

**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
MONTHLY AMBIENT AIR QUALITY MONITORING REPORT
April 2023
REPORT HISTORY**

Original report release date: May 31, 2023

Revised report release date: August 30, 2023

Revision 1 – Submission of H₂S data and Revision of TRS data at Patricia McInnes.

The Patricia McInnes air monitoring station (AMS06) collected H₂S data from January 3, 2023, to June 12, 2023, but it was reported as TRS. On August 30, 2023, the data was resubmitted as H₂S to the Electronic Transfer System (ETS) and the TRS data was revised. The monthly report cover letter, station summary, network summary, and calibration report contained within have been revised to reflect the change.



**WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION**

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Wood Buffalo Environmental Association

APRIL 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

August 30, 2023

Revision 01

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 APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	April 24, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:50	End time (MST):	15:48
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.19	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC486642			
Removed Cal Gas Conc:	49.19	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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.000943	0.998615	Backgd or Offset:	19.4	19.2
Calibration intercept:	-0.132808	0.106886	Coeff or Slope:	0.897	0.889

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.3	----
as found span	4918	81.3	799.9	804.4	0.994
as found 2nd point	4959	40.7	400.4	400.7	0.999
as found 3rd point	4979	20.3	199.7	199.3	1.002
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4918	81.3	799.9	799.3	1.001
second point	4959	40.7	400.4	399.1	1.003
third point	4979	20.3	199.7	199.9	0.999
as left zero	5000	0.0	0.0	0.6	----
as left span	4918	81.3	799.9	799.9	1.000
Average Correction Factor					1.001

Baseline Corr As found:	804.10	Previous response	800.56	*% change	0.4%
Baseline Corr 2nd AF pt:	400.40	AF Slope:	1.005658	AF Intercept:	-0.833202
Baseline Corr 3rd AF pt:	199.00	AF Correlation:	0.999989		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

SO₂ Calibration Summary

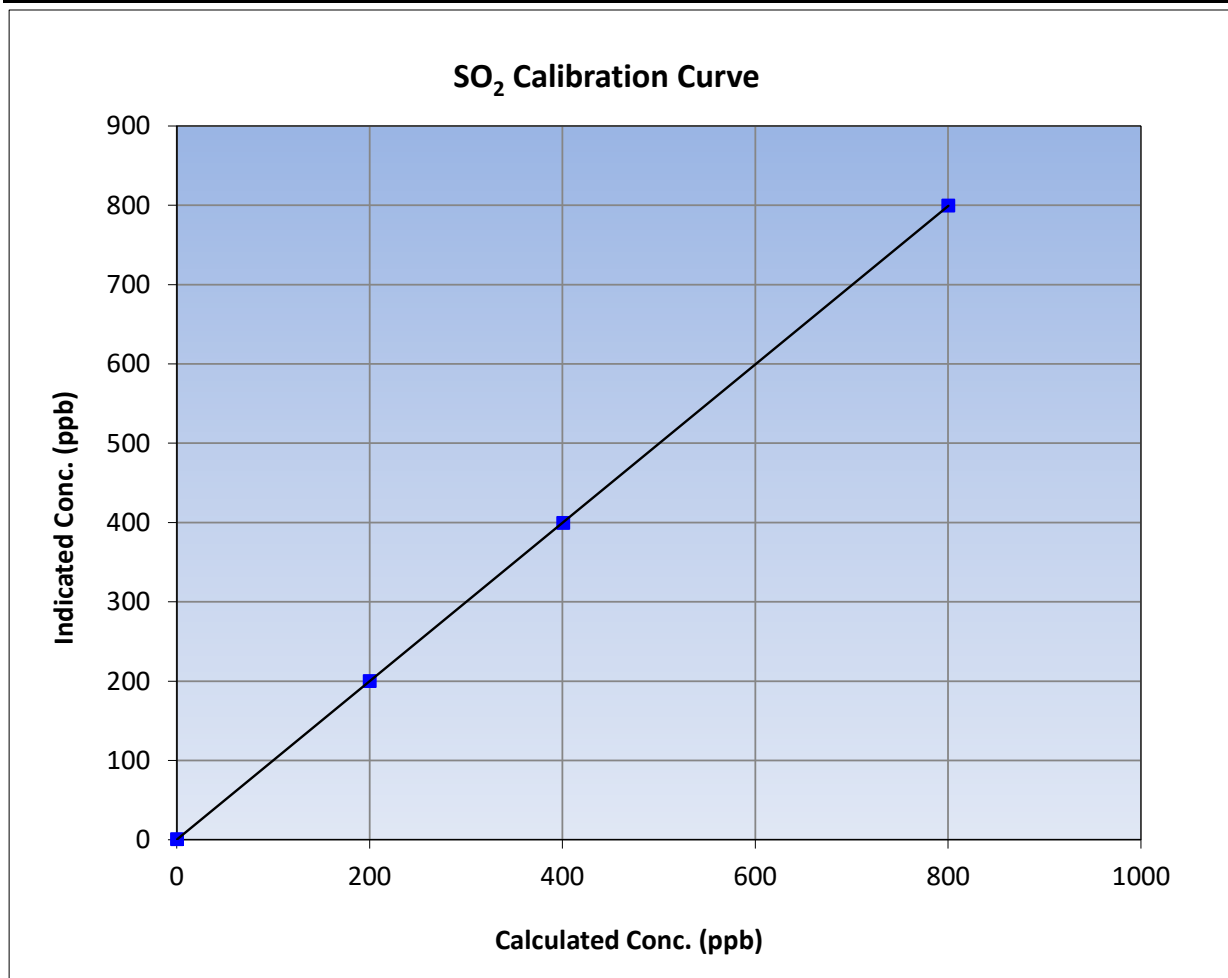
Version-01-2020

Station Information

Calibration Date:	April 24, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:50	End Time (MST):	15:48
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

Calibration Data

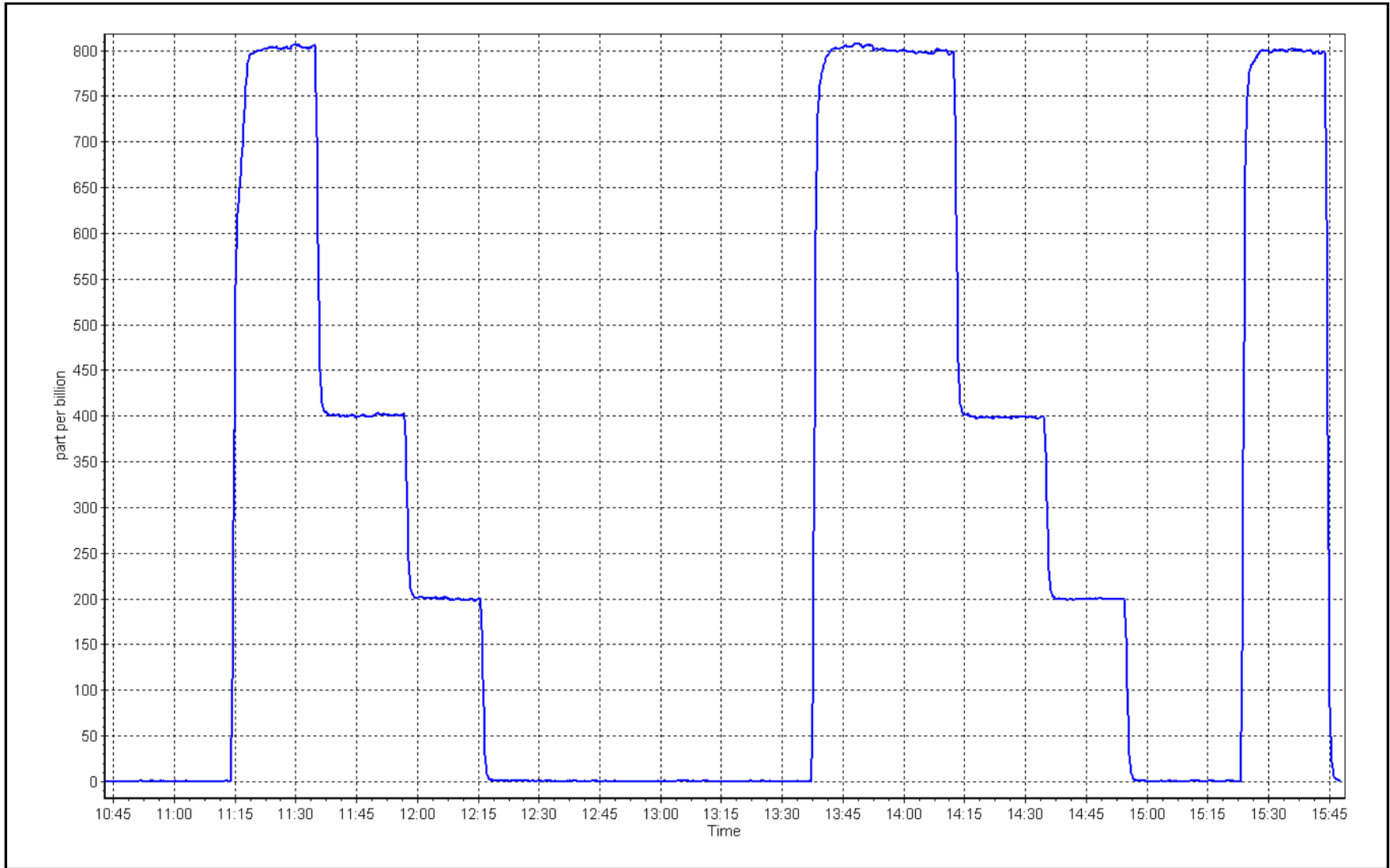
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999997	≥0.995
799.9	799.3	1.0008			
400.4	399.1	1.0033	Slope	0.998615	0.90 - 1.10
199.7	199.9	0.9992			
			Intercept	0.106886	+/-30



SO2 Calibration Plot

Date: April 24, 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: April 21, 2023 Last Cal Date: March 13, 2023
 Start time (MST): 9:26 End time (MST): 15:04
 Reason: Maintenance

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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.000364	0.999078	Backgd or Offset:	2.27	2.26
Calibration intercept:	0.439997	0.160000	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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.4	80.0	80.1	1.000
as found 2nd point	4960	39.2	40.0	40.1	1.000
as found 3rd point	4980	19.6	20.0	20.0	1.005
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	80.1	0.999
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	0.2	----
as left span	4921	78.4	80.0	79.2	1.010
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: 80.0 Prev response: 80.46 *% change: -0.6%
 Baseline Corr 2nd AF pt: 40.0 AF Slope: 1.000507 AF Intercept: 0.059999
 Baseline Corr 3rd AF pt: 19.9 AF Correlation: 0.999998

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

TRS Calibration Summary

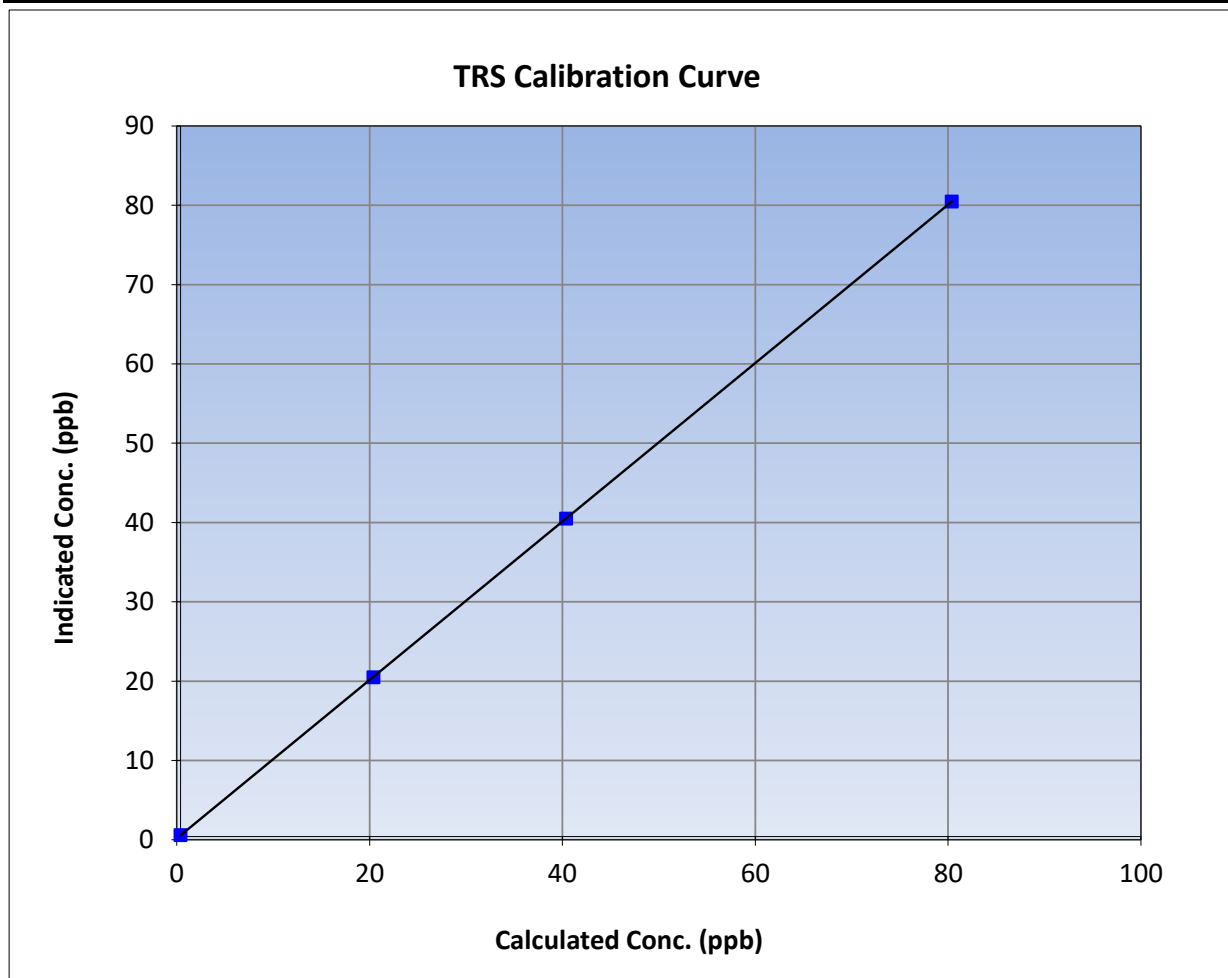
Version-11-2021

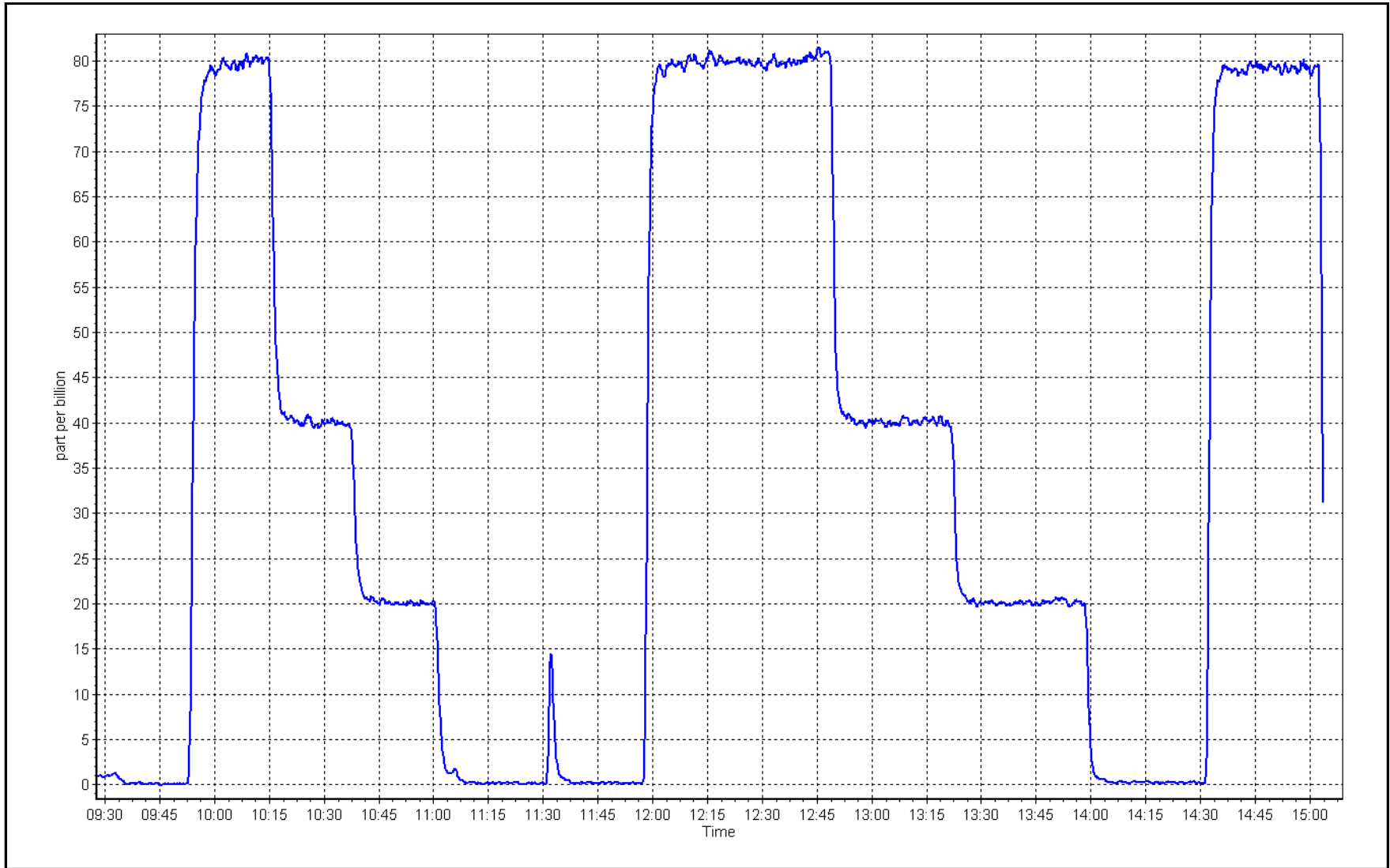
Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:26	End Time (MST):	15:04
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999999	≥0.995
80.0	80.1	0.9987			
40.0	40.1	0.9975	Slope	0.999078	0.90 - 1.10
20.0	20.1	0.9949			
			Intercept	0.160000	+/-3







Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Bertha Ganter-Fort McKay Station number: AMS01
 Calibration Date: April 21, 2023 Last Cal Date: March 13, 2023
 Start time (MST): 9:26 End time (MST): 15:04
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.996518	0.993089	Backgd or Offset: 1.94	1.90
Calibration intercept:	0.401597	0.521594	Coeff or Slope: 1.014	1.001

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	78.4	80.0	81.7	0.979
as found 2nd point	4960	39.2	40.0	41.2	0.971
as found 3rd point	4980	19.6	20.0	20.4	0.980
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	78.4	80.0	79.9	1.001
second point	4961	39.2	40.0	40.3	0.992
third point	4980	19.6	20.0	20.5	0.975
as left zero	5000	0.0	0.0	0.7	----
as left span	4921	78.4	80.0	78.7	1.016
SO2 Scrubber Check	4919	81.3	813.0	-0.2	----
Date of last scrubber change:	March 21, 2022			Ave Corr Factor	0.990
Date of last converter efficiency test:	efficiency				

Baseline Corr As found:	81.7	Prev response:	80.10	*% change:	2.0%
Baseline Corr 2nd AF pt:	41.2	AF Slope:	1.022138	AF Intercept:	0.059995
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999974		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

H₂S Calibration Summary

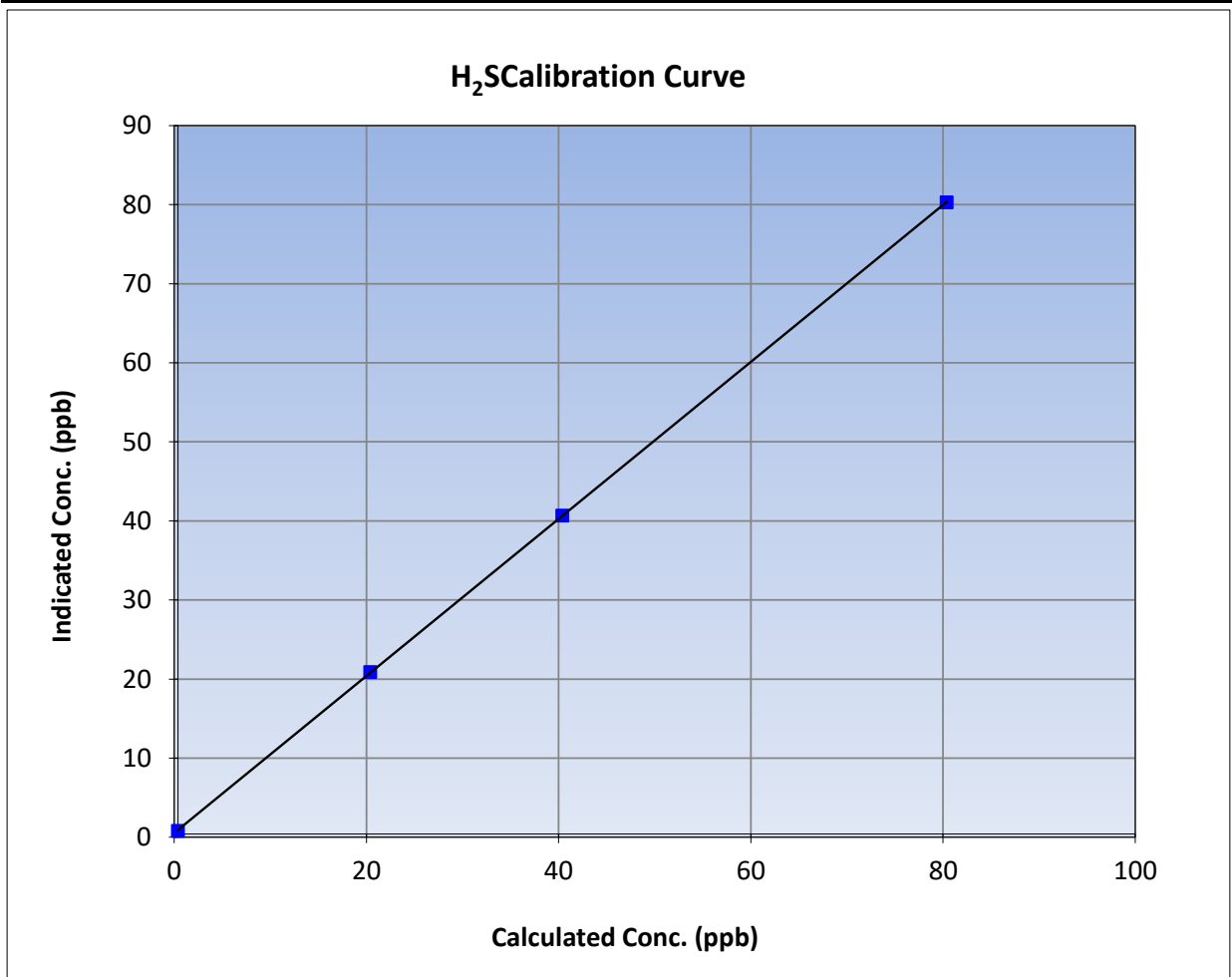
Version-11-2021

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:26	End Time (MST):	15:04
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

Calibration Data

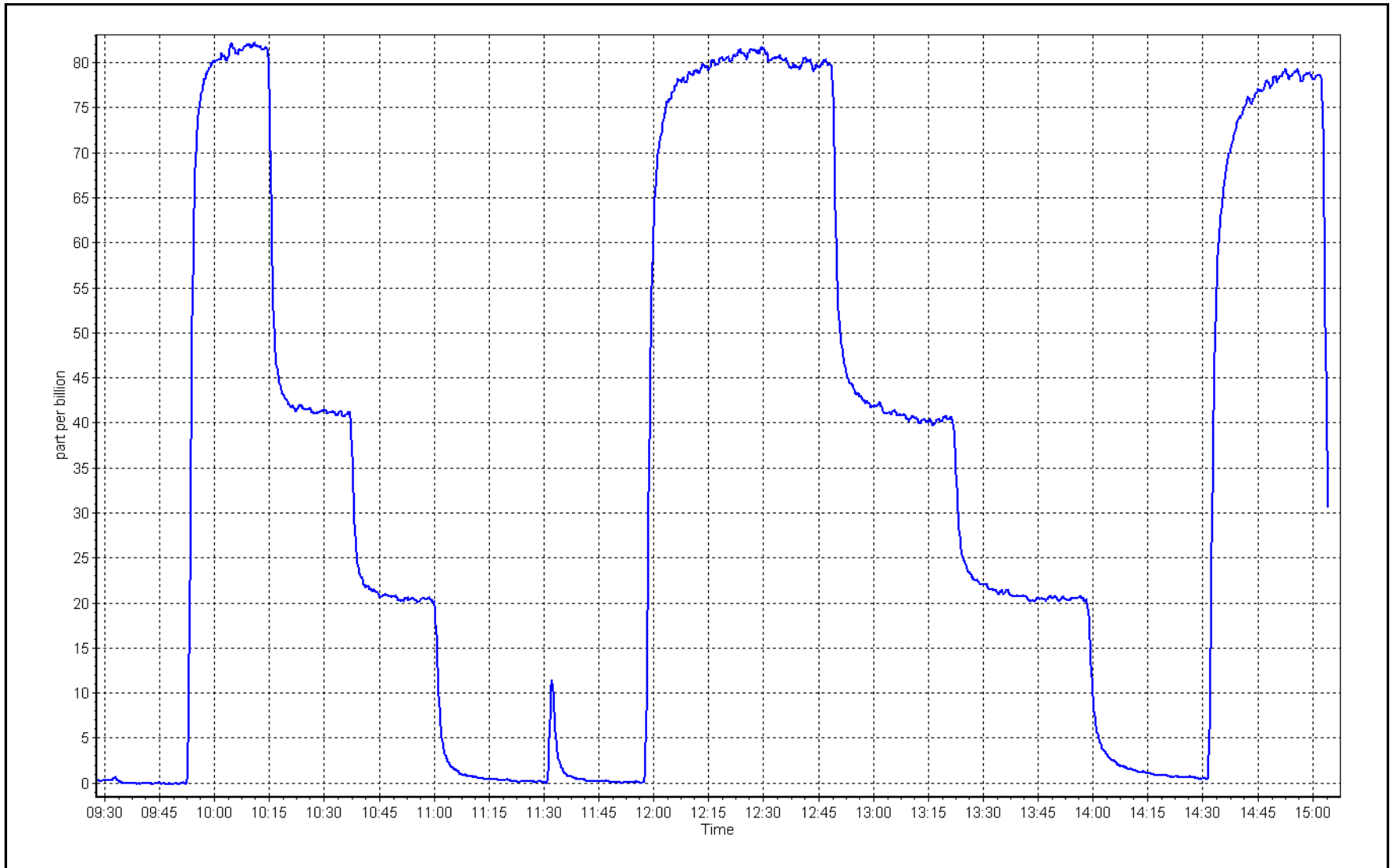
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.4	----	Correlation Coefficient	0.999989	≥0.995
80.0	79.9	1.0012			
40.0	40.3	0.9923	Slope	0.993089	0.90 - 1.10
20.0	20.5	0.9755			
			Intercept	0.521594	+/-3



H₂S Calibration Plot

Date: April 21, 2023

Location: Bertha Ganter-Fort McKay





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	April 24, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:50	End time (MST):	15:48
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:	CC486642	Cal Gas Expiry Date:	February 23, 2025
CH ₄ Cal Gas Conc.	497.7 ppm	CH ₄ Equiv Conc.	1063.1 ppm
C ₃ H ₈ Cal Gas Conc.	205.6 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	497.7 ppm	CH ₄ Equiv Conc.	1063.1 ppm
Removed C ₃ H ₈ Conc.	205.6 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	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	2.64E-04	2.78E-04	NMHC SP Ratio:	5.52E-05
CH ₄ Retention time:	14.4	14.4	NMHC Peak Area:	166551
				151639

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	17.29	16.12	1.072
as found 2nd point	4959	40.7	8.65	7.97	1.085
as found 3rd point	4980	20.3	4.32	3.98	1.084
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.29	17.37	0.995
second point	4959	40.7	8.65	8.63	1.003
third point	4980	20.3	4.32	4.32	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.29	17.36	0.996
Average Correction Factor					0.999
Baseline Corr AF:	16.12	Prev response	17.31	*% change	-7.4%
Baseline Corr 2nd AF:	8.0	AF Slope:	0.932699	AF Intercept:	-0.036523
Baseline Corr 3rd AF:	4.0	AF Correlation:	0.999956	* => +/-5% change initiates investigation	



Wood Buffalo Environmental Association

THC / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.19	8.47	1.086
as found 2nd point	4959	40.7	4.60	4.21	1.093
as found 3rd point	4980	20.3	2.30	2.11	1.087
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4918	81.3	9.19	9.25	0.994
second point	4959	40.7	4.60	4.63	0.995
third point	4980	20.3	2.30	2.33	0.984
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.19	9.27	0.992
Average Correction Factor					0.991
Baseline Corr AF:	8.47	Prev response	9.21	*% change	-8.8%
Baseline Corr 2nd AF:	4.2	AF Slope:	0.920790	AF Intercept:	-0.006752
Baseline Corr 3rd AF:	2.1	AF Correlation:	0.999984	* = > +/-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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	7.65	1.058
as found 2nd point	4959	40.7	4.05	3.76	1.076
as found 3rd point	4980	20.3	2.02	1.87	1.081
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.12	0.996
second point	4959	40.7	4.05	4.00	1.012
third point	4980	20.3	2.02	1.99	1.015
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.08	1.001
Average Correction Factor					1.008
Baseline Corr AF:	7.65	Prev response	8.09	*% change	-5.8%
Baseline Corr 2nd AF:	3.76	AF Slope:	0.946229	AF Intercept:	-0.029771
Baseline Corr 3rd AF:	1.87	AF Correlation:	0.999901	* = > +/-5% change initiates investigation	

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope:	1.001736	1.004703
THC Cal Offset:	-0.010696	-0.018891
CH ₄ Cal Slope:	1.001692	1.004303
CH ₄ Cal Offset:	-0.013161	-0.027159
NMHC Cal Slope:	1.001763	1.005180
NMHC Cal Offset:	0.002265	0.008268

Notes: Changed out the inlet filter and sample pump after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

THC Calibration Summary

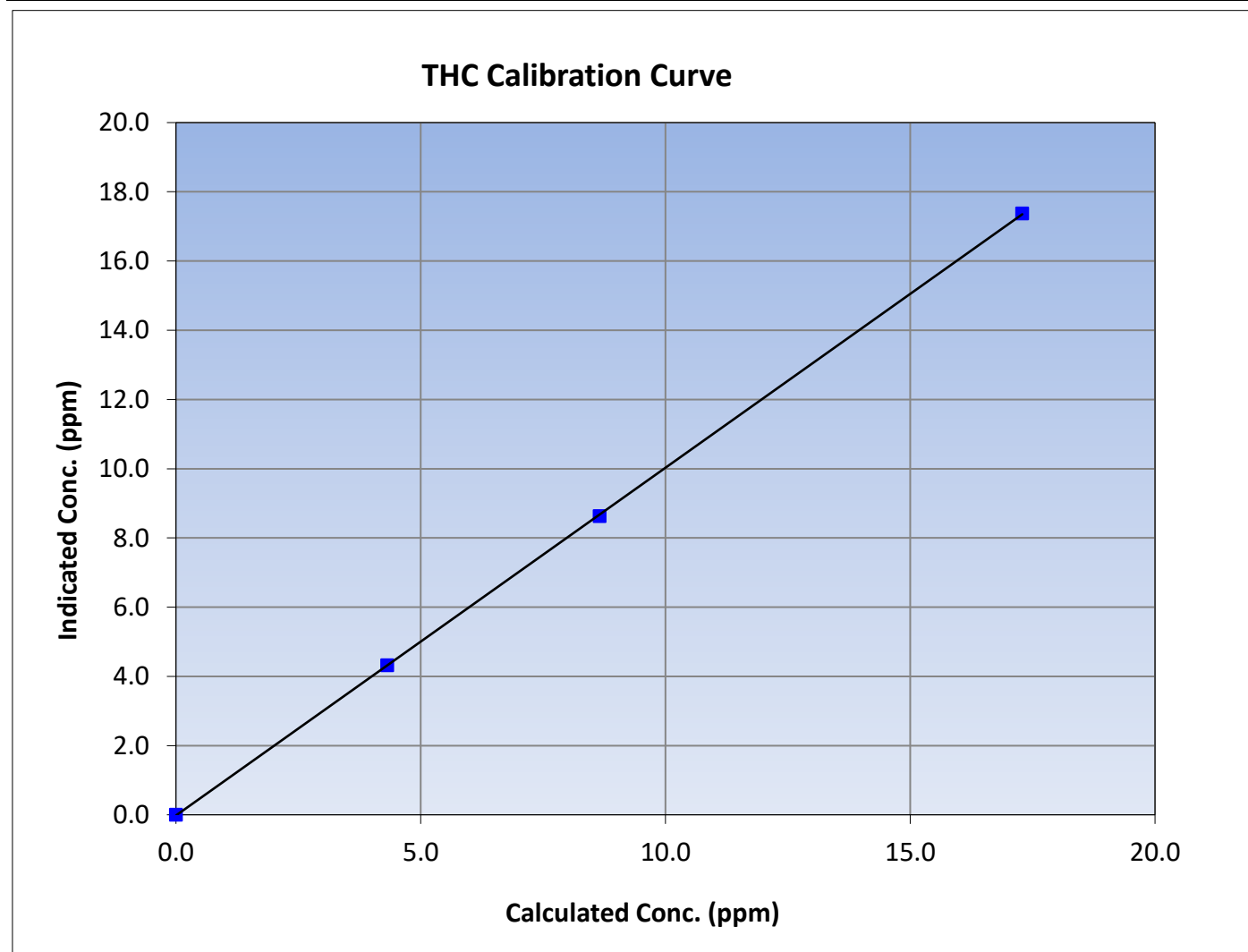
Version-01-2020

Station Information

Calibration Date:	April 24, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:50	End Time (MST):	15:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999981	≥ 0.995			
17.29	17.37	0.9951						
8.65	8.63	1.0030				Slope	1.004703	0.90 - 1.10
4.32	4.32	0.9982						
			Intercept	-0.018891	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

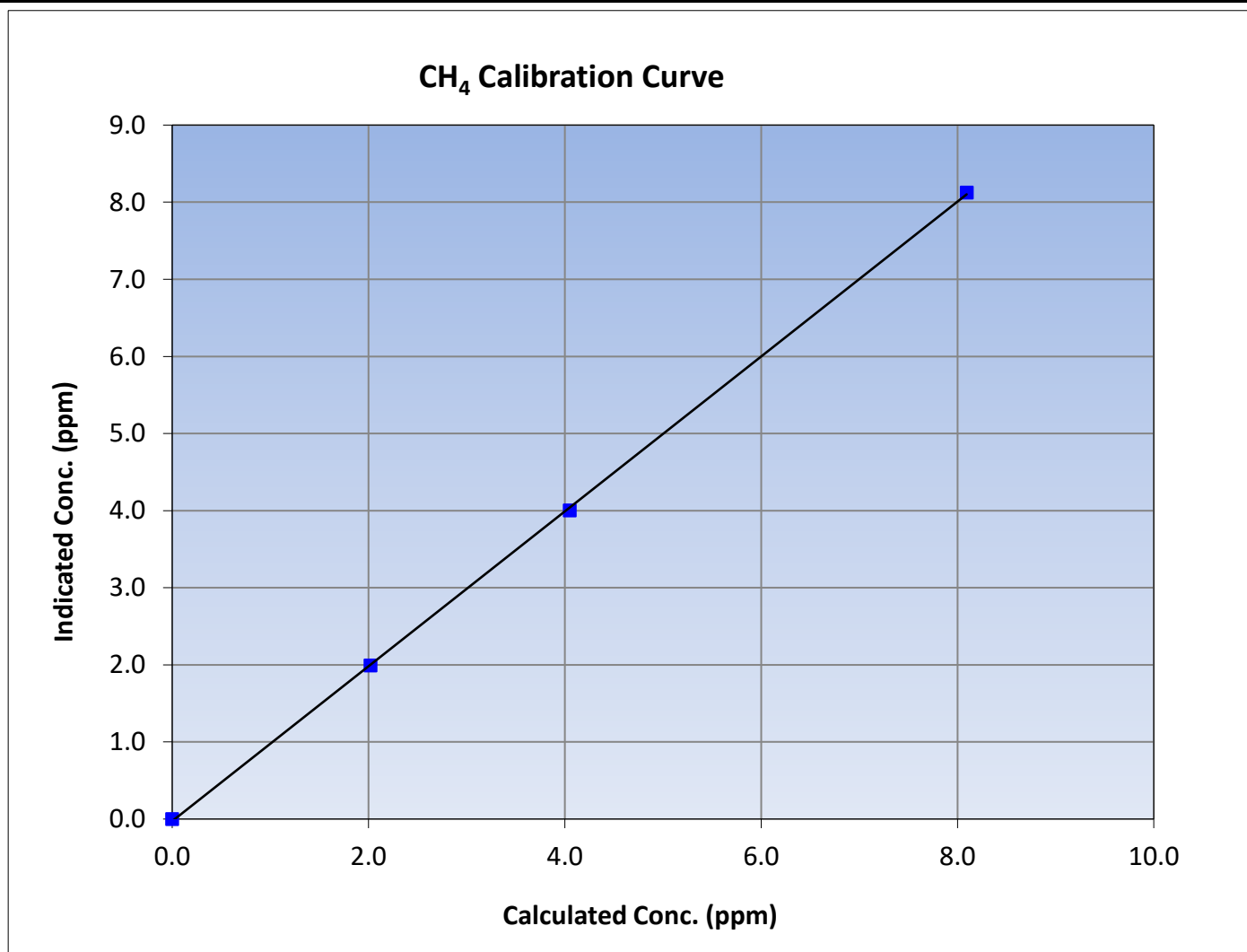
Version-01-2020

Station Information

Calibration Date:	April 24, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:50	End Time (MST):	15:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999924	≥0.995
8.09	8.12	0.9964			
4.05	4.00	1.0118			
2.02	1.99	1.0149			
			Slope	1.004303	0.90 - 1.10
			Intercept	-0.027159	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

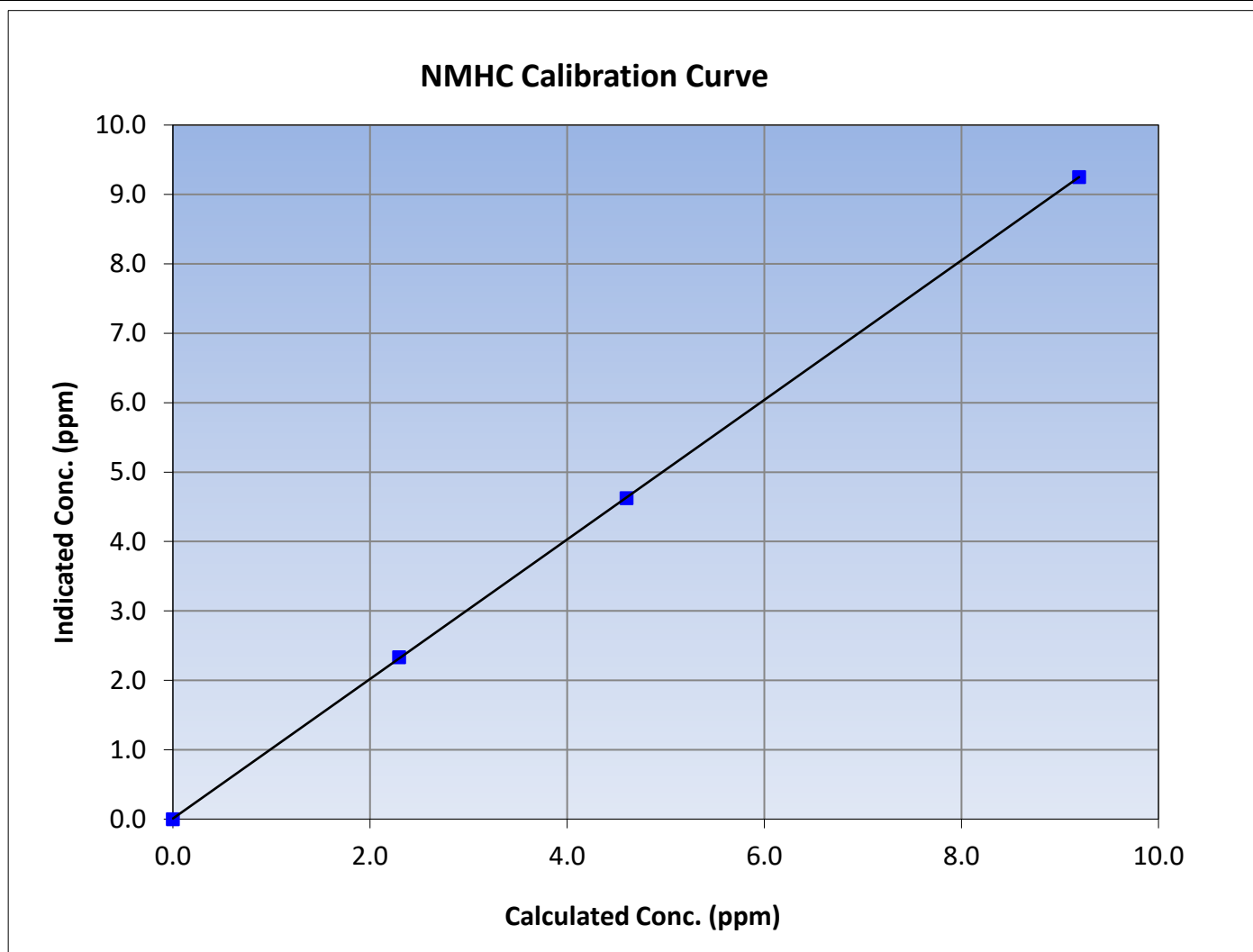
Version-01-2020

Station Information

Calibration Date:	April 24, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:50	End Time (MST):	15:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

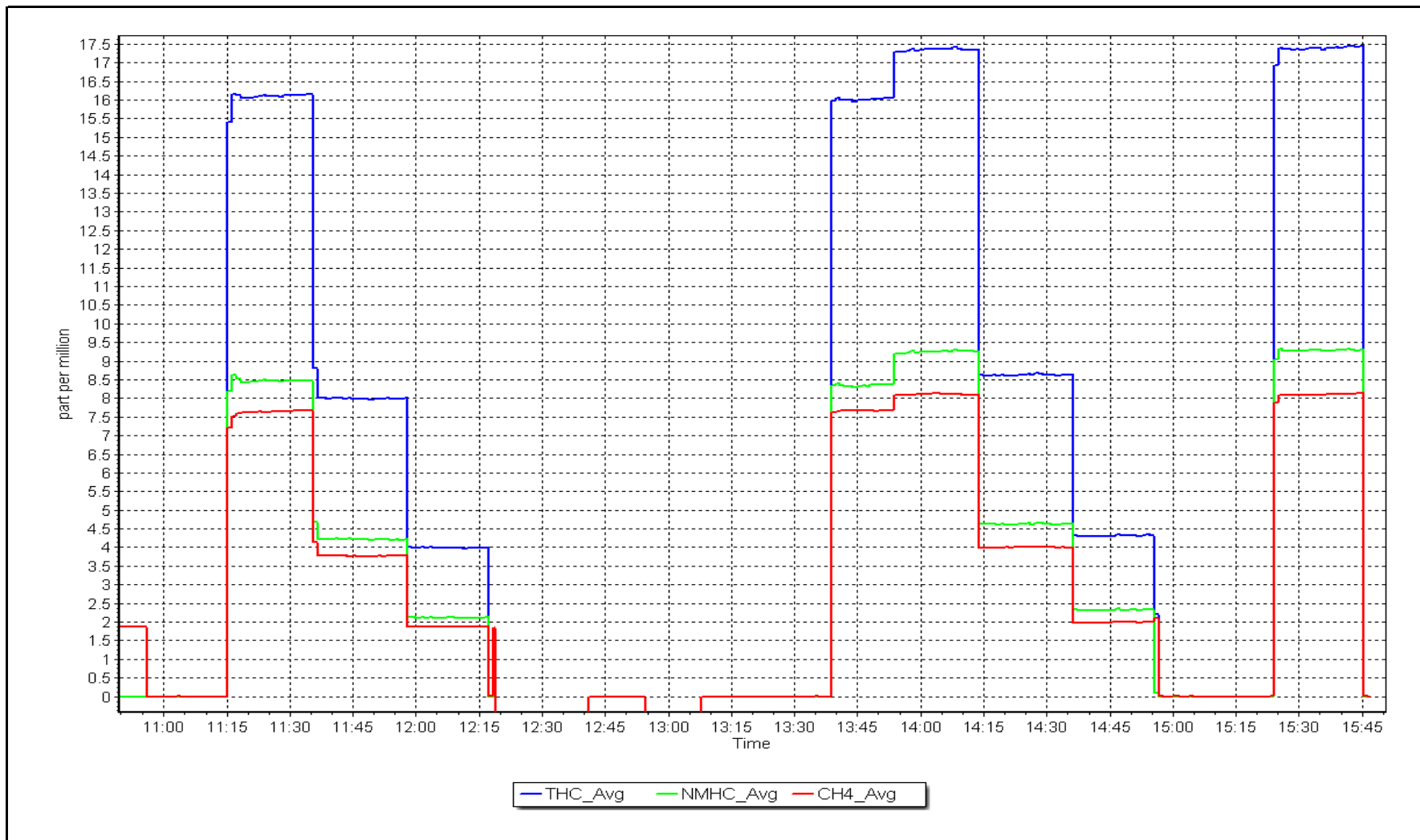
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999990	≥ 0.995
9.19	9.25	0.9939			
4.60	4.63	0.9951			
2.30	2.33	0.9839			
			Slope	1.005180	0.90 - 1.10
			Intercept	0.008268	+/-0.5



NMHC Calibration Plot

Date: April 24, 2023

Location: Bertha Ganter-Fort McKay





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name: Bertha Ganter-Fort McKay Station number: AMS01
 Calibration Date: April 26, 2023 Last Cal Date: April 24, 2023
 Start time (MST): 10:09 End time (MST): 15:09
 Reason: Maintenance Re-calibrating instrument due to drift

Calibration Standards

Gas Cert Reference: CC486642 Cal Gas Expiry Date: February 23, 2025
 CH₄ Cal Gas Conc. 497.7 ppm CH₄ Equiv Conc. 1063.1 ppm
 C₃H₈ Cal Gas Conc. 205.6 ppm
 Removed Gas Cert: NA Removed Gas Expiry: NA
 Removed CH₄ Conc. 497.7 ppm CH₄ Equiv Conc. 1063.1 ppm
 Removed C₃H₈ Conc. 205.6 ppm
 Diff between cyl (CH₄): 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	2.78E-04	2.82E-04	NMHC SP Ratio:	6.06E-05
CH ₄ Retention time:	14.4	14.6	NMHC Peak Area:	151639
				150450

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	17.29	17.12	1.010
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	17.29	17.29	1.000
second point	4959	40.7	8.65	8.59	1.007
third point	4980	20.3	4.32	4.27	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.29	17.30	0.999

Average Correction Factor				1.006
Baseline Corr AF:	17.12	Prev response	17.35	*% change -1.3%
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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.19	9.16	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4918	81.3	9.19	9.21	0.998
second point	4959	40.7	4.60	4.61	0.998
third point	4980	20.3	2.30	2.30	1.000
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.19	9.20	0.999
Average Correction Factor					0.999
Baseline Corr AF:	9.16	Prev response	9.25	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	7.96	1.017
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	8.08	1.002
second point	4959	40.7	4.05	3.98	1.018
third point	4980	20.3	2.02	1.98	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.10	0.999
Average Correction Factor					1.014
Baseline Corr AF:	7.96	Prev response	8.10	*% change	-1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	1.004703	1.000528
THC Cal Offset:	-0.018891	-0.030303
CH ₄ Cal Slope:	1.004303	0.999037
CH ₄ Cal Offset:	-0.027159	-0.028760
NMHC Cal Slope:	1.005180	1.001827
NMHC Cal Offset:	0.008268	-0.001743

Notes: Re-calibrating instrument to possible resolve dipping issues after routine calibration completed on April 23, 2023. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC Calibration Summary

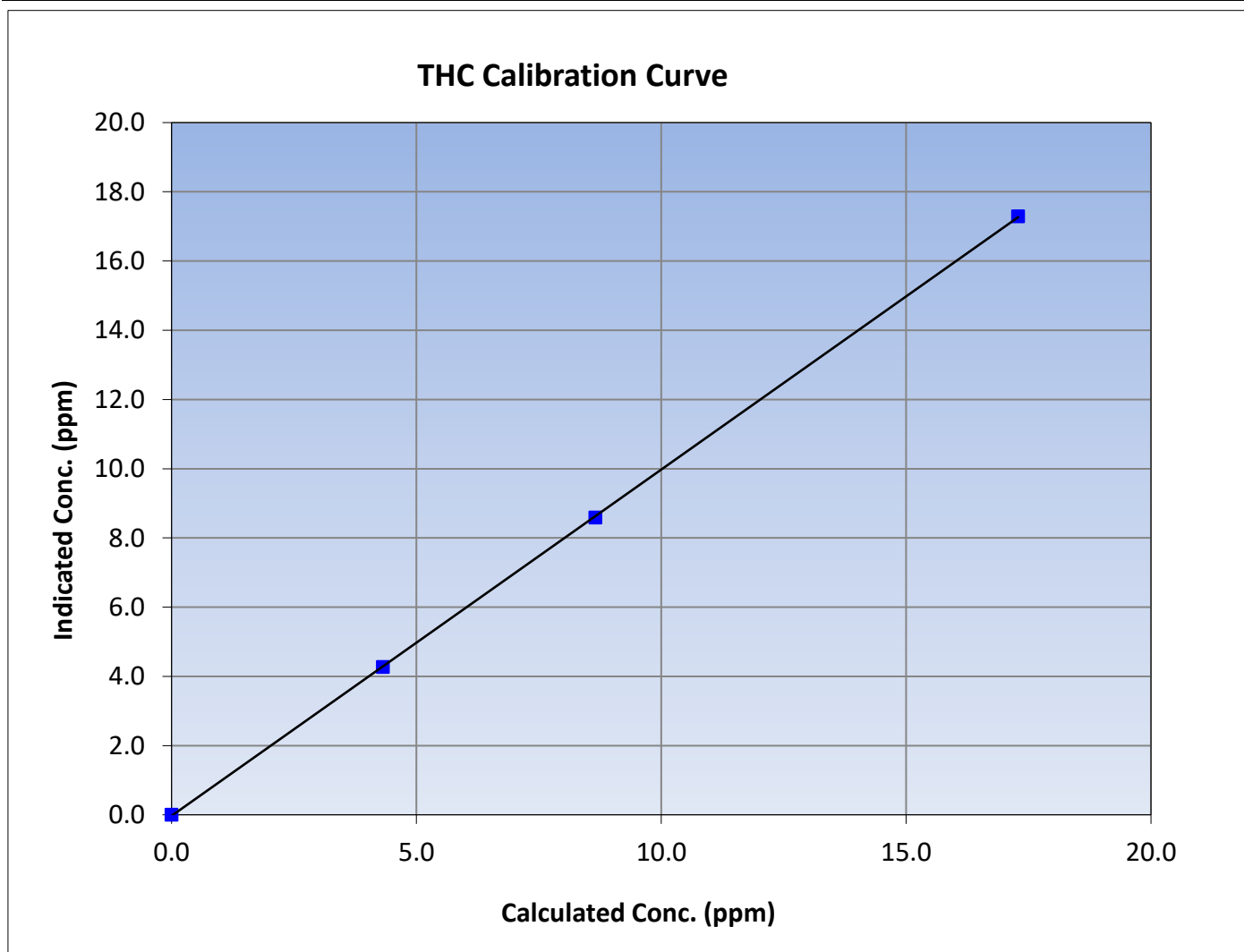
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	April 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:09	End Time (MST):	15:09
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999981	≥ 0.995
17.29	17.29	0.9999			
8.65	8.59	1.0074			
4.32	4.27	1.0101			
			Slope	1.000528	0.90 - 1.10
			Intercept	-0.030303	+/-0.5





Wood Buffalo Environmental Association

CH₄ Calibration Summary

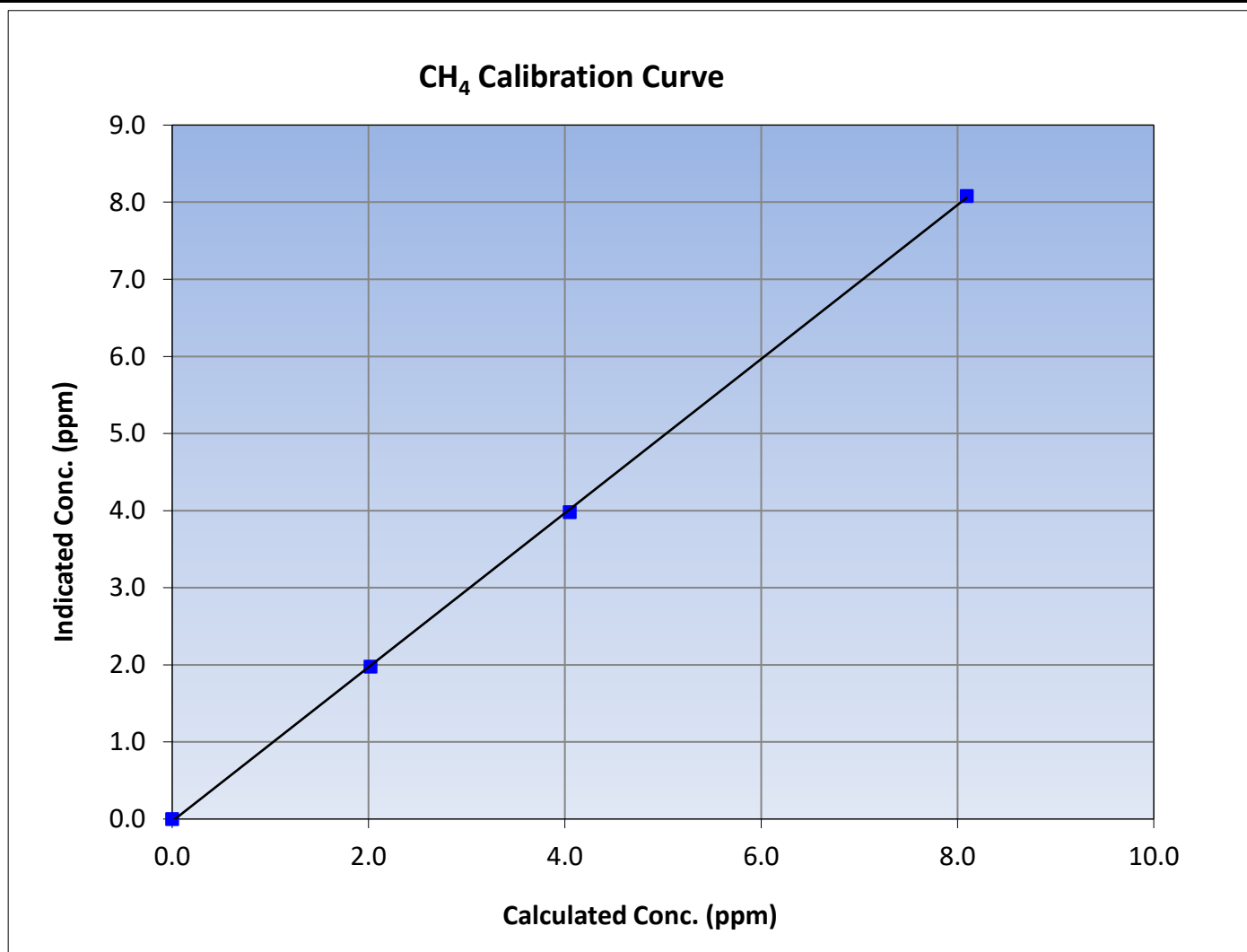
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	April 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:09	End Time (MST):	15:09
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999914	≥ 0.995
8.09	8.08	1.0017			
4.05	3.98	1.0182			
2.02	1.98	1.0216			
			Slope	0.999037	0.90 - 1.10
			Intercept	-0.028760	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

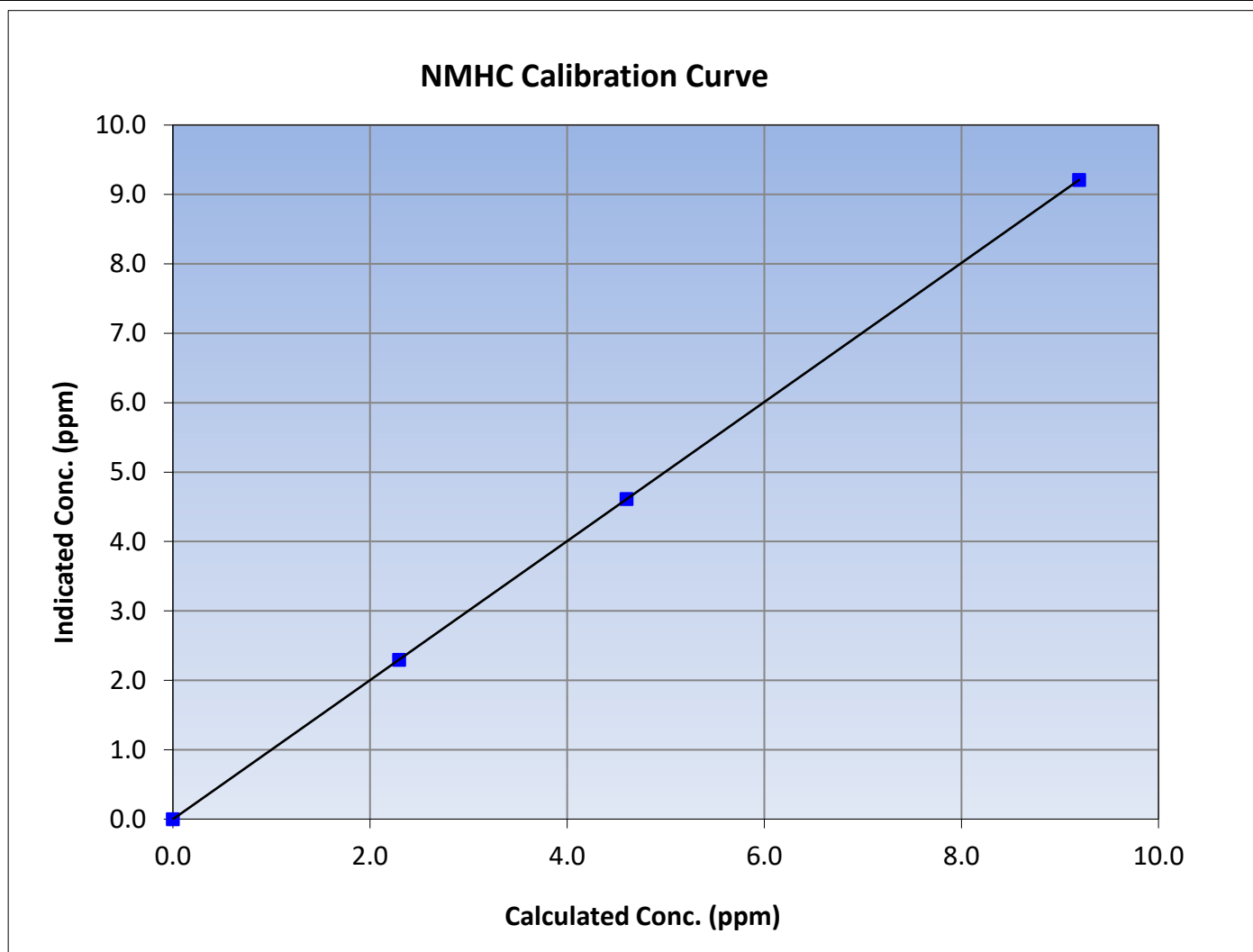
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	April 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:09	End Time (MST):	15:09
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

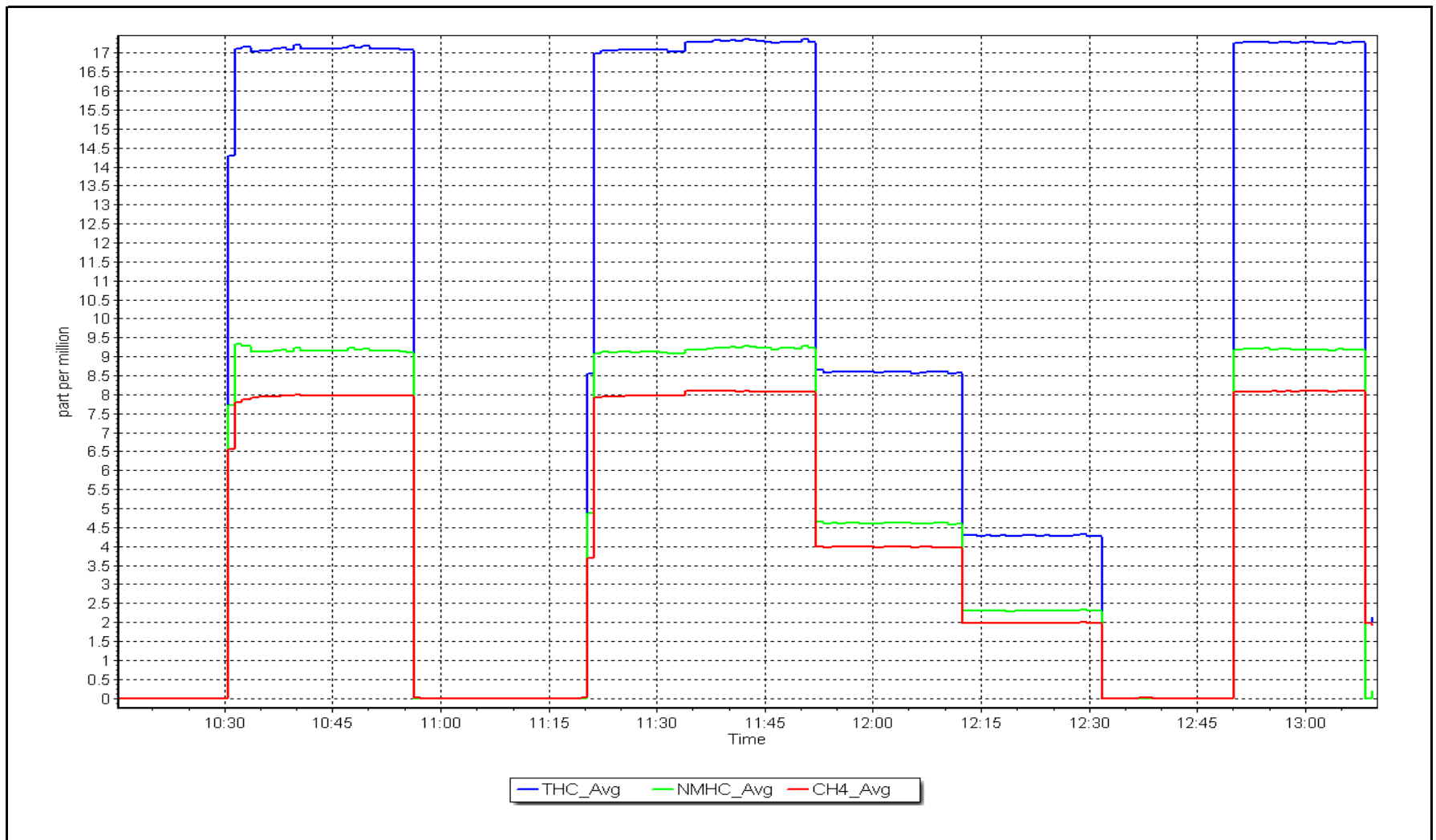
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	1.000000	≥ 0.995			
9.19	9.21	0.9983						
4.60	4.61	0.9983				Slope	1.001827	0.90 - 1.10
2.30	2.30	1.0002						
			Intercept	-0.001743	± 0.5			



NMHC Calibration Plot

Date: April 26, 2023

Location: Bertha Ganter-Fort McKay





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Bertha Ganter-Fort McKay Station number: AMS01
Calibration Date: April 18, 2023 Last Cal Date: March 3, 2023
Start time (MST): 9:46 End time (MST): 14:17
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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.458	1.498	NO bkgnd or offset:	6.9	7.1
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	7.0	7.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	194.8	194.8

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999171	0.999185
NO _x Cal Offset:	-0.060000	0.160000
NO Cal Slope:	1.000071	0.999572
NO Cal Offset:	-0.880000	-0.480000
NO ₂ Cal Slope:	0.998181	0.999865
NO ₂ Cal Offset:	-0.132907	-0.124708



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.5	0.4	0.1	----	----
as found span	4920	80.0	813.4	800.6	12.8	791.1	775.3	15.7	1.0282	1.0327
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.4	0.2	----	----
high point	4920	80.0	813.4	800.6	12.8	813.2	800.3	12.8	1.0003	1.0004
second point	4960	40.0	406.7	400.3	6.4	406.2	399.1	7.1	1.0013	1.0031
third point	4980	20.0	203.4	200.2	3.2	203.0	198.8	4.2	1.0018	1.0068
as left zero	5000	0.0	0.0	0.0	0.0	0.7	0.2	0.5	----	----
as left span	4920	80.0	813.4	401.2	412.2	812.5	398.9	413.6	1.0012	1.0059
Average Correction Factor									1.0011	1.0034

Corrected As found	NO _x = 790.6 ppb	NO = 774.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -2.8%	
Previous Response	NO _x = 812.7 ppb	NO = 799.8 ppb		*Percent Change	NO = -3.2%	
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:	Nx Int:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:	NO Int:
			As found	NO ₂ r ² :	NO ₂ SI:	NO ₂ Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
as found GPT zero						
as found GPT point (400 ppb NO ₂)						
as found GPT point (200 ppb NO ₂)						
as found GPT point (100 ppb NO ₂)						
1st GPT point (400 ppb O ₃)	797.9	398.5	412.2	412.2	1.0000	100.0%
2nd GPT point (200 ppb O ₃)	797.9	589.3	221.4	221.1	1.0014	99.9%
3rd GPT point (100 ppb O ₃)	797.9	693.6	117.1	116.6	1.0043	99.6%
Average Correction Factor					1.0019	99.8%

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

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

NO_x Calibration Summary

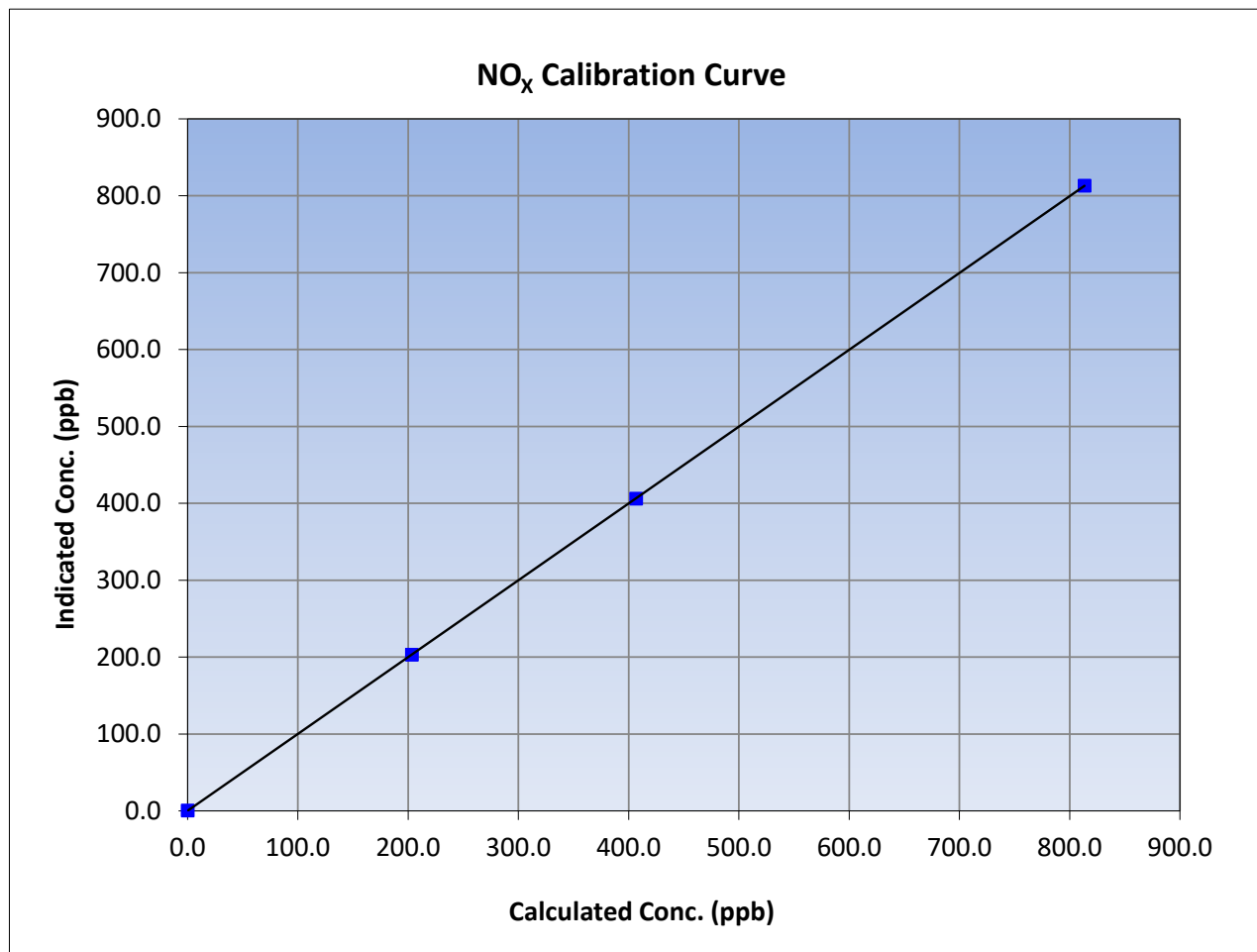
Version-04-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:46	End Time (MST):	14:17
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.6	----	Correlation Coefficient	≥0.995	
813.4	813.2	1.0003			
406.7	406.2	1.0013			
203.4	203.0	1.0018			
			Slope	0.999185	0.90 - 1.10
			Intercept	0.160000	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

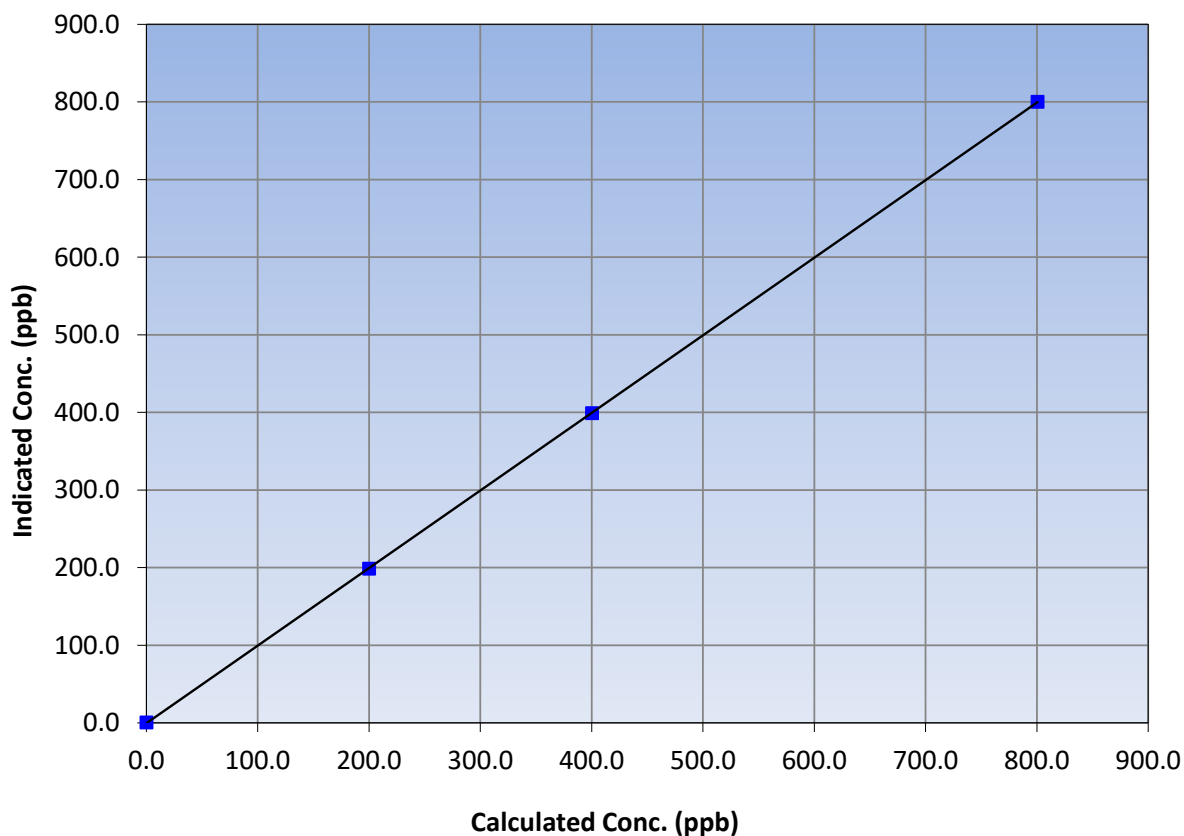
Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:46	End Time (MST):	14:17
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.4	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
800.6	800.3	1.0004		
400.3	399.1	1.0031		
200.2	198.8	1.0068		

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

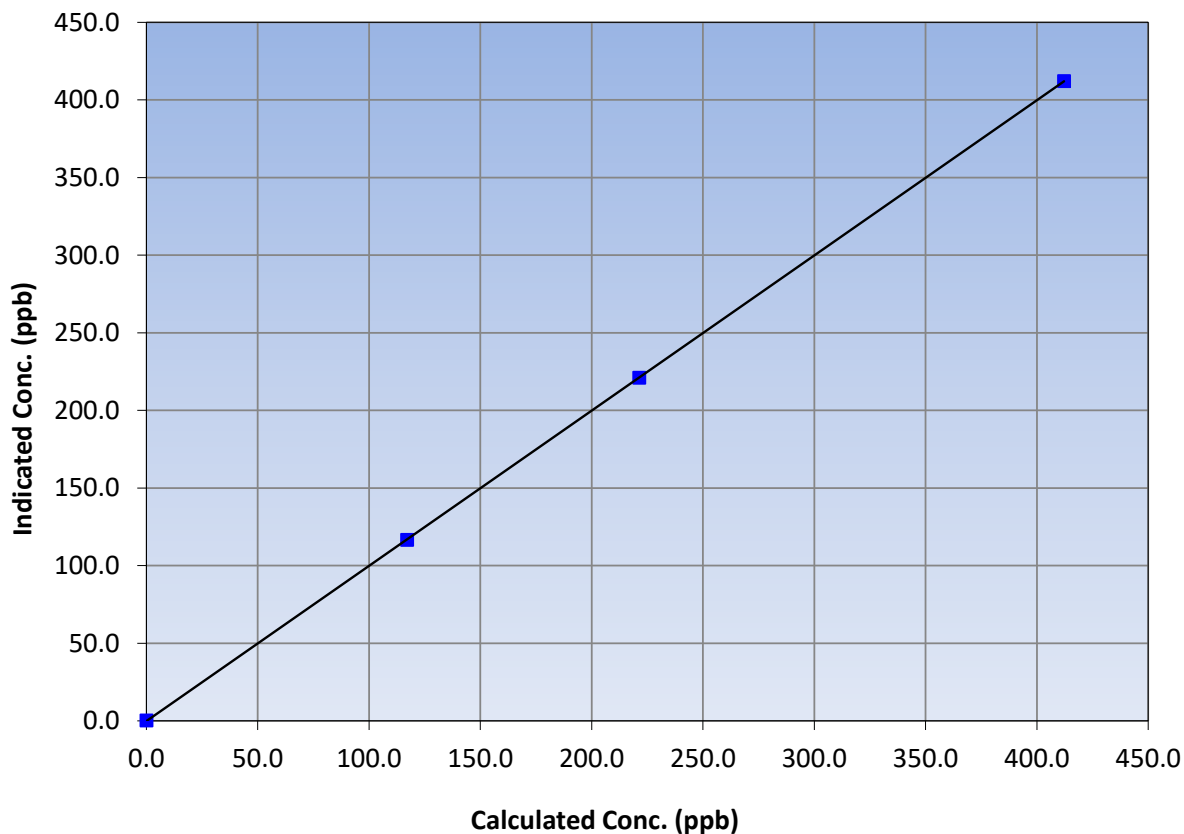
Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:46	End Time (MST):	14:17
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.2	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
412.2	412.2	1.0000		
221.4	221.1	1.0014		
117.1	116.6	1.0043		

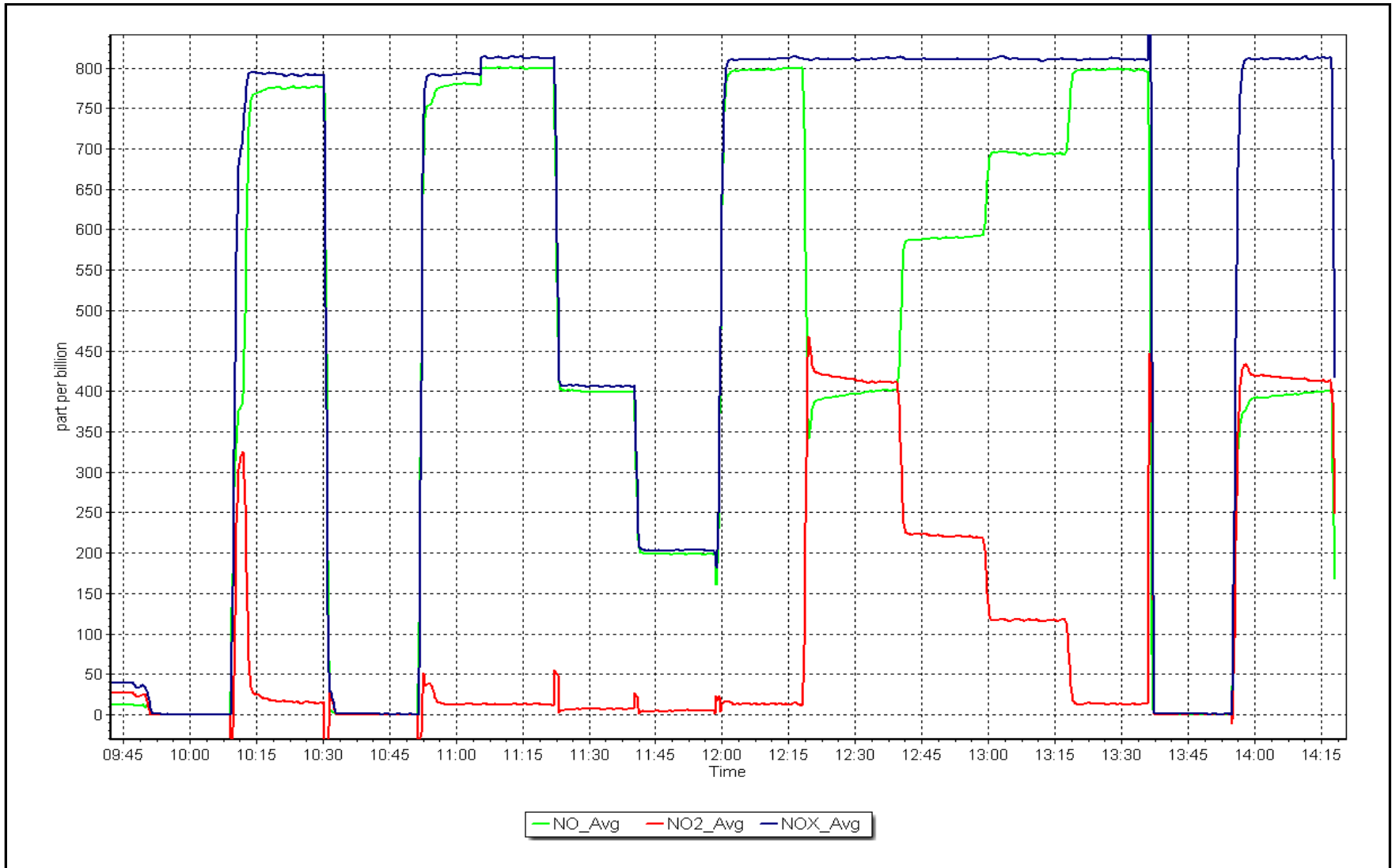
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 18, 2023

Location: Bertha Ganter-Fort McKay





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name: Bertha Ganter-Fort McKay Station number: AMS01
 Calibration Date: April 5, 2023 Last Cal Date: March 1, 2023
 Start time (MST): 10:08 End time (MST): 13:22
 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.999829	1.001057	Backgd or Offset:	2.5	2.5
Calibration intercept:	0.780000	0.440000	Coeff or Slope:	1.025	1.040

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	855.5	400.0	397.7	1.006
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	855.5	400.0	400.8	0.998
second point	5000	738.6	200.0	200.6	0.997
third point	5000	649.2	100.0	100.9	0.991
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	855.5	400.0	400.5	0.999
Average Correction Factor					0.995

Baseline Corr As found:	397.7	Previous response	400.7	*% 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: Changed inlet filter after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

O₃ Calibration Summary

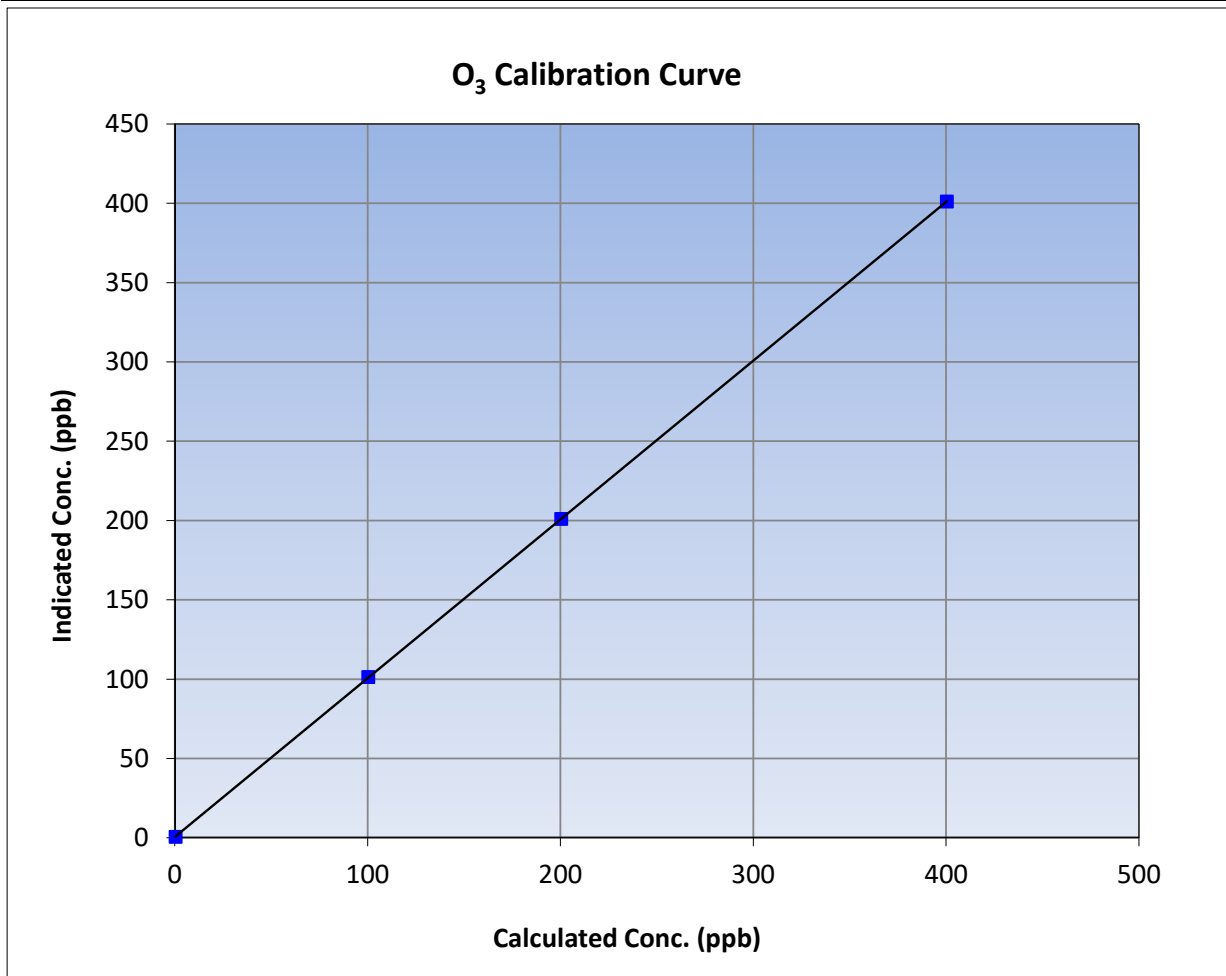
Version-01-2020

Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:08	End Time (MST):	13:22
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

Calibration Data

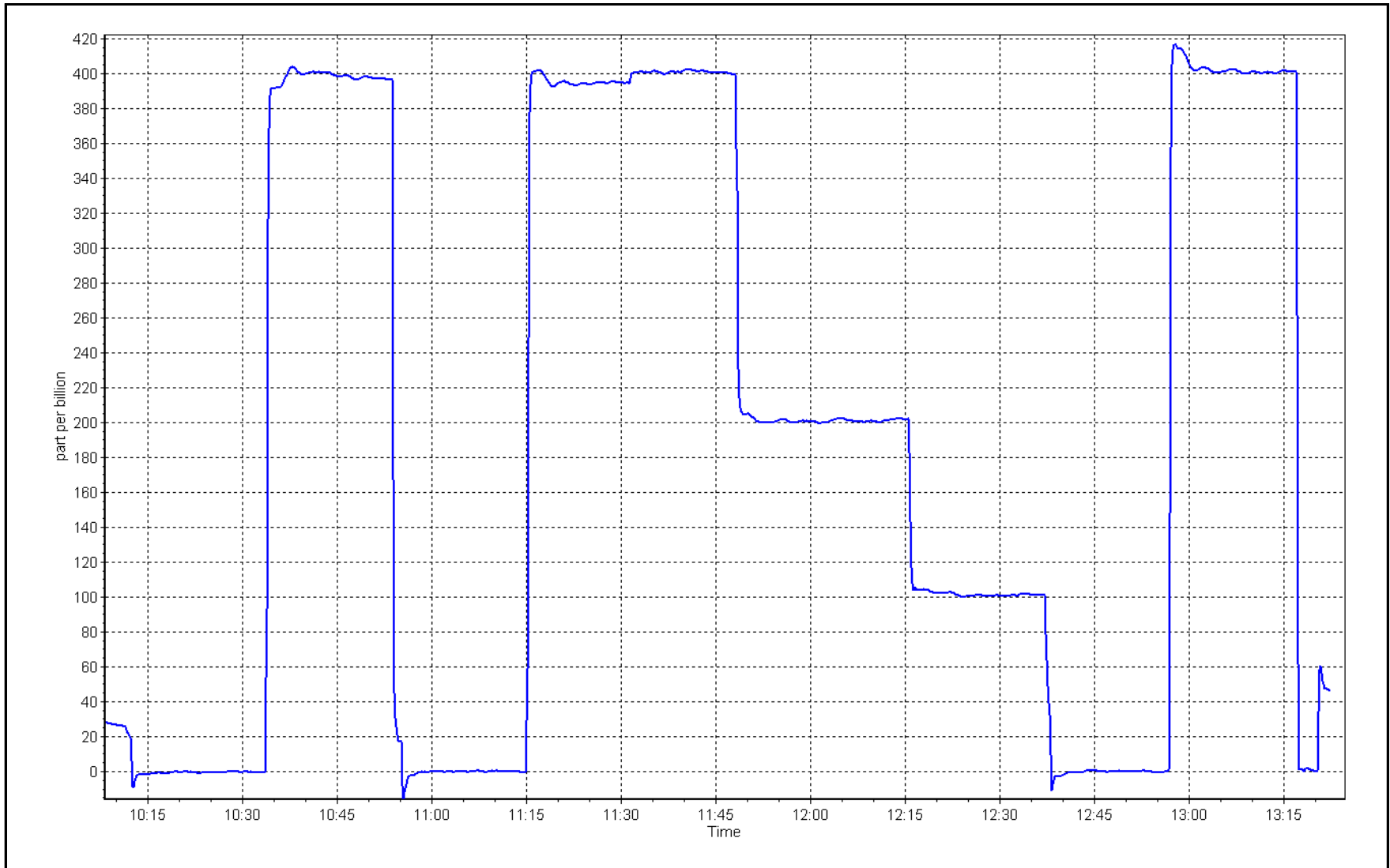
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999998	≥0.995
400.0	400.8	0.9980			
200.0	200.6	0.9970	Slope	1.001057	0.90 - 1.10
100.0	100.9	0.9911			
			Intercept	0.440000	+/- 5



O₃ Calibration Plot

Date: April 5, 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: April 20, 2023 Last Cal Date: March 30, 2023
 Start time (MST): 11:23 End time (MST): 13:07

Analyzer Make: API T640 S/N: 306
 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 (°C)	7.6	8.5	8.9	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	746.2	747.5	745.6	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	4.93	5.00	5.01	<input type="checkbox"/>	+/- 0.25 LPM

Leak Test: Date of check: April 20, 2023 Last Cal Date: March 30, 2023
 PM w/o HEPA: 5.6 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	11.8	11.1	<input checked="" type="checkbox"/>	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 5.6 w/ HEPA: 0
 Date Optical Chamber Cleaned: April 20, 2023 <0.2 ug/m3
 Disposable Filter Changed: March 30, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 31, 2022
 Date RH/T Sensor Cleaned: December 19, 2022

Notes: Flow, temperature and pressure verified. Leak check passed. Replaced the pump. Optical chamber cleaned.
 PMT peak voltage lowered from 1390V to 1386V.

Calibration by: Rene Chamberland



Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-11-2021

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
NOX Cal Date:	April 27, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	9:32	End time (MST):	14:27
NH3 Cal Date:	April 28, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	9:29	End time (MST):	12:30
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:	72.93	ppm	NH3 Gas Cylinder #:	CC281298
			NH3 Cal Gas Expiry:	February 28, 2023
Removed NH3 Conc:	72.93	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 #:	808
Converter model:	Teledyne API T501	Converter serial #:	824
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.20
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	470

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient:	0.850	0.834	TN coefficient:	0.850	0.836
NOX coefficient:	0.854	0.839	NO bkgnd:	-1.529	-0.626
NO2 coefficient:	1.000	1.000	NOX bkgnd:	-1.049	-0.402
NH3 coefficient:	0.937	0.937	TN bkgnd:	3.877	1.871

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	1.003400	1.005241
NO _x Cal Offset:	-1.540000	-0.420000
NO Cal Slope:	0.999800	1.000685
NO Cal Offset:	-1.960000	-2.020000
NO ₂ Cal Slope:	1.014549	1.007356
NO ₂ Cal Offset:	0.808984	1.516016
NH3 Cal Slope:	0.996086	1.005229
NH3 Cal Offset:	-1.322705	-3.943276
TN Cal Slope:	0.999769	1.009496
TN Cal Offset:	-1.287257	-3.914715



Wood Buffalo Environmental Association

TN - NOX - NH₃ Calibration Report

Version-11-2021

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) <i>Limit = 0.95-1.05</i>	NH3 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.9	-0.1	-0.8	----	----
as found NO	4920	80.0	813.4	813.4	----	812.2	813.0	-0.8	1.002	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	0.0	-0.4	----	----
high NO point	4920	80.0	813.4	813.4	----	815.5	817.2	-1.7	0.997	----
NO/O3 point	4920	80.0	813.4	813.4	----	812.9	811.5	1.2	1.001	----
as found NH3	3413	86.4	1800.6	----	1800.6	1813.7	----	1806.0	0.993	0.997
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1813.7	----	1806.0	0.993	0.997
second NH3	3452	48.0	1000.2	----	1000.2	1009.6	----	1005.3	0.991	0.995
third NH3	3476	24.0	500.1	----	500.1	493.7	----	491.5	1.013	1.017
Average Correction Factor									0.9991	1.0031

Corrected As found TN = 813.1 ppb NO_x = 813.1 ppb NH3 = 1806.8 ppb

Previous Response TN = 812 ppb NO_x = 814.7 ppb NH3 = 1792.3 ppb

NH3 Previous Converter Efficiency = 93.7%

NH3 Current Converter Efficiency = 93.7%

*Percent Change TN = 0.1%

*Percent Change NO_x = -0.2%

*Percent Change NH3 = 0.8%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-2.0	----	----
as found span	4920	80.0	813.4	800.6	813.4	833.0	814.5	828.0	0.9765	0.9830
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	-0.4	----	----
high point	4920	80.0	813.4	800.6	813.4	817.2	800.5	815.5	0.9954	1.0002
second point	4960	40.0	406.7	400.3	406.7	409.1	396.4	407.5	0.9942	1.0099
third point	4980	20.0	203.4	200.2	203.4	203.0	197.3	203.1	1.0018	1.0145
Average Correction Factor									0.9971	1.0082

Baseline Corr As fnd	TN = 830 ppb	NO _x = 833.0 ppb	NO = 814.4 ppb	*Percent Change	TN = 2.2%
Previous Response	TN = 812 ppb	NO _x = 814.7 ppb	NO = 798.5 ppb	*Percent Change	NO _x = 2.2%
				*Percent Change	NO = 1.9%
				* = > +/-5% change initiates investigation	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
as found zero	----	----	0.0	-0.1	----	----
calibration zero	----	----	0.0	0.2	----	----
1st GPT point (400 ppb O3)	795.4	389.4	418.8	422.7	0.9908	100.9%
2nd GPT point (200 ppb O3)	795.4	589.8	218.4	222.1	0.9833	101.7%
3rd GPT point (100 ppb O3)	795.4	692.8	115.4	119.2	0.9681	103.3%
Average Correction Factor					0.9807	102.0%

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

Calibration Performed By: Aswin Sasi Kumar & Rene Chamberland



Wood Buffalo Environmental Association

TN Calibration Summary

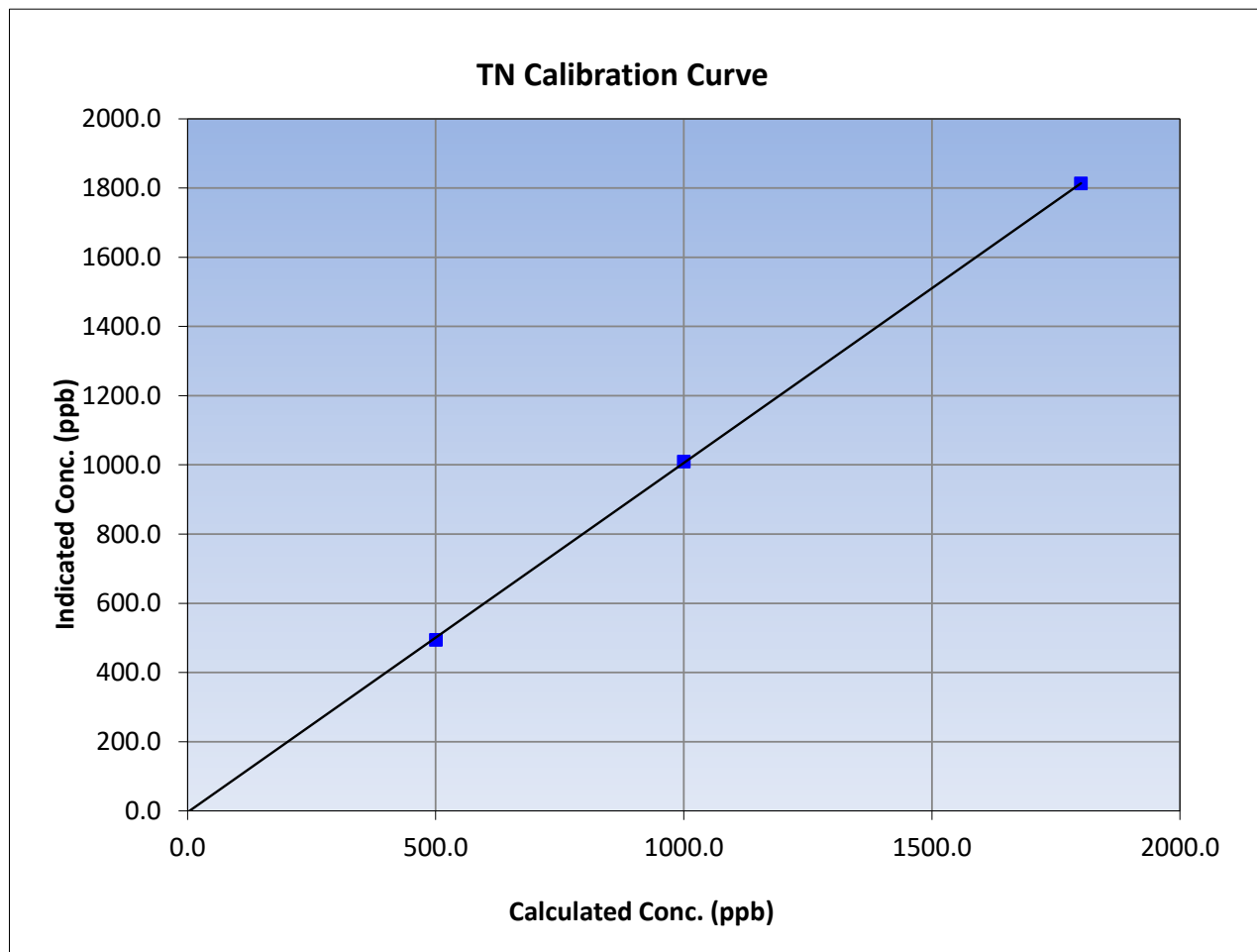
Version-11-2021

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	-0.4	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
1800.6	1813.7	0.9928		
1000.2	1009.6	0.9907		
500.1	493.7	1.0129		





Wood Buffalo Environmental Association

NH₃ Calibration Summary

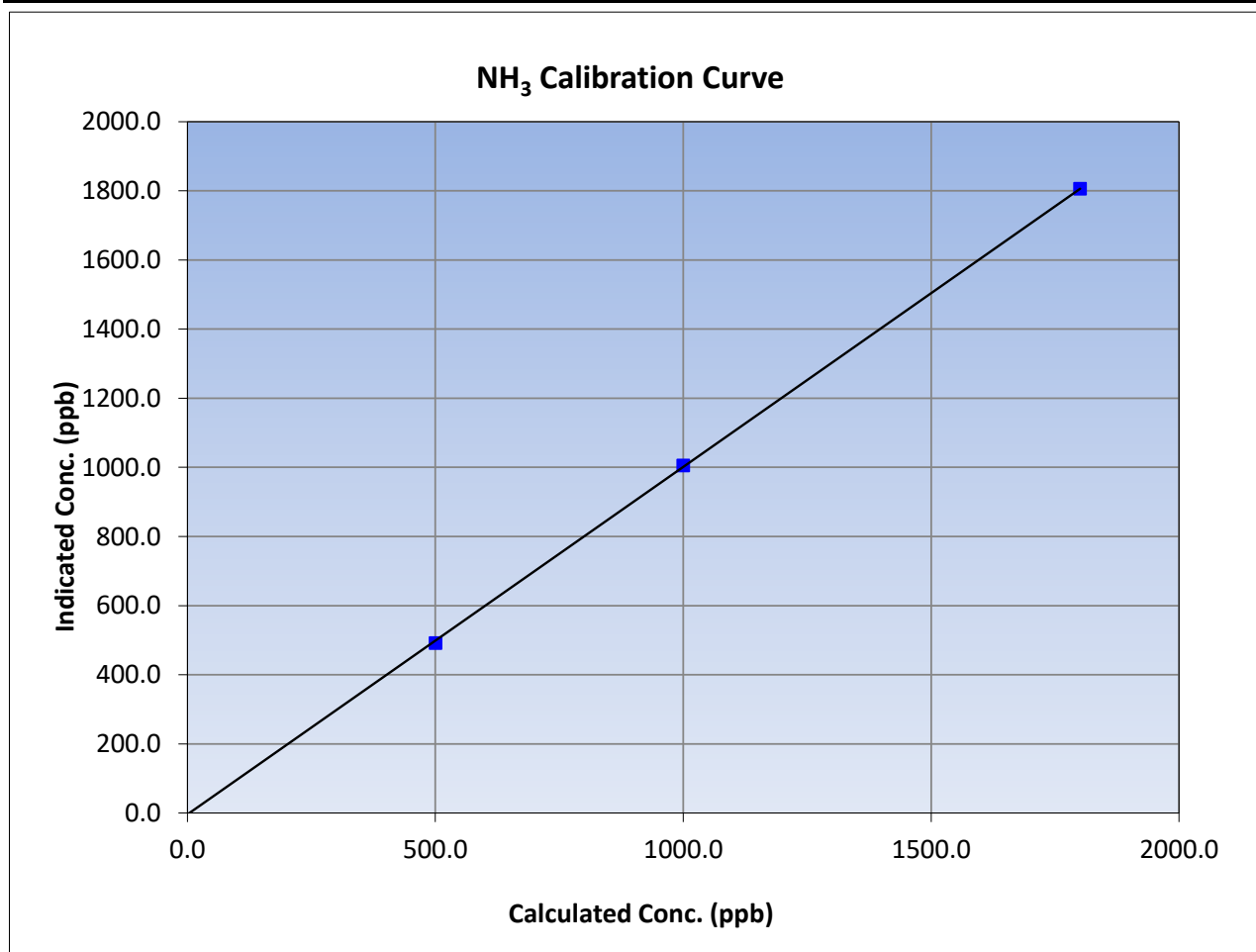
Version-11-2021

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	-0.4	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
1800.6	1806.0	0.9970		
1000.2	1005.3	0.9949		
500.1	491.5	1.0175		





Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-11-2021

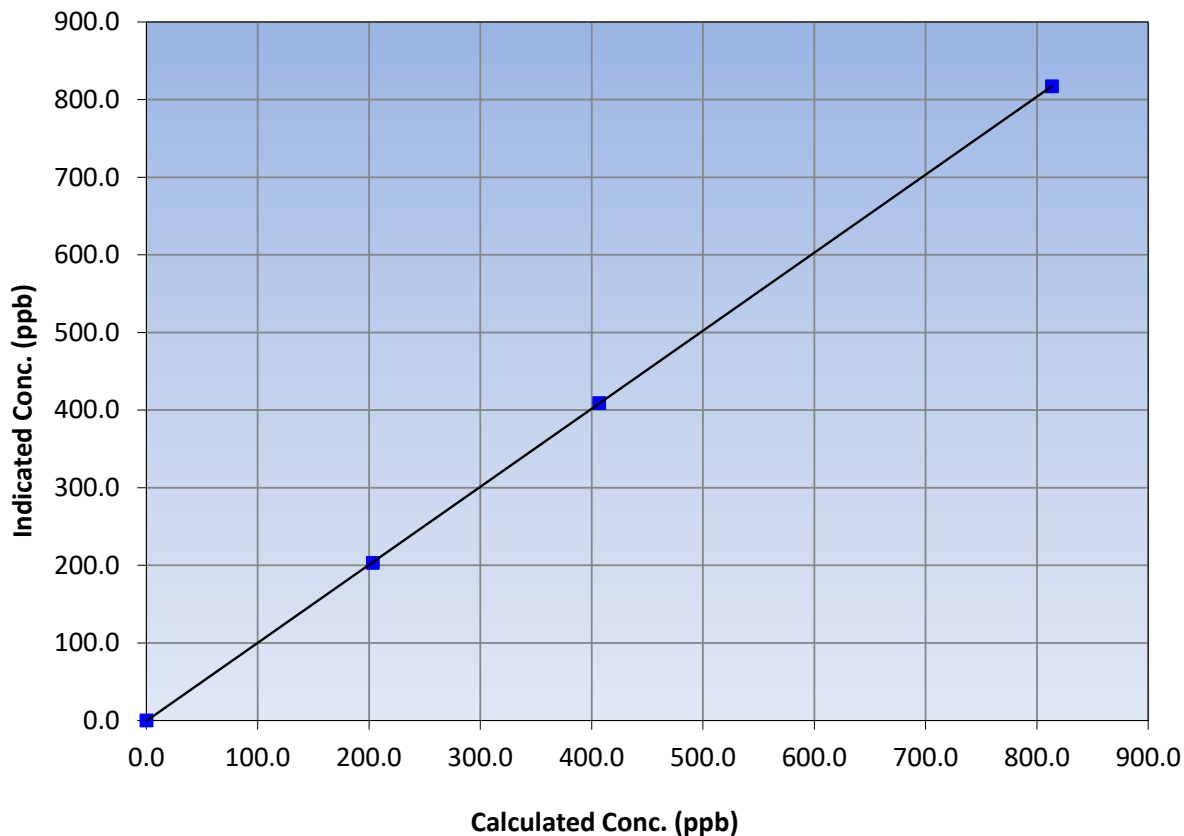
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
813.4	817.2	0.9954		
406.7	409.1	0.9942		
203.4	203.0	1.0018		
			0.999996	
			1.005241	
			-0.420000	

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-11-2021

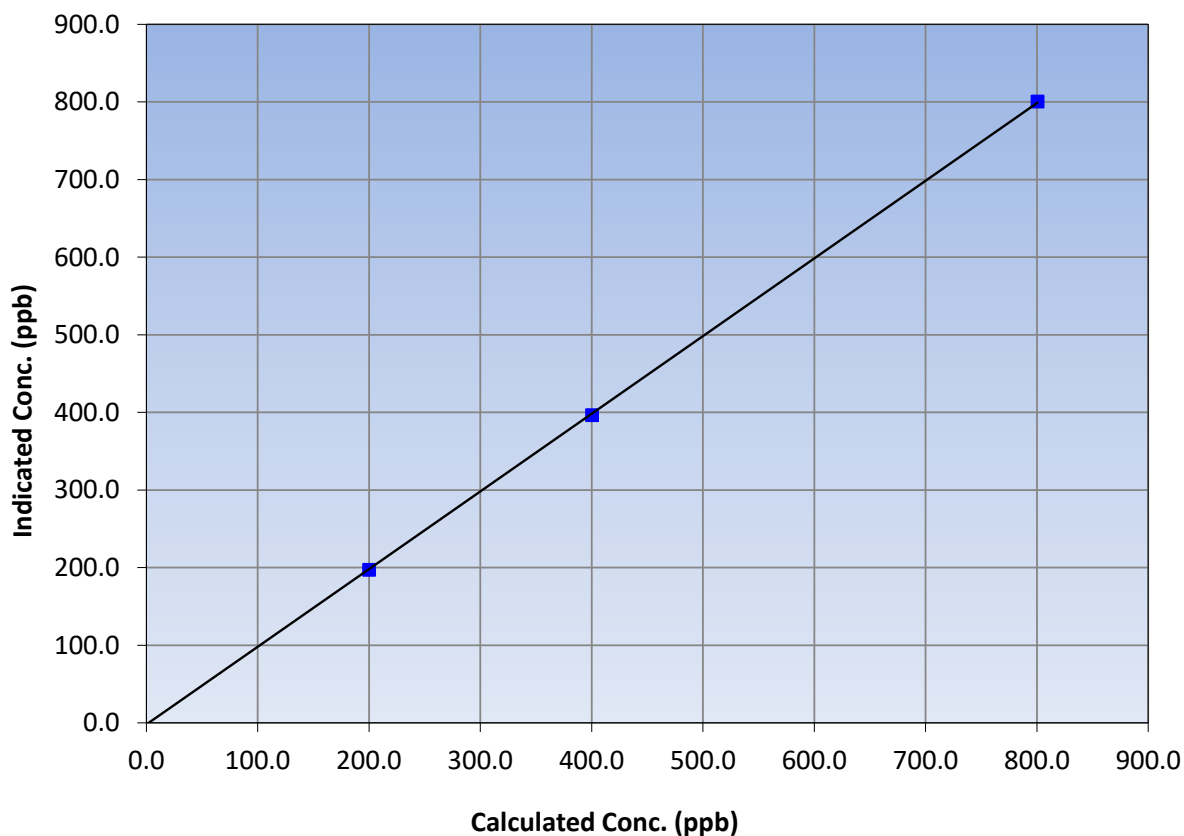
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	-0.2	----	Correlation Coefficient Slope Intercept	≥ 0.995 0.90 - 1.10 +/-20
800.6	800.5	1.0002		
400.3	396.4	1.0099		
200.2	197.3	1.0145		
			0.999969	
			1.000685	
			-2.020000	

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

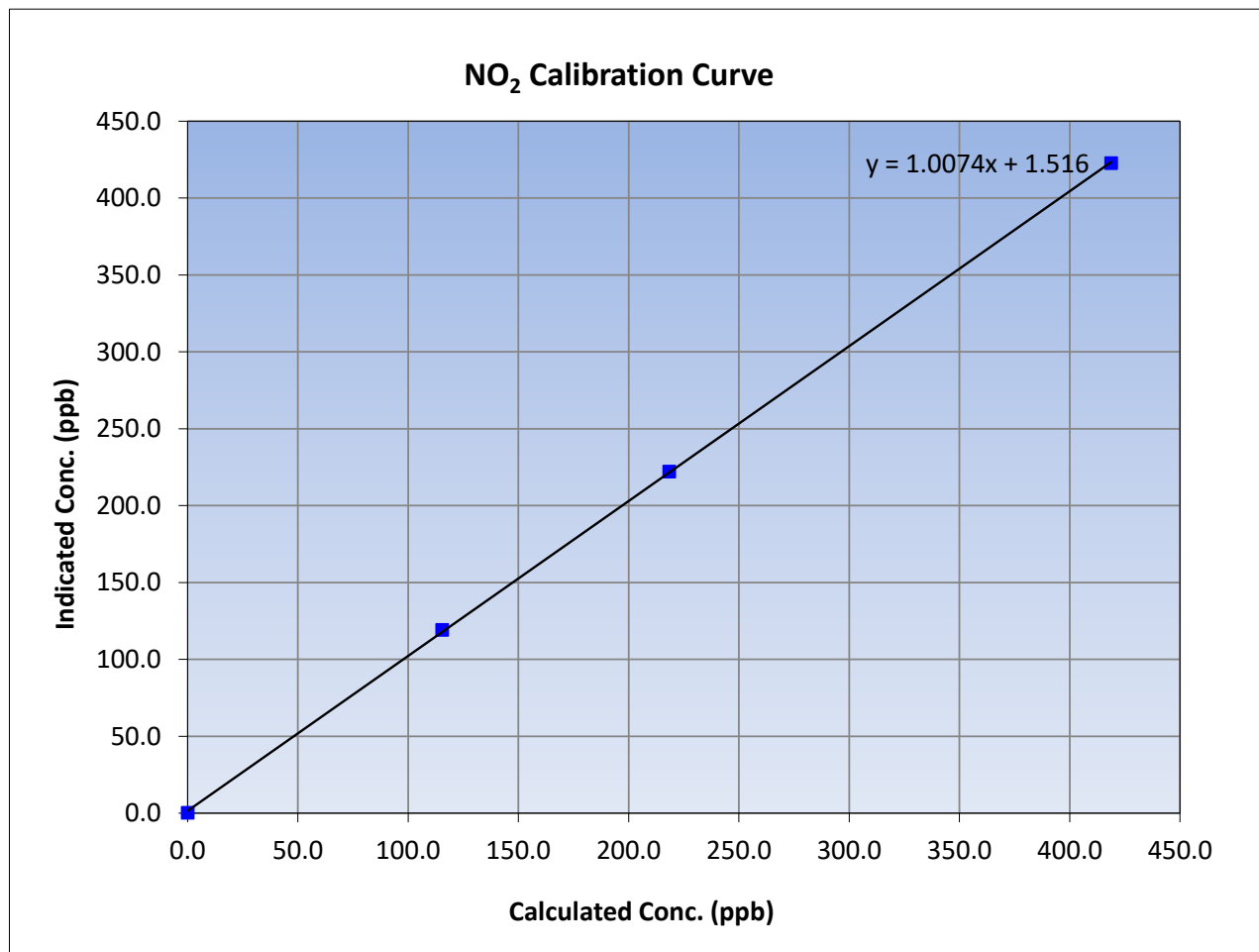
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

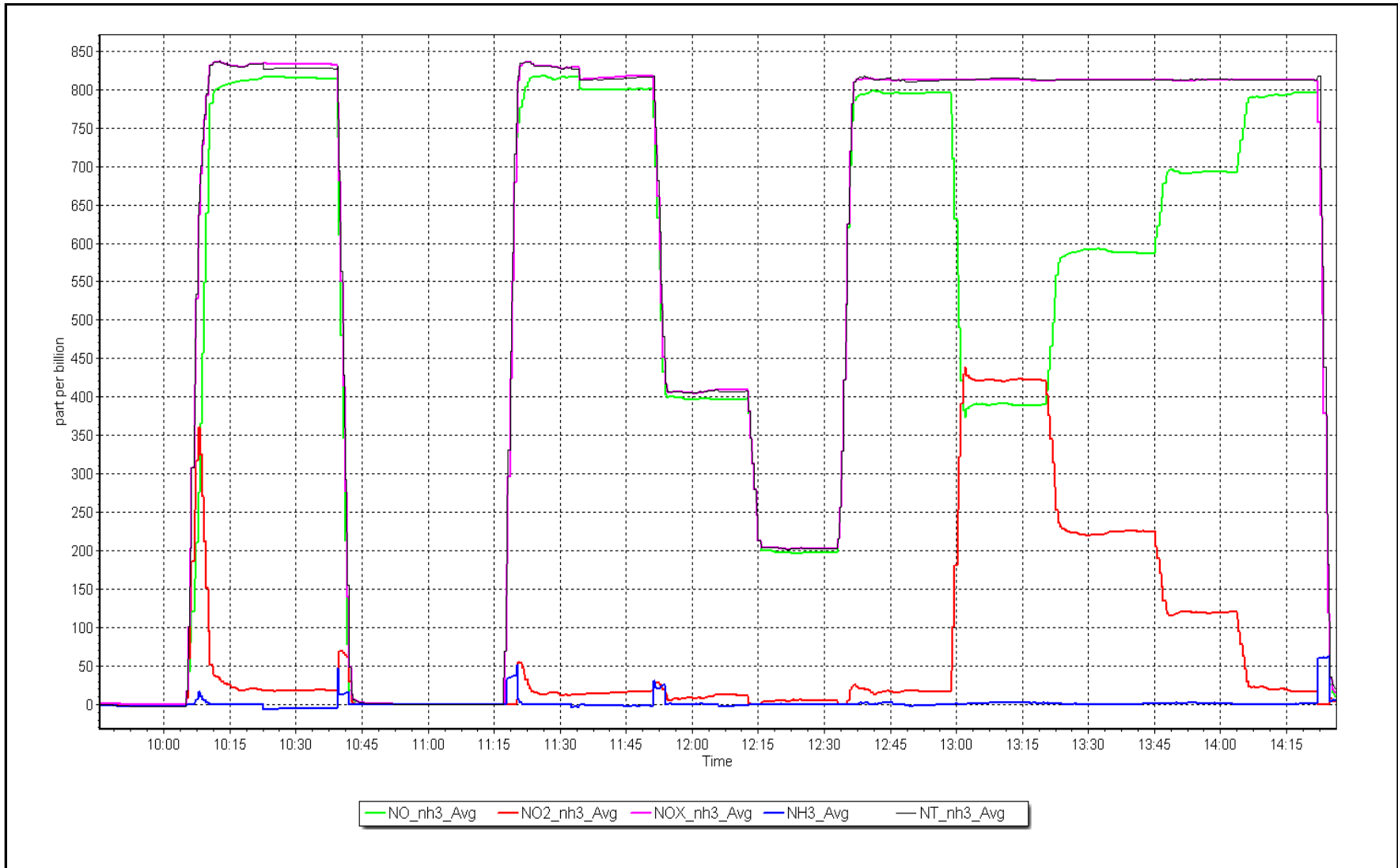
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.2	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
418.8	422.7	0.9908		
218.4	222.1	0.9833		
115.4	119.2	0.9681		



NO_x Calibration Plot

Date: April 27, 2023

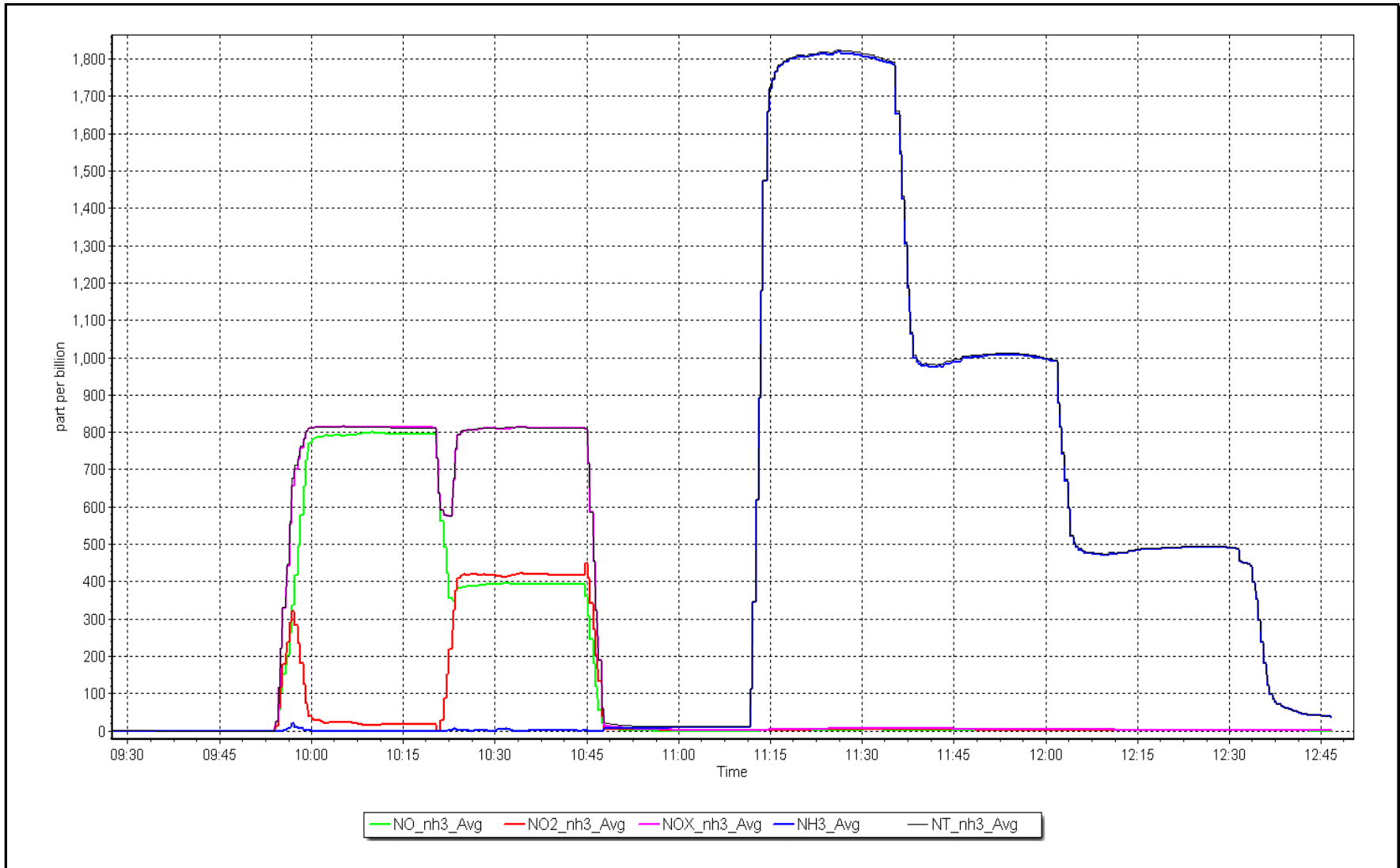
Location: Bertha Ganter-Fort McKay



NH₃ Calibration Plot

Date: April 28, 2023

Location: Bertha Ganter-Fort McKay





Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	April 20, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	11:06	End time (MST):	14:15
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	<u>3040</u>	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	<u>ALM042207</u>			
Removed Cal Gas Conc:	<u>3040</u>	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	<u>NA</u>		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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.002977	1.001765	Backgd or Offset:	-0.012	-0.012
Calibration intercept:	0.109828	0.123811	Coeff or Slope:	0.996	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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.2	----
as found span	4933	66.7	40.6	41.2	0.983
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	40.6	0.998
second point	4966	33.3	20.2	20.6	0.981
third point	4983	16.7	10.2	10.3	0.988
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.5	40.2	1.009
Average Correction Factor					0.989

Baseline Corr As found:	41.02	Prev response:	40.79	*% 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. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

CO Calibration Summary

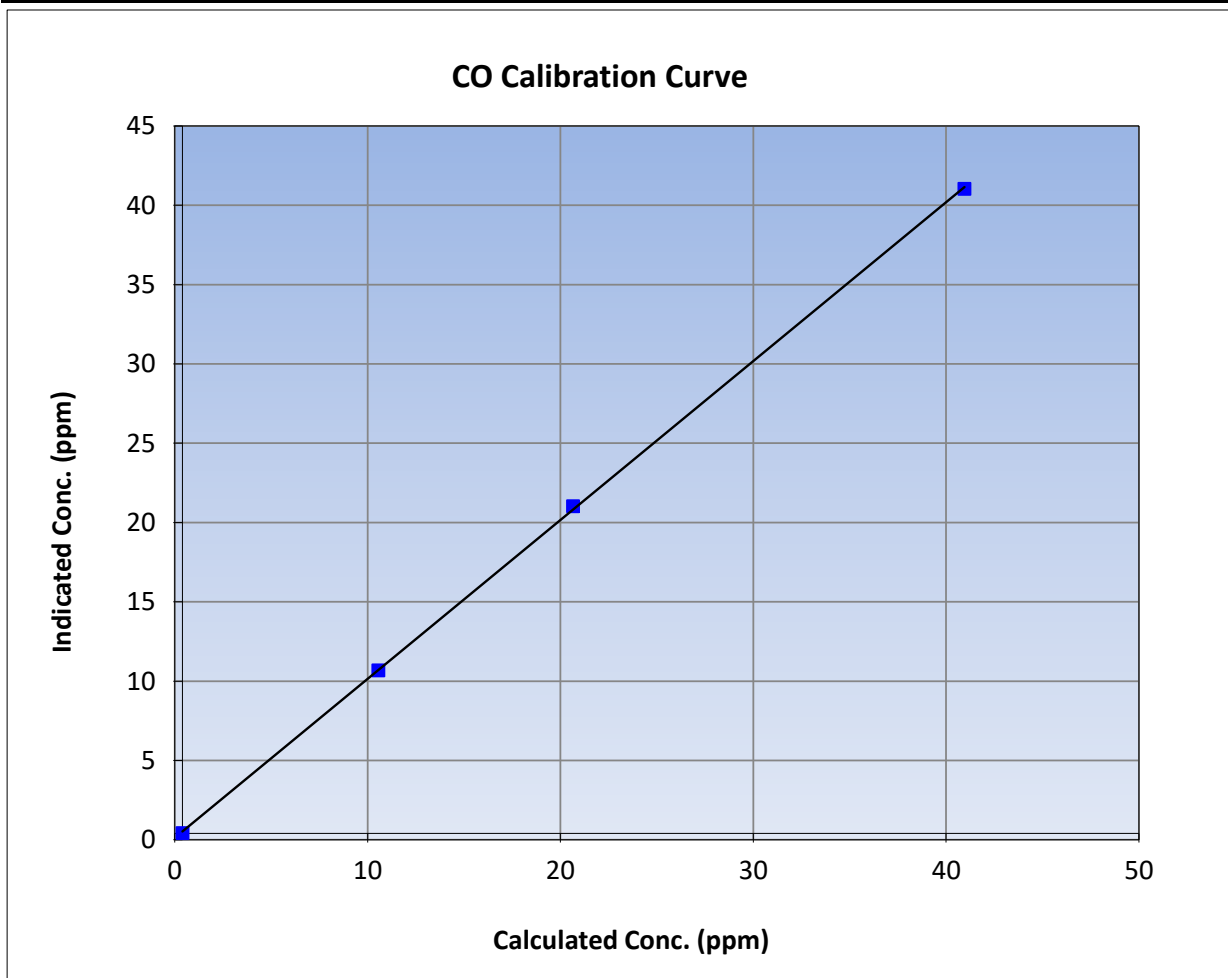
Version-01-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 8, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:06	End Time (MST):	14:15
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

Calibration Data

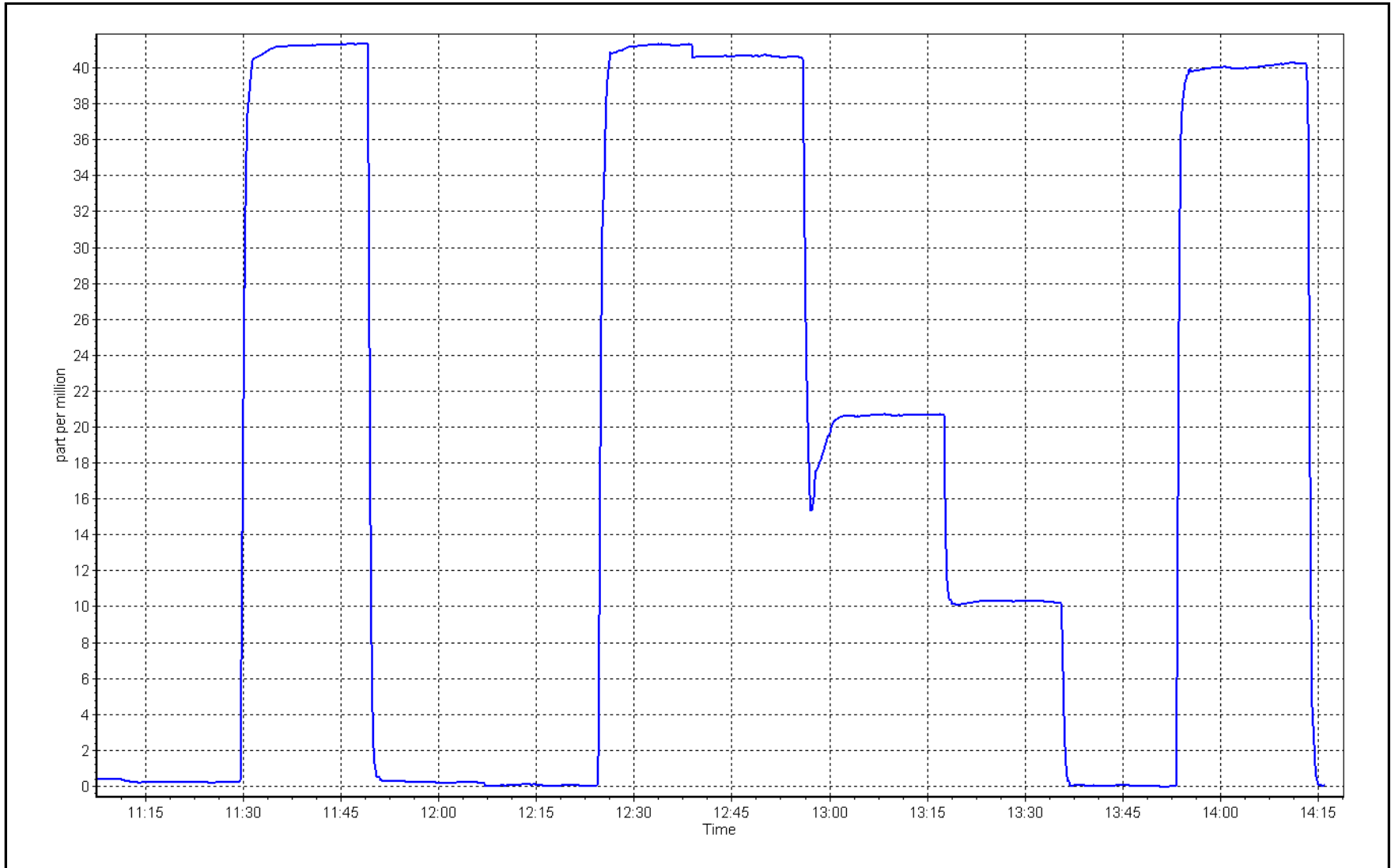
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999915	
40.6	40.6	0.9979			≥0.995
20.2	20.6	0.9811	Slope	1.001765	
10.2	10.3	0.9878			0.90 - 1.10
			Intercept	0.123811	+/-1.5



CO Calibration Plot

Date: April 20, 2023

Location: Bertha Ganter-Fort McKay





Wood Buffalo Environmental Association

CO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	April 19, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	9:57	End time (MST):	13:24
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	60,200	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	<u>ALM042207</u>			
Removed Cal Gas Conc:	<u>60,200</u>	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	<u>NA</u>		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	

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.002067	1.000116	Backgd or Offset:	0.037	0.037
Calibration intercept:	-4.460000	-5.740000	Coeff or Slope:	0.880	0.880

CO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	3000	0.0	0.0	-0.6	----
as found span	2920	80.0	1605.3	1617.9	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.2	----
high point	2920	80.0	1605.3	1602.3	1.002
second point	2960	40.0	802.7	795.0	1.010
third point	2980	20.0	401.3	389.6	1.030
as left zero	3000	0.0	0.0	-0.4	----
as left span	2960	40.0	802.7	782.8	1.025
Average Correction Factor					1.014

Baseline Corr As found:	1618.50	Prev response:	1604.19	*% 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 the inlet filter after as founds. Cycled power to the analyzer. No adjustments made.

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

CO₂ Calibration Summary

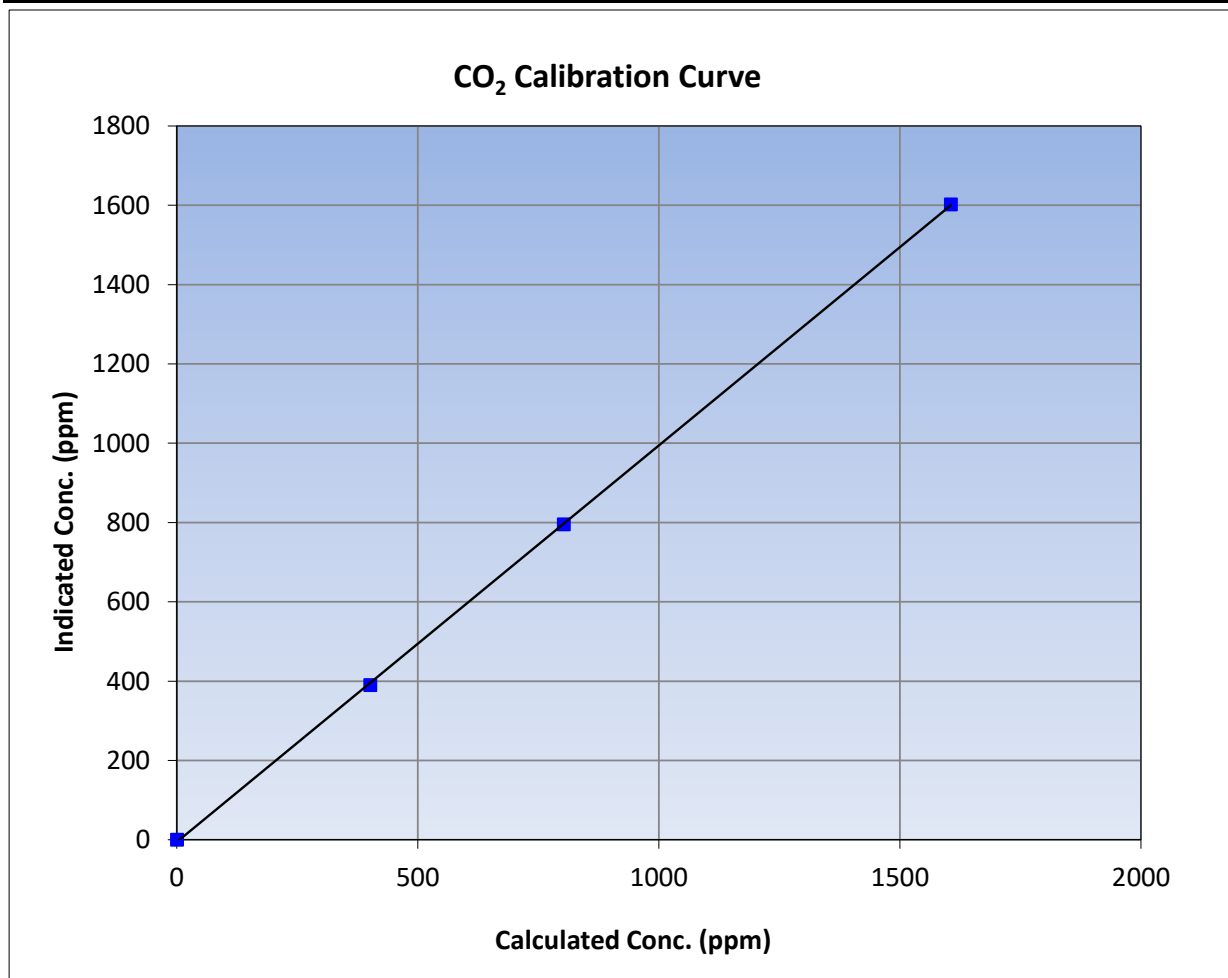
Version-01-2020

Station Information

Calibration Date	April 19, 2023	Previous Calibration	March 7, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	9:57	End Time (MST)	13:24
Analyzer make	Teledyne API 360	Analyzer serial #	442

Calibration Data

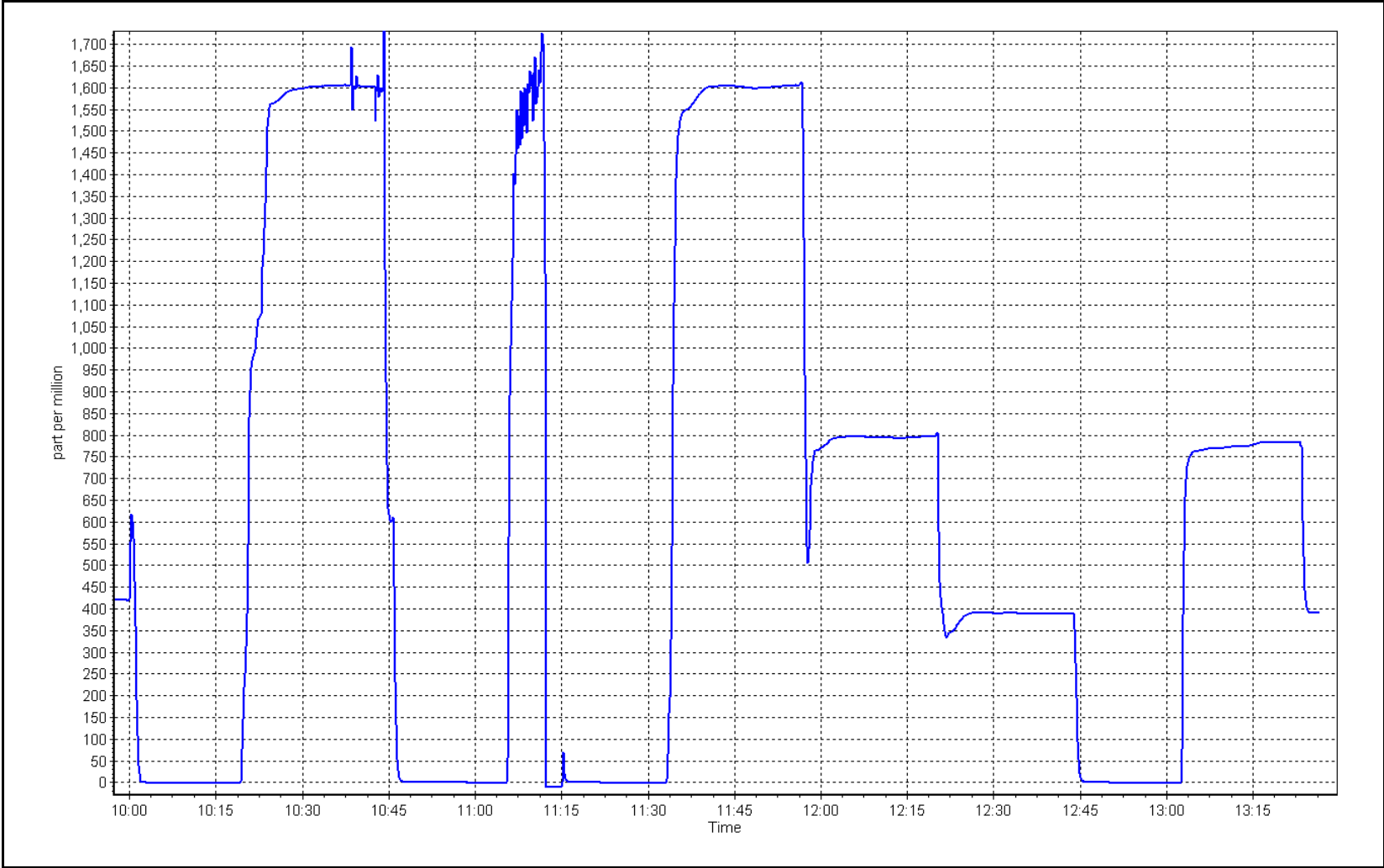
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.2	----	Correlation Coefficient	0.999945	≥0.995
1605.3	1602.3	1.0019	Slope	1.000116	0.90 - 1.10
802.7	795.0	1.0096	Intercept	-5.740000	+/-10
401.3	389.6	1.0301			



CO₂ Calibration Plot

Date: April 19, 2023

Location: Bertha Ganter-Fort McKay





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02 MILDRED LAKE APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	April 13, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	10:42 AM	End time (MST):	13:32
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:	5608

Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075
Analyzer Range	0 - 1000 ppb		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.002096	0.999874	Backgd or Offset:	18.0	18.3
Calibration intercept:	-0.984595	-0.805548	Coeff or Slope:	0.811	0.805

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.2	----
as found span	4920	80.2	801.6	809.6	0.990
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	801.0	1.001
second point	4960	40.1	400.8	400.1	1.002
third point	4980	20.0	199.9	197.8	1.011
as left zero	5000	0.0	0.0	-0.1	----
as left span	4920	80.2	801.6	802.5	0.999
Average Correction Factor					1.004

Baseline Corr As found:	809.80	Previous response	802.34	*% 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 inlet filter after as founds. Adjusted span.

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

SO₂ Calibration Summary

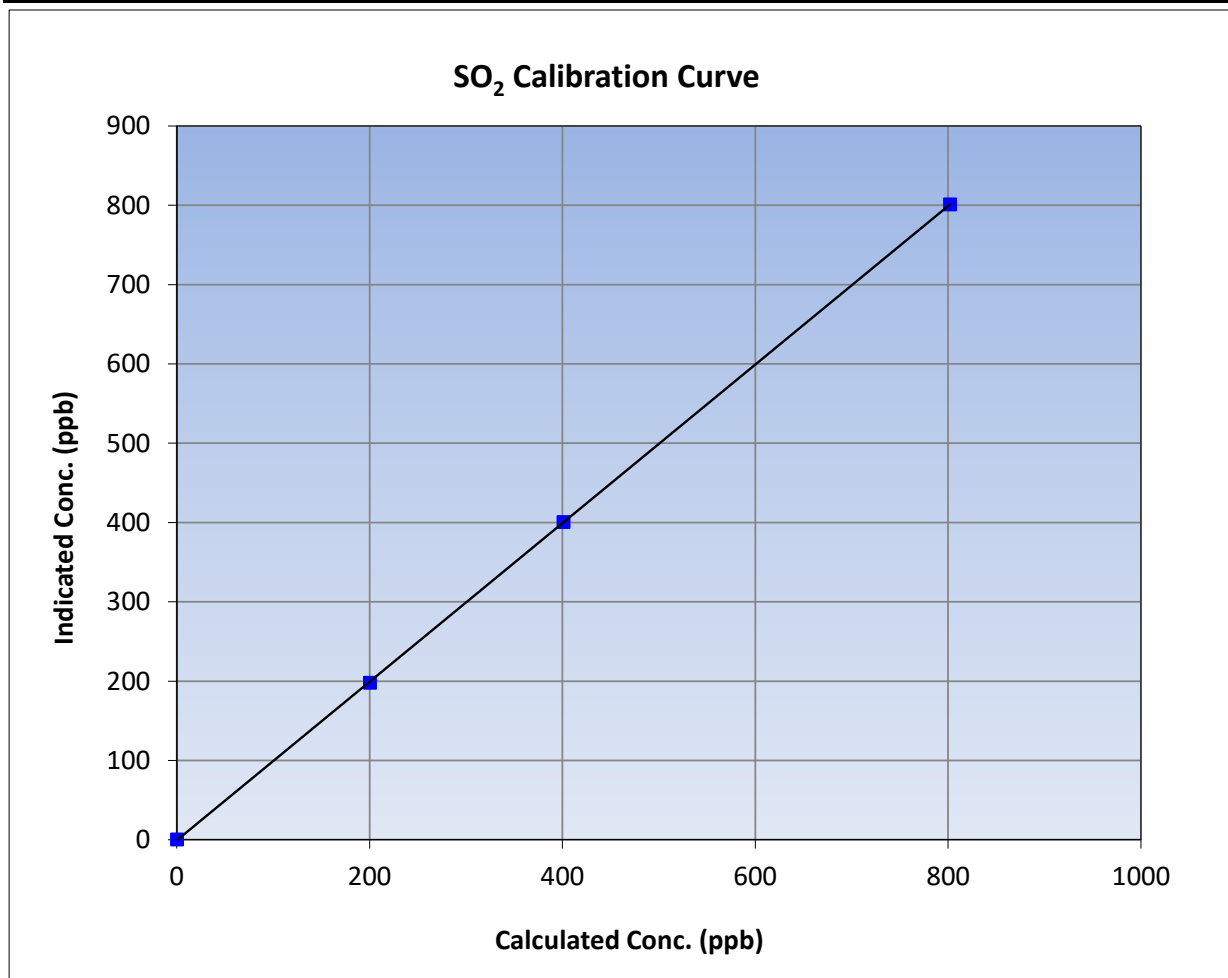
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:42	End Time (MST):	13:32
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

Calibration Data

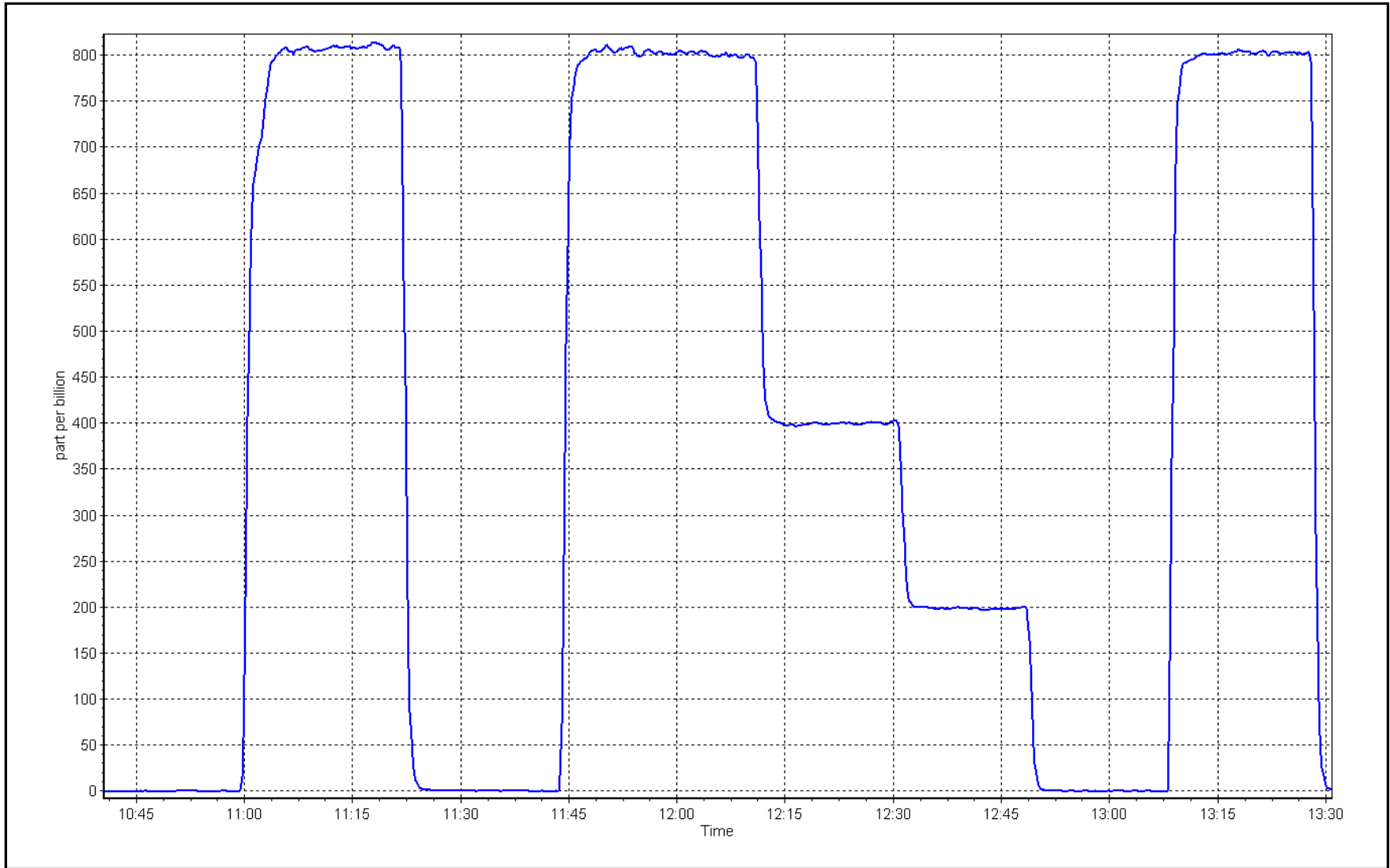
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999993	≥0.995
801.6	801.0	1.0008			
400.8	400.1	1.0018	Slope	0.999874	0.90 - 1.10
199.9	197.8	1.0107			
			Intercept	-0.805548	+/-30



SO2 Calibration Plot

Date: April 13, 2023

Location: Mildred Lake





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Mildred Lake Station number: AMS02
 Calibration Date: April 4, 2023 Last Cal Date: March 16, 2023
 Start time (MST): 9:03 End time (MST): 13:23
 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.007251	0.993678	Backgd or Offset:	1.83	1.75
Calibration intercept:	0.000807	0.100794	Coeff or Slope:	0.844	0.823

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4924	75.6	80.0	81.2	0.986
as found 2nd point	4962	37.8	40.0	40.8	0.983
as found 3rd point	4981	18.9	20.0	20.4	0.985
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.2	----
high point	4924	75.6	80.0	79.6	1.005
second point	4962	37.8	40.0	39.9	1.002
third point	4981	18.9	20.0	19.8	1.010
as left zero	5000	0.0	0.0	0.2	----
as left span	4924	75.6	80.0	79.9	1.001
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:	12-Sep-22			Ave Corr Factor	1.006
Date of last converter efficiency test:	efficiency				

Baseline Corr As found: 81.1 Prev response: 80.57 *% change: 0.7%
 Baseline Corr 2nd AF pt: 40.7 AF Slope: 1.013966 AF Intercept: 0.140813
 Baseline Corr 3rd AF pt: 20.3 AF Correlation: 0.999996

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

H₂S Calibration Summary

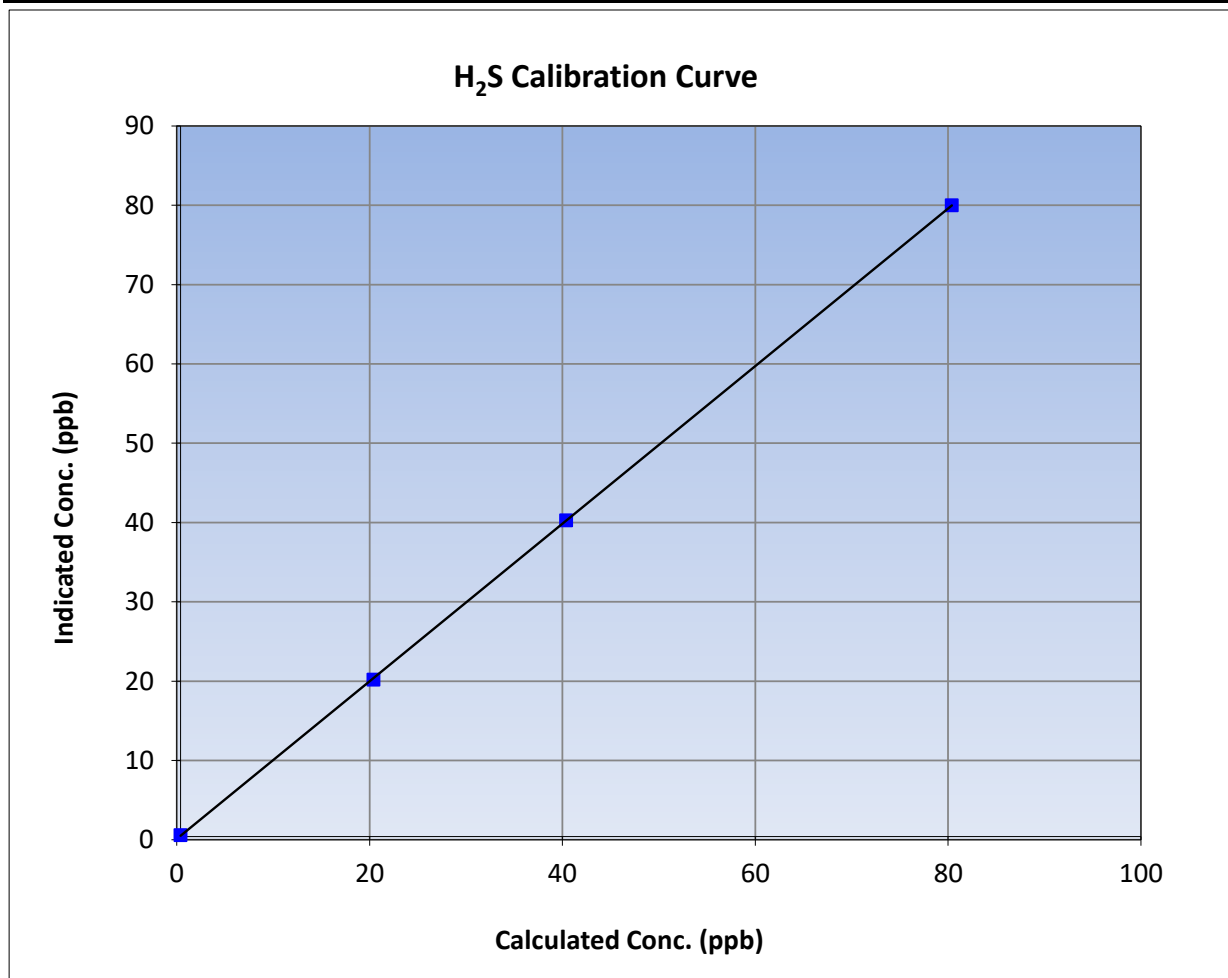
Version-11-2021

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 16, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:03	End Time (MST):	13:23
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

Calibration Data

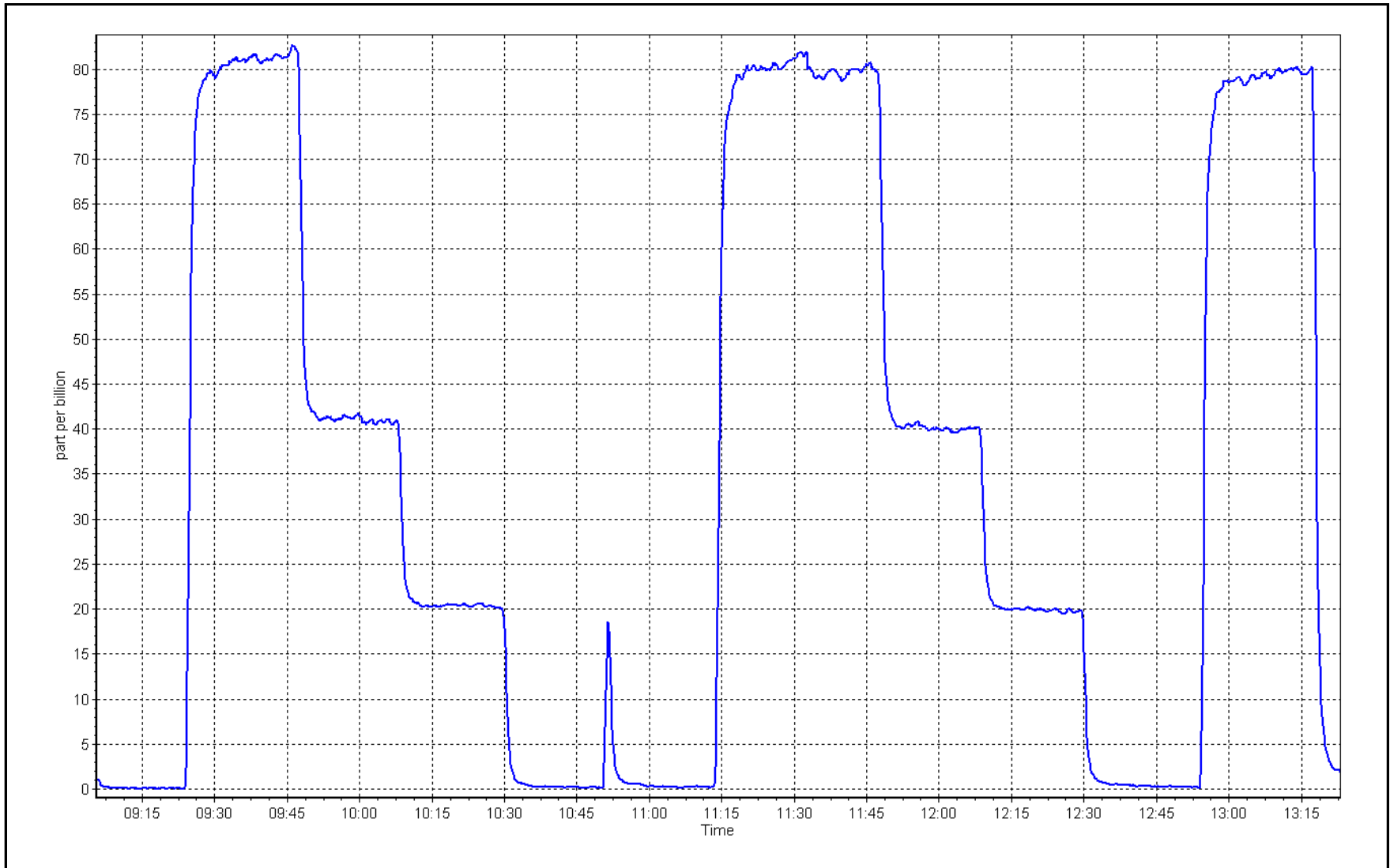
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999988	≥0.995
80.0	79.6	1.0049			
40.0	39.9	1.0024	Slope	0.993678	0.90 - 1.10
20.0	19.8	1.0099			
			Intercept	0.100794	+/-3



H₂S Calibration Plot

Date: April 4, 2023

Location: Mildred Lake





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Mildred Lake Station number: AMS02
 Calibration Date: April 5, 2023 Last Cal Date: April 4, 2023
 Start time (MST): 8:55 End time (MST): 11:58
 Reason: Maintenance will swap the pump (low flow)

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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.993678	1.015395	Backgd or Offset: 1.75	1.75
Calibration intercept:	0.100794	-0.059190	Coeff or Slope: 0.823	0.823

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4924	75.6	80.0	80.2	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.1	----
high point	4924	75.6	80.0	81.2	0.985
second point	4962	37.8	40.0	40.6	0.985
third point	4981	18.9	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.1	----
as left span	4924	75.6	80.0	80.8	0.990

SO₂ Scrubber Check

Date of last scrubber change:	12-Sep-22	Ave Corr Factor	0.990
Date of last converter efficiency test:		efficiency	

Baseline Corr As found:	80.1	Prev response:	79.59	*% change:	0.6%
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: Pump changed after as founds. No adjustment made.

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

H₂S Calibration Summary

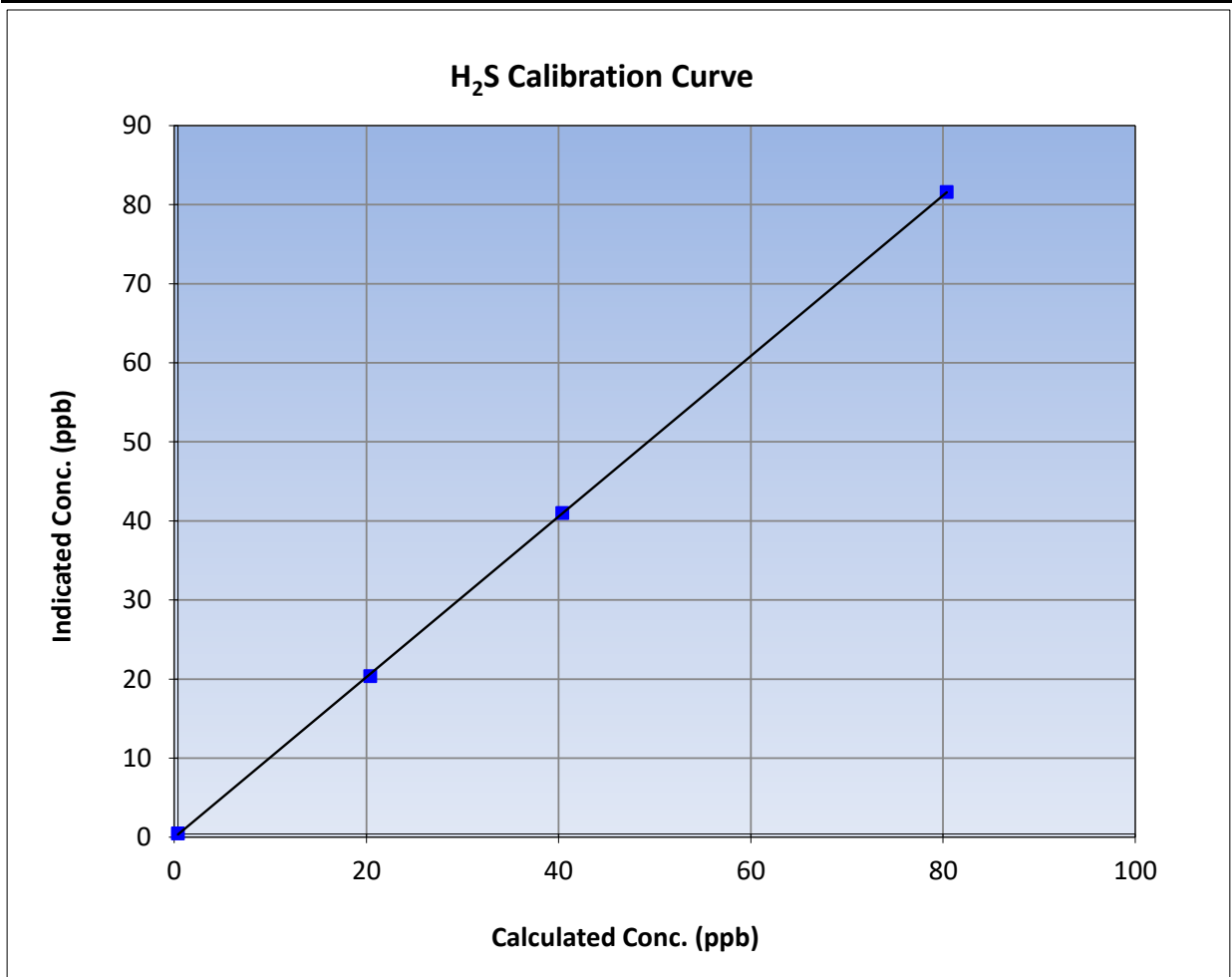
Version-11-2021

Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	April 4, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	8:55	End Time (MST):	11:58
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

Calibration Data

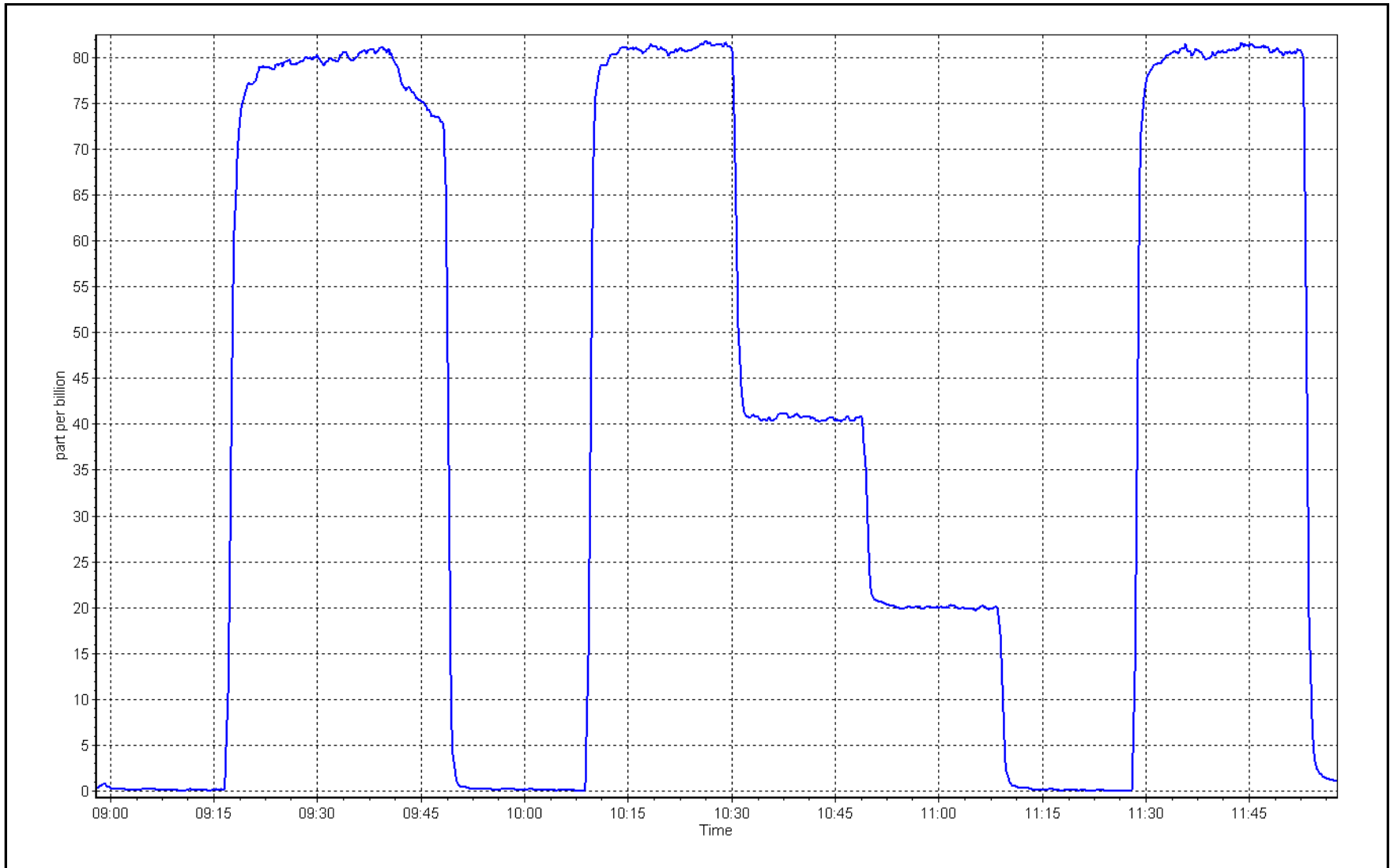
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999975	
80.0	81.2	0.9851			≥0.995
40.0	40.6	0.9851	Slope	1.015395	
20.0	20.0	0.9998			0.90 - 1.10
			Intercept	-0.059190	+/-3



H₂S Calibration Plot

Date: April 5, 2023

Location: Mildred Lake





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	April 13, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	10:42	End time (MST):	13:32
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC501209	Cal Gas Expiry Date:	August 12, 2024
CH ₄ Cal Gas Conc.	500.2 ppm	CH ₄ Equiv Conc.	1048.6 ppm
C ₃ H ₈ Cal Gas Conc.	199.4 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	
Removed CH ₄ Conc.	500.2 ppm	CH ₄ Equiv Conc.	1048.6 ppm
Removed C ₃ H ₈ 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:	5608

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	2.84E-04	2.86E-04	NMHC SP Ratio:	4.45E-04	4.49E-04
CH ₄ Retention time:	14.6	14.6	NMHC Peak Area:	197833	195861
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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	16.82	16.71	1.007
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	16.82	1.000
second point	4960	40.1	8.41	8.39	1.003
third point	4980	20.0	4.19	4.17	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.88	0.997
Average Correction Factor					1.003

Baseline Corr AF:	16.71	Prev response	16.80	*% change	-0.6%
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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.80	8.72	1.009
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	8.79	1.000
second point	4960	40.1	4.40	4.41	0.998
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					0.998
Baseline Corr AF:	8.72	Prev response	8.79	*% change	-0.8%
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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	7.99	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	80.2	8.02	8.03	1.000
second point	4960	40.1	4.01	3.98	1.008
third point	4980	20.0	2.00	1.97	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	8.05	0.997
Average Correction Factor					1.009
Baseline Corr AF:	7.99	Prev response	8.01	*% 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

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	1.000469	1.000482
THC Cal Offset:	-0.025314	-0.015912
CH ₄ Cal Slope:	1.001069	1.001482
CH ₄ Cal Offset:	-0.023053	-0.021253
NMHC Cal Slope:	0.999791	0.999608
NMHC Cal Offset:	-0.002261	0.004941

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

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

THC Calibration Summary

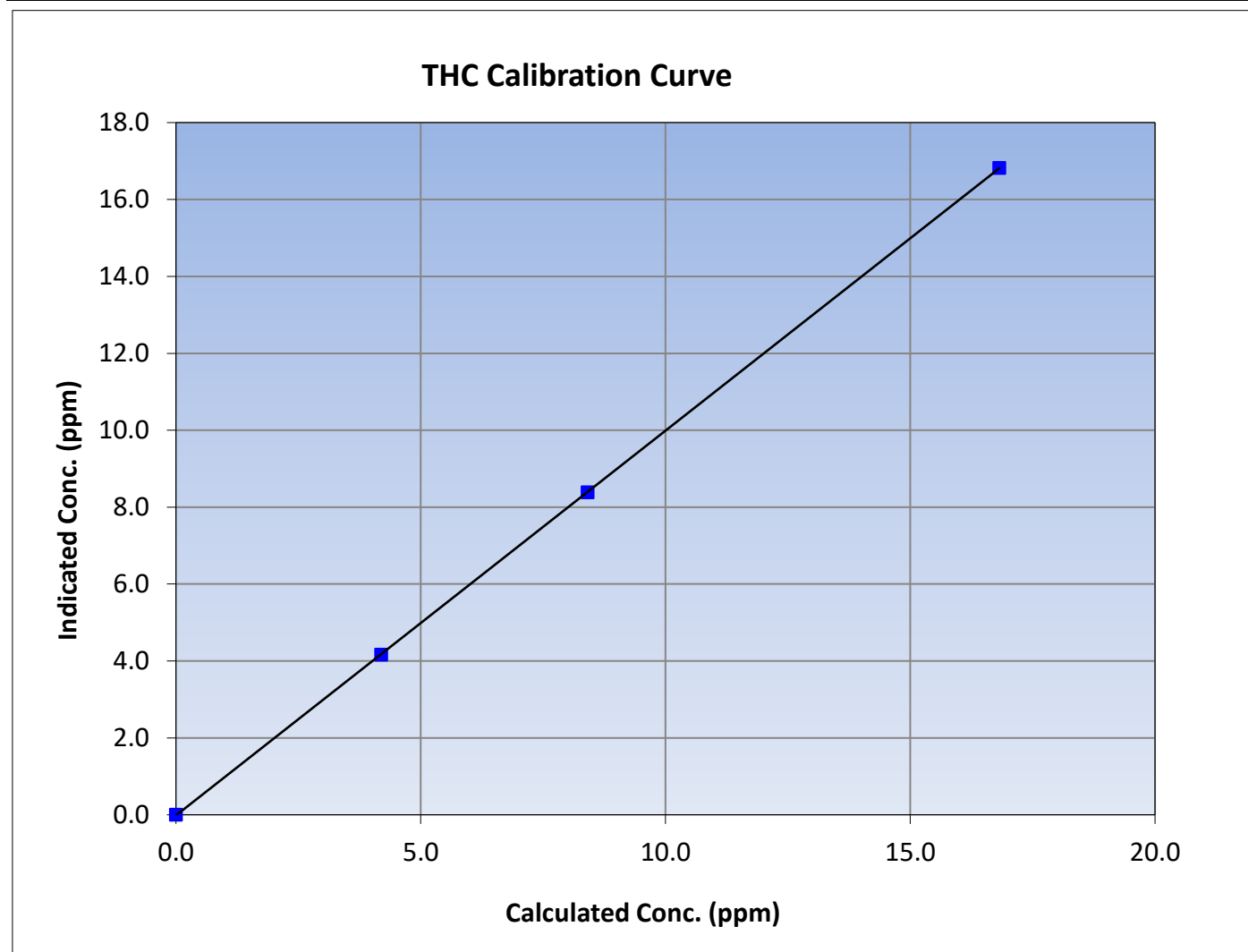
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:42	End Time (MST):	13:32
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999996	≥ 0.995			
16.82	16.82	0.9999						
8.41	8.39	1.0026				Slope	1.000482	0.90 - 1.10
4.19	4.17	1.0068						
			Intercept	-0.015912	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

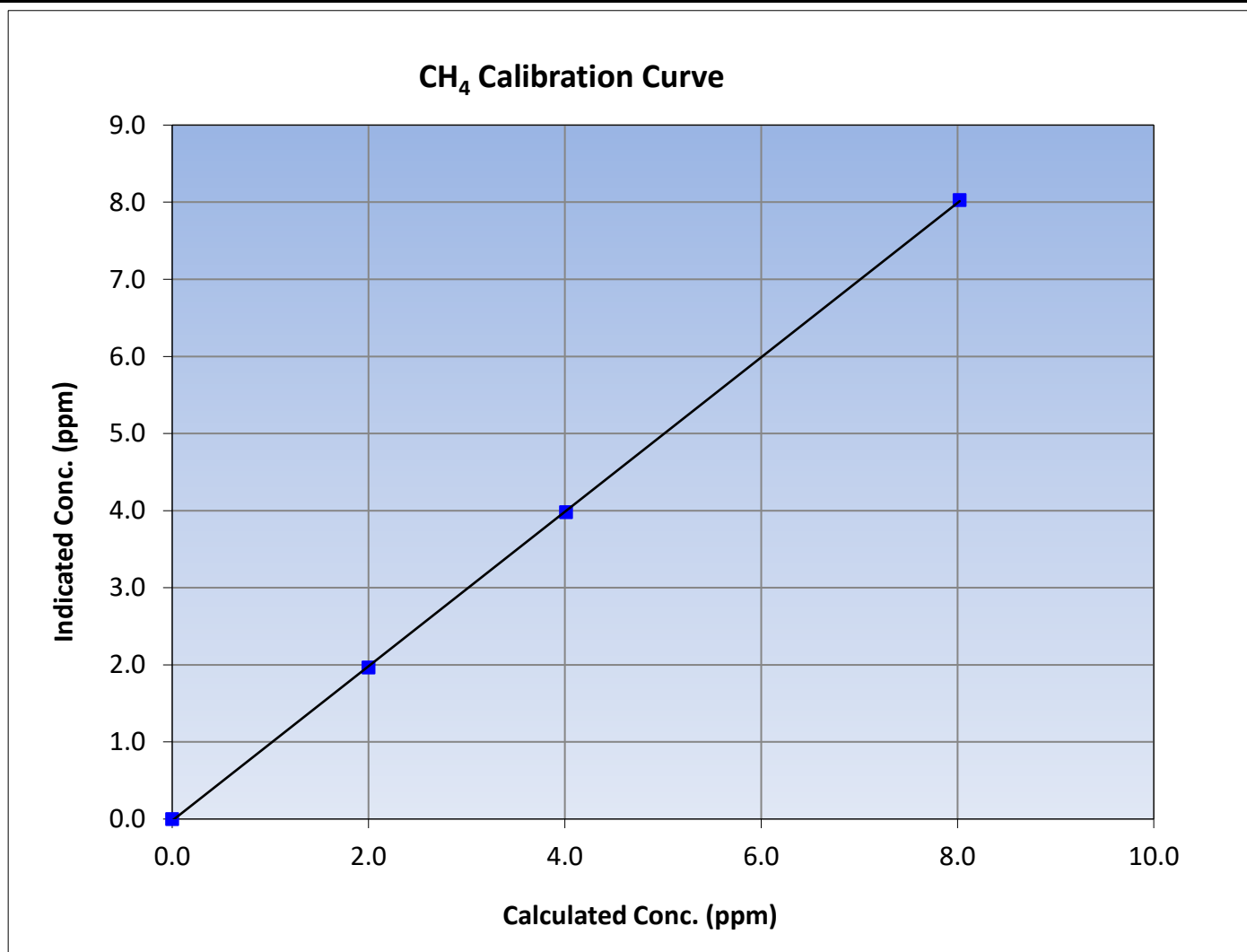
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:42	End Time (MST):	13:32
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999967	≥ 0.995			
8.02	8.03	0.9996						
4.01	3.98	1.0079				Slope	1.001482	0.90 - 1.10
2.00	1.97	1.0182						
			Intercept	-0.021253	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

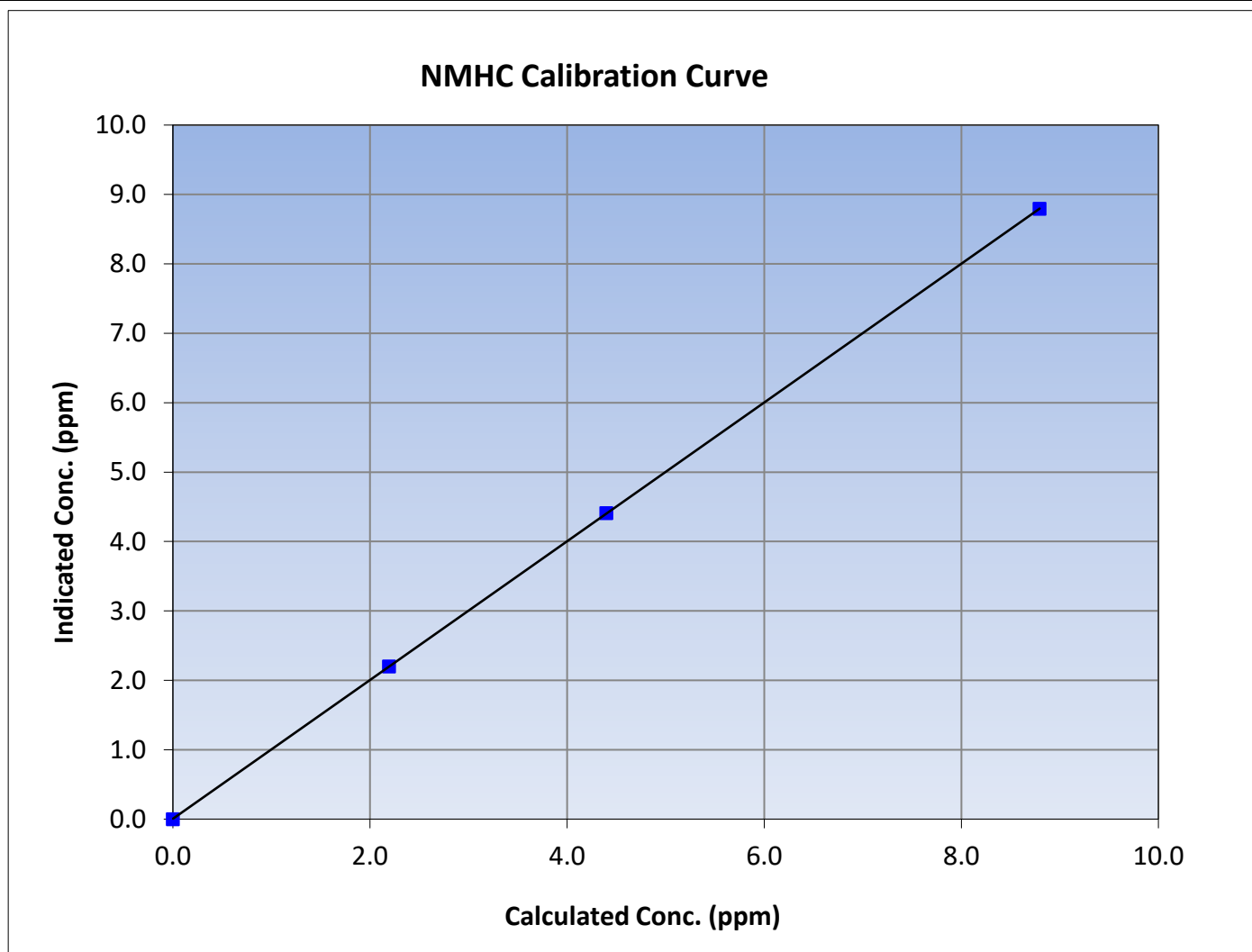
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:42	End Time (MST):	13:32
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

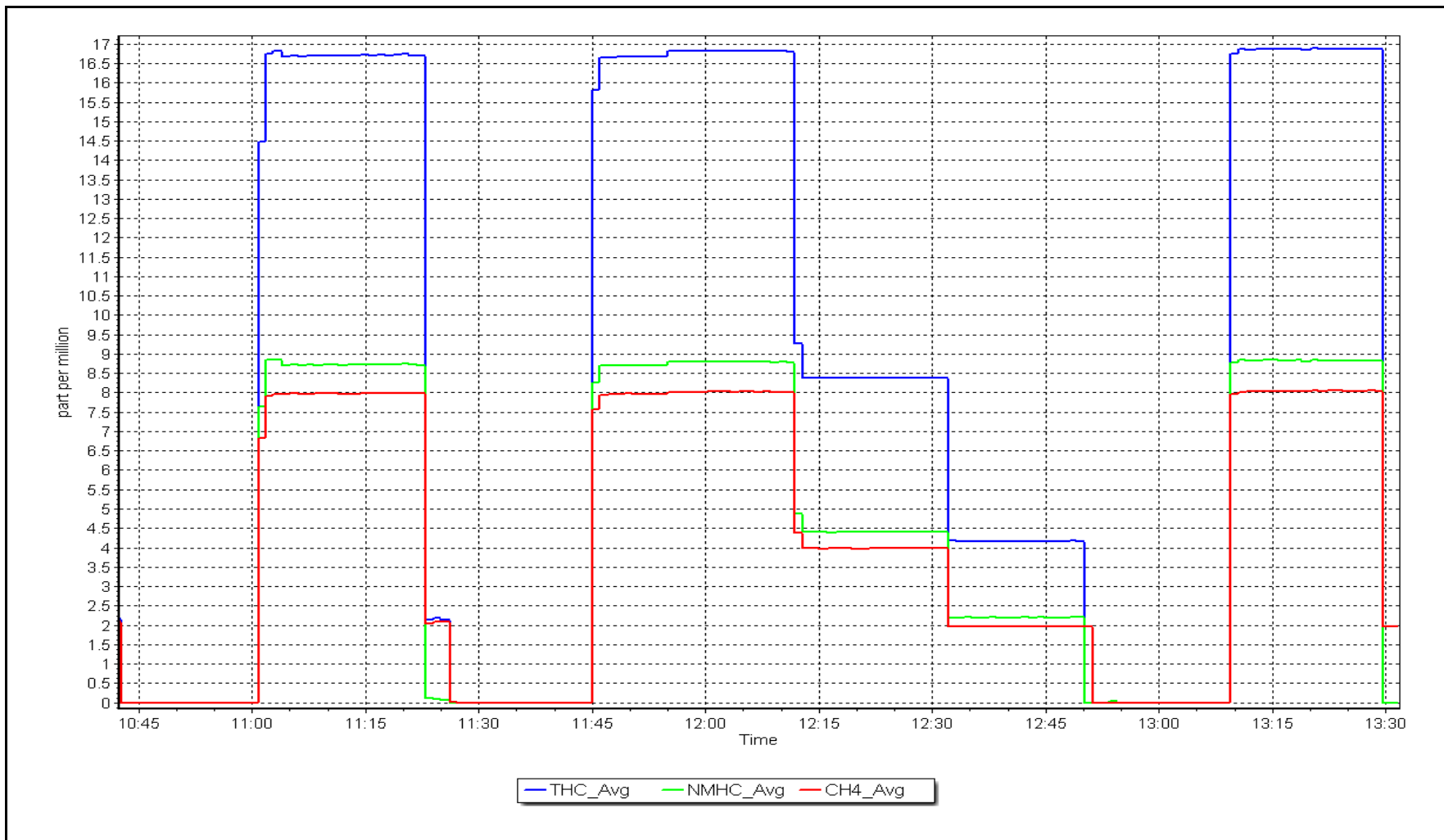
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999998	≥ 0.995			
8.80	8.79	1.0002						
4.40	4.41	0.9979				Slope	0.999608	0.90 - 1.10
2.19	2.20	0.9970						
			Intercept	0.004941	± 0.5			



NMHC Calibration Plot

Date: April 13, 2023

Location: Mildred Lake





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04 BUFFALO VIEWPOINT APRIL 2023

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

May 31, 2023





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	April 13, 2023	Last Cal Date:	March 28, 2023
Start time (MST):	7:42	End time (MST):	11:14
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.02	ppm	Cal Gas Exp Date:	September 9, 2028
Cal Gas Cylinder #:	CC470284			
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:	3808
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932
Analyzer Range	0 - 1000 ppb		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.996516	1.001885	Backgd or Offset:	22.1	22.1
Calibration intercept:	-0.920000	-0.100000	Coeff or Slope:	0.869	0.869

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.2	----
as found span	4920	80.0	800.3	797.2	1.004
as found 2nd point	4960	40.0	400.2	399.9	1.001
as found 3rd point	4980	20.0	200.1	198.9	1.006
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	80.0	800.3	801.7	0.998
second point	4960	40.0	400.2	401.4	0.997
third point	4980	20.0	200.1	199.3	1.004
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.0	800.3	801.8	0.998
Average Correction Factor					1.000

Baseline Corr As found:	797.00	Previous response	796.61	*% change	0.0%
Baseline Corr 2nd AF pt:	399.70	AF Slope:	0.996259	AF Intercept:	0.220000
Baseline Corr 3rd AF pt:	198.70	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

Notes: Analyzer moved to bottom shelf for more room for H2S analyzer. Sample line replaced to a longer line. Exhaust line extended. No adjustments done.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

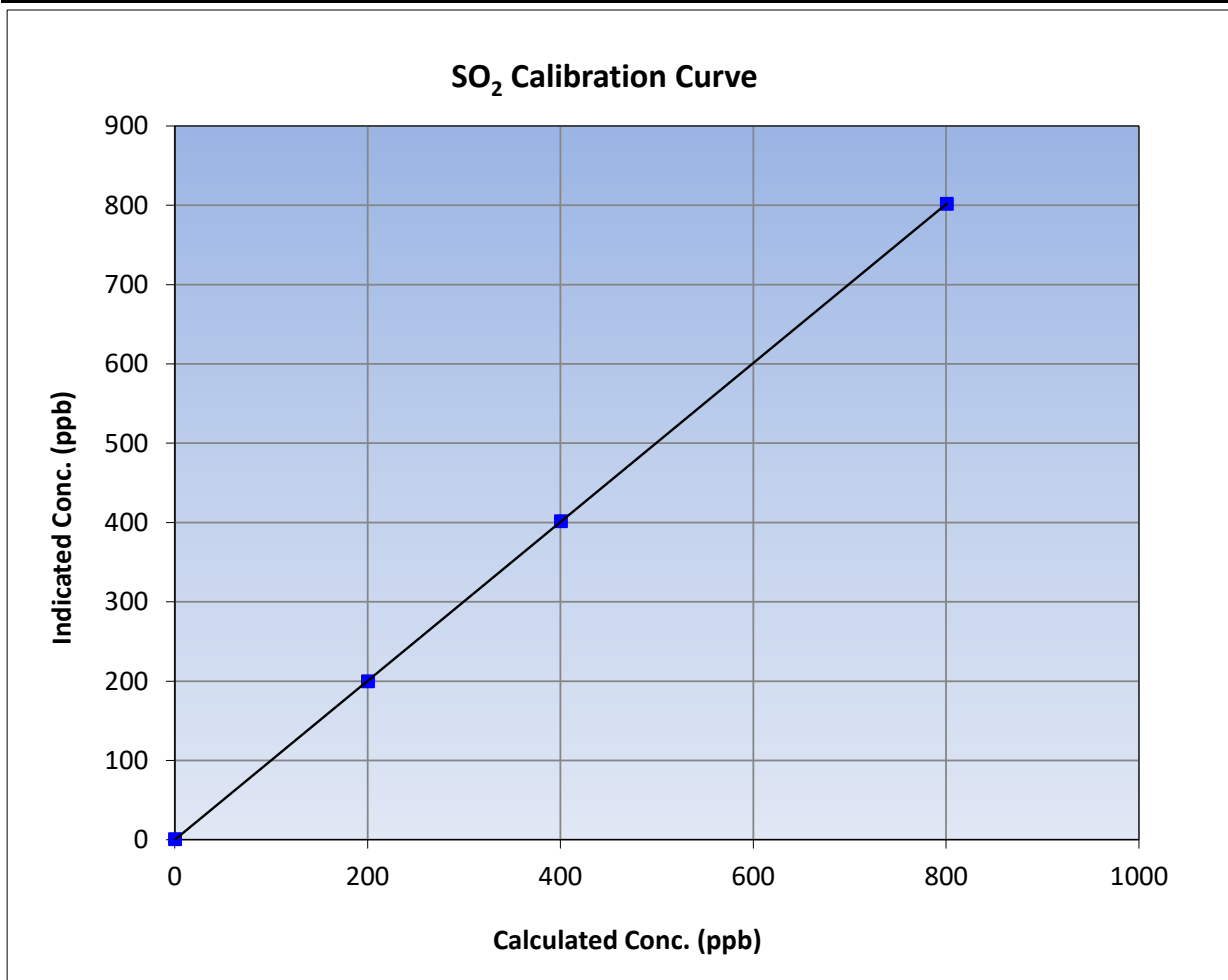
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 28, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:42	End Time (MST):	11:14
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

