WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

JANUARY 2024

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

February 29, 2024

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

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	January 11, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	11:21	End time (MST):	14:54
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.21	ppm	Cal Gas Exp Date:	March 10, 2031
Cal Gas Cylinder #:	CC418809			
Removed Cal Gas Conc:	49.21	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3565
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998738	0.999624	Backgd or Offset:	20.0	19.6
Calibration intercept:	-0.153291	-0.113430	Coeff or Slope:	0.887	0.891

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4918	81.3	800.3	794.3	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4918	81.3	800.3	800.2	1.000
second point	4959	40.7	400.6	399.8	1.002
third point	4979	20.3	199.8	199.3	1.003
as left zero	5000	0.0	0.0	0.4	----
as left span	4918	81.3	800.3	801.2	0.999
				Average Correction Factor	1.002

Baseline Corr As found:	794.20	Previous response	799.10	*% 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 span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

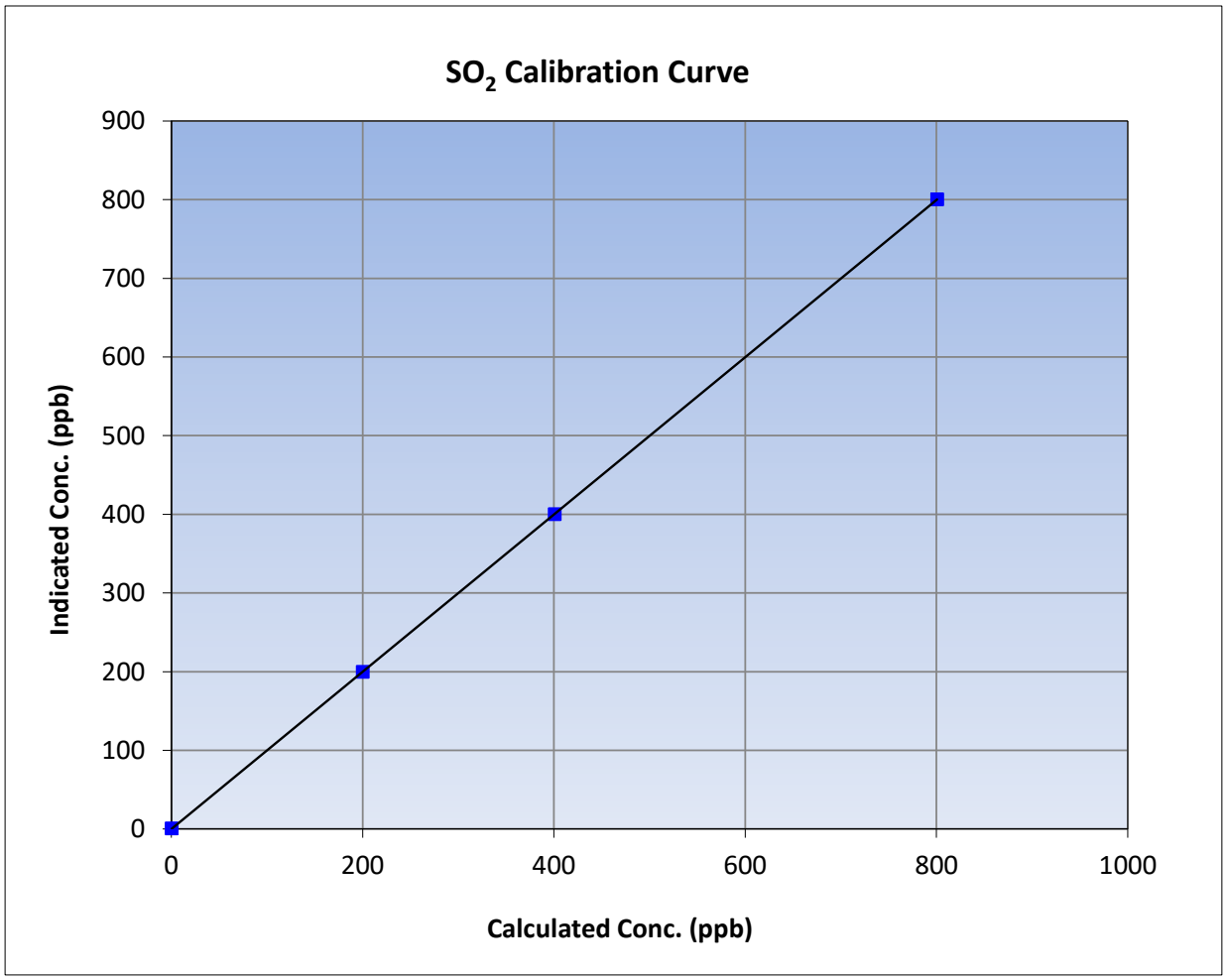
Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:21	End Time (MST):	14:54
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

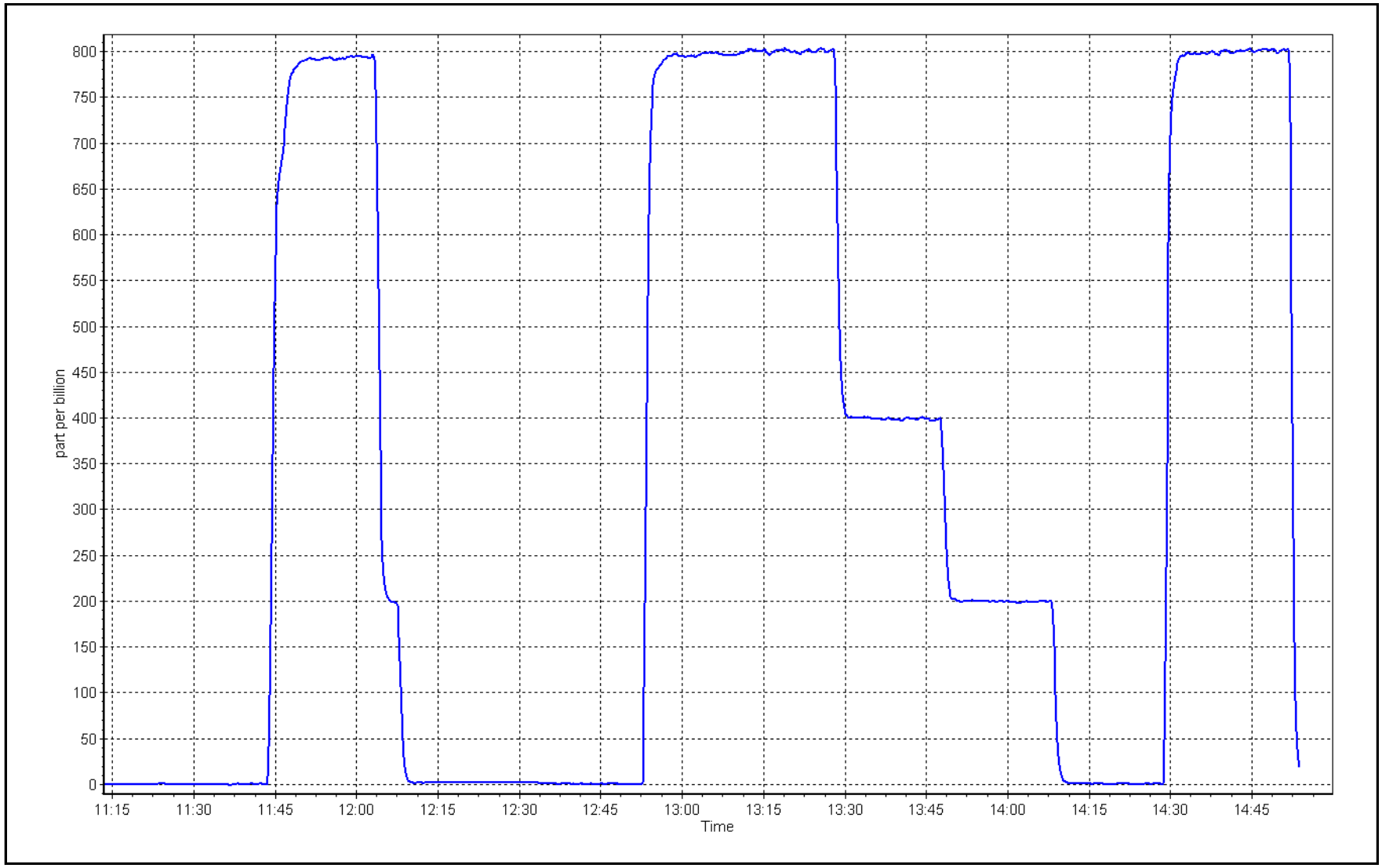
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.3	800.2	1.0001
400.6	399.8	1.0020
199.8	199.3	1.0026

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.999624	*0.90 - 1.10*
Intercept	-0.113430	*+/-30*



SO2 Calibration Plot Date: December 13, 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:	January 25, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	11:01	End time (MST):	16:52
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:	4890

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153461	
Converter make:	CD Nova		Converter serial #:	470	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999507	0.994364	Backgd or Offset:	2.25	2.32
Calibration intercept:	0.219996	0.300000	Coeff or Slope:	0.904	0.937

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.4	80.0	77.6	1.032
as found 2nd point	4960	39.2	40.0	38.8	1.034
as found 3rd point	4980	19.6	20.0	19.4	1.036
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	79.8	1.002
second point	4960	39.2	40.0	40.1	0.997
third point	4980	19.6	20.0	20.3	0.985
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	78.4	80.0	79.1	1.011
SO2 Scrubber Check	4919	81.3	813.0	0.1	----
Date of last scrubber change:		December 17, 2021		Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.5	Prev response:	80.17	*% change:	-3.5%
Baseline Corr 2nd AF pt:	38.7	AF Slope:	0.969076	AF Intercept:	0.060000
Baseline Corr 3rd AF pt:	19.3	AF Correlation:	0.999999		

* = > +/-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

TRS Calibration Summary

Version-11-2021

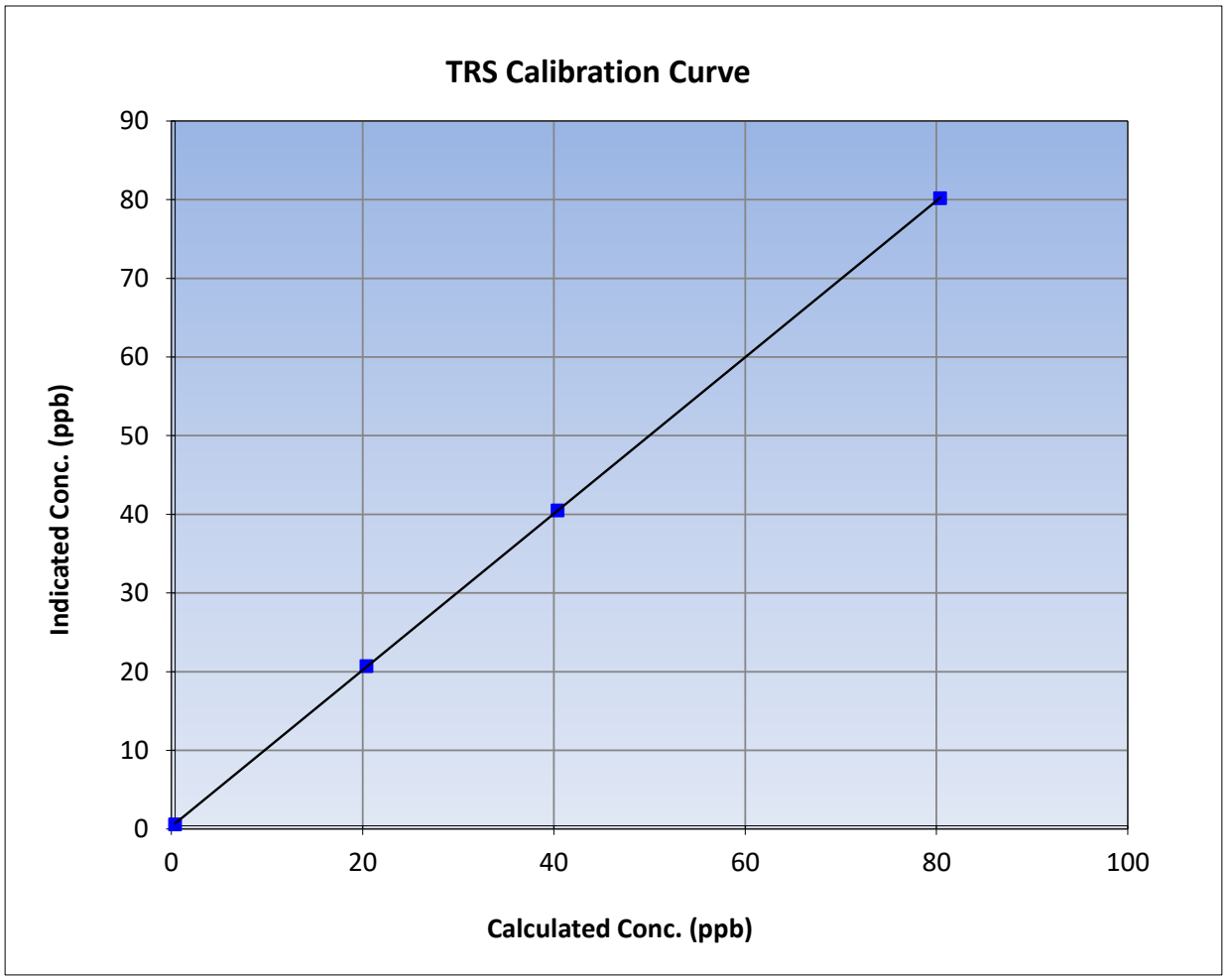
Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	December 12, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:01	End Time (MST):	16:52
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

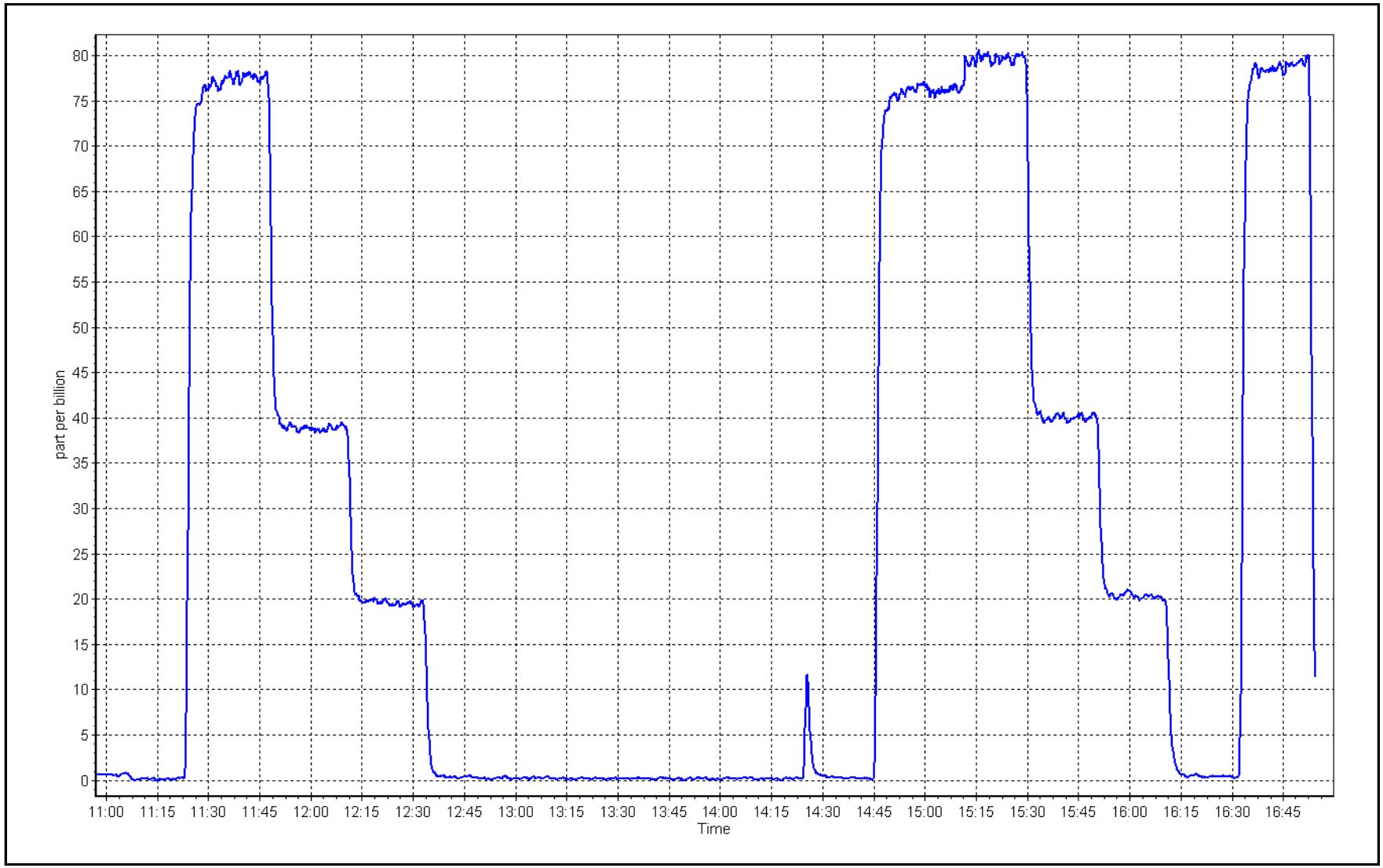
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.8	1.0024
40.0	40.1	0.9975
20.0	20.3	0.9851

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	0.994364	*0.90 - 1.10*
Intercept	0.300000	*+/-3*



TRS Calibration Plot Date: January 25, 2024 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	January 25, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	11:01	End time (MST):	16:52
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:	4890

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1200326167	
Converter make:	Global		Converter serial #:	2022-221	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.985566	0.998712	Backgd or Offset:	1.72	2.45
Calibration intercept:	0.536834	0.176812	Coeff or Slope:	1.009	0.992

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4922	78.4	80.0	78.2	1.026
as found 2nd point	4960	39.2	40.0	39.7	1.015
as found 3rd point	4980	19.6	20.0	20.1	1.010
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4922	78.4	80.0	80.1	0.998
second point	4960	39.2	40.0	40.1	0.997
third point	4980	19.6	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	78.4	80.0	79.9	1.001
SO2 Scrubber Check	4919	81.3	813.0	0.1	----
Date of last scrubber change:		January 25, 2024		Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.9	Prev response:	79.34	*% change:	-1.9%
Baseline Corr 2nd AF pt:	39.4	AF Slope:	0.973468	AF Intercept:	0.516858
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999955		

* = > +/-5% change initiates investigation

Notes: Inlet filter change and scrubber check completed after as founds. Replaced the converter. Changed out the scrubber beads. Removed the hydrator. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

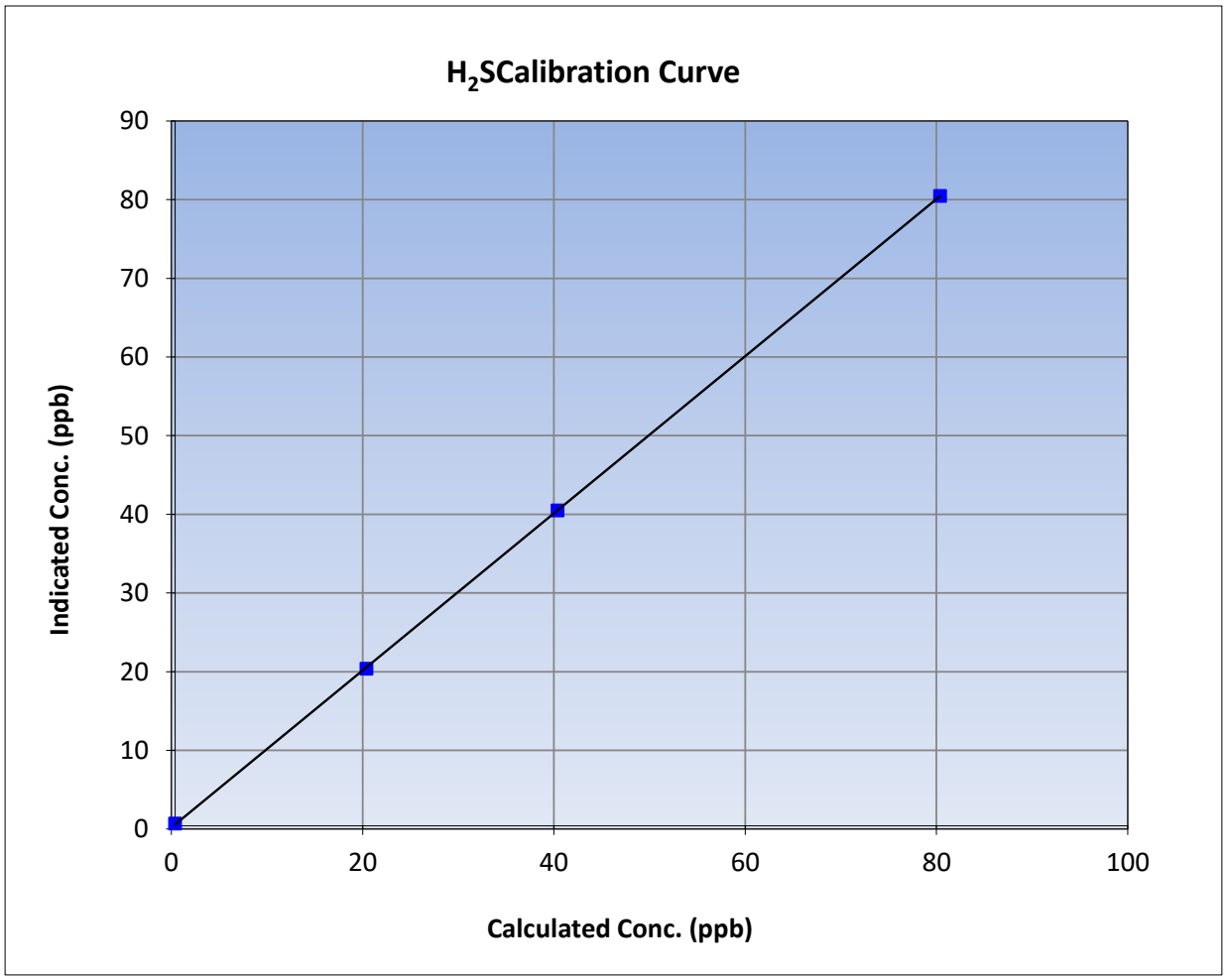
Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	December 12, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:01	End Time (MST):	16:52
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

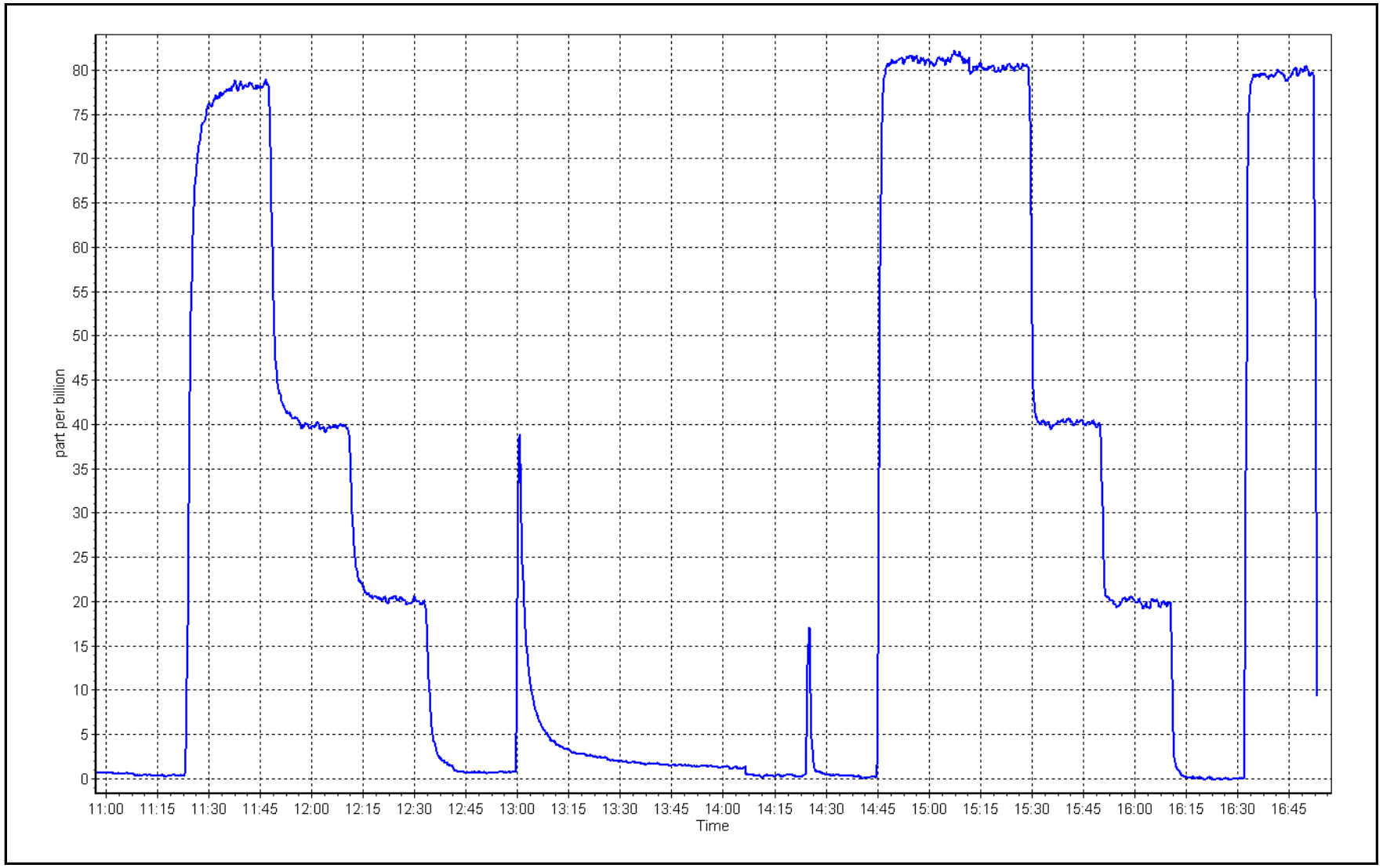
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	80.1	0.9985
40.0	40.1	0.9975
20.0	20.0	0.9999

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.998712	*0.90 - 1.10*
Intercept	0.176812	*+/-3*



H_2S Calibration Plot Date: January 25, 2024 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	January 11, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	11:21	End time (MST):	14:54
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC418809	Cal Gas Expiry Date:	March 10, 2031	
CH4 Cal Gas Conc.	497.2	ppm	CH4 Equiv Conc.	1061.8	ppm
C3H8 Cal Gas Conc.	205.3	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.2	ppm	CH4 Equiv Conc.	1061.8	ppm
Removed C3H8 Conc.	205.3	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3565	
ZAG make/model:	Teledyne API T701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320040	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.04E-04	4.37E-04	NMHC SP Ratio:	7.01E-05	7.11E-05
CH4 Retention time:	14.6	16.7	NMHC Peak Area:	131151	129269
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	17.27	17.46	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.27	17.21	1.003
second point	4959	40.7	8.64	8.53	1.013
third point	4980	20.3	4.31	4.27	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.27	17.43	0.990
				Average Correction Factor	1.009
Baseline Corr AF:	17.46	Prev response	17.16	*% change	1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.18	9.38	0.978
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	9.18	9.15	1.003
second point	4959	40.7	4.60	4.57	1.007
third point	4980	20.3	2.29	2.29	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	9.18	9.29	0.989
				Average Correction Factor	1.004
Baseline Corr AF:	9.38	Prev response	9.12	*% change	2.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	8.07	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.07	1.002
second point	4959	40.7	4.05	3.97	1.020
third point	4980	20.3	2.02	1.98	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.15	0.993
				Average Correction Factor	1.014
Baseline Corr AF:	8.07	Prev response	8.04	*% 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

	Start	***Finish***
THC Cal Slope:	0.997839	0.996788
THC Cal Offset:	-0.066185	-0.028998
CH4 Cal Slope:	1.002253	0.998653
CH4 Cal Offset:	-0.062393	-0.029405
NMHC Cal Slope:	0.994150	0.996266
NMHC Cal Offset:	-0.004590	-0.001592

Notes: Changed out the inlet filter after as founds. Lowered the carrier run pressure and adjusted the window timings. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

