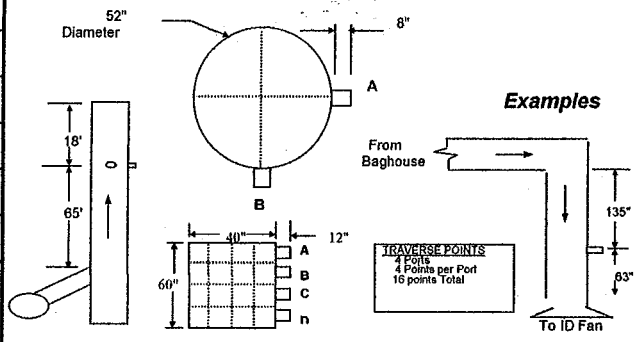
| | Distance (ft) | Diameters |
|---|---|---|
| Upstream (U) | 7'11" | 1 |
| Downstream (D) | 16'8" | 2.4 |

| Number of Traverse Points | CEM | Particulates | Velocity |
|---|---|---|---|
| Minimum Required | 6 | | |
| Number of Ports Used | 2 | | |
| Points per Port | 6 | | |

**Test Location Schematic(s)**

1. Include distances to disturbances and note what they are.
2. Show and label all ports. Note which was used for each test type.
3. Indicate the air flow direction.




NA = Not Applicable



Checked By: Jeff Turner 01/02/2024 (Project Manager or QA Manager - sign and date)

TRC



# 40 CFR 60 Method 18 -- TEDLAR BAG SAMPLING

| | | |
|---|---|---|
| Project No. 583056 | Bag Size 5 Liter | Date 12/28/2023 |
| Client Kern Energy | Pump ID N T-2 | Operator/Analyst JH / JM |
| Facility Panama Road Facility | Calibrator ID -- | Source Temperature (°F) - |
| Source/Process ID TH1 Heater | Pipe Diameter (in) 82.25 | Source Pressure (in Hg) - |
| Analytes $C^1$ - $C^{3+}$ | | Source Moisture (%) - |

**Sampling Rotameter Calibration**

| | Initial | Final | Average |
|---|---|---|---|
| Ball Setting: | -- | -- | -- |
| Flow (L/min) | -- | -- | -- |

**Sampling Location Schematic**

**Test 1 Sampling Data**

| | |
|---|---|
| Sample ID: | 217257 |
| Start Time: | 1214 |
| Stop Time: | 1244 |
| $P_{bar}$ (in Hg): | 29.75 |
| $T_{ambient}$ (°F): | |

| Elapsed Time | Ball Setting |
|---|---|
| 0 | 0.2 CC |
| 5 | 0.2 |
| 10 | 0.2 |
| 15 | 0.2 |
| 20 | 0.2 |
| 25 | 0.2 |
| 30 | 0.2 |
| 35 | - |
| Sample Volume (L) | -- |
| Dilution Gas (L) | -- |
| Total Volume (L) | -- |

**Test 2 Sampling Data**

| | |
|---|---|
| Sample ID: | 217258 |
| Start Time: | 1258 |
| Stop Time: | 1328 |
| $P_{bar}$ (in Hg): | 29.75 |
| $T_{ambient}$ (°F): | |

| Elapsed Time | Ball Setting |
|---|---|
| 0 | 0.2 CC |
| 5 | 0.2 |
| 10 | 0.15 |
| 15 | 0.15 |
| 20 | 0.15 |
| 25 | 0.15 |
| 30 | 0.15 |
| 35 | - |
| Sample Volume (L) | -- |
| Dilution Gas (L) | -- |
| Total Volume (L) | -- |

**Test 3 Sampling Data**

| | |
|---|---|
| Sample ID: | 217259 |
| Start Time: | 1341 |
| Stop Time: | 1411 |
| $P_{bar}$ (in Hg): | 29.75 |
| $T_{ambient}$ (°F): | |

| Elapsed Time | Ball Setting |
|---|---|
| 0 | 0.15 CC |
| 5 | 0.15 |
| 10 | 0.15 |
| 15 | 0.15 |
| 20 | 0.15 |
| 25 | 0.15 |
| 30 | 0.15 |
| 35 | - |
| Sample Volume (L) | -- |
| Dilution Gas (L) | -- |
| Total Volume (L) | -- |

**Comments:**

Checked By: [signature] 01/02/2024 (Project Manager or Designee sign and date)

KERN ENERGY
We Fuel the Future

7724 E. Panama Lane
Bakersfield, CA 93307–9210
www.kernenergy.com
661–845–0761

**Stream Name:** Refinery Gas
**Sample Point:** Refinery Fuel Gas

**Sample ID:** 126427
**Sample Date & Time:** 12/28/2023 at 11:00

## Composition of analysis by Gas Chromatography, ASTM D-1945

| Test | Result, Moles % |
|---|---|
| Hydrogen | 34.1090 |
| Methane | 18.1237 |
| Ethane | 7.3664 |
| Ethylene | 0.0021 |
| Propane | 12.8949 |
| Propylene | 0.0196 |
| Propadiene | 0.0000 |
| Methyl Acetylene | 0.0000 |
| Cyclopropane | 0.0000 |
| n-Butane | 14.6340 |
| i-Butane | 5.7316 |
| 1-Butylene | 0.0203 |
| Trans-2-Butylene | 0.0132 |
| IsoButylene | 0.0149 |
| 1,3-Butadiene | 0.0000 |
| n-Pentane | 1.8650 |
| i-Pentane | 3.1510 |
| C6+ | 0.2611 |
| Oxygen | 0.1760 |
| Nitrogen | 1.5953 |
| Carbon Monoxide | 0.0000 |
| Carbon Dioxide | 0.0000 |
| Hydrogen Sulfide | 0.0000 |
| Ammonia | 0.0000 |
| Total | 100.0000 |

## Calculated Heating Value, Compressibility Factor and Relative Density of Gaseous Fuel, ASTM D-3588

| | |
|---|---|
| Molecular Weight ($M_W$) | 27.7530 |
| Compressibility Factor @ STP(z) | 0.9934 |
| Ideal Gas Specific Gravity @ STP | 0.9703 |
| Real Gas Specific Gravity @ STP | 0.9765 |
| Ideal Gas Dry HHV @ STP | 1628.1 |
| Ideal Gas Dry LHV @ STP | 1489.4 |
| FOE (mBbls/SCF) | 0.2671 |
| Eq. Liq. (US Gas/SCF) | 4.9185 |
| Carbon Content (kg C/Kg Total) | 0.7797 |

2820 Pegasus Drive, Suite 1
Bakersfield, CA 93308
Telephone# 661.399.1398
www.TRCcompanies.com

| | | | |
|---|---|---|---|
| **Project No.:** | 583056 | **Lab No.:** | -- |
| **Client Name:** | Kern Energy | **TRC ID No.:** | 126427 |
| **Location/Unit:** | Panama Lane / THI Heater | **Date Sampled:** | 12/28/2023 @ 11:00 |
| **Fuel Source:** | Fuel Line | **Date Submitted:** | 12/28/2023 |
| **Fuel Type:** | Refinery Fuel Gas | **Date Analyzed:** | 12/28/2023 |

**Analyst:** Jimmy Khangura (Kern Energy) **Analyst's Signature** --

## Natural Gas Composition Determined by Gas Chromatography ASTM D 1945 - 03

| Constituents | mole % | weight % |
|---|---|---|
| Hydrogen | 34.14 | 2.48 |
| Oxygen | 0.18 | 0.20 |
| Nitrogen | 1.60 | 1.61 |
| Carbon Dioxide | - | - |
| Carbon Monoxide | - | - |
| Methane | 18.14 | 10.50 |
| Ethane | 7.37 | 8.00 |
| Propane | 12.91 | 20.54 |
| i-Butane | 5.74 | 12.03 |
| n-Butane | 14.65 | 30.73 |
| i-Pentane | 3.15 | 8.21 |
| n-Pentane | 1.87 | 4.86 |
| n-Hexane | 0.26 | 0.81 |
| **Totals** | **100.00** | **100.00** |

| CHONS | Weight % |
|---|---|
| Carbon | 77.95 |
| Hydrogen | 20.23 |
| Oxygen | 0.20 |
| Nitrogen | 1.61 |
| Sulfur | 0.00 |
| **Total** | **100.00** |
| **H/C Ratio** | 0.26 |

## F-Factors, Heating Values, Relative Density and Compressibility Factor Determined by ASTM D3588 - 17

| F-Factors | HHV | LHV |
|---|---|---|
| Fd-factor, dscf/MMBtu @60 °F | 8,605 | 9,415 |
| **Fd-factor, dscf/MMBtu @68 °F** | **8,737** | 9,560 |
| Fd-factor, dscf/MMBtu @70 °F | 8,771 | 9,596 |
| Fc-factor, scf $CO_2$/MMBtu @60 °F | 1,115 | 1,220 |
| Fc-factor, scf $CO_2$/MMBtu @68 °F | 1,133 | 1,239 |
| Fc-factor, scf $CO_2$/MMBtu @70 °F | 1,137 | 1,244 |

| | HHV | | LHV | |
|---|---|---|---|---|
| | Btu/ft$^3$ | Btu/lb | Btu/ft$^3$ | Btu/lb |
| dry | 1,627.0 | 22,284.1 | 1,487.1 | 20367.7 |
| wet | 1,598.6 | 21,895.3 | 1,461.2 | 20012.4 |
| **dry*** | **1,637.9** | **22,432.8** | 1,497.0 | 20503.6 |
| wet* | 1,609.3 | 22,041.4 | 1,470.9 | 20146.0 |

| | |
|---|---|
| Density, lb/ft$^3$ | 0.0730 |
| Specific Volume, ft$^3$/lb | 13.70 |
| Specific Gravity* | 0.9630 |
| Compressibility Factor, Z | 0.9934 |

* Corrected for Compressibility (Ideal Volume)
HHV - GROSS HEATING VALUE
LHV - NET HEATING VALUE

2820 Pegasus Drive, Suite 1
Bakersfield, CA 93308
661.399.1398
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# Lab Analysis Report

## Case Narrative

### General Information

| | |
|---|---|
| Company: | Kern Energy |
| Project #: | 583056 |
| TRC Lab #: | 1843 |
| Analysis Date: | 12/30/2023 |
| Analyst: | Jim McSweeney |

### Analysis

| | |
|---|---|
| Analytes: | VOC |
| Analytical Protocols: | C1 – C3+ |
| Analytical Notes: | No problems were encountered during the analyses. |
| QA/QC Review: | The data has been reviewed for quality assurance. The quality control and samples specific information in this package complete and meets or exceeds the minimum requirements for acceptability. |
| Comments: | The Gas Chromatograph used for VOC analysis was a SRI 8610C GC/FID Ser No. N12213 |

All samples arrived at the laboratory in a condition acceptable for analysis.

If you have any questions or concerns regarding this analysis, please feel free to contact me.

**Laboratory Certification Statements**

I certify that to the best of my knowledge:

- Test data and all corresponding information have been checked for accuracy and completeness.
- Analyses have been conducted in accordance with approved protocol, reference methods and the requirements of CARB (as applicable).
- All deviations, method modifications, or analytical anomalies are summarized in the appropriate report narrative(s).
- Analysis results only represent that of the samples as received into the laboratory.
- This document contains a total of 32 pages.



Jim McSweeney — December 30, 2023
Analyst — Date

Jeff S. Harris — January 3, 2023
Quality Assurance Review — Date

# CHAIN OF CUSTODY

# Chain of Custody Record



| Project Name: Kern Energy | TRC Contact: Jeff S Harris | T: 661.399.1398 |
|---|---|---|
| | Email: JHarris@trccompanies.com | |
| Site Name: Panama Lane | Sampling System Prepared by: Jeff S Harris | |
| Project No.: 583056.0000 | Samples Recovered by: Jeff S Harris | |

| Sub Lab ID | Sample ID Number | Sample Description* (Unit-Location-Run-Sample Fraction) | Date Sampled | Sample Matrix | **No. of Containers | Analyses Required: EPA Modified 18 | | | | | Comments: |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 217257 | THI Heater-Stack Outlet-Run 1 | 12/28/2023 | Stack Effluent | 1 | X | | | | | |
| | 217258 | THI Heater-Stack Outlet-Run 2 | 12/28/2023 | Stack Effluent | 1 | X | | | | | |
| | 217259 | THI Heater-Stack Outlet-Run 3 | 12/28/2023 | Stack Effluent | 1 | X | | | | | |
| | | | | | | | | | | | |
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**General Instructions:** This form documents all changes in custody. The name and dated signature for each person associated with the release or receipt of the listed samples must be recorded.

| TAT: Standard | Need By Date: Normal | Project Remarks: | Relinquished by: (Sign & Print) | Date/Time | Received by: (Sign & Print) | Date/Time |
|---|---|---|---|---|---|---|
| Shipped by: Bobby Hull | Shipped On: 12/28/2023 | | Jeff Harris | 12/28/2023 | J. McSweeney | 12/30/23 |
| Ship To Attn: Jim McSweeney | | | Jeff S Harris | 16:30 | | 1300 |
| Lab: **TRC Environmental, Inc.** | | | | | | |
| Address: 2820 Pegasus Drive, Bakersfield, CA 93308 | | | | | | |
| Phone: 661-399-1398 | | | | | | |

Special Instructions:

***SUBCONTRACTOR LABORATORY MUST CONTACT THE CITED TRC CONTACT TO ENSURE A PO IS IN PLACE.***

**TRC Environmental Corporation**
2820 Pegasus Drive, Bakersfield, CA 93308
T: 661.399.1398 F: 661.393.8306

**TRC Lab No: 1843**

**"Container Number" in sample description MUST agree with the container number logic presented in the Sample Recovery section of the test method SOP. Reference SOP GFM-15.

***"No. Containers" indicates the number of containers (sample jars) for the specified sample fraction. If more than one jar is used indicate 1 of 2, 2 of 2, etc. on the sample label.

If there is a break in the label numbering series, please make a note that that number was skipped.