Calibration Data

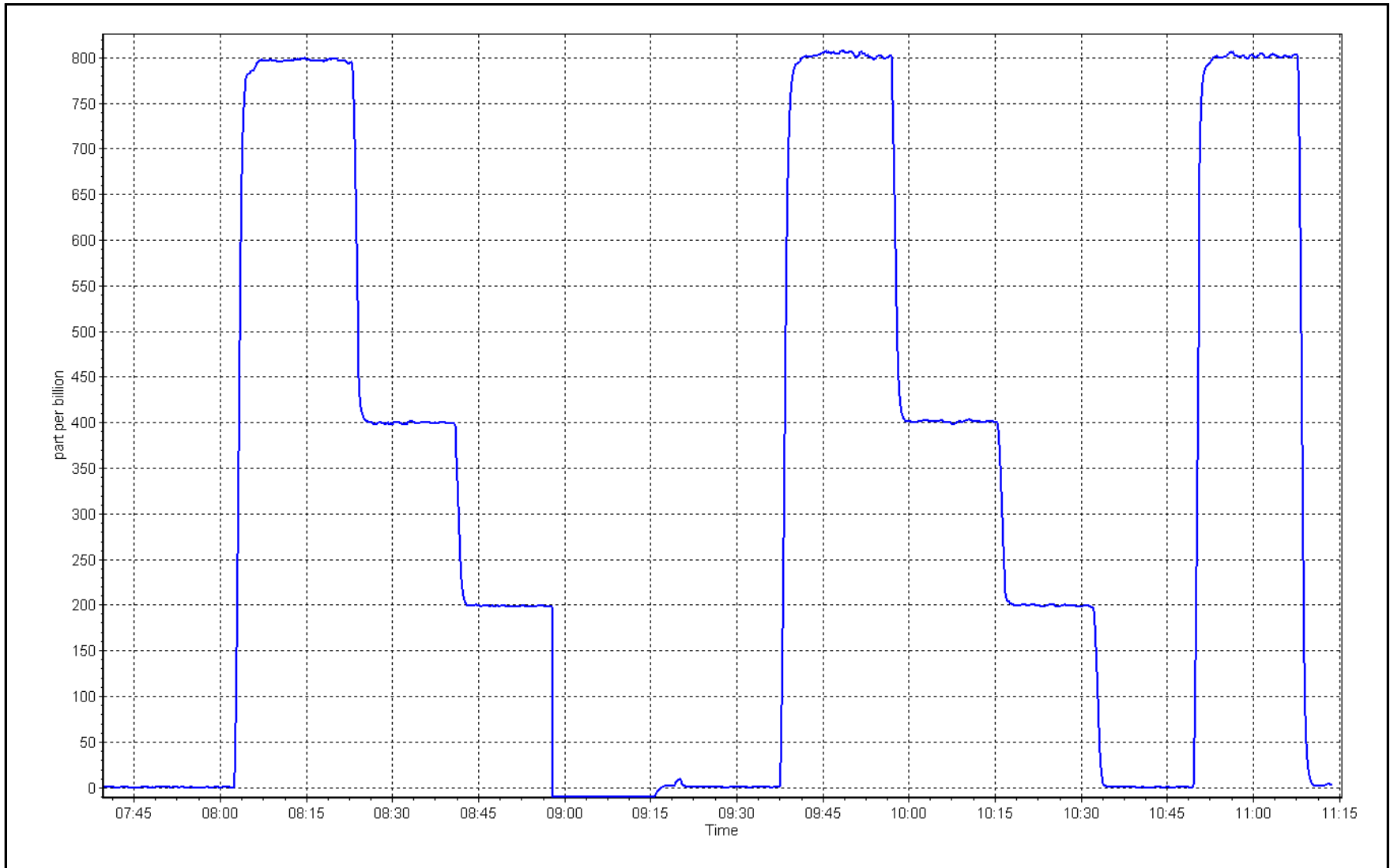
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.4	----	Correlation Coefficient	0.999995	≥0.995
800.3	801.7	0.9983			
400.2	401.4	0.9969	Slope	1.001885	0.90 - 1.10
200.1	199.3	1.0039			
			Intercept	-0.100000	+/-30



SO2 Calibration Plot

Date: April 13, 2023

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Buffalo Viewpoint Station number: AMS04
 Calibration Date: April 27, 2023 Last Cal Date: March 8, 2023
 Start time (MST): 6:42 End time (MST): 10:38
 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: January 4, 2025
 Removed Gas Cyl #: CC345266 Diff between cyl:
 Calibrator Make/Model: API T700 Serial Number: 3808
 ZAG Make/Model: API T701H Serial Number: 362

Analyzer Information

Analyzer make: Thermo 450i Analyzer serial #: 1336160094
 Converter make: NA Converter serial #: NA
 Analyzer Range: 0 - 100 ppb

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.995796	0.996073	Backgd or Offset:	18.7 19.0
Calibration intercept:	0.201944	0.142229	Coeff or Slope:	1.080 1.070

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.4	----
as found span	4926	74.1	80.3	81.1	0.995
as found 2nd point	4963	37.0	40.1	40.9	0.990
as found 3rd point	4982	18.5	20.1	20.4	1.003
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.1	80.3	80.0	1.004
second point	4963	37.0	40.1	40.5	0.990
third point	4982	18.5	20.1	19.9	1.008
as left zero	5000	0.0	0.0	0.4	----
as left span	4926	74.1	80.3	80.1	1.003
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.001
Date of last converter efficiency test:				efficiency	

Baseline Corr As found: 80.7 Prev response: 80.19 *% change: 0.6%
 Baseline Corr 2nd AF pt: 40.5 AF Slope: 1.005608 AF Intercept: 0.382341
 Baseline Corr 3rd AF pt: 20.0 AF Correlation: 0.999983

* = > +/-5% change initiates investigation

Notes: Sox scrubber checked after the calibrator zero. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

H₂S Calibration Summary

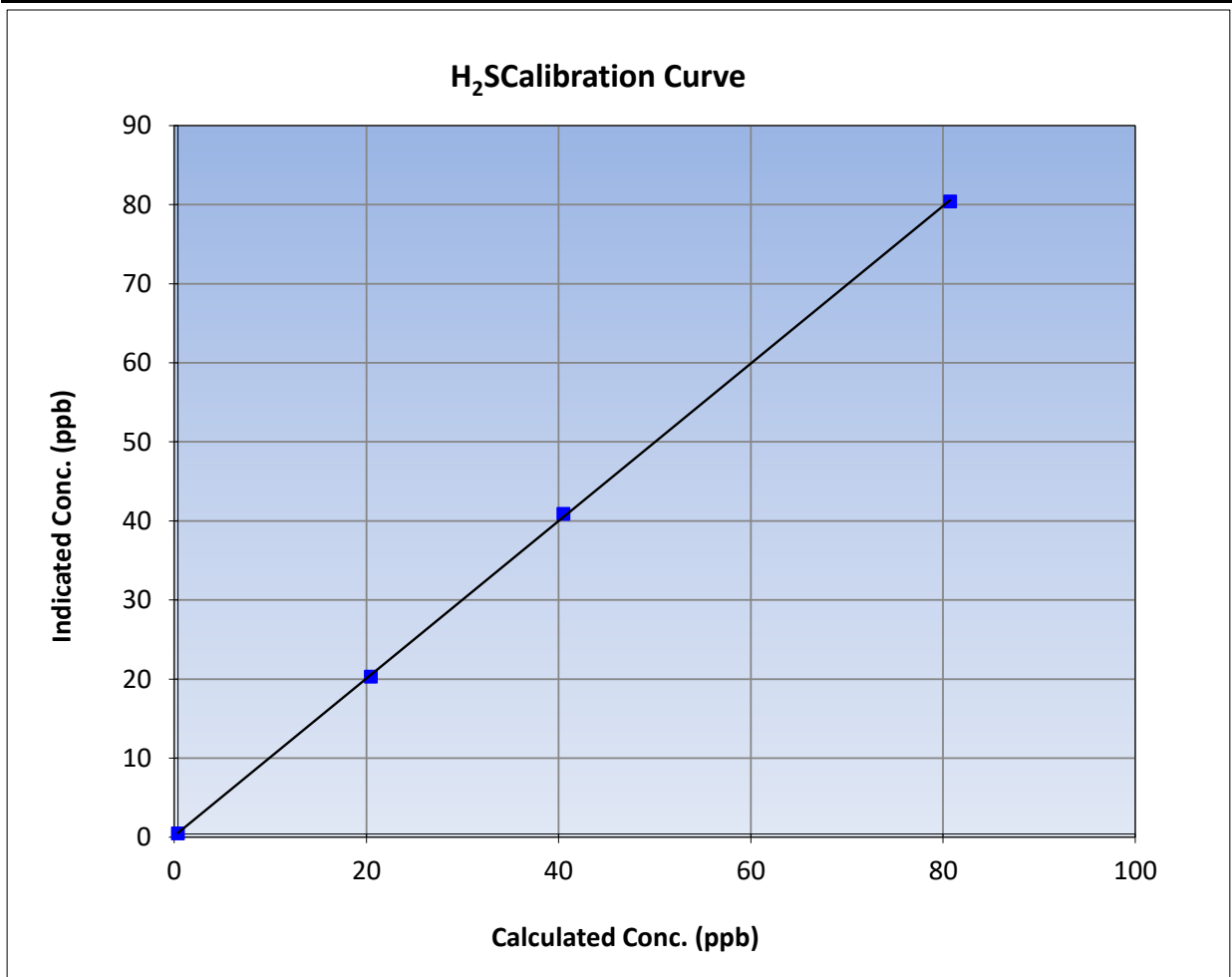
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:42	End Time (MST):	10:38
Analyzer make:	Thermo 450i	Analyzer serial #:	1336160094

Calibration Data

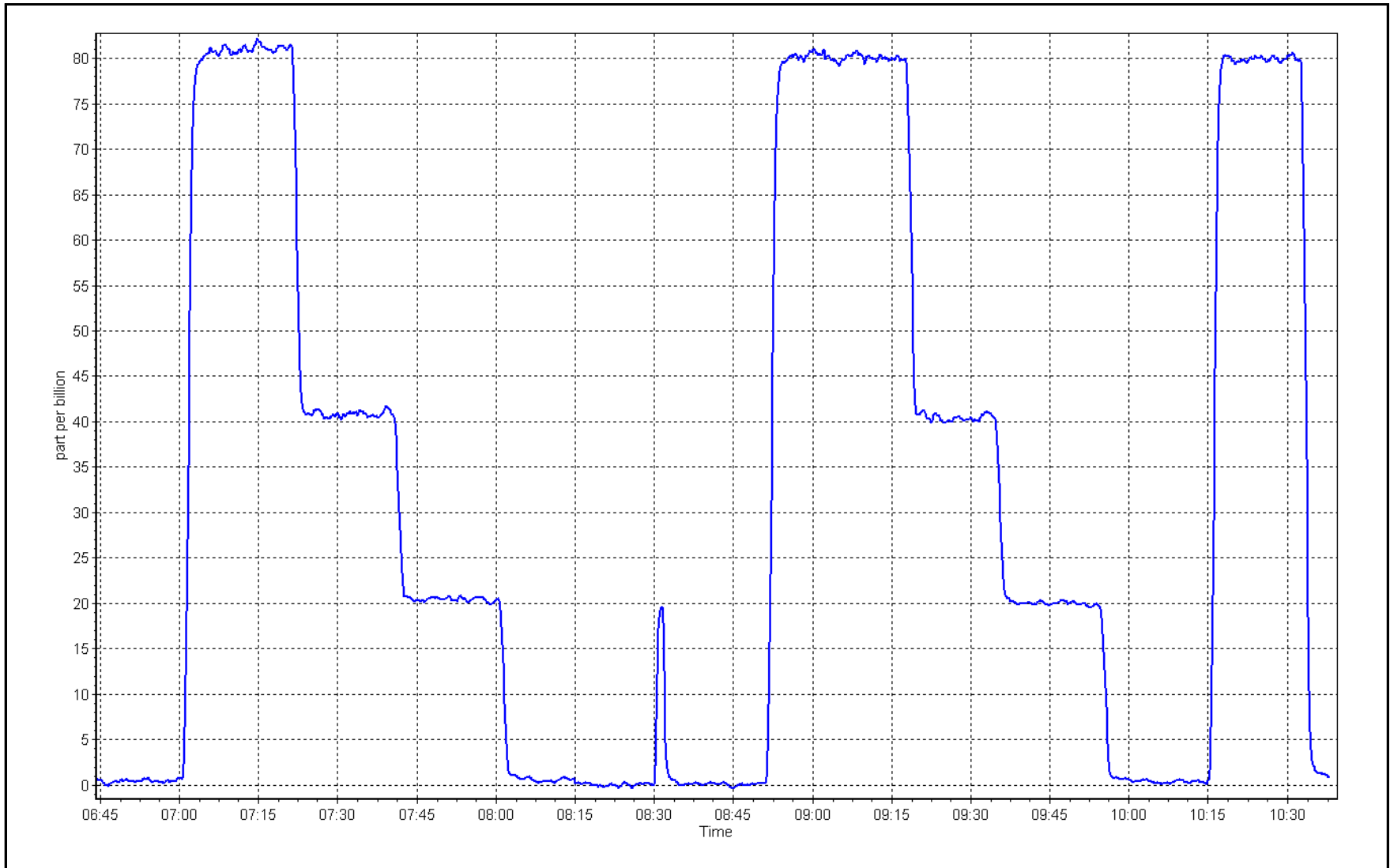
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999932	≥0.995
80.3	80.0	1.0040			
40.1	40.5	0.9903	Slope	0.996073	0.90 - 1.10
20.1	19.9	1.0076			
			Intercept	0.142229	+/-3



H₂S Calibration Plot

Date: April 27, 2023

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	May 4, 2023	Last Cal Date:	April 6, 2023
Start time (MST):	8:35	End time (MST):	11:17
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC470284	Cal Gas Expiry Date:	September 9, 2028
CH ₄ Cal Gas Conc.	497.8 ppm	CH ₄ Equiv Conc.	1062.9 ppm
C ₃ H ₈ Cal Gas Conc.	205.5 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	497.8 ppm	CH ₄ Equiv Conc.	1062.9 ppm
Removed C ₃ H ₈ Conc.	205.5 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	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	1.840E-04	1.860E-04	NMHC SP Ratio:	3.820E-05
CH ₄ Retention time:	11.8	11.8	NMHC Peak Area:	236377
				233712

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	17.01	16.76	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.01	16.98	1.002
second point	4960	40.0	8.50	8.48	1.003
third point	4980	20.0	4.25	4.21	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.01	16.96	1.003

Average Correction Factor				1.005
Baseline Corr AF:	16.76	Prev response	17.00	*% change -1.4%
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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	9.04	8.94	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.04	9.04	1.000
second point	4960	40.0	4.52	4.51	1.002
third point	4980	20.0	2.26	2.24	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.04	9.04	1.000
Average Correction Factor					1.004
Baseline Corr AF:	8.94	Prev response	9.02	*% change	-0.9%
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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	7.96	7.83	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	7.96	7.94	1.003
second point	4960	40.0	3.98	3.97	1.003
third point	4980	20.0	1.99	1.98	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	7.96	7.92	1.006
Average Correction Factor					1.004
Baseline Corr AF:	7.83	Prev response	7.96	*% 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

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	1.001213	0.999063
THC Cal Offset:	-0.032000	-0.016000
CH ₄ Cal Slope:	1.001406	0.997102
CH ₄ Cal Offset:	-0.012000	-0.002000
NMHC Cal Slope:	0.999779	1.000411
NMHC Cal Offset:	-0.020000	-0.010000

Notes: Span adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

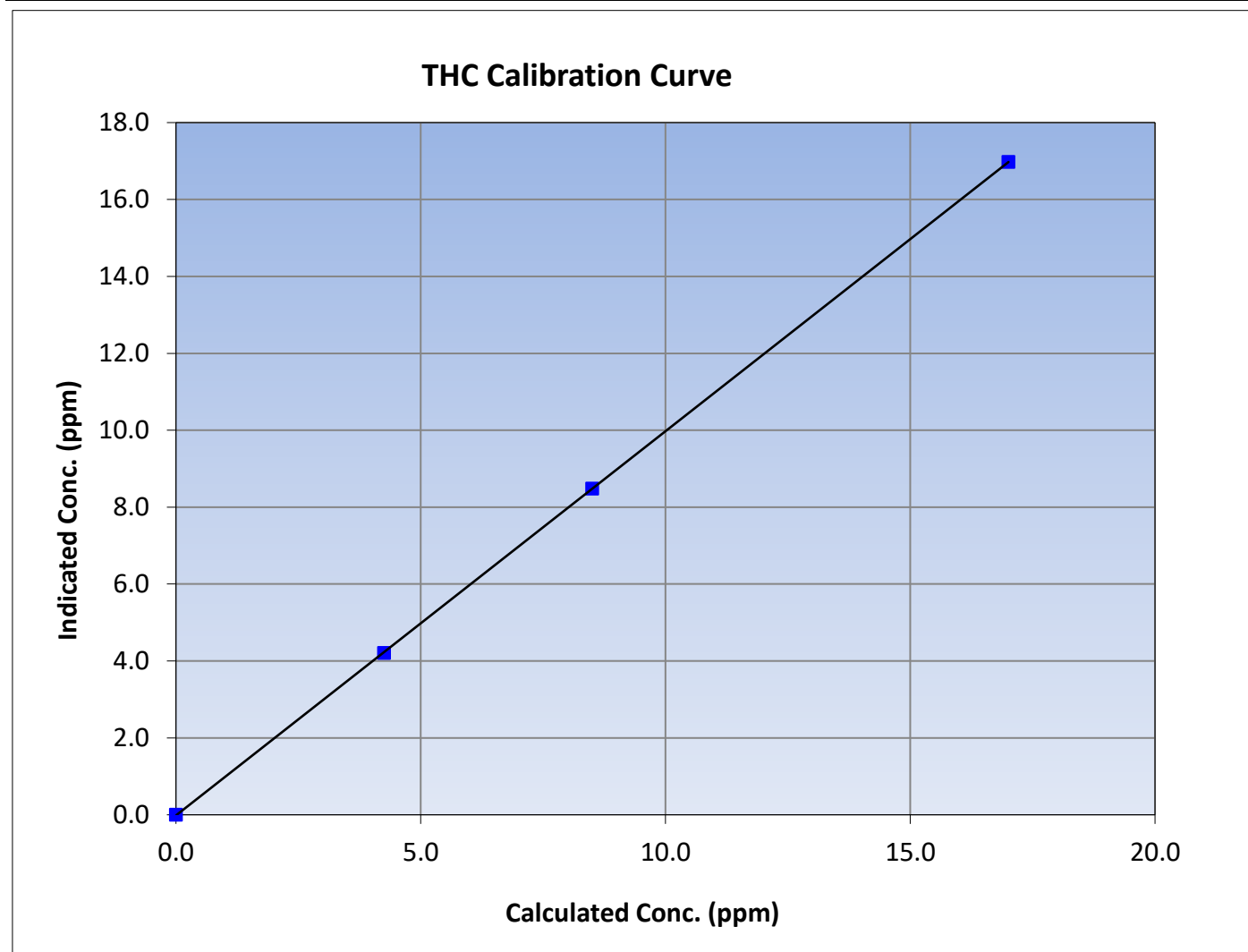
Version-01-2020

Station Information

Calibration Date:	May 4, 2023	Previous Calibration:	April 6, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:17
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999995	≥ 0.995
17.01	16.98	1.0016			
8.50	8.48	1.0028			
4.25	4.21	1.0099			
			Slope	0.999063	0.90 - 1.10
			Intercept	-0.016000	+/-0.5





Wood Buffalo Environmental Association

CH₄ Calibration Summary

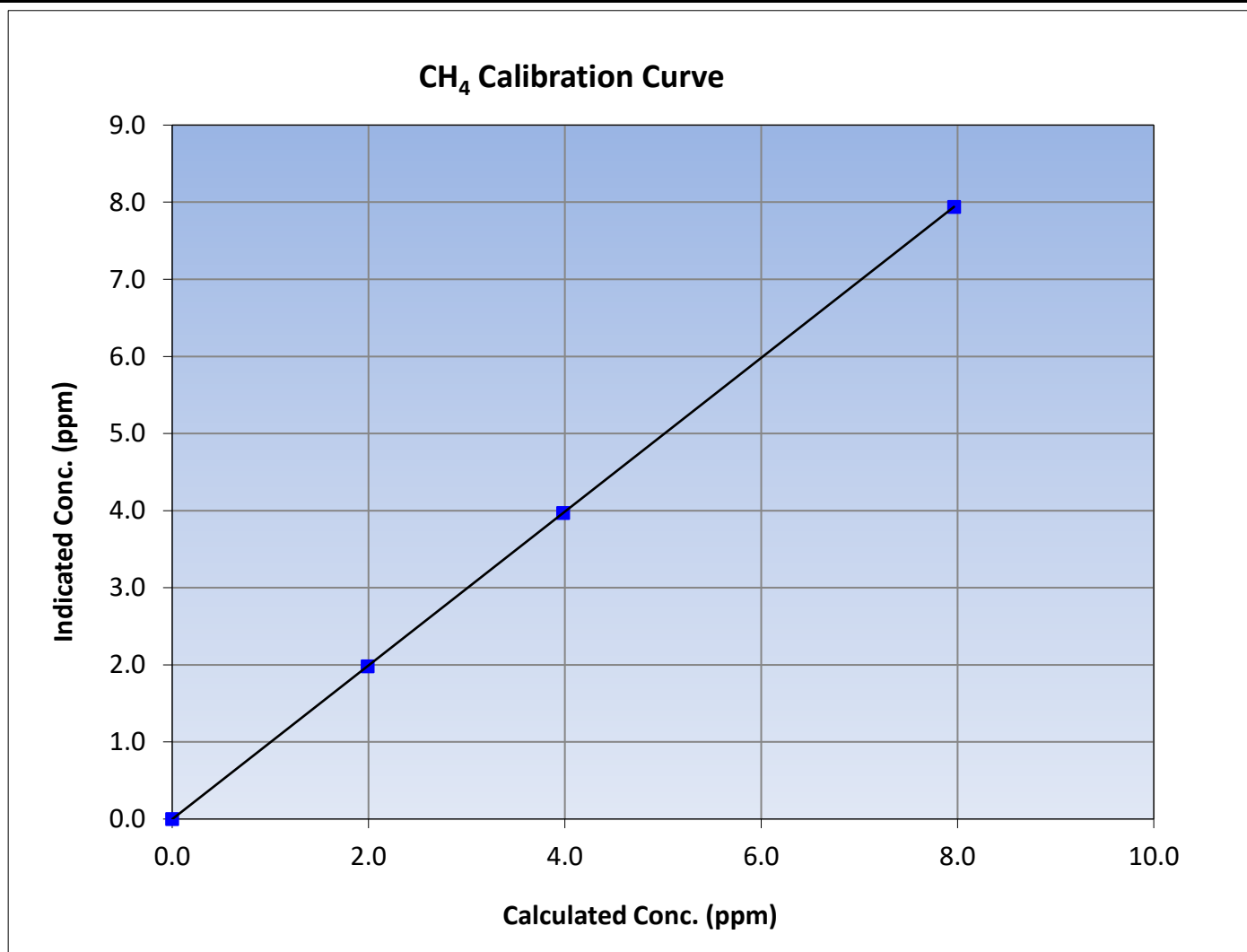
Version-01-2020

Station Information

Calibration Date:	May 4, 2023	Previous Calibration:	April 6, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:17
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	1.000000	≥0.995
7.96	7.94	1.0031			
3.98	3.97	1.0031			
1.99	1.98	1.0057			
			Slope	0.997102	0.90 - 1.10
			Intercept	-0.002000	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

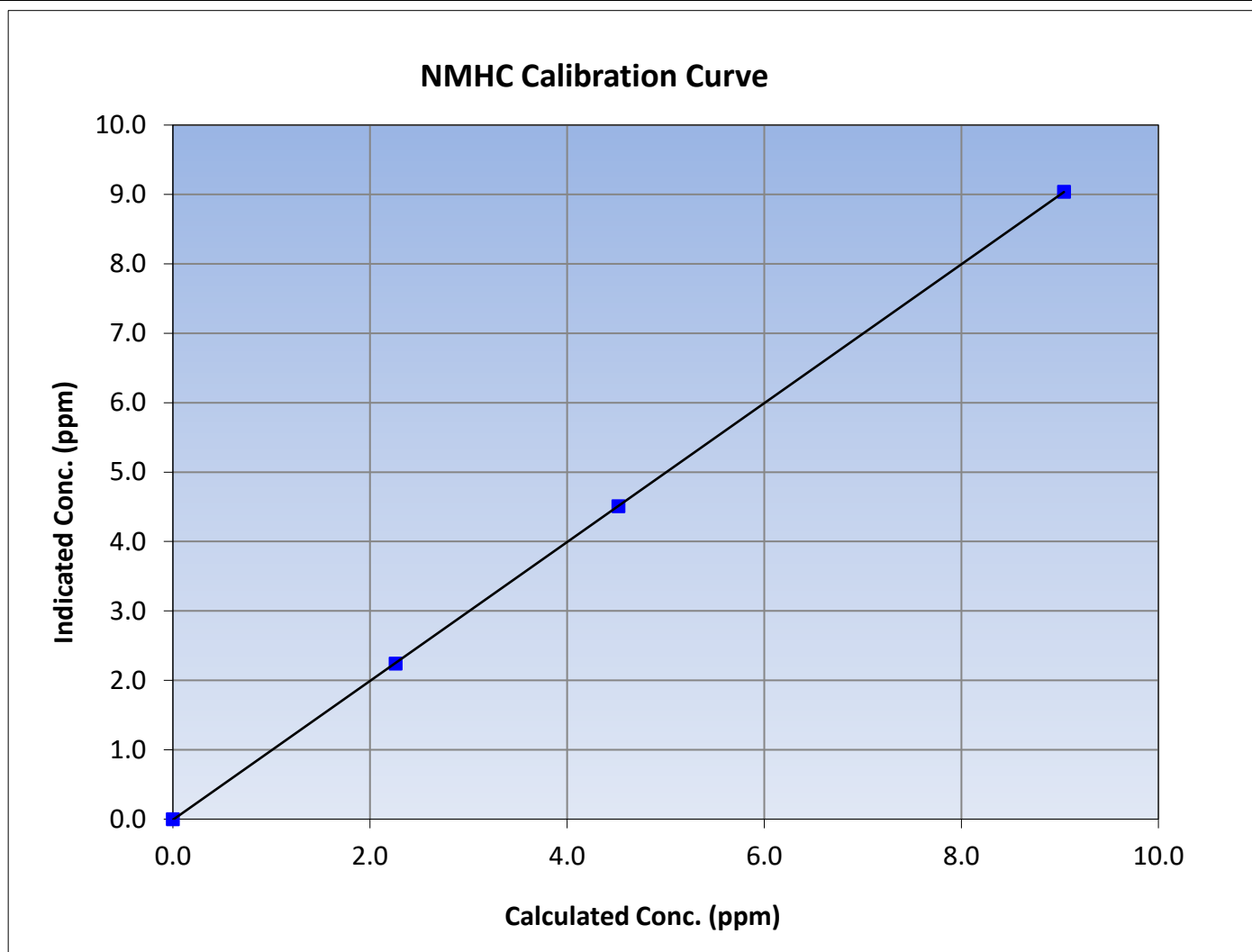
Version-01-2020

Station Information

Calibration Date:	May 4, 2023	Previous Calibration:	April 6, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:17
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

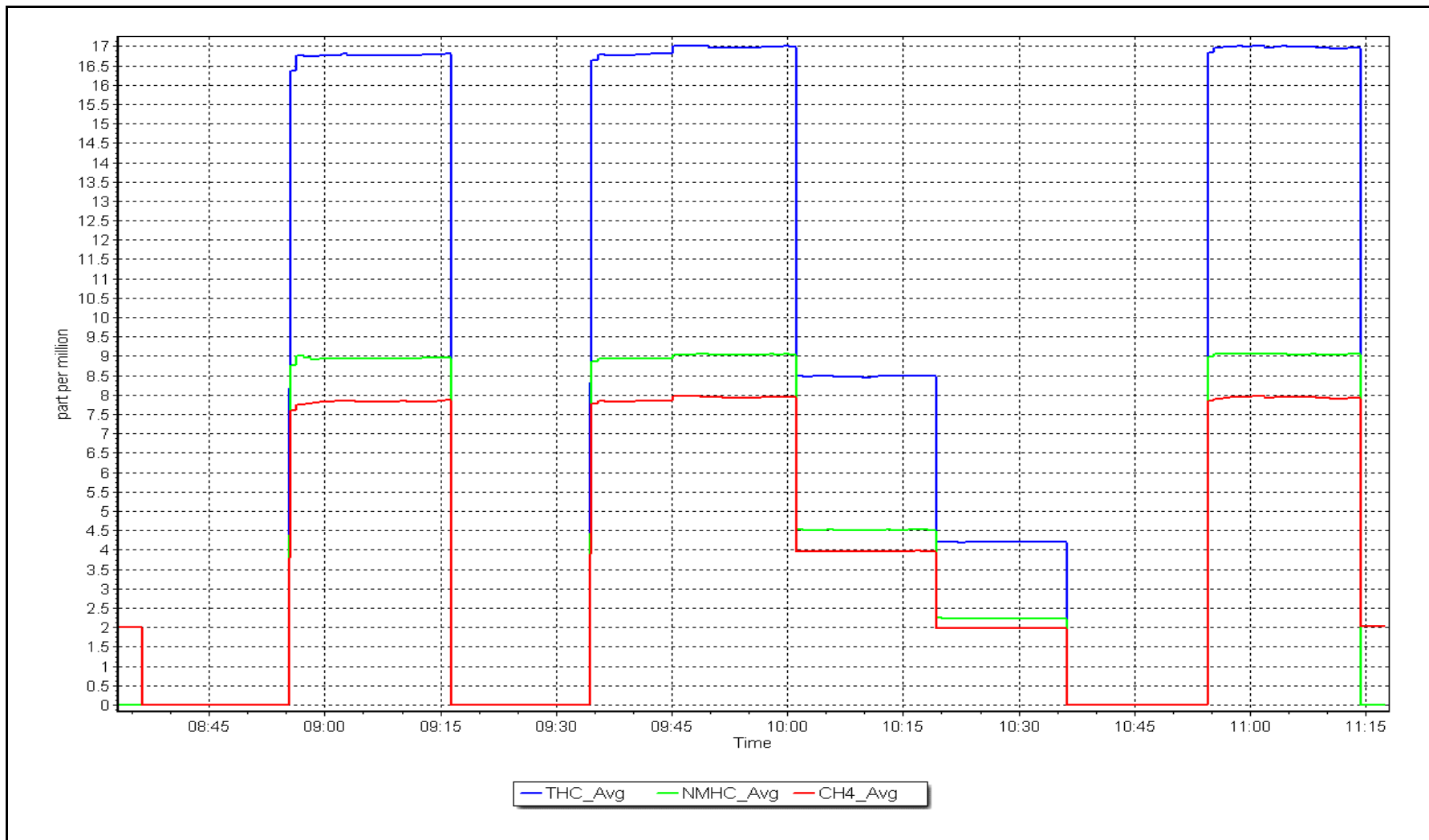
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999994	≥ 0.995
9.04	9.04	1.0002			
4.52	4.51	1.0024			
2.26	2.24	1.0092			
			Slope	1.000411	0.90 - 1.10
			Intercept	-0.010000	+/-0.5



NMHC Calibration Plot

Date: May 4, 2023

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	April 13, 2023	Last Cal Date:	April 5, 2023
Start time (MST):	6:15	End time (MST):	7:44
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC470284	Cal Gas Expiry Date:	September 9, 2028
CH ₄ Cal Gas Conc.	497.8 ppm	CH ₄ Equiv Conc.	1062.9 ppm
C ₃ H ₈ Cal Gas Conc.	205.5 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	497.8 ppm	CH ₄ Equiv Conc.	1062.9 ppm
Removed C ₃ H ₈ Conc.	205.5 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	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	1.840E-04	1.840E-04	NMHC SP Ratio:	3.820E-05
CH ₄ Retention time:	11.8	11.8	NMHC Peak Area:	236377
				236377

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	17.01	16.82	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.01	16.81	1.012
second point					
third point					
as left zero					
as left span					

				Average Correction Factor	1.012
Baseline Corr AF:	16.82	Prev response	17.00	*% change	-1.0%
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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	9.04	8.97	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.04	8.96	1.009
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.009
Baseline Corr AF:	8.97	Prev response	9.02	*% change	-0.6%
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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	7.96	7.85	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	7.96	7.85	1.015
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.015
Baseline Corr AF:	7.85	Prev response	7.96	*% 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

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	1.001213	0.988428
THC Cal Offset:	-0.032000	0.000000
CH ₄ Cal Slope:	1.001406	0.985587
CH ₄ Cal Offset:	-0.012000	0.000000
NMHC Cal Slope:	0.999779	0.990931
NMHC Cal Offset:	-0.020000	0.000000

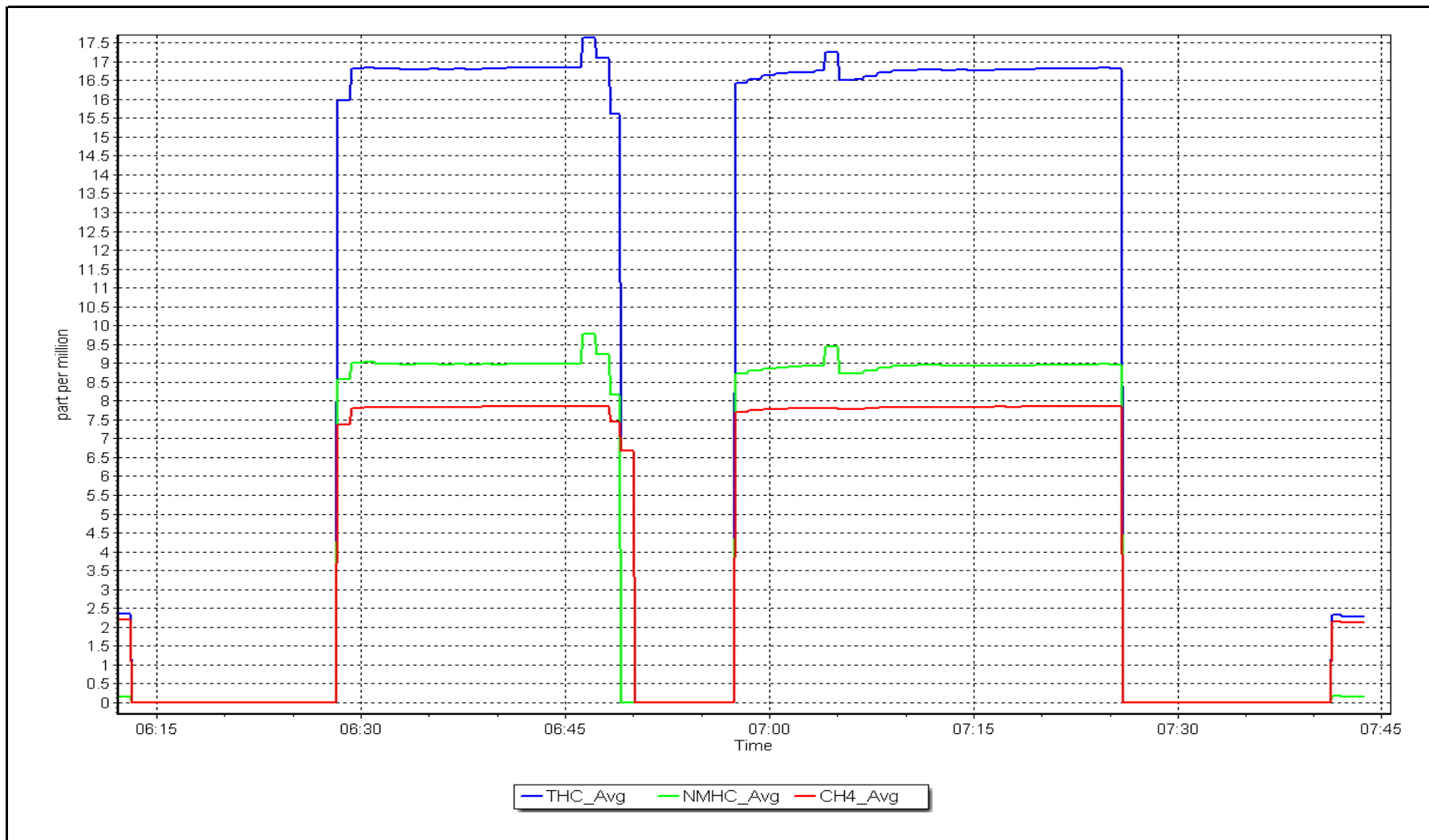
Notes: Hydrogen and Nitrogen cylinder change.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot

Date: April 13, 2023

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Buffalo Viewpoint
Calibration Date: April 4, 2023
Start time (MST): 6:20
Reason: Routine
Station number: AMS04
Last Cal Date: March 3, 2023
End time (MST): 11:26

Calibration Standards

NO Gas Cylinder #: T36RH1F
NOX Cal Gas Conc: 51.16 ppm
Removed Cylinder #: NA
Removed Gas NOX Conc: 51.16 ppm
NOX gas Diff:
Calibrator Model: API T700
ZAG make/model: API T701
Cal Gas Expiry Date: August 18, 2023
NO Cal Gas Conc: 50.91 ppm
Removed Gas Exp Date: NA
Removed Gas NO Conc: 50.91 ppm
NO gas Diff:
Serial Number: 2445
Serial Number: 362

Analyzer Information

Analyzer make: API T200
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 723

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	0.998	1.014	NO bkgnd or offset:	-2.1	-2.1
NOX coeff or slope:	0.992	1.013	NOX bkgnd or offset:	-1.7	-1.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.7	7.6

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.998743	0.999617
NO _x Cal Offset:	0.546857	-0.133690
NO Cal Slope:	1.004711	0.998232
NO Cal Offset:	-0.973240	-0.993777
NO ₂ Cal Slope:	0.992216	0.984274
NO ₂ Cal Offset:	0.603575	-0.102857



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.2	0.3	----	----
as found span	4922	78.1	799.1	795.2	3.9	782.1	780.8	1.3	1.0217	1.0184
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.5	-0.1	----	----
high point	4922	78.1	799.1	795.2	3.9	798.9	793.5	5.4	1.0003	1.0021
second point	4961	39.1	400.1	398.1	2.0	399.6	395.8	3.8	1.0012	1.0058
third point	4981	19.5	199.5	198.5	1.0	198.7	195.6	3.1	1.0040	1.0150
as left zero	5000	0.0	0.0	0.0	0.0	0.8	0.9	-0.1	----	----
as left span	4922	78.1	799.1	376.0	423.1	798.0	385.5	412.5	1.0014	0.9754
Average Correction Factor									1.0018	1.0076

Corrected As found	NO _x = 782.0 ppb	NO = 781.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -2.1%	
Previous Response	NO _x = 798.6 ppb	NO = 798.0 ppb		*Percent Change	NO = -2.2%	
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:	Nx Int:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:	NO Int:
			As found	NO ₂ r ² :	NO ₂ SI:	NO ₂ Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	797.1	377.9	423.1	416.4	1.0161	98.4%
2nd GPT point (200 ppb O3)	797.1	581.4	219.6	215.9	1.0172	98.3%
3rd GPT point (100 ppb O3)	797.1	686.8	114.2	112.4	1.0161	98.4%
Average Correction Factor					1.0164	98.4%

Notes: No maintenance done. Span adjusted. Due to drifting during the GPT the 2nd NO ref point used.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

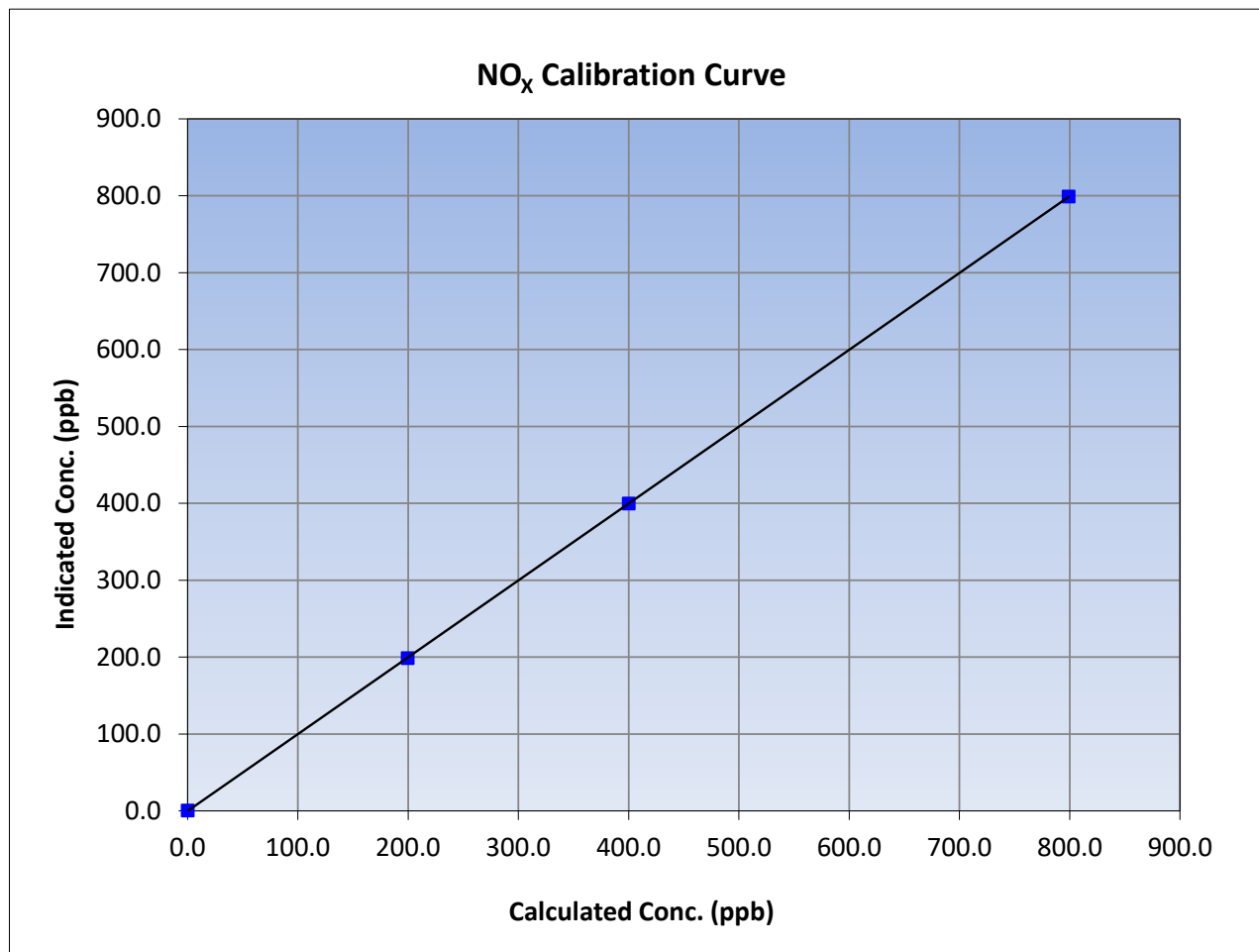
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:26
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.4	----	Correlation Coefficient	≥0.995	
799.1	798.9	1.0003			
400.1	399.6	1.0012			
199.5	198.7	1.0040			
			Slope	0.999617	0.90 - 1.10
			Intercept	-0.133690	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

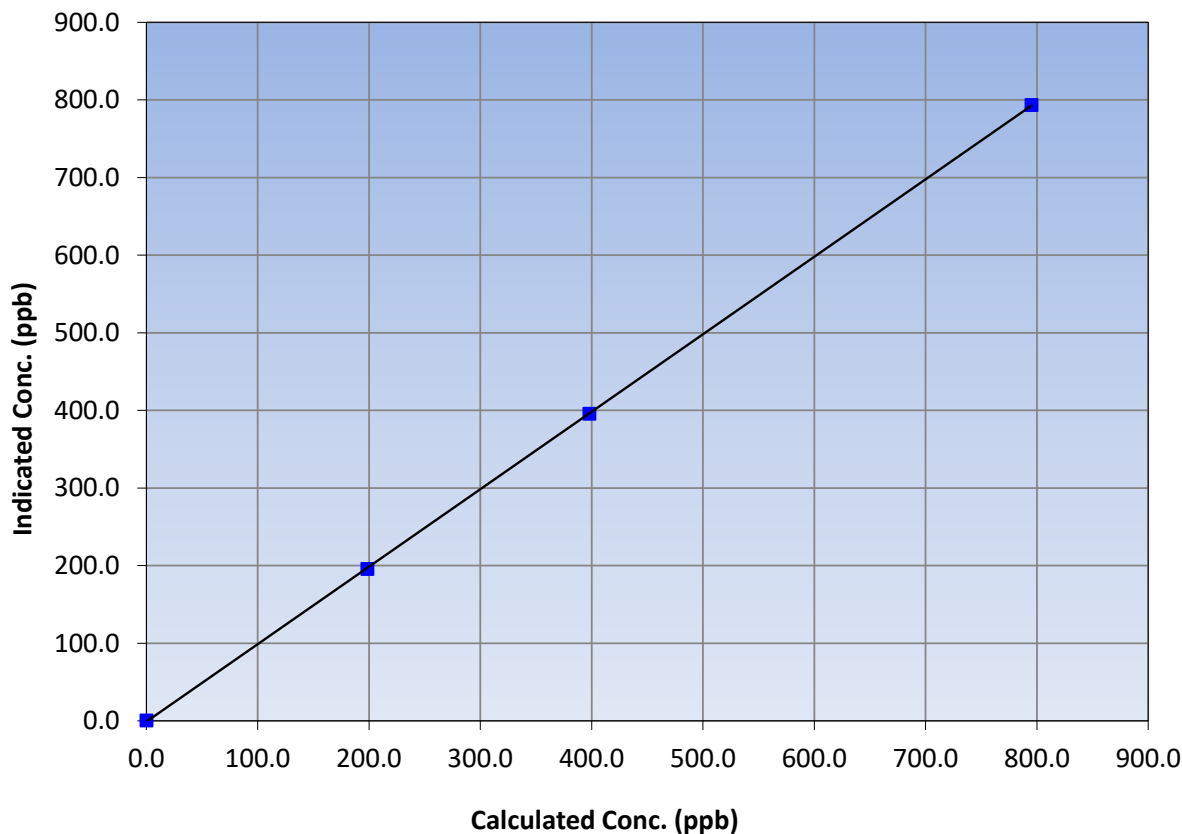
Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:26
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.5	----	Correlation Coefficient	≥0.995	
795.2	793.5	1.0021			
398.1	395.8	1.0058			
198.5	195.6	1.0150			
			Slope	0.998232	0.90 - 1.10
			Intercept	-0.993777	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

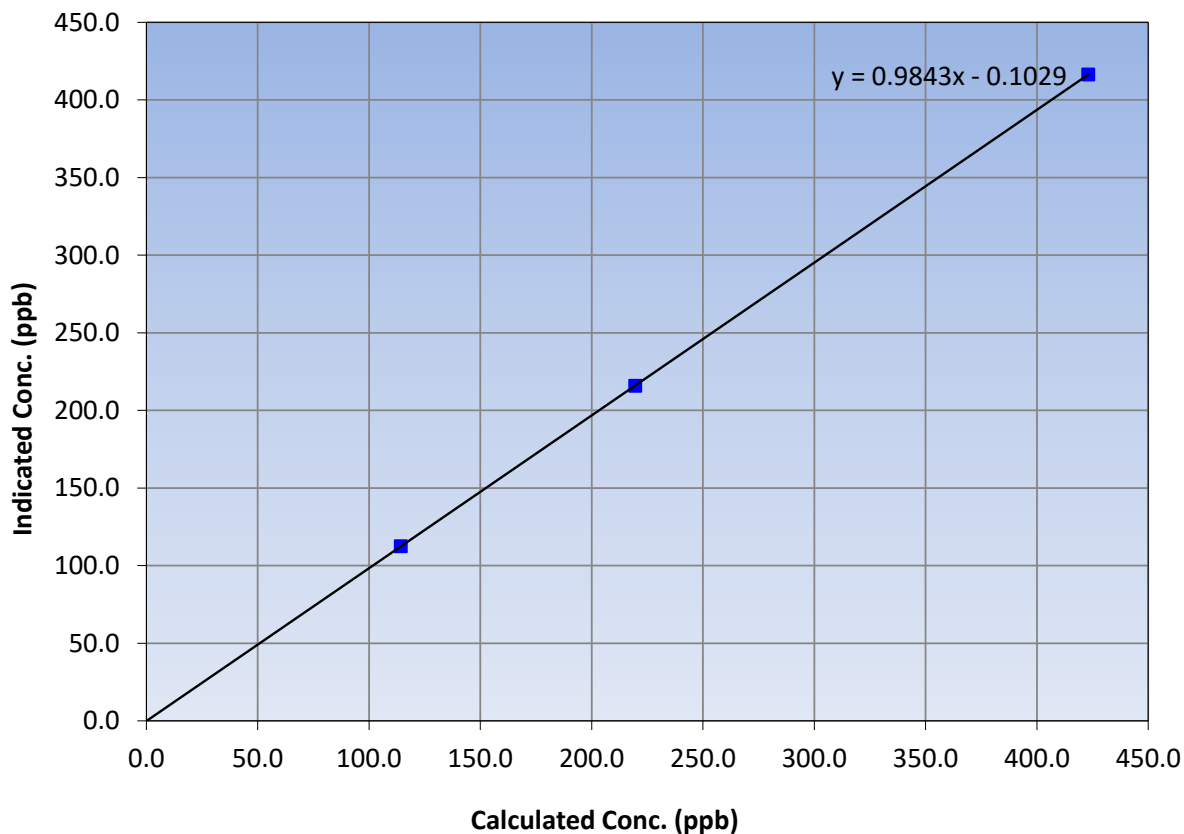
Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:26
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
423.1	416.4	1.0161		
219.6	215.9	1.0172		
114.2	112.4	1.0161		
			1.000000	
			0.984274	
			-0.102857	

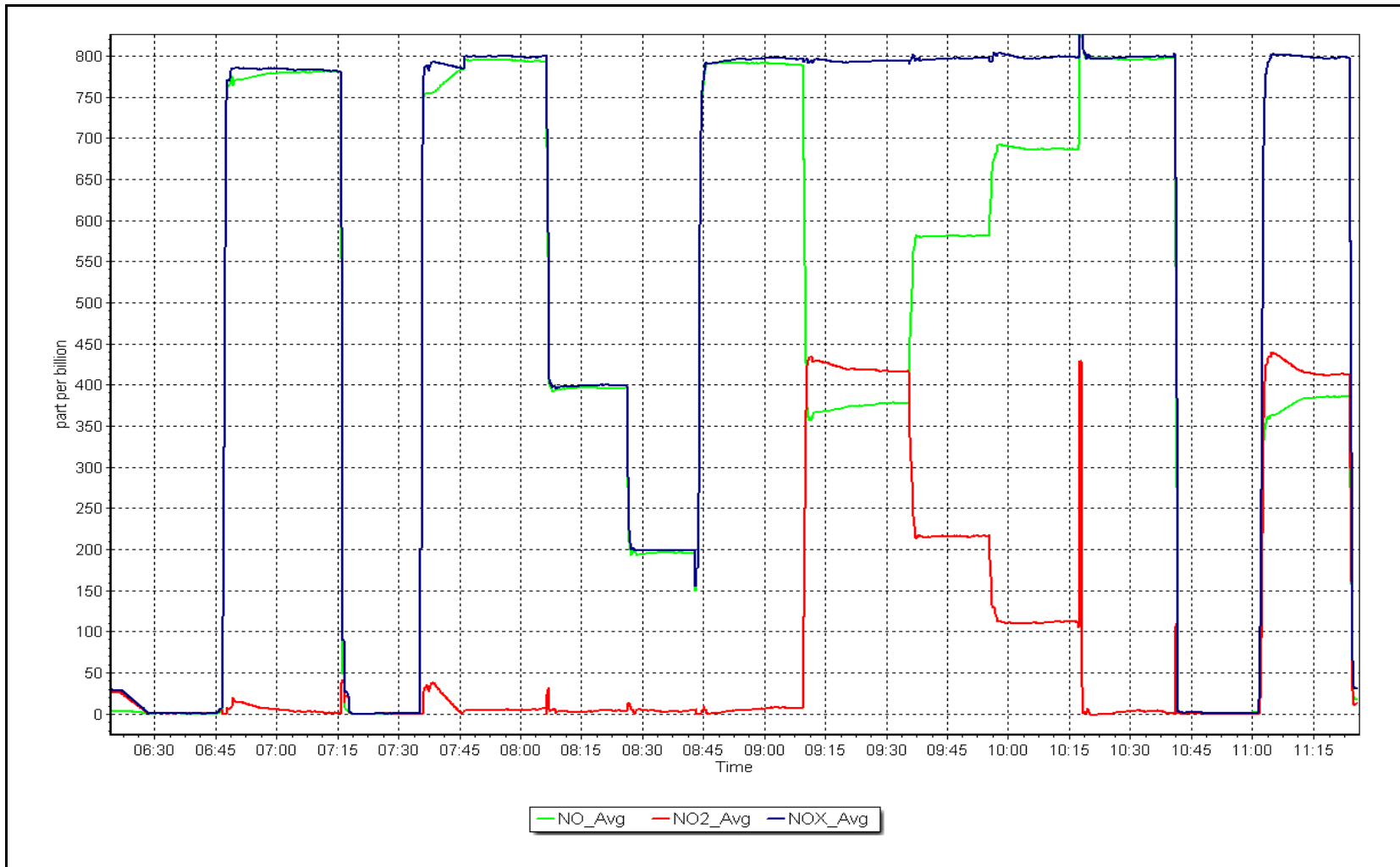
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 4, 2023

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name: Buffalo Viewpoint Station number: AMS04
 Calibration Date: April 3, 2023 Last Cal Date: March 7, 2023
 Start time (MST): 6:20 End time (MST): 11:19
 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.996114	1.000143	Backgd or Offset:	-5.3	-2.7
Calibration intercept:	1.880000	-0.100000	Coeff or Slope:	1.178	1.035

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	1.4	----
as found span	5000	976.7	400.0	407.7	0.981
as found 2nd point	5000	809.9	200.0	207.0	0.966
as found 3rd point	5000	702.3	100.0	106.4	0.940
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	979.7	400.0	400.1	1.000
second point	5000	813.9	200.0	199.7	1.002
third point	5000	705.6	100.0	99.8	1.002
as left zero	5000	0.0	0.0	-0.6	----
as left span	5000	980.1	400.0	401.5	0.996
Average Correction Factor					1.001

Baseline Corr As found:	406.3	Previous response	400.3	*% change	1.5%
Baseline Corr 2nd AF pt:	-200.7	AF Slope:	1.013514	AF Intercept:	3.260000
Baseline Corr 3rd AF pt:	-100.6	AF Correlation:	0.999904		

* = > +/-5% change initiates investigation

Notes: O3 scrubber replaced. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

O₃ Calibration Summary

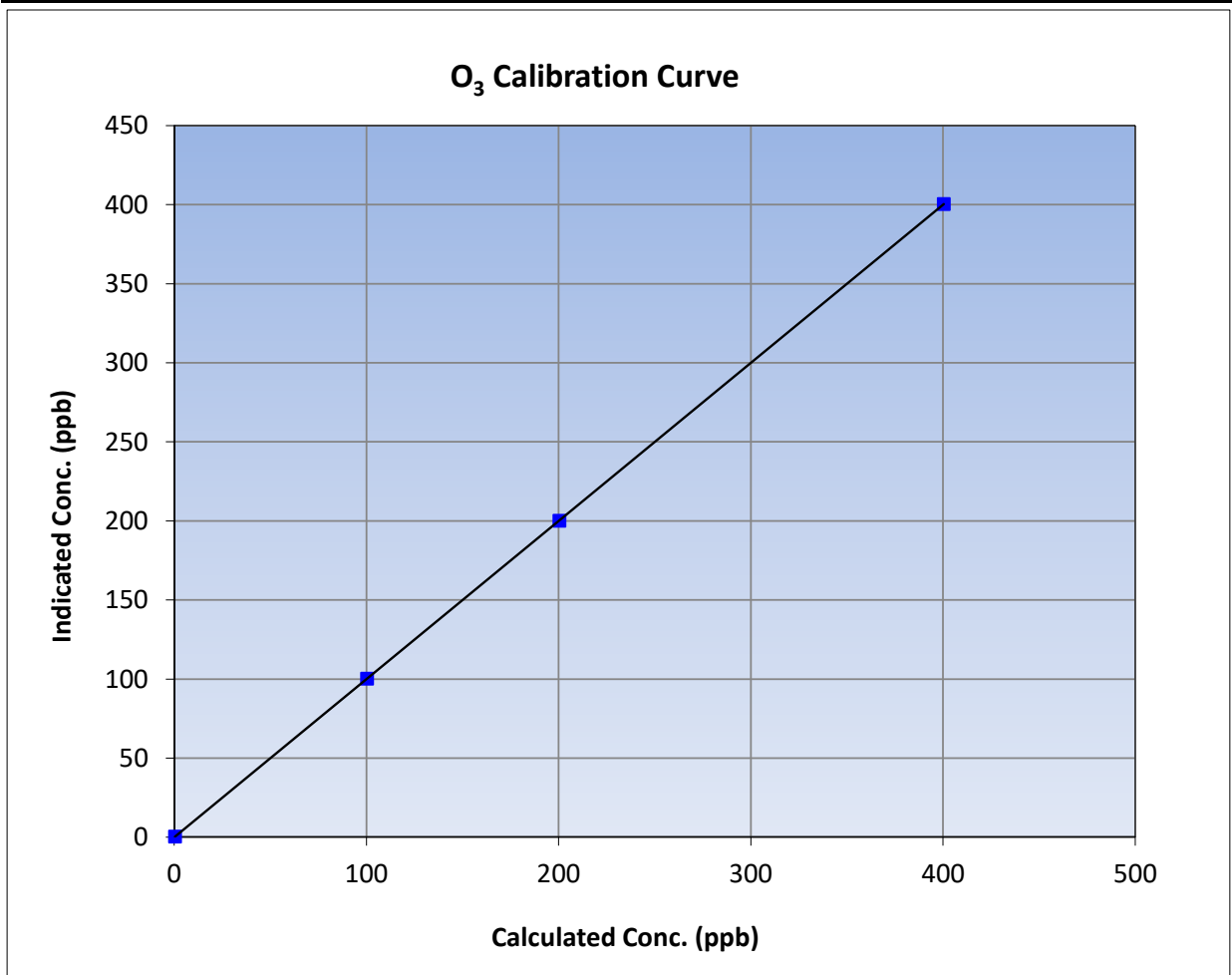
Version-01-2020

Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 7, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:19
Analyzer make:	API T400	Analyzer serial #:	2961

Calibration Data

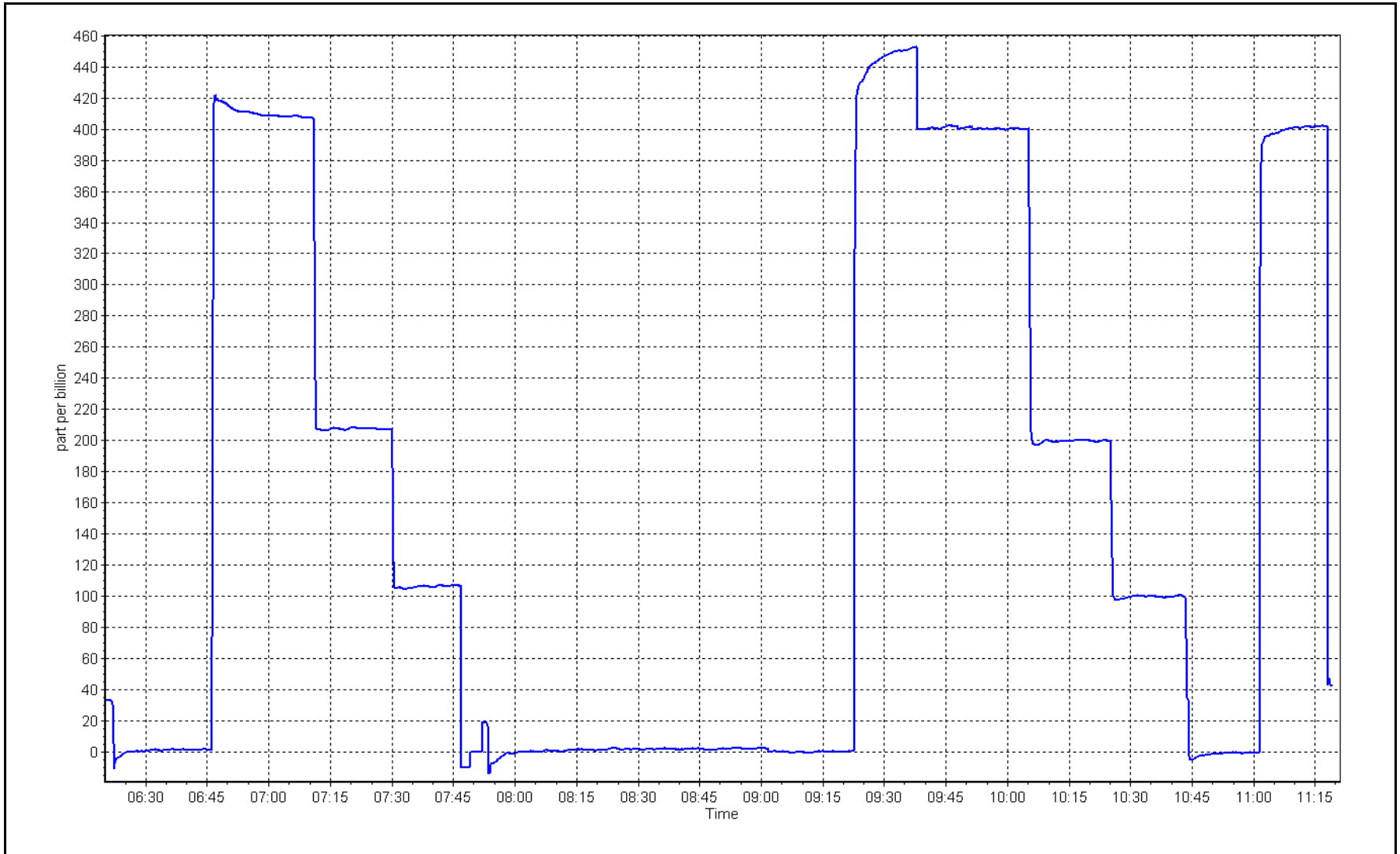
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999999	
400.0	400.1	0.9998			≥0.995
200.0	199.7	1.0015	Slope	1.000143	
100.0	99.8	1.0020			0.90 - 1.10
			Intercept	-0.100000	+/- 5



O₃ Calibration Plot

Date: April 3, 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: April 27, 2023 Last Cal Date: March 29, 2023
 Start time (MST): 6:15 End time (MST): 6:40

Analyzer Make: API T640 S/N: 322
 Particulate Fraction: PM2.5

Flow Meter Make/Model: AliCat S/N: 228085
 Temp/RH standard: AliCat S/N: 228085

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	1.8	1.4	1.8	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	730	731.1	730	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	5	4.98	5	<input type="checkbox"/>	+/- 0.25 LPM
Leak Test:	Date of check: <u>April 27, 2023</u>	Last Cal Date: <u>March 29, 2023</u>			
	PM w/o HEPA: <u>7.5</u>	PM w/ HEPA: <u>0</u>			<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		---		<input type="checkbox"/>	10.9 +/- 0.5
Post-maintenance leak check:		PM w/o HEPA: _____	w/ HEPA: _____		
Date Optical Chamber Cleaned:		<u>March 28, 2023</u>			<0.2 ug/m3
Disposable Filter Changed:		<u>March 28, 2023</u>			

Annual Maintenance

Date Sample Tube Cleaned: September 15, 2022
 Date RH/T Sensor Cleaned: September 15, 2022

No adjustments done. Head Cleaned.

Notes:

Calibration by: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

**AMS05
MANNIX
APRIL 2023**

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	April 25, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	8:06	End time (MST):	11:15
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.999400	1.003342	Backgd or Offset:	9.1	9.0
Calibration intercept:	-0.280000	0.240000	Coeff or Slope:	0.920	0.920

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.2	----
as found span	4920	80.0	800.3	800.6	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4920	80.0	800.3	803.5	0.996
second point	4960	40.0	400.2	401.2	0.997
third point	4980	20.0	200.1	201.0	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.0	800.3	806.3	0.993
Average Correction Factor					0.996

Baseline Corr As found:	800.40	Previous response	799.56	*% 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 made.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

SO₂ Calibration Summary

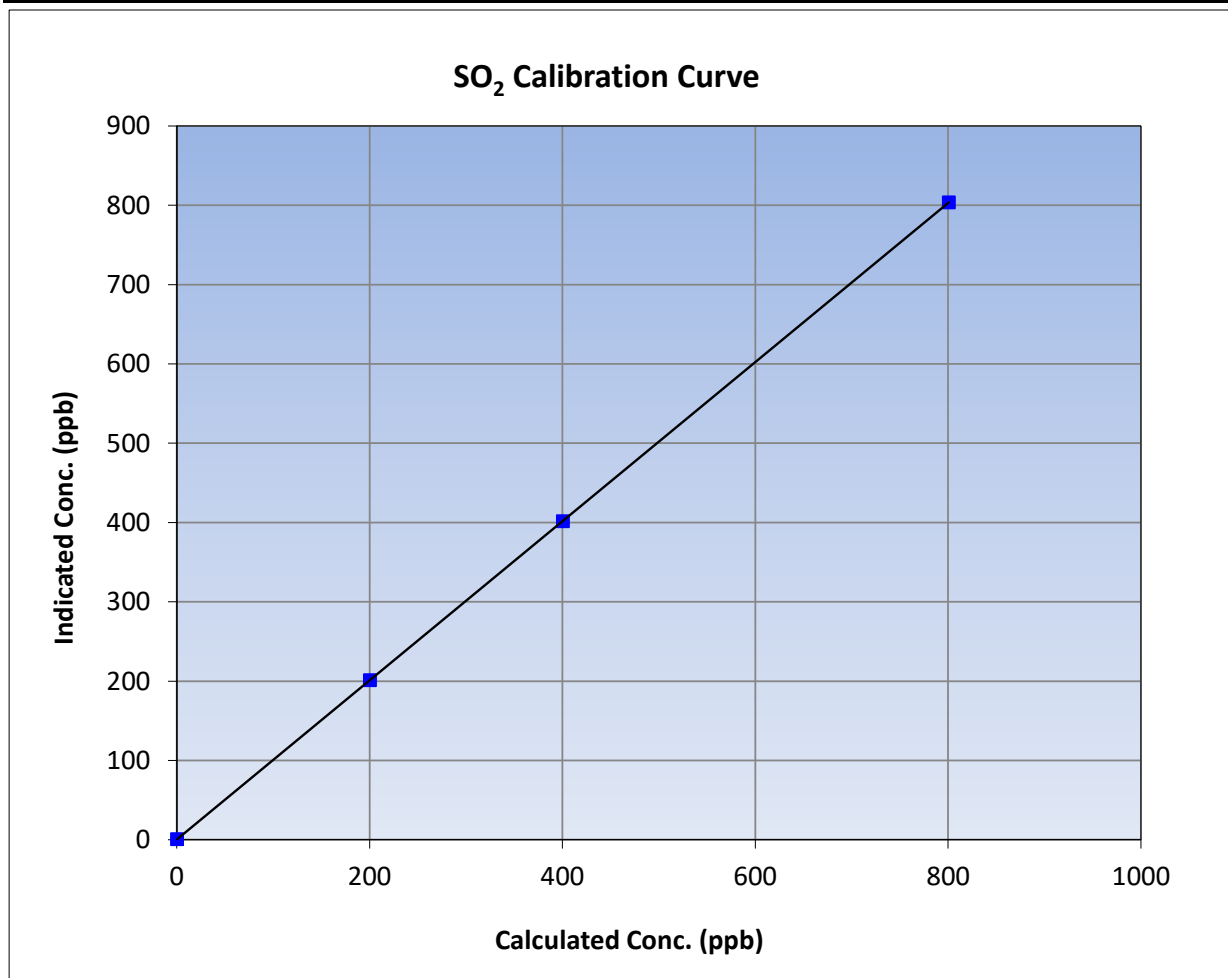
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 2, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:06	End Time (MST):	11:15
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

Calibration Data

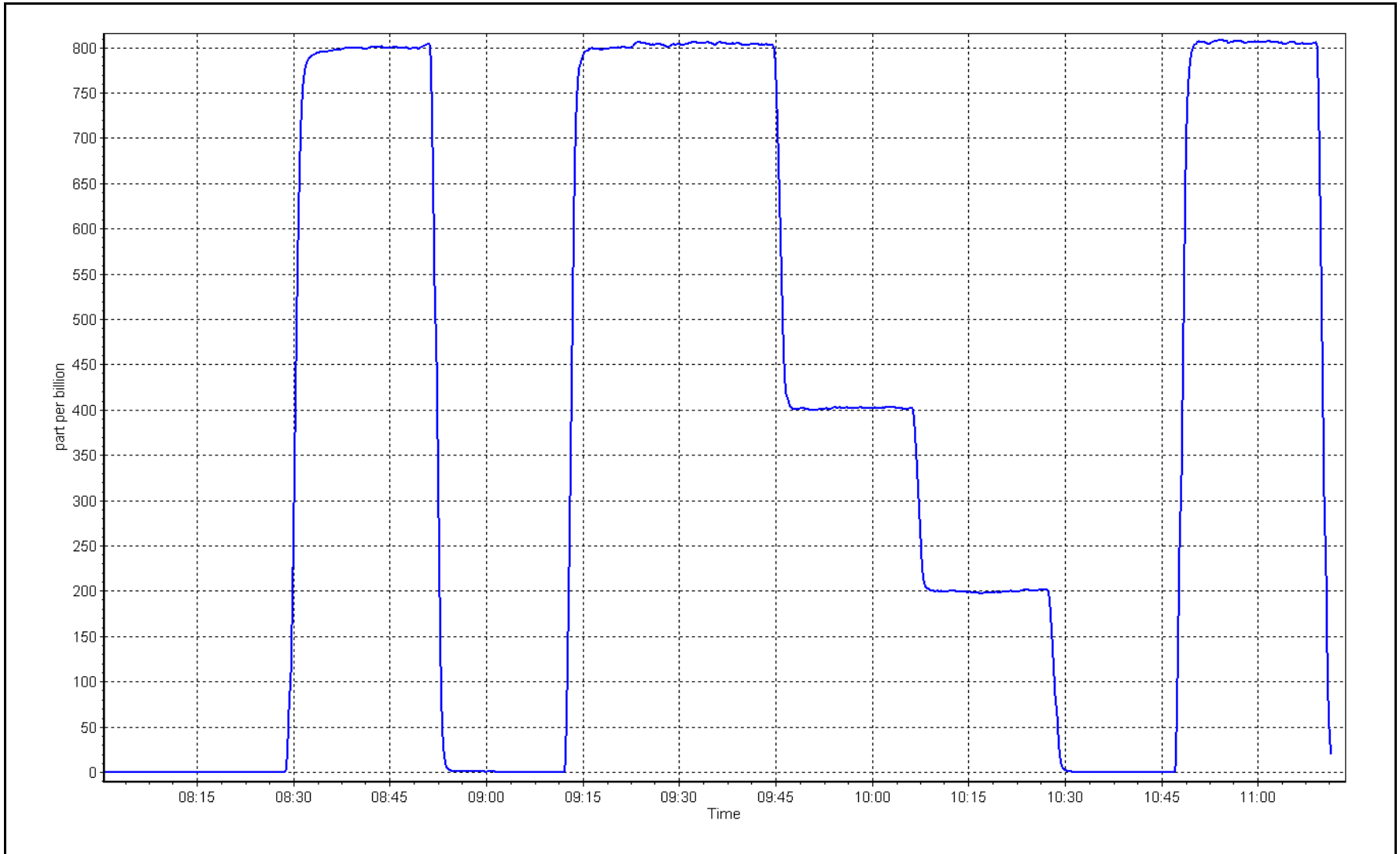
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.5	----	Correlation Coefficient	0.999999	≥0.995
800.3	803.5	0.9960			
400.2	401.2	0.9974	Slope	1.003342	0.90 - 1.10
200.1	201.0	0.9954			
			Intercept	0.240000	+/-30



SO2 Calibration Plot

Date: April 25, 2023

Location: Mannix





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Mannix Station number: AMS05
 Calibration Date: April 17, 2023 Last Cal Date: March 15, 2023
 Start time (MST): 9:10 End time (MST): 13:55
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.988329	1.005327	Backgd or Offset:	2.07
Calibration intercept:	0.380632	0.060642	Coeff or Slope:	0.822
				0.849

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	4919	81.3	80.0	79.1	1.011
as found 2nd point	4960	40.7	40.0	39.6	1.011
as found 3rd point	4980	20.3	20.0	19.6	1.019
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.1	----
high point	4919	81.3	80.0	80.5	0.994
second point	4960	40.7	40.0	40.3	0.994
third point	4980	20.3	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	81.3	80.0	79.7	1.004
SO2 Scrubber Check	4920	80.0	800.0	0.2	----
Date of last scrubber change:				Ave Corr Factor	0.994
Date of last converter efficiency test:				efficiency	

Baseline Corr As found: 79.1 Prev response: 79.44 *% change: -0.4%
 Baseline Corr 2nd AF pt: 39.6 AF Slope: 0.989473 AF Intercept: -0.059409
 Baseline Corr 3rd AF pt: 19.6 AF Correlation: 0.999995

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Scrubber check completed after calibrator zero.
 Adjusted the span only.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

H₂S Calibration Summary

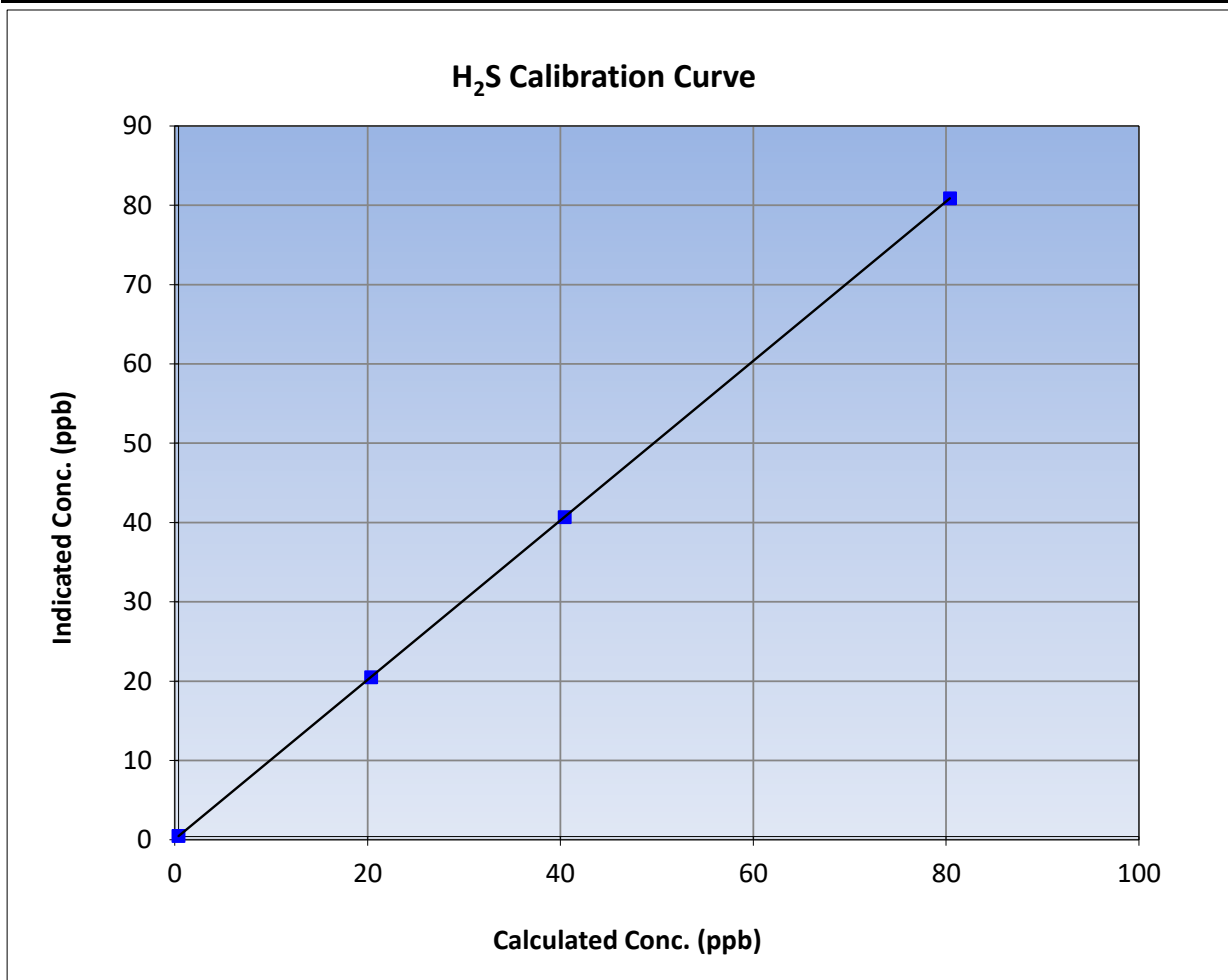
Version-11-2021

Station Information

Calibration Date:	April 17, 2023	Previous Calibration:	March 15, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:10	End Time (MST):	13:55
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

Calibration Data

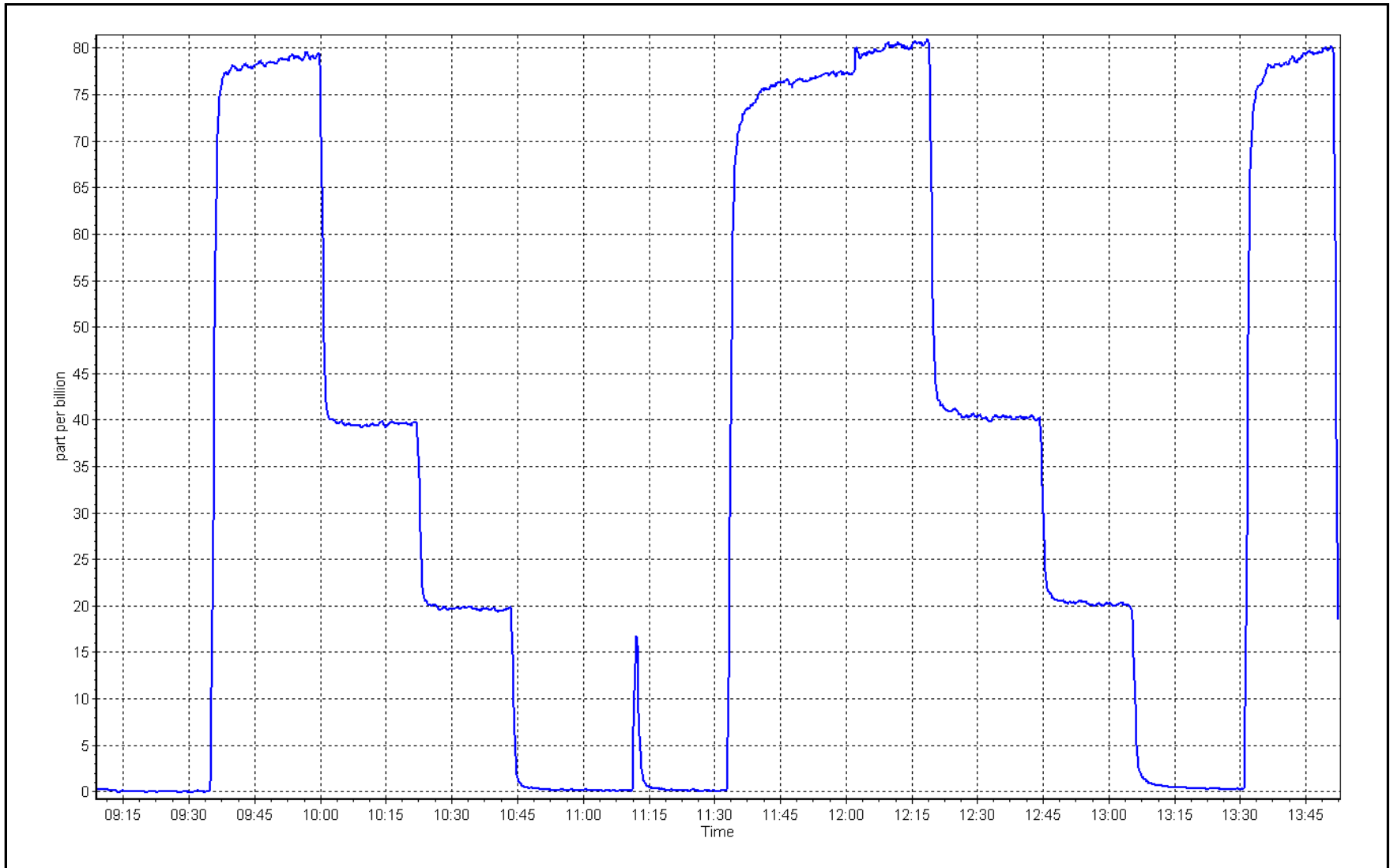
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999999	
80.0	80.5	0.9937			≥0.995
40.0	40.3	0.9936	Slope	1.005327	
20.0	20.1	0.9937			0.90 - 1.10
			Intercept	0.060642	+/-3



H₂S Calibration Plot

Date: April 17, 2023

Location: Mannix





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	April 25, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	8:06	End time (MST):	11:15
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	XCO268098	Cal Gas Expiry Date:	January 12, 2029
CH ₄ Cal Gas Conc.	504.9 ppm	CH ₄ Equiv Conc.	1076.6 ppm
C ₃ H ₈ Cal Gas Conc.	207.9 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	
Removed CH ₄ Conc.	504.9 ppm	CH ₄ Equiv Conc.	1076.6 ppm
Removed C ₃ H ₈ 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 T701H	Serial Number:	832

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	2.58E-04	2.65E-04	NMHC SP Ratio:	4.50E-05
CH ₄ Retention time:	15.00	15.00	NMHC Peak Area:	203233
				206898

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	17.23	17.19	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	80.0	17.23	17.24	0.999
second point	4960	40.0	8.61	8.61	1.000
third point	4980	20.0	4.31	4.31	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.29	0.997

Average Correction Factor				1.000
Baseline Corr AF:	17.19	Prev response	17.22	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	----
as found span	4920	80	9.15	9.35	0.979
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80	9.15	9.16	0.998
second point	4960	40	4.57	4.59	0.997
third point	4980	20	2.29	2.30	0.993
as left zero	5000	0	0.00	0.00	----
as left span	4920	80	9.15	9.20	0.994
Average Correction Factor					0.996
Baseline Corr AF:	9.35	Prev response	9.16	*% change	2.0%
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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	7.84	1.030
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.08	1.000
second point	4960	40.0	4.04	4.02	1.004
third point	4980	20.0	2.02	2.01	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.08	1.000
Average Correction Factor					1.004
Baseline Corr AF:	7.84	Prev response	8.06	*% change	-2.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	1.000262	1.000899
THC Cal Offset:	-0.006600	-0.002400
CH ₄ Cal Slope:	0.999646	1.000594
CH ₄ Cal Offset:	-0.011800	-0.009400
NMHC Cal Slope:	1.000469	1.001168
NMHC Cal Offset:	0.005800	0.007000

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

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

THC Calibration Summary

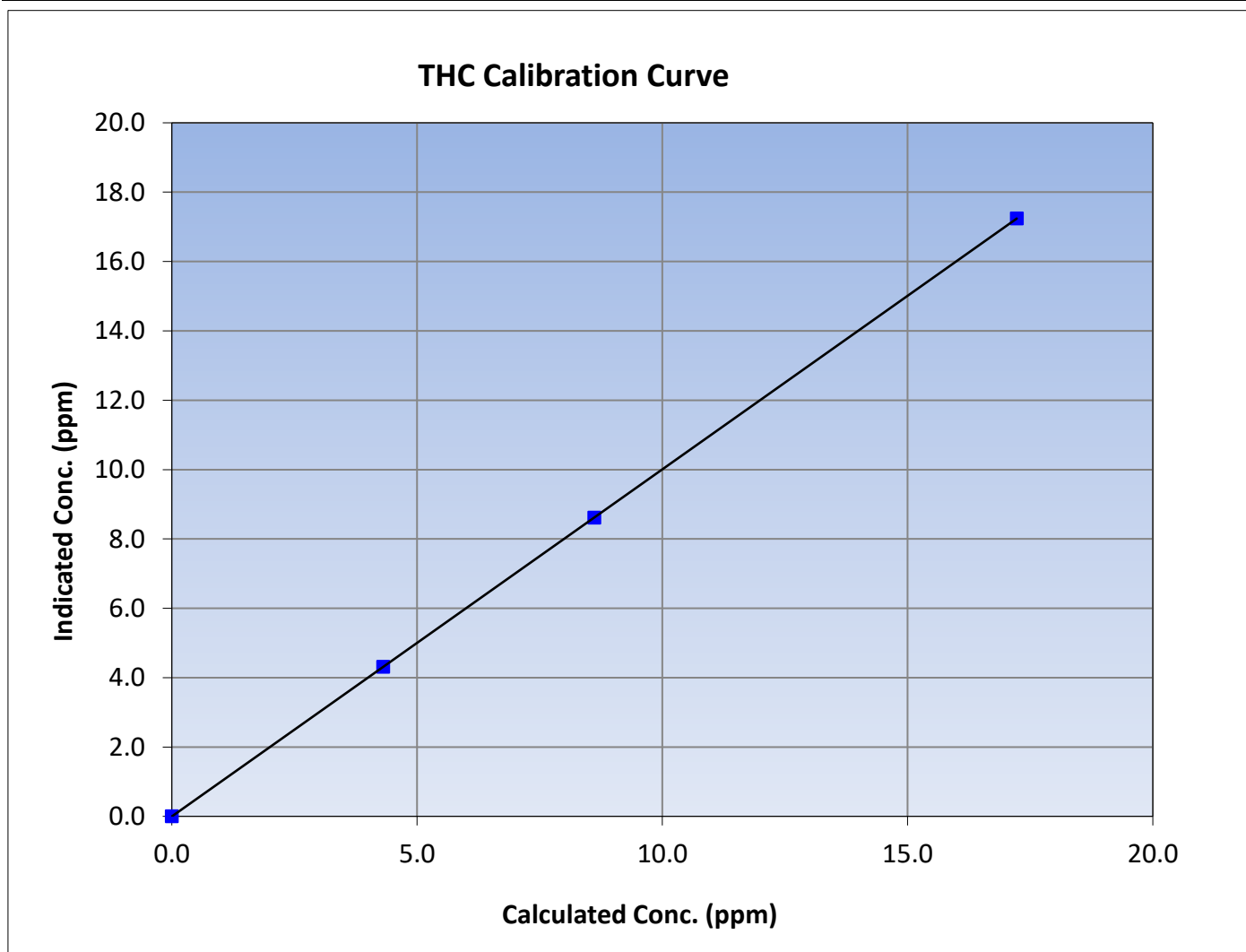
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 2, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:06	End Time (MST):	11:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	1.000000	≥ 0.995			
17.23	17.24	0.9991						
8.61	8.61	1.0001				Slope	1.000899	0.90 - 1.10
4.31	4.31	0.9994						
			Intercept	-0.002400	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

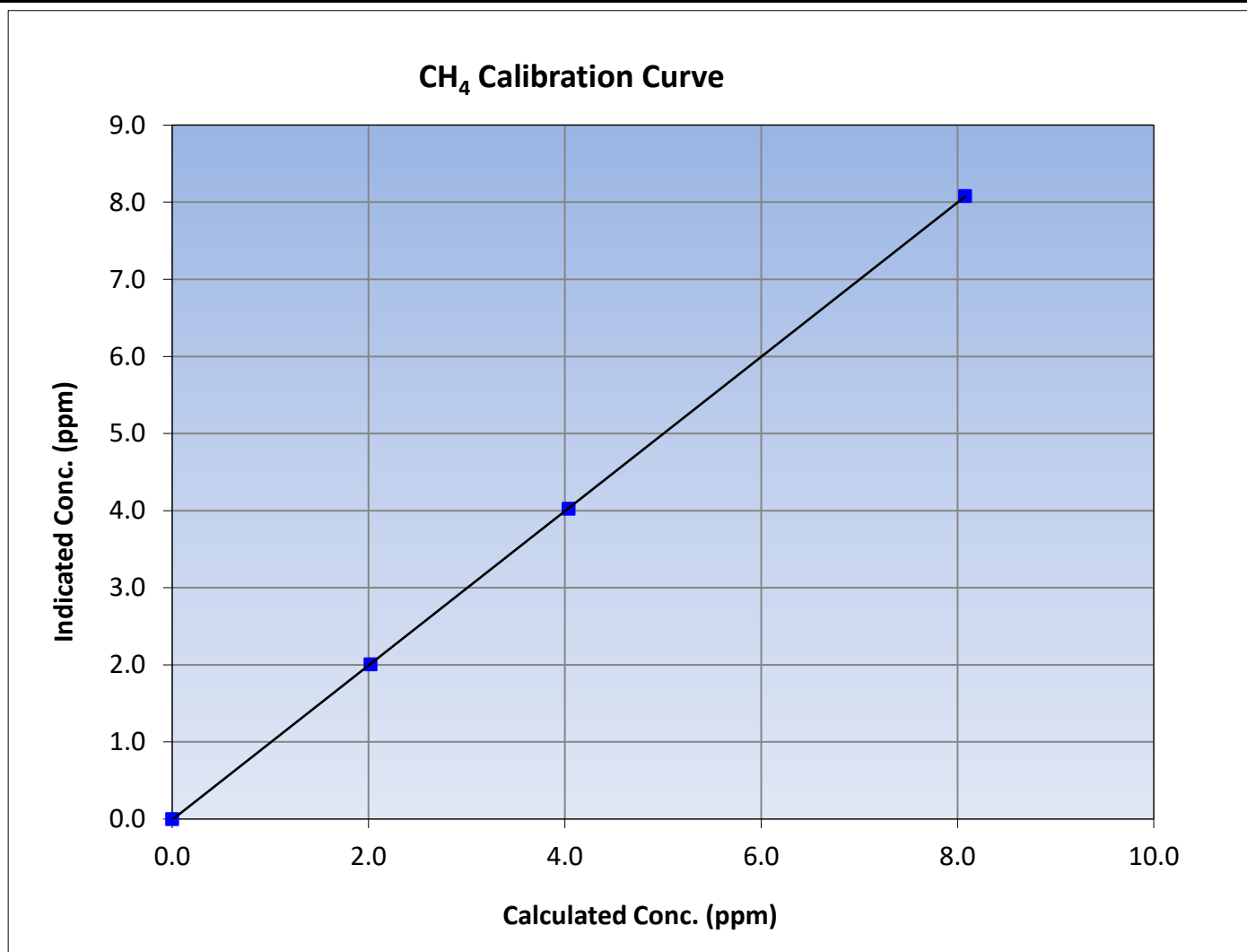
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 2, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:06	End Time (MST):	11:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999993	≥ 0.995			
8.08	8.08	0.9998						
4.04	4.02	1.0040				Slope	1.000594	0.90 - 1.10
2.02	2.01	1.0073						
			Intercept	-0.009400	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

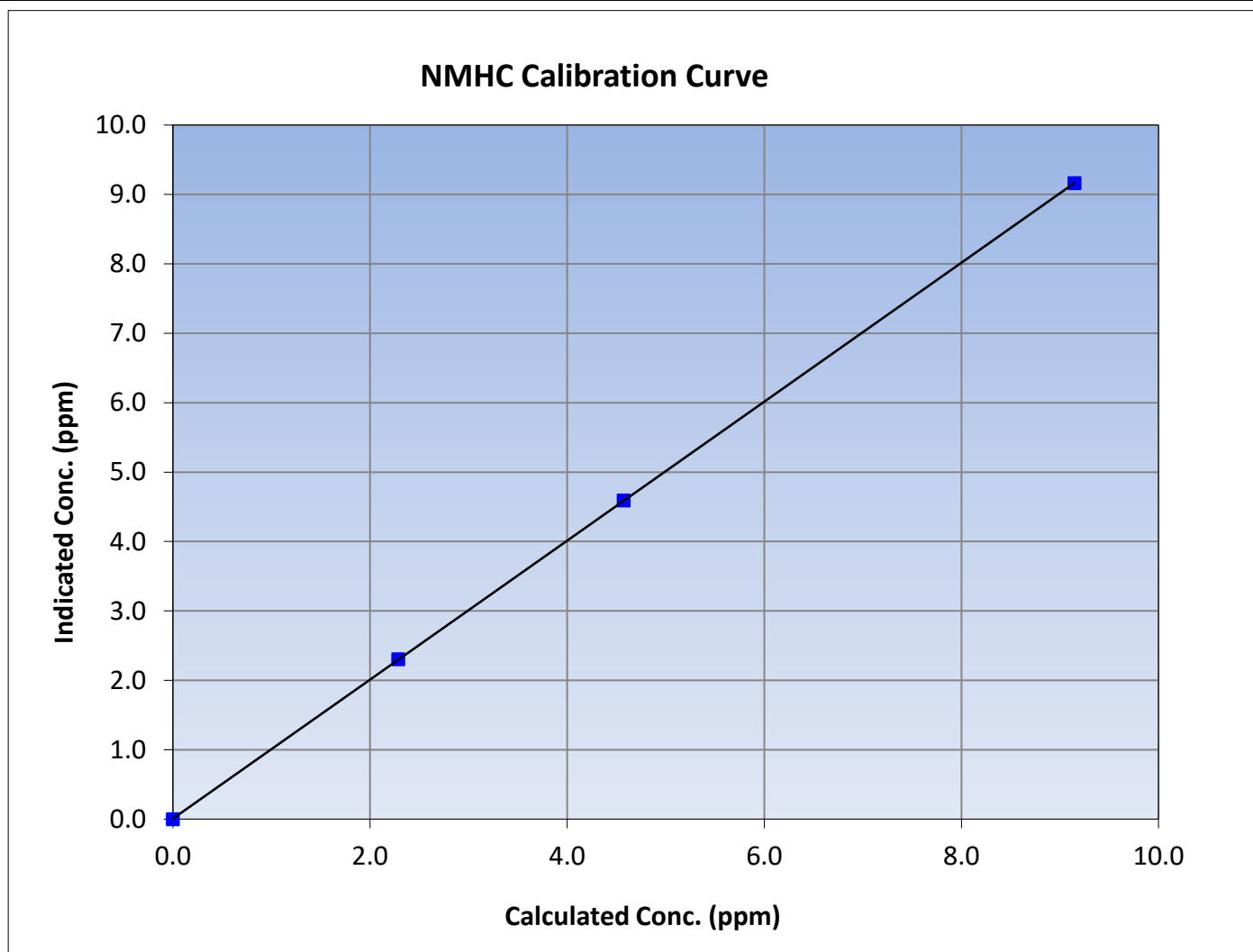
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 2, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:06	End Time (MST):	11:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

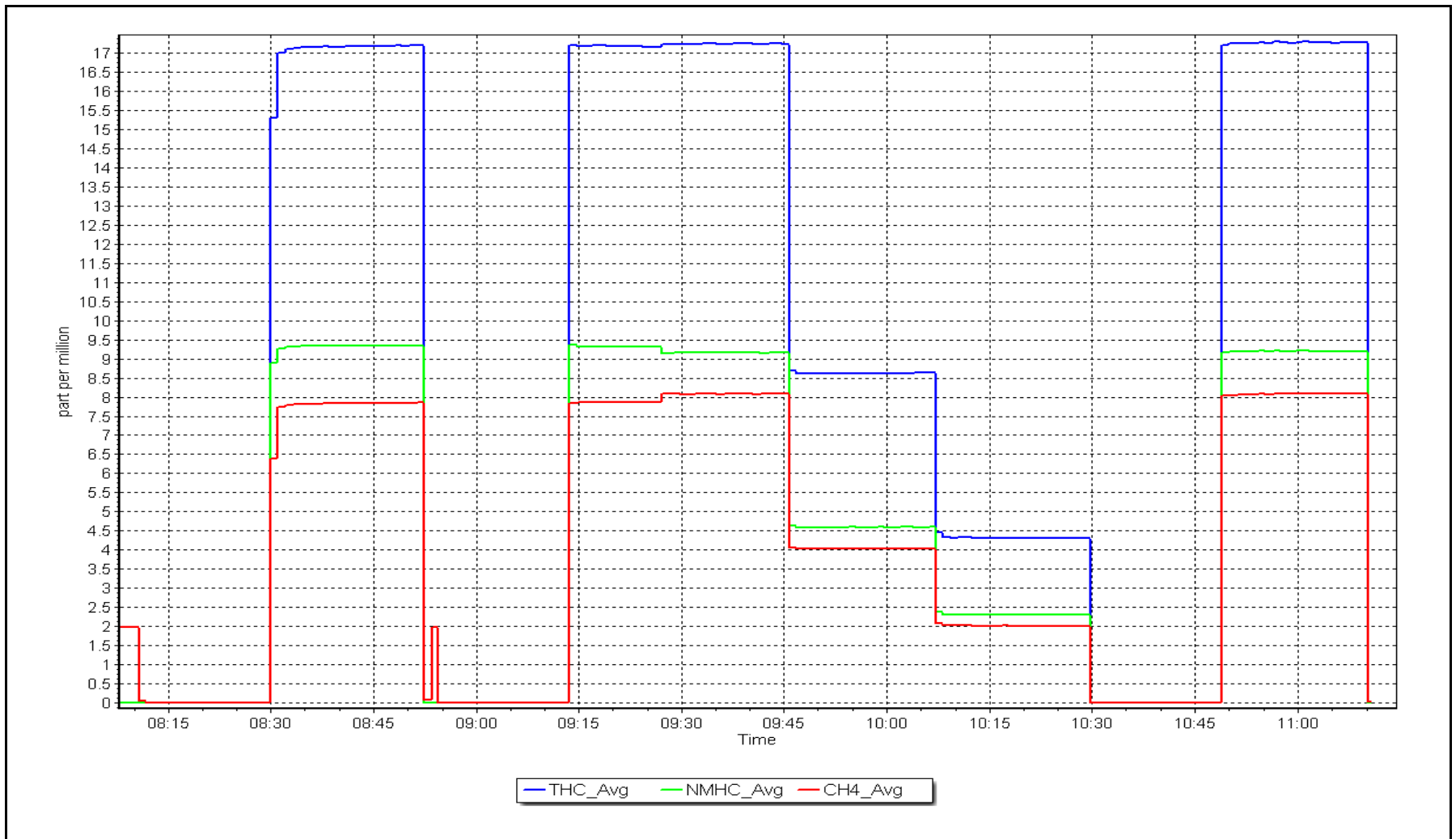
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999997	≥ 0.995
9.15	9.16	0.9984			
4.57	4.59	0.9967			
2.29	2.30	0.9926			
			Slope	1.001168	0.90 - 1.10
			Intercept	0.007000	+/-0.5



NMHC Calibration Plot

Date: April 25, 2023

Location: Mannix





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
APRIL 2023

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

August 30, 2023

Revision 01



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	April 13, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	8:55	End time (MST):	11:50
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:	689
ZAG Make/Model:	API T701		Serial Number:	3566

Analyzer Information

Analyzer make: Thermo 43i
 Analyzer Range 0 - 1000 ppb
 Analyzer serial #: 1160290013

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.991070	1.001234	Backgd or Offset:	17.2	17.2
Calibration intercept:	1.621614	1.539845	Coeff or Slope:	0.907	0.907

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.1	----
as found span	4920	80.3	799.5	803.0	0.996
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	801.2	0.998
second point	4960	40.2	400.2	403.1	0.993
third point	4980	20.1	200.1	203.4	0.984
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.3	799.5	806.7	0.991
Average Correction Factor					0.992

Baseline Corr As found:	803.10	Previous response	793.95	*% change	1.1%
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: Max Farrell



Wood Buffalo Environmental Association

SO₂ Calibration Summary

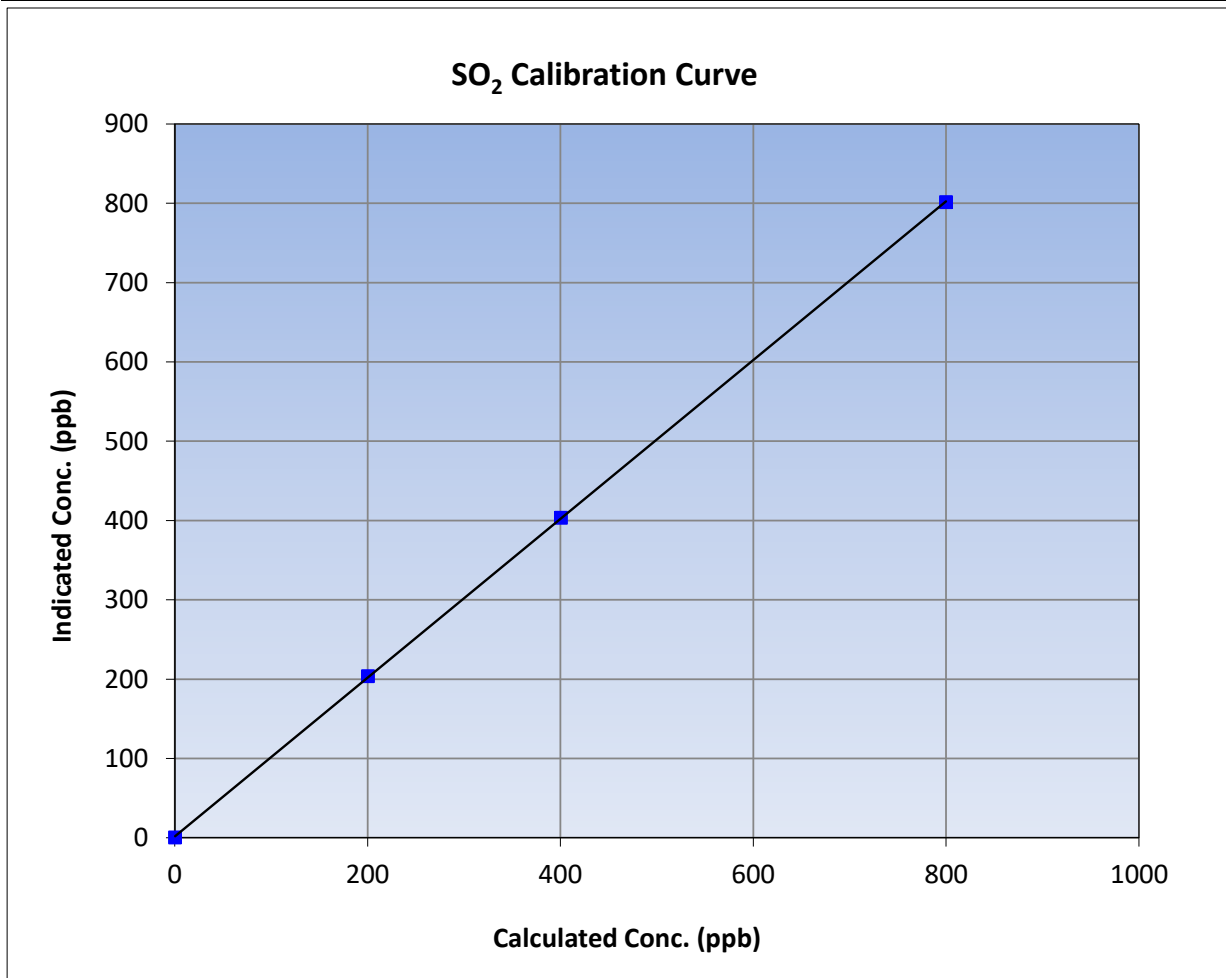
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:55	End Time (MST):	11:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

Calibration Data

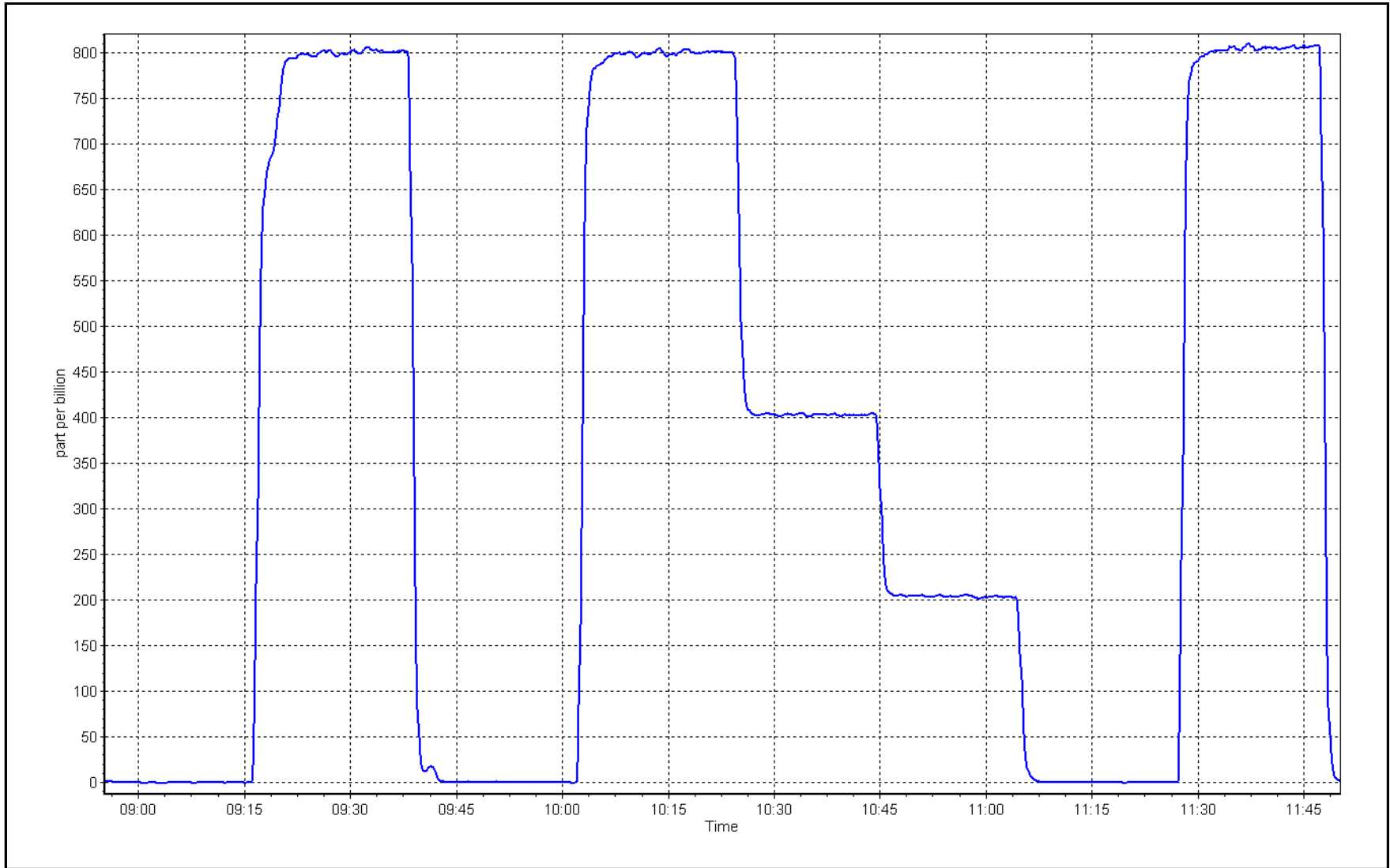
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999983	
799.5	801.2	0.9978			≥0.995
400.2	403.1	0.9929	Slope	1.001234	
200.1	203.4	0.9839			0.90 - 1.10
			Intercept	1.539845	+/-30



SO2 Calibration Plot

Date: April 13, 2023

Location: Patricia McInnes





Wood Buffalo Environmental Association

H2S Calibration Report

Version-11-2021

Station Information

Station Name: Patricia McInnes Station number: AMS 06
 Calibration Date: April 5, 2023 Last Cal Date: March 15, 2023
 Start time (MST): 9:22 End time (MST): 13:55
 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 H Serial Number: 689

Analyzer Information

Analyzer make: Thermo 43i TLE Analyzer serial #: 1218153358
 Converter make: Global G150 Converter serial #: 2022-195
 Analyzer Range: 0 - 100 ppb

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.997060	0.992200	Backgd or Offset: 1.84	1.84
Calibration intercept:	0.257193	0.277270	Coeff or Slope: 1.070	1.070

H2S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.3	79.9	79.1	1.011
as found 2nd point	4963	37.2	40.0	39.6	1.011
as found 3rd point	4981	18.6	20.0	20.0	1.001
new cylinder response					

H2S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.3	79.9	79.5	1.006
second point	4963	37.2	40.0	40.1	0.998
third point	4981	18.6	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.2	----
as left span	4926	74.3	79.9	79.9	1.001
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:	December 20, 2021			Ave Corr Factor	0.997
Date of last converter efficiency test:	efficiency				

Baseline Corr As found: 79.1 Prev response: 79.96 *% change: -1.1%
 Baseline Corr 2nd AF pt: 39.6 AF Slope: 0.988623 AF Intercept: 0.077446
 Baseline Corr 3rd AF pt: 20.0 AF Correlation: 0.999992

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Ran a SO2 scrubber check after the calibrator zero. No adjustments made.

Calibration Performed By: Max Farrell



Wood Buffalo Environmental Association

H2S Calibration Summary

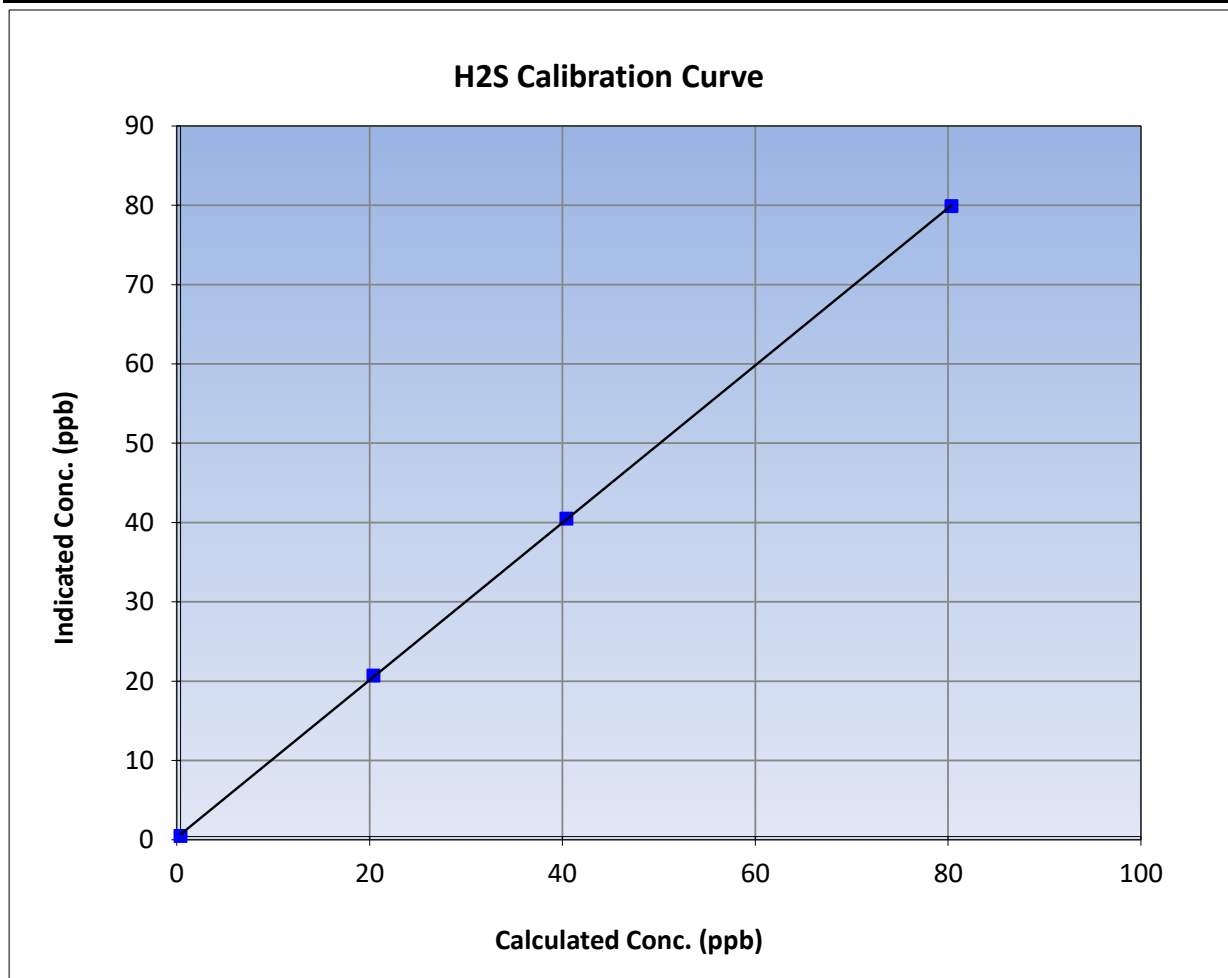
Version-11-2021

Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 15, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:22	End Time (MST):	13:55
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

Calibration Data

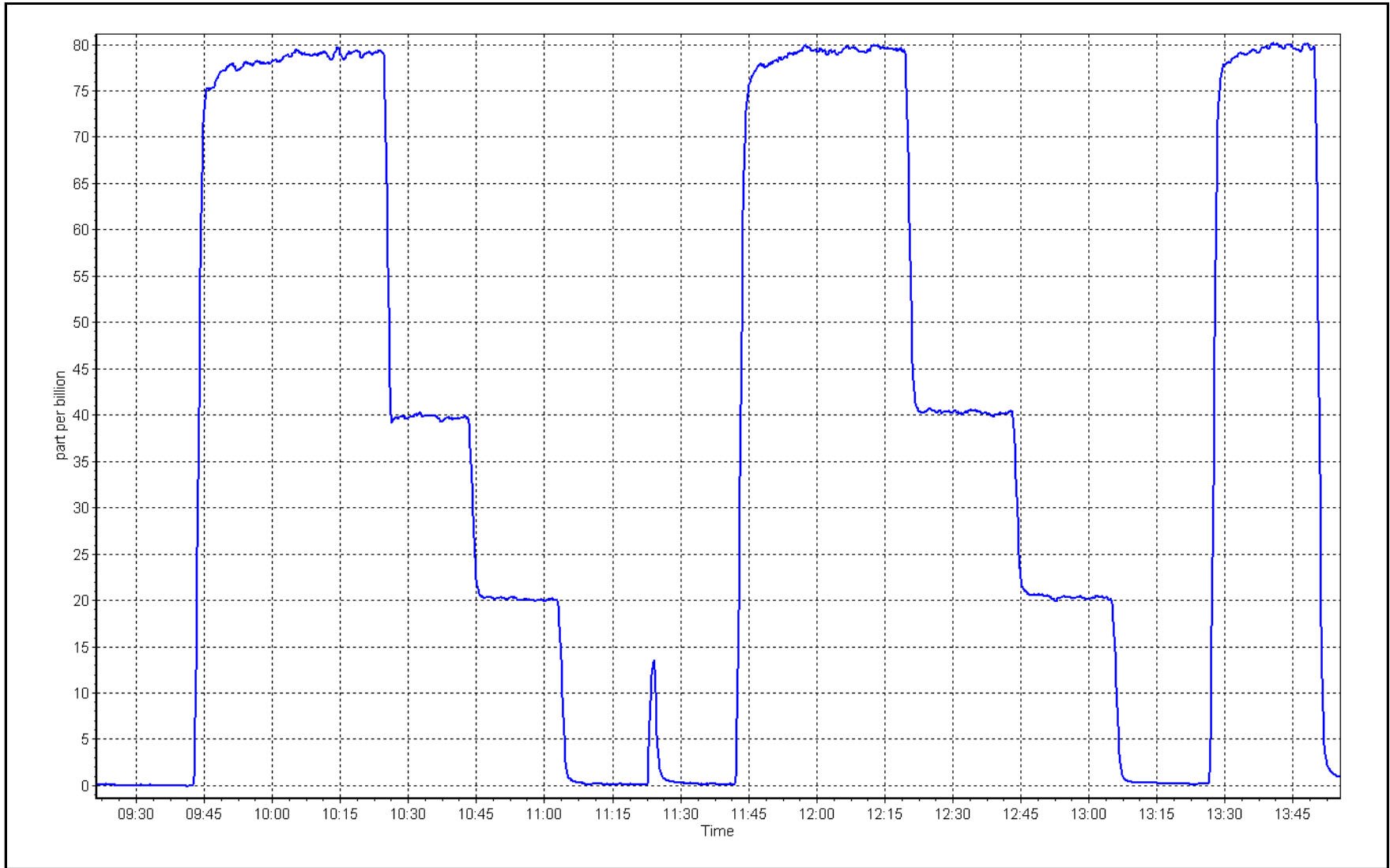
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999977	≥0.995
79.9	79.5	1.0056			
40.0	40.1	0.9981	Slope	0.992200	0.90 - 1.10
20.0	20.3	0.9860			
			Intercept	0.277270	+/-3



H2S Calibration Plot

Date: April 5, 2023

Location: Patricia McInnes





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	April 13, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	8:56	End time (MST):	11:50
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	AAL070632	Cal Gas Expiry Date:	September 9, 2024
CH ₄ Cal Gas Conc.	501.6 ppm	CH ₄ Equiv Conc.	1066.2 ppm
C ₃ H ₈ Cal Gas Conc.	205.3 ppm		
Removed Gas Ref.	N/A	Removed Gas Expiry:	N/A
Removed CH ₄ Conc.	501.6 ppm	CH ₄ Equiv Conc.	1066.2 ppm
Removed C ₃ H ₈ 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:	261

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	3.33E-04	3.33E-04	NMHC SP Ratio:	5.86E-05
CH ₄ Retention time:	14	14.0	NMHC Peak Area:	154840

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.12	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	80.3	17.12	17.03	1.006
second point	4960	40.2	8.57	8.51	1.007
third point	4980	20.1	4.29	4.29	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.03	1.006

Average Correction Factor	1.004
---------------------------	-------

Baseline Corr AF:	17.08	Prev response	17.15	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	----
as found span	4920	80.3	9.07	9.06	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.3	9.07	9.04	1.003
second point	4960	40.2	4.54	4.54	1.001
third point	4980	20.1	2.27	2.29	0.992
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.04	1.003
Average Correction Factor					0.999
Baseline Corr AF:	9.06	Prev response	9.08	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.06	8.01	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	80.3	8.06	7.98	1.009
second point	4960	40.2	4.03	3.97	1.015
third point	4980	20.1	2.02	2.00	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	7.99	1.009
Average Correction Factor					1.011
Baseline Corr AF:	8.01	Prev response	8.06	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* => +/-5% change initiates investigation	

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope:	1.000848	0.993826
THC Cal Offset:	0.007935	0.007564
CH ₄ Cal Slope:	1.001093	0.990693
CH ₄ Cal Offset:	-0.000603	-0.004180
NMHC Cal Slope:	1.000428	0.996672
NMHC Cal Offset:	0.009337	0.010746

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

Calibration Performed By: Max Farrell



Wood Buffalo Environmental Association

THC Calibration Summary

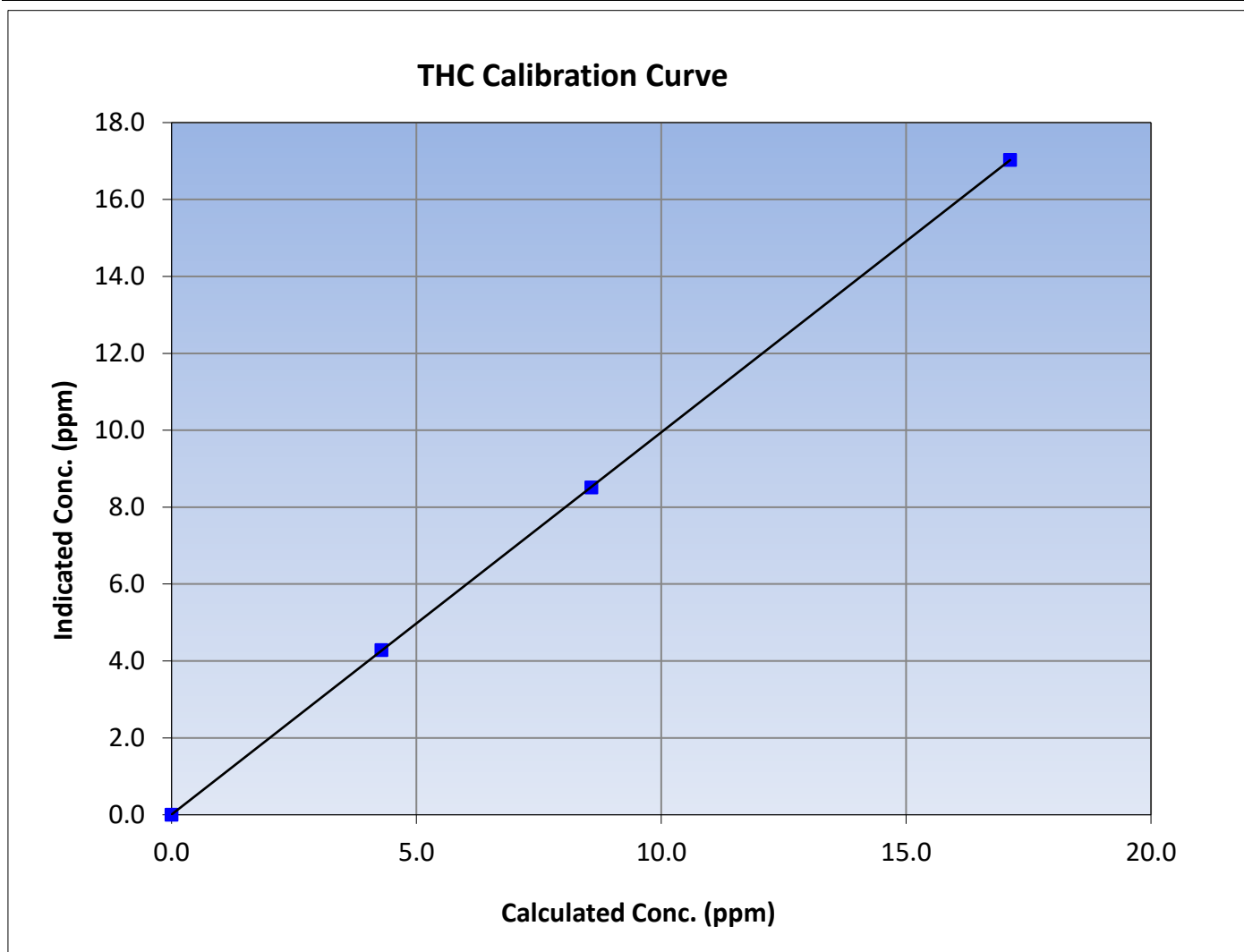
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:56	End Time (MST):	11:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999996	≥ 0.995			
17.12	17.03	1.0056						
8.57	8.51	1.0071				Slope	0.993826	0.90 - 1.10
4.29	4.29	0.9998						
			Intercept	0.007564	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

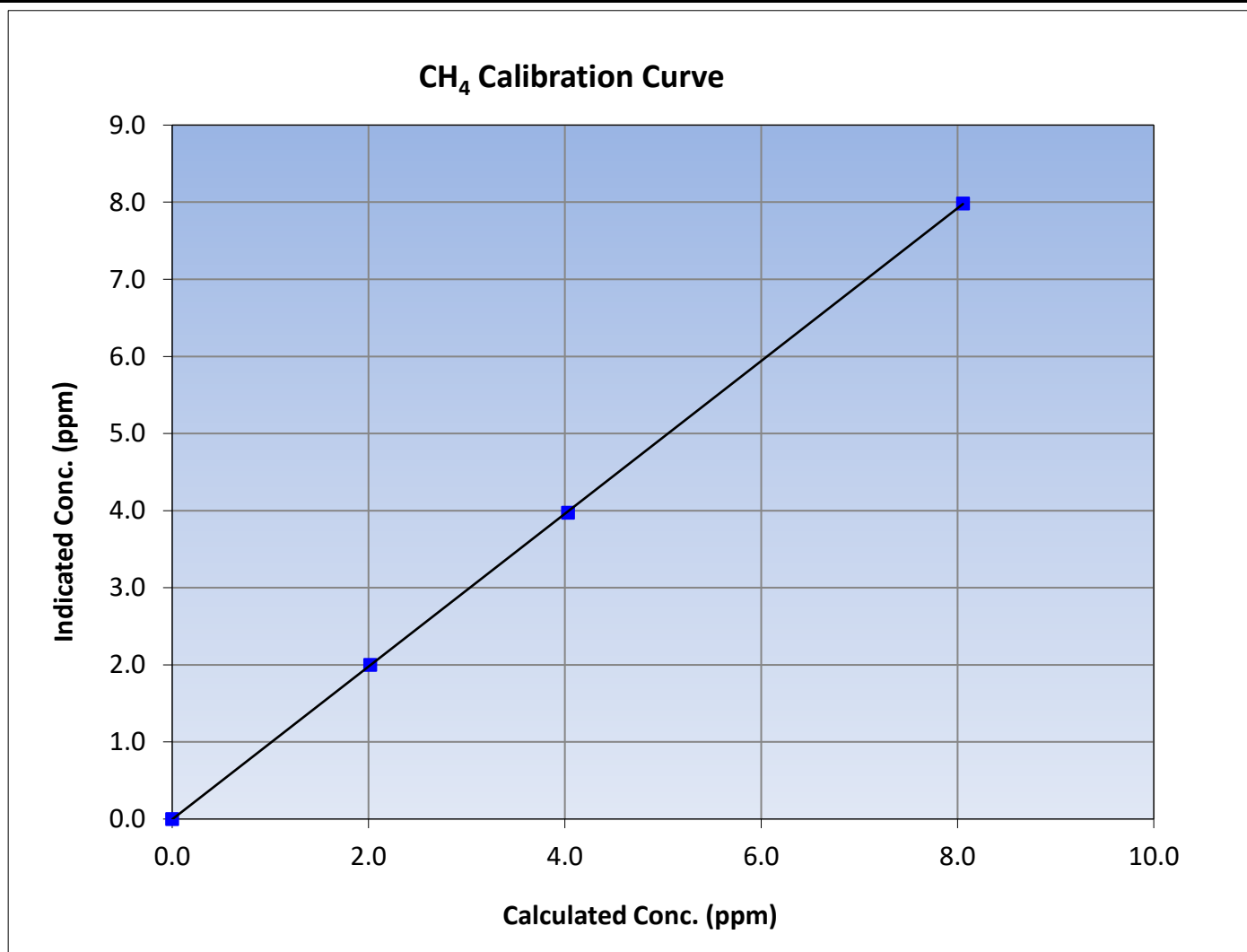
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:56	End Time (MST):	11:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999987	≥0.995			
8.06	7.98	1.0090						
4.03	3.97	1.0151				Slope	0.990693	0.90 - 1.10
2.02	2.00	1.0082						
			Intercept	-0.004180	+/-0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

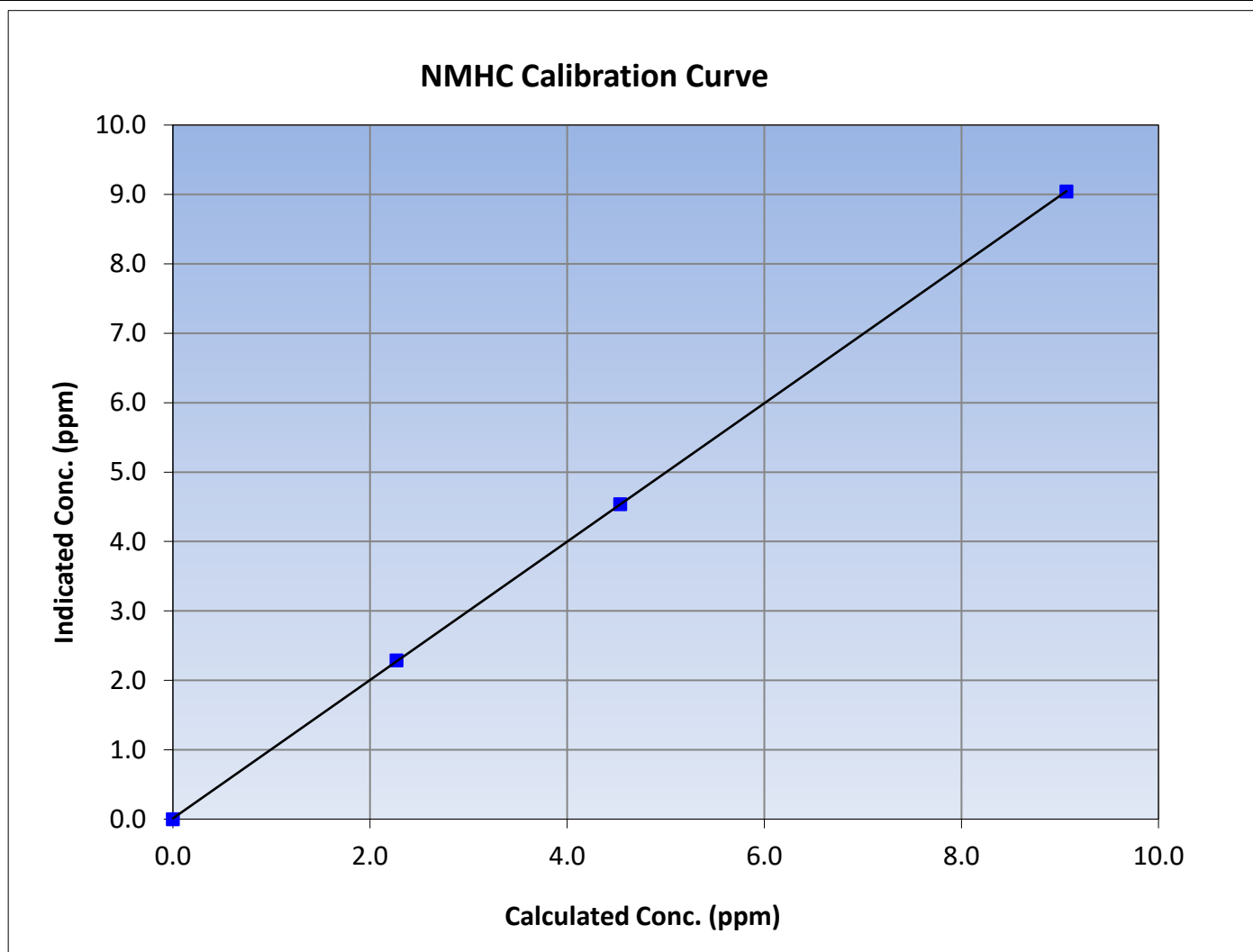
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:56	End Time (MST):	11:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

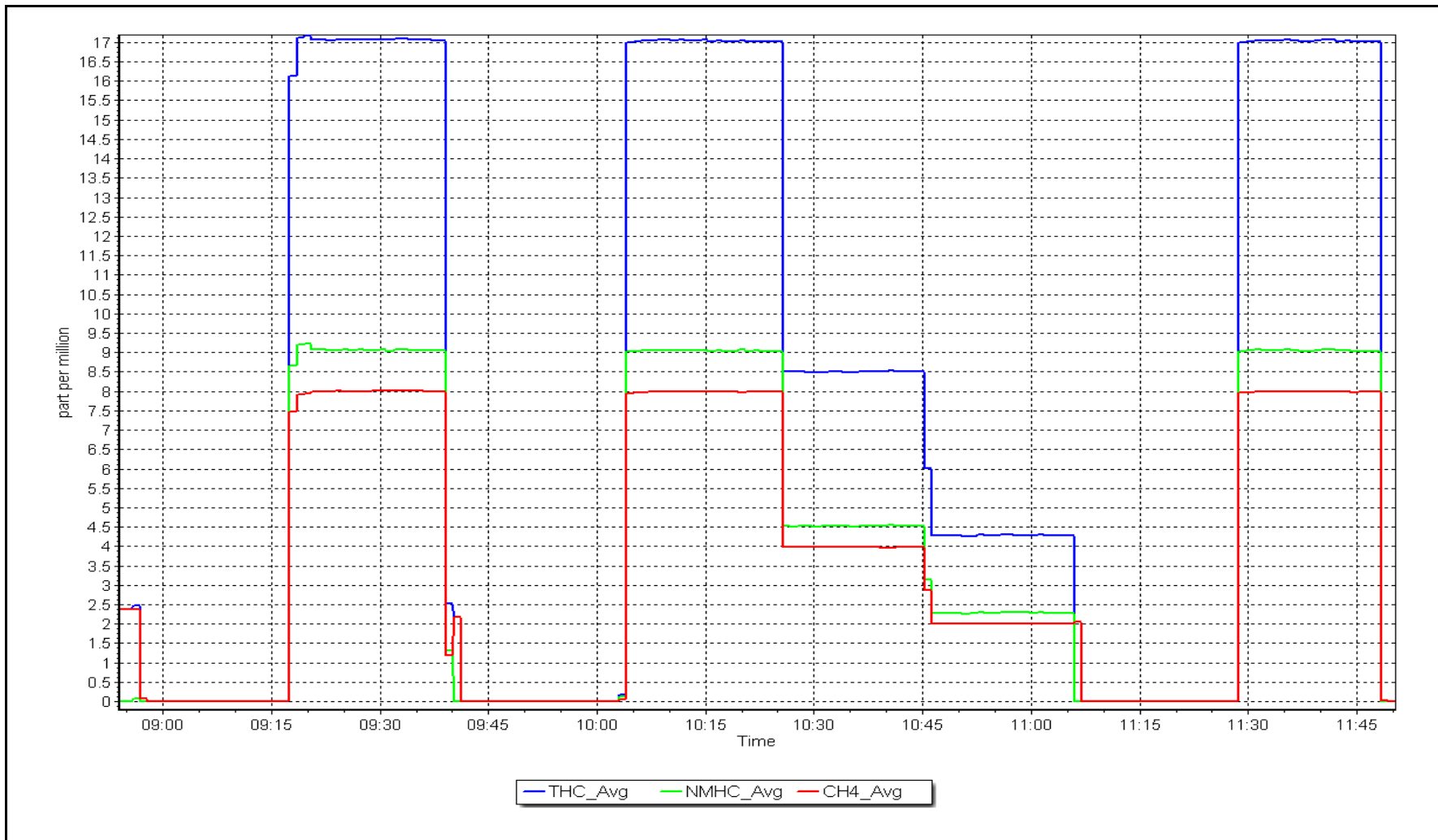
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999993	≥ 0.995			
9.07	9.04	1.0026						
4.54	4.54	1.0009				Slope	0.996672	0.90 - 1.10
2.27	2.29	0.9924						
			Intercept	0.010746	± 0.5			



NMHC Calibration Plot

Date: April 13, 2023

Location: Patricia McInnes





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	April 25, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	8:18	End time (MST):	12:15
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:	AAL070632	Cal Gas Expiry Date:	September 9, 2024
CH ₄ Cal Gas Conc.	501.6 ppm	CH ₄ Equiv Conc.	1066.2 ppm
C ₃ H ₈ Cal Gas Conc.	205.3 ppm		
Removed Gas Ref.	N/A	Removed Gas Expiry:	N/A
Removed CH ₄ Conc.	501.6 ppm	CH ₄ Equiv Conc.	1066.2 ppm
Removed C ₃ H ₈ 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:	261

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	3.33E-04	3.47E-04	NMHC SP Ratio:	5.86E-05
CH ₄ Retention time:	14	14.4	NMHC Peak Area:	154840
				158039

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.12	16.74	1.023
as found 2nd point	4960	40.2	8.57	8.36	1.026
as found 3rd point	4980	20.1	4.29	4.21	1.019
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.11	1.001
second point	4960	40.2	8.57	8.53	1.005
third point	4980	20.1	4.29	4.29	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.03	1.005

Average Correction Factor	1.001
---------------------------	-------

Baseline Corr AF:	16.74	Prev response	17.02	*% change	-1.7%
Baseline Corr 2nd AF:	8.4	AF Slope:	0.977199	AF Intercept:	0.001439
Baseline Corr 3rd AF:	4.2	AF Correlation:	0.999996	* = > +/-5% change initiates investigation	



Wood Buffalo Environmental Association

THC / CH₄ / 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	4920	80.3	9.07	8.94	1.014
as found 2nd point	4960	40.2	4.54	4.47	1.015
as found 3rd point	4980	20.1	2.27	2.25	1.009
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.3	9.07	9.07	1.000
second point	4960	40.2	4.54	4.53	1.002
third point	4980	20.1	2.27	2.28	0.996
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.05	1.002
Average Correction Factor					0.999
Baseline Corr AF:	8.94	Prev response	9.05	*% change	-1.2%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.985465	AF Intercept:	0.003975
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999997	* = > +/-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	7.80	1.032
as found 2nd point	4960	40.2	4.03	3.89	1.038
as found 3rd point	4980	20.1	2.02	1.96	1.031
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	8.05	1.000
second point	4960	40.2	4.03	4.00	1.009
third point	4980	20.1	2.02	2.01	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	7.99	1.008
Average Correction Factor					1.004
Baseline Corr AF:	7.80	Prev response	7.98	*% change	-2.2%
Baseline Corr 2nd AF:	3.89	AF Slope:	0.968249	AF Intercept:	-0.003536
Baseline Corr 3rd AF:	1.96	AF Correlation:	0.999989	* = > +/-5% change initiates investigation	

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope:	0.993826	0.999051
THC Cal Offset:	0.007564	-0.003849
CH ₄ Cal Slope:	0.990693	0.999177
CH ₄ Cal Offset:	-0.004180	-0.007594
NMHC Cal Slope:	0.996672	0.999419
NMHC Cal Offset:	0.010746	0.002345

Notes: Completed multipoint as founds. Changed the actuator after the as founds to fix the dipping issue.
New actuator fixed the issue. Adjusted the span only.

Calibration Performed By: Max Farrell



Wood Buffalo Environmental Association

THC Calibration Summary

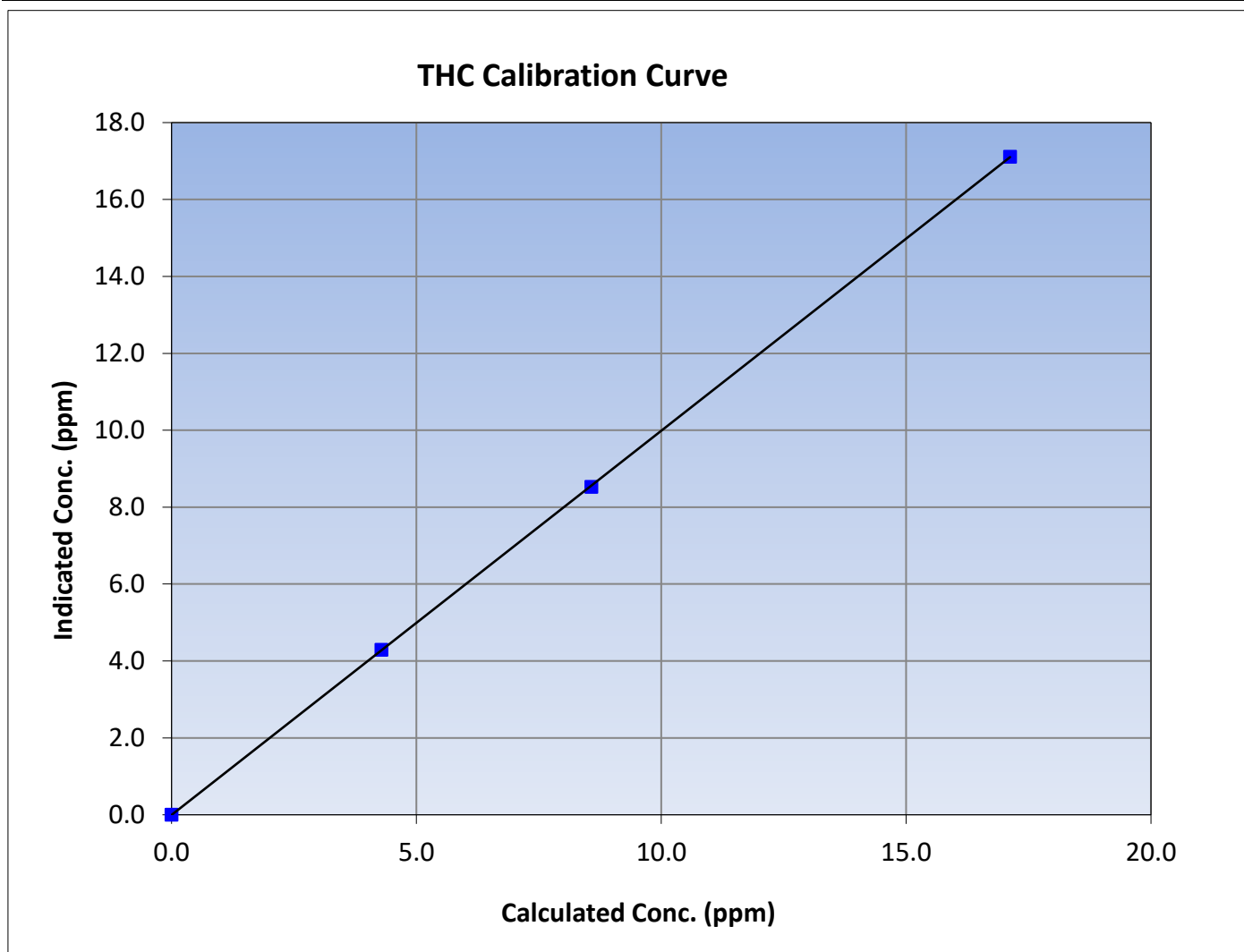
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:18	End Time (MST):	12:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999992	≥ 0.995
17.12	17.11	1.0005			
8.57	8.53	1.0049			
4.29	4.29	0.9984			
			Slope	0.999051	0.90 - 1.10
			Intercept	-0.003849	+/-0.5





Wood Buffalo Environmental Association

CH₄ Calibration Summary

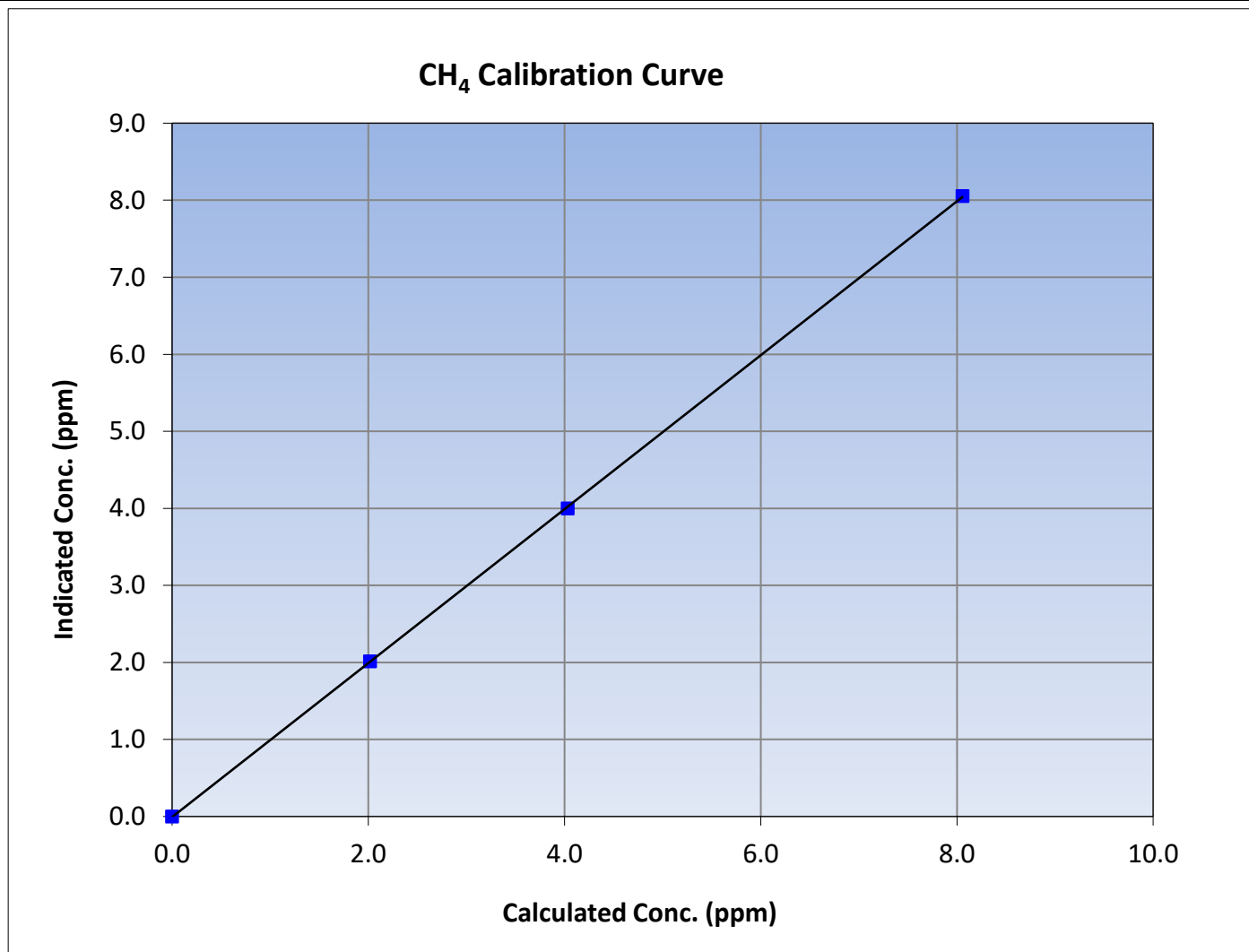
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:18	End Time (MST):	12:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999978	≥0.995
8.06	8.05	1.0005			
4.03	4.00	1.0087			
2.02	2.01	1.0017			
			Slope	0.999177	0.90 - 1.10
			Intercept	-0.007594	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

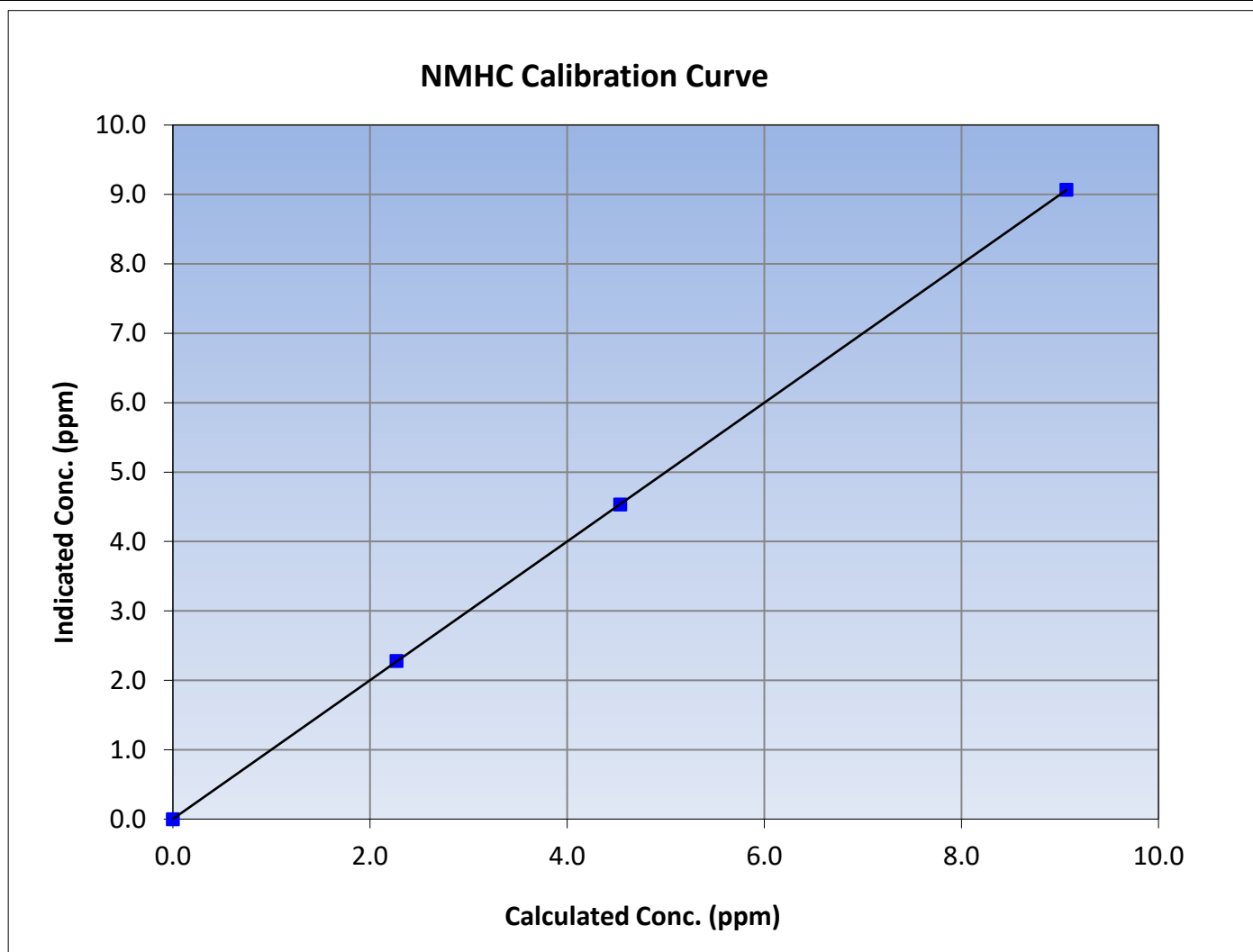
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:18	End Time (MST):	12:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

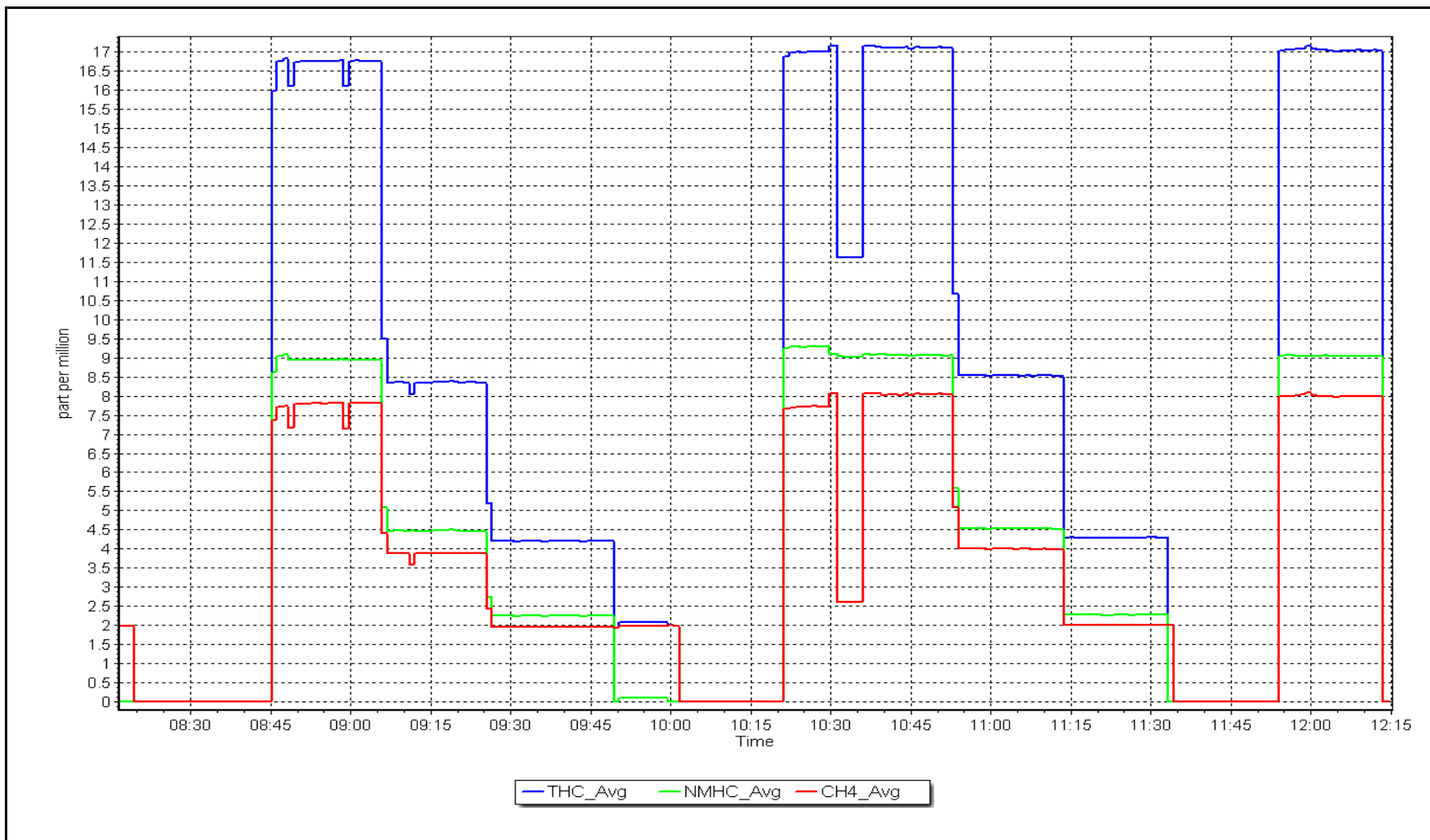
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999997	≥ 0.995
9.07	9.07	1.0001			
4.54	4.53	1.0018			
2.27	2.28	0.9959			
			Slope	0.999419	0.90 - 1.10
			Intercept	0.002345	+/-0.5



NMHC Calibration Plot

Date: April 25, 2023

Location: Patricia McInnes





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Patricia McInnes
Calibration Date: April 4, 2023
Start time (MST): 8:40
Reason: Routine
Station number: AMS06
Last Cal Date: March 7, 2023
End time (MST): 13:32

Calibration Standards

NO Gas Cylinder #: T26D9MR
NOX Cal Gas Conc: 52.51 ppm
Removed Cylinder #: N/A
Removed Gas NOX Conc: 52.51 ppm
NOX gas Diff:
Calibrator Model: Teledyne API T700
ZAG make/model: Teledyne API T701
Cal Gas Expiry Date: August 18, 2023
NO Cal Gas Conc: 51.98 ppm
Removed Gas Exp Date: N/A
Removed Gas NO Conc: 51.98 ppm
NO gas Diff:
Serial Number: 3566
Serial Number: 689

Analyzer Information

Analyzer make: Thermo 42i
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 1172750022

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	0.818	0.835	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.8	3.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	155.1	155.1

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.993329	1.001408
NO _x Cal Offset:	2.240132	2.760164
NO Cal Slope:	0.991966	0.998955
NO Cal Offset:	1.559980	1.840130
NO ₂ Cal Slope:	1.003238	1.006294
NO ₂ Cal Offset:	1.111866	1.349835



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as found span	4923	76.9	807.6	799.5	8.2	796.7	784.0	12.7	1.0137	1.0197
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.1	----	----
high point	4923	76.9	807.6	799.5	8.2	810.3	799.7	10.4	0.9967	0.9997
second point	4962	38.5	404.3	400.2	4.1	408.7	402.3	6.4	0.9893	0.9949
third point	4981	19.2	201.6	199.6	2.0	207.4	203.0	4.4	0.9722	0.9833
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.3	-0.2	----	----
as left span	4923	76.9	807.6	390.6	417.1	813.0	390.8	422.0	0.9934	0.9994
Average Correction Factor									0.9861	0.9926

Corrected As found	NO _x = 796.6 ppb	NO = 783.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -1.0%	
Previous Response	NO _x = 804.5 ppb	NO = 794.6 ppb		*Percent Change	NO = -1.4%	
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:	Nx Int:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:	NO Int:
			As found	NO ₂ r ² :	NO ₂ SI:	NO ₂ Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	800.5	391.6	417.1	420.8	0.9911	100.9%
2nd GPT point (200 ppb O3)	800.5	391.6	417.1	420.8	0.9911	100.9%
3rd GPT point (100 ppb O3)	800.5	697.9	110.8	114.5	0.9673	103.4%
Average Correction Factor					0.9831	101.7%

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

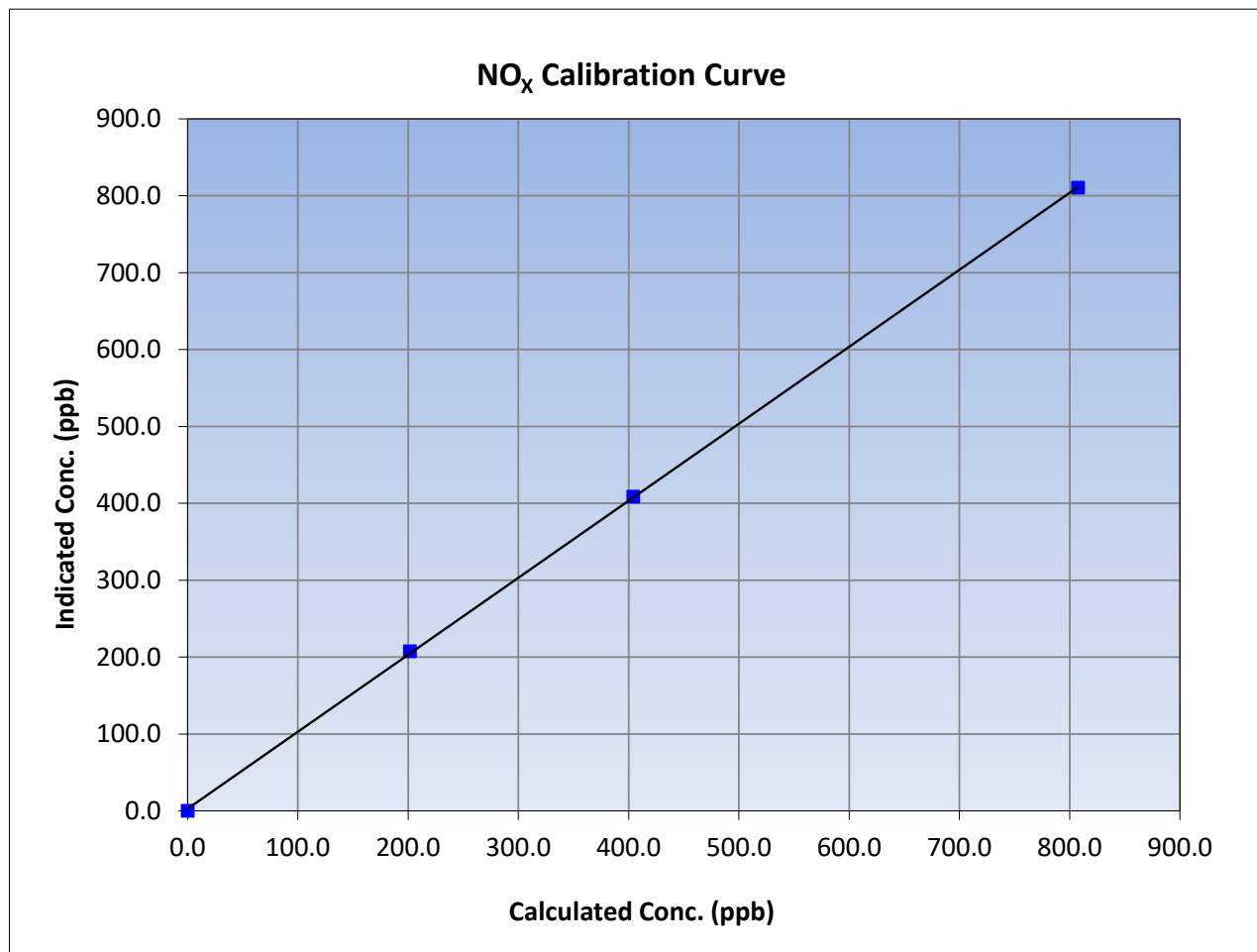
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:40	End Time (MST):	13:32
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	0.2	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
807.6	810.3	0.9967		
404.3	408.7	0.9893		
201.6	207.4	0.9722		





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

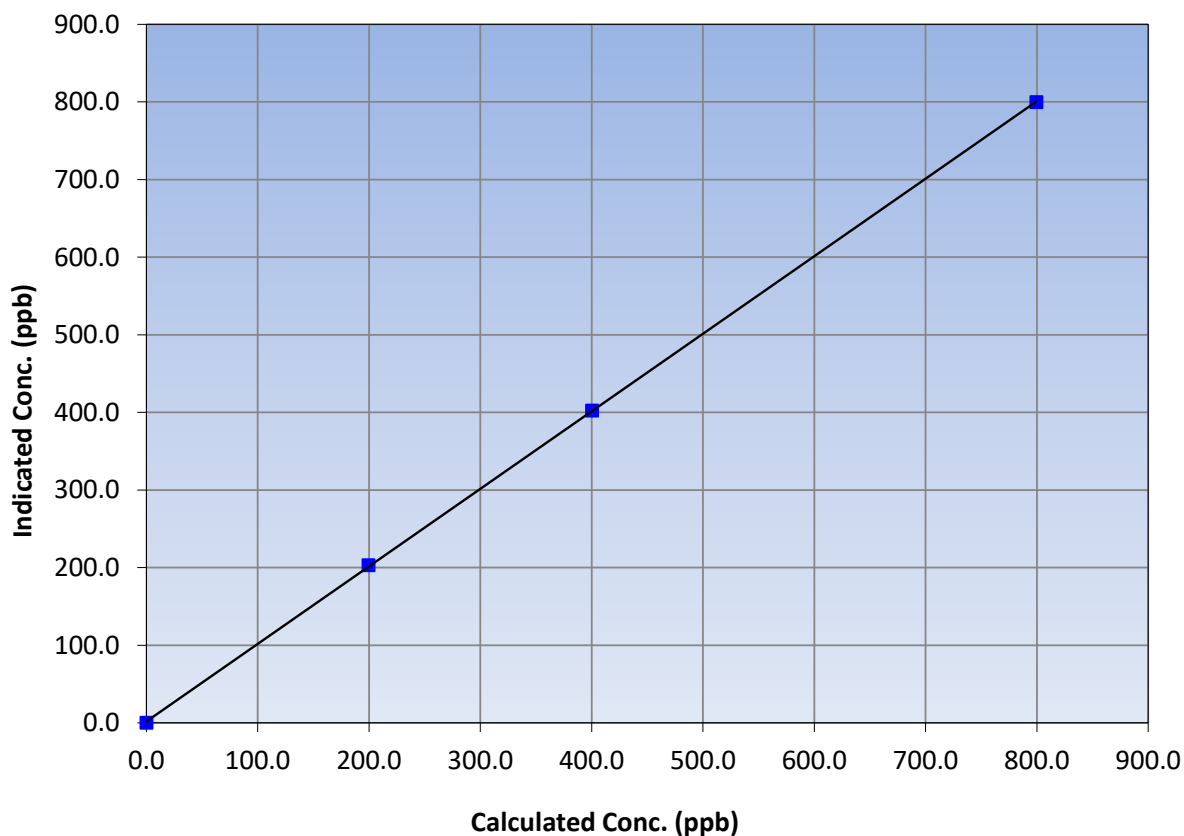
Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:40	End Time (MST):	13:32
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	0.2	----	Correlation Coefficient	≥0.995	
799.5	799.7	0.9997			
400.2	402.3	0.9949			
199.6	203.0	0.9833			
			Slope	0.998955	0.90 - 1.10
			Intercept	1.840130	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

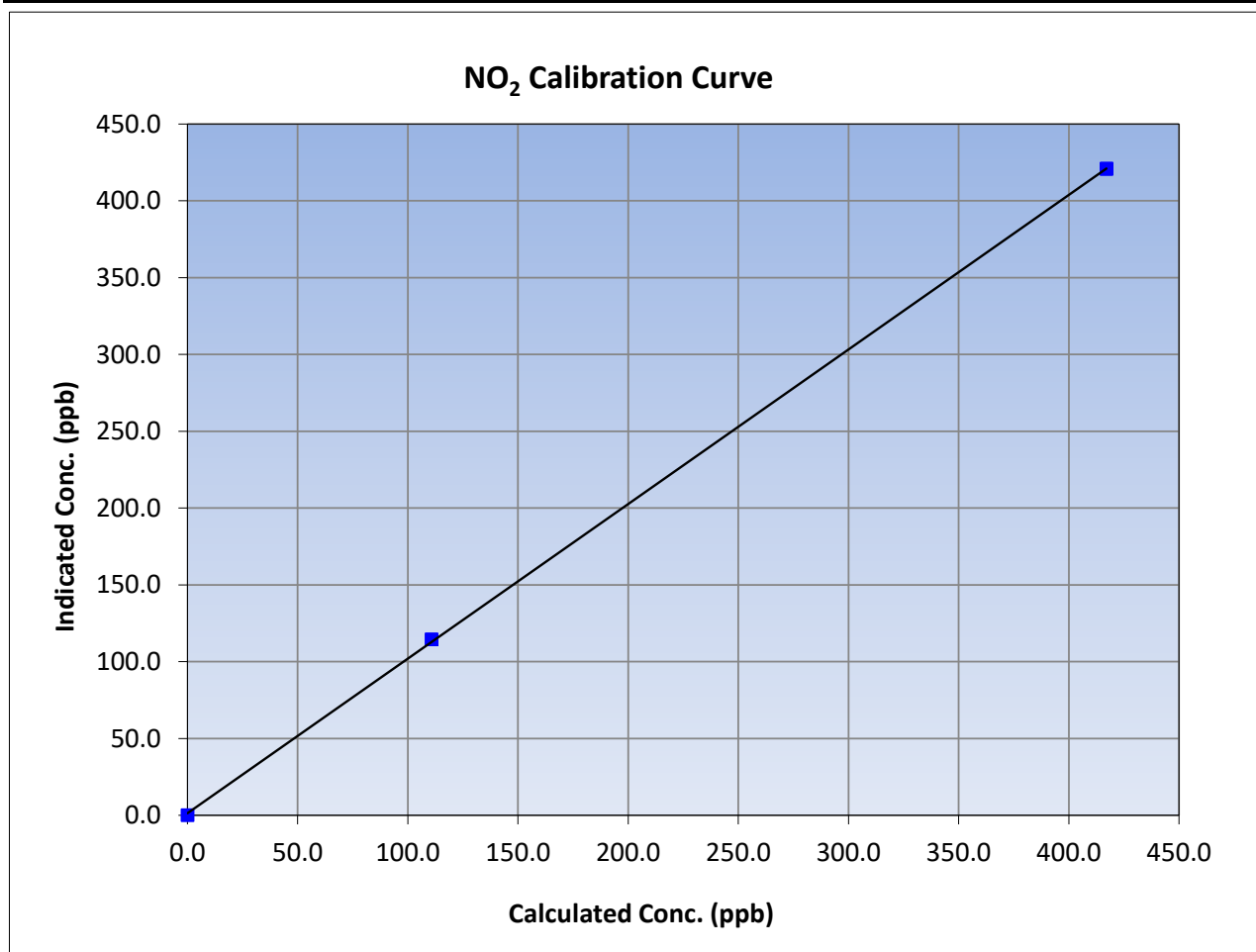
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:40	End Time (MST):	13:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

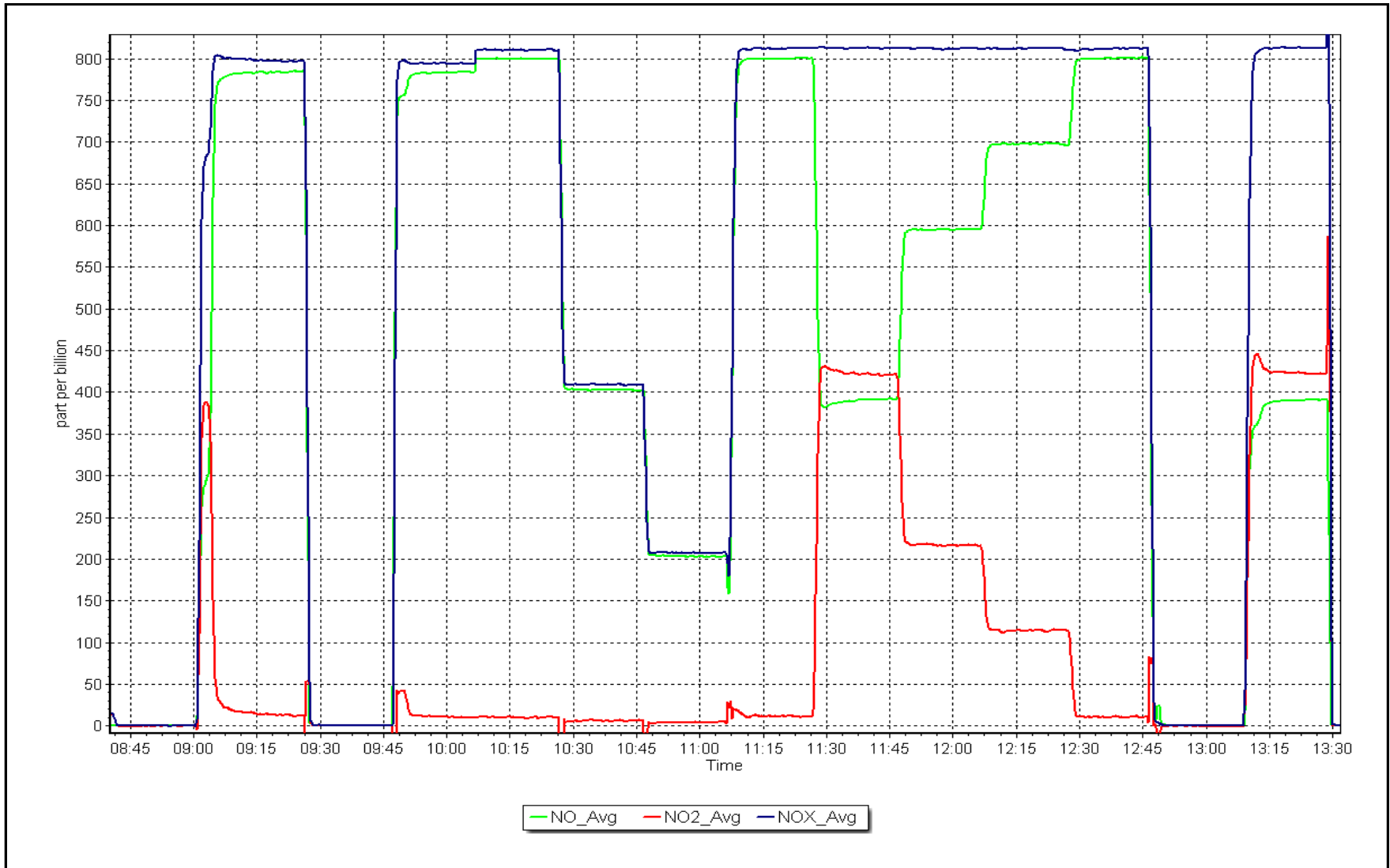
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
417.1	420.8	0.9911		
417.1	420.8	0.9911		
110.8	114.5	0.9673		



NO_x Calibration Plot

Date: April 4, 2023

Location: Patricia McInnes





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name: Patricia McInnes Station number: AMS06
 Calibration Date: April 3, 2023 Last Cal Date: March 9, 2023
 Start time (MST): 9:15 End time (MST): 12:58
 Reason: Routine

Calibration Standards

O3 generation mode: Photometer
 Calibrator Make/Model: API T700 Serial Number: 3566
 ZAG Make/Model: API T701H Serial Number: 689

Analyzer Information

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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.005771	1.006429	Backgd or Offset:	-1.2	-0.2
Calibration intercept:	0.940000	0.300000	Coeff or Slope:	1.019	1.019

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	800.0	0.0	0.5	----
as found span	5000	1303.0	400.0	403.9	0.990
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.2	----
high point	5000	1303.0	400.0	402.7	0.993
second point	5000	966.5	200.0	201.6	0.992
third point	5000	794.3	100.0	101.6	0.984
as left zero	5000	800.0	0.0	0.1	----
as left span	5000	1303.0	400.0	403.6	0.991
Average Correction Factor					0.990

Baseline Corr As found:	403.4	Previous response	403.2	*% 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. Adjusted the zero only.

Calibration Performed By: Max Farrell



Wood Buffalo Environmental Association

O₃ Calibration Summary

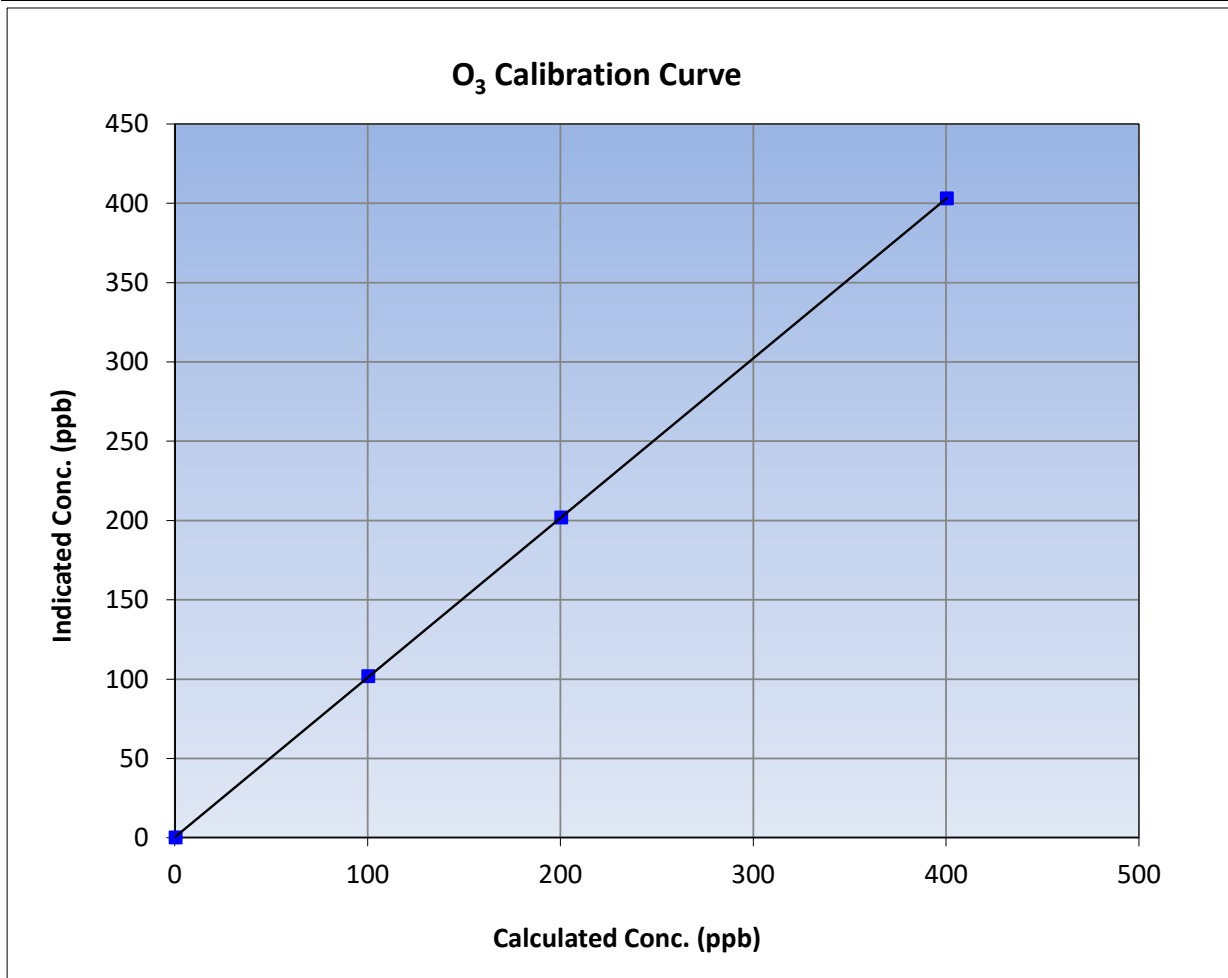
Version-01-2020

Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:15	End Time (MST):	12:58
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

Calibration Data

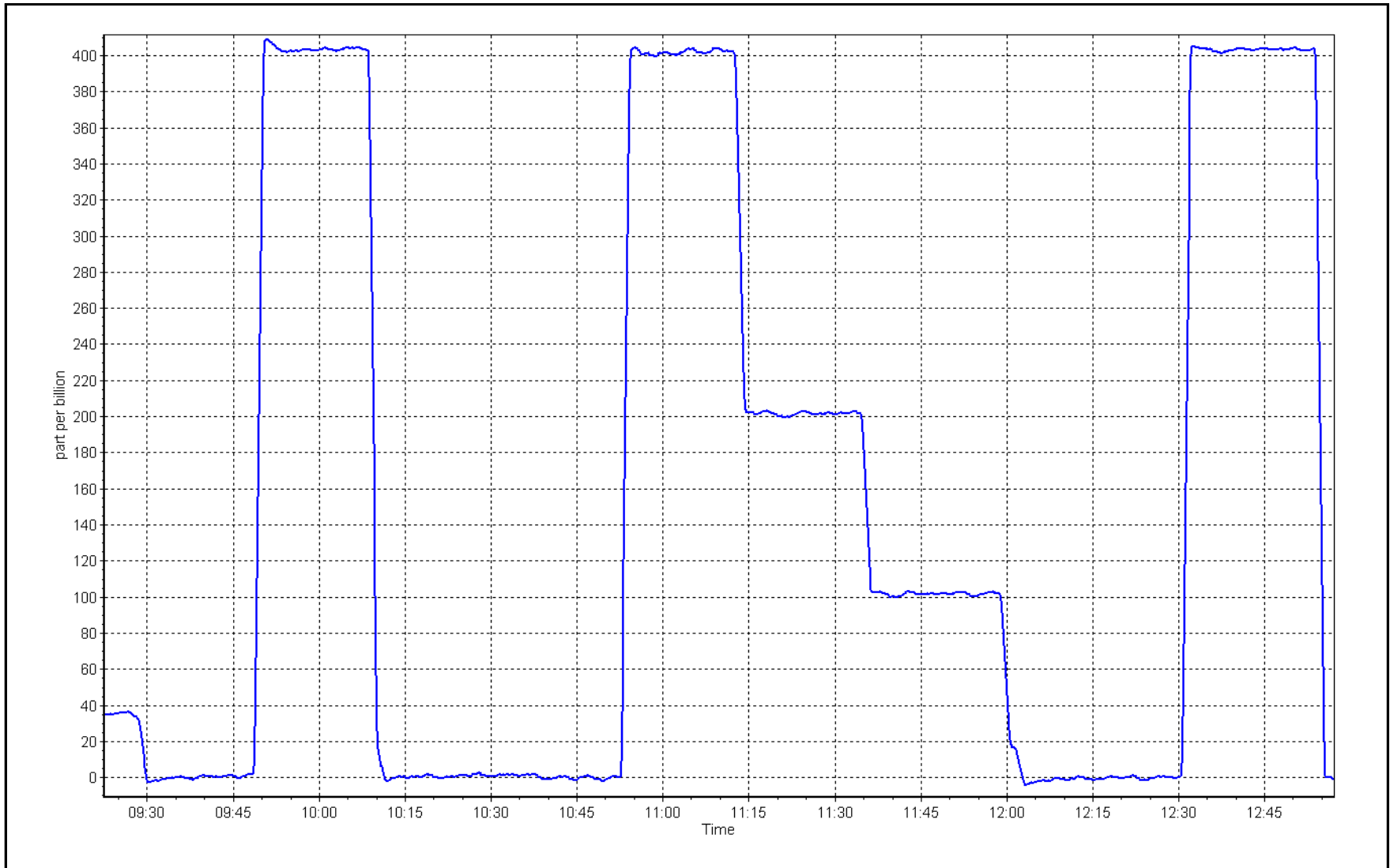
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.2	----	Correlation Coefficient	0.999992	≥0.995
400.0	402.7	0.9933			
200.0	201.6	0.9921	Slope	1.006429	0.90 - 1.10
100.0	101.6	0.9843			
			Intercept	0.300000	+/- 5



O₃ Calibration Plot

Date: April 3, 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: April 13, 2023 Last Cal Date: March 15, 2023
 Start time (MST): 12:12 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)	10.5	10.9	10.5	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	722	722.4	722	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	4.99	5.14	4.99	<input type="checkbox"/>	+/- 0.25 LPM

Leak Test: Date of check: April 13, 2023 Last Cal Date: March 15, 2023
 PM w/o HEPA: 5.6 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	11	11	11	<input type="checkbox"/>	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 10.4 w/ HEPA: 0
 Date Optical Chamber Cleaned: April 13, 2023 <0.2 ug/m3
 Disposable Filter Changed: April 13, 2023

Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023
 Date RH/T Sensor Cleaned: April 13, 2023

Notes: PMT Peak test completed. Leak check passed. No adjustments made.