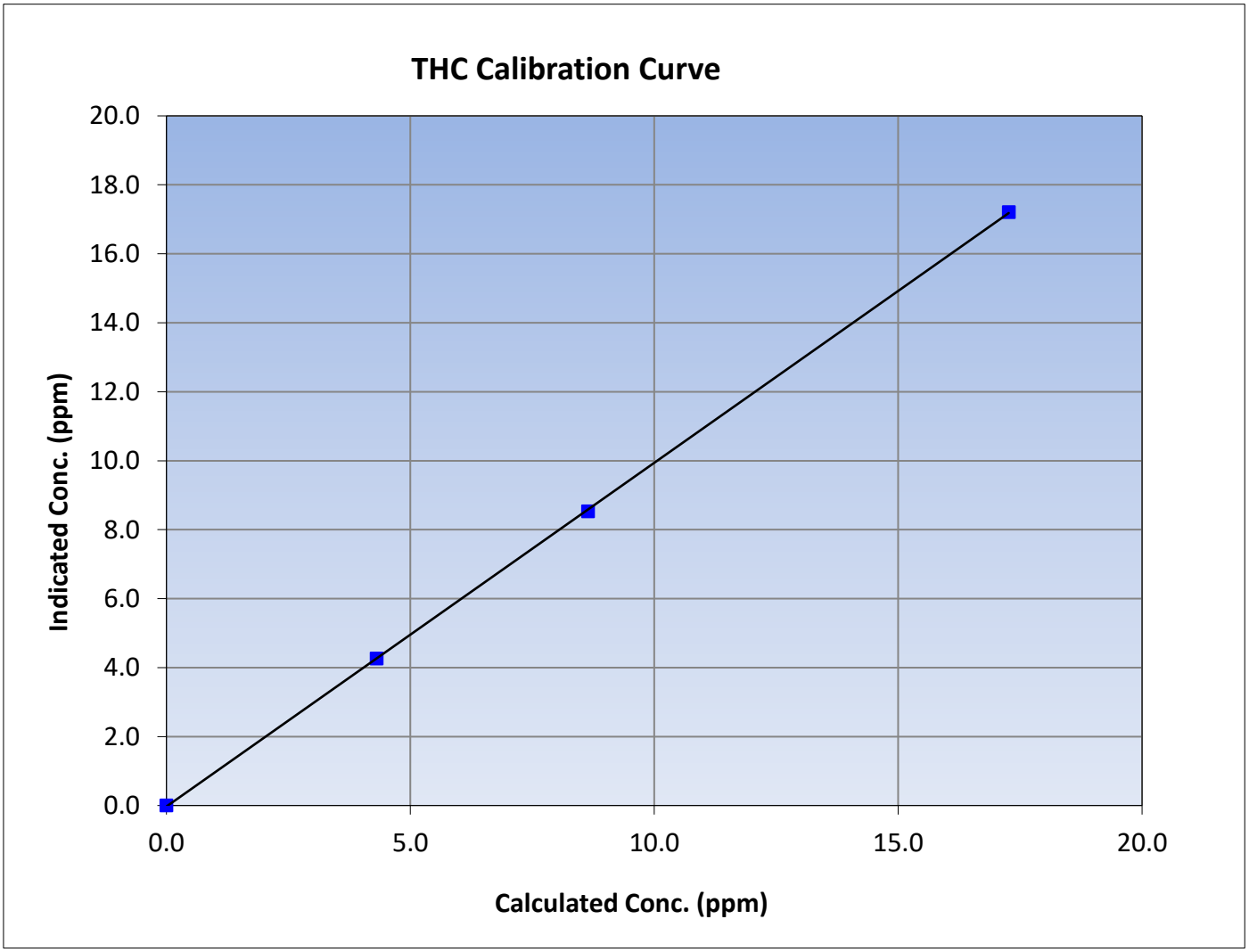
Version-06-2022

Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:21	End Time (MST):	14:54
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999972	*≥0.995*
17.27	17.21	1.0033			
8.64	8.53	1.0129	Slope	0.996788	*0.90 - 1.10*
4.31	4.27	1.0107			
			Intercept	-0.028998	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

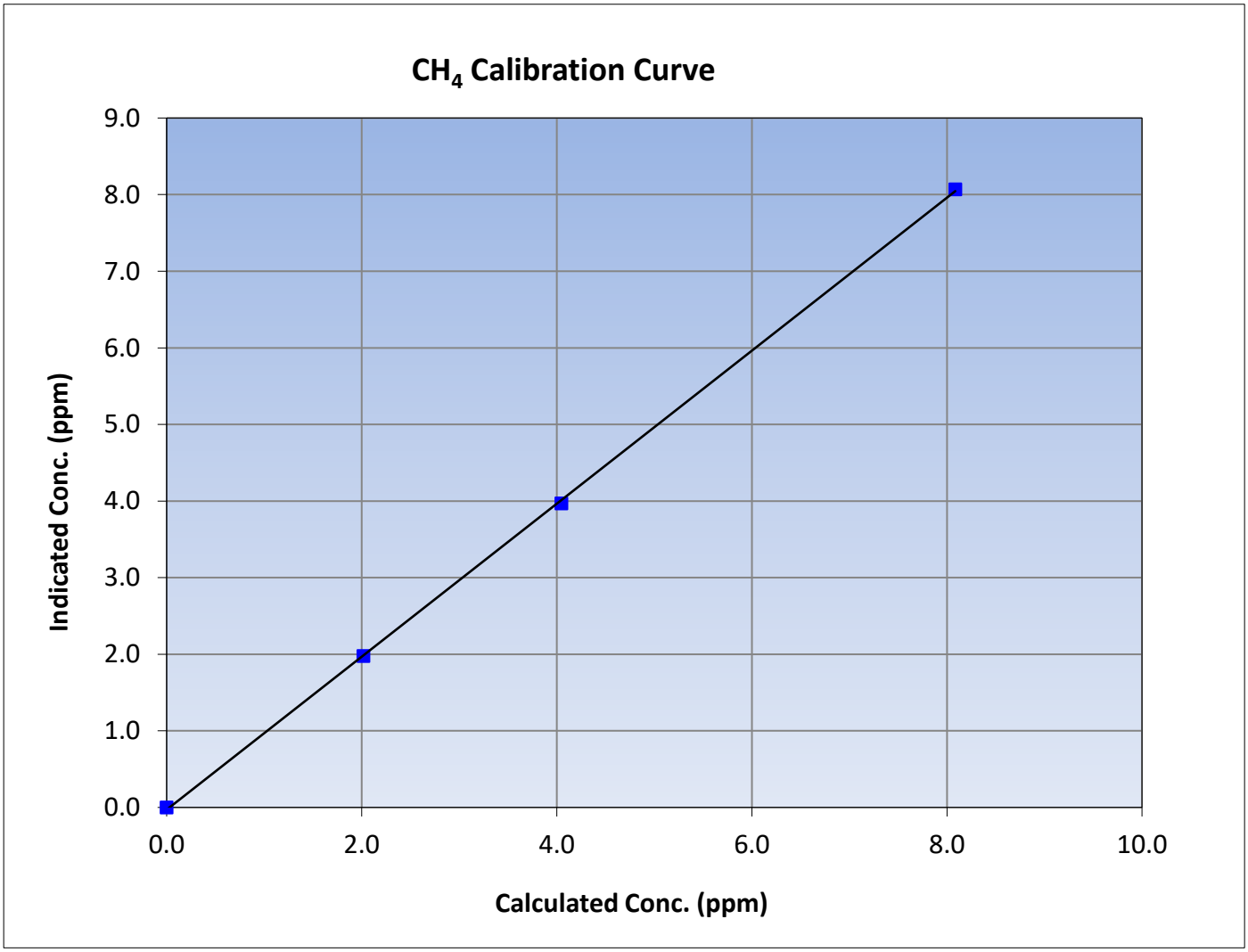
Version-06-2022

Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:21	End Time (MST):	14:54
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999900	*≥0.995*
8.09	8.07	1.0019			
4.05	3.97	1.0200	Slope	0.998653	*0.90 - 1.10*
2.02	1.98	1.0211			
			Intercept	-0.029405	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

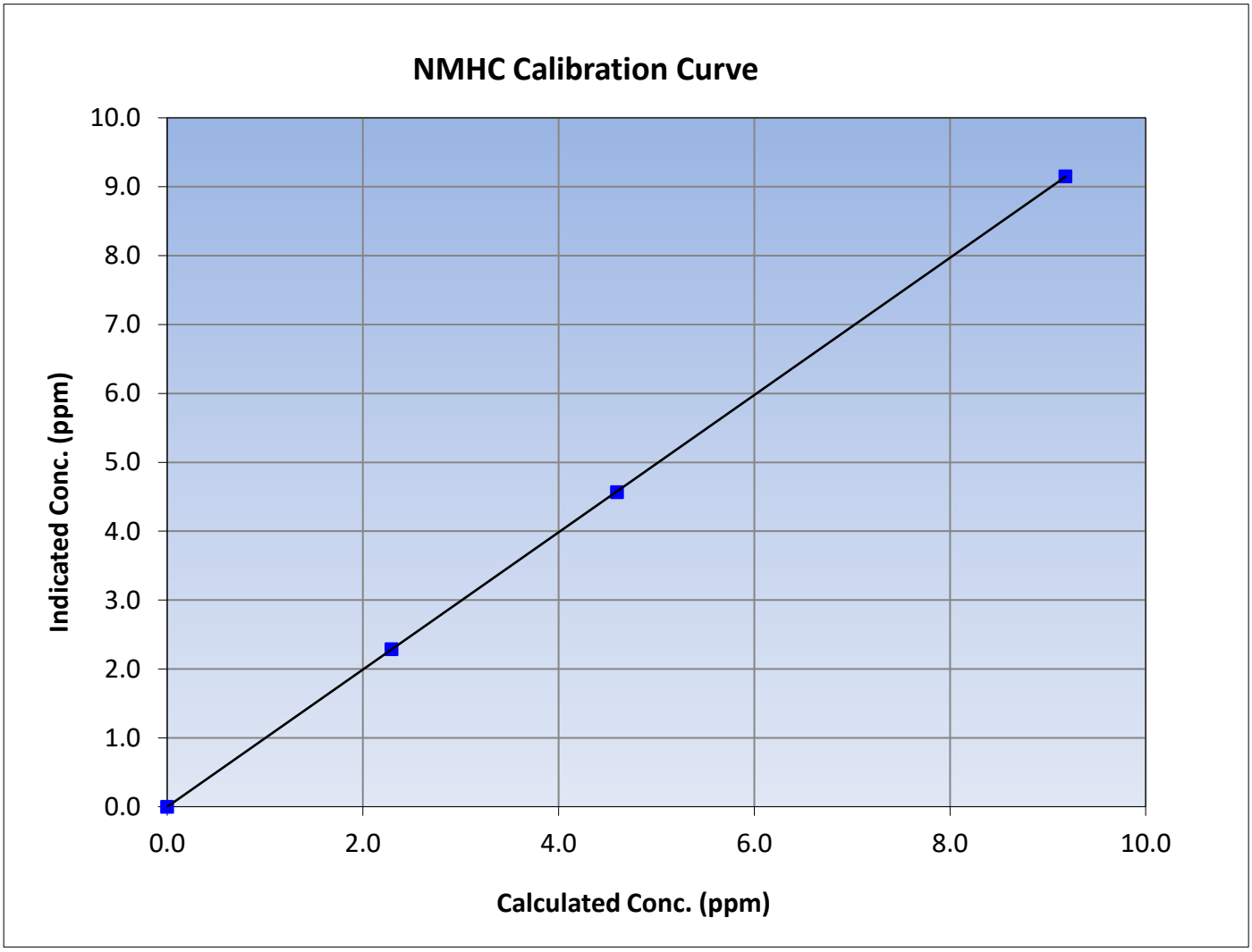
Version-06-2022

Station Information

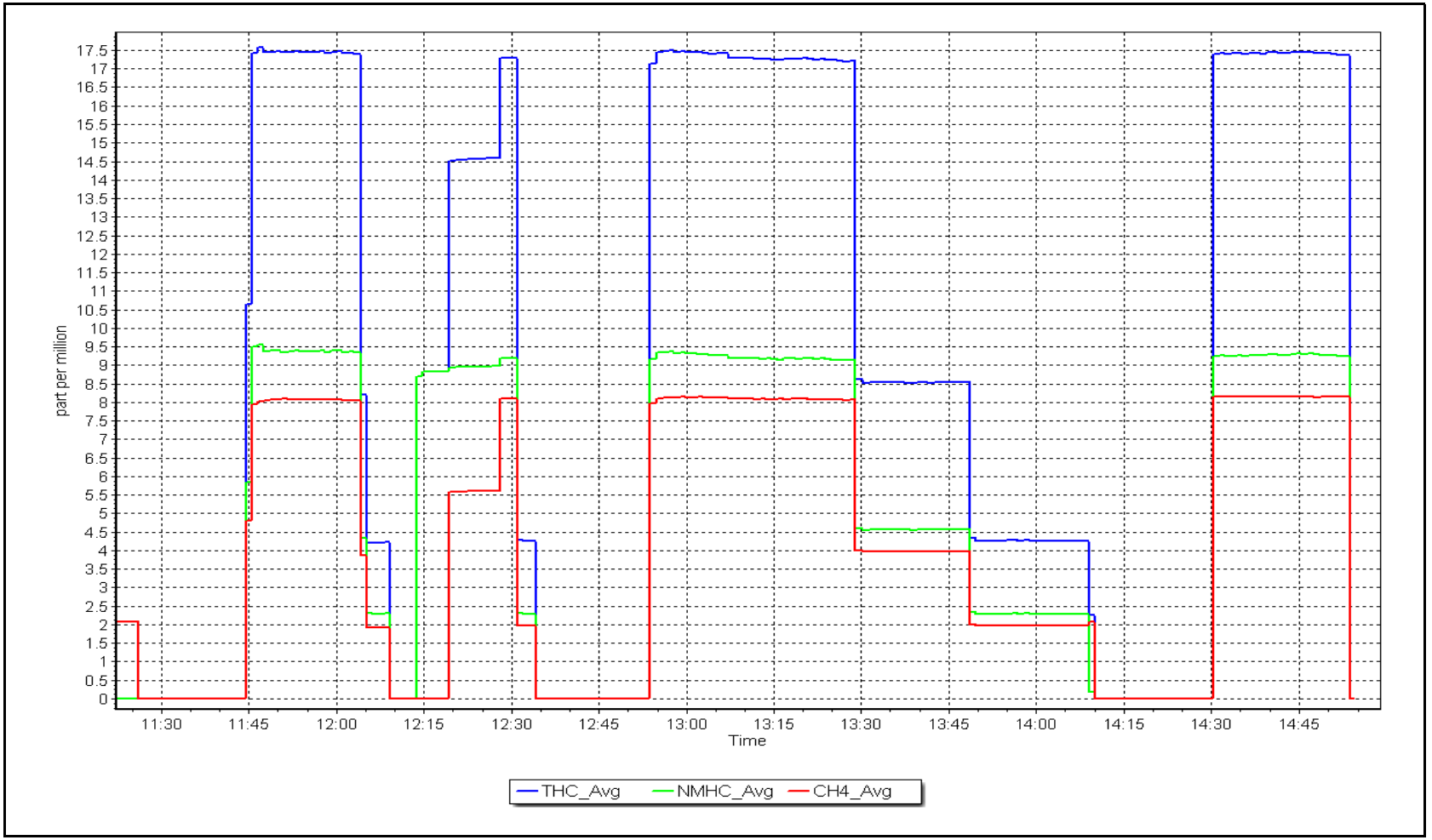
Calibration Date:	January 11, 2024	Previous Calibration:	December 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:21	End Time (MST):	14:54
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
9.18	9.15	1.0034			
4.60	4.57	1.0068	Slope	0.996266	*0.90 - 1.10*
2.29	2.29	1.0018			
			Intercept	-0.001592	*+/-0.5*



NMHC Calibration Plot Date: January 11, 2024 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	January 22, 2024	Last Cal Date:	January 11, 2024
Start time (MST):	11:08	End time (MST):	15:30
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC418809	Cal Gas Expiry Date:	March 10, 2031	
CH4 Cal Gas Conc.	497.2	ppm	CH4 Equiv Conc.	1061.8	ppm
C3H8 Cal Gas Conc.	205.3	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.2	ppm	CH4 Equiv Conc.	1061.8	ppm
Removed C3H8 Conc.	205.3	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3565	
ZAG make/model:	Teledyne API T701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320040	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	4.37E-04	4.37E-04	NMHC SP Ratio:	7.11E-05	7.11E-05
CH4 Retention time:	16.7	16.7	NMHC Peak Area:	129269	129269
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	17.27	17.61	0.980
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.27	19.66	0.878
				Average Correction Factor	
Baseline Corr AF:	17.61	Prev response	17.18	*% change	2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.18	9.33	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	9.18	10.61	0.865
				Average Correction Factor	
Baseline Corr AF:	9.33	Prev response	9.15	*% change	1.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	8.29	0.976
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	9.05	0.893
				Average Correction Factor	
Baseline Corr AF:	8.29	Prev response	8.05	*% change	2.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

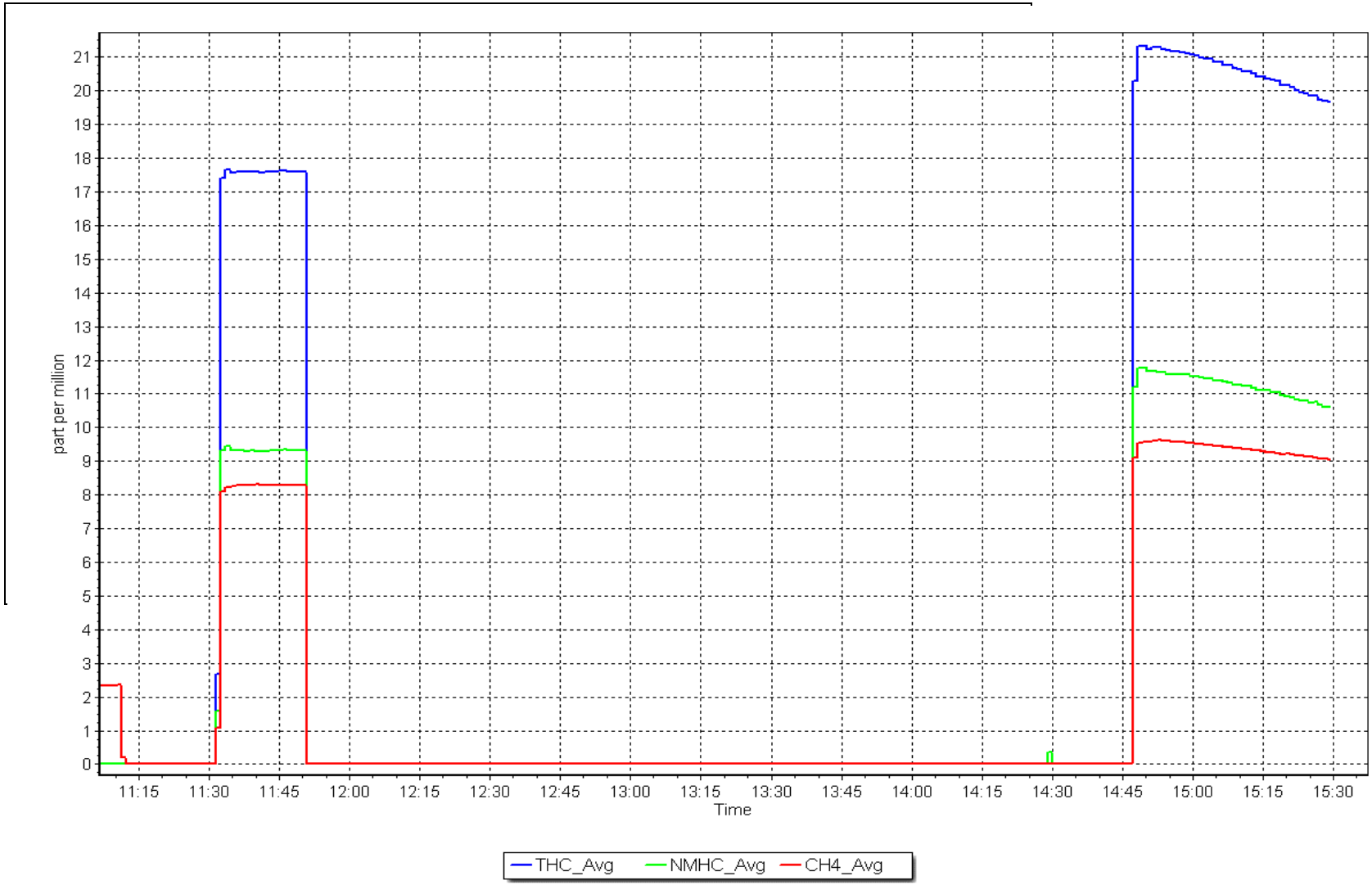
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.996788	
THC Cal Offset:	-0.028998	
CH4 Cal Slope:	0.998653	
CH4 Cal Offset:	-0.029405	
NMHC Cal Slope:	0.996266	
NMHC Cal Offset:	-0.001592	

Notes: Changed out the H2 and N2 cylinders.

Calibration Performed By: Rene Chamberland

NMHC Calibration Plot Date: January 22, 2024 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	January 4, 2024	Last Cal Date:	December 4, 2023
Start time (MST):	11:08	End time (MST):	16:01
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:	4890	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1218153357	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.431	1.442	NO bkgnd or offset:	7.3	7.1
NOX coeff or slope:	0.989	0.992	NOX bkgnd or offset:	8.0	7.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	199.2	199.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000323	1.000562
NO_X Cal Offset:	-0.720000	0.220000
NO Cal Slope:	1.001285	0.999101
NO Cal Offset:	-1.280000	-0.740000
NO_2 Cal Slope:	1.001111	1.003895
NO_2 Cal Offset:	-0.531962	0.627156

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-1.0	-0.3	-0.7	----	----
as found span	4920	80.0	813.4	800.6	12.8	808.3	792.1	16.1	1.0064	1.0108
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.1	----	----
high point	4920	80.0	813.4	800.6	12.8	813.7	799.3	14.5	0.9997	1.0017
second point	4960	40.0	406.7	400.3	6.4	408.2	399.6	8.5	0.9964	1.0018
third point	4980	20.0	203.4	200.2	3.2	203.3	198.0	5.4	1.0003	1.0109
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	4920	80.0	813.4	413.0	400.4	809.8	414.2	395.6	1.0045	0.9972
								Average Correction Factor	0.9988	1.0048

Corrected As found	NO_X = 809.3 ppb	NO = 792.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.5%
Previous Response	NO_X = 813.0 ppb	NO = 800.4 ppb		*Percent Change	NO =	-1.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	795.1	407.5	400.4	402.4	0.9950	100.5%
2nd GPT point (200 ppb O3)	795.1	601.0	206.9	208.3	0.9933	100.7%
3rd GPT point (100 ppb O3)	795.1	698.6	109.3	111.1	0.9838	101.6%
				Average Correction Factor	0.9907	100.9%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

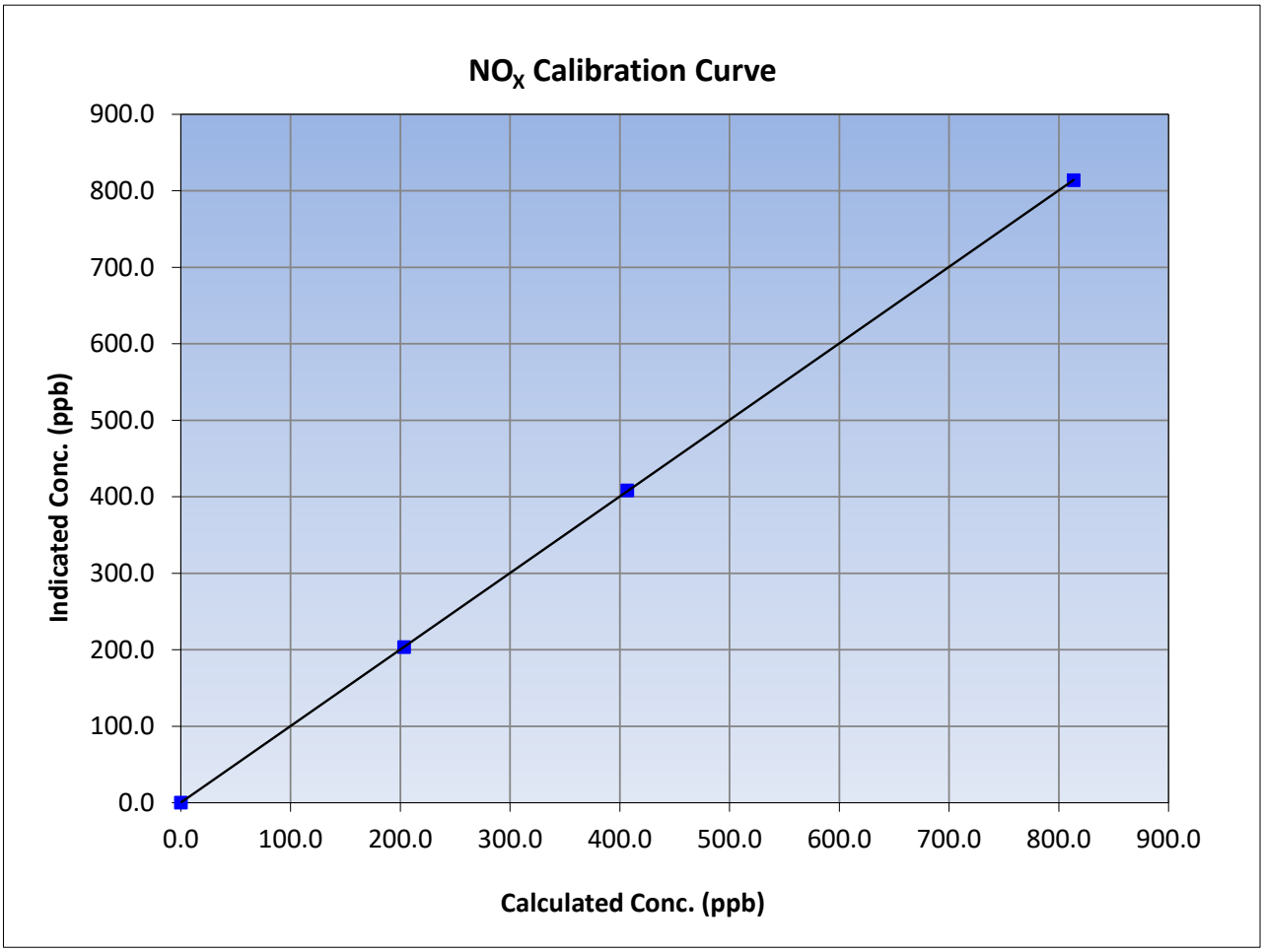
Version-04-2020

Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 4, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:08	End Time (MST):	16:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999996	≥0.995
813.4	813.7	0.9997			
406.7	408.2	0.9964	Slope	1.000562	0.90 - 1.10
203.4	203.3	1.0003			
			Intercept	0.220000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

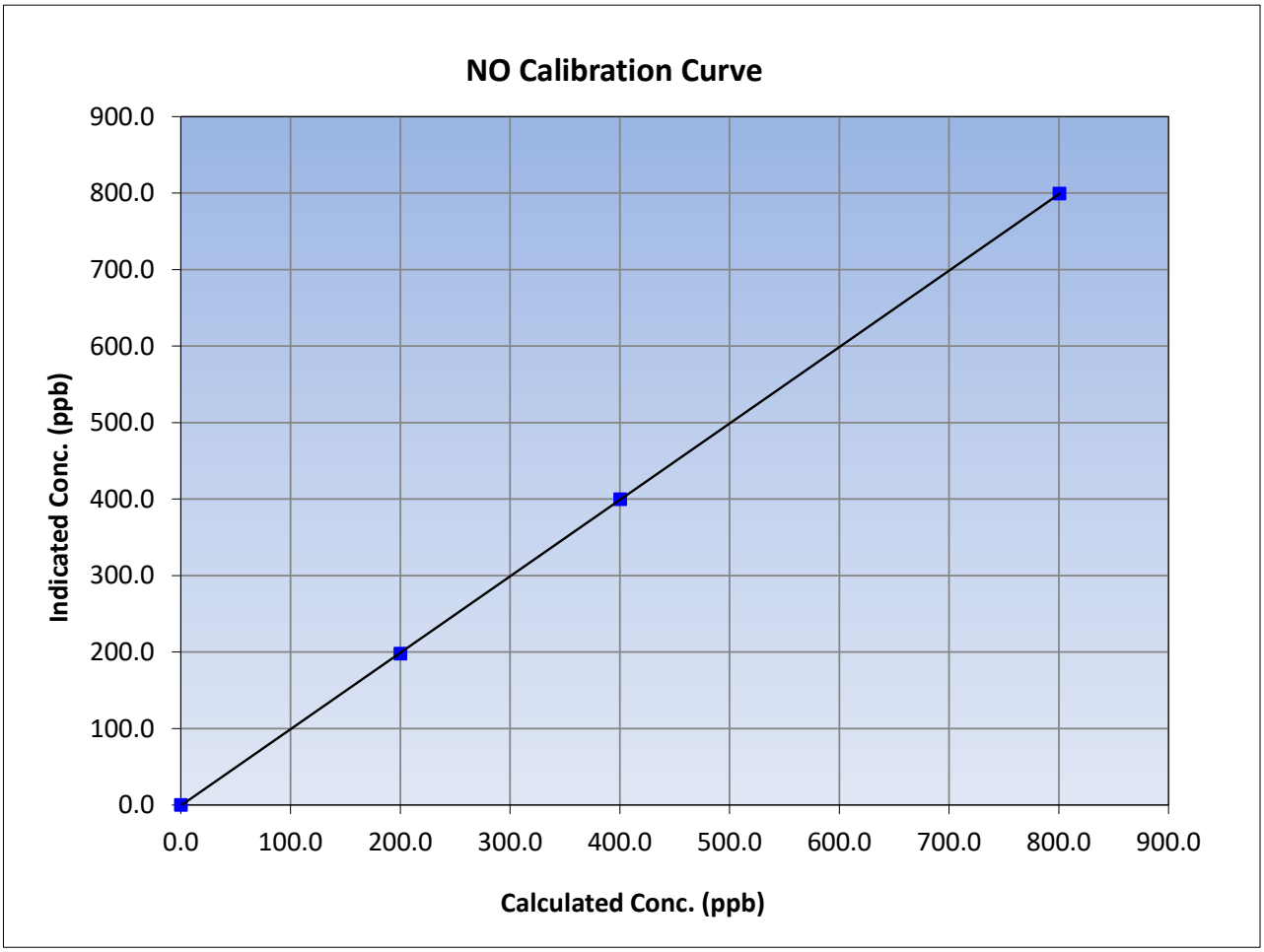
Version-04-2020

Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 4, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:08	End Time (MST):	16:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
800.6	799.3	1.0017			
400.3	399.6	1.0018	Slope	0.999101	0.90 - 1.10
200.2	198.0	1.0109			
			Intercept	-0.740000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

