| Linearity Check | $NO_X$-A | CO-A | $O_2$-A | $CO_2$-A | $NO_X$-B | $O_2$-B |
|---|---|---|---|---|---|---|
| Analyzer Range (ppmv), $O_2$ & $CO_2$ in % vol | 9.95 | 9.76 | 22.08 | 8.45 | 78.43 | 22.08 |
| Low Level Certified Value (ppm or % vol) | na | na | na | na | na | na |
| Mid Level Certified Value (ppm or % vol) | 5.03 | 5.10 | 12.05 | 4.41 | 39.63 | 12.05 |
| High Level Certified Value (ppm or % vol) | 9.95 | 9.76 | 22.08 | 8.45 | 78.43 | 22.08 |
| Zero Target (% Span) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Low Level Target (% Span) | na | na | na | na | na | na |
| Mid Level Target (% Span) | 50.6 | 52.3 | 54.6 | 52.2 | 50.5 | 54.6 |
| High Level Target (% Span) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Zero Observed (% Span) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Low Level Observed (% Span) | na | na | na | na | na | na |
| Mid Level Observed (% Span) | 49.3 | 53.6 | 54.6 | 52.1 | 50.4 | 54.6 |
| High Level Observed (% Span) | 99.4 | 99.4 | 100.0 | 100.6 | 100.1 | 100.0 |
| Zero Observed (ppm or % vol) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Low Level Observed (ppm or % vol) | na | na | na | na | na | na |
| Mid Level Observed (ppm or % vol) | 4.91 | 5.23 | 12.05 | 4.40 | 39.51 | 12.05 |
| High Level Observed (ppm or % vol) | 9.89 | 9.70 | 22.07 | 8.50 | 78.48 | 22.07 |
| % Difference From Zero to Target | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| % Difference From Low to Target | na | na | na | na | na | na |
| % Difference From Mid to Target | 1.2 | -1.3 | 0.0 | 0.1 | 0.2 | 0.0 |
| % Difference From High to Target | 0.6 | 0.6 | 0.0 | -0.6 | -0.1 | 0.0 |
| EPA Allowable % Difference from Target | ±2% Span | ±2% Span | ±2% Span | ±2% Span | ±2% Span | ±2% Span |
| **Run CT1-Strat** | $NO_X$-A | CO-A | $O_2$-A | $CO_2$-A | $NO_X$-B | $O_2$-B |
| Analyzer Range (ppm), $O_2$ & $CO_2$ in % | 9.95 | 9.76 | 22.08 | 8.45 | 78.43 | 22.08 |
| Calibration Gas Certified Value (ppm or %) | 5.03 | 5.10 | 22.08 | 4.41 | 39.63 | 22.08 |
| Target Calibration Gas (% Span) | 50.6 | 52.3 | 100.0 | 52.2 | 50.5 | 100.0 |
| Actual Zero Gas from Direct (% Span) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Actual Calibration Gas from Direct (% Span) | 49.3 | 53.6 | 100.0 | 52.1 | 50.4 | 100.0 |
| Initial Readings | | | | | | |
| Zero Gas (% Span) | 1.2 | 2.8 | 0.1 | 0.0 | 0.0 | 0.2 |
| Calibration Gas (% Span) | 48.7 | 55.0 | 99.6 | 51.4 | 48.8 | 99.3 |
| Zero Gas (ppmv) | 0.12 | 0.27 | 0.03 | 0.00 | -0.02 | 0.05 |
| Calibration Gas (ppmv) | 4.85 | 5.37 | 22.00 | 4.34 | 38.27 | 21.93 |
| Final Readings | | | | | | |
| Zero Gas (% Span) | 1.3 | 1.9 | 0.2 | 0.0 | 0.8 | 0.1 |
| Calibration Gas (% Span) | 49.3 | 54.8 | 99.6 | 52.1 | 49.1 | 99.0 |
| Zero Gas (ppmv) | 0.13 | 0.19 | 0.05 | 0.00 | 0.63 | 0.03 |
| Calibration Gas (ppmv) | 4.91 | 5.35 | 22.00 | 4.40 | 38.48 | 21.87 |
| Bias and Drift Calculations | | | | | | |
| Zero Bias (% Span) (Run-Direct Cal) ≤5% | 1.3 | 1.9 | 0.2 | 0.0 | 0.8 | 0.1 |
| Calibration Bias (% Span) ≤5% | 0.0 | 1.2 | -0.3 | 0.0 | -1.3 | -0.9 |
| Zero Drift (% Span) (Run-Run) ≤2 or 3% | -0.1 | 0.8 | -0.1 | 0.0 | -0.8 | 0.1 |
| Calibration Drift (% Span) ≤2 or 3% | -0.6 | 0.2 | 0.0 | -0.7 | -0.3 | 0.3 |
| Run Results | | | | | | |
| Raw Results (% Span) | 43.3 | 37.0 | 56.4 | 55.9 | 0.0 | 0.0 |
| Raw Results (ppmv or % vol) | 4.31 | 3.61 | 12.46 | 4.72 | | |
| Corrected Results (ppmv or % vol) | 4.42 | 3.36 | 12.49 | 4.76 | -0.32 | -0.04 |