# VOC ANALYTICAL REPORT

# EPA Method 18 Lab Results

Project Number: 583056.0000
Client: Kern Energy
Facility: Panama Lane
Unit/Location: THI Heater
Normal: As Found

Lab No. 1843
Test Date: 12/28/2023
Analysis Date: 12/30/2023
Analyst: Jim McSweeney (Technical Director)

## Initial Calibration GC Response

| | High Calibration Standard | | | | Mid Calibration Standard | | | | Low Calibration Standard | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Injection # | 1 | 2 | 3 | Average | 1 | 2 | 3 | Average | 1 | 2 | 3 | Average |
| Methane | 210.8326 | 211.9884 | 211.4053 | 211.41 | 63.2756 | 62.6972 | 63.0176 | 63 | 20.7652 | 20.8136 | 20.7605 | 20.78 |
| Ethane | 353.9618 | 356.7402 | 356.7564 | 355.82 | 107.1315 | 106.4737 | 107.3234 | 106.98 | 35.2598 | 34.8861 | 36.0836 | 35.41 |
| NMNEHC | 596.6005 | 601.654 | 601.8979 | 600.05 | 181.4999 | 180.8566 | 179.1339 | 180.5 | 59.3346 | 60.5285 | 59.1626 | 59.68 |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Area | 1161.3949 | 1170.3826 | 1170.0596 | | 351.907 | 350.0275 | 349.4749 | | 115.3596 | 116.2282 | 116.0067 | |

## Sample GC Response

| Sample ID # | Run 1 - 217257 | | | | Run 2 - 217258 | | | | Run 3 - 217259 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Injection # | 1 | 2 | 3 | Average | 1 | 2 | 3 | Average | 1 | 2 | 3 | Average |
| Methane | 1.1245 | 1.2093 | 1.1036 | 1.15 | - | - | - | - | 1.1055 | 1.0921 | 1.169 | 1.12 |
| Ethane | - | - | - | - | - | - | - | - | - | - | - | - |
| NMNEHC | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Area | 1.1245 | 1.2093 | 1.1036 | | | | | | 1.1055 | 1.0921 | 1.169 | |

## Final Calibration GC Response

| | High Calibration Standard | | | | Mid Calibration Standard | | | | Low Calibration Standard | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Injection # | 1 | 2 | 3 | Average | 1 | 2 | 3 | Average | 1 | 2 | 3 | Average |
| Methane | | | | | 62.7031 | 62.8284 | 62.882 | 62.8 | | | | |
| Ethane | | | | | 107.2032 | 106.952 | 106.7544 | 106.97 | | | | |
| NMNEHC | Not Required | | | | 179.2038 | 179.2086 | 181.9892 | 180.13 | Not Required | | | |
| - | | | | | | | | - | | | | |
| - | | | | | | | | - | | | | |
| - | | | | | | | | - | | | | |
| Total Area | | | | | 349.1101 | 348.989 | 351.6256 | | | | | |

| GC Response Calibration Curve | | | Coefficient of Determination | | |
|---|---|---|---|---|---|
| | Slope | Intercept | $R^2$ | Minimum | Pass |
| Methane | 4.218 | 0.000 | 1.0000 | 0.9900 | Yes |
| Ethane | 7.244 | 0.000 | 1.0000 | 0.9900 | Yes |
| NMNEHC | 12.173 | 0.000 | 1.0000 | 0.9900 | Yes |

| Calibration Criteria | | | |
|---|---|---|---|
| EPA section 8.2.1.5.2.1 | | | |
| Calibration Level | High | Mid | Low |
| Intial Calibration | 5% met | 5% met | 5% met |
| EPA section 8.2.1.5.2.2 | | | |
| Sample Injections | All injections met Section 8.2.1.5.2.2 requirements | | |
| Final Calibartion | Only mid final cal level required | | |

| $C_1$ - $C_3$ Calibration Standards | | | |
|---|---|---|---|
| | Low Level | Mid Level | High Level |
| Methane | 4.99 | 15.00 | 50.10 |
| Ethane | 4.98 | 14.8 | 49.1 |
| NMNEHC | 4.91 | 14.8 | 49.3 |
| Gas Vendor | Tier 5 Labs | Tier 5 Labs | Tier 5 Labs |
| Cylinder Number | EB0056927 | CC455254 | CC730137 |
| Expiration Date | 3/29/2030 | 3/13/2031 | 3/29/2030 |

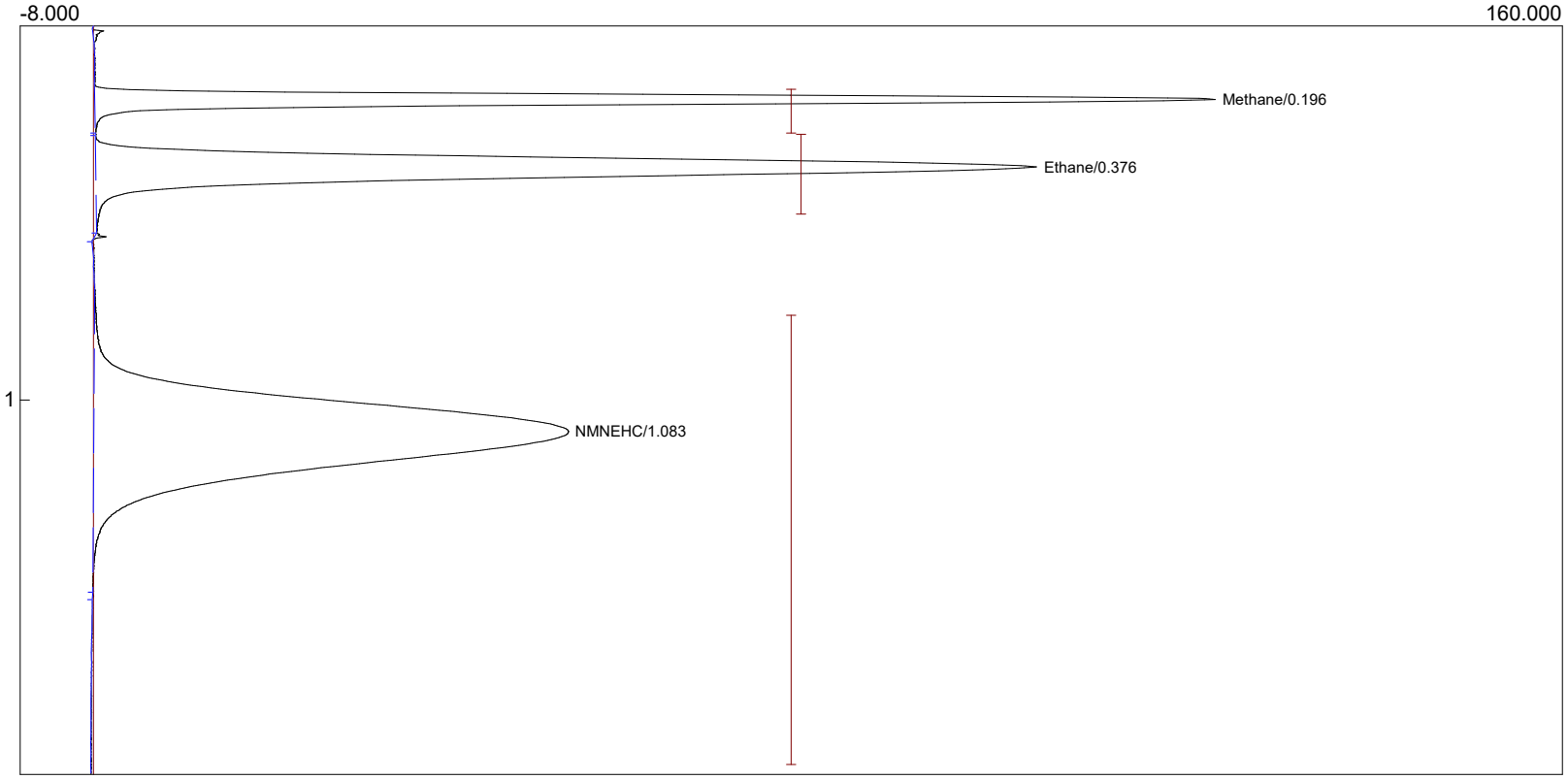
| Results | | | |
|---|---|---|---|
| Run # | 1 | 2 | 3 |
| Sample ID # | 217257 | 217258 | 217259 |
| Methane (ppmw) | 0.3 | ND < 0.1 | 0.3 |
| Ethane (ppmw) | ND < 0.1 | ND < 0.1 | ND < 0.1 |
| NMNEHC (ppmw) | ND < 0.1 | ND < 0.1 | ND < 0.1 |

EPA M18 section 8.2.1.5.2.1 - "The results are acceptable when the peak areas for the three injections agree to within 5 percent of their average. If they do not agree, run additional samples or correct the analytical techniques until this requirement is met. Then analyze the other two calibration mixtures in the same manner."

EPA M18 section 8.2.1.5.2.2 - "After all samples have been analyzed, repeat the analysis of the mid-level calibration gas for each compound. Compare the average response factor of the pre- and post-test analysis for each compound. If they differ by > 5 percent, analyze the other calibration gas levels for that compound, and prepare a calibration curve using all the pre- and post-test calibration gas mixture values."

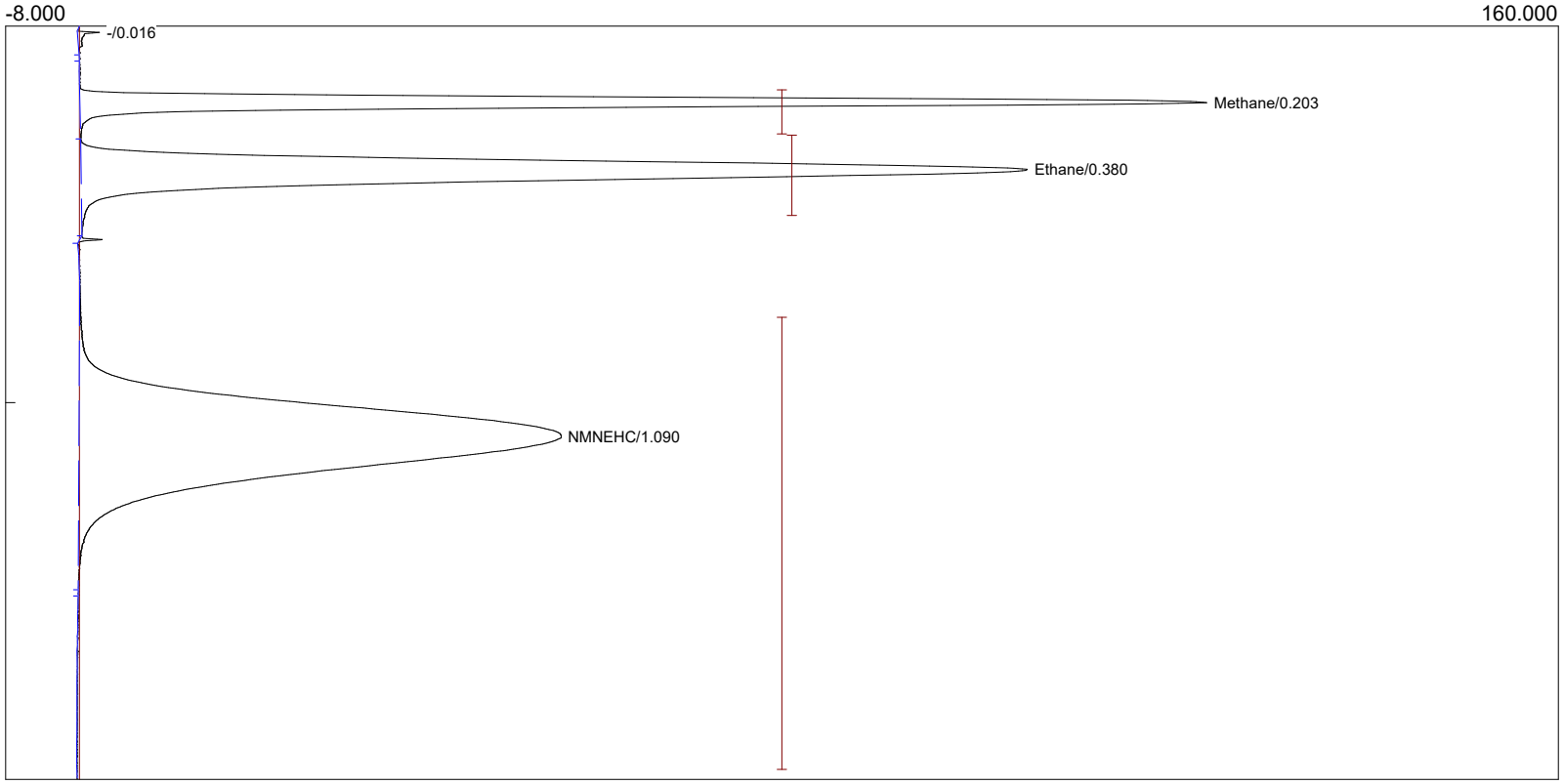
# VOC CHROMATOGRAMS

Lab name: TRC Bakersfield
Client: Calibration
Client ID:
Analysis date: 12/30/2023 12:29:03
Description: FID-CHANNEL 1
Data file: Lab_1843_00.CHR ()
Sample: ICal 50 ppm Inj 1
Operator: J McSweeney, QI



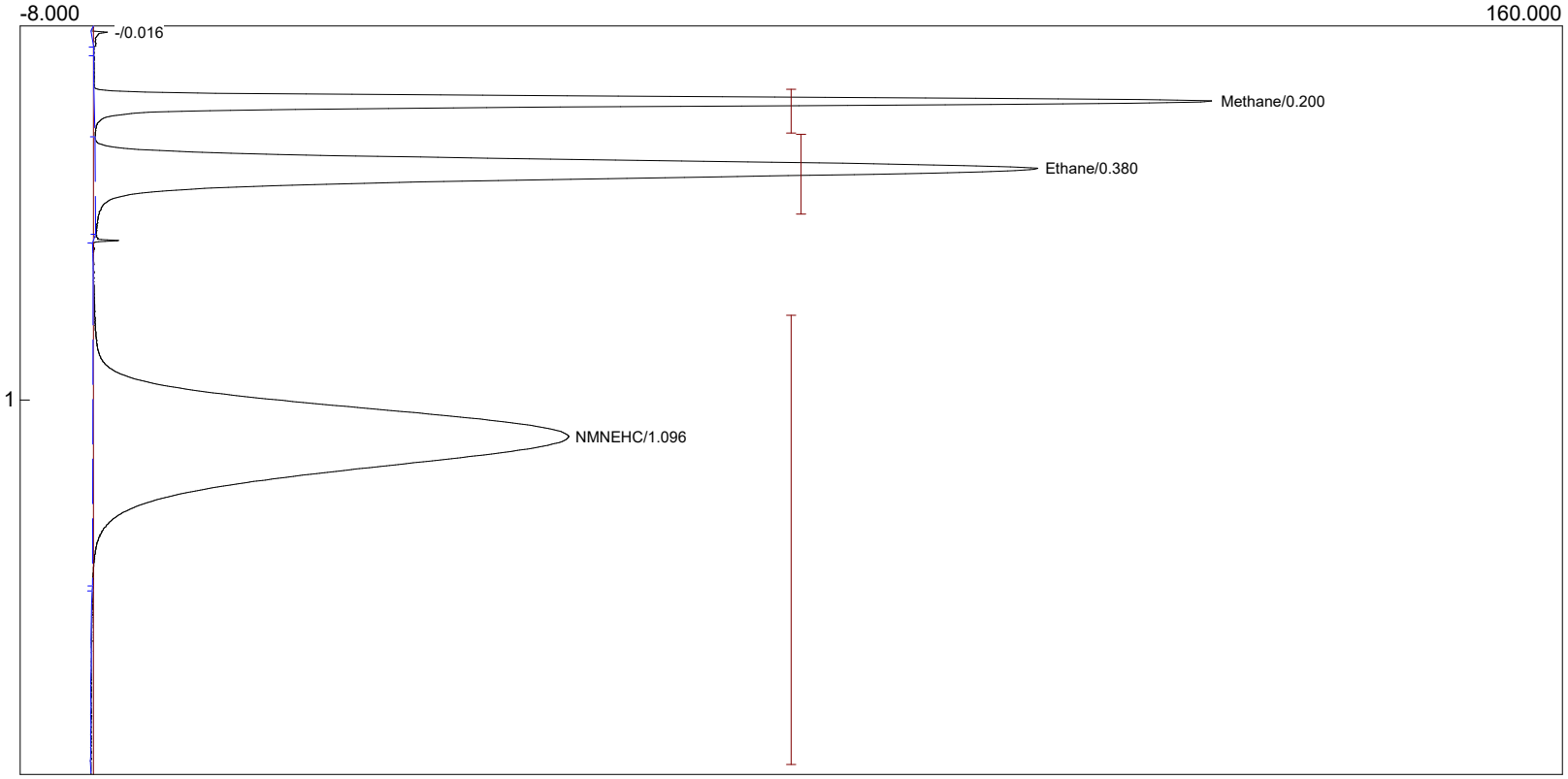

| Component | Retention | Area |
|---|---|---|
| Methane | 0.196 | 210.8326 |
| Ethane | 0.376 | 353.9618 |
| NMNEHC | 1.083 | 596.6005 |
| | | 1161.3949 |