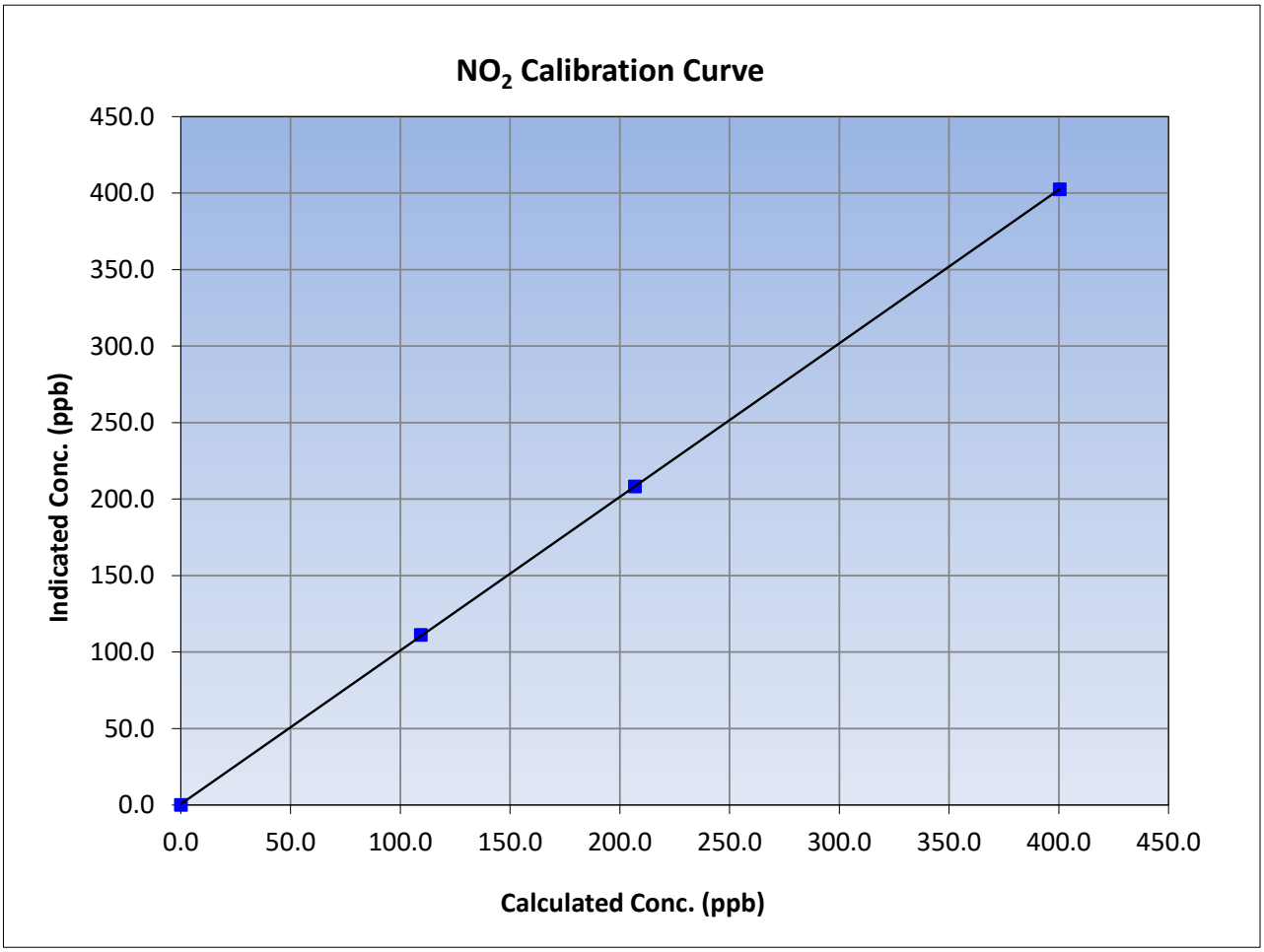
Version-04-2020

Station Information

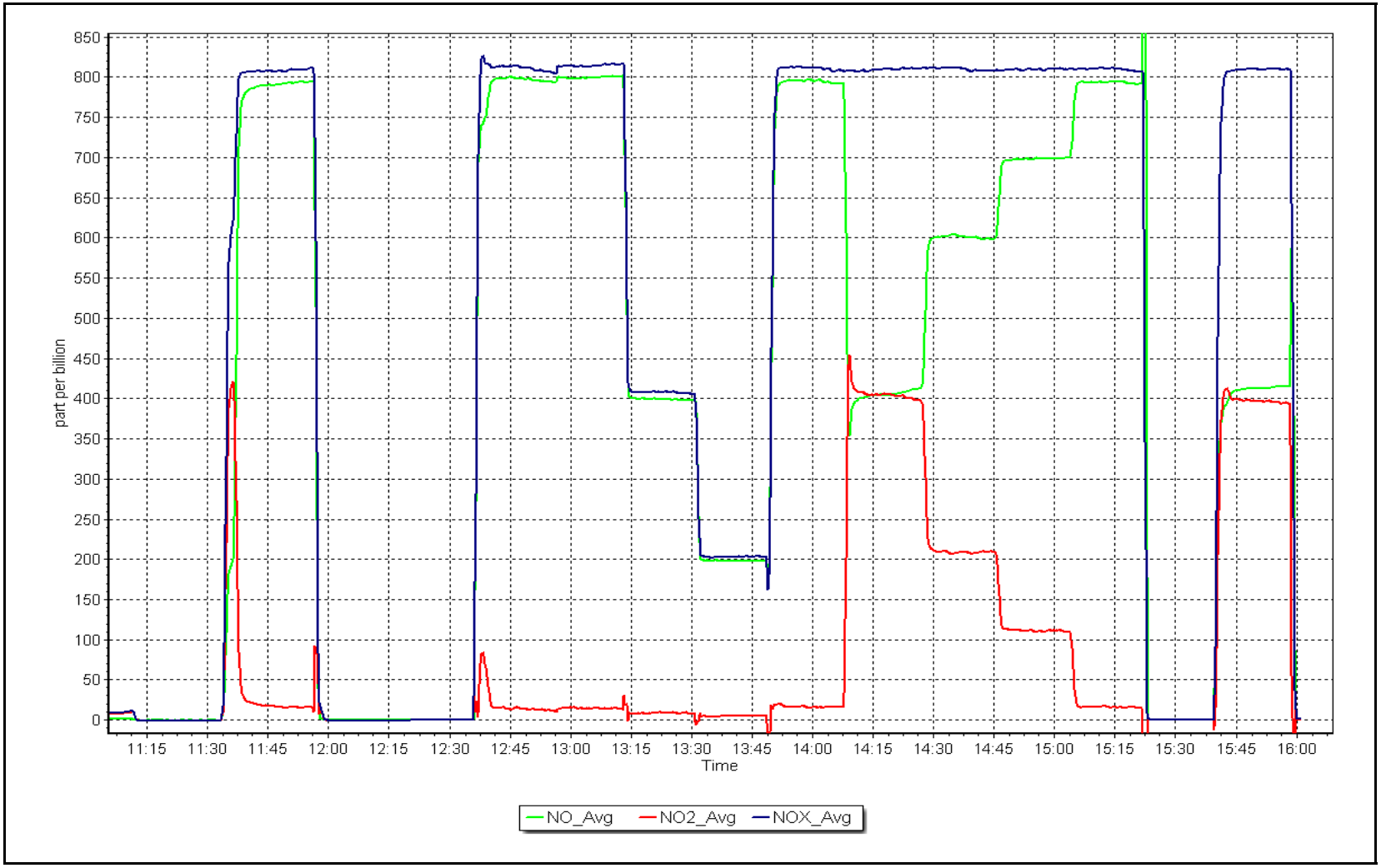
Calibration Date:	January 4, 2024	Previous Calibration:	December 4, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:08	End Time (MST):	16:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999990	≥0.995
400.4	402.4	0.9950			
206.9	208.3	0.9933	Slope	1.003895	0.90 - 1.10
109.3	111.1	0.9838			
			Intercept	0.627156	+/-20



NO_X Calibration Plot Date: January 4, 2024 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	January 3, 2024	Last Cal Date:	December 1, 2023
Start time (MST):	10:48	End time (MST):	13:46
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:	4890

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004914	0.999800	Backgd or Offset:	3.8	4.8
Calibration intercept:	0.040000	0.360000	Coeff or Slope:	1.012	1.014

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.5	----
as found span	5000	863.1	400.0	400.3	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	863.1	400.0	400.0	1.000
second point	5000	742.5	200.0	201.0	0.995
third point	5000	651.7	100.0	100.1	0.999
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	863.1	400.0	403.6	0.991
				Average Correction Factor	0.998

Baseline Corr As found:	399.8	Previous response	402.0	*% 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 zero only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

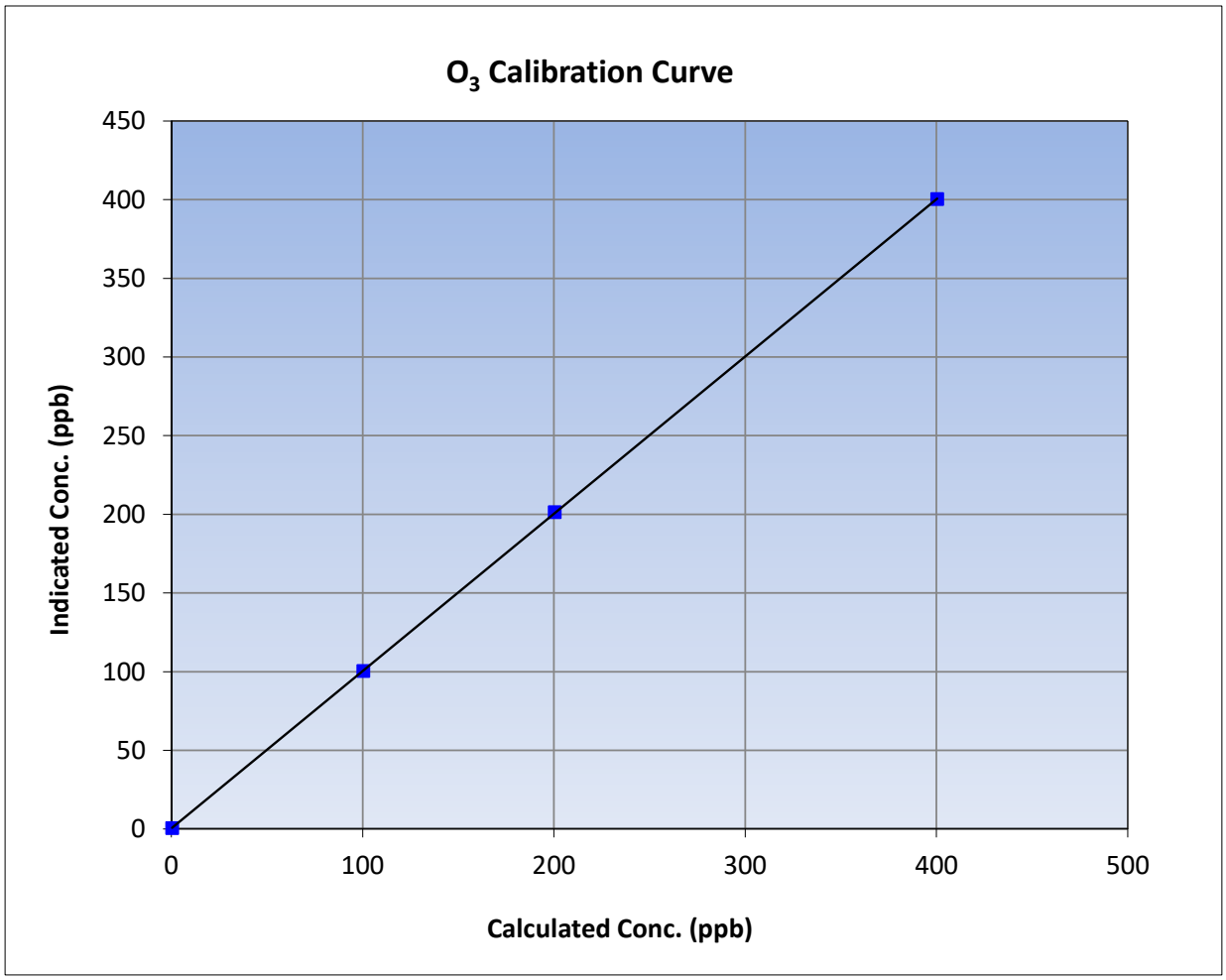
Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:48	End Time (MST):	13:46
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

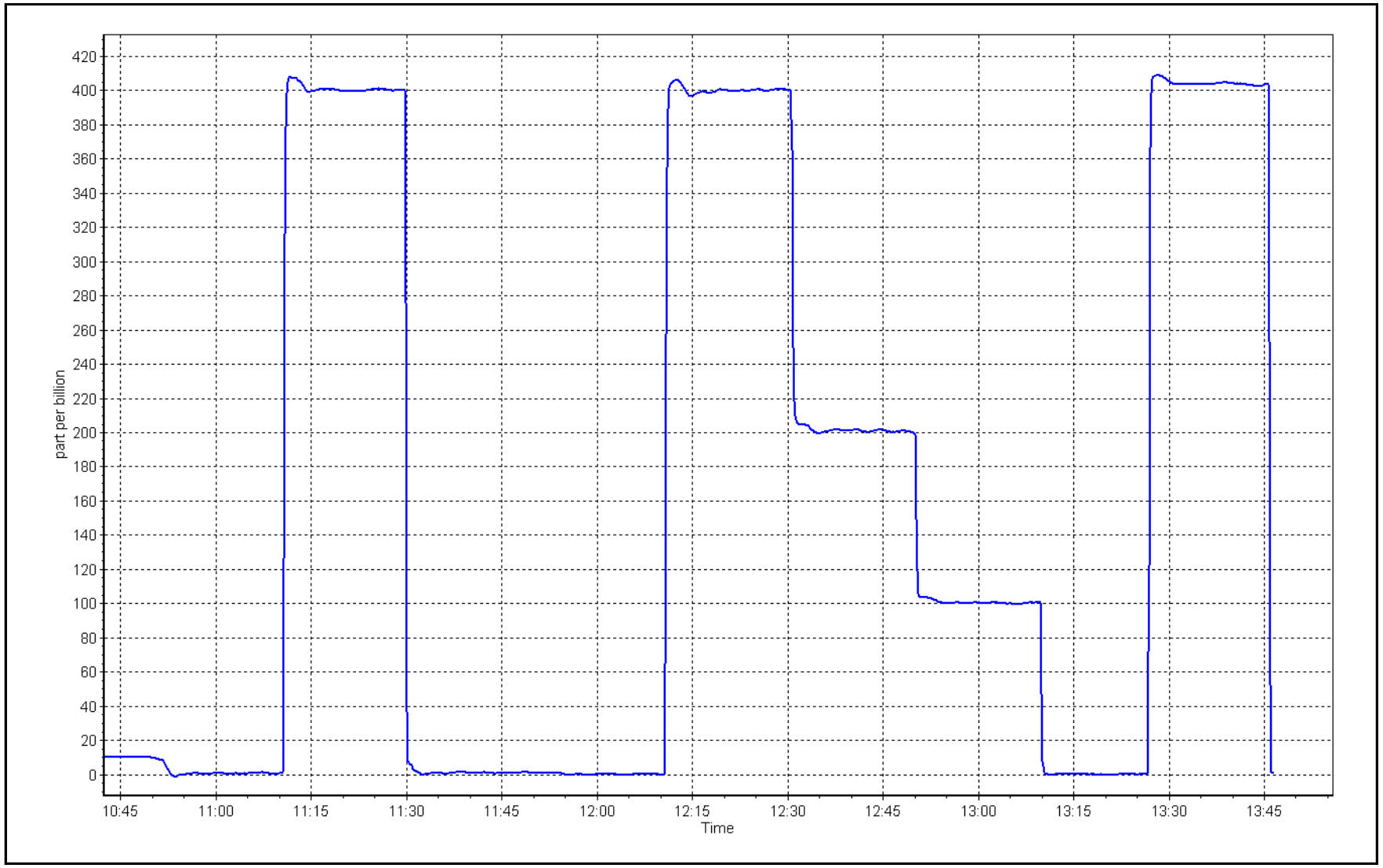
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	400.0	1.0000
200.0	201.0	0.9950
100.0	100.1	0.9990

Statistical Evaluation		Limits
Correlation Coefficient	0.999993	≥0.995
Slope	0.999800	0.90 - 1.10
Intercept	0.360000	+/- 5



O_3 Calibration Plot Date: January 3, 2024 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:	January 26, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	11:37	End time (MST):	13:49
Analyzer Make:	Teledyne API T640	S/N:	324
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat	S/N:	388752
Temp/RH standard:	Alicat	S/N:	388752

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-5.7	-6.3	-5.7	☐	+/- 2 °C
P (mmHg)	736.2	735.4	736.2	☐	+/- 10 mmHg
flow (LPM)	5.01	5.15	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: January 26, 2024 Last Cal Date: December 12, 2023

PM w/o HEPA: 34.2 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	10.5	11	11	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 13.5 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: January 26, 2024

Disposable Filter Changed: January 26, 2024

Annual Maintenance

Date Sample Tube Cleaned: September 14, 2023

Date RH/T Sensor Cleaned: January 26, 2024

Notes: Flow, temperature, and pressure all within limits. Leak check passed. PMT peak test within limits. Optical chamber and RH/T sensor cleaned. Disposable filter changed.

Calibration by: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	January 8, 2024	Last Cal Date:	December 11, 2023
Start time (MST):	10:38	End time (MST):	14:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	3040	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM042207			
Removed Cal Gas Conc:	3040	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3565
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make:	Teledyne API T300		Analyzer serial #:	3520	
Analyzer Range:	0 - 50 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001201	1.000186	Backgd or Offset:	-0.013	-0.013
Calibration intercept:	0.203827	0.241822	Coeff or Slope:	0.989	0.983

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4933	66.7	40.6	41.0	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4933	66.7	40.6	40.7	0.998
second point	4966	33.3	20.2	20.8	0.974
third point	4983	16.7	10.2	10.5	0.972
as left zero	5000	0.0	0.0	0.1	----
as left span	2960	40.0	40.5	40.2	1.010
				Average Correction Factor	0.981

Baseline Corr As found:	40.79	Prev response:	40.81	*% 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 span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

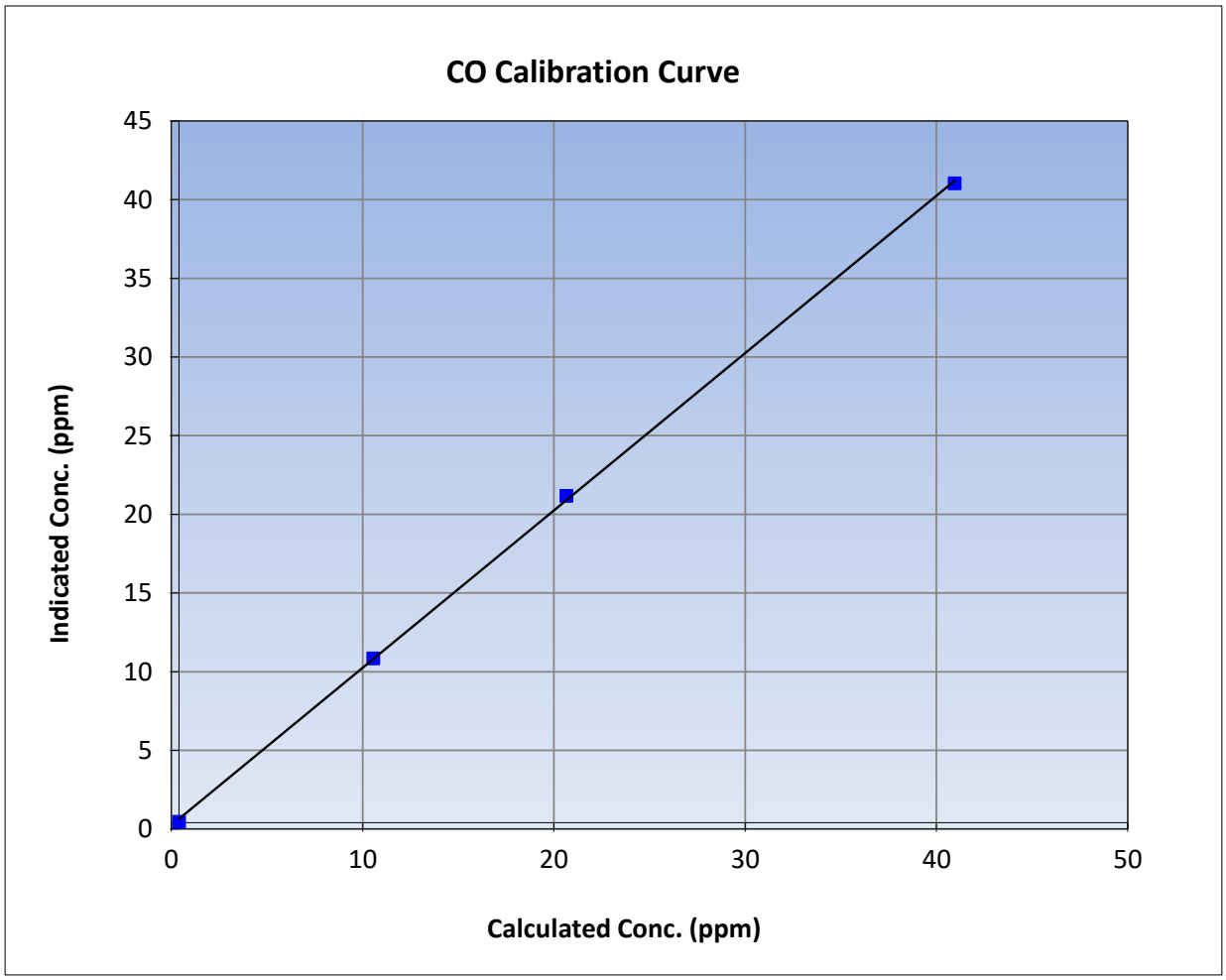
Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 11, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:38	End Time (MST):	14:00
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

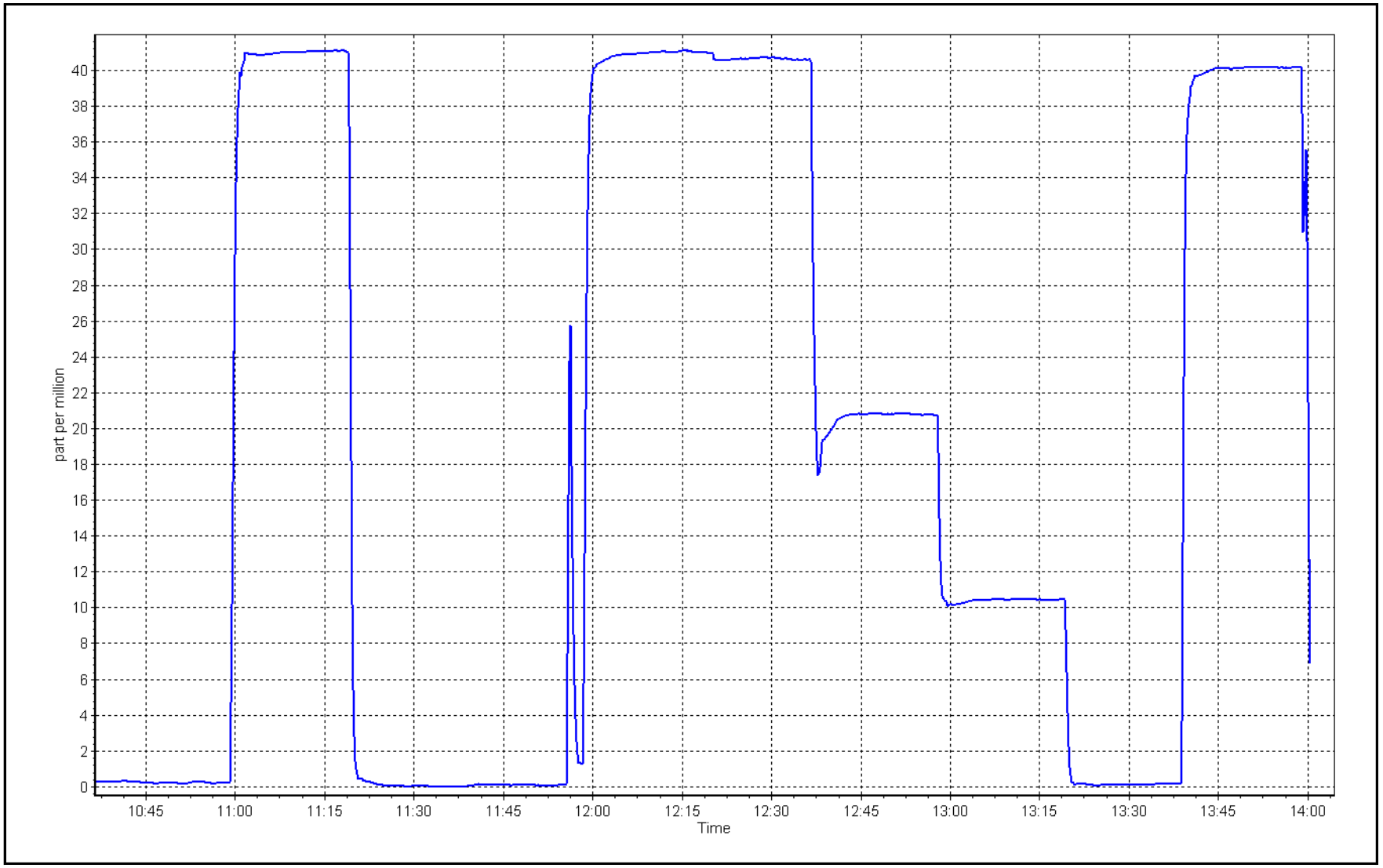
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.6	40.7	0.9977
20.2	20.8	0.9745
10.2	10.5	0.9717

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999843	*≥0.995*
Slope	1.000186	*0.90 - 1.10*
Intercept	0.241822	*+/-1.5*



CO Calibration Plot Date: January 8, 2024 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	January 5, 2024	Last Cal Date:	December 8, 2023
Start time (MST):	11:19	End time (MST):	14:30
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 2,000 ppm

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.000878	1.001967	Backgd or Offset:	0.045	0.045
Calibration intercept:	-5.800000	-5.940000	Coeff or Slope:	0.875	0.876

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	-0.2	----
as found span	2920	80.0	1605.3	1597.8	1.005
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	1605.4	1.000
second point	2960	40.0	802.7	795.9	1.009
third point	2980	20.0	401.3	389.6	1.030
as left zero	3000	0.0	0.0	-0.1	----
as left span	2960	40.0	802.7	786.7	1.020
				Average Correction Factor	1.013

Baseline Corr As found:	1598.00	Prev response:	1600.94	*% 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 the inlet filter after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