Calibration by: Max Farrell



Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	April 20, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	8:10	End time (MST):	12:00
NH3 Cal Date:	April 20, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	8:10	End time (MST):	12:00
Reason:	Cylinder Change NH3 cylinder swap		

Calibration Standards

NOX Cal Gas Conc:	52.51	ppm	NO Gas Cylinder #:	T26D9MR
NO Cal Gas Conc:	51.98	ppm	NO Cal Gas Expiry:	August 18, 2023
Removed NOX Conc:	52.51	ppm	Removed Cylinder #:	N/A
Removed NO Conc:	51.98	ppm	Removed cyl Expiry:	N/A
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	77.8	ppm	NH3 Gas Cylinder #:	CC710812
Removed NH3 Conc:	73.9	ppm	NH3 Cal Gas Expiry:	March 30, 2023
NH3 gas Diff:	-2.7%		Removed Cylinder #:	CC430800
Calibrator Model:	API T700		Removed cyl Expiry:	January 7, 2023
ZAG make/model:	API T701		Serial Number:	3566
			Serial Number:	689

Analyzer Information

Analyzer model:	API T201	Analyzer serial #:	152
Converter model:	API T501	Converter serial #:	147
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.70
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	531

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient:	0.823	0.823	TN coefficient:	0.822	0.822
NOX coefficient:	0.824	0.824	NO bkgnd:	-0.1	-0.1
NO2 coefficient:	1.000	1.000	NOX bkgnd:	0.0	0.0
NH3 coefficient:	0.951	0.951	TN bkgnd:	0.0	0.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999337	
NO _x Cal Offset:	1.041887	
NO Cal Slope:	0.997013	
NO Cal Offset:	2.119639	
NO ₂ Cal Slope:	0.993721	
NO ₂ Cal Offset:	-1.386593	
NH3 Cal Slope:	1.005985	
NH3 Cal Offset:	7.240605	
TN Cal Slope:	1.011422	
TN Cal Offset:	7.102178	



Wood Buffalo Environmental Association

TN - NOX - NH₃ Calibration Report

Version-11-2021

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) <i>Limit = 0.95-1.05</i>	NH3 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero										
as found NO										
calibrator zero										
high NO point										
NO/O3 point										
as found NH3	3415	85.3	1801.0	----	1801.0	1811.9	----	1802.0	0.994	0.999
new NH3 cyl rp	3419	81.2	1805.1	----	1805.1	1767.2		1758.2	1.021	1.027
first NH3										
second NH3										
third NH3										

								Average Correction Factor		
--	--	--	--	--	--	--	--	---------------------------	--	--

Corrected As found TN = NA ppb NO_x = NA ppb NH3 = NA ppb

Previous Response TN = NA ppb NO_x = NA ppb NH3 = 1819.1 ppb

NH3 Previous Converter Efficiency = 95.1%

NH3 Current Converter Efficiency = 95.1%

*Percent Change TN = NA

*Percent Change NO_x = NA

*Percent Change NH3 = NA

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	0.5	----	----
as found span	4923	76.9	807.6	799.5	807.6	809.6	797.5	811.1	0.9975	1.0024
new NO cyl rp										
calibrator zero										
high point										
second point										
third point										

						Average Correction Factor			
Baseline Corr As fnd	TN = 810.6 ppb	NO _x = 810.1 ppb	NO = 797.9 ppb			*Percent Change	TN = -1.6%		
Previous Response	TN = 823.9 ppb	NO _x = 808.1 ppb	NO = 799.2 ppb			*Percent Change	NO _x = 0.2%		
						*Percent Change	NO = -0.2%		
						* = > +/-5% change initiates investigation			

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
as found zero	----	----	0.0	-0.1	----	----
calibration zero						
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						

					Average Correction Factor			

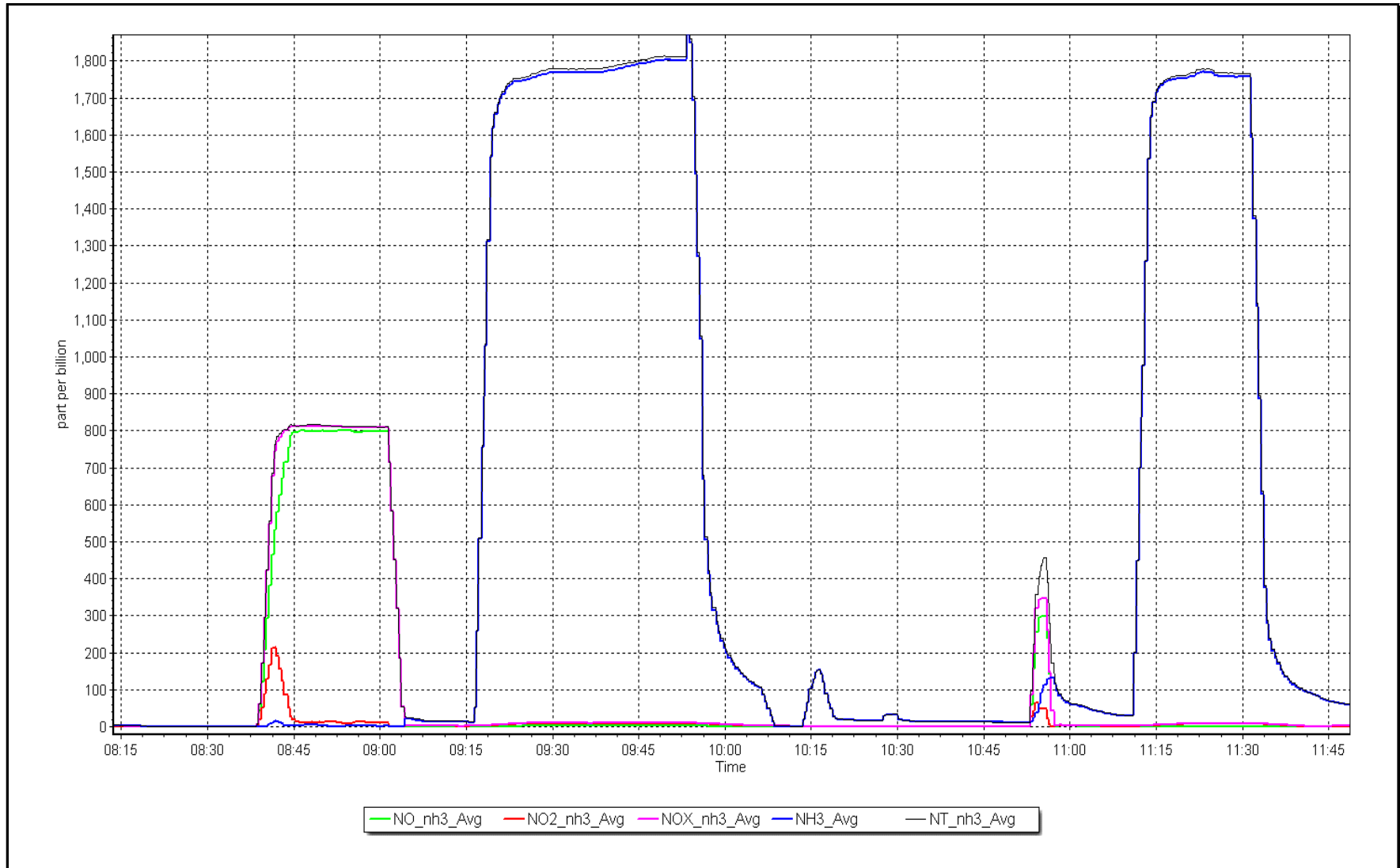
Notes: Changing out the NH₃ cal gas cylinder. Completed as founds and swapped out the NH₃ cylinder. Completed NH₃ span for comparison. Will complete a full calibration tomorrow.

Calibration Performed By: Max Farrell

NO_x Calibration Plot

Date: April 20, 2023

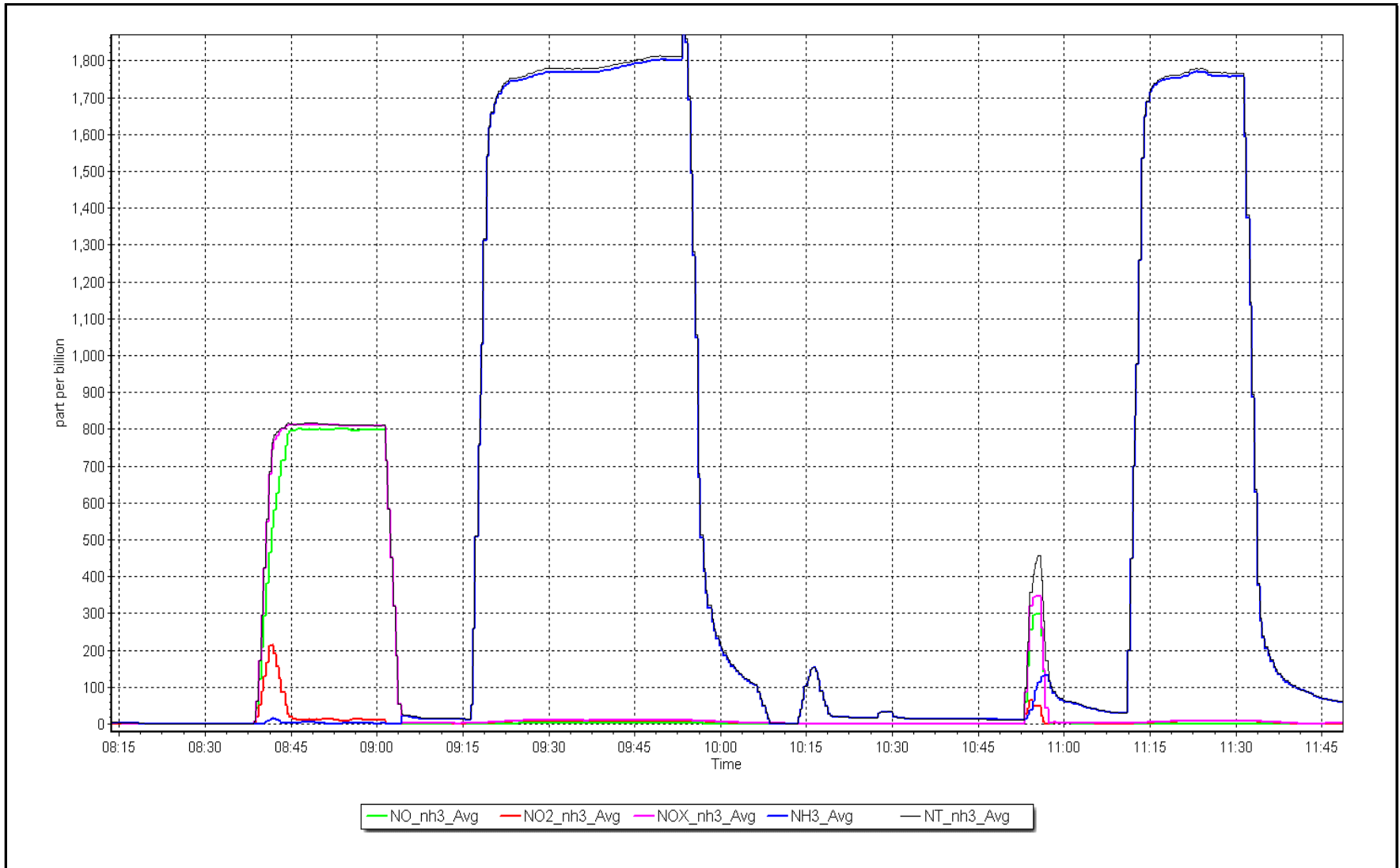
Location: Patricia McInnes



NH₃ Calibration Plot

Date: April 20, 2023

Location: Patricia McInnes





Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	April 27, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	8:10	End time (MST):	12:39
NH3 Cal Date:	April 27, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	13:00	End time (MST):	14:48
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	52.51	ppm	NO Gas Cylinder #:	T26D9MR
NO Cal Gas Conc:	51.98	ppm	NO Cal Gas Expiry:	August 18, 2023
Removed NOX Conc:	52.51	ppm	Removed Cylinder #:	N/A
Removed NO Conc:	51.98	ppm	Removed cyl Expiry:	N/A
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 #:	
NH3 gas Diff:			Removed cyl Expiry:	
Calibrator Model:	API T700		Serial Number:	3566
ZAG make/model:	API T701		Serial Number:	689

Analyzer Information

Analyzer model:	API T201	Analyzer serial #:	152
Converter model:	API T501	Converter serial #:	147
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.70
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	531

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient:	0.823	0.833	TN coefficient:	0.822	0.837
NOX coefficient:	0.824	0.839	NO bkgrnd:	-0.1	-0.1
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	0.0	0.0
NH3 coefficient:	0.951	0.951	TN bkgrnd:	0.0	0.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999337	1.004262
NO _x Cal Offset:	1.041887	2.034812
NO Cal Slope:	0.997013	1.000294
NO Cal Offset:	2.119639	0.654848
NO ₂ Cal Slope:	0.993721	1.003690
NO ₂ Cal Offset:	-1.386593	0.714817
NH3 Cal Slope:	1.005985	1.003144
NH3 Cal Offset:	7.240605	4.931327
TN Cal Slope:	1.011422	1.008443
TN Cal Offset:	7.102178	5.257930



Wood Buffalo Environmental Association

TN - NOX - NH₃ Calibration Report

Version-11-2021

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) <i>Limit = 0.95-1.05</i>	NH3 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.6	-0.7	1.3	----	----
as found NO	4923	76.9	807.6	807.6	----	791.1	794.2	-3.1	1.021	----
calibrator zero	5000	0.0	0.0	0.0	0.0	1.1	0.1	1.0	----	----
high NO point	4923	76.9	807.6	807.6	----	812.2	812.2	-0.2	0.994	----
NO/O3 point	4923	76.9	807.6	807.6	----	807.0	807.8	-0.8	1.001	----
as found NH3	3419	81.0	1800.7	----	1800.7	1818.5	----	1808.9	0.990	0.995
new NH3 cyl rp							----			
first NH3	3419	81.0	1800.7	----	1800.7	1818.5	----	1808.9	0.990	0.995
second NH3	3455	45.0	1000.4	----	1000.4	1017.0	----	1010.9	0.984	0.990
third NH3	3478	22.5	500.1	----	500.1	513.6	----	510.6	0.974	0.980
Average Correction Factor									0.9976	0.9882

Corrected As found TN = 790.5 ppb NO_x = 794.9 ppb NH3 = 1807.6 ppb

Previous Response TN = 823.9 ppb NO_x = 808.1 ppb NH3 = 1818.8 ppb

NH3 Previous Converter Efficiency = 95.1%

NH3 Current Converter Efficiency = 95.1%

*Percent Change TN = -4.2%

*Percent Change NO_x = -1.7%

*Percent Change NH3 = -0.6%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.2	0.6	----	----
as found span	4923	76.9	807.6	799.5	807.6	794.2	787.4	791.1	1.0169	1.0153
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	1.1	----	----
high point	4923	76.9	807.6	799.5	807.6	812.2	800.3	812.2	0.9944	0.9990
second point	4962	38.5	404.3	400.2	404.3	408.8	400.6	408.4	0.9890	0.9990
third point	4981	19.2	201.6	199.6	201.6	206.6	201.3	207.0	0.9759	0.9915
Average Correction Factor									0.9864	0.9965

Baseline Corr As fnd	TN = 790.5 ppb	NO _x = 794.9 ppb	NO = 787.6 ppb	*Percent Change	TN = -4.2%
Previous Response	TN = 823.9 ppb	NO _x = 808.1 ppb	NO = 799.2 ppb	*Percent Change	NO _x = -1.7%
				*Percent Change	NO = -1.5%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
as found zero	----	----	0.0	-0.4	----	----
calibration zero	----	----	0.0	0.0	----	----
1st GPT point (400 ppb O3)	798.1	380.9	425.4	427.0	0.9961	100.4%
2nd GPT point (200 ppb O3)	798.1	589.1	217.2	219.8	0.9880	101.2%
3rd GPT point (100 ppb O3)	798.1	693.7	112.6	113.9	0.9882	101.2%
Average Correction Factor					0.9908	100.9%

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

Calibration Performed By: Max Farrell



Wood Buffalo Environmental Association

TN Calibration Summary

Version-11-2021

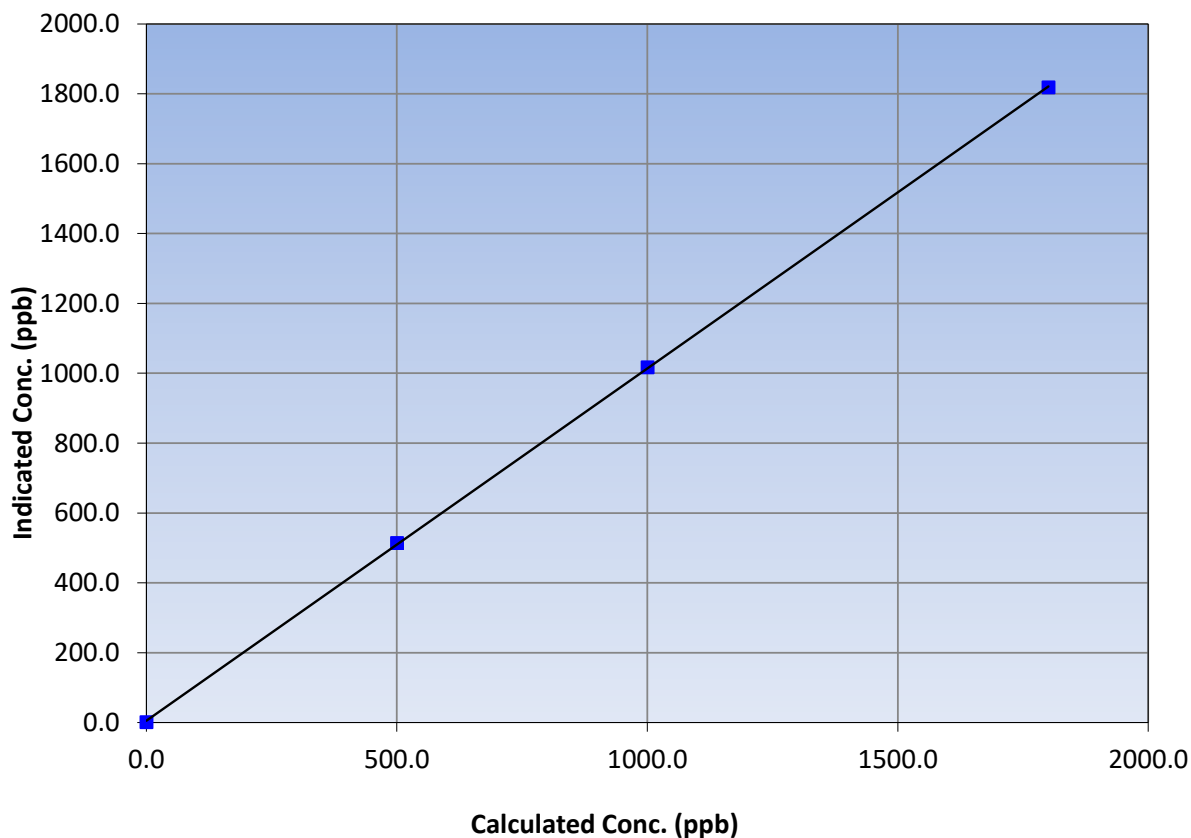
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	1.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
1800.7	1818.5	0.9902		
1000.4	1017.0	0.9837		
500.1	513.6	0.9738		
			0.999973	
			1.008443	
			5.257930	

TN Calibration Curve





Wood Buffalo Environmental Association

NH₃ Calibration Summary

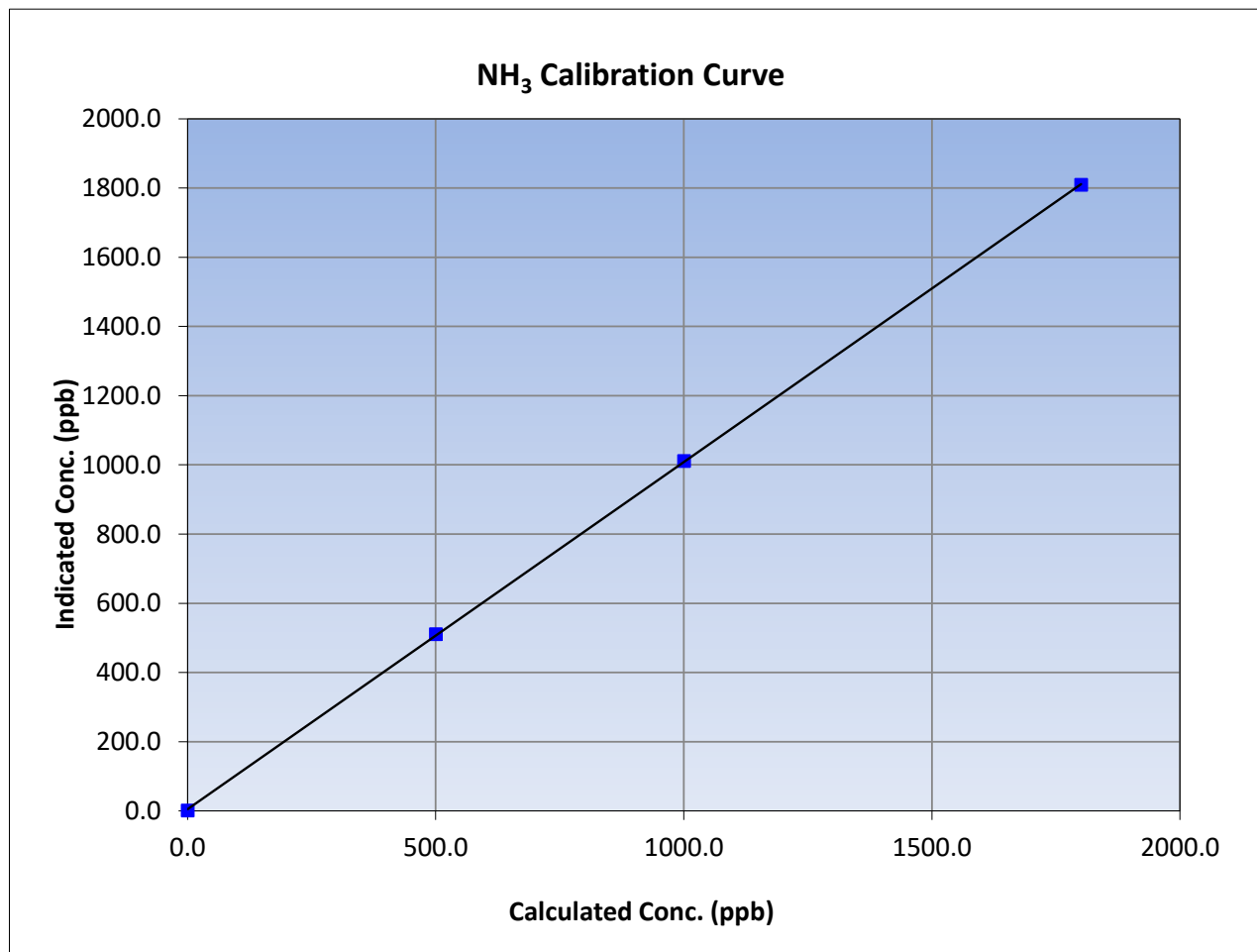
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	1.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
1800.7	1808.9	0.9955		
1000.4	1010.9	0.9896		
500.1	510.6	0.9795		
			0.999976	
			1.003144	
			4.931327	





Wood Buffalo Environmental Association

NO_x Calibration Summary

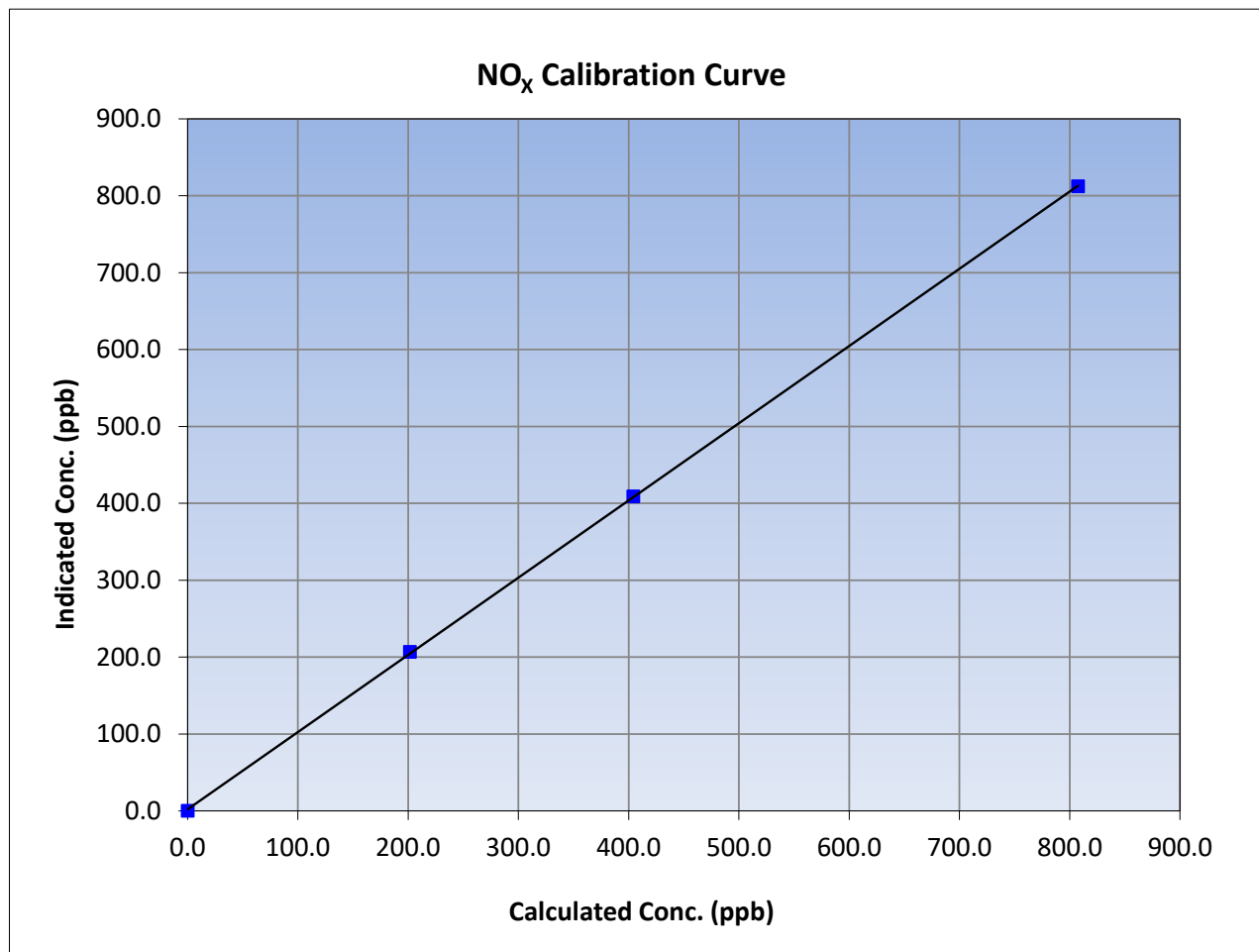
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.1	----	Correlation Coefficient	≥0.995	
807.6	812.2	0.9944			
404.3	408.8	0.9890			
201.6	206.6	0.9759			
			Slope	1.004262	0.90 - 1.10
			Intercept	2.034812	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-11-2021

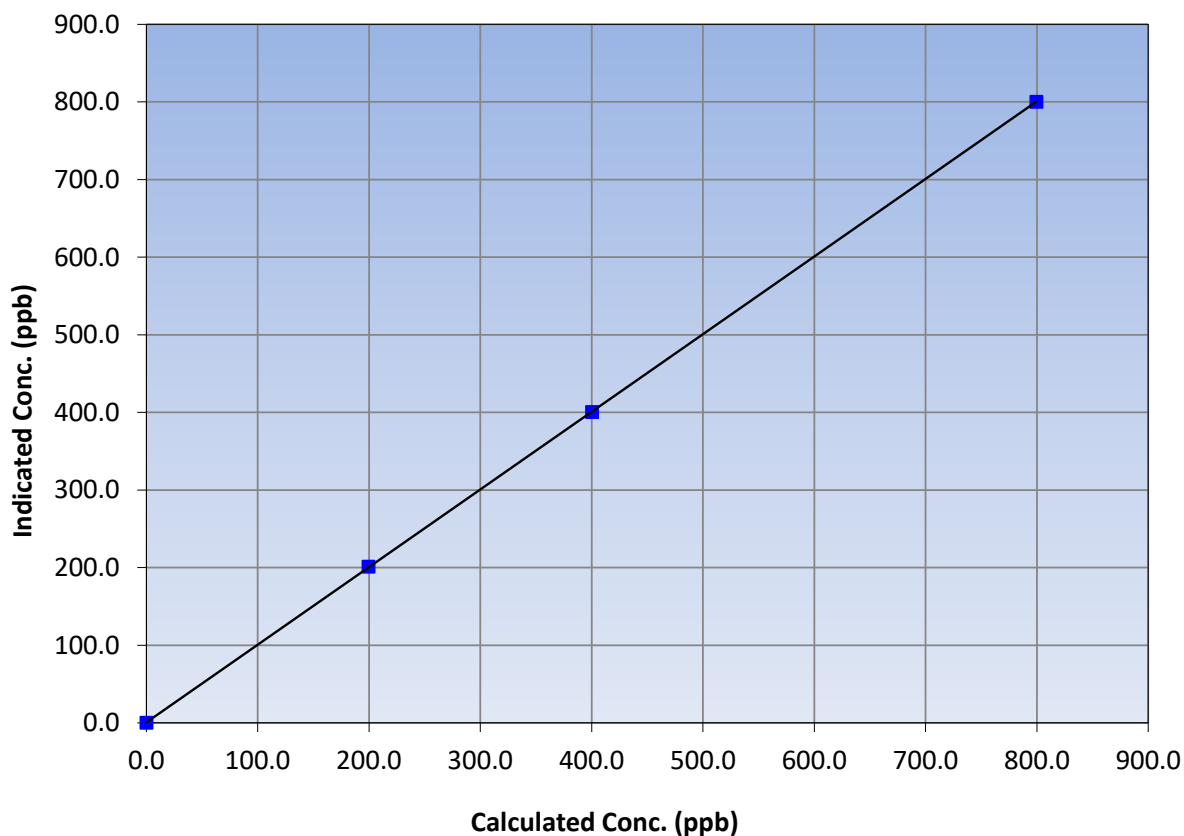
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.1	----	Correlation Coefficient	≥0.995	
799.5	800.3	0.9990			
400.2	400.6	0.9990			
199.6	201.3	0.9915			
			Slope	1.000294	0.90 - 1.10
			Intercept	0.654848	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

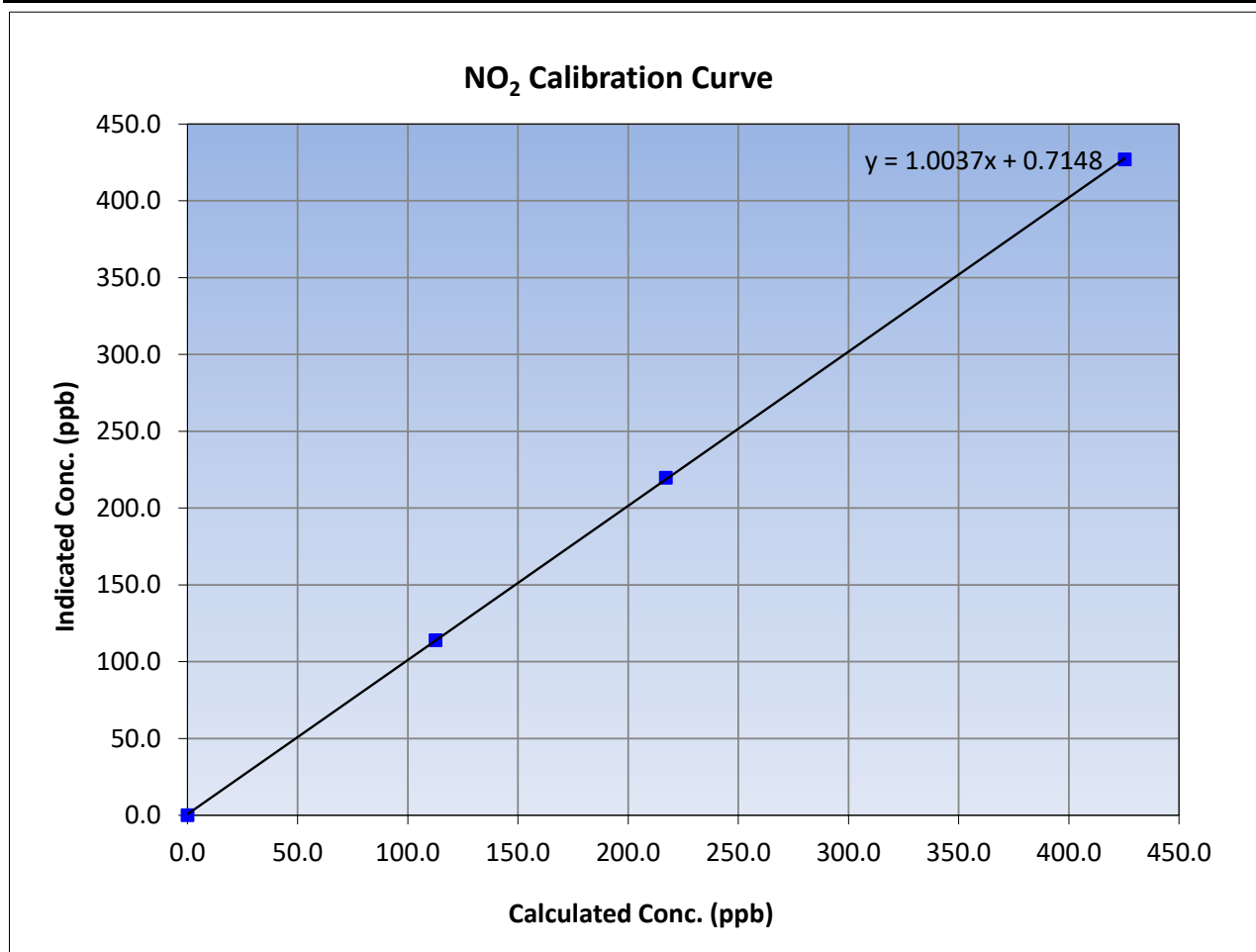
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

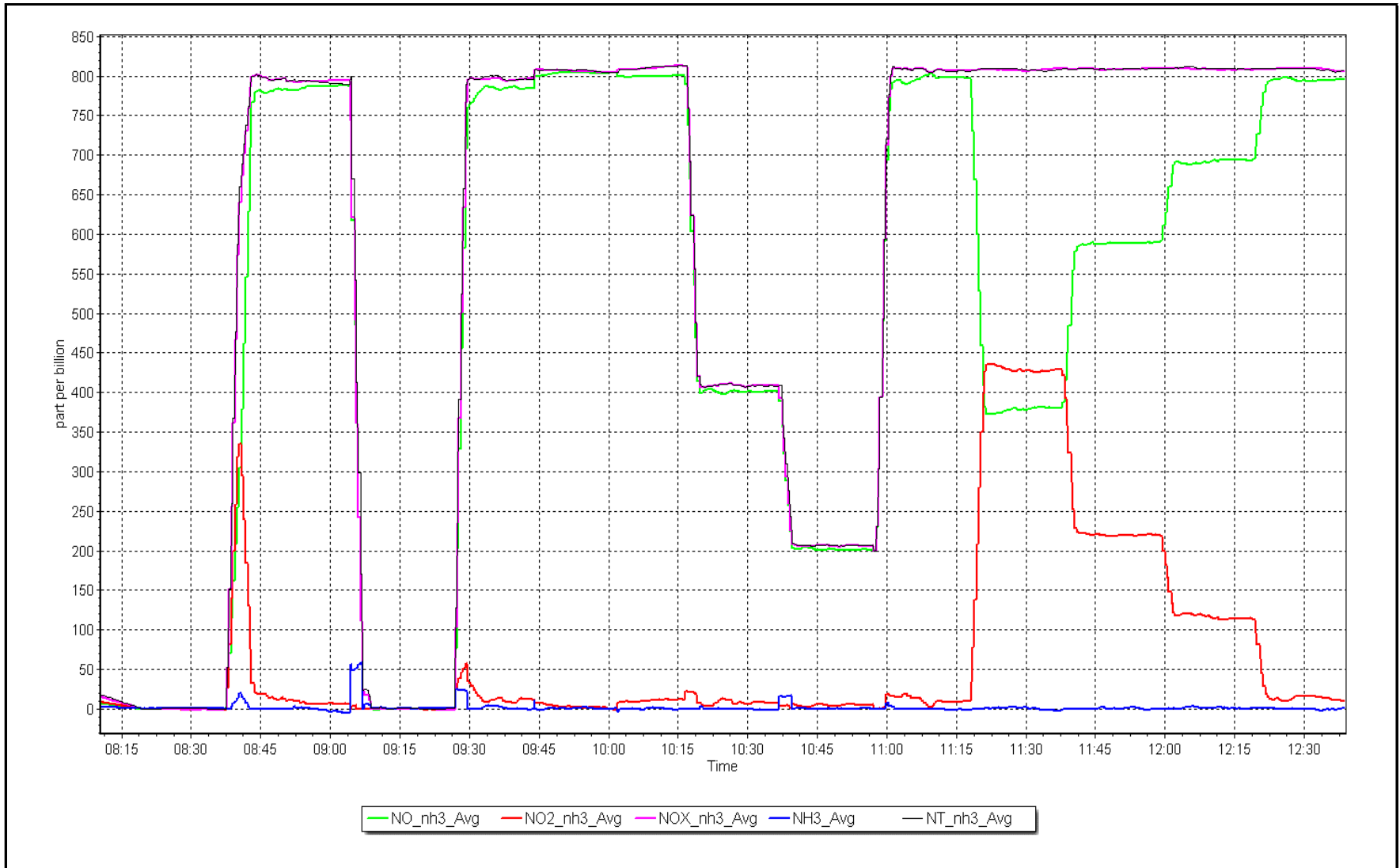
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	≥0.995	
425.4	427.0	0.9961			
217.2	219.8	0.9880			
112.6	113.9	0.9882			
			Slope	1.003690	0.90 - 1.10
			Intercept	0.714817	+/-20



NO_x Calibration Plot

Date: April 27, 2023

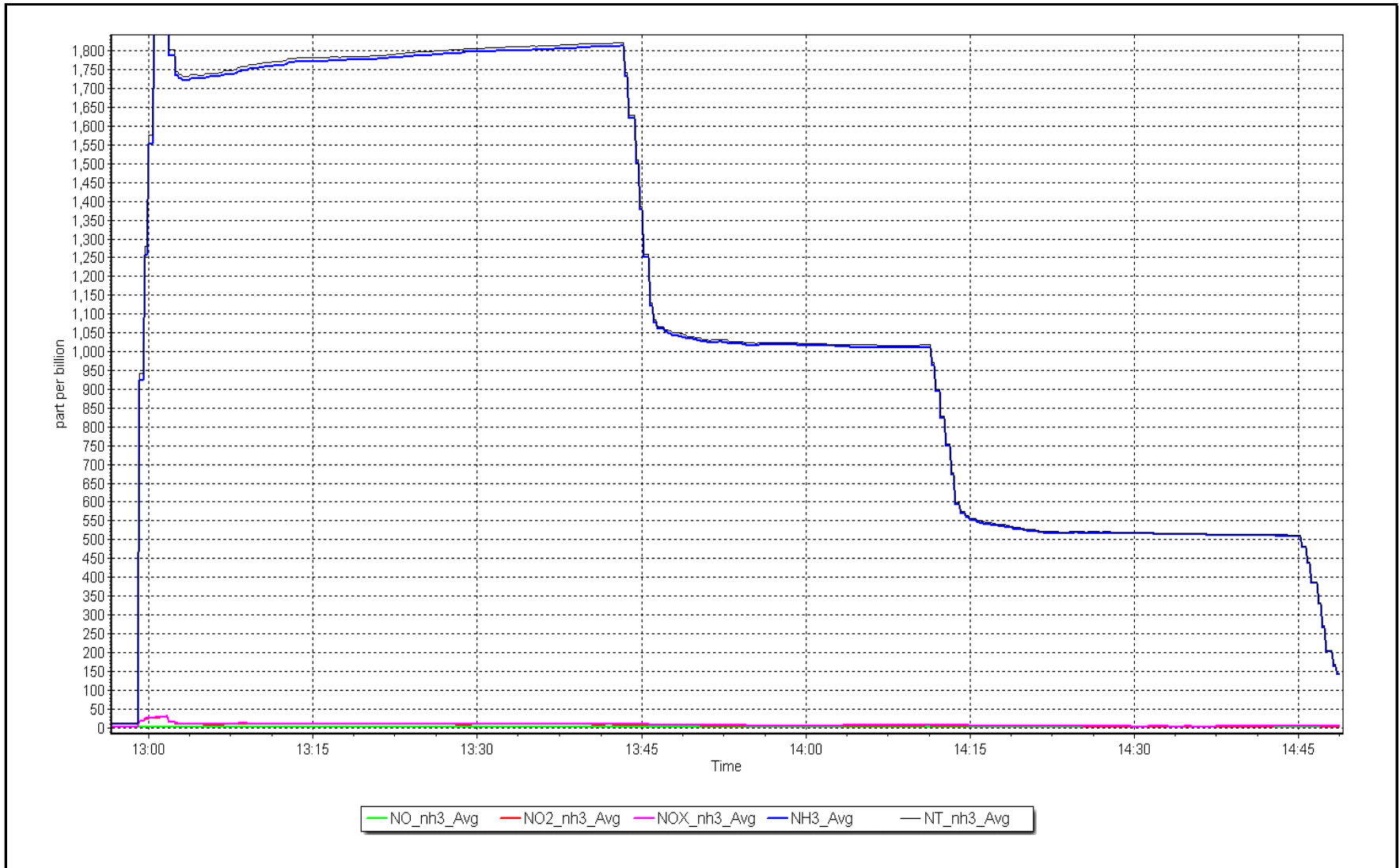
Location: Patricia McInnes



NH₃ Calibration Plot

Date: April 27, 2023

Location: Patricia McInnes





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07 ATHABASCA VALLEY APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	April 19, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	7:10	End time (MST):	9:58
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.995896	1.003328	Backgd or Offset:	2.70	2.70
Calibration intercept:	2.083550	2.004886	Coeff or Slope:	0.857	0.857

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.3	801.2	804.3	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.3	801.2	804.3	0.996
second point	4960	39.6	400.2	406.3	0.985
third point	4980	19.8	200.1	203.4	0.984
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.2	800.2	806.3	0.992
Average Correction Factor					0.988

Baseline Corr As found:	804.30	Previous response	799.99	*% 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 or maintenance done.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

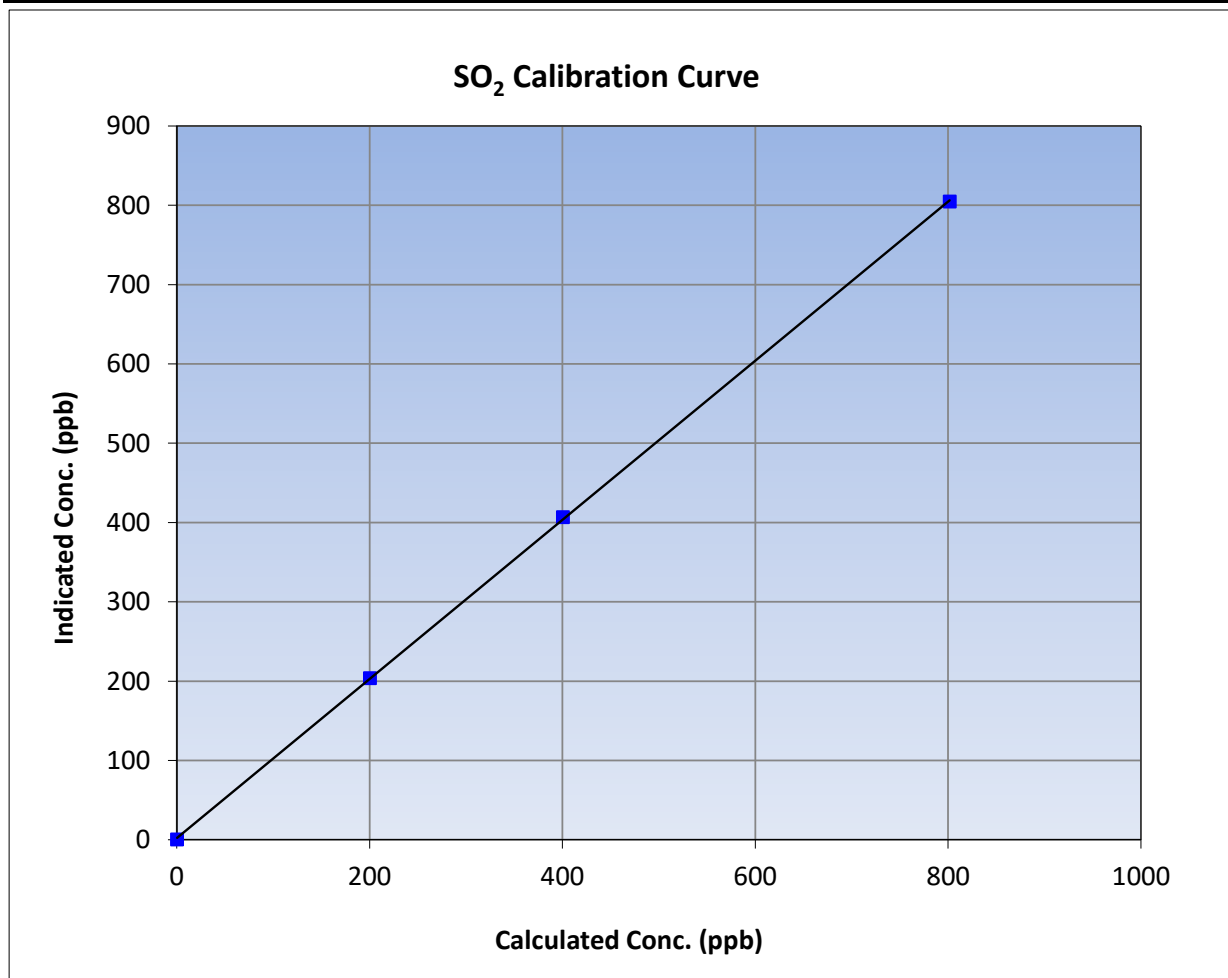
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:10	End Time (MST):	9:58
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

Calibration Data

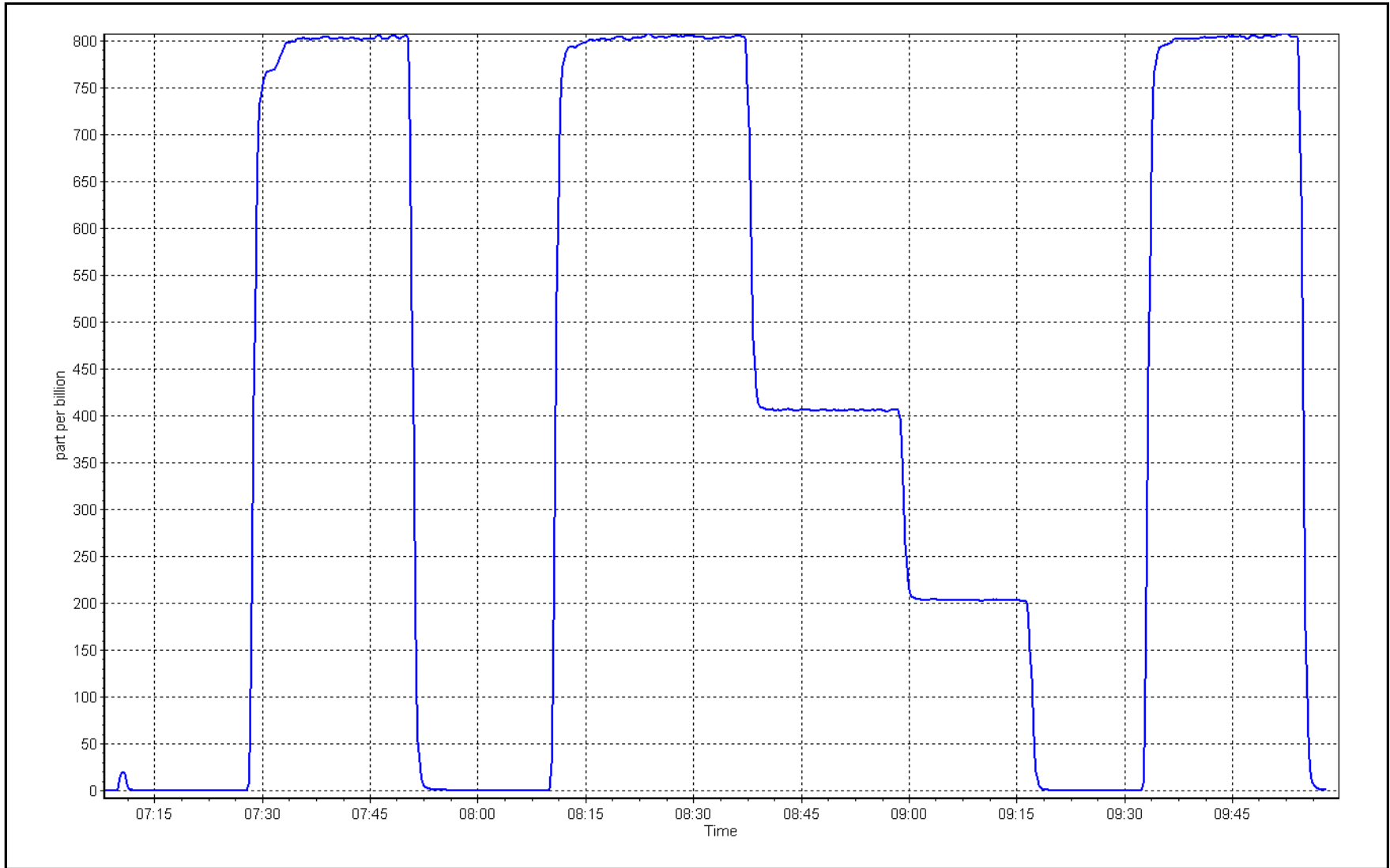
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999959	≥0.995
801.2	804.3	0.9961			
400.2	406.3	0.9849	Slope	1.003328	0.90 - 1.10
200.1	203.4	0.9836			
			Intercept	2.004886	+/-30



SO2 Calibration Plot

Date: April 19, 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: April 26, 2023 Last Cal Date: March 13, 2023
 Start time (MST): 6:18 End time (MST): 10:29
 Reason: Routine

Calibration Standards

Cal Gas Concentration: 4.94 ppm Cal Gas Exp Date: February 9, 2024
 Cal Gas Cylinder #: EY0002277
 Removed Cal Gas Conc: 4.94 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.993485	0.993201	Backgd or Offset:	2.20	2.17
Calibration intercept:	0.081597	0.141603	Coeff or Slope:	0.841	0.829

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	-0.1	----
as found span	4918	81.6	80.6	81.2	0.992
as found 2nd point	4959	40.8	40.3	40.5	0.993
as found 3rd point	4980	20.4	20.2	20.0	1.003
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.1	----
high point	4918	81.6	80.6	80.2	1.005
second point	4959	40.8	40.3	40.2	1.003
third point	4980	20.4	20.2	20.2	0.998
as left zero	5000	0.0	0.0	0.6	----
as left span	4918	81.6	80.6	79.8	1.010
SO2 Scrubber Check	4921	79.2	800.2	0.0	----
Date of last scrubber change:	25-Feb-22		Ave Corr Factor		1.002
Date of last converter efficiency test:	April 22, 2022		98.5% efficiency		

Baseline Corr As found: 81.3 Prev response: 80.18 *% change: 1.4%
 Baseline Corr 2nd AF pt: 40.6 AF Slope: 1.009218 AF Intercept: -0.198377
 Baseline Corr 3rd AF pt: 20.1 AF Correlation: 0.999992

* = > +/-5% change initiates investigation

Notes: Sox scrubber checked after calibrator zero. Span adjusted.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

TRS Calibration Summary

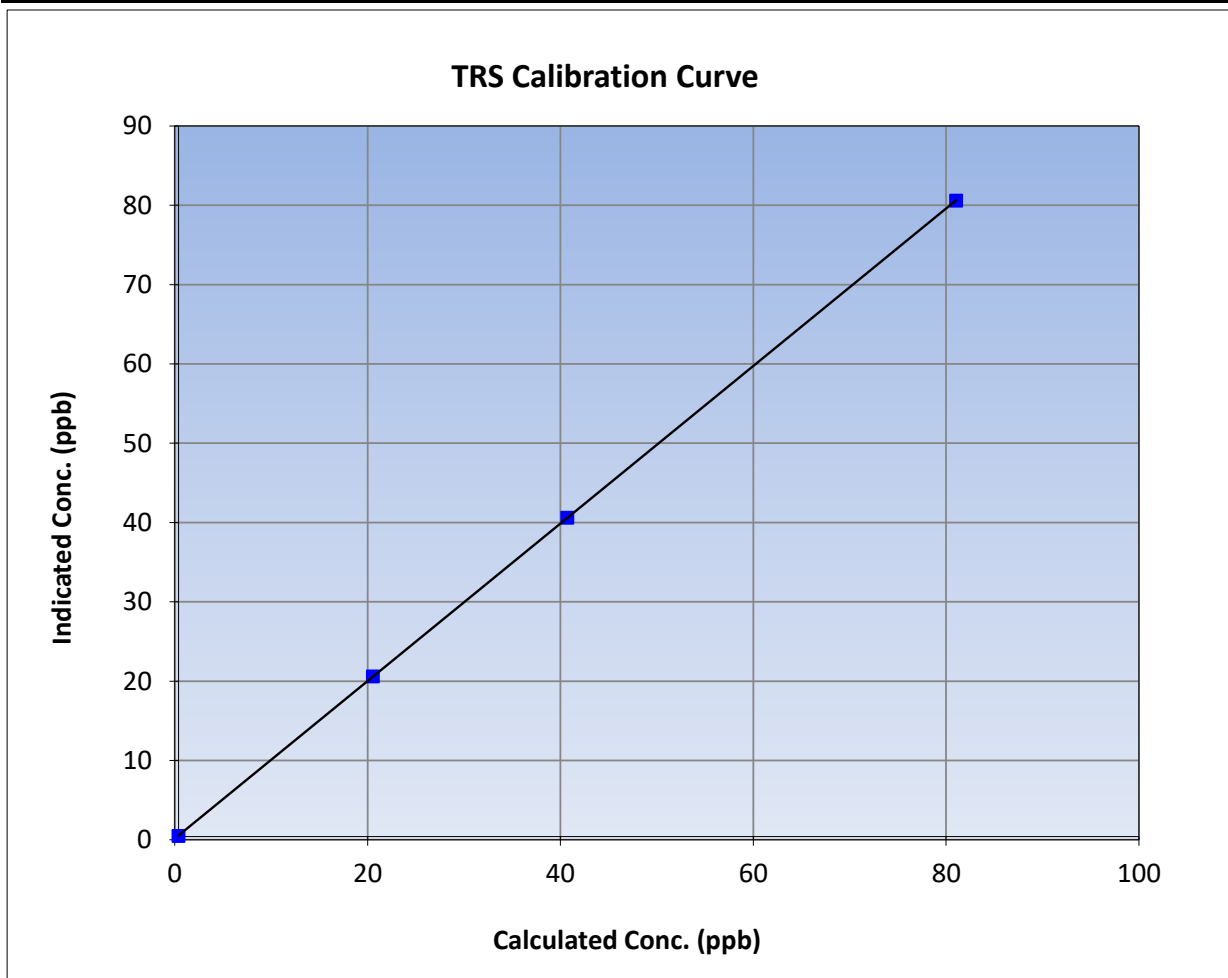
Version-11-2021

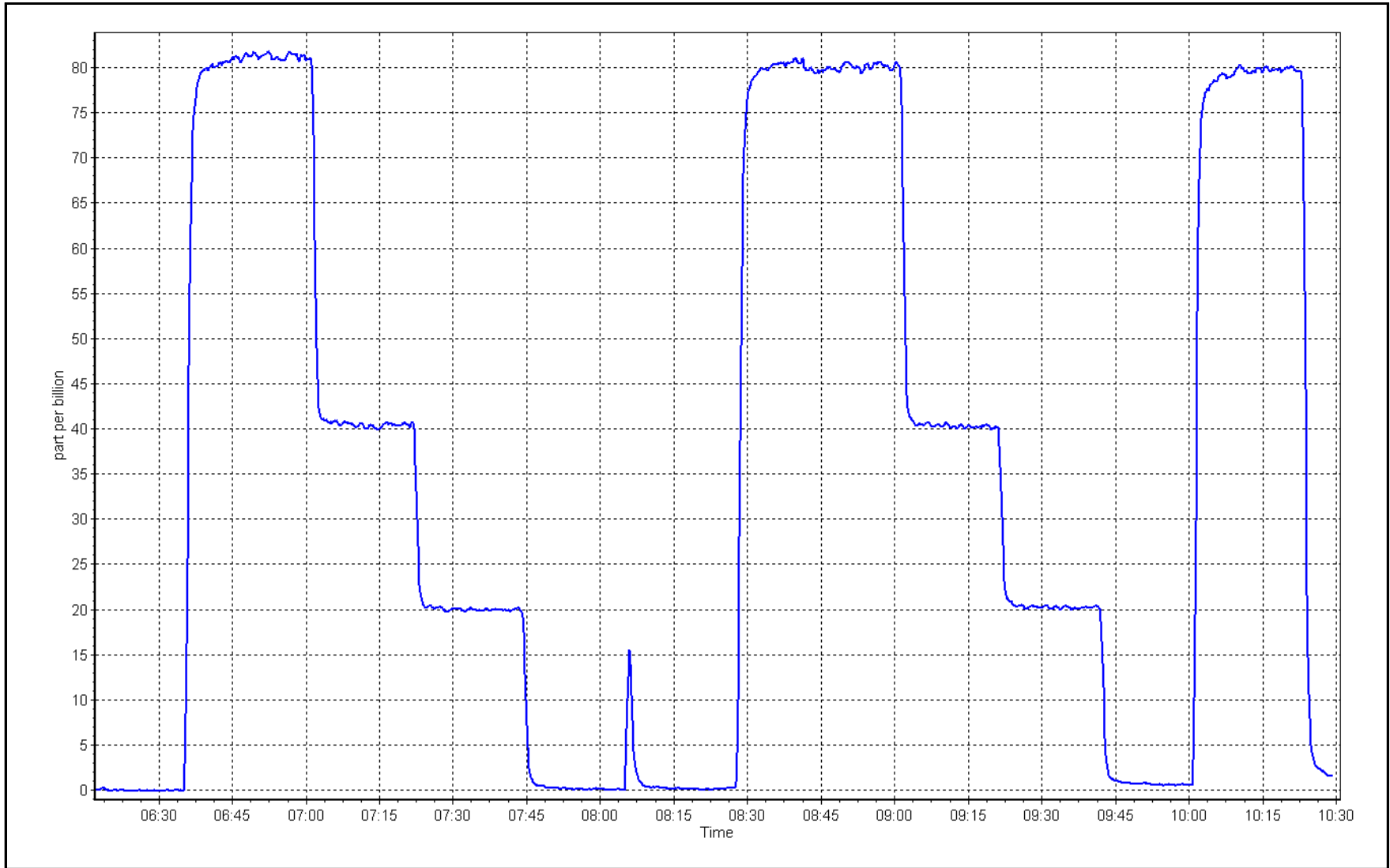
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 13, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	6:18	End Time (MST):	10:29
Analyzer make:	CDN-101	Analyzer serial #:	551

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
80.6	80.2	1.0053			
40.3	40.2	1.0028	Slope	0.993201	0.90 - 1.10
20.2	20.2	0.9977			
			Intercept	0.141603	+/-3







Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	April 19, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	7:10	End time (MST):	9:57
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC282115	Cal Gas Expiry Date:	December 29, 2028
CH ₄ Cal Gas Conc.	501.2 ppm	CH ₄ Equiv Conc.	1075.1 ppm
C ₃ H ₈ Cal Gas Conc.	208.7 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	501.2 ppm	CH ₄ Equiv Conc.	1075.1 ppm
Removed C ₃ H ₈ 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 #:	1317958219
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	0.000270	0.000278	NMHC SP Ratio: 4.42E-05	4.49E-05
CH ₄ Retention time:	13.4	13.8	NMHC Peak Area: 205840	202584

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	17.05	16.67	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	17.05	17.04	1.001
second point	4960	39.6	8.52	8.51	1.001
third point	4980	19.8	4.26	4.27	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.00	1.002

Average Correction Factor				0.999
Baseline Corr AF:	16.67	Prev response	16.97	*% change -1.9%
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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.3	9.10	8.95	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	9.10	9.10	1.000
second point	4960	39.6	4.55	4.56	0.997
third point	4980	19.8	2.27	2.29	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.07	1.002
Average Correction Factor					0.997
Baseline Corr AF:	8.95	Prev response	9.13	*% change	-2.0%
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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	7.95	7.72	1.030
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	7.95	7.94	1.001
second point	4960	39.6	3.97	3.96	1.002
third point	4980	19.8	1.98	1.98	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.93	1.001
Average Correction Factor					1.002
Baseline Corr AF:	7.72	Prev response	7.86	*% change	-1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	0.994780	0.999083
THC Cal Offset:	0.013474	0.005889
CH ₄ Cal Slope:	0.988322	0.998961
CH ₄ Cal Offset:	-0.000211	-0.002189
NMHC Cal Slope:	1.001323	0.999315
NMHC Cal Offset:	0.012086	0.010081

Notes: CH₄ channel is dipping a bit. Flame temp is a bit lower then last month. RT has moved. Span adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

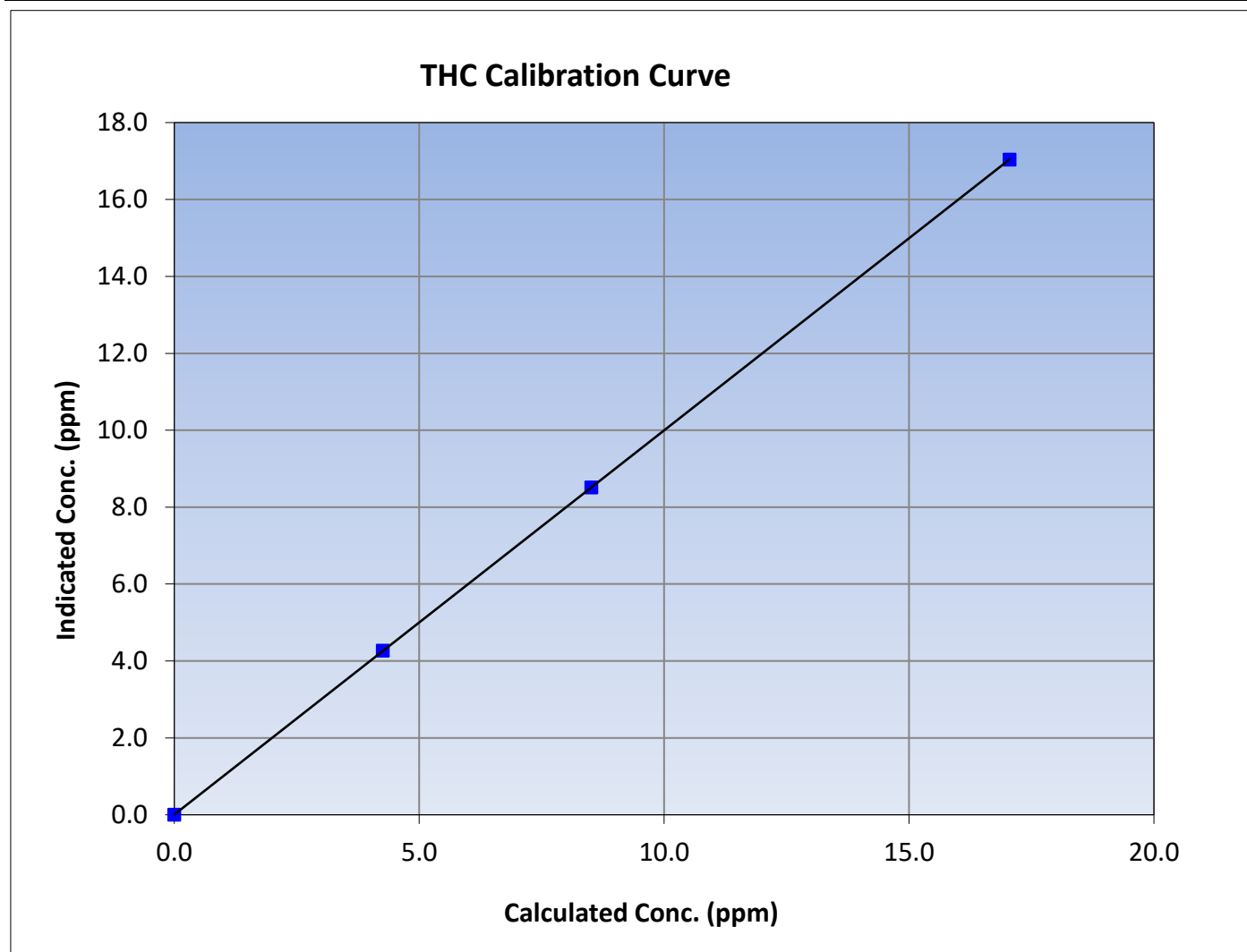
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:10	End Time (MST):	9:57
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999999	≥ 0.995			
17.05	17.04	1.0006						
8.52	8.51	1.0007				Slope	0.999083	0.90 - 1.10
4.26	4.27	0.9971						
			Intercept	0.005889	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

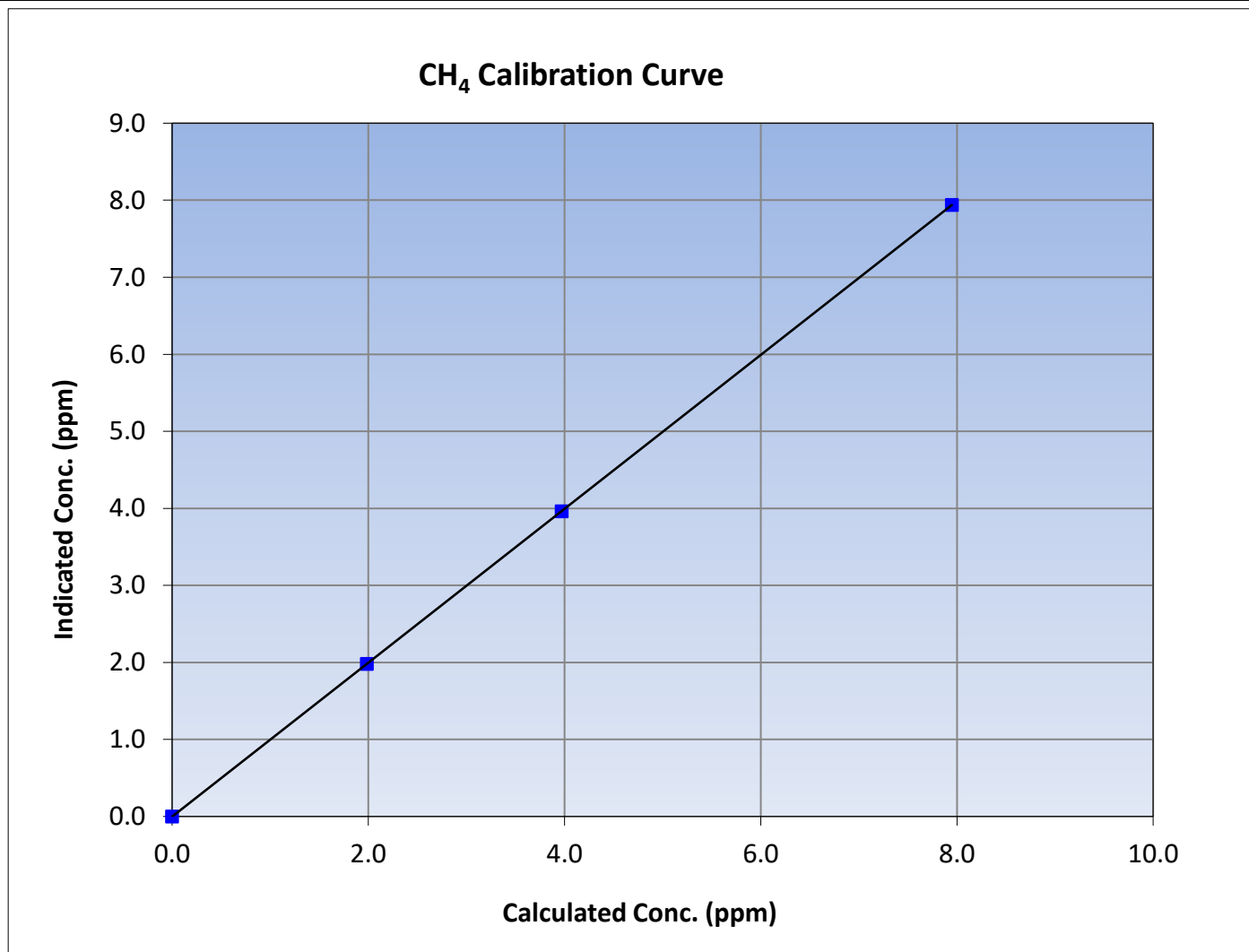
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:10	End Time (MST):	9:57
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999999	≥0.995
7.95	7.94	1.0011			
3.97	3.96	1.0025			
1.98	1.98	1.0024			
			Slope	0.998961	0.90 - 1.10
			Intercept	-0.002189	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

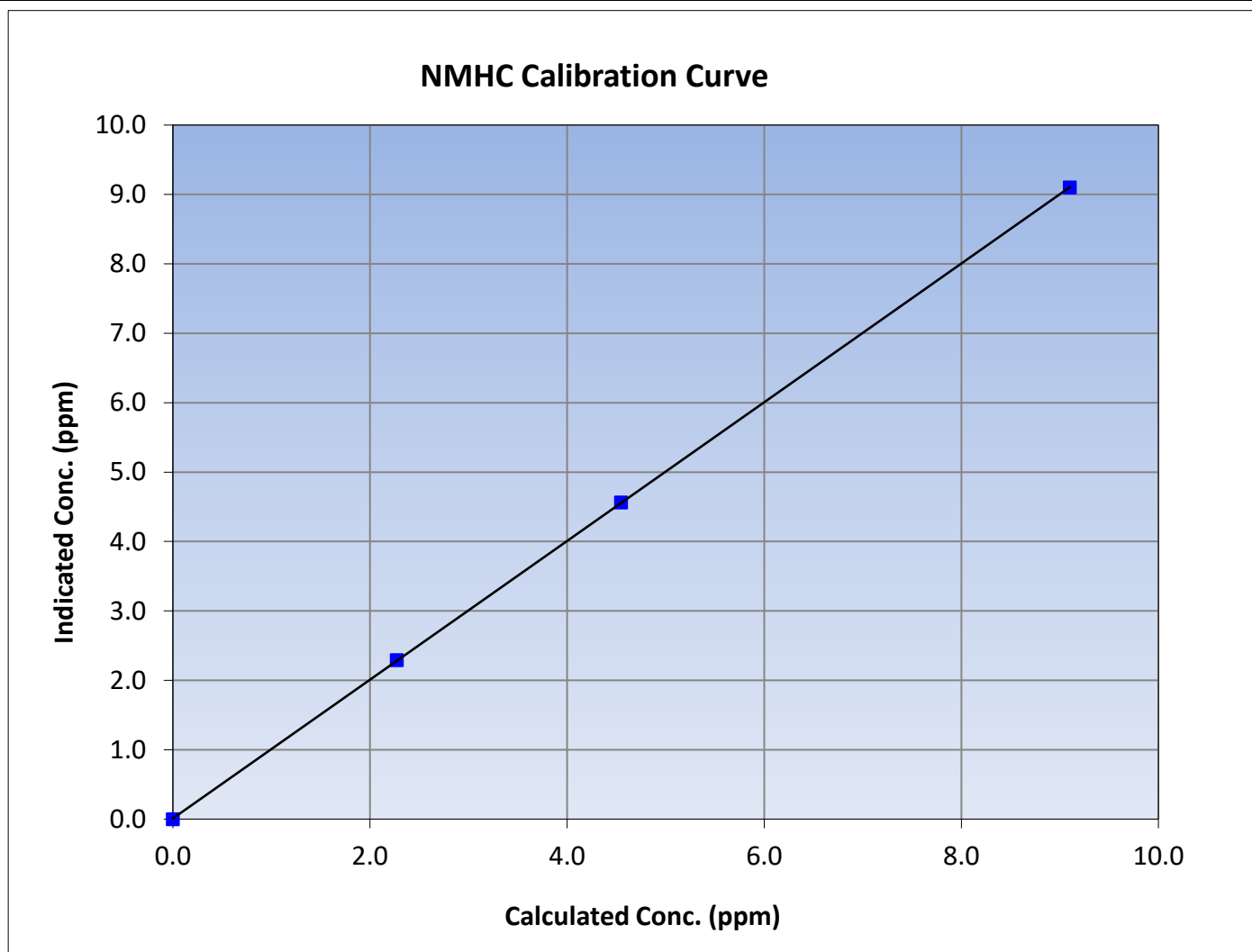
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:10	End Time (MST):	9:57
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

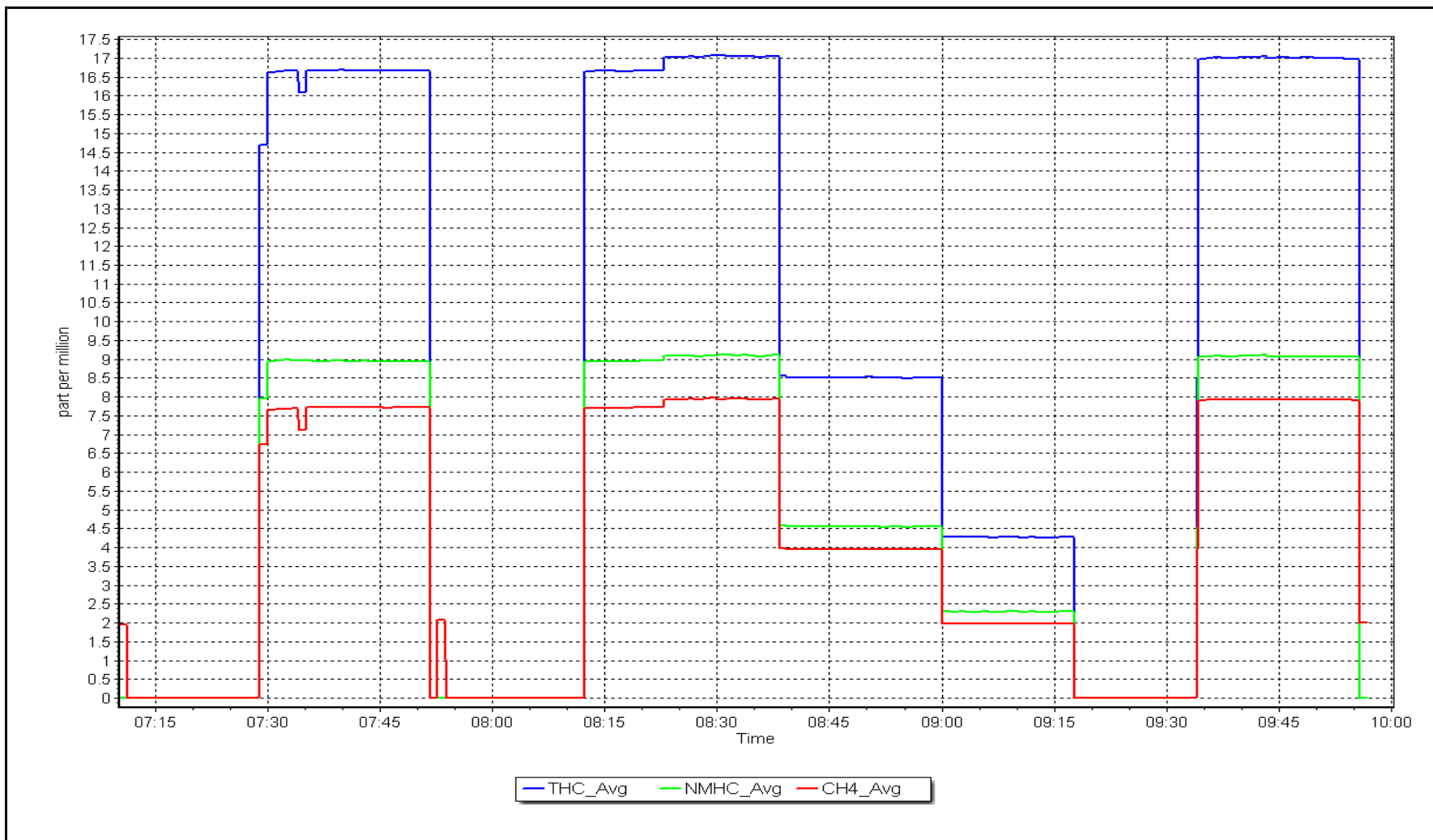
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999994	≥ 0.995			
9.10	9.10	1.0002						
4.55	4.56	0.9969				Slope	0.999315	0.90 - 1.10
2.27	2.29	0.9925						
			Intercept	0.010081	± 0.5			



NMHC Calibration Plot

Date: April 19, 2023

Location: Athabasca Valley





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Athabasca Valley Station number: AMS07
Calibration Date: April 21, 2023 Last Cal Date: March 10, 2023
Start time (MST): 5:48 End time (MST): 10:18
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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.048	1.048	NO bkgnd or offset:	7.3	7.3
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	7.5	7.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	203.5	203.5

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.997475	1.001476
NO _x Cal Offset:	1.358498	1.279327
NO Cal Slope:	0.997406	1.000931
NO Cal Offset:	1.054447	1.195212
NO ₂ Cal Slope:	1.001683	1.007625
NO ₂ Cal Offset:	0.681681	1.013573



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4920	80.2	816.7	800.7	16.0	818.2	800.9	17.4	0.9982	0.9997
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
high point	4920	80.2	816.7	800.7	16.0	818.4	801.8	16.5	0.9980	0.9986
second point	4960	40.1	408.4	400.4	8.0	411.6	403.4	8.2	0.9922	0.9924
third point	4980	20.0	203.7	199.7	4.0	205.8	201.4	4.3	0.9897	0.9915
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	----	----
as left span	4920	80.2	816.7	397.4	419.3	825.1	398.1	427.0	0.9898	0.9982
Average Correction Factor									0.9933	0.9942

Corrected As found	NO _x = 818.3 ppb	NO = 801.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = 0.3%
Previous Response	NO _x = 816.0 ppb	NO = 799.7 ppb		*Percent Change	NO = 0.2%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	798.9	395.6	419.3	423.0	0.9913	100.9%
2nd GPT point (200 ppb O3)	798.9	598.7	216.2	219.4	0.9856	101.5%
3rd GPT point (100 ppb O3)	798.9	699.4	115.5	118.5	0.9750	102.6%
Average Correction Factor					0.9840	101.6%

Notes:

No maintenance or adjustments done.

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

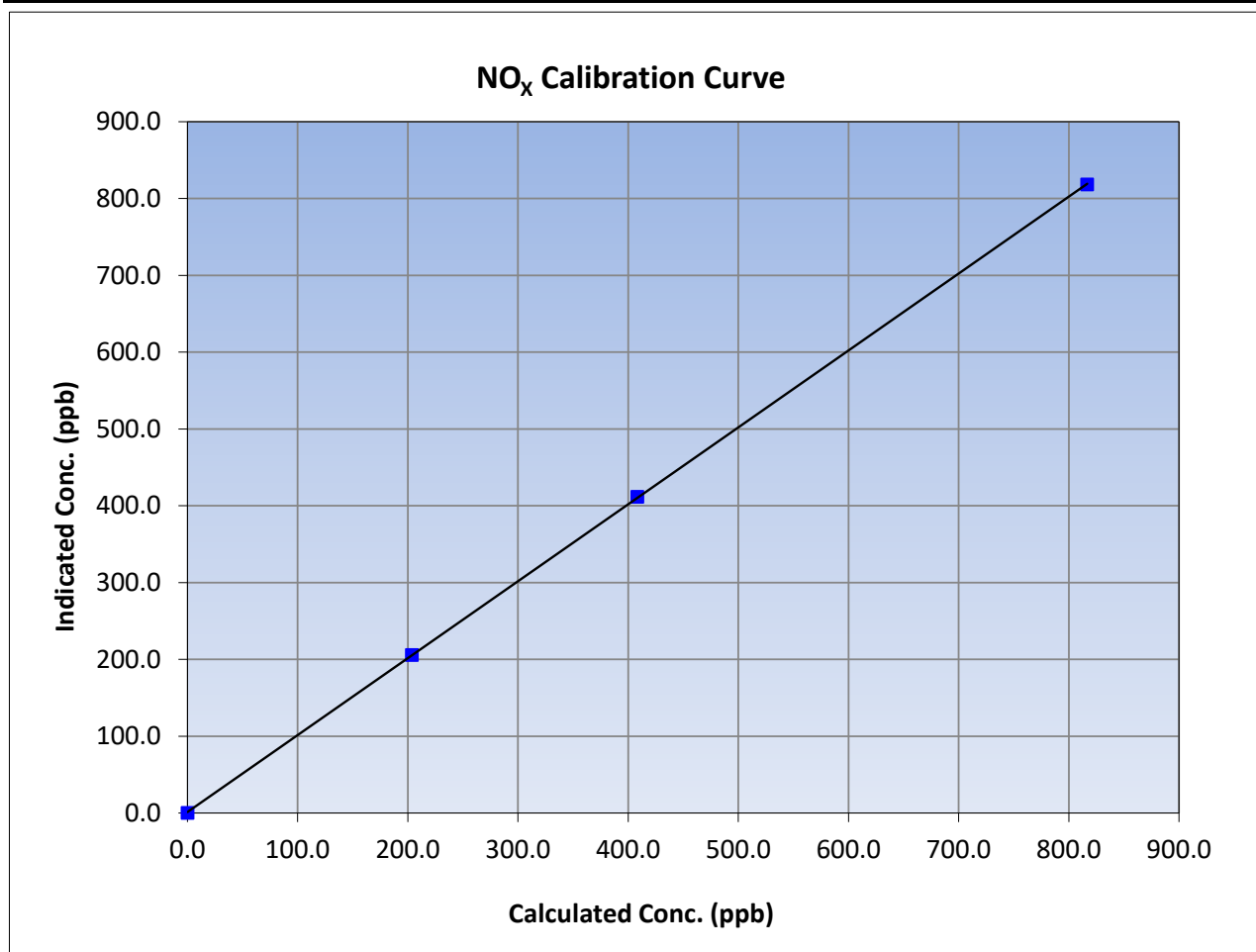
Version-04-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	5:48	End Time (MST):	10:18
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	≥0.995	
816.7	818.4	0.9980			
408.4	411.6	0.9922			
203.7	205.8	0.9897			
			Slope	1.001476	0.90 - 1.10
			Intercept	1.279327	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

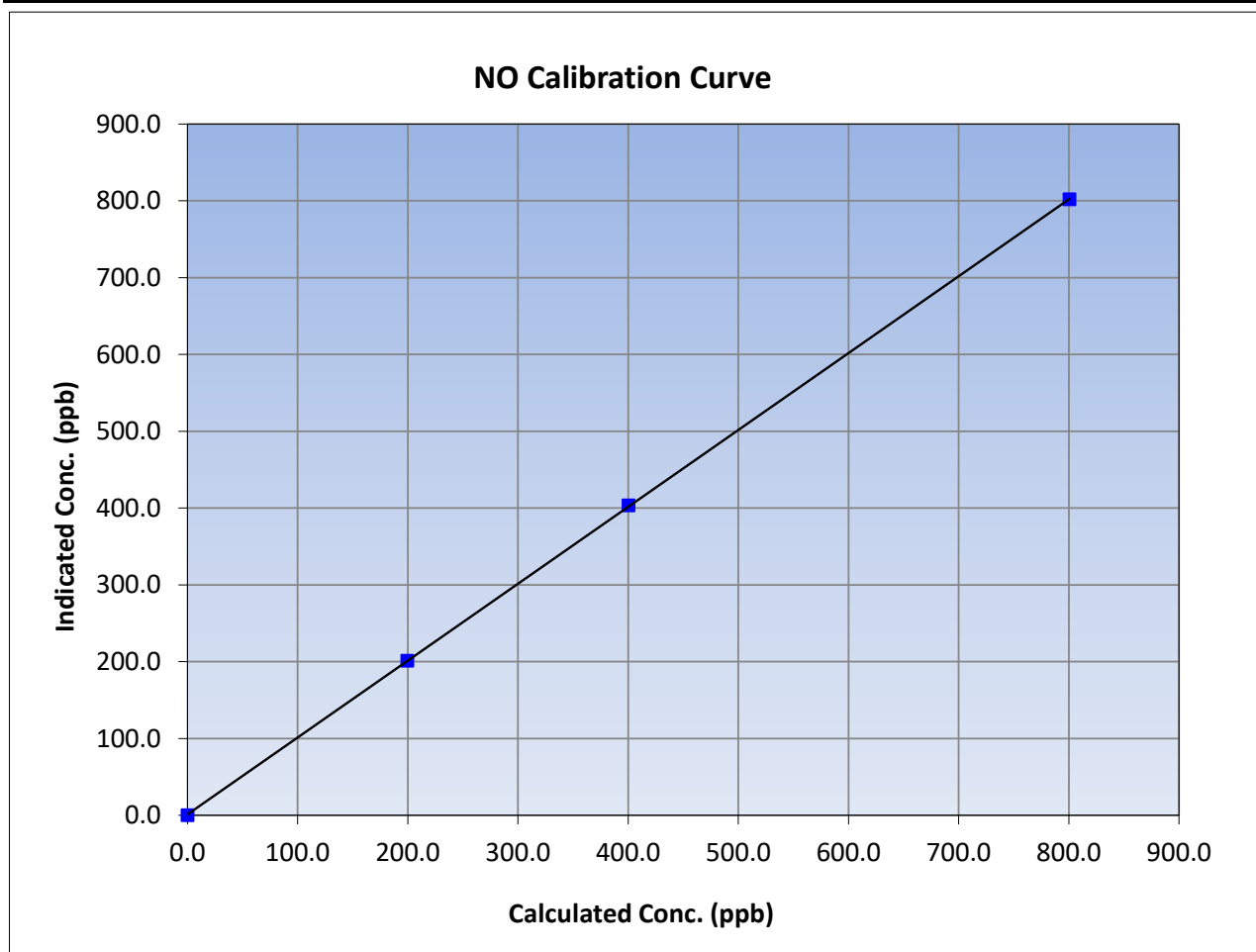
Version-04-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	5:48	End Time (MST):	10:18
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20
800.7	801.8	0.9986		
400.4	403.4	0.9924		
199.7	201.4	0.9915		





Wood Buffalo Environmental Association

NO₂ Calibration Summary

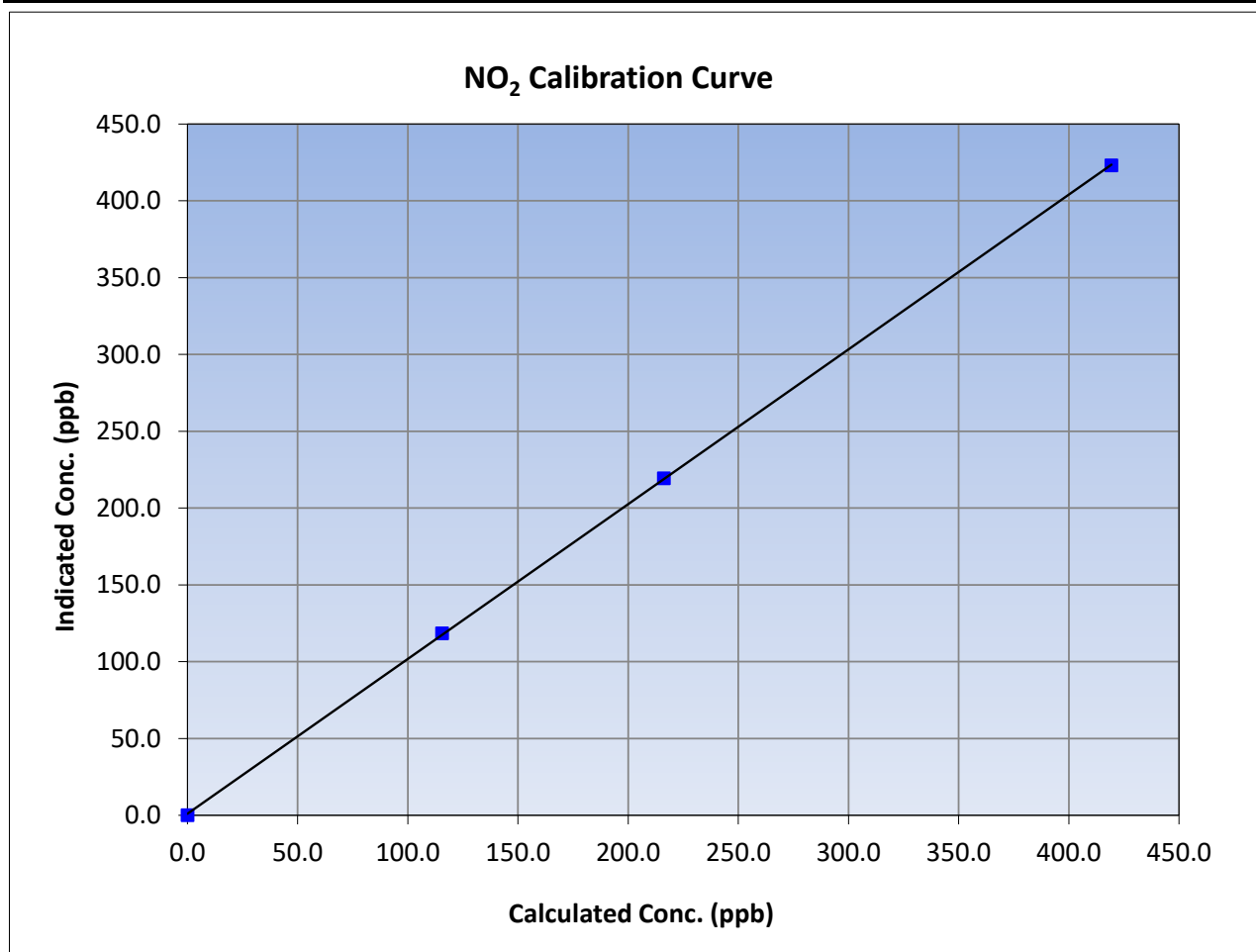
Version-04-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	5:48	End Time (MST):	10:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

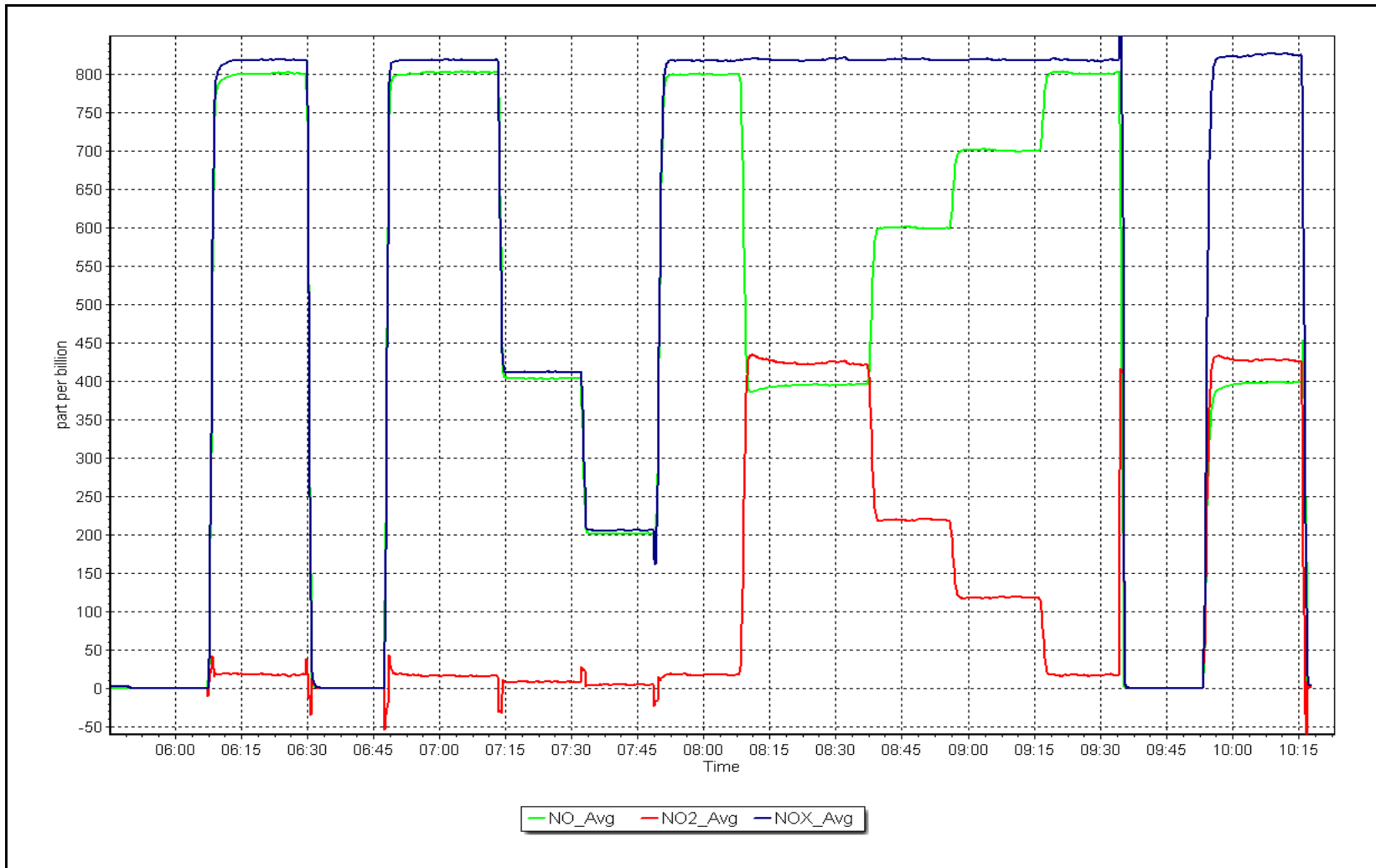
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
419.3	423.0	0.9913		
216.2	219.4	0.9856		
115.5	118.5	0.9750		



NO_x Calibration Plot

Date: April 21, 2023

Location: Athabasca Valley





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	April 19, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:55	End time (MST):	12:12
Reason:	Removal		

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 #:	1507964700
Analyzer Range:	0 - 500 ppb		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.994371		Backgd or Offset:	-0.6	-0.6
Calibration intercept:	2.260000		Coeff or Slope:	1.170	1.170

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	1.9	----
as found span	5000	1400.0	400.0	365.2	1.095
as found 2nd point	5000	1029.9	200.0	184.6	1.083
as found 3rd point	5000	848.3	100.0	93.9	1.065
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					

Average Correction Factor				
---------------------------	--	--	--	--

Baseline Corr As found:	363.3	Previous response	400.0	*% change	-10.1%
Baseline Corr 2nd AF pt:	-180.6	AF Slope:	0.907543	AF Intercept:	2.580000
Baseline Corr 3rd AF pt:	-90.7	AF Correlation:	0.999983		

* = > +/-5% change initiates investigation

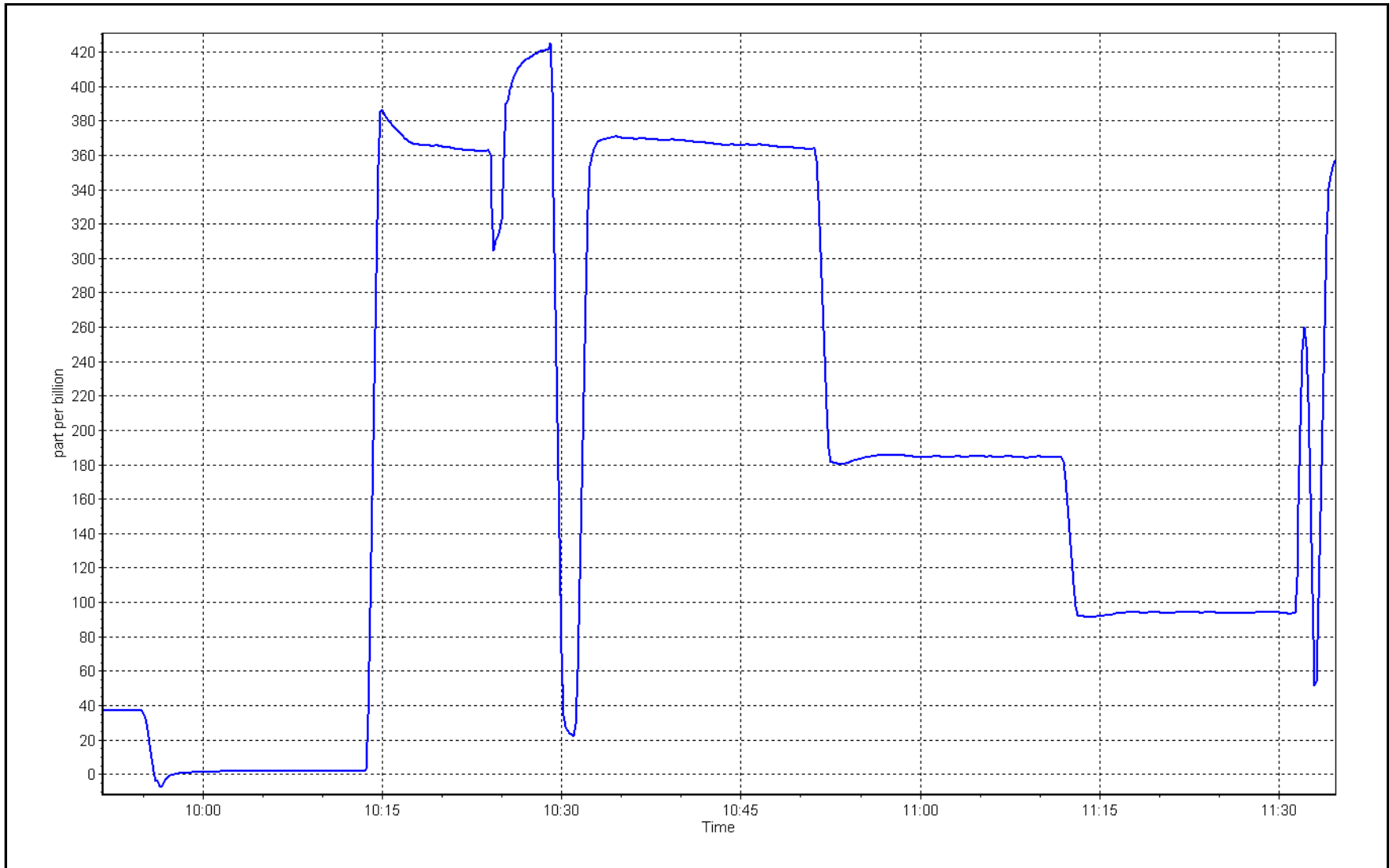
Notes: Removed due to leak in the solenoids

Calibration Performed By: Melissa Lemay

O₃ Calibration Plot

Date: April 19, 2023

Location: Athabasca Valley





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	April 20, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	10:28	End time (MST):	12:37
Reason:	Install		

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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:		0.998171	Backgd or Offset:		-2.8
Calibration intercept:		0.120000	Coeff or Slope:		1.435

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	1391.3	400.0	399.5	1.001
second point	5000	1026.7	200.0	199.3	1.004
third point	5000	848.3	100.0	100.4	0.996
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	1392.4	400.0	395.0	1.013
Average Correction Factor					1.000

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: Install due to suspected leak in old O3 analyzer.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

O₃ Calibration Summary

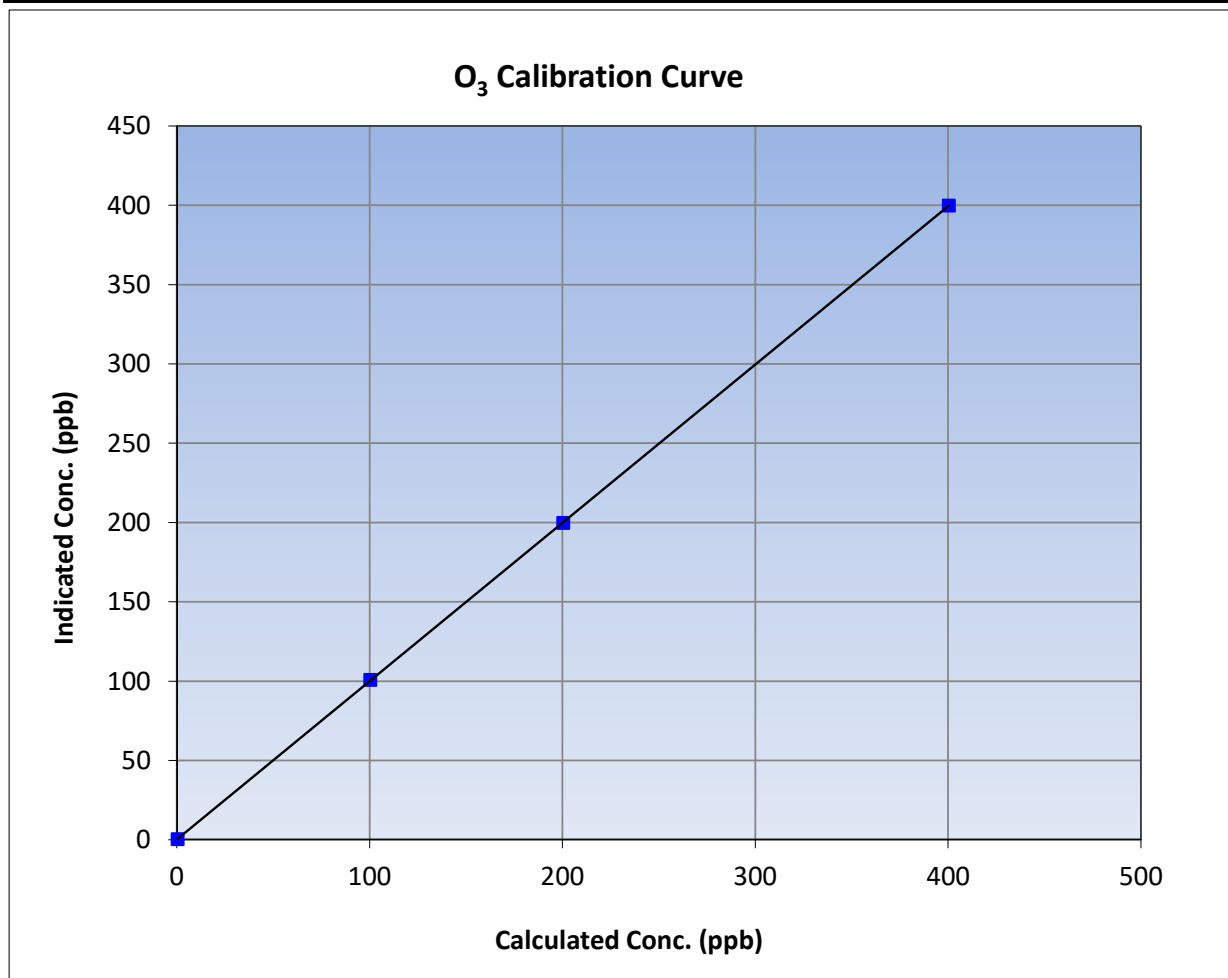
Version-01-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:28	End Time (MST):	12:37
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

Calibration Data

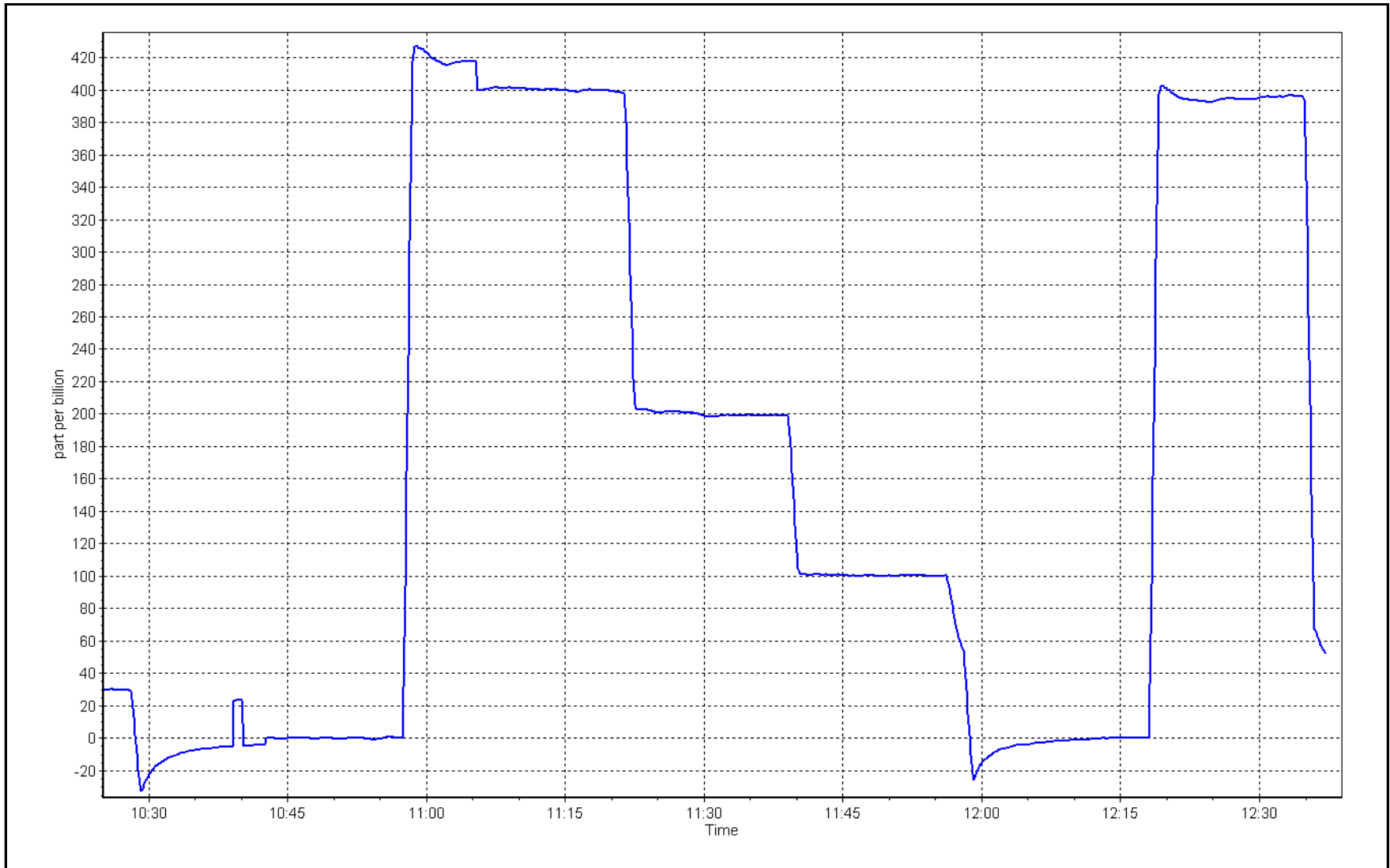
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999995	≥0.995
400.0	399.5	1.0013			
200.0	199.3	1.0035	Slope	0.998171	0.90 - 1.10
100.0	100.4	0.9960			
			Intercept	0.120000	+/- 5



O₃ Calibration Plot

Date: April 20, 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: April 26, 2023 Last Cal Date: March 31, 2023
 Start time (MST): 10:32 End time (MST): 11:04

Analyzer Make: API T640 S/N: 645
 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 (°C)	6.6	6.68	6.6	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	735.8	734.7	735.8	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	5	5.14	5	<input type="checkbox"/>	+/- 0.25 LPM
Leak Test:	Date of check: <u>April 26, 2023</u>	Last Cal Date: <u>March 31, 2023</u>			
	PM w/o HEPA: <u>3.8</u>	PM w/ HEPA: <u>0</u>			<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				<input type="checkbox"/>	10.9 +/- 0.5
Post-maintenance leak check:		PM w/o HEPA: _____	w/ HEPA: _____		
Date Optical Chamber Cleaned:		<u>February 1, 2023</u>			<0.2 ug/m3
Disposable Filter Changed:		<u>February 1, 2023</u>			

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022
 Date RH/T Sensor Cleaned: December 5, 2022

Notes: No adjustments done. Head cleaned.

Calibration by: Melissa Lemay



Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	April 25, 2023	Last Cal Date:	March 14, 2023
Start time (MST):	5:58	End time (MST):	8:51
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 serial #:	1408761381
Analyzer Range:	0 - 50 ppm		

	Start	Finish		Start	Finish
Calibration slope:	0.998030	0.994802	Backgd or Offset:	0.000	3.896
Calibration intercept:	0.026535	0.030541	Coeff or Slope:	1.079	1.079

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) <i>Limit = 0.95-1.05</i>
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	39.8	1.006
second point	4967	33.3	20.0	20.0	0.999
third point	4983	16.7	10.0	10.0	1.003
as left zero	5000	0.0	0.0	0.0	----
as left span	4933	66.7	40.0	39.7	1.007
Average Correction Factor					1.003

Baseline Corr As found:	40.05	Prev response:	39.97	*% 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: No Maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

CO Calibration Summary

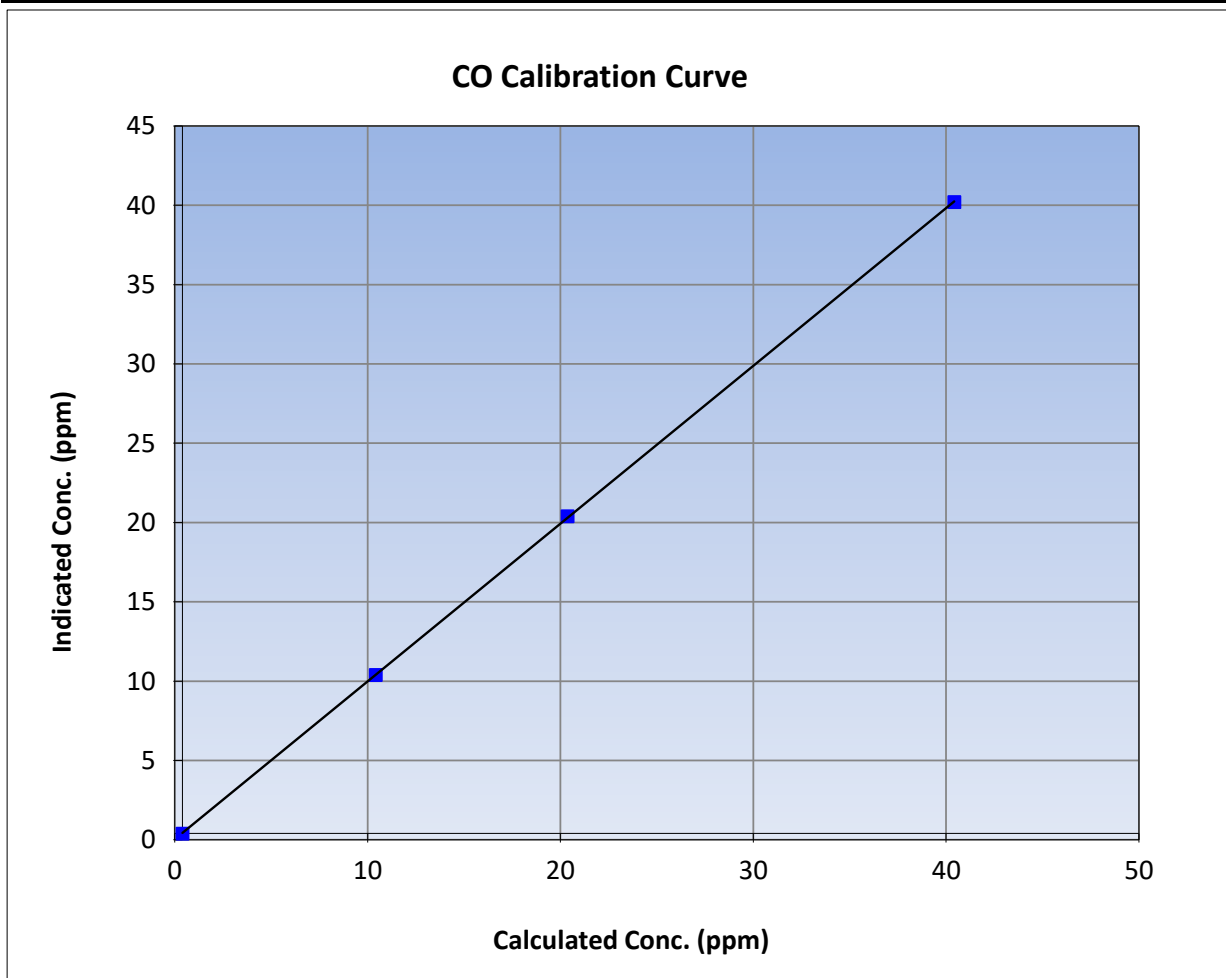
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 14, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	5:58	End Time (MST):	8:51
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

Calibration Data

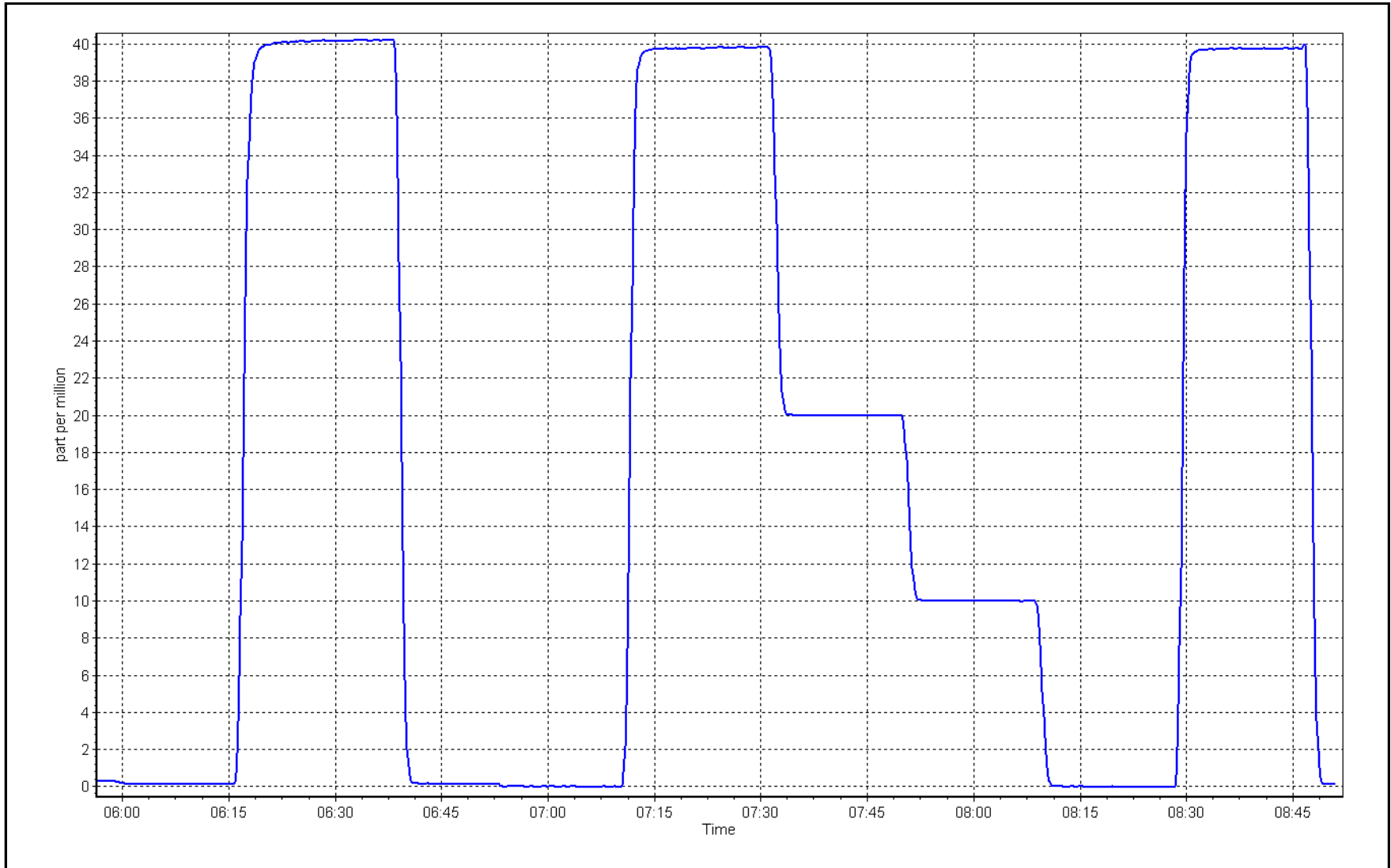
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	0.999985	
40.0	39.8	1.0056			≥ 0.995
20.0	20.0	0.9989	Slope	0.994802	
10.0	10.0	1.0031			$0.90 - 1.10$
			Intercept	0.030541	± 1.5



CO Calibration Plot

Date: April 25, 2023

Location: Athabasca Valley





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08 FORT CHIPEWYAN APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	April 12, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:22	End time (MST):	13:13
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:	3252
ZAG Make/Model:	Teledyne API T701		Serial Number:	260

Analyzer Information

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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.996661	1.003016	Backgd or Offset:	1.27	1.29
Calibration intercept:	1.336570	1.535287	Coeff or Slope:	0.981	1.010

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	80.3	800.4	778.6	1.028
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4920	80.3	800.4	804.4	0.995
second point	4960	40.2	400.7	402.0	0.997
third point	4980	20.1	200.4	205.1	0.977
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.3	800.4	805.3	0.994
Average Correction Factor					0.990

Baseline Corr As found:	778.50	Previous response	799.05	*% change	-2.6%
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* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur



Wood Buffalo Environmental Association

SO₂ Calibration Summary

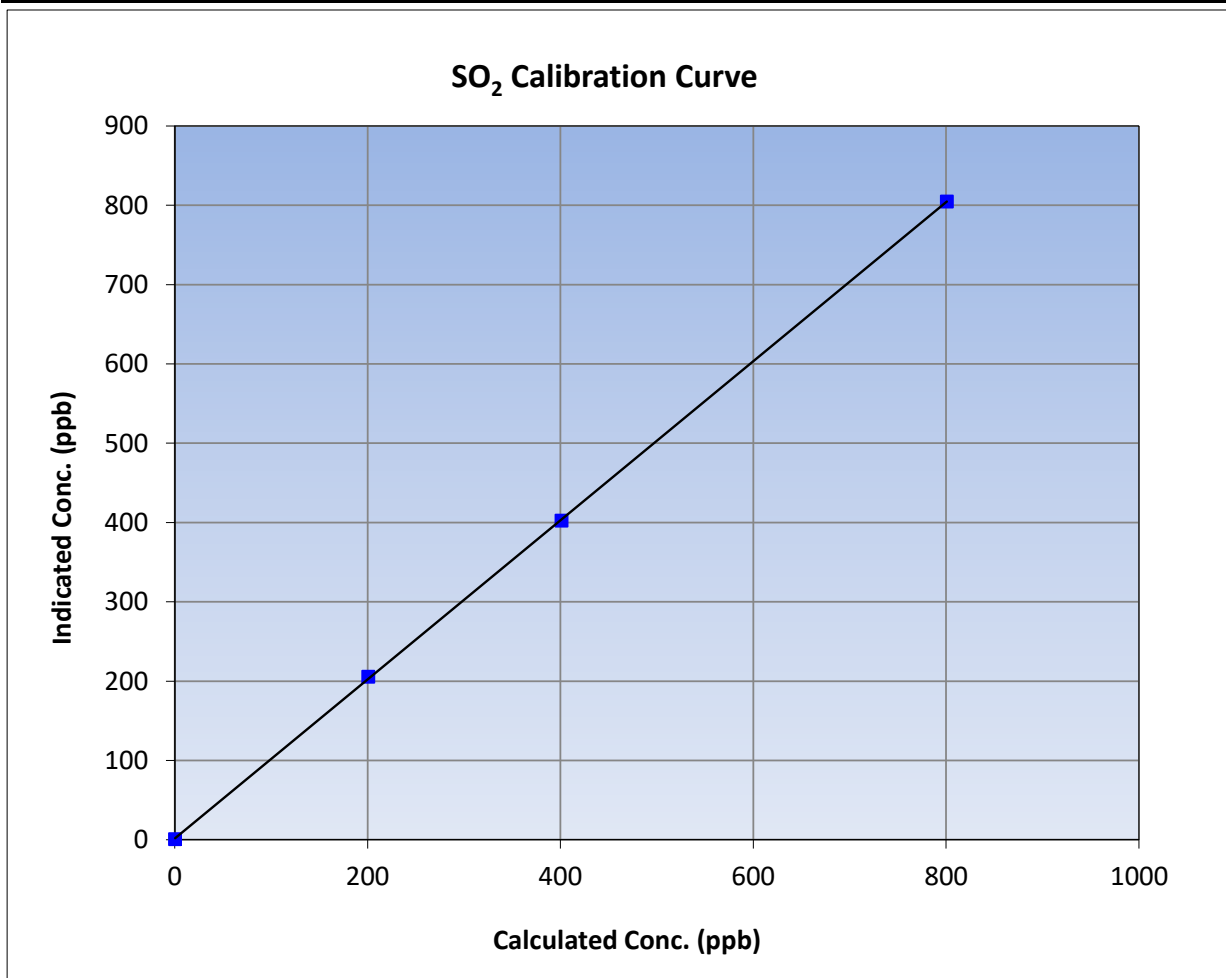
Version-01-2020

Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:22	End Time (MST):	13:13
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

Calibration Data

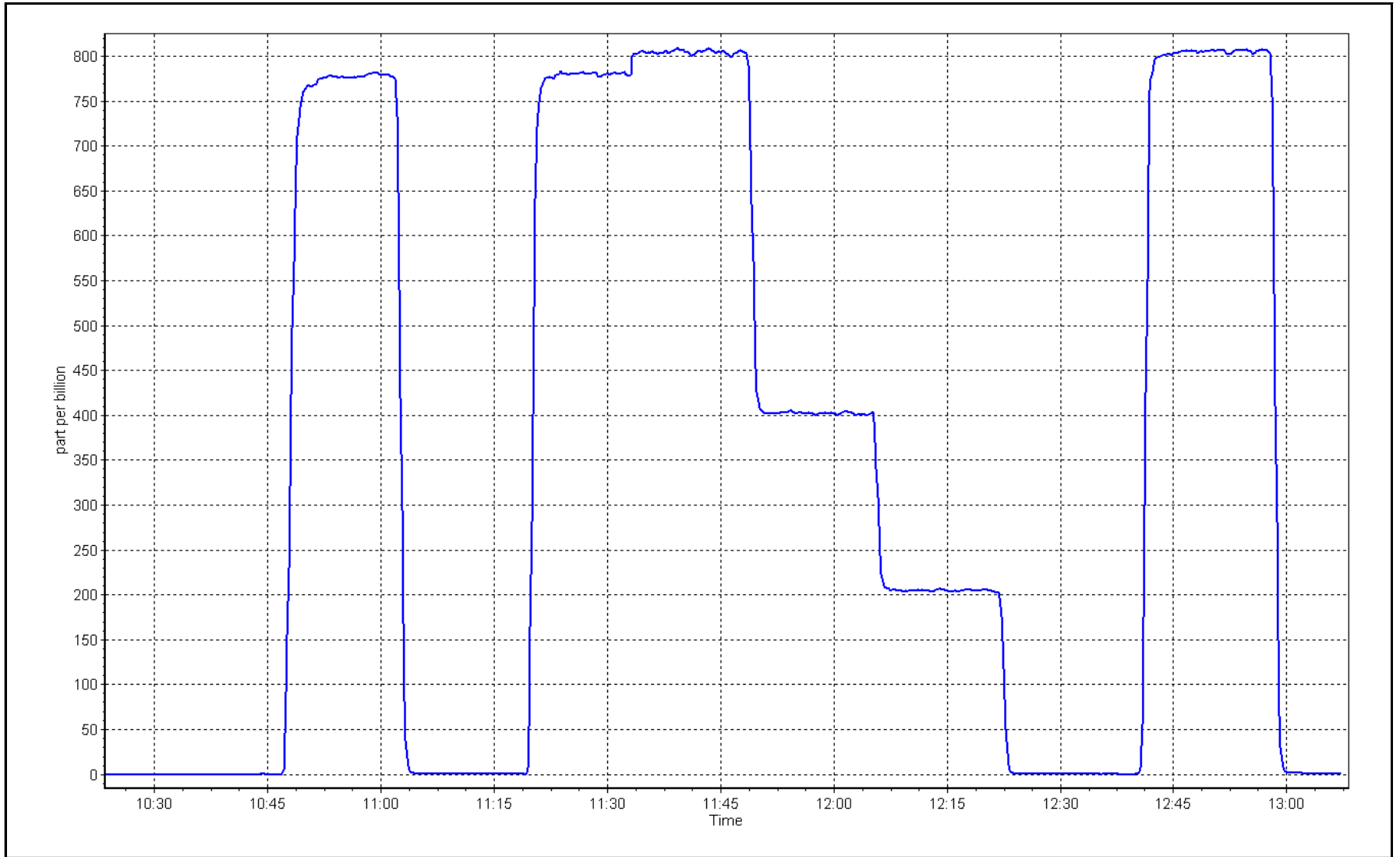
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.3	----	Correlation Coefficient	0.999970	≥0.995
800.4	804.4	0.9950			
400.7	402.0	0.9968	Slope	1.003016	0.90 - 1.10
200.4	205.1	0.9769			
			Intercept	1.535287	+/-30



SO2 Calibration Plot

Date: April 12, 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: April 26, 2023 Last Cal Date: March 12, 2023
 Start time (MST): 9:05 End time (MST): 13:10
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.995571	0.994424	Backgd or Offset: 1.37	0.92
Calibration intercept:	0.018651	0.158770	Coeff or Slope: 0.717	0.694

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	-0.5	----
as found span	4920	80.5	80.0	82.6	0.963
as found 2nd point	4960	40.2	40.0	40.9	0.965
as found 3rd point	4980	20.1	20.0	20.3	0.961
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.5	80.0	79.6	1.005
second point	4960	40.2	40.0	40.1	0.996
third point	4980	20.1	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.5	80.0	79.3	1.009
SO2 Scrubber Check	4919.7	80.3	803.0	0.0	----
Date of last scrubber change:	March 7, 2022			Ave Corr Factor	0.999
Date of last converter efficiency test:	March 15, 2022			100.7% efficiency	

Baseline Corr As found: 83.1 Prev response: 79.67 *% change: 4.1%
 Baseline Corr 2nd AF pt: 41.4 AF Slope: 1.038279 AF Intercept: -0.500550
 Baseline Corr 3rd AF pt: 20.8 AF Correlation: 0.999997

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Adjusted the zero and span.

Calibration Performed By: Morgan Voyageur



Wood Buffalo Environmental Association

TRS Calibration Summary

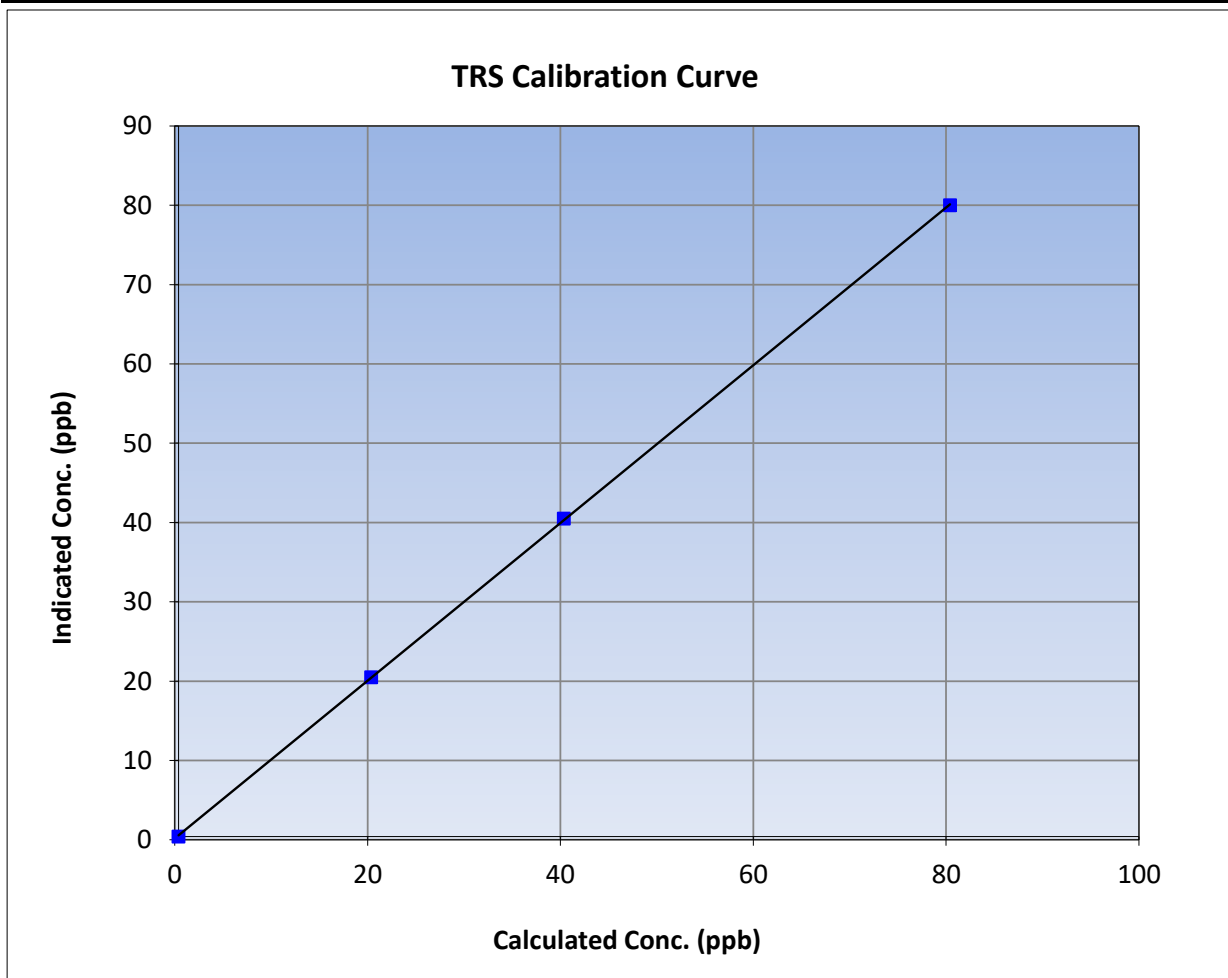
Version-11-2021

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 12, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:05	End Time (MST):	13:10
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

Calibration Data

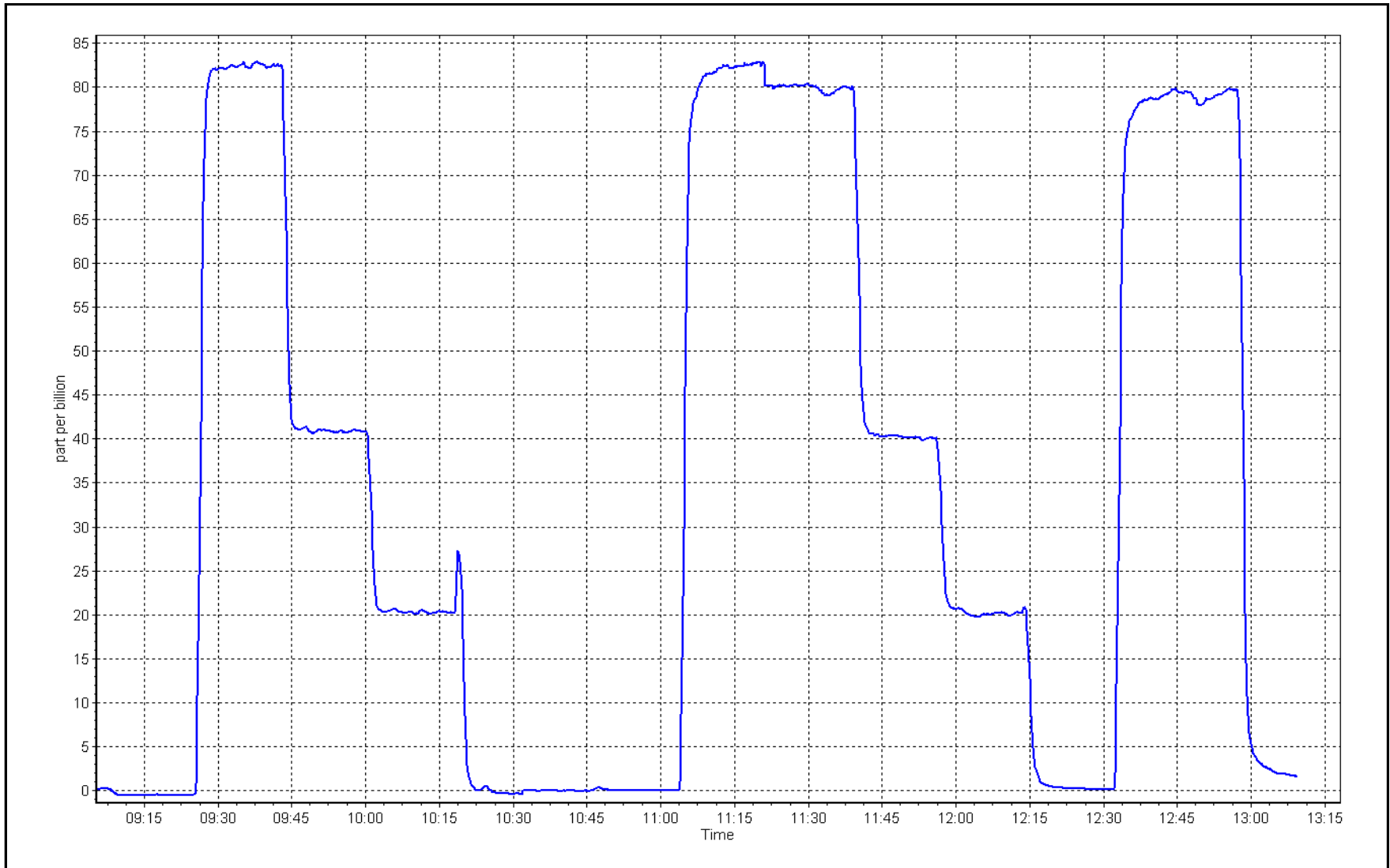
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999975	≥0.995
80.0	79.6	1.0051			
40.0	40.1	0.9964	Slope	0.994424	0.90 - 1.10
20.0	20.1	0.9940			
			Intercept	0.158770	+/-3



TRS Calibration Plot

Date: April 26, 2023

Location: Fort Chipewyan





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Fort Chipewyan
Calibration Date: April 13, 2023
Start time (MST): 8:28
Reason: Routine
Station number: AMS08
Last Cal Date: March 13, 2023
End time (MST): 12:48

Calibration Standards

NO Gas Cylinder #: CC363447
NOX Cal Gas Conc: 48.80 ppm
Removed Cylinder #: NA
Removed Gas NOX Conc: 48.80 ppm
NOX gas Diff:
Calibrator Model: Teledyne API T700
ZAG make/model: Teledyne API T701H
Cal Gas Expiry Date: February 2, 2024
NO Cal Gas Conc: 48.80 ppm
Removed Gas Exp Date: NA
Removed Gas NO Conc: 48.80 ppm
NO gas Diff:
Serial Number: 3252
Serial Number: 260

Analyzer Information

Analyzer make: Thermo 42i
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 1426262592

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.844	1.882	NO bkgnd or offset:	7.9	7.9
NOX coeff or slope:	0.993	1.000	NOX bkgnd or offset:	8.1	8.1
NO2 coeff or slope:	1.000	0.995	Reaction cell Press:	256.6	241.1

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	1.000657	0.996544
NO _x Cal Offset:	0.680000	1.320000
NO Cal Slope:	1.001428	0.995845
NO Cal Offset:	0.260000	0.740000
NO ₂ Cal Slope:	1.016898	1.003157
NO ₂ Cal Offset:	0.900918	0.613431



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.1	----	----
as found span	4918	82.0	800.3	800.3	0.0	799.1	795.6	3.4	1.0015	1.0059
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	4918	82.0	800.3	800.3	0.0	798.1	797.3	0.7	1.0028	1.0038
second point	4959	41.0	400.2	400.2	0.0	401.0	399.8	1.3	0.9979	1.0009
third point	4980	20.5	200.1	200.1	0.0	202.0	200.6	1.3	0.9905	0.9974
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.1	----	----
as left span	4918	82.0	800.3	407.9	392.4	801.6	406.6	395.1	0.9984	1.0032
Average Correction Factor									0.9971	1.0007

Corrected As found	NO _x = 799.4 ppb	NO = 795.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -0.3%	
Previous Response	NO _x = 801.5 ppb	NO = 801.7 ppb		*Percent Change	NO = -0.8%	
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:	Nx Int:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:	NO Int:
			As found	NO ₂ r ² :	NO ₂ SI:	NO ₂ Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	794.4	402.0	392.4	394.1	0.9957	100.4%
2nd GPT point (200 ppb O3)	794.4	601.3	193.1	194.1	0.9948	100.5%
3rd GPT point (100 ppb O3)	794.4	700.0	94.4	96.4	0.9793	102.1%
Average Correction Factor					0.9899	101.0%

Notes:

Sample inlet filter changed after as founds. No adjustment need.

Calibration Performed By: Morgan Voyageur



Wood Buffalo Environmental Association

NO_x Calibration Summary

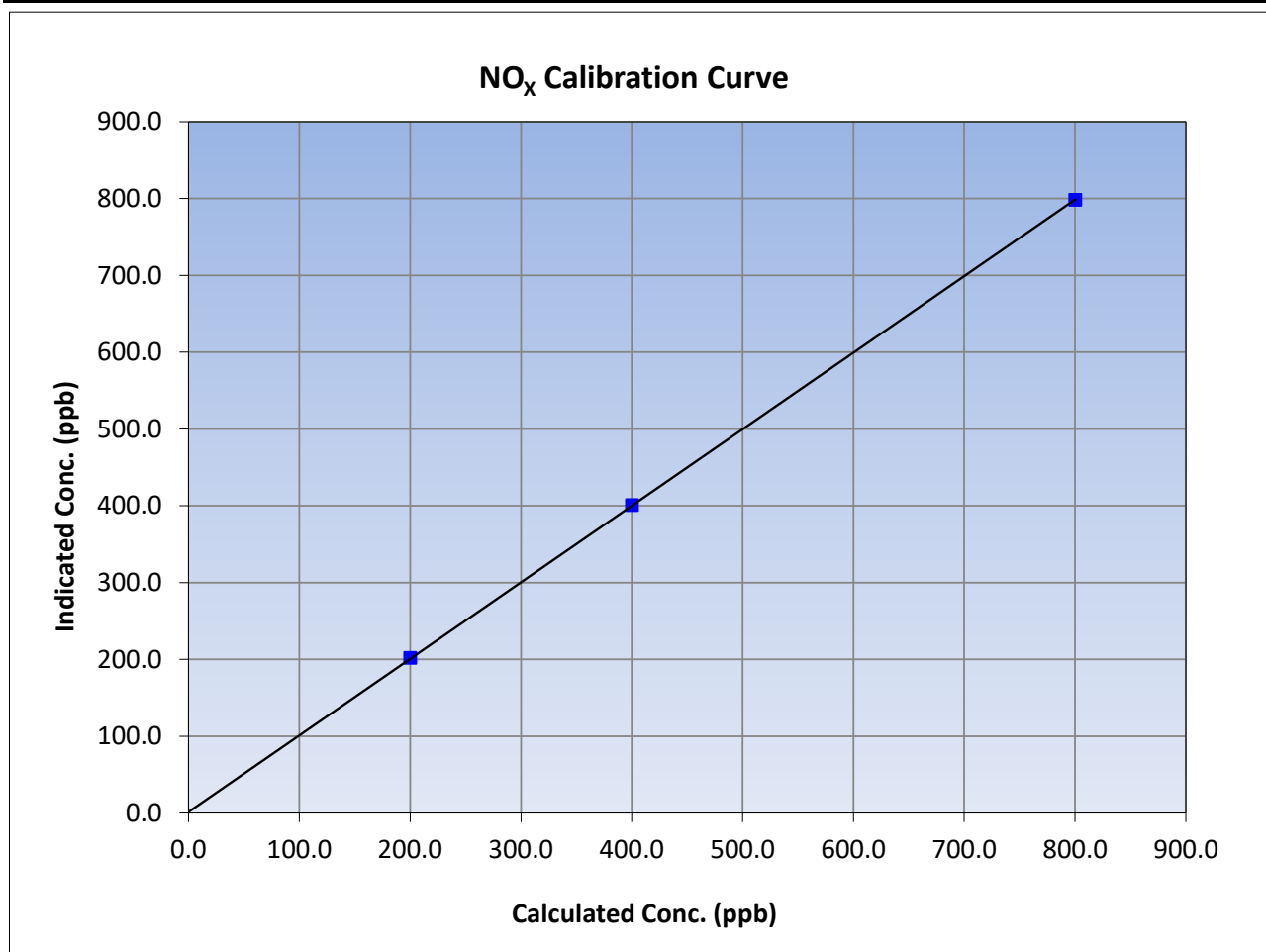
Version-04-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:28	End Time (MST):	12:48
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>				
0.0	-0.1	----	Correlation Coefficient	0.999985				
800.3	798.1	1.0028			≥0.995			
400.2	401.0	0.9979				Slope	0.996544	0.90 - 1.10
200.1	202.0	0.9905						
			Intercept	1.320000		+/-20		





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

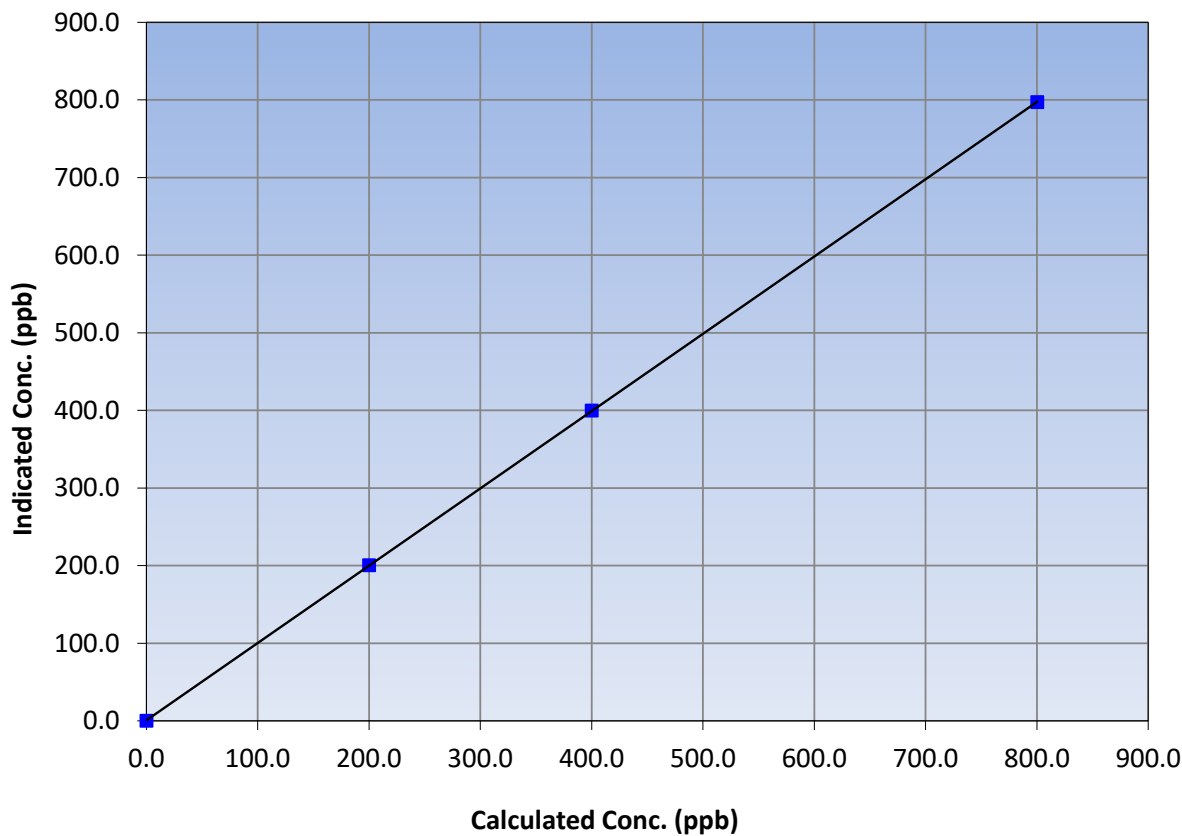
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:28	End Time (MST):	12:48
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	≥0.995	
800.3	797.3	1.0038			
400.2	399.8	1.0009			
200.1	200.6	0.9974			
			Slope	0.995845	0.90 - 1.10
			Intercept	0.740000	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

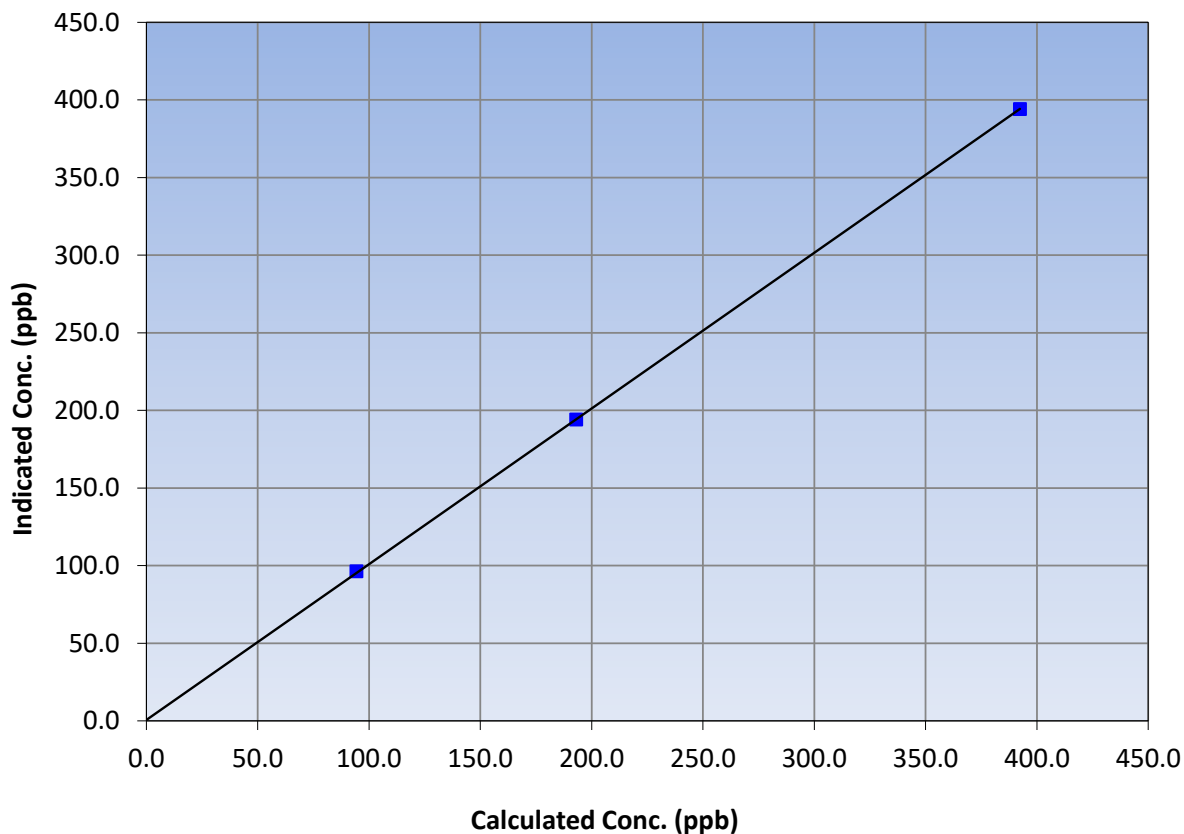
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:28	End Time (MST):	12:48
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	-0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
392.4	394.1	0.9957		
193.1	194.1	0.9948		
94.4	96.4	0.9793		
			0.999979	
			1.003157	
			0.613431	

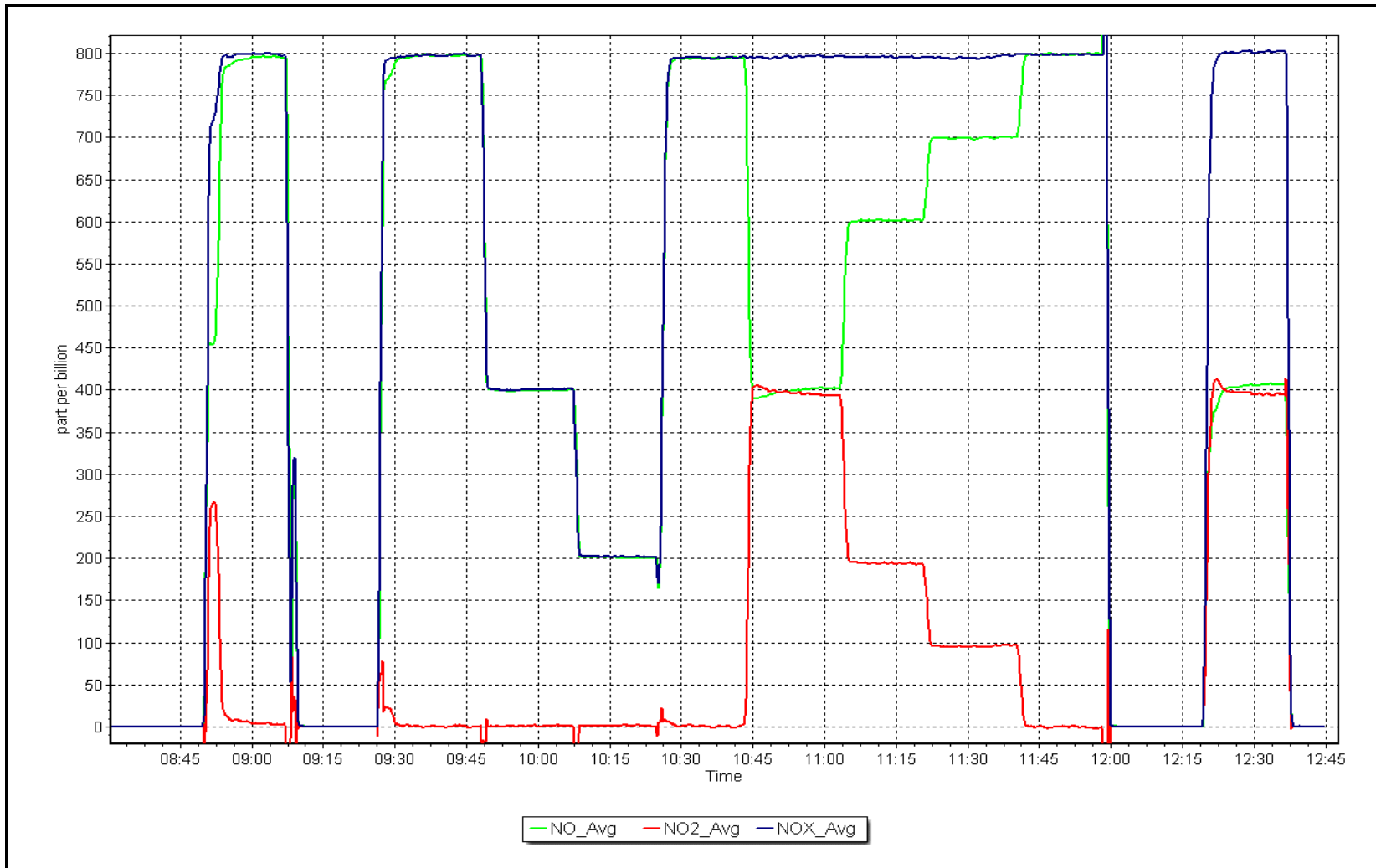
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 13, 2023

Location: Fort Chipewyan





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name: Fort Chipewyan Station number: AMS08
 Calibration Date: April 12, 2023 Last Cal Date: March 13, 2023
 Start time (MST): 7:52 End time (MST): 10:19
 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.002171	1.013200	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-0.880000	-0.960000	Coeff or Slope:	1.036	1.036

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	NA	0.0	0.2	----
as found span	5000	963.6	400.0	405.9	0.985
as found 2nd point					
as found 3rd point					
calibrator zero	5000	NA	0.0	0.3	----
high point	5000	961.7	400.0	404.9	0.988
second point	5000	810.3	200.0	201.2	0.994
third point	5000	701.3	100.0	99.0	1.010
as left zero	5000	NA	0.0	0.4	----
as left span	5000	963.3	400.0	405.9	0.985
Average Correction Factor					0.997

Baseline Corr As found:	405.7	Previous response	400.0	*% change	1.4%
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: Morgan Voyageur



Wood Buffalo Environmental Association

O₃ Calibration Summary

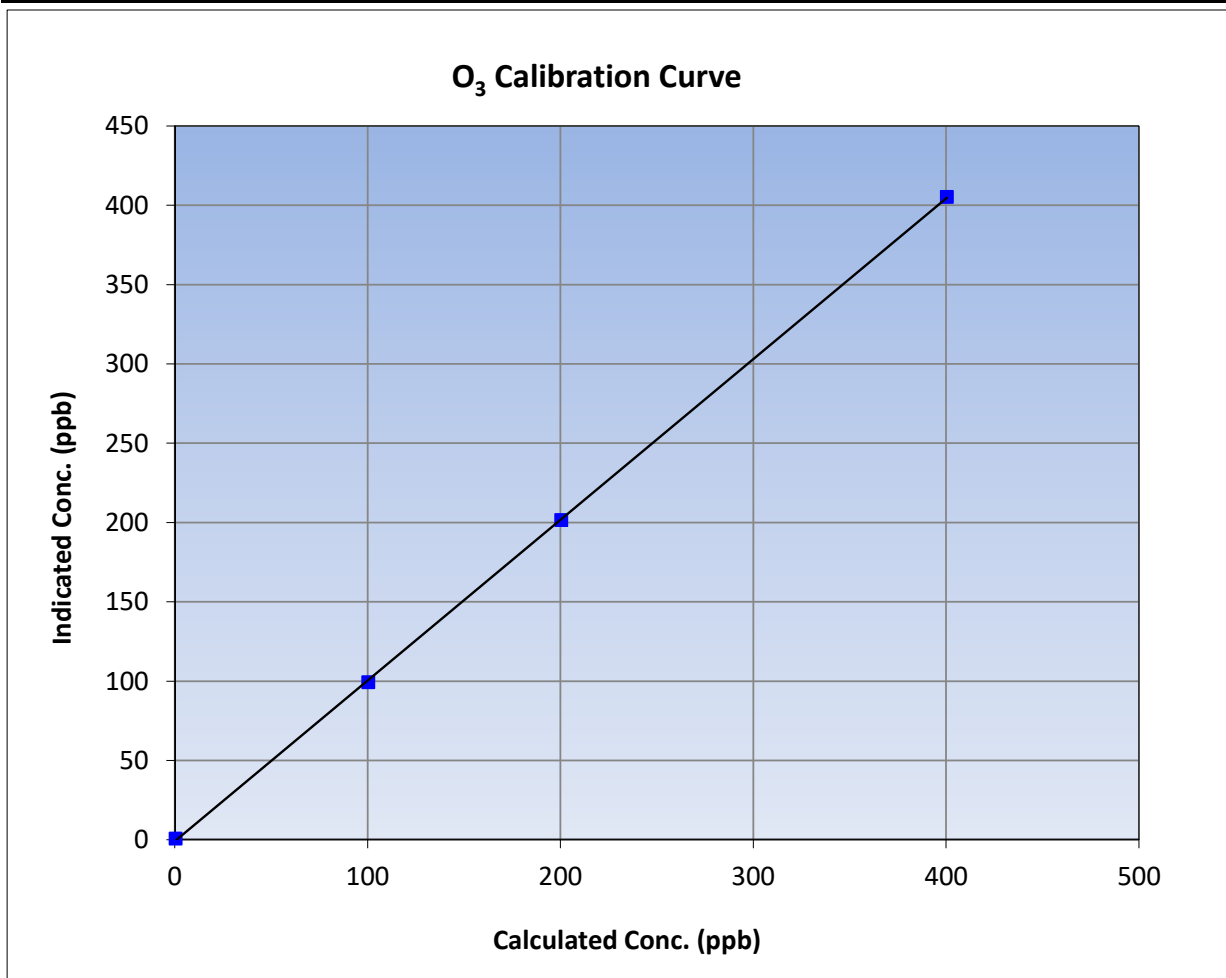
Version-01-2020

Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:52	End Time (MST):	10:19
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

Calibration Data

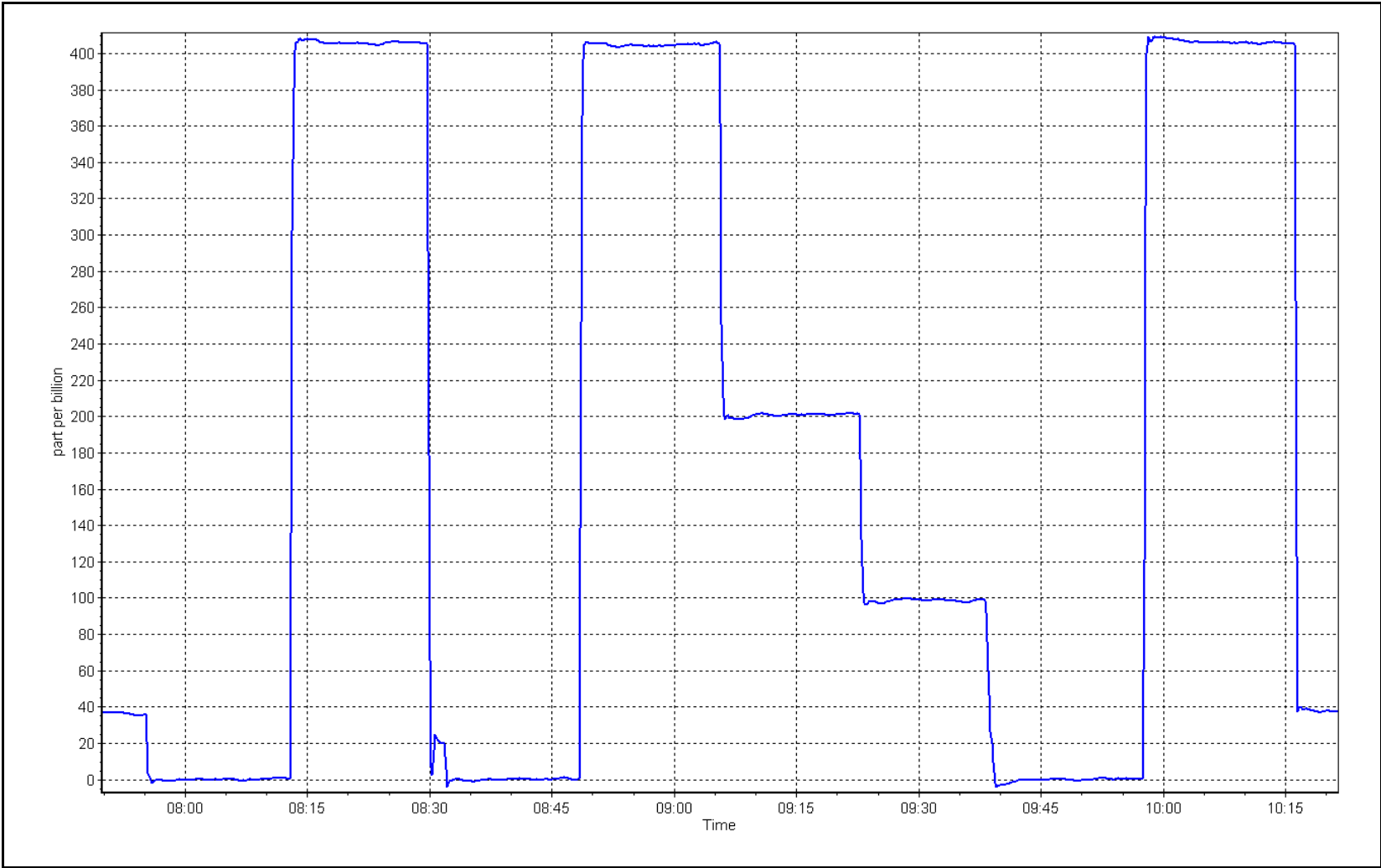
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999955	≥0.995
400.0	404.9	0.9879			
200.0	201.2	0.9940	Slope	1.013200	0.90 - 1.10
100.0	99.0	1.0101			
			Intercept	-0.960000	+/- 5



O₃ Calibration Plot

Date: April 12, 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: April 26, 2023 Last Cal Date: March 13, 2023
 Start time (MST): 12:41 End time (MST): 11:24

Analyzer Make: API S/N: 216
 Particulate Fraction: PM2.5

Flow Meter Make/Model: Delta Cal S/N: 1212
 Temp/RH standard: Delta Cal S/N: 1212

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	2.9	2.7	2.9	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	733.0	724.3	733.0	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	4.99	4.33	4.99	<input type="checkbox"/>	+/- 0.25 LPM
Leak Test:	Date of check: <u>April 26, 2023</u>	Last Cal Date: <u>March 13, 2023</u>			
	PM w/o HEPA: <u>0.1</u>	PM w/ HEPA: <u>0.0</u>			<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				<input type="checkbox"/>	11.3 +/- 0.5
Post-maintenance leak check:		PM w/o HEPA: _____	w/ HEPA: _____		
Date Optical Chamber Cleaned:		<u>March 13, 2023</u>			<0.2 ug/m3
Disposable Filter Changed:		<u>March 13, 2023</u>			

Annual Maintenance

Date Sample Tube Cleaned: July 14, 2022
 Date RH/T Sensor Cleaned: July 14, 2022

Notes: No adjustments 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:	April 21, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	7:44	End time (MST):	12:42
Reason:	Maintenance		

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:	5272
ZAG Make/Model:	API T701H		Serial Number:	197

Analyzer Information

Analyzer make:	API T300	Analyzer serial #:	3505
Analyzer Range:	0 - 50 ppm		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.998892	0.997452	Backgd or Offset:	-0.014	-0.014
Calibration intercept:	0.030961	0.118914	Coeff or Slope:	0.996	1.005

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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.18	----
as found span	4933	66.7	40.4	40.6	0.996
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	40.4	1.001
second point	4967	33.3	20.2	20.4	0.991
third point	4983	16.7	10.1	10.3	0.985
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.4	40.1	1.007
Average Correction Factor					0.993

Baseline Corr As found:	40.78	Prev response:	40.41	*% 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 inlet filter after as founds. Adjusted the zero and span. Pump failed on multi-point as found, replaced pump.

Calibration Performed By: Morgan Voyageur



Wood Buffalo Environmental Association

CO Calibration Summary

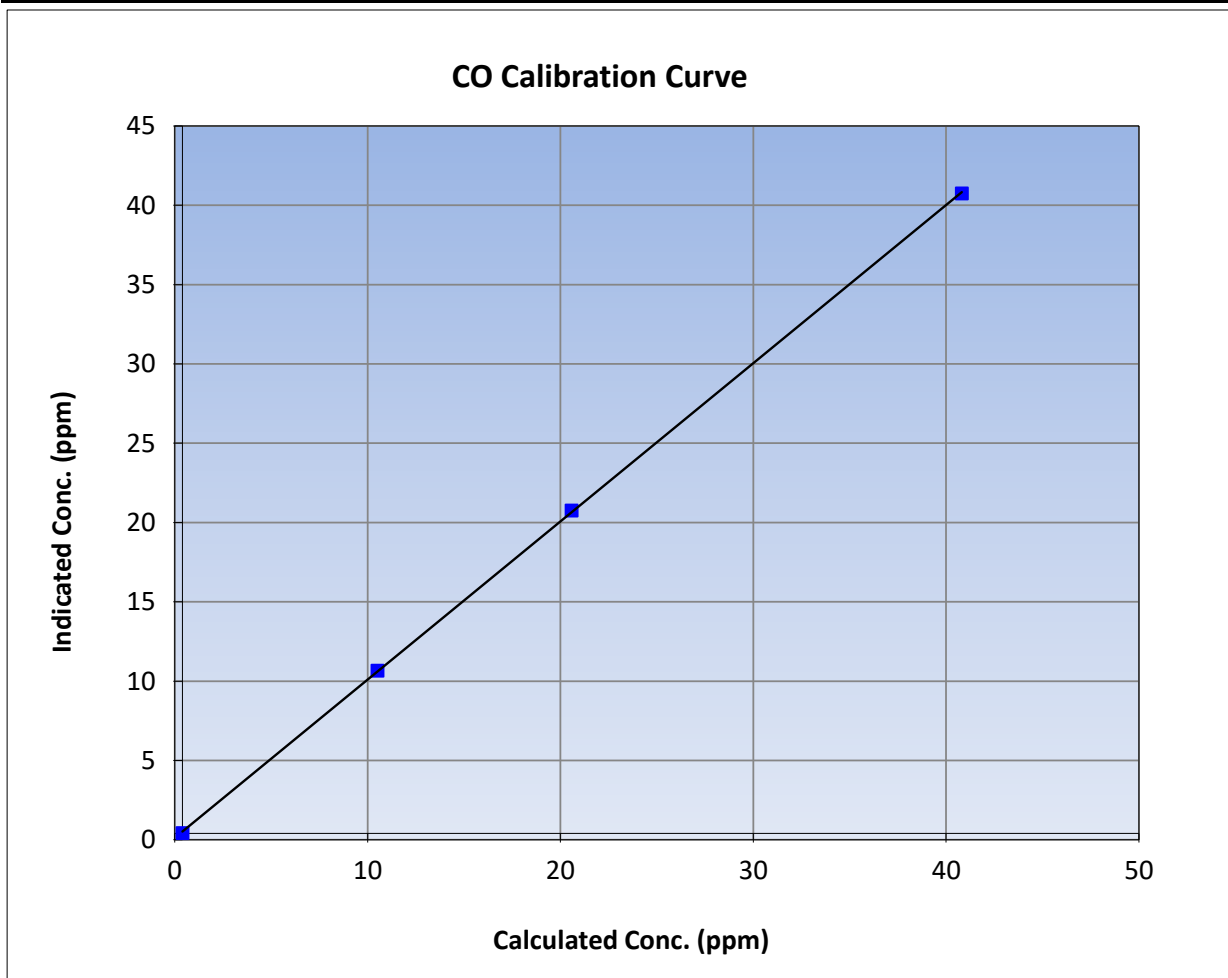
Version-01-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:44	End Time (MST):	12:42
Analyzer make:	API T300	Analyzer serial #:	3505

Calibration Data

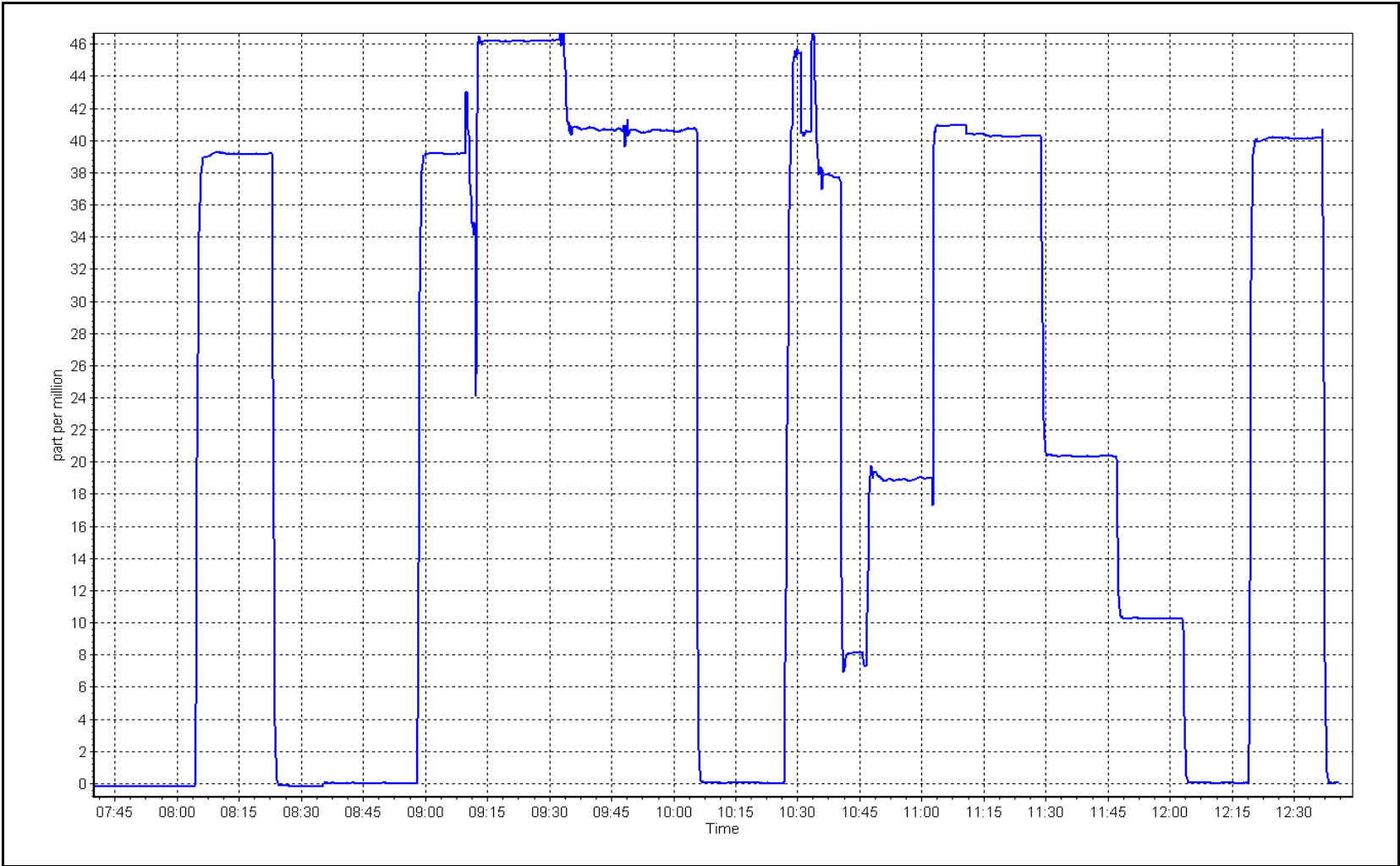
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999965	≥0.995
40.4	40.4	1.0014			
20.2	20.4	0.9911	Slope	0.997452	0.90 - 1.10
10.1	10.3	0.9854			
			Intercept	0.118914	+/-1.5



CO Calibration Plot

Date: April 21, 2023

Location: Fort Chipewyan





Wood Buffalo Environmental Association

CO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	April 21, 2023	Last Cal Date:	March 12, 2023
Start time (MST):	12:55	End time (MST):	15:39
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:	5272
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	

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.998937	0.992226	Backgd or Offset:	0.006	0.006
Calibration intercept:	-4.820000	-4.080000	Coeff or Slope:	1.018	1.018

CO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	3000	0.0	0.0	0.0	----
as found span	2920	80.0	1605.9	1594.0	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	0.6	----
high point	2920	80.0	1605.9	1595.4	1.007
second point	2960	40.0	802.9	779.0	1.031
third point	2980	20.0	401.5	397.1	1.011
as left zero	3000	0.0	0.0	0.2	----
as left span	2960	40.0	802.9	774.8	1.036
Average Correction Factor					1.016

Baseline Corr As found:	1594.00	Prev response:	1599.34	*% 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. no adjustments made

Calibration Performed By: Morgan Voyageur



Wood Buffalo Environmental Association

CO₂ Calibration Summary

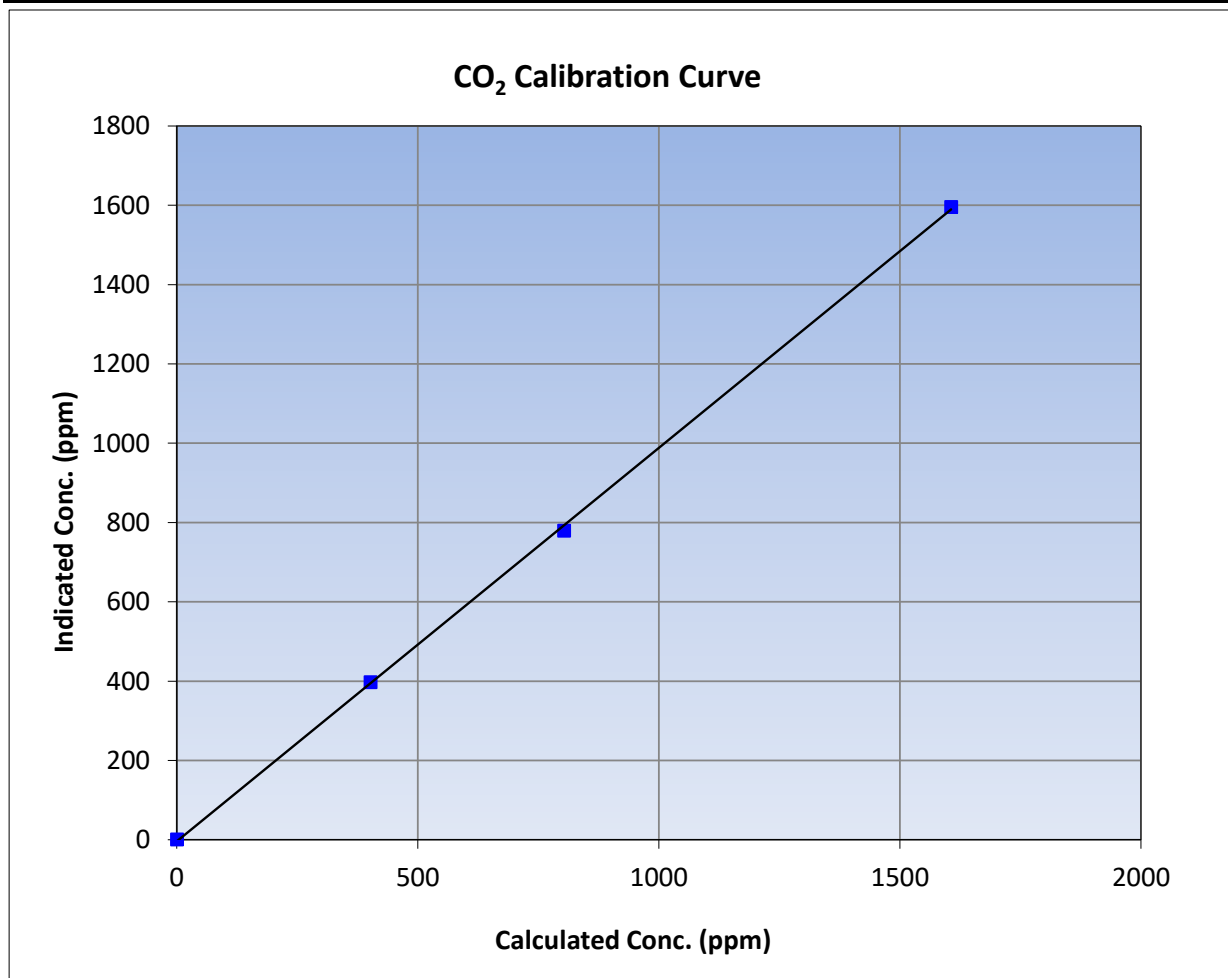
Version-01-2020

Station Information

Calibration Date	April 21, 2023	Previous Calibration	March 12, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	12:55	End Time (MST)	15:39
Analyzer make	Teledyne API T360	Analyzer serial #	289

Calibration Data

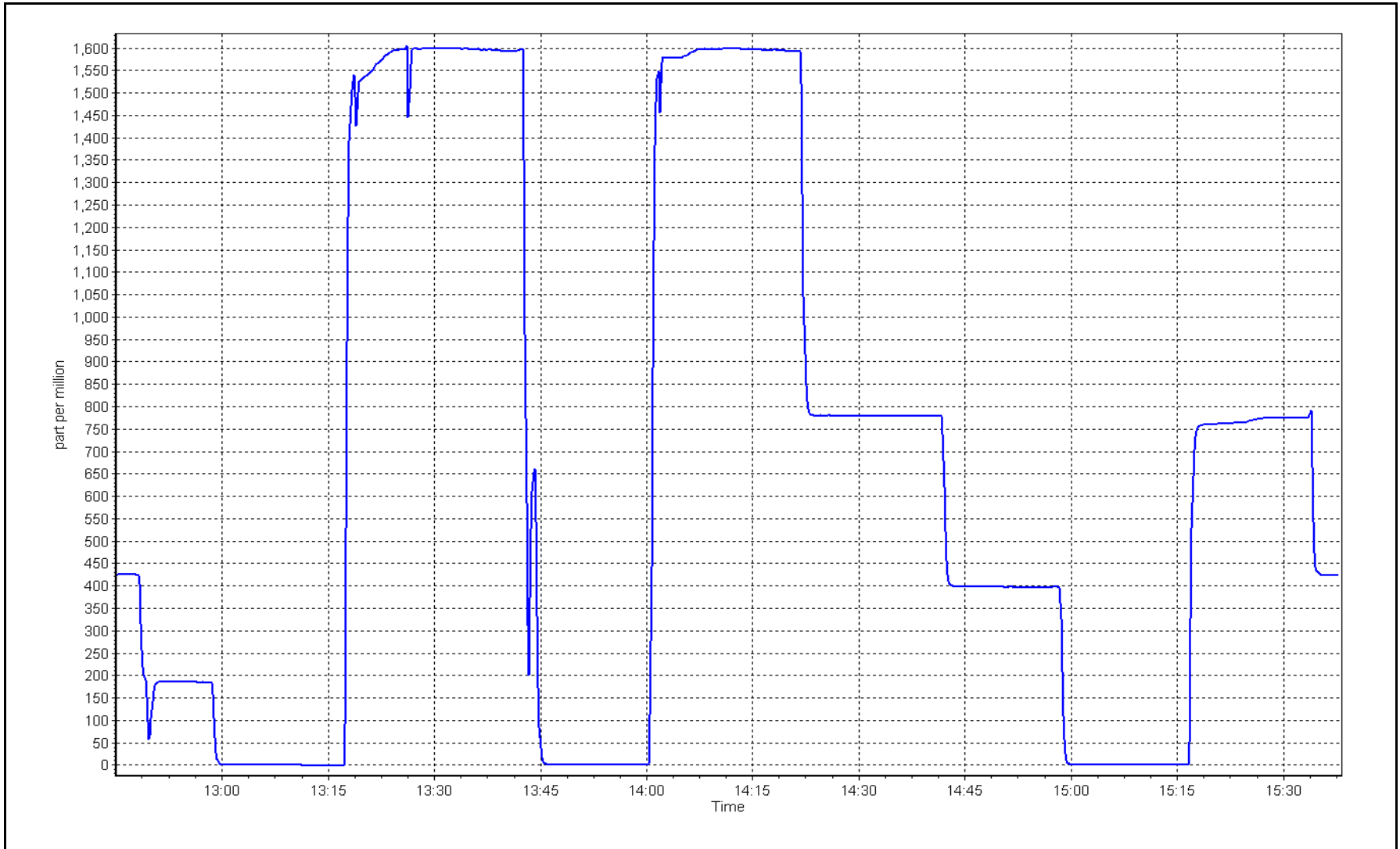
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.6	----	Correlation Coefficient	0.999818	≥0.995
1605.9	1595.4	1.0066	Slope	0.992226	0.90 - 1.10
802.9	779.0	1.0307	Intercept	-4.080000	+/-20
401.5	397.1	1.0110			



CO₂ Calibration Plot

Date: April 21, 2023

Location: Fort Chipewyan





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09 BARGE LANDING APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	April 11, 2023	Last Cal Date:	March 10, 2023
Start time (MST):	9:28	End time (MST):	13:11
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.001709	0.998843	Backgd or Offset:	9.7	9.7
Calibration intercept:	0.631572	-0.089025	Coeff or Slope:	0.986	0.986

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4919	80.2	801.5	798.6	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4919	80.2	801.5	801.0	1.001
second point	4959	40.1	400.8	399.0	1.004
third point	4980	20.0	199.8	199.8	1.000
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	80.2	801.5	795.7	1.007
Average Correction Factor					1.002

Baseline Corr As found:	798.50	Previous response	803.49	*% 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. No adjustments made.

Calibration Performed By: Braiden Boutilier



Wood Buffalo Environmental Association

SO₂ Calibration Summary

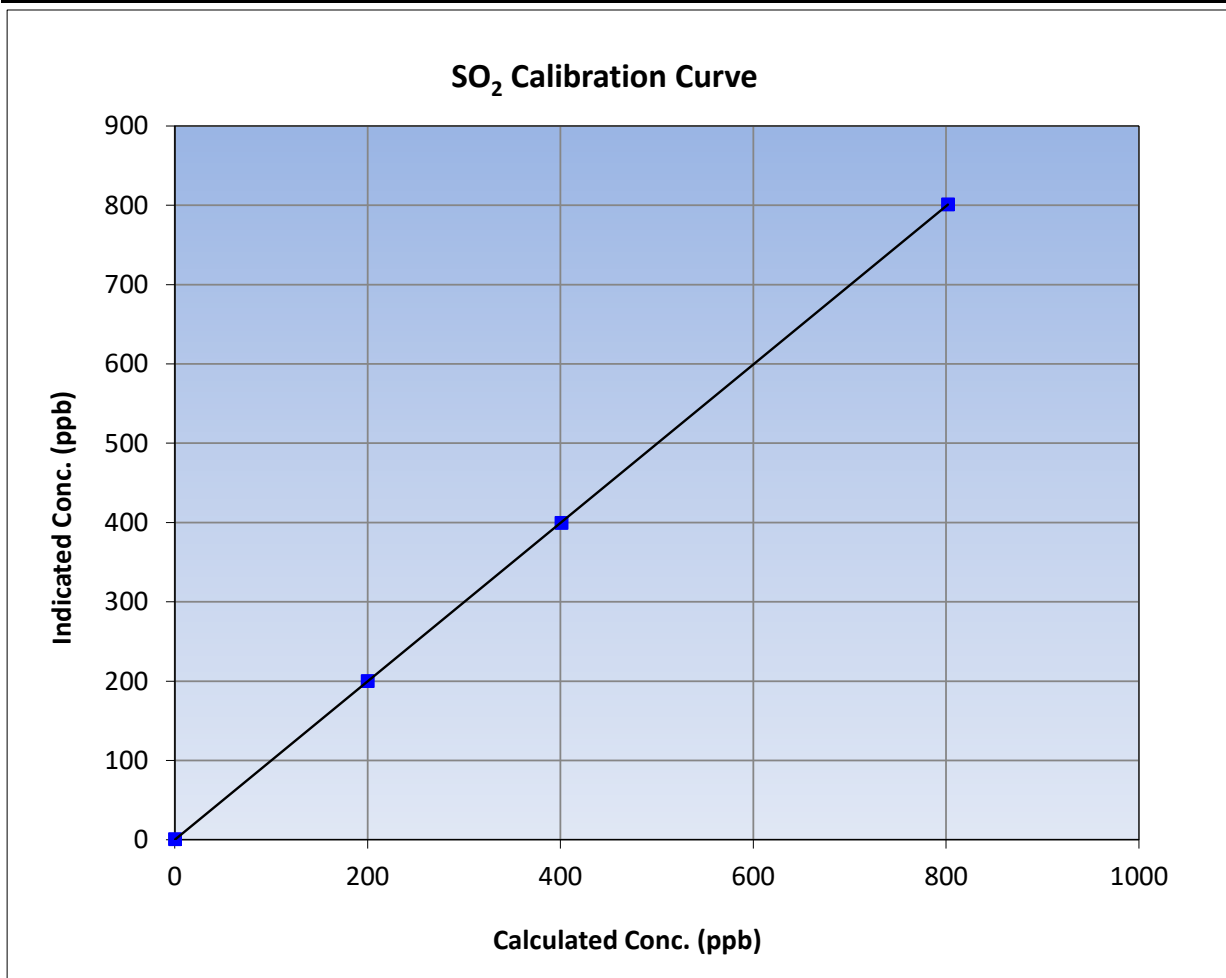
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 10, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:28	End Time (MST):	13:11
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

Calibration Data

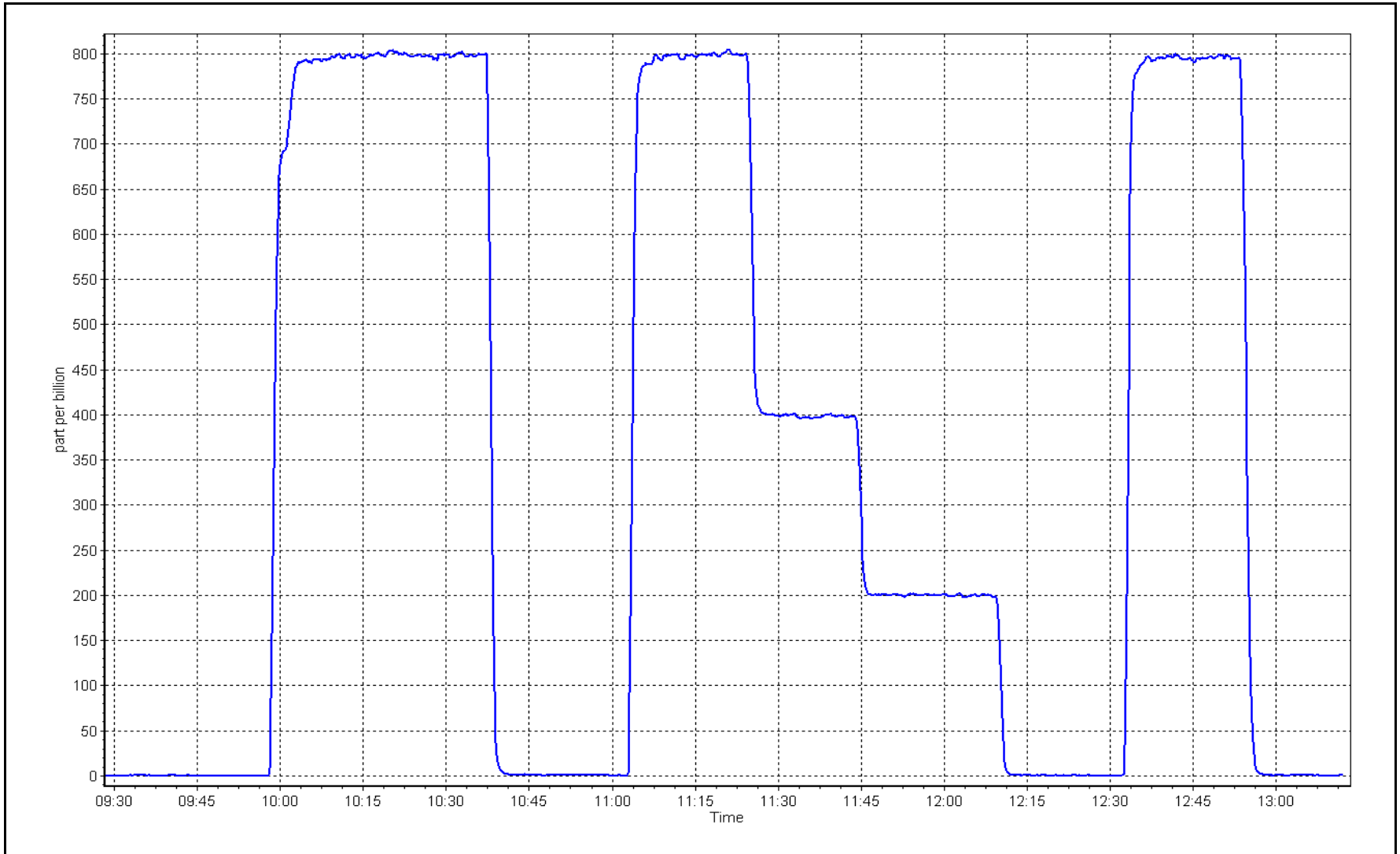
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999994	
801.5	801.0	1.0006			≥0.995
400.8	399.0	1.0044	Slope	0.998843	
199.8	199.8	1.0002			0.90 - 1.10
			Intercept	-0.089025	+/-30



SO2 Calibration Plot

Date: April 11, 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: April 17, 2023 Last Cal Date: March 23, 2023
 Start time (MST): 9:36 End time (MST): 15:01
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	1.006146	1.008720	Backgd or Offset: 2.76	2.78
Calibration intercept:	0.019102	0.079030	Coeff or Slope: 1.130	1.137

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	4918	82.1	80.0	78.6	1.017
as found 2nd point	4959	41.1	40.0	39.3	1.019
as found 3rd point	4979	20.5	20.0	19.7	1.014
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4918	82.1	80.0	80.7	0.991
second point	4959	41.1	40.0	40.5	0.988
third point	4979	20.5	20.0	20.3	0.984
as left zero	5000	0.0	0.0	0.0	----
as left span	4918	82.1	80.0	80.6	0.992
SO2 Scrubber Check	4920	80.2	802.0	-0.1	----
Date of last scrubber change:	28-Feb-23			Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found: 78.6 Prev response: 80.47 *% change: -2.4%
 Baseline Corr 2nd AF pt: 39.3 AF Slope: 0.982568 AF Intercept: 0.019097
 Baseline Corr 3rd AF pt: 19.7 AF Correlation: 0.999998

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. SOx scrubber check done after calibrator zero. Adjusted span.