Lab name: TRC Bakersfield
Client: Calibration
Client ID:
Analysis date: 12/30/2023 12:34:54
Description: FID-CHANNEL 1
Data file: Lab_1843_01.CHR ()
Sample: ICal 50 ppm Inj 2
Operator: J McSweeney, QI



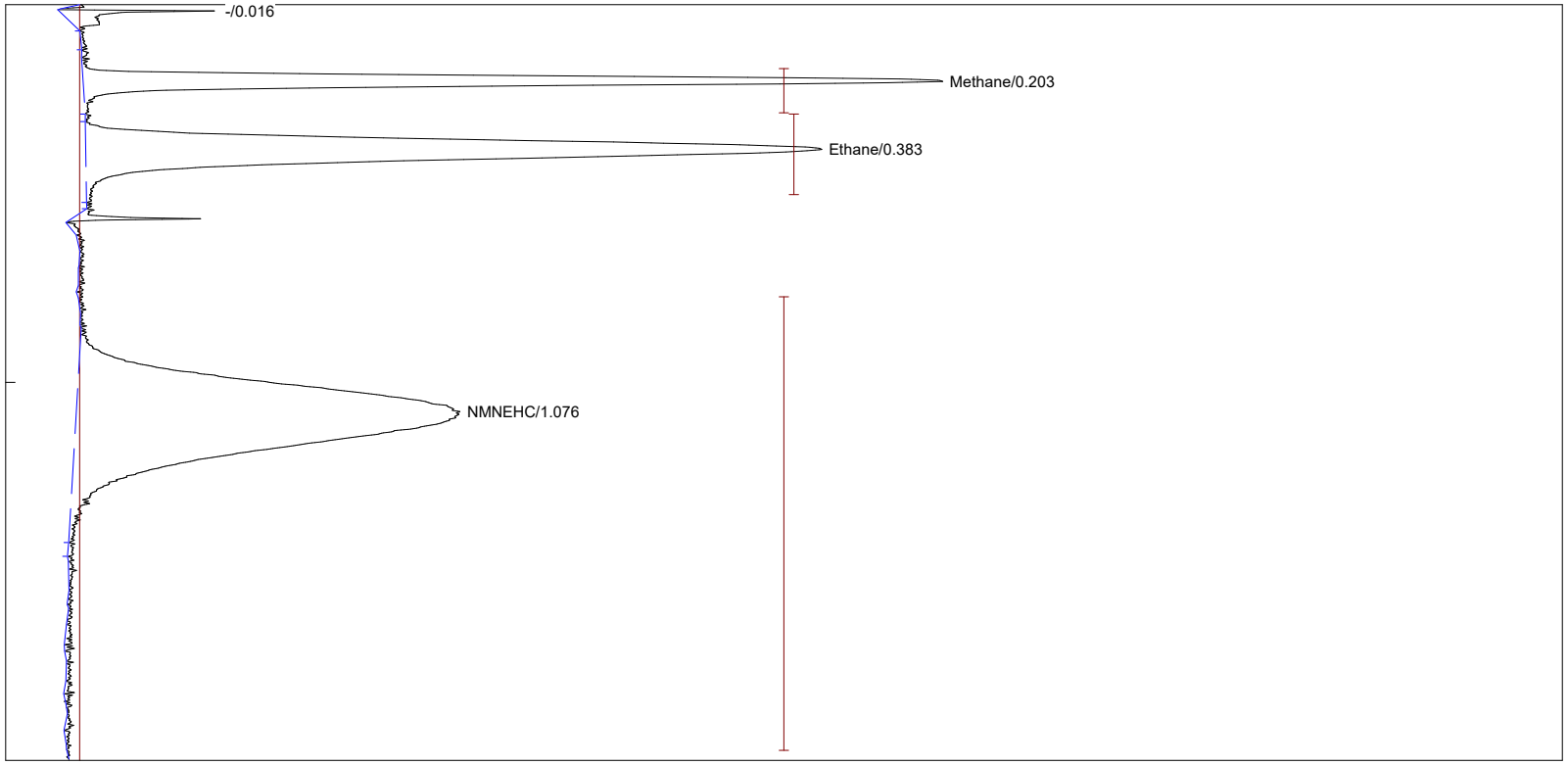

| Component | Retention | Area |
|---|---|---|
| Methane | 0.203 | 211.9884 |
| Ethane | 0.380 | 356.7402 |
| NMNEHC | 1.090 | 601.6540 |
| | | 1170.3826 |

Lab name: TRC Bakersfield
Client: Calibration
Client ID:
Analysis date: 12/30/2023 12:38:10
Description: FID-CHANNEL 1
Data file: Lab_1843_02.CHR ()
Sample: ICal 50 ppm Inj 3
Operator: J McSweeney, QI



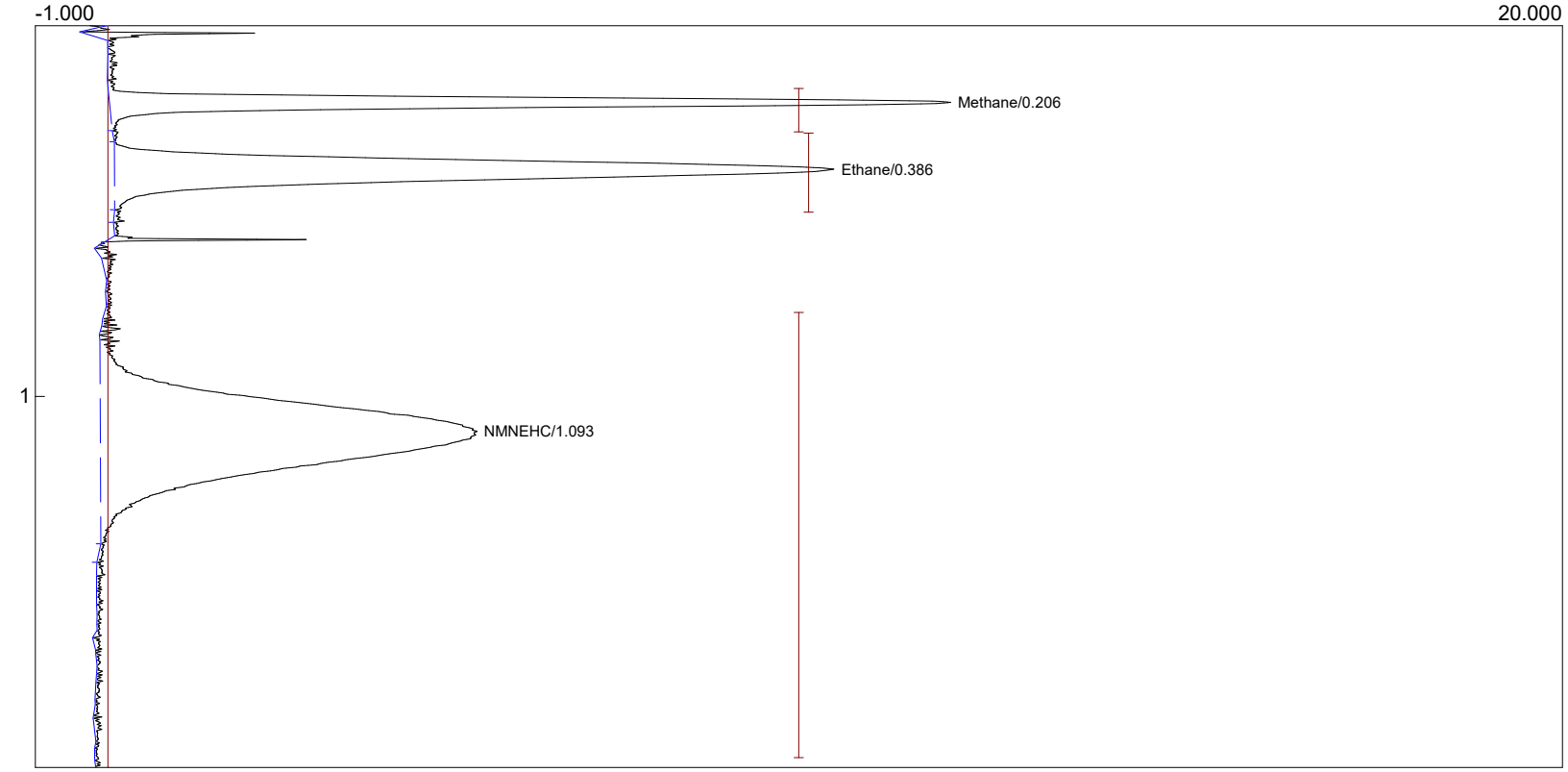

| Component | Retention | Area |
|---|---|---|
| Methane | 0.200 | 211.4053 |
| Ethane | 0.380 | 356.7564 |
| NMNEHC | 1.096 | 601.8979 |
| | | 1170.0596 |

Lab name: TRC Bakersfield
Client: Calibration
Client ID:
Analysis date: 12/30/2023 12:47:49
Description: FID-CHANNEL 1
Data file: Lab_1843_03.CHR ()
Sample: ICal 5 ppm Inj 1
Operator: J McSweeney, QI



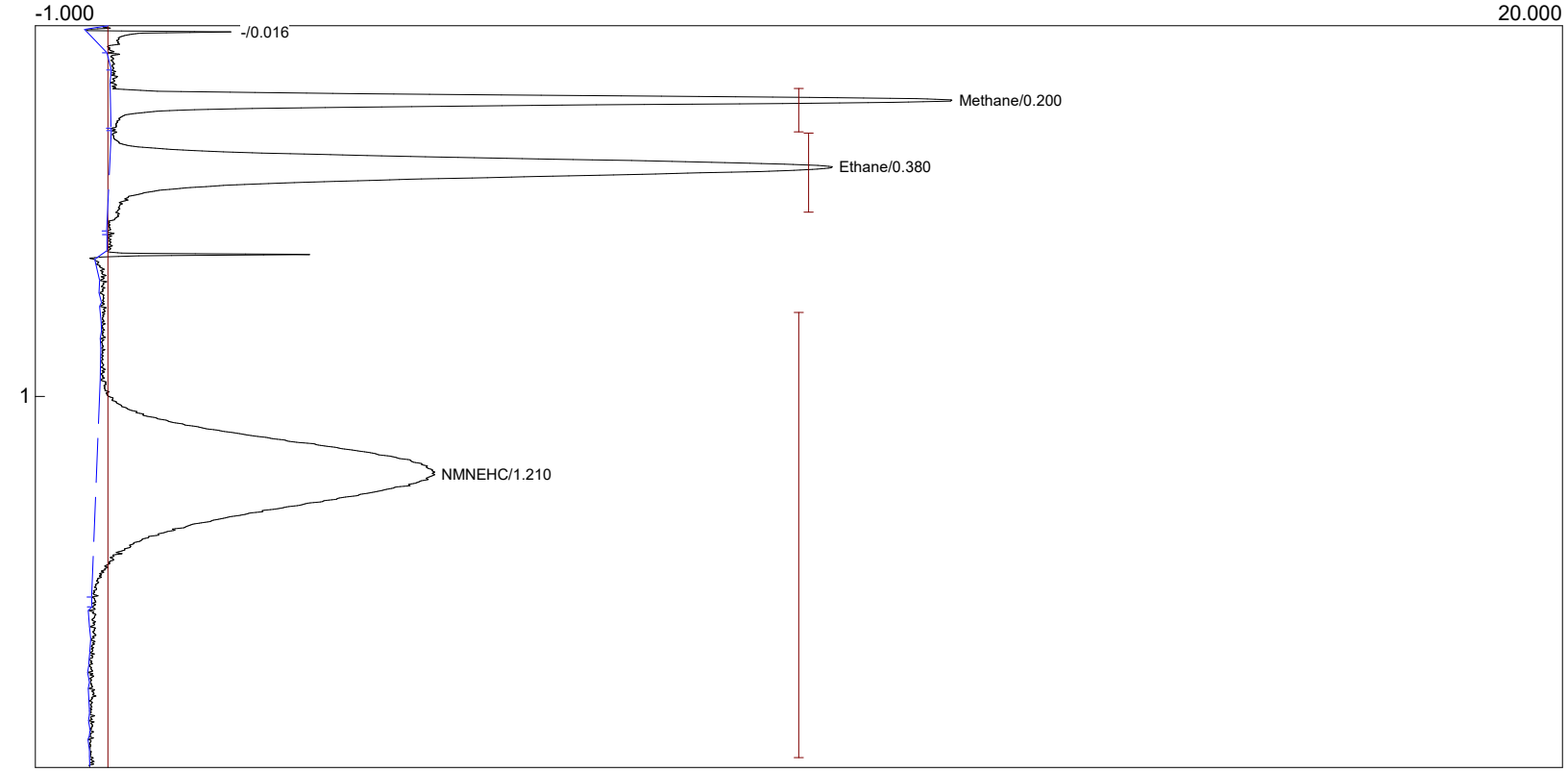

| Component | Retention | Area |
|---|---|---|
| Methane | 0.203 | 20.7652 |
| Ethane | 0.383 | 35.2598 |
| NMNEHC | 1.076 | 59.3346 |
| | | 115.3596 |

Lab name: TRC Bakersfield
Client: Calibration
Client ID:
Analysis date: 12/30/2023 12:51:42
Description: FID-CHANNEL 1
Data file: Lab_1843_04.CHR ()
Sample: ICal 5 ppm Inj 2
Operator: J McSweeney, QI



