WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

# AUGUST 2023

# MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

September 29, 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS01
## BERTHA GANTER - FORT MCKAY
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Bertha Ganter-Fort McKay | Station number: | AMS01 |
| Calibration Date: | August 1, 2023 | Last Cal Date: | July 14, 2023 |
| Start time (MST): | 8:37 | End time (MST): | 12:28 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.21 | ppm | Cal Gas Exp Date: | March 10, 2031 |
| Cal Gas Cylinder #: | CC418809 | | | |
| Removed Cal Gas Conc: | 49.21 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3565 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 5609 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: JC1501301448

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.000680 | 0.999194 | Backgd or Offset: | 19.2 | 19.2 |
| Calibration intercept: | -0.433310 | 0.086933 | Coeff or Slope: | 0.892 | 0.886 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 4918 | 81.3 | 800.3 | 800.1 | 1.000 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| high point | 4918 | 81.3 | 800.3 | 800.1 | 1.000 |
| second point | 4959 | 40.7 | 400.6 | 399.4 | 1.003 |
| third point | 4979 | 20.3 | 199.8 | 200.1 | 0.999 |
| as left zero | 5000 | 0.0 | 0.0 | 0.7 | ---- |
| as left span | 4918 | 81.3 | 800.3 | 800.6 | 1.000 |
| | | | | Average Correction Factor | 1.001 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 799.90 | Previous response | 800.38 | *% change | -0.1% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

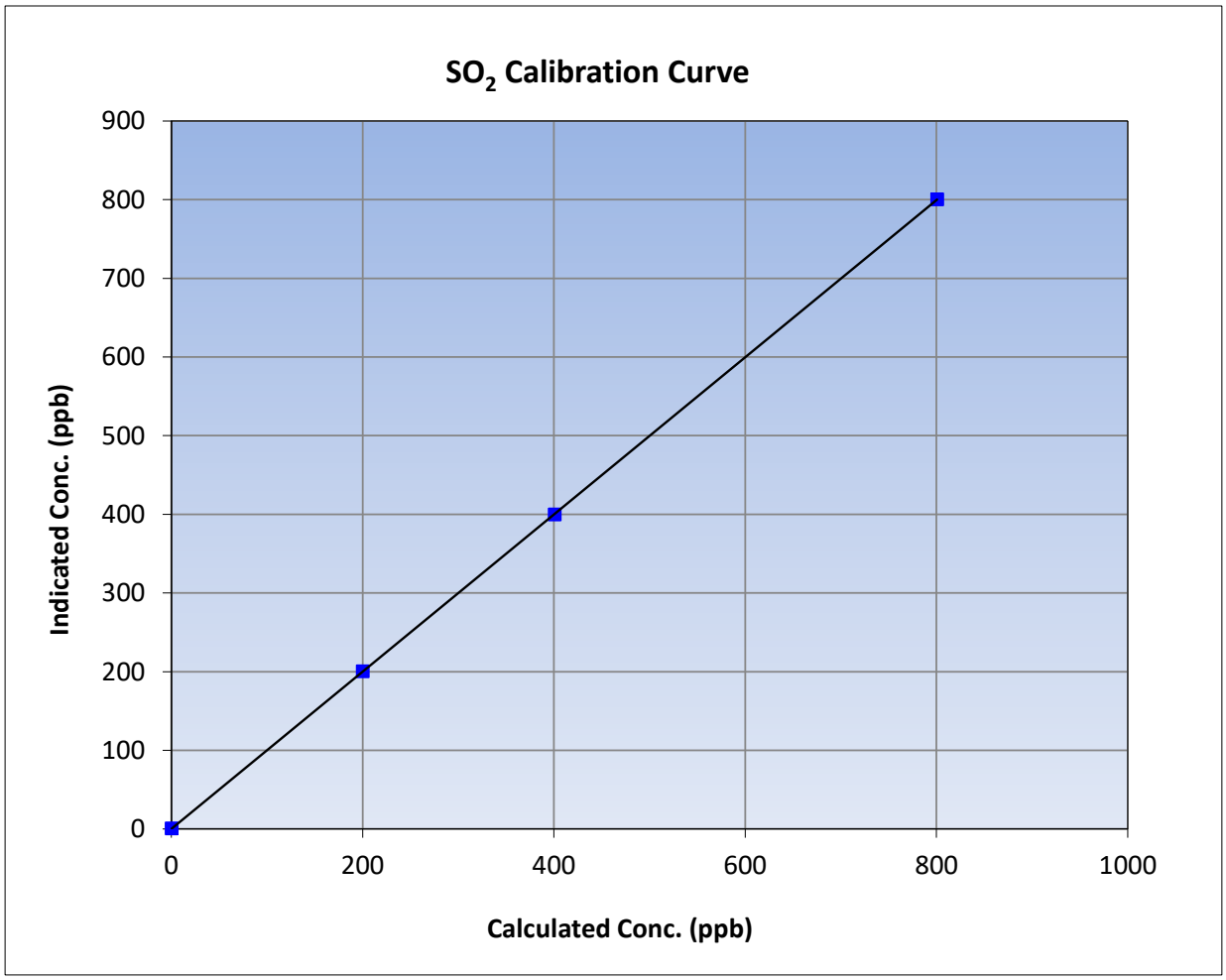
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 14, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 8:37 | End Time (MST): | 12:28 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | JC1501301448 |

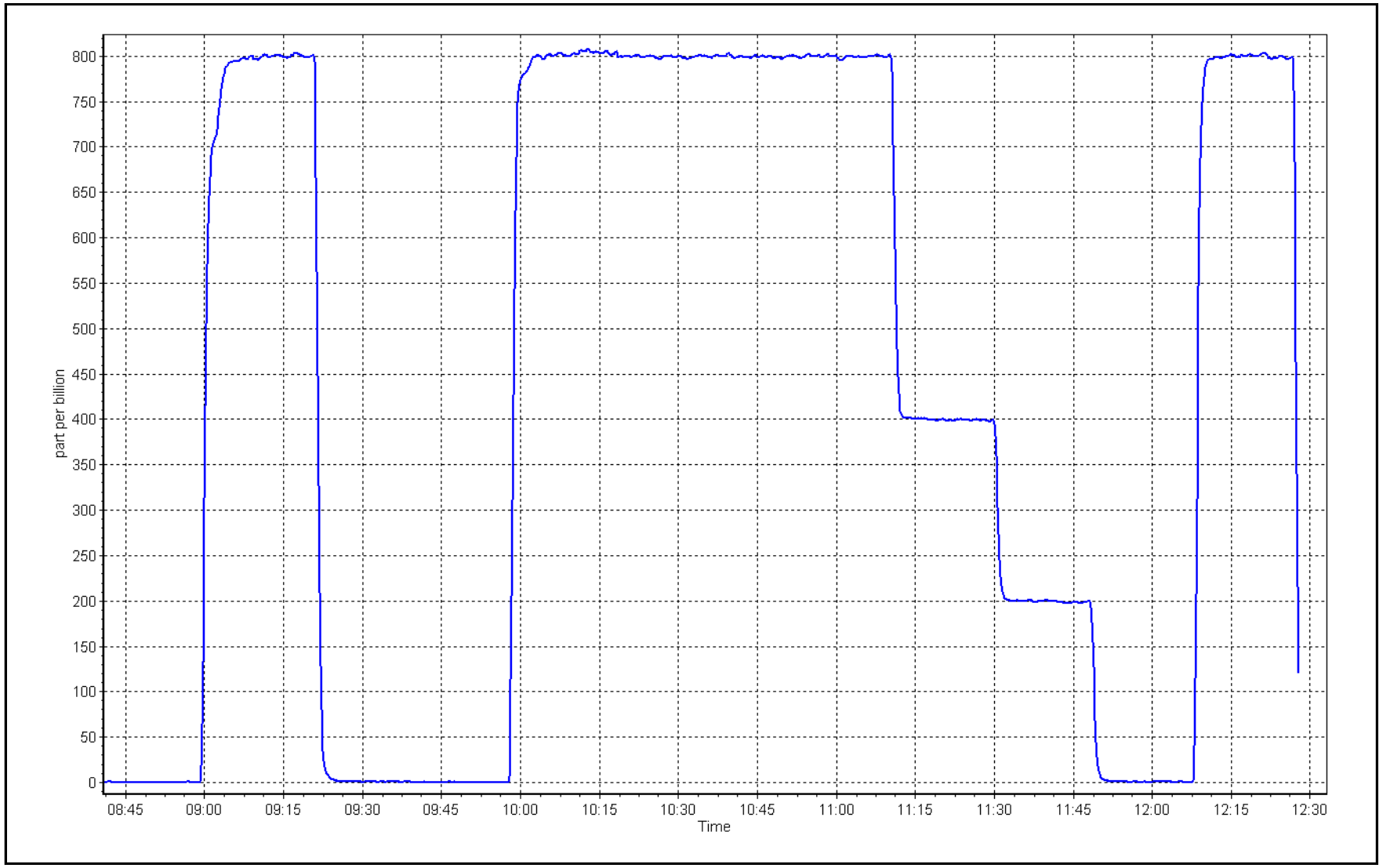
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.3 | ---- |
| 800.3 | 800.1 | 1.0002 |
| 400.6 | 399.4 | 1.0030 |
| 199.8 | 200.1 | 0.9986 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999996 | *≥0.995* |
| Slope | 0.999194 | *0.90 - 1.10* |
| Intercept | 0.086933 | *+/-30* |



**SO2 Calibration Plot** Date: August 1, 2023 Location: Bertha Ganter-Fort McKay



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Bertha Ganter-Fort McKay | Station number: | AMS01 |
| Calibration Date: | August 28, 2023 | Last Cal Date: | July 18, 2023 |
| Start time (MST): | 9:08 | End time (MST): | 15:22 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.10 | ppm | Cal Gas Exp Date: | September 16, 2024 |
| Cal Gas Cylinder #: | CC511749 | | | |
| Removed Cal Gas Conc: | 5.10 | ppm | Rem Gas Exp Date: | N/A |
| Removed Gas Cyl #: | N/A | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3565 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 5609 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i-TLE | | Analyzer serial #: | 1218153461 | |
| Converter make: | CD Nova | | Converter serial #: | 470 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.000507 | 1.000364 | Backgd or Offset: | 2.28 | 2.29 |
| Calibration intercept: | 0.159999 | 0.140000 | Coeff or Slope: | 0.919 | 0.919 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 4921 | 78.4 | 80.0 | 78.2 | 1.026 |
| as found 2nd point | 4960 | 39.2 | 40.0 | 39.7 | 1.013 |
| as found 3rd point | 4980 | 19.6 | 20.0 | 19.9 | 1.015 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4921 | 78.4 | 80.0 | 80.2 | 0.997 |
| second point | 4960 | 39.2 | 40.0 | 40.1 | 0.997 |
| third point | 4980 | 19.6 | 20.0 | 20.1 | 0.995 |
| as left zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as left span | 4921 | 78.4 | 80.0 | 79.7 | 1.004 |
| SO2 Scrubber Check | 4919 | 81.3 | 813.0 | 0.0 | ---- |
| Date of last scrubber change: | | December 17, 2021 | | Ave Corr Factor | 0.997 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 78.0 | Prev response: | 80.19 | *% change: | -2.8% |
| Baseline Corr 2nd AF pt: | 39.5 | AF Slope: | 0.974934 | AF Intercept: | 0.379995 |
| Baseline Corr 3rd AF pt: | 19.7 | AF Correlation: | 0.999950 | | |

* = > +/-5% change initiates investigation

Notes: Inlet filter change and scrubber check completed after as founds. No adjustments made.

Calibration Performed By: Rene Chamberland

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

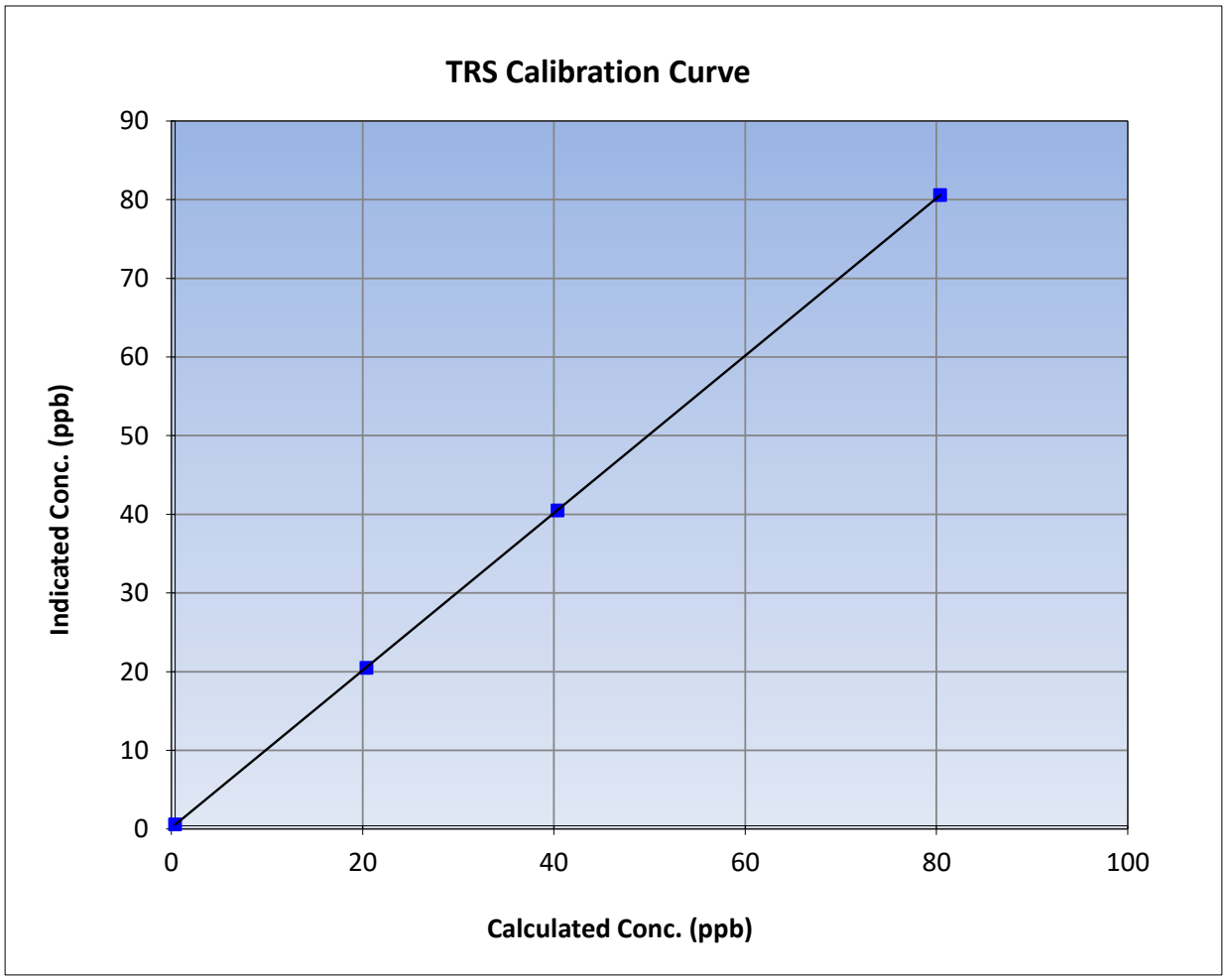
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 28, 2023 | Previous Calibration: | July 18, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:08 | End Time (MST): | 15:22 |
| Analyzer make: | Thermo 43i-TLE | Analyzer serial #: | 1218153461 |

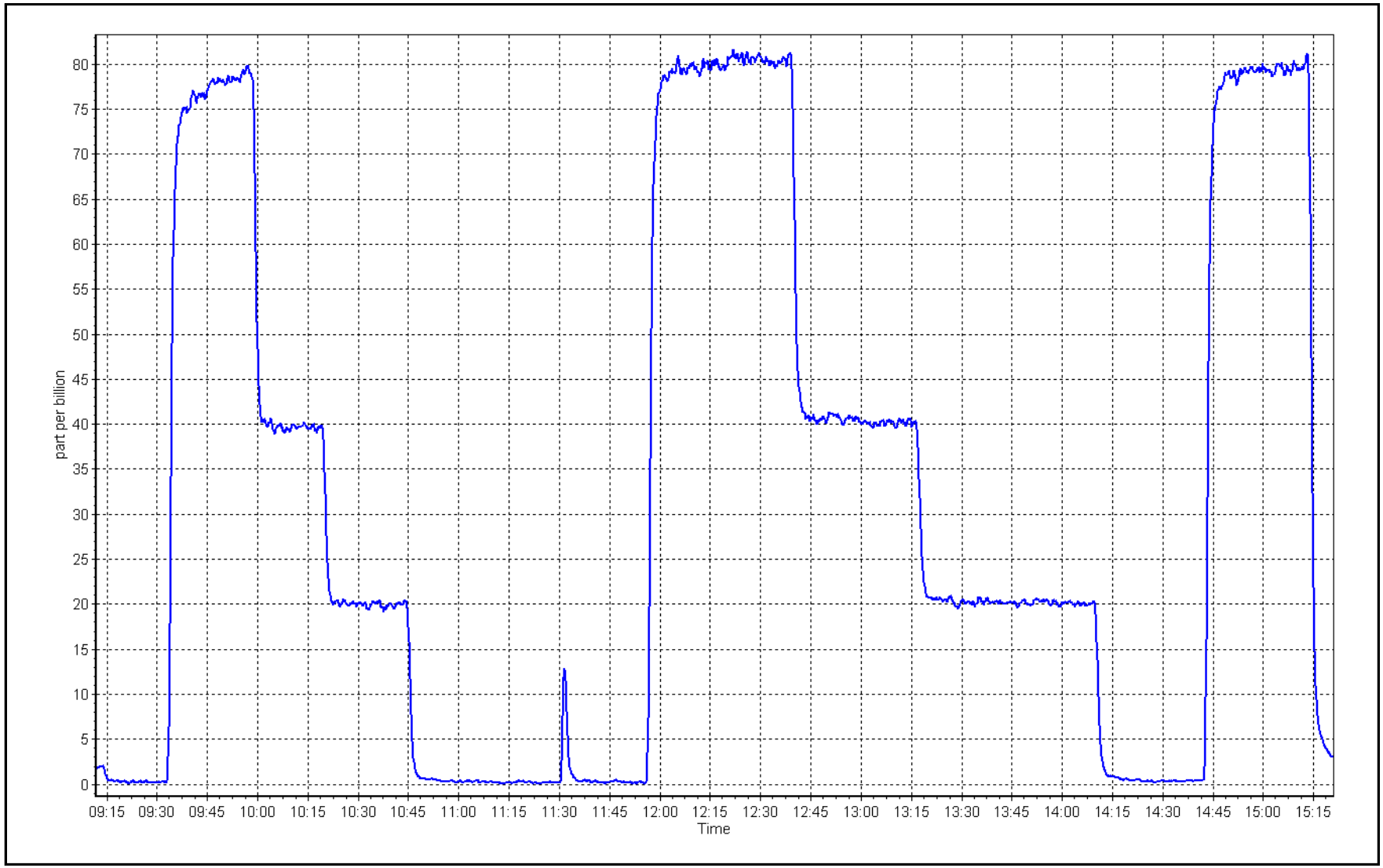
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 80.0 | 80.2 | 0.9974 |
| 40.0 | 40.1 | 0.9975 |
| 20.0 | 20.1 | 0.9949 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999997 | *≥0.995* |
| Slope | 1.000364 | *0.90 - 1.10* |
| Intercept | 0.140000 | *+/-3* |



**TRS Calibration Plot** Date: August 28, 2023 Location: Bertha Ganter-Fort McKay



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Bertha Ganter-Fort McKay | Station number: | AMS01 |
| Calibration Date: | August 28, 2023 | Last Cal Date: | July 18, 2023 |
| Start time (MST): | 9:08 | End time (MST): | 15:22 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.10 | ppm | Cal Gas Exp Date: | September 16, 2024 |
| Cal Gas Cylinder #: | CC511749 | | | |
| Removed Cal Gas Conc: | 5.10 | ppm | Rem Gas Exp Date: | N/A |
| Removed Gas Cyl #: | N/A | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3565 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 5609 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43iQTL | | Analyzer serial #: | 1200326167 | |
| Converter make: | Thermo Converter | | Converter serial #: | N/A | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.002857 | 1.003143 | Backgd or Offset: | 1.95 | 1.74 |
| Calibration intercept: | 0.056779 | 0.096765 | Coeff or Slope: | 1.014 | 1.014 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 4922 | 78.4 | 80.0 | 82.5 | 0.967 |
| as found 2nd point | 4960 | 39.2 | 40.0 | 41.1 | 0.968 |
| as found 3rd point | 4980 | 19.6 | 20.0 | 19.9 | 0.995 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4922 | 78.4 | 80.0 | 80.2 | 0.997 |
| second point | 4960 | 39.2 | 40.0 | 40.5 | 0.988 |
| third point | 4980 | 19.6 | 20.0 | 20.1 | 0.995 |
| as left zero | 5000 | 0.0 | 0.0 | 0.7 | ---- |
| as left span | 4922 | 78.4 | 80.0 | 78.6 | 1.018 |
| SO2 Scrubber Check | 4919 | 81.3 | 813.0 | -0.1 | ---- |
| Date of last scrubber change: | | March 21, 2022 | | Ave Corr Factor | 0.993 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 82.7 | Prev response: | 80.25 | *% change: | 3.0% |
| Baseline Corr 2nd AF pt: | 41.3 | AF Slope: | 1.036640 | AF Intercept: | -0.443312 |
| Baseline Corr 3rd AF pt: | 20.1 | AF Correlation: | 0.999942 | | |

* = > +/-5% change initiates investigation

Notes: Inlet filter change and scrubber check completed after as founds. Adjusted zero only.

Calibration Performed By: Rene Chamberland

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

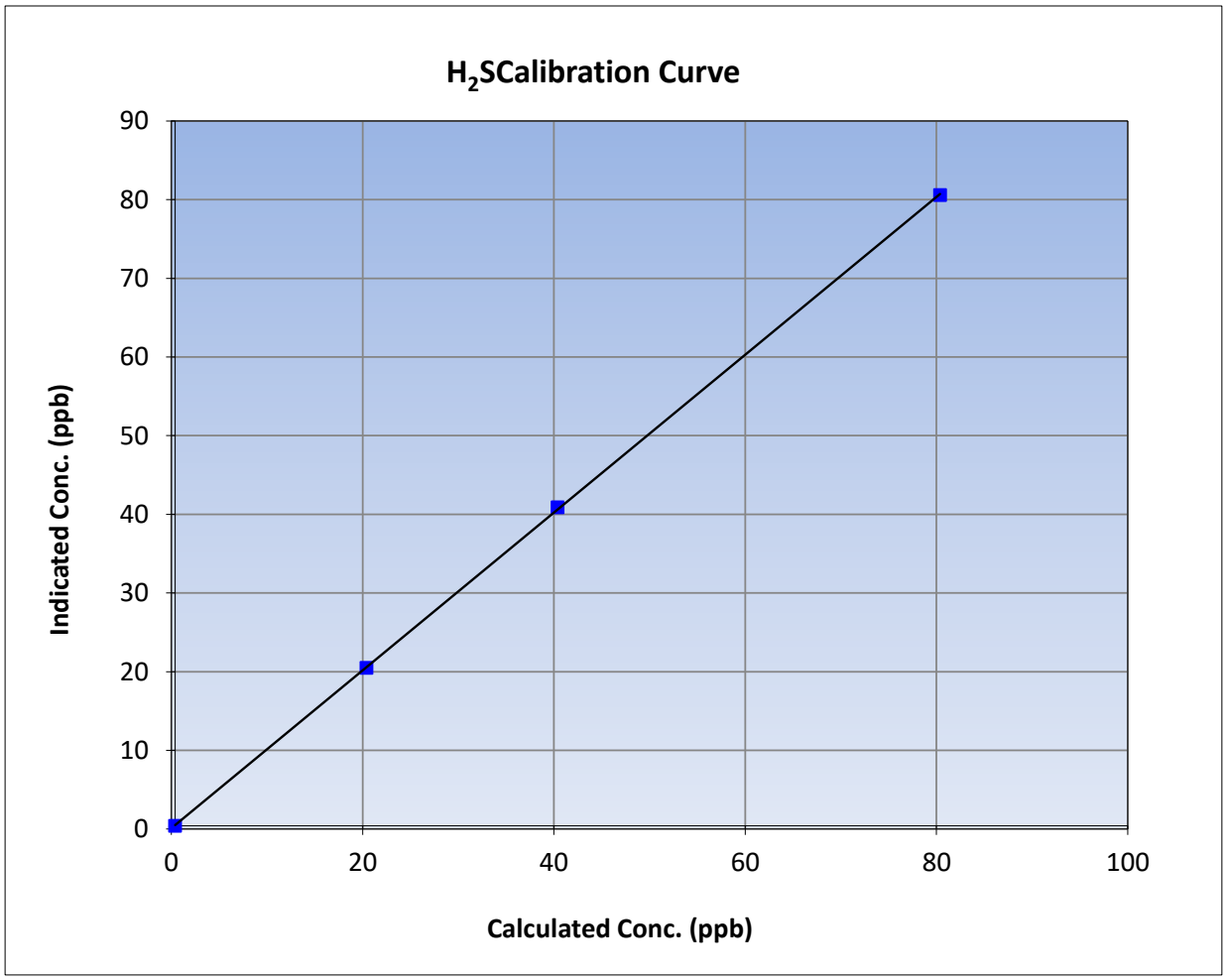
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 28, 2023 | Previous Calibration: | July 18, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:08 | End Time (MST): | 15:22 |
| Analyzer make: | Thermo 43iQTL | Analyzer serial #: | 1200326167 |

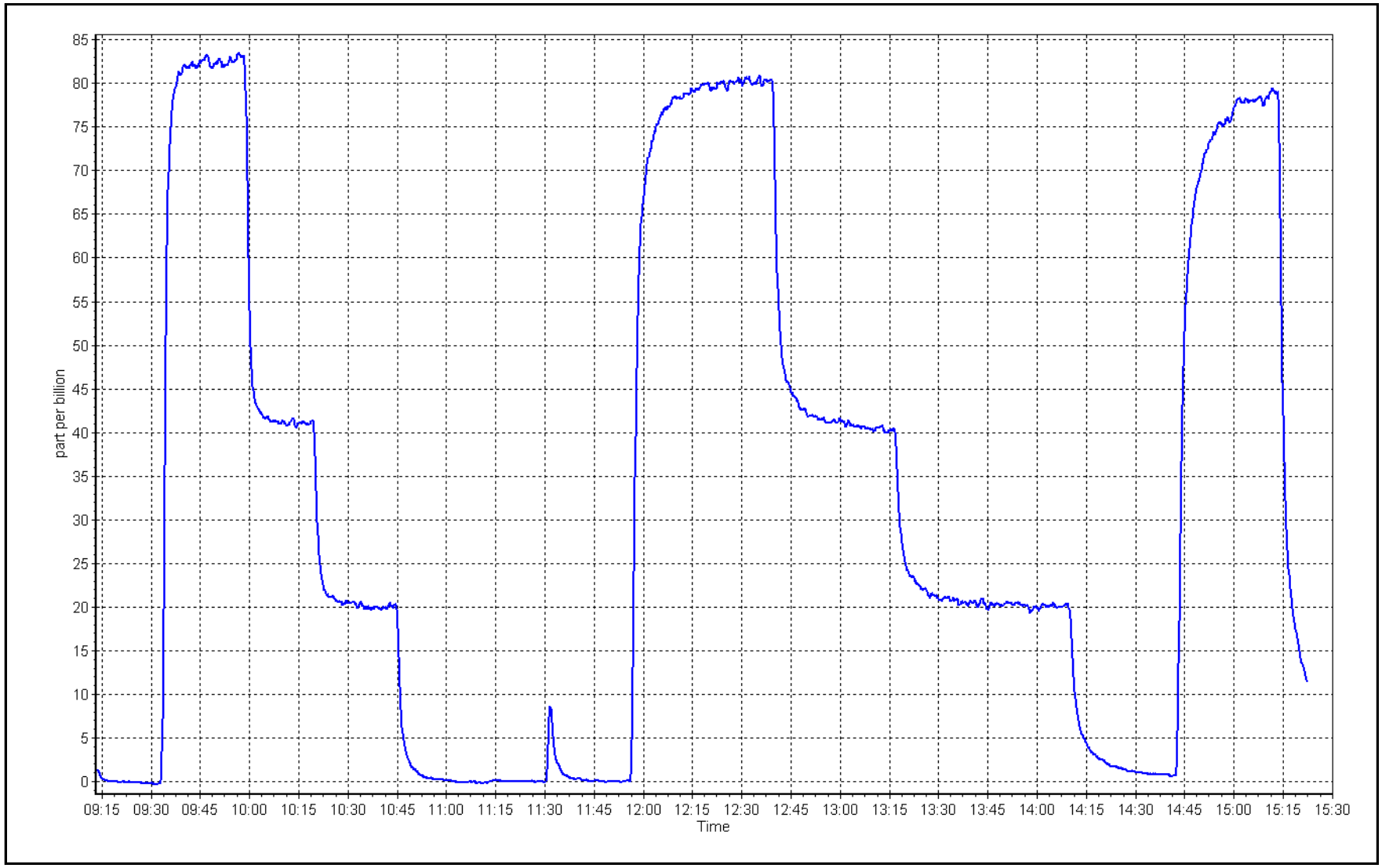
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 80.0 | 80.2 | 0.9972 |
| 40.0 | 40.5 | 0.9876 |
| 20.0 | 20.1 | 0.9949 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999970 | *≥0.995* |
| Slope | 1.003143 | *0.90 - 1.10* |
| Intercept | 0.096765 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 28, 2023 Location: Bertha Ganter-Fort McKay



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Bertha Ganter-Fort McKay | Station number: | AMS01 |
| Calibration Date: | August 1, 2023 | Last Cal Date: | July 14, 2023 |
| Start time (MST): | 8:37 | End time (MST): | 12:28 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC418809 | Cal Gas Expiry Date: | March 10, 2031 | |
| CH4 Cal Gas Conc. | 497.2 | ppm | CH4 Equiv Conc. | 1061.8 | ppm |
| C3H8 Cal Gas Conc. | 205.3 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 497.2 | ppm | CH4 Equiv Conc. | 1061.8 | ppm |
| Removed C3H8 Conc. | 205.3 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3565 | |
| ZAG make/model: | Teledyne API T701 | | Serial Number: | 5609 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1180320040 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.90E-04 | 2.91E-04 | NMHC SP Ratio: | 6.14E-05 | 6.33E-05 |
| CH4 Retention time: | 14.6 | 14.6 | NMHC Peak Area: | 149639 | 145218 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4918 | 81.3 | 17.27 | 17.03 | 1.014 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4918 | 81.3 | 17.27 | 17.21 | 1.003 |
| second point | 4959 | 40.7 | 8.64 | 8.52 | 1.015 |
| third point | 4980 | 20.3 | 4.31 | 4.25 | 1.014 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4918 | 81.3 | 17.27 | 17.25 | 1.001 |
| | | | | Average Correction Factor | 1.011 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 17.03 | Prev response | 17.24 | *% change | -1.2% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4918 | 81.3 | 9.18 | 8.98 | 1.023 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| high point | 4918 | 81.3 | 9.18 | 9.15 | 1.004 |
| second point | 4959 | 40.7 | 4.60 | 4.58 | 1.004 |
| third point | 4980 | 20.3 | 2.29 | 2.31 | 0.993 |
| as left zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as left span | 4918 | 81.3 | 9.18 | 9.21 | 0.997 |
| | | | | Average Correction Factor | 1.000 |
| Baseline Corr AF: | 8.98 | Prev response | 9.17 | *% change | -2.2% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4918 | 81.3 | 8.09 | 8.06 | 1.004 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4918 | 81.3 | 8.09 | 8.07 | 1.003 |
| second point | 4959 | 40.7 | 4.05 | 3.94 | 1.027 |
| third point | 4980 | 20.3 | 2.02 | 1.94 | 1.039 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4918 | 81.3 | 8.09 | 8.05 | 1.005 |
| | | | | Average Correction Factor | 1.023 |
| Baseline Corr AF: | 8.06 | Prev response | 8.06 | *% change | -0.1% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.001595 | 0.997017 |
| THC Cal Offset: | -0.058682 | -0.038093 |
| CH4 Cal Slope: | 1.002288 | 0.999108 |
| CH4 Cal Offset: | -0.042956 | -0.047957 |
| NMHC Cal Slope: | 1.000424 | 0.995361 |
| NMHC Cal Offset: | -0.014727 | 0.009863 |

Notes: Changed the inlet filter and N2 cylinder after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

# Wood Buffalo Environmental Association

## THC Calibration Summary

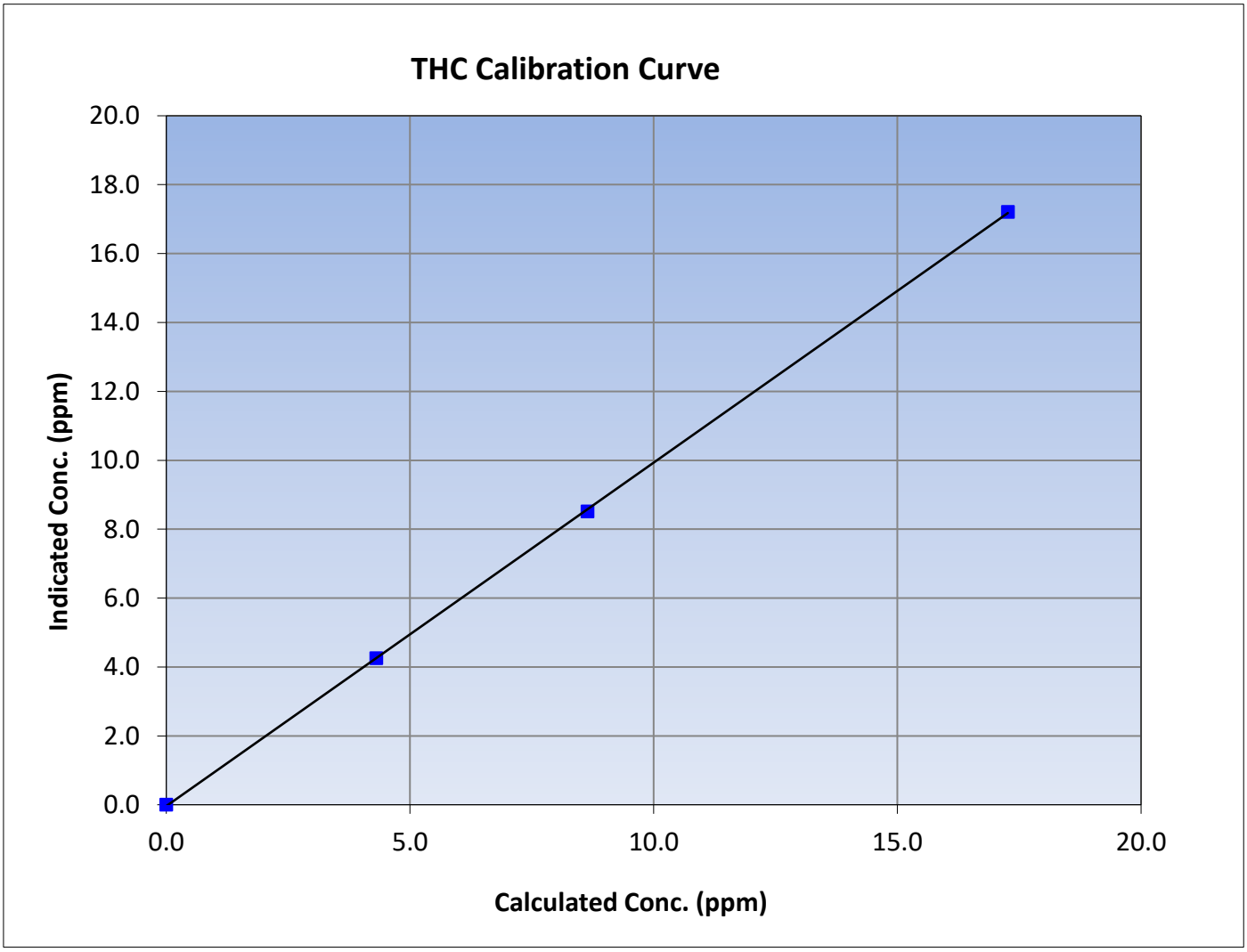
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 14, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 8:37 | End Time (MST): | 12:28 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320040 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999959 | *≥0.995* |
| 17.27 | 17.21 | 1.0032 | | | |
| 8.64 | 8.52 | 1.0149 | Slope | 0.997017 | *0.90 - 1.10* |
| 4.31 | 4.25 | 1.0141 | | | |
| | | | Intercept | -0.038093 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

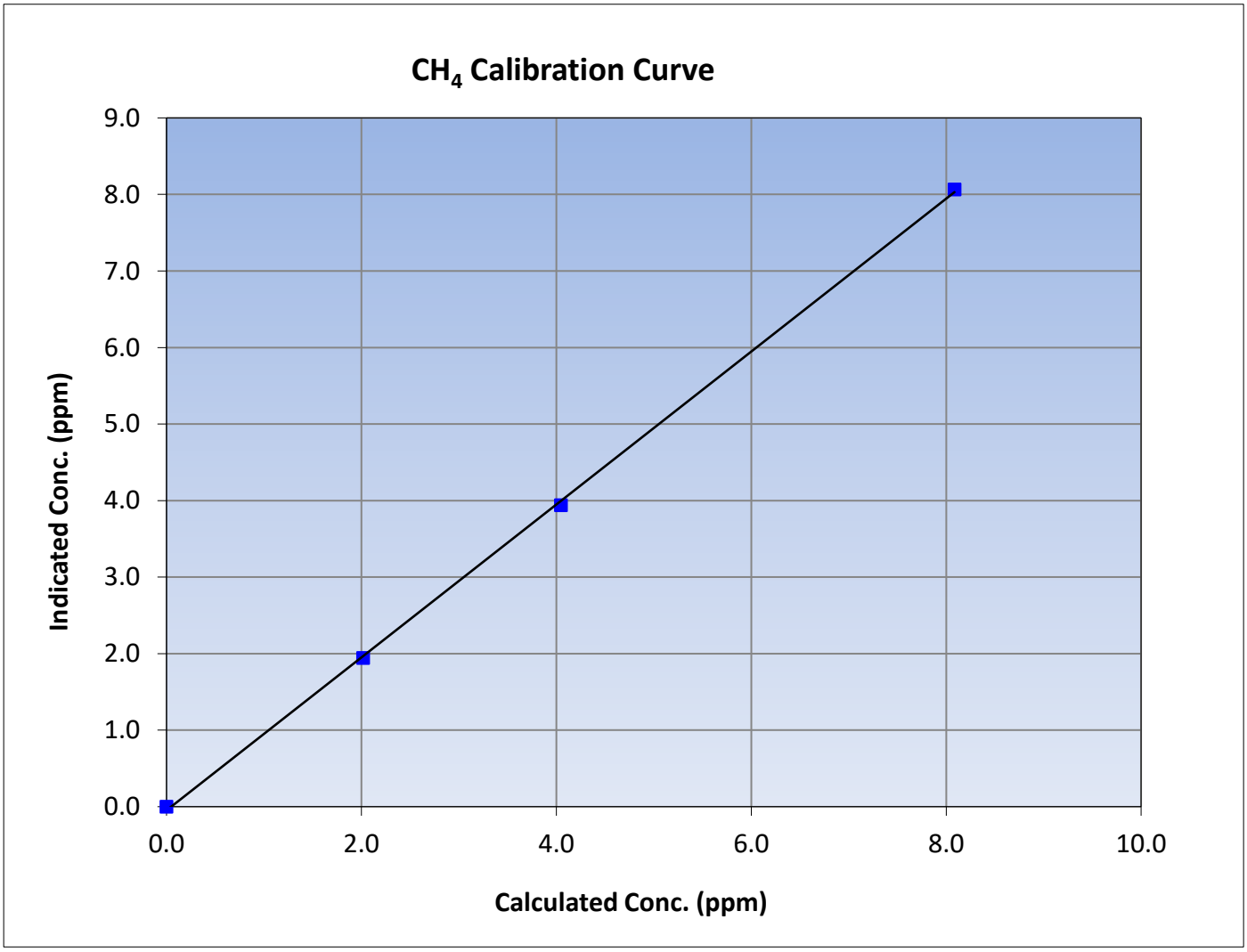
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 14, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 8:37 | End Time (MST): | 12:28 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320040 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999795 | *≥0.995* |
| 8.09 | 8.07 | 1.0026 | | | |
| 4.05 | 3.94 | 1.0272 | Slope | 0.999108 | *0.90 - 1.10* |
| 2.02 | 1.94 | 1.0395 | | | |
| | | | Intercept | -0.047957 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

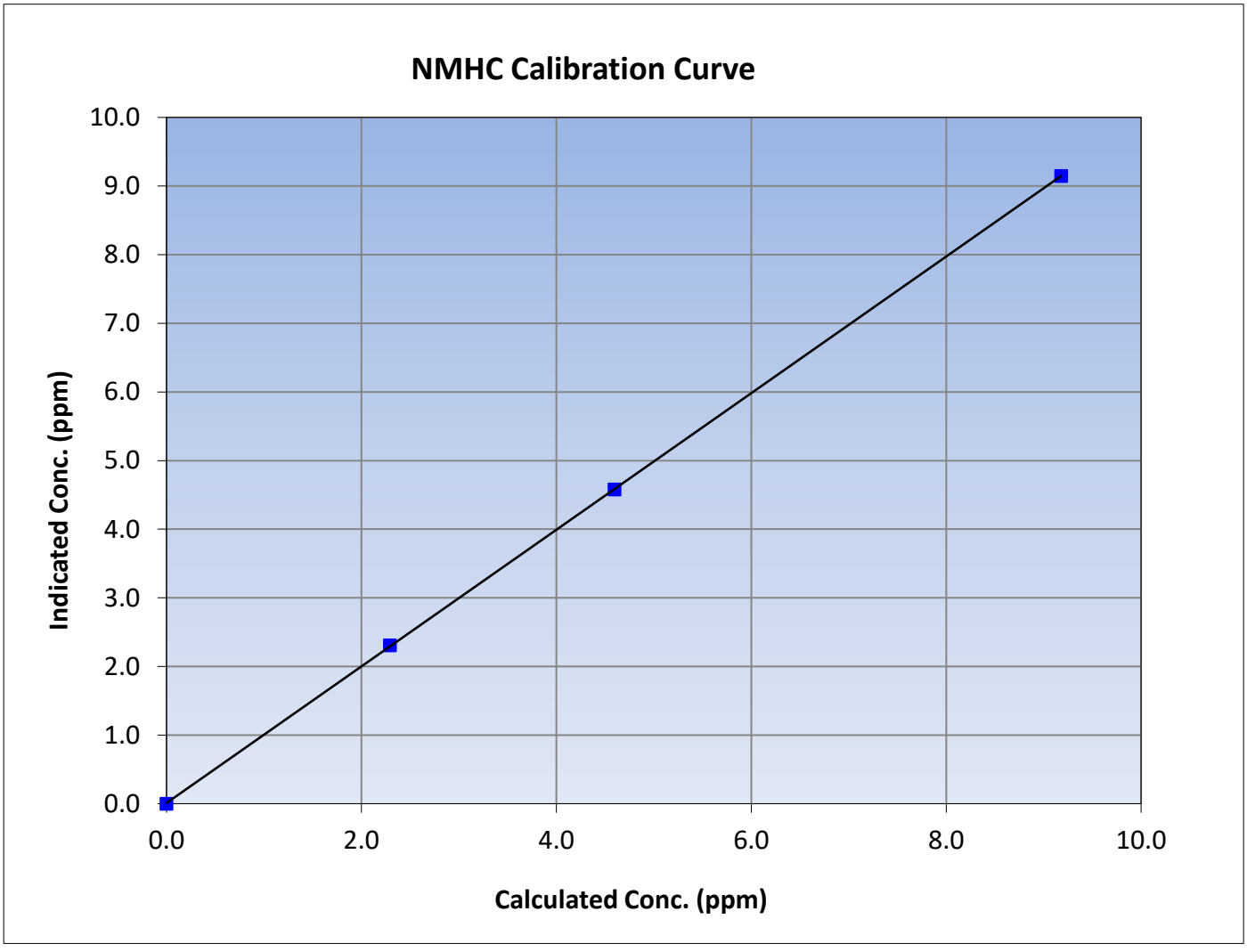
Version-01-2020

### Station Information

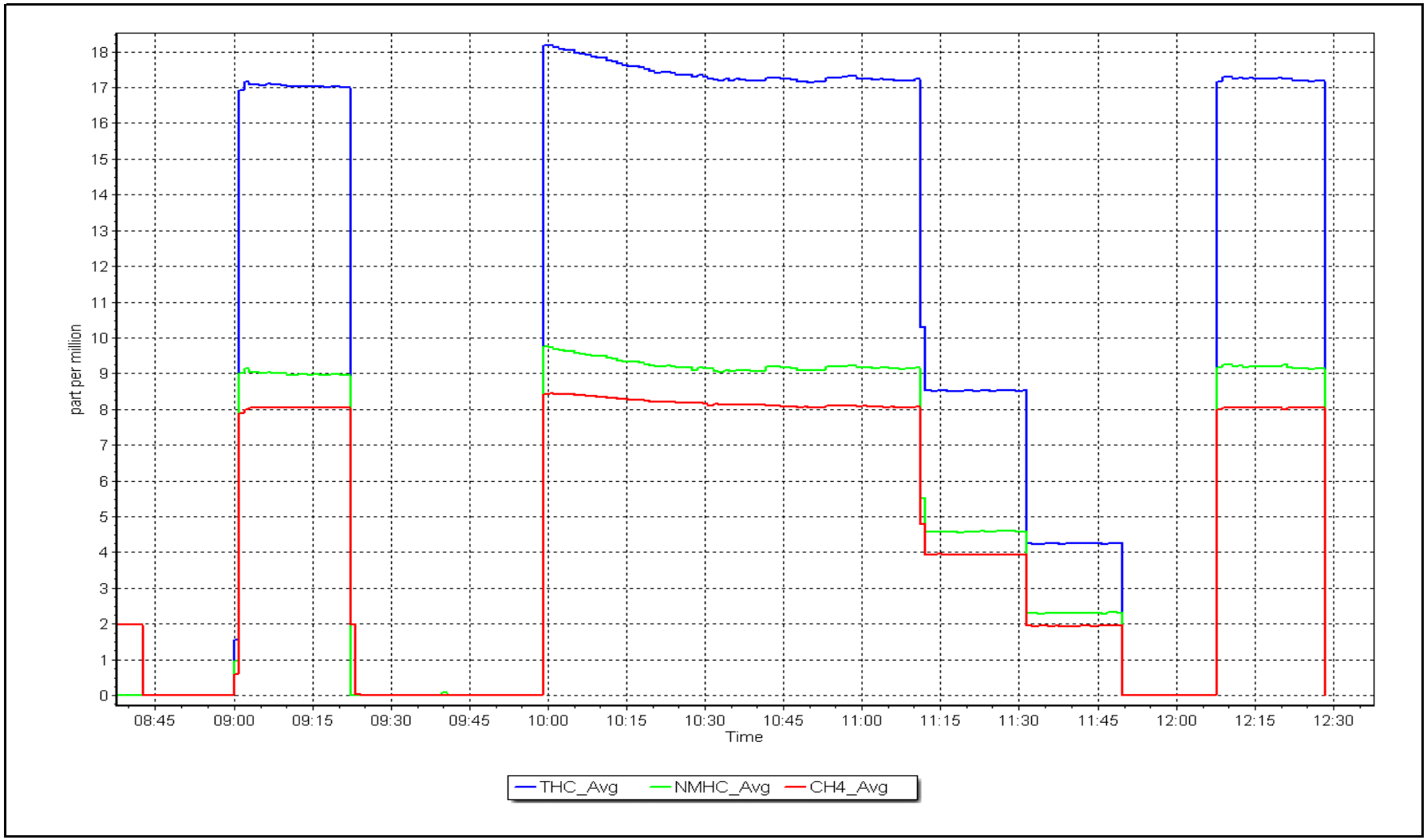
| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 14, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 8:37 | End Time (MST): | 12:28 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320040 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999991 | *≥0.995* |
| 9.18 | 9.15 | 1.0037 | | | |
| 4.60 | 4.58 | 1.0036 | Slope | 0.995361 | *0.90 - 1.10* |
| 2.29 | 2.31 | 0.9931 | | | |
| | | | Intercept | 0.009863 | *+/-0.5* |



**NMHC Calibration Plot** Date: August 1, 2023 Location: Bertha Ganter-Fort McKay



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Bertha Ganter-Fort McKay | Station number: | AMS01 |
| Calibration Date: | August 25, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 9:36 | End time (MST): | 14:50 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2Y1P9L | | Cal Gas Expiry Date: | December 11, 2023 | |
| NOX Cal Gas Conc: | 50.84 | ppm | NO Cal Gas Conc: | 50.04 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 50.84 | ppm | Removed Gas NO Conc: | 50.04 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3565 | |
| ZAG make/model: | Teledyne API T701 | | Serial Number: | 5609 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1218153357 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.324 | 1.348 | NO bkgnd or offset: | 6.9 | 6.9 |
| NOX coeff or slope: | 0.991 | 0.992 | NOX bkgnd or offset: | 7.0 | 7.1 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 190.7 | 189.2 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.998356 | 1.000155 |
| $NO_X$ Cal Offset: | -0.420000 | -0.260000 |
| NO Cal Slope: | 0.998644 | 0.998858 |
| NO Cal Offset: | -1.180000 | -1.280000 |
| $NO_2$ Cal Slope: | 1.002441 | 1.001610 |
| $NO_2$ Cal Offset: | 0.783625 | 0.629963 |

# Wood Buffalo Environmental Association

# $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | ---- | ---- |
| as found span | 4920 | 80.0 | 813.4 | 800.6 | 12.8 | 798.0 | 781.4 | 16.6 | 1.0193 | 1.0246 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | ---- | ---- |
| high point | 4920 | 80.0 | 813.4 | 800.6 | 12.8 | 813.5 | 799.0 | 14.5 | 0.9999 | 1.0021 |
| second point | 4960 | 40.0 | 406.7 | 400.3 | 6.4 | 406.4 | 398.2 | 8.2 | 1.0008 | 1.0053 |
| third point | 4980 | 20.0 | 203.4 | 200.2 | 3.2 | 202.6 | 197.2 | 5.4 | 1.0038 | 1.0150 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.1 | 0.3 | ---- | ---- |
| as left span | 4920 | 80.0 | 813.4 | 408.8 | 404.6 | 812.0 | 402.5 | 409.5 | 1.0018 | 1.0158 |
| | | | | | | | | Average Correction Factor | 1.0015 | 1.0075 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 797.9 ppb | NO = 781.4 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -1.7% |
| Previous Response | $NO_X$ = 811.7 ppb | NO = 798.4 ppb | | *Percent Change | NO = | -2.2% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 795.5 | 403.7 | 404.6 | 405.6 | 0.9975 | 100.2% |
| 2nd GPT point (200 ppb O3) | 795.5 | 593.9 | 214.4 | 215.7 | 0.9940 | 100.6% |
| 3rd GPT point (100 ppb O3) | 795.5 | 694.1 | 114.2 | 115.4 | 0.9896 | 101.1% |
| | | | | Average Correction Factor | 0.9937 | 100.6% |

Notes: Changed the inlet filter after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

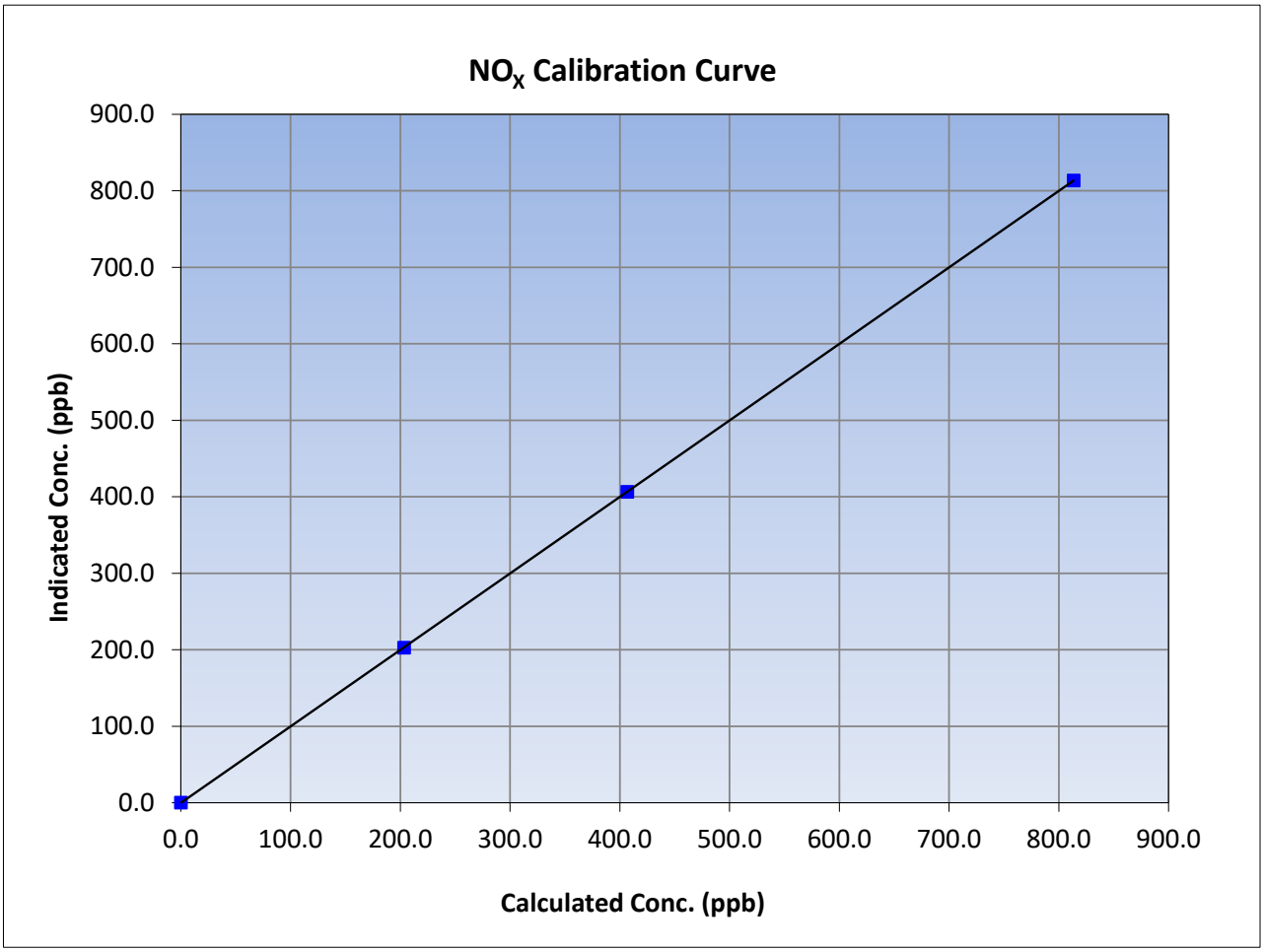
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 25, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:36 | End Time (MST): | 14:50 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1218153357 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999998 | ≥0.995 |
| 813.4 | 813.5 | 0.9999 | | | |
| 406.7 | 406.4 | 1.0008 | Slope | 1.000155 | 0.90 - 1.10 |
| 203.4 | 202.6 | 1.0038 | | | |
| | | | Intercept | -0.260000 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

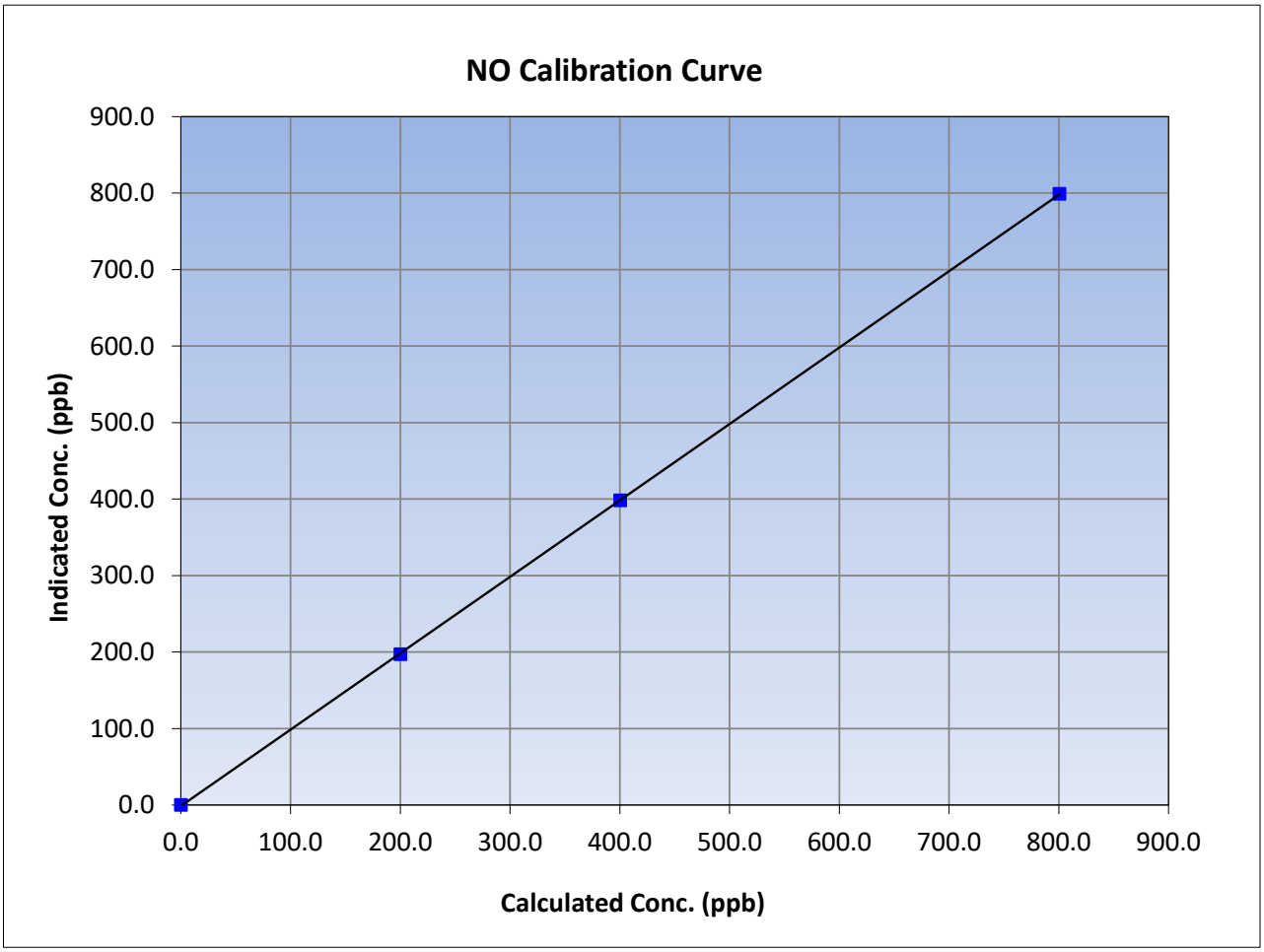
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 25, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:36 | End Time (MST): | 14:50 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1218153357 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999988 | ≥0.995 |
| 800.6 | 799.0 | 1.0021 | | | |
| 400.3 | 398.2 | 1.0053 | Slope | 0.998858 | 0.90 - 1.10 |
| 200.2 | 197.2 | 1.0150 | | | |
| | | | Intercept | -1.280000 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

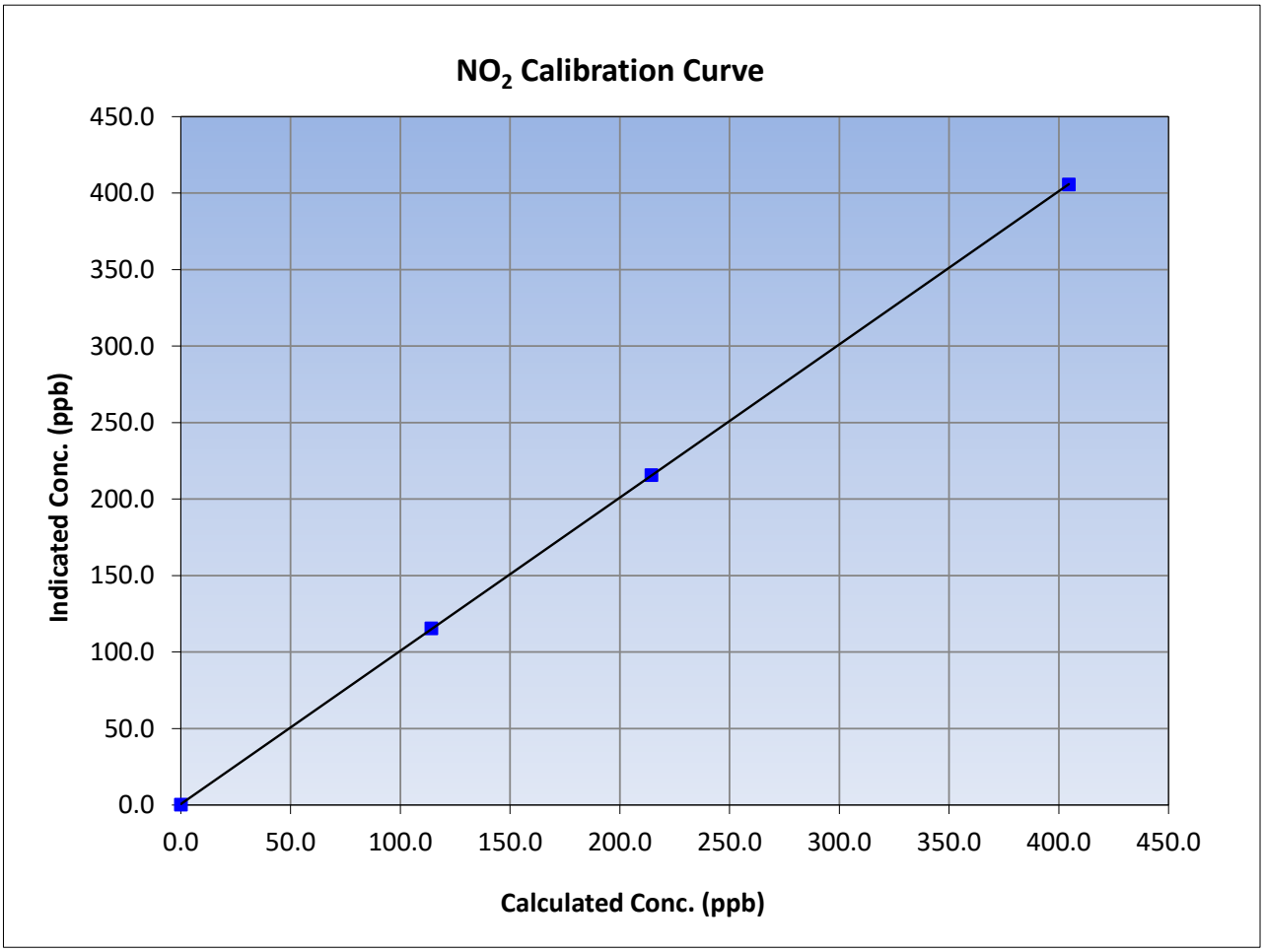
Version-04-2020

### Station Information

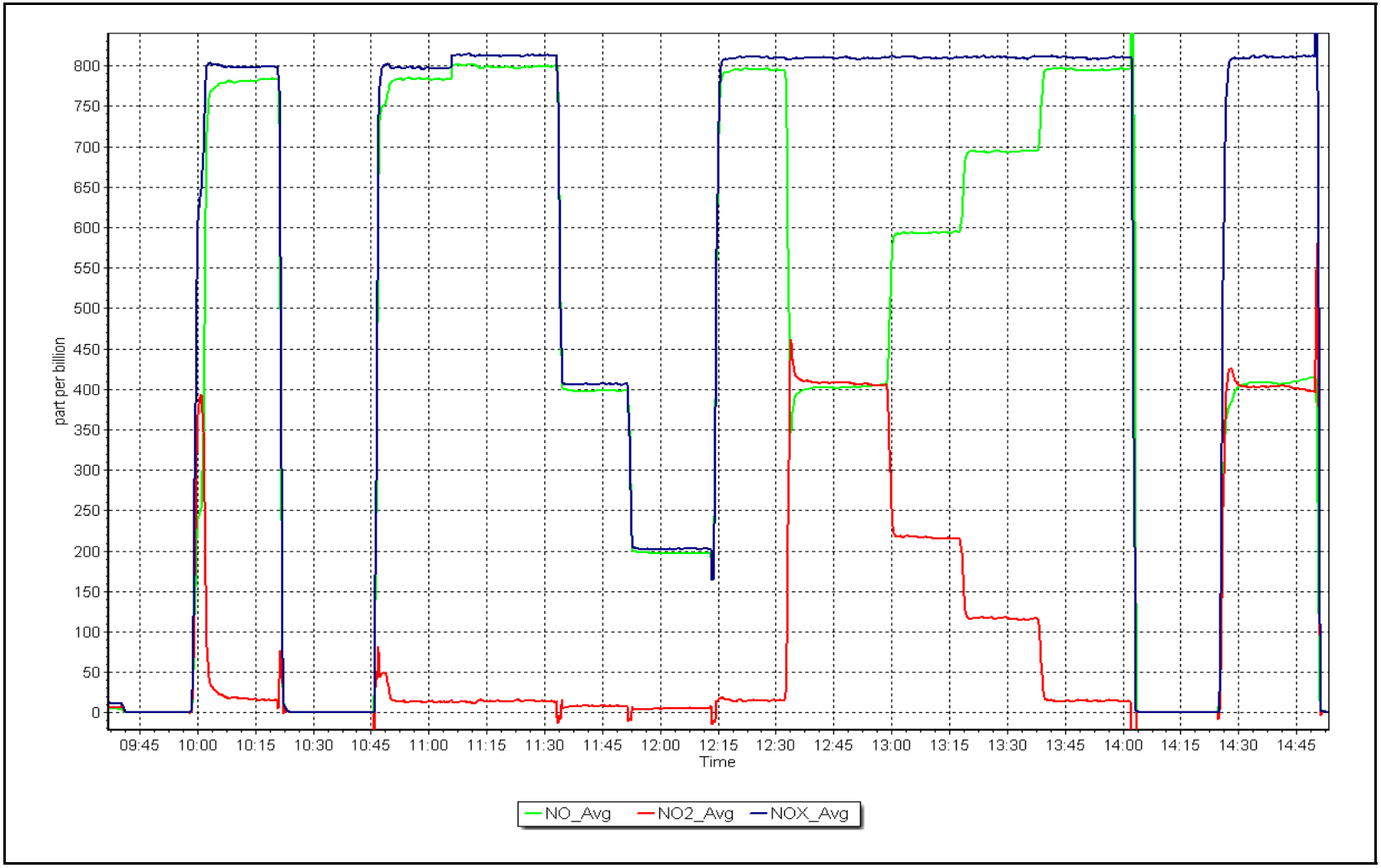
| | | | |
|---|---|---|---|
| Calibration Date: | August 25, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:36 | End Time (MST): | 14:50 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1218153357 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999994 | ≥0.995 |
| 404.6 | 405.6 | 0.9975 | | | |
| 214.4 | 215.7 | 0.9940 | Slope | 1.001610 | 0.90 - 1.10 |
| 114.2 | 115.4 | 0.9896 | | | |
| | | | Intercept | 0.629963 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 25, 2023 Location: Bertha Ganter-Fort McKay



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Bertha Ganter-Fort McKay | Station number: | AMS01 |
| Calibration Date: | August 10, 2023 | Last Cal Date: | July 4, 2023 |
| Start time (MST): | 9:43 | End time (MST): | 13:08 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | Teledyne API T700 | Serial Number: | 3565 |
| ZAG Make/Model: | Teledyne API T701 | Serial Number: | 5609 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Teledyne API T400 | Analyzer serial #: | 1107 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.001486 | 1.001743 | Backgd or Offset: | 3.2 | 3.2 |
| Calibration intercept: | 0.240000 | -0.080000 | Coeff or Slope: | 1.010 | 1.010 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 5000 | 863.1 | 400.0 | 399.0 | 1.003 |
| as found 2nd point | 5000 | 742.5 | 200.0 | 199.2 | 1.004 |
| as found 3rd point | 5000 | 651.7 | 100.0 | 99.9 | 1.001 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 5000 | 863.1 | 400.0 | 400.6 | 0.999 |
| second point | 5000 | 742.5 | 200.0 | 200.3 | 0.999 |
| third point | 5000 | 651.7 | 100.0 | 100.1 | 0.999 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 5000 | 863.1 | 400.0 | 404.4 | 0.989 |
| | | | | Average Correction Factor | 0.999 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 399.0 | Previous response | 400.8 | *% change | -0.5% |
| Baseline Corr 2nd AF pt: | 199.2 | AF Slope: | 0.997286 | AF Intercept: | 0.000000 |
| Baseline Corr 3rd AF pt: | 99.9 | AF Correlation: | 0.999999 | | |

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Adjusted the UV source lamp voltage. No adjustments made.

Calibration Performed By: Rene Chamberland

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

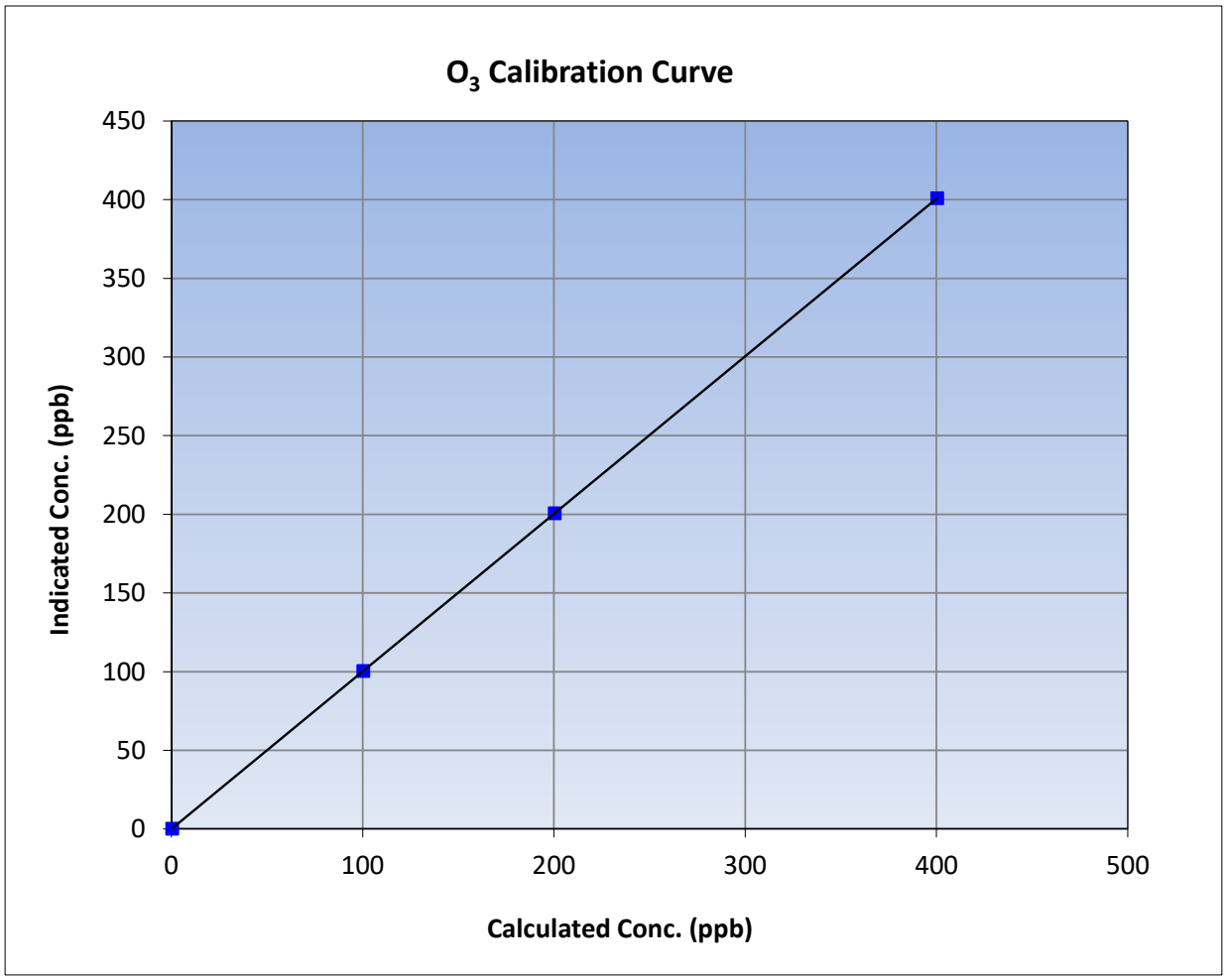
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:43 | End Time (MST): | 13:08 |
| Analyzer make: | Teledyne API T400 | Analyzer serial #: | 1107 |

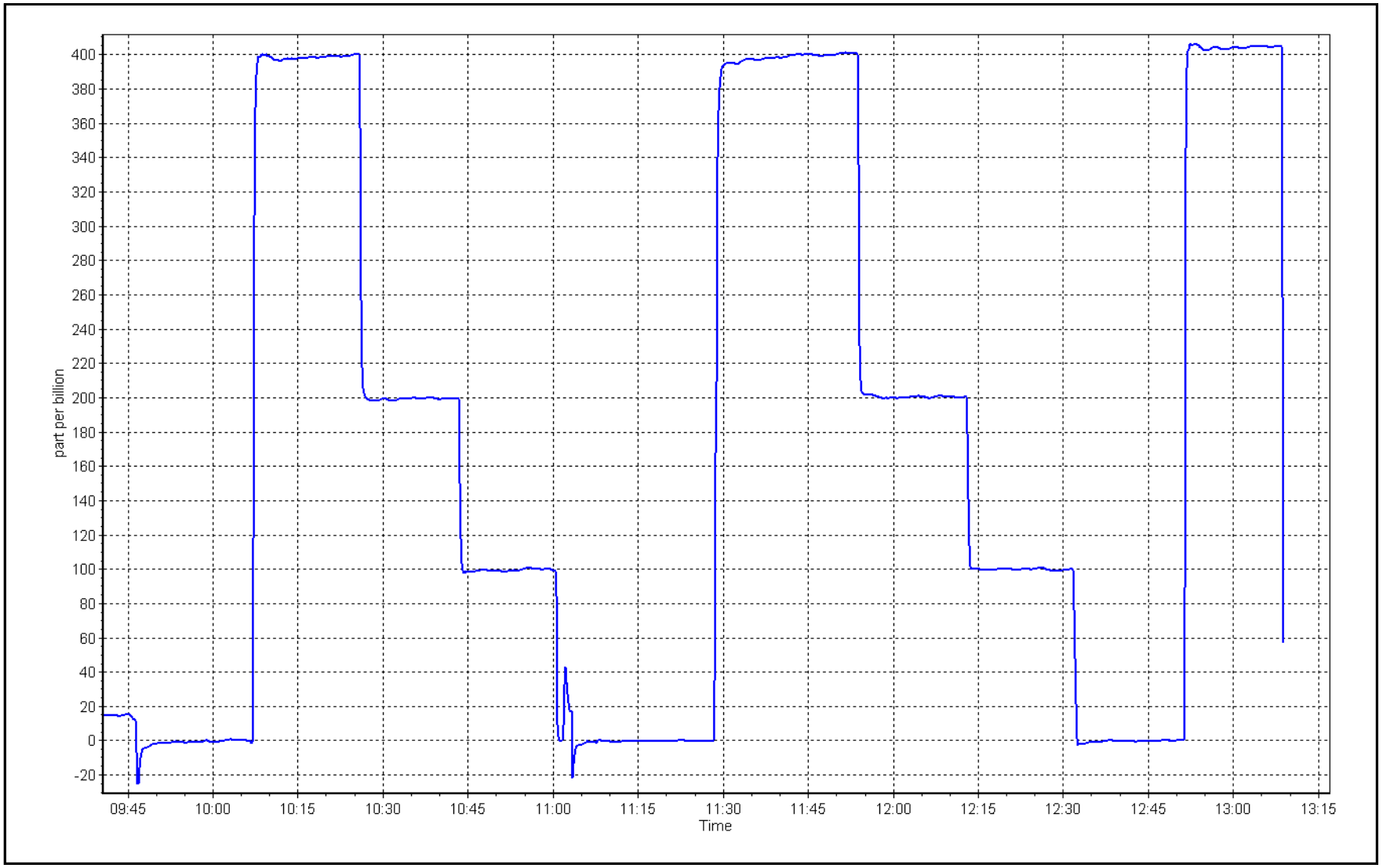
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 400.0 | 400.6 | 0.9985 |
| 200.0 | 200.3 | 0.9985 |
| 100.0 | 100.1 | 0.9990 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 1.000000 | *≥0.995* |
| Slope | 1.001743 | *0.90 - 1.10* |
| Intercept | -0.080000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 10, 2023 Location: Bertha Ganter-Fort McKay



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort McKay - Bertha Ganter | Station number: | AMS 01 |
| Calibration Date: | August 23, 2023 | Last Cal Date: | July 18, 2023 |
| Start time (MST): | 11:29 | End time (MST): | 12:57 |
| Analyzer Make: | Teledyne API T640 | S/N: | 324 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Delta Cal | S/N: | 1450 |
| Temp/RH standard: | Delta Cal | S/N: | 1450 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T ($^{o}$C) | 19.3 | 18.6 | 19.3 | ☐ | +/- 2 $^{o}$C |
| P (mmHg) | 736 | 735 | 736 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.00 | 5.07 | 5.00 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 23, 2023 Last Cal Date: July 18, 2023

PM w/o HEPA: 23.8 PM w/ HEPA: 0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☐

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | | | | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____

Date Optical Chamber Cleaned: July 18, 2023 <0.2 ug/m3

Disposable Filter Changed: August 23, 2023

### Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: July 18, 2023

Notes: Flow, temperature, and pressure all within limits. Leak checks passed. Displosable filter changed.

Calibration by: Rene Chamberland

# Wood Buffalo Environmental Association

## CO Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Bertha Ganter-Fort McKay | Station number: | AMS01 |
| Calibration Date: | August 21, 2023 | Last Cal Date: | July 17, 2023 |
| Start time (MST): | 10:24 | End time (MST): | 13:56 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 3040 | ppm | Cal Gas Exp Date: | December 1, 2028 |
| Cal Gas Cylinder #: | ALM042207 | | | |
| Removed Cal Gas Conc: | 3040 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3565 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 5609 |

### Analyzer Information

Analyzer make: Teledyne API T300 — Analyzer serial #: 3520

Analyzer Range: 0 - 50 ppm

| | *Start* | *Finish* | | *Start* | *Finish* |
|---|---|---|---|---|---|
| Calibration slope: | 1.002385 | 1.001990 | Backgd or Offset: | -0.012 | -0.012 |
| Calibration intercept: | 0.147828 | 0.159827 | Coeff or Slope: | 0.992 | 0.992 |

### CO Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 4933 | 66.7 | 40.6 | 40.9 | 0.993 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4933 | 66.7 | 40.6 | 40.7 | 0.997 |
| second point | 4966 | 33.3 | 20.2 | 20.7 | 0.977 |
| third point | 4983 | 16.7 | 10.2 | 10.3 | 0.982 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 2960 | 40.0 | 40.5 | 40.1 | 1.010 |
| | | | | Average Correction Factor | 0.986 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 40.75 | Prev response: | 40.80 | *% change: | -0.1% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

# Wood Buffalo Environmental Association

## CO Calibration Summary

Version-01-2020

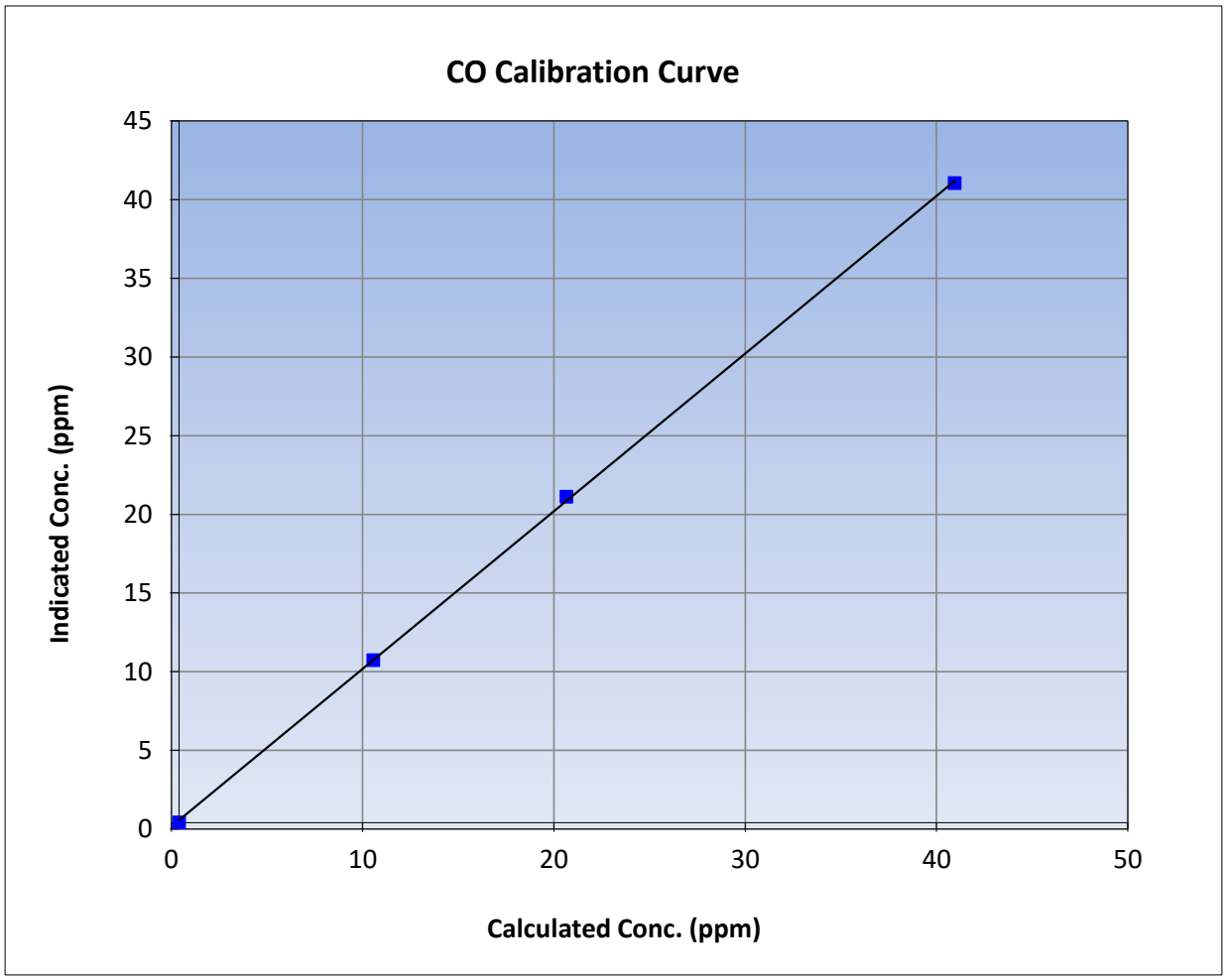
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 21, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 10:24 | End Time (MST): | 13:56 |
| Analyzer make: | Teledyne API T300 | Analyzer serial #: | 3520 |

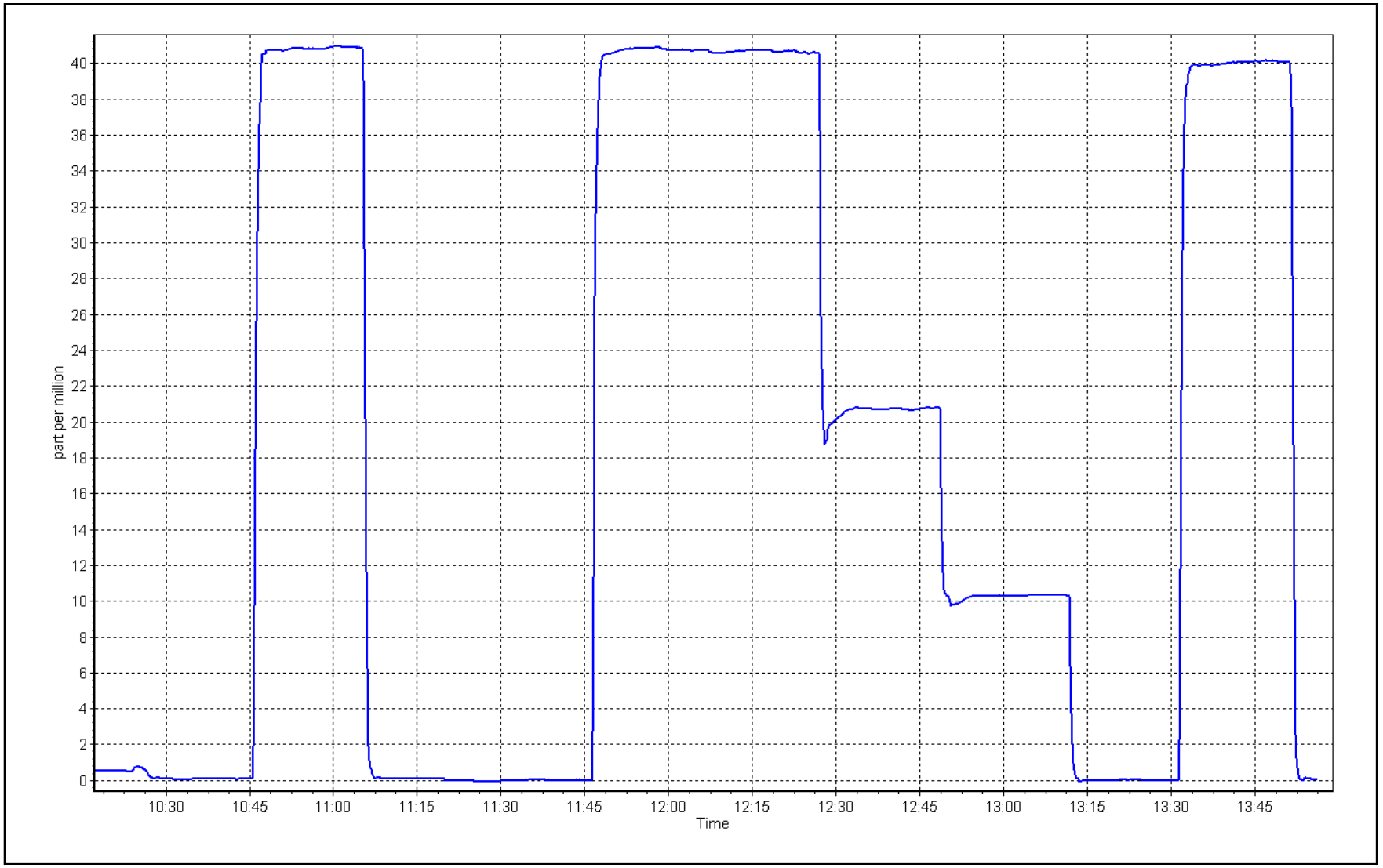
### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 40.6 | 40.7 | 0.9974 |
| 20.2 | 20.7 | 0.9773 |
| 10.2 | 10.3 | 0.9820 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999877 | *≥0.995* |
| Slope | 1.001990 | *0.90 - 1.10* |
| Intercept | 0.159827 | *+/-1.5* |



**CO Calibration Plot** Date: August 21, 2023 Location: Bertha Ganter-Fort McKay



# Wood Buffalo Environmental Association

## $CO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Bertha Ganter-Fort McKay | Station number: | AMS01 |
| Calibration Date: | August 11, 2023 | Last Cal Date: | July 10, 2023 |
| Start time (MST): | 9:43 | End time (MST): | 12:52 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 60,200 | ppm | Cal Gas Exp Date: | December 1, 2028 |
| Cal Gas Cylinder #: | ALM042207 | | | |
| Removed Cal Gas Conc: | 60,200 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3565 |
| N2 Gen Make/Model: | Peak Sci NG5000 | | Serial Number: | 7220900034 |

### Analyzer Information

Analyzer make: Teledyne API 360 — Analyzer serial #: 442

Analyzer Range 0 - 2,000 ppm

| | *Start* | *Finish* | | *Start* | *Finish* |
|---|---|---|---|---|---|
| Calibration slope: | 1.000422 | 1.000529 | Backgd or Offset: | 0.045 | 0.045 |
| Calibration intercept: | -4.480000 | -5.380000 | Coeff or Slope: | 0.874 | 0.874 |

### $CO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 3000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 2920 | 80.0 | 1605.3 | 1600.4 | 1.003 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 3000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 2920 | 80.0 | 1605.3 | 1603.5 | 1.001 |
| second point | 2960 | 40.0 | 802.7 | 795.0 | 1.010 |
| third point | 2980 | 20.0 | 401.3 | 390.8 | 1.027 |
| as left zero | 3000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 2960 | 40.0 | 802.7 | 784.3 | 1.023 |
| | | | | Average Correction Factor | 1.013 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 1600.50 | Prev response: | 1601.53 | *% change: | -0.1% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. No adjustments made.

Calibration Performed By: Rene Chamberland

# Wood Buffalo Environmental Association

## $CO_2$ Calibration Summary

Version-01-2020

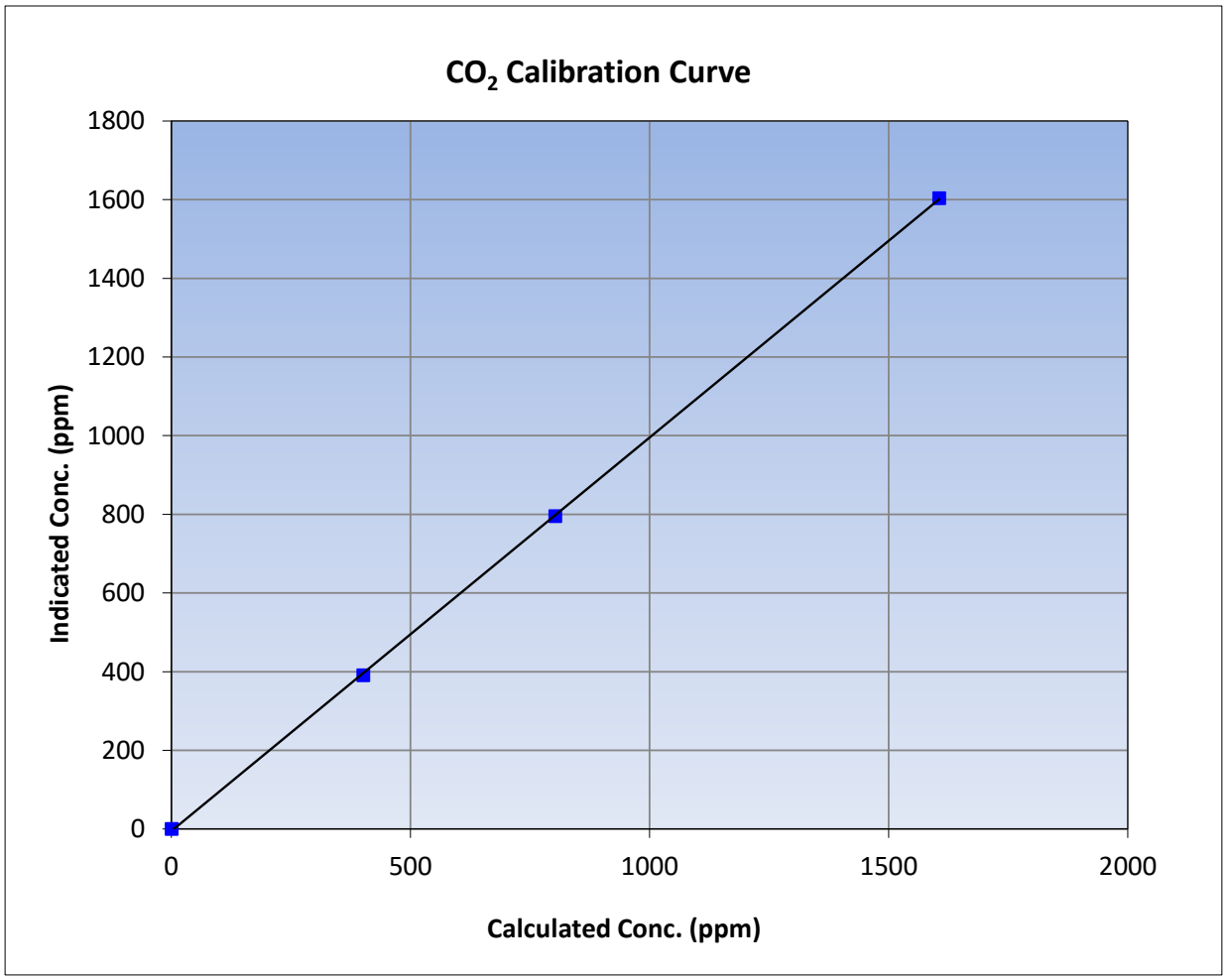
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date | August 11, 2023 | Previous Calibration | July 10, 2023 |
| Station Name | Bertha Ganter-Fort McKay | Station Number | AMS01 |
| Start Time (MST) | 9:43 | End Time (MST) | 12:52 |
| Analyzer make | Teledyne API 360 | Analyzer serial # | 442 |

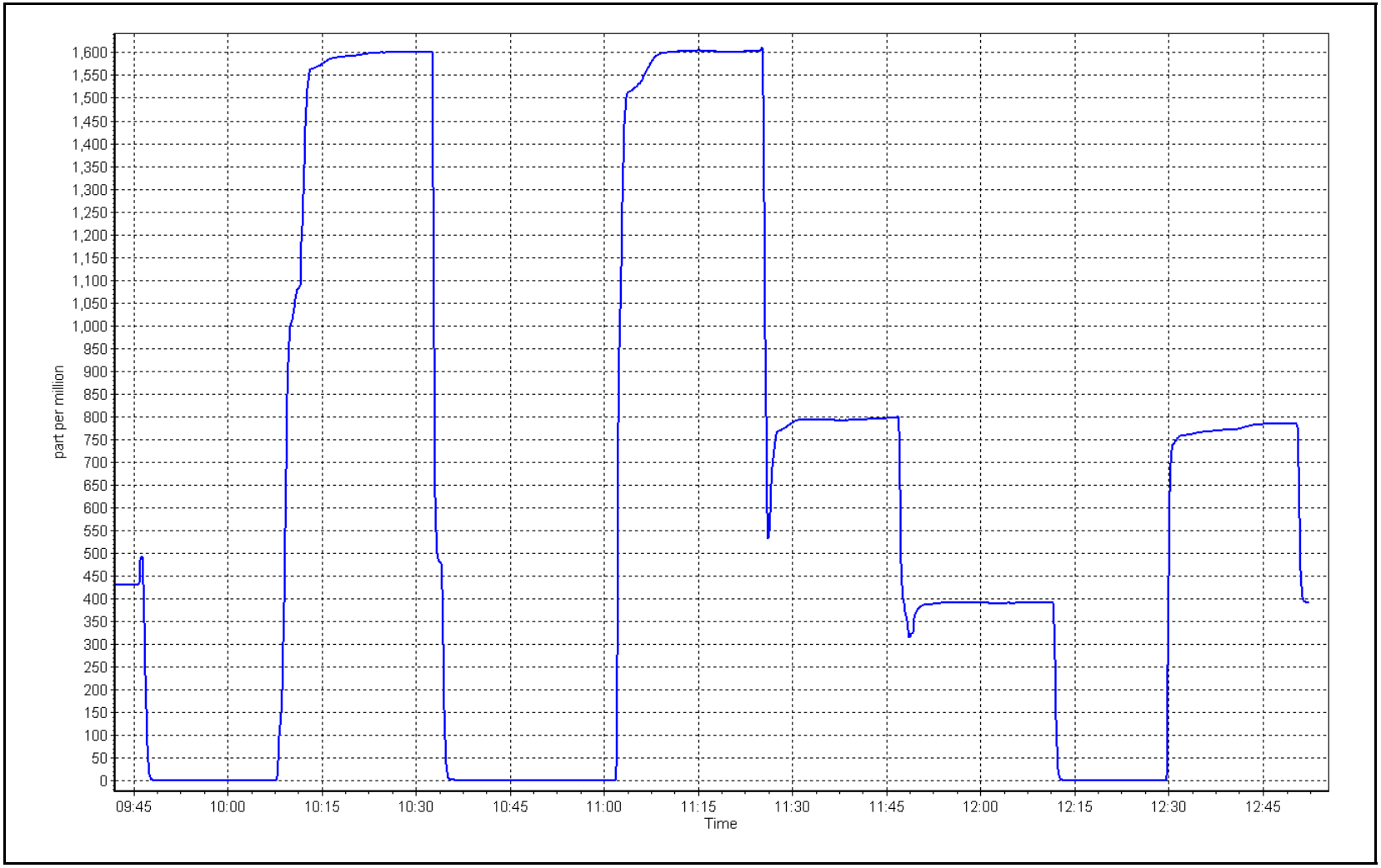
### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 1605.3 | 1603.5 | 1.0011 |
| 802.7 | 795.0 | 1.0096 |
| 401.3 | 390.8 | 1.0270 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999949 | *≥0.995* |
| Slope | 1.000529 | *0.90 - 1.10* |
| Intercept | -5.380000 | *+/-10* |



**$CO_2$ Calibration Plot** Date: August 11, 2023 Location: Bertha Ganter-Fort McKay



# Wood Buffalo Environmental Association

## TN - $NO_X$ - $NH_3$ Calibration Report

Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Bertha Ganter-Fort McKay | Station number: | AMS01 |
| NOX Cal Date: | August 23, 2023 | Last Cal Date: | July 12, 2023 |
| Start time (MST): | 9:48 | End time (MST): | 14:20 |
| NH3 Cal Date: | August 23, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 14:45 | End time (MST): | 16:50 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| NOX Cal Gas Conc: | 50.84 | ppm | NO Gas Cylinder #: | T2Y1P9L |
| NO Cal Gas Conc: | 50.04 | ppm | NO Cal Gas Expiry: | March 3, 2028 |
| Removed NOX Conc: | 50.84 | ppm | Removed Cylinder #: | NA |
| Removed NO Conc: | 50.04 | ppm | Removed cyl Expiry: | NA |
| NOX gas Diff: | | | NO gas Diff: | |
| NH3 Cal Gas Conc: | 74.90 | ppm | NH3 Gas Cylinder #: | CC744566 |
| | | | NH3 Cal Gas Expiry: | December 21, 2023 |
| Removed NH3 Conc: | 74.90 | ppm | Removed Cylinder #: | NA |
| NH3 gas Diff: | | | Removed cyl Expiry: | NA |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3565 |
| ZAG make/model: | Teledyne API T701 | | Serial Number: | 5609 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer model: | Teledyne API T201 | Analyzer serial #: | 475 |
| Converter model: | Teledyne API T501 | Converter serial #: | 824 |
| NH3 Range (ppb): | 0 - 2000 ppb | Reaction cell Press: | 5.10 |
| NOX Range (ppb): | 0 - 1000 ppb | Sample Flow: | 514 |

| | *Start* | *Finish* | | *Start* | *Finish* |
|---|---|---|---|---|---|
| NO coefficient: | 0.987 | 0.987 | TN coefficient: | 0.989 | 0.989 |
| NOX coefficient: | 0.987 | 0.987 | NO bkgrnd: | -0.9 | -0.9 |
| NO2 coefficient: | 1.000 | 1.000 | NOX bkgrnd: | -0.3 | -0.3 |
| NH3 coefficient: | 0.973 | 0.973 | TN bkgrnd: | 1.2 | 1.2 |

### Calibration Statistics

| | *Start* | *Finish* |
|---|---|---|
| $NO_X$ Cal Slope: | 1.000126 | 0.998131 |
| $NO_X$ Cal Offset: | -1.500000 | -2.040000 |
| NO Cal Slope: | 1.000428 | 0.998944 |
| NO Cal Offset: | -2.080000 | -2.460000 |
| $NO_2$ Cal Slope: | 0.999045 | 0.999734 |
| $NO_2$ Cal Offset: | 0.023464 | 0.074243 |
| NH3 Cal Slope: | 1.002916 | 1.003610 |
| NH3 Cal Offset: | -5.175346 | 0.576979 |
| TN Cal Slope: | 1.005585 | 1.006104 |
| TN Cal Offset: | -5.152839 | 0.744017 |

# Wood Buffalo Environmental Association

## TN - NOX - $NH_3$ Calibration Report

Version-05-2023

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated TN concentration (ppb) (Cc) | Calculated NOX concentration (ppb) (Cc) | Calculated NH3 concentration (ppb) (Cc) | Indicated TN concentration (ppb) (Ic) | Indicated NOX concentration (ppb) (Ic) | Indicated NH3 concentration (ppb) (Ic) | TN Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -2.2 | -2.3 | 0.1 | ---- | ---- |
| as found NO | 4920 | 80.0 | 813.4 | 813.4 | ---- | 808.0 | 810.0 | -2.2 | 1.007 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| high NO point | 4920 | 80.0 | 813.4 | 813.4 | ---- | 810.1 | 811.1 | -1.2 | 1.004 | ---- |
| NO/O3 point | 4920 | 80.0 | 813.4 | 813.4 | ---- | 806.0 | 803.7 | 2.1 | 1.009 | ---- |
| as found NH3 | 3416 | 84.1 | 1799.7 | ---- | 1799.7 | 1811.5 | ---- | 1807.0 | 0.994 | 0.996 |
| new NH3 cyl rp | | | | | | | ---- | | | |
| first NH3 | 3416 | 84.1 | 1799.7 | ---- | 1799.7 | 1811.5 | ---- | 1807.0 | 0.994 | 0.996 |
| second NH3 | 3453 | 46.7 | 999.4 | ---- | 999.4 | 1005.3 | ---- | 1002.5 | 0.994 | 0.997 |
| third NH3 | 3477 | 23.4 | 500.8 | ---- | 500.8 | 506.3 | ---- | 504.6 | 0.989 | 0.992 |
| | | | | | | | | Average Correction Factor | 1.0067 | 0.9951 |

Corrected As found TN = 810.2 ppb $NO_X$ = 812.3 ppb NH3 = 1806.9 ppb

Previous Response TN = 812.8 ppb $NO_X$ = 812.0 ppb NH3 = 1799.8 ppb

*Percent Change TN = -0.3%

*Percent Change $NO_X$ = 0.0%

*Percent Change NH3 = 0.4%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 97.3%

NH3 Current Converter Efficiency = 97.3%

# Wood Buffalo Environmental Association

# $NO_X$ - NO - $NO_2$ Calibration Report

Version-05-2023

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated TN concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated TN concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -2.3 | -2.4 | -2.2 | ---- | ---- |
| as found span | 4920 | 80.0 | 813.4 | 800.6 | 813.4 | 810.0 | 797.0 | 808.0 | 1.0042 | 1.0046 |
| new NO cyl rp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 | -0.1 | ---- | ---- |
| high point | 4920 | 80.0 | 813.4 | 800.6 | 813.4 | 811.1 | 799.0 | 810.1 | 1.0029 | 1.0021 |
| second point | 4960 | 40.0 | 406.7 | 400.3 | 406.7 | 402.2 | 395.0 | 402.5 | 1.0112 | 1.0135 |
| third point | 4980 | 20.0 | 203.4 | 200.2 | 203.4 | 199.5 | 195.7 | 199.5 | 1.0193 | 1.0228 |
| | | | | | | | | Average Correction Factor | 1.0112 | 1.0128 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Corr As fnd | TN = | 810.2 ppb | $NO_X$ = | 812.3 ppb | NO = | 799.4 ppb | *Percent Change TN = -0.3% |
| Previous Response | TN = | 812.8 ppb | $NO_X$ = | 812.0 ppb | NO = | 798.9 ppb | *Percent Change $NO_X$ = 0.0% |
| | | | | | | | *Percent Change NO = 0.1% |

* = > +/-5% change initiates investigation

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found zero | ---- | ---- | 0.0 | 0.2 | ---- | ---- |
| calibration zero | ---- | ---- | 0.0 | -0.2 | ---- | ---- |
| 1st GPT point (400 ppb O3) | 791.1 | 389.0 | 414.9 | 414.6 | 1.0007 | 99.9% |
| 2nd GPT point (200 ppb O3) | 791.1 | 589.9 | 214.0 | 214.5 | 0.9977 | 100.2% |
| 3rd GPT point (100 ppb O3) | 791.1 | 691.2 | 112.7 | 112.8 | 0.9991 | 100.1% |
| | | | | Average Correction Factor | 0.9992 | 100.1% |

Notes: Changed the inlet filter after as founds. No adjustments made. Used the 2nd GPT reference point due to drift.

Calibration Performed By: Rene Chamberland

# Wood Buffalo Environmental Association

## TN Calibration Summary

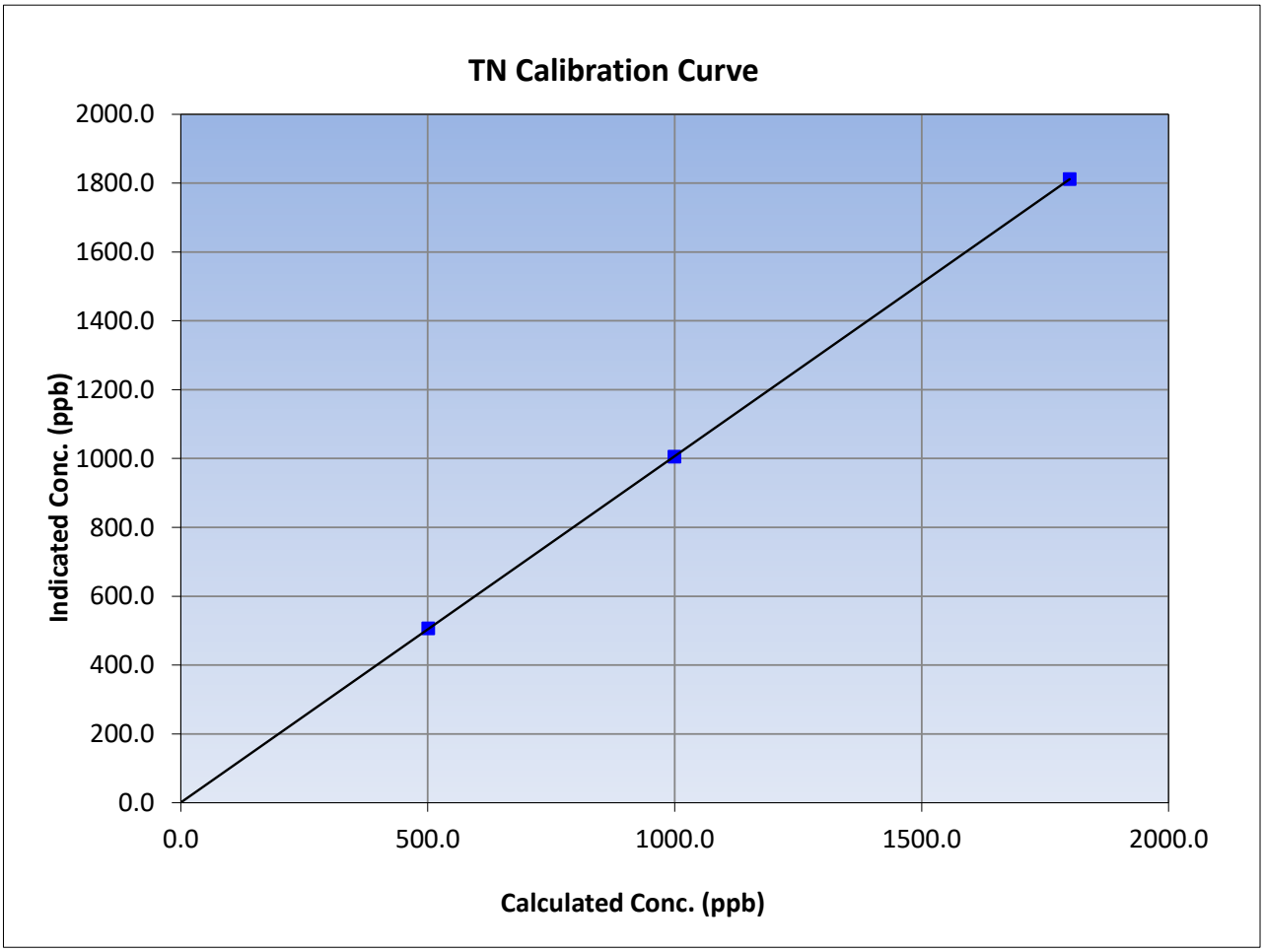
Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 12, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:48 | End Time (MST): | 14:20 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 475 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999997 | ≥0.995 |
| 1799.7 | 1811.5 | 0.9935 | | | |
| 999.4 | 1005.3 | 0.9941 | Slope | 1.006104 | 0.90 - 1.10 |
| 500.8 | 506.3 | 0.9891 | | | |
| | | | Intercept | 0.744017 | +/-20 |



# Wood Buffalo Environmental Association

## $NH_3$ Calibration Summary

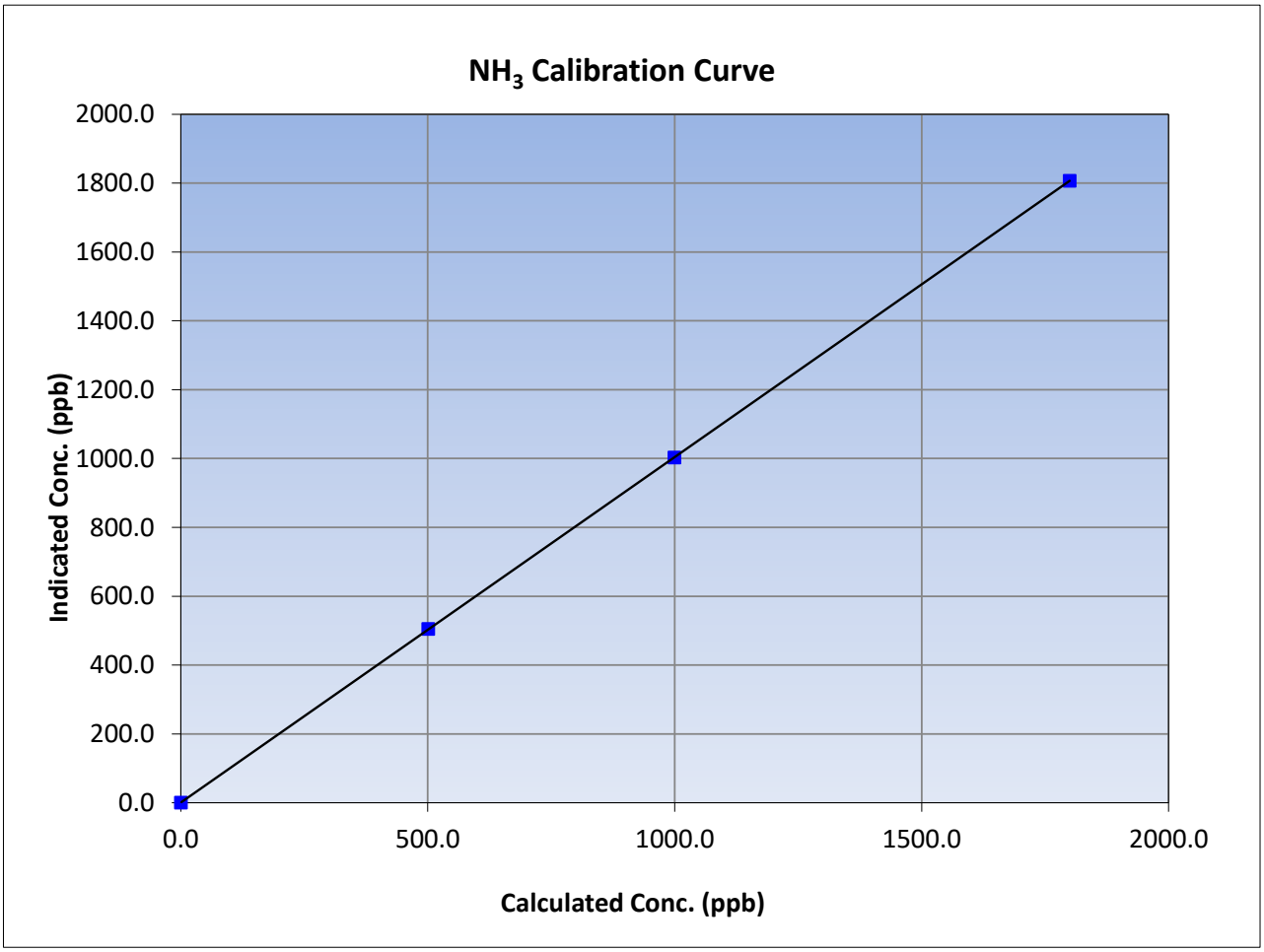
Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 12, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:48 | End Time (MST): | 14:20 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 475 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999998 | ≥0.995 |
| 1799.7 | 1807.0 | 0.9960 | | | |
| 999.4 | 1002.5 | 0.9969 | Slope | 1.003610 | 0.90 - 1.10 |
| 500.8 | 504.6 | 0.9924 | | | |
| | | | Intercept | 0.576979 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

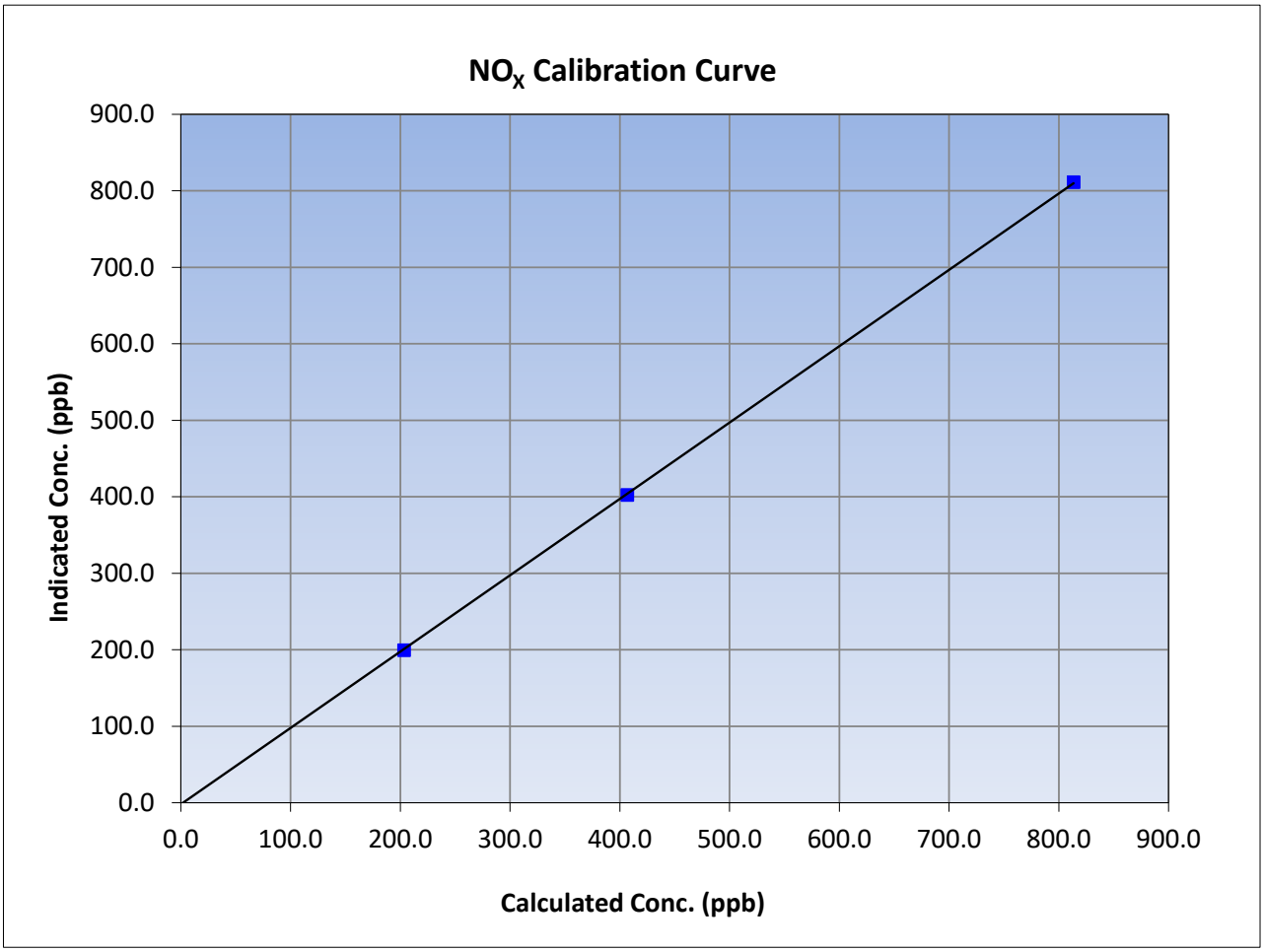
Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 12, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:48 | End Time (MST): | 14:20 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 475 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999971 | ≥0.995 |
| 813.4 | 811.1 | 1.0029 | | | |
| 406.7 | 402.2 | 1.0112 | Slope | 0.998131 | 0.90 - 1.10 |
| 203.4 | 199.5 | 1.0193 | | | |
| | | | Intercept | -2.040000 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

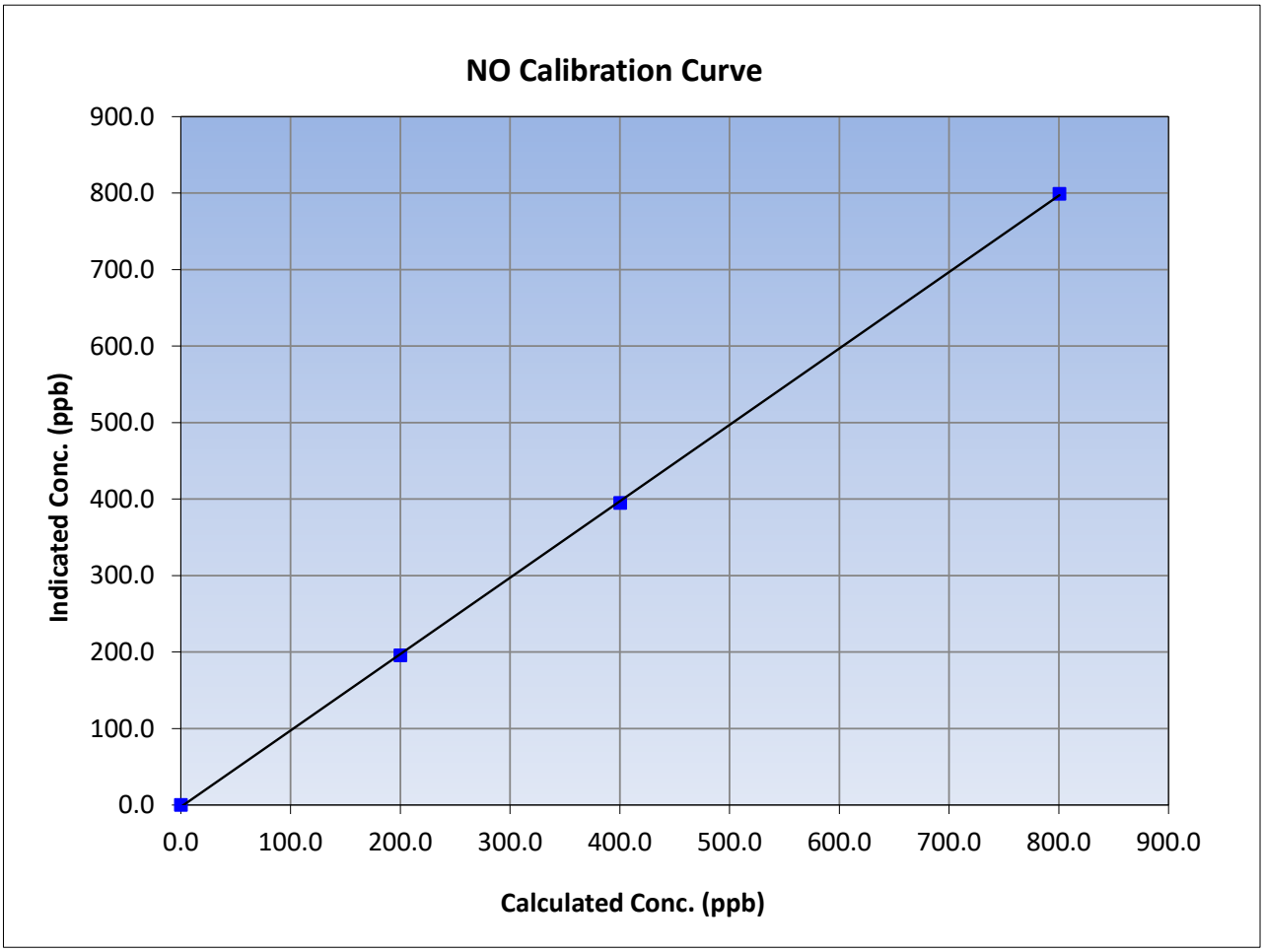
Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 12, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:48 | End Time (MST): | 14:20 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 475 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999947 | ≥0.995 |
| 800.6 | 799.0 | 1.0021 | | | |
| 400.3 | 395.0 | 1.0135 | Slope | 0.998944 | 0.90 - 1.10 |
| 200.2 | 195.7 | 1.0228 | | | |
| | | | Intercept | -2.460000 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

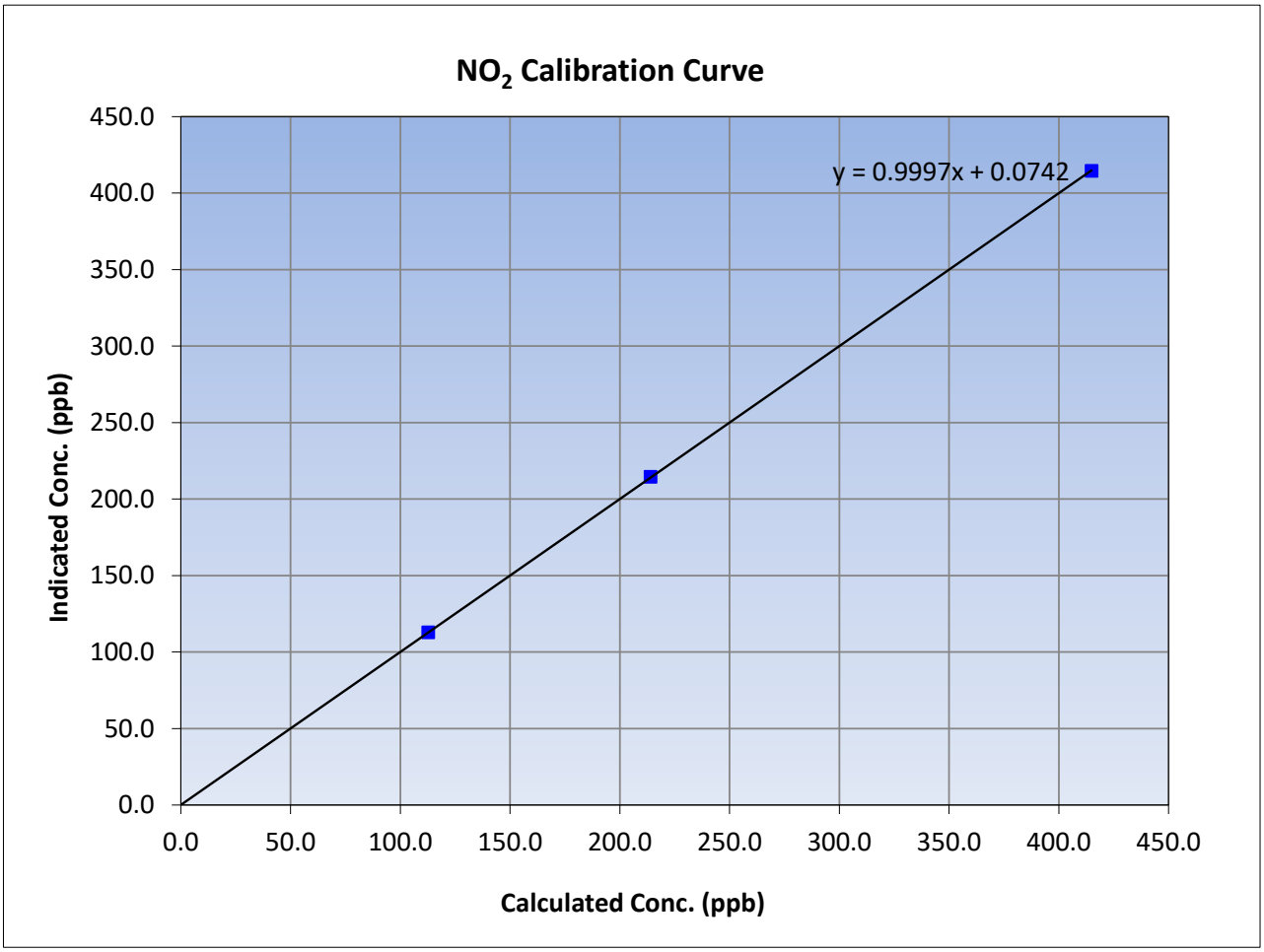
Version-05-2023

### Station Information

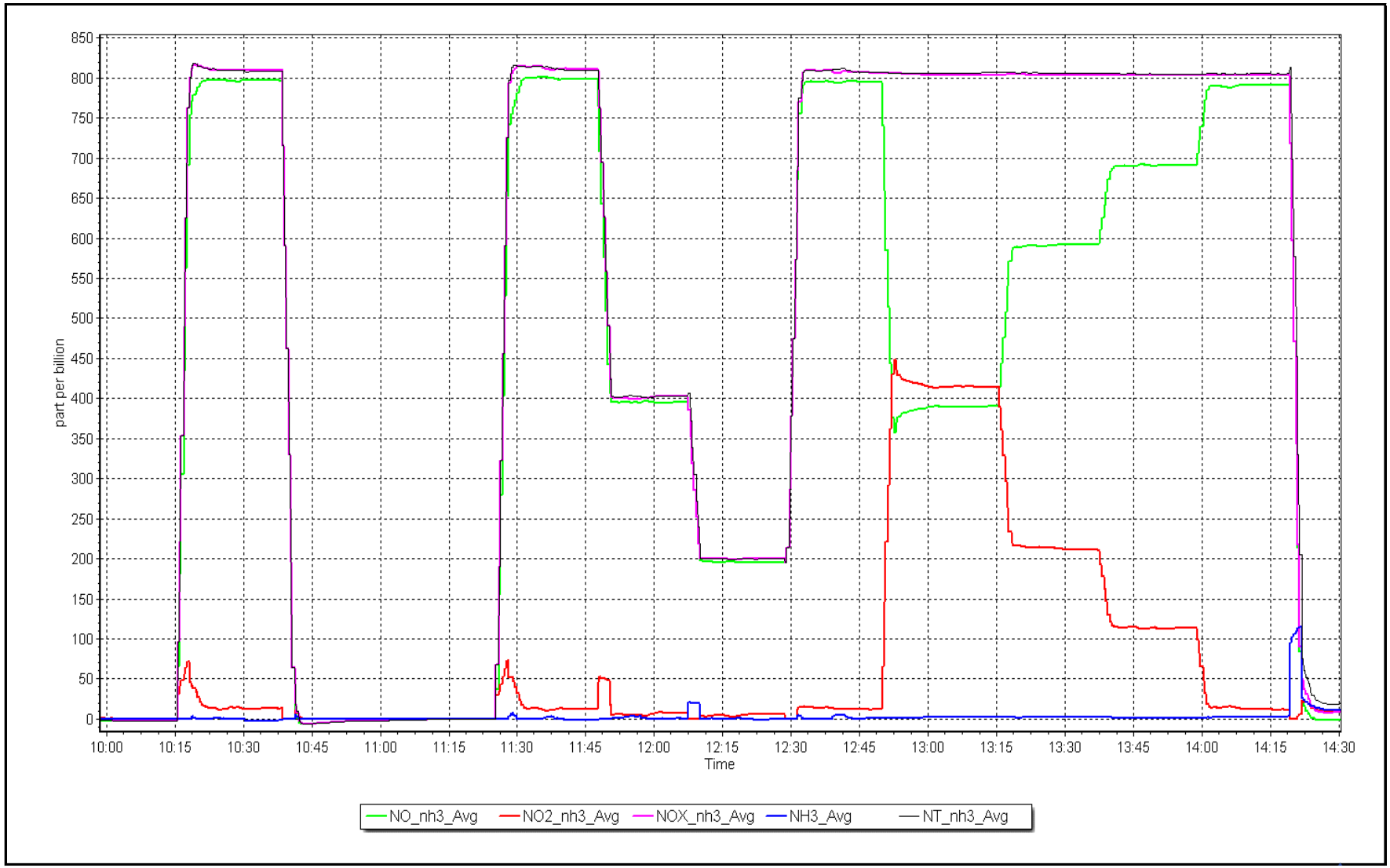
| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 12, 2023 |
| Station Name: | Bertha Ganter-Fort McKay | Station Number: | AMS01 |
| Start Time (MST): | 9:48 | End Time (MST): | 14:20 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 475 |

### Calibration Data

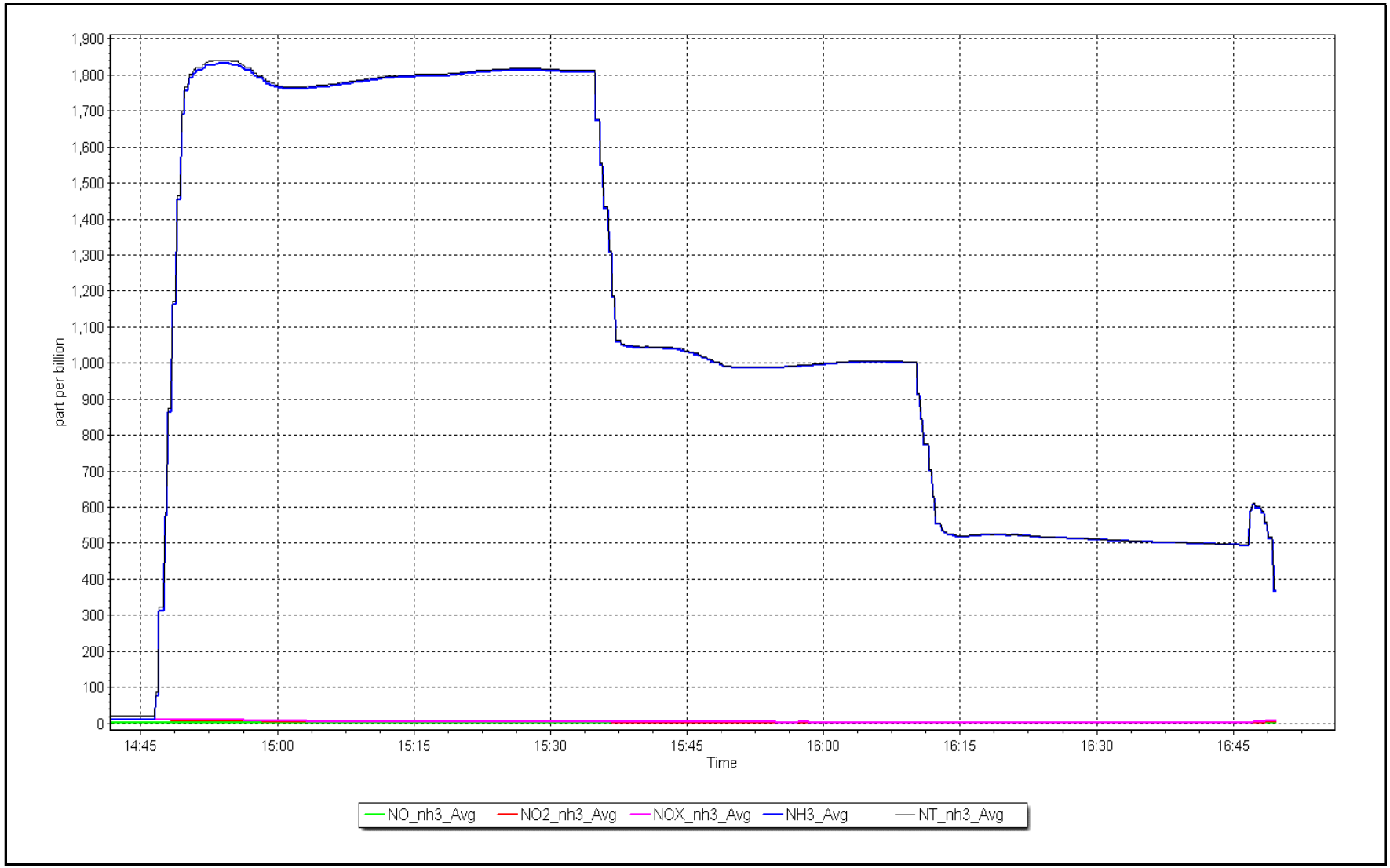
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999996 | ≥0.995 |
| 414.9 | 414.6 | 1.0007 | | | |
| 214.0 | 214.5 | 0.9977 | Slope | 0.999734 | 0.90 - 1.10 |
| 112.7 | 112.8 | 0.9991 | | | |
| | | | Intercept | 0.074243 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 23, 2023 Location: Bertha Ganter-Fort McKay



**$NH_3$ Calibration Plot** Date: August 23, 2023 Location: Bertha Ganter-Fort McKay



# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort McKay - Bertha Ganter | Station Number: | AMS 01 |
| Calibration Date: | August 25, 2023 | Prev Cal Date: | September 16, 2022 |
| Start Time (MST): | 11:43 | End Time (MST): | 13:17 |
| Tower Height (m): | 10.0 | Reason: | Routine |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | P10041 |
| WS Calibrator: | MetOne 053 | Serial Number: | P15103 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.3 | 0.5% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | 0.0% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999999 | 0.999999 | *≥0.9995* |
| Calculated slope | 0.999594 | 0.999594 | *0.90 - 1.10* |
| Calculated intercept | -0.028293 | -0.028293 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | R14655 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | 13:28 | Calc Declination*: | 13.74 Degrees |
| Deadband calc: | 1.5 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 1.1 | --- |
| 90 | 90.6 | 0.2% |
| 180 | 180.2 | 0.1% |
| 270 | 270.7 | 0.2% |
| 357 | 356.6 | -0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999996 | 0.999997 | *≥0.9995* |
| Calculated slope | 1.003118 | 1.003199 | *0.90 - 1.10* |
| Calculated intercept | -0.399196 | -1.004699 | *+/- 4* |

Notes: Performing annual MET sensor calibration. Bearings are good. Crossarm declination was aligned with true North using a compass.

Calibration Performed By: Rene Chamberland

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS02
## MILDRED LAKE
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Mildred Lake | Station number: | AMS02 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 12, 2023 |
| Start time (MST): | 9:49 | End time (MST): | 13:58 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.98 | ppm | Cal Gas Exp Date: | August 12, 2024 |
| Cal Gas Cylinder #: | CC501209 | | | |
| Removed Cal Gas Conc: | 49.98 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 1185 |
| ZAG Make/Model: | API T701 | | Serial Number: | 4891 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: JC1404901075

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.000728 | 1.008382 | Backgd or Offset: | 17.8 | 18.1 |
| Calibration intercept: | -1.304958 | -0.263519 | Coeff or Slope: | 0.783 | 0.797 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| as found span | 4920 | 80.2 | 801.6 | 787.2 | 1.018 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4920 | 80.2 | 801.6 | 808.0 | 0.992 |
| second point | 4960 | 40.1 | 400.8 | 404.4 | 0.991 |
| third point | 4980 | 20.0 | 199.9 | 200.8 | 0.996 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 4920 | 80.2 | 801.6 | 804.0 | 0.997 |
| | | | | Average Correction Factor | 0.993 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 787.50 | Previous response | 800.93 | *% change | -1.7% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Adjusted span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

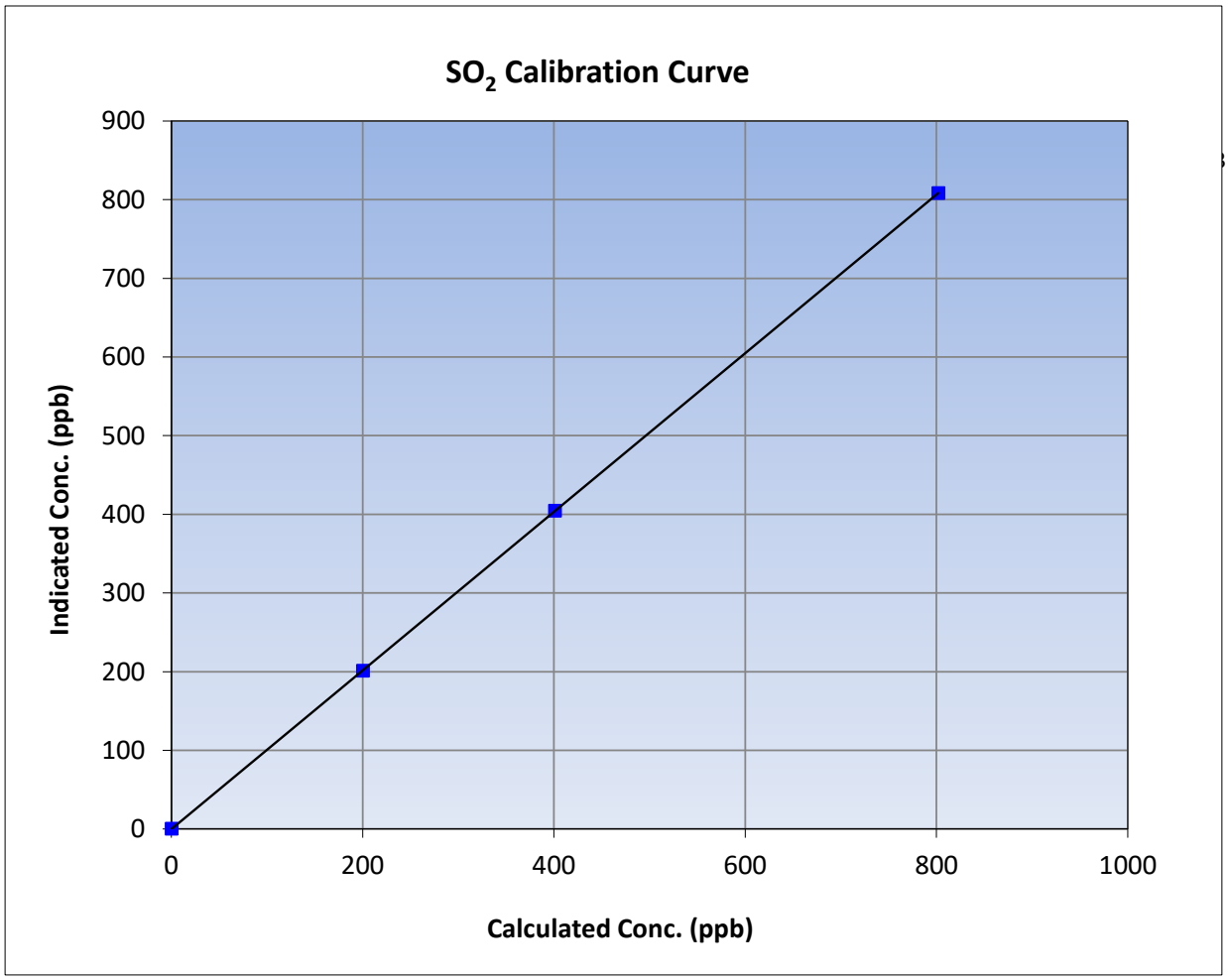
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 12, 2023 |
| Station Name: | Mildred Lake | Station Number: | AMS02 |
| Start Time (MST): | 9:49 | End Time (MST): | 13:58 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | JC1404901075 |

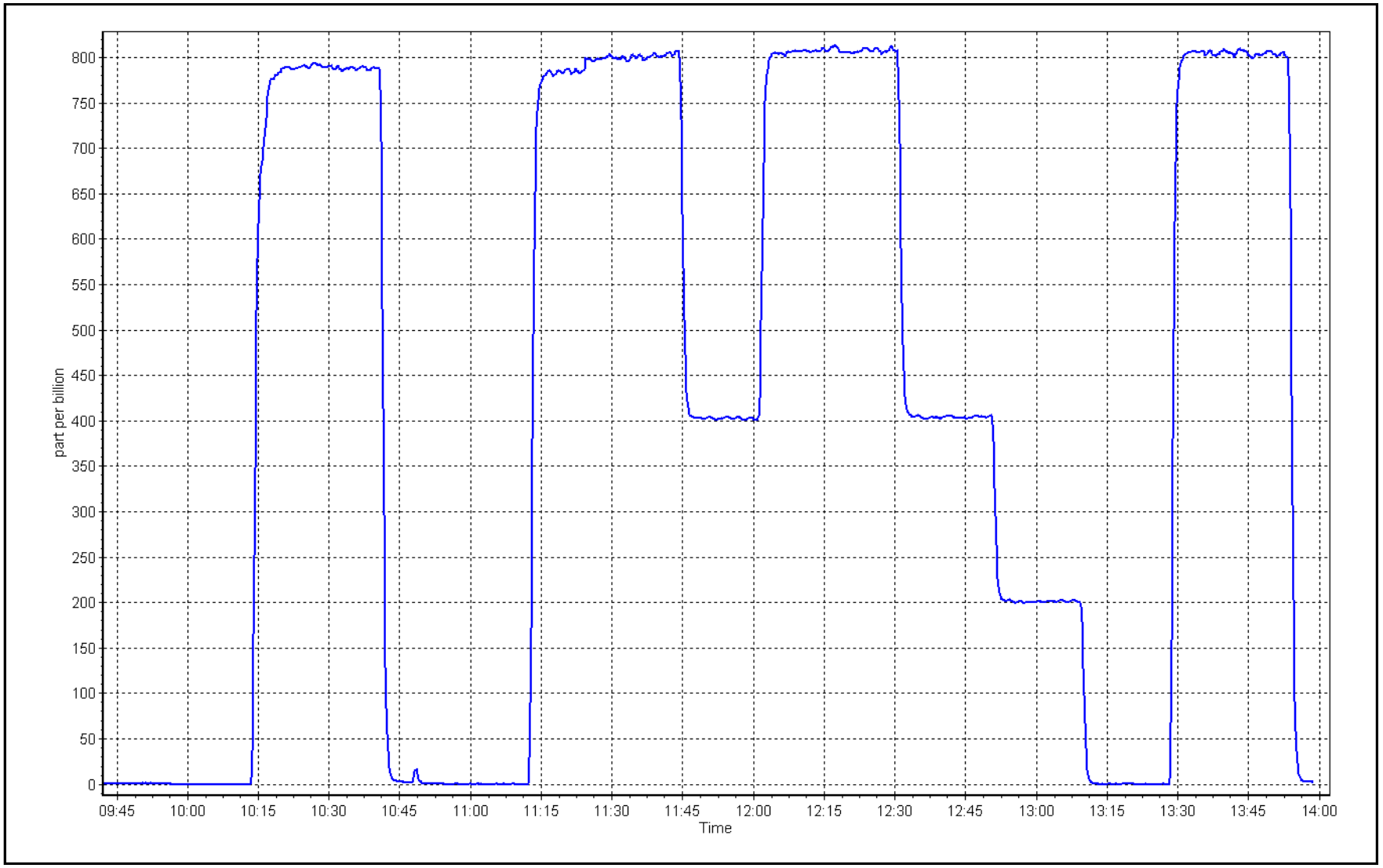
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 801.6 | 808.0 | 0.9921 |
| 400.8 | 404.4 | 0.9912 |
| 199.9 | 200.8 | 0.9956 |
| | | |

| Statistical Evaluation | | Limits |
|---|---|---|
| Correlation Coefficient | 0.999998 | ≥0.995 |
| Slope | 1.008382 | 0.90 - 1.10 |
| Intercept | -0.263519 | +/-30 |



**SO2 Calibration Plot** Date: August 15, 2023 Location: Mildred Lake



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Mildred Lake | Station number: | AMS02 |
| Calibration Date: | August 30, 2023 | Last Cal Date: | July 20, 2023 |
| Start time (MST): | 9:16 | End time (MST): | 17:40 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.29 | ppm | Cal Gas Exp Date: | January 4, 2025 |
| Cal Gas Cylinder #: | CC345191 | | | |
| Removed Cal Gas Conc: | 5.29 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 1185 |
| ZAG Make/Model: | API T701 | | Serial Number: | 5608 |

### Analyzer Information

| | | | | |
|---|---|---|---|---|
| Analyzer make: | Thermo 43iQTL | | Analyzer serial #: | 12113311966 |
| Converter make: | Global G150 | | Converter serial #: | 2022-198 |
| Analyzer Range | 0 - 100 ppb | | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.994964 | 1.031254 | Backgd or Offset: | 1.77 | 1.79 |
| Calibration intercept: | -0.019203 | -0.239187 | Coeff or Slope: | 0.821 | 0.821 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4924 | 75.6 | 80.0 | 79.9 | 1.001 |
| as found 2nd point | 4962 | 37.8 | 40.0 | 39.3 | 1.018 |
| as found 3rd point | 4981 | 18.9 | 20.0 | 19.3 | 1.036 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4924 | 75.6 | 80.0 | 82.6 | 0.968 |
| second point | 4962 | 37.8 | 40.0 | 40.4 | 0.990 |
| third point | 4981 | 18.9 | 20.0 | 20.2 | 0.990 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 4924 | 75.6 | 80.0 | 78.8 | 1.015 |
| SO2 Scrubber Check | 4920 | 80.2 | 802.0 | -0.1 | ---- |
| Date of last scrubber change: | | 12-Sep-22 | | Ave Corr Factor | 0.983 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 79.9 | Prev response: | 79.57 | *% change: | 0.4% |
| Baseline Corr 2nd AF pt: | 39.3 | AF Slope: | 1.000822 | AF Intercept: | -0.399208 |
| Baseline Corr 3rd AF pt: | 19.3 | AF Correlation: | 0.999879 | | |

* = > +/-5% change initiates investigation

Notes: Scrubber check done after MPAF's, passed. Ran room air to hydrate scrubber beads as the span was low. No adjustments made.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

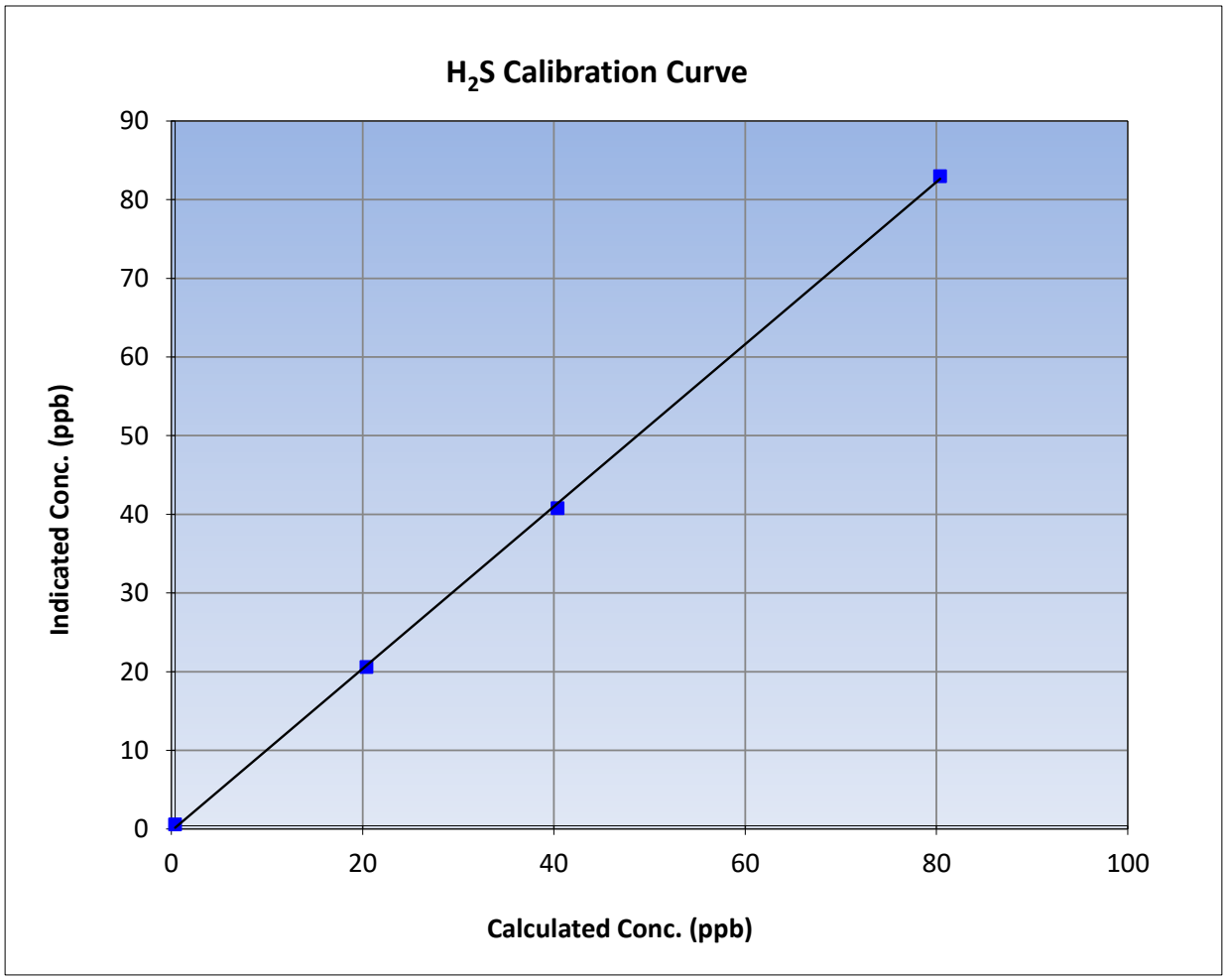
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 30, 2023 | Previous Calibration: | July 20, 2023 |
| Station Name: | Mildred Lake | Station Number: | AMS02 |
| Start Time (MST): | 9:16 | End Time (MST): | 17:40 |
| Analyzer make: | Thermo 43iQTL | Analyzer serial #: | 12113311966 |

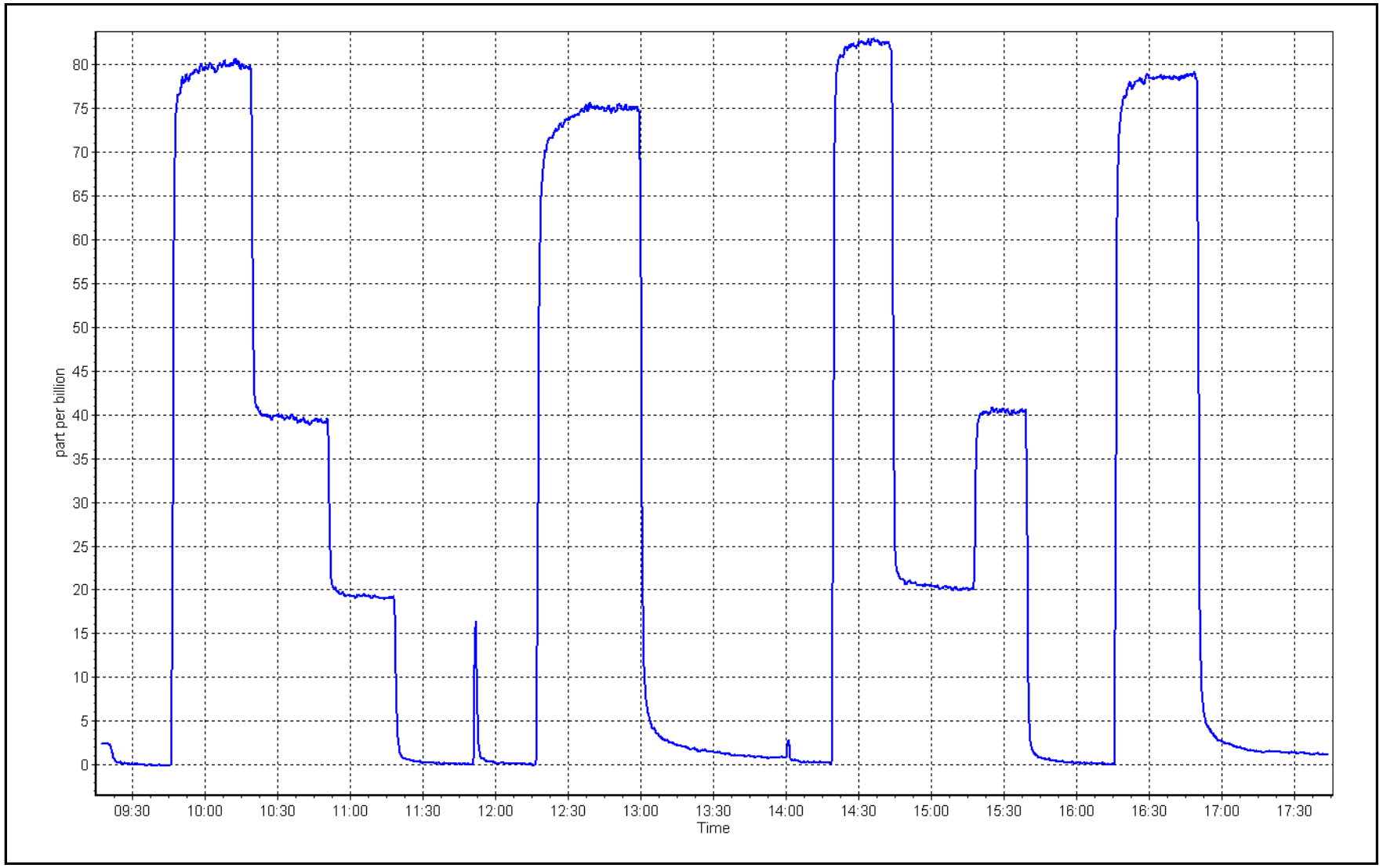
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 80.0 | 82.6 | 0.9684 |
| 40.0 | 40.4 | 0.9900 |
| 20.0 | 20.2 | 0.9899 |
| | | |

| Statistical Evaluation | | Limits |
|---|---|---|
| Correlation Coefficient | 0.999808 | ≥0.995 |
| Slope | 1.031254 | 0.90 - 1.10 |
| Intercept | -0.239187 | +/-3 |



**$H_2S$ Calibration Plot** Date: August 30, 2023 Location: Mildred Lake



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Mildred Lake | Station number: | AMS02 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 20, 2023 |
| Start time (MST): | 9:49 | End time (MST): | 13:58 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC501209 | Cal Gas Expiry Date: | August 12, 2024 | |
| CH4 Cal Gas Conc. | 500.2 | ppm | CH4 Equiv Conc. | 1048.6 | ppm |
| C3H8 Cal Gas Conc. | 199.4 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 500.2 | ppm | CH4 Equiv Conc. | 1048.6 | ppm |
| Removed C3H8 Conc. | 199.4 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 1185 | |
| ZAG make/model: | Teledyne API T701 | | Serial Number: | 4891 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1180320038 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.97E-04 | 2.95E-04 | NMHC SP Ratio: | 4.58E-05 | 4.58E-05 |
| CH4 Retention time: | 14.8 | 14.6 | NMHC Peak Area: | 192143 | 192337 |
| Zero Chromatogram: | ON | ON | Flat Baseline: | OFF | OFF |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.2 | 16.82 | 17.10 | 0.984 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.2 | 16.82 | 16.79 | 1.002 |
| second point | 4960 | 40.1 | 8.41 | 8.34 | 1.008 |
| third point | 4980 | 20.0 | 4.19 | 4.17 | 1.006 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.2 | 16.82 | 17.02 | 0.988 |
| | | | | Average Correction Factor | 1.005 |
| Baseline Corr AF: | 17.10 | Prev response | 16.81 | *% change | 1.7% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.2 | 8.80 | 8.89 | 0.989 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.2 | 8.80 | 8.78 | 1.002 |
| second point | 4960 | 40.1 | 4.40 | 4.37 | 1.005 |
| third point | 4980 | 20.0 | 2.19 | 2.20 | 0.997 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.2 | 8.80 | 8.83 | 0.996 |
| | | | | Average Correction Factor | 1.001 |
| Baseline Corr AF: | 8.89 | Prev response | 8.80 | *% change | 1.0% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.2 | 8.02 | 8.22 | 0.976 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.2 | 8.02 | 8.00 | 1.003 |
| second point | 4960 | 40.1 | 4.01 | 3.97 | 1.011 |
| third point | 4980 | 20.0 | 2.00 | 1.97 | 1.017 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.2 | 8.02 | 8.20 | 0.978 |
| | | | | Average Correction Factor | 1.010 |
| Baseline Corr AF: | 8.22 | Prev response | 8.01 | *% change | 2.6% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.000332 | 0.998327 |
| THC Cal Offset: | -0.014309 | -0.018313 |
| CH4 Cal Slope: | 1.000556 | 0.997907 |
| CH4 Cal Offset: | -0.018253 | -0.017457 |
| NMHC Cal Slope: | 1.000114 | 0.997620 |
| NMHC Cal Offset: | 0.003745 | 0.001341 |

Notes: Changed nitrogen cylinder. Adjusted span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## THC Calibration Summary

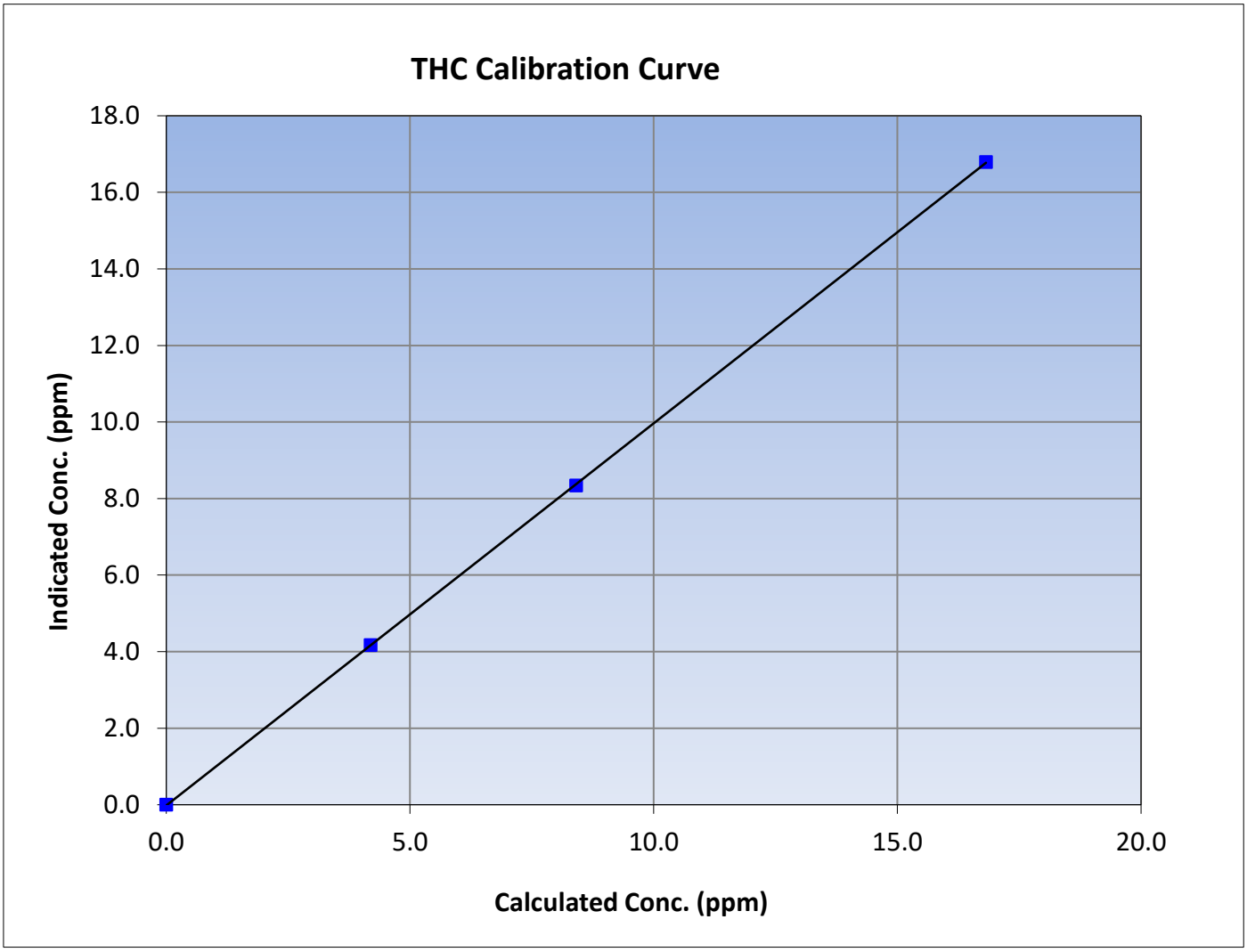
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 20, 2023 |
| Station Name: | Mildred Lake | Station Number: | AMS02 |
| Start Time (MST): | 9:49 | End Time (MST): | 13:58 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320038 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999987 | *≥0.995* |
| 16.82 | 16.79 | 1.0017 | | | |
| 8.41 | 8.34 | 1.0083 | Slope | 0.998327 | *0.90 - 1.10* |
| 4.19 | 4.17 | 1.0060 | | | |
| | | | Intercept | -0.018313 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

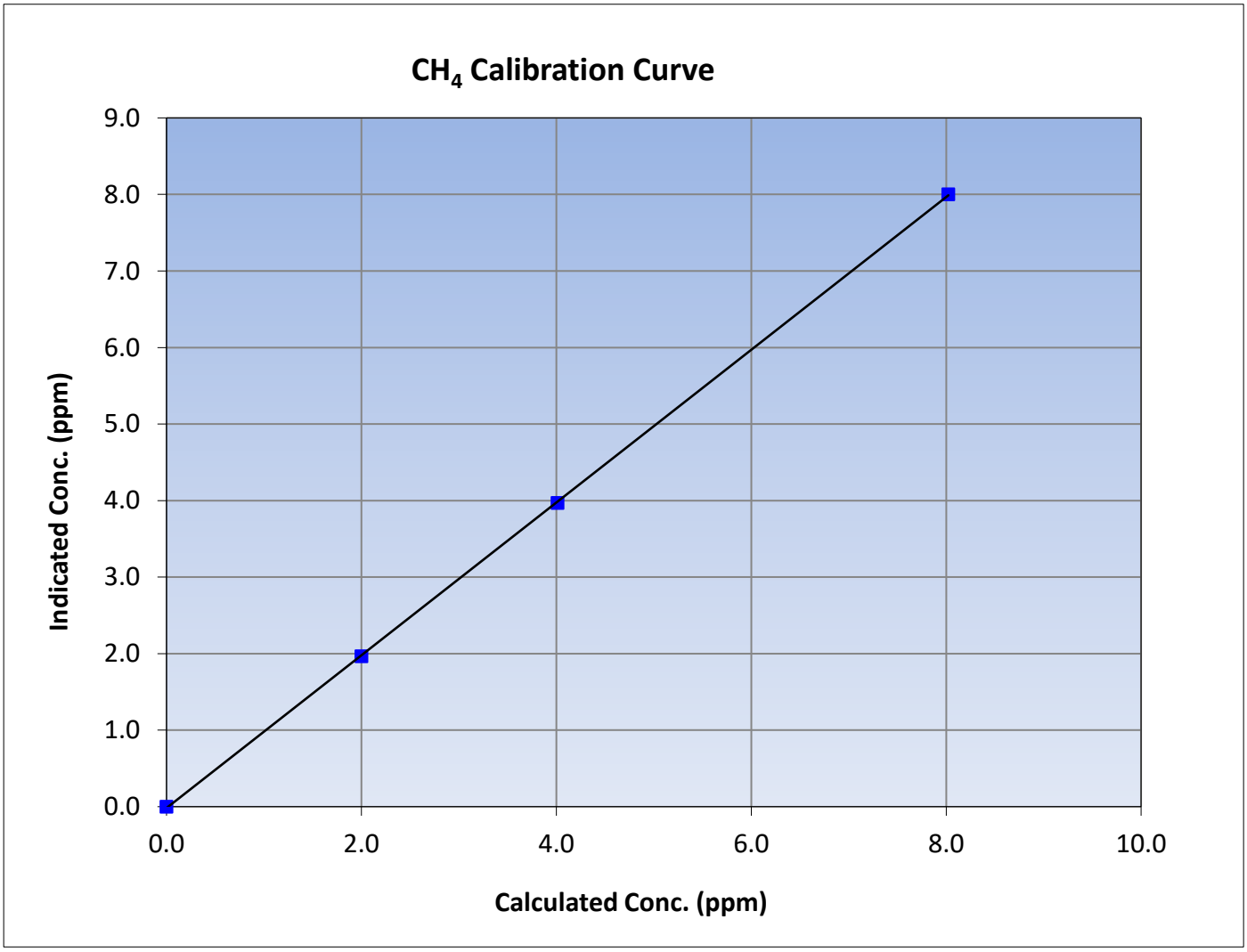
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 20, 2023 |
| Station Name: | Mildred Lake | Station Number: | AMS02 |
| Start Time (MST): | 9:49 | End Time (MST): | 13:58 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320038 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999975 | *≥0.995* |
| 8.02 | 8.00 | 1.0029 | | | |
| 4.01 | 3.97 | 1.0107 | Slope | 0.997907 | *0.90 - 1.10* |
| 2.00 | 1.97 | 1.0172 | | | |
| | | | Intercept | -0.017457 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

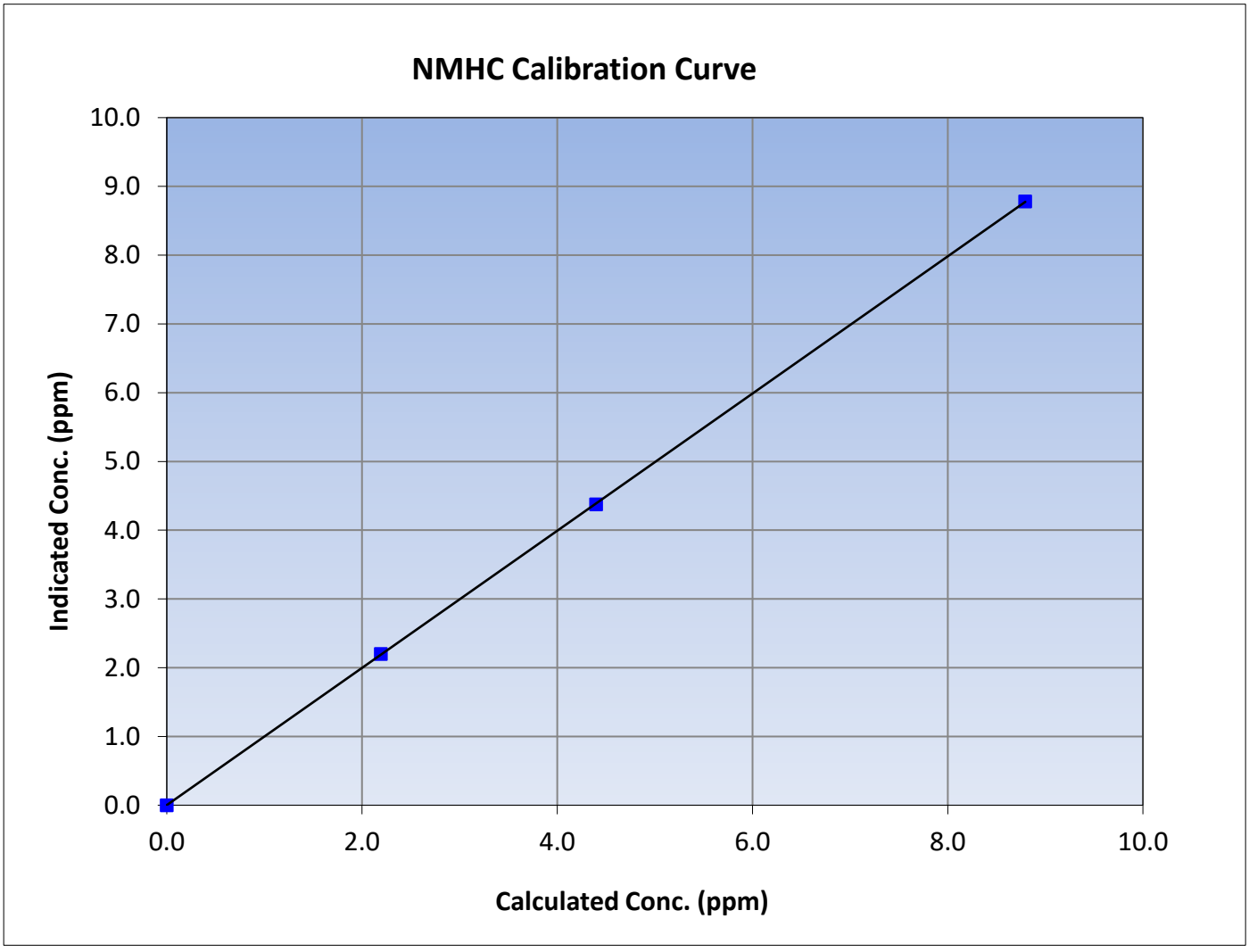
Version-06-2022

### Station Information

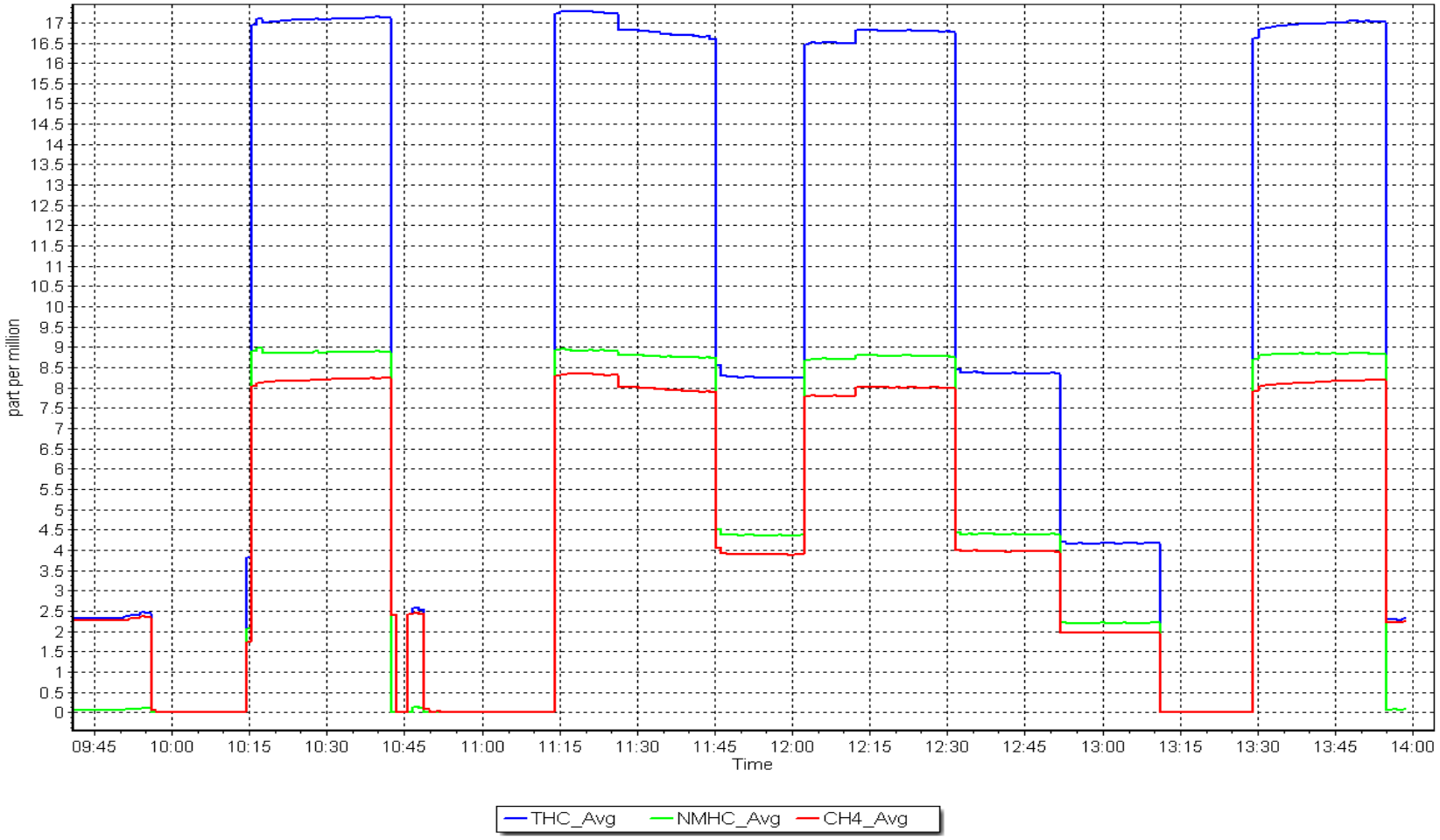
| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 20, 2023 |
| Station Name: | Mildred Lake | Station Number: | AMS02 |
| Start Time (MST): | 9:49 | End Time (MST): | 13:58 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320038 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999991 | *≥0.995* |
| 8.80 | 8.78 | 1.0017 | | | |
| 4.40 | 4.37 | 1.0054 | Slope | 0.997620 | *0.90 - 1.10* |
| 2.19 | 2.20 | 0.9965 | | | |
| | | | Intercept | 0.001341 | *+/-0.5* |



**NMHC Calibration Plot** Date: August 15, 2023 Location: Mildred Lake



# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Mildred Lake | Station Number: | AMS 02 |
| Calibration Date: | August 30, 2023 | Prev Cal Date: | October 6, 2022 |
| Start Time (MST): | 9:30 | End Time (MST): | 10:11 |
| Tower Height (m): | 10.0 | Reason: | Routine |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | E5130 |
| WS Calibrator: | MetOne 053 | Serial Number: | P15103 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.1 | -0.3% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.7 | 0.2% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999999 | *≥0.9995* |
| Calculated slope | | 0.998137 | *0.90 - 1.10* |
| Calculated intercept | | 0.028665 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | E5130 |
| As Found Declination (deg east of True North): | 13 | As Left Declination (deg east of True North): | 13 |
| Solar noon time (MST): | 11:27 | Calc Declination*: | 13.67 Degrees |
| Deadband calc: | -2.1 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 0.6 | --- |
| 90 | 87.6 | -0.7% |
| 180 | 179.3 | -0.2% |
| 270 | 273.3 | 0.9% |
| 357 | 359.7 | 0.8% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999924 | *≥0.9995* |
| Calculated slope | | 0.988811 | *0.90 - 1.10* |
| Calculated intercept | | 1.321034 | *+/- 4* |

Notes: Verified crossarm aligned with true north. Both sensors were within acceptable limits.