Calibration Performed By: Braiden Boutillier



Wood Buffalo Environmental Association

TRS Calibration Summary

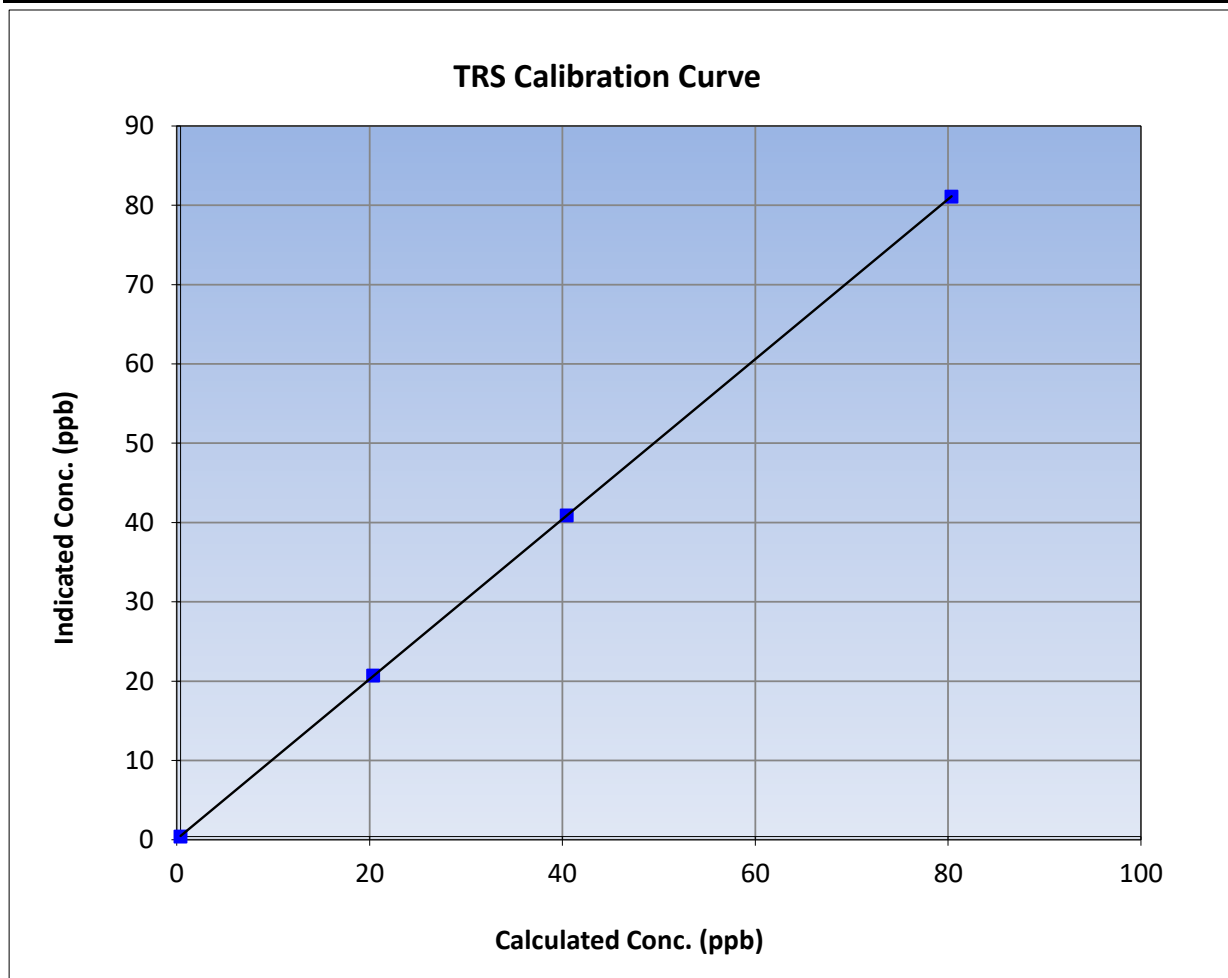
Version-11-2021

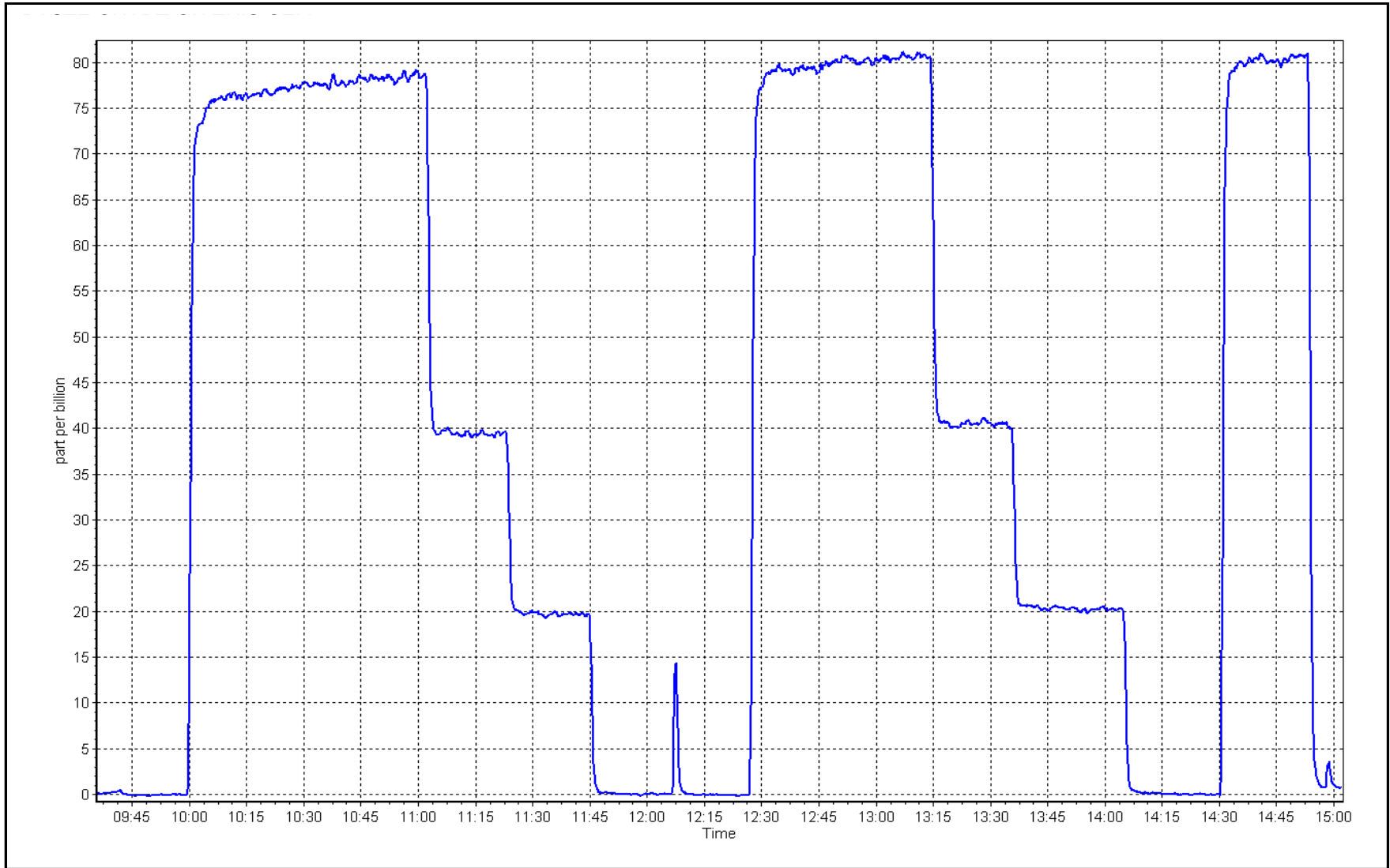
Station Information

Calibration Date:	April 17, 2023	Previous Calibration:	March 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:36	End Time (MST):	15:01
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

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
80.0	80.7	0.9909			
40.0	40.5	0.9884	Slope	1.008720	0.90 - 1.10
20.0	20.3	0.9837			
			Intercept	0.079030	+/-3







Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	April 11, 2023	Last Cal Date:	March 28, 2023
Start time (MST):	9:28	End time (MST):	13:11
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC151285	Cal Gas Expiry Date:	January 5, 2025
CH ₄ Cal Gas Conc.	497.6 ppm	CH ₄ Equiv Conc.	1067.1 ppm
C ₃ H ₈ Cal Gas Conc.	207.1 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	497.6 ppm	CH ₄ Equiv Conc.	1067.1 ppm
Removed C ₃ H ₈ 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	CH ₄ Range (ppm):	0 - 50 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	2.49E-04	2.49E-04	NMHC SP Ratio:	4.79E-05
CH ₄ Retention time:	15.2	15.2	NMHC Peak Area:	190949

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	17.12	17.07	1.003
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	17.06	1.003
second point	4960	40.1	8.56	8.54	1.002
third point	4980	20.0	4.27	4.29	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.18	0.996

Average Correction Factor				1.000
Baseline Corr AF:	17.07	Prev response	17.08	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.0	----
as found span	4919	80.2	9.14	9.08	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	80.2	9.14	9.07	1.007
second point	4960	40.1	4.57	4.54	1.006
third point	4980	20	2.28	2.28	0.998
as left zero	5000	0	0.00	0.00	----
as left span	4919	80.2	9.14	9.10	1.004
Average Correction Factor					1.004
Baseline Corr AF:	9.08	Prev response	9.13	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	7.98	7.99	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	7.98	8.00	0.998
second point	4960	40.1	3.99	4.00	0.997
third point	4980	20.0	1.99	2.01	0.990
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	8.08	0.988
Average Correction Factor					0.995
Baseline Corr AF:	7.99	Prev response	7.95	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	0.997787	0.995837
THC Cal Offset:	0.002047	0.017643
CH ₄ Cal Slope:	0.996643	1.000907
CH ₄ Cal Offset:	-0.003745	0.007869
NMHC Cal Slope:	0.998523	0.991957
NMHC Cal Offset:	0.006592	0.009575

Notes: Changed Nitrogen cylinder and sample inlet filters after as founds. No adjustments made.

Calibration Performed By: Braiden Boutillier



Wood Buffalo Environmental Association

THC Calibration Summary

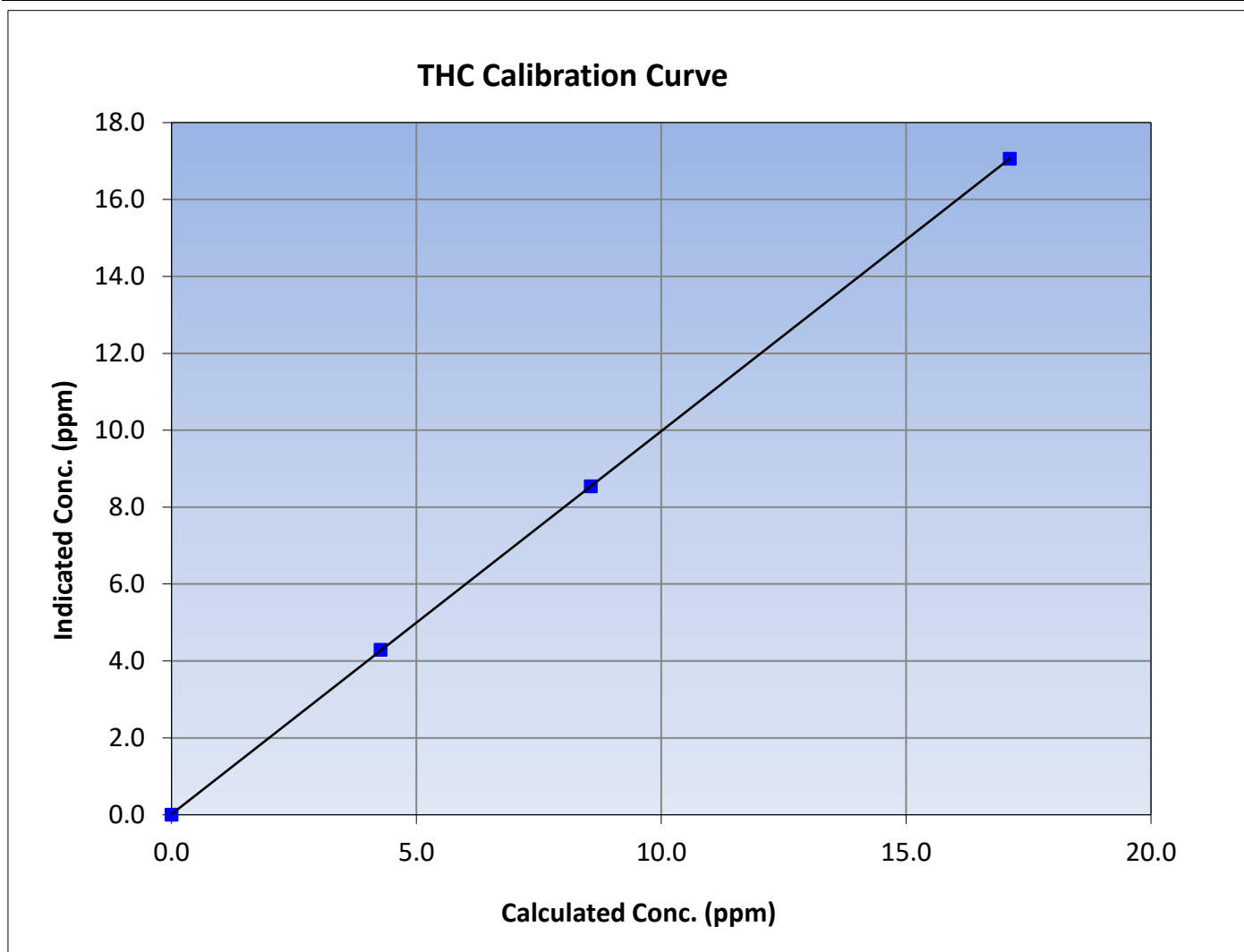
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:28	End Time (MST):	13:11
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999994	≥ 0.995			
17.12	17.06	1.0035						
8.56	8.54	1.0021				Slope	0.995837	0.90 - 1.10
4.27	4.29	0.9945						
			Intercept	0.017643	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

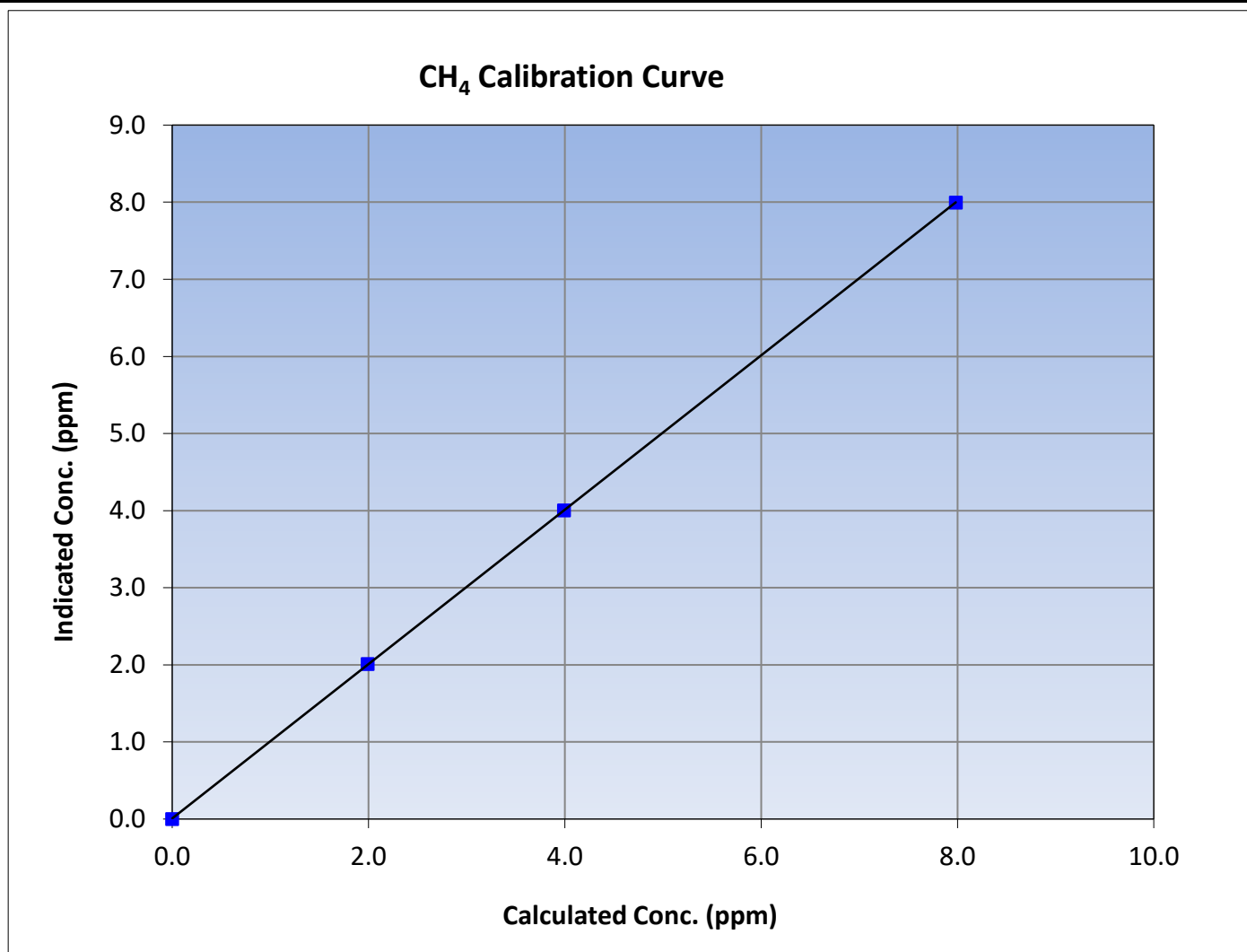
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:28	End Time (MST):	13:11
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999995	≥0.995
7.98	8.00	0.9985			
3.99	4.00	0.9969			
1.99	2.01	0.9902			
			Slope	1.000907	0.90 - 1.10
			Intercept	0.007869	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

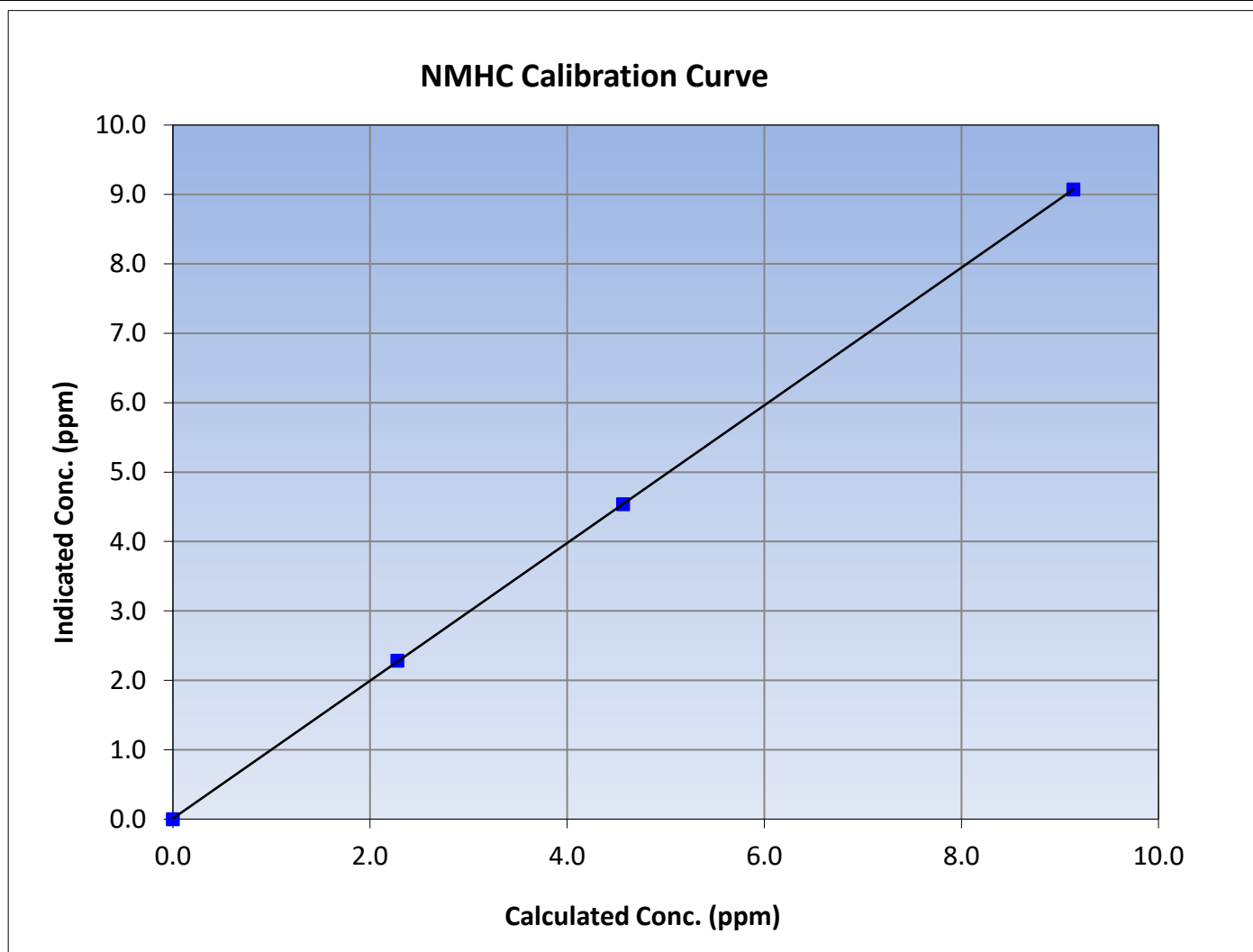
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:28	End Time (MST):	13:11
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

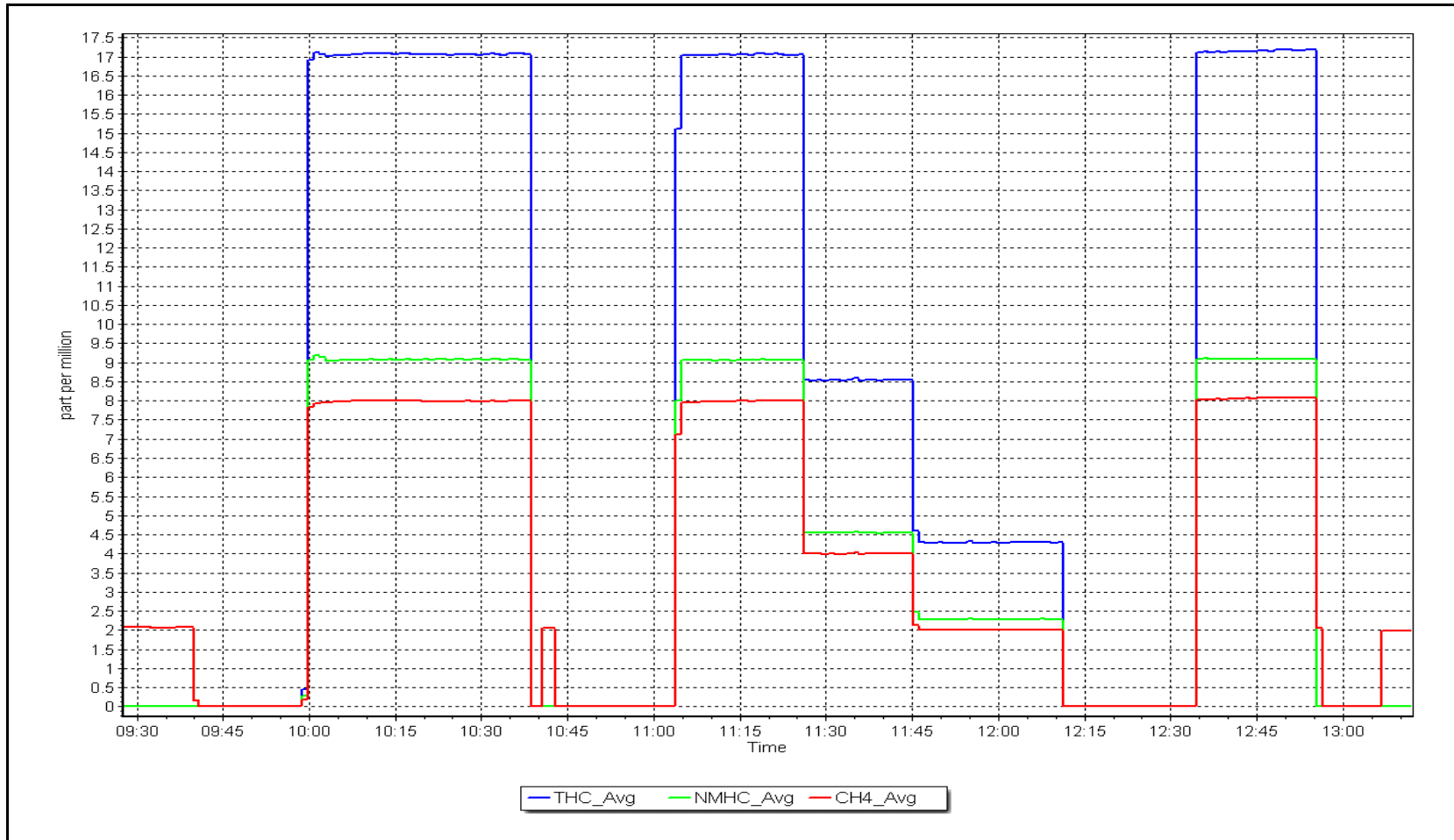
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999994	≥ 0.995			
9.14	9.07	1.0073						
4.57	4.54	1.0063				Slope	0.991957	0.90 - 1.10
2.28	2.28	0.9979						
			Intercept	0.009575	± 0.5			



NMHC Calibration Plot

Date: April 11, 2023

Location: Barge Landing





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Barge Landing
Calibration Date: April 28, 2023
Start time (MST): 9:38
Reason: Routine
Station number: AMS09
Last Cal Date: March 15, 2023
End time (MST): 14:32

Calibration Standards

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

Analyzer Information

Analyzer make: Thermo 42i
NOX Range (ppb): 0 - 1000 ppb

Analyzer serial #: 1426262593

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.175	1.175	NO bkgnd or offset:	10.5	10.5
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	10.6	10.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	179.2	174.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.998241	0.997105
NO _x Cal Offset:	0.748819	0.848780
NO Cal Slope:	1.000056	0.996586
NO Cal Offset:	-0.352413	-0.413290
NO ₂ Cal Slope:	1.001921	1.003813
NO ₂ Cal Offset:	-0.892005	0.518213



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as found span	4919	80.5	805.1	800.3	4.8	805.0	797.1	7.5	1.000	1.004
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	803.0	797.4	5.5	1.003	1.004
second point	4959	40.2	402.1	399.7	2.4	402.7	397.5	5.2	0.998	1.005
third point	4979	20.1	201.0	199.8	1.2	201.8	198.3	3.6	0.996	1.008
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4919	80.5	805.1	436.9	368.2	802.0	432.9	368.7	1.004	1.009
Average Correction Factor									0.999	1.006

Corrected As found	NO _x = 805.0 ppb	NO = 797.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = 0.1%
Previous Response	NO _x = 804.4 ppb	NO = 799.9 ppb		*Percent Change	NO = -0.3%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	795.0	431.6	368.2	369.9	0.995	100.5%
2nd GPT point (200 ppb O3)	795.0	656.9	142.9	144.4	0.990	101.0%
3rd GPT point (100 ppb O3)	795.0	724.6	75.2	76.5	0.983	101.7%
Average Correction Factor					0.990	101.1%

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

Calibration Performed By: Braiden Boutilier



Wood Buffalo Environmental Association

NO_x Calibration Summary

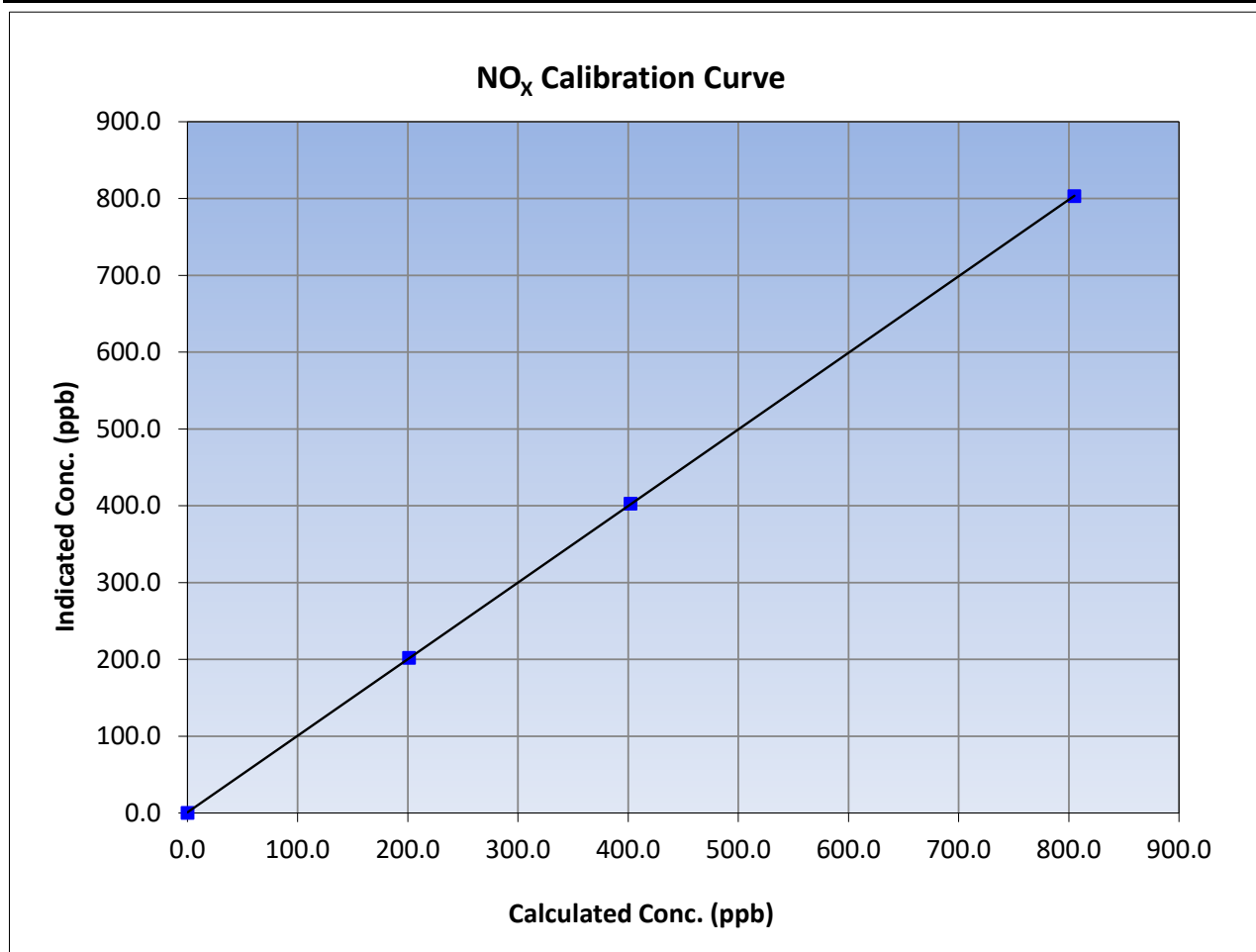
Version-04-2020

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:38	End Time (MST):	14:32
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	≥0.995	
805.1	803.0	1.0026			
402.1	402.7	0.9984			
201.0	201.8	0.9962			
			Slope	0.997105	0.90 - 1.10
			Intercept	0.848780	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

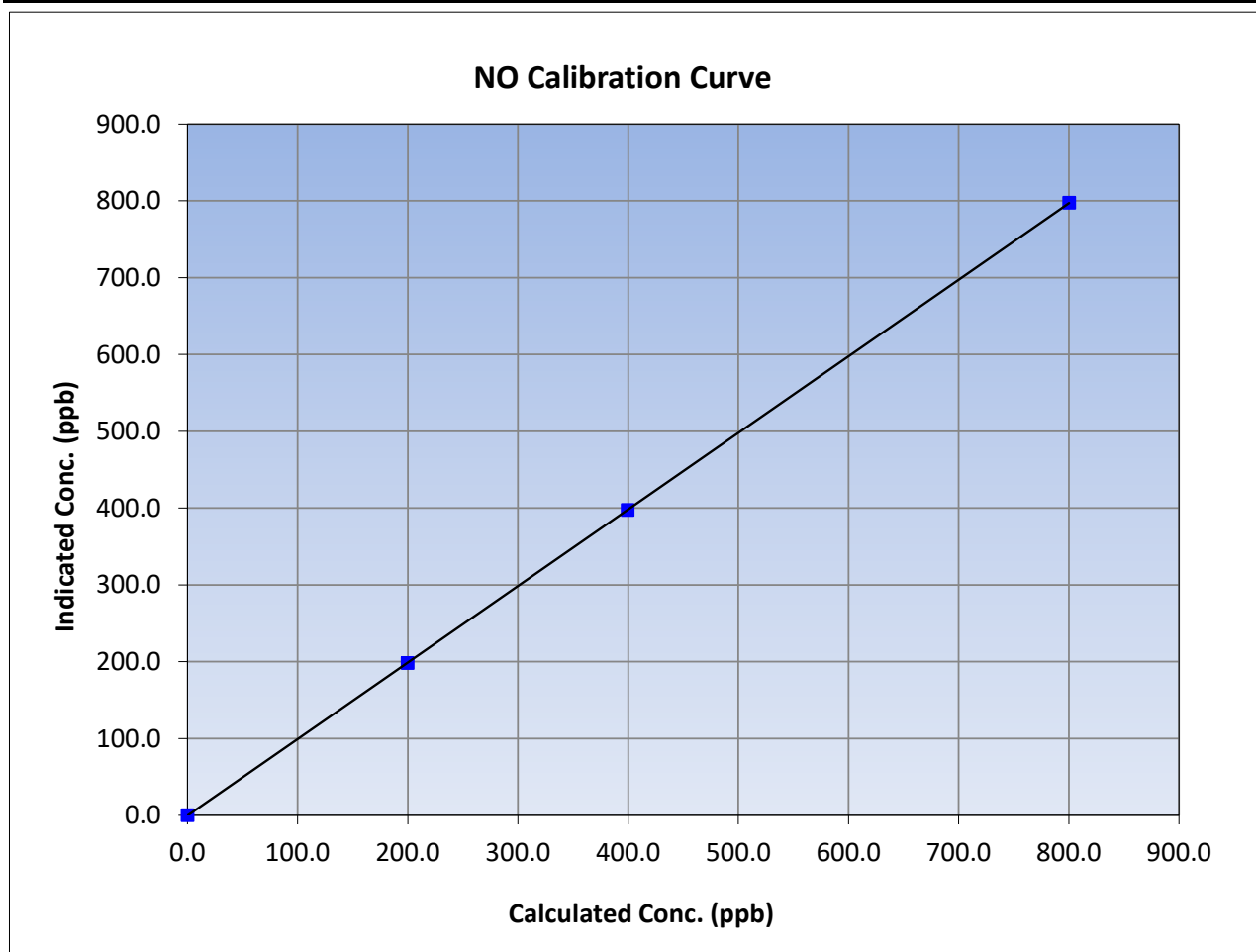
Version-04-2020

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:38	End Time (MST):	14:32
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20
800.3	797.4	1.0036		
399.7	397.5	1.0054		
199.8	198.3	1.0077		





Wood Buffalo Environmental Association

NO₂ Calibration Summary

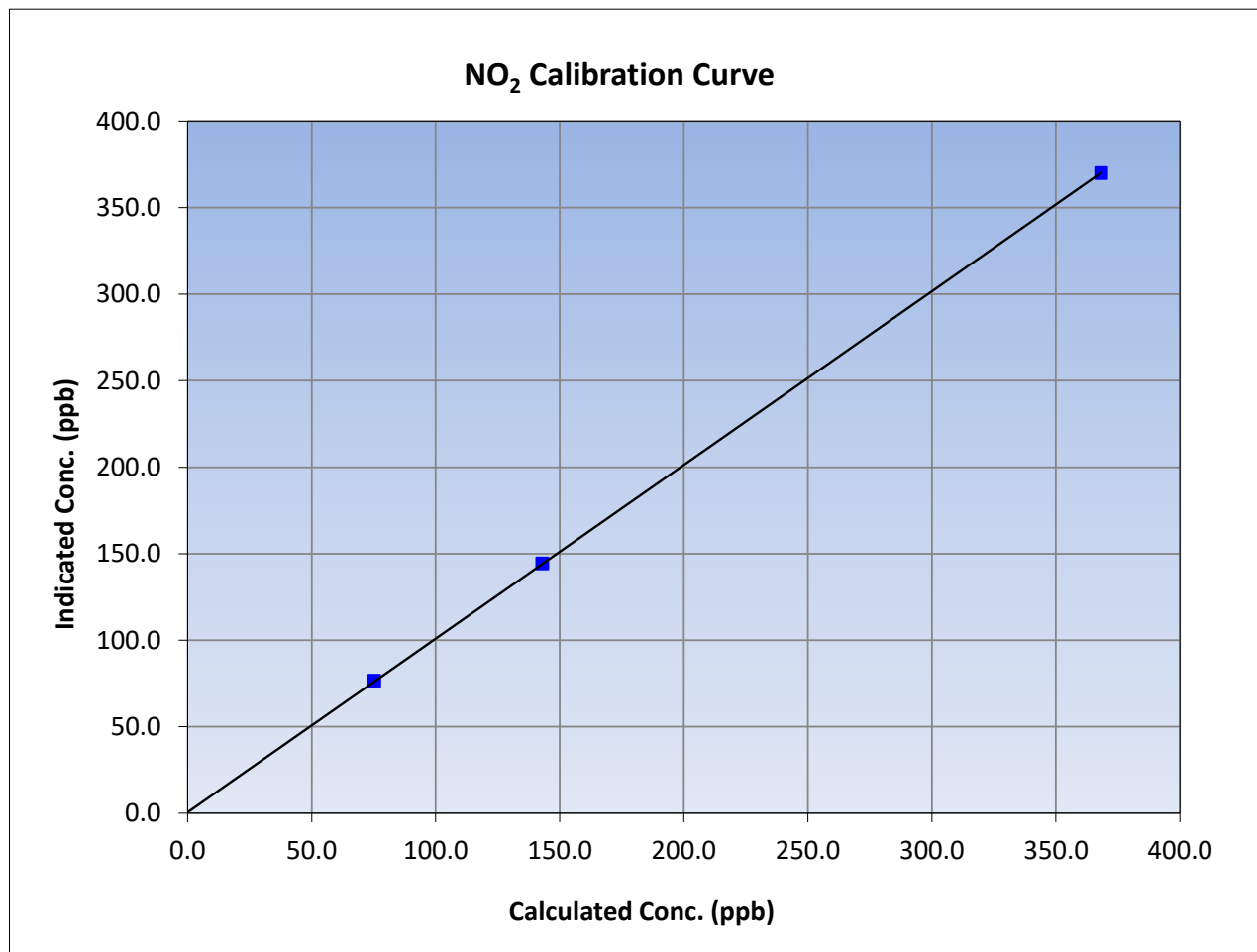
Version-04-2020

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:38	End Time (MST):	14:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

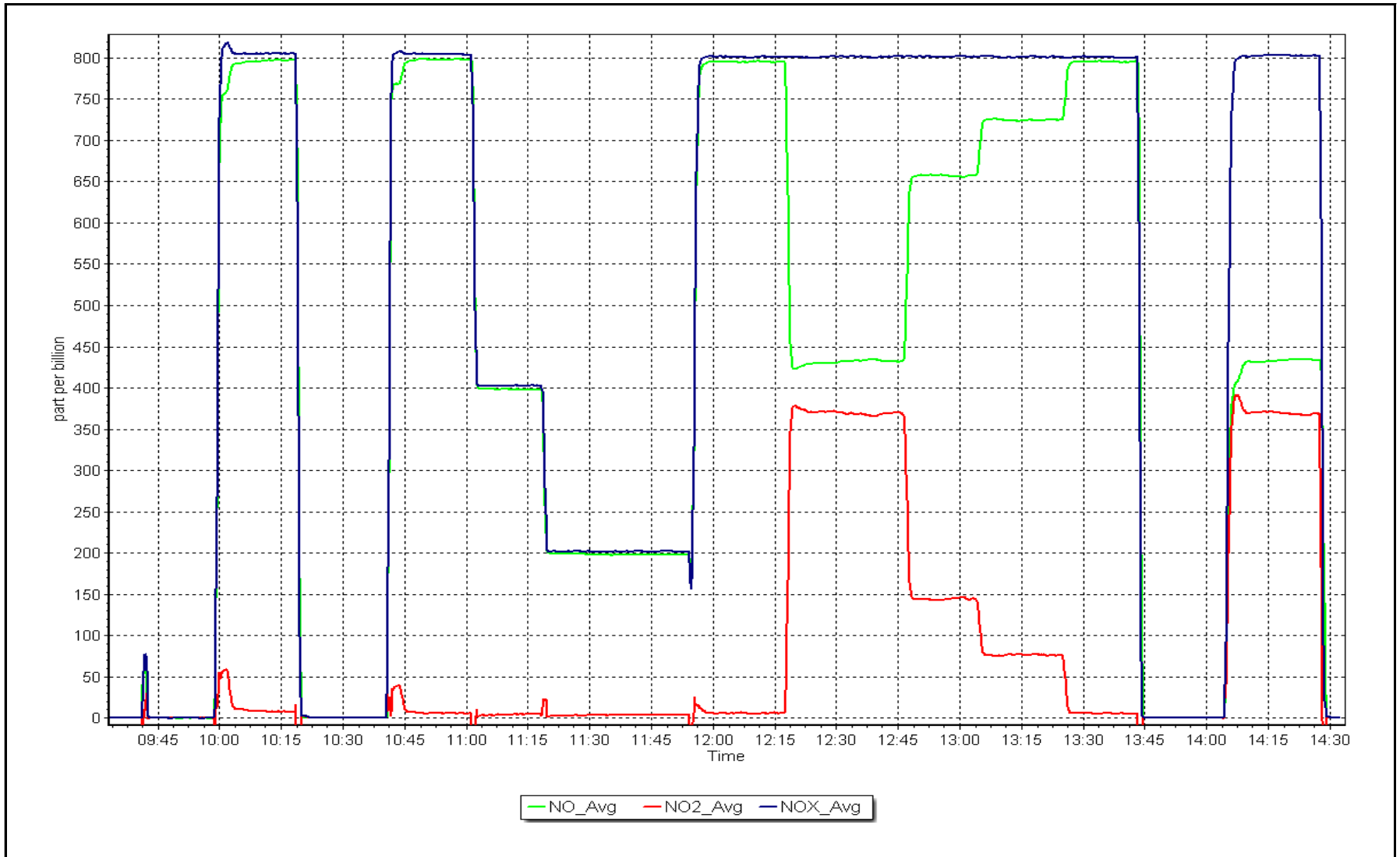
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	-0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
368.2	369.9	0.9955		
142.9	144.4	0.9898		
75.2	76.5	0.9834		



NO_x Calibration Plot

Date: April 28, 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:	April 28, 2023	Last Cal Date:	March 23, 2023
Start time (MST):	11:18	End time (MST):	11:48
Analyzer Make:	API T640	S/N:	321
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

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<u>(Limits)</u>
T (°C)	14.3	15.60	14.3	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	733.8	735.67	733.8	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	5.00	4.901	5.00	<input type="checkbox"/>	+/- 0.25 LPM
Leak Test:	Date of check:	<u>April 28, 2023</u>	Last Cal Date:	<u>March 23, 2023</u>	
	PM w/o HEPA:	<u>1.8</u>	PM w/ HEPA:	<u>0.0</u>	<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

<u>Parameter</u>	<u>As found</u>	<u>Post maintenance</u>	<u>As left</u>	<u>Adjusted</u>	<u>(Limits)</u>
PMT Peak Test	-	-	-	<input type="checkbox"/>	11.3 +/- 0.5
Post-maintenance leak check:		PM w/o HEPA:	<u>-</u>	w/ HEPA:	<u>-</u>
Date Optical Chamber Cleaned:			<u>February 28, 2023</u>		<0.2 ug/m3
Disposable Filter Changed:			<u>February 28, 2023</u>		

Annual Maintenance

Date Sample Tube Cleaned:	<u>November 15, 2022</u>
Date RH/T Sensor Cleaned:	<u>November 15, 2022</u>

Notes: No adjustments made. Cleaned inlet head. Leak check passed.

Calibration by: Braiden Boutilier



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11 LOWER CAMP APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	April 11, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	9:50	End time (MST):	12:47
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		

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.995374	0.995416	Backgd or Offset:	14.0
Calibration intercept:	-0.208611	-0.748519	Coeff or Slope:	1.051
				14.3
				1.051

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.3	----
as found span	4919	81.3	800.8	793.7	1.009
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	797.5	1.004
second point	4959	40.7	400.9	396.2	1.012
third point	4980	20.3	199.9	197.9	1.010
as left zero	5000	0.0	0.0	0.6	----
as left span	4919	81.3	800.8	794.2	1.008
Average Correction Factor					1.009

Baseline Corr As found:	793.40	Previous response	796.84	*% 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 sample inlet filter after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif



Wood Buffalo Environmental Association

SO₂ Calibration Summary

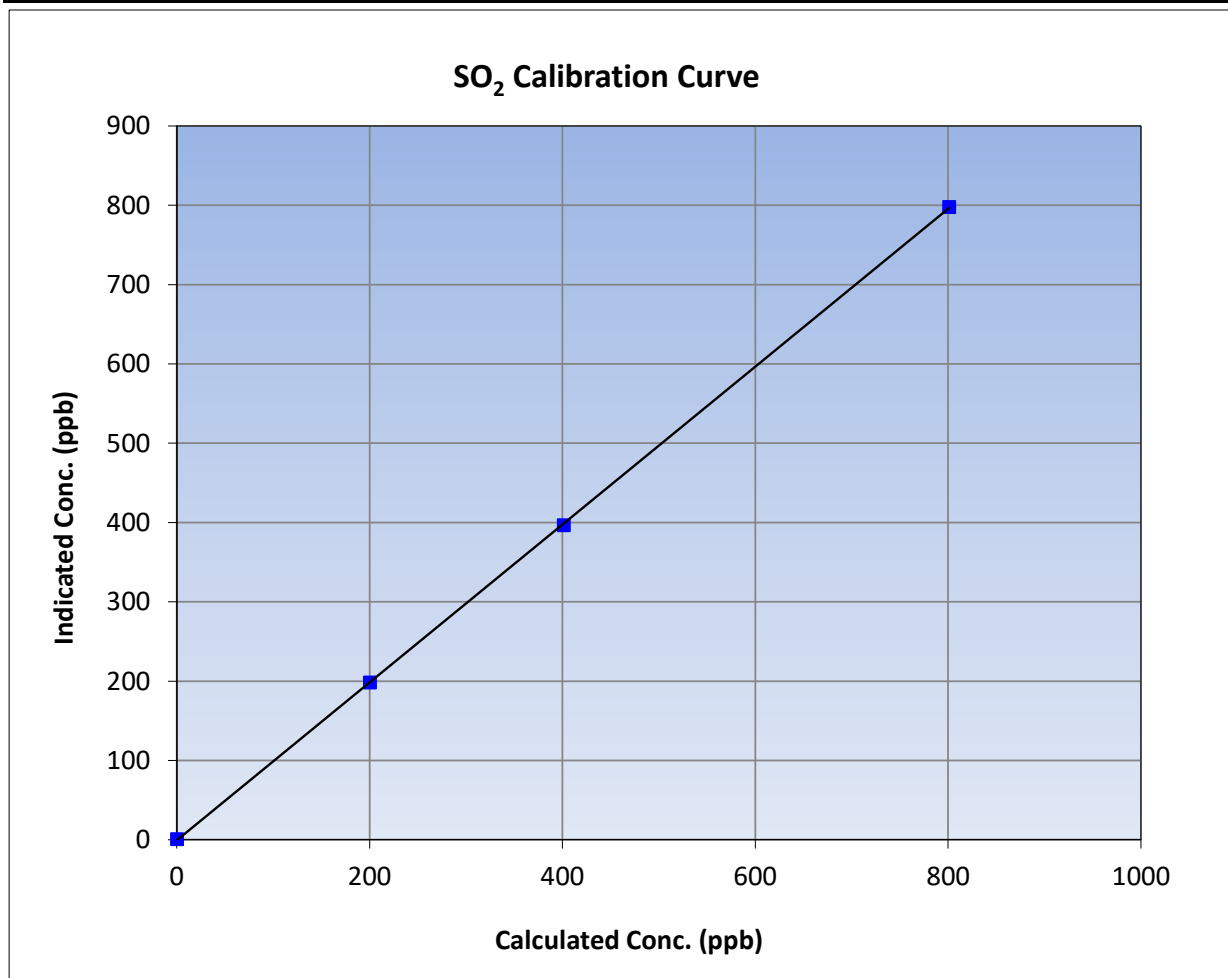
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:50	End Time (MST):	12:47
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

Calibration Data

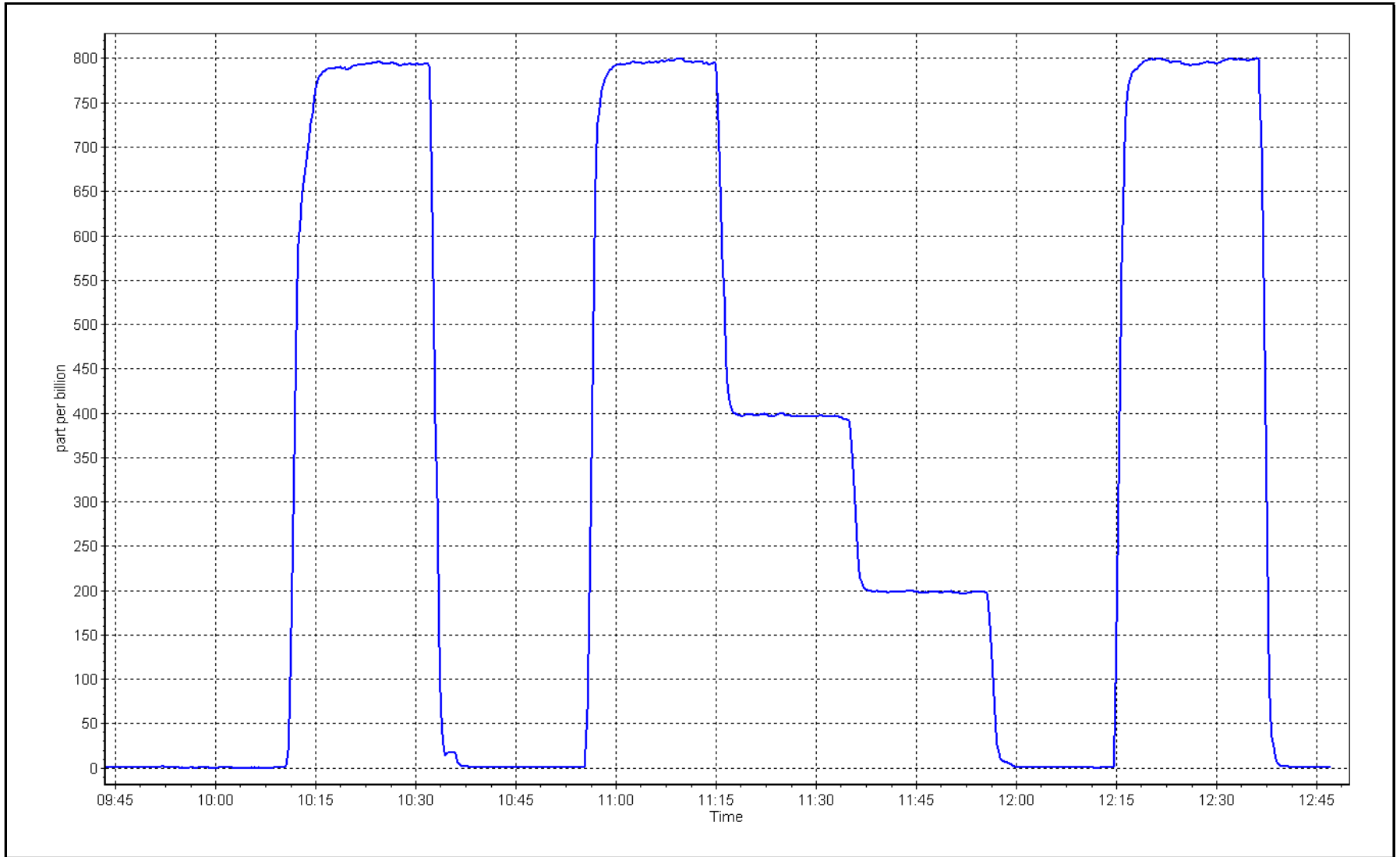
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.6	----	Correlation Coefficient	0.999977	≥0.995
800.8	797.5	1.0041			
400.9	396.2	1.0119	Slope	0.995416	0.90 - 1.10
199.9	197.9	1.0103			
			Intercept	-0.748519	+/-30



SO2 Calibration Plot

Date: April 11, 2023

Location: Lower Camp





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Lower Camp Station number: AMS11
 Calibration Date: April 13, 2023 Last Cal Date: March 28, 2023
 Start time (MST): 8:42 End time (MST): 12:19
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	1.026375	1.015352	Backgd or Offset: 13.9	14.0
Calibration intercept:	0.532956	0.293967	Coeff or Slope: 1.043	1.043

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.3	----
as found span	4926	73.6	79.9	80.8	0.993
as found 2nd point	4963	36.8	40.0	40.4	0.996
as found 3rd point	4982	18.6	20.2	20.3	1.010
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.4	----
high point	4926	73.6	79.9	81.5	0.981
second point	4963	36.8	40.0	40.8	0.979
third point	4982	18.6	20.2	20.7	0.976
as left zero	5000	0.0	0.0	0.5	----
as left span	4926	73.6	79.9	81.4	0.982
SO2 Scrubber Check	4919	81.1	811.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.979
Date of last converter efficiency test:				efficiency	

Baseline Corr As found: 80.5 Prev response: 82.56 *% change: -2.6%
 Baseline Corr 2nd AF pt: 40.1 AF Slope: 1.008475 AF Intercept: 0.134769
 Baseline Corr 3rd AF pt: 20.0 AF Correlation: 0.999980

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Completed a SO2 scrubber check after calibrator zero. No adjustments made.

Calibration Performed By: Mohammed Kashif



Wood Buffalo Environmental Association

H₂S Calibration Summary

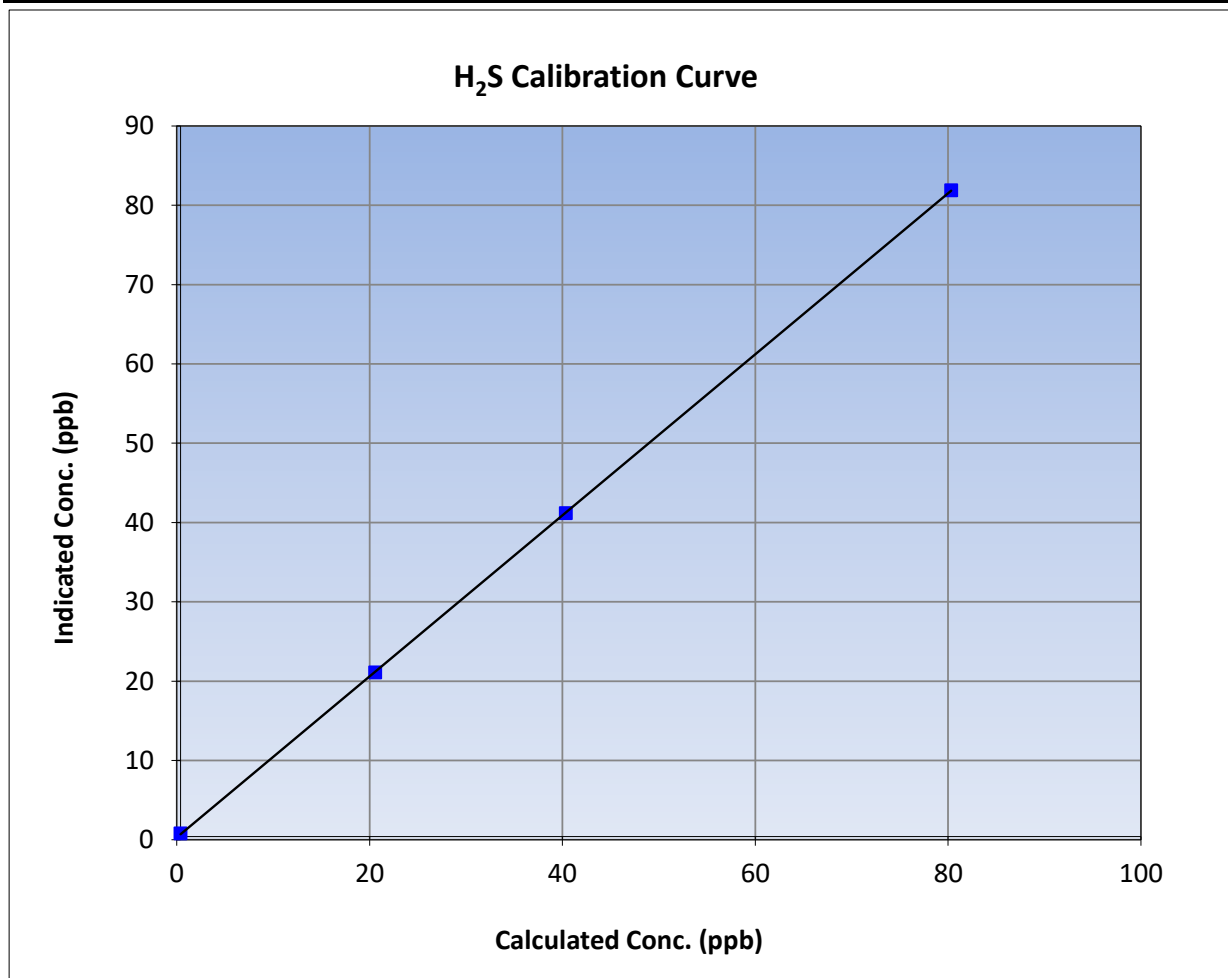
Version-11-2021

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 28, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	8:42	End Time (MST):	12:19
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

Calibration Data

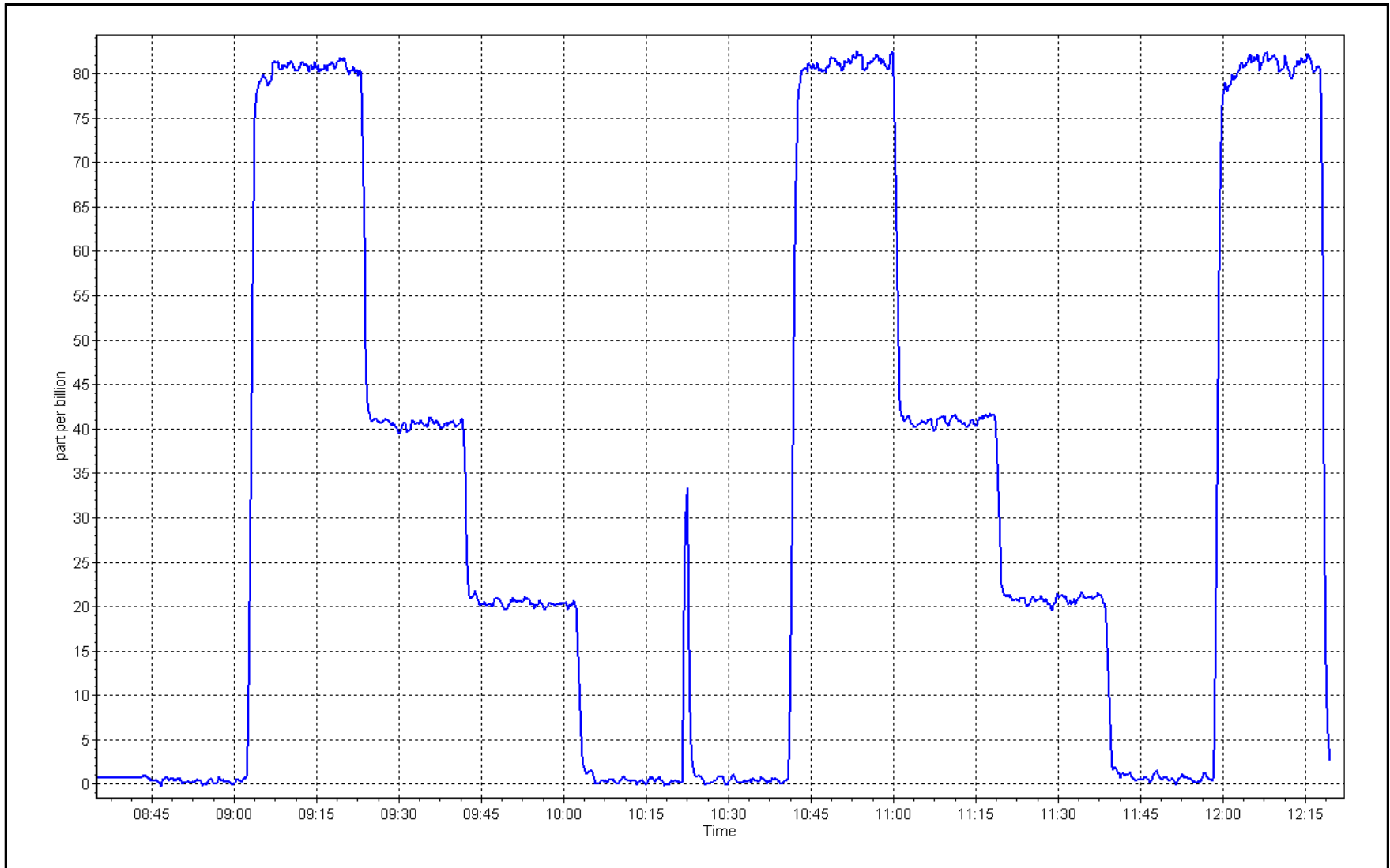
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.4	----	Correlation Coefficient	0.999992	
79.9	81.5	0.9806			≥0.995
40.0	40.8	0.9794	Slope	1.015352	
20.2	20.7	0.9755			0.90 - 1.10
			Intercept	0.293967	+/-3



H₂S Calibration Plot

Date: April 13, 2023

Location: Lower Camp





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	April 11, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	9:50	End time (MST):	12:47
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC2216	Cal Gas Expiry Date:	February 23, 2025
CH ₄ Cal Gas Conc.	502.0 ppm	CH ₄ Equiv Conc.	1067.1 ppm
C ₃ H ₈ Cal Gas Conc.	205.5 ppm		
Removed Gas Cert:		Removed Gas Expiry:	
Removed CH ₄ Conc.	502.0 ppm	CH ₄ Equiv Conc.	1067.1 ppm
Removed C ₃ H ₈ Conc.	205.5 ppm		
Diff between cyl (CH ₄):		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	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	3.02E-04	3.02E-04	NMHC SP Ratio:	5.86E-05
CH ₄ Retention time:	13.8	13.8	NMHC Peak Area:	156599

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	17.35	17.22	1.008
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	17.32	1.002
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	17.33	1.001

Average Correction Factor				1.008
Baseline Corr AF:	17.22	Prev response	17.30	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	9.19	9.12	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	9.19	9.16	1.004
second point	4959	40.7	4.60	4.55	1.011
third point	4980	20.3	2.29	2.27	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.18	1.001
Average Correction Factor					1.008
Baseline Corr AF:	9.12	Prev response	9.15	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.10	1.008
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	8.16	1.000
second point	4959	40.7	4.09	4.04	1.011
third point	4980	20.3	2.04	2.01	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.16	1.001
Average Correction Factor					1.008
Baseline Corr AF:	8.10	Prev response	8.15	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	0.998030	0.998101
THC Cal Offset:	-0.019190	-0.029983
CH ₄ Cal Slope:	1.000126	1.000279
CH ₄ Cal Offset:	-0.010089	-0.017886
NMHC Cal Slope:	0.996404	0.996415
NMHC Cal Offset:	-0.009301	-0.012098

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

Calibration Performed By: Mohammed Kashif



Wood Buffalo Environmental Association

THC Calibration Summary

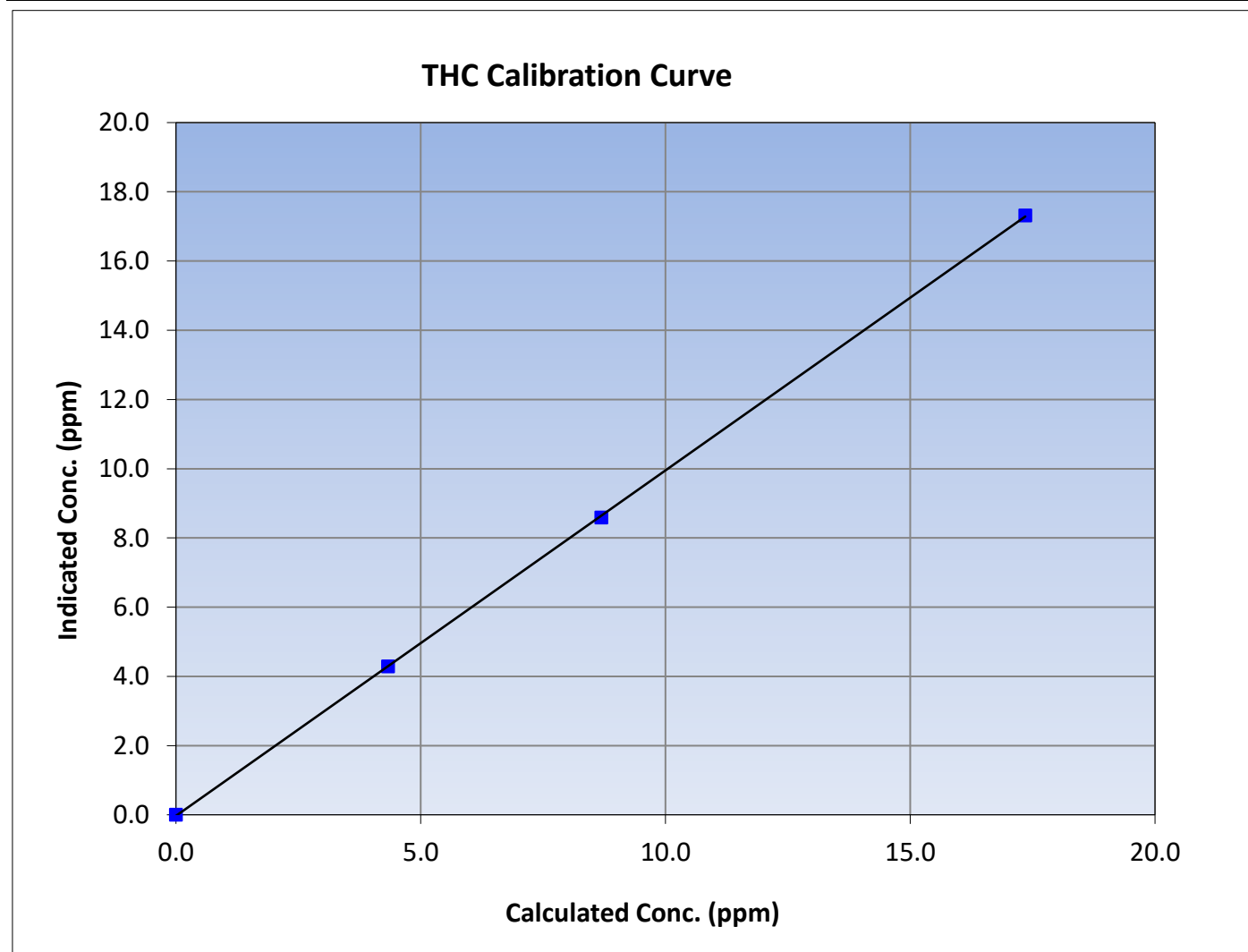
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:50	End Time (MST):	12:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999973	≥ 0.995			
17.35	17.32	1.0020						
8.69	8.59	1.0113				Slope	0.998101	0.90 - 1.10
4.33	4.29	1.0110						
			Intercept	-0.029983	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

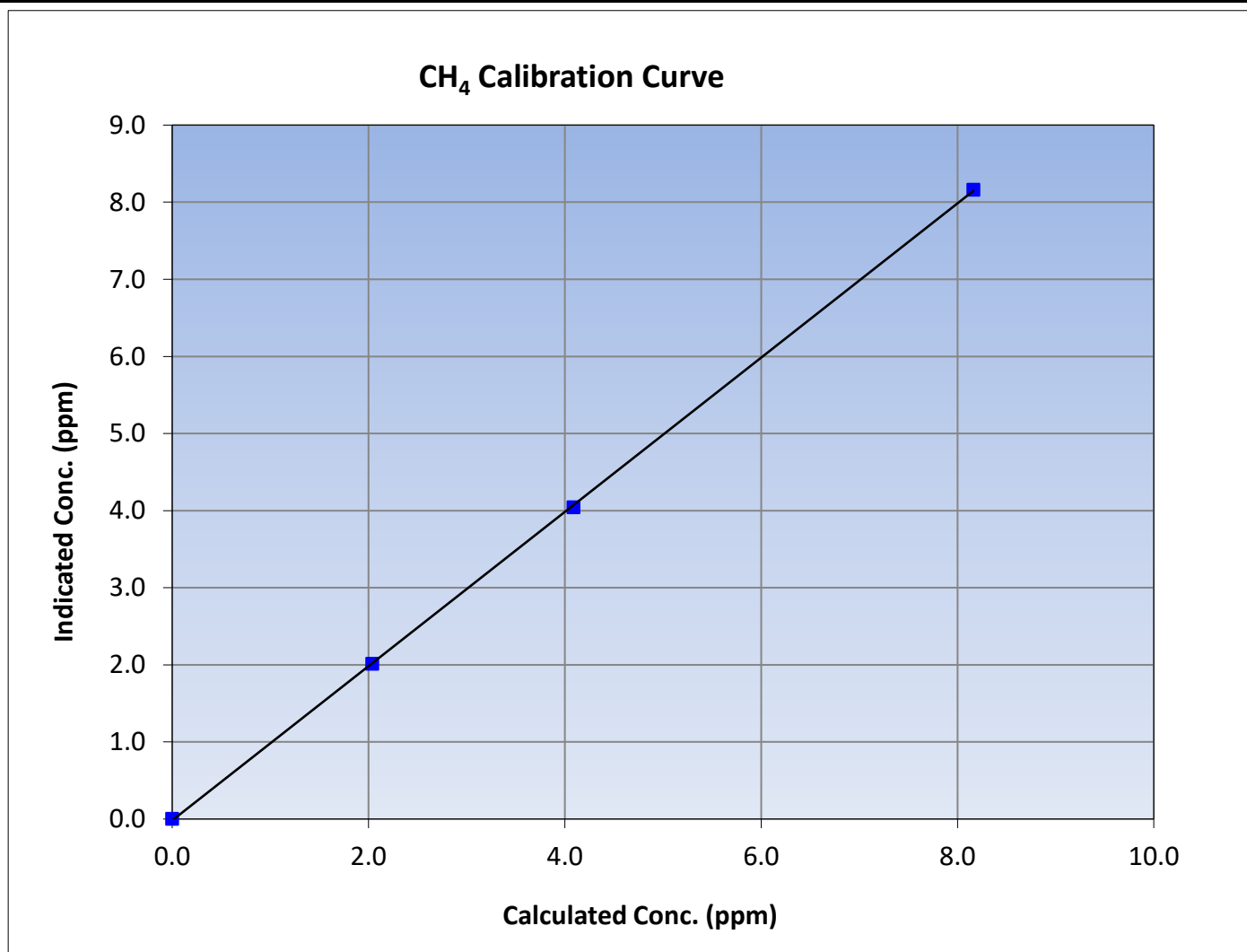
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:50	End Time (MST):	12:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999961	≥ 0.995
8.16	8.16	1.0000			
4.09	4.04	1.0108			
2.04	2.01	1.0129			
			Slope	1.000279	0.90 - 1.10
			Intercept	-0.017886	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

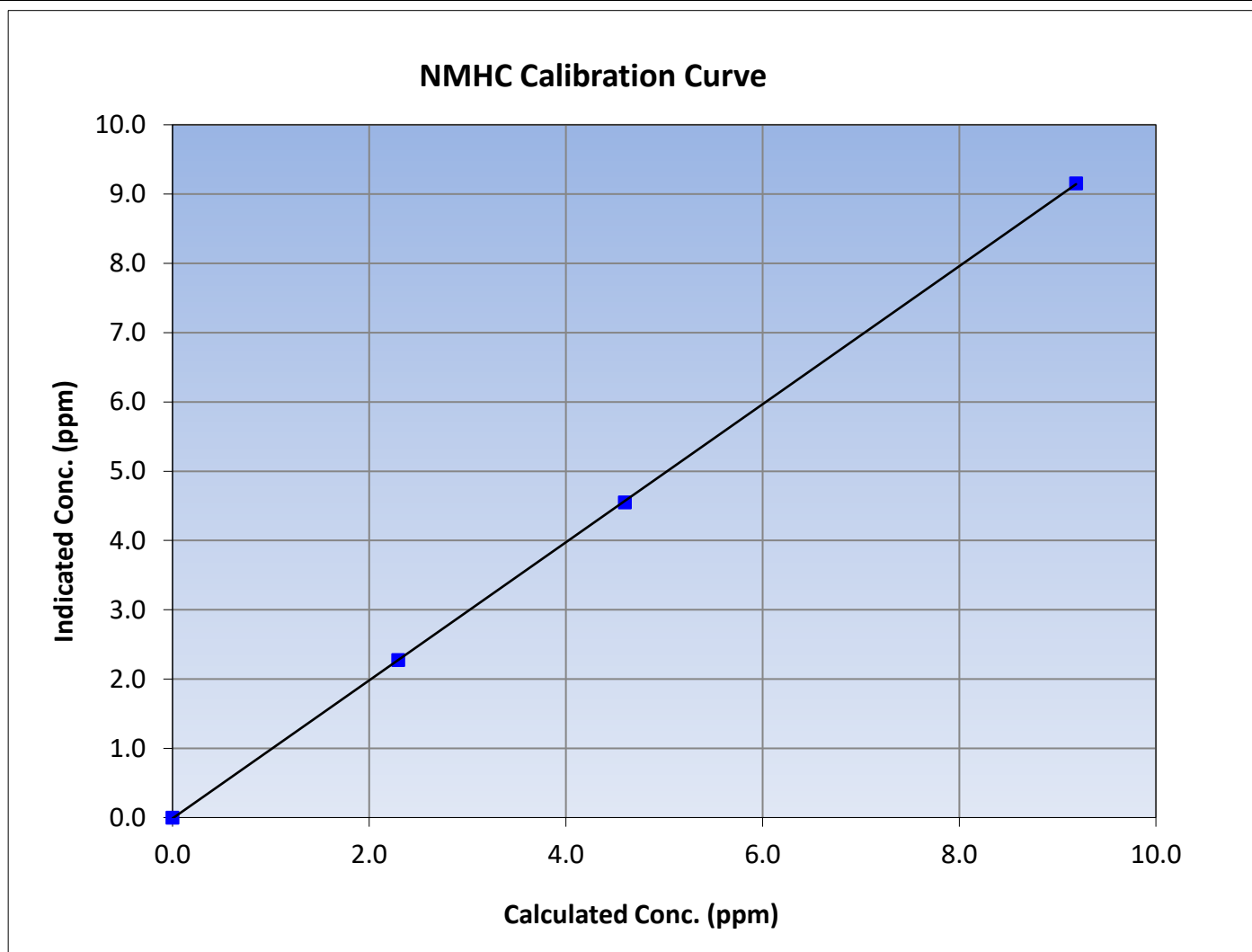
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:50	End Time (MST):	12:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

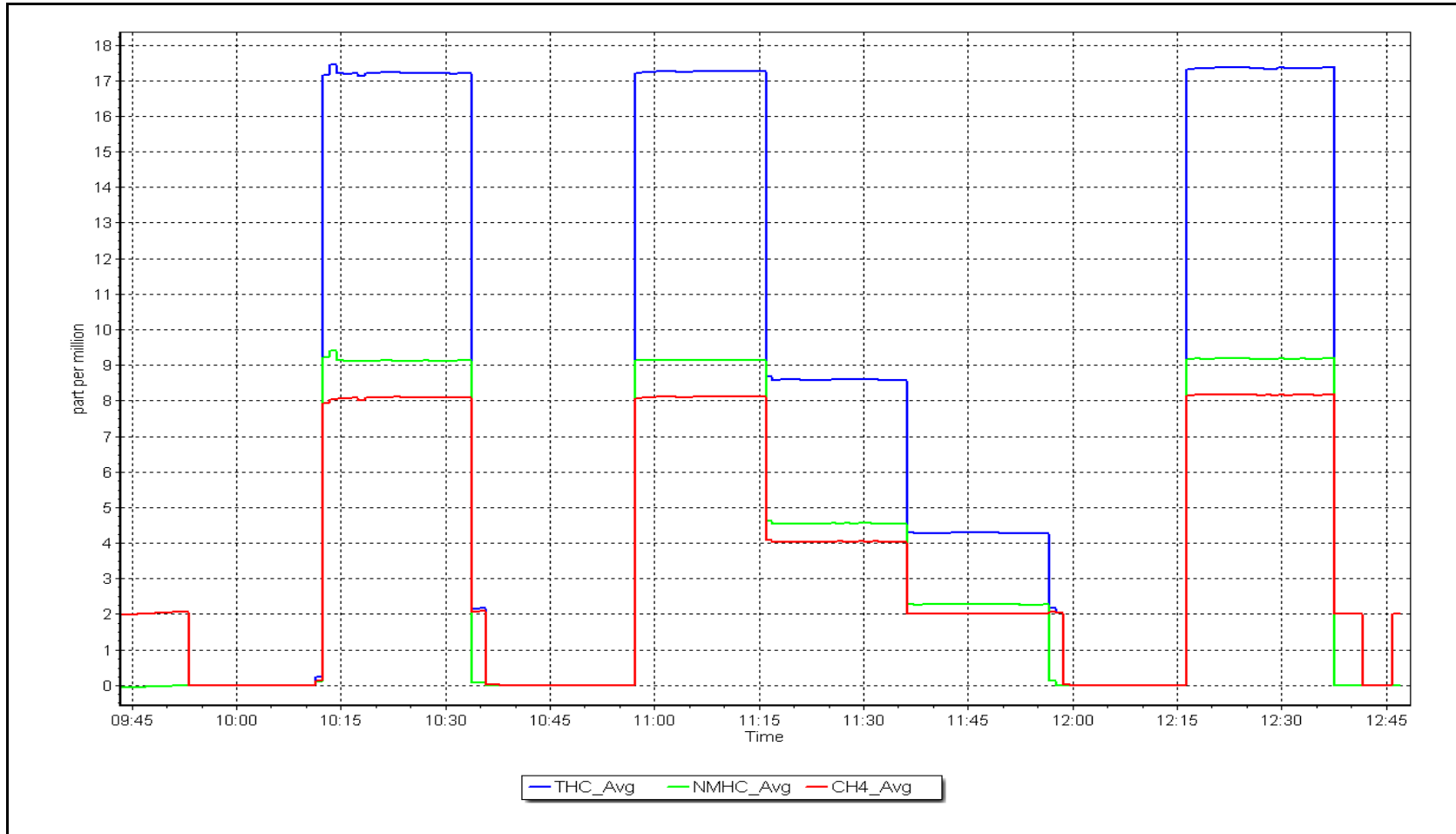
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999982	≥ 0.995			
9.19	9.16	1.0036						
4.60	4.55	1.0113				Slope	0.996415	0.90 - 1.10
2.29	2.27	1.0094						
			Intercept	-0.012098	± 0.5			



NMHC Calibration Plot

Date: April 11, 2023

Location: Lower Camp





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	April 27, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	9:21	End time (MST):	11:04
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:	CC2216	Cal Gas Expiry Date:	February 23, 2025
CH ₄ Cal Gas Conc.	502.0 ppm	CH ₄ Equiv Conc.	1067.1 ppm
C ₃ H ₈ Cal Gas Conc.	205.5 ppm		
Removed Gas Cert:		Removed Gas Expiry:	
Removed CH ₄ Conc.	502.0 ppm	CH ₄ Equiv Conc.	1067.1 ppm
Removed C ₃ H ₈ 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	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	3.02E-04	3.02E-04	NMHC SP Ratio:	5.86E-05
CH ₄ Retention time:	13.8	13.8	NMHC Peak Area:	156599

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	17.35	17.34	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	81.3	17.35	17.31	1.002
second point					
third point					
as left zero					
as left span					

				Average Correction Factor	1.002
Baseline Corr AF:	17.34	Prev response	17.29	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		<i>* = > +/-5% change initiates investigation</i>	



Wood Buffalo Environmental Association

THC / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	9.19	9.16	1.003
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					
third point					
as left zero					
as left span					
				Average Correction Factor	1.004
Baseline Corr AF:	9.16	Prev response	9.14	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.18	0.998
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	8.16	1.000
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.000
Baseline Corr AF:	8.18	Prev response	8.15	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	0.998101	0.997440
THC Cal Offset:	-0.029983	0.004000
CH ₄ Cal Slope:	1.000279	0.999139
CH ₄ Cal Offset:	-0.017886	0.004000
NMHC Cal Slope:	0.996415	0.995714
NMHC Cal Offset:	-0.012098	0.000000

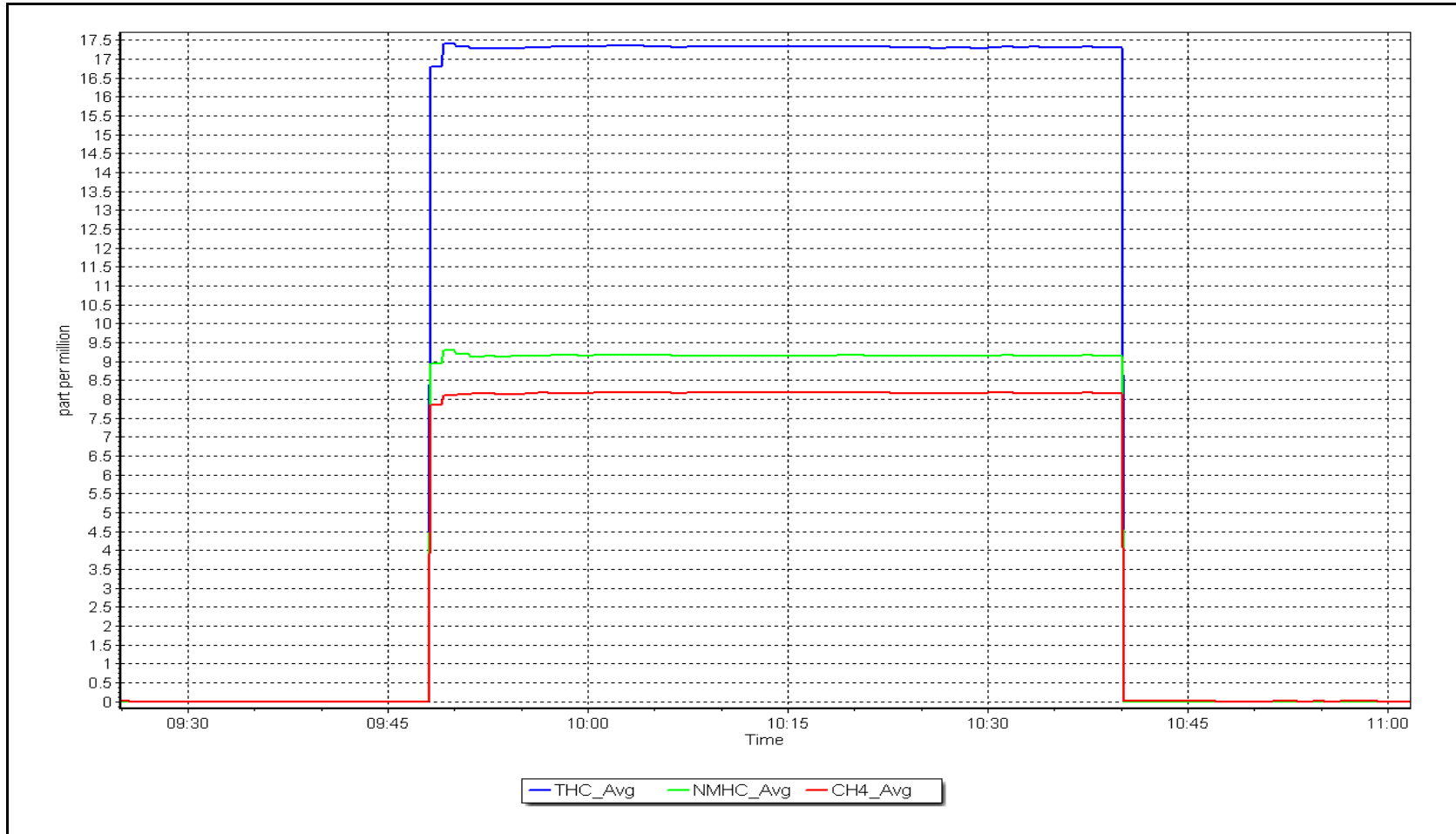
Notes: Changed N2 cylinder after as founds.

Calibration Performed By: Sean Bala

NMHC Calibration Plot

Date: April 27, 2023

Location: Lower Camp





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13 FORT MCKAY SOUTH APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	April 19, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	8:54	End time (MST):	12:04
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.001413	1.002614	Backgd or Offset:	77.5	80.5
Calibration intercept:	-2.738219	-2.958216	Coeff or Slope:	0.735	0.731

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.3	----
as found span	4921	79.1	799.7	804.5	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4921	79.1	799.7	800.1	0.999
second point	4961	39.5	399.3	396.3	1.008
third point	4980	19.8	200.2	194.8	1.028
as left zero	5000	0.0	0.0	-0.2	----
as left span	4921	79.1	799.7	798.5	1.001
Average Correction Factor					1.012

Baseline Corr As found:	804.80	Previous response	798.08	*% 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: Changed the inlet filter after as founds. Adjusted span only.

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

SO₂ Calibration Summary

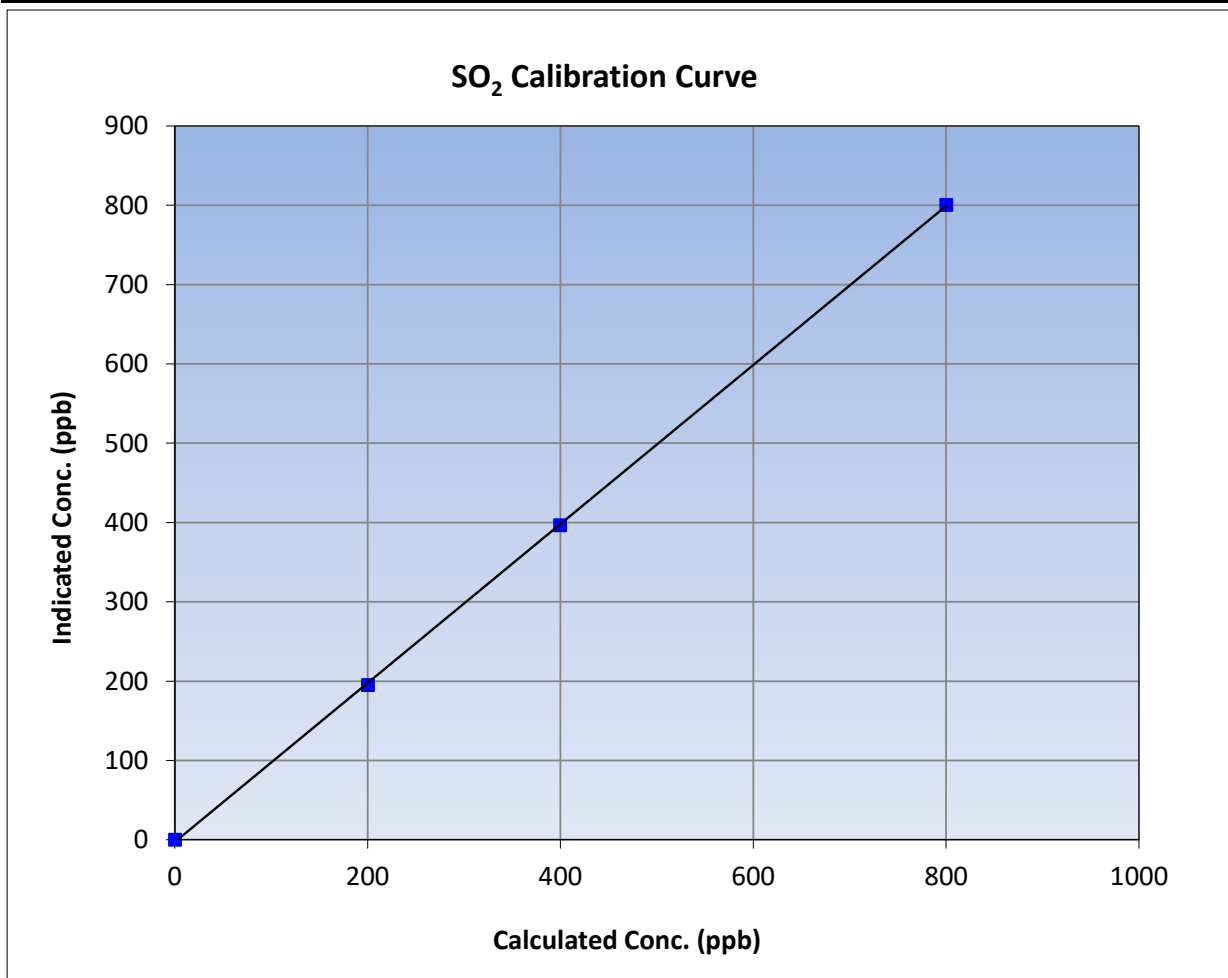
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:54	End Time (MST):	12:04
Analyzer make:	API T100	Analyzer serial #:	599

Calibration Data

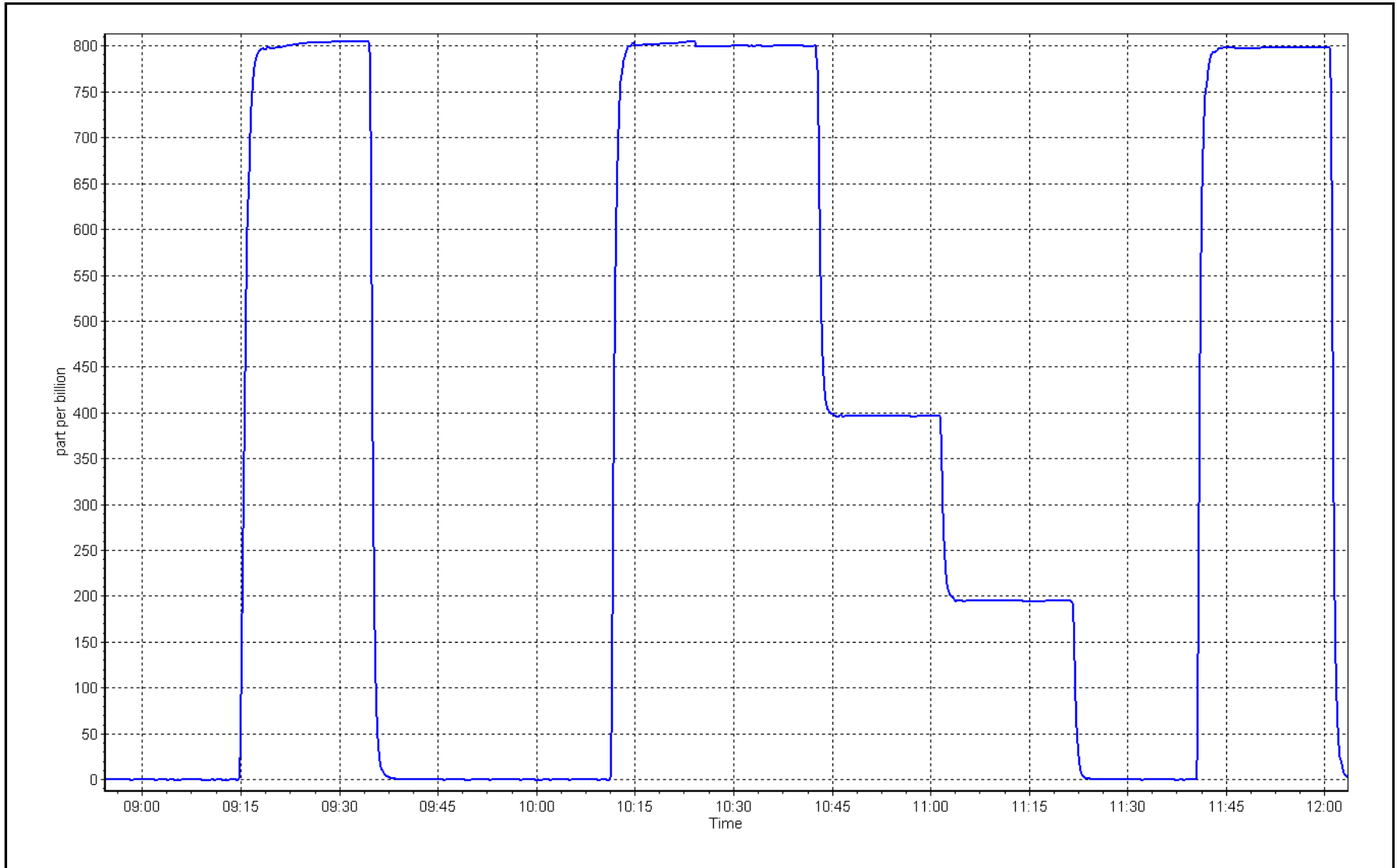
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999946	≥0.995
799.7	800.1	0.9995			
399.3	396.3	1.0076	Slope	1.002614	0.90 - 1.10
200.2	194.8	1.0276			
			Intercept	-2.958216	+/-30



SO2 Calibration Plot

Date: April 19, 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: April 3, 2023 Last Cal Date: March 1, 2023
 Start time (MST): 9:23 End time (MST): 13:20
 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:
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.987178	1.003341	Backgd or Offset: 3.69	3.71
Calibration intercept:	0.057822	-0.062227	Coeff or Slope: 1.120	1.120

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4925	75.5	80.6	80.8	0.999
as found 2nd point	4962	37.7	40.3	40.3	1.002
as found 3rd point	4981	18.9	20.2	19.7	1.030
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.1	----
high point	4925	75.5	80.6	80.9	0.997
second point	4962	37.7	40.3	40.3	0.999
third point	4981	18.9	20.2	20.0	1.009
as left zero	5000	0.0	0.0	0.2	----
as left span	4925	75.5	80.6	80.6	1.000
SO2 Scrubber Check	4921	79.1	791.0	0.1	----
Date of last scrubber change:	20-Mar-20		Ave Corr Factor		1.002
Date of last converter efficiency test:	NA		efficiency		

Baseline Corr As found: 80.7 Prev response: 79.65 *% change: 1.3%
 Baseline Corr 2nd AF pt: 40.2 AF Slope: 1.003338 AF Intercept: -0.162123
 Baseline Corr 3rd AF pt: 19.6 AF Correlation: 0.999936

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Completed a SO2 scrubber check after calibrator zero. No adjustment made.

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

TRS Calibration Summary

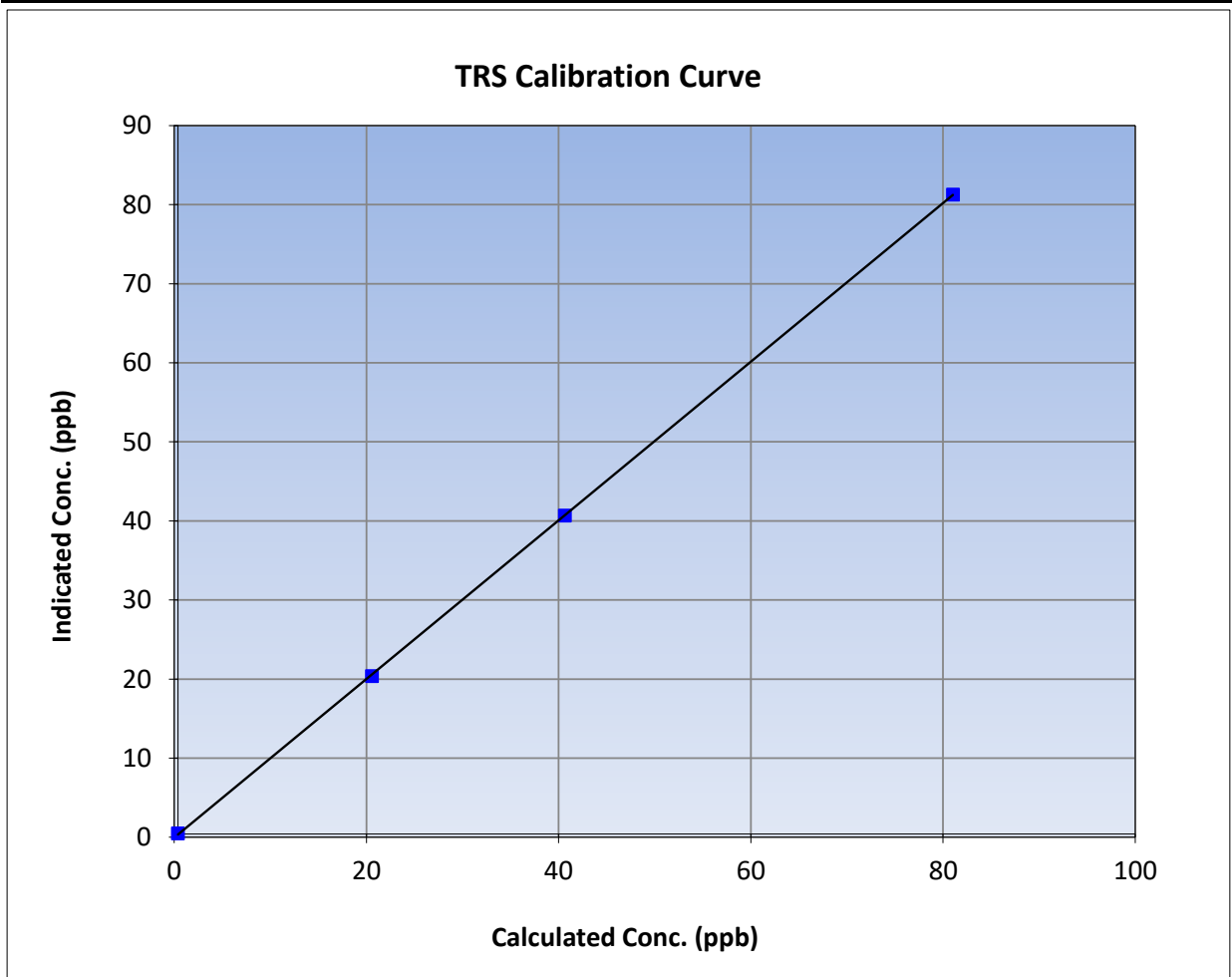
Version-11-2021

Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 1, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:23	End Time (MST):	13:36
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

Calibration Data

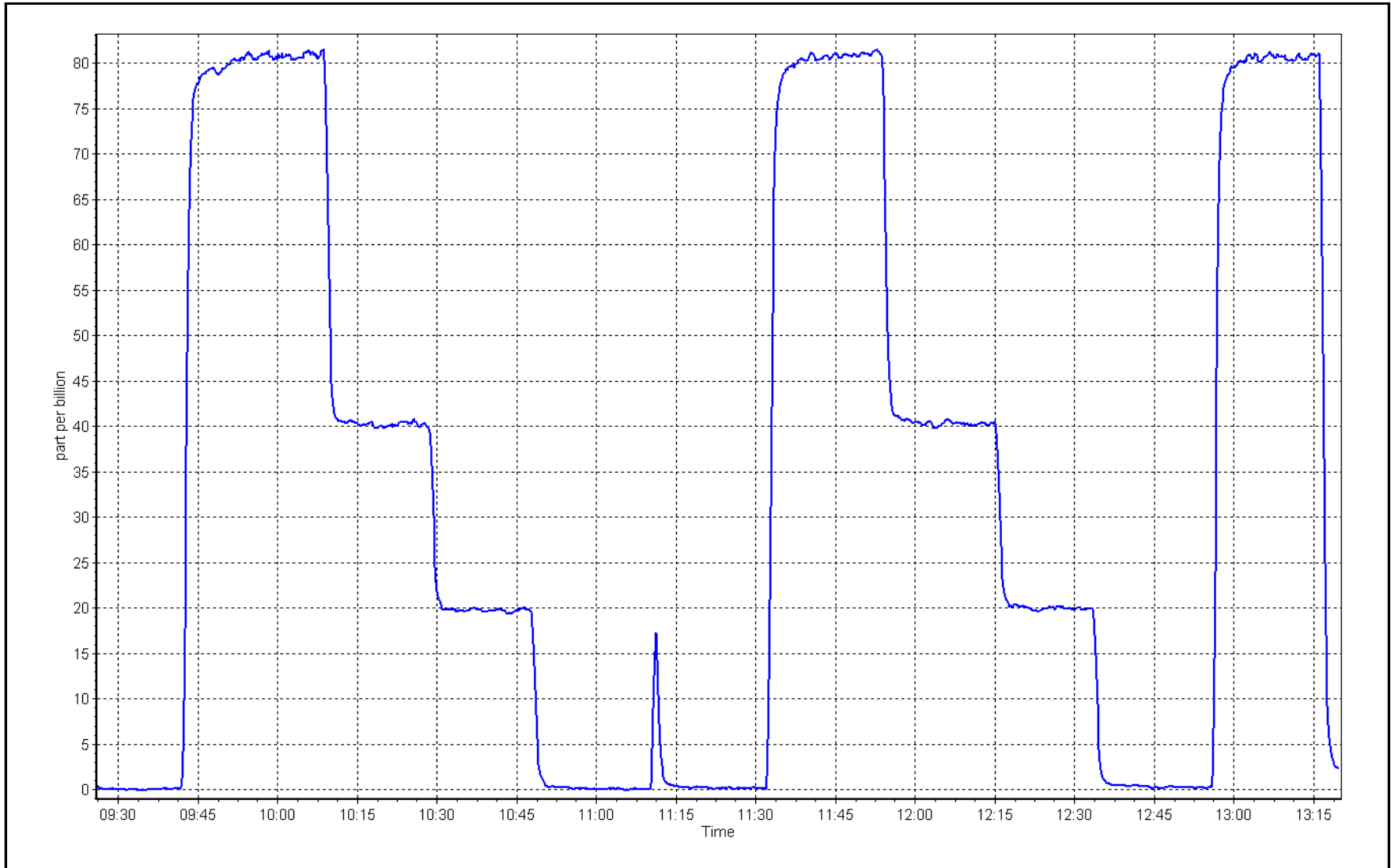
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999981	
80.6	80.9	0.9966			≥0.995
40.3	40.3	0.9992	Slope	1.003341	
20.2	20.0	1.0093			0.90 - 1.10
			Intercept	-0.062227	+/-3



TRS Calibration Plot

Date: April 3, 2023

Location: Fort McKay South





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	April 19, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	8:54	End time (MST):	12:04
Reason:	Install		

Calibration Standards

Gas Cert Reference:	CC260812	Cal Gas Expiry Date:	December 29, 2028
CH ₄ Cal Gas Conc.	503.6 ppm	CH ₄ Equiv Conc.	1077.5 ppm
C ₃ H ₈ Cal Gas Conc.	208.7 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	503.6 ppm	CH ₄ Equiv Conc.	1077.5 ppm
Removed C ₃ H ₈ 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:	API 701	Serial Number:	1117

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	2.16E-04	2.19E-04	NMHC SP Ratio:	5.11E-04
CH ₄ Retention time:	12.8	12.8	NMHC Peak Area:	177635
				179990

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	17.05	17.09	0.997
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	17.05	1.000
second point	4961	39.5	8.51	8.38	1.016
third point	4980	19.8	4.27	4.09	1.042
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.11	0.996

Average Correction Factor	1.019
---------------------------	-------

Baseline Corr AF:	17.09	Prev response	17.06	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.1	9.08	9.20	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.1	9.08	9.07	1.001
second point	4960	39.5	4.53	4.48	1.012
third point	4980	19.8	2.27	2.20	1.035
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.1	9.08	9.12	0.996
Average Correction Factor					1.016
Baseline Corr AF:	9.20	Prev response	9.10	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	7.97	7.89	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	79.1	7.97	7.97	0.999
second point	4960	39.5	3.98	3.90	1.022
third point	4980	19.8	1.99	1.90	1.050
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	7.99	0.997
Average Correction Factor					1.024
Baseline Corr AF:	7.89	Prev response	7.95	*% 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

	<u>Start</u>	<u>Finish</u>
THC Cal Slope:	1.005694	1.002569
THC Cal Offset:	-0.086175	-0.096376
CH ₄ Cal Slope:	1.003875	1.003704
CH ₄ Cal Offset:	-0.046747	-0.056151
NMHC Cal Slope:	1.007142	1.001425
NMHC Cal Offset:	-0.039766	-0.040562

Notes:

Changed inlet filter after as founds. Adjusted span.

Calibration Performed By:

Sean Bala



Wood Buffalo Environmental Association

THC Calibration Summary

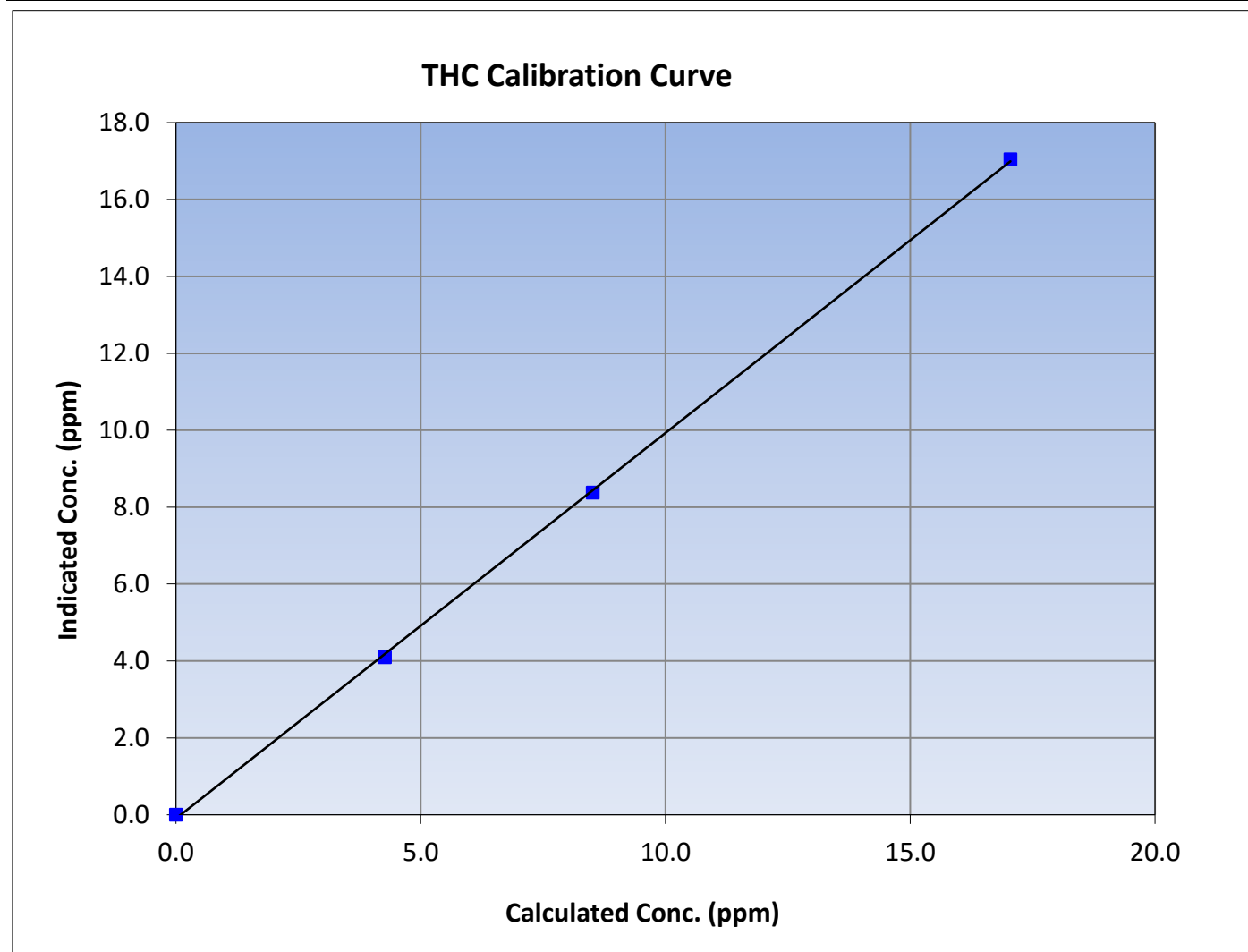
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 3, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:54	End Time (MST):	12:04
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999853	≥ 0.995
17.05	17.05	1.0000			
8.51	8.38	1.0162			
4.27	4.09	1.0423			
			Slope	1.002569	0.90 - 1.10
			Intercept	-0.096376	+/-0.5





Wood Buffalo Environmental Association

CH₄ Calibration Summary

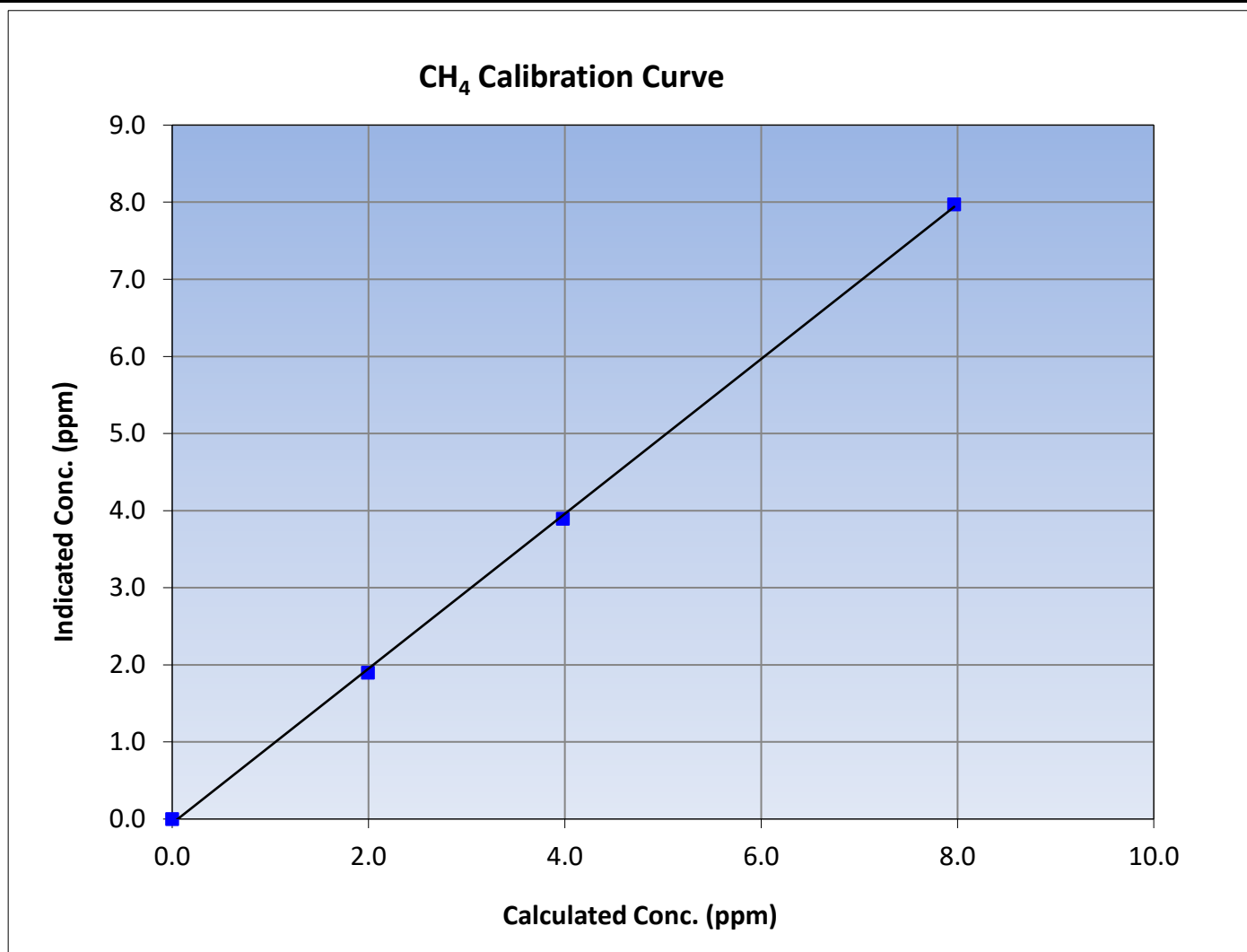
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 3, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:54	End Time (MST):	12:04
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999765	≥0.995			
7.97	7.97	0.9992						
3.98	3.90	1.0215				Slope	1.003704	0.90 - 1.10
1.99	1.90	1.0502						
			Intercept	-0.056151	+/-0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

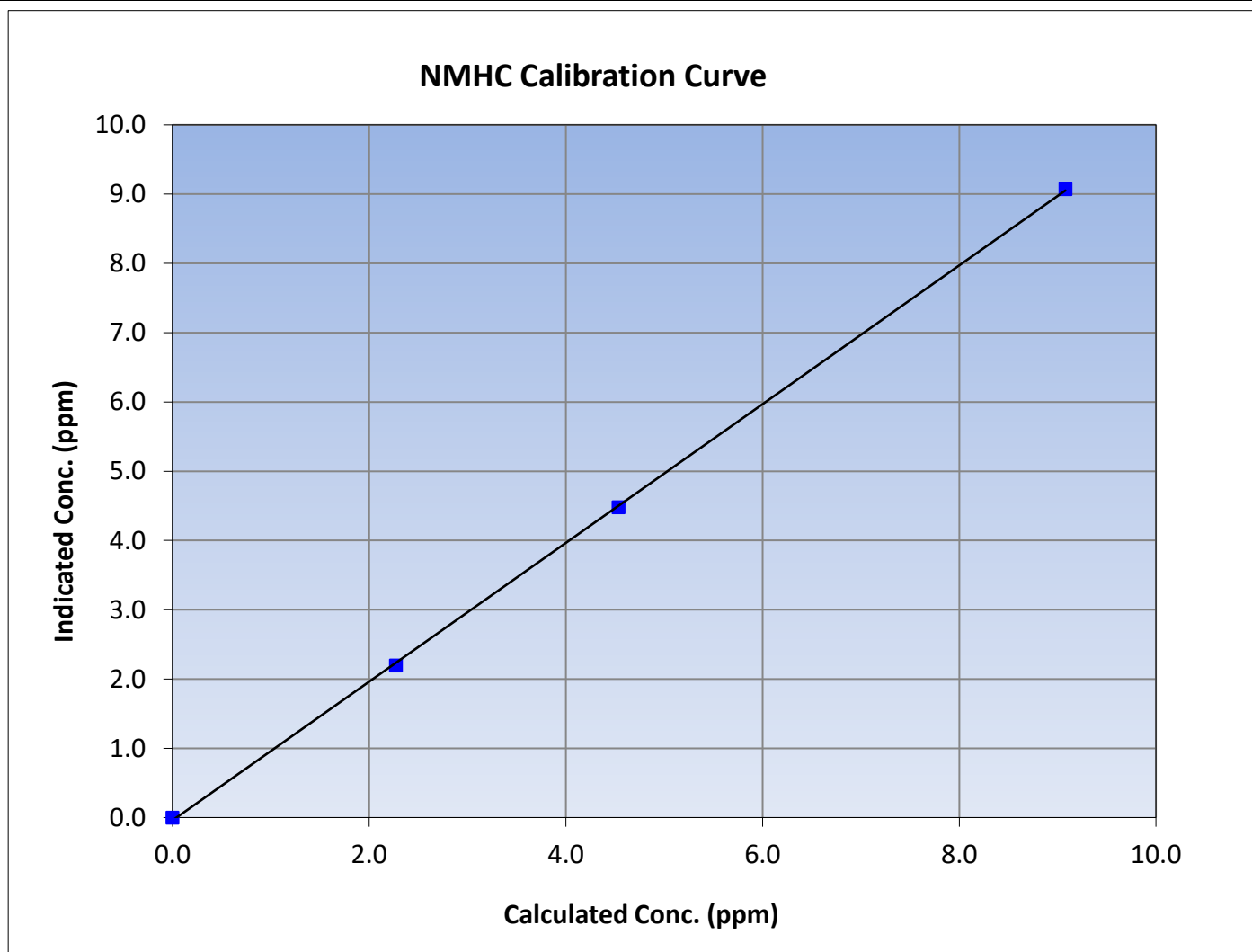
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 3, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:54	End Time (MST):	12:04
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

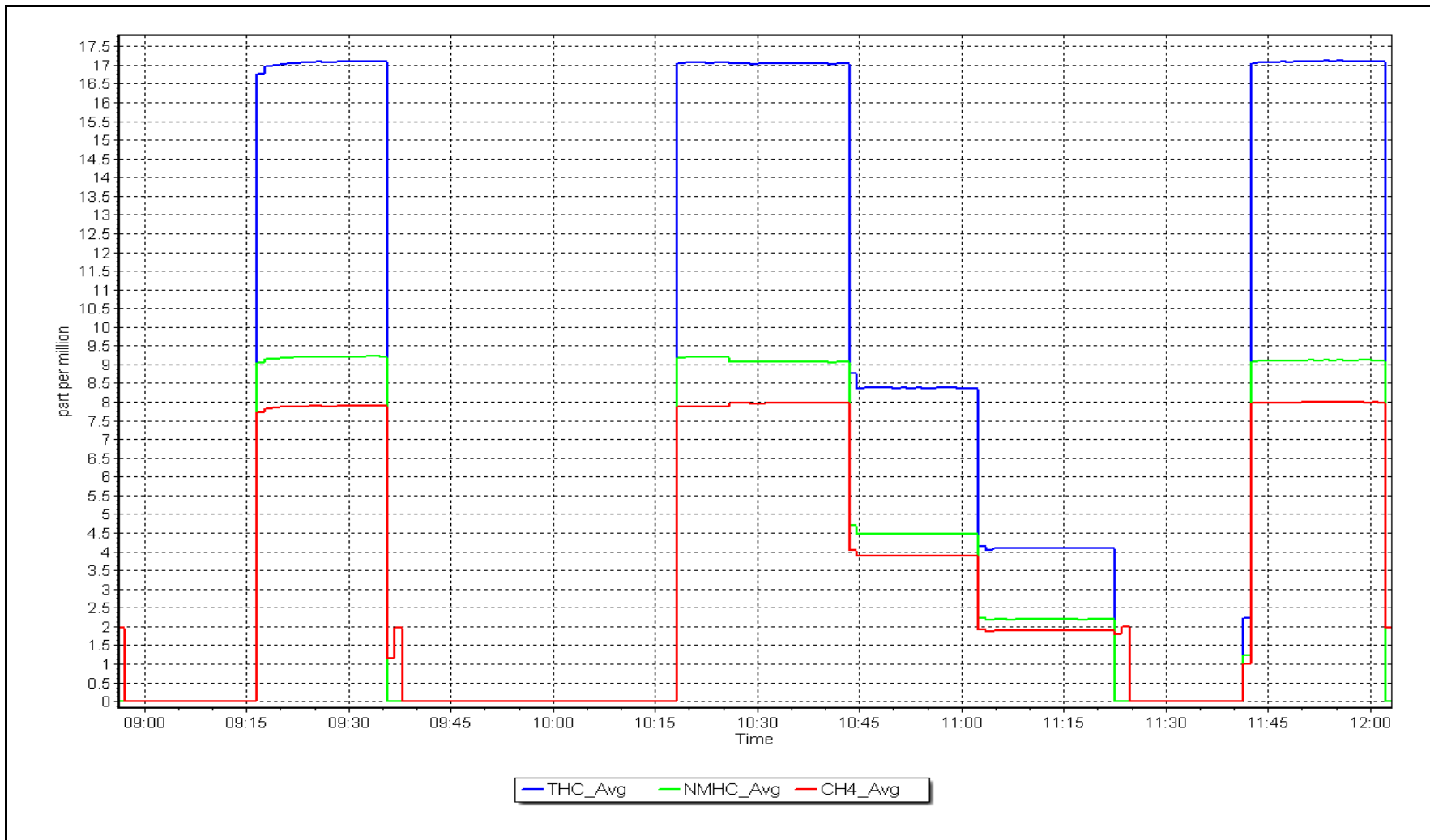
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999909	≥ 0.995			
9.08	9.07	1.0008						
4.53	4.48	1.0122				Slope	1.001425	0.90 - 1.10
2.27	2.20	1.0355						
			Intercept	-0.040562	± 0.5			



NMHC Calibration Plot

Date: April 19, 2023

Location: Fort McKay South





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Fort McKay South
Calibration Date: April 12, 2023
Start time (MST): 8:34
Reason: Routine
Station number: AMS 13
Last Cal Date: March 23, 2023
End time (MST): 12:42

Calibration Standards

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

Analyzer Information

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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.213	1.213	NO bkgnd or offset:	9.7	9.6
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	9.7	9.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	196.2	195.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	1.000036	1.001266
NO _x Cal Offset:	-2.351272	-2.371415
NO Cal Slope:	1.002705	1.003448
NO Cal Offset:	-3.225164	-3.285243
NO ₂ Cal Slope:	0.998357	0.998635
NO ₂ Cal Offset:	-0.332208	-0.712517



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as found span	4919	81.1	826.9	800.0	26.9	827.9	801.0	27.1	0.9988	0.9987
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	----	----
high point	4919	81.1	826.9	800.0	26.9	826.8	801.0	25.6	1.0001	0.9987
second point	4960	40.6	413.9	400.4	13.5	410.7	397.0	13.7	1.0078	1.0086
third point	4980	20.3	207.0	200.2	6.7	202.6	194.4	8.1	1.0216	1.0300
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4919	81.1	826.9	378.3	448.6	838.0	382.2	455.7	0.9867	0.9897
Average Correction Factor									1.0098	1.0124

Corrected As found	NO _x = 828.0 ppb	NO = 801.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = 0.4%
Previous Response	NO _x = 824.6 ppb	NO = 798.9 ppb		*Percent Change	NO = 0.3%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	798.2	376.5	448.6	447.6	1.0023	99.8%
2nd GPT point (200 ppb O3)	798.2	585.0	240.1	239.1	1.0043	99.6%
3rd GPT point (100 ppb O3)	798.2	690.5	134.6	132.7	1.0145	98.6%
Average Correction Factor					1.0070	99.3%

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

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

NO_x Calibration Summary

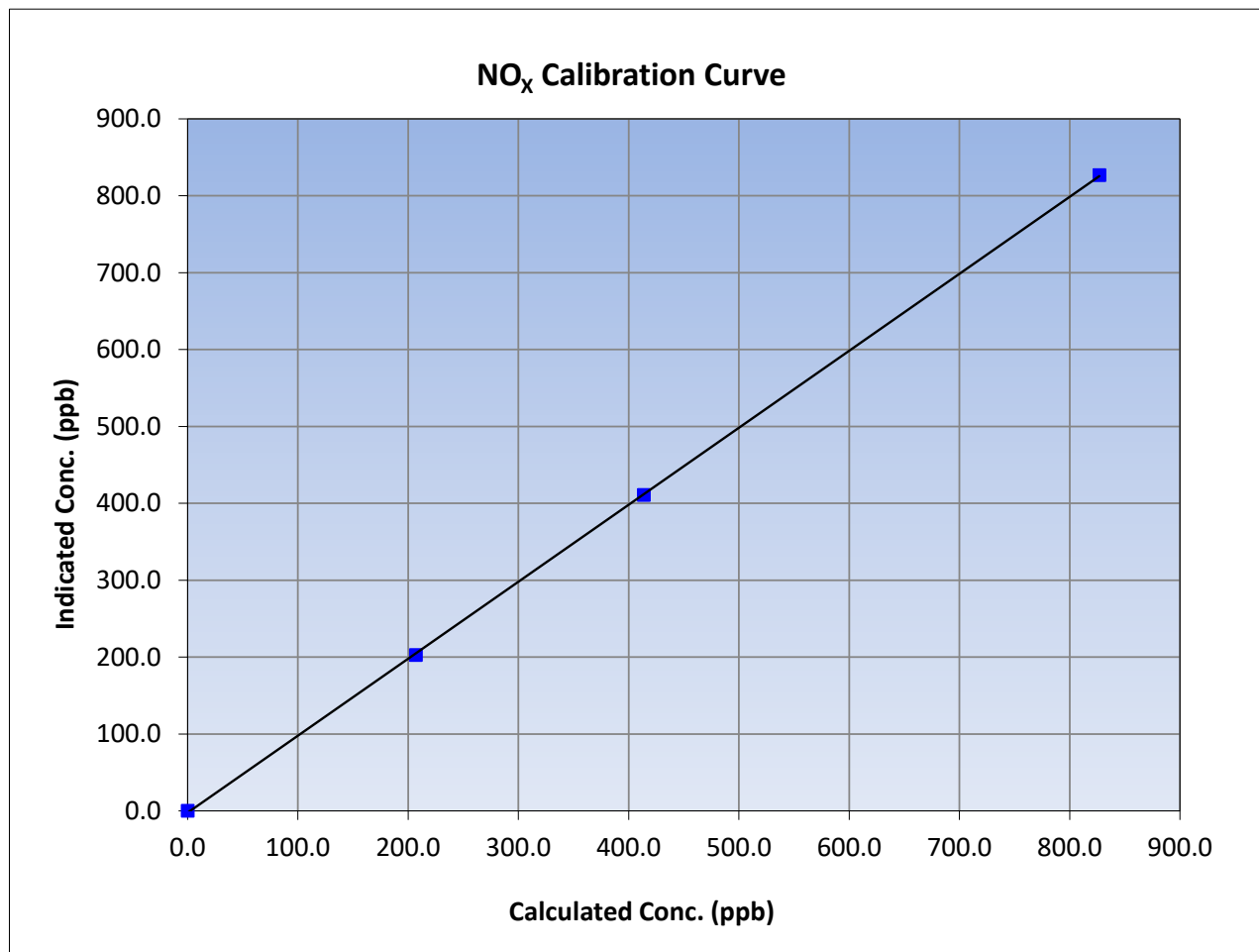
Version-04-2020

Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 23, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:34	End Time (MST):	12:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
826.9	826.8	1.0001			
413.9	410.7	1.0078			
207.0	202.6	1.0216			
			Slope	1.001266	0.90 - 1.10
			Intercept	-2.371415	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

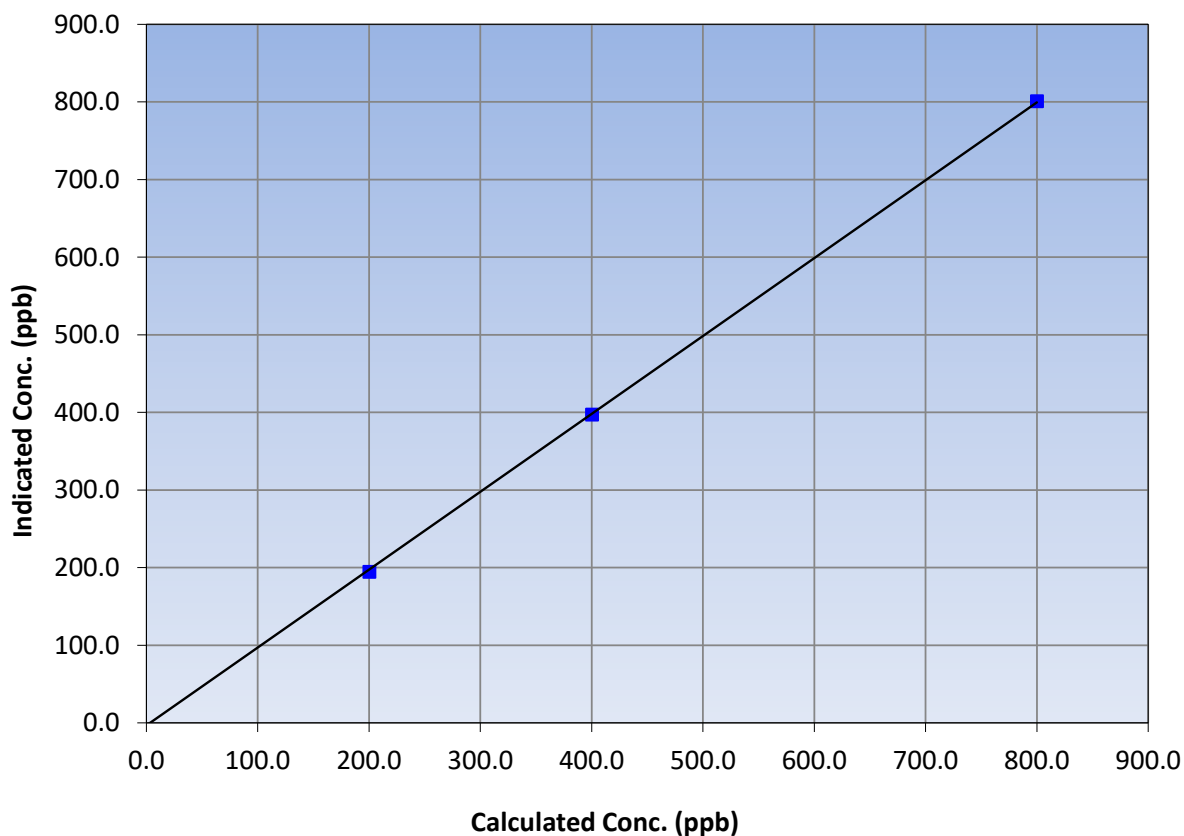
Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 23, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:34	End Time (MST):	12:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.1	----	Correlation Coefficient	0.999928	≥0.995
800.0	801.0	0.9987			
400.4	397.0	1.0086	Slope	1.003448	0.90 - 1.10
200.2	194.4	1.0300			
			Intercept	-3.285243	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

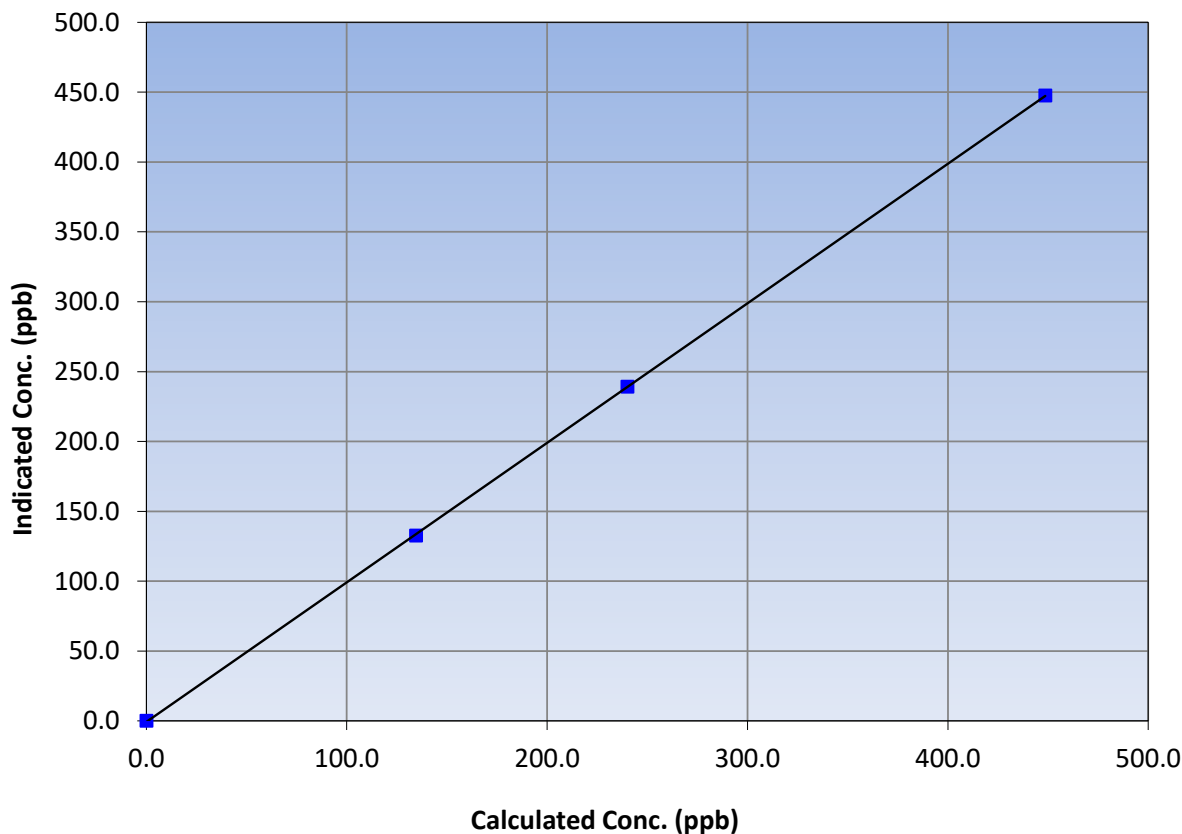
Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 23, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:34	End Time (MST):	12:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
448.6	447.6	1.0023			
240.1	239.1	1.0043			
134.6	132.7	1.0145			
			Slope	0.998635	0.90 - 1.10
			Intercept	-0.712517	+/-20

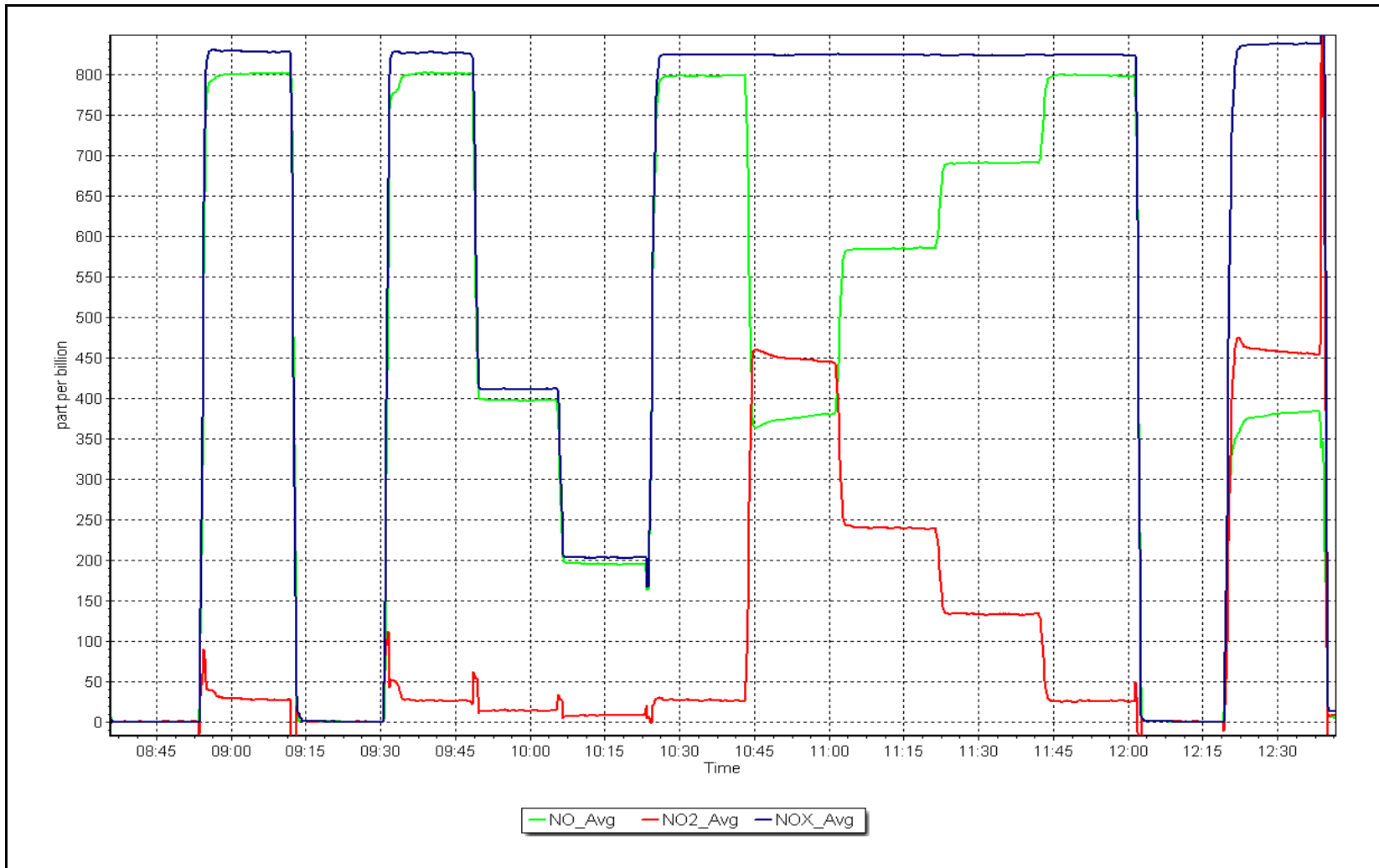
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 12, 2023

Location: Fort McKay South





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name: Fort McKay South Station number: AMS13
 Calibration Date: April 11, 2023 Last Cal Date: March 22, 2023
 Start time (MST): 9:09 End time (MST): 12:21
 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.997886	0.997171	Backgd or Offset:	3.7	3.4
Calibration intercept:	0.320000	0.620000	Coeff or Slope:	0.964	0.963

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-1.1	----
as found span	5000	969.9	400.0	399.3	1.002
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	980.6	400.0	399.1	1.002
second point	5000	838.0	200.0	200.4	0.998
third point	5000	735.3	100.0	101.2	0.988
as left zero	5000	0.0	0.0	-0.4	----
as left span	5000	979.1	400.0	401.6	0.996
Average Correction Factor					0.996

Baseline Corr As found:	400.4	Previous response	399.5	*% 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 inlet filter after as founds. Zero adjusted.

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

O₃ Calibration Summary

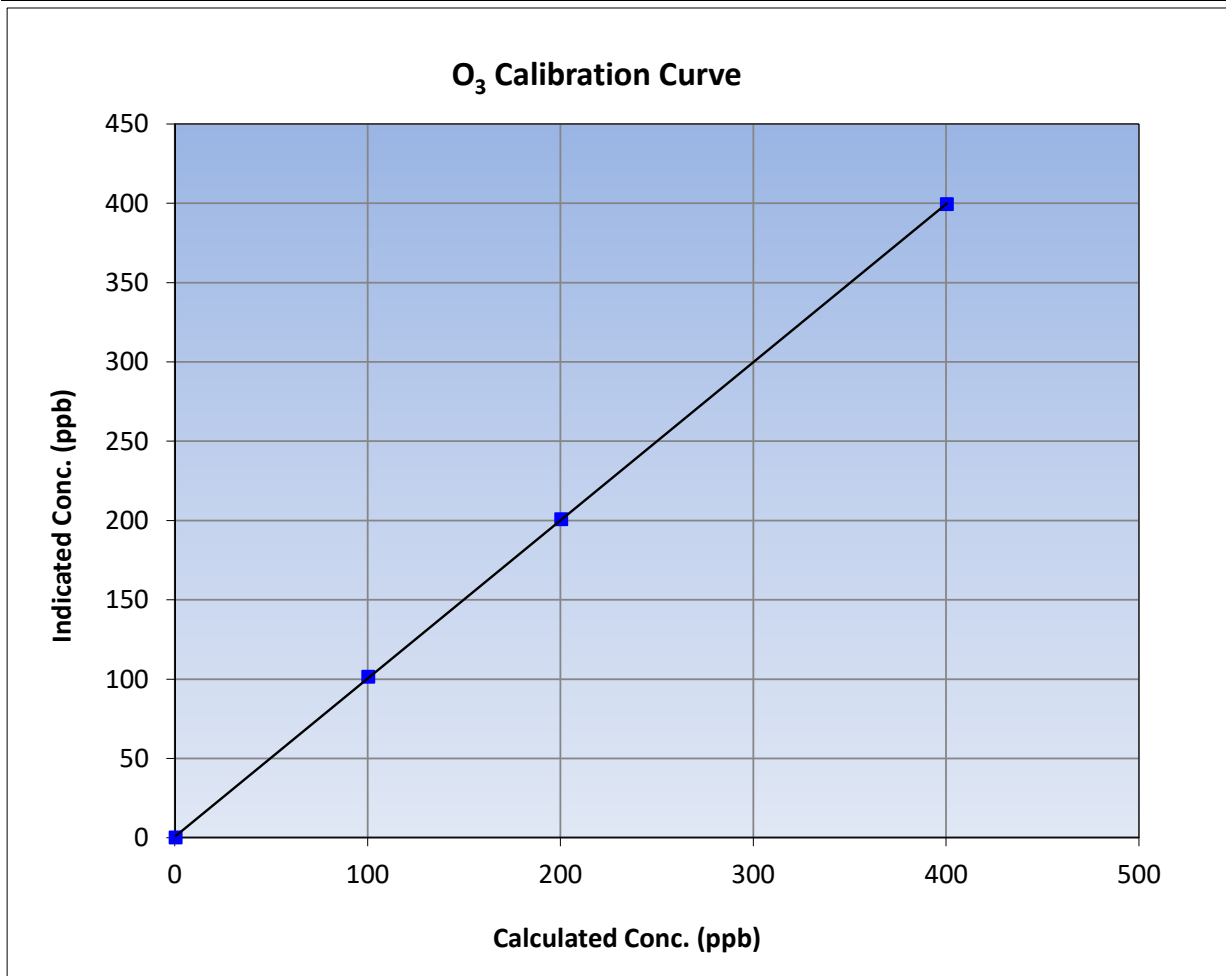
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 22, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:09	End Time (MST):	12:21
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

Calibration Data

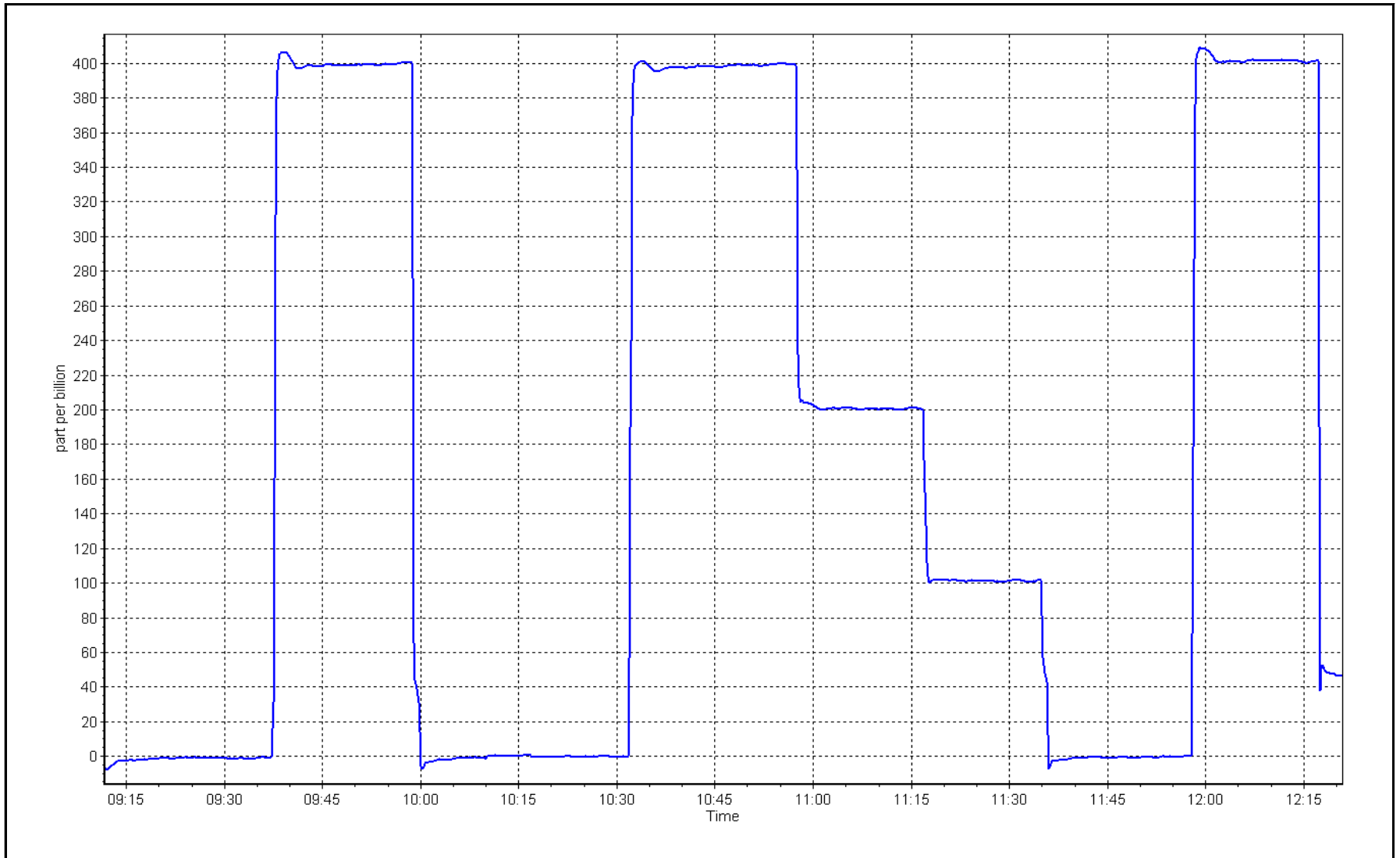
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.2	----	Correlation Coefficient	0.999981	≥0.995
400.0	399.1	1.0023			
200.0	200.4	0.9980	Slope	0.997171	0.90 - 1.10
100.0	101.2	0.9881			
			Intercept	0.620000	+/- 5



O₃ Calibration Plot

Date: April 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: April 12, 2023 Last Cal Date: March 22, 2023
 Start time (MST): 10:56 End time (MST): 11:56

Analyzer Make: API T640 S/N: 319
 Particulate Fraction: PM2.5

Flow Meter Make/Model: Delta Cal S/N: 141229
 Temp/RH standard: Delta Cal S/N: 141229

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	4.5	4.5	4.5	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	729.3	730	729.3	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	5.03	5.04	5.03	<input type="checkbox"/>	+/- 0.25 LPM
Leak Test:	Date of check: <u>April 12, 2023</u>	Last Cal Date: <u>March 22, 2023</u>			
	PM w/o HEPA: <u>2.6</u>	PM w/ HEPA: <u>2.5</u>			<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				<input type="checkbox"/>	10.9 +/- 0.5
Post-maintenance leak check:		PM w/o HEPA: <u>8.9</u>	w/ HEPA: <u>0.0</u>		
Date Optical Chamber Cleaned:		<u>April 12, 2023</u>			<0.2 ug/m3
Disposable Filter Changed:		<u>March 22, 2023</u>			

Annual Maintenance

Date Sample Tube Cleaned: _____
 Date RH/T Sensor Cleaned: _____

Notes: Inlet head clean and inspected. Leak check is not passing at first. Optical chamber cleaning was done, and tubing was inspected and making sure that screws, clamps are tight. 2nd leak checked passed.

Calibration by: Sean Bala



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

**AMS14
ANZAC
APRIL 2023**

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	April 18, 2023	Last Cal Date:	March 17, 2023
Start time (MST):	7:55	End time (MST):	10:21
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:	5239
ZAG Make/Model:	API T701H		Serial Number:	357

Analyzer Information

Analyzer make: Thermo 43i	Analyzer serial #: 0710321322
Analyzer Range 0 - 1000 ppb	

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.997012	0.997195	Backgd or Offset:	25.1	25.2
Calibration intercept:	-1.625104	-0.864371	Coeff or Slope:	0.795	0.798

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.2	----
as found span	4920	80.1	800.2	794.6	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.6	----
high point	4920	80.1	800.2	797.5	1.003
second point	4960	40.0	399.6	397.8	1.005
third point	4980	20.0	199.8	196.3	1.018
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.1	800.2	799.9	1.000
Average Correction Factor					1.009

Baseline Corr As found:	794.40	Previous response	796.17	*% 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: No Maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

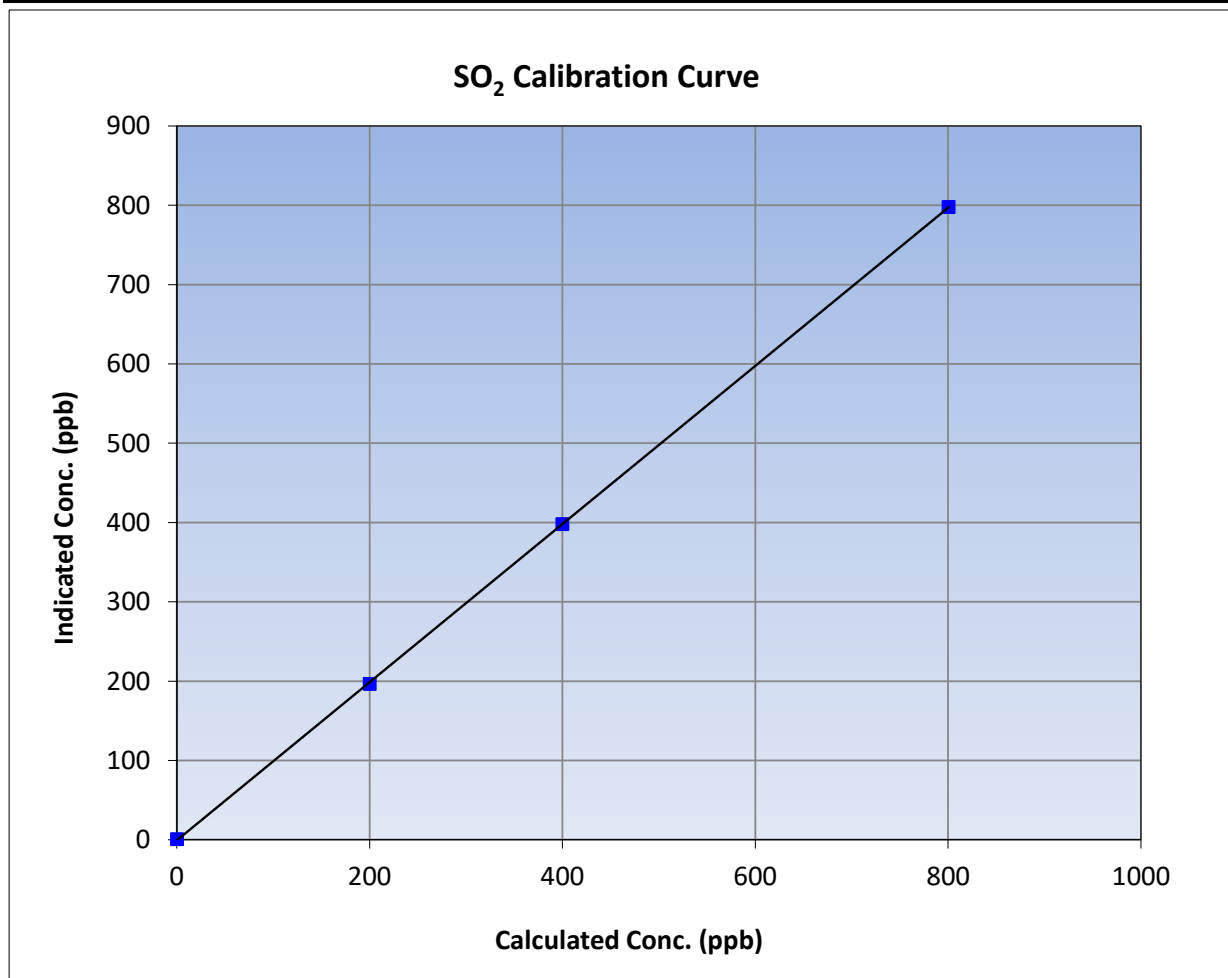
Version-01-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 17, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:55	End Time (MST):	10:21
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

Calibration Data

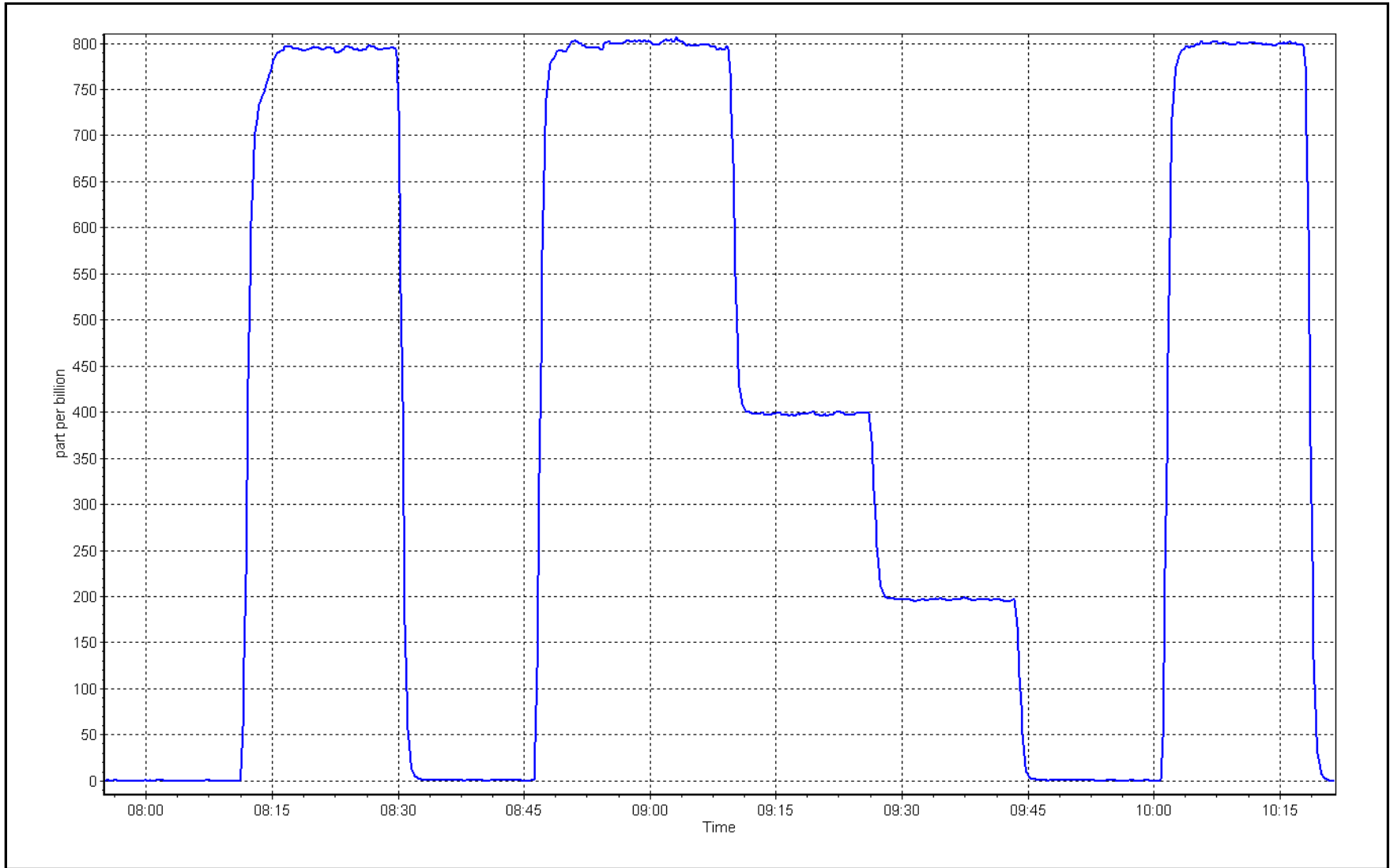
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.6	----	Correlation Coefficient	0.999981	
800.2	797.5	1.0034			≥0.995
399.6	397.8	1.0045	Slope	0.997195	
199.8	196.3	1.0178			0.90 - 1.10
			Intercept	-0.864371	+/-30



SO2 Calibration Plot

Date: April 18, 2023

Location: Anzac





Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name: Anzac Station number: AMS14
 Calibration Date: April 5, 2023 Last Cal Date: March 1, 2023
 Start time (MST): 7:43 End time (MST): 11:50
 Reason: Routine

Calibration Standards

Cal Gas Concentration: 5.38 ppm Cal Gas Exp Date: February 3, 2023
 Cal Gas Cylinder #: EY0000859
 Removed Cal Gas Conc: 5.38 ppm Rem Gas Exp Date: NA
 Removed Gas Cyl #: NA Diff between cyl:
 Calibrator Make/Model: API T700 Serial Number: 5252
 ZAG Make/Model: API 701H Serial Number: 357

Analyzer Information

Analyzer make: Thermo 43i-TLE Analyzer serial #: 1180540019
 Converter make: CD Nova CDN-101 Converter serial #: 503
 Analyzer Range 0 - 100 ppb

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	1.004840	1.002553	Backgd or Offset: 5.76	5.51
Calibration intercept:	0.178882	-0.041067	Coeff or Slope: 1.031	0.993

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.3	----
as found span	4925	74.3	80.0	83.9	0.956
as found 2nd point	4962	37.2	40.0	41.8	0.965
as found 3rd point	4981	18.6	20.0	20.6	0.986
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.3	----
high point	4925	74.3	80.0	80.3	0.996
second point	4962	37.2	40.0	39.9	1.003
third point	4981	18.6	20.0	19.7	1.016
as left zero	5000	0.0	0.0	0.4	----
as left span	4925	74.3	80.0	79.5	1.006
SO2 Scrubber Check	4920	80.0	800.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.005
Date of last converter efficiency test:				efficiency	

Baseline Corr As found: 83.6 Prev response: 80.52 *% change: 3.7%
 Baseline Corr 2nd AF pt: 41.5 AF Slope: 1.047722 AF Intercept: -0.022058
 Baseline Corr 3rd AF pt: 20.3 AF Correlation: 0.999932

* = > +/-5% change initiates investigation

Notes: Scrubber checked after the calibrator zero. No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

TRS Calibration Summary

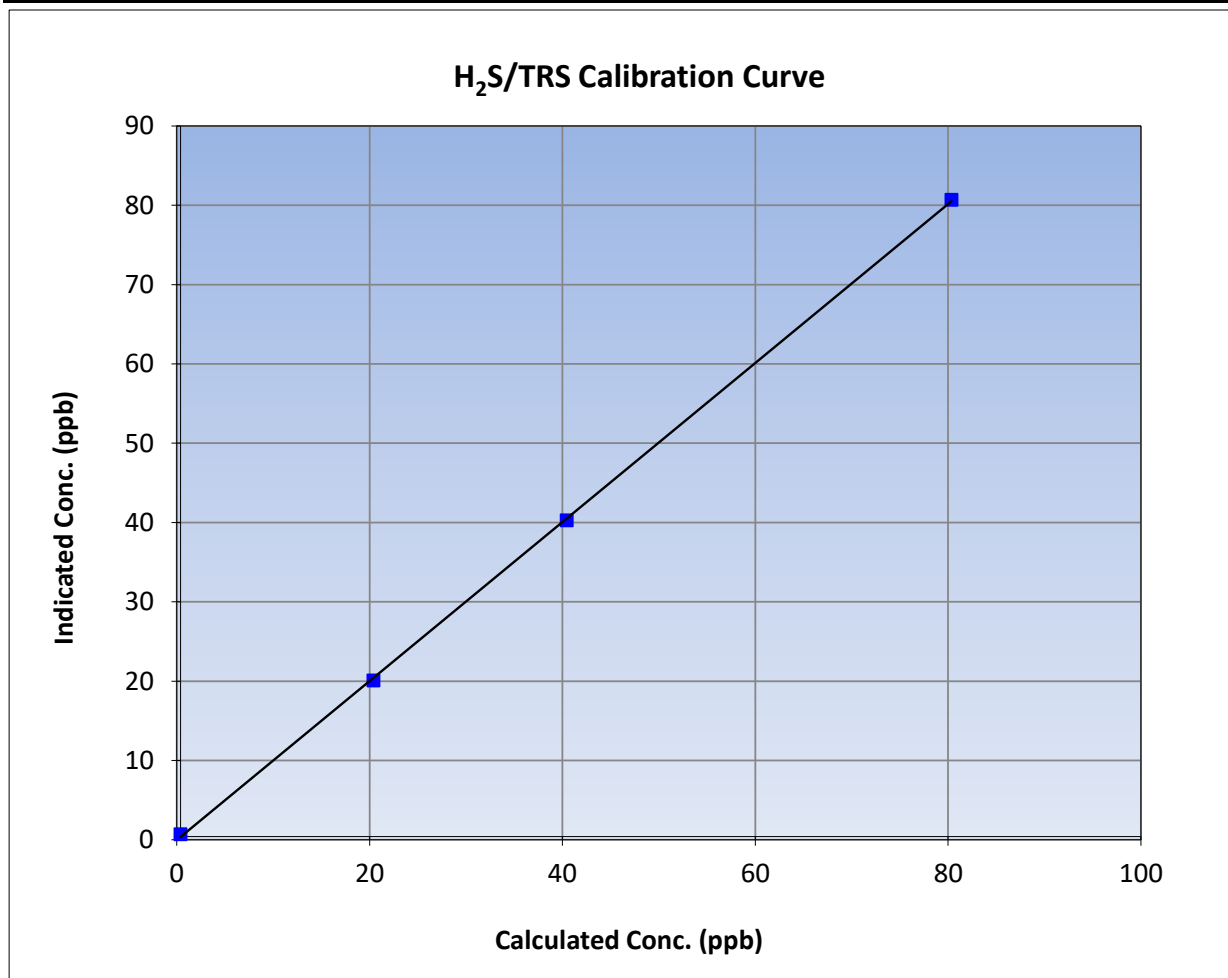
Version-11-2021

Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 1, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	7:43	End Time (MST):	11:50
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540019

Calibration Data

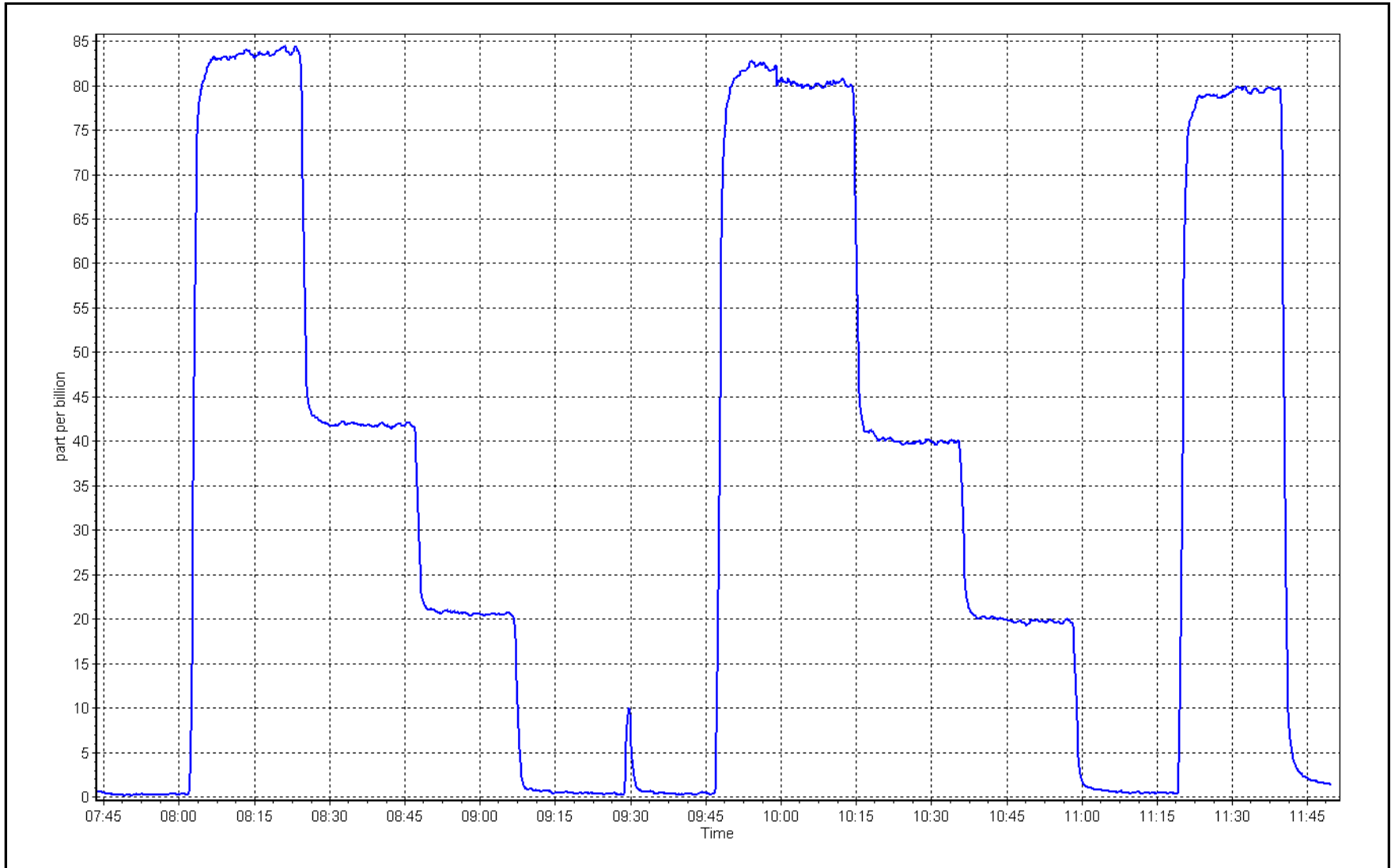
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999917	
80.0	80.3	0.9957			≥0.995
40.0	39.9	1.0033	Slope	1.002553	
20.0	19.7	1.0160			0.90 - 1.10
			Intercept	-0.041067	+/-3



TRS Calibration Plot

Date: April 5, 2023

Location: Anzac





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name: Anzac Station number: AMS 14
 Calibration Date: April 5, 2023 Last Cal Date: March 17, 2023
 Start time (MST): 6:40 End time (MST): 7:45
 Reason: Cylinder Change Nitrogen Cylinder Change

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 (CH₄): Diff between cyl (NM):
 Calibrator Model: API T700 Serial Number: 5252
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	3.85E-04	3.85E-04	NMHC SP Ratio:	4.46E-05
CH ₄ Retention time:	12.00	12.00	NMHC Peak Area:	204554
				204554

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	16.99	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	16.89	1.014
second point					
third point					
as left zero					
as left span					

				Average Correction Factor	1.014
Baseline Corr AF:	16.99	Prev response	17.03	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	9.12	9.07	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	80.1	9.12	9.02	1.011
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.011
Baseline Corr AF:	9.07	Prev response	9.10	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	7.92	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	8.00	7.87	1.016
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.016
Baseline Corr AF:	7.92	Prev response	7.94	*% 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

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	0.996031	0.986437
THC Cal Offset:	-0.019815	0.000000
CH ₄ Cal Slope:	0.993278	0.983919
CH ₄ Cal Offset:	-0.004047	0.000000
NMHC Cal Slope:	0.998568	0.988644
NMHC Cal Offset:	-0.013765	0.000000

Notes:

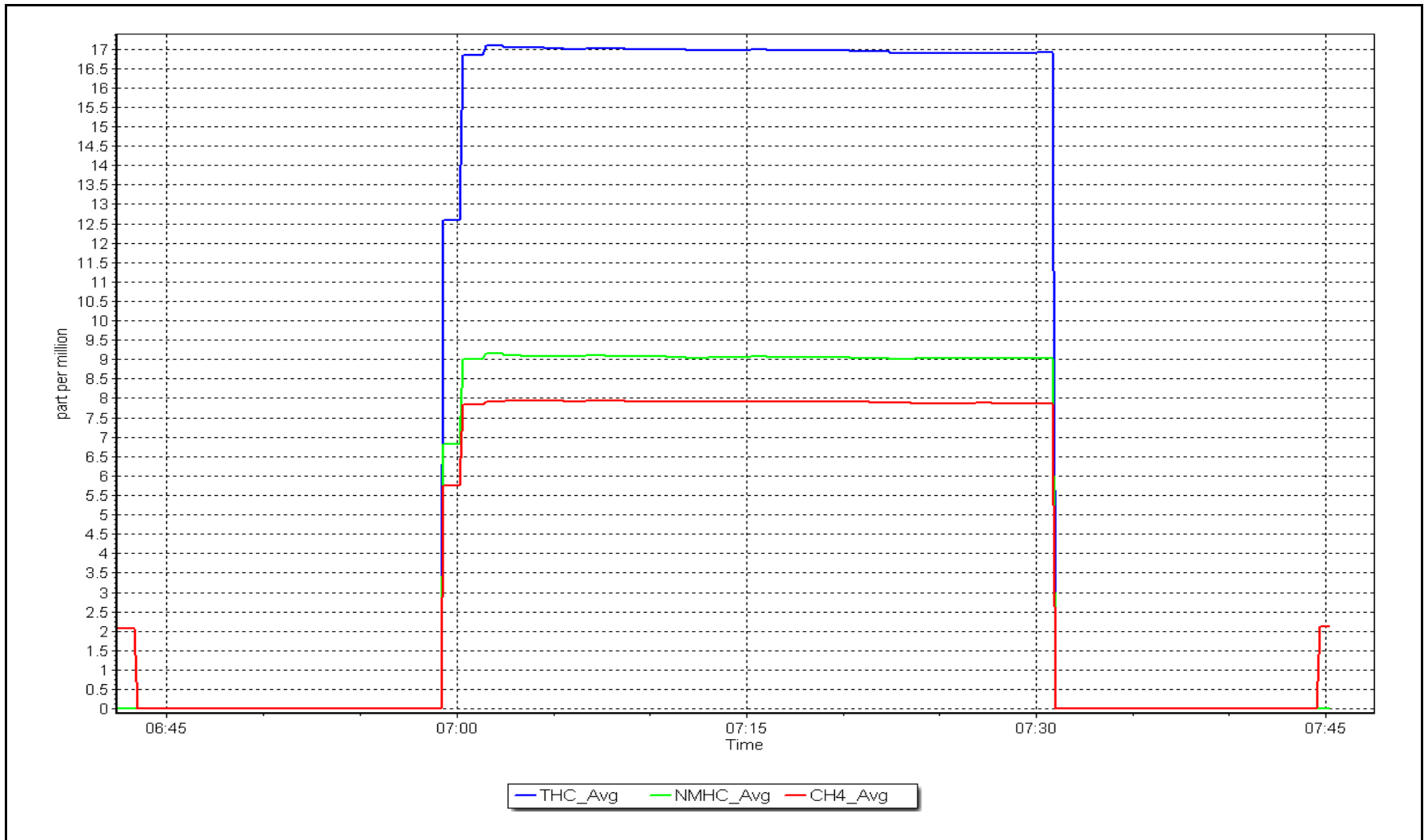
Nitrogen Cylinder Change.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot

Date: April 5, 2023

Location: Anzac





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	April 18, 2023	Last Cal Date:	March 17, 2023
Start time (MST):	7:55	End time (MST):	10:20
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC279389	Cal Gas Expiry Date:	January 5, 2025
CH ₄ Cal Gas Conc.	499.3 ppm	CH ₄ Equiv Conc.	1068.8 ppm
C ₃ H ₈ Cal Gas Conc.	207.1 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	499.3 ppm	CH ₄ Equiv Conc.	1068.8 ppm
Removed C ₃ H ₈ Conc.	207.1 ppm	Diff between cyl (THC):	
Diff between cyl (CH ₄):		Diff between cyl (NM):	
Calibrator Model:	API T700	Serial Number:	5252
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	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	3.85E-04	3.90E-04	NMHC SP Ratio:	4.46E-05
CH ₄ Retention time:	12.00	12.20	NMHC Peak Area:	204554
				201206

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	16.85	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	17.01	1.007
second point	4960	40.0	8.55	8.56	0.999
third point	4980	20.0	4.28	4.24	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	17.12	17.11	1.001

Average Correction Factor				1.005
Baseline Corr AF:	16.85	Prev response	17.03	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	9.12	8.97	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	9.12	9.11	1.001
second point	4960	40.0	4.56	4.56	0.999
third point	4980	20.0	2.28	2.25	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	9.12	9.12	1.000
Average Correction Factor					1.004
Baseline Corr AF:	8.97	Prev response	9.10	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	7.89	1.014
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	8.00	7.99	1.001
second point	4960	40.0	3.99	4.00	0.999
third point	4980	20.0	2.00	1.98	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	8.00	8.00	1.000
Average Correction Factor					1.003
Baseline Corr AF:	7.89	Prev response	7.94	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	0.996031	0.994025
THC Cal Offset:	-0.019815	0.010201
CH ₄ Cal Slope:	0.993278	0.999707
CH ₄ Cal Offset:	-0.004047	-0.004033
NMHC Cal Slope:	0.998568	0.999569
NMHC Cal Offset:	-0.013765	-0.007757

Notes: No Maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

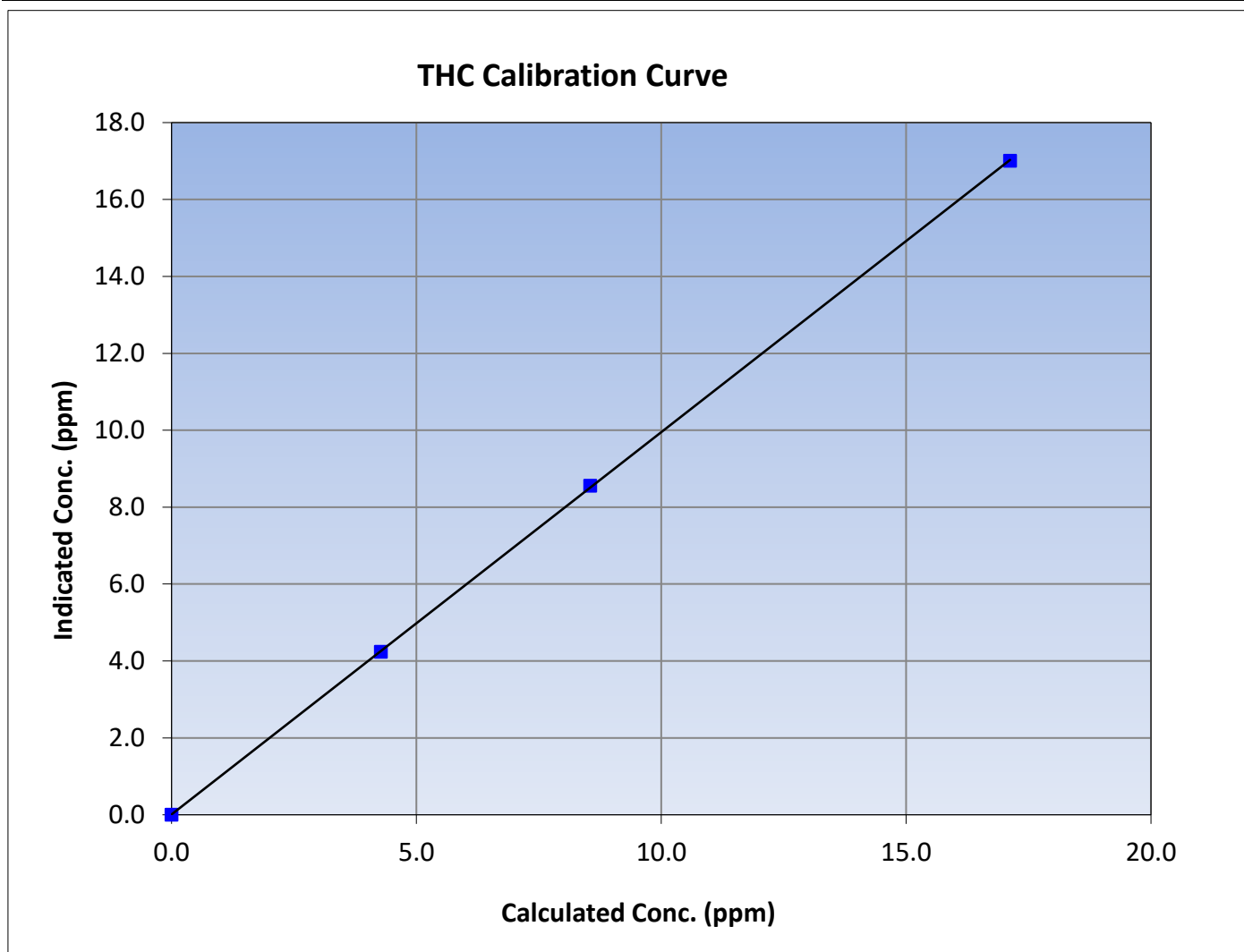
Version-01-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 17, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:55	End Time (MST):	10:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999978	≥ 0.995			
17.12	17.01	1.0066						
8.55	8.56	0.9989				Slope	0.994025	0.90 - 1.10
4.28	4.24	1.0083						
			Intercept	0.010201	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

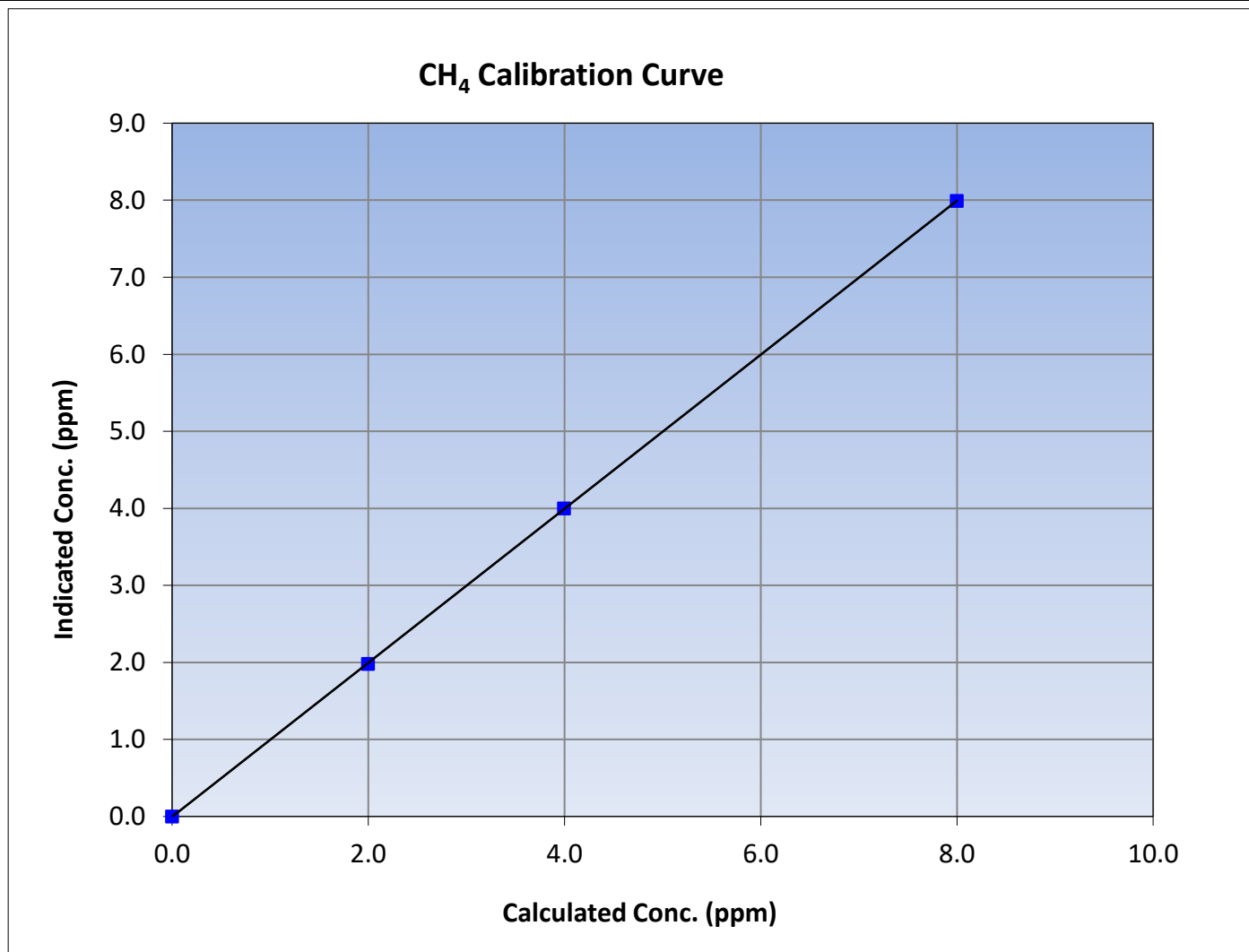
Version-01-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 17, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:55	End Time (MST):	10:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999992	≥0.995
8.00	7.99	1.0011			
3.99	4.00	0.9986			
2.00	1.98	1.0087			
			Slope	0.999707	0.90 - 1.10
			Intercept	-0.004033	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

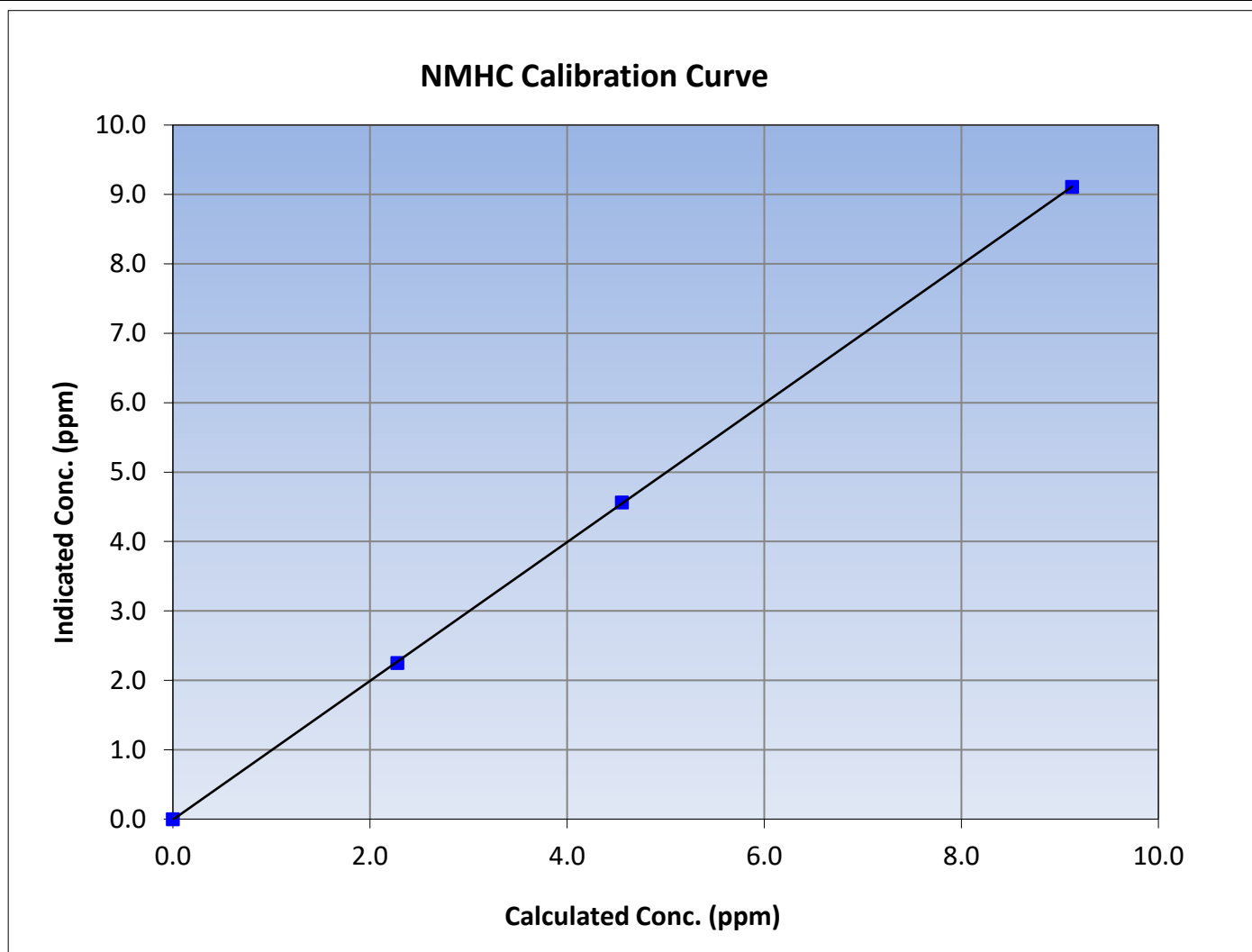
Version-01-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 17, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:55	End Time (MST):	10:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

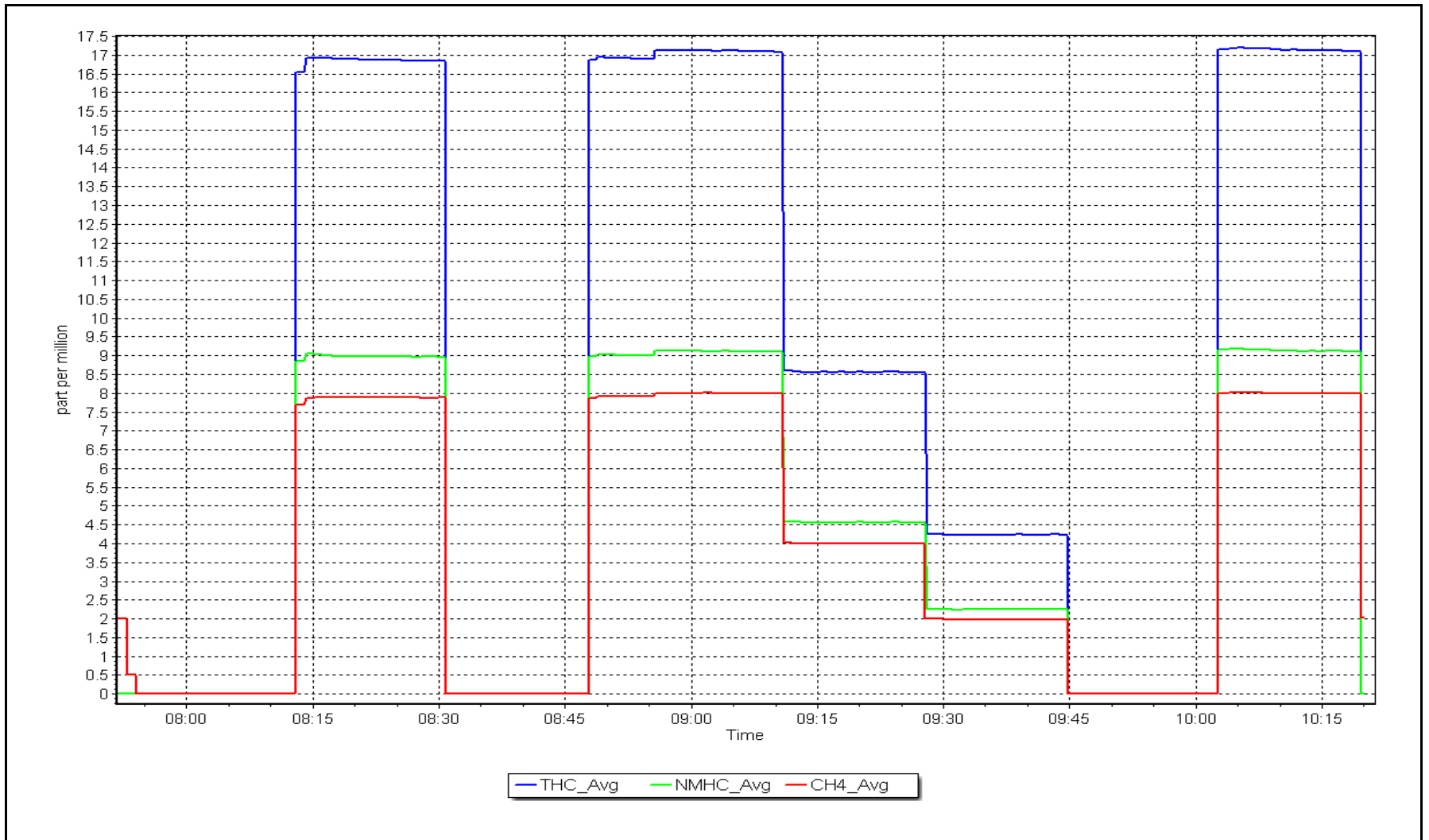
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999986	≥ 0.995			
9.12	9.11	1.0015						
4.56	4.56	0.9992				Slope	0.999569	0.90 - 1.10
2.28	2.25	1.0125						
			Intercept	-0.007757	± 0.5			



NMHC Calibration Plot

Date: April 18, 2023

Location: Anzac





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Anzac
Calibration Date: April 14, 2023
Start time (MST): 8:45
Reason: Routine
Station number: AMS 14
Last Cal Date: March 2, 2023
End time (MST): 11:32

Calibration Standards

NO Gas Cylinder #: T2Y1P8D
NOX Cal Gas Conc: 50.92 ppm
Removed Cylinder #: NA
Removed Gas NOX Conc: 50.92 ppm
NOX gas Diff:
Calibrator Model: Teledyne API T700
ZAG make/model: Teledyne API 701H
Cal Gas Expiry Date: December 11, 2023
NO Cal Gas Conc: 50.05 ppm
Removed Gas Exp Date: NA
Removed Gas NO Conc: 50.05 ppm
NO gas Diff:
Serial Number: 5239
Serial Number: 357

Analyzer Information

Analyzer make: Thermo 42i
NOX Range (ppb): 0 - 1000 ppb

Analyzer serial #: 1426262592

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.361	1.361	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:	163.0	163.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.993239	1.002446
NO _x Cal Offset:	-0.747177	-0.745161
NO Cal Slope:	0.995505	1.004625
NO Cal Offset:	-2.010875	-2.149028
NO ₂ Cal Slope:	0.999852	1.000896
NO ₂ Cal Offset:	0.368111	0.328255



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.2	0.3	----	----
as found span	4921	78.6	800.5	786.8	13.7	803.7	788.7	15.0	0.9961	0.9977
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	-0.2	----	----
high point	4921	78.6	800.5	786.8	13.7	802.0	789.2	12.8	0.9982	0.9970
second point	4961	39.3	400.2	393.4	6.8	400.5	392.5	8.0	0.9993	1.0022
third point	4980	19.6	199.6	196.2	3.4	198.2	192.6	5.6	1.0072	1.0188
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	4921	78.6	800.5	393.6	406.9	796.3	386.5	409.8	1.0053	1.0185
Average Correction Factor									1.0015	1.0060

Corrected As found	NO _x = 803.6 ppb	NO = 788.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = 1.1%
Previous Response	NO _x = 794.4 ppb	NO = 781.3 ppb		*Percent Change	NO = 1.0%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	782.7	389.5	406.9	407.3	0.9990	100.1%
2nd GPT point (200 ppb O3)	782.7	584.7	211.7	212.4	0.9966	100.3%
3rd GPT point (100 ppb O3)	782.7	684.2	112.2	113.2	0.9910	100.9%
Average Correction Factor					0.9955	100.5%

Notes:

No maintenance or adjustments done.