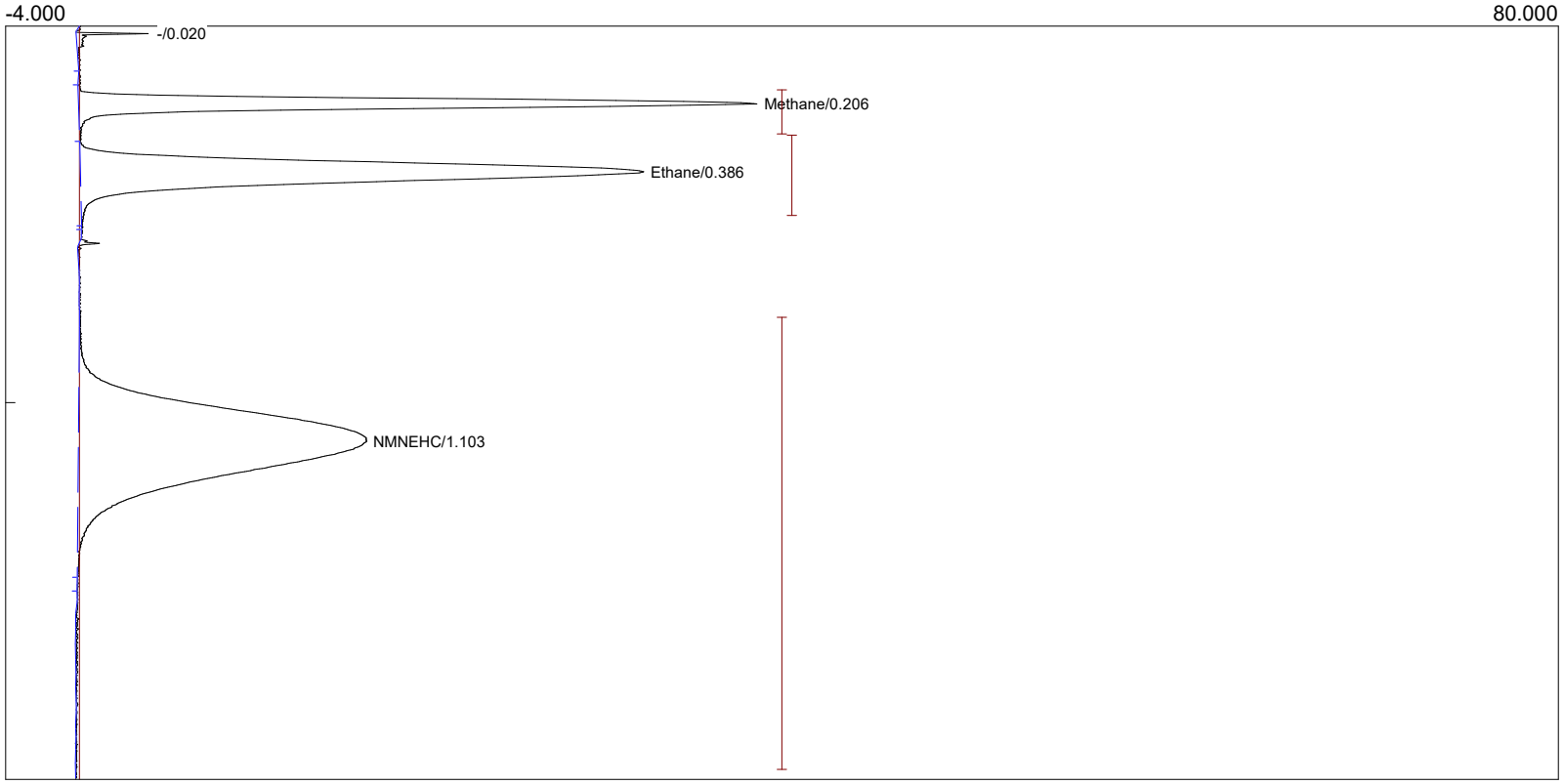

| Component | Retention | Area |
|---|---|---|
| Methane | 0.206 | 20.8136 |
| Ethane | 0.386 | 34.8861 |
| NMNEHC | 1.093 | 60.5285 |
| | | 116.2282 |

Lab name: TRC Bakersfield
Client: Calibration
Client ID:
Analysis date: 12/30/2023 12:54:21
Description: FID-CHANNEL 1
Data file: Lab_1843_05.CHR ()
Sample: ICal 5 ppm Inj 3
Operator: J McSweeney, QI



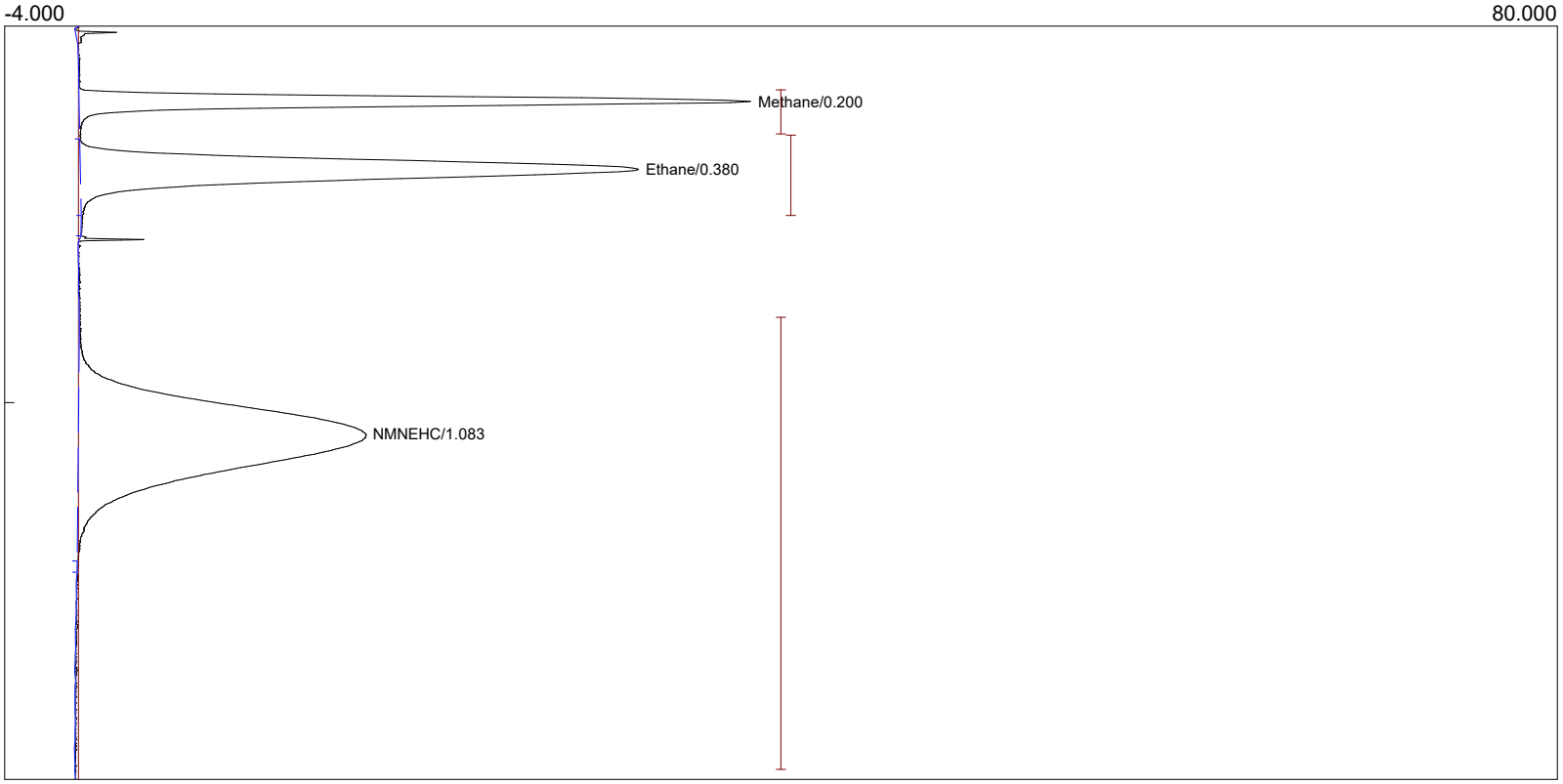

| Component | Retention | Area |
|---|---|---|
| Methane | 0.200 | 20.7605 |
| Ethane | 0.380 | 36.0836 |
| NMNEHC | 1.210 | 59.1626 |
| | | 116.0067 |

Lab name: TRC Bakersfield
Client: Calibration
Client ID:
Analysis date: 12/30/2023 12:59:38
Description: FID-CHANNEL 1
Data file: Lab_1843_06.CHR ()
Sample: ICal 15 ppm Inj 1
Operator: J McSweeney, QI



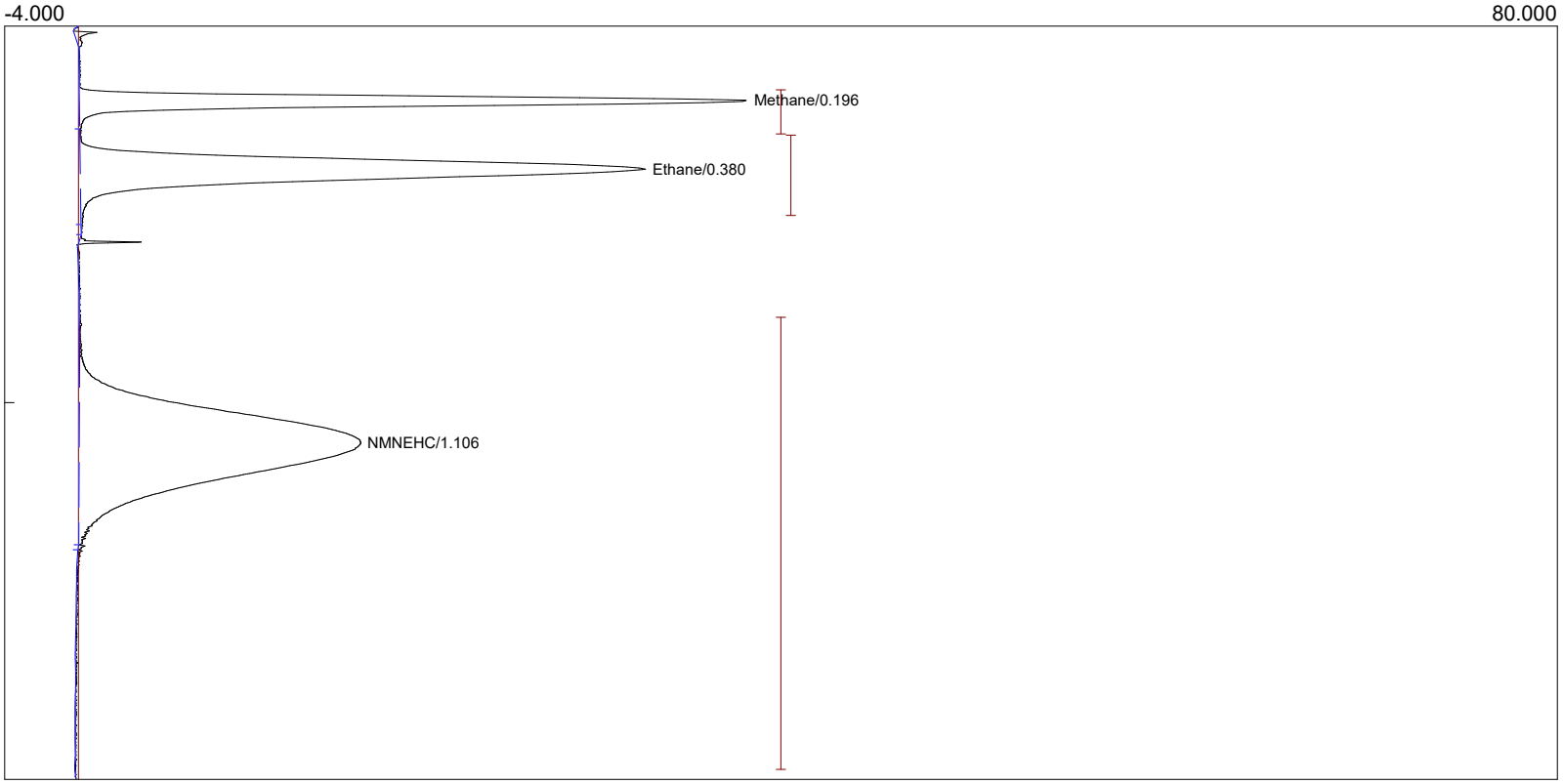

| Component | Retention | Area |
|---|---|---|
| Methane | 0.206 | 63.2756 |
| Ethane | 0.386 | 107.1315 |
| NMNEHC | 1.103 | 181.4999 |
| | | 351.9070 |

Lab name: TRC Bakersfield
Client: Calibration
Client ID:
Analysis date: 12/30/2023 13:04:46
Description: FID-CHANNEL 1
Data file: Lab_1843_07.CHR ()
Sample: ICal 15 ppm Inj 2
Operator: J McSweeney, QI



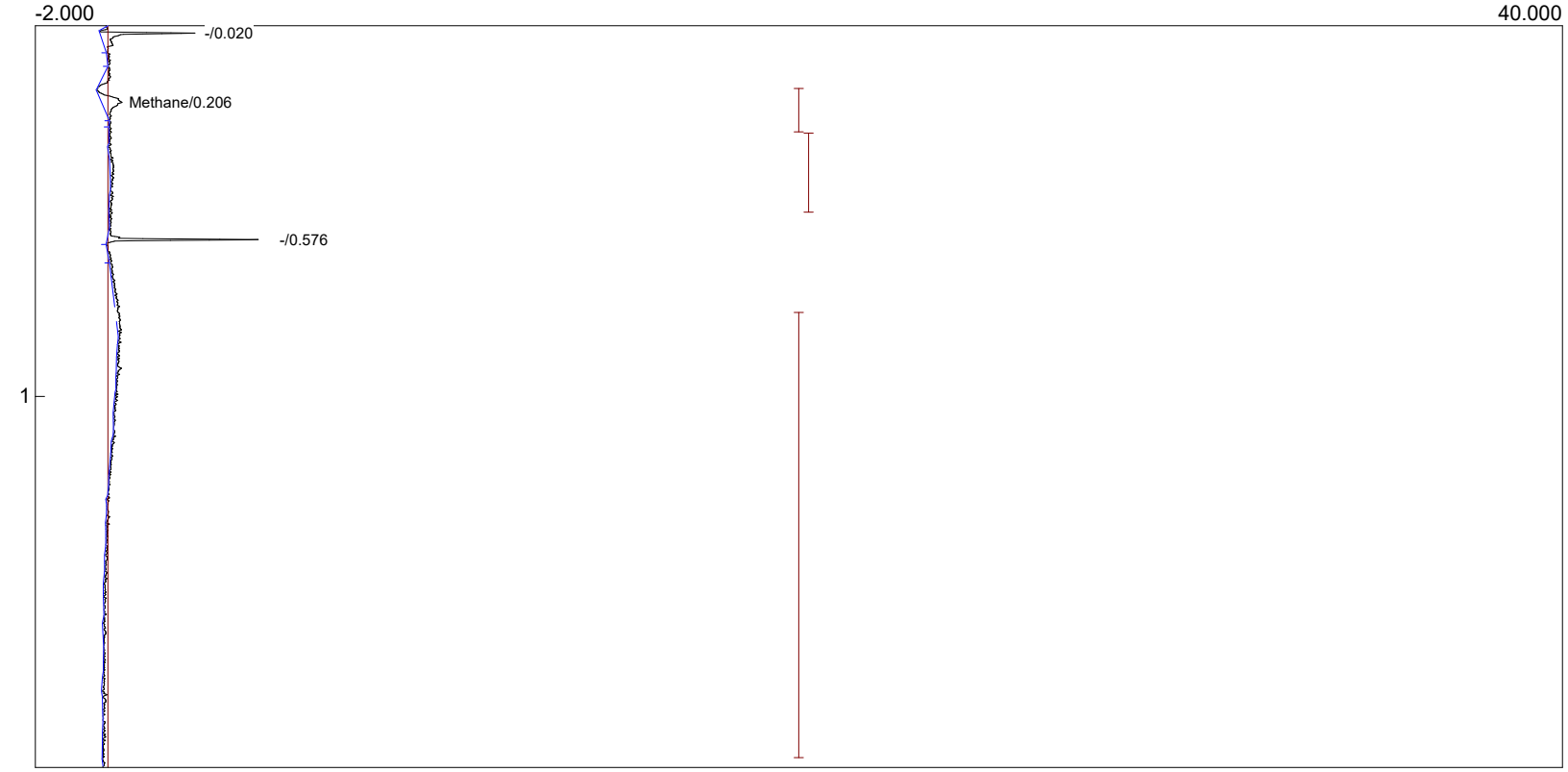

| Component | Retention | Area |
|---|---|---|
| Methane | 0.200 | 62.6972 |
| Ethane | 0.380 | 106.4737 |
| NMNEHC | 1.083 | 180.8566 |
| | | 350.0275 |