Calibration Performed By: Braiden Boutilier, Devin Russel

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS04
## BUFFALO VIEWPOINT
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Buffalo Viewpoint | Station number: | AMS04 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 19, 2023 |
| Start time (MST): | 5:40 | End time (MST): | 8:23 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 50.87 | ppm | Cal Gas Exp Date: | March 10, 2031 |
| Cal Gas Cylinder #: | CC446753 | | | |
| Removed Cal Gas Conc: | 50.87 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3808 |
| ZAG Make/Model: | API T701 | | Serial Number: | 362 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: JC1327300932

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.000328 | 0.999657 | Backgd or Offset: | 22.1 | 22.1 |
| Calibration intercept: | 0.714976 | 0.974700 | Coeff or Slope: | 0.860 | 0.860 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as found span | 4921 | 78.6 | 799.7 | 799.0 | 1.001 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| high point | 4921 | 78.6 | 799.7 | 800.0 | 1.000 |
| second point | 4961 | 39.3 | 399.8 | 401.5 | 0.996 |
| third point | 4980 | 19.6 | 199.4 | 200.4 | 0.995 |
| as left zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as left span | 4921 | 78.6 | 799.7 | 799.3 | 1.001 |
| | | | | Average Correction Factor | 0.997 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 798.60 | Previous response | 800.72 | *% change | -0.3% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

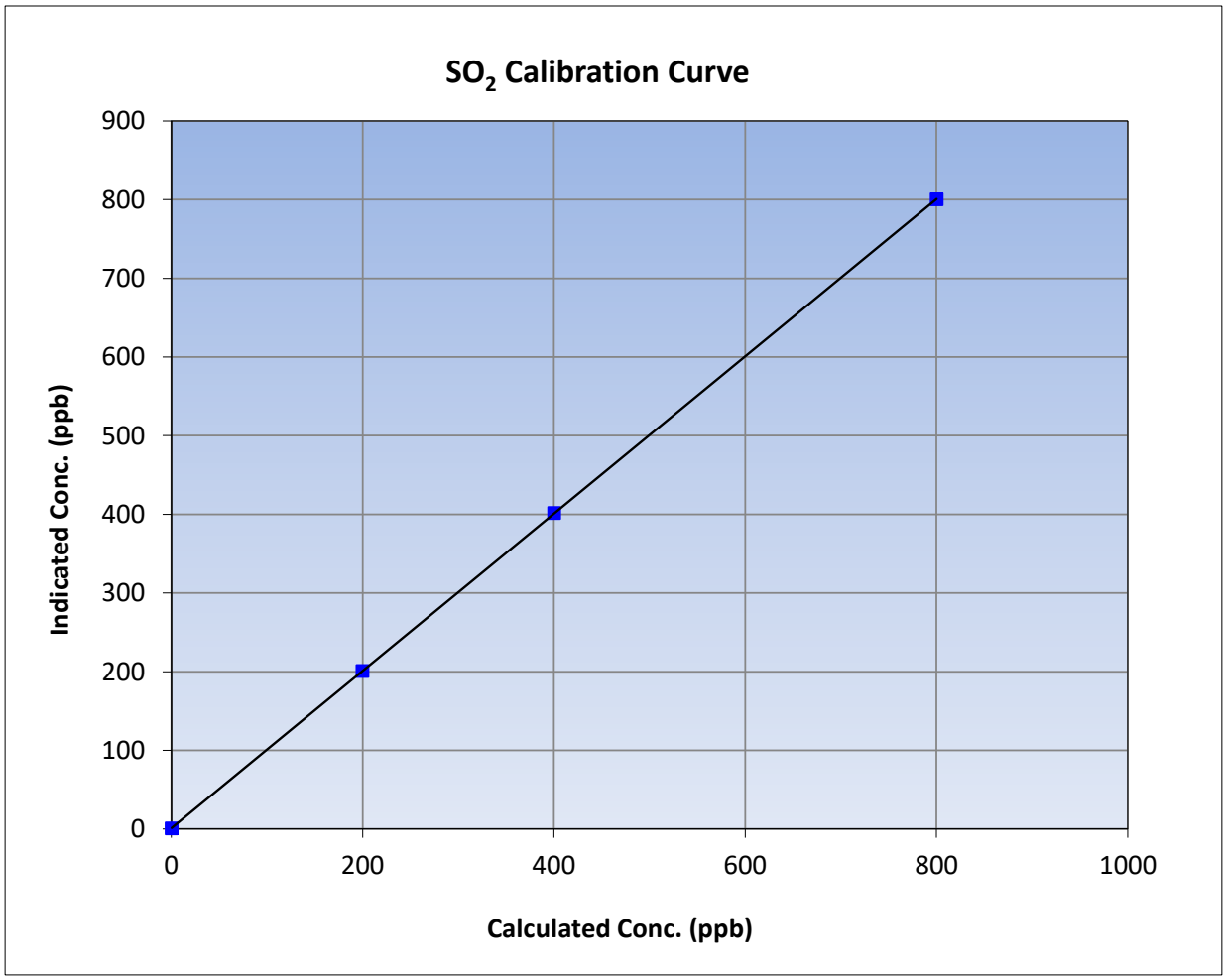
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Buffalo Viewpoint | Station Number: | AMS04 |
| Start Time (MST): | 5:40 | End Time (MST): | 8:23 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | JC1327300932 |

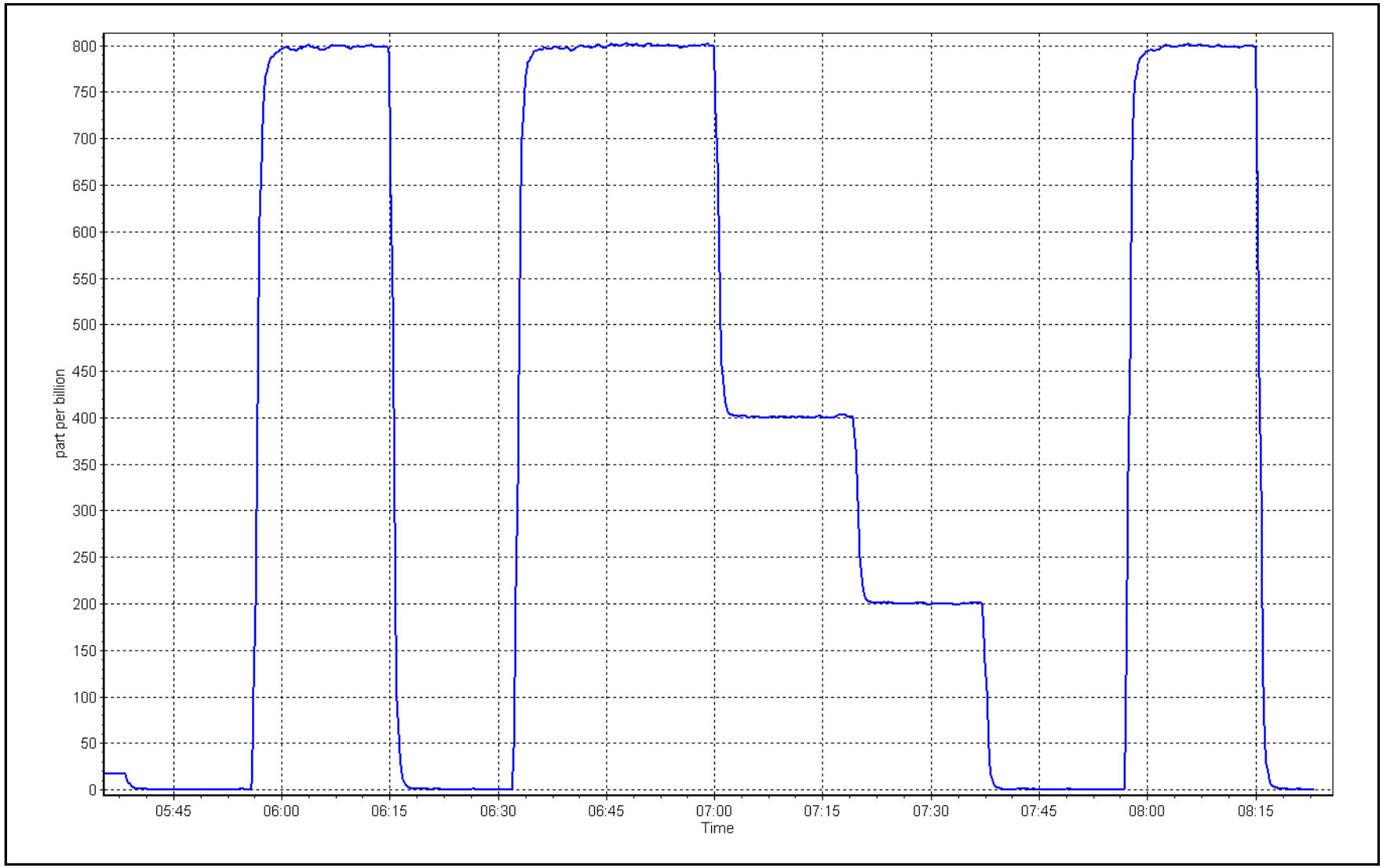
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.5 | ---- |
| 799.7 | 800.0 | 0.9997 |
| 399.8 | 401.5 | 0.9958 |
| 199.4 | 200.4 | 0.9951 |
| | | |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999997 | *≥0.995* |
| Slope | 0.999657 | *0.90 - 1.10* |
| Intercept | 0.974700 | *+/-30* |



**SO2 Calibration Plot** Date: August 9, 2023 Location: Buffalo Viewpoint



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Buffalo Viewpoint | Station number: | AMS04 |
| Calibration Date: | August 2, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 7:50 | End time (MST): | 12:15 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.42 | ppm | Cal Gas Exp Date: | January 4, 2025 |
| Cal Gas Cylinder #: | CC345266 | | | |
| Removed Cal Gas Conc: | 5.42 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3808 |
| ZAG Make/Model: | API T701H | | Serial Number: | 362 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i-LTE | | Analyzer serial #: | 1008841400 | |
| Converter make: | Global | | Converter serial #: | 2022-200 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.994226 | 1.000770 | Backgd or Offset: | 1.8 | 1.8 |
| Calibration intercept: | -0.017926 | -0.097733 | Coeff or Slope: | 1.095 | 1.095 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4926 | 74.1 | 80.3 | 79.6 | 1.009 |
| as found 2nd point | 4963 | 37.0 | 40.1 | 40.1 | 1.000 |
| as found 3rd point | 4982 | 18.5 | 20.1 | 19.9 | 1.008 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4926 | 74.1 | 80.3 | 80.2 | 1.002 |
| second point | 4963 | 37.0 | 40.1 | 40.3 | 0.995 |
| third point | 4982 | 18.5 | 20.1 | 19.8 | 1.013 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 4926 | 74.1 | 80.3 | 79.5 | 1.010 |
| SO2 Scrubber Check | 4920 | 80.0 | 800.0 | 0.0 | ---- |
| Date of last scrubber change: | | 16-May-23 | | Ave Corr Factor | 1.003 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 79.6 | Prev response: | 79.84 | *% change: | -0.3% |
| Baseline Corr 2nd AF pt: | 40.1 | AF Slope: | 0.991379 | AF Intercept: | 0.082088 |
| Baseline Corr 3rd AF pt: | 19.9 | AF Correlation: | 0.999974 | | |

* = > +/-5% change initiates investigation

Notes: Sox scrubber checked after the calibrator zero. No adjustments done.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

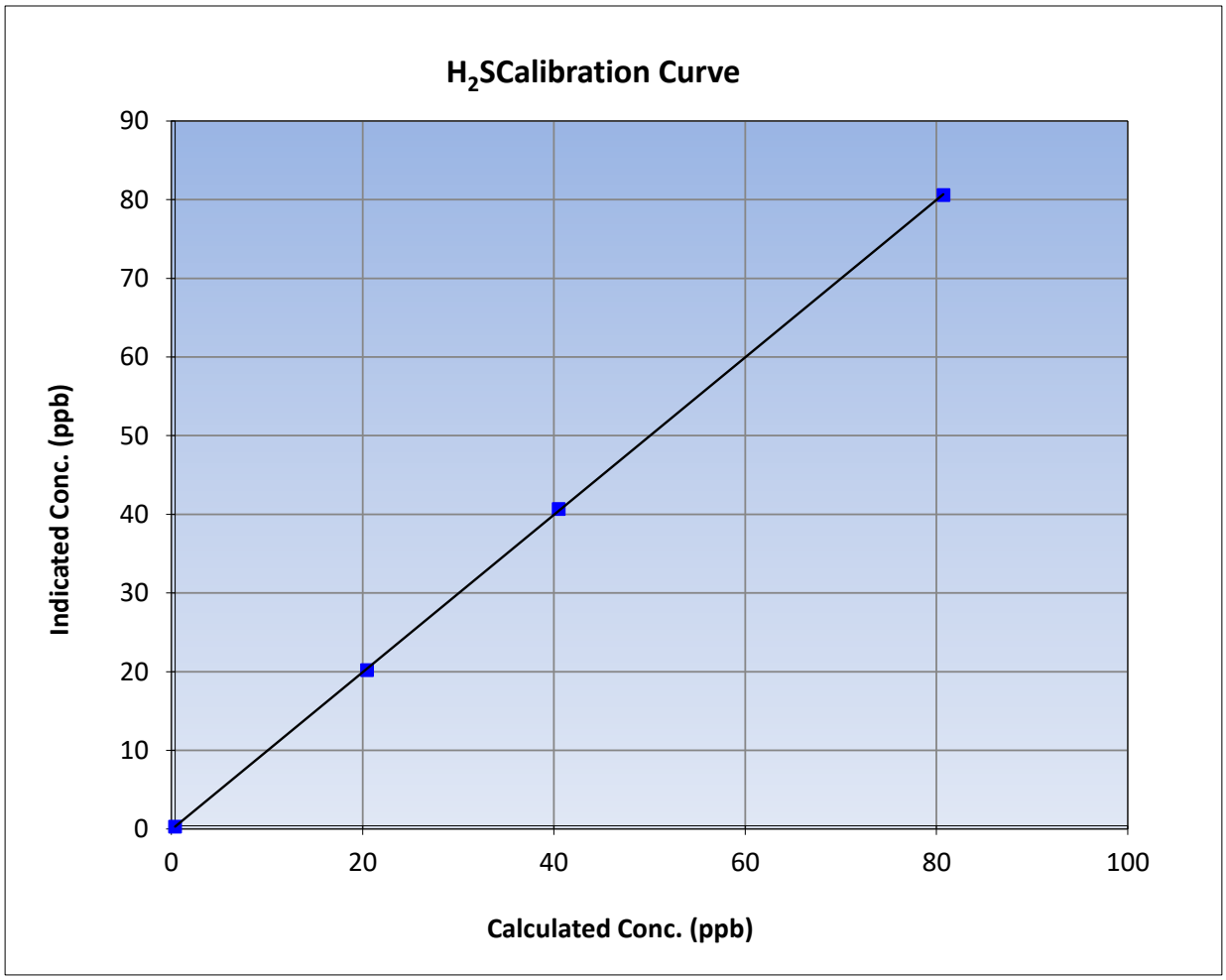
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 2, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Buffalo Viewpoint | Station Number: | AMS04 |
| Start Time (MST): | 7:50 | End Time (MST): | 12:15 |
| Analyzer make: | Thermo 43i-LTE | Analyzer serial #: | 1008841400 |

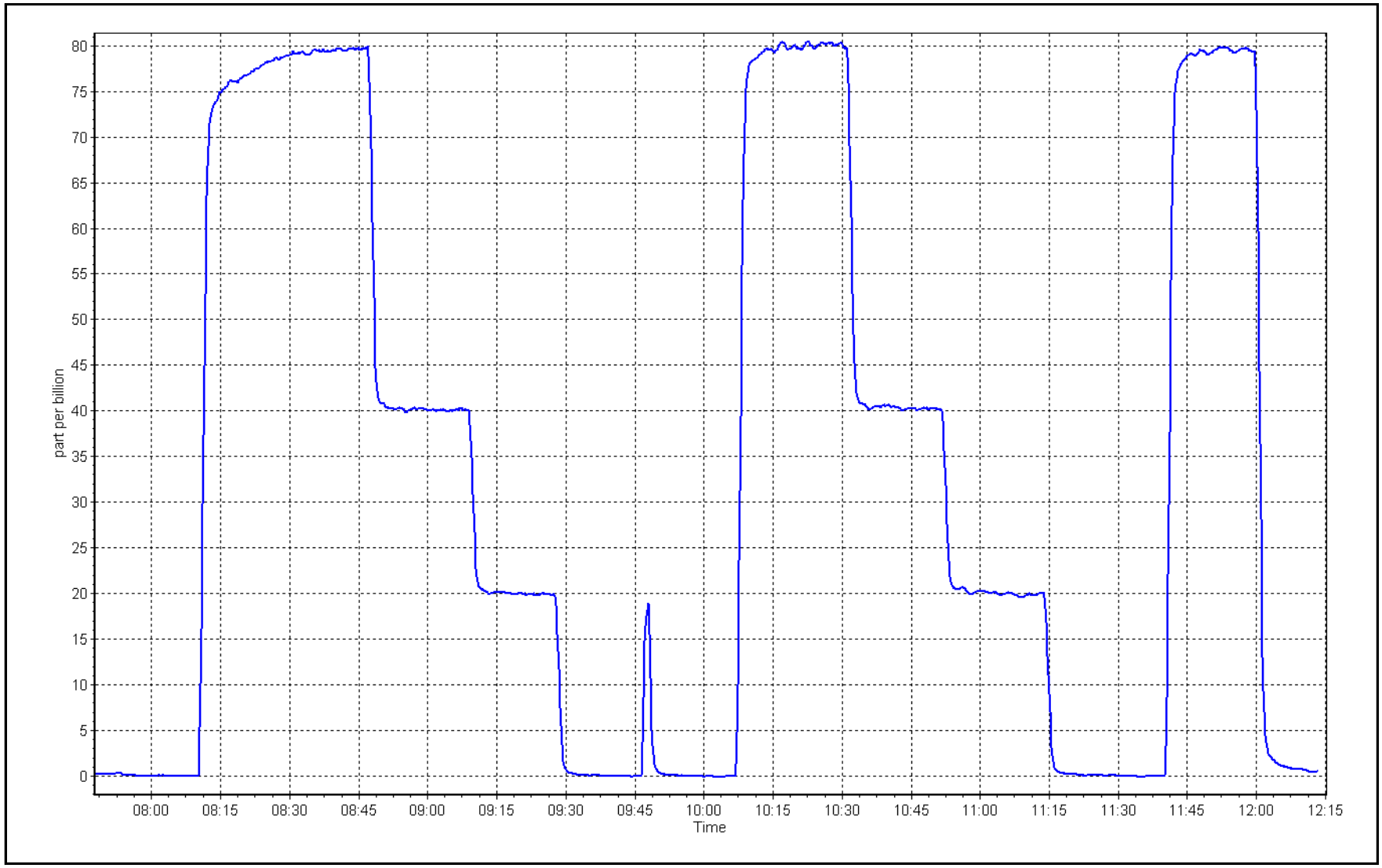
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 80.3 | 80.2 | 1.0015 |
| 40.1 | 40.3 | 0.9952 |
| 20.1 | 19.8 | 1.0127 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999971 | *≥0.995* |
| Slope | 1.000770 | *0.90 - 1.10* |
| Intercept | -0.097733 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 2, 2023 Location: Buffalo Viewpoint



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Buffalo Viewpoint | Station number: | AMS04 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 19, 2023 |
| Start time (MST): | 5:40 | End time (MST): | 8:22 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC446753 | Cal Gas Expiry Date: | March 10, 2031 | |
| CH4 Cal Gas Conc. | 497.2 | ppm | CH4 Equiv Conc. | 1058.2 | ppm |
| C3H8 Cal Gas Conc. | 204.0 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 497.2 | ppm | CH4 Equiv Conc. | 1058.2 | ppm |
| Removed C3H8 Conc. | 204.0 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 3808 | |
| ZAG make/model: | API T701 | | Serial Number: | 362 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1222762077 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 1.840E-04 | 1.860E-04 | NMHC SP Ratio: | 3.910E-05 | 3.960E-05 |
| CH4 Retention time: | 11.8 | 11.8 | NMHC Peak Area: | 225808 | 222570 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 78.6 | 16.64 | 16.44 | 1.012 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 78.6 | 16.64 | 16.64 | 1.000 |
| second point | 4961 | 39.3 | 8.32 | 8.31 | 1.001 |
| third point | 4980 | 19.6 | 4.15 | 4.14 | 1.002 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 78.6 | 16.64 | 16.64 | 1.000 |
| | | | | Average Correction Factor | 1.001 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 16.44 | Prev response | 16.64 | *% change | -1.2% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | |
| as found span | 4921 | 78.6 | 8.82 | 8.71 | 1.013 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 78.6 | 8.82 | 8.82 | 1.000 |
| second point | 4961 | 39.3 | 4.41 | 4.41 | 1.000 |
| third point | 4980 | 19.6 | 2.20 | 2.20 | 1.001 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 78.6 | 8.82 | 8.82 | 1.000 |
| | | | | Average Correction Factor | 1.000 |
| Baseline Corr AF: | 8.71 | Prev response | 8.82 | *% change | -1.3% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 78.6 | 7.82 | 7.74 | 1.010 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 78.6 | 7.82 | 7.82 | 1.000 |
| second point | 4961 | 39.3 | 3.91 | 3.90 | 1.002 |
| third point | 4980 | 19.6 | 1.95 | 1.94 | 1.005 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 78.6 | 7.82 | 7.82 | 1.000 |
| | | | | Average Correction Factor | 1.002 |
| Baseline Corr AF: | 7.74 | Prev response | 7.82 | *% change | -1.1% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.000429 | 1.000360 |
| THC Cal Offset: | -0.003535 | -0.005535 |
| CH4 Cal Slope: | 1.002052 | 1.000736 |
| CH4 Cal Offset: | -0.007900 | -0.005903 |
| NMHC Cal Slope: | 1.000156 | 1.000144 |
| NMHC Cal Offset: | 0.002367 | -0.000833 |

Notes: Span Adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## THC Calibration Summary

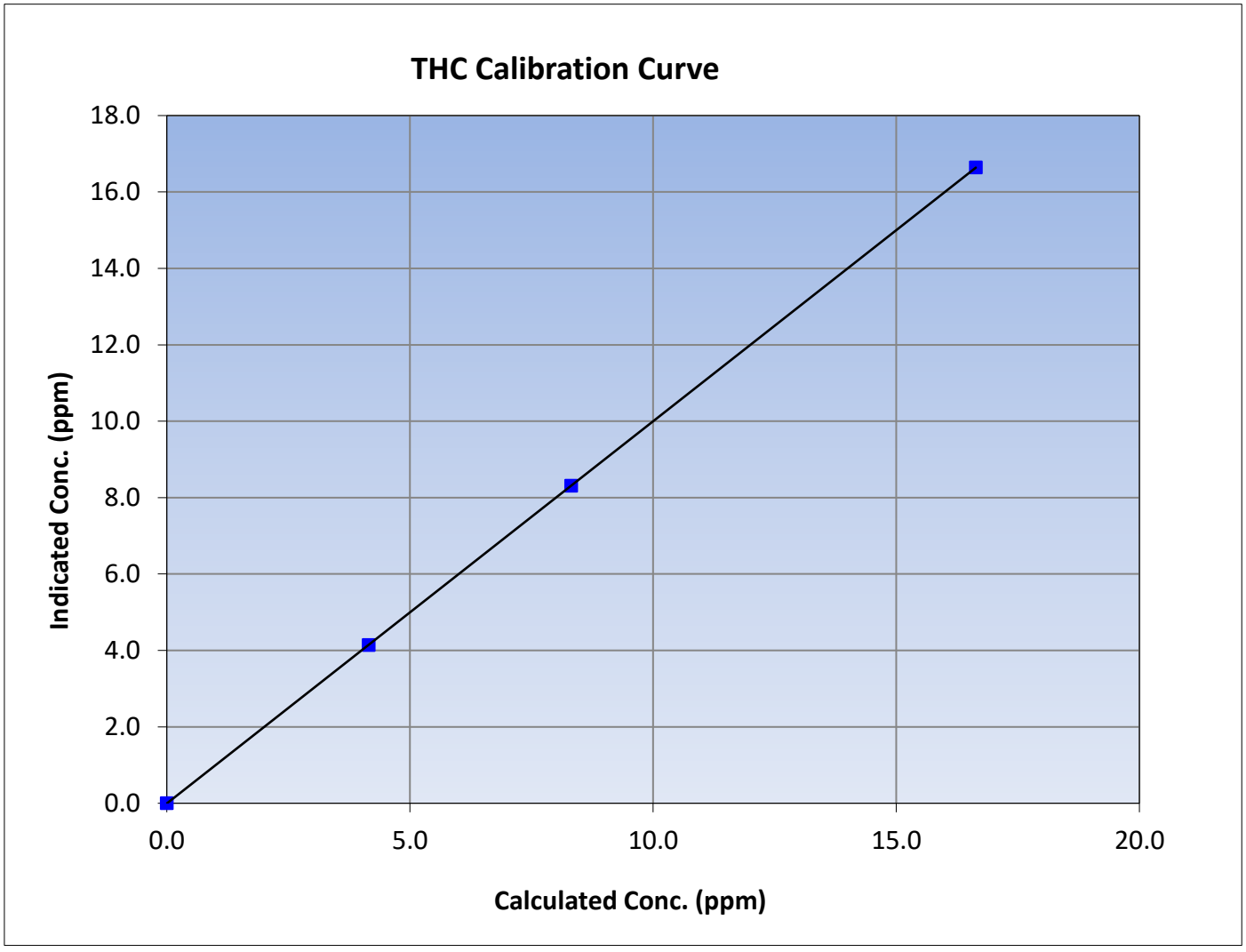
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Buffalo Viewpoint | Station Number: | AMS04 |
| Start Time (MST): | 5:40 | End Time (MST): | 8:22 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1222762077 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999999 | *≥0.995* |
| 16.64 | 16.64 | 0.9998 | | | |
| 8.32 | 8.31 | 1.0008 | Slope | 1.000360 | *0.90 - 1.10* |
| 4.15 | 4.14 | 1.0020 | | | |
| | | | Intercept | -0.005535 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

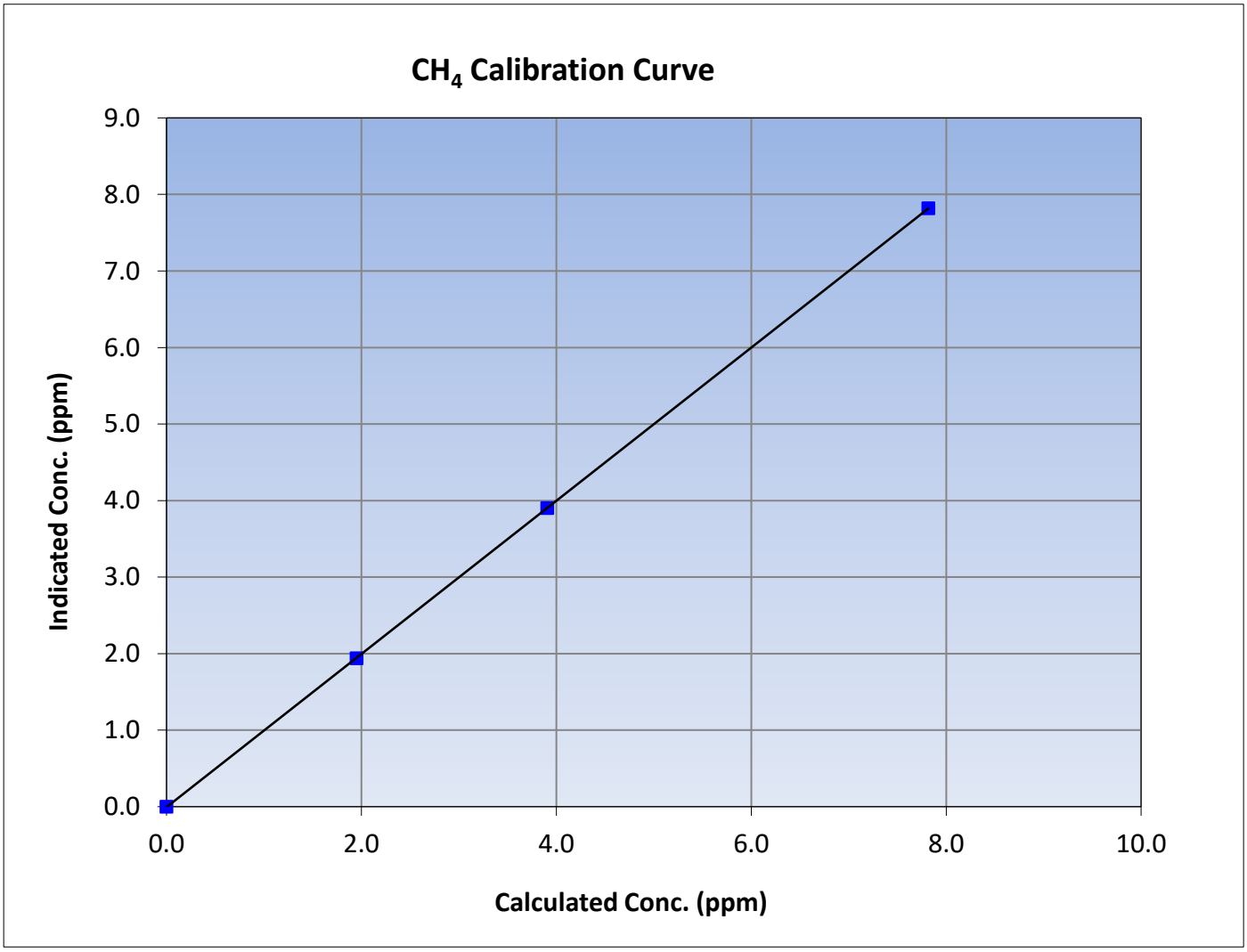
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Buffalo Viewpoint | Station Number: | AMS04 |
| Start Time (MST): | 5:40 | End Time (MST): | 8:22 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1222762077 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999997 | *≥0.995* |
| 7.82 | 7.82 | 0.9996 | | | |
| 3.91 | 3.90 | 1.0020 | Slope | 1.000736 | *0.90 - 1.10* |
| 1.95 | 1.94 | 1.0047 | | | |
| | | | Intercept | -0.005903 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

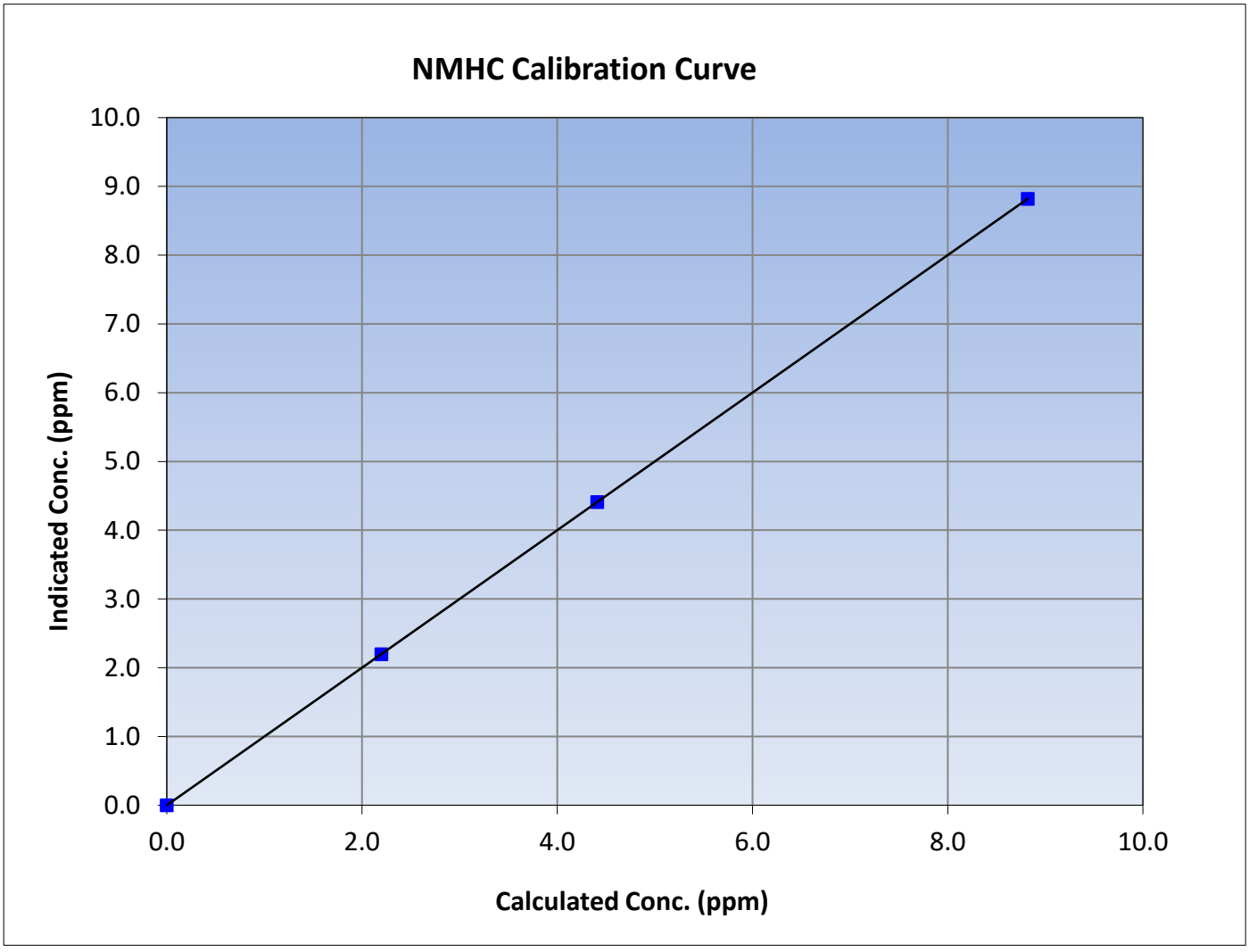
Version-01-2020

### Station Information

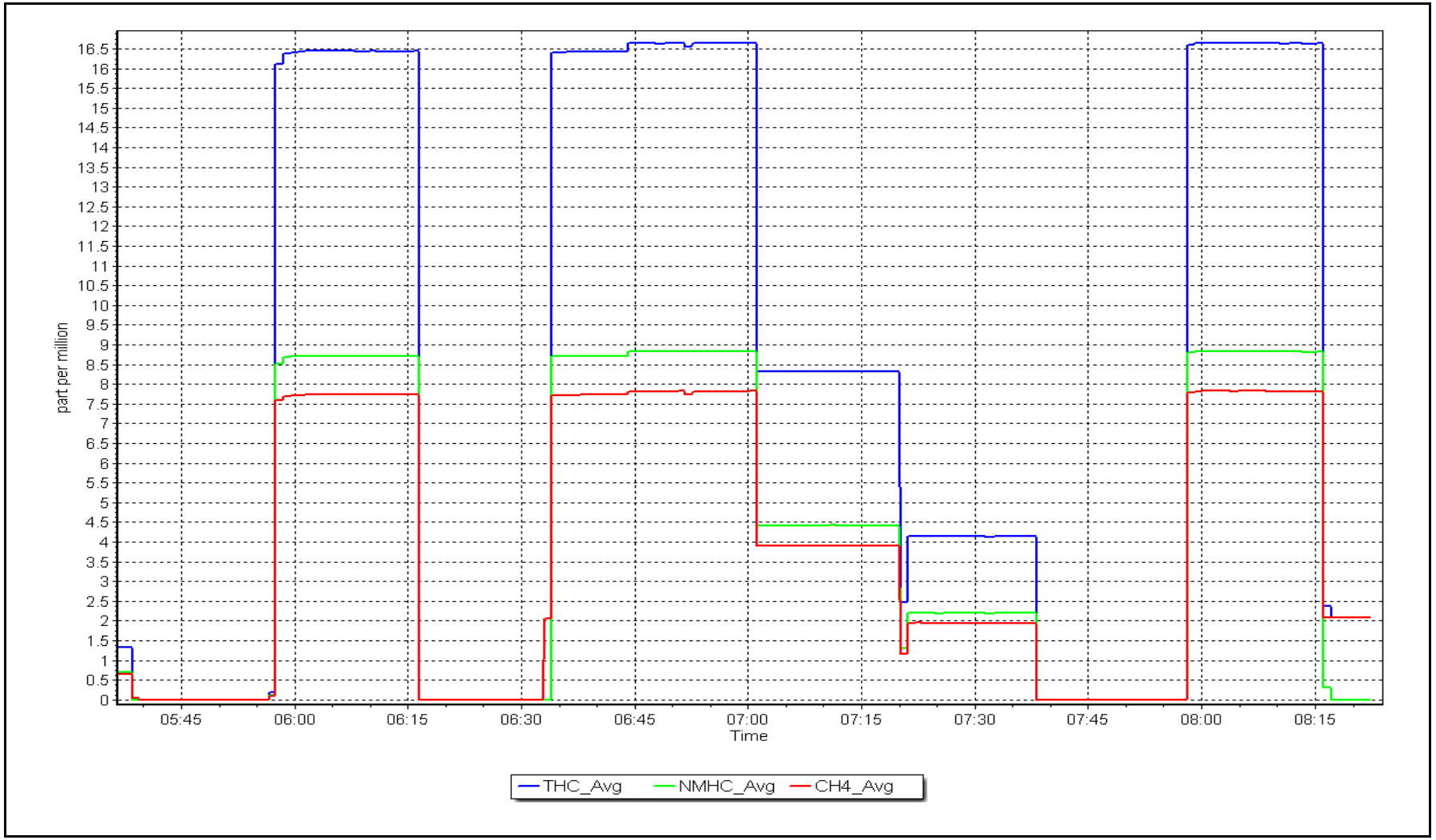
| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Buffalo Viewpoint | Station Number: | AMS04 |
| Start Time (MST): | 5:40 | End Time (MST): | 8:22 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1222762077 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 8.82 | 8.82 | 1.0000 | | | |
| 4.41 | 4.41 | 0.9998 | Slope | 1.000144 | 0.90 - 1.10 |
| 2.20 | 2.20 | 1.0010 | | | |
| | | | Intercept | -0.000833 | +/-0.5 |



**NMHC Calibration Plot** Date: August 9, 2023 Location: Buffalo Viewpoint



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Buffalo Viewpoint | Station number: | AMS04 |
| Calibration Date: | August 25, 2023 | Last Cal Date: | July 27, 2023 |
| Start time (MST): | 9:39 | End time (MST): | 14:52 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T36RH1F | | Cal Gas Expiry Date: | August 18, 2023 | |
| NOX Cal Gas Conc: | 51.16 | ppm | NO Cal Gas Conc: | 50.91 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 51.16 | ppm | Removed Gas NO Conc: | 50.91 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 3808 | |
| ZAG make/model: | API T701 | | Serial Number: | 362 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | API T200 | Analyzer serial #: | 721 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.071 | 1.121 | NO bkgnd or offset: | -0.6 | -0.6 |
| NOX coeff or slope: | 1.066 | 1.119 | NOX bkgnd or offset: | -0.3 | -0.3 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 4.5 | 4.5 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 1.002547 | 1.000803 |
| $NO_X$ Cal Offset: | -0.233343 | 0.426473 |
| NO Cal Slope: | 1.001796 | 1.000459 |
| NO Cal Offset: | -1.333988 | -0.993702 |
| $NO_2$ Cal Slope: | 0.990498 | 0.991739 |
| $NO_2$ Cal Offset: | 0.120026 | 2.285236 |

# Wood Buffalo Environmental Association

# $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.2 | 0.7 | ---- | ---- |
| as found span | 4922 | 78.1 | 799.1 | 795.2 | 3.9 | 759.3 | 753.6 | 5.7 | 1.0524 | 1.0552 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.5 | 0.1 | ---- | ---- |
| high point | 4922 | 78.1 | 799.1 | 795.2 | 3.9 | 800.3 | 795.3 | 5.0 | 0.9985 | 0.9999 |
| second point | 4961 | 39.1 | 400.1 | 398.1 | 2.0 | 400.6 | 396.6 | 4.0 | 0.9987 | 1.0038 |
| third point | 4981 | 19.5 | 199.5 | 198.5 | 1.0 | 200.0 | 196.1 | 3.9 | 0.9975 | 1.0124 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.8 | -0.2 | ---- | ---- |
| as left span | 4922 | 78.1 | 799.1 | 391.7 | 407.4 | 793.6 | 386.1 | 407.5 | 1.0069 | 1.0145 |
| | | | | | | | | Average Correction Factor | 0.9982 | 1.0054 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 758.3 ppb | NO = 753.4 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = -5.6% |
| Previous Response | $NO_X$ = 800.9 ppb | NO = 795.3 ppb | | *Percent Change | NO = -5.6% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 789.6 | 386.1 | 407.4 | 404.8 | 1.0064 | 99.4% |
| 2nd GPT point (200 ppb O3) | 789.6 | 584.7 | 208.8 | 211.6 | 0.9868 | 101.3% |
| 3rd GPT point (100 ppb O3) | 789.6 | 688.8 | 104.7 | 107.6 | 0.9731 | 102.8% |
| | | | | Average Correction Factor | 0.9888 | 101.2% |

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

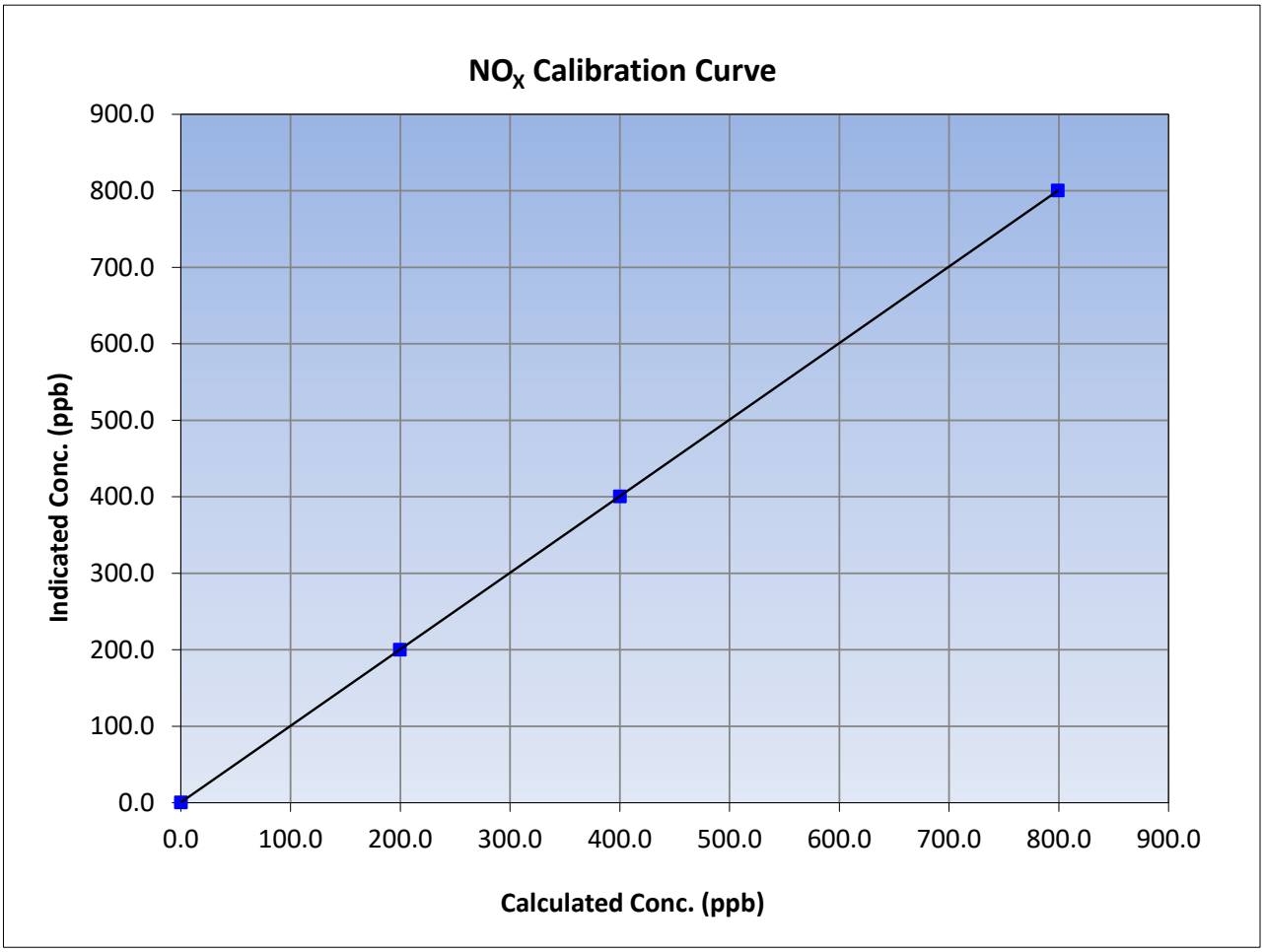
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 25, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Buffalo Viewpoint | Station Number: | AMS04 |
| Start Time (MST): | 9:39 | End Time (MST): | 14:52 |
| Analyzer make: | API T200 | Analyzer serial #: | 721 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.6 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 799.1 | 800.3 | 0.9985 | | | |
| 400.1 | 400.6 | 0.9987 | Slope | 1.000803 | 0.90 - 1.10 |
| 199.5 | 200.0 | 0.9975 | | | |
| | | | Intercept | 0.426473 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

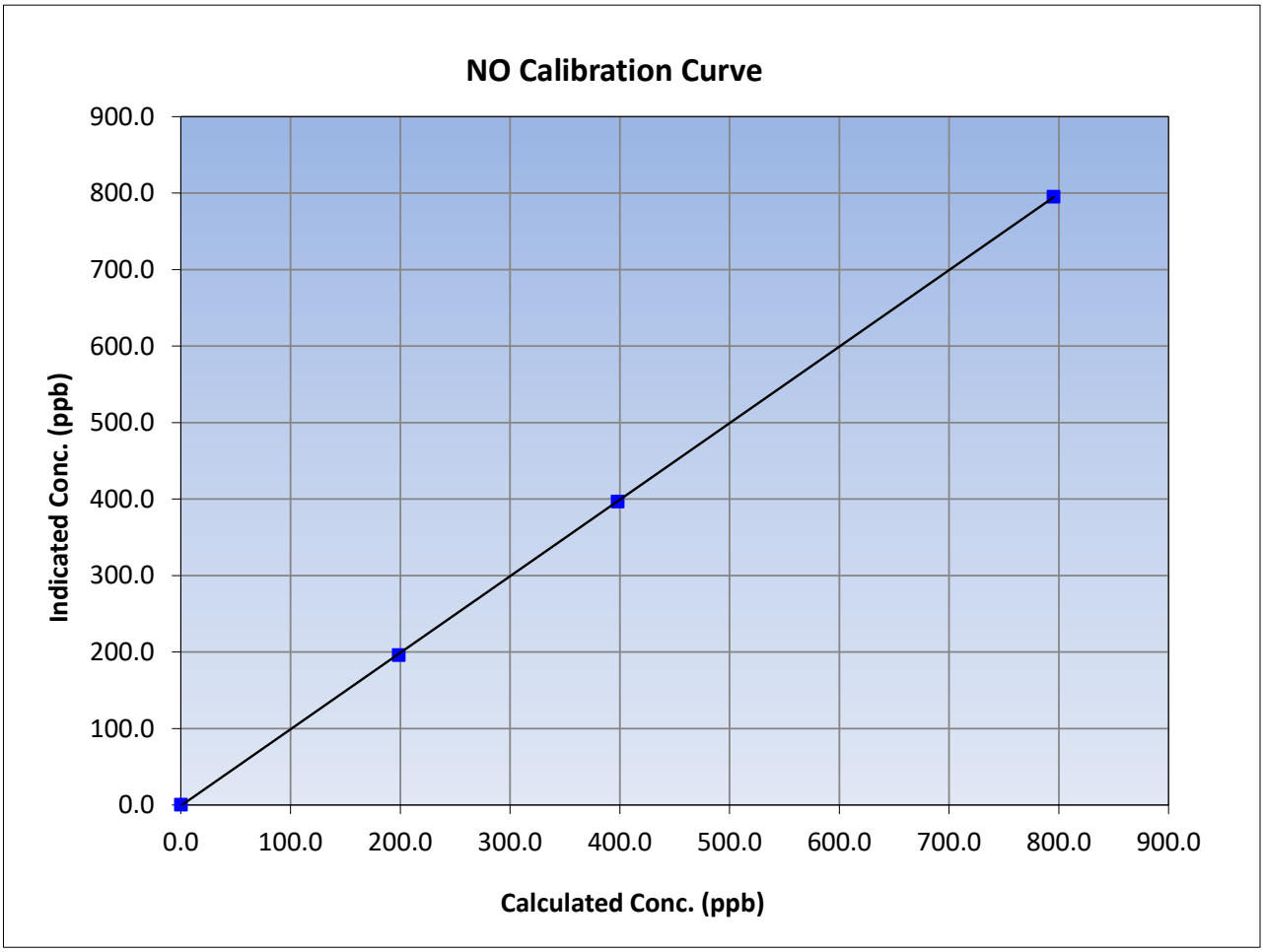
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 25, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Buffalo Viewpoint | Station Number: | AMS04 |
| Start Time (MST): | 9:39 | End Time (MST): | 14:52 |
| Analyzer make: | API T200 | Analyzer serial #: | 721 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.5 | ---- | Correlation Coefficient | 0.999984 | ≥0.995 |
| 795.2 | 795.3 | 0.9999 | | | |
| 398.1 | 396.6 | 1.0038 | Slope | 1.000459 | 0.90 - 1.10 |
| 198.5 | 196.1 | 1.0124 | | | |
| | | | Intercept | -0.993702 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

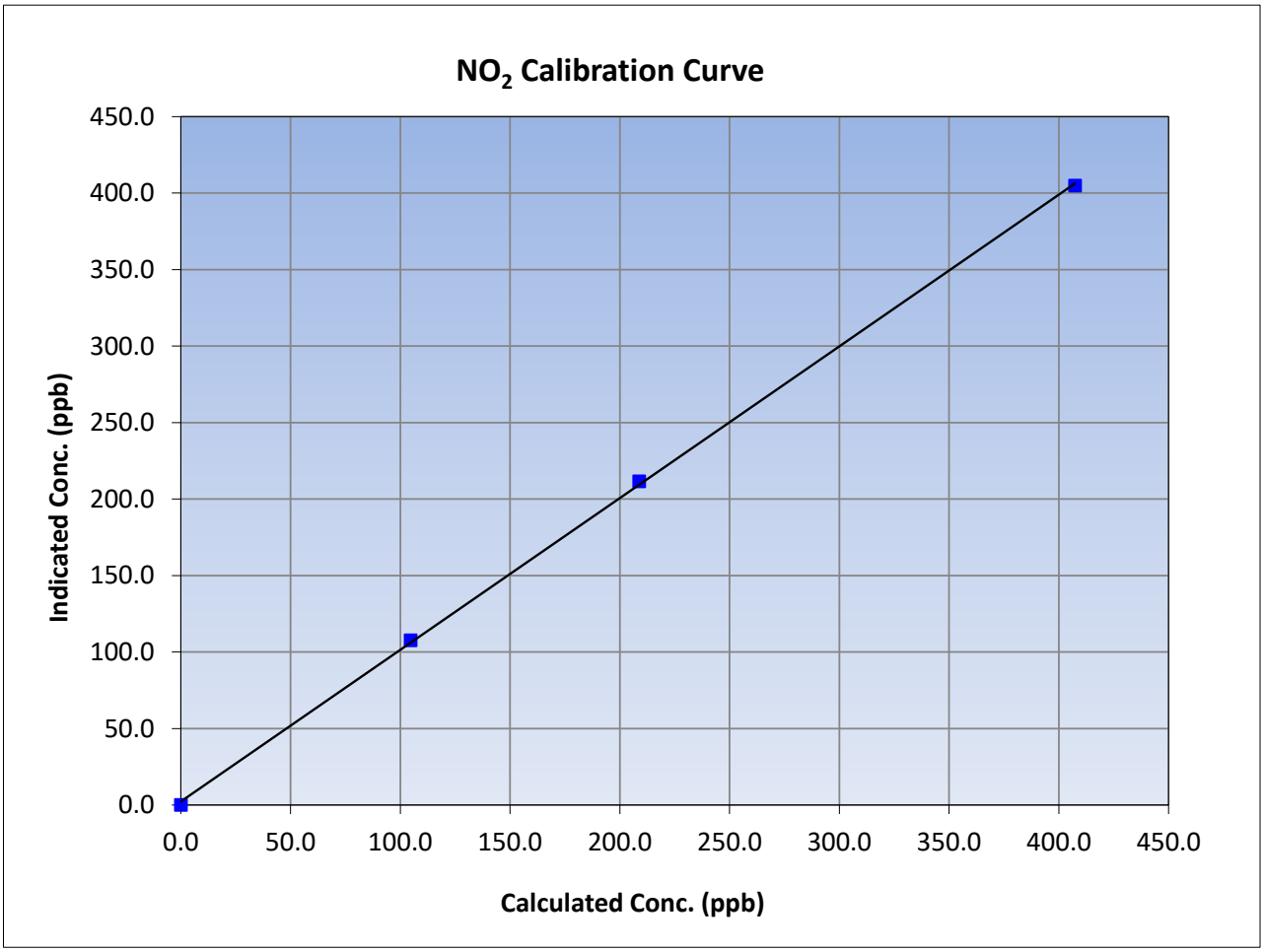
Version-04-2020

### Station Information

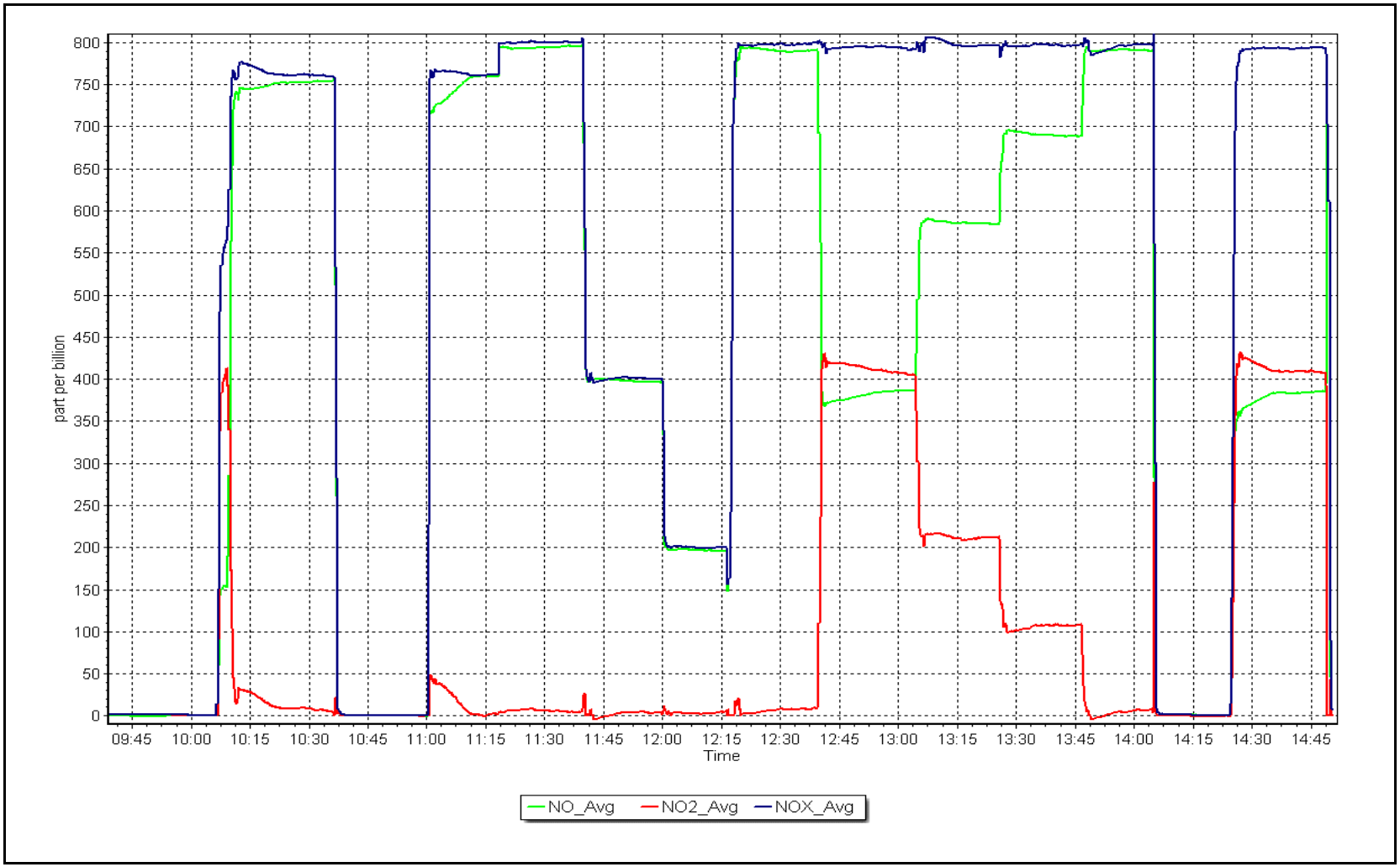
| | | | |
|---|---|---|---|
| Calibration Date: | August 25, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Buffalo Viewpoint | Station Number: | AMS04 |
| Start Time (MST): | 9:39 | End Time (MST): | 14:52 |
| Analyzer make: | API T200 | Analyzer serial #: | 721 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999840 | ≥0.995 |
| 407.4 | 404.8 | 1.0064 | | | |
| 208.8 | 211.6 | 0.9868 | Slope | 0.991739 | 0.90 - 1.10 |
| 104.7 | 107.6 | 0.9731 | | | |
| | | | Intercept | 2.285236 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 25, 2023 Location: Buffalo Viewpoint



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Buffalo Viewpoint | Station number: | AMS04 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 20, 2023 |
| Start time (MST): | 8:15 | End time (MST): | 10:41 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | API T700 | Serial Number: | 3808 |
| ZAG Make/Model: | API T701 | Serial Number: | 362 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | API T400 | Analyzer serial #: | 2961 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.996714 | 0.996114 | Backgd or Offset: | -2.6 | -2.6 |
| Calibration intercept: | 0.200000 | 0.480000 | Coeff or Slope: | 1.008 | 1.008 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.4 | ---- |
| as found span | 5000 | 986.3 | 400.0 | 398.4 | 1.004 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 5000 | 987.0 | 400.0 | 398.7 | 1.003 |
| second point | 5000 | 817.7 | 200.0 | 200.0 | 1.000 |
| third point | 5000 | 708.4 | 100.0 | 100.4 | 0.996 |
| as left zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as left span | 5000 | 986.8 | 400.0 | 400.0 | 1.000 |
| | | | | Average Correction Factor | 1.000 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 398.8 | Previous response | 398.9 | *% change | 0.0% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: No Maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

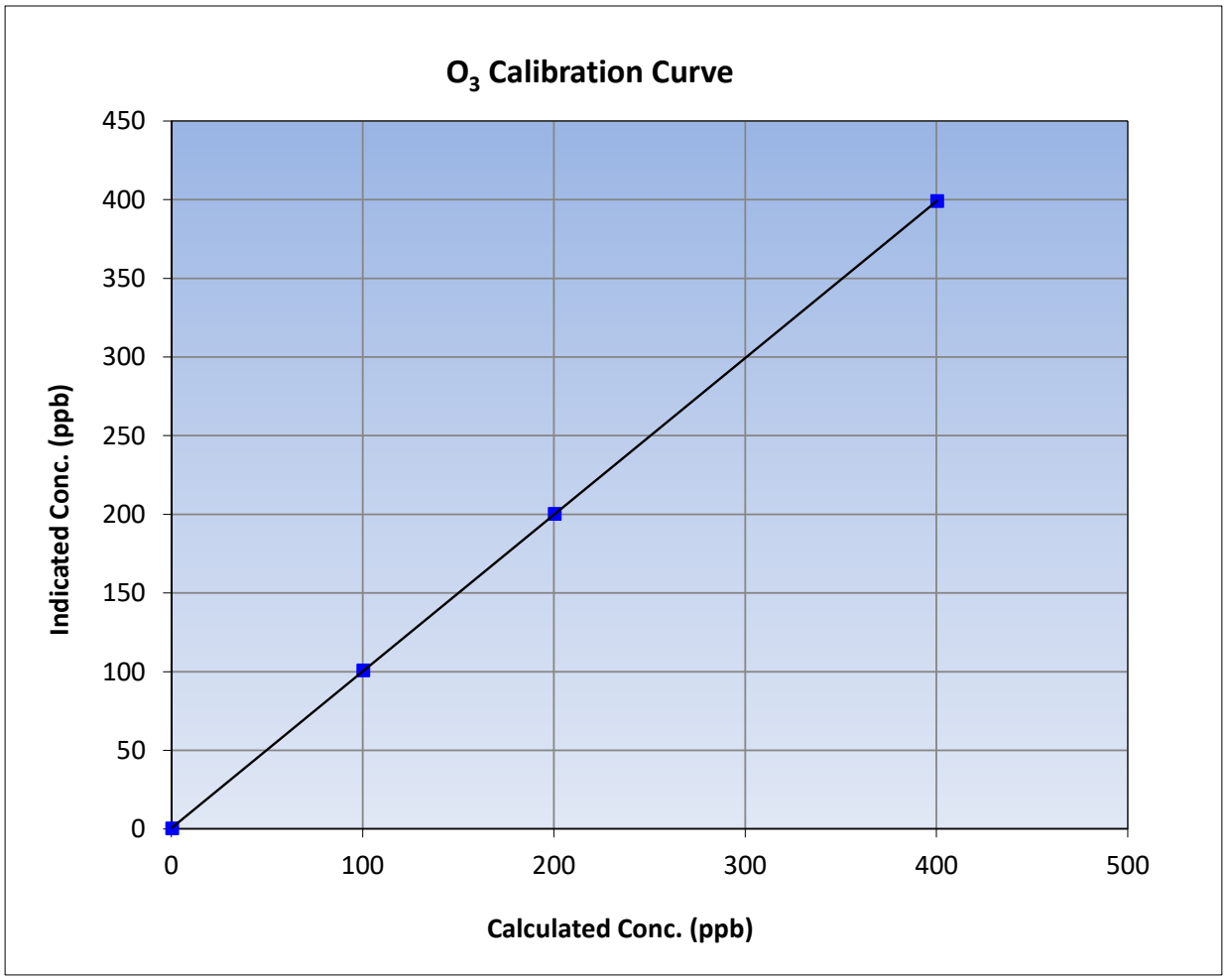
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 20, 2023 |
| Station Name: | Buffalo Viewpoint | Station Number: | AMS04 |
| Start Time (MST): | 8:15 | End Time (MST): | 10:41 |
| Analyzer make: | API T400 | Analyzer serial #: | 2961 |

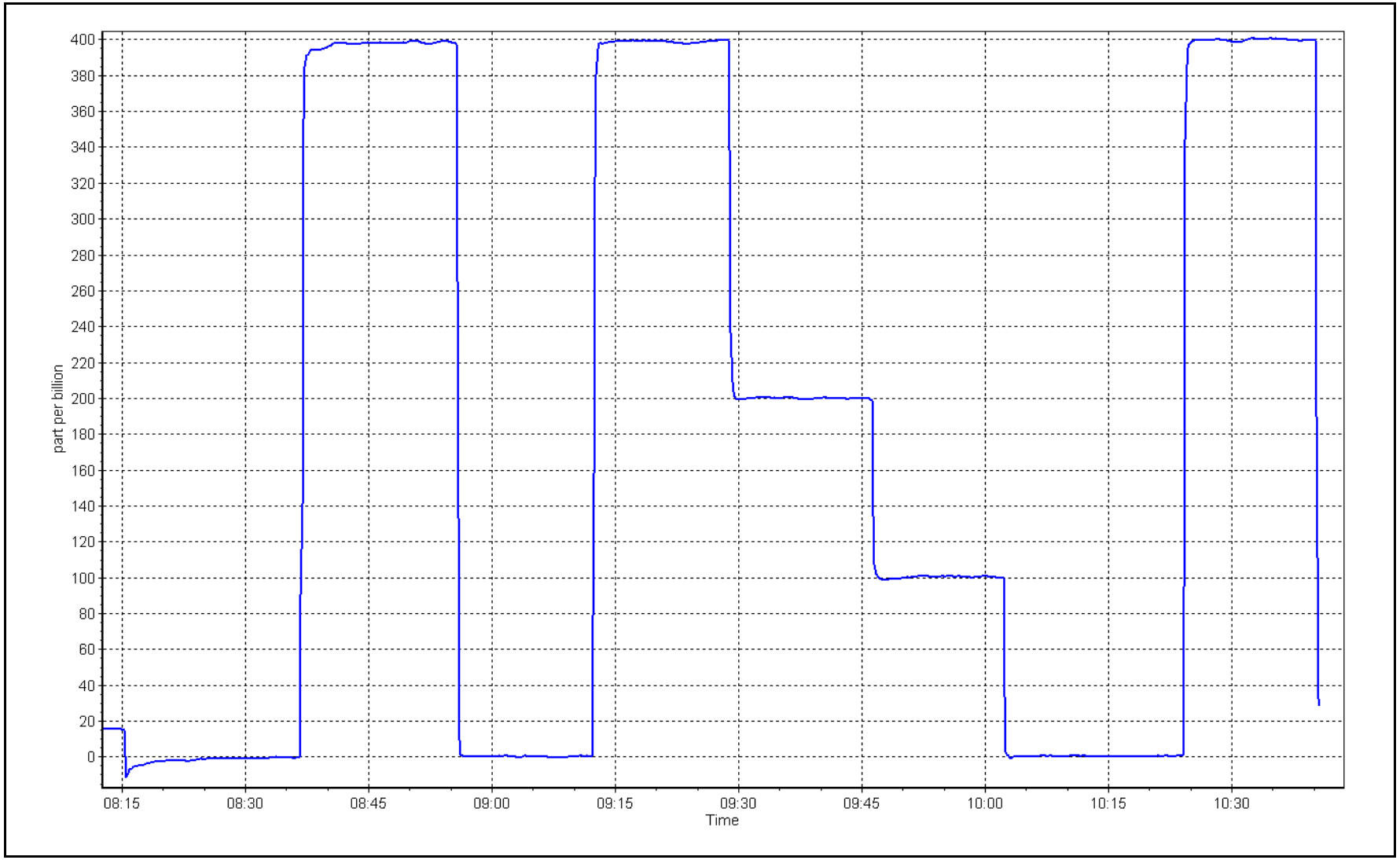
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 400.0 | 398.7 | 1.0033 |
| 200.0 | 200.0 | 1.0000 |
| 100.0 | 100.4 | 0.9960 |
| | | |

| Statistical Evaluation | | Limits |
|---|---|---|
| Correlation Coefficient | 0.999996 | ≥0.995 |
| Slope | 0.996114 | 0.90 - 1.10 |
| Intercept | 0.480000 | +/- 5 |



**$O_3$ Calibration Plot** Date: August 9, 2023 Location: Buffalo Viewpoint



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Buffalo Viewpoint | Station number: | AMS 04 |
| Calibration Date: | August 31, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 6:58 | End time (MST): | 8:16 |
| Analyzer Make: | API T640 | S/N: | 322 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Deltacal | S/N: | 1451 |
| Temp/RH standard: | Deltacal | S/N: | 1451 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | 16.7 | 17 | 16.7 | ☐ | +/- 2 °C |
| P (mmHg) | 719.9 | 721.6 | 719.9 | ☐ | +/- 10 mmHg |
| flow (LPM) | 4.60 | 4.45 | 5.01 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 31, 2023 Last Cal Date: July 11, 2023

PM w/o HEPA: 30.6 PM w/ HEPA: 0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 9.6 | 10.5 | 10.5 | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 33.6 w/ HEPA: 0

Date Optical Chamber Cleaned: August 31, 2023 <0.2 ug/m3

Disposable Filter Changed: August 31, 2023

### Annual Maintenance

Date Sample Tube Cleaned: May 23, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: Pump was at 100%. Filter was black. After cleaning pump went down to 35%. Flow at 5. No adjustments done. Leak check passed before and after cleaning.

Calibration by: Melissa Lemay

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS05
## MANNIX
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Mannix | Station number: | AMS05 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 10:35 | End time (MST): | 14:49 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 50.02 | ppm | Cal Gas Exp Date: | January 12, 2029 |
| Cal Gas Cylinder #: | XC026809B | | | |
| Removed Cal Gas Conc: | 50.02 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 621 |
| ZAG Make/Model: | API T701H | | Serial Number: | 832 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1008841399

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.000771 | 0.999257 | Backgd or Offset: | 9.0 | 8.9 |
| Calibration intercept: | 0.040000 | 0.220000 | Coeff or Slope: | 0.941 | 0.930 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as found span | 4920 | 80.0 | 800.3 | 812.4 | 0.985 |
| as found 2nd point | 4960 | 40.0 | 400.2 | 404.2 | 0.990 |
| as found 3rd point | 4980 | 20.0 | 200.1 | 201.8 | 0.991 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| high point | 4920 | 80.0 | 800.3 | 800.0 | 1.000 |
| second point | 4960 | 40.0 | 400.2 | 400.2 | 1.000 |
| third point | 4980 | 20.0 | 200.1 | 199.7 | 1.002 |
| as left zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| as left span | 4920 | 80.0 | 800.3 | 800.4 | 1.000 |
| | | | | Average Correction Factor | 1.001 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 812.00 | Previous response | 800.98 | *% change | 1.4% |
| Baseline Corr 2nd AF pt: | 403.80 | AF Slope: | 1.014965 | AF Intercept: | -0.680000 |
| Baseline Corr 3rd AF pt: | 201.40 | AF Correlation: | 0.999990 | | |

* = > +/-5% change initiates investigation

Notes: Multi point as founds completed for the NMHC instrument. Changed the inlet filter after as founds. Adjusted the span only.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

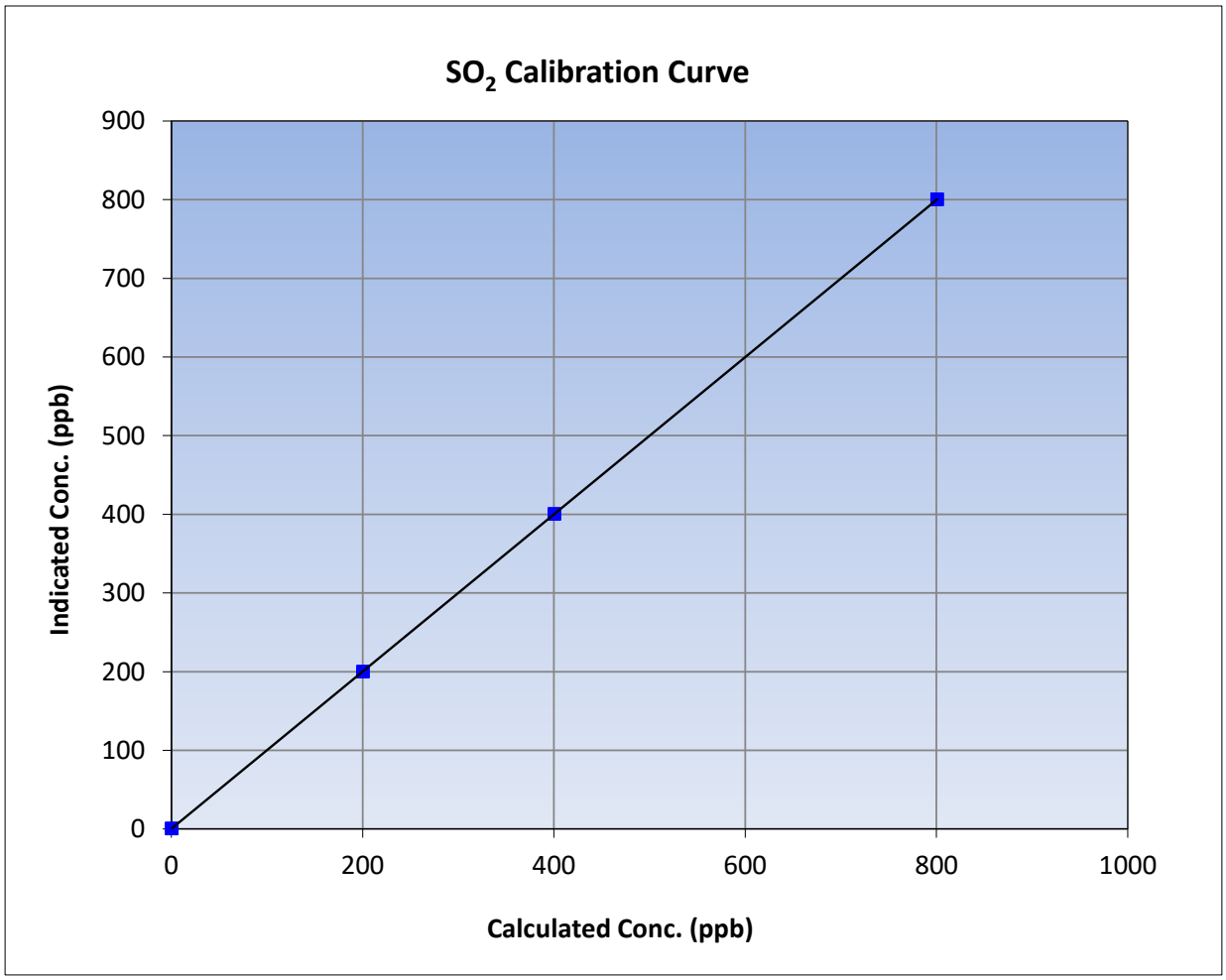
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Mannix | Station Number: | AMS05 |
| Start Time (MST): | 10:35 | End Time (MST): | 14:49 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1008841399 |

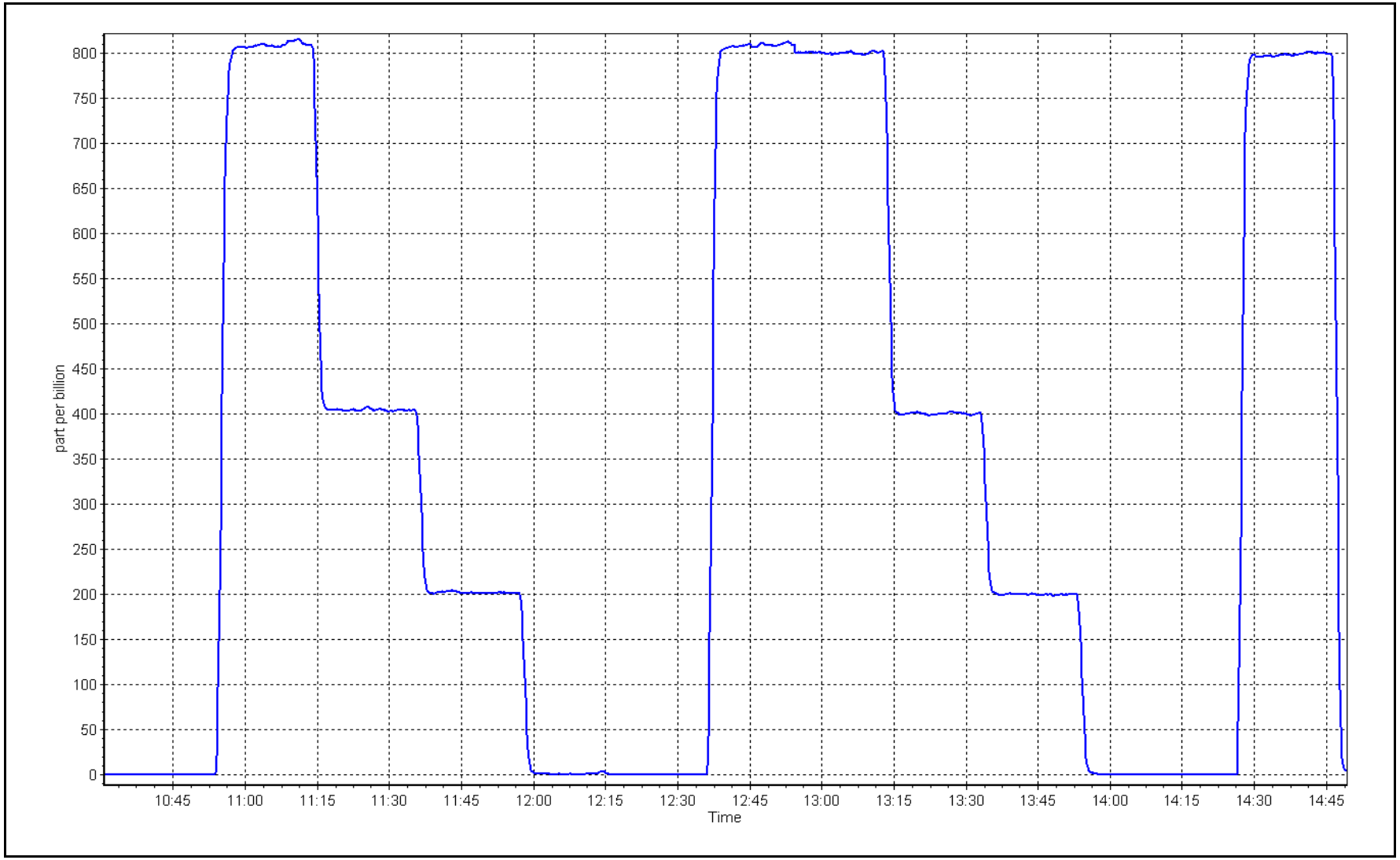
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.5 | ---- |
| 800.3 | 800.0 | 1.0004 |
| 400.2 | 400.2 | 0.9999 |
| 200.1 | 199.7 | 1.0019 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999999 | *≥0.995* |
| Slope | 0.999257 | *0.90 - 1.10* |
| Intercept | 0.220000 | *+/-30* |



**SO2 Calibration Plot** Date: August 15, 2023 Location: Mannix



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Mannix | Station number: | AMS05 |
| Calibration Date: | August 22, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 10:04 | End time (MST): | 15:01 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 4.92 | ppm | Cal Gas Exp Date: | February 9, 2024 |
| Cal Gas Cylinder #: | EY0002433 | | | |
| Removed Cal Gas Conc: | 4.92 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 1845 |
| ZAG Make/Model: | API T701H | | Serial Number: | 832 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43iQTL | | Analyzer serial #: | 1203169745 | |
| Converter make: | Global | | Converter serial #: | 2022-196 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.996187 | 1.000615 | Backgd or Offset: | 2.13 | 2.18 |
| Calibration intercept: | 0.180584 | 0.200559 | Coeff or Slope: | 0.842 | 0.866 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4919 | 81.3 | 80.0 | 81.9 | 0.977 |
| as found 2nd point | 4960 | 40.7 | 40.0 | 40.5 | 0.989 |
| as found 3rd point | 4980 | 20.3 | 20.0 | 19.9 | 1.004 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4919 | 81.3 | 80.0 | 80.2 | 0.997 |
| second point | 4960 | 40.7 | 40.0 | 40.4 | 0.991 |
| third point | 4980 | 20.3 | 20.0 | 20.1 | 0.994 |
| as left zero | 5000 | 0.0 | 0.0 | 0.7 | ---- |
| as left span | 4919 | 81.3 | 80.0 | 77.0 | 1.039 |
| SO2 Scrubber Check | 4920 | 80.0 | 800.0 | -0.1 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 0.994 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 81.9 | Prev response: | 79.87 | *% change: | 2.5% |
| Baseline Corr 2nd AF pt: | 40.5 | AF Slope: | 1.025466 | AF Intercept: | -0.319296 |
| Baseline Corr 3rd AF pt: | 19.9 | AF Correlation: | 0.999928 | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Ran a SO2 scrubber check after calibrator zero. Adjusted the span only.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

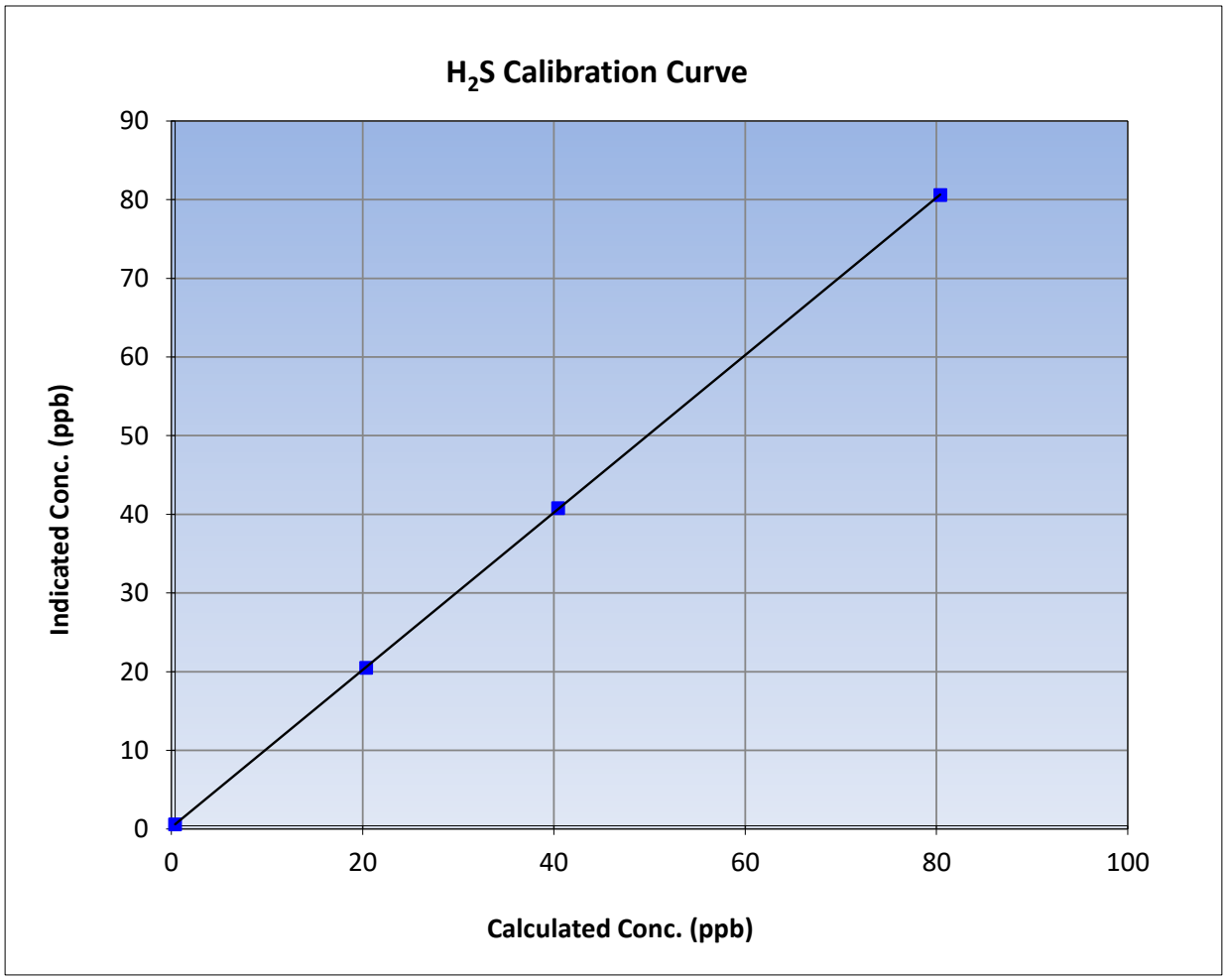
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 22, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Mannix | Station Number: | AMS05 |
| Start Time (MST): | 10:04 | End Time (MST): | 15:01 |
| Analyzer make: | Thermo 43iQTL | Analyzer serial #: | 1203169745 |

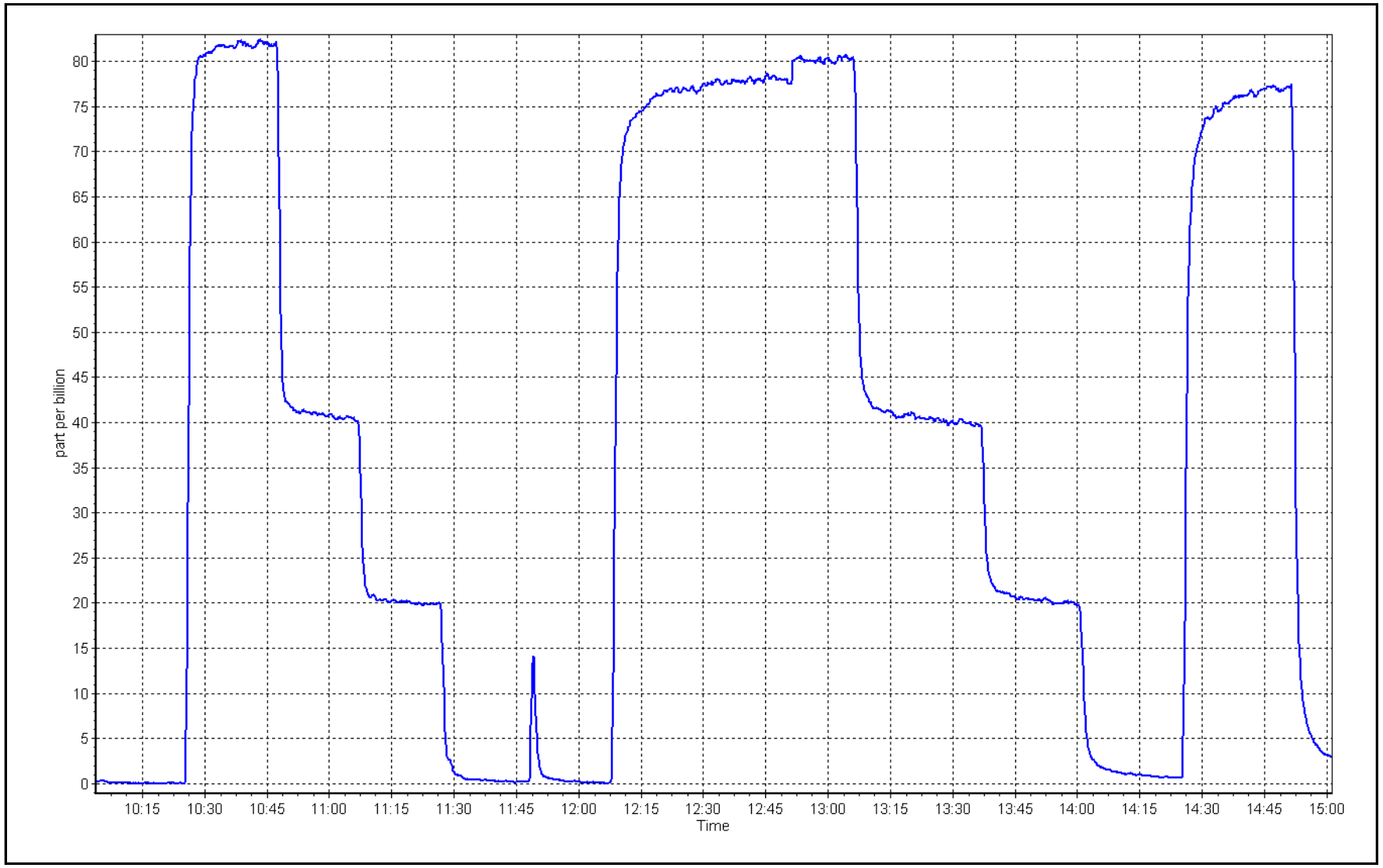
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 80.0 | 80.2 | 0.9974 |
| 40.0 | 40.4 | 0.9912 |
| 20.0 | 20.1 | 0.9937 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999992 | *≥0.995* |
| Slope | 1.000615 | *0.90 - 1.10* |
| Intercept | 0.200559 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 22, 2023 Location: Mannix



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Mannix | Station number: | AMS 05 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 10:34 | End time (MST): | 14:49 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | XCO268098 | | Cal Gas Expiry Date: | January 12, 2029 | |
| CH4 Cal Gas Conc. | 504.9 | ppm | CH4 Equiv Conc. | 1076.6 | ppm |
| C3H8 Cal Gas Conc. | 207.9 | ppm | | | |
| Removed Gas Cert: | | | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 504.9 | ppm | CH4 Equiv Conc. | 1076.6 | ppm |
| Removed C3H8 Conc. | 207.9 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 621 | |
| ZAG make/model: | API T701 | | Serial Number: | 5613 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1152430011 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.60E-05 | 2.62E-05 | NMHC SP Ratio: | 4.34E-05 | 4.44E-05 |
| CH4 Retention time: | 15.00 | 15.00 | NMHC Peak Area: | 210847 | 206221 |
| Zero Chromatogram: | ON | OFF | Flat Baseline: | OFF | OFF |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.0 | 17.23 | 16.89 | 1.020 |
| as found 2nd point | 4960 | 40.0 | 8.61 | 8.45 | 1.019 |
| as found 3rd point | 4980 | 20.0 | 4.31 | 4.23 | 1.018 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.0 | 17.23 | 17.22 | 1.001 |
| second point | 4960 | 40.0 | 8.61 | 8.63 | 0.998 |
| third point | 4980 | 20.0 | 4.31 | 4.34 | 0.993 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.0 | 17.23 | 17.30 | 0.996 |
| | | | | Average Correction Factor | 0.997 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 16.89 | Prev response | 17.22 | *% change | -2.0% |
| Baseline Corr 2nd AF: | 8.4 | AF Slope: | 0.980173 | AF Intercept: | 0.004800 |
| Baseline Corr 3rd AF: | 4.2 | AF Correlation: | 1.000000 | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.0 | 9.15 | 9.01 | 1.015 |
| as found 2nd point | 4960 | 40.0 | 4.57 | 4.53 | 1.009 |
| as found 3rd point | 4980 | 20.0 | 2.29 | 2.28 | 1.001 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.0 | 9.15 | 9.14 | 1.001 |
| second point | 4960 | 40.0 | 4.57 | 4.61 | 0.993 |
| third point | 4980 | 20.0 | 2.29 | 2.33 | 0.982 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.0 | 9.15 | 9.21 | 0.993 |
| | | | | Average Correction Factor | 0.992 |
| Baseline Corr AF: | 9.01 | Prev response | 9.13 | *% change | -1.4% |
| Baseline Corr 2nd AF: | 4.5 | AF Slope: | 0.983915 | AF Intercept: | 0.018800 |
| Baseline Corr 3rd AF: | 2.3 | AF Correlation: | 0.999979 | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.0 | 8.08 | 7.88 | 1.025 |
| as found 2nd point | 4960 | 40.0 | 4.04 | 3.92 | 1.031 |
| as found 3rd point | 4980 | 20.0 | 2.02 | 1.95 | 1.037 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.0 | 8.08 | 8.07 | 1.001 |
| second point | 4960 | 40.0 | 4.04 | 4.03 | 1.004 |
| third point | 4980 | 20.0 | 2.02 | 2.01 | 1.006 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.0 | 8.08 | 8.10 | 0.998 |
| | | | | Average Correction Factor | 1.003 |
| Baseline Corr AF: | 7.88 | Prev response | 8.09 | *% change | -2.6% |
| Baseline Corr 2nd AF: | 3.92 | AF Slope: | 0.975922 | AF Intercept: | -0.013200 |
| Baseline Corr 3rd AF: | 1.95 | AF Correlation: | 0.999986 | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 0.999419 | 0.998929 |
| THC Cal Offset: | 0.005000 | 0.017200 |
| CH4 Cal Slope: | 1.001938 | 0.999731 |
| CH4 Cal Offset: | -0.007400 | -0.006600 |
| NMHC Cal Slope: | 0.997195 | 0.998220 |
| NMHC Cal Offset: | 0.012400 | 0.023800 |

Notes: Changed the inlet filter the actuator after as founds. The instrument has been dipping and after an inspection decided to change the actuator. Adjusted the span only.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## THC Calibration Summary

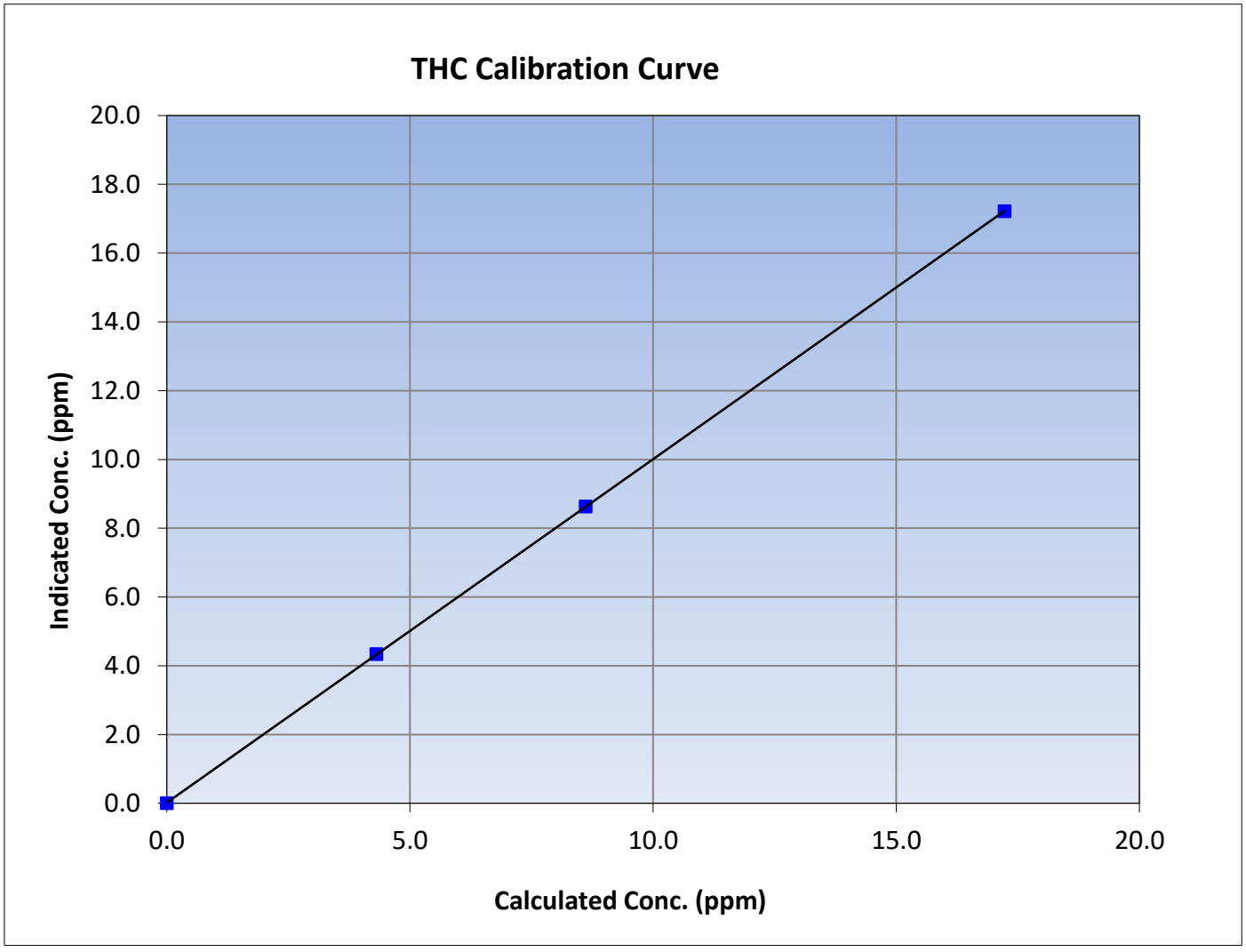
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Mannix | Station Number: | AMS 05 |
| Start Time (MST): | 10:34 | End Time (MST): | 14:49 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1152430011 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999995 | *≥0.995* |
| 17.23 | 17.22 | 1.0006 | | | |
| 8.61 | 8.63 | 0.9980 | Slope | 0.998929 | *0.90 - 1.10* |
| 4.31 | 4.34 | 0.9932 | | | |
| | | | Intercept | 0.017200 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

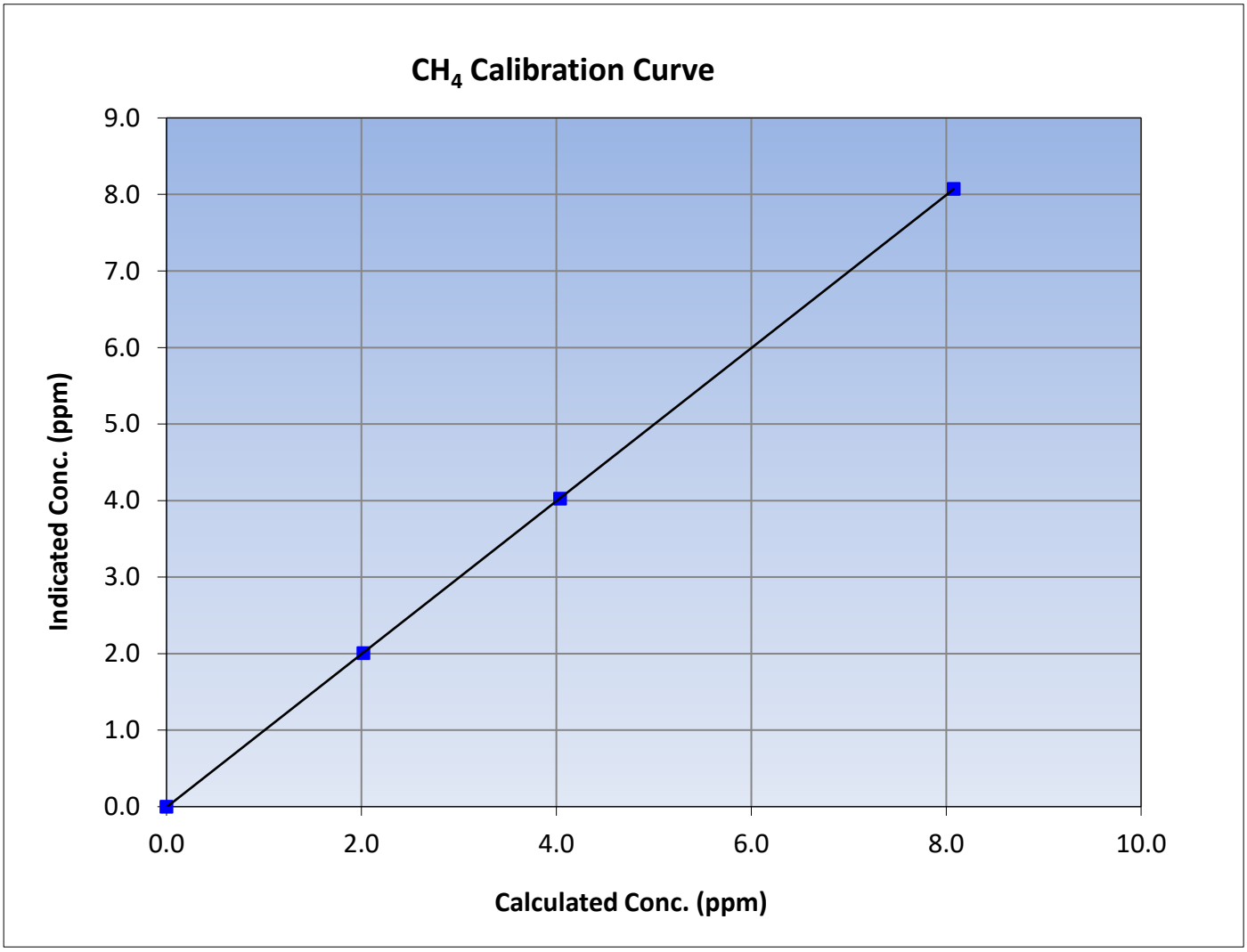
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Mannix | Station Number: | AMS 05 |
| Start Time (MST): | 10:34 | End Time (MST): | 14:49 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1152430011 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999996 | *≥0.995* |
| 8.08 | 8.07 | 1.0005 | | | |
| 4.04 | 4.03 | 1.0035 | Slope | 0.999731 | *0.90 - 1.10* |
| 2.02 | 2.01 | 1.0058 | | | |
| | | | Intercept | -0.006600 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

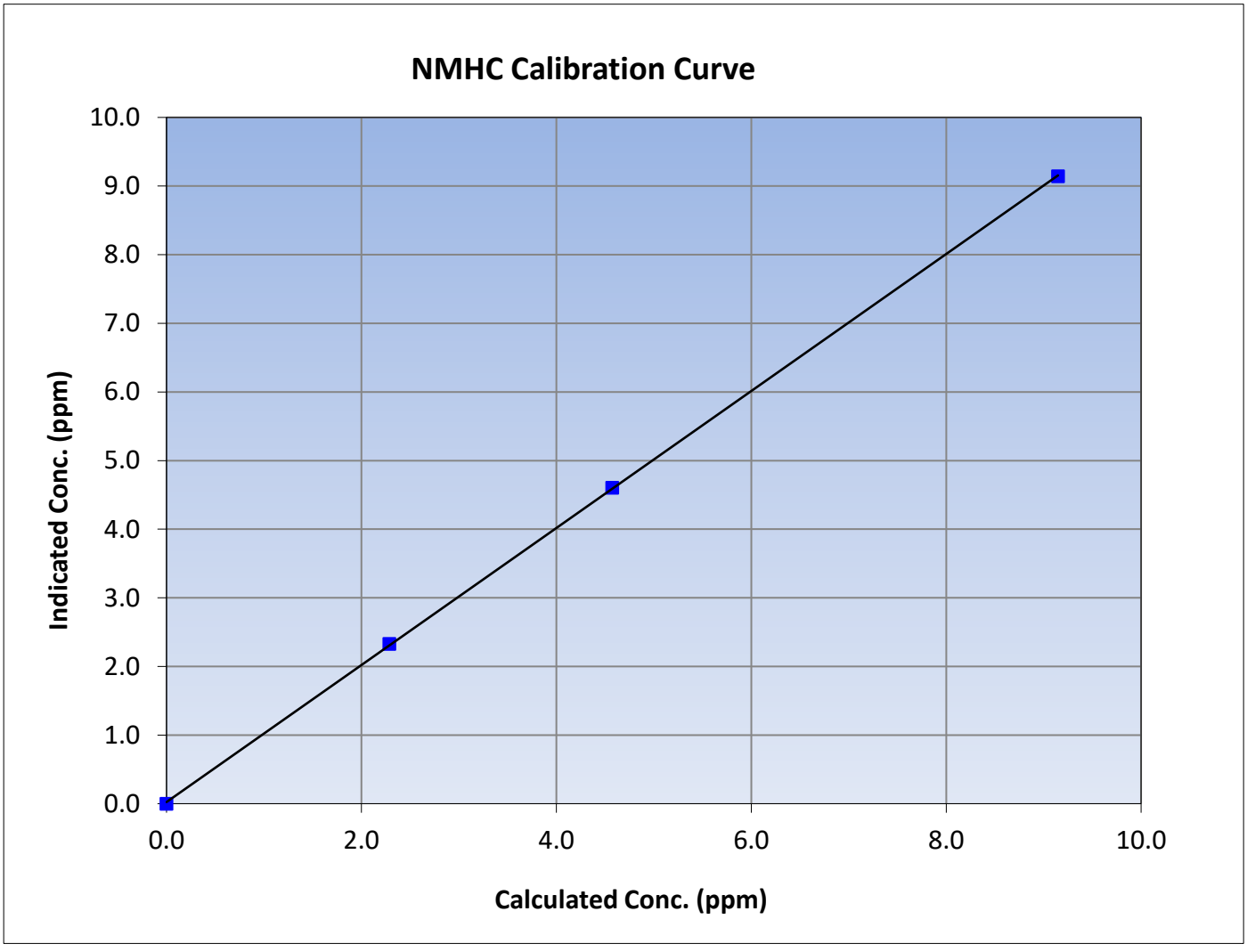
Version-06-2022

### Station Information

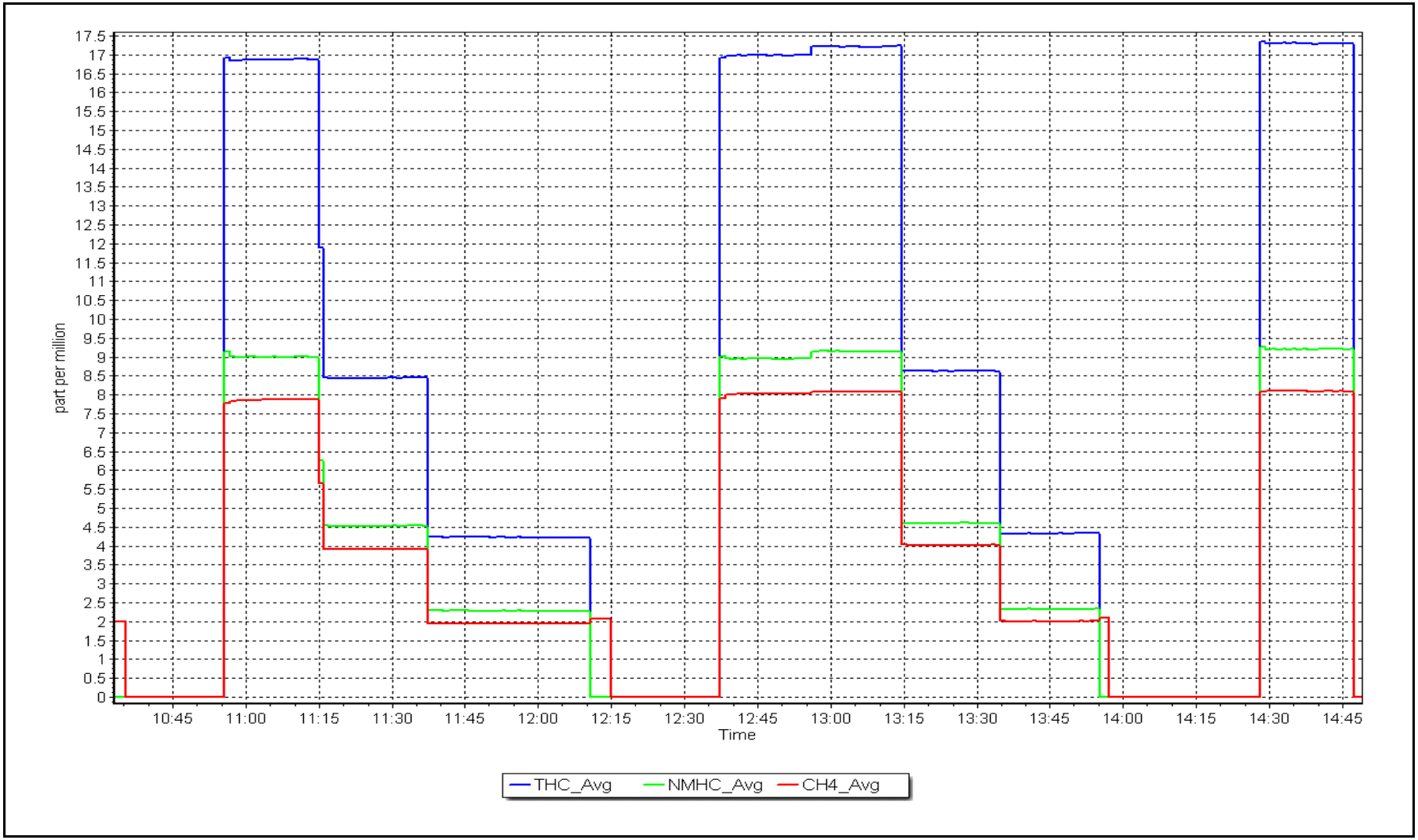
| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Mannix | Station Number: | AMS 05 |
| Start Time (MST): | 10:34 | End Time (MST): | 14:49 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1152430011 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999968 | ≥0.995 |
| 9.15 | 9.14 | 1.0006 | | | |
| 4.57 | 4.61 | 0.9932 | Slope | 0.998220 | 0.90 - 1.10 |
| 2.29 | 2.33 | 0.9823 | | | |
| | | | Intercept | 0.023800 | +/-0.5 |



**NMHC Calibration Plot** Date: August 15, 2023 Location: Mannix



# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS06
## PATRICIA MCINNES
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Patricia McInnes | Station number: | AMS06 |
| Calibration Date: | August 17, 2023 | Last Cal Date: | July 4, 2023 |
| Start time (MST): | 8:44 | End time (MST): | 14:20 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.78 | ppm | Cal Gas Exp Date: | September 9, 2024 |
| Cal Gas Cylinder #: | AAL070632 | | | |
| Removed Cal Gas Conc: | 49.78 | ppm | Rem Gas Exp Date: | N/A |
| Removed Gas Cyl #: | N/A | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3566 |
| ZAG Make/Model: | API T701 | | Serial Number: | 5608 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290013

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.006537 | 1.007062 | Backgd or Offset: | 17.2 | 17.2 |
| Calibration intercept: | 1.758830 | -0.099843 | Coeff or Slope: | 0.901 | 0.901 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4920 | 80.3 | 799.5 | 794.3 | 1.007 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4920 | 80.3 | 799.5 | 805.7 | 0.992 |
| second point | 4960 | 40.2 | 400.2 | 401.0 | 0.998 |
| third point | 4980 | 20.1 | 200.1 | 202.6 | 0.988 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4920 | 80.3 | 799.5 | 800.2 | 0.999 |
| | | | | Average Correction Factor | 0.993 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 794.40 | Previous response | 806.45 | *% change | -1.5% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Completed preventative maintenance on the H2 generator for the THC instrument. No adjustments made.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

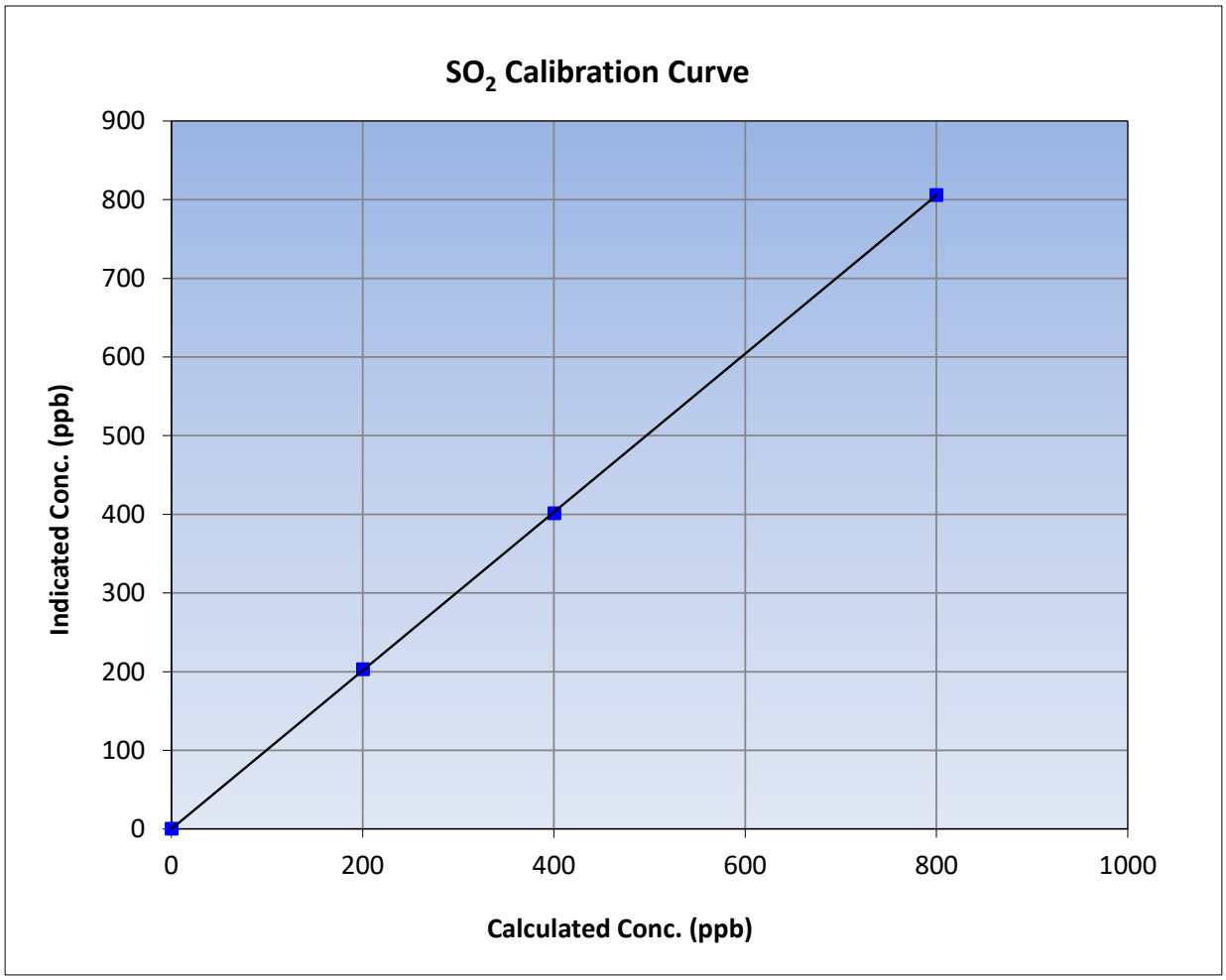
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS06 |
| Start Time (MST): | 8:44 | End Time (MST): | 14:20 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1160290013 |

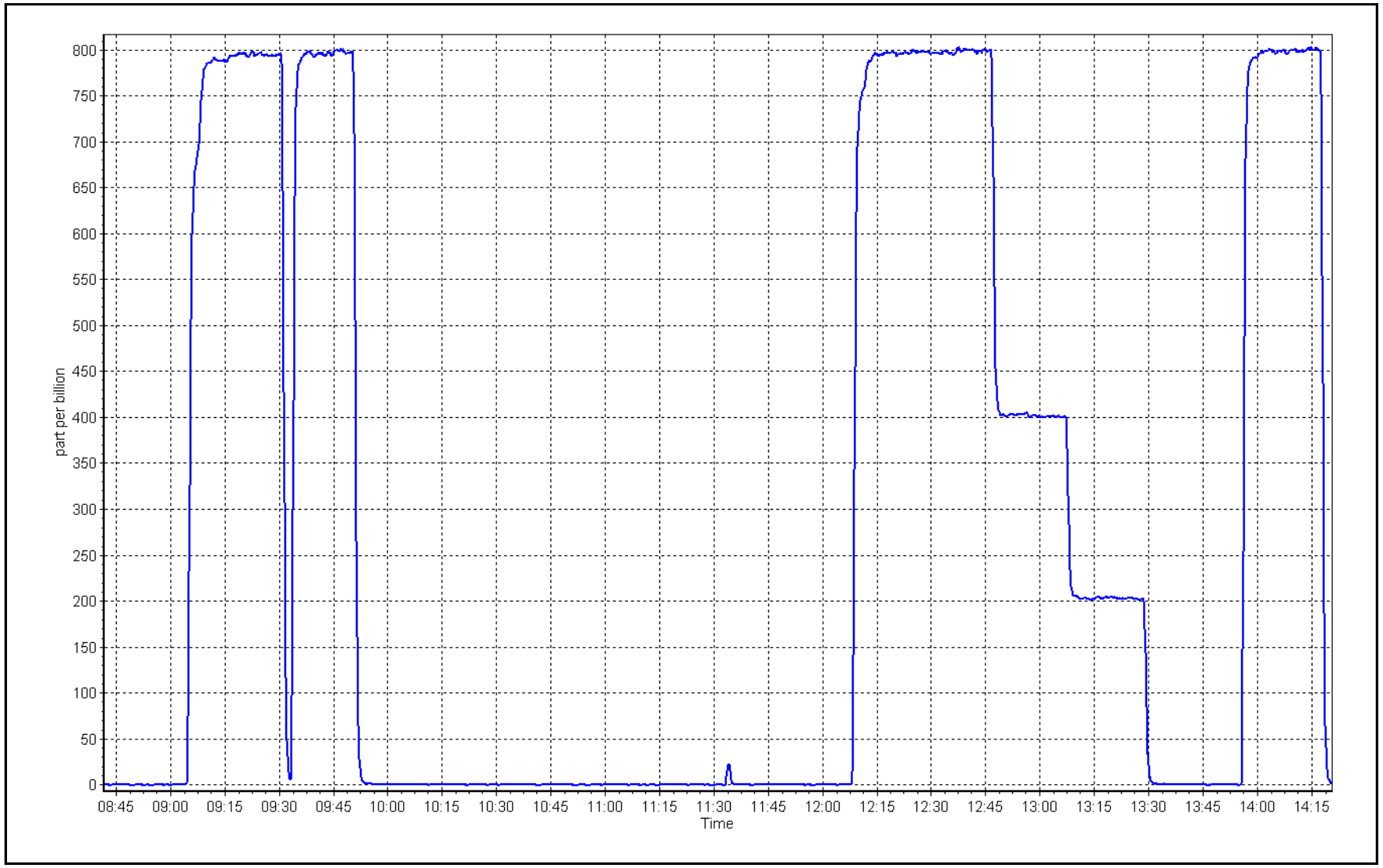
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 799.5 | 805.7 | 0.9923 |
| 400.2 | 401.0 | 0.9981 |
| 200.1 | 202.6 | 0.9877 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999984 | *≥0.995* |
| Slope | 1.007062 | *0.90 - 1.10* |
| Intercept | -0.099843 | *+/-30* |



**SO2 Calibration Plot** Date: August 17, 2023 Location: Patricia McInnes



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| Calibration Date: | August 25, 2023 | Last Cal Date: | July 12, 2023 |
| Start time (MST): | 8:47 | End time (MST): | 14:30 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.38 | ppm | Cal Gas Exp Date: | March 2, 2023 |
| Cal Gas Cylinder #: | EY0000809 | | | |
| Removed Cal Gas Conc: | 5.38 | ppm | Rem Gas Exp Date: | N/A |
| Removed Gas Cyl #: | N/A | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3566 |
| ZAG Make/Model: | API T701 | | Serial Number: | 4602 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i TLE | | Analyzer serial #: | 1218153358 | |
| Converter make: | CDN-101 | | Converter serial #: | 517 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.004924 | 0.988760 | Backgd or Offset: | 2.06 | 2.06 |
| Calibration intercept: | 0.356984 | -0.002363 | Coeff or Slope: | 1.187 | 1.187 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4926 | 74.3 | 79.9 | 76.8 | 1.041 |
| as found 2nd point | 4963 | 37.2 | 40.0 | 38.8 | 1.032 |
| as found 3rd point | 4981 | 18.6 | 20.0 | 20.0 | 1.001 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| high point | 4926 | 74.3 | 79.9 | 79.2 | 1.009 |
| second point | 4963 | 37.2 | 40.0 | 39.4 | 1.016 |
| third point | 4981 | 18.6 | 20.0 | 19.5 | 1.026 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4926 | 74.3 | 79.9 | 72.8 | 1.098 |
| SO2 Scrubber Check | 4920 | 80.3 | 803.0 | -0.2 | ---- |
| Date of last scrubber change: | | December 20, 2021 | | Ave Corr Factor | 1.017 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 76.8 | Prev response: | 80.69 | *% change: | -5.1% |
| Baseline Corr 2nd AF pt: | 38.8 | AF Slope: | 0.957890 | AF Intercept: | 0.377982 |
| Baseline Corr 3rd AF pt: | 20.0 | AF Correlation: | 0.999883 | | |

* = > +/-5% change initiates investigation

Notes: Bypassed the converter and ran a 100ppb SO2 point after the as founds, instrument reached the target at a reasonable time. Suspecting that the smoke is having an affect on the scrubber beads again. Installed a hydrator and added little bit of water. Ran a SO2 scrubber test after the calibrator zero. No adjustments made. See docit note for more info.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

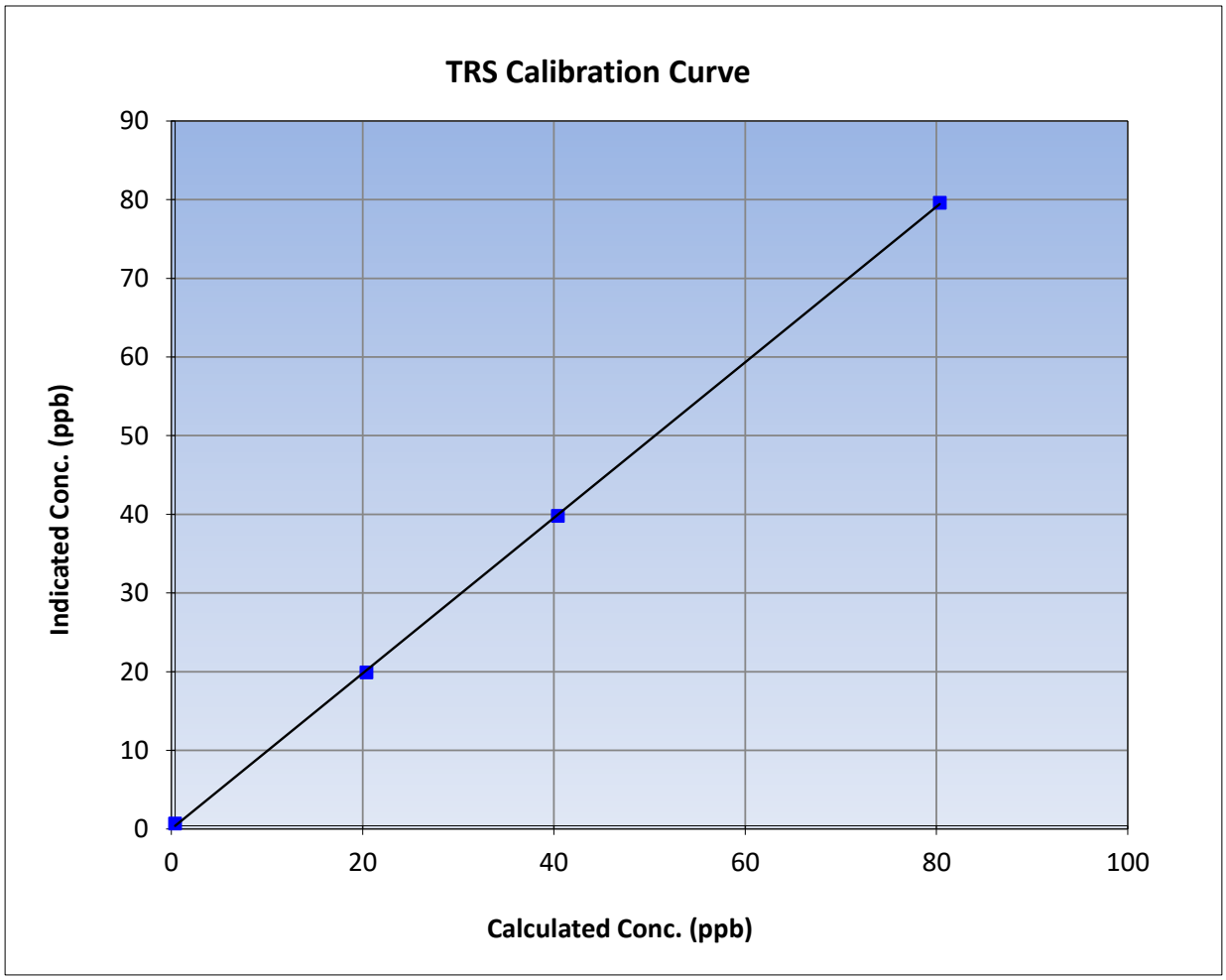
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 25, 2023 | Previous Calibration: | July 12, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS 06 |
| Start Time (MST): | 8:47 | End Time (MST): | 14:30 |
| Analyzer make: | Thermo 43i TLE | Analyzer serial #: | 1218153358 |

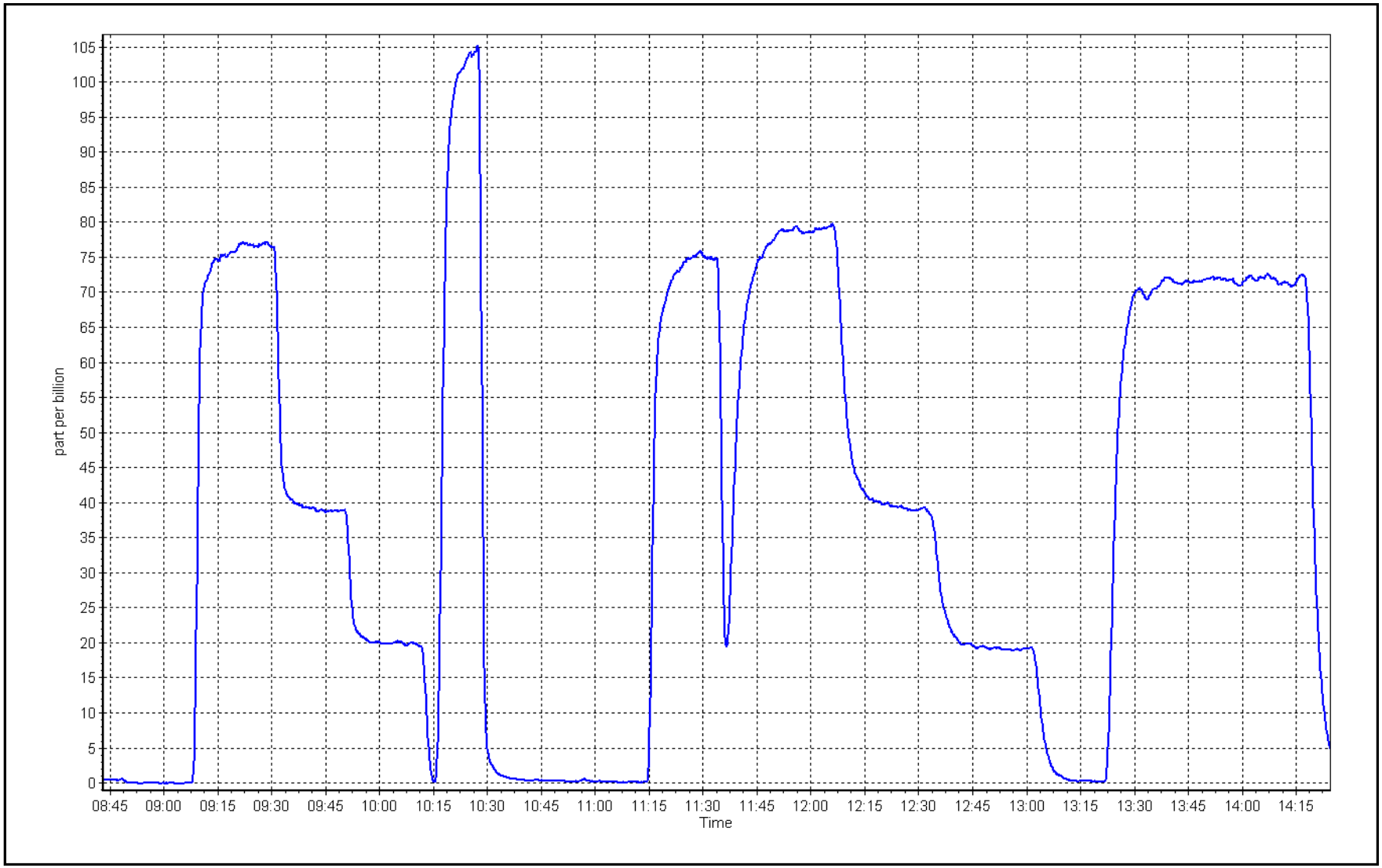
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.3 | ---- |
| 79.9 | 79.2 | 1.0094 |
| 40.0 | 39.4 | 1.0159 |
| 20.0 | 19.5 | 1.0264 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999933 | *≥0.995* |
| Slope | 0.988760 | *0.90 - 1.10* |
| Intercept | -0.002363 | *+/-3* |



**TRS Calibration Plot** Date: August 25, 2023 Location: Patricia McInnes



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| Calibration Date: | August 28, 2023 | Last Cal Date: | August 25, 2023 |
| Start time (MST): | 8:25 | End time (MST): | 12:54 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.38 | ppm | Cal Gas Exp Date: | March 2, 2023 |
| Cal Gas Cylinder #: | EY0000809 | | | |
| Removed Cal Gas Conc: | 5.38 | ppm | Rem Gas Exp Date: | N/A |
| Removed Gas Cyl #: | N/A | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3566 |
| ZAG Make/Model: | API T701 | | Serial Number: | 4602 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i TLE | | Analyzer serial #: | 1218153358 | |
| Converter make: | CDN-101 | | Converter serial #: | 517 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.988760 | 1.003779 | Backgd or Offset: | 2.06 | 2.00 |
| Calibration intercept: | -0.002363 | 0.097067 | Coeff or Slope: | 1.187 | 1.158 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4926 | 74.3 | 79.9 | 65.8 | 1.215 |
| as found 2nd point | 4963 | 37.2 | 40.0 | 32.7 | 1.224 |
| as found 3rd point | 4981 | 18.6 | 20.0 | 16.0 | 1.251 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4926 | 74.3 | 79.9 | 80.3 | 0.996 |
| second point | 4963 | 37.2 | 40.0 | 40.3 | 0.993 |
| third point | 4981 | 18.6 | 20.0 | 20.3 | 0.986 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 4926 | 74.3 | 79.9 | 80.2 | 0.997 |
| SO2 Scrubber Check | 4920 | 80.3 | 803.0 | 0.1 | ---- |
| Date of last scrubber change: | | December 20, 2021 | | Ave Corr Factor | 0.992 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 65.8 | Prev response: | 79.04 | *% change: | -20.1% |
| Baseline Corr 2nd AF pt: | 32.7 | AF Slope: | 0.824778 | AF Intercept: | -0.238684 |
| Baseline Corr 3rd AF pt: | 16.0 | AF Correlation: | 0.999939 | | |

* = > +/-5% change initiates investigation

Notes: Spans are very low due to SO2 scrubbers. After as founds changed the SO2 scrubber beads and installed it vertically outside the converter. Removed the hydrator. Ran a SO2 scrubber test. Adjusted the span.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

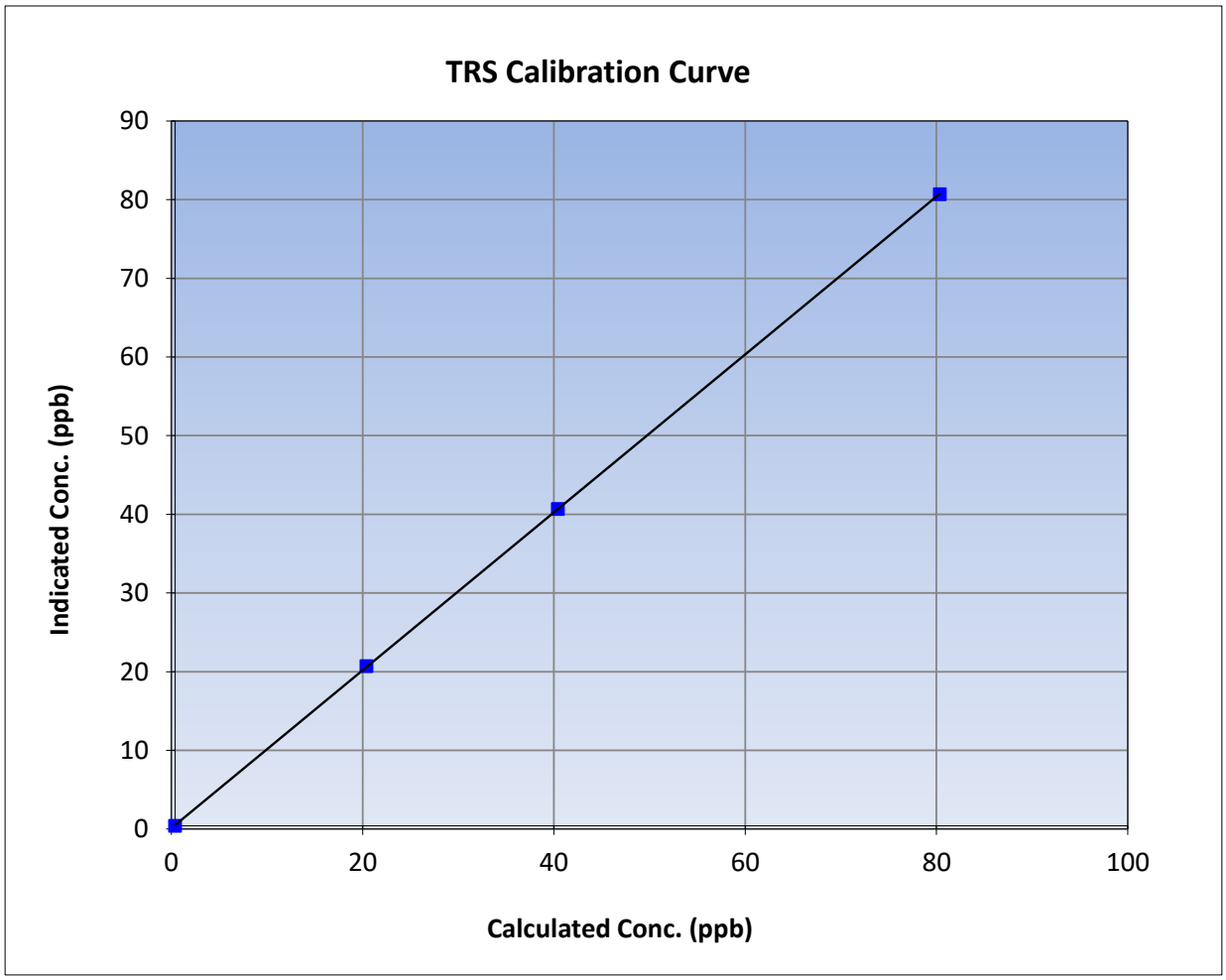
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 28, 2023 | Previous Calibration: | August 25, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS 06 |
| Start Time (MST): | 8:25 | End Time (MST): | 12:54 |
| Analyzer make: | Thermo 43i TLE | Analyzer serial #: | 1218153358 |

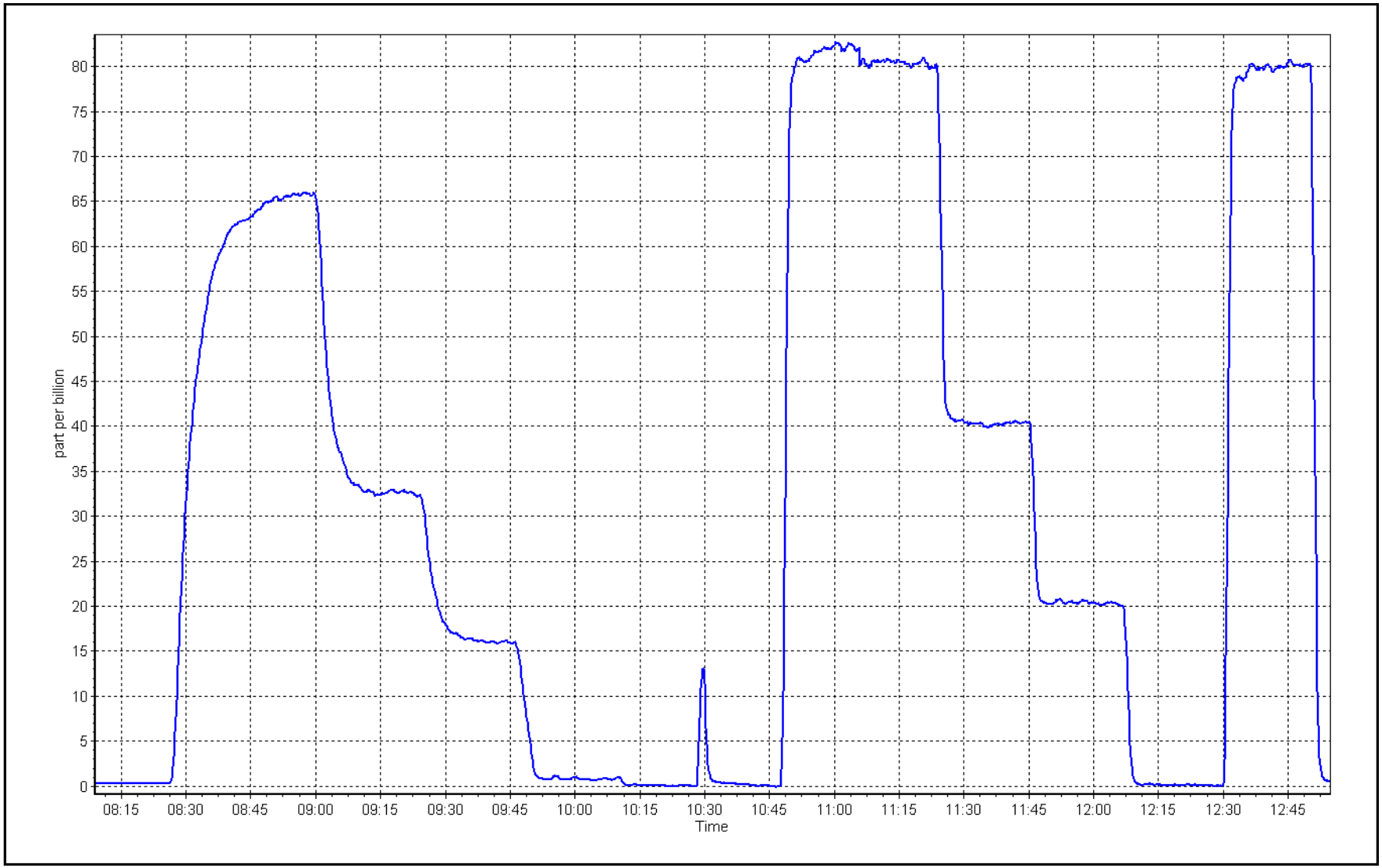
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 79.9 | 80.3 | 0.9955 |
| 40.0 | 40.3 | 0.9932 |
| 20.0 | 20.3 | 0.9860 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999993 | *≥0.995* |
| Slope | 1.003779 | *0.90 - 1.10* |
| Intercept | 0.097067 | *+/-3* |



**TRS Calibration Plot** Date: August 28, 2023 Location: Patricia McInnes



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Patricia McInnes | Station number: | AMS06 |
| Calibration Date: | August 17, 2023 | Last Cal Date: | July 31, 2023 |
| Start time (MST): | 8:44 | End time (MST): | 14:20 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | AAL070632 | Cal Gas Expiry Date: | September 9, 2024 | |
| CH4 Cal Gas Conc. | 501.6 | ppm | CH4 Equiv Conc. | 1066.2 | ppm |
| C3H8 Cal Gas Conc. | 205.3 | ppm | | | |
| Removed Gas Ref. | | N/A | Removed Gas Expiry: | N/A | |
| Removed CH4 Conc. | 501.6 | ppm | CH4 Equiv Conc. | 1066.2 | ppm |
| Removed C3H8 Conc. | 205.3 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 3566 | |
| ZAG make/model: | API T701 | | Serial Number: | 4602 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1118148495 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.11E-04 | 2.11E-04 | NMHC SP Ratio: | 4.72E-05 | 4.72E-05 |
| CH4 Retention time: | 14.0 | 14.0 | NMHC Peak Area: | 192120 | 192120 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| as found span | 4920 | 80.3 | 17.12 | 17.06 | 1.004 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| high point | 4920 | 80.3 | 17.12 | 17.04 | 1.005 |
| second point | 4960 | 40.2 | 8.57 | 8.57 | 1.001 |
| third point | 4980 | 20.1 | 4.29 | 4.36 | 0.984 |
| as left zero | 5000 | 0.0 | 0.00 | 0.02 | ---- |
| as left span | 4920 | 80.3 | 17.12 | 17.02 | 1.006 |
| | | | | Average Correction Factor | 0.996 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 17.05 | Prev response | 17.18 | *% change | -0.7% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0 | 0.00 | 0.01 | ---- |
| as found span | 4920 | 80.3 | 9.07 | 9.02 | 1.006 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0 | 0.00 | 0.01 | ---- |
| high point | 4920 | 80.3 | 9.07 | 9.01 | 1.006 |
| second point | 4960 | 40.2 | 4.54 | 4.55 | 0.997 |
| third point | 4980 | 20.1 | 2.27 | 2.33 | 0.974 |
| as left zero | 5000 | 0 | 0.00 | 0.02 | ---- |
| as left span | 4920 | 80.3 | 9.07 | 9.00 | 1.007 |
| | | | | Average Correction Factor | 0.993 |
| Baseline Corr AF: | 9.01 | Prev response | 9.13 | *% change | -1.4% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.3 | 8.06 | 8.04 | 1.002 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.3 | 8.06 | 8.03 | 1.003 |
| second point | 4960 | 40.2 | 4.03 | 4.01 | 1.005 |
| third point | 4980 | 20.1 | 2.02 | 2.03 | 0.995 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.3 | 8.06 | 8.02 | 1.005 |
| | | | | Average Correction Factor | 1.001 |
| Baseline Corr AF: | 8.04 | Prev response | 8.05 | *% change | -0.1% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.001550 | 0.993295 |
| THC Cal Offset: | 0.032027 | 0.049653 |
| CH4 Cal Slope: | 1.000285 | 0.996285 |
| CH4 Cal Offset: | -0.004951 | 0.004651 |
| NMHC Cal Slope: | 1.002851 | 0.990348 |
| NMHC Cal Offset: | 0.036779 | 0.045403 |

Notes: Changed the inlet filter after as founds. Completed preventative maintenance on the H2 generator and swapped the H2 cylinder for the Mocon. No adjustments made.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## THC Calibration Summary

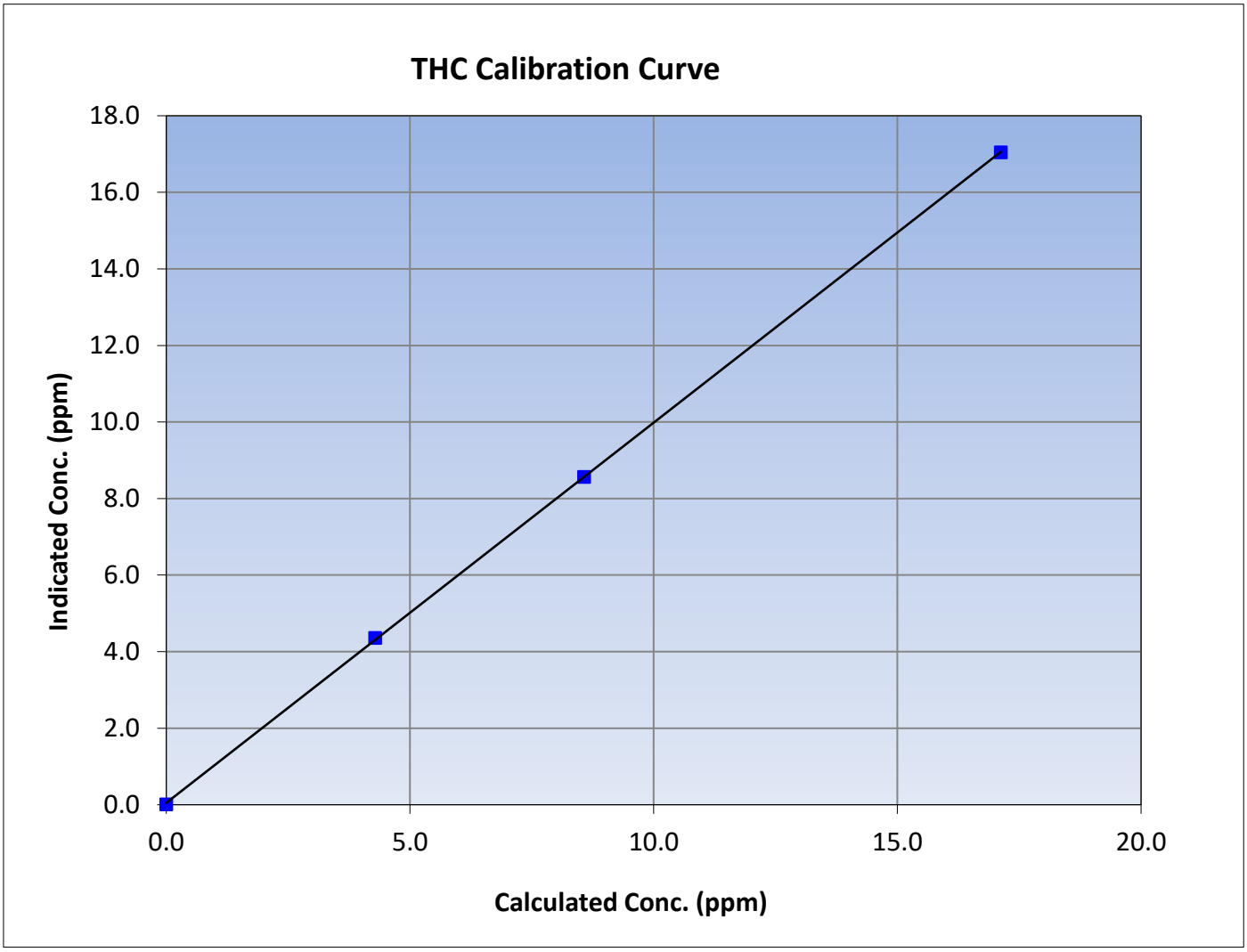
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 31, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS06 |
| Start Time (MST): | 8:44 | End Time (MST): | 14:20 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1118148495 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.01 | ---- | Correlation Coefficient | 0.999975 | ≥0.995 |
| 17.12 | 17.04 | 1.0046 | | | |
| 8.57 | 8.57 | 1.0005 | Slope | 0.993295 | 0.90 - 1.10 |
| 4.29 | 4.36 | 0.9841 | | | |
| | | | Intercept | 0.049653 | +/-0.5 |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

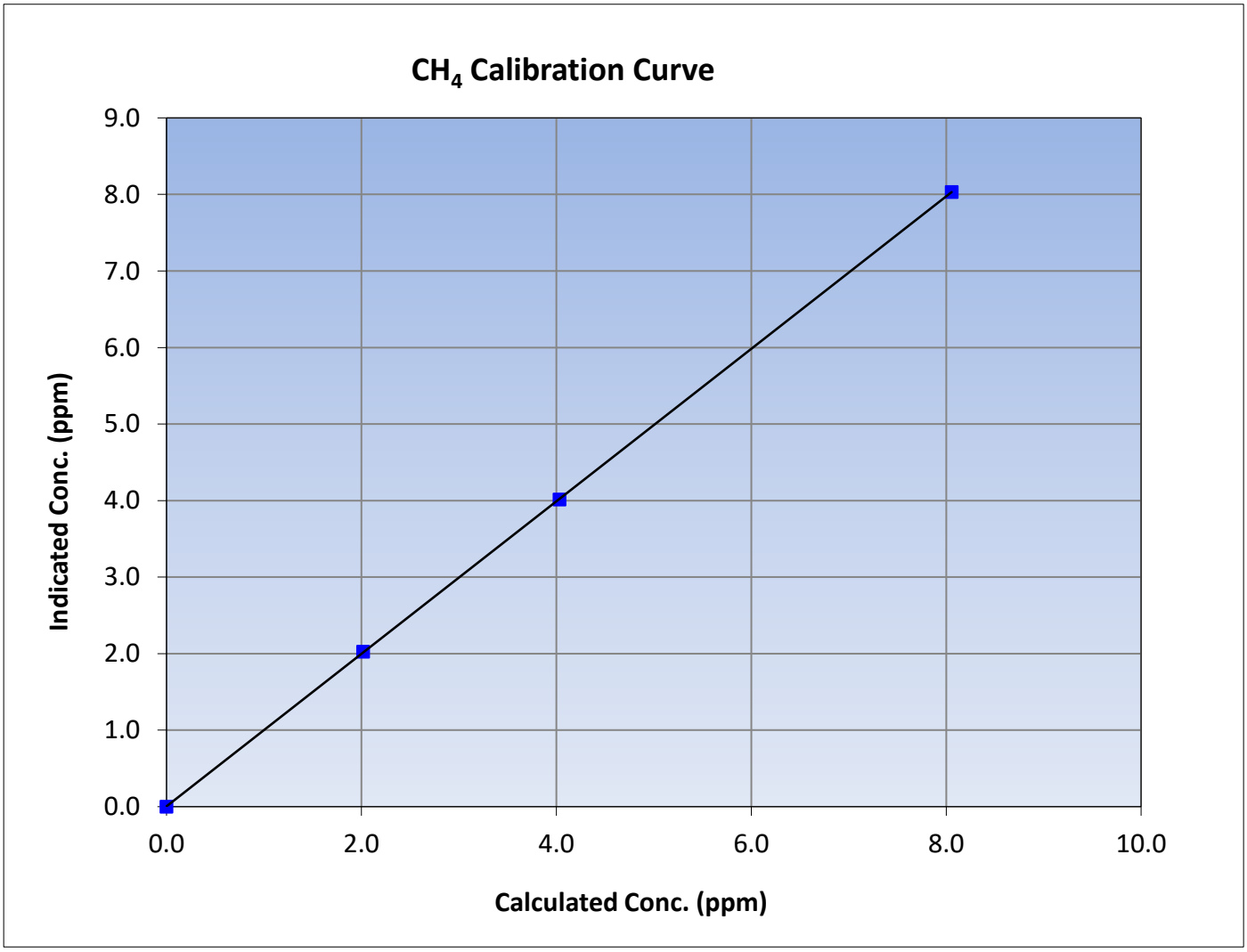
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 31, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS06 |
| Start Time (MST): | 8:44 | End Time (MST): | 14:20 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1118148495 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999992 | ≥0.995 |
| 8.06 | 8.03 | 1.0030 | | | |
| 4.03 | 4.01 | 1.0049 | Slope | 0.996285 | 0.90 - 1.10 |
| 2.02 | 2.03 | 0.9953 | | | |
| | | | Intercept | 0.004651 | +/-0.5 |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

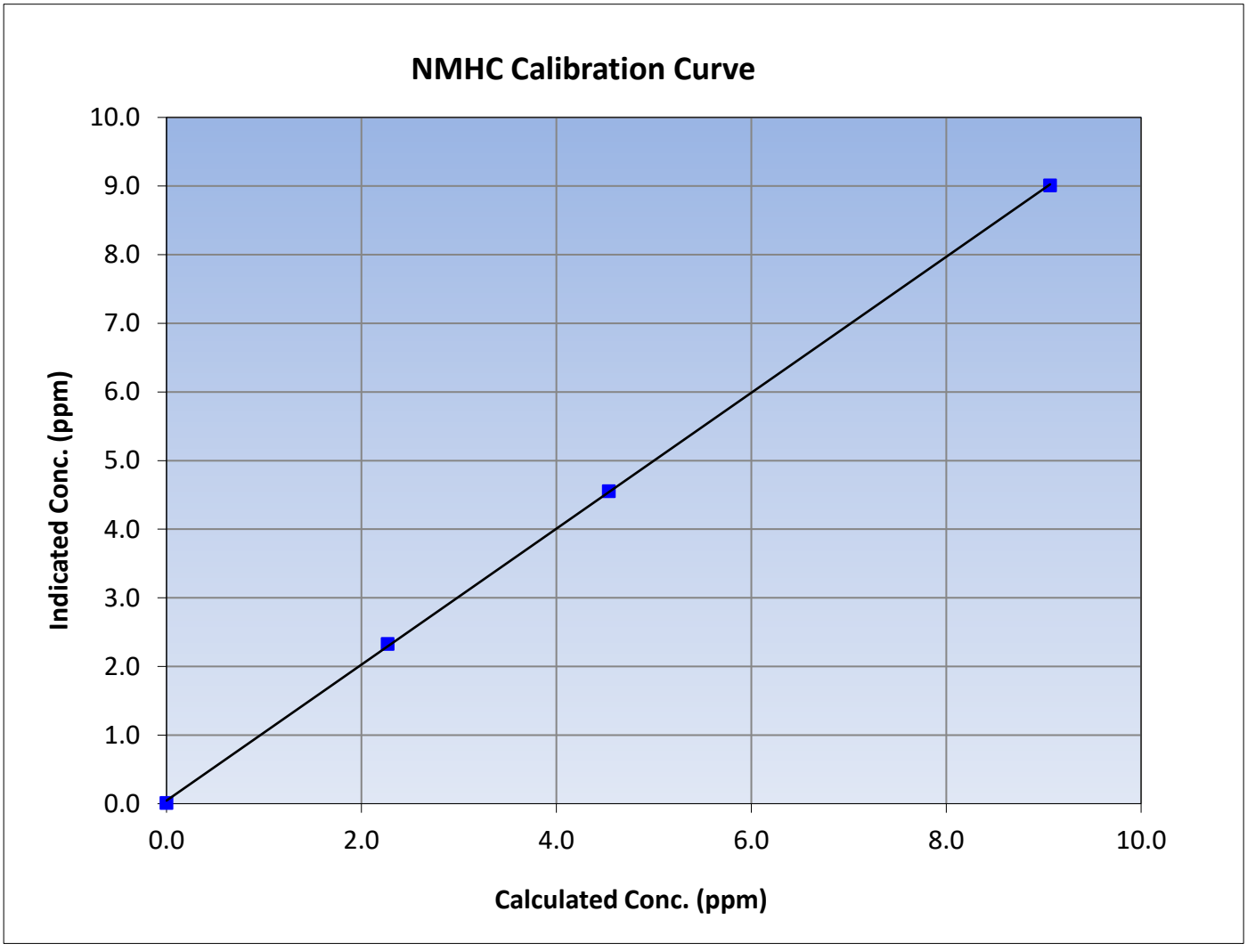
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 31, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS06 |
| Start Time (MST): | 8:44 | End Time (MST): | 14:20 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1118148495 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.01 | ---- | Correlation Coefficient | 0.999936 | ≥0.995 |
| 9.07 | 9.01 | 1.0063 | | | |
| 4.54 | 4.55 | 0.9971 | Slope | 0.990348 | 0.90 - 1.10 |
| 2.27 | 2.33 | 0.9741 | | | |
| | | | Intercept | 0.045403 | +/-0.5 |



**NMHC Calibration Plot** Date: August 17, 2023 Location: Patricia McInnes

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Patricia McInnes | Station number: | AMS06 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 27, 2023 |
| Start time (MST): | 8:16 | End time (MST): | 12:49 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T30YCWN | | Cal Gas Expiry Date: | April 11, 2025 | |
| NOX Cal Gas Conc: | 47.94 | ppm | NO Cal Gas Conc: | 46.39 | ppm |
| Removed Cylinder #: | N/A | | Removed Gas Exp Date: | N/A | |
| Removed Gas NOX Conc: | 47.94 | ppm | Removed Gas NO Conc: | 46.39 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3566 | |
| ZAG make/model: | Teledyne API T701 | | Serial Number: | 4602 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1172750022 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 0.815 | 0.815 | NO bkgnd or offset: | 3.2 | 3.2 |
| NOX coeff or slope: | 0.986 | 0.986 | NOX bkgnd or offset: | 3.8 | 3.8 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 157.2 | 157.2 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.993425 | 0.992318 |
| $NO_X$ Cal Offset: | 2.677022 | 2.277330 |
| NO Cal Slope: | 0.996185 | 0.995327 |
| NO Cal Offset: | 1.203660 | 1.003845 |
| $NO_2$ Cal Slope: | 0.998218 | 0.998809 |
| $NO_2$ Cal Offset: | -0.045063 | -0.587092 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | -0.1 | ---- | ---- |
| as found span | 4914 | 86.2 | 826.5 | 799.7 | 26.7 | 819.6 | 793.2 | 26.5 | 1.0084 | 1.0082 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.3 | 0.0 | ---- | ---- |
| high point | 4914 | 86.2 | 826.5 | 799.7 | 26.7 | 821.4 | 796.6 | 24.9 | 1.0062 | 1.0039 |
| second point | 4957 | 43.1 | 413.2 | 399.9 | 13.4 | 413.4 | 399.5 | 13.9 | 0.9996 | 1.0009 |
| third point | 4978 | 21.6 | 207.1 | 200.4 | 6.7 | 209.6 | 201.1 | 8.5 | 0.9882 | 0.9966 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.5 | 0.0 | ---- | ---- |
| as left span | 4914 | 86.2 | 826.5 | 404.9 | 421.5 | 818.9 | 401.3 | 417.5 | 1.0092 | 1.0090 |
| | | | | | | | | Average Correction Factor | 0.9980 | 1.0005 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 819.5 ppb | NO = 793.0 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -0.5% |
| Previous Response | $NO_X$ = 823.7 ppb | NO = 797.9 ppb | | *Percent Change | NO = | -0.6% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 794.8 | 400.0 | 421.5 | 420.8 | 1.0017 | 99.8% |
| 2nd GPT point (200 ppb O3) | 794.8 | 600.0 | 221.5 | 220.3 | 1.0055 | 99.4% |
| 3rd GPT point (100 ppb O3) | 794.8 | 696.5 | 125.0 | 123.7 | 1.0107 | 98.9% |
| | | | | Average Correction Factor | 1.0060 | 99.4% |

Notes: Changed the inlet filter after as founds. No adjustments made.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

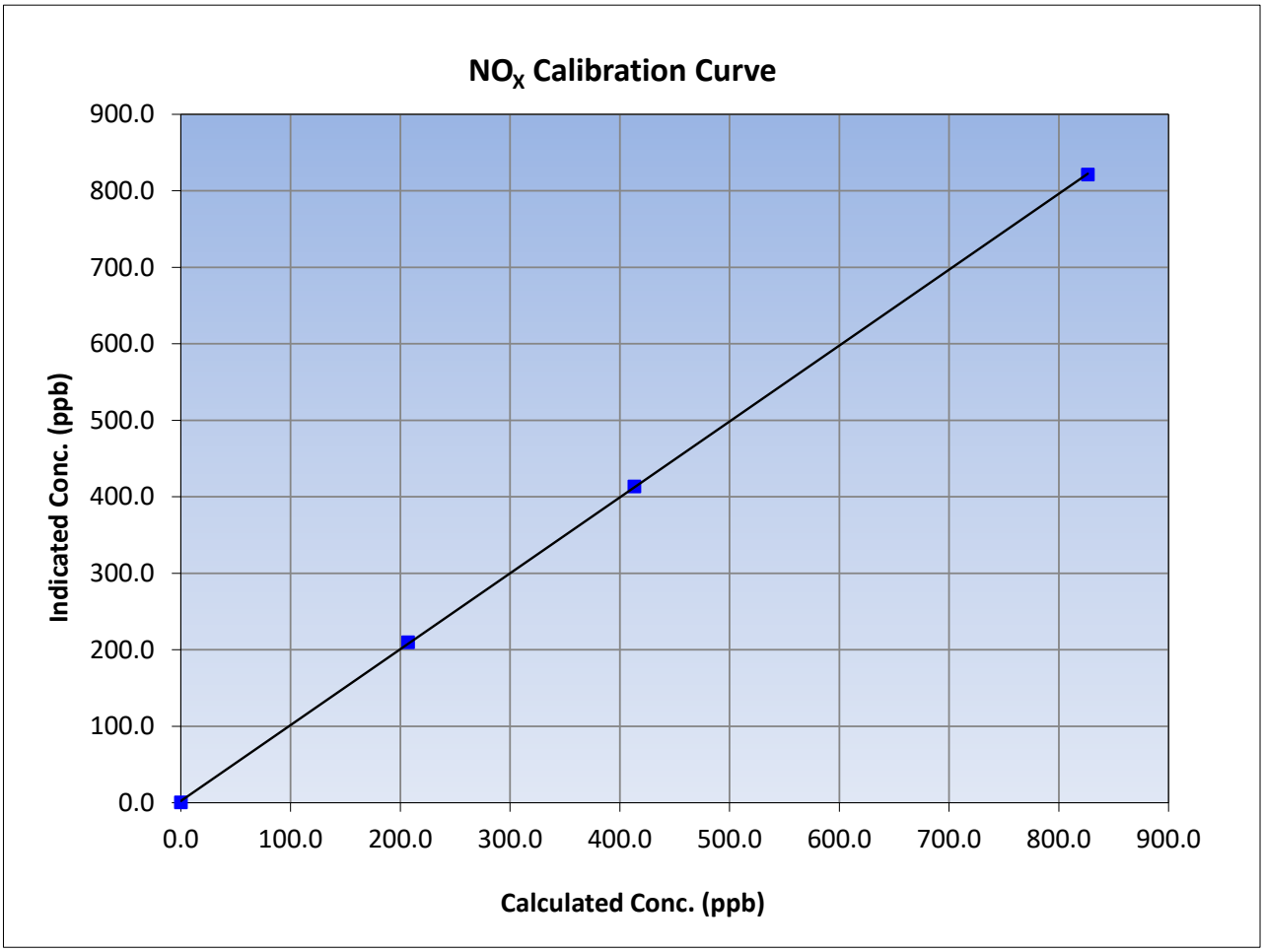
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS06 |
| Start Time (MST): | 8:16 | End Time (MST): | 12:49 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1172750022 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999976 | *≥0.995* |
| 826.5 | 821.4 | 1.0062 | | | |
| 413.2 | 413.4 | 0.9996 | Slope | 0.992318 | *0.90 - 1.10* |
| 207.1 | 209.6 | 0.9882 | | | |
| | | | Intercept | 2.277330 | *+/-20* |



# Wood Buffalo Environmental Association

## NO Calibration Summary

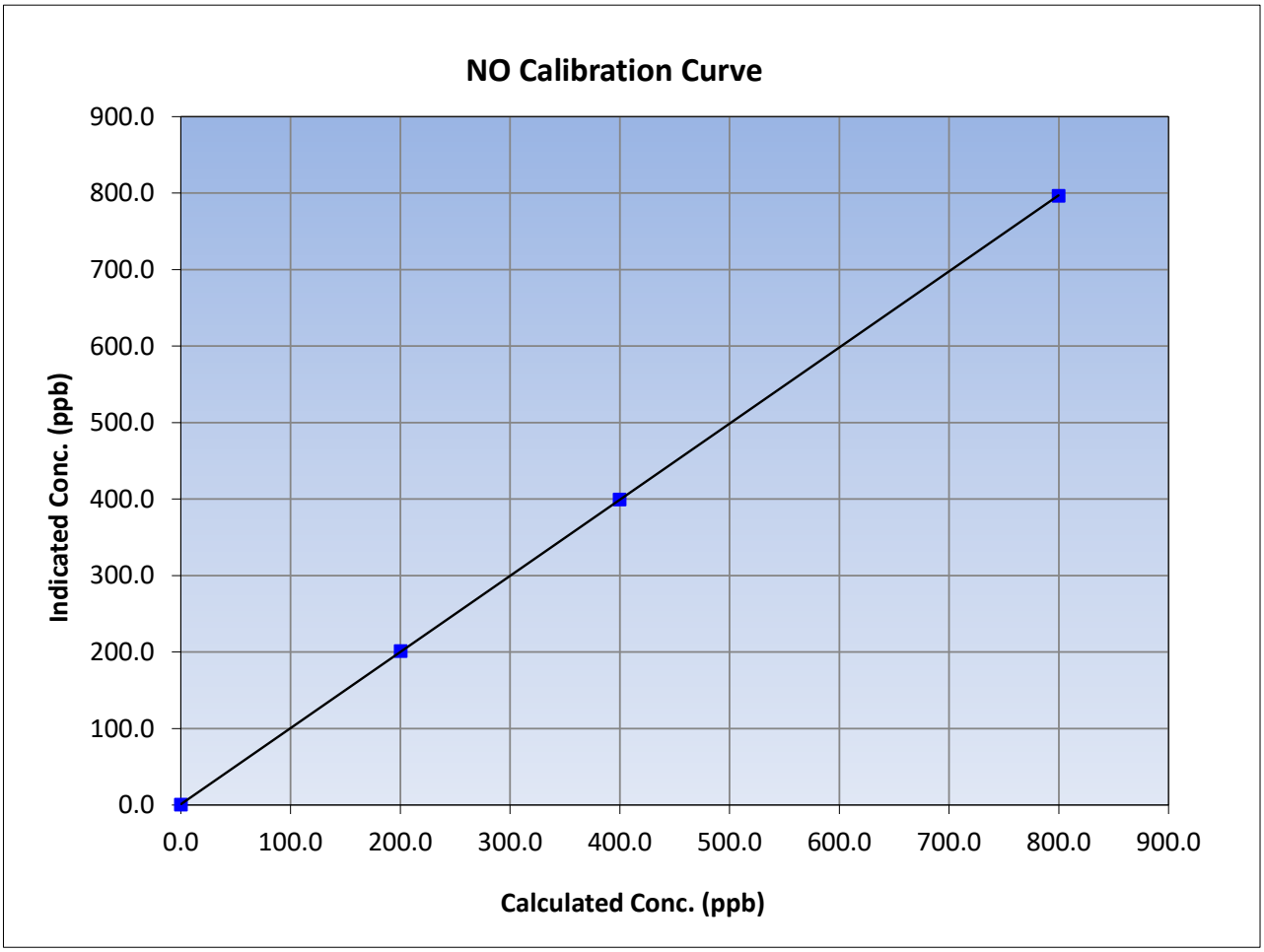
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS06 |
| Start Time (MST): | 8:16 | End Time (MST): | 12:49 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1172750022 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 0.999996 | ≥0.995 |
| 799.7 | 796.6 | 1.0039 | | | |
| 399.9 | 399.5 | 1.0009 | Slope | 0.995327 | 0.90 - 1.10 |
| 200.4 | 201.1 | 0.9966 | | | |
| | | | Intercept | 1.003845 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

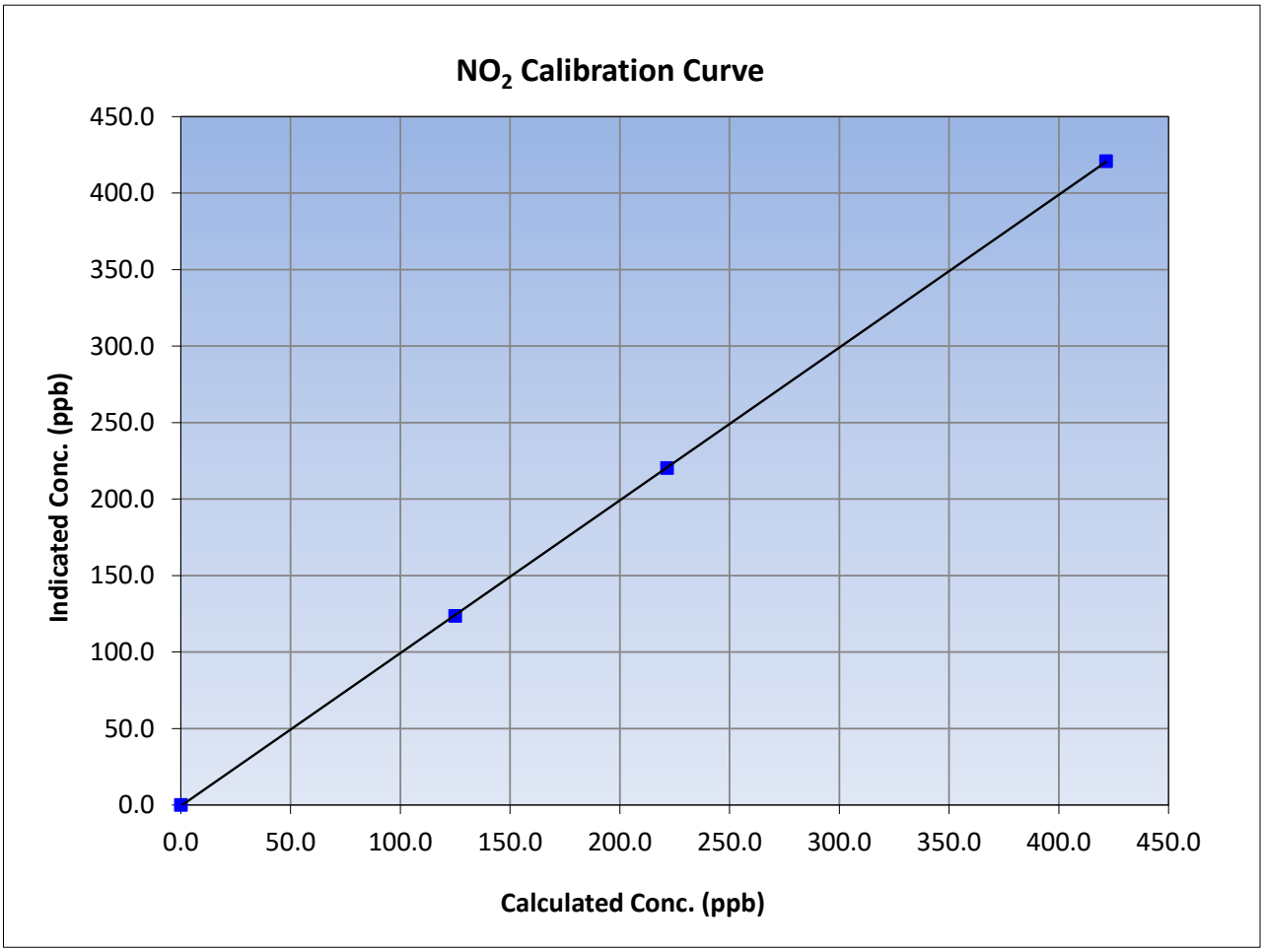
Version-04-2020

### Station Information

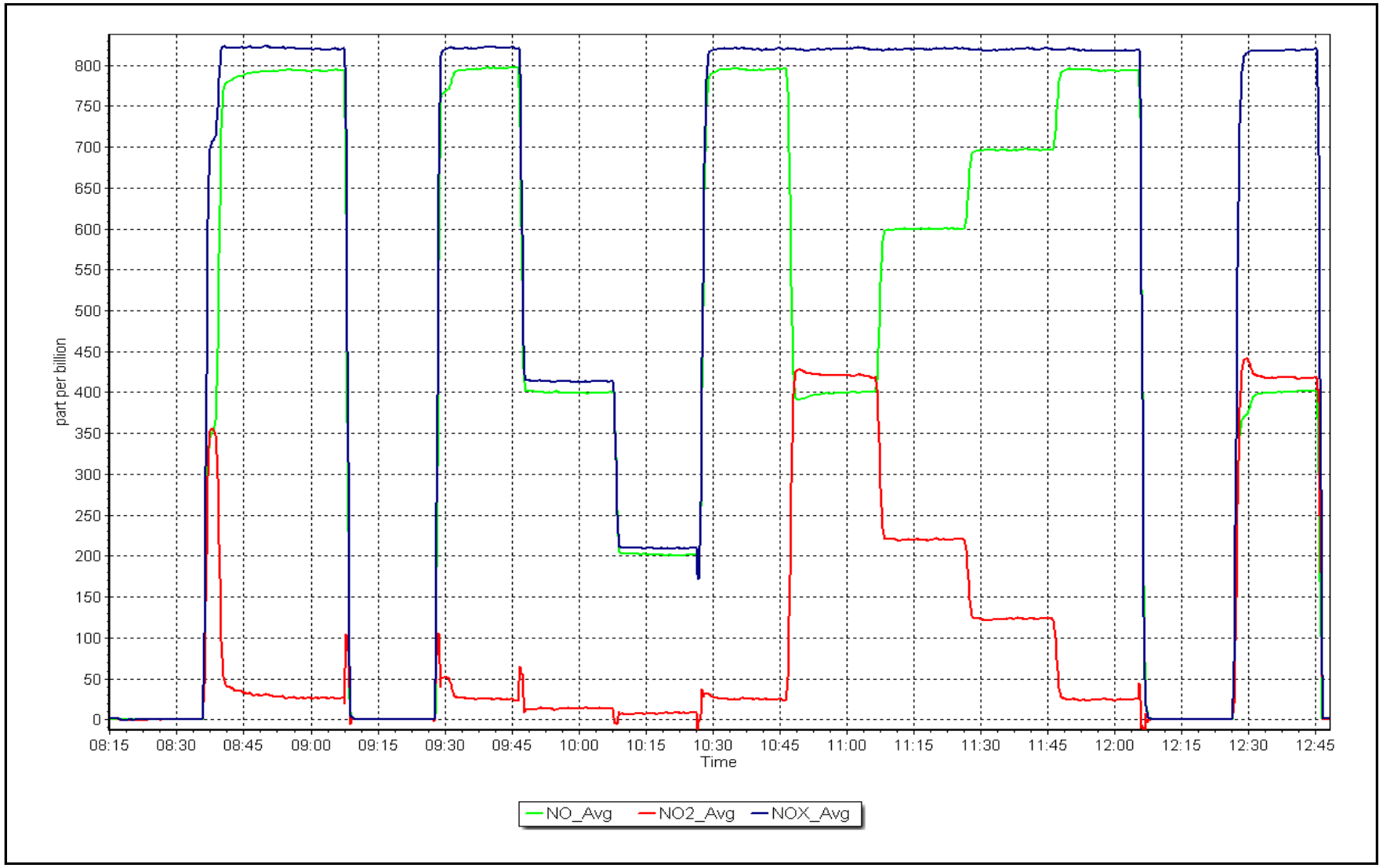
| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS06 |
| Start Time (MST): | 8:16 | End Time (MST): | 12:49 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1172750022 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999990 | *≥0.995* |
| 421.5 | 420.8 | 1.0017 | | | |
| 221.5 | 220.3 | 1.0055 | Slope | 0.998809 | *0.90 - 1.10* |
| 125.0 | 123.7 | 1.0107 | | | |
| | | | Intercept | -0.587092 | *+/-20* |



**$NO_X$ Calibration Plot** Date: August 9, 2023 Location: Patricia McInnes



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Patricia McInnes | Station number: | AMS06 |
| Calibration Date: | August 11, 2023 | Last Cal Date: | July 14, 2023 |
| Start time (MST): | 9:28 | End time (MST): | 12:28 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | API T700 | Serial Number: | 3566 |
| ZAG Make/Model: | API T701 | Serial Number: | 4602 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 49i | Analyzer serial #: | 1300156234 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.001286 | 1.002629 | Backgd or Offset: | -0.2 | -0.2 |
| Calibration intercept: | 0.500000 | 0.540000 | Coeff or Slope: | 1.019 | 1.019 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 800.0 | 0.0 | -1.1 | ---- |
| as found span | 5000 | 1303.0 | 400.0 | 401.2 | 0.997 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 800.0 | 0.0 | -0.2 | ---- |
| high point | 5000 | 1303.0 | 400.0 | 401.4 | 0.997 |
| second point | 5000 | 966.5 | 200.0 | 200.9 | 0.996 |
| third point | 5000 | 794.3 | 100.0 | 101.9 | 0.981 |
| as left zero | 5000 | 800.0 | 0.0 | -0.8 | ---- |
| as left span | 5000 | 1303.0 | 400.0 | 403.5 | 0.991 |
| | | | | Average Correction Factor | 0.991 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 402.3 | Previous response | 401.0 | *% change | 0.3% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. No adjustments made.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

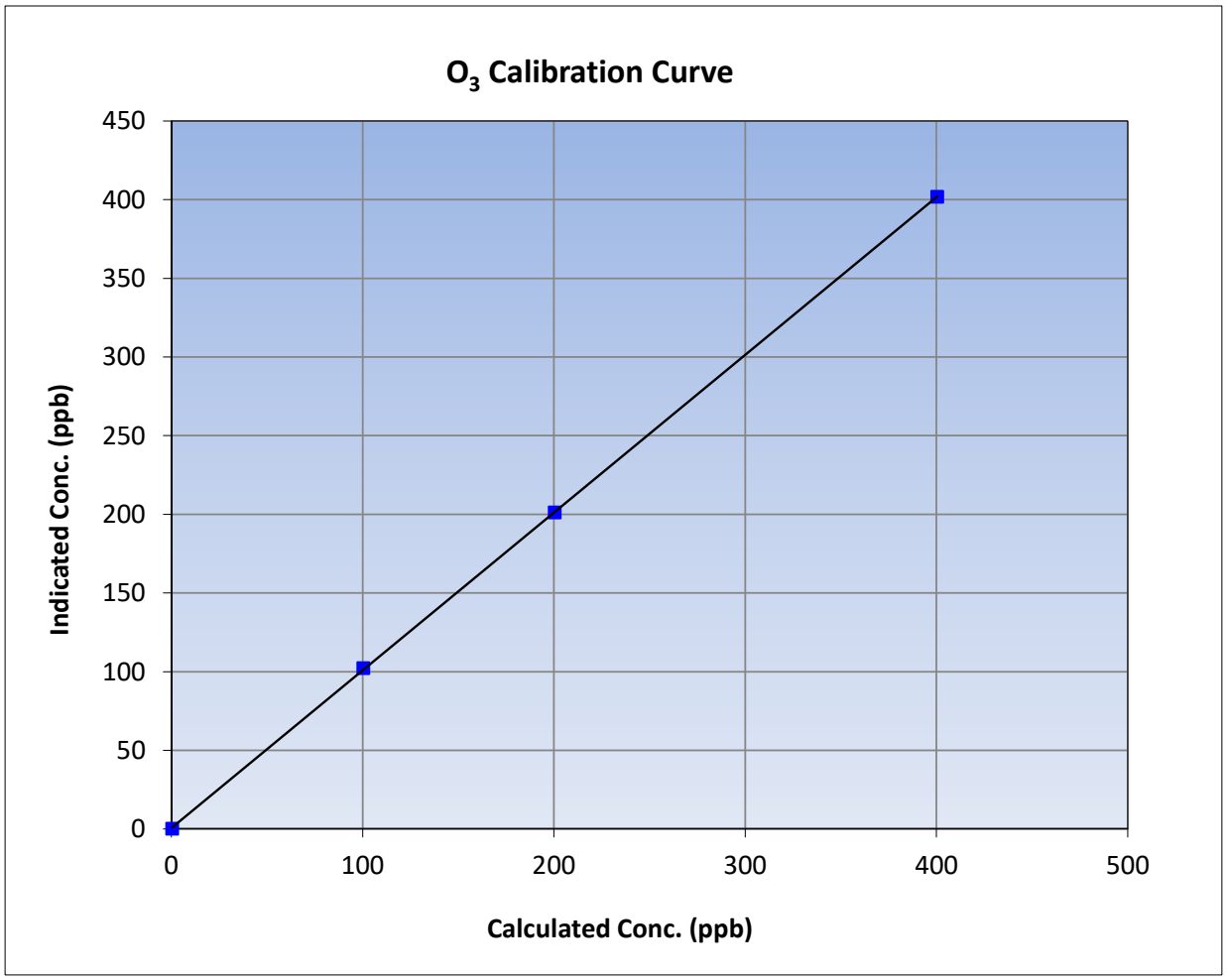
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 11, 2023 | Previous Calibration: | July 14, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS06 |
| Start Time (MST): | 9:28 | End Time (MST): | 12:28 |
| Analyzer make: | Thermo 49i | Analyzer serial #: | 1300156234 |

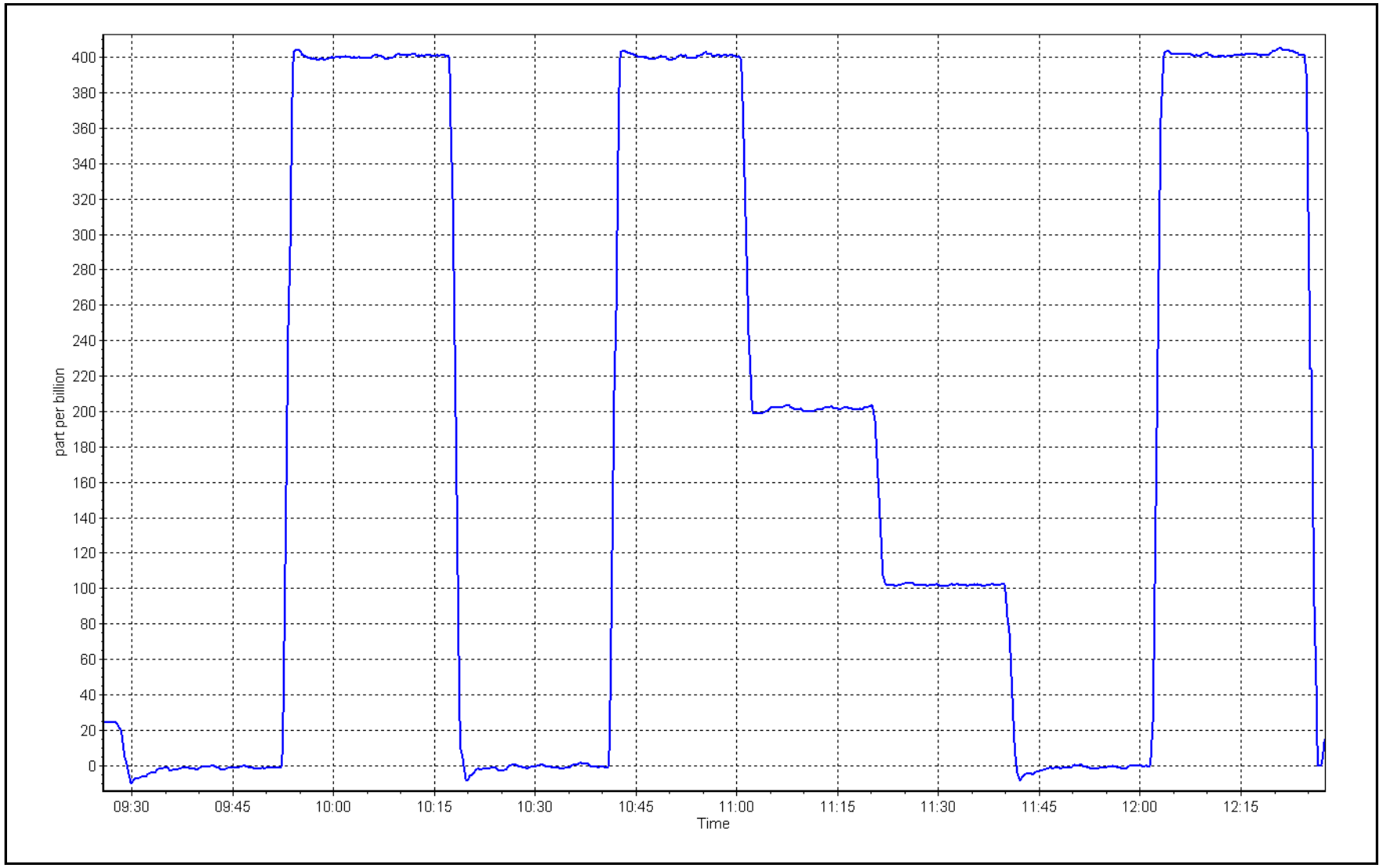
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.2 | ---- |
| 400.0 | 401.4 | 0.9965 |
| 200.0 | 200.9 | 0.9955 |
| 100.0 | 101.9 | 0.9814 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999979 | *≥0.995* |
| Slope | 1.002629 | *0.90 - 1.10* |
| Intercept | 0.540000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 11, 2023 Location: Patricia McInnes



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| Calibration Date: | August 24, 2023 | Last Cal Date: | July 14, 2023 |
| Start time (MST): | 11:58 | End time (MST): | 13:02 |
| Analyzer Make: | API T640 | S/N: | 766 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | ALICAT FP-25 | S/N: | 388755 |
| Temp/RH standard: | ALICAT FP-25 | S/N: | 388755 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | 17.7 | 17.0 | 17.7 | ☐ | +/- 2 °C |
| P (mmHg) | 728.9 | 729.6 | 728.9 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.00 | 4.98 | 5.00 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 24, 2023 Last Cal Date: July 14, 2023

PM w/o HEPA: 31.4 PM w/ HEPA: 0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 11.0 | 11.0 | 11.0 | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 21.8 w/ HEPA: 0

Date Optical Chamber Cleaned: August 24, 2023 <0.2 ug/m3

Disposable Filter Changed: August 24, 2023

### Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023

Date RH/T Sensor Cleaned: April 13, 2023

Notes: Cleaned the chamber and changed the filter. PMT peak was on target. Leak check passed, no adjustments made.

Calibration by: Max Farrell

# Wood Buffalo Environmental Association

## TN - $NO_X$ - $NH_3$ Calibration Report

Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| NOX Cal Date: | August 3, 2023 | Last Cal Date: | August 2, 2023 |
| Start time (MST): | 7:43 | End time (MST): | 10:53 |
| NH3 Cal Date: | August 3, 2023 | Last Cal Date: | August 2, 2023 |
| Start time (MST): | 11:15 | End time (MST): | 14:00 |
| Reason: | Maintenance | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| NOX Cal Gas Conc: | 47.94 | ppm | NO Gas Cylinder #: | T30YCWN |
| NO Cal Gas Conc: | 46.39 | ppm | NO Cal Gas Expiry: | April 11, 2025 |
| Removed NOX Conc: | 47.94 | ppm | Removed Cylinder #: | NA |
| Removed NO Conc: | 46.39 | ppm | Removed cyl Expiry: | NA |
| NOX gas Diff: | | | NO gas Diff: | |
| NH3 Cal Gas Conc: | 77.8 | ppm | NH3 Gas Cylinder #: | CC710812 |
| | | | NH3 Cal Gas Expiry: | March 30, 2023 |
| Removed NH3 Conc: | 77.8 | ppm | Removed Cylinder #: | NA |
| NH3 gas Diff: | | | Removed cyl Expiry: | NA |
| Calibrator Model: | API T700 | | Serial Number: | 3566 |
| ZAG make/model: | API T701 | | Serial Number: | 4602 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer model: | Teledyne API T201 | Analyzer serial #: | 152 |
| Converter model: | Teledyne API T501 | Converter serial #: | 147 |
| NH3 Range (ppb): | 0 - 2000 ppb | Reaction cell Press: | 6.50 |
| NOX Range (ppb): | 0 - 1000 ppb | Sample Flow: | 542 |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coefficient: | 0.794 | 0.794 | TN coefficient: | 0.794 | 0.794 |
| NOX coefficient: | 0.796 | 0.796 | NO bkgrnd: | -0.1 | -0.1 |
| NO2 coefficient: | 1.000 | 1.000 | NOX bkgrnd: | 0.0 | 0.0 |
| NH3 coefficient: | 0.908 | 0.908 | TN bkgrnd: | 0.0 | 0.0 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 1.012637 | 1.003439 |
| $NO_X$ Cal Offset: | 1.353007 | 1.455068 |
| NO Cal Slope: | 1.012223 | 0.997870 |
| NO Cal Offset: | 1.240145 | 0.164066 |
| $NO_2$ Cal Slope: | 1.001251 | 1.000820 |
| $NO_2$ Cal Offset: | 0.861558 | -0.026033 |
| NH3 Cal Slope: | 1.026272 | 1.002680 |
| NH3 Cal Offset: | 3.727263 | 5.795340 |
| TN Cal Slope: | 1.031709 | 1.008130 |
| TN Cal Offset: | 4.015689 | 5.548239 |

# Wood Buffalo Environmental Association

## TN - NOX - $NH_3$ Calibration Report

Version-05-2023

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated TN concentration (ppb) (Cc) | Calculated NOX concentration (ppb) (Cc) | Calculated NH3 concentration (ppb) (Cc) | Indicated TN concentration (ppb) (Ic) | Indicated NOX concentration (ppb) (Ic) | Indicated NH3 concentration (ppb) (Ic) | TN Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 0.1 | 1.2 | ---- | ---- |
| as found NO | 4914 | 86.2 | 826.5 | 826.5 | ---- | 825.9 | 830.3 | -4.3 | 1.001 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 0.1 | 1.2 | ---- | ---- |
| high NO point | 4914 | 86.2 | 826.5 | 826.5 | ---- | 825.9 | 830.3 | -4.3 | 1.001 | ---- |
| GPT point | 4914 | 86.2 | 826.5 | 826.5 | ---- | 827.1 | 825.1 | 2.2 | 0.999 | ---- |
| as found NH3 | 3419 | 81.0 | 1800.5 | ---- | 1800.5 | 1819.4 | ---- | 1809.7 | 0.990 | 0.995 |
| new NH3 cyl rp | | | | | | | ---- | | | |
| first NH3 | 3419 | 81.0 | 1800.5 | ---- | 1800.5 | 1819.4 | ---- | 1809.7 | 0.990 | 0.995 |
| second NH3 | 3455 | 45.0 | 1000.3 | ---- | 1000.3 | 1013.1 | ---- | 1007.9 | 0.987 | 0.992 |
| third NH3 | 3478 | 22.5 | 500.1 | ---- | 500.1 | 516.1 | ---- | 514.1 | 0.969 | 0.973 |
| | | | | | | | | Average Correction Factor | 0.9999 | 0.9867 |

Corrected As found TN = 824.6 ppb $NO_X$ = 830.2 ppb NH3 = 1808.5 ppb

Previous Response TN = 856.7 ppb $NO_X$ = 838.2 ppb NH3 = 1851.5 ppb

*Percent Change TN = -3.9%

*Percent Change $NO_X$ = -1.0%

*Percent Change NH3 = -2.4%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 90.8%

NH3 Current Converter Efficiency = 90.8%

# Wood Buffalo Environmental Association

# $NO_X$ - NO - $NO_2$ Calibration Report

Version-05-2023

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated TN concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated TN concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.8 | 1.3 | ---- | ---- |
| as found span | 4914 | 86.2 | 826.5 | 799.7 | 826.5 | 830.3 | 798.4 | 825.9 | 0.9954 | 1.0017 |
| new NO cyl rp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.8 | 1.3 | ---- | ---- |
| high point | 4914 | 86.2 | 826.5 | 799.7 | 826.5 | 830.3 | 798.4 | 825.9 | 0.9954 | 1.0017 |
| second point | 4957 | 43.1 | 413.2 | 399.9 | 413.2 | 416.1 | 399.2 | 414.5 | 0.9931 | 1.0017 |
| third point | 4978 | 21.6 | 207.1 | 200.4 | 207.1 | 211.1 | 199.3 | 210.9 | 0.9811 | 1.0056 |
| | | | | | | | | Average Correction Factor | 0.9899 | 1.0030 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Baseline Corr As fnd | TN = | 824.6 ppb | $NO_X$ = | 830.2 ppb | NO = | 797.6 ppb | *Percent Change | TN = -3.9% |
| Previous Response | TN = | 856.7 ppb | $NO_X$ = | 838.2 ppb | NO = | 810.7 ppb | *Percent Change | $NO_X$ = -1.0% |
| | | | | | | | *Percent Change | NO = -1.6% |

* = > +/-5% change initiates investigation

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found zero | ---- | ---- | 0.0 | -0.8 | ---- | ---- |
| calibration zero | ---- | ---- | 0.0 | -0.8 | ---- | ---- |
| 1st GPT point (400 ppb O3) | 799.0 | 396.9 | 428.8 | 428.3 | 1.0012 | 99.9% |
| 2nd GPT point (200 ppb O3) | 799.0 | 601.8 | 223.9 | 225.7 | 0.9921 | 100.8% |
| 3rd GPT point (100 ppb O3) | 799.0 | 696.0 | 129.7 | 129.8 | 0.9994 | 100.1% |
| | | | | Average Correction Factor | 0.9976 | 100.2% |

Notes: Multipoint as founds completed yesterday and the pump has been swapped out for preventative maintenance. No adjustments made.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## TN Calibration Summary

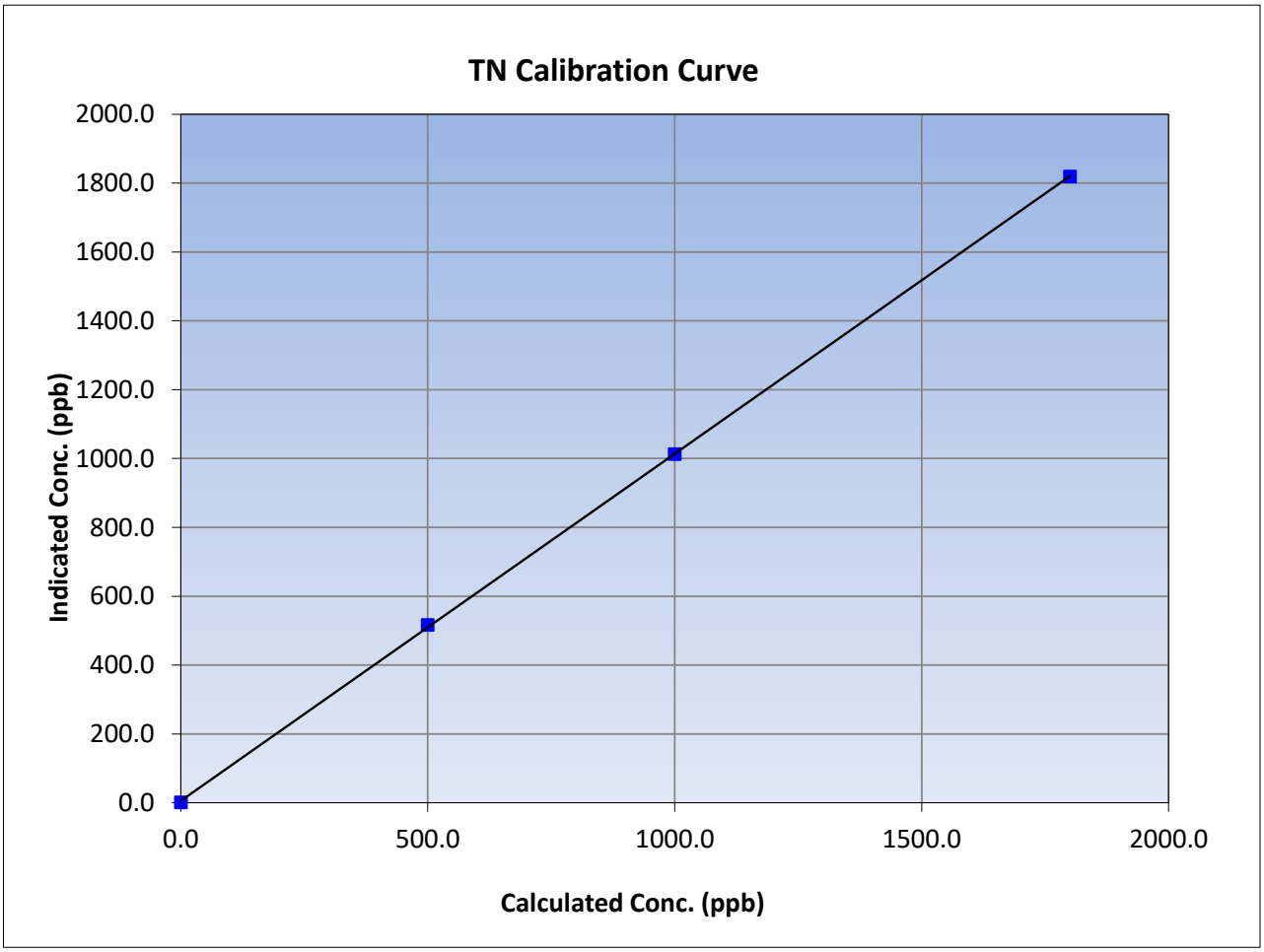
Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | August 2, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS 06 |
| Start Time (MST): | 11:15 | End Time (MST): | 14:00 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 152 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 1.3 | ---- | Correlation Coefficient | 0.999966 | *≥0.995* |
| 1800.5 | 1819.4 | 0.9896 | | | |
| 1000.3 | 1013.1 | 0.9874 | Slope | 1.008130 | *0.90 - 1.10* |
| 500.1 | 516.1 | 0.9689 | | | |
| | | | Intercept | 5.548239 | *+/-20* |



# Wood Buffalo Environmental Association

## $NH_3$ Calibration Summary

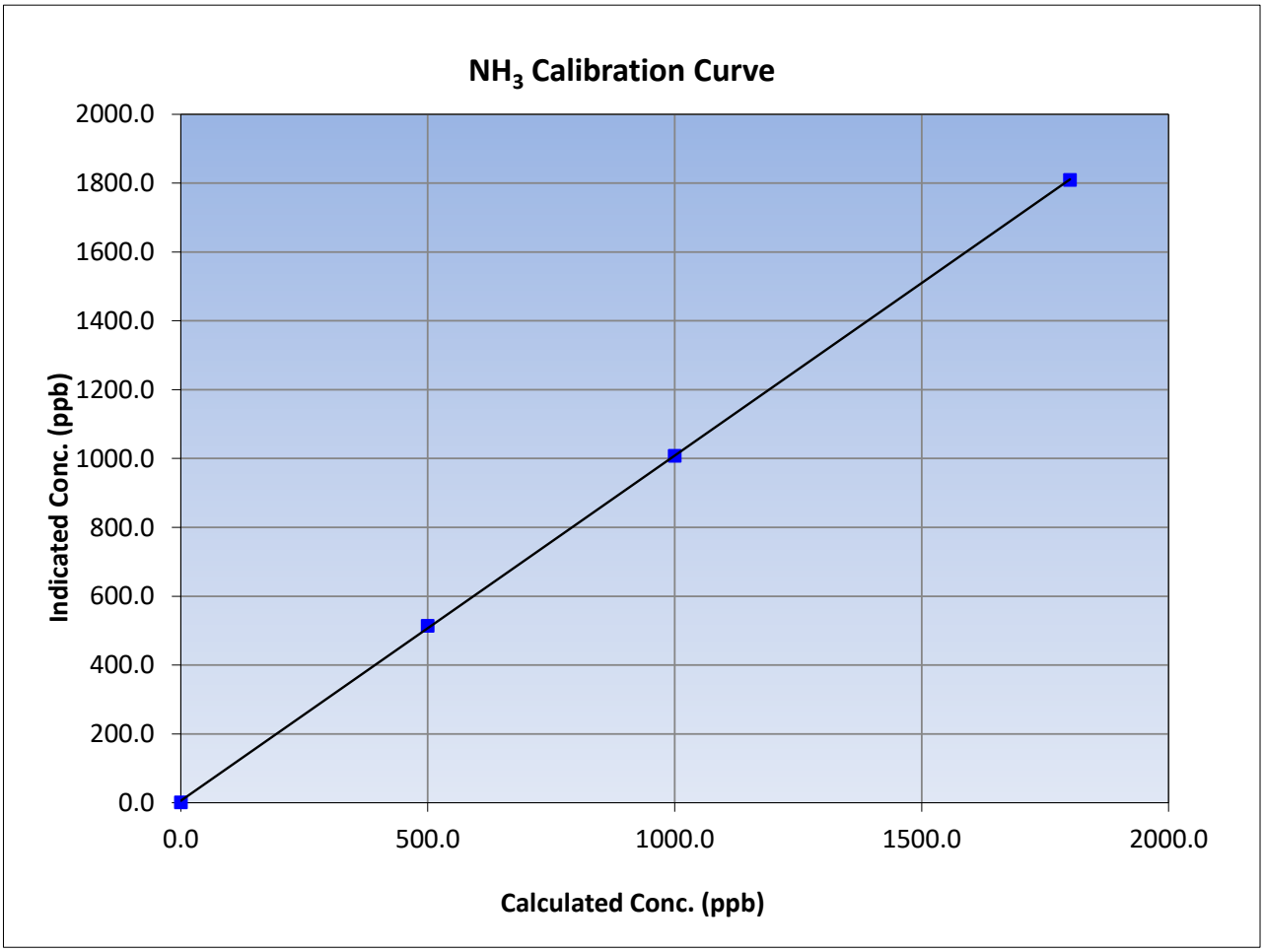
Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | August 2, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS 06 |
| Start Time (MST): | 11:15 | End Time (MST): | 14:00 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 152 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 1.2 | ---- | Correlation Coefficient | 0.999960 | ≥0.995 |
| 1800.5 | 1809.7 | 0.9949 | | | |
| 1000.3 | 1007.9 | 0.9924 | Slope | 1.002680 | 0.90 - 1.10 |
| 500.1 | 514.1 | 0.9727 | | | |
| | | | Intercept | 5.795340 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

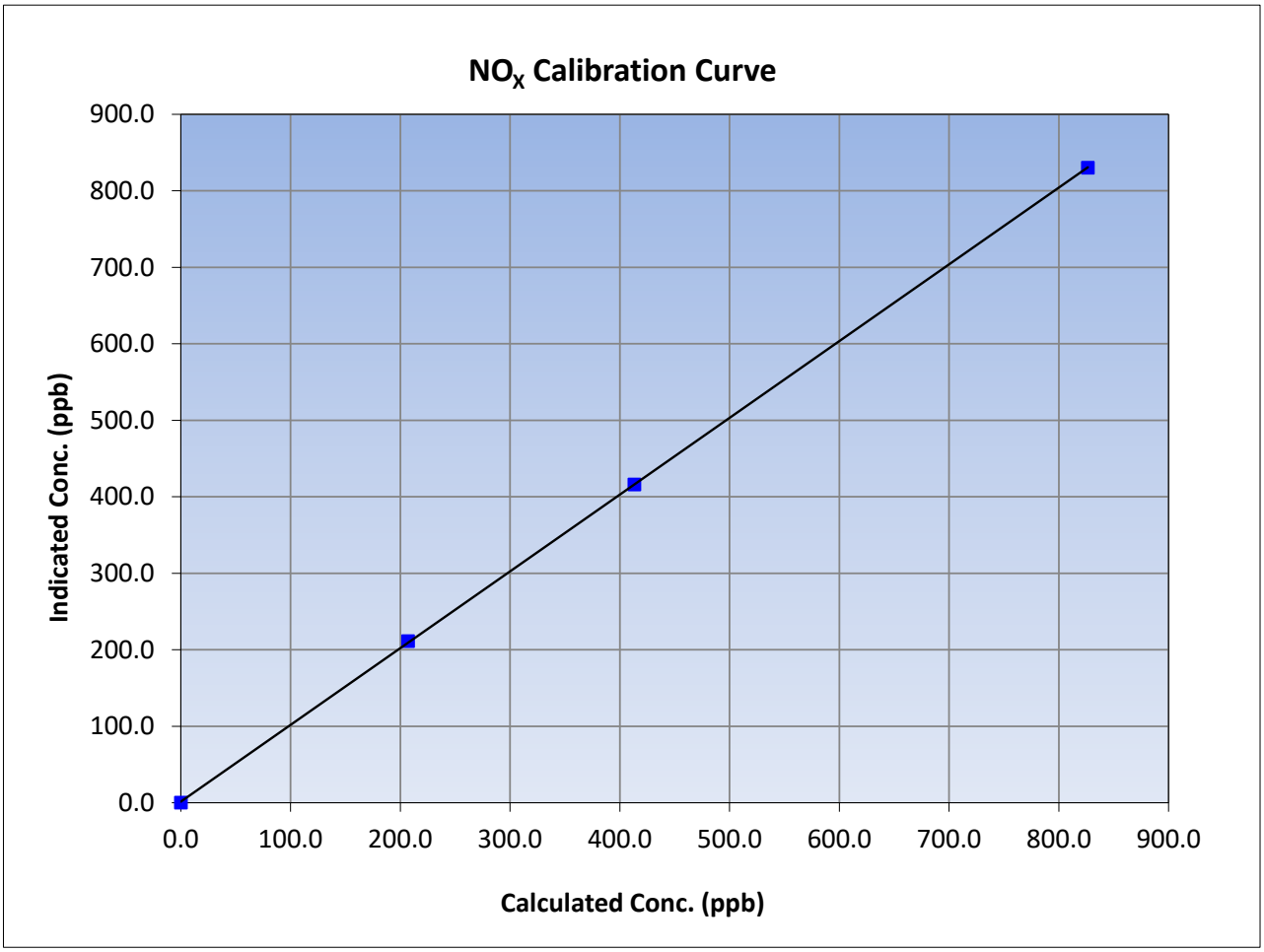
Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | August 2, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS 06 |
| Start Time (MST): | 7:43 | End Time (MST): | 10:53 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 152 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999986 | ≥0.995 |
| 826.5 | 830.3 | 0.9954 | | | |
| 413.2 | 416.1 | 0.9931 | Slope | 1.003439 | 0.90 - 1.10 |
| 207.1 | 211.1 | 0.9811 | | | |
| | | | Intercept | 1.455068 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

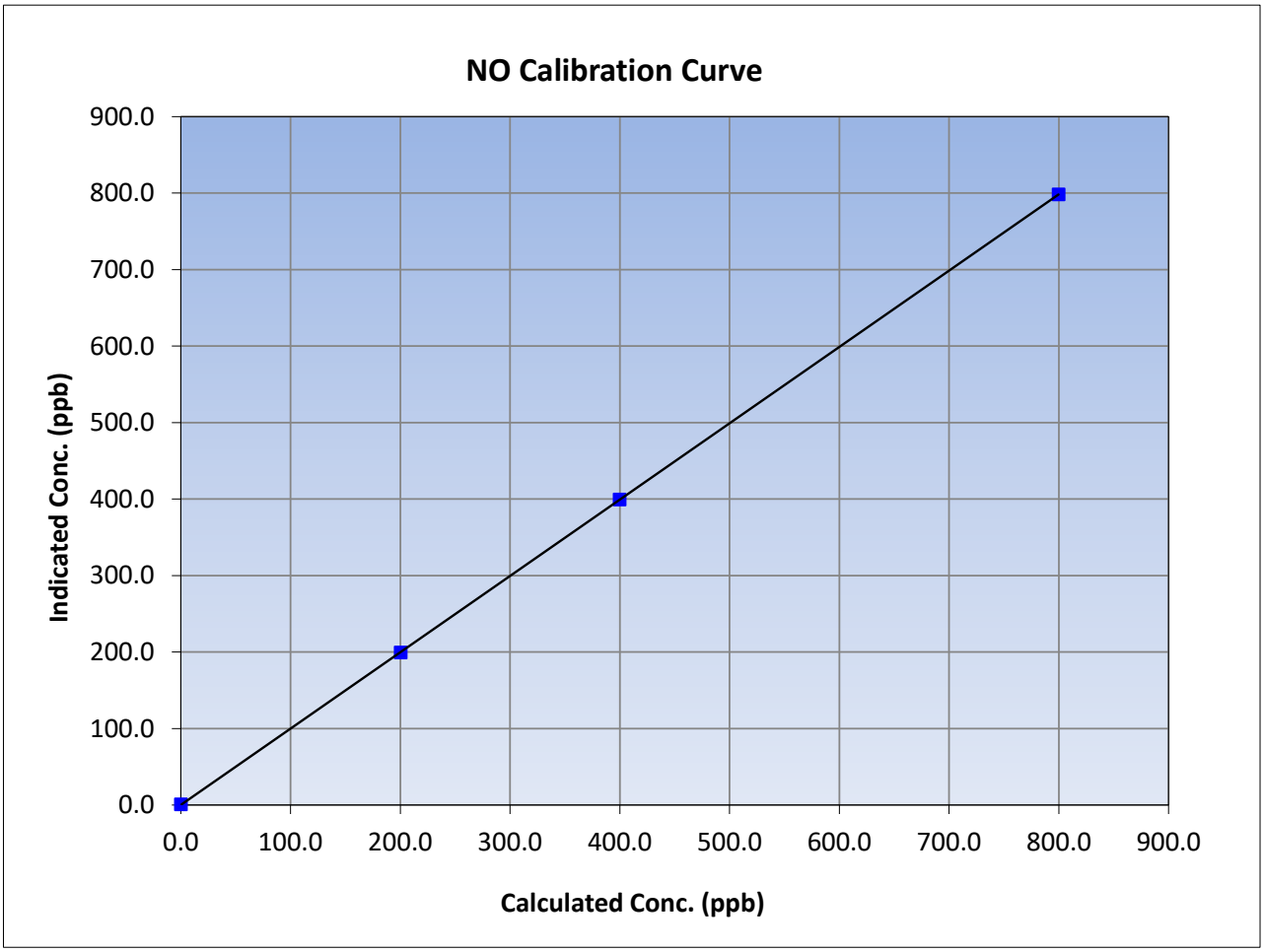
Version-05-2023

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | August 2, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS 06 |
| Start Time (MST): | 7:43 | End Time (MST): | 10:53 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 152 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.8 | ---- | Correlation Coefficient | 0.999997 | *≥0.995* |
| 799.7 | 798.4 | 1.0017 | | | |
| 399.9 | 399.2 | 1.0017 | Slope | 0.997870 | *0.90 - 1.10* |
| 200.4 | 199.3 | 1.0056 | | | |
| | | | Intercept | 0.164066 | *+/-20* |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

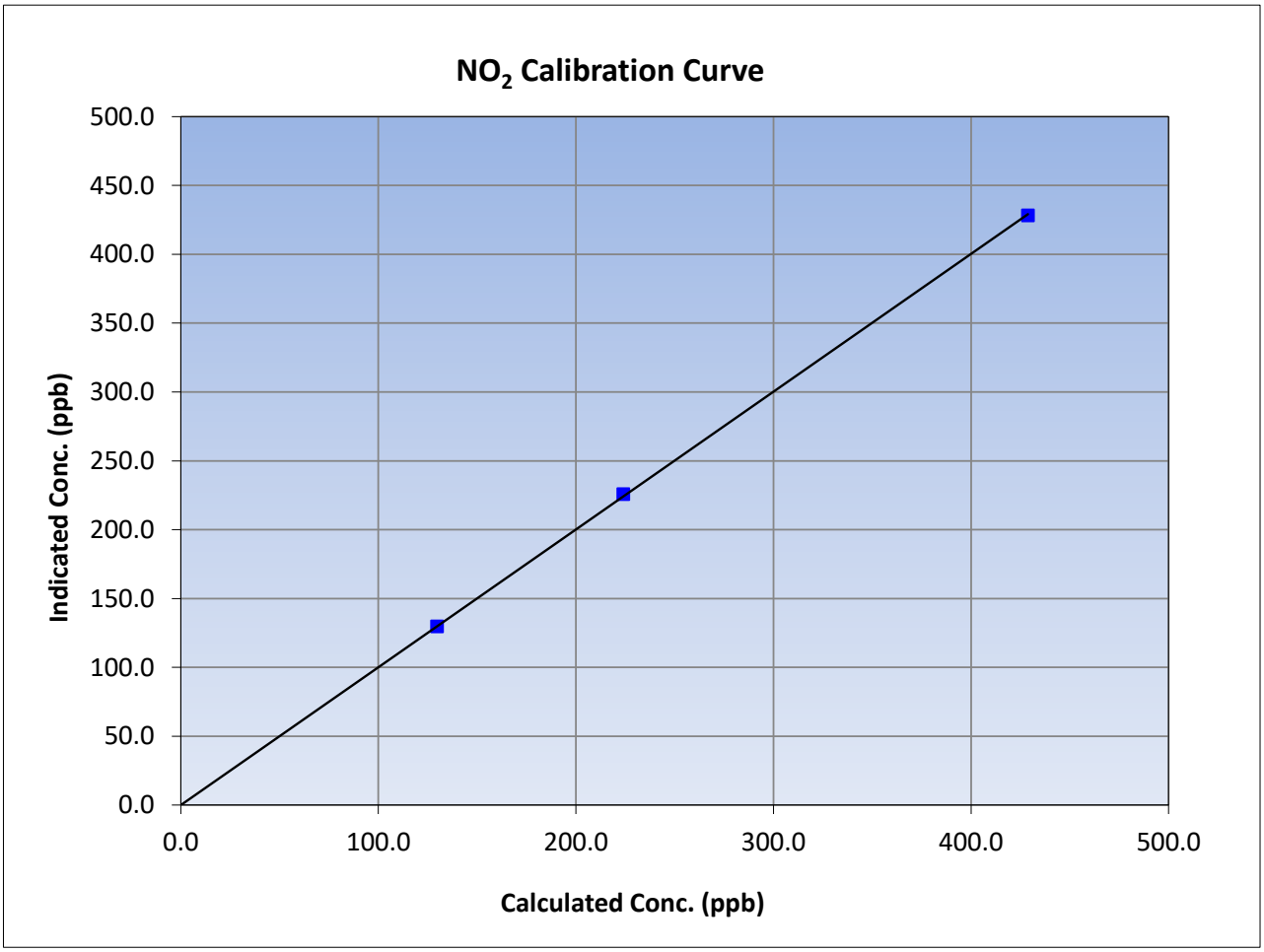
Version-05-2023

### Station Information

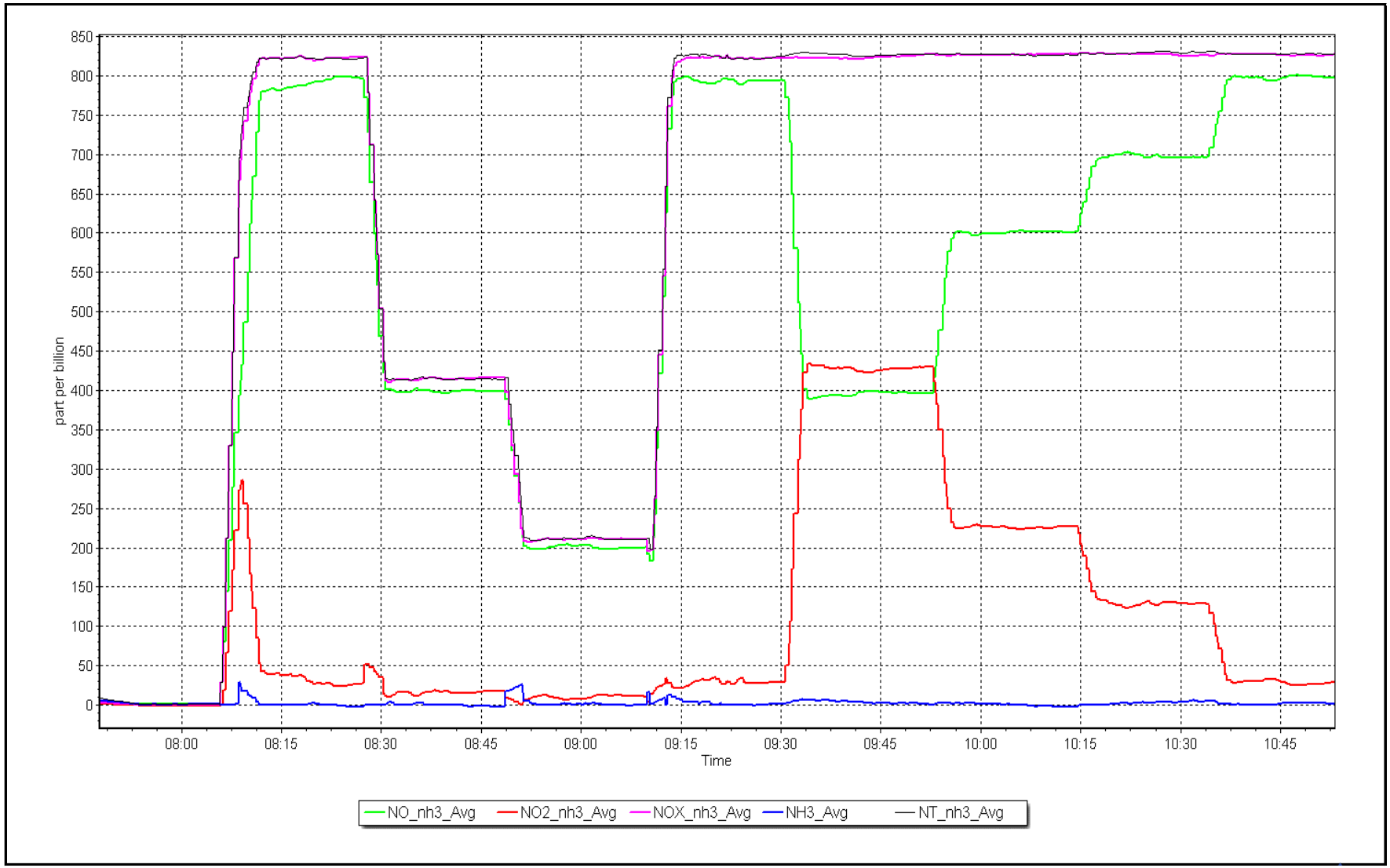
| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | August 2, 2023 |
| Station Name: | Patricia McInnes | Station Number: | AMS 06 |
| Start Time (MST): | 7:43 | End Time (MST): | 10:53 |
| Analyzer make: | Teledyne API T201 | Analyzer serial #: | 152 |

### Calibration Data

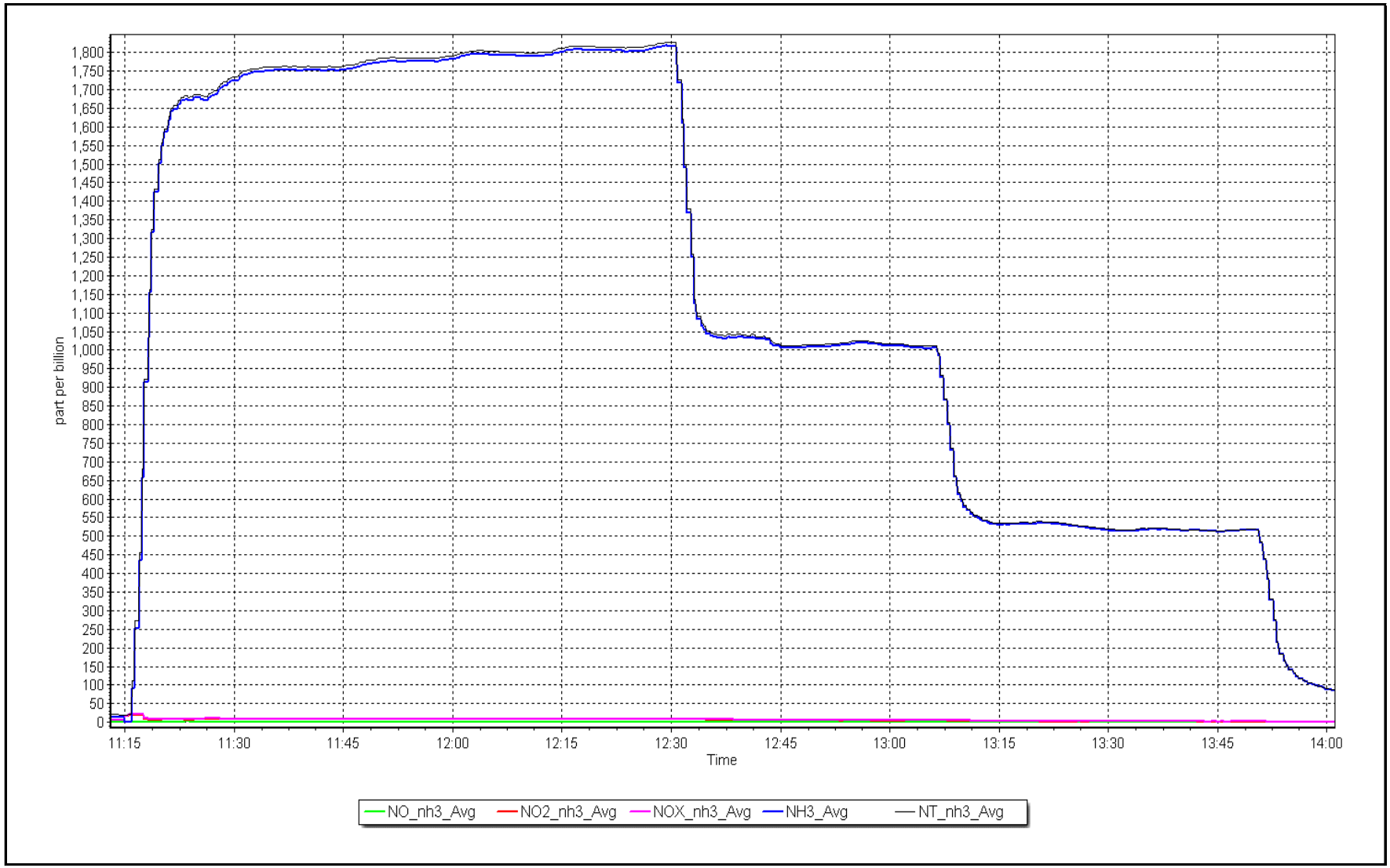
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | -0.8 | ---- | Correlation Coefficient | 0.999960 | *≥0.995* |
| 428.8 | 428.3 | 1.0012 | | | |
| 223.9 | 225.7 | 0.9921 | Slope | 1.000820 | *0.90 - 1.10* |
| 129.7 | 129.8 | 0.9994 | | | |
| | | | Intercept | -0.026033 | *+/-20* |



**$NO_X$ Calibration Plot** Date: August 3, 2023 Location: Patricia McInnes



**$NH_3$ Calibration Plot** Date: August 3, 2023 Location: Patricia McInnes



# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Patricia McInnes | Station Number: | AMS 06 |
| Calibration Date: | August 25, 2023 | Prev Cal Date: | August 30, 2022 |
| Start Time (MST): | 13:40 | End Time (MST): | 14:25 |
| Tower Height (m): | 10.0 | Reason: | Routine |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | B10015 |
| WS Calibrator: | Young 18802 | Serial Number: | CA 03845 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.1 | -0.3% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | -0.1% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999998 | *≥0.9995* |
| Calculated slope | | 0.999113 | *0.90 - 1.10* |
| Calculated intercept | | 0.030337 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | E4854 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | | Calc Declination*: | Degrees |
| Deadband calc: | 2.6 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 1.9 | --- |
| 90 | 87.2 | -0.8% |
| 180 | 177.9 | -0.6% |
| 270 | 269.6 | -0.1% |
| 357 | 356.3 | -0.2% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999922 | *≥0.9995* |
| Calculated slope | | 1.003011 | *0.90 - 1.10* |
| Calculated intercept | | 0.282225 | *+/- 4* |

Notes: Bearing are in good condition, checked crossarm alignment using a compass.