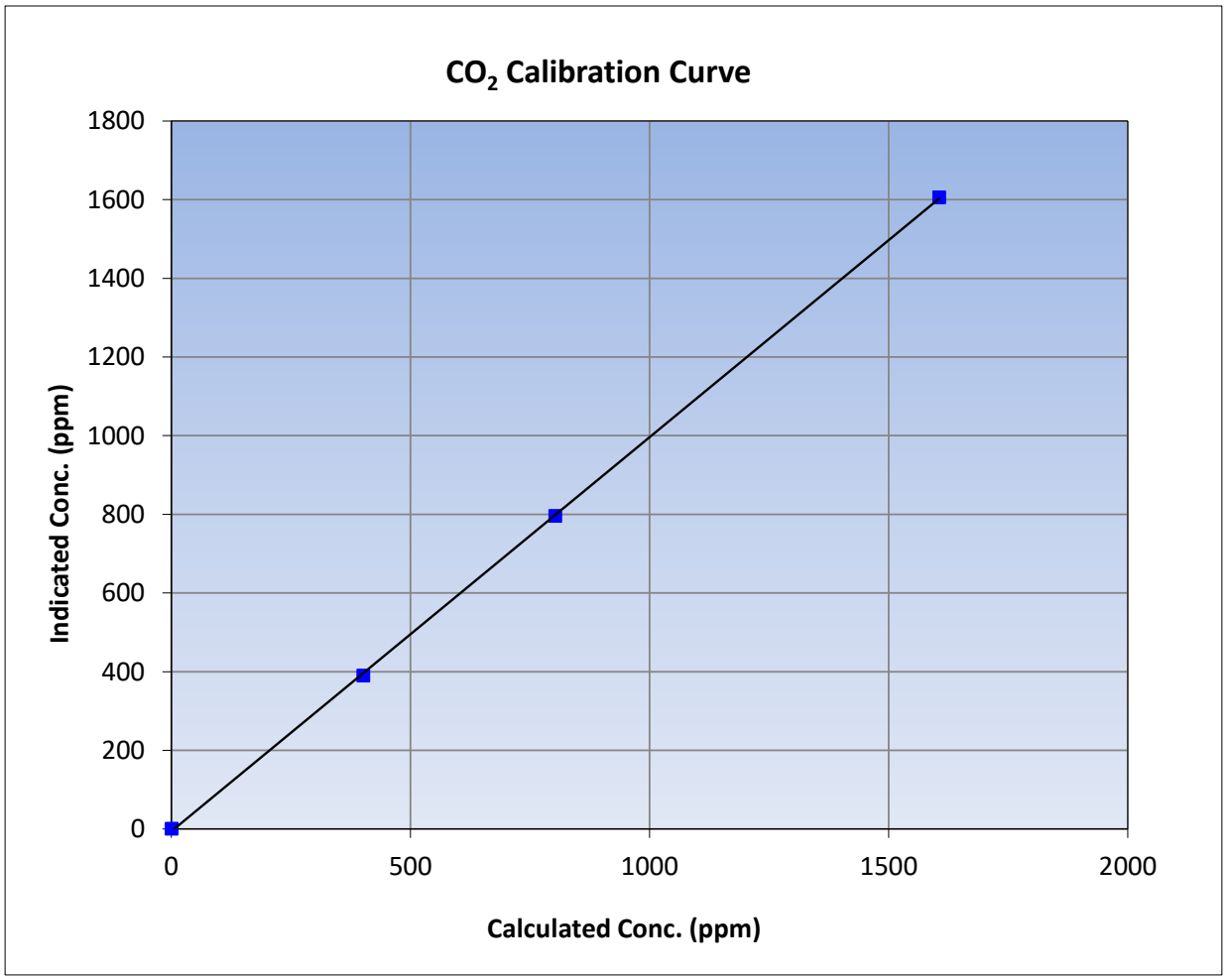
Station Information

Calibration Date	January 5, 2024	Previous Calibration	December 8, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	11:19	End Time (MST)	14:30
Analyzer make	Teledyne API 360	Analyzer serial #	442

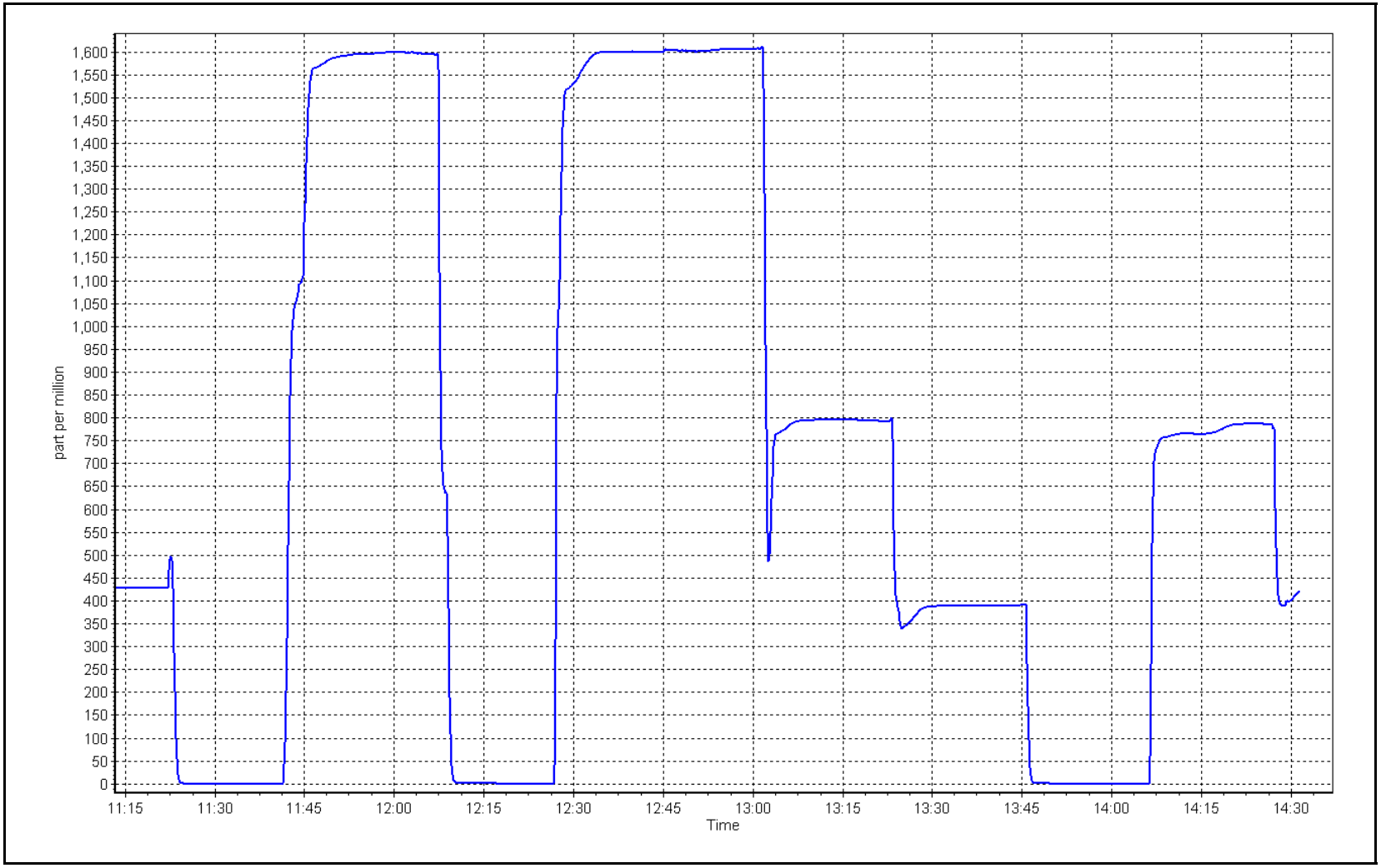
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
1605.3	1605.4	1.0000
802.7	795.9	1.0085
401.3	389.6	1.0301

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999933	*≥0.995*
Slope	1.001967	*0.90 - 1.10*
Intercept	-5.940000	*+/-10*



CO_2 Calibration Plot Date: January 5, 2024 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
NOX Cal Date:	January 9, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	12:23	End time (MST):	16:55
NH3 Cal Date:	January 10, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	11:10	End time (MST):	14:15
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:	December 11, 2023
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:	76.58	ppm	NH3 Gas Cylinder #:	CC743587
			NH3 Cal Gas Expiry:	August 22, 2024
Removed NH3 Conc:	76.58	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:	4890

Analyzer Information

Analyzer model:	Teledyne API T201	Analyzer serial #:	475
Converter model:	Teledyne API T501	Converter serial #:	824
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.50
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	514

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.987	0.964	TN coefficient:	0.989	0.968
NOX coefficient:	0.989	0.967	NO bkgrnd:	-0.9	-0.9
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-0.3	-0.3
NH3 coefficient:	0.932	0.932	TN bkgrnd:	1.2	1.2

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.004707	0.998960
NO_X Cal Offset:	-2.480000	-2.460000
NO Cal Slope:	1.004525	0.998530
NO Cal Offset:	-3.440000	-2.840000
NO_2 Cal Slope:	0.995838	0.997727
NO_2 Cal Offset:	-1.454892	-0.655687
NH3 Cal Slope:	1.001746	1.004832
NH3 Cal Offset:	-2.214411	-8.183521
TN Cal Slope:	1.004330	1.007188
TN Cal Offset:	-1.994595	-8.051061

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-1.2	-1.2	0.0	----	----
as found NO	4920	80.0	813.4	813.4	----	812.1	813.0	-0.6	1.002	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.2	----	----
high NO point	4920	80.0	813.4	813.4	----	812.4	811.8	0.9	1.001	----
NO/O3 point	4920	80.0	813.4	813.4	----	808.8	806.7	1.8	1.006	----
as found NH3	3416	84.1	1840.1	----	1840.1	1808.1	----	1803.9	1.018	1.020
new NH3 cyl rp							----			
first NH3	3418	82.2	1798.5	----	1798.5	1808.1	----	1803.9	0.995	0.997
second NH3	3454	45.7	1000.0	----	1000.0	994.7	----	992.0	1.005	1.008
third NH3	3477	22.8	498.9	----	498.9	486.4	----	484.9	1.026	1.029
								Average Correction Factor	1.0035	1.0113

Corrected As found TN = 813.3 ppb NO_X = 814.2 ppb NH3 = 1803.9 ppb

Previous Response TN = 815 ppb NO_X = 814.8 ppb NH3 = 1841.1 ppb

*Percent Change TN = -0.2%

*Percent Change NO_X = -0.1%

*Percent Change NH3 = -2.1%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 93.2%

NH3 Current Converter Efficiency = 93.2%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as found span	4920	80.0	813.4	800.6	813.4	835.2	819.5	835.4	0.9739	0.9770
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.1	-0.3	----	----
high point	4920	80.0	813.4	800.6	813.4	811.8	798.5	812.4	1.0020	1.0027
second point	4960	40.0	406.7	400.3	406.7	401.2	394.2	401.3	1.0138	1.0155
third point	4980	20.0	203.4	200.2	203.4	199.3	194.9	200.0	1.0204	1.0270
								Average Correction Factor	1.0121	1.0151

Baseline Corr As fnd TN = 835.3 ppb NO_X = 835.1 ppb NO = 819.5 ppb

Previous Response TN = 815 ppb NO_X = 814.8 ppb NO = 800.8 ppb

*Percent Change TN = 2.4%

*Percent Change NO_X = 2.4%

*Percent Change NO = 2.3%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	0.0	----	----
calibration zero	----	----	0.0	-0.2	----	----
1st GPT point (400 ppb O3)	794.2	387.9	419.1	417.5	1.0038	99.6%
2nd GPT point (200 ppb O3)	794.2	600.9	206.1	205.5	1.0029	99.7%
3rd GPT point (100 ppb O3)	794.2	694.2	112.8	110.9	1.0171	98.3%
				Average Correction Factor	1.0080	99.2%

Notes: Changed the inlet filter after as founds. Adjusted the NOx/TN span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

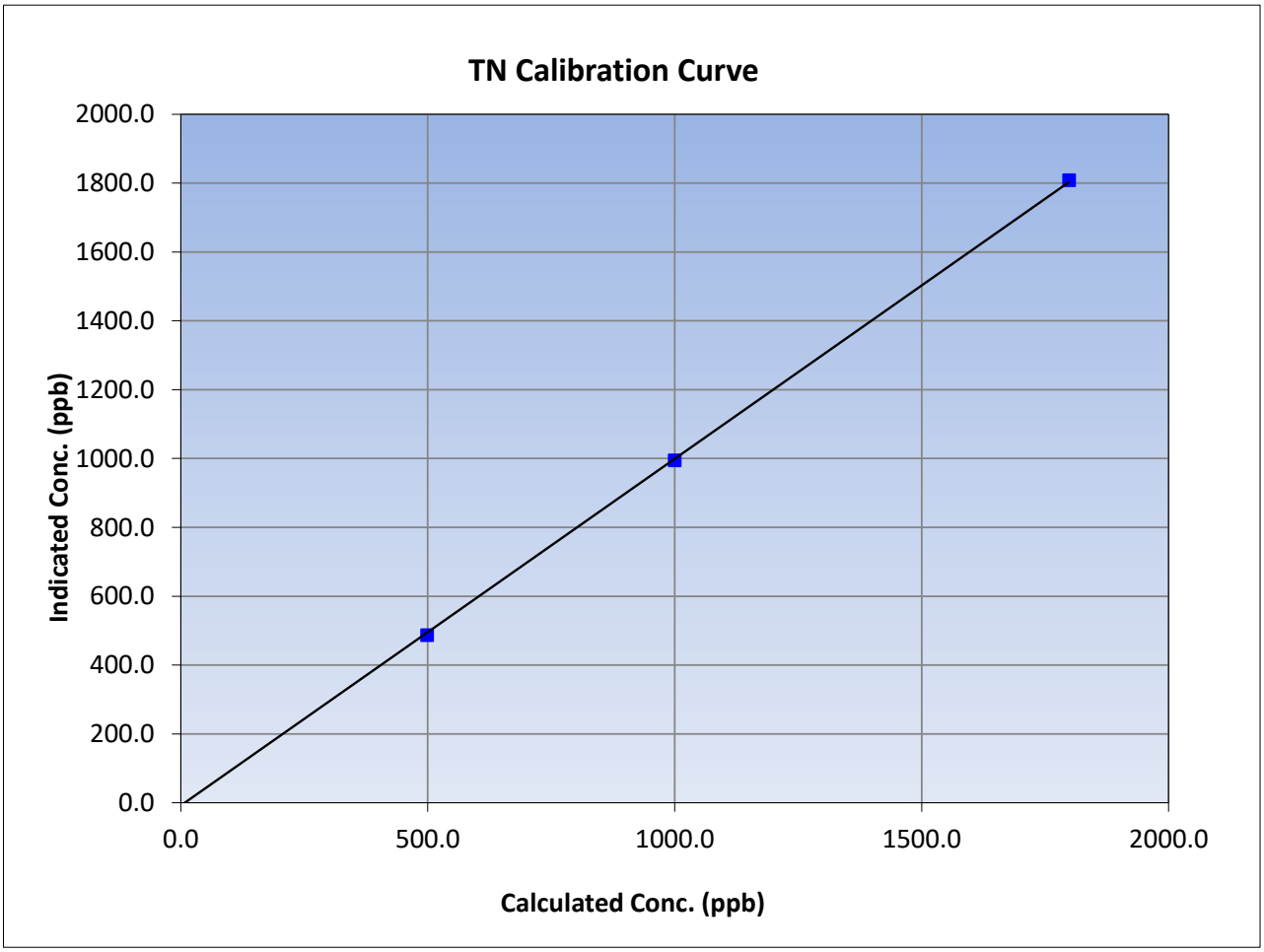
Version-05-2023

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:10	End Time (MST):	14:15
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999907	≥0.995
1798.5	1808.1	0.9947			
1000.0	994.7	1.0053	Slope	1.007188	0.90 - 1.10
498.9	486.4	1.0256			
			Intercept	-8.051061	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

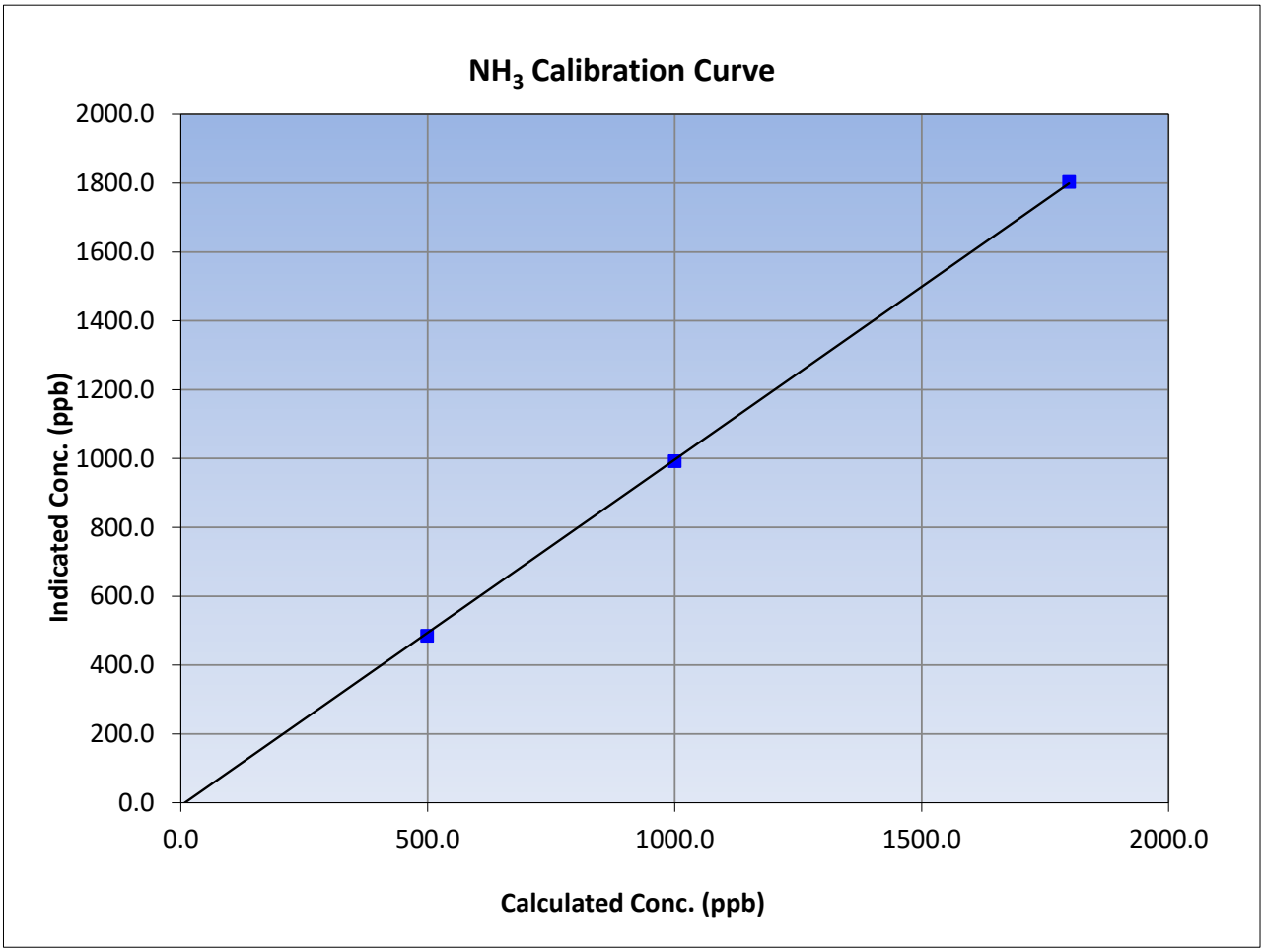
Version-05-2023

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:10	End Time (MST):	14:15
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999901	≥0.995
1798.5	1803.9	0.9970			
1000.0	992.0	1.0081	Slope	1.004832	0.90 - 1.10
498.9	484.9	1.0288			
			Intercept	-8.183521	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

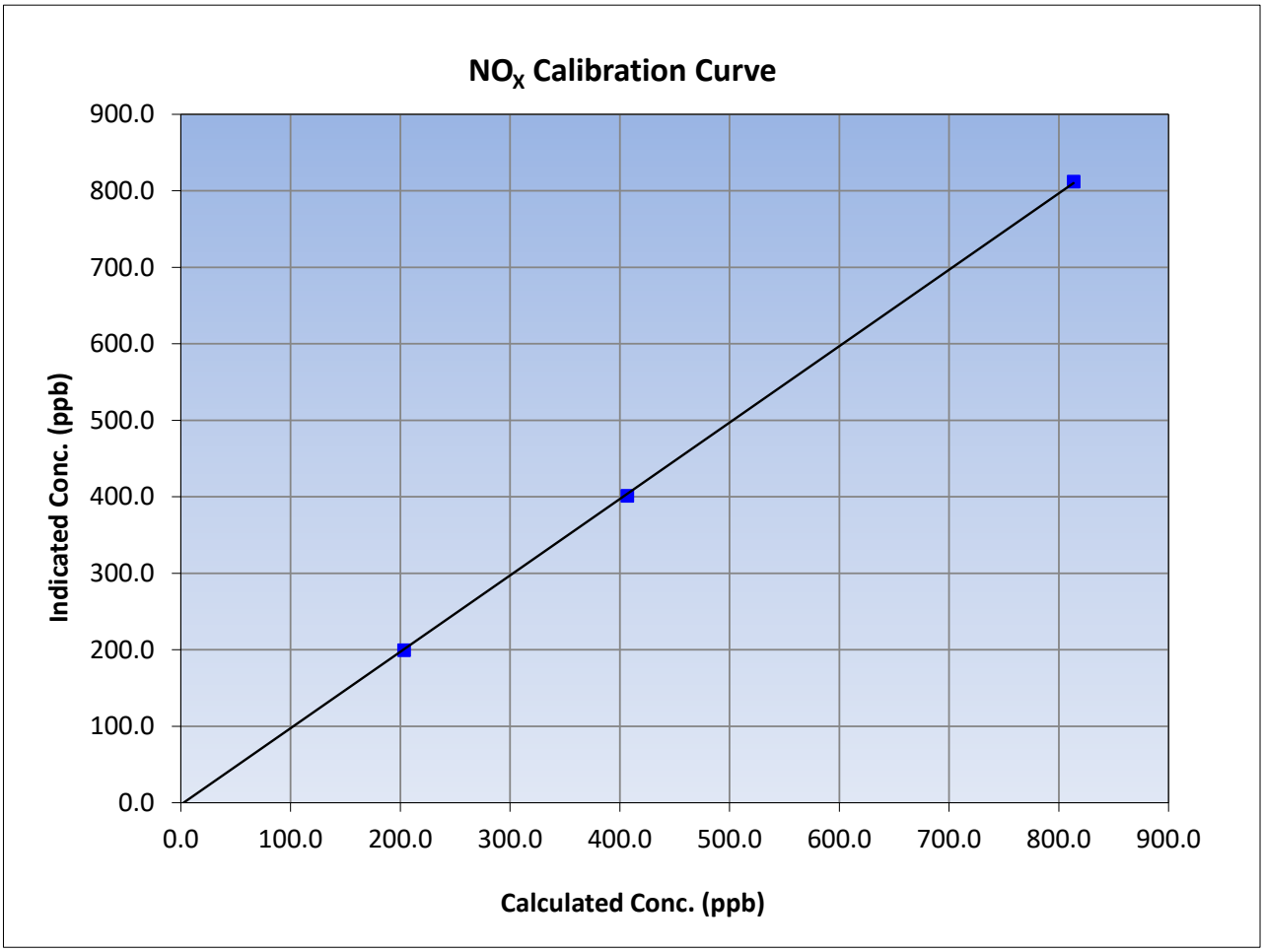
Version-05-2023

Station Information

Calibration Date:	January 9, 2024	Previous Calibration:	December 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	12:23	End Time (MST):	16:55
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999952	*≥0.995*
813.4	811.8	1.0020			
406.7	401.2	1.0138	Slope	0.998960	*0.90 - 1.10*
203.4	199.3	1.0204			
			Intercept	-2.460000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

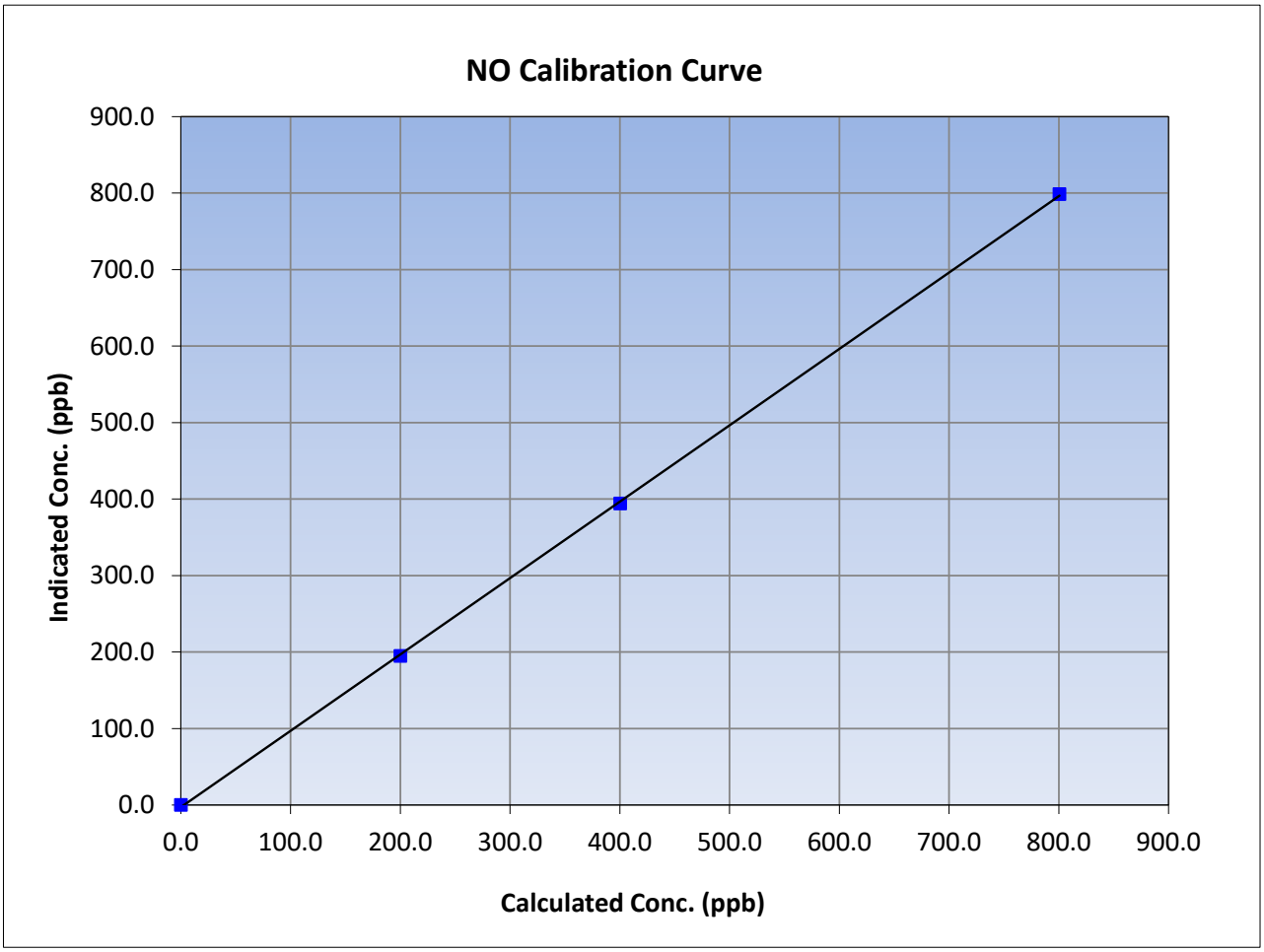
Version-05-2023

Station Information

Calibration Date:	January 9, 2024	Previous Calibration:	December 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	12:23	End Time (MST):	16:55
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999932	≥0.995
800.6	798.5	1.0027			
400.3	394.2	1.0155	Slope	0.998530	0.90 - 1.10
200.2	194.9	1.0270			
			Intercept	-2.840000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