Lab name: TRC Bakersfield
Client: Calibration
Client ID:
Analysis date: 12/30/2023 13:07:15
Description: FID-CHANNEL 1
Data file: Lab_1843_08.CHR ()
Sample: ICal 15 ppm Inj 3
Operator: J McSweeney, QI



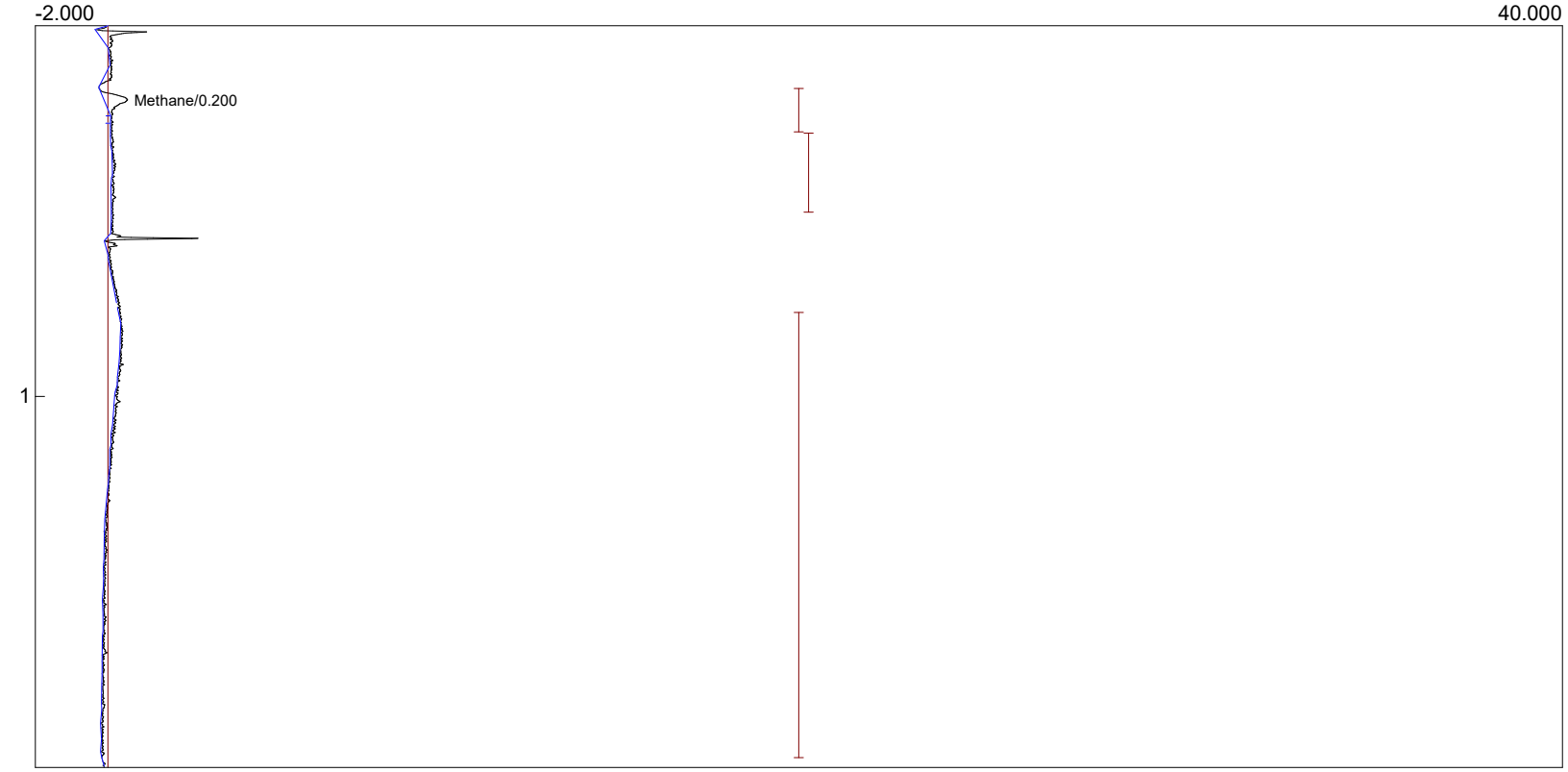

| Component | Retention | Area |
|---|---|---|
| Methane | 0.196 | 63.0176 |
| Ethane | 0.380 | 107.3234 |
| NMNEHC | 1.106 | 179.1339 |
| | | 349.4749 |

Lab name: TRC Bakersfield
Client: Kern Energy
Client ID: THI Heater
Analysis date: 12/30/2023 13:11:00
Description: FID-CHANNEL 1
Data file: Lab_1843_09.CHR ()
Sample: 217257 Run 1 Inj 1
Operator: J McSweeney, QI



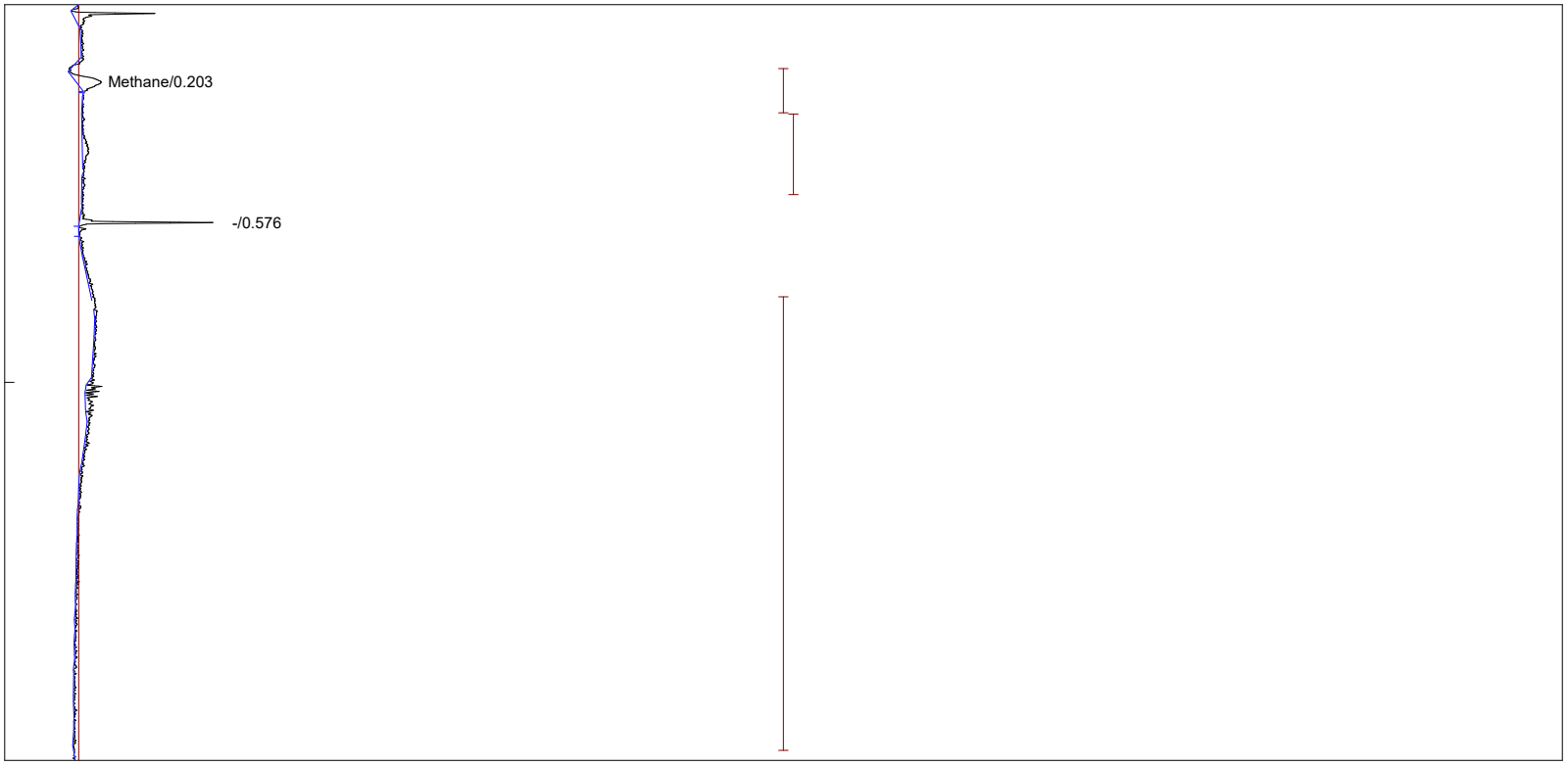

| Component | Retention | Area |
|---|---|---|
| Methane | 0.206 | 1.1245 |
| | | 1.1245 |

Lab name: TRC Bakersfield
Client: Kern Energy
Client ID: THI Heater
Analysis date: 12/30/2023 13:14:00
Description: FID-CHANNEL 1
Data file: Lab_1843_10.CHR ()
Sample: 217257 Run 1 Inj 2
Operator: J McSweeney, QI



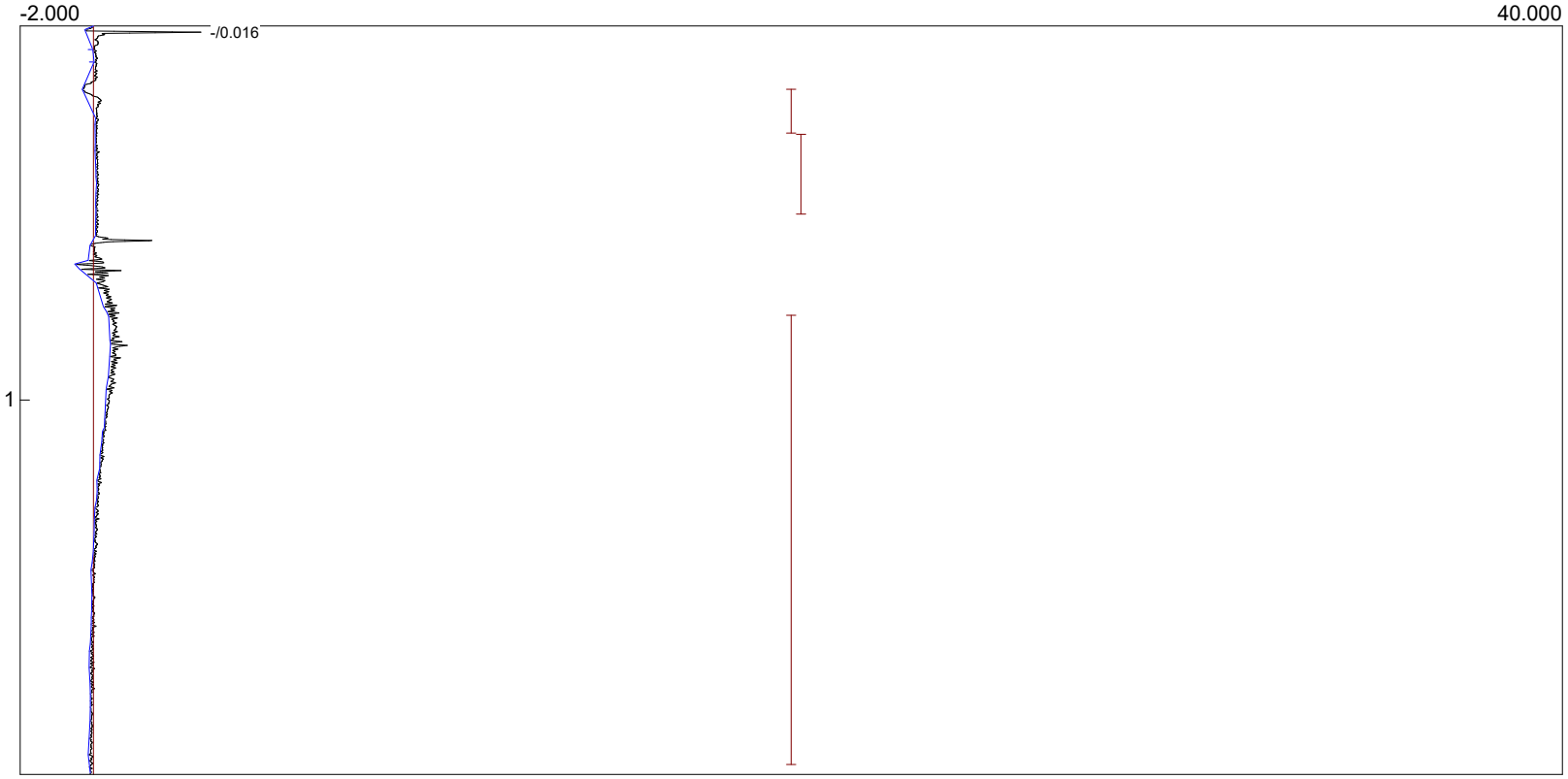

| Component | Retention | Area |
|---|---|---|
| Methane | 0.200 | 1.2093 |
| | | 1.2093 |

Lab name: TRC Bakersfield
Client: Kern Energy
Client ID: THI Heater
Analysis date: 12/30/2023 13:16:30
Description: FID-CHANNEL 1
Data file: Lab_1843_11.CHR ()
Sample: 217257 Run 1 Inj 3
Operator: J McSweeney, QI



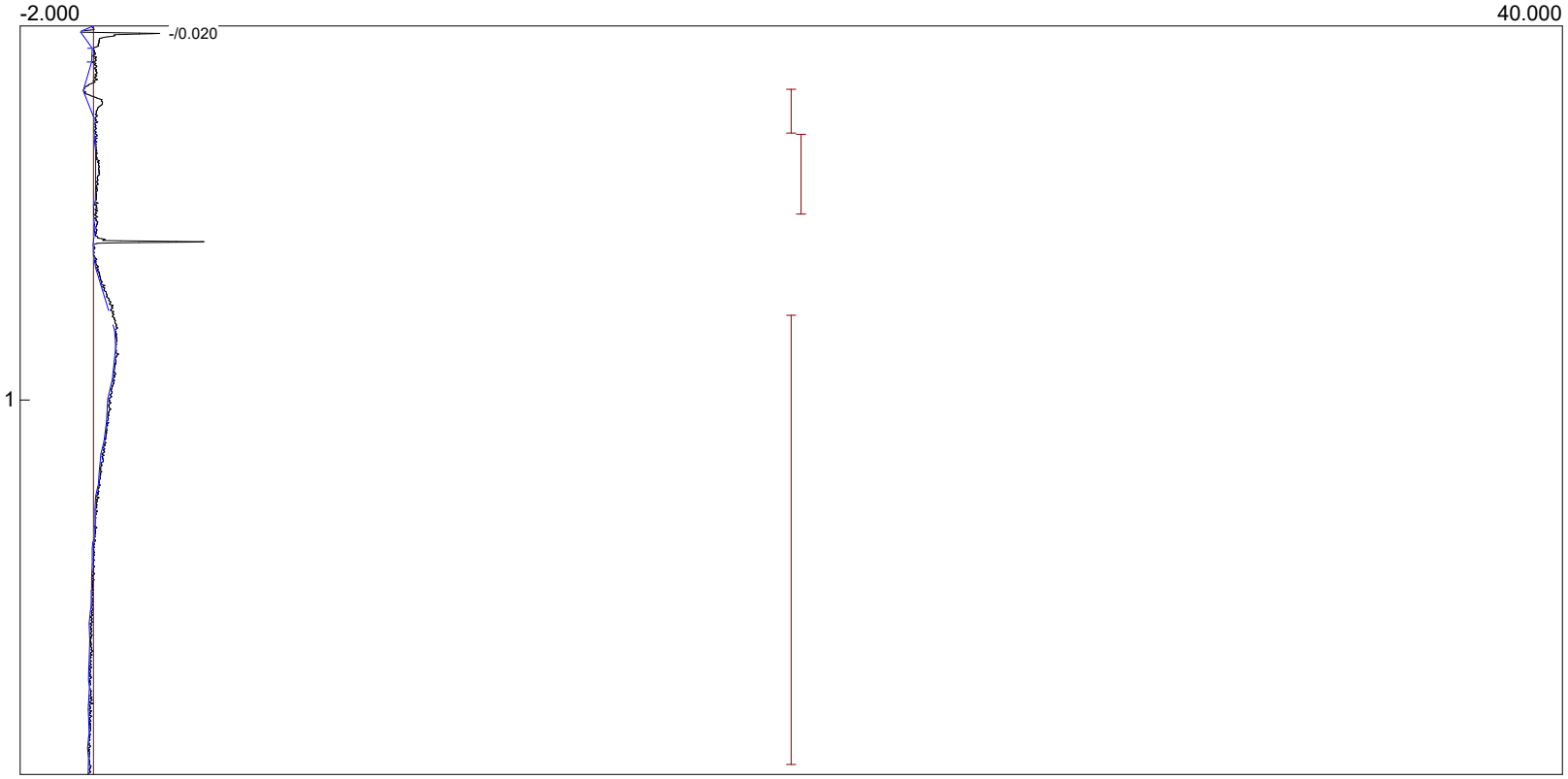

| Component | Retention | Area |
|---|---|---|
| Methane | 0.203 | 1.1036 |
| | | 1.1036 |