Calibration Performed By: Max Farrell

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS07
## ATHABASCA VALLEY
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Athabasca Valley | Station number: | AMS07 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 8:38 | End time (MST): | 12:38 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 50.52 | ppm | Cal Gas Exp Date: | December 29, 2028 |
| Cal Gas Cylinder #: | CC282115 | | | |
| Removed Cal Gas Conc: | 50.52 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3805 |
| ZAG Make/Model: | API 701H | | Serial Number: | 198 |

### Analyzer Information

Analyzer make: Thermo 43i-LTE  Analyzer serial #: 1507864683

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.995398 | 0.997338 | Backgd or Offset: | 2.61 | 2.61 |
| Calibration intercept: | 2.183198 | 1.503428 | Coeff or Slope: | 0.834 | 0.834 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4921 | 79.3 | 801.2 | 797.2 | 1.005 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4921 | 79.3 | 801.2 | 799.4 | 1.002 |
| second point | 4960 | 39.6 | 400.2 | 402.8 | 0.993 |
| third point | 4980 | 19.8 | 200.1 | 201.3 | 0.994 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4921 | 79.2 | 800.2 | 798.7 | 1.002 |
| | | | | Average Correction Factor | 0.997 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 797.30 | Previous response | 799.70 | *% change | -0.3% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

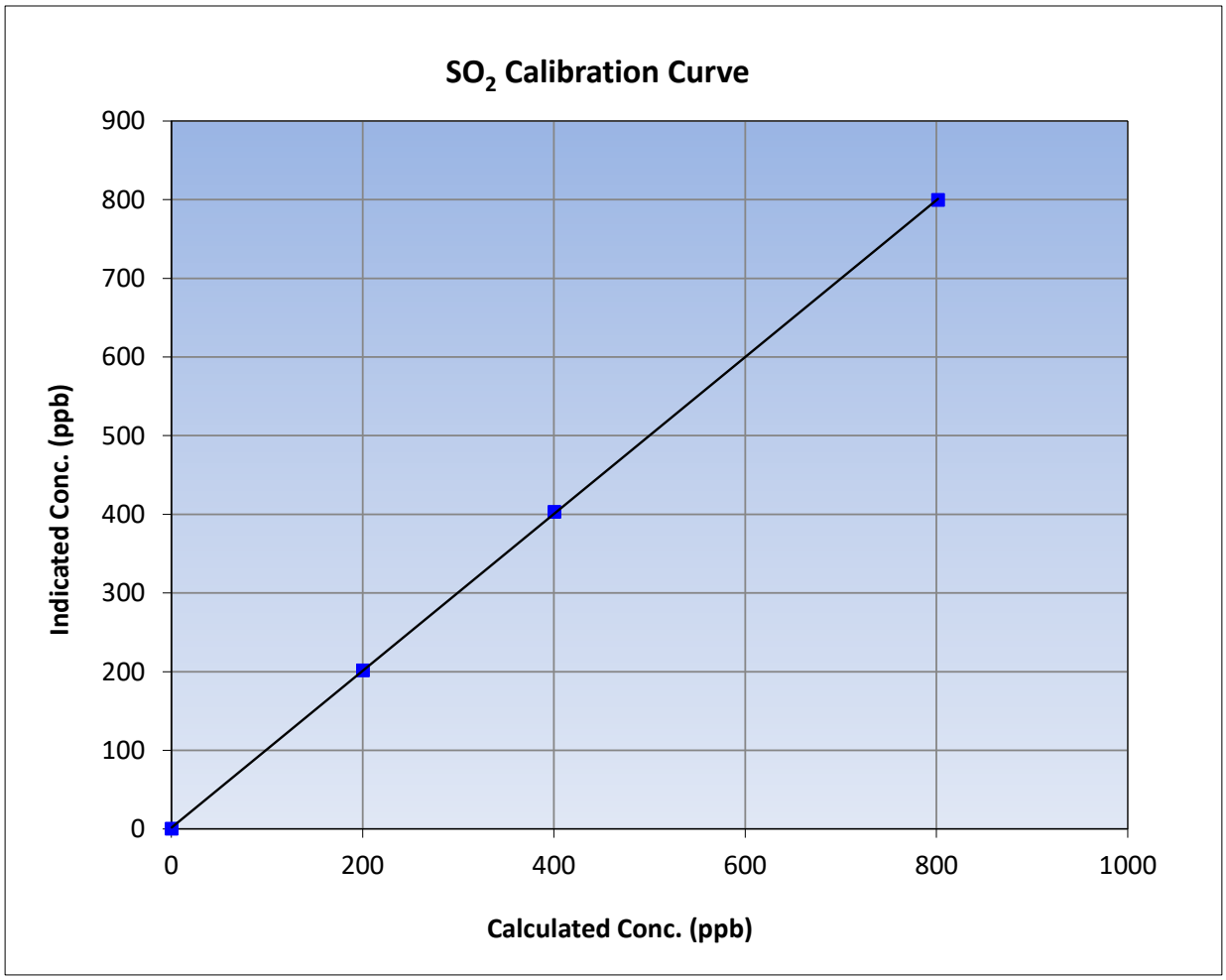
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 8:38 | End Time (MST): | 12:38 |
| Analyzer make: | Thermo 43i-LTE | Analyzer serial #: | 1507864683 |

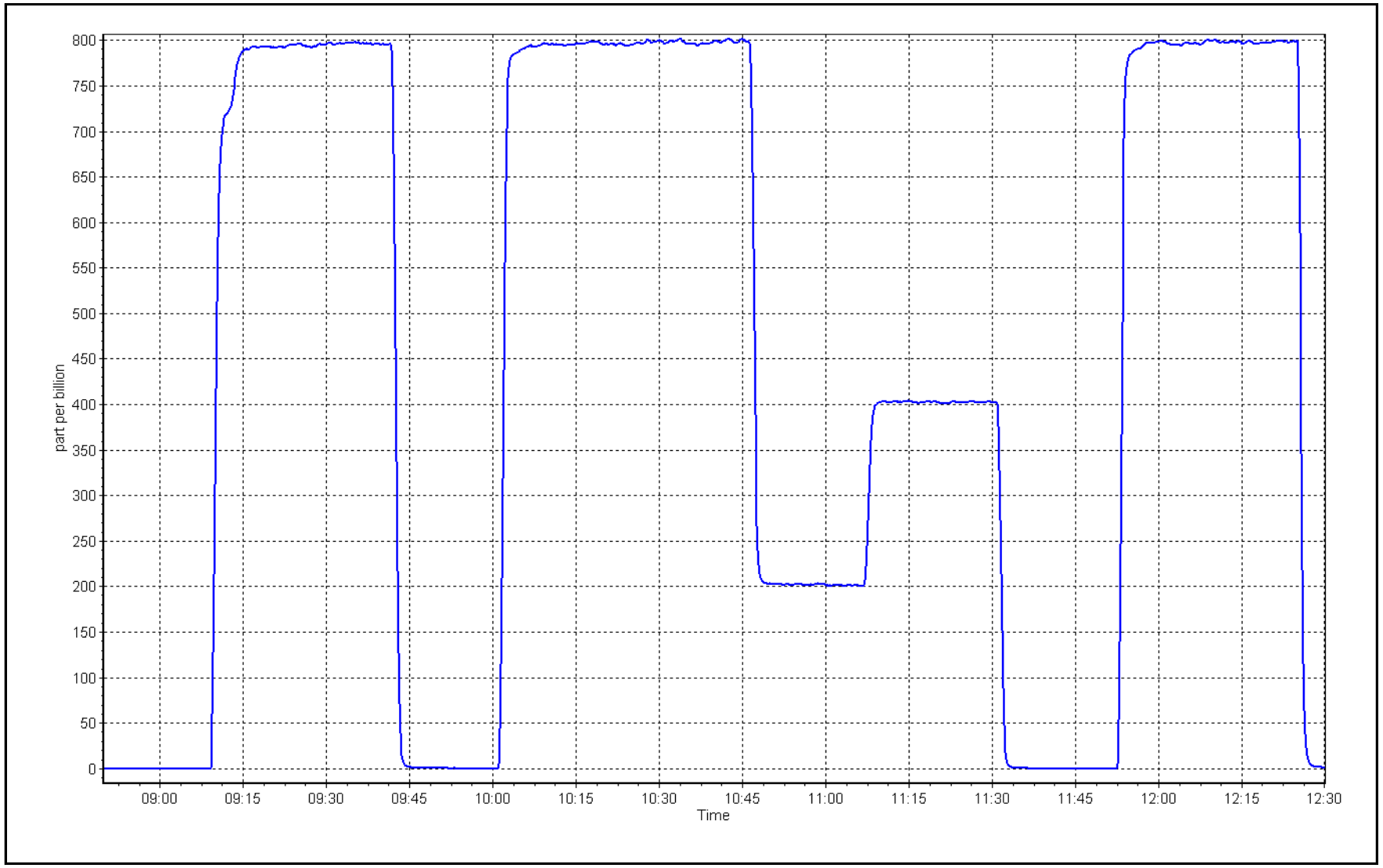
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 801.2 | 799.4 | 1.0023 |
| 400.2 | 402.8 | 0.9934 |
| 200.1 | 201.3 | 0.9939 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999977 | *≥0.995* |
| Slope | 0.997338 | *0.90 - 1.10* |
| Intercept | 1.503428 | *+/-30* |



**SO2 Calibration Plot** Date: August 9, 2023 Location: Athabasca Valley



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Athabasca Valley | Station number: | AMS07 |
| Calibration Date: | August 2, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 9:00 | End time (MST): | 14:06 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.25 | ppm | Cal Gas Exp Date: | January 3, 2026 |
| Cal Gas Cylinder #: | CC504080 | | | |
| Removed Cal Gas Conc: | 5.25 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3805 |
| ZAG Make/Model: | API T701H | | Serial Number: | 198 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i LTE | | Analyzer serial #: | 1180540018 | |
| Converter make: | CDN-101 | | Converter serial #: | 551 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.008281 | 1.005977 | Backgd or Offset: | 2.33 | 2.33 |
| Calibration intercept: | -0.182074 | -0.002158 | Coeff or Slope: | 0.885 | 0.899 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4925 | 75.5 | 79.3 | 78.5 | 1.008 |
| as found 2nd point | 4962 | 37.7 | 39.6 | 38.9 | 1.015 |
| as found 3rd point | 4981 | 18.9 | 19.8 | 19.2 | 1.028 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4925 | 75.5 | 79.3 | 79.8 | 0.994 |
| second point | 4962 | 37.7 | 39.6 | 39.9 | 0.993 |
| third point | 4981 | 18.9 | 19.9 | 19.8 | 1.003 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4925 | 75.5 | 79.3 | 79.5 | 0.998 |
| SO2 Scrubber Check | 4921 | 79.2 | 800.2 | 0.0 | ---- |
| Date of last scrubber change: | | 25-Feb-22 | | Ave Corr Factor | 0.996 |
| Date of last converter efficiency test: | | April 22, 2022 | | 92.6% | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 78.6 | Prev response: | 79.74 | *% change: | -1.5% |
| Baseline Corr 2nd AF pt: | 39.0 | AF Slope: | 0.992855 | AF Intercept: | -0.302193 |
| Baseline Corr 3rd AF pt: | 19.3 | AF Correlation: | 0.999970 | | |

* = > +/-5% change initiates investigation

Notes: Scrubber check passed. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

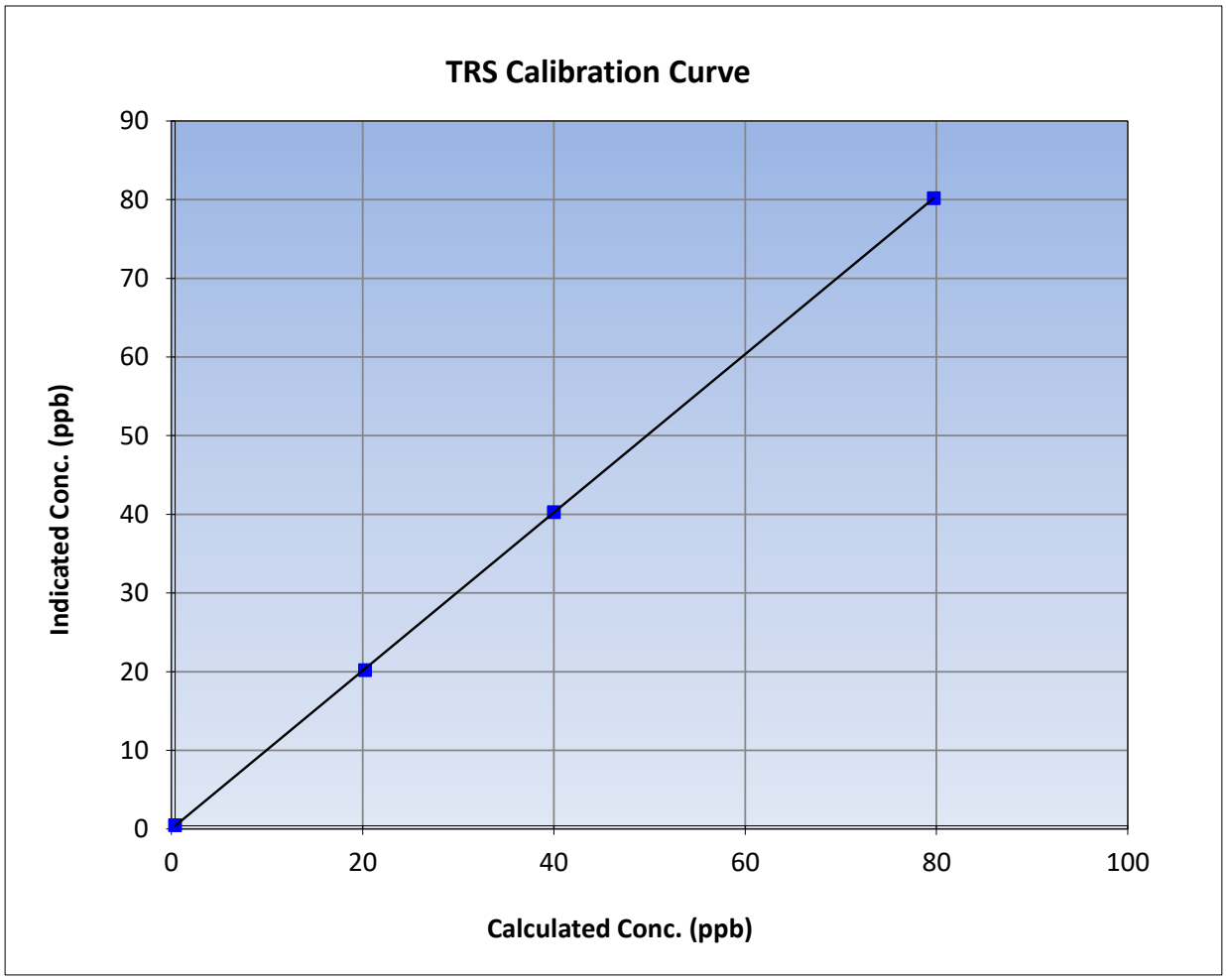
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 2, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 9:00 | End Time (MST): | 14:06 |
| Analyzer make: | CDN-101 | Analyzer serial #: | 551 |

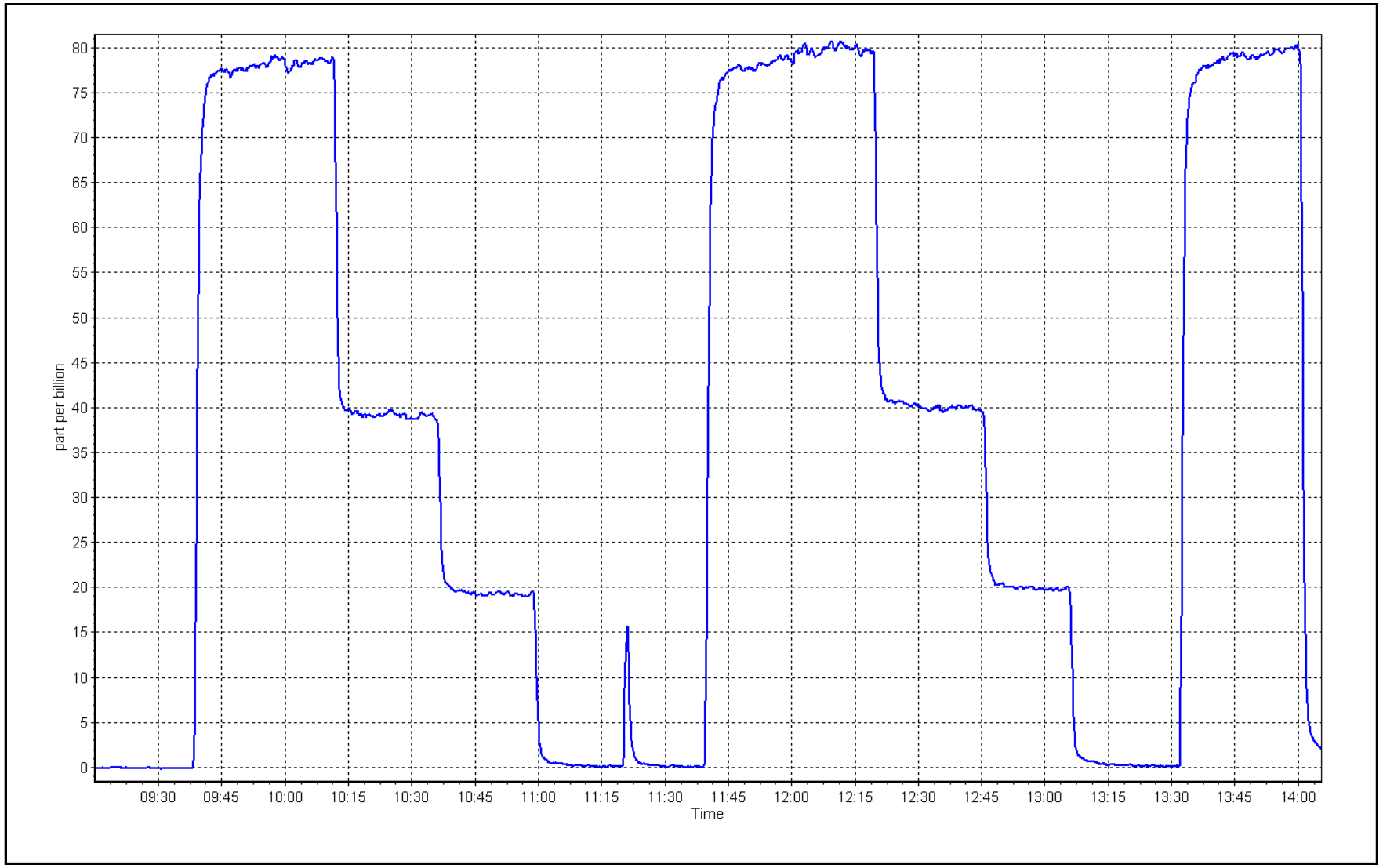
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 79.3 | 79.8 | 0.9939 |
| 39.6 | 39.9 | 0.9927 |
| 19.9 | 19.8 | 1.0029 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999987 | *≥0.995* |
| Slope | 1.005977 | *0.90 - 1.10* |
| Intercept | -0.002158 | *+/-3* |



**TRS Calibration Plot** Date: August 2, 2023 Location: Athabasca Valley



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Athabasca Valley | Station number: | AMS07 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 21, 2023 |
| Start time (MST): | 8:38 | End time (MST): | 12:39 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC282115 | Cal Gas Expiry Date: | December 29, 2028 | |
| CH4 Cal Gas Conc. | 501.2 | ppm | CH4 Equiv Conc. | 1075.1 | ppm |
| C3H8 Cal Gas Conc. | 208.7 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 501.2 | ppm | CH4 Equiv Conc. | 1075.1 | ppm |
| Removed C3H8 Conc. | 208.7 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 3805 | |
| ZAG make/model: | API 701H | | Serial Number: | 198 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1152430012 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 0.000263 | 0.000256 | NMHC SP Ratio: | 4.97E-05 | 4.57E-05 |
| CH4 Retention time: | 14.4 | 14.2 | NMHC Peak Area: | 182990 | 198820 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.2 | 17.03 | 18.04 | 0.944 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.2 | 17.03 | 16.98 | 1.003 |
| second point | 4960 | 39.6 | 8.52 | 8.51 | 1.000 |
| third point | 4980 | 19.8 | 4.26 | 4.28 | 0.995 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.2 | 17.03 | 17.01 | 1.001 |
| | | | | Average Correction Factor | 0.999 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 18.04 | Prev response | 16.89 | *% change | 6.4% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.2 | 9.09 | 9.91 | 0.918 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.2 | 9.09 | 9.07 | 1.002 |
| second point | 4960 | 39.6 | 4.55 | 4.56 | 0.998 |
| third point | 4980 | 19.8 | 2.27 | 2.31 | 0.986 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.2 | 9.09 | 9.08 | 1.001 |
| | | | | Average Correction Factor | 0.995 |
| Baseline Corr AF: | 9.91 | Prev response | 8.96 | *% change | 9.5% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.2 | 7.94 | 8.13 | 0.976 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.2 | 7.94 | 7.91 | 1.004 |
| second point | 4960 | 39.6 | 3.97 | 3.96 | 1.003 |
| third point | 4980 | 19.8 | 1.98 | 1.98 | 1.004 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.2 | 7.94 | 7.93 | 1.002 |
| | | | | Average Correction Factor | 1.004 |
| Baseline Corr AF: | 8.13 | Prev response | 7.93 | *% change | 2.5% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 0.993293 | 0.996468 |
| THC Cal Offset: | -0.024935 | 0.018660 |
| CH4 Cal Slope: | 0.998509 | 0.996465 |
| CH4 Cal Offset: | 0.000842 | -0.000558 |
| NMHC Cal Slope: | 0.988725 | 0.996357 |
| NMHC Cal Offset: | -0.025977 | 0.019418 |

Notes: Dips present during night z/s cycle. As founds 9% high. Chromatograms look normal. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## THC Calibration Summary

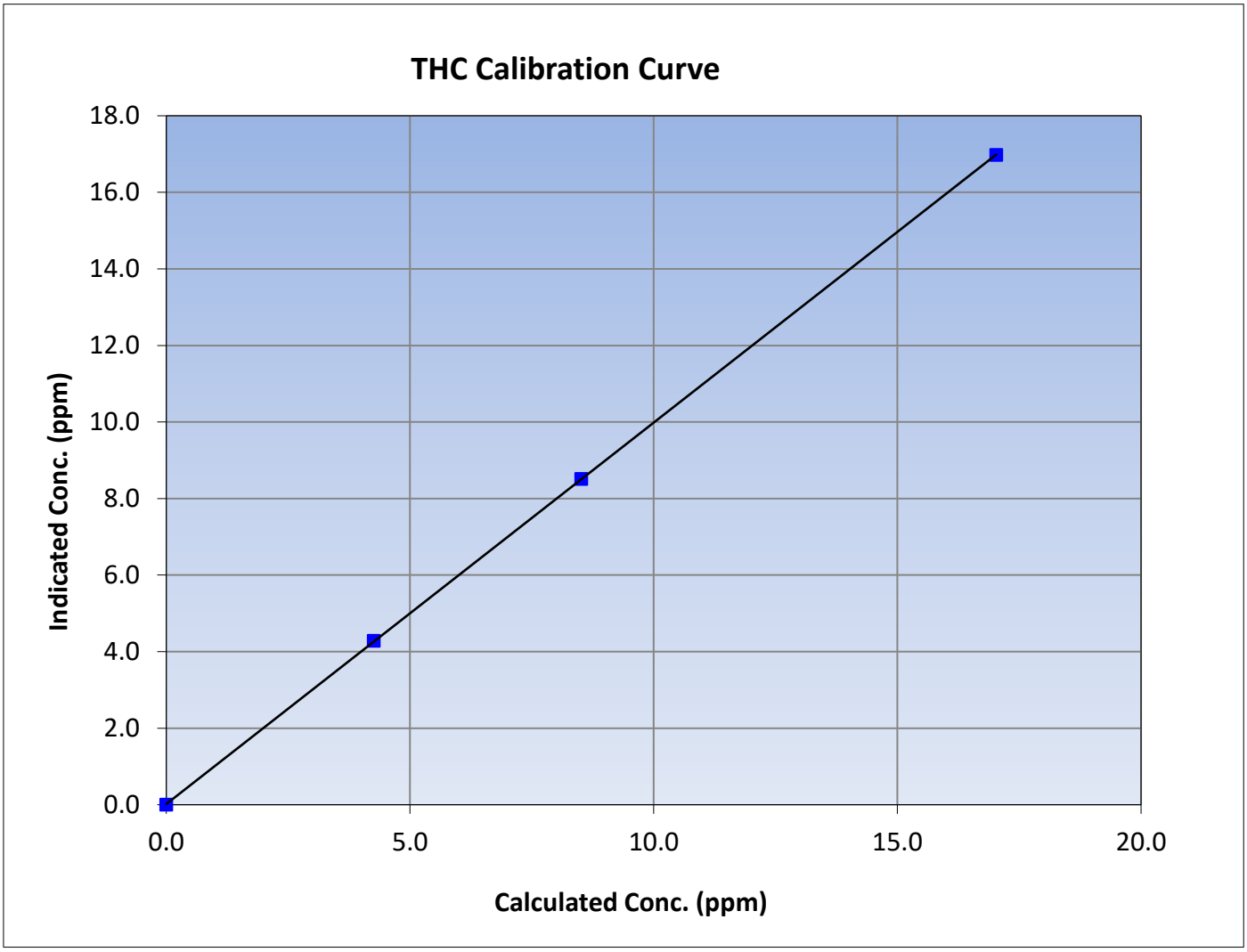
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 8:38 | End Time (MST): | 12:39 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1152430012 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999994 | *≥0.995* |
| 17.03 | 16.98 | 1.0030 | | | |
| 8.52 | 8.51 | 1.0004 | Slope | 0.996468 | *0.90 - 1.10* |
| 4.26 | 4.28 | 0.9945 | | | |
| | | | Intercept | 0.018660 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

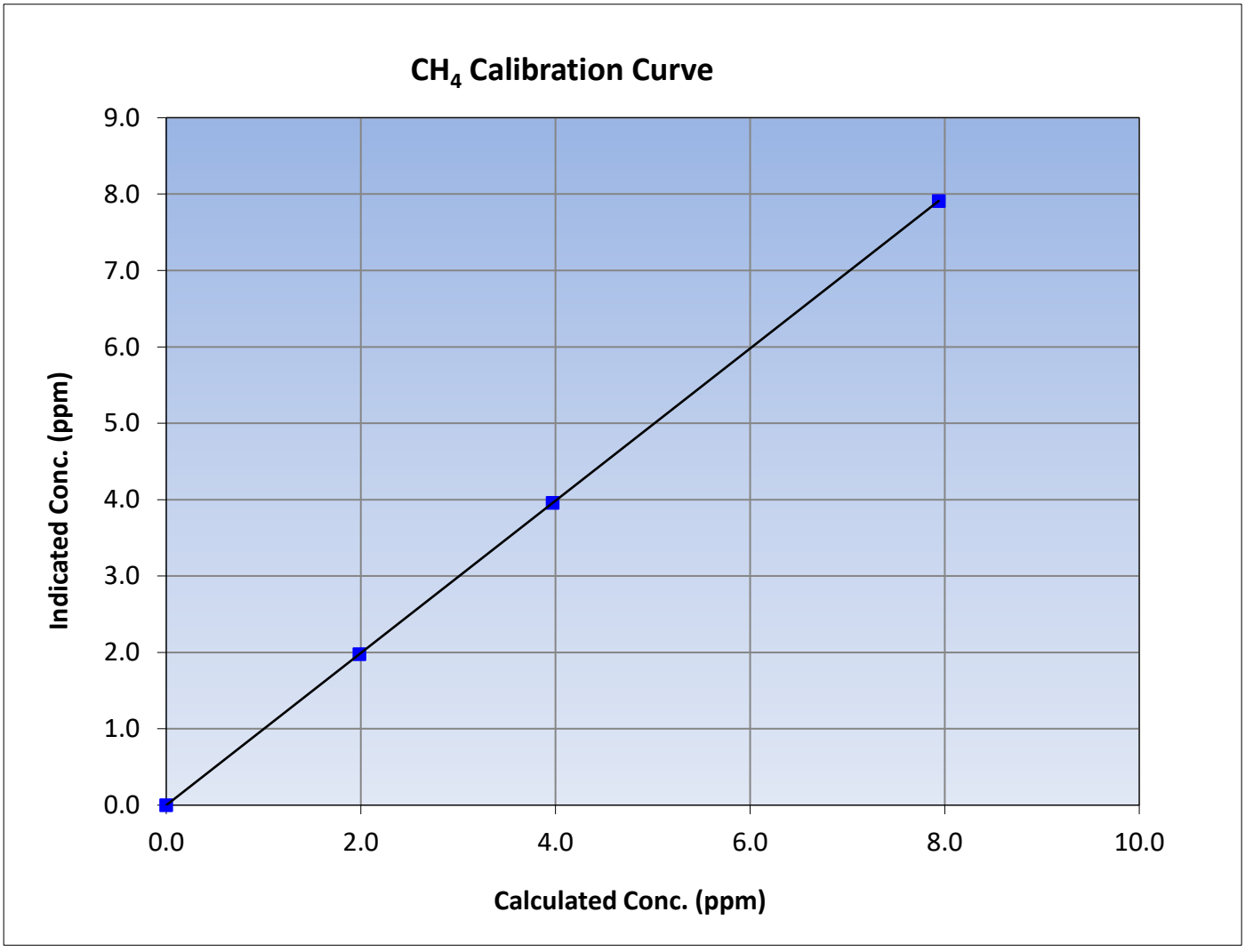
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 8:38 | End Time (MST): | 12:39 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1152430012 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | *≥0.995* |
| 7.94 | 7.91 | 1.0036 | | | |
| 3.97 | 3.96 | 1.0035 | Slope | 0.996465 | *0.90 - 1.10* |
| 1.98 | 1.98 | 1.0045 | | | |
| | | | Intercept | -0.000558 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

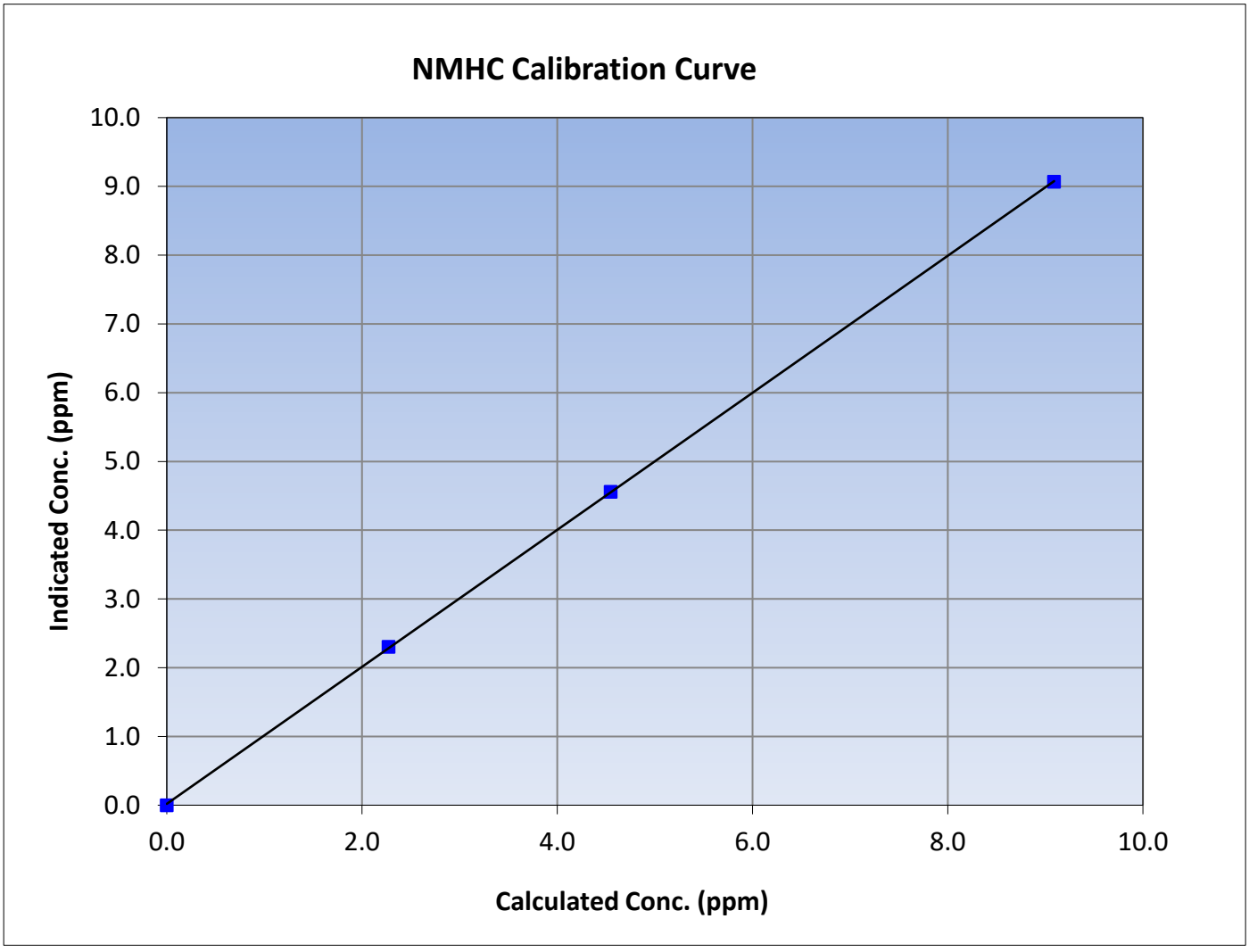
Version-01-2020

### Station Information

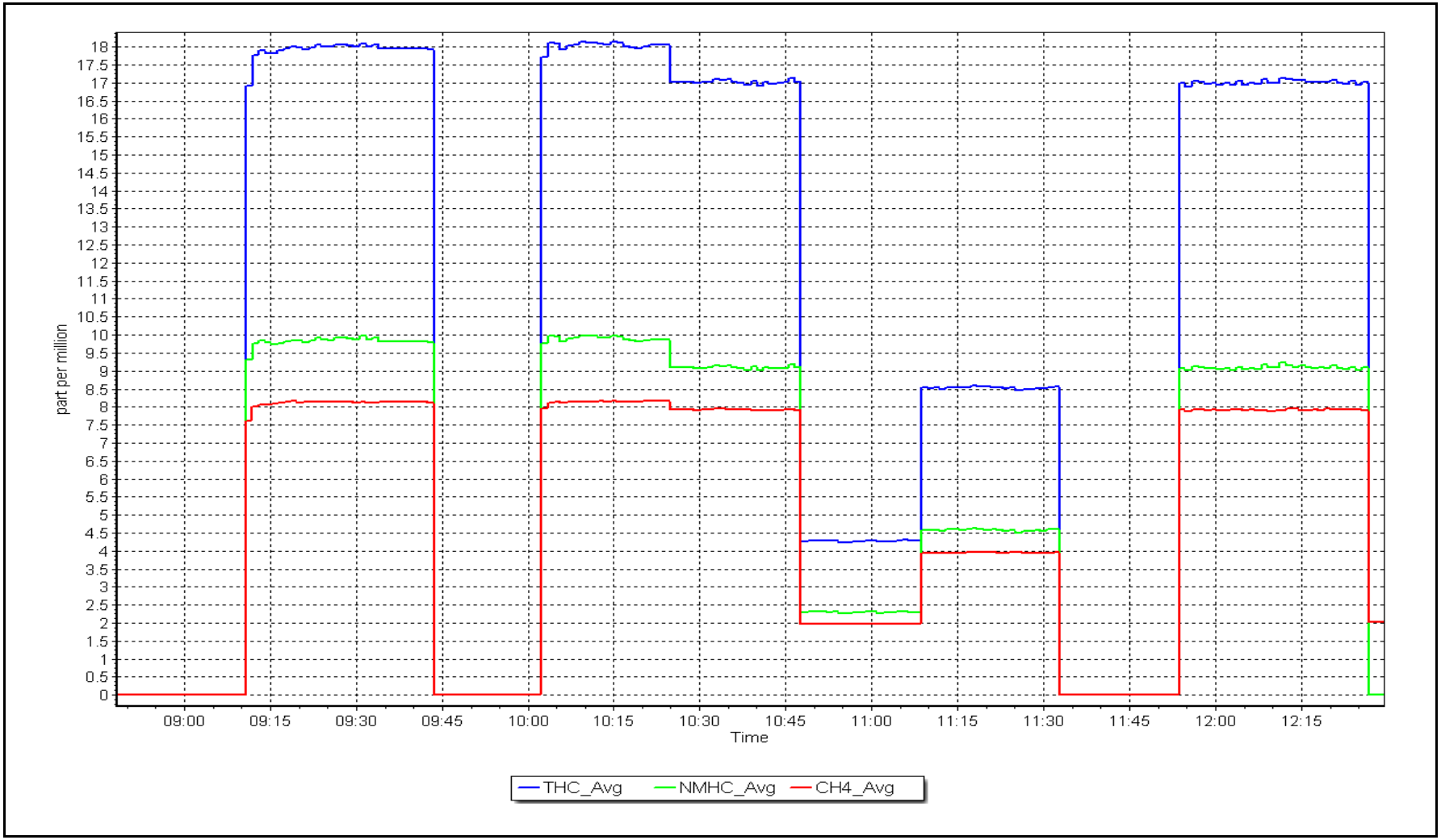
| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 8:38 | End Time (MST): | 12:39 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1152430012 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999979 | *≥0.995* |
| 9.09 | 9.07 | 1.0025 | | | |
| 4.55 | 4.56 | 0.9978 | Slope | 0.996357 | *0.90 - 1.10* |
| 2.27 | 2.31 | 0.9860 | | | |
| | | | Intercept | 0.019418 | *+/-0.5* |



**NMHC Calibration Plot** Date: August 9, 2023 Location: Athabasca Valley



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Athabasca Valley | Station number: | AMS07 |
| Calibration Date: | August 29, 2023 | Last Cal Date: | August 9, 2023 |
| Start time (MST): | 9:22 | End time (MST): | 10:53 |
| Reason: | Cylinder Change | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC282115 | Cal Gas Expiry Date: | December 29, 2028 | |
| CH4 Cal Gas Conc. | 501.2 | ppm | CH4 Equiv Conc. | 1075.1 | ppm |
| C3H8 Cal Gas Conc. | 208.7 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 501.2 | ppm | CH4 Equiv Conc. | 1075.1 | ppm |
| Removed C3H8 Conc. | 208.7 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 3805 | |
| ZAG make/model: | API 701H | | Serial Number: | 198 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1152430012 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 0.000256 | 0.000256 | NMHC SP Ratio: | 4.57E-05 | 4.57E-05 |
| CH4 Retention time: | 14.2 | 14.2 | NMHC Peak Area: | 198820 | 198820 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | | | | | |
| as found span | | | | | |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.2 | 17.03 | 17.70 | 0.962 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| | | | | Average Correction Factor | 0.962 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | NA | Prev response | NA | *% change | NA |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | | | | | |
| as found span | | | | | |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.2 | 9.09 | 9.66 | 0.941 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| | | | | Average Correction Factor | 0.941 |
| Baseline Corr AF: | NA | Prev response | NA | *% change | NA |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | | ---- |
| as found span | | | | | |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.2 | 7.94 | 8.05 | 0.986 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| | | | | Average Correction Factor | 0.986 |
| Baseline Corr AF: | NA | Prev response | NA | *% change | NA |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

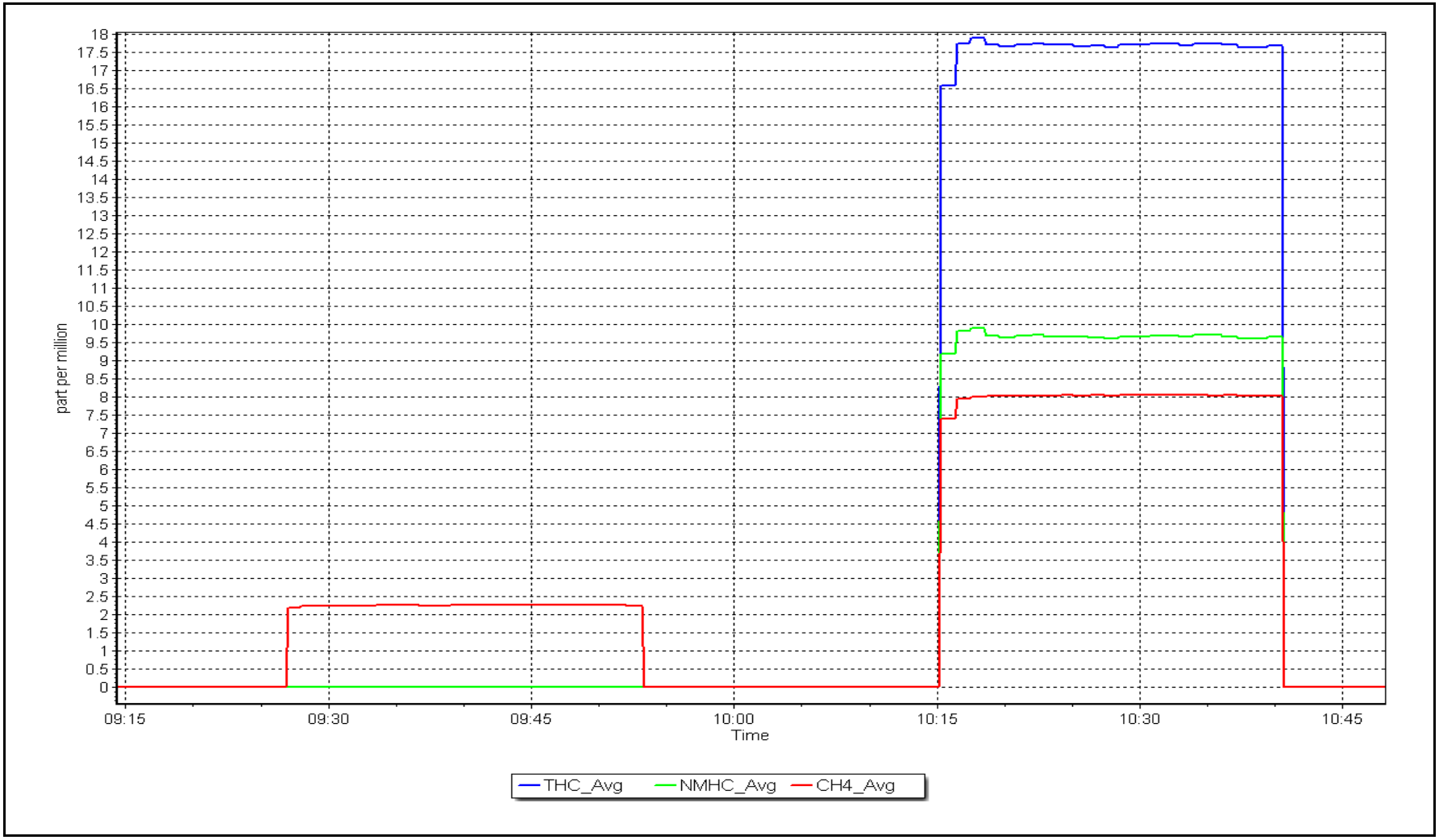
### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | N/A | N/A |
| THC Cal Offset: | N/A | N/A |
| CH4 Cal Slope: | N/A | N/A |
| CH4 Cal Offset: | N/A | N/A |
| NMHC Cal Slope: | N/A | N/A |
| NMHC Cal Offset: | N/A | N/A |

Notes: No as founds done due to both N2 and H2 being low. N2 and H2 cylinders replaced.

Calibration Performed By: Aswin Sasi Kumar

**NMHC Calibration Plot** Date: August 29, 2023 Location: Athabasca Valley



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Athabasca Valley | Station number: | AMS07 |
| Calibration Date: | August 14, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 9:48 | End time (MST): | 14:55 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2Y1KA4 | | Cal Gas Expiry Date: | November 30, 2023 | |
| NOX Cal Gas Conc: | 50.92 | ppm | NO Cal Gas Conc: | 49.92 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 50.92 | ppm | Removed Gas NO Conc: | 49.92 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 3805 | |
| ZAG make/model: | API T701H | | Serial Number: | 198 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1160120024 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.065 | 1.080 | NO bkgnd or offset: | 7.5 | 7.6 |
| NOX coeff or slope: | 0.995 | 0.994 | NOX bkgnd or offset: | 7.7 | 7.8 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 207.8 | 211.7 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 1.001112 | 1.002539 |
| $NO_X$ Cal Offset: | 1.259152 | 0.999372 |
| NO Cal Slope: | 1.001431 | 1.002515 |
| NO Cal Offset: | 0.895212 | 1.115453 |
| $NO_2$ Cal Slope: | 1.003989 | 0.998415 |
| $NO_2$ Cal Offset: | 0.417819 | 0.146993 |

# Wood Buffalo Environmental Association

# $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| as found span | 4920 | 80.2 | 816.7 | 800.7 | 16.0 | 808.2 | 789.9 | 18.3 | 1.0105 | 1.0137 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | -0.1 | ---- | ---- |
| high point | 4920 | 80.2 | 816.7 | 800.7 | 16.0 | 819.0 | 803.0 | 16.0 | 0.9972 | 0.9971 |
| second point | 4960 | 40.1 | 408.4 | 400.4 | 8.0 | 411.9 | 404.0 | 7.9 | 0.9914 | 0.9910 |
| third point | 4980 | 20.0 | 203.7 | 199.7 | 4.0 | 205.4 | 201.5 | 3.9 | 0.9916 | 0.9910 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | -0.1 | ---- | ---- |
| as left span | 4920 | 80.2 | 816.7 | 393.3 | 423.4 | 825.2 | 398.8 | 426.4 | 0.9897 | 0.9862 |
| | | | | | | | | Average Correction Factor | 0.9934 | 0.9930 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 808.2 ppb | NO = 789.9 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -1.3% |
| Previous Response | $NO_X$ = 818.9 ppb | NO = 802.7 ppb | | *Percent Change | NO = | -1.6% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 802.2 | 394.8 | 423.4 | 422.7 | 1.0017 | 99.8% |
| 2nd GPT point (200 ppb O3) | 802.2 | 599.1 | 219.1 | 219.3 | 0.9993 | 100.1% |
| 3rd GPT point (100 ppb O3) | 802.2 | 700.1 | 118.1 | 118.2 | 0.9995 | 100.1% |
| | | | | Average Correction Factor | 1.0002 | 100.0% |

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

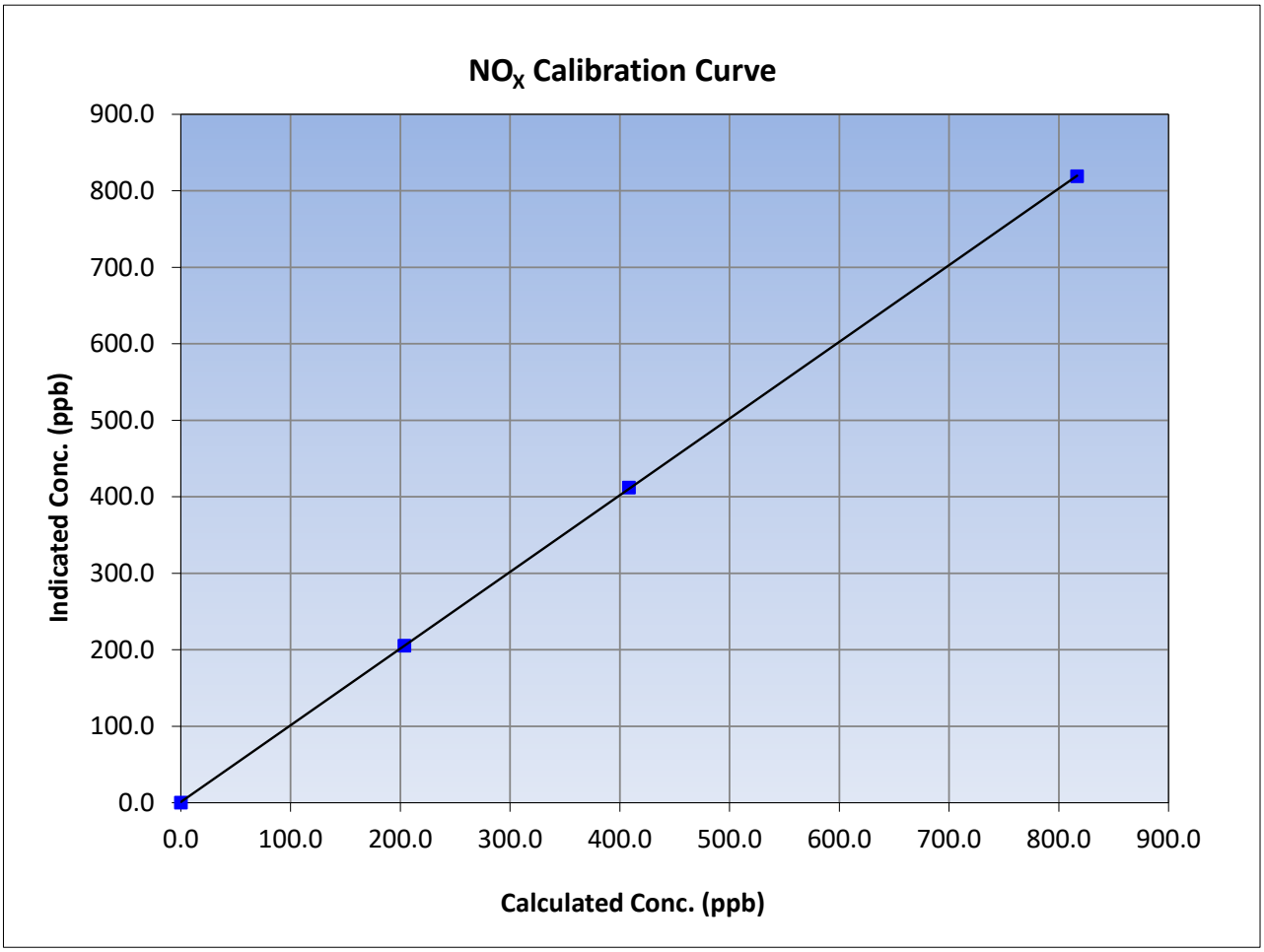
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 14, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 9:48 | End Time (MST): | 14:55 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1160120024 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999990 | *≥0.995* |
| 816.7 | 819.0 | 0.9972 | | | |
| 408.4 | 411.9 | 0.9914 | Slope | 1.002539 | *0.90 - 1.10* |
| 203.7 | 205.4 | 0.9916 | | | |
| | | | Intercept | 0.999372 | *+/-20* |



# Wood Buffalo Environmental Association

## NO Calibration Summary

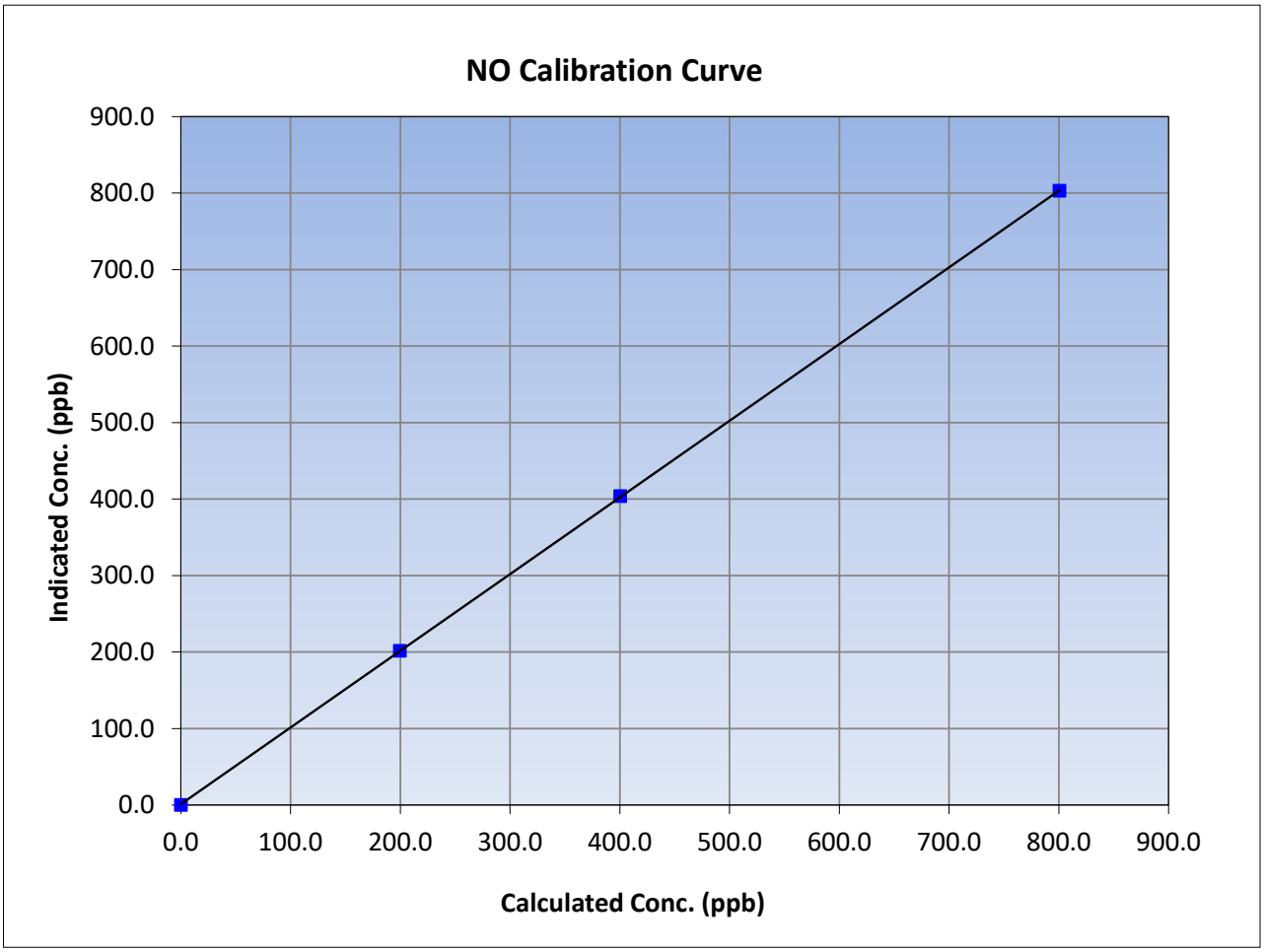
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 14, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 9:48 | End Time (MST): | 14:55 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1160120024 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999989 | ≥0.995 |
| 800.7 | 803.0 | 0.9971 | | | |
| 400.4 | 404.0 | 0.9910 | Slope | 1.002515 | 0.90 - 1.10 |
| 199.7 | 201.5 | 0.9910 | | | |
| | | | Intercept | 1.115453 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

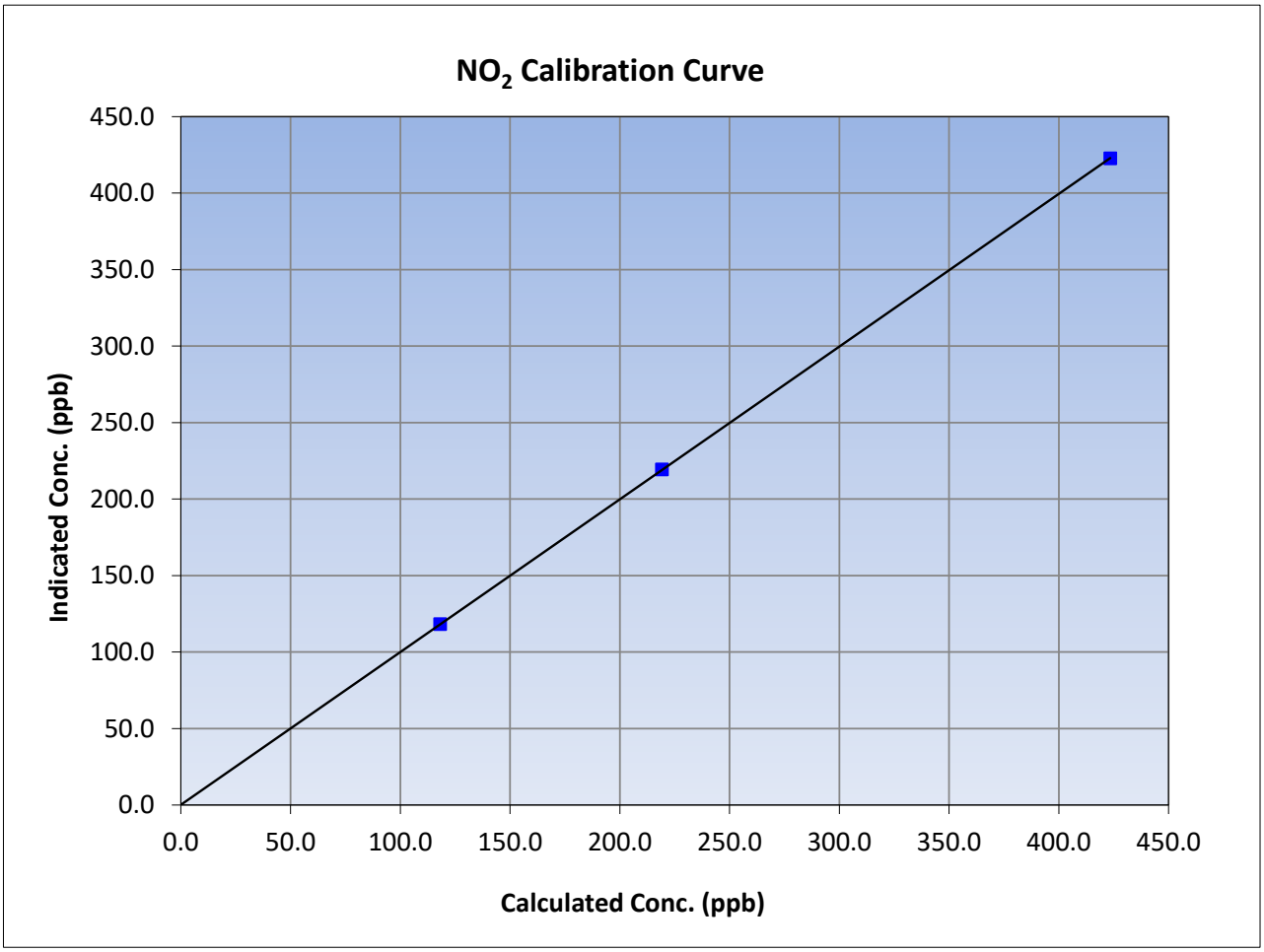
Version-04-2020

### Station Information

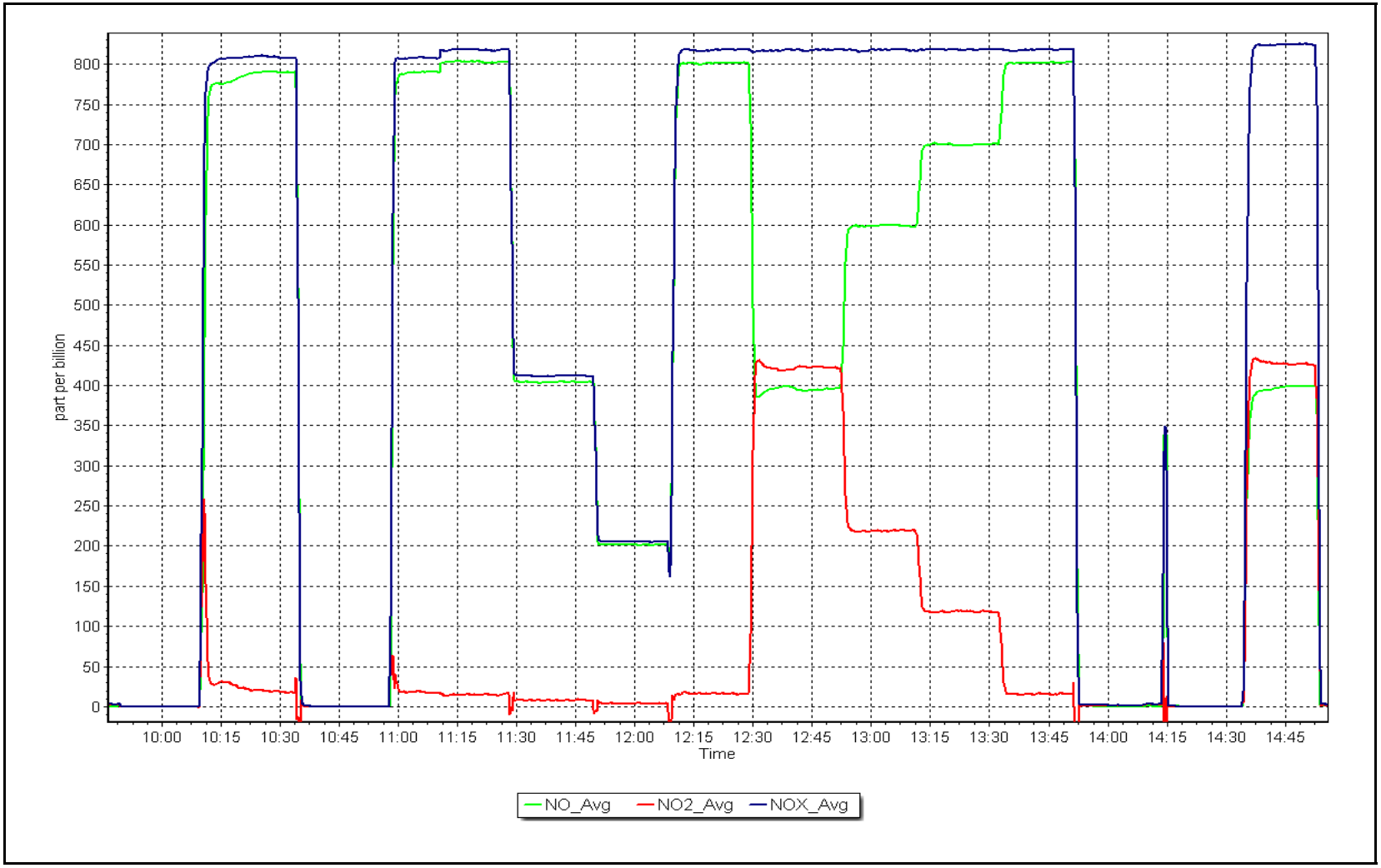
| | | | |
|---|---|---|---|
| Calibration Date: | August 14, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 9:48 | End Time (MST): | 14:55 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1160120024 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999997 | *≥0.995* |
| 423.4 | 422.7 | 1.0017 | | | |
| 219.1 | 219.3 | 0.9993 | Slope | 0.998415 | *0.90 - 1.10* |
| 118.1 | 118.2 | 0.9995 | | | |
| | | | Intercept | 0.146993 | *+/-20* |



**$NO_X$ Calibration Plot** Date: August 14, 2023 Location: Athabasca Valley



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Athabasca Valley | Station number: | AMS07 |
| Calibration Date: | August 11, 2023 | Last Cal Date: | July 7, 2023 |
| Start time (MST): | 9:45 | End time (MST): | 13:27 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | T700 | Serial Number: | 3805 |
| ZAG Make/Model: | T701H | Serial Number: | 198 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 49i | Analyzer serial #: | 1152220023 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.002371 | 0.999171 | Backgd or Offset: | -2.6 | -2.6 |
| Calibration intercept: | 0.860000 | 0.320000 | Coeff or Slope: | 1.522 | 1.522 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -1.3 | ---- |
| as found span | 5000 | 1414.8 | 400.0 | 398.7 | 1.003 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.6 | ---- |
| high point | 5000 | 1415.7 | 400.0 | 399.4 | 1.002 |
| second point | 5000 | 1039.9 | 200.0 | 201.0 | 0.995 |
| third point | 5000 | 856.2 | 100.0 | 100.9 | 0.991 |
| as left zero | 5000 | 0.0 | 0.0 | -0.5 | ---- |
| as left span | 5000 | 1416.0 | 400.0 | 403.9 | 0.990 |
| | | | | Average Correction Factor | 0.996 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 400.0 | Previous response | 401.8 | *% change | -0.5% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

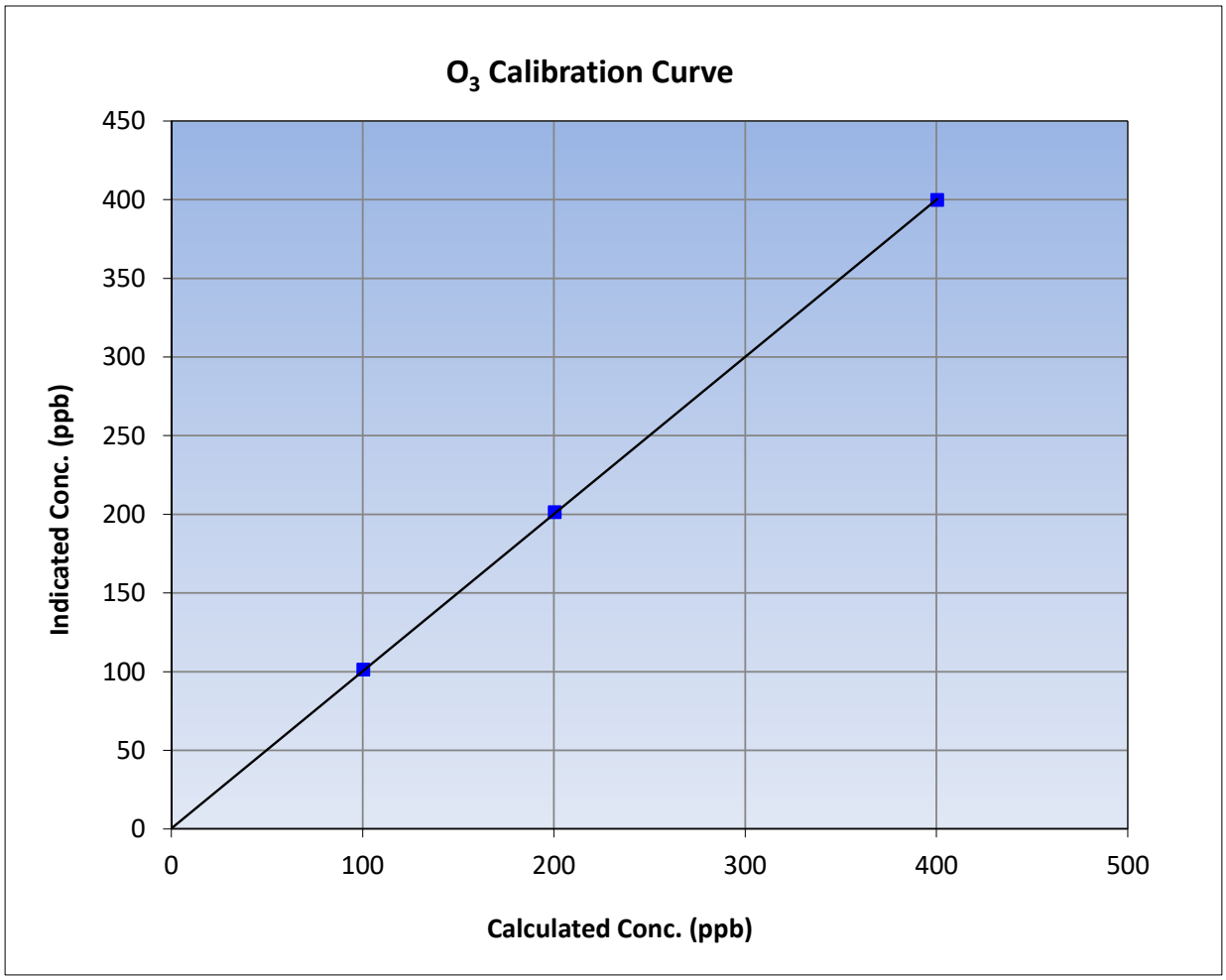
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 11, 2023 | Previous Calibration: | July 7, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 9:45 | End Time (MST): | 13:27 |
| Analyzer make: | Thermo 49i | Analyzer serial #: | 1152220023 |

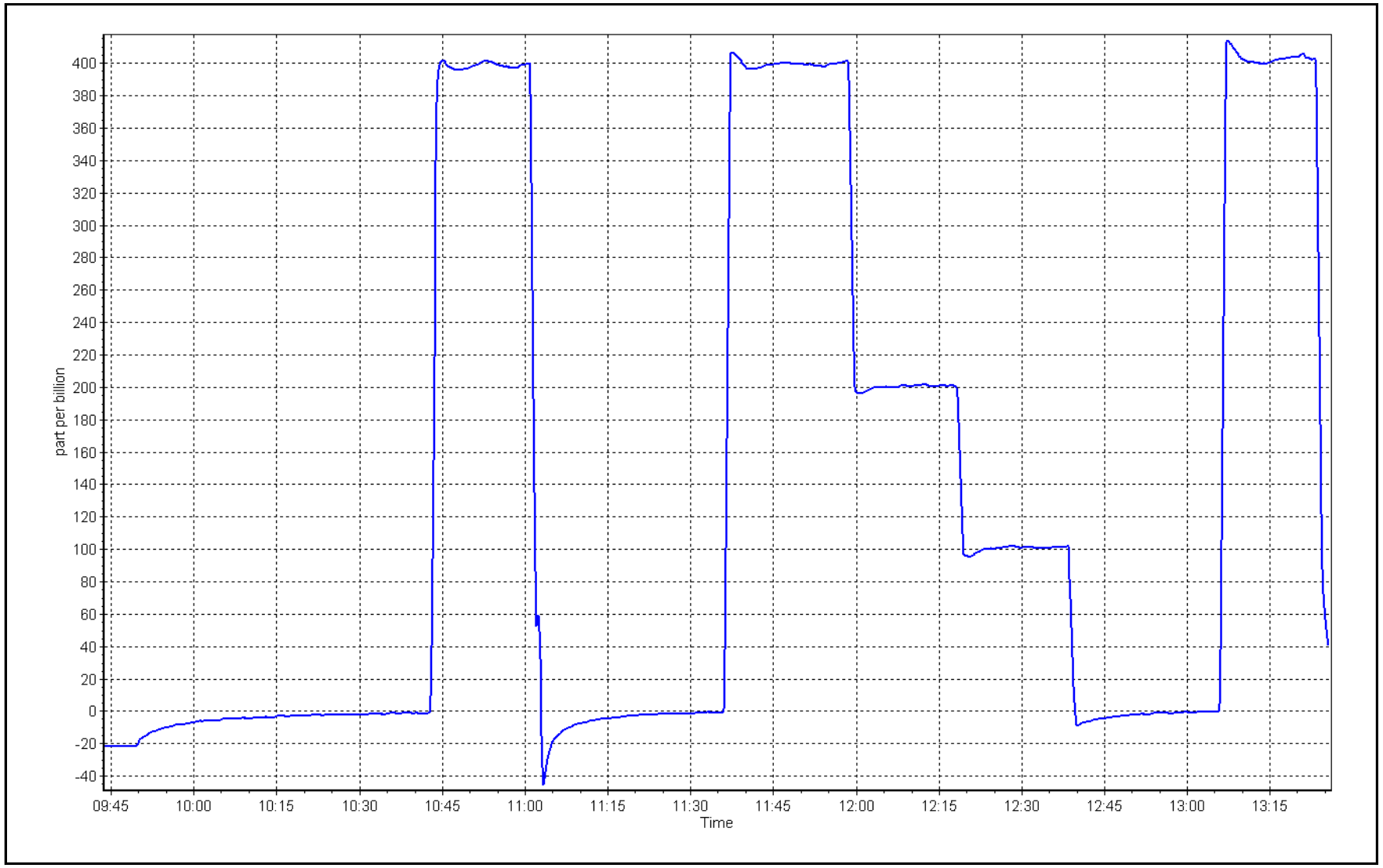
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.6 | ---- |
| 400.0 | 399.4 | 1.0015 |
| 200.0 | 201.0 | 0.9950 |
| 100.0 | 100.9 | 0.9911 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999973 | *≥0.995* |
| Slope | 0.999171 | *0.90 - 1.10* |
| Intercept | 0.320000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 11, 2023 Location: Athabasca Valley



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Athabasca Valley | Station number: | AMS 07 |
| Calibration Date: | August 28, 2023 | Last Cal Date: | July 24, 2023 |
| Start time (MST): | 13:25 | End time (MST): | 15:25 |
| Analyzer Make: | API T640 | S/N: | 871 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat FP-25BT | S/N: | 388748 |
| Temp/RH standard: | Alicat FP-25BT | S/N: | 388748 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | 27.8 | 26.65 | 27.8 | ☐ | +/- 2 °C |
| P (mmHg) | 735.1 | 737.74 | 735.1 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.10 | 5.07 | 5.10 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 28, 2023 Last Cal Date: July 24, 2023

PM w/o HEPA: 57.8 PM w/ HEPA: 0.0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 10.5 | 10.5 | 10.5 | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 57.8 w/ HEPA: 0.0

Date Optical Chamber Cleaned: August 28, 2023 <0.2 ug/m3

Disposable Filter Changed: August 28, 2023

### Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: Temp, flow and pressure checked. Leak check passed. Chamber cleaned, filter swapped. No issues.

Calibration by: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## CO Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Athabasca Valley | Station number: | AMS07 |
| Calibration Date: | August 16, 2023 | Last Cal Date: | July 24, 2023 |
| Start time (MST): | 9:17 | End time (MST): | 12:35 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 3,000 | ppm | Cal Gas Exp Date: | December 12, 2026 |
| Cal Gas Cylinder #: | LL66942 | | | |
| Removed Cal Gas Conc: | 3,000 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3805 |
| ZAG Make/Model: | API 700H | | Serial Number: | 198 |

### Analyzer Information

Analyzer make: Thermo 48i-LTE
Analyzer Range: 0 - 50 ppm
Analyzer serial #: 1408761381

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.000886 | 0.999458 | Backgd or Offset: | 4.137 | 4.225 |
| Calibration intercept: | 0.076548 | 0.036542 | Coeff or Slope: | 1.086 | 1.086 |

### CO Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 4933 | 66.7 | 40.0 | 40.2 | 0.996 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4933 | 66.7 | 40.0 | 40.0 | 1.001 |
| second point | 4967 | 33.3 | 20.0 | 20.1 | 0.994 |
| third point | 4983 | 16.7 | 10.0 | 10.1 | 0.997 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4933 | 66.7 | 40.0 | 39.9 | 1.003 |
| | | | | Average Correction Factor | 0.997 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 40.08 | Prev response: | 40.13 | *% change: | -0.1% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Zero slightly adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## CO Calibration Summary

Version-01-2020

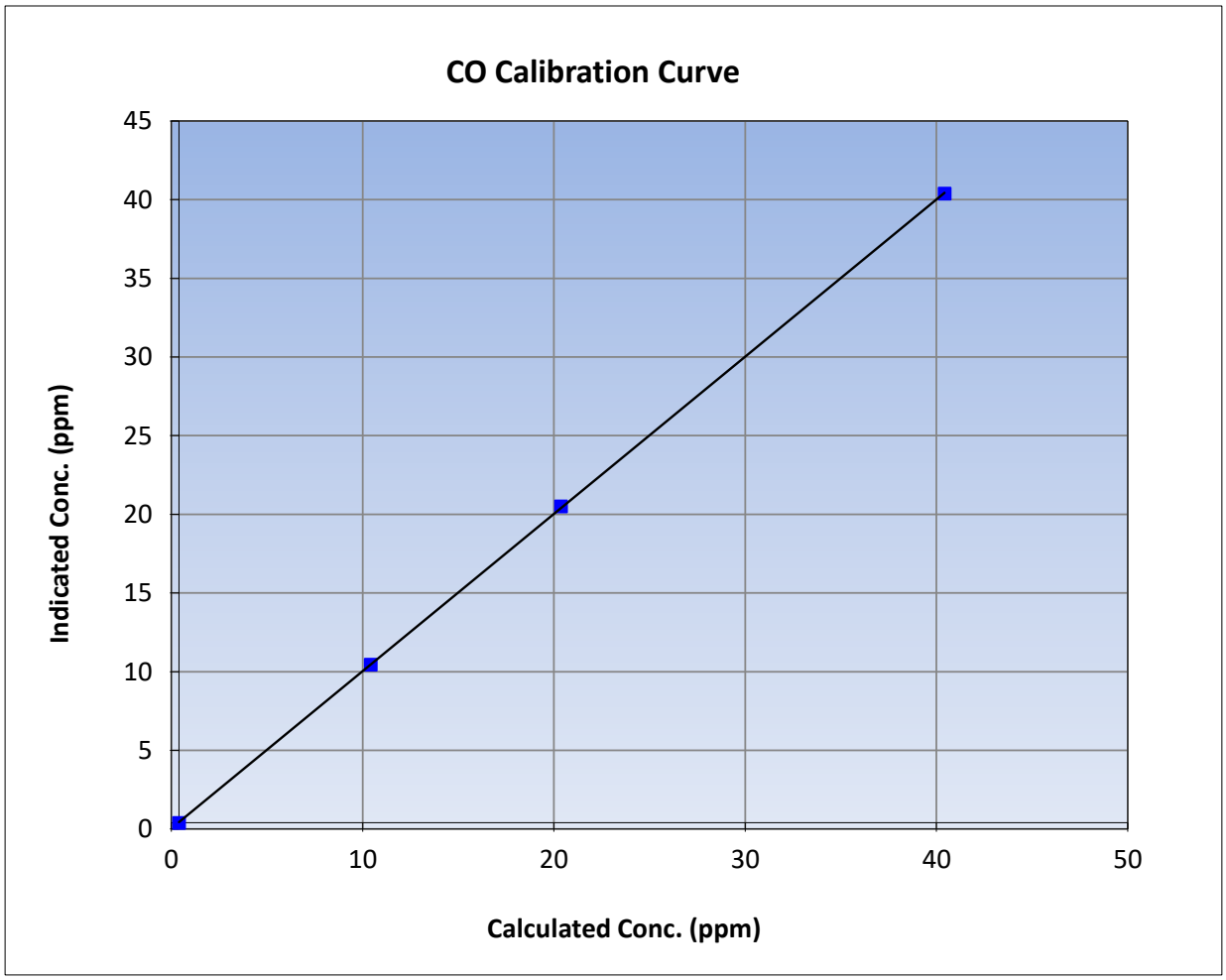
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 24, 2023 |
| Station Name: | Athabasca Valley | Station Number: | AMS07 |
| Start Time (MST): | 9:17 | End Time (MST): | 12:35 |
| Analyzer make: | Thermo 48i-LTE | Analyzer serial #: | 1408761381 |

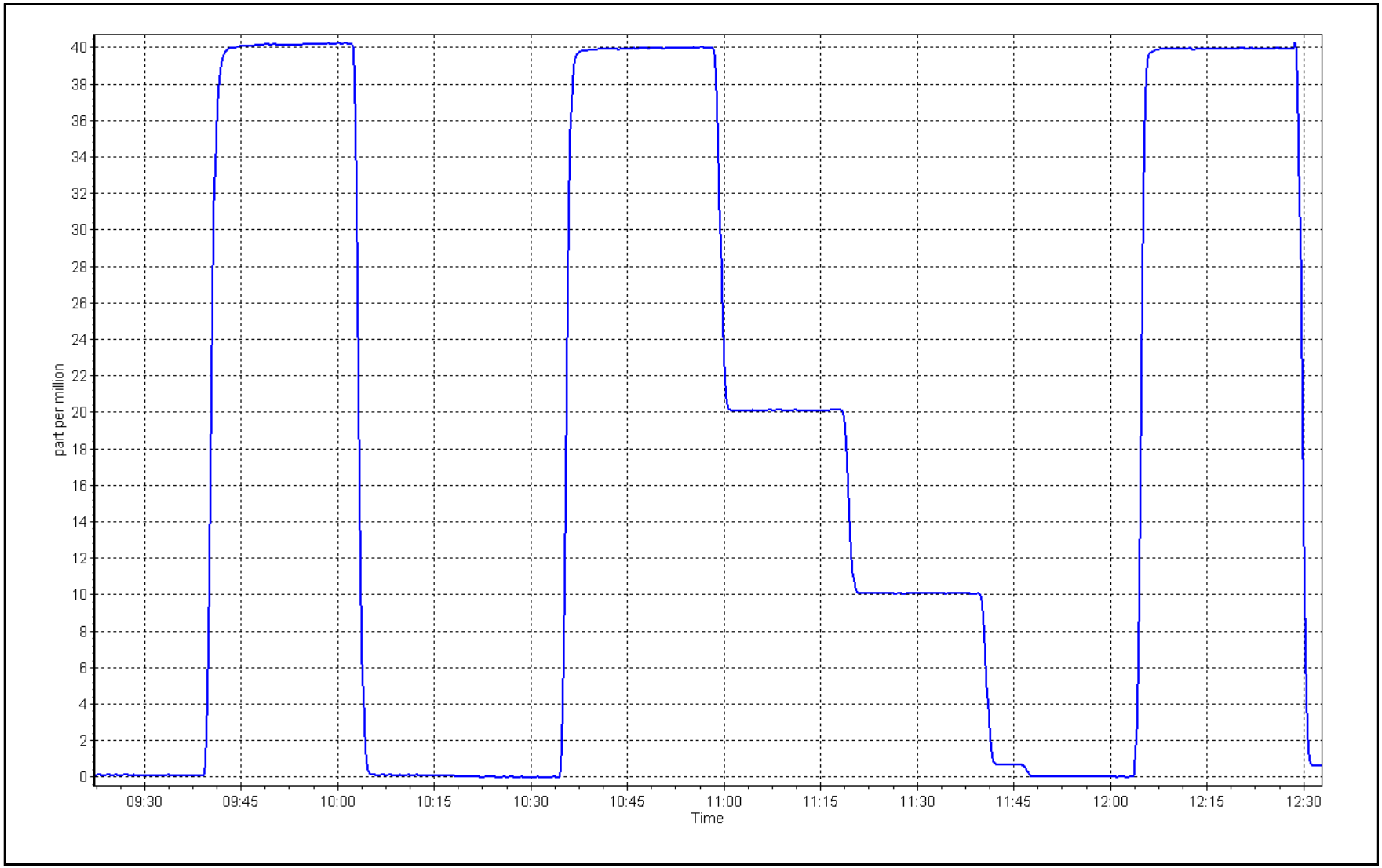
### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 40.0 | 40.0 | 1.0008 |
| 20.0 | 20.1 | 0.9940 |
| 10.0 | 10.1 | 0.9971 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999985 | *≥0.995* |
| Slope | 0.999458 | *0.90 - 1.10* |
| Intercept | 0.036542 | *+/-1.5* |



**CO Calibration Plot** Date: August 16, 2023 Location: Athabasca Valley



# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS08
## FORT CHIPEWYAN
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Chipewyan | Station number: | AMS08 |
| Calibration Date: | August 14, 2023 | Last Cal Date: | July 14, 2023 |
| Start time (MST): | 11:11 | End time (MST): | 13:46 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.84 | ppm | Cal Gas Exp Date: | January 6, 2030 |
| Cal Gas Cylinder #: | CC196697 | | | |
| Removed Cal Gas Conc: | 49.84 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3060 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 260 |

### Analyzer Information

Analyzer make: Thermo 43i-TLE
Analyzer serial #: 1136451241
Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.003156 | 1.000314 | Backgd or Offset: | 1.53 | 4.65 |
| Calibration intercept: | -0.363935 | -0.543305 | Coeff or Slope: | 0.915 | 0.963 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 2.1 | ---- |
| as found span | 4920 | 80.3 | 800.4 | 758.9 | 1.055 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4920 | 80.3 | 800.4 | 801.0 | 0.999 |
| second point | 4960 | 40.2 | 400.7 | 398.0 | 1.007 |
| third point | 4980 | 20.1 | 200.4 | 200.8 | 0.998 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4920 | 80.3 | 800.4 | 802.2 | 0.998 |
| | | | | Average Correction Factor | 1.001 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 756.80 | Previous response | 802.54 | *% change | -6.0% |

* = > +/-5% change initiates investigation

Notes: changed inlet filters after as founds. Adjusted zero and span

Calibration Performed By: Morgan Voyageur

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

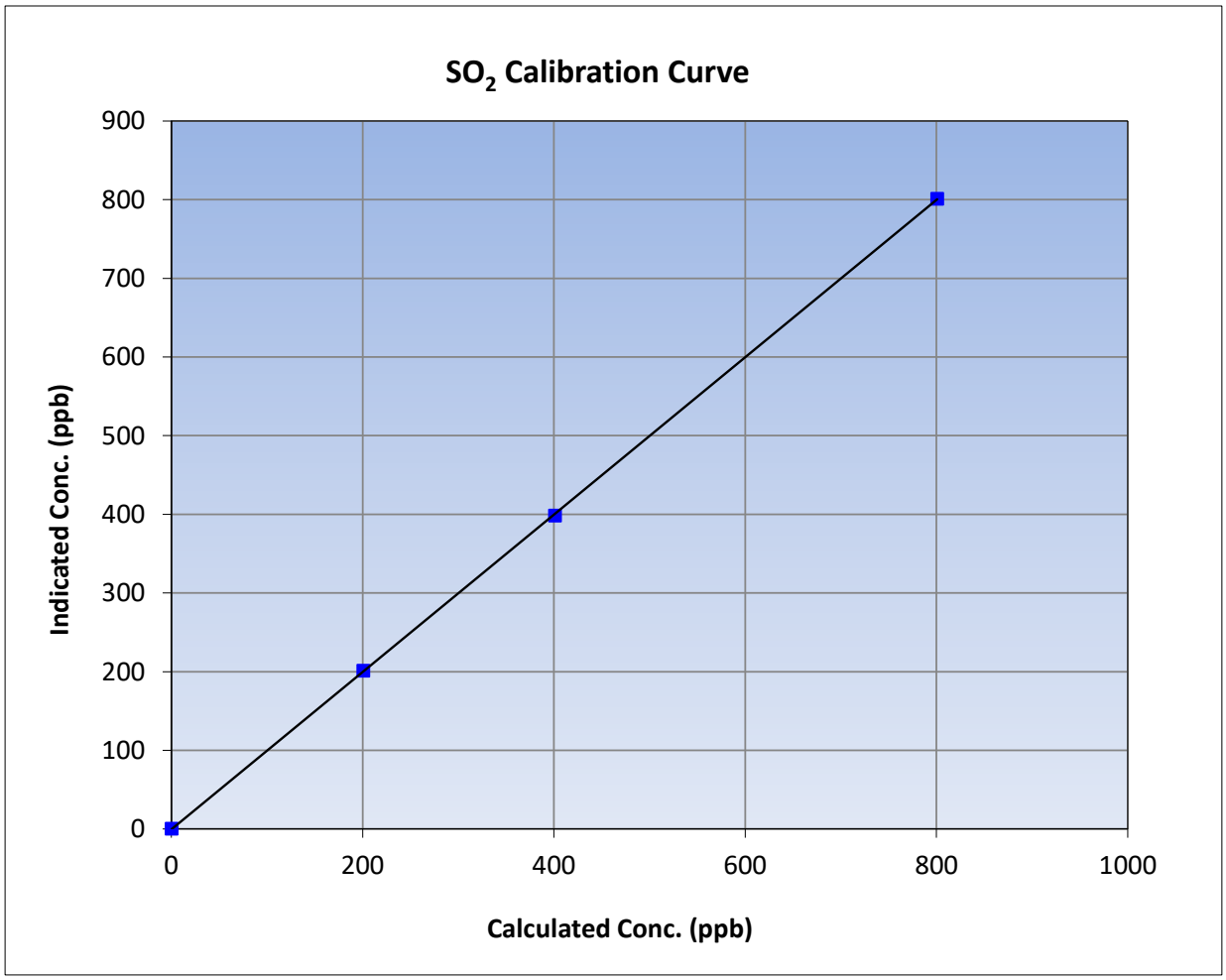
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 14, 2023 | Previous Calibration: | July 14, 2023 |
| Station Name: | Fort Chipewyan | Station Number: | AMS08 |
| Start Time (MST): | 11:11 | End Time (MST): | 13:46 |
| Analyzer make: | Thermo 43i-TLE | Analyzer serial #: | 1136451241 |

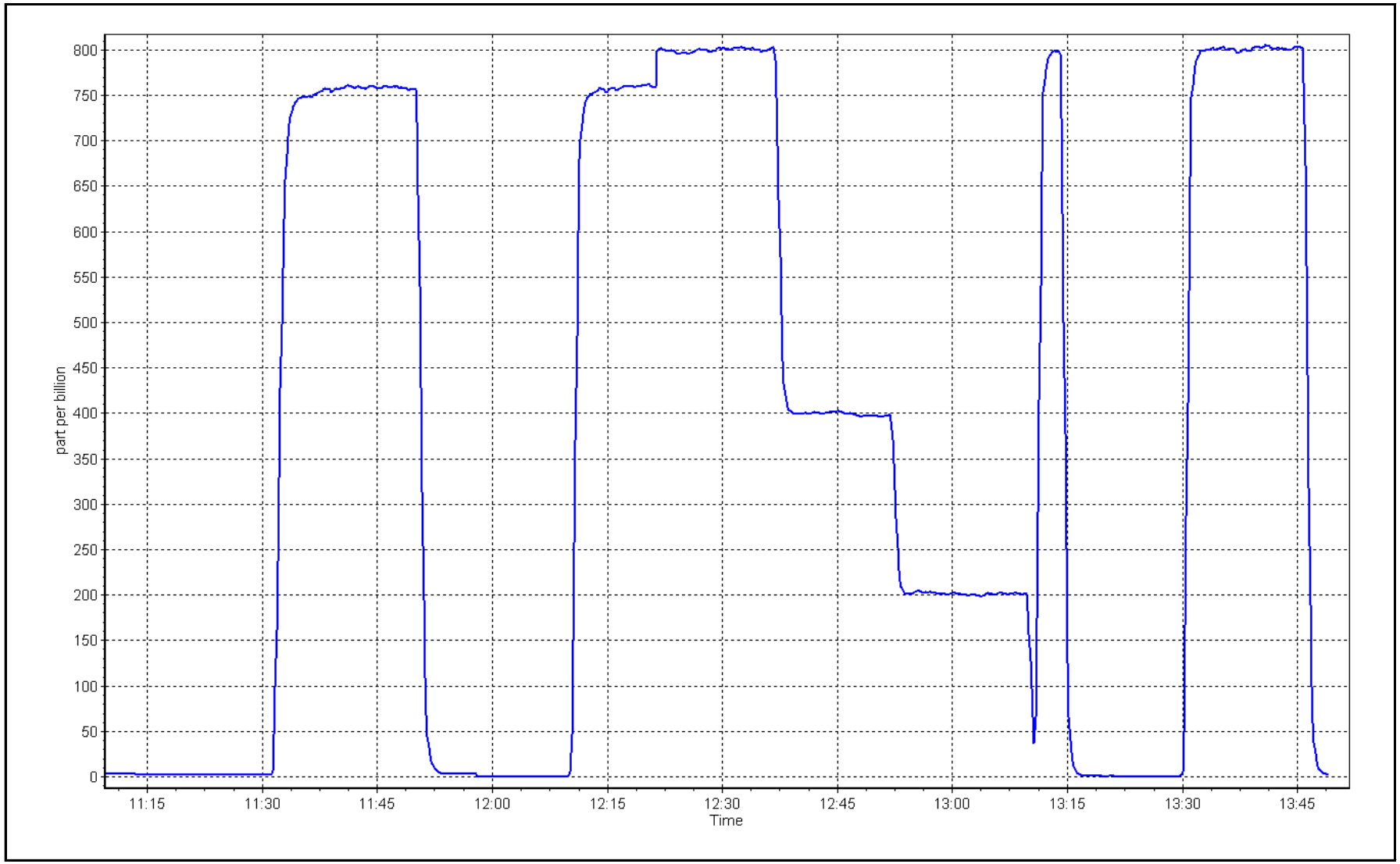
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 800.4 | 801.0 | 0.9992 |
| 400.7 | 398.0 | 1.0068 |
| 200.4 | 200.8 | 0.9978 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999980 | *≥0.995* |
| Slope | 1.000314 | *0.90 - 1.10* |
| Intercept | -0.543305 | *+/-30* |



**SO2 Calibration Plot** Date: August 14, 2023 Location: Fort Chipewyan



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Chipewyan | Station number: | AMS08 |
| Calibration Date: | August 24, 2023 | Last Cal Date: | July 14, 2023 |
| Start time (MST): | 12:26 | End time (MST): | 15:49 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 4.97 | ppm | Cal Gas Exp Date: | February 9, 2024 |
| Cal Gas Cylinder #: | EY0002276 | | | |
| Removed Cal Gas Conc: | 4.97 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3252 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 260 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43iQ-TL | | Analyzer serial #: | 1203169744 | |
| Converter make: | CDN-101 | | Converter serial #: | 14639 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.011142 | 0.999424 | Backgd or Offset: | 0.94 | 0.99 |
| Calibration intercept: | 0.198873 | 0.458863 | Coeff or Slope: | 0.707 | 0.752 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as found span | 4920 | 80.5 | 80.0 | 75.0 | 1.071 |
| as found 2nd point | 4960 | 40.2 | 40.0 | 37.5 | 1.074 |
| as found 3rd point | 4980 | 20.1 | 20.0 | 19.0 | 1.068 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| high point | 4920 | 80.5 | 80.0 | 80.3 | 0.996 |
| second point | 4960 | 40.2 | 40.0 | 40.6 | 0.984 |
| third point | 4980 | 20.1 | 20.0 | 20.5 | 0.975 |
| as left zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| as left span | 4920 | 80.5 | 80.0 | 80.8 | 0.990 |
| SO2 Scrubber Check | 4919.7 | 80.3 | 803.0 | 0.2 | ---- |
| Date of last scrubber change: | | March 7, 2022 | | Ave Corr Factor | 0.985 |
| Date of last converter efficiency test: | | March 15, 2022 | | 100.7% | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 74.7 | Prev response: | 81.10 | *% change: | -8.6% |
| Baseline Corr 2nd AF pt: | 37.2 | AF Slope: | 0.933294 | AF Intercept: | 0.297479 |
| Baseline Corr 3rd AF pt: | 18.7 | AF Correlation: | 0.999996 | | |

* = > +/-5% change initiates investigation

Notes: Sampled inlet filter changed after as founds. Scrubber check passed. Adjusted span.

Calibration Performed By: Morgan Voyageur

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

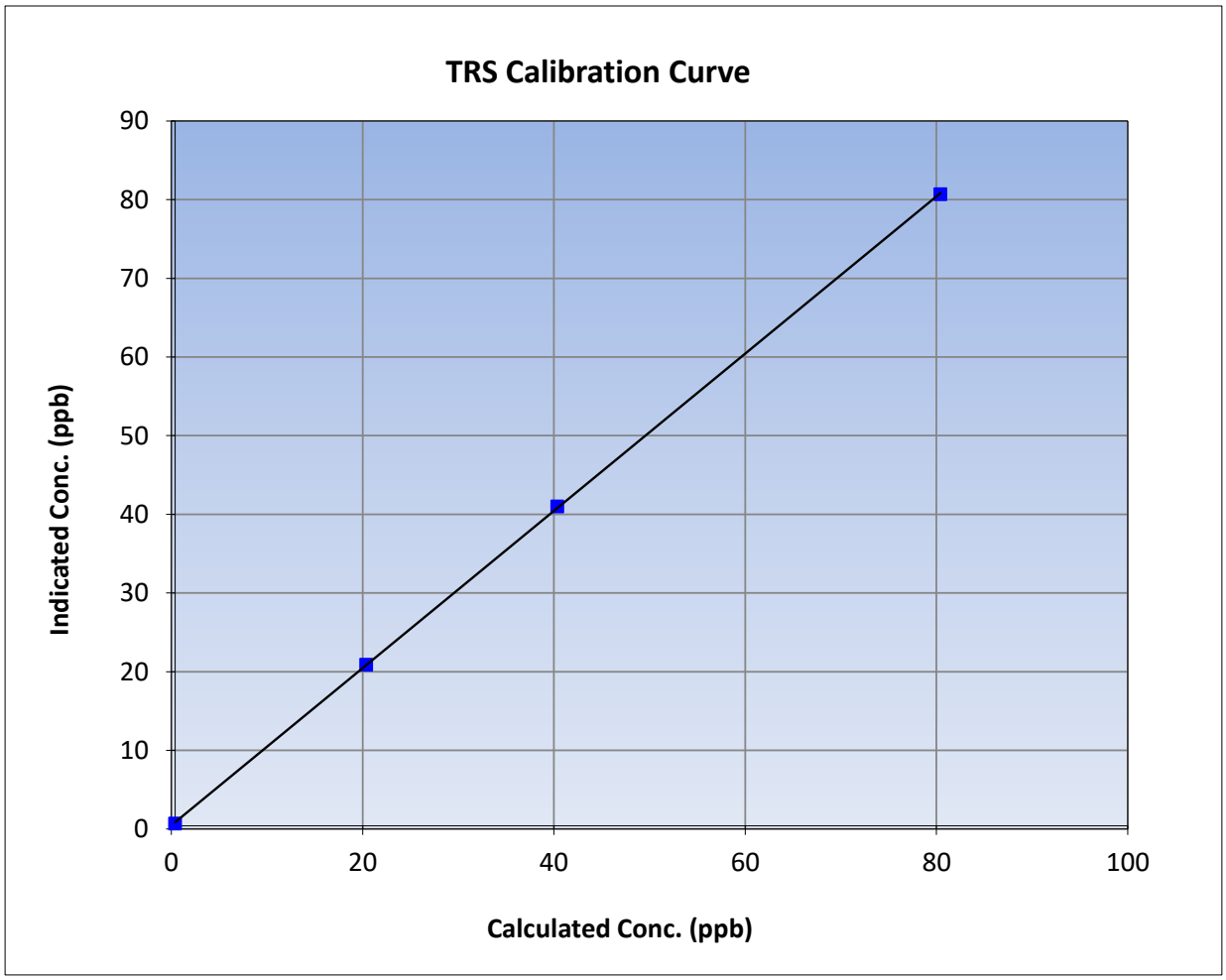
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 24, 2023 | Previous Calibration: | July 14, 2023 |
| Station Name: | Fort Chipewyan | Station Number: | AMS08 |
| Start Time (MST): | 12:26 | End Time (MST): | 15:49 |
| Analyzer make: | Thermo 43iQ-TL | Analyzer serial #: | 1203169744 |

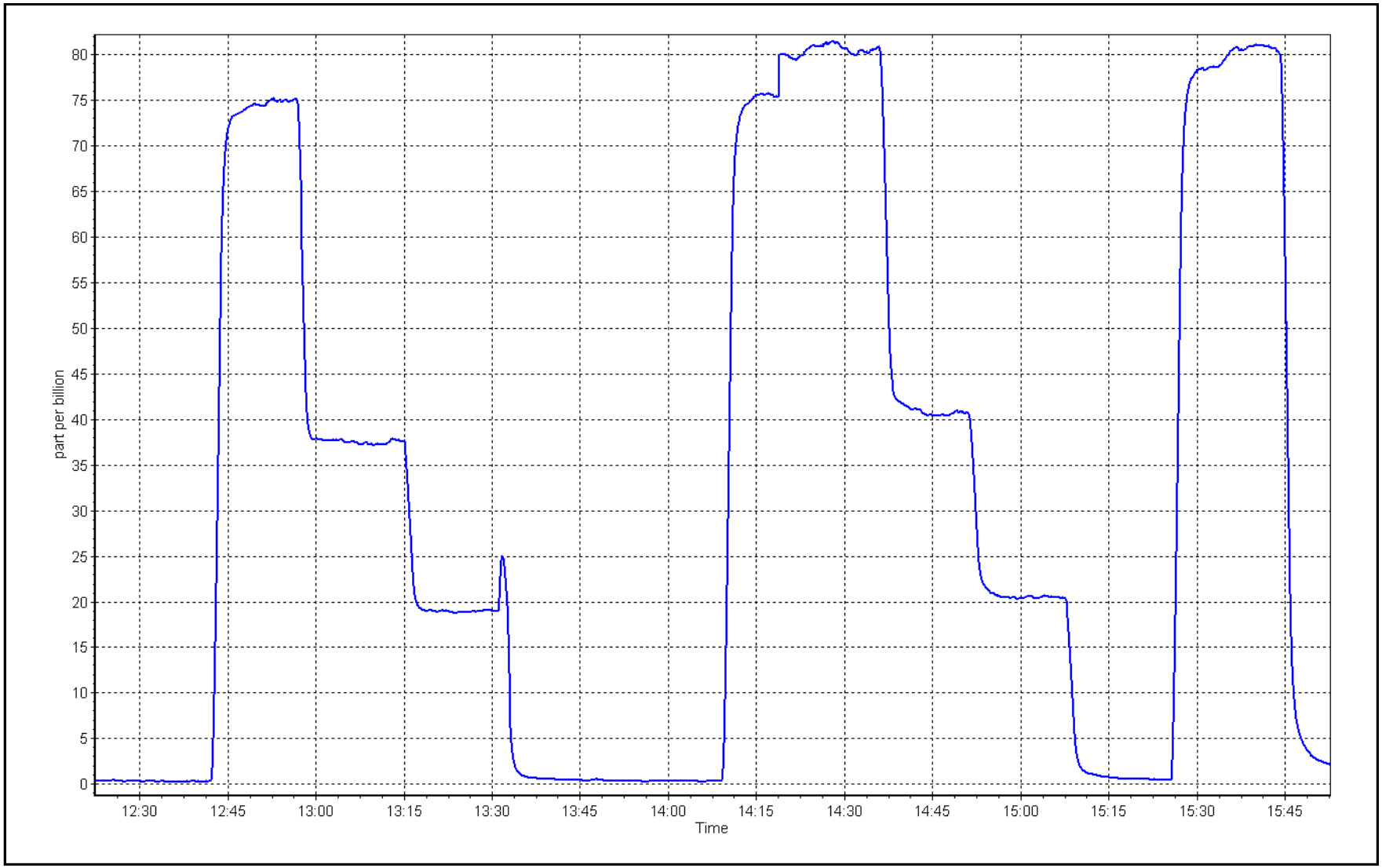
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.3 | ---- |
| 80.0 | 80.3 | 0.9964 |
| 40.0 | 40.6 | 0.9842 |
| 20.0 | 20.5 | 0.9746 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999975 | *≥0.995* |
| Slope | 0.999424 | *0.90 - 1.10* |
| Intercept | 0.458863 | *+/-3* |



**TRS Calibration Plot** Date: August 24, 2023 Location: Fort Chipewyan



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Chipewyan | Station number: | AMS08 |
| Calibration Date: | August 28, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 12:13 | End time (MST): | 16:00 |
| Reason: | As Found | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | CC363447 | | Cal Gas Expiry Date: | February 2, 2024 | |
| NOX Cal Gas Conc: | 48.80 | ppm | NO Cal Gas Conc: | 48.80 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 48.80 | ppm | Removed Gas NO Conc: | 48.80 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3060 | |
| ZAG make/model: | Teledyne API T701H | | Serial Number: | 260 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1426262592 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 1.933 | 1.020 | NO bkgnd or offset: | 8.1 | 9.2 |
| NOX coeff or slope: | 0.993 | 0.992 | NOX bkgnd or offset: | 8.2 | 10.1 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 268.1 | 146.7 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.991475 | |
| $NO_X$ Cal Offset: | 0.520000 | |
| NO Cal Slope: | 0.992674 | |
| NO Cal Offset: | -0.500000 | |
| $NO_2$ Cal Slope: | 0.995889 | |
| $NO_2$ Cal Offset: | 0.340396 | |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | -0.2 | ---- | ---- |
| as found span | 4918 | 82.0 | 800.3 | 800.3 | 0.0 | 734.6 | 731.5 | 3.1 | 1.0895 | 1.0941 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | | | | | | | | | | |
| high point | | | | | | | | | | |
| second point | | | | | | | | | | |
| third point | | | | | | | | | | |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| | | | | | | | | Average Correction Factor | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 734.4 ppb | NO = 731.1 ppb | * = > +/-5% change initiates investigation | | | *Percent Change | $NO_X$ = | -8.1% |
| Previous Response | $NO_X$ = 794.0 ppb | NO = 794.0 ppb | | | | *Percent Change | NO = | -8.6% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | | Nx Sl: | Nx Int: | |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | | NO Sl: | NO Int: | |
| | | | As found | $NO_2$ $r^2$: | | NO2 Sl: | $NO_2$ Int: | |

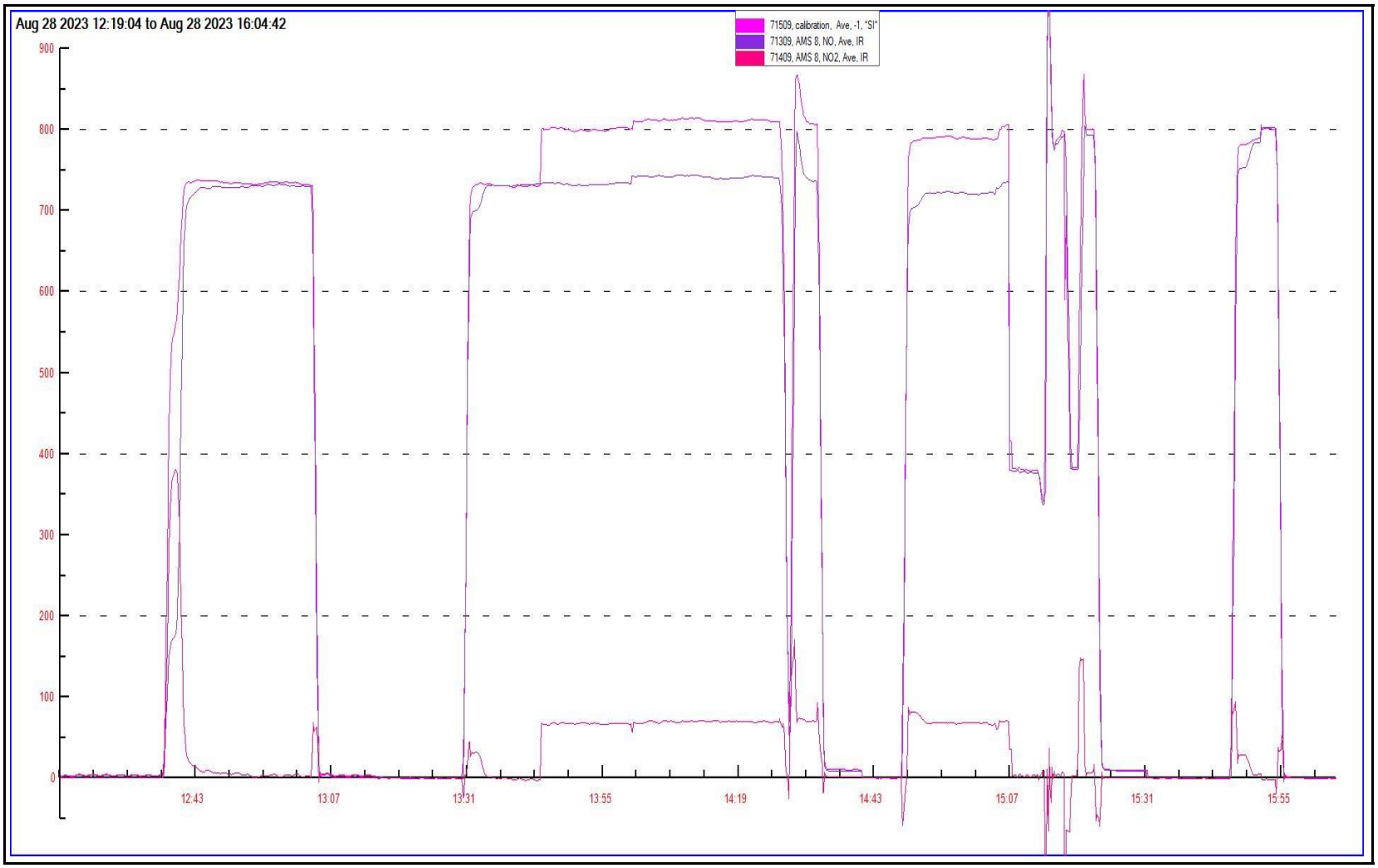
### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | | | | | | |
| 2nd GPT point (200 ppb O3) | | | | | | |
| 3rd GPT point (100 ppb O3) | | | | | | |
| | | | | Average Correction Factor | | |

Notes: Sample inlet filter changed after as founds, sample flow was low so pump was changed. Span adjustment limited, adjusted HVPS to reach optimal setpoint. Calibration to be completed on August 29th.

Calibration Performed By: Matthew C

**$NO_X$ Calibration Plot** Date: August 28, 2023 Location: Fort Chipewyan



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Chipewyan | Station number: | AMS08 |
| Calibration Date: | August 29, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 15:05 | End time (MST): | 19:15 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | CC363447 | | Cal Gas Expiry Date: | February 2, 2024 | |
| NOX Cal Gas Conc: | 48.80 | ppm | NO Cal Gas Conc: | 48.80 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 48.80 | ppm | Removed Gas NO Conc: | 48.80 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3060 | |
| ZAG make/model: | Teledyne API T701H | | Serial Number: | 260 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1426262592 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 1.933 | 1.020 | NO bkgnd or offset: | 8.1 | 9.2 |
| NOX coeff or slope: | 0.993 | 0.992 | NOX bkgnd or offset: | 8.2 | 10.1 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 268.1 | 268.1 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.991475 | 0.996773 |
| $NO_X$ Cal Offset: | 0.520000 | 0.340000 |
| NO Cal Slope: | 0.992674 | 0.997515 |
| NO Cal Offset: | -0.500000 | -0.520000 |
| $NO_2$ Cal Slope: | 0.995889 | 1.009480 |
| $NO_2$ Cal Offset: | 0.340396 | 1.358955 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.6 | -0.2 | -0.4 | ---- | ---- |
| as found span | 4918 | 82.0 | 800.3 | 800.3 | 0.0 | 804.2 | 800.5 | 2.8 | 0.9952 | 0.9998 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.2 | -0.2 | ---- | ---- |
| high point | 4918 | 82.0 | 800.3 | 800.3 | 0.0 | 797.2 | 797.4 | -0.2 | 1.0039 | 1.0037 |
| second point | 4959 | 41.0 | 400.2 | 400.2 | 0.0 | 401.1 | 400.2 | 0.9 | 0.9977 | 0.9999 |
| third point | 4980 | 20.5 | 200.1 | 200.1 | 0.0 | 199.5 | 197.6 | 1.9 | 1.0029 | 1.0126 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.6 | -0.2 | -0.4 | ---- | ---- |
| as left span | 4918 | 82.0 | 800.3 | 410.7 | 389.6 | 793.4 | 403.9 | 389.5 | 1.0087 | 1.0169 |
| | | | | | | | | Average Correction Factor | 1.0015 | 1.0054 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 804.8 ppb | NO = 800.7 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | 1.3% |
| Previous Response | $NO_X$ = 794.0 ppb | NO = 794.0 ppb | | *Percent Change | NO = | 0.8% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 791.5 | 401.9 | 389.6 | 393.5 | 0.9901 | 101.0% |
| 2nd GPT point (200 ppb O3) | 791.5 | 601.8 | 189.7 | 194.9 | 0.9733 | 102.7% |
| 3rd GPT point (100 ppb O3) | 791.5 | 699.5 | 92.0 | 94.9 | 0.9694 | 103.2% |
| | | | | Average Correction Factor | 0.9776 | 102.3% |

Notes: sampled inlet filter changed after as founds. No adjustments made. Triggered gen auto NO and by mistake during GPT point.

Calibration Performed By: Matthew C

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

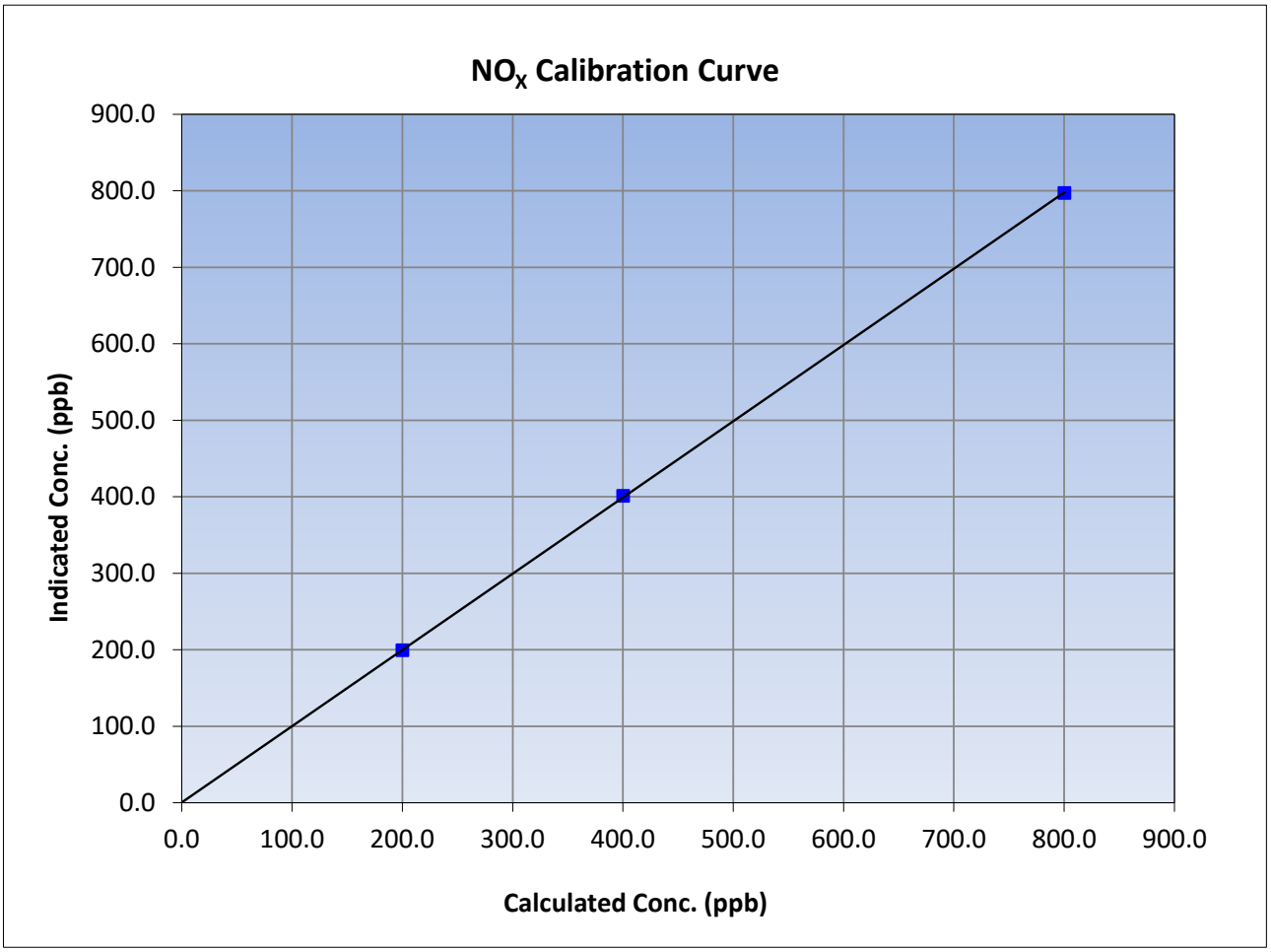
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 29, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Fort Chipewyan | Station Number: | AMS08 |
| Start Time (MST): | 15:05 | End Time (MST): | 19:15 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1426262592 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.4 | ---- | Correlation Coefficient | 0.999986 | ≥0.995 |
| 800.3 | 797.2 | 1.0039 | | | |
| 400.2 | 401.1 | 0.9977 | Slope | 0.996773 | 0.90 - 1.10 |
| 200.1 | 199.5 | 1.0029 | | | |
| | | | Intercept | 0.340000 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

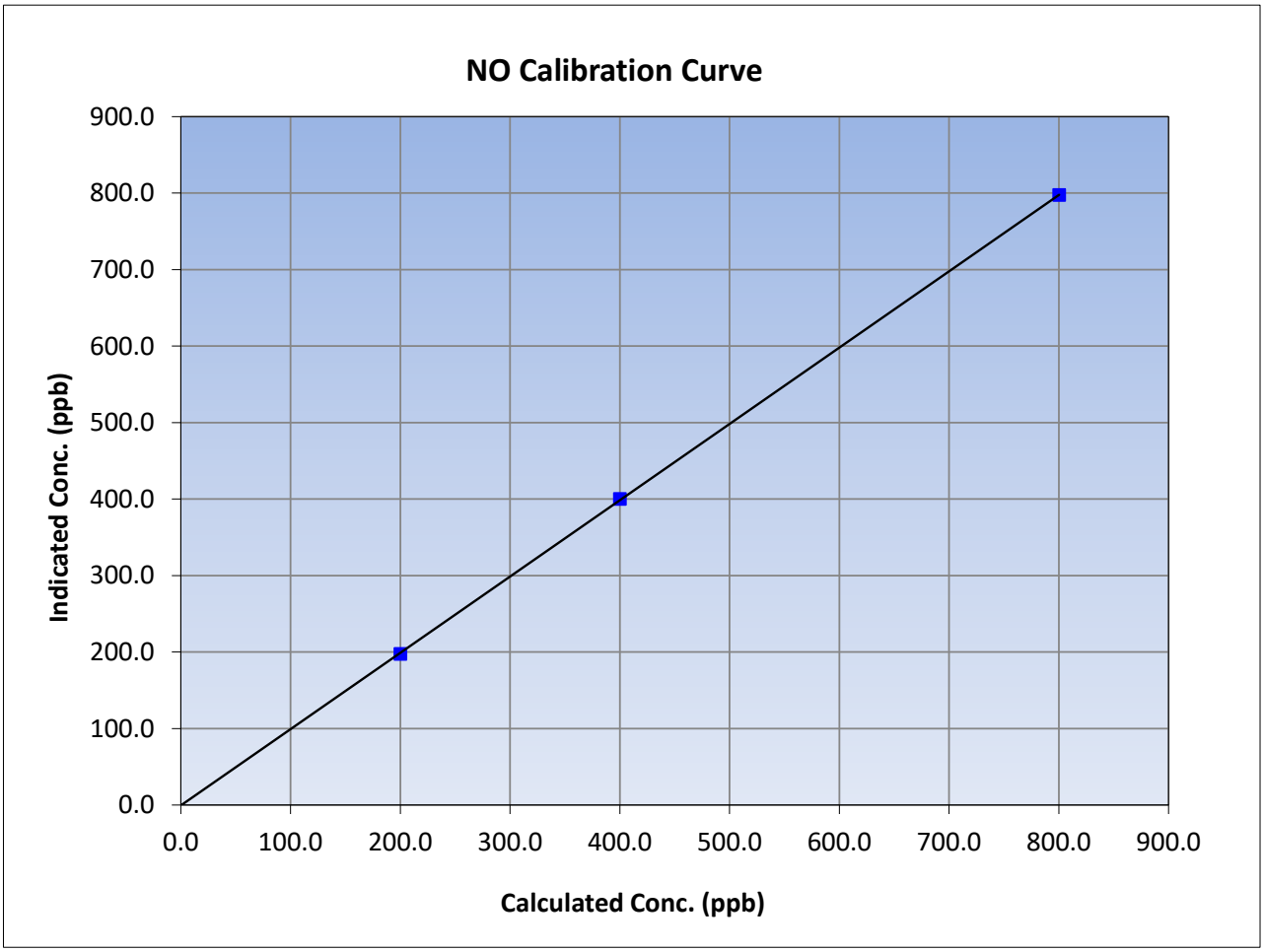
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 29, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Fort Chipewyan | Station Number: | AMS08 |
| Start Time (MST): | 15:05 | End Time (MST): | 19:15 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1426262592 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999986 | ≥0.995 |
| 800.3 | 797.4 | 1.0037 | | | |
| 400.2 | 400.2 | 0.9999 | Slope | 0.997515 | 0.90 - 1.10 |
| 200.1 | 197.6 | 1.0126 | | | |
| | | | Intercept | -0.520000 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

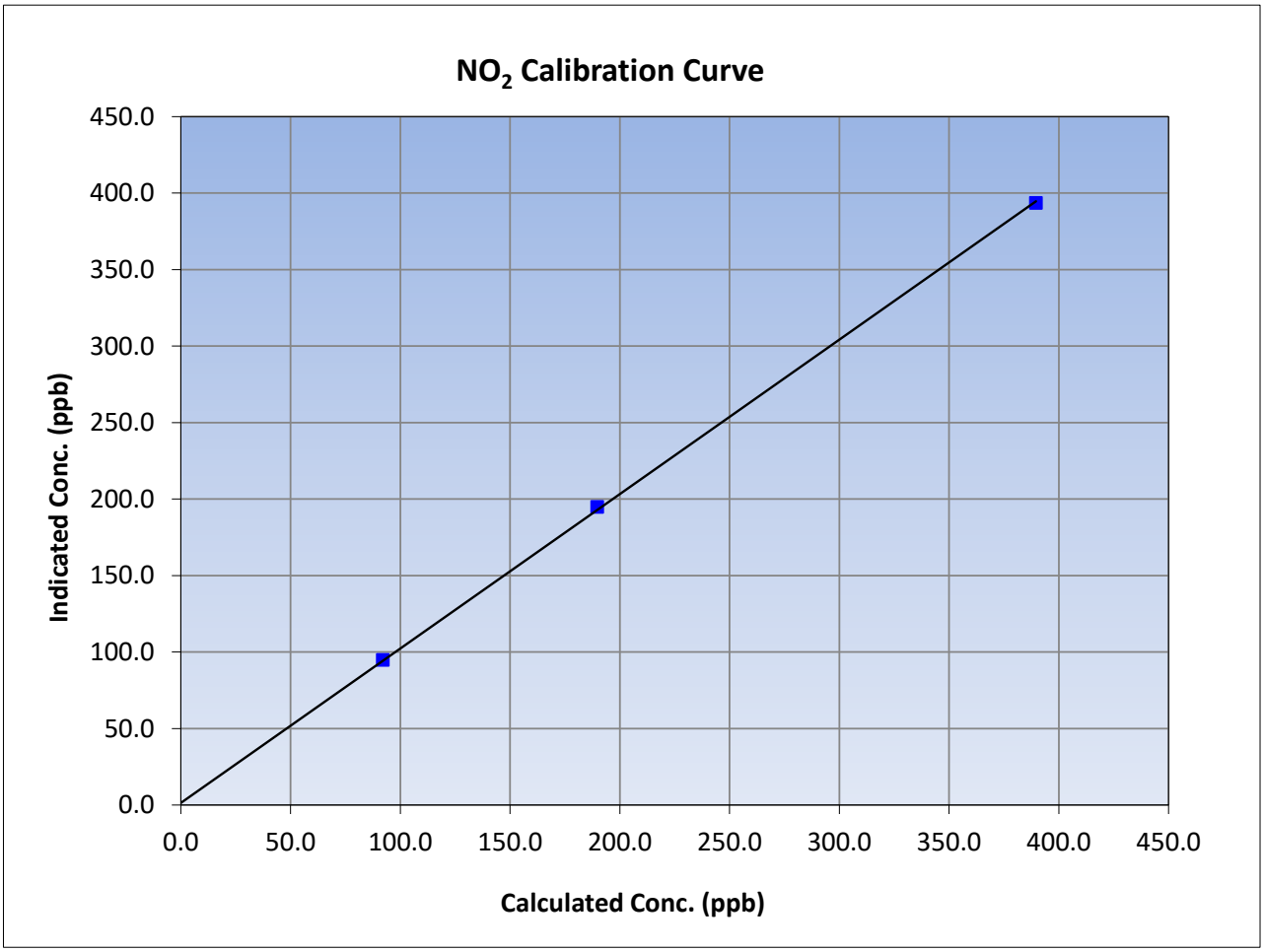
Version-04-2020

### Station Information

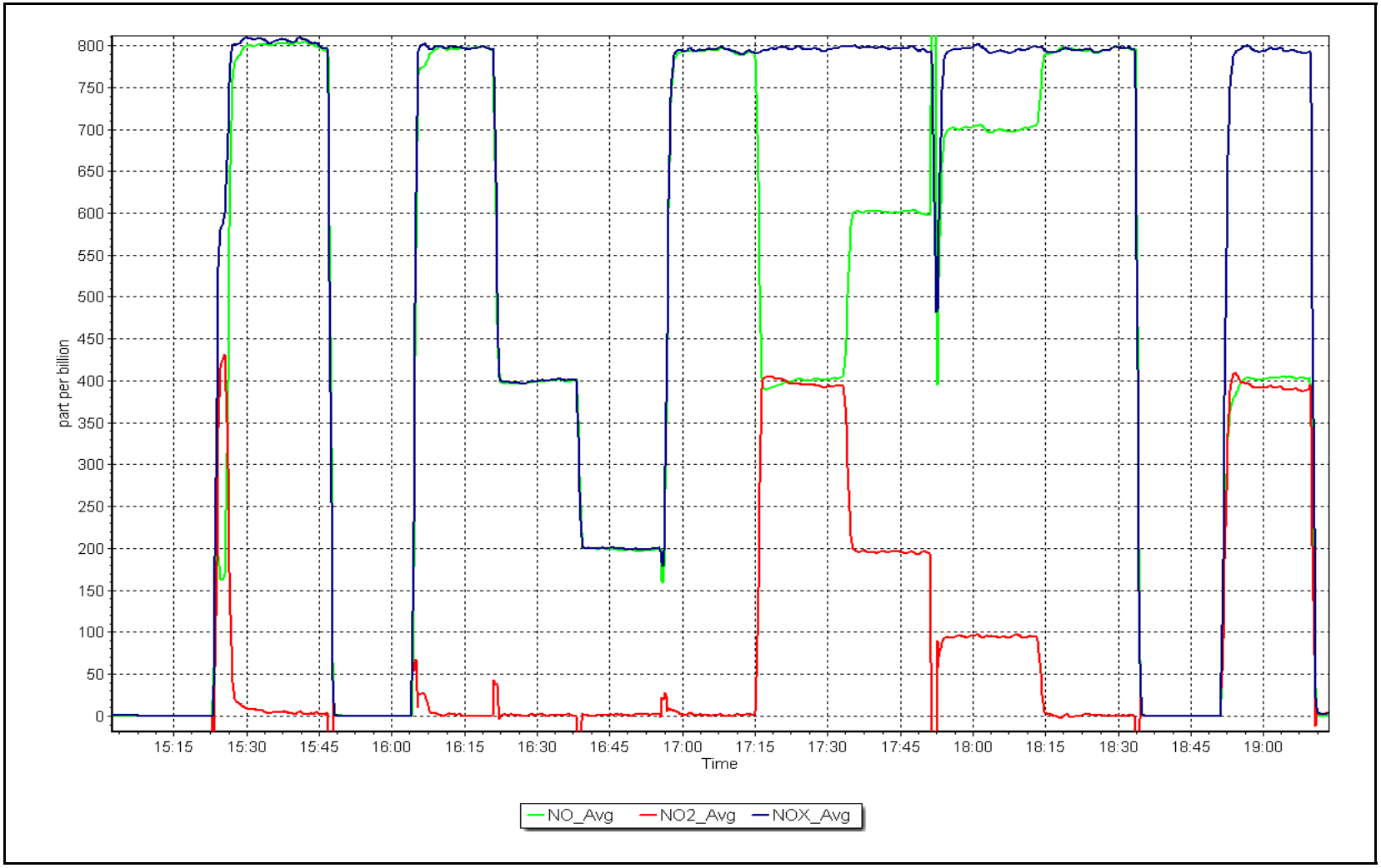
| | | | |
|---|---|---|---|
| Calibration Date: | August 29, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Fort Chipewyan | Station Number: | AMS08 |
| Start Time (MST): | 15:05 | End Time (MST): | 19:15 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1426262592 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999902 | ≥0.995 |
| 389.6 | 393.5 | 0.9901 | | | |
| 189.7 | 194.9 | 0.9733 | Slope | 1.009480 | 0.90 - 1.10 |
| 92.0 | 94.9 | 0.9694 | | | |
| | | | Intercept | 1.358955 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 29, 2023 Location: Fort Chipewyan



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Chipewyan | Station number: | AMS08 |
| Calibration Date: | August 14, 2023 | Last Cal Date: | July 10, 2023 |
| Start time (MST): | 8:32 | End time (MST): | 11:14 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | Teledyne API T700 | Serial Number: | 3252 |
| ZAG Make/Model: | Teledyne API T701 | Serial Number: | 260 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Teledyne API T400 | Analyzer serial #: | 3872 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.010943 | 1.018771 | Backgd or Offset: | -2.0 | -2.0 |
| Calibration intercept: | -1.940000 | -0.760000 | Coeff or Slope: | 1.036 | 1.036 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | NA | 0.0 | 0.3 | ---- |
| as found span | 5000 | 913.0 | 400.0 | 403.4 | 0.992 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | NA | 0.0 | 0.3 | ---- |
| high point | 5000 | 914.7 | 400.0 | 407.3 | 0.982 |
| second point | 5000 | 786.4 | 200.0 | 202.4 | 0.988 |
| third point | 5000 | 701.3 | 100.0 | 100.1 | 0.999 |
| as left zero | 5000 | NA | 0.0 | 0.3 | ---- |
| as left span | 5000 | 963.3 | 400.0 | 407.5 | 0.982 |
| | | | | Average Correction Factor | 0.990 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 403.1 | Previous response | 402.4 | *% change | 0.2% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed out inlet filter after as found. adjusted span

Calibration Performed By: Morgan Voyageur

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

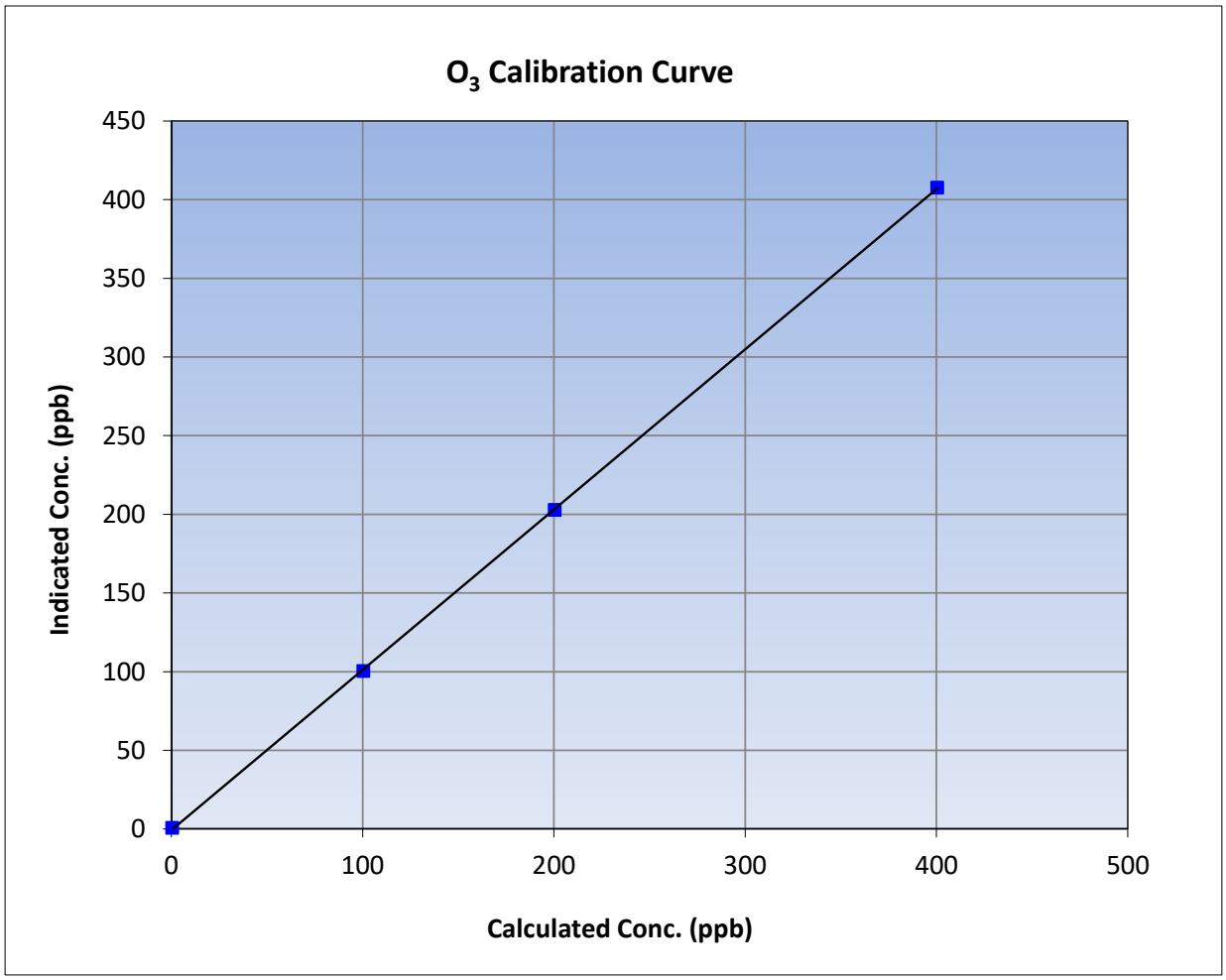
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 14, 2023 | Previous Calibration: | July 10, 2023 |
| Station Name: | Fort Chipewyan | Station Number: | AMS08 |
| Start Time (MST): | 8:32 | End Time (MST): | 11:14 |
| Analyzer make: | Teledyne API T400 | Analyzer serial #: | 3872 |

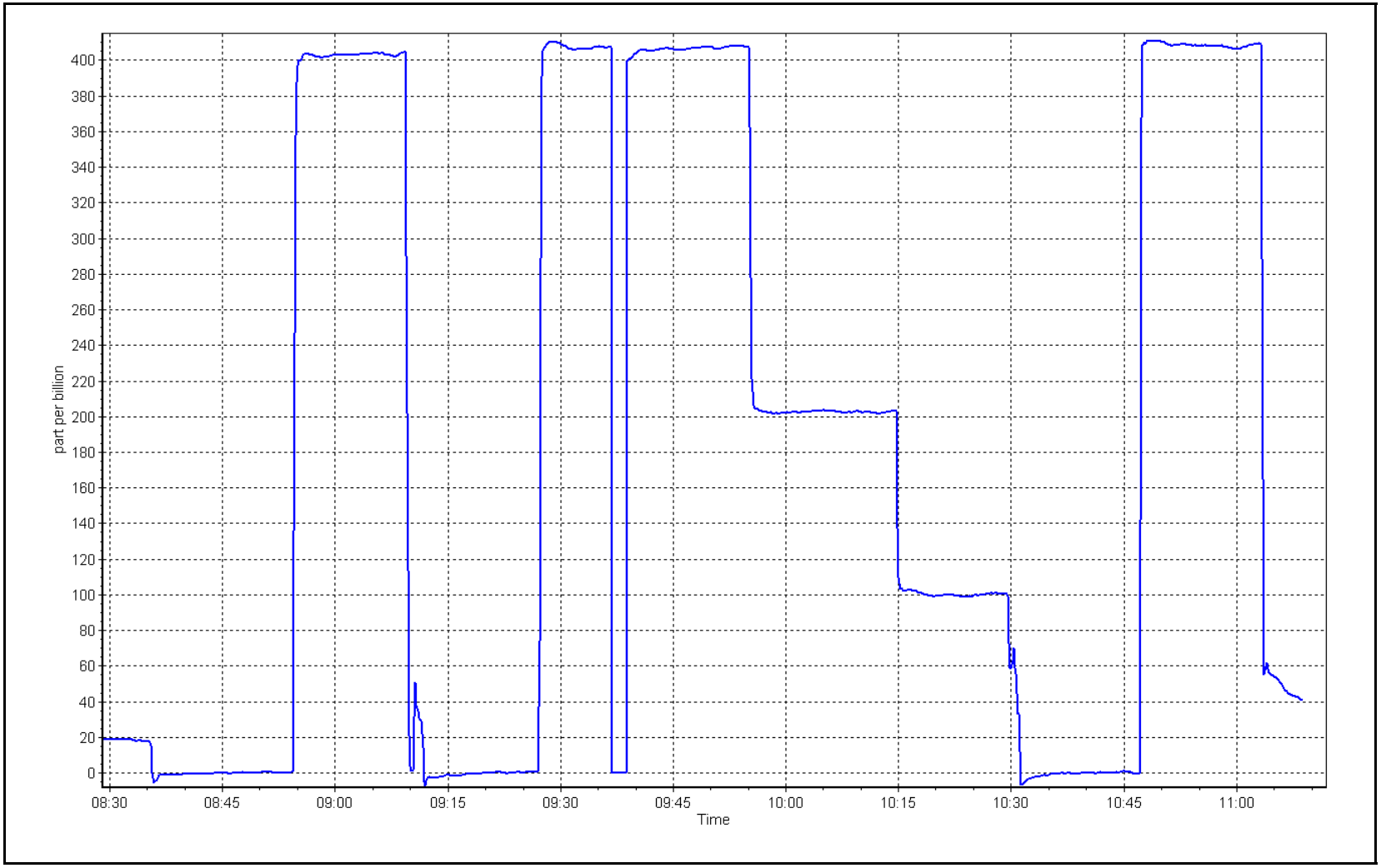
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.3 | ---- |
| 400.0 | 407.3 | 0.9821 |
| 200.0 | 202.4 | 0.9881 |
| 100.0 | 100.1 | 0.9990 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999969 | *≥0.995* |
| Slope | 1.018771 | *0.90 - 1.10* |
| Intercept | -0.760000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 14, 2023 Location: Fort Chipewyan



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Chipewyan | Station number: | AMS 08 |
| Calibration Date: | August 24, 2023 | Last Cal Date: | July 25, 2023 |
| Start time (MST): | 14:05 | End time (MST): | 14:34 |
| Analyzer Make: | Teledyne API T640 | S/N: | 216 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | FP-25 | S/N: | 388747 |
| Temp/RH standard: | FP-25 | S/N: | 388747 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T ($^{o}$C) | 18.9 | 19.1 | 19.0 | ☐ | +/- 2 $^{o}$C |
| P (mmHg) | 735.6 | 728.3 | 740.8 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.00 | 5.00 | 5.00 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: July 25, 2023 Last Cal Date: June 29,2023

PM w/o HEPA: 18.8 PM w/ HEPA: 0.0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☐

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 11.1 | 11.0 | 11.2 | ☐ | 11.3 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 24.5 w/ HEPA: 0.0

Date Optical Chamber Cleaned: July 25, 2023 <0.2 ug/m3

Disposable Filter Changed: July 25, 2023

### Annual Maintenance

Date Sample Tube Cleaned: July 25, 2023

Date RH/T Sensor Cleaned: July 25, 2023

Notes: No adjustment made.

Calibration by: Morgan Voyageur

# Wood Buffalo Environmental Association

## CO Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Chipewyan | Station number: | AMS08 |
| Calibration Date: | August 30, 2023 | Last Cal Date: | July 25, 2023 |
| Start time (MST): | 16:10 | End time (MST): | 18:45 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 3,030 | ppm | Cal Gas Exp Date: | December 1, 2028 |
| Cal Gas Cylinder #: | ALM014846 | | | |
| Removed Cal Gas Conc: | 3,030 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3060 |
| ZAG Make/Model: | API T701H | | Serial Number: | 260 |

### Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3505

Analyzer Range: 0 - 50 ppm

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.996203 | 0.995357 | Backgd or Offset: | -0.014 | -0.013 |
| Calibration intercept: | 0.030984 | 0.050947 | Coeff or Slope: | 0.968 | 0.999 |

### CO Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.00 | ---- |
| as found span | 4933 | 66.7 | 40.4 | 40.3 | 1.004 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4934 | 66.7 | 40.4 | 40.2 | 1.004 |
| second point | 4967 | 33.3 | 20.2 | 20.2 | 0.997 |
| third point | 4983 | 16.7 | 10.1 | 10.1 | 1.005 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 2960 | 40.0 | 40.4 | 40.1 | 1.007 |
| | | | | Average Correction Factor | 1.002 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 40.25 | Prev response: | 40.30 | *% change: | -0.1% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. No adjustments made.

Calibration Performed By: Matthew C

# Wood Buffalo Environmental Association

## CO Calibration Summary

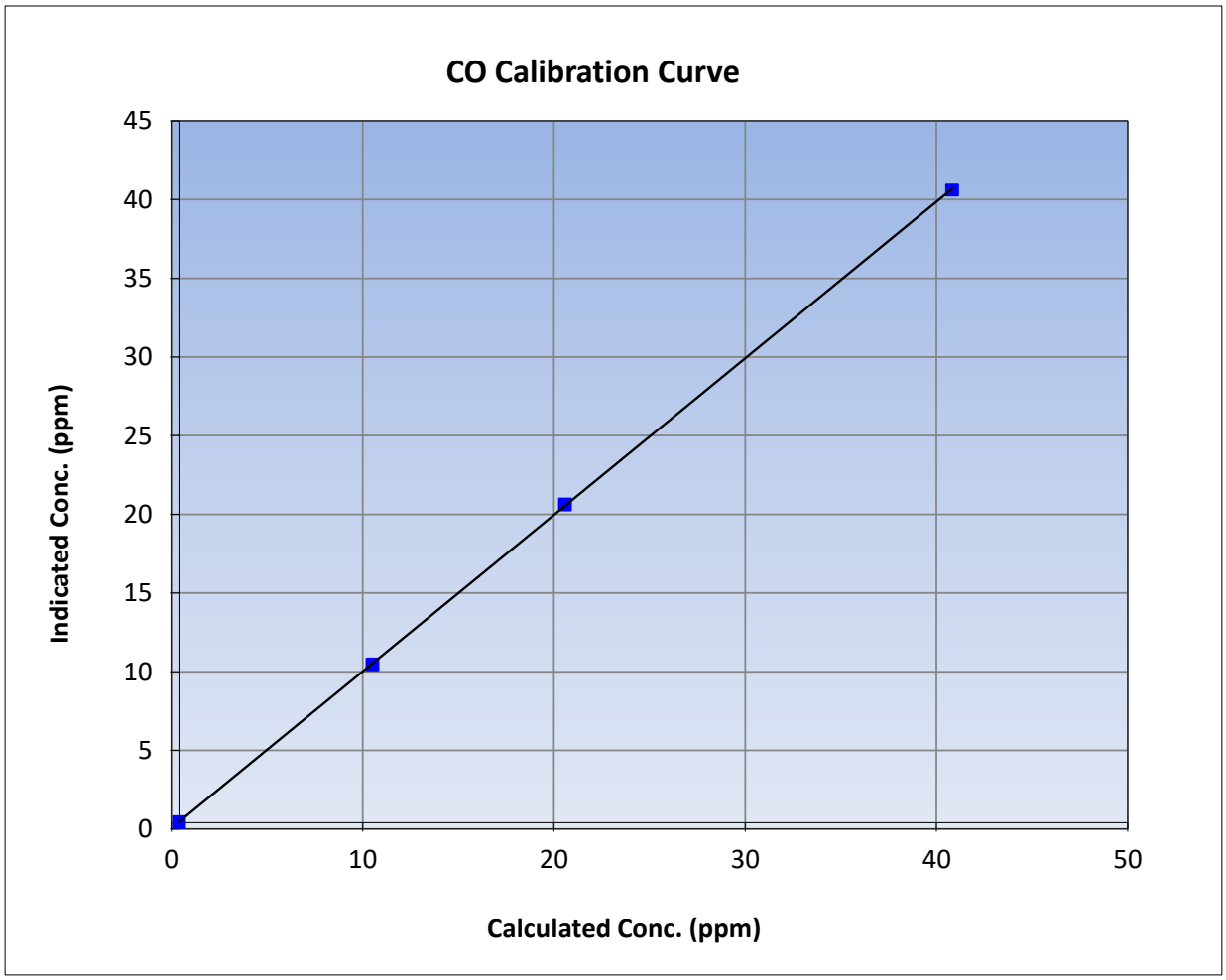
Version-01-2020

### Station Information

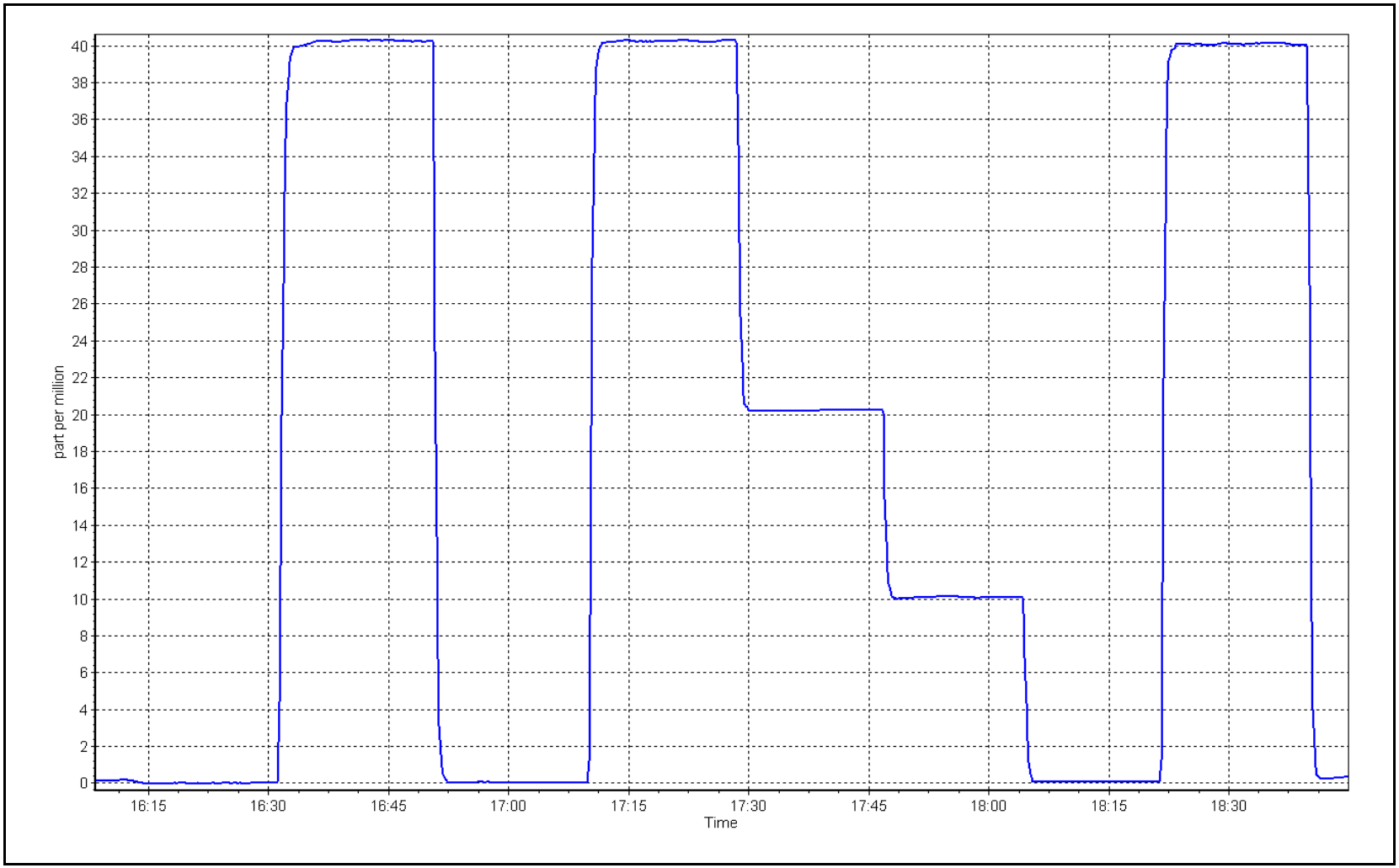
| | | | |
|---|---|---|---|
| Calibration Date: | August 30, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Fort Chipewyan | Station Number: | AMS08 |
| Start Time (MST): | 16:10 | End Time (MST): | 18:45 |
| Analyzer make: | API T300 | Analyzer serial #: | 3505 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999983 | *≥0.995* |
| 40.4 | 40.2 | 1.0043 | | | |
| 20.2 | 20.2 | 0.9970 | Slope | 0.995357 | *0.90 - 1.10* |
| 10.1 | 10.1 | 1.0050 | | | |
| | | | Intercept | 0.050947 | *+/-1.5* |



**CO Calibration Plot** Date: August 30, 2023 Location: Fort Chipewyan



# Wood Buffalo Environmental Association

## $CO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Chipewyan | Station number: | AMS08 |
| Calibration Date: | August 28, 2023 | Last Cal Date: | July 26, 2023 |
| Start time (MST): | 15:57 | End time (MST): | 19:09 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 60,220 | ppm | Cal Gas Exp Date: | December 1, 2028 |
| Cal Gas Cylinder #: | ALM014846 | | | |
| Removed Cal Gas Conc: | 60,220 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3252 |
| N2 Gen Make/Model: | NG 5000 | | Serial Number: | 771048318 |

### Analyzer Information

Analyzer make: Teledyne API T360 — Analyzer serial #: 289

Analyzer Range 0 - 2,000 ppm

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.997030 | 0.997557 | Backgd or Offset: | 0.008 | 0.008 |
| Calibration intercept: | -4.080000 | -1.000000 | Coeff or Slope: | 1.016 | 1.019 |

### $CO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 3000 | 0.0 | 0.0 | 0.5 | ---- |
| as found span | 2920 | 80.0 | 1605.9 | 1584.9 | 1.013 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 3000 | 0.0 | 0.0 | 1.4 | ---- |
| high point | 2920 | 80.0 | 1605.9 | 1606.4 | 1.000 |
| second point | 2960 | 40.0 | 802.9 | 786.0 | 1.022 |
| third point | 2980 | 20.0 | 401.5 | 405.6 | 0.990 |
| as left zero | 3000 | 0.0 | 0.0 | 1.9 | ---- |
| as left span | 2960 | 40.0 | 802.9 | 784.5 | 1.023 |
| | | | | Average Correction Factor | 1.004 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 1584.40 | Prev response: | 1597.02 | *% change: | -0.8% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: As founds done and changed inlet filter. Made adjustment to span point but changed to early.

Calibration Performed By: Matthew C

# Wood Buffalo Environmental Association

## $CO_2$ Calibration Summary

Version-01-2020

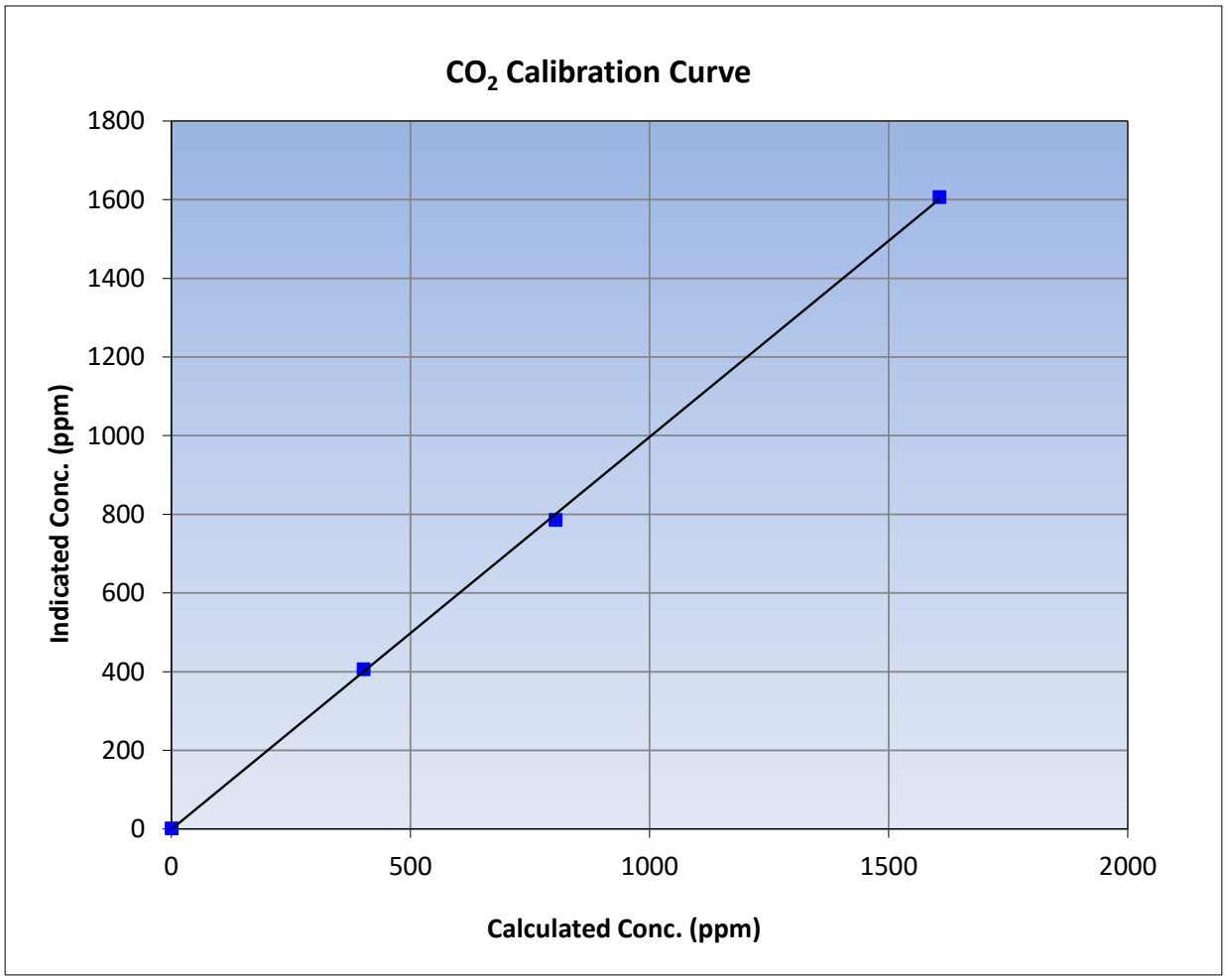
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date | August 28, 2023 | Previous Calibration | July 26, 2023 |
| Station Name | Fort Chipewyan | Station Number | AMS08 |
| Start Time (MST) | 15:57 | End Time (MST) | 19:06 |
| Analyzer make | Teledyne API T360 | Analyzer serial # | 289 |

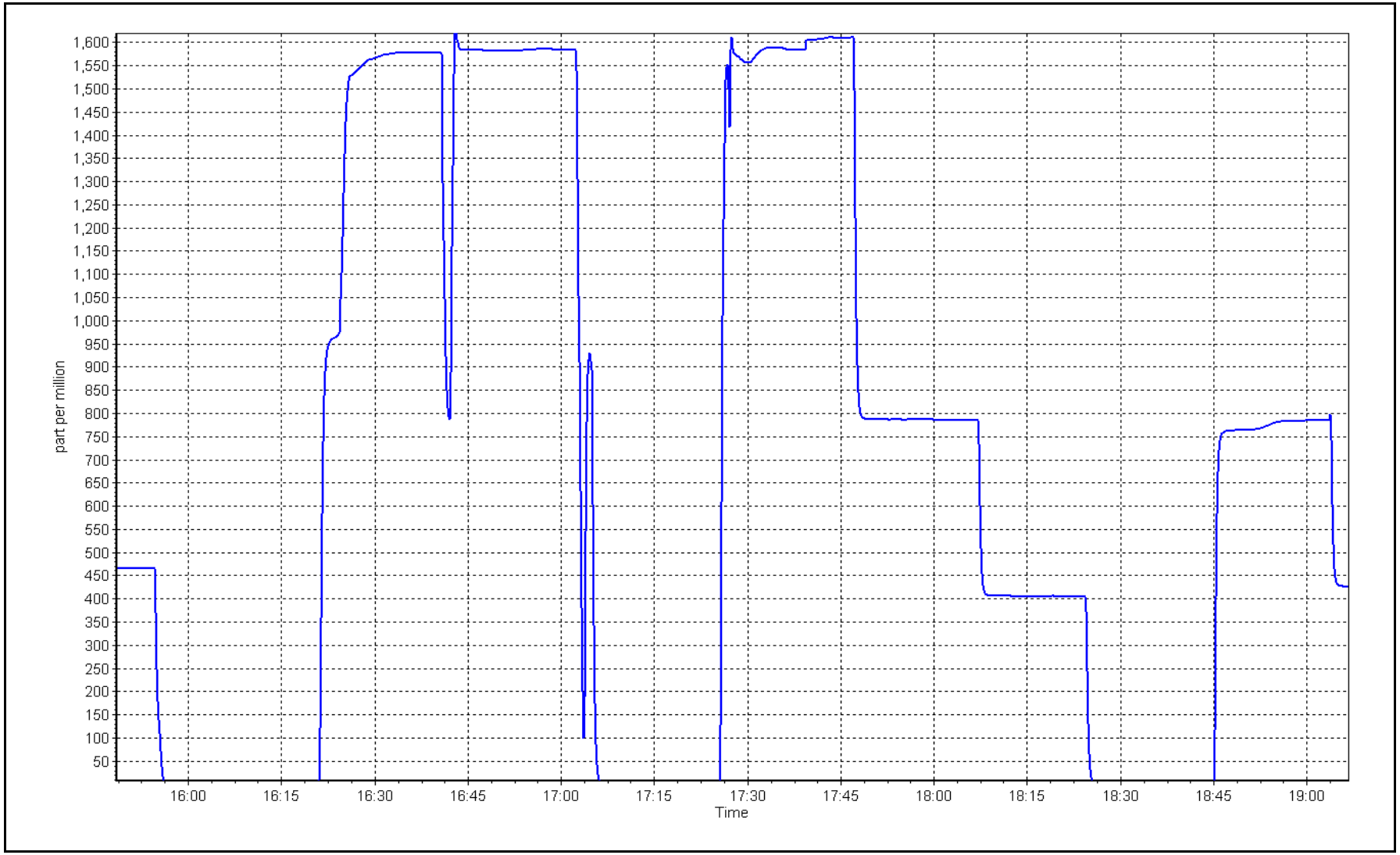
### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 1.4 | ---- |
| 1605.9 | 1606.4 | 0.9997 |
| 802.9 | 786.0 | 1.0215 |
| 401.5 | 405.6 | 0.9898 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999809 | *≥0.995* |
| Slope | 0.997557 | *0.90 - 1.10* |
| Intercept | -1.000000 | *+/-20* |



**$CO_2$ Calibration Plot** Date: August 28, 2023 Location: Fort Chipewyan



# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS09
## BARGE LANDING
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Barge Landing | Station number: | AMS09 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 8:31 | End time (MST): | 11:55 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.96 | ppm | Cal Gas Exp Date: | January 5, 2025 |
| Cal Gas Cylinder #: | CC151285 | | | |
| Removed Cal Gas Conc: | 49.96 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3812 |
| ZAG Make/Model: | API T701 | | Serial Number: | 4888 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1118148498

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.000739 | 0.998231 | Backgd or Offset: | 9.6 | 9.7 |
| Calibration intercept: | 0.671341 | 0.050728 | Coeff or Slope: | 0.986 | 0.975 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as found span | 4919 | 80.2 | 801.5 | 808.5 | 0.991 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| high point | 4919 | 80.2 | 801.5 | 800.6 | 1.001 |
| second point | 4959 | 40.1 | 400.8 | 399.1 | 1.004 |
| third point | 4980 | 20.0 | 199.8 | 199.6 | 1.001 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 4919 | 80.2 | 801.5 | 803.4 | 0.998 |
| | | | | Average Correction Factor | 1.002 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 808.20 | Previous response | 802.75 | *% change | 0.7% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Adjusted span only.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

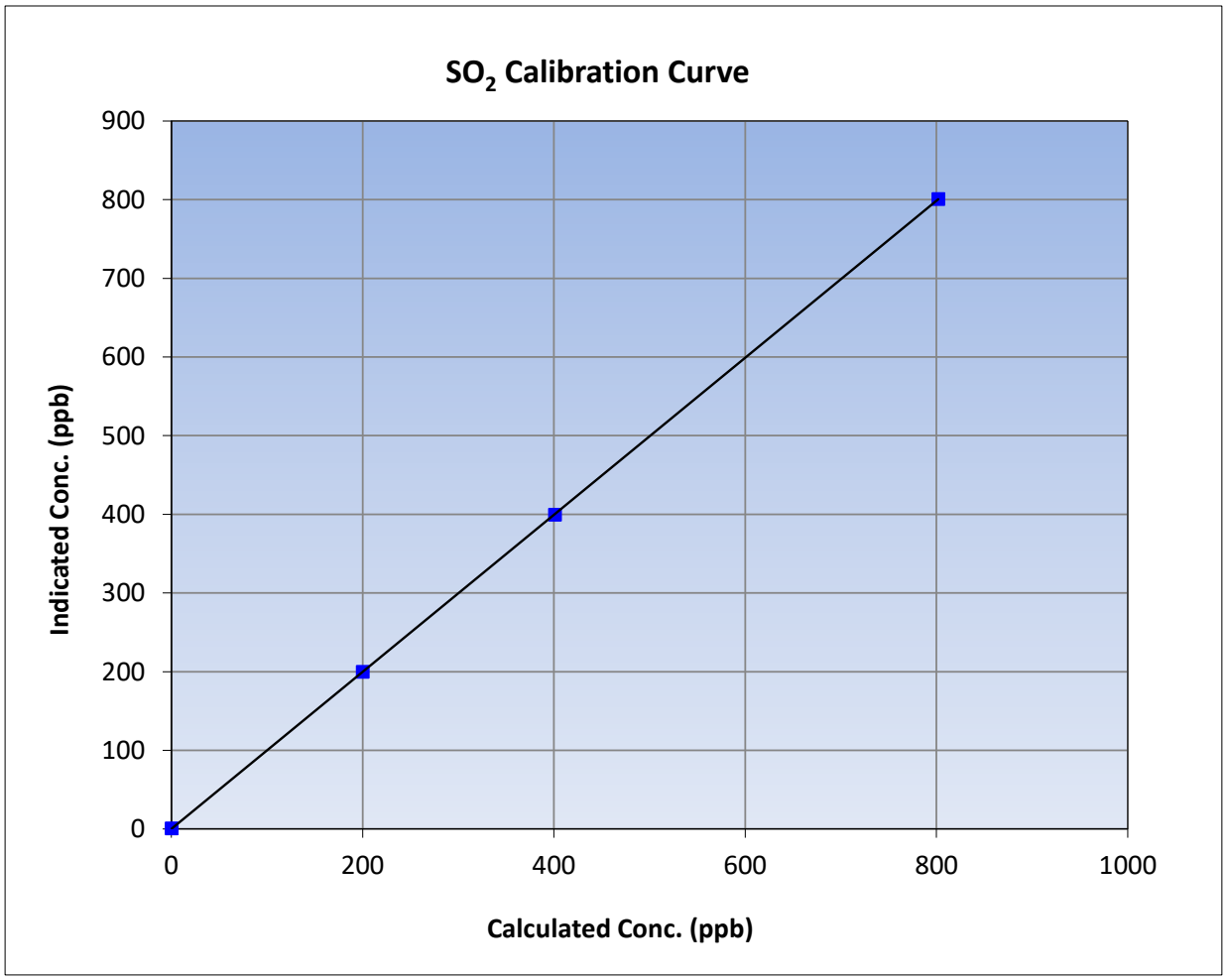
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Barge Landing | Station Number: | AMS09 |
| Start Time (MST): | 8:31 | End Time (MST): | 11:55 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1118148498 |

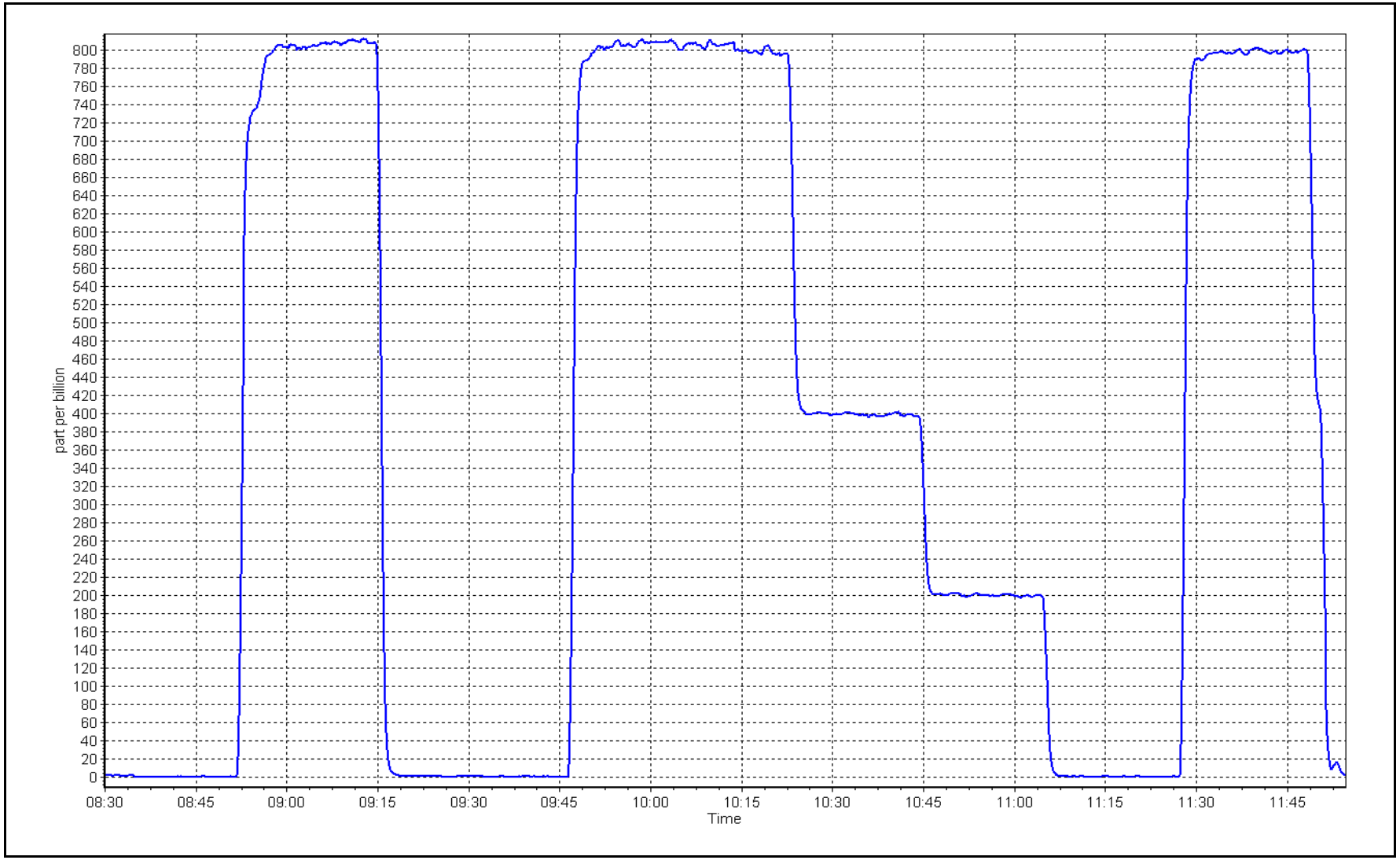
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.5 | ---- |
| 801.5 | 800.6 | 1.0011 |
| 400.8 | 399.1 | 1.0041 |
| 199.8 | 199.6 | 1.0012 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999996 | *≥0.995* |
| Slope | 0.998231 | *0.90 - 1.10* |
| Intercept | 0.050728 | *+/-30* |



**SO2 Calibration Plot** Date: August 15, 2023 Location: Barge Landing



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Barge Landing | Station number: | AMS09 |
| Calibration Date: | August 8, 2023 | Last Cal Date: | July 4, 2023 |
| Start time (MST): | 9:30 | End time (MST): | 13:40 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 4.87 | ppm | Cal Gas Exp Date: | September 2, 2024 |
| Cal Gas Cylinder #: | EY0002346 | | | |
| Removed Cal Gas Conc: | 4.87 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3812 |
| ZAG Make/Model: | API T701 | | Serial Number: | 4888 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i-TLE | | Analyzer serial #: | 1331259320 | |
| Converter make: | CDN-101 | | Converter serial #: | 519 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.000859 | 1.007720 | Backgd or Offset: | 2.77 | 2.77 |
| Calibration intercept: | -0.220903 | -0.060968 | Coeff or Slope: | 1.134 | 1.134 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4918 | 82.1 | 80.0 | 79.6 | 1.003 |
| as found 2nd point | 4959 | 41.1 | 40.0 | 39.8 | 1.003 |
| as found 3rd point | 4979 | 20.5 | 20.0 | 19.7 | 1.009 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4918 | 82.1 | 80.0 | 80.5 | 0.993 |
| second point | 4959 | 41.1 | 40.0 | 40.3 | 0.993 |
| third point | 4979 | 20.5 | 20.0 | 20.1 | 0.993 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4918 | 82.1 | 80.0 | 80.9 | 0.988 |
| SO2 Scrubber Check | 4920 | 80.2 | 802.0 | -0.1 | ---- |
| Date of last scrubber change: | | 28-Feb-23 | | Ave Corr Factor | 0.993 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 79.7 | Prev response: | 79.81 | *% change: | -0.1% |
| Baseline Corr 2nd AF pt: | 39.9 | AF Slope: | 0.997146 | AF Intercept: | -0.140983 |
| Baseline Corr 3rd AF pt: | 19.8 | AF Correlation: | 0.999998 | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. SOx scrubber check done after calibrator zero. No adjustment made.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

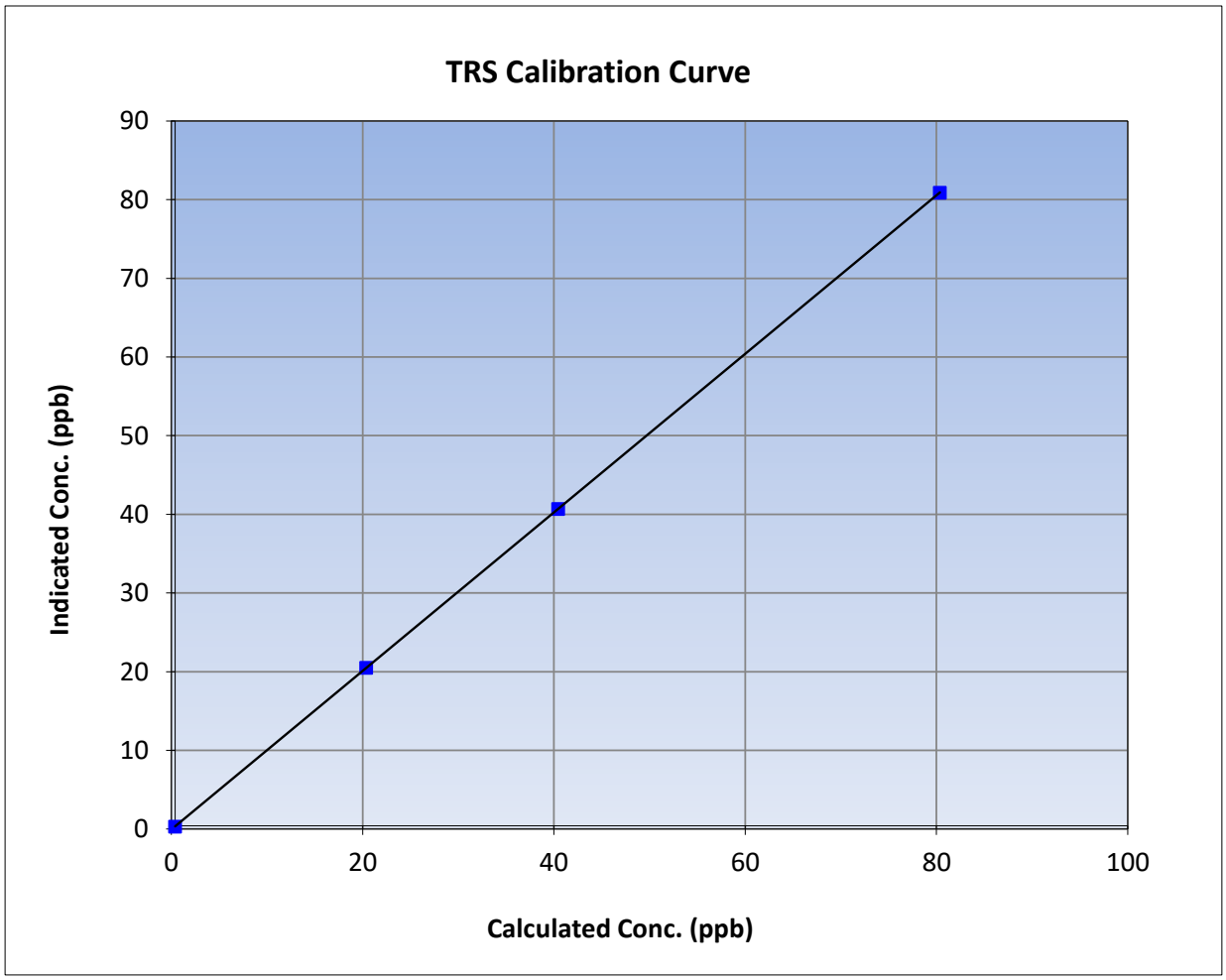
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | Barge Landing | Station Number: | AMS09 |
| Start Time (MST): | 9:30 | End Time (MST): | 13:40 |
| Analyzer make: | Thermo 43i-TLE | Analyzer serial #: | 1331259320 |

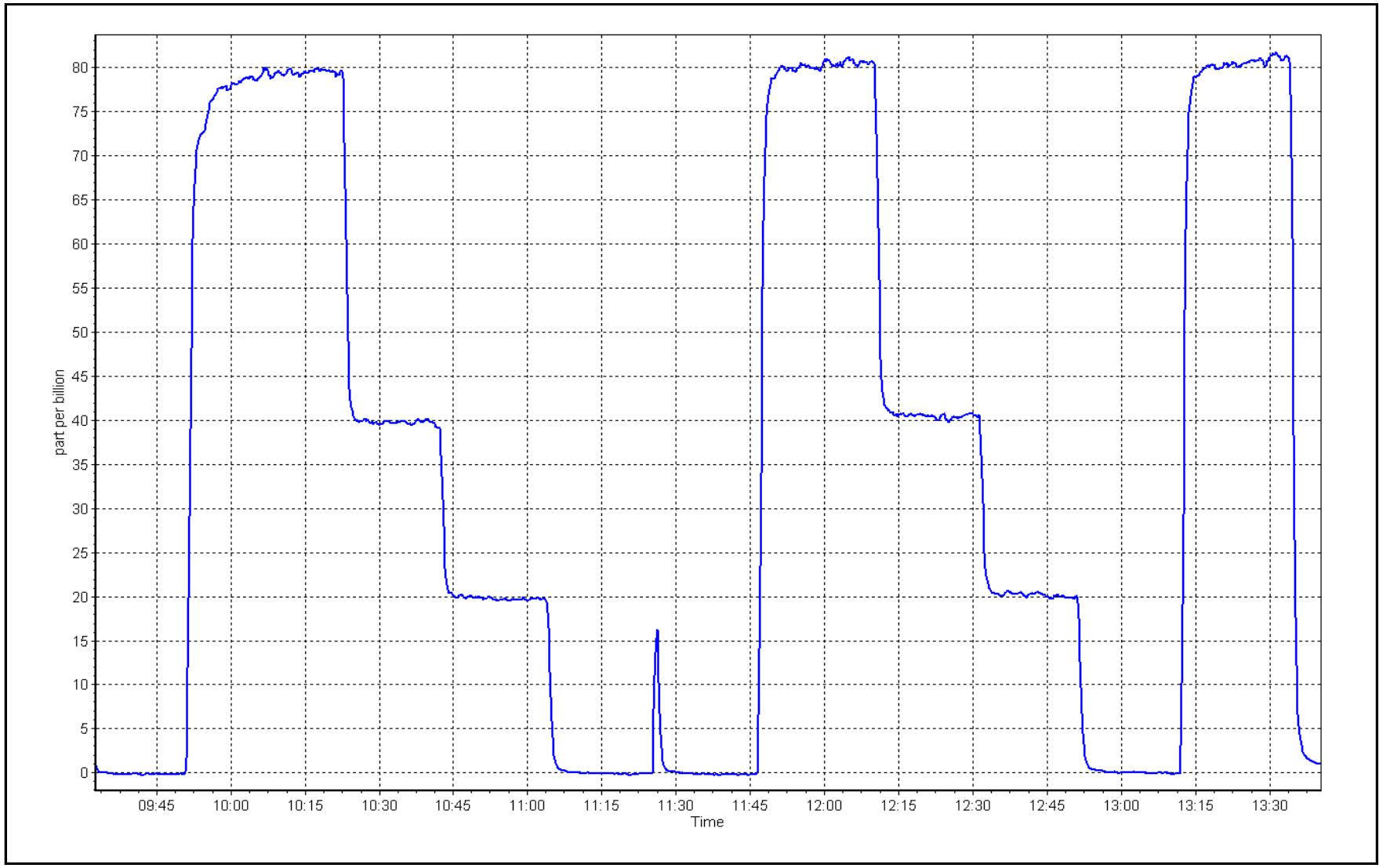
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 80.0 | 80.5 | 0.9933 |
| 40.0 | 40.3 | 0.9933 |
| 20.0 | 20.1 | 0.9935 |
| | | |

| Statistical Evaluation | | Limits |
|---|---|---|
| Correlation Coefficient | 0.999999 | ≥0.995 |
| Slope | 1.007720 | 0.90 - 1.10 |
| Intercept | -0.060968 | +/-3 |



**TRS Calibration Plot** Date: August 8, 2023 Location: Barge Landing



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Barge Landing | Station number: | AMS09 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 8:31 | End time (MST): | 11:55 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC151285 | Cal Gas Expiry Date: | January 5, 2025 | |
| CH4 Cal Gas Conc. | 497.6 | ppm | CH4 Equiv Conc. | 1067.1 | ppm |
| C3H8 Cal Gas Conc. | 207.1 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 497.6 | ppm | CH4 Equiv Conc. | 1067.1 | ppm |
| Removed C3H8 Conc. | 207.1 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 3812 | |
| ZAG make/model: | API T701 | | Serial Number: | 4888 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1193585649 | |
| THC Range (ppm): | 0 - 100 ppm | | | | |
| NMHC Range (ppm): | 0 - 50 ppm | | CH4 Range (ppm): | 0 - 50 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.52E-04 | 2.51E-04 | NMHC SP Ratio: | 4.85E-05 | 4.87E-05 |
| CH4 Retention time: | 15.4 | 15.2 | NMHC Peak Area: | 188466 | 187816 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 80.2 | 17.12 | 17.15 | 0.999 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 80.2 | 17.12 | 17.14 | 0.999 |
| second point | 4960 | 40.1 | 8.56 | 8.55 | 1.001 |
| third point | 4980 | 20.0 | 4.27 | 4.29 | 0.996 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 80.2 | 17.12 | 17.15 | 0.998 |
| | | | | Average Correction Factor | 0.999 |
| Baseline Corr AF: | 17.15 | Prev response | 17.16 | *% change | -0.1% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.0 | ---- |
| as found span | 4919 | 80.2 | 9.14 | 9.13 | 1.001 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 80.2 | 9.14 | 9.14 | 1.000 |
| second point | 4960 | 40.1 | 4.57 | 4.57 | 1.000 |
| third point | 4980 | 20 | 2.28 | 2.30 | 0.991 |
| as left zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 80.2 | 9.14 | 9.14 | 1.000 |
| | | | | Average Correction Factor | 0.997 |
| Baseline Corr AF: | 9.13 | Prev response | 9.16 | *% change | -0.4% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 80.2 | 7.98 | 8.02 | 0.995 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 80.2 | 7.98 | 8.00 | 0.998 |
| second point | 4960 | 40.1 | 3.99 | 3.98 | 1.003 |
| third point | 4980 | 20.0 | 1.99 | 1.99 | 1.002 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 80.2 | 7.98 | 8.02 | 0.996 |
| | | | | Average Correction Factor | 1.001 |
| Baseline Corr AF: | 8.02 | Prev response | 8.00 | *% change | 0.3% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.002740 | 1.000663 |
| THC Cal Offset: | -0.004535 | 0.001260 |
| CH4 Cal Slope: | 1.002125 | 1.002197 |
| CH4 Cal Offset: | -0.000132 | -0.007135 |
| NMHC Cal Slope: | 1.003064 | 0.999486 |
| NMHC Cal Offset: | -0.003803 | 0.007995 |

Notes: Changed sample inlet filter after as founds. Adjusted span.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## THC Calibration Summary

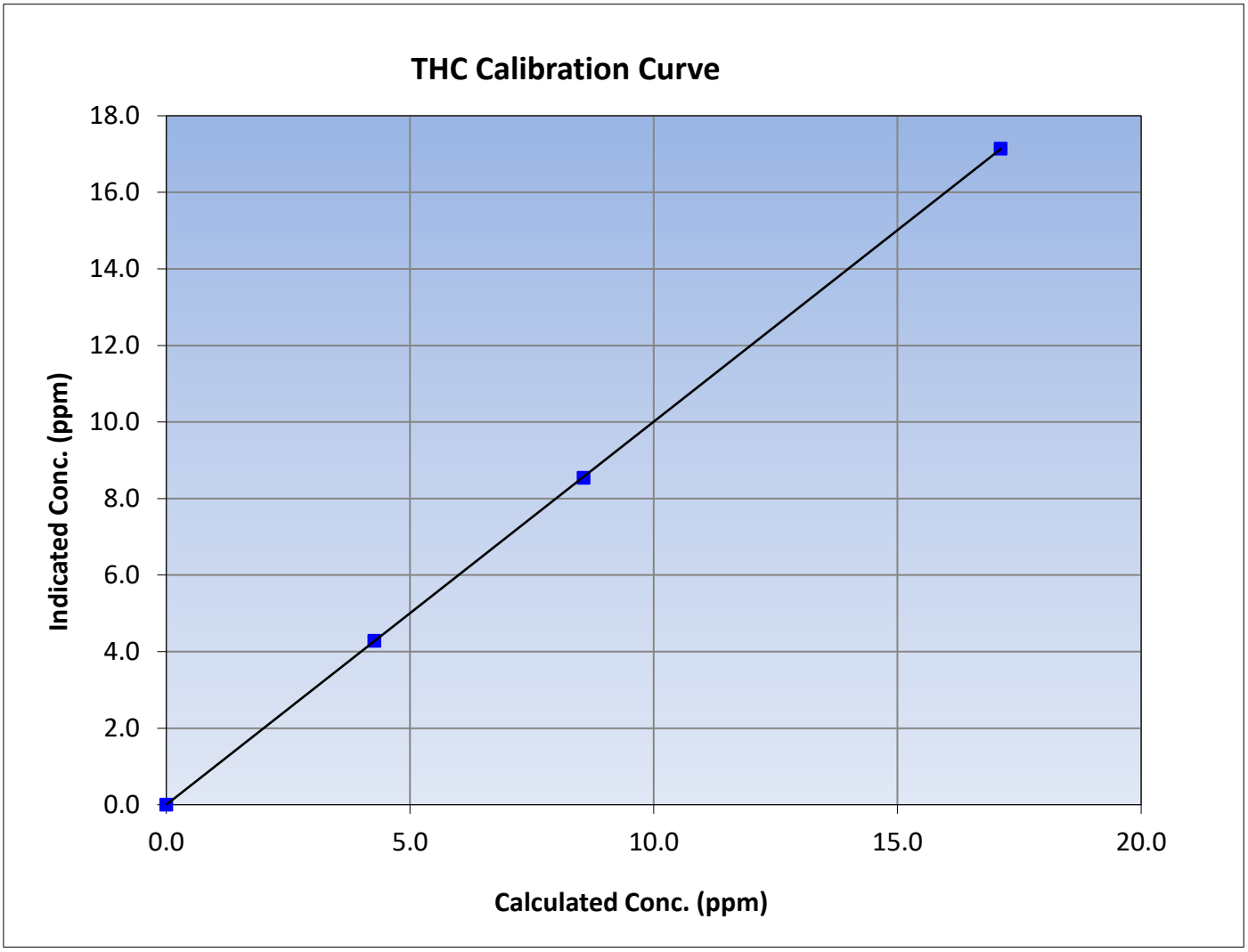
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Barge Landing | Station Number: | AMS09 |
| Start Time (MST): | 8:31 | End Time (MST): | 11:55 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1193585649 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999996 | *≥0.995* |
| 17.12 | 17.14 | 0.9989 | | | |
| 8.56 | 8.55 | 1.0014 | Slope | 1.000663 | *0.90 - 1.10* |
| 4.27 | 4.29 | 0.9957 | | | |
| | | | Intercept | 0.001260 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

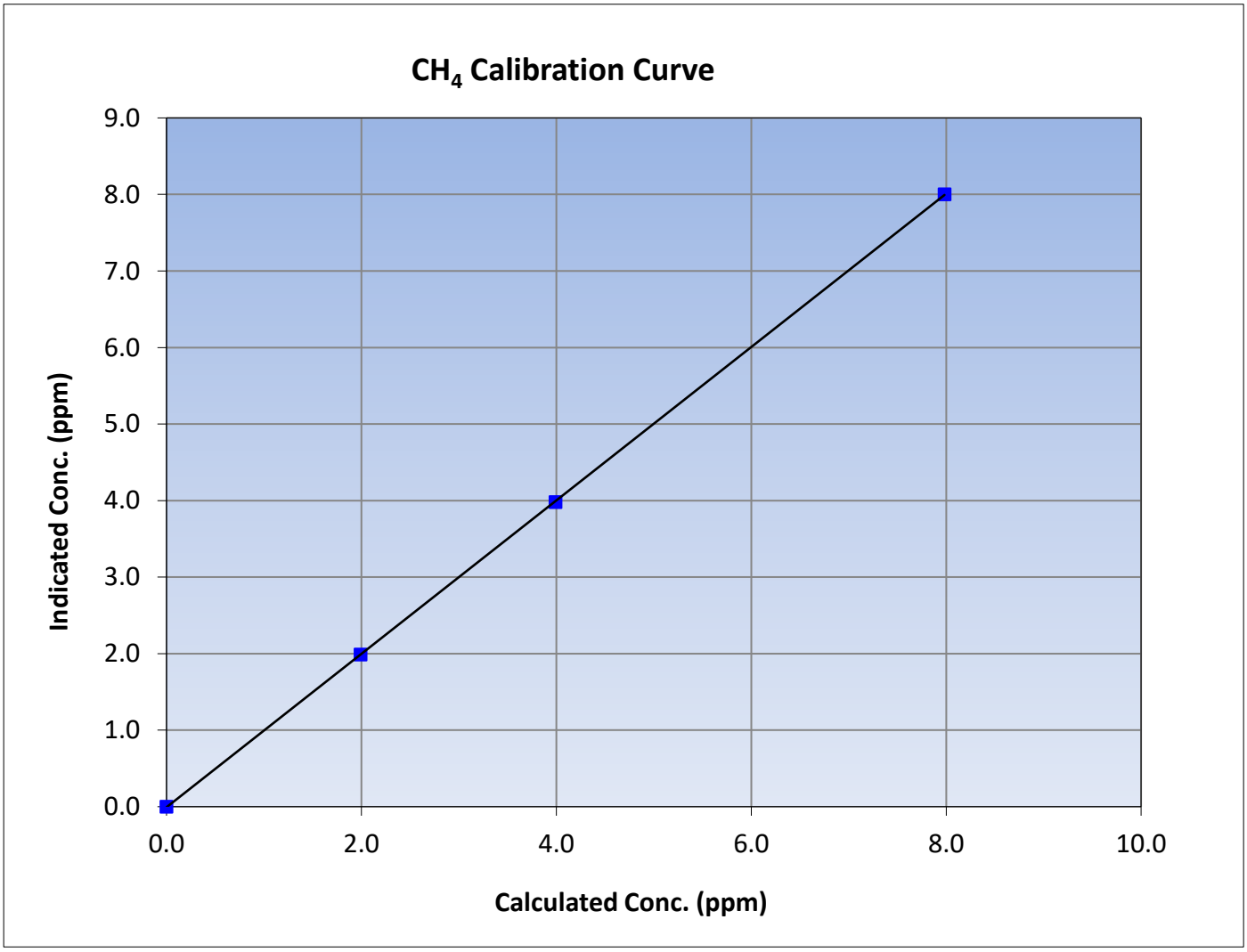
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Barge Landing | Station Number: | AMS09 |
| Start Time (MST): | 8:31 | End Time (MST): | 11:55 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1193585649 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999992 | *≥0.995* |
| 7.98 | 8.00 | 0.9978 | | | |
| 3.99 | 3.98 | 1.0029 | Slope | 1.002197 | *0.90 - 1.10* |
| 1.99 | 1.99 | 1.0017 | | | |
| | | | Intercept | -0.007135 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

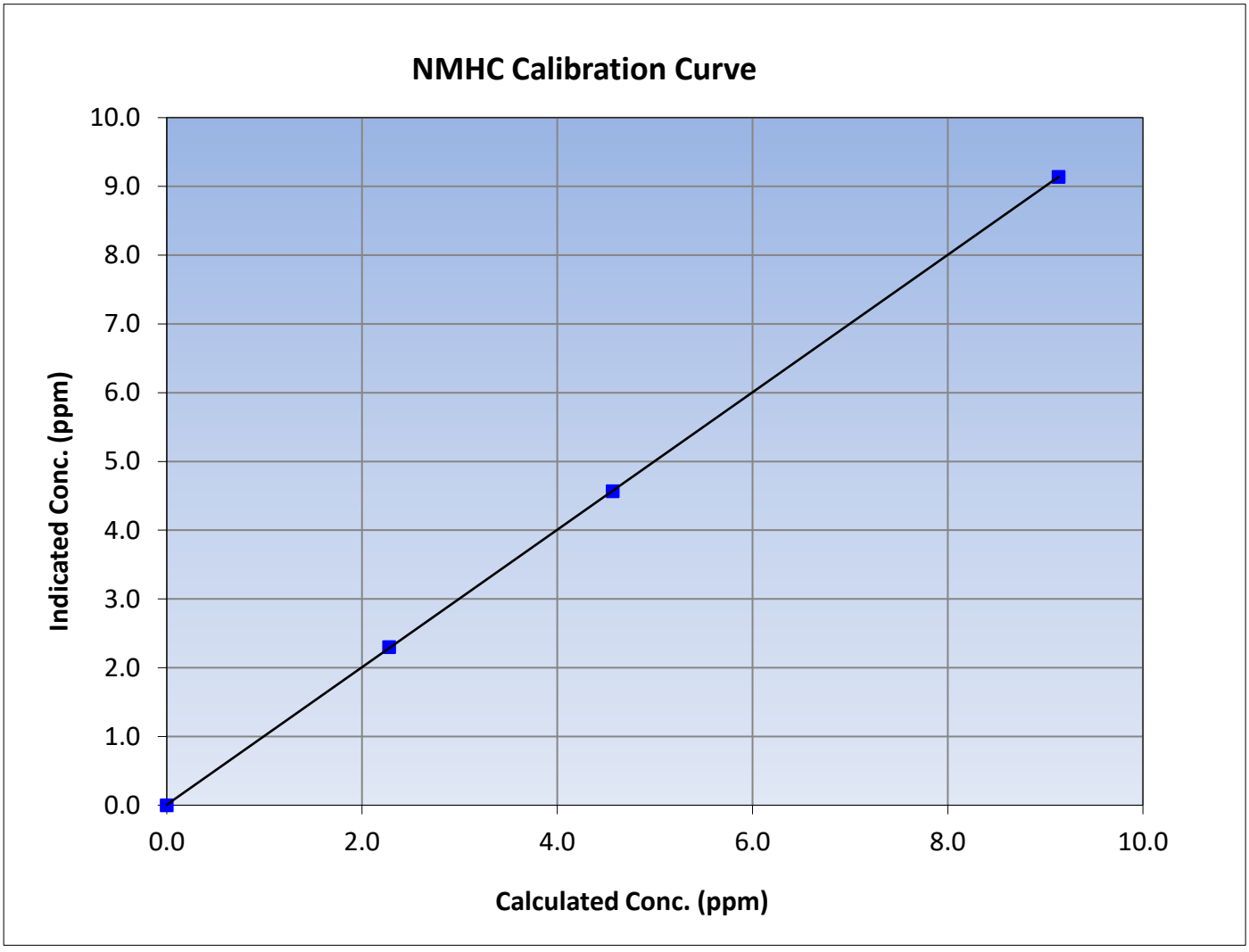
Version-01-2020

### Station Information

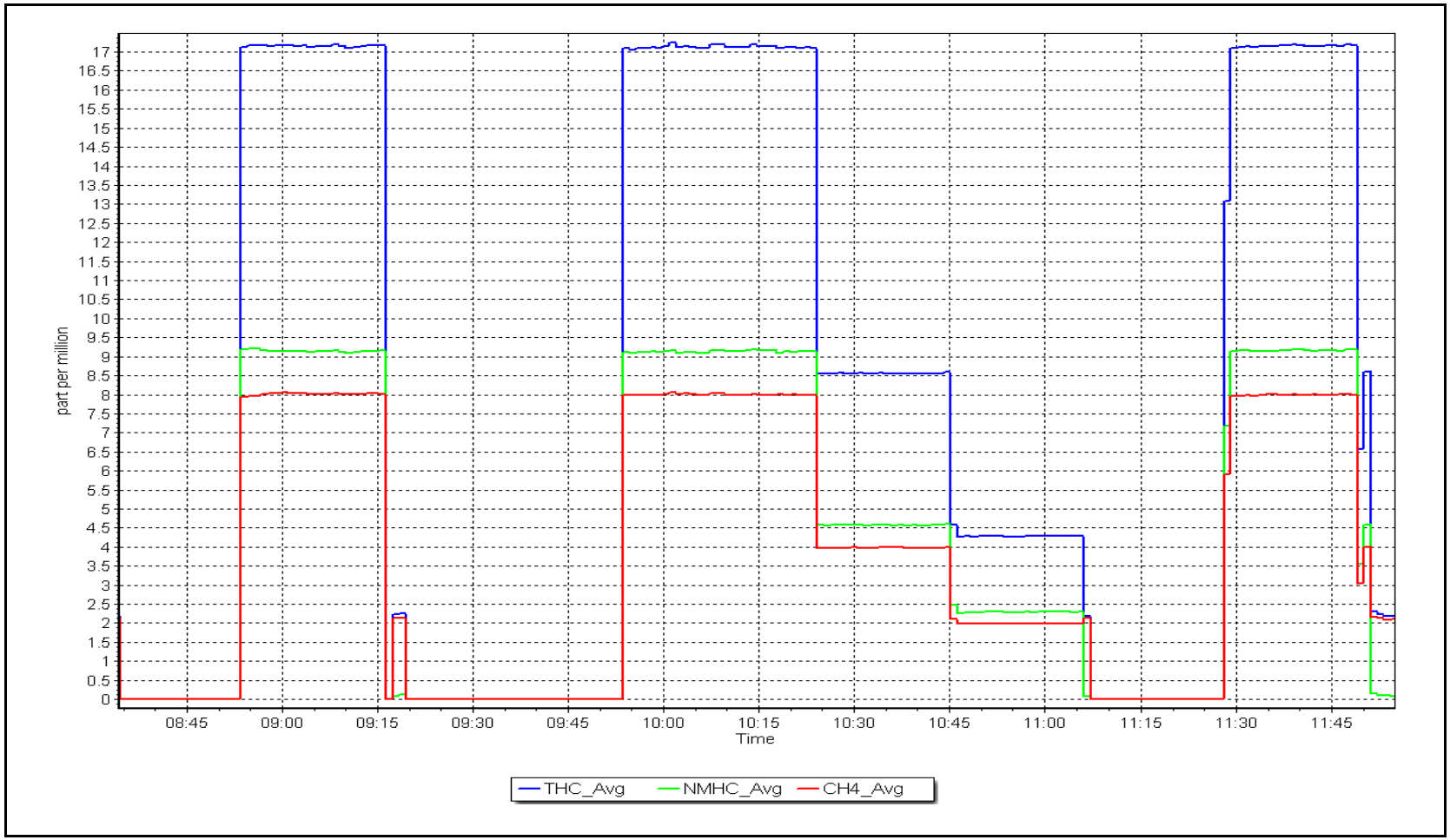
| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Barge Landing | Station Number: | AMS09 |
| Start Time (MST): | 8:31 | End Time (MST): | 11:55 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1193585649 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999994 | *≥0.995* |
| 9.14 | 9.14 | 0.9997 | | | |
| 4.57 | 4.57 | 0.9999 | Slope | 0.999486 | *0.90 - 1.10* |
| 2.28 | 2.30 | 0.9909 | | | |
| | | | Intercept | 0.007995 | *+/-0.5* |



**NMHC Calibration Plot** Date: August 15, 2023 Location: Barge Landing



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Barge Landing | Station number: | AMS09 |
| Calibration Date: | August 23, 2023 | Last Cal Date: | July 5, 2023 |
| Start time (MST): | 9:03 | End time (MST): | 13:42 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | DT0036634 | | Cal Gas Expiry Date: | January 28, 2024 | |
| NOX Cal Gas Conc: | 50.00 | ppm | NO Cal Gas Conc: | 49.70 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 50.00 | ppm | Removed Gas NO Conc: | 49.70 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 3812 | |
| ZAG make/model: | API T701 | | Serial Number: | 4888 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1426262593 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 1.169 | 1.157 | NO bkgnd or offset: | 10.7 | 10.6 |
| NOX coeff or slope: | 0.994 | 0.994 | NOX bkgnd or offset: | 10.9 | 10.8 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 175.6 | 174.9 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.997858 | 0.999930 |
| $NO_X$ Cal Offset: | 0.708793 | 0.929269 |
| NO Cal Slope: | 0.999541 | 1.001426 |
| NO Cal Offset: | -0.472540 | -0.332141 |
| $NO_2$ Cal Slope: | 1.000792 | 1.000531 |
| $NO_2$ Cal Offset: | -0.264400 | 0.173936 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | 0.2 | ---- | ---- |
| as found span | 4919 | 80.5 | 805.1 | 800.3 | 4.8 | 816.2 | 809.5 | 6.6 | 0.986 | 0.989 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 | ---- | ---- |
| high point | 4919 | 80.5 | 805.1 | 800.3 | 4.8 | 805.4 | 801.1 | 4.2 | 1.000 | 0.999 |
| second point | 4959 | 40.2 | 402.1 | 399.7 | 2.4 | 403.7 | 400.0 | 3.7 | 0.996 | 0.999 |
| third point | 4979 | 20.1 | 201.0 | 199.8 | 1.2 | 202.7 | 199.4 | 3.4 | 0.992 | 1.002 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| as left span | 4919 | 80.5 | 805.1 | 437.1 | 368.0 | 804.5 | 437.5 | 366.9 | 1.001 | 0.999 |
| | | | | | | | | Average Correction Factor | 0.996 | 1.000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 816.2 ppb | NO = 809.7 ppb | * = > +/-5% change initiates investigation | | *Percent Change | $NO_X$ = | 1.5% |
| Previous Response | $NO_X$ = 804.1 ppb | NO = 799.4 ppb | | | *Percent Change | NO = | 1.3% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: | |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: | |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: | |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 798.3 | 435.1 | 368.0 | 368.4 | 0.999 | 100.1% |
| 2nd GPT point (200 ppb O3) | 798.3 | 658.4 | 144.7 | 144.9 | 0.999 | 100.1% |
| 3rd GPT point (100 ppb O3) | 798.3 | 727.3 | 75.8 | 76.2 | 0.995 | 100.5% |
| | | | | Average Correction Factor | 0.998 | 100.2% |

Notes: Changed sample inlet filter after as founds. Adjusted span.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

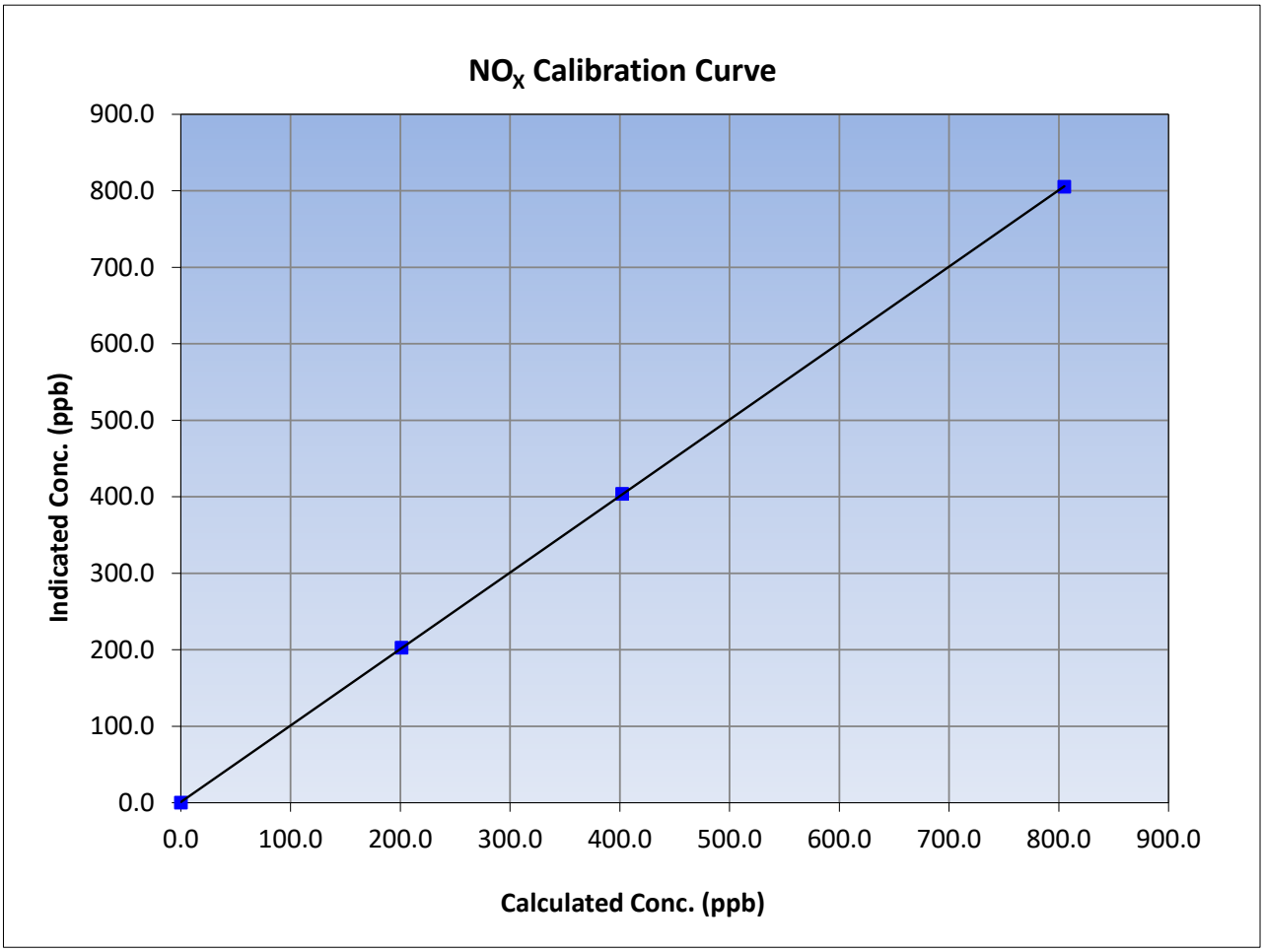
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 5, 2023 |
| Station Name: | Barge Landing | Station Number: | AMS09 |
| Start Time (MST): | 9:03 | End Time (MST): | 13:42 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1426262593 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999994 | *≥0.995* |
| 805.1 | 805.4 | 0.9996 | | | |
| 402.1 | 403.7 | 0.9959 | Slope | 0.999930 | *0.90 - 1.10* |
| 201.0 | 202.7 | 0.9918 | | | |
| | | | Intercept | 0.929269 | *+/-20* |



# Wood Buffalo Environmental Association

## NO Calibration Summary

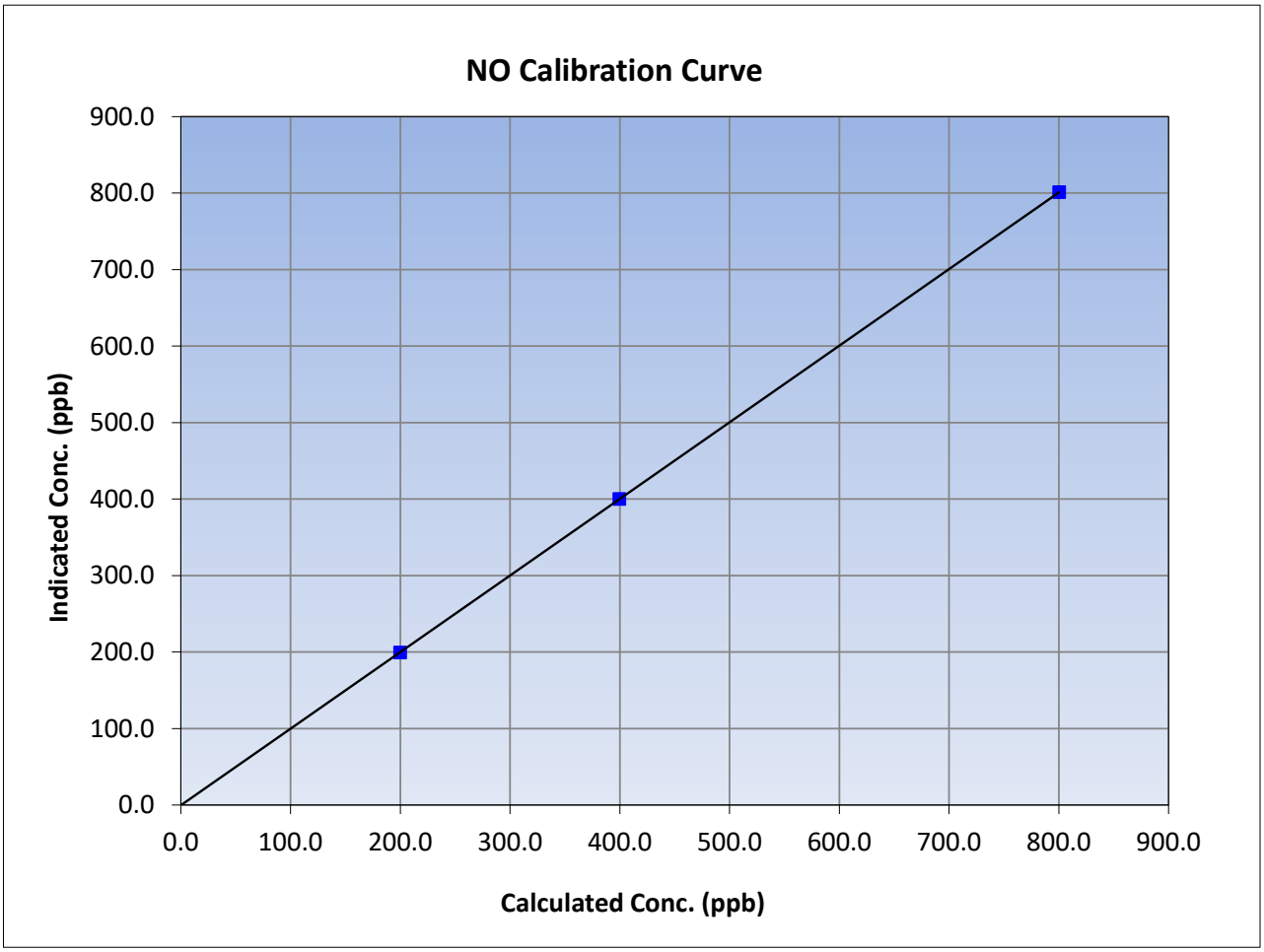
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 5, 2023 |
| Station Name: | Barge Landing | Station Number: | AMS09 |
| Start Time (MST): | 9:03 | End Time (MST): | 13:42 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1426262593 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999999 | ≥0.995 |
| 800.3 | 801.1 | 0.9989 | | | |
| 399.7 | 400.0 | 0.9991 | Slope | 1.001426 | 0.90 - 1.10 |
| 199.8 | 199.4 | 1.0022 | | | |
| | | | Intercept | -0.332141 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

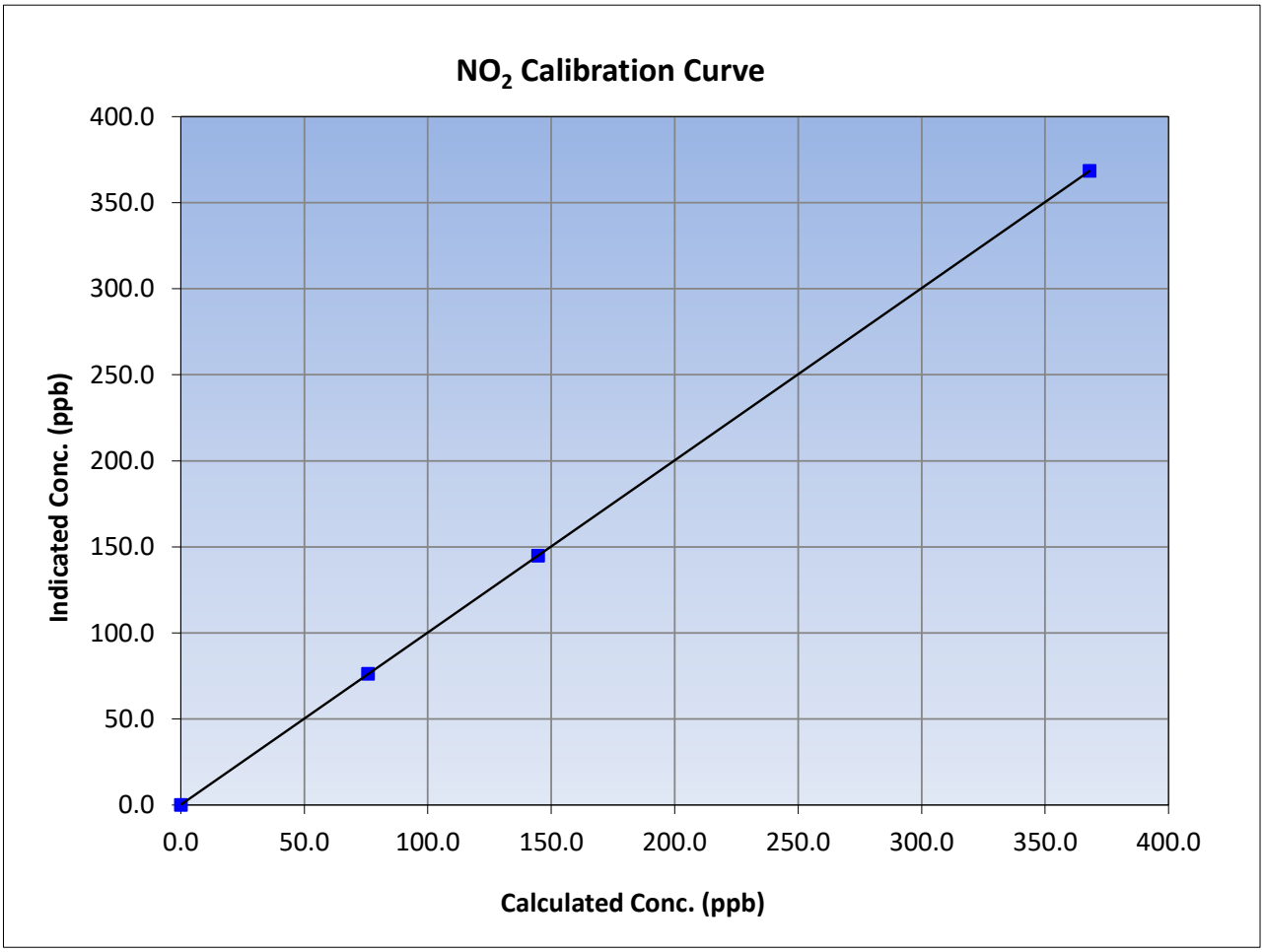
Version-04-2020

### Station Information

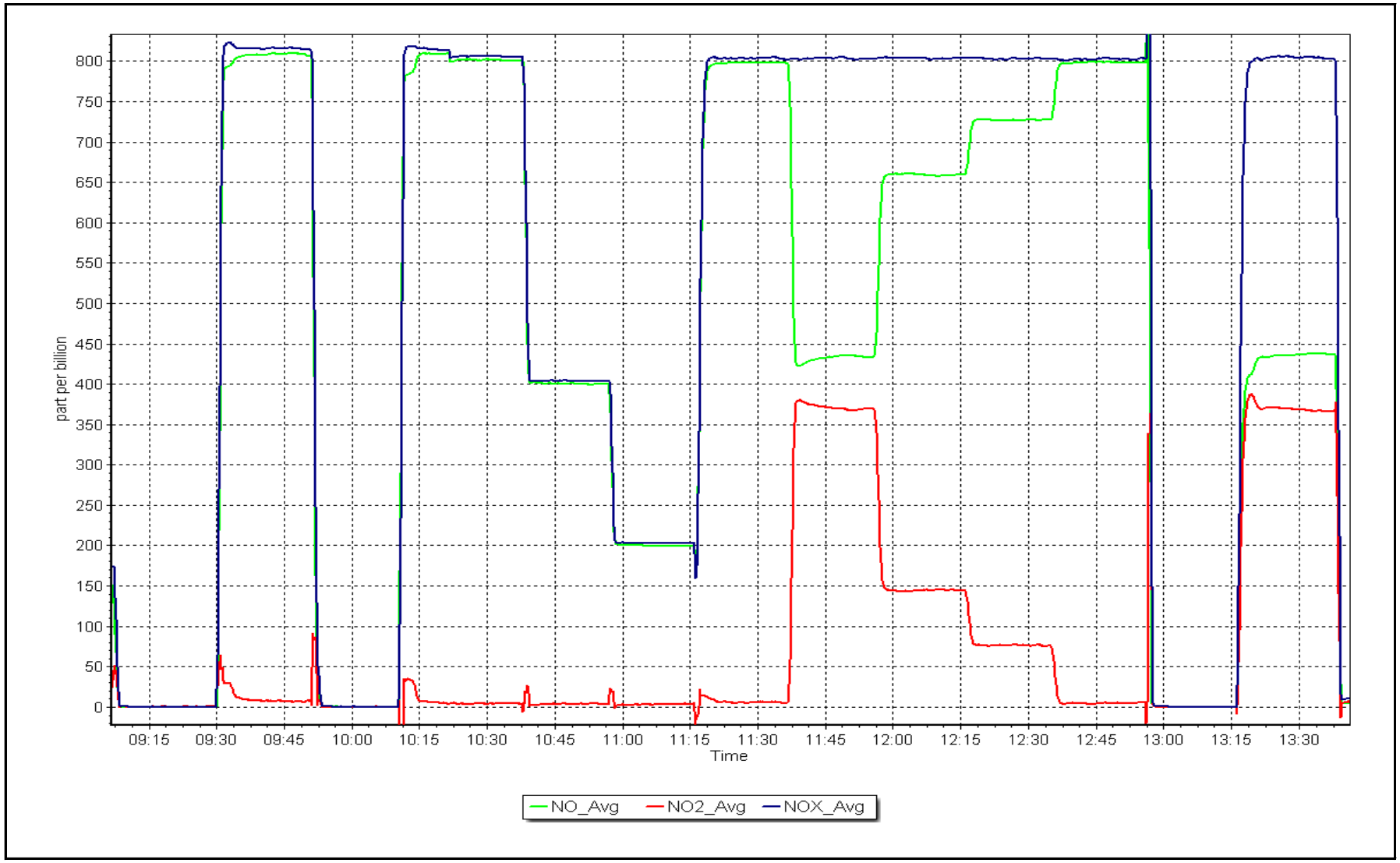
| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 5, 2023 |
| Station Name: | Barge Landing | Station Number: | AMS09 |
| Start Time (MST): | 9:03 | End Time (MST): | 13:42 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1426262593 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 1.000000 | *≥0.995* |
| 368.0 | 368.4 | 0.9990 | | | |
| 144.7 | 144.9 | 0.9988 | Slope | 1.000531 | *0.90 - 1.10* |
| 75.8 | 76.2 | 0.9952 | | | |
| | | | Intercept | 0.173936 | *+/-20* |



**$NO_X$ Calibration Plot** Date: August 23, 2023 Location: Barge Landing



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Barge Landing | Station number: | AMS 09 |
| Calibration Date: | August 23, 2023 | Last Cal Date: | July 5, 2023 |
| Start time (MST): | 9:38 | End time (MST): | 10:45 |
| Analyzer Make: | API T640 | S/N: | 321 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | DeltaCal | S/N: | 1451 |
| Temp/RH standard: | DeltaCal | S/N: | 1451 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | 15.8 | 16.2 | 15.8 | ☐ | +/- 2 °C |
| P (mmHg) | 732.8 | 733.5 | 732.8 | ☐ | +/- 10 mmHg |
| flow (LPM) | 4.99 | 5.06 | 4.99 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 23, 2023 Last Cal Date: July 5, 2023

PM w/o HEPA: 26.9 PM w/ HEPA: 0.0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 10.0 | 10.9 | 10.9 | ☑ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 26.6 w/ HEPA: 0.0

Date Optical Chamber Cleaned: August 23, 2023 <0.2 ug/m3

Disposable Filter Changed: August 23, 2023

### Annual Maintenance

Date Sample Tube Cleaned: August 23, 2023

Date RH/T Sensor Cleaned: August 23, 2023

Notes: Inlet head looks good. No adjustments made. Leak check passed. PMT adjusted.

Calibration by: Sean Bala

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Barge Landing | Station Number: | AMS 09 |
| Calibration Date: | August 22, 2023 | Prev Cal Date: | November 15, 2022 |
| Start Time (MST): | 10:45 | End Time (MST): | 10:59 |
| Tower Height (m): | 20.0 | Reason: | Removal |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | P19838 |
| WS Calibrator: | MetOne 053 | Serial Number: | P15103 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.3 | 0.5% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | 0.0% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 1.000000 | 0.999999 | *≥0.9995* |
| Calculated slope | 0.999465 | 0.999594 | *0.90 - 1.10* |
| Calculated intercept | -0.013446 | -0.028293 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | E4852 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | 13:29 | Calc Declination*: | 13.72 Degrees |
| Deadband calc: | 4.1 degrees (*Limit 4 deg*) | * - calculated declination as per NOAA website | |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 1.0 | --- |
| 90 | 88.1 | -0.5% |
| 180 | 177.1 | -0.8% |
| 270 | 266.3 | -1.0% |
| 357 | 353.9 | -0.9% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999975 | 0.999975 | *≥0.9995* |
| Calculated slope | 1.010368 | 1.011326 | *0.90 - 1.10* |
| Calculated intercept | -3.799847 | 0.097530 | *+/- 4* |

Notes: Removing the old 20m WS/WD sensors. WD sensor calibration was completed at the shop.