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

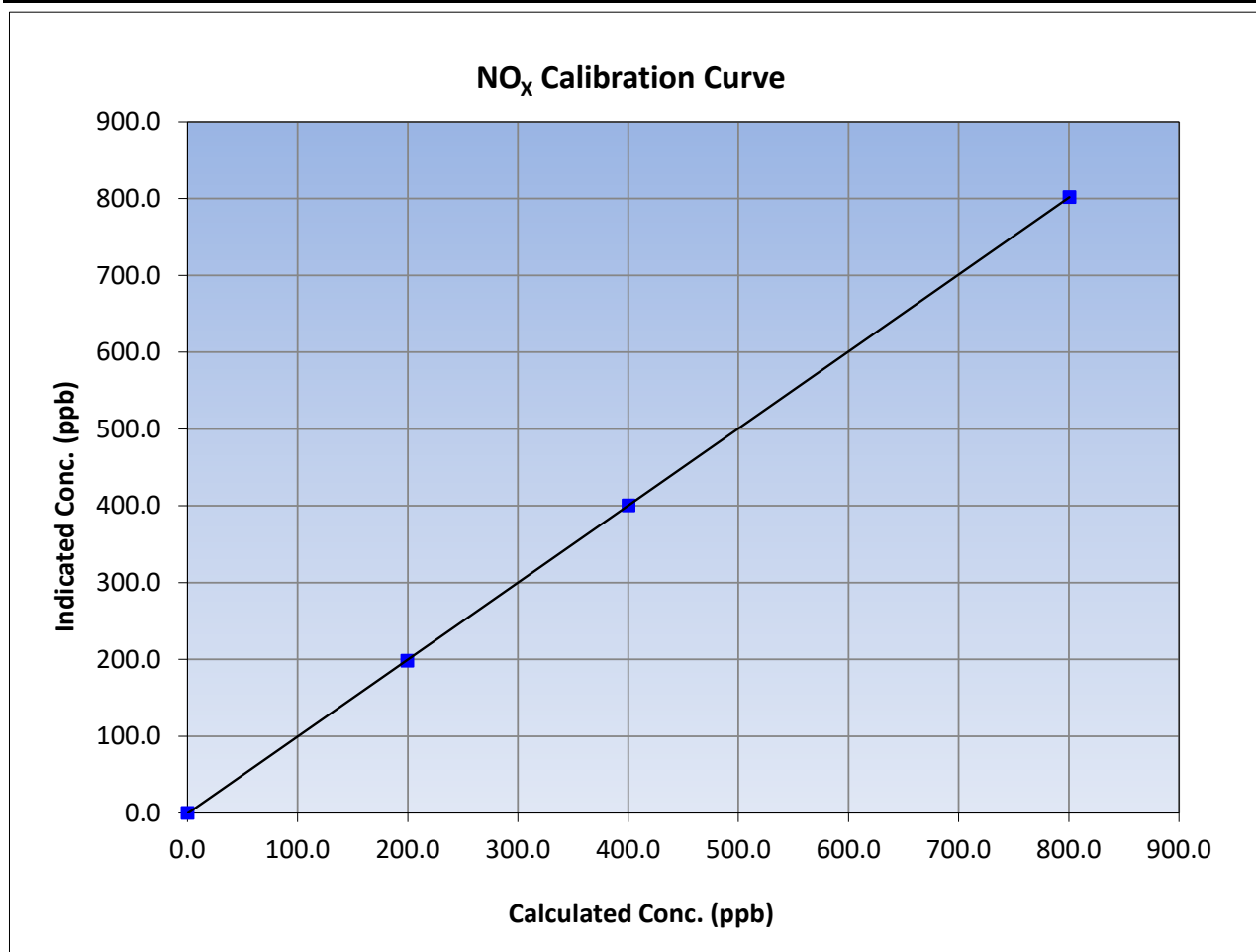
Version-04-2020

Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:45	End Time (MST):	11:32
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	0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
800.5	802.0	0.9982		
400.2	400.5	0.9993		
199.6	198.2	1.0072		
			0.999994	
			1.002446	
			-0.745161	





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

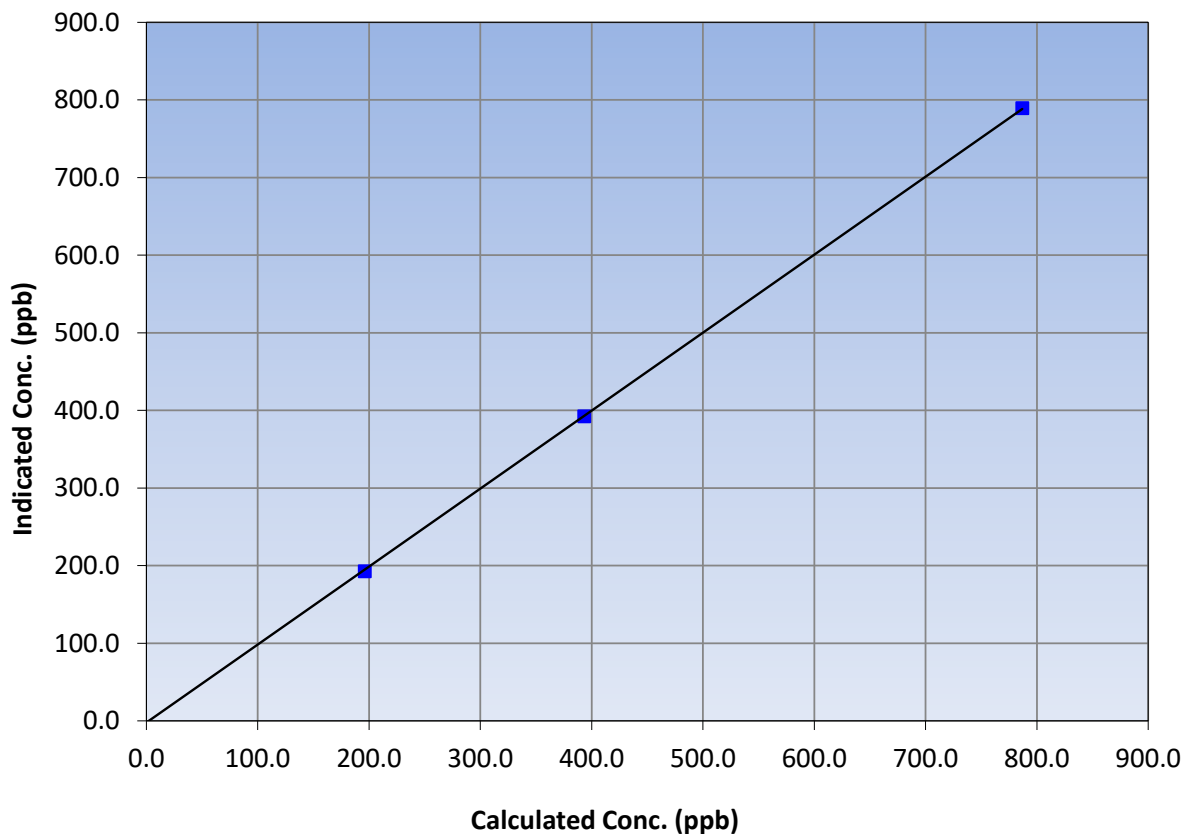
Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:45	End Time (MST):	11:32
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	-0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
786.8	789.2	0.9970		
393.4	392.5	1.0022		
196.2	192.6	1.0188		
			0.999968	
			1.004625	
			-2.149028	

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

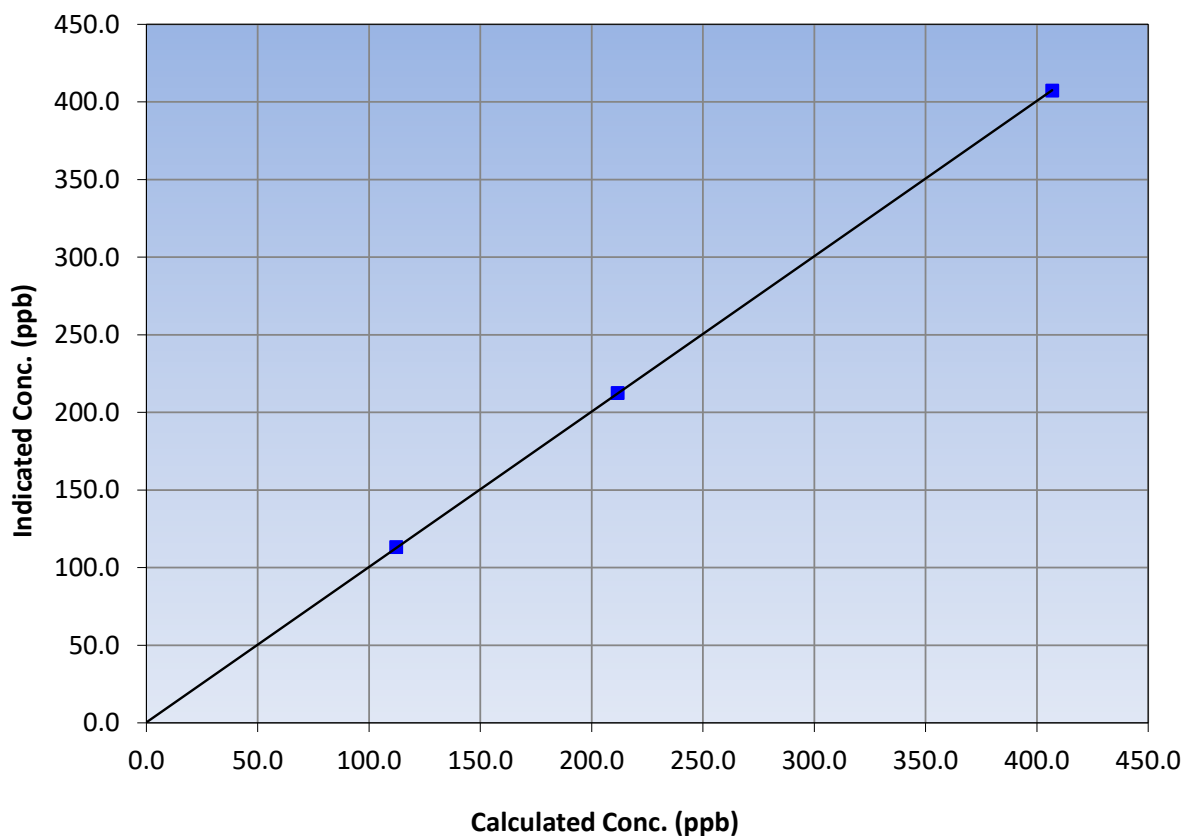
Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:45	End Time (MST):	11:32
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20
406.9	407.3	0.9990		
211.7	212.4	0.9966		
112.2	113.2	0.9910		
			0.999992	
			1.000896	
			0.328255	

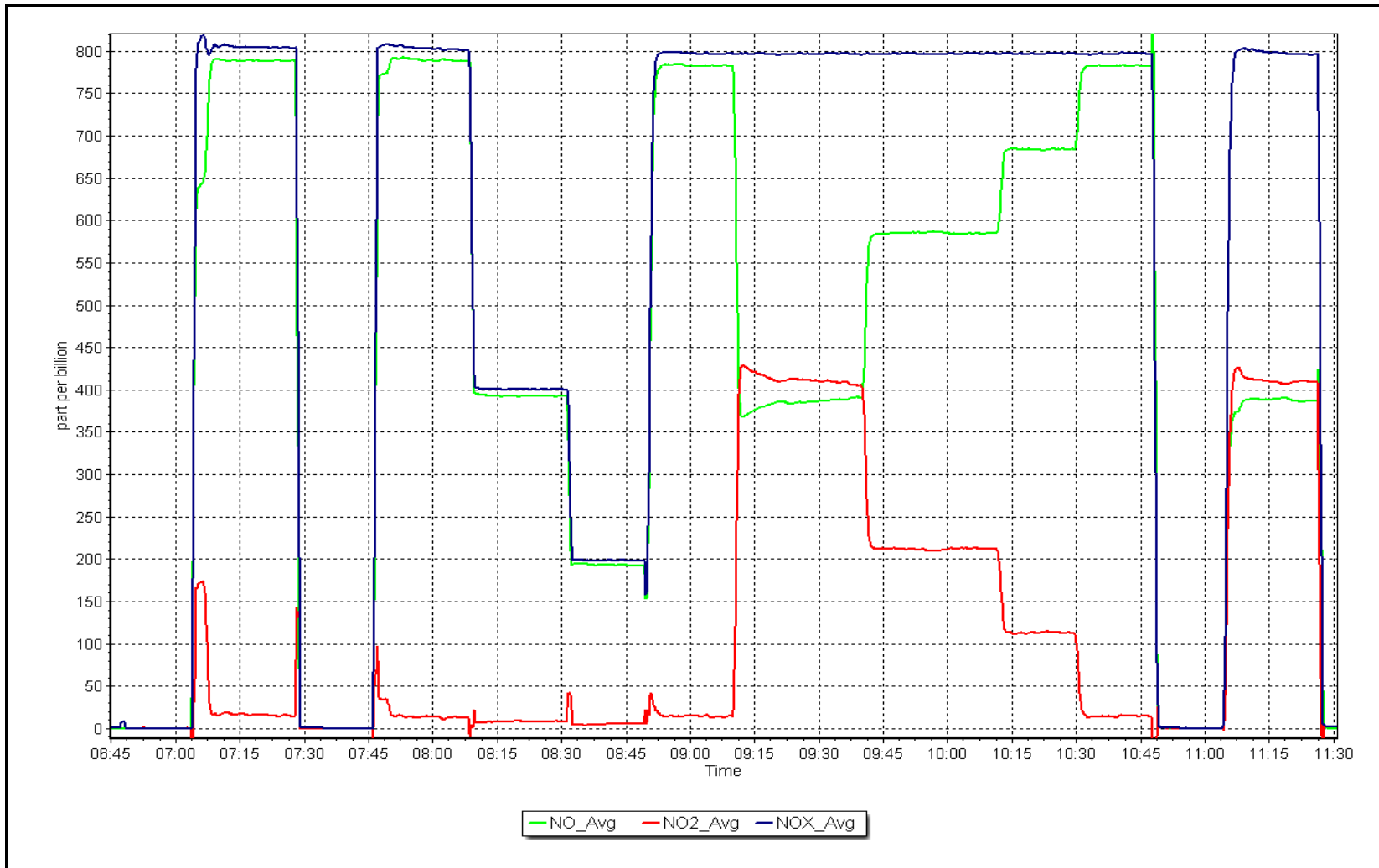
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 14, 2023

Location: Anzac





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name: Anzac Station number: AMS14
 Calibration Date: April 18, 2023 Last Cal Date: March 30, 2023
 Start time (MST): 6:45 End time (MST): 12:07
 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.001686	1.000057	Backgd or Offset:	0.9	1.3
Calibration intercept:	0.080000	0.140000	Coeff or Slope:	1.516	1.516

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	884.8	400.0	401.9	0.995
as found 2nd point	5000	771.6	200.0	201.1	0.995
as found 3rd point	5000	672.9	100.0	100.7	0.993
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	886.1	400.0	400.1	1.000
second point	5000	772.1	200.0	200.1	1.000
third point	5000	671.5	100.0	100.5	0.995
as left zero	5000	0.0	0.0	-0.9	----
as left span	5000	885.7	400.0	401.4	0.997
Average Correction Factor					0.998

Baseline Corr As found:	401.6	Previous response	400.8	*% change	0.2%
Baseline Corr 2nd AF pt:	200.8	AF Slope:	1.004000	AF Intercept:	0.300000
Baseline Corr 3rd AF pt:	100.4	AF Correlation:	1.000000		

* = > +/-5% change initiates investigation

Notes:

Ozone Scrubber Replaced. Zero adjusted.

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

O₃ Calibration Summary

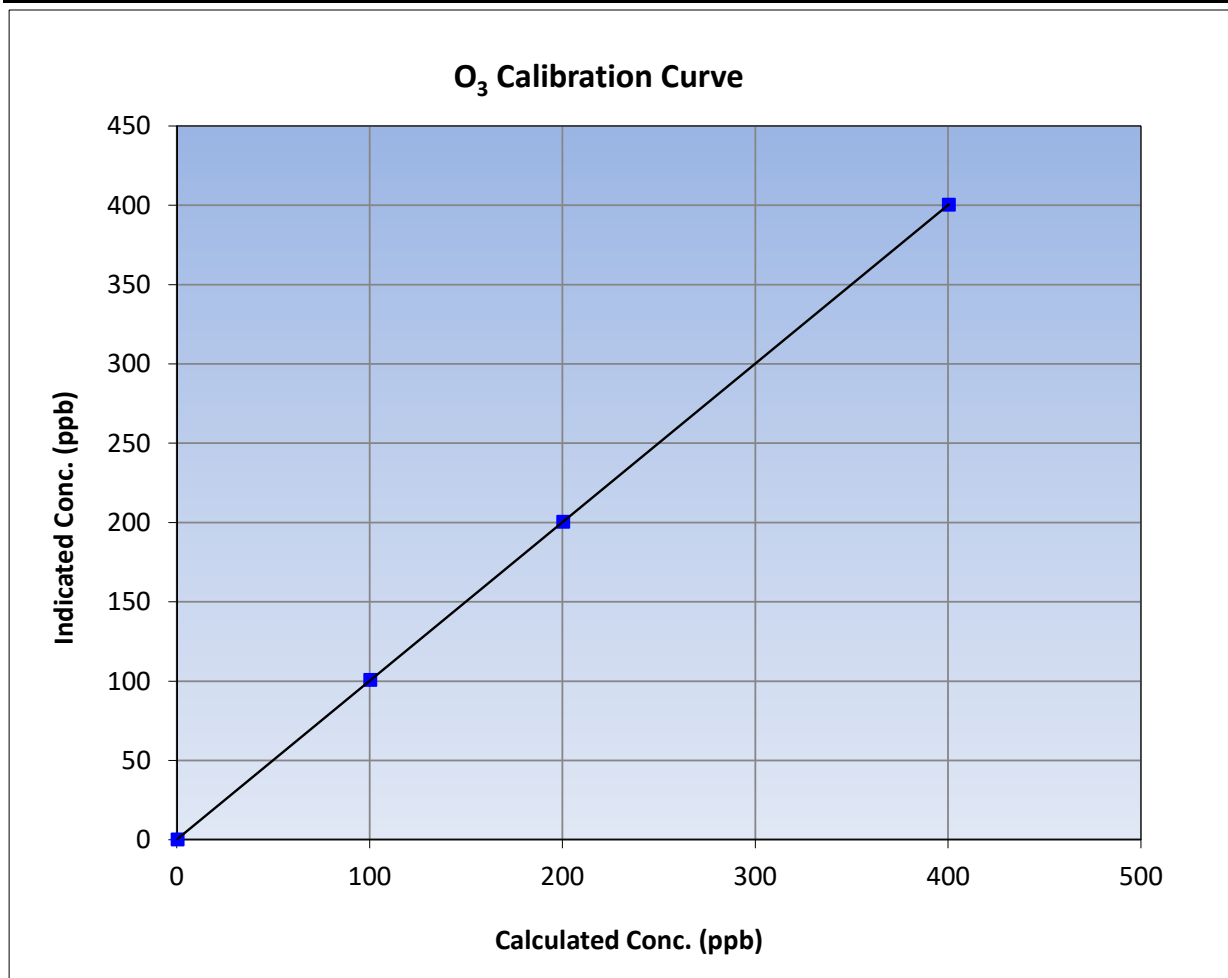
Version-01-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 30, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	6:45	End Time (MST):	12:07
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

Calibration Data

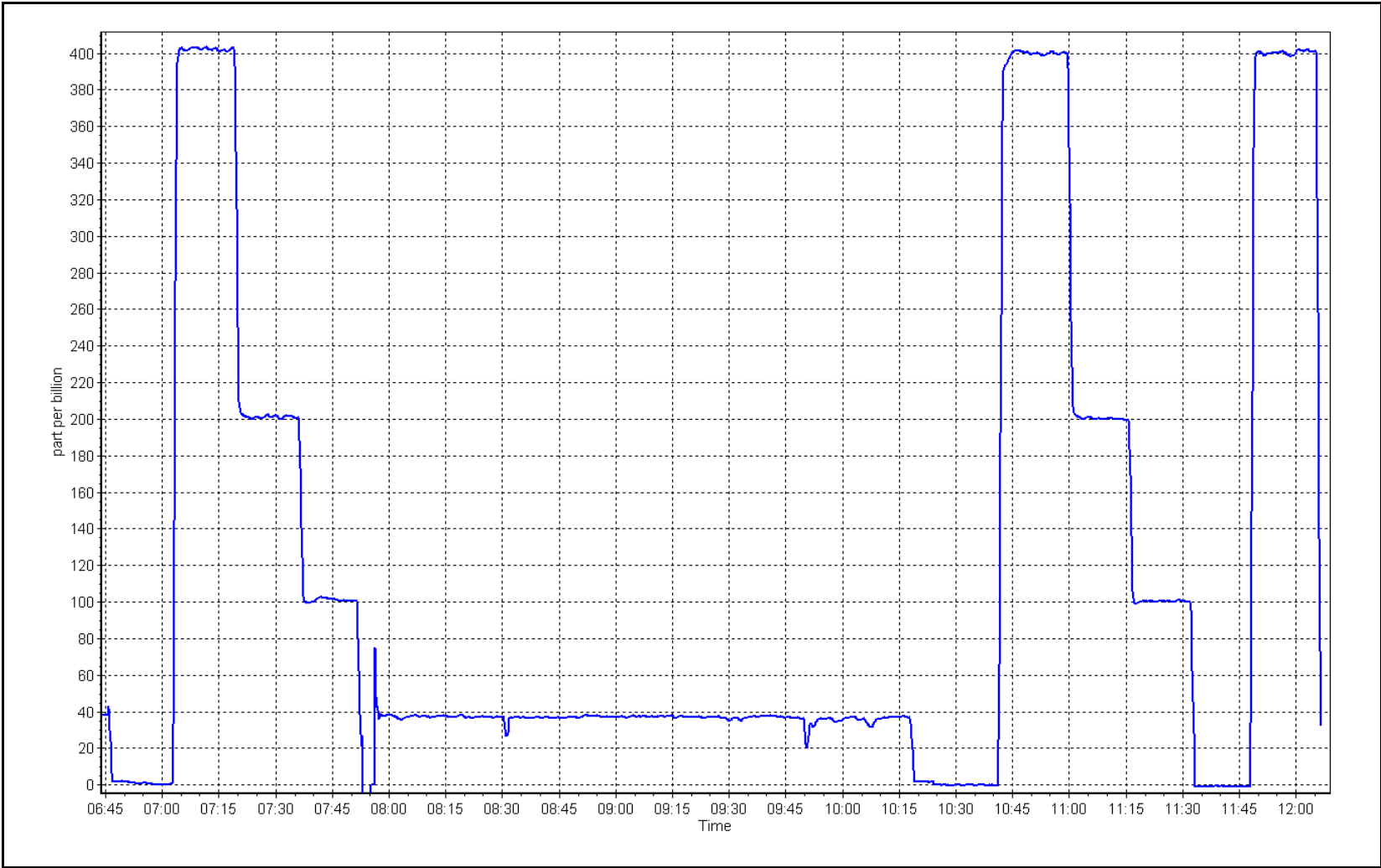
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999998	≥0.995
400.0	400.1	0.9998			
200.0	200.1	0.9995	Slope	1.000057	0.90 - 1.10
100.0	100.5	0.9950			
			Intercept	0.140000	+/- 5



O₃ Calibration Plot

Date: April 18, 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: April 18, 2023 Last Cal Date: March 30, 2023
 Start time (MST): 7:03 End time (MST): 7:25

Analyzer Make: API T640 S/N: 825
 Particulate Fraction: PM2.5

Flow Meter Make/Model: Alicat FP-25 S/N: 388753
 Temp/RH standard: Alicat FP-25 S/N: 388753

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	2.5	2.8	2.5	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	708.6	709.7	708.6	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	5	5.08	5	<input type="checkbox"/>	+/- 0.25 LPM
Leak Test:	Date of check: <u>April 18, 2023</u>	Last Cal Date: <u>March 30, 2023</u>			
	PM w/o HEPA: <u>2.8</u>	PM w/ HEPA: <u>0</u>			<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				<input type="checkbox"/>	10.9 +/- 0.5
Post-maintenance leak check:		PM w/o HEPA: _____	w/ HEPA: _____		
Date Optical Chamber Cleaned:		<u>March 30, 2023</u>			<0.2 ug/m3
Disposable Filter Changed:		<u>March 30, 2023</u>			

Annual Maintenance

Date Sample Tube Cleaned: June 21, 2022
 Date RH/T Sensor Cleaned: June 21, 2022

Notes: No adjustments done. Head Cleaned.

Calibration by: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

**AMS17
WAPASU
APRIL 2023**

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	April 13, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:10	End time (MST):	12:40
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	<u>50.38</u> ppm	Cal Gas Exp Date:	January 12, 2029
Cal Gas Cylinder #:	<u>ALM066507</u>		
Removed Cal Gas Conc:	<u>50.38</u> ppm	Rem Gas Exp Date:	n/a
Removed Gas Cyl #:	<u>n/a</u>	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	

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.999724	0.999723	Backgd or Offset:	12.4	12.4
Calibration intercept:	-1.859598	-1.559214	Coeff or Slope:	1.099	1.099

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.1	----
as found span	4921	79.4	800.0	794.5	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4921	79.4	800.0	799.6	1.000
second point	4960	39.7	400.0	395.6	1.011
third point	4980	19.8	199.5	197.8	1.009
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	79.4	800.1	799.9	1.000
Average Correction Factor					1.007

Baseline Corr As found:	794.60	Previous response	797.89	*% 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: Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

SO₂ Calibration Summary

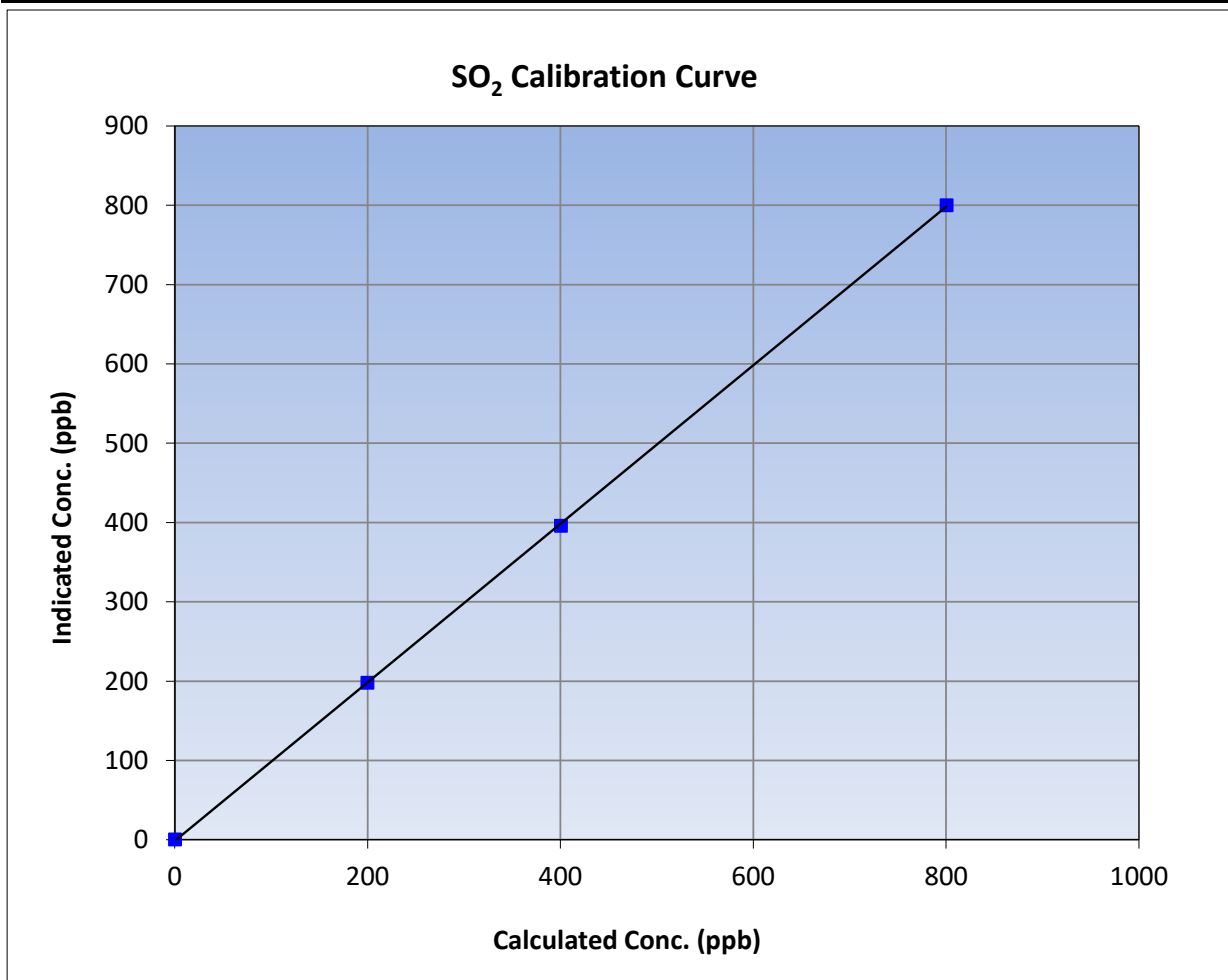
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 9, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:10	End Time (MST):	12:40
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

Calibration Data

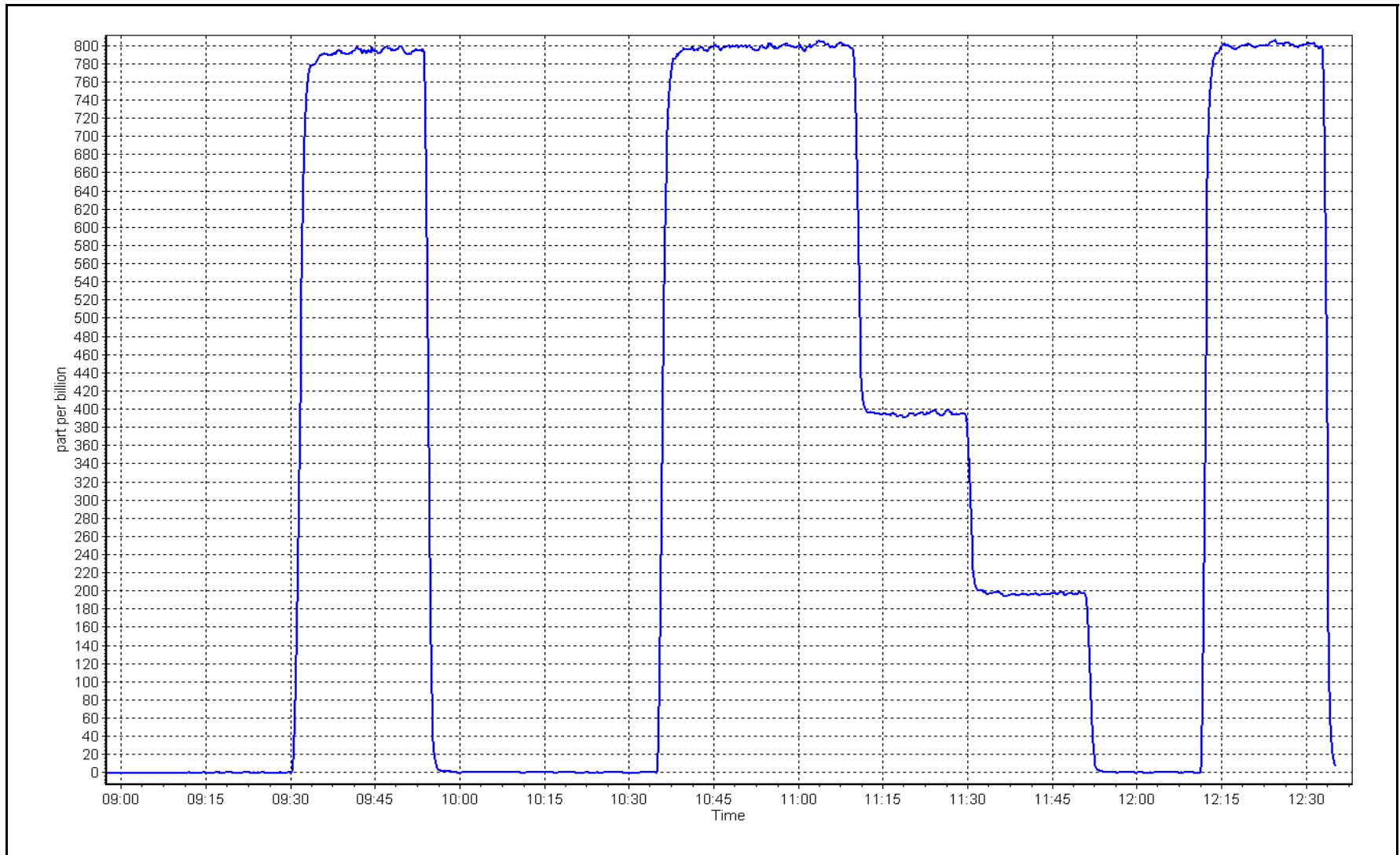
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.1	----	Correlation Coefficient	≥0.995
800.0	799.6	1.0005		
400.0	395.6	1.0112	Slope	0.90 - 1.10
199.5	197.8	1.0087		
			Intercept	+/-30



SO2 Calibration Plot

Date: April 13, 2023

Location: Wapasu





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Wapasu Station number: AMS17
 Calibration Date: April 21, 2023 Last Cal Date: March 8, 2023
 Start time (MST): 9:02 End time (MST): 13:23
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.990568	0.990854	Backgd or Offset:	12.7
Calibration intercept:	0.180784	0.220786	Coeff or Slope:	1.085

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.8	80.0	79.7	1.005
as found 2nd point	4961	39.4	40.0	39.8	1.007
as found 3rd point	4980	19.7	20.0	20.0	1.005
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	78.8	80.0	79.6	1.005
second point	4961	39.4	40.0	39.7	1.007
third point	4980	19.7	20.0	19.9	1.005
as left zero	5000	0.0	0.0	0.5	----
as left span	4921	78.8	80.0	78.1	1.024
SO2 Scrubber Check	4921	79.4	800.0	0.1	----
Date of last scrubber change:	n/a			Ave Corr Factor	1.006
Date of last converter efficiency test:	n/a			efficiency	

Baseline Corr As found: 79.6 Prev response: 79.43 *% change: 0.2%
 Baseline Corr 2nd AF pt: 39.7 AF Slope: 0.994854 AF Intercept: 0.080792
 Baseline Corr 3rd AF pt: 19.9 AF Correlation: 0.999998

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

H₂S Calibration Summary

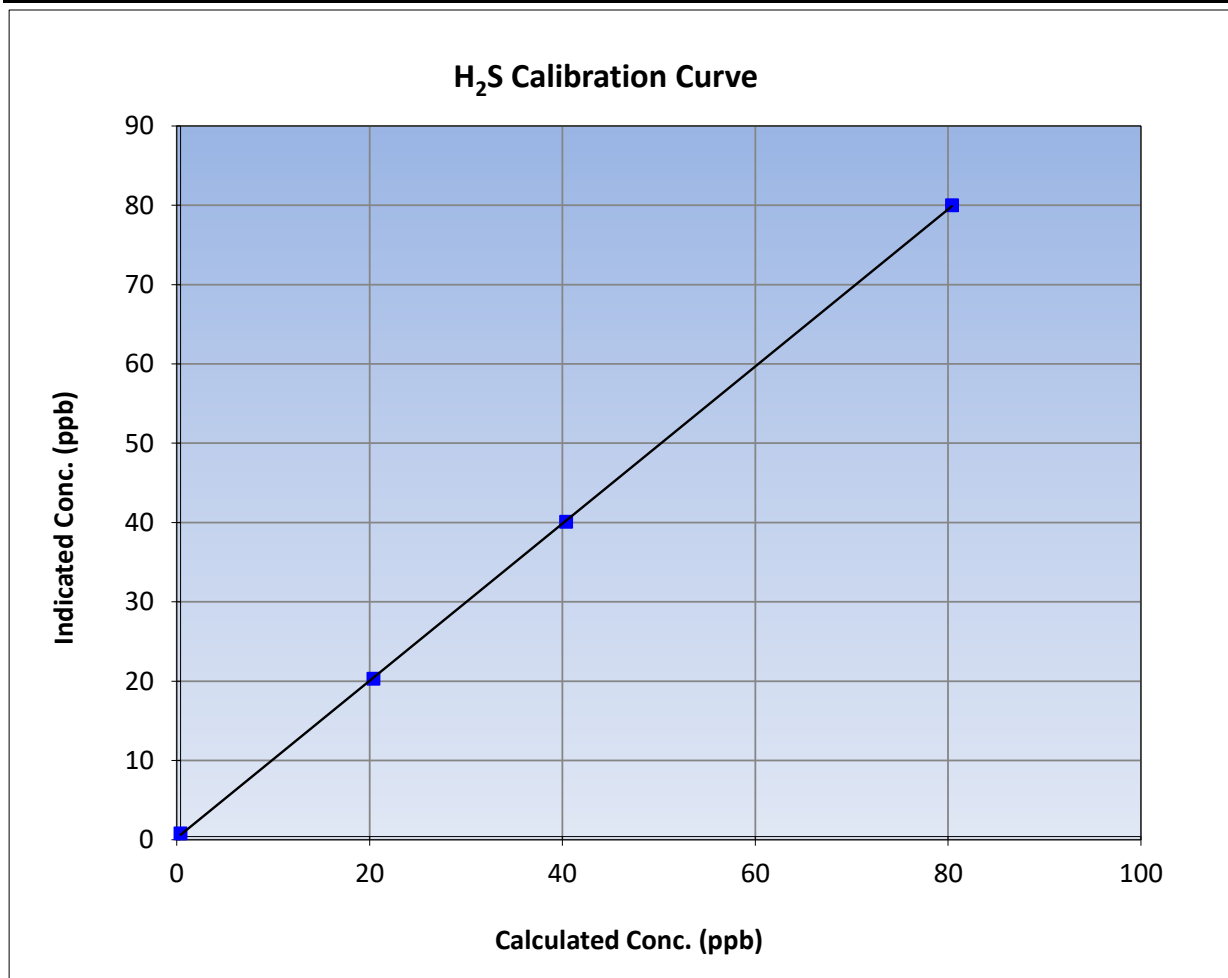
Version-11-2021

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 8, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:02	End Time (MST):	13:23
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

Calibration Data

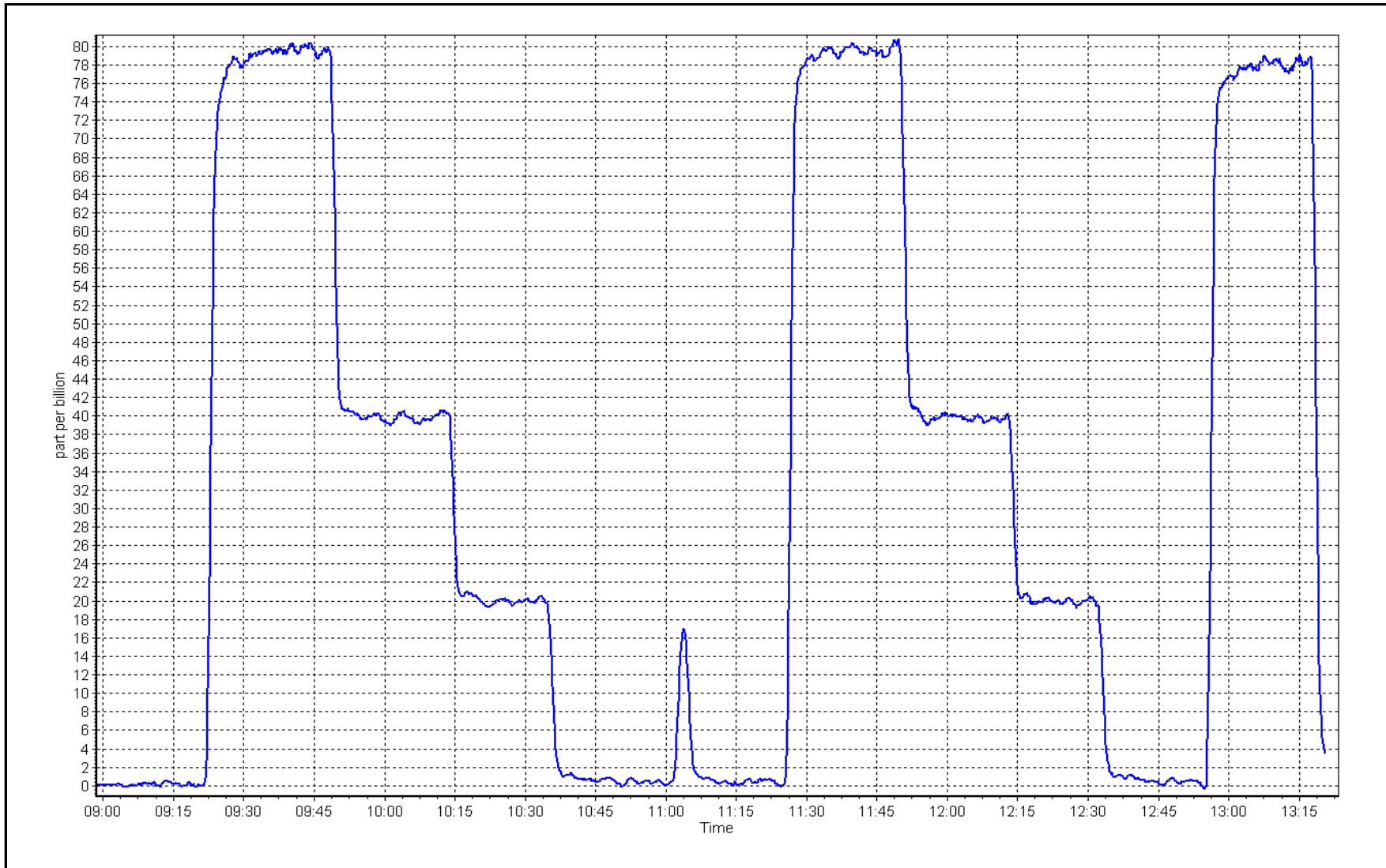
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.4	----	Correlation Coefficient	0.999975	≥0.995
80.0	79.6	1.0050			
40.0	39.7	1.0074	Slope	0.990854	0.90 - 1.10
20.0	19.9	1.0051			
			Intercept	0.220786	+/-3



H₂S Calibration Plot

Date: April 21, 2023

Location: Wapasu





Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	April 13, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:10	End time (MST):	12:40
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	ALM066507	Cal Gas Expiry Date:	January 12, 2029
CH4 Cal Gas Conc.	<u>503.5</u> ppm	CH4 Equiv Conc.	1076.3 ppm
C3H8 Cal Gas Conc.	<u>208.3</u> ppm		
Removed Gas Cert:	n/a	Removed Gas Expiry:	n/a
Removed CH4 Conc.	<u>503.5</u> ppm	CH4 Equiv Conc.	1076.3 ppm
Removed C3H8 Conc.	<u>208.3</u> 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.000425	1.001474	Background:	3.140	3.070
Calibration intercept:	-0.058335	-0.066926	Coefficient:	4.250	4.296

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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.00	-0.11	----
as found span	4921	79.4	17.09	16.82	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.03	----
high point	4921	79.4	17.09	17.09	1.000
second point	4960	39.7	8.55	8.41	1.016
third point	4980	19.8	4.26	4.21	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.4	17.09	17.13	0.998
Average Correction Factor					1.010
Baseline Corr As found:	16.93	Previous response	17.04	*% 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. Adjusted the zero and span.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

THC Calibration Summary

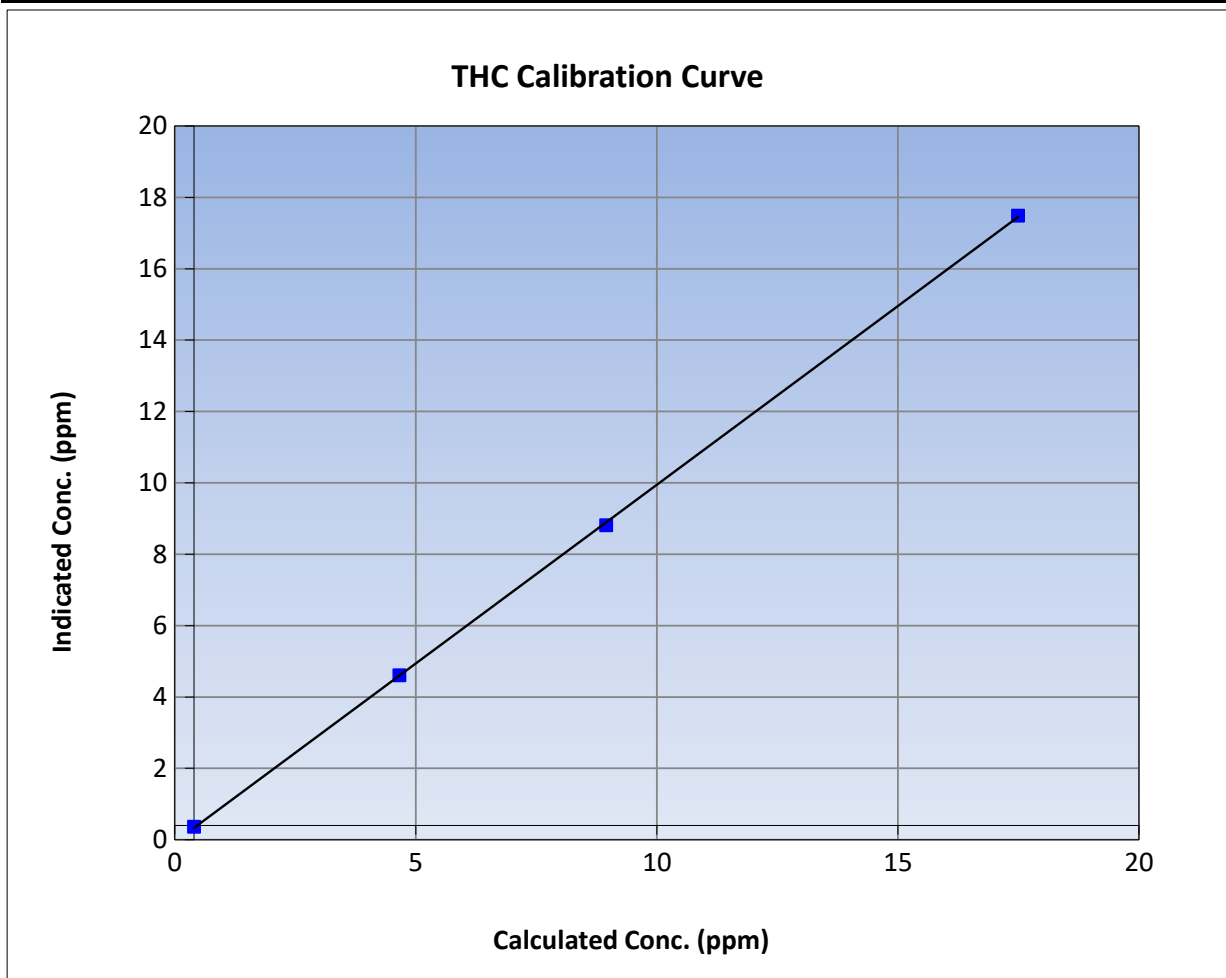
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 9, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:10	End Time (MST):	12:40
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

Calibration Data

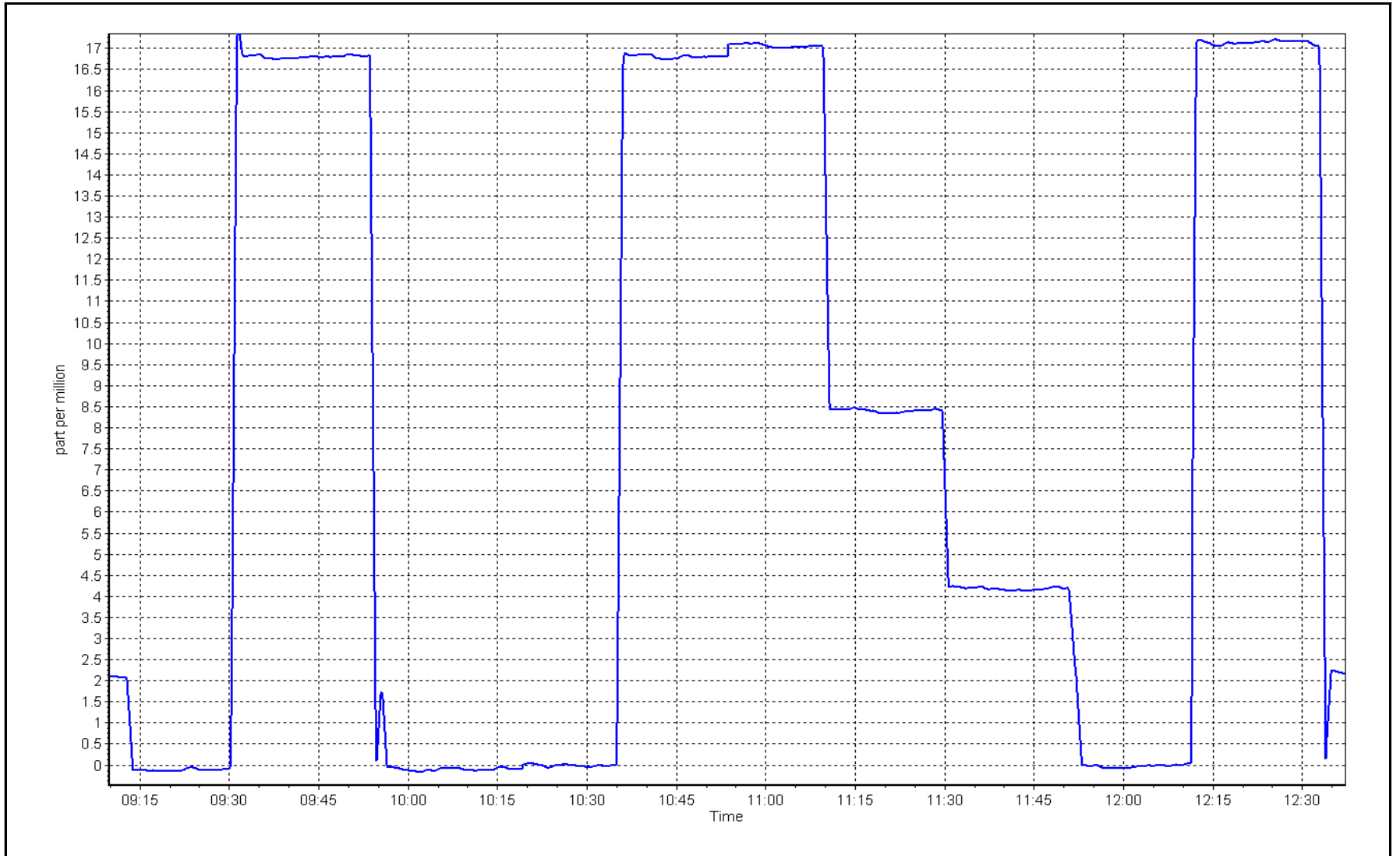
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.00	-0.03	----	Correlation Coefficient	0.999944	≥0.995
17.09	17.09	1.0002			
8.55	8.41	1.0159	Slope	1.001474	0.90 - 1.10
4.26	4.21	1.0129			
			Intercept	-0.066926	+/-1.5



THC Calibration Plot

Date: April 13, 2023

Location: Wapasu





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Wapasu
Calibration Date: April 25, 2023
Start time (MST): 10:10
Reason: Routine
Station number: AMS17
Last Cal Date: March 23, 2023
End time (MST): 15:05

Calibration Standards

NO Gas Cylinder #: T375YK8
NOX Cal Gas Conc: 49.11 ppm
Removed Cylinder #: T375YK8
Removed Gas NOX Conc: 49.11 ppm
NOX gas Diff:
Calibrator Model: API T700
ZAG make/model: API T701H
Cal Gas Expiry Date: April 13, 2025
NO Cal Gas Conc: 48.07 ppm
Removed Gas Exp Date:
Removed Gas NO Conc: 48.07 ppm
NO gas Diff:
Serial Number: 2449
Serial Number: 359

Analyzer Information

Analyzer make: Teledyne API T200
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 833

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	0.820	0.836	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	0.812	0.828	NOX bkgnd or offset:	-0.4	-0.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.4	4.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.987970	1.001718
NO _x Cal Offset:	-1.020000	-1.660000
NO Cal Slope:	0.989414	1.001759
NO Cal Offset:	-1.920000	-1.940000
NO ₂ Cal Slope:	0.999015	0.991719
NO ₂ Cal Offset:	0.401105	-0.351144



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.5	0.0	0.5	----	----
as found span	4917	83.2	817.2	799.9	17.3	799.3	780.8	18.5	1.0224	1.0244
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.2	0.4	----	----
high point	4917	83.2	817.2	799.9	17.3	818.0	800.0	17.7	0.9990	0.9999
second point	4958	41.6	408.6	399.9	8.7	406.2	398.5	7.6	1.0059	1.0036
third point	4979	20.8	204.3	200.0	4.3	201.6	196.2	5.4	1.0134	1.0192
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	4917	83.2	817.2	399.1	418.1	810.0	398.3	411.8	1.0089	1.0020
Average Correction Factor									1.0061	1.0076

Corrected As found	NO _x = 798.8 ppb	NO = 780.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -0.9%	
Previous Response	NO _x = 806.3 ppb	NO = 789.5 ppb		*Percent Change	NO = -1.1%	
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:	Nx Int:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:	NO Int:
			As found	NO ₂ r ² :	NO ₂ SI:	NO ₂ Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	798.5	397.7	418.1	414.7	1.0082	99.2%
2nd GPT point (200 ppb O3)	798.5	599.3	216.5	214.0	1.0117	98.8%
3rd GPT point (100 ppb O3)	798.5	700.2	115.6	113.5	1.0186	98.2%
Average Correction Factor					1.0128	98.7%

Notes: Sample inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

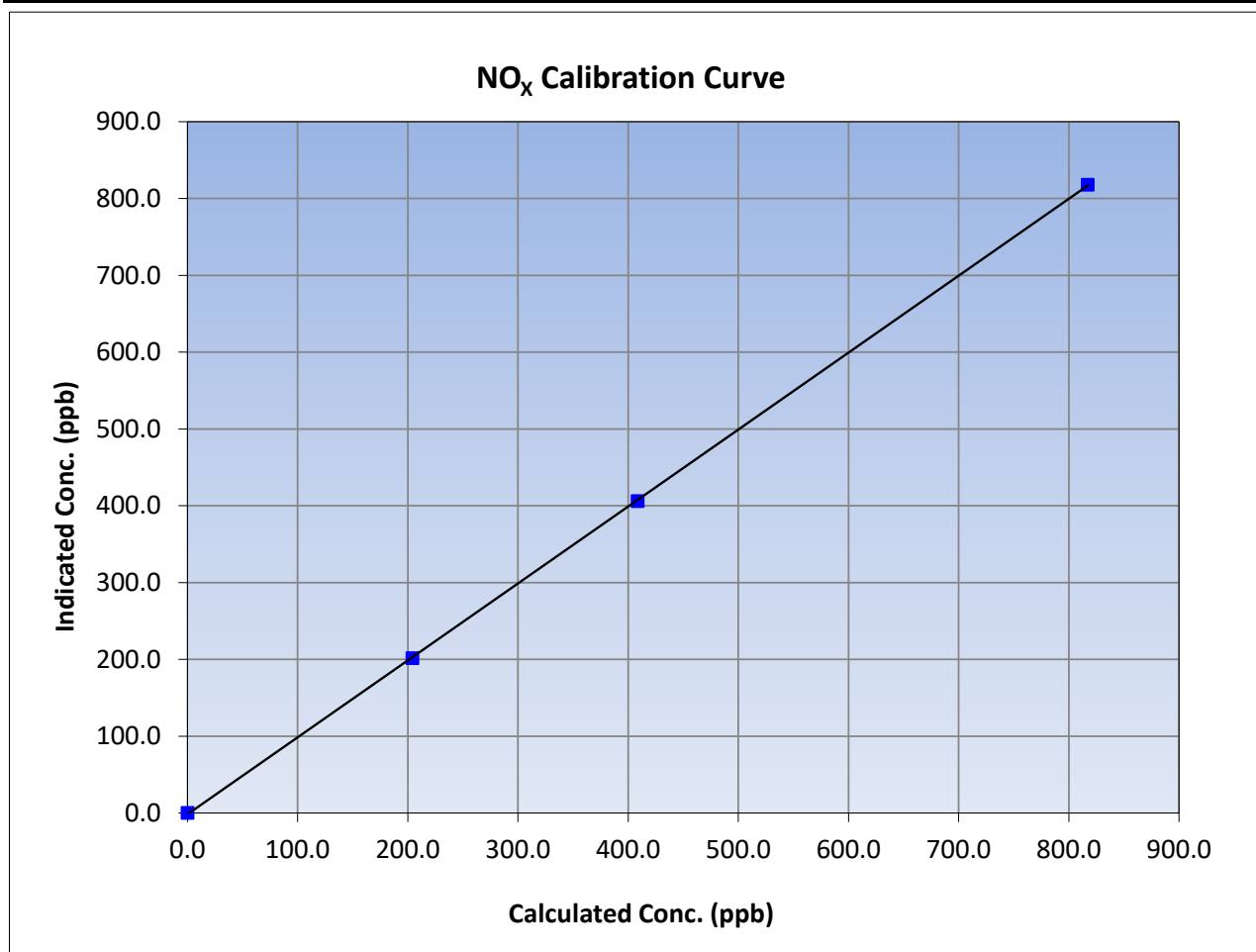
Version-04-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:10	End Time (MST):	15:05
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
817.2	818.0	0.9990		
408.6	406.2	1.0059		
204.3	201.6	1.0134		
			0.999978	
			1.001718	
			-1.660000	





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

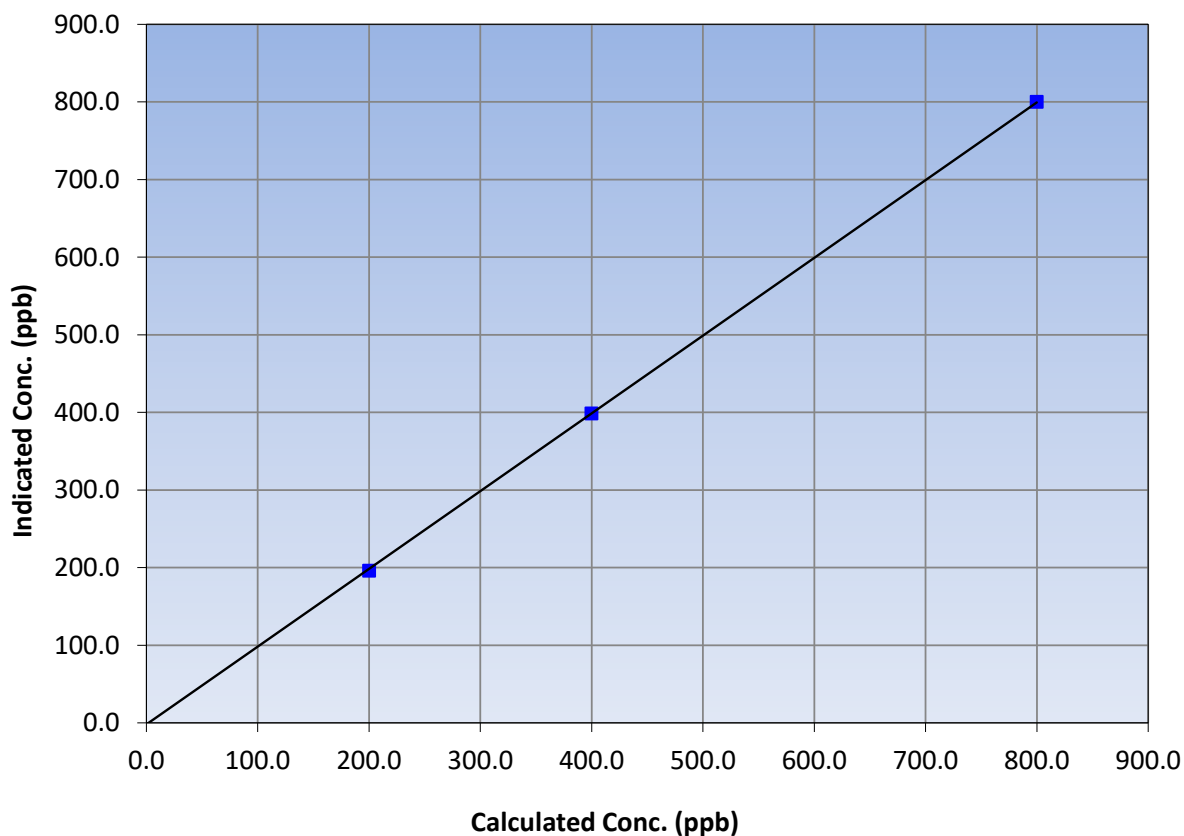
Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:10	End Time (MST):	15:05
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.2	----	Correlation Coefficient	0.999976	≥0.995
799.9	800.0	0.9999			
399.9	398.5	1.0036	Slope	1.001759	0.90 - 1.10
200.0	196.2	1.0192			
			Intercept	-1.940000	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

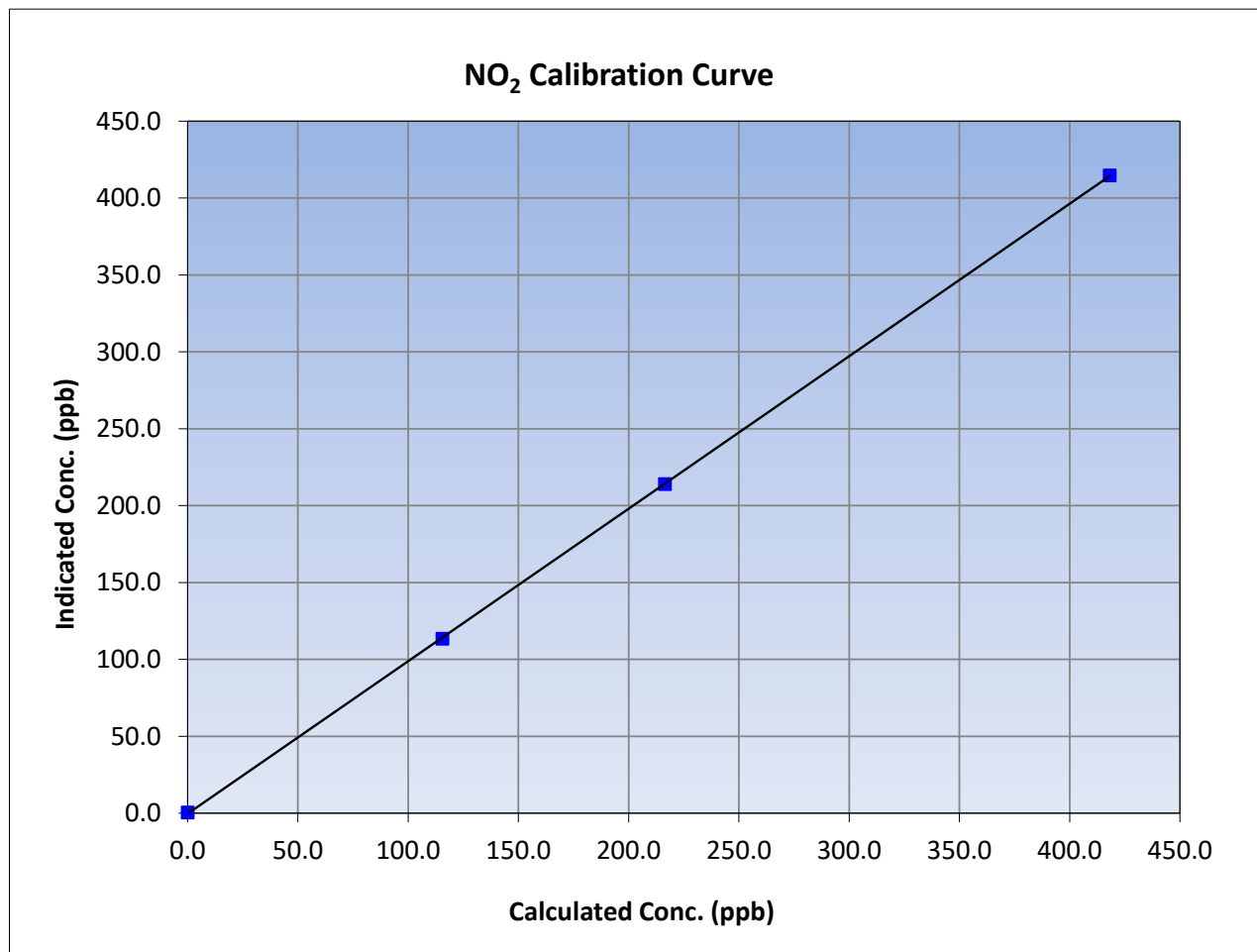
Version-04-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:10	End Time (MST):	15:05
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

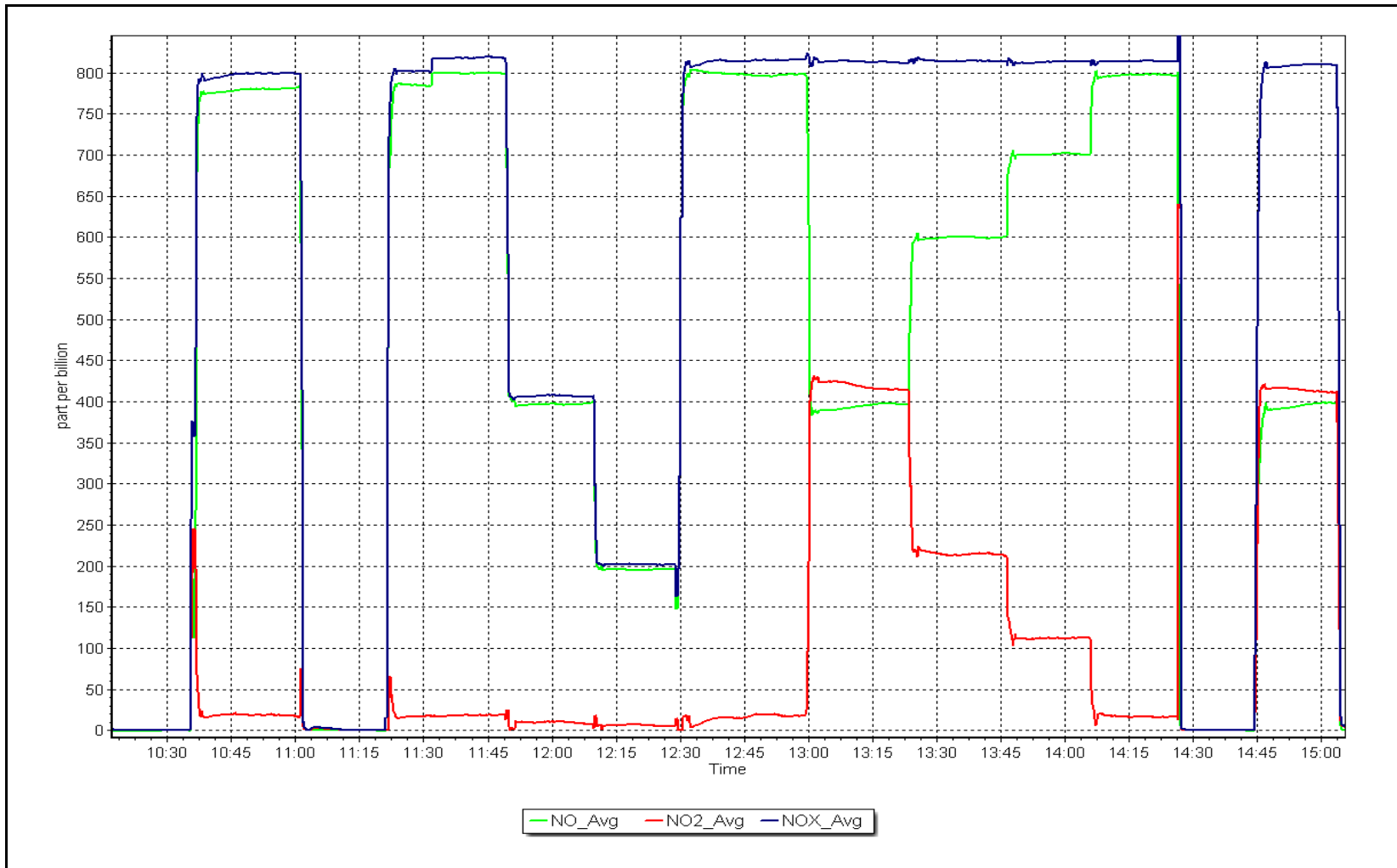
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.4	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
418.1	414.7	1.0082		
216.5	214.0	1.0117		
115.6	113.5	1.0186		



NO_x Calibration Plot

Date: April 25, 2023

Location: Wapasu





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	April 11, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	9:55	End time (MST):	13:13
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.006086	1.008600	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.540000	-0.380000	Coeff or Slope:	1.020	1.020

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	1077.3	400.0	403.6	0.991
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	1077.3	400.0	403.2	0.992
second point	5000	900.3	200.0	201.4	0.993
third point	5000	789.5	100.0	99.8	1.002
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	1077.3	400.0	405.8	0.986
Average Correction Factor					0.996

Baseline Corr As found:	403.5	Previous response	401.9	*% 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: Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

O₃ Calibration Summary

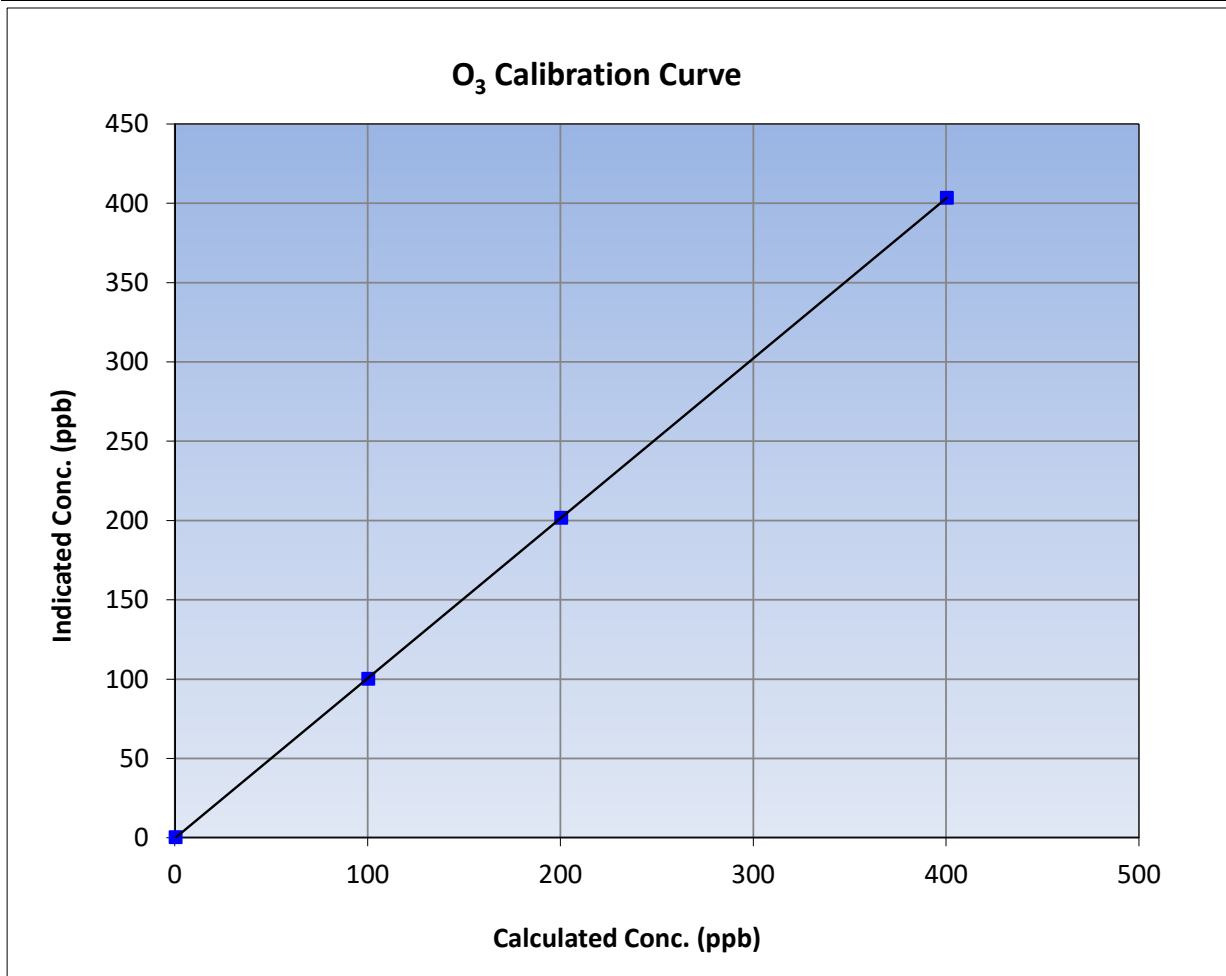
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 3, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:55	End Time (MST):	13:13
Analyzer make:	API T400	Analyzer serial #:	3870

Calibration Data

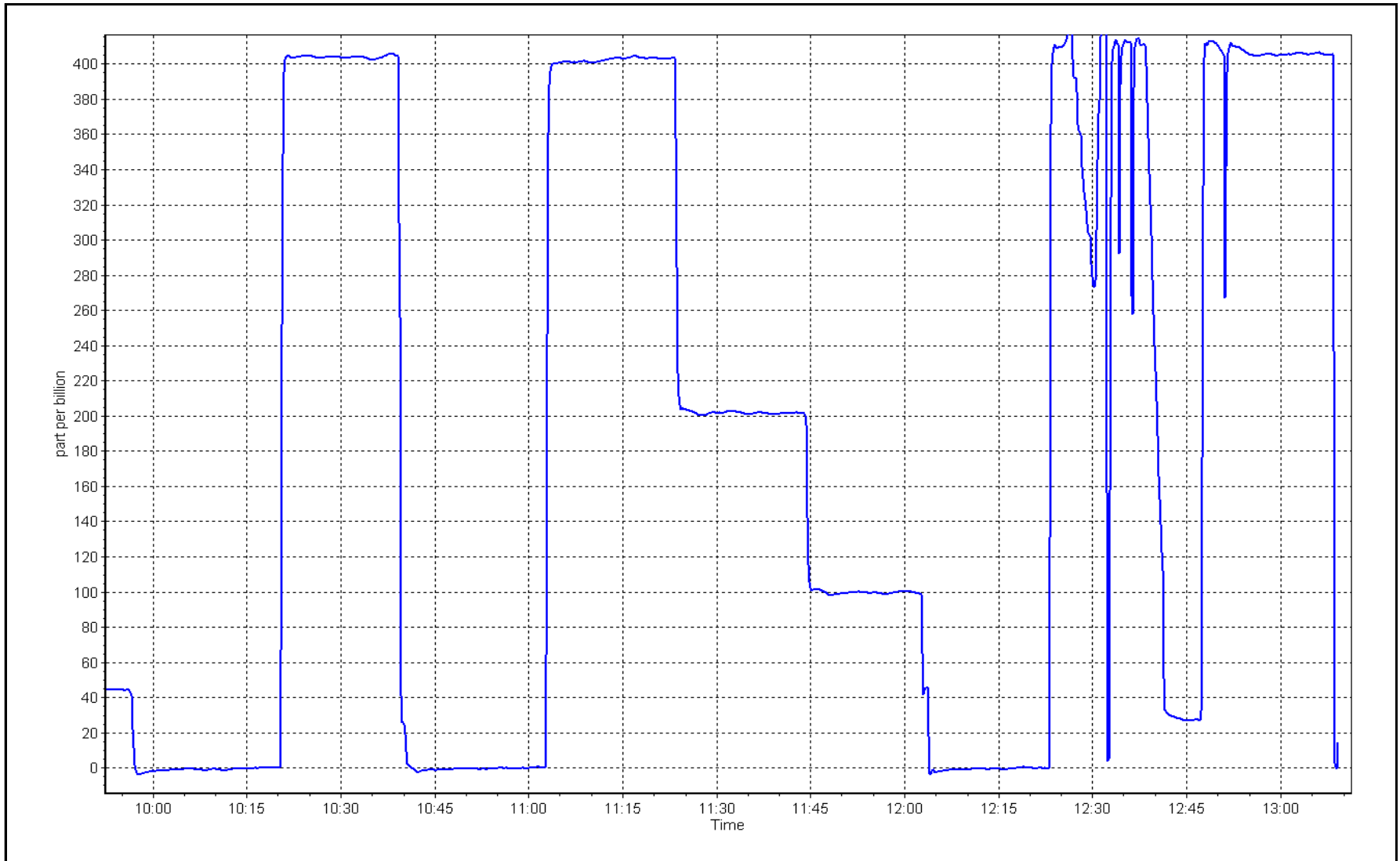
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999992	≥0.995
400.0	403.2	0.9921			
200.0	201.4	0.9930	Slope	1.008600	0.90 - 1.10
100.0	99.8	1.0020			
			Intercept	-0.380000	+/- 5



O₃ Calibration Plot

Date: April 11, 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: April 25, 2023 Last Cal Date: March 23, 2023
 Start time (MST): 13:15 End time (MST): 14:34

Analyzer Make: API T640 S/N: 1183
 Particulate Fraction: PM2.5

Flow Meter Make/Model: Alicat FP-25BT S/N: 388754
 Temp/RH standard: Alicat FP-25BT S/N: 388754

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	4.60	4.06	4.60	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	710.00	712.43	710.00	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	5.00	5.05	5.00	<input type="checkbox"/>	+/- 0.25 LPM

Leak Test: Date of check: April 25, 2023 Last Cal Date: March 23, 2023
 PM w/o HEPA: 6.9 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				<input type="checkbox"/>	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____
 Date Optical Chamber Cleaned: March 23, 2023 <0.2 ug/m3
 Disposable Filter Changed: March 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____
 Date RH/T Sensor Cleaned: _____

Notes: No adjustments made. Leak check passed.

Calibration by: Aswin Sasi Kumar



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18 STONY MOUNTAIN APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	April 27, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	9:50	End time (MST):	12:48
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.006974	0.997063	Backgd or Offset:	22.9	22.6
Calibration intercept:	-1.482948	0.035860	Coeff or Slope:	0.817	0.808

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5009	0.0	0.0	-0.2	----
as found span	4919	81.0	800.3	805.9	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4919	81.0	800.3	797.6	1.003
second point	4959	40.5	400.2	400.2	1.000
third point	4979	20.2	199.6	198.2	1.007
as left zero	5000	0.0	0.0	0.0	----
as left span	4919	81.0	800.3	799.2	1.001
Average Correction Factor					1.003

Baseline Corr As found:	806.10	Previous response	804.38	*% 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: Sample inlet filter changed after as founds. Adjusted the span only.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

SO₂ Calibration Summary

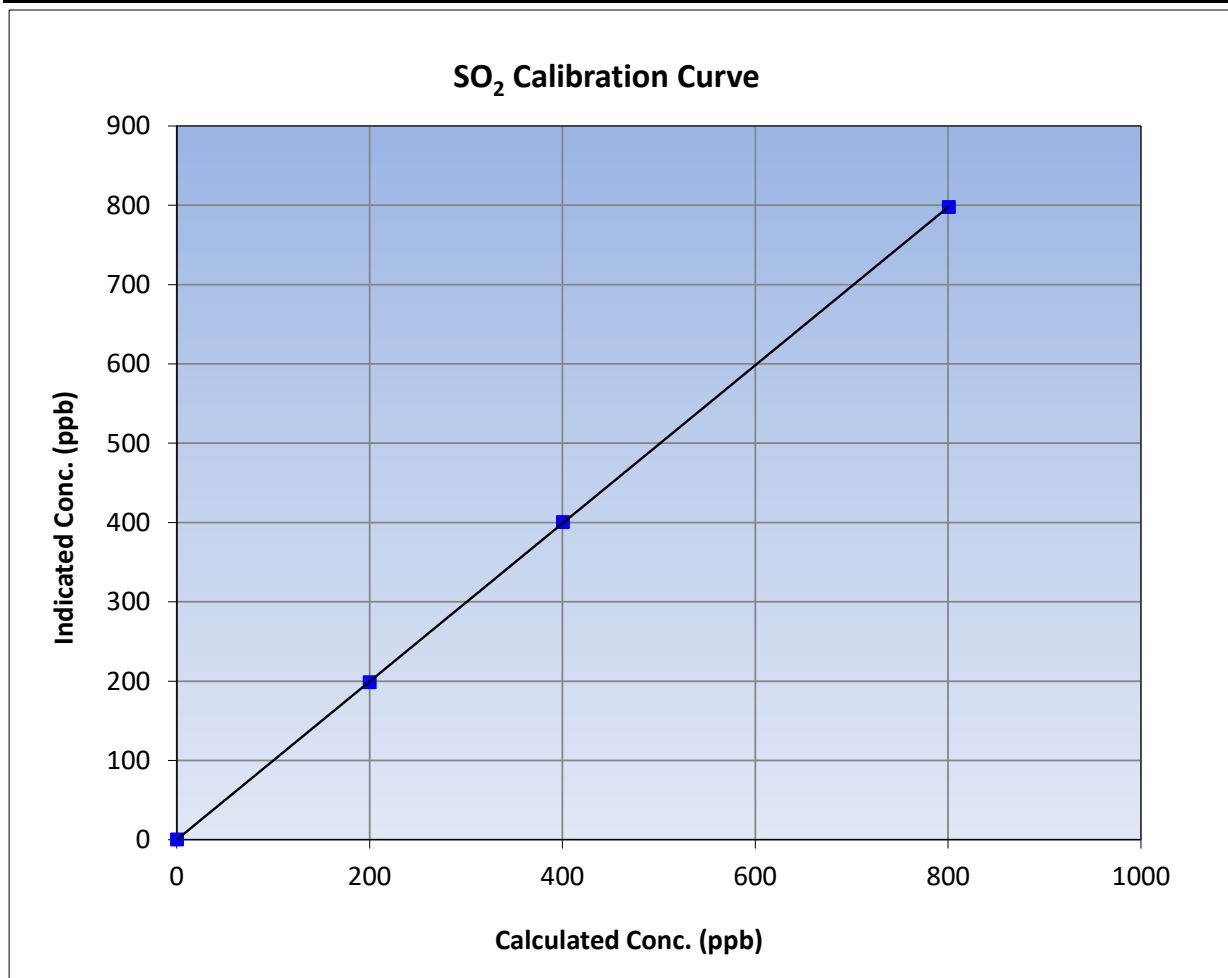
Version-01-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:50	End Time (MST):	12:48
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

Calibration Data

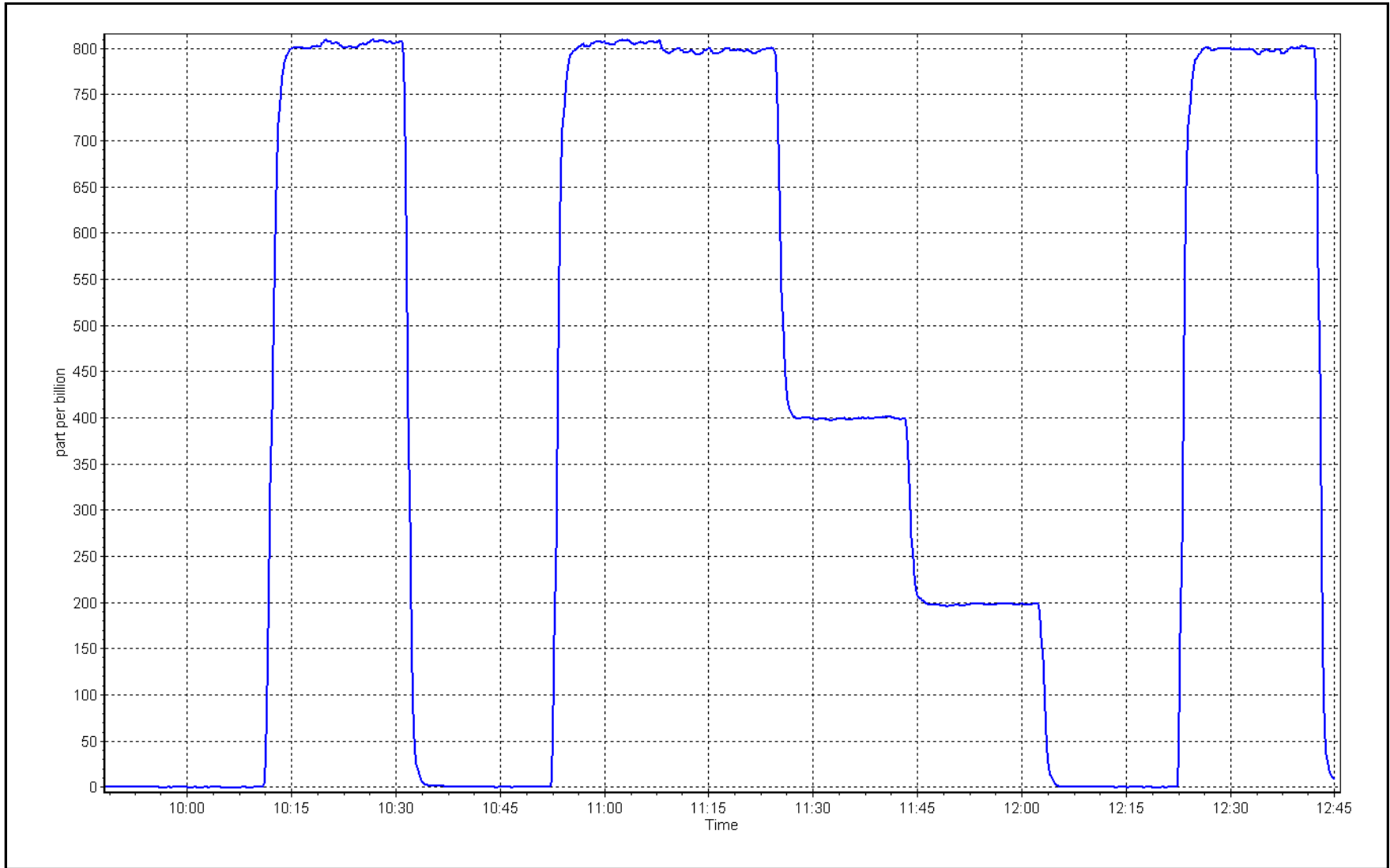
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999994	≥0.995
800.3	797.6	1.0034			
400.2	400.2	1.0000	Slope	0.997063	0.90 - 1.10
199.6	198.2	1.0071			
			Intercept	0.035860	+/-30



SO2 Calibration Plot

Date: April 27, 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:	April 26, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	9:37	End time (MST):	14:00
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.005159	0.994871	Backgd or Offset:	2.56	2.60
Calibration intercept:	0.260882	0.321057	Coeff or Slope:	1.151	1.151

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4927	73.0	80.0	78.6	1.019
as found 2nd point	4964	36.5	40.0	39.6	1.012
as found 3rd point	4983	18.3	20.0	19.5	1.033
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.2	----
high point	4927	73.0	80.0	79.8	1.002
second point	4964	36.5	40.0	40.3	0.992
third point	4983	18.3	20.0	20.3	0.988
as left zero	5000	0.0	0.0	0.3	----
as left span	4927	73.0	80.0	79.7	1.004
SO2 Scrubber Check	4923	77.1	771.0	0.0	----
Date of last scrubber change:	17-Dec-21			Ave Corr Factor	0.994
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.5	Prev response:	80.67	*% change:	-2.8%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.982863	AF Intercept:	0.041427
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999961		

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Scrubber check completed after calibrator zero. No adjustments made.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

TRS Calibration Summary

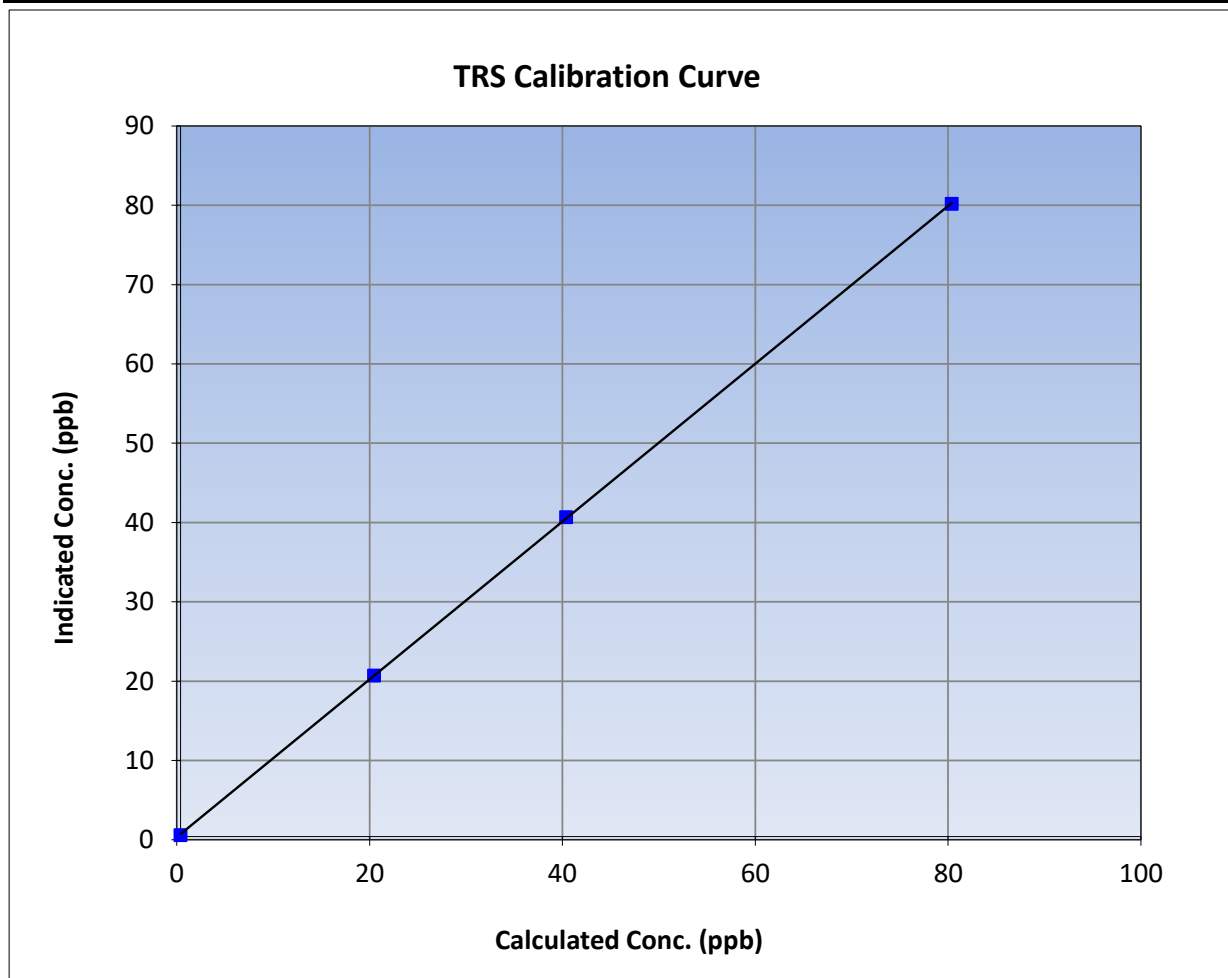
Version-11-2021

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 7, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	9:37	End Time (MST):	14:00
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

Calibration Data

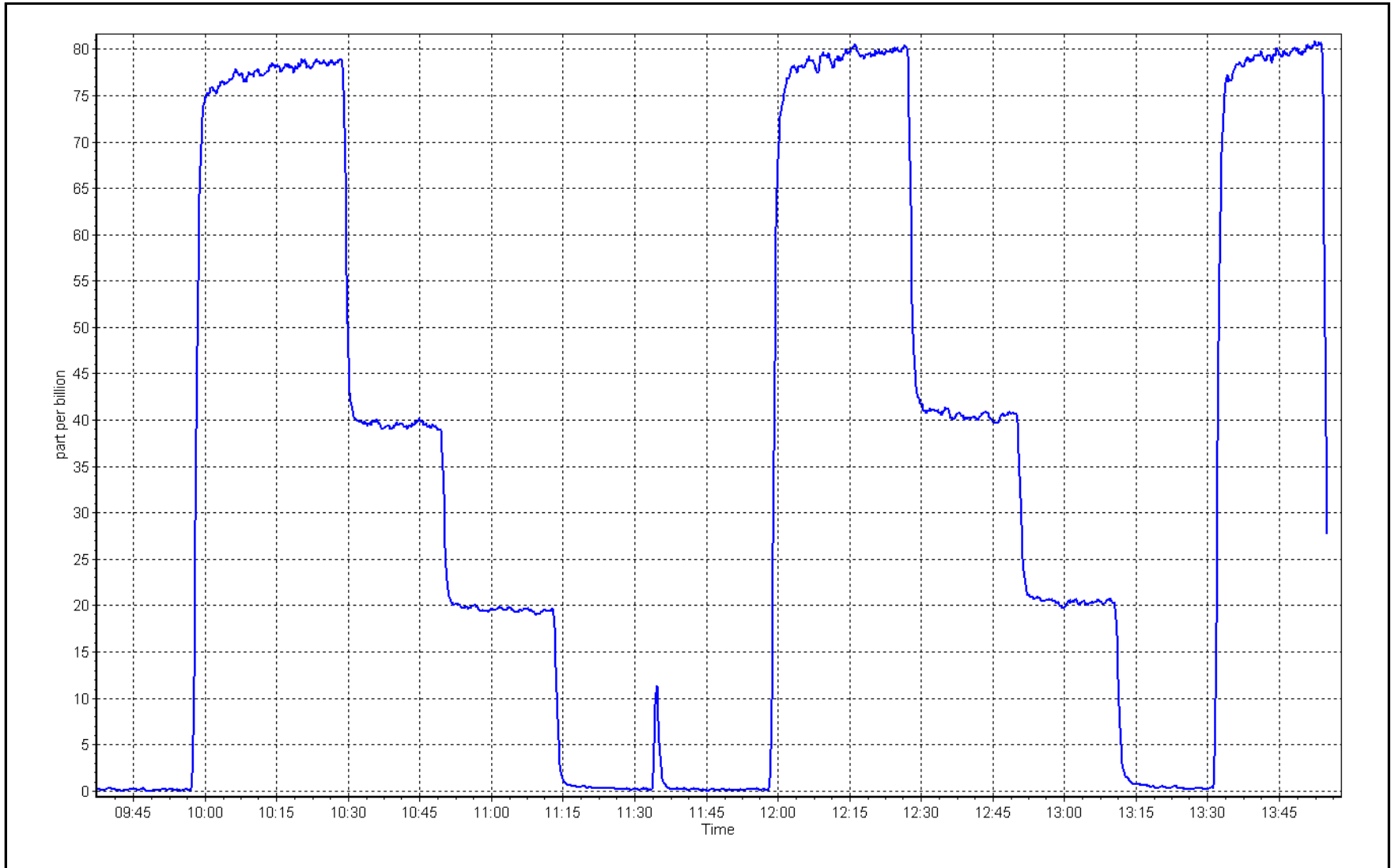
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999982	≥0.995
80.0	79.8	1.0024			
40.0	40.3	0.9924	Slope	0.994871	0.90 - 1.10
20.0	20.3	0.9876			
			Intercept	0.321057	+/-3



TRS Calibration Plot

Date: April 26, 2023

Location: Stony Mountain





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	April 27, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	9:50	End time (MST):	12:48
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC463851	Cal Gas Expiry Date:	February 23, 2025
CH ₄ Cal Gas Conc.	500.8 ppm	CH ₄ Equiv Conc.	1066.8 ppm
C ₃ H ₈ Cal Gas Conc.	205.8 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	500.8 ppm	CH ₄ Equiv Conc.	1066.8 ppm
Removed C ₃ H ₈ 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	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	3.06E-04	3.06E-04	NMHC SP Ratio:	5.66E-05
CH ₄ Retention time:	14.60	14.60	NMHC Peak Area:	162130
				159925

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	17.28	17.12	1.009
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	17.27	1.000
second point	4959	40.5	8.64	8.63	1.002
third point	4979	20.2	4.31	4.31	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.32	0.998

				Average Correction Factor	1.001
Baseline Corr AF:	17.12	Prev response	17.22	*% change	-0.6%
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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	9.03	1.015
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	9.17	1.000
second point	4959	40.5	4.58	4.59	0.998
third point	4979	20.2	2.29	2.30	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81	9.17	9.19	0.998
Average Correction Factor					0.997
Baseline Corr AF:	9.03	Prev response	9.11	*% change	-0.8%
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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	8.11	8.09	1.003
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	8.11	1.001
second point	4959	40.5	4.06	4.03	1.006
third point	4979	20.2	2.02	2.00	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.14	0.997
Average Correction Factor					1.006
Baseline Corr AF:	8.09	Prev response	8.11	*% 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

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	0.997054	0.999520
THC Cal Offset:	-0.008797	-0.003183
CH ₄ Cal Slope:	1.001440	0.999834
CH ₄ Cal Offset:	-0.011209	-0.012012
NMHC Cal Slope:	0.992924	0.999279
NMHC Cal Offset:	0.002412	0.008428

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

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

THC Calibration Summary

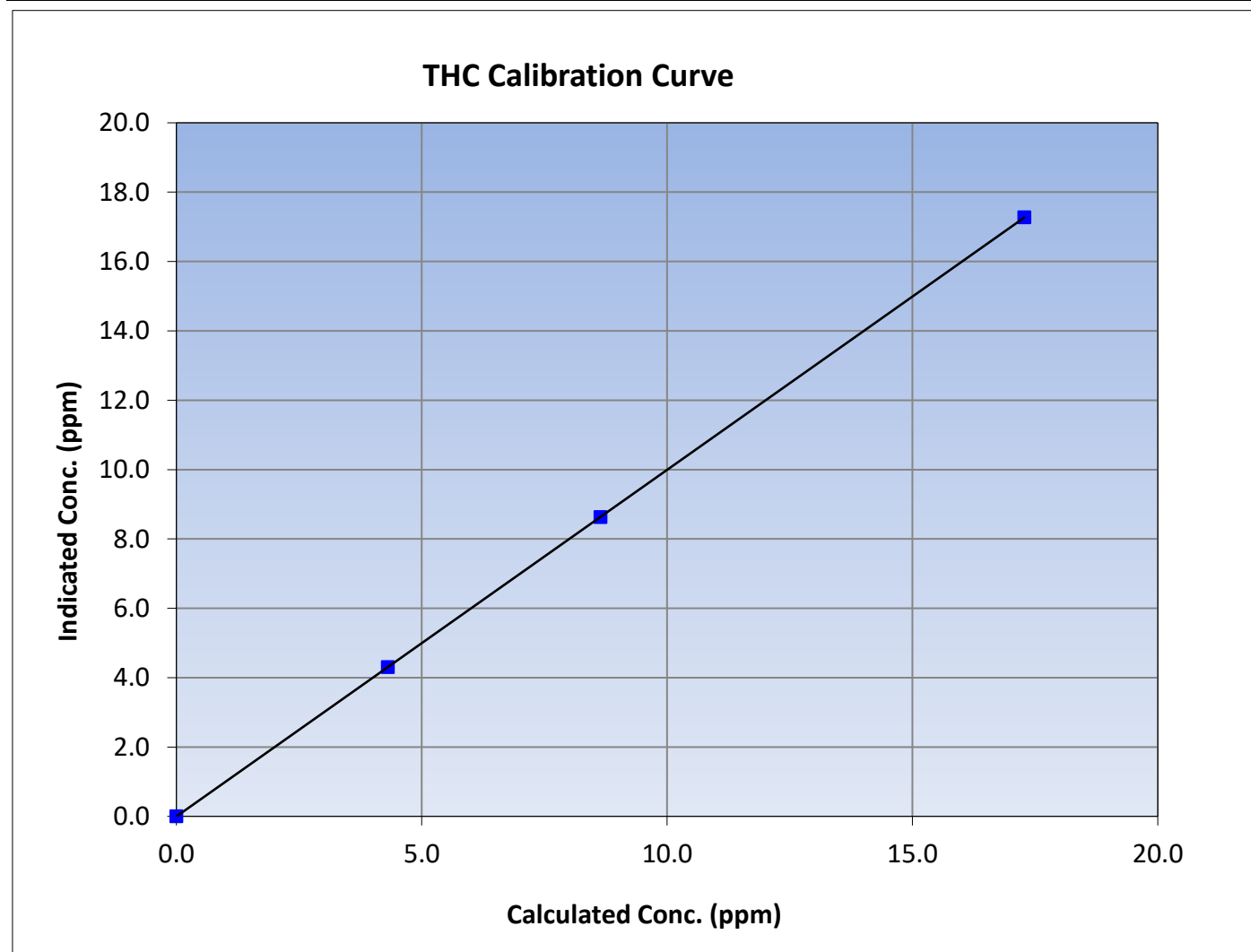
Version-01-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:50	End Time (MST):	12:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	1.000000	≥ 0.995
17.28	17.27	1.0005			
8.64	8.63	1.0016			
4.31	4.31	1.0012			
			Slope	0.999520	0.90 - 1.10
			Intercept	-0.003183	+/-0.5





Wood Buffalo Environmental Association

CH₄ Calibration Summary

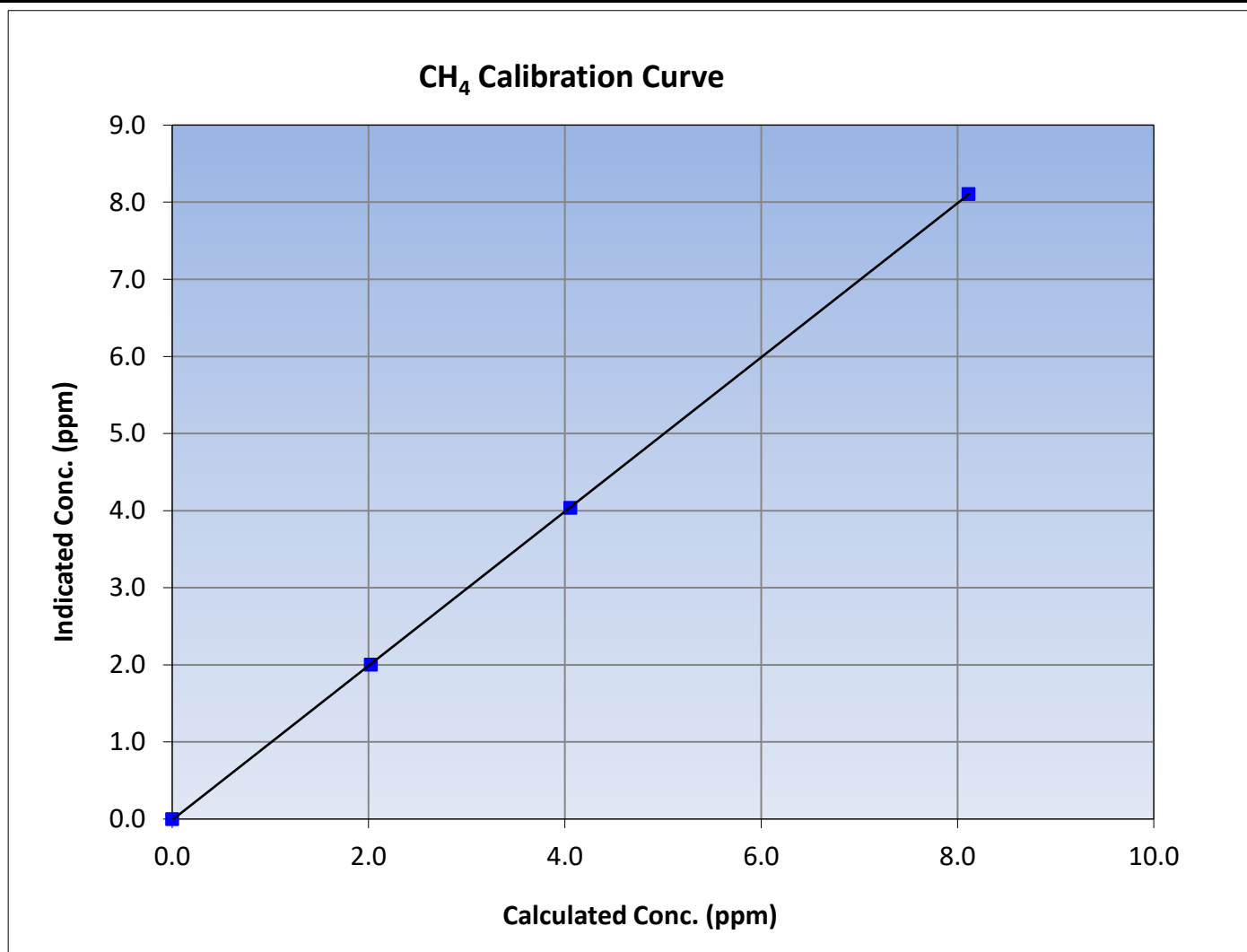
Version-01-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:50	End Time (MST):	12:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999989	≥ 0.995
8.11	8.11	1.0007			
4.06	4.03	1.0057			
2.02	2.00	1.0108			
			Slope	0.999834	0.90 - 1.10
			Intercept	-0.012012	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

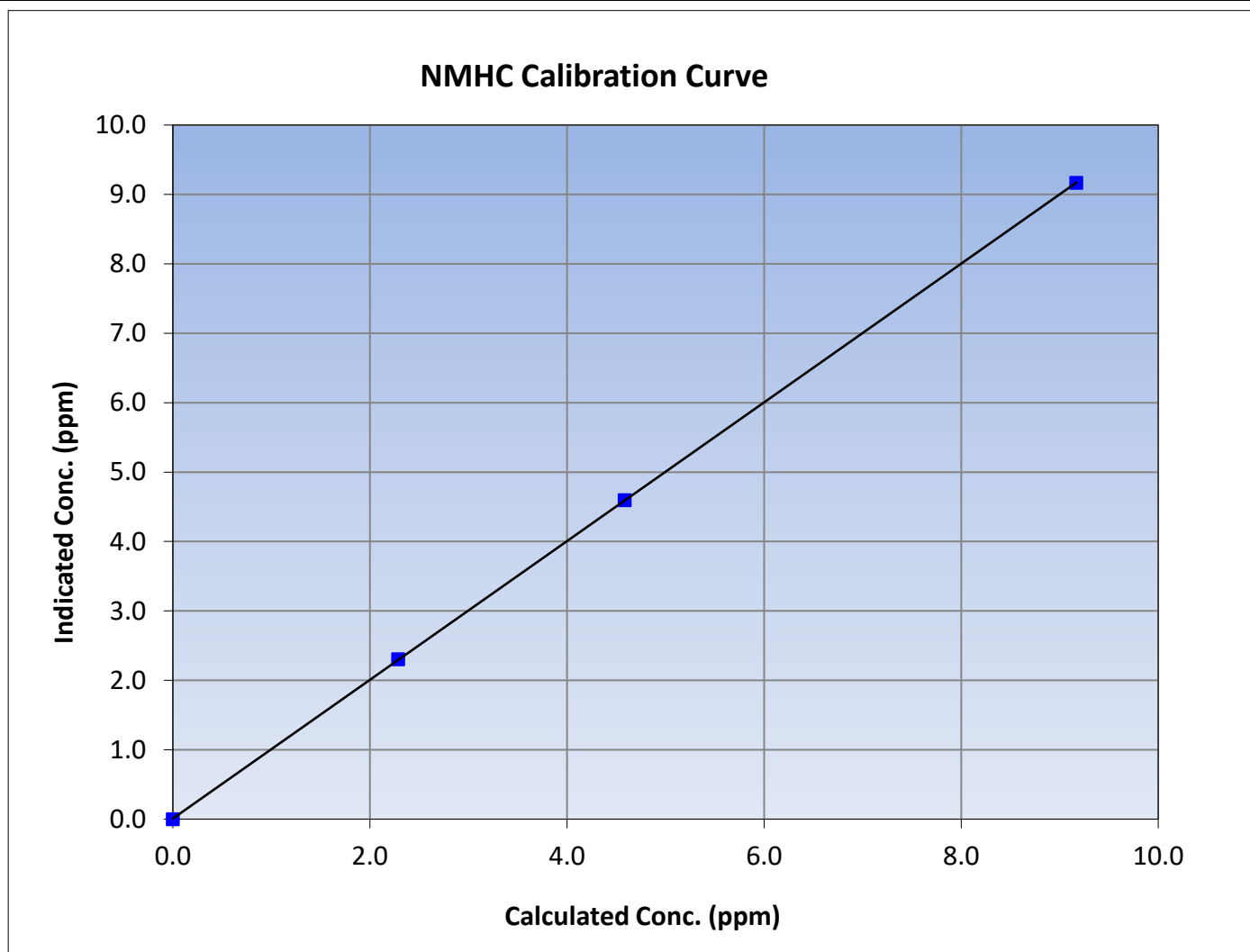
Version-01-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:50	End Time (MST):	12:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

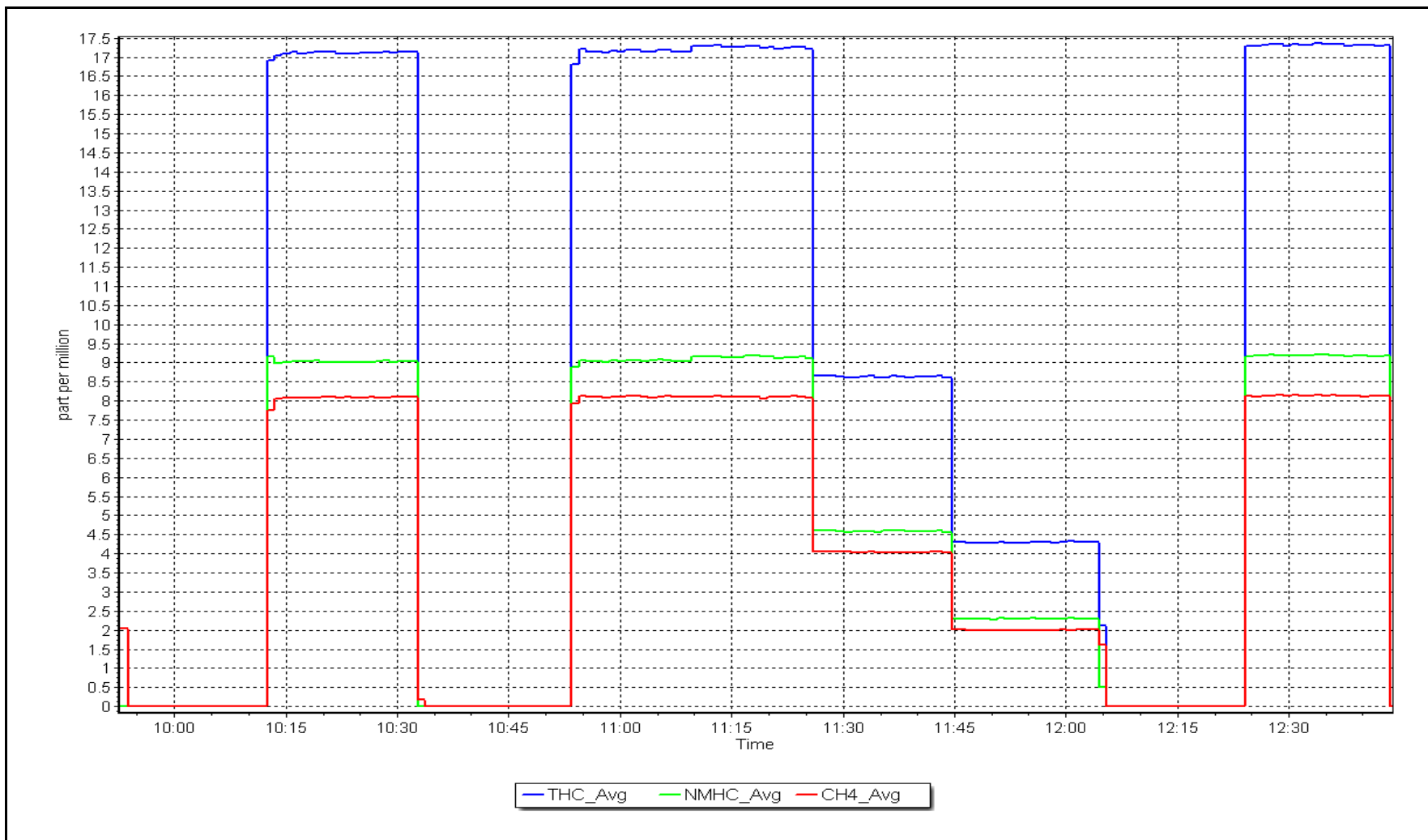
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999996	≥ 0.995
9.17	9.17	1.0003			
4.58	4.59	0.9980			
2.29	2.30	0.9934			
			Slope	0.999279	0.90 - 1.10
			Intercept	0.008428	+/-0.5



NMHC Calibration Plot

Date: April 27, 2023

Location: Stony Mountain





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Stony Mountain Station number: AMS 18
Calibration Date: April 20, 2023 Last Cal Date: March 22, 2023
Start time (MST): 9:18 End time (MST): 13:45
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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.062	1.062	NO bkgnd or offset:	3.0	3.0
NOX coeff or slope:	0.984	0.984	NOX bkgnd or offset:	3.0	3.0
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	223.9	230.2

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999873	0.993566
NO _x Cal Offset:	-0.210265	0.129802
NO Cal Slope:	1.002239	0.995555
NO Cal Offset:	-0.950426	-1.209770
NO ₂ Cal Slope:	0.999365	0.999137
NO ₂ Cal Offset:	-0.185598	0.306137



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4919	81.3	820.8	800.3	20.5	815.7	793.7	22.1	1.0062	1.0083
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	4919	81.3	820.8	800.3	20.5	815.4	796.0	19.3	1.0066	1.0054
second point	4959	40.7	410.9	400.7	10.3	409.0	397.4	11.6	1.0047	1.0082
third point	4980	20.3	204.9	199.8	5.1	203.4	196.3	7.1	1.0076	1.0179
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.1	----	----
as left span	4919	81.3	820.8	380.5	440.3	818.6	374.0	444.7	1.0026	1.0173
Average Correction Factor									1.0063	1.0105

Corrected As found	NO _x = 815.8 ppb	NO = 793.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -0.6%	
Previous Response	NO _x = 820.4 ppb	NO = 801.1 ppb		*Percent Change	NO = -0.9%	
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:	Nx Int:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:	NO Int:
			As found	NO ₂ r ² :	NO ₂ SI:	NO ₂ Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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	375.0	440.3	440.2	1.0002	100.0%
2nd GPT point (200 ppb O3)	794.8	584.8	230.5	230.4	1.0004	100.0%
3rd GPT point (100 ppb O3)	794.8	693.5	121.8	122.4	0.9950	100.5%
Average Correction Factor					0.9985	100.1%

Notes: Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

NO_x Calibration Summary

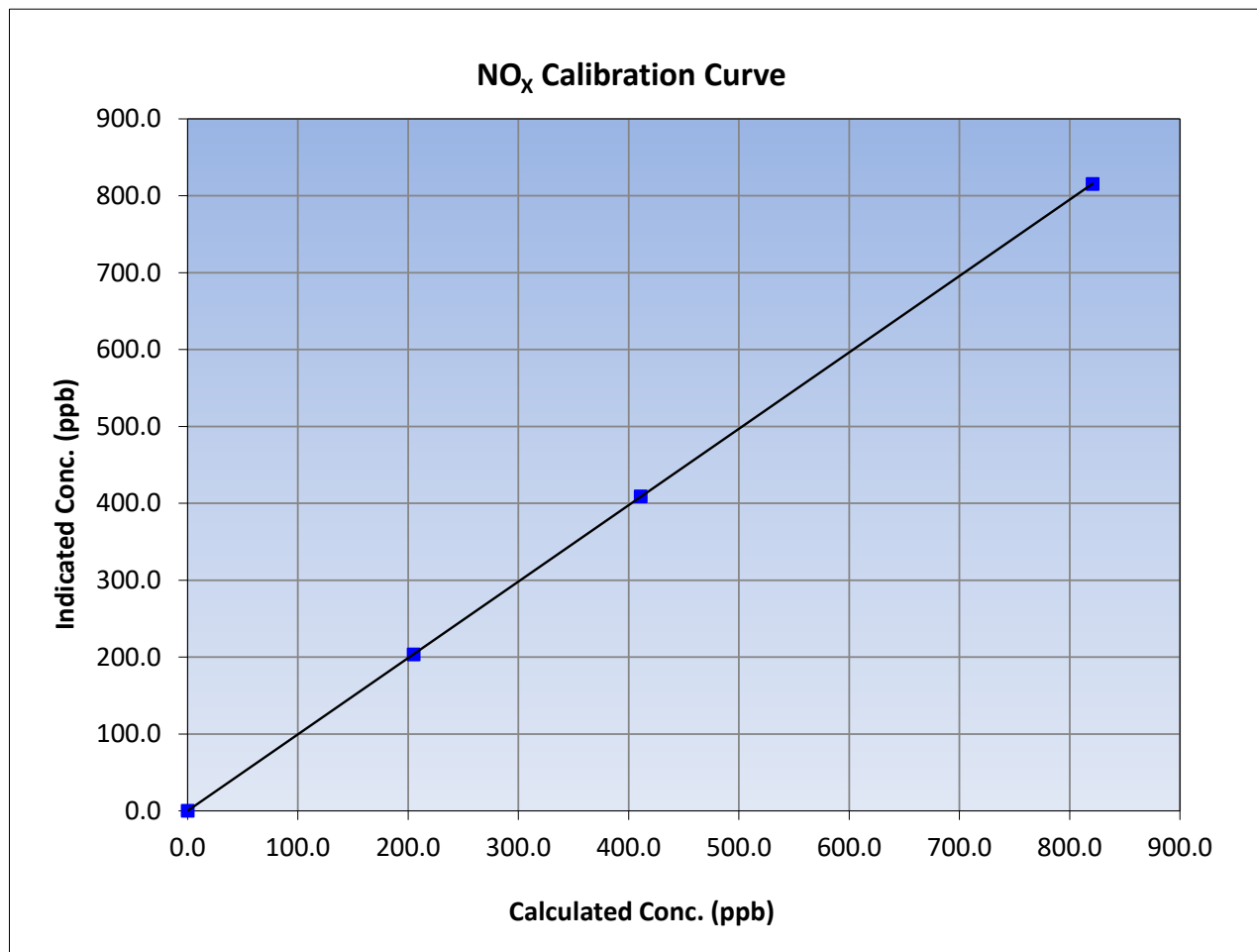
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 22, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:18	End Time (MST):	13:45
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.1	----	Correlation Coefficient	≥0.995	
820.8	815.4	1.0066			
410.9	409.0	1.0047			
204.9	203.4	1.0076			
			Slope	0.993566	0.90 - 1.10
			Intercept	0.129802	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

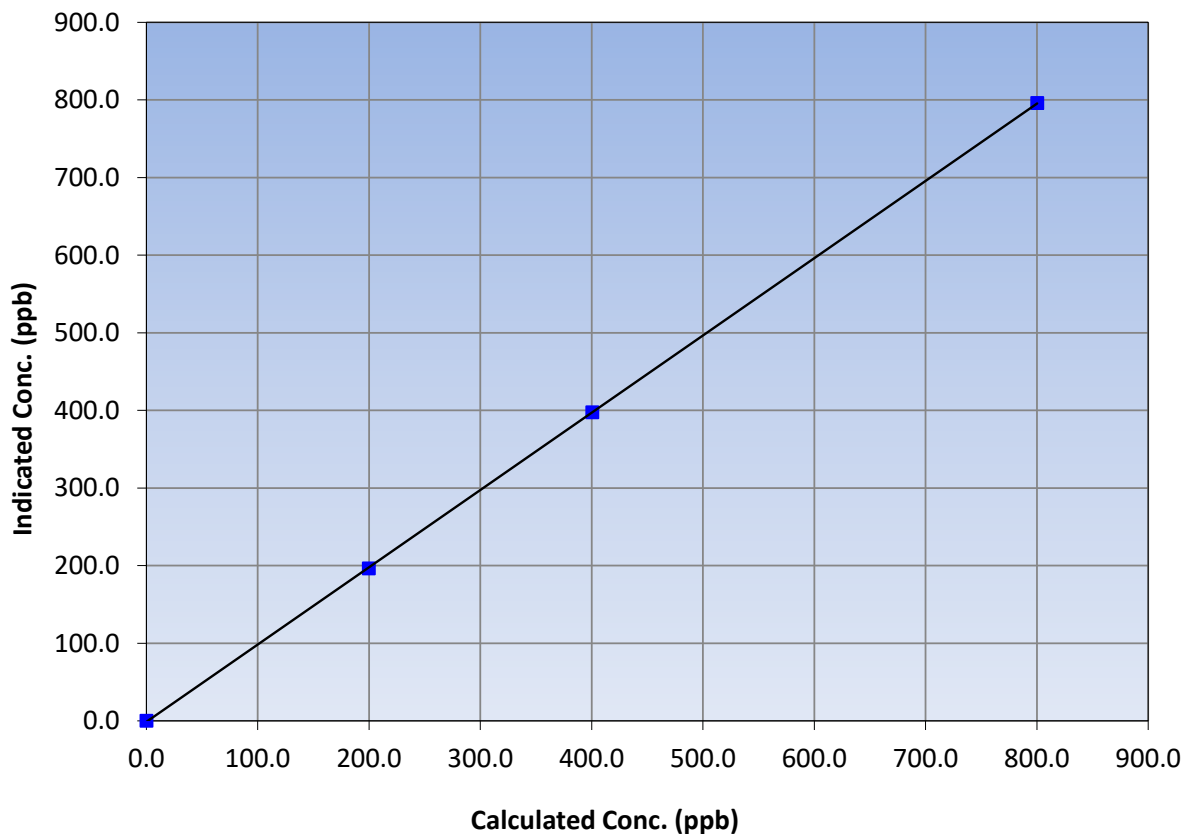
Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 22, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:18	End Time (MST):	13:45
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	0.0	----	Correlation Coefficient	≥0.995	
800.3	796.0	1.0054			
400.7	397.4	1.0082			
199.8	196.3	1.0179			
			Slope	0.995555	0.90 - 1.10
			Intercept	-1.209770	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

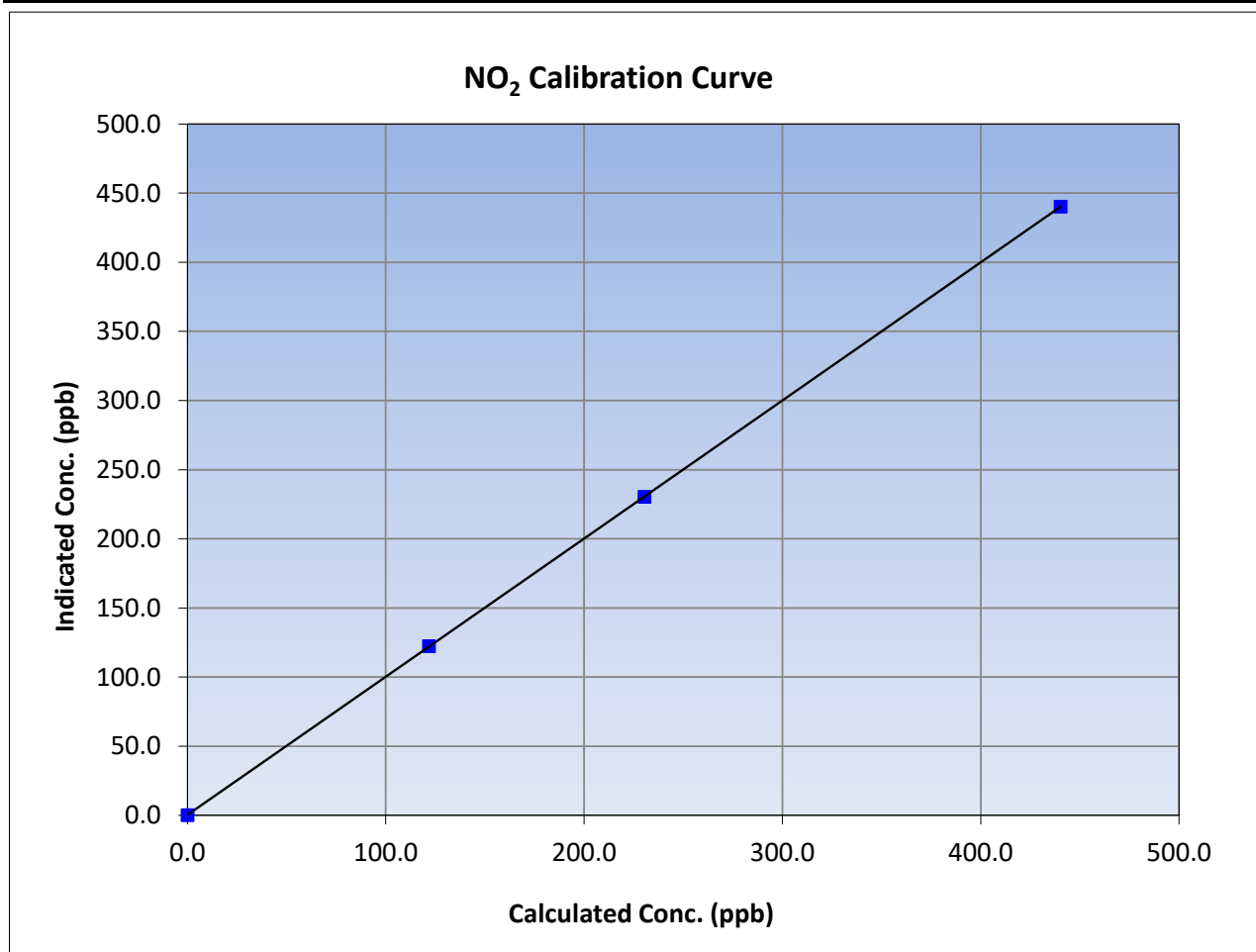
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 22, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:18	End Time (MST):	13:45
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

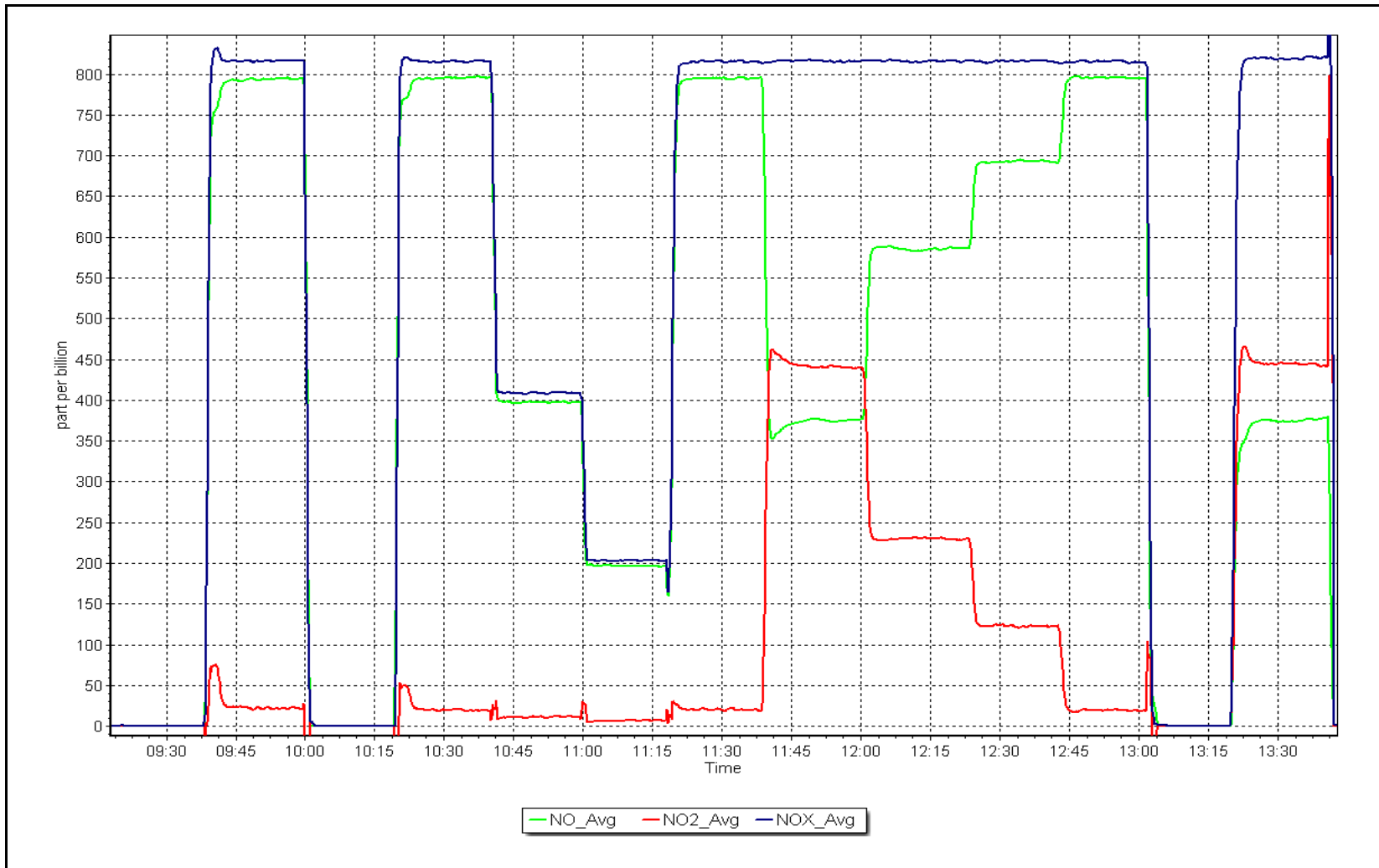
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.1	----	Correlation Coefficient	≥0.995	
440.3	440.2	1.0002			
230.5	230.4	1.0004			
121.8	122.4	0.9950			
			Slope	0.999137	0.90 - 1.10
			Intercept	0.306137	+/-20



NO_x Calibration Plot

Date: April 20, 2023

Location: Stony Mountain





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name: Stony Mountain Station number: AMS18
 Calibration Date: April 4, 2023 Last Cal Date: March 1, 2023
 Start time (MST): 9:28 End time (MST): 12:50
 Reason: Routine

Calibration Standards

O3 generation mode: Photometer
 Calibrator Make/Model: Teledyne API T700 Serial Number: 2658
 ZAG Make/Model: Teledyne API T701H Serial Number: 360

Analyzer Information

Analyzer make: API T400 Analyzer serial #: 825
 Analyzer Range 0 - 500 ppb

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.993829	0.999114	Backgd or Offset:	1.000	1.000
Calibration intercept:	0.180000	-0.420000	Coeff or Slope:	0.993	0.993

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	800.0	0.0	-0.3	----
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	-0.3	----
high point	4888	1101.7	400.0	399.3	1.002
second point	4888	863.9	200.0	199.3	1.004
third point	4888	741.4	100.0	99.4	1.006
as left zero	5000	800.0	0.0	0.1	----
as left span	4812	1097.9	400.0	400.6	0.999
Average Correction Factor					1.004

Baseline Corr As found:	401.4	Previous response	397.7	*% 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: Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

O₃ Calibration Summary

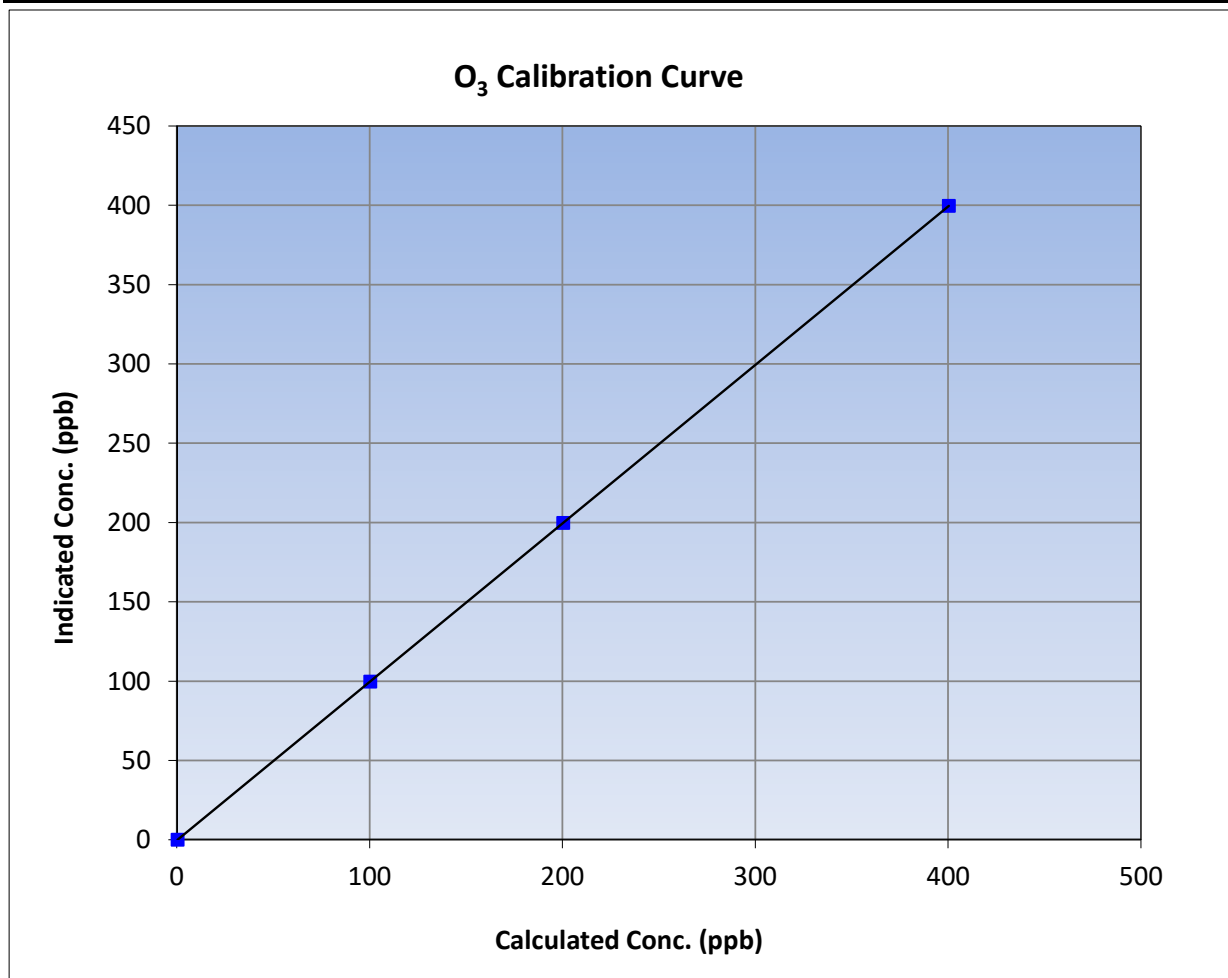
Version-01-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 1, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	9:28	End Time (MST):	12:50
Analyzer make:	API T400	Analyzer serial #:	825

Calibration Data

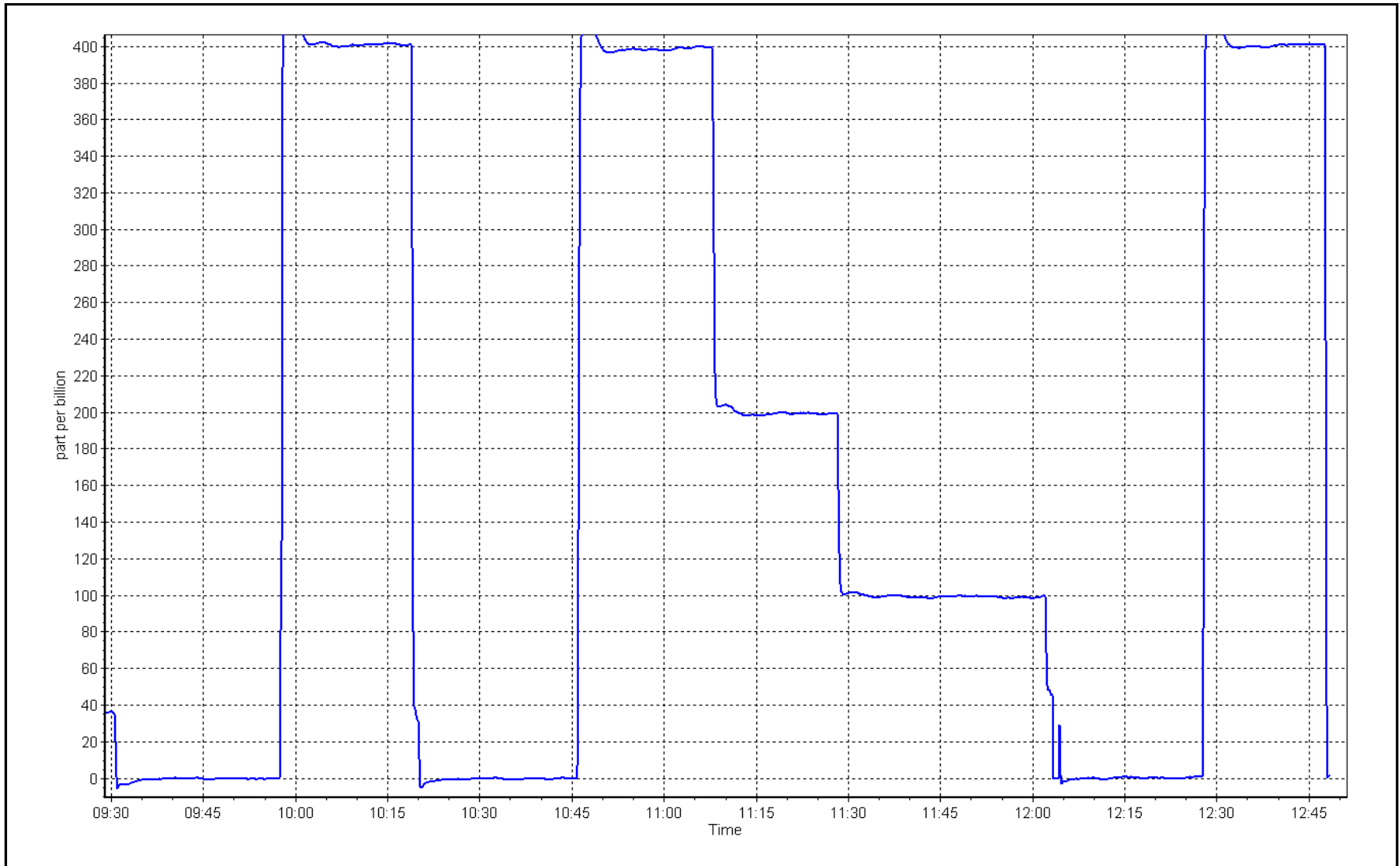
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.3	----	Correlation Coefficient	1.000000	≥0.995
400.0	399.3	1.0018			
200.0	199.3	1.0035	Slope	0.999114	0.90 - 1.10
100.0	99.4	1.0060			
			Intercept	-0.420000	+/- 5



O₃ Calibration Plot

Date: April 4, 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: April 19, 2023 Last Cal Date: March 22, 2023
 Start time (MST): 10:23 End time (MST): 10:45

Analyzer Make: API T640 S/N: 1335
 Particulate Fraction: PM2.5

Flow Meter Make/Model: Delta Cal S/N: 1102
 Temp/RH standard: Delta Cal S/N: 1102

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	0.5	0.7	0.5	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	701.5	703.2	701.5	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	5.01	4.92	5.01	<input type="checkbox"/>	+/- 0.25 LPM

Leak Test: Date of check: April 19, 2023 Last Cal Date: March 22, 2023
 PM w/o HEPA: 0.7 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	-37.0			<input type="checkbox"/>	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____
 Date Optical Chamber Cleaned: March 22, 2023 **<0.2 ug/m3**
 Disposable Filter Changed: March 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022
 Date RH/T Sensor Cleaned: August 30, 2022

Notes: Removal checks for instrument change out.

Calibration by: Karan Pandit



Wood Buffalo Environmental Association

T640 PM_{2.5} CALIBRATION

Version-01-2023

Station Information

Station Name: Stony Mountain Station number: AMS 18
 Calibration Date: April 19, 2023 Last Cal Date: NA
 Start time (MST): 10:50 End time (MST): 11:22

Analyzer Make: API T640 S/N: 1162
 Particulate Fraction: PM2.5

Flow Meter Make/Model: Delta Cal S/N: 1102
 Temp/RH standard: Delta Cal S/N: 1102

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	0.9	0.8	0.9	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	704.1	704.6	704.1	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	4.99	4.71	4.99	<input checked="" type="checkbox"/>	+/- 0.25 LPM

Leak Test: Date of check: April 19, 2023 Last Cal Date: NA
 PM w/o HEPA: 2.2 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		10.9	<input type="checkbox"/>	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 4.8 w/ HEPA: 0.0
 Date Optical Chamber Cleaned: March 22, 2023 <0.2 ug/m3
 Disposable Filter Changed: March 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022
 Date RH/T Sensor Cleaned: August 30, 2022

Notes: Install calibration. Adjusted the flow only. Leak check passed. No PMT adjustments made.

Calibration by: Karan Pandit



Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	April 12, 2023	Last Cal Date:	March 24, 2023
Start time (MST):	9:32	End time (MST):	12:10
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.002302	1.011069	Backgd or Offset:	-0.009	-0.012
Calibration intercept:	0.205803	0.019763	Coeff or Slope:	0.904	0.912

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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.2	----
as found span	4933	66.7	40.7	41.1	0.990
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	41.1	0.990
second point	4966	33.3	20.3	20.7	0.981
third point	4983	16.7	10.2	10.3	0.991
as left zero	3000	0.0	0.0	0.0	----
as left span	2960	40.0	40.7	41.2	0.987
Average Correction Factor					0.987

Baseline Corr As found:	40.87	Prev response:	40.99	*% 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 the zero only.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

CO Calibration Summary

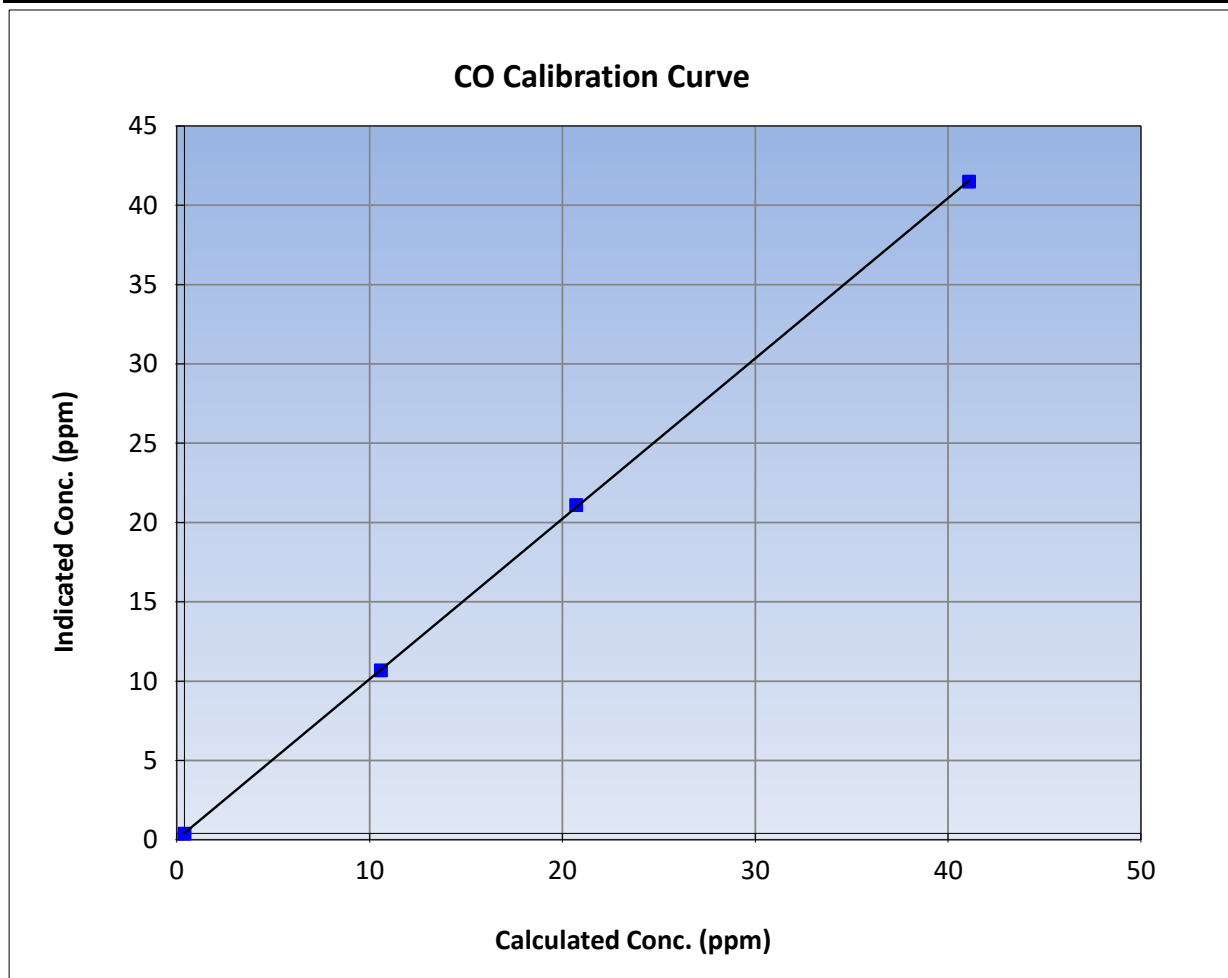
Version-01-2020

Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 24, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:32	End Time (MST):	12:10
Analyzer make:	API T300	Analyzer serial #:	3504

Calibration Data

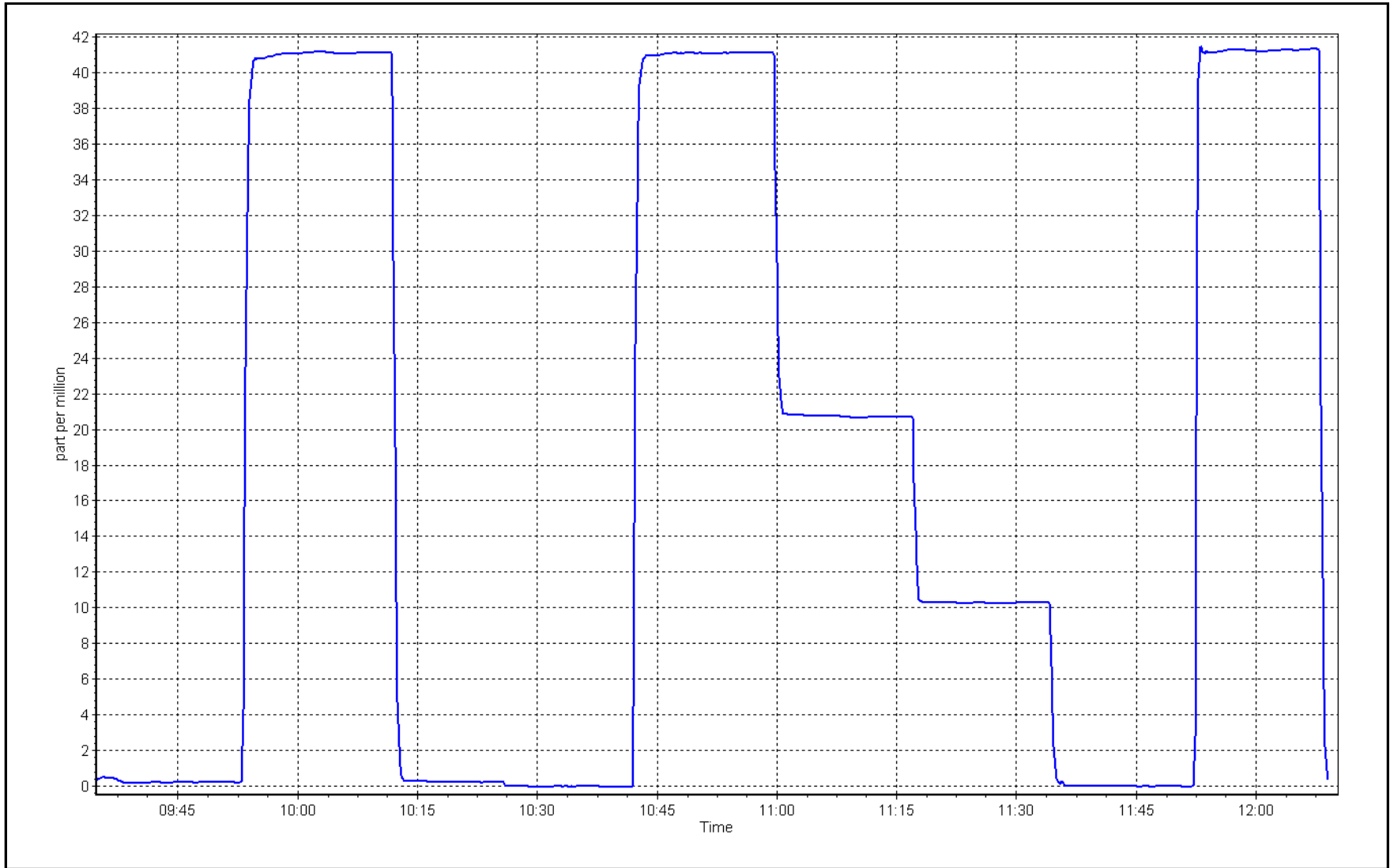
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999972	≥0.995
40.7	41.1	0.9900			
20.3	20.7	0.9814	Slope	1.011069	0.90 - 1.10
10.2	10.3	0.9910			
			Intercept	0.019763	+/-1.5



CO Calibration Plot

Date: April 12, 2023

Location: Stony Mountain





Wood Buffalo Environmental Association

CO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	April 19, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	10:02	End time (MST):	13:12
Reason:	Maintenance		

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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.008751	1.012352	Backgd or Offset:	-0.059	-0.069
Calibration intercept:	4.460000	0.980000	Coeff or Slope:	1.066	1.076

CO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	3000	0.0	0.0	0.6	----
as found span	2920	80.0	1605.9	1612.7	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	----
high point	2920	80.0	1605.9	1624.1	0.989
second point	2960	40.0	802.9	820.5	0.979
third point	2980	20.0	401.5	404.4	0.993
as left zero	3000	0.0	0.0	0.5	----
as left span	2930	80.0	1600.5	1621.9	0.987
Average Correction Factor					0.987

Baseline Corr As found:	1612.10	Prev response:	1624.38	*% 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. Adjusted the zero only.

Calibration Performed By: Karan Pandit



Wood Buffalo Environmental Association

CO₂ Calibration Summary

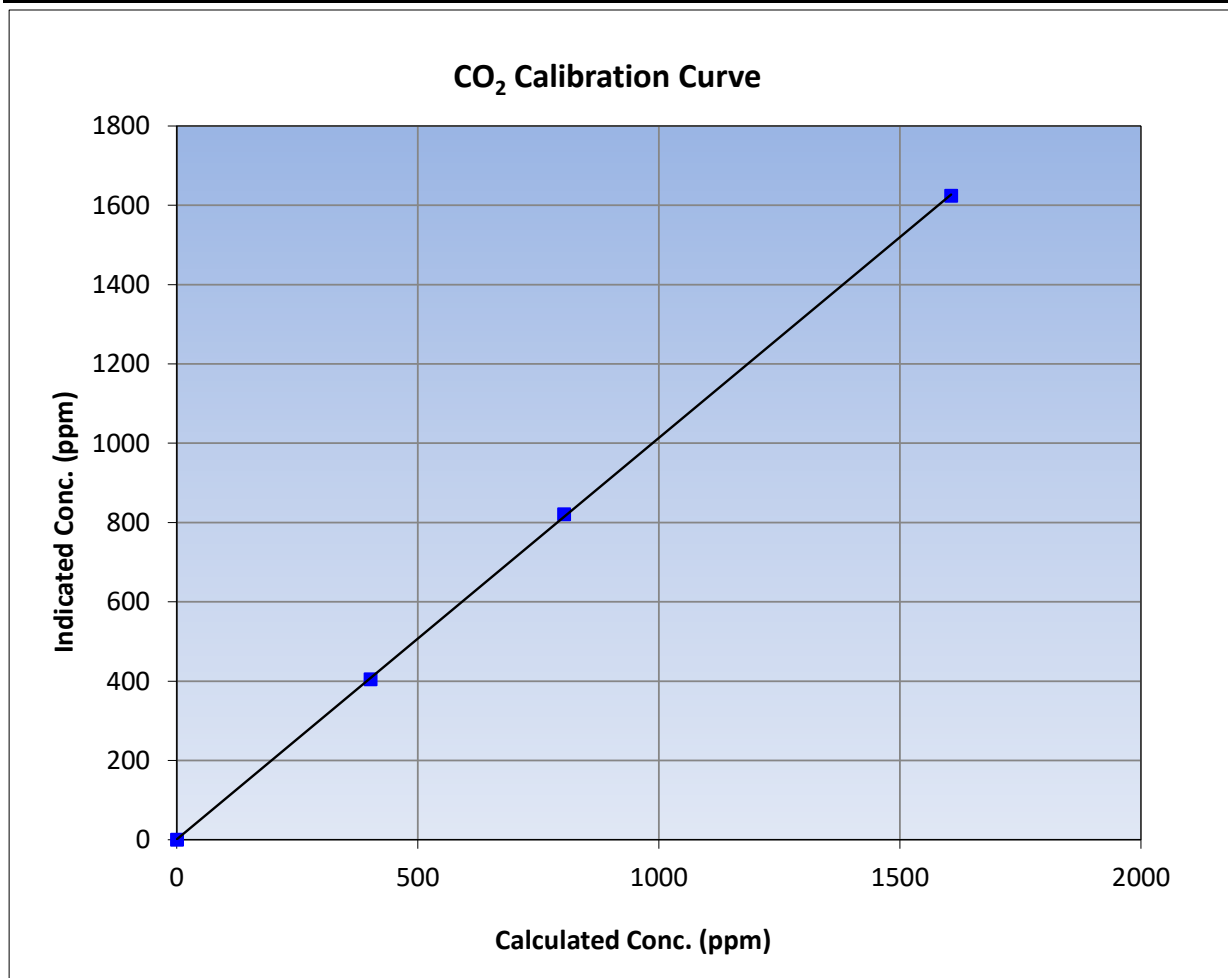
Version-01-2020

Station Information

Calibration Date	April 19, 2023	Previous Calibration	March 29, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:02	End Time (MST)	13:12
Analyzer make	API T360	Analyzer serial #	283

Calibration Data

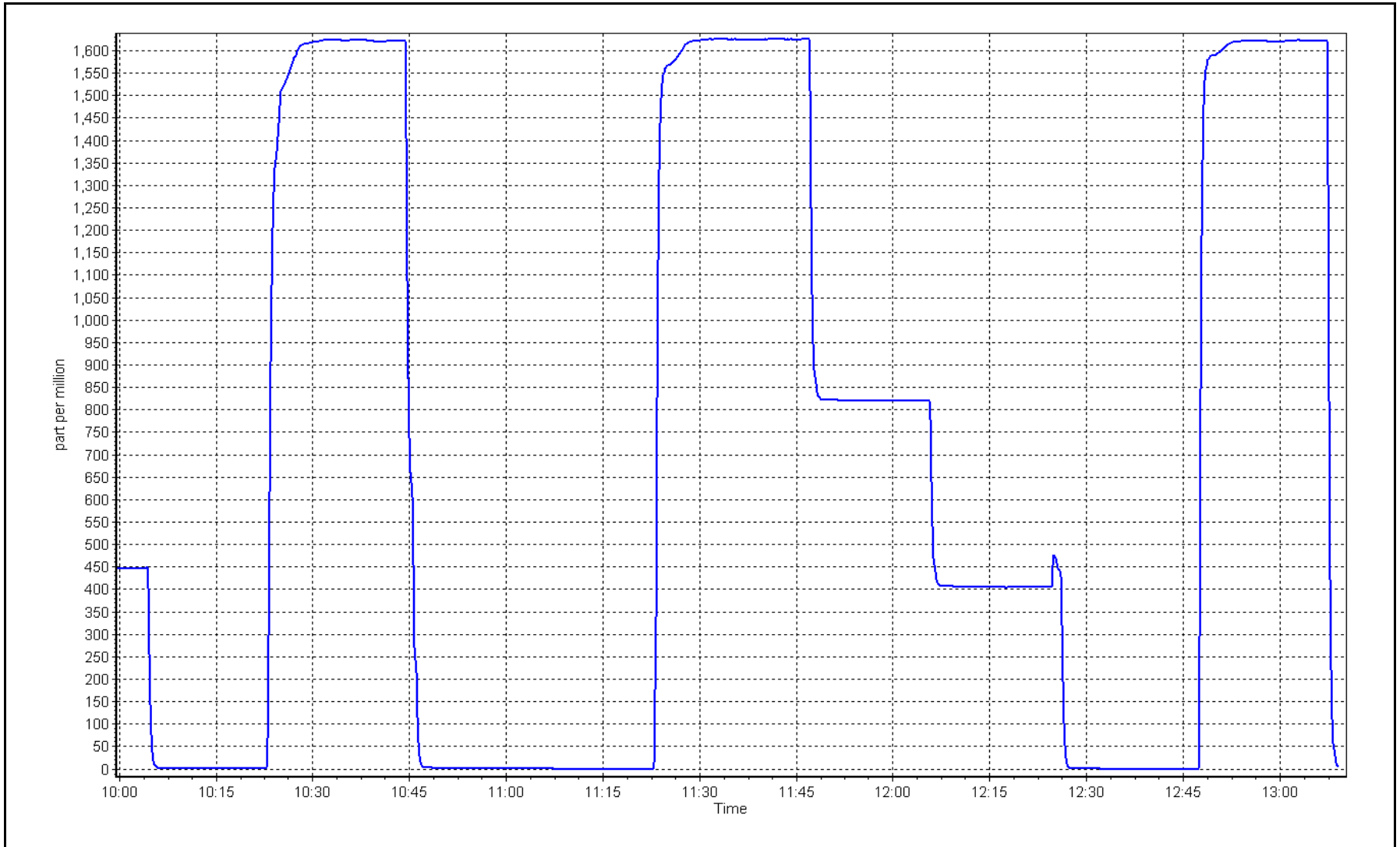
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.1	----	Correlation Coefficient	0.999958	≥0.995
1605.9	1624.1	0.9888			
802.9	820.5	0.9786	Slope	1.012352	0.90 - 1.10
401.5	404.4	0.9927			
			Intercept	0.980000	+/-10



CO₂ Calibration Plot

Date: April 19, 2023

Location: Stony Mountain





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

**AMS19
FIREBAG
APRIL 2023**

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

May 31, 2023





Wood Buffalo Environmental Association

SO₂ Calibration Summary

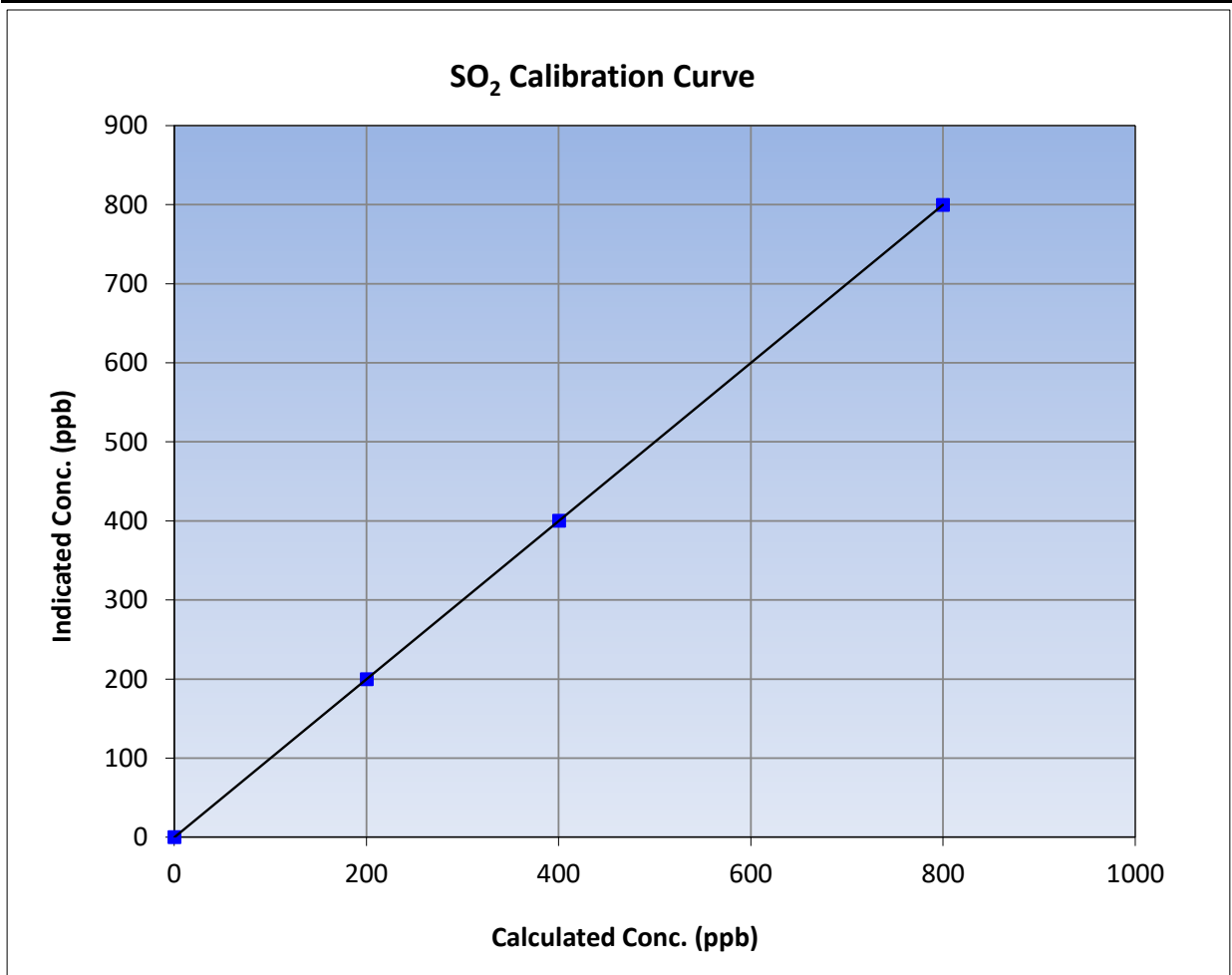
Version-01-2020

Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 7, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:45	End Time (MST):	14:48
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

Calibration Data

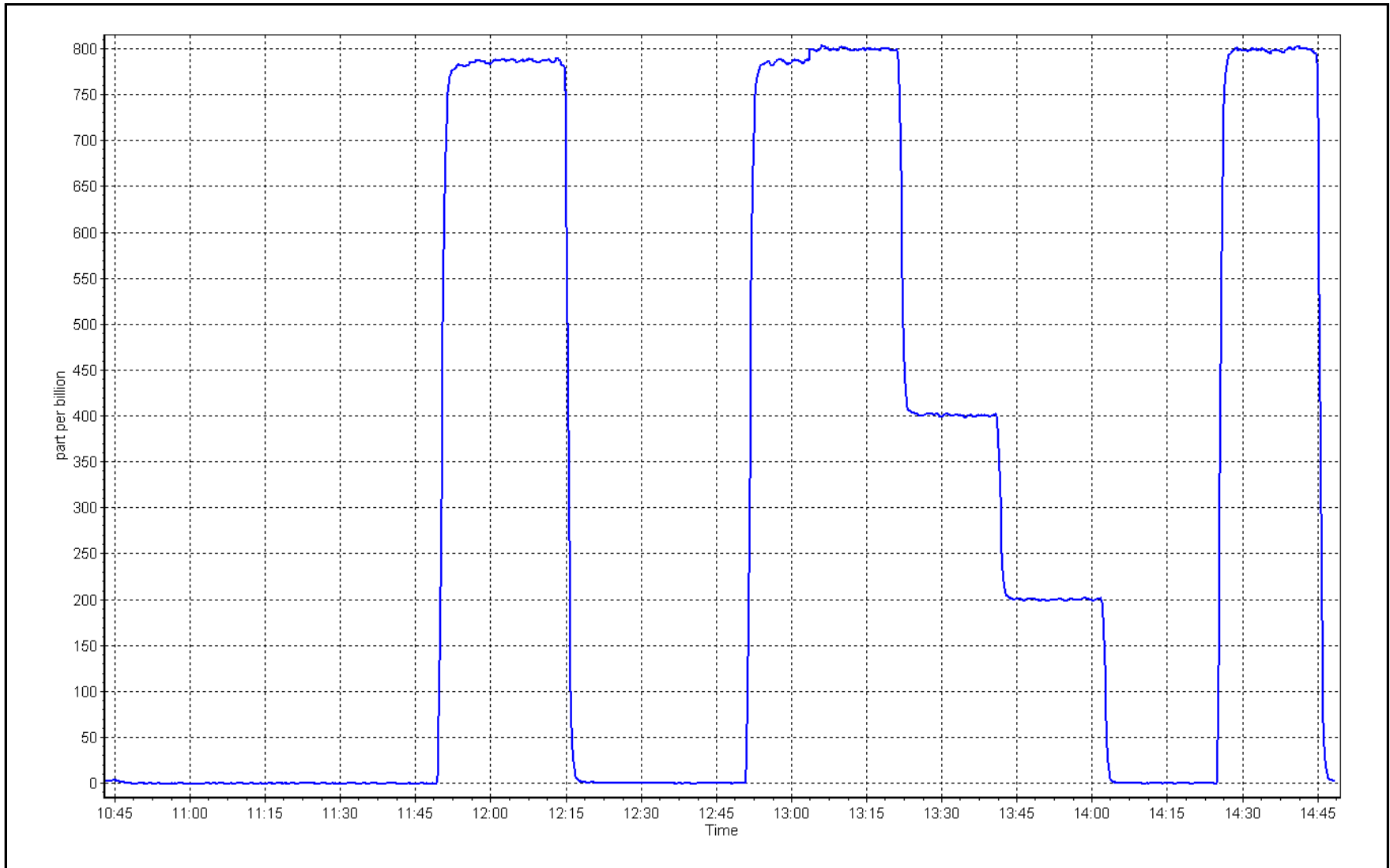
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.2	----	Correlation Coefficient	1.000000	≥0.995
799.5	799.5	1.0000			
400.3	399.8	1.0012	Slope	1.000391	0.90 - 1.10
200.1	199.6	1.0025			
			Intercept	-0.421893	+/-30



SO2 Calibration Plot

Date: April 14, 2023

Location: Firebag





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Firebag Station number: AMS19
 Calibration Date: April 3, 2023 Last Cal Date: March 2, 2023
 Start time (MST): 10:02 End time (MST): 13:40
 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 #: 1336160090
 Converter make: Global Converter serial #: 2022-222
 Analyzer Range: 0 - 100 ppb

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	1.003769	1.003054	Backgd or Offset:	3.18
Calibration intercept:	0.038321	0.038381	Coeff or Slope:	0.990

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	-0.1	----
as found span	4922	78.2	80.0	80.3	0.995
as found 2nd point	4961	39.1	40.0	40.1	0.995
as found 3rd point	4980	19.6	20.0	20.0	0.997
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4922	78.2	80.0	80.2	0.997
second point	4961	39.1	40.0	40.3	0.992
third point	4980	19.6	20.0	20.1	0.997
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	78.2	80.0	80.0	1.000
SO2 Scrubber Check	4922	78.3	800.2	0.0	----
Date of last scrubber change:	January 18, 2023			Ave Corr Factor	0.996
Date of last converter efficiency test:	n/a			efficiency	

Baseline Corr As found: 80.4 Prev response: 80.32 *% change: 0.1%
 Baseline Corr 2nd AF pt: 40.2 AF Slope: 1.005483 AF Intercept: -0.121676
 Baseline Corr 3rd AF pt: 20.1 AF Correlation: 0.999999

* = > +/-5% change initiates investigation

Notes: SOx scrubber check done after calibrator zero. No adjustments made. Changed sample inlet filter after MPAF's.