Lab name: TRC Bakersfield
Client: Kern Energy
Client ID: THI Heater
Analysis date: 12/30/2023 13:21:11
Description: FID-CHANNEL 1
Data file: Lab_1843_12.CHR ()
Sample: 217258 Run 2 Inj 1
Operator: J McSweeney, QI



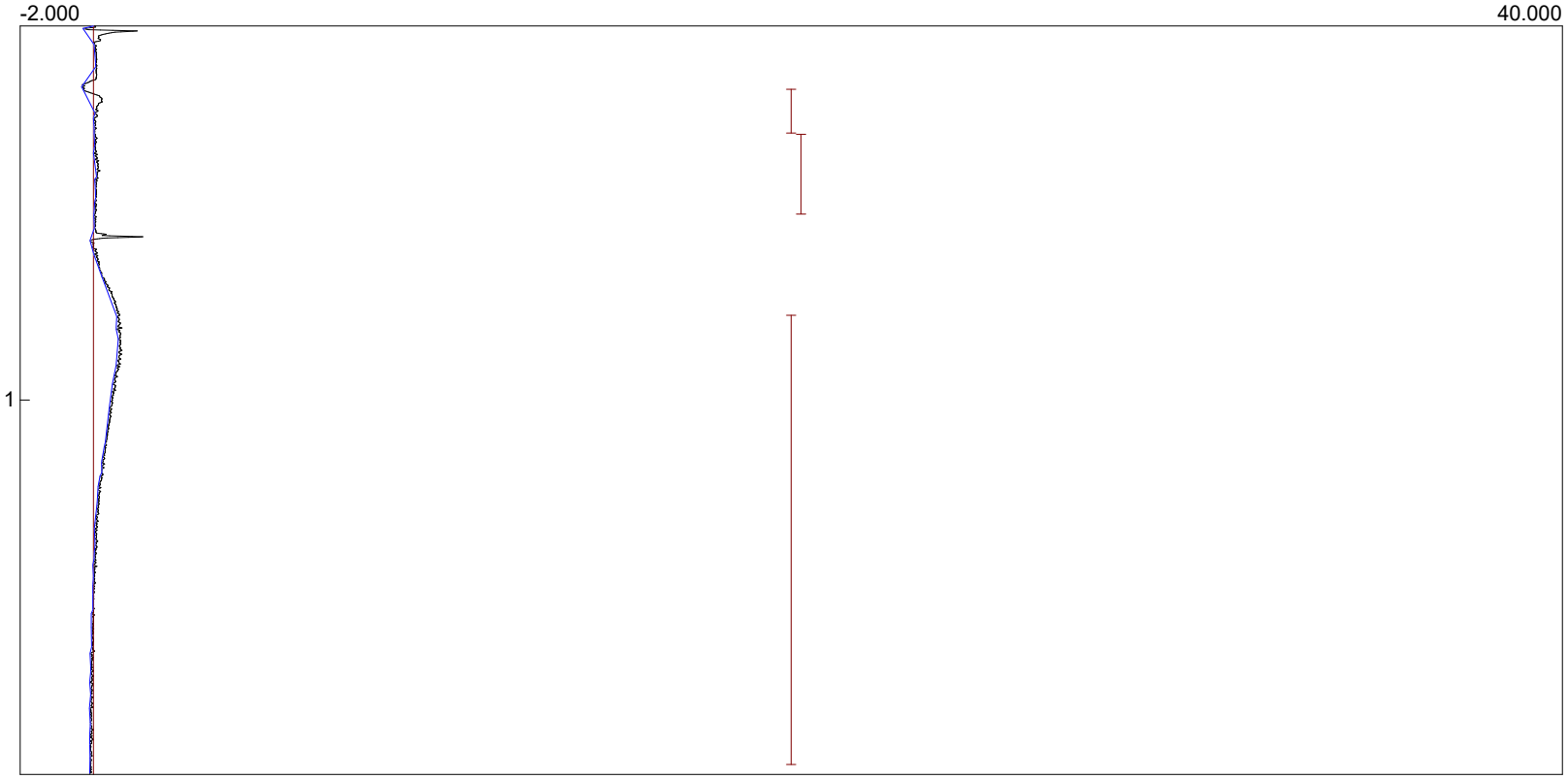

| Component | Retention | Area |
|---|---|---|
| | | 0.0000 |

Lab name: TRC Bakersfield
Client: Kern Energy
Client ID: THI Heater
Analysis date: 12/30/2023 13:24:46
Description: FID-CHANNEL 1
Data file: Lab_1843_13.CHR ()
Sample: 217258 Run 2 Inj 2
Operator: J McSweeney, QI



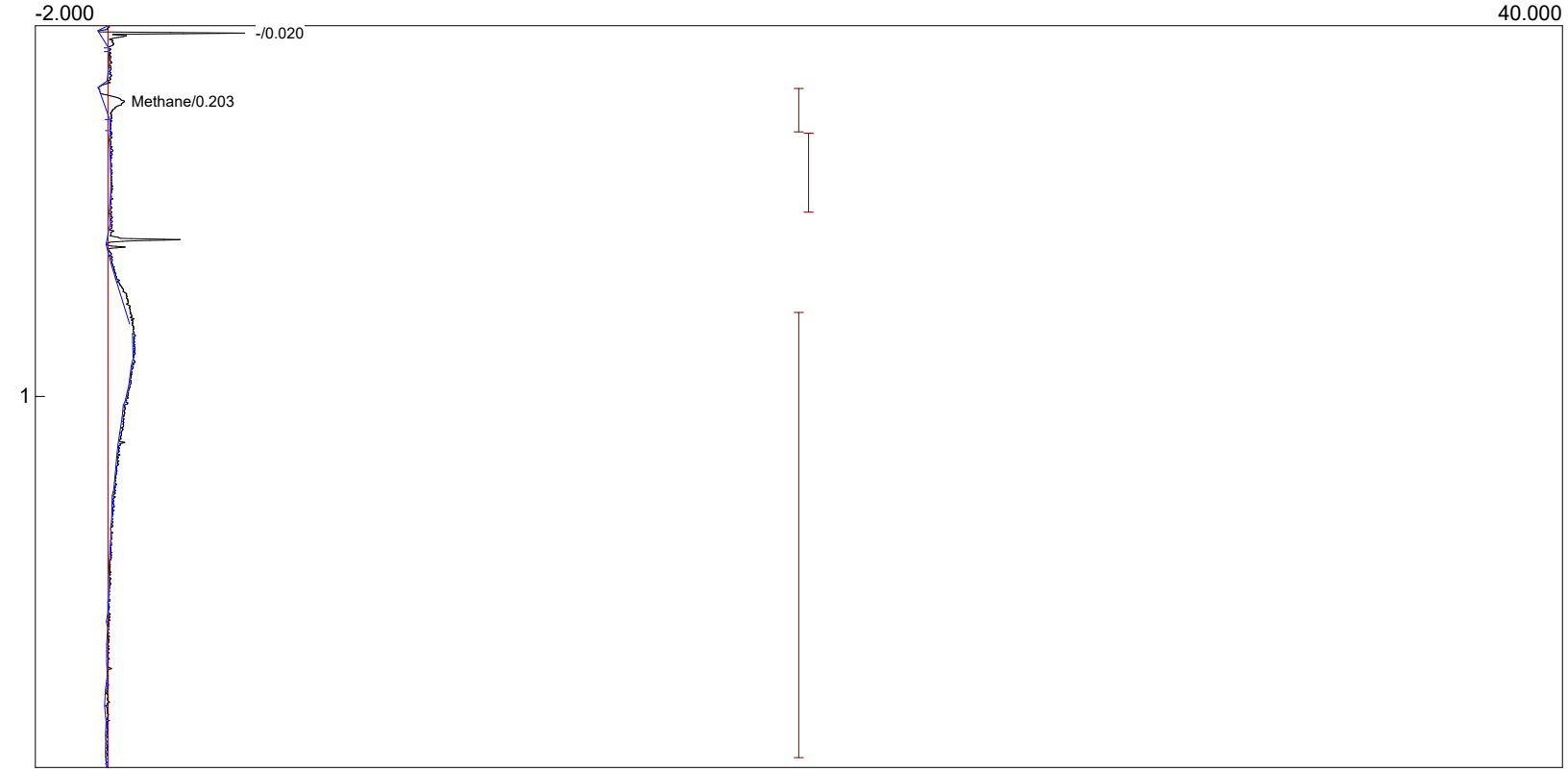

| Component | Retention | Area |
|---|---|---|
| | | 0.0000 |

Lab name: TRC Bakersfield
Client: Kern Energy
Client ID: THI Heater
Analysis date: 12/30/2023 13:27:11
Description: FID-CHANNEL 1
Data file: Lab_1843_14.CHR ()
Sample: 217258 Run 2 Inj 3
Operator: J McSweeney, QI



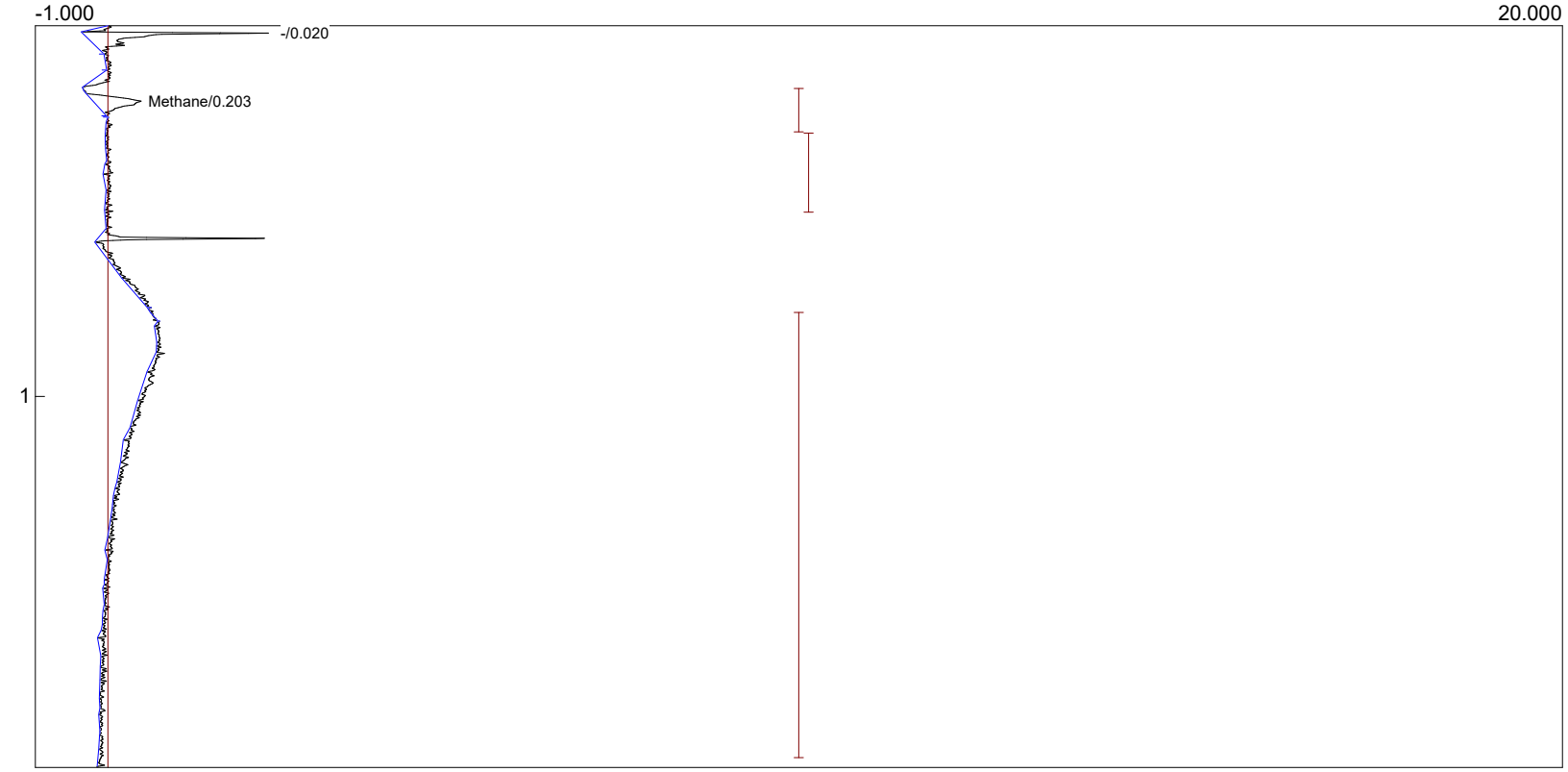

| Component | Retention | Area |
|---|---|---|
| | | 0.0000 |

Lab name: TRC Bakersfield
Client: Kern Energy
Client ID: THI Heater
Analysis date: 12/30/2023 13:32:58
Description: FID-CHANNEL 1
Data file: Lab_1843_15.CHR ()
Sample: 217259 Run 3 Inj 1
Operator: J McSweeney, QI