Calibration Performed By: Rene Chamberland & Devin Russell

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Barge Landing | Station Number: | AMS 09 |
| Calibration Date: | August 22, 2023 | Prev Cal Date: | November 15, 2022 |
| Start Time (MST): | 10:15 | End Time (MST): | 10:30 |
| Tower Height (m): | 20.0 | Reason: | Install |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | B4129 |
| WS Calibrator: | MetOne 053 | Serial Number: | P15103 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.3 | 0.5% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | 0.0% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999999 | *≥0.9995* |
| Calculated slope | | 0.999594 | *0.90 - 1.10* |
| Calculated intercept | | -0.028293 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | D14061 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | 13:29 | Calc Declination*: | 13.72 Degrees |
| Deadband calc: | -1.8 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | -0.7 | --- |
| 90 | 88.2 | -0.5% |
| 180 | 178.5 | -0.4% |
| 270 | 268.6 | -0.4% |
| 357 | 358.1 | 0.3% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999975 | *≥0.9995* |
| Calculated slope | | 0.995462 | *0.90 - 1.10* |
| Calculated intercept | | 1.663468 | *+/- 4* |

Notes: Installing new 20m WS/WD sensors. Crossarm aligned with true north. No issues to note.

Calibration Performed By: Rene Chamberland & Devin Russell.

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS11
## LOWER CAMP
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Lower Camp | Station number: | AMS11 |
| Calibration Date: | August 10, 2023 | Last Cal Date: | July 17, 2023 |
| Start time (MST): | 9:48 | End time (MST): | 12:42 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.25 | ppm | Cal Gas Exp Date: | February 23, 2025 |
| Cal Gas Cylinder #: | CC2216 | | | |
| Removed Cal Gas Conc: | 49.25 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3807 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 196 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 100841398

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.004778 | 1.001812 | Backgd or Offset: | 14.7 | 14.8 |
| Calibration intercept: | 0.370932 | 0.110451 | Coeff or Slope: | 1.034 | 1.034 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as found span | 4919 | 81.3 | 800.8 | 803.3 | 0.997 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| high point | 4919 | 81.3 | 800.8 | 802.6 | 0.998 |
| second point | 4959 | 40.7 | 400.9 | 401.4 | 0.999 |
| third point | 4980 | 20.3 | 199.9 | 200.0 | 1.000 |
| as left zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as left span | 4919 | 81.3 | 800.8 | 805.7 | 0.994 |
| | | | | Average Correction Factor | 0.999 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 803.00 | Previous response | 804.95 | *% change | -0.2% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

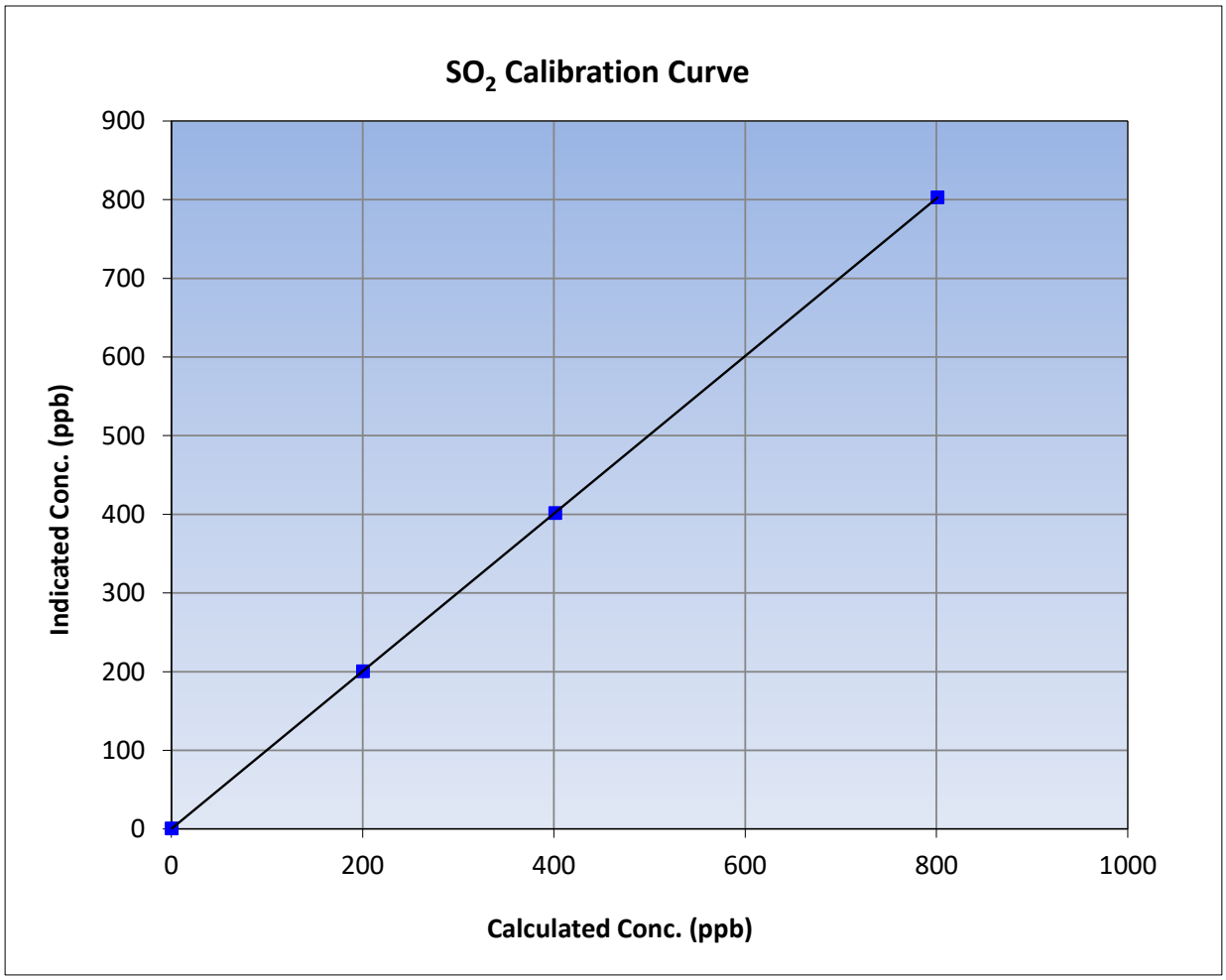
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Lower Camp | Station Number: | AMS11 |
| Start Time (MST): | 9:48 | End Time (MST): | 12:42 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 100841398 |

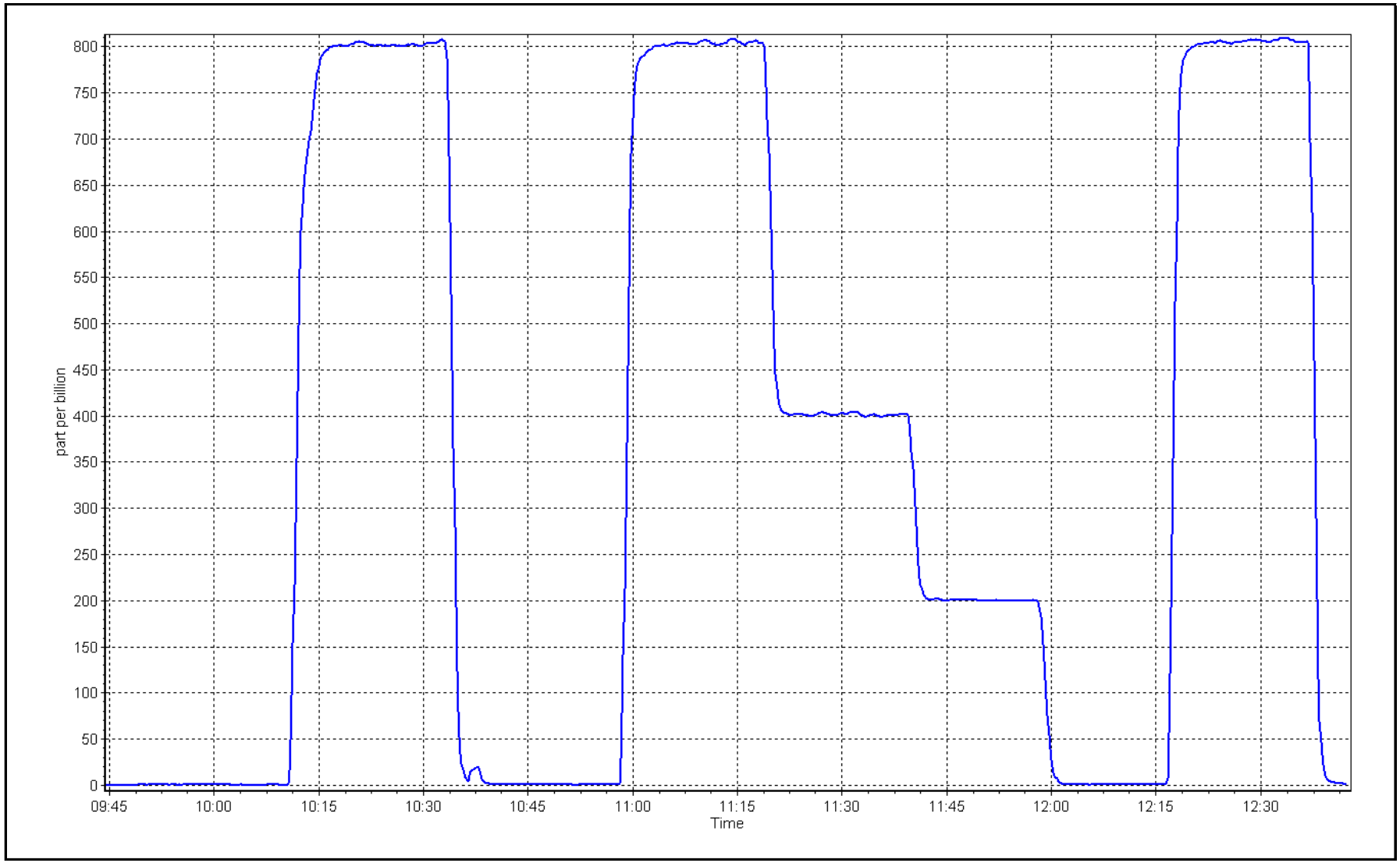
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.6 | ---- |
| 800.8 | 802.6 | 0.9977 |
| 400.9 | 401.4 | 0.9988 |
| 199.9 | 200.0 | 0.9997 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999998 | *≥0.995* |
| Slope | 1.001812 | *0.90 - 1.10* |
| Intercept | 0.110451 | *+/-30* |



**SO2 Calibration Plot** Date: August 10, 2023 Location: Lower Camp



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Lower Camp | Station number: | AMS11 |
| Calibration Date: | August 29, 2023 | Last Cal Date: | July 18, 2023 |
| Start time (MST): | 10:31 | End time (MST): | 14:44 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.429 | ppm | Cal Gas Exp Date: | January 4, 2025 |
| Cal Gas Cylinder #: | CC501097 | | | |
| Removed Cal Gas Conc: | 5.429 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3807 |
| ZAG Make/Model: | API T701H | | Serial Number: | 196 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 450iQ | | Analyzer serial #: | CM20080003 | |
| Converter make: | NA | | Converter serial #: | NA | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.017077 | 1.017077 | Backgd or Offset: | 13.5 | 14.1 |
| Calibration intercept: | 0.133554 | -0.466446 | Coeff or Slope: | 1.001 | 1.001 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| as found span | 4926 | 73.6 | 79.9 | 81.0 | 0.993 |
| as found 2nd point | 4963 | 36.8 | 40.0 | 41.0 | 0.987 |
| as found 3rd point | 4982 | 18.6 | 20.2 | 20.6 | 1.005 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | -0.5 | ---- |
| high point | 4926 | 73.6 | 79.9 | 80.8 | 0.989 |
| second point | 4963 | 36.8 | 40.0 | 40.2 | 0.994 |
| third point | 4982 | 18.6 | 20.2 | 20.1 | 1.005 |
| as left zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as left span | 4926 | 73.6 | 79.9 | 80.4 | 0.994 |
| SO2 Scrubber Check | 4919 | 81.1 | 811.0 | 0.1 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 0.996 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 80.5 | Prev response: | 81.42 | *% change: | -1.1% |
| Baseline Corr 2nd AF pt: | 40.5 | AF Slope: | 1.008617 | AF Intercept: | 0.454811 |
| Baseline Corr 3rd AF pt: | 20.1 | AF Correlation: | 0.999968 | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Completed SO2 scrubber check after calibrator zero. Adjusted zero only.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

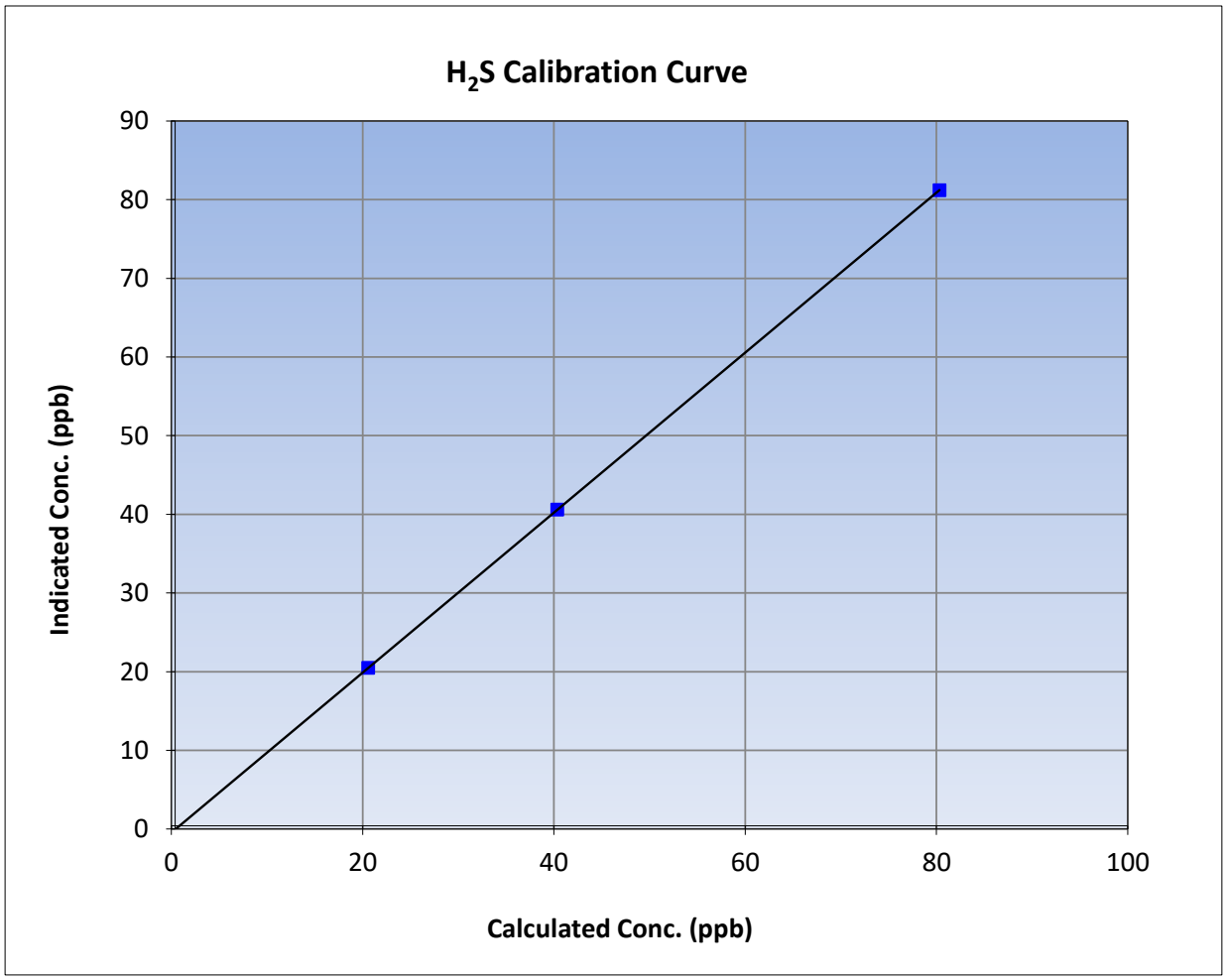
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 29, 2023 | Previous Calibration: | July 18, 2023 |
| Station Name: | Lower Camp | Station Number: | AMS11 |
| Start Time (MST): | 10:31 | End Time (MST): | 14:44 |
| Analyzer make: | Thermo 450iQ | Analyzer serial #: | CM20080003 |

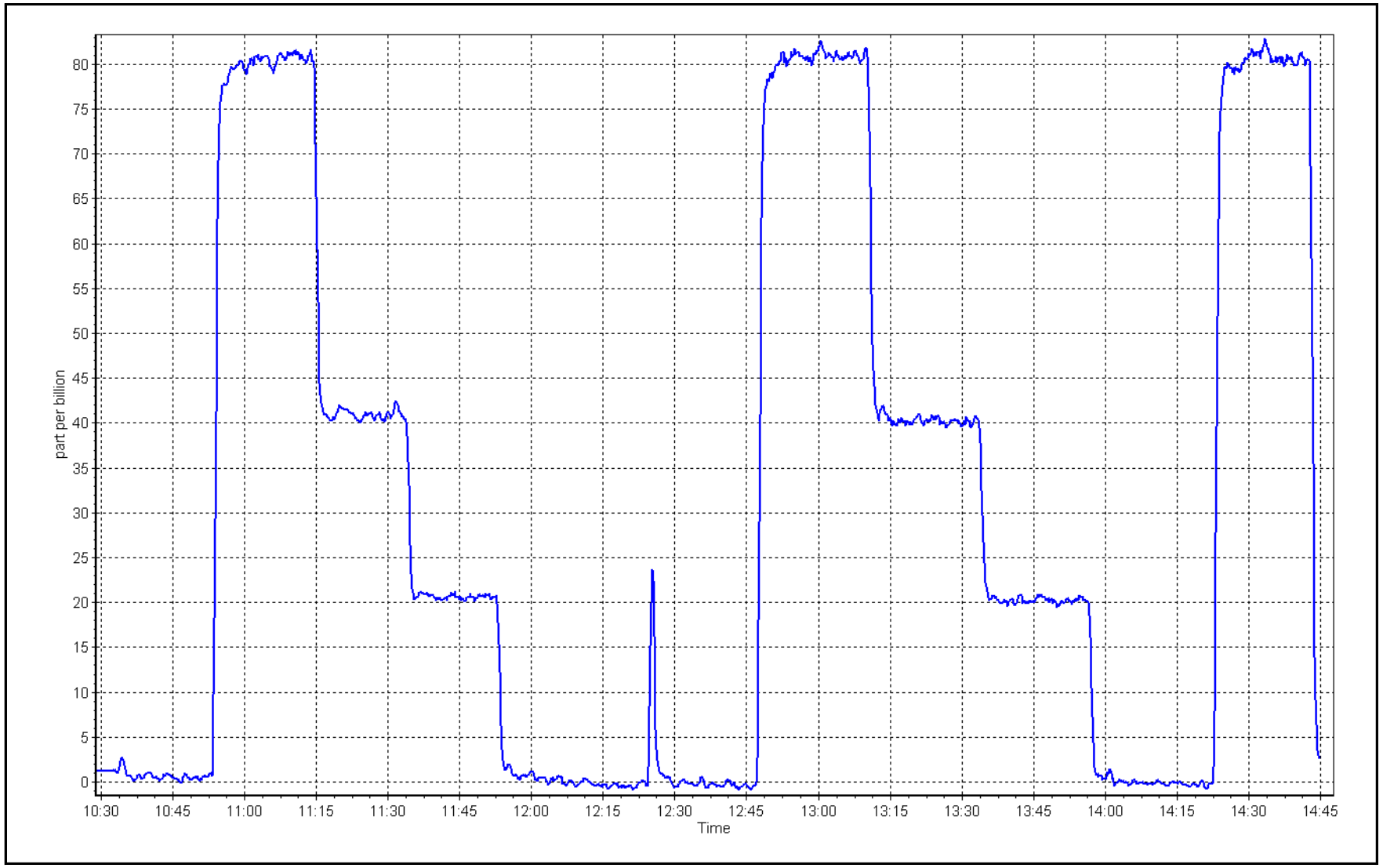
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.5 | ---- |
| 79.9 | 80.8 | 0.9891 |
| 40.0 | 40.2 | 0.9940 |
| 20.2 | 20.1 | 1.0046 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999999 | *≥0.995* |
| Slope | 1.017077 | *0.90 - 1.10* |
| Intercept | -0.466446 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 29, 2023 Location: Lower Camp



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Lower Camp | Station number: | AMS11 |
| Calibration Date: | August 10, 2023 | Last Cal Date: | July 17, 2023 |
| Start time (MST): | 9:48 | End time (MST): | 12:42 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC2216 | Cal Gas Expiry Date: | February 23, 2025 | |
| CH4 Cal Gas Conc. | 502.0 | ppm | CH4 Equiv Conc. | 1067.1 | ppm |
| C3H8 Cal Gas Conc. | 205.5 | ppm | | | |
| Removed Gas Cert: | | | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 502.0 | ppm | CH4 Equiv Conc. | 1067.1 | ppm |
| Removed C3H8 Conc. | 205.5 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 3807 | |
| ZAG make/model: | API T701 | | Serial Number: | 196 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1505164381 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.99E-04 | 2.99E-04 | NMHC SP Ratio: | 5.79E-05 | 5.79E-05 |
| CH4 Retention time: | 14.0 | 14.0 | NMHC Peak Area: | 158468 | 158468 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 81.3 | 17.35 | 17.24 | 1.007 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.3 | 17.35 | 17.29 | 1.004 |
| second point | 4959 | 40.7 | 8.69 | 8.59 | 1.011 |
| third point | 4980 | 20.3 | 4.33 | 4.29 | 1.011 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 81.3 | 17.35 | 17.36 | 1.000 |
| | | | | Average Correction Factor | 1.009 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 17.24 | Prev response | 17.21 | *% change | 0.2% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 81.3 | 9.19 | 9.14 | 1.006 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.3 | 9.19 | 9.15 | 1.004 |
| second point | 4959 | 40.7 | 4.60 | 4.56 | 1.010 |
| third point | 4980 | 20.3 | 2.29 | 2.28 | 1.008 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 81.3 | 9.19 | 9.19 | 1.000 |
| | | | | Average Correction Factor | 1.007 |
| Baseline Corr AF: | 9.14 | Prev response | 9.12 | *% change | 0.2% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 81.3 | 8.16 | 8.10 | 1.007 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.3 | 8.16 | 8.13 | 1.004 |
| second point | 4959 | 40.7 | 4.09 | 4.03 | 1.014 |
| third point | 4980 | 20.3 | 2.04 | 2.01 | 1.014 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 81.3 | 8.16 | 8.16 | 1.000 |
| | | | | Average Correction Factor | 1.010 |
| Baseline Corr AF: | 8.10 | Prev response | 8.09 | *% change | 0.1% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 0.992518 | 0.996495 |
| THC Cal Offset: | -0.014592 | -0.024788 |
| CH4 Cal Slope: | 0.993056 | 0.996527 |
| CH4 Cal Offset: | -0.015088 | -0.015486 |
| NMHC Cal Slope: | 0.992065 | 0.996217 |
| NMHC Cal Offset: | 0.000895 | -0.009301 |

Notes: Changed sample inlet filter after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## THC Calibration Summary

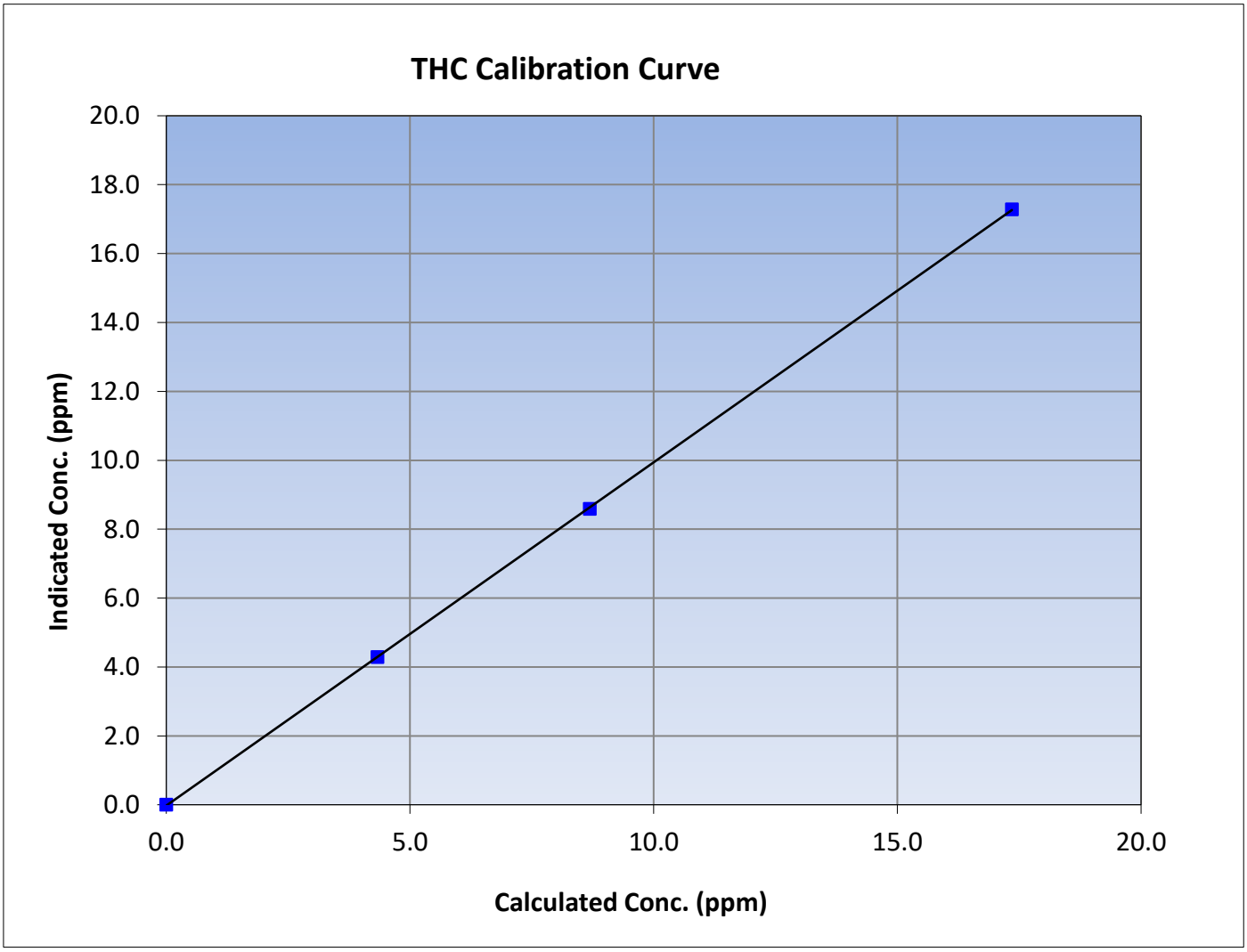
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Lower Camp | Station Number: | AMS11 |
| Start Time (MST): | 9:48 | End Time (MST): | 12:42 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1505164381 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999982 | ≥0.995 |
| 17.35 | 17.29 | 1.0037 | | | |
| 8.69 | 8.59 | 1.0112 | Slope | 0.996495 | 0.90 - 1.10 |
| 4.33 | 4.29 | 1.0110 | | | |
| | | | Intercept | -0.024788 | +/-0.5 |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

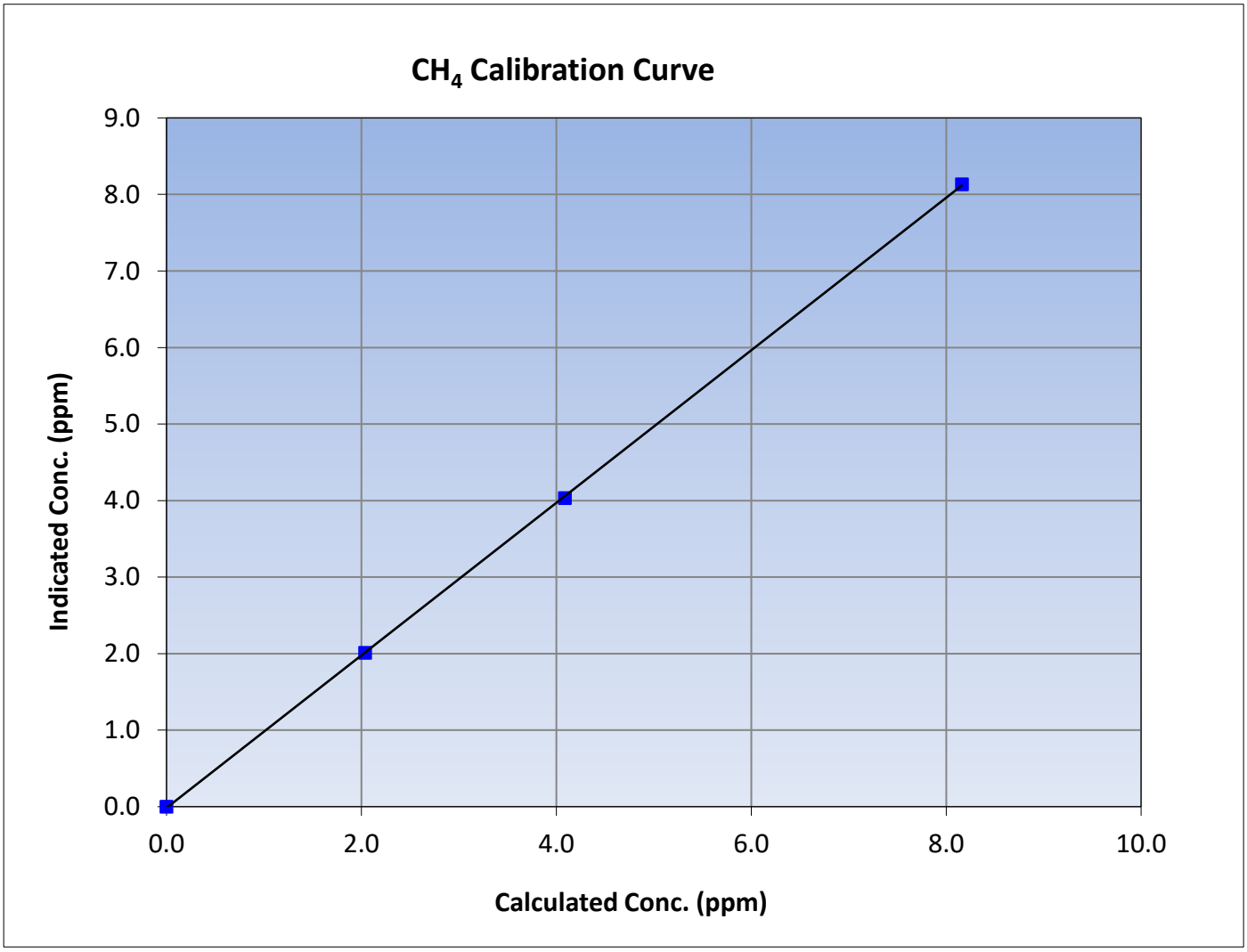
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Lower Camp | Station Number: | AMS11 |
| Start Time (MST): | 9:48 | End Time (MST): | 12:42 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1505164381 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999969 | *≥0.995* |
| 8.16 | 8.13 | 1.0037 | | | |
| 4.09 | 4.03 | 1.0135 | Slope | 0.996527 | *0.90 - 1.10* |
| 2.04 | 2.01 | 1.0139 | | | |
| | | | Intercept | -0.015486 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

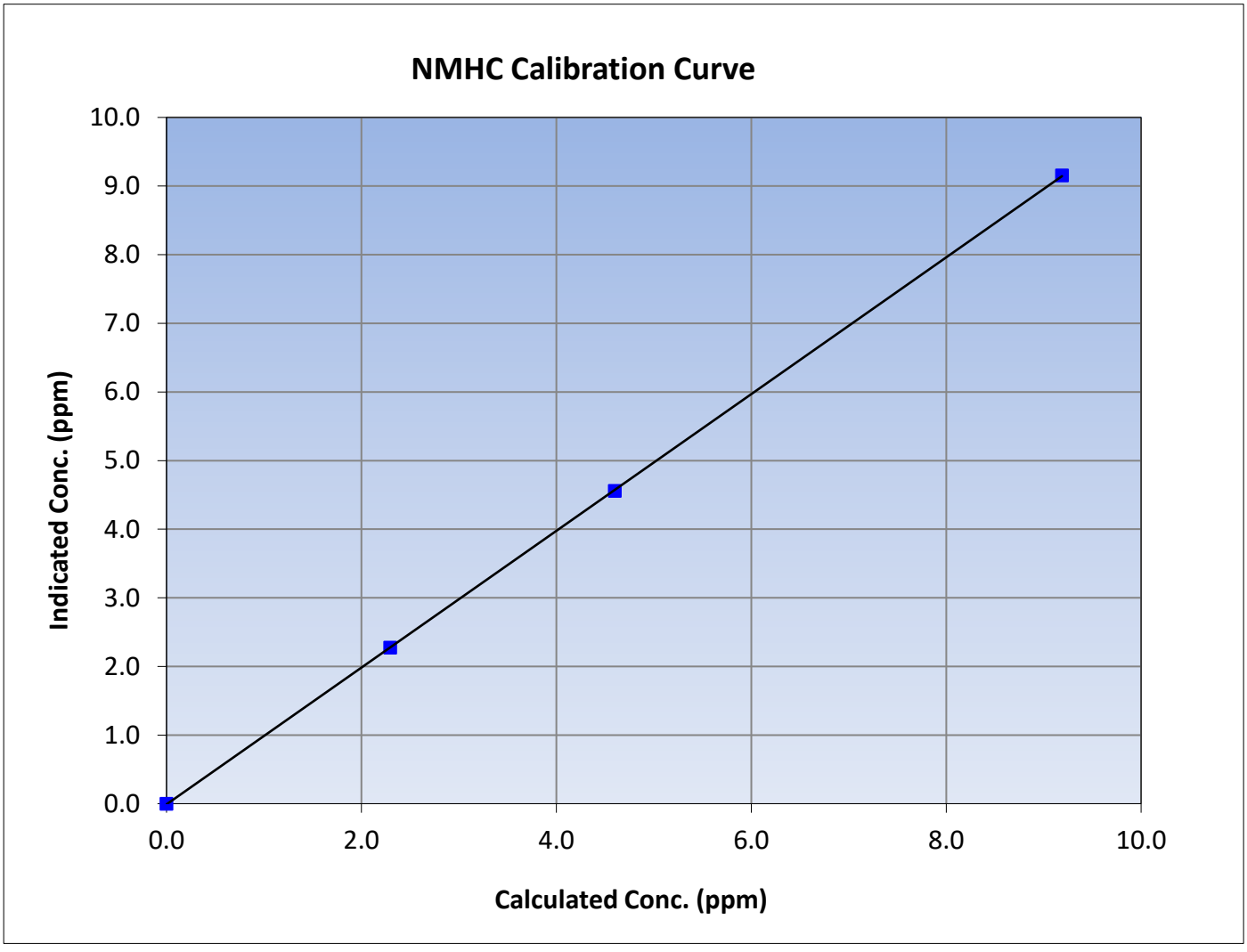
Version-01-2020

### Station Information

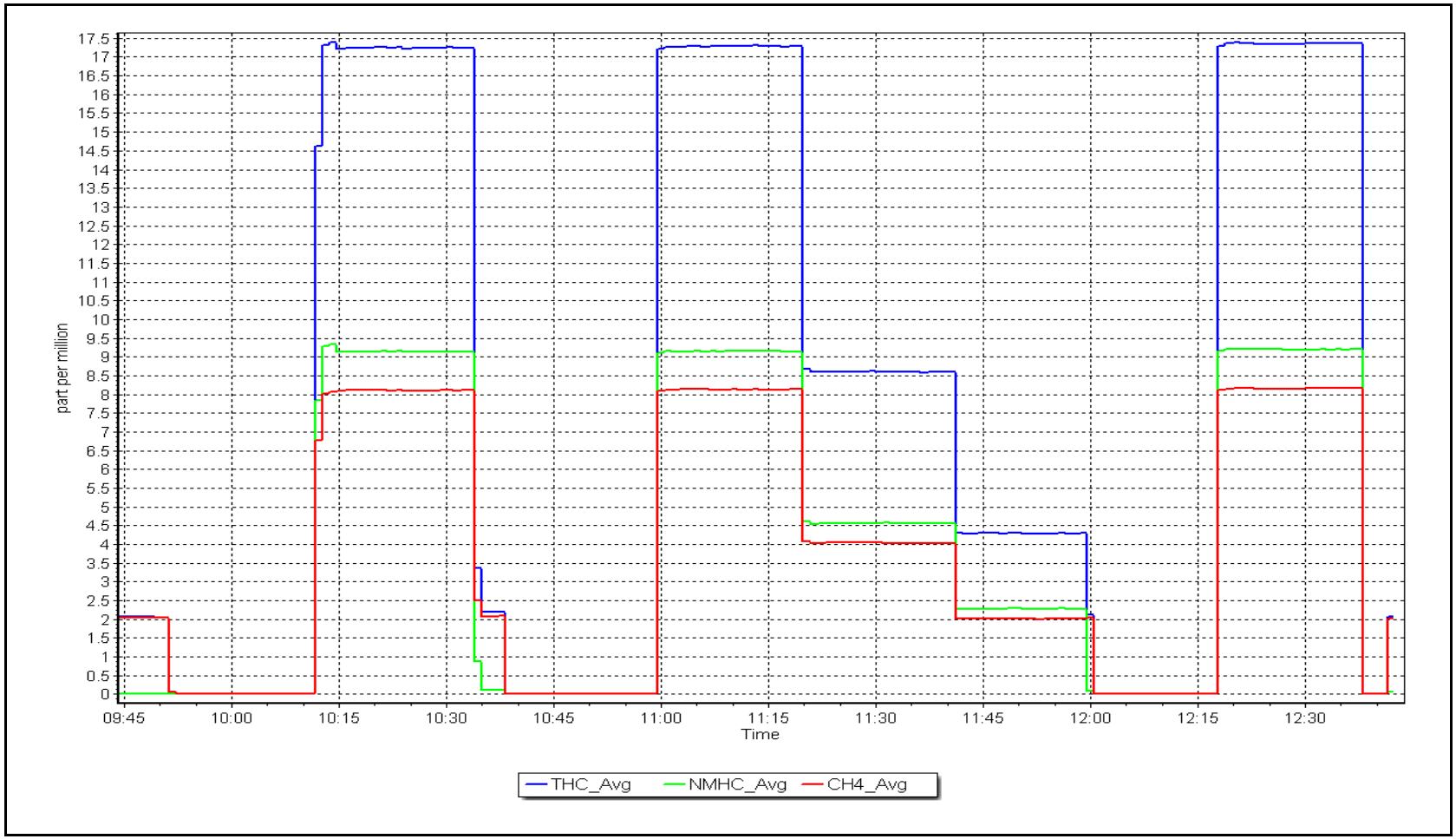
| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Lower Camp | Station Number: | AMS11 |
| Start Time (MST): | 9:48 | End Time (MST): | 12:42 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1505164381 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999990 | *≥0.995* |
| 9.19 | 9.15 | 1.0039 | | | |
| 4.60 | 4.56 | 1.0095 | Slope | 0.996217 | *0.90 - 1.10* |
| 2.29 | 2.28 | 1.0085 | | | |
| | | | Intercept | -0.009301 | *+/-0.5* |



**NMHC Calibration Plot** Date: August 10, 2023 Location: Lower Camp



# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | | |
|---|---|---|---|---|
| Station Name: | Lower Camp | Station Number: | AMS 11 | |
| Calibration Date: | August 16, 2023 | Prev Cal Date: | July 21, 2023 | |
| Start Time (MST): | 9:17 | End Time (MST): | 9:45 | |
| Tower Height (m): | 10.0 | Reason: | As Found | To test WD sensor. |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | NA | Serial Number: | NA |
| WS Calibrator: | NA | Serial Number: | NA |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | NA | --- |
| 200 | 20.2 | NA | |
| 400 | 39.4 | NA | |
| 600 | 58.6 | NA | |
| 800 | 77.8 | NA | |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999998 | | *≥0.9995* |
| Calculated slope | 0.998863 | | *0.90 - 1.10* |
| Calculated intercept | 0.064097 | | *+/- 2* |

### Wind Direction Information

| | | | | | |
|---|---|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | | Serial Number: | N12035 | |
| As Found Declination (deg east of True North): | 14 | | As Left Declination (deg east of True North): | 14 | |
| Solar noon time (MST): | 13:30 | | Calc Declination*: | 13.64 | Degrees |
| Deadband calc: | 4.0 degrees (*Limit 4 deg*) | | | * - calculated declination as per NOAA website | |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 3.0 | --- |
| 90 | 90.6 | 0.2% |
| 180 | 180.1 | 0.0% |
| 270 | 272.5 | 0.7% |
| 354.5 | 356.0 | 0.4% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999918 | 0.999964 | *≥0.9995* |
| Calculated slope | 0.998903 | 1.001308 | *0.90 - 1.10* |
| Calculated intercept | -0.302646 | -1.771447 | *+/- 4* |

Notes: Performed WD as founds to test sensor since it was not trending with nearby stations. Sensor was not secured in its coupler properly this caused misalignment with true north; readings were off ~54 degrees. Installed the sensor back and realigned crossarm using solar noon as reference.

Calibration Performed By: Mohammed Kashif

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS13
## FORT MCKAY SOUTH
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort McKay South | Station number: | AMS13 |
| Calibration Date: | August 16, 2023 | Last Cal Date: | July 25, 2023 |
| Start time (MST): | 8:48 | End time (MST): | 12:02 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 50.55 | ppm | Cal Gas Exp Date: | December 29, 2028 |
| Cal Gas Cylinder #: | CC260812 | | | |
| Removed Cal Gas Conc: | 50.55 | ppm | Rem Gas Exp Date: | N/A |
| Removed Gas Cyl #: | N/A | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 2448 |
| ZAG Make/Model: | API 701 | | Serial Number: | 1117 |

### Analyzer Information

Analyzer make: API T100 Analyzer serial #: 599

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.002083 | 1.002886 | Backgd or Offset: | 86.3 | 86.3 |
| Calibration intercept: | -1.997771 | -2.078412 | Coeff or Slope: | 0.715 | 0.715 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 4921 | 79.1 | 799.7 | 799.4 | 1.000 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4921 | 79.1 | 799.7 | 801.0 | 0.998 |
| second point | 4961 | 39.5 | 399.3 | 397.3 | 1.005 |
| third point | 4980 | 19.8 | 200.2 | 196.5 | 1.019 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4921 | 79.1 | 799.7 | 800.6 | 0.999 |
| | | | | Average Correction Factor | 1.007 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 799.30 | Previous response | 799.35 | *% change | 0.0% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. No adjustments made.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

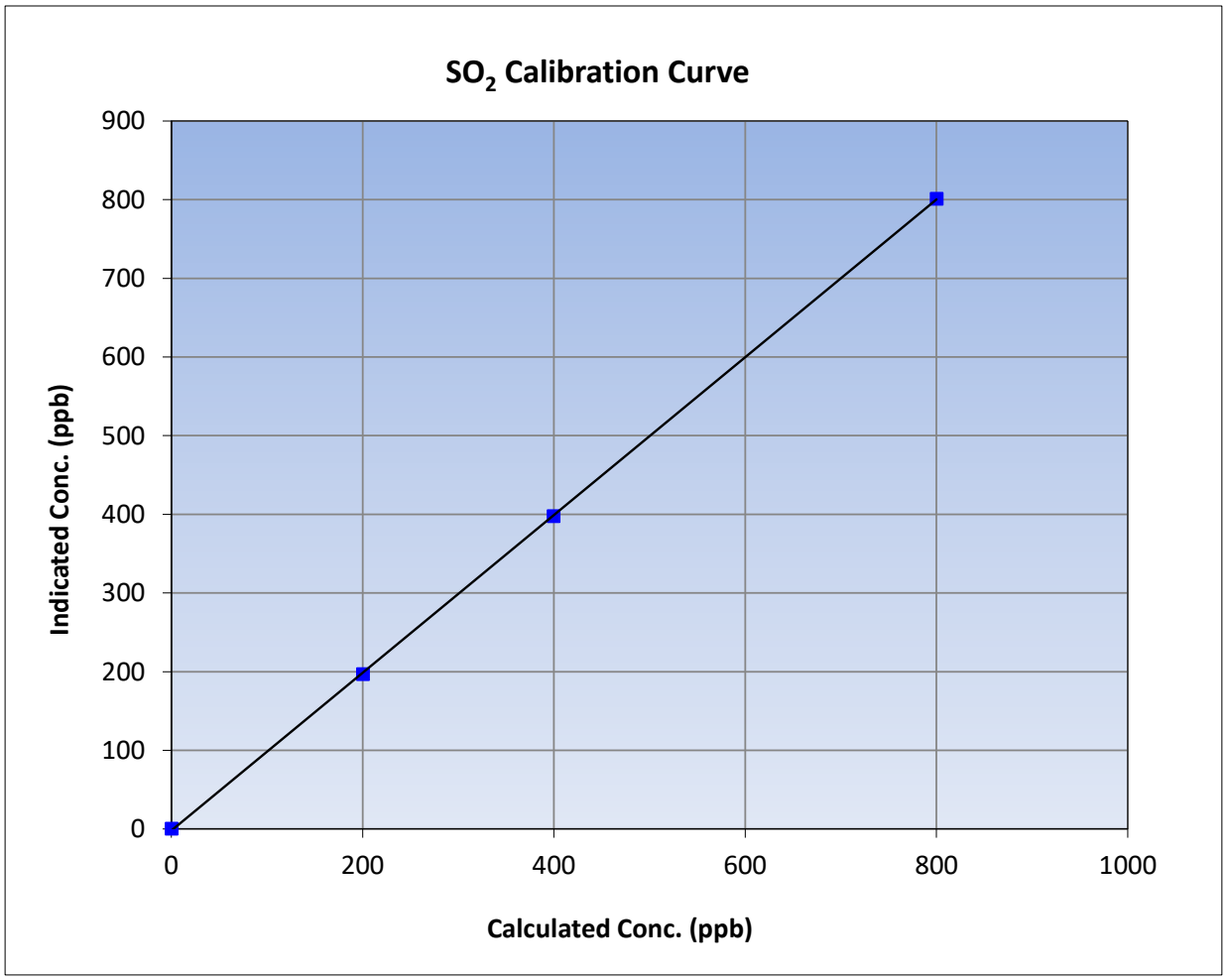
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Fort McKay South | Station Number: | AMS13 |
| Start Time (MST): | 8:48 | End Time (MST): | 12:02 |
| Analyzer make: | API T100 | Analyzer serial #: | 599 |

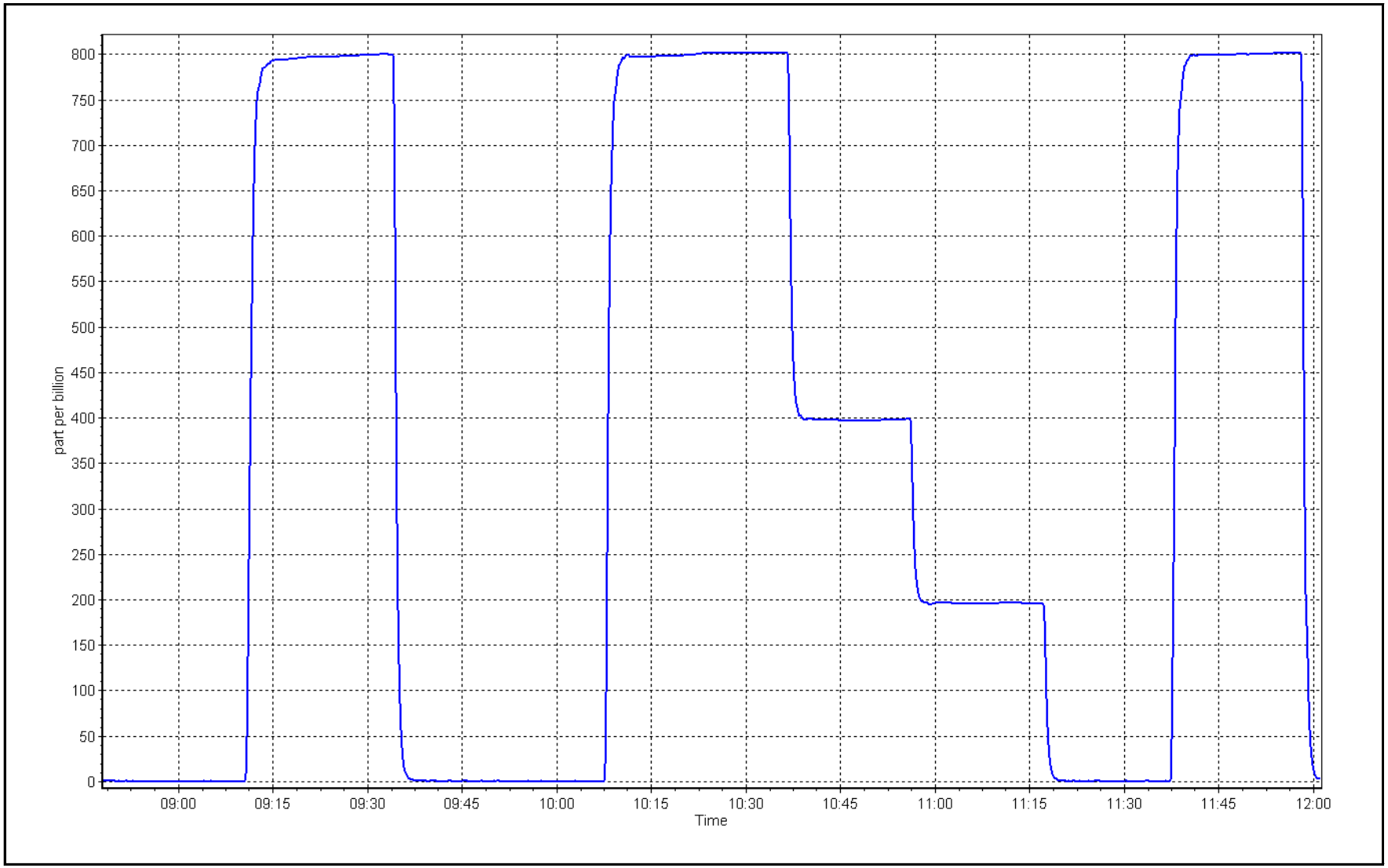
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 799.7 | 801.0 | 0.9984 |
| 399.3 | 397.3 | 1.0050 |
| 200.2 | 196.5 | 1.0188 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999966 | *≥0.995* |
| Slope | 1.002886 | *0.90 - 1.10* |
| Intercept | -2.078412 | *+/-30* |



**SO2 Calibration Plot** Date: August 16, 2023 Location: Fort McKay South



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort McKay South | Station number: | AMS13 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 8:55 | End time (MST): | 13:25 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.34 | ppm | Cal Gas Exp Date: | January 4, 2025 |
| Cal Gas Cylinder #: | CC500241 | | | |
| Removed Cal Gas Conc: | 5.34 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 2448 |
| ZAG Make/Model: | Teledyne API 701 | | Serial Number: | 1117 |

### Analyzer Information

| | | | | |
|---|---|---|---|---|
| Analyzer make: | Thermo 43i TLE | | Analyzer serial #: | 1180540017 |
| Converter make: | CDN-101 | | Converter serial #: | 521 |
| Analyzer Range | 0 - 100 ppb | | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.995542 | 1.004479 | Backgd or Offset: | 3.54 | 3.77 |
| Calibration intercept: | -0.262162 | -0.502377 | Coeff or Slope: | 1.066 | 1.130 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 4925 | 75.5 | 80.6 | 76.9 | 1.046 |
| as found 2nd point | 4962 | 37.7 | 40.3 | 38.1 | 1.051 |
| as found 3rd point | 4981 | 18.9 | 20.2 | 18.7 | 1.068 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 4925 | 75.5 | 80.6 | 80.7 | 0.999 |
| second point | 4962 | 37.7 | 40.3 | 39.6 | 1.017 |
| third point | 4981 | 18.9 | 20.2 | 19.6 | 1.030 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4925 | 75.5 | 80.6 | 78.3 | 1.030 |
| SO2 Scrubber Check | 4921 | 79.1 | 791.0 | 0.1 | ---- |
| Date of last scrubber change: | | 20-Mar-20 | | Ave Corr Factor | 1.015 |
| Date of last converter efficiency test: | | NA | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 77.1 | Prev response: | 80.00 | *% change: | -3.8% |
| Baseline Corr 2nd AF pt: | 38.3 | AF Slope: | 0.957689 | AF Intercept: | -0.402123 |
| Baseline Corr 3rd AF pt: | 18.9 | AF Correlation: | 0.999968 | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Completed a SO2 scrubber check after calibrator zero. Span adjusted.

Calibration Performed By: Devin Russell

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

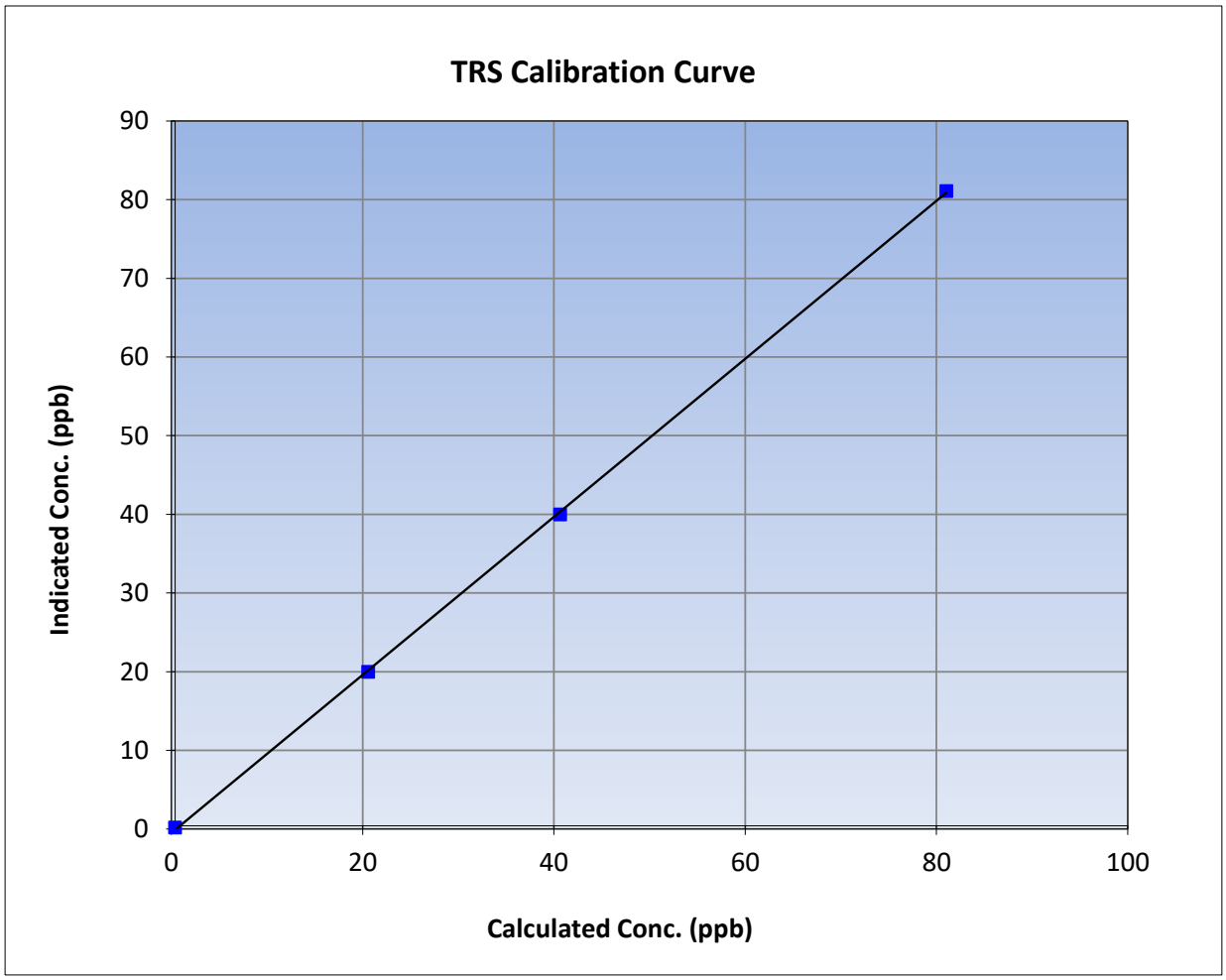
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Fort McKay South | Station Number: | AMS13 |
| Start Time (MST): | 8:55 | End Time (MST): | 13:25 |
| Analyzer make: | Thermo 43i TLE | Analyzer serial #: | 1180540017 |

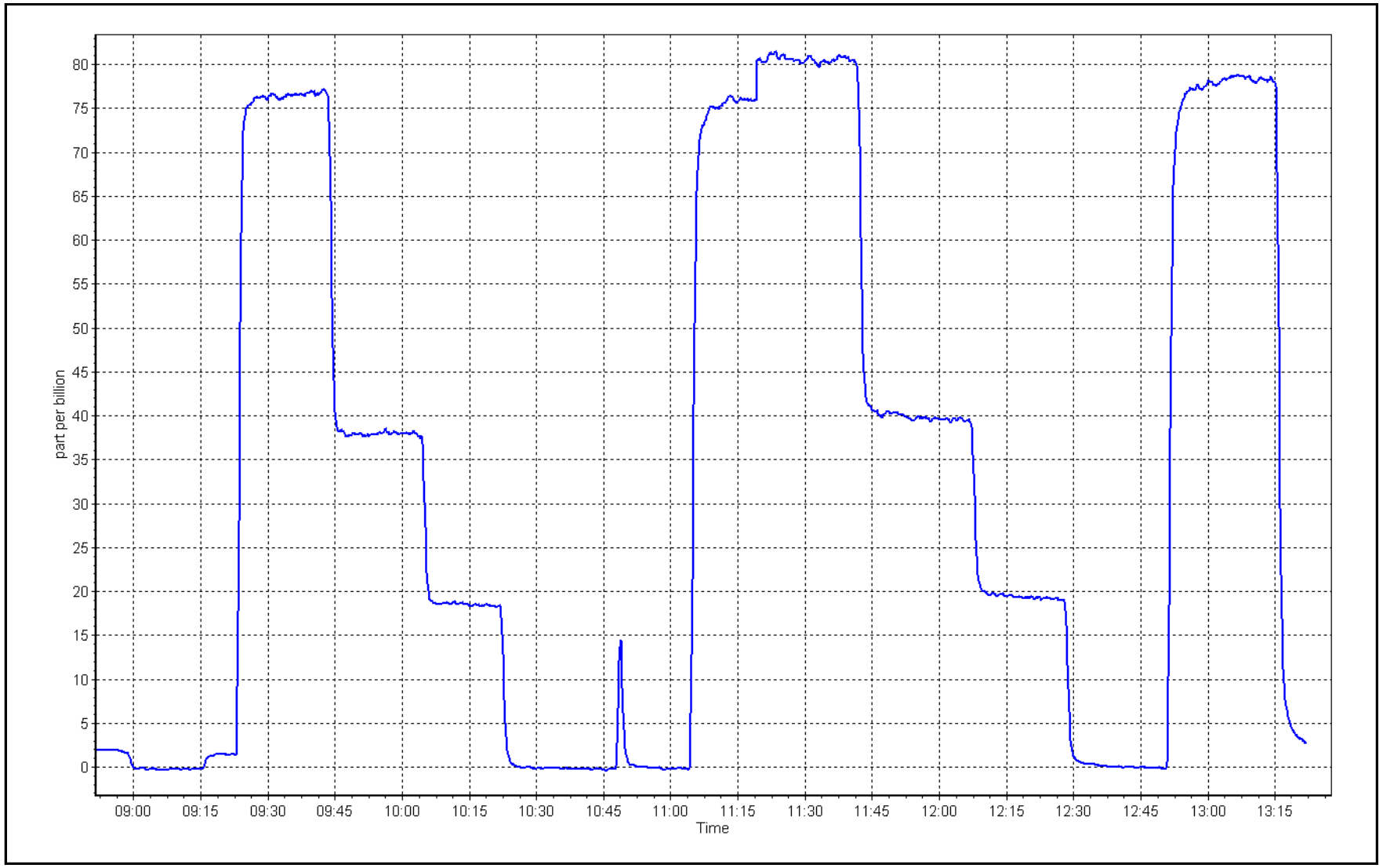
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.2 | ---- |
| 80.6 | 80.7 | 0.9991 |
| 40.3 | 39.6 | 1.0168 |
| 20.2 | 19.6 | 1.0299 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999920 | *≥0.995* |
| Slope | 1.004479 | *0.90 - 1.10* |
| Intercept | -0.502377 | *+/-3* |



**TRS Calibration Plot** Date: August 15, 2023 Location: Fort McKay South



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort McKay South | Station number: | AMS13 |
| Calibration Date: | August 16, 2023 | Last Cal Date: | July 25, 2023 |
| Start time (MST): | 8:48 | End time (MST): | 12:02 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC260812 | Cal Gas Expiry Date: | December 29, 2028 | |
| CH4 Cal Gas Conc. | 503.6 | ppm | CH4 Equiv Conc. | 1077.5 | ppm |
| C3H8 Cal Gas Conc. | 208.7 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 503.6 | ppm | CH4 Equiv Conc. | 1077.5 | ppm |
| Removed C3H8 Conc. | 208.7 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 2448 | |
| ZAG make/model: | API701 | | Serial Number: | 1117 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 11700501330 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.21E-04 | 2.22E-04 | NMHC SP Ratio: | 5.17E-04 | 4.70E-04 |
| CH4 Retention time: | 12.80 | 12.80 | NMHC Peak Area: | 175502 | 193345 |
| Zero Chromatogram: | OFF | ON | Flat Baseline: | OFF | ON |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.1 | 17.05 | 17.08 | 0.998 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.1 | 17.05 | 17.07 | 0.999 |
| second point | 4961 | 39.5 | 8.51 | 8.41 | 1.012 |
| third point | 4980 | 19.8 | 4.27 | 4.13 | 1.033 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.1 | 17.05 | 17.05 | 1.000 |
| | | | | Average Correction Factor | 1.015 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 17.08 | Prev response | 17.02 | *% change | 0.3% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.1 | 9.08 | 9.11 | 0.996 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.1 | 9.08 | 9.09 | 0.999 |
| second point | 4961 | 39.5 | 4.53 | 4.50 | 1.008 |
| third point | 4980 | 19.8 | 2.27 | 2.21 | 1.027 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.1 | 9.08 | 9.07 | 1.001 |
| | | | | Average Correction Factor | 1.011 |
| Baseline Corr AF: | 9.11 | Prev response | 9.07 | *% change | 0.5% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.1 | 7.97 | 7.97 | 1.000 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.1 | 7.97 | 7.98 | 0.998 |
| second point | 4961 | 39.5 | 3.98 | 3.91 | 1.017 |
| third point | 4980 | 19.8 | 1.99 | 1.92 | 1.040 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.1 | 7.97 | 7.98 | 0.998 |
| | | | | Average Correction Factor | 1.018 |
| Baseline Corr AF: | 7.97 | Prev response | 7.95 | *% change | 0.2% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.003313 | 1.003320 |
| THC Cal Offset: | -0.083173 | -0.078975 |
| CH4 Cal Slope: | 1.003948 | 1.004551 |
| CH4 Cal Offset: | -0.045749 | -0.047351 |
| NMHC Cal Slope: | 1.002735 | 1.002546 |
| NMHC Cal Offset: | -0.038763 | -0.032763 |

Notes: Changed inlet filter after as founds. Used zero chromatogram and flat baseline. Adjusted span.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## THC Calibration Summary

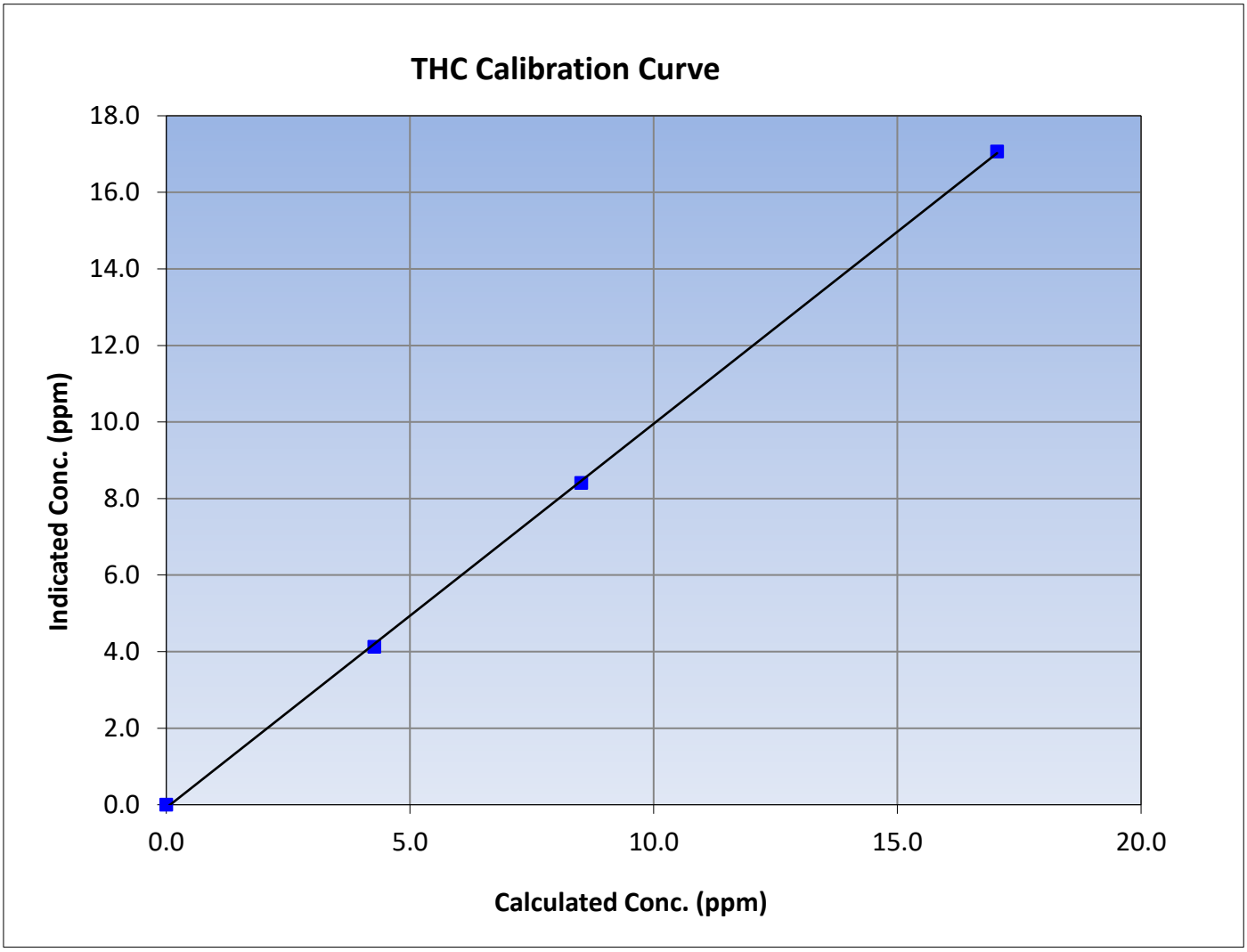
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Fort McKay South | Station Number: | AMS13 |
| Start Time (MST): | 8:48 | End Time (MST): | 12:02 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 11700501330 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999901 | *≥0.995* |
| 17.05 | 17.07 | 0.9988 | | | |
| 8.51 | 8.41 | 1.0121 | Slope | 1.003320 | *0.90 - 1.10* |
| 4.27 | 4.13 | 1.0330 | | | |
| | | | Intercept | -0.078975 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

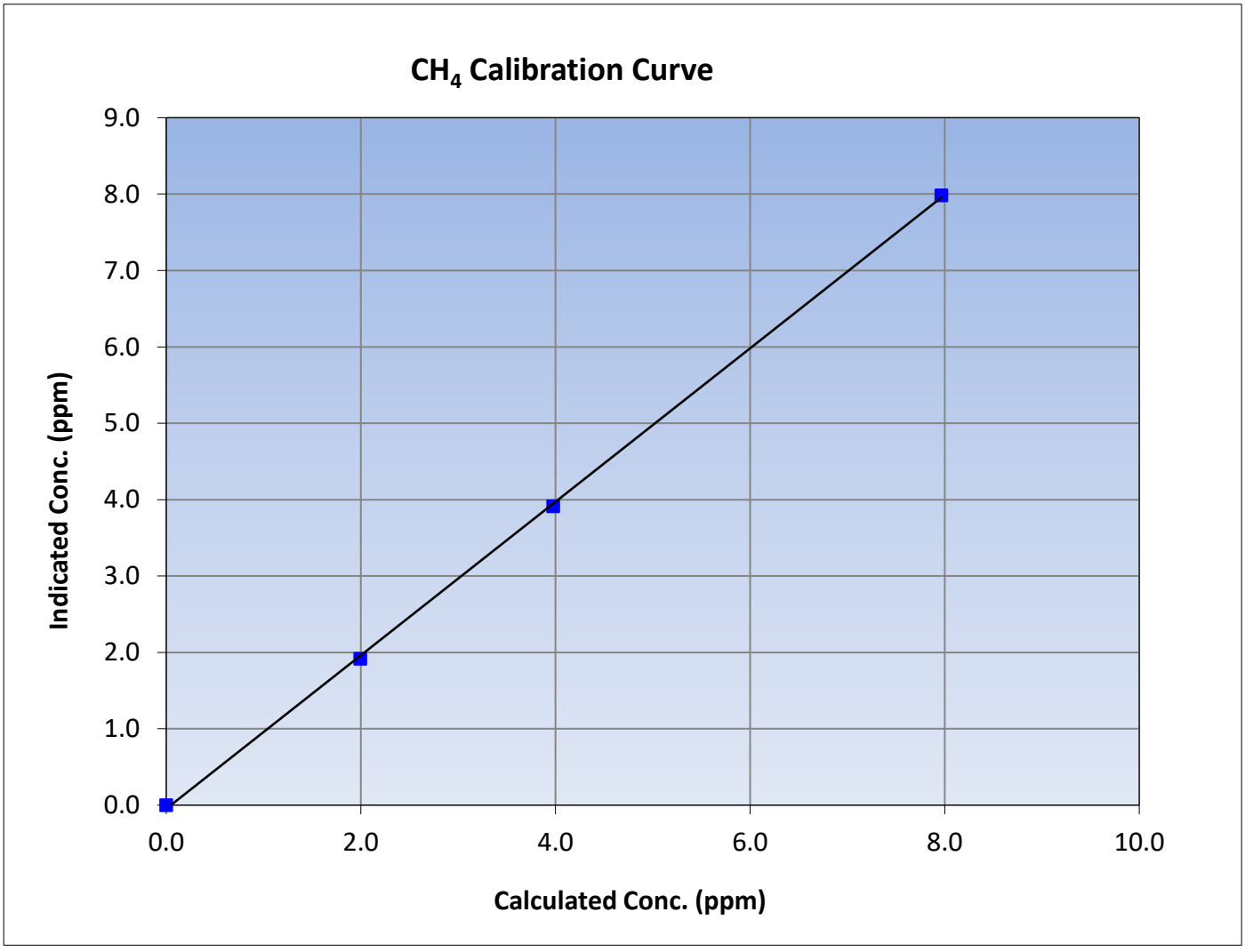
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Fort McKay South | Station Number: | AMS13 |
| Start Time (MST): | 8:48 | End Time (MST): | 12:02 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 11700501330 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999833 | *≥0.995* |
| 7.97 | 7.98 | 0.9978 | | | |
| 3.98 | 3.91 | 1.0169 | Slope | 1.004563 | *0.90 - 1.10* |
| 1.99 | 1.92 | 1.0398 | | | |
| | | | Intercept | -0.047194 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

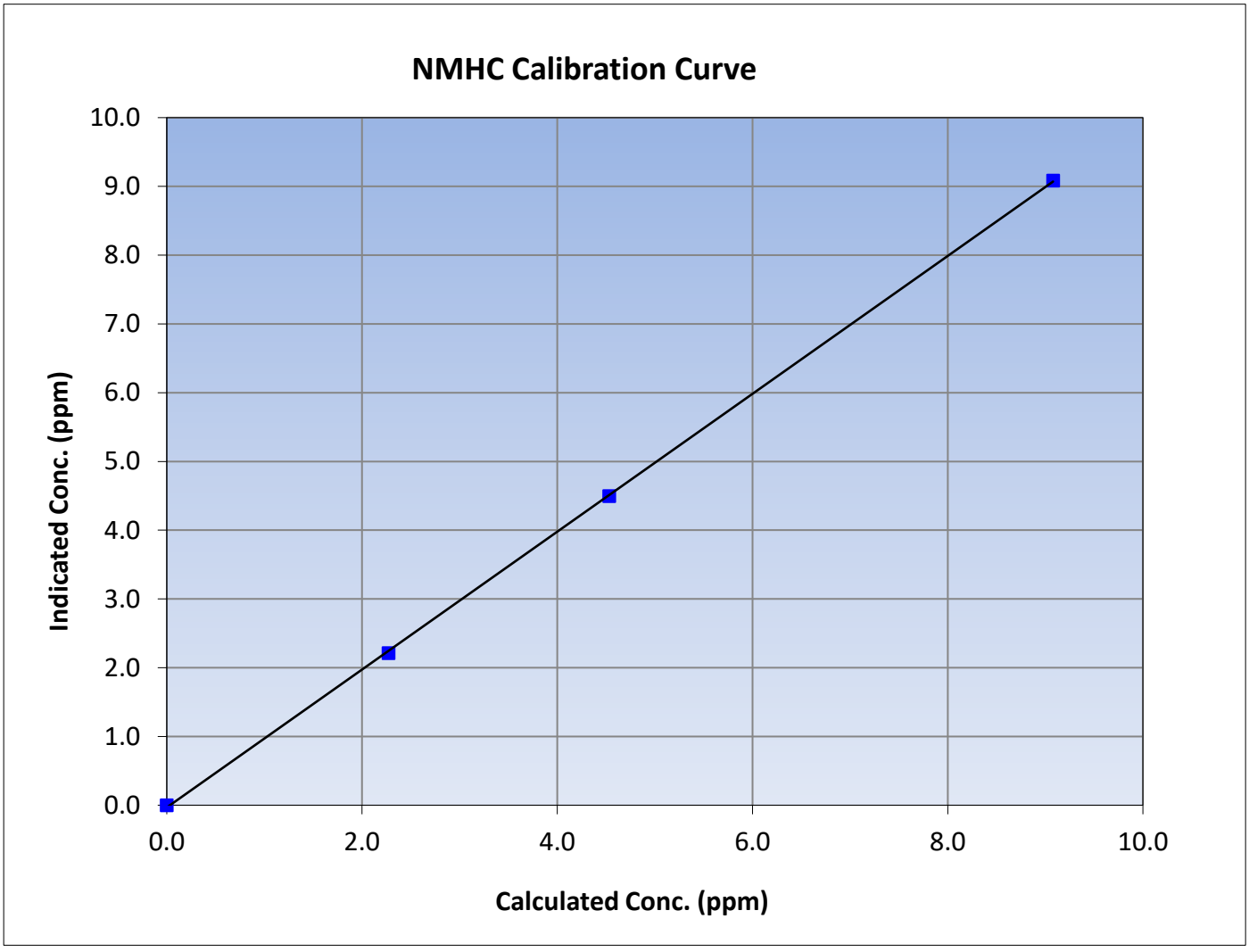
Version-06-2022

### Station Information

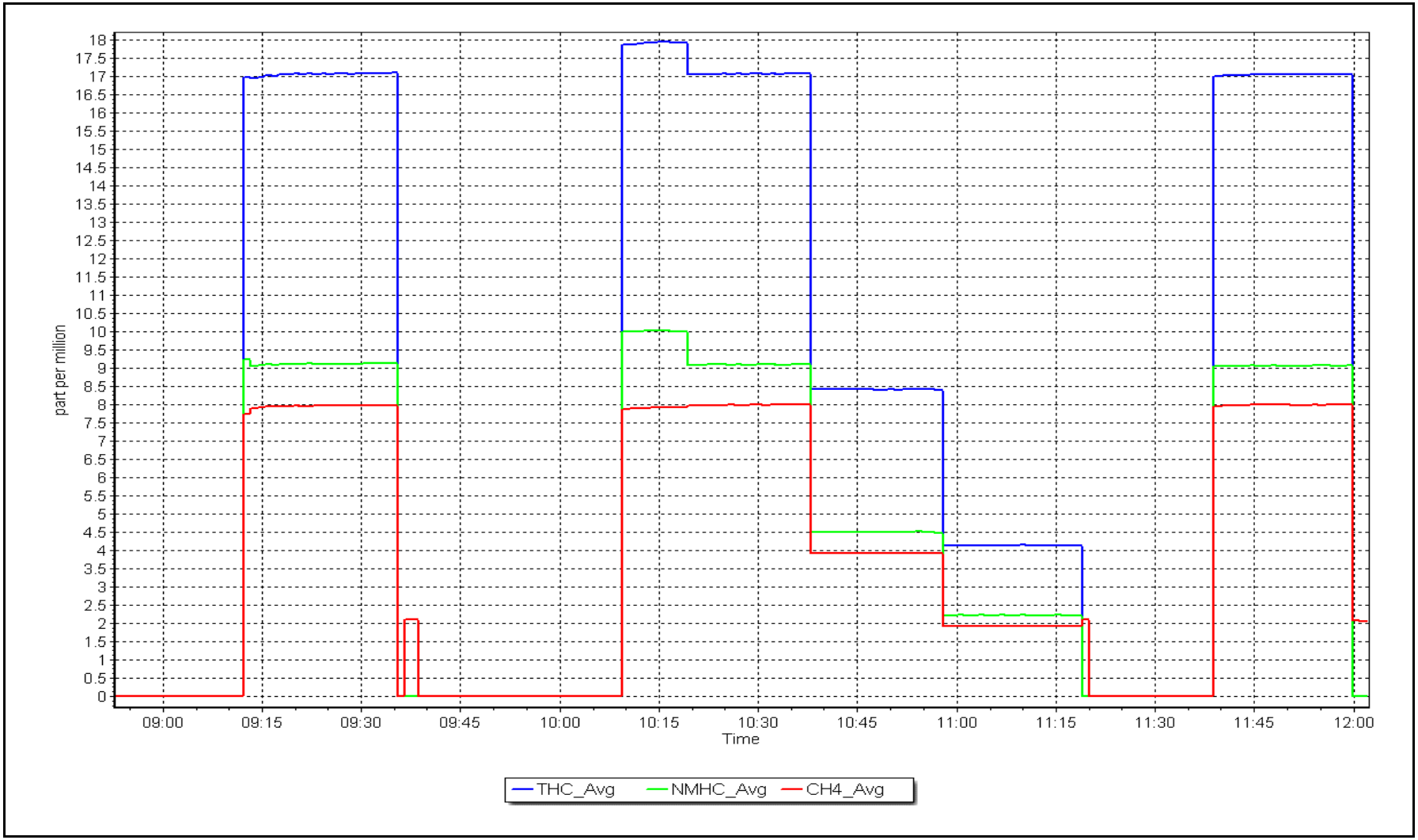
| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Fort McKay South | Station Number: | AMS13 |
| Start Time (MST): | 8:48 | End Time (MST): | 12:02 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 11700501330 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999941 | ≥0.995 |
| 9.08 | 9.09 | 0.9993 | | | |
| 4.53 | 4.50 | 1.0081 | Slope | 1.002557 | 0.90 - 1.10 |
| 2.27 | 2.21 | 1.0270 | | | |
| | | | Intercept | -0.032582 | +/-0.5 |



**NMHC Calibration Plot** Date: August 16, 2023 Location: Fort McKay South



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort McKay South | Station number: | AMS13 |
| Calibration Date: | August 29, 2023 | Last Cal Date: | August 16, 2023 |
| Start time (MST): | 8:53 | End time (MST): | 10:41 |
| Reason: | Cylinder Change | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC260812 | Cal Gas Expiry Date: | December 29, 2028 | |
| CH4 Cal Gas Conc. | 503.6 | ppm | CH4 Equiv Conc. | 1077.5 | ppm |
| C3H8 Cal Gas Conc. | 208.7 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 503.6 | ppm | CH4 Equiv Conc. | 1077.5 | ppm |
| Removed C3H8 Conc. | 208.7 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 2448 | |
| ZAG make/model: | API701 | | Serial Number: | 1117 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 11700501330 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.21E-04 | 2.22E-04 | NMHC SP Ratio: | 5.17E-04 | 4.70E-04 |
| CH4 Retention time: | 12.80 | 12.80 | NMHC Peak Area: | 175502 | 193345 |
| Zero Chromatogram: | OFF | ON | Flat Baseline: | OFF | ON |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.1 | 17.05 | 17.08 | 0.998 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.1 | 17.05 | 17.08 | 0.998 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| | | | | Average Correction Factor | 0.998 |
| Baseline Corr AF: | 17.08 | Prev response | 17.02 | *% change | 0.4% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.1 | 9.08 | 9.17 | 0.990 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.1 | 9.08 | 9.16 | 0.991 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| | | | | Average Correction Factor | 0.991 |
| Baseline Corr AF: | 9.17 | Prev response | 9.07 | *% change | 1.1% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.1 | 7.97 | 7.91 | 1.007 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.1 | 7.97 | 7.92 | 1.007 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| | | | | Average Correction Factor | 1.007 |
| Baseline Corr AF: | 7.91 | Prev response | 7.95 | *% change | -0.5% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

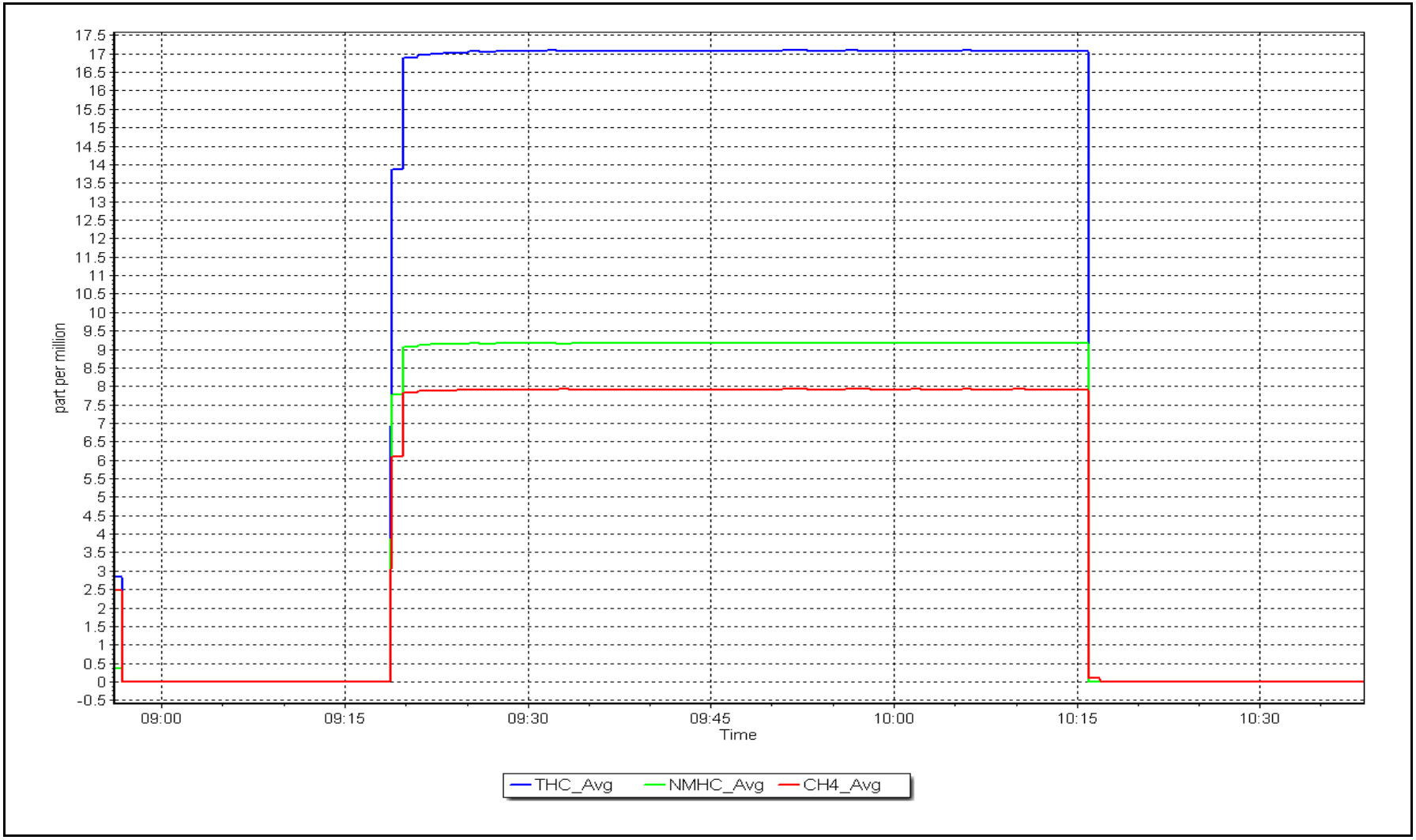
### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.003313 | 1.003320 |
| THC Cal Offset: | -0.083173 | -0.078975 |
| CH4 Cal Slope: | 1.003948 | 1.004551 |
| CH4 Cal Offset: | -0.045749 | -0.047351 |
| NMHC Cal Slope: | 1.002735 | 1.002546 |
| NMHC Cal Offset: | -0.038763 | -0.032763 |

Notes: Changed N2 cylinder.

Calibration Performed By: Sean Bala

**NMHC Calibration Plot** Date: August 29, 2023 Location: Fort McKay South



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort McKay South | Station number: | AMS 13 |
| Calibration Date: | August 24, 2023 | Last Cal Date: | July 17, 2023 |
| Start time (MST): | 8:45 | End time (MST): | 13:26 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2Y1P76 | | Cal Gas Expiry Date: | December 11, 2023 | |
| NOX Cal Gas Conc: | 50.98 | ppm | NO Cal Gas Conc: | 49.32 | ppm |
| Removed Cylinder #: | N/A | | Removed Gas Exp Date: | N/A | |
| Removed Gas NOX Conc: | 50.98 | ppm | Removed Gas NO Conc: | 49.32 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 2448 | |
| ZAG make/model: | API T701 | | Serial Number: | 1117 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1410661329 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.113 | 1.113 | NO bkgnd or offset: | 9.1 | 9.5 |
| NOX coeff or slope: | 0.991 | 0.991 | NOX bkgnd or offset: | 10.5 | 9.7 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 159.0 | 160.8 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 1.000258 | 0.996609 |
| $NO_X$ Cal Offset: | -1.931590 | -1.710896 |
| NO Cal Slope: | 1.002649 | 0.999177 |
| NO Cal Offset: | -2.105499 | -2.764638 |
| $NO_2$ Cal Slope: | 1.001659 | 0.995830 |
| $NO_2$ Cal Offset: | -0.999973 | -0.645143 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -1.1 | 0.2 | -1.3 | ---- | ---- |
| as found span | 4919 | 81.1 | 826.9 | 800.0 | 26.9 | 823.9 | 796.6 | 27.3 | 1.0036 | 1.0042 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| high point | 4919 | 81.1 | 826.9 | 800.0 | 26.9 | 823.2 | 797.9 | 25.2 | 1.0045 | 1.0026 |
| second point | 4960 | 40.6 | 413.9 | 400.4 | 13.5 | 410.0 | 396.0 | 14.1 | 1.0095 | 1.0112 |
| third point | 4980 | 20.3 | 207.0 | 200.2 | 6.7 | 202.8 | 194.5 | 8.3 | 1.0205 | 1.0294 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.3 | 0.1 | ---- | ---- |
| as left span | 4919 | 80.1 | 816.8 | 372.6 | 444.2 | 828.9 | 380.3 | 448.5 | 0.9855 | 0.9798 |
| | | | | | | | | Average Correction Factor | 1.0115 | 1.0144 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 825.0 ppb | NO = 796.4 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | 0.0% |
| Previous Response | $NO_X$ = 825.2 ppb | NO = 800.0 ppb | | *Percent Change | NO = | -0.4% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 795.2 | 377.9 | 444.2 | 442.3 | 1.0044 | 99.6% |
| 2nd GPT point (200 ppb O3) | 795.2 | 585.5 | 236.6 | 234.1 | 1.0108 | 98.9% |
| 3rd GPT point (100 ppb O3) | 795.2 | 689.2 | 132.9 | 131.4 | 1.0116 | 98.9% |
| | | | | Average Correction Factor | 1.0089 | 99.1% |

Notes: Changed inlet filter after as founds. Adjusted zero only.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

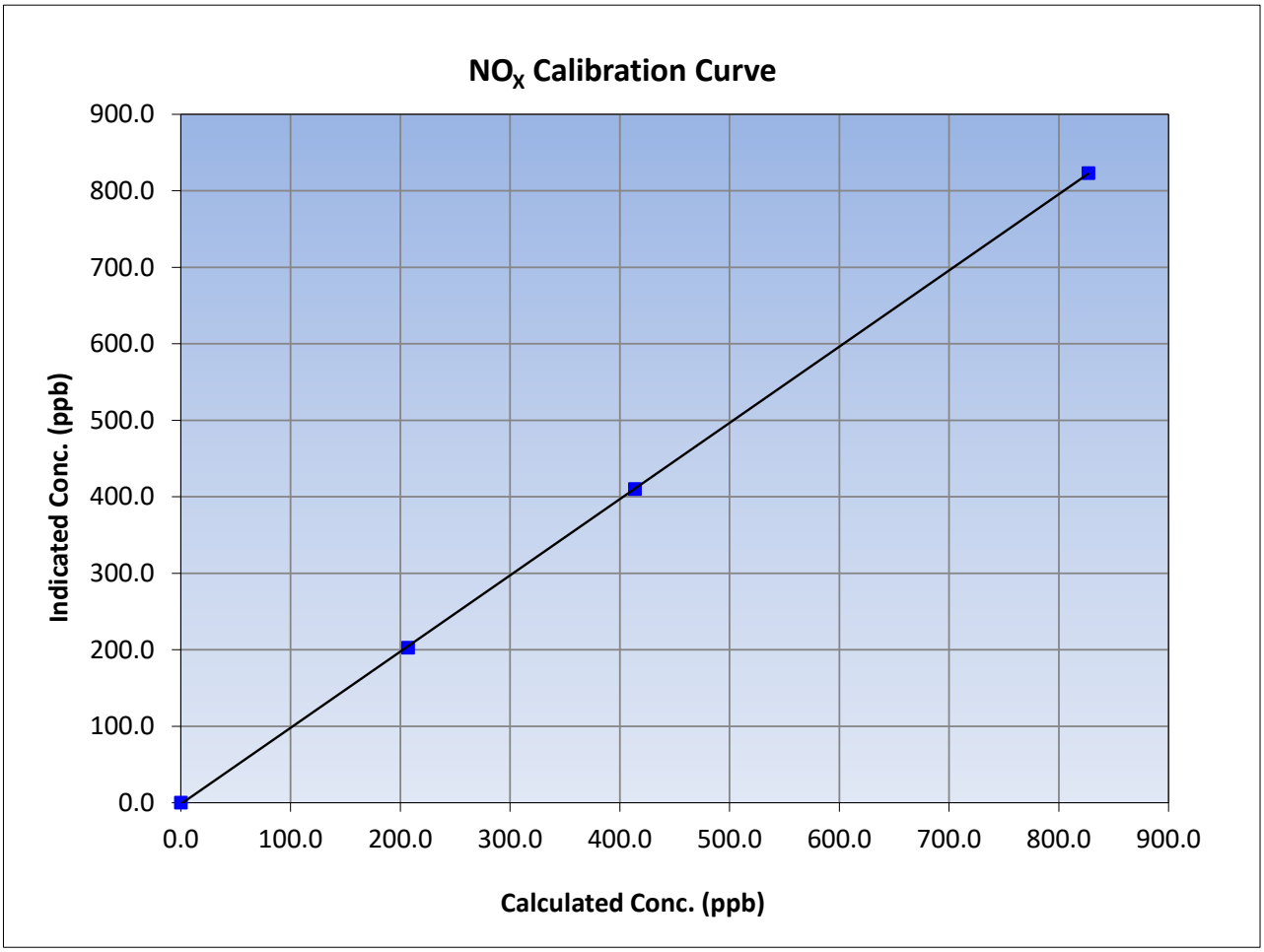
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 24, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Fort McKay South | Station Number: | AMS 13 |
| Start Time (MST): | 8:45 | End Time (MST): | 13:26 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1410661329 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999980 | ≥0.995 |
| 826.9 | 823.2 | 1.0045 | | | |
| 413.9 | 410.0 | 1.0095 | Slope | 0.996609 | 0.90 - 1.10 |
| 207.0 | 202.8 | 1.0205 | | | |
| | | | Intercept | -1.710896 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

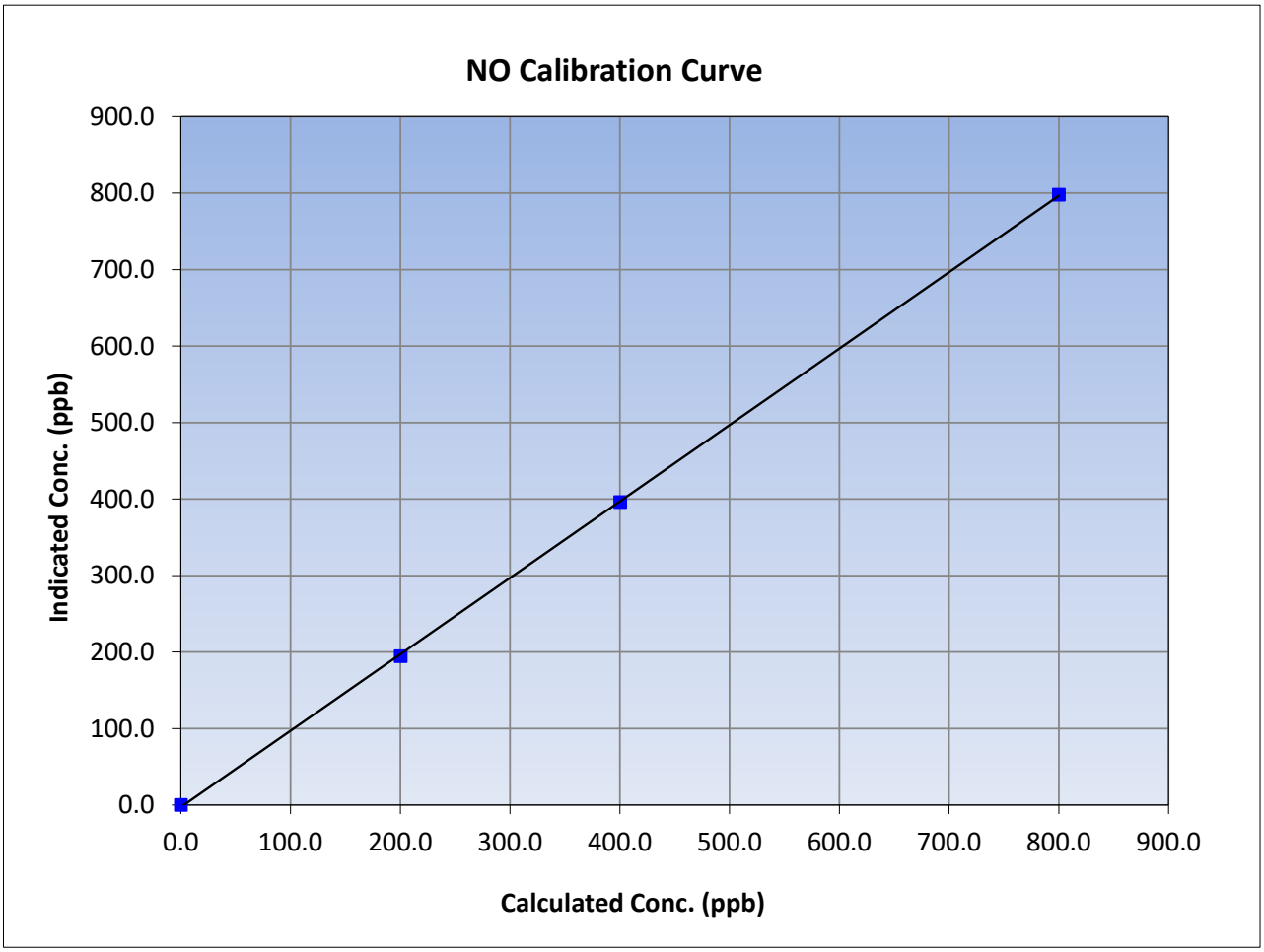
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 24, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Fort McKay South | Station Number: | AMS 13 |
| Start Time (MST): | 8:45 | End Time (MST): | 13:26 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1410661329 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999945 | ≥0.995 |
| 800.0 | 797.9 | 1.0026 | | | |
| 400.4 | 396.0 | 1.0112 | Slope | 0.999177 | 0.90 - 1.10 |
| 200.2 | 194.5 | 1.0294 | | | |
| | | | Intercept | -2.764638 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

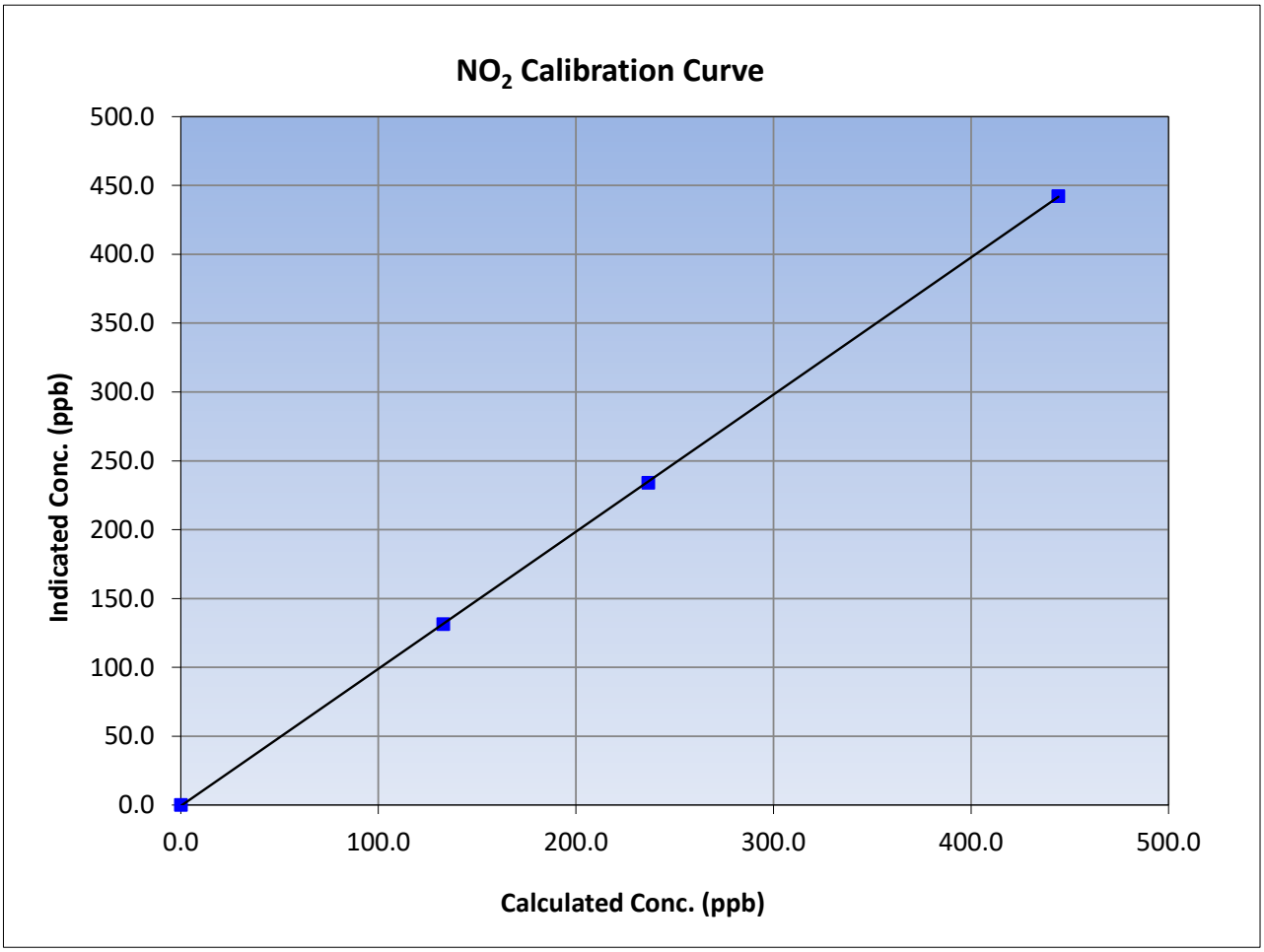
Version-04-2020

### Station Information

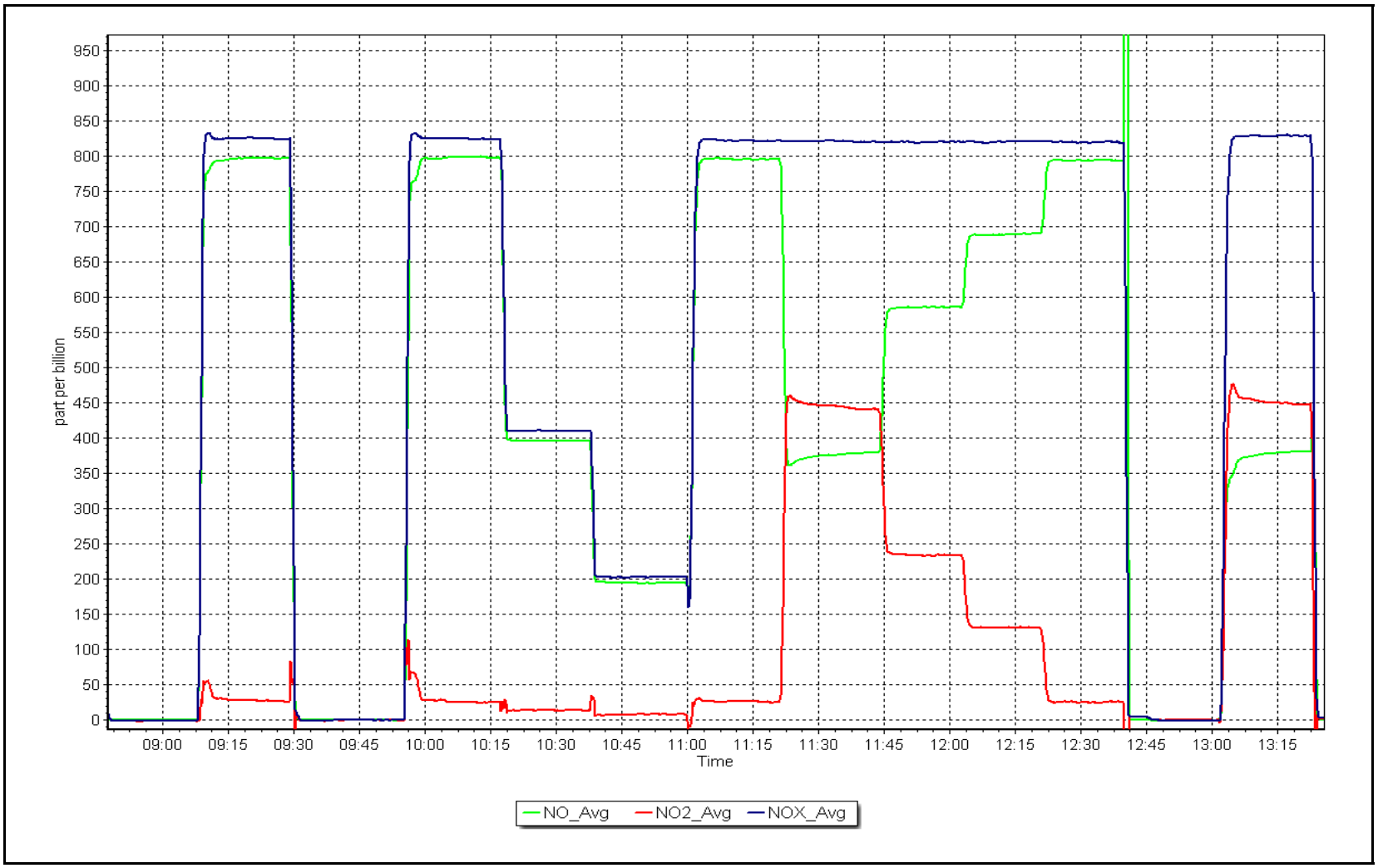
| | | | |
|---|---|---|---|
| Calibration Date: | August 24, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Fort McKay South | Station Number: | AMS 13 |
| Start Time (MST): | 8:45 | End Time (MST): | 13:26 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1410661329 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999984 | ≥0.995 |
| 444.2 | 442.3 | 1.0044 | | | |
| 236.6 | 234.1 | 1.0108 | Slope | 0.995830 | 0.90 - 1.10 |
| 132.9 | 131.4 | 1.0116 | | | |
| | | | Intercept | -0.645143 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 24, 2023 Location: Fort McKay South



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort McKay South | Station number: | AMS13 |
| Calibration Date: | August 11, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 9:01 | End time (MST): | 12:26 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | Teledyne API T700 | Serial Number: | 2448 |
| ZAG Make/Model: | Teledyne API T701 | Serial Number: | 1117 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Teledyne API T400 | Analyzer serial #: | 3871 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.996829 | 0.997543 | Backgd or Offset: | 2.4 | 2.4 |
| Calibration intercept: | 0.980000 | 1.180000 | Coeff or Slope: | 0.963 | 0.963 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 5000 | 977.0 | 400.0 | 398.6 | 1.004 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 5000 | 977.0 | 400.0 | 399.8 | 1.001 |
| second point | 5000 | 838.0 | 200.0 | 201.1 | 0.995 |
| third point | 5000 | 735.9 | 100.0 | 101.7 | 0.983 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 5000 | 977.0 | 400.0 | 401.3 | 0.997 |
| | | | | Average Correction Factor | 0.993 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 398.6 | Previous response | 399.7 | *% change | -0.3% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. No adjustments made.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

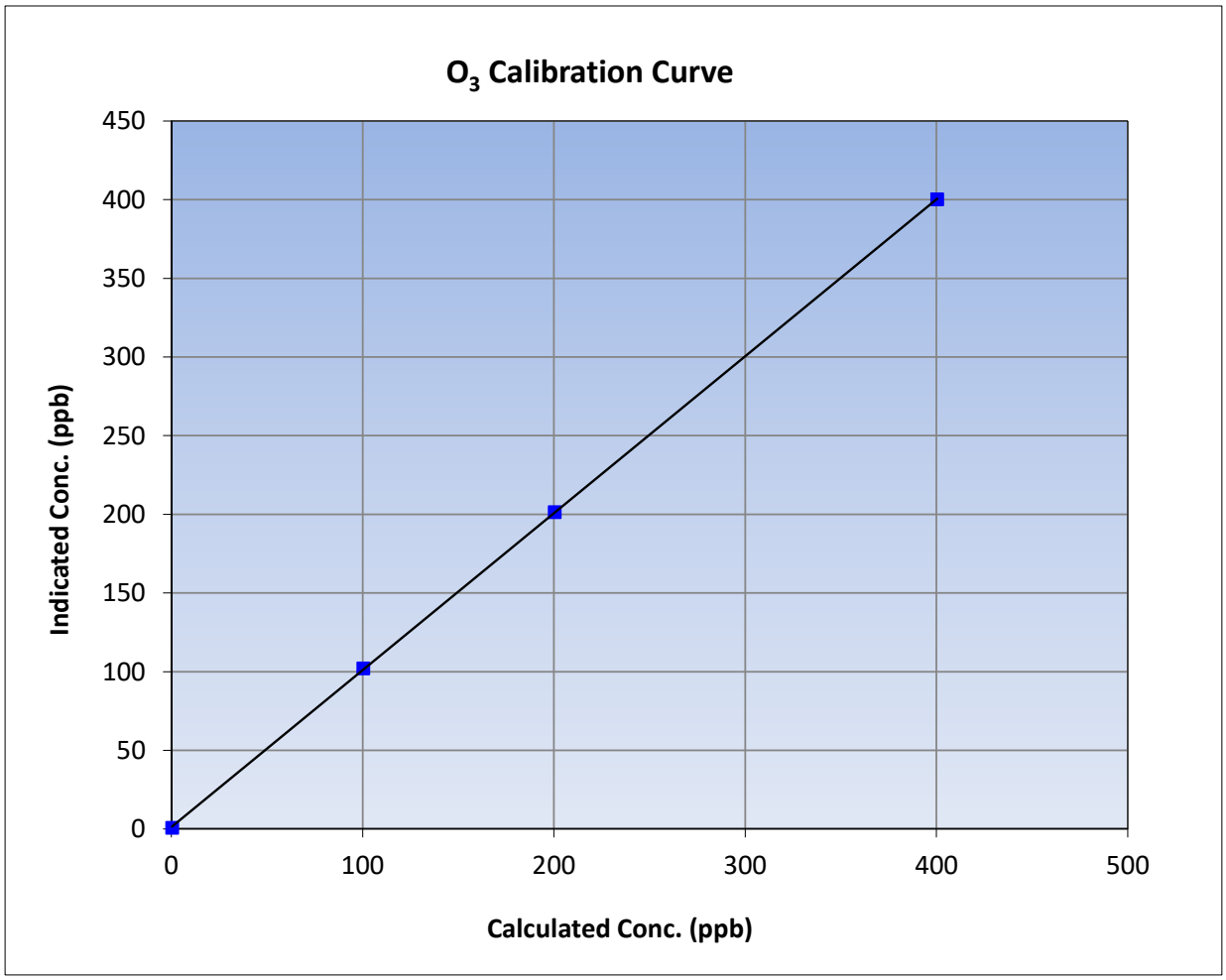
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 11, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Fort McKay South | Station Number: | AMS13 |
| Start Time (MST): | 9:01 | End Time (MST): | 12:26 |
| Analyzer make: | Teledyne API T400 | Analyzer serial #: | 3871 |

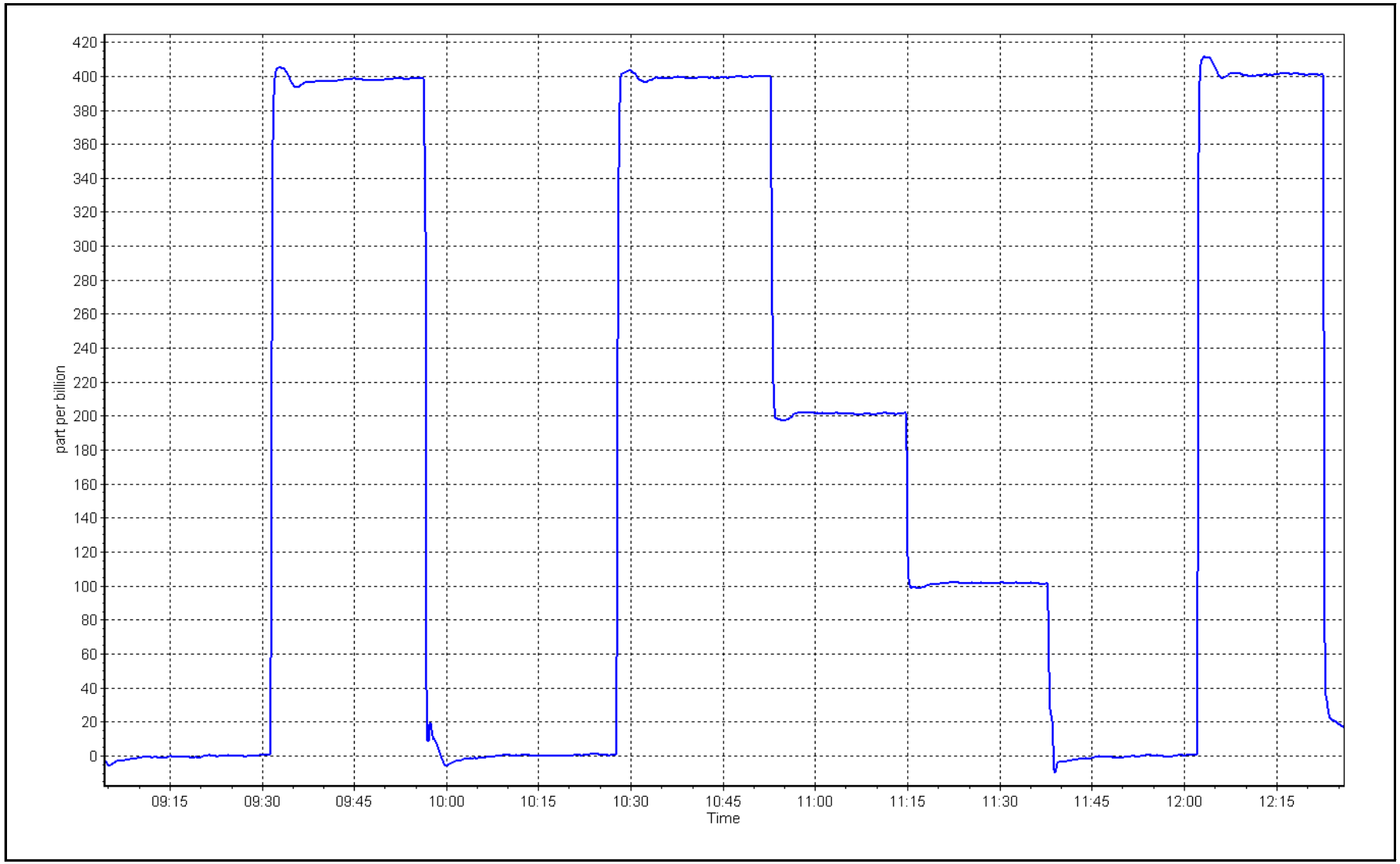
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.4 | ---- |
| 400.0 | 399.8 | 1.0005 |
| 200.0 | 201.1 | 0.9945 |
| 100.0 | 101.7 | 0.9833 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999983 | *≥0.995* |
| Slope | 0.997543 | *0.90 - 1.10* |
| Intercept | 1.180000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 11, 2023 Location: Fort McKay South



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort McKay South | Station number: | AMS 13 |
| Calibration Date: | August 24, 2023 | Last Cal Date: | July 26, 2023 |
| Start time (MST): | 10:37 | End time (MST): | 11:42 |
| Analyzer Make: | API T640 | S/N: | 319 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Delta Cal | S/N: | 1450 |
| Temp/RH standard: | Delta Cal | S/N: | 1450 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T ($^{o}$C) | 17.6 | 17.4 | 17.6 | ☐ | +/- 2 $^{o}$C |
| P (mmHg) | 737.5 | 738.5 | 737.5 | ☐ | +/- 10 mmHg |
| flow (LPM) | 4.99 | 5.02 | 4.99 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 24, 2023 Last Cal Date: July 26, 2023

PM w/o HEPA: 9.0 PM w/ HEPA: 0.0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | | | | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____

Date Optical Chamber Cleaned: June 29, 2023 <0.2 ug/m3

Disposable Filter Changed: July 26, 2023

### Annual Maintenance

Date Sample Tube Cleaned: June 29, 2023

Date RH/T Sensor Cleaned: June 29, 2023

Notes: Inlet head clean and inspected. Leak check passed. No adjustment made.

Calibration by: Sean Bala

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS14
## ANZAC
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Anzac | Station number: | AMS 14 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 8:54 | End time (MST): | 13:17 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.95 | ppm | Cal Gas Exp Date: | January 5, 2025 |
| Cal Gas Cylinder #: | CC279389 | | | |
| Removed Cal Gas Conc: | 49.95 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3060 |
| ZAG Make/Model: | API T701H | | Serial Number: | 357 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 0710321322

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.020118 | 1.015152 | Backgd or Offset: | 25.1 | 25.2 |
| Calibration intercept: | -0.460015 | -1.929538 | Coeff or Slope: | 0.798 | 0.798 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 4938 | 80.3 | 799.3 | 809.1 | 0.988 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.8 | ---- |
| high point | 4938 | 80.3 | 799.3 | 811.0 | 0.986 |
| second point | 4979 | 40.2 | 400.1 | 402.3 | 0.994 |
| third point | 4998 | 20.2 | 201.1 | 199.8 | 1.006 |
| as left zero | 5000 | 0.0 | 0.0 | 0.7 | ---- |
| as left span | 4938 | 80.3 | 799.3 | 813.0 | 0.983 |
| | | | | Average Correction Factor | 0.995 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 808.50 | Previous response | 814.89 | *% change | -0.8% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

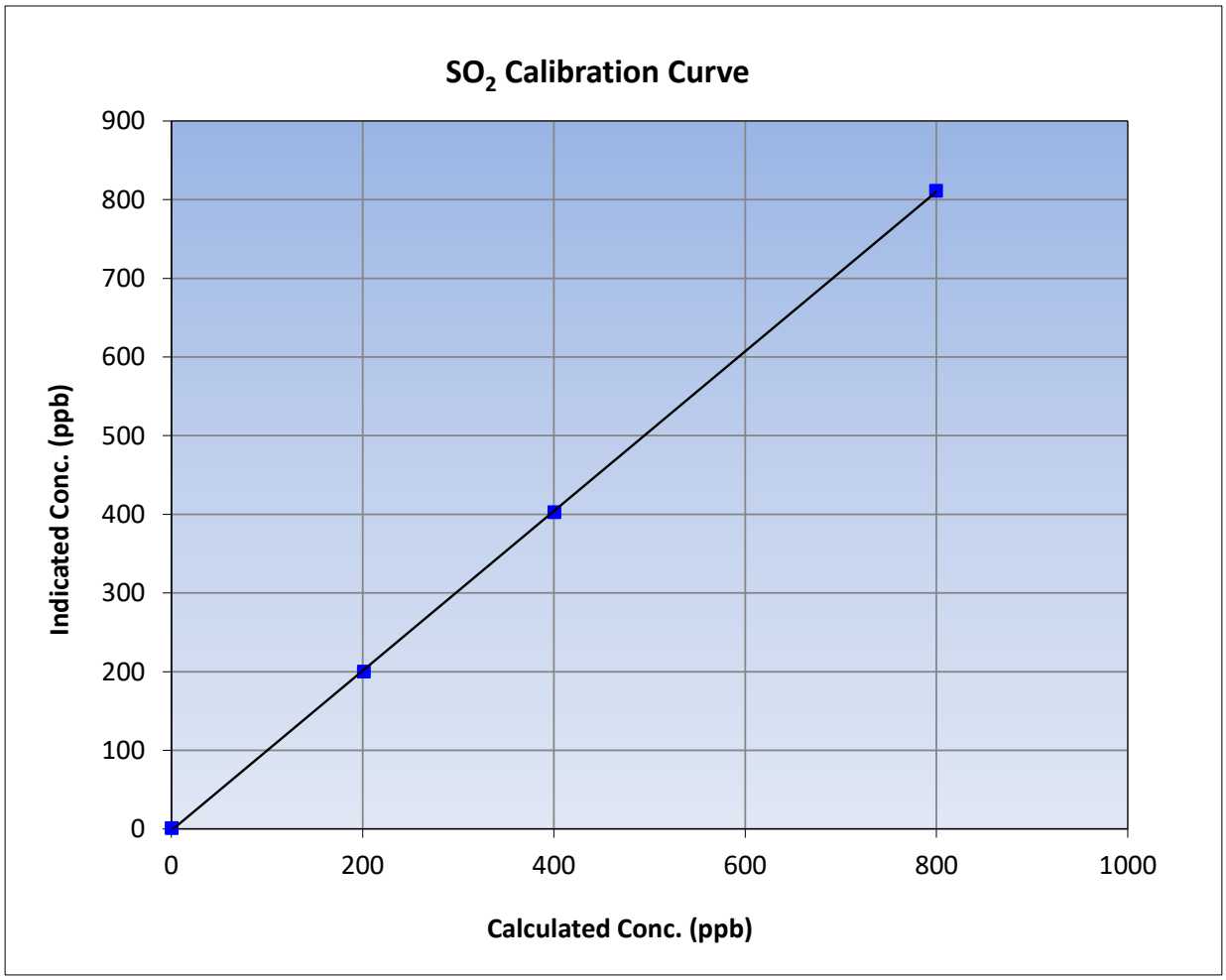
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Anzac | Station Number: | AMS 14 |
| Start Time (MST): | 8:54 | End Time (MST): | 13:17 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 0710321322 |

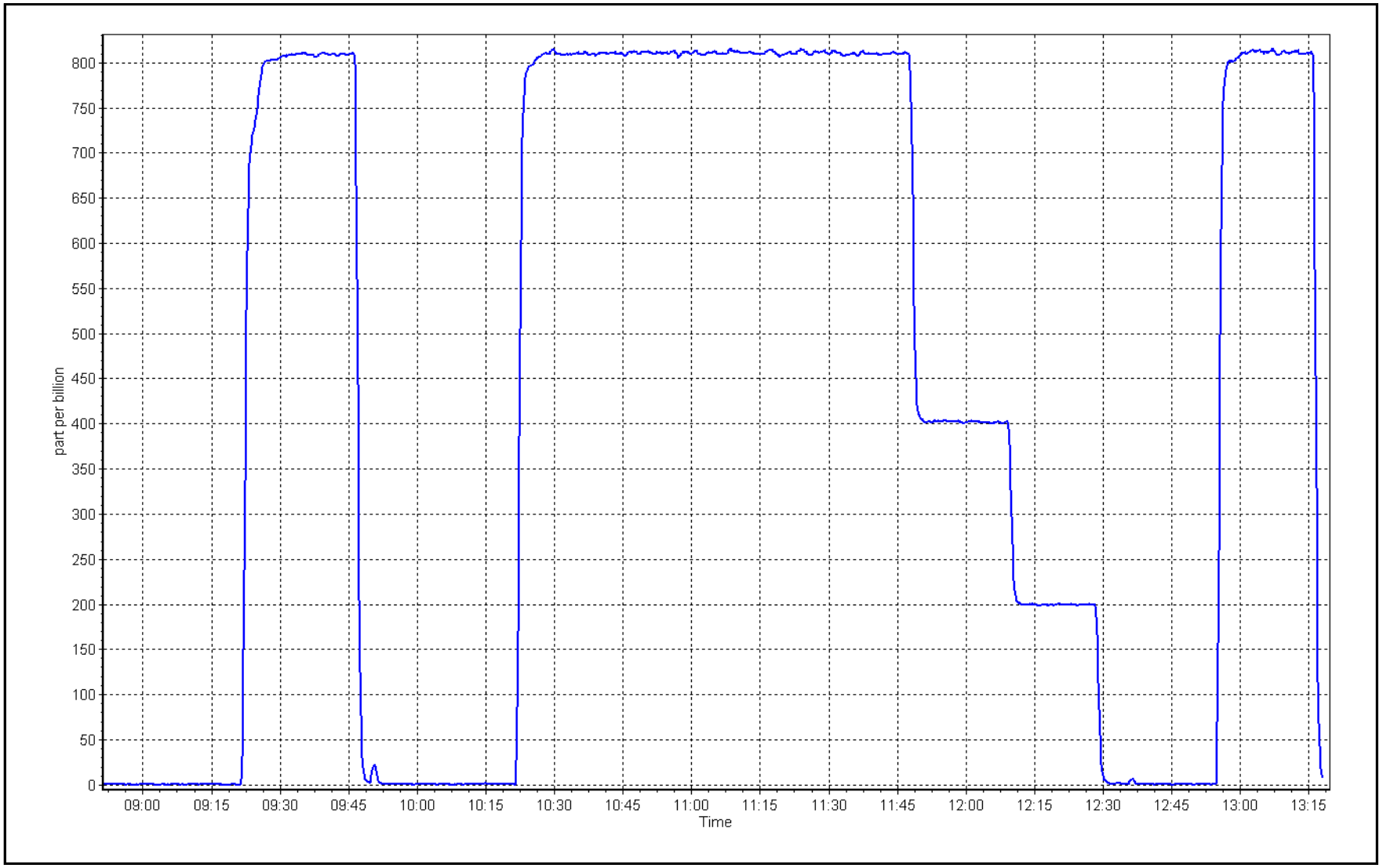
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.8 | ---- |
| 799.3 | 811.0 | 0.9855 |
| 400.1 | 402.3 | 0.9944 |
| 201.1 | 199.8 | 1.0063 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999947 | *≥0.995* |
| Slope | 1.015152 | *0.90 - 1.10* |
| Intercept | -1.929538 | *+/-30* |



**SO2 Calibration Plot** Date: August 9, 2023 Location: Anzac



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Anzac | Station number: | AMS14 |
| Calibration Date: | August 4, 2023 | Last Cal Date: | July 2, 2023 |
| Start time (MST): | 13:00 | End time (MST): | 16:25 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.15 | ppm | Cal Gas Exp Date: | January 3, 2026 |
| Cal Gas Cylinder #: | CC510379 | | | |
| Removed Cal Gas Conc: | 5.38 | ppm | Rem Gas Exp Date: | February 3, 2023 |
| Removed Gas Cyl #: | EY0000859 | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3060 |
| ZAG Make/Model: | API 701H | | Serial Number: | 357 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i-TLE | | Analyzer serial #: | 1218153582 | |
| Converter make: | CD Nova CDN-101 | | Converter serial #: | 503 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.998548 | 0.991300 | Backgd or Offset: | 2.20 | 2.30 |
| Calibration intercept: | -0.100891 | -0.125436 | Coeff or Slope: | 0.960 | 0.992 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | | | | | |
| as found span | | | | | |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4938 | 77.9 | 80.0 | 79.4 | 1.007 |
| second point | 4973 | 38.9 | 40.0 | 39.0 | 1.025 |
| third point | 4997 | 19.5 | 20.0 | 19.6 | 1.021 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 4938 | 77.9 | 80.0 | 78.9 | 1.013 |
| SO2 Scrubber Check | 4936 | 80.3 | 800.4 | -0.1 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 1.017 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | NA | Prev response: | NA | *% change: | NA |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | NA | AF Intercept: | NA |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | NA | | |

* = > +/-5% change initiates investigation

Notes: Installed new cal gas cylinder. Changed sample inlet filter. Performed scrubber check after calibrator zero and it passed. Adjusted span only. Could not perform MAF's; refer to docit notes.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

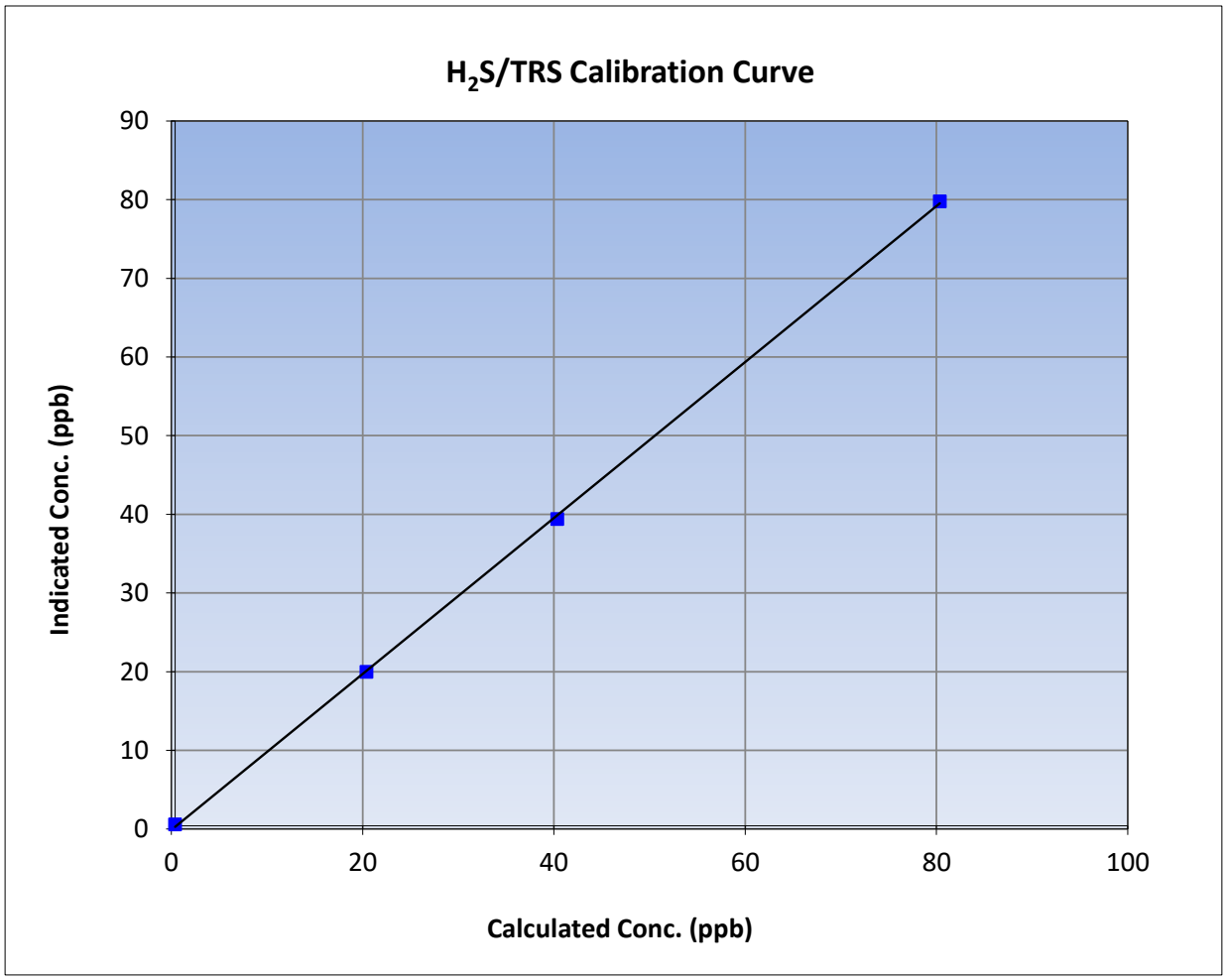
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 4, 2023 | Previous Calibration: | July 2, 2023 |
| Station Name: | Anzac | Station Number: | AMS14 |
| Start Time (MST): | 13:00 | End Time (MST): | 16:25 |
| Analyzer make: | Thermo 43i-TLE | Analyzer serial #: | 1218153582 |

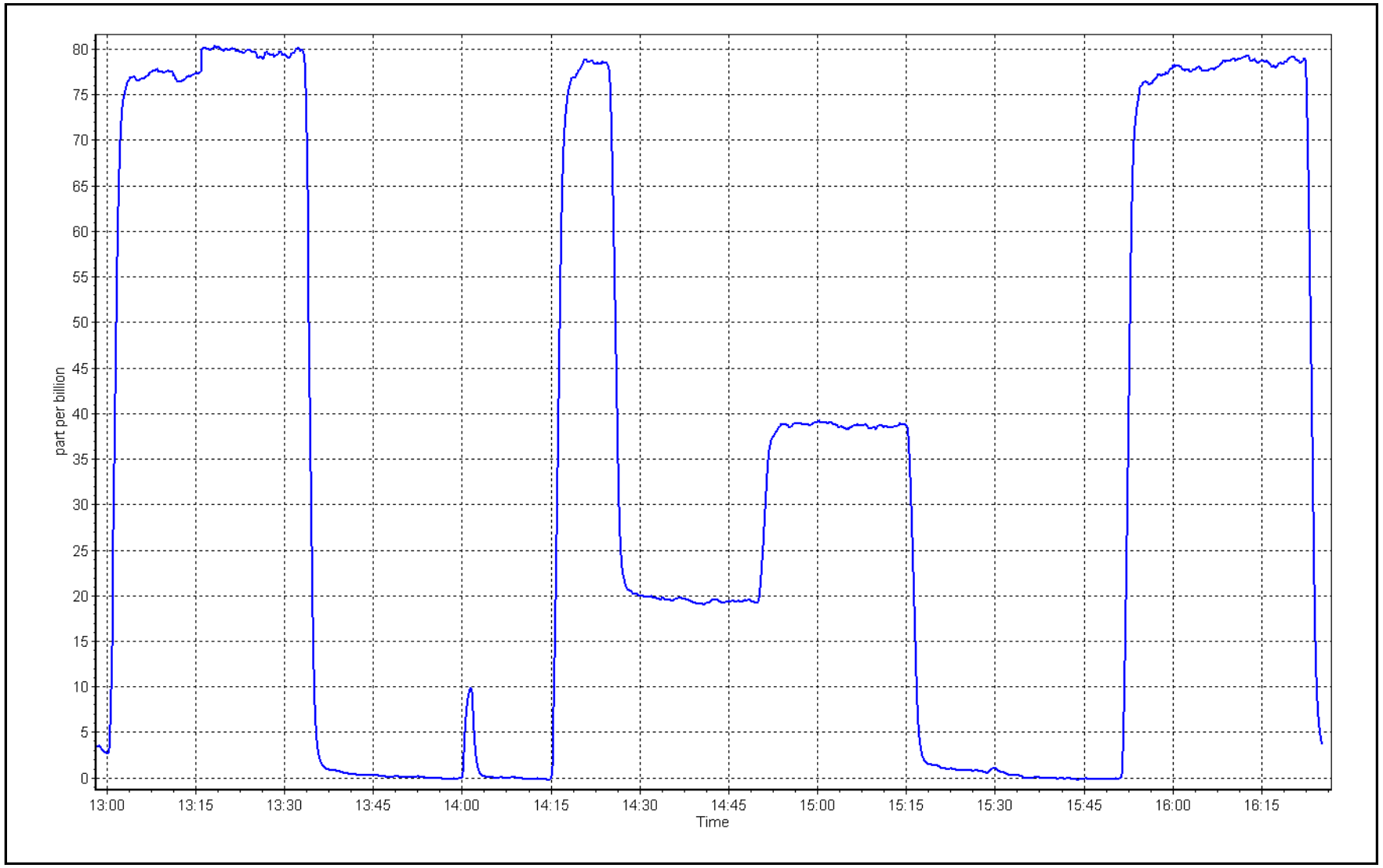
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 80.0 | 79.4 | 1.0069 |
| 40.0 | 39.0 | 1.0245 |
| 20.0 | 19.6 | 1.0210 |
| | | |

| Statistical Evaluation | | Limits |
|---|---|---|
| Correlation Coefficient | 0.999876 | ≥0.995 |
| Slope | 0.991300 | 0.90 - 1.10 |
| Intercept | -0.125436 | +/-3 |



**TRS Calibration Plot** Date: August 4, 2023 Location: Anzac



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Anzac | Station number: | AMS 14 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 8:54 | End time (MST): | 13:17 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC279389 | Cal Gas Expiry Date: | January 5, 2025 | |
| CH4 Cal Gas Conc. | 499.3 | ppm | CH4 Equiv Conc. | 1068.8 | ppm |
| C3H8 Cal Gas Conc. | 207.1 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | | NA |
| Removed CH4 Conc. | 499.3 | ppm | CH4 Equiv Conc. | 1068.8 | ppm |
| Removed C3H8 Conc. | 207.1 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 3060 | |
| ZAG make/model: | API 701H | | Serial Number: | 357 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1118148494 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 3.90E-04 | 3.90E-04 | NMHC SP Ratio: | 4.53E-05 | 4.53E-05 |
| CH4 Retention time: | 12.20 | 12.20 | NMHC Peak Area: | 201206 | 201206 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4938 | 80.3 | 17.10 | 17.12 | 0.999 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4938 | 80.3 | 17.10 | 17.22 | 0.993 |
| second point | 4979 | 40.2 | 8.56 | 8.59 | 0.996 |
| third point | 4998 | 20.2 | 4.30 | 4.27 | 1.008 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4938 | 80.3 | 17.10 | 17.30 | 0.989 |
| | | | | Average Correction Factor | 0.999 |
| Baseline Corr AF: | 17.12 | Prev response | 17.15 | *% change | -0.2% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4938 | 80.3 | 9.11 | 9.06 | 1.006 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4938 | 80.3 | 9.11 | 9.08 | 1.004 |
| second point | 4979 | 40.2 | 4.56 | 4.53 | 1.006 |
| third point | 4998 | 20.2 | 2.29 | 2.25 | 1.018 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4938 | 80.3 | 9.11 | 9.13 | 0.999 |
| | | | | Average Correction Factor | 1.010 |
| Baseline Corr AF: | 9.06 | Prev response | 9.09 | *% change | -0.4% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4938 | 80.3 | 7.99 | 8.07 | 0.991 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4938 | 80.3 | 7.99 | 8.14 | 0.982 |
| second point | 4979 | 40.2 | 4.00 | 4.06 | 0.986 |
| third point | 4998 | 20.2 | 2.01 | 2.02 | 0.996 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4938 | 80.3 | 7.99 | 8.17 | 0.978 |
| | | | | Average Correction Factor | 0.988 |
| Baseline Corr AF: | 8.07 | Prev response | 8.05 | *% change | 0.2% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.002824 | 1.007749 |
| THC Cal Offset: | -0.002175 | -0.029955 |
| CH4 Cal Slope: | 1.007994 | 1.019842 |
| CH4 Cal Offset: | -0.000017 | -0.015535 |
| NMHC Cal Slope: | 0.998090 | 0.997110 |
| NMHC Cal Offset: | -0.001358 | -0.015020 |

Notes: Sample inlet filter changed after as founds. Swapped hydrogen cylinder. No adjustments made.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## THC Calibration Summary

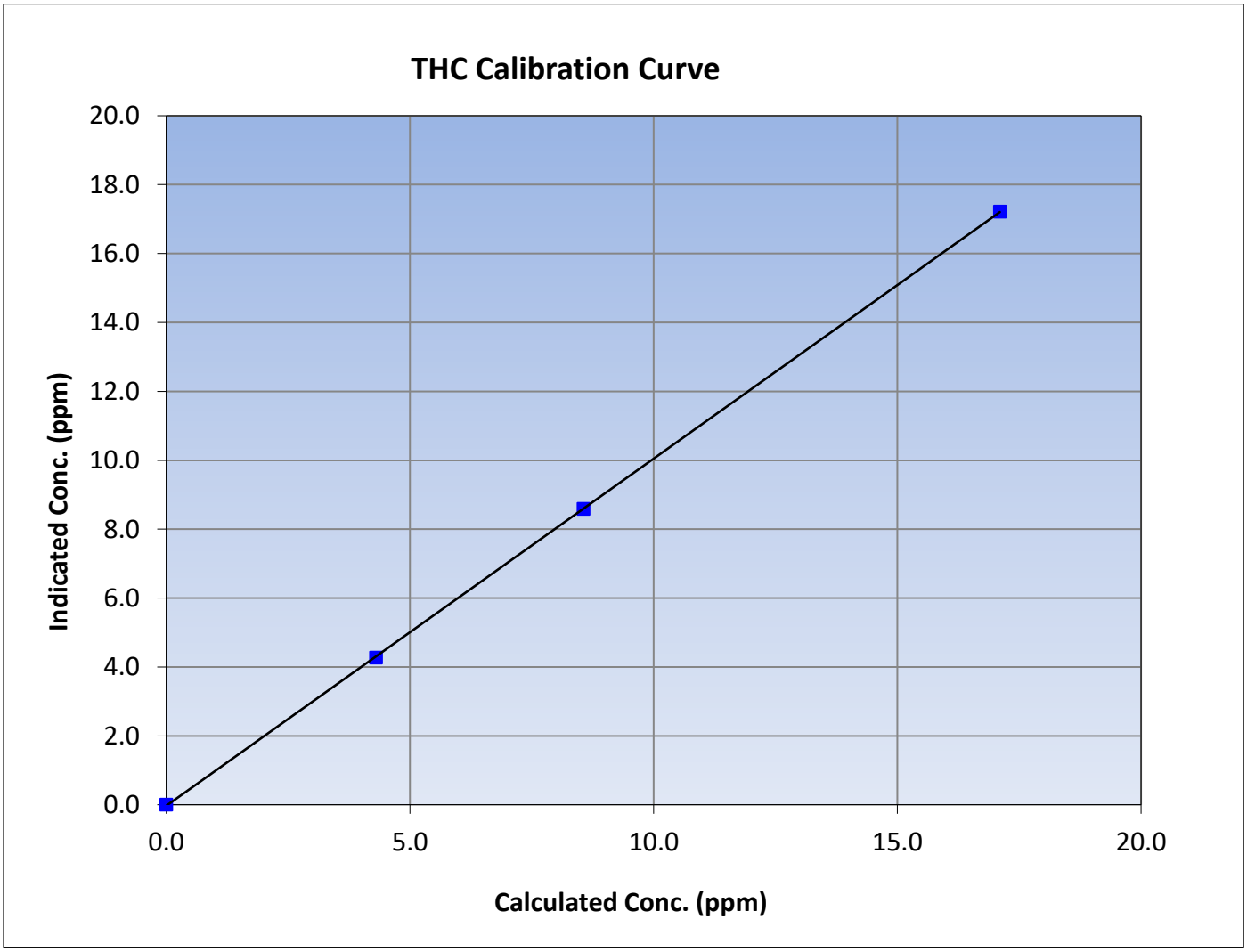
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Anzac | Station Number: | AMS 14 |
| Start Time (MST): | 8:54 | End Time (MST): | 13:17 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1118148494 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999985 | ≥0.995 |
| 17.10 | 17.22 | 0.9934 | | | |
| 8.56 | 8.59 | 0.9963 | Slope | 1.007749 | 0.90 - 1.10 |
| 4.30 | 4.27 | 1.0078 | | | |
| | | | Intercept | -0.029955 | +/-0.5 |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

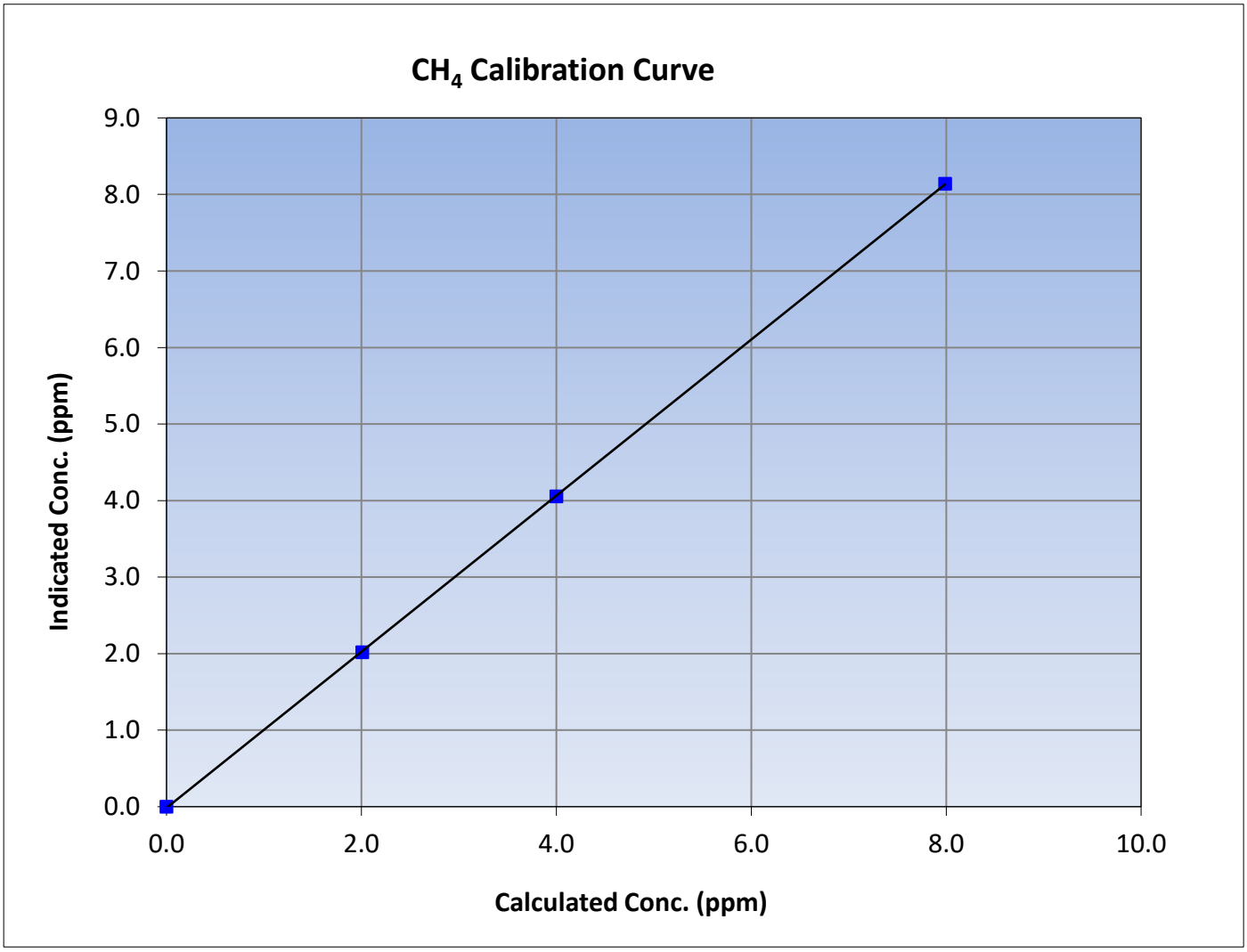
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Anzac | Station Number: | AMS 14 |
| Start Time (MST): | 8:54 | End Time (MST): | 13:17 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1118148494 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999983 | *≥0.995* |
| 7.99 | 8.14 | 0.9815 | | | |
| 4.00 | 4.06 | 0.9860 | Slope | 1.019842 | *0.90 - 1.10* |
| 2.01 | 2.02 | 0.9960 | | | |
| | | | Intercept | -0.015535 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

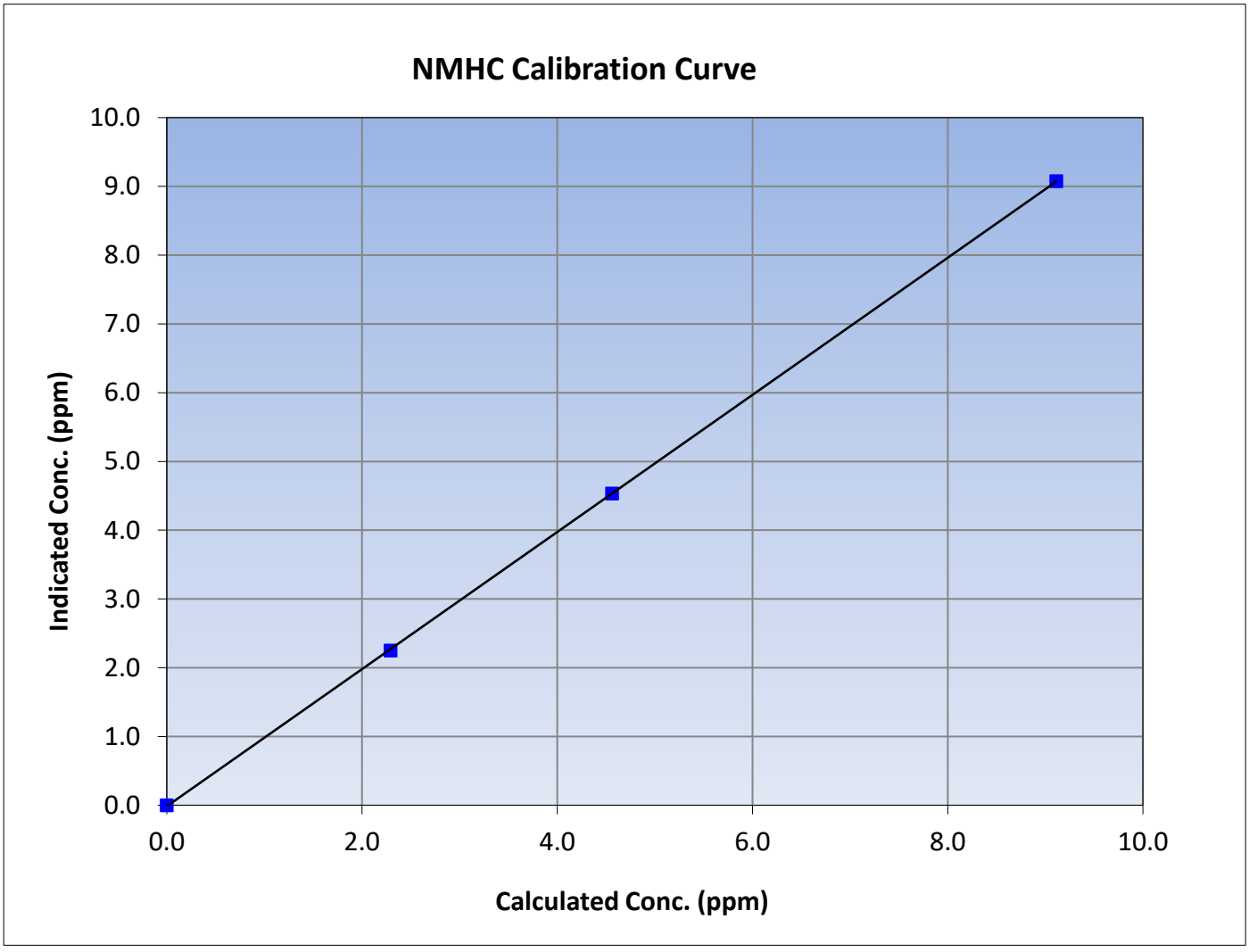
Version-01-2020

### Station Information

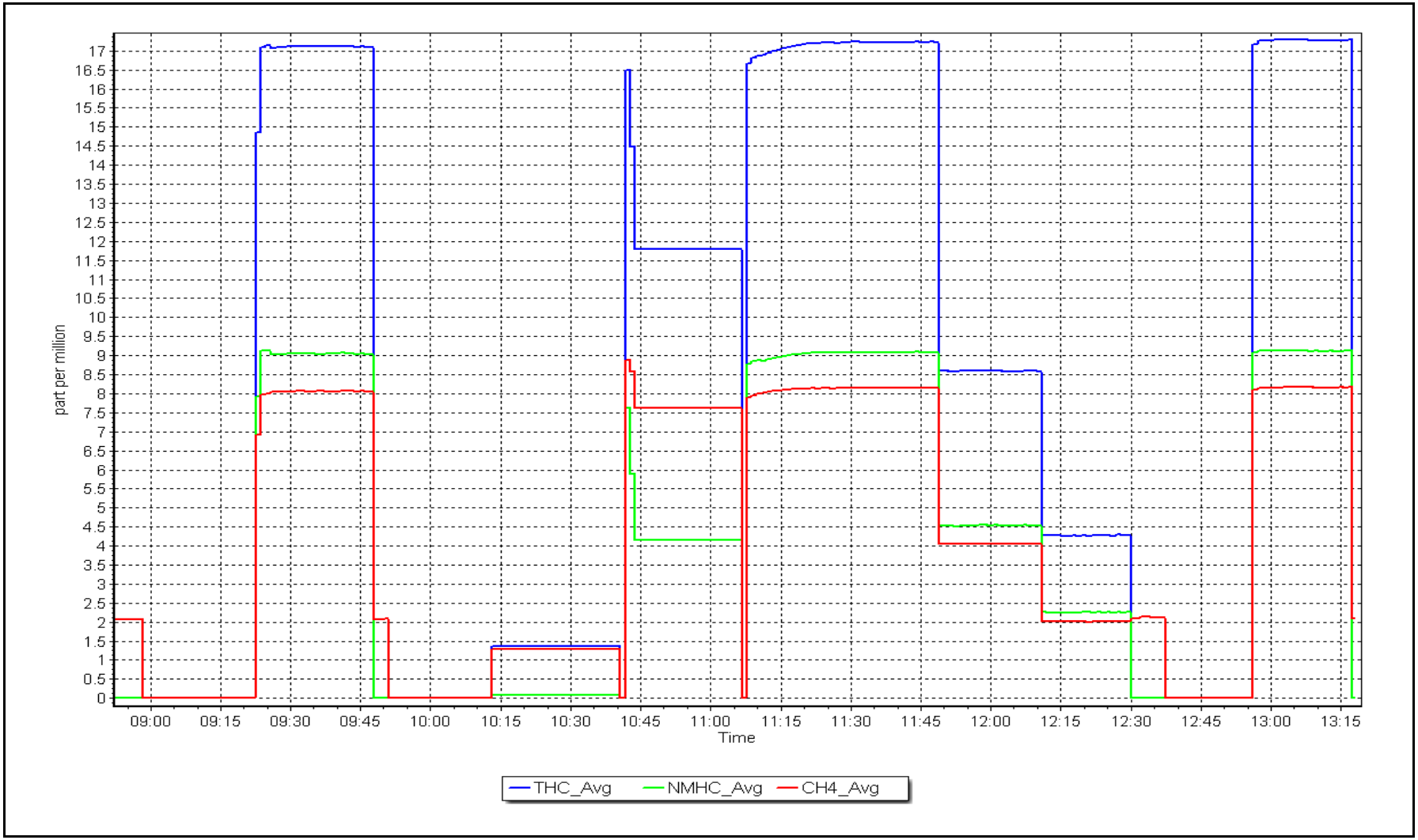
| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Anzac | Station Number: | AMS 14 |
| Start Time (MST): | 8:54 | End Time (MST): | 13:17 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1118148494 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999986 | *≥0.995* |
| 9.11 | 9.08 | 1.0040 | | | |
| 4.56 | 4.53 | 1.0063 | Slope | 0.997110 | *0.90 - 1.10* |
| 2.29 | 2.25 | 1.0185 | | | |
| | | | Intercept | -0.015020 | *+/-0.5* |



**NMHC Calibration Plot** Date: August 9, 2023 Location: Anzac



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Anzac | Station number: | AMS 14 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 7, 2023 |
| Start time (MST): | 7:25 | End time (MST): | 11:56 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2Y1P8D | | Cal Gas Expiry Date: | December 11, 2023 | |
| NOX Cal Gas Conc: | 50.92 | ppm | NO Cal Gas Conc: | 50.05 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 50.92 | ppm | Removed Gas NO Conc: | 50.05 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3060 | |
| ZAG make/model: | Teledyne API 701H | | Serial Number: | 357 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1426262592 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 1.375 | 1.375 | NO bkgnd or offset: | 3.7 | 3.7 |
| NOX coeff or slope: | 0.996 | 0.996 | NOX bkgnd or offset: | 3.7 | 3.7 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 163.9 | 161.2 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.995865 | 0.986023 |
| $NO_X$ Cal Offset: | 0.033705 | -0.615739 |
| NO Cal Slope: | 0.996593 | 0.987256 |
| NO Cal Offset: | -1.310286 | -2.172778 |
| $NO_2$ Cal Slope: | 1.000260 | 1.000092 |
| $NO_2$ Cal Offset: | 1.094049 | 0.381307 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.2 | ---- | ---- |
| as found span | 4932 | 80.1 | 813.8 | 799.9 | 13.9 | 803.6 | 786.6 | 17.0 | 1.0127 | 1.0169 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | ---- | ---- |
| high point | 4932 | 80.1 | 813.8 | 799.9 | 13.9 | 802.0 | 788.7 | 13.4 | 1.0147 | 1.0142 |
| second point | 4980 | 40.1 | 406.7 | 399.8 | 6.9 | 400.6 | 391.1 | 9.5 | 1.0153 | 1.0222 |
| third point | 4998 | 20.1 | 204.0 | 200.5 | 3.5 | 199.3 | 193.8 | 5.6 | 1.0234 | 1.0344 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | 0.2 | ---- | ---- |
| as left span | 4932 | 80.1 | 813.8 | 420.4 | 393.4 | 803.4 | 409.8 | 393.7 | 1.0129 | 1.0258 |
| | | | | | | | | Average Correction Factor | 1.0178 | 1.0236 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 803.6 ppb | NO = 786.7 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = -0.9% |
| Previous Response | $NO_X$ = 810.4 ppb | NO = 795.8 ppb | | *Percent Change | NO = -1.2% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 786.8 | 407.3 | 393.4 | 393.5 | 0.9998 | 100.0% |
| 2nd GPT point (200 ppb O3) | 786.8 | 604.6 | 196.1 | 197.3 | 0.9939 | 100.6% |
| 3rd GPT point (100 ppb O3) | 786.8 | 699.1 | 101.6 | 101.7 | 0.9991 | 100.1% |
| | | | | Average Correction Factor | 0.9976 | 100.2% |

Notes: Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

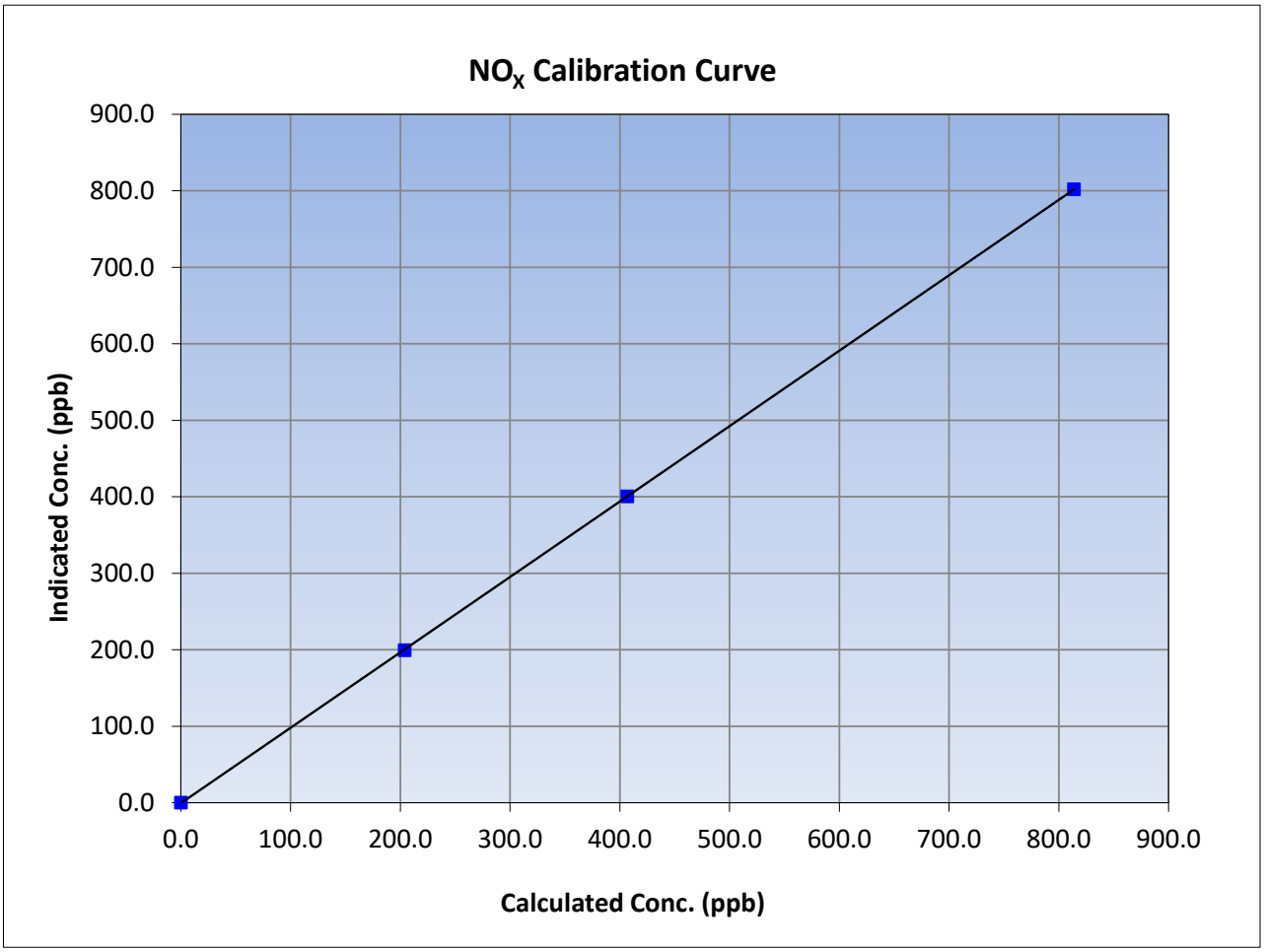
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 7, 2023 |
| Station Name: | Anzac | Station Number: | AMS 14 |
| Start Time (MST): | 7:25 | End Time (MST): | 11:56 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1426262592 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999994 | *≥0.995* |
| 813.8 | 802.0 | 1.0147 | | | |
| 406.7 | 400.6 | 1.0153 | Slope | 0.986023 | *0.90 - 1.10* |
| 204.0 | 199.3 | 1.0234 | | | |
| | | | Intercept | -0.615739 | *+/-20* |



# Wood Buffalo Environmental Association

## NO Calibration Summary

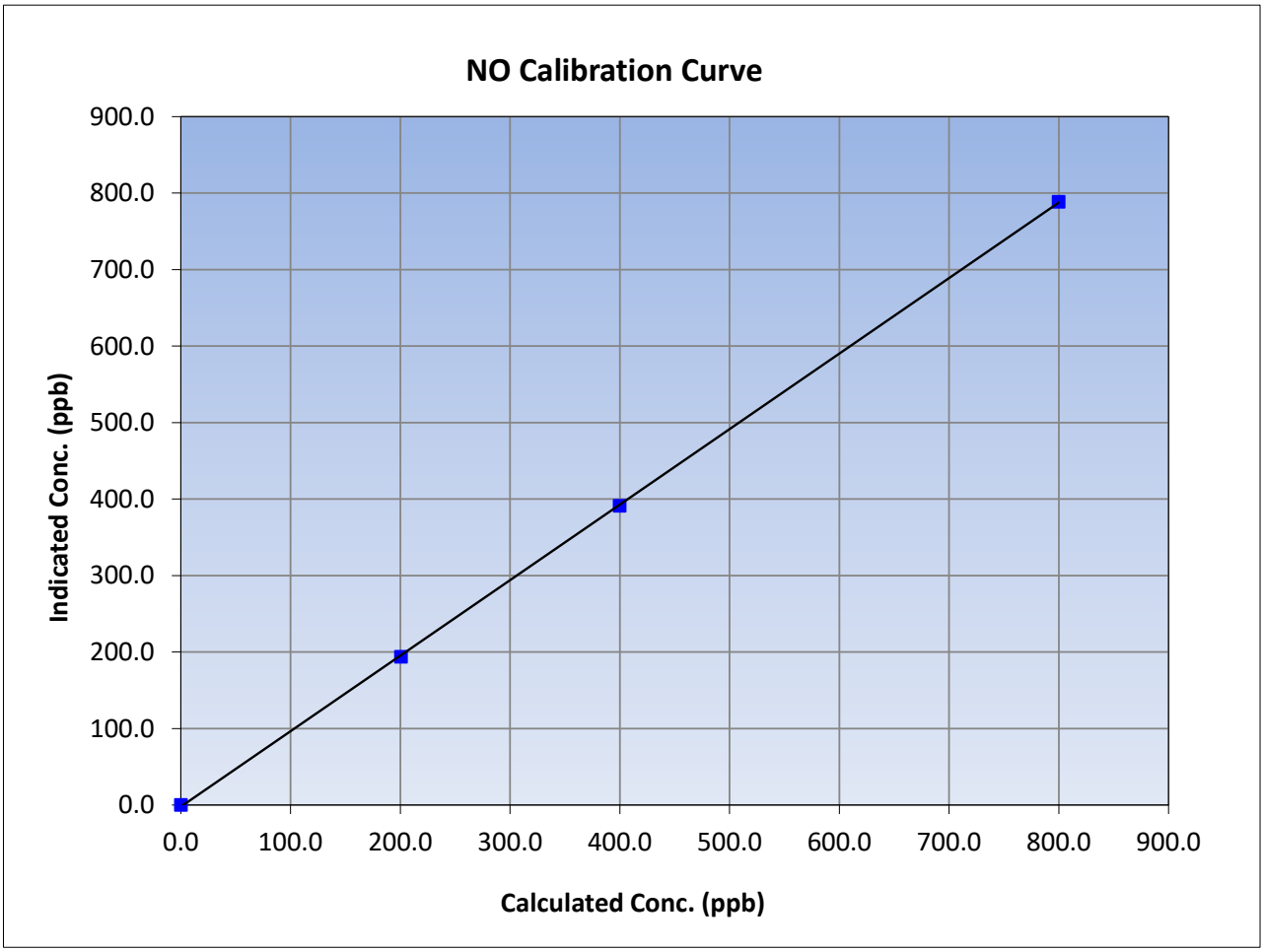
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 7, 2023 |
| Station Name: | Anzac | Station Number: | AMS 14 |
| Start Time (MST): | 7:25 | End Time (MST): | 11:56 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1426262592 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999965 | *≥0.995* |
| 799.9 | 788.7 | 1.0142 | | | |
| 399.8 | 391.1 | 1.0222 | Slope | 0.987256 | *0.90 - 1.10* |
| 200.5 | 193.8 | 1.0344 | | | |
| | | | Intercept | -2.172778 | *+/-20* |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

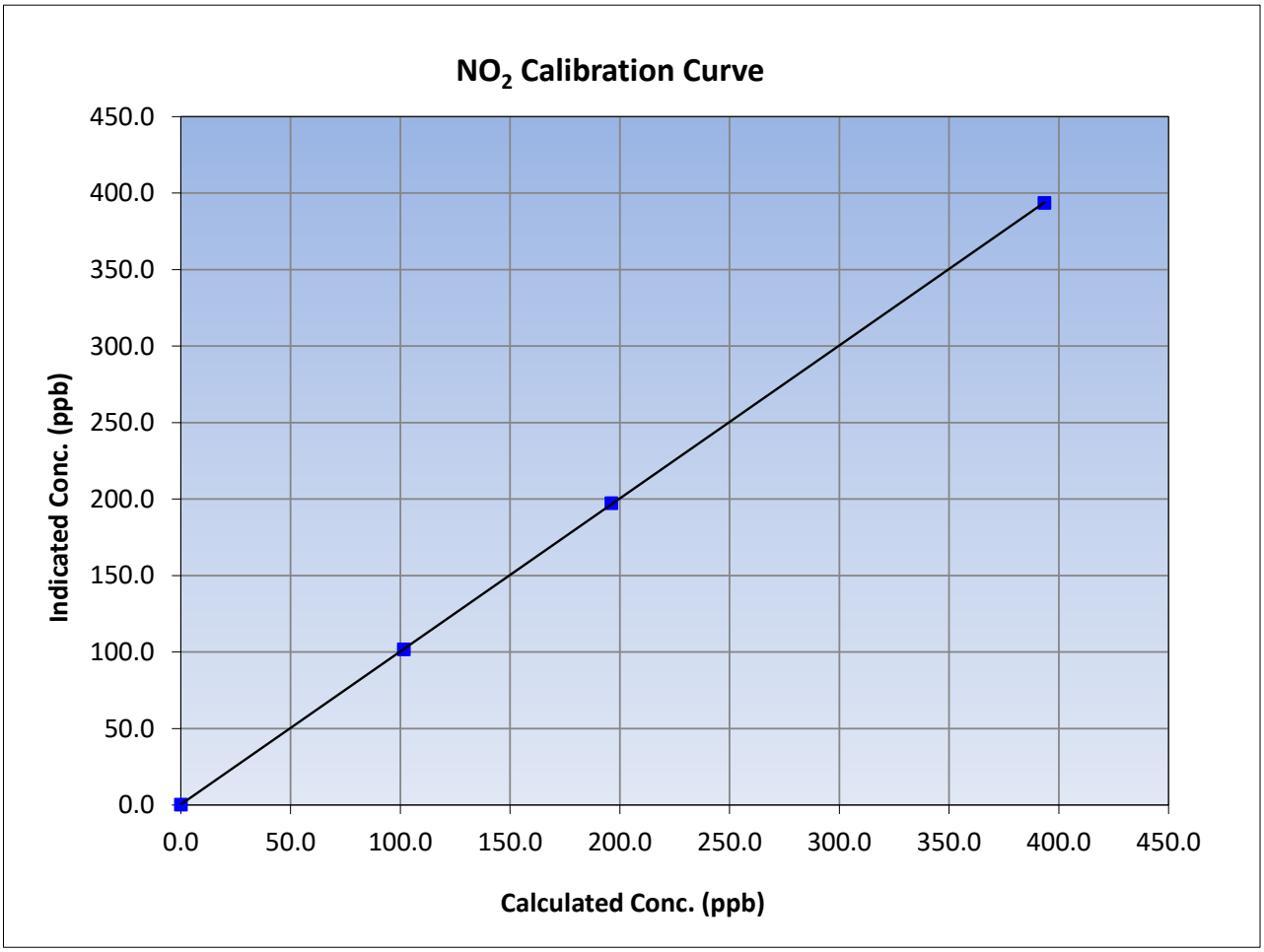
Version-04-2020

### Station Information

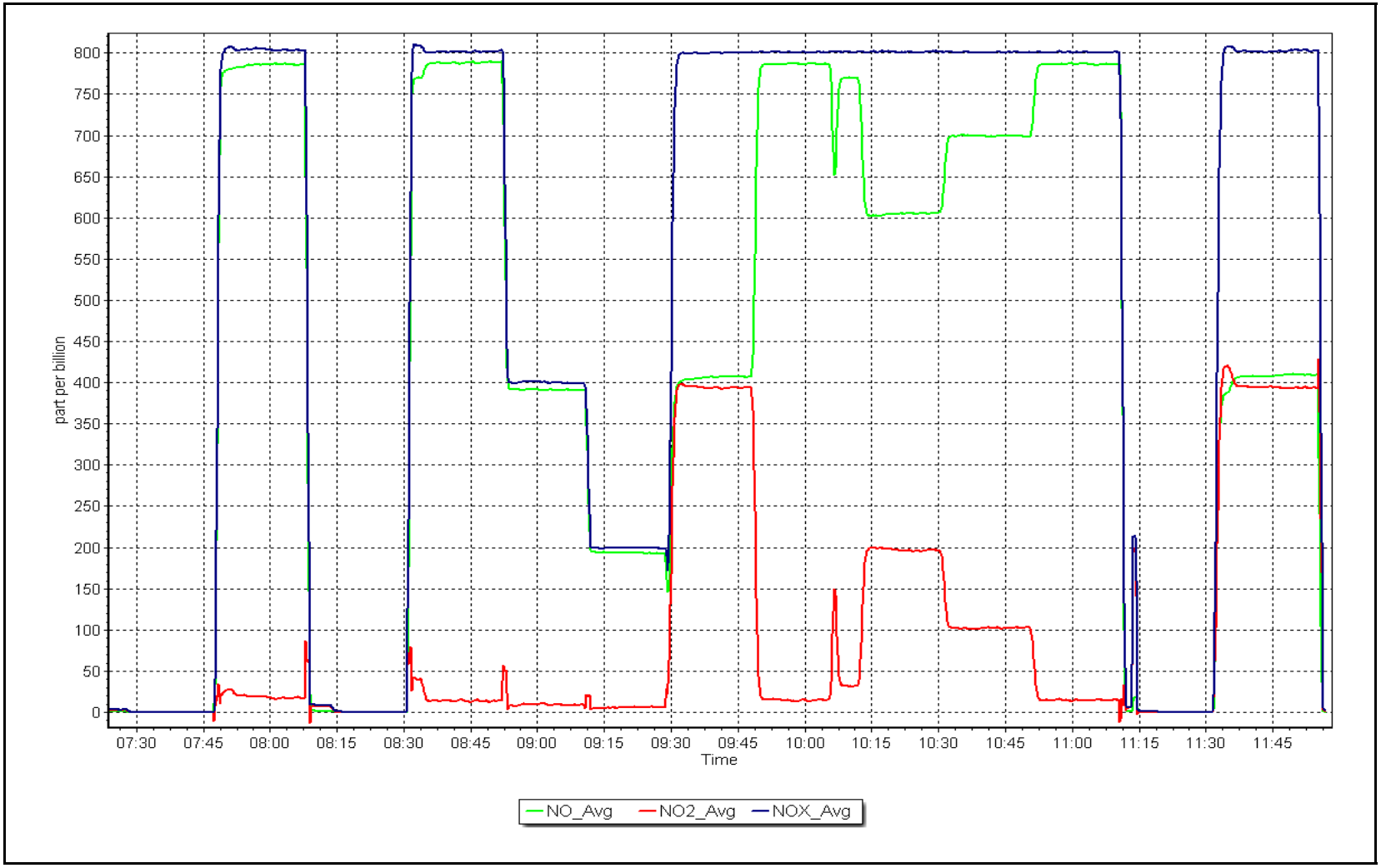
| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 7, 2023 |
| Station Name: | Anzac | Station Number: | AMS 14 |
| Start Time (MST): | 7:25 | End Time (MST): | 11:56 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1426262592 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999990 | ≥0.995 |
| 393.4 | 393.5 | 0.9998 | | | |
| 196.1 | 197.3 | 0.9939 | Slope | 1.000092 | 0.90 - 1.10 |
| 101.6 | 101.7 | 0.9991 | | | |
| | | | Intercept | 0.381307 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 15, 2023 Location: Anzac



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Anzac | Station number: | AMS14 |
| Calibration Date: | August 1, 2023 | Last Cal Date: | July 11, 2023 |
| Start time (MST): | 9:53 | End time (MST): | 13:05 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | API T700 | Serial Number: | 5239 |
| ZAG Make/Model: | API 701H | Serial Number: | 357 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 49i | Analyzer serial #: | 1426262595 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.989000 | 0.999171 | Backgd or Offset: | 1.3 | 1.3 |
| Calibration intercept: | 0.500000 | 0.520000 | Coeff or Slope: | 1.516 | 1.550 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 5000 | 884.2 | 400.0 | 395.7 | 1.011 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 5000 | 884.9 | 400.0 | 399.9 | 1.000 |
| second point | 5000 | 769.3 | 200.0 | 200.9 | 0.996 |
| third point | 5000 | 669.8 | 100.0 | 100.5 | 0.995 |
| as left zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| as left span | 5000 | 883.1 | 400.0 | 403.0 | 0.993 |
| | | | | Average Correction Factor | 0.997 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 395.1 | Previous response | 396.1 | *% change | -0.3% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Adjusted span only.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

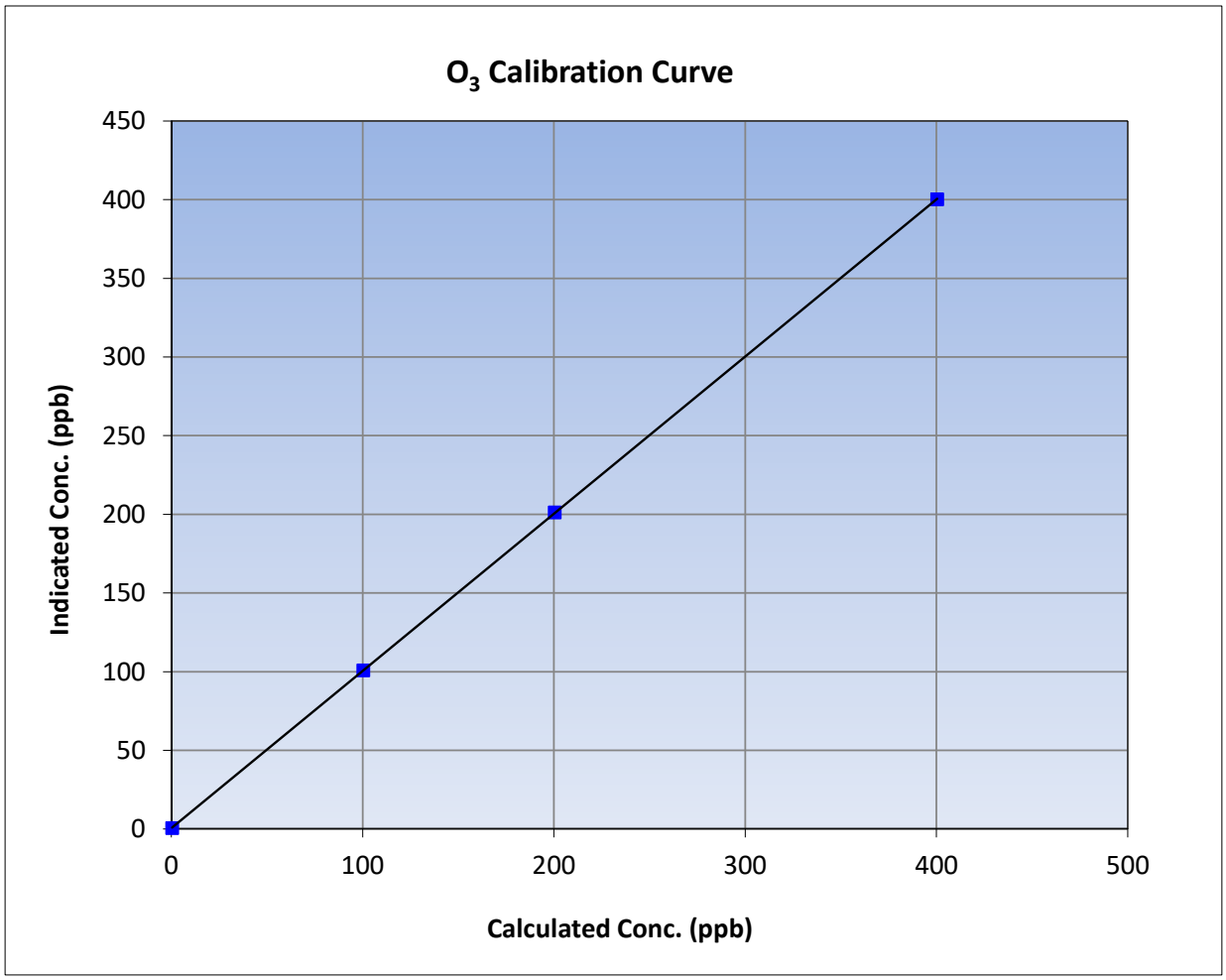
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 11, 2023 |
| Station Name: | Anzac | Station Number: | AMS14 |
| Start Time (MST): | 9:53 | End Time (MST): | 13:05 |
| Analyzer make: | Thermo 49i | Analyzer serial #: | 1426262595 |

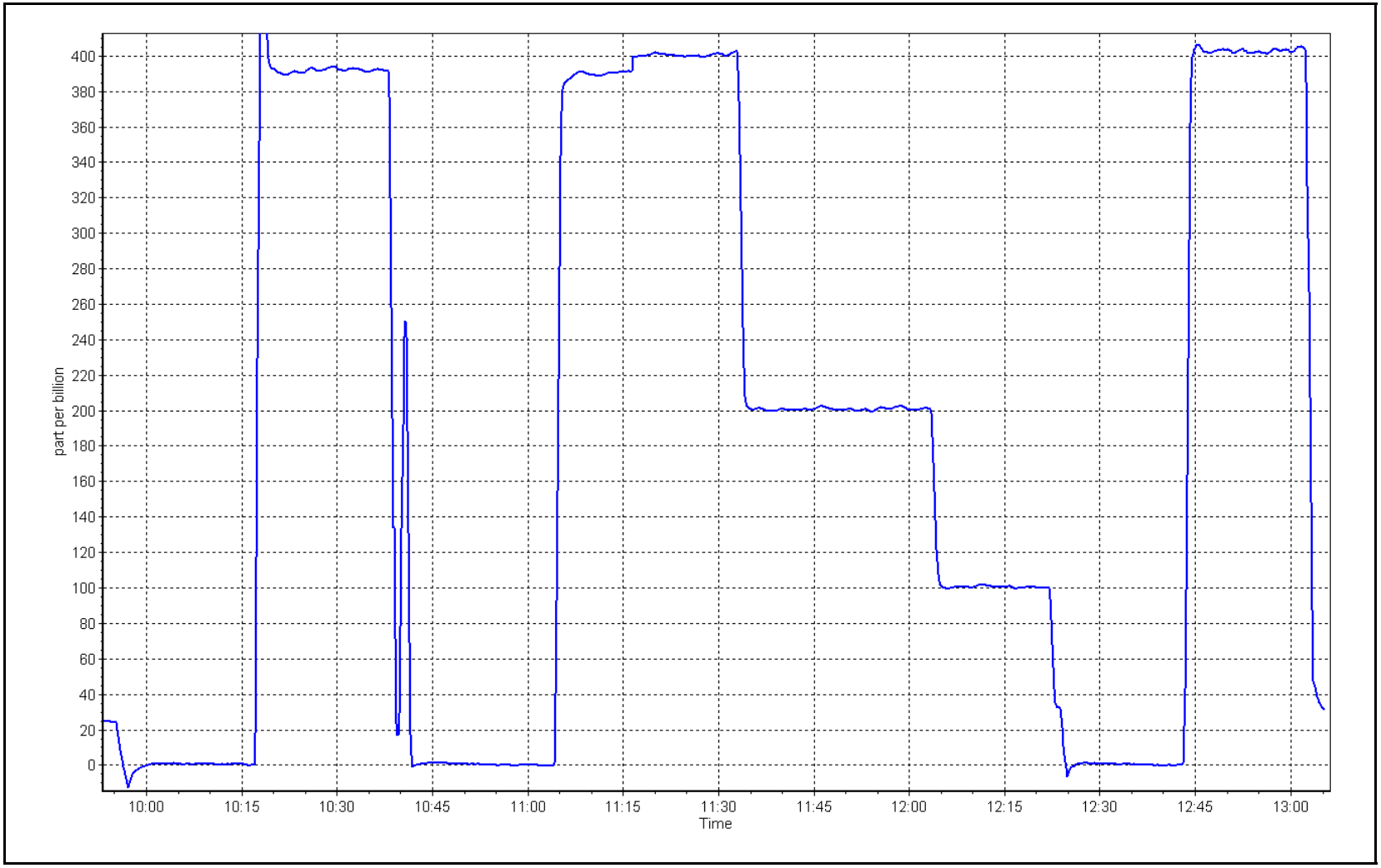
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 400.0 | 399.9 | 1.0003 |
| 200.0 | 200.9 | 0.9955 |
| 100.0 | 100.5 | 0.9950 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999994 | *≥0.995* |
| Slope | 0.999171 | *0.90 - 1.10* |
| Intercept | 0.520000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 1, 2023 Location: Anzac



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Anzac | Station number: | AMS 14 |
| Calibration Date: | August 1, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 12:55 | End time (MST): | 14:50 |
| Analyzer Make: | API T640 | S/N: | 825 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat FP-25 | S/N: | 388749 |
| Temp/RH standard: | Alicat FP-25 | S/N: | 388749 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | 21.0 | 22.4 | 21.0 | ☐ | +/- 2 °C |
| P (mmHg) | 715.1 | 716.3 | 715.1 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.03 | 4.85 | 5.03 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 1, 2023 Last Cal Date: July 6, 2023

PM w/o HEPA: 32.8 PM w/ HEPA: 0.0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 0 | 11 | 11 | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 30.9 w/ HEPA: 0

Date Optical Chamber Cleaned: August 1, 2023 <0.2 ug/m3

Disposable Filter Changed: August 1, 2023

### Annual Maintenance

Date Sample Tube Cleaned: July 6, 2023

Date RH/T Sensor Cleaned: July 6, 2023

Notes: No adjustments needed. Performed quarterly maintenance. As found PMT leak test is 0, because the analyzer's screen appeared to be frozen and was reading 0.00 µg/m3. Leak check passed. Head Cleaned.

Calibration by: Mohammed Kashif

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Anzac | Station Number: | AMS 14 |
| Calibration Date: | August 21, 2023 | Prev Cal Date: | August 9, 2022 |
| Start Time (MST): | 11:13 | End Time (MST): | 11:50 |
| Tower Height (m): | 20.0 | Reason: | Routine |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | D6359 |
| WS Calibrator: | MetOne 053 | Serial Number: | CA05231 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | NA | --- |
| 200 | 20.2 | NA | |
| 400 | 39.4 | NA | |
| 600 | 58.6 | NA | |
| 800 | 77.8 | NA | |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | | *≥0.9995* |
| Calculated slope | | | *0.90 - 1.10* |
| Calculated intercept | | | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | Z1048 |
| As Found Declination (deg east of True North): | NA | As Left Declination (deg east of True North): | NA |
| Solar noon time (MST): | 13:27 | Calc Declination*: | 12.03 Degrees |
| Deadband calc: | 0.7 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 2.8 | --- |
| 90 | 92.2 | 0.6% |
| 180 | 182.1 | 0.6% |
| 270 | 271.9 | 0.5% |
| 356 | 359.1 | 0.9% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999994 | *≥0.9995* |
| Calculated slope | | 0.999682 | *0.90 - 1.10* |
| Calculated intercept | | -2.362272 | *+/- 4* |

Notes: As found WD calibration; could not perform WS calibration due to damaged cable. WS bearings appears to be not in optimal condition on inspection.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Anzac | Station Number: | AMS 14 |
| Calibration Date: | August 23, 2023 | Prev Cal Date: | NA |
| Start Time (MST): | 10:52 | End Time (MST): | 11:20 |
| Tower Height (m): | 20.0 | Reason: | Install |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | E5132 |
| WS Calibrator: | MetOne 053 | Serial Number: | CA05231 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.1 | -0.3% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | 0.0% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999999 | *≥0.9995* |
| Calculated slope | | 0.998909 | *0.90 - 1.10* |
| Calculated intercept | | 0.030357 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | NA | Serial Number: | NA |
| As Found Declination (deg east of True North): | NA | As Left Declination (deg east of True North): | NA |
| Solar noon time (MST): | NA | Calc Declination*: | NA Degrees |
| Deadband calc: | #VALUE! degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | NA | --- |
| 90 | NA | |
| 180 | NA | |
| 270 | NA | |
| 356 | NA | |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | | *≥0.9995* |
| Calculated slope | | | *0.90 - 1.10* |
| Calculated intercept | | | *+/- 4* |

Notes: WS installation. Inspected bearings, they appear to be in good condition. Swapped both WS and WD cables.