Calibration Performed By: Braiden Boutillier



Wood Buffalo Environmental Association

H₂S Calibration Summary

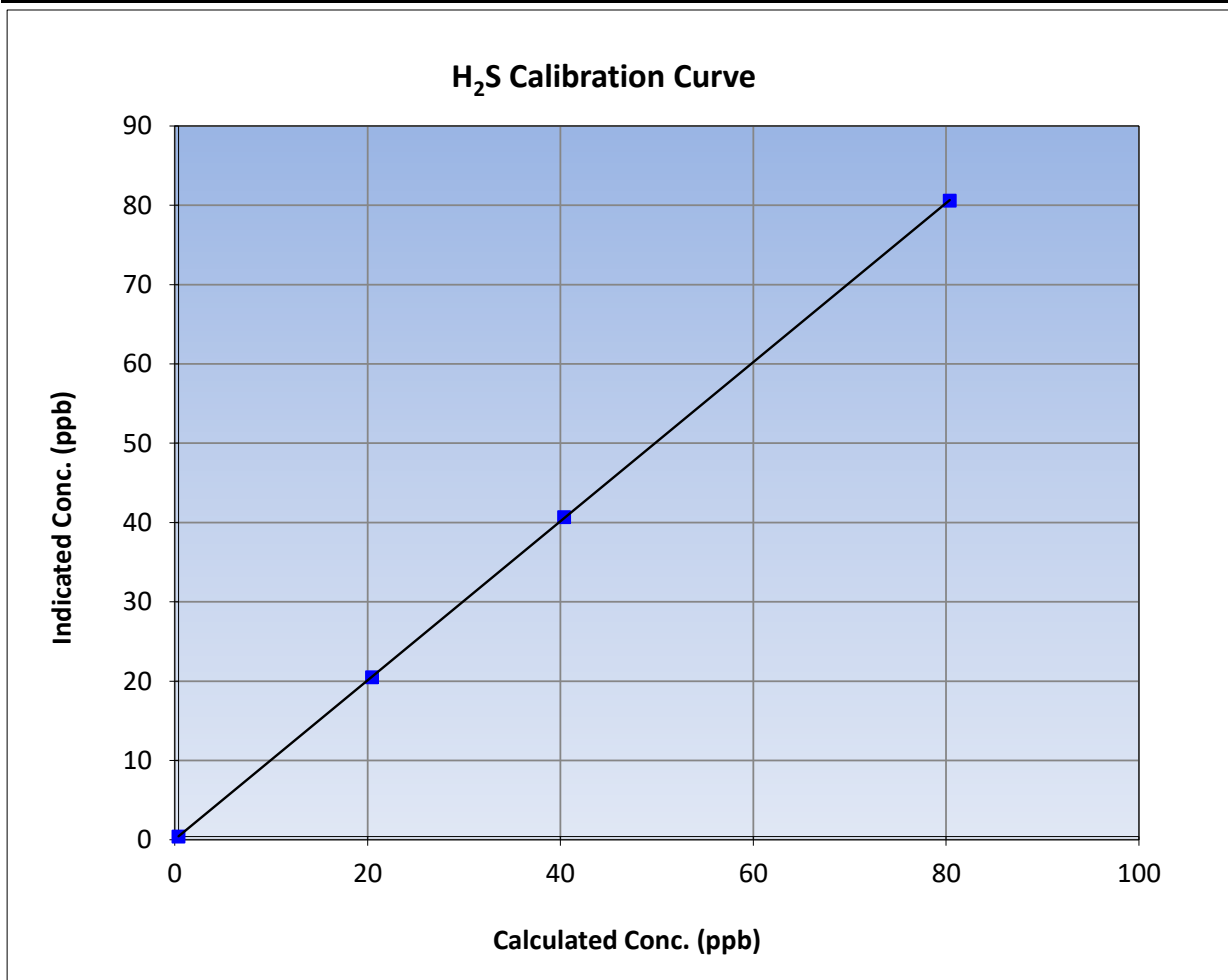
Version-11-2021

Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 2, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	10:02	End Time (MST):	13:40
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

Calibration Data

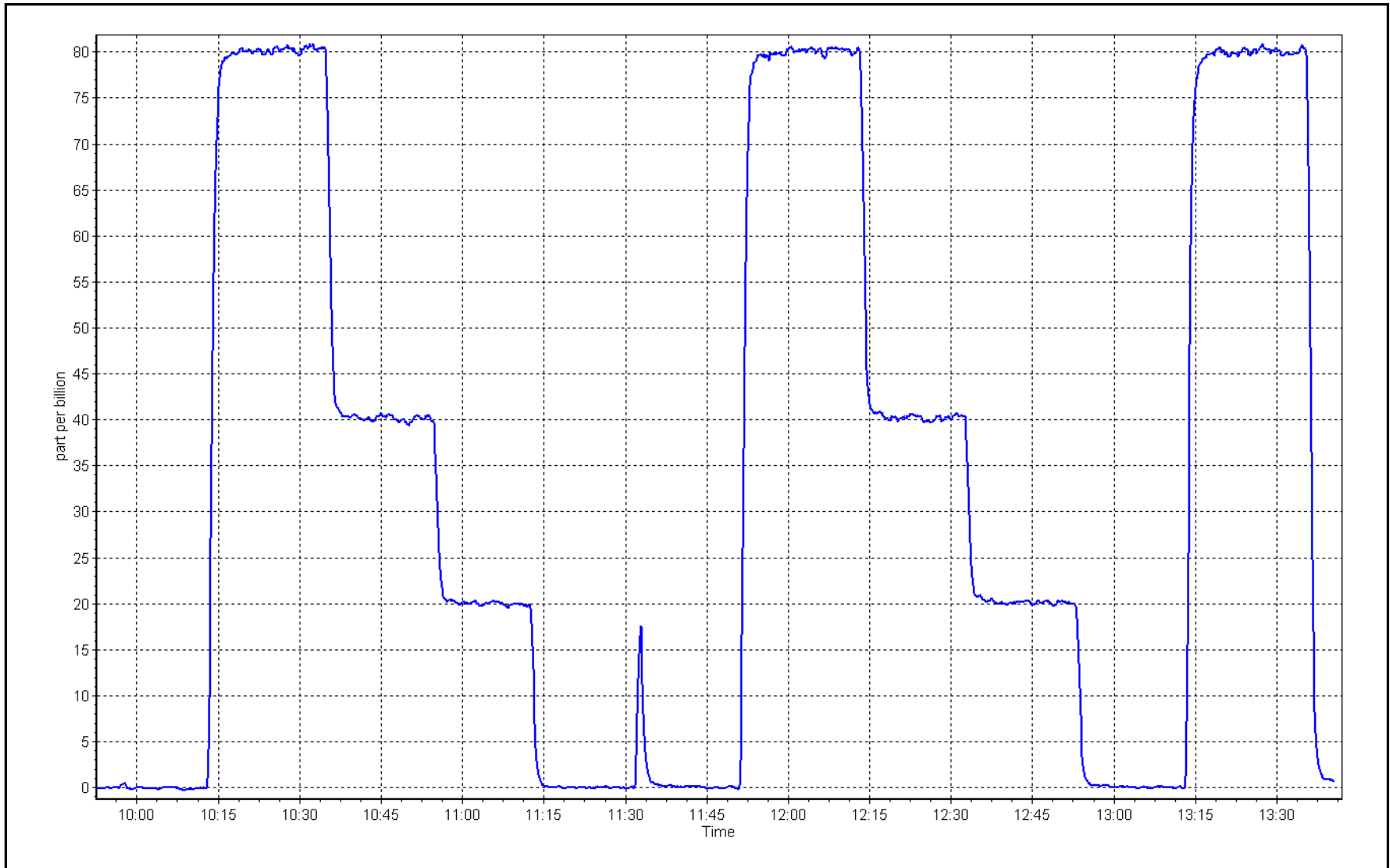
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999992	≥0.995
80.0	80.2	0.9973			
40.0	40.3	0.9923	Slope	1.003054	0.90 - 1.10
20.0	20.1	0.9974			
			Intercept	0.038381	+/-3



H₂S Calibration Plot

Date: April 3, 2023

Location: Firebag





Wood Buffalo Environmental Association

THC Calibration Summary

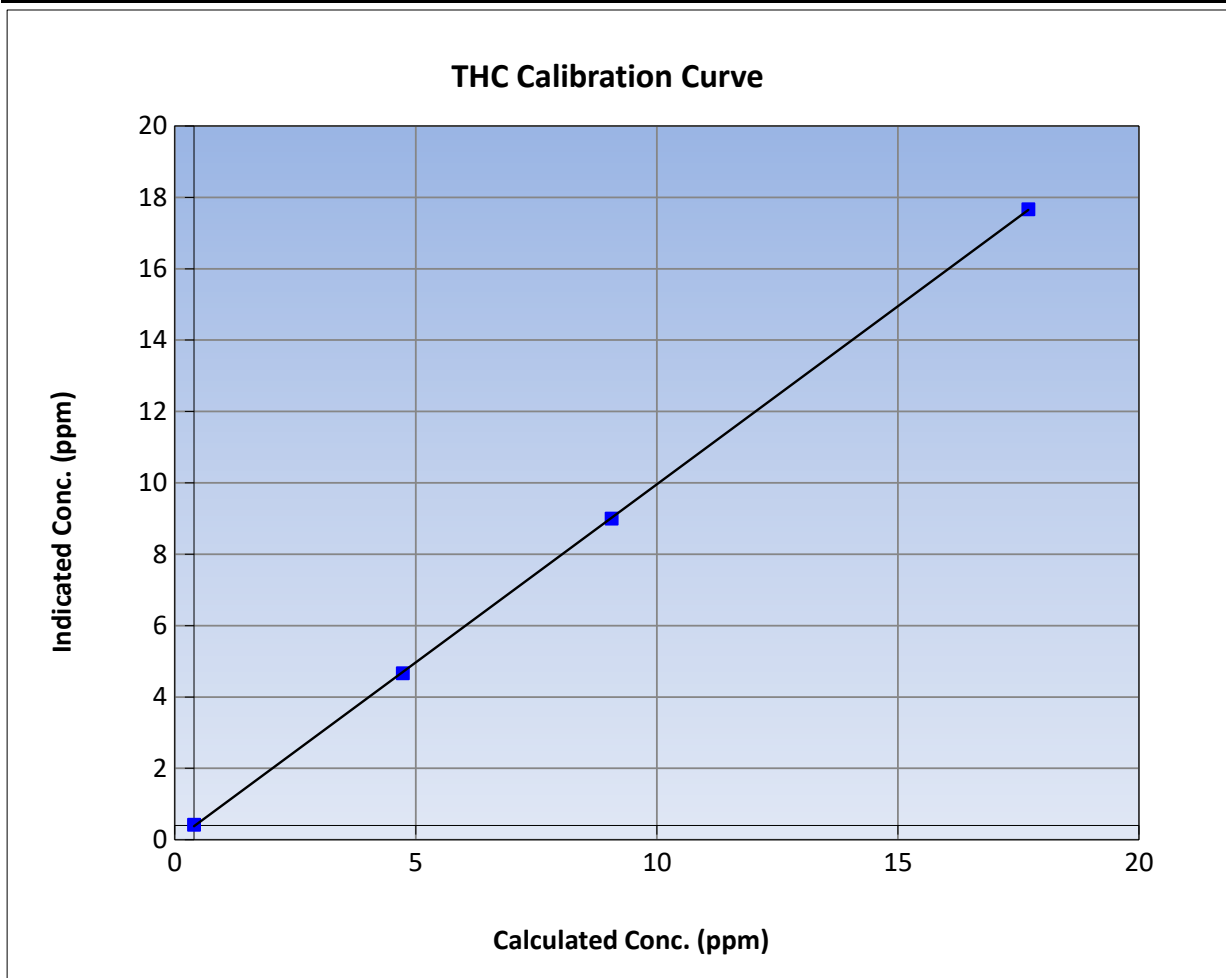
Version-01-2020

Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 7, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:45	End Time (MST):	14:48
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

Calibration Data

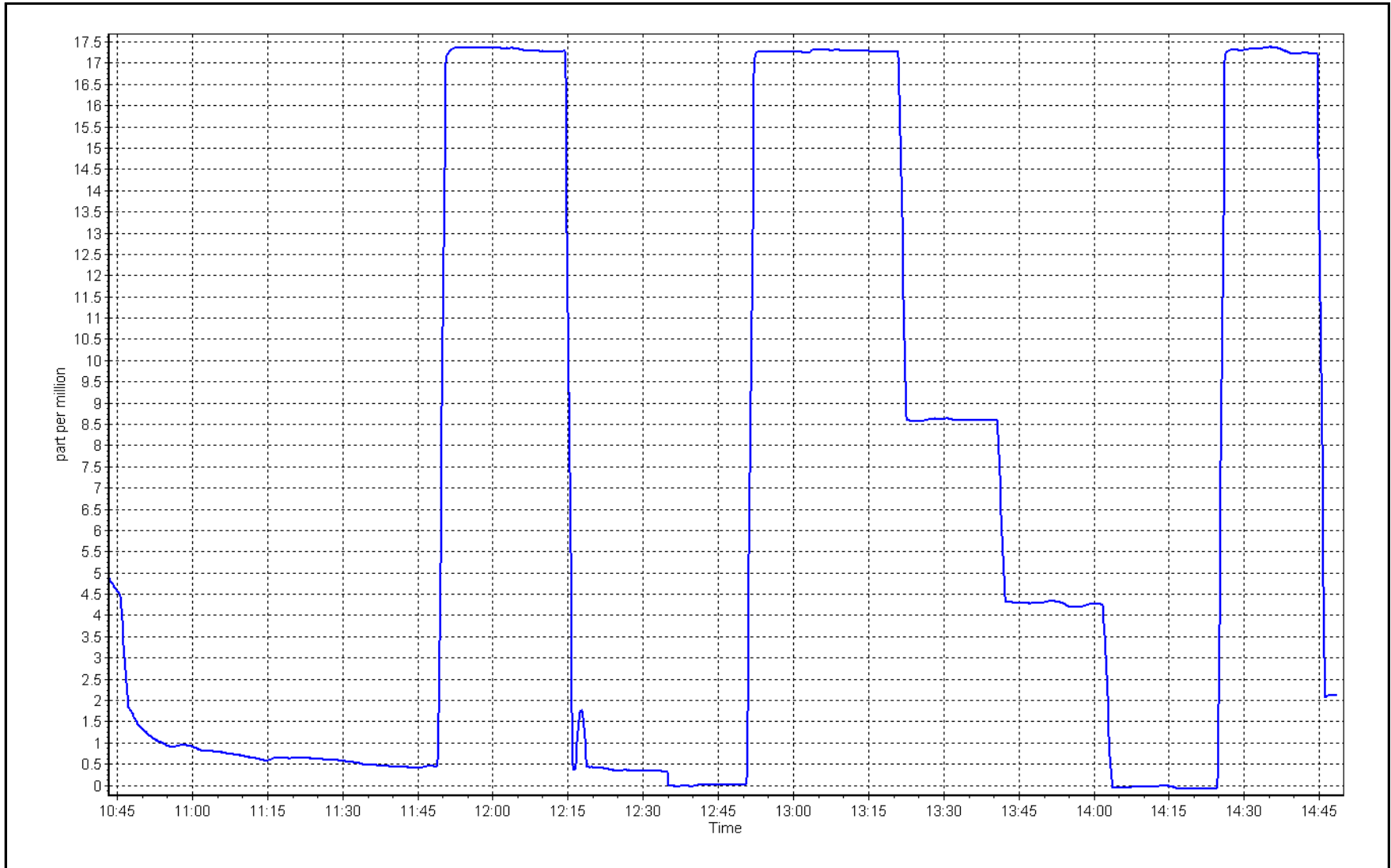
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	<u>Limits</u>	
0.00	0.02	----	Correlation Coefficient	0.999977	
17.31	17.27	1.0020			≥ 0.995
8.66	8.60	1.0075	Slope	0.997928	
4.33	4.27	1.0151			$0.90 - 1.10$
			Intercept	-0.020741	± 1.5



THC Calibration Plot

Date: April 14, 2023

Location: Firebag





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Firebag
Calibration Date: April 4, 2023
Start time (MST): 10:06
Reason: Routine
Station number: AMS 19
Last Cal Date: March 3, 2023
End time (MST): 14:32

Calibration Standards

NO Gas Cylinder #: T2Y1K63
NOX Cal Gas Conc: 51.12 ppm
Removed Cylinder #: n/a
Removed Gas NOX Conc: 51.12 ppm
NOX gas Diff:
Calibrator Model: Teledyne API T700
ZAG make/model: Teledyne API T701
Cal Gas Expiry Date: November 30, 2023
NO Cal Gas Conc: 49.40 ppm
Removed Gas Exp Date: n/a
Removed Gas NO Conc: 49.40 ppm
NO gas Diff:
Serial Number: 1607
Serial Number: 1118

Analyzer Information

Analyzer make: Thermo 42i
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 1410661309

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.041	1.041	NO bkgnd or offset:	7.2	7.3
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	7.3	7.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	206.6	210.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.994815	0.991227
NO _x Cal Offset:	0.755137	0.554416
NO Cal Slope:	0.993858	0.991132
NO Cal Offset:	0.287575	-0.133220
NO ₂ Cal Slope:	1.003159	0.999545
NO ₂ Cal Offset:	0.561215	-0.476369



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4999	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as found span	4919	81.0	828.1	800.3	27.9	826.0	794.5	31.5	1.0026	1.0073
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4919	81.0	828.1	800.3	27.9	821.0	792.9	28.2	1.0087	1.0093
second point	4960	40.5	414.0	400.1	13.9	411.6	396.9	14.6	1.0059	1.0081
third point	4980	20.2	206.5	199.6	6.9	205.7	197.3	8.4	1.0040	1.0115
as left zero	4999	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	4919	81.0	828.1	362.7	465.5	825.0	356.7	468.4	1.0038	1.0168
Average Correction Factor									1.0062	1.0096

Corrected As found	NO _x = 826.2 ppb	NO = 794.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = 0.2%
Previous Response	NO _x = 824.6 ppb	NO = 795.7 ppb		*Percent Change	NO = -0.1%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	790.5	352.9	465.5	465.1	1.0008	99.9%
2nd GPT point (200 ppb O3)	790.5	570.6	247.8	246.8	1.0039	99.6%
3rd GPT point (100 ppb O3)	790.5	682.1	136.3	135.3	1.0071	99.3%
Average Correction Factor					1.0039	99.6%

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

Calibration Performed By: Braiden Boutilier



Wood Buffalo Environmental Association

NO_x Calibration Summary

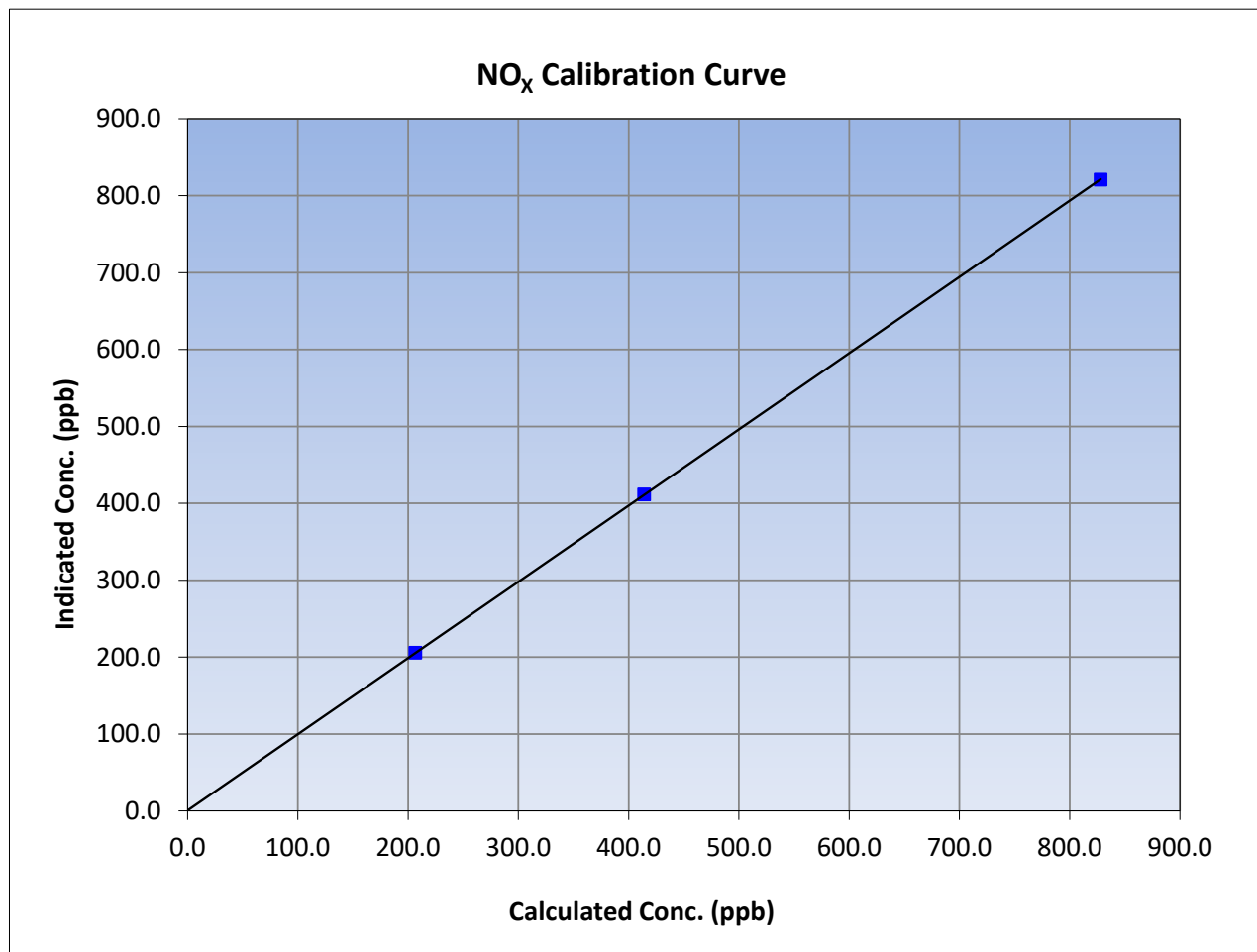
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:06	End Time (MST):	14:32
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	≥0.995	
828.1	821.0	1.0087			
414.0	411.6	1.0059			
206.5	205.7	1.0040			
			Slope	0.991227	0.90 - 1.10
			Intercept	0.554416	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

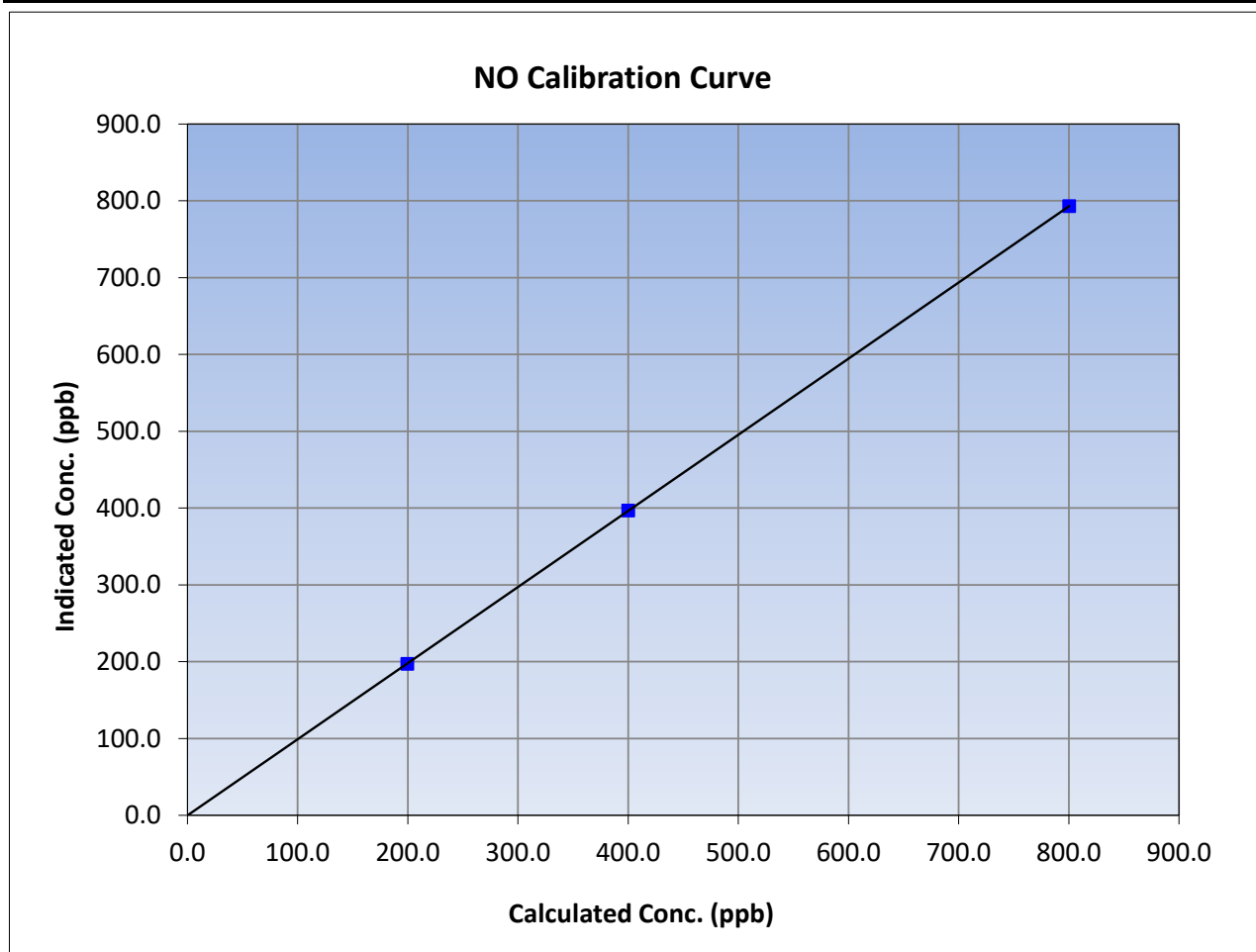
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:06	End Time (MST):	14:32
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20
800.3	792.9	1.0093		
400.1	396.9	1.0081		
199.6	197.3	1.0115		





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

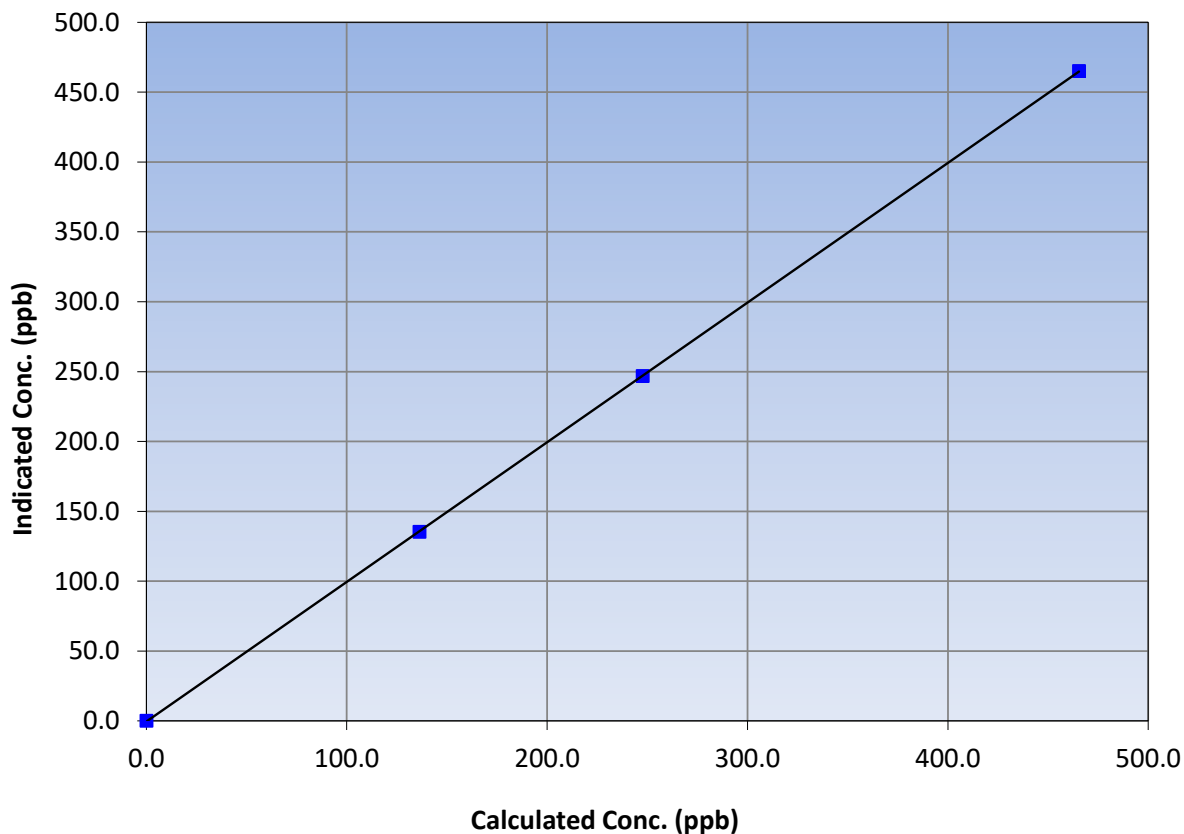
Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:06	End Time (MST):	14:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
465.5	465.1	1.0008		
247.8	246.8	1.0039		
136.3	135.3	1.0071		

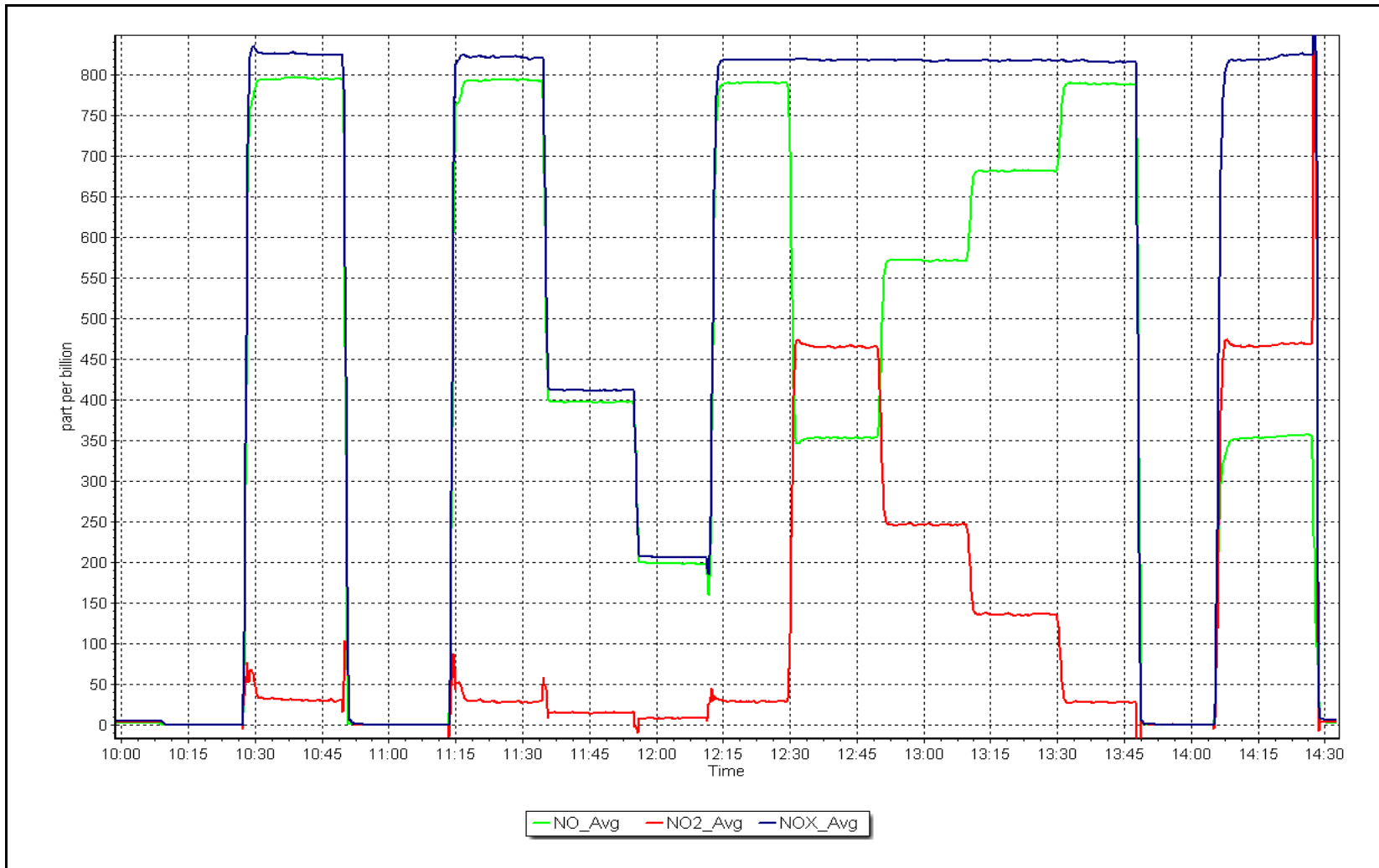
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 4, 2023

Location: Firebag





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20 MACKAY RIVER APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Mackay River	Station number:	AMS20
Calibration Date:	April 3, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	10:04	End time (MST):	13:02
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.992140	1.005548	Backgd or Offset:	19.1	18.9
Calibration intercept:	3.311046	0.790939	Coeff or Slope:	0.974	0.974

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	4919	81.3	800.3	805.6	0.993
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	800.3	805.5	0.994
second point	4959	40.7	400.7	403.1	0.994
third point	4980	20.3	199.8	202.9	0.985
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	81.3	800.3	804.8	0.994
Average Correction Factor					0.991

Baseline Corr As found:	805.60	Previous response	797.29	*% 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: Sample inlet filter changed after as founds. No adjustments required.

Calibration Performed By: Mohammed Kashif



Wood Buffalo Environmental Association

SO₂ Calibration Summary

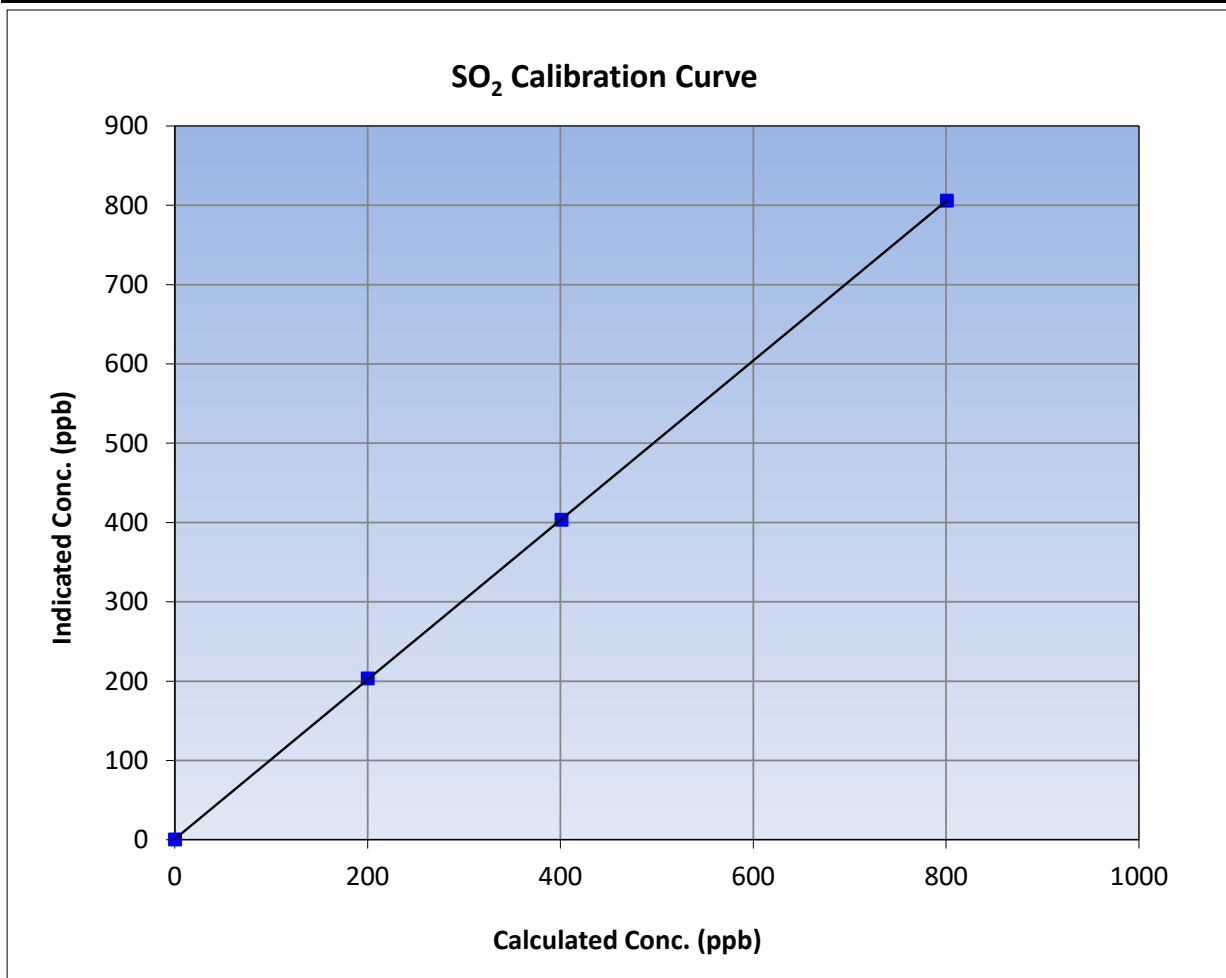
Version-01-2020

Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 1, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:04	End Time (MST):	13:02
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

Calibration Data

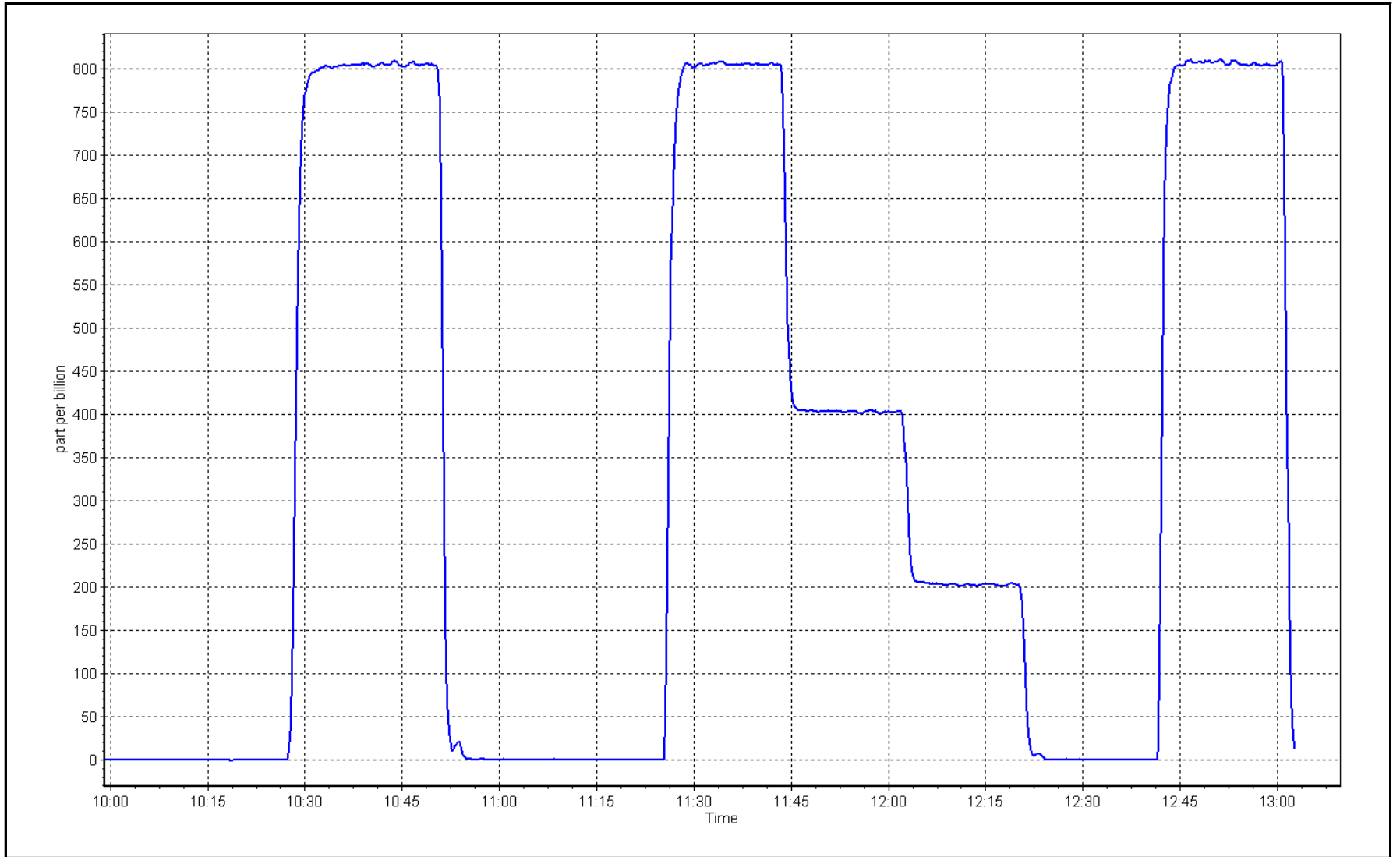
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.2	----	Correlation Coefficient	0.999994	
800.3	805.5	0.9935			≥0.995
400.7	403.1	0.9940	Slope	1.005548	
199.8	202.9	0.9848			0.90 - 1.10
			Intercept	0.790939	+/-30



SO2 Calibration Plot

Date: April 3, 2023

Location: MacKay River





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: MacKay River Station number: AMS20
 Calibration Date: April 4, 2023 Last Cal Date: March 8, 2023
 Start time (MST): 9:59 End time (MST): 14:52
 Reason: Routine

Calibration Standards

Cal Gas Concentration: 4.87 ppm Cal Gas Exp Date: May 5, 2023
 Cal Gas Cylinder #: EY0001922
 Removed Cal Gas Conc: 4.87 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: Teledyne API T101 Analyzer serial #: 196
 Converter make: Internal Converter serial #: NA
 Analyzer Range 0 - 100 ppb

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.999432	1.003004	Backgd or Offset: 44.9	46.3
Calibration intercept:	0.479018	0.079047	Coeff or Slope: 1.008	0.987

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.6	----
as found span	4918	82.1	80.0	83.1	0.969
as found 2nd point	4959	41.1	40.0	42.1	0.965
as found 3rd point	4979	20.5	20.0	21.4	0.960
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4918	82.1	80.0	80.2	0.997
second point	4959	41.1	40.0	40.3	0.993
third point	4979	20.5	20.0	20.3	0.984
as left zero	5000	0.0	0.0	0.0	----
as left span	4918	82.1	80.0	79.5	1.006
SO2 Scrubber Check	4919	80.0	800.2	0.1	----
Date of last scrubber change:	December 15, 2020			Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found: 82.5 Prev response: 80.40 *% change: 2.5%
 Baseline Corr 2nd AF pt: 41.5 AF Slope: 1.031156 AF Intercept: 0.718981
 Baseline Corr 3rd AF pt: 20.8 AF Correlation: 0.999990

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi point as founds. Performed scrubber test after calibrator zero. Adjusted zero and span.

Calibration Performed By: Mohammed Kashif



Wood Buffalo Environmental Association

H₂S Calibration Summary

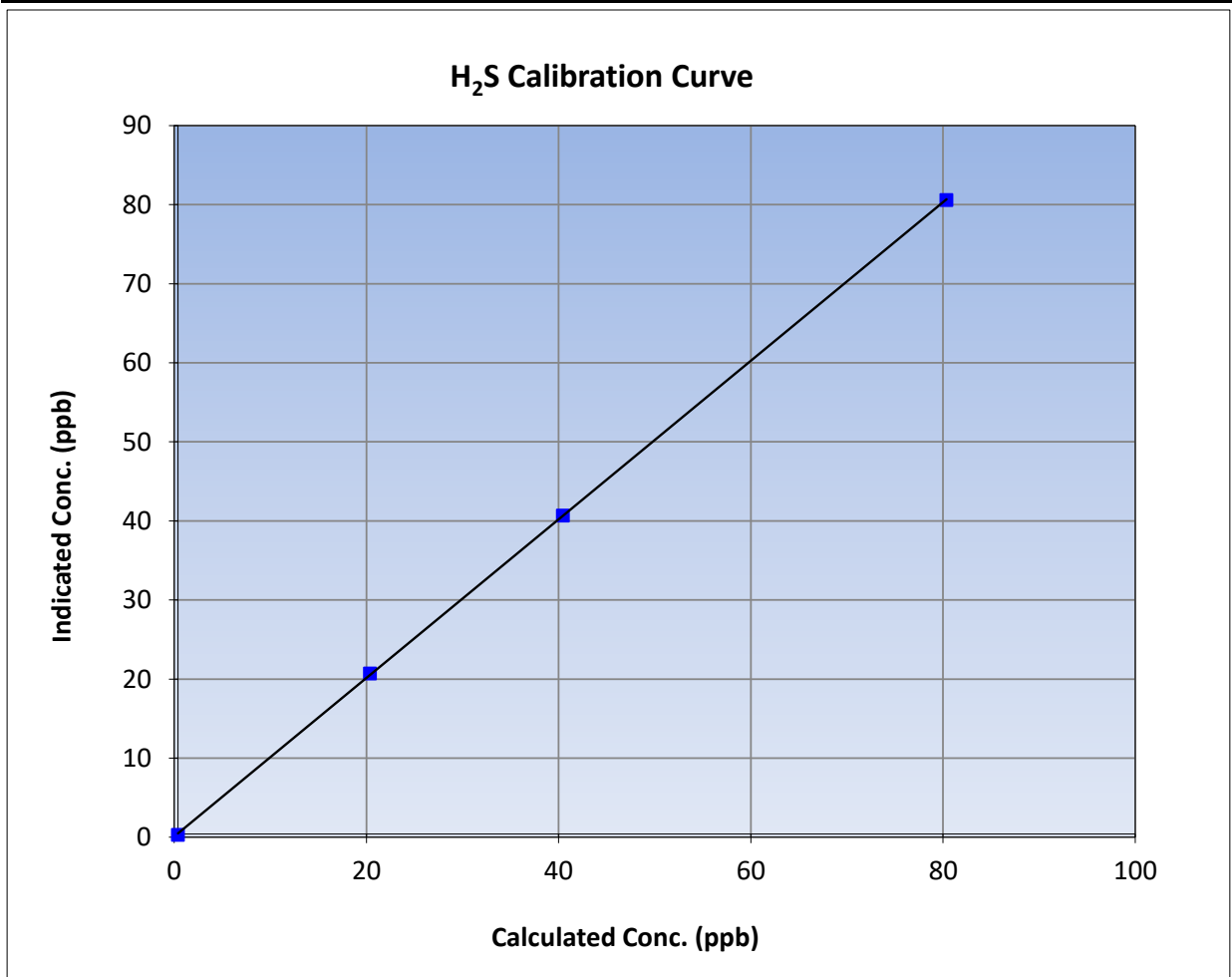
Version-11-2021

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 8, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:59	End Time (MST):	14:52
Analyzer make:	Teledyne API T101	Analyzer serial #:	196

Calibration Data

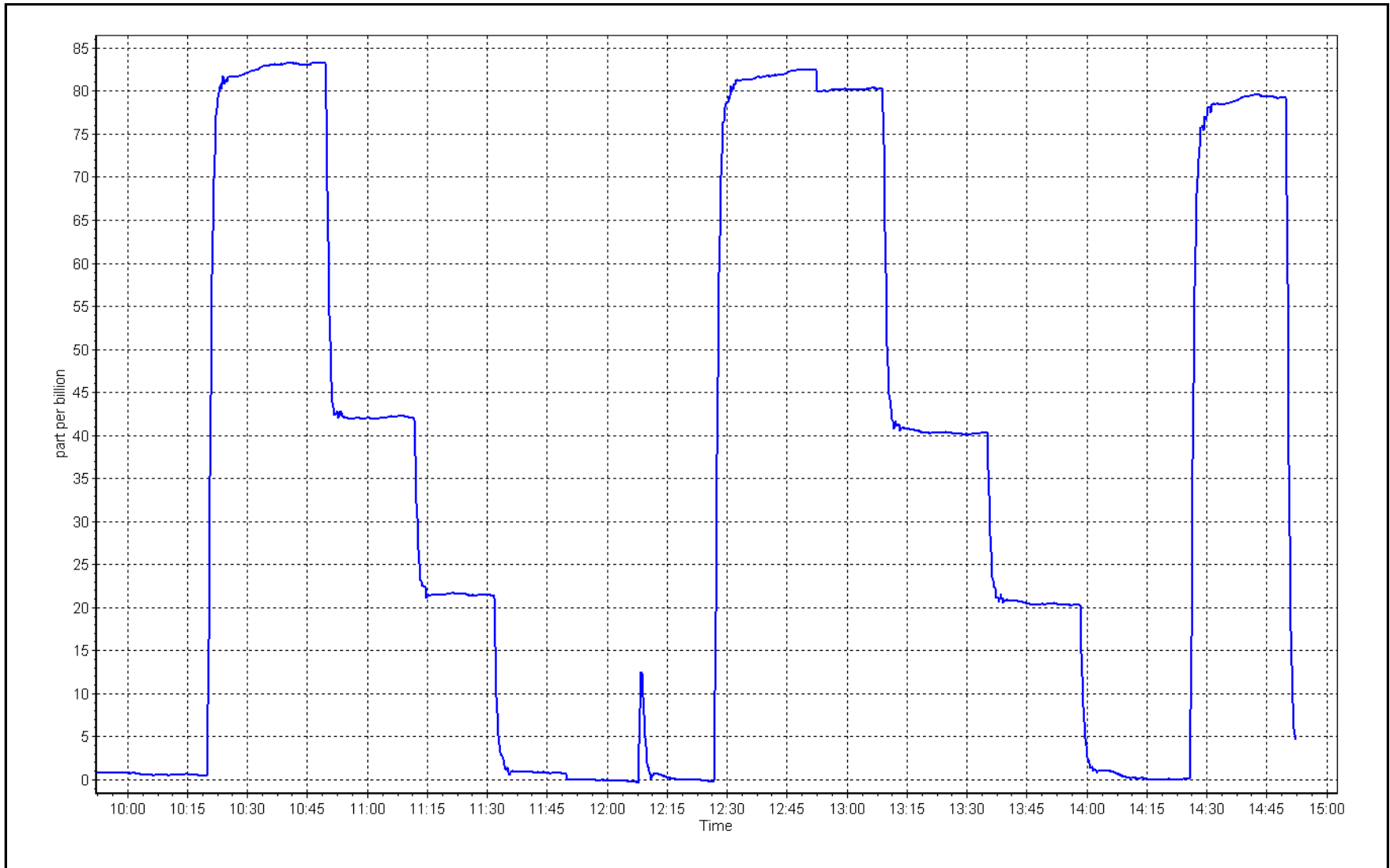
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999977	
80.0	80.2	0.9971			≥0.995
40.0	40.3	0.9933	Slope	1.003004	
20.0	20.3	0.9837			0.90 - 1.10
			Intercept	0.079047	+/-3



H₂S Calibration Plot

Date: April 4, 2023

Location: MacKay River





Wood Buffalo Environmental Association

THC Calibration Summary

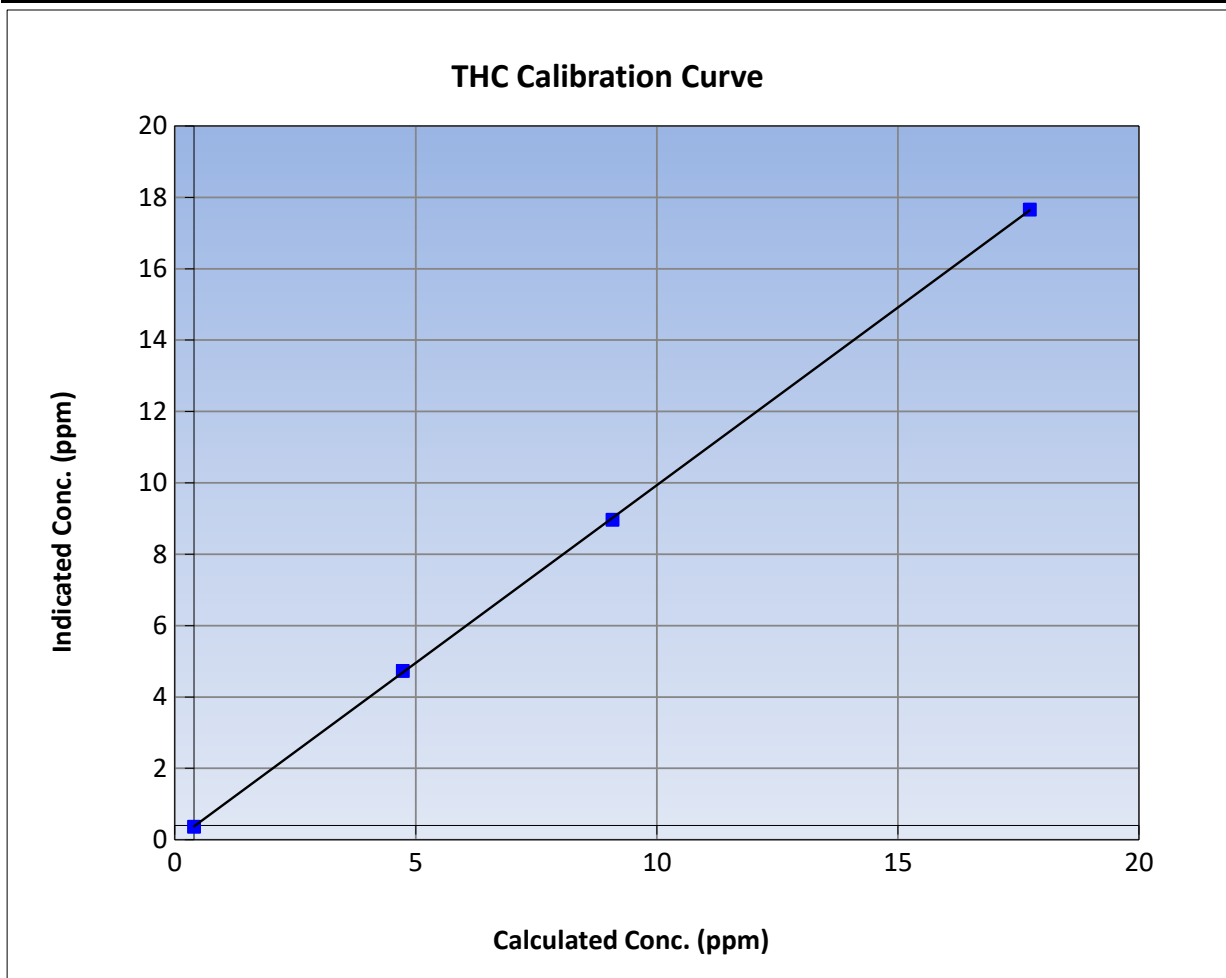
Version-01-2020

Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 1, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:04	End Time (MST):	13:02
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

Calibration Data

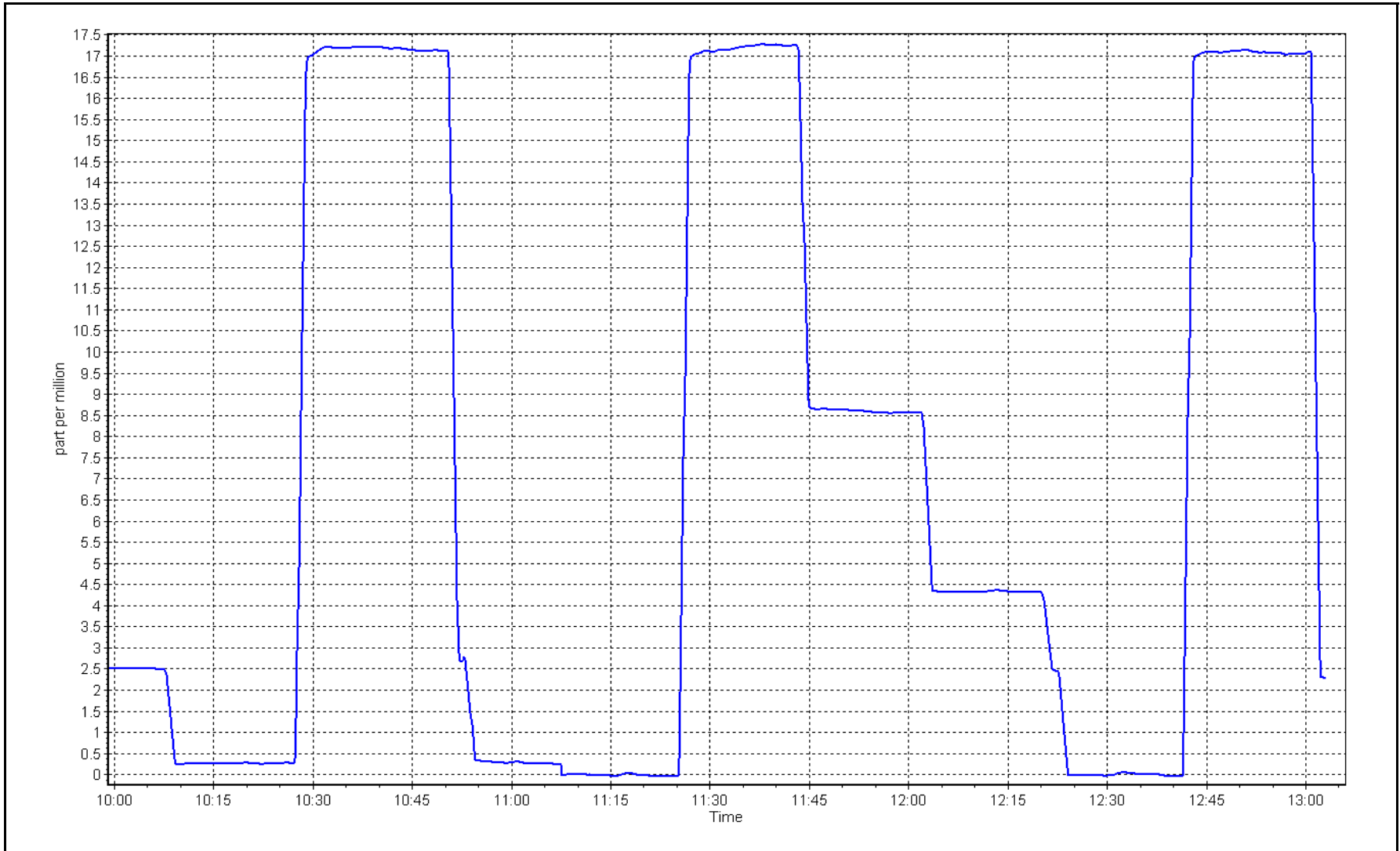
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.00	-0.03	----	Correlation Coefficient	0.999965	≥0.995
17.34	17.26	1.0047			
8.68	8.57	1.0136	Slope	0.995858	0.90 - 1.10
4.33	4.34	0.9987			
			Intercept	-0.025166	+/-1.5



THC Calibration Plot

Date: April 3, 2023

Location: MacKay River





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4917	83.3	819.5	800.3	19.2	796.4	775.6	20.8	1.0290	1.0318
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	4917	83.3	819.5	800.3	19.2	818.3	800.7	17.7	1.0014	0.9995
second point	4956	41.7	410.4	400.8	9.6	410.9	401.2	9.7	0.9989	0.9991
third point	4979	20.8	204.6	199.9	4.8	208.5	201.7	6.7	0.9815	0.9908
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4917	83.3	819.5	457.8	361.7	819.5	456.8	362.7	0.9999	1.0022
Average Correction Factor									0.9939	0.9965

Corrected As found	NO _x = 796.5 ppb	NO = 775.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -3.4%
Previous Response	NO _x = 823.6 ppb	NO = 805.9 ppb		*Percent Change	NO = -3.9%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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	455.8	361.7	359.4	1.0063	99.4%
2nd GPT point (200 ppb O3)	798.3	619.0	198.5	194.2	1.0219	97.9%
3rd GPT point (100 ppb O3)	798.3	704.6	112.9	108.5	1.0402	96.1%
Average Correction Factor					1.0228	97.8%

Notes:

Adjusted span only.

Calibration Performed By:

Mohammed Kashif



Wood Buffalo Environmental Association

NO_x Calibration Summary

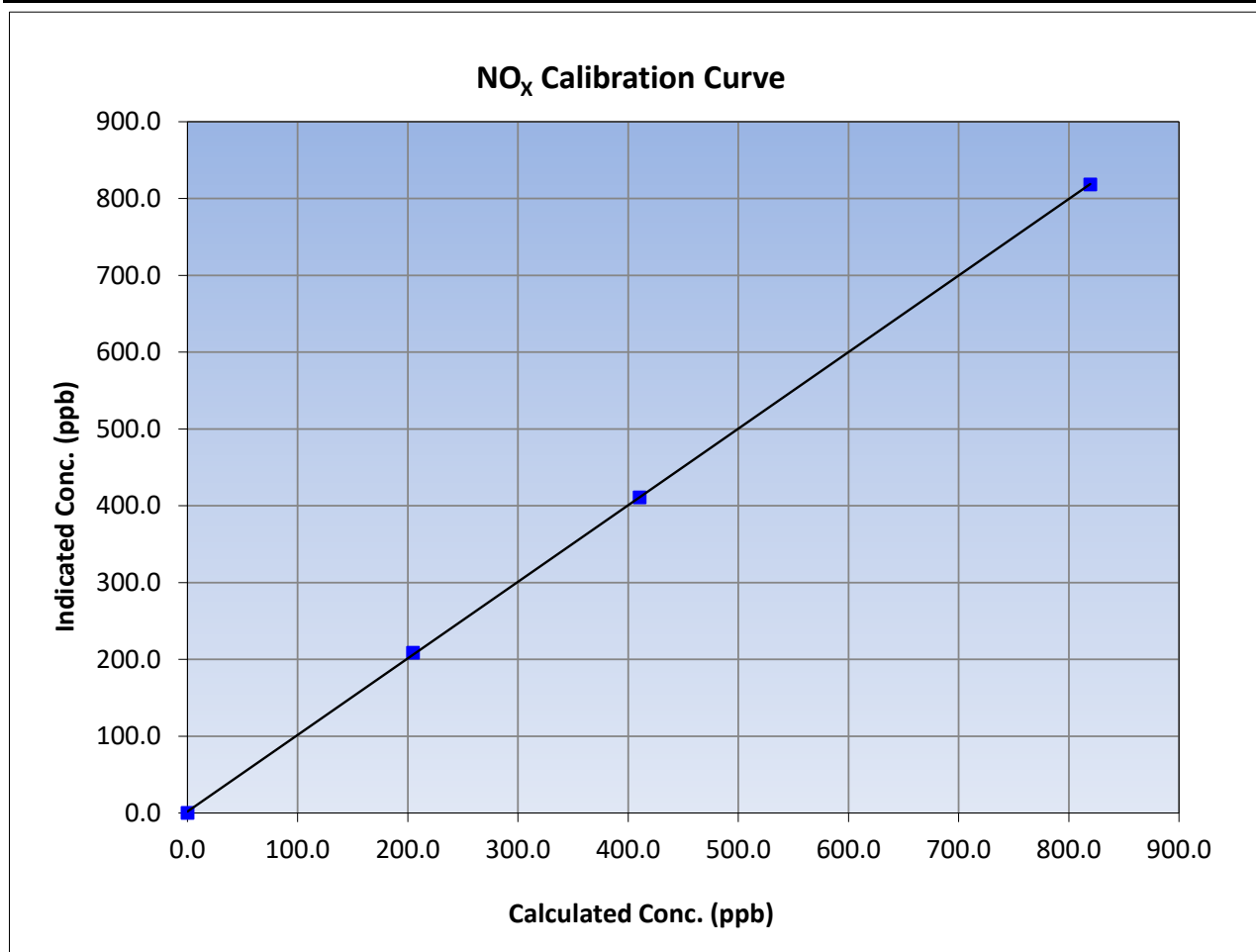
Version-04-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Mackay River	Station Number:	AMS20
Start Time (MST):	9:47	End Time (MST):	14:26
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	≥0.995	
819.5	818.3	1.0014			
410.4	410.9	0.9989			
204.6	208.5	0.9815			
			Slope	0.996899	0.90 - 1.10
			Intercept	1.929986	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

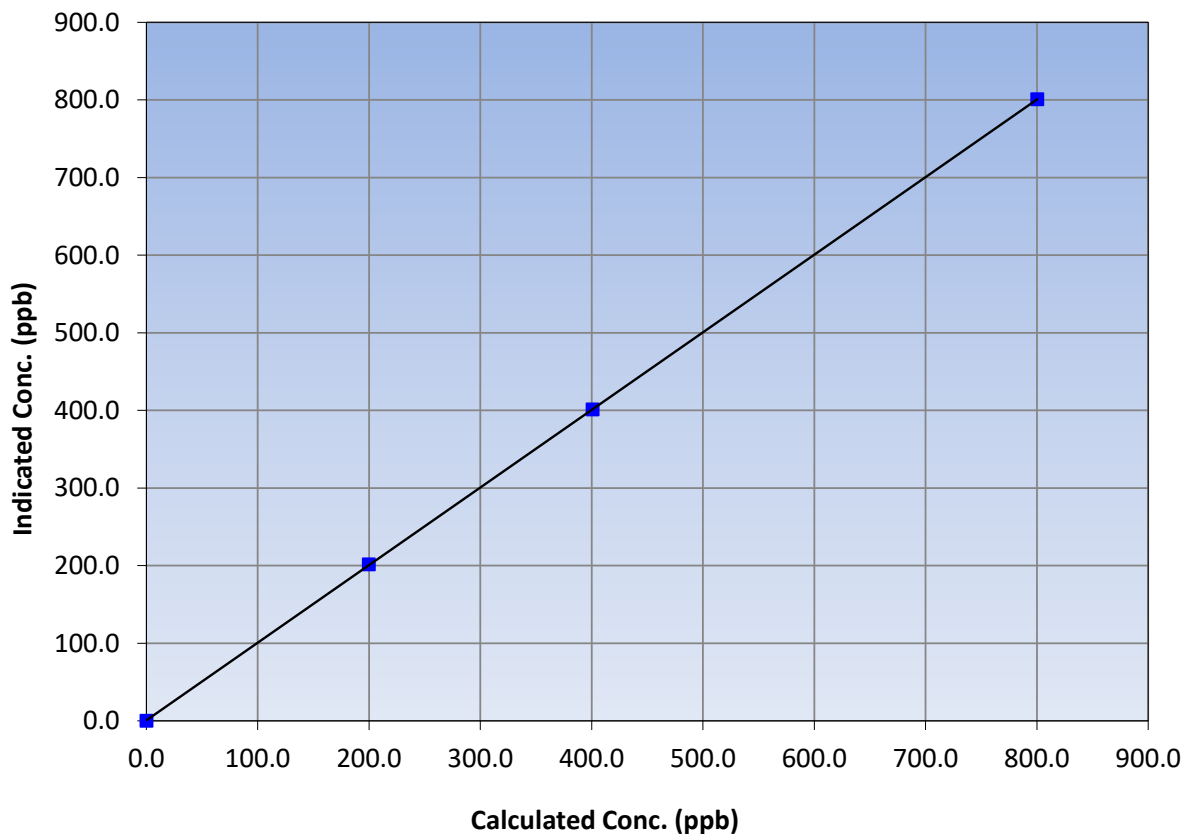
Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Mackay River	Station Number:	AMS20
Start Time (MST):	9:47	End Time (MST):	14:26
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	0.0	----	Correlation Coefficient	≥0.995	
800.3	800.7	0.9995			
400.8	401.2	0.9991			
199.9	201.7	0.9908			
			Slope	0.999776	0.90 - 1.10
			Intercept	0.730780	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

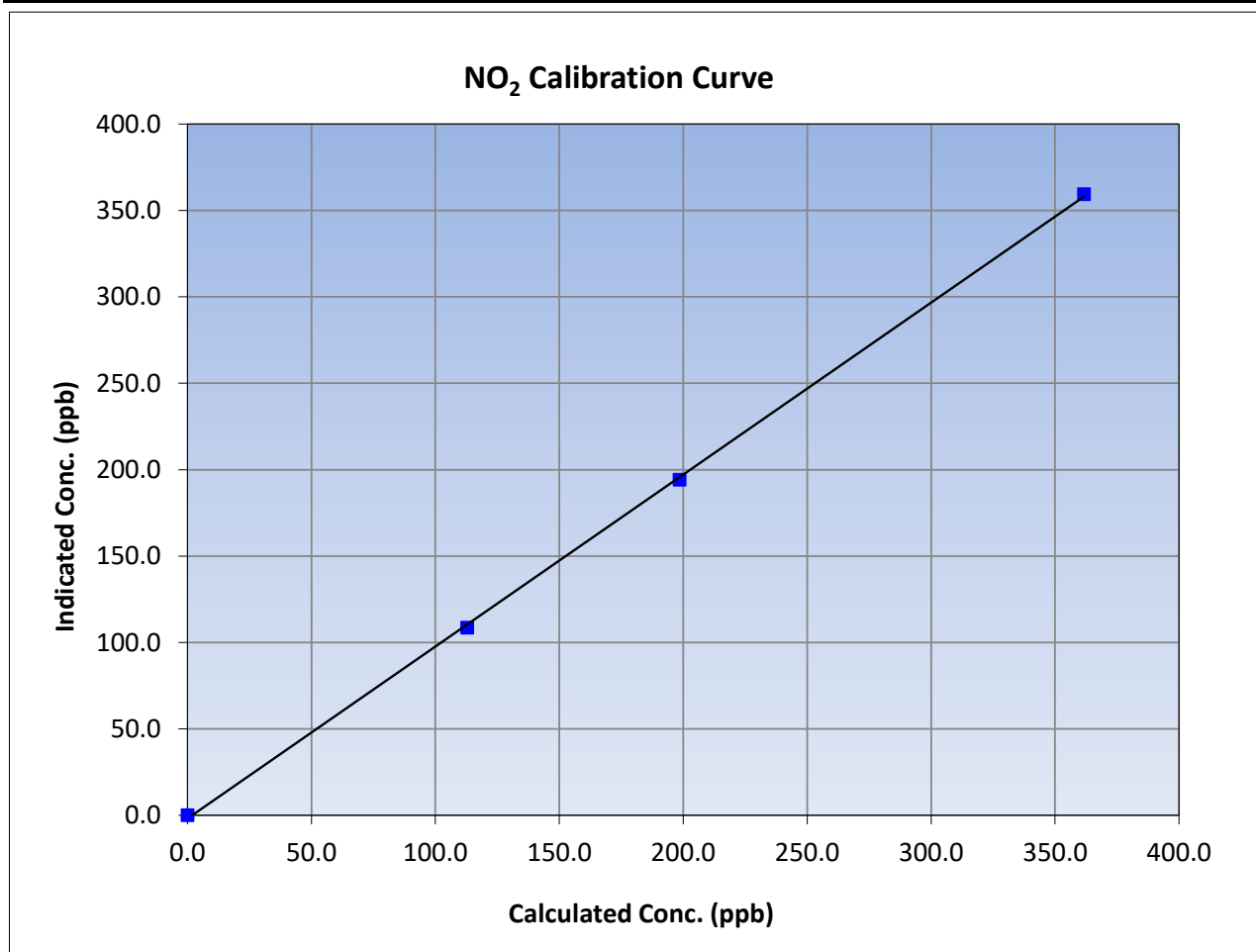
Version-04-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:47	End Time (MST):	14:26
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

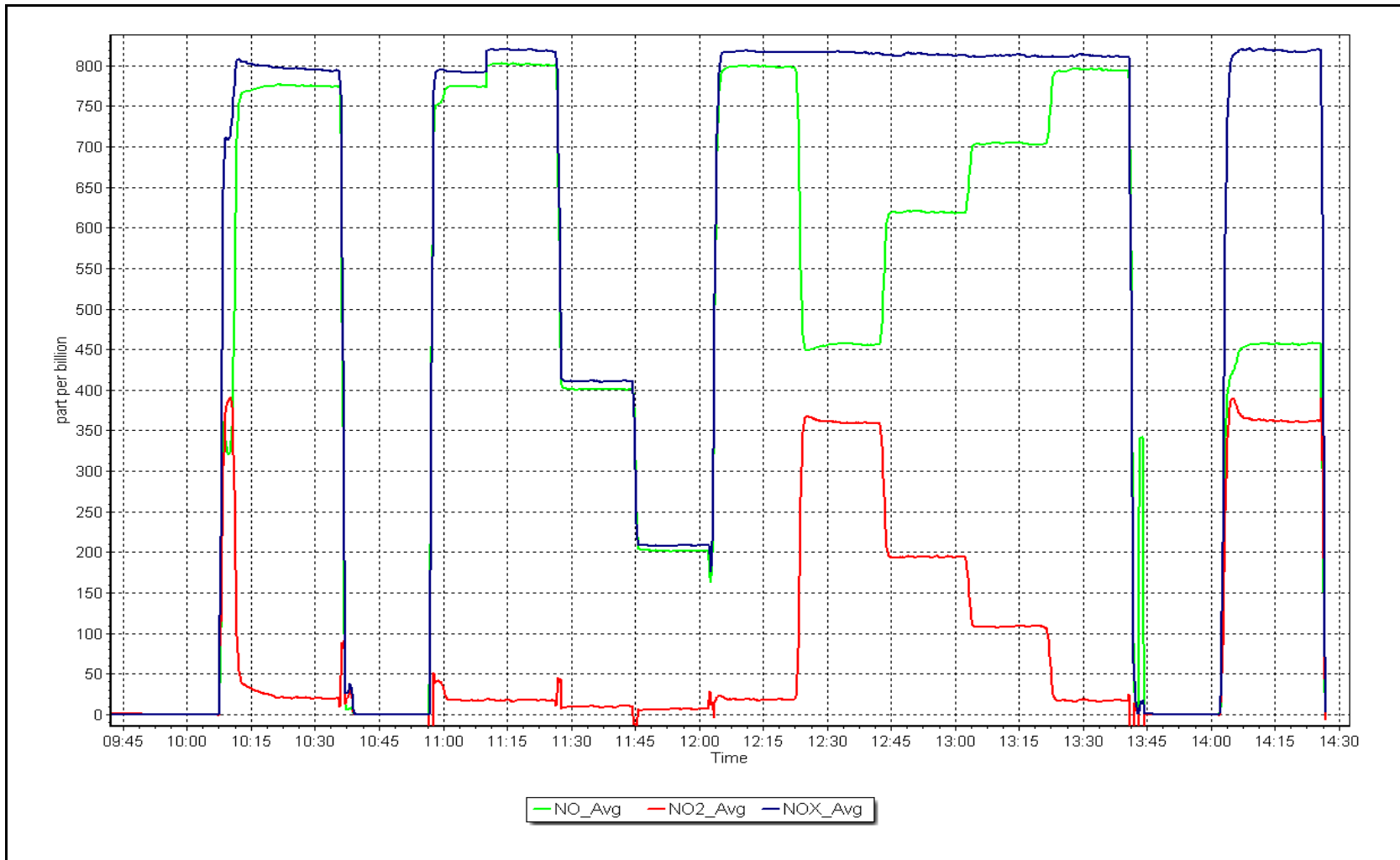
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
361.7	359.4	1.0063		
198.5	194.2	1.0219		
112.9	108.5	1.0402		



NO_x Calibration Plot

Date: April 19, 2023

Location: MacKay River





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

**AMS21
CONKLIN
APRIL 2023**

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Summary

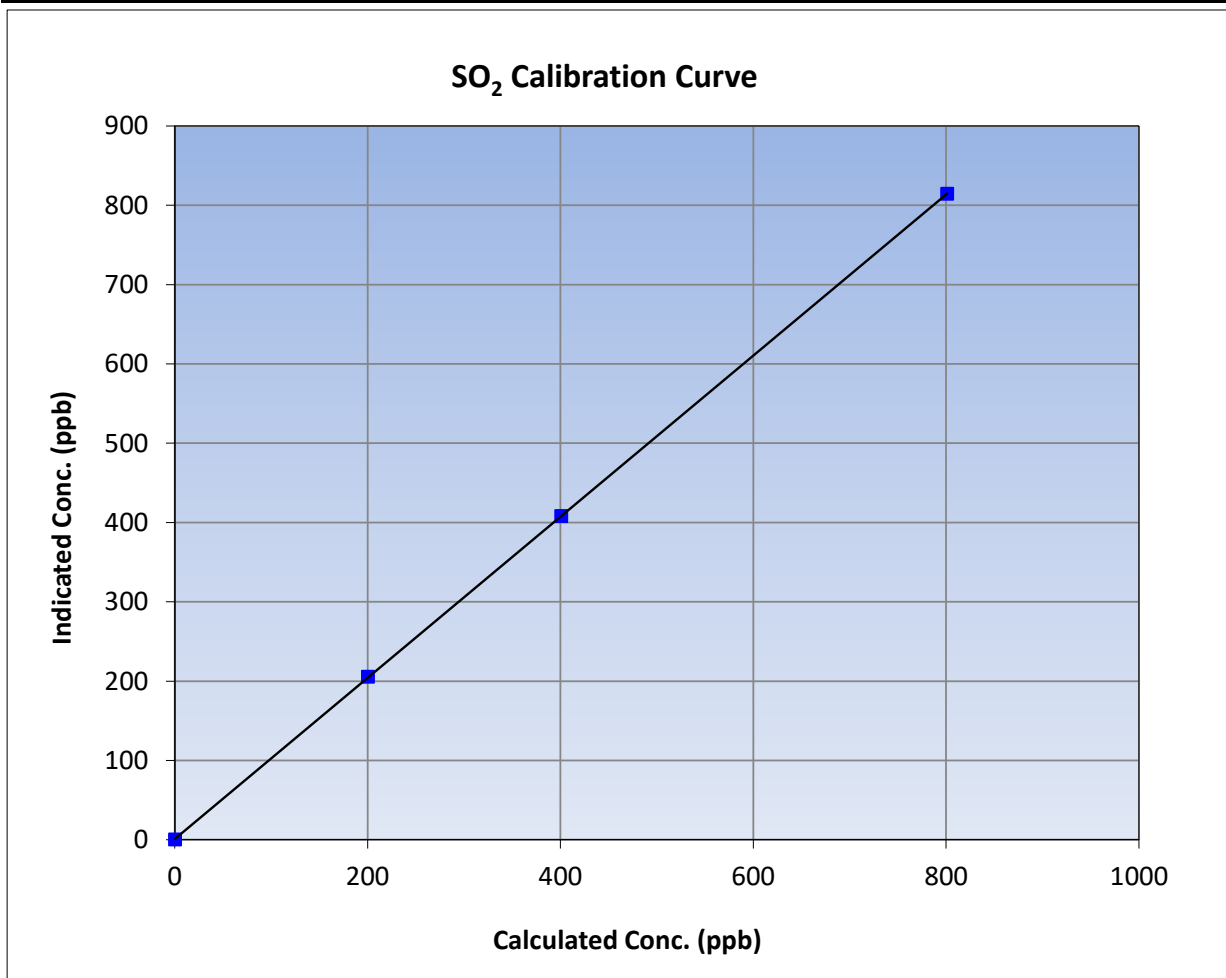
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:14	End Time (MST):	12:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

Calibration Data

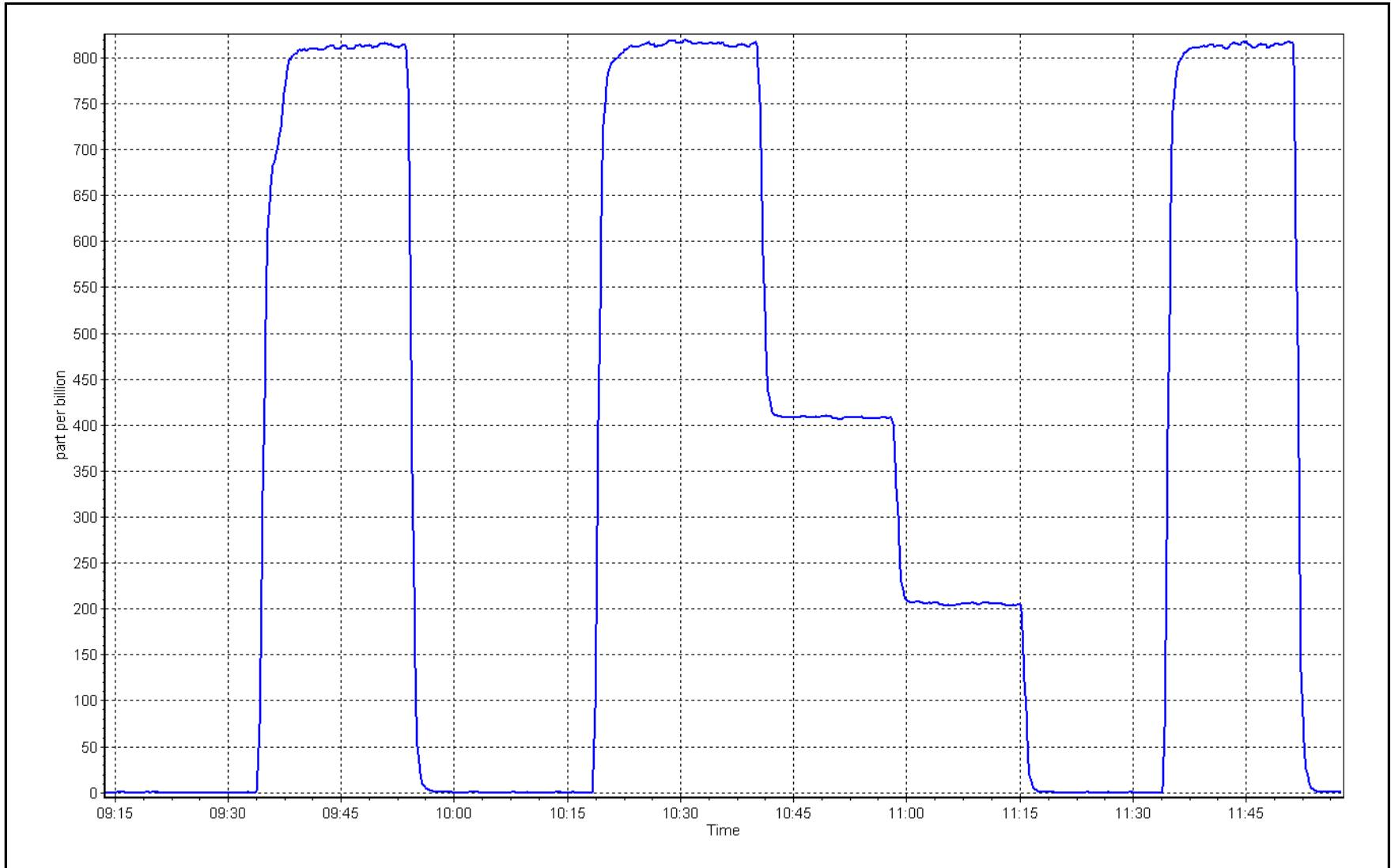
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999995	≥0.995
800.8	814.1	0.9837			
400.4	407.9	0.9817	Slope	1.015856	0.90 - 1.10
200.1	205.1	0.9757			
			Intercept	0.896430	+/-30



SO2 Calibration Plot

Date: April 13, 2023

Location: Conklin





Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name: Conklin Station number: AMS21
 Calibration Date: April 26, 2023 Last Cal Date: March 22, 2023
 Start time (MST): 9:17 End time (MST): 13:05
 Reason: Routine

Calibration Standards

Cal Gas Concentration: 5.03 ppm Cal Gas Exp Date: April 16, 2022
 Cal Gas Cylinder #: CC505493
 Removed Cal Gas Conc: 5.03 ppm Rem Gas Exp Date: NA
 Removed Gas Cyl #: NA 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	1.019442	1.009291	Backgd or Offset: 2.9	2.8
Calibration intercept:	0.237078	-0.082550	Coeff or Slope: 0.991	0.974

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	-0.4	----
as found span	4921	79.5	80.0	81.9	0.972
as found 2nd point	4960	39.8	40.0	41.1	0.965
as found 3rd point	4980	19.9	20.0	20.5	0.958
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4921	79.5	80.0	80.5	0.993
second point	4960	39.8	40.0	40.5	0.989
third point	4980	19.9	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.5	80.0	80.5	0.993
SO2 Scrubber Check	4920	80.2	802.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	0.989
Date of last converter efficiency test:				efficiency	

Baseline Corr As found: 82.3 Prev response: 81.76 *% change: 0.7%
 Baseline Corr 2nd AF pt: 41.5 AF Slope: 1.028298 AF Intercept: -0.222949
 Baseline Corr 3rd AF pt: 20.9 AF Correlation: 0.999977

* = > +/-5% change initiates investigation

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

TRS Calibration Summary

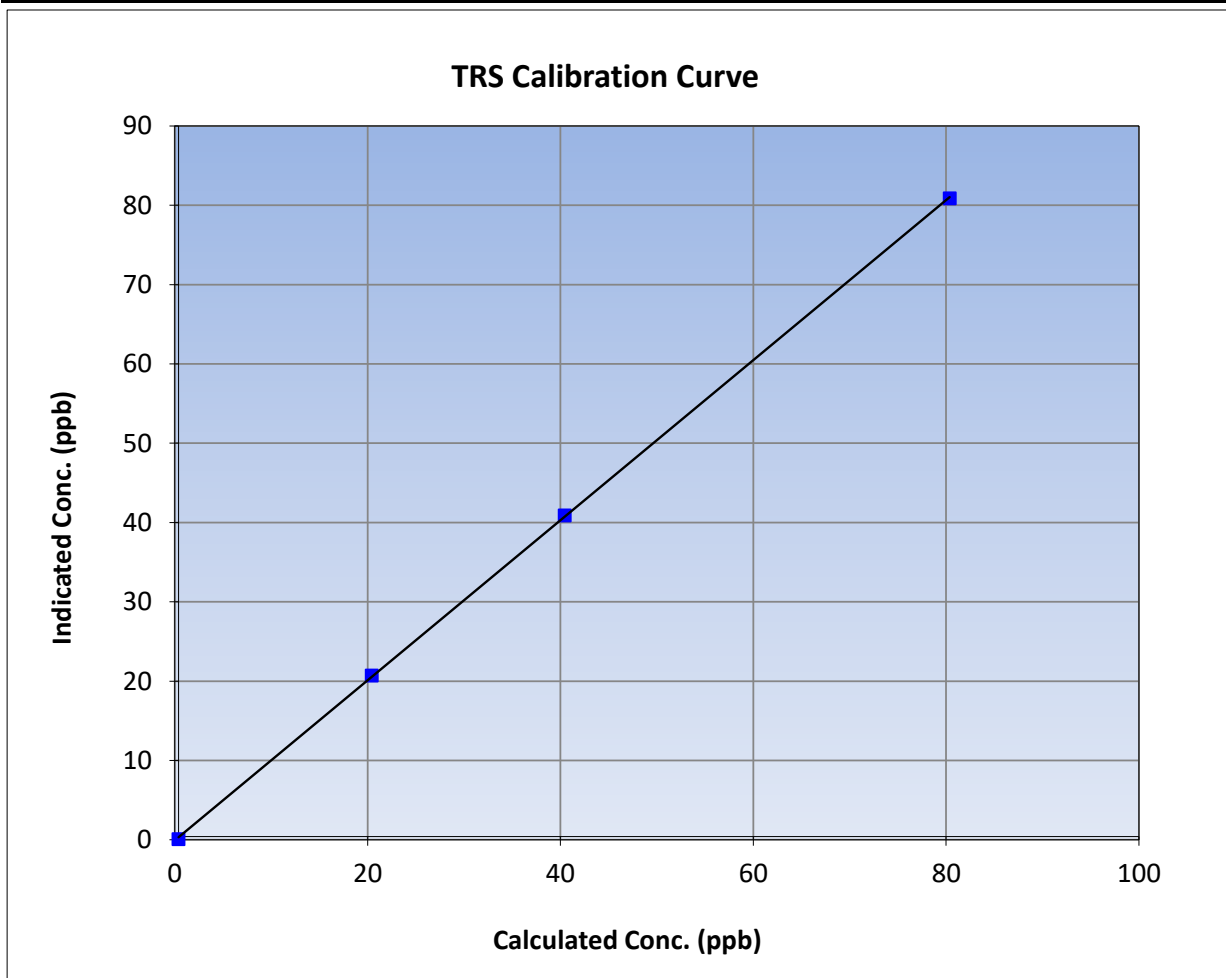
Version-11-2021

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 22, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:17	End Time (MST):	13:05
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

Calibration Data

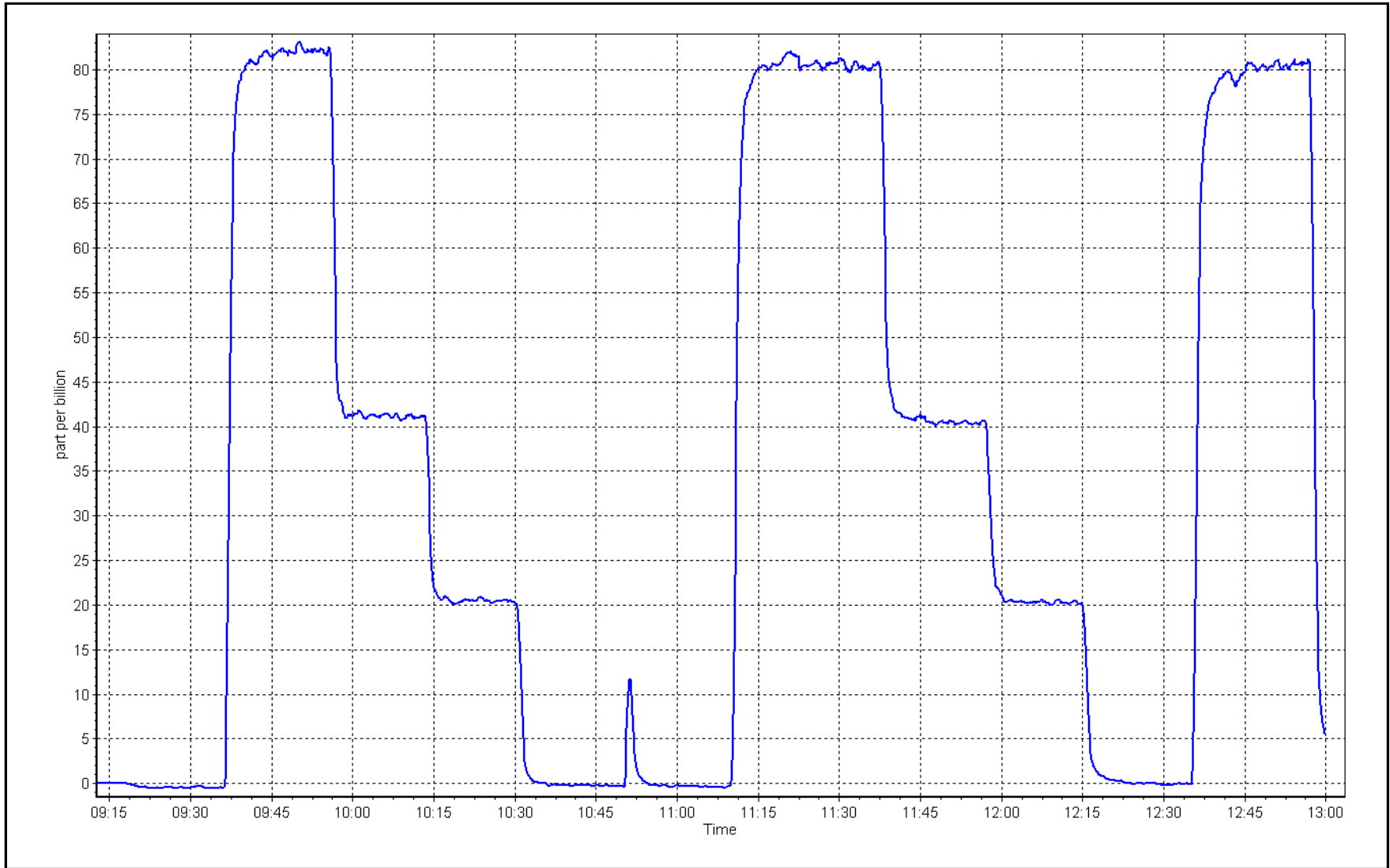
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.3	----	Correlation Coefficient	0.999965	≥0.995
80.0	80.5	0.9934			
40.0	40.5	0.9887	Slope	1.009291	0.90 - 1.10
20.0	20.3	0.9862			
			Intercept	-0.082550	+/-3



TRS Calibration Plot

Date: April 26, 2023

Location: Conklin





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	April 13, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	9:14	End time (MST):	12:00
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC259455	Cal Gas Expiry Date:	January 5, 2025
CH ₄ Cal Gas Conc.	497.9 ppm	CH ₄ Equiv Conc.	1067.7 ppm
C ₃ H ₈ Cal Gas Conc.	207.2 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	497.9 ppm	CH ₄ Equiv Conc.	1067.7 ppm
Removed C ₃ H ₈ 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 701	Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	118148495
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	1.86E-04	1.86E-04	NMHC SP Ratio:	4.56E-05
CH ₄ Retention time:	12.60	12.60	NMHC Peak Area:	200658
				200658

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	17.19	0.996
as found 2nd point	4960	40.1	8.56		
as found 3rd point	4980	20.0	4.27		
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.16	0.998
second point	4960	40.1	8.56	8.62	0.994
third point	4980	20.0	4.27	4.34	0.984
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.05	1.004
Average Correction Factor					0.992
Baseline Corr AF:	17.19	Prev response	17.21	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.19	0.994
as found 2nd point	4960	40.1	4.57		
as found 3rd point	4980	20.0	2.28		
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.19	0.994
second point	4960	40.1	4.57	4.60	0.993
third point	4980	20.0	2.28	2.32	0.982
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.07	1.007
Average Correction Factor					0.990
Baseline Corr AF:	9.19	Prev response	9.17	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	8.00	0.998
as found 2nd point	4960	40.1	3.99		
as found 3rd point	4980	20.0	1.99		
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	7.97	1.002
second point	4960	40.1	3.99	4.02	0.994
third point	4980	20.0	1.99	2.02	0.986
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.98	1.001
Average Correction Factor					0.994
Baseline Corr AF:	8.00	Prev response	8.04	*% 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

	<u>Start</u>	<u>Finish</u>
THC Cal Slope:	1.003632	1.000983
THC Cal Offset:	0.026595	0.032189
CH ₄ Cal Slope:	1.005332	0.996933
CH ₄ Cal Offset:	0.011959	0.019545
NMHC Cal Slope:	1.002247	1.004534
NMHC Cal Offset:	0.014236	0.012844

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

THC Calibration Summary

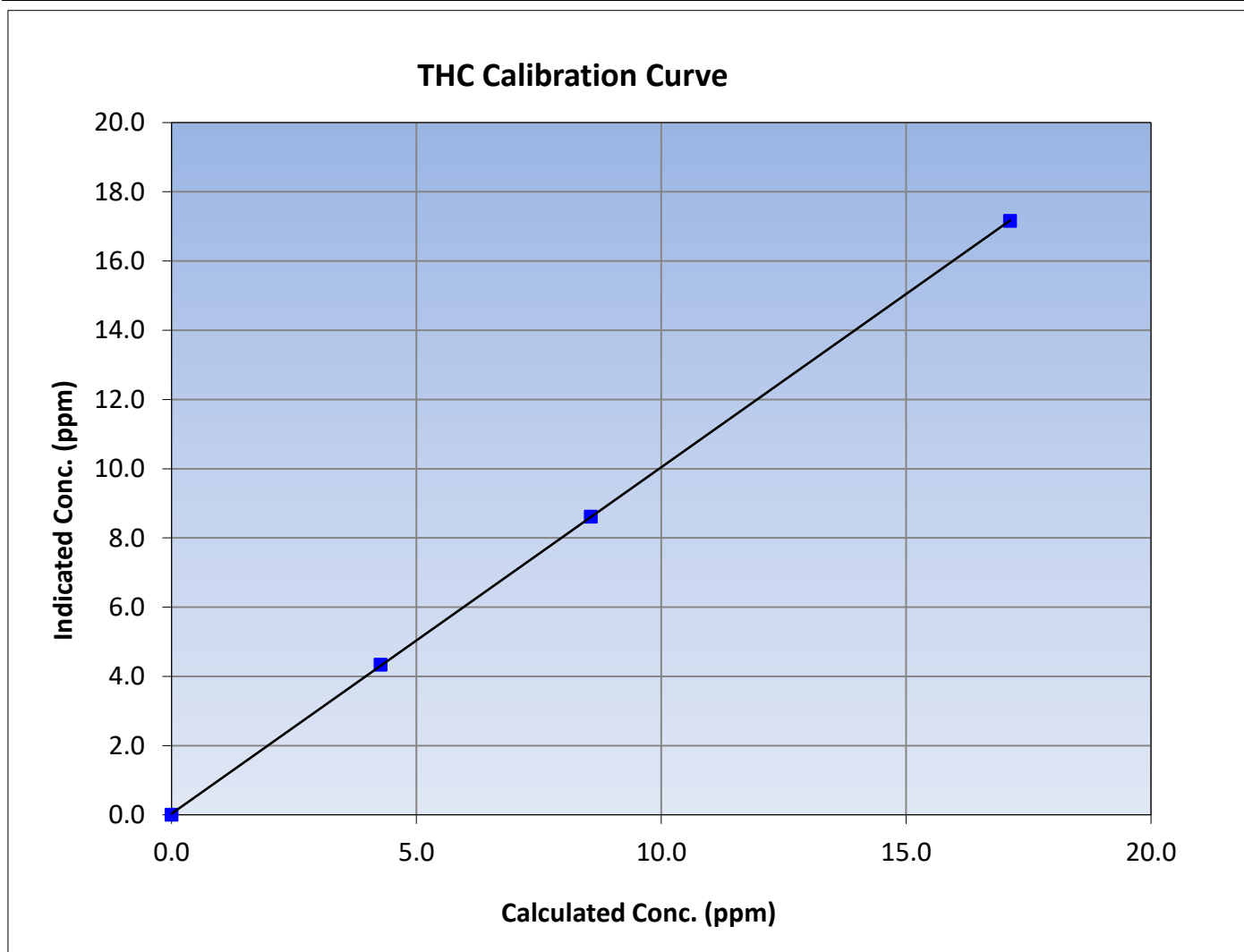
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:14	End Time (MST):	12:00
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999984	≥ 0.995			
17.13	17.16	0.9980						
8.56	8.62	0.9937				Slope	1.000983	0.90 - 1.10
4.27	4.34	0.9838						
			Intercept	0.032189	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

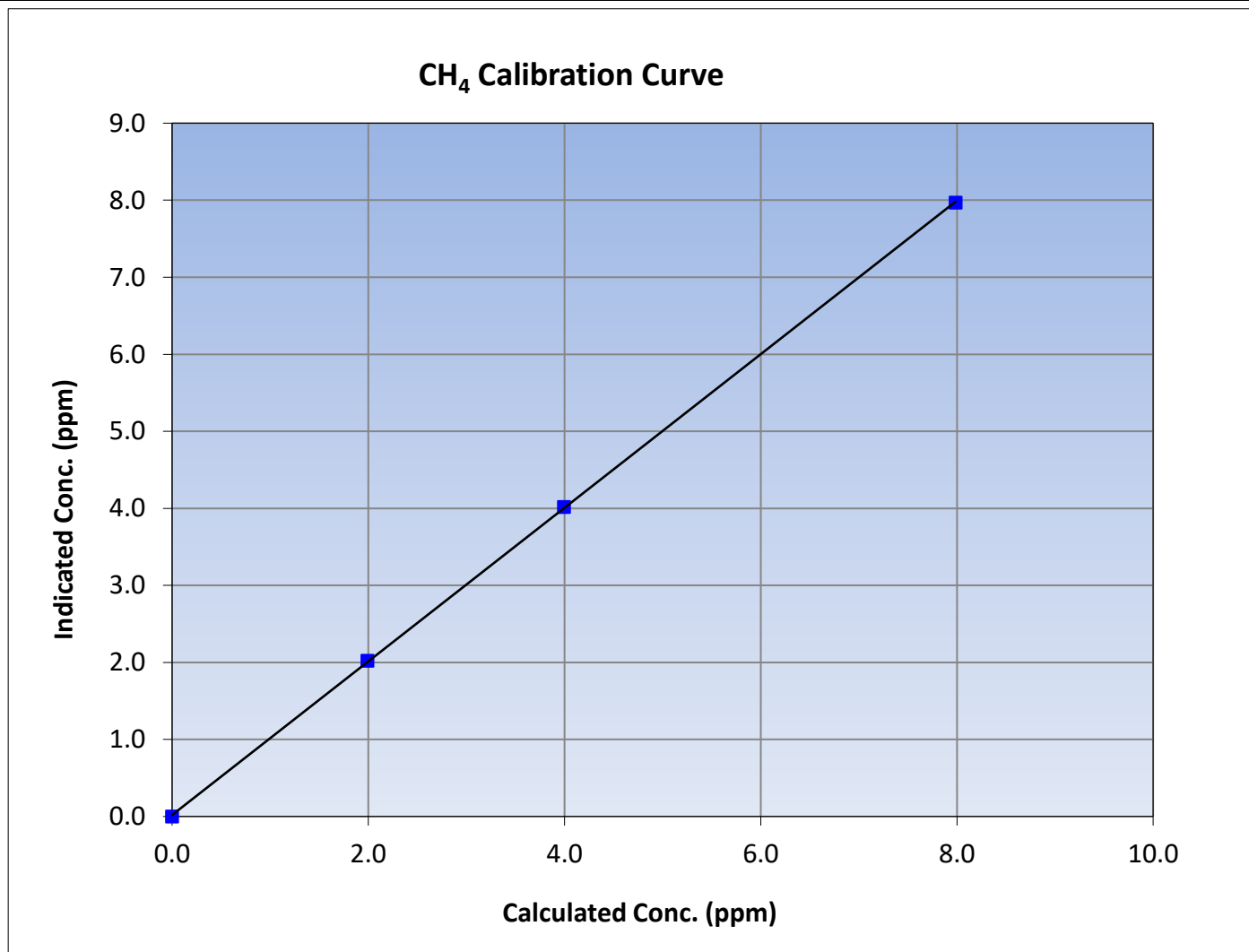
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:14	End Time (MST):	12:00
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999970	≥ 0.995			
7.99	7.97	1.0021						
3.99	4.02	0.9940				Slope	0.996933	0.90 - 1.10
1.99	2.02	0.9859						
			Intercept	0.019545	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

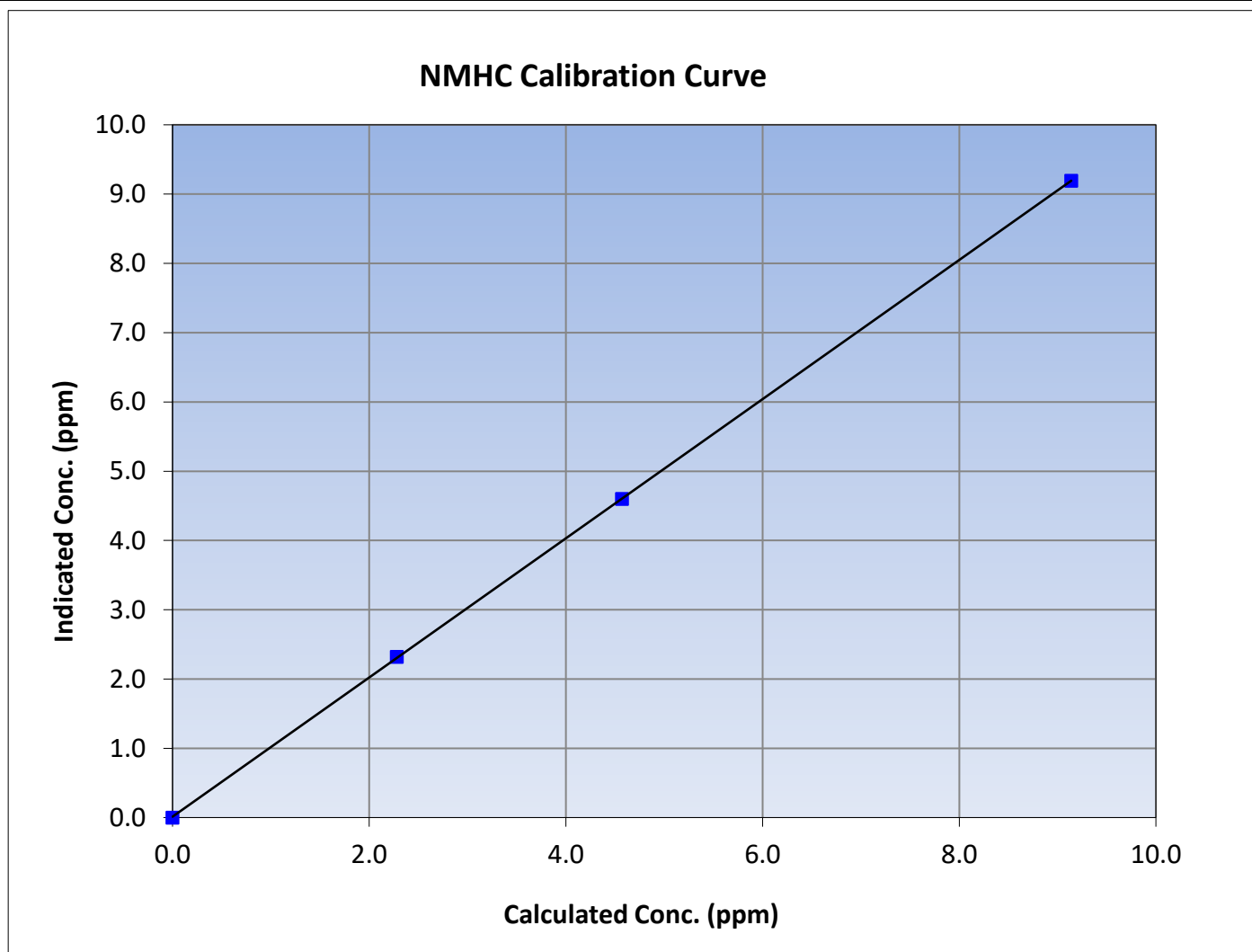
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:14	End Time (MST):	12:00
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

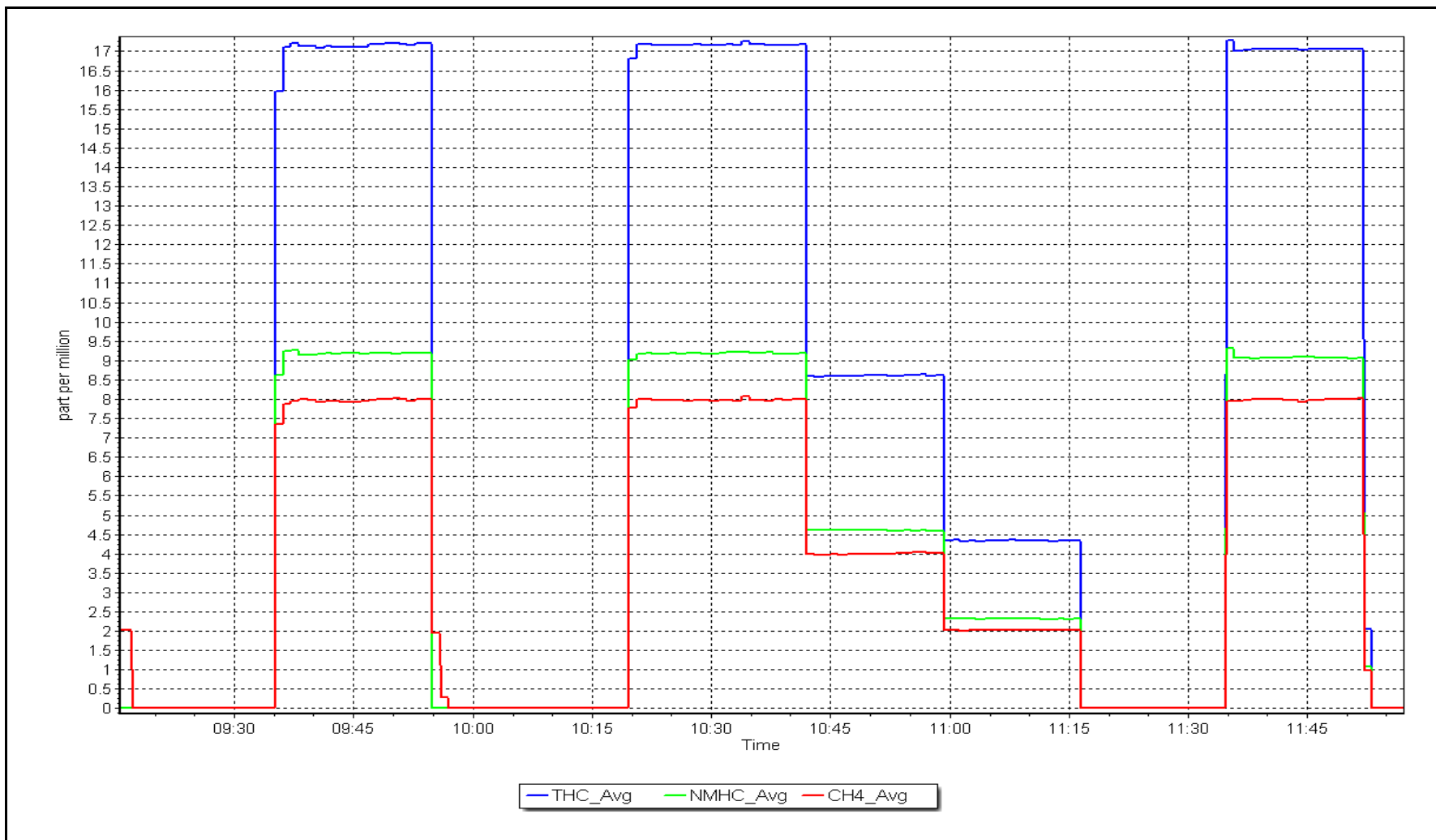
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999989	≥ 0.995			
9.14	9.19	0.9945						
4.57	4.60	0.9932				Slope	1.004534	0.90 - 1.10
2.28	2.32	0.9820						
			Intercept	0.012844	± 0.5			



NMHC Calibration Plot

Date: April 13, 2023

Location: Conklin





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	April 16, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	10:14	End time (MST):	12:50
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:	CC259455	Cal Gas Expiry Date:	January 5, 2025
CH ₄ Cal Gas Conc.	497.9 ppm	CH ₄ Equiv Conc.	1067.7 ppm
C ₃ H ₈ Cal Gas Conc.	207.2 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	497.9 ppm	CH ₄ Equiv Conc.	1067.7 ppm
Removed C ₃ H ₈ 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 701	Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	118148495
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	1.86E-04	1.82E-04	NMHC SP Ratio:	4.56E-05
CH ₄ Retention time:	12.60	12.20	NMHC Peak Area:	200658
				199772

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	17.24	0.993
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	17.16	0.998
second point	4960	40.1	8.56	8.61	0.994
third point	4980	20.0	4.27	4.32	0.988
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	16.86	1.016
Average Correction Factor					0.993
Baseline Corr AF:	17.24	Prev response	17.17	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.10	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	80.2	9.14	9.13	1.001
second point	4960	40.1	4.57	4.61	0.992
third point	4980	20.0	2.28	2.32	0.984
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	8.98	1.018
Average Correction Factor					0.992
Baseline Corr AF:	9.10	Prev response	9.19	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	8.14	0.981
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	8.03	0.995
second point	4960	40.1	3.99	4.01	0.997
third point	4980	20.0	1.99	2.01	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.88	1.013
Average Correction Factor					0.994
Baseline Corr AF:	8.14	Prev response	7.98	*% change	2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	1.000983	1.001470
THC Cal Offset:	0.032189	0.023785
CH ₄ Cal Slope:	0.996933	1.005018
CH ₄ Cal Offset:	0.019545	0.000556
NMHC Cal Slope:	1.004534	0.998508
NMHC Cal Offset:	0.012844	0.023429

Notes: Analyzer was having dipping issue and had to recalibrate. Adjusted the span.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

THC Calibration Summary

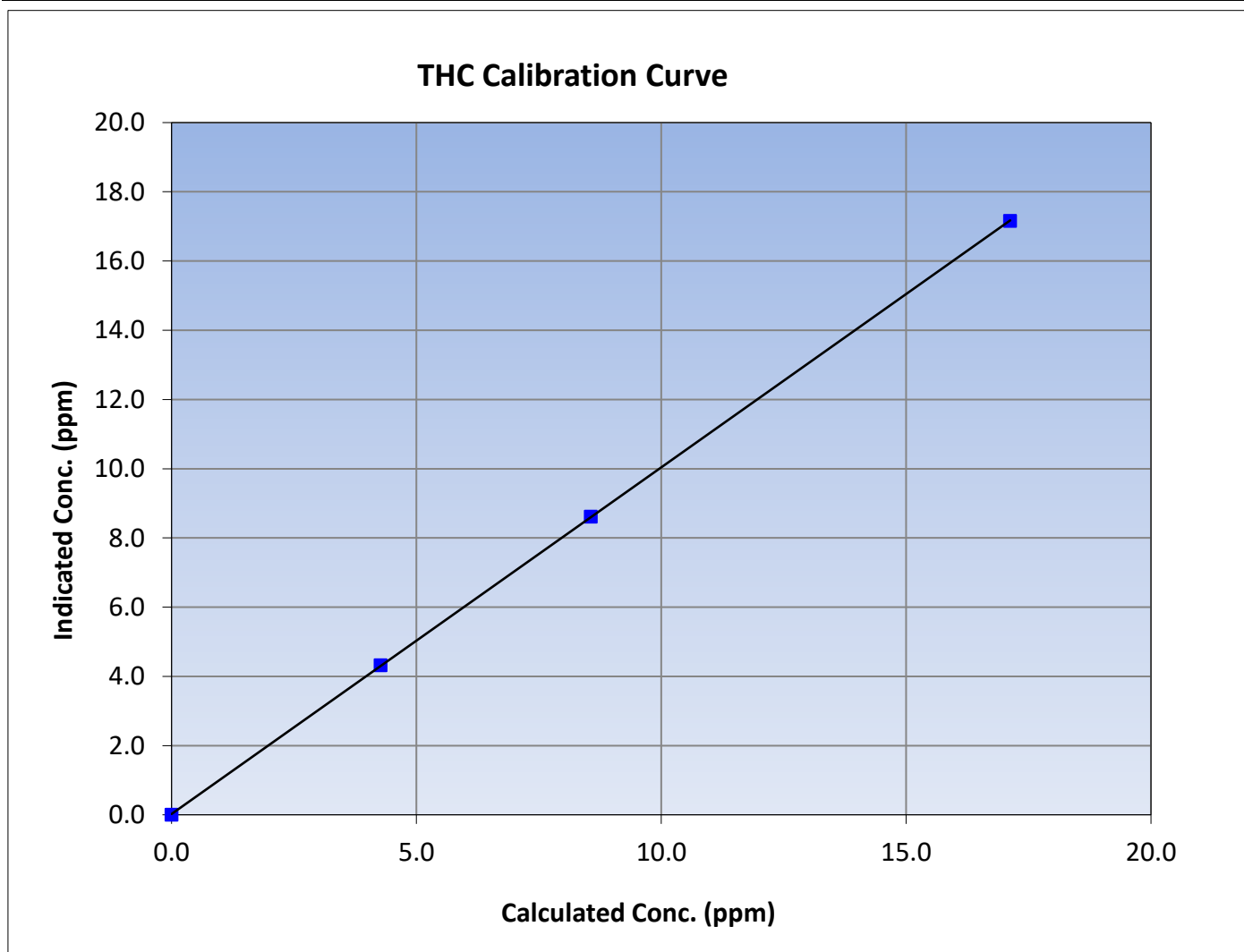
Version-06-2022

Station Information

Calibration Date:	April 16, 2023	Previous Calibration:	April 13, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:14	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999991	≥ 0.995			
17.13	17.16	0.9979						
8.56	8.61	0.9943				Slope	1.001470	0.90 - 1.10
4.27	4.32	0.9877						
			Intercept	0.023785	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

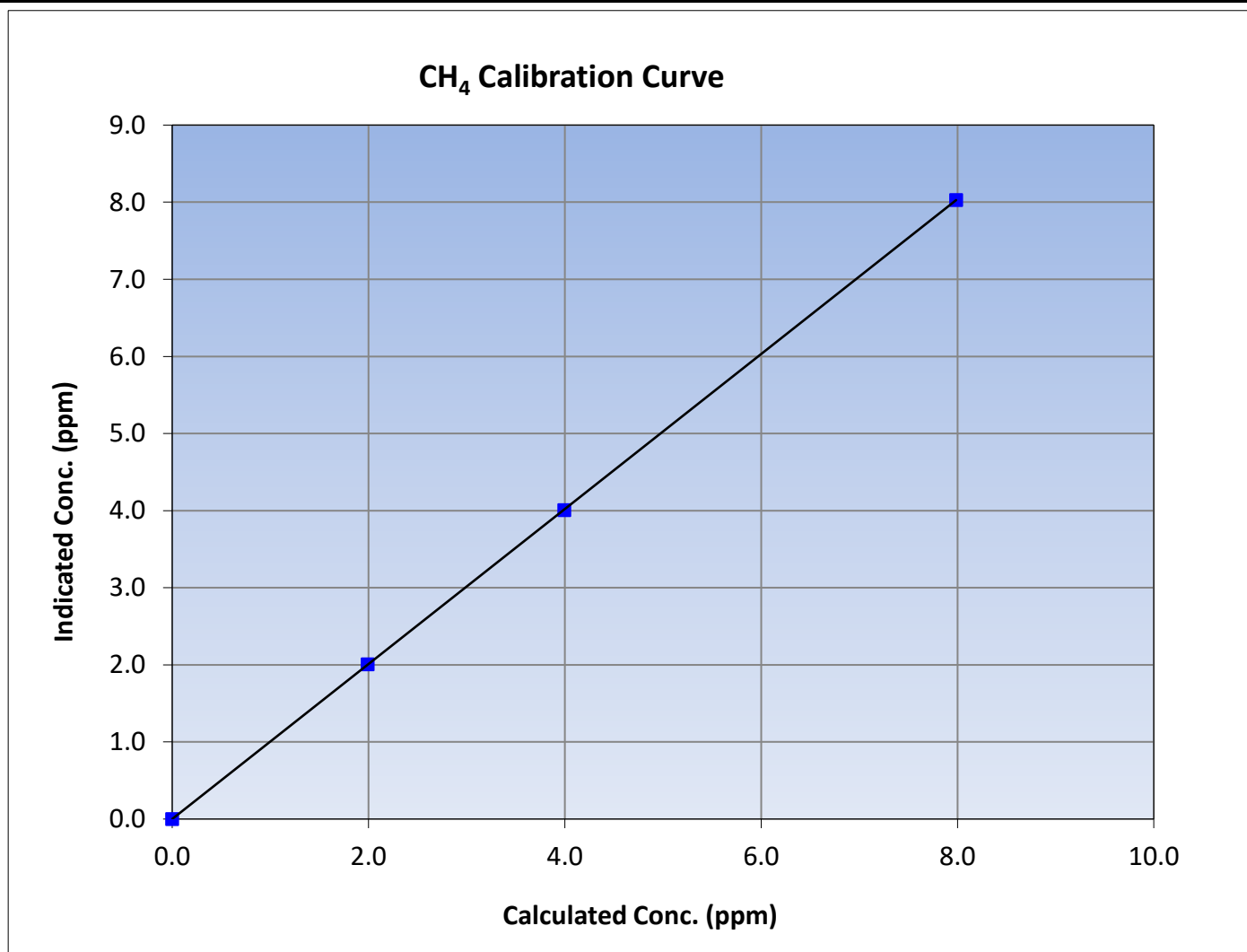
Version-06-2022

Station Information

Calibration Date:	April 16, 2023	Previous Calibration:	April 13, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:14	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995			
7.99	8.03	0.9946						
3.99	4.01	0.9968				Slope	1.005018	0.90 - 1.10
1.99	2.01	0.9918						
			Intercept	0.000556	+/-0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

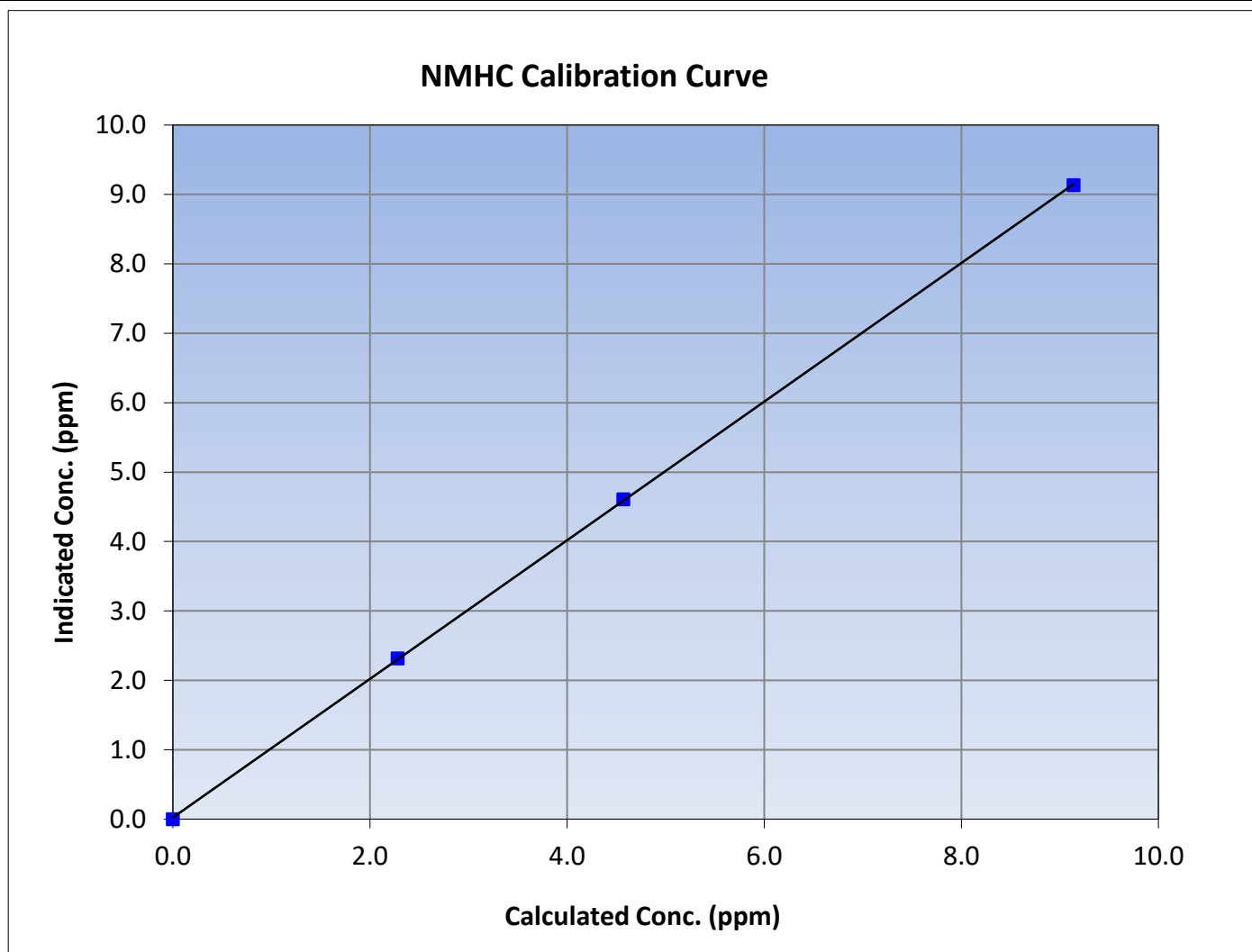
Version-06-2022

Station Information

Calibration Date:	April 16, 2023	Previous Calibration:	April 13, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:14	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

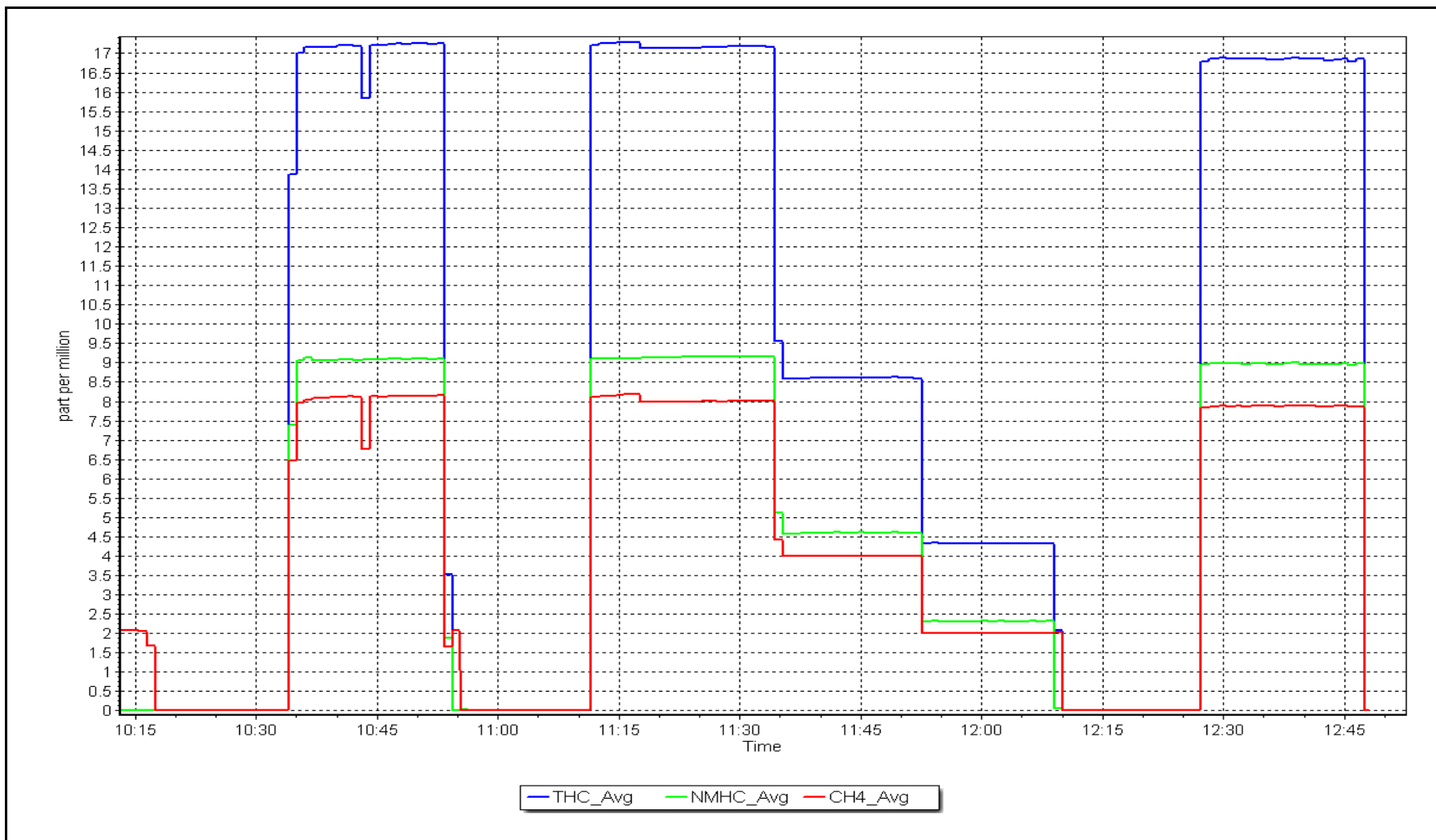
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999967	≥0.995			
9.14	9.13	1.0006						
4.57	4.61	0.9917				Slope	0.998508	0.90 - 1.10
2.28	2.32	0.9841						
			Intercept	0.023429	+/-0.5			



NMHC Calibration Plot

Date: April 16, 2023

Location: Conklin





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	April 18, 2023	Last Cal Date:	April 16, 2023
Start time (MST):	9:50	End time (MST):	11:10
Reason:	Removal		

Calibration Standards

Gas Cert Reference:	CC259455	Cal Gas Expiry Date:	January 5, 2025
CH ₄ Cal Gas Conc.	497.9 ppm	CH ₄ Equiv Conc.	1067.7 ppm
C ₃ H ₈ Cal Gas Conc.	207.2 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	497.9 ppm	CH ₄ Equiv Conc.	1067.7 ppm
Removed C ₃ H ₈ 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 701	Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	118148495
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	1.82E-04	NA	NMHC SP Ratio:	4.58E-05
CH ₄ Retention time:	12.20	NA	NMHC Peak Area:	199772

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	17.02	1.006
as found 2nd point	4960	40.1	8.56	8.51	1.006
as found 3rd point	4980	20.0	4.27	4.28	0.998
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					

			Average Correction Factor		
Baseline Corr AF:	17.02	Prev response	17.17	*% change	-0.9%
Baseline Corr 2nd AF:	8.5	AF Slope:	0.993144	AF Intercept:	0.014151
Baseline Corr 3rd AF:	4.3	AF Correlation:	0.999995	* = > +/-5% change initiates investigation	



Wood Buffalo Environmental Association

THC / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.18	0.996
as found 2nd point	4960	40.1	4.57	4.59	0.996
as found 3rd point	4980	20.0	2.28	2.31	0.987
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	9.18	Prev response	9.19	*% change	-0.1%
Baseline Corr 2nd AF:	4.6	AF Slope:	1.003685	AF Intercept:	0.008240
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999994	* = > +/-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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.84	1.019
as found 2nd point	4960	40.1	3.99	3.92	1.019
as found 3rd point	4980	20.0	1.99	1.97	1.011
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	7.84	Prev response	7.98	*% change	-1.8%
Baseline Corr 2nd AF:	3.92	AF Slope:	0.981080	AF Intercept:	0.005912
Baseline Corr 3rd AF:	1.97	AF Correlation:	0.999996	* = > +/-5% change initiates investigation	

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope:	1.000983	
THC Cal Offset:	0.032189	
CH ₄ Cal Slope:	0.996933	
CH ₄ Cal Offset:	0.019545	
NMHC Cal Slope:	1.004534	
NMHC Cal Offset:	0.012844	

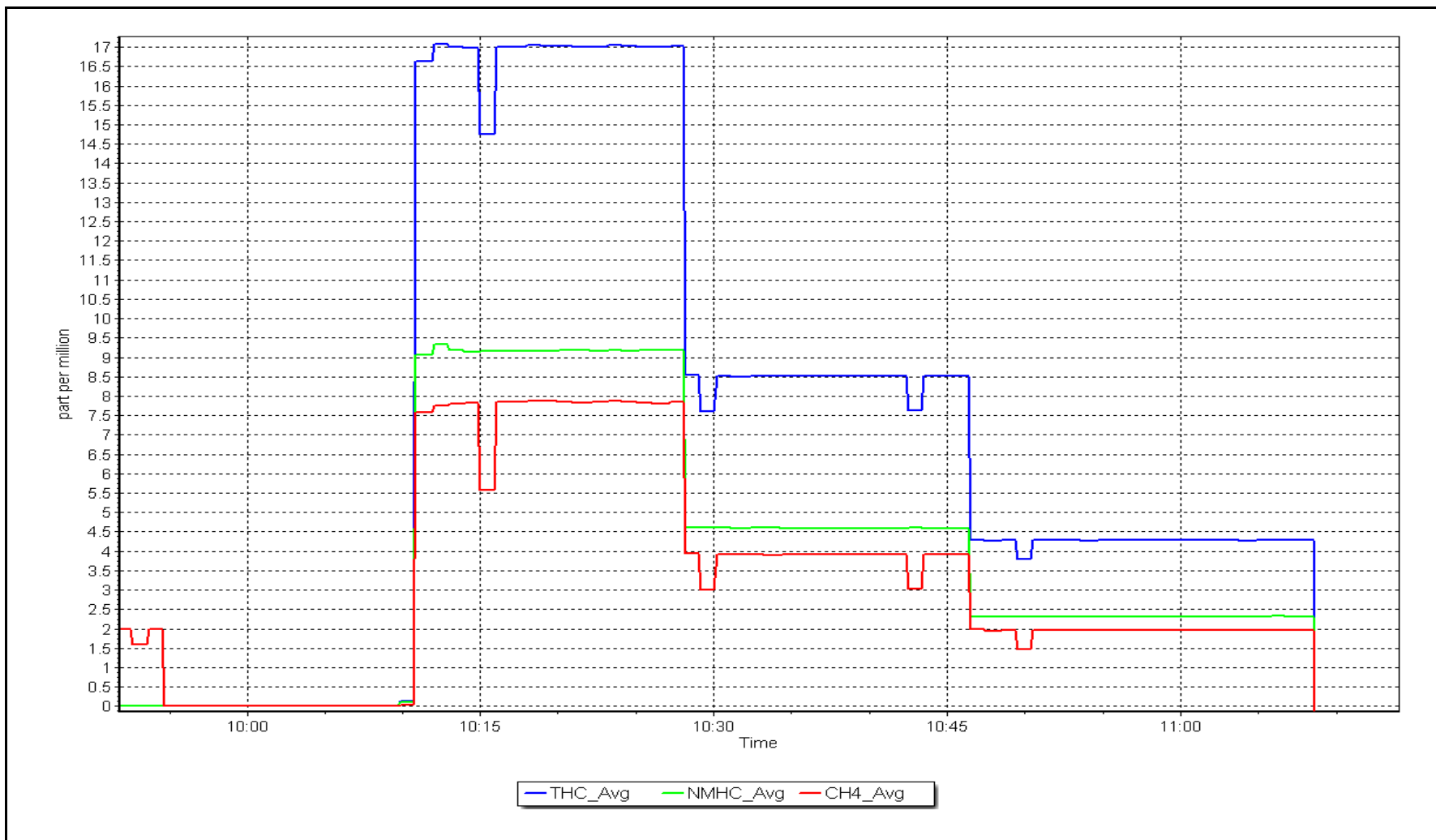
Notes: Removal calibration for instrument change out.

Calibration Performed By: Karan Pandit

NMHC Calibration Plot

Date: April 18, 2023

Location: Conklin





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	April 18, 2023	Last Cal Date:	NA
Start time (MST):	11:55	End time (MST):	14:29
Reason:	Install		

Calibration Standards

Gas Cert Reference:	CC259455	Cal Gas Expiry Date:	January 5, 2025
CH ₄ Cal Gas Conc.	497.9 ppm	CH ₄ Equiv Conc.	1067.7 ppm
C ₃ H ₈ Cal Gas Conc.	207.2 ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH ₄ Conc.	497.9 ppm	CH ₄ Equiv Conc.	1067.7 ppm
Removed C ₃ H ₈ 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 701	Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	118148495
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	NA	2.16E-04	NMHC SP Ratio:	NA
CH ₄ Retention time:	NA	12.00	NMHC Peak Area:	NA
				196084

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
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	4920	80.2	17.13	17.14	0.999
second point	4960	40.1	8.56	8.63	0.992
third point	4980	20.0	4.27	4.36	0.979
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					0.990
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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
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	4920	80.2	9.14	9.15	0.999
second point	4960	40.1	4.57	4.61	0.991
third point	4980	20.0	2.28	2.33	0.979
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.18	0.996
Average Correction Factor					0.990
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 <i>Limit= 0.95-1.05</i>
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	4920	80.2	7.99	8.00	0.999
second point	4960	40.1	3.99	4.02	0.993
third point	4980	20.0	1.99	2.03	0.980
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	8.00	0.998
Average Correction Factor					0.991
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

	<u>Start</u>	<u>Finish</u>
THC Cal Slope:	NA	0.999574
THC Cal Offset:	NA	0.045989
CH ₄ Cal Slope:	NA	0.999808
CH ₄ Cal Offset:	NA	0.019754
NMHC Cal Slope:	NA	0.999495
NMHC Cal Offset:	NA	0.026235

Notes:

Install calibration.

Calibration Performed By:

Karan Pandit



Wood Buffalo Environmental Association

THC Calibration Summary

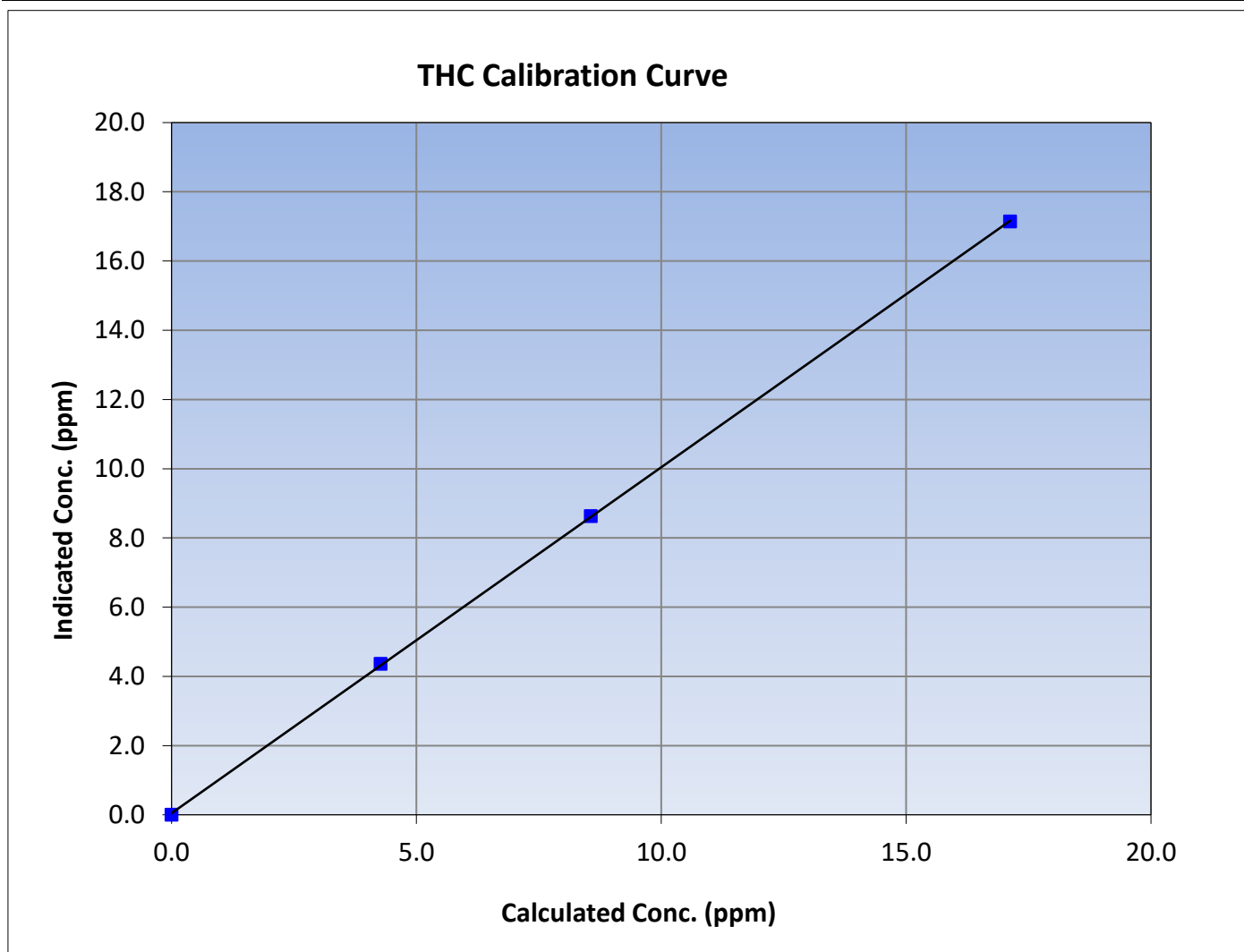
Version-06-2022

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	NA
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:55	End Time (MST):	14:29
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999967	≥ 0.995			
17.13	17.14	0.9991						
8.56	8.63	0.9924				Slope	0.999574	0.90 - 1.10
4.27	4.36	0.9793						
			Intercept	0.045989	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

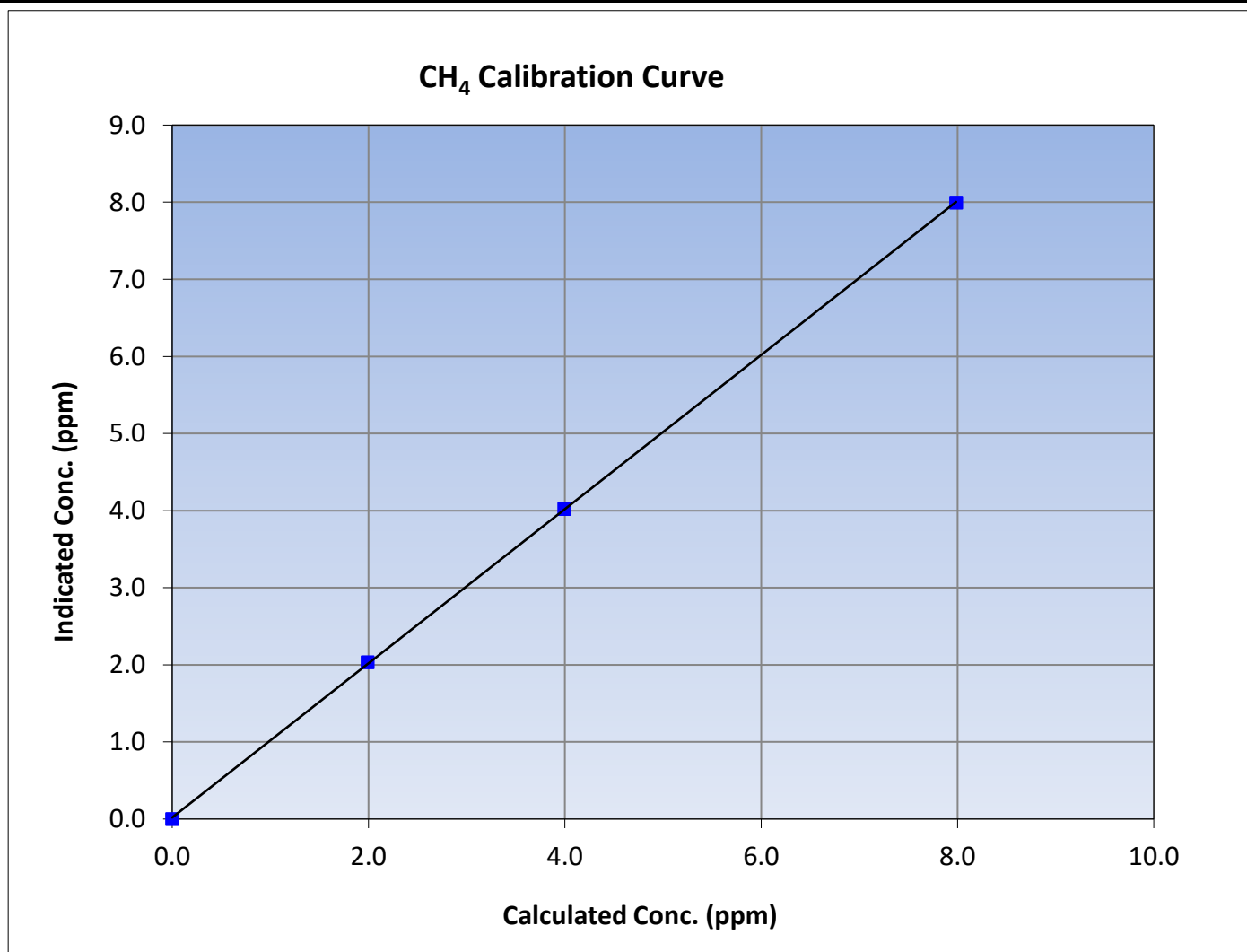
Version-06-2022

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	NA
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:55	End Time (MST):	14:29
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999972	≥ 0.995
7.99	8.00	0.9989			
3.99	4.02	0.9933			
1.99	2.03	0.9801			
			Slope	0.999808	0.90 - 1.10
			Intercept	0.019754	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

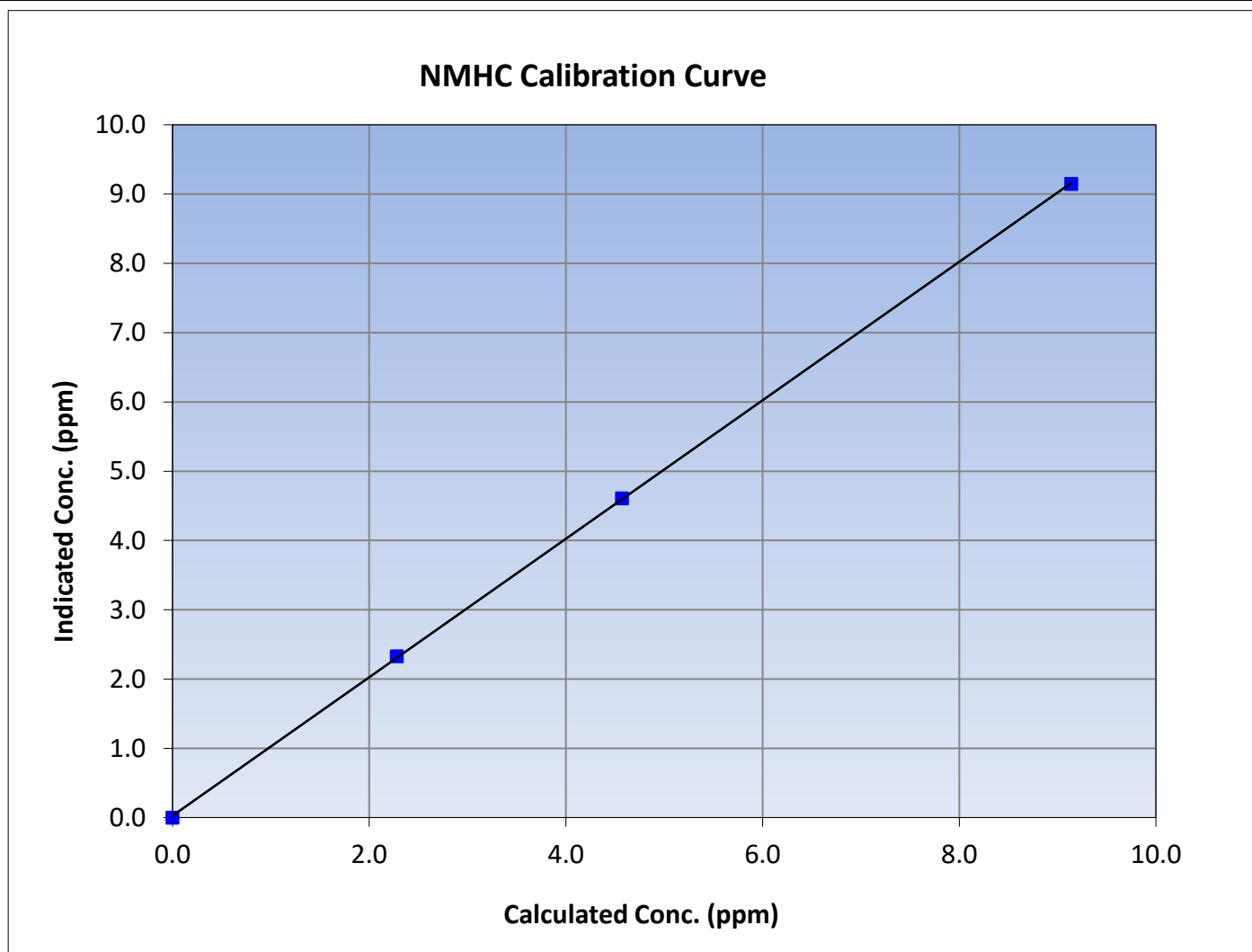
Version-06-2022

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	NA
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:55	End Time (MST):	14:29
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

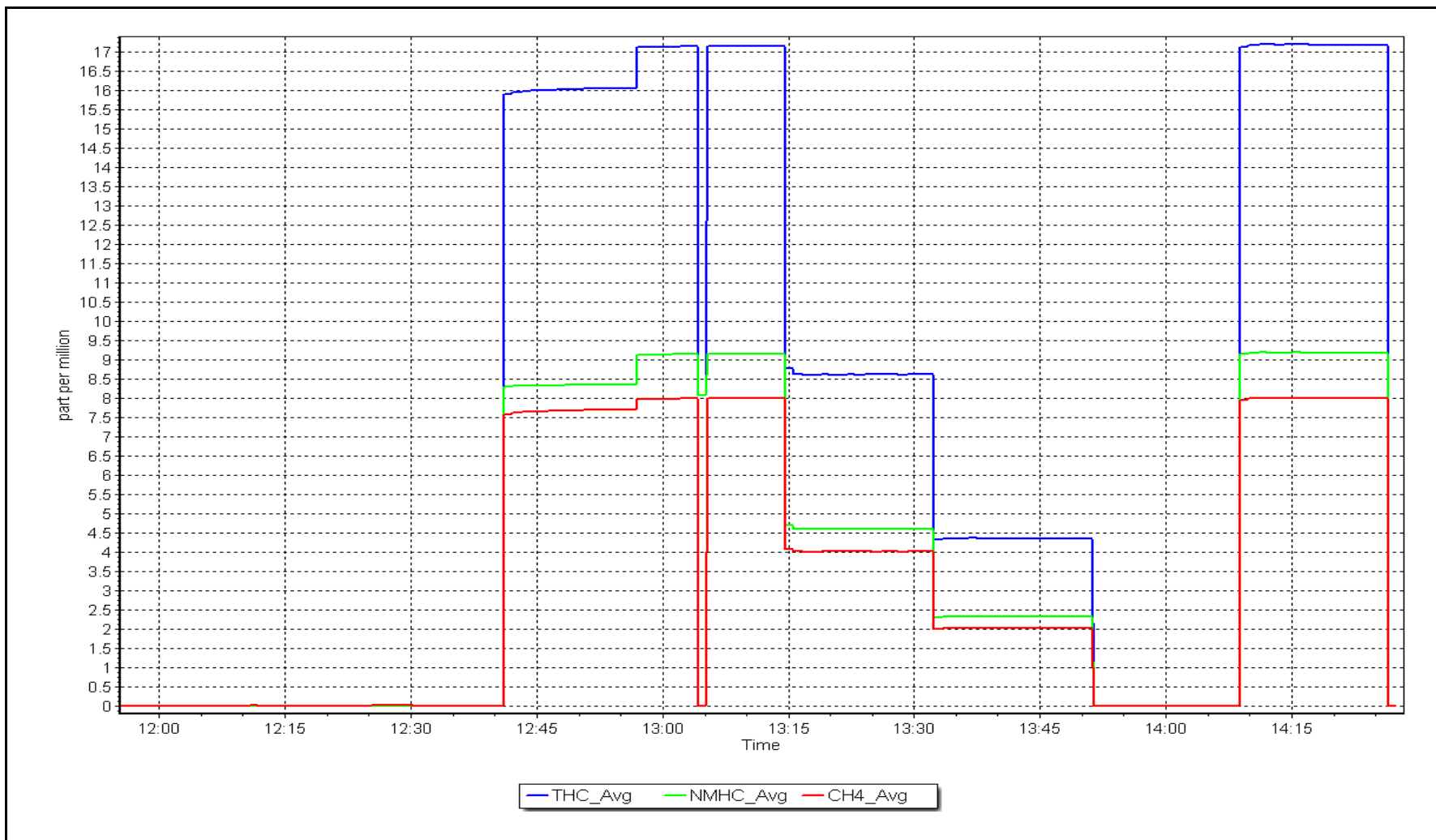
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999962	≥ 0.995
9.14	9.15	0.9992			
4.57	4.61	0.9915			
2.28	2.33	0.9786			
			Slope	0.999495	$0.90 - 1.10$
			Intercept	0.026235	± 0.5



NMHC Calibration Plot

Date: April 18, 2023

Location: Conklin





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Conklin
Calibration Date: April 28, 2023
Start time (MST): 8:34
Reason: Routine
Station number: AMS21
Last Cal Date: March 29, 2023
End time (MST): 12:30

Calibration Standards

NO Gas Cylinder #: T2Y1P1H
NOX Cal Gas Conc: 51.09 ppm
Removed Cylinder #: n/a
Removed Gas NOX Conc: 51.09 ppm
NOX gas Diff:
Calibrator Model: Teledyne API T700
ZAG make/model: Teledyne API T701H
Cal Gas Expiry Date: December 11, 2023
NO Cal Gas Conc: 50.39 ppm
Removed Gas Exp Date: n/a
Removed Gas NO Conc: 50.39 ppm
NO gas Diff:
Serial Number: 3810
Serial Number: 691

Analyzer Information

Analyzer make: Thermo 42i
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 1501663731

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.144	1.144	NO bkgnd or offset:	11.6	11.6
NOX coeff or slope:	1.001	1.001	NOX bkgnd or offset:	11.8	11.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	220.7	219.5

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	1.009334	1.010616
NO _x Cal Offset:	2.026079	2.246244
NO Cal Slope:	1.010890	1.008763
NO Cal Offset:	0.963352	1.982980
NO ₂ Cal Slope:	1.002951	1.003351
NO ₂ Cal Offset:	-0.706596	-0.204066



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.1	----	----
as found span	4921	79.4	811.2	800.1	11.1	820.4	807.4	13.1	0.9888	0.9910
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	820.9	807.9	13.0	0.9882	0.9904
second point	4960	39.7	405.7	400.1	5.6	413.5	407.3	6.3	0.9811	0.9824
third point	4980	19.8	202.3	199.6	2.8	209.0	204.8	4.2	0.9681	0.9744
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	377.3	433.9	821.8	390.1	431.7	0.9872	0.9673
Average Correction Factor									0.9791	0.9824

Corrected As found	NO _x = 820.6 ppb	NO = 807.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = 0.0%
Previous Response	NO _x = 820.8 ppb	NO = 809.8 ppb		*Percent Change	NO = -0.3%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI: ;

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	808.0	385.2	433.9	434.9	0.9977	100.2%
2nd GPT point (200 ppb O3)	808.0	602.5	216.6	218.1	0.9932	100.7%
3rd GPT point (100 ppb O3)	808.0	702.4	116.7	116.1	1.0053	99.5%
Average Correction Factor					0.9987	100.1%

Notes:

No adjustments required.

Calibration Performed By:

Denny Ray Estador



Wood Buffalo Environmental Association

NO_x Calibration Summary

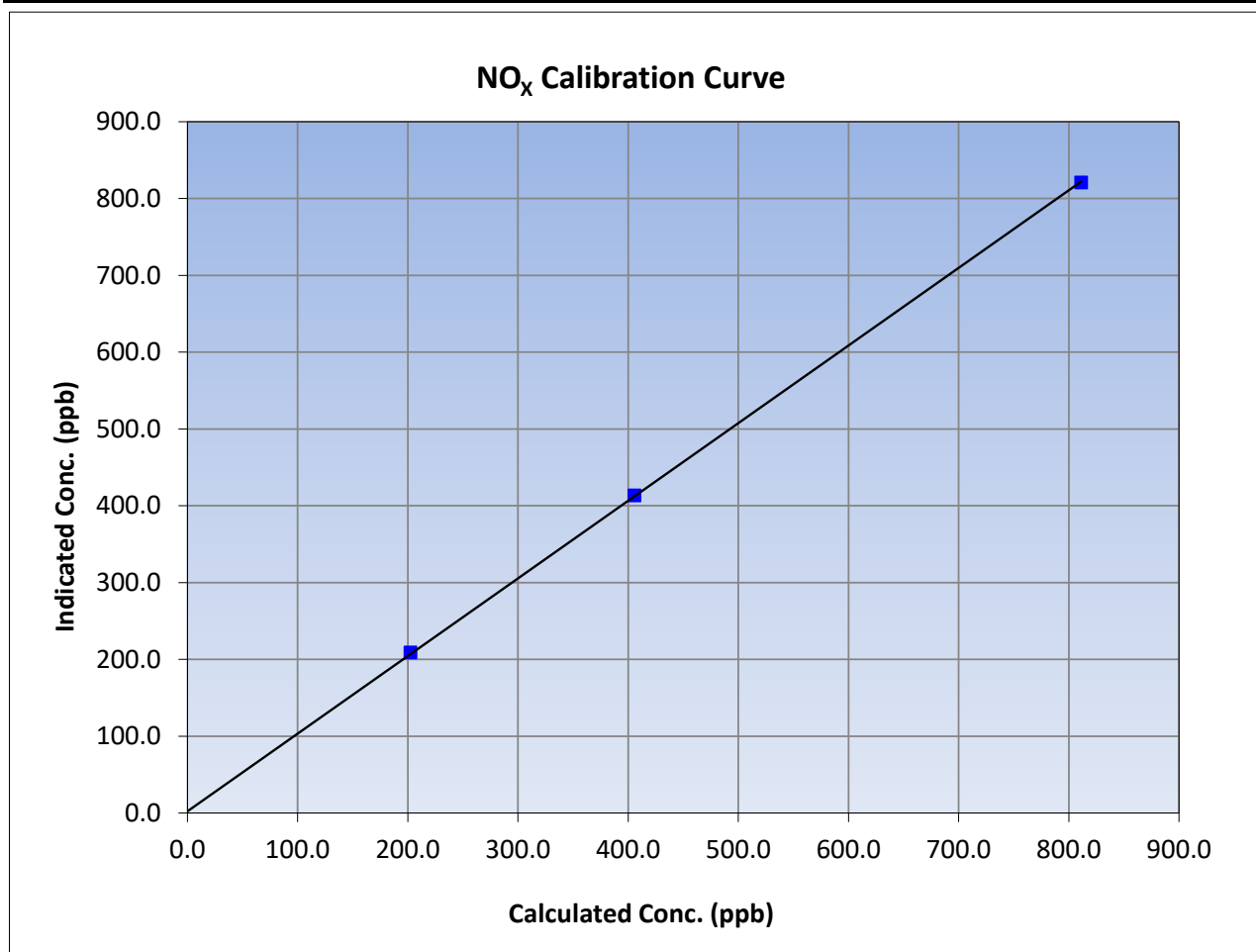
Version-04-2020

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 29, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:34	End Time (MST):	12:30
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	≥0.995	
811.2	820.9	0.9882			
405.7	413.5	0.9811			
202.3	209.0	0.9681			
			Slope	1.010616	0.90 - 1.10
			Intercept	2.246244	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

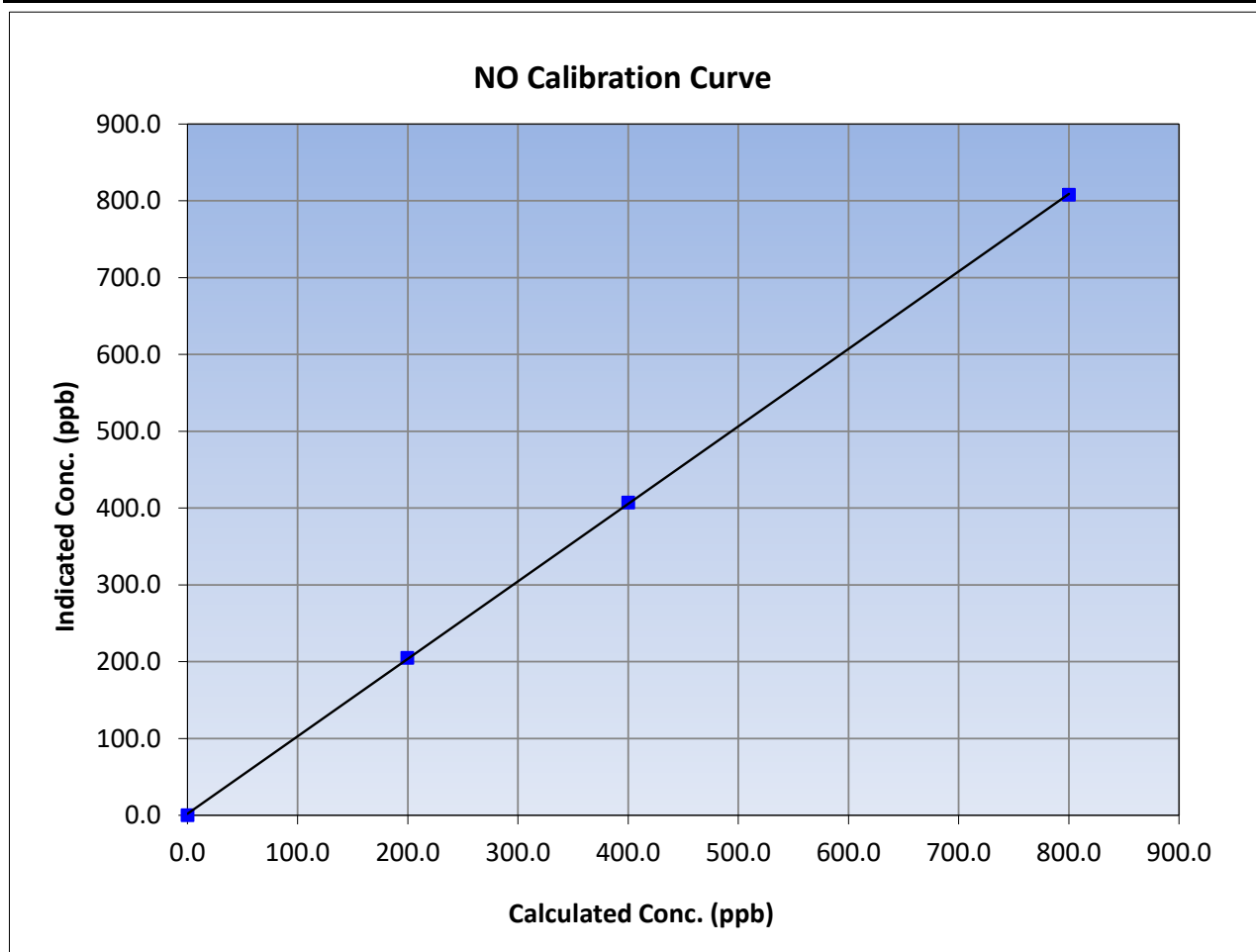
Version-04-2020

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 29, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:34	End Time (MST):	12:30
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20
800.1	807.9	0.9904		
400.1	407.3	0.9824		
199.6	204.8	0.9744		





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

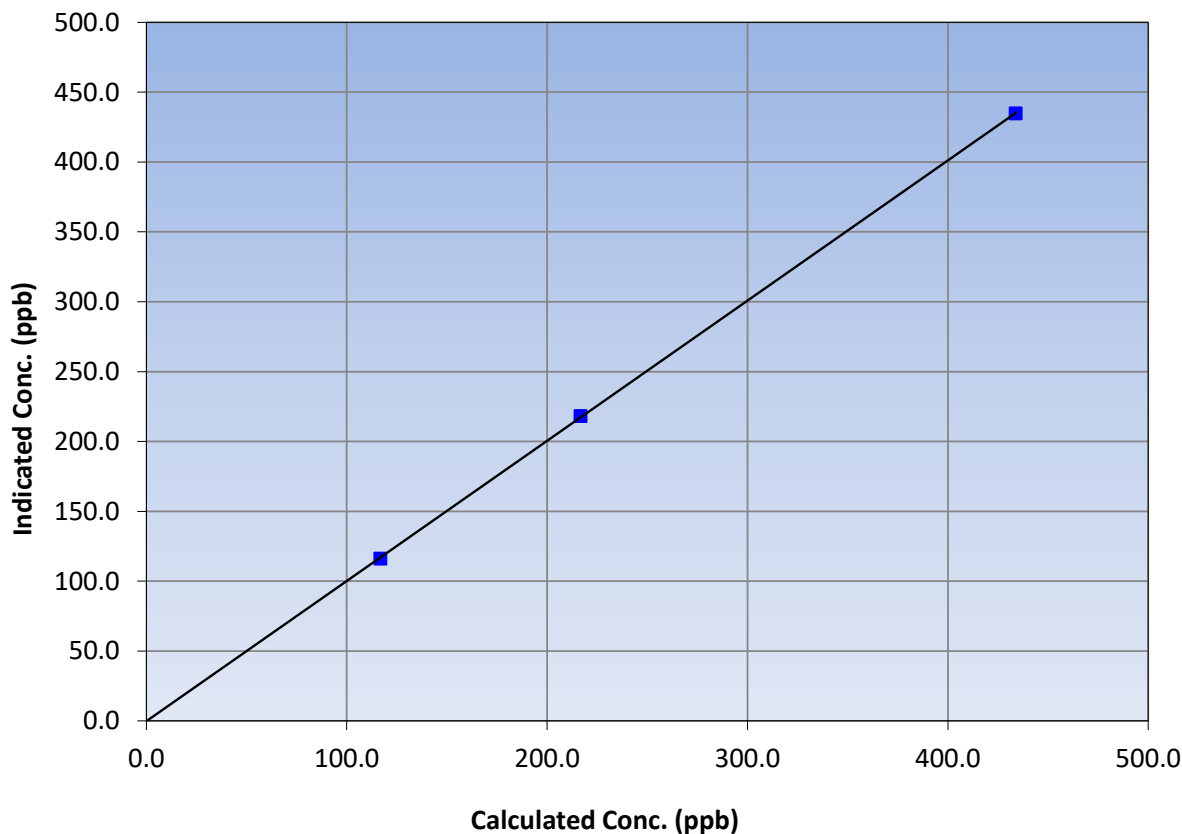
Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 29, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:34	End Time (MST):	12:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	-0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
433.9	434.9	0.9977		
216.6	218.1	0.9932		
116.7	116.1	1.0053		
			0.999984	
			1.003351	
			-0.204066	

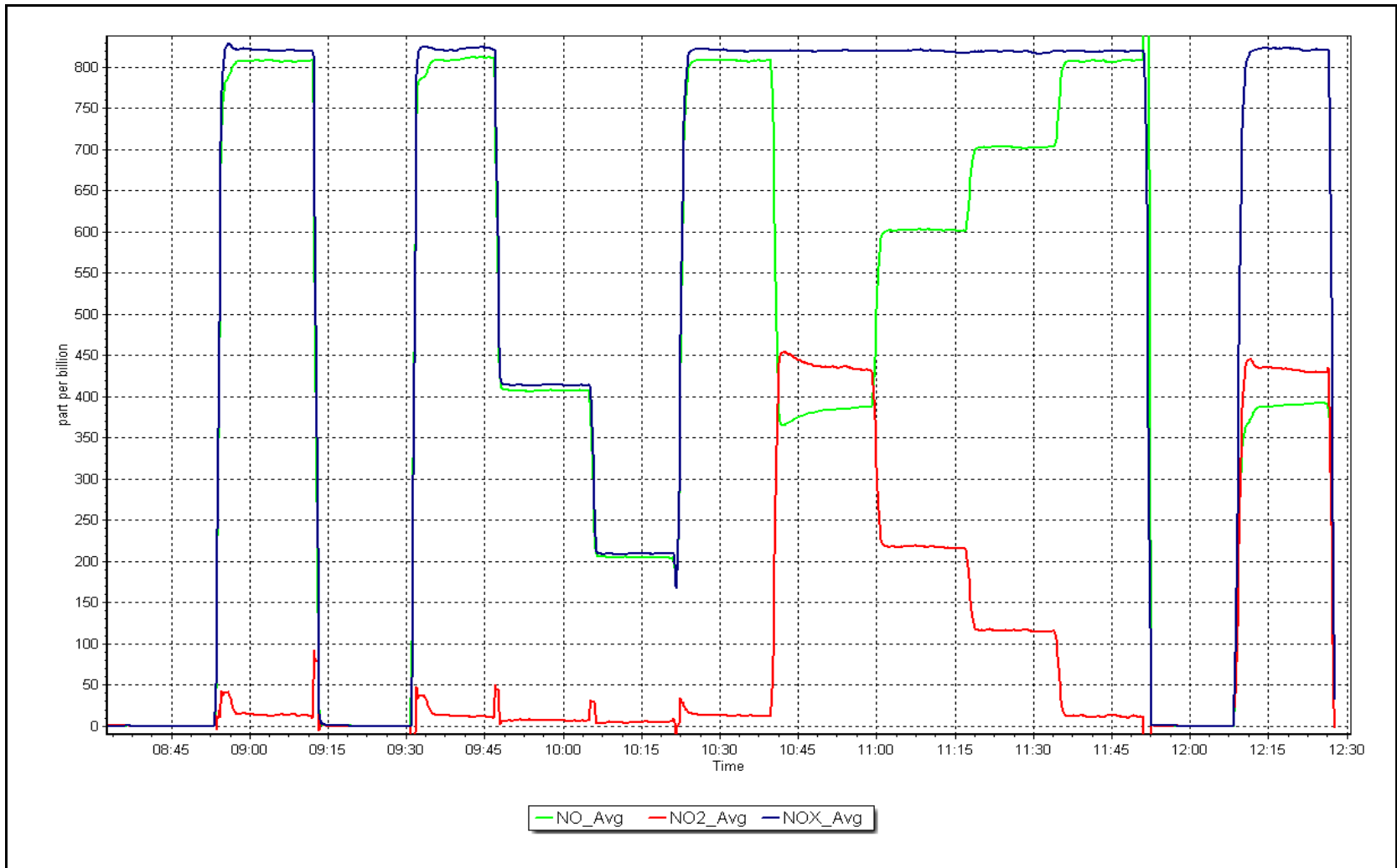
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 28, 2023

Location: Conklin





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name: Conklin
 Calibration Date: April 14, 2023
 Start time (MST): 9:02
 Reason: Routine
 Station number: AMS21
 Last Cal Date: March 9, 2023
 End time (MST): 11:51

Calibration Standards

O3 generation mode: Photometer
 Calibrator Make/Model: Teledyne API T700
 ZAG Make/Model: Teledyne API 701
 Serial Number: 3810
 Serial Number: 263

Analyzer Information

Analyzer make: Thermo 49i
 Analyzer Range 0 - 500 ppb
 Analyzer serial #: 1501663734

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.000343	0.999857	Backgd or Offset:	-0.7	-1.2
Calibration intercept:	0.240000	0.700000	Coeff or Slope:	1.002	1.002

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-1.1	----
as found span	5000	944.3	400.0	400.0	1.000
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	946.2	400.0	400.0	1.000
second point	5000	803.2	200.0	202.0	0.990
third point	5000	705.0	100.0	100.6	0.994
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	936.0	400.0	404.7	0.988
Average Correction Factor					0.995

Baseline Corr As found:	401.1	Previous response	400.4	*% 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: Adjusted the zero.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

O₃ Calibration Summary

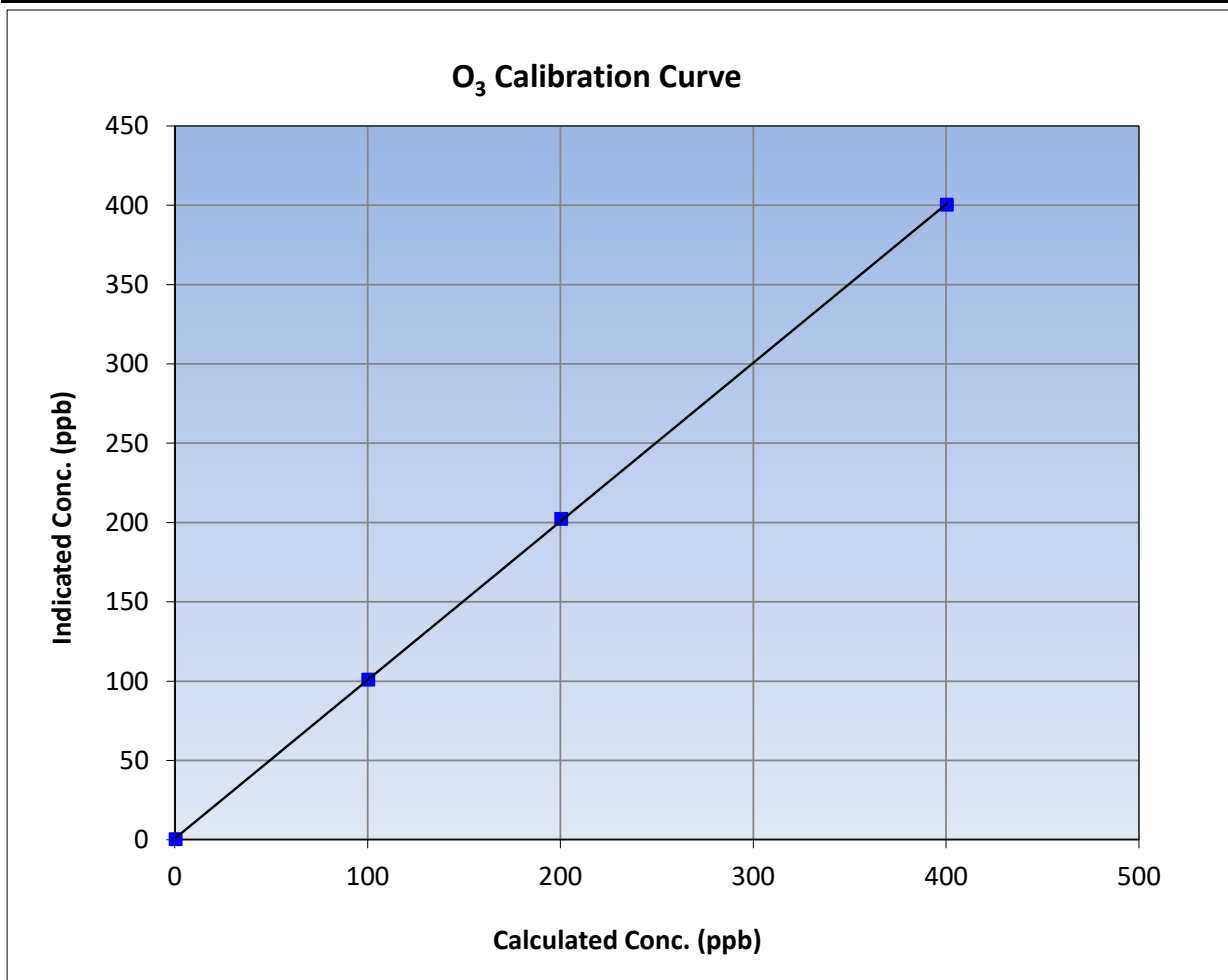
Version-01-2020

Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 9, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:02	End Time (MST):	11:51
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

Calibration Data

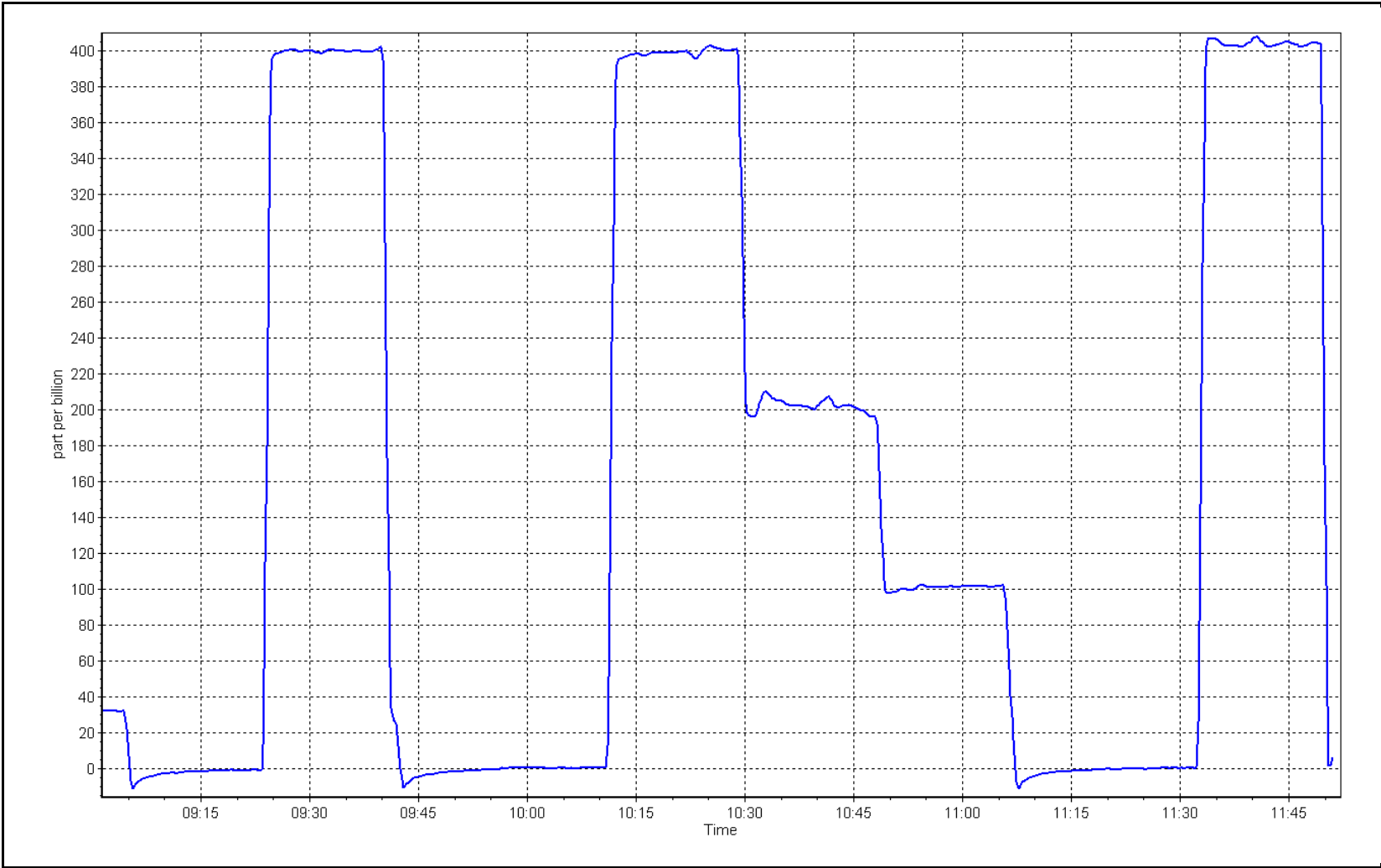
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999971	≥0.995
400.0	400.0	1.0000			
200.0	202.0	0.9901	Slope	0.999857	0.90 - 1.10
100.0	100.6	0.9940			
			Intercept	0.700000	+/- 5



O₃ Calibration Plot

Date: April 14, 2023

Location: Conklin





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

**AMS22
JANVIER
APRIL 2023**

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	April 26, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	10:44	End time (MST):	13:45
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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.998449	0.998121	Backgd or Offset:	21.6	21.8
Calibration intercept:	0.464715	0.804418	Coeff or Slope:	1.022	1.003

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.6	----
as found span	4920	79.8	799.8	812.2	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	79.8	799.8	798.7	1.001
second point	4960	39.9	399.9	400.4	0.999
third point	4980	20.0	200.4	201.5	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	79.8	799.8	800.6	0.999
Average Correction Factor					0.998

Baseline Corr As found:	811.60	Previous response	799.01	*% change	1.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Inlet filter changed after as founds. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

SO₂ Calibration Summary

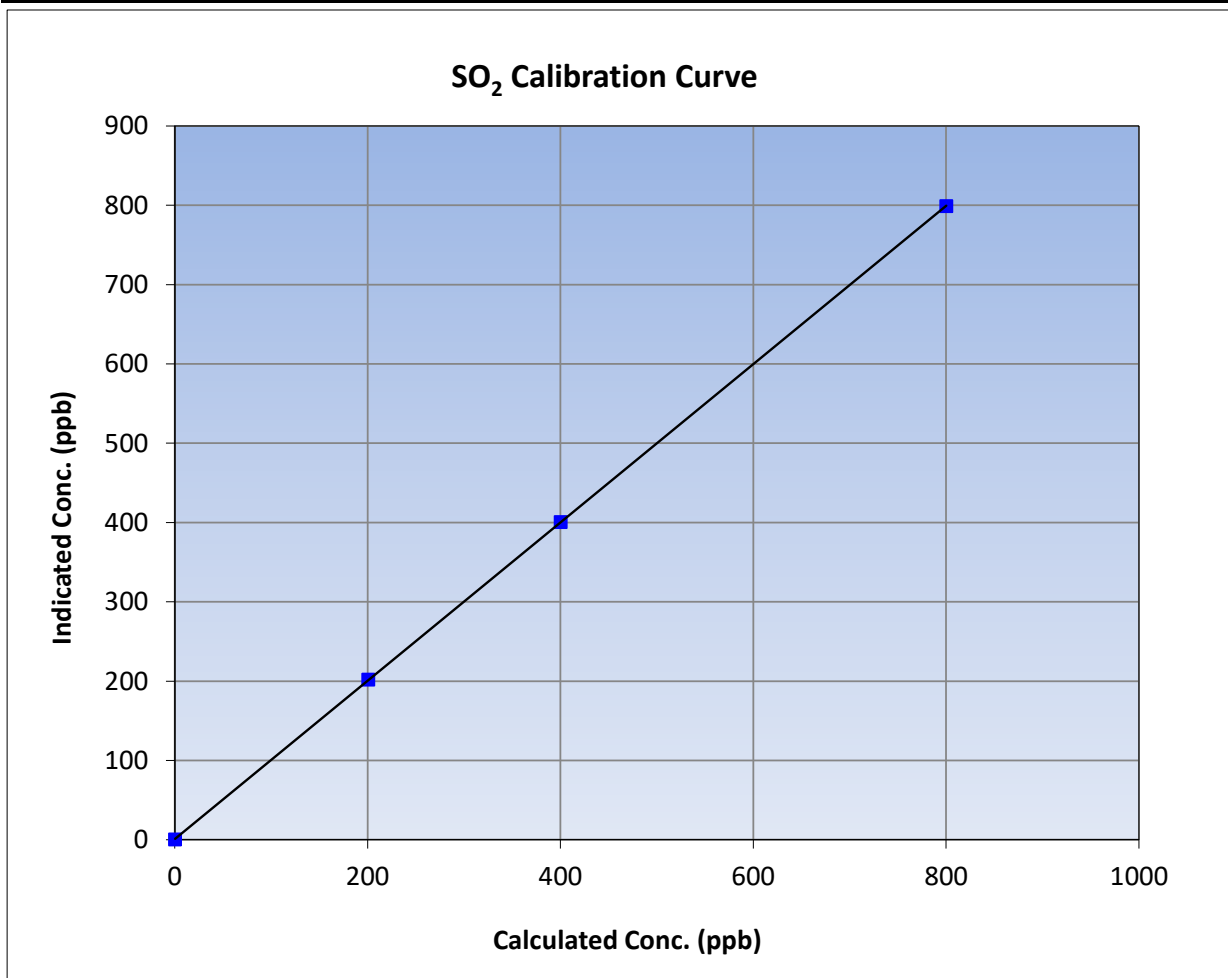
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:44	End Time (MST):	13:45
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

Calibration Data

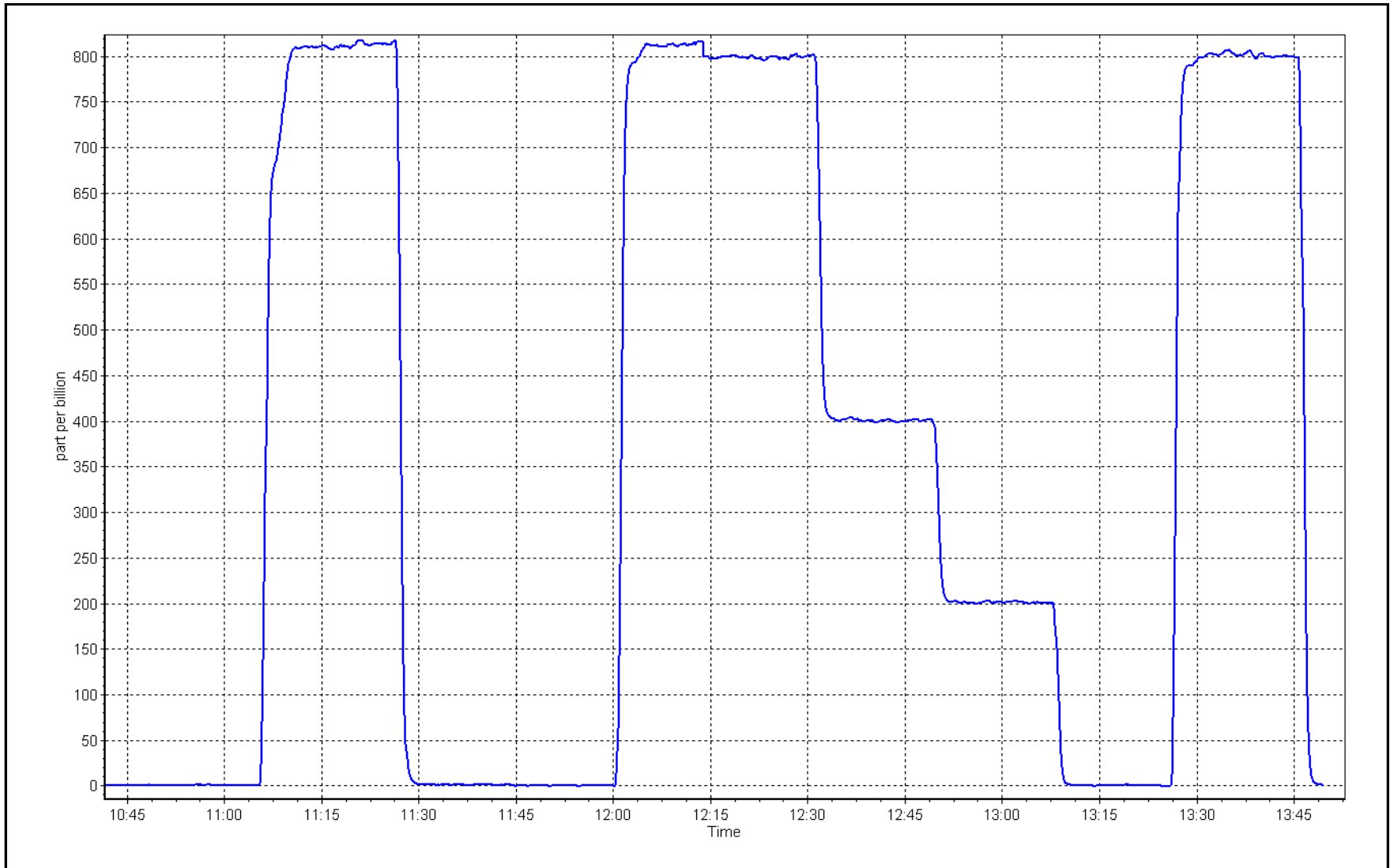
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999996	≥0.995
799.8	798.7	1.0014			
399.9	400.4	0.9987	Slope	0.998121	0.90 - 1.10
200.4	201.5	0.9947			
			Intercept	0.804418	+/-30



SO2 Calibration Plot

Date: April 26, 2023

Location: Janvier





Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name: Janvier Station number: AMS22
 Calibration Date: April 25, 2023 Last Cal Date: March 29, 2023
 Start time (MST): 10:33 End time (MST): 16:35
 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 43i-TLE Analyzer serial #: 1151680031
 Converter make: CDN-101 Converter serial #: 587
 Analyzer Range: 0 - 100 ppb

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.999222	0.999363	Backgd or Offset:	3.50	5.95
Calibration intercept:	0.140953	-0.038984	Coeff or Slope:	1.220	1.071

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.9	----
as found span	4920	79.5	80.0	87.6	0.923
as found 2nd point	4960	39.8	40.0	45.0	0.908
as found 3rd point	4980	19.9	20.0	23.0	0.906
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	79.5	80.0	79.9	1.001
second point	4960	39.8	40.0	40.0	1.001
third point	4980	19.9	20.0	19.9	1.006
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	79.5	80.0	79.4	1.007
SO2 Scrubber Check	4920	79.8	798.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.003
Date of last converter efficiency test:				efficiency	

Baseline Corr As found: 86.7 Prev response: 80.06 *% change: 7.7%
 Baseline Corr 2nd AF pt: 44.1 AF Slope: 1.083245 AF Intercept: 1.199186
 Baseline Corr 3rd AF pt: 22.1 AF Correlation: 0.999916

* = > +/-5% change initiates investigation

Notes: Changed out the inlet filter and flash lamp after as founds. Adjusted the flash lamp voltage and PMT voltage. Scrubber check passed. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

TRS Calibration Summary

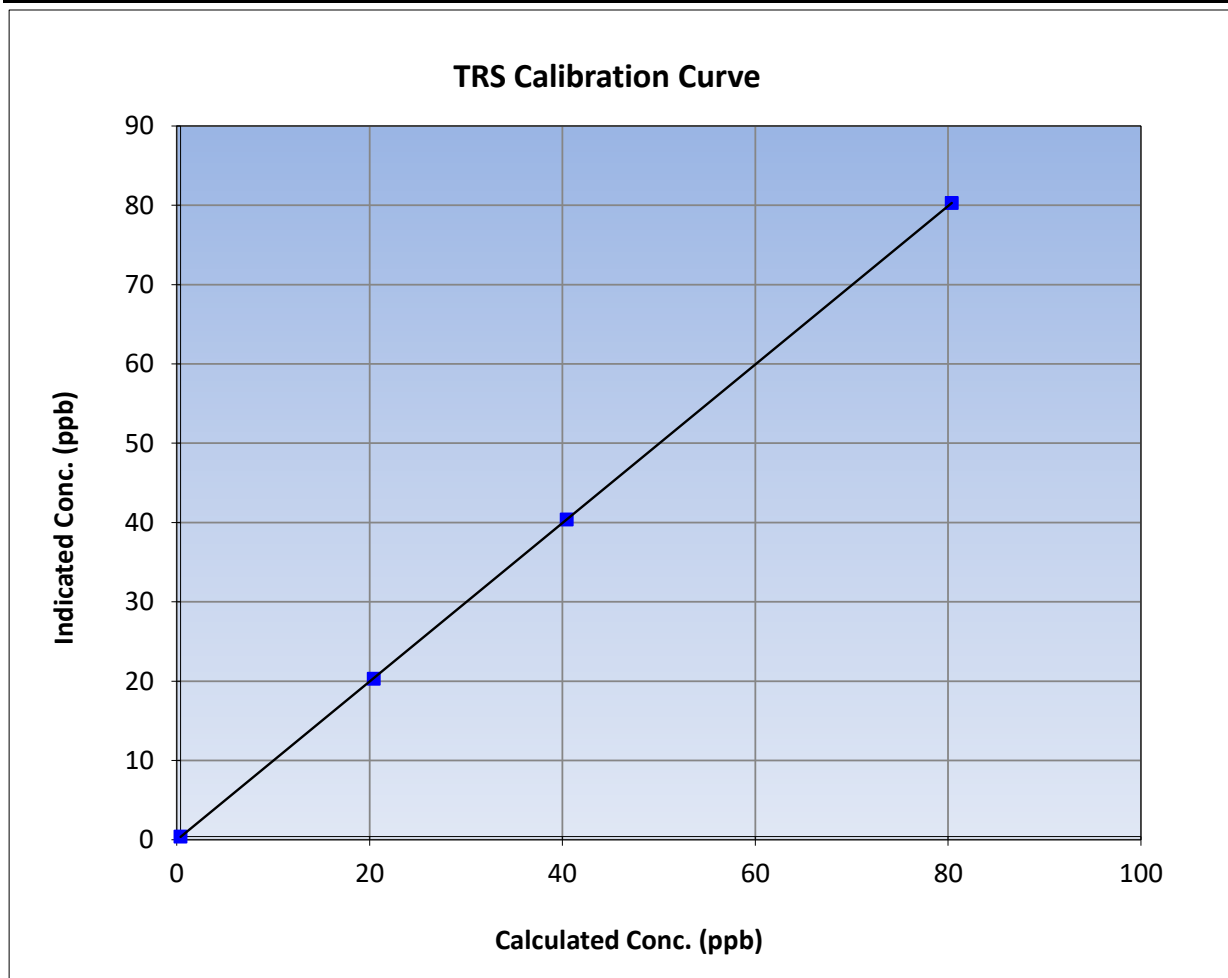
Version-11-2021

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 29, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	10:33	End Time (MST):	16:35
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