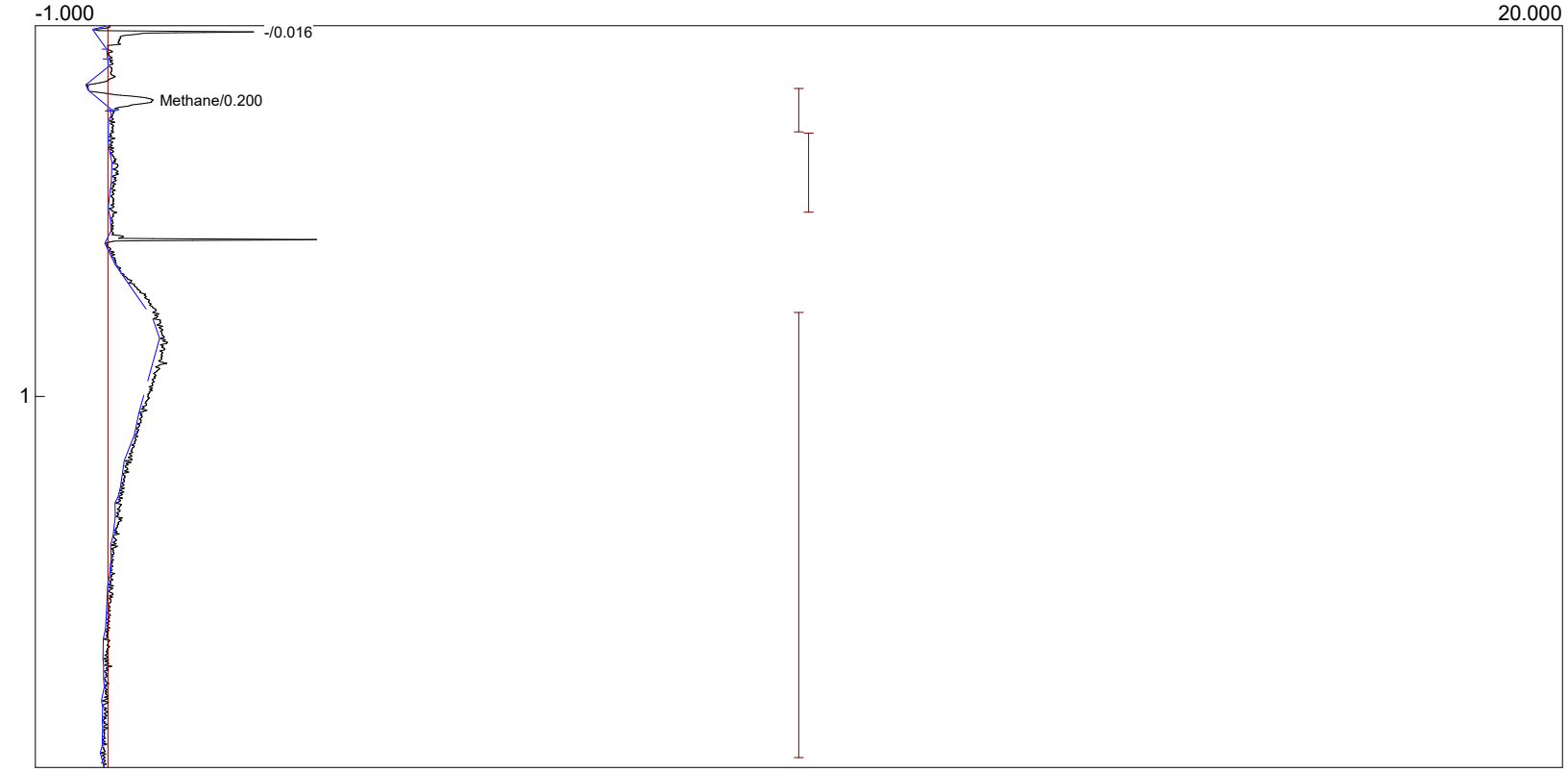

| Component | Retention | Area |
|---|---|---|
| Methane | 0.203 | 1.1055 |
| | | 1.1055 |

Lab name: TRC Bakersfield
Client: Kern Energy
Client ID: THI Heater
Analysis date: 12/30/2023 13:36:33
Description: FID-CHANNEL 1
Data file: Lab_1843_16.CHR ()
Sample: 217259 Run 3 Inj 2
Operator: J McSweeney, QI



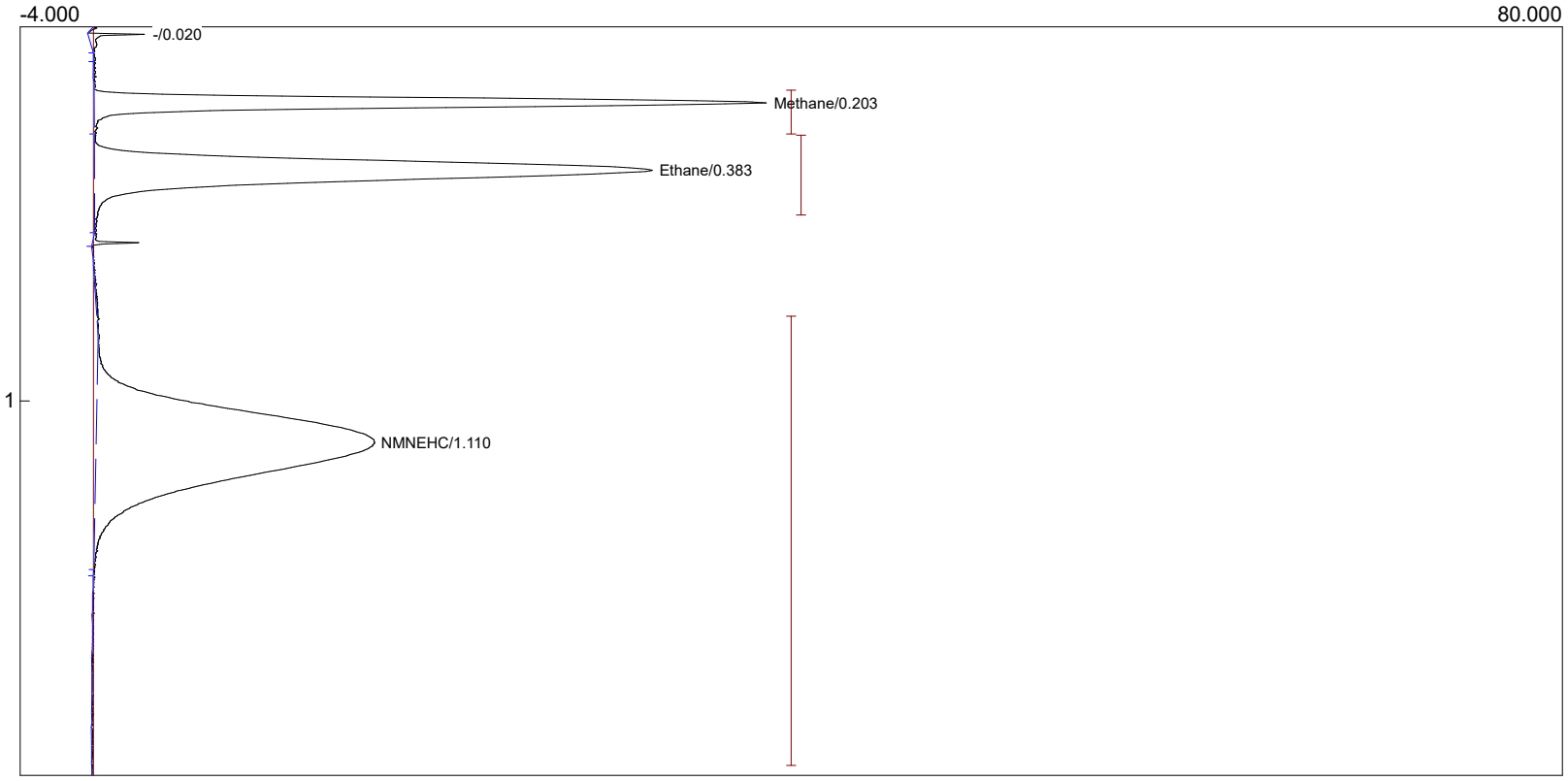

| Component | Retention | Area |
|---|---|---|
| Methane | 0.203 | 1.0921 |
| | | 1.0921 |

Lab name: TRC Bakersfield
Client: Kern Energy
Client ID: THI Heater
Analysis date: 12/30/2023 13:41:32
Description: FID-CHANNEL 1
Data file: Lab_1843_17.CHR ()
Sample: 217259 Run 3 Inj 3
Operator: J McSweeney, QI



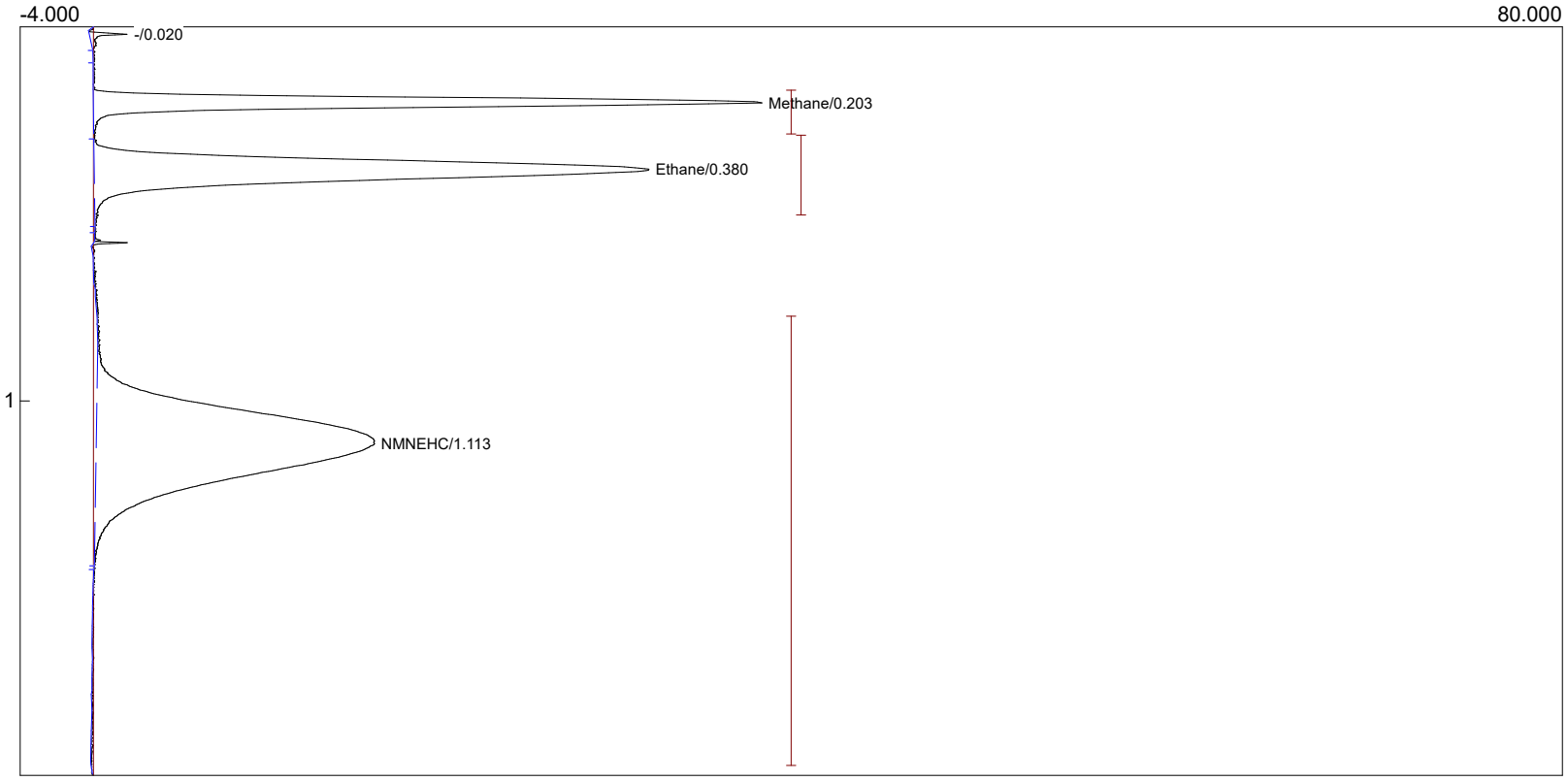

| Component | Retention | Area |
|---|---|---|
| Methane | 0.200 | 1.1690 |
| | | 1.1690 |

Lab name: TRC Bakersfield
Client: Calibration
Analysis date: 12/30/2023 13:45:14
Description: FID-CHANNEL 1
Data file: Lab_1843_18.CHR ()
Sample: FCal 15 ppm Inj 1
Operator: J McSweeney, QI



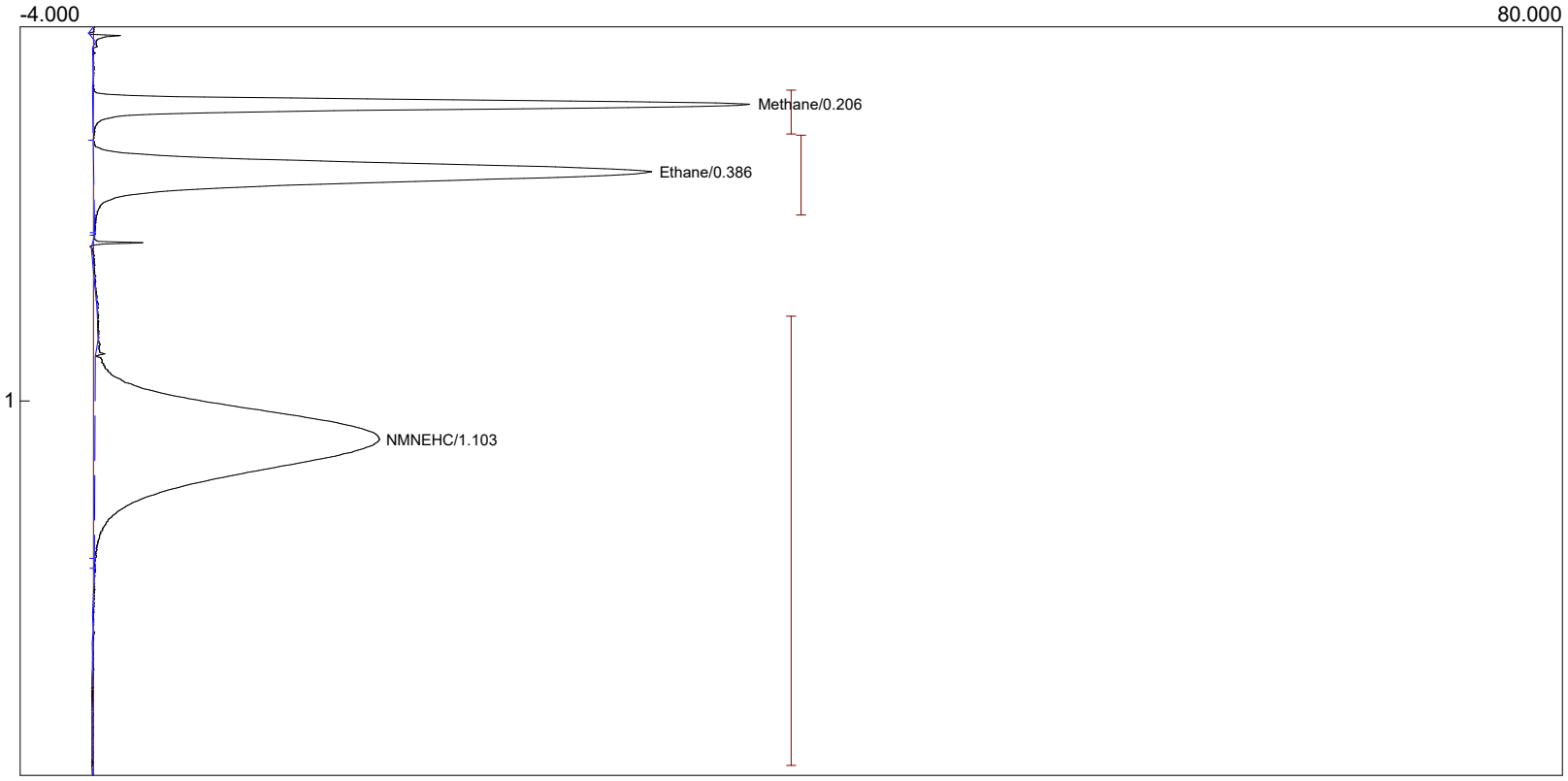

| Component | Retention | Area |
|---|---|---|
| Methane | 0.203 | 62.7031 |
| Ethane | 0.383 | 107.2032 |
| NMNEHC | 1.110 | 179.2038 |
| | | 349.1101 |