Calibration Performed By: Mohammed Kashif

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS17
## WAPASU
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Wapasu | Station number: | AMS17 |
| Calibration Date: | August 3, 2023 | Last Cal Date: | July 5, 2023 |
| Start time (MST): | 10:00 | End time (MST): | 13:08 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| Cal Gas Concentration: | 50.38 ppm | Cal Gas Exp Date: | January 12, 2029 |
| Cal Gas Cylinder #: | ALM066507 | | |
| Removed Cal Gas Conc: | 50.38 ppm | Rem Gas Exp Date: | n/a |
| Removed Gas Cyl #: | n/a | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | Serial Number: | 2449 |
| ZAG Make/Model: | API 701H | Serial Number: | 359 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1218153459

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.008014 | 1.003838 | Backgd or Offset: | 12.6 | 12.6 |
| Calibration intercept: | -1.662517 | -2.099065 | Coeff or Slope: | 1.111 | 1.111 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 4921 | 79.4 | 800.0 | 799.6 | 1.000 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4921 | 79.4 | 800.0 | 802.4 | 0.997 |
| second point | 4960 | 39.7 | 400.0 | 397.2 | 1.007 |
| third point | 4980 | 19.8 | 199.5 | 196.9 | 1.013 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4920 | 79.4 | 800.1 | 804.2 | 0.995 |
| | | | | Average Correction Factor | 1.006 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 799.80 | Previous response | 804.72 | *% change | -0.6% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

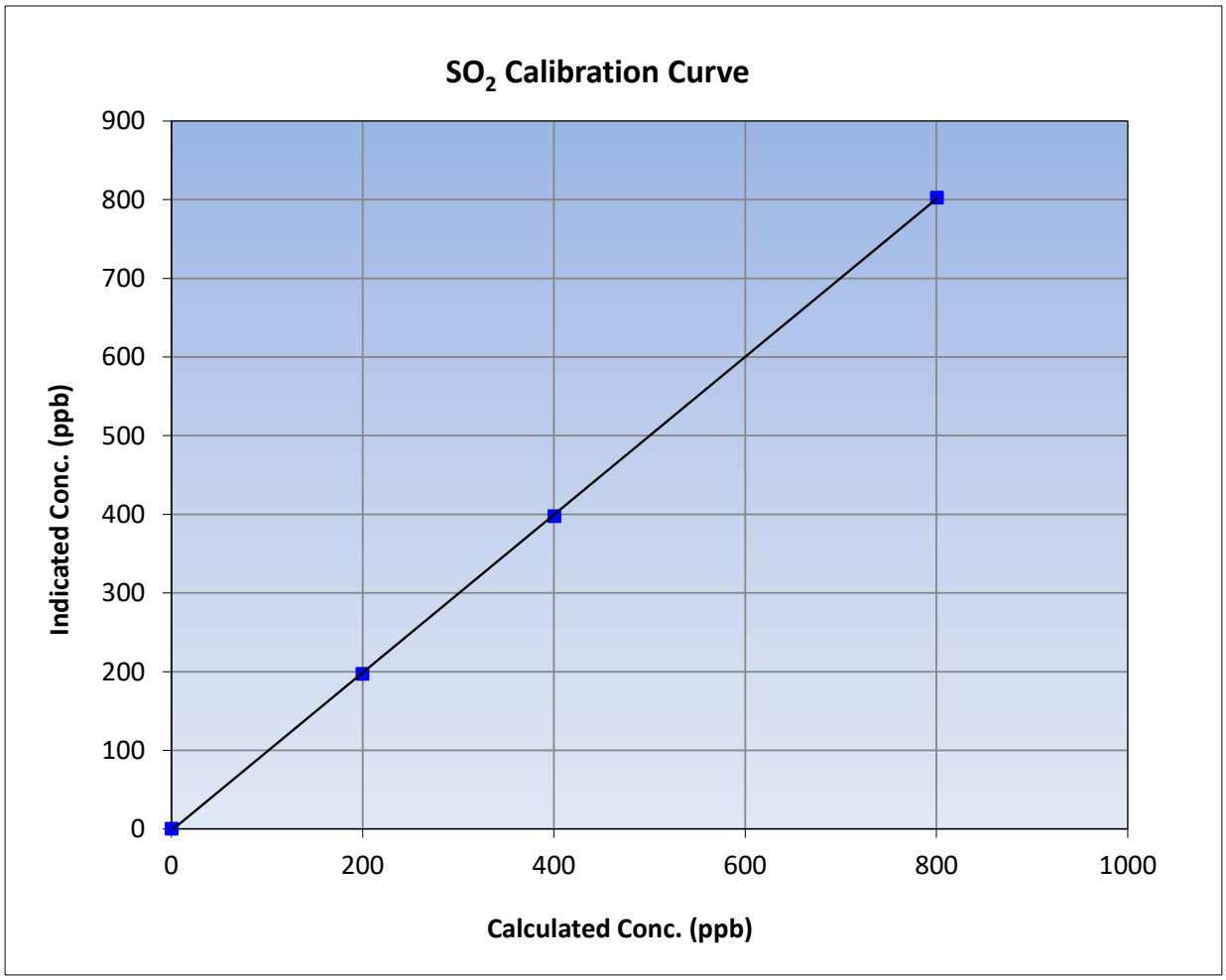
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 5, 2023 |
| Station Name: | Wapasu | Station Number: | AMS17 |
| Start Time (MST): | 10:00 | End Time (MST): | 13:08 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1218153459 |

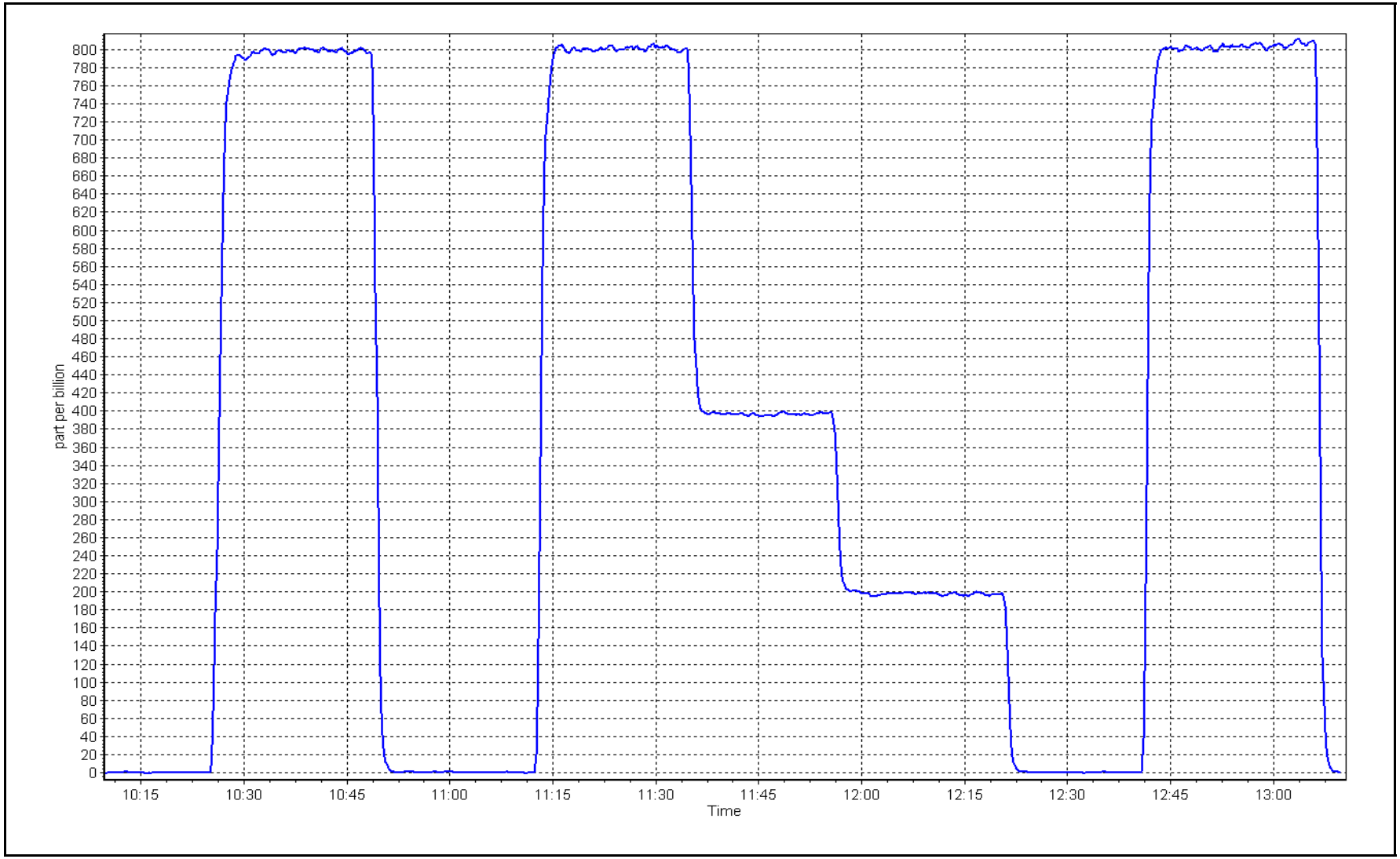
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 800.0 | 802.4 | 0.9970 |
| 400.0 | 397.2 | 1.0072 |
| 199.5 | 196.9 | 1.0133 |
| | | |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999962 | *≥0.995* |
| Slope | 1.003838 | *0.90 - 1.10* |
| Intercept | -2.099065 | *+/-30* |



**SO2 Calibration Plot** Date: August 3, 2023 Location: Wapasu



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Wapasu | Station number: | AMS17 |
| Calibration Date: | August 8, 2023 | Last Cal Date: | July 17, 2023 |
| Start time (MST): | 9:45 | End time (MST): | 15:08 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.076 | ppm | Cal Gas Exp Date: | September 16, 2024 |
| Cal Gas Cylinder #: | CC511852 | | | |
| Removed Cal Gas Conc: | 5.076 | ppm | Rem Gas Exp Date: | n/a |
| Removed Gas Cyl #: | n/a | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 2449 |
| ZAG Make/Model: | API T701H | | Serial Number: | 359 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 450i | | Analyzer serial #: | 1218153583 | |
| Converter make: | n/a | | Converter serial #: | n/a | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.996997 | 0.996998 | Backgd or Offset: | 13.0 | 13.1 |
| Calibration intercept: | -0.319220 | -0.219239 | Coeff or Slope: | 1.134 | 1.116 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4921 | 78.8 | 80.0 | 83.7 | 0.955 |
| as found 2nd point | 4961 | 39.4 | 40.0 | 41.8 | 0.955 |
| as found 3rd point | 4980 | 19.7 | 20.0 | 21.0 | 0.948 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4921 | 78.8 | 80.0 | 79.9 | 1.001 |
| second point | 4961 | 39.4 | 40.0 | 38.9 | 1.028 |
| third point | 4980 | 19.7 | 20.0 | 19.8 | 1.010 |
| as left zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as left span | 4921 | 78.8 | 80.0 | 77.2 | 1.036 |
| SO2 Scrubber Check | 4921 | 79.4 | 800.0 | -0.1 | ---- |
| Date of last scrubber change: | | n/a | | Ave Corr Factor | 1.013 |
| Date of last converter efficiency test: | | n/a | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 83.8 | Prev response: | 79.44 | *% change: | 5.2% |
| Baseline Corr 2nd AF pt: | 41.9 | AF Slope: | 1.046854 | AF Intercept: | -0.039164 |
| Baseline Corr 3rd AF pt: | 21.1 | AF Correlation: | 0.999996 | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

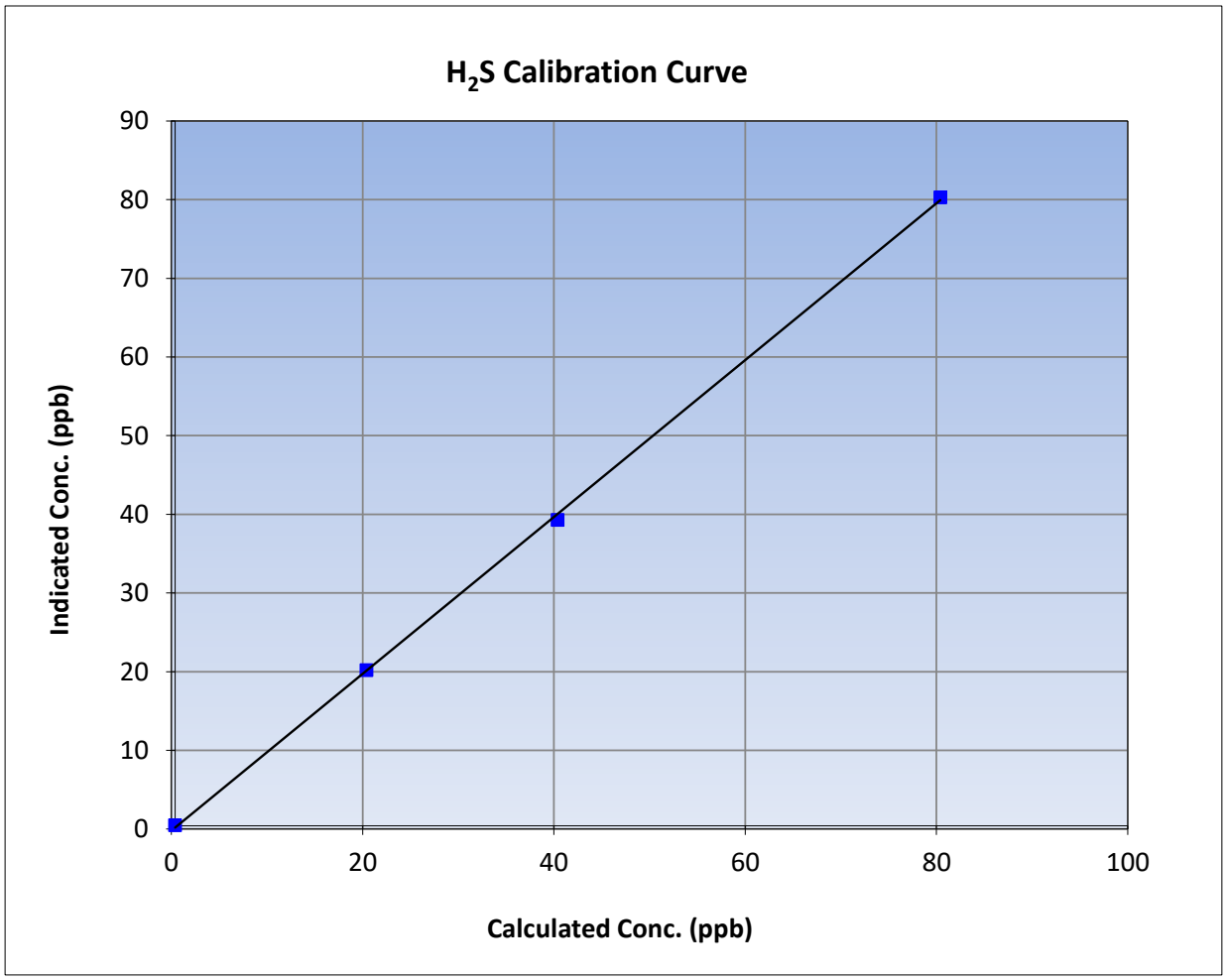
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Wapasu | Station Number: | AMS17 |
| Start Time (MST): | 9:45 | End Time (MST): | 15:08 |
| Analyzer make: | Thermo 450i | Analyzer serial #: | 1218153583 |

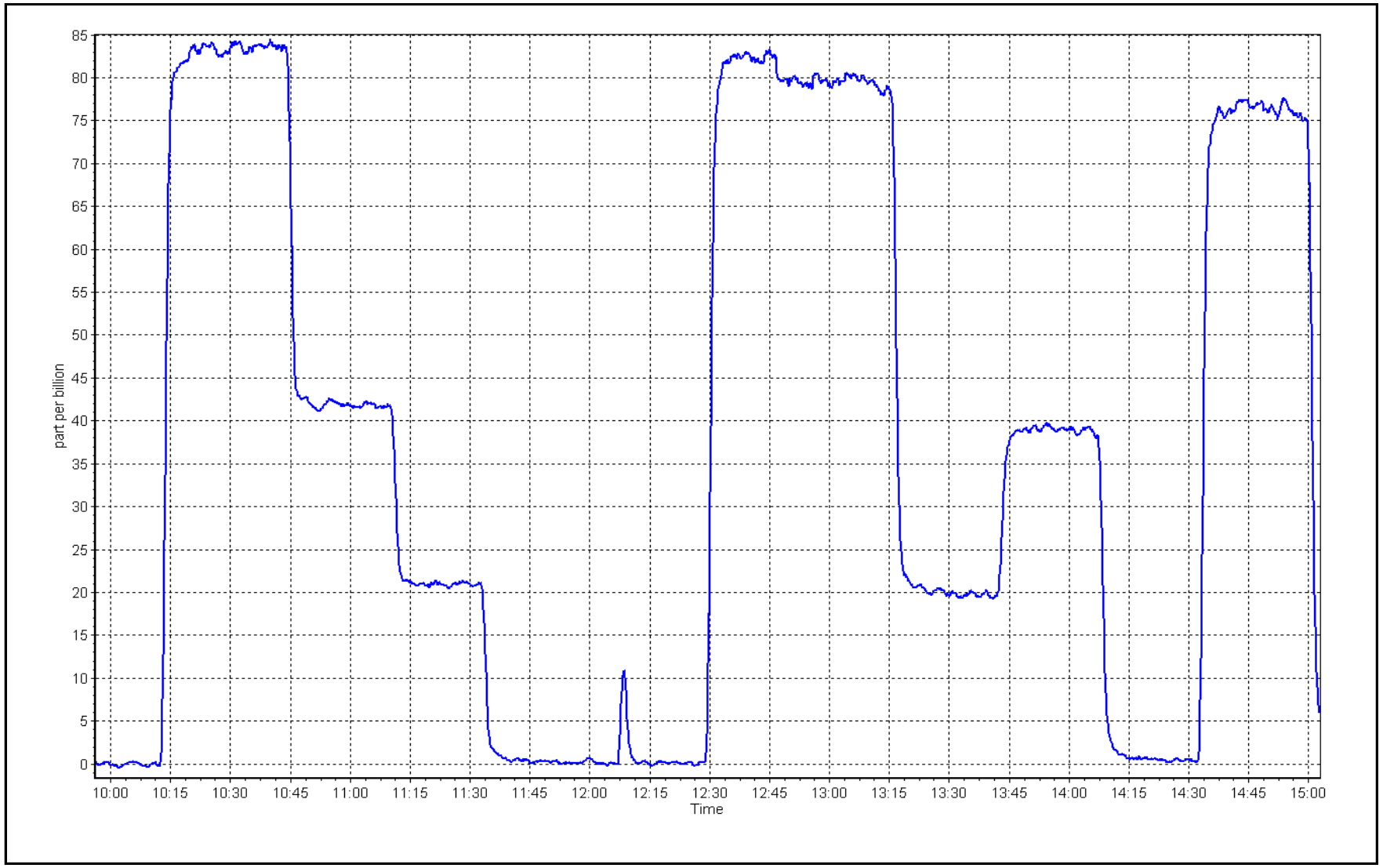
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 80.0 | 79.9 | 1.0013 |
| 40.0 | 38.9 | 1.0282 |
| 20.0 | 19.8 | 1.0101 |
| | | |

| Statistical Evaluation | | Limits |
|---|---|---|
| Correlation Coefficient | 0.999768 | ≥0.995 |
| Slope | 0.996998 | 0.90 - 1.10 |
| Intercept | -0.219239 | +/-3 |



**$H_2S$ Calibration Plot** Date: August 8, 2023 Location: Wapasu



# Wood Buffalo Environmental Association

## THC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Wapasu | Station number: | AMS17 |
| Calibration Date: | August 3, 2023 | Last Cal Date: | July 5, 2023 |
| Start time (MST): | 10:00 | End time (MST): | 13:08 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | ALM066507 | Cal Gas Expiry Date: | January 12, 2029 | |
| CH4 Cal Gas Conc. | 503.5 | ppm | CH4 Equiv Conc. | 1076.3 | ppm |
| C3H8 Cal Gas Conc. | 208.3 | ppm | | | |
| Removed Gas Cert: | | n/a | Removed Gas Expiry: | n/a | |
| Removed CH4 Conc. | 503.5 | ppm | CH4 Equiv Conc. | 1076.3 | ppm |
| Removed C3H8 Conc. | 208.3 | ppm | Diff between cyl: | | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 2449 | |
| ZAG Make/Model: | API 701H | | Serial Number: | 359 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 51i-LT | | Analyzer serial #: | 1218153352 | |
| Analyzer Range: | 0 - 20 ppm | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.994932 | 0.999409 | Background: | 3.300 | 3.300 |
| Calibration intercept: | -0.001771 | -0.080737 | Coefficient: | 4.460 | 4.460 |

### THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | -0.08 | ---- |
| as found span | 4921 | 79.4 | 17.09 | 17.09 | 1.000 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | -0.05 | ---- |
| high point | 4921 | 79.4 | 17.09 | 17.03 | 1.004 |
| second point | 4960 | 39.7 | 8.55 | 8.40 | 1.017 |
| third point | 4980 | 19.8 | 4.26 | 4.18 | 1.020 |
| as left zero | 5000 | 0.0 | 0.00 | -0.06 | ---- |
| as left span | 4920 | 79.4 | 17.09 | 17.04 | 1.003 |
| | | | | Average Correction Factor | 1.014 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 17.17 | Previous response | 17.00 | *% change | 1.0% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## THC Calibration Summary

Version-01-2020

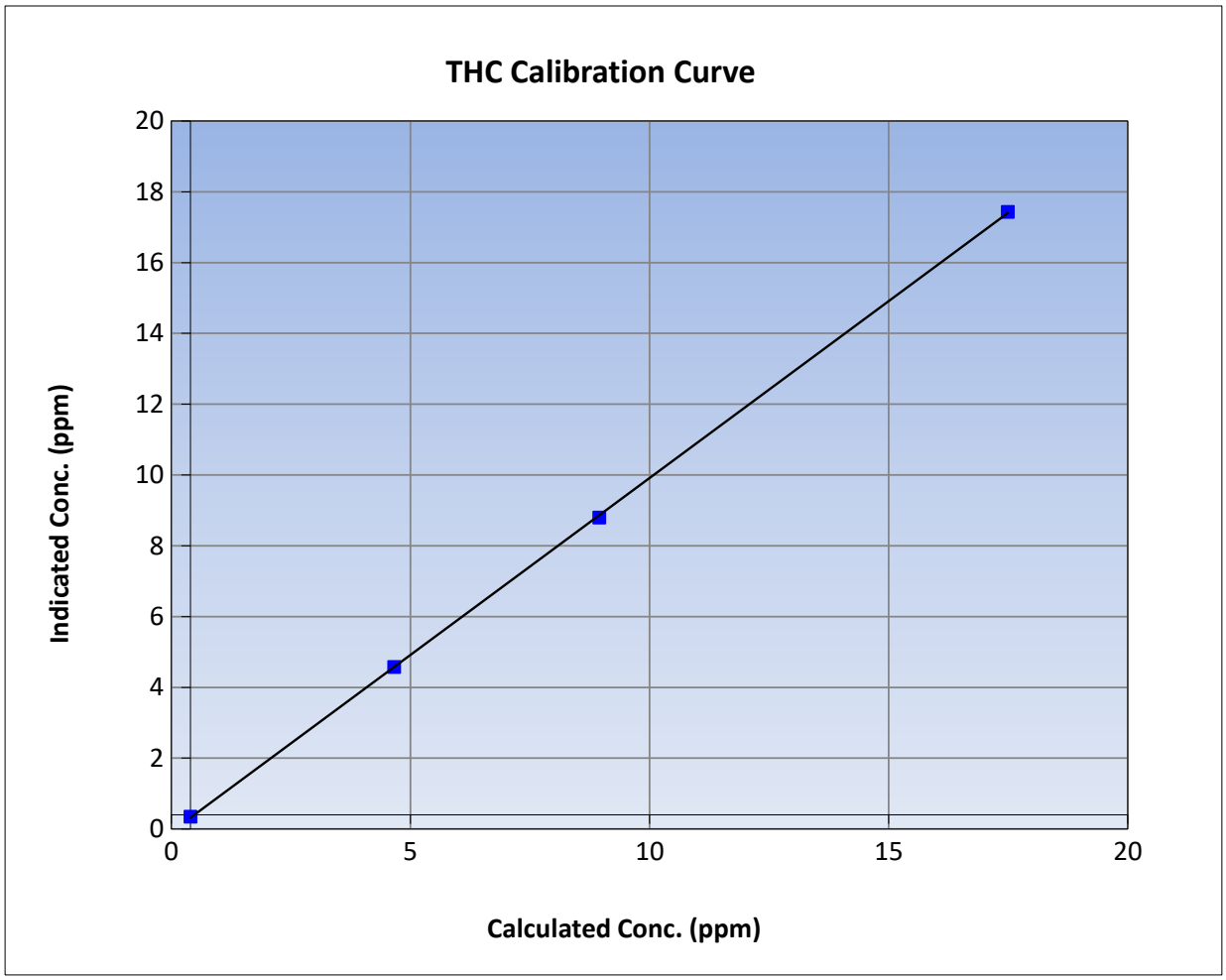
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 5, 2023 |
| Station Name: | Wapasu | Station Number: | AMS17 |
| Start Time (MST): | 10:00 | End Time (MST): | 13:08 |
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1218153352 |

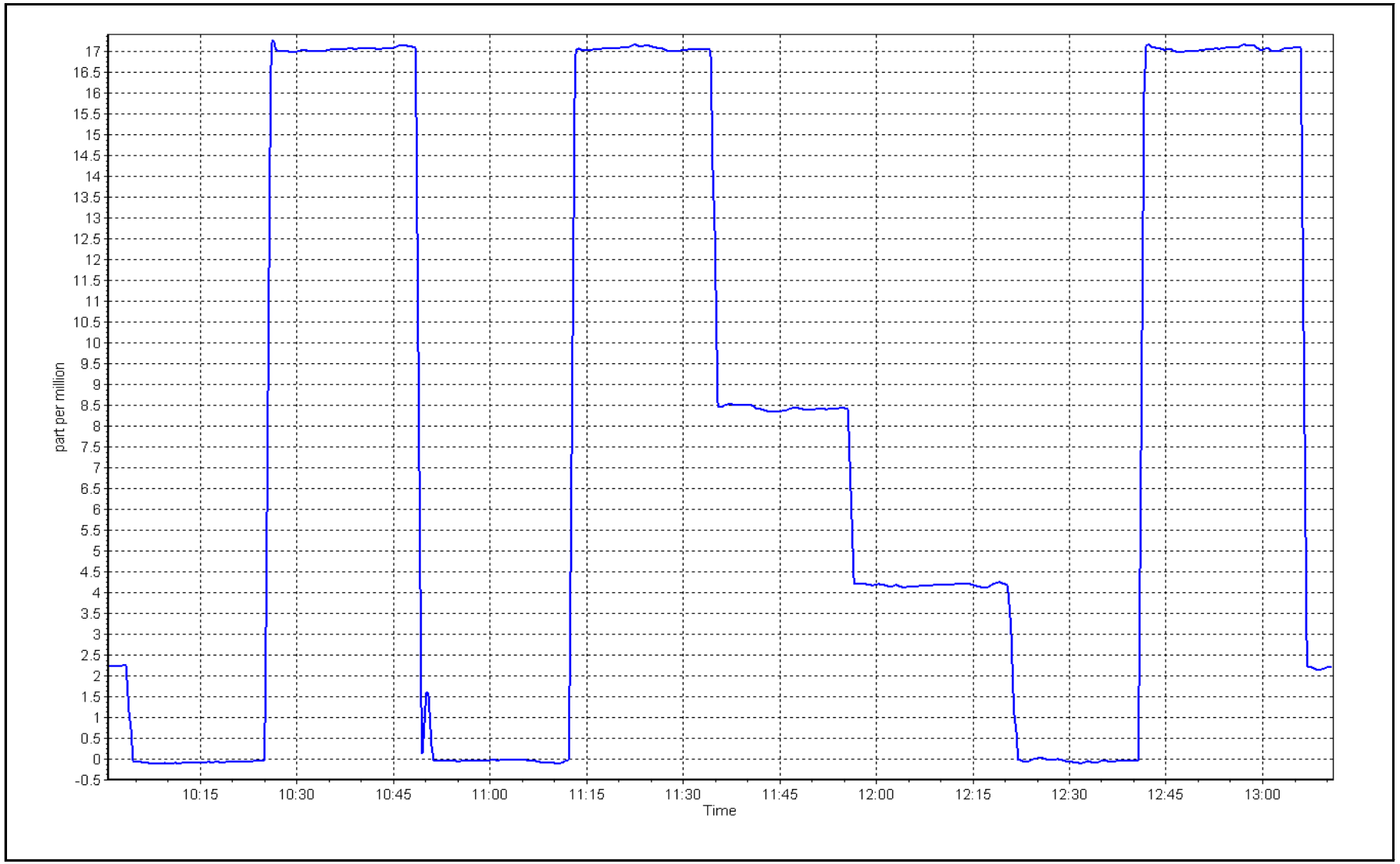
### Calibration Data

| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.00 | -0.05 | ---- |
| 17.09 | 17.03 | 1.0036 |
| 8.55 | 8.40 | 1.0174 |
| 4.26 | 4.18 | 1.0197 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999966 | *≥0.995* |
| Slope | 0.999409 | *0.90 - 1.10* |
| Intercept | -0.080737 | *+/-1.5* |



**THC Calibration Plot** Date: August 3, 2023 Location: Wapasu



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Wapasu | Station number: | AMS17 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 25, 2023 |
| Start time (MST): | 9:30 | End time (MST): | 14:13 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T375YK8 | | Cal Gas Expiry Date: | April 13, 2025 | |
| NOX Cal Gas Conc: | 49.11 | ppm | NO Cal Gas Conc: | 48.07 | ppm |
| Removed Cylinder #: | | | Removed Gas Exp Date: | | |
| Removed Gas NOX Conc: | 49.11 | ppm | Removed Gas NO Conc: | 48.07 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 2449 | |
| ZAG make/model: | API T701H | | Serial Number: | 359 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo Scientific 42iQ | Analyzer serial #: | 12300522720 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.205 | 1.212 | NO bkgnd or offset: | 10.1 | 9.0 |
| NOX coeff or slope: | 0.996 | 0.992 | NOX bkgnd or offset: | 10.2 | 9.1 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 430.0 | 383.1 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.988306 | 1.001480 |
| $NO_X$ Cal Offset: | -0.640000 | -3.500000 |
| NO Cal Slope: | 0.986171 | 0.999458 |
| NO Cal Offset: | -1.460000 | -3.960000 |
| $NO_2$ Cal Slope: | 1.024572 | 0.998776 |
| $NO_2$ Cal Offset: | -0.186089 | -0.422855 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.2 | ---- | ---- |
| as found span | 4917 | 83.2 | 817.2 | 799.9 | 17.3 | 801.6 | 782.2 | 19.5 | 1.0194 | 1.0226 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | ---- | ---- |
| high point | 4917 | 83.2 | 817.2 | 799.9 | 17.3 | 817.3 | 797.9 | 19.5 | 0.9999 | 1.0025 |
| second point | 4958 | 41.6 | 408.6 | 399.9 | 8.7 | 402.1 | 392.6 | 9.5 | 1.0162 | 1.0187 |
| third point | 4979 | 20.8 | 204.3 | 200.0 | 4.3 | 198.7 | 192.6 | 6.1 | 1.0282 | 1.0383 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.0 | ---- | ---- |
| as left span | 4917 | 83.2 | 817.2 | 395.3 | 421.9 | 799.4 | 389.1 | 410.3 | 1.0222 | 1.0158 |
| | | | | | | | | Average Correction Factor | 1.0147 | 1.0198 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 801.6 ppb | NO = 782.1 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -0.7% |
| Previous Response | $NO_X$ = 807.0 ppb | NO = 787.4 ppb | | *Percent Change | NO = | -0.7% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found $NO_X$ $r^2$: | Nx Sl: | Nx Int: | |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found NO $r^2$: | NO Sl: | NO Int: | |
| | | | As found $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: | |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 796.8 | 392.2 | 421.9 | 421.4 | 1.0012 | 99.9% |
| 2nd GPT point (200 ppb O3) | 796.8 | 595.6 | 218.5 | 217.0 | 1.0069 | 99.3% |
| 3rd GPT point (100 ppb O3) | 796.8 | 698.3 | 115.8 | 115.2 | 1.0053 | 99.5% |
| | | | | Average Correction Factor | 1.0045 | 99.6% |

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

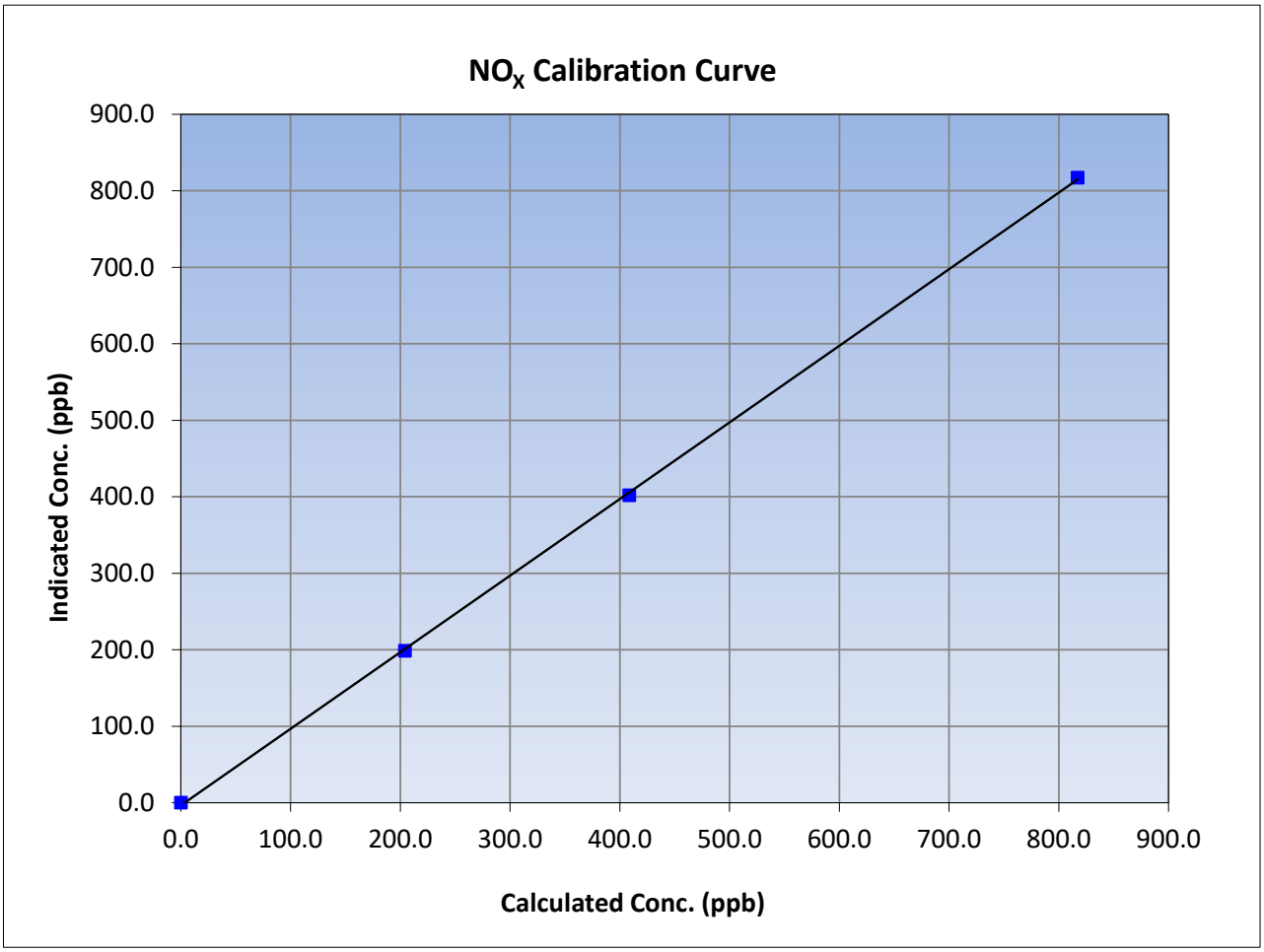
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Wapasu | Station Number: | AMS17 |
| Start Time (MST): | 9:30 | End Time (MST): | 14:13 |
| Analyzer make: | Thermo Scientific 42iQ | Analyzer serial #: | 12300522720 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999898 | ≥0.995 |
| 817.2 | 817.3 | 0.9999 | | | |
| 408.6 | 402.1 | 1.0162 | Slope | 1.001480 | 0.90 - 1.10 |
| 204.3 | 198.7 | 1.0282 | | | |
| | | | Intercept | -3.500000 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

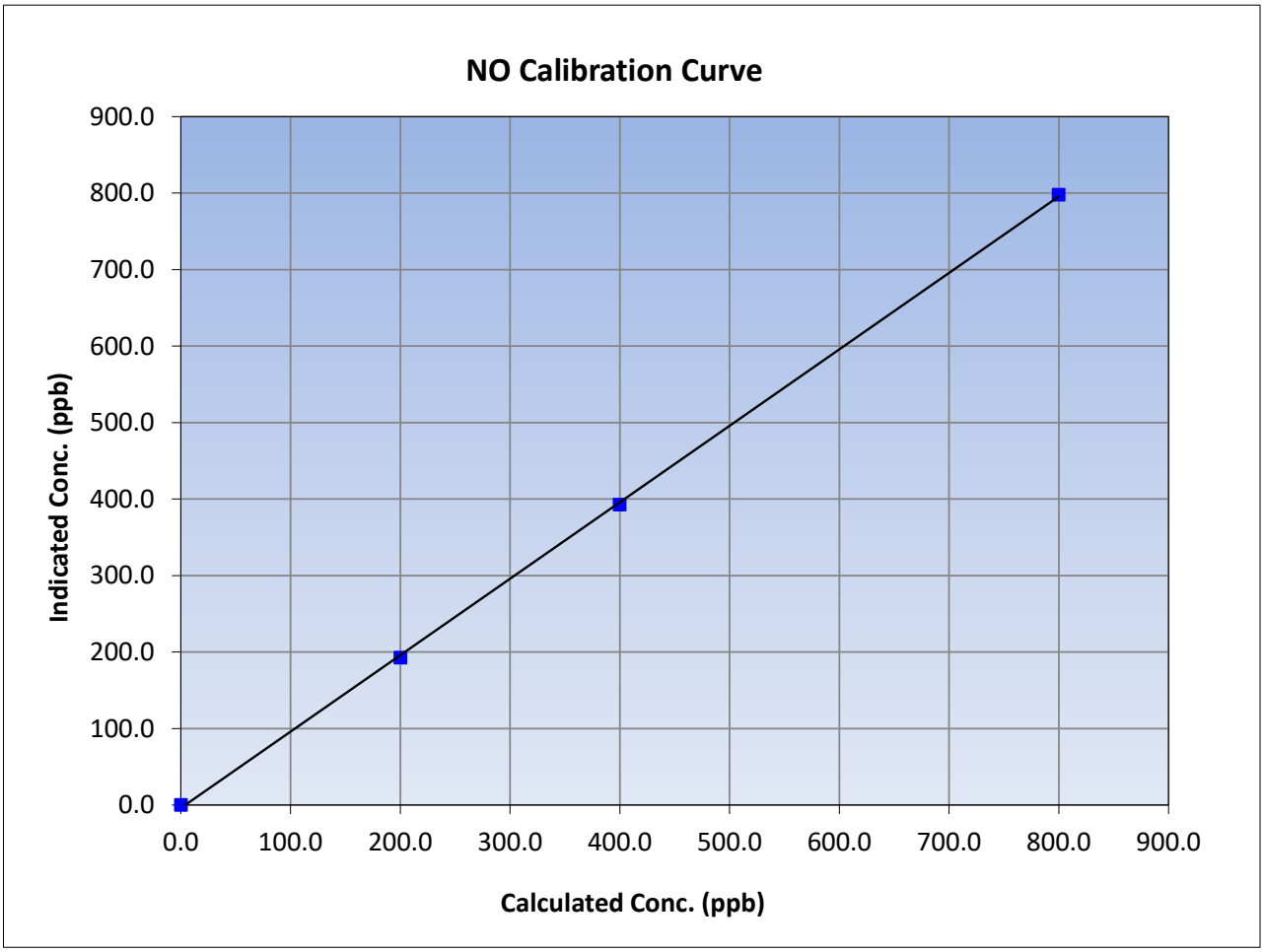
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Wapasu | Station Number: | AMS17 |
| Start Time (MST): | 9:30 | End Time (MST): | 14:13 |
| Analyzer make: | Thermo Scientific 42iQ | Analyzer serial #: | 12300522720 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999876 | ≥0.995 |
| 799.9 | 797.9 | 1.0025 | | | |
| 399.9 | 392.6 | 1.0187 | Slope | 0.999458 | 0.90 - 1.10 |
| 200.0 | 192.6 | 1.0383 | | | |
| | | | Intercept | -3.960000 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

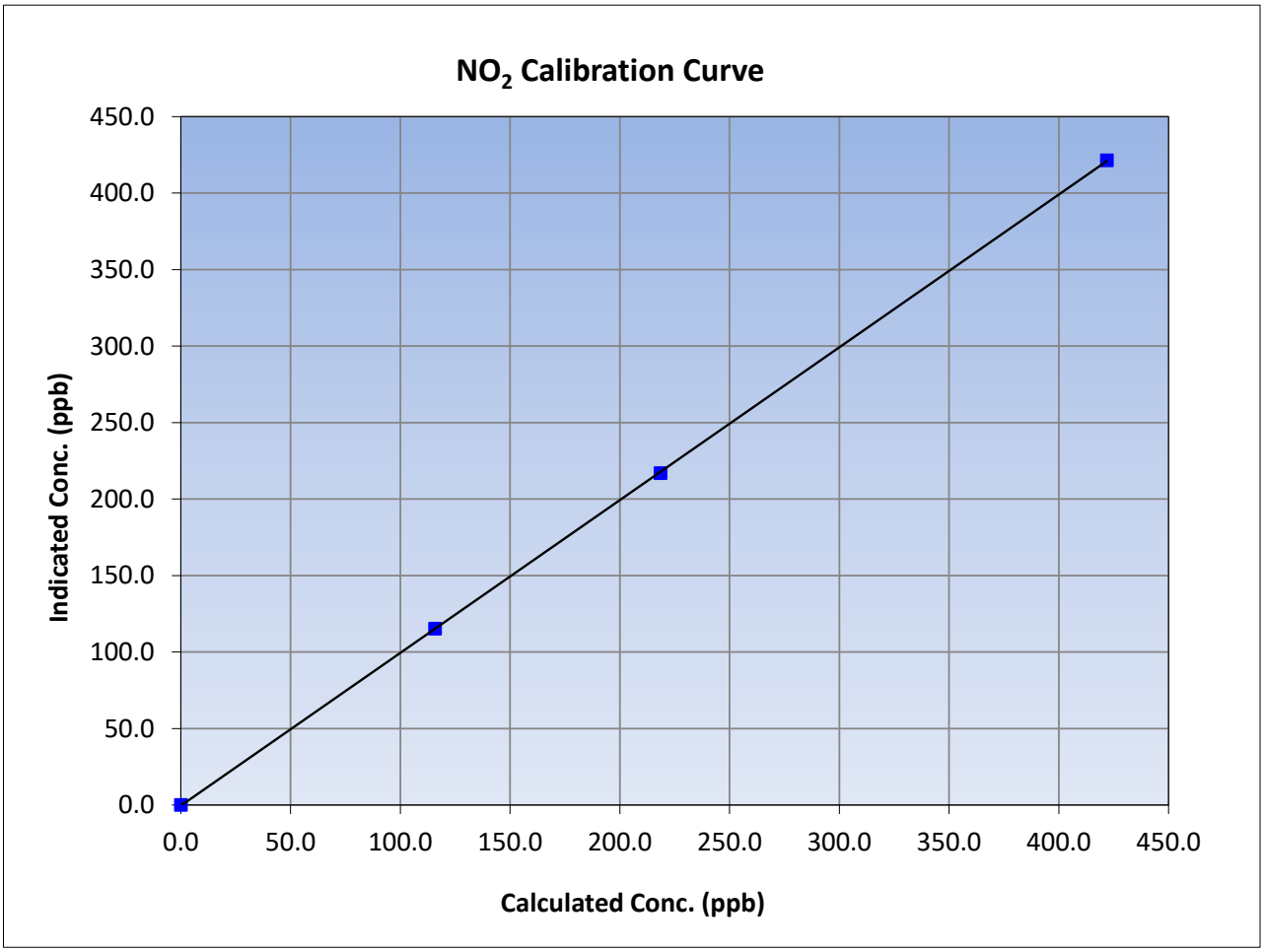
Version-04-2020

### Station Information

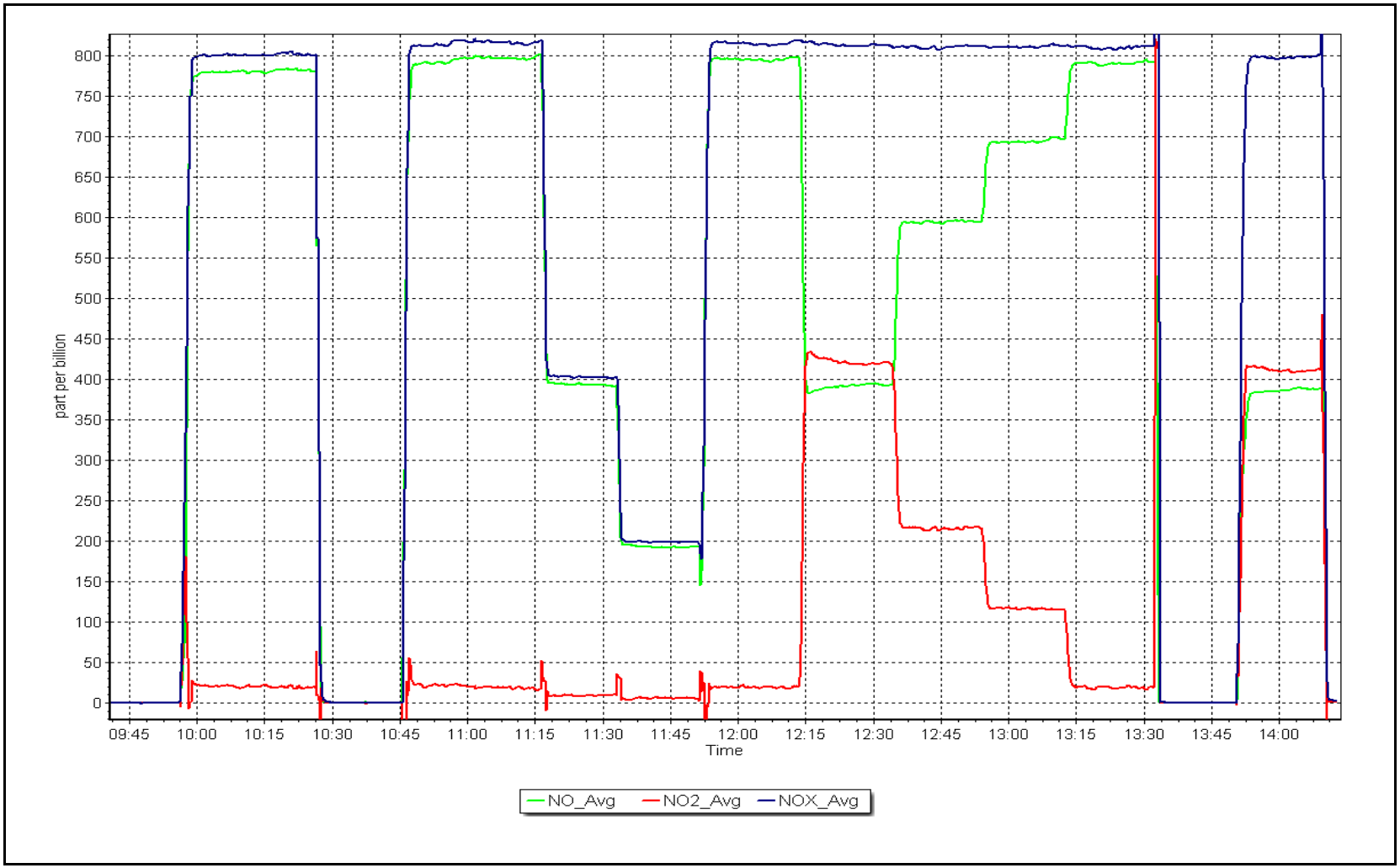
| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Wapasu | Station Number: | AMS17 |
| Start Time (MST): | 9:30 | End Time (MST): | 14:13 |
| Analyzer make: | Thermo Scientific 42iQ | Analyzer serial #: | 12300522720 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999989 | *≥0.995* |
| 421.9 | 421.4 | 1.0012 | | | |
| 218.5 | 217.0 | 1.0069 | Slope | 0.998776 | *0.90 - 1.10* |
| 115.8 | 115.2 | 1.0053 | | | |
| | | | Intercept | -0.422855 | *+/-20* |



**$NO_X$ Calibration Plot** Date: August 15, 2023 Location: Wapasu



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Wapasu | Station number: | AMS17 |
| Calibration Date: | August 1, 2023 | Last Cal Date: | July 12, 2023 |
| Start time (MST): | 10:22 | End time (MST): | 13:55 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | API T700 | Serial Number: | 2449 |
| ZAG Make/Model: | API T701H | Serial Number: | 359 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | API T400 | Analyzer serial #: | 3870 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.000171 | 1.003629 | Backgd or Offset: | -1.8 | -1.8 |
| Calibration intercept: | -0.580000 | -0.960000 | Coeff or Slope: | 1.020 | 1.026 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.5 | ---- |
| as found span | 5000 | 1077.3 | 400.0 | 396.8 | 1.008 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| high point | 5000 | 1077.3 | 400.0 | 400.8 | 0.998 |
| second point | 5000 | 900.3 | 200.0 | 199.5 | 1.003 |
| third point | 5000 | 789.5 | 100.0 | 98.7 | 1.013 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 5000 | 1077.3 | 400.0 | 406.4 | 0.984 |
| | | | | Average Correction Factor | 1.005 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 397.3 | Previous response | 399.5 | *% change | -0.6% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

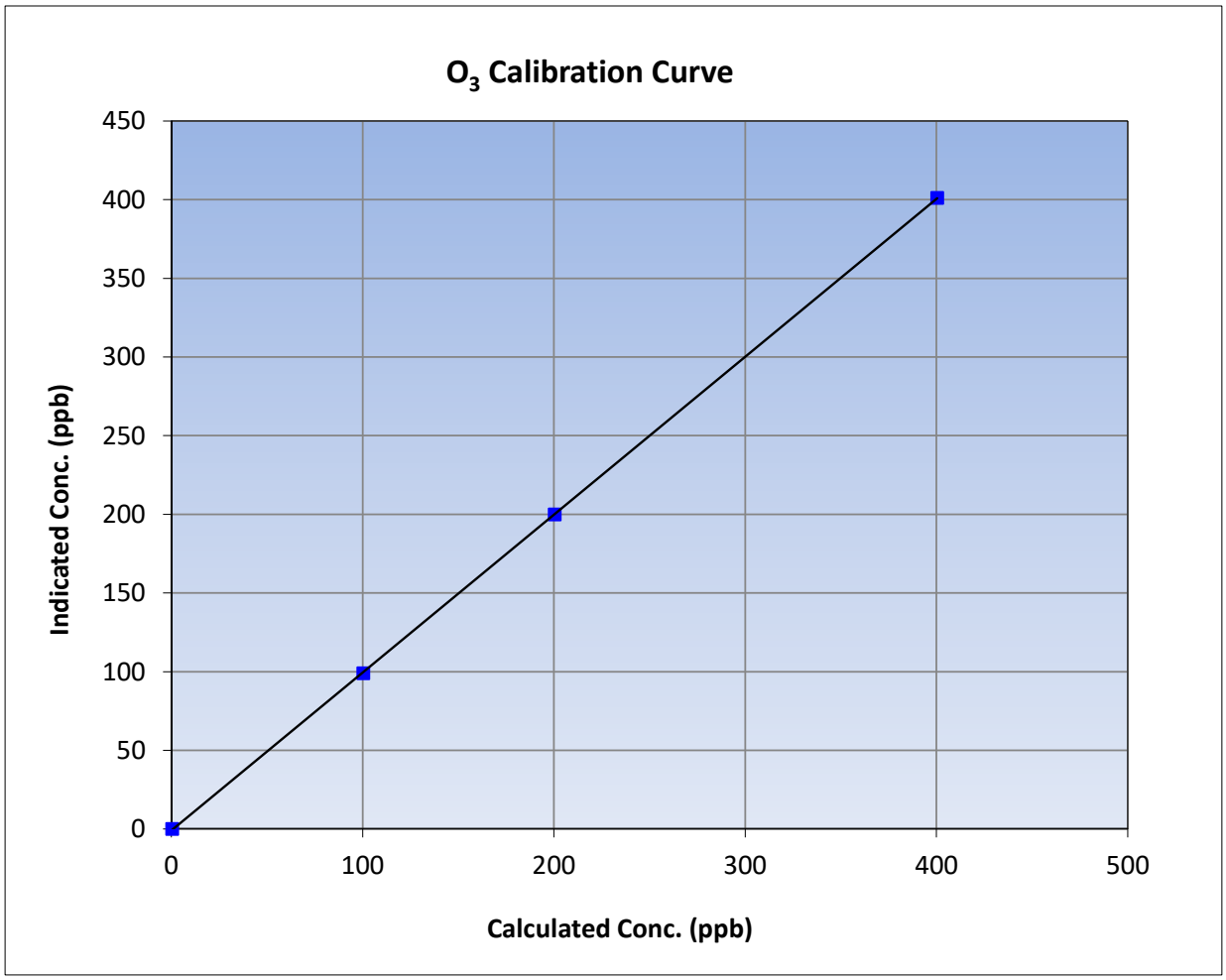
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 12, 2023 |
| Station Name: | Wapasu | Station Number: | AMS17 |
| Start Time (MST): | 10:22 | End Time (MST): | 13:55 |
| Analyzer make: | API T400 | Analyzer serial #: | 3870 |

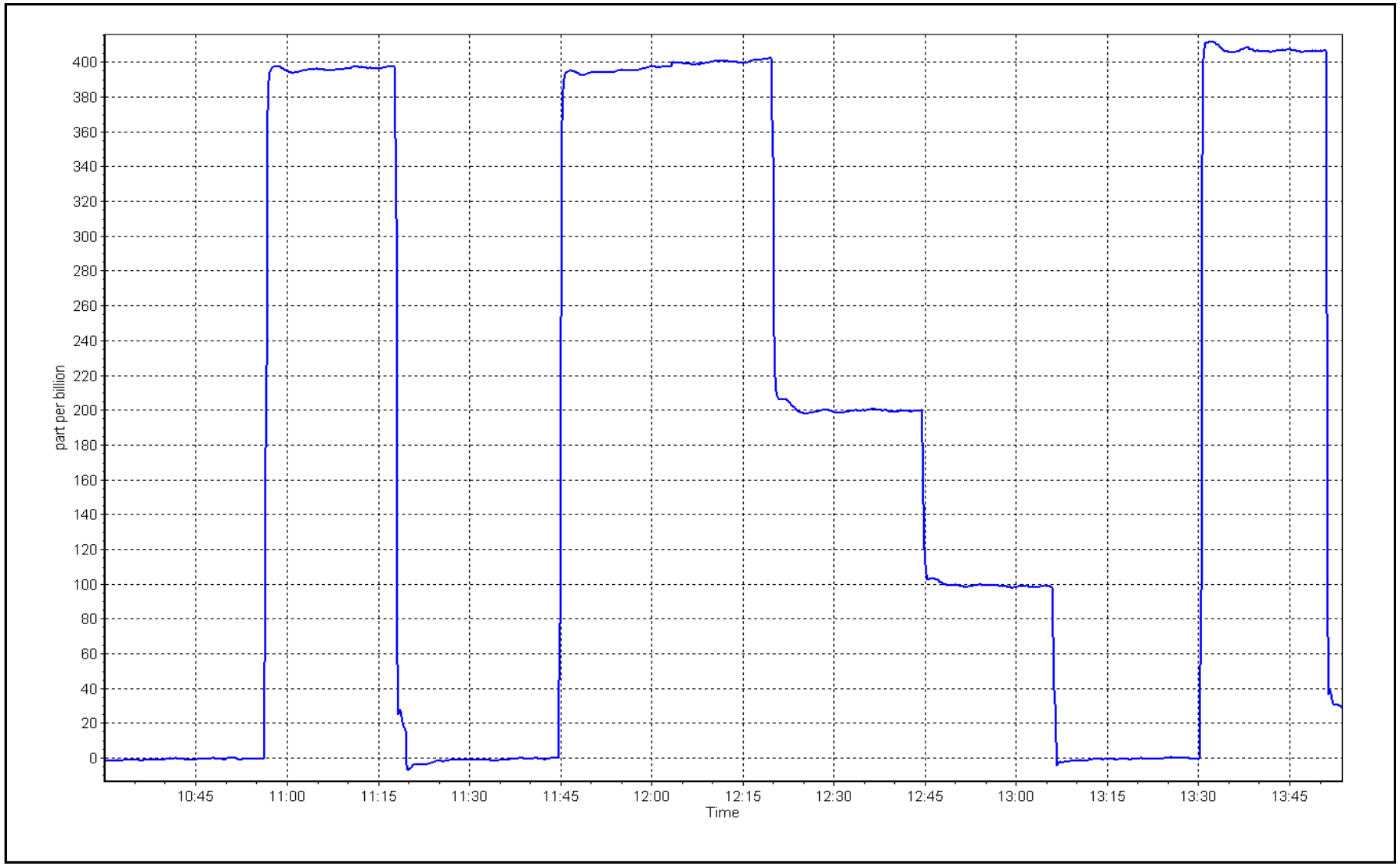
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.3 | ---- |
| 400.0 | 400.8 | 0.9980 |
| 200.0 | 199.5 | 1.0025 |
| 100.0 | 98.7 | 1.0132 |
| | | |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999988 | *≥0.995* |
| Slope | 1.003629 | *0.90 - 1.10* |
| Intercept | -0.960000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 1, 2023 Location: Wapasu



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Wapasu | Station number: | AMS17 |
| Calibration Date: | August 31, 2023 | Last Cal Date: | August 1, 2023 |
| Start time (MST): | 10:36 | End time (MST): | 13:24 |
| Reason: | Maintenance | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | API T700 | Serial Number: | 2449 |
| ZAG Make/Model: | API T701H | Serial Number: | 359 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | API T400 | Analyzer serial #: | 3870 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.003629 | 1.009629 | Backgd or Offset: | -1.8 | -1.8 |
| Calibration intercept: | -0.960000 | -0.060000 | Coeff or Slope: | 1.026 | 1.026 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | | | | | |
| as found span | | | | | |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| high point | 5000 | 1077.3 | 400.0 | 403.8 | 0.991 |
| second point | 5000 | 900.3 | 200.0 | 201.6 | 0.992 |
| third point | 5000 | 789.5 | 100.0 | 101.4 | 0.986 |
| as left zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as left span | 5000 | 1077.3 | 400.0 | 406.7 | 0.984 |
| | | | | Average Correction Factor | 0.990 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | NA | Previous response | NA | *% change | NA |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Tested response after replacing a severed external pump line. No as founds done as the T400's sample flow was at 0 CC/min. No adjustments made.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

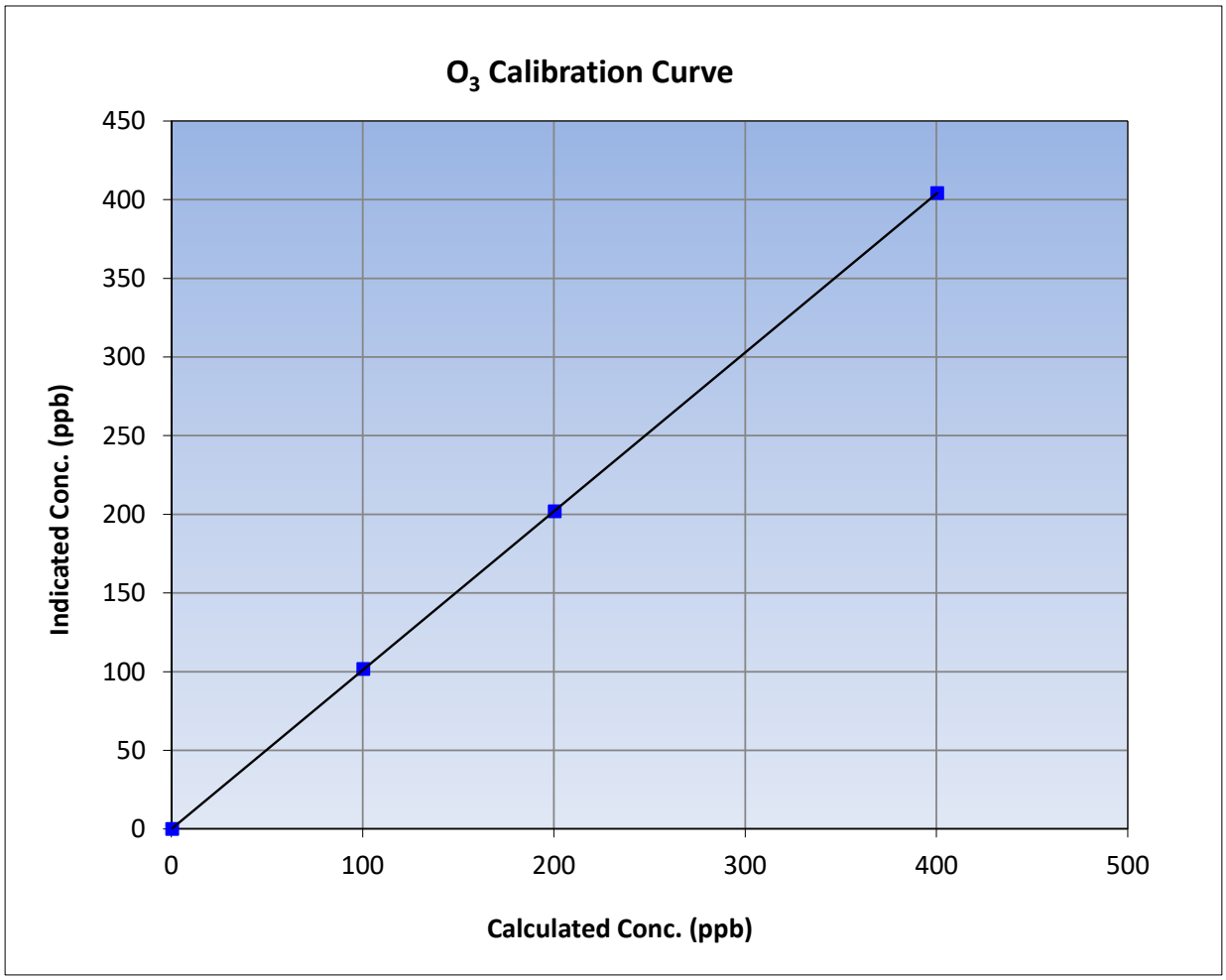
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 31, 2023 | Previous Calibration: | August 1, 2023 |
| Station Name: | Wapasu | Station Number: | AMS17 |
| Start Time (MST): | 10:36 | End Time (MST): | 13:24 |
| Analyzer make: | API T400 | Analyzer serial #: | 3870 |

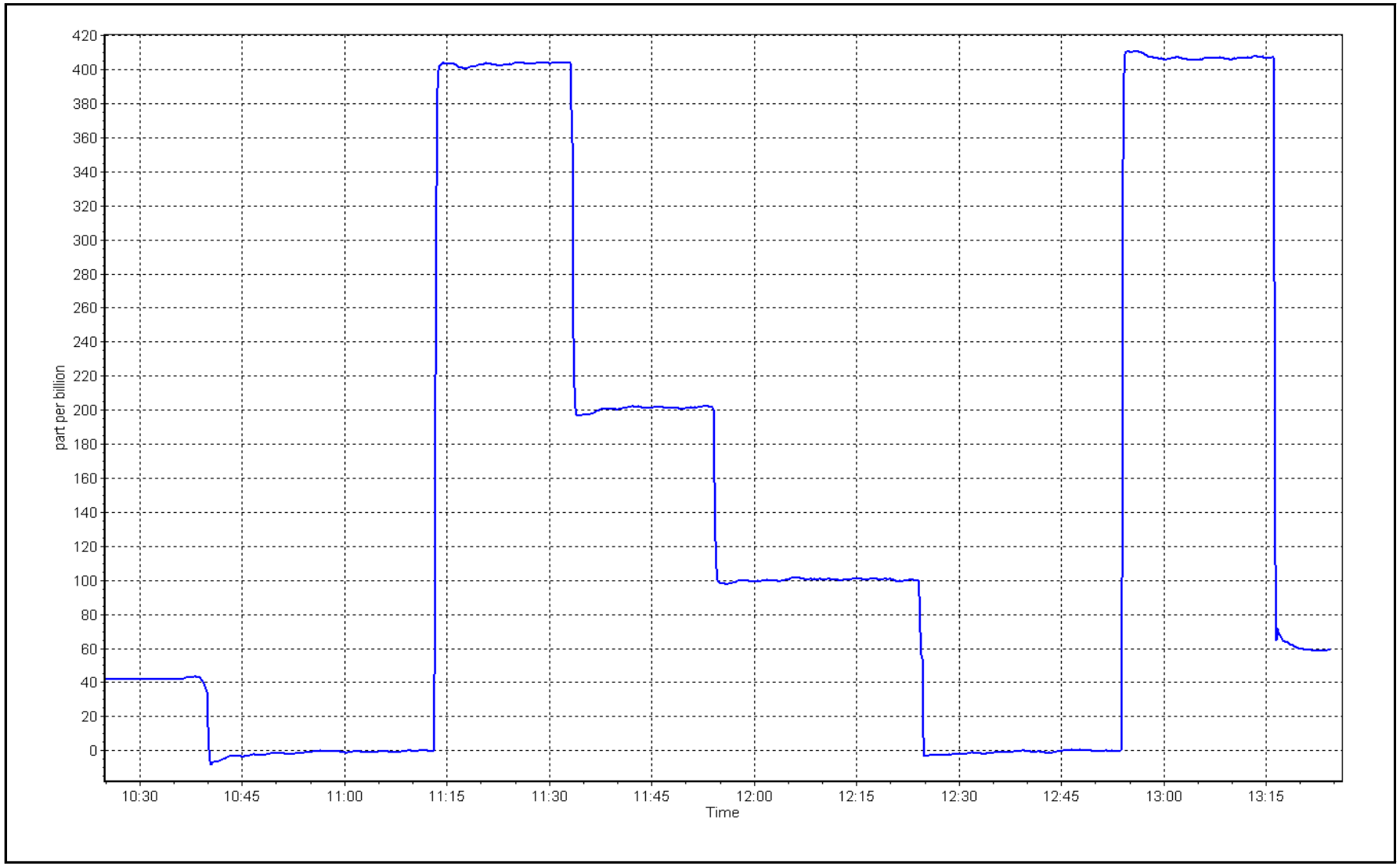
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.3 | ---- |
| 400.0 | 403.8 | 0.9906 |
| 200.0 | 201.6 | 0.9921 |
| 100.0 | 101.4 | 0.9862 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999996 | *≥0.995* |
| Slope | 1.009629 | *0.90 - 1.10* |
| Intercept | -0.060000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 31, 2023 Location: Wapasu



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Wapasu | Station number: | AMS 17 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 27, 2023 |
| Start time (MST): | 12:37 | End time (MST): | 13:58 |
| Analyzer Make: | API T640 | S/N: | 1183 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat FP-25BT | S/N: | 388748 |
| Temp/RH standard: | Alicat FP-25BT | S/N: | 388748 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T ($^{o}$C) | 15.3 | 15.1 | 15.3 | ☐ | +/- 2 $^{o}$C |
| P (mmHg) | 708.7 | 710.6 | 708.7 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.01 | 5.05 | 5.01 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 15, 2023 Last Cal Date: July 27, 2023

PM w/o HEPA: 7.3 PM w/ HEPA: 0.0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | | | | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____

Date Optical Chamber Cleaned: July 27, 2023 <0.2 ug/m3

Disposable Filter Changed: July 27, 2023

### Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: Temp, pressure and flow checked. Leak check passed.

Calibration by: Aswin Sasi Kumar

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS18
## STONY MOUNTAIN
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | August 10, 2023 | Last Cal Date: | July 18, 2023 |
| Start time (MST): | 10:25 | End time (MST): | 13:58 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.40 | ppm | Cal Gas Exp Date: | February 23, 2025 |
| Cal Gas Cylinder #: | CC463851 | | | |
| Removed Cal Gas Conc: | 49.40 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 2658 |
| ZAG Make/Model: | Teledyne API 701H | | Serial Number: | 360 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: JC1501301453

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.003290 | 1.004073 | Backgd or Offset: | 22.6 | 22.6 |
| Calibration intercept: | -0.043536 | -0.542544 | Coeff or Slope: | 0.808 | 0.808 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5009 | 0.0 | 0.0 | -0.3 | ---- |
| as found span | 4919 | 81.0 | 800.3 | 803.2 | 0.996 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4919 | 81.0 | 800.3 | 803.6 | 0.996 |
| second point | 4959 | 40.5 | 400.2 | 400.2 | 1.000 |
| third point | 4979 | 20.2 | 199.6 | 199.6 | 1.000 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 4919 | 81.0 | 800.3 | 803.8 | 0.996 |
| | | | | Average Correction Factor | 0.999 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 803.50 | Previous response | 802.87 | *% change | 0.1% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

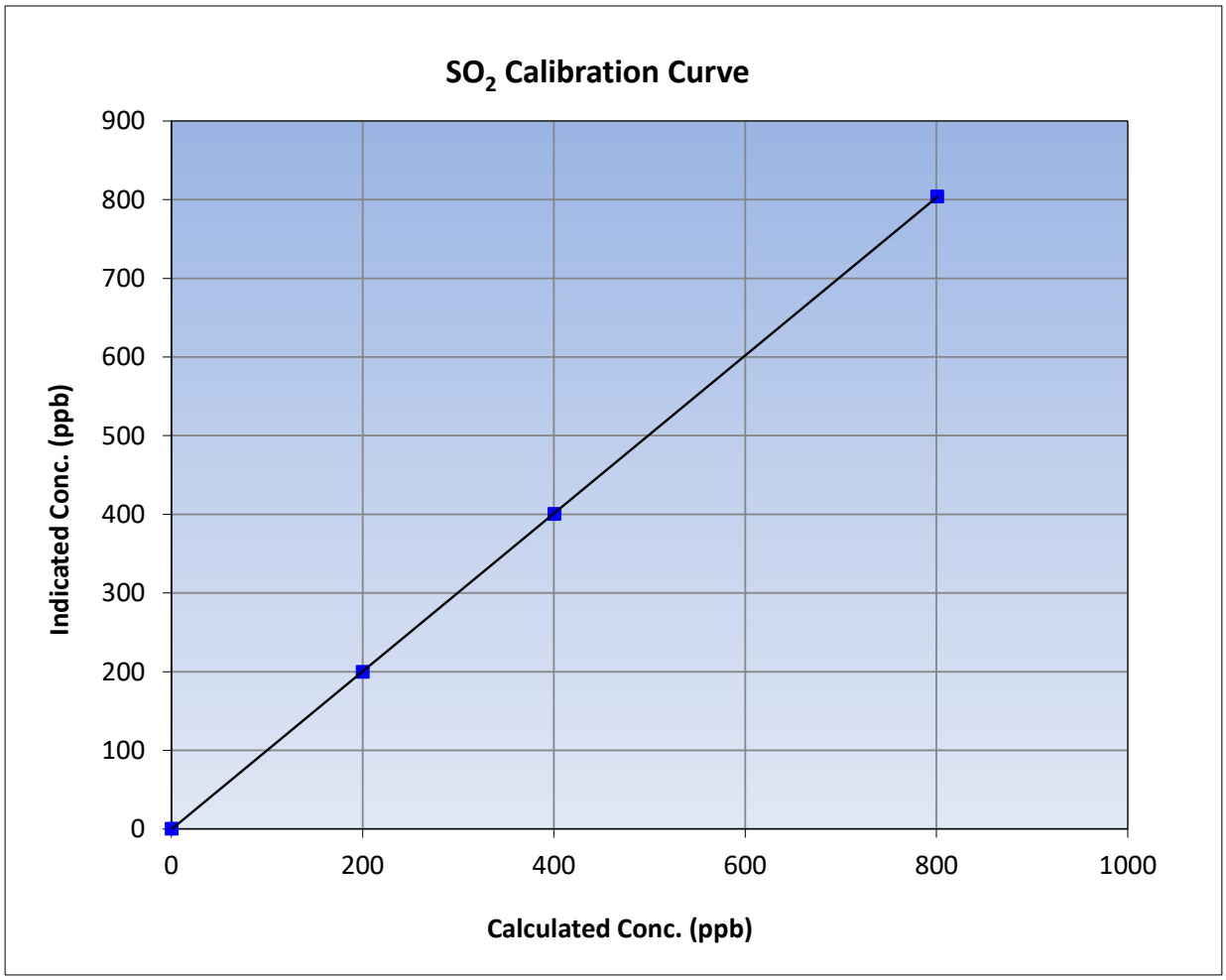
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 18, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 10:25 | End Time (MST): | 13:58 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | JC1501301453 |

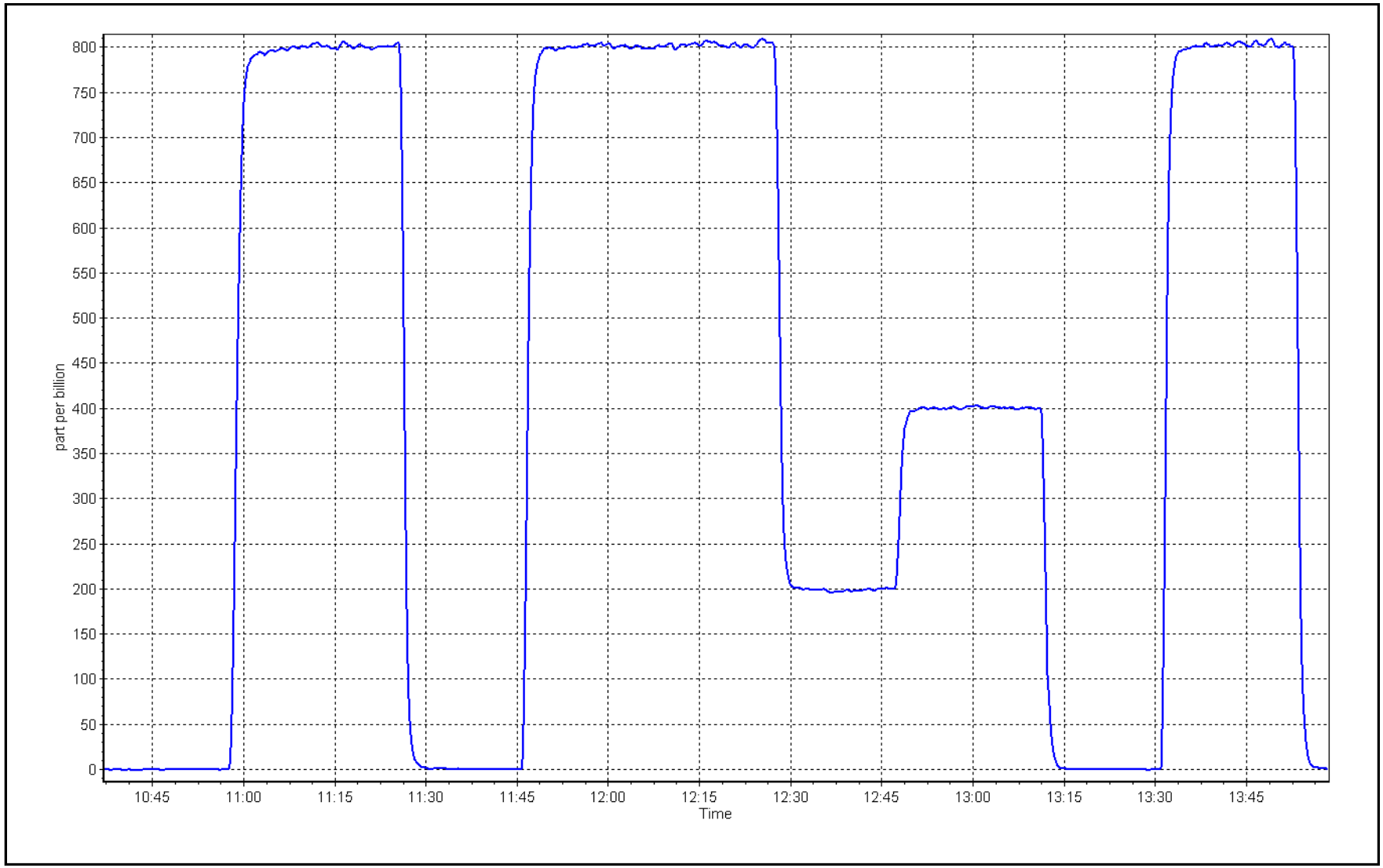
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 800.3 | 803.6 | 0.9959 |
| 400.2 | 400.2 | 1.0000 |
| 199.6 | 199.6 | 1.0000 |
| | | |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999994 | *≥0.995* |
| Slope | 1.004073 | *0.90 - 1.10* |
| Intercept | -0.542544 | *+/-30* |



**SO2 Calibration Plot** Date: August 10, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS18 |
| Calibration Date: | August 24, 2023 | Last Cal Date: | July 19, 2023 |
| Start time (MST): | 10:52 | End time (MST): | 15:12 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.479 | ppm | Cal Gas Exp Date: | January 4, 2025 |
| Cal Gas Cylinder #: | CC500395 | | | |
| Removed Cal Gas Conc: | 5.479 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 2658 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 360 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i-TLE | | Analyzer serial #: | 1218153359 | |
| Converter make: | CD Nova CDN-101 | | Converter serial #: | 555 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.003873 | 0.993582 | Backgd or Offset: | 2.66 | 2.66 |
| Calibration intercept: | 0.080889 | 0.341175 | Coeff or Slope: | 1.189 | 1.189 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 4927 | 73.0 | 80.0 | 80.3 | 0.999 |
| as found 2nd point | 4964 | 36.5 | 40.0 | 39.6 | 1.015 |
| as found 3rd point | 4983 | 18.3 | 20.0 | 19.5 | 1.039 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 4927 | 73.0 | 80.0 | 79.8 | 1.002 |
| second point | 4964 | 36.5 | 40.0 | 40.2 | 0.995 |
| third point | 4983 | 18.3 | 20.0 | 20.1 | 0.997 |
| as left zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as left span | 4927 | 73.0 | 80.0 | 79.2 | 1.010 |
| SO2 Scrubber Check | 4923 | 77.1 | 771.0 | -0.2 | ---- |
| Date of last scrubber change: | | 17-Dec-21 | | Ave Corr Factor | 0.998 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 80.1 | Prev response: | 80.38 | *% change: | -0.4% |
| Baseline Corr 2nd AF pt: | 39.4 | AF Slope: | 1.003725 | AF Intercept: | -0.238924 |
| Baseline Corr 3rd AF pt: | 19.3 | AF Correlation: | 0.999860 | | |

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Scrubber check completed after calibrator zero. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

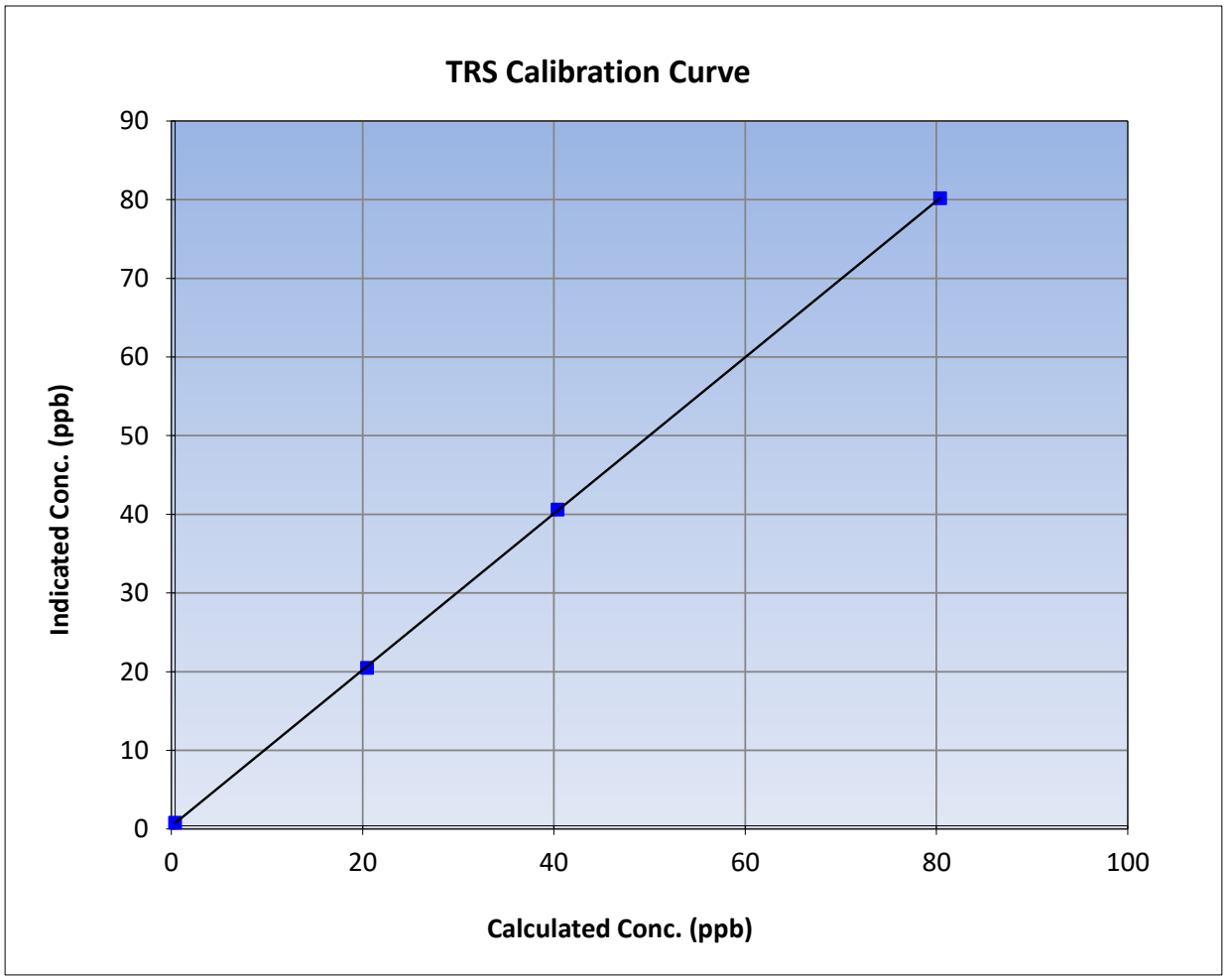
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 24, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS18 |
| Start Time (MST): | 10:52 | End Time (MST): | 15:12 |
| Analyzer make: | Thermo 43i-TLE | Analyzer serial #: | 1218153359 |

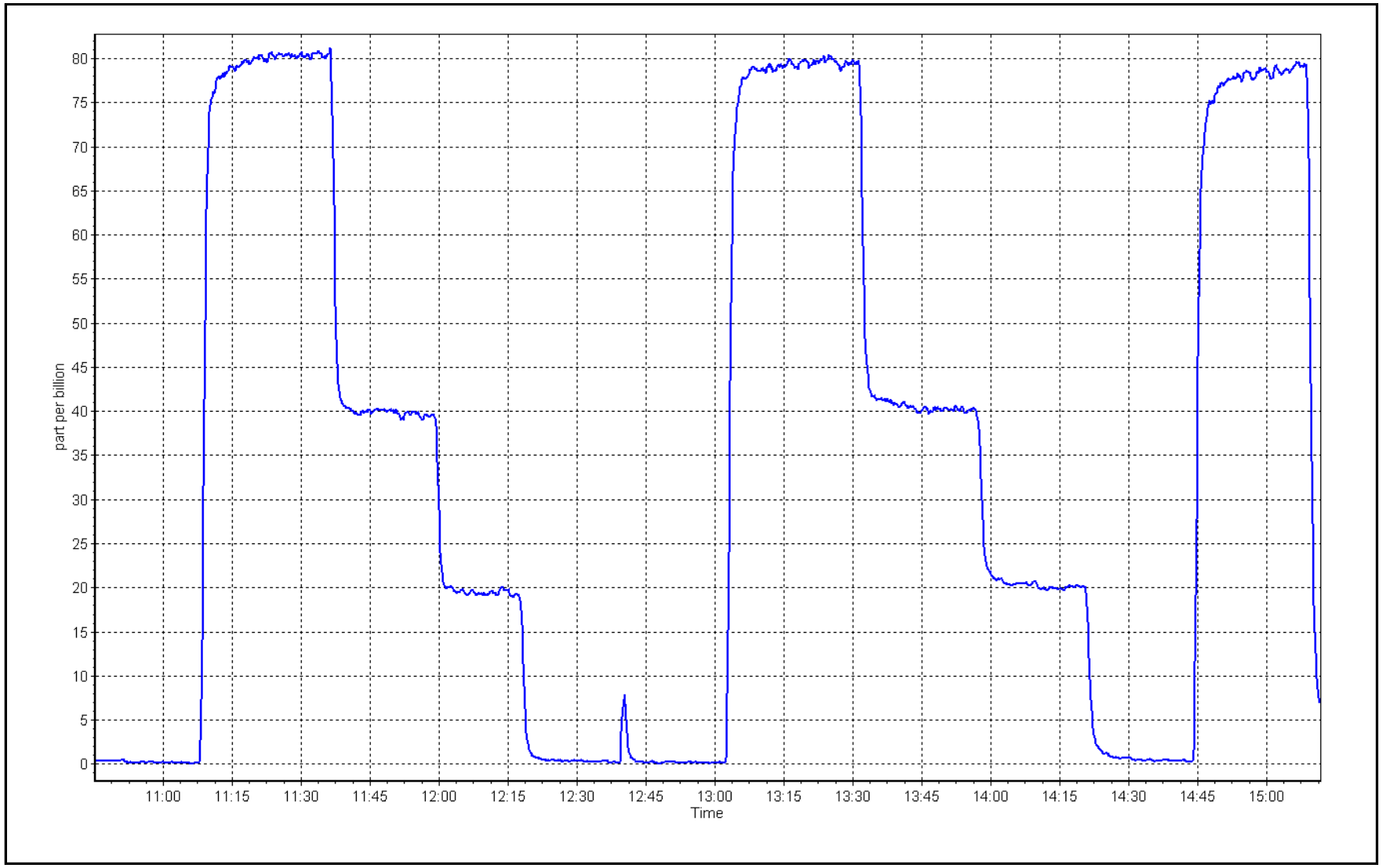
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.4 | ---- |
| 80.0 | 79.8 | 1.0024 |
| 40.0 | 40.2 | 0.9948 |
| 20.0 | 20.1 | 0.9974 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999987 | *≥0.995* |
| Slope | 0.993582 | *0.90 - 1.10* |
| Intercept | 0.341175 | *+/-3* |



**TRS Calibration Plot** Date: August 24, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | August 10, 2023 | Last Cal Date: | July 18, 2023 |
| Start time (MST): | 10:25 | End time (MST): | 13:58 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC463851 | Cal Gas Expiry Date: | February 23, 2025 | |
| CH4 Cal Gas Conc. | 500.8 | ppm | CH4 Equiv Conc. | 1066.8 | ppm |
| C3H8 Cal Gas Conc. | 205.8 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 500.8 | ppm | CH4 Equiv Conc. | 1066.8 | ppm |
| Removed C3H8 Conc. | 205.8 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 2658 | |
| ZAG make/model: | Teledyne API T701H | | Serial Number: | 360 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1180320039 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 3.21E-04 | 3.26E-04 | NMHC SP Ratio: | 6.21E-05 | 6.89E-05 |
| CH4 Retention time: | 15.20 | 15.40 | NMHC Peak Area: | 147573 | 133711 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| as found span | 4919 | 81.0 | 17.28 | 16.21 | 1.066 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| high point | 4919 | 81.0 | 17.28 | 17.18 | 1.006 |
| second point | 4959 | 40.5 | 8.64 | 8.62 | 1.002 |
| third point | 4979 | 20.2 | 4.31 | 4.28 | 1.008 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 81.0 | 17.28 | 17.22 | 1.003 |
| | | | | Average Correction Factor | 1.005 |
| Baseline Corr AF: | 16.20 | Prev response | 17.25 | *% change | -6.5% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 81.0 | 9.17 | 8.25 | 1.112 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.0 | 9.17 | 9.08 | 1.010 |
| second point | 4959 | 40.5 | 4.58 | 4.58 | 1.002 |
| third point | 4979 | 20.2 | 2.29 | 2.27 | 1.007 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 81 | 9.17 | 9.10 | 1.007 |
| | | | | Average Correction Factor | 1.006 |
| Baseline Corr AF: | 8.25 | Prev response | 9.15 | *% change | -10.9% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| as found span | 4919 | 81.0 | 8.11 | 7.97 | 1.018 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| high point | 4919 | 81.0 | 8.11 | 8.10 | 1.002 |
| second point | 4959 | 40.5 | 4.06 | 4.04 | 1.003 |
| third point | 4979 | 20.2 | 2.02 | 2.01 | 1.007 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 81.0 | 8.11 | 8.12 | 0.999 |
| | | | | Average Correction Factor | 1.004 |
| Baseline Corr AF: | 7.96 | Prev response | 8.11 | *% change | -1.9% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 0.998376 | 0.993729 |
| THC Cal Offset: | 0.001211 | 0.010586 |
| CH4 Cal Slope: | 0.999482 | 0.997581 |
| CH4 Cal Offset: | -0.003013 | 0.000983 |
| NMHC Cal Slope: | 0.997360 | 0.990059 |
| NMHC Cal Offset: | 0.003625 | 0.010402 |

Notes: NM low, chromatograms and diagnostics looks fine. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## THC Calibration Summary

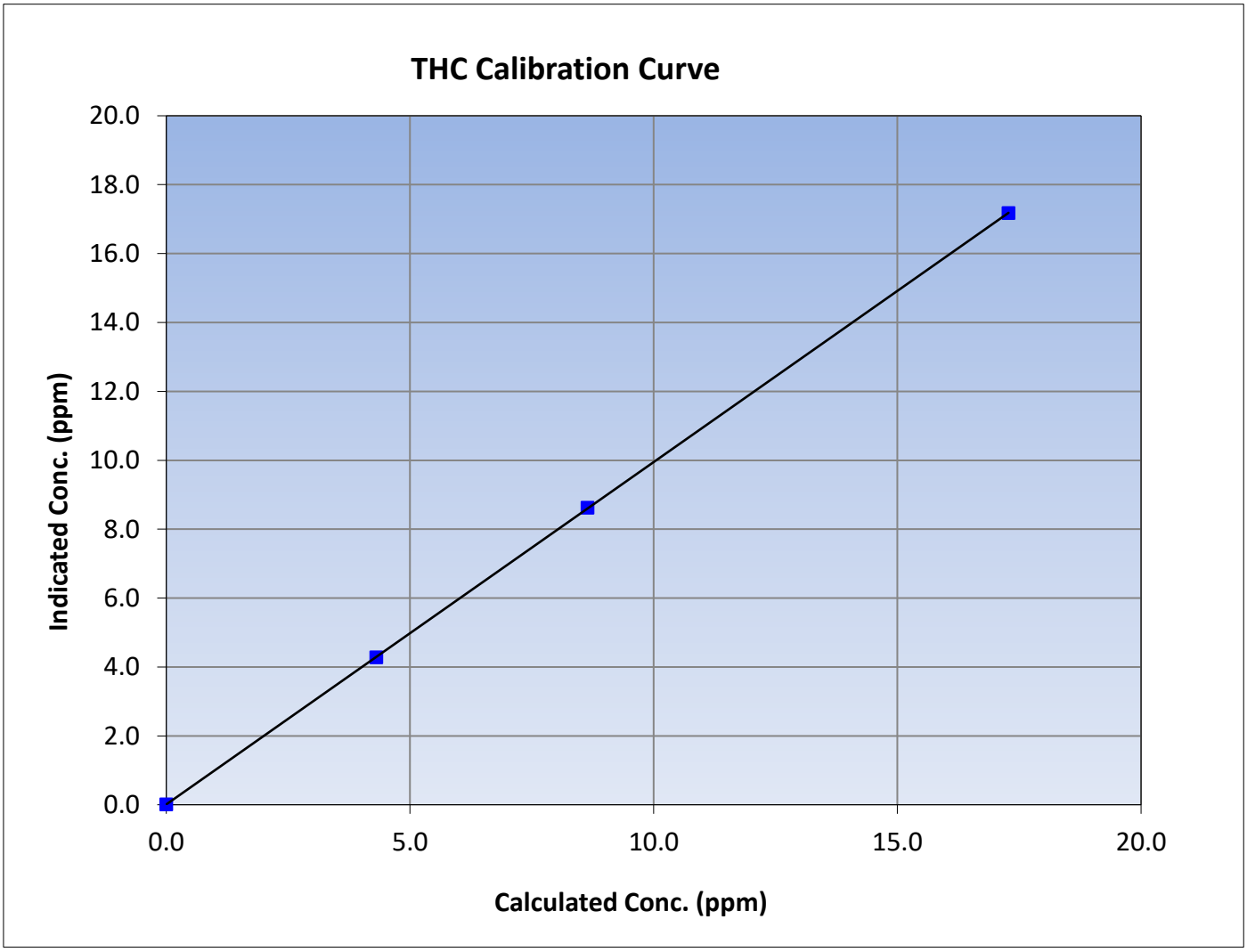
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 18, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 10:25 | End Time (MST): | 13:58 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320039 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.01 | ---- | Correlation Coefficient | 0.999995 | *≥0.995* |
| 17.28 | 17.18 | 1.0061 | | | |
| 8.64 | 8.62 | 1.0024 | Slope | 0.993729 | *0.90 - 1.10* |
| 4.31 | 4.28 | 1.0076 | | | |
| | | | Intercept | 0.010586 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

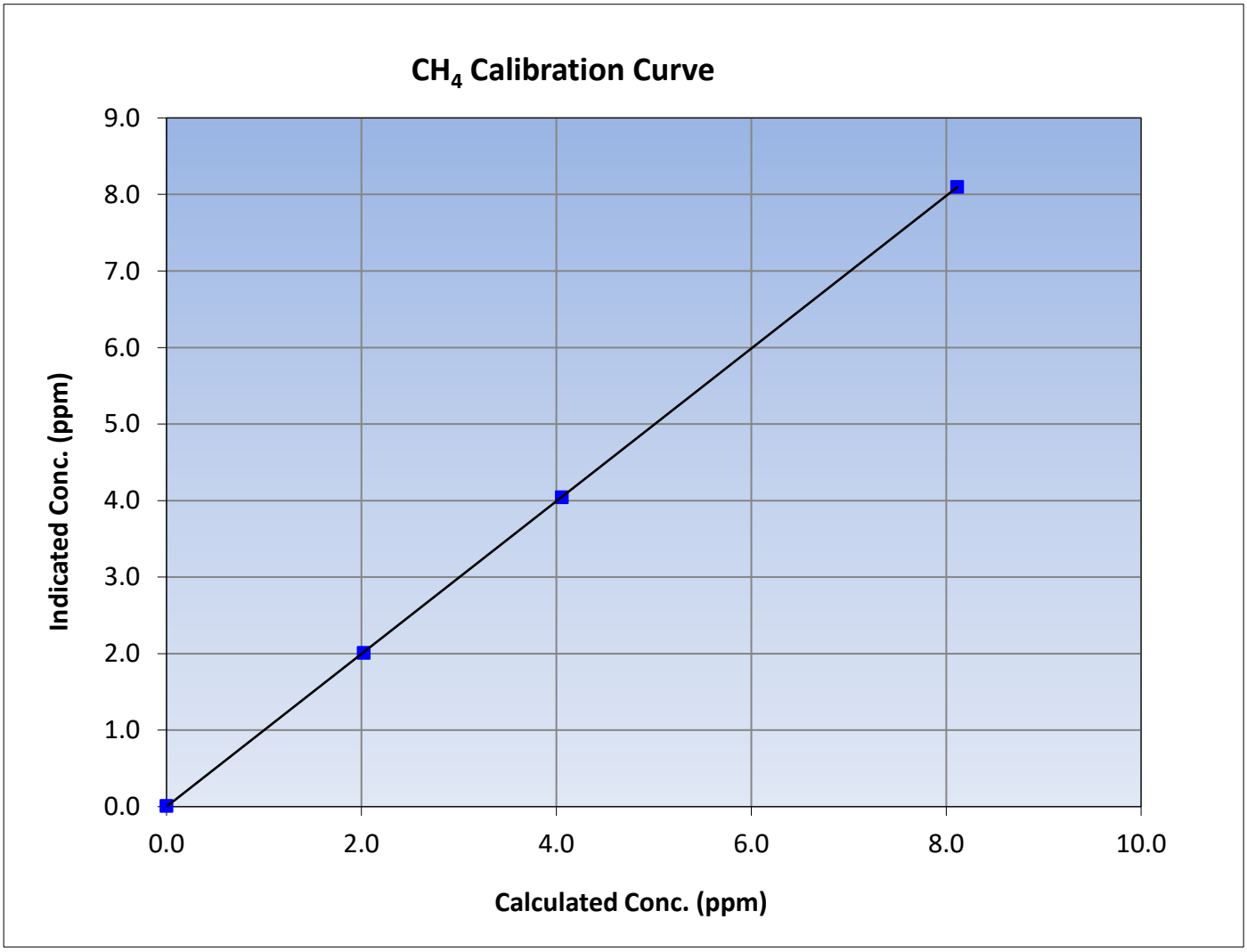
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 18, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 10:25 | End Time (MST): | 13:58 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320039 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.01 | ---- | Correlation Coefficient | 0.999993 | *≥0.995* |
| 8.11 | 8.10 | 1.0017 | | | |
| 4.06 | 4.04 | 1.0032 | Slope | 0.997581 | *0.90 - 1.10* |
| 2.02 | 2.01 | 1.0072 | | | |
| | | | Intercept | 0.000983 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

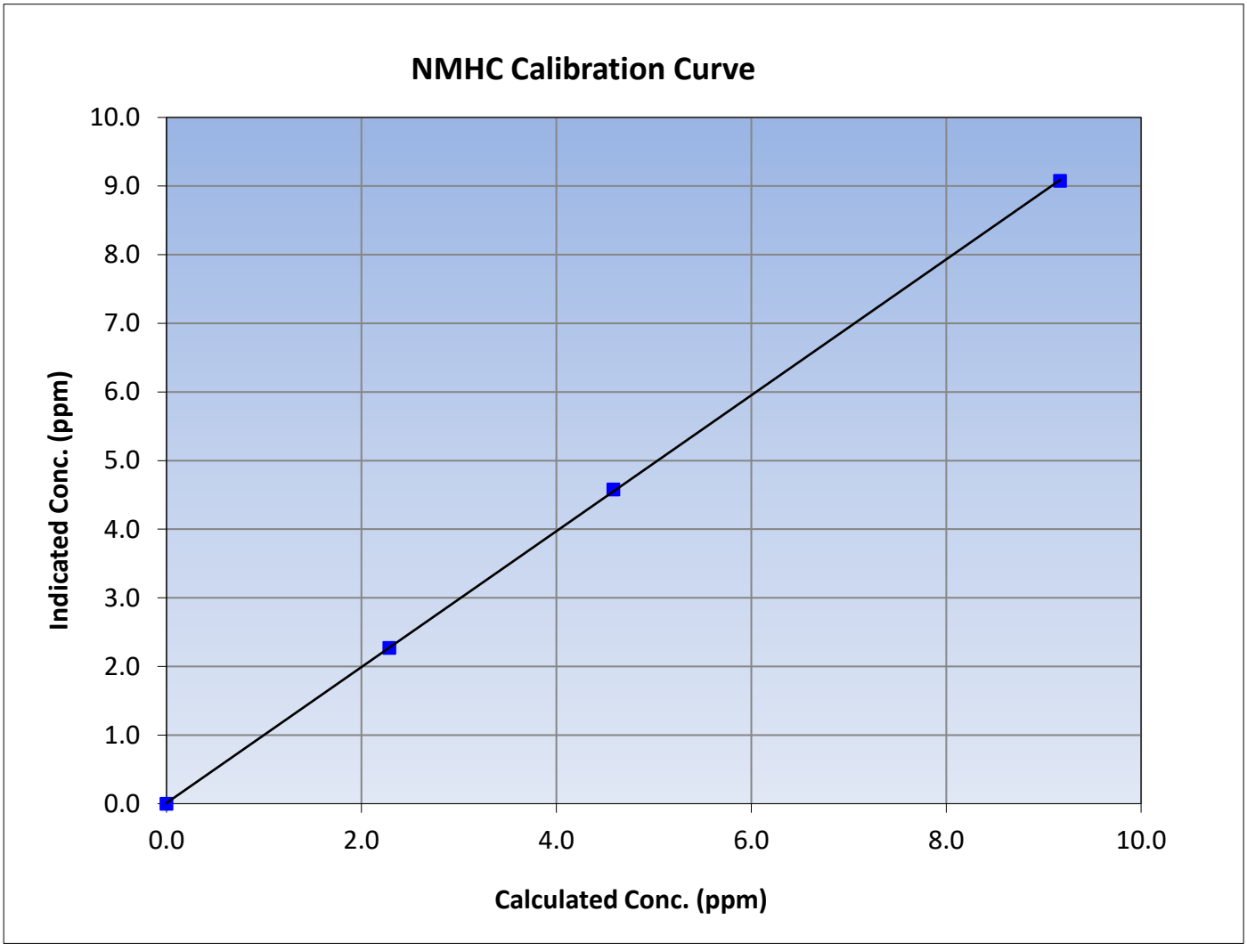
Version-01-2020

### Station Information

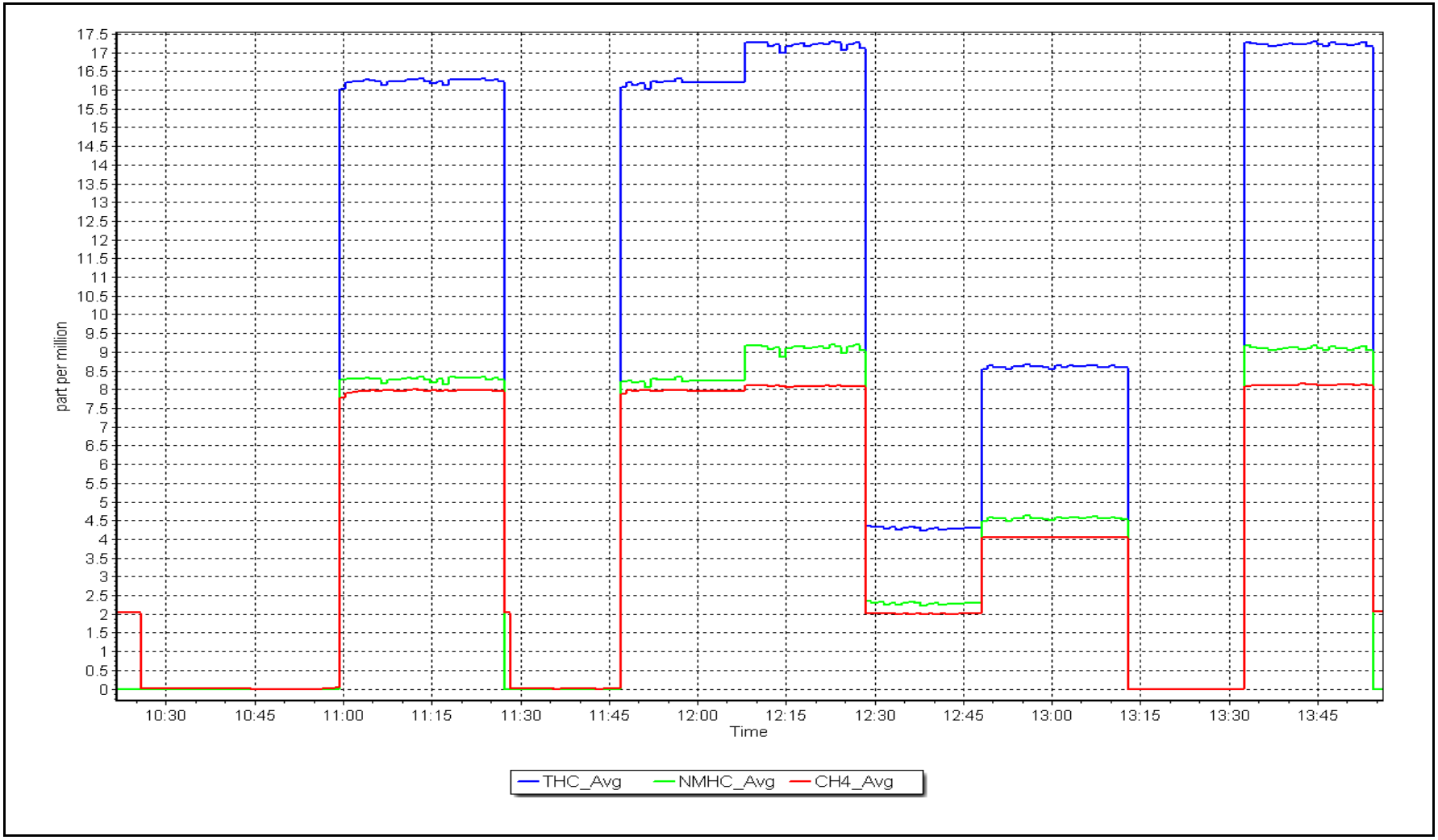
| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 18, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 10:25 | End Time (MST): | 13:58 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320039 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999977 | ≥0.995 |
| 9.17 | 9.08 | 1.0103 | | | |
| 4.58 | 4.58 | 1.0017 | Slope | 0.990059 | 0.90 - 1.10 |
| 2.29 | 2.27 | 1.0074 | | | |
| | | | Intercept | 0.010402 | +/-0.5 |



**NMHC Calibration Plot** Date: August 10, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | August 23, 2023 | Last Cal Date: | August 10, 2023 |
| Start time (MST): | 12:02 | End time (MST): | 13:50 |
| Reason: | Cylinder Change | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC463851 | Cal Gas Expiry Date: | February 23, 2025 | |
| CH4 Cal Gas Conc. | 500.8 | ppm | CH4 Equiv Conc. | 1066.8 | ppm |
| C3H8 Cal Gas Conc. | 205.8 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 500.8 | ppm | CH4 Equiv Conc. | 1066.8 | ppm |
| Removed C3H8 Conc. | 205.8 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 2658 | |
| ZAG make/model: | Teledyne API T701H | | Serial Number: | 360 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1180320039 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 3.26E-04 | 3.26E-04 | NMHC SP Ratio: | 6.89E-05 | 6.89E-05 |
| CH4 Retention time: | 15.40 | 15.40 | NMHC Peak Area: | 133711 | 133711 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 81.0 | 17.28 | 17.62 | 0.981 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.0 | 17.28 | 17.60 | 0.982 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| | | | | Average Correction Factor | 0.982 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 17.62 | Prev response | NA | *% change | NA |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 81.0 | 9.17 | 9.80 | 0.936 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.0 | 9.17 | 9.79 | 0.936 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| | | | | Average Correction Factor | 0.936 |
| Baseline Corr AF: | 9.80 | Prev response | NA | *% change | NA |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 81.0 | 8.11 | 7.82 | 1.038 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.0 | 8.11 | 7.81 | 1.039 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| | | | | Average Correction Factor | 1.039 |
| Baseline Corr AF: | 7.82 | Prev response | NA | *% change | NA |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

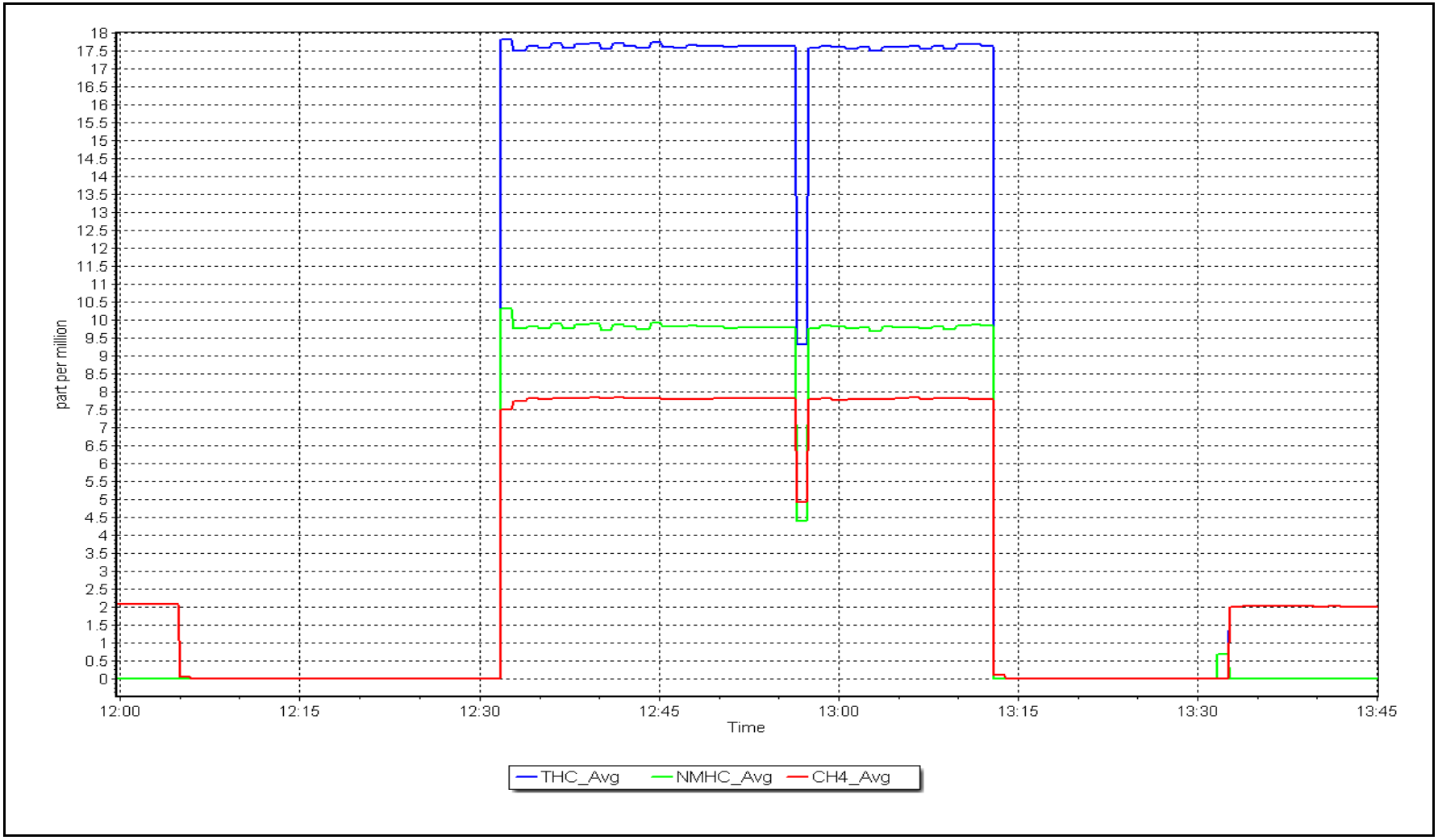
### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | N/A | N/A |
| THC Cal Offset: | N/A | N/A |
| CH4 Cal Slope: | N/A | N/A |
| CH4 Cal Offset: | N/A | N/A |
| NMHC Cal Slope: | N/A | N/A |
| NMHC Cal Offset: | N/A | N/A |

Notes: N2 Cylinder change

Calibration Performed By: Aswin Sasi Kumar

**NMHC Calibration Plot** Date: August 23, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | August 26, 2023 | Last Cal Date: | August 10, 2023 |
| Start time (MST): | 10:49 | End time (MST): | 14:42 |
| Reason: | Maintenance | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC463851 | Cal Gas Expiry Date: | February 23, 2025 | |
| CH4 Cal Gas Conc. | 500.8 | ppm | CH4 Equiv Conc. | 1066.8 | ppm |
| C3H8 Cal Gas Conc. | 205.8 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | | NA |
| Removed CH4 Conc. | 500.8 | ppm | CH4 Equiv Conc. | 1066.8 | ppm |
| Removed C3H8 Conc. | 205.8 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 2658 | |
| ZAG make/model: | Teledyne API T701H | | Serial Number: | 360 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1180320039 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 3.26E-04 | 3.37E-04 | NMHC SP Ratio: | 6.89E-05 | 7.14E-05 |
| CH4 Retention time: | 15.4 | 15.6 | NMHC Peak Area: | 133711 | 128380 |
| Zero Chromatogram: | ON | ON | Flat Baseline: | ON | ON |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| as found span | 4919 | 81.0 | 17.28 | 17.32 | 0.998 |
| as found 2nd point | 4959 | 40.5 | 8.64 | 8.68 | 0.996 |
| as found 3rd point | 4979 | 20.2 | 4.31 | 4.33 | 0.997 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.0 | 17.28 | 17.29 | 1.000 |
| second point | 4959 | 40.5 | 8.64 | 8.62 | 1.002 |
| third point | 4979 | 20.2 | 4.31 | 4.32 | 0.998 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 81.0 | 17.28 | 17.22 | 1.003 |
| | | | | Average Correction Factor | 1.000 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 17.31 | Prev response | 17.18 | *% change | 0.7% |
| Baseline Corr 2nd AF: | 8.7 | AF Slope: | 1.001755 | AF Intercept: | 0.012422 |
| Baseline Corr 3rd AF: | 4.3 | AF Correlation: | 0.999999 | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4919 | 81.0 | 9.17 | 9.61 | 0.954 |
| as found 2nd point | 4959 | 40.5 | 4.58 | 4.82 | 0.951 |
| as found 3rd point | 4979 | 20.2 | 2.29 | 2.41 | 0.948 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.0 | 9.17 | 9.17 | 0.999 |
| second point | 4959 | 40.5 | 4.58 | 4.57 | 1.004 |
| third point | 4979 | 20.2 | 2.29 | 2.30 | 0.996 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 81.0 | 9.17 | 9.10 | 1.007 |
| | | | | Average Correction Factor | 1.000 |
| Baseline Corr AF: | 9.61 | Prev response | 9.09 | *% change | 5.4% |
| Baseline Corr 2nd AF: | 4.8 | AF Slope: | 1.047822 | AF Intercept: | 0.009525 |
| Baseline Corr 3rd AF: | 2.4 | AF Correlation: | 0.999995 | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| as found span | 4919 | 81.0 | 8.11 | 7.70 | 1.053 |
| as found 2nd point | 4959 | 40.5 | 4.06 | 3.86 | 1.052 |
| as found 3rd point | 4979 | 20.2 | 2.02 | 1.91 | 1.058 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4919 | 81.0 | 8.11 | 8.11 | 1.000 |
| second point | 4959 | 40.5 | 4.06 | 4.05 | 1.001 |
| third point | 4979 | 20.2 | 2.02 | 2.02 | 1.001 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4919 | 81.0 | 8.11 | 8.12 | 0.999 |
| | | | | Average Correction Factor | 1.001 |
| Baseline Corr AF: | 7.69 | Prev response | 8.09 | *% change | -5.2% |
| Baseline Corr 2nd AF: | 3.85 | AF Slope: | 0.948921 | AF Intercept: | 0.003896 |
| Baseline Corr 3rd AF: | 1.90 | AF Correlation: | 0.999994 | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 0.993729 | 0.999923 |
| THC Cal Offset: | 0.010586 | -0.001977 |
| CH4 Cal Slope: | 0.997581 | 0.999791 |
| CH4 Cal Offset: | 0.000983 | -0.001608 |
| NMHC Cal Slope: | 0.990059 | 1.000027 |
| NMHC Cal Offset: | 0.010402 | -0.000569 |

Notes: Changed the actuator after as founds. Oddly there was no CH4 readings after this change. Had to adjust the span multiple times as it dropped after the first adjustment. Points are looking good after the second adjustment.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## THC Calibration Summary

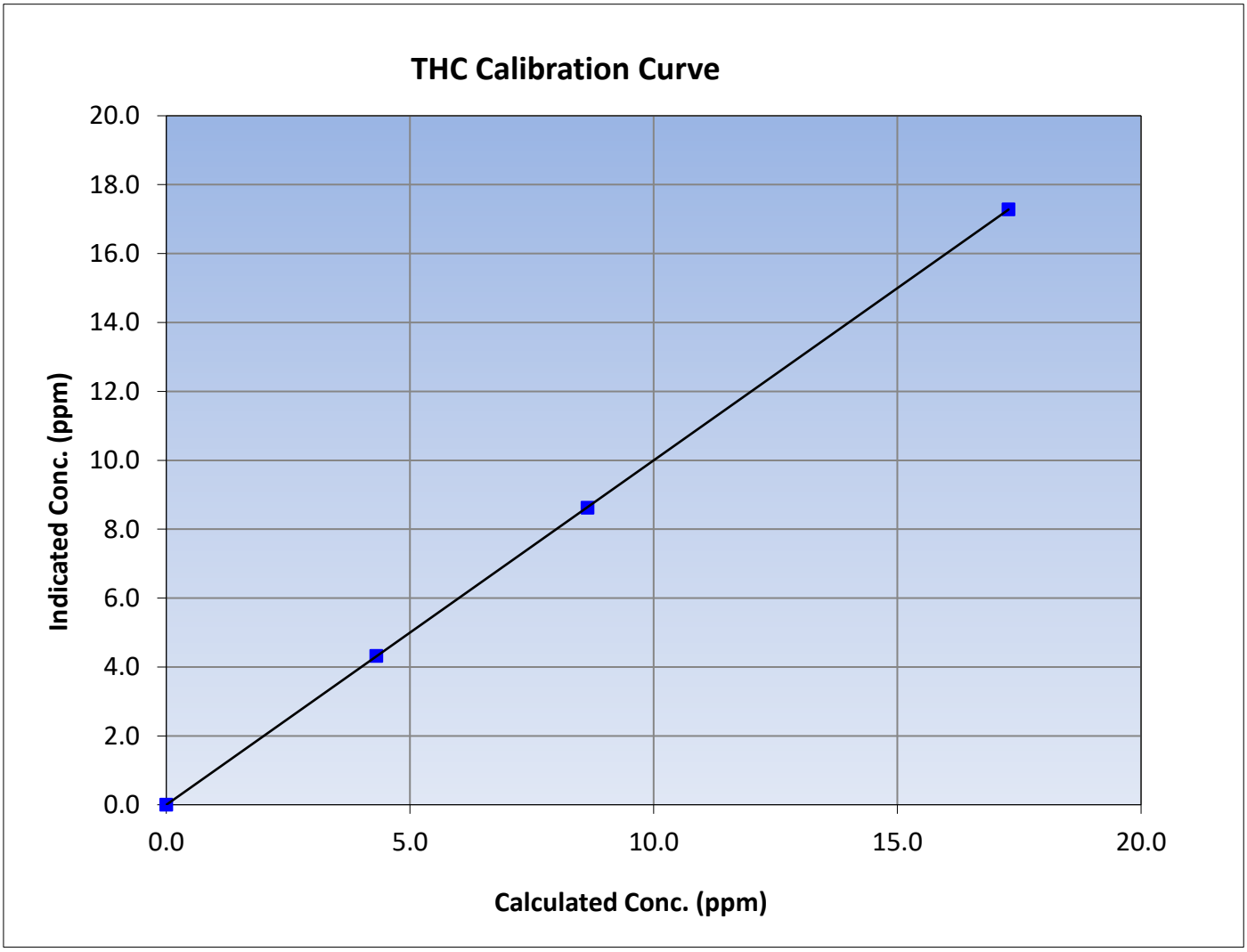
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 26, 2023 | Previous Calibration: | August 10, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 10:49 | End Time (MST): | 14:42 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320039 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999997 | ≥0.995 |
| 17.28 | 17.29 | 0.9998 | | | |
| 8.64 | 8.62 | 1.0025 | Slope | 0.999923 | 0.90 - 1.10 |
| 4.31 | 4.32 | 0.9982 | | | |
| | | | Intercept | -0.001977 | +/-0.5 |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

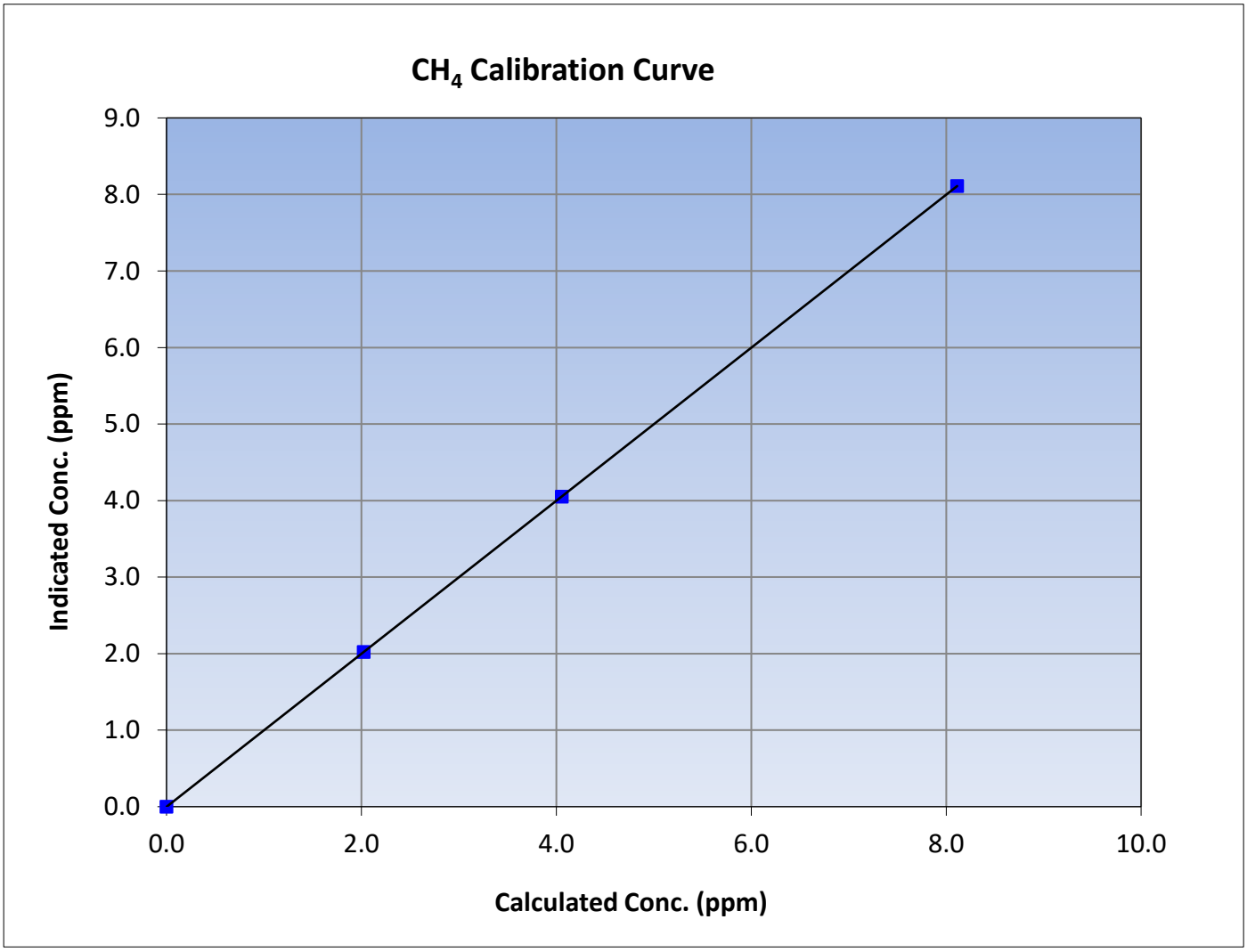
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 26, 2023 | Previous Calibration: | August 10, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 10:49 | End Time (MST): | 14:42 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320039 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | *≥0.995* |
| 8.11 | 8.11 | 1.0002 | | | |
| 4.06 | 4.05 | 1.0012 | Slope | 0.999791 | *0.90 - 1.10* |
| 2.02 | 2.02 | 1.0013 | | | |
| | | | Intercept | -0.001608 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

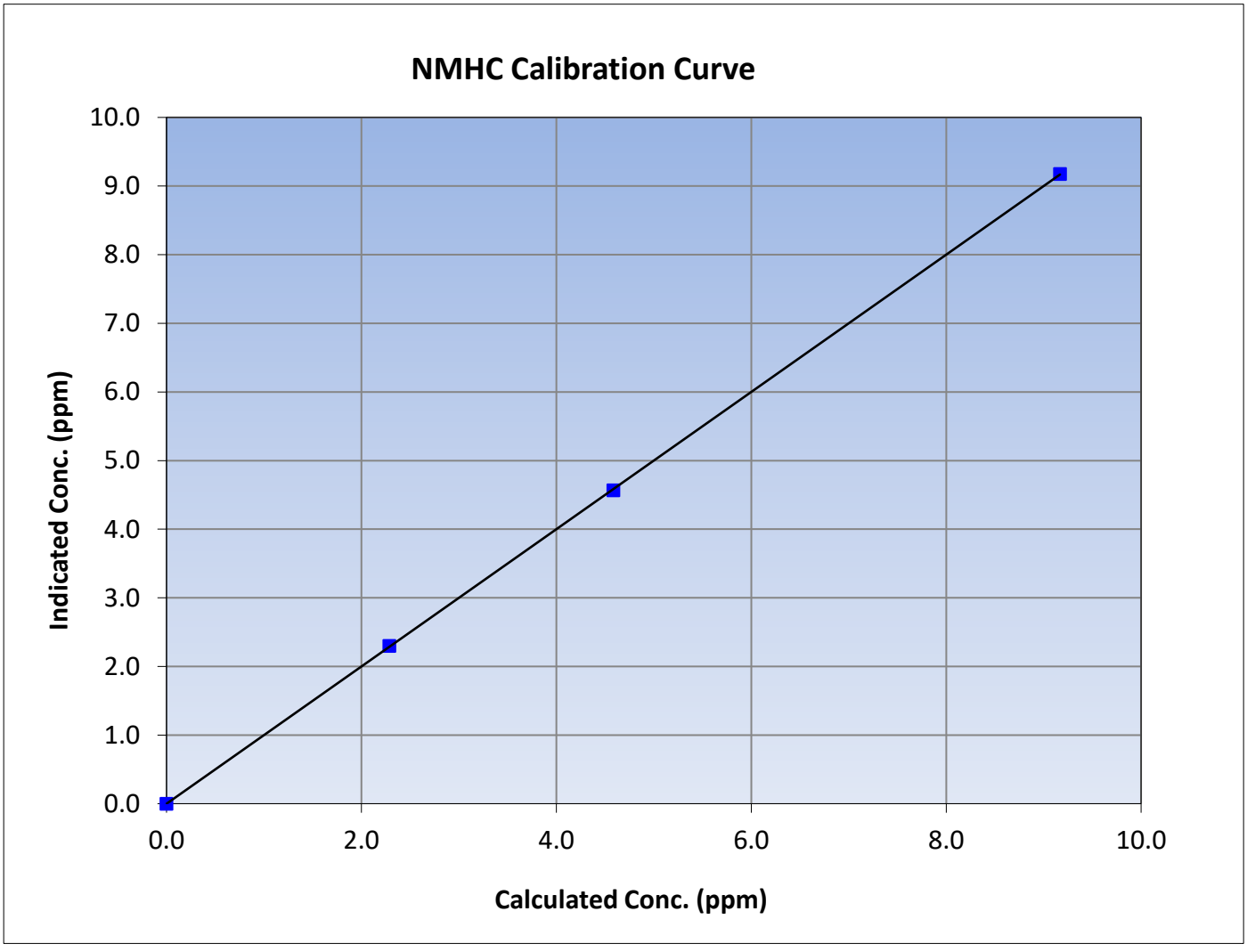
Version-06-2022

### Station Information

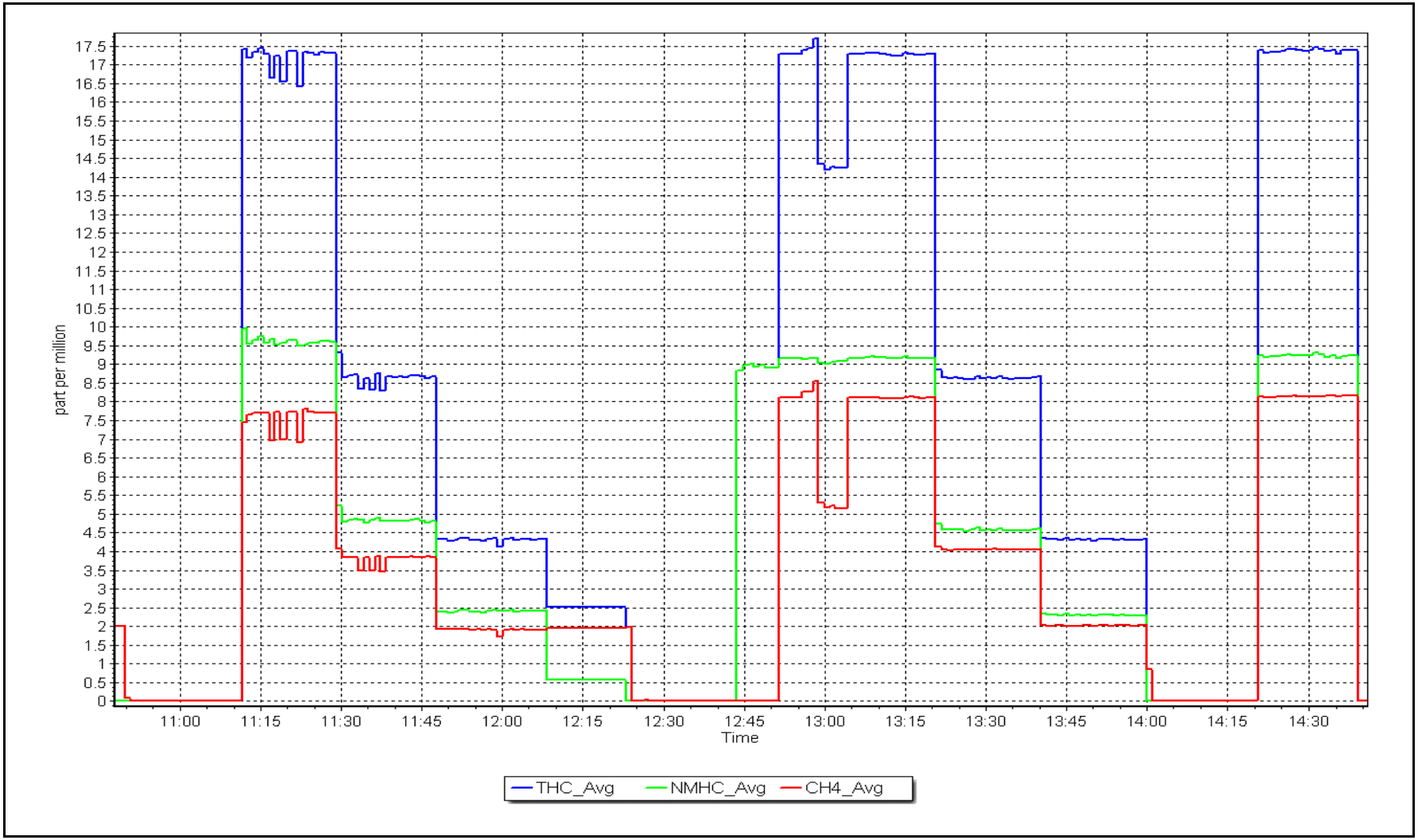
| | | | |
|---|---|---|---|
| Calibration Date: | August 26, 2023 | Previous Calibration: | August 10, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 10:49 | End Time (MST): | 14:42 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1180320039 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999990 | ≥0.995 |
| 9.17 | 9.17 | 0.9994 | | | |
| 4.58 | 4.57 | 1.0039 | Slope | 1.000027 | 0.90 - 1.10 |
| 2.29 | 2.30 | 0.9956 | | | |
| | | | Intercept | -0.000569 | +/-0.5 |



**NMHC Calibration Plot** Date: August 26, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | August 30, 2023 | Last Cal Date: | July 26, 2023 |
| Start time (MST): | 11:05 | End time (MST): | 16:15 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2XX7ME | | Cal Gas Expiry Date: | January 14, 2024 | |
| NOX Cal Gas Conc: | 50.48 | ppm | NO Cal Gas Conc: | 49.22 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 50.48 | ppm | Removed Gas NO Conc: | 49.22 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 2658 | |
| ZAG make/model: | Teledyne API 701H | | Serial Number: | 360 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1336160088 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 0.993 | 0.993 | NO bkgnd or offset: | 2.8 | 2.8 |
| NOX coeff or slope: | 0.984 | 0.984 | NOX bkgnd or offset: | 2.8 | 2.8 |
| NO2 coeff or slope: | 0.999 | 0.999 | Reaction cell Press: | 230.6 | 230.6 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.998716 | 1.000289 |
| $NO_X$ Cal Offset: | -0.069984 | -0.209933 |
| NO Cal Slope: | 1.001009 | 0.999824 |
| NO Cal Offset: | -1.469781 | -1.429814 |
| $NO_2$ Cal Slope: | 1.000734 | 1.011795 |
| $NO_2$ Cal Offset: | -0.286696 | -0.075280 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | 0.2 | ---- | ---- |
| as found span | 4919 | 81.3 | 820.8 | 800.3 | 20.5 | 806.0 | 784.6 | 21.6 | 1.0183 | 1.0200 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.2 | 0.1 | ---- | ---- |
| high point | 4919 | 81.3 | 820.8 | 800.3 | 20.5 | 821.0 | 799.4 | 21.6 | 0.9997 | 1.0011 |
| second point | 4959 | 40.7 | 410.9 | 400.7 | 10.3 | 410.7 | 398.7 | 11.9 | 1.0006 | 1.0050 |
| third point | 4980 | 20.3 | 204.9 | 199.8 | 5.1 | 204.2 | 196.5 | 7.7 | 1.0036 | 1.0169 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.1 | 0.3 | ---- | ---- |
| as left span | 4919 | 81.3 | 820.8 | 387.2 | 433.6 | 817.8 | 381.4 | 436.4 | 1.0036 | 1.0151 |
| | | | | | | | | Average Correction Factor | 1.0013 | 1.0076 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 805.7 ppb | NO = 784.5 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -1.7% |
| Previous Response | $NO_X$ = 819.6 ppb | NO = 799.6 ppb | | *Percent Change | NO = | -1.9% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 791.2 | 378.1 | 433.6 | 439.1 | 0.9874 | 101.3% |
| 2nd GPT point (200 ppb O3) | 791.2 | 589.0 | 222.7 | 224.0 | 0.9941 | 100.6% |
| 3rd GPT point (100 ppb O3) | 791.2 | 692.9 | 118.8 | 120.7 | 0.9841 | 101.6% |
| | | | | Average Correction Factor | 0.9886 | 101.2% |

Notes: Sample inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

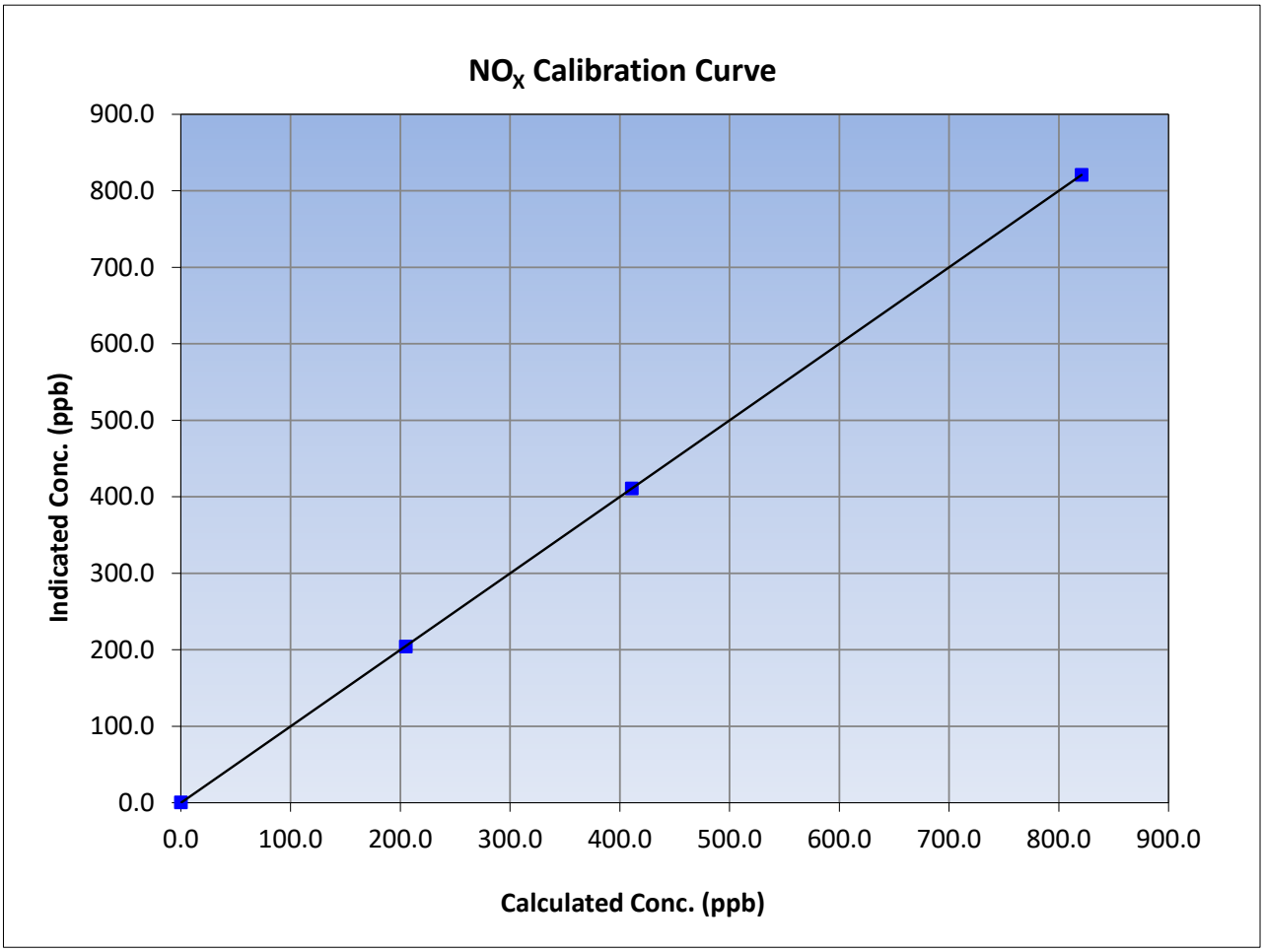
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 30, 2023 | Previous Calibration: | July 26, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 11:05 | End Time (MST): | 16:15 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1336160088 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 0.999998 | ≥0.995 |
| 820.8 | 821.0 | 0.9997 | | | |
| 410.9 | 410.7 | 1.0006 | Slope | 1.000289 | 0.90 - 1.10 |
| 204.9 | 204.2 | 1.0036 | | | |
| | | | Intercept | -0.209933 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

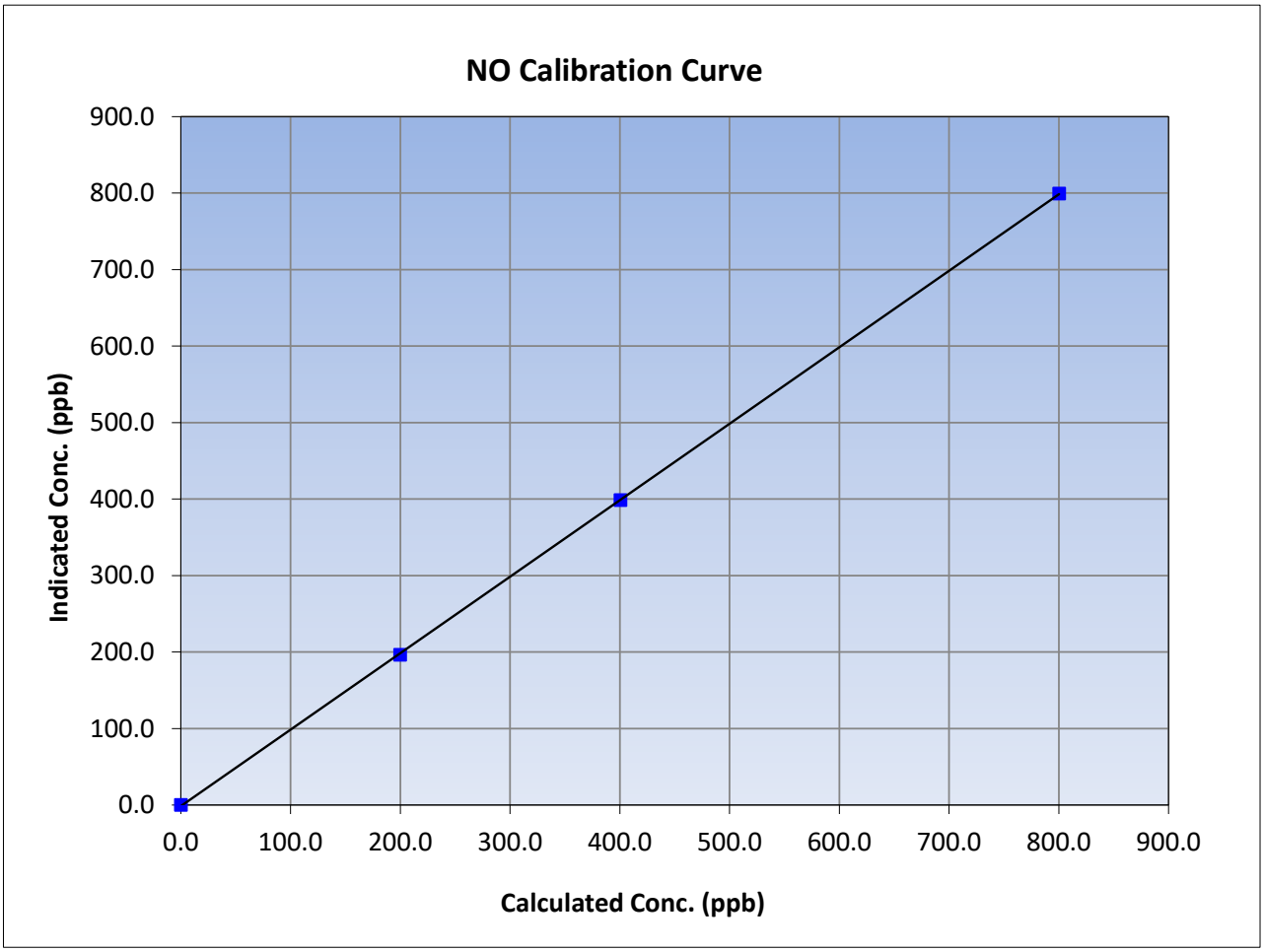
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 30, 2023 | Previous Calibration: | July 26, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 11:05 | End Time (MST): | 16:15 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1336160088 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999981 | ≥0.995 |
| 800.3 | 799.4 | 1.0011 | | | |
| 400.7 | 398.7 | 1.0050 | Slope | 0.999824 | 0.90 - 1.10 |
| 199.8 | 196.5 | 1.0169 | | | |
| | | | Intercept | -1.429814 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

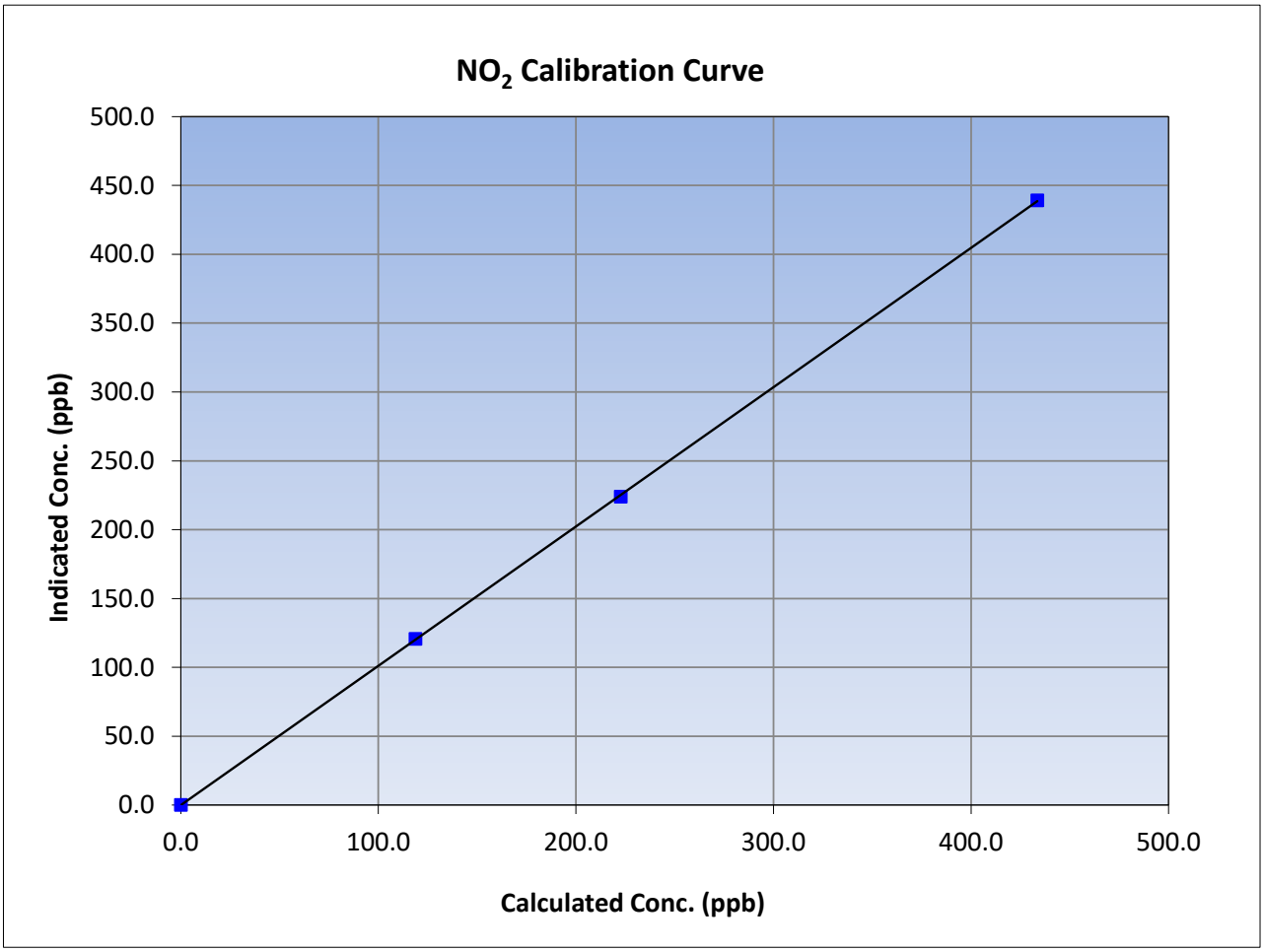
Version-04-2020

### Station Information

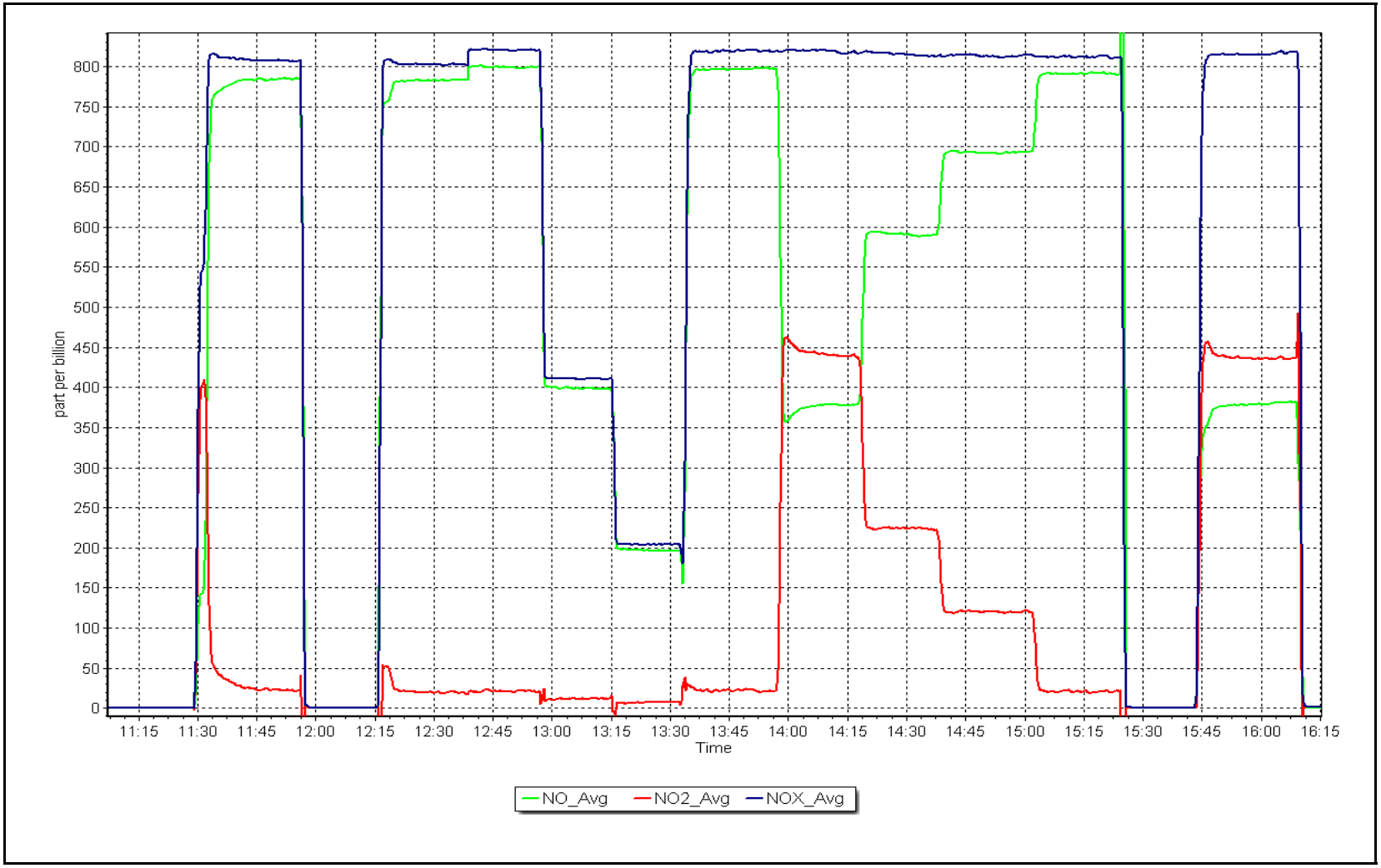
| | | | |
|---|---|---|---|
| Calibration Date: | August 30, 2023 | Previous Calibration: | July 26, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 11:05 | End Time (MST): | 16:15 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1336160088 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999979 | ≥0.995 |
| 433.6 | 439.1 | 0.9874 | | | |
| 222.7 | 224.0 | 0.9941 | Slope | 1.011795 | 0.90 - 1.10 |
| 118.8 | 120.7 | 0.9841 | | | |
| | | | Intercept | -0.075280 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 30, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS18 |
| Calibration Date: | August 23, 2023 | Last Cal Date: | July 26, 2023 |
| Start time (MST): | 10:35 | End time (MST): | 14:02 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | Teledyne API T750 | Serial Number: | 282 |
| ZAG Make/Model: | Teledyne API T751H | Serial Number: | 321 |

### Analyzer Information

Analyzer make: API T400 Analyzer serial #: 825

Analyzer Range 0 - 500 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.007600 | 1.003086 | Backgd or Offset: | 1.300 | 1.300 |
| Calibration intercept: | -1.380000 | 0.360000 | Coeff or Slope: | 1.002 | 1.002 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 800.0 | 0.0 | 0.7 | ---- |
| as found span | 4888 | 1096.9 | 400.0 | 401.1 | 0.997 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 800.0 | 0.0 | 0.6 | ---- |
| high point | 4888 | 1101.7 | 400.0 | 401.8 | 0.996 |
| second point | 4888 | 863.9 | 200.0 | 200.6 | 0.997 |
| third point | 4888 | 741.4 | 100.0 | 100.6 | 0.994 |
| as left zero | 5000 | 800.0 | 0.0 | 0.8 | ---- |
| as left span | 4812 | 1097.9 | 400.0 | 413.6 | 0.967 |
| | | | | Average Correction Factor | 0.996 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 400.4 | Previous response | 401.7 | *% change | -0.3% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Using portable calibrator for the calibration. No adjustments made.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

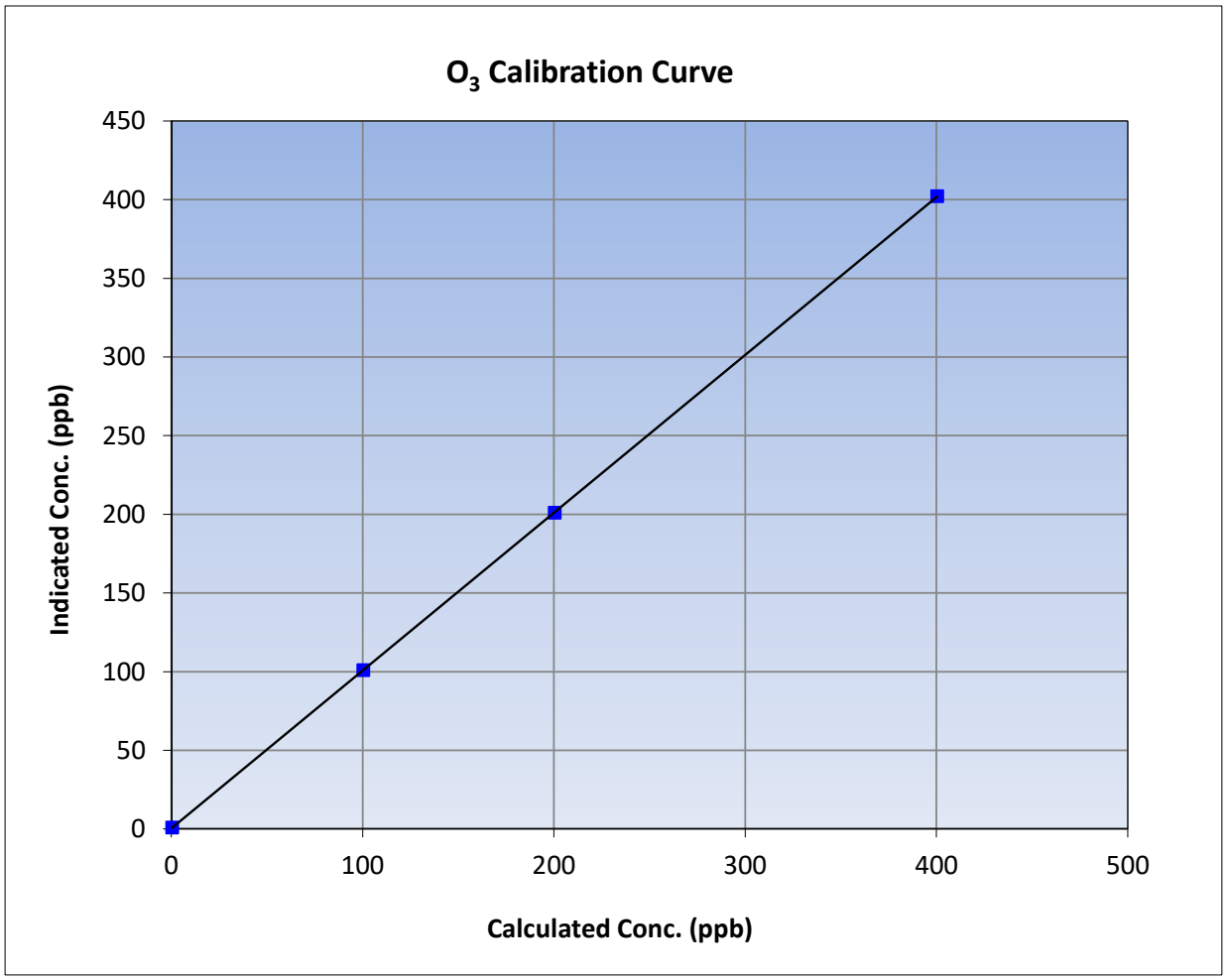
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 26, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS18 |
| Start Time (MST): | 10:35 | End Time (MST): | 14:02 |
| Analyzer make: | API T400 | Analyzer serial #: | 825 |

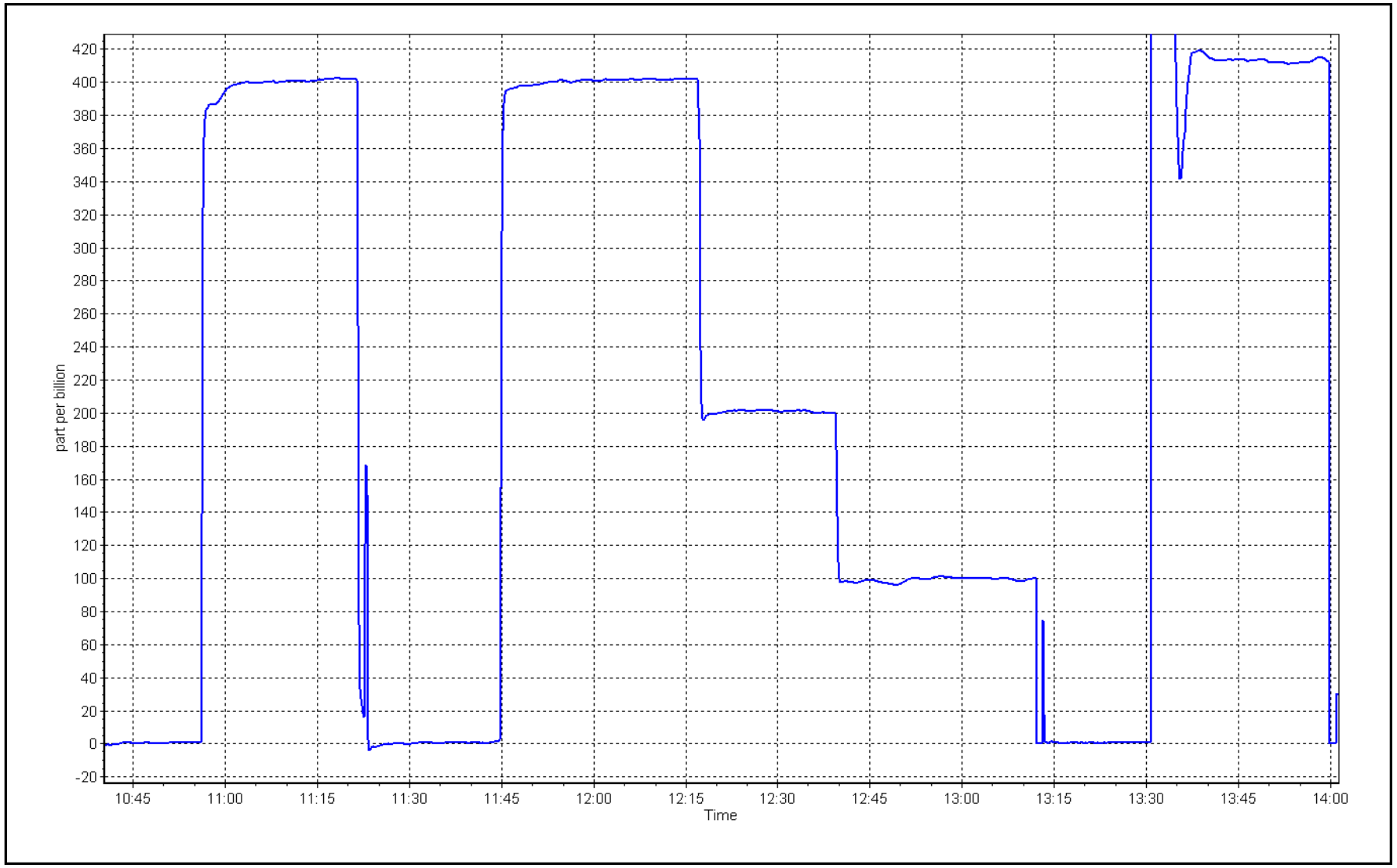
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.6 | ---- |
| 400.0 | 401.8 | 0.9955 |
| 200.0 | 200.6 | 0.9970 |
| 100.0 | 100.6 | 0.9940 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999997 | *≥0.995* |
| Slope | 1.003086 | *0.90 - 1.10* |
| Intercept | 0.360000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 23, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | August 30, 2023 | Last Cal Date: | July 26, 2023 |
| Start time (MST): | 13:55 | End time (MST): | 16:00 |
| Analyzer Make: | API T640 | S/N: | 1162 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat FP-25BT | S/N: | 388748 |
| Temp/RH standard: | Alicat FP-25BT | S/N: | 388748 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | 24.9 | 24.7 | 24.9 | ☐ | +/- 2 °C |
| P (mmHg) | 696.0 | 697.3 | 696.0 | ☐ | +/- 10 mmHg |
| flow (LPM) | 4.98 | 5.05 | 4.98 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 30, 2023 Last Cal Date: July 26, 2023

PM w/o HEPA: 12.4 PM w/ HEPA: 0.0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 10.0 | 11.1 | 11.1 | ☑ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 12.4 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: August 30, 2023

Disposable Filter Changed: August 30, 2023

### Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022

Date RH/T Sensor Cleaned: August 30, 2022

Notes: Adjusted PMT, no other adjustments needed.

Calibration by: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## CO Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | August 21, 2023 | Last Cal Date: | July 4, 2023 |
| Start time (MST): | 11:05 | End time (MST): | 13:49 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 3,050 | ppm | Cal Gas Exp Date: | December 1, 2028 |
| Cal Gas Cylinder #: | ALM063503 | | | |
| Removed Cal Gas Conc: | 3,050 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 2658 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 360 |

### Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3504

Analyzer Range: 0 - 50 ppm

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.999550 | 0.999692 | Backgd or Offset: | -0.010 | -0.010 |
| Calibration intercept: | 0.039792 | 0.079759 | Coeff or Slope: | 0.906 | 0.906 |

### CO Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4933 | 66.7 | 40.7 | 40.8 | 0.999 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4933 | 66.7 | 40.7 | 40.7 | 1.000 |
| second point | 4966 | 33.3 | 20.3 | 20.5 | 0.990 |
| third point | 4983 | 16.7 | 10.2 | 10.3 | 0.994 |
| as left zero | 3000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 2960 | 40.0 | 40.7 | 40.9 | 0.994 |
| | | | | Average Correction Factor | 0.994 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 40.71 | Prev response: | 40.71 | *% change: | 0.0% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## CO Calibration Summary

Version-01-2020

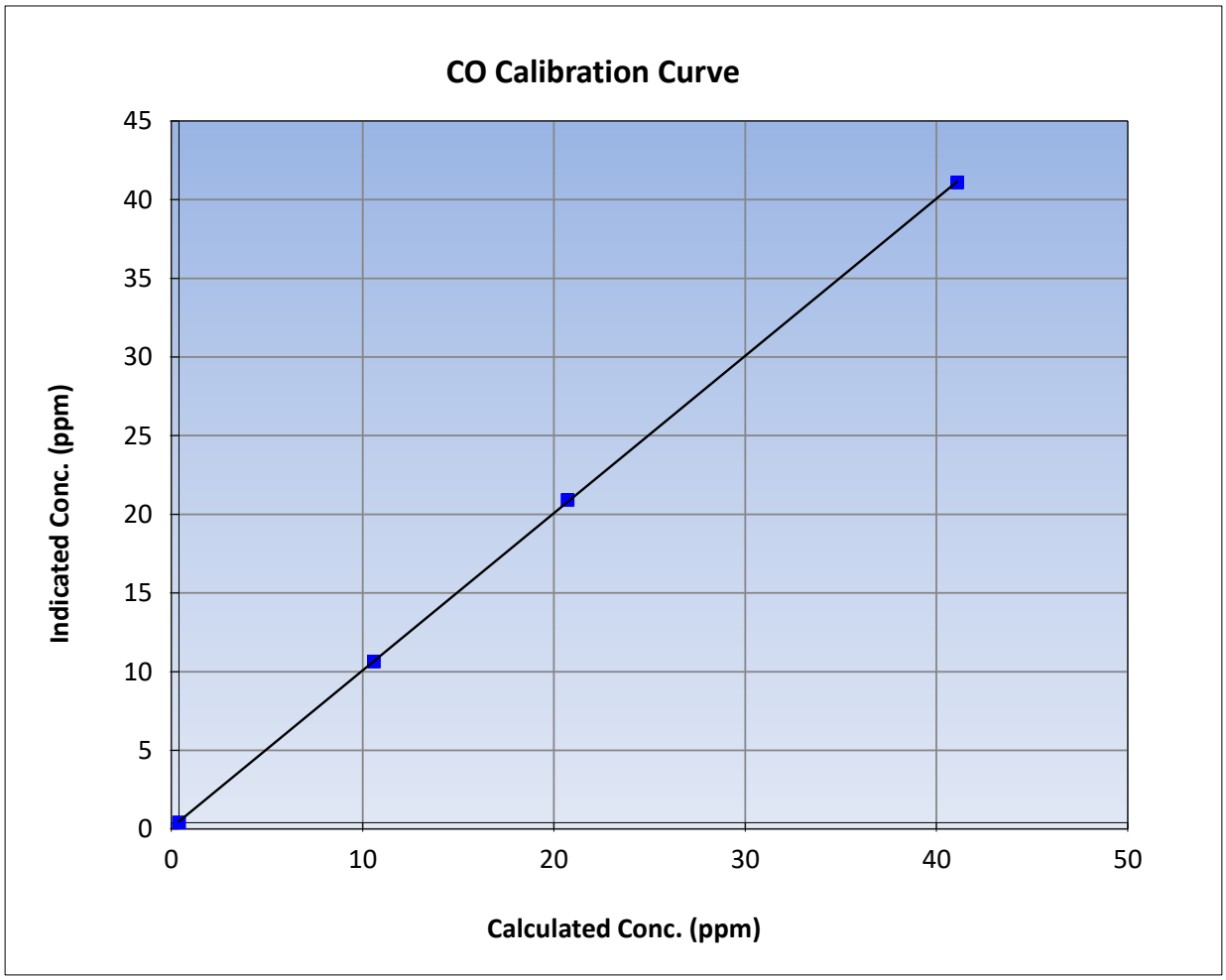
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 21, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Start Time (MST): | 11:05 | End Time (MST): | 13:49 |
| Analyzer make: | API T300 | Analyzer serial #: | 3504 |

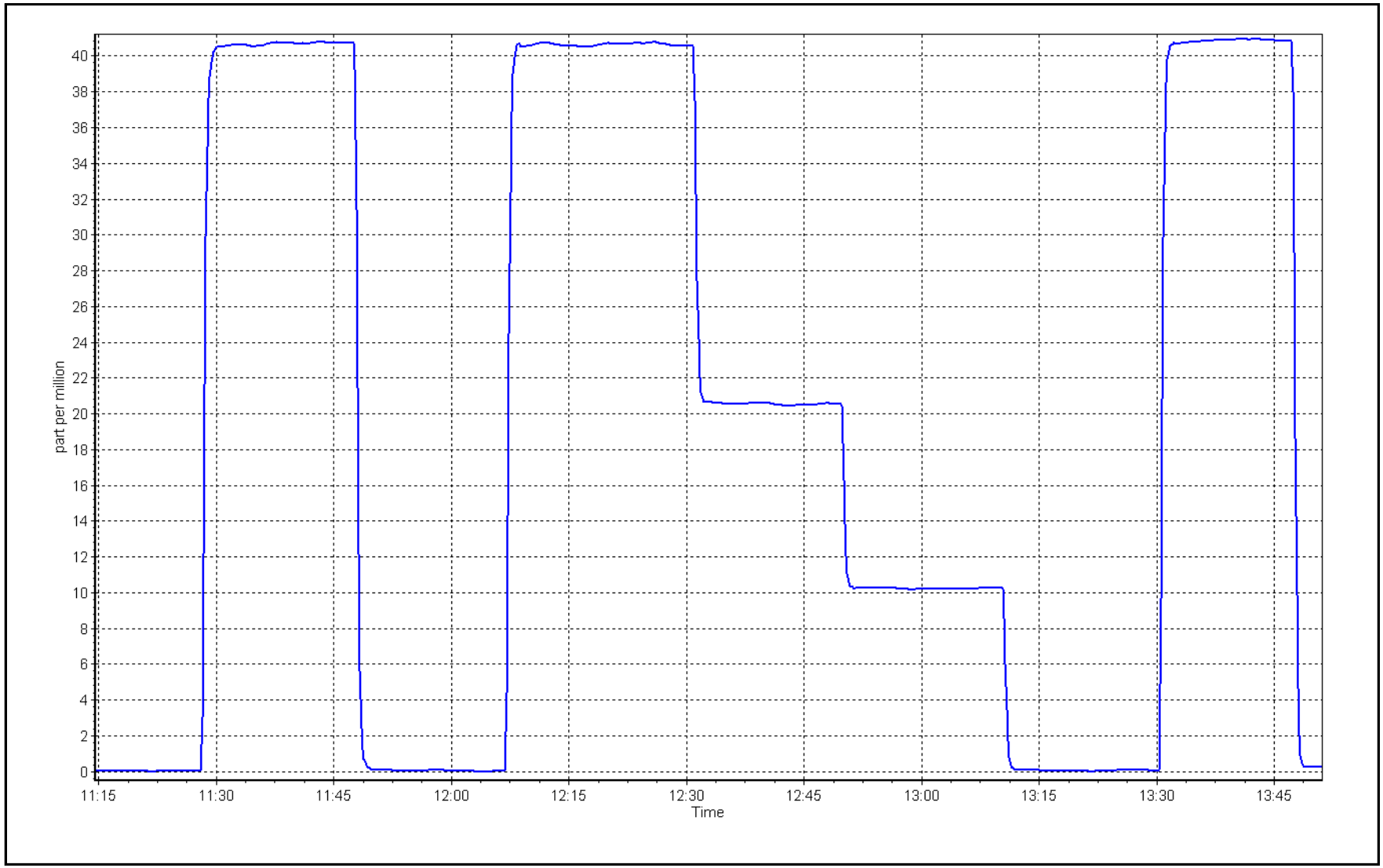
### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 40.7 | 40.7 | 1.0000 |
| 20.3 | 20.5 | 0.9896 |
| 10.2 | 10.3 | 0.9939 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999969 | *≥0.995* |
| Slope | 0.999692 | *0.90 - 1.10* |
| Intercept | 0.079759 | *+/-1.5* |



**CO Calibration Plot** Date: August 21, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## $CO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | August 22, 2023 | Last Cal Date: | July 5, 2023 |
| Start time (MST): | 10:06 | End time (MST): | 14:34 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 60,220 | ppm | Cal Gas Exp Date: | December 1, 2026 |
| Cal Gas Cylinder #: | ALM063503 | | | |
| Removed Cal Gas Conc: | 60,220 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 2658 |
| N2 Gen Make/Model: | Peak Scientific | | Serial Number: | 771048317 |

### Analyzer Information

Analyzer make: API T360 — Analyzer serial #: 283

Analyzer Range 0 - 2,000 ppm

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.999115 | 0.994404 | Backgd or Offset: | -0.081 | -0.103 |
| Calibration intercept: | -4.820000 | 2.640000 | Coeff or Slope: | 1.091 | 1.109 |

### $CO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 3000 | 0.0 | 0.0 | 2.4 | ---- |
| as found span | 2920 | 80.0 | 1605.9 | 1611.4 | 0.997 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 3000 | 0.0 | 0.0 | 3.1 | ---- |
| high point | 2920 | 80.0 | 1605.9 | 1599.6 | 1.004 |
| second point | 2960 | 40.0 | 802.9 | 801.3 | 1.002 |
| third point | 2980 | 20.0 | 401.5 | 401.1 | 1.001 |
| as left zero | 3000 | 0.0 | 0.0 | 2.6 | ---- |
| as left span | 2930 | 80.0 | 1600.5 | 1602.0 | 0.999 |
| | | | | Average Correction Factor | 1.002 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 1609.00 | Prev response: | 1599.63 | *% change: | 0.6% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Zero and span adjusted. Third point failed, performed linearity adjustment.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $CO_2$ Calibration Summary

Version-01-2020

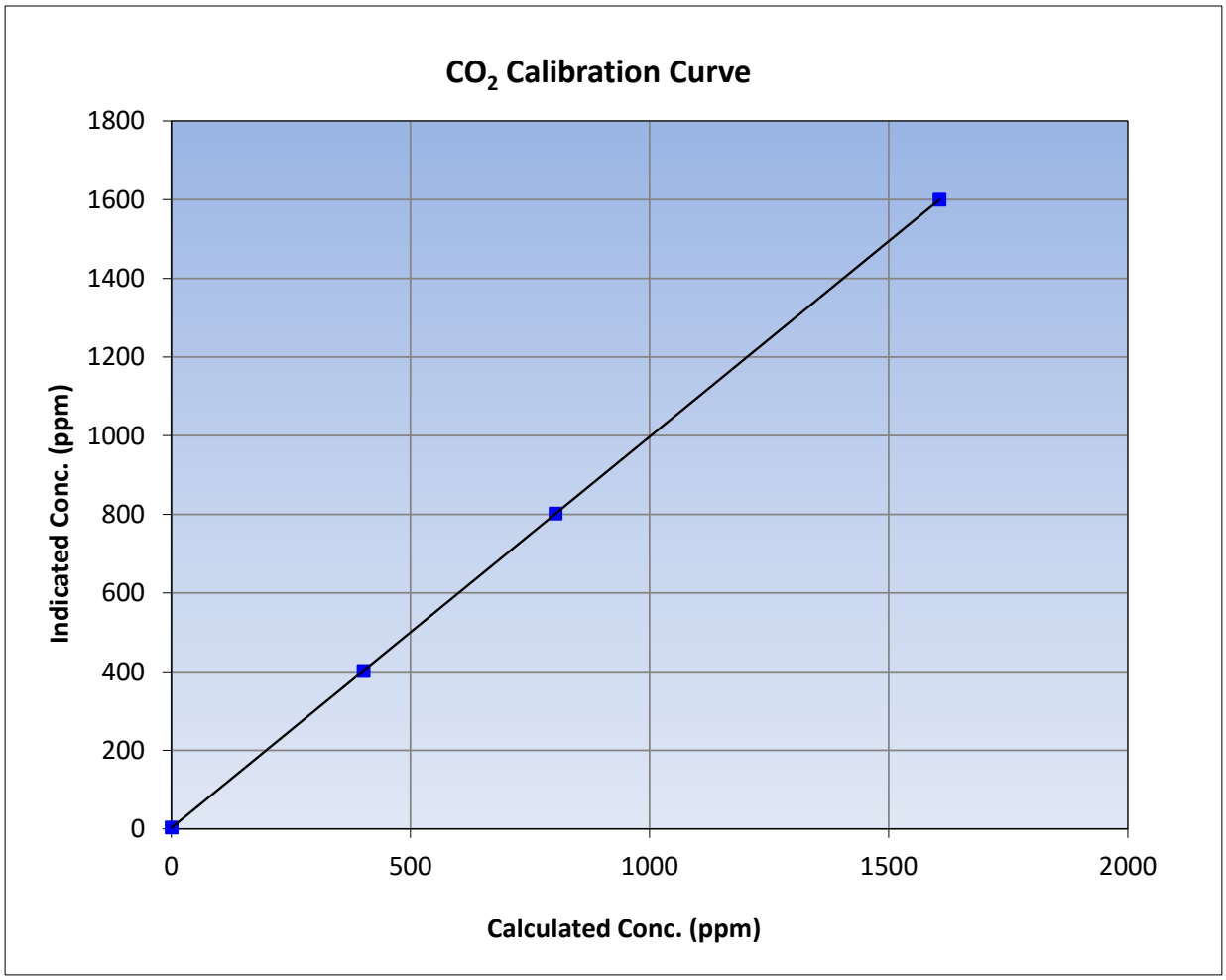
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date | August 22, 2023 | Previous Calibration | July 5, 2023 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:06 | End Time (MST) | 14:34 |
| Analyzer make | API T360 | Analyzer serial # | 283 |

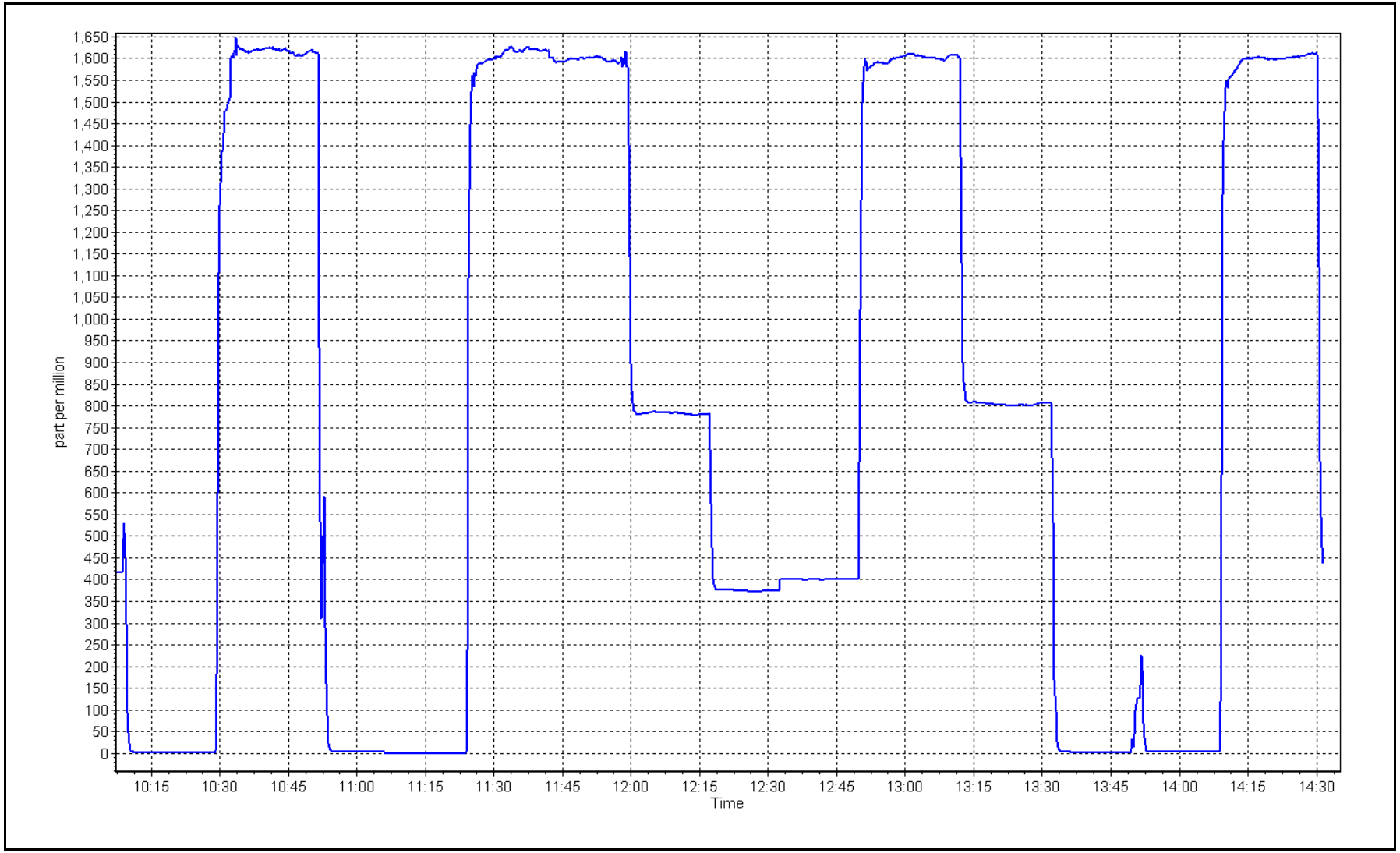
### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 3.1 | ---- |
| 1605.9 | 1599.6 | 1.0039 |
| 802.9 | 801.3 | 1.0020 |
| 401.5 | 401.1 | 1.0009 |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999999 | *≥0.995* |
| Slope | 0.994404 | *0.90 - 1.10* |
| Intercept | 2.640000 | *+/-10* |



**$CO_2$ Calibration Plot** Date: August 22, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## $CO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | August 31, 2023 | Last Cal Date: | N/A |
| Start time (MST): | 11:54 | End time (MST): | 15:55 |
| Reason: | Install | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 60,220 | ppm | Cal Gas Exp Date: | December 1, 2026 |
| Cal Gas Cylinder #: | ALM063503 | | | |
| Removed Cal Gas Conc: | 60,220 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 2658 |
| N2 Gen Make/Model: | Peak Scientific | | Serial Number: | 771048317 |

### Analyzer Information

Analyzer make: API T360 — Analyzer serial #: 288

Analyzer Range 0 - 2,000 ppm

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | N/A | 1.002574 | Backgd or Offset: | N/A | 0.041 |
| Calibration intercept: | N/A | -0.200000 | Coeff or Slope: | N/A | 1.009 |

### $CO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | | | | | |
| as found span | | | | | |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 3000 | 0.0 | 0.0 | 2.4 | ---- |
| high point | 2920 | 80.0 | 1605.9 | 1611.1 | 0.997 |
| second point | 2960 | 40.0 | 802.9 | 803.5 | 0.999 |
| third point | 2980 | 20.0 | 401.5 | 399.7 | 1.004 |
| as left zero | 3000 | 0.0 | 0.0 | 3.5 | ---- |
| as left span | 2930 | 80.0 | 1600.5 | 1610.0 | 0.994 |
| | | | | Average Correction Factor | 1.000 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | NA | Prev response: | NA | *% change: | NA |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: API T360 S/N 283 removed due to instrument failure. S/N: 288 installed. Zero and span adjusted. Third point failed, performed linearity adjustment.

Calibration Performed By: Aswin Sasi Kumar

# Wood Buffalo Environmental Association

## $CO_2$ Calibration Summary

Version-01-2020

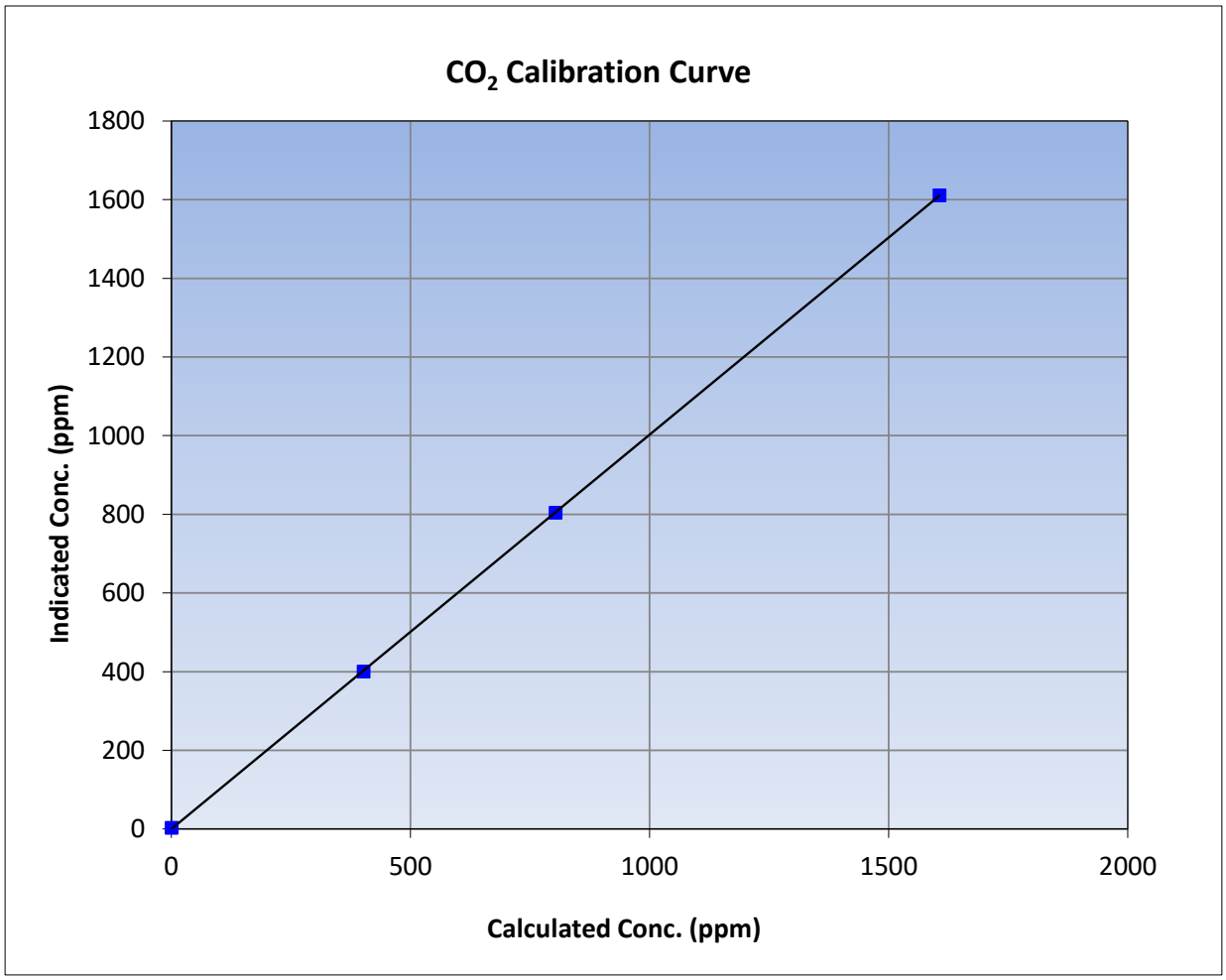
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date | August 31, 2023 | Previous Calibration | N/A |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 11:54 | End Time (MST) | 15:55 |
| Analyzer make | API T360 | Analyzer serial # | 288 |

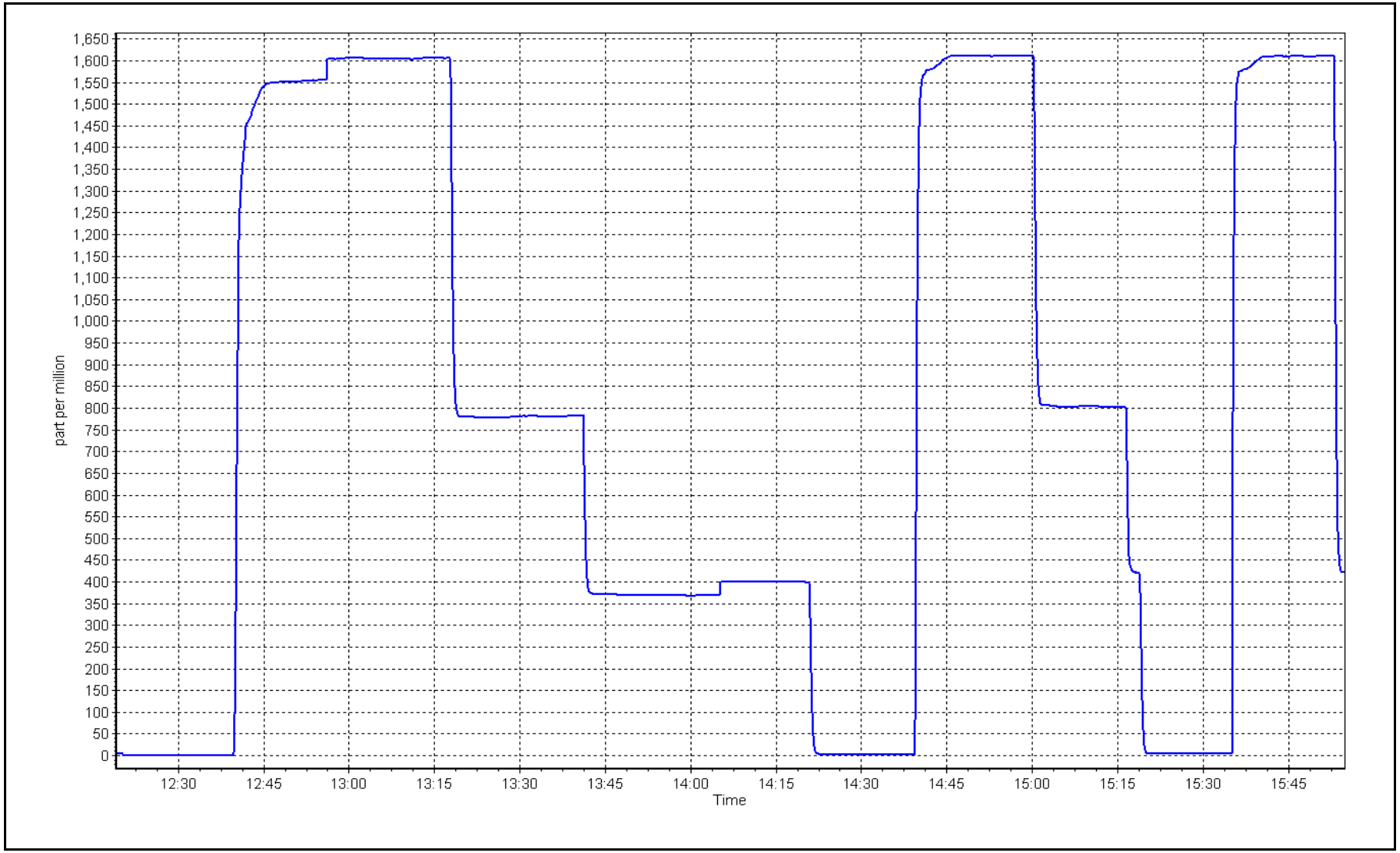
### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 2.4 | ---- |
| 1605.9 | 1611.1 | 0.9968 |
| 802.9 | 803.5 | 0.9993 |
| 401.5 | 399.7 | 1.0044 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999988 | *≥0.995* |
| Slope | 1.002574 | *0.90 - 1.10* |
| Intercept | -0.200000 | *+/-10* |



**$CO_2$ Calibration Plot** Date: August 31, 2023 Location: Stony Mountain



# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Calibration Date: | August 24, 2023 | Prev Cal Date: | August 4, 2022 |
| Start Time (MST): | 12:40 | End Time (MST): | 12:51 |
| Tower Height (m): | 20.0 | Reason: | Install |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | W23536 |
| WS Calibrator: | MetOne 053 | Serial Number: | P15103 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.3 | 0.5% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | 0.0% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999999 | *≥0.9995* |
| Calculated slope | | 0.999594 | *0.90 - 1.10* |
| Calculated intercept | | -0.028293 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | D14057 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | 13:27 | Calc Declination*: | 13.2 Degrees |
| Deadband calc: | 1.1 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | -0.4 | --- |
| 90 | 87.7 | -0.7% |
| 180 | 179.3 | -0.2% |
| 270 | 269.7 | -0.1% |
| 357 | 355.5 | -0.4% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999982 | *≥0.9995* |
| Calculated slope | | 1.000171 | *0.90 - 1.10* |
| Calculated intercept | | 1.026670 | *+/- 4* |

Notes: Installing new WS/WD sensors on the 20m tower. Crossarm aligned with true north. No issues to note.

Calibration Performed By: Rene Chamberland & Devin Russell

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Stony Mountain | Station Number: | AMS 18 |
| Calibration Date: | August 24, 2023 | Prev Cal Date: | August 4, 2022 |
| Start Time (MST): | 13:38 | End Time (MST): | 14:00 |
| Tower Height (m): | 20.0 | Reason: | Removal |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | A1406 |
| WS Calibrator: | MetOne 053 | Serial Number: | P15103 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.1 | -0.3% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | -0.1% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999999 | 0.999999 | *≥0.9995* |
| Calculated slope | 0.998857 | 0.999473 | *0.90 - 1.10* |
| Calculated intercept | 0.029838 | 0.026227 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | 10478 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | 13:27 | Calc Declination*: | 13.2 Degrees |
| Deadband calc: | -10.9 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 0.9 | --- |
| 90 | 85.8 | -1.2% |
| 180 | 176.6 | -1.0% |
| 270 | 279.6 | 2.7% |
| 357 | 368.8 | 3.3% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999990 | 0.999467 | *≥0.9995* |
| Calculated slope | 1.000134 | 0.960823 | *0.90 - 1.10* |
| Calculated intercept | -1.328101 | 4.207460 | *+/- 4* |

Notes: Removing old 20m WS/WD sensors. WD sensor outside of limits.

Calibration Performed By: Rene Chamberland & Devin Russell

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS19
## FIREBAG
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Firebag | Station number: | AMS 19 |
| Calibration Date: | August 14, 2023 | Last Cal Date: | July 19, 2023 |
| Start time (MST): | 11:00 | End time (MST): | 14:15 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.29 | ppm | Cal Gas Exp Date: | February 23, 2025 |
| Cal Gas Cylinder #: | CC716618 | | | |
| Removed Cal Gas Conc: | 49.29 | ppm | Rem Gas Exp Date: | |
| Removed Gas Cyl #: | | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 1607 |
| ZAG Make/Model: | API T701 | | Serial Number: | 1118 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1410661308

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.995832 | 1.001265 | Backgd or Offset: | 10.2 | 10.3 |
| Calibration intercept: | -0.101381 | 0.897402 | Coeff or Slope: | 0.992 | 1.002 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 4999 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4919 | 81.1 | 799.5 | 791.9 | 1.010 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 4999 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4919 | 81.1 | 799.5 | 801.0 | 0.998 |
| second point | 4959 | 40.6 | 400.3 | 402.1 | 0.995 |
| third point | 4980 | 20.3 | 200.1 | 201.9 | 0.991 |
| as left zero | 4999 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 4919 | 81.1 | 799.5 | 801.0 | 0.998 |
| | | | | Average Correction Factor | 0.995 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 792.00 | Previous response | 796.03 | *% change | -0.5% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Adjusted span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

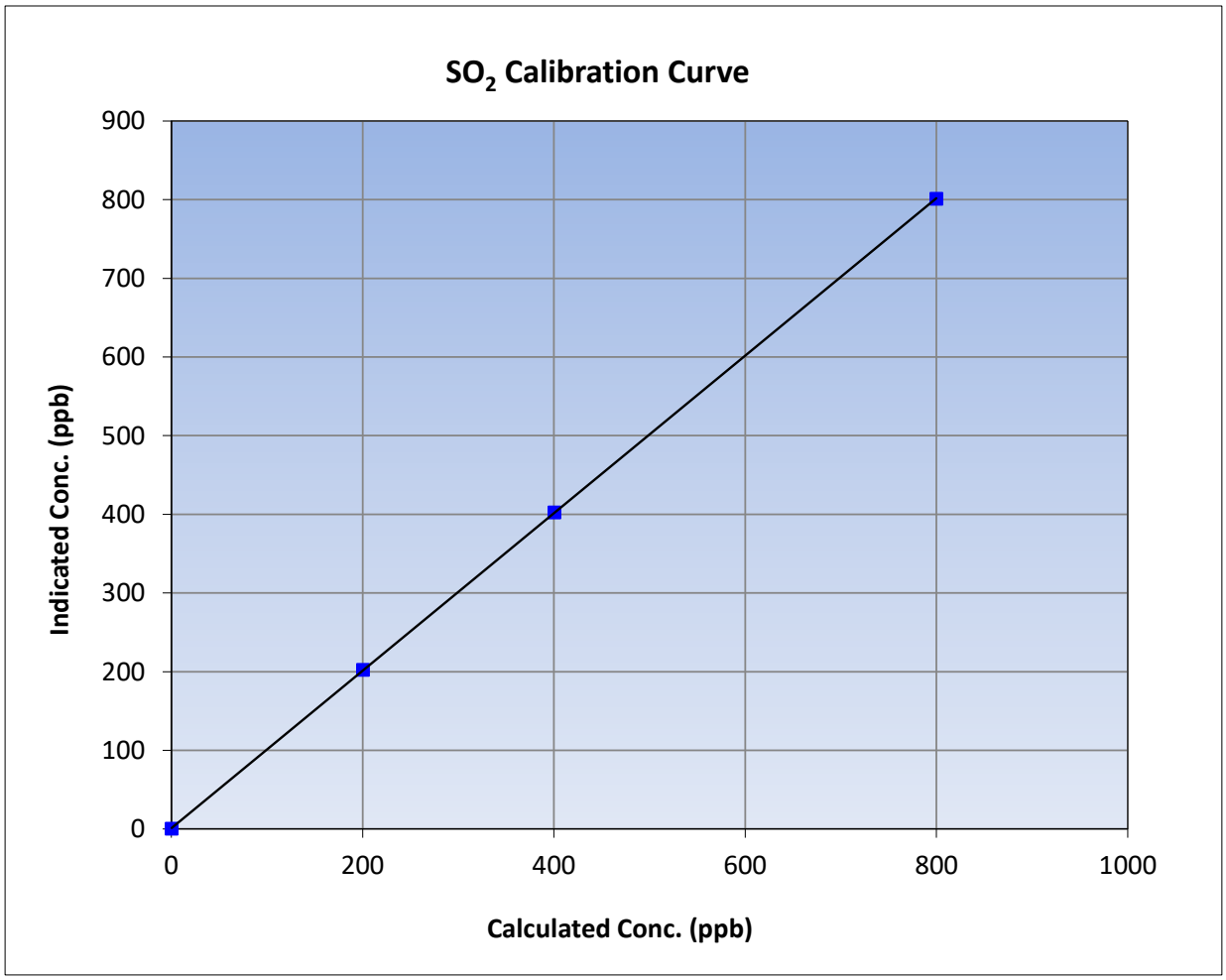
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 14, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Firebag | Station Number: | AMS 19 |
| Start Time (MST): | 11:00 | End Time (MST): | 14:15 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1410661308 |

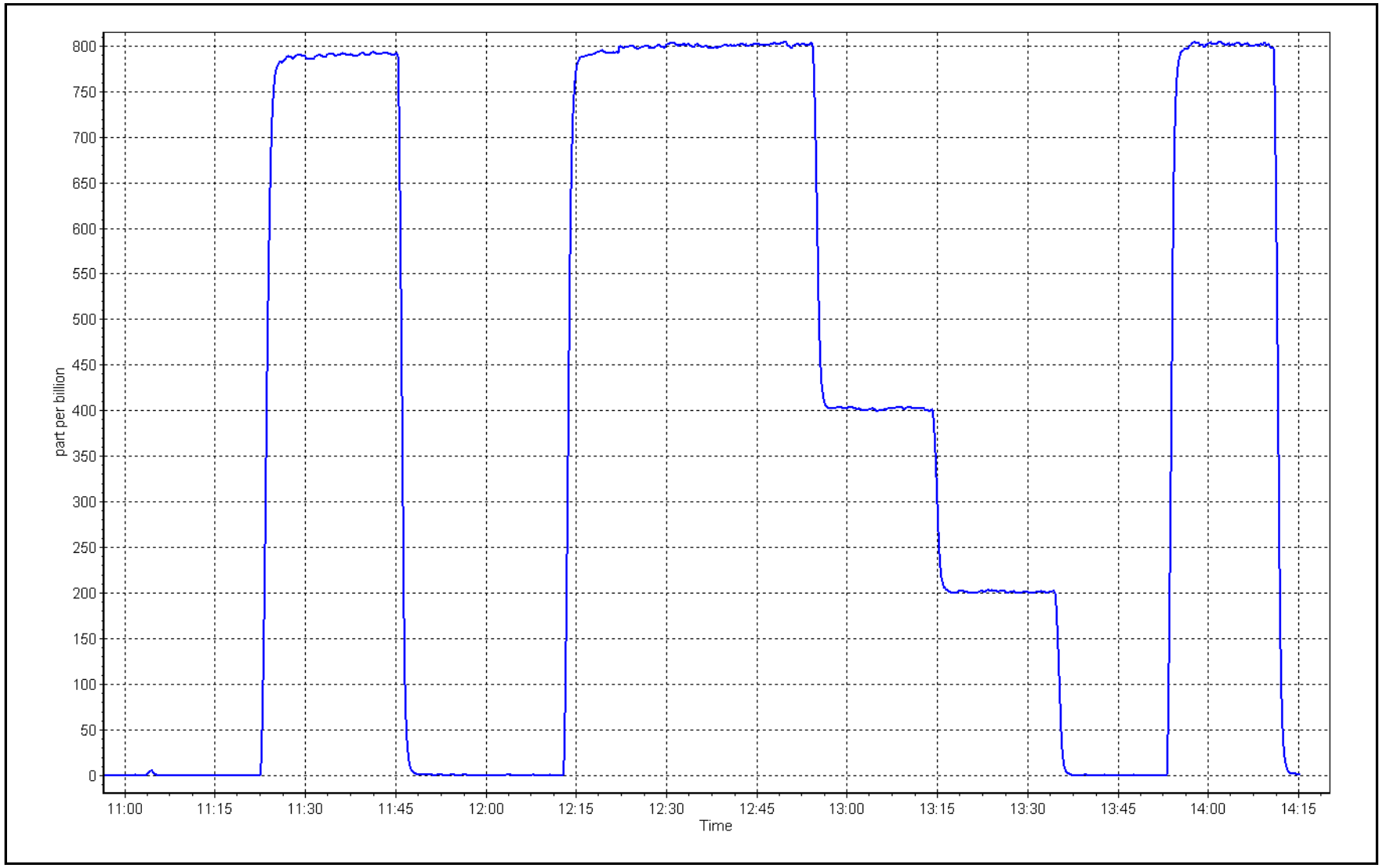
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 799.5 | 801.0 | 0.9981 |
| 400.3 | 402.1 | 0.9954 |
| 200.1 | 201.9 | 0.9911 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999996 | *≥0.995* |
| Slope | 1.001265 | *0.90 - 1.10* |
| Intercept | 0.897402 | *+/-30* |



**SO2 Calibration Plot** Date: August 14, 2023 Location: Firebag



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Firebag | Station number: | AMS19 |
| Calibration Date: | August 10, 2023 | Last Cal Date: | July 18, 2023 |
| Start time (MST): | 10:15 | End time (MST): | 14:56 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.114 | ppm | Cal Gas Exp Date: | February 5, 2024 |
| Cal Gas Cylinder #: | CC517427 | | | |
| Removed Cal Gas Conc: | 5.114 | ppm | Rem Gas Exp Date: | n/a |
| Removed Gas Cyl #: | n/a | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 1607 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 1118 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i-TLE | | Analyzer serial #: | 1151680032 | |
| Converter make: | Global | | Converter serial #: | 2022-222 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.004340 | 1.000053 | Backgd or Offset: | 2.54 | 2.55 |
| Calibration intercept: | -0.181643 | -0.081596 | Coeff or Slope: | 1.122 | 1.122 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| as found span | 4922 | 78.2 | 80.0 | 80.4 | 0.991 |
| as found 2nd point | 4961 | 39.1 | 40.0 | 40.0 | 0.992 |
| as found 3rd point | 4980 | 19.6 | 20.0 | 19.9 | 0.992 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4922 | 78.2 | 80.0 | 79.9 | 1.001 |
| second point | 4961 | 39.1 | 40.0 | 39.9 | 1.002 |
| third point | 4980 | 19.6 | 20.0 | 20.0 | 1.002 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 4922 | 78.2 | 80.0 | 79.4 | 1.007 |
| SO2 Scrubber Check | 4922 | 78.3 | 800.2 | 0.0 | ---- |
| Date of last scrubber change: | | January 18, 2023 | | Ave Corr Factor | 1.002 |
| Date of last converter efficiency test: | | n/a | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 80.7 | Prev response: | 80.15 | *% change: | 0.7% |
| Baseline Corr 2nd AF pt: | 40.3 | AF Slope: | 1.009057 | AF Intercept: | -0.321768 |
| Baseline Corr 3rd AF pt: | 20.2 | AF Correlation: | 0.999999 | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter and ran SOx scrubber check after MPAF's. No adjustments needed.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

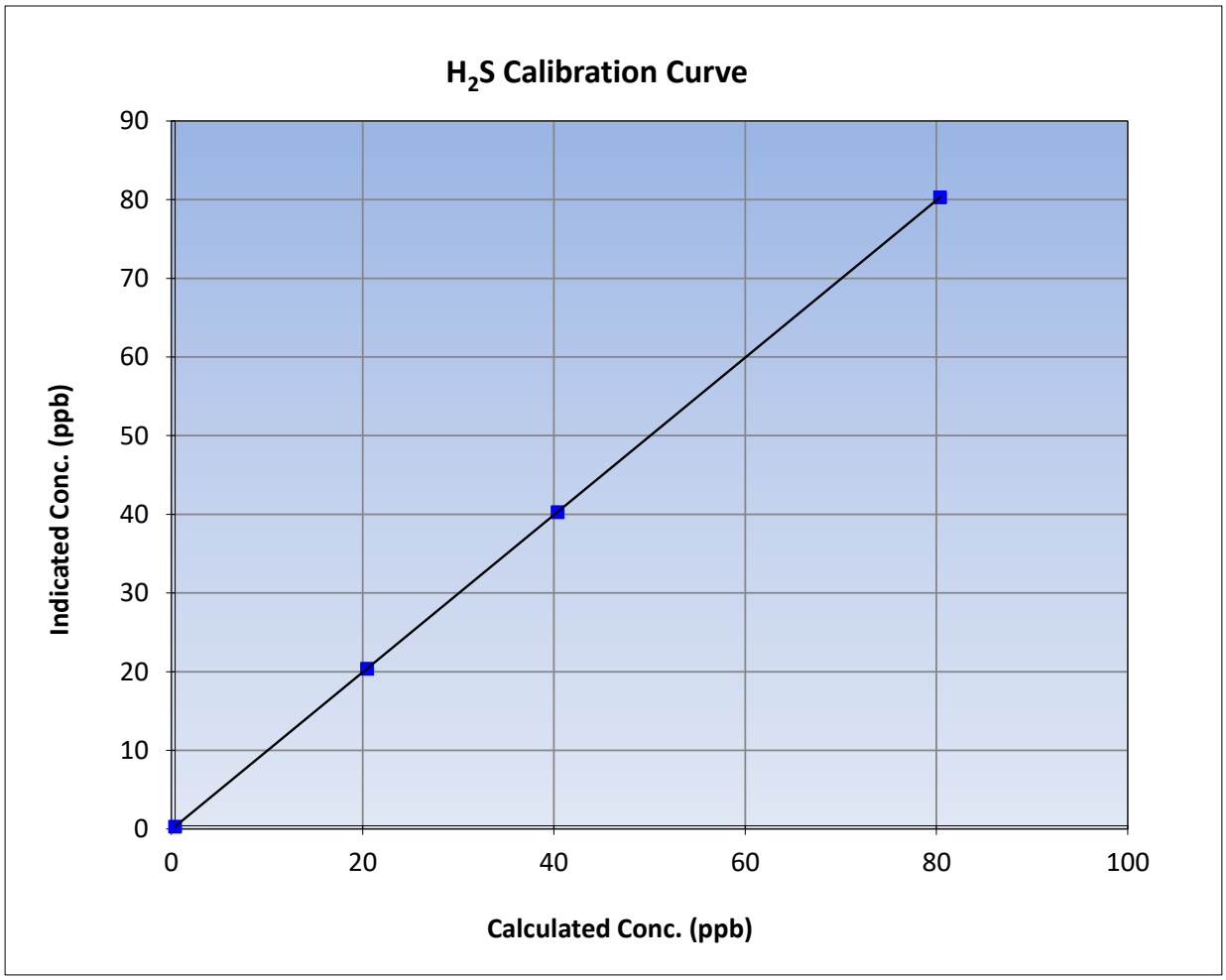
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 18, 2023 |
| Station Name: | Firebag | Station Number: | AMS19 |
| Start Time (MST): | 10:15 | End Time (MST): | 14:56 |
| Analyzer make: | Thermo 43i-TLE | Analyzer serial #: | 1151680032 |

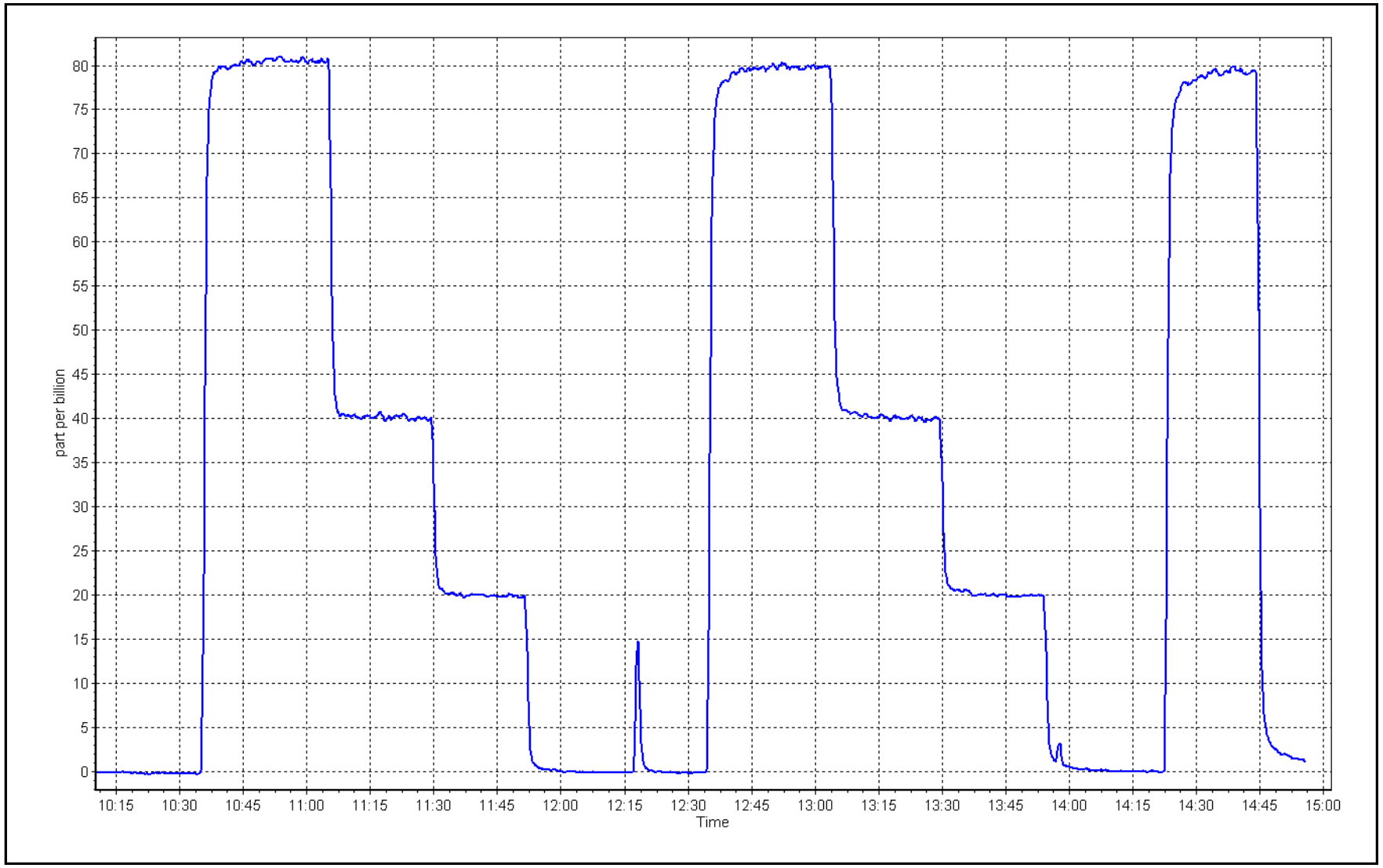
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 80.0 | 79.9 | 1.0010 |
| 40.0 | 39.9 | 1.0023 |
| 20.0 | 20.0 | 1.0024 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 1.000000 | *≥0.995* |
| Slope | 1.000053 | *0.90 - 1.10* |
| Intercept | -0.081596 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 10, 2023 Location: Firebag



# Wood Buffalo Environmental Association

## THC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Firebag | Station number: | AMS 19 |
| Calibration Date: | August 14, 2023 | Last Cal Date: | July 19, 2023 |
| Start time (MST): | 11:00 | End time (MST): | 14:15 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC716618 | Cal Gas Expiry Date: | February 23, 2025 | |
| CH4 Cal Gas Conc. | 500.7 | ppm | CH4 Equiv Conc. | 1066.9 | ppm |
| C3H8 Cal Gas Conc. | 205.9 | ppm | | | |
| Removed Gas Cert: | | | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 500.7 | ppm | CH4 Equiv Conc. | 1066.9 | ppm |
| Removed C3H8 Conc. | 205.9 | ppm | Diff between cyl: | | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 1607 | |
| ZAG Make/Model: | API T701 | | Serial Number: | 1118 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 51i-LT | | Analyzer serial #: | 1336160089 | |
| Analyzer Range: | 0 - 20 ppm | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.999589 | 0.998012 | Background: | 3.75 | 3.11 |
| Calibration intercept: | -0.108328 | -0.083128 | Coefficient: | 3.716 | 3.765 |

### THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.16 | ---- |
| as found span | 4919 | 81.1 | 17.31 | 17.45 | 0.992 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 4999 | 0.0 | 0.00 | -0.05 | ---- |
| high point | 4919 | 81.1 | 17.31 | 17.22 | 1.005 |
| second point | 4959 | 40.6 | 8.66 | 8.50 | 1.019 |
| third point | 4980 | 20.3 | 4.33 | 4.24 | 1.022 |
| as left zero | 5000 | 0.0 | 0.00 | -0.06 | ---- |
| as left span | 4919 | 81.1 | 17.31 | 17.34 | 0.998 |
| | | | | Average Correction Factor | 1.015 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 17.29 | Previous response | 17.19 | *% change | 0.6% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## THC Calibration Summary

Version-01-2020

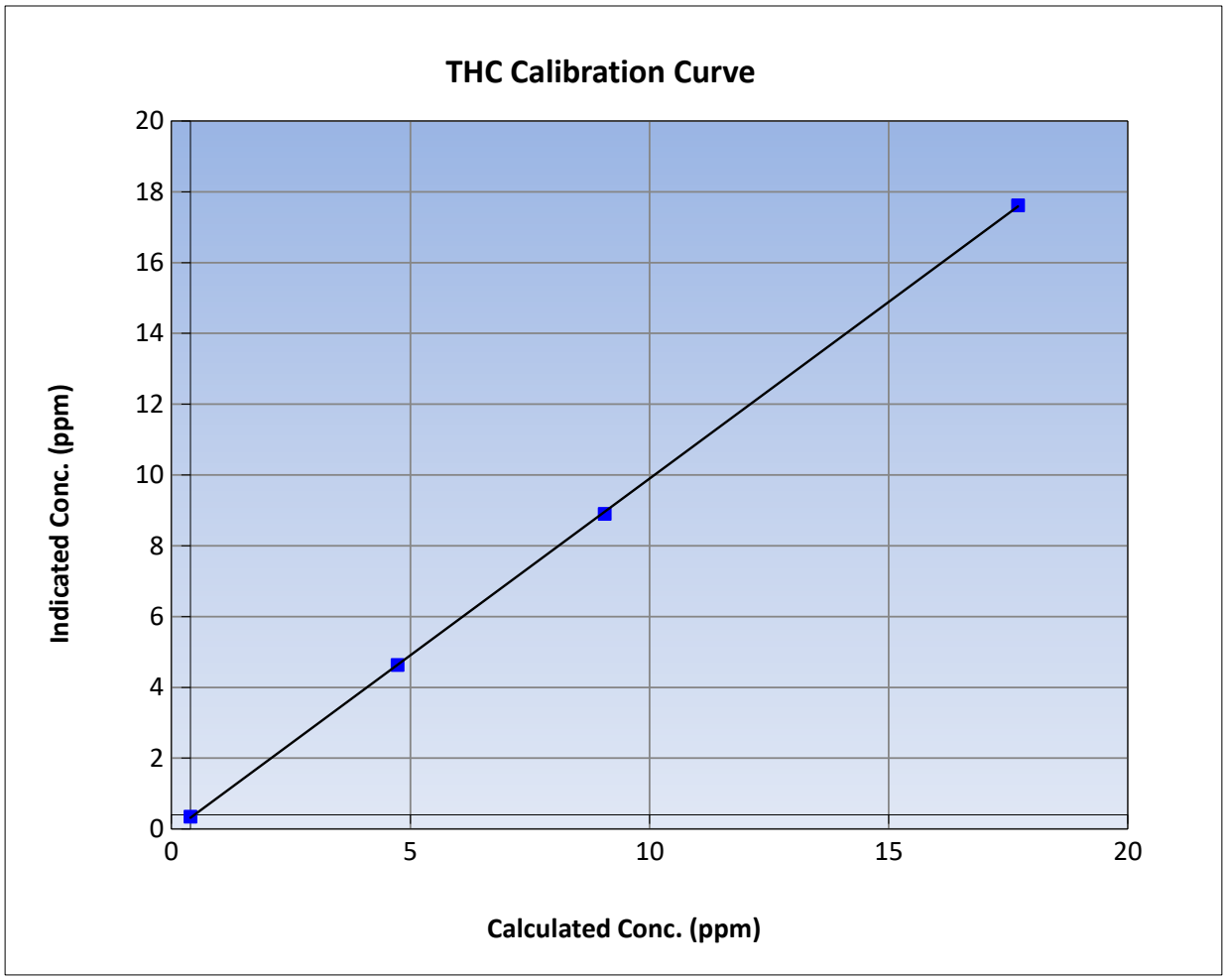
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 14, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Firebag | Station Number: | AMS 19 |
| Start Time (MST): | 11:00 | End Time (MST): | 14:15 |
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1336160089 |

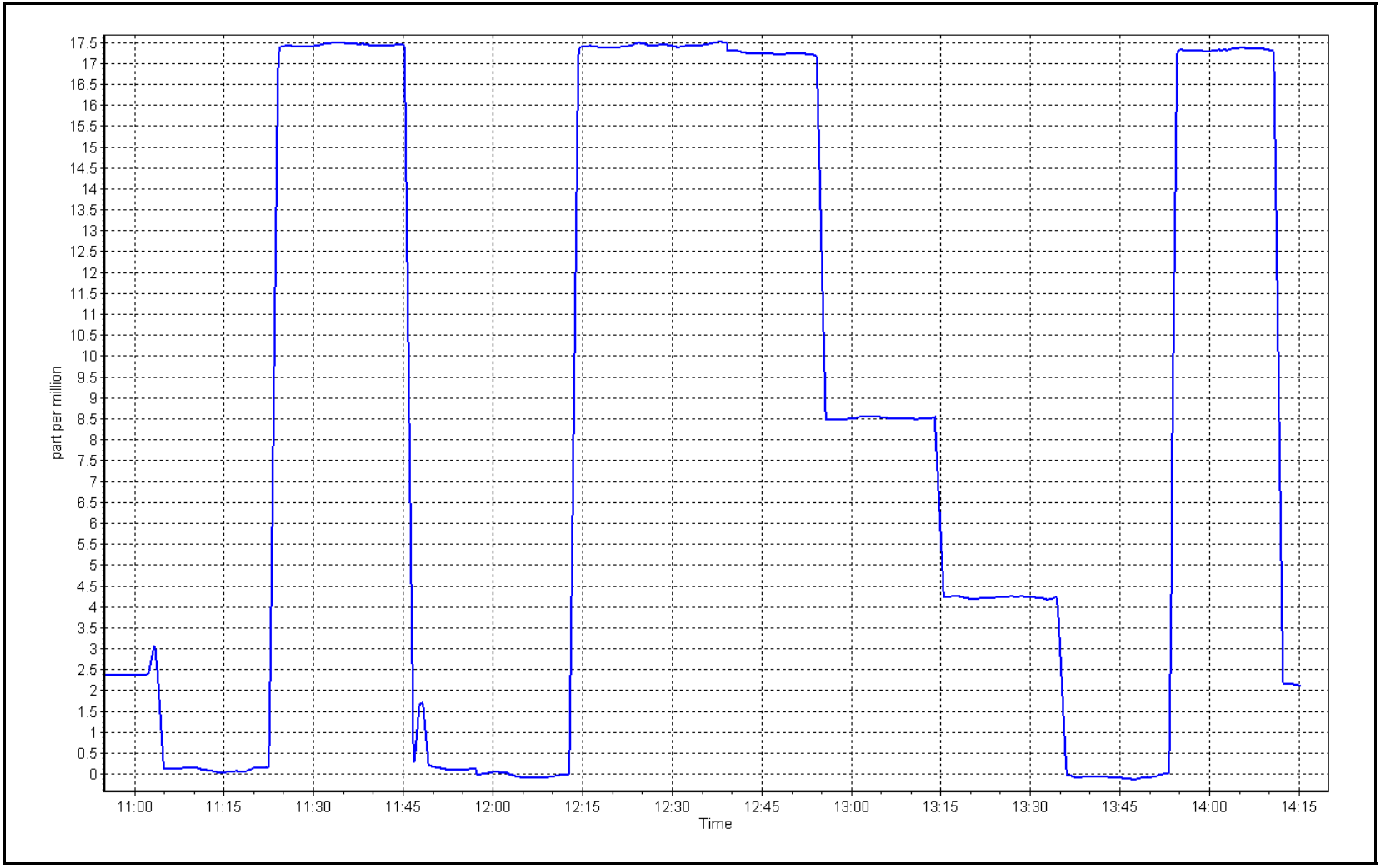
### Calibration Data

| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.00 | -0.05 | ---- |
| 17.31 | 17.22 | 1.0049 |
| 8.66 | 8.50 | 1.0193 |
| 4.33 | 4.24 | 1.0221 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999962 | *≥0.995* |
| Slope | 0.998012 | *0.90 - 1.10* |
| Intercept | -0.083128 | *+/-1.5* |



**THC Calibration Plot** Date: August 14, 2023 Location: Firebag



# Wood Buffalo Environmental Association

## THC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Firebag | Station number: | AMS 19 |
| Calibration Date: | August 28, 2023 | Last Cal Date: | August 14, 2023 |
| Start time (MST): | 9:30 | End time (MST): | 13:08 |
| Reason: | Maintenance | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC716618 | Cal Gas Expiry Date: | February 23, 2025 | |
| CH4 Cal Gas Conc. | 500.7 | ppm | CH4 Equiv Conc. | 1066.9 | ppm |
| C3H8 Cal Gas Conc. | 205.9 | ppm | | | |
| Removed Gas Cert: | | | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 500.7 | ppm | CH4 Equiv Conc. | 1066.9 | ppm |
| Removed C3H8 Conc. | 205.9 | ppm | Diff between cyl: | | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 1607 | |
| ZAG Make/Model: | API T701 | | Serial Number: | 1118 | |

### Analyzer Information

Analyzer make: Thermo 51i-LT
Analyzer serial #: 1336160089
Analyzer Range: 0 - 20 ppm

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.998012 | 1.005644 | Background: | 3.11 | 3.78 |
| Calibration intercept: | -0.083128 | -0.153944 | Coefficient: | 3.765 | 3.779 |

### THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | | | | | |
| as found span | | | | | |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 4999 | 0.0 | 0.00 | -0.07 | ---- |
| high point | 4919 | 81.1 | 17.31 | 17.30 | 1.000 |
| second point | 4959 | 40.6 | 8.66 | 8.49 | 1.021 |
| third point | 4980 | 20.3 | 4.33 | 4.14 | 1.047 |
| as left zero | 5000 | 0.0 | 0.00 | -0.21 | ---- |
| as left span | 4919 | 81.1 | 17.31 | 17.23 | 1.004 |
| | | | | Average Correction Factor | 1.023 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | NA | Previous response | NA | *% change | NA |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Calibrated after instrument crashed and was offline since August 26. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## THC Calibration Summary

Version-01-2020

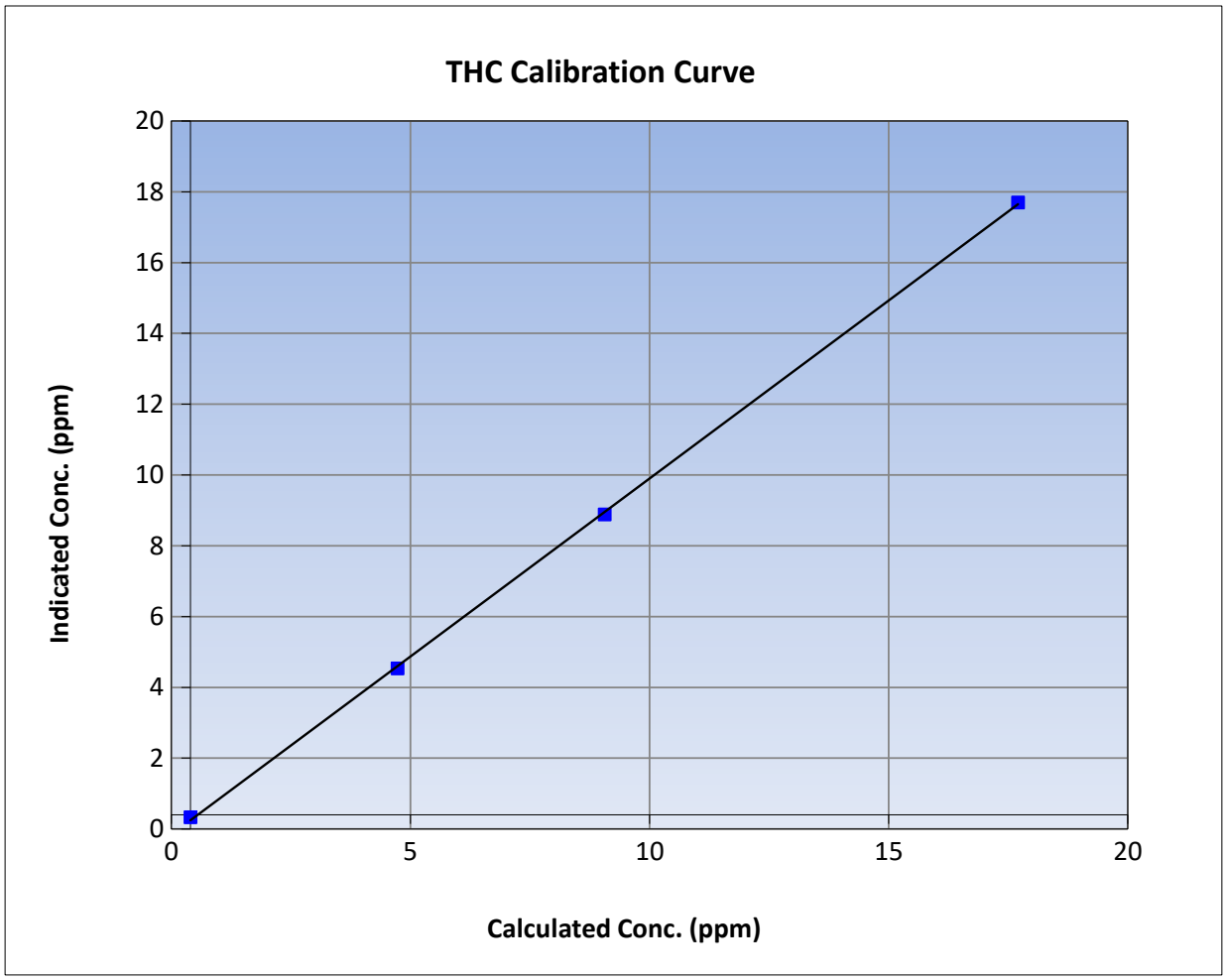
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 28, 2023 | Previous Calibration: | August 14, 2023 |
| Station Name: | Firebag | Station Number: | AMS 19 |
| Start Time (MST): | 9:30 | End Time (MST): | 13:08 |
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1336160089 |

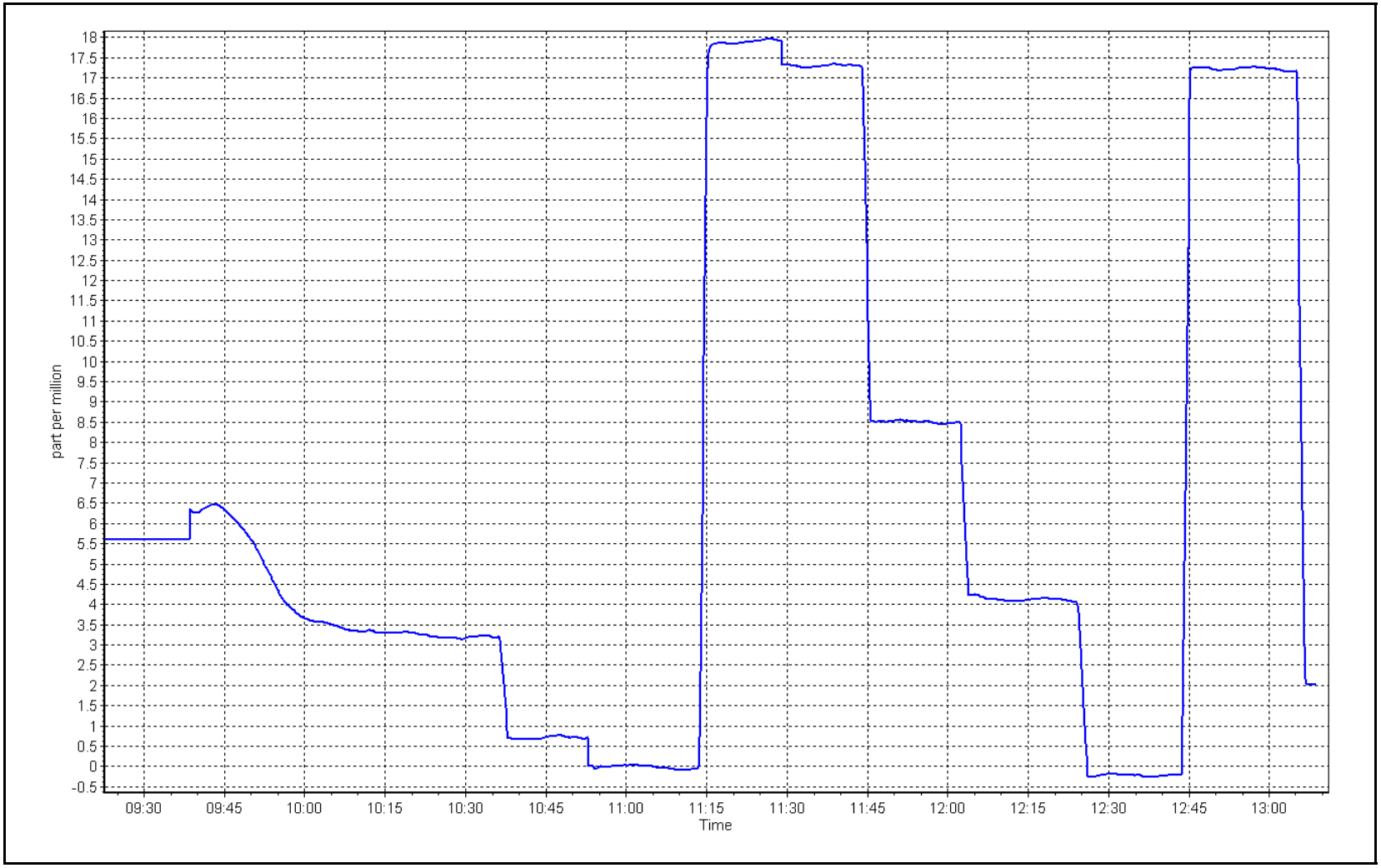
### Calibration Data

| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.00 | -0.07 | ---- |
| 17.31 | 17.30 | 1.0003 |
| 8.66 | 8.49 | 1.0205 |
| 4.33 | 4.14 | 1.0473 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999887 | *≥0.995* |
| Slope | 1.005644 | *0.90 - 1.10* |
| Intercept | -0.153944 | *+/-1.5* |



**THC Calibration Plot** Date: August 28, 2023 Location: Firebag



# Wood Buffalo Environmental Association

## THC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Firebag | Station number: | AMS 19 |
| Calibration Date: | August 29, 2023 | Last Cal Date: | August 28, 2023 |
| Start time (MST): | 10:00 | End time (MST): | 13:10 |
| Reason: | Maintenance | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC716618 | Cal Gas Expiry Date: | February 23, 2025 | |
| CH4 Cal Gas Conc. | 500.7 | ppm | CH4 Equiv Conc. | 1066.9 | ppm |
| C3H8 Cal Gas Conc. | 205.9 | ppm | | | |
| Removed Gas Cert: | | | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 500.7 | ppm | CH4 Equiv Conc. | 1066.9 | ppm |
| Removed C3H8 Conc. | 205.9 | ppm | Diff between cyl: | | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 1607 | |
| ZAG Make/Model: | API T701 | | Serial Number: | 1118 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 51i-LT | | Analyzer serial #: | 1336160089 | |
| Analyzer Range: | 0 - 20 ppm | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.005644 | 0.994308 | Background: | 3.78 | 3.27 |
| Calibration intercept: | -0.153944 | -0.010322 | Coefficient: | 3.779 | 3.762 |

### THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 4999 | 0.0 | 0.00 | -0.48 | ---- |
| as found span | 4919 | 81.1 | 17.31 | 16.82 | 1.029 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 4999 | 0.0 | 0.00 | 0.03 | ---- |
| high point | 4919 | 81.1 | 17.31 | 17.22 | 1.005 |
| second point | 4959 | 40.6 | 8.66 | 8.57 | 1.011 |
| third point | 4980 | 20.3 | 4.33 | 4.27 | 1.014 |
| as left zero | 5000 | 0.0 | 0.00 | -0.01 | ---- |
| as left span | 4919 | 81.1 | 17.31 | 17.30 | 1.000 |
| | | | | Average Correction Factor | 1.010 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 17.30 | Previous response | 17.25 | *% change | 0.3% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Calibrated due to baseline drift. Changed sample inlet filter after as founds. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## THC Calibration Summary

Version-01-2020

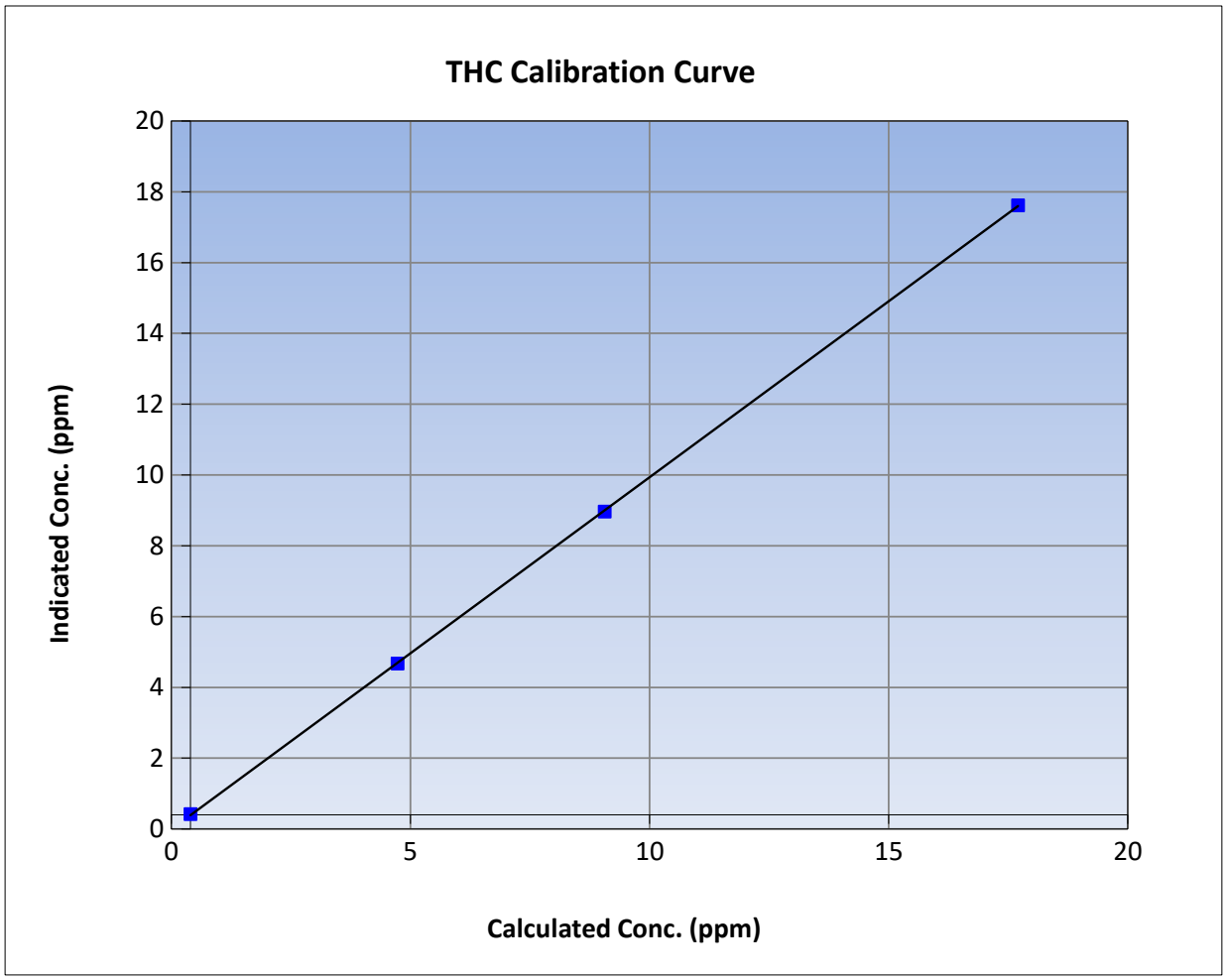
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 29, 2023 | Previous Calibration: | August 28, 2023 |
| Station Name: | Firebag | Station Number: | AMS 19 |
| Start Time (MST): | 10:00 | End Time (MST): | 13:10 |
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1336160089 |

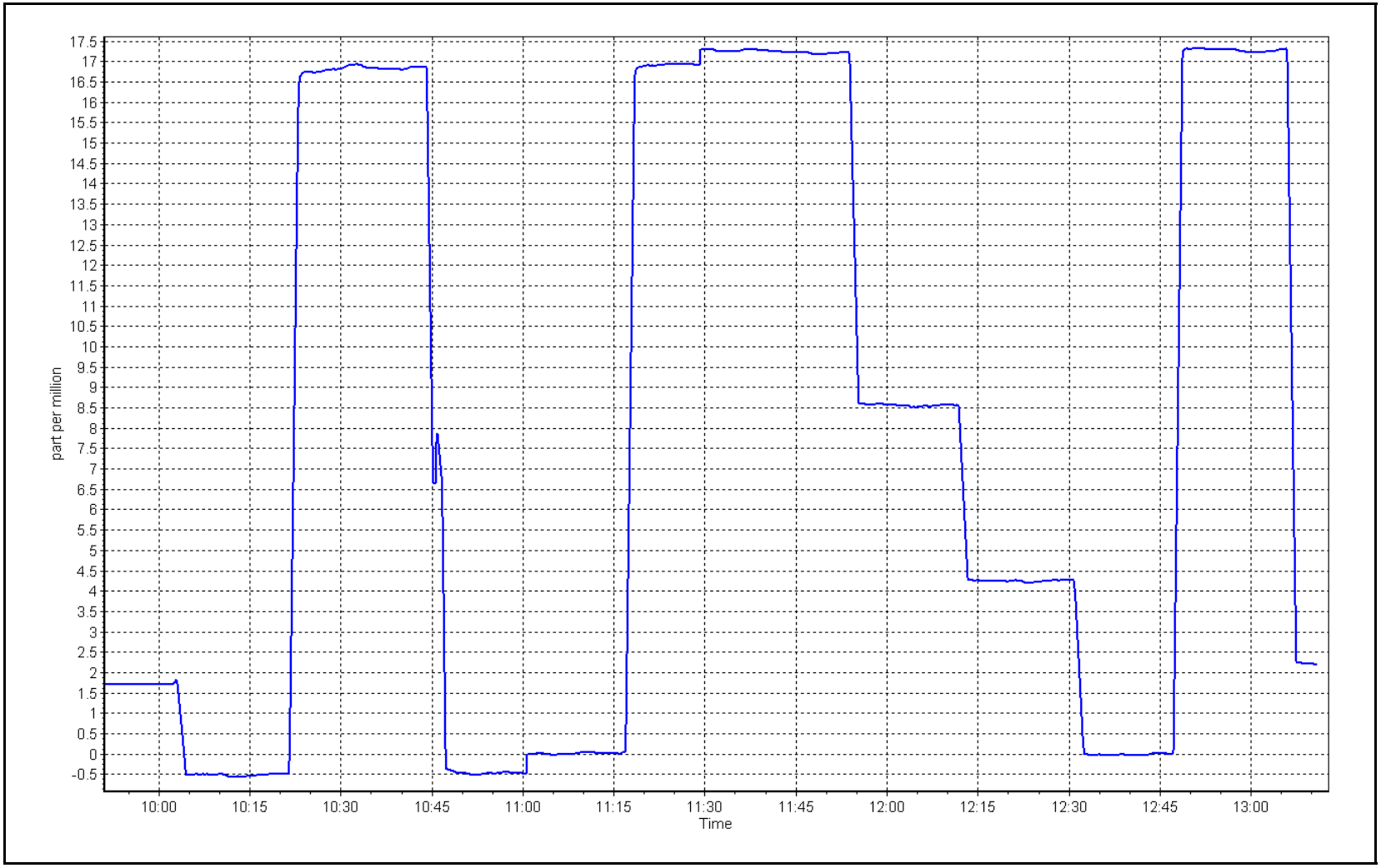
### Calibration Data

| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.00 | 0.03 | ---- |
| 17.31 | 17.22 | 1.0049 |
| 8.66 | 8.57 | 1.0110 |
| 4.33 | 4.27 | 1.0142 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999977 | *≥0.995* |
| Slope | 0.994308 | *0.90 - 1.10* |
| Intercept | -0.010322 | *+/-1.5* |



**THC Calibration Plot** Date: August 29, 2023 Location: Firebag



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Firebag | Station number: | AMS 19 |
| Calibration Date: | August 16, 2023 | Last Cal Date: | July 27, 2023 |
| Start time (MST): | 10:25 | End time (MST): | 14:52 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2Y1K63 | | Cal Gas Expiry Date: | November 30, 2023 | |
| NOX Cal Gas Conc: | 51.12 | ppm | NO Cal Gas Conc: | 49.40 | ppm |
| Removed Cylinder #: | n/a | | Removed Gas Exp Date: | n/a | |
| Removed Gas NOX Conc: | 51.12 | ppm | Removed Gas NO Conc: | 49.40 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 1607 | |
| ZAG make/model: | Teledyne API T701 | | Serial Number: | 1118 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1410661309 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.106 | 1.112 | NO bkgnd or offset: | 7.7 | 7.8 |
| NOX coeff or slope: | 0.993 | 0.993 | NOX bkgnd or offset: | 7.7 | 7.8 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 214.0 | 213.1 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.996456 | 0.998001 |
| $NO_X$ Cal Offset: | 1.235903 | 1.176081 |
| NO Cal Slope: | 0.999440 | 0.999755 |
| NO Cal Offset: | 0.208843 | 0.048770 |
| $NO_2$ Cal Slope: | 0.999338 | 1.004673 |
| $NO_2$ Cal Offset: | 0.066857 | 0.372474 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 4999 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.2 | 0.3 | ---- | ---- |
| as found span | 4919 | 81.0 | 828.1 | 800.3 | 27.9 | 820.0 | 790.6 | 29.2 | 1.0099 | 1.0122 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 4999 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 | 0.2 | ---- | ---- |
| high point | 4919 | 81.0 | 828.1 | 800.3 | 27.9 | 827.0 | 800.0 | 26.6 | 1.0014 | 1.0004 |
| second point | 4960 | 40.5 | 414.0 | 400.1 | 13.9 | 415.3 | 400.3 | 15.0 | 0.9969 | 0.9995 |
| third point | 4980 | 20.2 | 206.5 | 199.6 | 6.9 | 208.1 | 199.6 | 8.5 | 0.9924 | 0.9998 |
| as left zero | 4999 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 | 0.2 | ---- | ---- |
| as left span | 4919 | 81.0 | 828.1 | 365.8 | 462.4 | 837.0 | 366.4 | 470.5 | 0.9894 | 0.9983 |
| | | | | | | | | Average Correction Factor | 0.9969 | 0.9999 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 819.9 ppb | NO = 790.8 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -0.8% |
| Previous Response | $NO_X$ = 826.4 ppb | NO = 800.0 ppb | | *Percent Change | NO = | -1.2% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 800.0 | 365.5 | 462.4 | 465.2 | 0.9939 | 100.6% |
| 2nd GPT point (200 ppb O3) | 800.0 | 583.0 | 244.9 | 245.3 | 0.9982 | 100.2% |
| 3rd GPT point (100 ppb O3) | 800.0 | 696.7 | 131.2 | 133.1 | 0.9855 | 101.5% |
| | | | | Average Correction Factor | 0.9925 | 100.8% |

Notes: Changed sample inlet filter after as founds. Adjusted span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

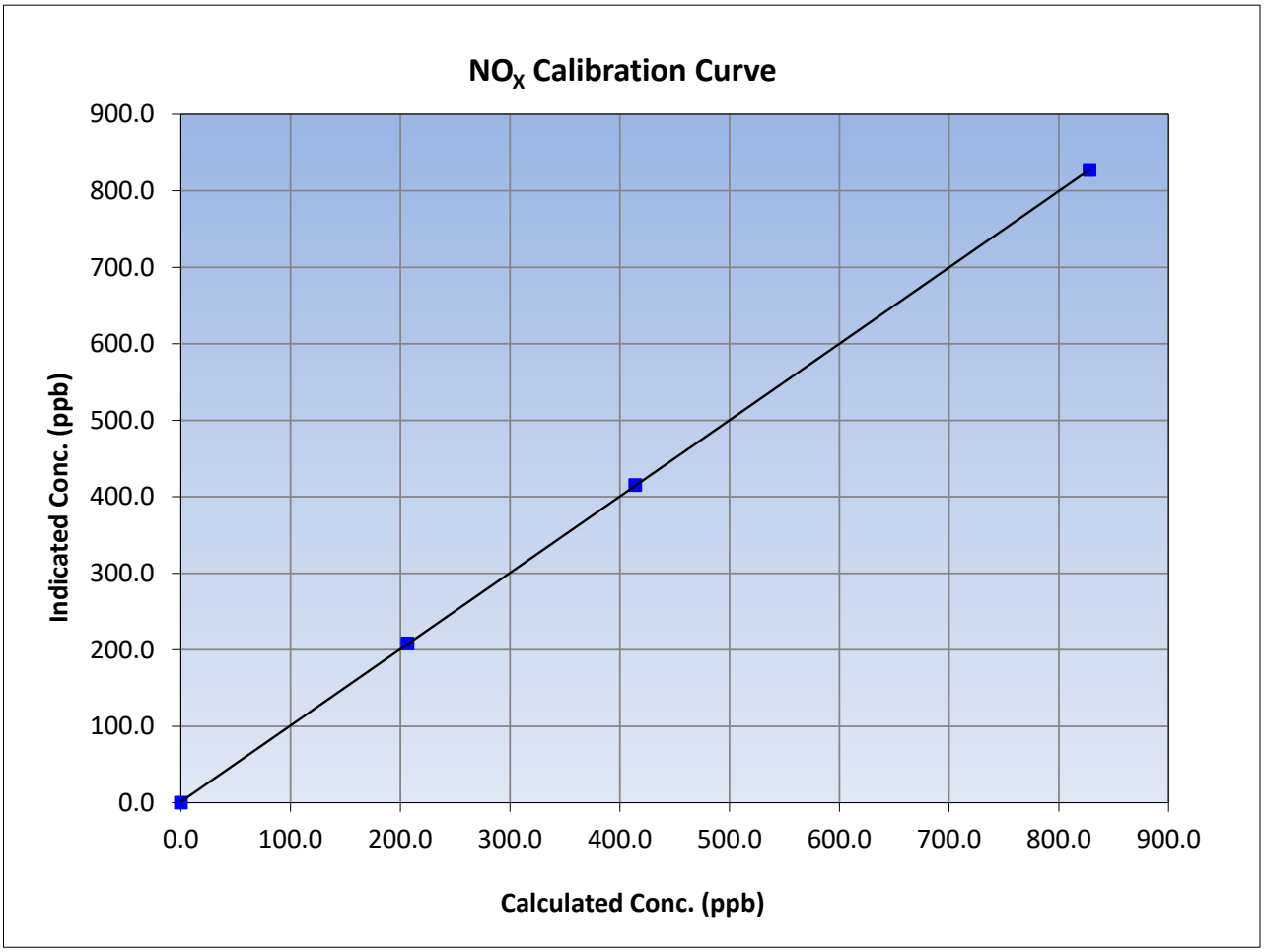
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Firebag | Station Number: | AMS 19 |
| Start Time (MST): | 10:25 | End Time (MST): | 14:52 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1410661309 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999992 | ≥0.995 |
| 828.1 | 827.0 | 1.0014 | | | |
| 414.0 | 415.3 | 0.9969 | Slope | 0.998001 | 0.90 - 1.10 |
| 206.5 | 208.1 | 0.9924 | | | |
| | | | Intercept | 1.176081 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

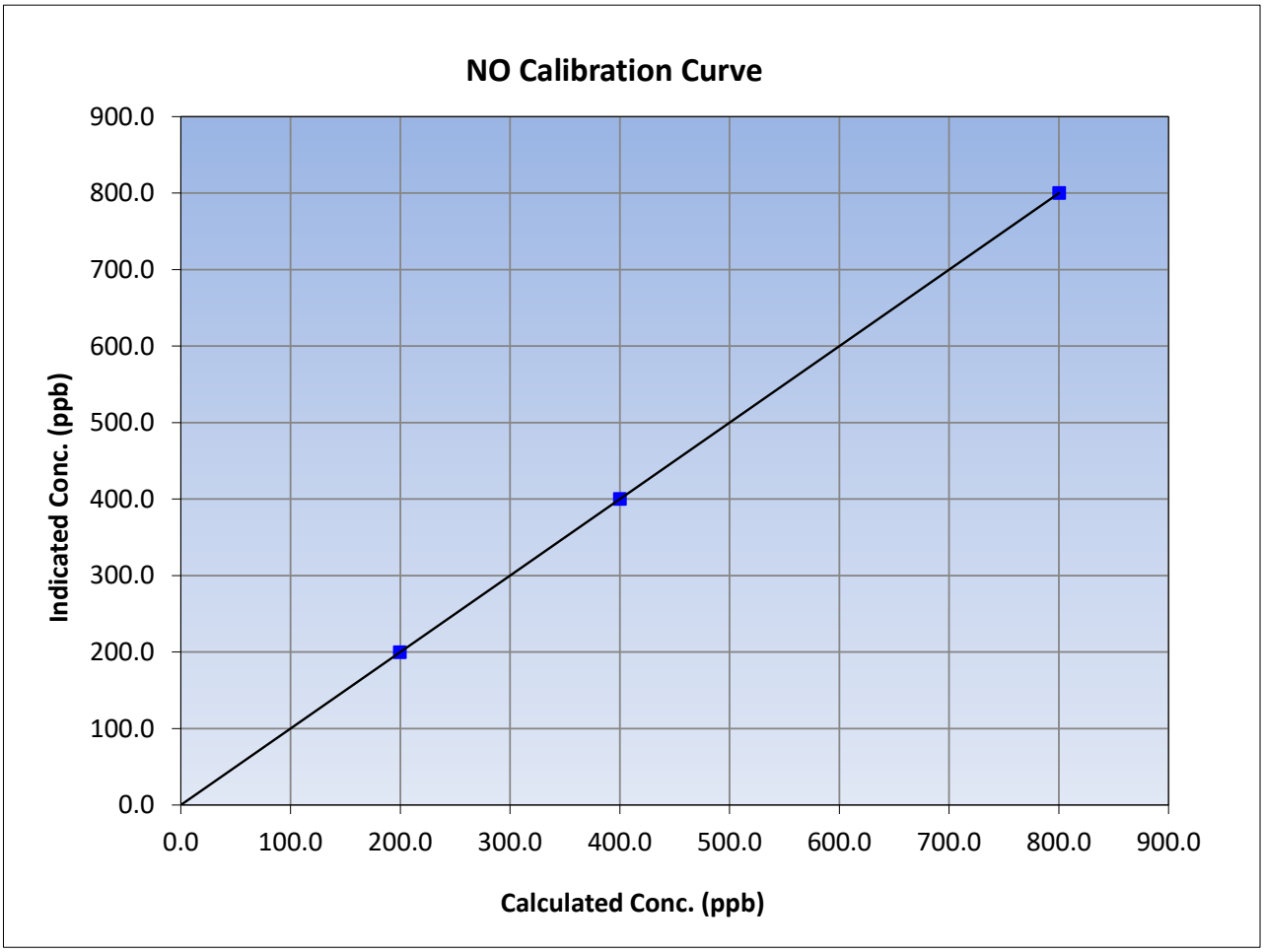
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Firebag | Station Number: | AMS 19 |
| Start Time (MST): | 10:25 | End Time (MST): | 14:52 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1410661309 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 1.000000 | *≥0.995* |
| 800.3 | 800.0 | 1.0004 | | | |
| 400.1 | 400.3 | 0.9995 | Slope | 0.999755 | *0.90 - 1.10* |
| 199.6 | 199.6 | 0.9998 | | | |
| | | | Intercept | 0.048770 | *+/-20* |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

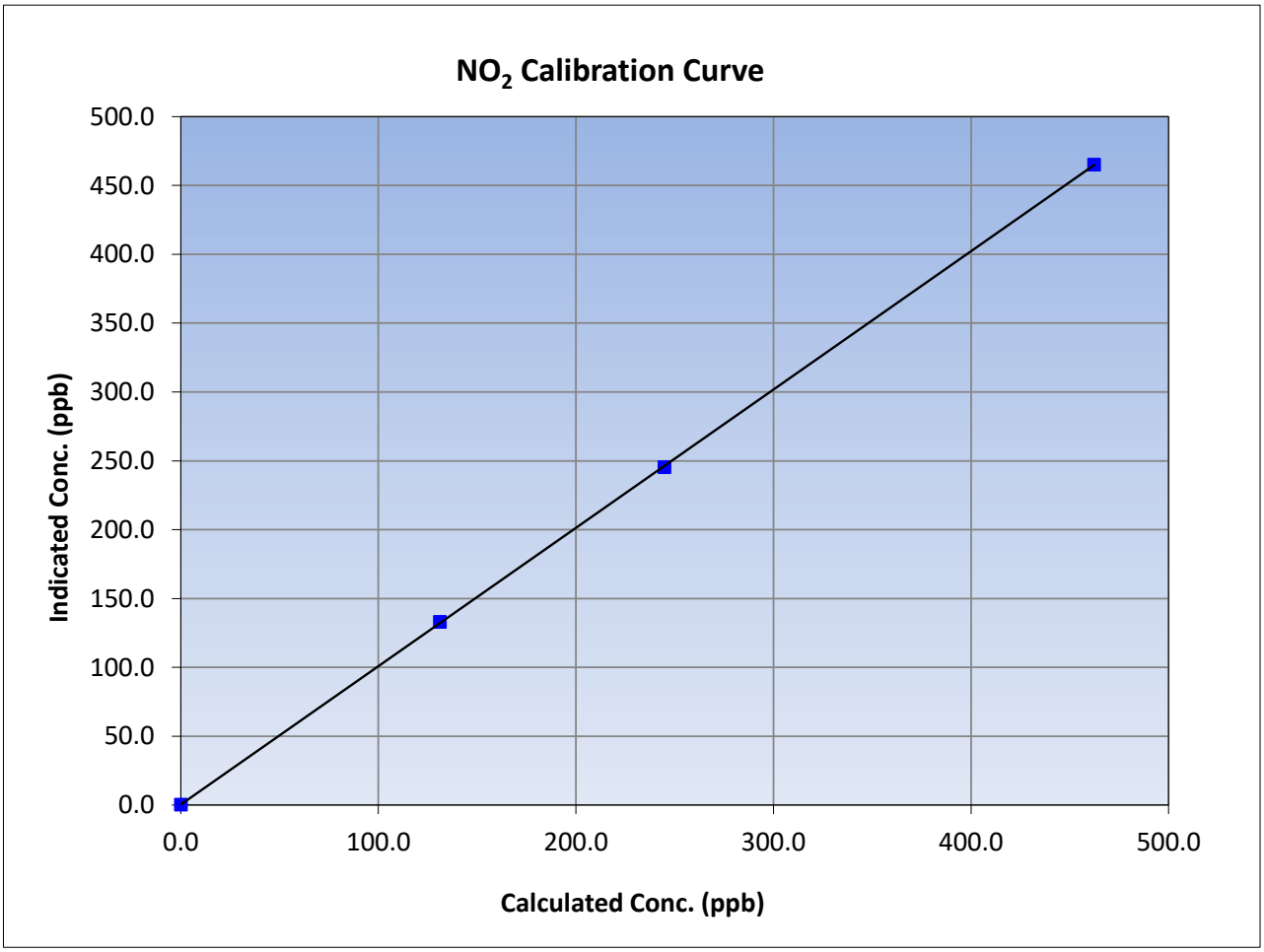
Version-04-2020

### Station Information

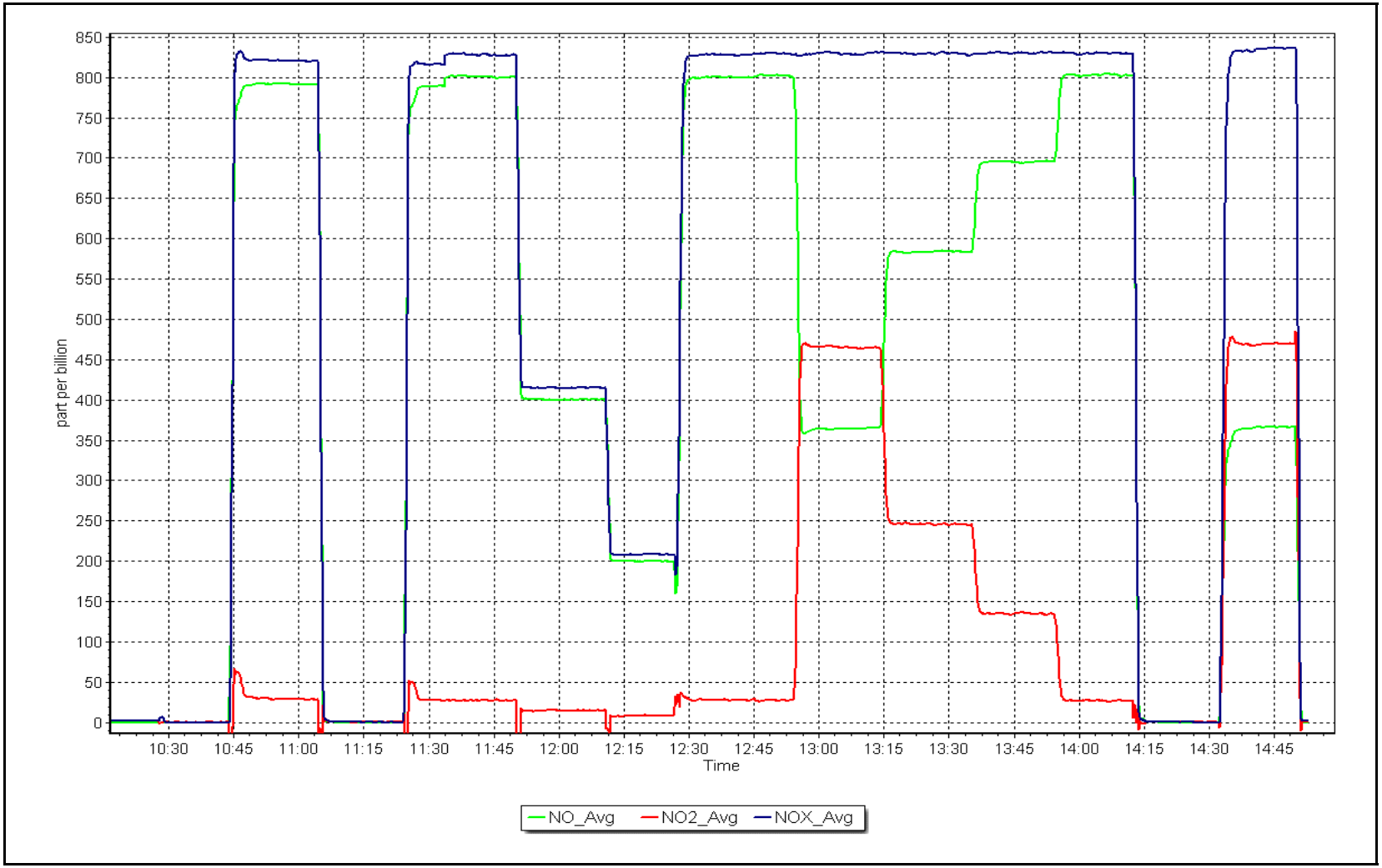
| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Firebag | Station Number: | AMS 19 |
| Start Time (MST): | 10:25 | End Time (MST): | 14:52 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1410661309 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999981 | ≥0.995 |
| 462.4 | 465.2 | 0.9939 | | | |
| 244.9 | 245.3 | 0.9982 | Slope | 1.004673 | 0.90 - 1.10 |
| 131.2 | 133.1 | 0.9855 | | | |
| | | | Intercept | 0.372474 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 16, 2023 Location: Firebag



# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS20
## MACKAY RIVER
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | MacKay River | Station number: | AMS20 |
| Calibration Date: | August 8, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 8:34 | End time (MST): | 11:14 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| Cal Gas Concentration: | 49.22 ppm | Cal Gas Exp Date: | February 23, 2025 |
| Cal Gas Cylinder #: | CC306868 | | |
| Removed Cal Gas Conc: | 49.22 ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | Serial Number: | 1220 |
| ZAG Make/Model: | Teledyne API 701 | Serial Number: | 4522 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1501301450

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.996723 | 0.997865 | Backgd or Offset: | 18.2 | 18.2 |
| Calibration intercept: | 2.331293 | 2.431247 | Coeff or Slope: | 0.945 | 0.945 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as found span | 4919 | 81.3 | 800.3 | 800.1 | 1.000 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 4919 | 81.3 | 800.3 | 800.4 | 1.000 |
| second point | 4959 | 40.7 | 400.7 | 402.0 | 0.997 |
| third point | 4980 | 20.3 | 199.8 | 204.7 | 0.976 |
| as left zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as left span | 4919 | 81.3 | 800.3 | 801.5 | 0.998 |
| | | | | Average Correction Factor | 0.991 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 799.80 | Previous response | 799.98 | *% change | 0.0% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

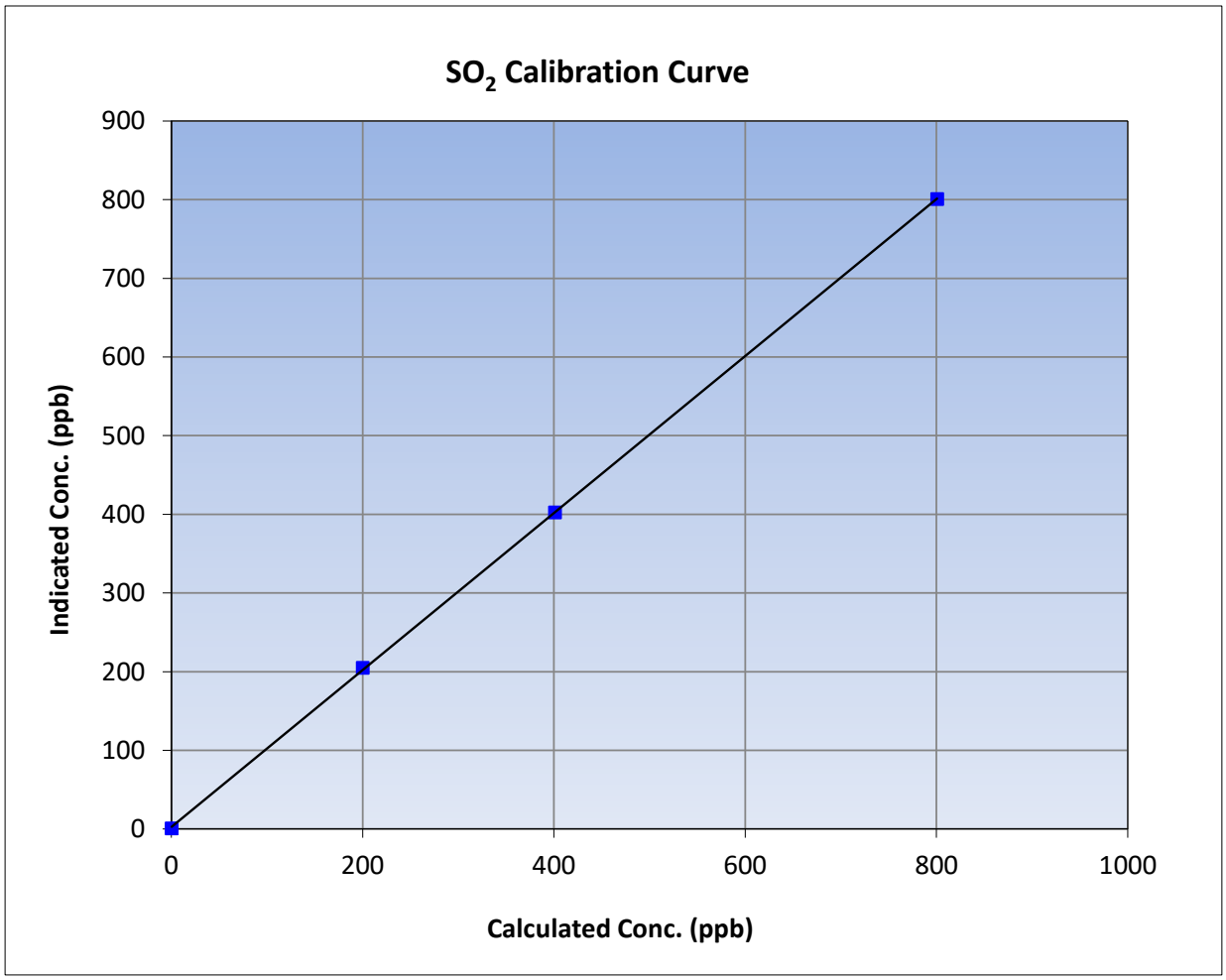
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | MacKay River | Station Number: | AMS20 |
| Start Time (MST): | 8:34 | End Time (MST): | 11:14 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1501301450 |

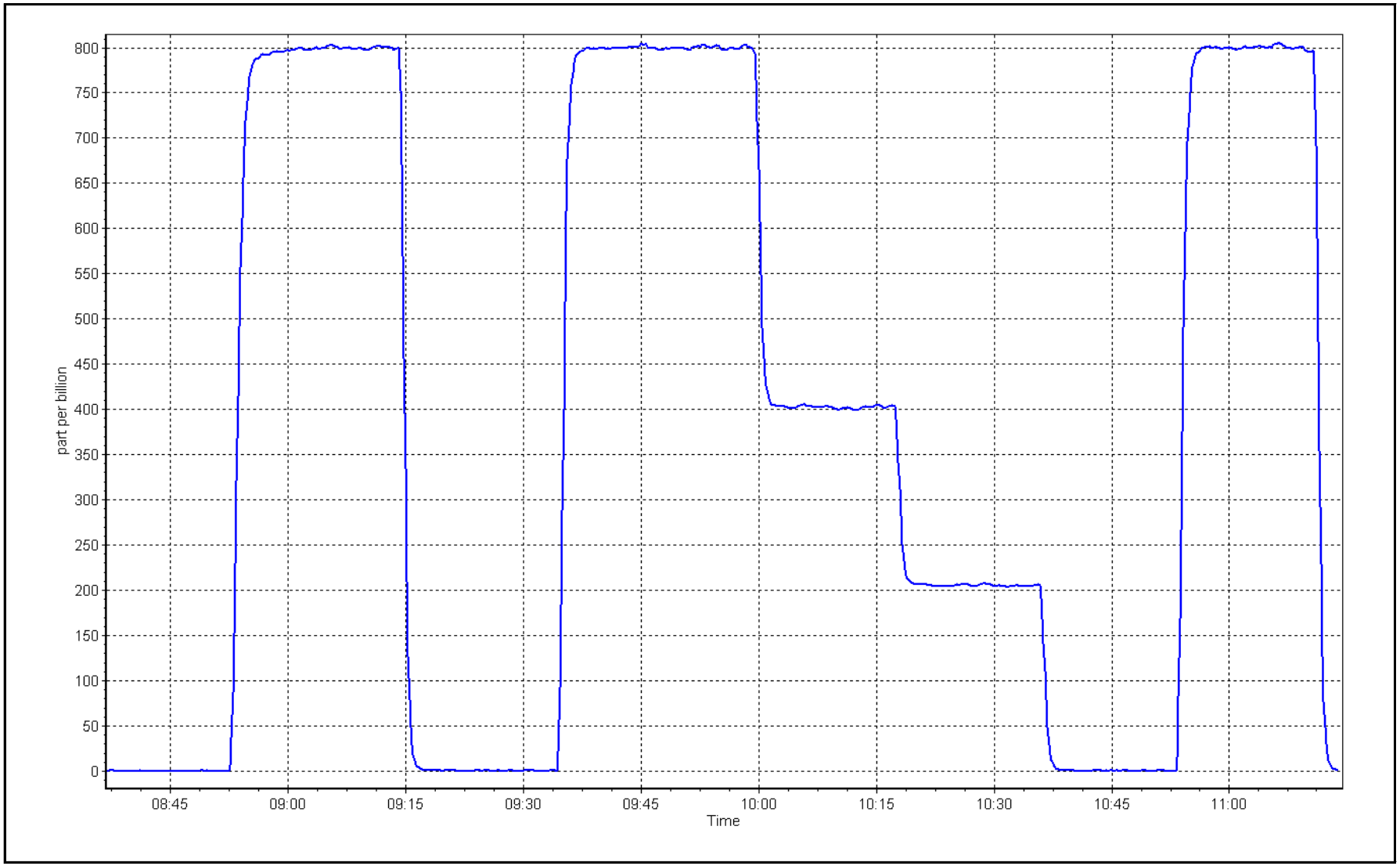
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.4 | ---- |
| 800.3 | 800.4 | 0.9998 |
| 400.7 | 402.0 | 0.9967 |
| 199.8 | 204.7 | 0.9762 |
| | | |

| Statistical Evaluation | | Limits |
|---|---|---|
| Correlation Coefficient | 0.999963 | ≥0.995 |
| Slope | 0.997865 | 0.90 - 1.10 |
| Intercept | 2.431247 | +/-30 |



**SO2 Calibration Plot** Date: August 8, 2023 Location: MacKay River



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | MacKay River | Station number: | AMS20 |
| Calibration Date: | August 4, 2023 | Last Cal Date: | July 5, 2023 |
| Start time (MST): | 6:20 | End time (MST): | 10:23 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.12 | ppm | Cal Gas Exp Date: | January 3, 2026 |
| Cal Gas Cylinder #: | CC515997 | | | |
| Removed Cal Gas Conc: | 5.12 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 1220 |
| ZAG Make/Model: | Teledyne API 701 | | Serial Number: | 4522 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43iQ TLE | | Analyzer serial #: | 12124313139 | |
| Converter make: | Global | | Converter serial #: | 2022-226 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.996518 | 0.994521 | Backgd or Offset: | 1.0 | 0.97 |
| Calibration intercept: | 0.267198 | 0.287104 | Coeff or Slope: | 0.571 | 0.535 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4922 | 78.1 | 80.0 | 86.0 | 0.930 |
| as found 2nd point | 4961 | 39.0 | 39.9 | 43.1 | 0.927 |
| as found 3rd point | 4980 | 19.5 | 20.0 | 21.6 | 0.925 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4922 | 78.1 | 80.0 | 79.8 | 1.003 |
| second point | 4961 | 39.0 | 40.0 | 40.1 | 0.997 |
| third point | 4980 | 19.5 | 20.0 | 20.4 | 0.981 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 4922 | 78.1 | 80.0 | 79.6 | 1.005 |
| SO2 Scrubber Check | 4919 | 80.0 | 800.2 | 0.0 | ---- |
| Date of last scrubber change: | | May 25, 2023 | | Ave Corr Factor | 0.994 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 86.0 | Prev response: | 79.96 | *% change: | 7.0% |
| Baseline Corr 2nd AF pt: | 43.1 | AF Slope: | 1.075049 | AF Intercept: | 0.080869 |
| Baseline Corr 3rd AF pt: | 21.6 | AF Correlation: | 0.999995 | | |

* = > +/-5% change initiates investigation

Notes: Diagonstics similar to last month. Sox Scrubber check completed after calibrator zero. Span Adjusted.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

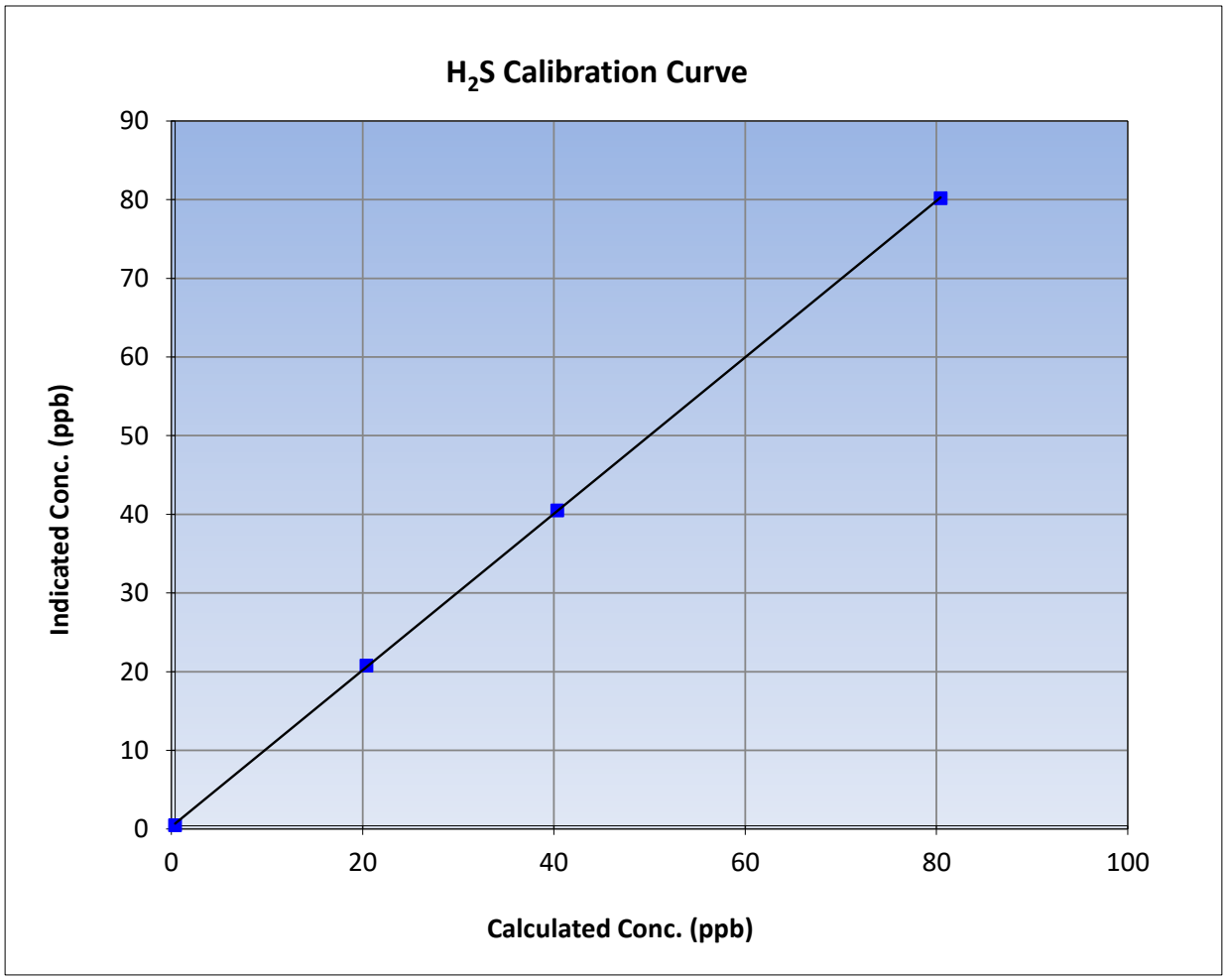
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 4, 2023 | Previous Calibration: | July 5, 2023 |
| Station Name: | MacKay River | Station Number: | AMS20 |
| Start Time (MST): | 6:20 | End Time (MST): | 10:23 |
| Analyzer make: | Thermo 43iQ TLE | Analyzer serial #: | 12124313139 |

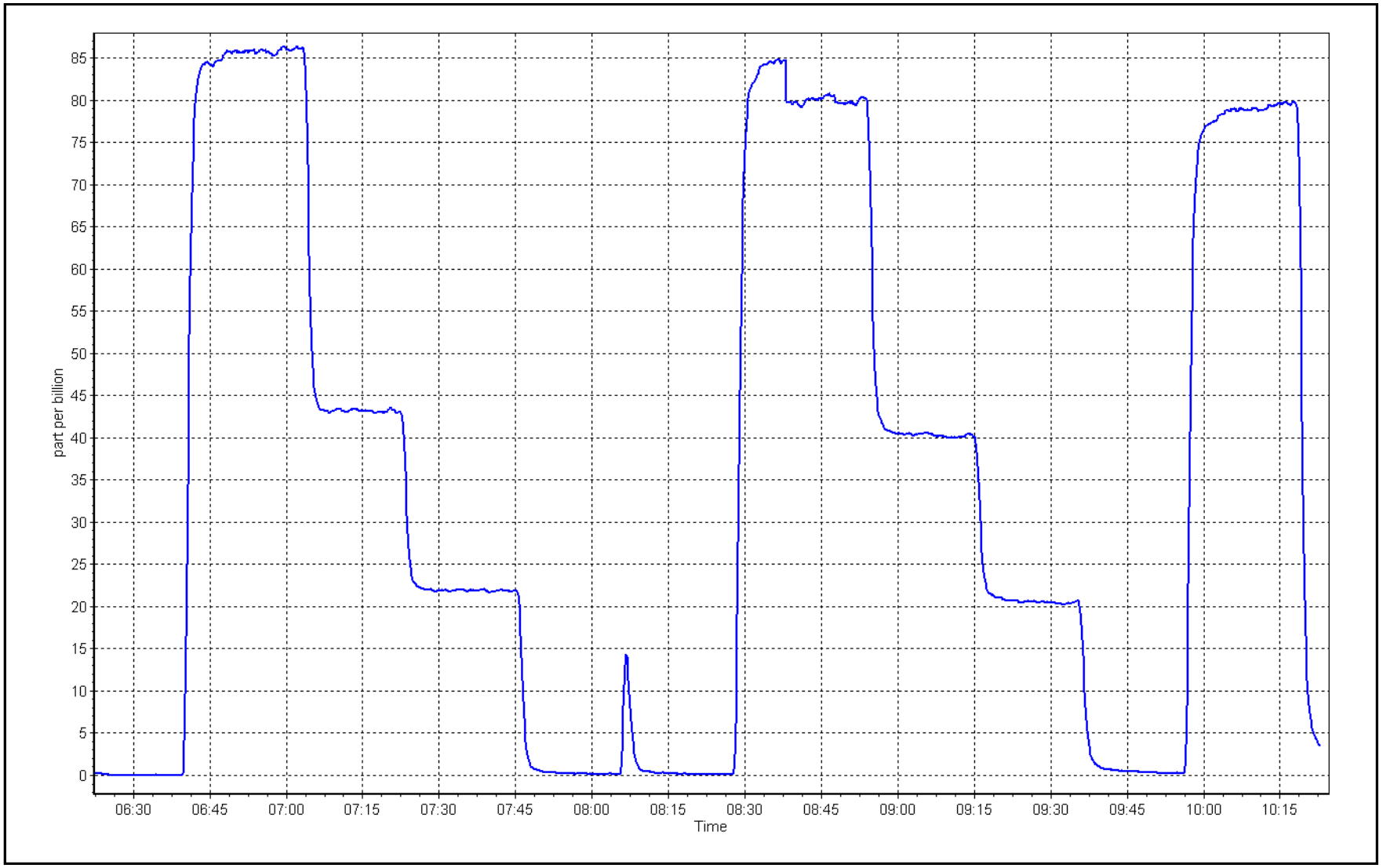
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 80.0 | 79.8 | 1.0029 |
| 40.0 | 40.1 | 0.9967 |
| 20.0 | 20.4 | 0.9812 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999974 | *≥0.995* |
| Slope | 0.994521 | *0.90 - 1.10* |
| Intercept | 0.287104 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 4, 2023 Location: MacKay River



# Wood Buffalo Environmental Association

## THC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | MacKay River | Station number: | AMS20 |
| Calibration Date: | August 8, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 8:34 | End time (MST): | 11:13 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | CC306868 | | Cal Gas Expiry Date: | February 23, 2025 | |
| CH4 Cal Gas Conc. | 499.40 | ppm | CH4 Equiv Conc. | 1066.45 | ppm |
| C3H8 Cal Gas Conc. | 206.20 | ppm | | | |
| Removed Gas Cert: | NA | | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 499.40 | ppm | CH4 Equiv Conc. | 1066.45 | ppm |
| Removed C3H8 Conc. | 206.20 | ppm | Diff between cyl: | | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 1220 | |
| ZAG Make/Model: | Teledyne API 701 | | Serial Number: | 4522 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 51i-LT | | Analyzer serial #: | 1501663727 | |
| Analyzer Range: | 0 - 20 ppm | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.989494 | 0.992565 | Background: | 3.040 | 3.090 |
| Calibration intercept: | 0.030619 | 0.123818 | Coefficient: | 5.384 | 5.465 |

### THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.09 | ---- |
| as found span | 4919 | 81.3 | 17.34 | 16.94 | 1.024 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.07 | ---- |
| high point | 4919 | 81.3 | 17.34 | 17.32 | 1.001 |
| second point | 4959 | 40.7 | 8.68 | 8.73 | 0.994 |
| third point | 4980 | 20.3 | 4.33 | 4.50 | 0.962 |
| as left zero | 5000 | 0.0 | 0.00 | 0.07 | ---- |
| as left span | 4919 | 81.3 | 17.34 | 17.18 | 1.009 |
| | | | | Average Correction Factor | 0.986 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 16.85 | Previous response | 17.19 | *% change | -2.0% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## THC Calibration Summary

Version-01-2020

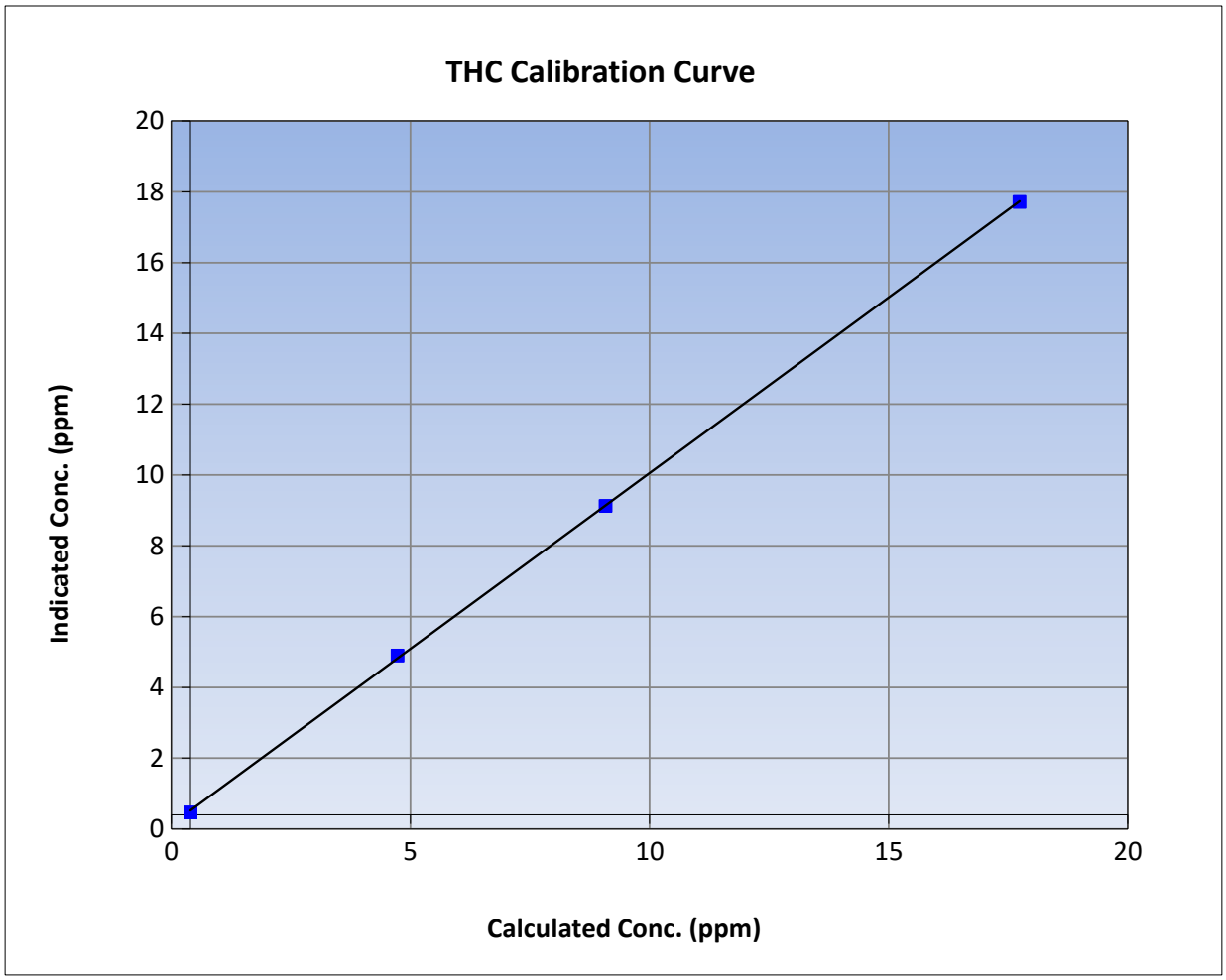
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | MacKay River | Station Number: | AMS20 |
| Start Time (MST): | 8:34 | End Time (MST): | 11:13 |
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1501663727 |

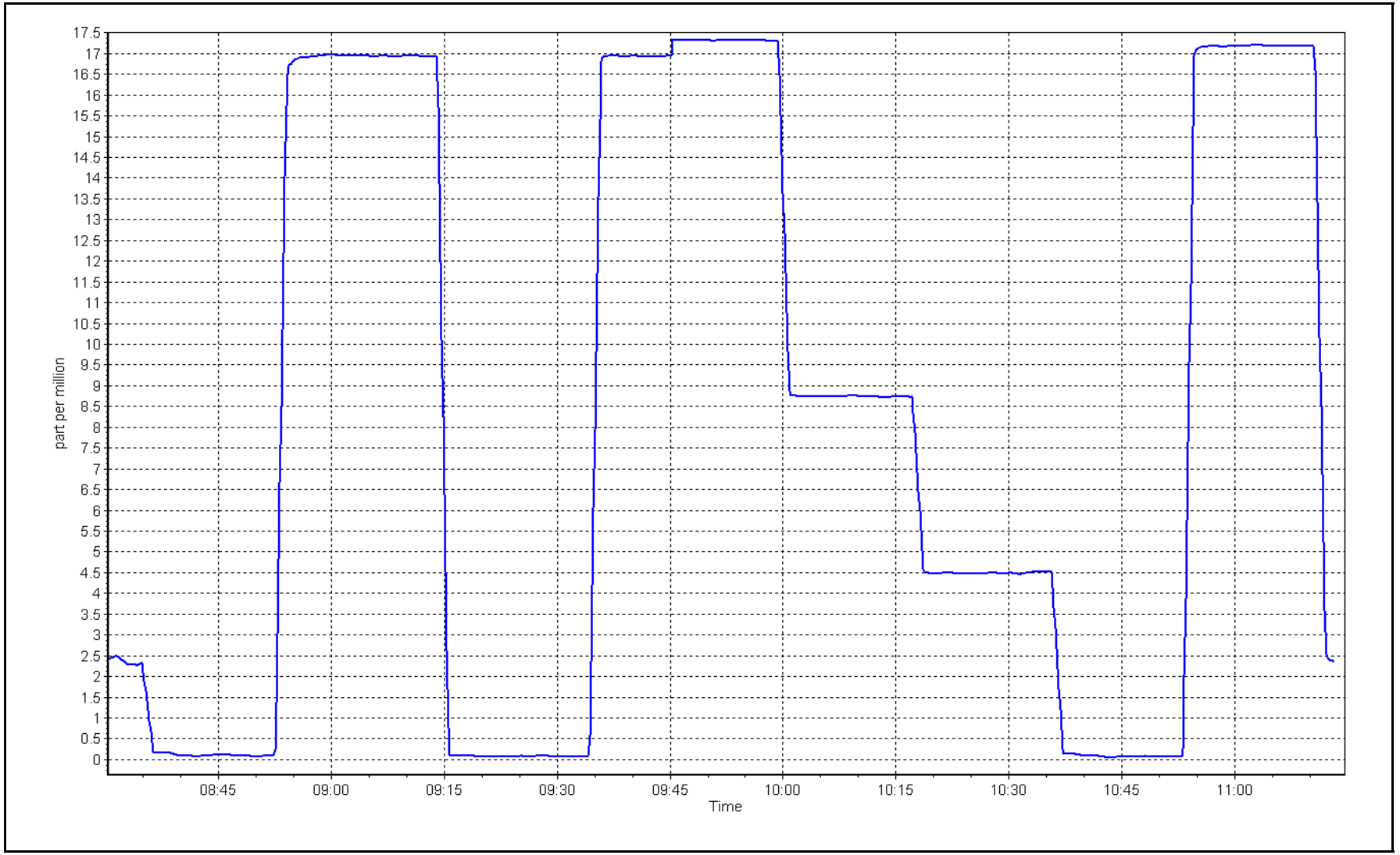
### Calibration Data

| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.00 | 0.07 | ---- |
| 17.34 | 17.32 | 1.0011 |
| 8.68 | 8.73 | 0.9944 |
| 4.33 | 4.50 | 0.9621 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999942 | *≥0.995* |
| Slope | 0.992565 | *0.90 - 1.10* |
| Intercept | 0.123818 | *+/-1.5* |



**THC Calibration Plot** Date: August 8, 2023 Location: MacKay River



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | MacKay River | Station number: | AMS20 |
| Calibration Date: | August 3, 2023 | Last Cal Date: | July 4, 2023 |
| Start time (MST): | 7:12 | End time (MST): | 11:22 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T376265 | | Cal Gas Expiry Date: | April 13, 2025 | |
| NOX Cal Gas Conc: | 49.19 | ppm | NO Cal Gas Conc: | 48.04 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 49.19 | ppm | Removed Gas NO Conc: | 48.04 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 1220 | |
| ZAG make/model: | Teledyne API 701 | | Serial Number: | 4522 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1505164379 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 1.503 | 1.503 | NO bkgnd or offset: | 4.2 | 4.2 |
| NOX coeff or slope: | 0.992 | 0.992 | NOX bkgnd or offset: | 4.2 | 4.2 |
| NO2 coeff or slope: | 0.995 | 0.995 | Reaction cell Press: | 182.5 | 182.5 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.990458 | 0.986386 |
| $NO_X$ Cal Offset: | 2.589991 | 3.150520 |
| NO Cal Slope: | 0.991438 | 0.988909 |
| NO Cal Offset: | 1.451137 | 1.711850 |
| $NO_2$ Cal Slope: | 0.998430 | 1.003108 |
| $NO_2$ Cal Offset: | -0.419338 | 1.350779 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 | 0.1 | ---- | ---- |
| as found span | 4917 | 83.3 | 819.5 | 800.3 | 19.2 | 813.8 | 794.0 | 19.9 | 1.0070 | 1.0079 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.2 | ---- | ---- |
| high point | 4917 | 83.3 | 819.5 | 800.3 | 19.2 | 810.4 | 792.8 | 17.7 | 1.0112 | 1.0095 |
| second point | 4956 | 41.7 | 410.4 | 400.8 | 9.6 | 408.2 | 397.5 | 10.7 | 1.0055 | 1.0084 |
| third point | 4979 | 20.8 | 204.6 | 199.9 | 4.8 | 208.8 | 201.9 | 6.8 | 0.9801 | 0.9899 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | 0.2 | ---- | ---- |
| as left span | 4917 | 83.3 | 819.5 | 447.1 | 372.4 | 814.7 | 438.1 | 376.6 | 1.0058 | 1.0205 |
| | | | | | | | | Average Correction Factor | 0.9989 | 1.0026 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 813.7 ppb | NO = 794.1 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = -0.1% |
| Previous Response | $NO_X$ = 814.2 ppb | NO = 794.9 ppb | | *Percent Change | NO = -0.1% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 788.3 | 435.1 | 372.4 | 374.5 | 0.9943 | 100.6% |
| 2nd GPT point (200 ppb O3) | 788.3 | 606.4 | 201.1 | 202.7 | 0.9919 | 100.8% |
| 3rd GPT point (100 ppb O3) | 788.3 | 697.6 | 109.9 | 113.4 | 0.9688 | 103.2% |
| | | | | Average Correction Factor | 0.9850 | 101.5% |

Notes: No adjustments and maintenance done.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

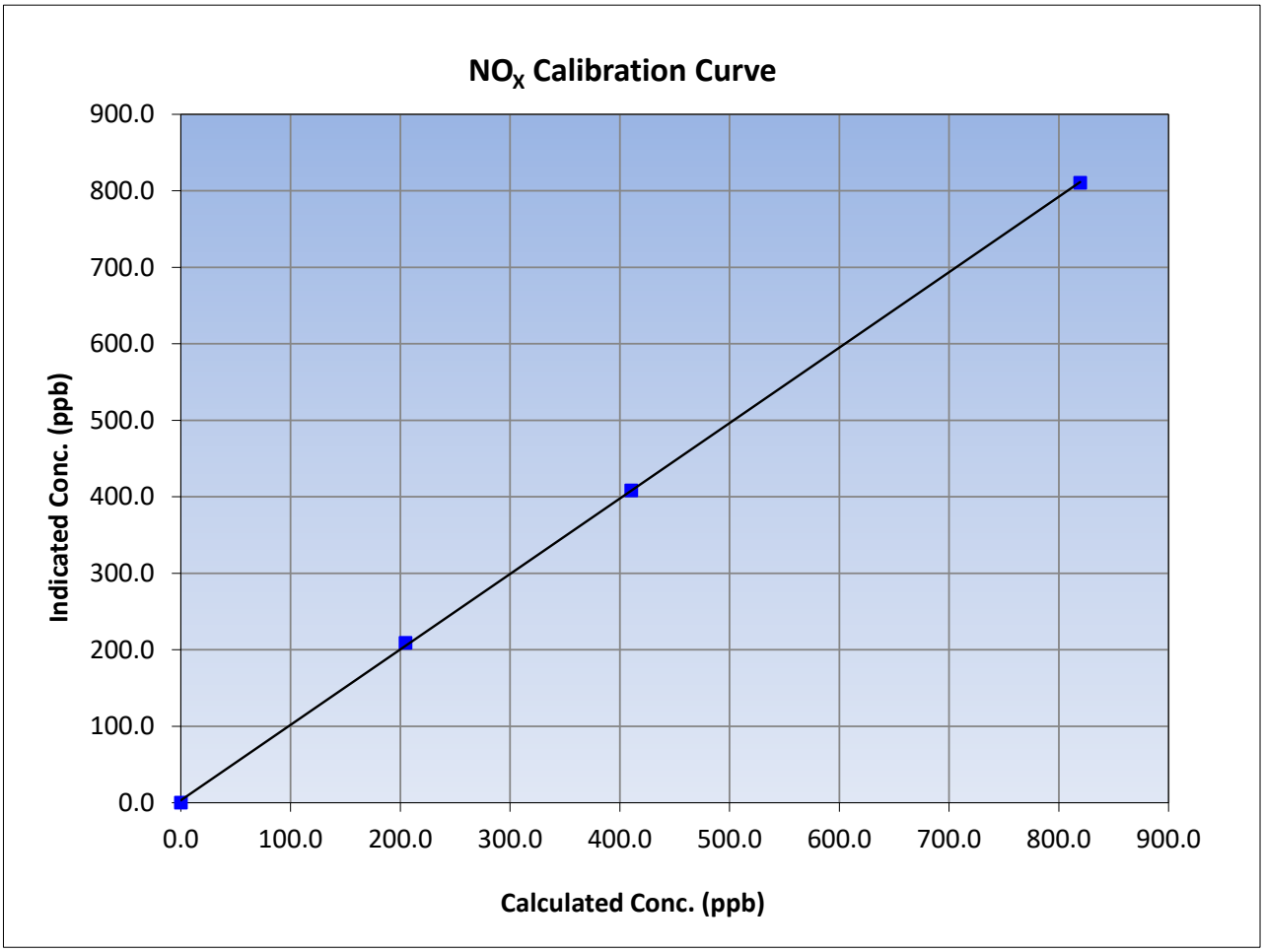
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | MacKay River | Station Number: | AMS20 |
| Start Time (MST): | 7:12 | End Time (MST): | 11:22 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1505164379 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999932 | *≥0.995* |
| 819.5 | 810.4 | 1.0112 | | | |
| 410.4 | 408.2 | 1.0055 | Slope | 0.986386 | *0.90 - 1.10* |
| 204.6 | 208.8 | 0.9801 | | | |
| | | | Intercept | 3.150520 | *+/-20* |



# Wood Buffalo Environmental Association

## NO Calibration Summary

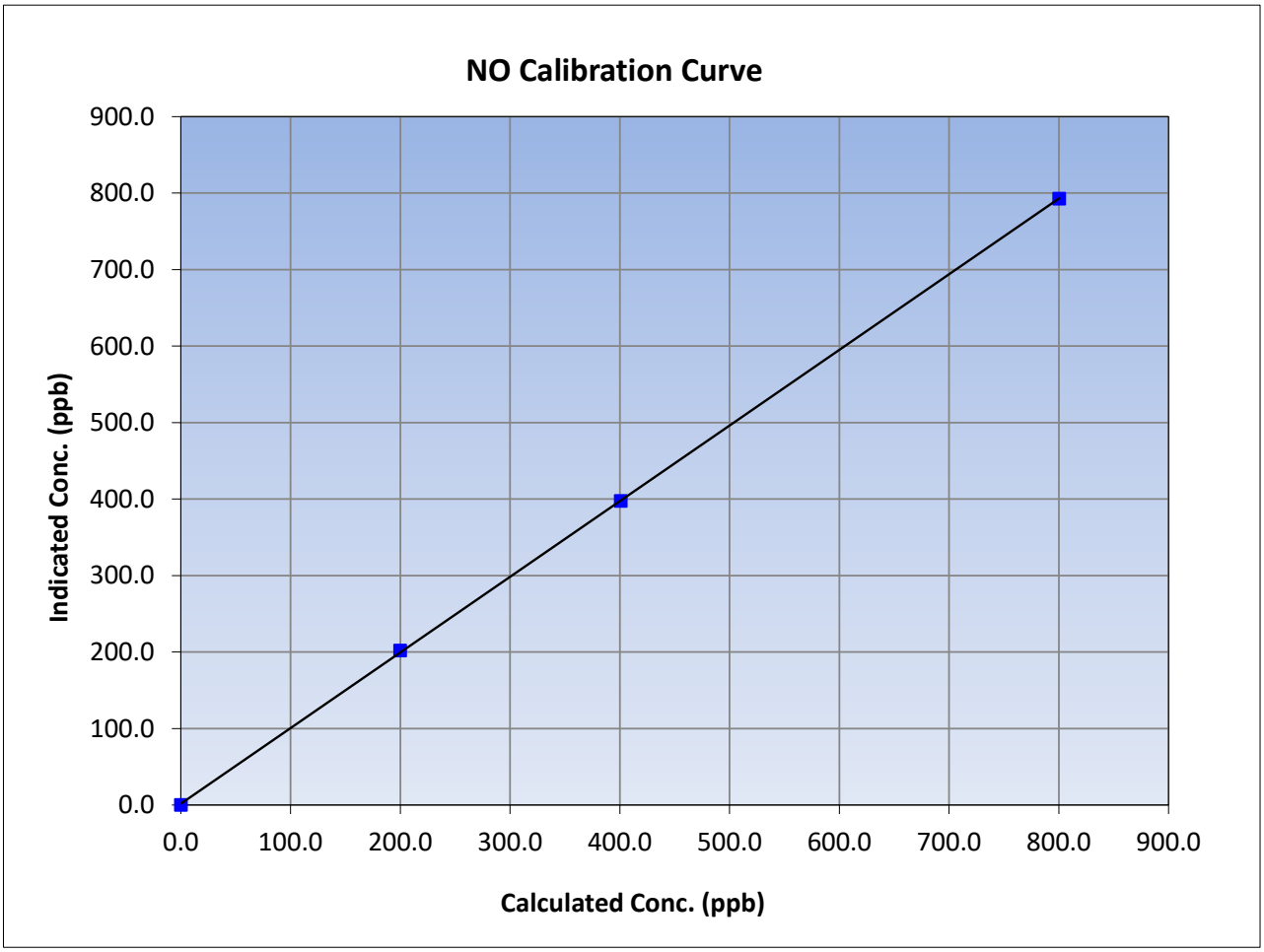
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | MacKay River | Station Number: | AMS20 |
| Start Time (MST): | 7:12 | End Time (MST): | 11:22 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1505164379 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999972 | ≥0.995 |
| 800.3 | 792.8 | 1.0095 | | | |
| 400.8 | 397.5 | 1.0084 | Slope | 0.988909 | 0.90 - 1.10 |
| 199.9 | 201.9 | 0.9899 | | | |
| | | | Intercept | 1.711850 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

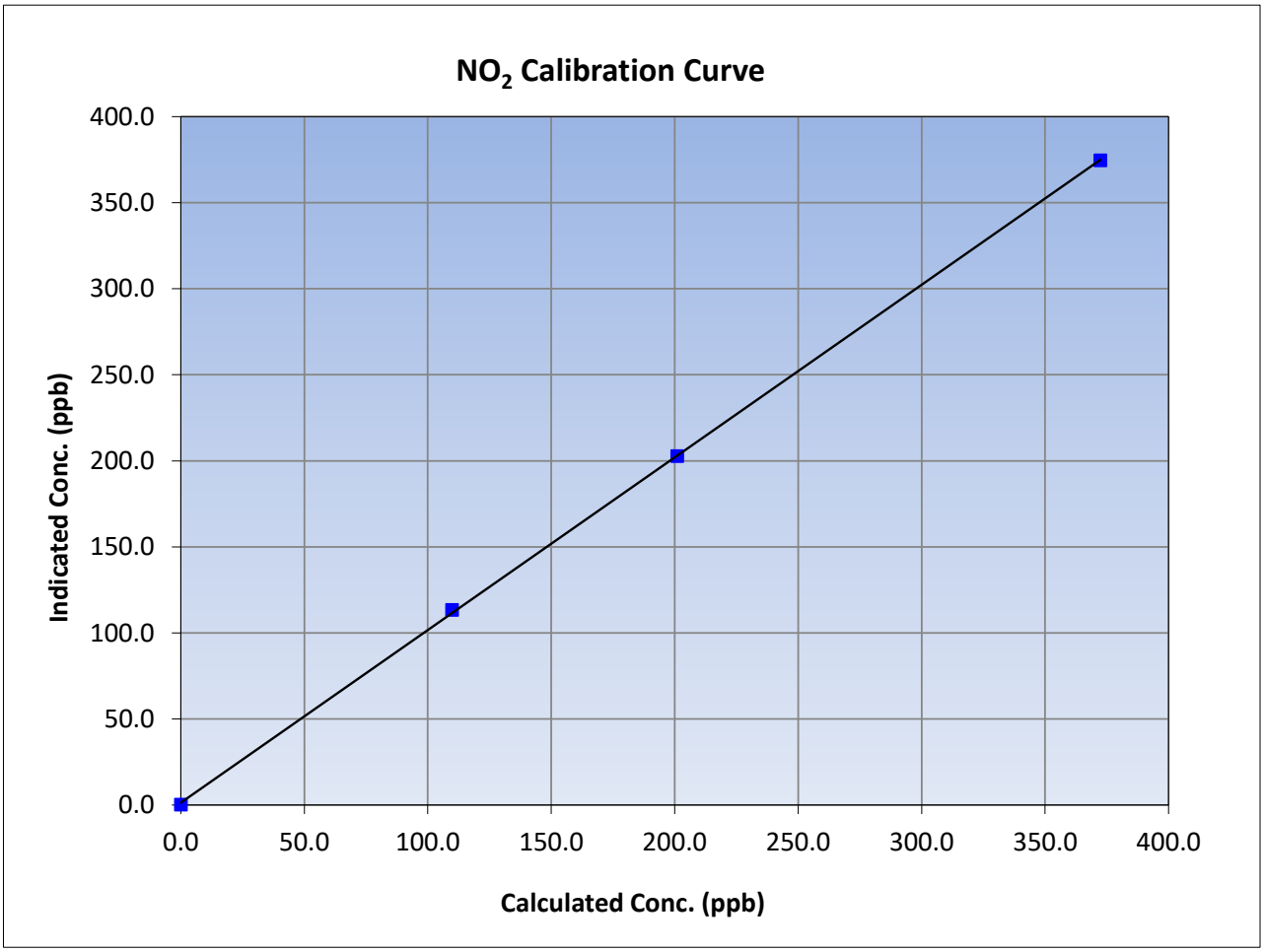
Version-04-2020

### Station Information

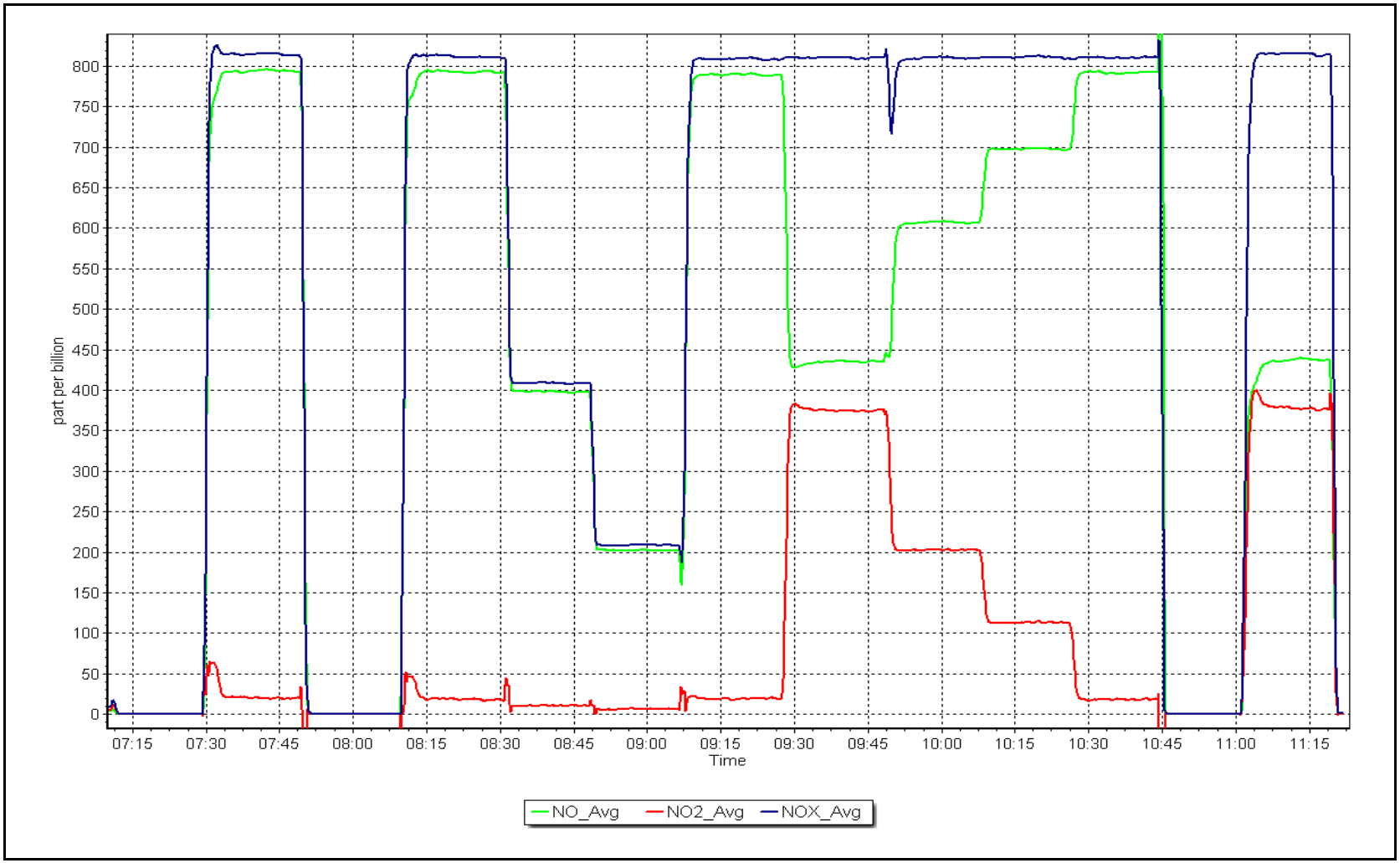
| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | MacKay River | Station Number: | AMS20 |
| Start Time (MST): | 7:12 | End Time (MST): | 11:22 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1505164379 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999933 | *≥0.995* |
| 372.4 | 374.5 | 0.9943 | | | |
| 201.1 | 202.7 | 0.9919 | Slope | 1.003108 | *0.90 - 1.10* |
| 109.9 | 113.4 | 0.9688 | | | |
| | | | Intercept | 1.350779 | *+/-20* |



**$NO_x$ Calibration Plot** Date: August 3, 2023 Location: MacKay River



# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS21
## CONKLIN
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Conklin | Station number: | AMS21 |
| Calibration Date: | August 3, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 9:15 | End time (MST): | 12:25 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.93 | ppm | Cal Gas Exp Date: | January 5, 2025 |
| Cal Gas Cylinder #: | CC259455 | | | |
| Removed Cal Gas Conc: | 49.93 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3810 |
| ZAG Make/Model: | Teledyne API 701 | | Serial Number: | 691 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1428701363

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.997605 | 1.006909 | Backgd or Offset: | 27.2 | 26.8 |
| Calibration intercept: | 0.415762 | 0.556149 | Coeff or Slope: | 0.883 | 0.883 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5005 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 4920 | 80.2 | 800.8 | 798.6 | 1.003 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5005 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4920 | 80.2 | 800.8 | 807.0 | 0.992 |
| second point | 4960 | 40.1 | 400.4 | 403.0 | 0.994 |
| third point | 4980 | 20.0 | 200.1 | 203.3 | 0.984 |
| as left zero | 5005 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4920 | 80.2 | 800.8 | 805.0 | 0.995 |
| | | | | Average Correction Factor | 0.990 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 798.80 | Previous response | 799.34 | *% change | -0.1% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Adjusted the zero.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

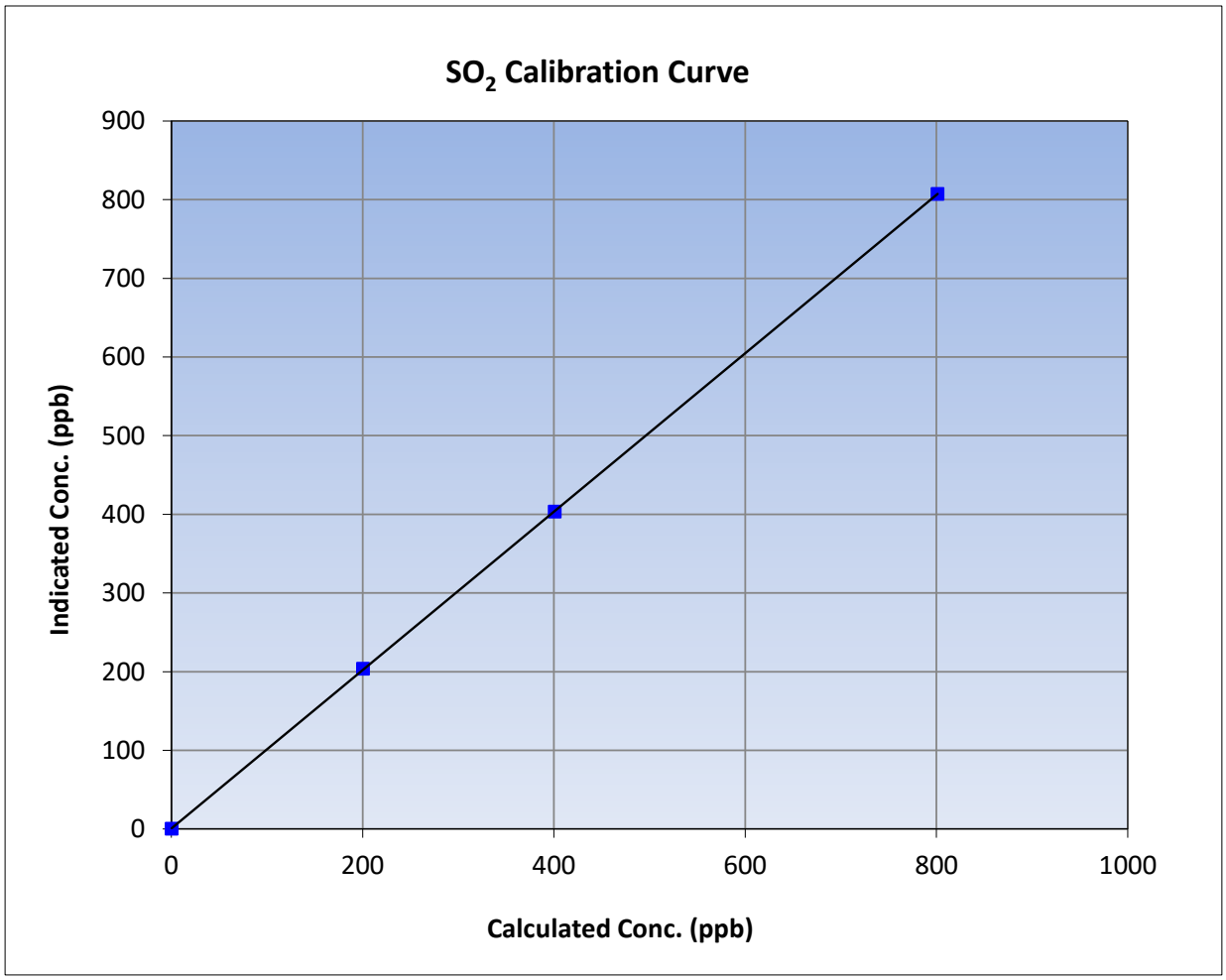
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Conklin | Station Number: | AMS21 |
| Start Time (MST): | 9:15 | End Time (MST): | 12:25 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1428701363 |

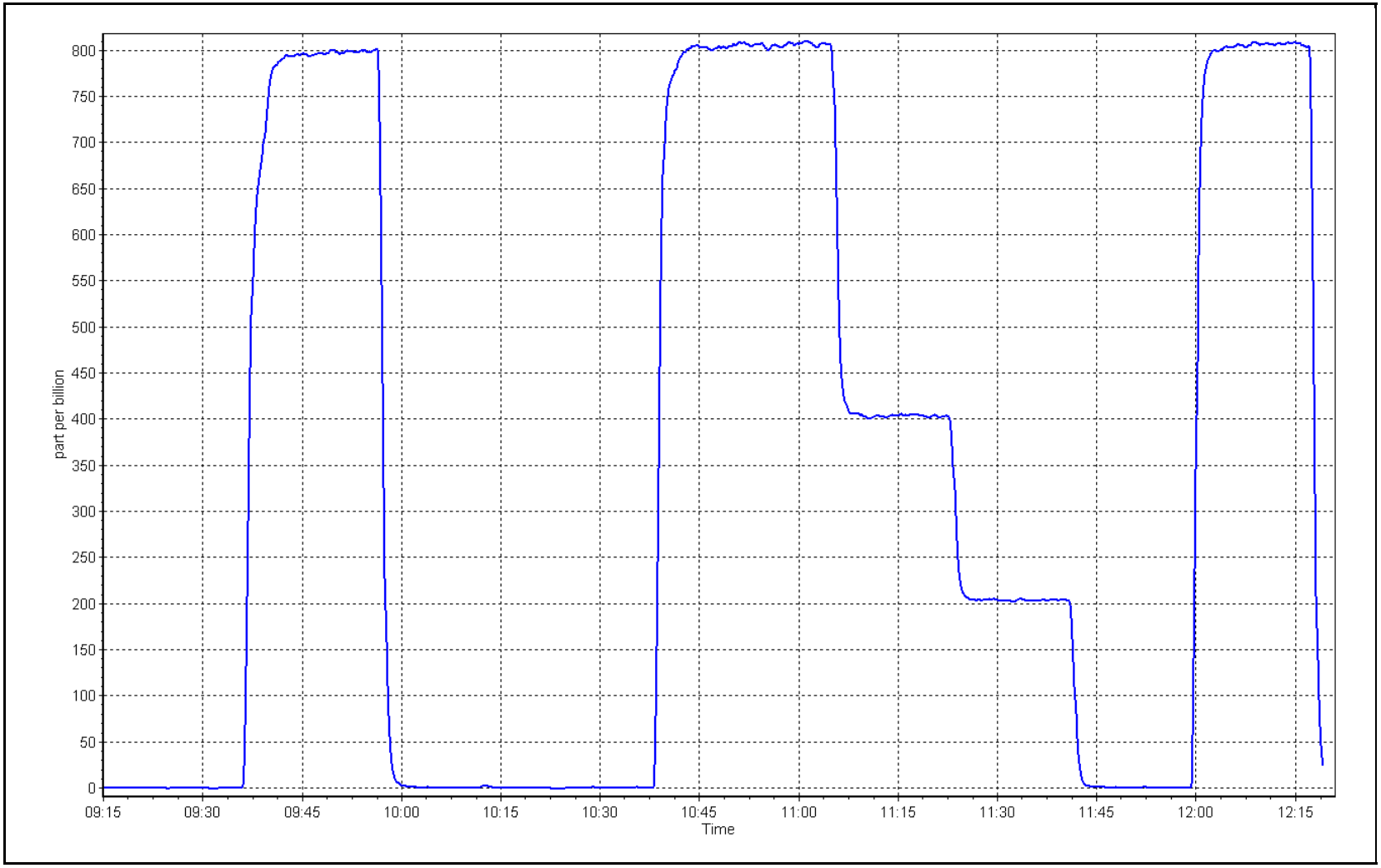
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 800.8 | 807.0 | 0.9924 |
| 400.4 | 403.0 | 0.9936 |
| 200.1 | 203.3 | 0.9843 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999993 | *≥0.995* |
| Slope | 1.006909 | *0.90 - 1.10* |
| Intercept | 0.556149 | *+/-30* |



**SO2 Calibration Plot** Date: August 3, 2023 Location: Conklin



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Conklin | Station number: | AMS21 |
| Calibration Date: | August 24, 2023 | Last Cal Date: | July 27, 2023 |
| Start time (MST): | 9:15 | End time (MST): | 13:05 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.00 | ppm | Cal Gas Exp Date: | January 3, 2026 |
| Cal Gas Cylinder #: | CC501204 | | | |
| Removed Cal Gas Conc: | 5.03 | ppm | Rem Gas Exp Date: | April 16, 2022 |
| Removed Gas Cyl #: | CC505493 | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3810 |
| ZAG Make/Model: | API 701H | | Serial Number: | 691 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i-TLE | | Analyzer serial #: | 1236656116 | |
| Converter make: | CD-Nova 101 | | Converter serial #: | NA | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.007143 | 1.004857 | Backgd or Offset: | 2.4 | 2.4 |
| Calibration intercept: | 0.200000 | 0.280000 | Coeff or Slope: | 0.958 | 0.958 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4920 | 80.0 | 80.5 | 80.0 | 1.006 |
| as found 2nd point | 4960 | 40.0 | 40.2 | 40.3 | 0.999 |
| as found 3rd point | 4980 | 20.0 | 20.1 | 20.2 | 0.996 |
| new cylinder response | 4920 | 80.0 | 80.0 | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4920 | 80.0 | 80.0 | 80.5 | 0.994 |
| second point | 4960 | 40.0 | 40.0 | 40.8 | 0.980 |
| third point | 4980 | 20.0 | 20.0 | 20.4 | 0.980 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4920 | 80.0 | 80.0 | 79.0 | 1.013 |
| SO2 Scrubber Check | 4920 | 80.2 | 802.0 | 0.0 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 0.985 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 80.0 | Prev response: | 81.25 | *% change: | -1.6% |
| Baseline Corr 2nd AF pt: | 40.3 | AF Slope: | 0.993610 | AF Intercept: | 0.140000 |
| Baseline Corr 3rd AF pt: | 20.2 | AF Correlation: | 0.999981 | | |

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

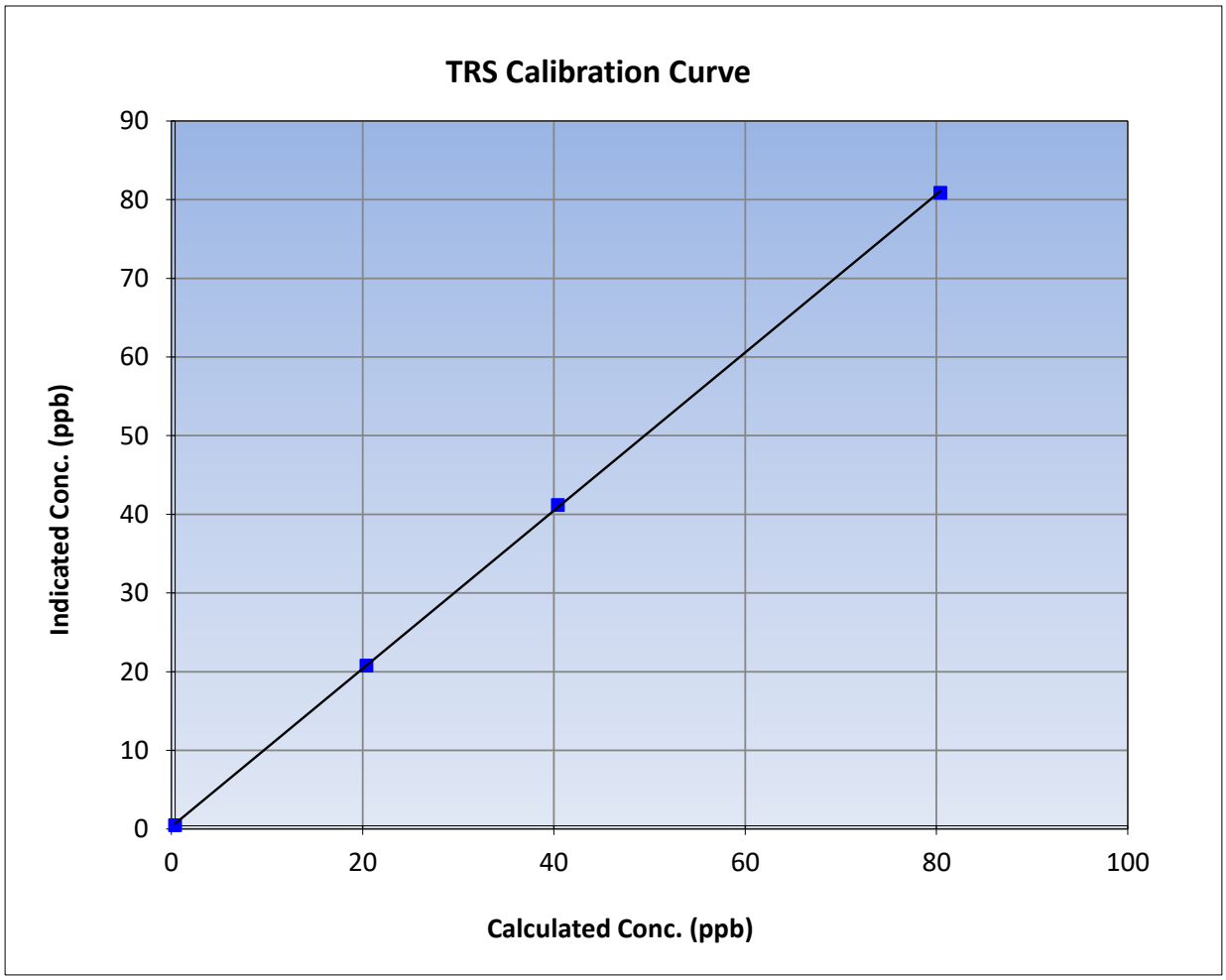
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 24, 2023 | Previous Calibration: | July 27, 2023 |
| Station Name: | Conklin | Station Number: | AMS21 |
| Start Time (MST): | 9:15 | End Time (MST): | 13:05 |
| Analyzer make: | Thermo 43i-TLE | Analyzer serial #: | 1236656116 |

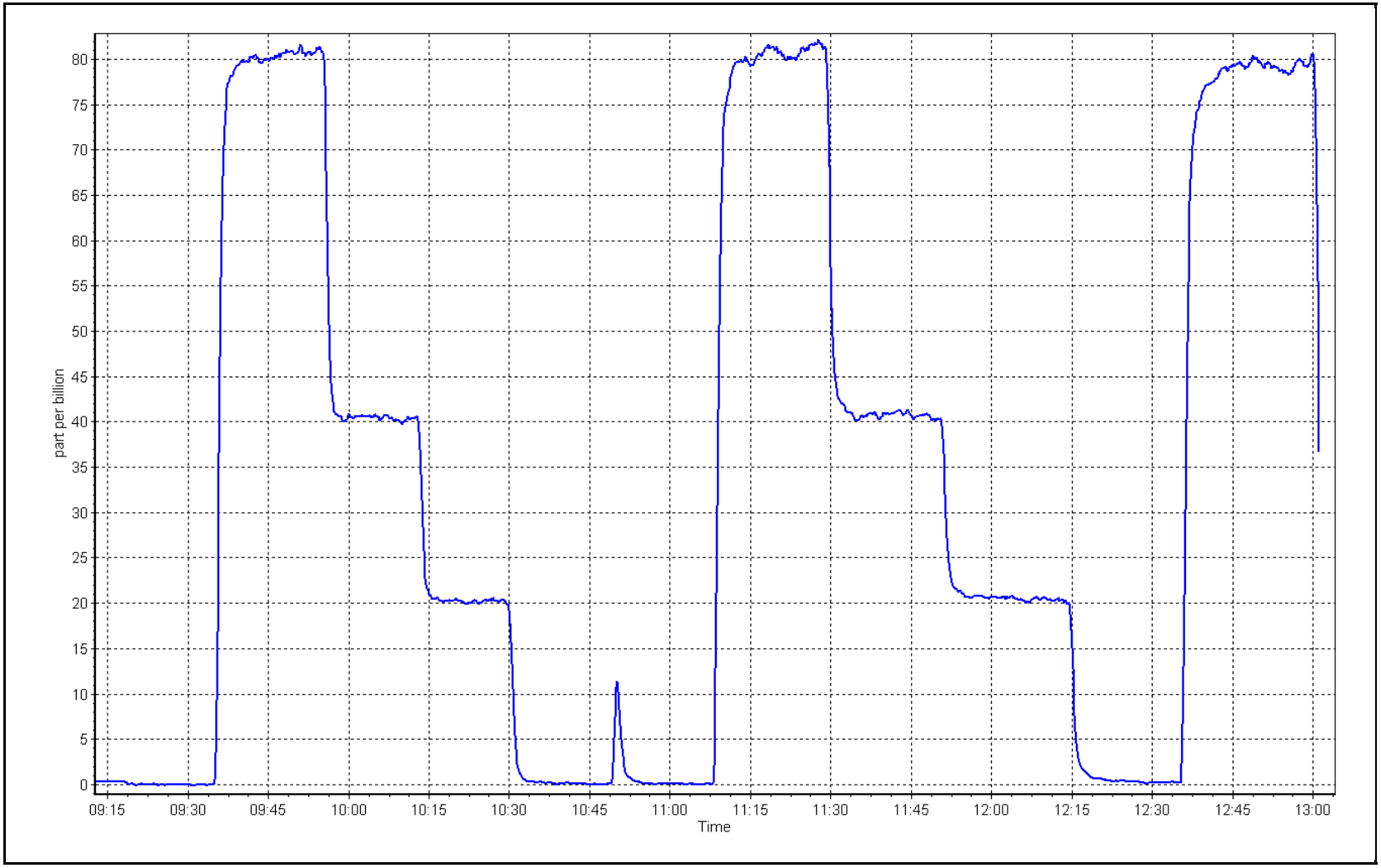
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 80.0 | 80.5 | 0.9938 |
| 40.0 | 40.8 | 0.9804 |
| 20.0 | 20.4 | 0.9804 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999953 | *≥0.995* |
| Slope | 1.004857 | *0.90 - 1.10* |
| Intercept | 0.280000 | *+/-3* |



**TRS Calibration Plot** Date: August 24, 2023 Location: Conklin



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Conklin | Station number: | AMS21 |
| Calibration Date: | August 3, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 9:15 | End time (MST): | 12:25 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC259455 | Cal Gas Expiry Date: | January 5, 2025 | |
| CH4 Cal Gas Conc. | 497.9 | ppm | CH4 Equiv Conc. | 1067.7 | ppm |
| C3H8 Cal Gas Conc. | 207.2 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 497.9 | ppm | CH4 Equiv Conc. | 1067.7 | ppm |
| Removed C3H8 Conc. | 207.2 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3810 | |
| ZAG make/model: | Teledyne API 701H | | Serial Number: | 691 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1331259521 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.27E-04 | 2.29E-04 | NMHC SP Ratio: | 5.05E-05 | 5.09E-05 |
| CH4 Retention time: | 12.00 | 12.00 | NMHC Peak Area: | 180824 | 179681 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.2 | 17.13 | 17.08 | 1.003 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.2 | 17.13 | 17.10 | 1.001 |
| second point | 4960 | 40.1 | 8.56 | 8.53 | 1.004 |
| third point | 4980 | 20.0 | 4.27 | 4.29 | 0.996 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.2 | 17.13 | 17.18 | 0.997 |
| | | | | Average Correction Factor | 1.000 |
| Baseline Corr AF: | 17.08 | Prev response | 17.12 | *% change | -0.2% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.2 | 9.14 | 9.11 | 1.003 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.2 | 9.14 | 9.13 | 1.001 |
| second point | 4960 | 40.1 | 4.57 | 4.57 | 0.999 |
| third point | 4980 | 20.0 | 2.28 | 2.30 | 0.990 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.2 | 9.14 | 9.15 | 0.999 |
| | | | | Average Correction Factor | 0.997 |
| Baseline Corr AF: | 9.11 | Prev response | 9.14 | *% change | -0.3% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.2 | 7.99 | 7.97 | 1.002 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.2 | 7.99 | 7.98 | 1.001 |
| second point | 4960 | 40.1 | 3.99 | 3.96 | 1.010 |
| third point | 4980 | 20.0 | 1.99 | 1.99 | 1.003 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.2 | 7.99 | 8.03 | 0.995 |
| | | | | Average Correction Factor | 1.005 |
| Baseline Corr AF: | 7.97 | Prev response | 7.98 | *% change | -0.1% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 0.999162 | 0.997914 |
| THC Cal Offset: | 0.004574 | 0.005170 |
| CH4 Cal Slope: | 0.999695 | 0.998322 |
| CH4 Cal Offset: | -0.004854 | -0.008057 |
| NMHC Cal Slope: | 0.998696 | 0.997658 |
| NMHC Cal Offset: | 0.009428 | 0.012827 |

Notes: Replaced H2 cylinder. No adjustments made.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## THC Calibration Summary

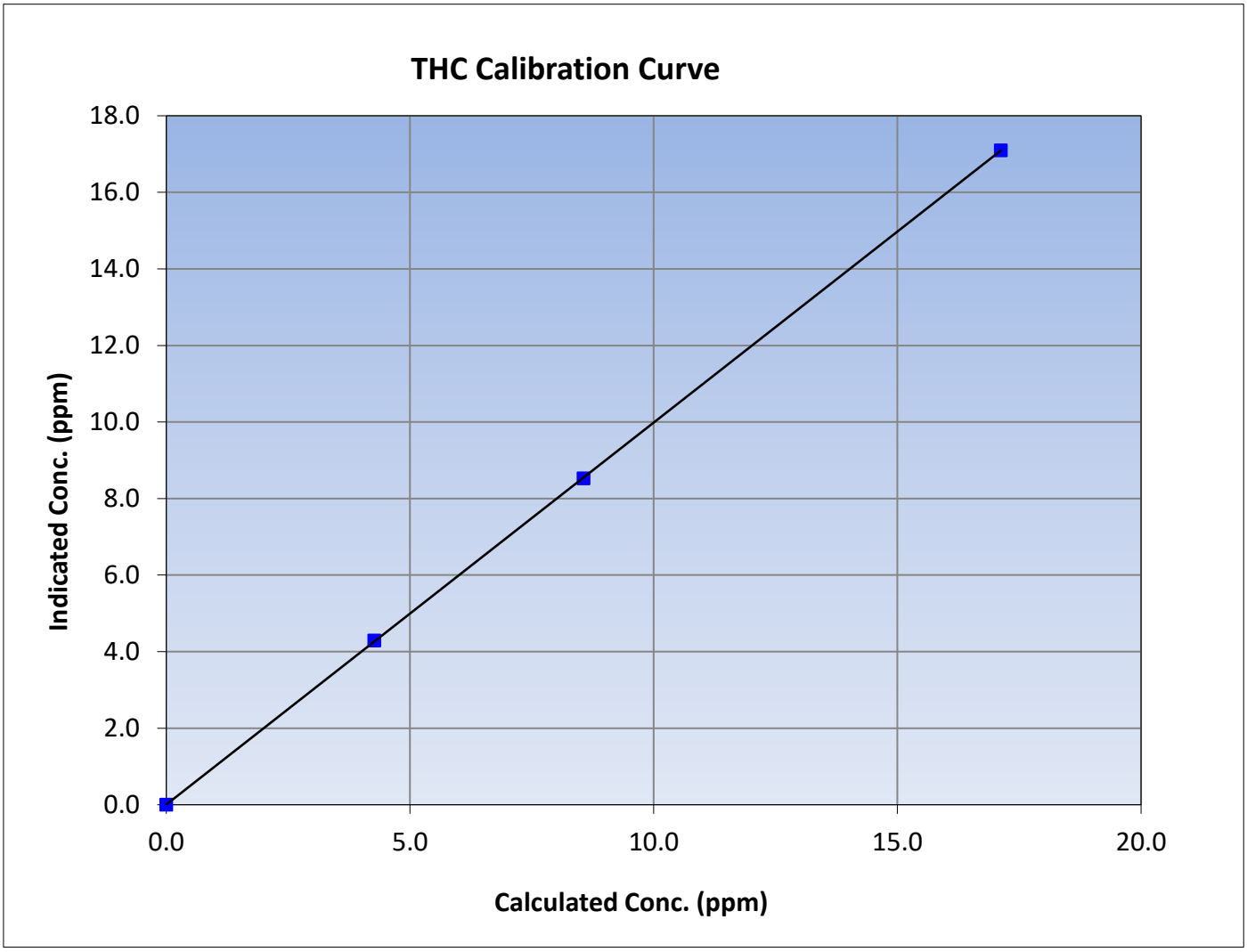
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Conklin | Station Number: | AMS21 |
| Start Time (MST): | 9:15 | End Time (MST): | 12:25 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1331259521 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999994 | ≥0.995 |
| 17.13 | 17.10 | 1.0015 | | | |
| 8.56 | 8.53 | 1.0040 | Slope | 0.997914 | 0.90 - 1.10 |
| 4.27 | 4.29 | 0.9960 | | | |
| | | | Intercept | 0.005170 | +/-0.5 |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

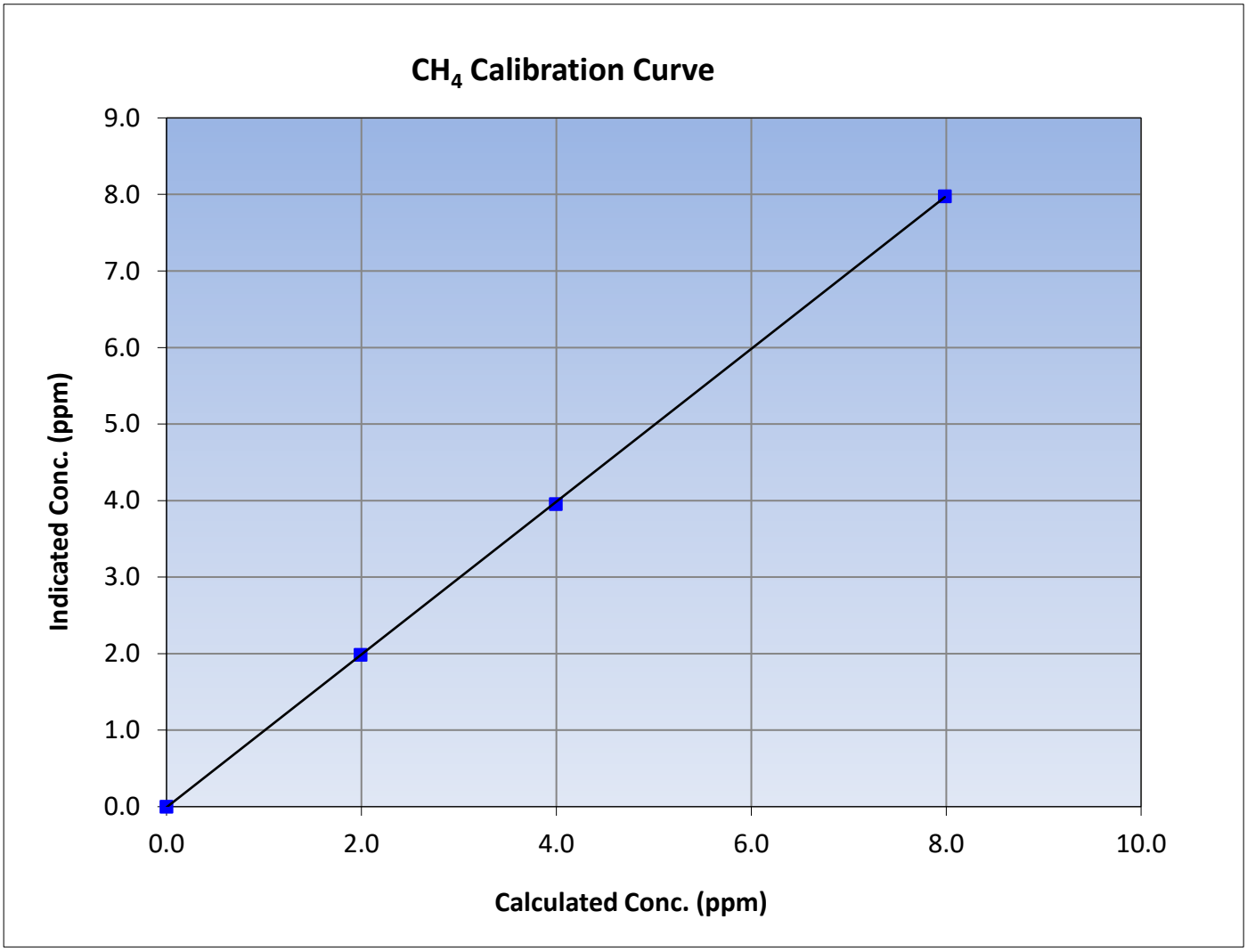
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Conklin | Station Number: | AMS21 |
| Start Time (MST): | 9:15 | End Time (MST): | 12:25 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1331259521 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999979 | *≥0.995* |
| 7.99 | 7.98 | 1.0014 | | | |
| 3.99 | 3.96 | 1.0096 | Slope | 0.998322 | *0.90 - 1.10* |
| 1.99 | 1.99 | 1.0033 | | | |
| | | | Intercept | -0.008057 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

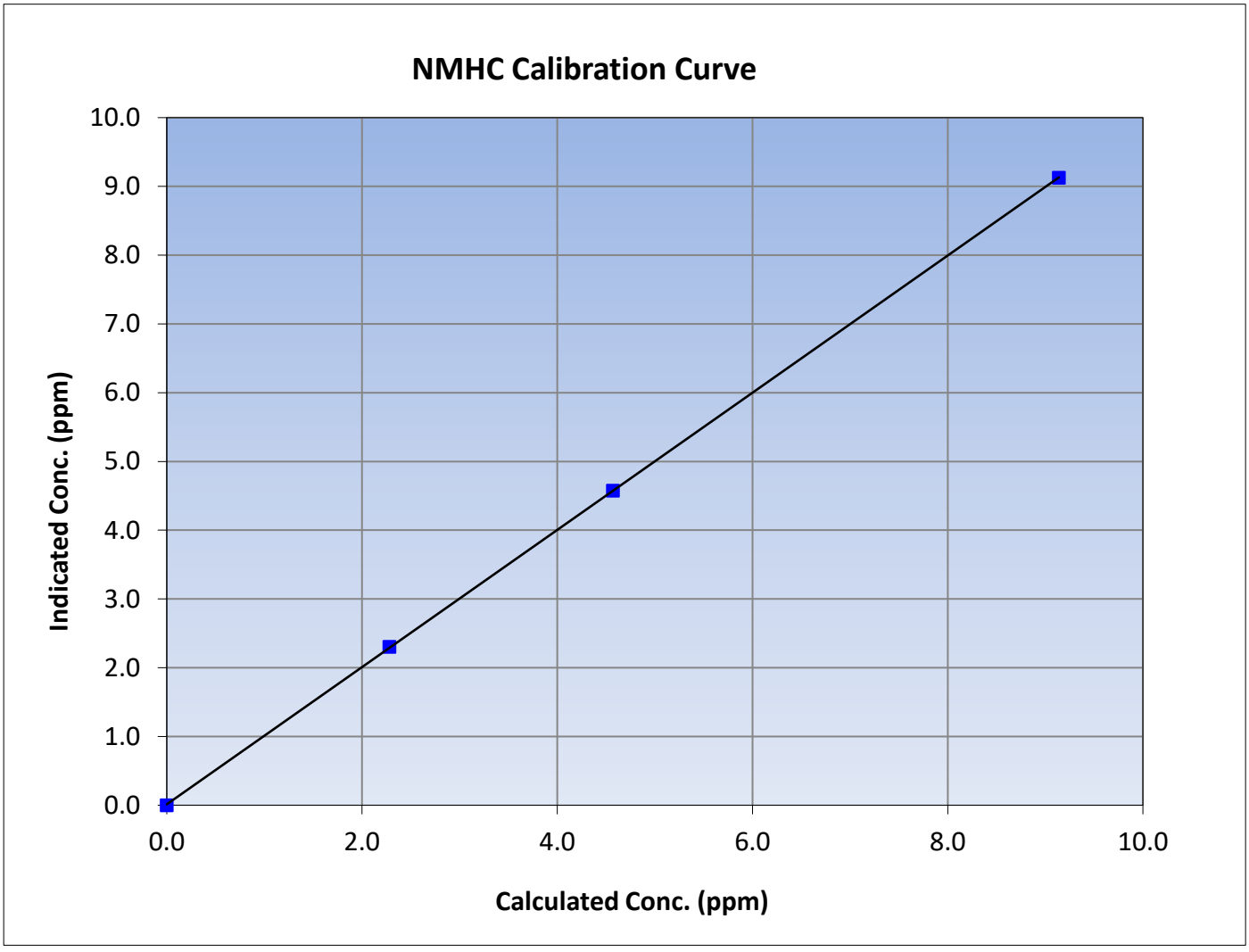
Version-06-2022

### Station Information

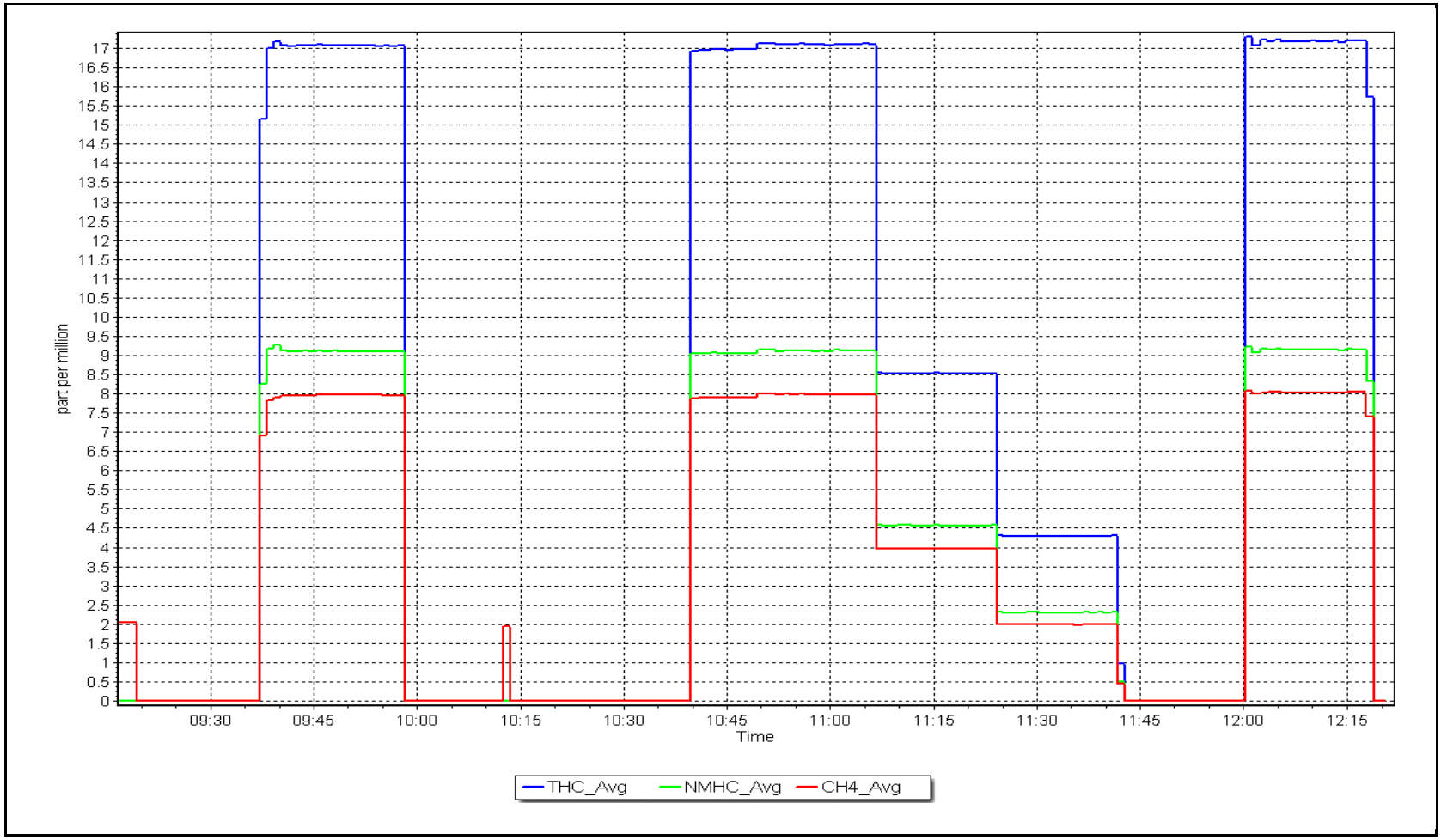
| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Conklin | Station Number: | AMS21 |
| Start Time (MST): | 9:15 | End Time (MST): | 12:25 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1331259521 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999990 | ≥0.995 |
| 9.14 | 9.13 | 1.0014 | | | |
| 4.57 | 4.57 | 0.9993 | Slope | 0.997658 | 0.90 - 1.10 |
| 2.28 | 2.30 | 0.9897 | | | |
| | | | Intercept | 0.012827 | +/-0.5 |



**NMHC Calibration Plot** Date: August 3, 2023 Location: Conklin



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Conklin | Station number: | AMS21 |
| Calibration Date: | August 10, 2023 | Last Cal Date: | July 28, 2023 |
| Start time (MST): | 8:53 | End time (MST): | 12:50 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2Y1P1H | | Cal Gas Expiry Date: | December 11, 2023 | |
| NOX Cal Gas Conc: | 51.09 | ppm | NO Cal Gas Conc: | 50.39 | ppm |
| Removed Cylinder #: | n/a | | Removed Gas Exp Date: | n/a | |
| Removed Gas NOX Conc: | 51.09 | ppm | Removed Gas NO Conc: | 50.39 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3810 | |
| ZAG make/model: | Teledyne API T701H | | Serial Number: | 691 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1501663731 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 1.115 | 1.120 | NO bkgnd or offset: | 11.2 | 11.2 |
| NOX coeff or slope: | 1.000 | 1.000 | NOX bkgnd or offset: | 11.4 | 11.4 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 203.7 | 196.0 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.998617 | 0.998758 |
| $NO_X$ Cal Offset: | 2.003897 | 1.603828 |
| NO Cal Slope: | 0.999267 | 0.999738 |
| NO Cal Offset: | 0.881047 | 0.741061 |
| $NO_2$ Cal Slope: | 0.998137 | 1.000498 |
| $NO_2$ Cal Offset: | -0.798489 | 0.217772 |

# Wood Buffalo Environmental Association

# $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.2 | -0.1 | ---- | ---- |
| as found span | 4921 | 79.4 | 811.2 | 800.1 | 11.1 | 809.0 | 796.7 | 12.4 | 1.0028 | 1.0043 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | -0.1 | ---- | ---- |
| high point | 4921 | 79.4 | 811.2 | 800.1 | 11.1 | 811.0 | 800.3 | 10.7 | 1.0003 | 0.9998 |
| second point | 4960 | 39.7 | 405.7 | 400.1 | 5.6 | 407.6 | 401.1 | 6.5 | 0.9953 | 0.9976 |
| third point | 4980 | 19.8 | 202.3 | 199.6 | 2.8 | 205.4 | 201.0 | 4.3 | 0.9850 | 0.9928 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| as left span | 4921 | 79.4 | 811.2 | 365.7 | 445.5 | 812.6 | 374.4 | 438.3 | 0.9983 | 0.9768 |
| | | | | | | | | Average Correction Factor | 0.9935 | 0.9967 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 809.3 ppb | NO = 796.9 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -0.3% |
| Previous Response | $NO_X$ = 812.1 ppb | NO = 800.4 ppb | | *Percent Change | NO = | -0.4% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found $NO_X$ $r^2$: | Nx Sl: | Nx Int: | |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found NO $r^2$: | NO Sl: | NO Int: | |
| | | | As found $NO_2$ $r^2$: | NO2 Sl: ; | $NO_2$ Int: | |

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 796.3 | 361.9 | 445.5 | 445.8 | 0.9994 | 100.1% |
| 2nd GPT point (200 ppb O3) | 796.3 | 593.2 | 214.2 | 214.7 | 0.9977 | 100.2% |
| 3rd GPT point (100 ppb O3) | 796.3 | 696.7 | 110.7 | 111.3 | 0.9947 | 100.5% |
| | | | | Average Correction Factor | 0.9973 | 100.3% |

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

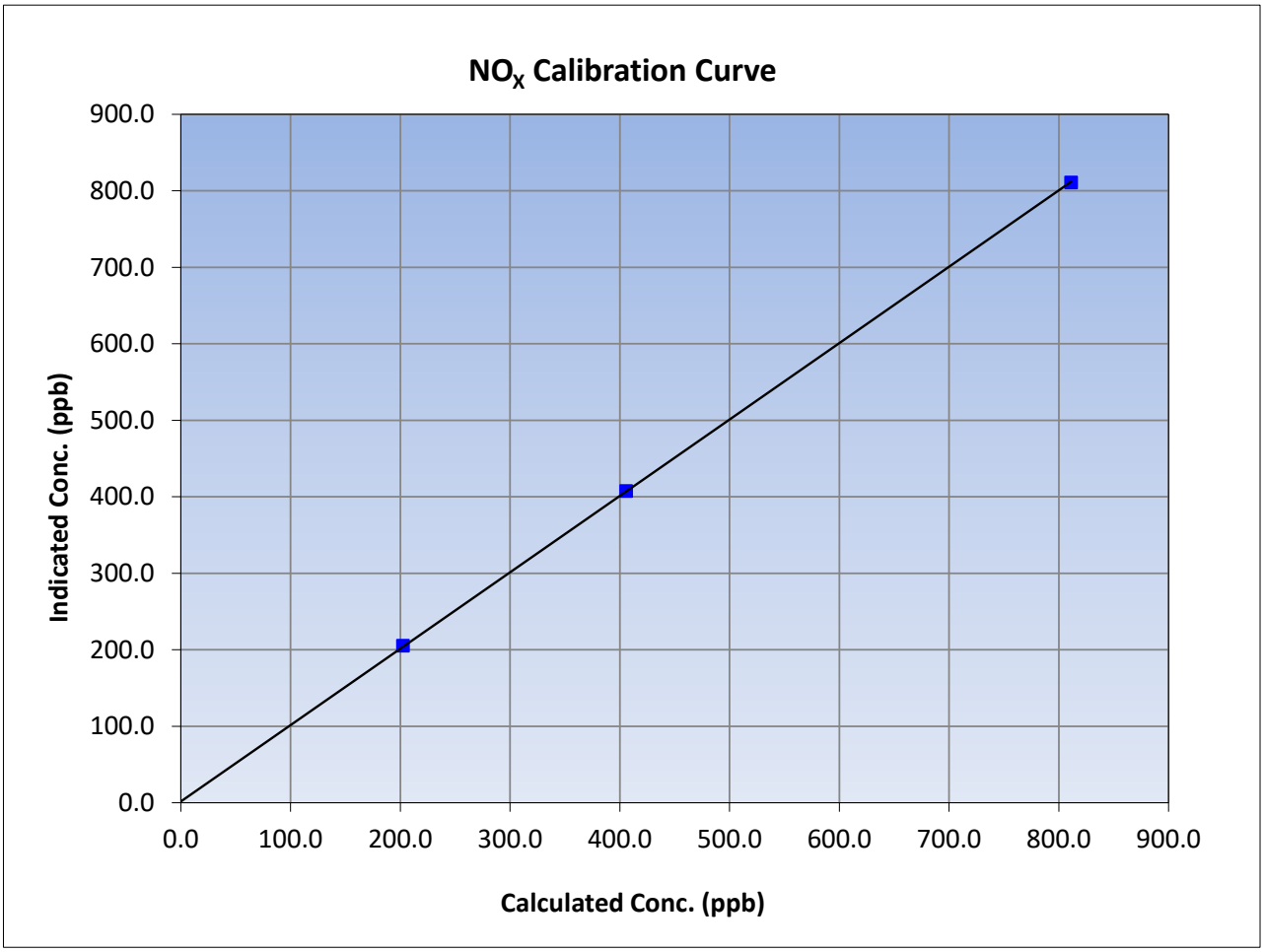
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 28, 2023 |
| Station Name: | Conklin | Station Number: | AMS21 |
| Start Time (MST): | 8:53 | End Time (MST): | 12:50 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1501663731 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999980 | ≥0.995 |
| 811.2 | 811.0 | 1.0003 | | | |
| 405.7 | 407.6 | 0.9953 | Slope | 0.998758 | 0.90 - 1.10 |
| 202.3 | 205.4 | 0.9850 | | | |
| | | | Intercept | 1.603828 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

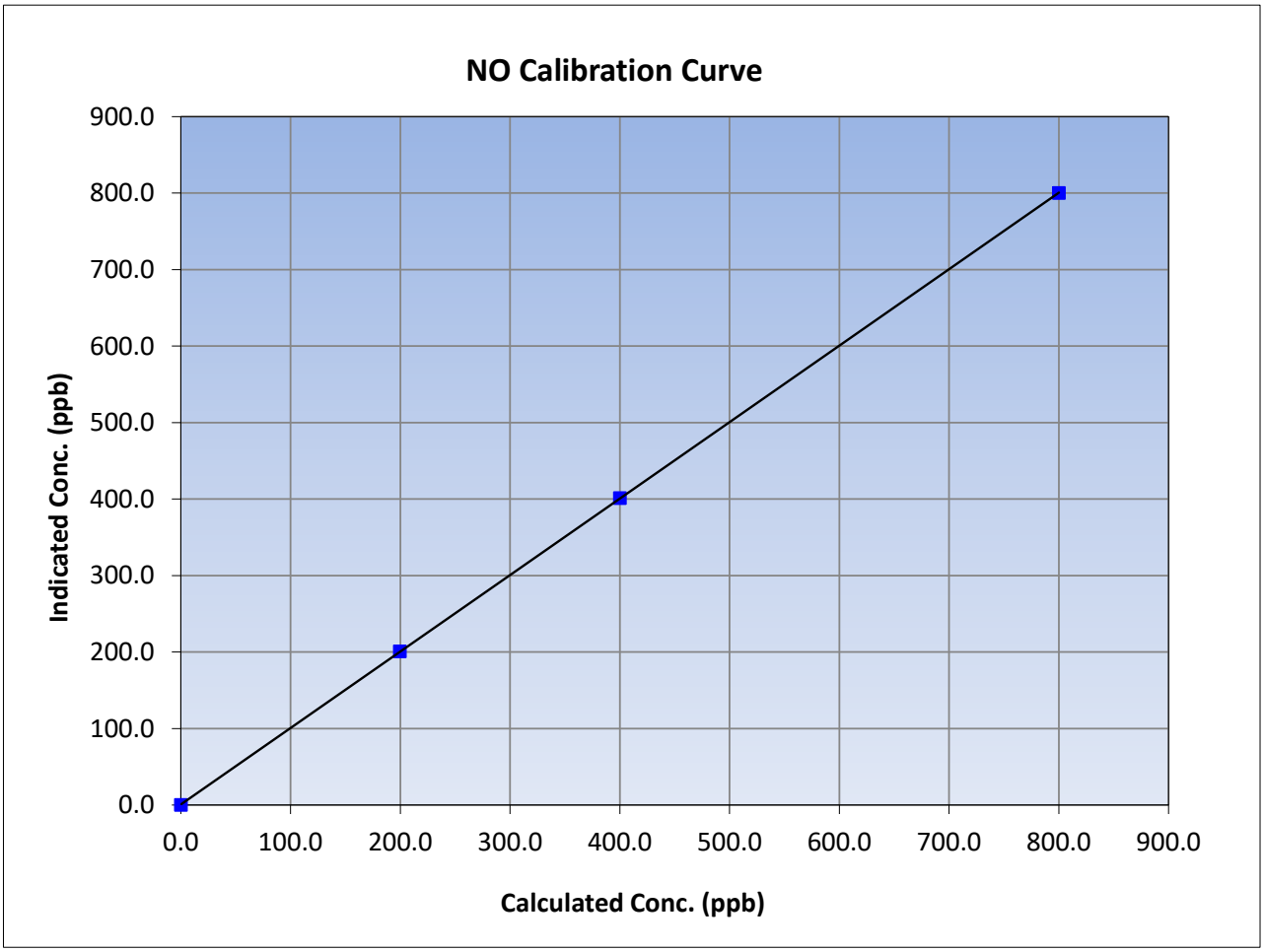
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 28, 2023 |
| Station Name: | Conklin | Station Number: | AMS21 |
| Start Time (MST): | 8:53 | End Time (MST): | 12:50 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1501663731 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999996 | ≥0.995 |
| 800.1 | 800.3 | 0.9998 | | | |
| 400.1 | 401.1 | 0.9976 | Slope | 0.999738 | 0.90 - 1.10 |
| 199.6 | 201.0 | 0.9928 | | | |
| | | | Intercept | 0.741061 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

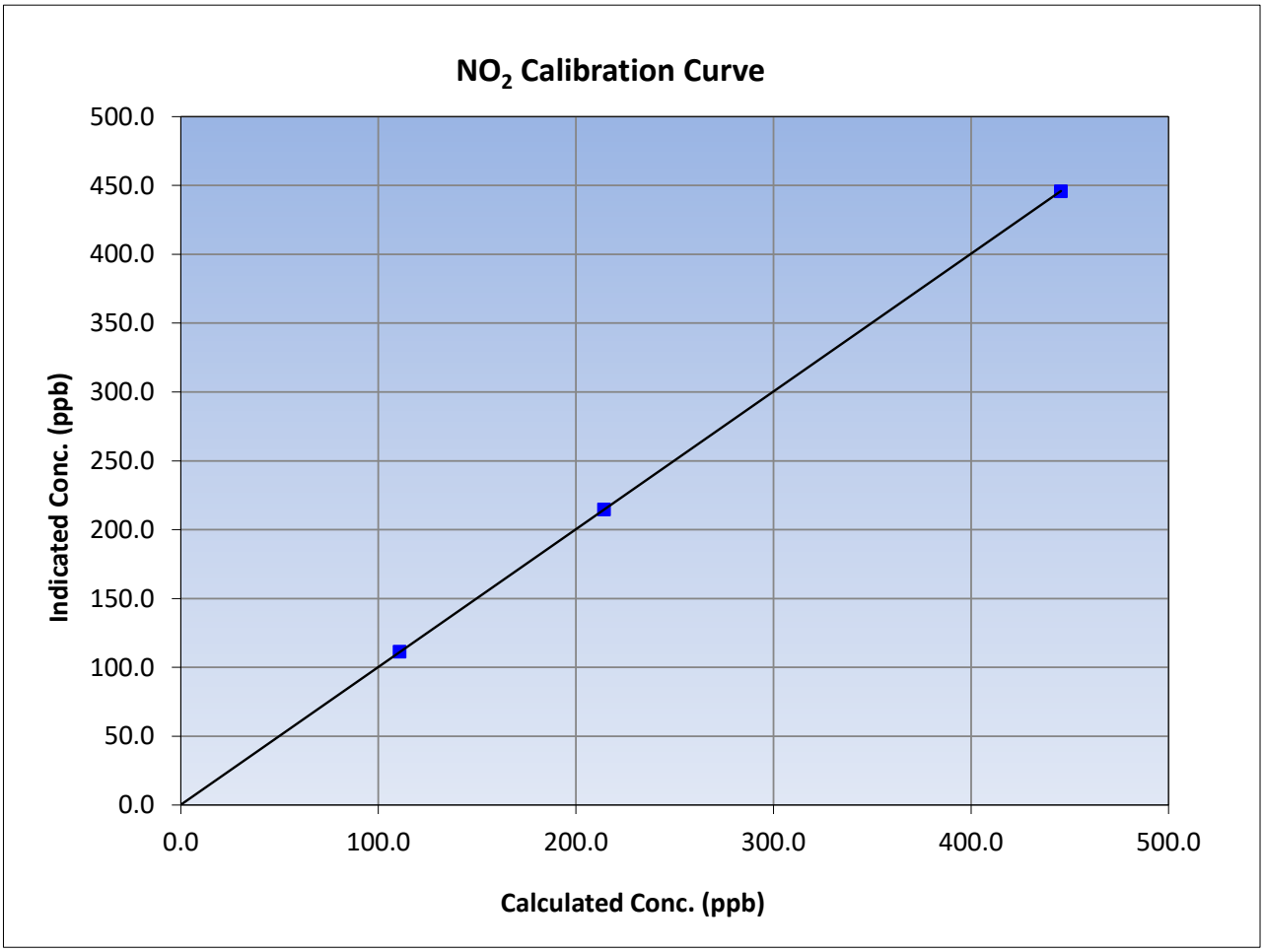
Version-04-2020

### Station Information

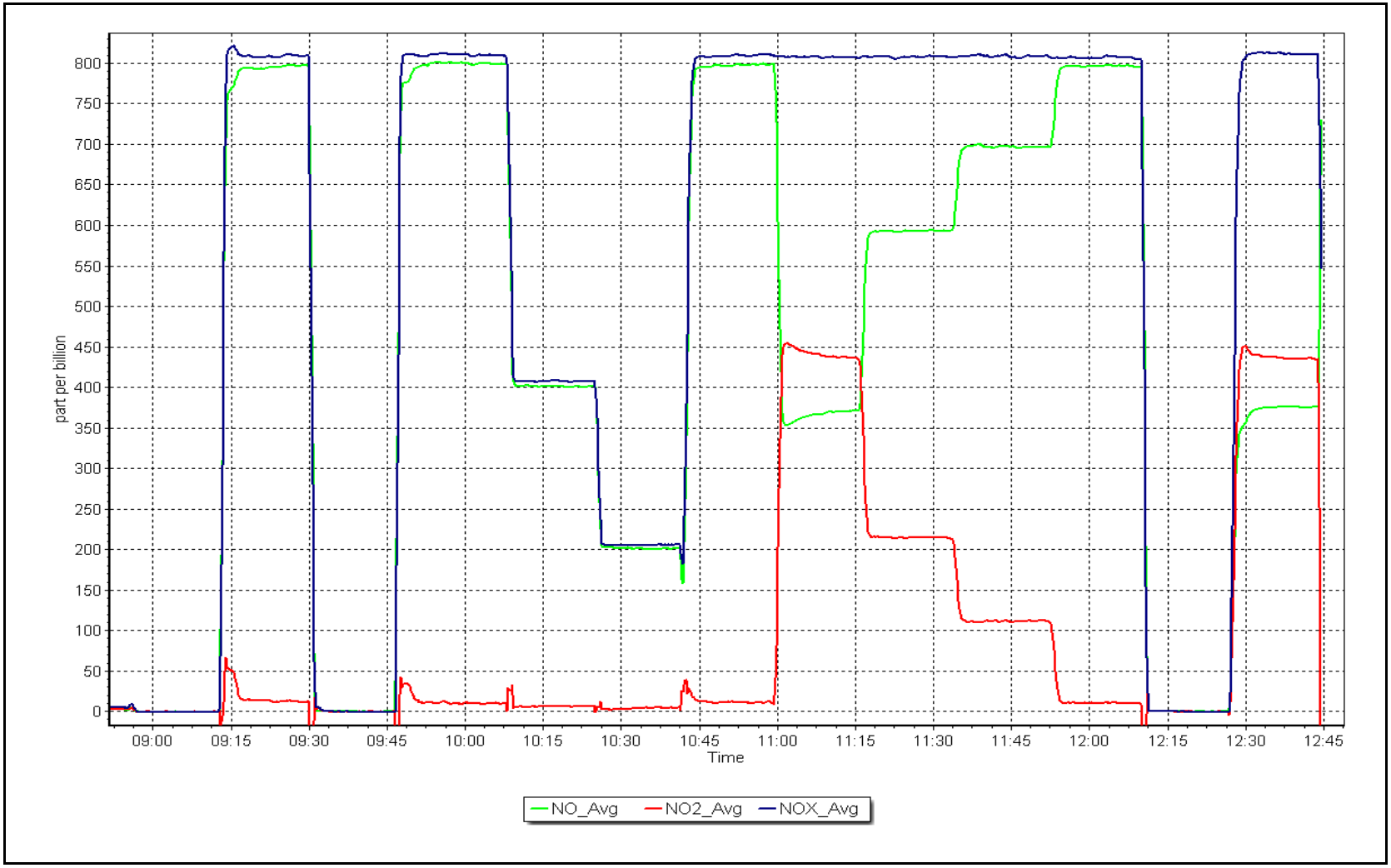
| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 28, 2023 |
| Station Name: | Conklin | Station Number: | AMS21 |
| Start Time (MST): | 8:53 | End Time (MST): | 12:50 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1501663731 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999998 | ≥0.995 |
| 445.5 | 445.8 | 0.9994 | | | |
| 214.2 | 214.7 | 0.9977 | Slope | 1.000498 | 0.90 - 1.10 |
| 110.7 | 111.3 | 0.9947 | | | |
| | | | Intercept | 0.217772 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 10, 2023 Location: Conklin



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Conklin | Station number: | AMS21 |
| Calibration Date: | August 15, 2023 | Last Cal Date: | July 24, 2023 |
| Start time (MST): | 9:09 | End time (MST): | 12:45 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | Teledyne API T700 | Serial Number: | 3810 |
| ZAG Make/Model: | Teledyne API 701H | Serial Number: | 691 |

### Analyzer Information

Analyzer make: Thermo 49i  Analyzer serial #: 1501663734

Analyzer Range 0 - 500 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.012514 | 1.000257 | Backgd or Offset: | -2.0 | -2.0 |
| Calibration intercept: | 1.160000 | 1.580000 | Coeff or Slope: | 1.002 | 0.981 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.8 | ---- |
| as found span | 5000 | 951.2 | 400.0 | 407.0 | 0.983 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 5000 | 950.9 | 400.0 | 401.0 | 0.998 |
| second point | 5000 | 804.0 | 200.0 | 202.3 | 0.989 |
| third point | 5000 | 703.6 | 100.0 | 103.0 | 0.971 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 5000 | 936.0 | 400.0 | 408.7 | 0.979 |
| | | | | Average Correction Factor | 0.986 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 407.8 | Previous response | 406.2 | *% change | 0.4% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Adjusted both zero and span.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

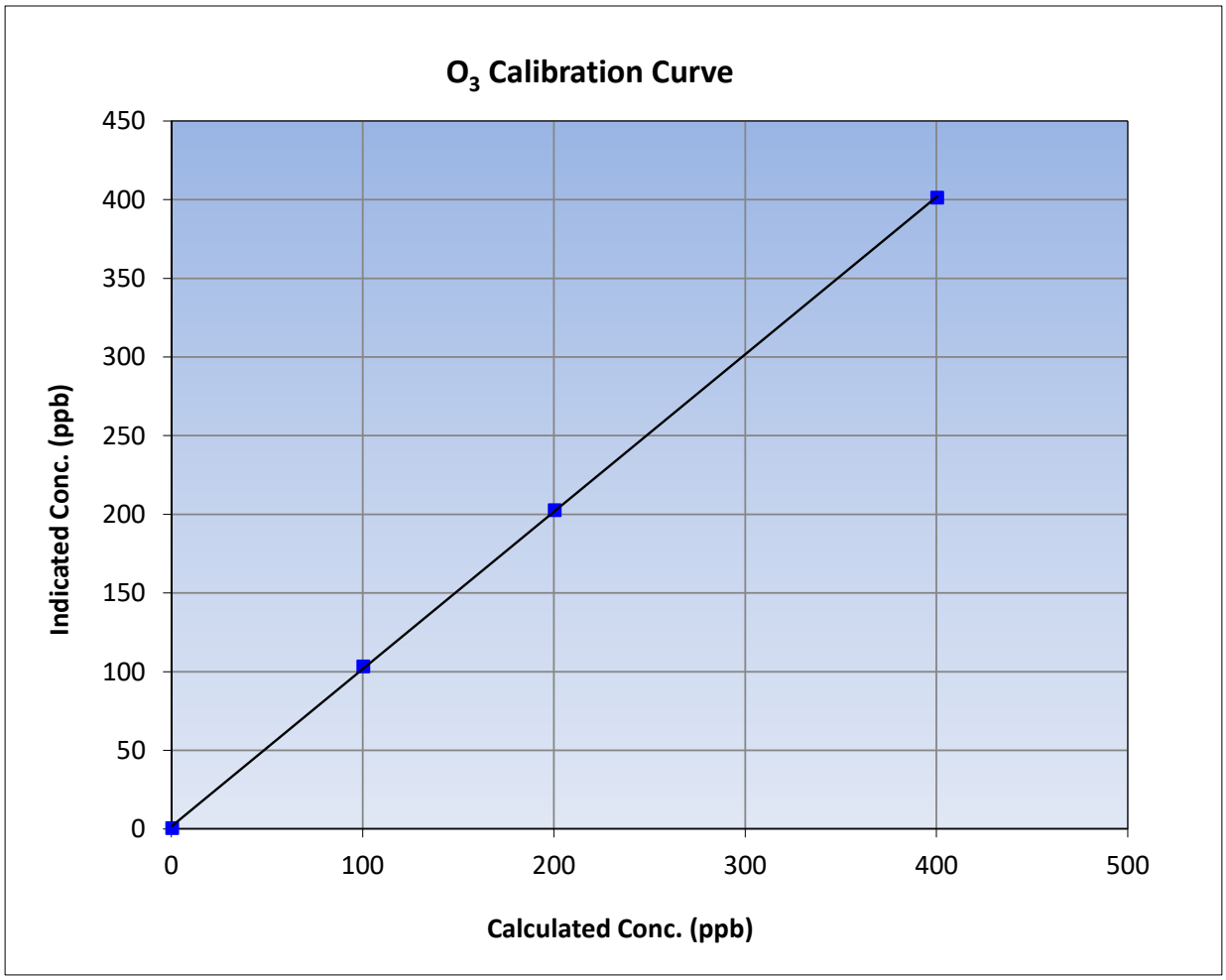
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 15, 2023 | Previous Calibration: | July 24, 2023 |
| Station Name: | Conklin | Station Number: | AMS21 |
| Start Time (MST): | 9:09 | End Time (MST): | 12:45 |
| Analyzer make: | Thermo 49i | Analyzer serial #: | 1501663734 |

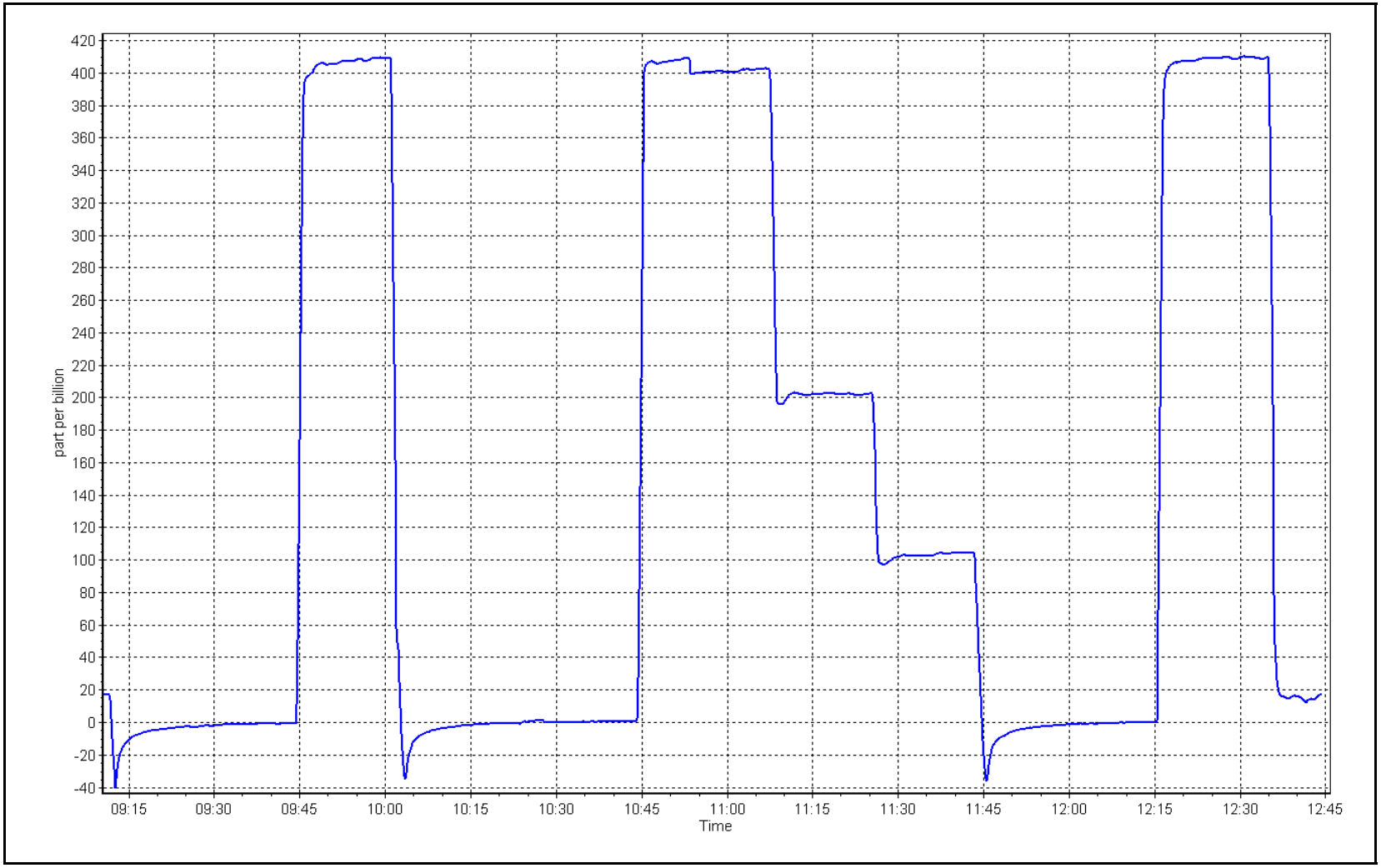
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 400.0 | 401.0 | 0.9975 |
| 200.0 | 202.3 | 0.9886 |
| 100.0 | 103.0 | 0.9709 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999946 | *≥0.995* |
| Slope | 1.000257 | *0.90 - 1.10* |
| Intercept | 1.580000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 15, 2023 Location: Conklin



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Conklin | Station number: | AMS 21 |
| Calibration Date: | August 17, 2023 | Last Cal Date: | July 27, 2023 |
| Start time (MST): | 9:56 | End time (MST): | 10:37 |
| Analyzer Make: | API T640X | S/N: | 1597 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat | S/N: | 388751 |
| Temp/RH standard: | Alicat | S/N: | 388751 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T ($^{o}$C) | 22.5 | 22.5 | 22.5 | ☐ | +/- 2 $^{o}$C |
| P (mmHg) | 699.9 | 702.5 | 699.9 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.05 | 5.03 | 5.05 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 17, 2023 Last Cal Date: July 27, 2023

PM w/o HEPA: 16.3 PM w/ HEPA: 0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 11 | 11.2 | 11 | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 2.8 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: August 17, 2023

Disposable Filter Changed: August 17, 2023

### Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned:

Notes: No adjustments made for both monthly and quarterly maintenance.

Calibration by: Denny Ray Estador

# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Conklin | Station number: | AMS 21 |
| Calibration Date: | August 18, 2023 | Last Cal Date: | August 17, 2023 |
| Start time (MST): | 11:13 | End time (MST): | 11:24 |
| Analyzer Make: | API T640 | S/N: | 326 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat | S/N: | 388750 |
| Temp/RH standard: | Alicat | S/N: | 388750 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | NA | 13.48 | 13.7 | ☐ | +/- 2 °C |
| P (mmHg) | NA | 703.04 | 701.2 | ☐ | +/- 10 mmHg |
| flow (LPM) | NA | 5.071 | 4.99 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 18, 2023 Last Cal Date: August 17, 2023

PM w/o HEPA: 79.5 PM w/ HEPA: 0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☐

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | | | | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____ <0.2 ug/m3

Date Optical Chamber Cleaned: _____

Disposable Filter Changed: _____

### Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: T640 installed as previous instrument had an internal serial failure.

Calibration by: Braiden Boutilier

# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Conklin | Station number: | AMS 21 |
| Calibration Date: | August 18, 2023 | Last Cal Date: | August 17, 2023 |
| Start time (MST): | 10:30 | End time (MST): | 11:08 |
| Analyzer Make: | API T640X | S/N: | 1597 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat | S/N: | 388750 |
| Temp/RH standard: | Alicat | S/N: | 388750 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | 14.5 | 14.92 | NA | ☐ | +/- 2 °C |
| P (mmHg) | 700.5 | 702.82 | NA | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.02 | 5.118 | NA | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 18, 2023 Last Cal Date: August 17, 2023

PM w/o HEPA: NA PM w/ HEPA: NA <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☐

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | | | | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____ <0.2 ug/m3

Date Optical Chamber Cleaned: _____

Disposable Filter Changed: _____

### Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: T640X removed because PM readings not displayed due to an internal serial error

Calibration by: Braiden Boutilier

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Conklin | Station Number: | AMS 21 |
| Calibration Date: | August 30, 2023 | Prev Cal Date: | July 22, 2022 |
| Start Time (MST): | 10:00 | End Time (MST): | 10:45 |
| Tower Height (m): | 10.0 | Reason: | Routine |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | J4337 |
| WS Calibrator: | MetOne 053-120 | Serial Number: | R10866 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.2 | 0.2% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | -0.1% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999999 | *≥0.9995* |
| Calculated slope | | 0.999979 | *0.90 - 1.10* |
| Calculated intercept | | -0.013577 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | P22886 |
| As Found Declination (deg east of True North): | 15 | As Left Declination (deg east of True North): | 13 |
| Solar noon time (MST): | 13:25 | Calc Declination*: | 13 Degrees |
| Deadband calc: | -1.4 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | -0.2 | --- |
| 90 | 89.1 | -0.3% |
| 180 | 179.4 | -0.2% |
| 270 | 269.0 | -0.3% |
| 357 | 358.2 | 0.3% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999985 | *≥0.9995* |
| Calculated slope | | 0.996994 | *0.90 - 1.10* |
| Calculated intercept | | 0.838364 | *+/- 4* |

Notes:

Bearings still good. Confirmed declination with a compass.

Calibration Performed By: Denny Ray Estador

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

**AMS22**
**JANVIER**
**AUGUST 2023**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Janvier | Station number: | AMS 22 |
| Calibration Date: | August 23, 2023 | Last Cal Date: | July 17, 2023 |
| Start time (MST): | 10:00 | End time (MST): | 13:26 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 50.11 | ppm | Cal Gas Exp Date: | January 18, 2029 |
| Cal Gas Cylinder #: | CC281519 | | | |
| Removed Cal Gas Conc: | 50.11 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3806 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 4890 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1152430006

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.001279 | 1.005224 | Backgd or Offset: | 21.4 | 21.4 |
| Calibration intercept: | 2.123935 | 1.843010 | Coeff or Slope: | 0.989 | 0.989 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 1.0 | ---- |
| as found span | 4920 | 79.8 | 799.8 | 800.8 | 0.999 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 1.1 | ---- |
| high point | 4920 | 79.8 | 799.8 | 805.4 | 0.993 |
| second point | 4960 | 39.9 | 399.9 | 404.3 | 0.989 |
| third point | 4980 | 20.0 | 200.4 | 204.0 | 0.983 |
| as left zero | 5000 | 0.0 | 0.0 | 1.2 | ---- |
| as left span | 4920 | 79.8 | 799.8 | 806.4 | 0.992 |
| | | | | Average Correction Factor | 0.988 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 799.80 | Previous response | 802.93 | *% change | -0.4% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. No adjustments made.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

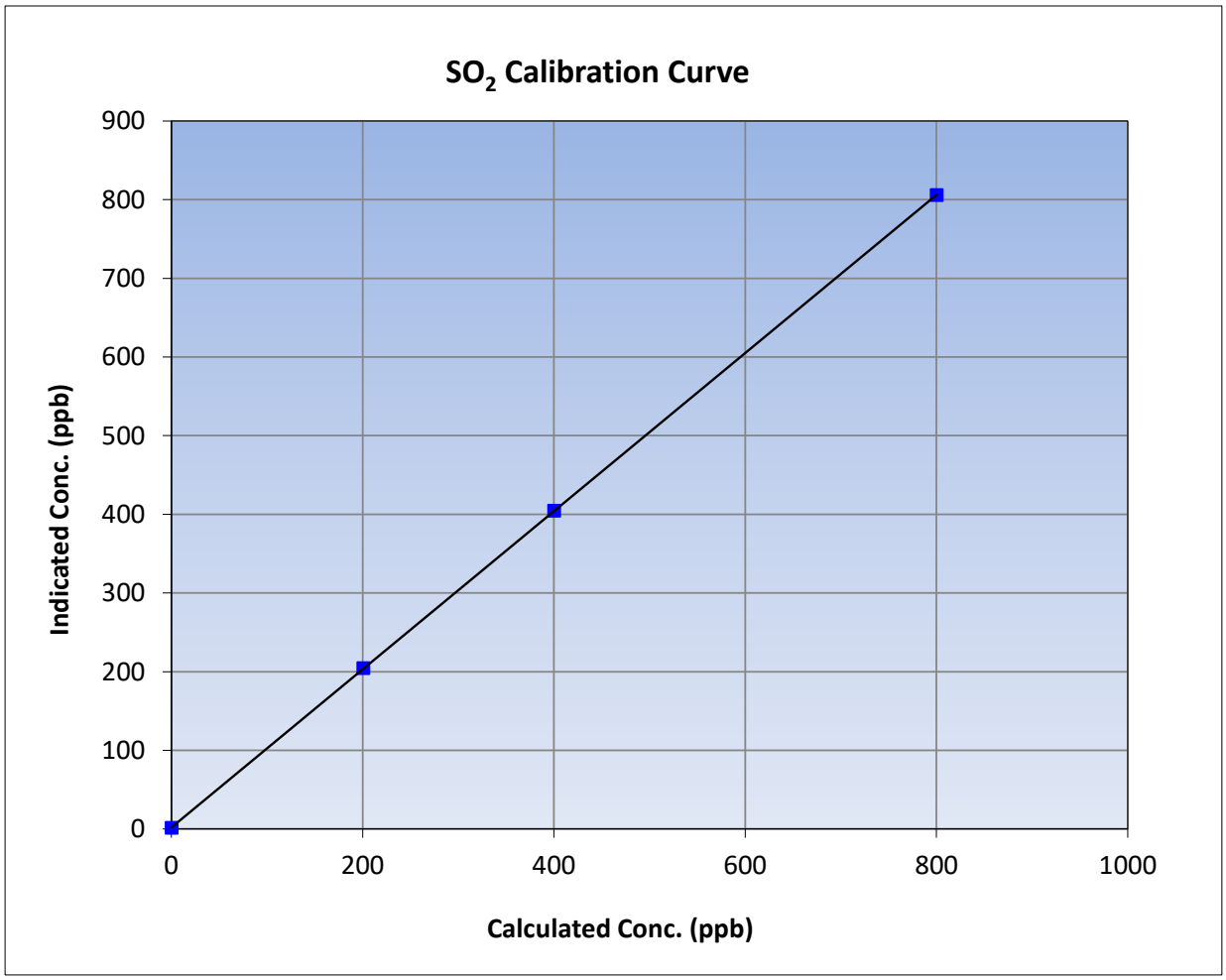
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Janvier | Station Number: | AMS 22 |
| Start Time (MST): | 10:00 | End Time (MST): | 13:26 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1152430006 |

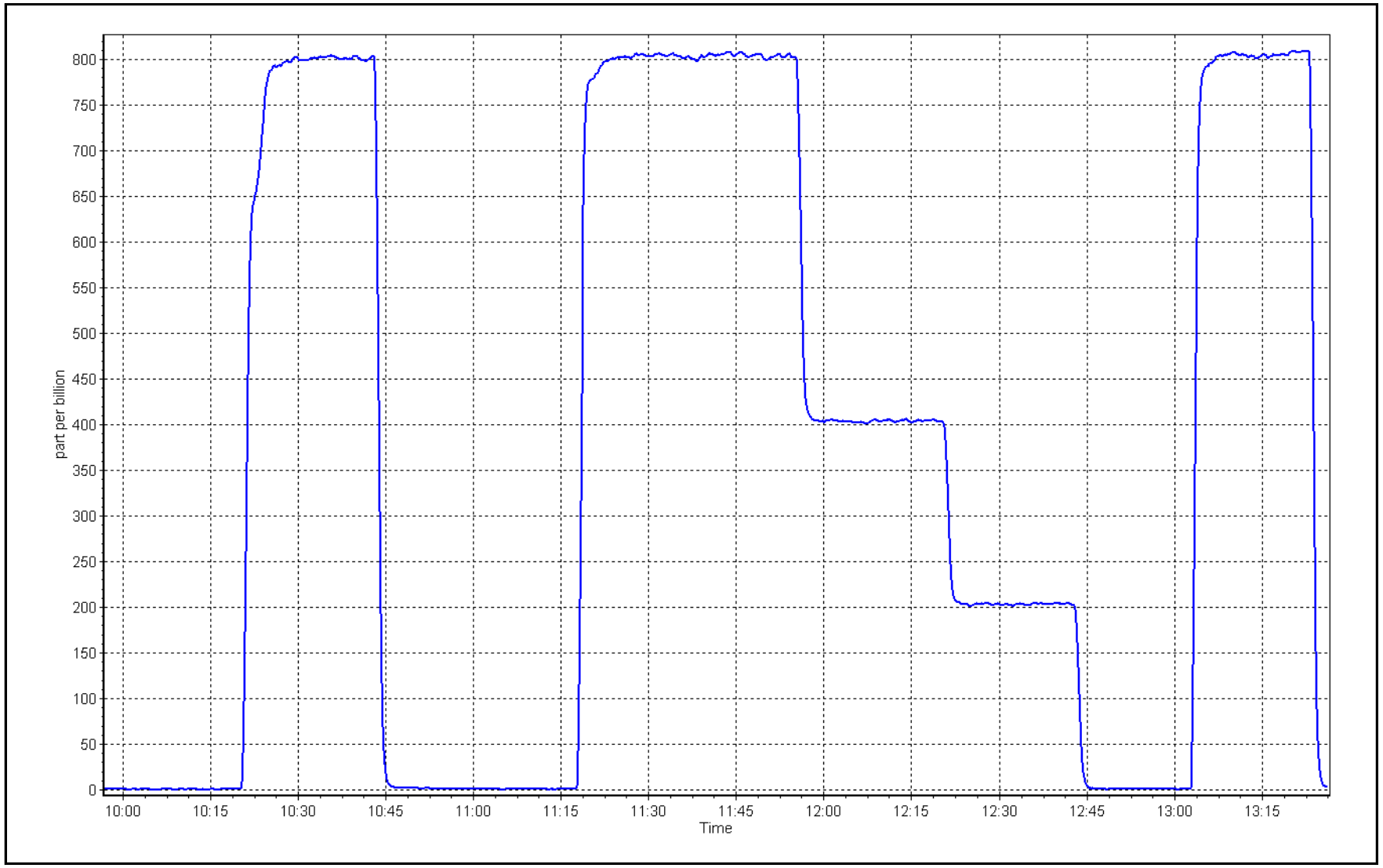
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 1.1 | ---- |
| 799.8 | 805.4 | 0.9930 |
| 399.9 | 404.3 | 0.9891 |
| 200.4 | 204.0 | 0.9825 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999996 | *≥0.995* |
| Slope | 1.005224 | *0.90 - 1.10* |
| Intercept | 1.843010 | *+/-30* |



**SO2 Calibration Plot** Date: August 23, 2023 Location: Janvier



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Janvier | Station number: | AMS22 |
| Calibration Date: | August 8, 2023 | Last Cal Date: | July 25, 2023 |
| Start time (MST): | 9:35 | End time (MST): | 13:52 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.03 | ppm | Cal Gas Exp Date: | April 16, 2022 |
| Cal Gas Cylinder #: | DT0018680 | | | |
| Removed Cal Gas Conc: | 5.03 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3806 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 4890 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43iQ-TLE | | Analyzer serial #: | 1200326169 | |
| Converter make: | CDN-101 | | Converter serial #: | 587 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.003363 | 1.004084 | Backgd or Offset: | 0.96 | 1.05 |
| Calibration intercept: | 0.020959 | 0.420700 | Coeff or Slope: | 0.880 | 0.965 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4920 | 79.5 | 80.0 | 73.0 | 1.096 |
| as found 2nd point | 4960 | 39.8 | 40.0 | 35.3 | 1.134 |
| as found 3rd point | 4980 | 19.9 | 20.0 | 17.4 | 1.151 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4920 | 79.5 | 80.0 | 80.5 | 0.994 |
| second point | 4960 | 39.8 | 40.0 | 41.0 | 0.977 |
| third point | 4980 | 19.9 | 20.0 | 20.7 | 0.967 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 4920 | 79.5 | 80.0 | 82.7 | 0.967 |
| SO2 Scrubber Check | 4920 | 79.8 | 798.0 | 0.0 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 0.979 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 73.0 | Prev response: | 80.27 | *% change: | -10.0% |
| Baseline Corr 2nd AF pt: | 35.3 | AF Slope: | 0.914618 | AF Intercept: | -0.596957 |
| Baseline Corr 3rd AF pt: | 17.4 | AF Correlation: | 0.999599 | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Ran a SO2 scrubber check after calibrator zero. Adjusted the span only. Diagnostics are normal, suspecting the change in humidity has caused the shift in span since last calibration.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

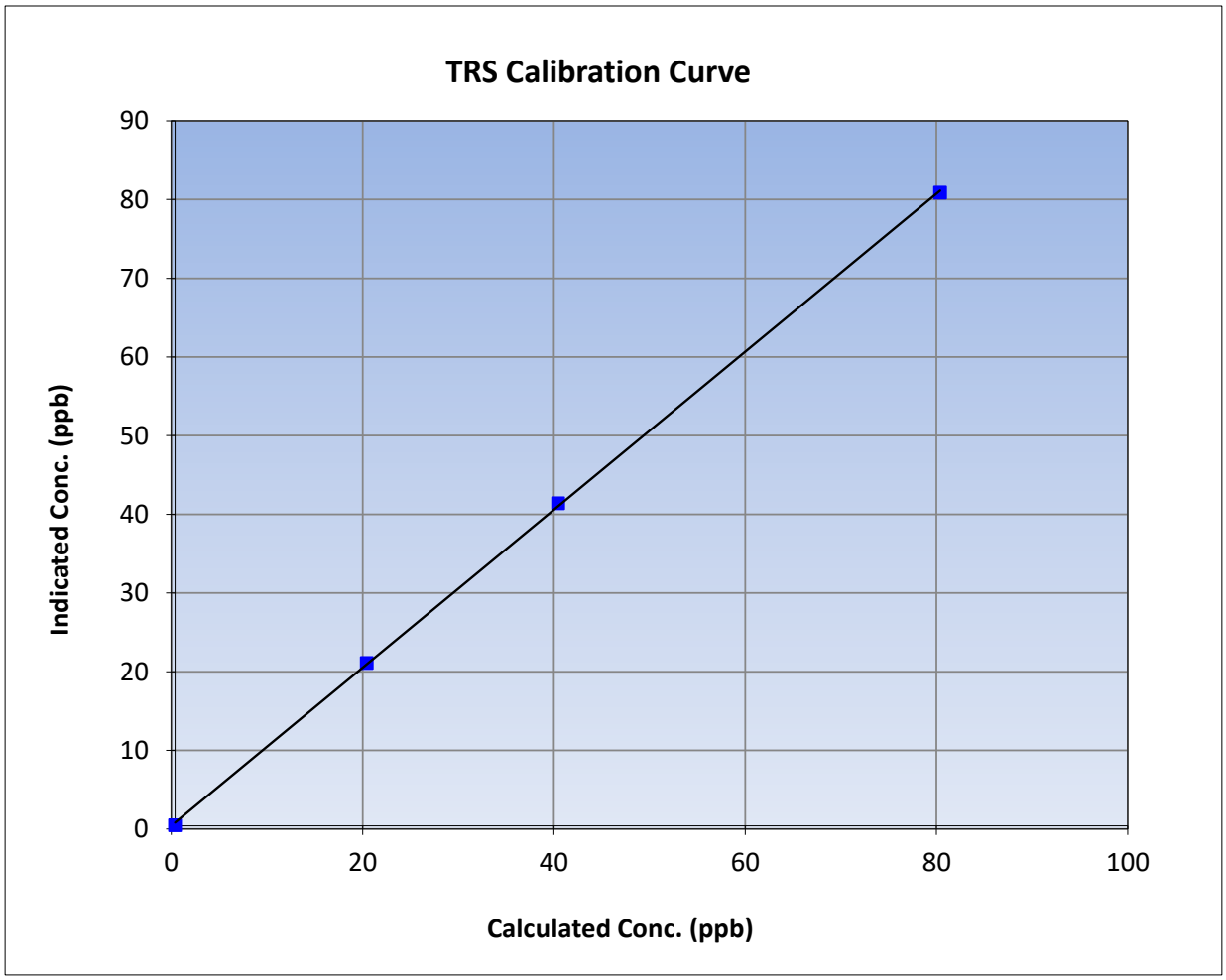
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Janvier | Station Number: | AMS22 |
| Start Time (MST): | 9:35 | End Time (MST): | 13:52 |
| Analyzer make: | Thermo 43iQ-TLE | Analyzer serial #: | 1200326169 |

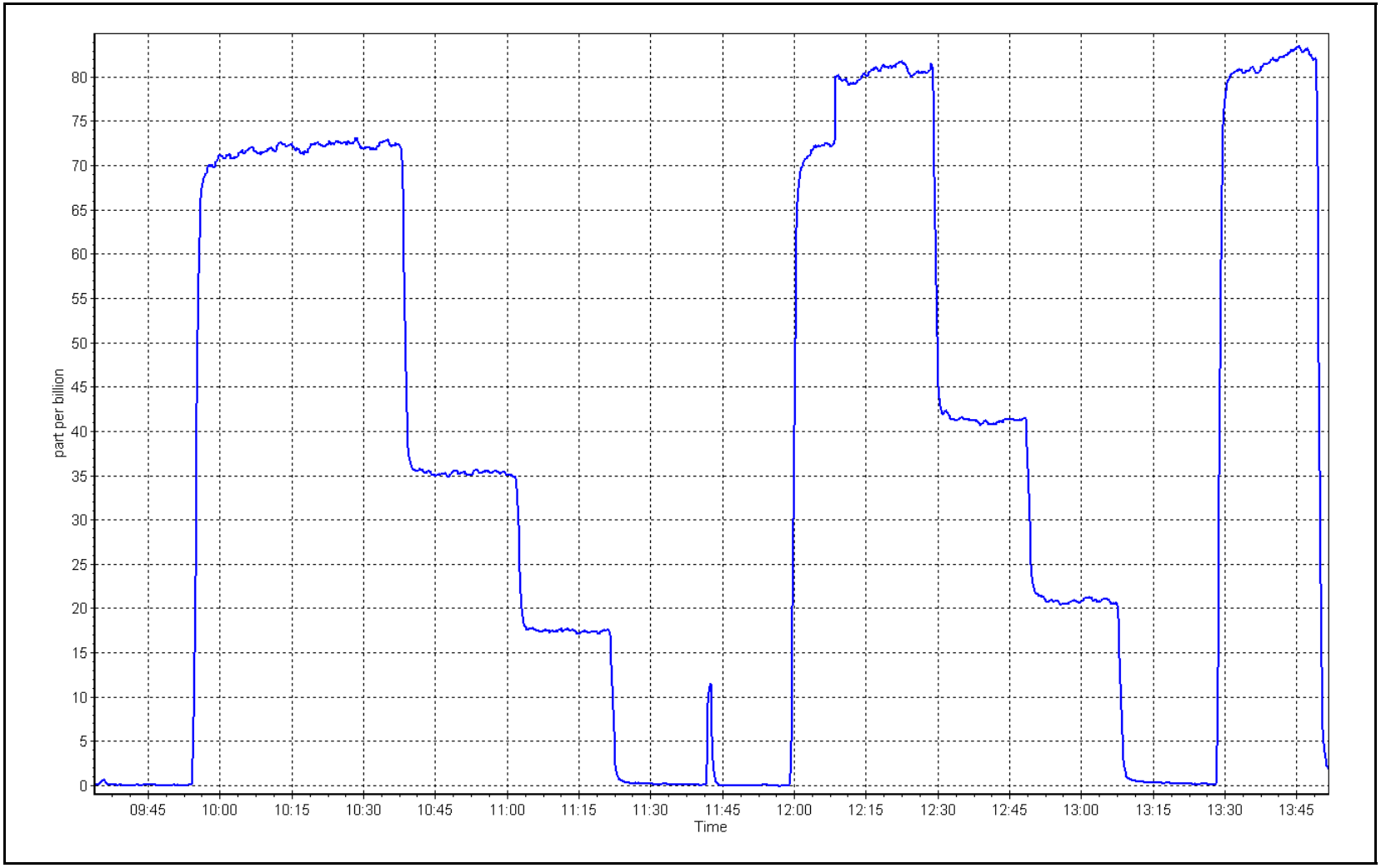
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 80.0 | 80.5 | 0.9936 |
| 40.0 | 41.0 | 0.9766 |
| 20.0 | 20.7 | 0.9671 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999907 | *≥0.995* |
| Slope | 1.004084 | *0.90 - 1.10* |
| Intercept | 0.420700 | *+/-3* |



**TRS Calibration Plot** Date: August 8, 2023 Location: Janvier



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Janvier | Station number: | AMS22 |
| Calibration Date: | August 29, 2023 | Last Cal Date: | August 8, 2023 |
| Start time (MST): | 9:46 | End time (MST): | 14:23 |
| Reason: | Maintenance | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.03 | ppm | Cal Gas Exp Date: | April 16, 2022 |
| Cal Gas Cylinder #: | DT0018680 | | | |
| Removed Cal Gas Conc: | 5.03 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 3806 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 4890 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43iQ-TLE | | Analyzer serial #: | 1200326169 | |
| Converter make: | CDN-101 | | Converter serial #: | 587 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.004084 | 1.004358 | Backgd or Offset: | 1.05 | 1.01 |
| Calibration intercept: | 0.420700 | -0.338889 | Coeff or Slope: | 0.965 | 0.926 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4920 | 79.5 | 80.0 | 78.8 | 1.015 |
| as found 2nd point | 4960 | 39.8 | 40.0 | 40.1 | 0.999 |
| as found 3rd point | 4980 | 19.9 | 20.0 | 19.6 | 1.021 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4920 | 79.5 | 80.0 | 80.2 | 0.997 |
| second point | 4960 | 39.8 | 40.0 | 39.7 | 1.009 |
| third point | 4980 | 19.9 | 20.0 | 19.3 | 1.037 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 4920 | 79.5 | 80.0 | 80.0 | 1.000 |
| SO2 Scrubber Check | 4920 | 79.8 | 798.0 | 0.0 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 1.014 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 78.8 | Prev response: | 80.73 | *% change: | -2.5% |
| Baseline Corr 2nd AF pt: | 40.1 | AF Slope: | 0.986651 | AF Intercept: | 0.081062 |
| Baseline Corr 3rd AF pt: | 19.6 | AF Correlation: | 0.999893 | | |

* = > +/-5% change initiates investigation

Notes: Daily spans have been getting lower every day and the response has been very slow. Changed the scrubber beads after multipoint as founds. Adjusted the span only.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

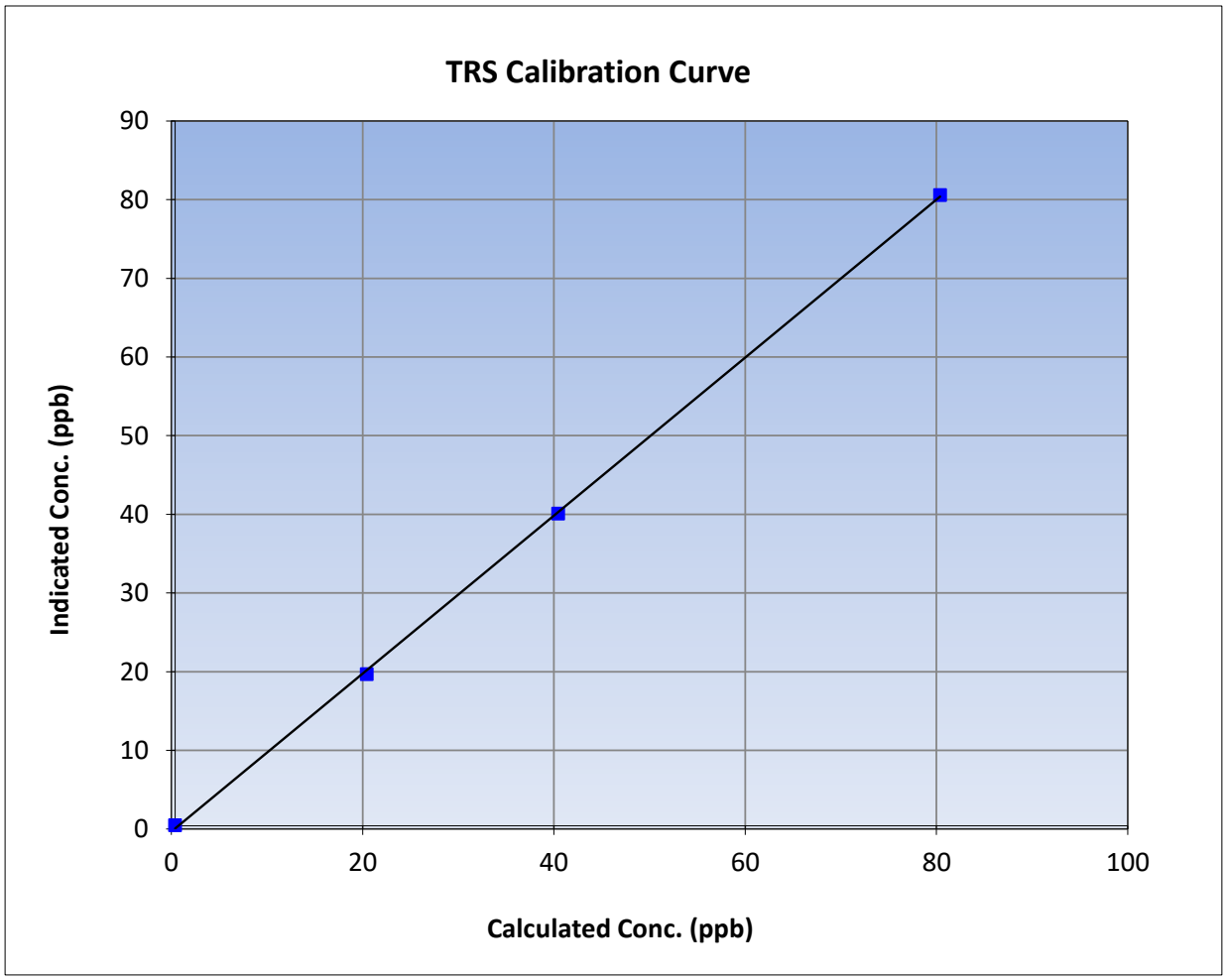
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 29, 2023 | Previous Calibration: | August 8, 2023 |
| Station Name: | Janvier | Station Number: | AMS22 |
| Start Time (MST): | 9:46 | End Time (MST): | 14:23 |
| Analyzer make: | Thermo 43iQ-TLE | Analyzer serial #: | 1200326169 |

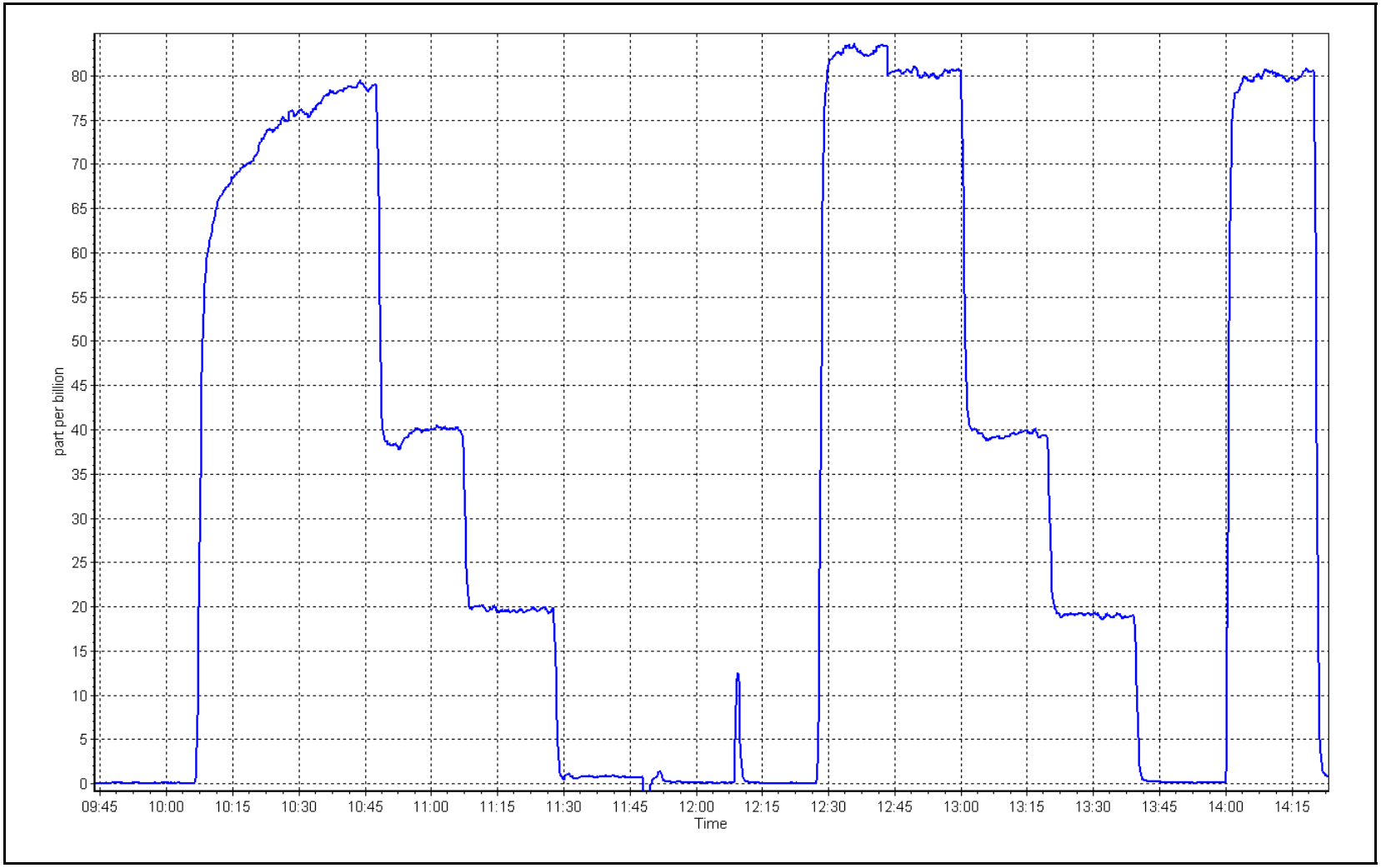
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 80.0 | 80.2 | 0.9973 |
| 40.0 | 39.7 | 1.0086 |
| 20.0 | 19.3 | 1.0373 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999863 | *≥0.995* |
| Slope | 1.004358 | *0.90 - 1.10* |
| Intercept | -0.338889 | *+/-3* |



**TRS Calibration Plot** Date: August 29, 2023 Location: Janvier



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Janvier | Station number: | AMS 22 |
| Calibration Date: | August 23, 2023 | Last Cal Date: | July 17, 2023 |
| Start time (MST): | 10:00 | End time (MST): | 13:27 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | CC281519 | | Cal Gas Expiry Date: | January 18, 2029 | |
| CH4 Cal Gas Conc. | 502.8 | ppm | CH4 Equiv Conc. | 1075.9 | ppm |
| C3H8 Cal Gas Conc. | 208.4 | ppm | | | |
| Removed Gas Cert: | | | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 502.8 | ppm | CH4 Equiv Conc. | 1075.9 | ppm |
| Removed C3H8 Conc. | 208.4 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | Teledyne API 700 | | Serial Number: | 3806 | |
| ZAG make/model: | Teledyne API 701 | | Serial Number: | 4890 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | | | Analyzer serial #: | | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.180E-04 | 2.190E-04 | NMHC SP Ratio: | 4.35E-05 | 4.39E-05 |
| CH4 Retention time: | 13.4 | 13.6 | NMHC Peak Area: | 210352 | 208229 |
| Zero Chromatogram: | OFF | OFF | Flat Baseline: | OFF | OFF |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 79.8 | 17.17 | 17.11 | 1.004 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 79.8 | 17.17 | 17.12 | 1.003 |
| second point | 4960 | 39.9 | 8.59 | 8.54 | 1.006 |
| third point | 4980 | 20.0 | 4.30 | 4.29 | 1.003 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 79.8 | 17.17 | 17.24 | 0.996 |
| | | | | Average Correction Factor | 1.004 |
| Baseline Corr AF: | 17.11 | Prev response | 17.27 | *% change | -0.9% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-06-2022

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 79.8 | 9.15 | 9.09 | 1.006 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 79.8 | 9.15 | 9.12 | 1.003 |
| second point | 4960 | 39.9 | 4.57 | 4.56 | 1.003 |
| third point | 4980 | 20.0 | 2.29 | 2.28 | 1.005 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 79.8 | 9.15 | 9.18 | 0.996 |
| | | | | Average Correction Factor | 1.004 |
| Baseline Corr AF: | 9.09 | Prev response | 9.13 | *% change | -0.4% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 79.8 | 8.03 | 8.02 | 1.000 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 79.8 | 8.03 | 8.01 | 1.002 |
| second point | 4960 | 39.9 | 4.01 | 3.98 | 1.009 |
| third point | 4980 | 20.0 | 2.01 | 2.01 | 1.000 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 79.8 | 8.03 | 8.06 | 0.996 |
| | | | | Average Correction Factor | 1.004 |
| Baseline Corr AF: | 8.02 | Prev response | 8.14 | *% change | -1.5% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.006073 | 0.997041 |
| THC Cal Offset: | -0.009020 | -0.005391 |
| CH4 Cal Slope: | 1.014274 | 0.996940 |
| CH4 Cal Offset: | 0.000208 | -0.003162 |
| NMHC Cal Slope: | 0.998891 | 0.997018 |
| NMHC Cal Offset: | -0.009028 | -0.002029 |

Notes: Changed the inlet filter and the H2 cylinder after as founds. Adjusted the span only.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## THC Calibration Summary

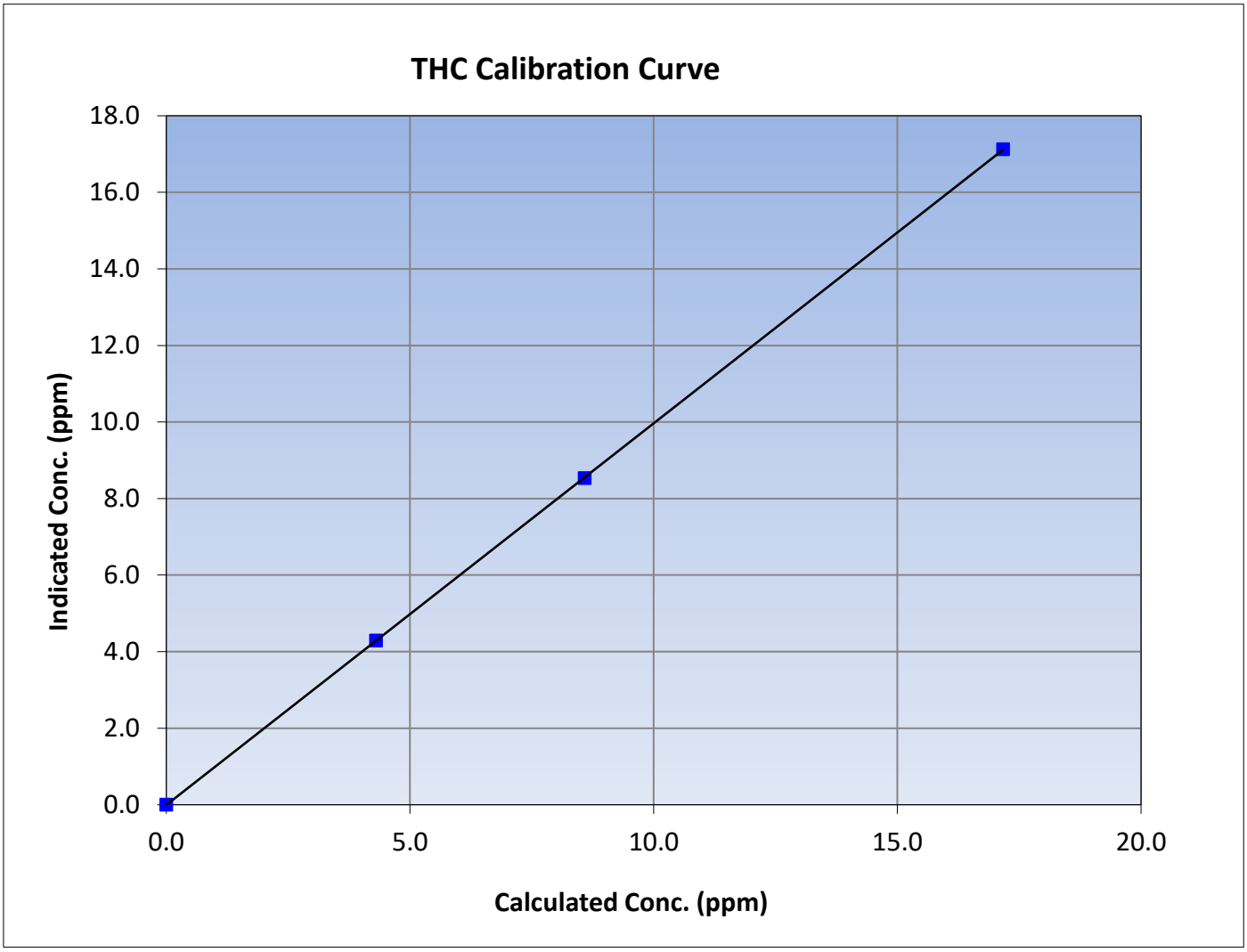
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Janvier | Station Number: | AMS 22 |
| Start Time (MST): | 10:00 | End Time (MST): | 13:27 |
| Analyzer make: | | Analyzer serial #: | |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999997 | *≥0.995* |
| 17.17 | 17.12 | 1.0028 | | | |
| 8.59 | 8.54 | 1.0058 | Slope | 0.997041 | *0.90 - 1.10* |
| 4.30 | 4.29 | 1.0029 | | | |
| | | | Intercept | -0.005391 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

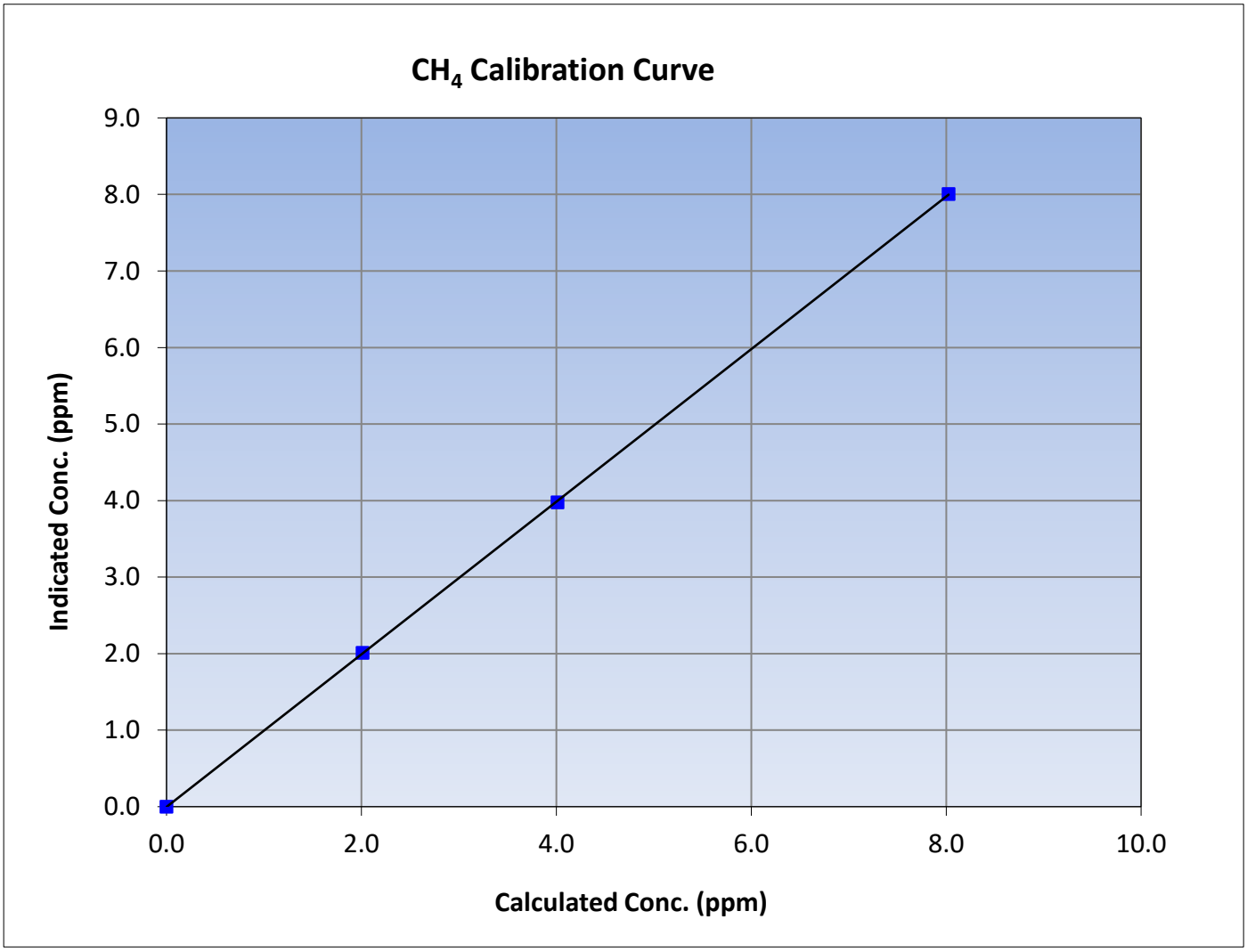
Version-06-2022

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Janvier | Station Number: | AMS 22 |
| Start Time (MST): | 10:00 | End Time (MST): | 13:27 |
| Analyzer make: | | Analyzer serial #: | |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999984 | *≥0.995* |
| 8.03 | 8.01 | 1.0025 | | | |
| 4.01 | 3.98 | 1.0089 | Slope | 0.996940 | *0.90 - 1.10* |
| 2.01 | 2.01 | 1.0001 | | | |
| | | | Intercept | -0.003162 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

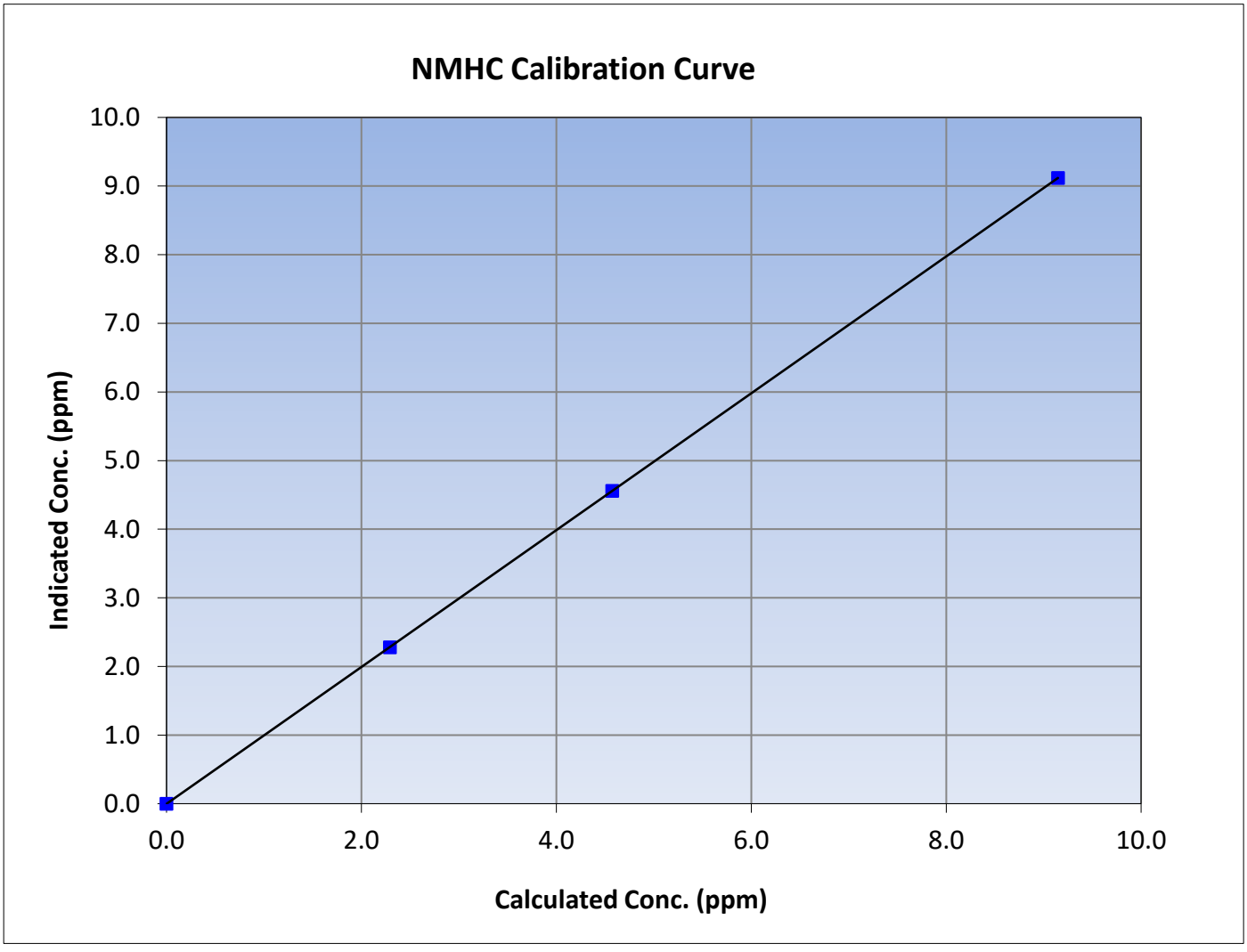
Version-06-2022

### Station Information

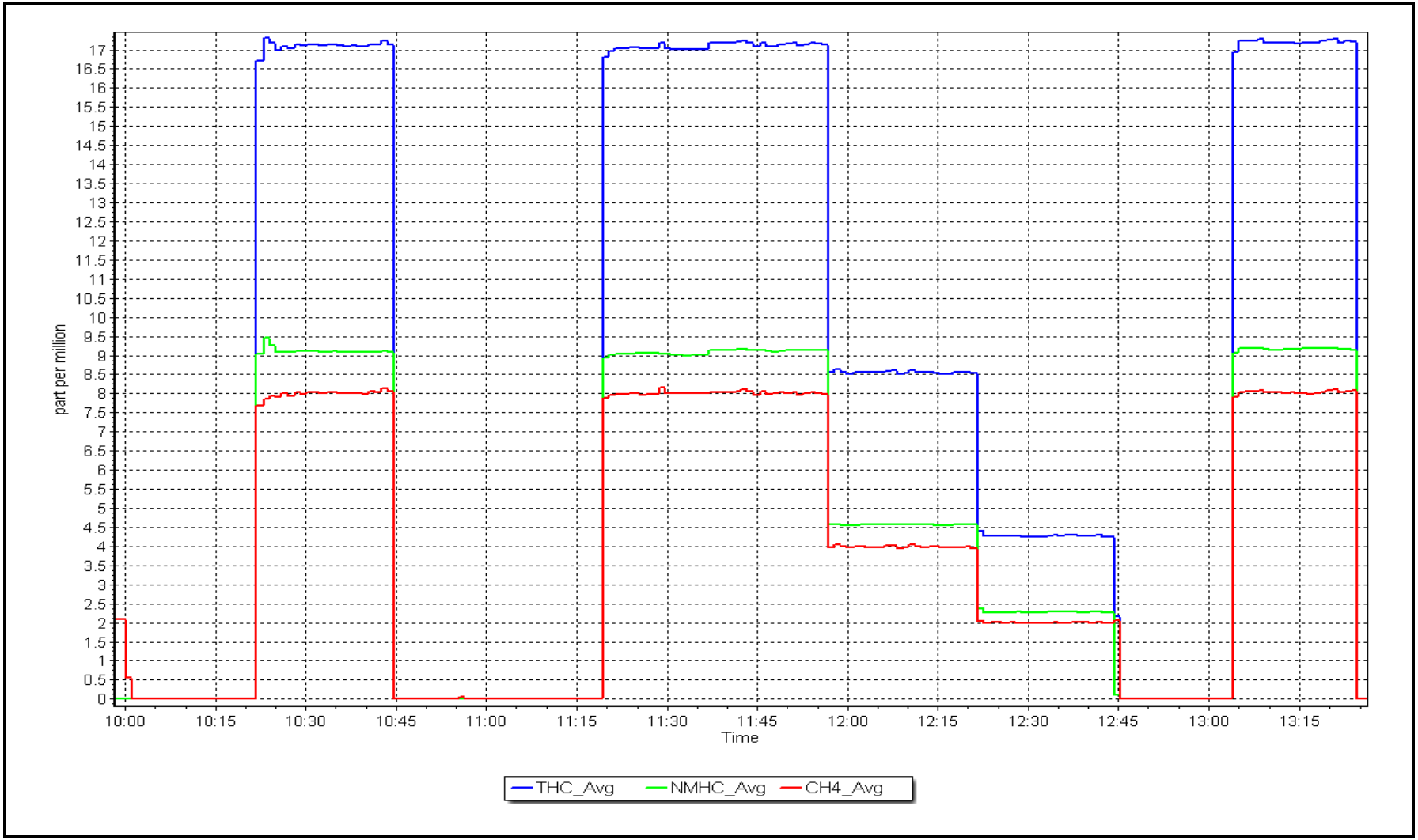
| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Janvier | Station Number: | AMS 22 |
| Start Time (MST): | 10:00 | End Time (MST): | 13:27 |
| Analyzer make: | | Analyzer serial #: | |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | *≥0.995* |
| 9.15 | 9.12 | 1.0032 | | | |
| 4.57 | 4.56 | 1.0032 | Slope | 0.997018 | *0.90 - 1.10* |
| 2.29 | 2.28 | 1.0054 | | | |
| | | | Intercept | -0.002029 | *+/-0.5* |