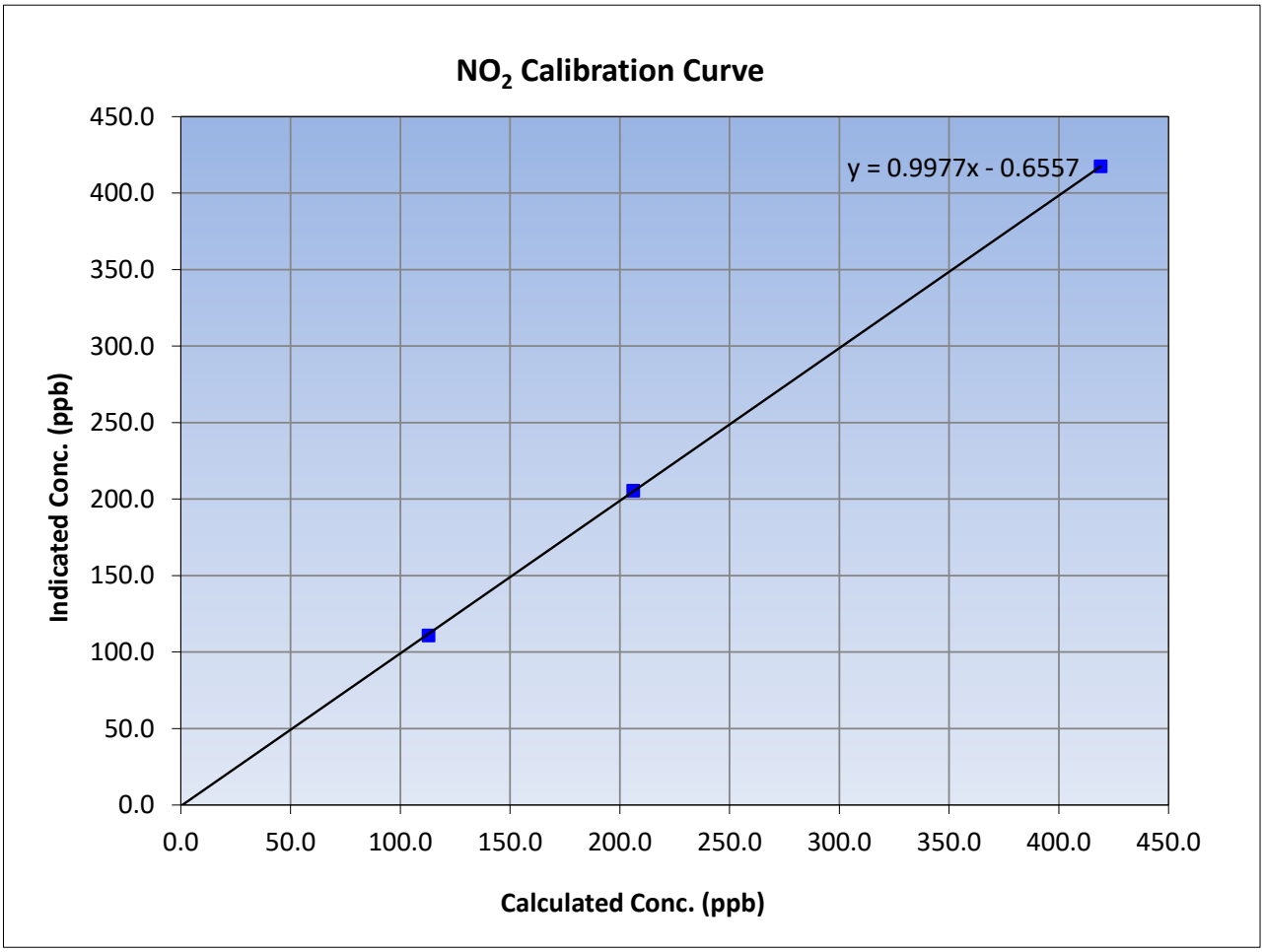
Version-05-2023

Station Information

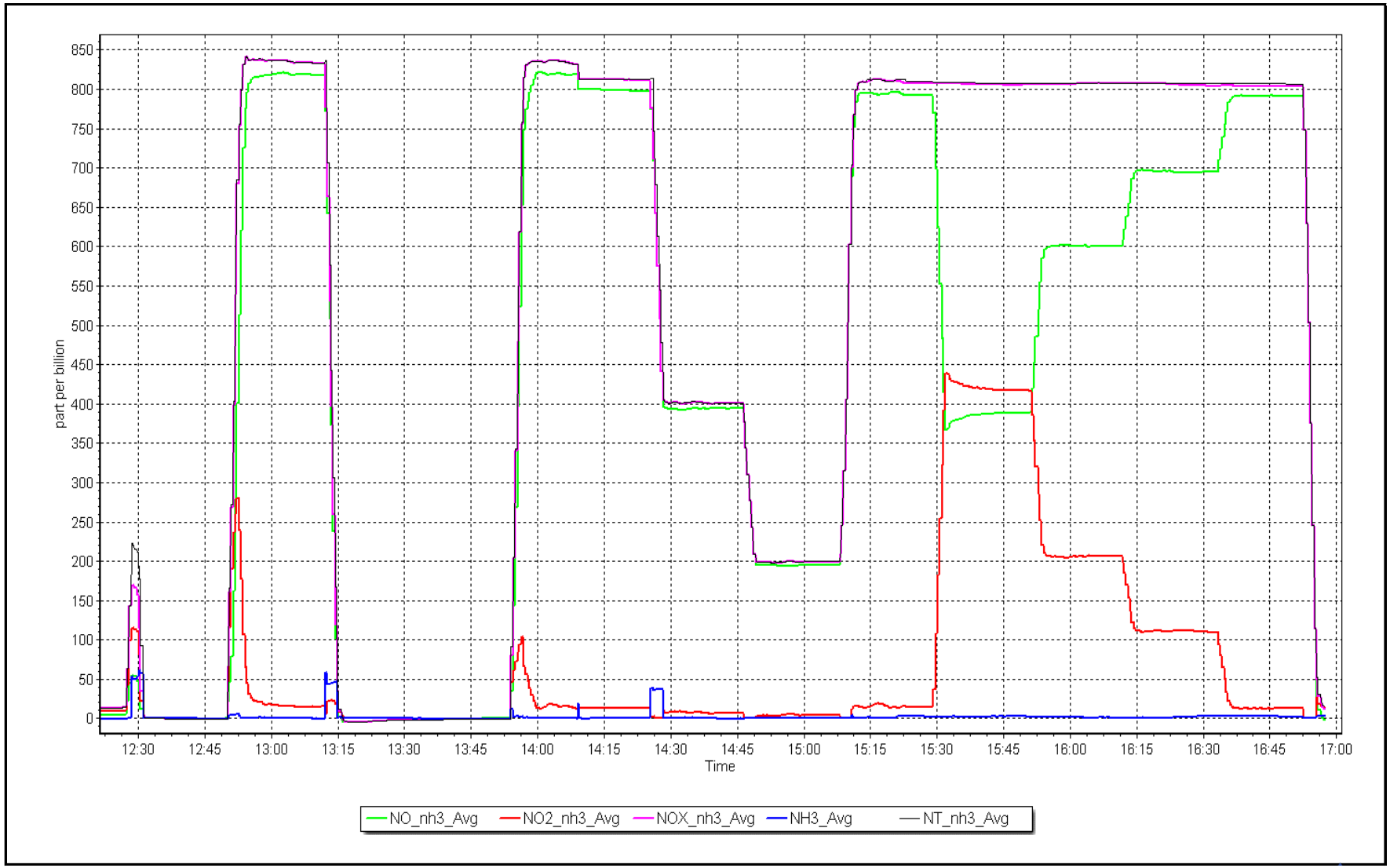
Calibration Date:	January 9, 2024	Previous Calibration:	December 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	12:23	End Time (MST):	16:55
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

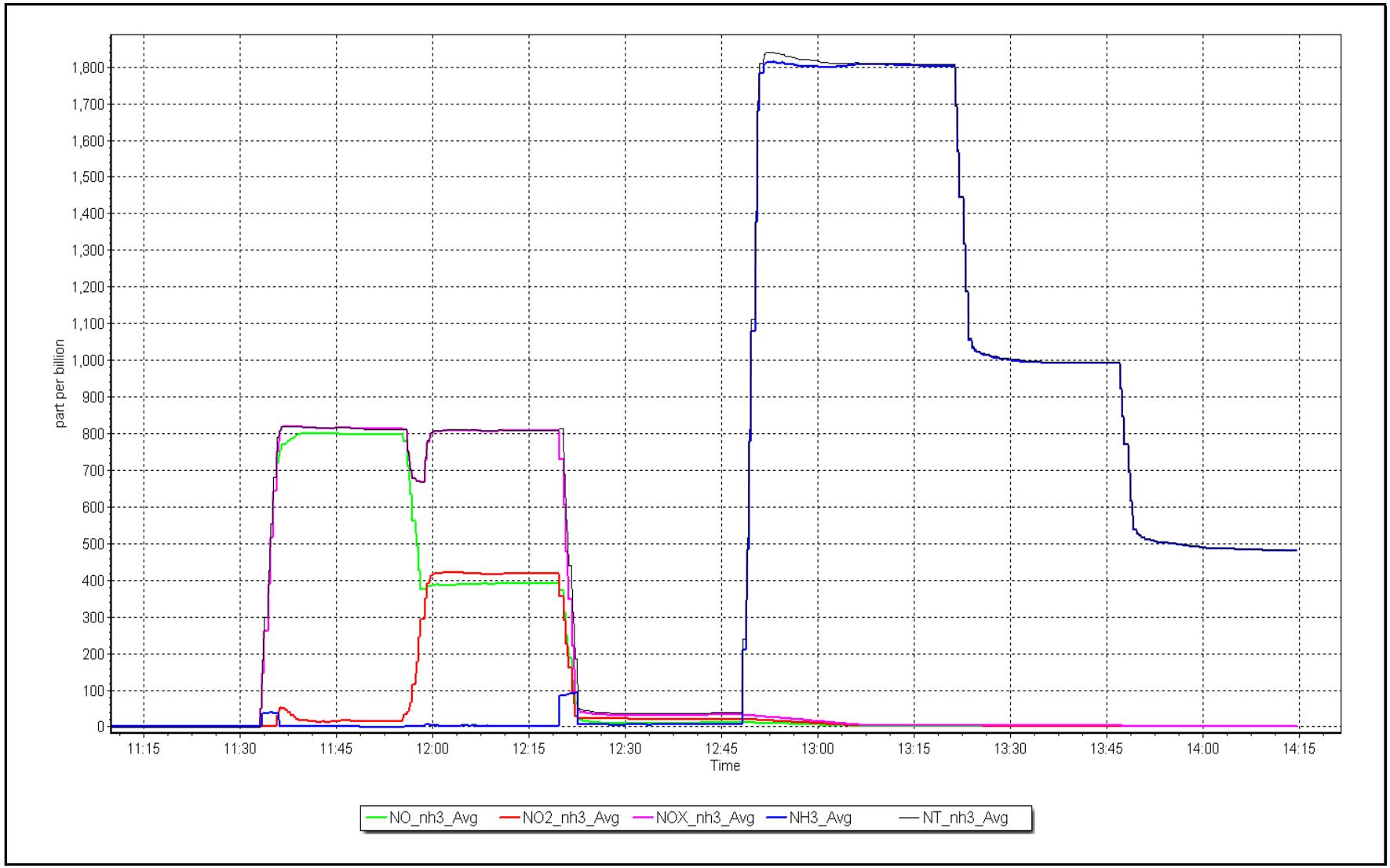
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999985	≥0.995
419.1	417.5	1.0038			
206.1	205.5	1.0029	Slope	0.997727	0.90 - 1.10
112.8	110.9	1.0171			
			Intercept	-0.655687	+/-20



NO_X Calibration Plot Date: January 9, 2024 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: January 10, 2024 Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	January 1, 2024	Last Cal Date:	December 8, 2023
Start time (MST):	11:18	End time (MST):	14:47
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000671	0.994869	Backgd or Offset:	18.6	18.4
Calibration intercept:	-0.784833	0.074375	Coeff or Slope:	0.775	0.795

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.8	----
as found span	4920	80.2	801.6	784.2	1.022
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.2	801.6	797.8	1.005
second point	4960	40.1	400.8	398.2	1.007
third point	4980	20.0	199.9	199.5	1.002
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.2	801.6	810.0	0.990
				Average Correction Factor	1.005

Baseline Corr As found:	785.00	Previous response	801.40	*% change	-2.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

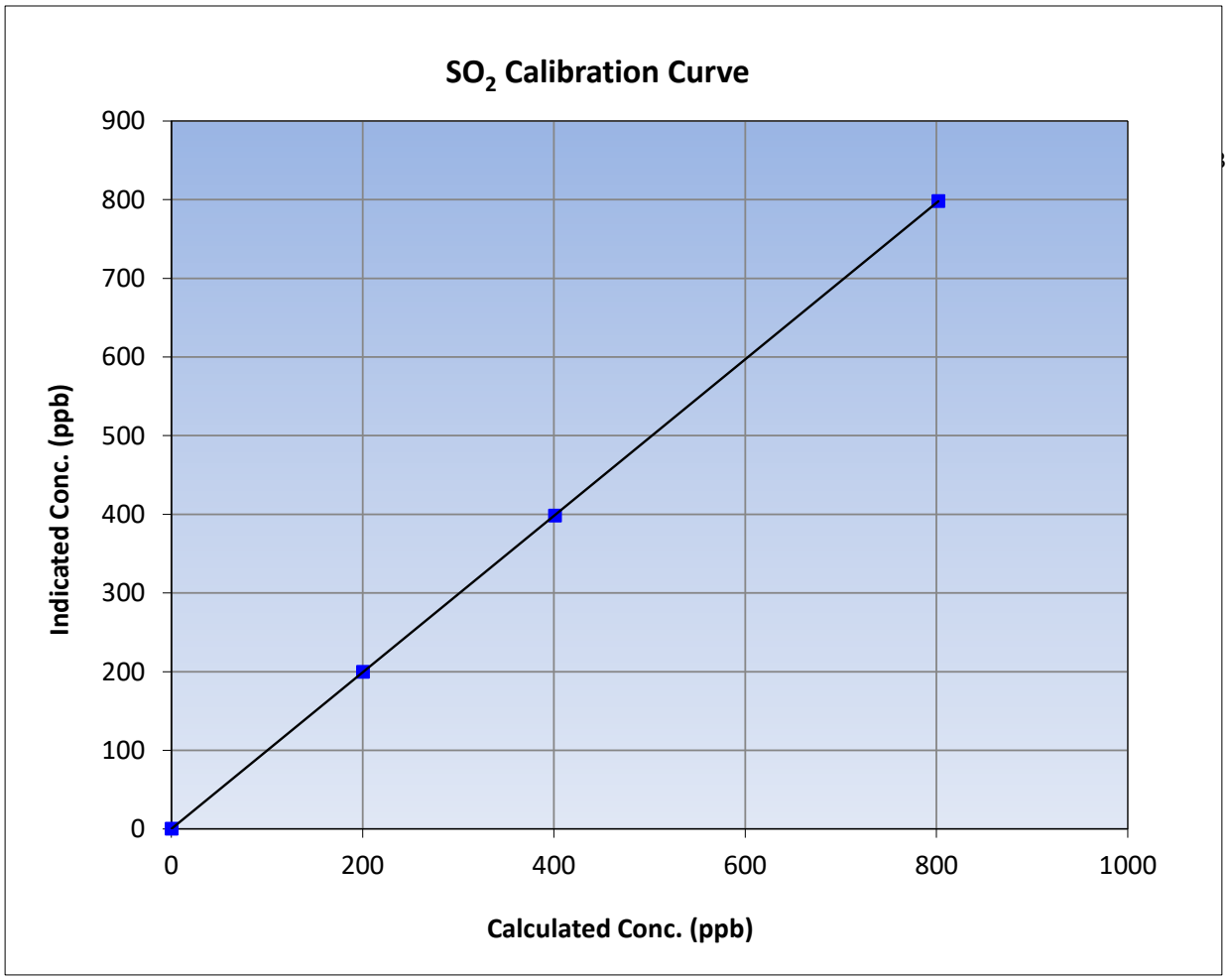
Station Information

Calibration Date:	January 1, 2024	Previous Calibration:	December 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	11:18	End Time (MST):	14:47
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

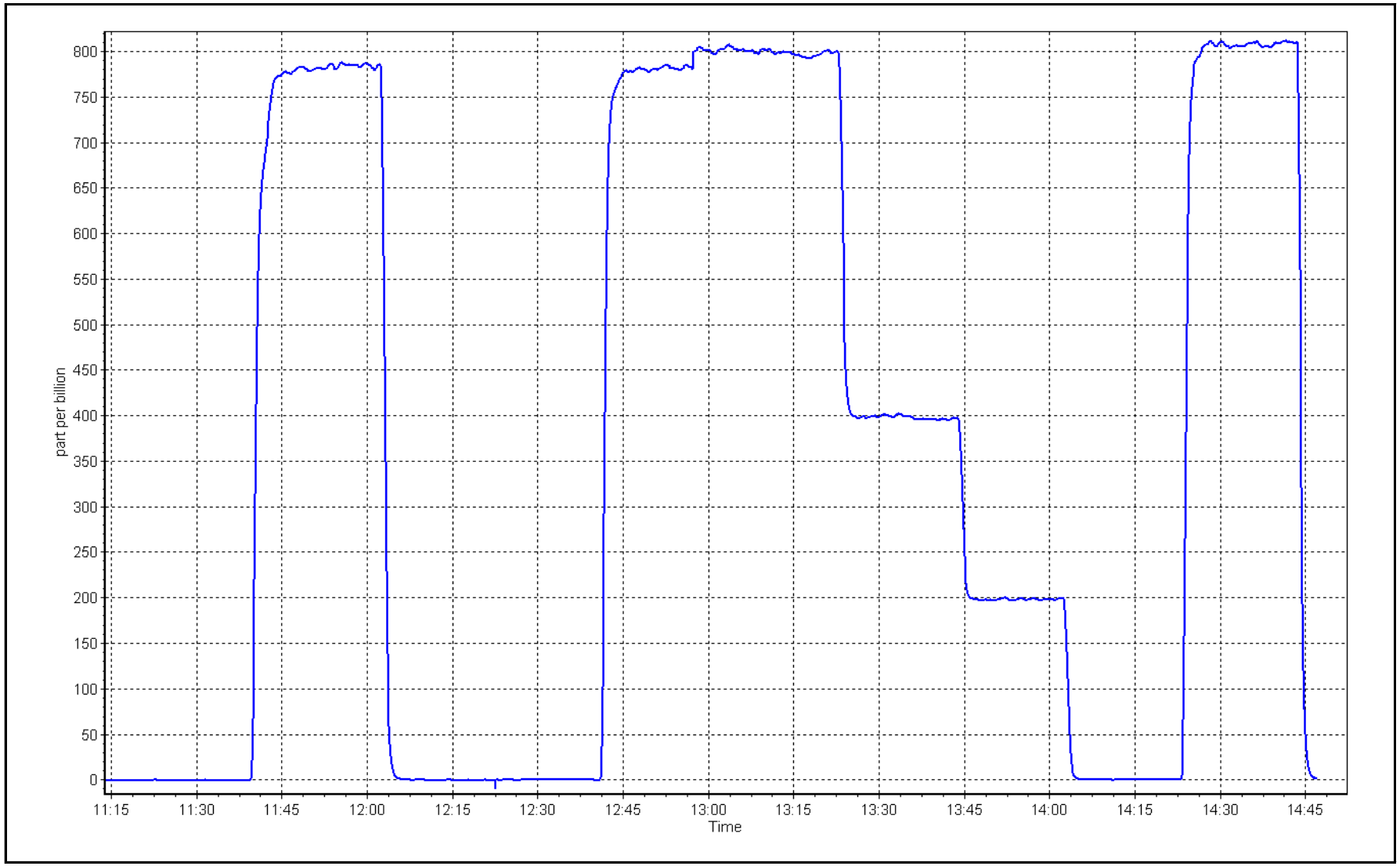
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
801.6	797.8	1.0048
400.8	398.2	1.0066
199.9	199.5	1.0021

Statistical Evaluation		Limits
Correlation Coefficient	0.999998	≥0.995
Slope	0.994869	0.90 - 1.10
Intercept	0.074375	+/-30



SO2 Calibration Plot Date: January 1, 2024 Location: Mildred Lake



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	January 10, 2024	Last Cal Date:	December 18, 2023
Start time (MST):	10:25	End time (MST):	15:50
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	12113311966	
Converter make:	Global G150		Converter serial #:	2022-198	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.008965	1.001107	Backgd or Offset:	1.70	1.68
Calibration intercept:	-0.059195	0.040801	Coeff or Slope:	0.740	0.740

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4924	75.6	80.0	79.3	1.009
as found 2nd point	4962	37.8	40.0	39.8	1.005
as found 3rd point	4981	18.9	20.0	19.9	1.005
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4924	75.6	80.0	80.1	0.999
second point	4962	37.8	40.0	40.2	0.995
third point	4981	18.9	20.0	19.9	1.005
as left zero	5000	0.0	0.0	0.1	----
as left span	4924	75.6	80.0	79.7	1.004
SO2 Scrubber Check	4920	80.2	802.0	0.1	----
Date of last scrubber change:		20-Sep-23		Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.3	Prev response:	80.65	*% change:	-1.7%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.991249	AF Intercept:	0.060795
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

Notes: Scrubber check done after cal zero, passed. No adjustments made.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

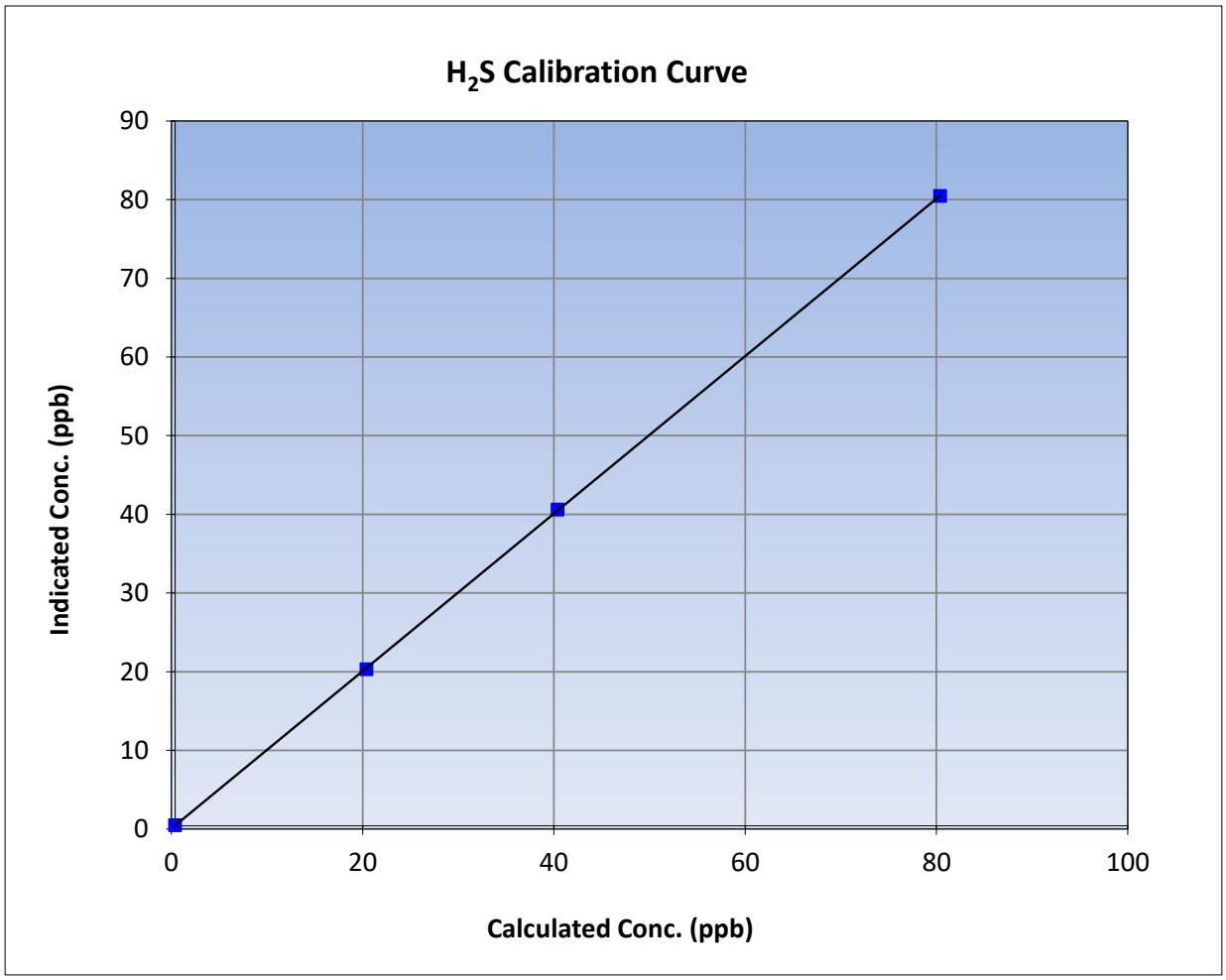
Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 18, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:25	End Time (MST):	15:50
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

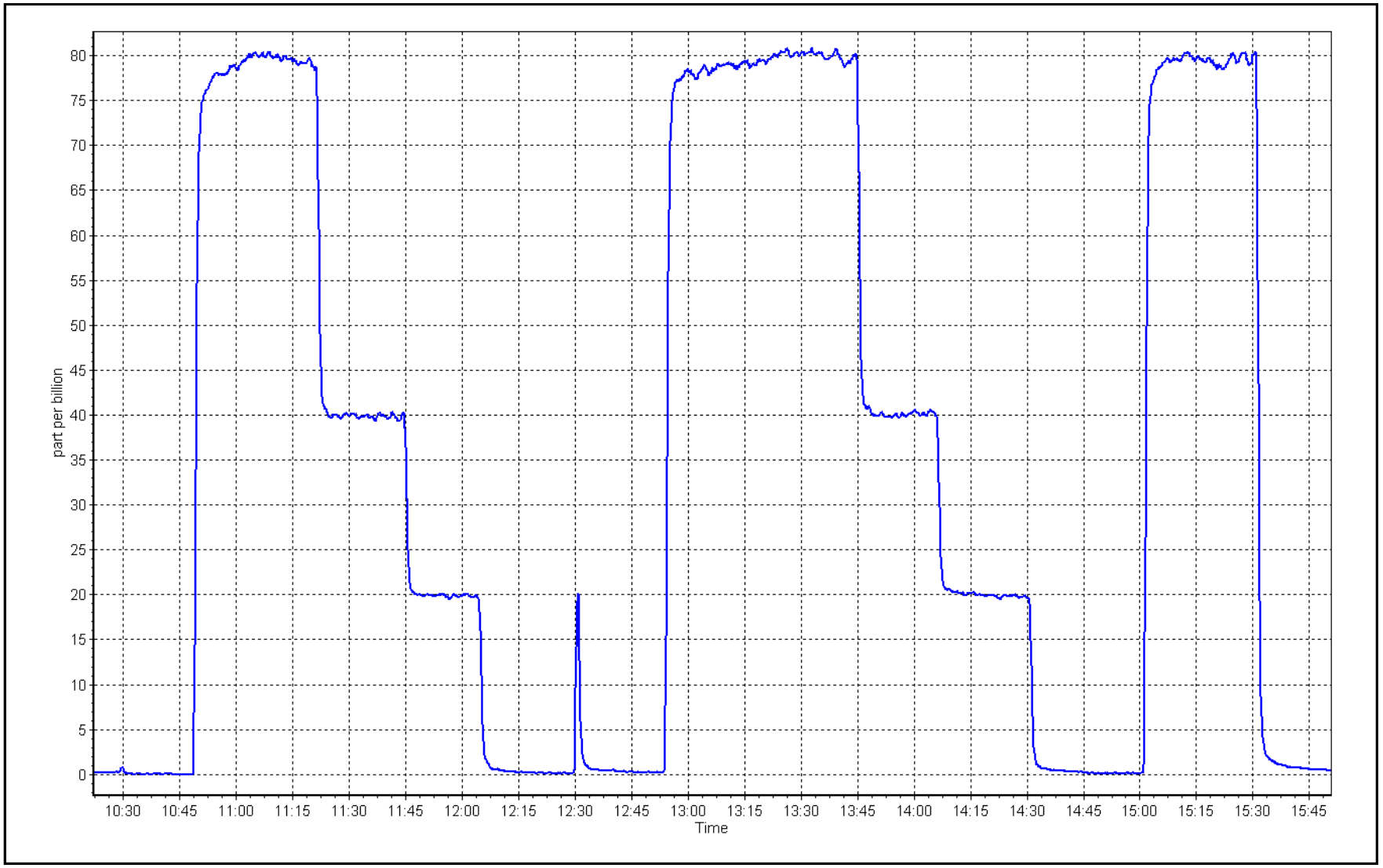
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.1	0.9986
40.0	40.2	0.9949
20.0	19.9	1.0049

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	1.001107	*0.90 - 1.10*
Intercept	0.040801	*+/-3*