Calibration Data

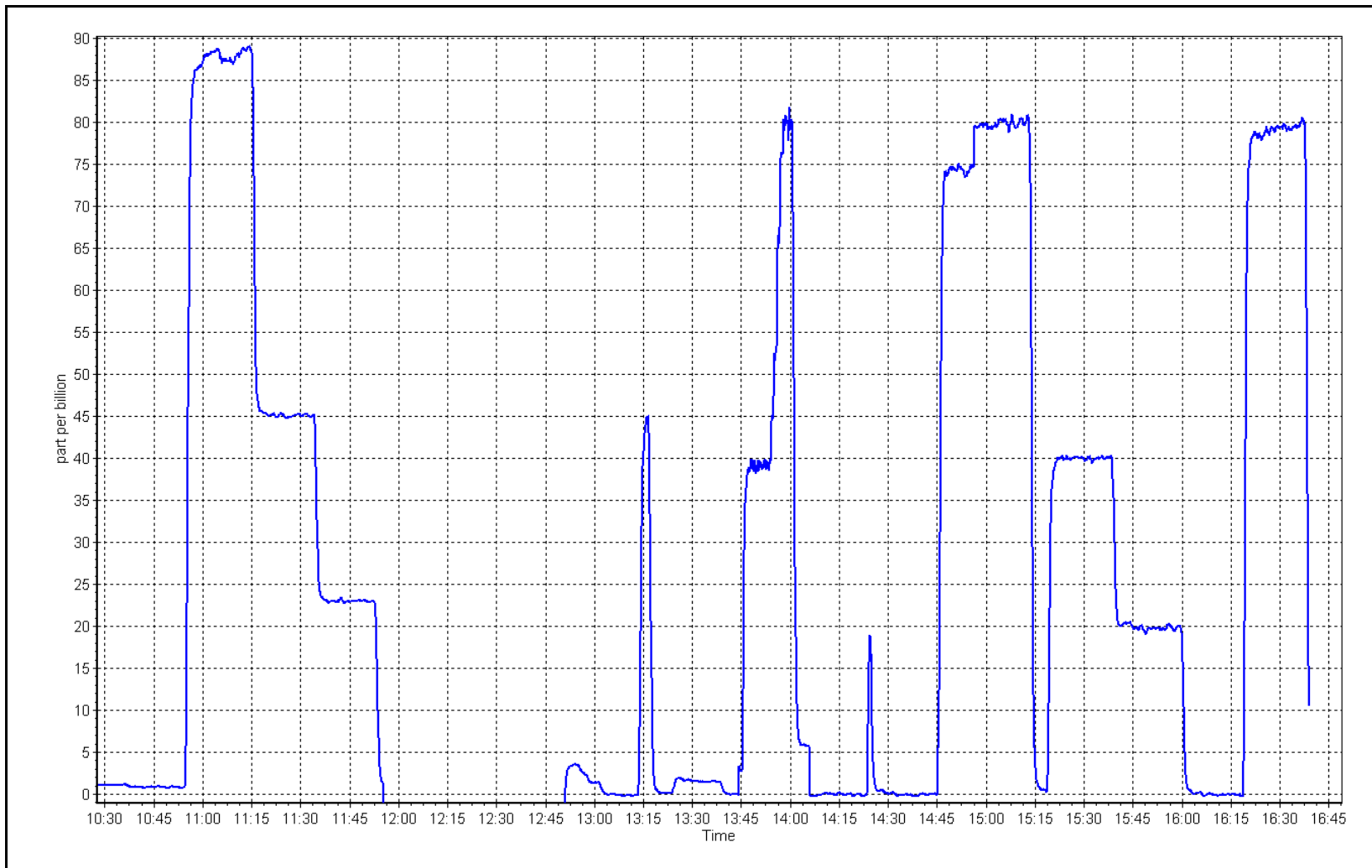
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999998	
80.0	79.9	1.0011			≥0.995
40.0	40.0	1.0010	Slope	0.999363	
20.0	19.9	1.0060			0.90 - 1.10
			Intercept	-0.038984	+/-3



TRS Calibration Plot

Date: April 25, 2023

Location: Janvier





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	April 26, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	10:44	End time (MST):	13:45
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC281519	Cal Gas Expiry Date:	January 18, 2029
CH ₄ Cal Gas Conc.	502.8 ppm	CH ₄ Equiv Conc.	1075.9 ppm
C ₃ H ₈ Cal Gas Conc.	208.4 ppm		
Removed Gas Cert:	N/A	Removed Gas Expiry:	N/A
Removed CH ₄ Conc.	502.8 ppm	CH ₄ Equiv Conc.	1075.9 ppm
Removed C ₃ H ₈ 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:	Thermo 55i	Analyzer serial #:	1172750023
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	2.150E-04	2.150E-04	NMHC SP Ratio:	4.51E-05
CH ₄ Retention time:	13.20	13.20	NMHC Peak Area:	202703
				205602

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	17.17	17.54	0.979
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	17.20	0.998
second point	4960	39.9	8.59	8.56	1.004
third point	4980	20.0	4.30	4.26	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.10	1.004

Average Correction Factor				1.004
Baseline Corr AF:	17.54	Prev response	17.15	*% change 2.2%
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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	----
as found span	4920	79.8	9.15	9.30	0.983
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	79.8	9.15	9.15	1.000
second point	4960	39.9	4.57	4.56	1.003
third point	4980	20.0	2.29	2.27	1.012
as left zero	5000	0	0.00	0.00	----
as left span	4920	79.8	9.15	9.11	1.005
Average Correction Factor					1.005
Baseline Corr AF:	9.30	Prev response	9.10	*% change	2.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		<i>* = > +/-5% change initiates investigation</i>	

CH₄ Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	8.23	0.975
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	8.05	0.996
second point	4960	39.9	4.01	3.99	1.005
third point	4980	20.0	2.01	1.99	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	7.99	1.004
Average Correction Factor					1.004
Baseline Corr AF:	8.23	Prev response	8.05	*% change	2.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		<i>* = > +/-5% change initiates investigation</i>	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	1.000168	1.002618
THC Cal Offset:	-0.027388	-0.031798
CH ₄ Cal Slope:	1.005284	1.004358
CH ₄ Cal Offset:	-0.018965	-0.017966
NMHC Cal Slope:	0.995905	1.001328
NMHC Cal Offset:	-0.008823	-0.014032

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

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

THC Calibration Summary

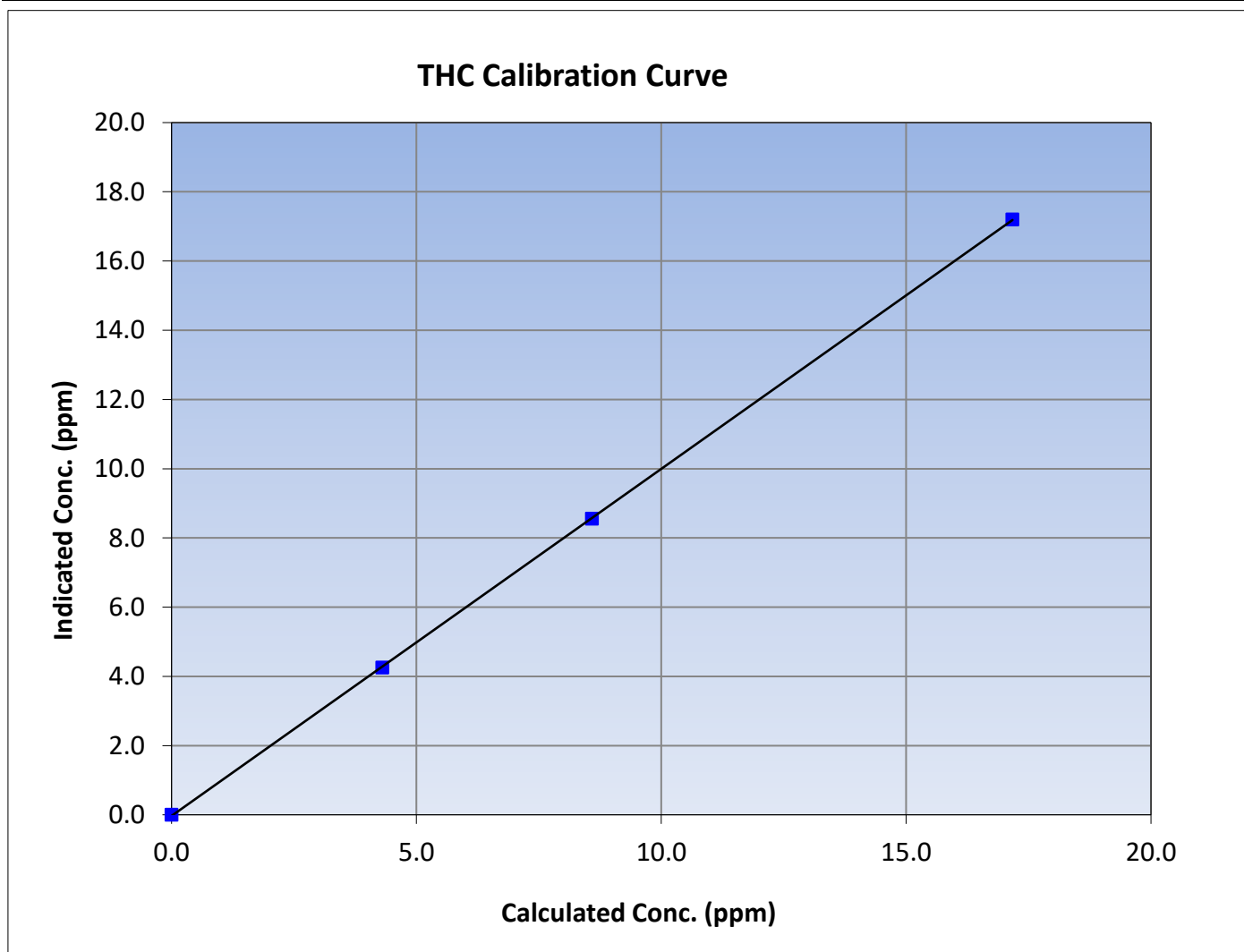
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:44	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999984	≥ 0.995			
17.17	17.20	0.9982						
8.59	8.56	1.0036				Slope	1.002618	0.90 - 1.10
4.30	4.26	1.0114						
			Intercept	-0.031798	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

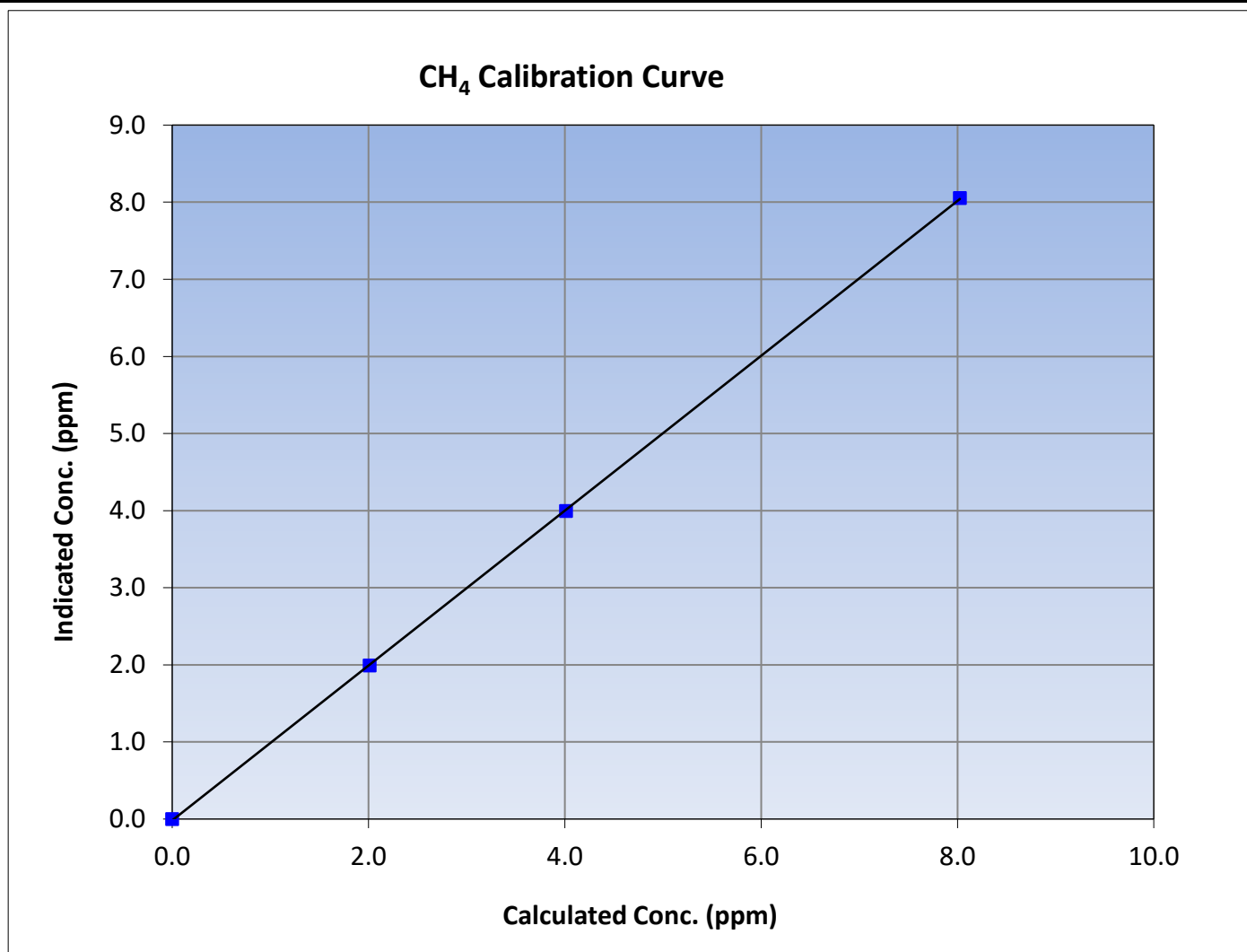
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:44	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999974	≥ 0.995
8.03	8.05	0.9964			
4.01	3.99	1.0046			
2.01	1.99	1.0107			
			Slope	1.004358	0.90 - 1.10
			Intercept	-0.017966	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

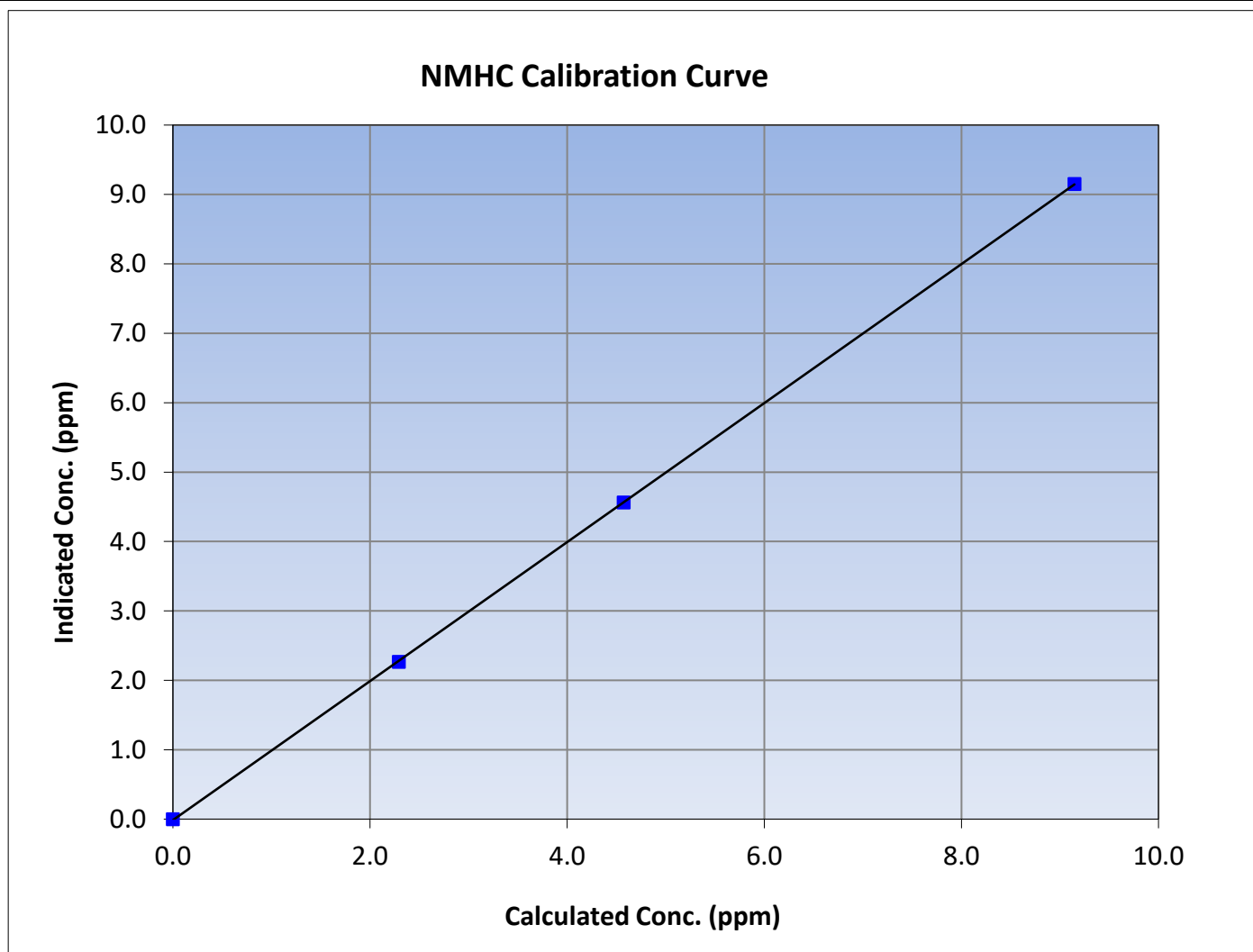
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:44	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999989	≥ 0.995			
9.15	9.15	0.9996						
4.57	4.56	1.0025				Slope	1.001328	0.90 - 1.10
2.29	2.27	1.0121						
			Intercept	-0.014032	± 0.5			



NMHC Calibration Plot

Date: April 26, 2023

Location: Janvier





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Janvier Station number: AMS 22
Calibration Date: April 27, 2023 Last Cal Date: March 9, 2023
Start time (MST): 11:33 End time (MST): 16:55
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: 4890

Analyzer Information

Analyzer make: Teledyne API T200 Analyzer serial #: 7117
NOX Range (ppb): 0 - 1000 ppb

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.019	1.012	NO bkgnd or offset:	-0.3	4.8
NOX coeff or slope:	1.009	1.002	NOX bkgnd or offset:	0.4	5.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.1	5.1

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	1.001316	0.999487
NO _x Cal Offset:	0.648371	0.688544
NO Cal Slope:	1.001644	0.999800
NO Cal Offset:	0.008462	-0.271133
NO ₂ Cal Slope:	1.000730	1.003470
NO ₂ Cal Offset:	0.876715	0.116060



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	4.1	2.2	1.9	----	----
as found span	4918	82.3	799.9	799.9	0.0	809.4	803.9	5.7	0.9883	0.9950
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	4918	82.3	799.9	799.9	0.0	799.8	799.5	0.3	1.0001	1.0005
second point	4959	41.2	400.4	400.4	0.0	401.3	400.3	1.0	0.9979	1.0004
third point	4980	20.6	200.2	200.2	0.0	201.6	199.4	2.3	0.9931	1.0041
as left zero	5000	0.0	0.0	0.0	0.0	-1.5	-1.3	-0.2	----	----
as left span	4918	82.3	799.9	400.3	399.6	795.2	398.0	397.2	1.0059	1.0058
Average Correction Factor									0.9970	1.0016

Corrected As found	NO _x = 805.3 ppb	NO = 801.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = 0.5%
Previous Response	NO _x = 801.6 ppb	NO = 801.2 ppb		*Percent Change	NO = 0.1%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	796.2	396.6	399.6	400.9	0.9968	100.3%
2nd GPT point (200 ppb O3)	796.2	595.2	201.0	202.2	0.9941	100.6%
3rd GPT point (100 ppb O3)	796.2	694.8	101.4	101.9	0.9951	100.5%
Average Correction Factor					0.9953	100.5%

Notes: Changed the inlet filter after as founds. Changed out the ZAG charcoal scrubbers. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

NO_x Calibration Summary

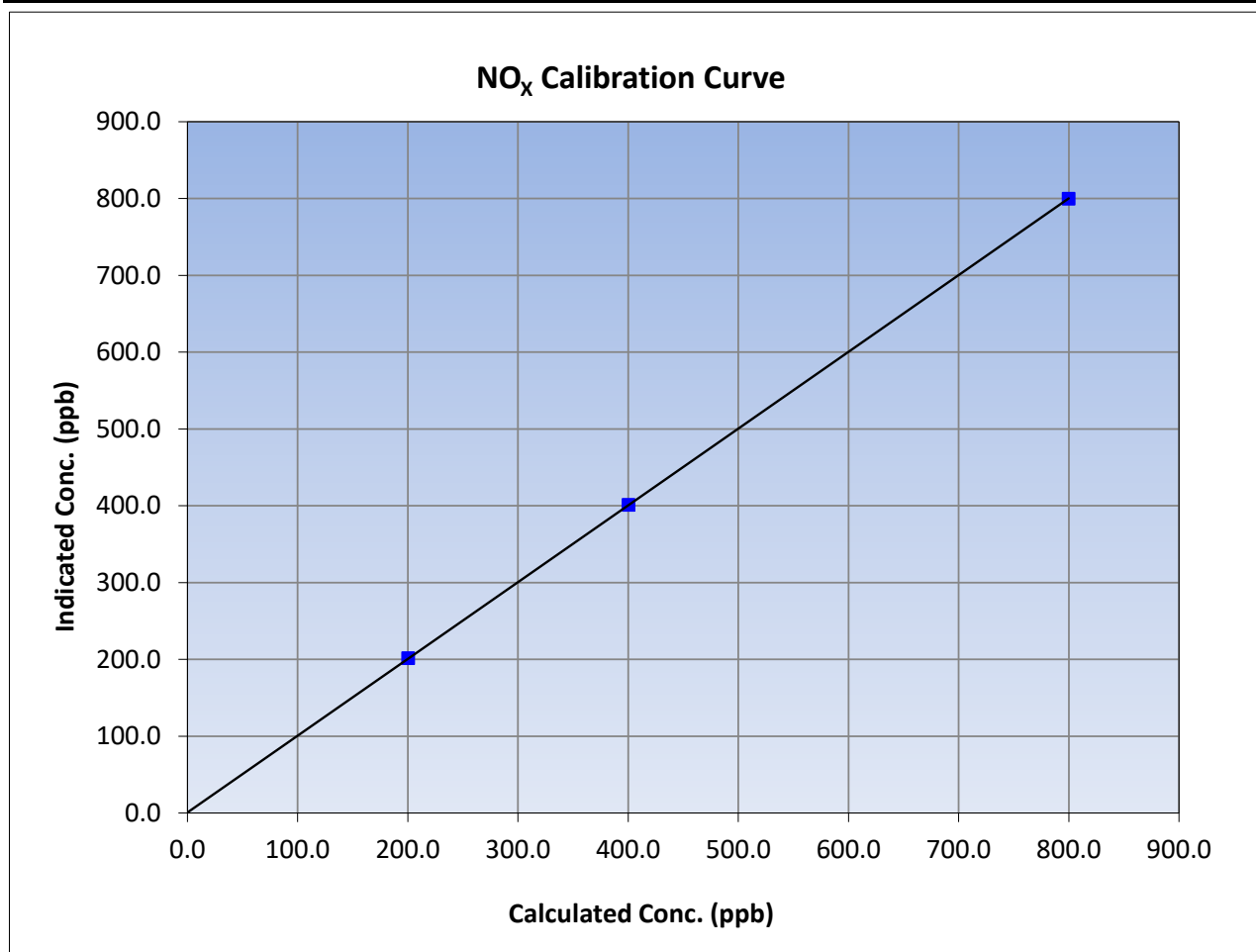
Version-04-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 9, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:33	End Time (MST):	16:55
Analyzer make:	Teledyne API T200	Analyzer serial #:	7117

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.1	----	Correlation Coefficient	≥0.995	
799.9	799.8	1.0001			
400.4	401.3	0.9979			
200.2	201.6	0.9931			
			Slope	0.999487	0.90 - 1.10
			Intercept	0.688544	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

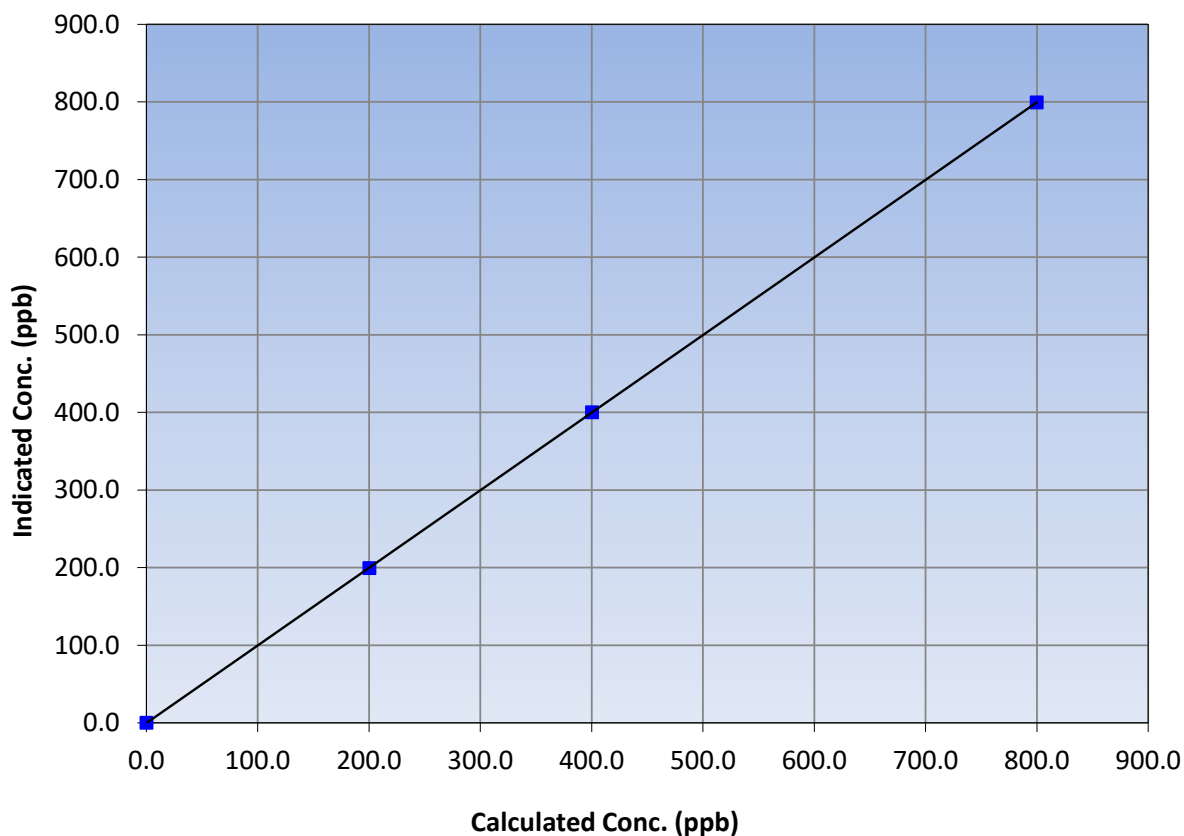
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 9, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:33	End Time (MST):	16:55
Analyzer make:	Teledyne API T200	Analyzer serial #:	7117

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥ 0.995	
799.9	799.5	1.0005			
400.4	400.3	1.0004			
200.2	199.4	1.0041			
			Slope	0.999800	0.90 - 1.10
			Intercept	-0.271133	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

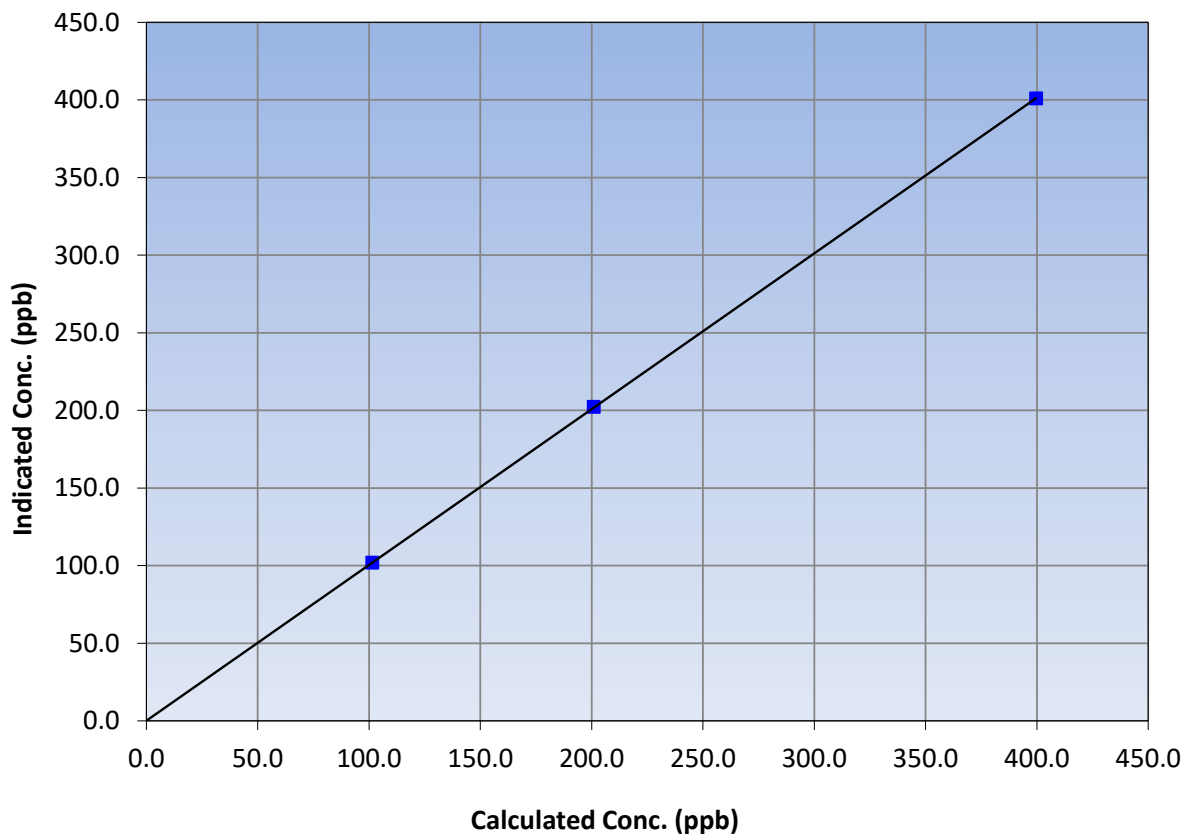
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 9, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:33	End Time (MST):	16:55
Analyzer make:	Teledyne API T200	Analyzer serial #:	7117

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	-0.1	----	Correlation Coefficient Slope Intercept	≥ 0.995 <i>0.90 - 1.10</i> <i>+/-20</i>
399.6	400.9	0.9968		
201.0	202.2	0.9941		
101.4	101.9	0.9951		
			0.999997	
			1.003470	
			0.116060	

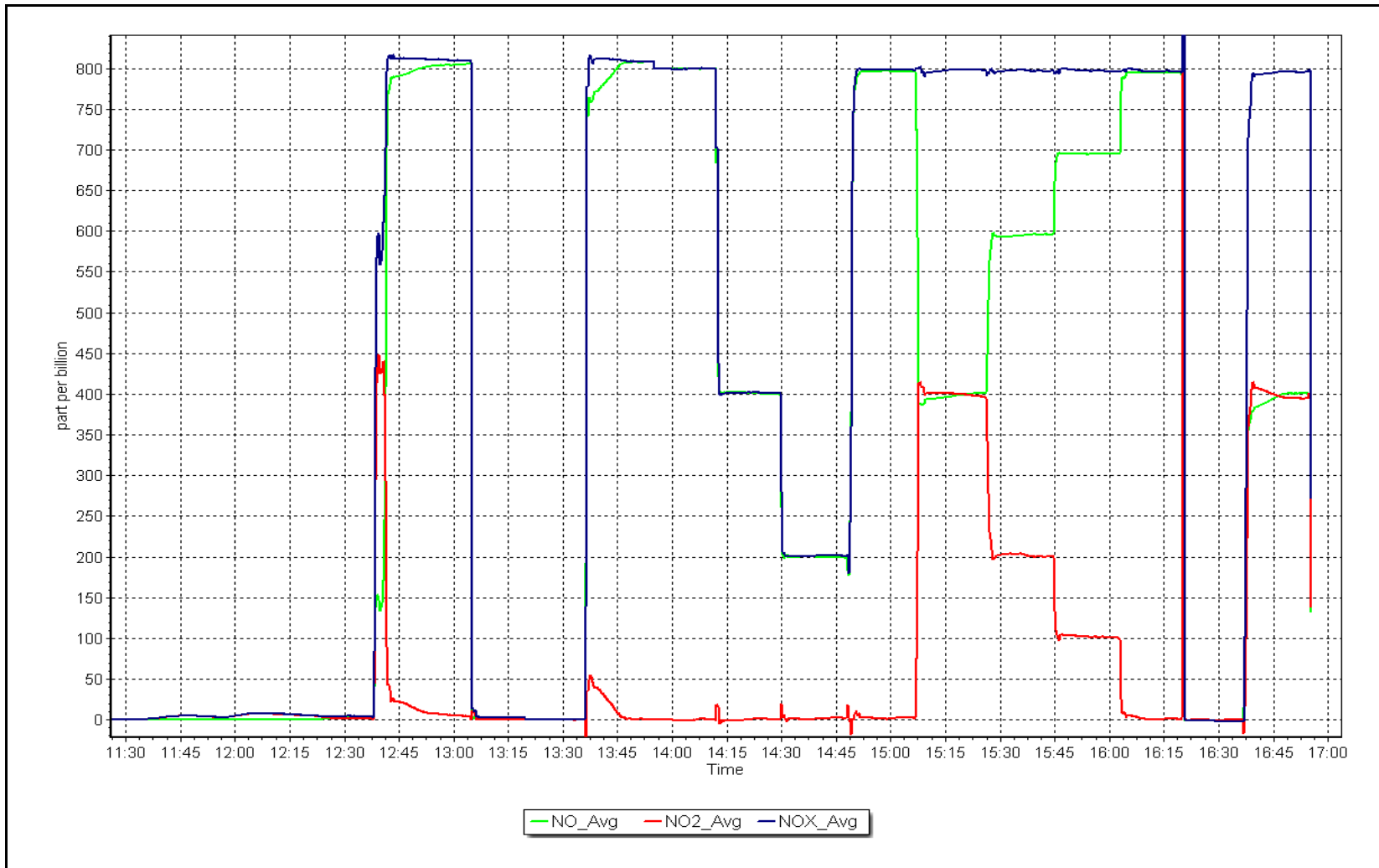
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 27, 2023

Location: Janvier





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-01-2020

Station Information

Station Name: Janvier Station number: AMS 22
 Calibration Date: April 26, 2023 Last Cal Date: March 28, 2023
 Start time (MST): 13:45 End time (MST): 17:04
 Reason: Routine

Calibration Standards

O3 generation mode: Photometer
 Calibrator Make/Model: Teledyne API T700 Serial Number: 3806
 ZAG Make/Model: Teledyne API T701 Serial Number: 201

Analyzer Information

Analyzer make: Teledyne API T400 Analyzer serial #: 3869
 Analyzer Range 0 - 500 ppb

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.000429	1.007857	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	0.000000	0.800000	Coeff or Slope:	1.011	1.011

O₃ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	800.0	0.0	-0.5	----
as found span	4893	899.1	400.0	401.1	0.997
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.3	----
high point	4893	899.1	400.0	403.4	0.992
second point	4893	753.4	200.0	202.9	0.986
third point	4893	655.7	100.0	102.7	0.974
as left zero	5000	800.0	0.0	-0.2	----
as left span	4816	899.1	400.0	404.7	0.988
Average Correction Factor					0.984

Baseline Corr As found:	401.6	Previous response	400.2	*% 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: Changed the inlet filter after as founds. No adjustments made.

Calibration Performed By: Rene Chamberland



Wood Buffalo Environmental Association

O₃ Calibration Summary

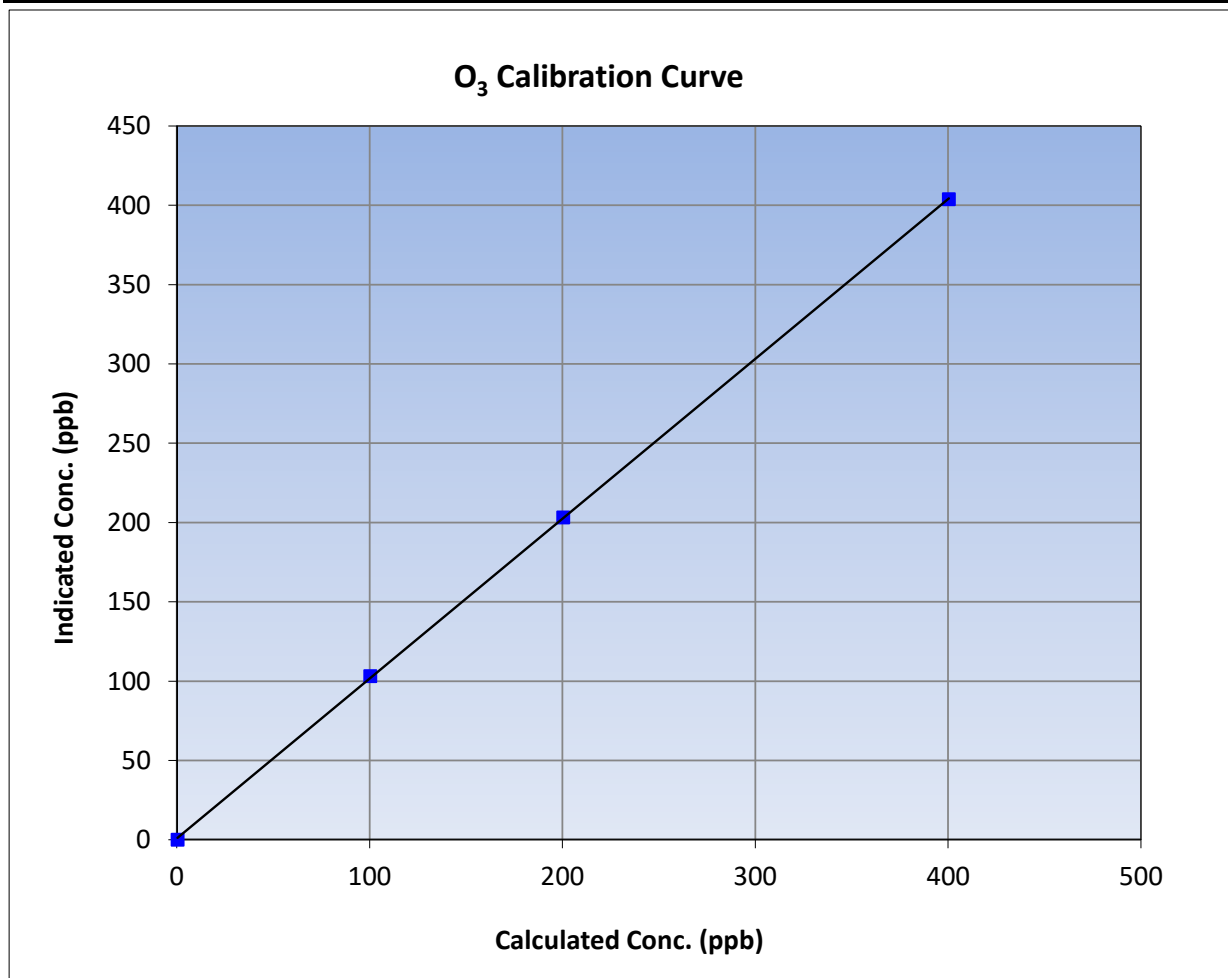
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 28, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	13:45	End Time (MST):	17:04
Analyzer make:	Teledyne API T400	Analyzer serial #:	3869

Calibration Data

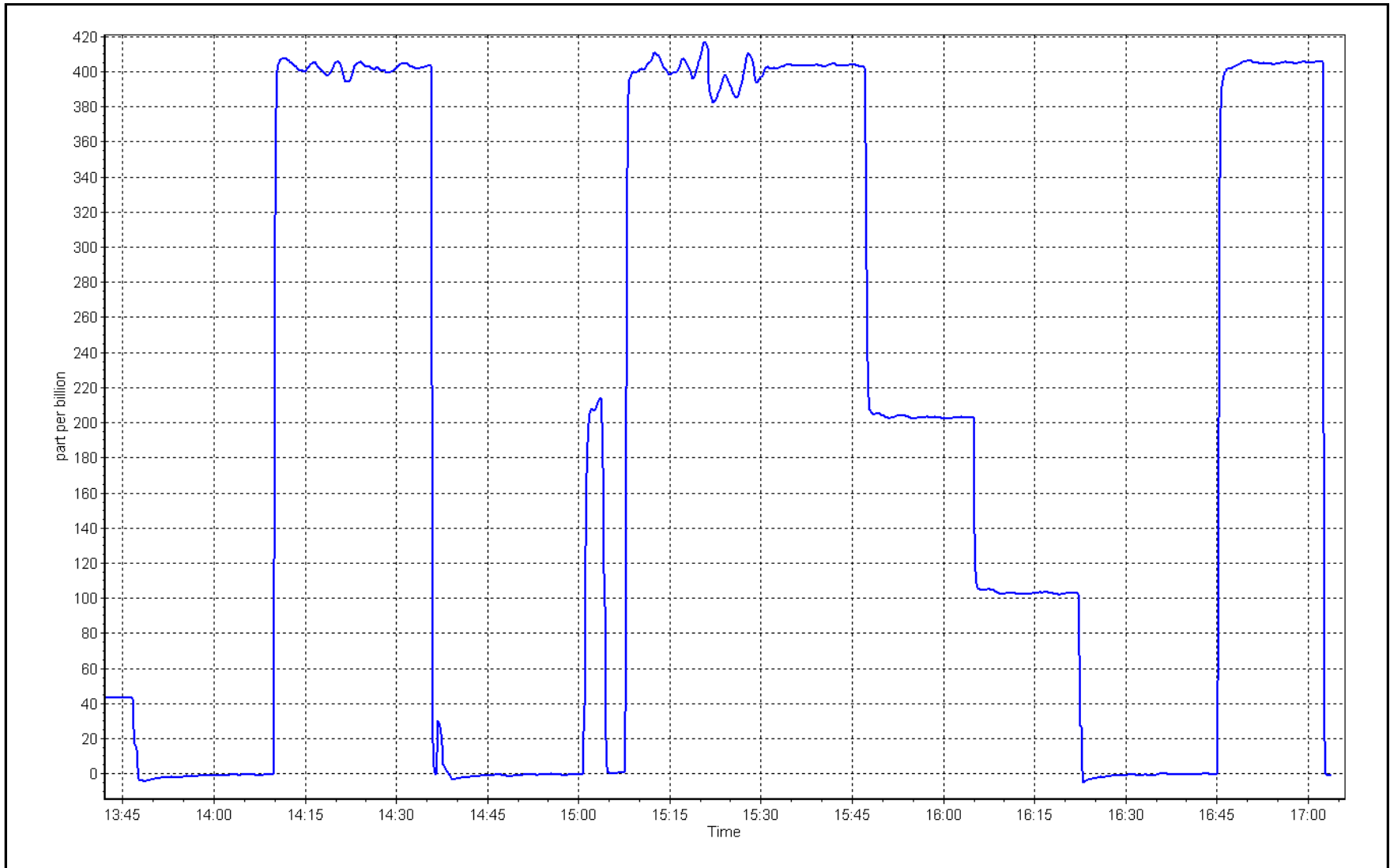
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.3	----	Correlation Coefficient	0.999966	≥0.995
400.0	403.4	0.9916			
200.0	202.9	0.9857	Slope	1.007857	0.90 - 1.10
100.0	102.7	0.9737			
			Intercept	0.800000	+/- 5



O₃ Calibration Plot

Date: April 26, 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: April 27, 2023 Last Cal Date: March 29, 2023
 Start time (MST): 13:00 End time (MST): 14:26

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 (°C)	11.7	11.8	12.8	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	718.6	719	718.6	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	5.01	4.97	4.99	<input type="checkbox"/>	+/- 0.25 LPM

Leak Test: Date of check: April 27, 2023 Last Cal Date: March 29, 2023
 PM w/o HEPA: 3.8 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	10.2	11.8	11.1	<input checked="" type="checkbox"/>	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 6.5 w/ HEPA: 0
 Date Optical Chamber Cleaned: April 27, 2023 <0.2 ug/m3
 Disposable Filter Changed: April 27, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 6, 2022
 Date RH/T Sensor Cleaned: October 6, 2022

Notes: Verified flow, temperature, and pressure. Leak test passed. Adjusted PMT peak voltage from 1385V to 1380V. Optical chamber cleaned and disposable filter changed. Inlet head cleaned.

Calibration by: Rene Chamberland



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS23
FORT HILLS
APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Summary

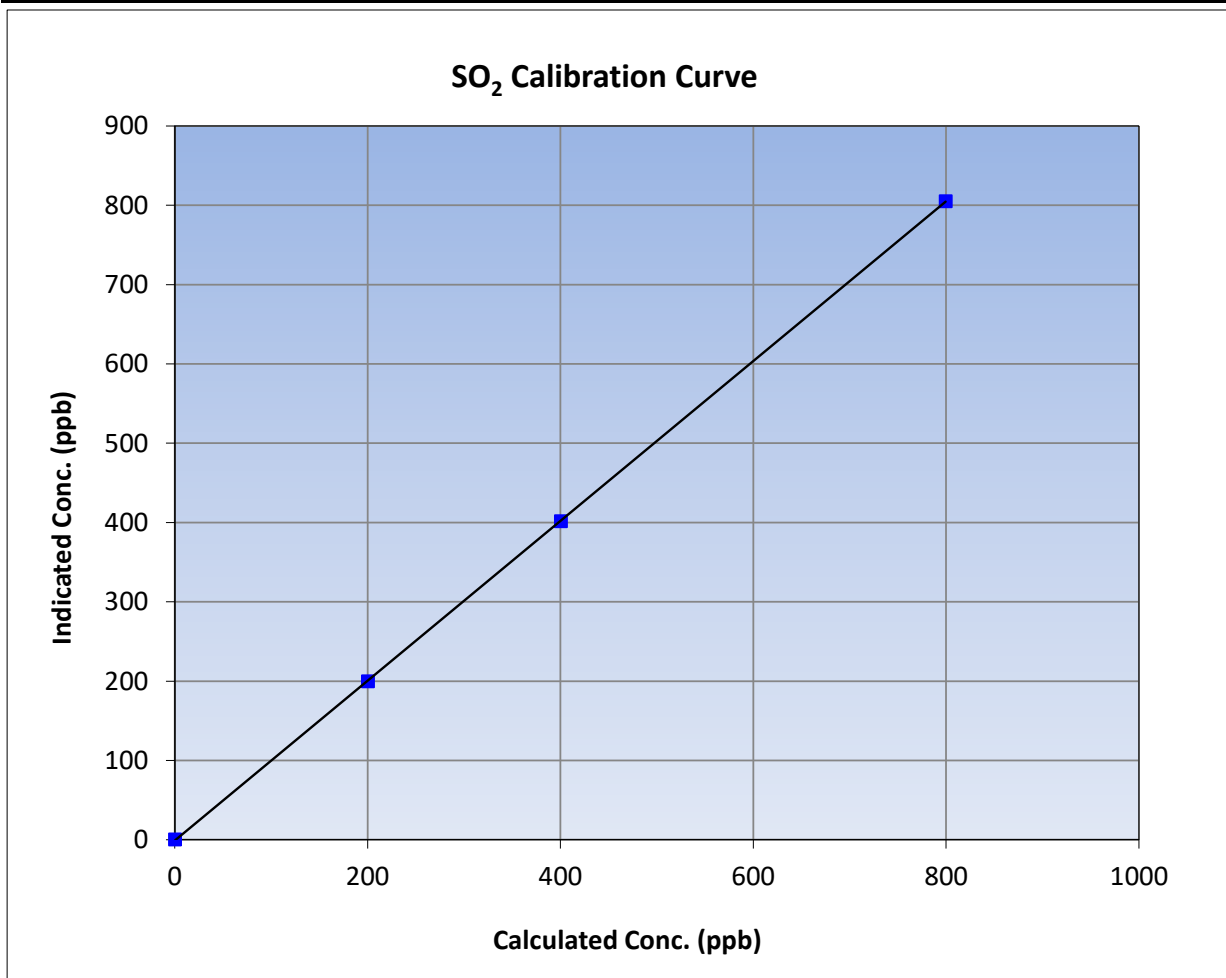
Version-01-2020

Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 2, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:37	End Time (MST):	12:35
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

Calibration Data

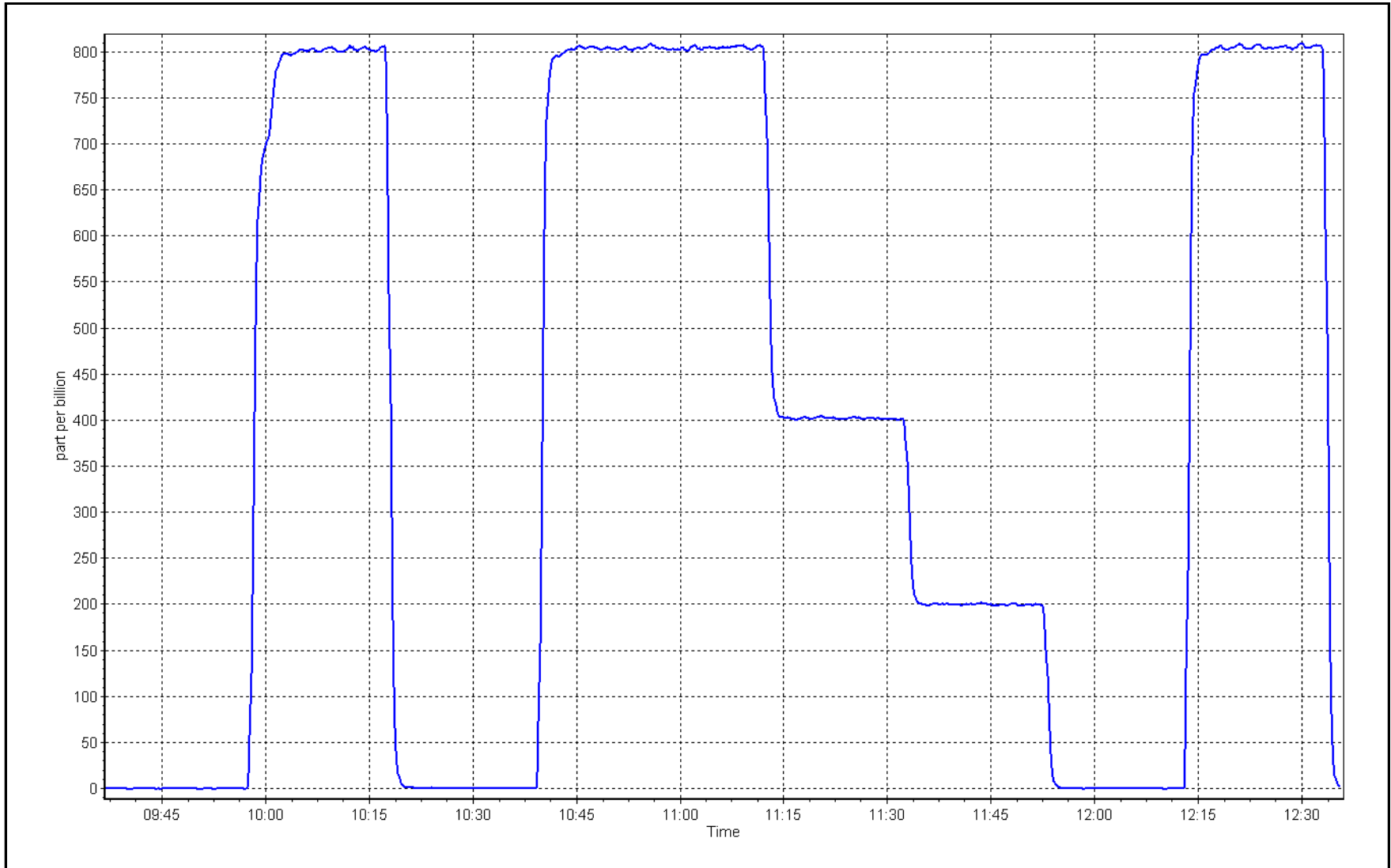
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999990	
799.1	804.8	0.9929			≥0.995
400.1	401.4	0.9966	Slope	1.007702	
200.0	199.4	1.0032			0.90 - 1.10
			Intercept	-1.064774	+/-30



SO2 Calibration Plot

Date: April 14, 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:	April 5, 2023	Last Cal Date:	March 17, 2023
Start time (MST):	10:04	End time (MST):	14:30
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 43iQ TLE	Analyzer serial #:	1300156232
Converter make:	CDN-101	Converter serial #:	594
Analyzer Range	0 - 100 ppb		

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.998462	1.003023	Backgd or Offset:	1.75
Calibration intercept:	-0.258331	0.182125	Coeff or Slope:	1.031
				1.192
				1.132

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	4923	77.0	80.0	71.8	1.114
as found 2nd point	4962	38.5	40.0	36.0	1.111
as found 3rd point	4981	19.2	19.9	17.8	1.121
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.0	80.0	80.4	0.995
second point	4962	38.5	40.0	40.2	0.995
third point	4981	19.2	19.9	20.5	0.973
as left zero	5000	0.0	0.0	0.7	----
as left span	4923	77.0	80.0	81.1	0.986
SO2 Scrubber Check	4920	80.3	803.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	71.8	Prev response:	79.62	*% change:	-10.9%
Baseline Corr 2nd AF pt:	36.0	AF Slope:	0.898055	AF Intercept:	-0.020379
Baseline Corr 3rd AF pt:	17.8	AF Correlation:	0.999993		

* = > +/-5% change initiates investigation

Notes: Calibrated due to a large span shift seen during a nightly span. Adjusted span. SOx scrubber check done after calibrator zero.

Calibration Performed By: Braiden Boutillier



Wood Buffalo Environmental Association

TRS Calibration Summary

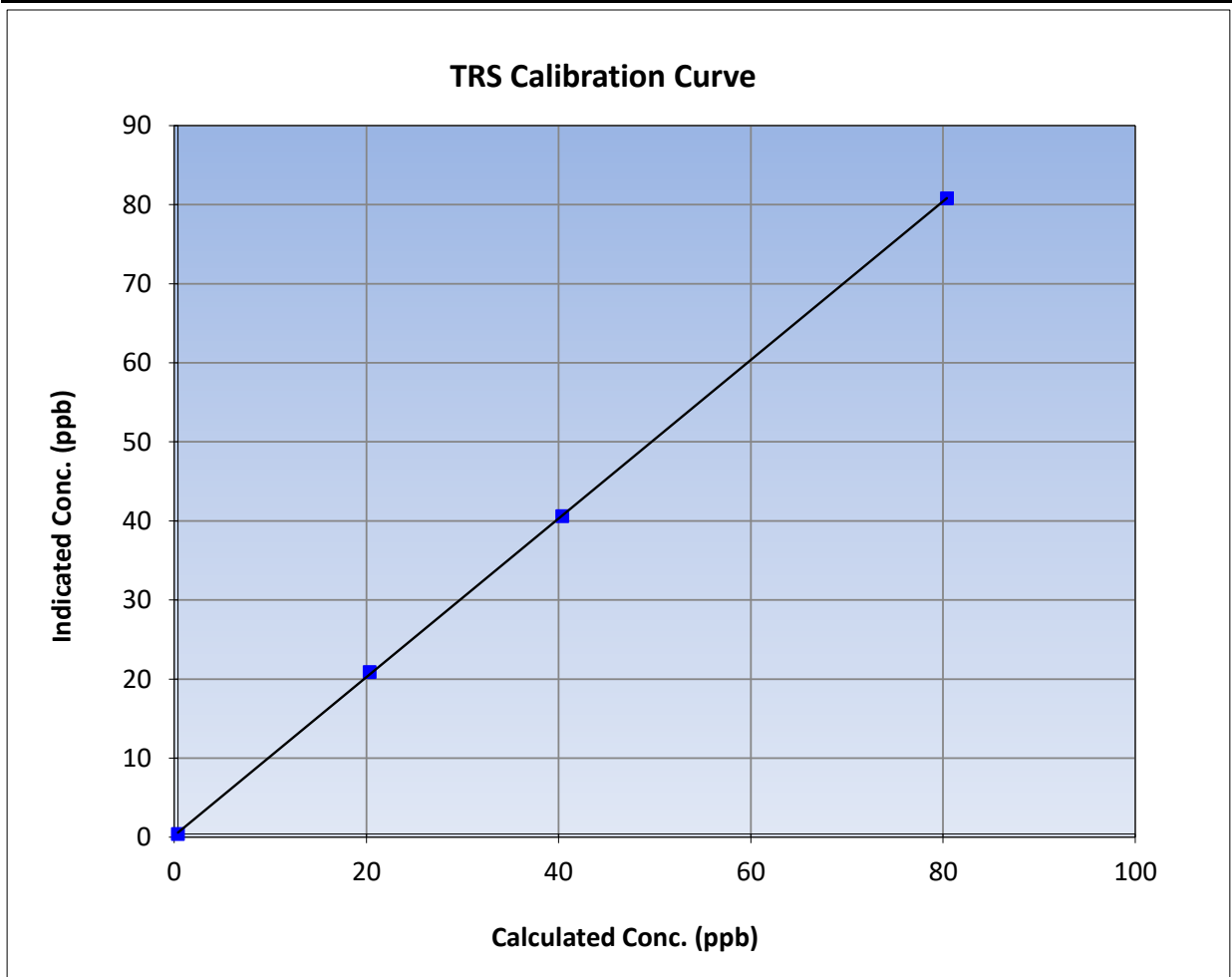
Version-11-2021

Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:04	End Time (MST):	14:30
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	1300156232

Calibration Data

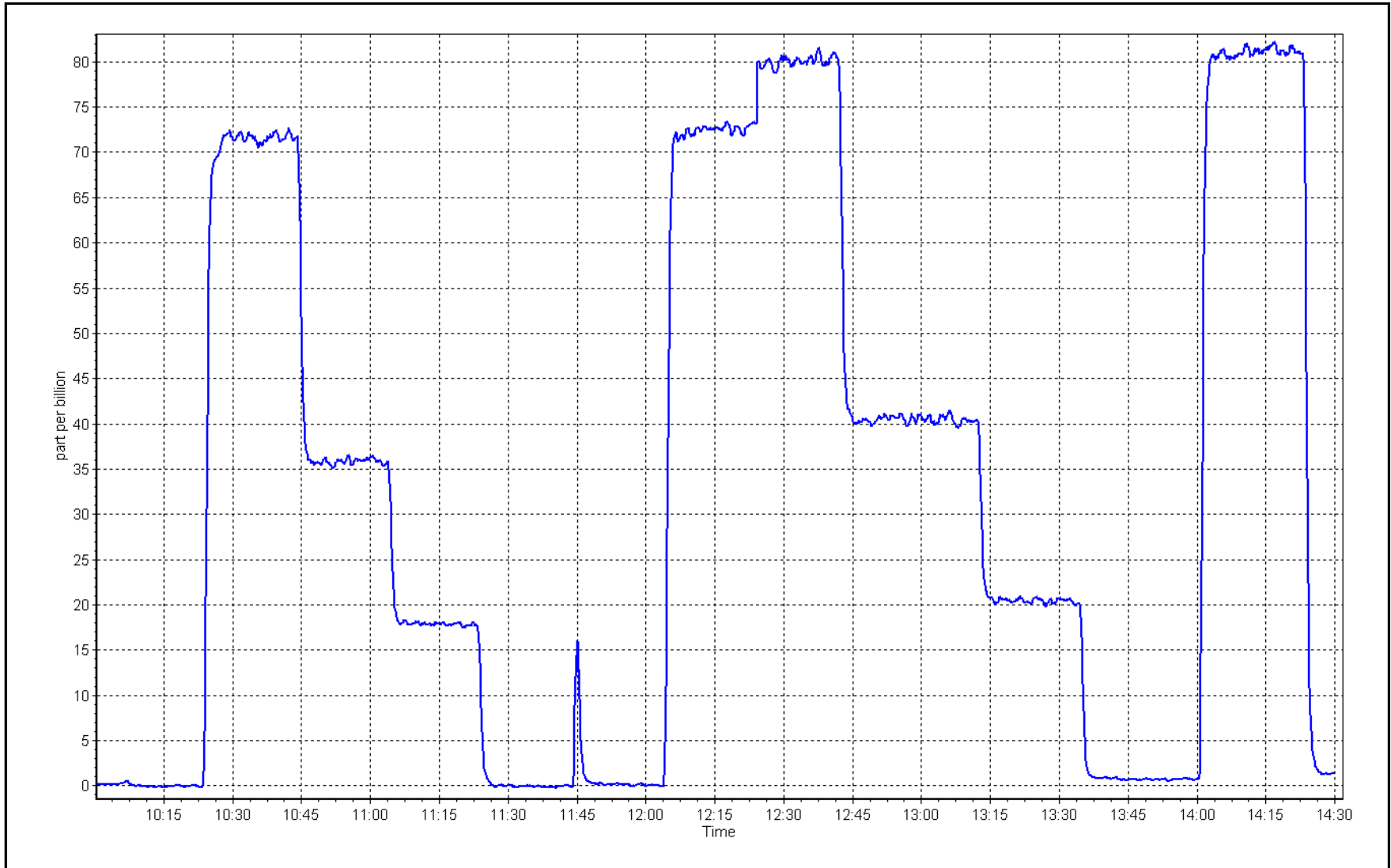
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999960	
80.0	80.4	0.9951			≥0.995
40.0	40.2	0.9950	Slope	1.003023	
19.9	20.5	0.9731			0.90 - 1.10
			Intercept	0.182125	+/-3



TRS Calibration Plot

Date: April 5, 2023

Location: Fort Hills





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	May 10, 2023	Last Cal Date:	April 14, 2023
Start time (MST):	9:24	End time (MST):	12:35
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC281425	Cal Gas Expiry Date:	January 5, 2025
CH ₄ Cal Gas Conc.	500.2 ppm	CH ₄ Equiv Conc.	1070.6 ppm
C ₃ H ₈ Cal Gas Conc.	207.4 ppm		
Removed Gas Cert:	N/A	Removed Gas Expiry:	N/A
Removed CH ₄ Conc.	500.2 ppm	CH ₄ Equiv Conc.	1070.6 ppm
Removed C ₃ H ₈ 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	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	2.32E-04	2.32E-04	NMHC SP Ratio:	5.06E-05
CH ₄ Retention time:	13.0	13.0	NMHC Peak Area:	181940

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.19	17.21	0.999
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	17.19	1.000
second point	4960	40.2	8.61	8.56	1.005
third point	4980	20.1	4.30	4.29	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.15	1.003

				Average Correction Factor	1.003
Baseline Corr AF:	17.21	Prev response	17.26	*% 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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	9.16	9.15	1.001
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	9.14	1.003
second point	4960	40.2	4.59	4.60	0.997
third point	4980	20.1	2.29	2.32	0.990
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.12	1.004
Average Correction Factor					0.997
Baseline Corr AF:	9.15	Prev response	9.20	*% change	-0.6%
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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	8.07	0.996
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	8.05	0.997
second point	4960	40.2	4.02	3.96	1.015
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	8.02	1.001
Average Correction Factor					1.010
Baseline Corr AF:	8.07	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

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	1.002839	0.999810
THC Cal Offset:	0.020787	-0.013170
CH ₄ Cal Slope:	1.005380	1.003198
CH ₄ Cal Offset:	-0.017654	-0.029231
NMHC Cal Slope:	1.000647	0.996713
NMHC Cal Offset:	0.038041	0.016062

Notes: Changed the inlet filter and the N₂ cylinder after as founds. No adjustments made.

Calibration Performed By: Max Farrell



Wood Buffalo Environmental Association

THC Calibration Summary

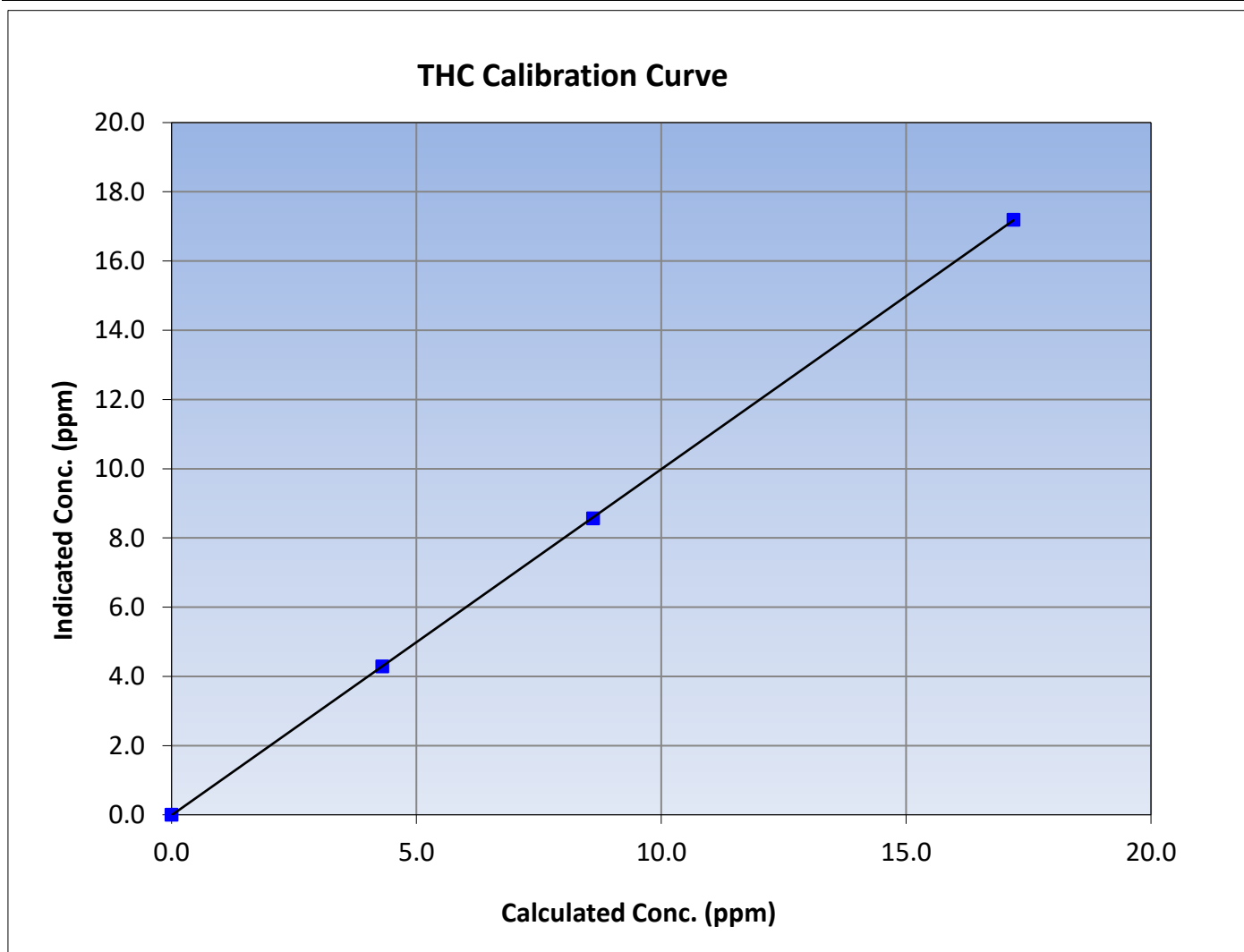
Version-01-2020

Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 14, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:24	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999992	≥ 0.995
17.19	17.19	1.0001			
8.61	8.56	1.0052			
4.30	4.29	1.0027			
			Slope	0.999810	0.90 - 1.10
			Intercept	-0.013170	+/-0.5





Wood Buffalo Environmental Association

CH₄ Calibration Summary

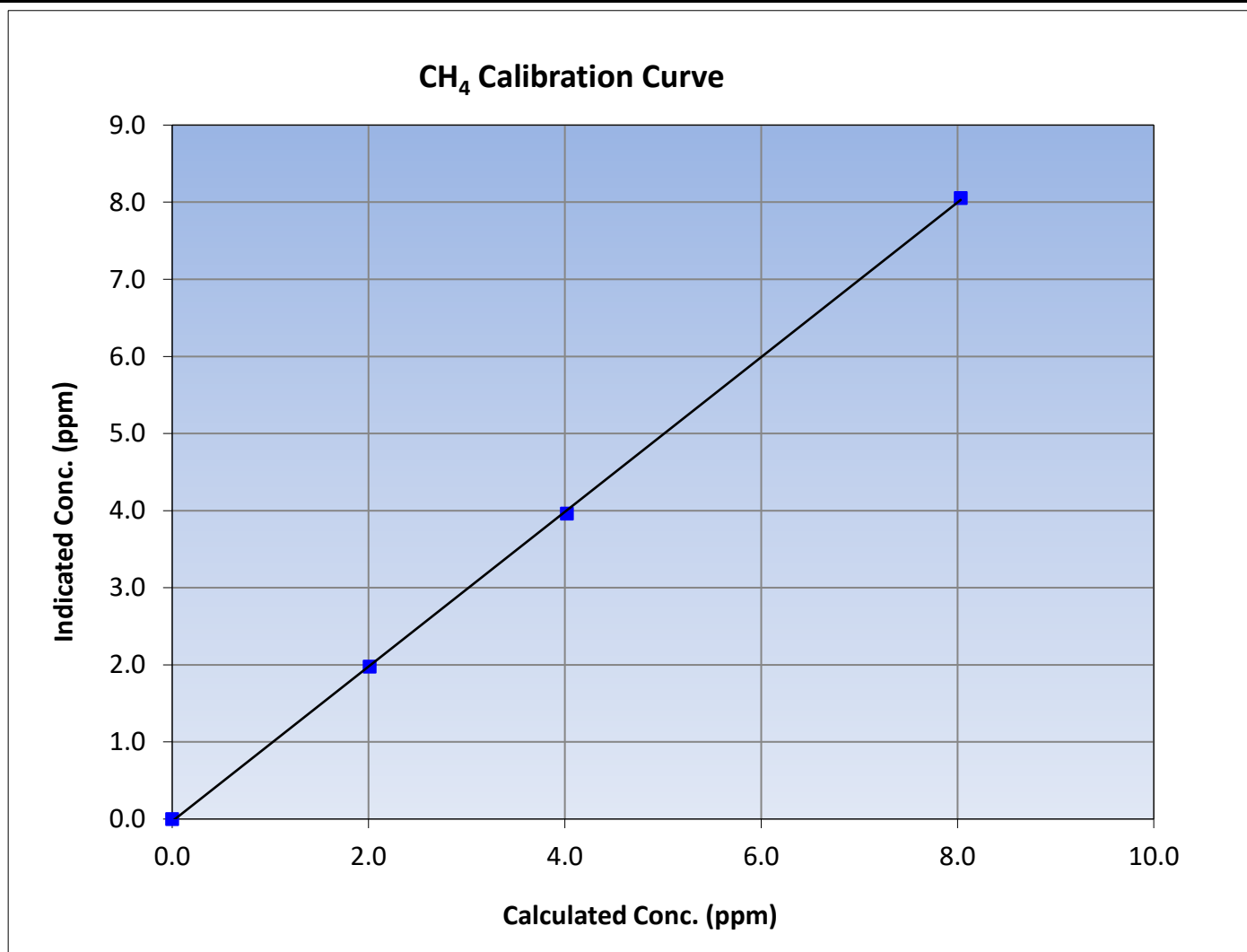
Version-01-2020

Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 14, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:24	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999907	≥ 0.995
8.03	8.05	0.9975			
4.02	3.96	1.0147			
2.01	1.98	1.0171			
			Slope	1.003198	0.90 - 1.10
			Intercept	-0.029231	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

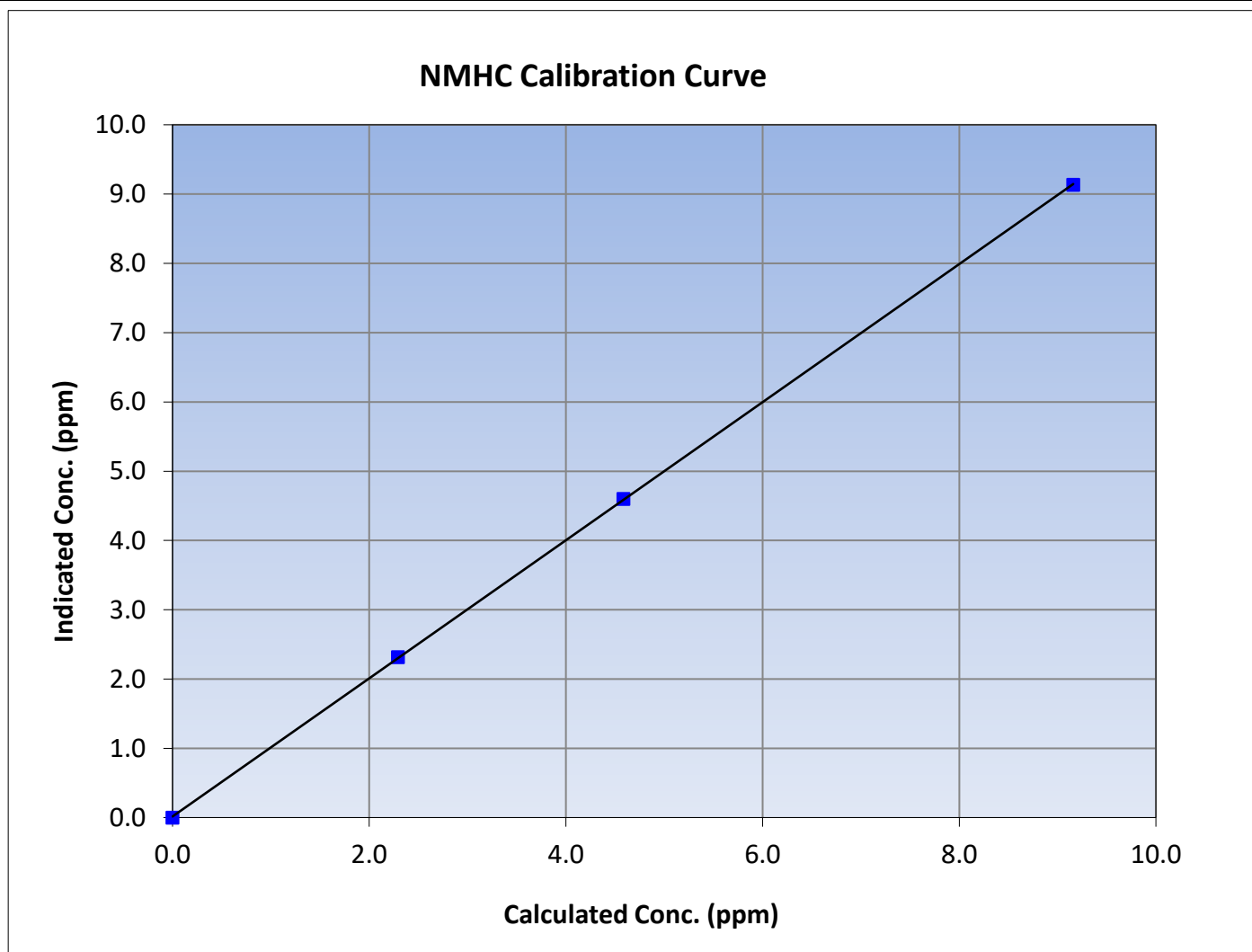
Version-01-2020

Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 14, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:24	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

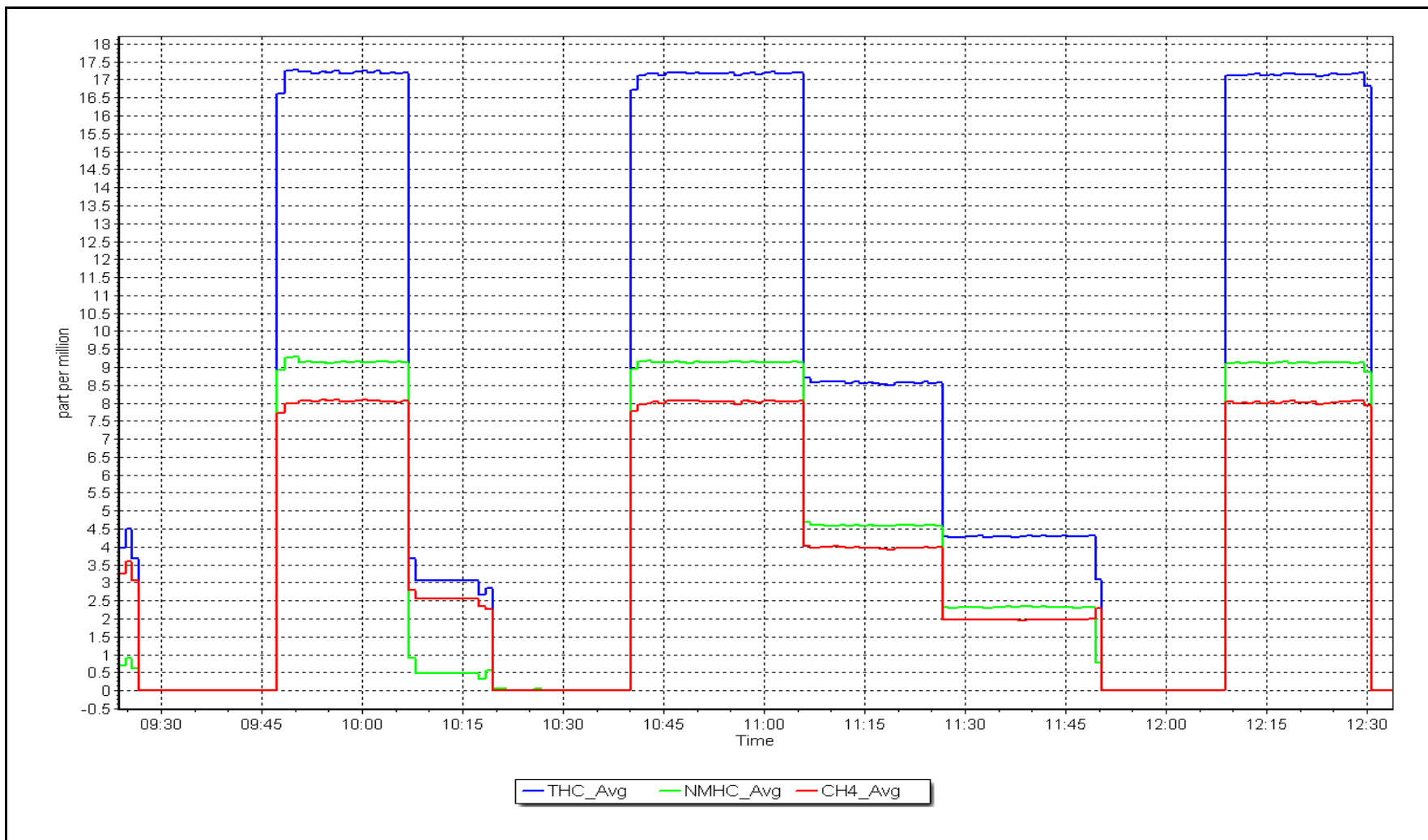
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999985	≥ 0.995			
9.16	9.14	1.0025						
4.59	4.60	0.9973				Slope	0.996713	0.90 - 1.10
2.29	2.32	0.9904						
			Intercept	0.016062	± 0.5			



NMHC Calibration Plot

Date: May 10, 2023

Location: Fort Hills





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Fort Hills
Calibration Date: April 21, 2023
Start time (MST): 8:48
Reason: Routine
Station number: AMS23
Last Cal Date: March 1, 2023
End time (MST): 13:36

Calibration Standards

NO Gas Cylinder #: CC332703
NOX Cal Gas Conc: 49.7 ppm
Removed Cylinder #: N/A
Removed Gas NOX Conc: 49.7 ppm
NOX gas Diff:
Calibrator Model: Teledyne API T750
ZAG make/model: Teledyne API T751H
Cal Gas Expiry Date: January 28, 2024
NO Cal Gas Conc: 49.7 ppm
Removed Gas Exp Date: N/A
Removed Gas NO Conc: 49.7 ppm
NO gas Diff:
Serial Number: 275
Serial Number: 307

Analyzer Information

Analyzer make: Thermo 42i
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 1152430007

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.025	1.065	NO bkgnd or offset:	2.8	2.9
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	3.1	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	155.0	158.3

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.992756	1.003237
NO _x Cal Offset:	0.201484	0.084507
NO Cal Slope:	0.995756	1.004153
NO Cal Offset:	-1.598210	-1.236008
NO ₂ Cal Slope:	0.998881	1.006445
NO ₂ Cal Offset:	0.599000	0.589439



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as found span	4920	80.5	800.2	800.2	0.0	775.9	771.5	4.4	1.031	1.037
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	80.5	800.2	800.2	0.0	802.6	802.7	-0.1	0.997	0.997
second point	4960	40.2	399.6	399.6	0.0	401.7	399.9	1.8	0.995	0.999
third point	4980	20.1	199.8	199.8	0.0	200.0	197.8	2.2	0.999	1.010
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4920	80.5	800.2	440.0	360.2	797.8	435.7	362.1	1.003	1.010
Average Correction Factor									0.997	1.002

Corrected As found	NO _x = 775.9 ppb	NO = 771.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -2.4%
Previous Response	NO _x = 794.6 ppb	NO = 795.2 ppb		*Percent Change	NO = -3.1%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	798.0	437.8	360.2	362.7	0.993	100.7%
2nd GPT point (200 ppb O3)	798.0	621.0	177.0	179.5	0.986	101.4%
3rd GPT point (100 ppb O3)	798.0	708.0	90.0	91.3	0.986	101.4%
Average Correction Factor					0.988	101.2%

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

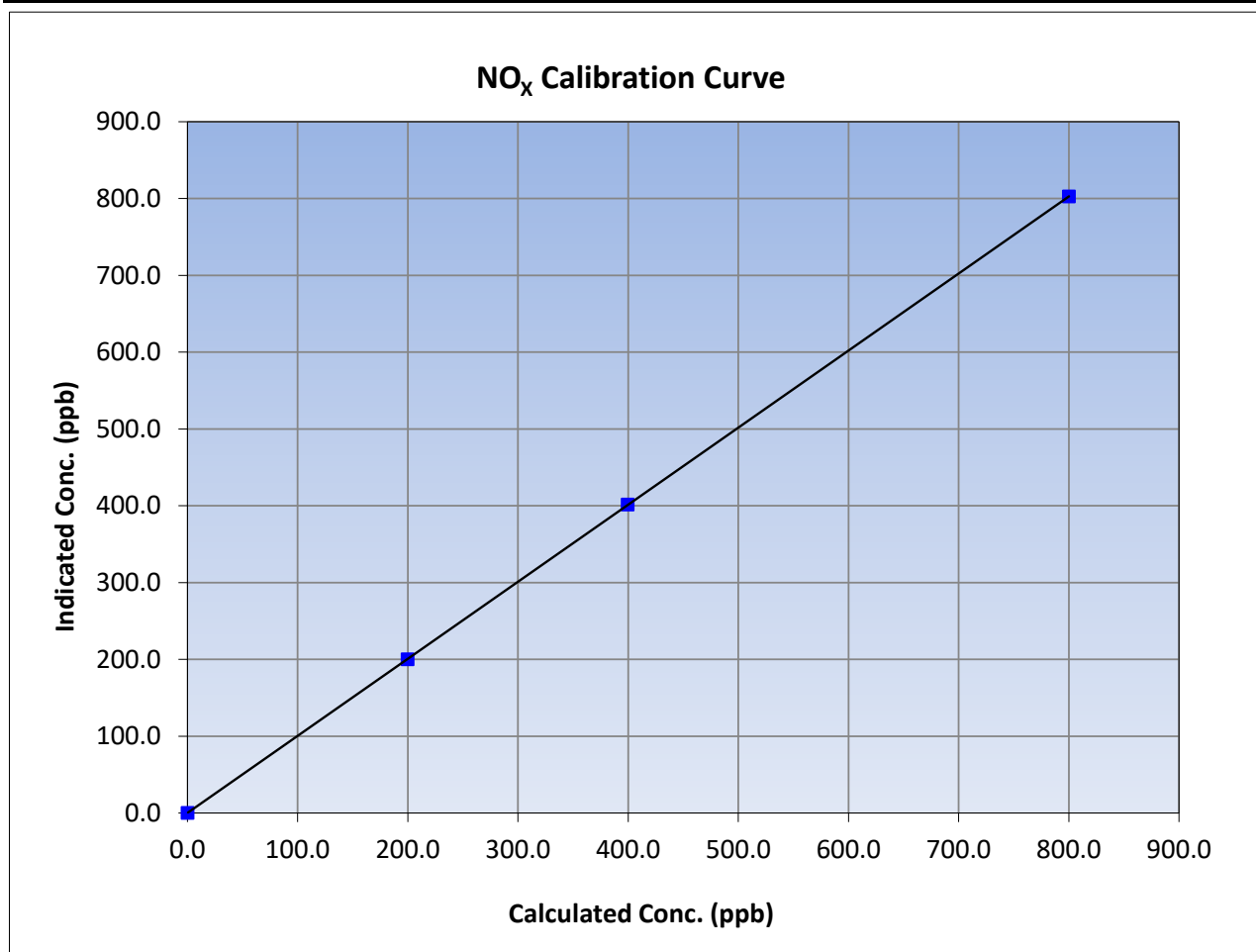
Version-04-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:48	End Time (MST):	13:36
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20
800.2	802.6	0.9970		
399.6	401.7	0.9947		
199.8	200.0	0.9990		





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

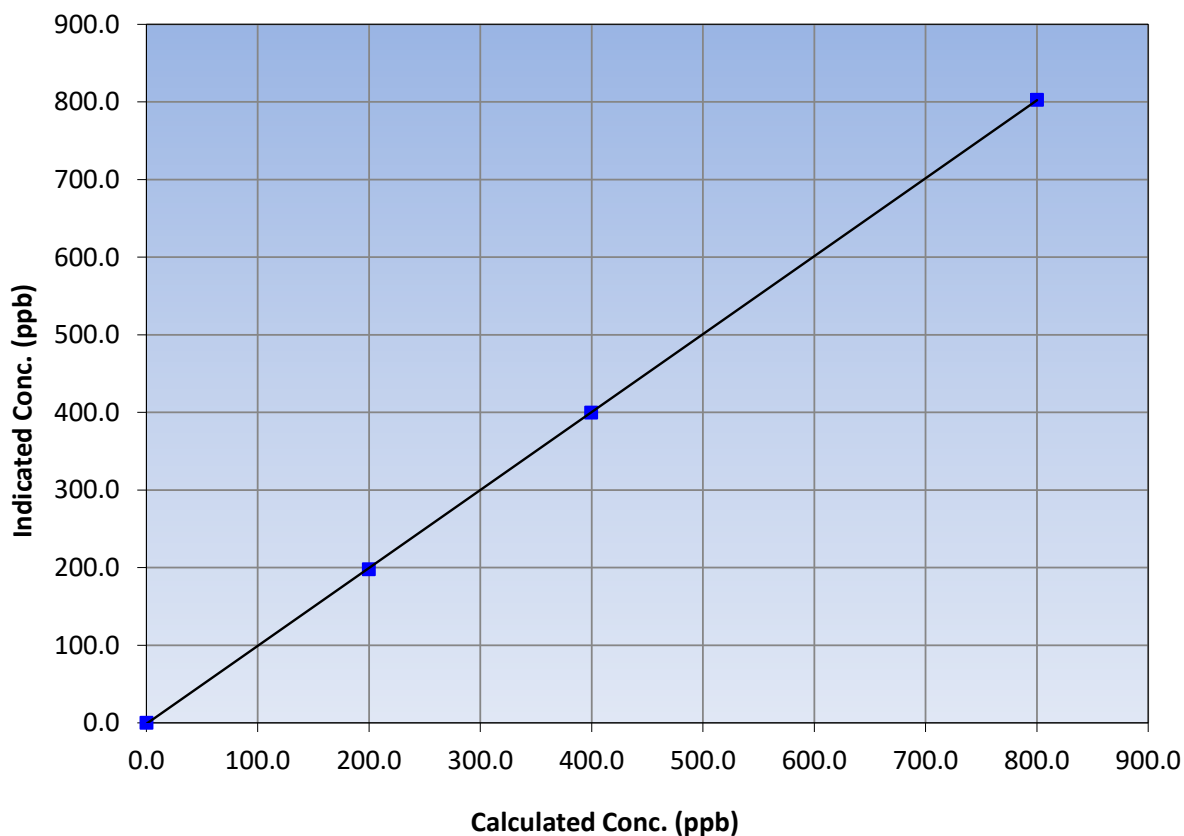
Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:48	End Time (MST):	13:36
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	0.0	----	Correlation Coefficient	≥0.995	
800.2	802.7	0.9968			
399.6	399.9	0.9992			
199.8	197.8	1.0101			
			Slope	1.004153	0.90 - 1.10
			Intercept	-1.236008	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

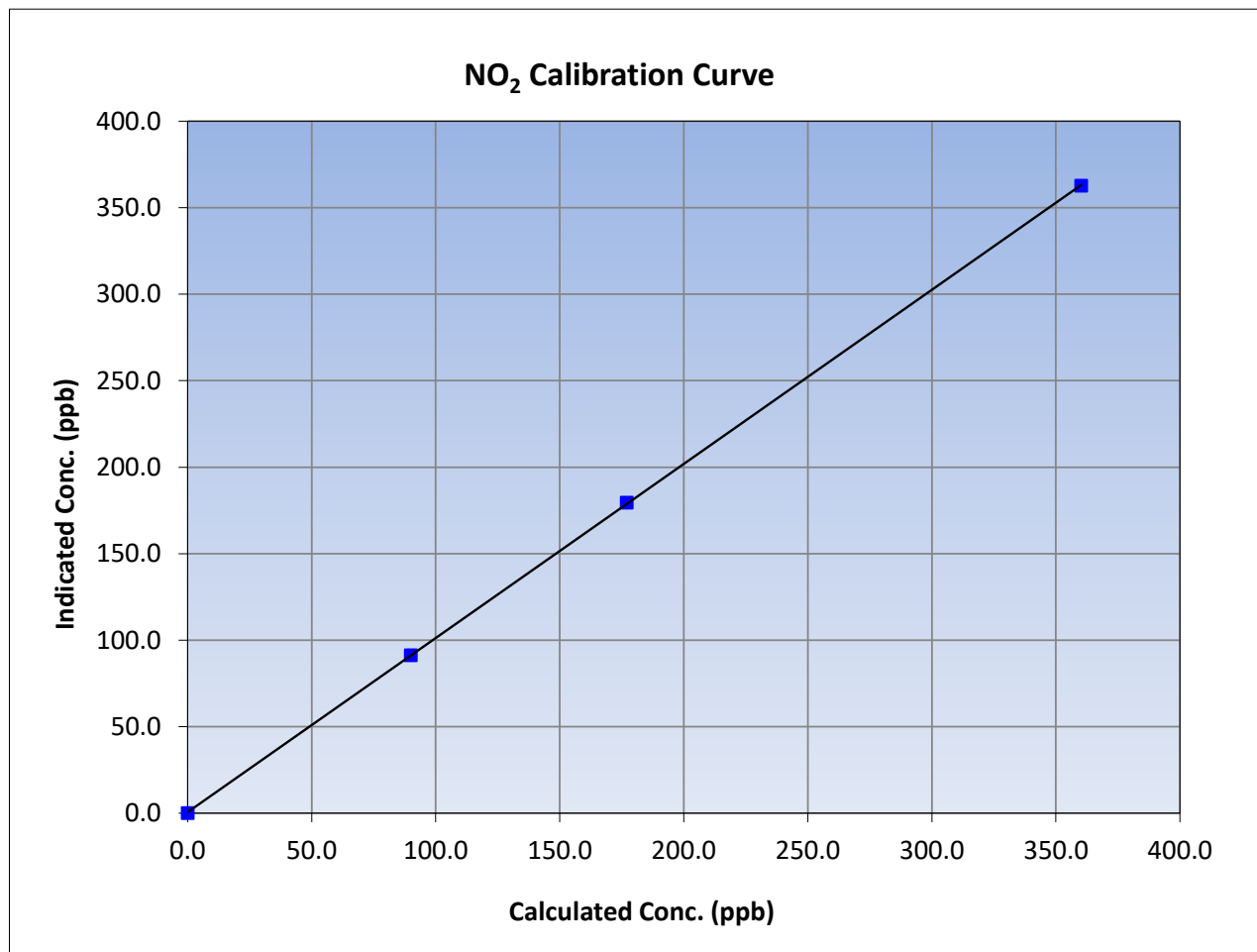
Version-04-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:48	End Time (MST):	13:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

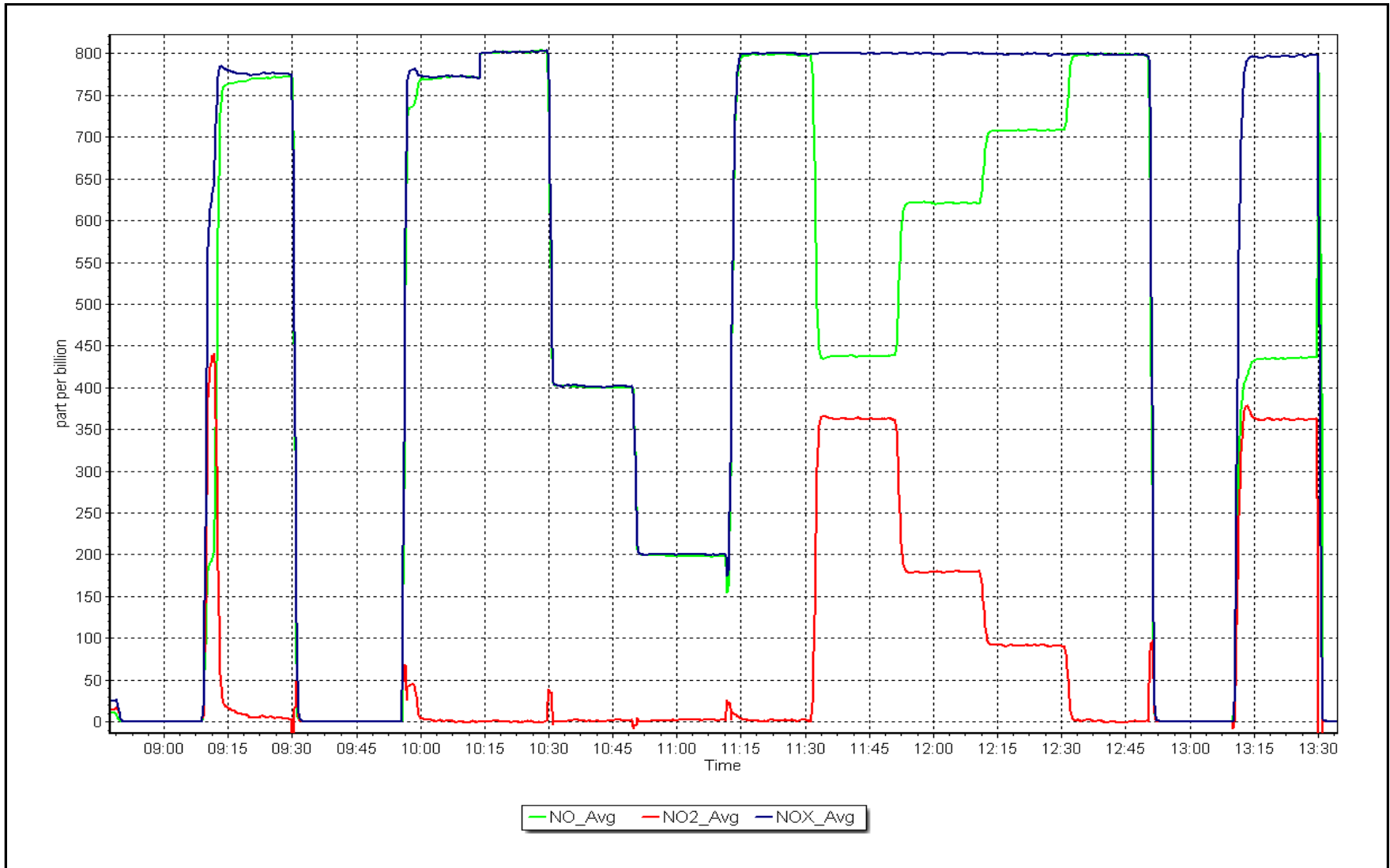
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.0	0.1	----	Correlation Coefficient	0.999986	≥0.995			
360.2	362.7	0.9931						
177.0	179.5	0.9861				Slope	1.006445	0.90 - 1.10
90.0	91.3	0.9858						
			Intercept	0.589439	+/-20			



NO_x Calibration Plot

Date: April 21, 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: April 21, 2023 Last Cal Date: March 18, 2023
 Start time (MST): 13:12 End time (MST): 13:41

Analyzer Make: API T640 S/N: 1546
 Particulate Fraction: PM2.5

Flow Meter Make/Model: Alicat FP-25BT S/N: 388755
 Temp/RH standard: Alicat FP-25BT S/N: 388755

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	9.6	10.8	9.6	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	747.10	746.3	747.10	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	4.97	5.05	4.97	<input type="checkbox"/>	+/- 0.25 LPM
Leak Test:	Date of check: <u>April 21, 2023</u>	Last Cal Date: <u>March 18, 2023</u>			
	PM w/o HEPA: <u>7</u>	PM w/ HEPA: <u>0</u>			<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				<input type="checkbox"/>	11.3 +/- 0.5
Post-maintenance leak check:		PM w/o HEPA: _____	w/ HEPA: _____		
Date Optical Chamber Cleaned:		<u>March 18, 2023</u>			<0.2 ug/m3
Disposable Filter Changed:		<u>March 18, 2023</u>			

Annual Maintenance

Date Sample Tube Cleaned: September 26, 2022
 Date RH/T Sensor Cleaned: September 26, 2022

Notes: Leak check passed, no adjustments needed.

Calibration by: Max Farrell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25 WASKŌW OHCI PIMÂTISIWIN APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Summary

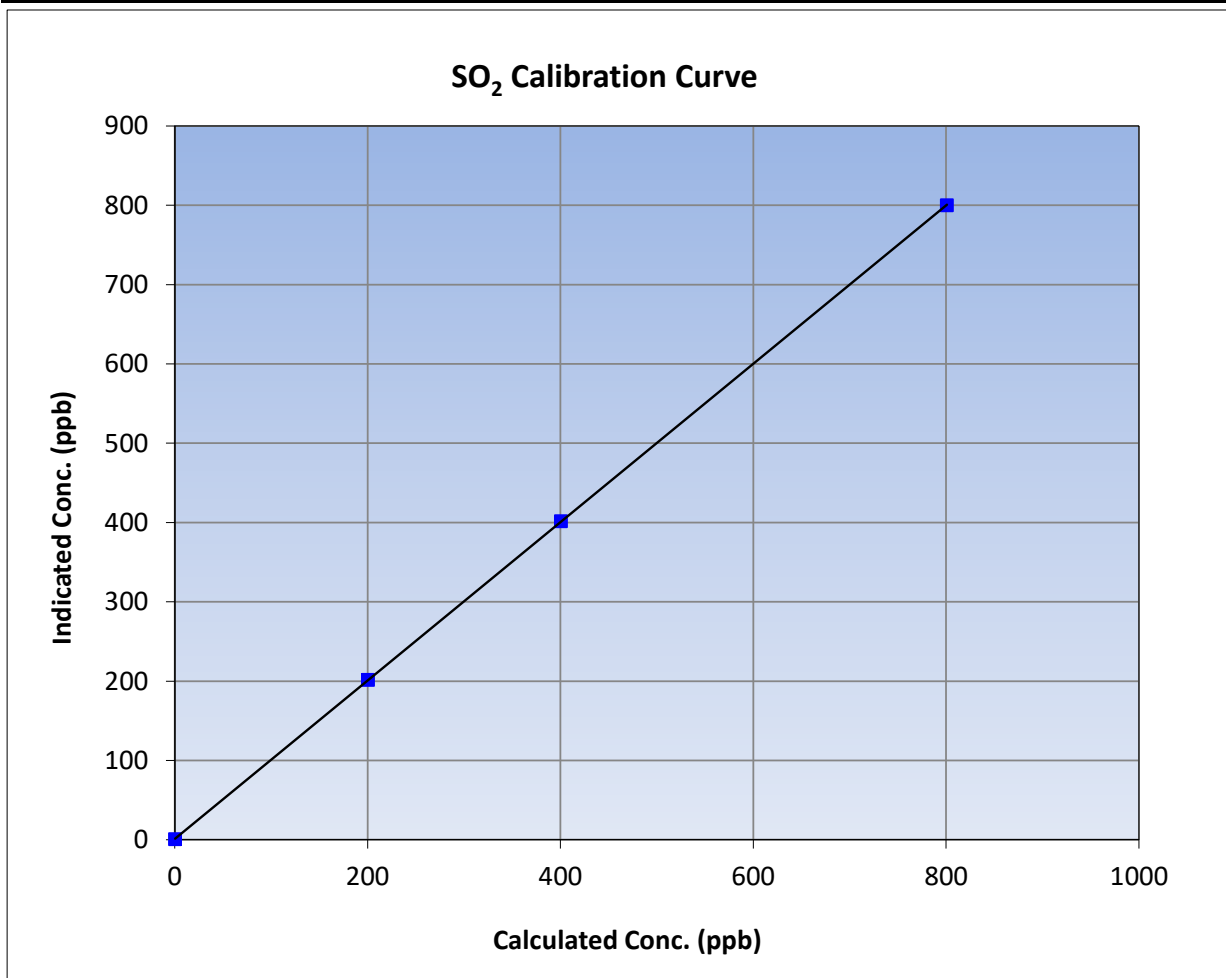
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 15, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	7:10	End Time (MST):	10:54
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

Calibration Data

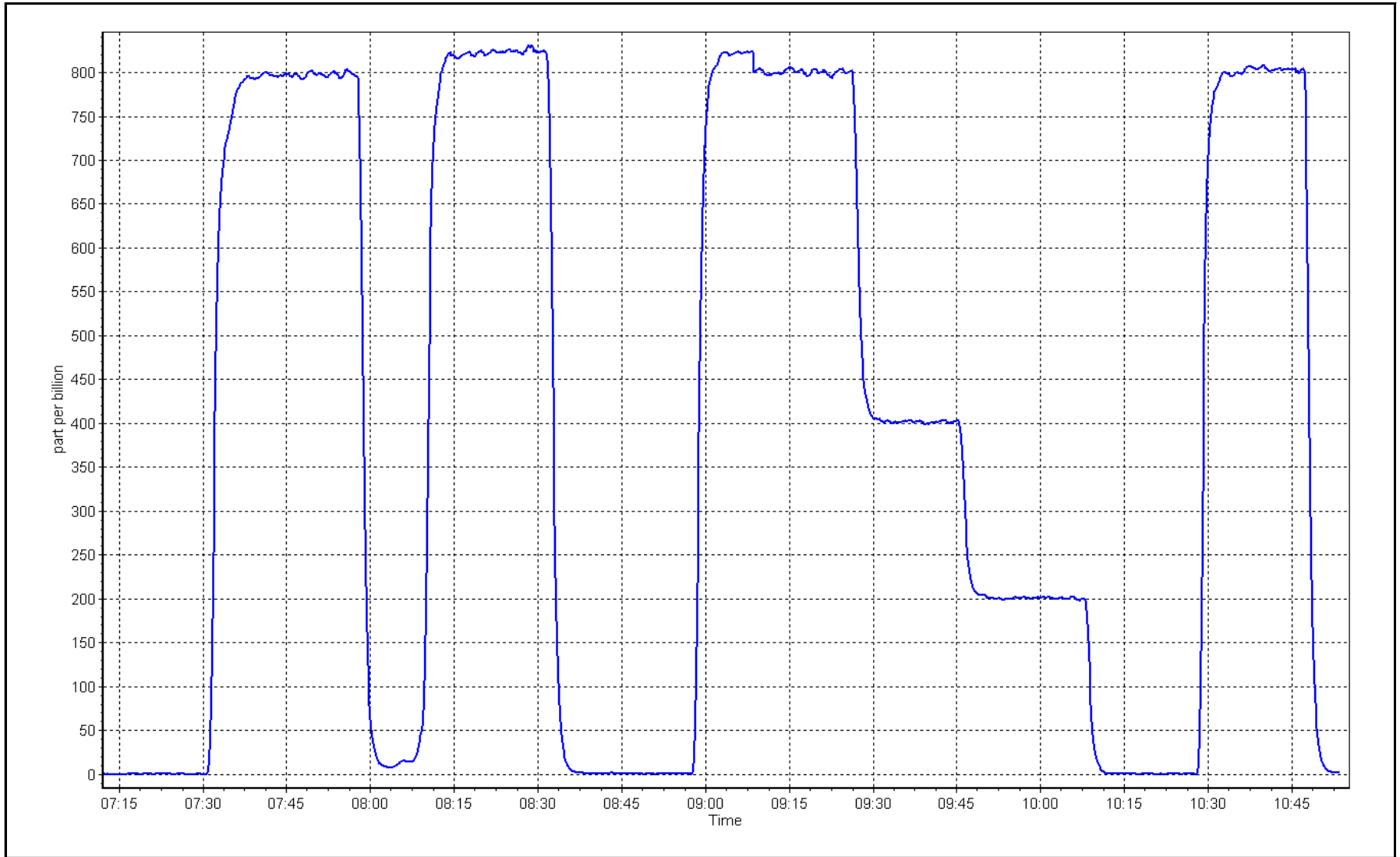
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.4	----	Correlation Coefficient	0.999996	≥0.995
800.5	799.9	1.0008			
400.3	401.5	0.9970	Slope	0.998563	0.90 - 1.10
200.1	201.1	0.9953			
			Intercept	0.983970	+/-30



SO2 Calibration Plot

Date: April 11, 2023

Location: Waskow ohci Pimatisiwin





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Waskow ohci Pimatisiwin Station number: AMS25
 Calibration Date: April 12, 2023 Last Cal Date: March 16, 2023
 Start time (MST): 6:25 End time (MST): 11:17
 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: 4.90 ppm Rem Gas Exp Date: May 5, 2023
 Removed Gas Cyl #: LL119538 Diff between cyl: -0.9%
 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: Thermo 43C Converter serial #: 328702539
 Analyzer Range: 0 - 100 ppb

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	1.003738	1.014757	Backgd or Offset: 3.3	3.4
Calibration intercept:	0.281608	0.200000	Coeff or Slope: 1.085	1.108

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4918	81.6	80.0	79.9	1.002
as found 2nd point	4959	40.8	40.0	40.1	1.000
as found 3rd point	4980	20.4	20.0	20.1	1.000
new cylinder response	4920	80.0	79.5	78.7	1.010

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	80.0	79.5	80.8	0.983
second point	4960	40.0	39.7	40.6	0.979
third point	4980	20.0	19.9	20.3	0.979
as left zero	5000	0.0	0.0	0.2	----
as left span	4912	88.3	800.0	841.0	0.951
SO2 Scrubber Check	4924	76.3	800.0	0.1	----

Date of last scrubber change:	19-Jul-10	Ave Corr Factor	0.980
Date of last converter efficiency test:		efficiency	

Baseline Corr As found: 79.8 Prev response: 80.55 *% change: -0.9%
 Baseline Corr 2nd AF pt: 40.0 AF Slope: 0.997736 AF Intercept: 0.141597
 Baseline Corr 3rd AF pt: 20.0 AF Correlation: 0.999998

** = > +/-5% change initiates investigation*

Notes: Sox scrubber checked after the calibrator zero. H₂S calibration Gas changed. Span adjusted.

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

H₂S Calibration Summary

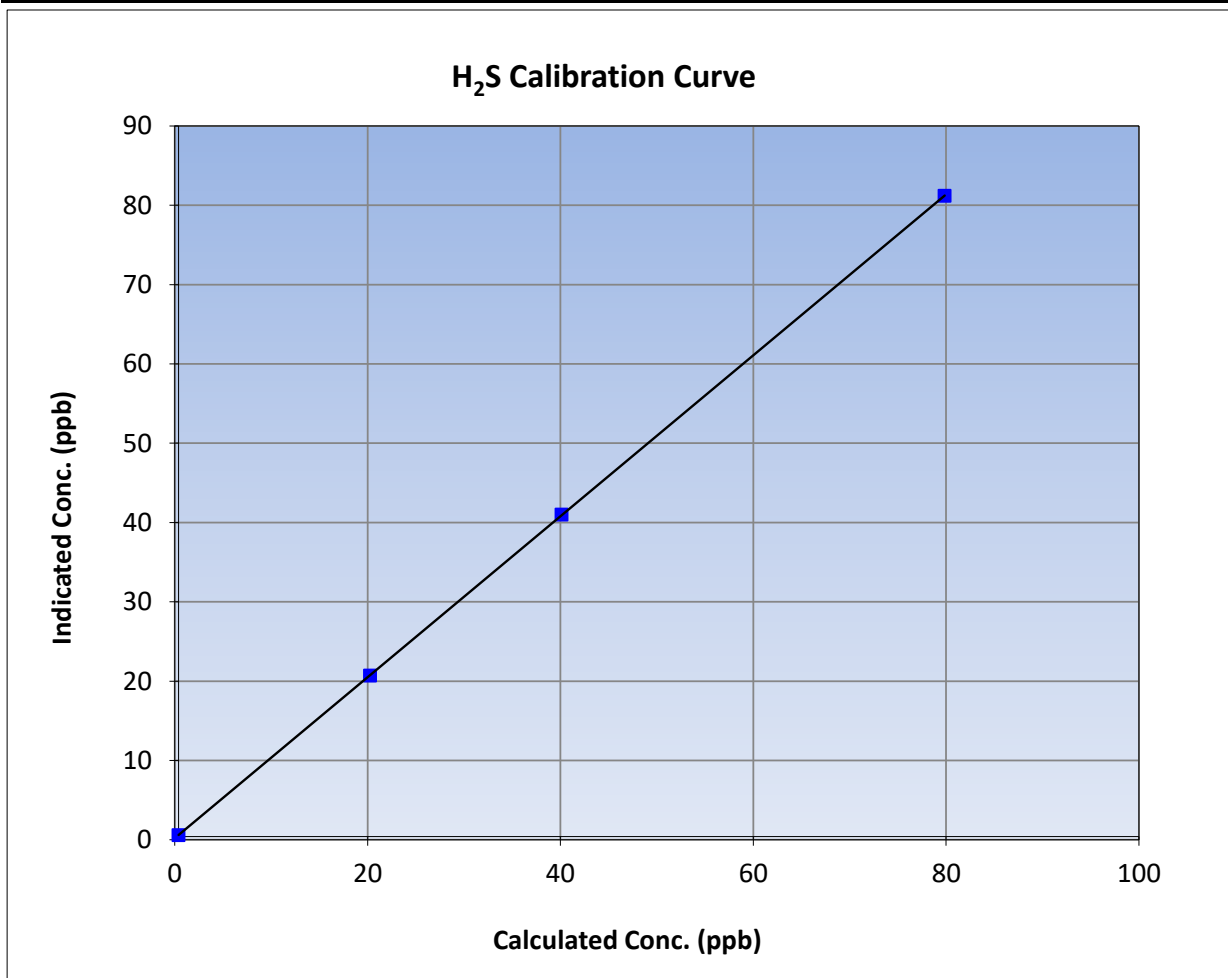
Version-11-2021

Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 16, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	6:25	End Time (MST):	11:17
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

Calibration Data

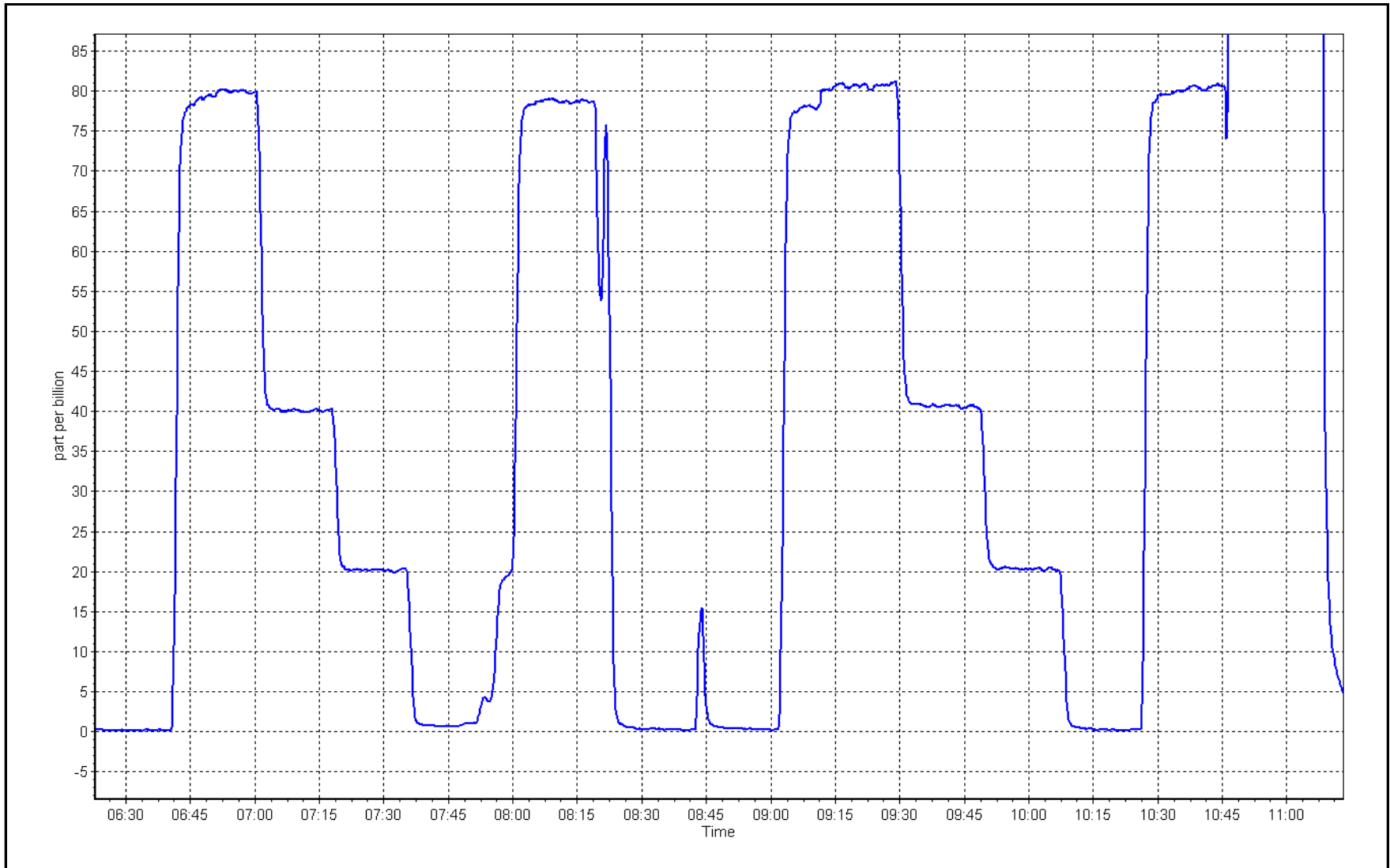
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999997	≥0.995
79.5	80.8	0.9834			
39.7	40.6	0.9785	Slope	1.014757	0.90 - 1.10
19.9	20.3	0.9785			
			Intercept	0.200000	+/-3



H₂S Calibration Plot

Date: April 12, 2023

Location: Waskow ohci Pimatisiwin





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	April 27, 2023	Last Cal Date:	March 23, 2023
Start time (MST):	7:23	End time (MST):	9:56
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.56	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	<u>CC362134</u>			
Removed Cal Gas Conc:	49.56	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	<u>NA</u>		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2447
ZAG Make/Model:	API T701		Serial Number:	953

Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001
Analyzer Range	0 - 1000 ppb		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.990536	1.010951	Backgd or Offset:	16.5	16.5
Calibration intercept:	-2.994790	-2.757950	Coeff or Slope:	0.929	0.929

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.5	----
as found span	4919	80.6	799.0	807.8	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4919	80.6	799.0	806.5	0.991
second point	4960	40.3	399.4	399.6	1.000
third point	4980	20.2	200.2	196.4	1.019
as left zero	5000	0.0	0.0	0.4	----
as left span	4919	80.6	799.0	807.7	0.989
Average Correction Factor					1.003

Baseline Corr As found:	807.30	Previous response	788.42	*% change	2.3%
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

SO₂ Calibration Summary

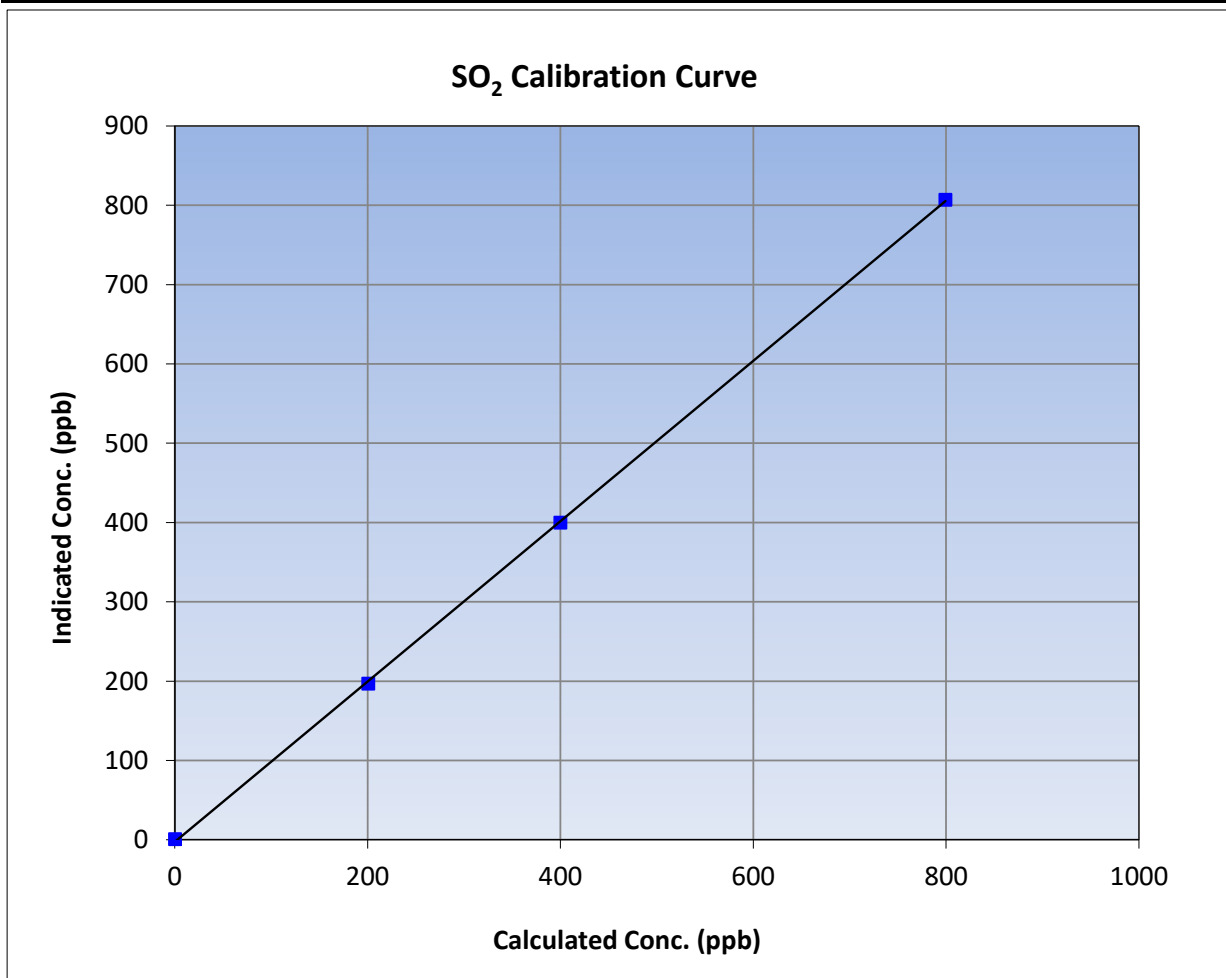
Version-01-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 23, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	7:23	End Time (MST):	9:56
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

Calibration Data

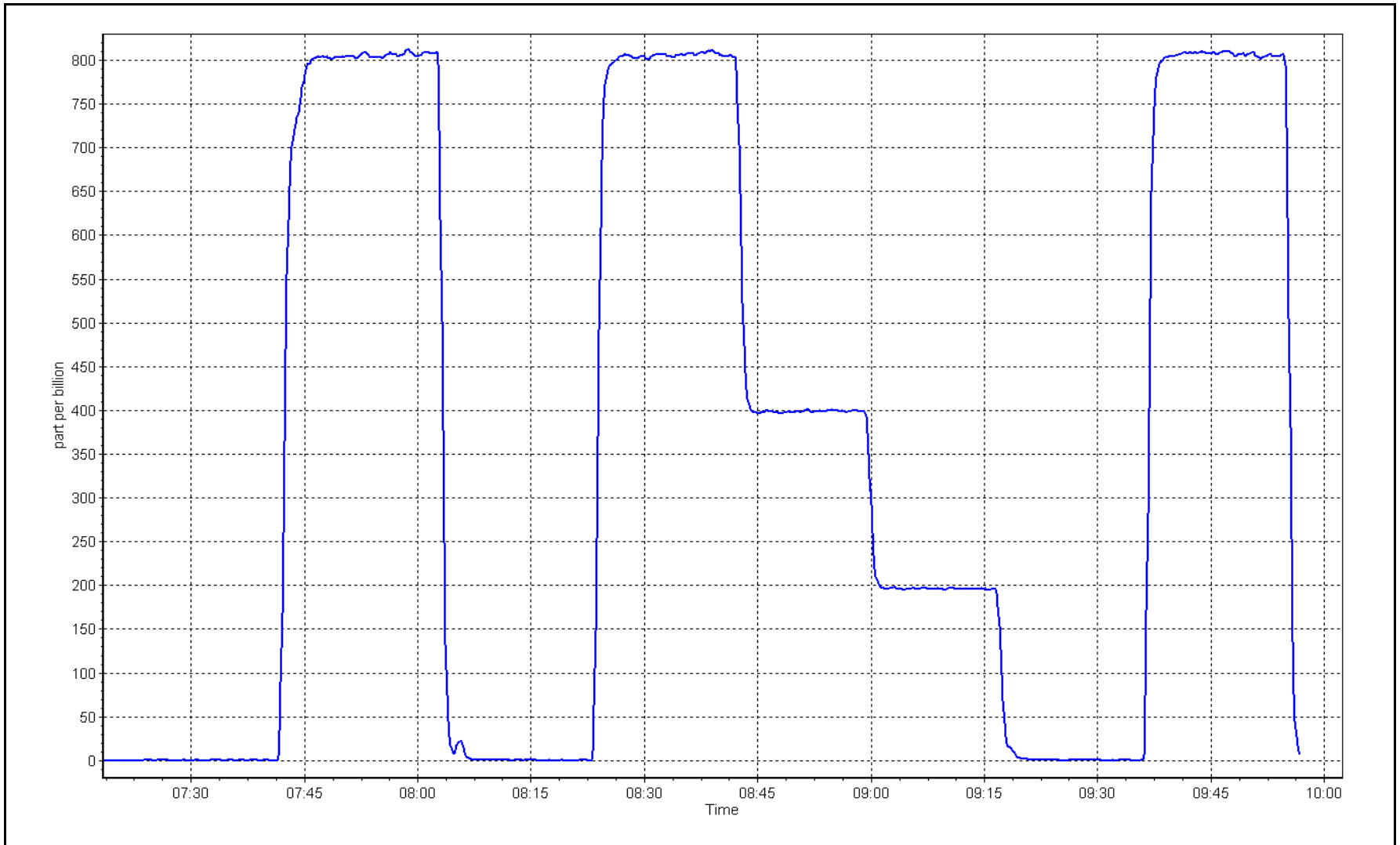
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.4	----	Correlation Coefficient	0.999930	
799.0	806.5	0.9907			≥0.995
399.4	399.6	0.9996	Slope	1.010951	
200.2	196.4	1.0194			0.90 - 1.10
			Intercept	-2.757950	+/-30



SO2 Calibration Plot

Date: April 27, 2023

Location: Christina Lake





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Christina Lake Station number: AMS26
 Calibration Date: April 25, 2023 Last Cal Date: March 22, 2023
 Start time (MST): 11:18 End time (MST): 15:02
 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 T701 Serial Number: 953

Analyzer Information

Analyzer make: Thermo 450i Analyzer serial #: 1180030032
 Converter make: NA Converter serial #: NA
 Analyzer Range: 0 - 100 ppb

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.979904	1.005611	Backgd or Offset: 33.6	35.4
Calibration intercept:	0.438608	-0.360862	Coeff or Slope: 1.125	1.125

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	1.3	----
as found span	4918	81.8	80.0	82.4	0.986
as found 2nd point	4959	40.9	40.0	41.4	0.998
as found 3rd point	4979	20.4	20.0	21.1	1.008
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4918	81.8	80.0	80.2	0.998
second point	4959	40.9	40.0	39.7	1.008
third point	4979	20.4	20.0	19.6	1.018
as left zero	5000	0.0	0.0	-0.2	----
as left span	4918	81.8	80.0	81.3	0.984
SO2 Scrubber Check	4919	80.6	806.1	0.0	----
Date of last scrubber change:	27-Feb-19			Ave Corr Factor	1.008
Date of last converter efficiency test:					efficiency

Baseline Corr As found: 81.1 Prev response: 78.83 *% change: 2.8%
 Baseline Corr 2nd AF pt: 40.1 AF Slope: 1.014895 AF Intercept: 1.039275
 Baseline Corr 3rd AF pt: 19.8 AF Correlation: 0.999948

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's. Ran scrubber check after calibrator zero. Adjusted zero only.

Calibration Performed By: Mohammed Kashif



Wood Buffalo Environmental Association

H₂S Calibration Summary

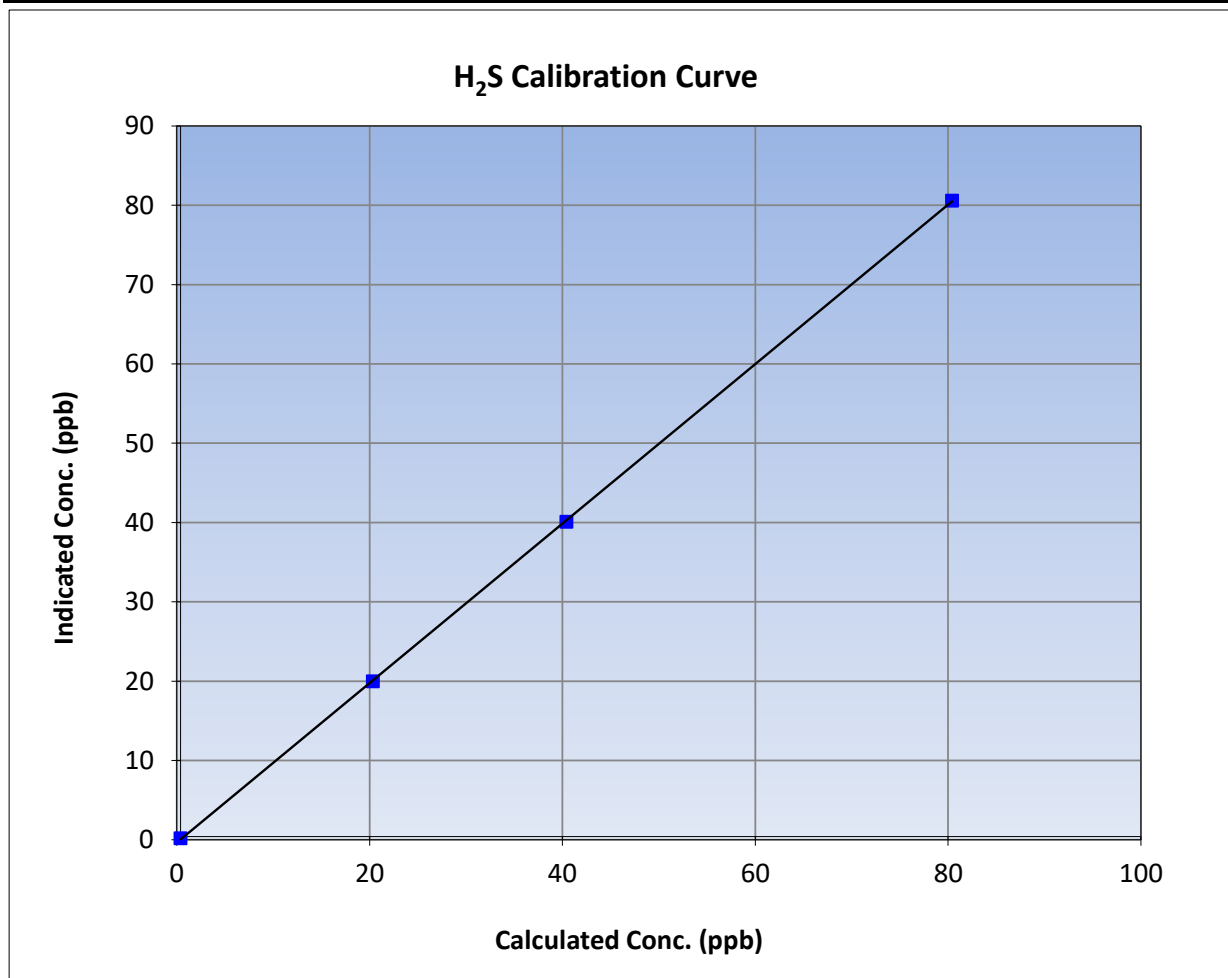
Version-11-2021

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 22, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:18	End Time (MST):	15:02
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

Calibration Data

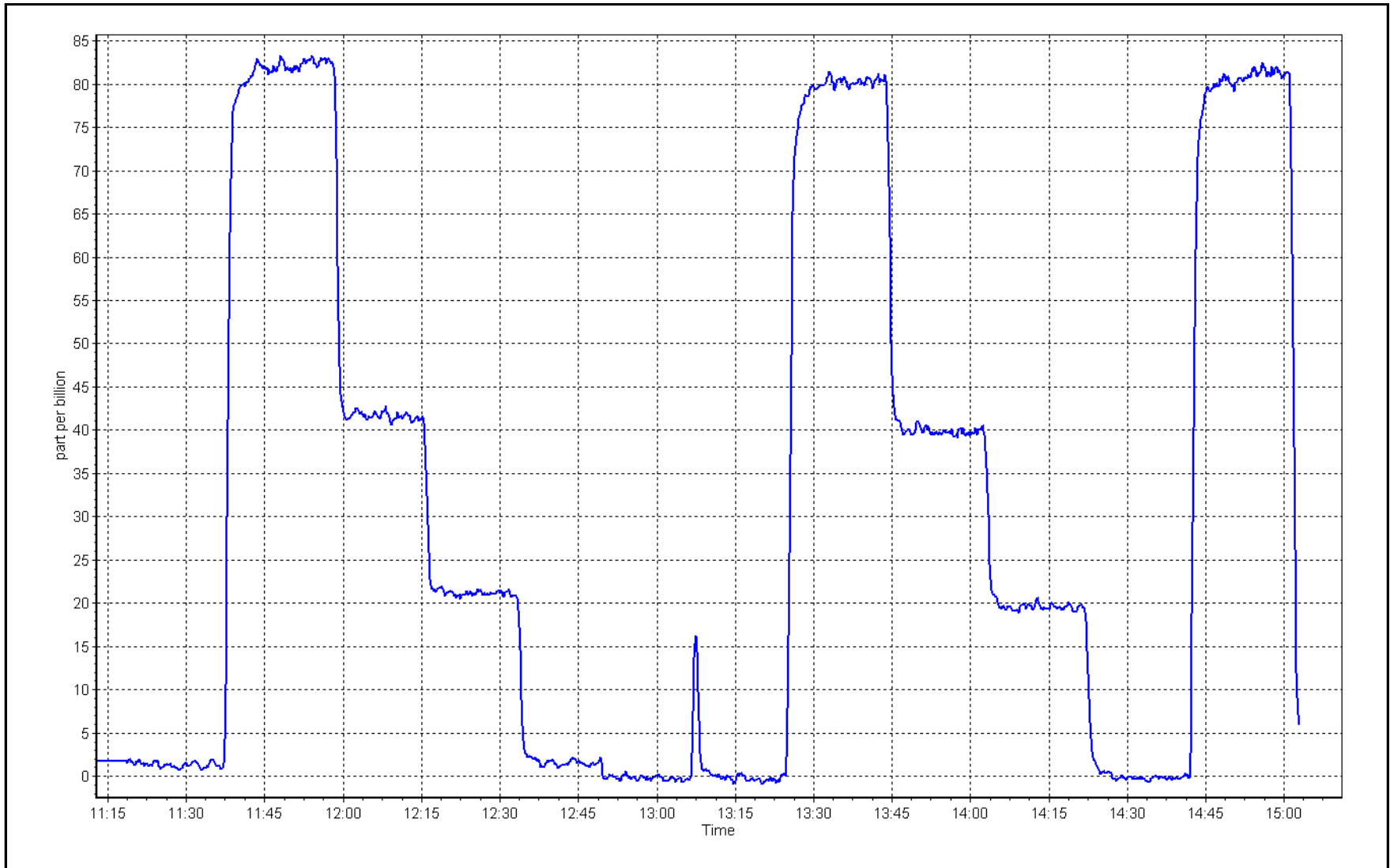
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999979	≥0.995
80.0	80.2	0.9976			
40.0	39.7	1.0076	Slope	1.005611	0.90 - 1.10
20.0	19.6	1.0180			
			Intercept	-0.360862	+/-3



H₂S Calibration Plot

Date: April 25, 2023

Location: Christina Lake





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Christina Lake
Calibration Date: April 26, 2023
Start time (MST): 10:16
Reason: Routine
Station number: AMS 26
Last Cal Date: March 29, 2023
End time (MST): 16:57

Calibration Standards

NO Gas Cylinder #: T2Y1P4C
NOX Cal Gas Conc: 50.82 ppm
Removed Cylinder #: NA
Removed Gas NOX Conc: 50.82 ppm
NOX gas Diff:
Calibrator Model: API T700
ZAG make/model: API T701
Cal Gas Expiry Date: November 12, 2023
NO Cal Gas Conc: 50.02 ppm
Removed Gas Exp Date: NA
Removed Gas NO Conc: 50.02 ppm
NO gas Diff:
Serial Number: 2447
Serial Number: 953

Analyzer Information

Analyzer make: Thermo 42i
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 1173480006

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.713	1.762	NO bkgnd or offset:	2.9	2.9
NOX coeff or slope:	0.996	0.997	NOX bkgnd or offset:	2.9	3.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	191.9	198.6

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.989754	0.999958
NO _x Cal Offset:	-1.920000	-1.700000
NO Cal Slope:	0.990261	0.999786
NO Cal Offset:	-2.780000	-2.340000
NO ₂ Cal Slope:	1.001972	1.003094
NO ₂ Cal Offset:	0.216428	0.778854



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4920	80.0	813.1	800.3	12.8	796.4	781.2	15.2	1.0210	1.0245
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	813.1	800.3	12.8	812.2	798.9	13.4	1.0011	1.0018
second point	4960	40.0	406.6	400.2	6.4	404.2	396.8	7.3	1.0058	1.0085
third point	4980	20.0	203.3	200.1	3.2	199.6	195.2	4.5	1.0184	1.0250
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.1	----	----
as left span	4920	80.0	813.1	397.1	416.0	815.5	399.3	416.2	0.9971	0.9945
Average Correction Factor									1.0085	1.0117

Corrected As found	NO _x = 796.5 ppb	NO = 781.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -0.8%
Previous Response	NO _x = 802.9 ppb	NO = 789.7 ppb		*Percent Change	NO = -1.1%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	798.2	395.0	416.0	417.6	0.9962	100.4%
2nd GPT point (200 ppb O3)	798.2	597.2	213.8	215.9	0.9903	101.0%
3rd GPT point (100 ppb O3)	798.2	702.3	108.7	110.3	0.9855	101.5%
Average Correction Factor					0.9906	100.9%

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

Calibration Performed By: Mohammed Kashif



Wood Buffalo Environmental Association

NO_x Calibration Summary

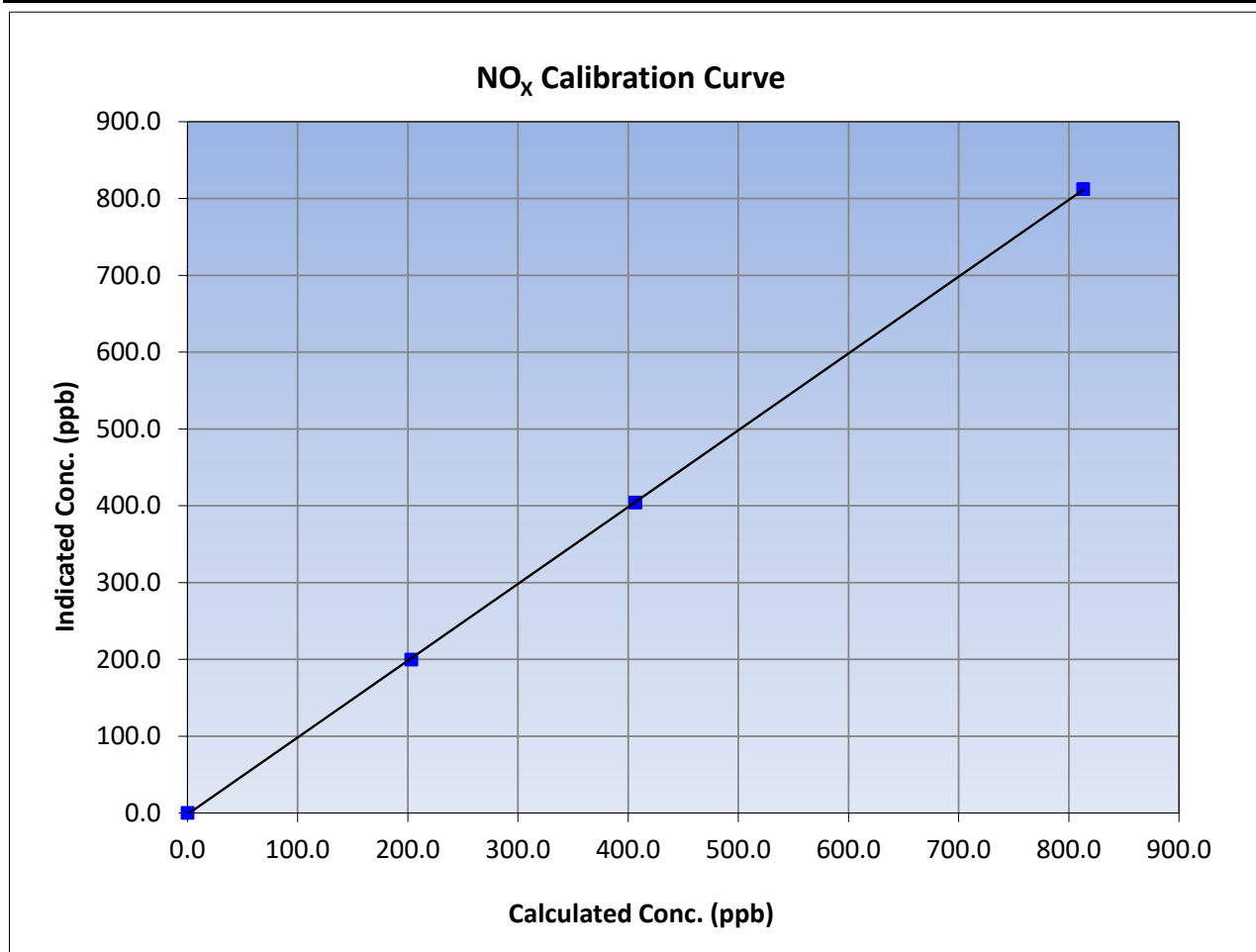
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 29, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:16	End Time (MST):	16:57
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.1	----	Correlation Coefficient	≥0.995	
813.1	812.2	1.0011			
406.6	404.2	1.0058			
203.3	199.6	1.0184			
			Slope	0.999958	0.90 - 1.10
			Intercept	-1.700000	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

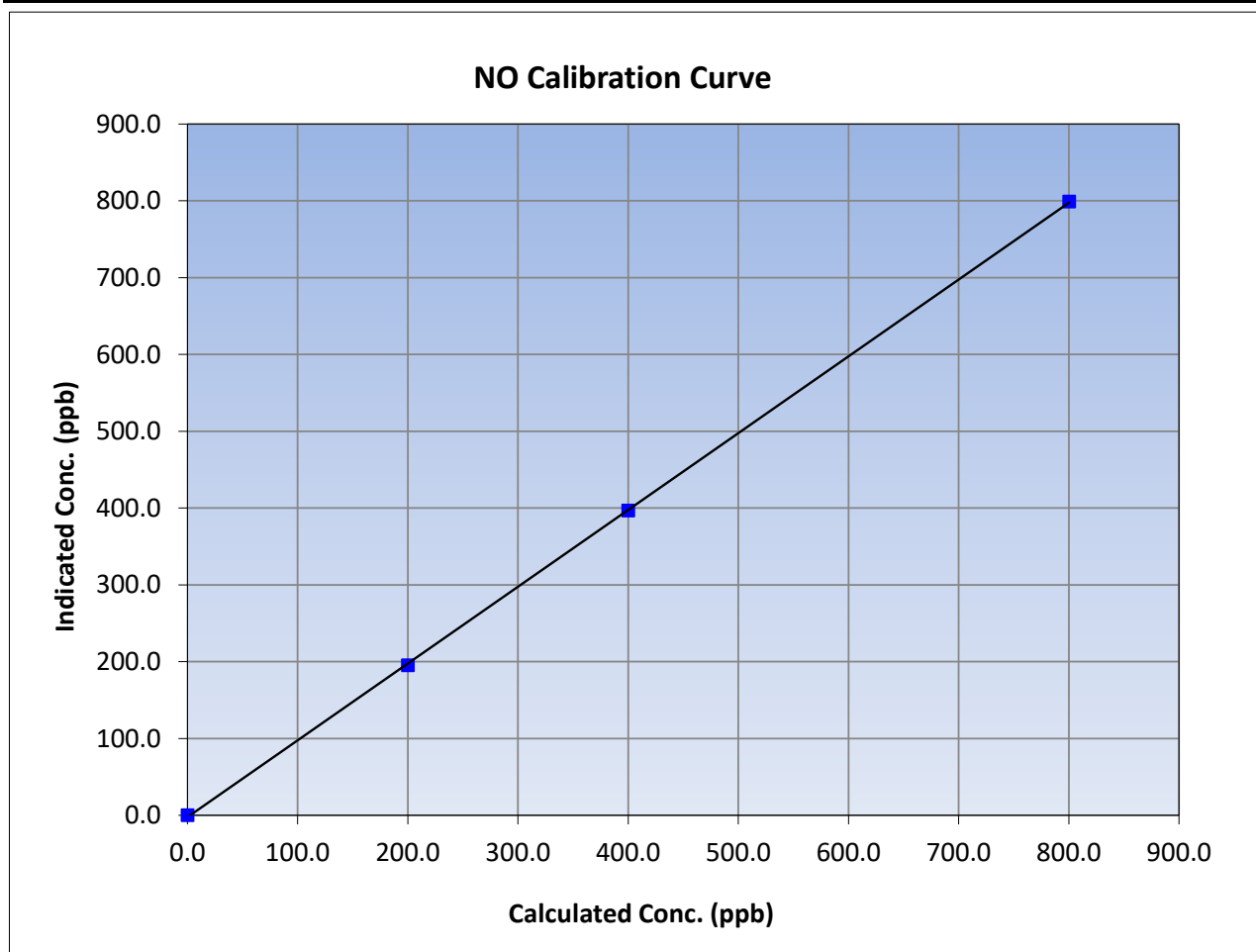
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 29, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:16	End Time (MST):	16:57
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.0	----	Correlation Coefficient Slope Intercept	≥ 0.995 <i>0.90 - 1.10</i> <i>+/-20</i>
800.3	798.9	1.0018		
400.2	396.8	1.0085		
200.1	195.2	1.0250		





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

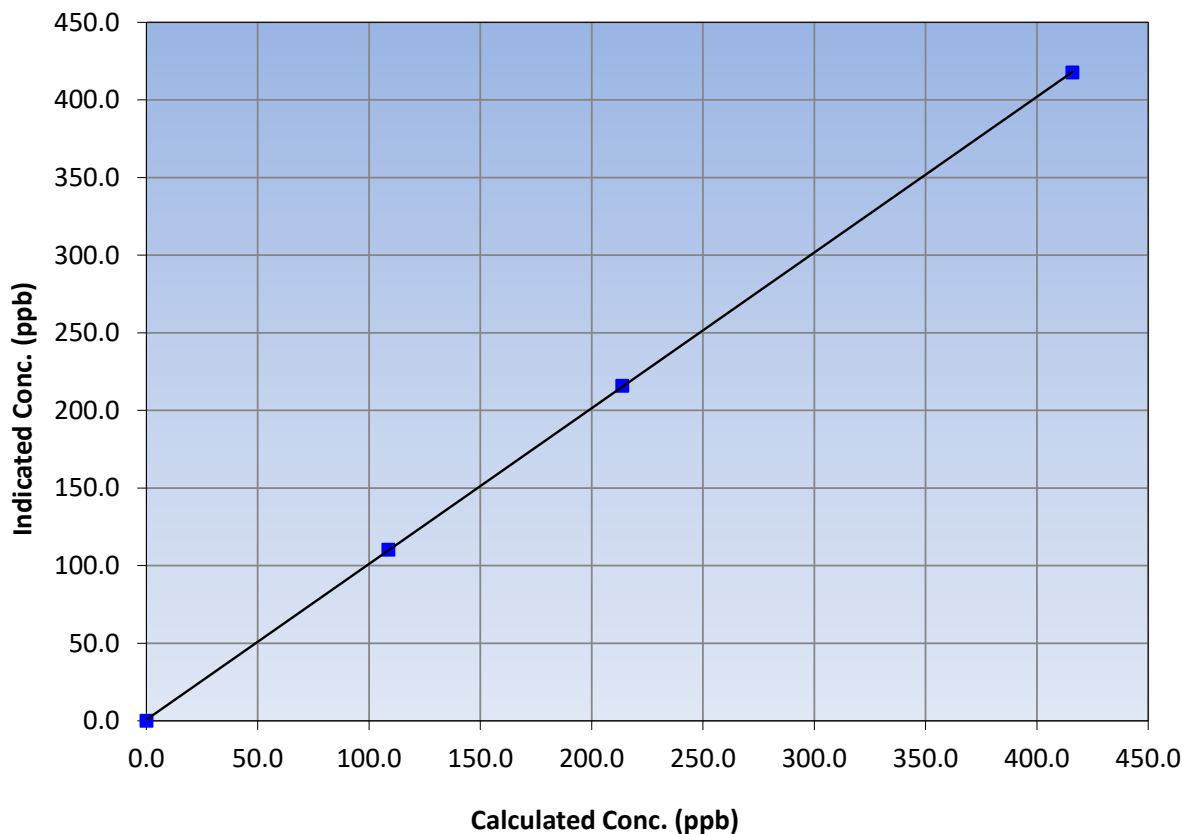
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 29, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:16	End Time (MST):	16:57
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
416.0	417.6	0.9962		
213.8	215.9	0.9903		
108.7	110.3	0.9855		

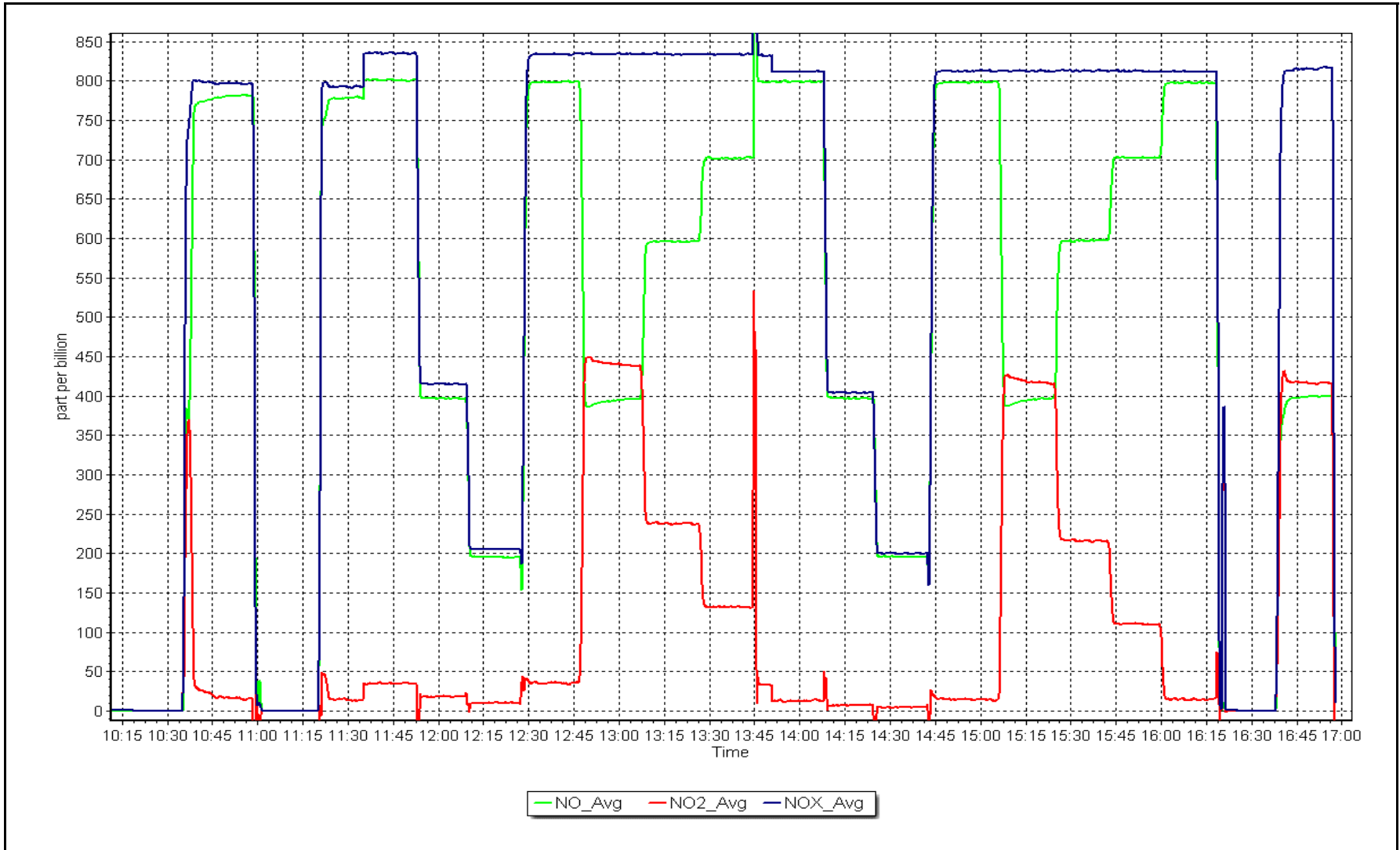
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 26, 2023

Location: Christina Lake





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS 27
Calibration Date:	April 4, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	9:39	End time (MST):	12:07
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.58	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	<u>SG9133974BAL</u>			
Removed Cal Gas Conc:	50.58	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	<u>NA</u>		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API T701H		Serial Number:	135

Analyzer Information

Analyzer make:	Thero 43iQ	Analyzer serial #:	12124313138
Analyzer Range	0 - 1000 ppb		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.002034	1.012431	Backgd or Offset:	7.8	7.9
Calibration intercept:	-2.538384	-1.377395	Coeff or Slope:	0.990	0.990

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.1	800.2	810.0	0.988
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	809.0	0.989
second point	4961	39.5	399.5	403.8	0.989
third point	4980	19.8	200.3	199.0	1.007
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.1	800.2	811.3	0.986
Average Correction Factor					0.995

Baseline Corr As found:	810.00	Previous response	799.25	*% change	1.3%
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 made.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

SO₂ Calibration Summary

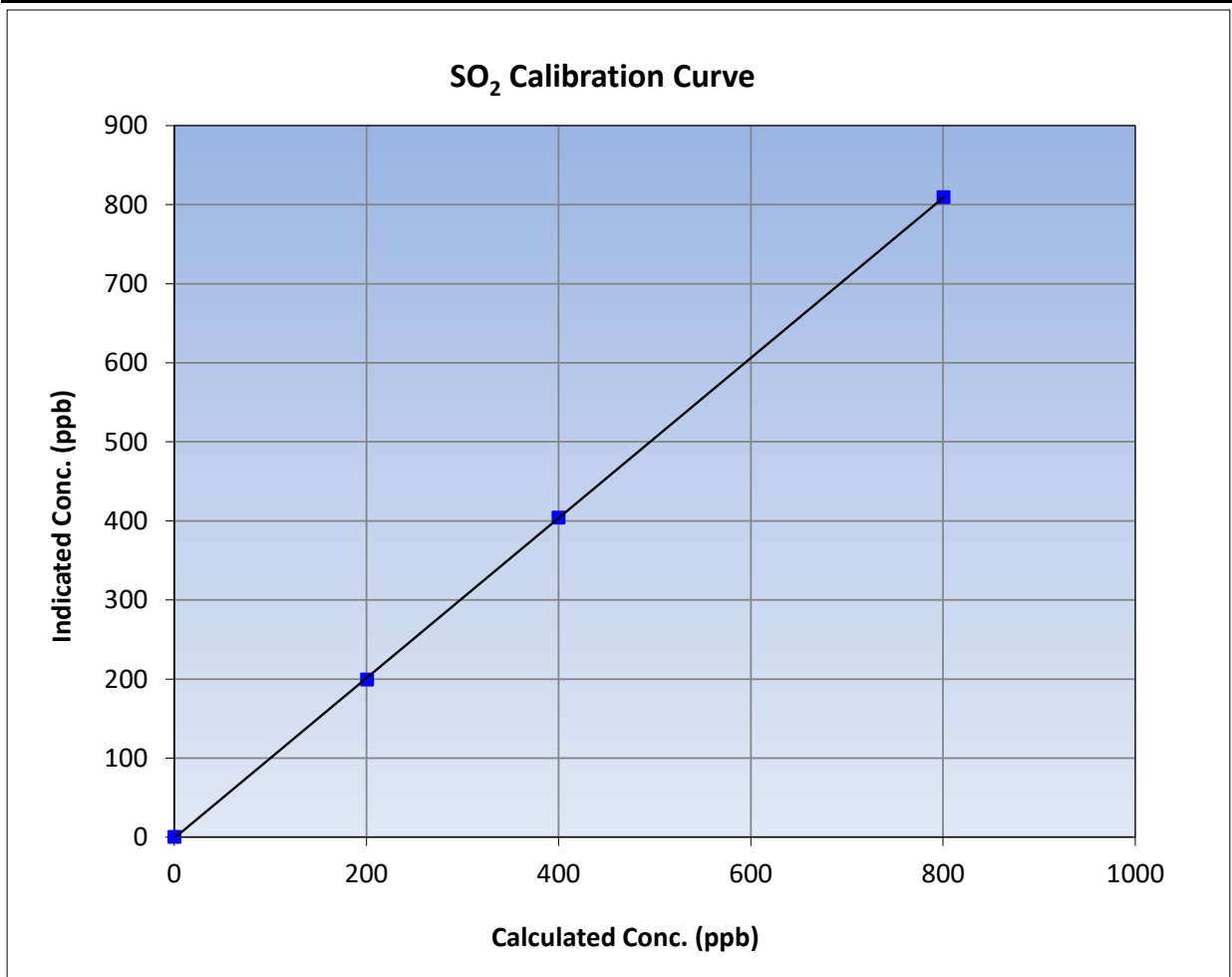
Version-01-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 8, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	9:39	End Time (MST):	12:07
Analyzer make:	Thero 43iQ	Analyzer serial #:	12124313138

Calibration Data

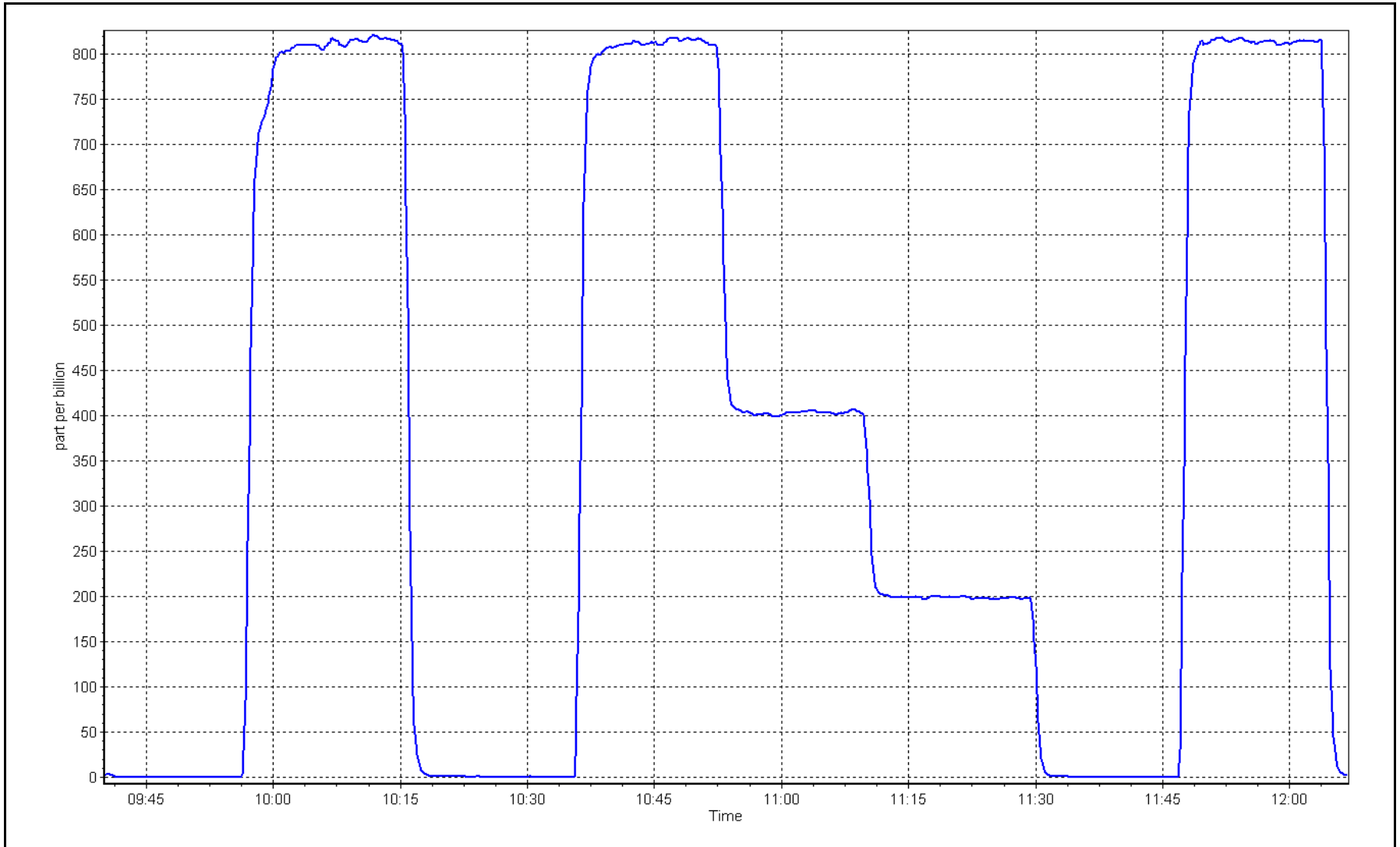
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.1	----	Correlation Coefficient	≥0.995
800.2	809.0	0.9891		
399.5	403.8	0.9895	Slope	0.90 - 1.10
200.3	199.0	1.0066		
			Intercept	+/-30



SO2 Calibration Plot

Date: April 4, 2023

Location: Jackfish 2/3





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Jackfish 2/3 Station number: AMS27
 Calibration Date: April 27, 2023 Last Cal Date: March 23, 2023
 Start time (MST): 9:18 End time (MST): 13:12
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.983812	1.000342	Backgd or Offset: 25.4	25.7
Calibration intercept:	-0.138417	-0.217897	Coeff or Slope: 0.949	0.970

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.3	----
as found span	4926	74.1	80.2	79.7	1.010
as found 2nd point	4963	37.0	40.0	39.8	1.014
as found 3rd point	4982	18.5	20.0	19.5	1.042
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.1	80.2	80.0	1.002
second point	4963	37.0	40.0	40.0	1.001
third point	4982	18.5	20.0	19.4	1.032
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.1	80.2	79.9	1.003
SO2 Scrubber Check	4921	79.1	791.0	0.1	----

Date of last scrubber change:	Ave Corr Factor	1.012
Date of last converter efficiency test:	efficiency	

Baseline Corr As found: 79.4 Prev response: 78.74 *% change: 0.8%
 Baseline Corr 2nd AF pt: 39.5 AF Slope: 0.992790 AF Intercept: 0.021866
 Baseline Corr 3rd AF pt: 19.2 AF Correlation: 0.999931

* = > +/-5% change initiates investigation

Notes: Adjusted the zero and span.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

H₂S Calibration Summary

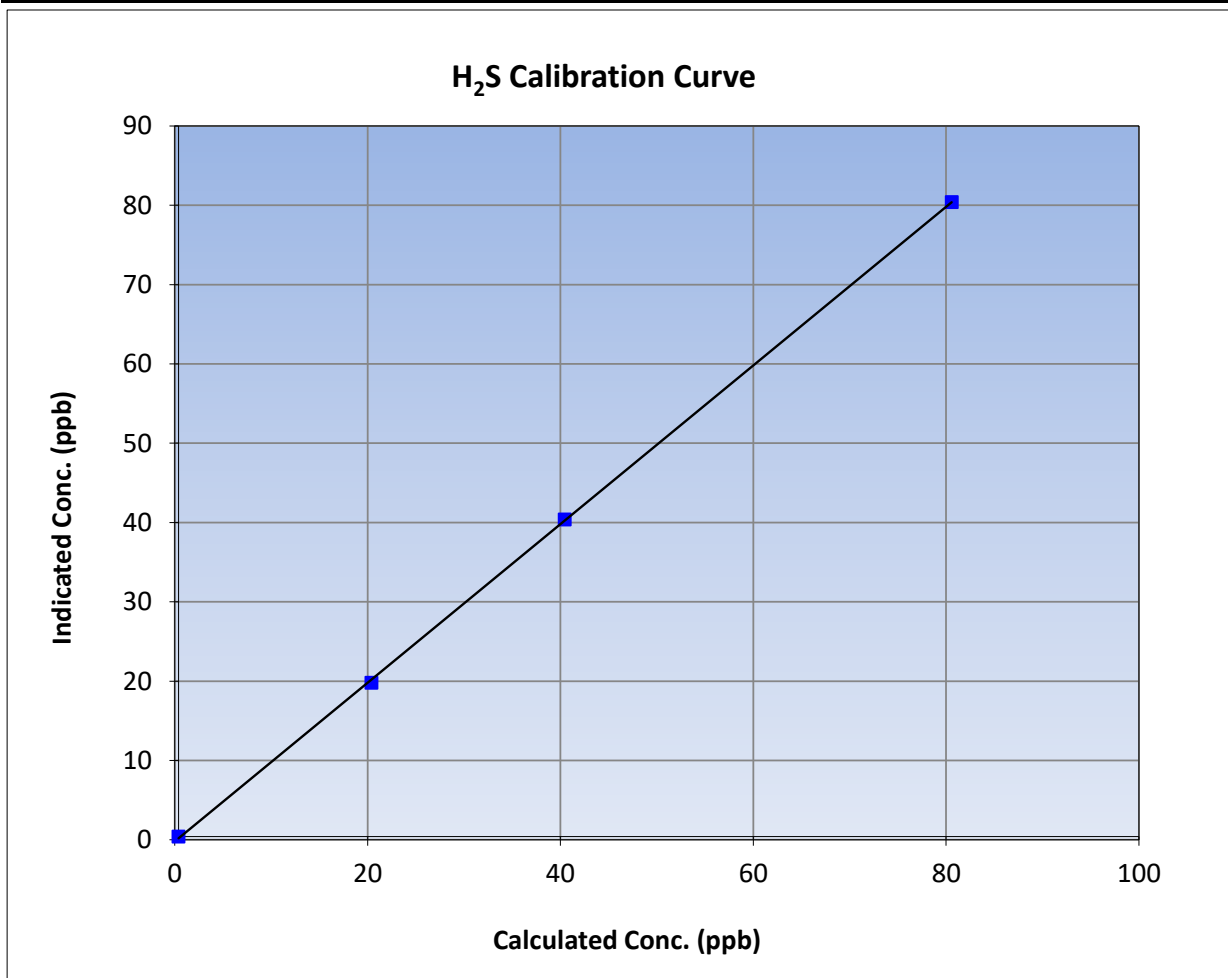
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 23, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:18	End Time (MST):	13:12
Analyzer make:	API T101	Analyzer serial #:	621

Calibration Data

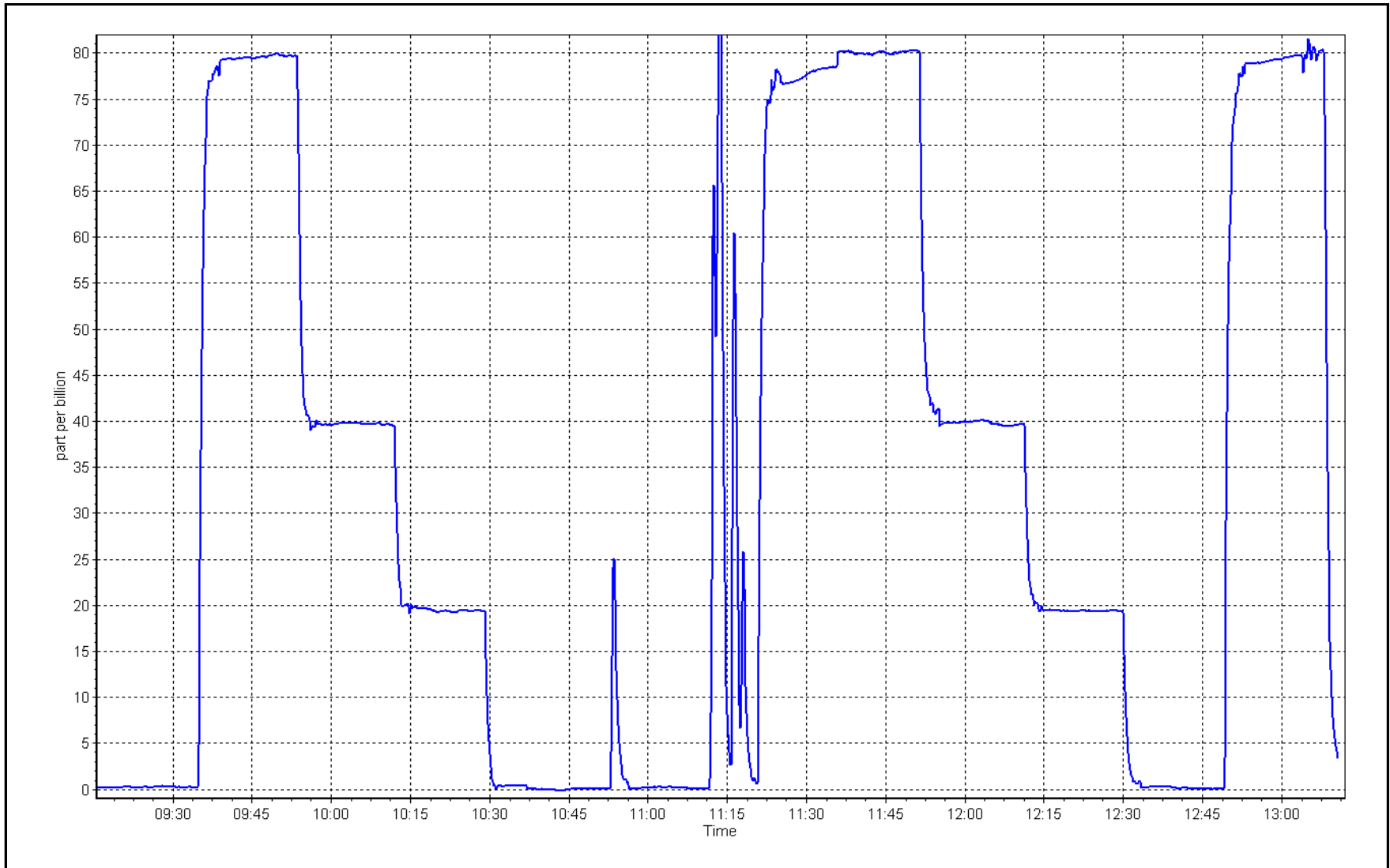
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999932	≥0.995
80.2	80.0	1.0022			
40.0	40.0	1.0009	Slope	1.000342	0.90 - 1.10
20.0	19.4	1.0317			
			Intercept	-0.217897	+/-3



H₂S Calibration Plot

Date: April 27, 2023

Location: Jackfish 2/3





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Jackfish 2/3
Calibration Date: April 19, 2023
Start time (MST): 9:42
Reason: Removal
Station number: AMS27
Last Cal Date: March 28, 2023
End time (MST): 12:15

Calibration Standards

NO Gas Cylinder #: T2Y1P35
NOX Cal Gas Conc: 51.44 ppm
Removed Cylinder #: NA
Removed Gas NOX Conc: 51.44 ppm
NOX gas Diff:
Calibrator Model: API T700
ZAG make/model: API T701
Cal Gas Expiry Date: December 11, 2023
NO Cal Gas Conc: 50.40 ppm
Removed Gas Exp Date: NA
Removed Gas NO Conc: 50.40 ppm
NO gas Diff:
Serial Number: 3811
Serial Number: 135

Analyzer Information

Analyzer make: API T200
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 4460

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.241	N/A	NO bkgnd or offset:	0.9	N/A
NOX coeff or slope:	1.228	N/A	NOX bkgnd or offset:	0.9	N/A
NO2 coeff or slope:	1.000	N/A	Reaction cell Press:	4.4	N/A

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.998179	N/A
NO _x Cal Offset:	-4.217263	N/A
NO Cal Slope:	0.998789	N/A
NO Cal Offset:	-3.720948	N/A
NO ₂ Cal Slope:	0.995821	N/A
NO ₂ Cal Offset:	-0.727241	N/A



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.2	-0.8	0.9	----	----
as found span	4921	79.4	816.8	800.3	16.5	805.0	793.4	11.6	1.0147	1.0087
as found 2nd	4960	39.7	408.5	400.2	8.3	400.2	392.1	8.2	1.0206	1.0207
as found 3rd	4980	19.8	203.7	199.6	4.1	198.9	190.9	8.0	1.0242	1.0455
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 = 804.8 ppb	NO = 794.2 ppb	<i>* = > +/-5% change initiates investigation</i>		*Percent Change	NO _x = 83.2%
Previous Response	NO _x = 135.0 ppb	NO = 795.6 ppb			*Percent Change	NO = -0.2%
Baseline Corr 2nd pt	NO _x = 400.0 ppb	NO = 392.9 ppb	As found	NO _x r ² : 0.999986	Nx SI: 0.985810	Nx Int: -1.098
Baseline Corr 3rd pt	NO _x = 198.7 ppb	NO = 191.7 ppb	As found	NO r ² : 0.999917	NO SI: 0.994520	NO Int: -4.202
			As found	NO ₂ r ² : 0.999899	NO ₂ SI: 0.992758	NO ₂ Int: -0.742

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
as found GPT zero	----	----	0.0	0.9	----	----
as found GPT point (400 ppb NO ₂)	790.9	392.7	414.7	411.4	1.0081	99.2%
as found GPT point (200 ppb NO ₂)	790.9	600.5	206.9	205.1	1.0088	99.1%
as found GPT point (100 ppb NO ₂)	790.9	700.6	106.8	102.8	1.0390	96.2%
1st GPT point (400 ppb O ₃)						
2nd GPT point (200 ppb O ₃)						
3rd GPT point (100 ppb O ₃)	N/A					

Average Correction Factor

Notes:

Conducted MPAFs for a removal calibration; analyzer will be replaced.

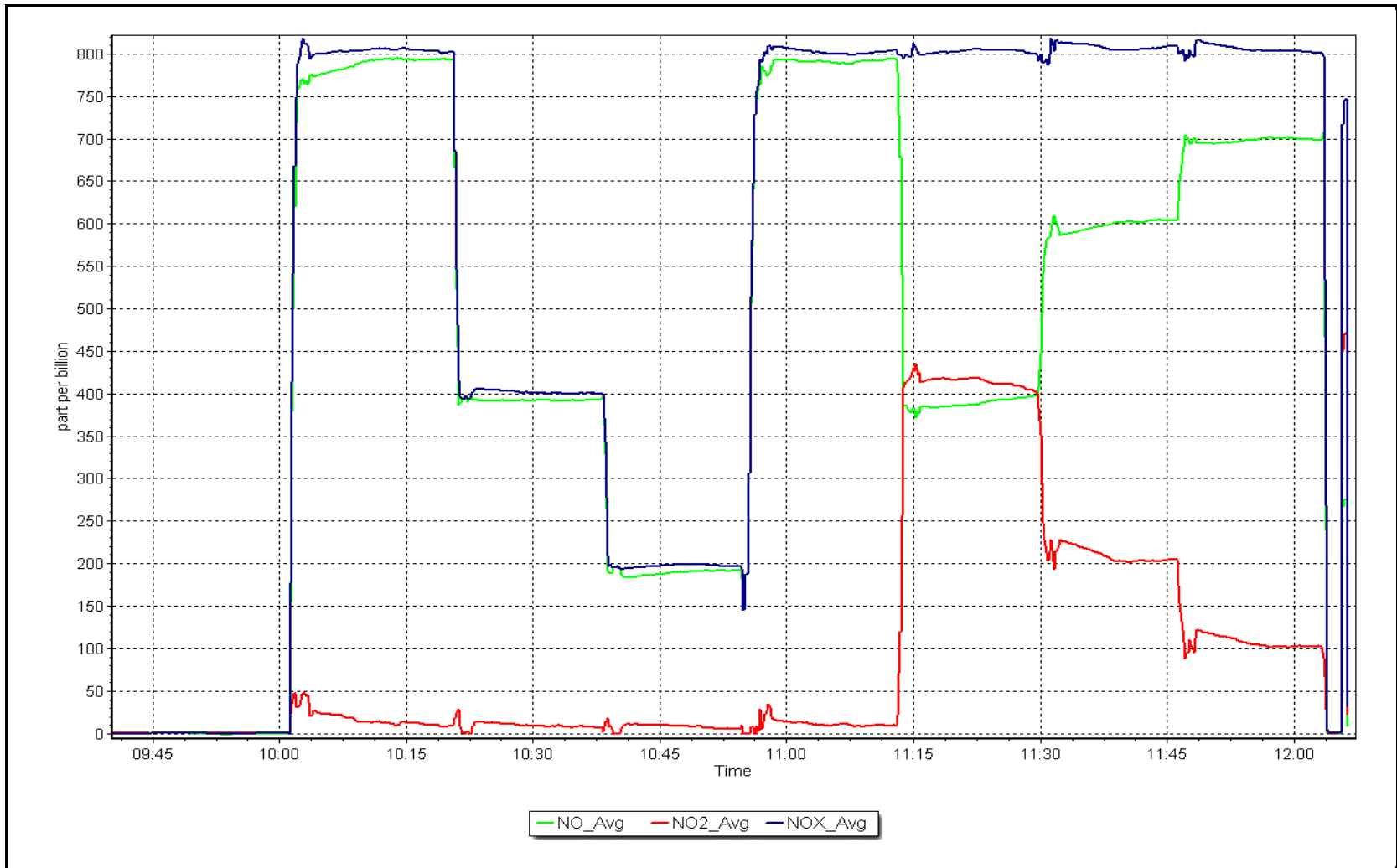
Calibration Performed By:

Denny Ray Estador

NO_x Calibration Plot

Date: April 19, 2023

Location: Jackfish 2/3





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Jackfish 2/3
Calibration Date: April 20, 2023
Start time (MST): 9:18
Reason: Install
Station number: AMS27
Last Cal Date: April 19, 2023
End time (MST): 13:15

Calibration Standards

NO Gas Cylinder #: T2Y1P35
NOX Cal Gas Conc: 51.44 ppm
Removed Cylinder #: NA
Removed Gas NOX Conc: 51.44 ppm
NOX gas Diff:
Calibrator Model: API T700
ZAG make/model: API T701
Cal Gas Expiry Date: December 11, 2023
NO Cal Gas Conc: 50.40 ppm
Removed Gas Exp Date: NA
Removed Gas NO Conc: 50.40 ppm
NO gas Diff:
Serial Number: 3811
Serial Number: 135

Analyzer Information

Analyzer make: API T200
NOX Range (ppb): 0 - 1000 ppb
Analyzer serial #: 722

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.241	1.003	NO bkgnd or offset:	0.9	-3.0
NOX coeff or slope:	1.228	1.005	NOX bkgnd or offset:	0.9	-2.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.4	4.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	N/A	1.005888
NO _x Cal Offset:	N/A	-2.995962
NO Cal Slope:	N/A	1.002272
NO Cal Offset:	N/A	-2.840268
NO ₂ Cal Slope:	N/A	0.996178
NO ₂ Cal Offset:	N/A	1.252891



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
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	0.1	0.1	0.0	----	----
high point	4921	79.4	816.8	800.3	16.5	820.0	800.6	19.2	0.9961	0.9996
second point	4960	39.7	408.5	400.2	8.3	406.8	397.2	9.6	1.0041	1.0076
third point	4980	19.8	203.7	199.6	4.1	198.5	194.0	4.5	1.0262	1.0288
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.9	-0.4	----	----
as left span	4921	79.4	816.8	407.9	410.1	814.4	405.6	408.9	1.0029	1.0057
Average Correction Factor									1.0088	1.0120

Corrected As found	NO _x = NA	ppb	NO = NA	ppb	<i>* = > +/-5% change initiates investigation</i>		*Percent Change	NO _x = NA
Previous Response	NO _x = NA	ppb	NO = NA	ppb			*Percent Change	NO = NA
Baseline Corr 2nd pt	NO _x = NA	ppb	NO = NA	ppb	As found	NO _x r ² :	Nx SI:	Nx Int:
Baseline Corr 3rd pt	NO _x = NA	ppb	NO = NA	ppb	As found	NO r ² :	NO SI:	NO Int:
					As found	NO ₂ r ² :	NO ₂ SI:	NO ₂ Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	800.1	406.5	410.1	409.1	1.0025	99.8%
2nd GPT point (200 ppb O3)	800.1	615.2	201.4	202.7	0.9937	100.6%
3rd GPT point (100 ppb O3)	800.1	707.8	108.8	110.8	0.9821	101.8%
Average Correction Factor					0.9927	100.7%

Notes: Install calibration; Replaced analyzer due to poor performance. Adjusted both zero and span.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

NO_x Calibration Summary

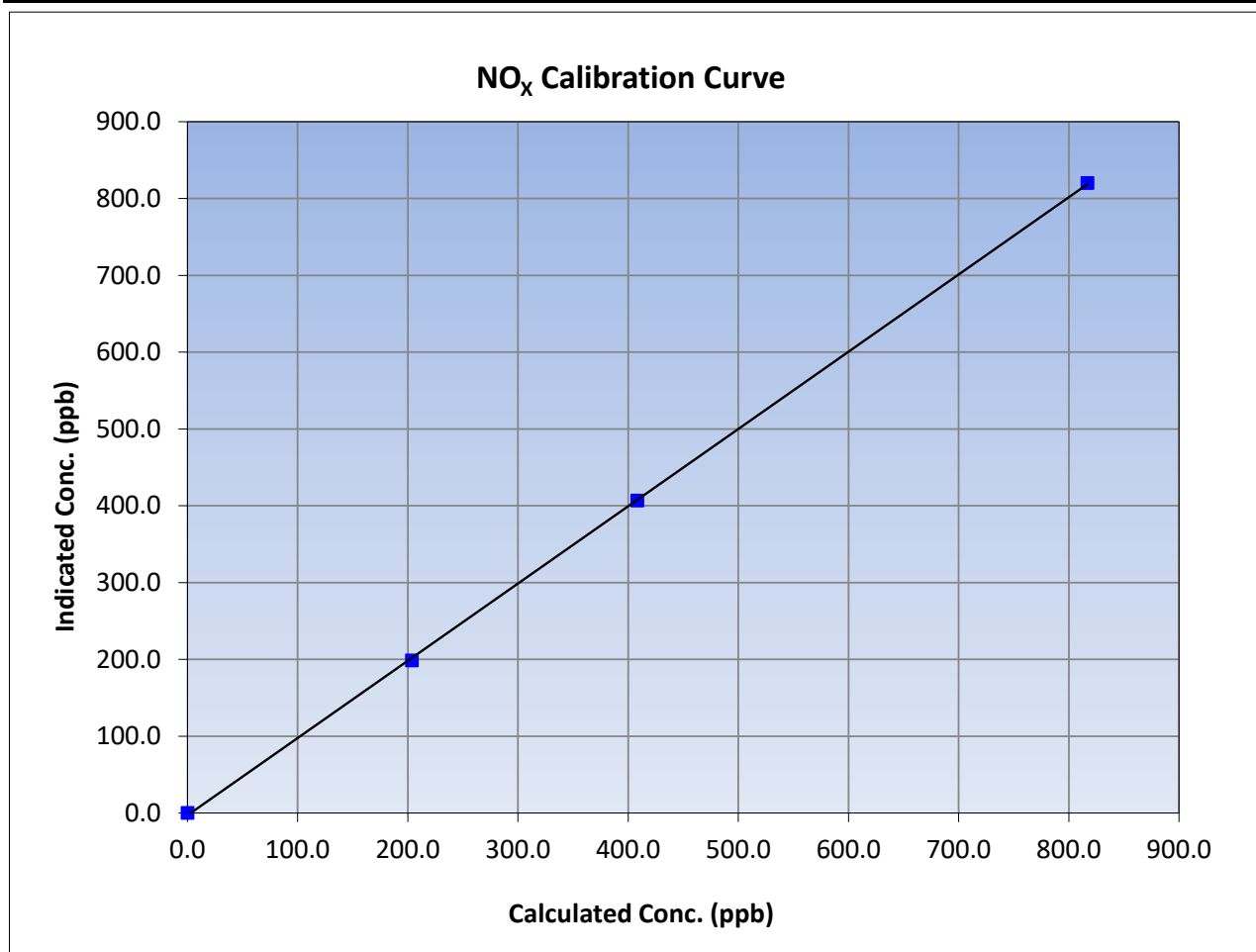
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:18	End Time (MST):	13:15
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.1	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
816.8	820.0	0.9961		
408.5	406.8	1.0041		
203.7	198.5	1.0262		





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

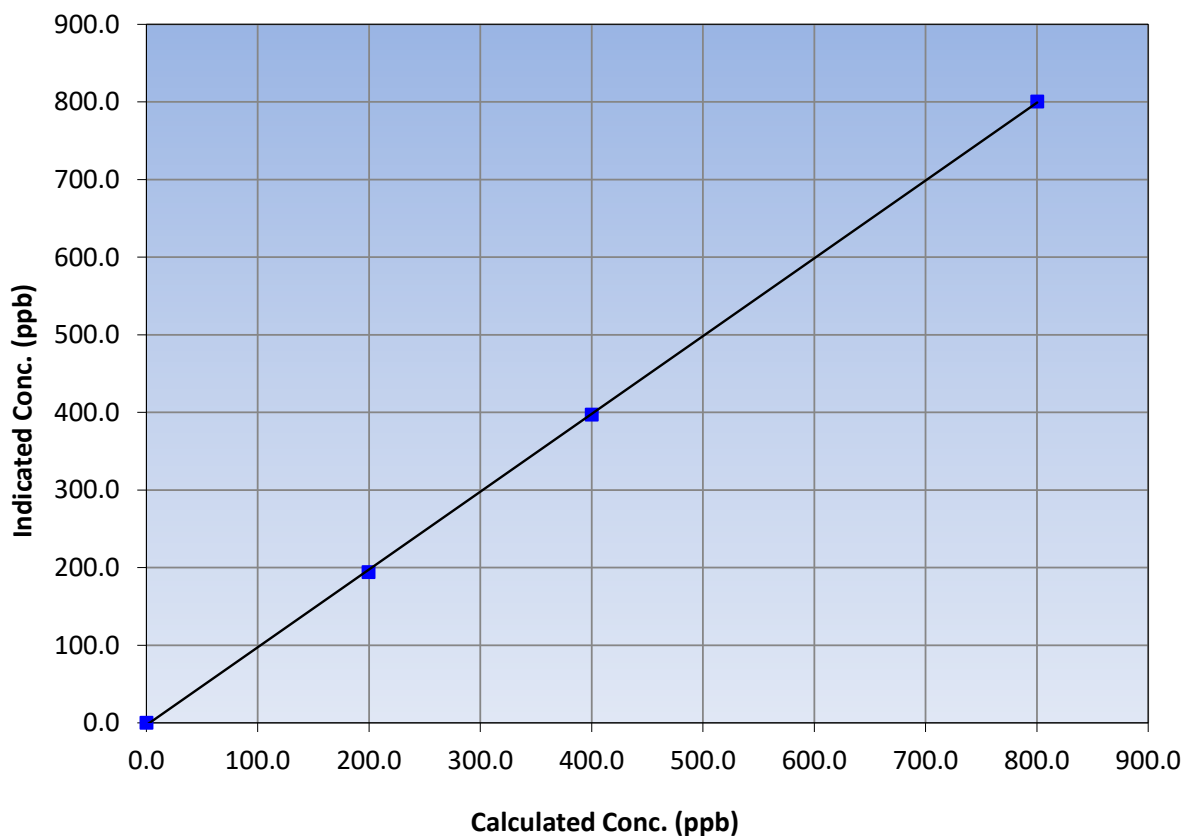
Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:18	End Time (MST):	13:15
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	0.1	----	Correlation Coefficient Slope Intercept	≥ 0.995 $0.90 - 1.10$ ± 20
800.3	800.6	0.9996		
400.2	397.2	1.0076		
199.6	194.0	1.0288		

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

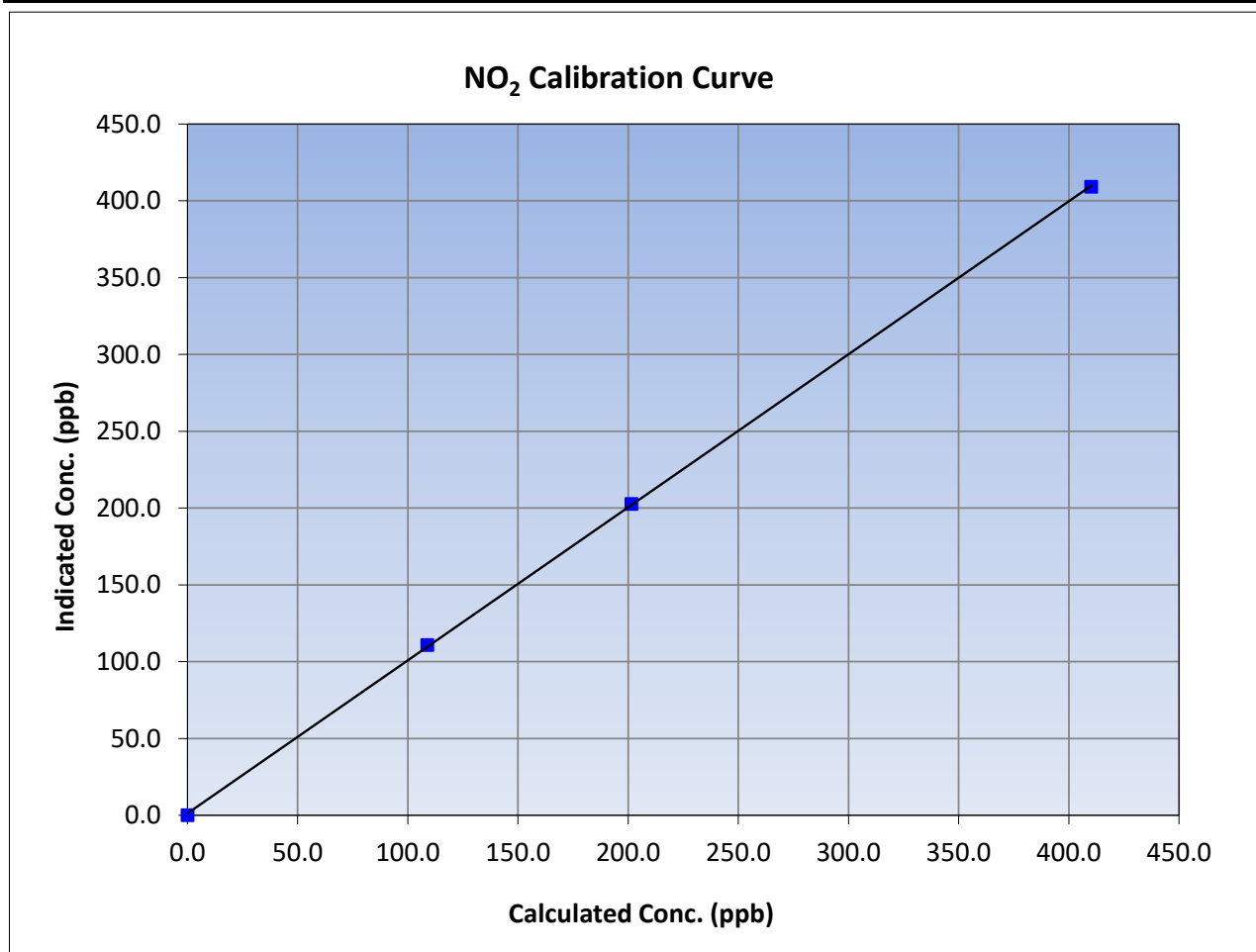
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:18	End Time (MST):	13:15
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

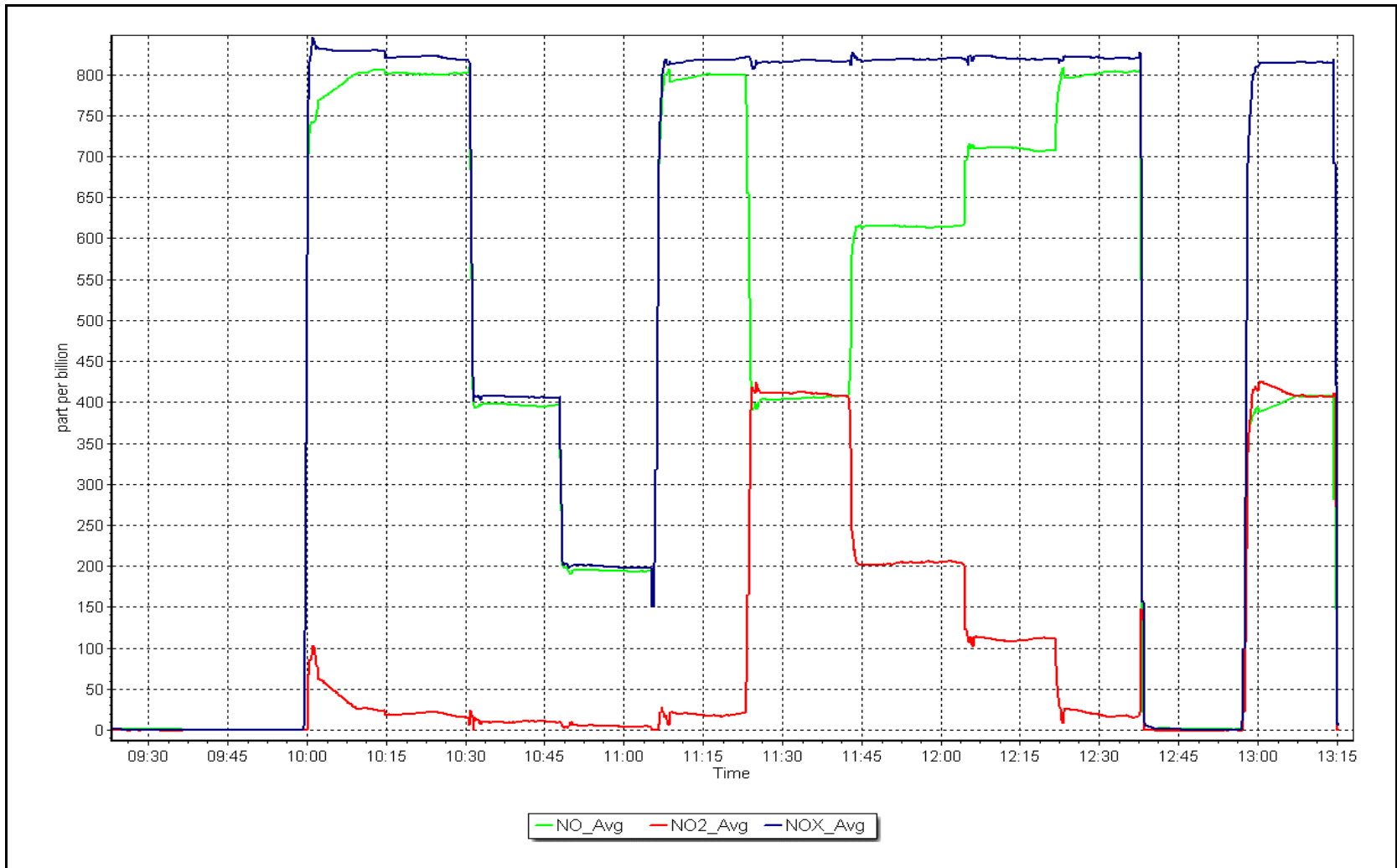
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
410.1	409.1	1.0025		
201.4	202.7	0.9937		
108.8	110.8	0.9821		



NO_x Calibration Plot

Date: April 20, 2023

Location: Jackfish 2/3





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

**AMS29
SURMONT 2
APRIL 2023**

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	April 13, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:01	End time (MST):	13:12
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	<u>49.21</u>	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	<u>CC356008</u>			
Removed Cal Gas Conc:	<u>49.21</u>	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	<u>NA</u>		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5258
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150
Analyzer Range	0 - 1000 ppb		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.006112	0.998958	Backgd or Offset:	12.4	12.3
Calibration intercept:	-2.145180	-0.765478	Coeff or Slope:	0.934	0.922

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.2	----
as found span	4919	81.3	800.1	805.0	0.994
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	800.1	799.1	1.001
second point	4959	40.7	400.6	398.8	1.004
third point	4979	20.3	199.8	197.7	1.011
as left zero	5000	0.0	0.0	0.1	----
as left span	4919	81.3	800.1	799.5	1.001
Average Correction Factor					1.005

Baseline Corr As found:	805.20	Previous response	802.85	*% 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. Adjusted span.