**NMHC Calibration Plot** Date: August 23, 2023 Location: Janvier



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Janvier | Station number: | AMS 22 |
| Calibration Date: | August 16, 2023 | Last Cal Date: | July 19, 2023 |
| Start time (MST): | 9:58 | End time (MST): | 14:36 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | CC424183 | | Cal Gas Expiry Date: | April 16, 2023 | |
| NOX Cal Gas Conc: | 48.60 | ppm | NO Cal Gas Conc: | 48.60 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 48.60 | ppm | Removed Gas NO Conc: | 48.60 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 3806 | |
| ZAG make/model: | Teledyne API T701 | | Serial Number: | 201 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | API T200 | Analyzer serial #: | 833 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 0.808 | 0.808 | NO bkgnd or offset: | -5.6 | -5.6 |
| NOX coeff or slope: | 0.799 | 0.799 | NOX bkgnd or offset: | -3.9 | -3.9 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 5.0 | 5.0 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.997788 | 0.995773 |
| $NO_X$ Cal Offset: | 2.208515 | 2.689123 |
| NO Cal Slope: | 0.999902 | 0.994314 |
| NO Cal Offset: | 1.168443 | 1.949881 |
| $NO_2$ Cal Slope: | 0.994081 | 1.001315 |
| $NO_2$ Cal Offset: | -0.360935 | -0.151118 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 1.7 | -0.4 | ---- | ---- |
| as found span | 4918 | 82.3 | 799.9 | 799.9 | 0.0 | 796.9 | 792.5 | 4.4 | 1.0038 | 1.0093 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 2.3 | -0.4 | ---- | ---- |
| high point | 4918 | 82.3 | 799.9 | 799.9 | 0.0 | 798.7 | 797.3 | 1.4 | 1.0015 | 1.0033 |
| second point | 4959 | 41.2 | 400.4 | 400.4 | 0.0 | 402.2 | 400.5 | 1.7 | 0.9956 | 0.9999 |
| third point | 4980 | 20.6 | 200.2 | 200.2 | 0.0 | 202.6 | 200.3 | 2.3 | 0.9882 | 0.9995 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 2.7 | -0.8 | ---- | ---- |
| as left span | 4918 | 82.3 | 799.9 | 355.2 | 444.7 | 794.9 | 352.0 | 442.9 | 1.0063 | 1.0091 |
| | | | | | | | | Average Correction Factor | 0.9951 | 1.0009 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 795.6 ppb | NO = 790.8 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = -0.6% |
| Previous Response | $NO_X$ = 800.3 ppb | NO = 801.0 ppb | | *Percent Change | NO = -1.3% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 794.9 | 350.2 | 444.7 | 444.7 | 1.0000 | 100.0% |
| 2nd GPT point (200 ppb O3) | 794.9 | 585.0 | 209.9 | 211.2 | 0.9938 | 100.6% |
| 3rd GPT point (100 ppb O3) | 794.9 | 685.7 | 109.2 | 108.7 | 1.0046 | 99.5% |
| | | | | Average Correction Factor | 0.9995 | 100.1% |

Notes: Changed the inlet filter after as founds. No adjustments made.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

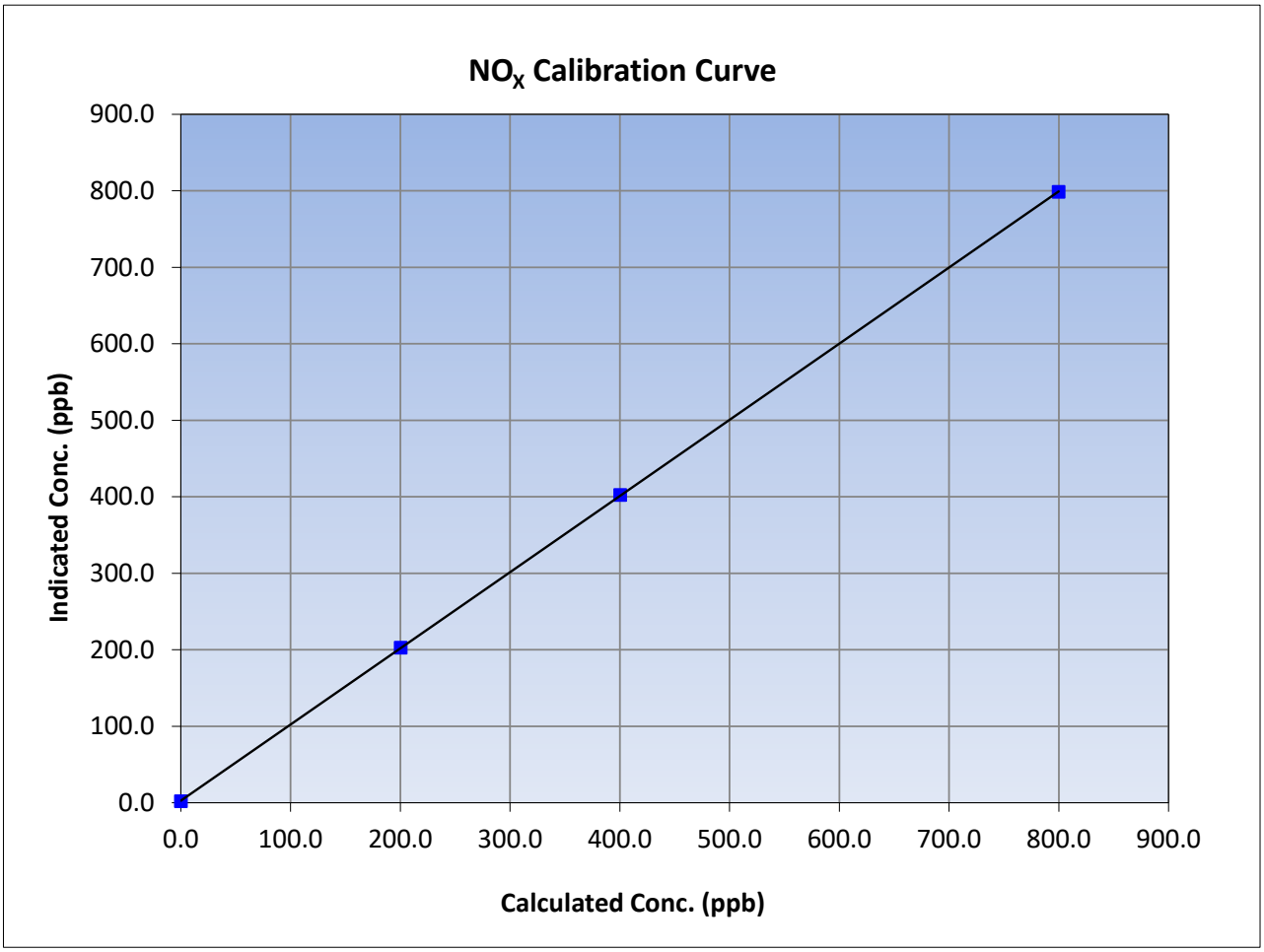
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Janvier | Station Number: | AMS 22 |
| Start Time (MST): | 9:58 | End Time (MST): | 14:36 |
| Analyzer make: | API T200 | Analyzer serial #: | 833 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 1.9 | ---- | Correlation Coefficient | 0.999995 | ≥0.995 |
| 799.9 | 798.7 | 1.0015 | | | |
| 400.4 | 402.2 | 0.9956 | Slope | 0.995773 | 0.90 - 1.10 |
| 200.2 | 202.6 | 0.9882 | | | |
| | | | Intercept | 2.689123 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

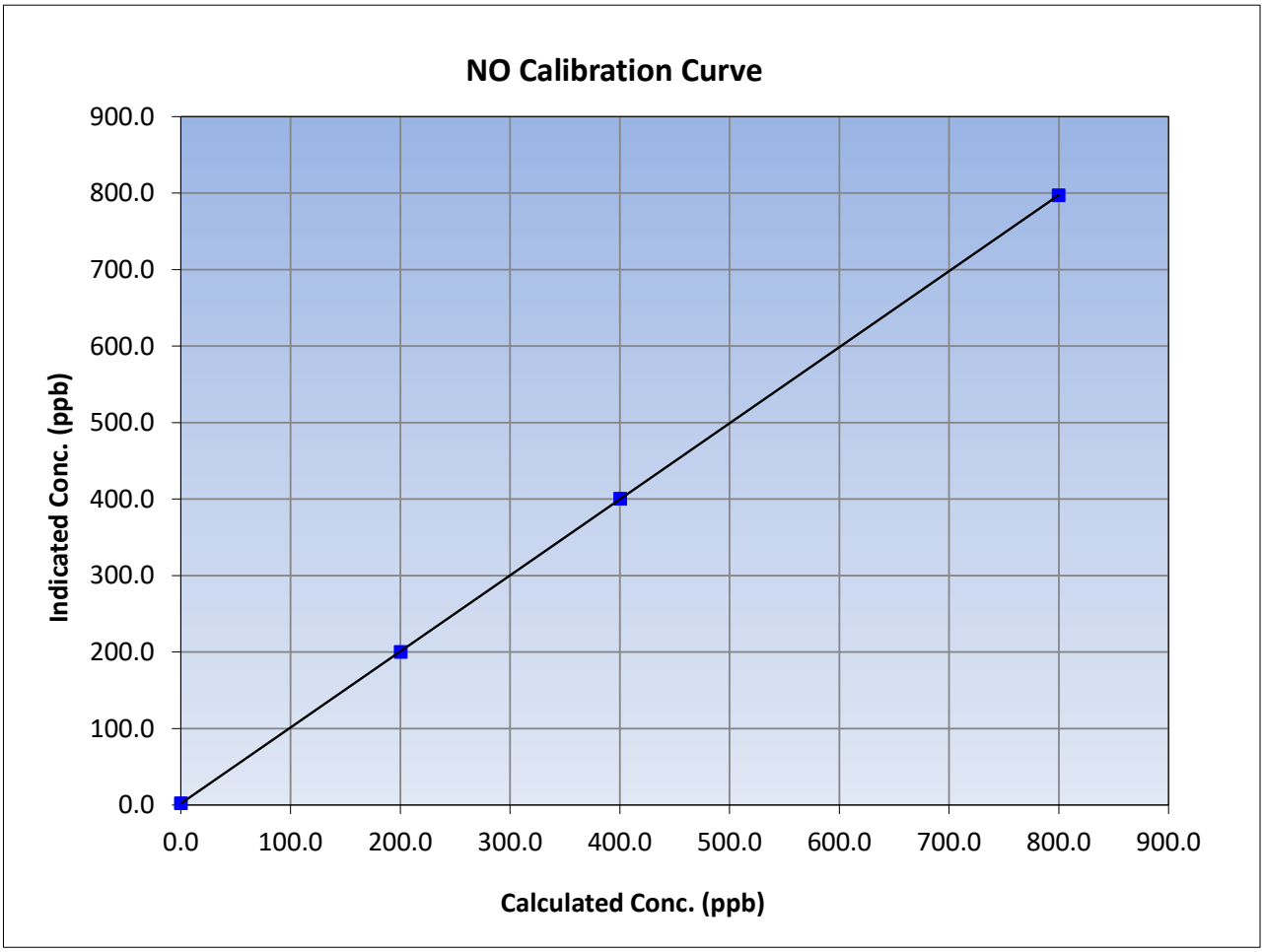
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Janvier | Station Number: | AMS 22 |
| Start Time (MST): | 9:58 | End Time (MST): | 14:36 |
| Analyzer make: | API T200 | Analyzer serial #: | 833 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 2.3 | ---- | Correlation Coefficient | 0.999998 | ≥0.995 |
| 799.9 | 797.3 | 1.0033 | | | |
| 400.4 | 400.5 | 0.9999 | Slope | 0.994314 | 0.90 - 1.10 |
| 200.2 | 200.3 | 0.9995 | | | |
| | | | Intercept | 1.949881 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

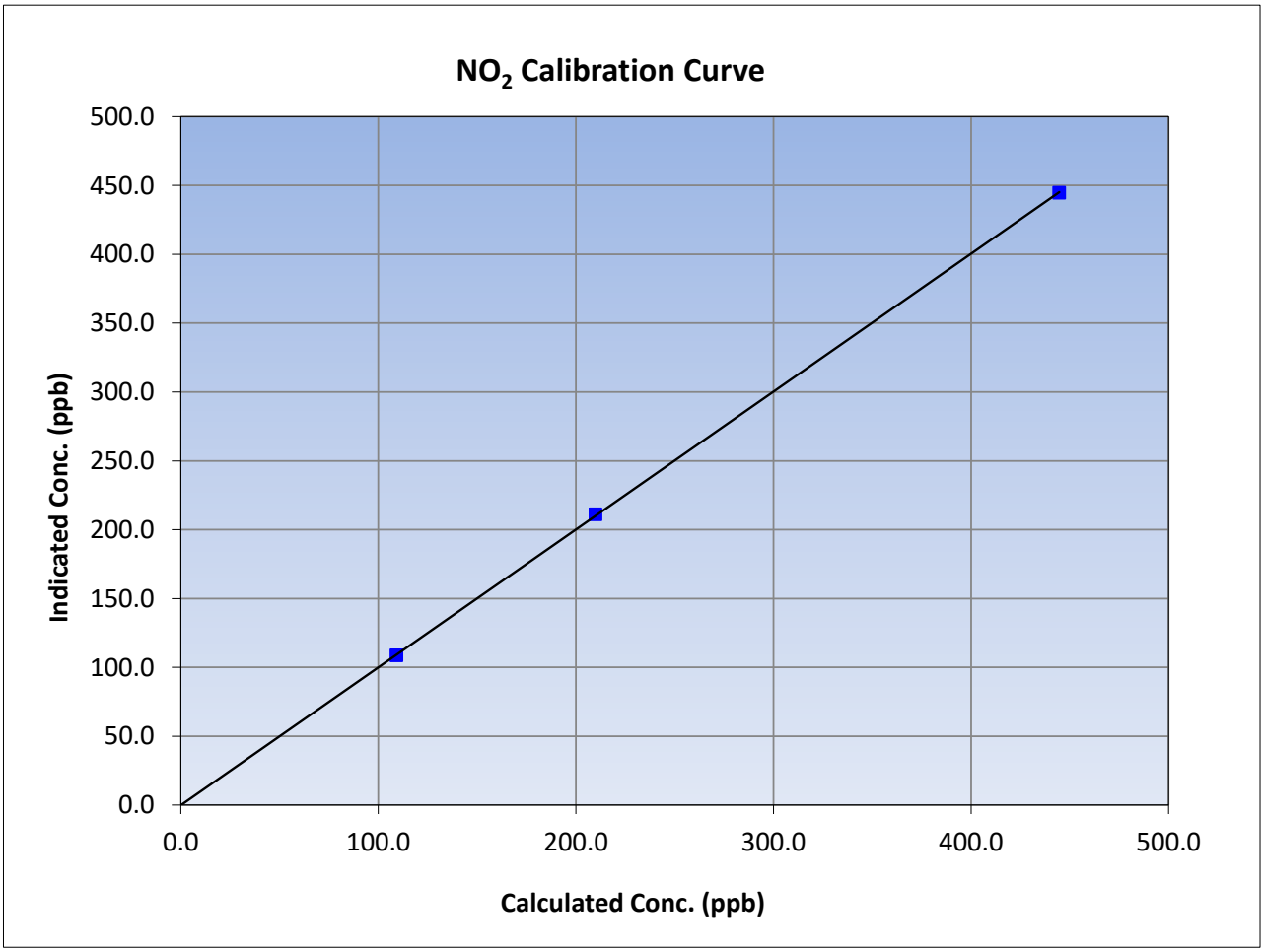
Version-04-2020

### Station Information

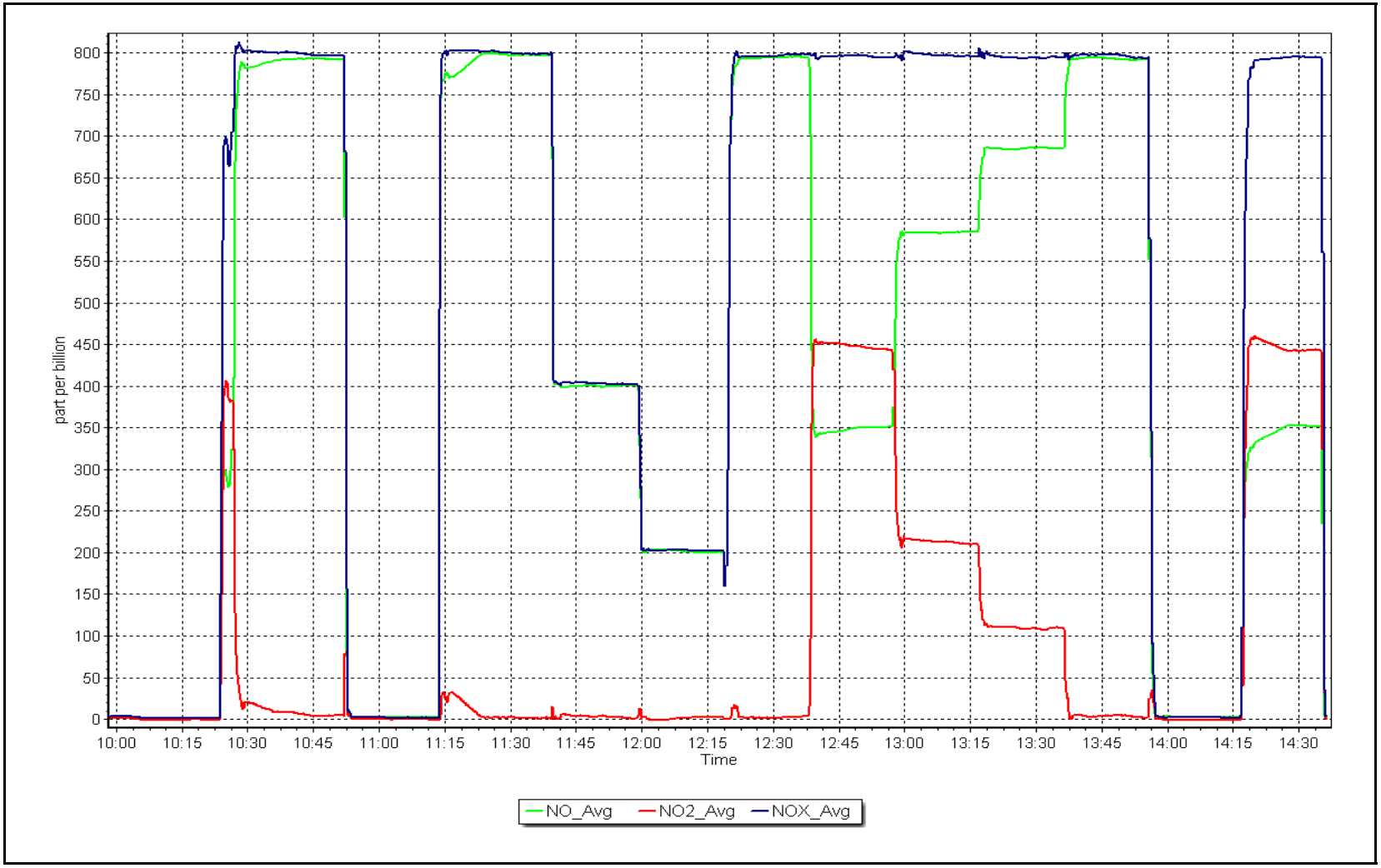
| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Janvier | Station Number: | AMS 22 |
| Start Time (MST): | 9:58 | End Time (MST): | 14:36 |
| Analyzer make: | API T200 | Analyzer serial #: | 833 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.4 | ---- | Correlation Coefficient | 0.999983 | ≥0.995 |
| 444.7 | 444.7 | 1.0000 | | | |
| 209.9 | 211.2 | 0.9938 | Slope | 1.001315 | 0.90 - 1.10 |
| 109.2 | 108.7 | 1.0046 | | | |
| | | | Intercept | -0.151118 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 16, 2023 Location: Janvier



# Wood Buffalo Environmental Association

## $O_3$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Janvier | Station number: | AMS 22 |
| Calibration Date: | August 18, 2023 | Last Cal Date: | July 26, 2023 |
| Start time (MST): | 9:49 | End time (MST): | 13:29 |
| Reason: | Routine | | |

### Calibration Standards

| | | | |
|---|---|---|---|
| O3 generation mode: | Photometer | | |
| Calibrator Make/Model: | Teledyne API T700 | Serial Number: | 3806 |
| ZAG Make/Model: | Teledyne API T701H | Serial Number: | 201 |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Teledyne API T400 | Analyzer serial #: | 7046 |
| Analyzer Range | 0 - 500 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 0.999714 | 1.001114 | Backgd or Offset: | -0.1 | -0.1 |
| Calibration intercept: | 2.000000 | 2.780000 | Coeff or Slope: | 0.953 | 0.922 |

### $O_3$ Calibration Data

| Set Point | Total air flow rate (sccm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 800.0 | 0.0 | 0.2 | ---- |
| as found span | 4895 | 904.3 | 400.0 | 414.7 | 0.965 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| calibrator zero | 5000 | 800.0 | 0.0 | 0.6 | ---- |
| high point | 4895 | 904.3 | 400.0 | 402.1 | 0.995 |
| second point | 4895 | 756.7 | 200.0 | 204.2 | 0.979 |
| third point | 4895 | 656.1 | 100.0 | 105.0 | 0.952 |
| as left zero | 5000 | 800.0 | 0.0 | 0.9 | ---- |
| as left span | 4895 | 904.3 | 400.0 | 402.1 | 0.995 |
| | | | | Average Correction Factor | 0.976 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 414.5 | Previous response | 401.9 | *% change | 3.0% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Adjusted the span only.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $O_3$ Calibration Summary

Version-01-2020

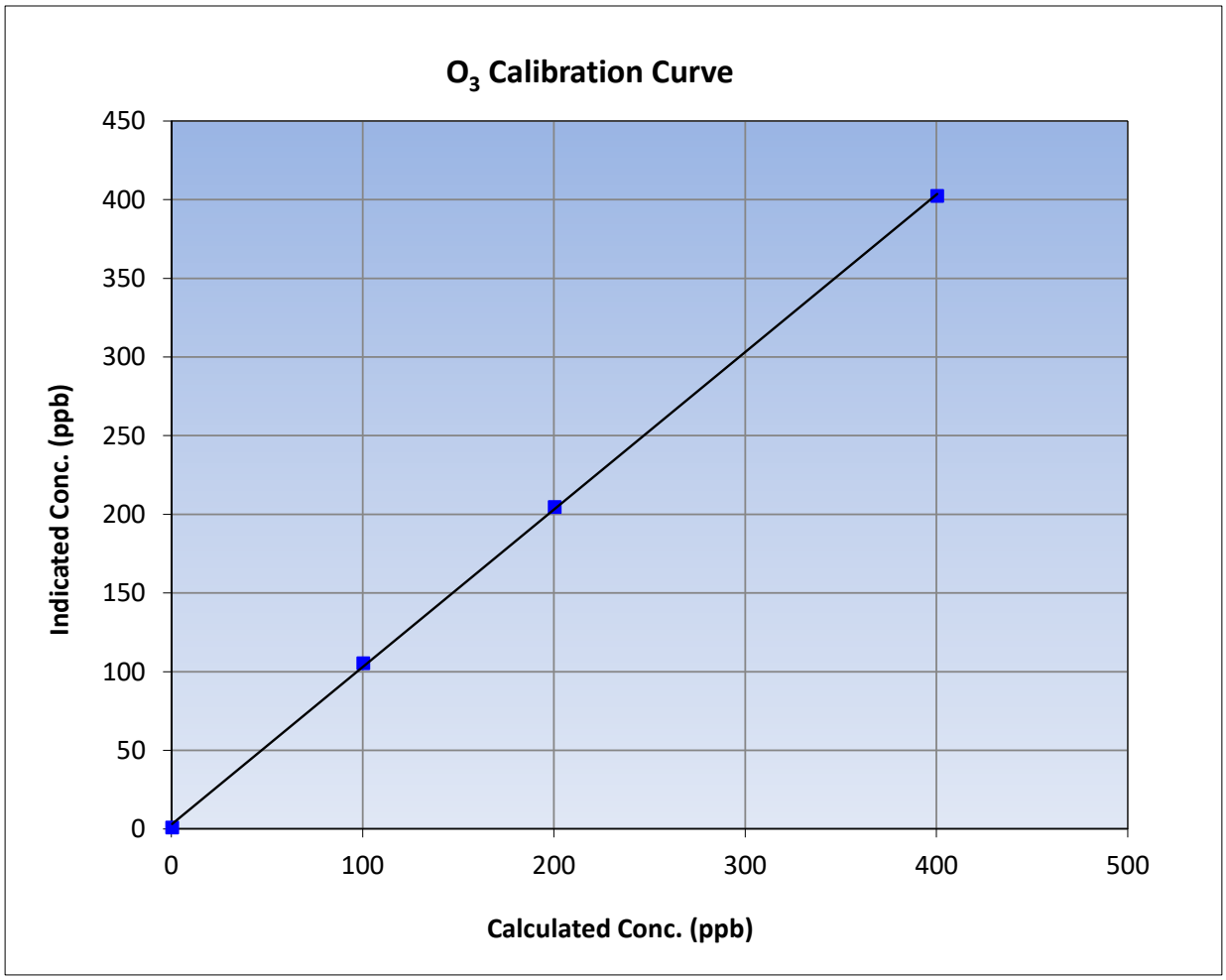
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 18, 2023 | Previous Calibration: | July 26, 2023 |
| Station Name: | Janvier | Station Number: | AMS 22 |
| Start Time (MST): | 9:49 | End Time (MST): | 13:29 |
| Analyzer make: | Teledyne API T400 | Analyzer serial #: | 7046 |

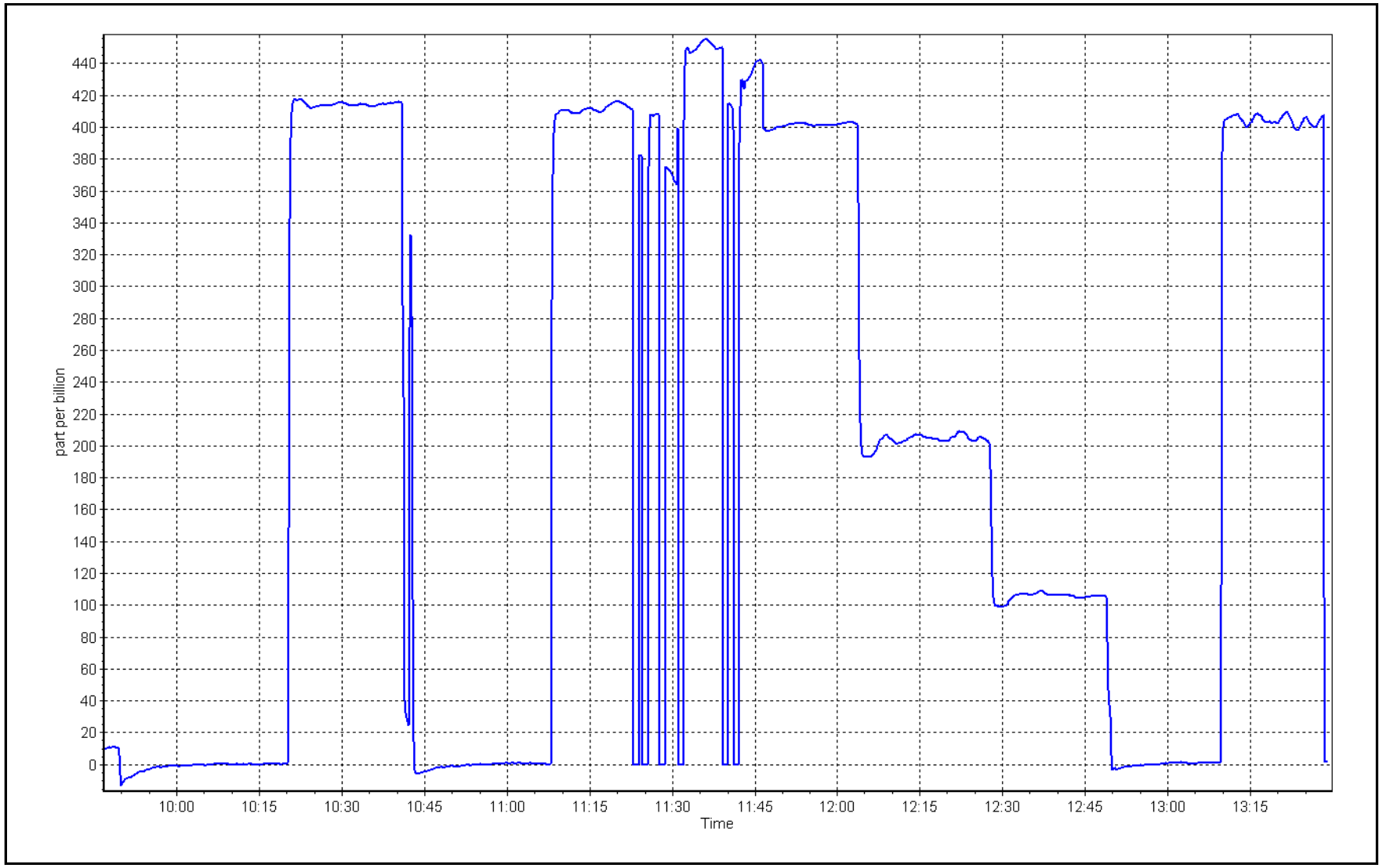
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.6 | ---- |
| 400.0 | 402.1 | 0.9948 |
| 200.0 | 204.2 | 0.9794 |
| 100.0 | 105.0 | 0.9524 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999864 | *≥0.995* |
| Slope | 1.001114 | *0.90 - 1.10* |
| Intercept | 2.780000 | *+/- 5* |



**$O_3$ Calibration Plot** Date: August 18, 2023 Location: Janvier



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Janvier | Station number: | AMS 22 |
| Calibration Date: | August 23, 2023 | Last Cal Date: | July 26, 2023 |
| Start time (MST): | 14:00 | End time (MST): | 14:19 |
| Analyzer Make: | Teledyne API T640 | S/N: | 325 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Delta Cal | S/N: | 1450 |
| Temp/RH standard: | Delta Cal | S/N: | 1450 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T ($^{o}$C) | 20.9 | 21 | 20.9 | ☐ | +/- 2 $^{o}$C |
| P (mmHg) | 716.1 | 716.6 | 716.1 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.01 | 4.95 | 5.01 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 23, 2023 Last Cal Date: July 26, 2023

PM w/o HEPA: 8.4 PM w/ HEPA: 0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☐

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | | | | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____

Date Optical Chamber Cleaned: July 26, 2023 <0.2 ug/m3

Disposable Filter Changed: July 26, 2023

### Annual Maintenance

Date Sample Tube Cleaned: July 26, 2023

Date RH/T Sensor Cleaned: July 26, 2023

Notes:

No adjustments needed. Leak check passed.

Calibration by: Max Farrell

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Janvier | Station Number: | AMS 22 |
| Calibration Date: | August 24, 2023 | Prev Cal Date: | September 30, 2022 |
| Start Time (MST): | 11:00 | End Time (MST): | 11:11 |
| Tower Height (m): | 20.0 | Reason: | Removal |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | B10017 |
| WS Calibrator: | MetOne 053 | Serial Number: | P15103 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.3 | 0.5% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | 0.0% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999999 | 0.999999 | *≥0.9995* |
| Calculated slope | 0.999473 | 0.999594 | *0.90 - 1.10* |
| Calculated intercept | 0.026227 | -0.028293 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | A23969 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | 13:25 | Calc Declination*: | 13.02 Degrees |
| Deadband calc: | -2.3 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 0.0 | --- |
| 90 | 86.1 | -1.1% |
| 180 | 176.3 | -1.0% |
| 270 | 273.2 | 0.9% |
| 357 | 359.3 | 0.6% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999770 | 0.999819 | *≥0.9995* |
| Calculated slope | 1.004979 | 0.986918 | *0.90 - 1.10* |
| Calculated intercept | -0.912418 | 2.766146 | *+/- 4* |

Notes: Removing old WS/WD sensors, WD sensor was outside of acceptable limits.

Calibration Performed By: Rene Chamberland & Devin Russell

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Janvier | Station Number: | AMS 22 |
| Calibration Date: | August 24, 2023 | Prev Cal Date: | September 30, 2022 |
| Start Time (MST): | 10:10 | End Time (MST): | 10:23 |
| Tower Height (m): | 20.0 | Reason: | Install |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | P22393 |
| WS Calibrator: | MetOne 053 | Serial Number: | P15103 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.3 | 0.5% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | 0.0% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999999 | *≥0.9995* |
| Calculated slope | | 0.999594 | *0.90 - 1.10* |
| Calculated intercept | | -0.028293 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | D14054 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | 13:25 | Calc Declination*: | 13.02 Degrees |
| Deadband calc: | 1.7 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 0.0 | --- |
| 90 | 88.1 | -0.5% |
| 180 | 179.1 | -0.2% |
| 270 | 270.2 | 0.0% |
| 357 | 355.3 | -0.5% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999979 | *≥0.9995* |
| Calculated slope | | 1.001480 | *0.90 - 1.10* |
| Calculated intercept | | 0.582167 | *+/- 4* |

Notes: Installing new WS/WD sensors. Crossarm aligned with true north. No issues to note.

Calibration Performed By: Rene Chamberland & Devin Russell

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS23
## FORT HILLS
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Hills | Station number: | AMS23 |
| Calibration Date: | August 10, 2023 | Last Cal Date: | July 10, 2023 |
| Start time (MST): | 9:26 | End time (MST): | 12:20 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.76 | ppm | Cal Gas Exp Date: | January 5, 2025 |
| Cal Gas Cylinder #: | CC281425 | | | |
| Removed Cal Gas Conc: | 49.76 | ppm | Rem Gas Exp Date: | N/A |
| Removed Gas Cyl #: | N/A | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 451 |
| ZAG Make/Model: | API T701 | | Serial Number: | 5611 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290012

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.002525 | 1.000337 | Backgd or Offset: | 17.8 | 17.8 |
| Calibration intercept: | -0.604149 | -0.563797 | Coeff or Slope: | 1.040 | 1.040 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 4920 | 80.3 | 799.1 | 798.2 | 1.001 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4920 | 80.3 | 799.1 | 798.9 | 1.000 |
| second point | 4960 | 40.2 | 400.1 | 399.8 | 1.001 |
| third point | 4980 | 20.1 | 200.0 | 198.8 | 1.006 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4920 | 80.3 | 799.1 | 798.5 | 1.001 |
| | | | | Average Correction Factor | 1.002 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 798.40 | Previous response | 800.51 | *% change | -0.3% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. No adjustments made.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

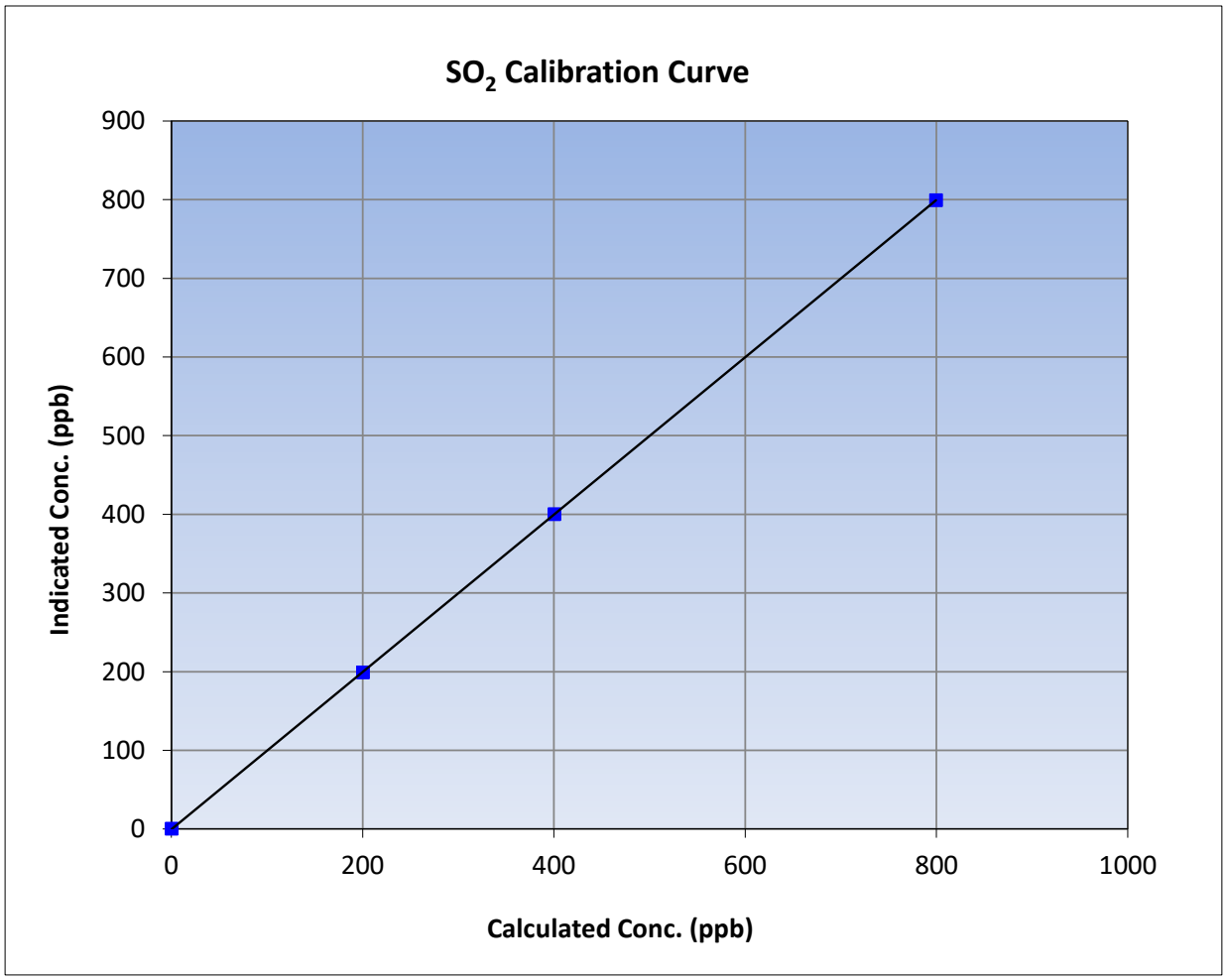
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 10, 2023 |
| Station Name: | Fort Hills | Station Number: | AMS23 |
| Start Time (MST): | 9:26 | End Time (MST): | 12:20 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1160290012 |

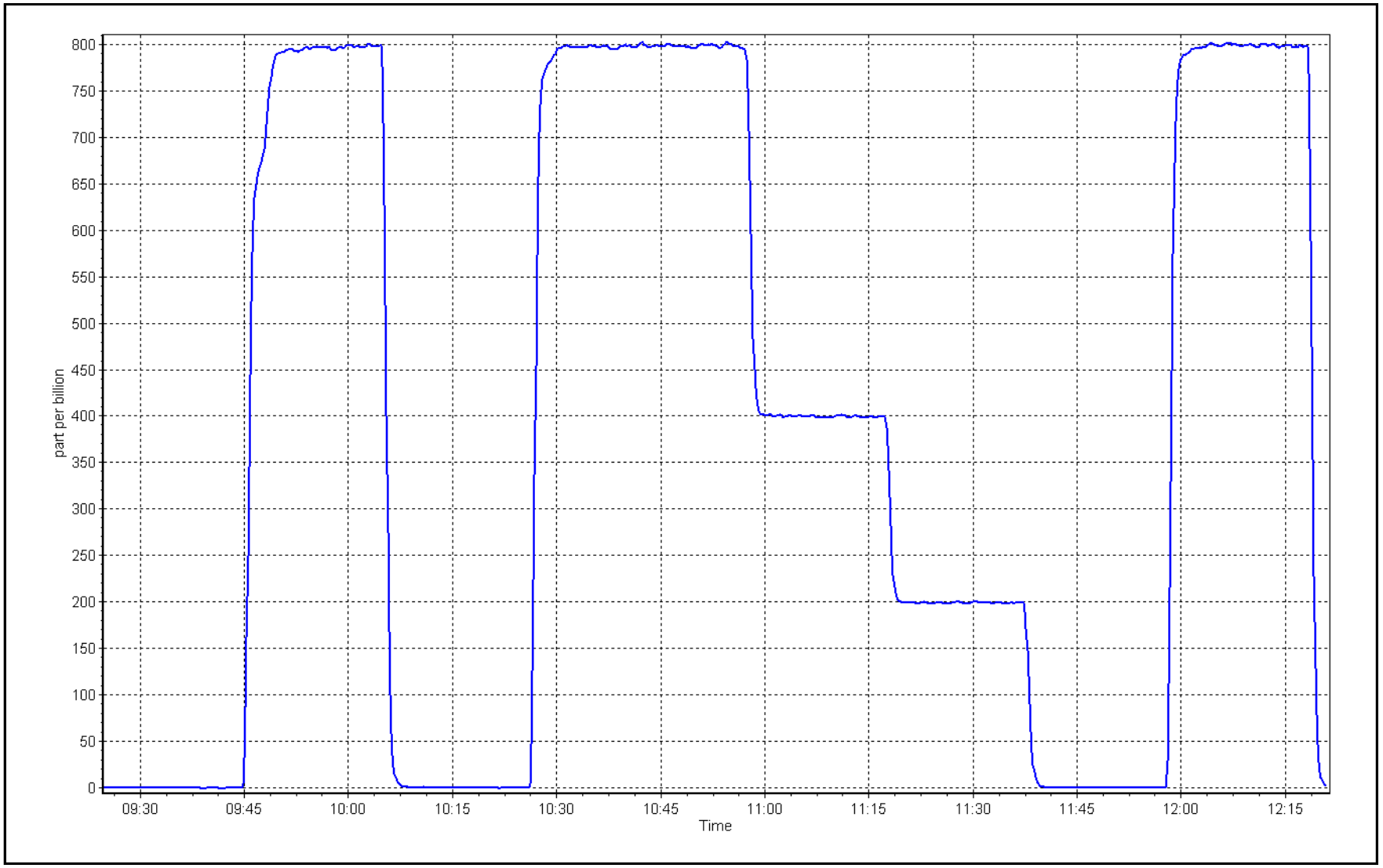
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 799.1 | 798.9 | 1.0002 |
| 400.1 | 399.8 | 1.0006 |
| 200.0 | 198.8 | 1.0062 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999998 | *≥0.995* |
| Slope | 1.000337 | *0.90 - 1.10* |
| Intercept | -0.563797 | *+/-30* |



**SO2 Calibration Plot** Date: August 10, 2023 Location: Fort Hills



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Hills | Station number: | AMS23 |
| Calibration Date: | August 17, 2023 | Last Cal Date: | July 24, 2023 |
| Start time (MST): | 6:50 | End time (MST): | 10:40 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.20 | ppm | Cal Gas Exp Date: | February 5, 2024 |
| Cal Gas Cylinder #: | CC517372 | | | |
| Removed Cal Gas Conc: | 5.20 | ppm | Rem Gas Exp Date: | N/A |
| Removed Gas Cyl #: | N/A | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 451 |
| ZAG Make/Model: | API T701 | | Serial Number: | 5611 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i TLE | | Analyzer serial #: | 1300156232 | |
| Converter make: | CDN-101 | | Converter serial #: | 594 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.006312 | 1.011740 | Backgd or Offset: | 1.19 | 1.19 |
| Calibration intercept: | 0.042041 | 0.002125 | Coeff or Slope: | 1.124 | 1.124 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4923 | 77.0 | 80.0 | 77.0 | 1.038 |
| as found 2nd point | 4962 | 38.5 | 40.0 | 38.7 | 1.031 |
| as found 3rd point | 4981 | 19.2 | 19.9 | 19.2 | 1.034 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4923 | 77.0 | 80.0 | 80.8 | 0.990 |
| second point | 4962 | 38.5 | 40.0 | 40.8 | 0.980 |
| third point | 4981 | 19.2 | 19.9 | 20.1 | 0.992 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4923 | 77.0 | 80.0 | 81.7 | 0.979 |
| SO2 Scrubber Check | 4920 | 80.3 | 803.0 | 0.0 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 0.988 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 77.1 | Prev response: | 80.55 | *% change: | -4.5% |
| Baseline Corr 2nd AF pt: | 38.8 | AF Slope: | 0.963751 | AF Intercept: | -0.018891 |
| Baseline Corr 3rd AF pt: | 19.3 | AF Correlation: | 0.999987 | | |

* = > +/-5% change initiates investigation

Notes: Averageing time changed from 60sec to 90sec. SOx scrubber checked after the calibrator zero.No adjustments done.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

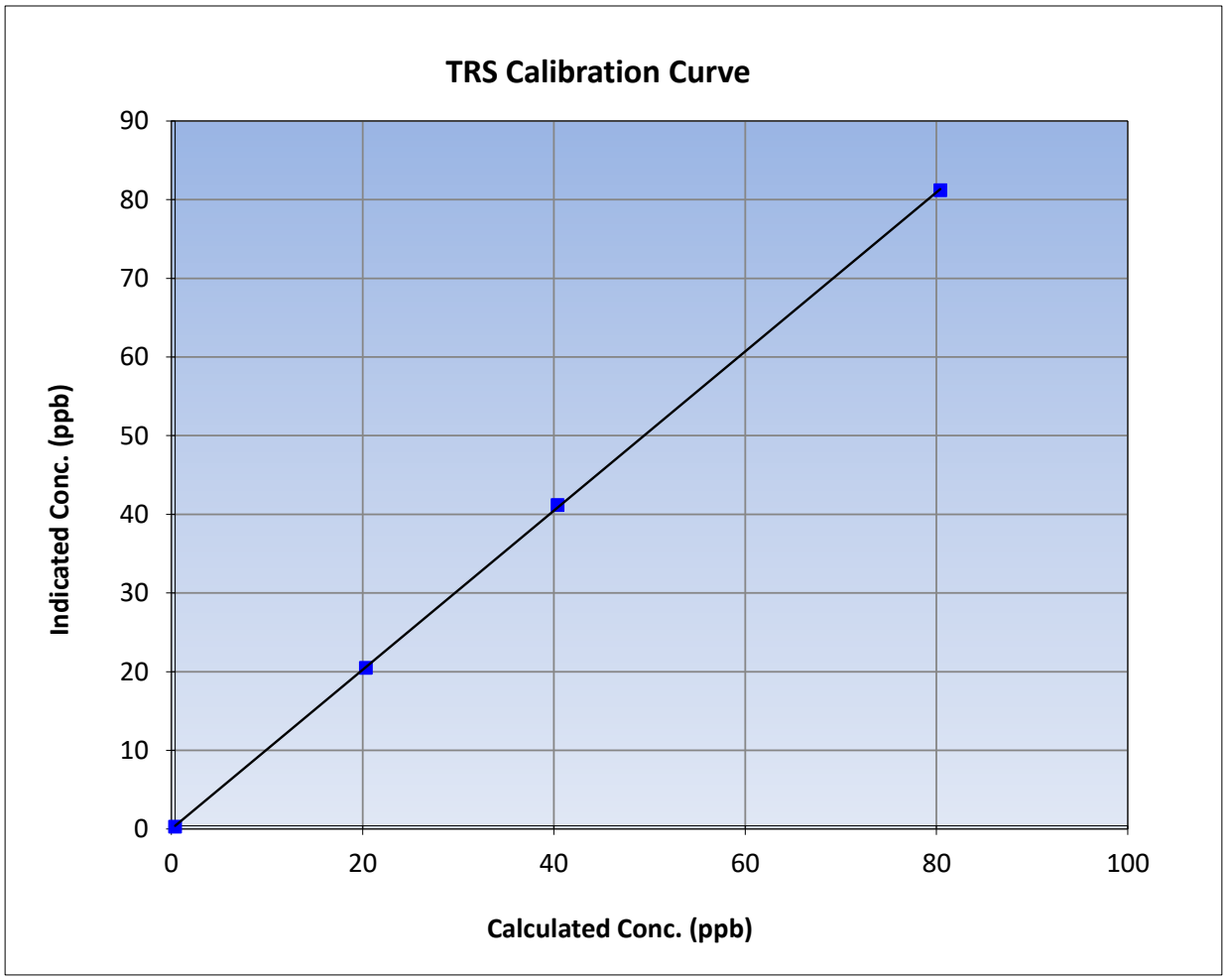
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 24, 2023 |
| Station Name: | Fort Hills | Station Number: | AMS23 |
| Start Time (MST): | 6:50 | End Time (MST): | 10:40 |
| Analyzer make: | Thermo 43i TLE | Analyzer serial #: | 1300156232 |

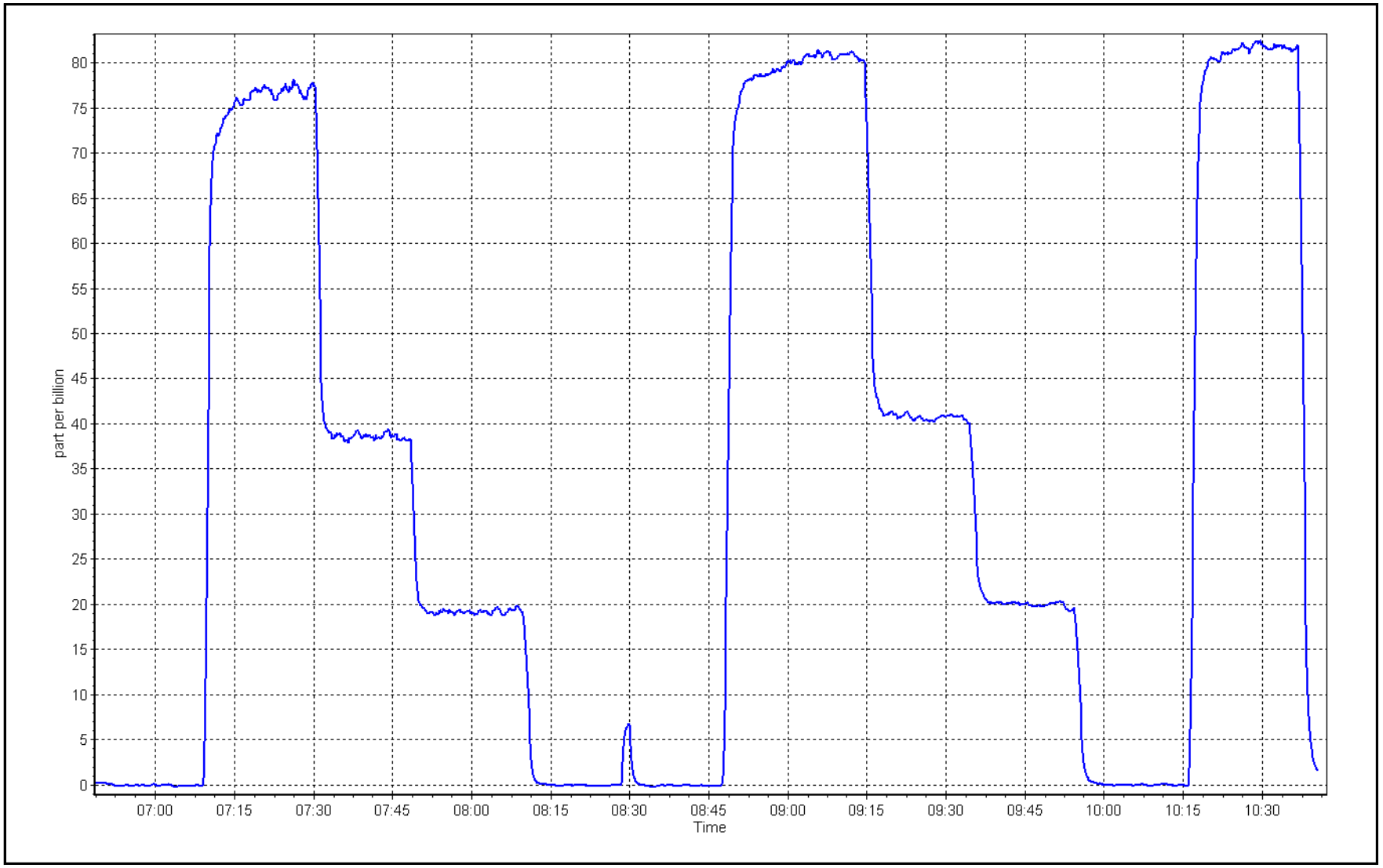
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 80.0 | 80.8 | 0.9901 |
| 40.0 | 40.8 | 0.9803 |
| 19.9 | 20.1 | 0.9924 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999959 | *≥0.995* |
| Slope | 1.011740 | *0.90 - 1.10* |
| Intercept | 0.002125 | *+/-3* |



**TRS Calibration Plot** Date: August 17, 2023 Location: Fort Hills



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Hills | Station number: | AMS23 |
| Calibration Date: | August 10, 2023 | Last Cal Date: | July 10, 2023 |
| Start time (MST): | 9:26 | End time (MST): | 12:20 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC281425 | Cal Gas Expiry Date: | January 5, 2025 | |
| CH4 Cal Gas Conc. | 500.2 | ppm | CH4 Equiv Conc. | 1070.6 | ppm |
| C3H8 Cal Gas Conc. | 207.4 | ppm | | | |
| Removed Gas Cert: | | N/A | Removed Gas Expiry: | N/A | |
| Removed CH4 Conc. | 500.2 | ppm | CH4 Equiv Conc. | 1070.6 | ppm |
| Removed C3H8 Conc. | 207.4 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 451 | |
| ZAG make/model: | API T701 | | Serial Number: | 5611 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1193585648 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 2.32E-04 | 2.39E-04 | NMHC SP Ratio: | 5.06E-05 | 5.21E-05 |
| CH4 Retention time: | 13.0 | 13.0 | NMHC Peak Area: | 181940 | 176470 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.3 | 17.19 | 16.77 | 1.025 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.3 | 17.19 | 17.28 | 0.995 |
| second point | 4960 | 40.2 | 8.61 | 8.64 | 0.996 |
| third point | 4980 | 20.1 | 4.30 | 4.30 | 1.002 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.3 | 17.19 | 17.29 | 0.994 |
| | | | | Average Correction Factor | 0.998 |
| Baseline Corr AF: | 16.77 | Prev response | 17.07 | *% change | -1.8% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.3 | 9.16 | 8.92 | 1.027 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.3 | 9.16 | 9.22 | 0.994 |
| second point | 4960 | 40.2 | 4.59 | 4.63 | 0.990 |
| third point | 4980 | 20.1 | 2.29 | 2.32 | 0.989 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.3 | 9.16 | 9.19 | 0.996 |
| | | | | Average Correction Factor | 0.991 |
| Baseline Corr AF: | 8.92 | Prev response | 9.09 | *% change | -1.9% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4920 | 80.3 | 8.03 | 7.85 | 1.024 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4920 | 80.3 | 8.03 | 8.06 | 0.996 |
| second point | 4960 | 40.2 | 4.02 | 4.01 | 1.003 |
| third point | 4980 | 20.1 | 2.01 | 1.98 | 1.017 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4920 | 80.3 | 8.03 | 8.10 | 0.991 |
| | | | | Average Correction Factor | 1.005 |
| Baseline Corr AF: | 7.85 | Prev response | 7.98 | *% change | -1.7% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 0.993826 | 1.005681 |
| THC Cal Offset: | -0.020141 | -0.013606 |
| CH4 Cal Slope: | 0.997507 | 1.005023 |
| CH4 Cal Offset: | -0.033221 | -0.021648 |
| NMHC Cal Slope: | 0.990511 | 1.006196 |
| NMHC Cal Offset: | 0.013680 | 0.008043 |

Notes: Changed the inlet filter after as founds. Adjusted the span only.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## THC Calibration Summary

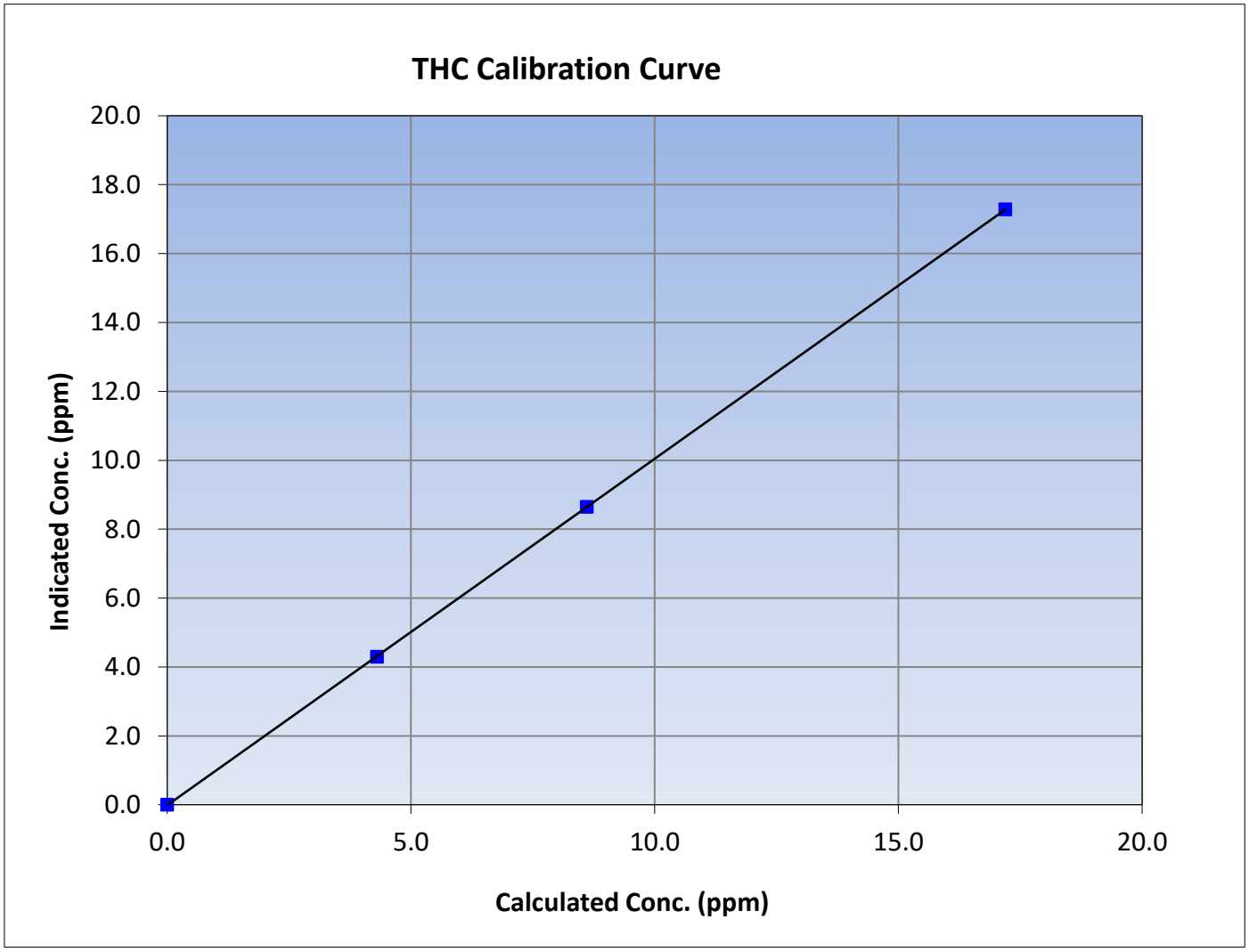
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 10, 2023 |
| Station Name: | Fort Hills | Station Number: | AMS23 |
| Start Time (MST): | 9:26 | End Time (MST): | 12:20 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1193585648 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999996 | *≥0.995* |
| 17.19 | 17.28 | 0.9949 | | | |
| 8.61 | 8.64 | 0.9957 | Slope | 1.005681 | *0.90 - 1.10* |
| 4.30 | 4.30 | 1.0020 | | | |
| | | | Intercept | -0.013606 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

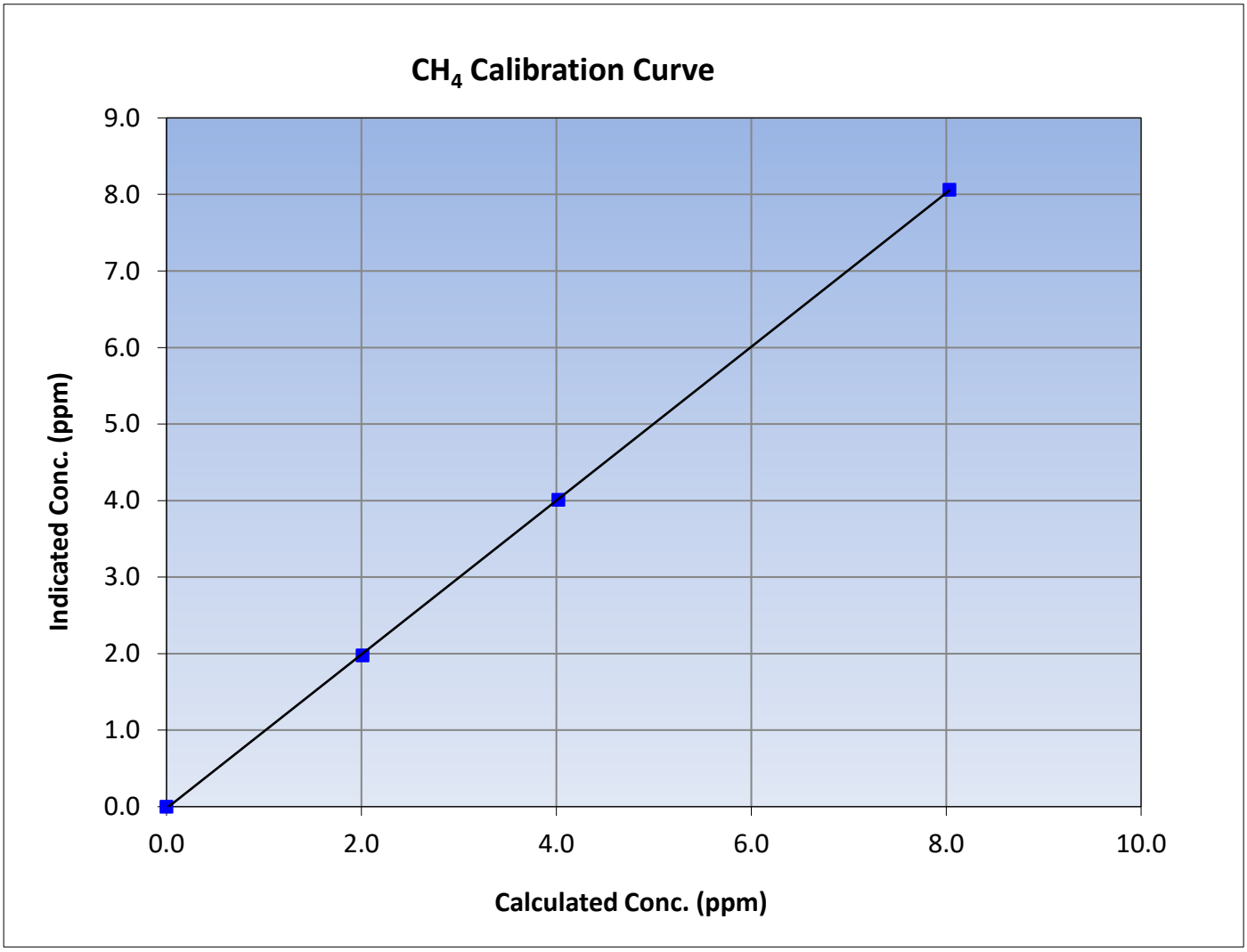
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 10, 2023 |
| Station Name: | Fort Hills | Station Number: | AMS23 |
| Start Time (MST): | 9:26 | End Time (MST): | 12:20 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1193585648 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999967 | *≥0.995* |
| 8.03 | 8.06 | 0.9964 | | | |
| 4.02 | 4.01 | 1.0029 | Slope | 1.005023 | *0.90 - 1.10* |
| 2.01 | 1.98 | 1.0171 | | | |
| | | | Intercept | -0.021648 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

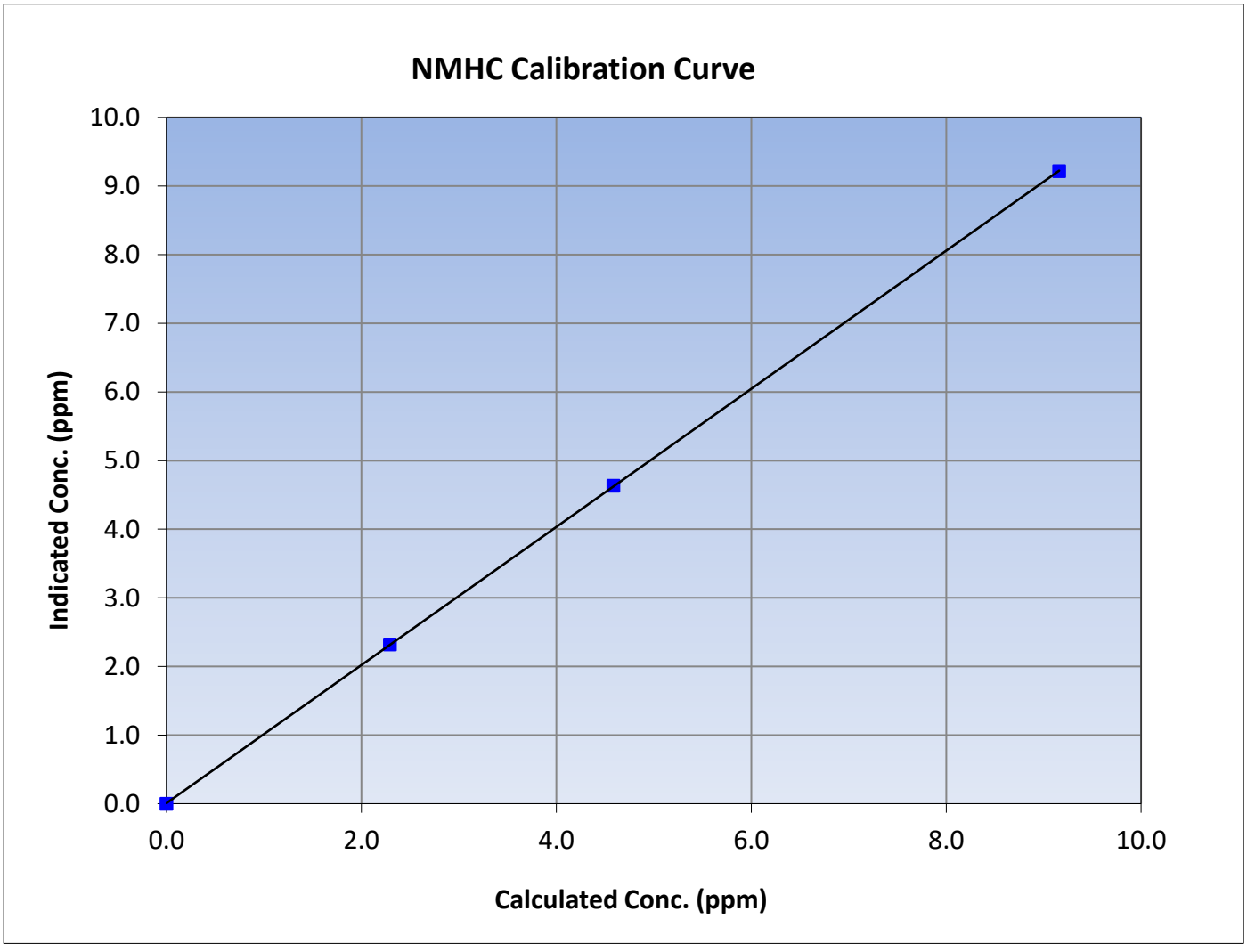
Version-01-2020

### Station Information

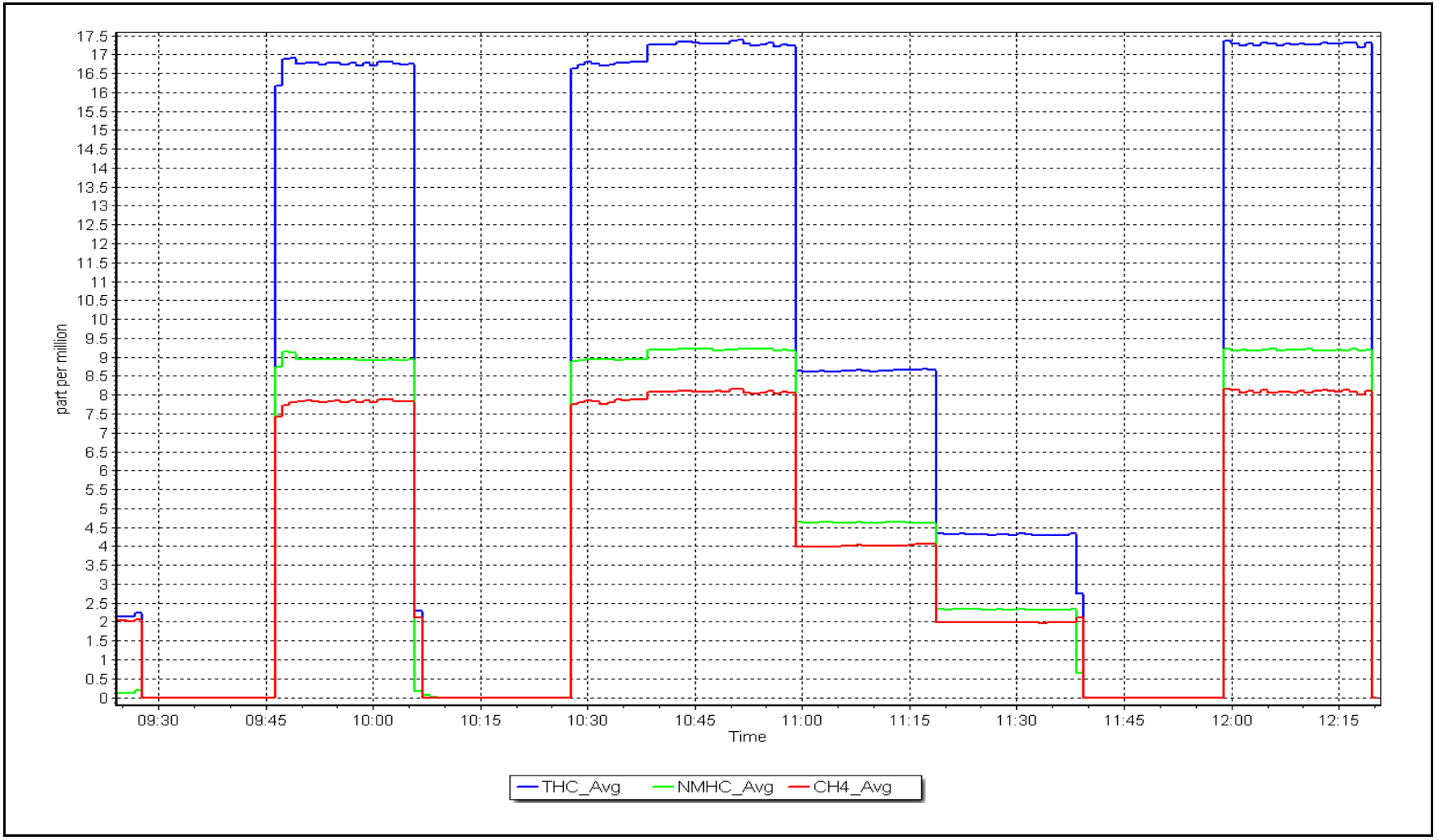
| | | | |
|---|---|---|---|
| Calibration Date: | August 10, 2023 | Previous Calibration: | July 10, 2023 |
| Station Name: | Fort Hills | Station Number: | AMS23 |
| Start Time (MST): | 9:26 | End Time (MST): | 12:20 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1193585648 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999995 | ≥0.995 |
| 9.16 | 9.22 | 0.9936 | | | |
| 4.59 | 4.63 | 0.9899 | Slope | 1.006196 | 0.90 - 1.10 |
| 2.29 | 2.32 | 0.9887 | | | |
| | | | Intercept | 0.008043 | +/-0.5 |



**NMHC Calibration Plot** Date: August 10, 2023 Location: Fort Hills



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Hills | Station number: | AMS23 |
| Calibration Date: | August 1, 2023 | Last Cal Date: | July 21, 2023 |
| Start time (MST): | 8:50 | End time (MST): | 13:52 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | CC332703 | | Cal Gas Expiry Date: | January 28, 2024 | |
| NOX Cal Gas Conc: | 49.7 | ppm | NO Cal Gas Conc: | 49.7 | ppm |
| Removed Cylinder #: | N/A | | Removed Gas Exp Date: | N/A | |
| Removed Gas NOX Conc: | 49.7 | ppm | Removed Gas NO Conc: | 49.7 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 451 | |
| ZAG make/model: | Teledyne API T701 | | Serial Number: | 5611 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1152430007 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 1.094 | 1.107 | NO bkgnd or offset: | 3.4 | 3.4 |
| NOX coeff or slope: | 0.995 | 0.995 | NOX bkgnd or offset: | 3.8 | 3.8 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 165.6 | 166.6 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.999493 | 0.999964 |
| $NO_X$ Cal Offset: | 0.844323 | 0.504456 |
| NO Cal Slope: | 0.999823 | 1.001151 |
| NO Cal Offset: | 0.004005 | -0.335801 |
| $NO_2$ Cal Slope: | 1.006741 | 0.997897 |
| $NO_2$ Cal Offset: | 0.163045 | -0.698579 |

# Wood Buffalo Environmental Association

# $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.1 | -0.3 | ---- | ---- |
| as found span | 4920 | 80.5 | 800.2 | 800.2 | 0.0 | 790.7 | 788.0 | 2.7 | 1.012 | 1.015 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.1 | -0.3 | ---- | ---- |
| high point | 4920 | 80.5 | 800.2 | 800.2 | 0.0 | 799.8 | 800.4 | -0.5 | 1.000 | 1.000 |
| second point | 4960 | 40.2 | 399.6 | 399.6 | 0.0 | 401.7 | 401.0 | 0.7 | 0.995 | 0.996 |
| third point | 4980 | 20.1 | 199.8 | 199.8 | 0.0 | 200.4 | 198.5 | 1.9 | 0.997 | 1.006 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.2 | -0.2 | ---- | ---- |
| as left span | 4920 | 80.5 | 800.2 | 445.8 | 354.4 | 800.6 | 445.8 | 354.8 | 0.999 | 1.000 |
| | | | | | | | | Average Correction Factor | 0.997 | 1.001 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 791.1 ppb | NO = 788.1 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -1.2% |
| Previous Response | $NO_X$ = 800.6 ppb | NO = 800.0 ppb | | *Percent Change | NO = | -1.5% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 800.2 | 445.8 | 354.4 | 353.2 | 1.003 | 99.7% |
| 2nd GPT point (200 ppb O3) | 800.2 | 623.9 | 176.3 | 174.9 | 1.008 | 99.2% |
| 3rd GPT point (100 ppb O3) | 800.2 | 710.0 | 90.2 | 89.0 | 1.013 | 98.7% |
| | | | | Average Correction Factor | 1.008 | 99.2% |

Notes: Changed the inlet filter after as founds. Adjusted the span only.

Calibration Performed By: Max Farrell

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

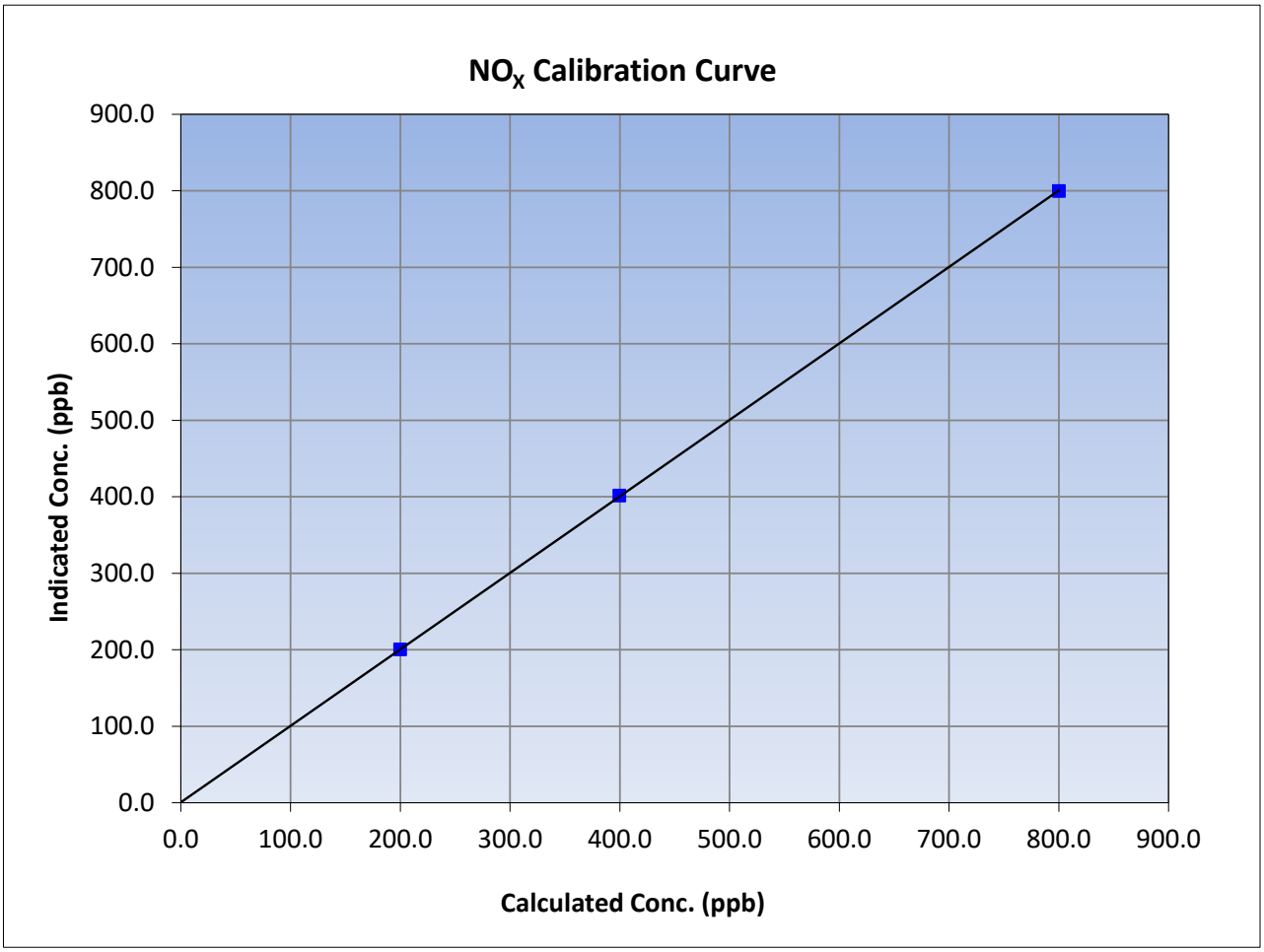
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Fort Hills | Station Number: | AMS23 |
| Start Time (MST): | 8:50 | End Time (MST): | 13:52 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1152430007 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | -0.4 | ---- | Correlation Coefficient | 0.999988 | *≥0.995* |
| 800.2 | 799.8 | 1.0005 | | | |
| 399.6 | 401.7 | 0.9947 | Slope | 0.999964 | *0.90 - 1.10* |
| 199.8 | 200.4 | 0.9970 | | | |
| | | | Intercept | 0.504456 | *+/-20* |



# Wood Buffalo Environmental Association

## NO Calibration Summary

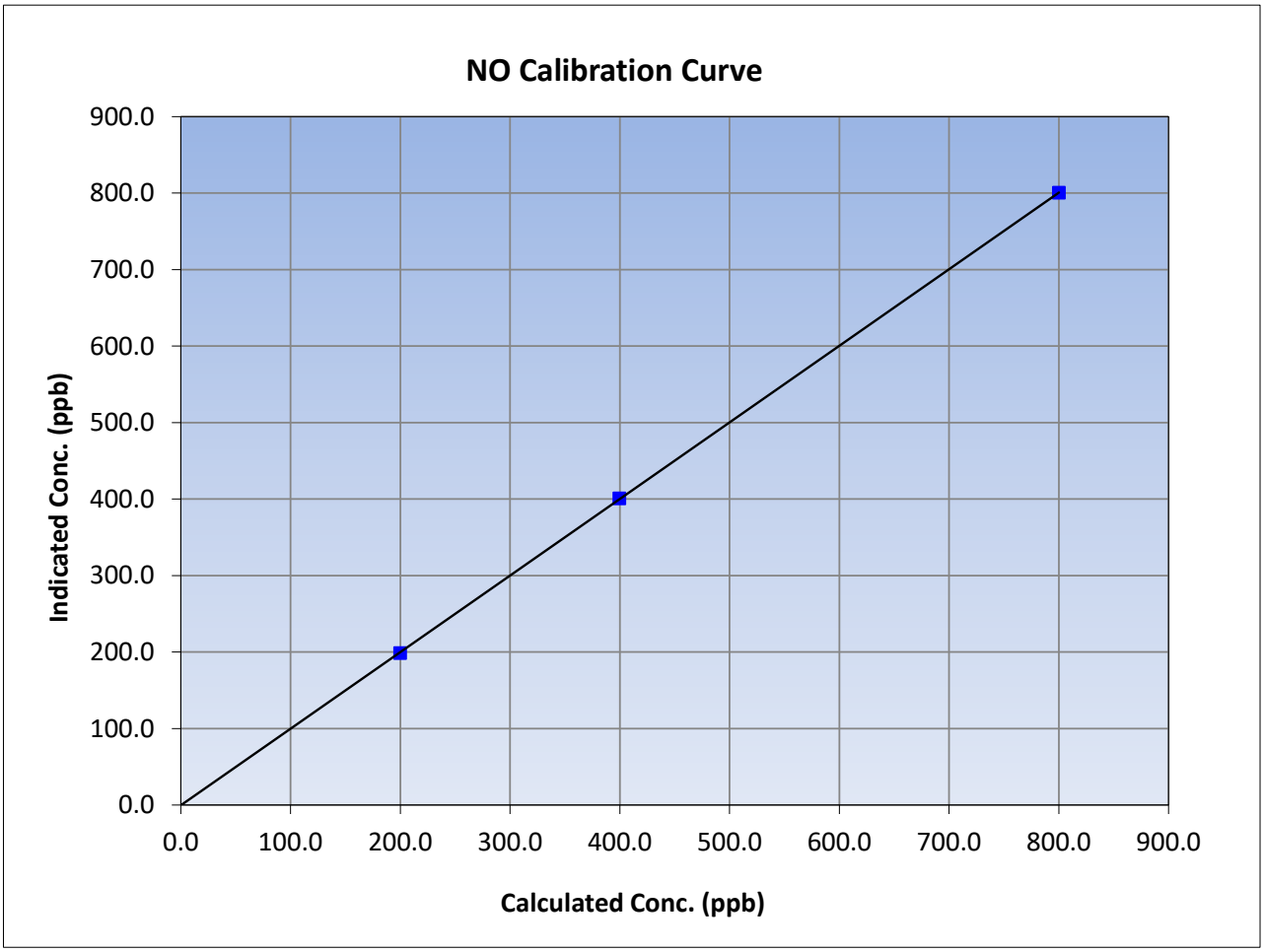
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Fort Hills | Station Number: | AMS23 |
| Start Time (MST): | 8:50 | End Time (MST): | 13:52 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1152430007 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999991 | ≥0.995 |
| 800.2 | 800.4 | 0.9997 | | | |
| 399.6 | 401.0 | 0.9964 | Slope | 1.001151 | 0.90 - 1.10 |
| 199.8 | 198.5 | 1.0065 | | | |
| | | | Intercept | -0.335801 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

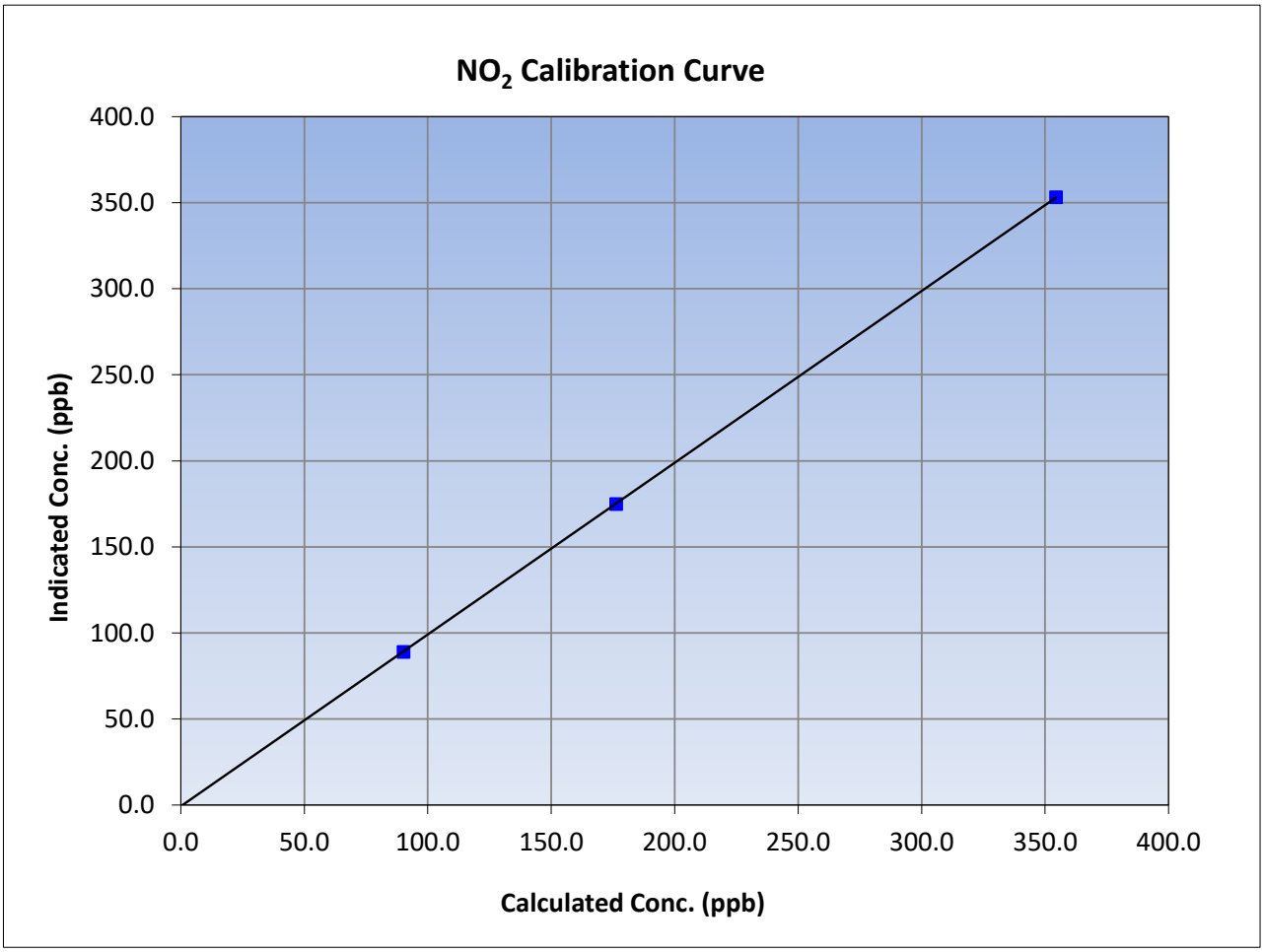
Version-04-2020

### Station Information

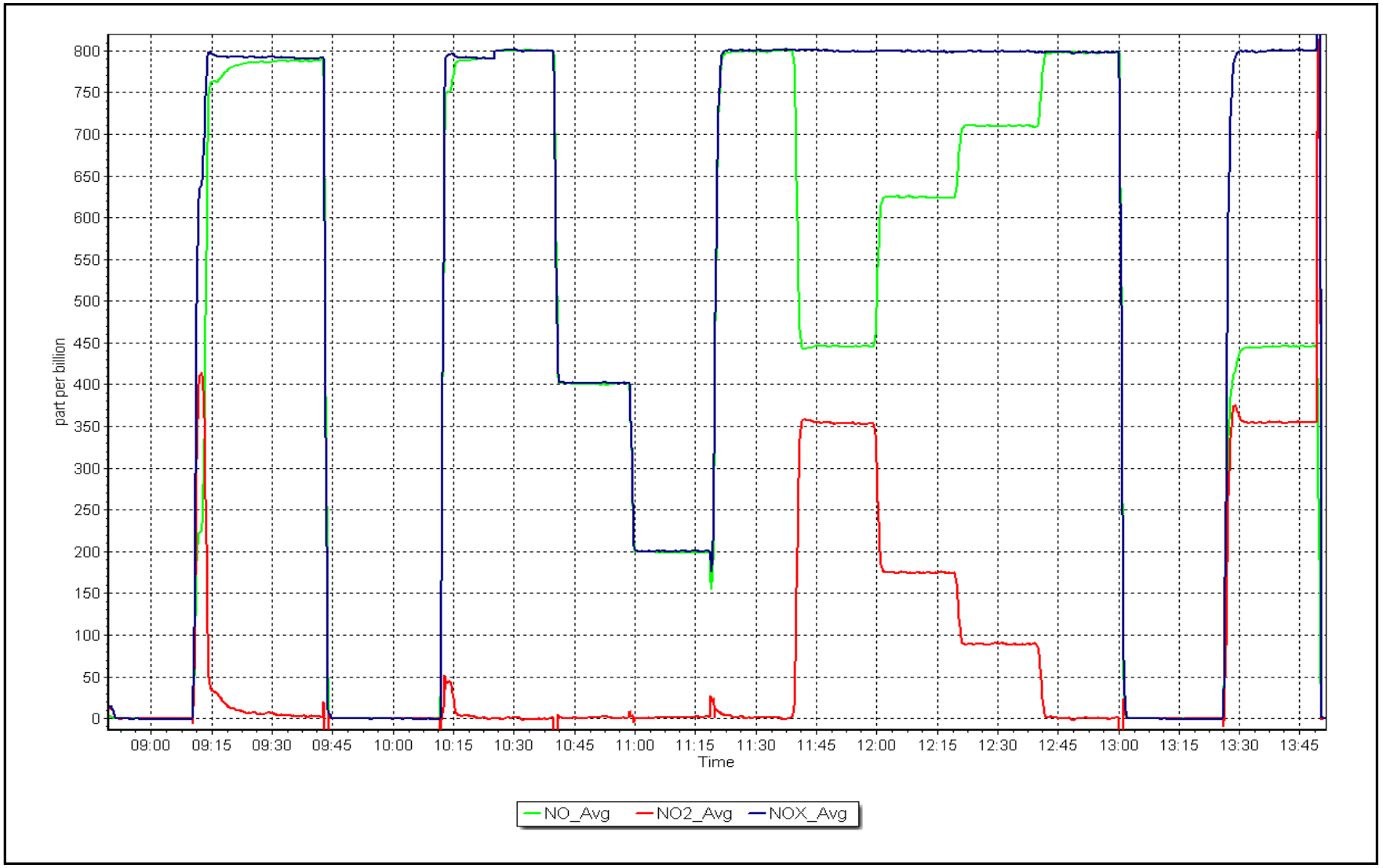
| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Fort Hills | Station Number: | AMS23 |
| Start Time (MST): | 8:50 | End Time (MST): | 13:52 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1152430007 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -0.3 | ---- | Correlation Coefficient | 0.999994 | ≥0.995 |
| 354.4 | 353.2 | 1.0034 | | | |
| 176.3 | 174.9 | 1.0080 | Slope | 0.997897 | 0.90 - 1.10 |
| 90.2 | 89.0 | 1.0135 | | | |
| | | | Intercept | -0.698579 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 1, 2023 Location: Fort Hills



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Fort Hills | Station number: | AMS 23 |
| Calibration Date: | August 17, 2023 | Last Cal Date: | July 24, 2023 |
| Start time (MST): | 7:09 | End time (MST): | 9:34 |
| Analyzer Make: | API T640 | S/N: | 1546 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat FP-25BT | S/N: | 388753 |
| Temp/RH standard: | Alicat FP-25BT | S/N: | 388753 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T ($^{o}$C) | 15.8 | 16.4 | 15.8 | ☐ | +/- 2 $^{o}$C |
| P (mmHg) | 725.4 | 724.8 | 725.4 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.02 | 5.16 | 5.02 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 17, 2023 Last Cal Date: July 24, 2023

PM w/o HEPA: 11.8 PM w/ HEPA: 0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 10.8 | 10.6 | 10.6 | ☐ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 22.2 w/ HEPA: 0.0

Date Optical Chamber Cleaned: August 17, 2023 <0.2 ug/m3

Disposable Filter Changed: August 17, 2023

### Annual Maintenance

Date Sample Tube Cleaned: May 10, 2023

Date RH/T Sensor Cleaned: May 10, 2023

Notes: No adjustments done. Leak check passed before cleaning. After cleaning leak check PM10 analyzer reading 1.0ug/m3, Datalogger reading 0.0ug/m3. PM2.5 both analyzer and datalogger reading 0.0ug/m3. Unplugged and left without power for 5mins Both PM10 and 2.5 now reading 0.0ug/m3 on analyzer and datalogger.

Calibration by: Melissa Lemay

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS25
## WASKŌW OHCI PIMÂTISIWIN
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Waskow ohci Pimatisiwin | Station number: | AMS25 |
| Calibration Date: | August 29, 2023 | Last Cal Date: | July 24, 2023 |
| Start time (MST): | 6:30 | End time (MST): | 9:33 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 50.54 | ppm | Cal Gas Exp Date: | December 29, 2028 |
| Cal Gas Cylinder #: | CC437219 | | | |
| Removed Cal Gas Conc: | 50.54 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 747 |
| ZAG Make/Model: | API T701 | | Serial Number: | 4765 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1118148497

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.005116 | 0.997792 | Backgd or Offset: | 9.7 | 9.7 |
| Calibration intercept: | -0.536058 | 0.703977 | Coeff or Slope: | 0.988 | 0.988 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 4921 | 79.2 | 800.5 | 796.1 | 1.006 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 4921 | 79.2 | 800.5 | 799.0 | 1.002 |
| second point | 4960 | 39.6 | 400.3 | 401.2 | 0.998 |
| third point | 4980 | 19.8 | 200.1 | 200.1 | 1.000 |
| as left zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| as left span | 4921 | 79.2 | 800.5 | 798.7 | 1.002 |
| | | | | Average Correction Factor | 1.000 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 795.90 | Previous response | 804.08 | *% change | -1.0% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

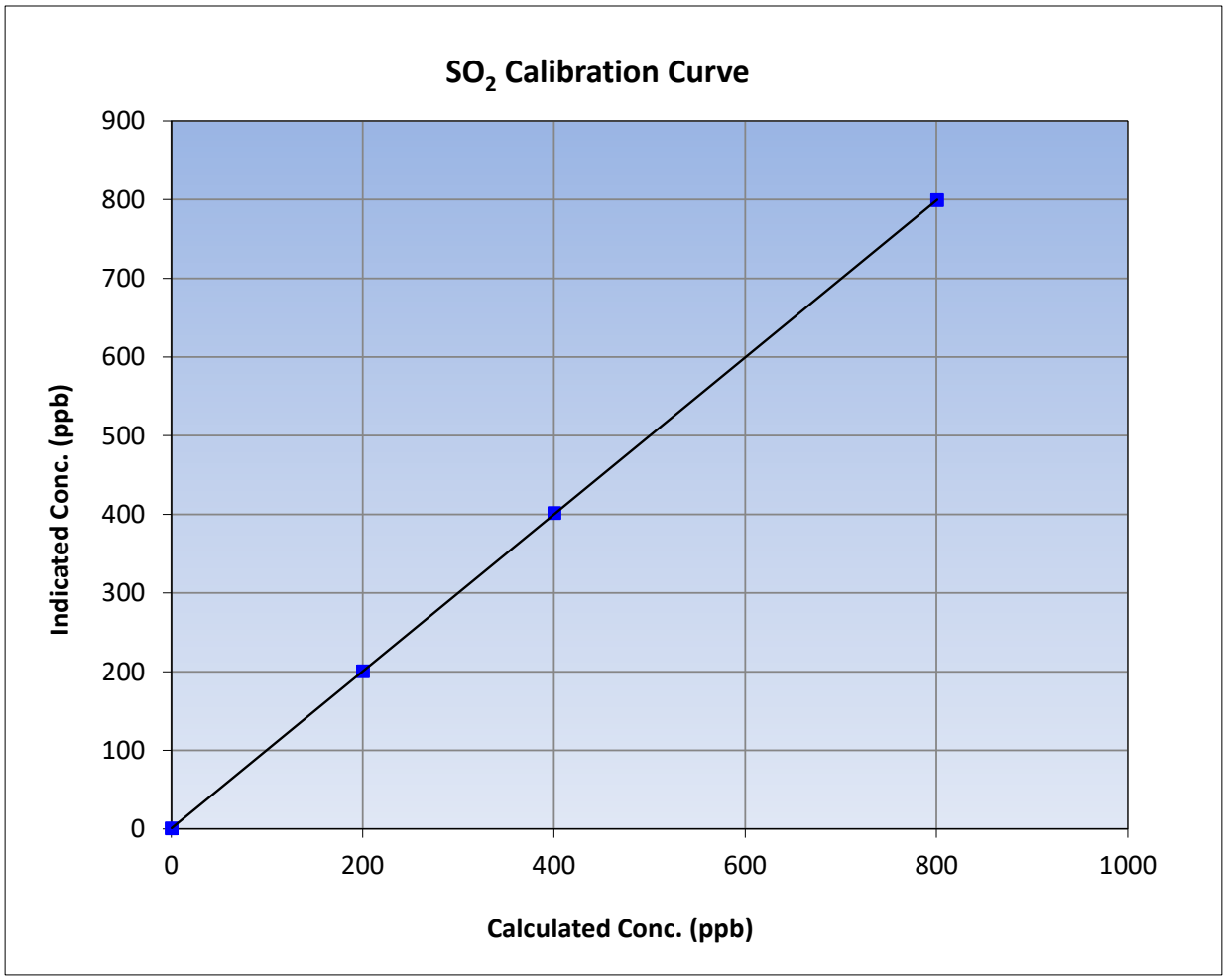
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 29, 2023 | Previous Calibration: | July 24, 2023 |
| Station Name: | Waskow ohci Pimatisiwin | Station Number: | AMS25 |
| Start Time (MST): | 6:30 | End Time (MST): | 9:33 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1118148497 |

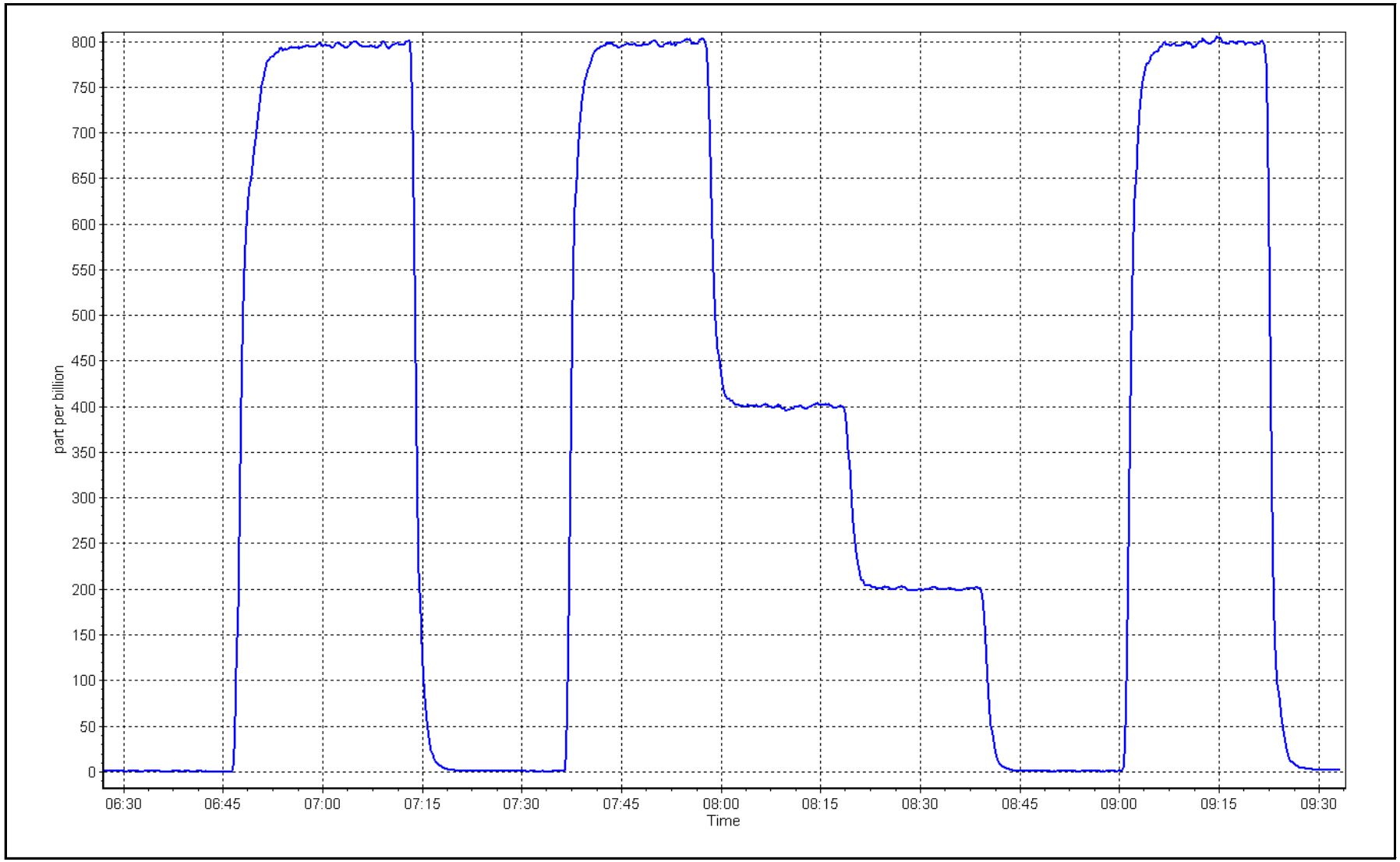
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.4 | ---- |
| 800.5 | 799.0 | 1.0019 |
| 400.3 | 401.2 | 0.9978 |
| 200.1 | 200.1 | 1.0002 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999996 | *≥0.995* |
| Slope | 0.997792 | *0.90 - 1.10* |
| Intercept | 0.703977 | *+/-30* |



**SO2 Calibration Plot** Date: August 29, 2023 Location: Waskow ohci Pimatisiwin



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Waskow ohci Pimatisiwin | Station number: | AMS25 |
| Calibration Date: | August 18, 2023 | Last Cal Date: | July 18, 2023 |
| Start time (MST): | 6:12 | End time (MST): | 10:38 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 4.97 | ppm | Cal Gas Exp Date: | January 3, 2026 |
| Cal Gas Cylinder #: | CC517099 | | | |
| Removed Cal Gas Conc: | 4.97 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 747 |
| ZAG Make/Model: | API T701 | | Serial Number: | 261 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i-LTE | | Analyzer serial #: | 1170050146 | |
| Converter make: | Global G-150 | | Converter serial #: | 2022-219 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.997066 | 0.991600 | Backgd or Offset: | 3.25 | 3.25 |
| Calibration intercept: | -0.060000 | 0.080000 | Coeff or Slope: | 1.079 | 1.079 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 4920 | 80.0 | 79.5 | 79.3 | 0.999 |
| as found 2nd point | 4960 | 40.0 | 39.7 | 39.8 | 0.993 |
| as found 3rd point | 4980 | 20.0 | 19.9 | 19.8 | 0.993 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4920 | 80.0 | 79.5 | 78.8 | 1.008 |
| second point | 4960 | 40.0 | 39.7 | 39.6 | 1.003 |
| third point | 4980 | 20.0 | 19.9 | 19.8 | 1.003 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4920 | 80.0 | 800.0 | 796.3 | 1.005 |
| SO2 Scrubber Check | 4921 | 79.2 | 800.0 | 0.0 | ---- |
| Date of last scrubber change: | | 20-Jun-23 | | Ave Corr Factor | 1.005 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 79.5 | Prev response: | 79.16 | *% change: | 0.4% |
| Baseline Corr 2nd AF pt: | 40.0 | AF Slope: | 1.000374 | AF Intercept: | -0.100000 |
| Baseline Corr 3rd AF pt: | 20.0 | AF Correlation: | 0.999988 | | |

* = > +/-5% change initiates investigation

Notes: SOx scrubber checked after the calibrator zero. No adjustments done.

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

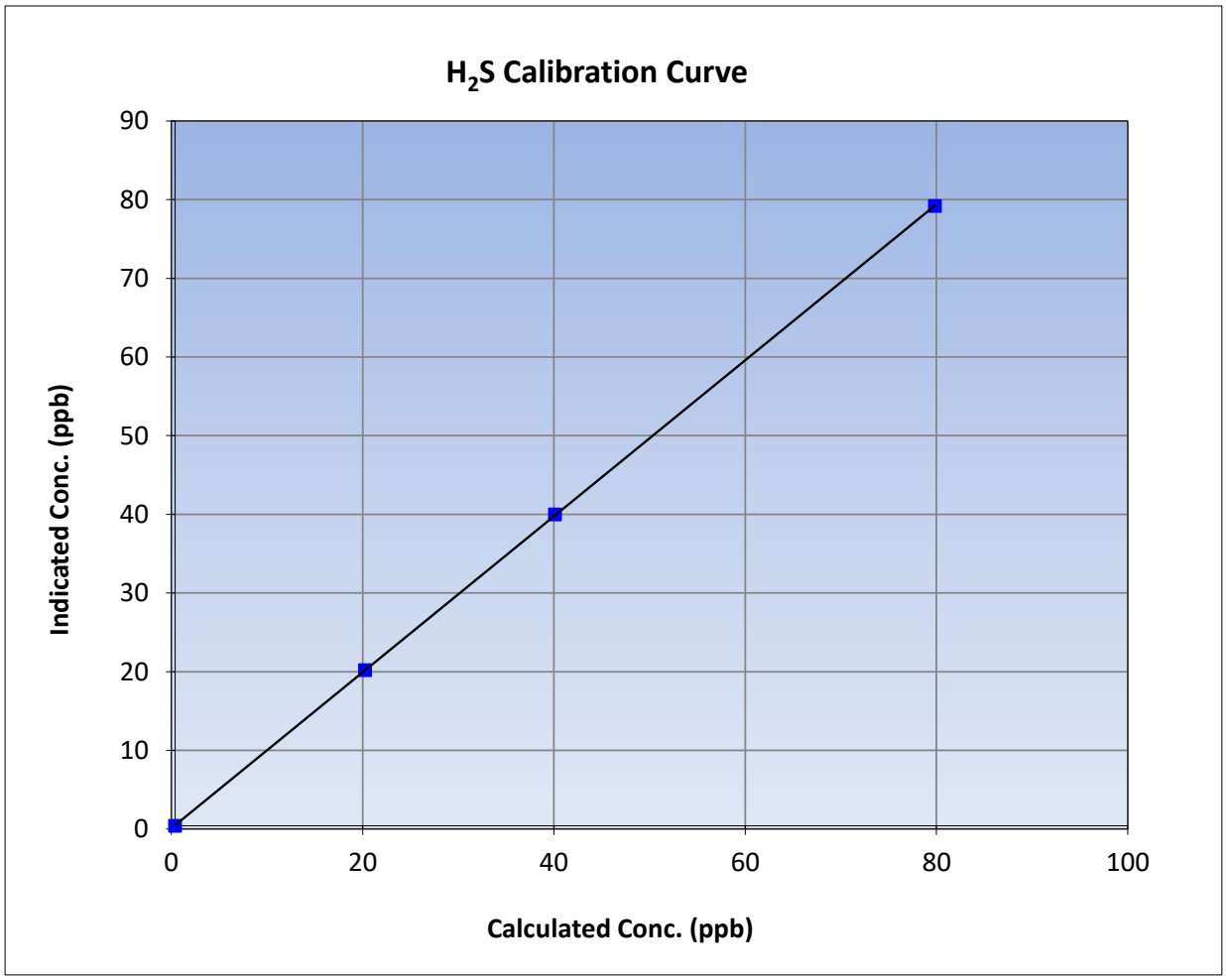
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 18, 2023 | Previous Calibration: | July 18, 2023 |
| Station Name: | Waskow ohci Pimatisiwin | Station Number: | AMS25 |
| Start Time (MST): | 6:12 | End Time (MST): | 10:38 |
| Analyzer make: | Thermo 43i-LTE | Analyzer serial #: | 1170050146 |

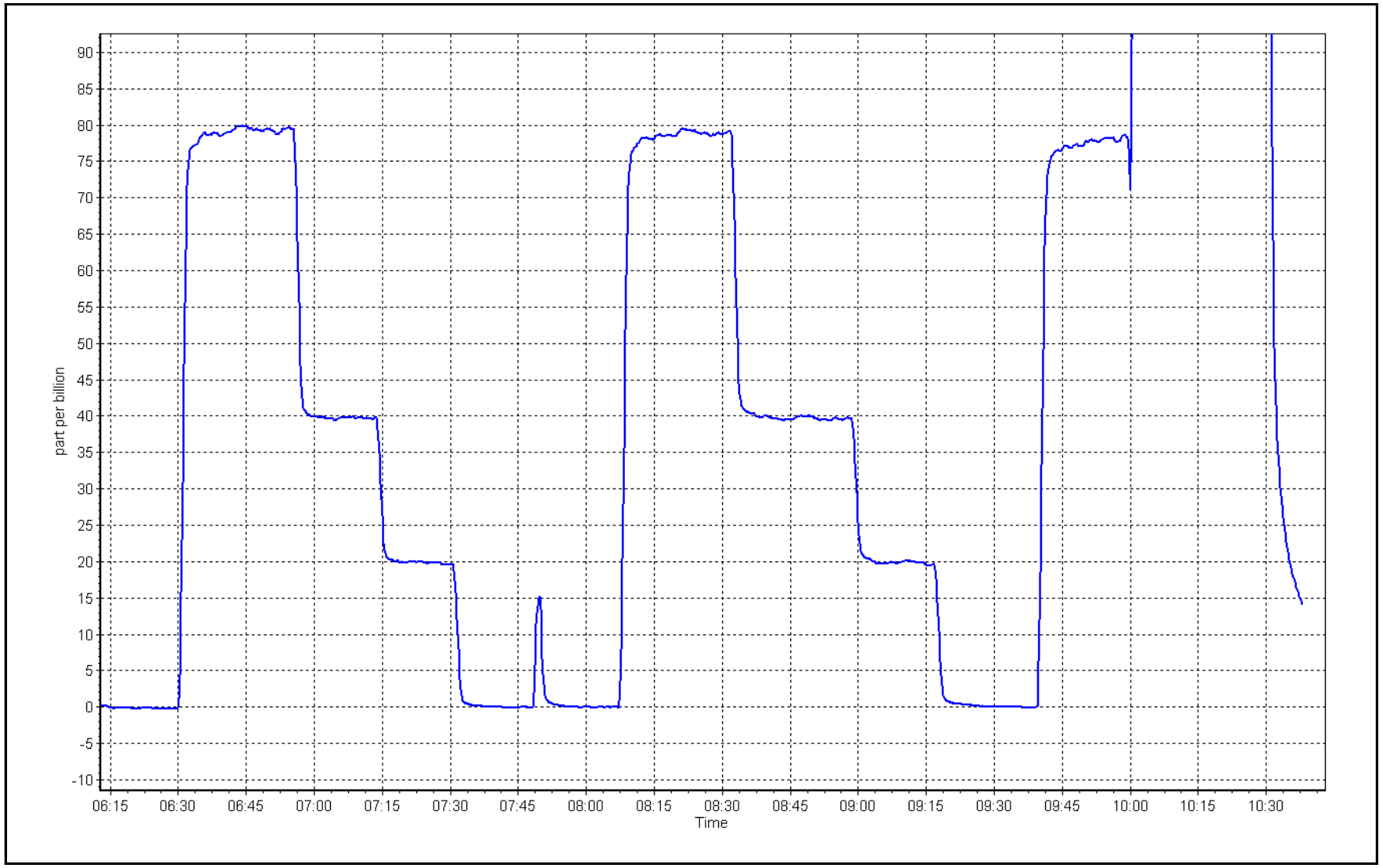
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 79.5 | 78.8 | 1.0083 |
| 39.7 | 39.6 | 1.0032 |
| 19.9 | 19.8 | 1.0032 |
| | | |

| Statistical Evaluation | | Limits |
|---|---|---|
| Correlation Coefficient | 0.999992 | ≥0.995 |
| Slope | 0.991600 | 0.90 - 1.10 |
| Intercept | 0.080000 | +/-3 |



**$H_2S$ Calibration Plot** Date: August 18, 2023 Location: Waskow ohci Pimatisiwin



# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Waskōw ohci Pimâtisiwin | Station Number: | AMS 25 |
| Calibration Date: | August 31, 2023 | Prev Cal Date: | October 7, 2022 |
| Start Time (MST): | 9:13 | End Time (MST): | 9:43 |
| Tower Height (m): | 10m | Reason: | Removal |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | U11125 |
| WS Calibrator: | MetOne 053 | Serial Number: | R10866 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.2 | 0.2% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | -0.1% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999999 | 0.999999 | *≥0.9995* |
| Calculated slope | 0.999979 | 0.999979 | *0.90 - 1.10* |
| Calculated intercept | -0.013577 | -0.013577 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | |
| As Found Declination (deg east of True North): | | As Left Declination (deg east of True North): | |
| Solar noon time (MST): | | Calc Declination*: | Degrees |
| Deadband calc: | 357.0 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | | --- |
| 90 | | |
| 180 | | |
| 270 | | |
| 357 | | |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | | *≥0.9995* |
| Calculated slope | | | *0.90 - 1.10* |
| Calculated intercept | | | *+/- 4* |

Notes: WS removed Due to stalling at low speeds

Calibration Performed By: Melissa Lemay

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Waskōw ohci Pimâtisiwin | Station Number: | AMS 25 |
| Calibration Date: | August 31, 2023 | Prev Cal Date: | October 7, 2022 |
| Start Time (MST): | 9:13 | End Time (MST): | 9:43 |
| Tower Height (m): | 10m | Reason: | Install |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | Y18364 |
| WS Calibrator: | MetOne 053 | Serial Number: | R10866 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.1 | -0.3% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | -0.1% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999999 | *≥0.9995* |
| Calculated slope | | 0.999473 | *0.90 - 1.10* |
| Calculated intercept | | 0.026227 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | U11345 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | NA | Calc Declination*: | NA Degrees |
| Deadband calc: | 1.1 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | 0.1 | --- |
| 90 | 90.7 | 0.2% |
| 180 | 178.4 | -0.4% |
| 270 | 269.0 | -0.3% |
| 357 | 356.0 | -0.3% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | 0.999972 | 0.999988 | *≥0.9995* |
| Calculated slope | 1.001522 | 1.004369 | *0.90 - 1.10* |
| Calculated intercept | 0.998562 | -0.221411 | *+/- 4* |

Notes: WS installed due to other WS not working properly. WD passed the torque test.

Calibration Performed By: Melissa Lemay

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS26
## CHRISTINA LAKE
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Christina Lake | Station number: | AMS 26 |
| Calibration Date: | August 17, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 15:09 | End time (MST): | 17:42 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.56 | ppm | Cal Gas Exp Date: | February 23, 2025 |
| Cal Gas Cylinder #: | CC362134 | | | |
| Removed Cal Gas Conc: | 49.56 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 2447 |
| ZAG Make/Model: | API T701H | | Serial Number: | 832 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1173410001

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.015687 | 1.018405 | Backgd or Offset: | 16.2 | 16.2 |
| Calibration intercept: | -2.538773 | -2.239175 | Coeff or Slope: | 0.900 | 0.900 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 4919 | 80.6 | 799.0 | 812.1 | 0.984 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| high point | 4919 | 80.6 | 799.0 | 812.6 | 0.983 |
| second point | 4960 | 40.3 | 399.4 | 403.9 | 0.989 |
| third point | 4980 | 20.2 | 200.2 | 198.3 | 1.010 |
| as left zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as left span | 4919 | 80.6 | 799.0 | 814.7 | 0.981 |
| | | | | Average Correction Factor | 0.994 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 811.50 | Previous response | 808.97 | *% change | 0.3% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

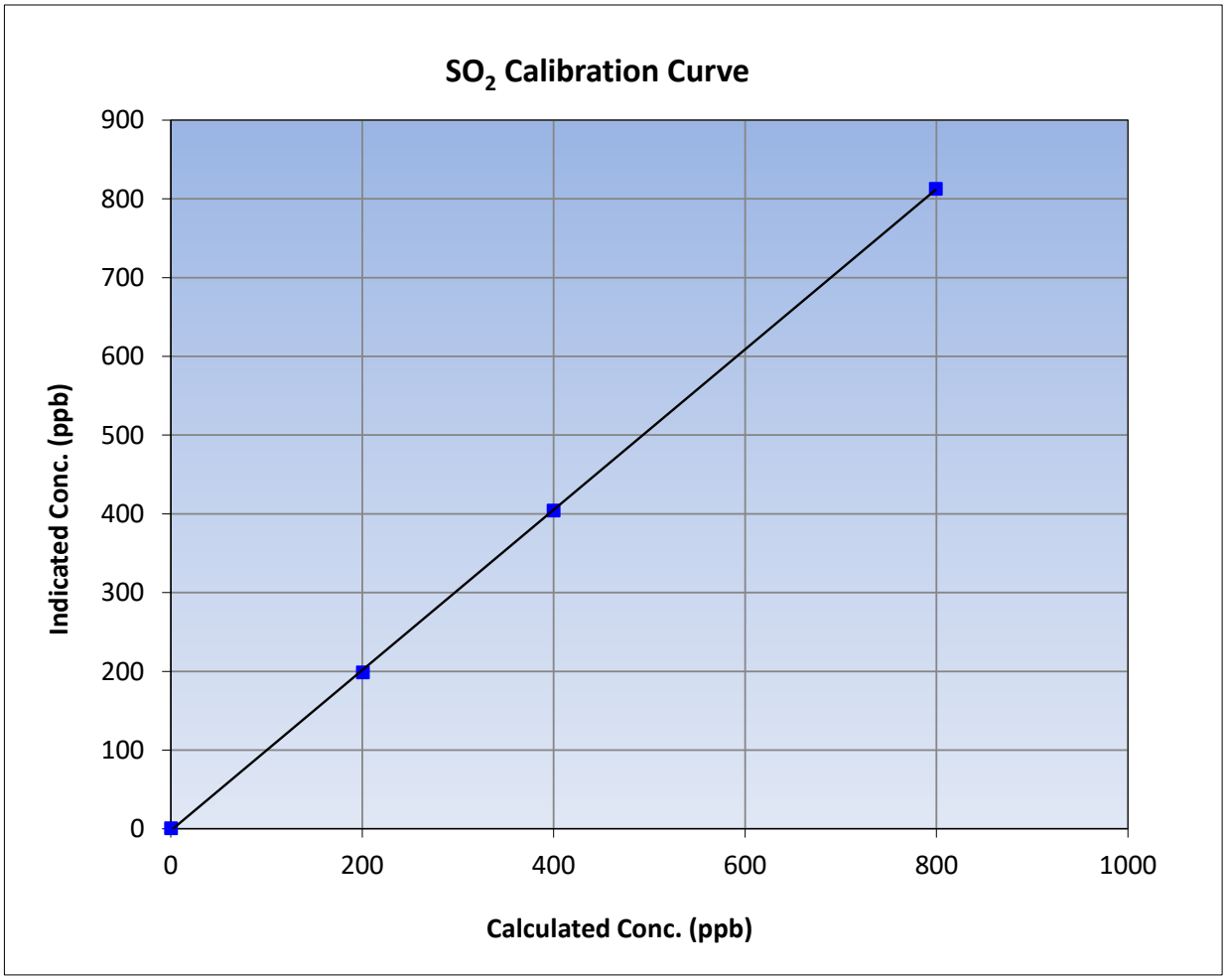
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Christina Lake | Station Number: | AMS 26 |
| Start Time (MST): | 15:09 | End Time (MST): | 17:42 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1173410001 |

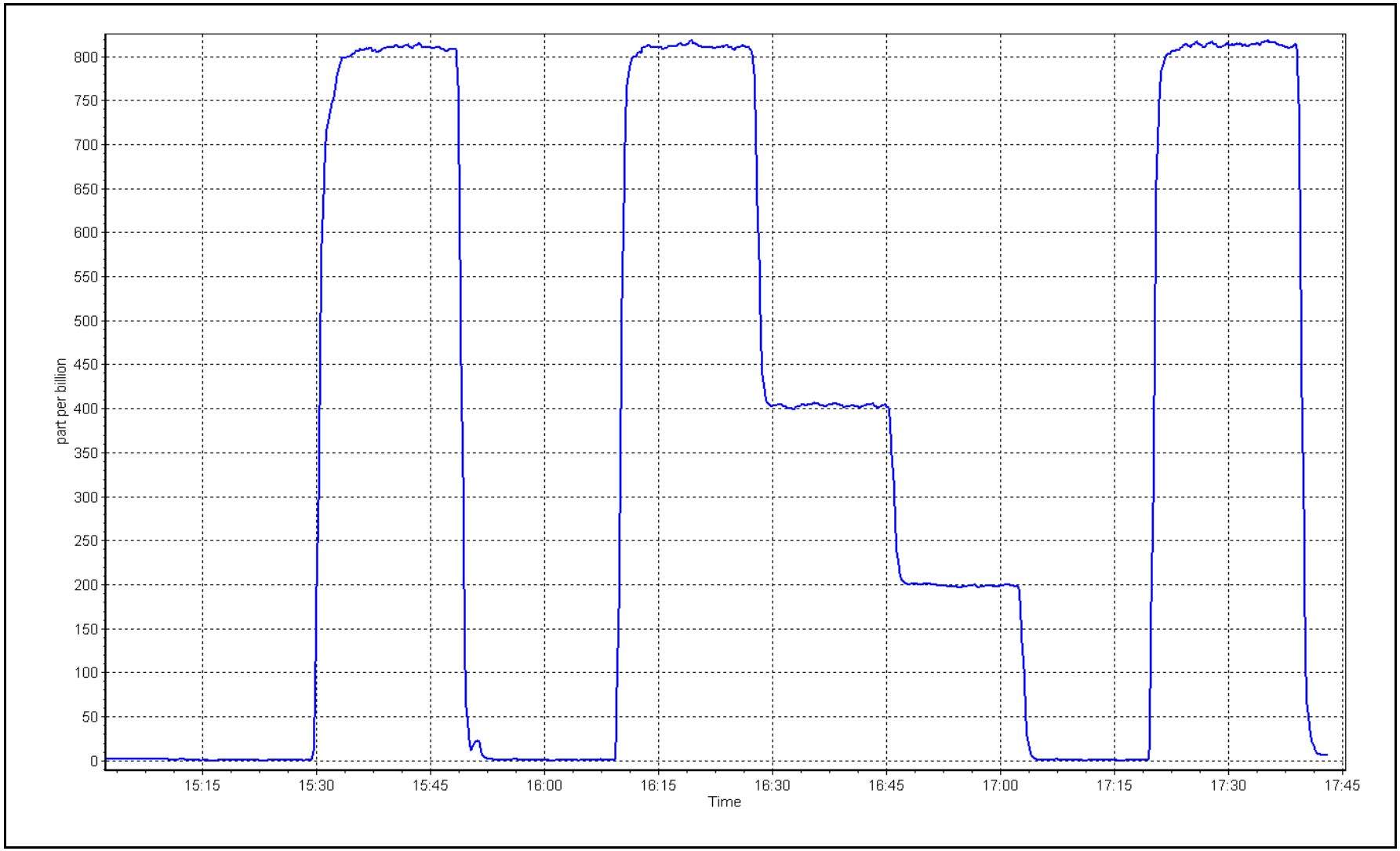
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.6 | ---- |
| 799.0 | 812.6 | 0.9832 |
| 399.4 | 403.9 | 0.9889 |
| 200.2 | 198.3 | 1.0097 |
| | | |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999942 | *≥0.995* |
| Slope | 1.018405 | *0.90 - 1.10* |
| Intercept | -2.239175 | *+/-30* |



**SO2 Calibration Plot** Date: August 17, 2023 Location: Christina Lake



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Christina Lake | Station number: | AMS26 |
| Calibration Date: | August 17, 2023 | Last Cal Date: | July 14, 2023 |
| Start time (MST): | 6:33 | End time (MST): | 10:21 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 4.89 | ppm | Cal Gas Exp Date: | February 9, 2024 |
| Cal Gas Cylinder #: | EY0002466 | | | |
| Removed Cal Gas Conc: | 4.89 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 2447 |
| ZAG Make/Model: | API T701H | | Serial Number: | 832 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 450i | | Analyzer serial #: | 1180030032 | |
| Converter make: | NA | | Converter serial #: | NA | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.001325 | 1.002610 | Backgd or Offset: | 35.1 | 35.4 |
| Calibration intercept: | -0.160901 | 0.119119 | Coeff or Slope: | 1.093 | 1.093 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as found span | 4918 | 81.8 | 80.0 | 82.0 | 0.980 |
| as found 2nd point | 4959 | 40.9 | 40.0 | 40.9 | 0.988 |
| as found 3rd point | 4979 | 20.4 | 20.0 | 20.2 | 1.008 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4918 | 81.8 | 80.0 | 80.4 | 0.995 |
| second point | 4959 | 40.9 | 40.0 | 40.1 | 0.998 |
| third point | 4979 | 20.4 | 20.0 | 20.1 | 0.993 |
| as left zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| as left span | 4918 | 81.8 | 80.0 | 81.7 | 0.979 |
| SO2 Scrubber Check | 4919 | 80.6 | 806.1 | 0.1 | ---- |
| Date of last scrubber change: | | 27-Feb-19 | | Ave Corr Factor | 0.995 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 81.6 | Prev response: | 79.95 | *% change: | 2.0% |
| Baseline Corr 2nd AF pt: | 40.5 | AF Slope: | 1.021895 | AF Intercept: | 0.119353 |
| Baseline Corr 3rd AF pt: | 19.8 | AF Correlation: | 0.999945 | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's. Ran scrubber check after calibrator zero. No adjustments made.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

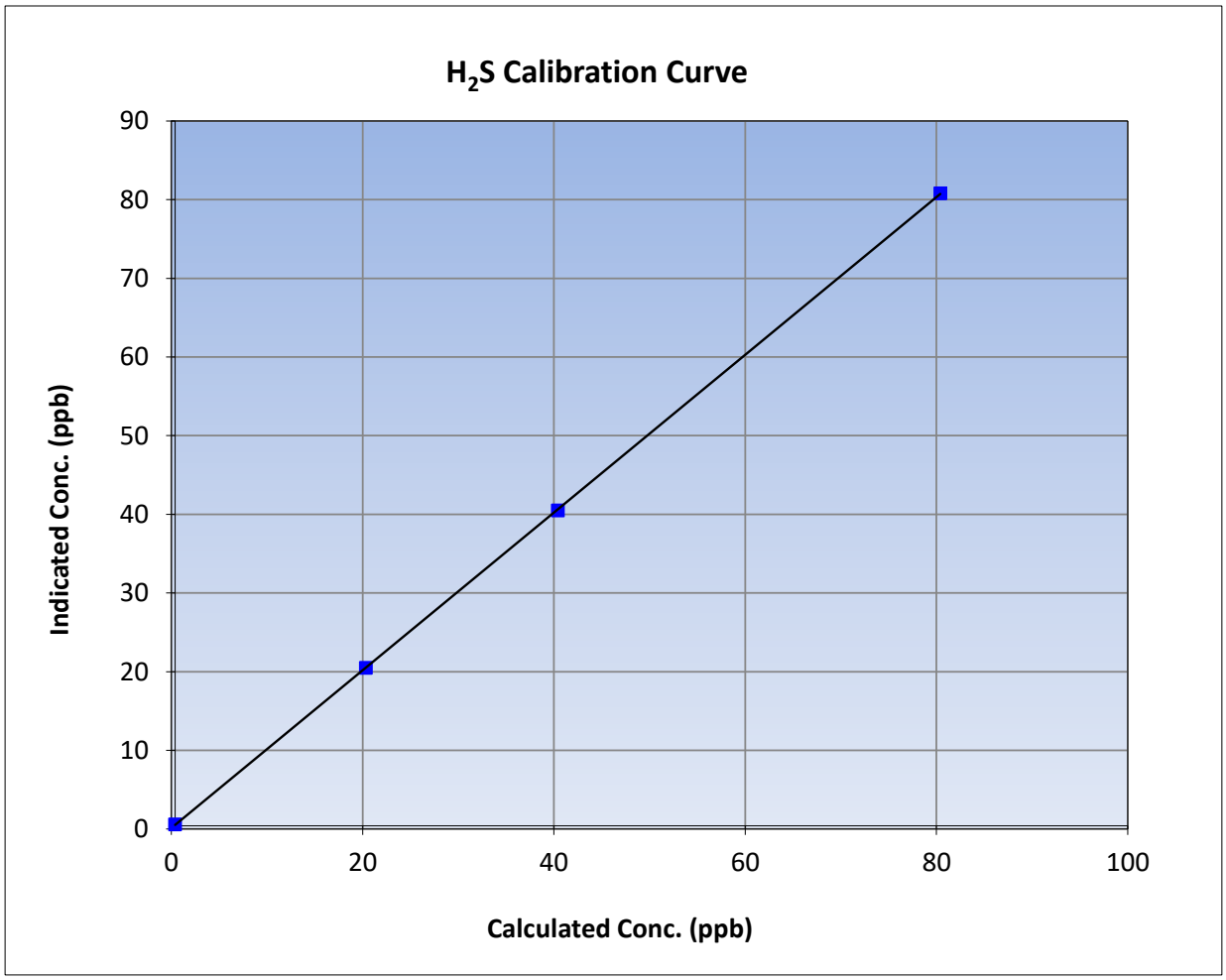
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 14, 2023 |
| Station Name: | Christina Lake | Station Number: | AMS26 |
| Start Time (MST): | 6:33 | End Time (MST): | 10:21 |
| Analyzer make: | Thermo 450i | Analyzer serial #: | 1180030032 |

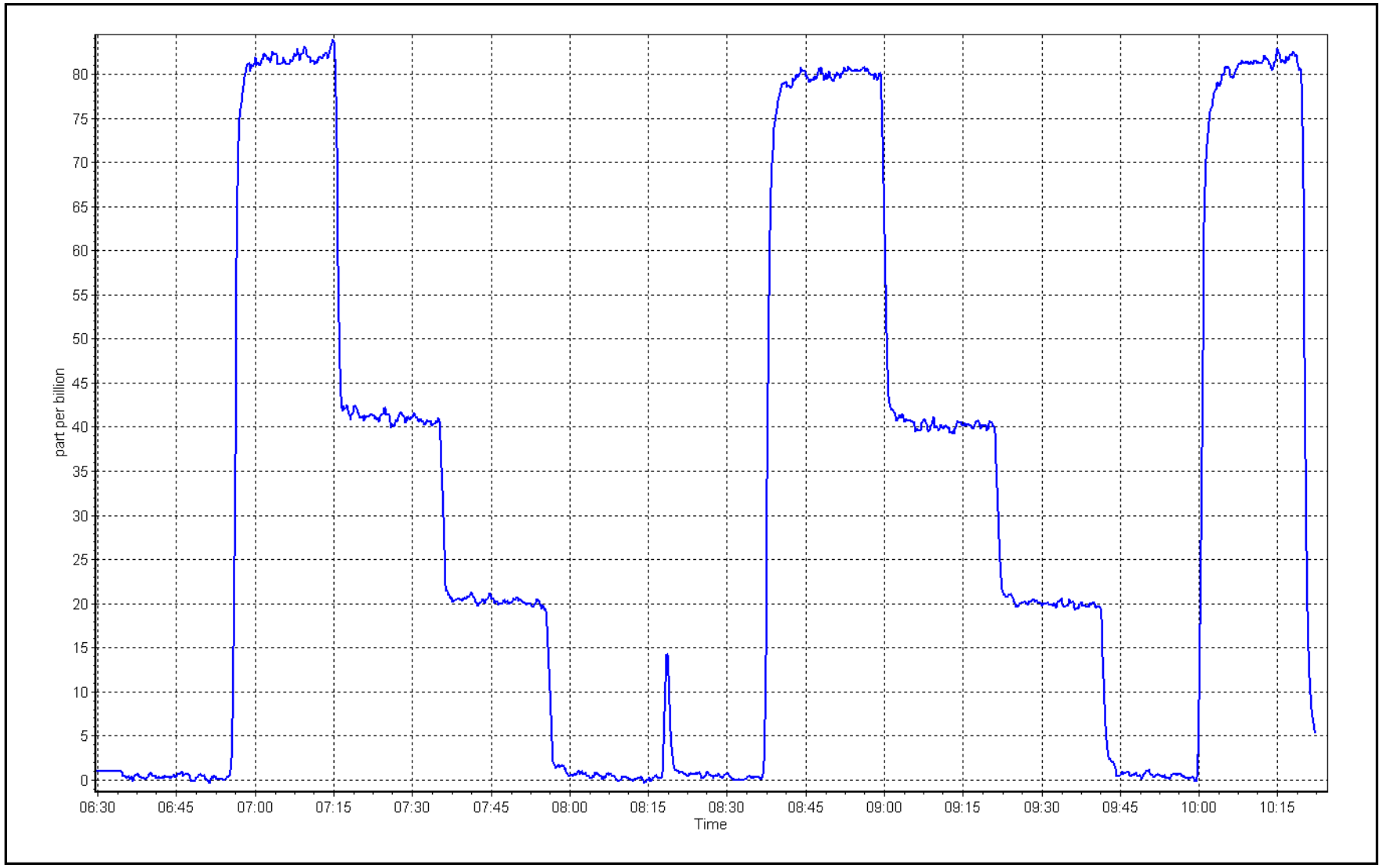
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 80.0 | 80.4 | 0.9951 |
| 40.0 | 40.1 | 0.9975 |
| 20.0 | 20.1 | 0.9927 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999992 | *≥0.995* |
| Slope | 1.002610 | *0.90 - 1.10* |
| Intercept | 0.119119 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 17, 2023 Location: Christina Lake



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Christina Lake | Station number: | AMS26 |
| Calibration Date: | August 17, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 10:18 | End time (MST): | 15:11 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2Y1P4C | | Cal Gas Expiry Date: | November 12, 2023 | |
| NOX Cal Gas Conc: | 50.82 | ppm | NO Cal Gas Conc: | 50.02 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 50.82 | ppm | Removed Gas NO Conc: | 50.02 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 2447 | |
| ZAG make/model: | API T701H | | Serial Number: | 832 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1173480006 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.396 | 1.370 | NO bkgnd or offset: | 2.6 | 2.6 |
| NOX coeff or slope: | 0.991 | 0.991 | NOX bkgnd or offset: | 3.4 | 3.4 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 164.7 | 160.7 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 0.999944 | 0.996528 |
| $NO_X$ Cal Offset: | -1.520000 | -1.780000 |
| NO Cal Slope: | 1.003527 | 1.001328 |
| NO Cal Offset: | -2.600000 | -2.380000 |
| $NO_2$ Cal Slope: | 0.993893 | 0.995894 |
| $NO_2$ Cal Offset: | -0.796010 | -1.805192 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.8 | -0.1 | -0.6 | ---- | ---- |
| as found span | 4920 | 80.0 | 813.1 | 800.3 | 12.8 | 826.4 | 814.6 | 11.7 | 0.9839 | 0.9825 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.6 | 0.0 | -0.6 | ---- | ---- |
| high point | 4920 | 80.0 | 813.1 | 800.3 | 12.8 | 809.1 | 800.2 | 8.9 | 1.0050 | 1.0001 |
| second point | 4960 | 40.0 | 406.6 | 400.2 | 6.4 | 402.8 | 397.1 | 5.7 | 1.0093 | 1.0077 |
| third point | 4980 | 20.0 | 203.3 | 200.1 | 3.2 | 199.6 | 195.6 | 4.0 | 1.0184 | 1.0229 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.6 | 0.0 | -0.6 | ---- | ---- |
| as left span | 4920 | 80.0 | 813.1 | 396.0 | 417.1 | 810.0 | 396.9 | 413.1 | 1.0039 | 0.9978 |
| | | | | | | | | Average Correction Factor | 1.0109 | 1.0103 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 827.2 ppb | NO = 814.7 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | 1.9% |
| Previous Response | $NO_X$ = 811.6 ppb | NO = 800.5 ppb | | *Percent Change | NO = | 1.7% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 799.5 | 395.2 | 417.1 | 414.1 | 1.0072 | 99.3% |
| 2nd GPT point (200 ppb O3) | 799.5 | 592.8 | 219.5 | 216.6 | 1.0134 | 98.7% |
| 3rd GPT point (100 ppb O3) | 799.5 | 698.9 | 113.4 | 109.6 | 1.0347 | 96.6% |
| | | | | Average Correction Factor | 1.0184 | 98.2% |

Notes: Changed sample inlet filter after as founds. Adjusted span only.

Calibration Performed By: Mohammed Kashif

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

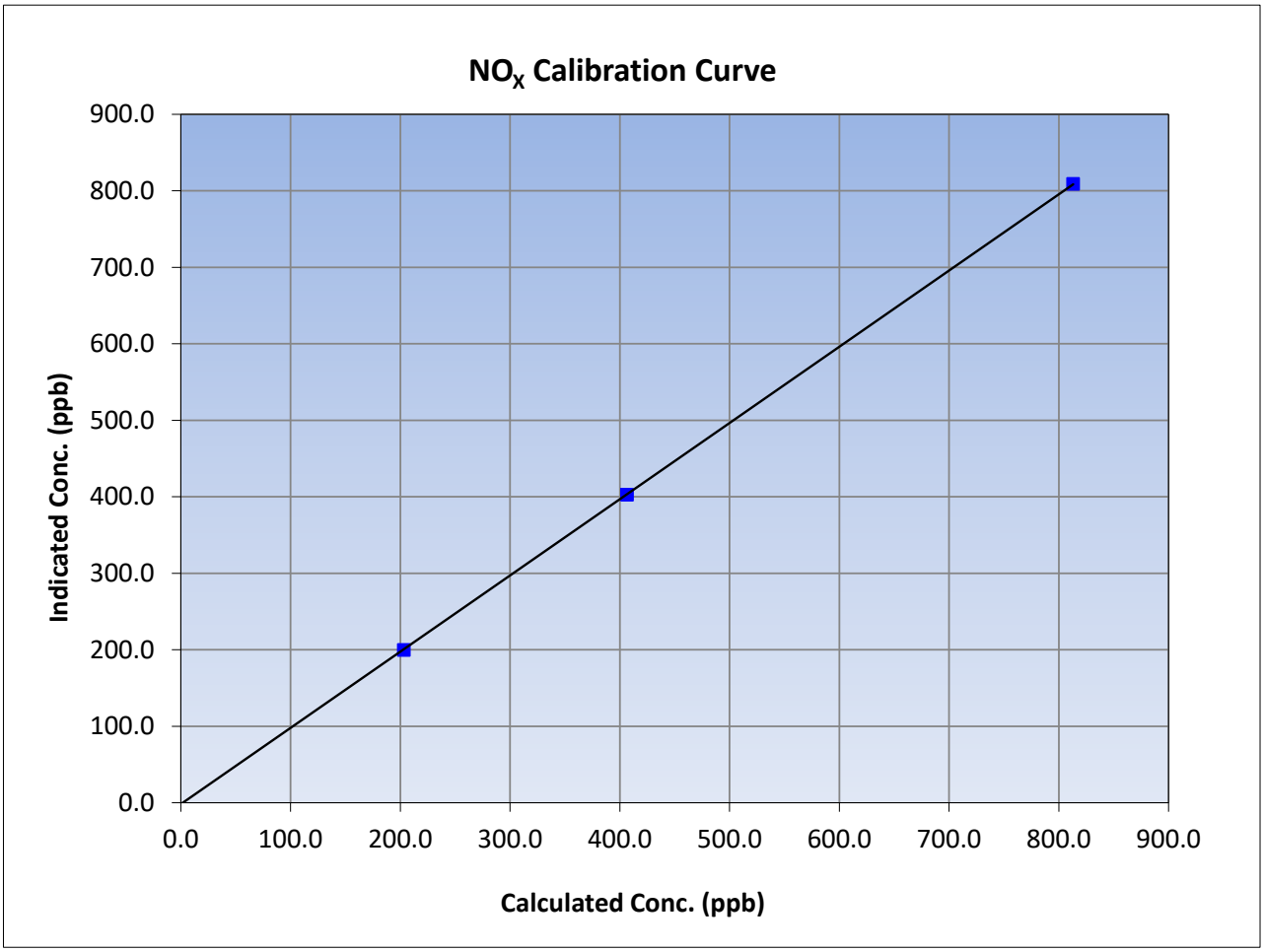
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Christina Lake | Station Number: | AMS26 |
| Start Time (MST): | 10:18 | End Time (MST): | 15:11 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1173480006 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | -0.6 | ---- | Correlation Coefficient | 0.999990 | *≥0.995* |
| 813.1 | 809.1 | 1.0050 | | | |
| 406.6 | 402.8 | 1.0093 | Slope | 0.996528 | *0.90 - 1.10* |
| 203.3 | 199.6 | 1.0184 | | | |
| | | | Intercept | -1.780000 | *+/-20* |



# Wood Buffalo Environmental Association

## NO Calibration Summary

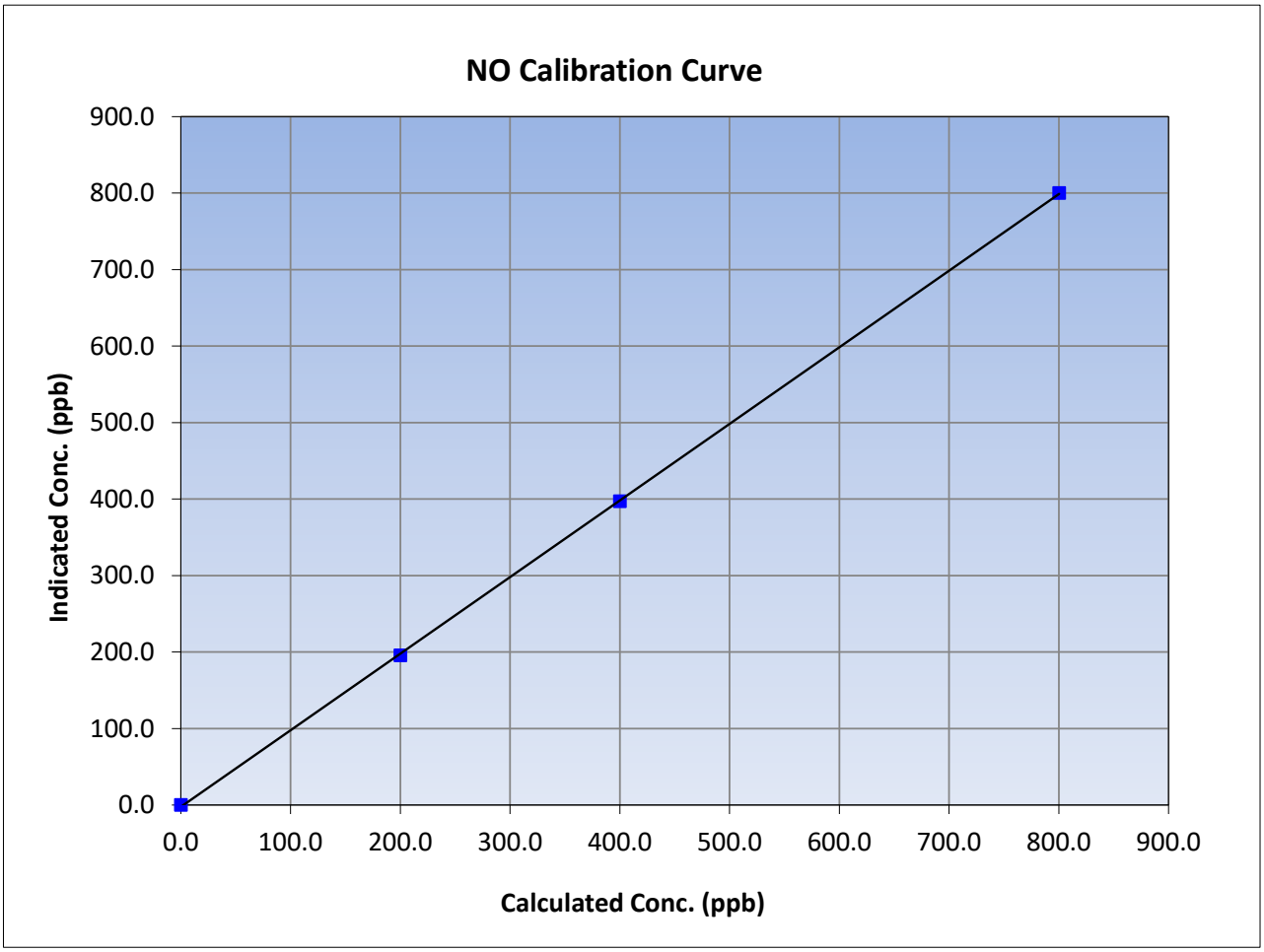
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Christina Lake | Station Number: | AMS26 |
| Start Time (MST): | 10:18 | End Time (MST): | 15:11 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1173480006 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999960 | ≥0.995 |
| 800.3 | 800.2 | 1.0001 | | | |
| 400.2 | 397.1 | 1.0077 | Slope | 1.001328 | 0.90 - 1.10 |
| 200.1 | 195.6 | 1.0229 | | | |
| | | | Intercept | -2.380000 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

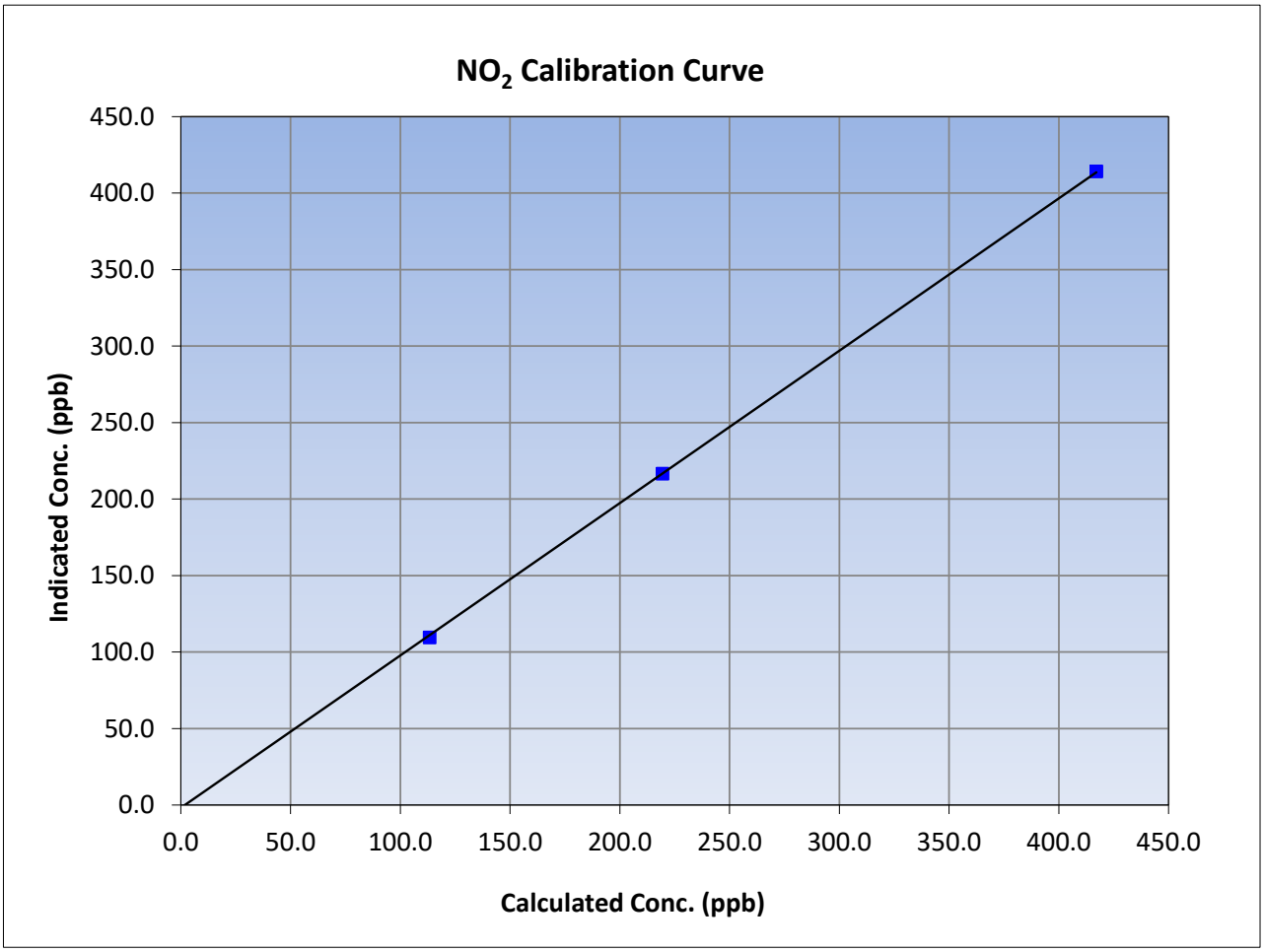
Version-04-2020

### Station Information

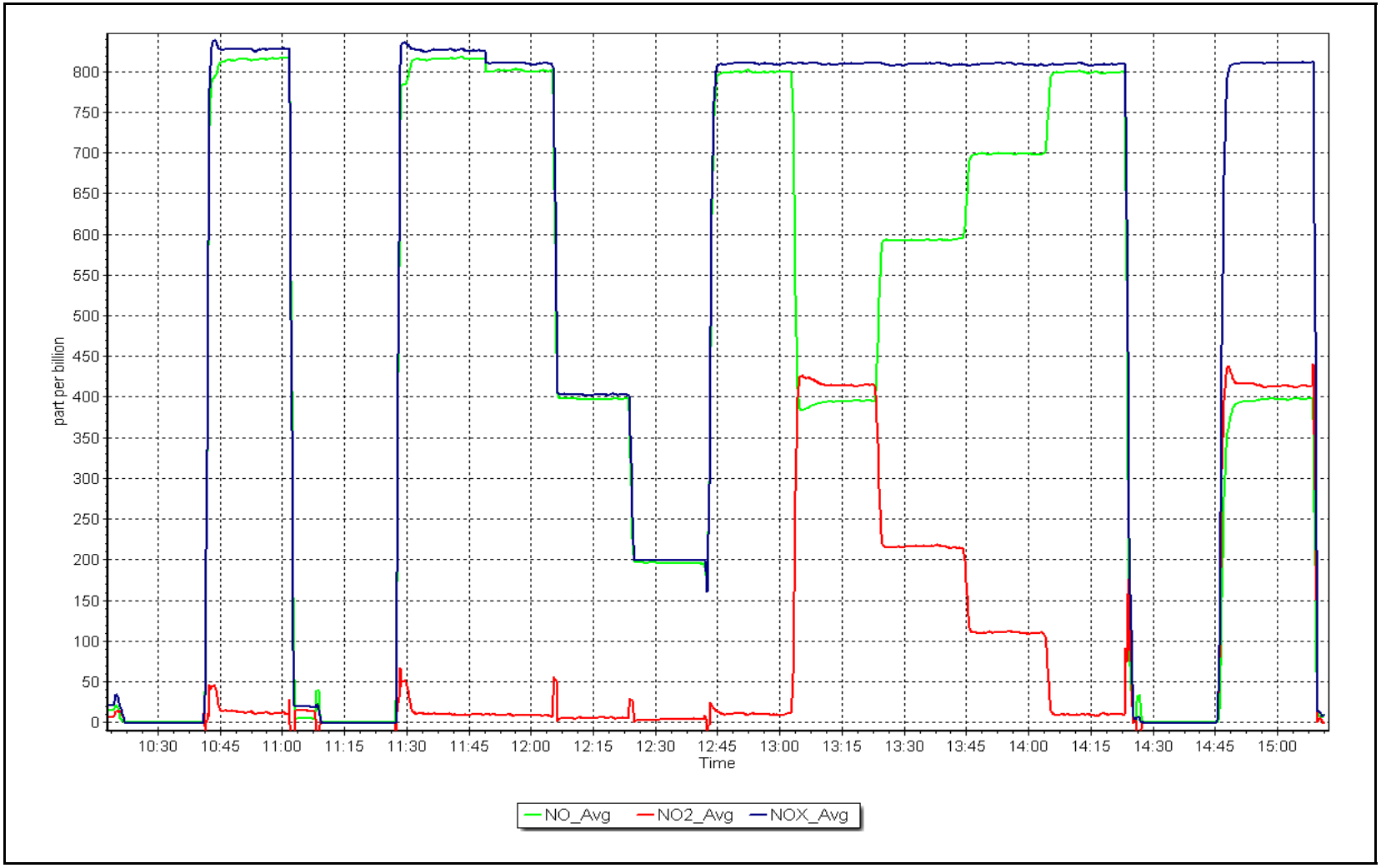
| | | | |
|---|---|---|---|
| Calibration Date: | August 17, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Christina Lake | Station Number: | AMS26 |
| Start Time (MST): | 10:18 | End Time (MST): | 15:11 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1173480006 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | -0.6 | ---- | Correlation Coefficient | 0.999956 | *≥0.995* |
| 417.1 | 414.1 | 1.0072 | | | |
| 219.5 | 216.6 | 1.0134 | Slope | 0.995894 | *0.90 - 1.10* |
| 113.4 | 109.6 | 1.0347 | | | |
| | | | Intercept | -1.805192 | *+/-20* |



**$NO_X$ Calibration Plot** Date: August 17, 2023 Location: Christina Lake



# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS27
## JACKFISH 2/3
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Jackfish 2/3 | Station number: | AMS 27 |
| Calibration Date: | August 23, 2023 | Last Cal Date: | July 7, 2023 |
| Start time (MST): | 9:31 | End time (MST): | 12:20 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 50.58 | ppm | Cal Gas Exp Date: | December 29, 2028 |
| Cal Gas Cylinder #: | SG9133974BAL | | | |
| Removed Cal Gas Conc: | 50.58 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3811 |
| ZAG Make/Model: | API 701 | | Serial Number: | 135 |

### Analyzer Information

Analyzer make: Thermo 43iQ  Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.008391 | 1.000975 | Backgd or Offset: | 7.5 | 7.2 |
| Calibration intercept: | -1.738506 | -1.618030 | Coeff or Slope: | 0.942 | 0.891 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4921 | 79.1 | 800.2 | 846.6 | 0.945 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4921 | 79.1 | 800.2 | 800.0 | 1.000 |
| second point | 4961 | 39.5 | 399.5 | 398.0 | 1.004 |
| third point | 4980 | 19.8 | 200.3 | 196.8 | 1.018 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4921 | 79.1 | 800.2 | 800.2 | 1.000 |
| | | | | Average Correction Factor | 1.007 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 846.70 | Previous response | 805.14 | *% change | 4.9% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Adjusted both zero and span.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

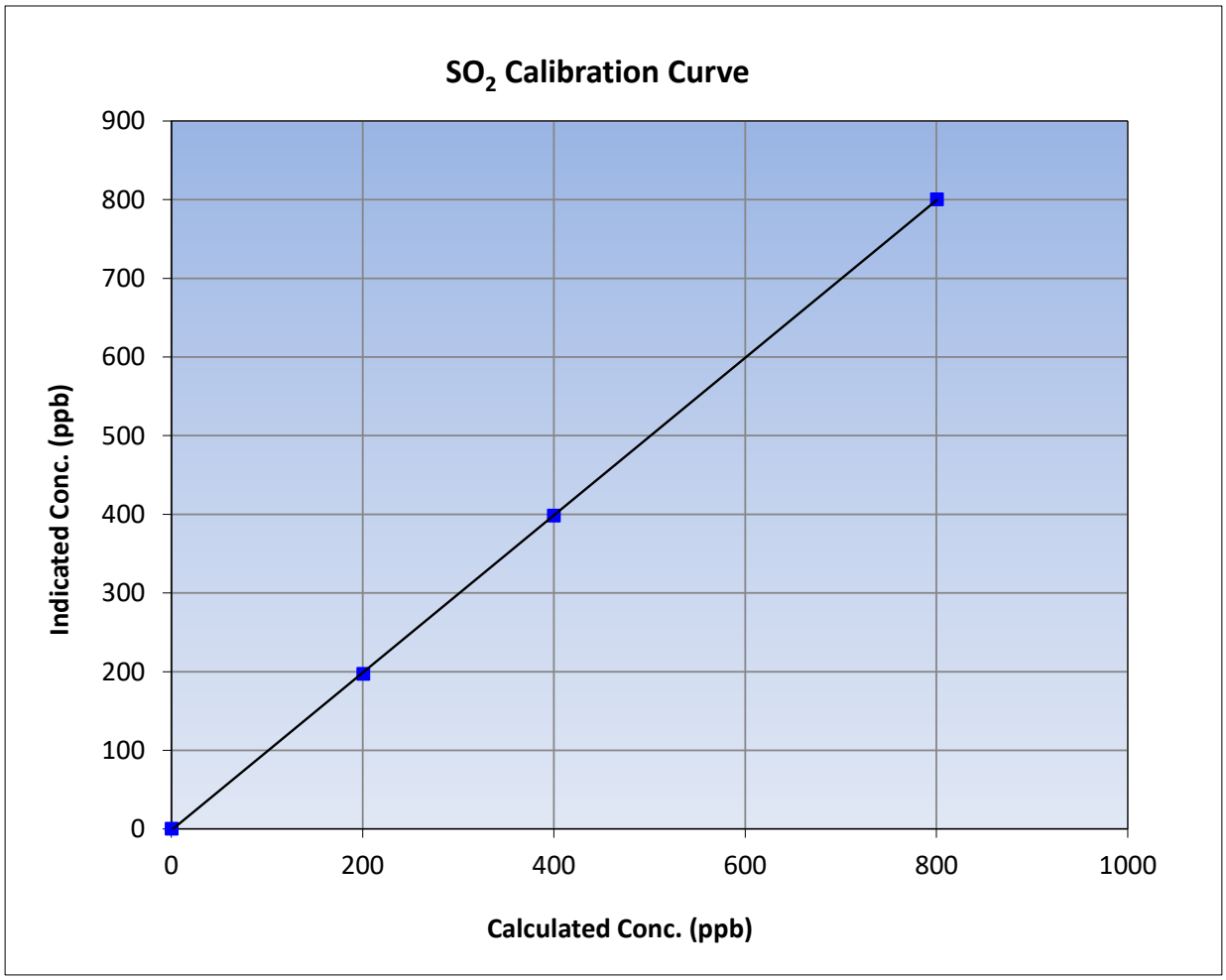
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 23, 2023 | Previous Calibration: | July 7, 2023 |
| Station Name: | Jackfish 2/3 | Station Number: | AMS 27 |
| Start Time (MST): | 9:31 | End Time (MST): | 12:20 |
| Analyzer make: | Thermo 43iQ | Analyzer serial #: | 12124313138 |

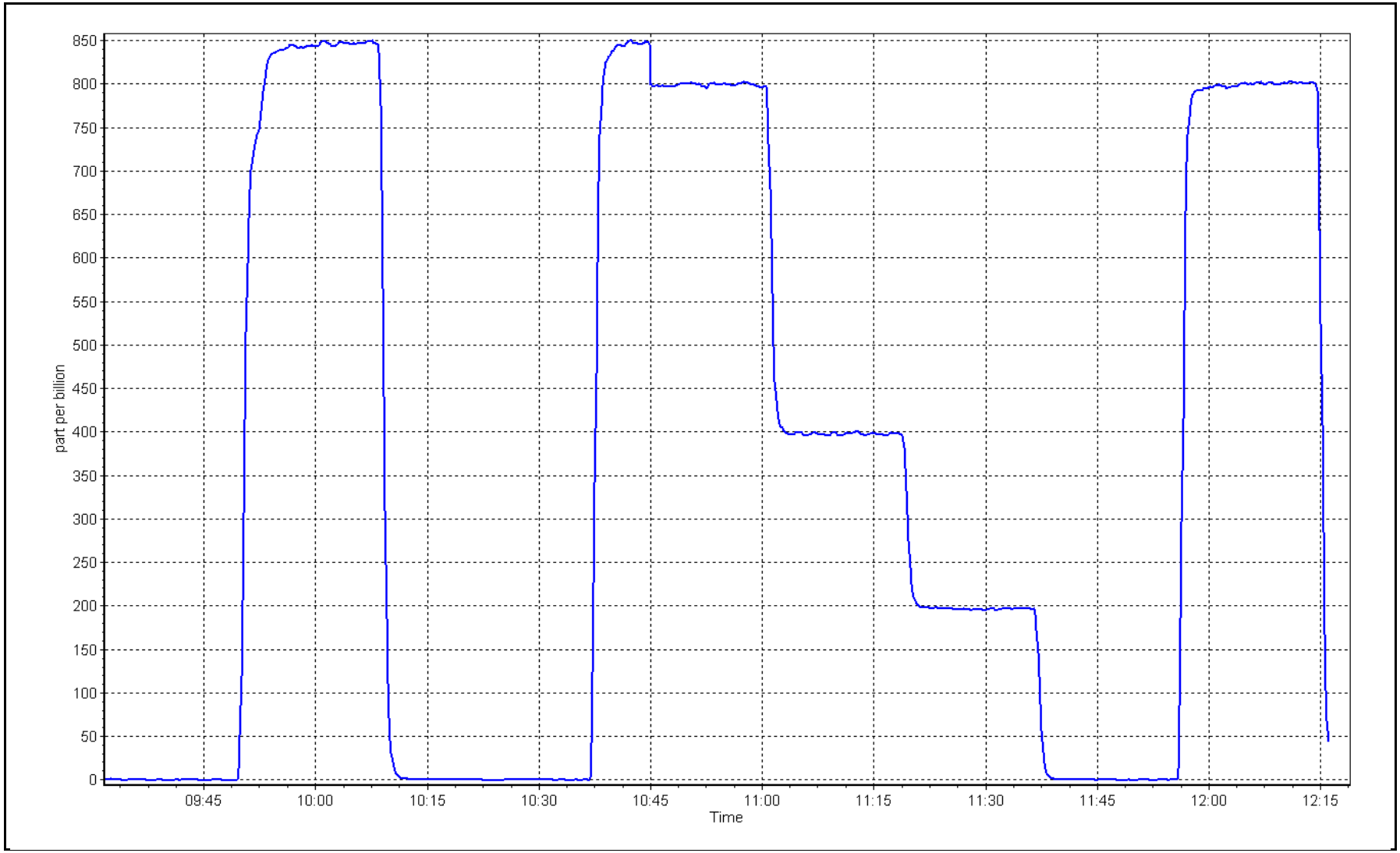
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 800.2 | 800.0 | 1.0002 |
| 399.5 | 398.0 | 1.0039 |
| 200.3 | 196.8 | 1.0178 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999978 | *≥0.995* |
| Slope | 1.000975 | *0.90 - 1.10* |
| Intercept | -1.618030 | *+/-30* |



**SO2 Calibration Plot** Date: August 23, 2023 Location: Jackfish 2/3



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Jackfish 2/3 | Station number: | AMS27 |
| Calibration Date: | August 2, 2023 | Last Cal Date: | July 19, 2023 |
| Start time (MST): | 7:50 | End time (MST): | 11:30 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.41 | ppm | Cal Gas Exp Date: | January 4, 2025 |
| Cal Gas Cylinder #: | CC345023 | | | |
| Removed Cal Gas Conc: | 5.41 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3811 |
| ZAG Make/Model: | API 701 | | Serial Number: | 135 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | API T101 | | Analyzer serial #: | 621 | |
| Converter make: | | | Converter serial #: | | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.011028 | 1.006901 | Backgd or Offset: | 27.3 | 28.3 |
| Calibration intercept: | 0.082512 | -0.097803 | Coeff or Slope: | 0.961 | 0.944 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as found span | 4926 | 74.1 | 80.2 | 83.0 | 0.969 |
| as found 2nd point | 4963 | 37.0 | 40.0 | 42.0 | 0.960 |
| as found 3rd point | 4982 | 18.5 | 20.0 | 20.8 | 0.976 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4926 | 74.1 | 80.2 | 80.7 | 0.993 |
| second point | 4963 | 37.0 | 40.0 | 40.1 | 0.998 |
| third point | 4982 | 18.5 | 20.0 | 20.0 | 1.001 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4926 | 74.1 | 80.2 | 80.0 | 1.002 |
| SO2 Scrubber Check | 4921 | 79.1 | 791.0 | 0.1 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 0.998 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 82.7 | Prev response: | 81.14 | *% change: | 1.9% |
| Baseline Corr 2nd AF pt: | 41.7 | AF Slope: | 1.032695 | AF Intercept: | 0.322966 |
| Baseline Corr 3rd AF pt: | 20.5 | AF Correlation: | 0.999956 | | |

* = > +/-5% change initiates investigation

Notes: Adjusted both zero and span.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

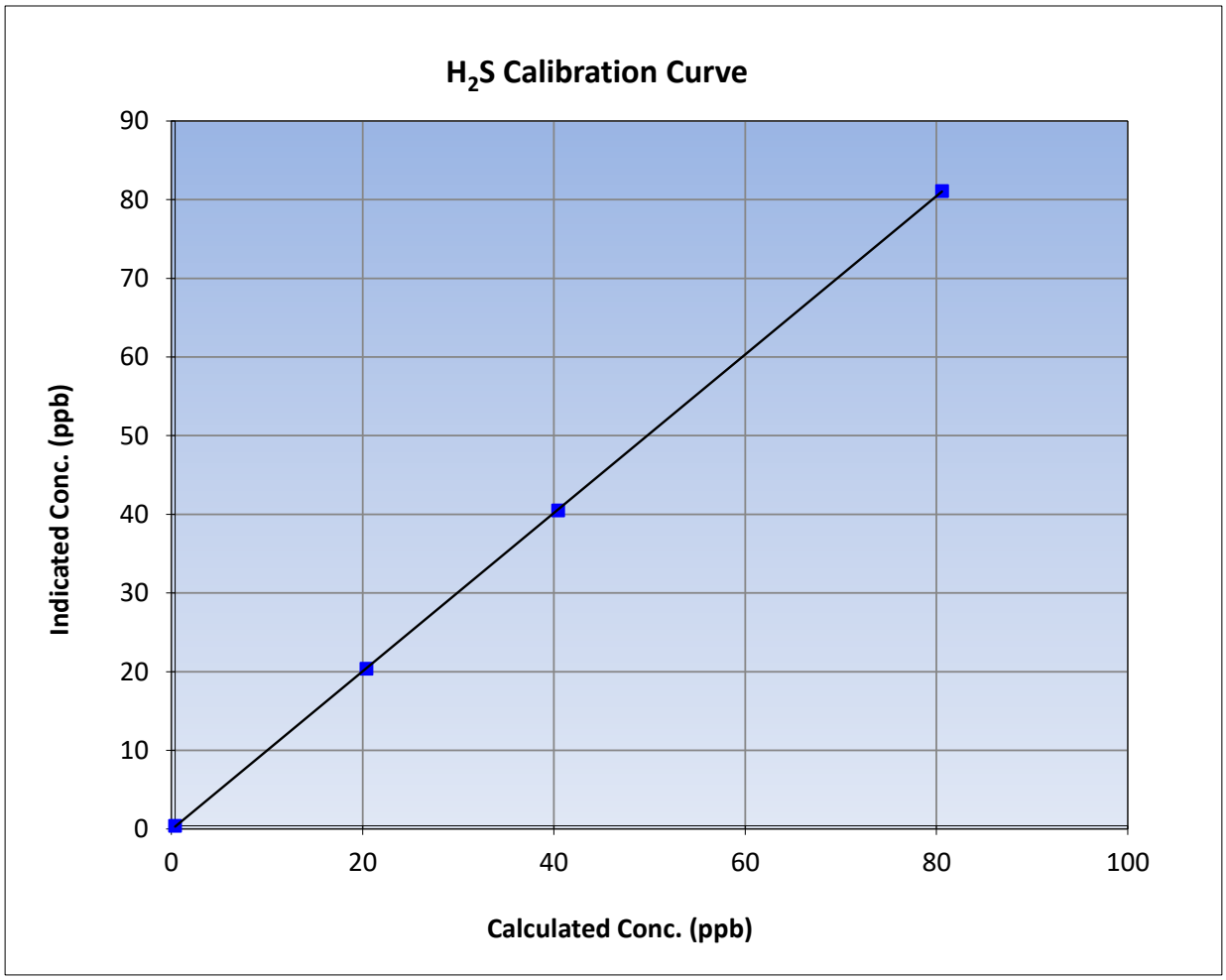
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 2, 2023 | Previous Calibration: | July 19, 2023 |
| Station Name: | Jackfish 2/3 | Station Number: | AMS27 |
| Start Time (MST): | 7:50 | End Time (MST): | 11:30 |
| Analyzer make: | API T101 | Analyzer serial #: | 621 |

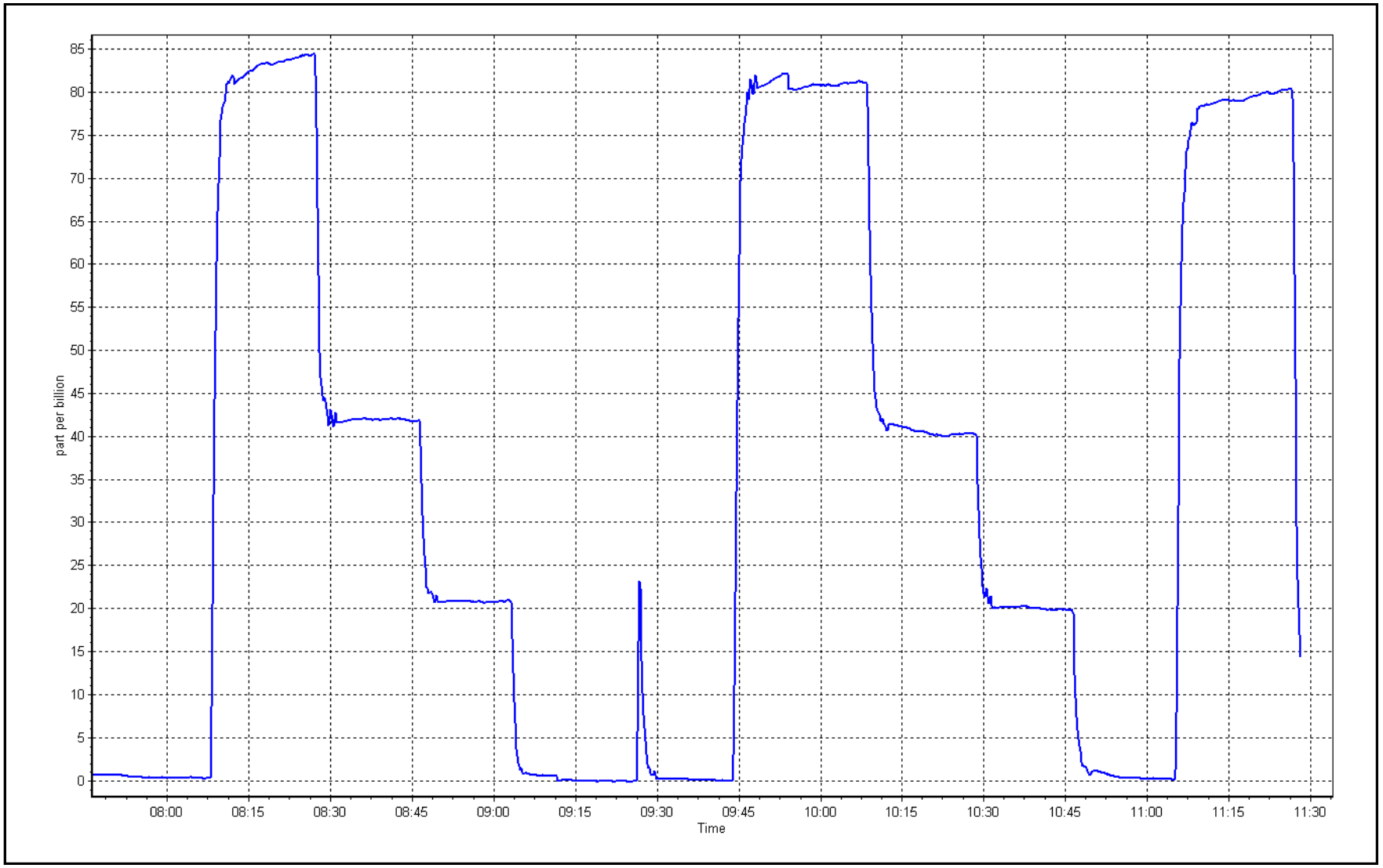
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 80.2 | 80.7 | 0.9935 |
| 40.0 | 40.1 | 0.9984 |
| 20.0 | 20.0 | 1.0007 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999992 | *≥0.995* |
| Slope | 1.006901 | *0.90 - 1.10* |
| Intercept | -0.097803 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 2, 2023 Location: Jackfish 2/3



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Jackfish 2/3 | Station number: | AMS27 |
| Calibration Date: | August 8, 2023 | Last Cal Date: | July 20, 2023 |
| Start time (MST): | 9:59 | End time (MST): | 13:45 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2Y1P35 | | Cal Gas Expiry Date: | December 11, 2023 | |
| NOX Cal Gas Conc: | 51.44 | ppm | NO Cal Gas Conc: | 50.40 | ppm |
| Removed Cylinder #: | NA | | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 51.44 | ppm | Removed Gas NO Conc: | 50.40 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 3811 | |
| ZAG make/model: | API T701 | | Serial Number: | 135 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | API T200 | Analyzer serial #: | 722 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.082 | 1.109 | NO bkgnd or offset: | 0.3 | 0.3 |
| NOX coeff or slope: | 1.081 | 1.087 | NOX bkgnd or offset: | 1.2 | 1.2 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 5.5 | 5.6 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 1.000962 | 1.000358 |
| $NO_X$ Cal Offset: | -1.136298 | -1.195601 |
| NO Cal Slope: | 1.001486 | 1.010851 |
| NO Cal Offset: | -2.340129 | -1.717915 |
| $NO_2$ Cal Slope: | 1.003914 | 0.972010 |
| $NO_2$ Cal Offset: | 0.816669 | 0.660630 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.6 | 0.3 | ---- | ---- |
| as found span | 4921 | 79.4 | 816.8 | 800.3 | 16.5 | 808.0 | 780.0 | 28.0 | 1.0109 | 1.0260 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| high point | 4921 | 79.4 | 816.8 | 800.3 | 16.5 | 816.8 | 808.2 | 8.7 | 1.0000 | 0.9902 |
| second point | 4960 | 39.7 | 408.5 | 400.2 | 8.3 | 405.9 | 401.7 | 4.2 | 1.0063 | 0.9963 |
| third point | 4980 | 19.8 | 203.7 | 199.6 | 4.1 | 202.0 | 198.5 | 3.6 | 1.0085 | 1.0055 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | 0.8 | -1.0 | ---- | ---- |
| as left span | 4921 | 79.4 | 816.8 | 430.6 | 401.7 | 814.5 | 428.3 | 386.2 | 1.0028 | 1.0054 |
| | | | | | | | | Average Correction Factor | 1.0049 | 0.9973 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 808.3 ppb | NO = 780.6 ppb | * = > +/-5% change initiates investigation | | *Percent Change | $NO_X$ = | -1.0% |
| Previous Response | $NO_X$ = 816.5 ppb | NO = 799.1 ppb | | | *Percent Change | NO = | -2.4% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: | |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: | |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: | |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 808.6 | 423.4 | 401.7 | 390.8 | 1.0279 | 97.3% |
| 2nd GPT point (200 ppb O3) | 808.6 | 630.2 | 194.9 | 190.5 | 1.0232 | 97.7% |
| 3rd GPT point (100 ppb O3) | 808.6 | 729.2 | 95.9 | 94.5 | 1.0150 | 98.5% |
| | | | | Average Correction Factor | 1.0220 | 97.8% |

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

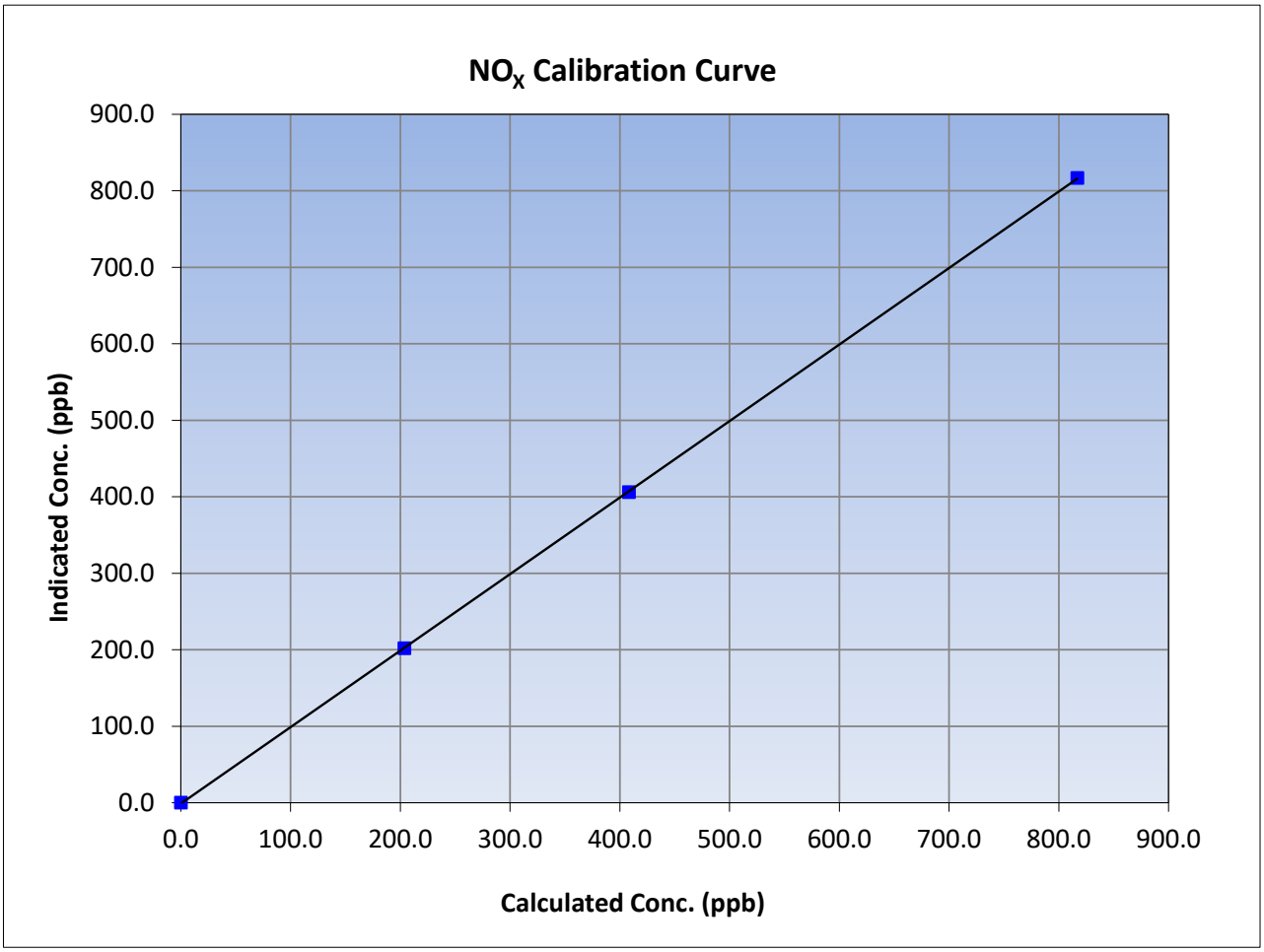
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 20, 2023 |
| Station Name: | Jackfish 2/3 | Station Number: | AMS27 |
| Start Time (MST): | 9:59 | End Time (MST): | 13:45 |
| Analyzer make: | API T200 | Analyzer serial #: | 722 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999987 | ≥0.995 |
| 816.8 | 816.8 | 1.0000 | | | |
| 408.5 | 405.9 | 1.0063 | Slope | 1.000358 | 0.90 - 1.10 |
| 203.7 | 202.0 | 1.0085 | | | |
| | | | Intercept | -1.195601 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

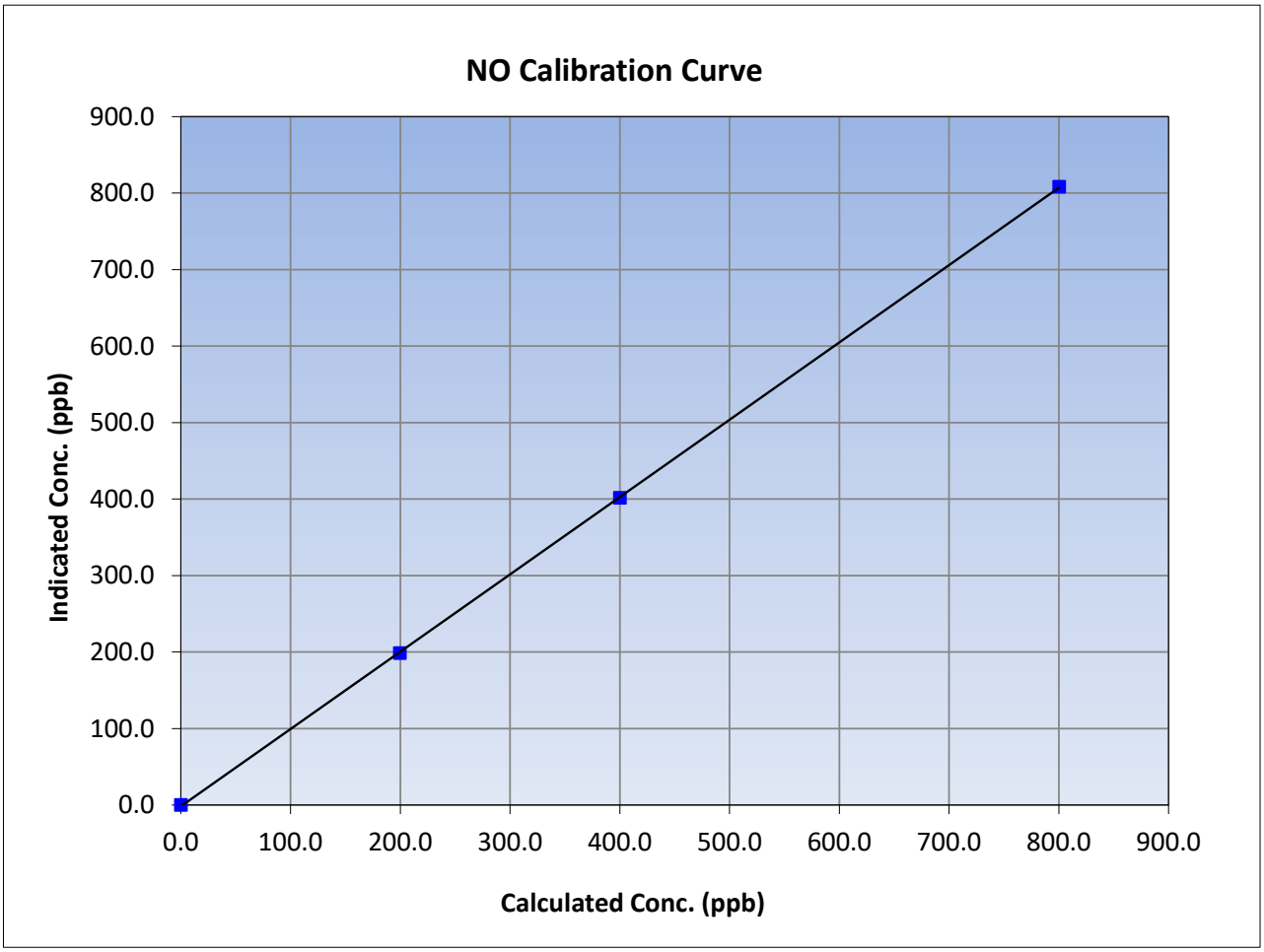
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 20, 2023 |
| Station Name: | Jackfish 2/3 | Station Number: | AMS27 |
| Start Time (MST): | 9:59 | End Time (MST): | 13:45 |
| Analyzer make: | API T200 | Analyzer serial #: | 722 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999979 | ≥0.995 |
| 800.3 | 808.2 | 0.9902 | | | |
| 400.2 | 401.7 | 0.9963 | Slope | 1.010851 | 0.90 - 1.10 |
| 199.6 | 198.5 | 1.0055 | | | |
| | | | Intercept | -1.717915 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

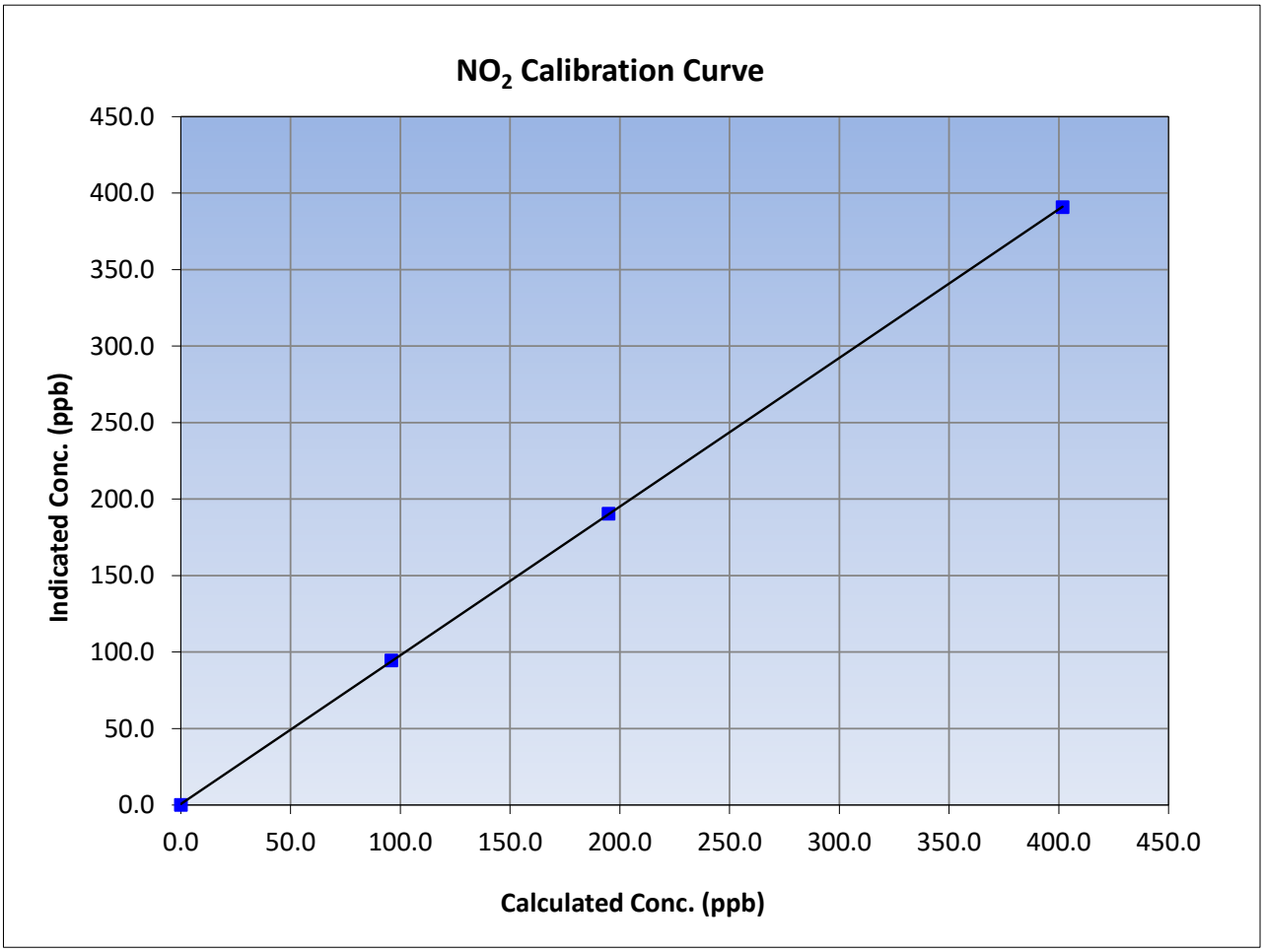
Version-04-2020

### Station Information

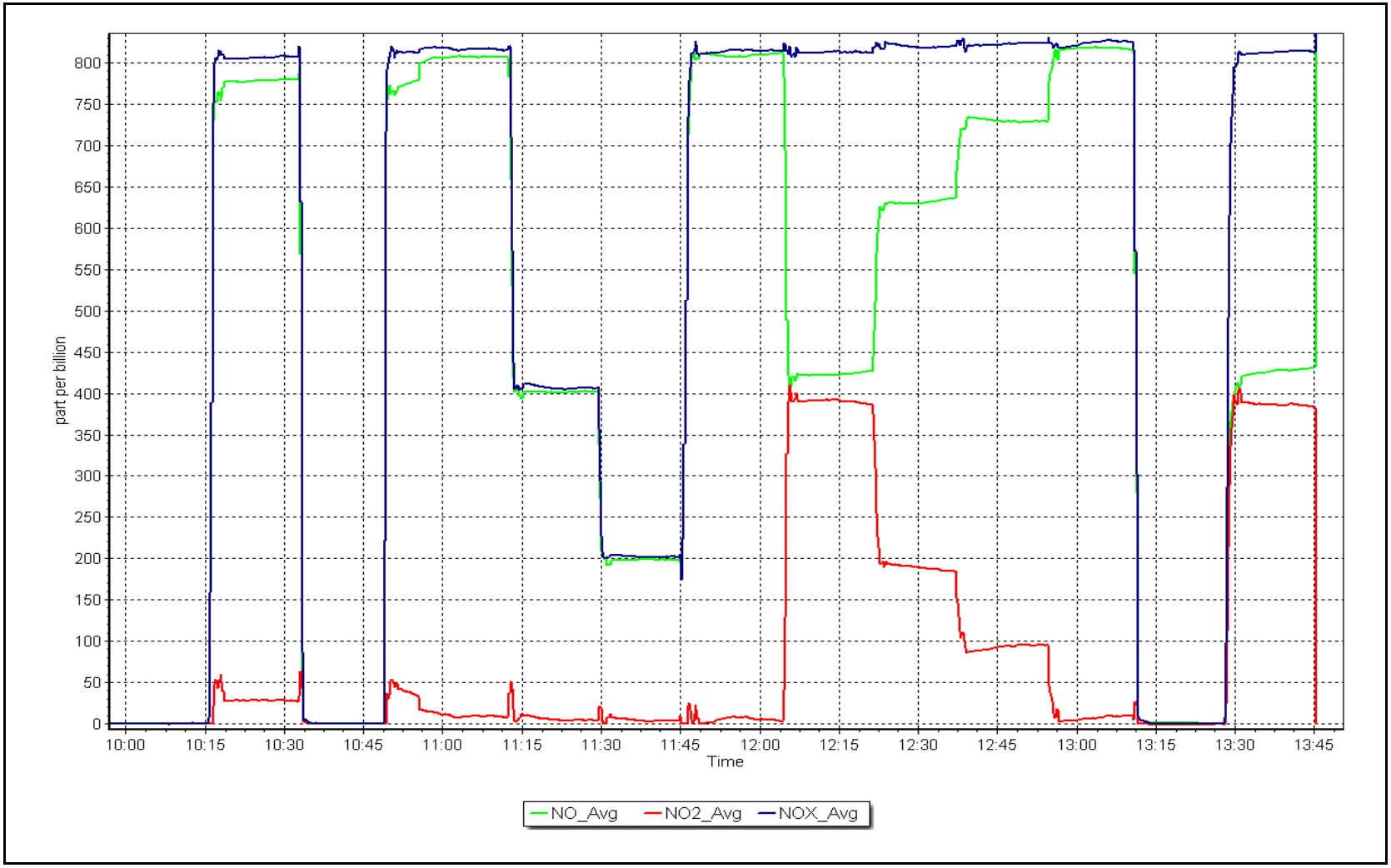
| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 20, 2023 |
| Station Name: | Jackfish 2/3 | Station Number: | AMS27 |
| Start Time (MST): | 9:59 | End Time (MST): | 13:45 |
| Analyzer make: | API T200 | Analyzer serial #: | 722 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999987 | ≥0.995 |
| 401.7 | 390.8 | 1.0279 | | | |
| 194.9 | 190.5 | 1.0232 | Slope | 0.972010 | 0.90 - 1.10 |
| 95.9 | 94.5 | 1.0150 | | | |
| | | | Intercept | 0.660630 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 8, 2023 Location: Jackfish 2/3



# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Jackfish 2/3 | Station Number: | AMS 30 |
| Calibration Date: | August 29, 2023 | Prev Cal Date: | August 31, 2022 |
| Start Time (MST): | 10:00 | End Time (MST): | 10:55 |
| Tower Height (m): | 10.0 | Reason: | Routine |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | X16496 |
| WS Calibrator: | MetOne 053-120 | Serial Number: | R10866 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.2 | 0.2% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | -0.1% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999999 | *≥0.9995* |
| Calculated slope | | 0.999979 | *0.90 - 1.10* |
| Calculated intercept | | -0.013577 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | X16480 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 13 |
| Solar noon time (MST): | 13:24 | Calc Declination*: | 13 Degrees |
| Deadband calc: | 2.2 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | -0.8 | --- |
| 90 | 91.1 | 0.3% |
| 180 | 181.8 | 0.5% |
| 270 | 271.0 | 0.3% |
| 357 | 354.0 | -0.8% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999918 | *≥0.9995* |
| Calculated slope | | 1.004859 | *0.90 - 1.10* |
| Calculated intercept | | -0.893768 | *+/- 4* |

Notes:

Bearings still good. Confirmed declination with a compass.