Lab name: TRC Bakersfield
Client: Calibration
Analysis date: 12/30/2023 13:48:56
Description: FID-CHANNEL 1
Data file: Lab_1843_19.CHR ()
Sample: FCal 15 ppm Inj 2
Operator: J McSweeney, QI




| Component | Retention | Area |
|---|---|---|
| Methane | 0.203 | 62.8284 |
| Ethane | 0.380 | 106.9520 |
| NMNEHC | 1.113 | 179.2086 |
| | | 348.9890 |

Lab name: TRC Bakersfield
Client: Calibration
Analysis date: 12/30/2023 13:51:35
Description: FID-CHANNEL 1
Data file: Lab_1843_20.CHR ()
Sample: FCal 15 ppm Inj 3
Operator: J McSweeney, QI




| Component | Retention | Area |
|---|---|---|
| Methane | 0.206 | 62.8820 |
| Ethane | 0.386 | 106.7544 |
| NMNEHC | 1.103 | 181.9892 |
| | | 351.6256 |

# VOC CALIBRATION GAS CERTIFICATES

| | | | |
|---|---|---|---|
| Cylinder Number: | EB0056927 | Certification Date: | 3/29/2022 |
| Mixture Grade: | Certified Mixture | Issuance Date: | 3/29/2022 |
| Certificate Number: | | Expiration Date: | 3/29/2030 |
| Final Pressure: | 2015 PSIG | Batch Number: | 08422B-02T5 |
| | | Part Number: | T5C 7FB0001-A1-3 |

Do not use below 100 psi (0.7 megapascals)

## Certified Concentrations

| Component | Concentration | Analytical Uncertainty | | Assay Dates |
|---|---|---|---|---|
| Methane | 4.99 ppm | 10 % | Relative | 3/29/2022 |
| Ethane | 4.98 ppm | 10 % | Relative | 3/29/2022 |
| Propane | 4.91 ppm | 10 % | Relative | 3/29/2022 |
| Nitrogen | Balance | | | |

## Anaytical Instrumentation

| Component | Analytical Principle | Make | Model | Serial | MPC Date |
|---|---|---|---|---|---|
| Methane | Gravimetric | | | | |
| Ethane | Gravimetric | | | | |
| Propane | Gravimetric | | | | |

Cylinder serial numbers in this batch: EB0056927

The calibration results published in this certificate were obtained using equipment and standards capable of producing results that are traceable to National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI). The expanded uncertainties, if included on this certificate, use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. If uncertainties are not included on this certificate, they are available upon request. The nitrogen used as a component or balance gas as well as the oxygen used in air mixtures meets the requirements set forth in 40CFR1065.750. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from the calibration facility. Calibration certificates without signatures are not valid. This calibration meets the requirements of ISO/IEC 17025-2017.

Analytical Chemist Christopher Haas

Quality Manager Allison Martinez

Production Laboratory:
Tier 5 Labs
PGVP Vendor ID R12022
5353 W Southern Ave
Indianapolis, IN 46241

| | | | | |
|---|---|---|---|---|
| Cylinder Number: | CC455254 | | Certification Date: | 3/13/2023 |
| Mixture Grade: | Certified Mixture | | Issuance Date: | 3/13/2023 |
| Certificate Number: | 06823B-02T5-C02 | | Expiration Date: | 3/13/2031 |
| Final Pressure: | 2030 | PSIG | Batch Number: | 06823B-02T5 |
| Order Number: | 7180624 002 | | Part Number: | T5C 7FB0001-A1-4 |
| Cylinder Volume: | 140.8 | | CGA Outlet Connection: | 350 |

Do not use below 100 psi (0.7 megapascals)

## Certified Concentrations

| Component | Concentration | | Analytical Uncertainty | | | Assay Dates |
|---|---|---|---|---|---|---|
| Methane | 15.0 | ppm | 5 | % | Relative | 3/13/2023 |
| Ethane | 14.8 | ppm | 5 | % | Relative | 3/13/2023 |
| Propane | 14.8 | ppm | 5 | % | Relative | 3/13/2023 |
| Nitrogen | Balance | | | | | |

## Anaytical Instrumentation

| Component | Analytical Principle | Make | Model | Serial | MPC Date |
|---|---|---|---|---|---|
| Methane | Gravimetric | | | | |
| Ethane | Gravimetric | | | | |
| Propane | Gravimetric | | | | |

Cylinder serial numbers in this batch: CC719540 CC455254

The calibration results published in this certificate were obtained using equipment and standards capable of producing results that are traceable to National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI). The expanded uncertainties, if included on this certificate, use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. If uncertainties are not included on this certificate, they are available upon request. The nitrogen used as a component or balance gas as well as the oxygen used in air mixtures meets the requirements set forth in 40CFR1065.750. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from the calibration facility. Calibration certificates without signatures are not valid. This calibration meets the requirements of ISO/IEC 17025-2017.

Carlie Peacock

Carlie Peacock

Analytical Chemist

Alexis Gerke

Alex Gerke

Analytical Chemist

Production Laboratory:

Tier 5 Labs
PGVP Vendor ID R12023
5353 W Southern Ave
Indianapolis, IN 46241

Page - 1 of 1

| | | | |
|---|---|---|---|
| Cylinder Number: | CC730137 | Certification Date: | 3/29/2022 |
| Mixture Grade: | Certified Mixture | Issuance Date: | 3/29/2022 |
| Certificate Number: | | Expiration Date: | 3/29/2030 |
| Final Pressure: | 2015 PSIG | Batch Number: | 08422B-02T5 |
| | | Part Number: | T5C 7FB0001-A1-5 |

Do not use below 100 psi (0.7 megapascals)

## Certified Concentrations

| Component | Concentration | | Analytical Uncertainty | | | Assay Dates |
|---|---|---|---|---|---|---|
| Methane | 50.1 | ppm | 5 | % | Relative | 3/29/2022 |
| Ethane | 49.1 | ppm | 5 | % | Relative | 3/29/2022 |
| Propane | 49.3 | ppm | 5 | % | Relative | 3/29/2022 |
| Nitrogen | Balance | | | | | |

## Anaytical Instrumentation

| Component | Analytical Principle | Make | Model | Serial | MPC Date |
|---|---|---|---|---|---|
| Methane | Gravimetric | | | | |
| Ethane | Gravimetric | | | | |
| Propane | Gravimetric | | | | |

Cylinder serial numbers in this batch: CC730137

The calibration results published in this certificate were obtained using equipment and standards capable of producing results that are traceable to National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI). The expanded uncertainties, if included on this certificate, use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. If uncertainties are not included on this certificate, they are available upon request. The nitrogen used as a component or balance gas as well as the oxygen used in air mixtures meets the requirements set forth in 40CFR1065.750. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from the calibration facility. Calibration certificates without signatures are not valid. This calibration meets the requirements of ISO/IEC 17025-2017.

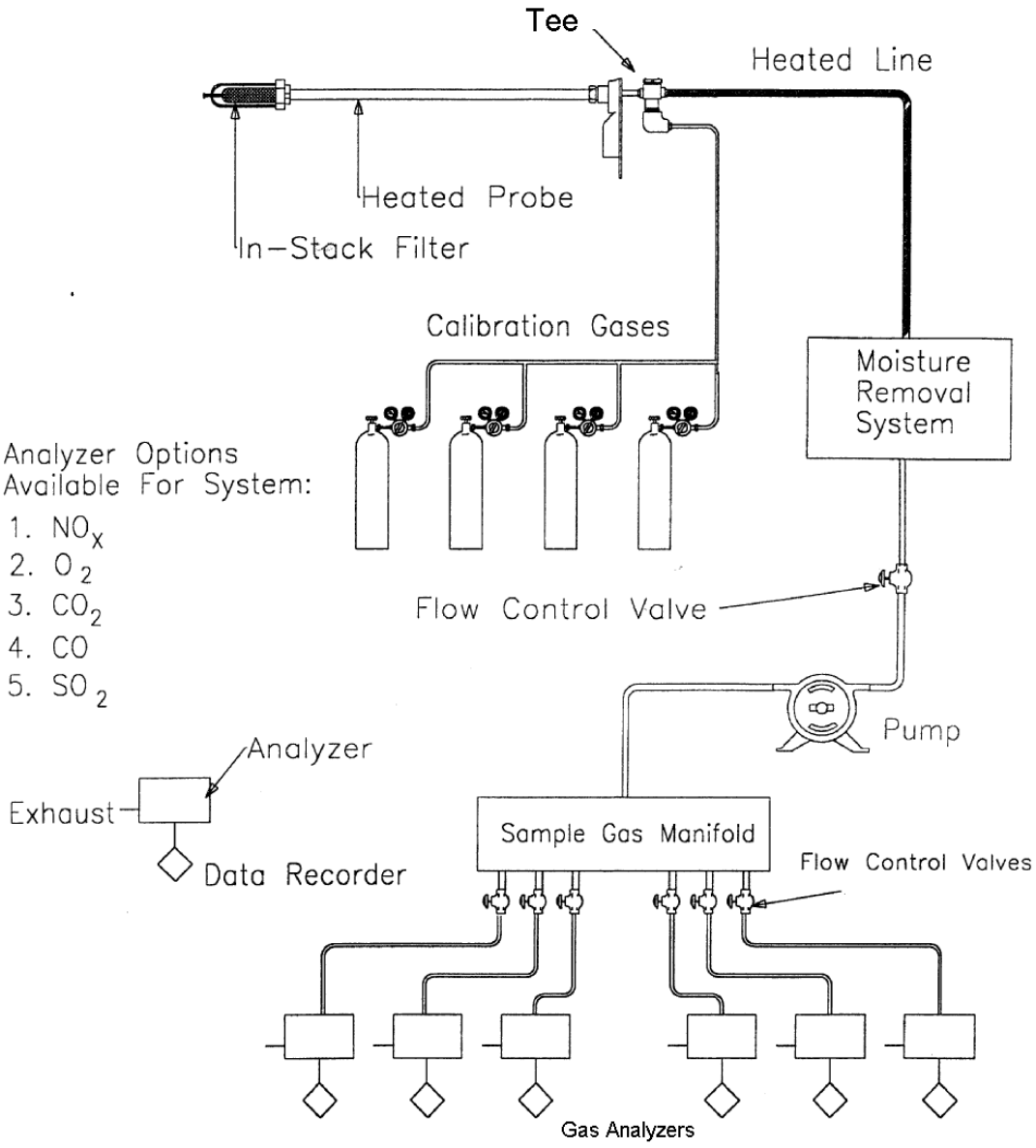
Analytical Chemist Christopher Haas

Quality Manager Allison Martinez

Production Laboratory:
Tier 5 Labs
PGVP Vendor ID R12022
5353 W Southern Ave
Indianapolis, IN 46241

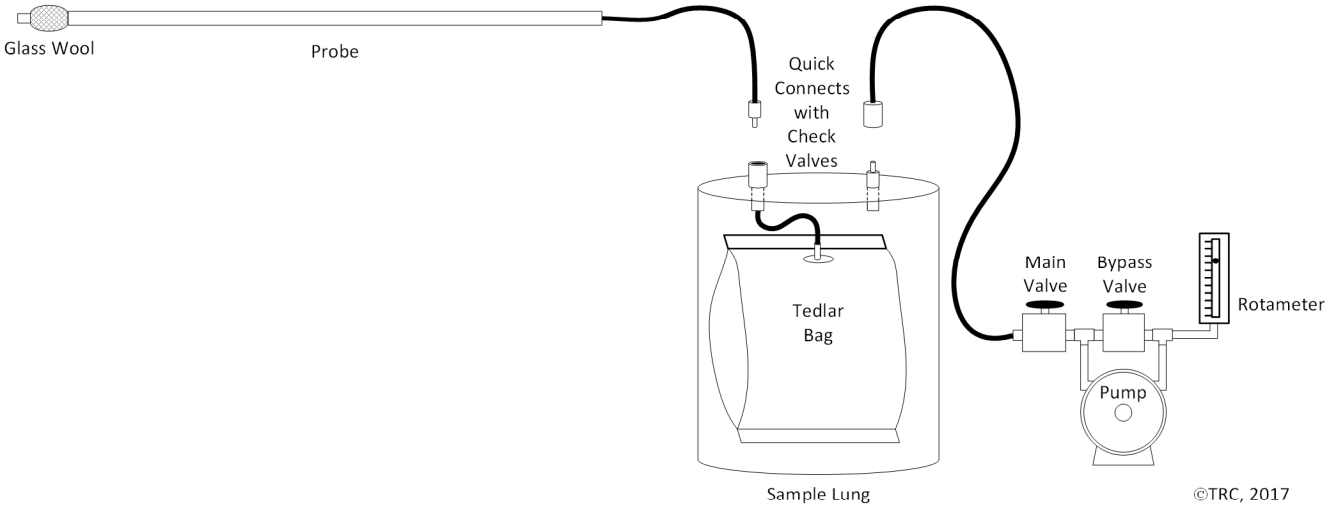
# Determination of Multiple Gaseous Pollutants Using an Extractive Sampling Train

USEPA Promulgated Methods 3A, 6C, 7E and 10



# Determination of Gaseous Organic Compounds by Gas Chromatography (Tedlar Bag Procedure)

USEPA Promulgated Method 18



## Sivesind, Shawna

**From:** McSweeney, James
**Sent:** Tuesday, December 26, 2023 12:23 PM
**To:** Sivesind, Shawna
**Subject:** Fwd: [EXTERNAL] RE: Tulsa Heater (S-37-1-18) Source Testing questions

Fyi

Sent from my Verizon, Samsung Galaxy smartphone
Get Outlook for Android

---

**From:** Source Test South <Source.TestSouth@valleyair.org>
**Sent:** Tuesday, December 26, 2023 10:24:31 AM
**To:** Harris, Jeff <JHarris@trccompanies.com>; McSweeney, James <JMcSweeney@trccompanies.com>; 'Thomas Landeros' <tlanderos@kernenergy.com>; 'mpalmer@kernenergy.com' <mpalmer@kernenergy.com>; Gabe Castro <gcastro@kernenergy.com>
**Subject:** RE: [EXTERNAL] RE: Tulsa Heater (S-37-1-18) Source Testing questions



*District Staff has completed the review of the test protocol submitted for the testing of permitted unit(s) S-37-1-18. Staff finds the protocol will meet the District's requirements. Should the test date or test methods change from the approved protocol, then a modified protocol shall be submitted for review no later than seven (7) days prior to the scheduled test date. Submittal of the modified protocol after this date may result in test cancellation by District Staff.*

*Source test reports may be submitted to the District electronically at Source.TestSouth@valleyair.org or via PAS Portal. Refer to the latest policy for requirements.*

*Sincerely,*

*Dave Born*
*Supervising Air Quality Inspector*
*Office: (661) 392-5559*
*Fax: (661) 392-5585*
*Cell: (559) 260-7497*
San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

---

**From:** Renee Chavez <Renee.Chavez@valleyair.org>
**Sent:** Friday, December 22, 2023 4:11 PM
**To:** Source Test South <Source.TestSouth@valleyair.org>
**Subject:** FW: [EXTERNAL] RE: Tulsa Heater (S-37-1-18) Source Testing questions