H_2S Calibration Plot Date: January 10, 2024 Location: Mildred Lake



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	January 1, 2024	Last Cal Date:	December 23, 2023
Start time (MST):	11:18	End time (MST):	14:47
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320039	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.63E-04	2.62E-04	NMHC SP Ratio:	6.75E-05	6.18E-05
CH4 Retention time:	15.5	15.3	NMHC Peak Area:	130400	142482
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	16.82	17.66	0.952
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	16.82	16.79	1.002
second point	4960	40.1	8.41	8.35	1.007
third point	4980	20.0	4.19	4.15	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.64	1.011
				Average Correction Factor	1.007
Baseline Corr AF:	17.66	Prev response	16.84	*% change	4.6%
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 / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.80	9.60	0.916
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.78	1.002
second point	4960	40.1	4.40	4.41	0.998
third point	4980	20.0	2.19	2.19	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.65	1.017
				Average Correction Factor	1.000
Baseline Corr AF:	9.60	Prev response	8.83	*% change	8.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	8.06	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.02	8.00	1.003
second point	4960	40.1	4.01	3.95	1.016
third point	4980	20.0	2.00	1.96	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	7.99	1.005
				Average Correction Factor	1.014
Baseline Corr AF:	8.06	Prev response	8.00	*% 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

	Start	***Finish***
THC Cal Slope:	1.000046	0.998824
THC Cal Offset:	0.020295	-0.024719
CH4 Cal Slope:	0.998148	0.998021
CH4 Cal Offset:	-0.004054	-0.025858
NMHC Cal Slope:	1.001244	0.998479
NMHC Cal Offset:	0.025148	0.003536

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

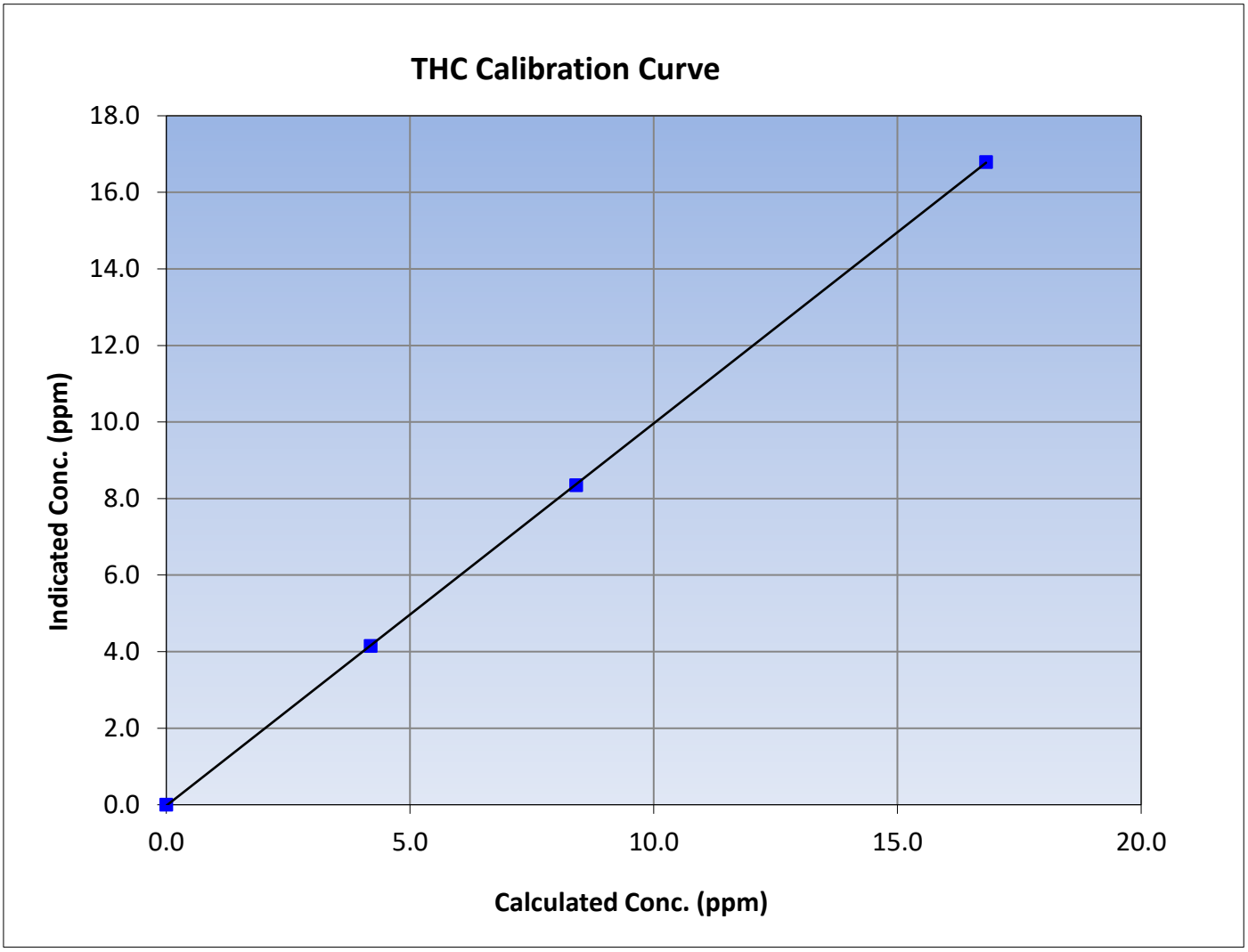
Version-06-2022

Station Information

Calibration Date:	January 1, 2024	Previous Calibration:	December 23, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	11:18	End Time (MST):	14:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999989	*≥0.995*
16.82	16.79	1.0017			
8.41	8.35	1.0071	Slope	0.998824	*0.90 - 1.10*
4.19	4.15	1.0111			
			Intercept	-0.024719	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

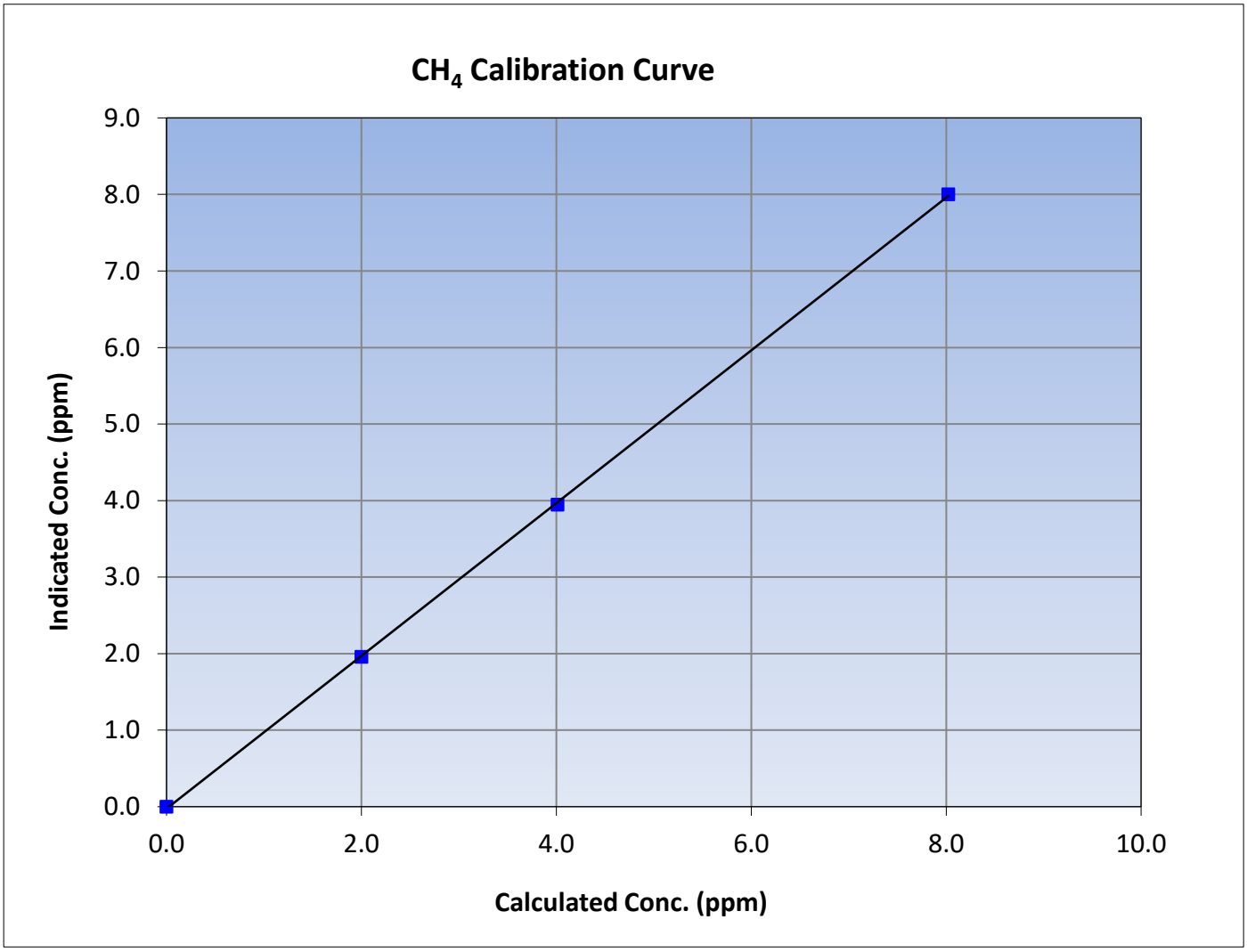
Version-06-2022

Station Information

Calibration Date:	January 1, 2024	Previous Calibration:	December 23, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	11:18	End Time (MST):	14:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999938	*≥0.995*
8.02	8.00	1.0029			
4.01	3.95	1.0163	Slope	0.998021	*0.90 - 1.10*
2.00	1.96	1.0224			
			Intercept	-0.025858	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

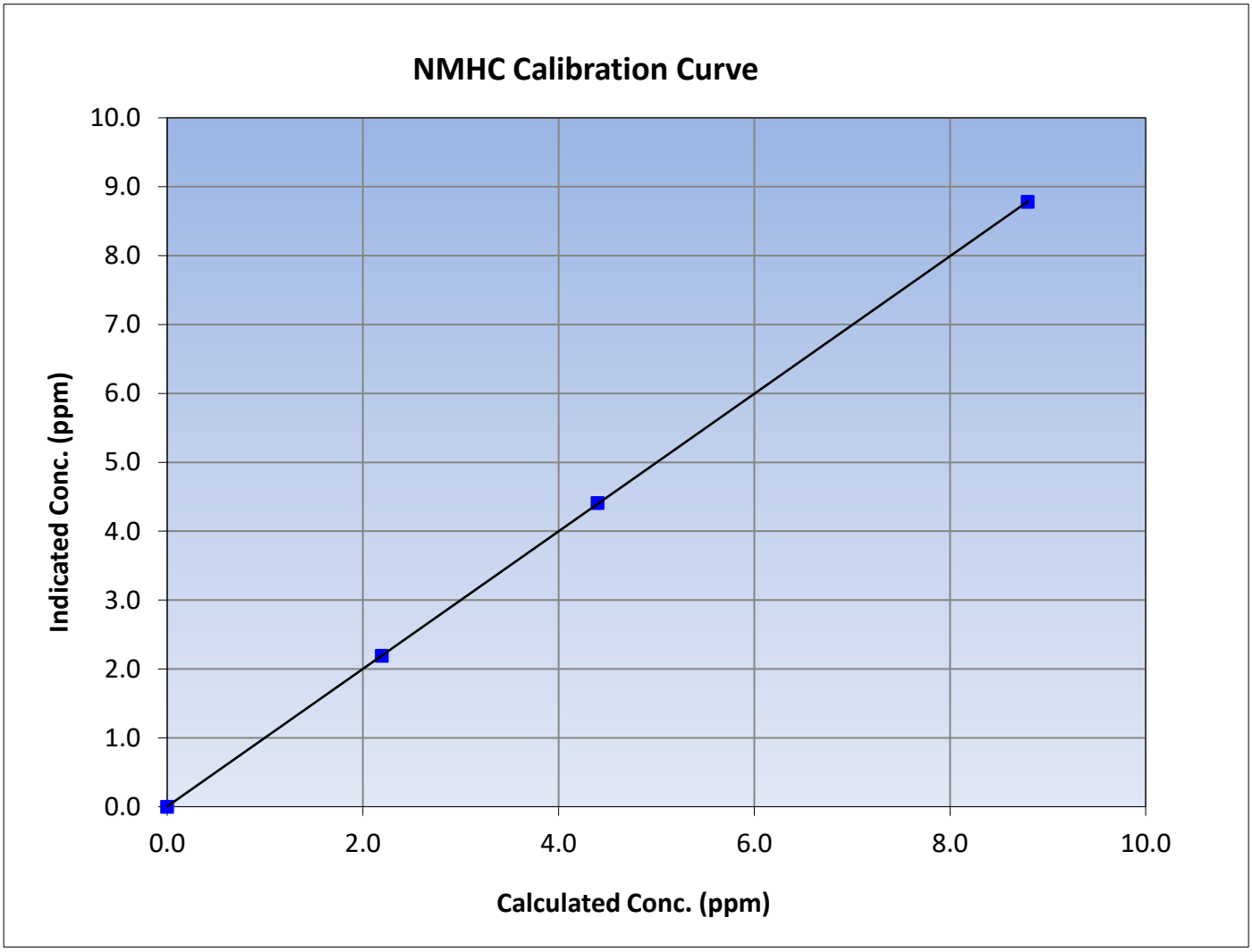
Version-06-2022

Station Information

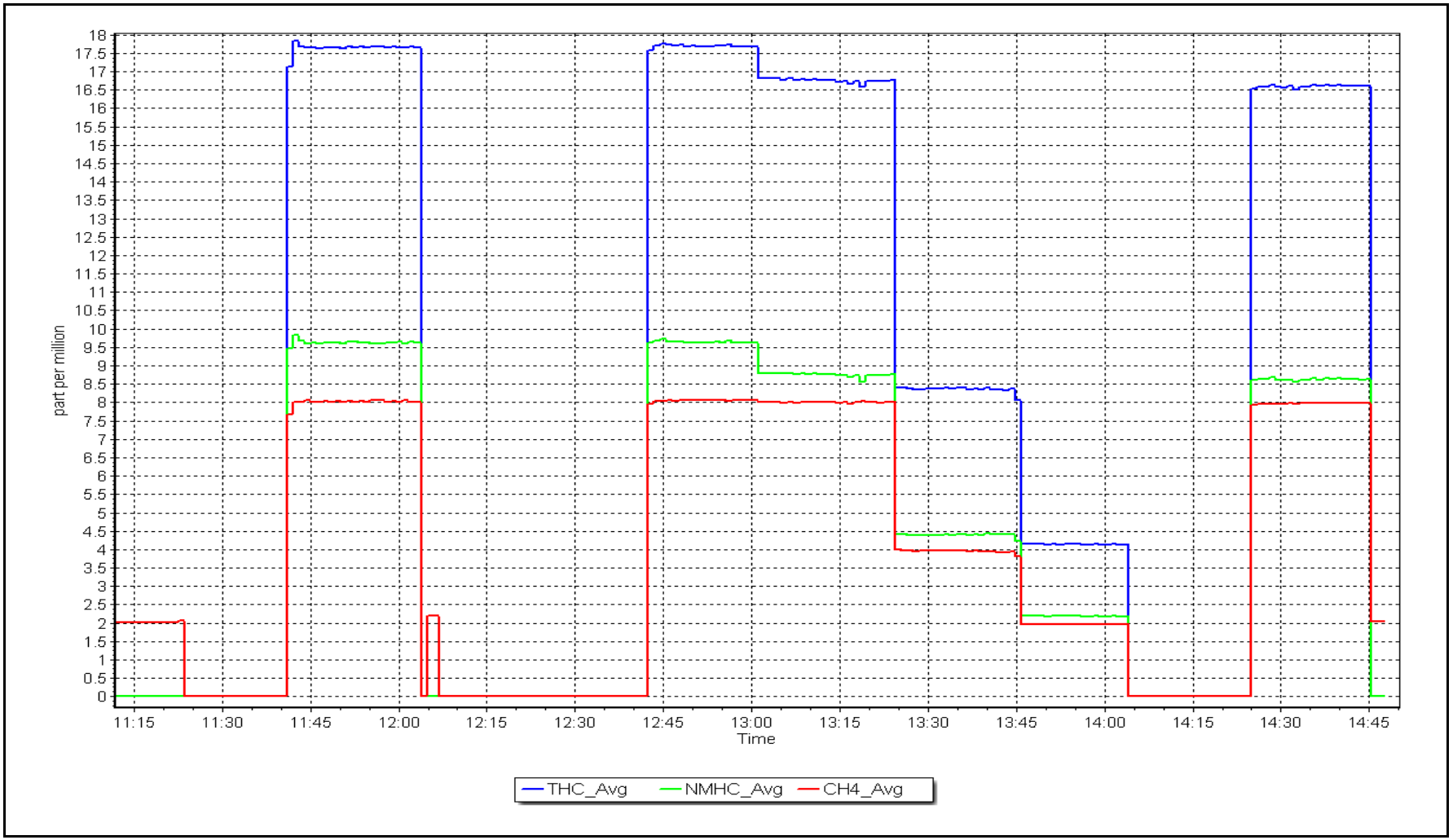
Calibration Date:	January 1, 2024	Previous Calibration:	December 23, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	11:18	End Time (MST):	14:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
8.80	8.78	1.0017			
4.40	4.41	0.9979	Slope	0.998479	*0.90 - 1.10*
2.19	2.19	1.0016			
			Intercept	0.003536	*+/-0.5*



NMHC Calibration Plot Date: January 1, 2024 Location: Mildred Lake



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	January 25, 2024	Last Cal Date:	January 1, 2024
Start time (MST):	10:26	End time (MST):	13:46
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320039	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.62E-04	2.62E-04	NMHC SP Ratio:	6.18E-05	6.08E-05
CH4 Retention time:	15.3	15.5	NMHC Peak Area:	142482	144769
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	16.82	16.95	0.992
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	16.81	1.000
second point	4960	40.1	8.41	8.43	0.998
third point	4980	20.0	4.19	4.19	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.76	1.003
				Average Correction Factor	0.999
Baseline Corr AF:	16.95	Prev response	16.77	*% 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 / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.80	9.00	0.977
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	1.001
second point	4960	40.1	4.40	4.41	0.997
third point	4980	20.0	2.19	2.20	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.79	1.001
				Average Correction Factor	0.998
Baseline Corr AF:	9.00	Prev response	8.79	*% change	2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	7.95	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	8.02	8.02	1.000
second point	4960	40.1	4.01	4.02	0.998
third point	4980	20.0	2.00	1.99	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	7.97	1.006
				Average Correction Factor	1.001
Baseline Corr AF:	7.95	Prev response	7.98	*% 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

	Start	***Finish***
THC Cal Slope:	0.998824	0.999652
THC Cal Offset:	-0.024719	0.005690
CH4 Cal Slope:	0.998021	1.000099
CH4 Cal Offset:	-0.025858	-0.001651
NMHC Cal Slope:	0.998479	0.999219
NMHC Cal Offset:	0.003536	0.006941

Notes: Swapped Hydrogen cylinder. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

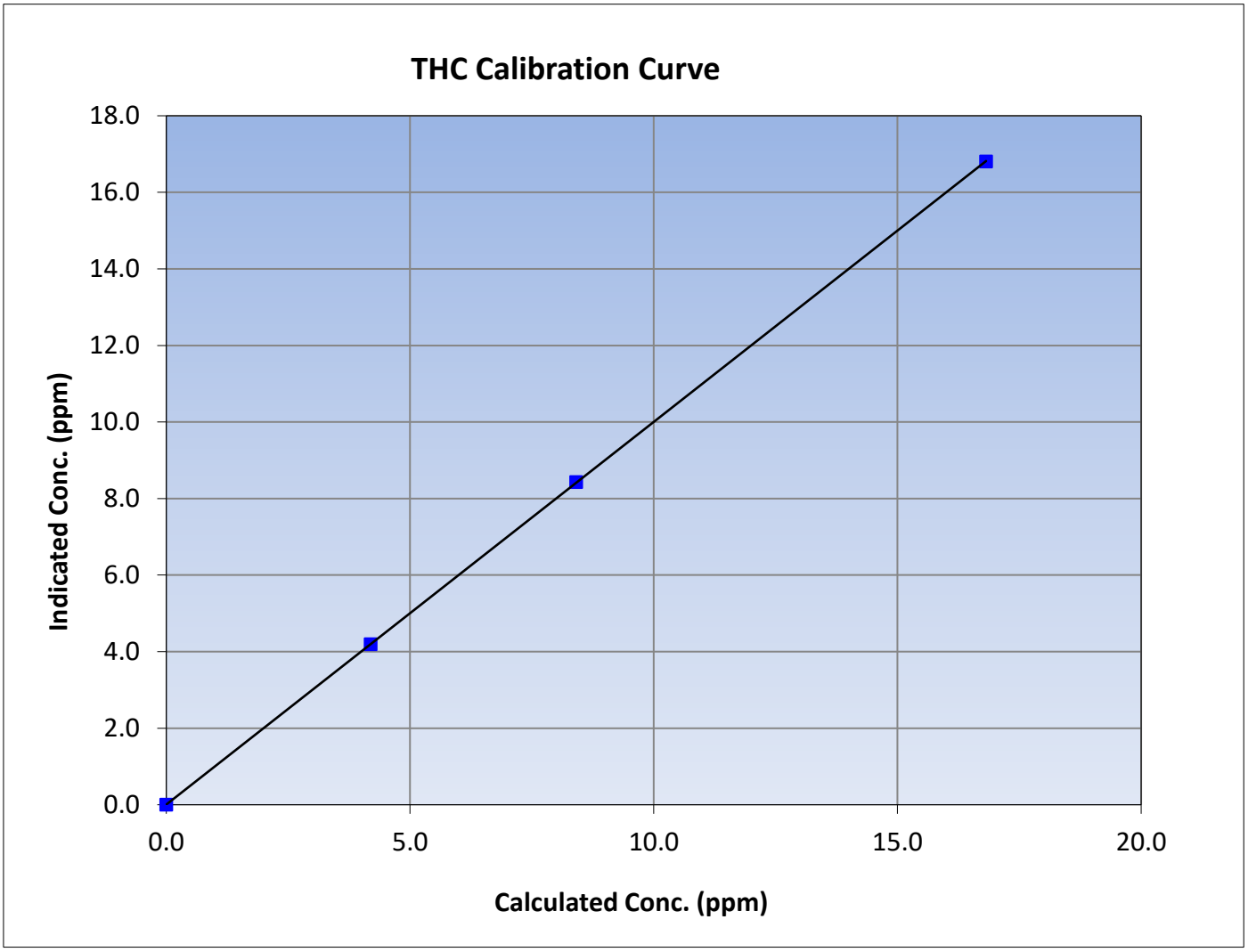
Version-06-2022

Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	January 1, 2024
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:26	End Time (MST):	13:46
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999997	*≥0.995*
16.82	16.81	1.0005			
8.41	8.43	0.9975	Slope	0.999652	*0.90 - 1.10*
4.19	4.19	1.0000			
			Intercept	0.005690	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

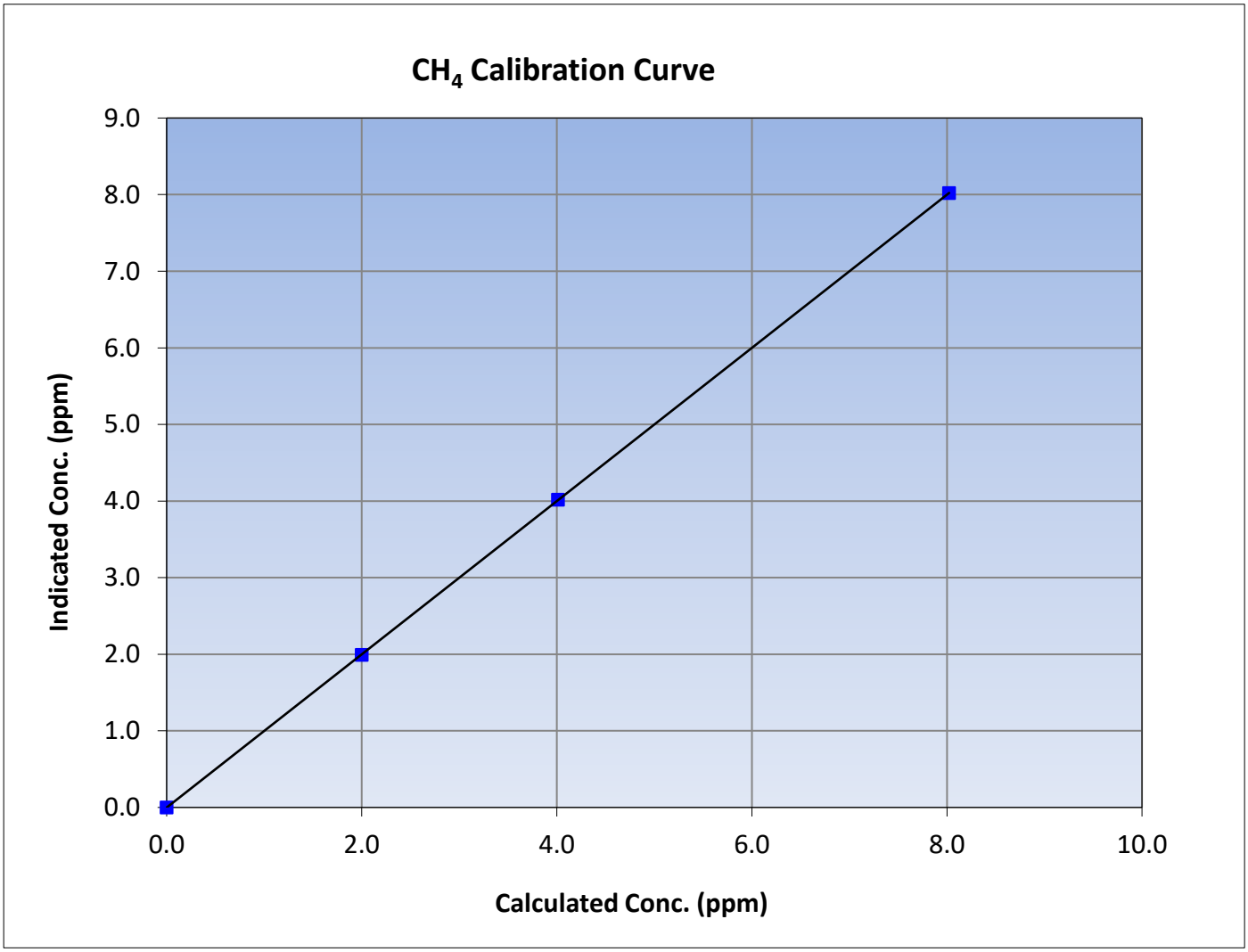
Version-06-2022

Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	January 1, 2024
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:26	End Time (MST):	13:46
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999997	*≥0.995*
8.02	8.02	1.0004			
4.01	4.02	0.9984	Slope	1.000099	*0.90 - 1.10*
2.00	1.99	1.0044			
			Intercept	-0.001651	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