Calibration Performed By: Braiden Boutilier



Wood Buffalo Environmental Association

SO₂ Calibration Summary

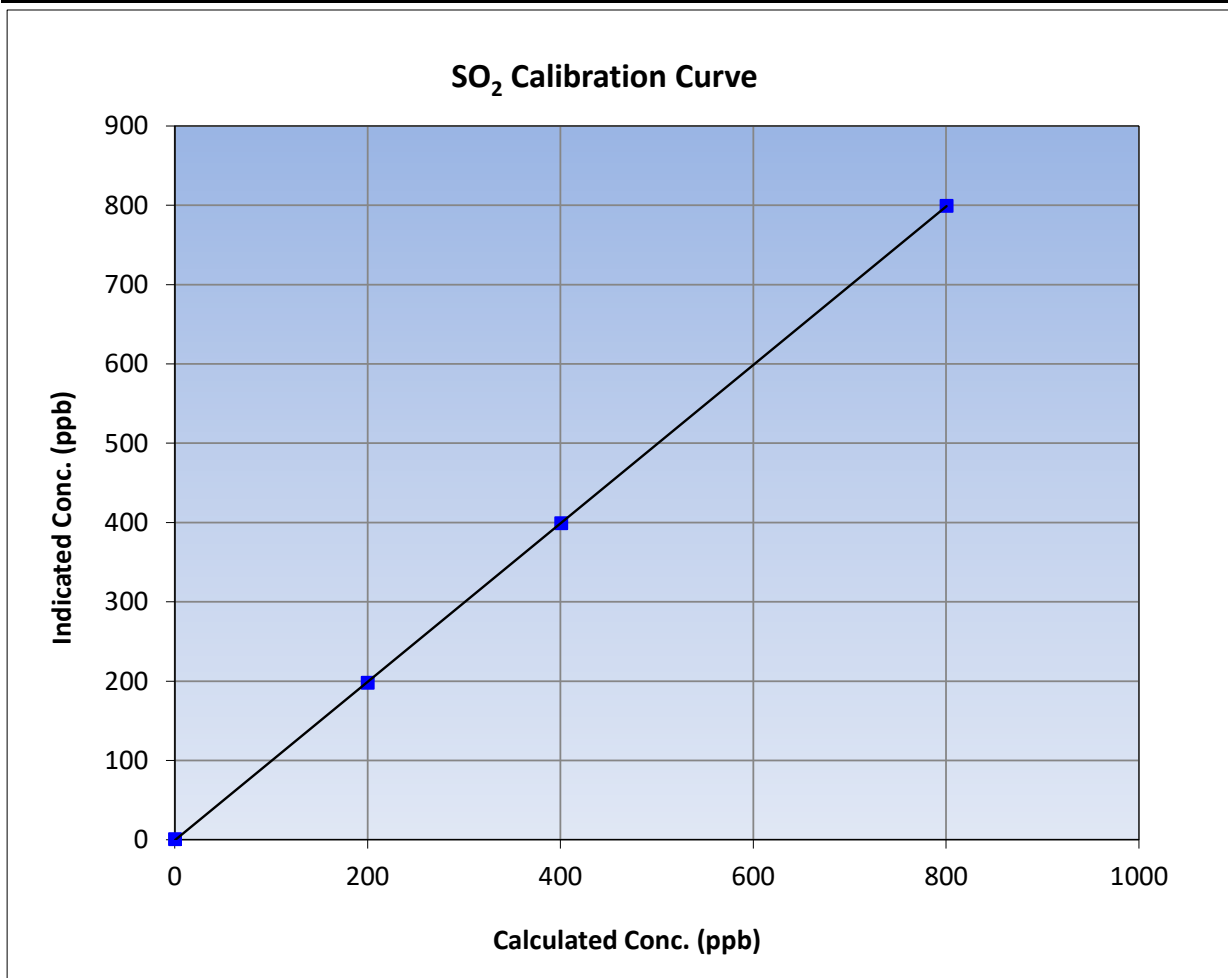
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:01	End Time (MST):	13:12
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

Calibration Data

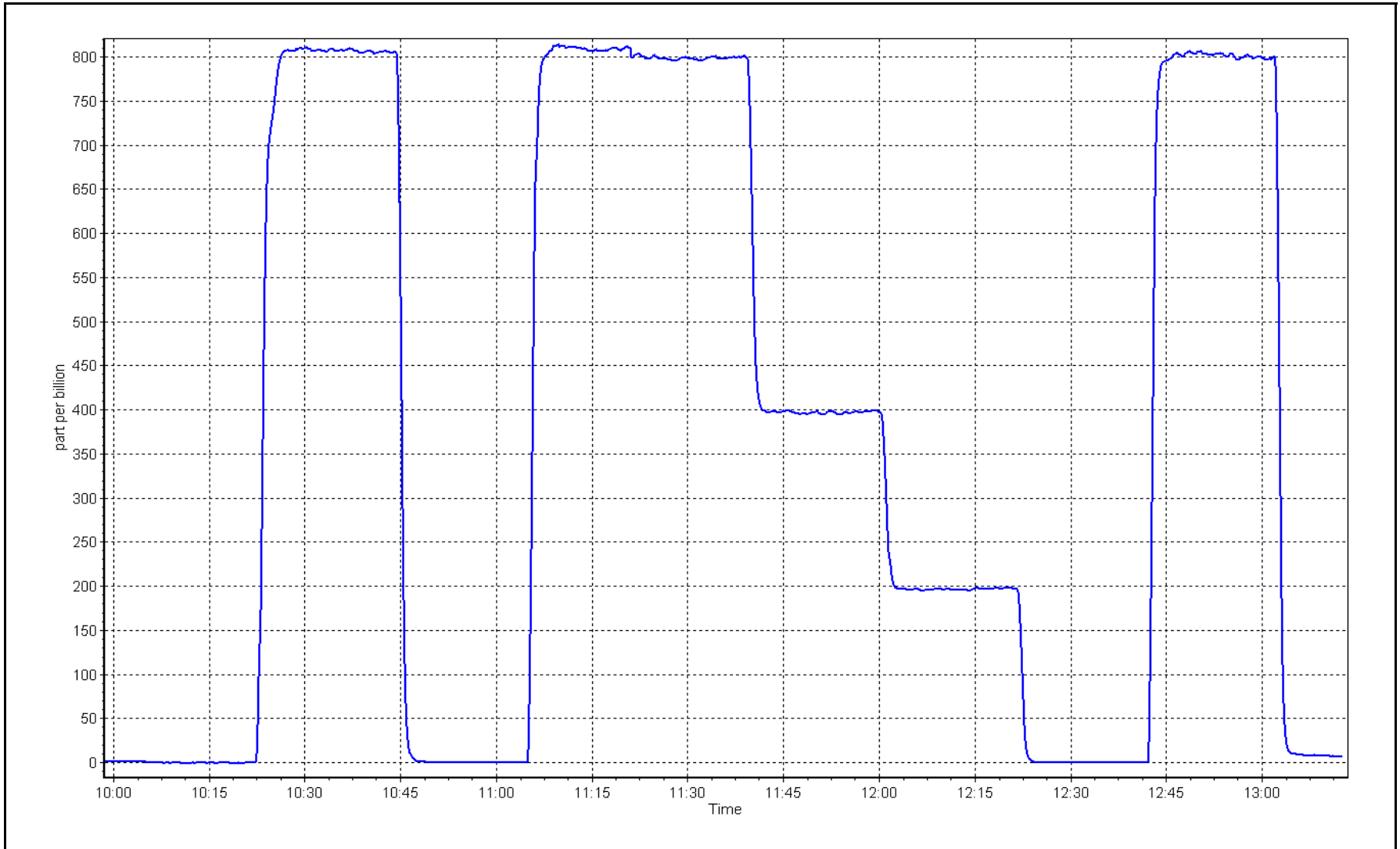
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.4	----	Correlation Coefficient	0.999990	
800.1	799.1	1.0013			≥0.995
400.6	398.8	1.0045	Slope	0.998958	
199.8	197.7	1.0107			0.90 - 1.10
			Intercept	-0.765478	+/-30



SO2 Calibration Plot

Date: April 13, 2023

Location: Surmont 2





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Surmont 2 Station number: AMS29
 Calibration Date: April 12, 2023 Last Cal Date: March 30, 2023
 Start time (MST): 9:31 End time (MST): 14:54
 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: 5258
 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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	1.002040	0.999326	Backgd or Offset:	1.22
Calibration intercept:	-0.162687	-0.142577	Coeff or Slope:	1.043
				0.82
				1.043

H₂S As Found Data

Set Point	Dilution air flow rate (scm)	Source gas flow rate (scm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	-0.5	----
as found span	4926	74.2	80.0	78.9	1.008
as found 2nd point	4963	37.2	40.1	39.0	1.015
as found 3rd point	4982	18.6	20.1	19.0	1.028
new cylinder response					

H₂S Calibration Data

Set Point	Dilution air flow rate (scm)	Source gas flow rate (scm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.2	80.0	79.9	1.001
second point	4963	37.2	40.1	39.8	1.008
third point	4982	18.6	20.1	19.8	1.013
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	80.3	0.996
SO2 Scrubber Check	4919	81.3	813.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.007
Date of last converter efficiency test:				efficiency	

Baseline Corr As found: 79.4 Prev response: 80.0 *% change: -0.8%
 Baseline Corr 2nd AF pt: 39.5 AF Slope: 0.993753 AF Intercept: -0.722284
 Baseline Corr 3rd AF pt: 19.5 AF Correlation: 0.999964

* = > +/-5% change initiates investigation

Notes: Changed external valve. Adjusted zero only. SOx scrubber check done after calibrator zero.

Calibration Performed By: Braiden Boutillier



Wood Buffalo Environmental Association

H₂S Calibration Summary

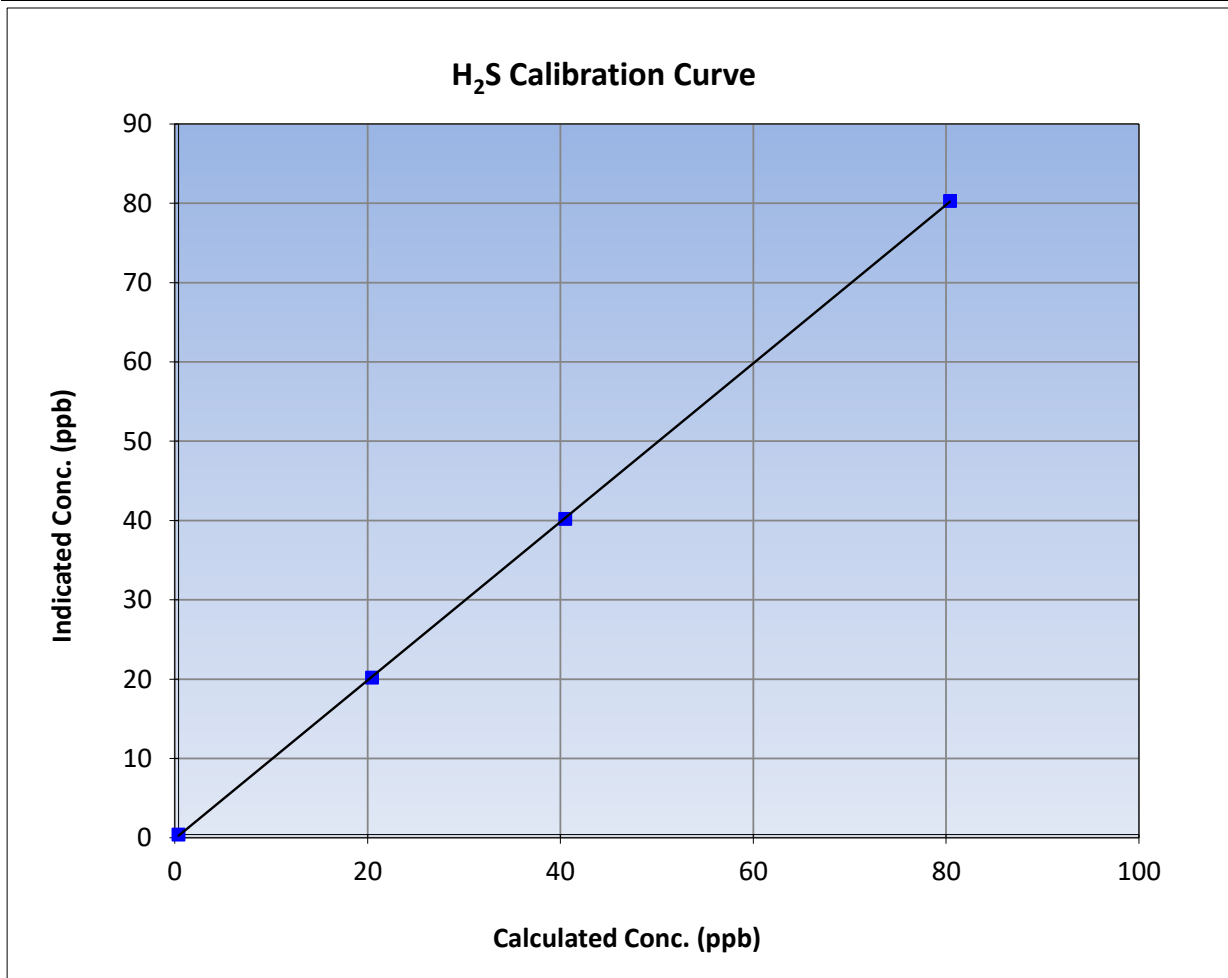
Version-11-2021

Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 30, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:31	End Time (MST):	14:54
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

Calibration Data

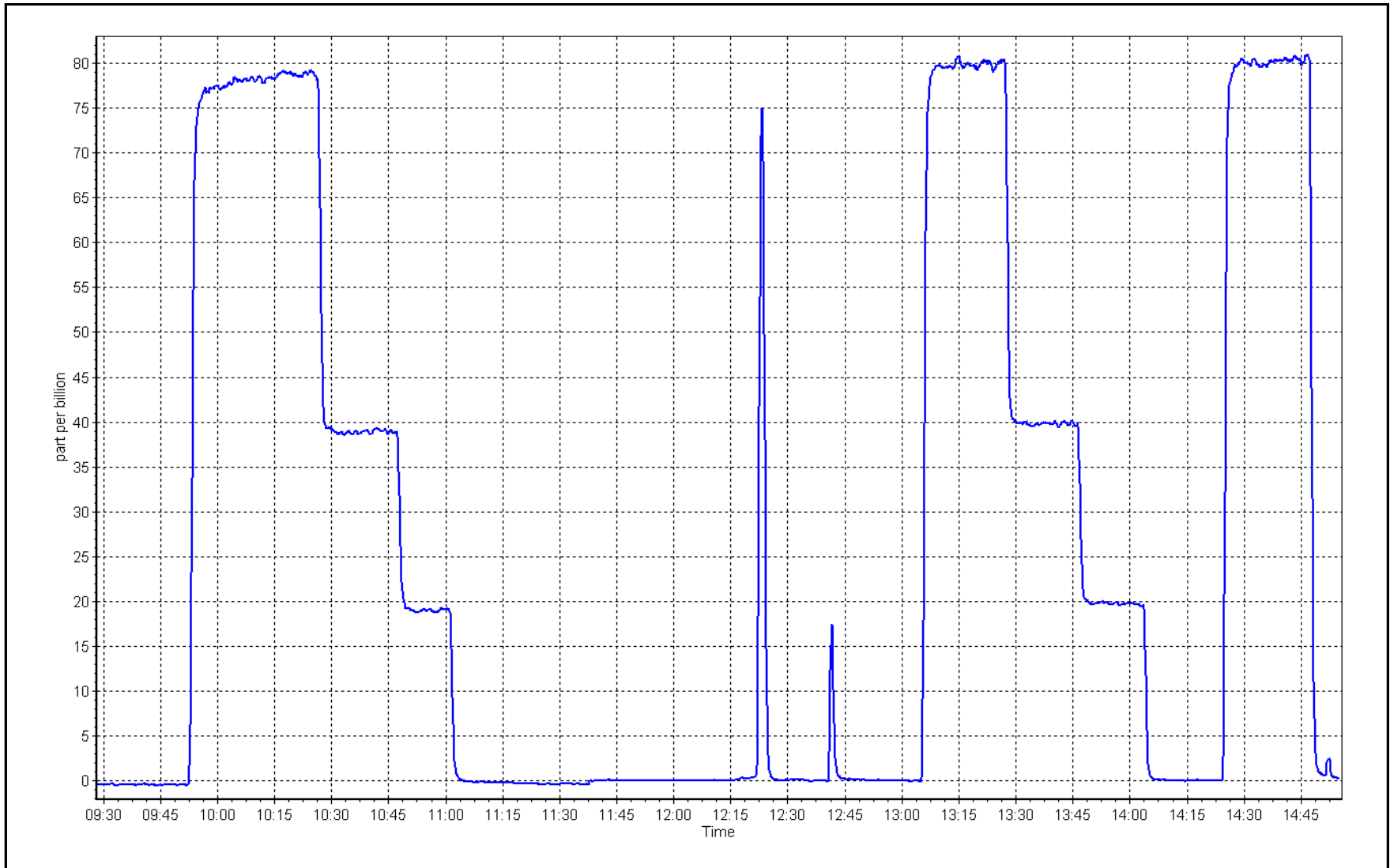
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999983	
80.0	79.9	1.0013			≥0.995
40.1	39.8	1.0077	Slope	0.999326	
20.1	19.8	1.0128			0.90 - 1.10
			Intercept	-0.142577	+/-3



H₂S Calibration Plot

Date: April 12, 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:	April 13, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:01	End time (MST):	13:12
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC356008	Cal Gas Expiry Date:	February 23, 2025
CH4 Cal Gas Conc.	<u>499.0</u> ppm	CH4 Equiv Conc.	1064.7 ppm
C3H8 Cal Gas Conc.	<u>205.7</u> ppm		
Removed Gas Cert:	NA	Removed Gas Expiry:	NA
Removed CH4 Conc.	<u>499.0</u> ppm	CH4 Equiv Conc.	1064.7 ppm
Removed C3H8 Conc.	<u>205.7</u> ppm	Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700	Serial Number:	5258
ZAG Make/Model:	Teledyne API T701	Serial Number:	4297

Analyzer Information

Analyzer make: Thermo 51i-LT Analyzer serial #: 1170050149
 Analyzer Range: 0 - 20 ppm

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.008880	1.000707	Background:	4.62	4.62
Calibration intercept:	-0.118074	-0.035654	Coefficient:	5.286	5.286

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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.00	-0.04	----
as found span	4918	81.3	17.31	17.32	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.03	----
high point	4918	81.3	17.31	17.30	1.001
second point	4959	40.7	8.67	8.62	1.005
third point	4979	20.3	4.32	4.29	1.008
as left zero	5000	0.0	0.00	-0.03	----
as left span	4918	81.3	17.31	17.40	0.995
Average Correction Factor					1.005
Baseline Corr As found:	17.36	Previous response	17.35	*% 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. No adjustments made.

Calibration Performed By: Braiden Boutillier



Wood Buffalo Environmental Association

THC Calibration Summary

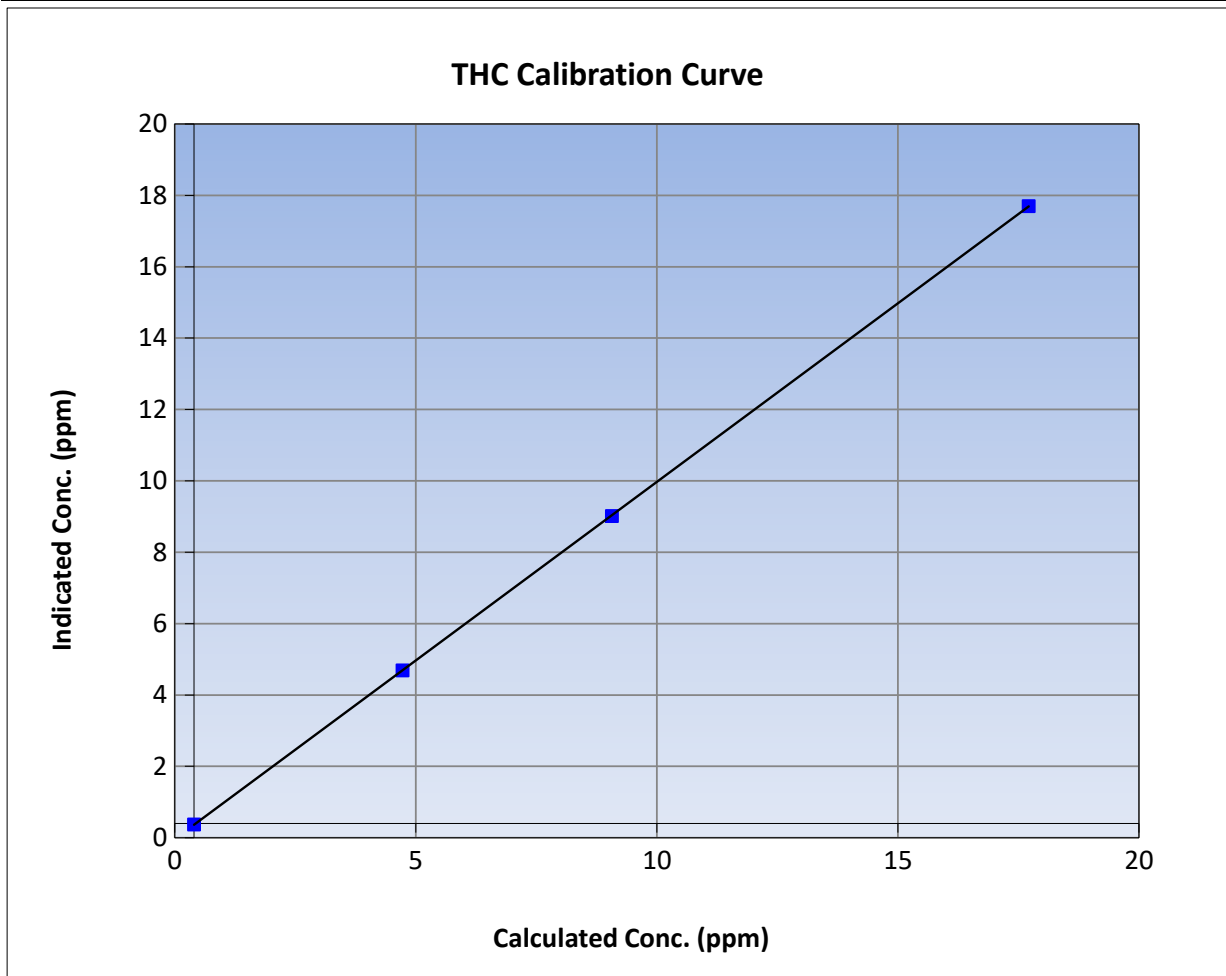
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:01	End Time (MST):	13:12
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

Calibration Data

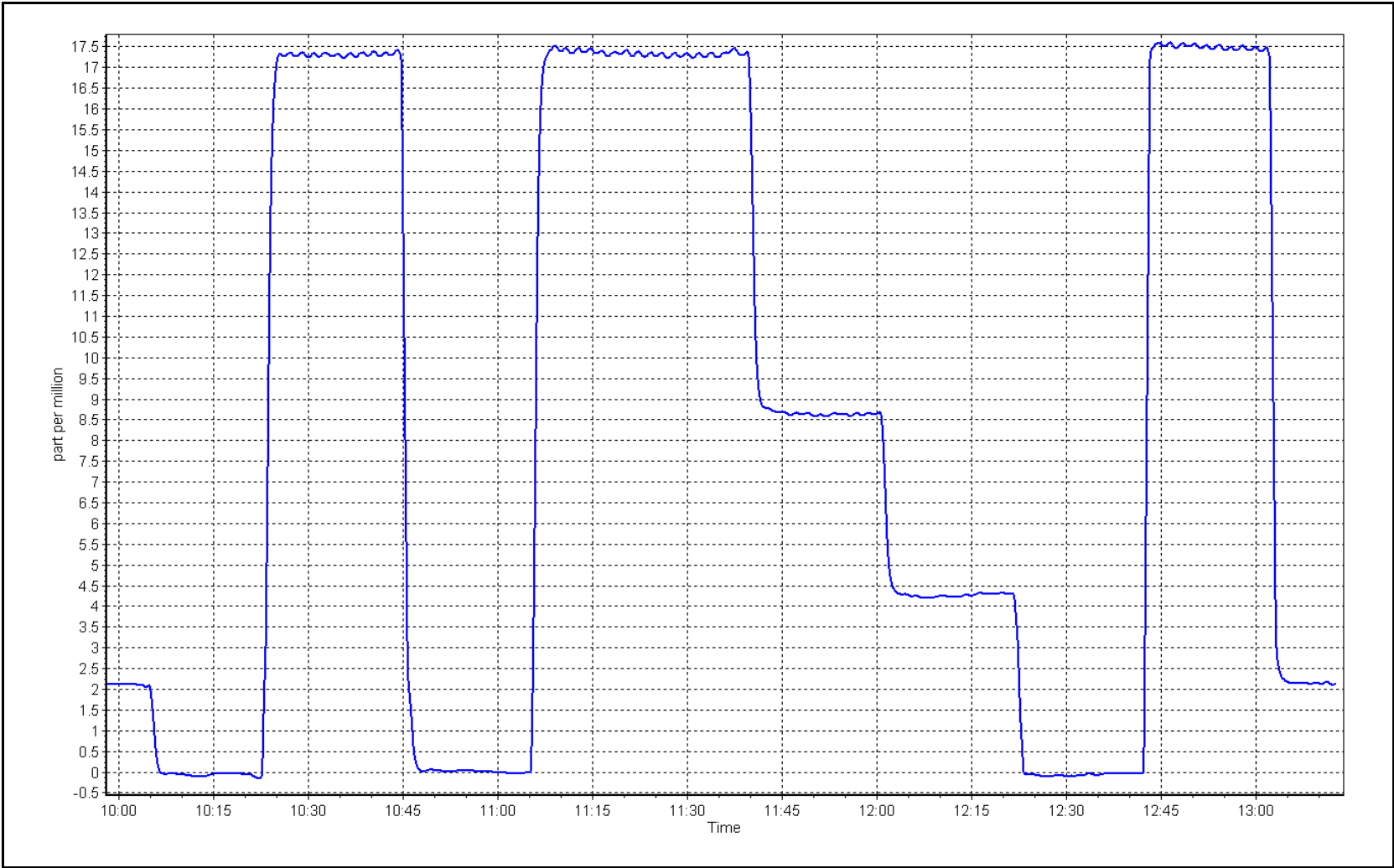
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.00	-0.03	----	Correlation Coefficient	0.999997	≥0.995
17.31	17.30	1.0008			
8.67	8.62	1.0054	Slope	1.000707	0.90 - 1.10
4.32	4.29	1.0082			
			Intercept	-0.035654	+/-1.5



THC Calibration Plot

Date: April 13, 2023

Location: Surmont 2





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0	----	----
as found span	4916	84.2	799.2	799.2	0.0	792.0	790.3	1.7	1.0091	1.0113
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	4916	84.2	799.2	799.2	0.0	798.8	797.9	1.0	1.0005	1.0016
second point	4958	42.1	399.6	399.6	0.0	400.2	399.7	0.5	0.9985	0.9998
third point	4979	21.1	200.3	200.3	0.0	198.7	197.2	1.4	1.0079	1.0156
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4916	84.2	799.2	396.7	402.5	794.4	392.4	402.0	1.0060	1.0109
Average Correction Factor									1.0023	1.0057

Corrected As found	NO _x = 792.2 ppb	NO = 790.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -0.6%
Previous Response	NO _x = 797.2 ppb	NO = 797.0 ppb		*Percent Change	NO = -0.8%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	793.3	390.8	402.5	402.2	1.0007	99.9%
2nd GPT point (200 ppb O3)	793.3	595.7	197.6	195.9	1.0087	99.1%
3rd GPT point (100 ppb O3)	793.3	696.6	96.7	97.7	0.9898	101.0%
Average Correction Factor					0.9997	100.0%

Notes: Changed sample inlet filter after as founds. Adjusted span. Second high NO reference point used for the GPT calibration formulas.

Calibration Performed By: Braiden Boutilier



Wood Buffalo Environmental Association

NO_x Calibration Summary

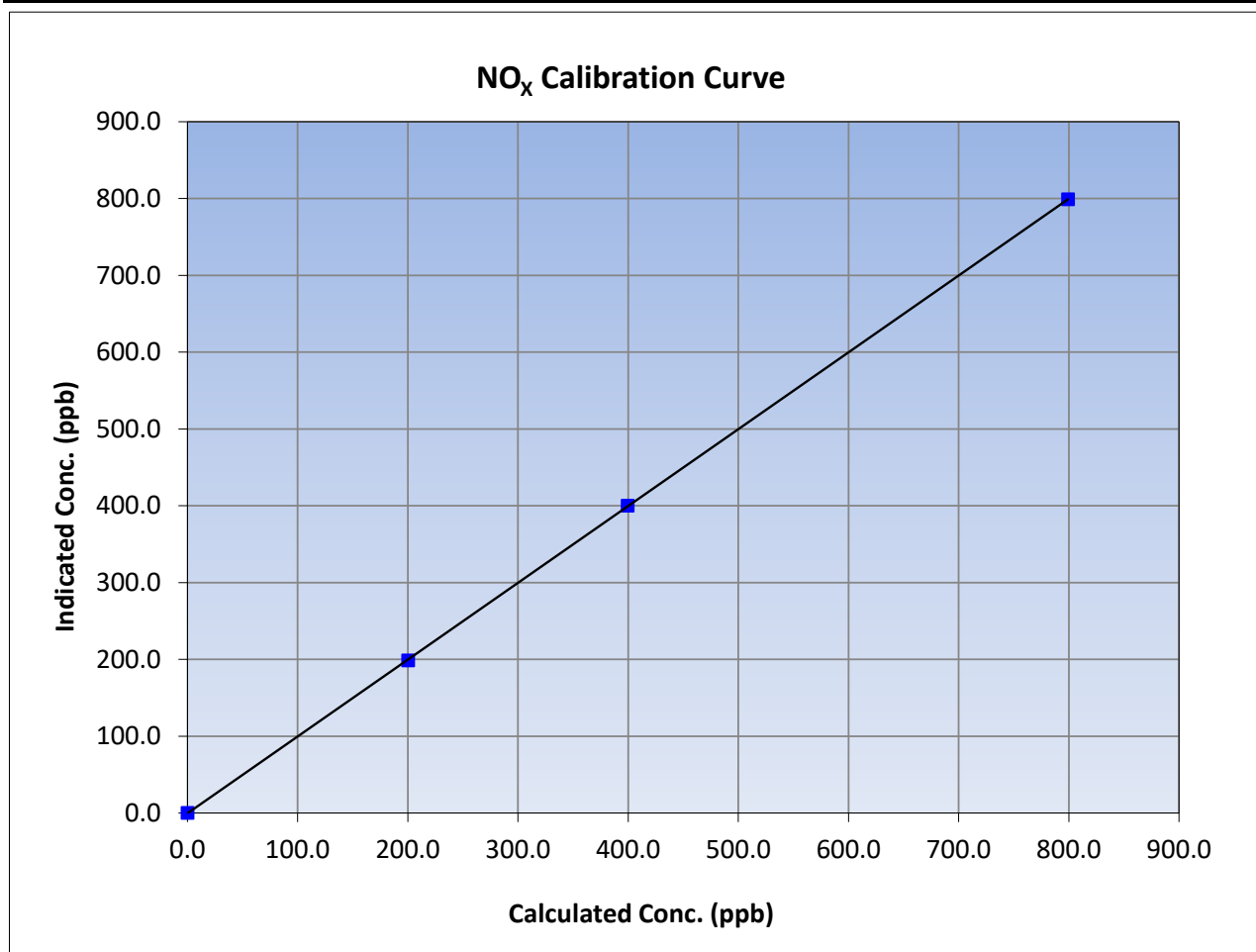
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:00	End Time (MST):	15:05
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20	
799.2	798.8	1.0005			0.999993
399.6	400.2	0.9985			1.000252
200.3	198.7	1.0079			-0.432516





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

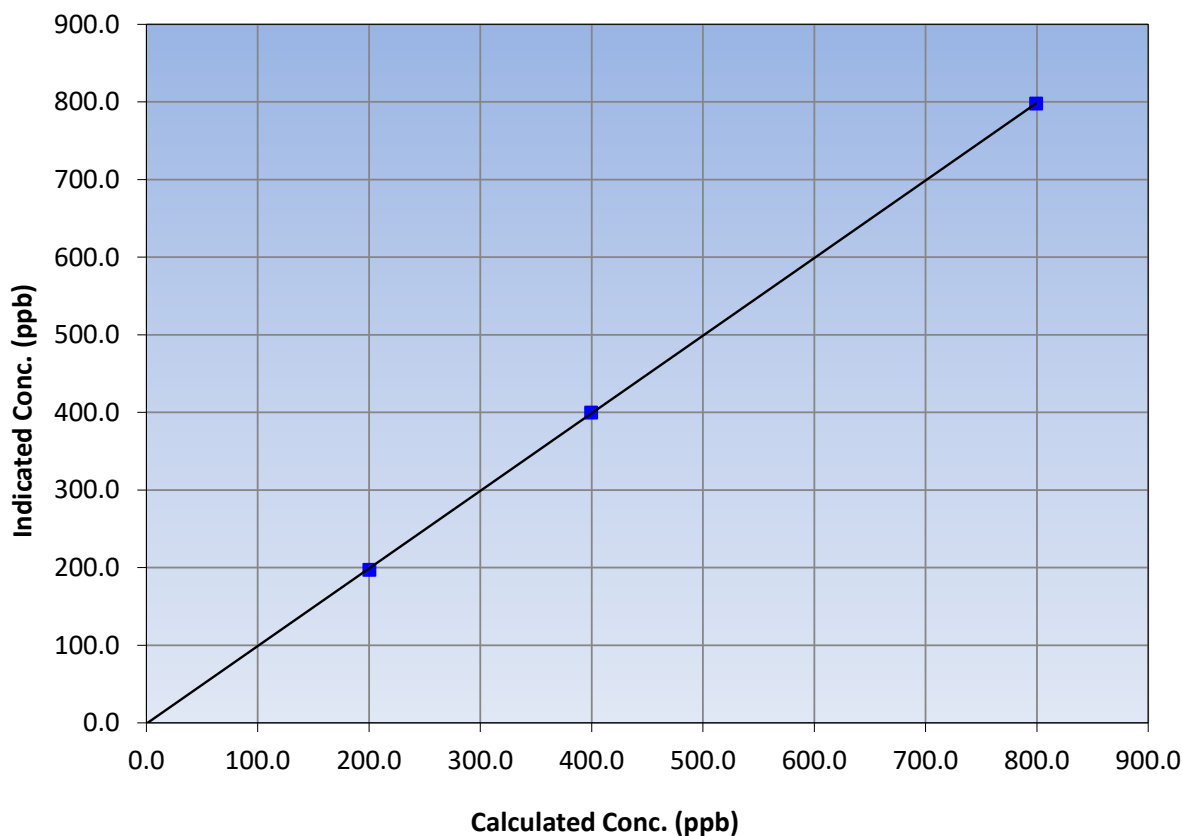
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:00	End Time (MST):	15:05
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	≥0.995	
799.2	797.9	1.0016			
399.6	399.7	0.9998	Slope	0.90 - 1.10	
200.3	197.2	1.0156			
			Intercept	-1.012030	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

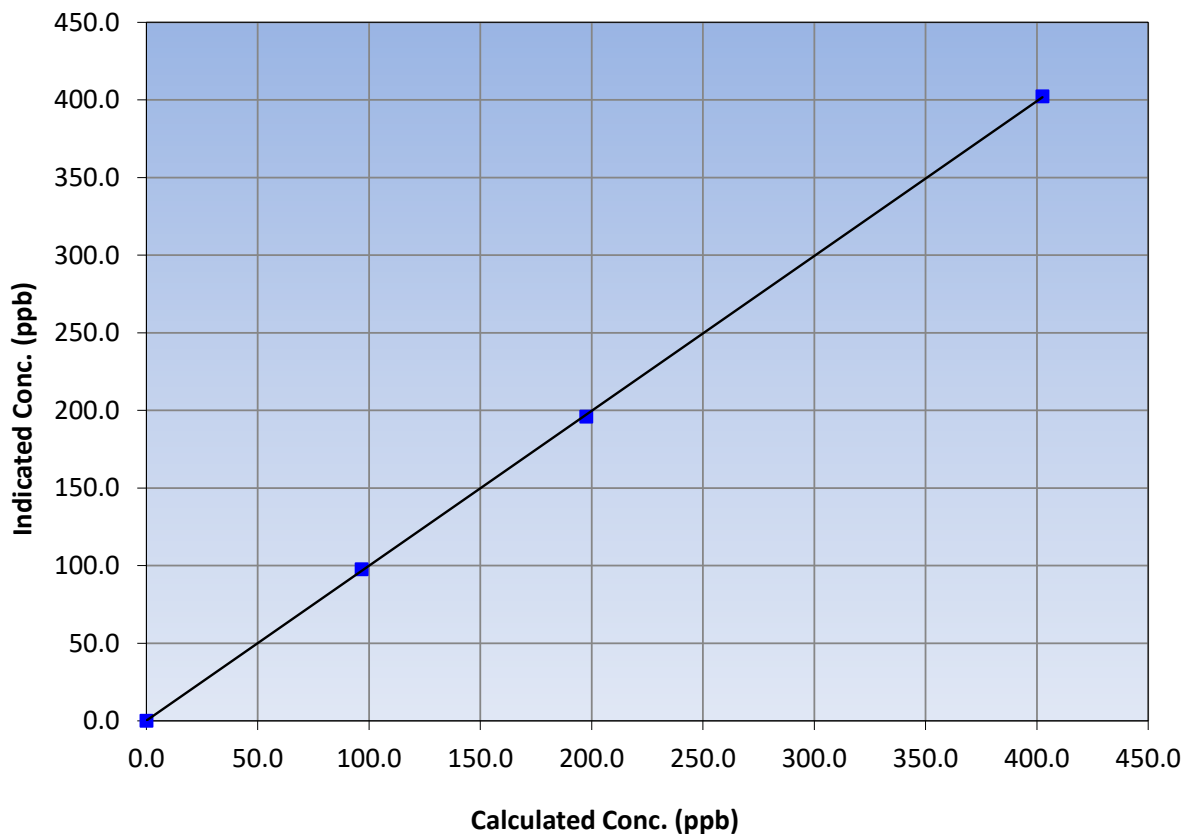
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:00	End Time (MST):	15:05
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20
402.5	402.2	1.0007		
197.6	195.9	1.0087		
96.7	97.7	0.9898		

NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 26, 2023

Location: Surmont 2





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

**AMS30
ELLS RIVER
APRIL 2023**

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Summary

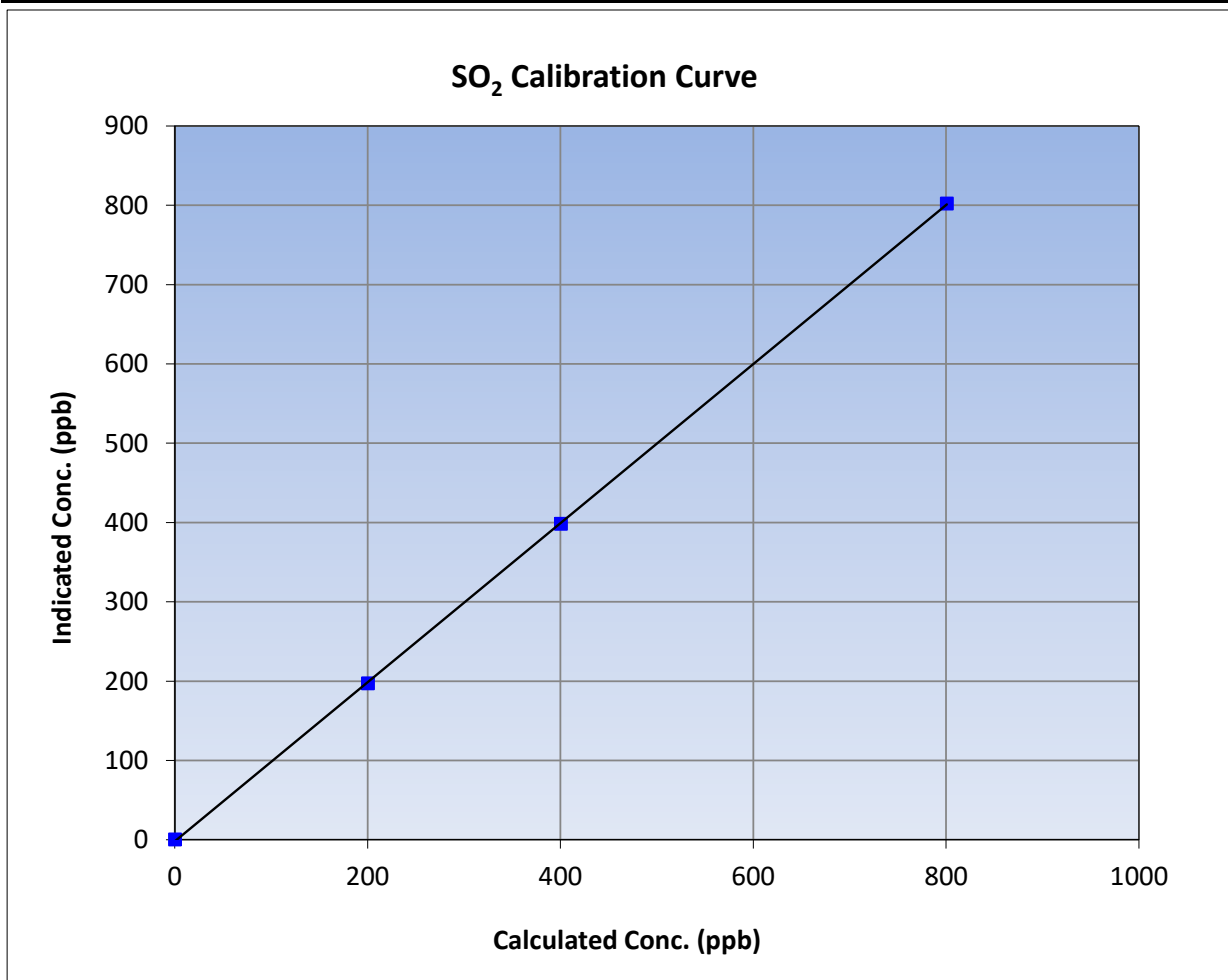
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:19	End Time (MST):	12:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

Calibration Data

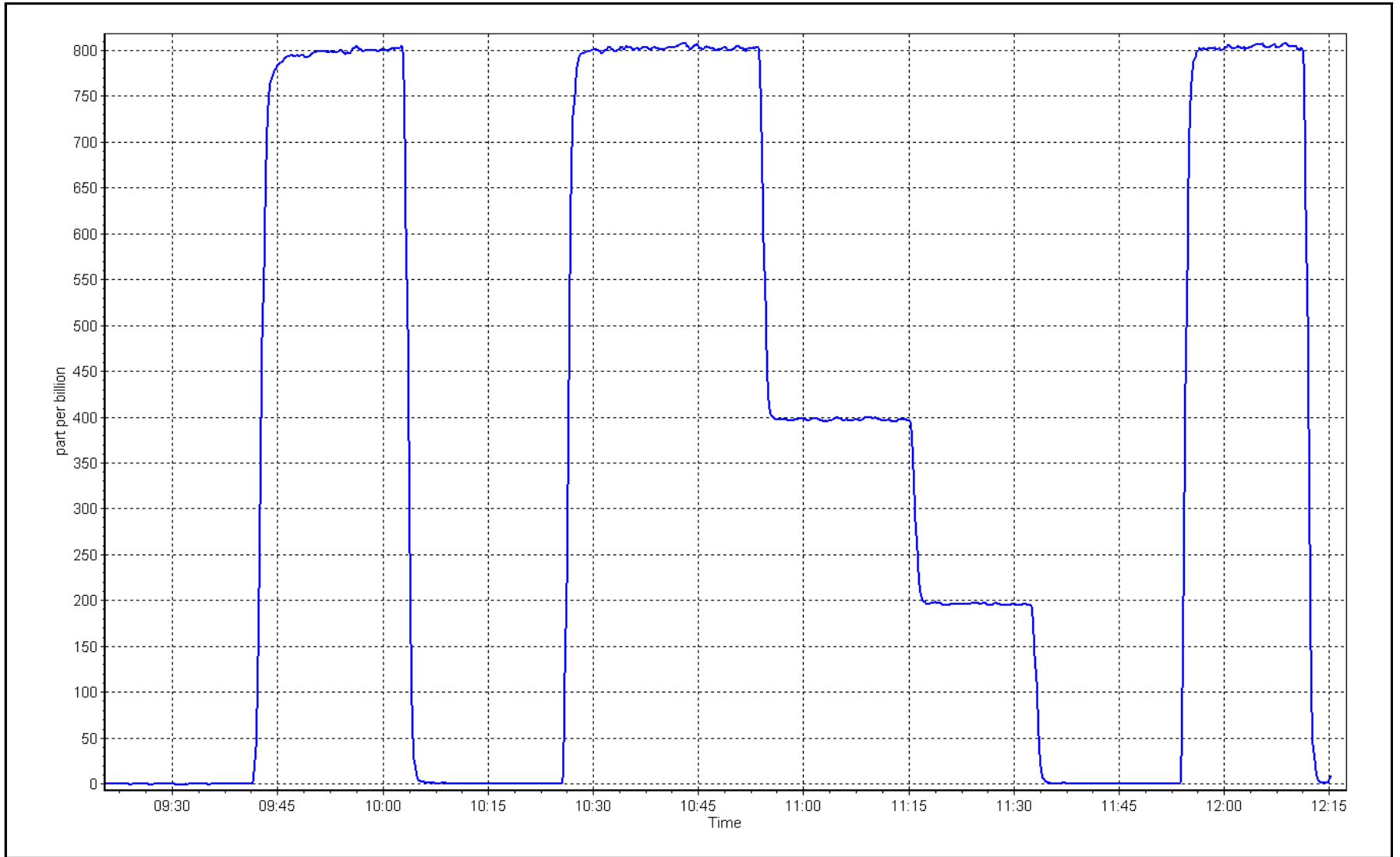
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999969	≥0.995
800.4	801.9	0.9981			
400.2	398.0	1.0056	Slope	1.003073	0.90 - 1.10
200.1	196.8	1.0168			
			Intercept	-2.075962	+/-30



SO2 Calibration Plot

Date: April 11, 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: April 3, 2023 Last Cal Date: March 2, 2023
 Start time (MST): 9:34 End time (MST): 13:15
 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 #: 555
 Analyzer Range 0 - 100 ppb

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	0.998207	1.000494	Backgd or Offset: 1.57	1.55
Calibration intercept:	0.060852	-0.019196	Coeff or Slope: 1.092	1.092

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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	78.7	80.0	79.3	1.008
as found 2nd point	4961	39.4	40.0	39.6	1.011
as found 3rd point	4980	19.7	20.0	19.9	1.006
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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	78.7	80.0	80.0	1.000
second point	4961	39.4	40.0	40.0	1.001
third point	4980	19.7	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	78.7	80.0	80.0	1.000
SO2 Scrubber Check	4921	79.2	800.4	0.1	----
Date of last scrubber change:	N/A		Ave Corr Factor		1.000
Date of last converter efficiency test:	N/A		95.1% efficiency		

Baseline Corr As found: 79.3 Prev response: 79.88 *% change: -0.7%
 Baseline Corr 2nd AF pt: 39.6 AF Slope: 0.991347 AF Intercept: 0.000989
 Baseline Corr 3rd AF pt: 19.9 AF Correlation: 0.999997

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

TRS Calibration Summary

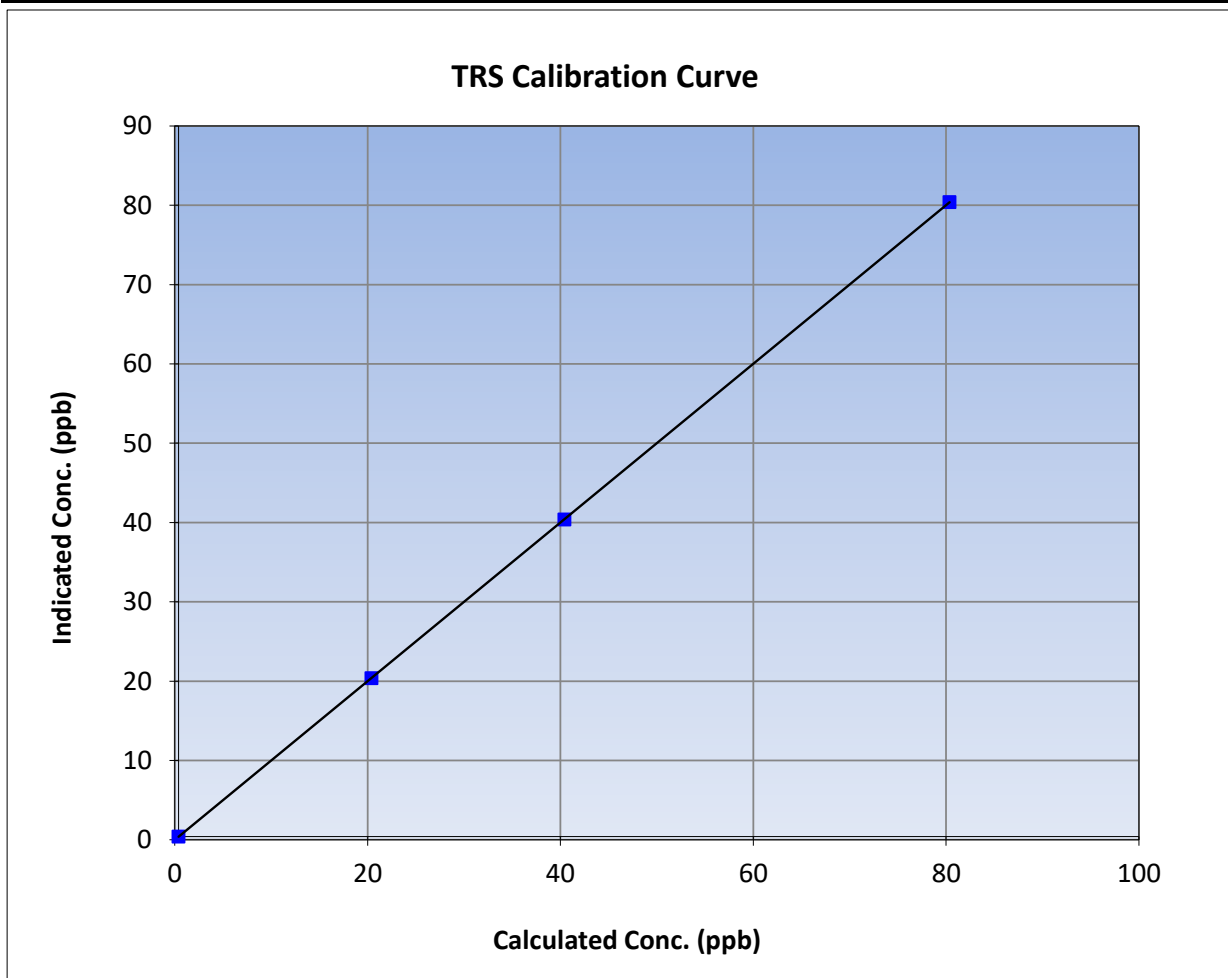
Version-11-2021

Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 2, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	9:34	End Time (MST):	13:15
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

Calibration Data

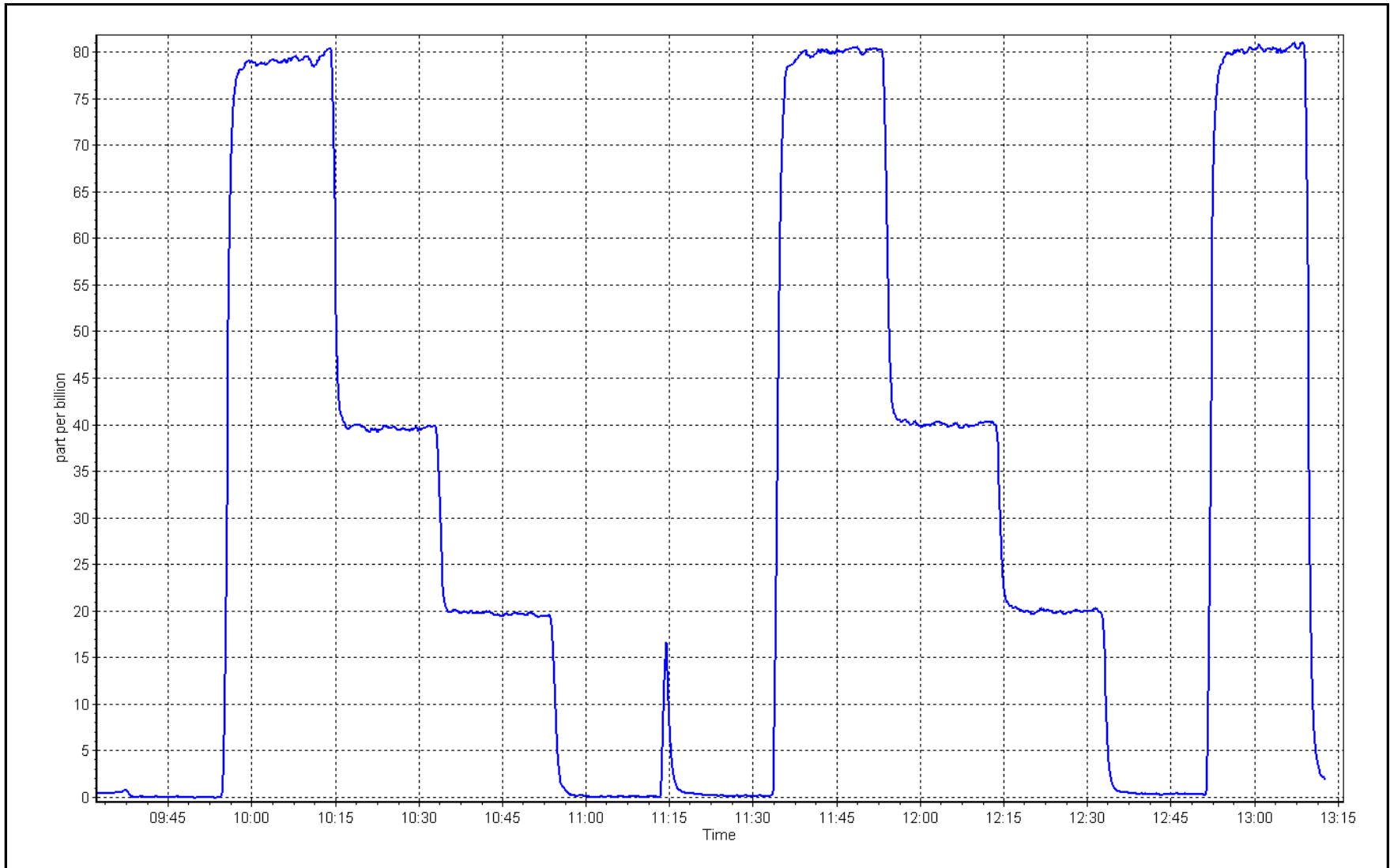
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	1.000000	
80.0	80.0	0.9995			≥0.995
40.0	40.0	1.0007	Slope	1.000494	
20.0	20.0	1.0008			0.90 - 1.10
			Intercept	-0.019196	+/-3



TRS Calibration Plot

Date: April 3, 2023

Location: Ells River





Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	April 11, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	9:19	End time (MST):	12:20
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC494126	Cal Gas Expiry Date:	December 29, 2028
CH ₄ Cal Gas Conc.	499.7 ppm	CH ₄ Equiv Conc.	1075.0 ppm
C ₃ H ₈ Cal Gas Conc.	209.2 ppm		
Removed Gas Cert:		Removed Gas Expiry:	
Removed CH ₄ Conc.	499.7 ppm	CH ₄ Equiv Conc.	1075.0 ppm
Removed C ₃ H ₈ Conc.	209.2 ppm		
Diff between cyl (CH ₄):		Diff between cyl (THC):	
Calibrator Model:	API T700	Diff between cyl (NM):	
ZAG make/model:	API T701H	Serial Number:	3061
		Serial Number:	358

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH ₄ Range (ppm):	0 - 10 ppm

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
CH ₄ SP Ratio:	0.000234	0.000238	NMHC SP Ratio: 4.19E-05	4.39E-05
CH ₄ Retention time:	14.2	14.2	NMHC Peak Area: 217301	207620

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	17.03	16.46	1.035
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	8.51	8.42	1.012
third point	4980	19.8	4.26	4.16	1.023
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.06	0.998

Average Correction Factor				1.012
Baseline Corr AF:	16.46	Prev response	16.96	*% change -3.0%
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 / CH₄ / 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	8.72	1.045
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.2	9.11	9.10	1.001
second point	4960	39.6	4.56	4.53	1.007
third point	4980	19.8	2.28	2.24	1.016
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.13	0.998
Average Correction Factor					1.008
Baseline Corr AF:	8.72	Prev response	9.10	*% change	-4.3%
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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.91	7.74	1.022
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	7.91	7.88	1.005
second point	4960	39.6	3.96	3.89	1.017
third point	4980	19.8	1.98	1.92	1.031
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.92	0.999
Average Correction Factor					1.018
Baseline Corr AF:	7.74	Prev response	7.87	*% change	-1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	<i>Start</i>	<i>Finish</i>
THC Cal Slope:	0.998858	0.998335
THC Cal Offset:	-0.050537	-0.048138
CH ₄ Cal Slope:	0.997766	0.996510
CH ₄ Cal Offset:	-0.031956	-0.029356
NMHC Cal Slope:	1.000170	0.999568
NMHC Cal Offset:	-0.018781	-0.018381

Notes: Adjusted the span.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

THC Calibration Summary

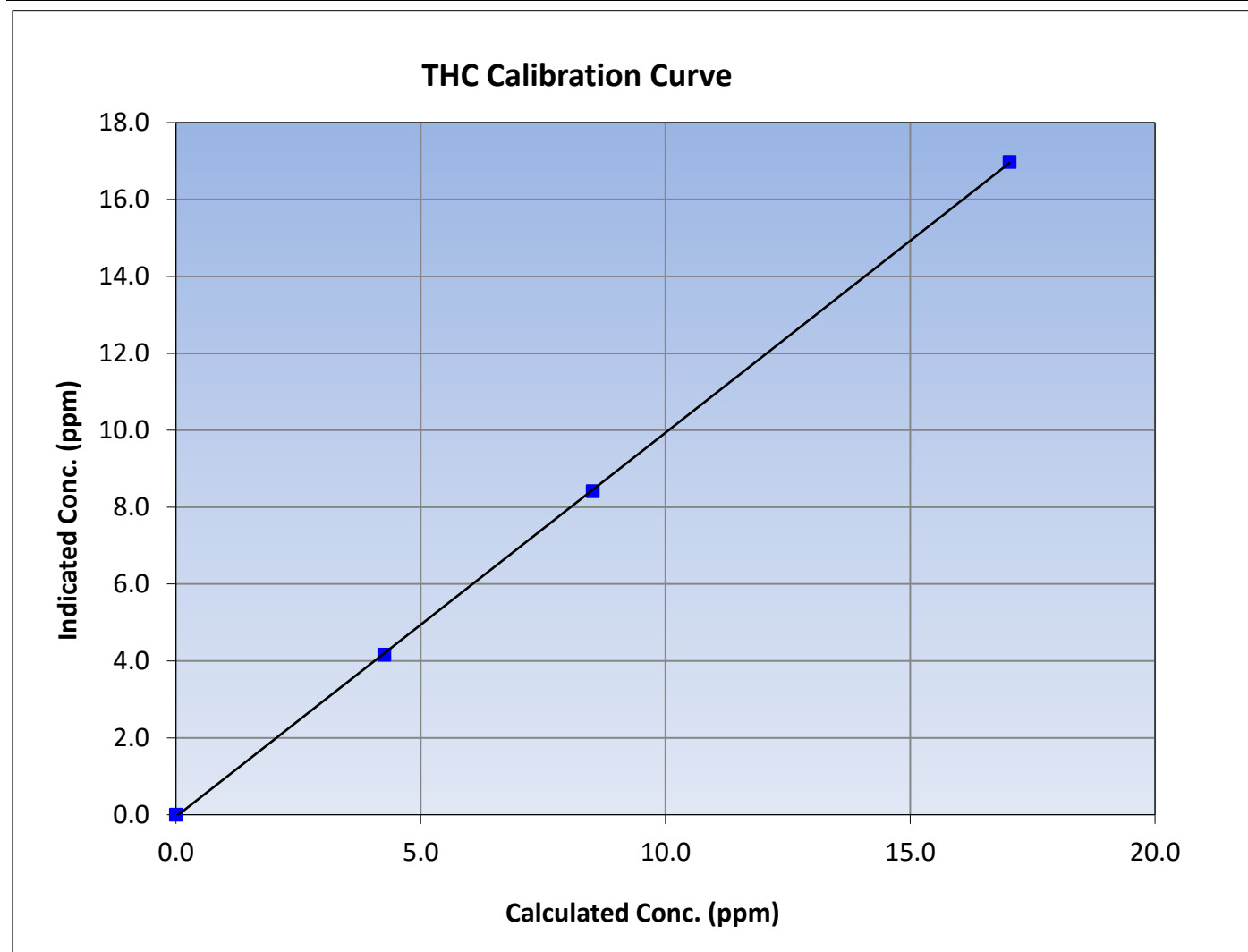
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:19	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999962	≥ 0.995			
17.03	16.98	1.0028						
8.51	8.42	1.0117				Slope	0.998335	0.90 - 1.10
4.26	4.16	1.0229						
			Intercept	-0.048138	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

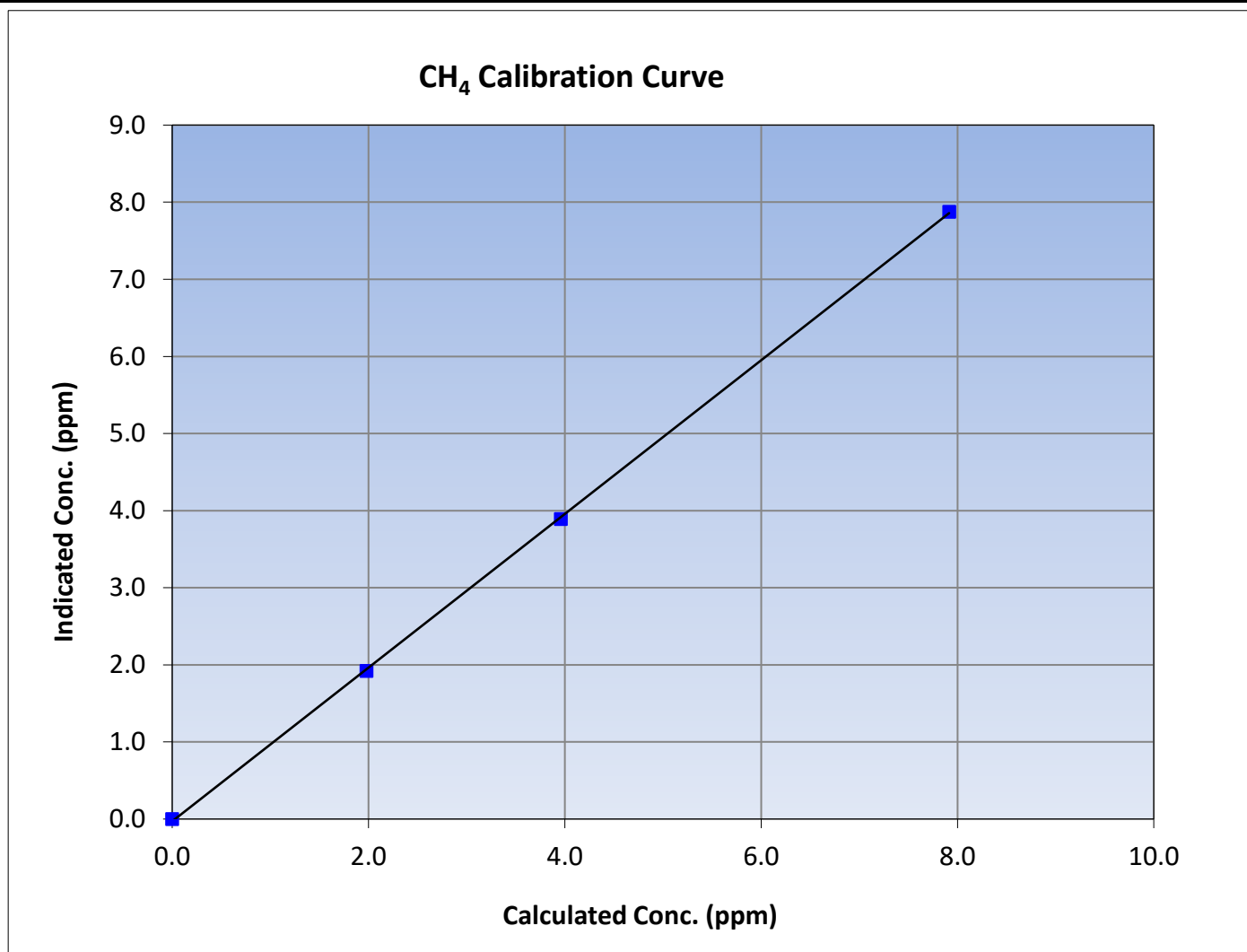
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:19	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999932	≥0.995
7.91	7.88	1.0049			
3.96	3.89	1.0175			
1.98	1.92	1.0307			
			Slope	0.996510	0.90 - 1.10
			Intercept	-0.029356	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

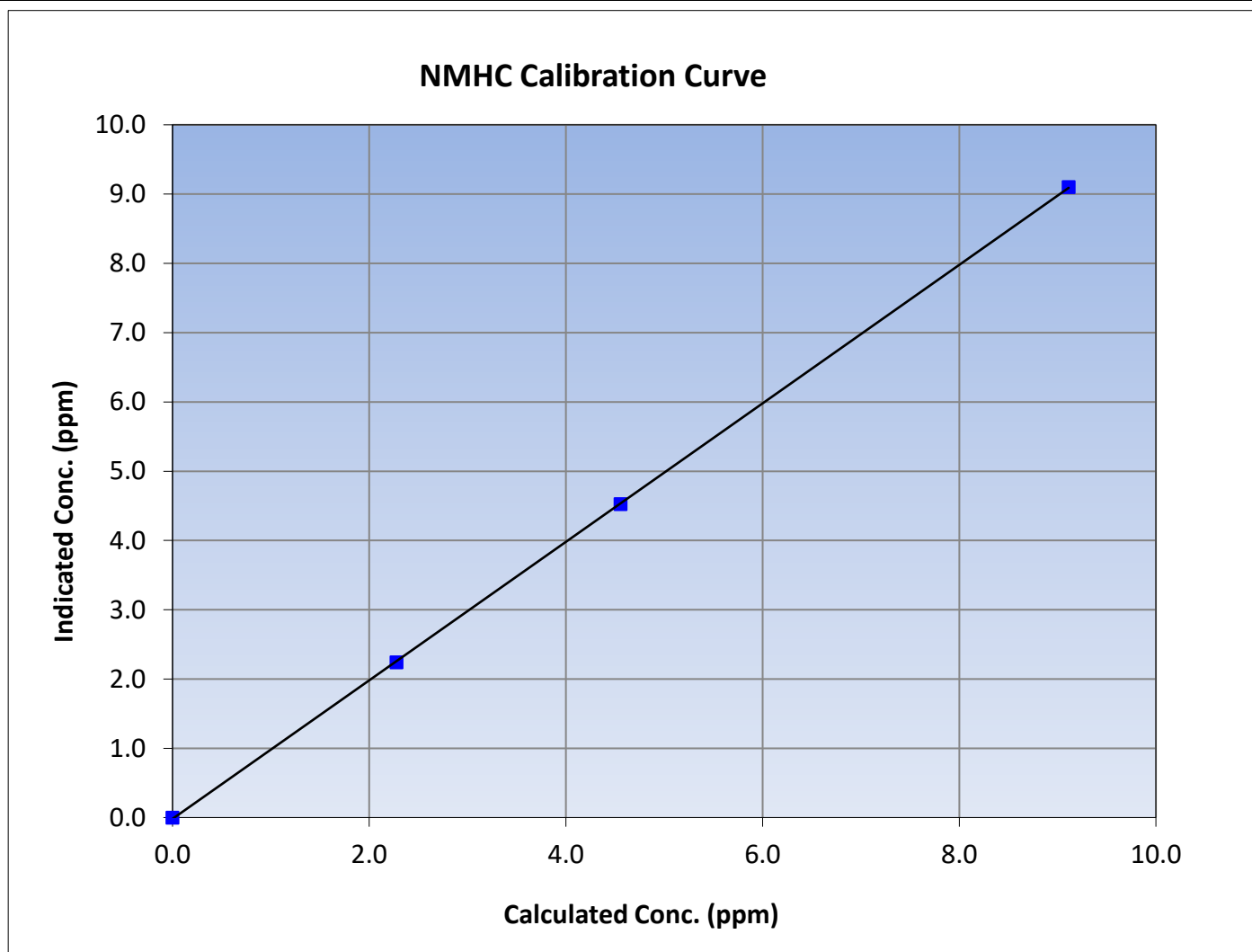
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:19	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650

Calibration Data

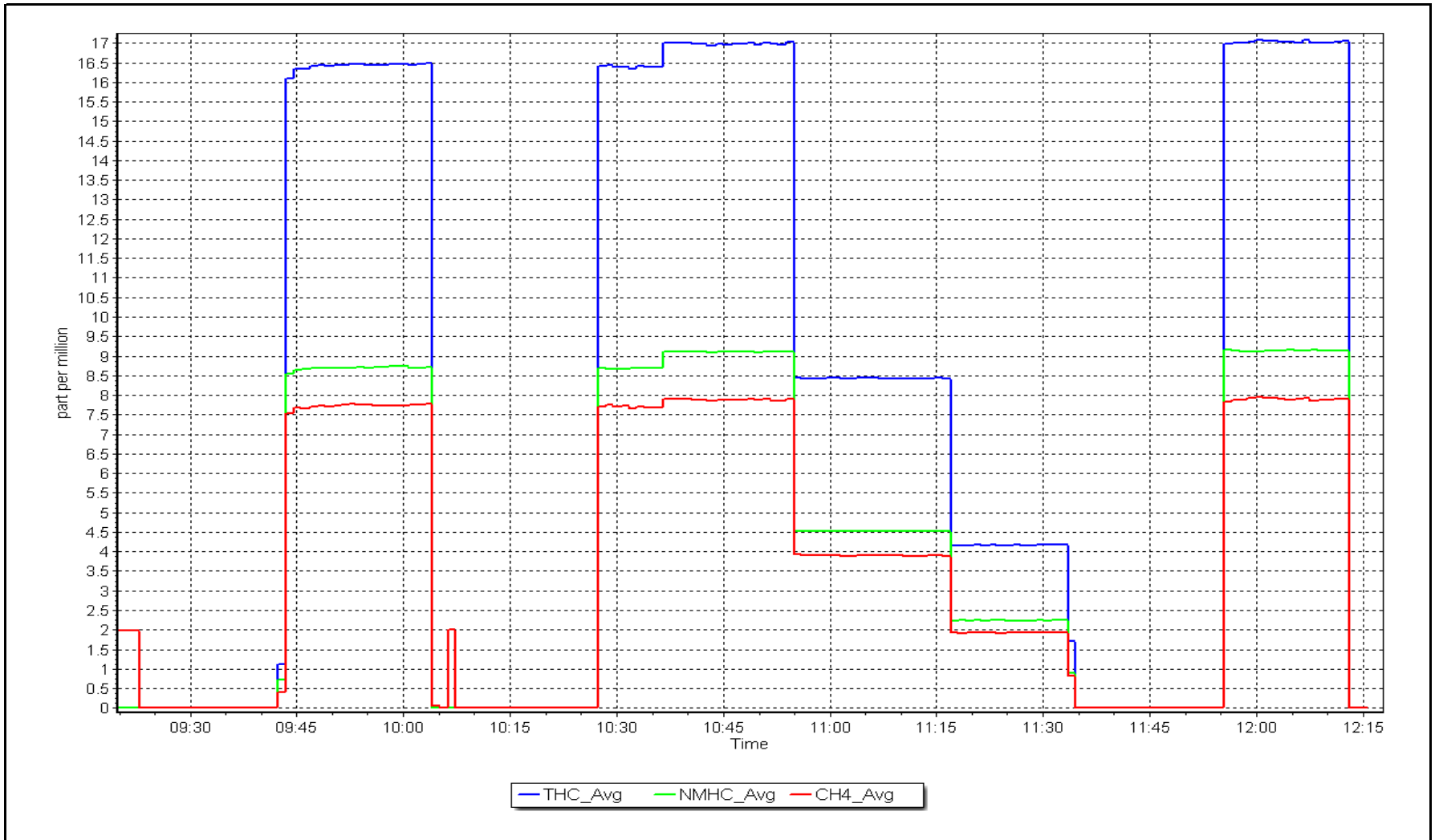
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999981	≥ 0.995
9.11	9.10	1.0014			
4.56	4.53	1.0070			
2.28	2.24	1.0162			
			Slope	0.999568	0.90 - 1.10
			Intercept	-0.018381	+/-0.5



NMHC Calibration Plot

Date: April 11, 2023

Location: Ells River





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Ells River
Calibration Date: April 5, 2023
Start time (MST): 8:57
Reason: Routine
Station number: AMS 30
Last Cal Date: March 15, 2023
End time (MST): 13:15

Calibration Standards

NO Gas Cylinder #: T2Y1P2R
NOX Cal Gas Conc: 50.83 ppm
Removed Cylinder #:
Removed Gas NOX Conc: 50.83 ppm
NOX gas Diff:
Calibrator Model: API T700
ZAG make/model: API T701H
Cal Gas Expiry Date: December 11, 2023
NO Cal Gas Conc: 49.97 ppm
Removed Gas Exp Date:
Removed Gas NO Conc: 49.97 ppm
NO gas Diff:
Serial Number: 3061
Serial Number: 358

Analyzer Information

Analyzer make: Thermo 42i
NOX Range (ppb): 0 - 1000 ppb

Analyzer serial #: 710321429

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.029	1.029	NO bkgnd or offset:	12.5	12.5
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	12.4	12.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	182.7	183.6

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999129	1.000576
NO _x Cal Offset:	-0.900000	-1.140000
NO Cal Slope:	0.999714	0.998571
NO Cal Offset:	-1.740000	-1.840000
NO ₂ Cal Slope:	1.002165	1.002663
NO ₂ Cal Offset:	0.164860	0.679699



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.3	0.3	----	----
as found span	4920	80.0	813.3	799.5	13.8	813.0	796.8	16.1	1.0003	1.0034
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	813.3	797.6	15.7	1.0000	1.0024
second point	4960	40.0	406.6	399.8	6.9	404.9	396.0	8.9	1.0043	1.0095
third point	4980	20.0	203.3	199.9	3.4	201.2	196.2	4.9	1.0105	1.0188
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4920	80.0	813.3	437.9	375.4	812.3	435.3	376.8	1.0012	1.0060
Average Correction Factor									1.0049	1.0102

Corrected As found	NO _x = 813.0 ppb	NO = 797.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = 0.2%
Previous Response	NO _x = 811.7 ppb	NO = 797.6 ppb		*Percent Change	NO = -0.1%
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:
			As found	NO ₂ r ² :	NO ₂ SI:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
as found GPT zero						
as found GPT point (400 ppb NO ₂)						
as found GPT point (200 ppb NO ₂)						
as found GPT point (100 ppb NO ₂)						
1st GPT point (400 ppb O ₃)	793.8	432.2	375.4	376.7	0.9964	100.4%
2nd GPT point (200 ppb O ₃)	793.8	611.9	195.7	197.2	0.9922	100.8%
3rd GPT point (100 ppb O ₃)	793.8	702.3	105.3	106.8	0.9856	101.5%
Average Correction Factor					0.9914	100.9%

Notes:

No adjustments have been made.

Calibration Performed By: Denny Ray Estador



Wood Buffalo Environmental Association

NO_x Calibration Summary

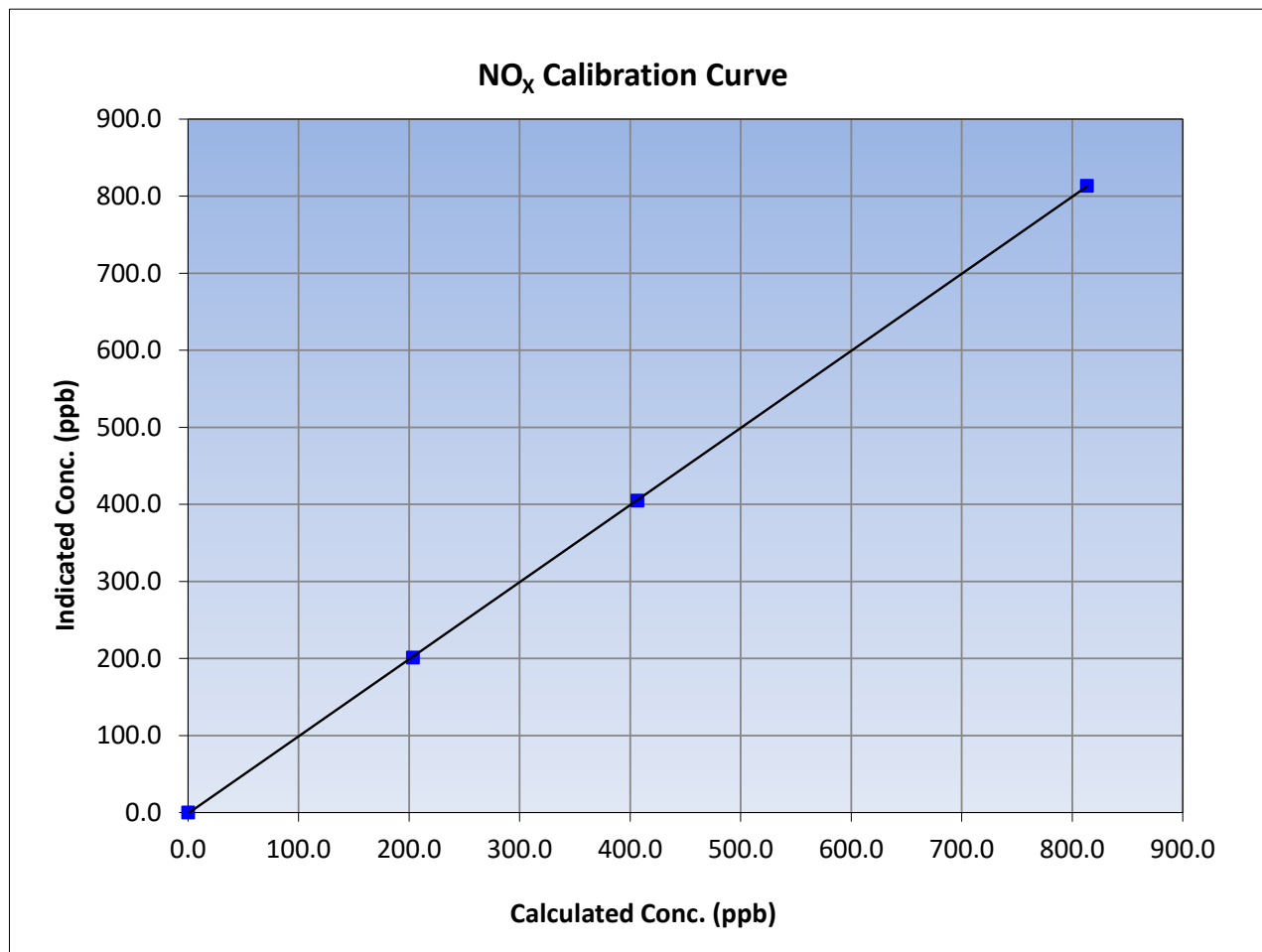
Version-04-2020

Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 15, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:57	End Time (MST):	13:15
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20
813.3	813.3	1.0000		
406.6	404.9	1.0043		
203.3	201.2	1.0105		
			0.999989	
			1.000576	
			-1.140000	





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

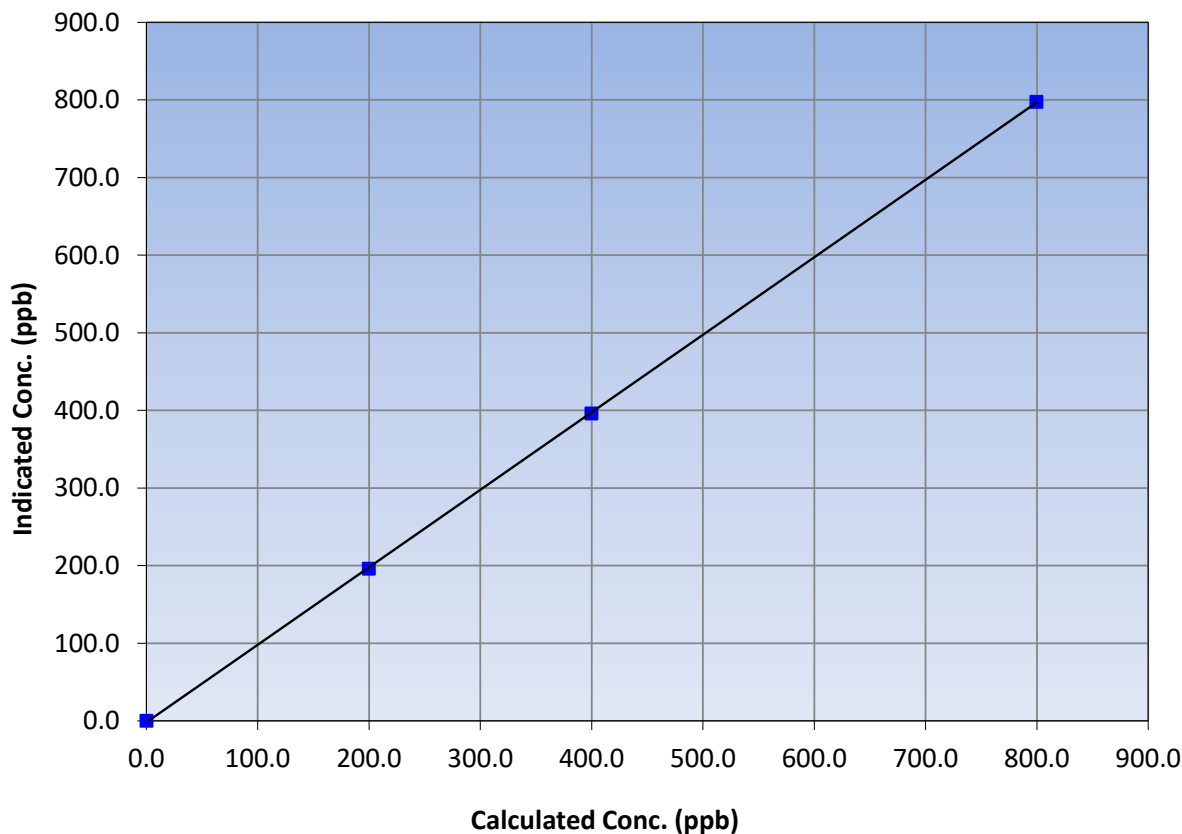
Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 15, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:57	End Time (MST):	13:15
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	≥0.995	
799.5	797.6	1.0024			
399.8	396.0	1.0095			
199.9	196.2	1.0188			
			Slope	0.998571	0.90 - 1.10
			Intercept	-1.840000	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

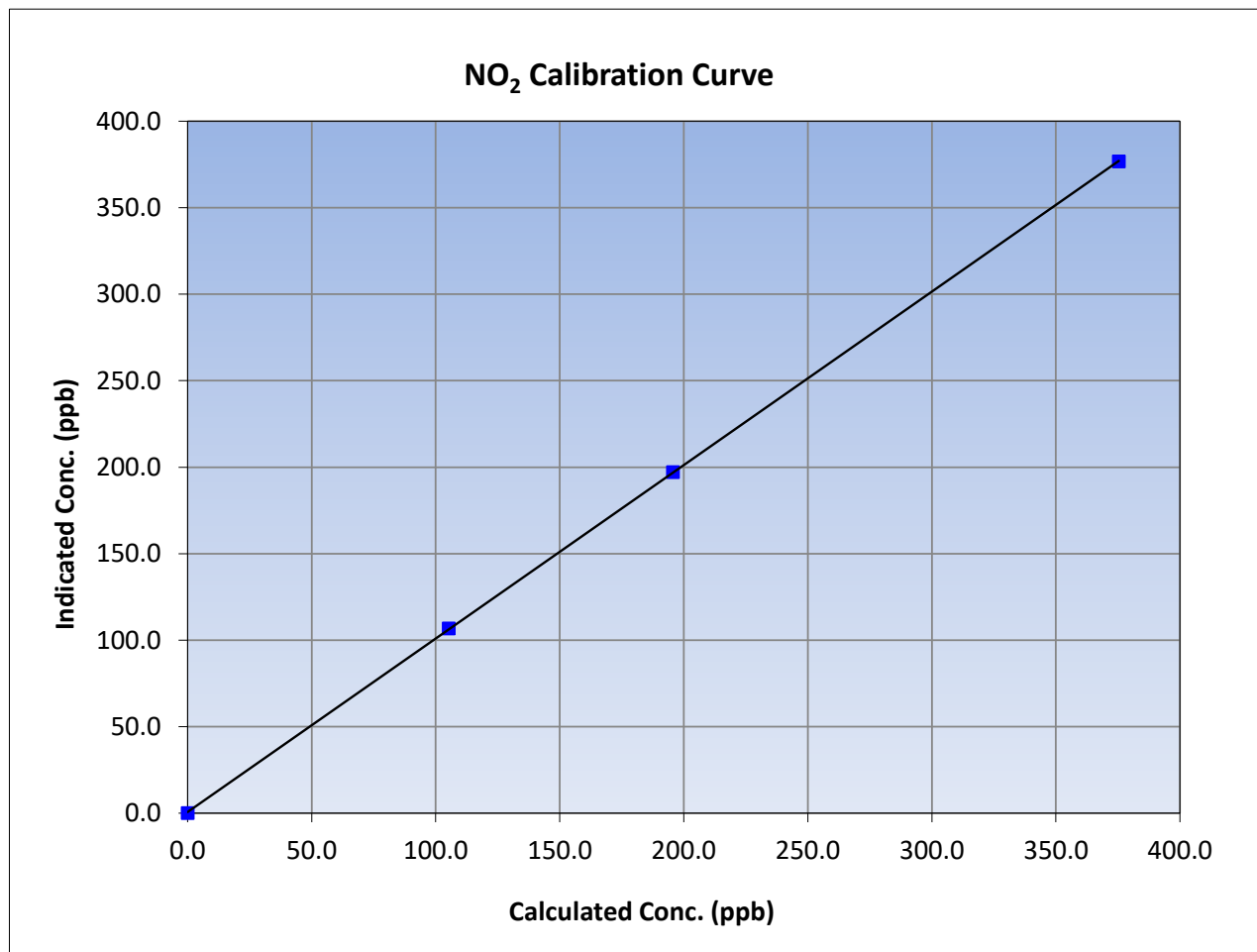
Version-04-2020

Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 15, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:57	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

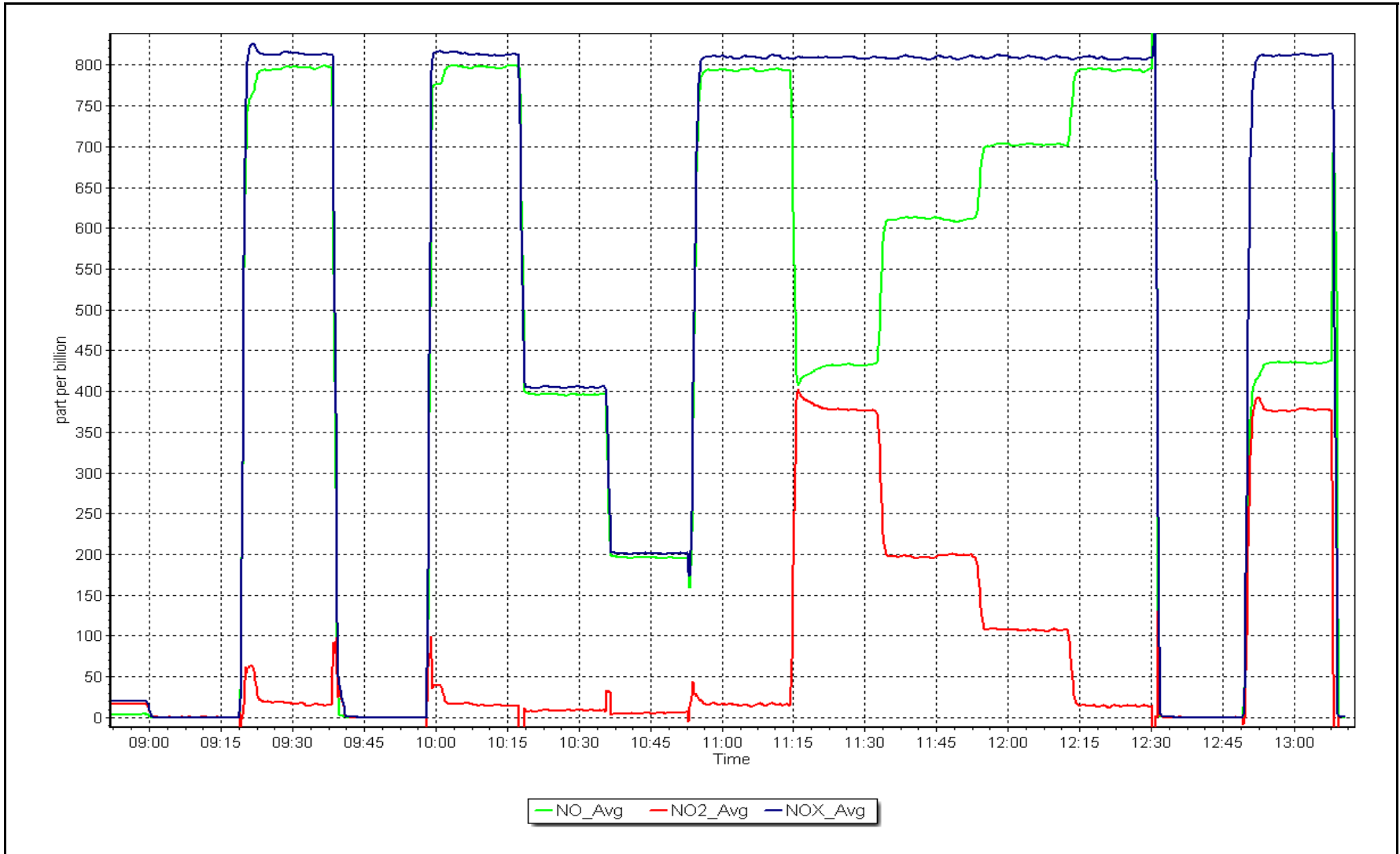
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<i>Limits</i>
0.0	0.1	----	Correlation Coefficient	0.999988	≥0.995
375.4	376.7	0.9964			
195.7	197.2	0.9922			
105.3	106.8	0.9856			
			Slope	1.002663	0.90 - 1.10
			Intercept	0.679699	+/-20



NO_x Calibration Plot

Date: April 5, 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: April 11, 2023 Last Cal Date: March 16, 2023
 Start time (MST): 10:57 End time (MST): 11:20

Analyzer Make: API T640 S/N: 875
 Particulate Fraction: PM2.5

Flow Meter Make/Model: Delta Cal S/N: 954
 Temp/RH standard: Delta Cal S/N: 954

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	-11	-10.2	-11	<input type="checkbox"/>	+/- 2 °C
P (mmHg)	724	724	724	<input type="checkbox"/>	+/- 10 mmHg
flow (LPM)	5.02	5.05	5.02	<input type="checkbox"/>	+/- 0.25 LPM

Leak Test: Date of check: April 11, 2023 Last Cal Date: March 16, 2023
 PM w/o HEPA: 3.1 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				<input type="checkbox"/>	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____
 Date Optical Chamber Cleaned: _____ <0.2 ug/m3
 Disposable Filter Changed: _____

Annual Maintenance

Date Sample Tube Cleaned: _____
 Date RH/T Sensor Cleaned: _____

Notes: No adjustments made. Inlet head still clean.

Calibration by: Denny Ray Estador



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS506
JACKFISH 1
APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 1	Station number:	AMS 506
Calibration Date:	April 20, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	8:39	End time (MST):	11:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	<u>50.52</u> ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	<u>CC274266</u>		
Removed Cal Gas Conc:	<u>50.52</u> ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	<u>NA</u>	Diff between cyl:	
Calibrator Make/Model:	API T700	Serial Number:	2659
ZAG Make/Model:	API 701	Serial Number:	4427

Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011
Analyzer Range:	0 - 1000 ppb		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.001172	1.003357	Backgd or Offset:	18.9	18.7
Calibration intercept:	-1.416002	-1.656062	Coeff or Slope:	0.966	0.949

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.6	----
as found span	4921	79.2	800.2	813.2	0.984
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4921	79.2	800.2	801.4	0.999
second point	4960	39.6	400.2	400.7	0.999
third point	4980	19.8	200.1	196.7	1.017
as left zero	5000	0.0	0.0	-0.2	----
as left span	4921	79.2	800.2	800.4	1.000
Average Correction Factor					1.005

Baseline Corr As found:	813.80	Previous response	799.73	*% 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 inlet filter after as founds. Adjusted span only.

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

SO₂ Calibration Summary

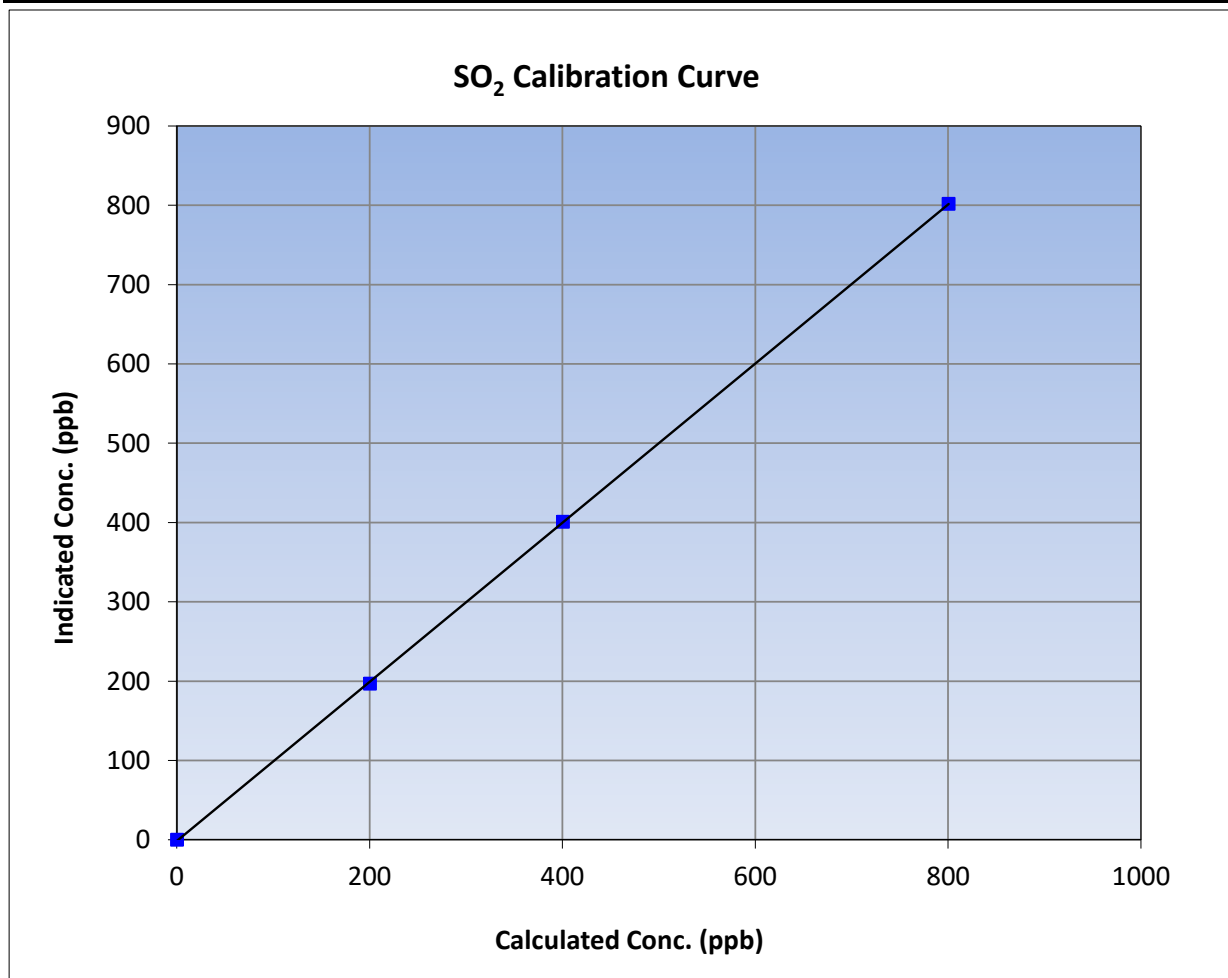
Version-01-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 9, 2023
Station Name:	Jackfish 1	Station Number:	AMS 506
Start Time (MST):	8:39	End Time (MST):	11:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

Calibration Data

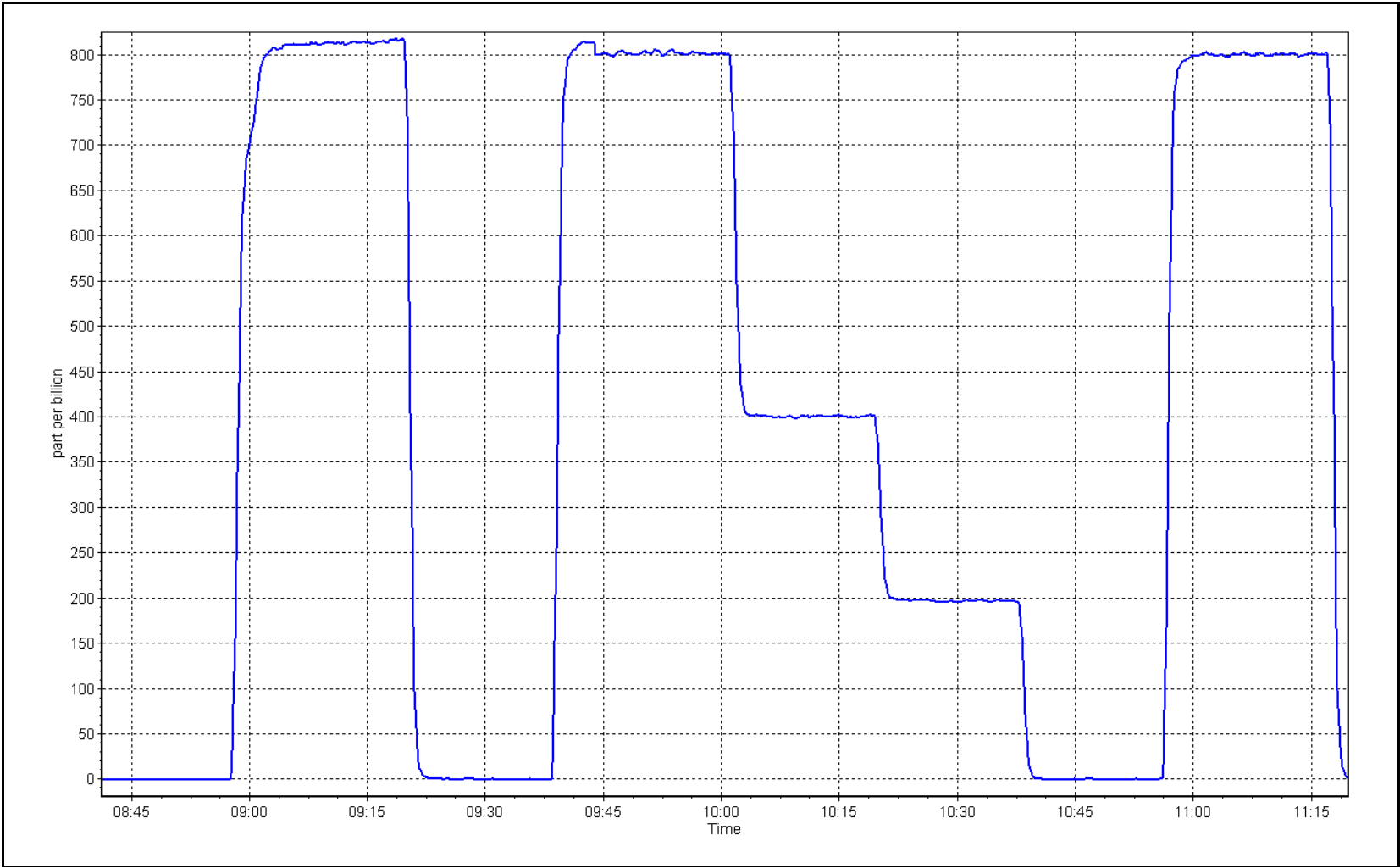
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.3	----	Correlation Coefficient	0.999976	≥0.995
800.2	801.4	0.9985			
400.2	400.7	0.9986	Slope	1.003357	0.90 - 1.10
200.1	196.7	1.0171			
			Intercept	-1.656062	+/-30



SO2 Calibration Plot

Date: April 20, 2023

Location: Jackfish 1





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name:	Jackfish 1	Station number:	AMS506
Calibration Date:	April 25, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	9:04	End time (MST):	12:54
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.14	ppm	Cal Gas Exp Date:	September 16, 2024
Cal Gas Cylinder #:	CC511843			
Removed Cal Gas Conc:	5.14	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2659
ZAG Make/Model:	API 701		Serial Number:	4427

Analyzer Information

Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020
Converter make:	Global G150	Converter serial #:	2022-218
Analyzer Range	0 - 100 ppb		

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	1.005003	0.999860	Backgd or Offset:	3.42
Calibration intercept:	-0.178301	-0.298400	Coeff or Slope:	1.090
				3.37
				1.066

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	-0.2	----
as found span	4922	77.8	80.0	80.8	0.987
as found 2nd point	4961	38.9	40.0	40.1	0.992
as found 3rd point	4981	19.4	19.9	19.7	1.002
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4922	77.8	80.0	79.7	1.004
second point	4961	38.9	40.0	39.7	1.007
third point	4981	19.4	19.9	19.5	1.023
as left zero	5000	0.0	0.0	-0.2	----
as left span	4922	77.8	80.0	79.9	1.001
SO2 Scrubber Check	4921	79.2	792.0	0.0	----
Date of last scrubber change:	24-Feb-23			Ave Corr Factor	1.011
Date of last converter efficiency test:	December 1, 2022			efficiency	

Baseline Corr As found:	81.0	Prev response:	80.20	*% change:	1.0%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.013717	AF Intercept:	-0.358110
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999983		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi-point as founds. Scrubber test done and passed after calibrator zero. Adjusted span only.

Calibration Performed By: Sean Bala



Wood Buffalo Environmental Association

H₂S Calibration Summary

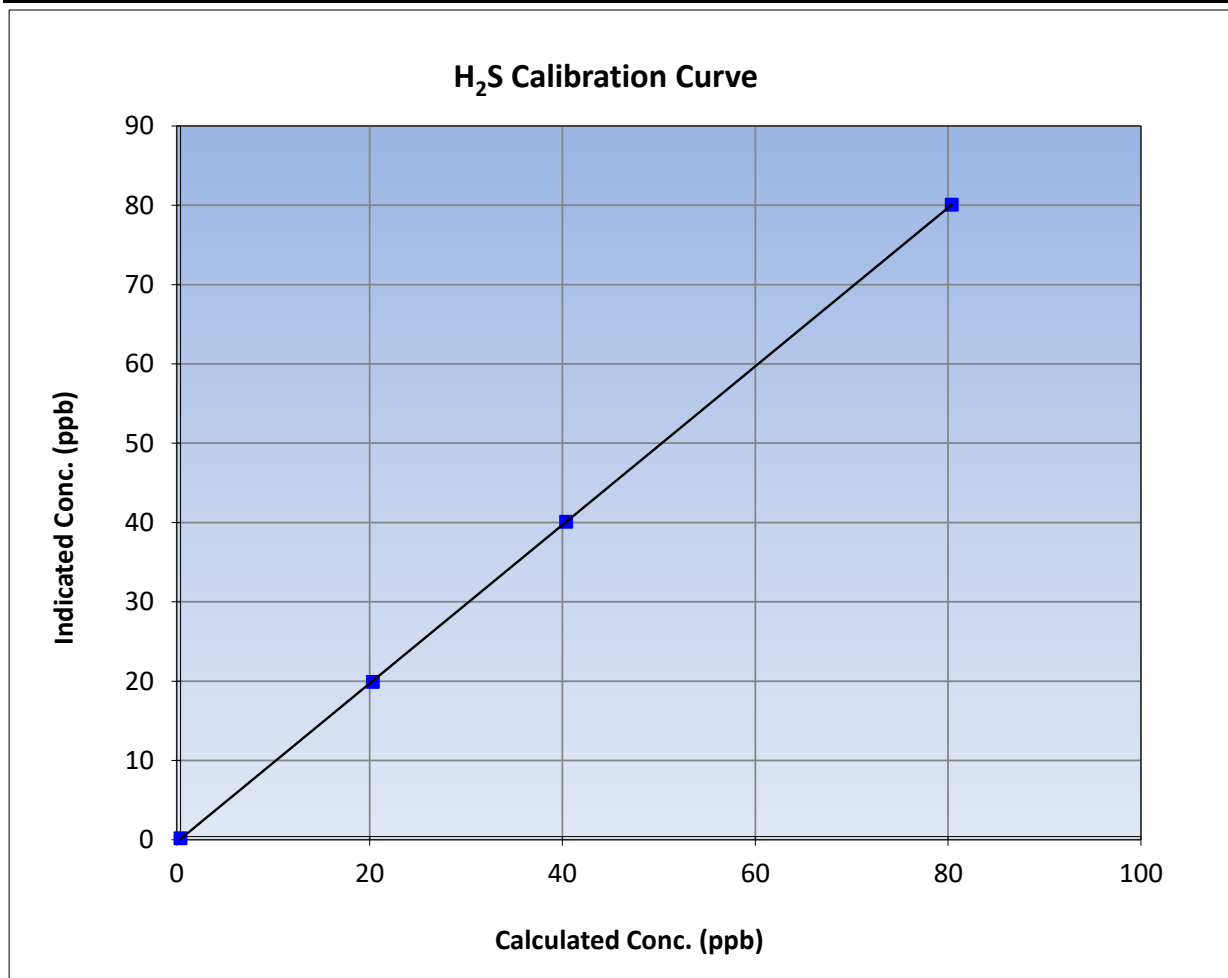
Version-11-2021

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 29, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	9:04	End Time (MST):	12:54
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

Calibration Data

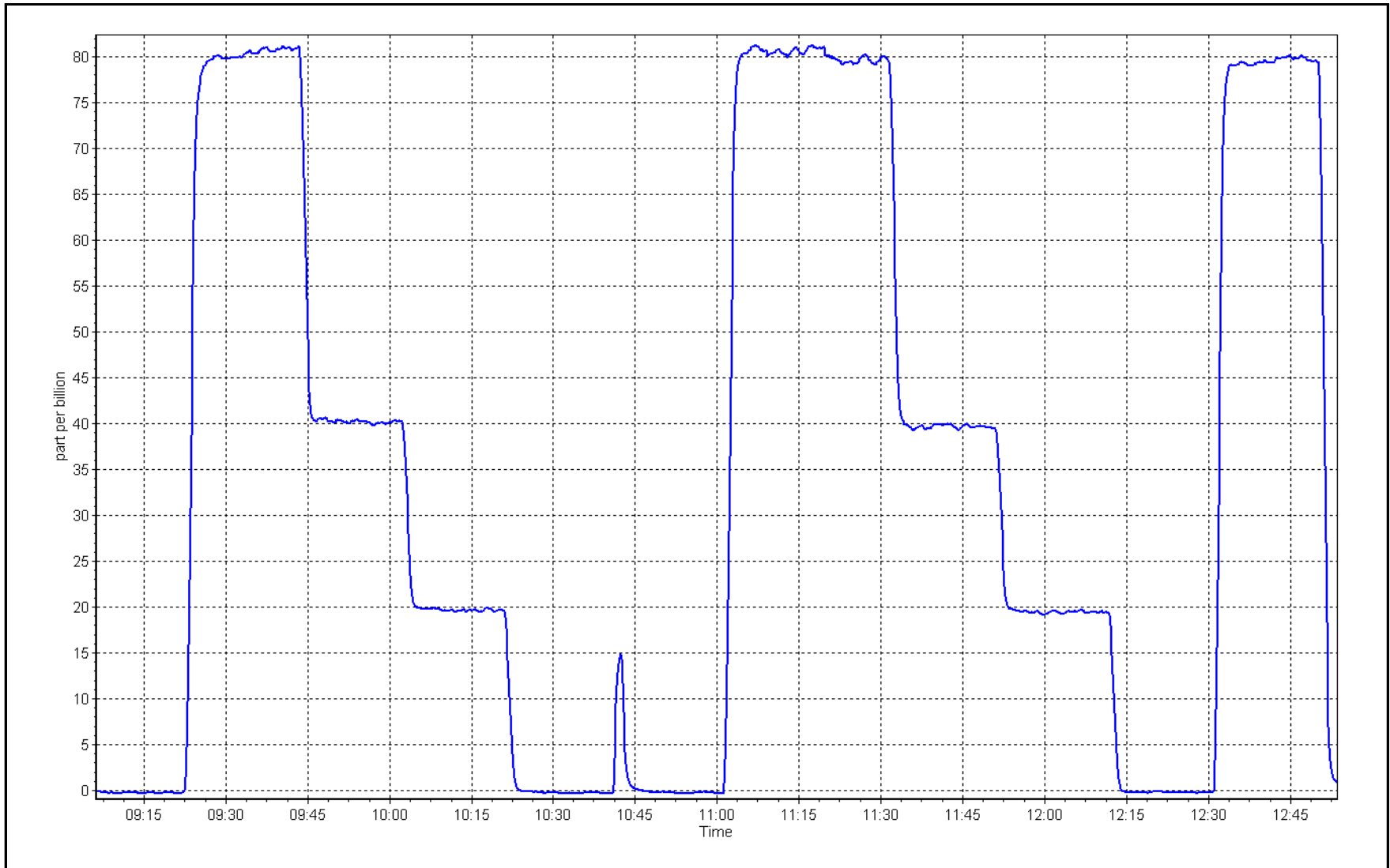
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999991	≥0.995
80.0	79.7	1.0035			
40.0	39.7	1.0073	Slope	0.999860	0.90 - 1.10
19.9	19.5	1.0226			
			Intercept	-0.298400	+/-3



H₂S Calibration Plot

Date: April 25, 2023

Location: Jackfish 1





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	----	----
as found span	4916	84.4	801.1	799.9	1.2	792.4	786.0	6.3	1.0109	1.0177
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
high point	4916	84.4	801.1	799.9	1.2	801.2	798.3	3.0	0.9998	1.0020
second point	4958	42.2	400.5	400.0	0.6	402.2	399.5	2.6	0.9959	1.0011
third point	4979	21.1	200.3	200.0	0.3	198.1	195.5	2.6	1.0110	1.0229
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	0.0	----	----
as left span	4916	84.4	801.1	402.4	398.7	803.1	402.5	400.6	0.9975	0.9997
Average Correction Factor									1.0022	1.0087

Corrected As found	NO _x = 792.3 ppb	NO = 785.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -1.4%	
Previous Response	NO _x = 803.1 ppb	NO = 800.5 ppb		*Percent Change	NO = -1.9%	
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:	Nx Int:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:	NO Int:
			As found	NO ₂ r ² :	NO ₂ SI:	NO ₂ Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
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)	798.8	401.3	398.7	401.7	0.9925	100.8%
2nd GPT point (200 ppb O3)	798.8	595.0	205.0	207.2	0.9893	101.1%
3rd GPT point (100 ppb O3)	798.8	692.5	107.5	110.4	0.9736	102.7%
Average Correction Factor					0.9851	101.5%

Notes:

Adjusted the span only.

Calibration Performed By:

Sean Bala



Wood Buffalo Environmental Association

NO_x Calibration Summary

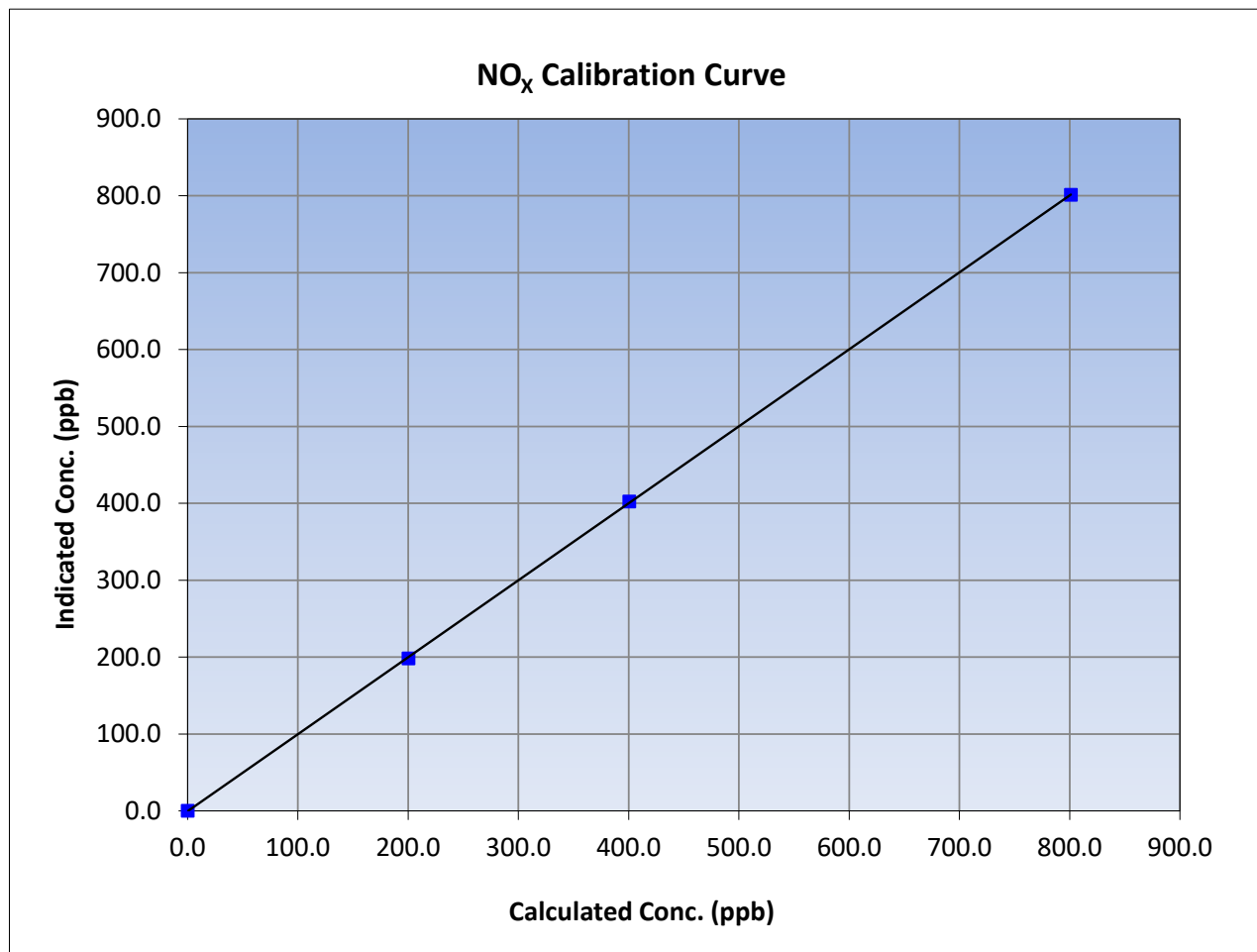
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 30, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.2	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
801.1	801.2	0.9998		
400.5	402.2	0.9959		
200.3	198.1	1.0110		
			0.999980	
			1.001147	
			-0.448022	





Wood Buffalo Environmental Association

NO Calibration Summary

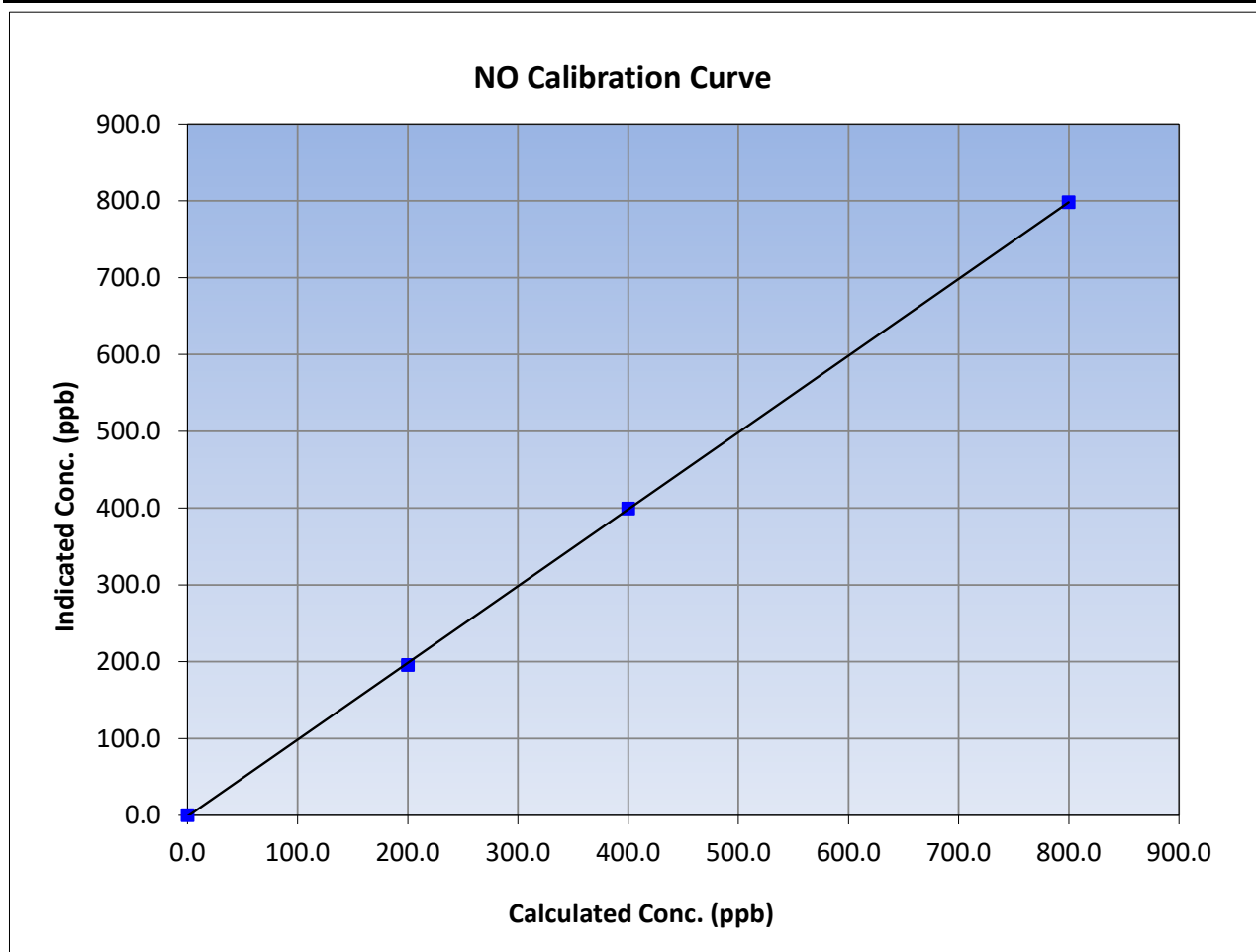
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 30, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
799.9	798.3	1.0020			
400.0	399.5	1.0011			
200.0	195.5	1.0229			
			Slope	0.999625	0.90 - 1.10
			Intercept	-1.447978	+/-20





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

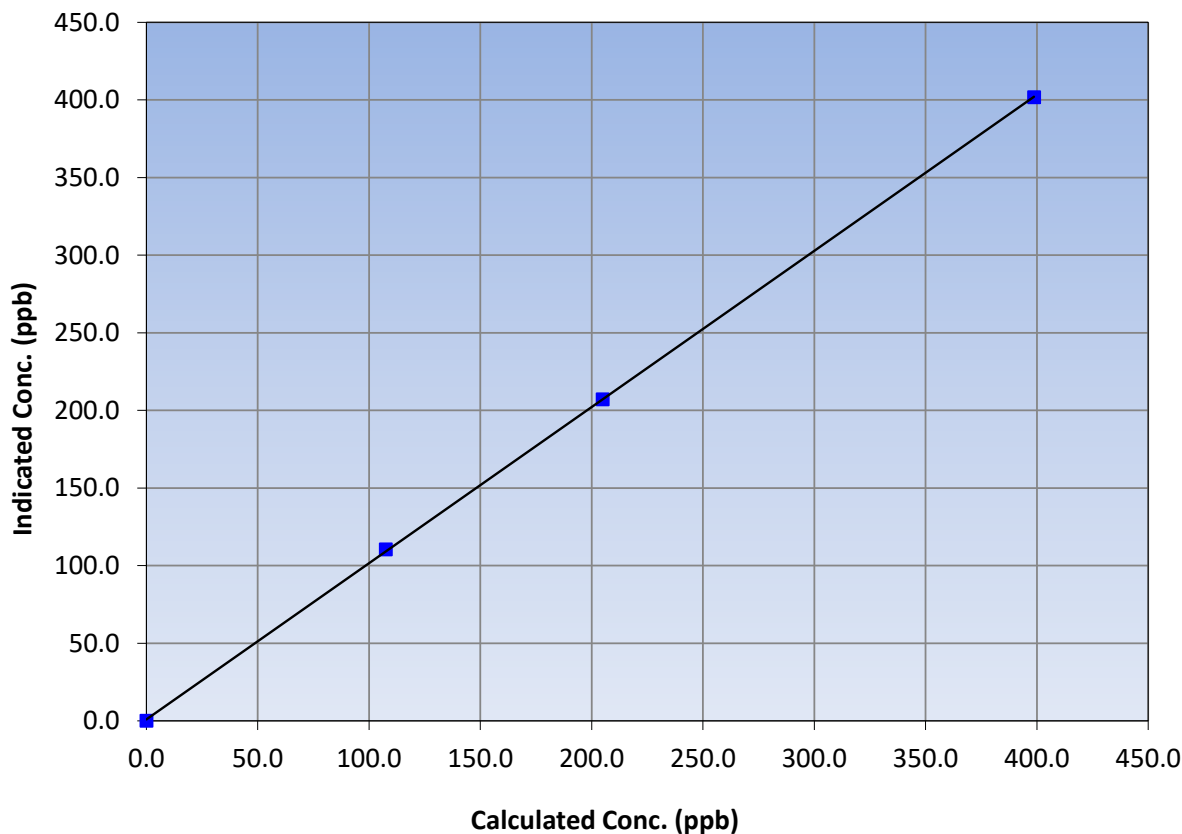
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 30, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
398.7	401.7	0.9925		
205.0	207.2	0.9893		
107.5	110.4	0.9736		
			0.999968	
			1.006063	
			0.960980	

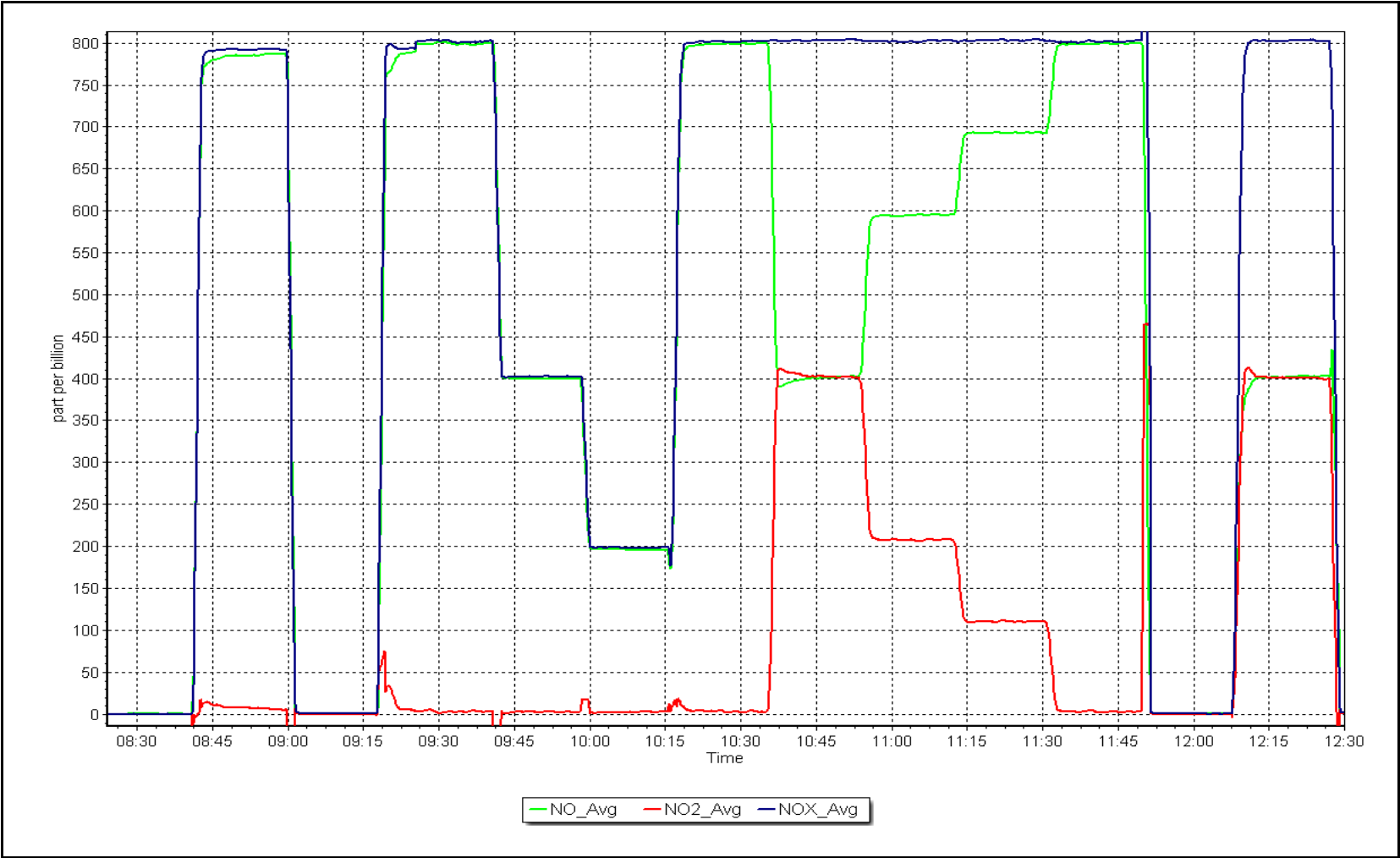
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 26, 2023

Location: Jackfish 1





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS508
KIRBY NORTH
APRIL 2023

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

May 31, 2023



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	April 21, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:33	End time (MST):	12:46
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.18	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	<u>CC303554</u>			
Removed Cal Gas Conc:	49.18	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	<u>NA</u>		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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.997350	0.997420	Backgd or Offset:	19.6	19.5
Calibration intercept:	-0.929311	-0.728926	Coeff or Slope:	1.151	1.151

SO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.2	----
as found span	4919	81.3	799.6	799.2	1.001
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	799.6	797.3	1.003
second point	4959	40.7	400.3	397.5	1.007
third point	4980	20.3	199.7	198.7	1.005
as left zero	5000	0.0	0.0	-0.3	----
as left span	4919	81.3	799.6	800.0	1.000
Average Correction Factor					1.005

Baseline Corr As found:	799.40	Previous response	796.57	*% 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 sample inlet filter after as founds. No adjustments made.

Calibration Performed By: Braiden Boutilier



Wood Buffalo Environmental Association

SO₂ Calibration Summary

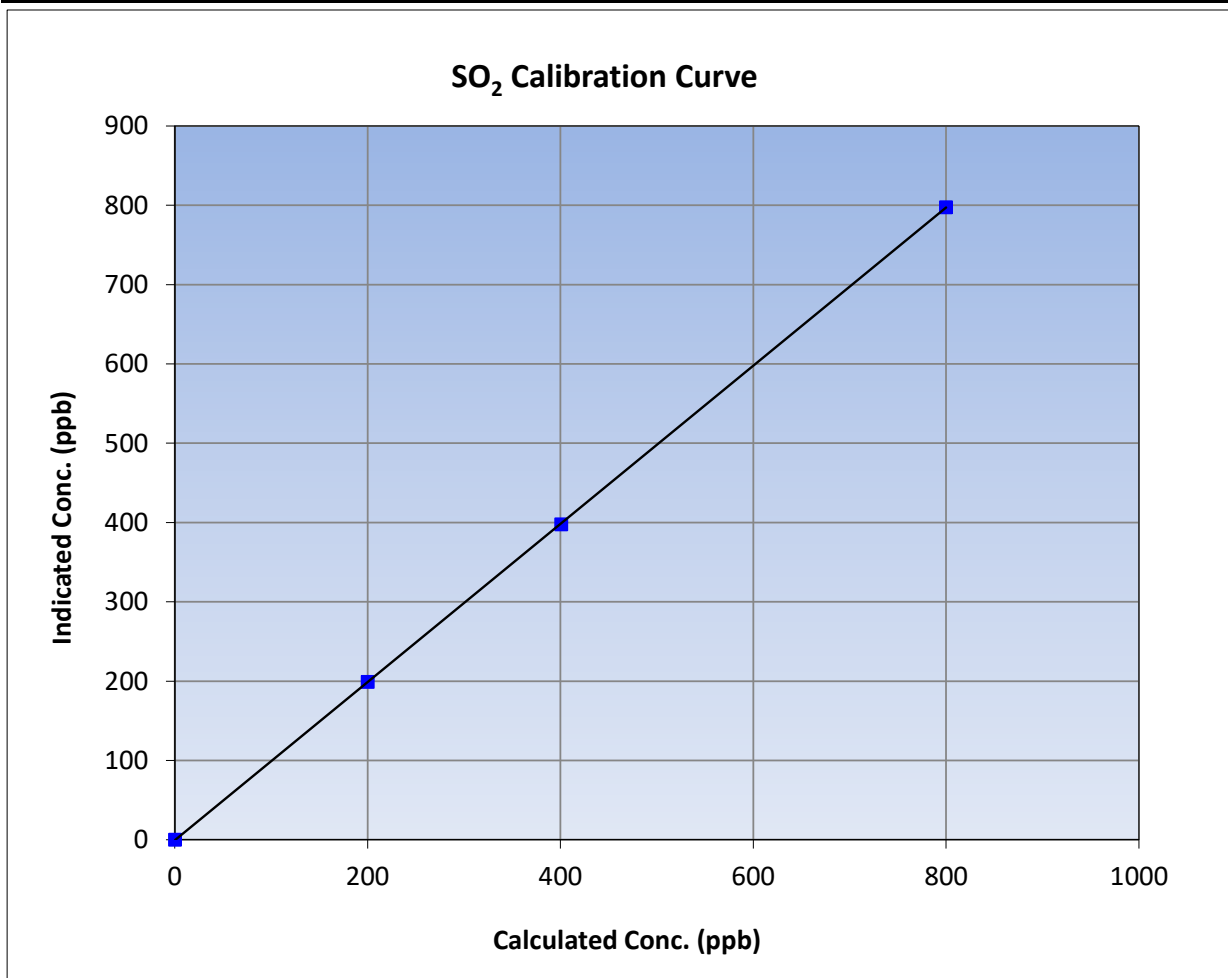
Version-01-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 9, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	9:33	End Time (MST):	12:46
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

Calibration Data

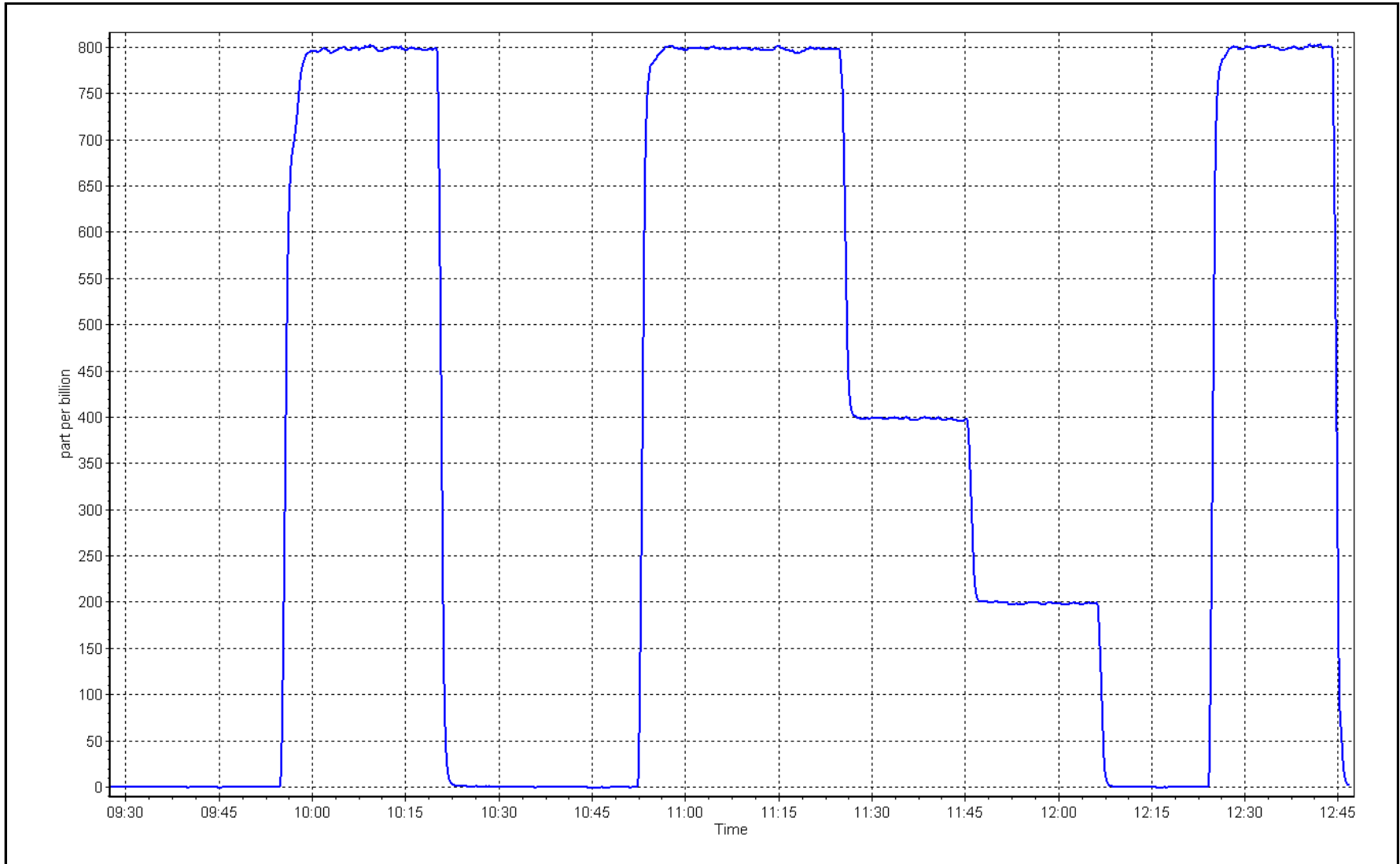
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.4	----	Correlation Coefficient	0.999995	≥0.995
799.6	797.3	1.0029			
400.3	397.5	1.0072	Slope	0.997420	0.90 - 1.10
199.7	198.7	1.0048			
			Intercept	-0.728926	+/-30



SO2 Calibration Plot

Date: April 21, 2023

Location: Kirby North





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name: Kirby North Station number: AMS508
 Calibration Date: April 19, 2023 Last Cal Date: March 9, 2023
 Start time (MST): 10:48 End time (MST): 16:14
 Reason: As Found

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

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Calibration slope:	1.007456		Backgd or Offset:	1.67 1.71
Calibration intercept:	-0.140937		Coeff or Slope:	1.009 1.114

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	-0.2	----
as found span	4923	77.4	80.0	78.4	1.018
as found 2nd point	4961	38.8	40.1	38.8	1.028
as found 3rd point	4981	19.3	19.9	19.2	1.028
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.4	80.0	80.3	0.996
second point					
third point					
as left zero					
as left span					
SO2 Scrubber Check	4920	79.8	798.0	0.1	----
Date of last scrubber change:	19-Apr-23			Ave Corr Factor	0.996
Date of last converter efficiency test:	efficiency				

Baseline Corr As found: 78.6 Prev response: 80.43 *% change: -2.3%
 Baseline Corr 2nd AF pt: 39.0 AF Slope: 0.983029 AF Intercept: -0.360848
 Baseline Corr 3rd AF pt: 19.4 AF Correlation: 0.999967

* = > +/-5% change initiates investigation

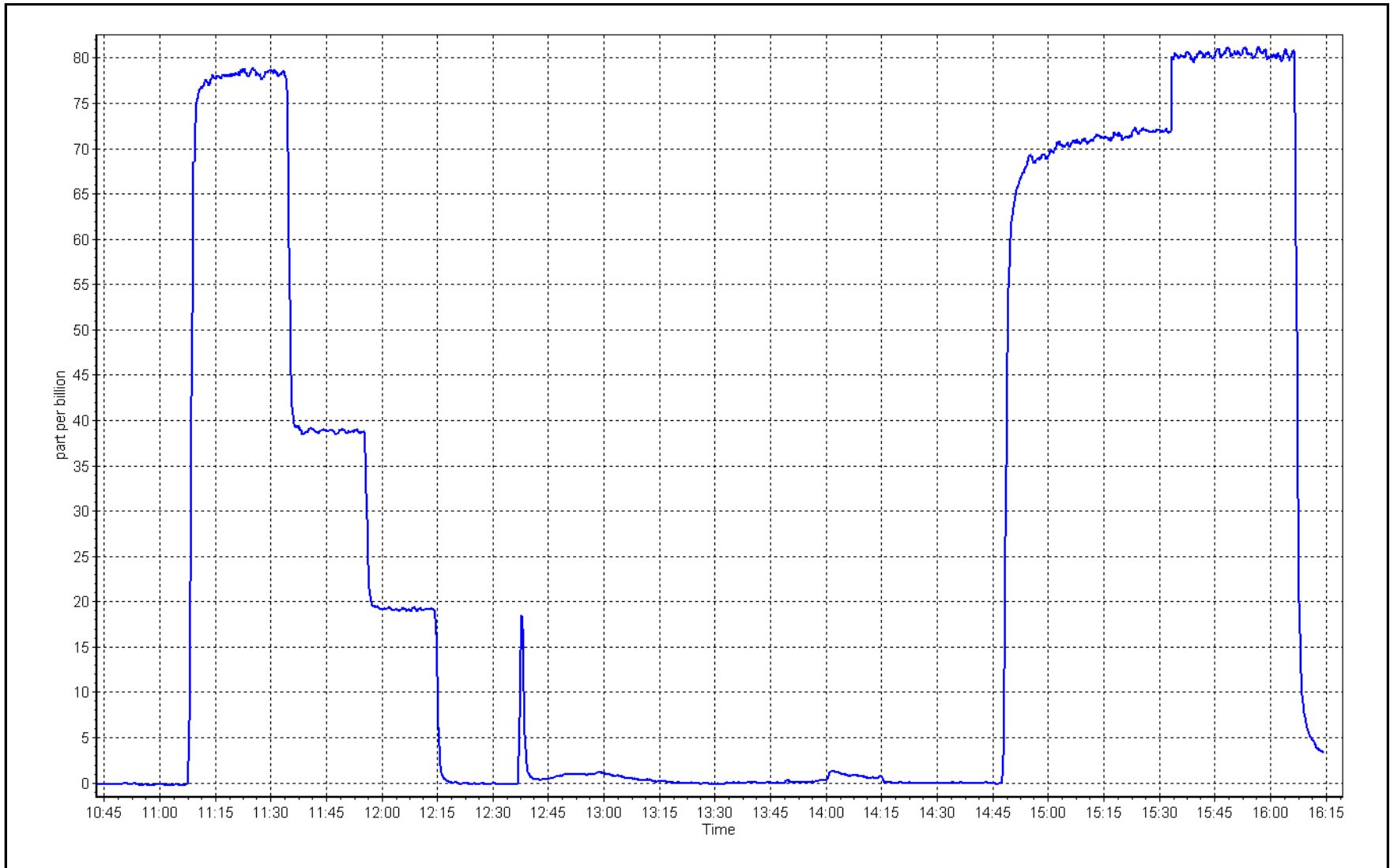
Notes: As founds completed. Replaced SOx scrubber, third scrubber check passed. Adjusted zero and span. The remaining portion of the calibration will be completed April 20, 2023.

Calibration Performed By: Braiden Boutillier

H₂S Calibration Plot

Date: April 19, 2023

Location: Kirby North





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	April 20, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	6:30	End time (MST):	9:14
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	<u>CC517378</u>			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	<u>NA</u>		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		

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.007456	1.001312	Backgd or Offset:	1.71	1.60
Calibration intercept:	-0.140937	-0.100838	Coeff or Slope:	1.114	1.046

H₂S 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)) <i>Limit = 0.90-1.10</i>
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					

H₂S 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) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.4	80.0	80.1	0.998
second point	4961	38.8	40.1	39.8	1.007
third point	4981	19.3	19.9	19.9	1.002
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.4	80.0	80.2	0.997

SO₂ Scrubber Check

Date of last scrubber change:	19-Apr-23	Ave Corr Factor	1.003
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: Completed calibration, as founds and scrubber check done April 19, 2023. Adjusted span.

Calibration Performed By: Braiden Boutillier



Wood Buffalo Environmental Association

H₂S Calibration Summary

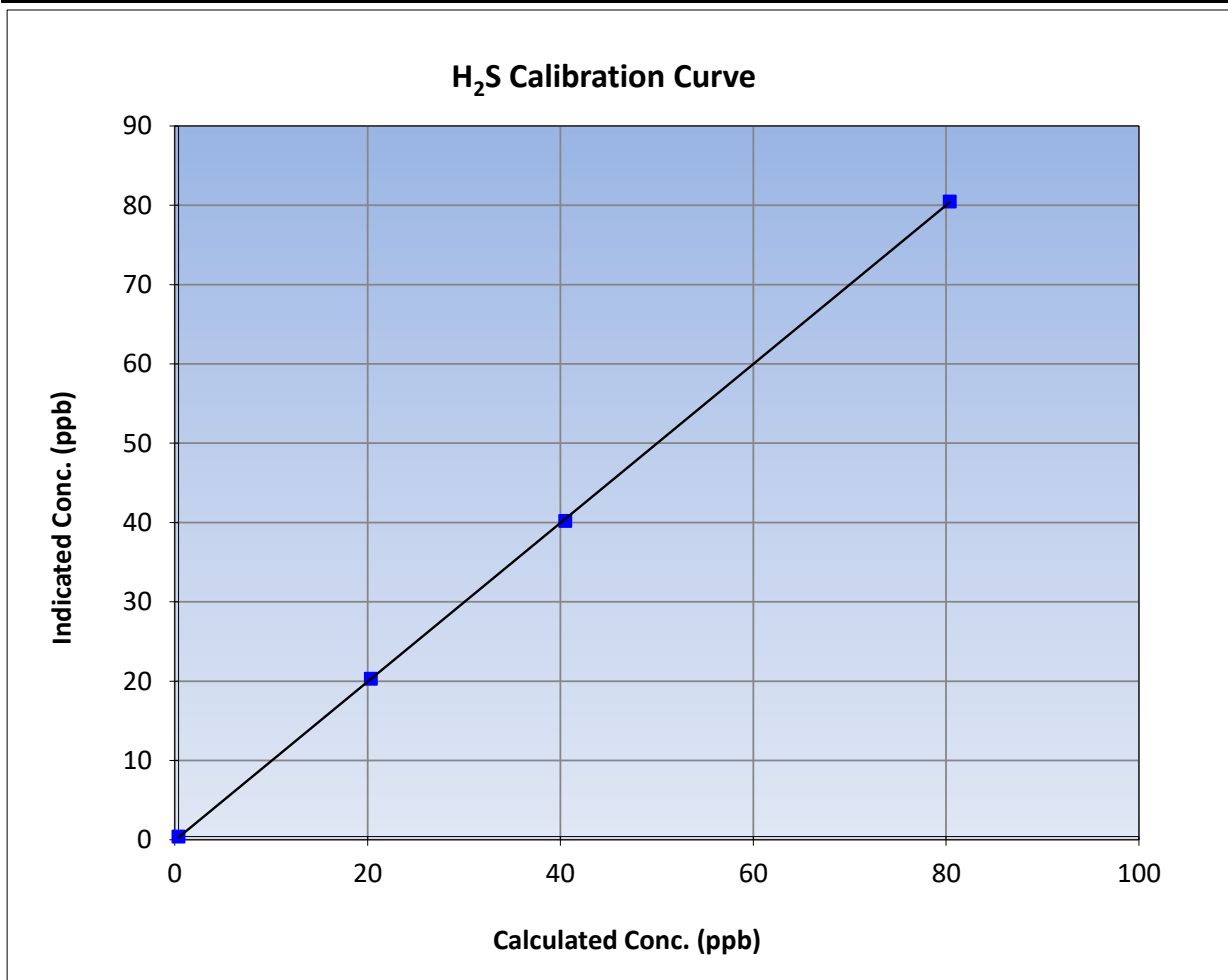
Version-11-2021

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	6:30	End Time (MST):	9:14
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

Calibration Data

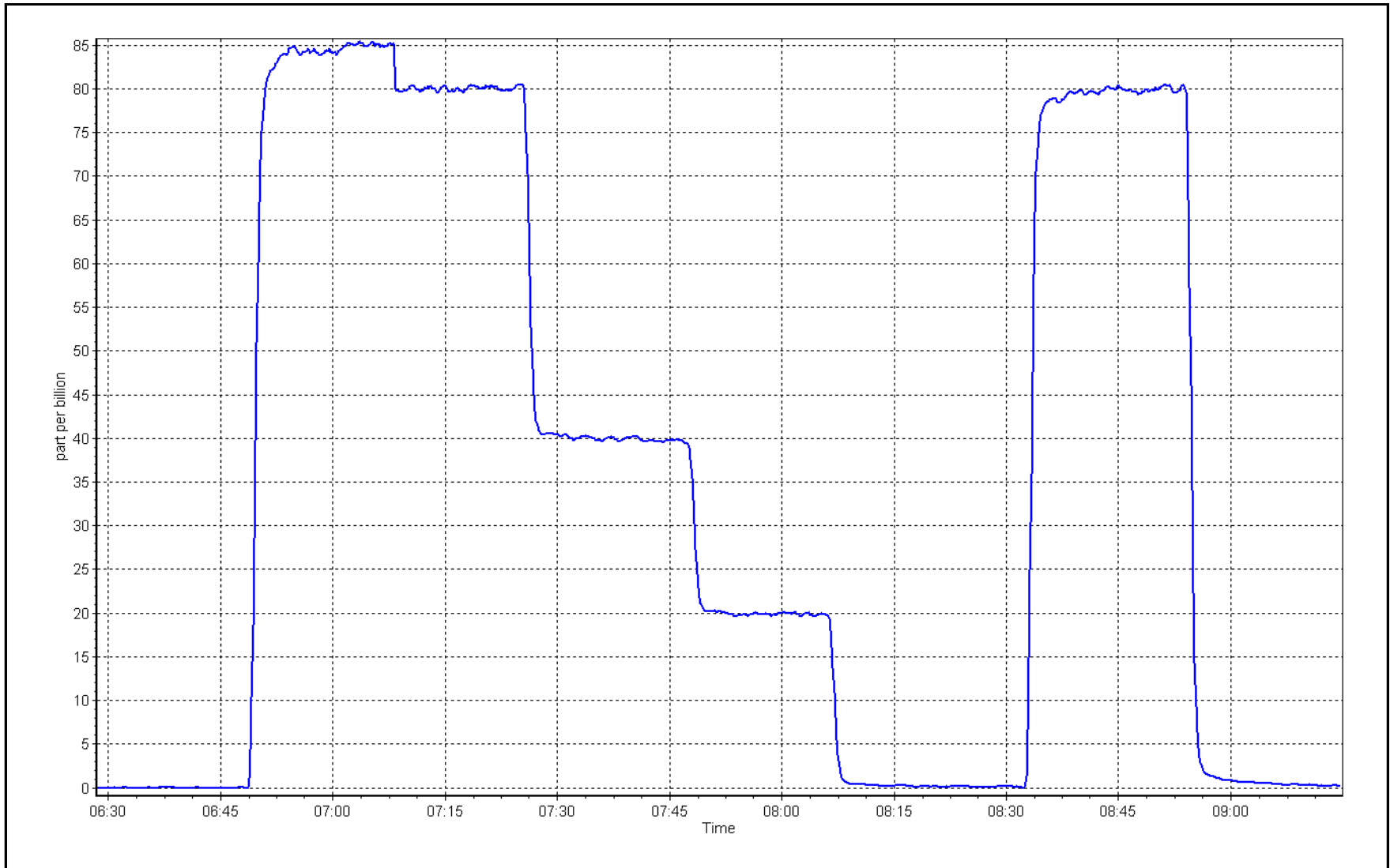
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.0	----	Correlation Coefficient	0.999975
80.0	80.1	0.9985		
40.1	39.8	1.0075	Slope	1.001312
19.9	19.9	1.0022		
			Intercept	-0.100838
				+/-3



H₂S Calibration Plot

Date: April 20, 2023

Location: Kirby North





Wood Buffalo Environmental Association

THC Calibration Summary

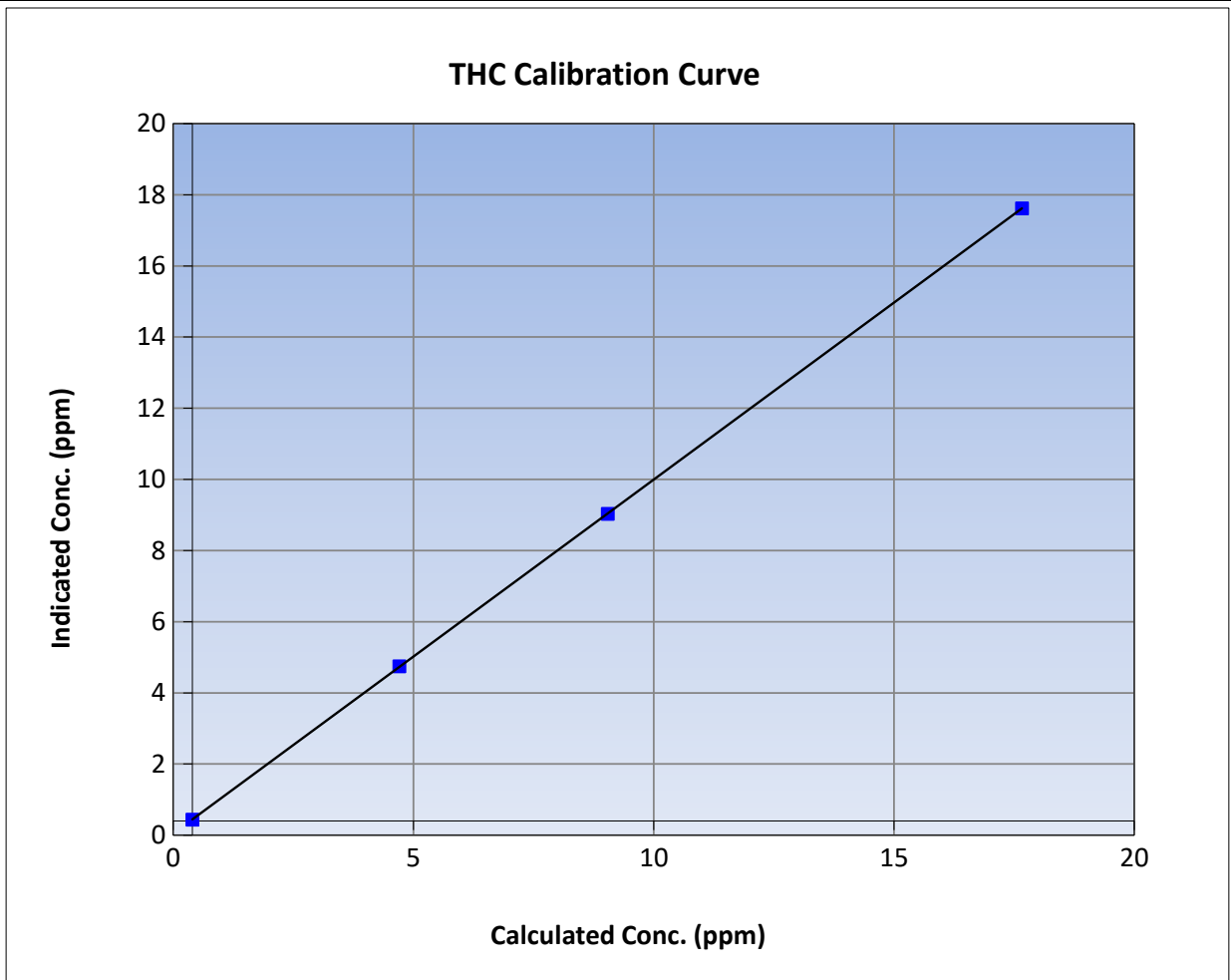
Version-01-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 9, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	9:33	End Time (MST):	12:46
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

Calibration Data

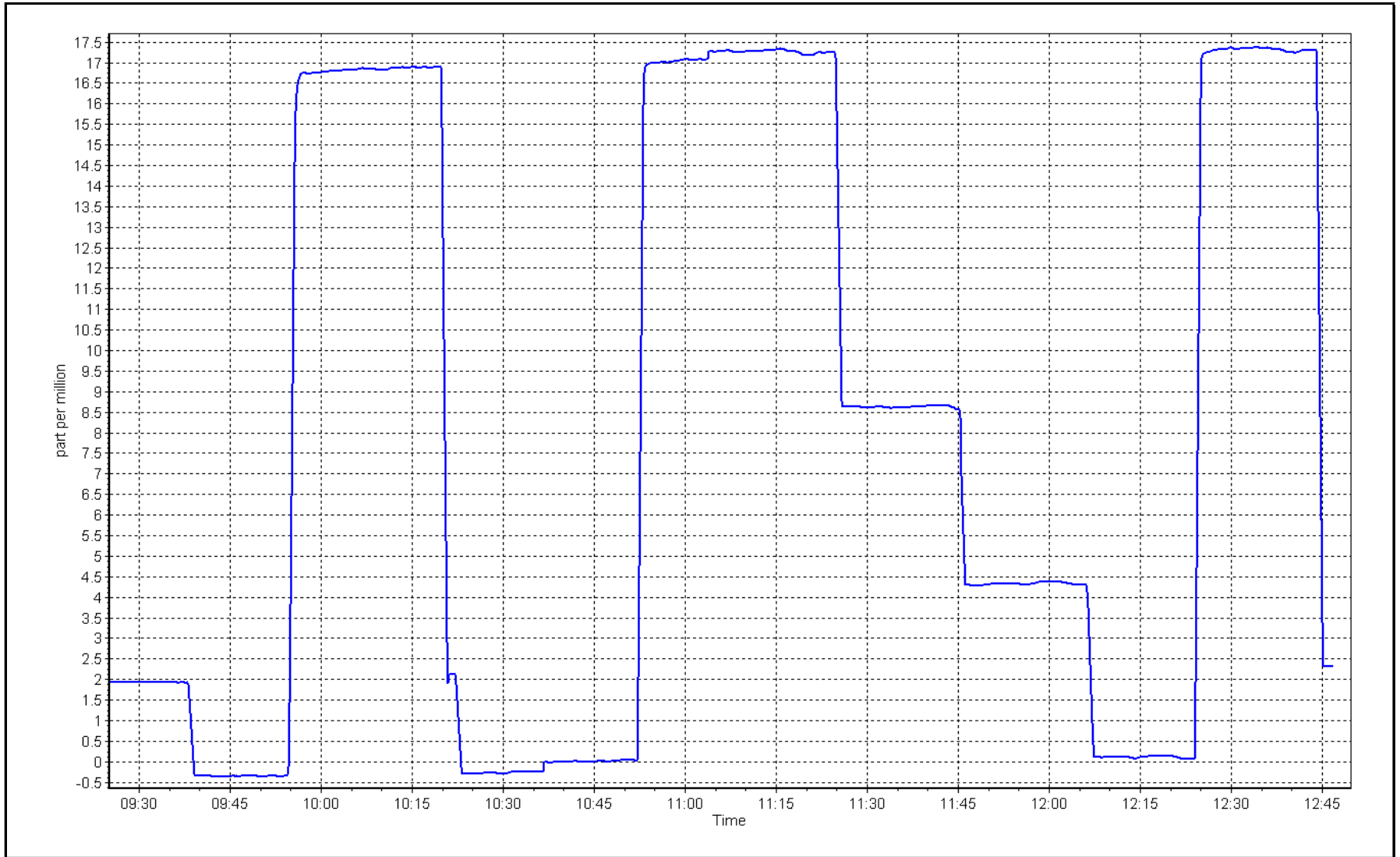
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	<u>Limits</u>	
0.00	0.04	----	Correlation Coefficient	0.999997	≥0.995
17.26	17.22	1.0025			
8.64	8.63	1.0015	Slope	0.994800	0.90 - 1.10
4.31	4.35	0.9911			
			Intercept	0.044805	+/-1.5



THC Calibration Plot

Date: April 21, 2023

Location: Kirby North





Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	April 20, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	8:53	End time (MST):	13:44
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:	API T200	Analyzer serial #:	7029
NOX Range (ppb):	0 - 1000 ppb		

	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.026	1.026	NO bkgnd or offset:	0.1 0.1
NOX coeff or slope:	1.023	1.023	NOX bkgnd or offset:	0.3 0.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.0 5.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.997146	0.999458
NO _x Cal Offset:	-1.392505	-0.151623
NO Cal Slope:	0.996559	1.001479
NO Cal Offset:	-2.174660	-1.633427
NO ₂ Cal Slope:	1.007853	1.001970
NO ₂ Cal Offset:	0.638504	1.001988



Wood Buffalo Environmental Association

NO_x \ NO \ NO₂ Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as found span	4919	81.0	800.1	794.1	6.0	795.6	787.6	8.0	1.0057	1.0083
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	81.0	800.1	794.1	6.0	799.4	794.4	5.0	1.0009	0.9997
second point	4960	40.5	400.0	397.0	3.0	400.2	395.4	4.8	0.9995	1.0041
third point	4980	20.2	199.5	198.0	1.5	198.7	194.9	3.8	1.0042	1.0161
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	4919	81.0	800.1	415.2	384.9	799.0	414.3	384.7	1.0014	1.0022
Average Correction Factor									1.0015	1.0066

Corrected As found	NO _x = 795.5 ppb	NO = 787.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO _x = -0.1%	
Previous Response	NO _x = 796.4 ppb	NO = 789.2 ppb		*Percent Change	NO = -0.2%	
Baseline Corr 2nd pt	NO _x = NA ppb	NO = NA ppb	As found	NO _x r ² :	Nx SI:	Nx Int:
Baseline Corr 3rd pt	NO _x = NA ppb	NO = NA ppb	As found	NO r ² :	NO SI:	NO Int:
			As found	NO ₂ r ² :	NO ₂ SI:	NO ₂ Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO ₂ concentration (ppb) (Ic)	NO ₂ Correction factor (Cc/Ic) <i>Calibration Limit = 0.95-1.05</i> <i>As Found Limit = 0.90-1.10</i>	Converter Efficiency <i>Calibration Limit = 96-104%</i>
as found GPT zero						
as found GPT point (400 ppb NO ₂)						
as found GPT point (200 ppb NO ₂)						
as found GPT point (100 ppb NO ₂)						
1st GPT point (400 ppb O ₃)	791.5	412.6	384.9	386.0	0.9971	100.3%
2nd GPT point (200 ppb O ₃)	791.5	608.3	189.2	191.6	0.9874	101.3%
3rd GPT point (100 ppb O ₃)	791.5	706.7	90.8	92.6	0.9805	102.0%
Average Correction Factor					0.9884	101.2%

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

Calibration Performed By: Braiden Boutilier



Wood Buffalo Environmental Association

NO_x Calibration Summary

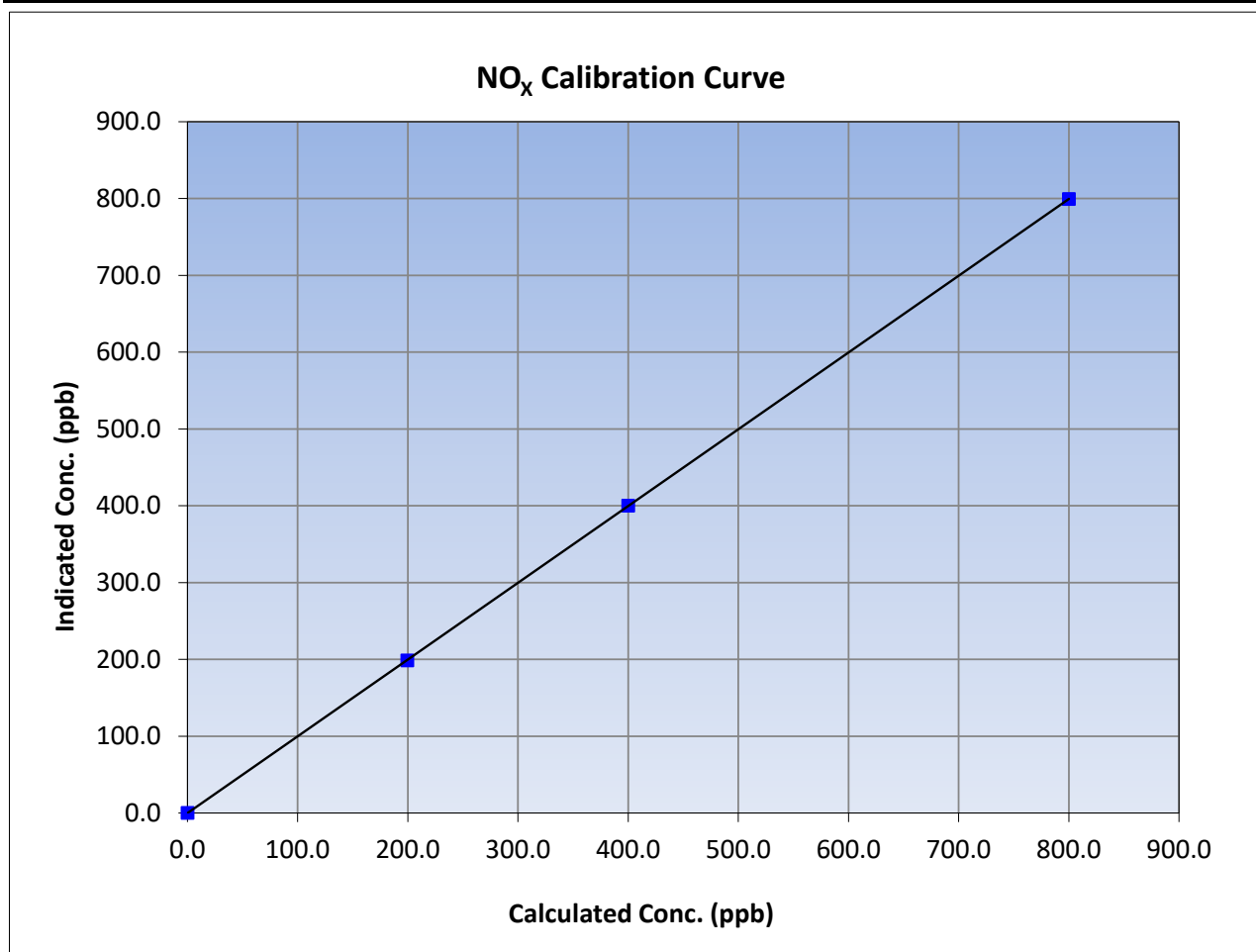
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 8, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:53	End Time (MST):	13:44
Analyzer make:	API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
800.1	799.4	1.0009			
400.0	400.2	0.9995			
199.5	198.7	1.0042			
			Slope	0.999458	0.90 - 1.10
			Intercept	-0.151623	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-04-2020

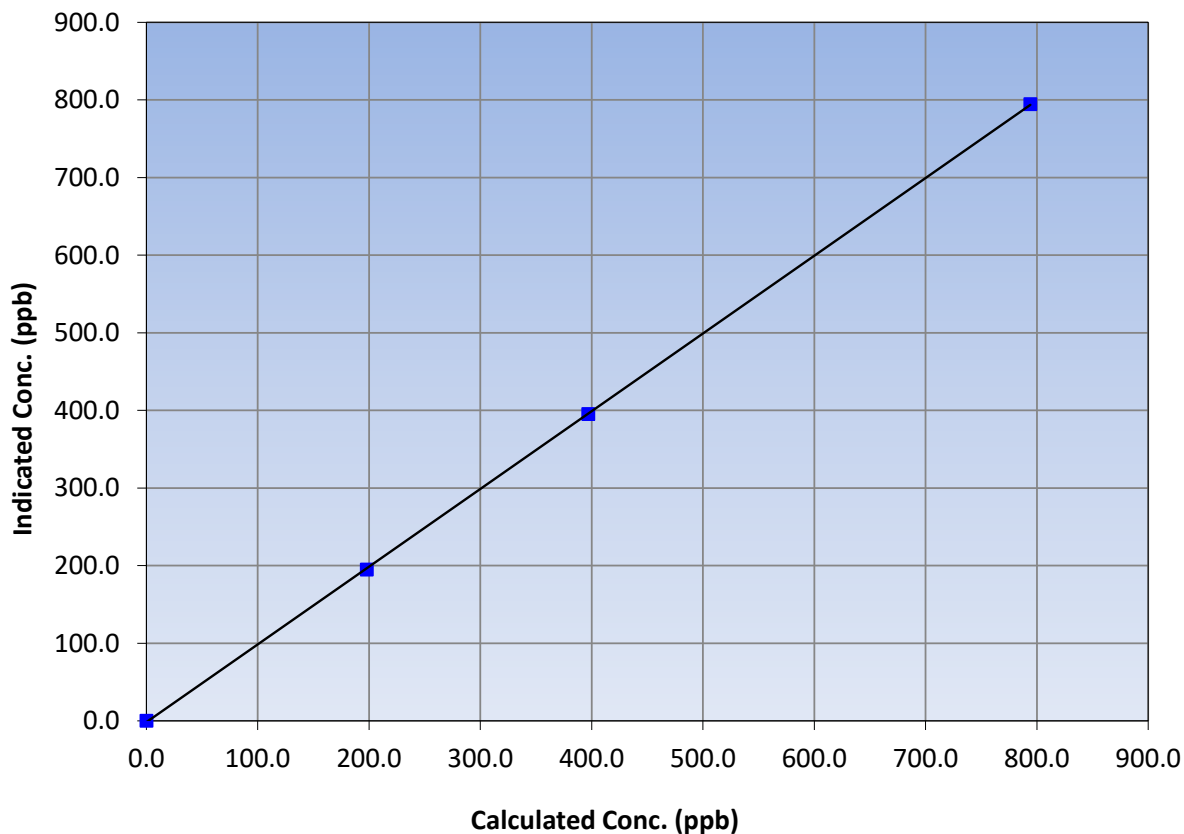
Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 8, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:53	End Time (MST):	13:44
Analyzer make:	API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
794.1	794.4	0.9997		
397.0	395.4	1.0041		
198.0	194.9	1.0161		
			0.999980	
			1.001479	
			-1.633427	

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-04-2020

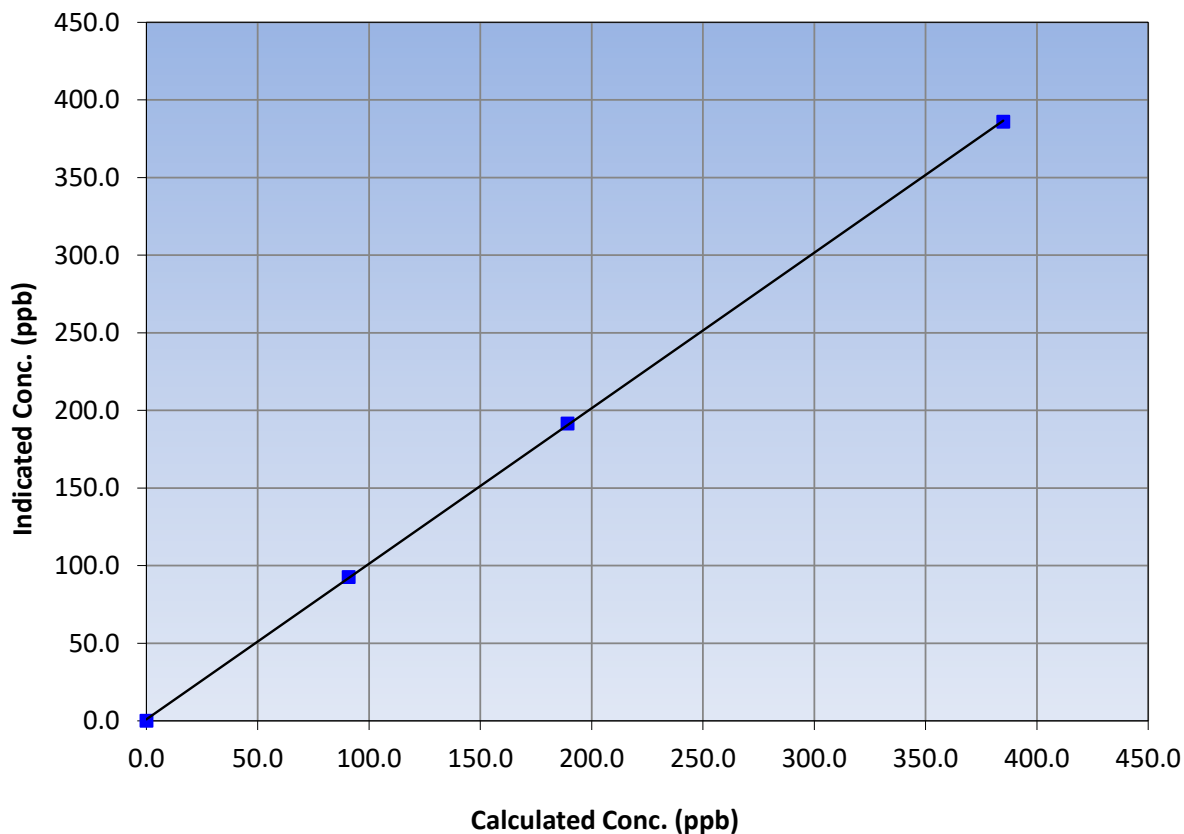
Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 8, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:53	End Time (MST):	13:44
Analyzer make:	API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
384.9	386.0	0.9971		
189.2	191.6	0.9874		
90.8	92.6	0.9805		

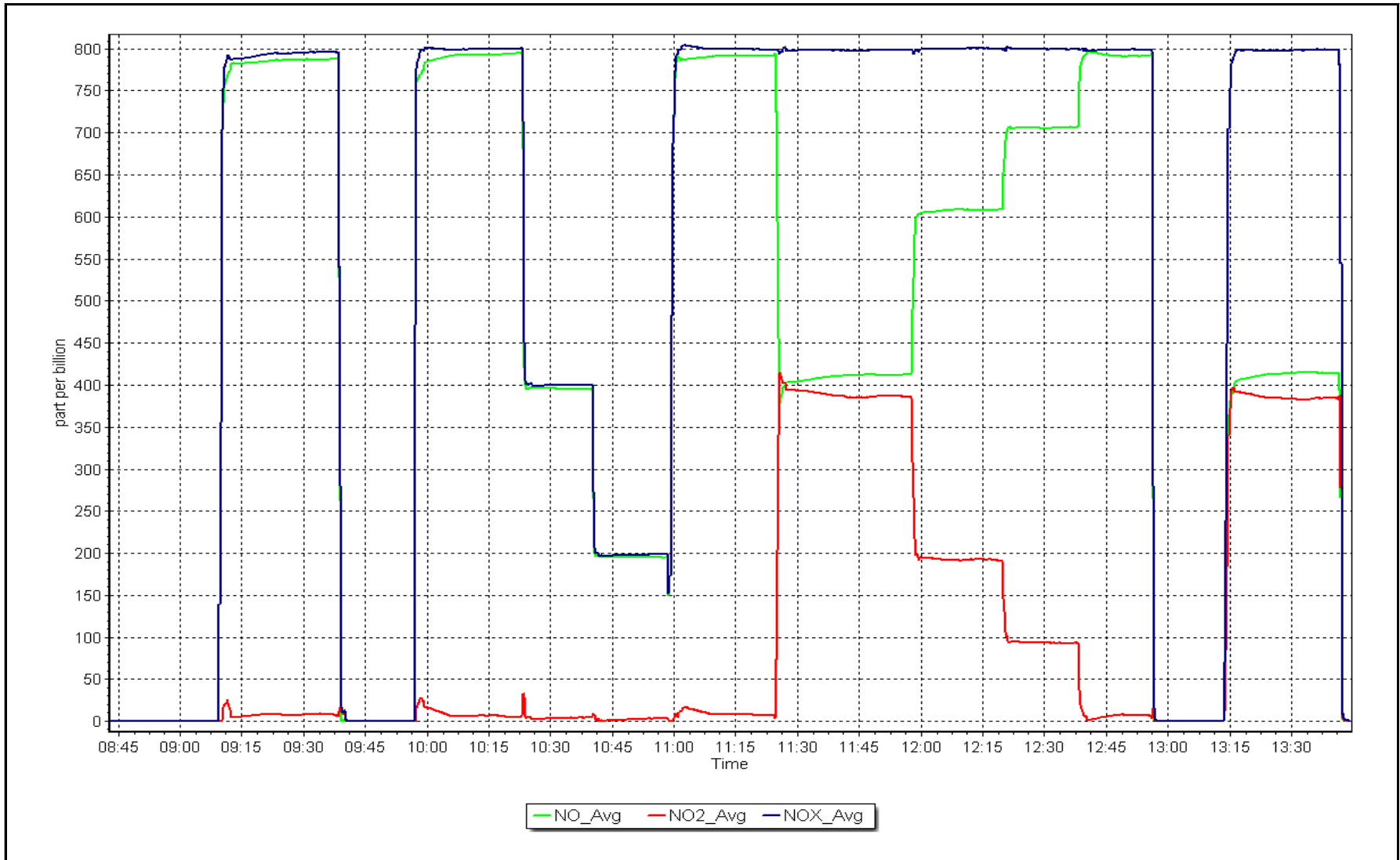
NO₂ Calibration Curve



NO_x Calibration Plot

Date: April 20, 2023

Location: Kirby North





End of Report