Calibration Performed By: Denny Ray Estador

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS29
## SURMONT 2
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Surmont 2 | Station number: | AMS29 |
| Calibration Date: | August 8, 2023 | Last Cal Date: | July 17, 2023 |
| Start time (MST): | 9:56 | End time (MST): | 12:56 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.21 | ppm | Cal Gas Exp Date: | February 23, 2025 |
| Cal Gas Cylinder #: | CC356008 | | | |
| Removed Cal Gas Conc: | 49.21 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 5472 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 4297 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1170050150

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.005842 | 1.001658 | Backgd or Offset: | 12.5 | 13.1 |
| Calibration intercept: | -1.525687 | -0.685685 | Coeff or Slope: | 0.942 | 0.942 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 4919 | 81.3 | 800.1 | 804.0 | 0.995 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4919 | 81.3 | 800.1 | 801.0 | 0.999 |
| second point | 4959 | 40.7 | 400.6 | 400.4 | 1.000 |
| third point | 4979 | 20.3 | 199.8 | 198.8 | 1.005 |
| as left zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| as left span | 4919 | 81.3 | 800.1 | 802.0 | 0.998 |
| | | | | Average Correction Factor | 1.002 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 803.80 | Previous response | 803.26 | *% change | 0.1% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Adjusted zero.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

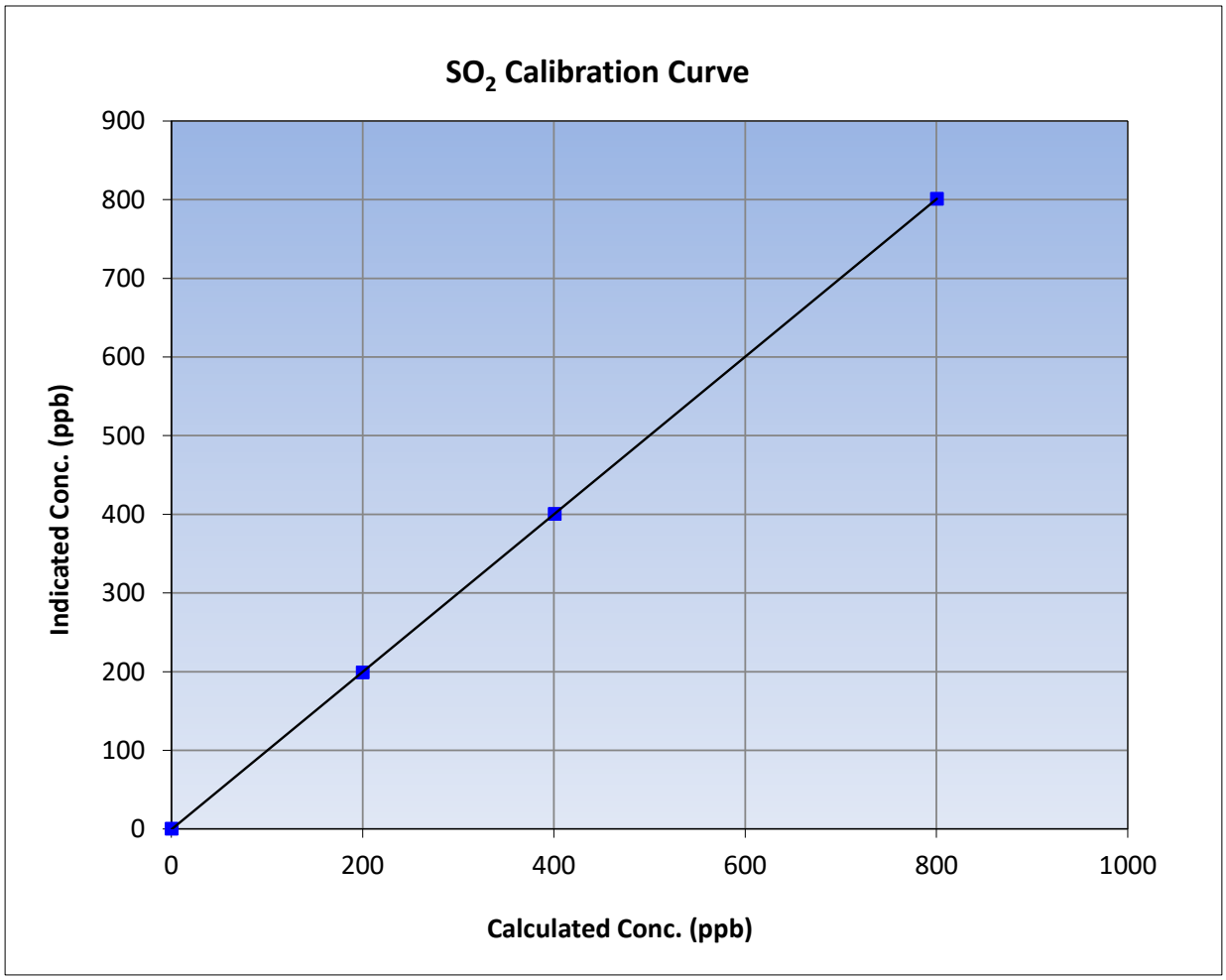
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Surmont 2 | Station Number: | AMS29 |
| Start Time (MST): | 9:56 | End Time (MST): | 12:56 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1170050150 |

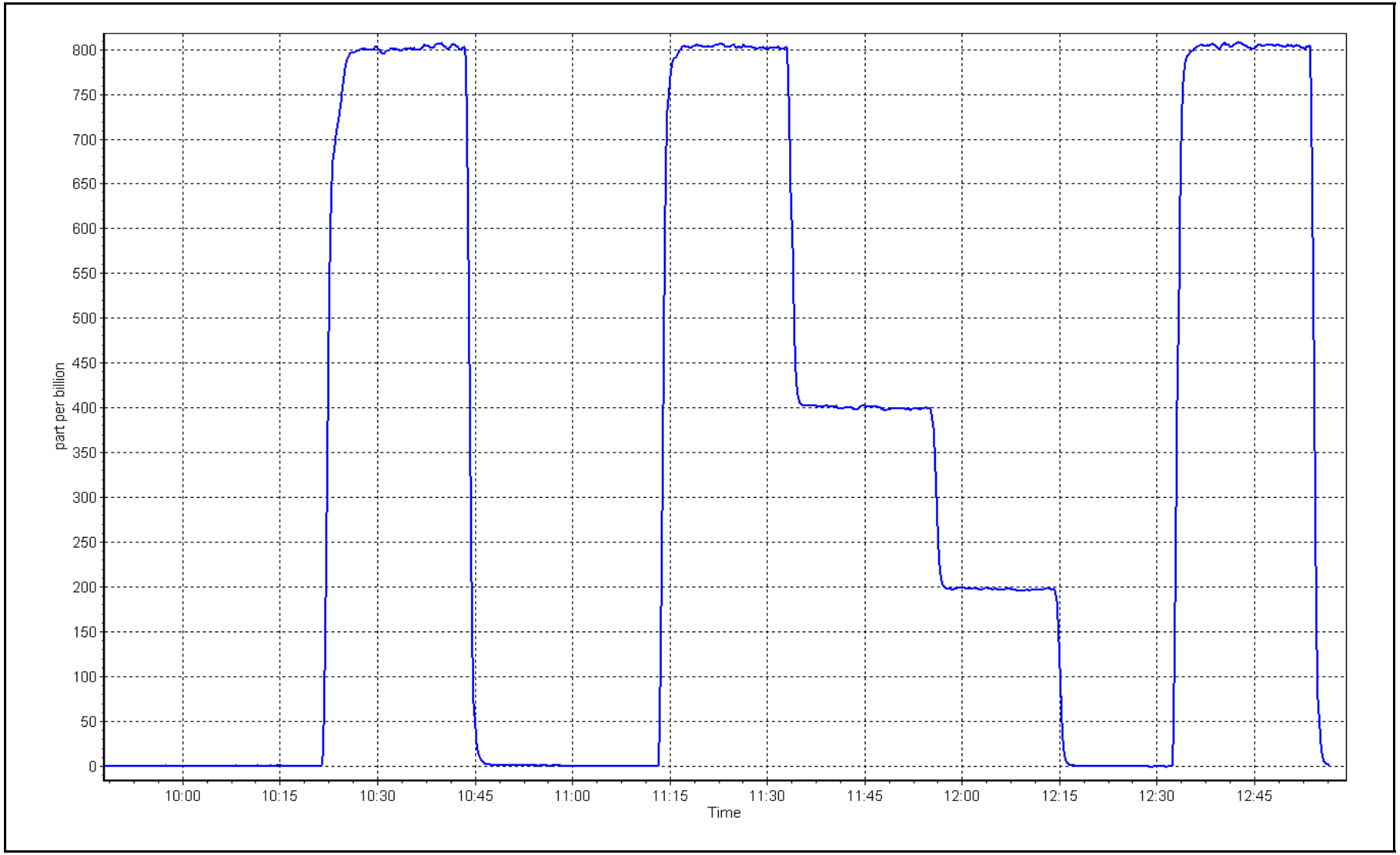
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 800.1 | 801.0 | 0.9989 |
| 400.6 | 400.4 | 1.0005 |
| 199.8 | 198.8 | 1.0051 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999997 | *≥0.995* |
| Slope | 1.001658 | *0.90 - 1.10* |
| Intercept | -0.685685 | *+/-30* |



**SO2 Calibration Plot** Date: August 8, 2023 Location: Surmont 2



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Surmont 2 | Station number: | AMS29 |
| Calibration Date: | August 1, 2023 | Last Cal Date: | July 10, 2023 |
| Start time (MST): | 9:50 | End time (MST): | 14:48 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.391 | ppm | Cal Gas Exp Date: | January 4, 2025 |
| Cal Gas Cylinder #: | CC508338 | | | |
| Removed Cal Gas Conc: | 5.391 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | CC508338 | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 5472 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 4297 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43iQ-TLE | | Analyzer serial #: | 1200326170 | |
| Converter make: | Global | | Converter serial #: | 2022-223 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.001618 | 1.001190 | Backgd or Offset: | 0.82 | 0.82 |
| Calibration intercept: | -0.122896 | -0.182890 | Coeff or Slope: | 1.049 | 1.049 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 4926 | 74.2 | 80.0 | 80.1 | 0.996 |
| as found 2nd point | 4963 | 37.2 | 40.1 | 39.9 | 1.000 |
| as found 3rd point | 4982 | 18.6 | 20.1 | 19.9 | 0.998 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 4926 | 74.2 | 80.0 | 79.9 | 1.001 |
| second point | 4963 | 37.2 | 40.1 | 40.0 | 1.003 |
| third point | 4982 | 18.6 | 20.1 | 19.9 | 1.008 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 4926 | 74.2 | 80.0 | 79.1 | 1.011 |
| SO2 Scrubber Check | 4919 | 81.3 | 813.0 | 0.1 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 1.004 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 80.3 | Prev response: | 80.01 | *% change: | 0.4% |
| Baseline Corr 2nd AF pt: | 40.1 | AF Slope: | 1.003614 | AF Intercept: | -0.242852 |
| Baseline Corr 3rd AF pt: | 20.1 | AF Correlation: | 0.999995 | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. SOx scrubber check done after calibrator zero. No adjustments made.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

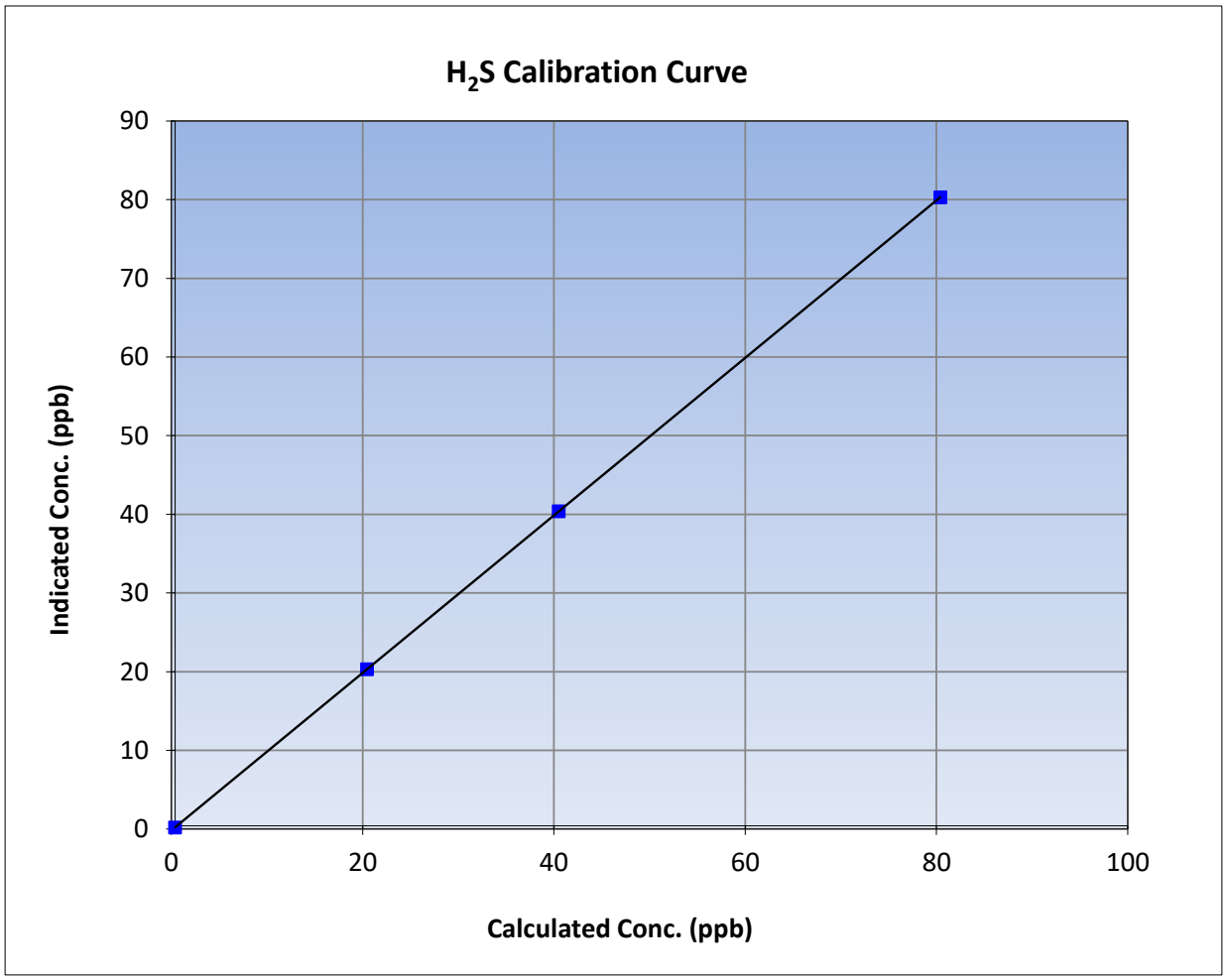
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 10, 2023 |
| Station Name: | Surmont 2 | Station Number: | AMS29 |
| Start Time (MST): | 9:50 | End Time (MST): | 14:48 |
| Analyzer make: | Thermo 43iQ-TLE | Analyzer serial #: | 1200326170 |

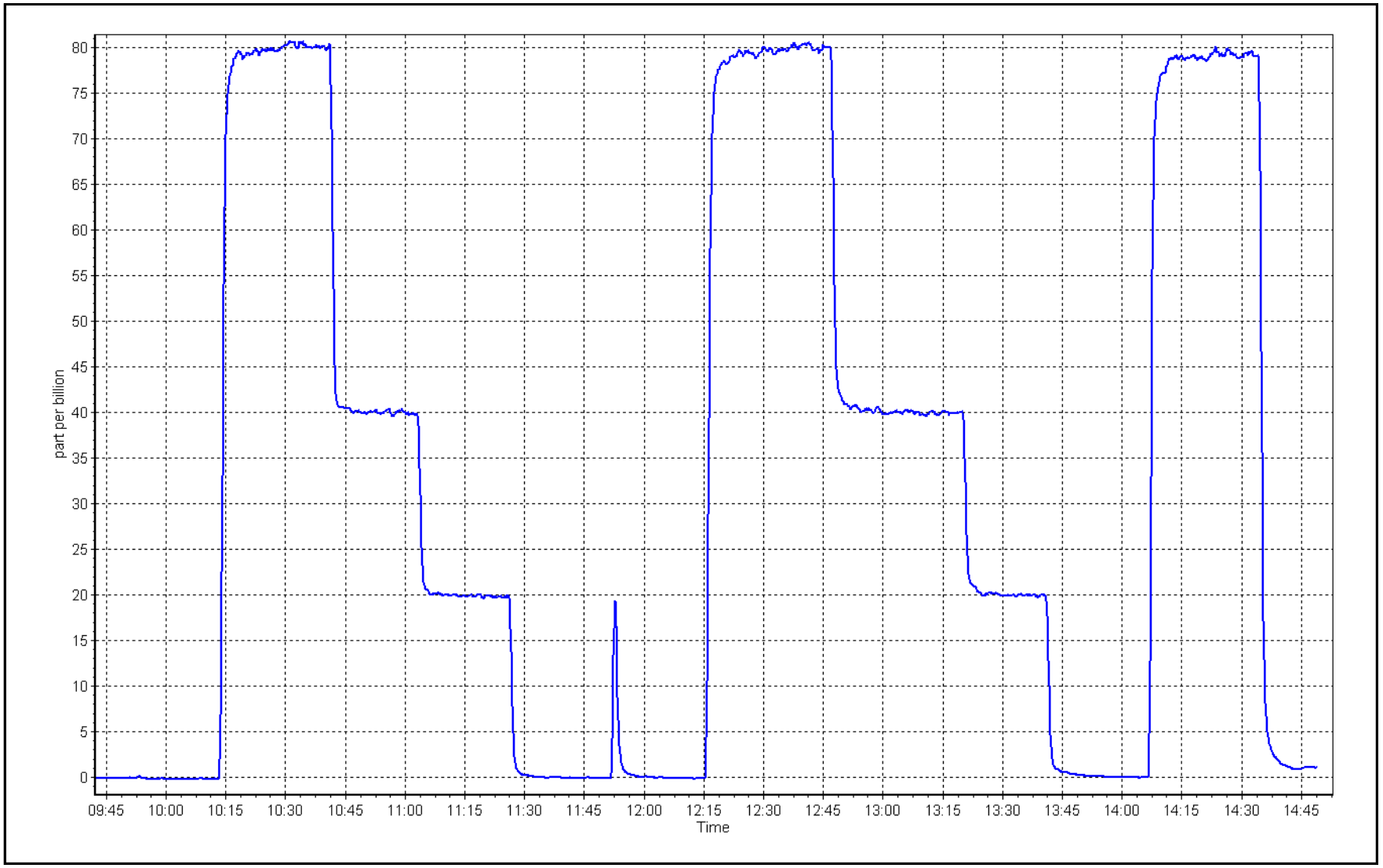
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.2 | ---- |
| 80.0 | 79.9 | 1.0013 |
| 40.1 | 40.0 | 1.0027 |
| 20.1 | 19.9 | 1.0077 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 1.000000 | *≥0.995* |
| Slope | 1.001190 | *0.90 - 1.10* |
| Intercept | -0.182890 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 1, 2023 Location: Surmont 2



# Wood Buffalo Environmental Association

## THC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Surmont 2 | Station number: | AMS29 |
| Calibration Date: | August 8, 2023 | Last Cal Date: | July 17, 2023 |
| Start time (MST): | 9:56 | End time (MST): | 12:56 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | CC356008 | | Cal Gas Expiry Date: | February 23, 2025 | |
| CH4 Cal Gas Conc. | 499.0 | ppm | CH4 Equiv Conc. | 1064.7 | ppm |
| C3H8 Cal Gas Conc. | 205.7 | ppm | | | |
| Removed Gas Cert: | NA | | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 499.0 | ppm | CH4 Equiv Conc. | 1064.7 | ppm |
| Removed C3H8 Conc. | 205.7 | ppm | Diff between cyl: | | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 5472 | |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 4297 | |

### Analyzer Information

Analyzer make: Thermo 51i-LT
Analyzer serial #: 1170050149
Analyzer Range: 0 - 20 ppm

| | *Start* | *Finish* | | *Start* | *Finish* |
|---|---|---|---|---|---|
| Calibration slope: | 1.000217 | 1.000971 | Background: | 3.64 | 3.64 |
| Calibration intercept: | -0.075664 | -0.017870 | Coefficient: | 3.987 | 3.987 |

### THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | -0.04 | ---- |
| as found span | 4918 | 81.3 | 17.31 | 17.36 | 0.997 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.06 | ---- |
| high point | 4918 | 81.3 | 17.31 | 17.35 | 0.998 |
| second point | 4959 | 40.6 | 8.65 | 8.60 | 1.005 |
| third point | 4979 | 20.3 | 4.32 | 4.23 | 1.021 |
| as left zero | 5000 | 0.0 | 0.00 | 0.03 | ---- |
| as left span | 4918 | 81.3 | 17.31 | 17.42 | 0.994 |
| | | | | Average Correction Factor | 1.008 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 17.40 | Previous response | 17.24 | *% change | 0.9% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. No adjustments made.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## THC Calibration Summary

Version-01-2020

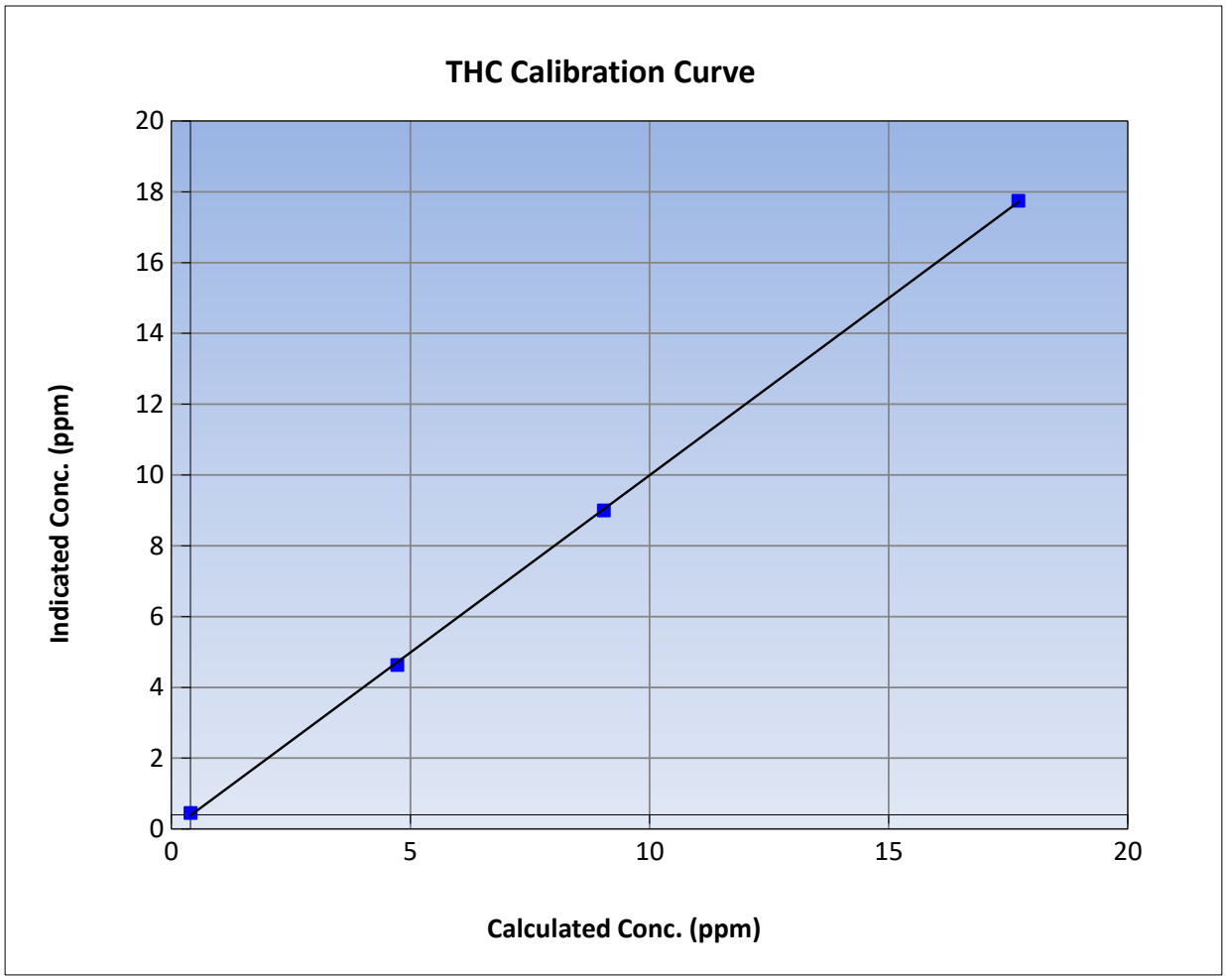
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 8, 2023 | Previous Calibration: | July 17, 2023 |
| Station Name: | Surmont 2 | Station Number: | AMS29 |
| Start Time (MST): | 9:56 | End Time (MST): | 12:56 |
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1170050149 |

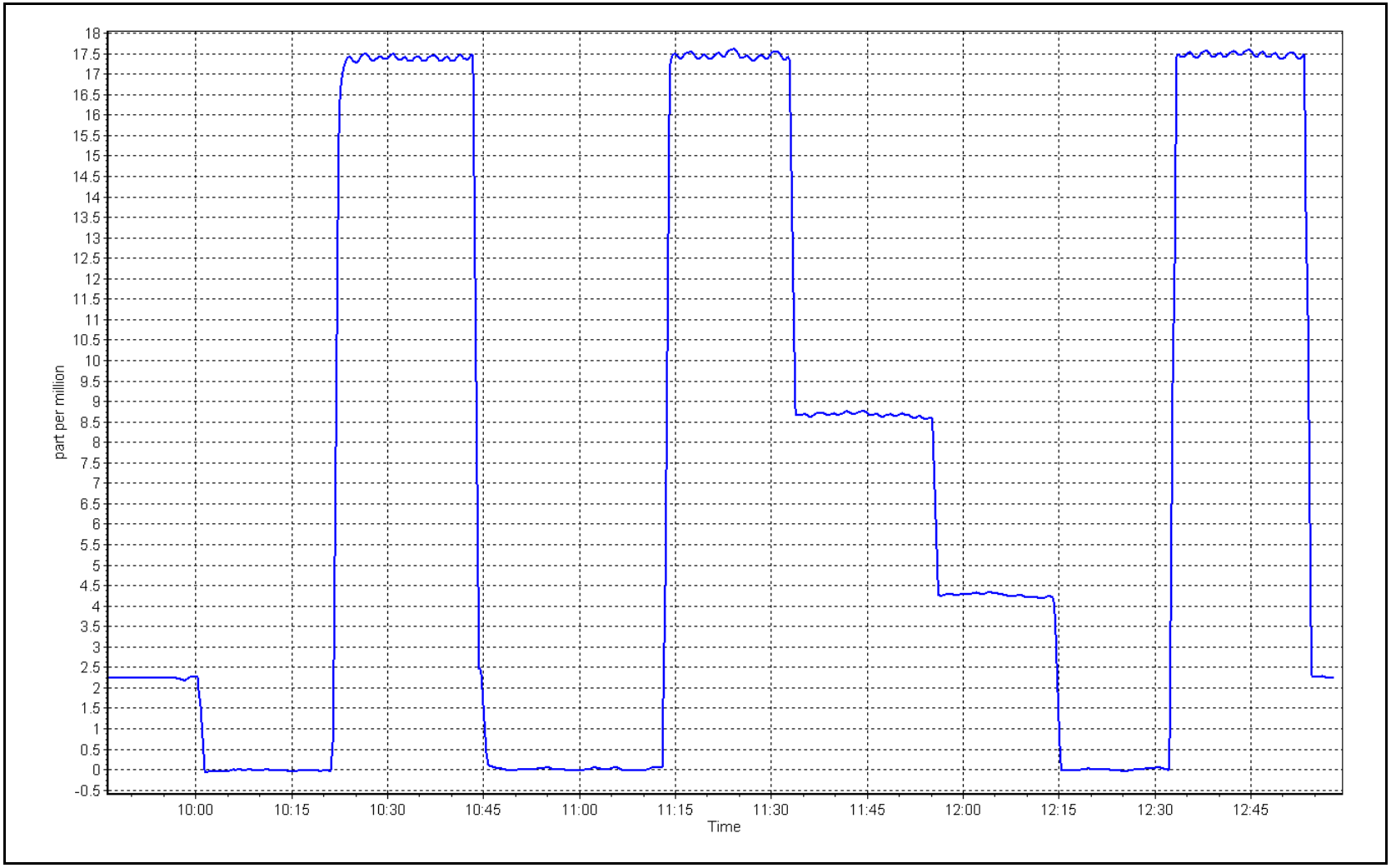
### Calibration Data

| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.00 | 0.06 | ---- |
| 17.31 | 17.35 | 0.9979 |
| 8.65 | 8.60 | 1.0053 |
| 4.32 | 4.23 | 1.0211 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999915 | *≥0.995* |
| Slope | 1.000971 | *0.90 - 1.10* |
| Intercept | -0.017870 | *+/-1.5* |



**THC Calibration Plot** Date: August 8, 2023 Location: Surmont 2



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Surmont 2 | Station number: | AMS29 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 21, 2023 |
| Start time (MST): | 9:29 | End time (MST): | 14:09 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | | T12YYFE | Cal Gas Expiry Date: | October 30, 2024 | |
| NOX Cal Gas Conc: | 47.46 | ppm | NO Cal Gas Conc: | 47.46 | ppm |
| Removed Cylinder #: | | NA | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 47.46 | ppm | Removed Gas NO Conc: | 47.46 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | Teledyne API T700 | | Serial Number: | 5472 | |
| ZAG make/model: | Teledyne API T701 | | Serial Number: | 4297 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 42i | | Analyzer serial #: | 1170050148 | |
| NOX Range (ppb): | 0 - 1000 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| NO coeff or slope: | 1.370 | 1.370 | NO bkgnd or offset: | 1.3 | 1.3 |
| NOX coeff or slope: | 0.995 | 0.995 | NOX bkgnd or offset: | 1.4 | 1.4 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 173.4 | 176.2 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 1.002041 | 1.000454 |
| $NO_X$ Cal Offset: | 0.266787 | -0.253155 |
| NO Cal Slope: | 1.002168 | 1.000066 |
| NO Cal Offset: | -1.052471 | -0.992422 |
| $NO_2$ Cal Slope: | 0.999330 | 1.000433 |
| $NO_2$ Cal Offset: | 0.616986 | 0.227914 |

# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| as found span | 4916 | 84.2 | 799.2 | 799.2 | 0.0 | 797.0 | 795.9 | 1.1 | 1.0028 | 1.0041 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | ---- | ---- |
| high point | 4916 | 84.2 | 799.2 | 799.2 | 0.0 | 799.7 | 798.7 | 1.0 | 0.9994 | 1.0006 |
| second point | 4958 | 42.1 | 399.6 | 399.6 | 0.0 | 398.7 | 398.4 | 0.3 | 1.0023 | 1.0030 |
| third point | 4979 | 21.1 | 200.3 | 200.3 | 0.0 | 200.2 | 198.0 | 2.2 | 1.0004 | 1.0115 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | ---- | ---- |
| as left span | 4916 | 84.2 | 799.2 | 407.4 | 391.8 | 801.0 | 407.1 | 393.7 | 0.9977 | 1.0007 |
| | | | | | | | | Average Correction Factor | 1.0007 | 1.0050 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 797.0 ppb | NO = 795.9 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -0.5% |
| Previous Response | $NO_X$ = 801.1 ppb | NO = 799.9 ppb | | *Percent Change | NO = | -0.5% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found $NO_X$ $r^2$: | Nx Sl: | Nx Int: | |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found NO $r^2$: | NO Sl: | NO Int: | |
| | | | As found $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: | |

### GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 792.9 | 401.1 | 391.8 | 392.1 | 0.9992 | 100.1% |
| 2nd GPT point (200 ppb O3) | 792.9 | 610.5 | 182.4 | 182.8 | 0.9978 | 100.2% |
| 3rd GPT point (100 ppb O3) | 792.9 | 701.4 | 91.5 | 92.0 | 0.9946 | 100.5% |
| | | | | Average Correction Factor | 0.9972 | 100.3% |

Notes: Changed sample inlet filter after as founds. No adjustments made.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

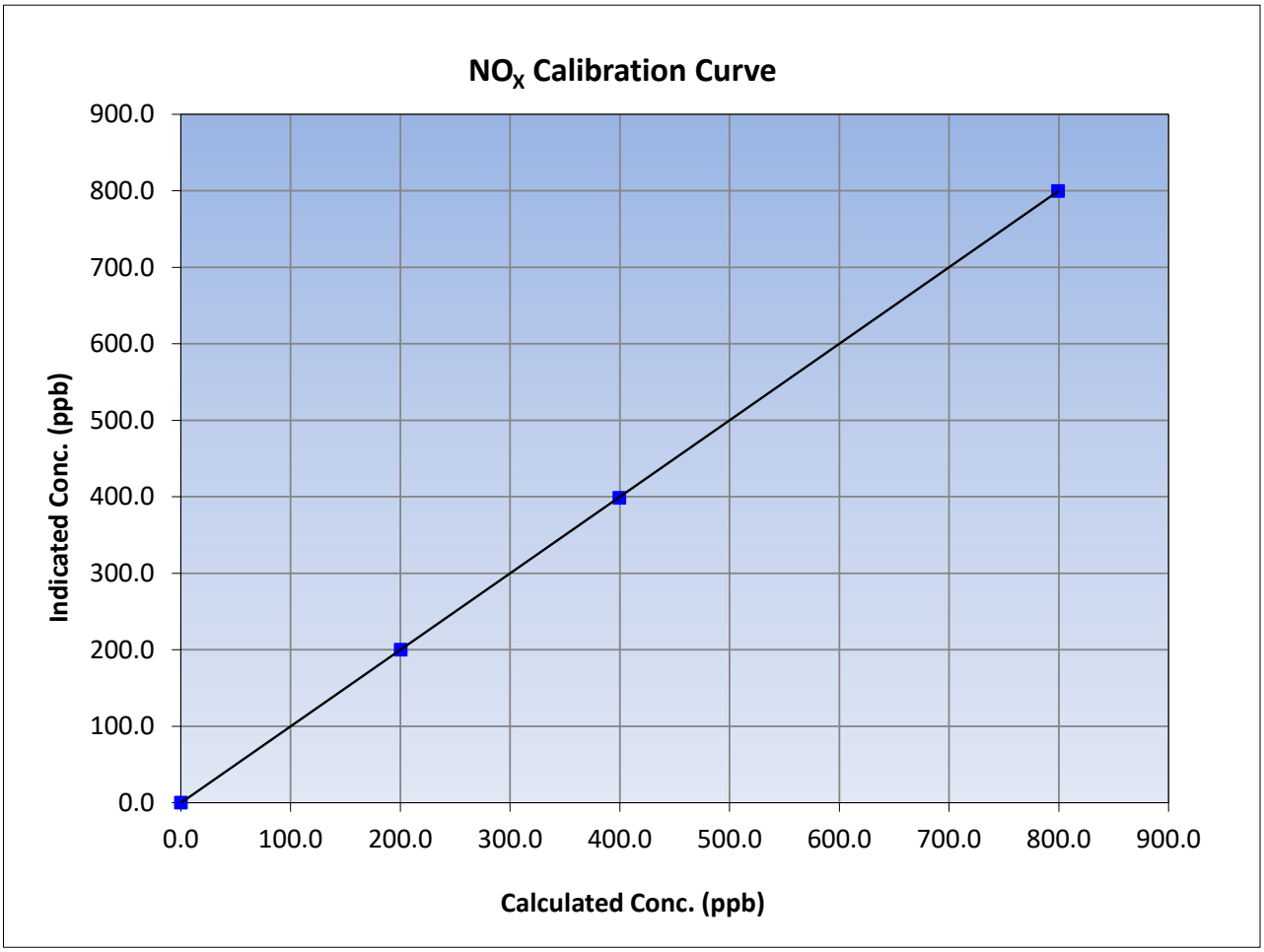
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Surmont 2 | Station Number: | AMS29 |
| Start Time (MST): | 9:29 | End Time (MST): | 14:09 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1170050148 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999997 | ≥0.995 |
| 799.2 | 799.7 | 0.9994 | | | |
| 399.6 | 398.7 | 1.0023 | Slope | 1.000454 | 0.90 - 1.10 |
| 200.3 | 200.2 | 1.0004 | | | |
| | | | Intercept | -0.253155 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

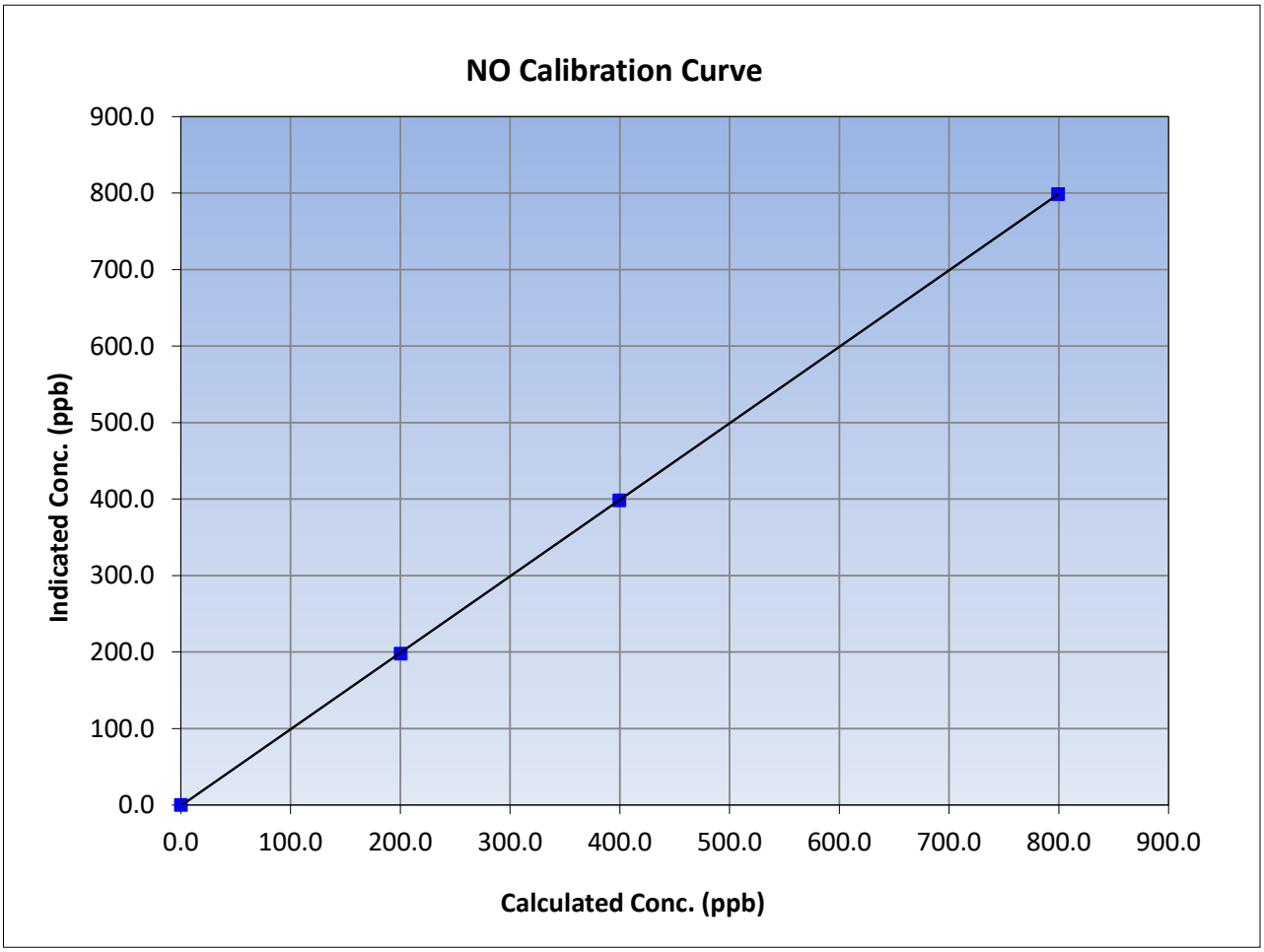
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Surmont 2 | Station Number: | AMS29 |
| Start Time (MST): | 9:29 | End Time (MST): | 14:09 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1170050148 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999991 | ≥0.995 |
| 799.2 | 798.7 | 1.0006 | | | |
| 399.6 | 398.4 | 1.0030 | Slope | 1.000066 | 0.90 - 1.10 |
| 200.3 | 198.0 | 1.0115 | | | |
| | | | Intercept | -0.992422 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

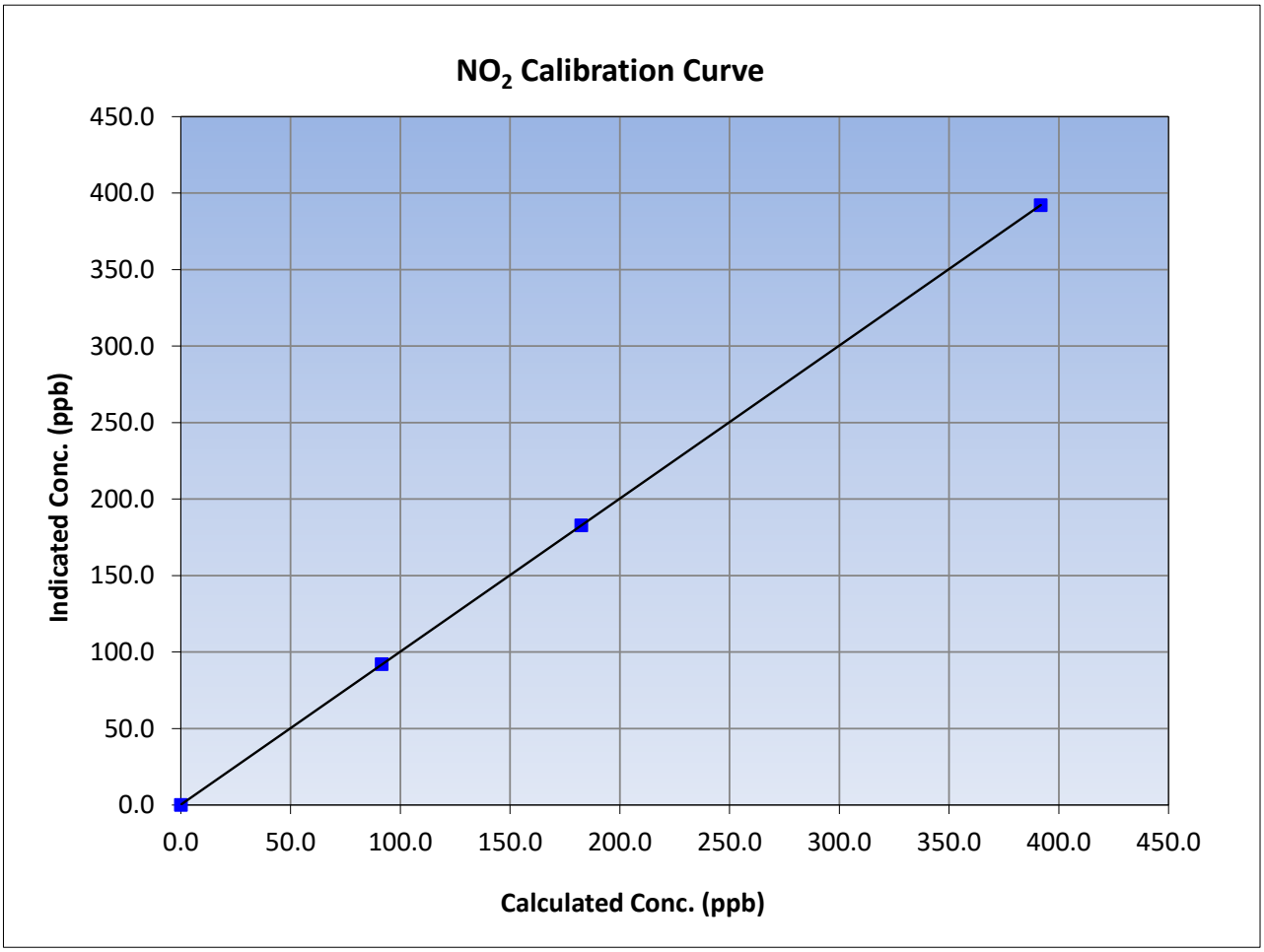
Version-04-2020

### Station Information

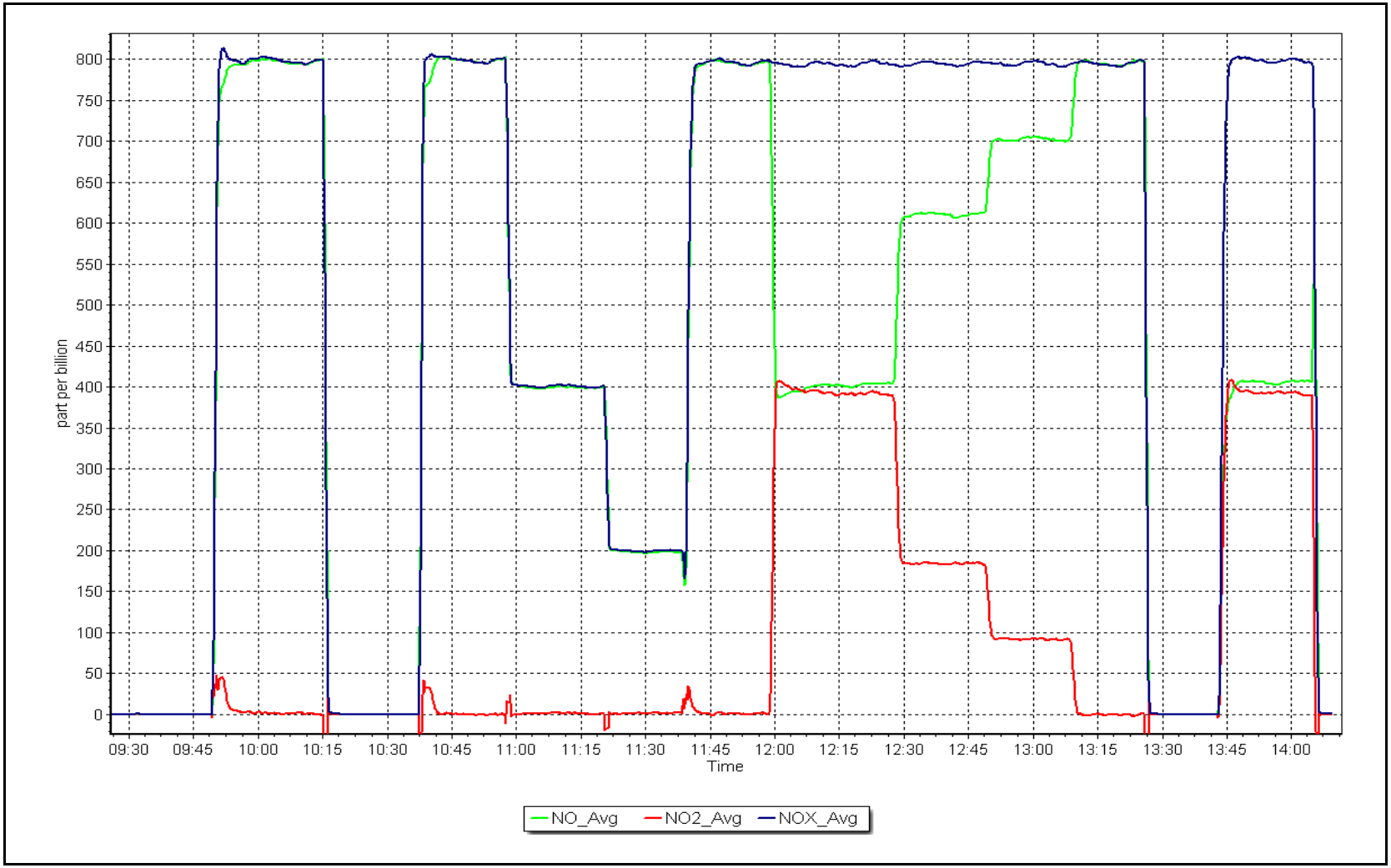
| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Surmont 2 | Station Number: | AMS29 |
| Start Time (MST): | 9:29 | End Time (MST): | 14:09 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1170050148 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999999 | ≥0.995 |
| 391.8 | 392.1 | 0.9992 | | | |
| 182.4 | 182.8 | 0.9978 | Slope | 1.000433 | 0.90 - 1.10 |
| 91.5 | 92.0 | 0.9946 | | | |
| | | | Intercept | 0.227914 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 9, 2023 Location: Surmont 2



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Surmont 2 | Station number: | AMS 29 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 21, 2023 |
| Start time (MST): | 9:54 | End time (MST): | 12:20 |
| Analyzer Make: | API T640 | S/N: | 253 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat FP-25BT | S/N: | 388750 |
| Temp/RH standard: | Alicat FP-25BT | S/N: | 388750 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | 13.2 | 14.26 | 13.2 | ☐ | +/- 2 °C |
| P (mmHg) | 708.1 | 709.23 | 708.1 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.01 | 5.127 | 5.01 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 9, 2023 Last Cal Date: July 21, 2023

PM w/o HEPA: 3.3 PM w/ HEPA: 0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☐

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 11.0 | 10.8 | 11.2 | ☑ | 11.3 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 3.3 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: August 9, 2023

Disposable Filter Changed: August 9, 2023

### Annual Maintenance

Date Sample Tube Cleaned: September 30, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: Adjusted PMT peak, both leak checks passed.

Calibration by: Braiden Boutilier

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS30
## ELLS RIVER
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Ells River | Station number: | AMS 30 |
| Calibration Date: | August 1, 2023 | Last Cal Date: | July 4, 2023 |
| Start time (MST): | 8:32 | End time (MST): | 11:45 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 50.53 | ppm | Cal Gas Exp Date: | December 29, 2028 |
| Cal Gas Cylinder #: | CC494126 | | | |
| Removed Cal Gas Conc: | 50.53 | ppm | Rem Gas Exp Date: | |
| Removed Gas Cyl #: | | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3061 |
| ZAG Make/Model: | API T701H | | Serial Number: | 358 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1008841397

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.010041 | 0.999617 | Backgd or Offset: | 9.5 | 9.6 |
| Calibration intercept: | -3.016022 | -2.615868 | Coeff or Slope: | 0.988 | 0.988 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| as found span | 4921 | 79.2 | 800.4 | 800.8 | 0.999 |
| as found 2nd point | 4960 | 39.6 | 400.2 | 397.9 | 1.006 |
| as found 3rd point | 4980 | 19.8 | 200.1 | 195.2 | 1.025 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4921 | 79.2 | 800.4 | 799.0 | 1.002 |
| second point | 4960 | 39.6 | 400.2 | 395.3 | 1.012 |
| third point | 4980 | 19.8 | 200.1 | 195.5 | 1.024 |
| as left zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| as left span | 4921 | 79.2 | 800.4 | 802.0 | 0.998 |
| | | | | Average Correction Factor | 1.013 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 801.10 | Previous response | 805.38 | *% change | -0.5% |
| Baseline Corr 2nd AF pt: | 398.20 | AF Slope: | 1.002630 | AF Intercept: | -2.695974 |
| Baseline Corr 3rd AF pt: | 195.50 | AF Correlation: | 0.999958 | | |

* = > +/-5% change initiates investigation

Notes: No adjustments made. Replaced pump after MPAFs.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

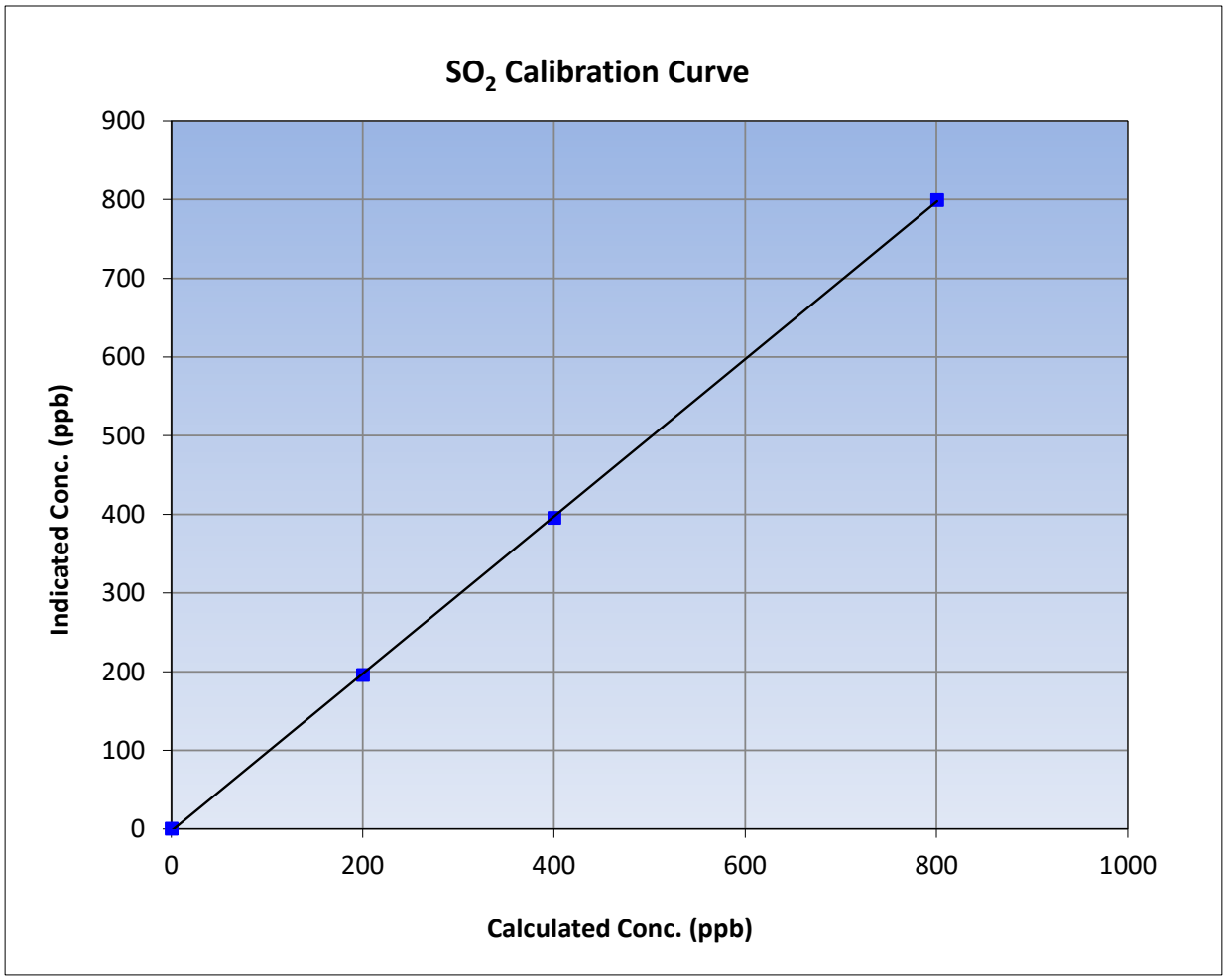
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | Ells River | Station Number: | AMS 30 |
| Start Time (MST): | 8:32 | End Time (MST): | 11:45 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1008841397 |

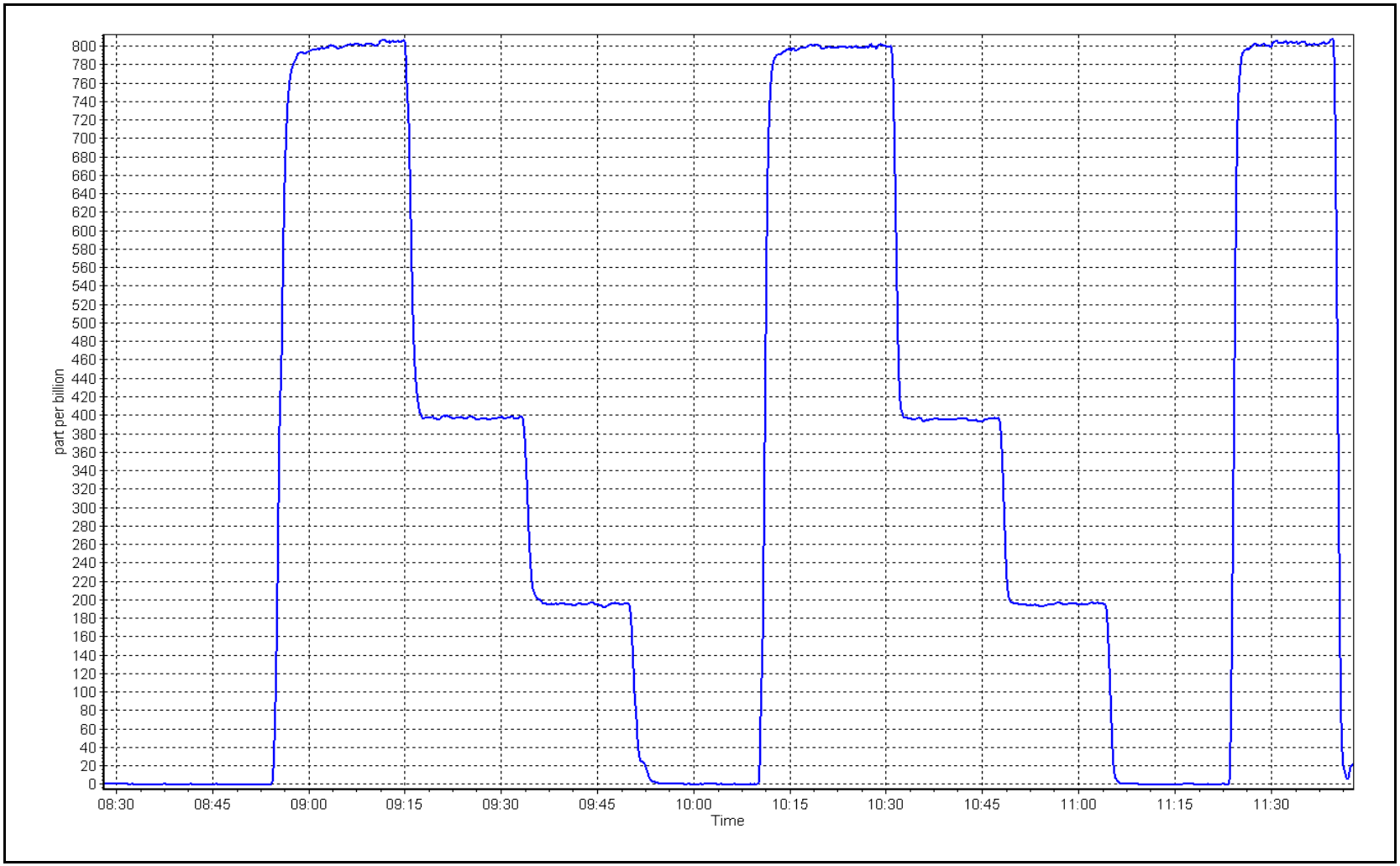
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | -0.1 | ---- |
| 800.4 | 799.0 | 1.0017 |
| 400.2 | 395.3 | 1.0125 |
| 200.1 | 195.5 | 1.0236 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999951 | *≥0.995* |
| Slope | 0.999617 | *0.90 - 1.10* |
| Intercept | -2.615868 | *+/-30* |



**SO2 Calibration Plot** Date: August 1, 2023 Location: Ells River



# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Ells River | Station number: | AMS30 |
| Calibration Date: | August 16, 2023 | Last Cal Date: | July 5, 2023 |
| Start time (MST): | 9:21 | End time (MST): | 13:17 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.08 | ppm | Cal Gas Exp Date: | February 9, 2024 |
| Cal Gas Cylinder #: | EY0002443 | | | |
| Removed Cal Gas Conc: | 5.08 | ppm | Rem Gas Exp Date: | |
| Removed Gas Cyl #: | | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3061 |
| ZAG Make/Model: | API T701H | | Serial Number: | 358 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i TLE | | Analyzer serial #: | 1410661331 | |
| Converter make: | CDN - 101 | | Converter serial #: | 562 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.008782 | 1.003494 | Backgd or Offset: | 1.61 | 1.63 |
| Calibration intercept: | -0.159281 | -0.199209 | Coeff or Slope: | 1.136 | 1.136 |

### TRS As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4921 | 78.7 | 80.0 | 79.0 | 1.012 |
| as found 2nd point | 4961 | 39.4 | 40.0 | 39.7 | 1.008 |
| as found 3rd point | 4980 | 19.7 | 20.0 | 19.5 | 1.026 |
| new cylinder response | | | | | |

### TRS Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4921 | 78.7 | 80.0 | 80.1 | 0.998 |
| second point | 4961 | 39.4 | 40.0 | 40.0 | 1.001 |
| third point | 4980 | 19.7 | 20.0 | 19.6 | 1.021 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 4921 | 78.7 | 80.0 | 80.1 | 0.998 |
| SO2 Scrubber Check | 4921 | 79.2 | 800.4 | 0.1 | ---- |
| Date of last scrubber change: | | N/A | | Ave Corr Factor | 1.007 |
| Date of last converter efficiency test: | | N/A | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 79.0 | Prev response: | 80.51 | *% change: | -1.9% |
| Baseline Corr 2nd AF pt: | 39.7 | AF Slope: | 0.989347 | AF Intercept: | -0.079019 |
| Baseline Corr 3rd AF pt: | 19.5 | AF Correlation: | 0.999974 | | |

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-11-2021

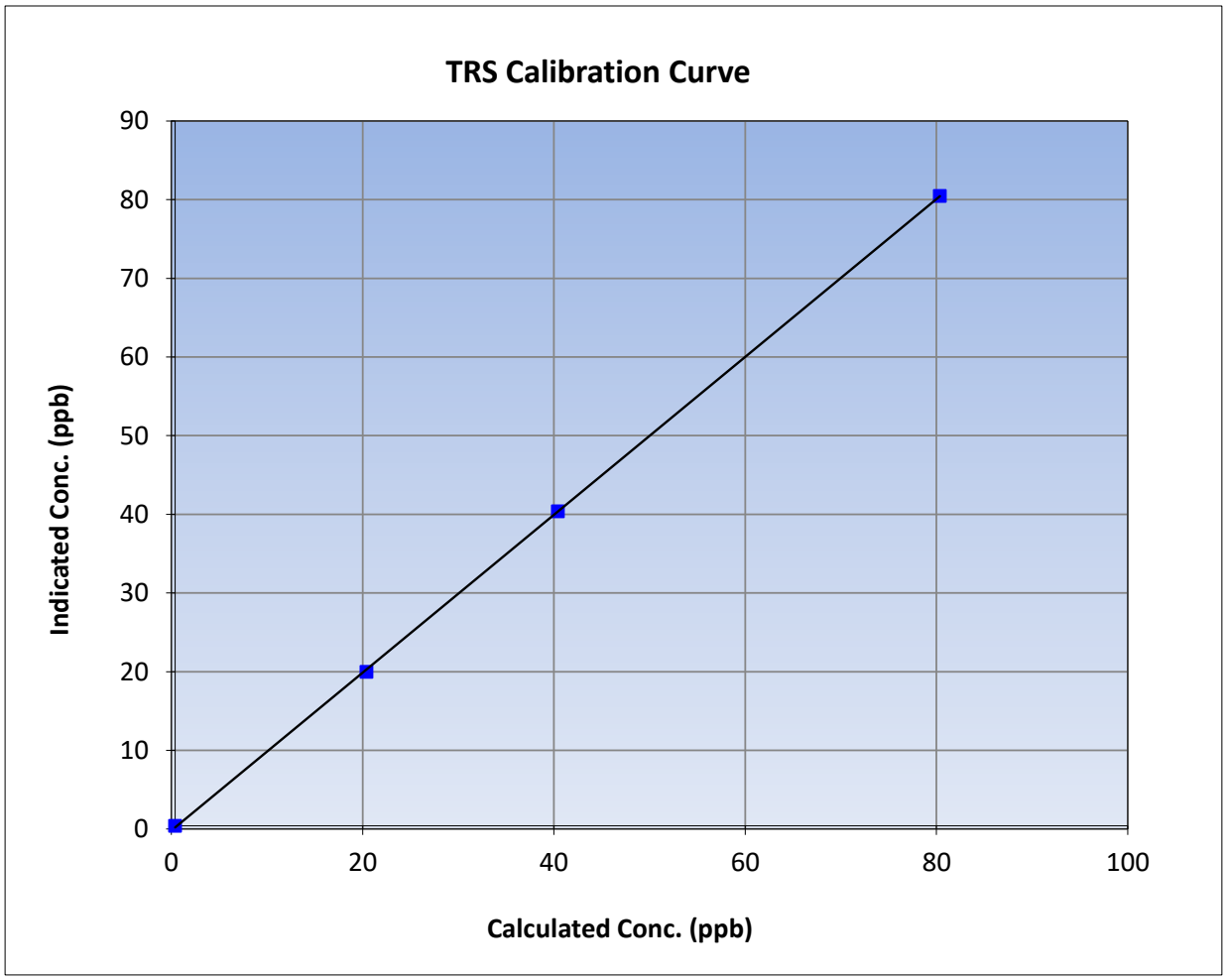
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 16, 2023 | Previous Calibration: | July 5, 2023 |
| Station Name: | Ells River | Station Number: | AMS30 |
| Start Time (MST): | 9:21 | End Time (MST): | 13:17 |
| Analyzer make: | Thermo 43i TLE | Analyzer serial #: | 1410661331 |

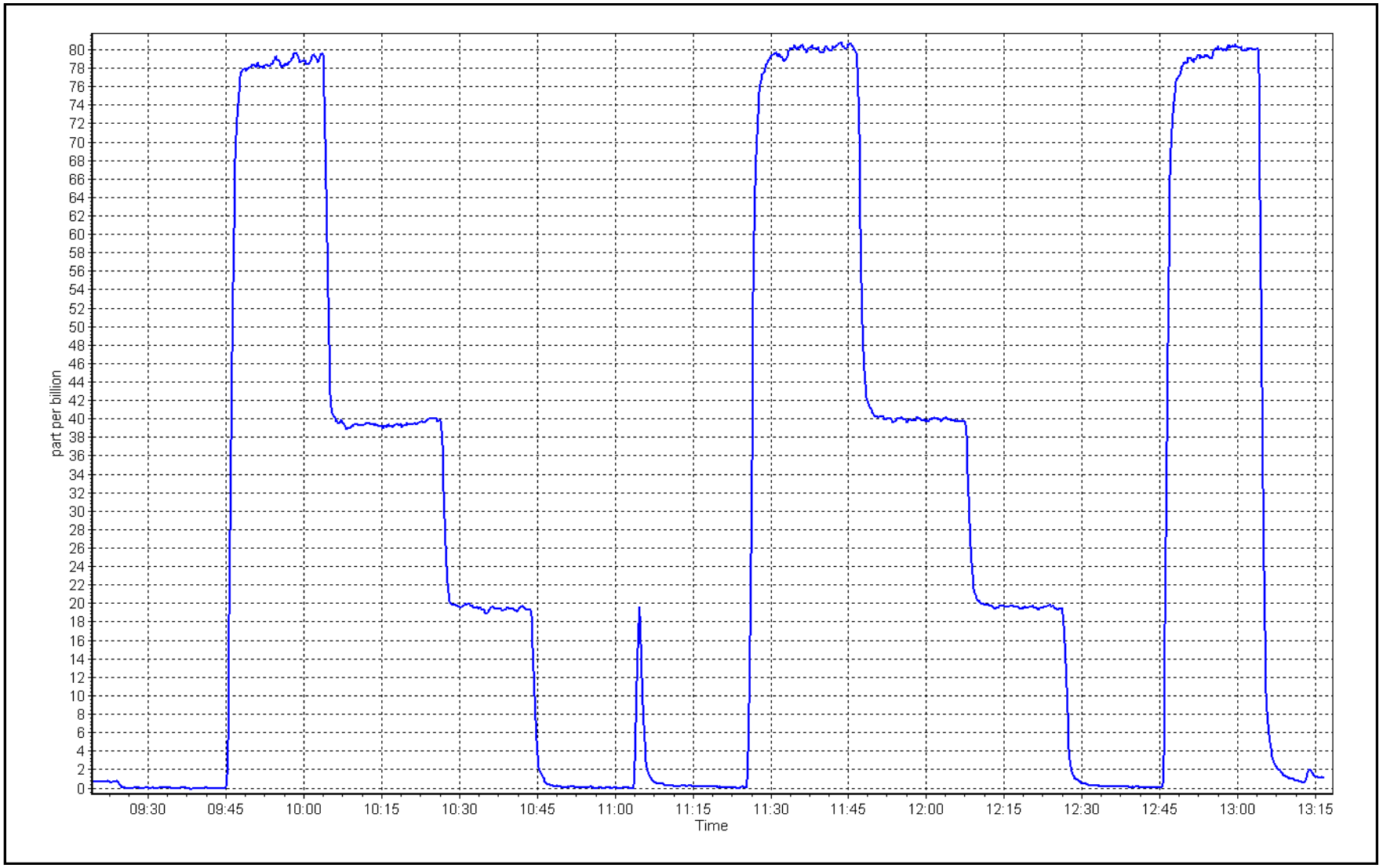
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 80.0 | 80.1 | 0.9983 |
| 40.0 | 40.0 | 1.0007 |
| 20.0 | 19.6 | 1.0212 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999964 | *≥0.995* |
| Slope | 1.003494 | *0.90 - 1.10* |
| Intercept | -0.199209 | *+/-3* |



**TRS Calibration Plot** Date: August 16, 2023 Location: Ells River



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Ells River | Station number: | AMS 30 |
| Calibration Date: | August 1, 2023 | Last Cal Date: | July 21, 2023 |
| Start time (MST): | 8:32 | End time (MST): | 11:45 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC494126 | Cal Gas Expiry Date: | December 29, 2028 | |
| CH4 Cal Gas Conc. | 499.7 | ppm | CH4 Equiv Conc. | 1075.0 | ppm |
| C3H8 Cal Gas Conc. | 209.2 | ppm | | | |
| Removed Gas Cert: | | | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 499.7 | ppm | CH4 Equiv Conc. | 1075.0 | ppm |
| Removed C3H8 Conc. | 209.2 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 3061 | |
| ZAG make/model: | API T701H | | Serial Number: | 358 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1181490018 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 0.000252 | 0.000252 | NMHC SP Ratio: | 4.67E-05 | 4.67E-05 |
| CH4 Retention time: | 14.4 | 14.4 | NMHC Peak Area: | 195284 | 195284 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.2 | 17.03 | 17.25 | 0.987 |
| as found 2nd point | 4960 | 39.6 | 8.51 | 8.55 | 0.995 |
| as found 3rd point | 4980 | 19.8 | 4.26 | 4.20 | 1.014 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.2 | 17.03 | 17.18 | 0.991 |
| second point | 4960 | 39.6 | 8.51 | 8.50 | 1.001 |
| third point | 4980 | 19.8 | 4.26 | 4.18 | 1.018 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.2 | 17.03 | 17.26 | 0.987 |
| | | | | Average Correction Factor | 1.004 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr AF: | 17.25 | Prev response | 16.99 | *% change | 1.5% |
| Baseline Corr 2nd AF: | 8.5 | AF Slope: | 1.014882 | AF Intercept: | -0.059940 |
| Baseline Corr 3rd AF: | 4.2 | AF Correlation: | 0.999945 | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.2 | 9.11 | 9.26 | 0.984 |
| as found 2nd point | 4960 | 39.6 | 4.56 | 4.58 | 0.997 |
| as found 3rd point | 4980 | 19.8 | 2.28 | 2.25 | 1.015 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.2 | 9.11 | 9.24 | 0.986 |
| second point | 4960 | 39.6 | 4.56 | 4.57 | 0.998 |
| third point | 4980 | 19.8 | 2.28 | 2.25 | 1.013 |
| as left zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.2 | 9.11 | 9.26 | 0.984 |
| | | | | Average Correction Factor | 0.999 |
| Baseline Corr AF: | 9.26 | Prev response | 9.10 | *% change | 1.8% |
| Baseline Corr 2nd AF: | 4.6 | AF Slope: | 1.018352 | AF Intercept: | -0.040535 |
| Baseline Corr 3rd AF: | 2.2 | AF Correlation: | 0.999911 | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.2 | 7.91 | 7.99 | 0.991 |
| as found 2nd point | 4960 | 39.6 | 3.96 | 3.97 | 0.996 |
| as found 3rd point | 4980 | 19.8 | 1.98 | 1.96 | 1.012 |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4921 | 79.2 | 7.91 | 7.93 | 0.998 |
| second point | 4960 | 39.6 | 3.96 | 3.93 | 1.006 |
| third point | 4980 | 19.8 | 1.98 | 1.93 | 1.023 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.2 | 7.91 | 8.00 | 0.990 |
| | | | | Average Correction Factor | 1.009 |
| Baseline Corr AF: | 7.99 | Prev response | 7.90 | *% change | 1.1% |
| Baseline Corr 2nd AF: | 3.97 | AF Slope: | 1.010866 | AF Intercept: | -0.021620 |
| Baseline Corr 3rd AF: | 1.96 | AF Correlation: | 0.999966 | * = > +/-5% change initiates investigation | |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.001691 | 1.010450 |
| THC Cal Offset: | -0.062138 | -0.062141 |
| CH4 Cal Slope: | 1.001405 | 1.003947 |
| CH4 Cal Offset: | -0.027557 | -0.026358 |
| NMHC Cal Slope: | 1.001951 | 1.016086 |
| NMHC Cal Offset: | -0.034381 | -0.035983 |

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## THC Calibration Summary

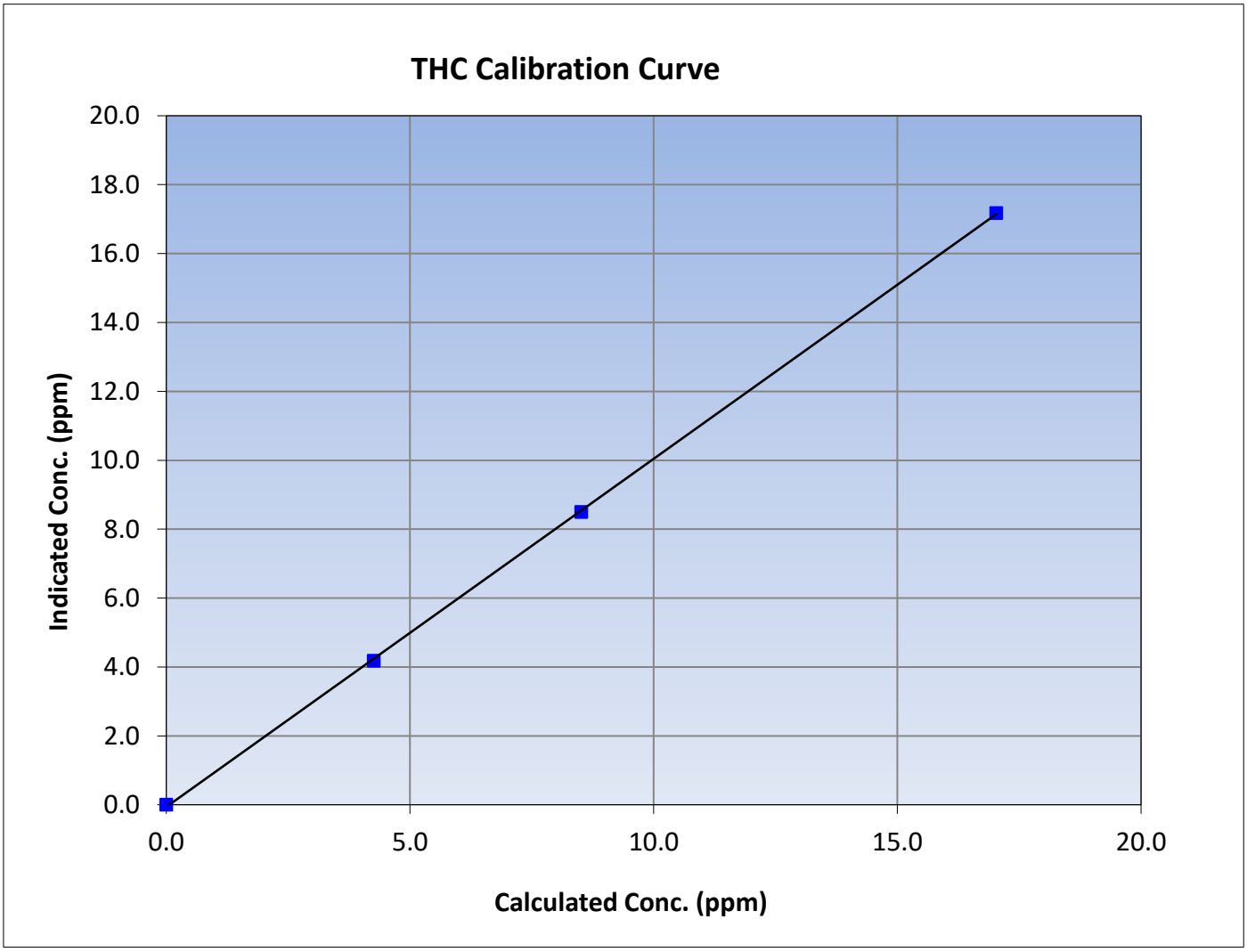
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Ells River | Station Number: | AMS 30 |
| Start Time (MST): | 8:32 | End Time (MST): | 11:45 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1181490018 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999940 | *≥0.995* |
| 17.03 | 17.18 | 0.9913 | | | |
| 8.51 | 8.50 | 1.0015 | Slope | 1.010450 | *0.90 - 1.10* |
| 4.26 | 4.18 | 1.0177 | | | |
| | | | Intercept | -0.062141 | *+/-0.5* |



# Wood Buffalo Environmental Association

## $CH_4$ Calibration Summary

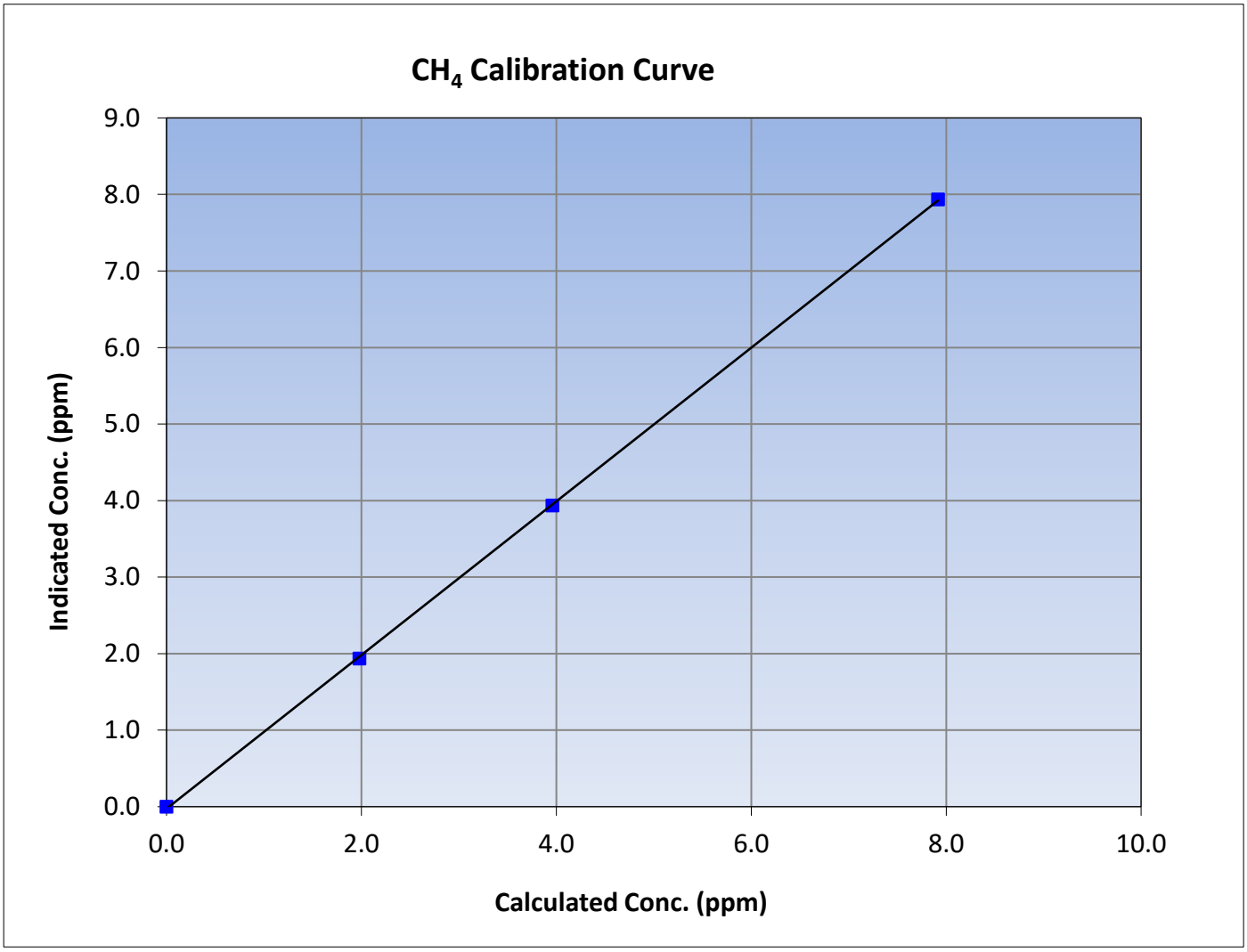
Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Ells River | Station Number: | AMS 30 |
| Start Time (MST): | 8:32 | End Time (MST): | 11:45 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1181490018 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999950 | *≥0.995* |
| 7.91 | 7.93 | 0.9977 | | | |
| 3.96 | 3.93 | 1.0061 | Slope | 1.003947 | *0.90 - 1.10* |
| 1.98 | 1.93 | 1.0232 | | | |
| | | | Intercept | -0.026358 | *+/-0.5* |



# Wood Buffalo Environmental Association

## NMHC Calibration Summary

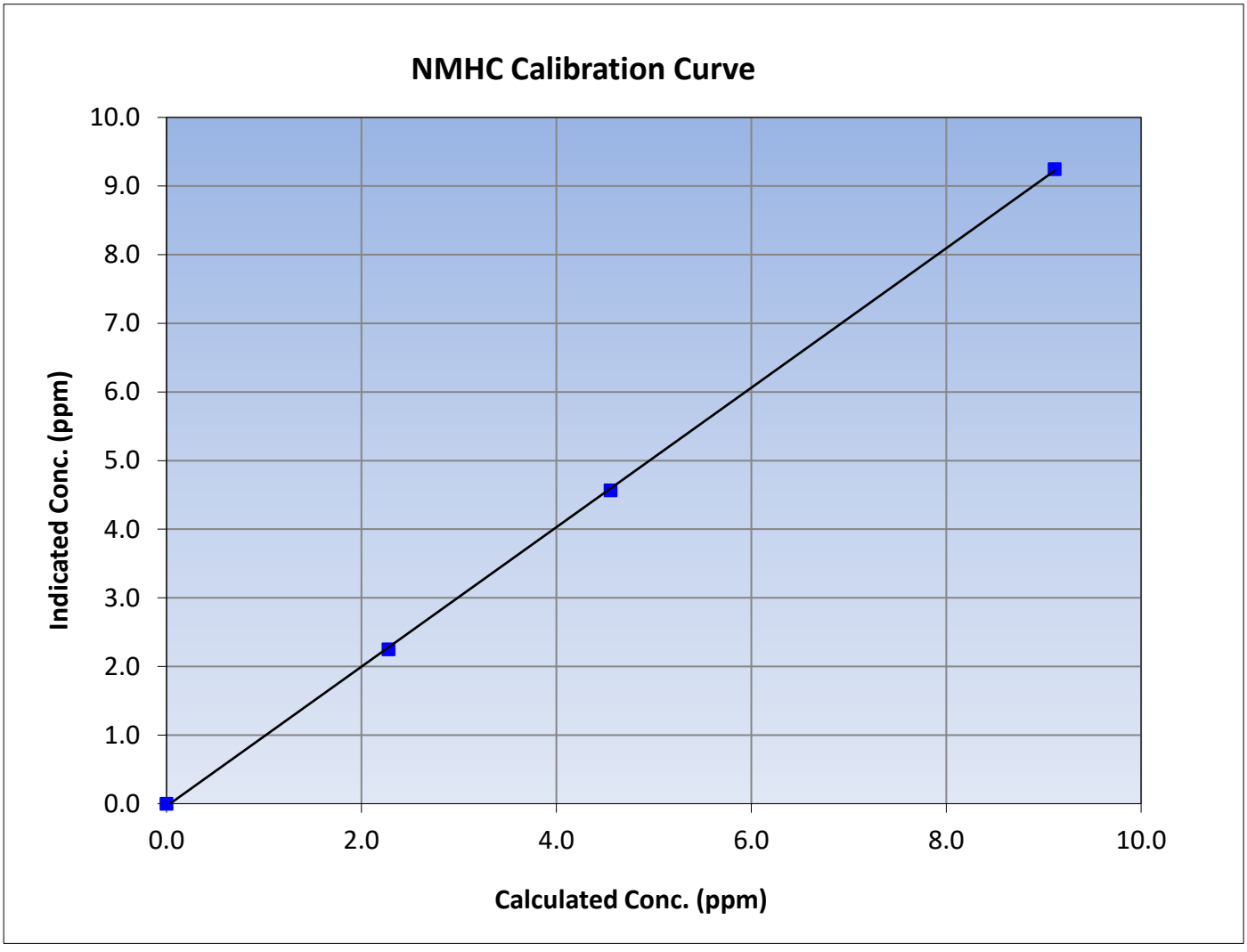
Version-01-2020

### Station Information

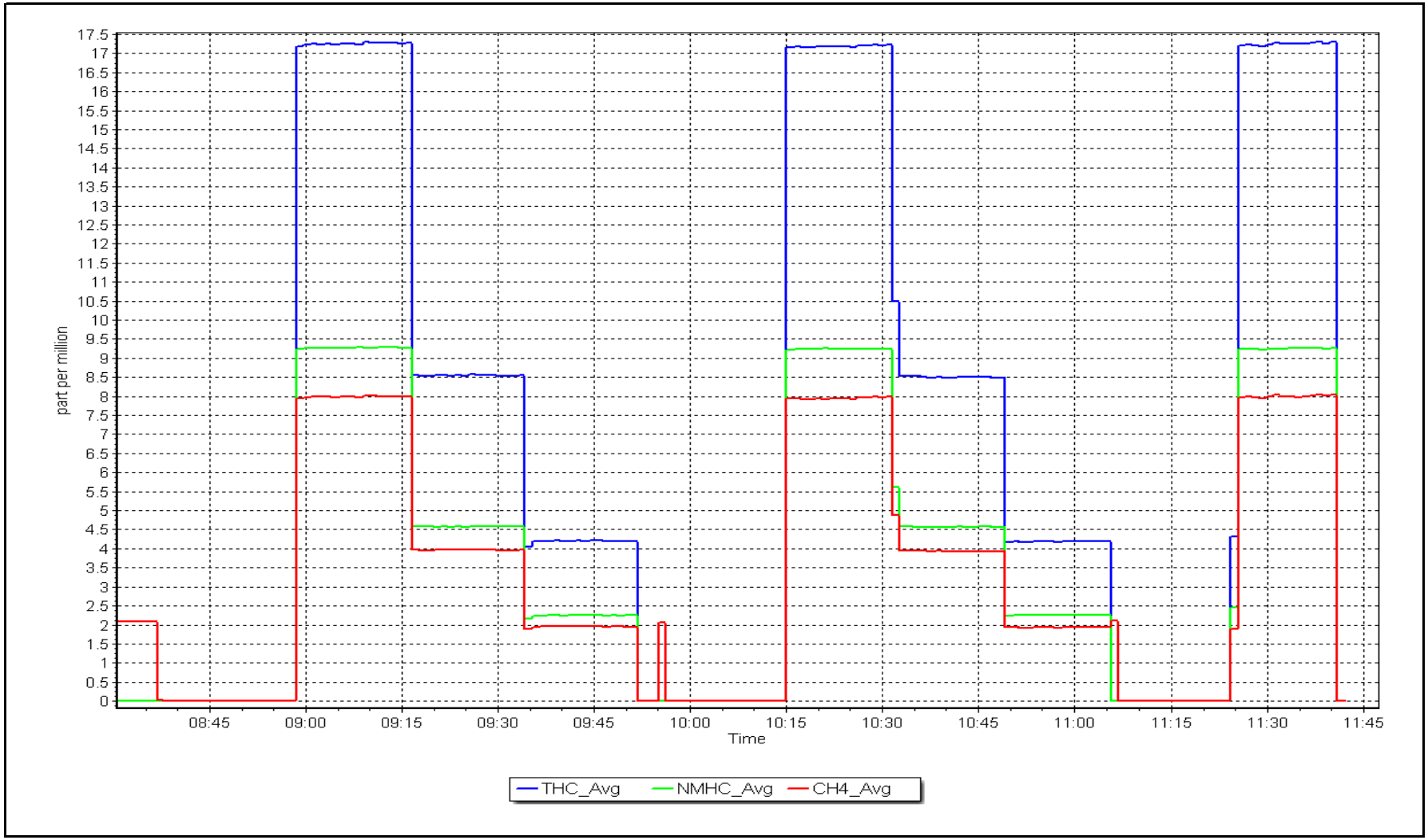
| | | | |
|---|---|---|---|
| Calibration Date: | August 1, 2023 | Previous Calibration: | July 21, 2023 |
| Station Name: | Ells River | Station Number: | AMS 30 |
| Start Time (MST): | 8:32 | End Time (MST): | 11:45 |
| Analyzer make: | Thermo 55i | Analyzer serial #: | 1181490018 |

### Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999928 | *≥0.995* |
| 9.11 | 9.24 | 0.9858 | | | |
| 4.56 | 4.57 | 0.9978 | Slope | 1.016086 | *0.90 - 1.10* |
| 2.28 | 2.25 | 1.0130 | | | |
| | | | Intercept | -0.035983 | *+/-0.5* |



**NMHC Calibration Plot** Date: August 1, 2023 Location: Ells River



# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Ells River | Station number: | AMS 30 |
| Calibration Date: | August 14, 2023 | Last Cal Date: | August 1, 2023 |
| Start time (MST): | 9:39 | End time (MST): | 11:20 |
| Reason: | Cylinder Change | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC494126 | Cal Gas Expiry Date: | December 29, 2028 | |
| CH4 Cal Gas Conc. | 499.7 | ppm | CH4 Equiv Conc. | 1075.0 | ppm |
| C3H8 Cal Gas Conc. | 209.2 | ppm | | | |
| Removed Gas Cert: | | | Removed Gas Expiry: | | |
| Removed CH4 Conc. | 499.7 | ppm | CH4 Equiv Conc. | 1075.0 | ppm |
| Removed C3H8 Conc. | 209.2 | ppm | Diff between cyl (THC): | | |
| Diff between cyl ($CH_4$): | | | Diff between cyl (NM): | | |
| Calibrator Model: | API T700 | | Serial Number: | 3061 | |
| ZAG make/model: | API T701H | | Serial Number: | 358 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 55i | | Analyzer serial #: | 1181490018 | |
| THC Range (ppm): | 0 - 20 ppm | | | | |
| NMHC Range (ppm): | 0 - 10 ppm | | CH4 Range (ppm): | 0 - 10 ppm | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| CH4 SP Ratio: | 0.000252 | 0.000252 | NMHC SP Ratio: | 4.67E-05 | 4.67E-05 |
| CH4 Retention time: | 14.4 | 14.4 | NMHC Peak Area: | 195284 | 195284 |

### THC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.2 | 17.03 | 16.96 | 1.004 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | | | | | |
| high point | | | | | |
| second point | | | | | |
| third point | | | | | |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.2 | 17.03 | 16.87 | 1.009 |
| | | | | Average Correction Factor | |
| Baseline Corr AF: | 16.96 | Prev response | 17.14 | *% change | -1.1% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

# Wood Buffalo Environmental Association

## THC / $CH_4$ / NMHC Calibration Report

Version-01-2020

### NMHC Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.2 | 9.11 | 8.98 | 1.015 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | | | | | |
| high point | | | | | |
| second point | | | | | |
| third point | | | | | |
| as left zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.2 | 9.11 | 8.94 | 1.020 |
| | | | | Average Correction Factor | |
| Baseline Corr AF: | 8.98 | Prev response | 9.22 | *% change | -2.8% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

### CH4 Calibration Data

| Set Point | Dil air flow rate | Source gas flow rate | Calc conc (ppm) (Cc) | Ind conc (ppm) (Ic) | CF *Limit= 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4921 | 79.2 | 7.91 | 7.98 | 0.992 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | | | | | |
| high point | | | | | |
| second point | | | | | |
| third point | | | | | |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4921 | 79.2 | 7.91 | 7.94 | 0.997 |
| | | | | Average Correction Factor | |
| Baseline Corr AF: | 7.98 | Prev response | 7.92 | *% change | 0.8% |
| Baseline Corr 2nd AF: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF: | NA | AF Correlation: | | * = > +/-5% change initiates investigation | |

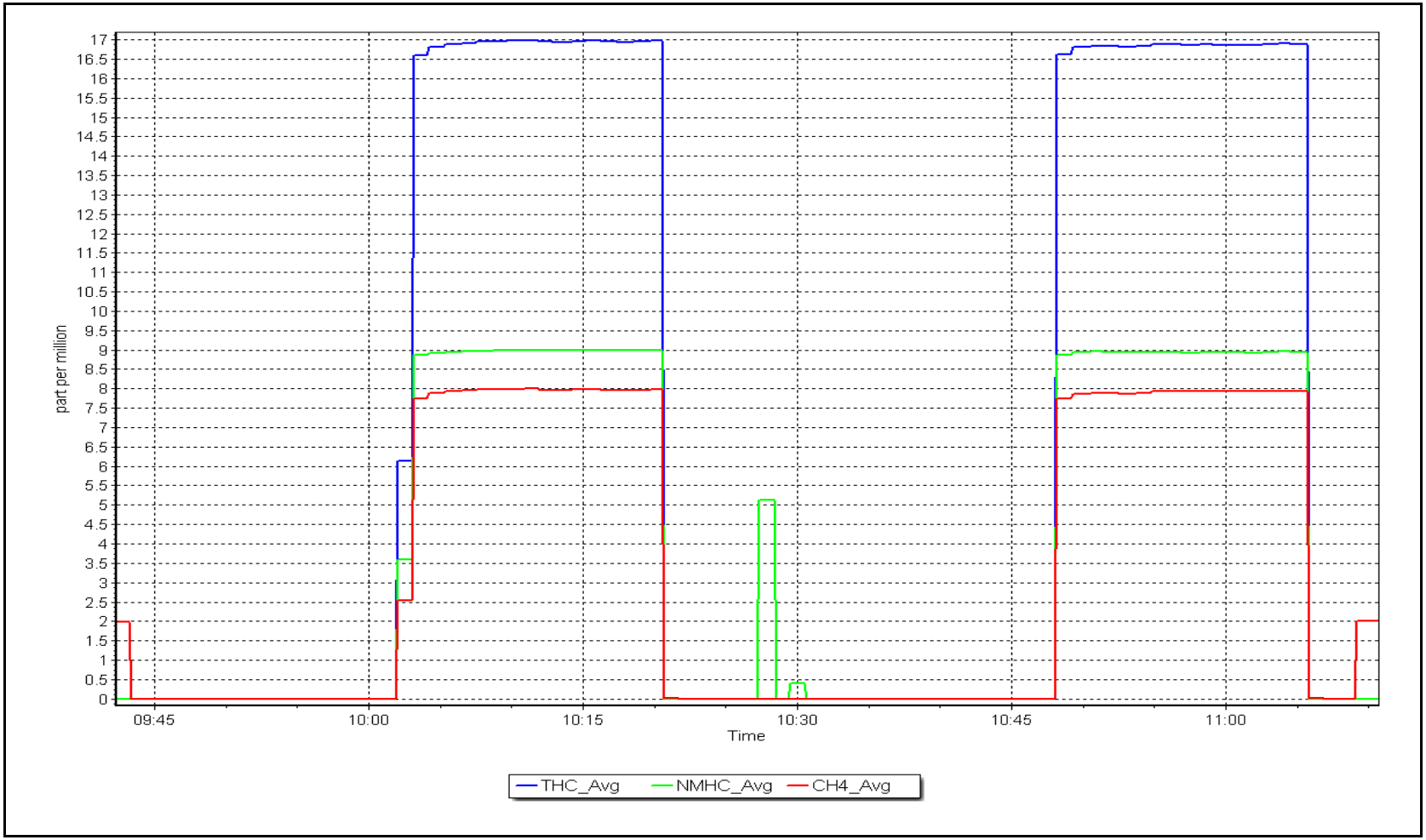
### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| THC Cal Slope: | 1.010450 | |
| THC Cal Offset: | -0.062141 | |
| CH4 Cal Slope: | 1.003947 | |
| CH4 Cal Offset: | -0.026358 | |
| NMHC Cal Slope: | 1.016086 | |
| NMHC Cal Offset: | -0.035983 | |

Notes: Replaced N2 cylinder.

Calibration Performed By: Denny Ray Estador

**NMHC Calibration Plot** Date: August 14, 2023 Location: Ells River



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Ells River | Station number: | AMS 30 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 8:32 | End time (MST): | 12:50 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T2Y1P2R | | Cal Gas Expiry Date: | December 11, 2023 | |
| NOX Cal Gas Conc: | 50.83 | ppm | NO Cal Gas Conc: | 49.97 | ppm |
| Removed Cylinder #: | | | Removed Gas Exp Date: | | |
| Removed Gas NOX Conc: | 50.83 | ppm | Removed Gas NO Conc: | 49.97 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 3061 | |
| ZAG make/model: | API T701H | | Serial Number: | 358 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 42i | Analyzer serial #: | 710321429 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.031 | 1.099 | NO bkgnd or offset: | 12.8 | 13.5 |
| NOX coeff or slope: | 0.994 | 0.989 | NOX bkgnd or offset: | 12.8 | 13.5 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 184.2 | 188.1 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 1.001026 | 1.004722 |
| $NO_X$ Cal Offset: | -1.400000 | -1.140000 |
| NO Cal Slope: | 0.999657 | 1.006504 |
| NO Cal Offset: | -2.520000 | -2.140000 |
| $NO_2$ Cal Slope: | 1.005854 | 1.001553 |
| $NO_2$ Cal Offset: | 1.195147 | 0.383629 |

# Wood Buffalo Environmental Association

# $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.3 | 0.1 | ---- | ---- |
| as found span | 4920 | 80.0 | 813.3 | 799.5 | 13.8 | 773.0 | 755.2 | 17.8 | 1.0521 | 1.0587 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | ---- | ---- |
| high point | 4920 | 80.0 | 813.3 | 799.5 | 13.8 | 816.5 | 803.7 | 12.8 | 0.9961 | 0.9948 |
| second point | 4960 | 40.0 | 406.6 | 399.8 | 6.9 | 407.1 | 399.0 | 8.1 | 0.9989 | 1.0019 |
| third point | 4980 | 20.0 | 203.3 | 199.9 | 3.4 | 201.7 | 197.0 | 4.8 | 1.0080 | 1.0146 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 | 0.1 | ---- | ---- |
| as left span | 4920 | 80.0 | 813.3 | 420.3 | 393.0 | 824.6 | 431.6 | 393.0 | 0.9863 | 0.9739 |
| | | | | | | | | Average Correction Factor | 1.0010 | 1.0038 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 773.2 ppb | NO = 755.5 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = | -5.1% |
| Previous Response | $NO_X$ = 812.7 ppb | NO = 796.7 ppb | | *Percent Change | NO = | -5.5% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 804.3 | 425.1 | 393.0 | 393.8 | 0.9979 | 100.2% |
| 2nd GPT point (200 ppb O3) | 804.3 | 619.8 | 198.3 | 199.1 | 0.9958 | 100.4% |
| 3rd GPT point (100 ppb O3) | 804.3 | 710.5 | 107.6 | 108.4 | 0.9923 | 100.8% |
| | | | | Average Correction Factor | 0.9953 | 100.5% |

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

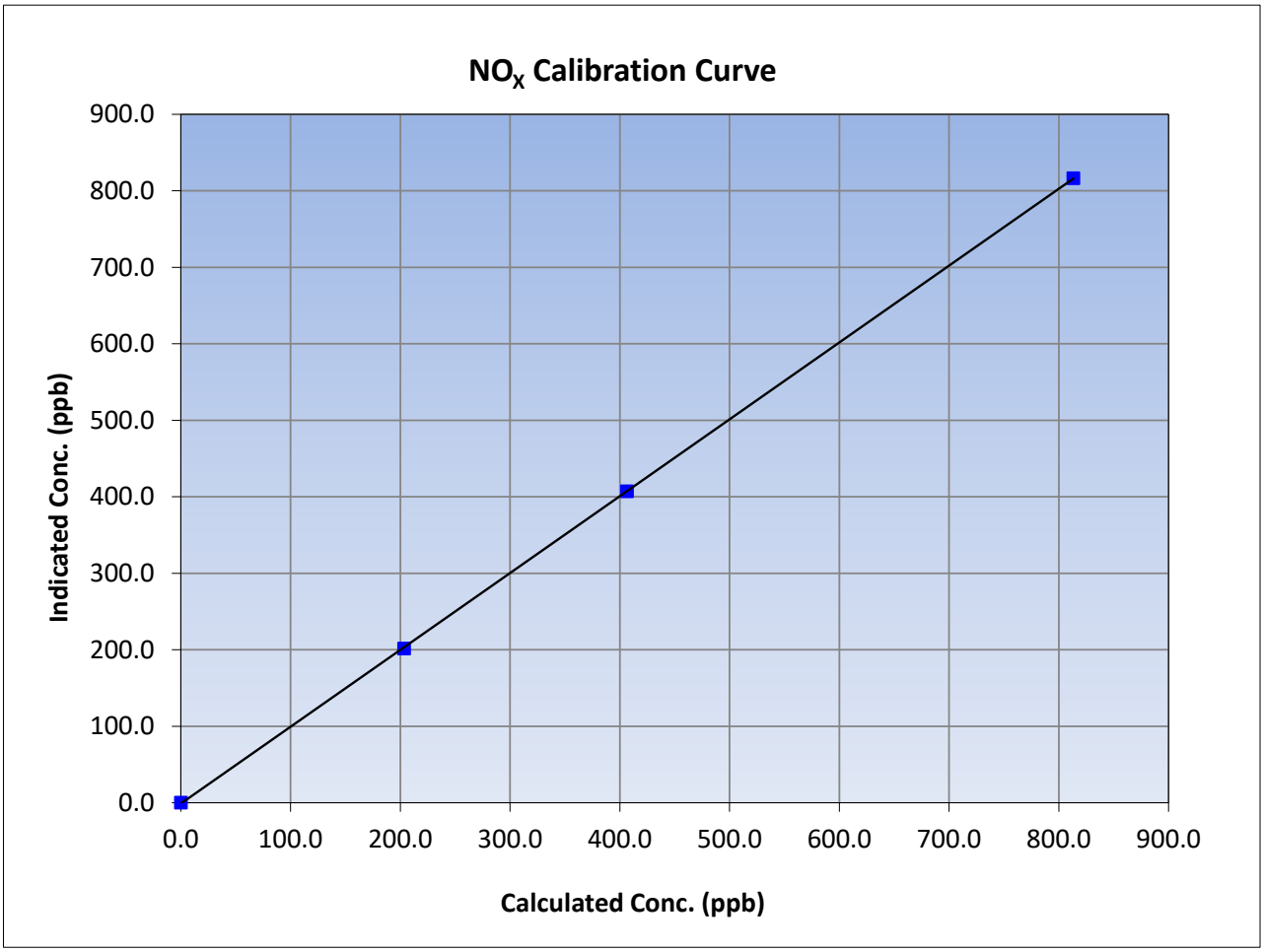
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Ells River | Station Number: | AMS 30 |
| Start Time (MST): | 8:32 | End Time (MST): | 12:50 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 710321429 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999989 | ≥0.995 |
| 813.3 | 816.5 | 0.9961 | | | |
| 406.6 | 407.1 | 0.9989 | Slope | 1.004722 | 0.90 - 1.10 |
| 203.3 | 201.7 | 1.0080 | | | |
| | | | Intercept | -1.140000 | +/-20 |



# Wood Buffalo Environmental Association

## NO Calibration Summary

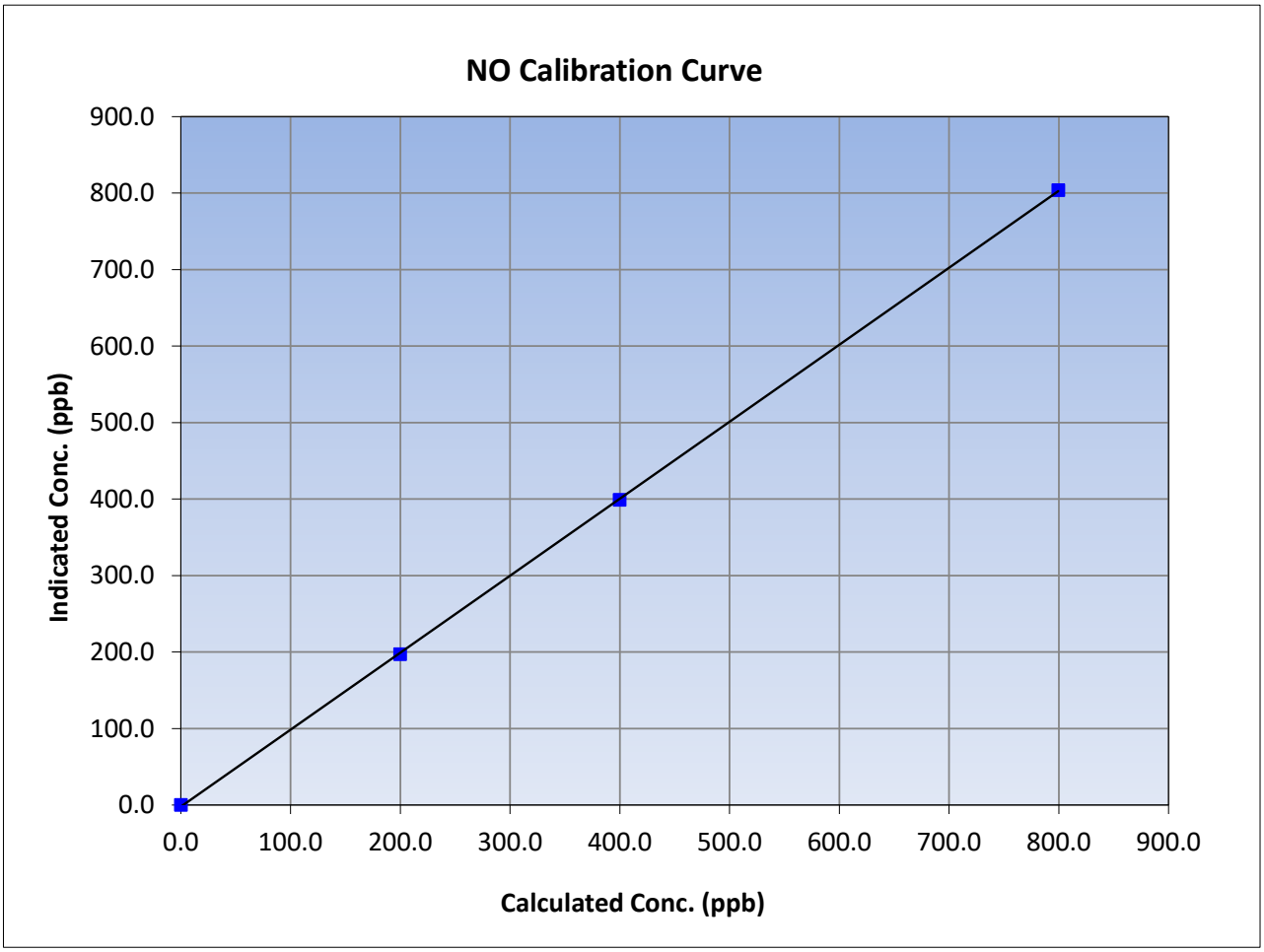
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Ells River | Station Number: | AMS 30 |
| Start Time (MST): | 8:32 | End Time (MST): | 12:50 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 710321429 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999968 | ≥0.995 |
| 799.5 | 803.7 | 0.9948 | | | |
| 399.8 | 399.0 | 1.0019 | Slope | 1.006504 | 0.90 - 1.10 |
| 199.9 | 197.0 | 1.0146 | | | |
| | | | Intercept | -2.140000 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

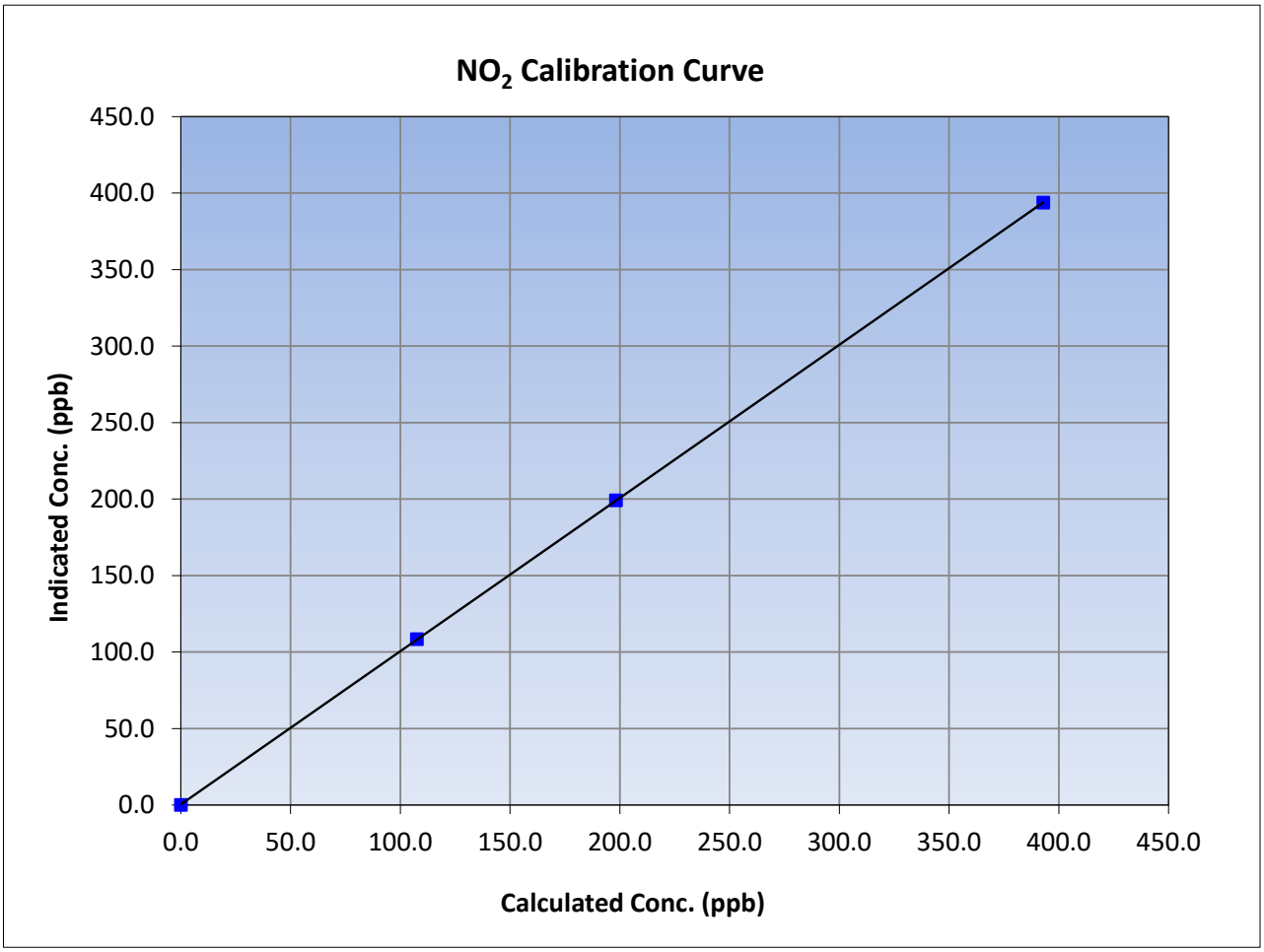
Version-04-2020

### Station Information

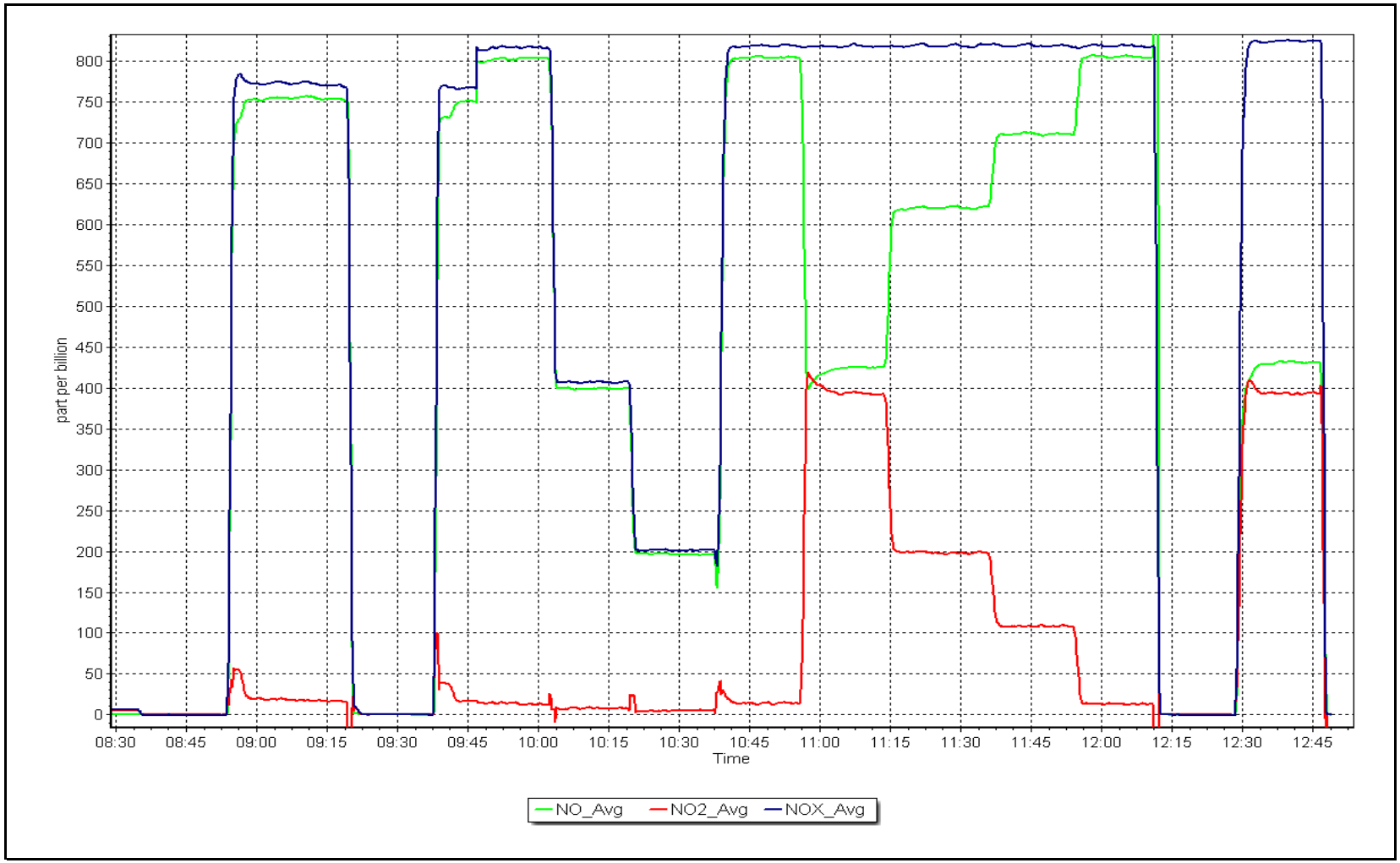
| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Ells River | Station Number: | AMS 30 |
| Start Time (MST): | 8:32 | End Time (MST): | 12:50 |
| Analyzer make: | Thermo 42i | Analyzer serial #: | 710321429 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999997 | ≥0.995 |
| 393.0 | 393.8 | 0.9979 | | | |
| 198.3 | 199.1 | 0.9958 | Slope | 1.001553 | 0.90 - 1.10 |
| 107.6 | 108.4 | 0.9923 | | | |
| | | | Intercept | 0.383629 | +/-20 |



**$NO_x$ Calibration Plot** Date: August 9, 2023 Location: Ells River



# Wood Buffalo Environmental Association

## T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Ells River | Station number: | AMS 30 |
| Calibration Date: | August 25, 2023 | Last Cal Date: | July 26, 2023 |
| Start time (MST): | 9:14 | End time (MST): | 9:53 |
| Analyzer Make: | API T640 | S/N: | 875 |
| Particulate Fraction: | PM2.5 | | |
| Flow Meter Make/Model: | Alicat | S/N: | 388751 |
| Temp/RH standard: | Alicat | S/N: | 388751 |

### Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| T (°C) | 14.9 | 14.1 | 14.9 | ☐ | |
| P (mmHg) | 736.8 | 738.77 | 736.8 | ☐ | +/- 10 mmHg |
| flow (LPM) | 5.00 | 5.02 | 5.00 | ☐ | +/- 0.25 LPM |

Leak Test: Date of check: August 25, 2023 Last Cal Date: July 26, 2023

PM w/o HEPA: 27.8 PM w/ HEPA: 0 <0.2 ug/m3

Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check

Inlet cleaning : Inlet Head ☑

### Quarterly Calibration Test

| Parameter | As found | Post maintenance | As left | Adjusted | *(Limits)* |
|---|---|---|---|---|---|
| PMT Peak Test | 10.7 | 11.6 | 10.8 | ☑ | 10.9 +/- 0.5 |

Post-maintenance leak check: PM w/o HEPA: 19.4 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: August 25, 2023

Disposable Filter Changed: August 25, 2023

### Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned:

Notes: Adjusted PMT. Inlet head: Clean!

Calibration by: Denny Ray Estador

# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-10-2022

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Ells River | Station Number: | AMS 30 |
| Calibration Date: | August 25, 2023 | Prev Cal Date: | October 11, 2022 |
| Start Time (MST): | 10:00 | End Time (MST): | 12:05 |
| Tower Height (m): | 10.0 | Reason: | Routine |

### Wind Speed Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 010C-1 | Serial Number: | A3111 |
| WS Calibrator: | MetOne 053-120 | Serial Number: | R10866 |

| Shaft RPM | Calculated Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | % Error *Limit = +/- 1.5%* |
|---|---|---|---|
| 0 | 0.0 | 0.0 | --- |
| 200 | 20.2 | 20.1 | -0.3% |
| 400 | 39.4 | 39.4 | 0.1% |
| 600 | 58.6 | 58.5 | -0.1% |
| 800 | 77.8 | 77.8 | 0.1% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999999 | *≥0.9995* |
| Calculated slope | | 0.999473 | *0.90 - 1.10* |
| Calculated intercept | | 0.026227 | *+/- 2* |

### Wind Direction Information

| | | | |
|---|---|---|---|
| Sensor make/model: | Met One 020C-1 | Serial Number: | J2732 |
| As Found Declination (deg east of True North): | 14 | As Left Declination (deg east of True North): | 14 |
| Solar noon time (MST): | 13:29 | Calc Declination*: | 14 Degrees |
| Deadband calc: | 0.3 degrees (*Limit 4 deg*) | | * - calculated declination as per NOAA website |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | % Error (based on 357° FS) *Limit = +/- 1.0%* |
|---|---|---|
| 0 | -0.4 | --- |
| 90 | 87.7 | -0.6% |
| 180 | 176.8 | -0.9% |
| 270 | 270.0 | 0.0% |
| 357 | 356.3 | -0.2% |

| | ***Start*** | ***Finish*** | *Limits* |
|---|---|---|---|
| Correl Coeff ($r^2$) | | 0.999955 | *≥0.9995* |
| Calculated slope | | 0.998023 | *0.90 - 1.10* |
| Calculated intercept | | 1.672019 | *+/- 4* |

Notes:

Bearings still good. Confirmed declination with a compass.

Calibration Performed By: Denny Ray Estador

# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS505
## SAWBONES BAY
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Sawbones Bay | Station number: | AMS505 |
| Calibration Date: | August 9, 2023 | Last Cal Date: | July 14, 2023 |
| Start time (MST): | 10:05 | End time (MST): | 12:52 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 51.4 | ppm | Cal Gas Exp Date: | February 15, 2029 |
| Cal Gas Cylinder #: | EY0000672 | | | |
| Removed Cal Gas Conc: | 51.40 | ppm | Rem Gas Exp Date: | February 15, 2029 |
| Removed Gas Cyl #: | EY0000672 | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 5112 |
| ZAG Make/Model: | Teledyne API T701H | | Serial Number: | 690 |

### Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 0710321323

Analyzer Range 0 - 1000 ppb

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| Calibration slope: | 1.001253 | 1.000823 | Backgd or Offset: | 19.2 | 19.2 |
| Calibration intercept: | -0.552518 | -0.552184 | Coeff or Slope: | 0.995 | 0.995 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 4922 | 77.8 | 799.8 | 799.6 | 1.000 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 4922 | 77.8 | 799.8 | 800.1 | 1.000 |
| second point | 4961 | 38.9 | 399.9 | 400.1 | 1.000 |
| third point | 4981 | 19.5 | 200.4 | 198.5 | 1.010 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 4922 | 77.8 | 799.8 | 801.2 | 0.998 |
| | | | | Average Correction Factor | 1.003 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 799.50 | Previous response | 800.27 | *% change | -0.1% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed inlet filter. Adjusted span only.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

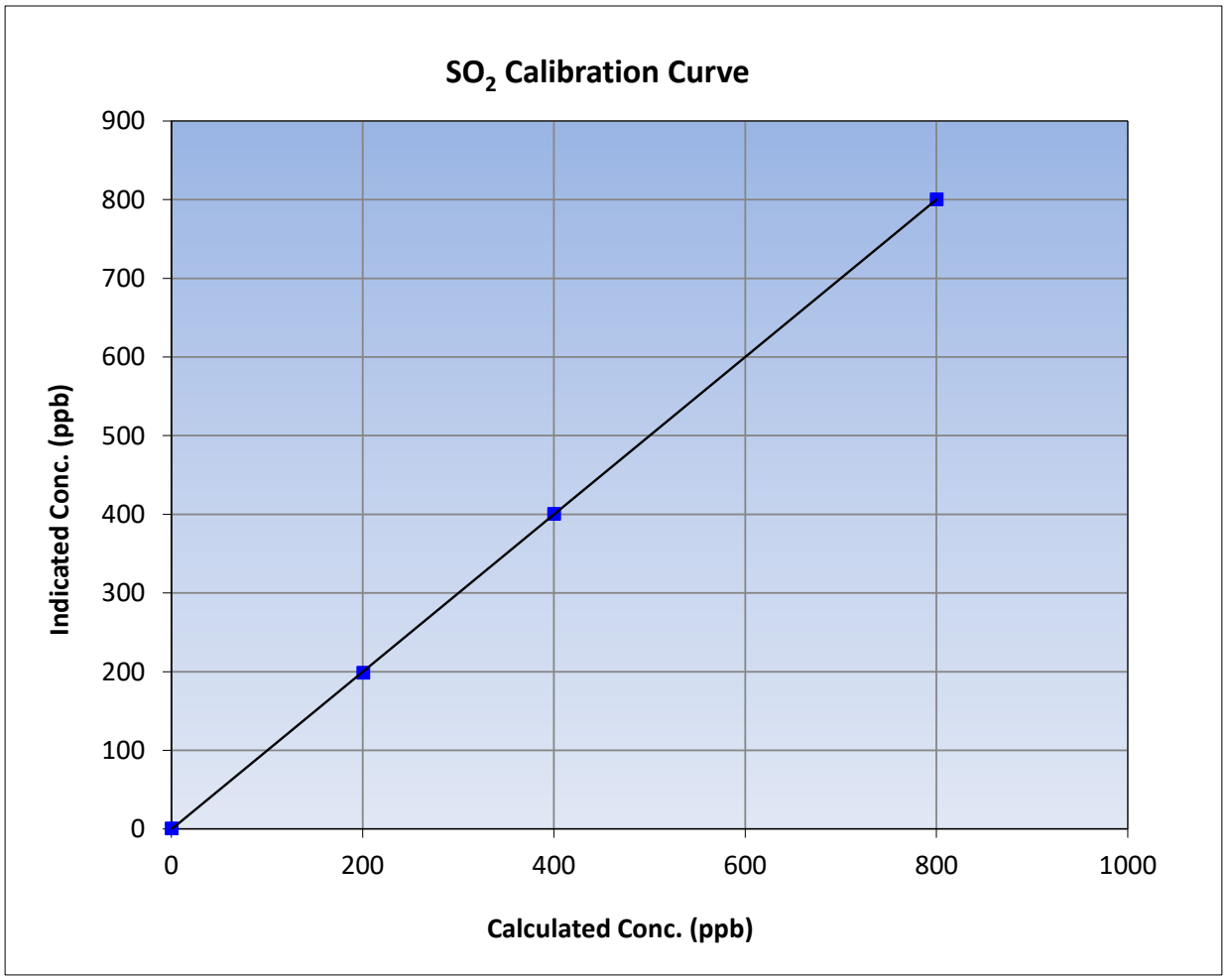
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 9, 2023 | Previous Calibration: | July 14, 2023 |
| Station Name: | Sawbones Bay | Station Number: | AMS505 |
| Start Time (MST): | 10:05 | End Time (MST): | 12:52 |
| Analyzer make: | Thermo 43i | Analyzer serial #: | 0710321323 |

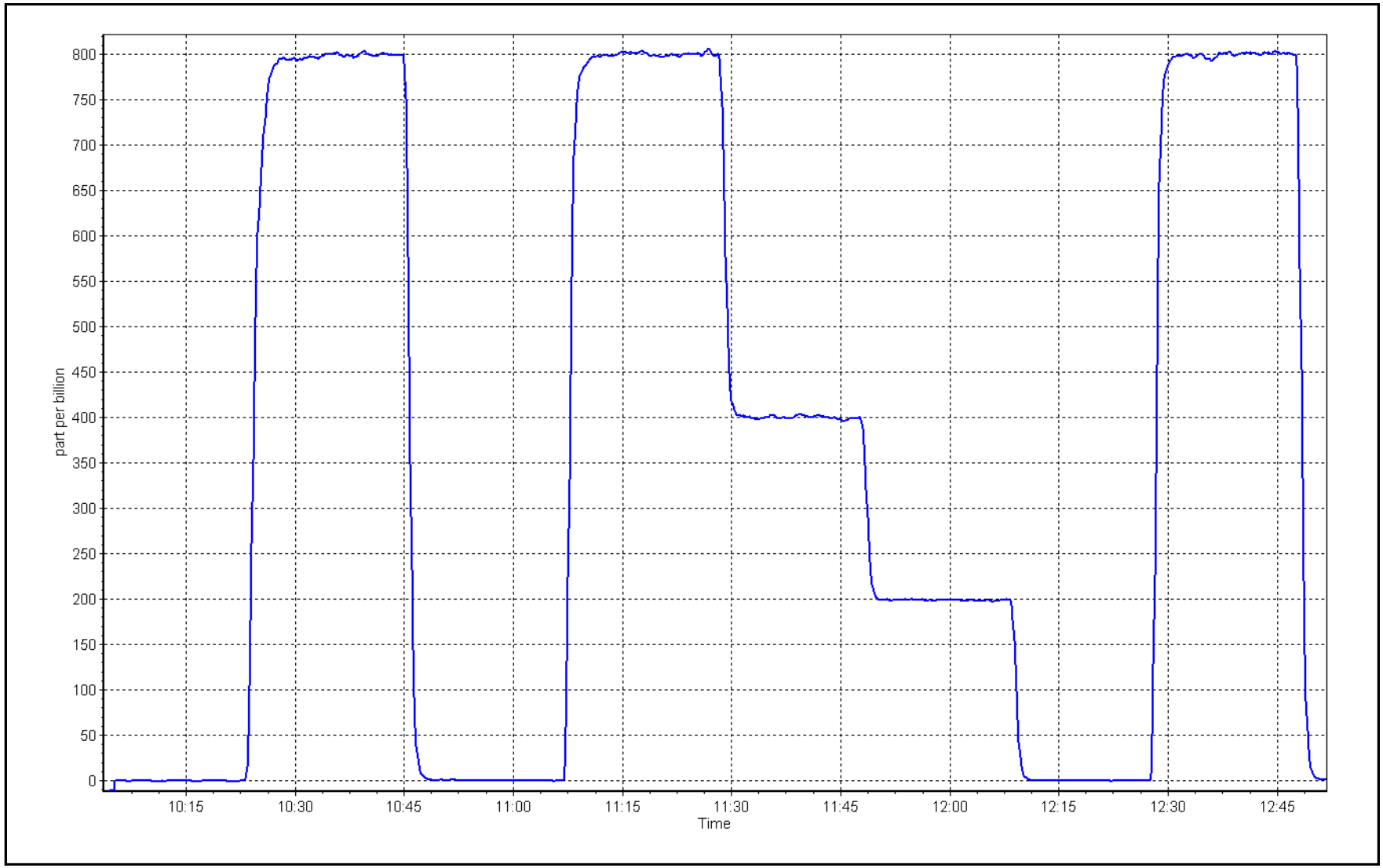
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.4 | ---- |
| 799.8 | 800.1 | 0.9996 |
| 399.9 | 400.1 | 0.9995 |
| 200.4 | 198.5 | 1.0098 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999990 | *≥0.995* |
| Slope | 1.000823 | *0.90 - 1.10* |
| Intercept | -0.552184 | *+/-30* |



**SO2 Calibration Plot** Date: August 9, 2023 Location: Sawbones Bay



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Sawbones Bay | Station number: | AMS505 |
| Calibration Date: | August 30, 2023 | Last Cal Date: | July 12, 2023 |
| Start time (MST): | 08:24 | End time (MST): | 12:31 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.15 | ppm | Cal Gas Exp Date: | February 5, 2024 |
| Cal Gas Cylinder #: | CC517397 | | | |
| Removed Cal Gas Conc: | 5.15 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | Teledyne API T700 | | Serial Number: | 5112 |
| ZAG Make/Model: | Teledyne API T701 | | Serial Number: | 690 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43iQ | | Analyzer serial #: | 1228021057 | |
| Converter make: | Global 150 | | Converter serial #: | 2022-224 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.994365 | 0.998506 | Backgd or Offset: | 2.26 | 2.21 |
| Calibration intercept: | -0.098257 | -0.018155 | Coeff or Slope: | 1.037 | 1.021 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4922 | 77.7 | 80.0 | 80.4 | 0.994 |
| as found 2nd point | 4961 | 38.8 | 40.0 | 40.4 | 0.987 |
| as found 3rd point | 4981 | 19.4 | 20.0 | 20.2 | 0.984 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4922 | 77.7 | 80.0 | 79.9 | 1.002 |
| second point | 4961 | 38.8 | 40.0 | 39.9 | 1.002 |
| third point | 4981 | 19.4 | 20.0 | 19.9 | 1.004 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 4922 | 77.7 | 80.0 | 79.6 | 1.005 |
| SO2 Scrubber Check | 4922 | 77.8 | 778.0 | -0.1 | ---- |
| Date of last scrubber change: | | | | Ave Corr Factor | 1.002 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 80.5 | Prev response: | 79.49 | *% change: | 1.3% |
| Baseline Corr 2nd AF pt: | 40.5 | AF Slope: | 1.005356 | AF Intercept: | 0.042111 |
| Baseline Corr 3rd AF pt: | 20.3 | AF Correlation: | 0.999981 | | |

* = > +/-5% change initiates investigation

Notes: Changed inlet after calibrator zero. Scrubber check and passed after calibrator zero. Adjusted span only.

Calibration Performed By: Sean Bala

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

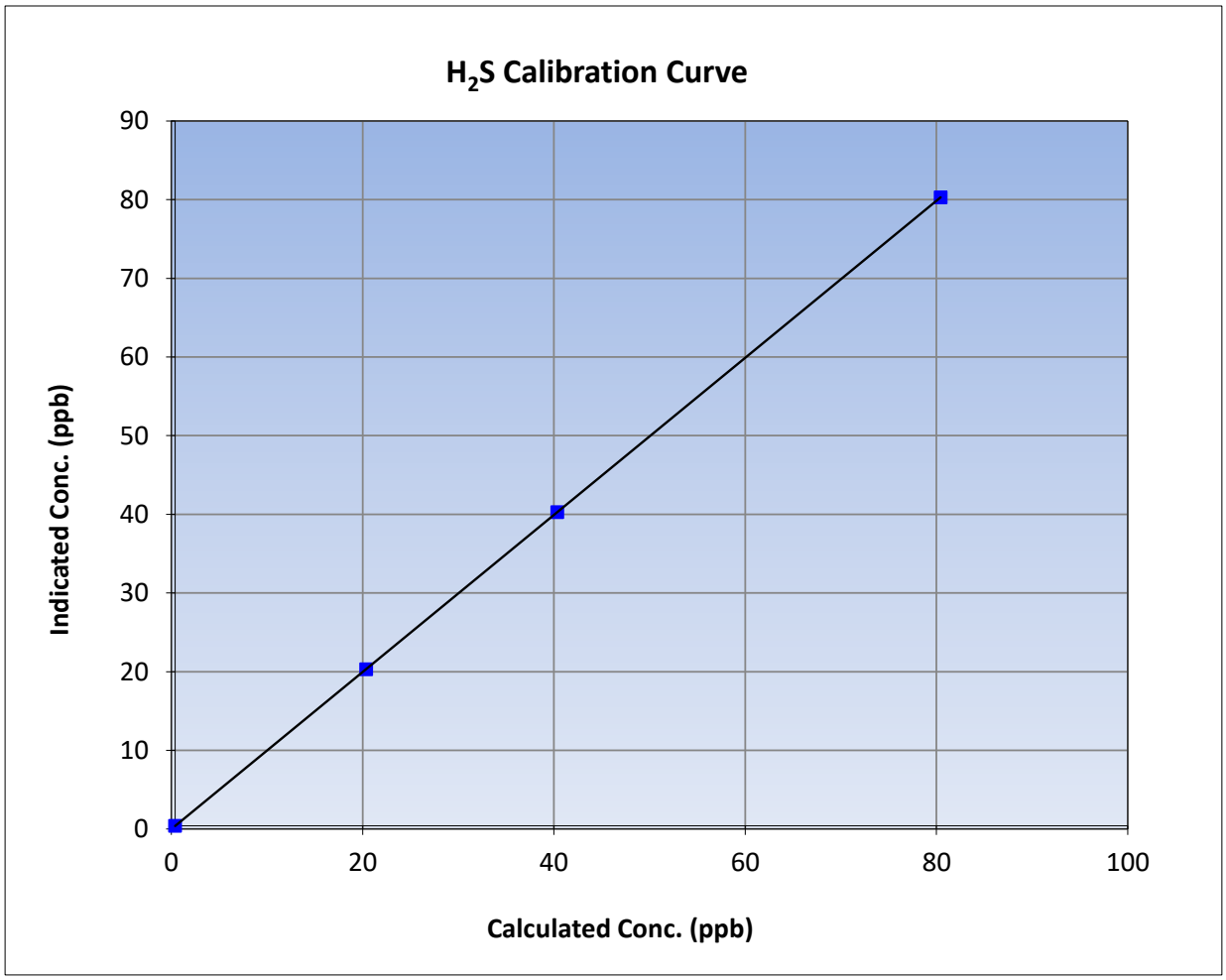
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 30, 2023 | Previous Calibration: | July 12, 2023 |
| Station Name: | Sawbones Bay | Station Number: | AMS505 |
| Start Time (MST): | | End Time (MST): | 12:31 |
| Analyzer make: | Thermo 43iQ | Analyzer serial #: | 1228021057 |

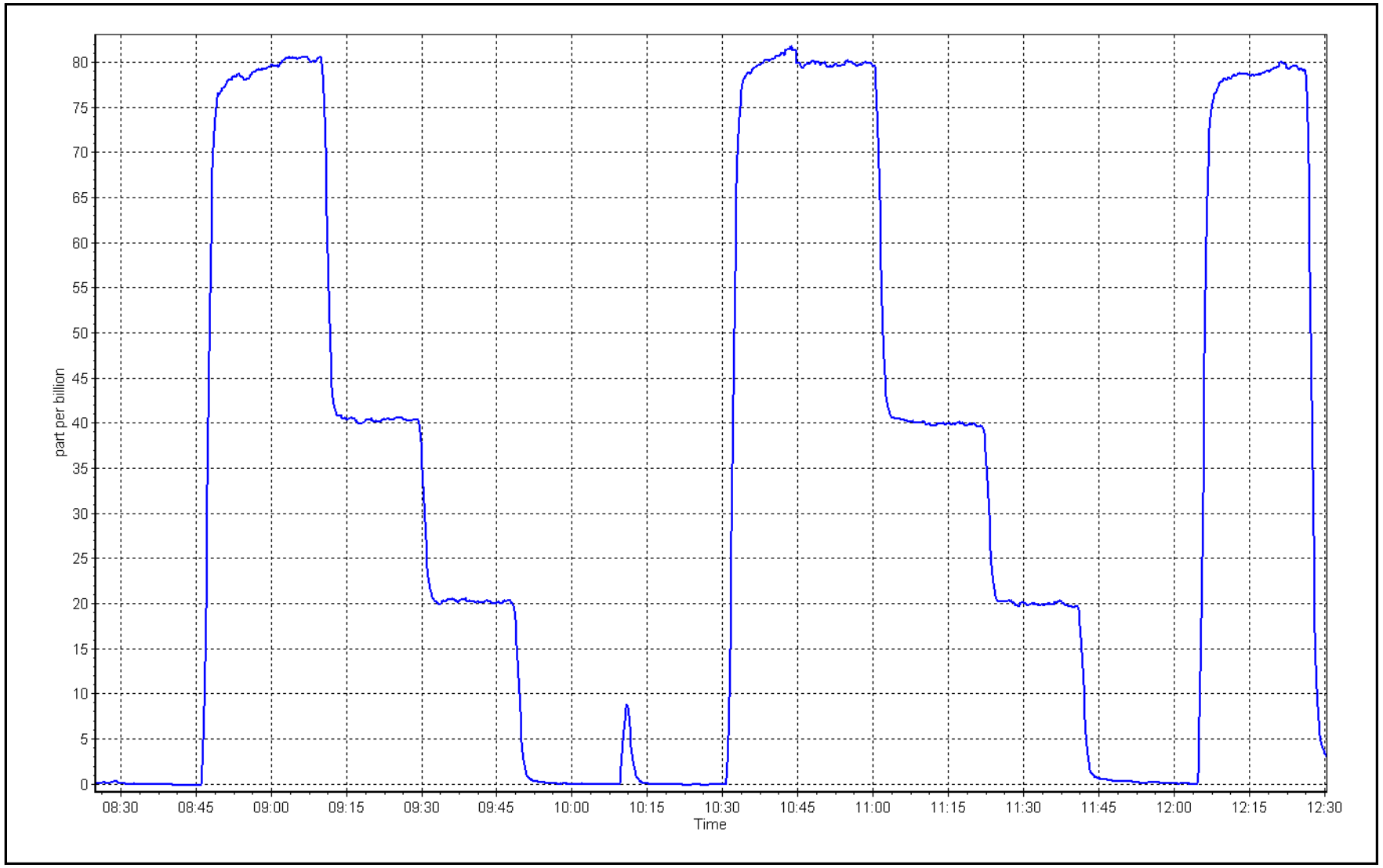
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.0 | ---- |
| 80.0 | 79.9 | 1.0017 |
| 40.0 | 39.9 | 1.0016 |
| 20.0 | 19.9 | 1.0040 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 1.000000 | *≥0.995* |
| Slope | 0.998506 | *0.90 - 1.10* |
| Intercept | -0.018155 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 30, 2023 Location: Sawbones Bay



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Sawbones Bay | Station number: | AMS505 |
| Calibration Date: | August 4, 2023 | Last Cal Date: | July 13, 2023 |
| Start time (MST): | 7:57 | End time (MST): | 12:21 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | T1FY3PK | | Cal Gas Expiry Date: | January 14, 2024 | |
| NOX Cal Gas Conc: | 47.94 | ppm | NO Cal Gas Conc: | 47.94 | ppm |
| Removed Cylinder #: | T1FY3PK | | Removed Gas Exp Date: | January 14, 2024 | |
| Removed Gas NOX Conc: | 47.94 | ppm | Removed Gas NO Conc: | 47.94 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 5112 | |
| ZAG make/model: | API T701H | | Serial Number: | 690 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | API T200 | Analyzer serial #: | 4260 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 0.977 | 1.038 | NO bkgnd or offset: | 0.0 | -0.1 |
| NOX coeff or slope: | 0.972 | 1.036 | NOX bkgnd or offset: | 1.9 | 3.1 |
| NO2 coeff or slope: | NA | NA | Reaction cell Press: | 11.5 | 8.3 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 1.003551 | 1.003179 |
| $NO_X$ Cal Offset: | -0.870760 | -3.190449 |
| NO Cal Slope: | 1.008612 | 1.001620 |
| NO Cal Offset: | -1.291670 | -2.069911 |
| $NO_2$ Cal Slope: | 0.999342 | 1.000764 |
| $NO_2$ Cal Offset: | 0.567256 | -1.369113 |

# Wood Buffalo Environmental Association

# $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | | | | | | | | | | |
| as found span | | | | | | | | | | |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -1.0 | 0.1 | -1.1 | ---- | ---- |
| high point | 4917 | 83.4 | 799.6 | 799.6 | 0.0 | 800.0 | 799.6 | 0.6 | 0.9995 | 1.0000 |
| second point | 4958 | 41.7 | 399.8 | 399.8 | 0.0 | 396.9 | 398.2 | -1.2 | 1.0074 | 1.0041 |
| third point | 4979 | 20.9 | 200.4 | 200.4 | 0.0 | 195.6 | 195.9 | -0.3 | 1.0245 | 1.0229 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -1.5 | 0.2 | -1.6 | ---- | ---- |
| as left span | 4916 | 83.4 | 799.7 | 330.8 | 468.9 | 797.4 | 327.5 | 470.0 | 1.0029 | 1.0102 |
| | | | | | | | | Average Correction Factor | 1.0105 | 1.0090 |

Corrected As found $NO_X$ = NA ppb NO = NA ppb

Previous Response $NO_X$ = NA ppb NO = NA ppb

Baseline Corr 2nd pt $NO_X$ = NA ppb NO = NA ppb

Baseline Corr 3rd pt $NO_X$ = NA ppb NO = NA ppb

* = > +/-5% change initiates investigation

*Percent Change $NO_X$ = NA

*Percent Change NO = NA

As found $NO_X$ $r^2$: Nx Sl: Nx Int:

As found NO $r^2$: NO Sl: NO Int:

As found $NO_2$ $r^2$: NO2 Sl: $NO_2$ Int:

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 796.7 | 327.8 | 468.9 | 467.9 | 1.0021 | 99.8% |
| 2nd GPT point (200 ppb O3) | 796.7 | 536.3 | 260.4 | 259.6 | 1.0031 | 99.7% |
| 3rd GPT point (100 ppb O3) | 796.7 | 640.6 | 156.1 | 154.2 | 1.0123 | 98.8% |
| | | | | Average Correction Factor | 1.0058 | 99.4% |

Notes: Calibration done after the external pump was changed on August 3. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

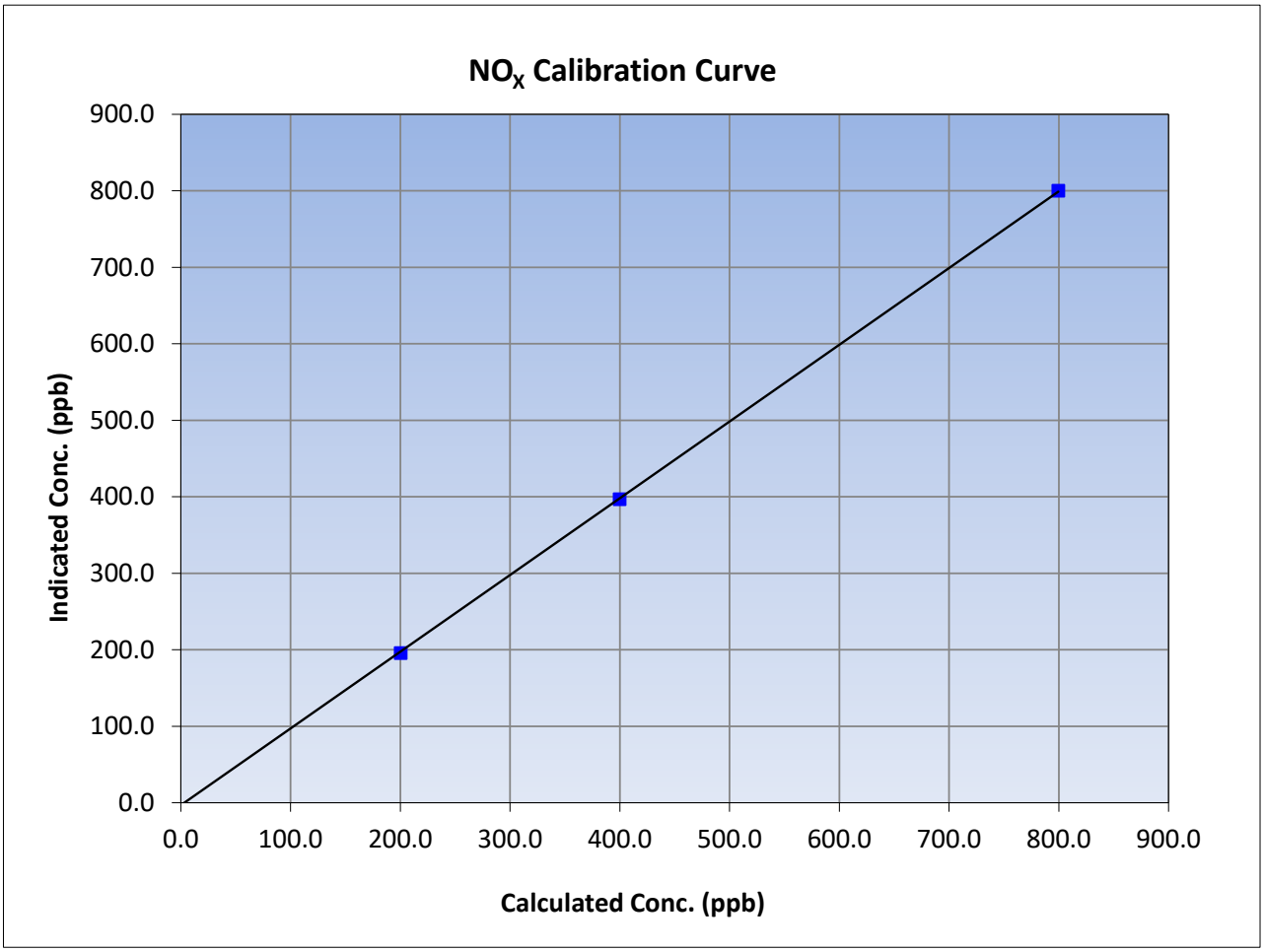
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 4, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Sawbones Bay | Station Number: | AMS505 |
| Start Time (MST): | 7:57 | End Time (MST): | 12:21 |
| Analyzer make: | API T200 | Analyzer serial #: | 4260 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | -1.0 | ---- | Correlation Coefficient | 0.999966 | *≥0.995* |
| 799.6 | 800.0 | 0.9995 | | | |
| 399.8 | 396.9 | 1.0074 | Slope | 1.003179 | *0.90 - 1.10* |
| 200.4 | 195.6 | 1.0245 | | | |
| | | | Intercept | -3.190449 | *+/-20* |



# Wood Buffalo Environmental Association

## NO Calibration Summary

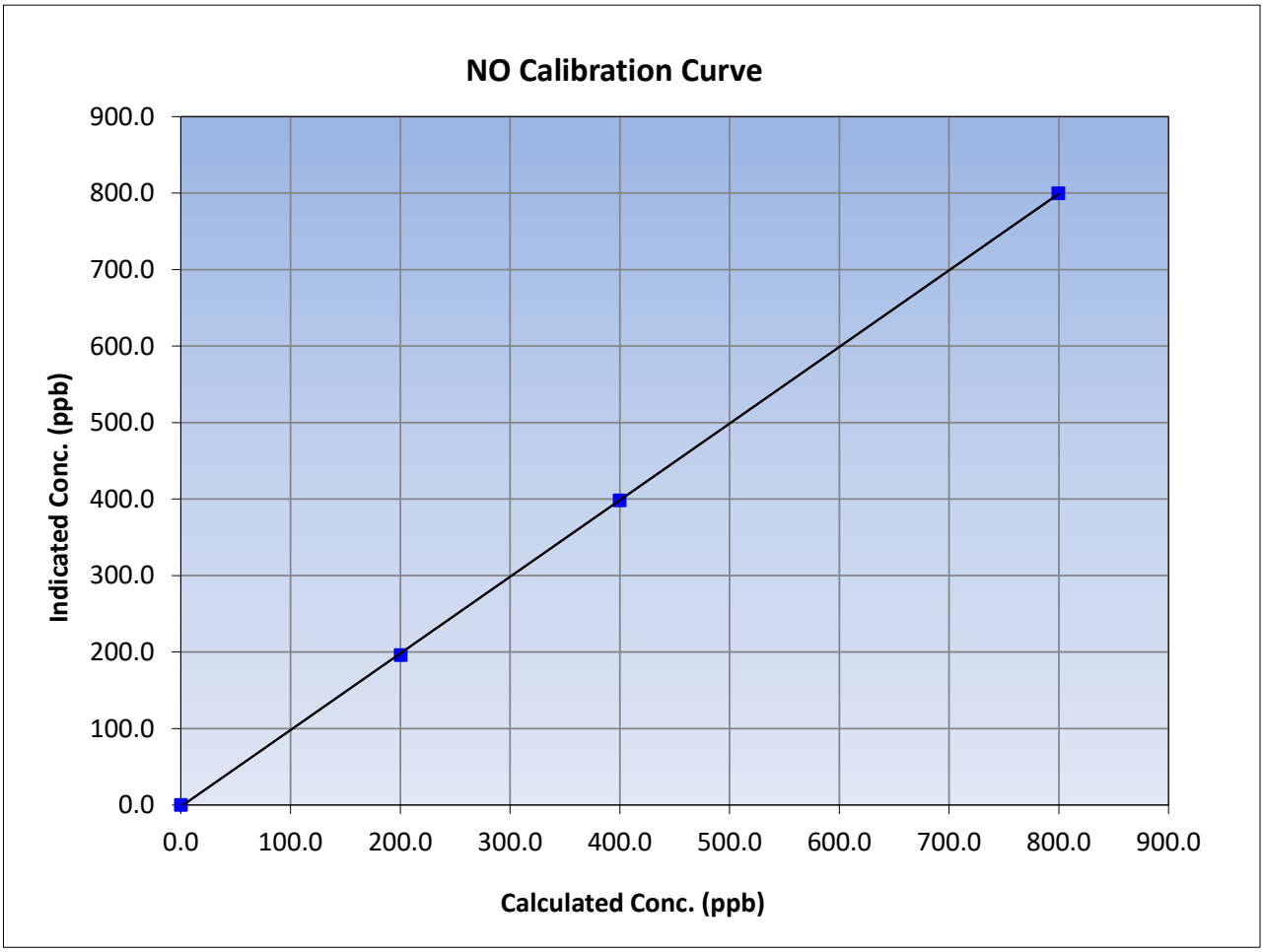
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 4, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Sawbones Bay | Station Number: | AMS505 |
| Start Time (MST): | 7:57 | End Time (MST): | 12:21 |
| Analyzer make: | API T200 | Analyzer serial #: | 4260 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999963 | ≥0.995 |
| 799.6 | 799.6 | 1.0000 | | | |
| 399.8 | 398.2 | 1.0041 | Slope | 1.001620 | 0.90 - 1.10 |
| 200.4 | 195.9 | 1.0229 | | | |
| | | | Intercept | -2.069911 | +/-20 |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

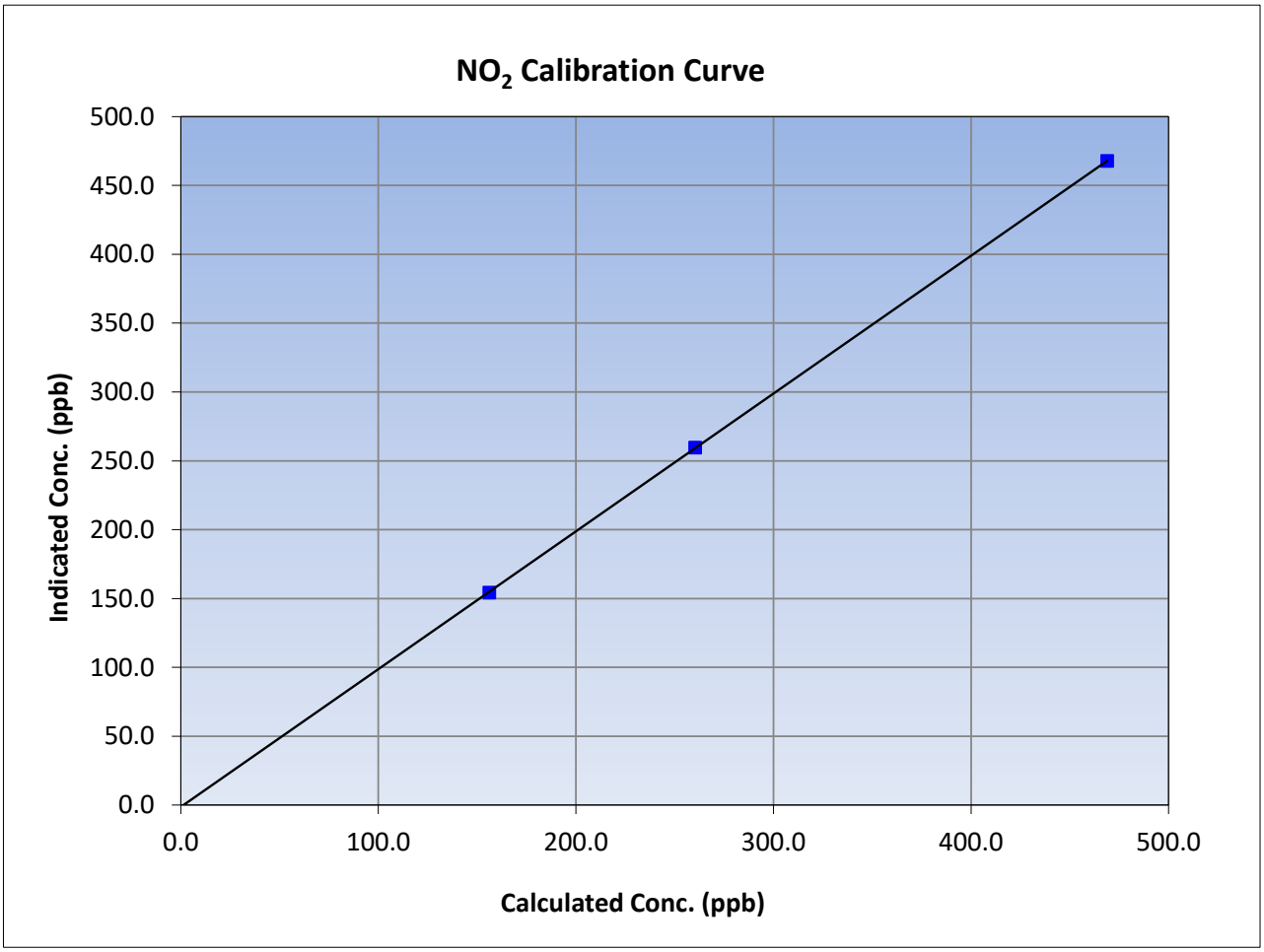
Version-04-2020

### Station Information

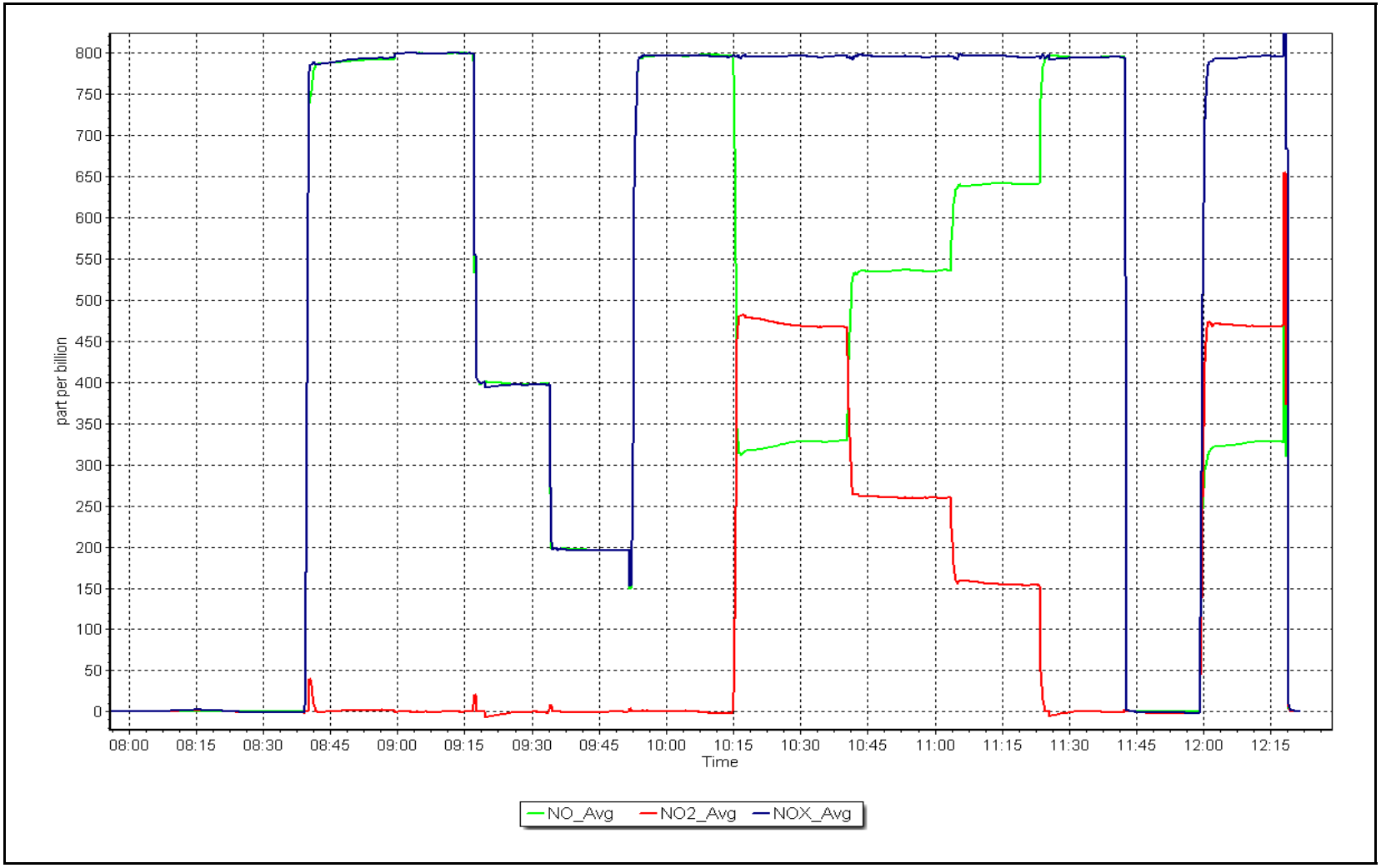
| | | | |
|---|---|---|---|
| Calibration Date: | August 4, 2023 | Previous Calibration: | July 13, 2023 |
| Station Name: | Sawbones Bay | Station Number: | AMS505 |
| Start Time (MST): | 7:57 | End Time (MST): | 12:21 |
| Analyzer make: | API T200 | Analyzer serial #: | 4260 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | Limits |
|---|---|---|---|---|---|
| 0.0 | -1.1 | ---- | Correlation Coefficient | 0.999995 | ≥0.995 |
| 468.9 | 467.9 | 1.0021 | | | |
| 260.4 | 259.6 | 1.0031 | Slope | 1.000764 | 0.90 - 1.10 |
| 156.1 | 154.2 | 1.0123 | | | |
| | | | Intercept | -1.369113 | +/-20 |



**$NO_X$ Calibration Plot** Date: August 4, 2023 Location: Sawbones Bay



# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

## AMS507
## KIRBY SOUTH
## AUGUST 2023

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

September 29, 2023

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Kirby South | Station number: | AMS 507 |
| Calibration Date: | August 3, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 12:37 | End time (MST): | 15:44 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 49.18 | ppm | Cal Gas Exp Date: | February 23, 2025 |
| Cal Gas Cylinder #: | CC303554 | | | |
| Removed Cal Gas Conc: | 49.18 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3804 |
| ZAG Make/Model: | API T701H | | Serial Number: | 880 |

### Analyzer Information

Analyzer make: Thermo 43iQ — Analyzer serial #: 1182340007

Analyzer Range 0 - 1000 ppb

| | *Start* | *Finish* | | *Start* | *Finish* |
|---|---|---|---|---|---|
| Calibration slope: | 1.002607 | 0.999847 | Backgd or Offset: | 18.9 | 19.0 |
| Calibration intercept: | -0.968916 | -1.128170 | Coeff or Slope: | 1.135 | 1.135 |

### $SO_2$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 4919 | 81.3 | 799.6 | 793.4 | 1.008 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4919 | 81.3 | 799.6 | 799.7 | 1.000 |
| second point | 4959 | 40.7 | 400.3 | 396.5 | 1.010 |
| third point | 4980 | 20.3 | 199.7 | 198.5 | 1.006 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 4919 | 81.3 | 799.6 | 797.5 | 1.003 |
| | | | | Average Correction Factor | 1.005 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 793.30 | Previous response | 800.73 | *% change | -0.9% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. No adjustments made.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $SO_2$ Calibration Summary

Version-01-2020

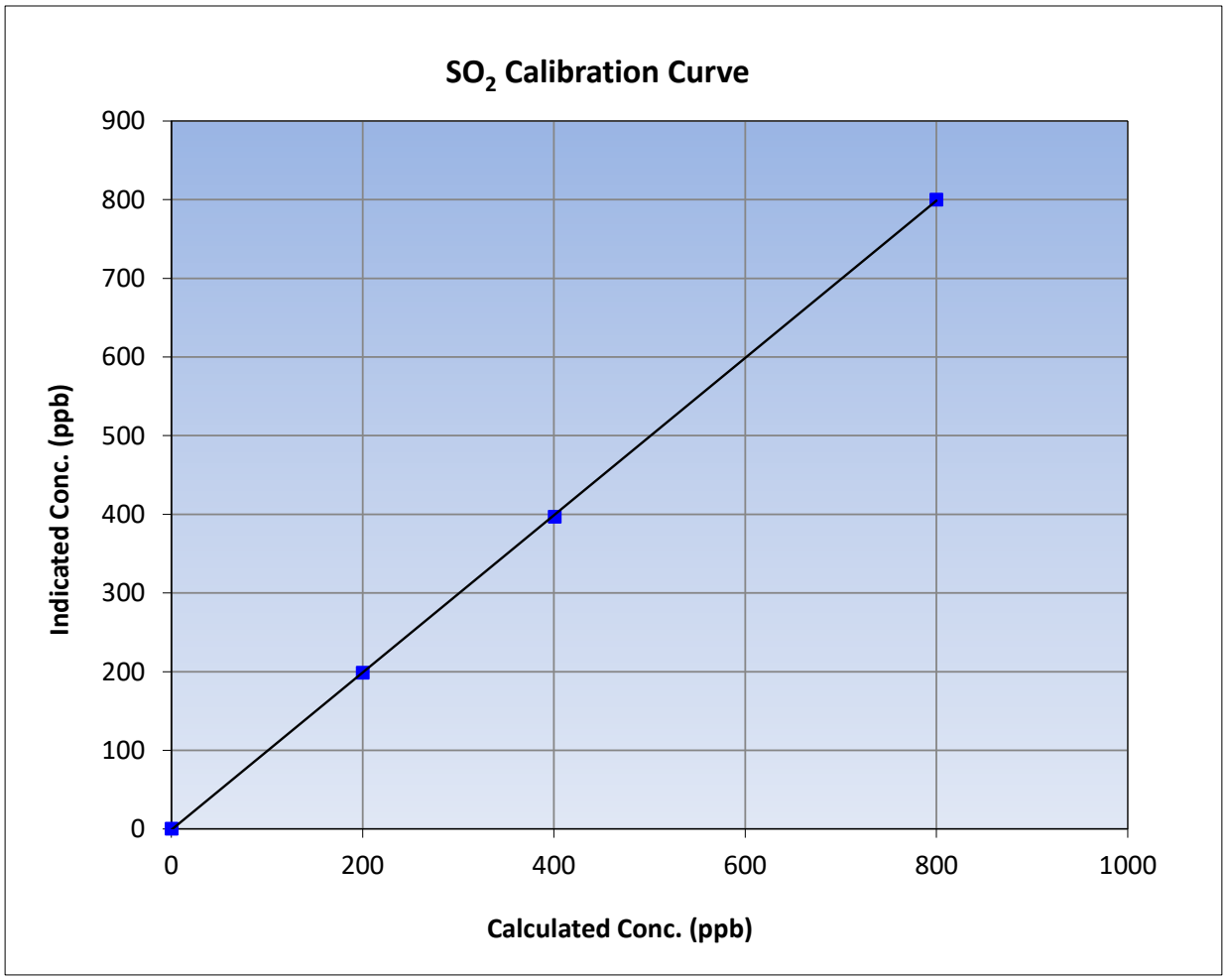
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Kirby South | Station Number: | AMS 507 |
| Start Time (MST): | 12:37 | End Time (MST): | 15:44 |
| Analyzer make: | Thermo 43iQ | Analyzer serial #: | 1182340007 |

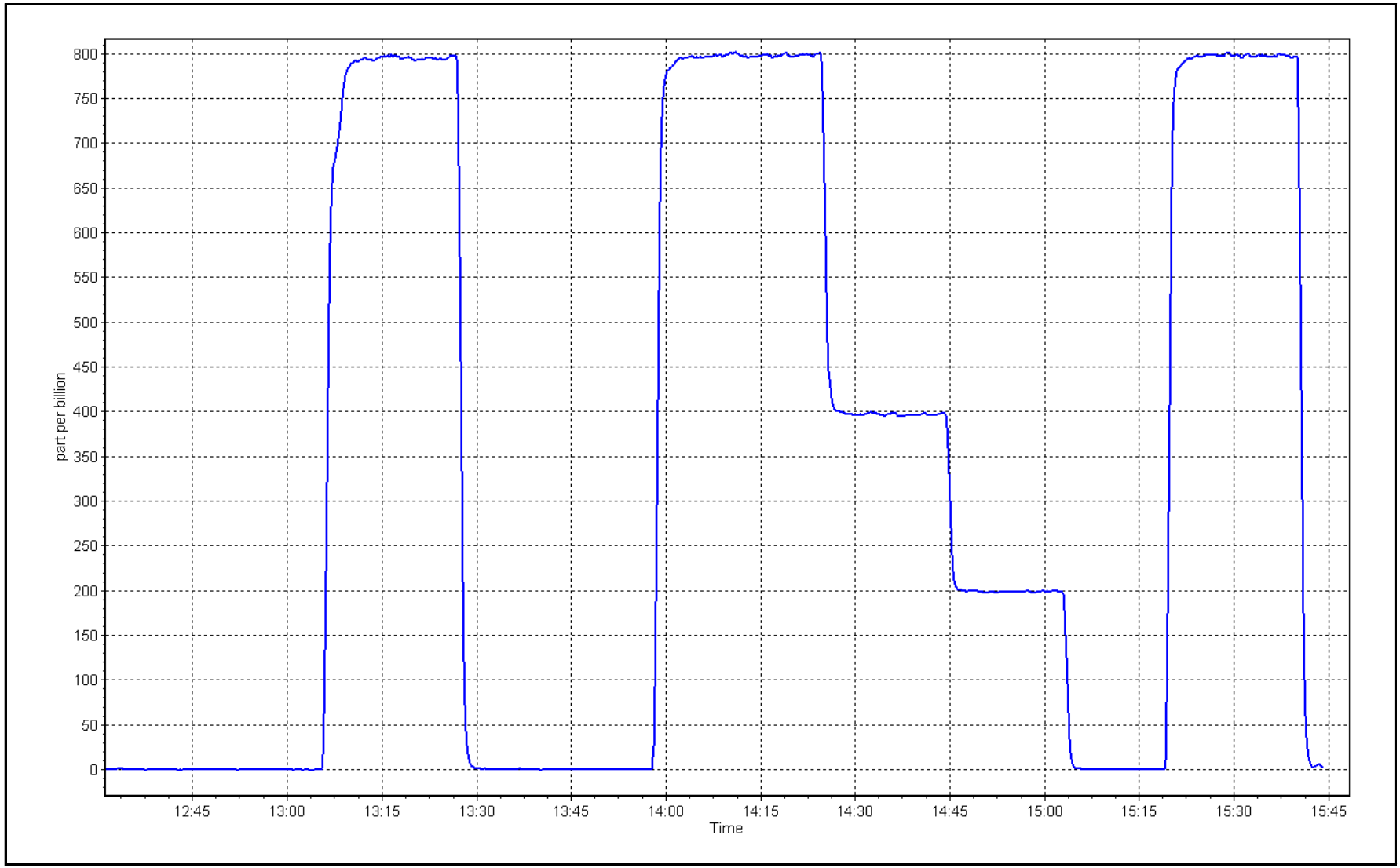
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.2 | ---- |
| 799.6 | 799.7 | 0.9999 |
| 400.3 | 396.5 | 1.0097 |
| 199.7 | 198.5 | 1.0058 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999970 | *≥0.995* |
| Slope | 0.999847 | *0.90 - 1.10* |
| Intercept | -1.128170 | *+/-30* |



**SO2 Calibration Plot** Date: August 3, 2023 Location: Kirby South



# Wood Buffalo Environmental Association

## $H_2S$ Calibration Report

Version-11-2021

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Kirby South | Station number: | AMS507 |
| Calibration Date: | August 2, 2023 | Last Cal Date: | July 25, 2023 |
| Start time (MST): | 11:02 | End time (MST): | 15:50 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | |
|---|---|---|---|---|
| Cal Gas Concentration: | 5.167 | ppm | Cal Gas Exp Date: | February 5, 2024 |
| Cal Gas Cylinder #: | CC517378 | | | |
| Removed Cal Gas Conc: | 5.167 | ppm | Rem Gas Exp Date: | NA |
| Removed Gas Cyl #: | NA | | Diff between cyl: | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3804 |
| ZAG Make/Model: | API T701H | | Serial Number: | 880 |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 43i TLE | | Analyzer serial #: | 1150840012 | |
| Converter make: | Global | | Converter serial #: | 2022-197 | |
| Analyzer Range | 0 - 100 ppb | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 1.005318 | 1.001457 | Backgd or Offset: | 1.64 | 1.53 |
| Calibration intercept: | 0.458932 | 0.019070 | Coeff or Slope: | 1.109 | 1.048 |

### $H_2S$ As Found Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 4923 | 77.4 | 80.0 | 84.5 | 0.948 |
| as found 2nd point | 4961 | 38.8 | 40.1 | 41.7 | 0.964 |
| as found 3rd point | 4981 | 19.3 | 19.9 | 20.8 | 0.963 |
| new cylinder response | | | | | |

### $H_2S$ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4923 | 77.4 | 80.0 | 80.2 | 0.997 |
| second point | 4961 | 38.8 | 40.1 | 40.0 | 1.002 |
| third point | 4981 | 19.3 | 19.9 | 20.0 | 0.997 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 4923 | 77.4 | 80.0 | 80.1 | 0.998 |
| SO2 Scrubber Check | 4919 | 80.0 | 800.2 | 0.0 | ---- |
| Date of last scrubber change: | | 25-Jul-23 | | Ave Corr Factor | 0.999 |
| Date of last converter efficiency test: | | | | | efficiency |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 84.4 | Prev response: | 80.86 | *% change: | 4.2% |
| Baseline Corr 2nd AF pt: | 41.6 | AF Slope: | 1.055729 | AF Intercept: | -0.180734 |
| Baseline Corr 3rd AF pt: | 20.7 | AF Correlation: | 0.999911 | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Scrubber check done after MPAF's, passed. Adjusted span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $H_2S$ Calibration Summary

Version-11-2021

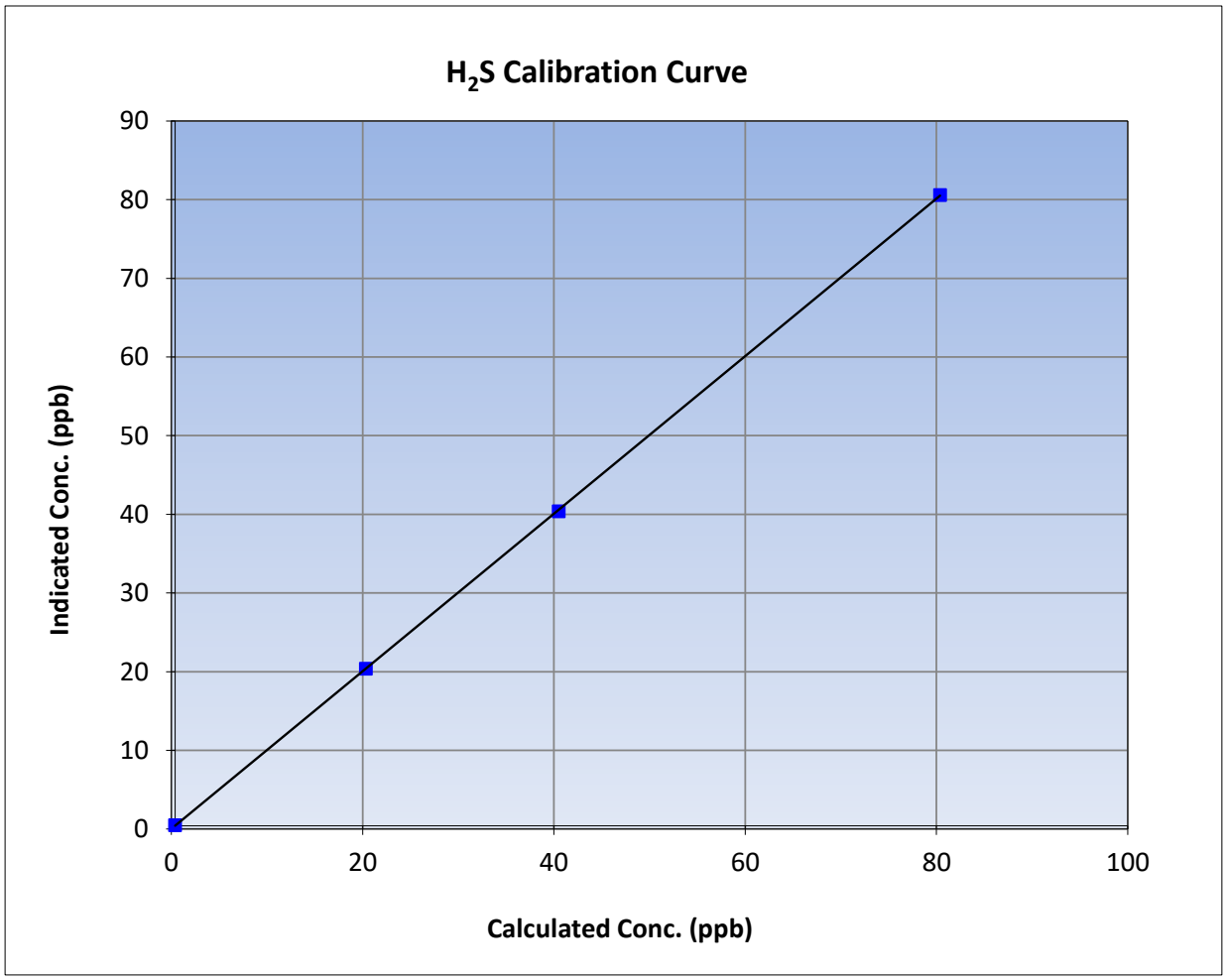
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 2, 2023 | Previous Calibration: | July 25, 2023 |
| Station Name: | Kirby South | Station Number: | AMS507 |
| Start Time (MST): | 11:02 | End Time (MST): | 15:50 |
| Analyzer make: | Thermo 43i-TLE | Analyzer serial #: | 1150840012 |

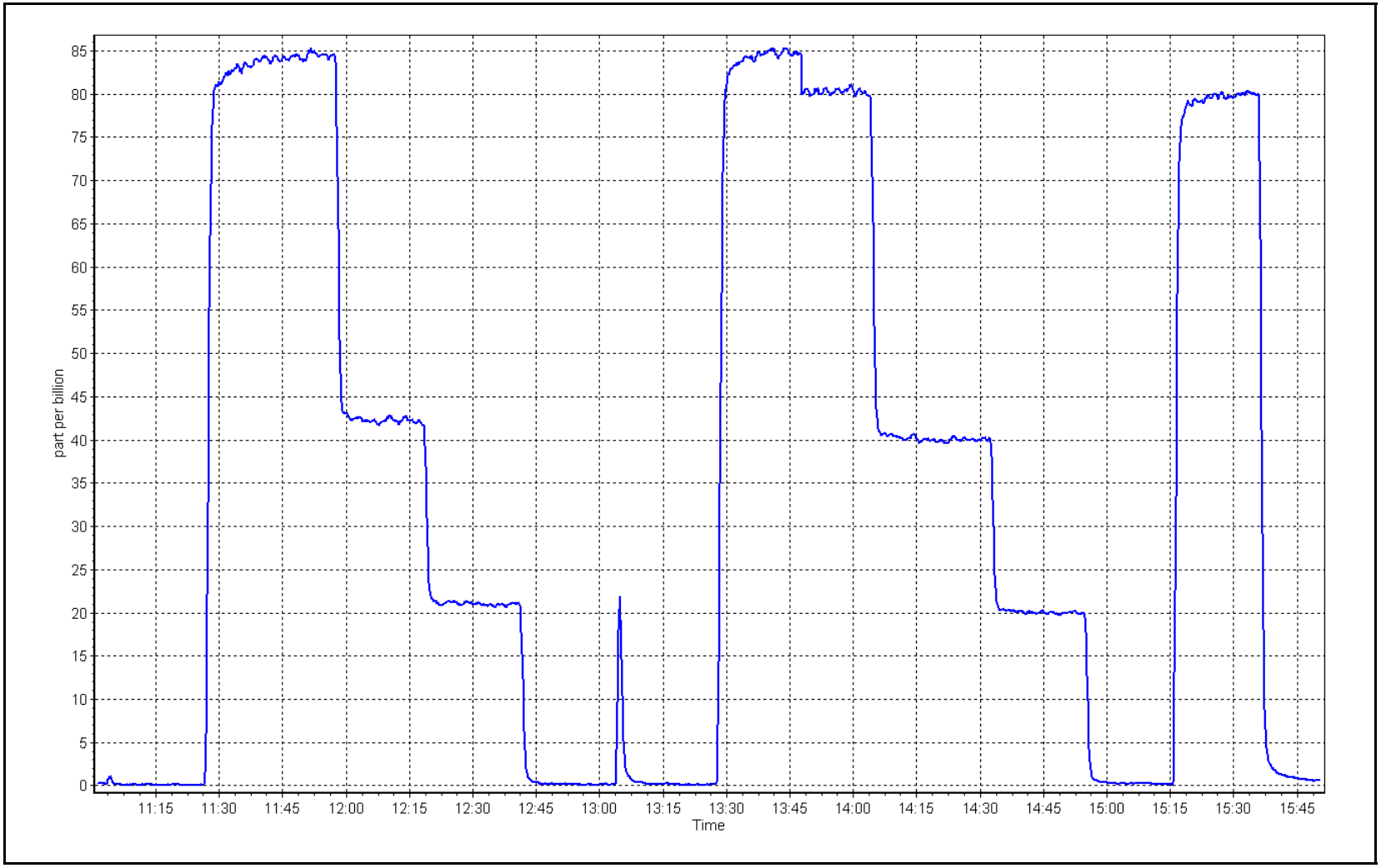
### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.0 | 0.1 | ---- |
| 80.0 | 80.2 | 0.9972 |
| 40.1 | 40.0 | 1.0024 |
| 19.9 | 20.0 | 0.9972 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999987 | *≥0.995* |
| Slope | 1.001457 | *0.90 - 1.10* |
| Intercept | 0.019070 | *+/-3* |



**$H_2S$ Calibration Plot** Date: August 2, 2023 Location: Kirby South



# Wood Buffalo Environmental Association

## THC Calibration Report

Version-01-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Kirby South | Station number: | AMS507 |
| Calibration Date: | August 3, 2023 | Last Cal Date: | July 6, 2023 |
| Start time (MST): | 12:37 | End time (MST): | 15:44 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| Gas Cert Reference: | | CC303554 | Cal Gas Expiry Date: | March 23, 2025 | |
| CH4 Cal Gas Conc. | 496.6 | ppm | CH4 Equiv Conc. | 1061.7 | ppm |
| C3H8 Cal Gas Conc. | 205.5 | ppm | | | |
| Removed Gas Cert: | | NA | Removed Gas Expiry: | NA | |
| Removed CH4 Conc. | 496.6 | ppm | CH4 Equiv Conc. | 1061.7 | ppm |
| Removed C3H8 Conc. | 205.5 | ppm | Diff between cyl: | | |
| Calibrator Make/Model: | API T700 | | Serial Number: | 3804 | |
| ZAG Make/Model: | API T701H | | Serial Number: | 880 | |

### Analyzer Information

| | | | | | |
|---|---|---|---|---|---|
| Analyzer make: | Thermo 51i | | Analyzer serial #: | 1182340005 | |
| Analyzer Range: | 0 - 20 ppm | | | | |
| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
| Calibration slope: | 0.999300 | 0.999381 | Background: | 2.70 | 2.64 |
| Calibration intercept: | -0.060190 | -0.016800 | Coefficient: | 3.749 | 3.799 |

### THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.00 | -0.06 | ---- |
| as found span | 4919 | 81.3 | 17.26 | 16.93 | 1.020 |
| as found 2nd point | | | | | |
| as found 3rd point | | | | | |
| new cylinder response | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.03 | ---- |
| high point | 4919 | 81.3 | 17.26 | 17.26 | 1.000 |
| second point | 4959 | 40.7 | 8.64 | 8.59 | 1.006 |
| third point | 4980 | 20.3 | 4.31 | 4.25 | 1.013 |
| as left zero | 5000 | 0.0 | 0.00 | 0.02 | ---- |
| as left span | 4919 | 81.3 | 17.26 | 17.36 | 0.994 |
| | | | | Average Correction Factor | 1.007 |

| | | | | | |
|---|---|---|---|---|---|
| Baseline Corr As found: | 16.99 | Previous response | 17.19 | *% change | -1.2% |
| Baseline Corr 2nd AF pt: | NA | AF Slope: | | AF Intercept: | |
| Baseline Corr 3rd AF pt: | NA | AF Correlation: | | | |

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## THC Calibration Summary

Version-01-2020

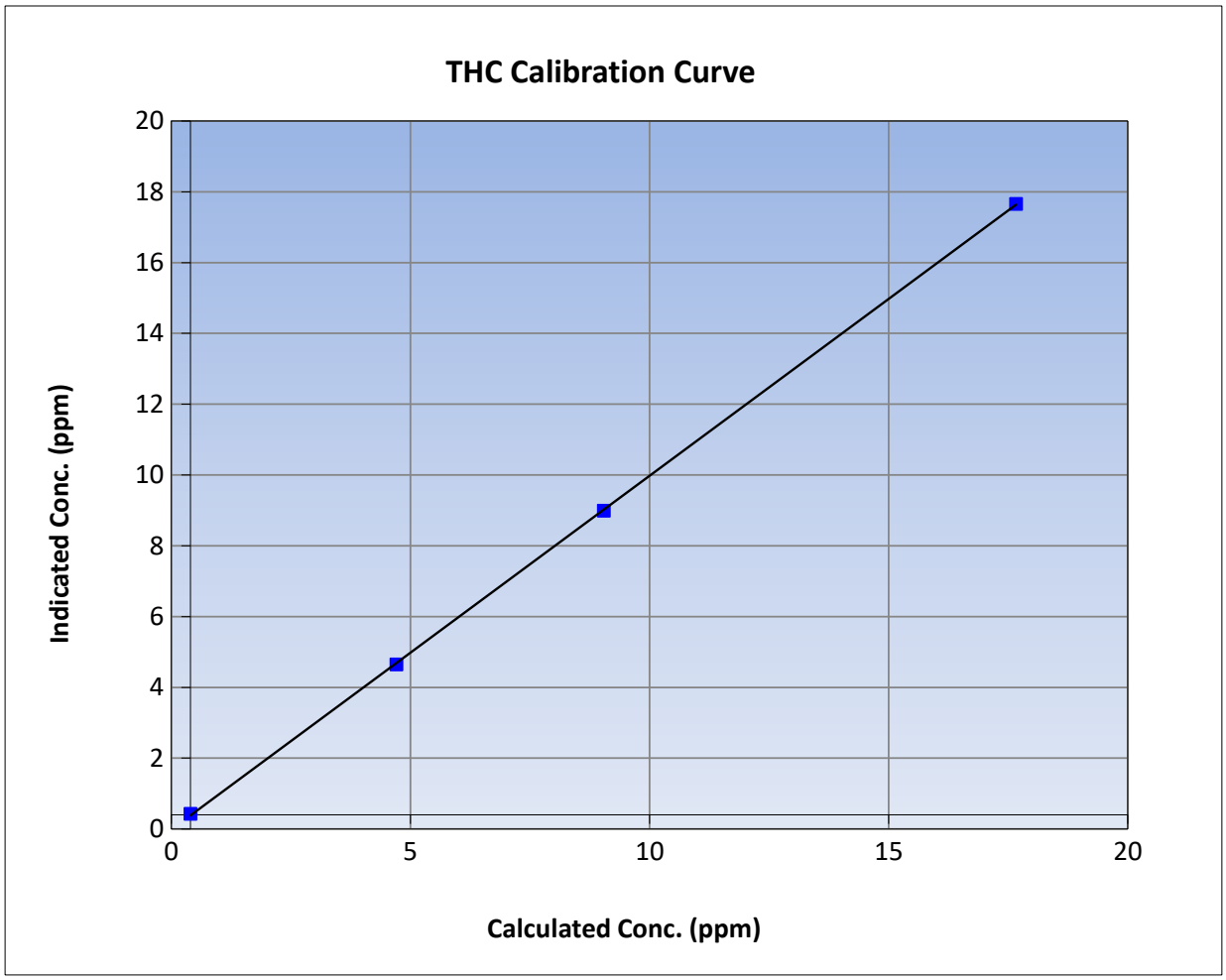
### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 6, 2023 |
| Station Name: | Kirby South | Station Number: | AMS507 |
| Start Time (MST): | 12:37 | End Time (MST): | 15:44 |
| Analyzer make: | Thermo 51i | Analyzer serial #: | 1182340005 |

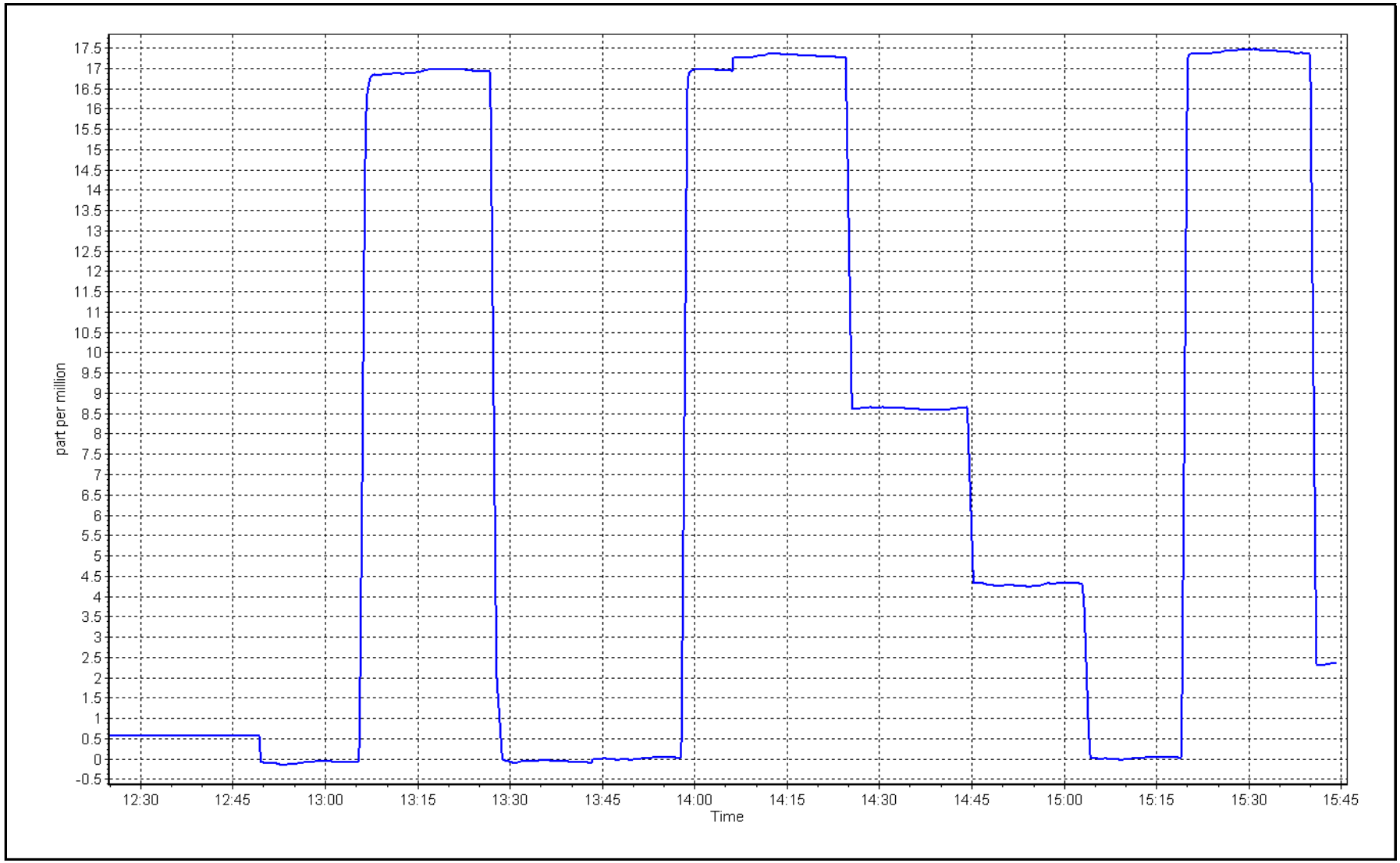
### Calibration Data

| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---|---|---|
| 0.00 | 0.03 | ---- |
| 17.26 | 17.26 | 1.0002 |
| 8.64 | 8.59 | 1.0062 |
| 4.31 | 4.25 | 1.0135 |
| | | |

| Statistical Evaluation | | *Limits* |
|---|---|---|
| Correlation Coefficient | 0.999970 | *≥0.995* |
| Slope | 0.999381 | *0.90 - 1.10* |
| Intercept | -0.016800 | *+/-1.5* |



**THC Calibration Plot** Date: August 3, 2023 Location: Kirby South



# Wood Buffalo Environmental Association

## $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Station Name: | Kirby South | Station number: | AMS507 |
| Calibration Date: | August 3, 2023 | Last Cal Date: | July 4, 2023 |
| Start time (MST): | 7:36 | End time (MST): | 12:35 |
| Reason: | Routine | | |

### Calibration Standards

| | | | | | |
|---|---|---|---|---|---|
| NO Gas Cylinder #: | | T34ULGL | Cal Gas Expiry Date: | March 8, 2025 | |
| NOX Cal Gas Conc: | 49.39 | ppm | NO Cal Gas Conc: | 49.02 | ppm |
| Removed Cylinder #: | | NA | Removed Gas Exp Date: | NA | |
| Removed Gas NOX Conc: | 49.39 | ppm | Removed Gas NO Conc: | 49.02 | ppm |
| NOX gas Diff: | | | NO gas Diff: | | |
| Calibrator Model: | API T700 | | Serial Number: | 3804 | |
| ZAG make/model: | API 701H | | Serial Number: | 880 | |

### Analyzer Information

| | | | |
|---|---|---|---|
| Analyzer make: | Thermo 42iQ | Analyzer serial #: | 1182340006 |
| NOX Range (ppb): | 0 - 1000 ppb | | |

| | ***Start*** | ***Finish*** | | ***Start*** | ***Finish*** |
|---|---|---|---|---|---|
| NO coeff or slope: | 1.429 | 1.429 | NO bkgnd or offset: | 1.9 | 1.9 |
| NOX coeff or slope: | 0.992 | 0.992 | NOX bkgnd or offset: | 2.0 | 2.0 |
| NO2 coeff or slope: | 1.000 | 1.000 | Reaction cell Press: | 162.66 | 160.75 |

### Calibration Statistics

| | ***Start*** | ***Finish*** |
|---|---|---|
| $NO_X$ Cal Slope: | 1.001602 | 1.006090 |
| $NO_X$ Cal Offset: | -2.351758 | -4.471991 |
| NO Cal Slope: | 1.003048 | 1.005987 |
| NO Cal Offset: | -3.253489 | -5.373912 |
| $NO_2$ Cal Slope: | 1.006879 | 1.007635 |
| $NO_2$ Cal Offset: | 1.400873 | 1.168421 |

# Wood Buffalo Environmental Association

# $NO_X$ \ NO \ $NO_2$ Calibration Report

Version-04-2020

## Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05* | NO Correction factor (Cc/Ic) *Limit = 0.95-1.05* |
|---|---|---|---|---|---|---|---|---|---|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.8 | -0.8 | 0.0 | ---- | ---- |
| as found span | 4919 | 81.0 | 800.1 | 794.1 | 6.0 | 767.8 | 763.7 | 4.1 | 1.0421 | 1.0398 |
| as found 2nd | | | | | | | | | | |
| as found 3rd | | | | | | | | | | |
| new cyl resp | | | | | | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| high point | 4919 | 81.0 | 800.1 | 794.1 | 6.0 | 803.0 | 796.6 | 6.2 | 0.9964 | 0.9969 |
| second point | 4960 | 40.5 | 400.0 | 397.0 | 3.0 | 394.9 | 390.0 | 4.9 | 1.0130 | 1.0180 |
| third point | 4980 | 20.2 | 199.5 | 198.0 | 1.5 | 192.5 | 189.5 | 3.0 | 1.0365 | 1.0450 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | 0.0 | ---- | ---- |
| as left span | 4919 | 81.0 | 800.1 | 399.4 | 400.7 | 796.2 | 396.1 | 400.1 | 1.0049 | 1.0084 |
| | | | | | | | | Average Correction Factor | 1.0153 | 1.0200 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Corrected As found | $NO_X$ = 768.6 ppb | NO = 764.5 ppb | * = > +/-5% change initiates investigation | *Percent Change | $NO_X$ = -4.0% |
| Previous Response | $NO_X$ = 799.0 ppb | NO = 793.3 ppb | | *Percent Change | NO = -3.8% |
| Baseline Corr 2nd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | $NO_X$ $r^2$: | Nx Sl: | Nx Int: |
| Baseline Corr 3rd pt | $NO_X$ = NA ppb | NO = NA ppb | As found | NO $r^2$: | NO Sl: | NO Int: |
| | | | As found | $NO_2$ $r^2$: | NO2 Sl: | $NO_2$ Int: |

## GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO Reference concentration (ppb) | Indicated NO Drop concentration (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NO2 concentration (ppb) (Ic) | NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10* | Converter Efficiency *Calibration Limit = 96-104%* |
|---|---|---|---|---|---|---|
| as found GPT zero | | | | | | |
| as found GPT point (400 ppb NO2) | | | | | | |
| as found GPT point (200 ppb NO2) | | | | | | |
| as found GPT point (100 ppb NO2) | | | | | | |
| 1st GPT point (400 ppb O3) | 792.4 | 397.7 | 400.7 | 403.9 | 0.9921 | 100.8% |
| 2nd GPT point (200 ppb O3) | 792.4 | 606.0 | 192.4 | 197.1 | 0.9761 | 102.4% |
| 3rd GPT point (100 ppb O3) | 792.4 | 704.6 | 93.8 | 95.8 | 0.9791 | 102.1% |
| | | | | Average Correction Factor | 0.9824 | 101.8% |

Notes: Changed sample inlet filter after as founds. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

# Wood Buffalo Environmental Association

## $NO_X$ Calibration Summary

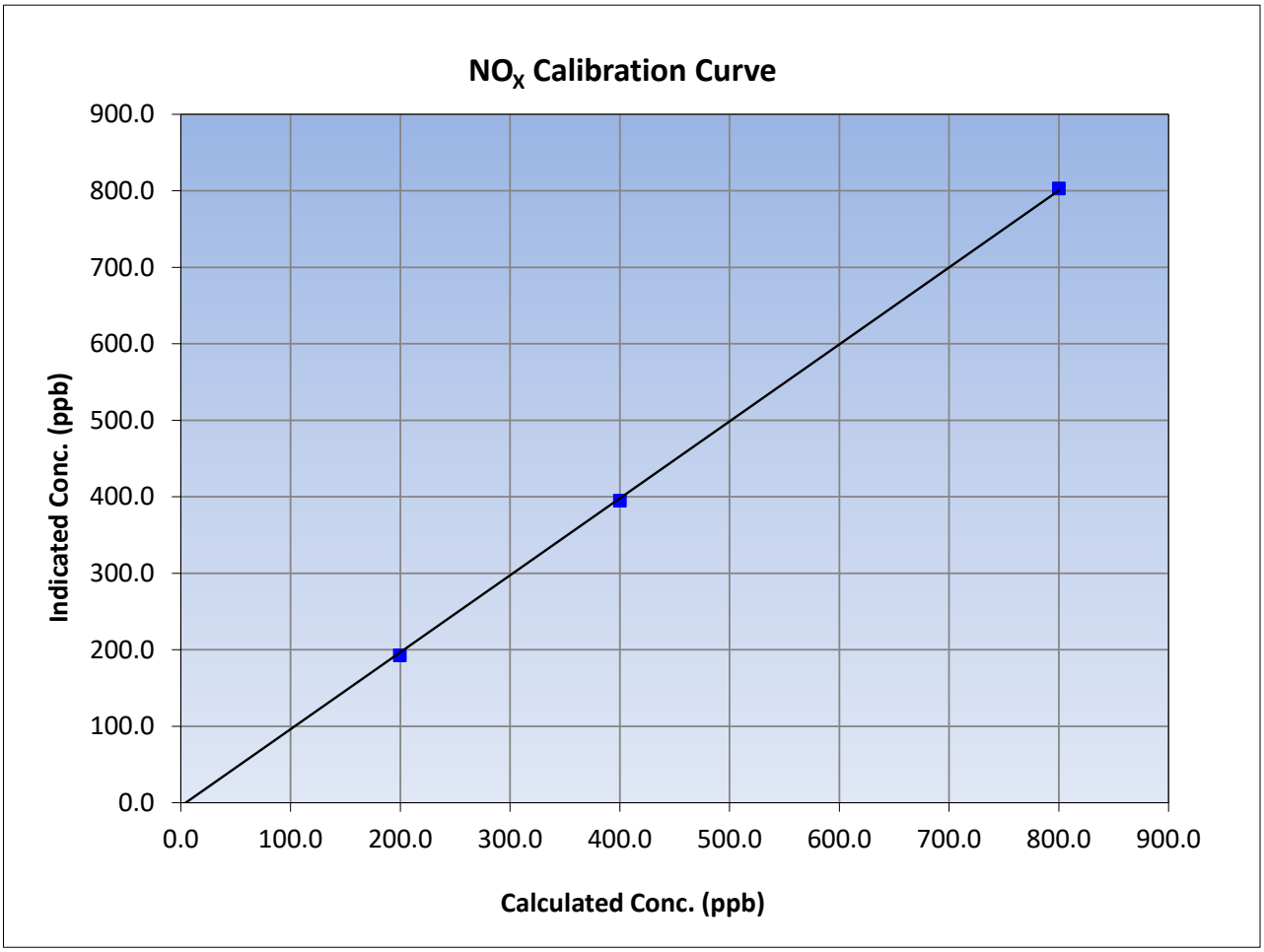
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | Kirby South | Station Number: | AMS507 |
| Start Time (MST): | 7:36 | End Time (MST): | 12:35 |
| Analyzer make: | Thermo 42iQ | Analyzer serial #: | 1182340006 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999862 | *≥0.995* |
| 800.1 | 803.0 | 0.9964 | | | |
| 400.0 | 394.9 | 1.0130 | Slope | 1.006090 | *0.90 - 1.10* |
| 199.5 | 192.5 | 1.0365 | | | |
| | | | Intercept | -4.471991 | *+/-20* |



# Wood Buffalo Environmental Association

## NO Calibration Summary

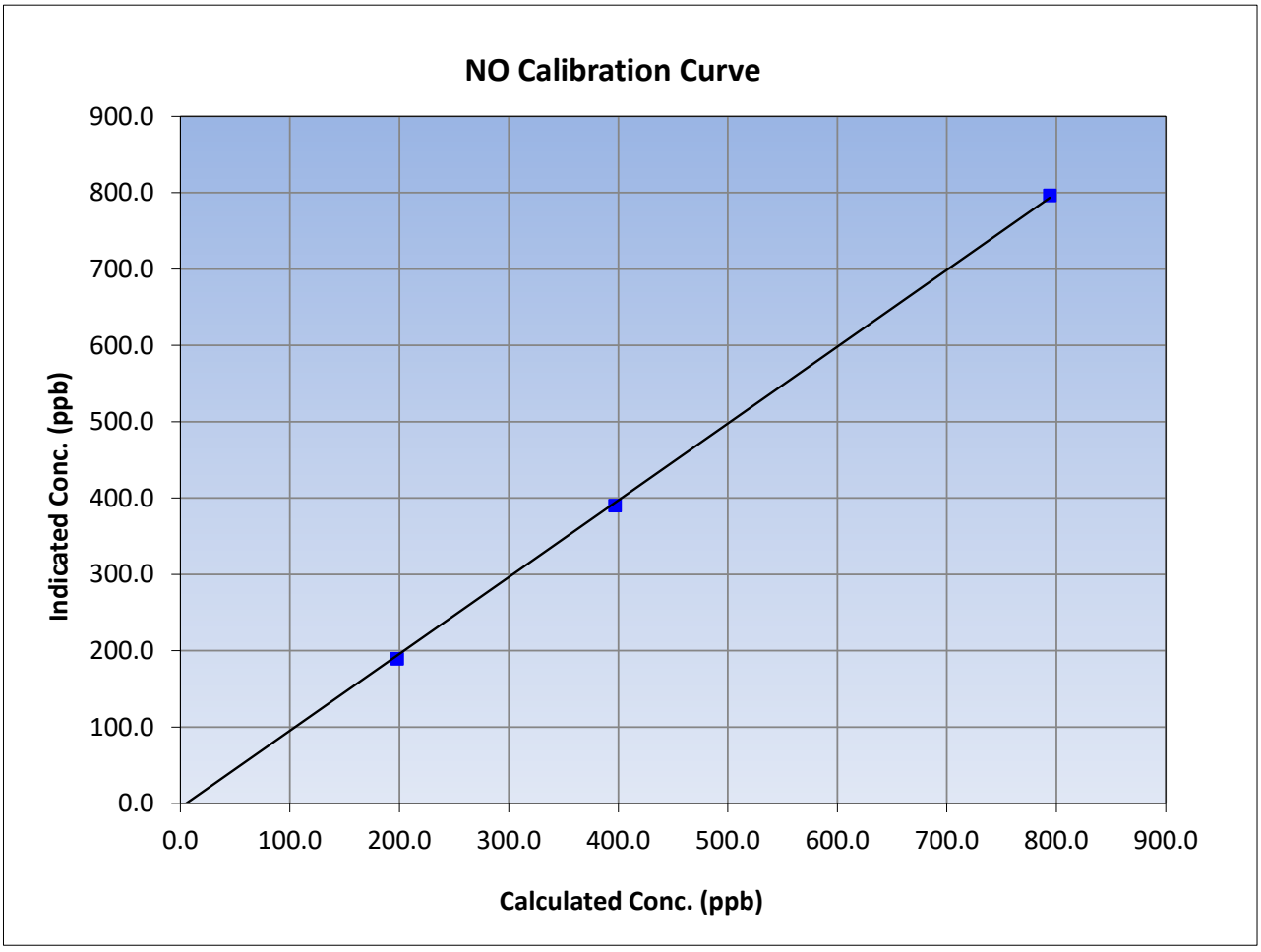
Version-04-2020

### Station Information

| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | Kirby South | Station Number: | AMS507 |
| Start Time (MST): | 7:36 | End Time (MST): | 12:35 |
| Analyzer make: | Thermo 42iQ | Analyzer serial #: | 1182340006 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999792 | *≥0.995* |
| 794.1 | 796.6 | 0.9969 | | | |
| 397.0 | 390.0 | 1.0180 | Slope | 1.005987 | *0.90 - 1.10* |
| 198.0 | 189.5 | 1.0450 | | | |
| | | | Intercept | -5.373912 | *+/-20* |



# Wood Buffalo Environmental Association

## $NO_2$ Calibration Summary

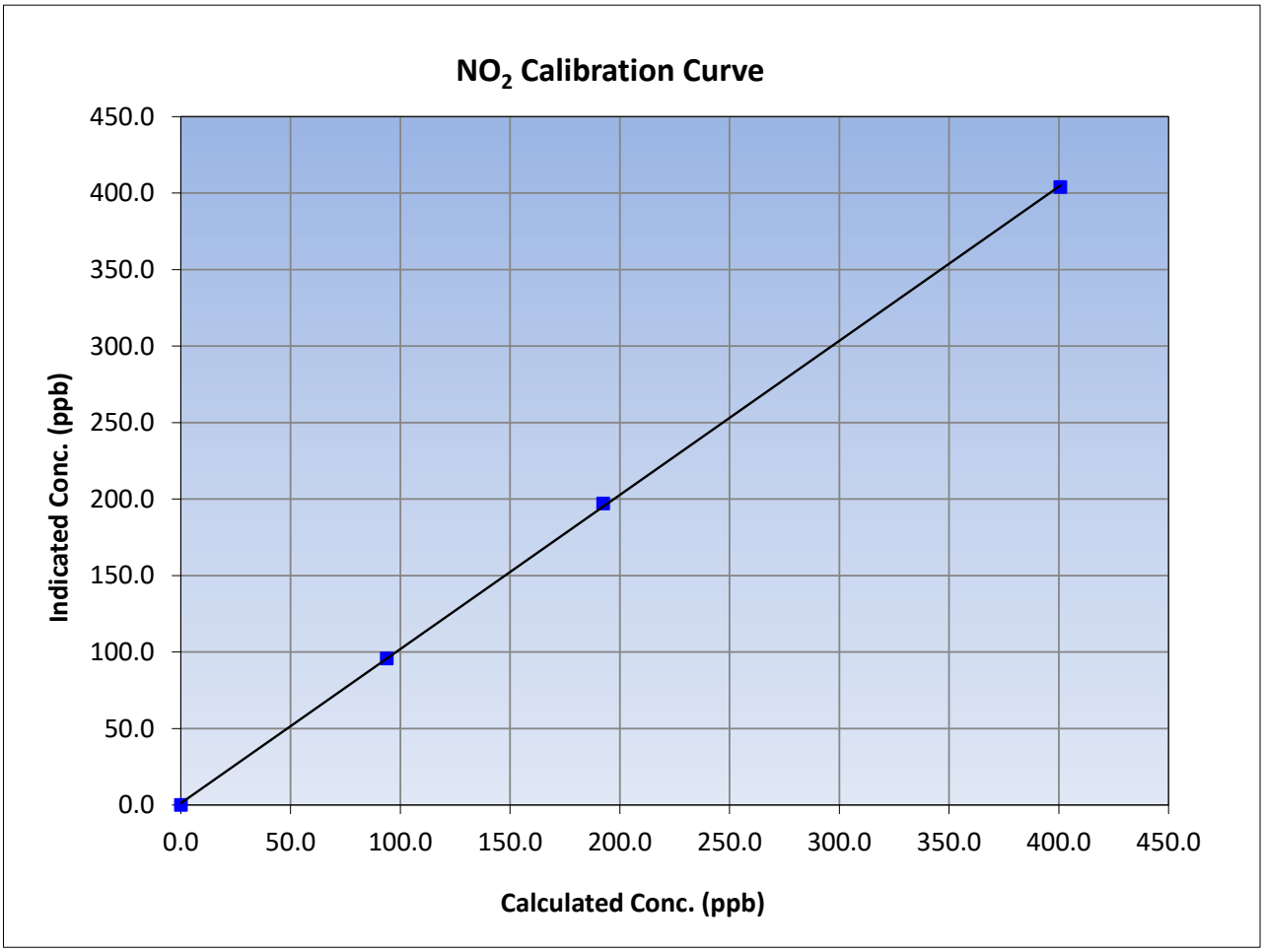
Version-04-2020

### Station Information

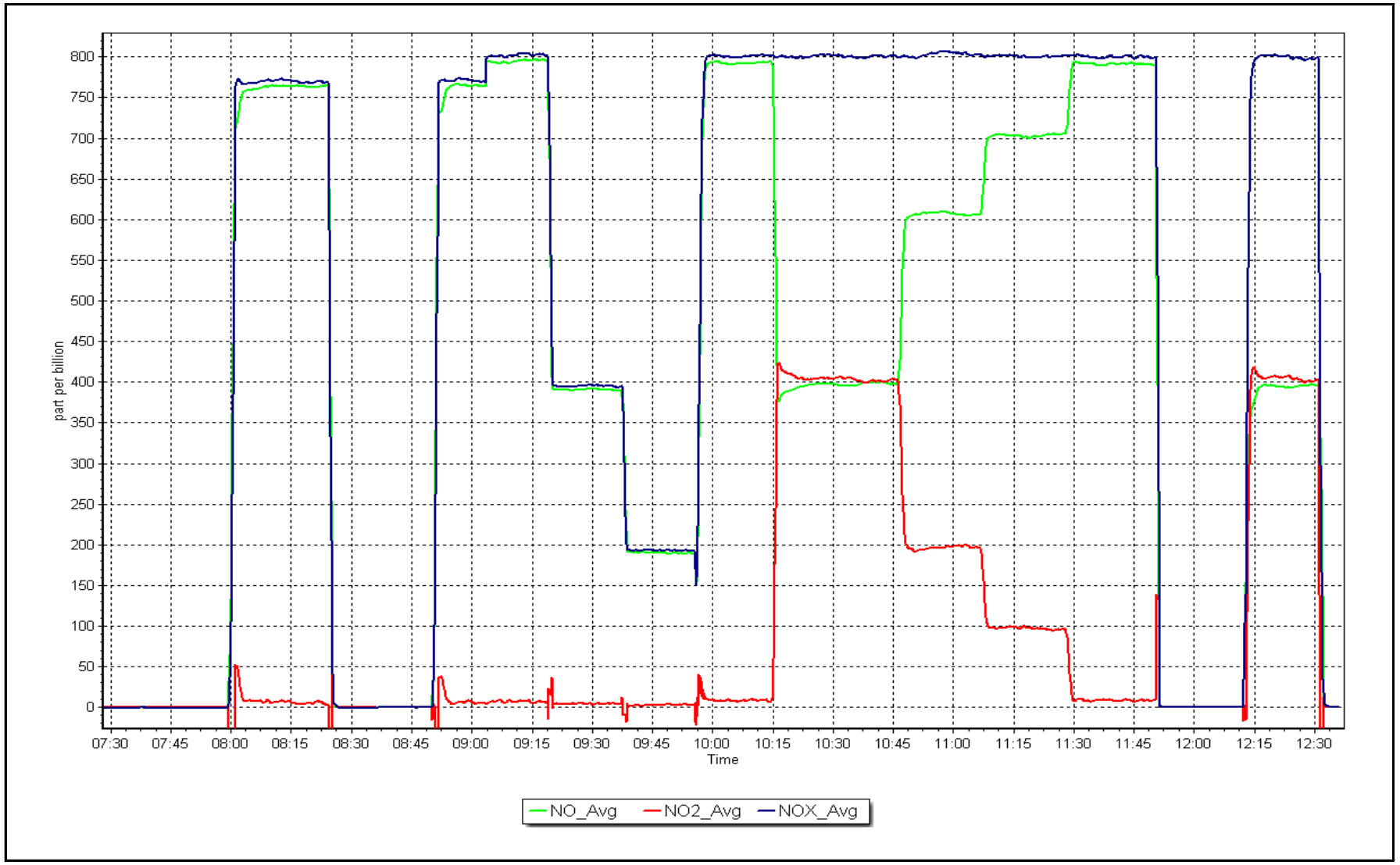
| | | | |
|---|---|---|---|
| Calibration Date: | August 3, 2023 | Previous Calibration: | July 4, 2023 |
| Station Name: | Kirby South | Station Number: | AMS507 |
| Start Time (MST): | 7:36 | End Time (MST): | 12:35 |
| Analyzer make: | Thermo 42iQ | Analyzer serial #: | 1182340006 |

### Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | *Limits* |
|---|---|---|---|---|---|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999925 | *≥0.995* |
| 400.7 | 403.9 | 0.9921 | | | |
| 192.4 | 197.1 | 0.9761 | Slope | 1.007635 | *0.90 - 1.10* |
| 93.8 | 95.8 | 0.9791 | | | |
| | | | Intercept | 1.168421 | *+/-20* |



**$NO_X$ Calibration Plot** Date: August 3, 2023 Location: Kirby South



End of Report