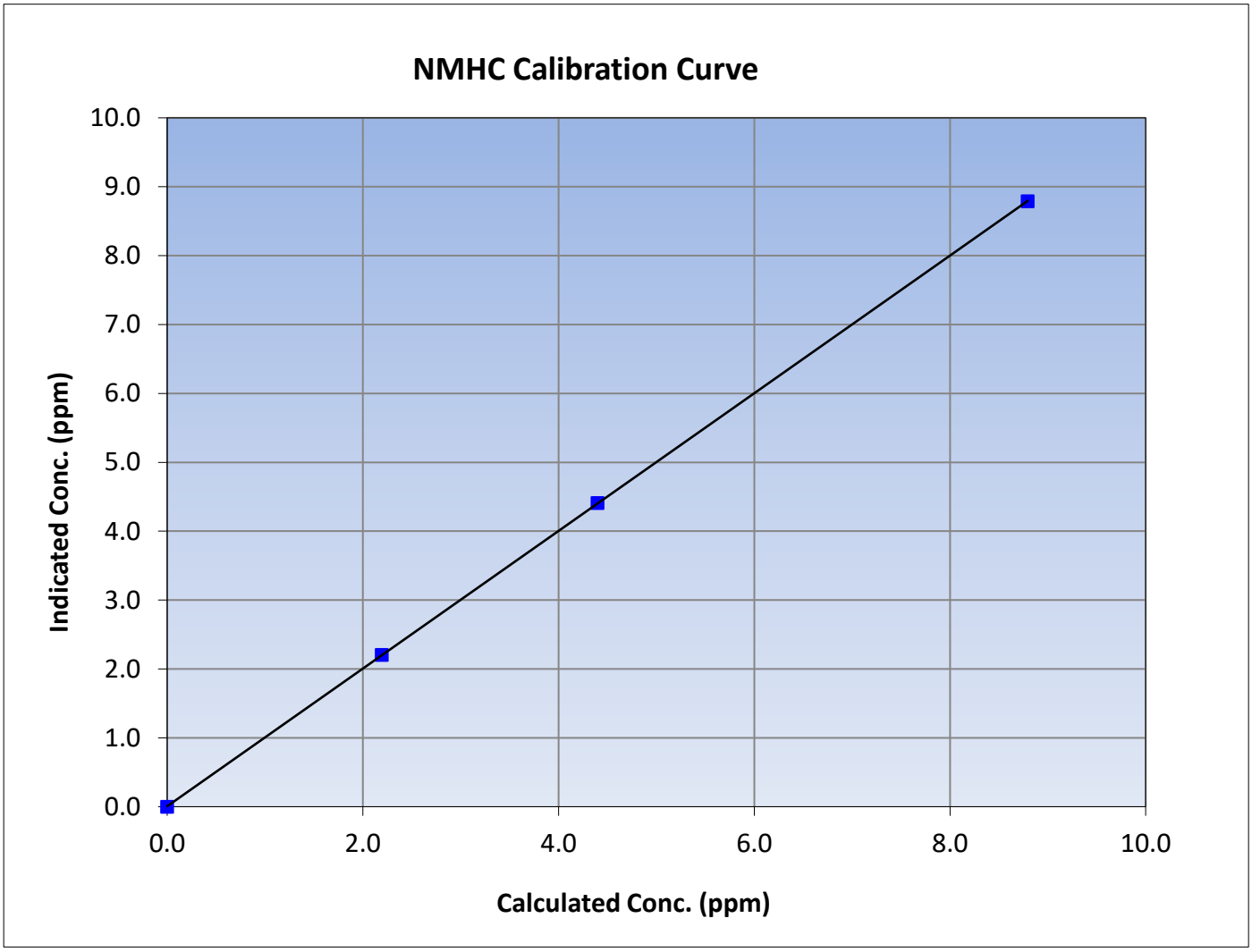
Version-06-2022

Station Information

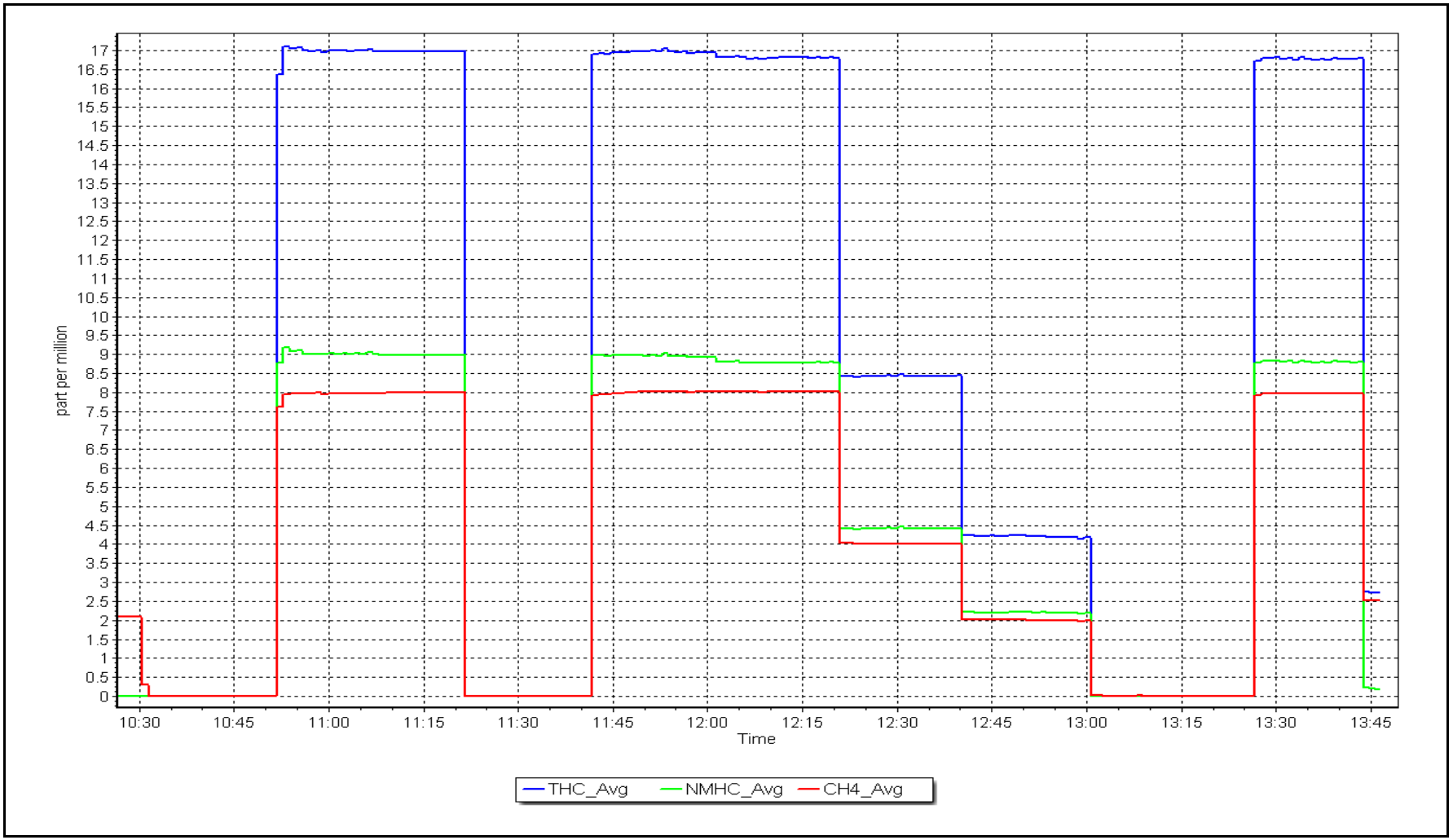
Calibration Date:	January 25, 2024	Previous Calibration:	January 1, 2024
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:26	End Time (MST):	13:46
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
8.80	8.79	1.0006			
4.40	4.41	0.9972	Slope	0.999219	0.90 - 1.10
2.19	2.20	0.9961			
			Intercept	0.006941	+/-0.5



NMHC Calibration Plot Date: January 25, 2024 Location: Mildred Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	January 17, 2024	Last Cal Date:	December 14, 2023
Start time (MST):	7:34	End time (MST):	10:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998629	0.986256	Backgd or Offset:	24.1	23.8
Calibration intercept:	0.434228	0.211572	Coeff or Slope:	0.873	0.864

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4921	78.6	799.7	804.5	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.6	----
high point	4921	78.6	799.7	789.2	1.013
second point	4961	39.3	399.8	394.2	1.014
third point	4980	19.6	199.4	196.6	1.014
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	78.6	799.7	786.9	1.016
				Average Correction Factor	1.014

Baseline Corr As found:	804.60	Previous response	799.08	*% change	0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Span adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

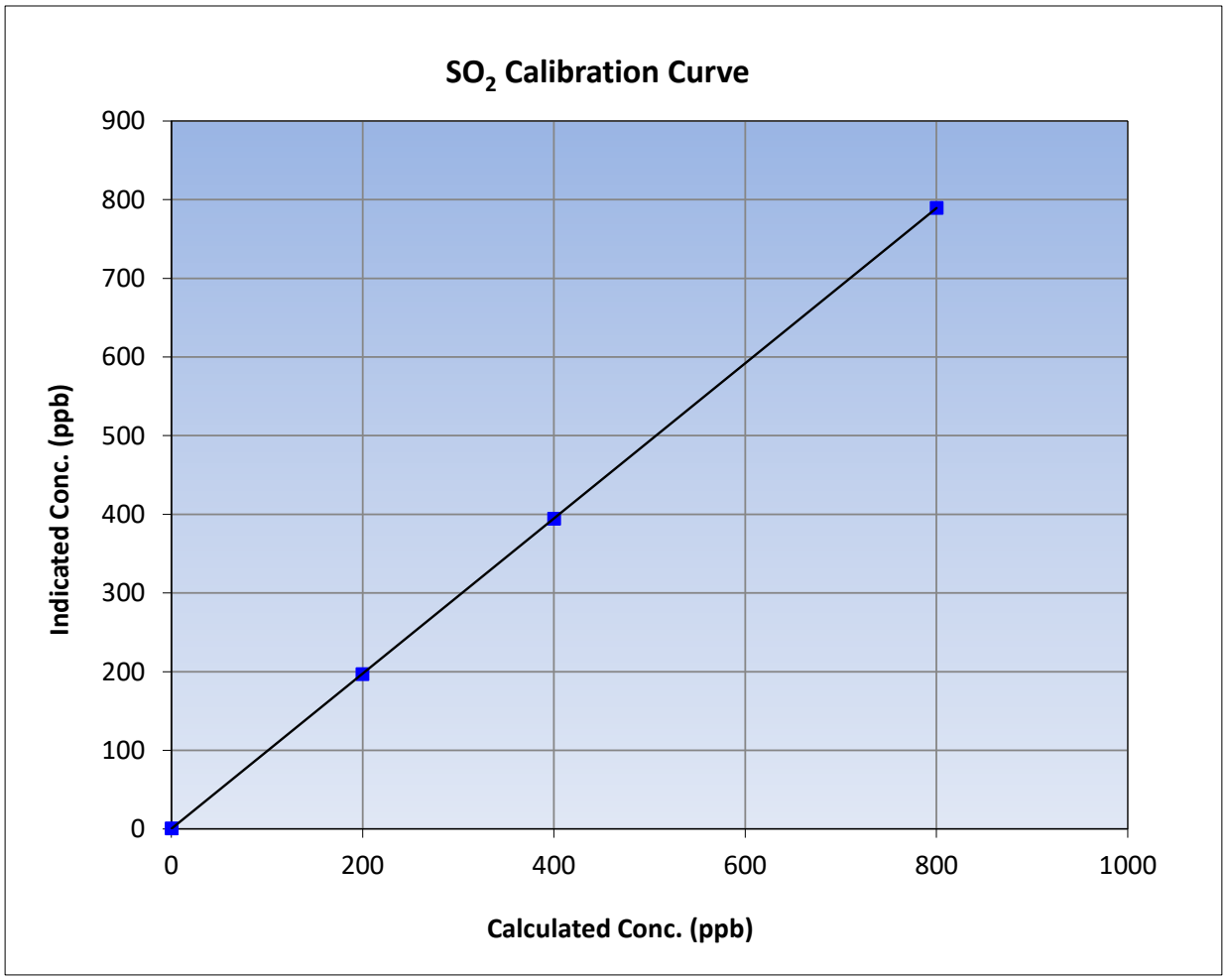
Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	December 14, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:34	End Time (MST):	10:35
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

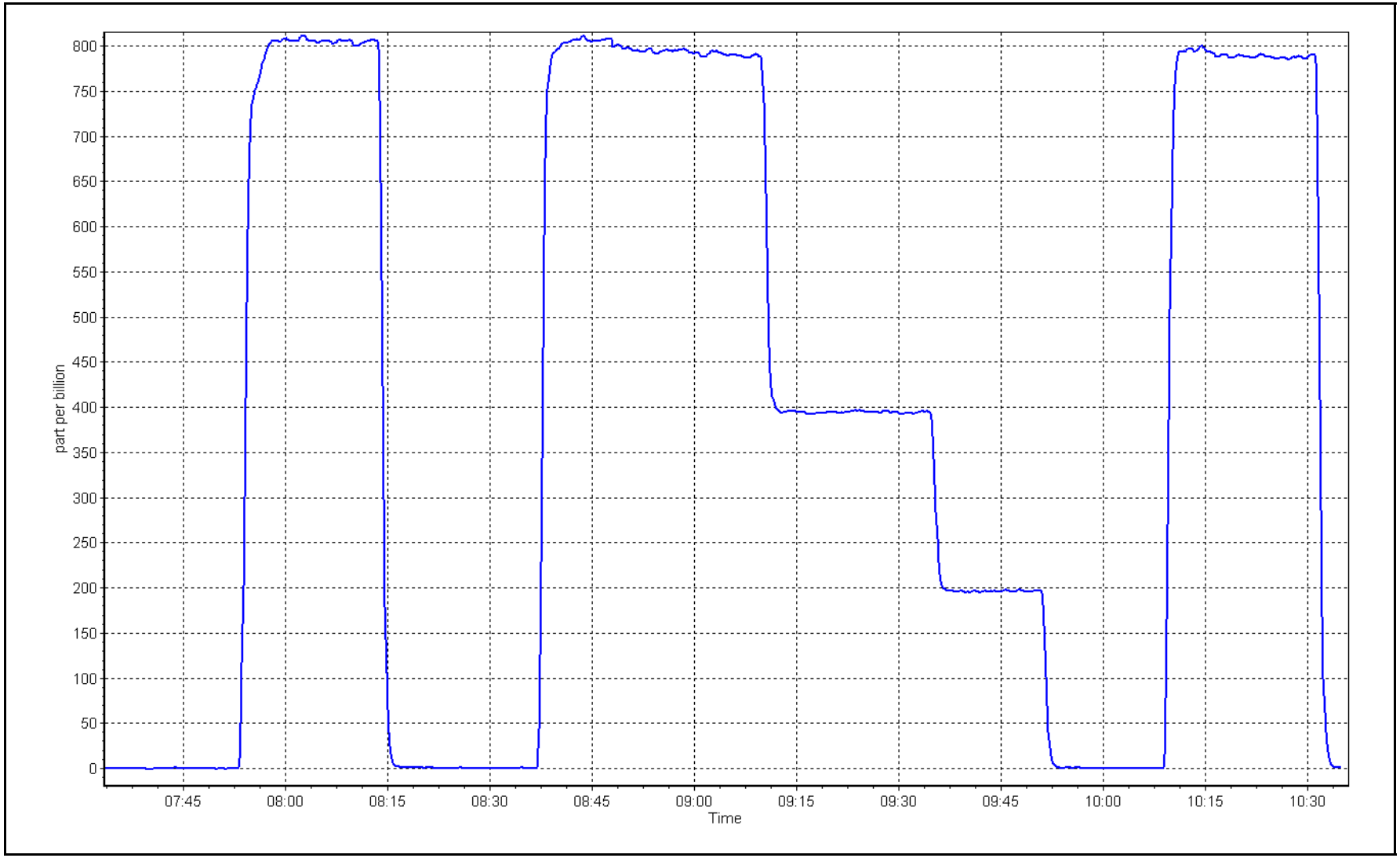
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
799.7	789.2	1.0134
399.8	394.2	1.0142
199.4	196.6	1.0144

Statistical Evaluation		Limits
Correlation Coefficient	0.999999	≥0.995
Slope	0.986256	0.90 - 1.10
Intercept	0.211572	+/-30



SO2 Calibration Plot Date: January 17, 2024 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	January 11, 2024	Last Cal Date:	December 8, 2023
Start time (MST):	7:34	End time (MST):	12:10
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1008841400
Converter make:	Global		Converter serial #:	2022-200
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000346	0.996076	Backgd or Offset:	1.83	1.87
Calibration intercept:	0.042159	0.242122	Coeff or Slope:	1.115	1.143

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4926	74.1	80.3	78.0	1.031
as found 2nd point	4963	37.0	40.1	39.5	1.018
as found 3rd point	4982	18.5	20.1	19.6	1.028
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4926	74.1	80.3	80.2	1.002
second point	4963	37.0	40.1	40.4	0.993
third point	4982	18.5	20.1	20.0	1.003
as left zero	5000	0.0	0.0	0.4	----
as left span	4926	74.1	80.3	80.2	1.002
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:		16-May-23		Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.9	Prev response:	80.39	*% change:	-3.2%
Baseline Corr 2nd AF pt:	39.4	AF Slope:	0.970320	AF Intercept:	0.221672
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999947		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

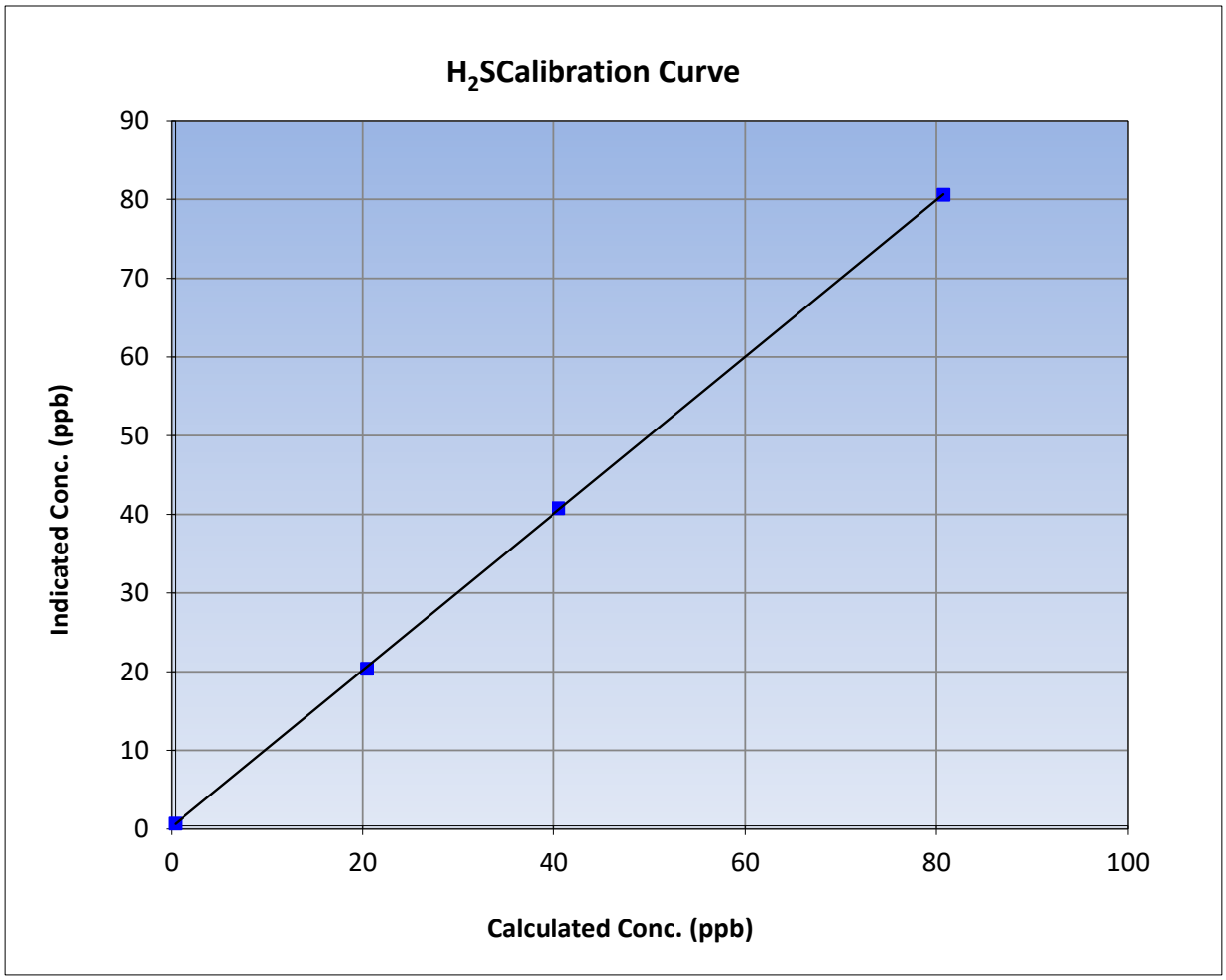
Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 8, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:34	End Time (MST):	12:10
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1008841400

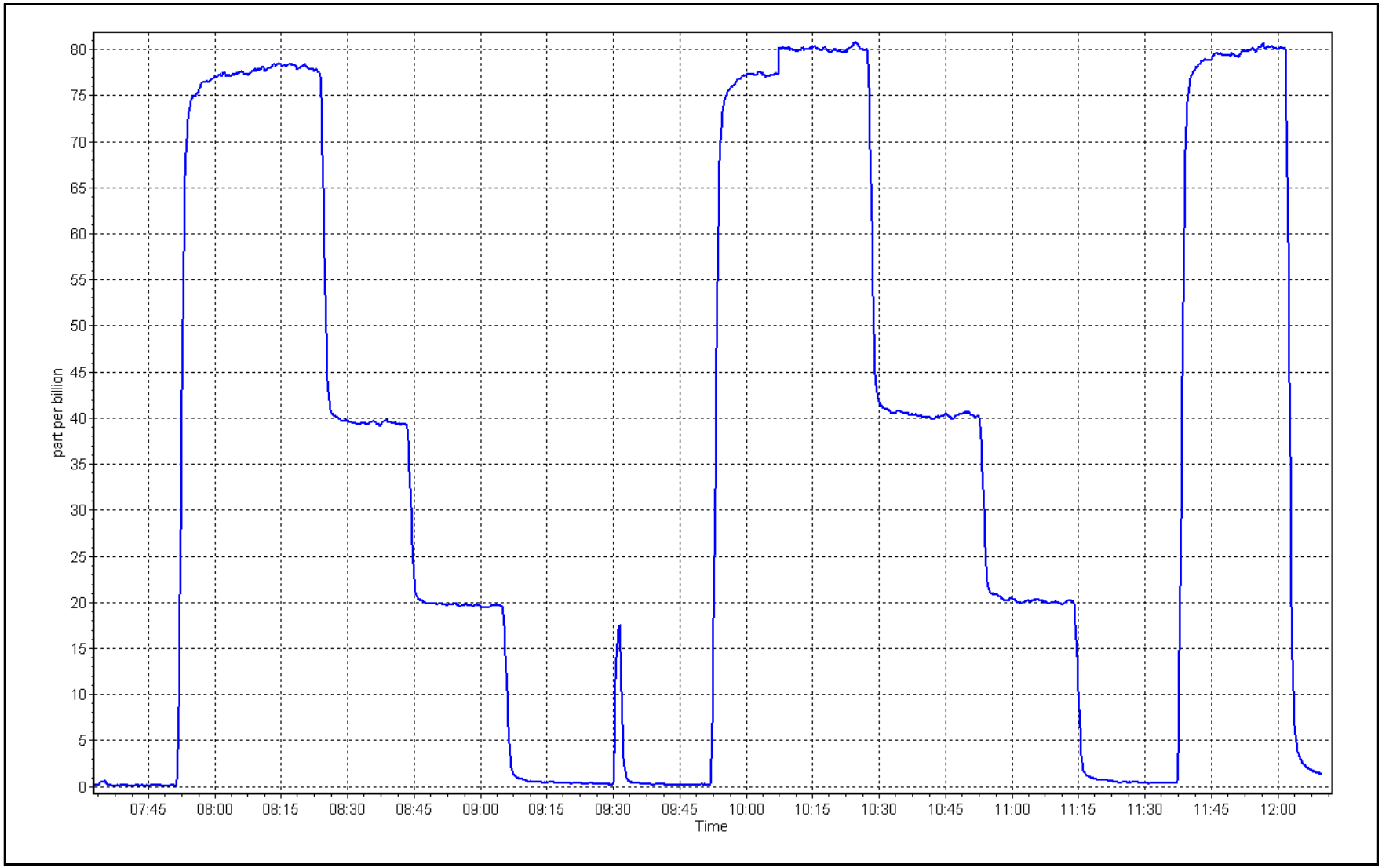
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.3	80.2	1.0015
40.1	40.4	0.9928
20.1	20.0	1.0026

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999973	*≥0.995*
Slope	0.996076	*0.90 - 1.10*
Intercept	0.242122	*+/-3*



H_2S Calibration Plot Date: January 11, 2024 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	January 17, 2024	Last Cal Date:	December 14, 2023
Start time (MST):	7:34	End time (MST):	10:33
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		NA	Cal Gas Expiry Date:	March 10, 1931	
CH4 Cal Gas Conc.	497.2	ppm	CH4 Equiv Conc.	1058.2	ppm
C3H8 Cal Gas Conc.	204.0	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		
Removed CH4 Conc.	497.2	ppm	CH4 Equiv Conc.	1058.2	ppm
Removed C3H8 Conc.	204.0	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.03E-04	2.10E-04	NMHC SP Ratio:	4.45E-05	4.60E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	198327	191608
Zero Chromatogram:	OFF	OFF	Flat Baseline:	ON	ON

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	16.64	16.11	1.033
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	16.64	16.62	1.001
second point	4961	39.3	8.32	8.20	1.014
third point	4980	19.6	4.15	4.03	1.029
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	16.64	16.60	1.002
				Average Correction Factor	1.015
Baseline Corr AF:	16.11	Prev response	16.60	*% 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 / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	8.82	8.52	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	78.6	8.82	8.80	1.002
second point	4961	39.3	4.41	4.37	1.009
third point	4980	19.6	2.20	2.15	1.023
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	8.82	8.80	1.002
				Average Correction Factor	1.011
Baseline Corr AF:	8.52	Prev response	8.80	*% change	-3.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	7.82	7.58	1.031
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	7.82	7.82	1.000
second point	4961	39.3	3.91	3.83	1.020
third point	4980	19.6	1.95	1.88	1.037
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	7.82	7.80	1.002
				Average Correction Factor	1.019
Baseline Corr AF:	7.58	Prev response	7.80	*% change	-2.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001050	1.000639
THC Cal Offset:	-0.055556	-0.067561
CH4 Cal Slope:	1.002202	1.002348
CH4 Cal Offset:	-0.035913	-0.043914
NMHC Cal Slope:	1.000029	0.999123
NMHC Cal Offset:	-0.019643	-0.023647

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

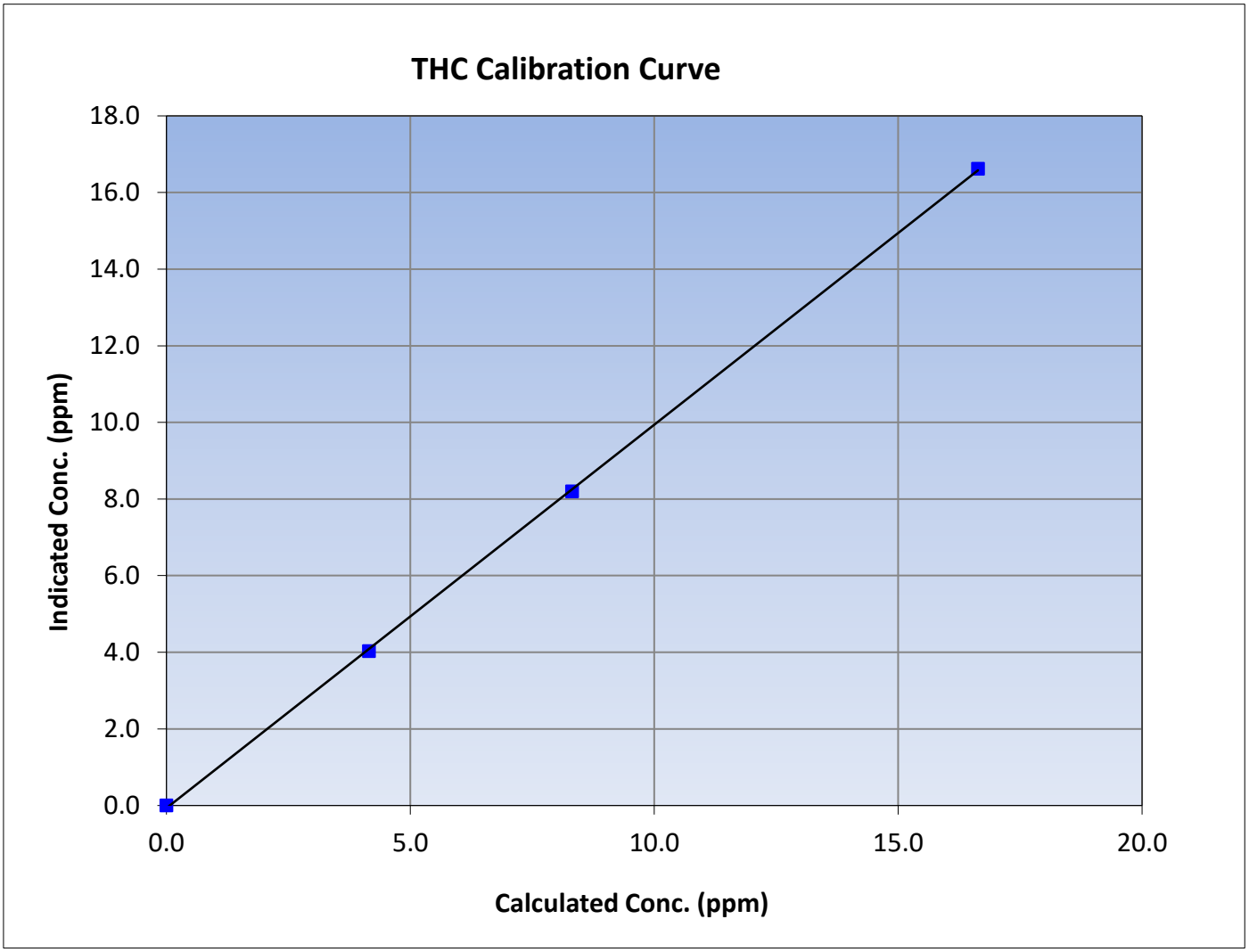
Version-06-2022

Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	December 14, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:34	End Time (MST):	10:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999920	≥0.995
16.64	16.62	1.0010			
8.32	8.20	1.0143	Slope	1.000639	0.90 - 1.10
4.15	4.03	1.0294			
			Intercept	-0.067561	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