# Quality Assurance Activities
# Calibration Error, Bias, and Drift Checks

Unit CT1

| Run CT1-C-1A/RA-1 | $NO_X$-A | CO-A | $O_2$-A | $CO_2$-A | $NO_X$-B | $O_2$-B |
|---|---|---|---|---|---|---|
| Analyzer Range (ppm), $O_2$ & $CO_2$ in % | 9.95 | 9.76 | 22.08 | 8.45 | 78.43 | 22.08 |
| Calibration Gas Certified Value (ppm or %) | 5.03 | 5.10 | 22.08 | 4.41 | 39.63 | 22.08 |
| Target Calibration Gas (% Span) | 50.6 | 52.3 | 100.0 | 52.2 | 50.5 | 100.0 |
| Actual Zero Gas from Direct (% Span) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Actual Calibration Gas from Direct (% Span) | 49.3 | 53.6 | 100.0 | 52.1 | 50.4 | 100.0 |
| Initial Readings | | | | | | |
| Zero Gas (% Span) | 1.3 | 1.9 | 0.2 | 0.0 | 0.8 | 0.1 |
| Calibration Gas (% Span) | 49.3 | 54.8 | 99.6 | 52.1 | 49.1 | 99.0 |
| Zero Gas (ppmv) | 0.13 | 0.19 | 0.05 | 0.00 | 0.63 | 0.03 |
| Calibration Gas (ppmv) | 4.91 | 5.35 | 22.00 | 4.40 | 38.48 | 21.87 |
| Final Readings | | | | | | |
| Zero Gas (% Span) | 1.2 | 2.6 | 0.2 | 0.0 | 0.8 | 0.1 |
| Calibration Gas (% Span) | 49.4 | 54.6 | 99.6 | 52.1 | 49.1 | 99.0 |
| Zero Gas (ppmv) | 0.12 | 0.25 | 0.05 | 0.00 | 0.63 | 0.03 |
| Calibration Gas (ppmv) | 4.92 | 5.33 | 22.00 | 4.40 | 38.48 | 21.87 |
| Bias and Drift Calculations | | | | | | |
| Zero Bias (% Span) (Run-Direct Cal) ≤5% | 1.2 | 2.6 | 0.2 | 0.0 | 0.8 | 0.1 |
| Calibration Bias (% Span) ≤5% | 0.1 | 1.0 | -0.3 | 0.0 | -1.3 | -0.9 |
| Zero Drift (% Span) (Run-Run) ≤2 or 3% | 0.1 | -0.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| Calibration Drift (% Span) ≤2 or 3% | -0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| Run Results | | | | | | |
| Raw Results (% Span) | 43.8 | 41.2 | 56.1 | 56.2 | 41.7 | 51.9 |
| Raw Results (ppmv or % vol) | 4.36 | 4.02 | 12.39 | 4.75 | 32.69 | 11.47 |
| Corrected Results (ppmv or % vol) | 4.45 | 3.79 | 12.41 | 4.76 | 33.57 | 11.57 |

STACK TESTING ACCREDITATION COUNCIL 500 W. Wood St., Palatine, IL 60067, director@betterdata.org

February 28, 2011

Mr. Ed MacKinnon
TRC

VIA E-mail

Dear Mr. MacKinnon,

On behalf of the STAC Board of Directors, I am pleased to inform you that TRC has been granted interim accreditation by the Stack Testing Accreditation Council (STAC). After careful review of your Quality System documentation and procedures, STAC has determined that they are in conformance with ASTM D7036-04 "Standard Practice for the Competency of Air Emission Testing Bodies". Final accreditation is contingent upon successful completion of your field audit. Please see Module 3 of STAC policy documentation for scheduling requirements.

During this period of interim accreditation, TRC may not claim to be a STAC accredited organization although you may refer to your interim status. To achieve final accreditation requires evidence that your Quality System is effectively implemented in your organization as determined by the field assessment. You may claim that your Quality System meets ASTM D7036 requirements.

Please note that the Attestation of Compliance you signed as part of your application for accreditation requires TRC to be in continuous compliance with the provisions of ASTM D7036. You are also required to comply with all relevant STAC policies and procedures. I encourage you to review this information.

If you have any questions, please feel free to contact me at 847-654-4569. Thank you for your participation in the STAC process and congratulations.

Yours truly,

Scott Evans
STAC, General Manager

**Dedicated to Continuous Improvement of Air Quality Measurement**

# This is to Certify that:

## Richard Hyre

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

EPA Method CTM-027

**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:** **05-15-2017**

Date of Issue: 05-15-2012

Certificate Number: 00320

Edward J MacKinnon

Air Measurements Practice Quality Director

TRC

# This is to Certify that:

## Richard Hyre

**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.

**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:** **08-25-2013**

Date of Issue: 01-19-2011

Certificate Number: 00056

Edward J MacKinnon

Air Measurements Practice Quality Director

TRC

# This is to Certify that:

## Richard Hyre

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

EPA Methods 1, 1A, 2, 2A, 2C, 2D, 2F, 2G, 2H, 3, 3B, 4, 5, 5A, 5B, 5E, 5F, 5i, 17, 19, 201A and 202..

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

**This certification is effective until:** **April 13, 2014**

Edward J MacKinnon

Air Measurements Practice Quality Coordinator

TRC