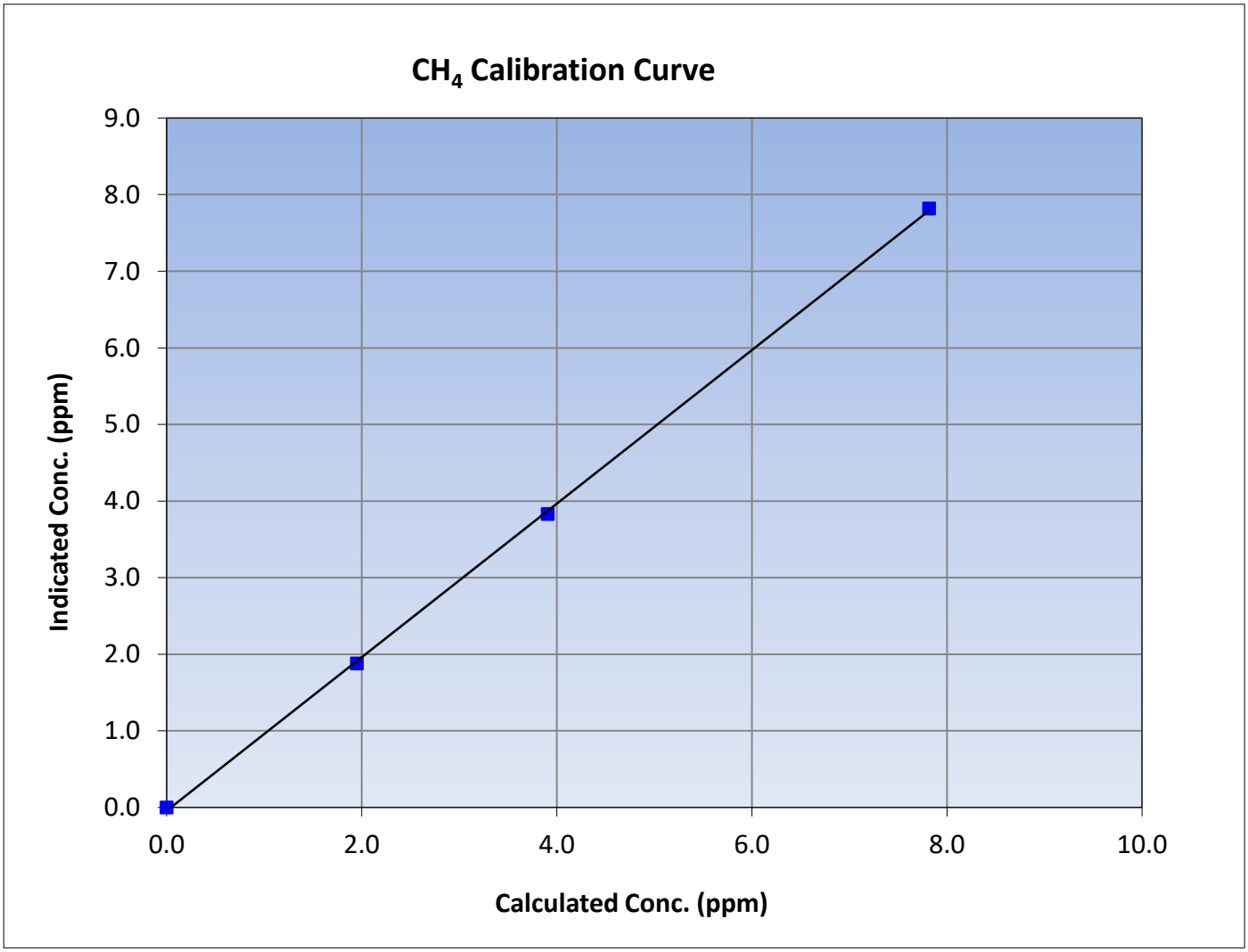
Version-06-2022

Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	December 14, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:34	End Time (MST):	10:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999836	*≥0.995*
7.82	7.82	0.9996			
3.91	3.83	1.0203	Slope	1.002348	*0.90 - 1.10*
1.95	1.88	1.0368			
			Intercept	-0.043914	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

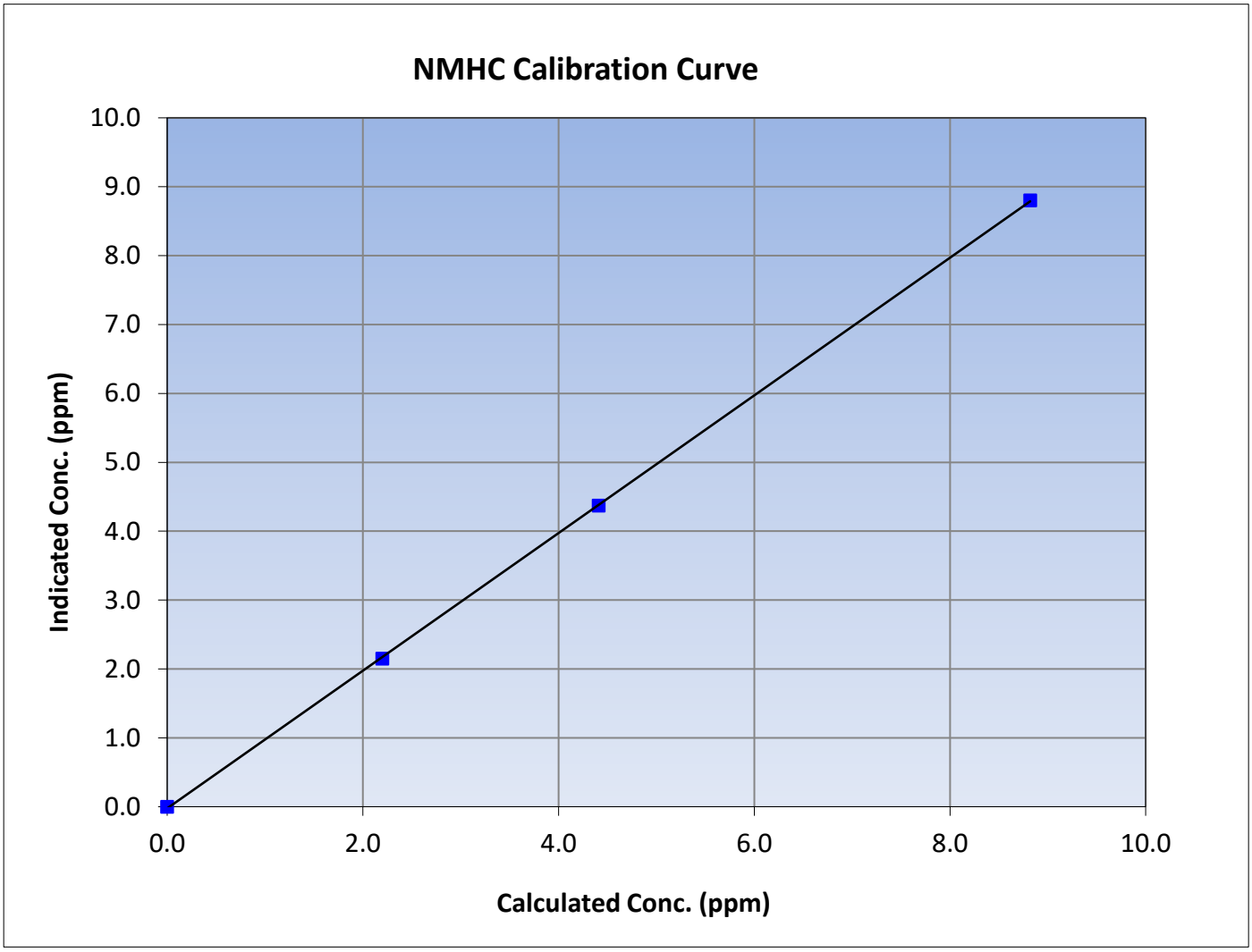
Version-06-2022

Station Information

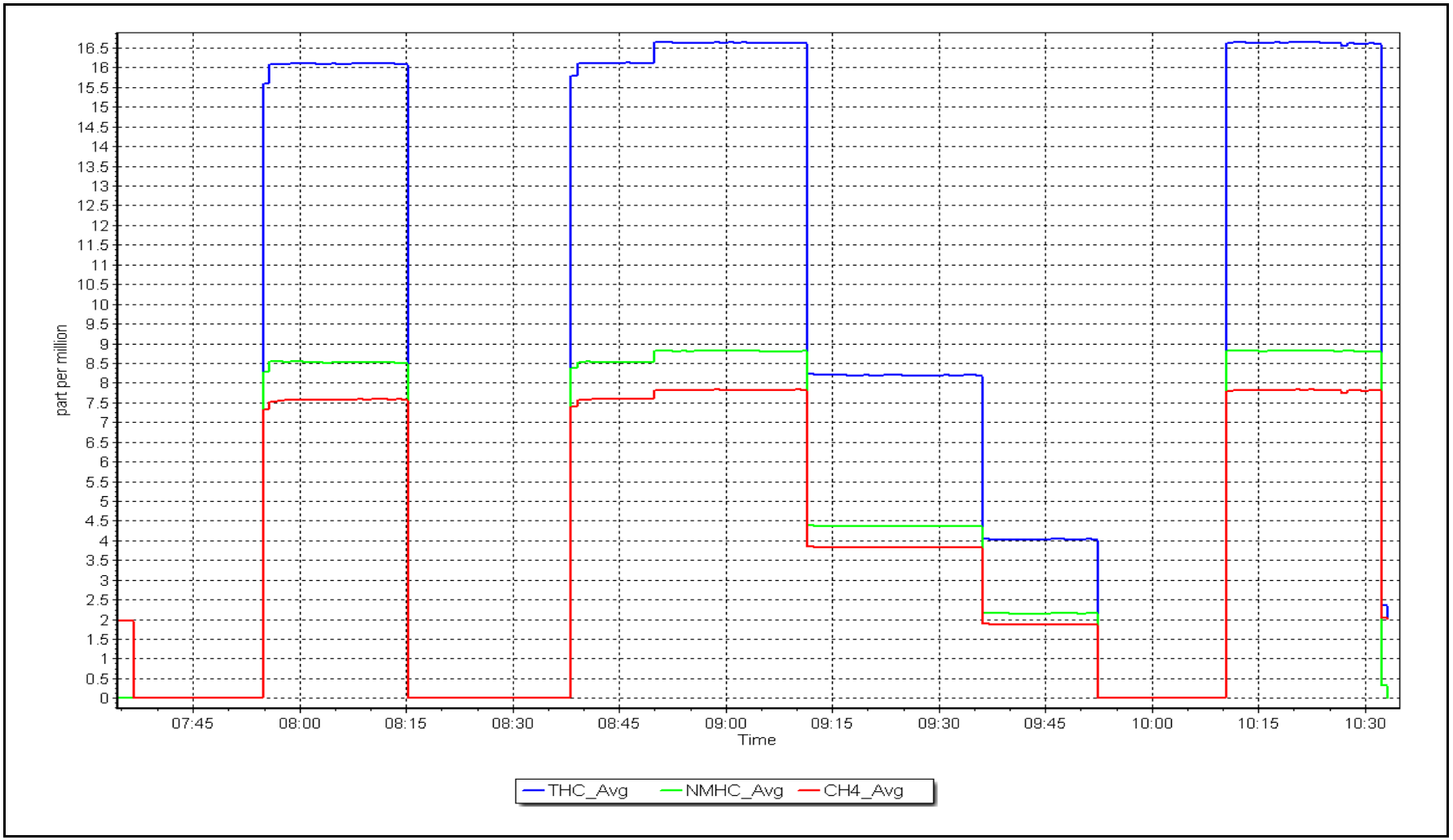
Calibration Date:	January 17, 2024	Previous Calibration:	December 14, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:34	End Time (MST):	10:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999967	≥0.995
8.82	8.80	1.0022			
4.41	4.37	1.0090	Slope	0.999123	0.90 - 1.10
2.20	2.15	1.0229			
			Intercept	-0.023647	+/-0.5



NMHC Calibration Plot Date: January 17, 2024 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	January 26, 2024	Last Cal Date:	January 17, 2024
Start time (MST):	9:20	End time (MST):	10:46
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		NA	Cal Gas Expiry Date:	March 10, 1931	
CH4 Cal Gas Conc.	497.2	ppm	CH4 Equiv Conc.	1058.2	ppm
C3H8 Cal Gas Conc.	204.0	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		
Removed CH4 Conc.	497.2	ppm	CH4 Equiv Conc.	1058.2	ppm
Removed C3H8 Conc.	204.0	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1222762077	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.10E-04	2.10E-04	NMHC SP Ratio:	4.60E-05	4.60E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	191608	191608
Zero Chromatogram:	OFF	OFF	Flat Baseline:	ON	ON

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	16.64	16.39	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	16.64	16.38	1.016
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.016
Baseline Corr AF:	16.39	Prev response	16.58	*% change	-1.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	8.82	8.70	1.014
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	8.82	8.65	1.020
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.020
Baseline Corr AF:	8.70	Prev response	8.79	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	7.82	7.69	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	7.82	7.72	1.013
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.013
Baseline Corr AF:	7.69	Prev response	7.79	*% change	-1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

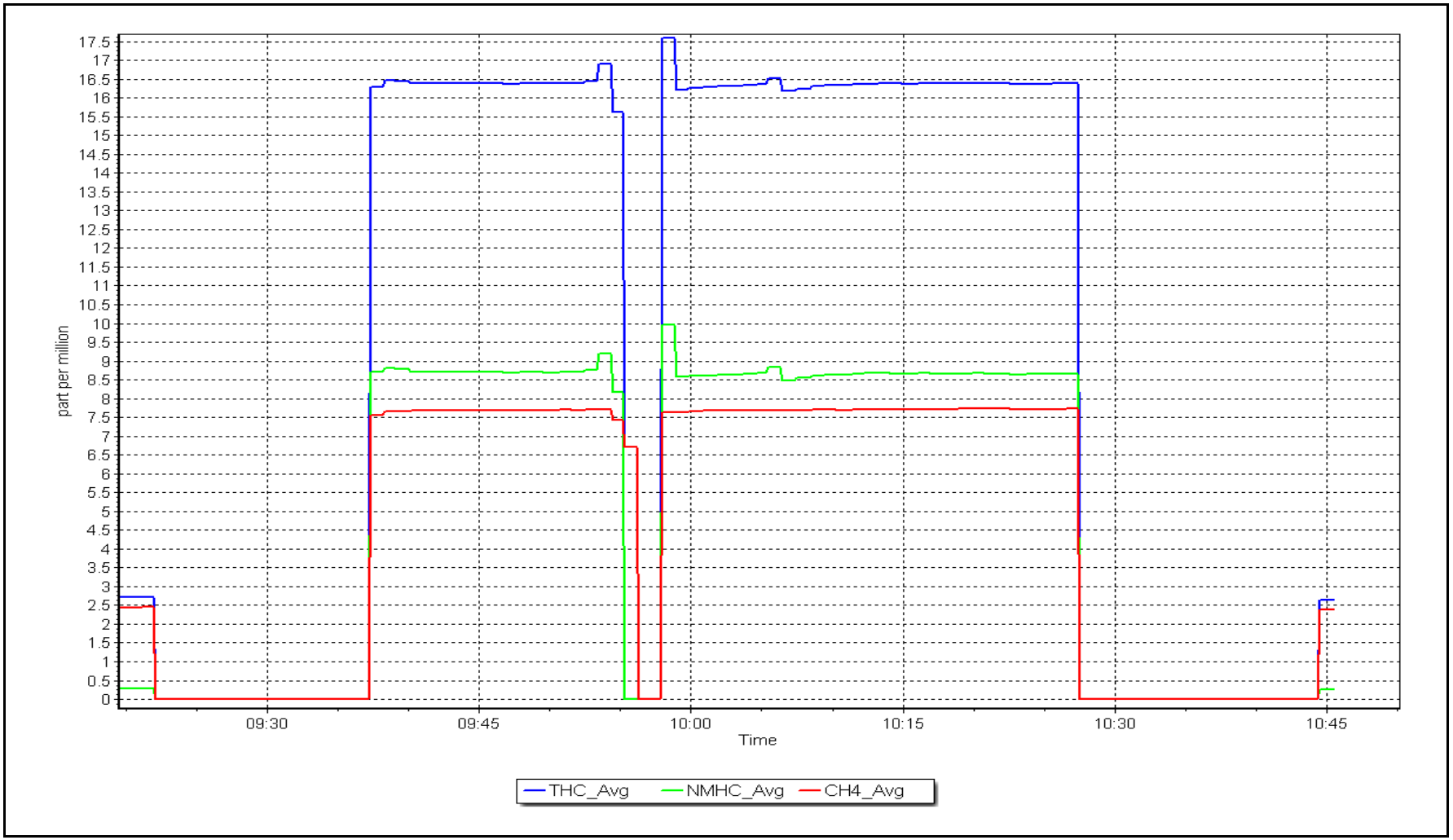
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000639	0.984598
THC Cal Offset:	-0.067561	0.000000
CH4 Cal Slope:	1.002348	0.987641
CH4 Cal Offset:	-0.043914	0.000000
NMHC Cal Slope:	0.999123	0.980767
NMHC Cal Offset:	-0.023647	0.000000

Notes: Hydrogen Cylinder Changed.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: January 26, 2024 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	January 12, 2024	Last Cal Date:	December 11, 2023
Start time (MST):	6:43	End time (MST):	11:43
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC324979		Cal Gas Expiry Date:	November 3, 1932	
NOX Cal Gas Conc:	48.90	ppm	NO Cal Gas Conc:	48.80	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	48.90	ppm	Removed Gas NO Conc:	48.80	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

Analyzer make:	API T200		Analyzer serial #:	721	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.163	1.182	NO bkgnd or offset:	-0.6	-0.6
NOX coeff or slope:	1.148	1.169	NOX bkgnd or offset:	-0.3	-0.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.4	4.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000893	1.000181
NO_X Cal Offset:	-0.273094	-0.473674
NO Cal Slope:	1.000600	1.002304
NO Cal Offset:	-1.154426	-1.574438
NO_2 Cal Slope:	0.986885	0.987754
NO_2 Cal Offset:	-0.475922	-0.437615

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.4	-0.5	----	----
as found span	4918	81.8	800.0	798.4	1.6	787.8	788.2	-0.4	1.0155	1.0129
as found 2nd										
as found 3rd										
new cyl resp	4918	81.8	800.0	798.4	1.6					
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.7	-0.1	----	----
high point	4918	81.8	800.0	798.4	1.6	800.2	799.7	0.4	0.9998	0.9984
second point	4959	40.9	400.0	399.2	0.8	399.1	397.7	1.4	1.0023	1.0038
third point	4980	20.4	199.5	199.1	0.4	198.1	195.5	2.6	1.0070	1.0184
as left zero	5000	0.0	0.0	0.0	0.0	0.6	0.9	-0.4	----	----
as left span	4918	81.8	800.0	398.5	401.5	793.1	402.8	390.3	1.0087	0.9893
								Average Correction Factor	1.0030	1.0068

Corrected As found	NO_X = 787.8 ppb	NO = 787.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -1.6%
Previous Response	NO_X = 800.5 ppb	NO = 797.7 ppb		*Percent Change	NO = -1.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.8	396.9	401.5	396.3	1.0132	98.7%
2nd GPT point (200 ppb O3)	796.8	595.2	203.2	200.3	1.0147	98.6%
3rd GPT point (100 ppb O3)	796.8	696.2	102.2	100.1	1.0213	97.9%
				Average Correction Factor	1.0164	98.4%

Notes: No Maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

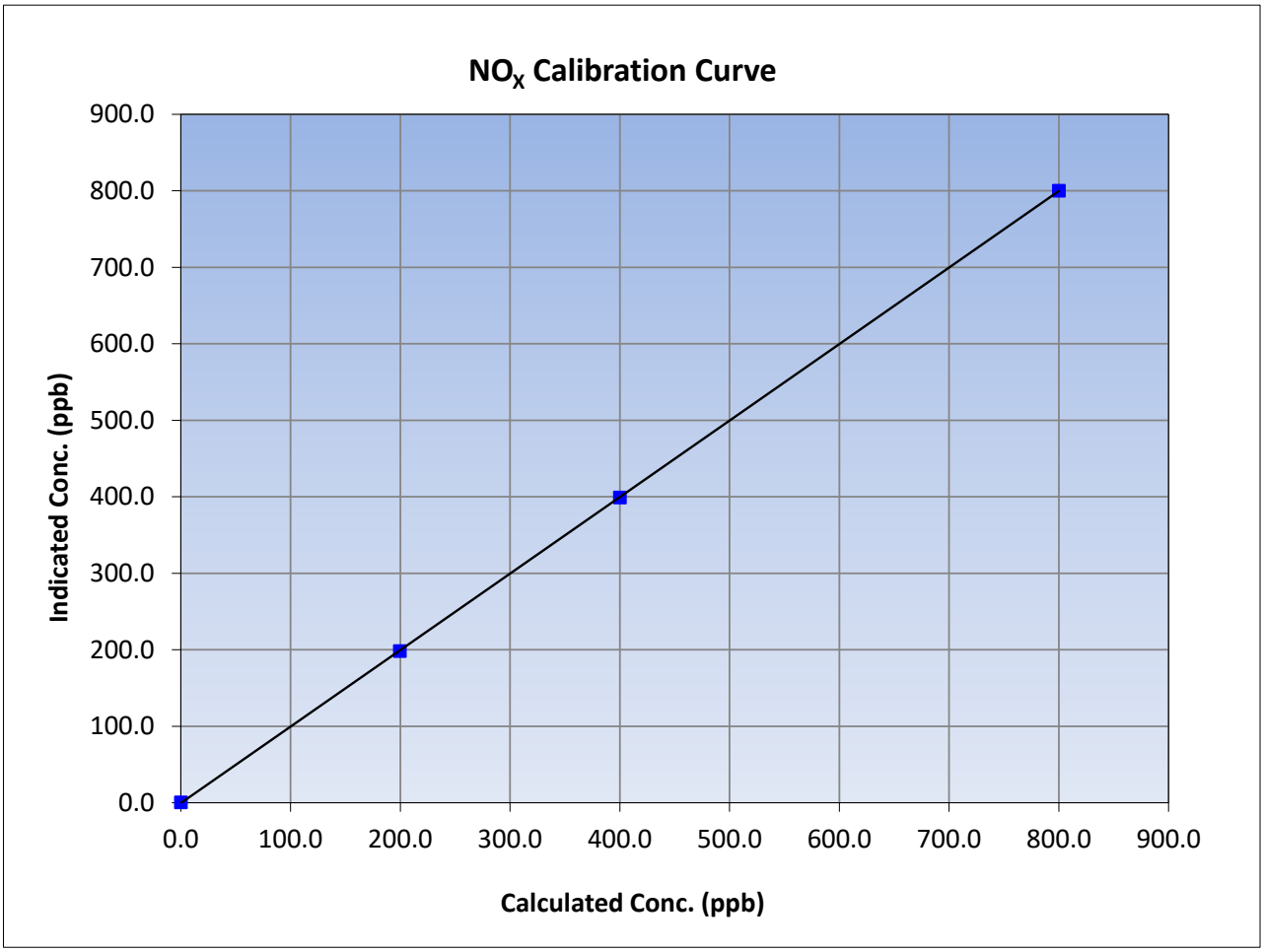
Version-04-2020

Station Information

Calibration Date:	January 12, 2024	Previous Calibration:	December 11, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:43	End Time (MST):	11:43
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.5	----	Correlation Coefficient	0.999993	≥0.995
800.0	800.2	0.9998			
400.0	399.1	1.0023	Slope	1.000181	0.90 - 1.10
199.5	198.1	1.0070			
			Intercept	-0.473674	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

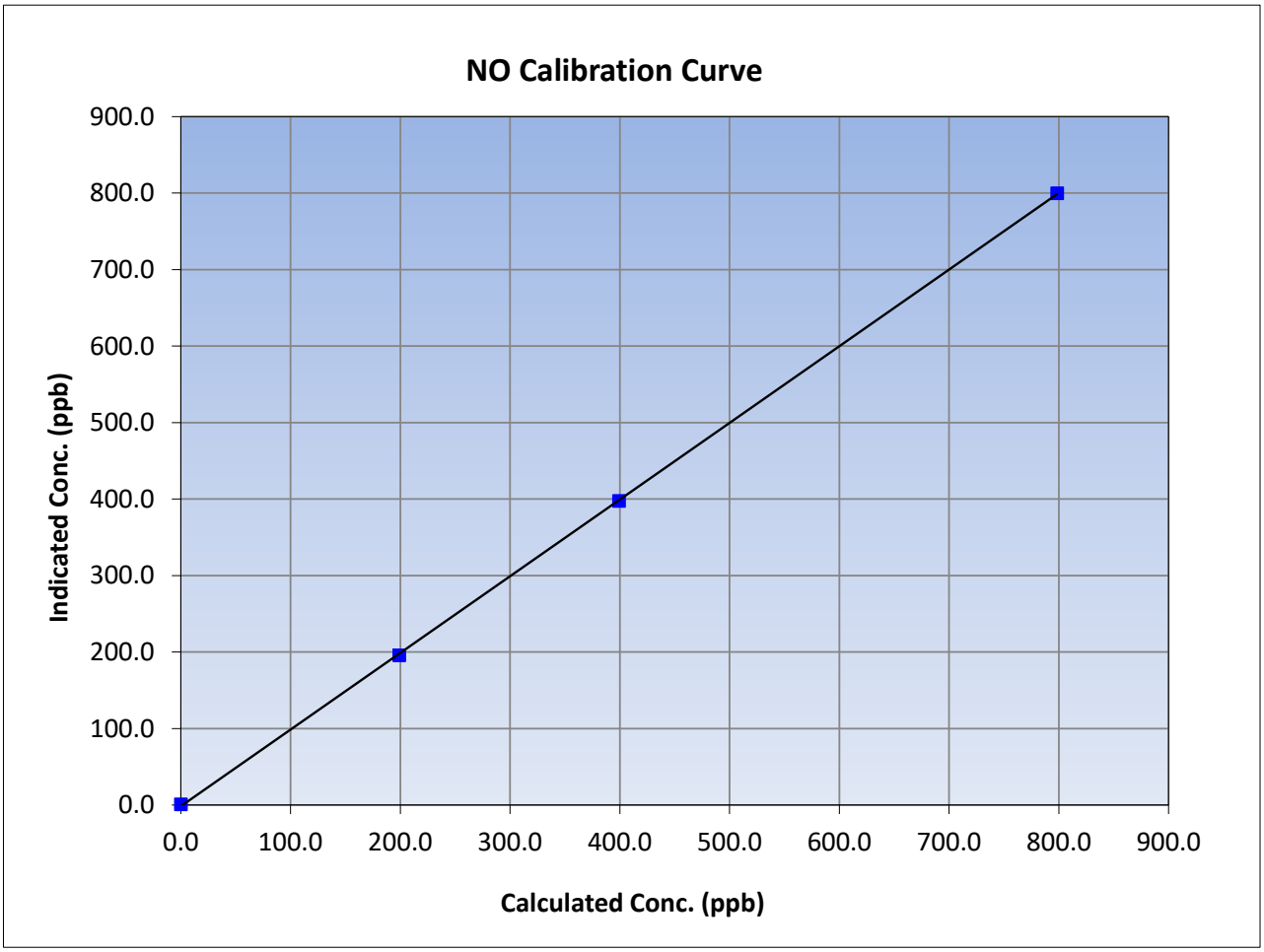
Version-04-2020

Station Information

Calibration Date:	January 12, 2024	Previous Calibration:	December 11, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:43	End Time (MST):	11:43
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.7	----	Correlation Coefficient	0.999963	≥0.995
798.4	799.7	0.9984			
399.2	397.7	1.0038	Slope	1.002304	0.90 - 1.10
199.1	195.5	1.0184			
			Intercept	-1.574438	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

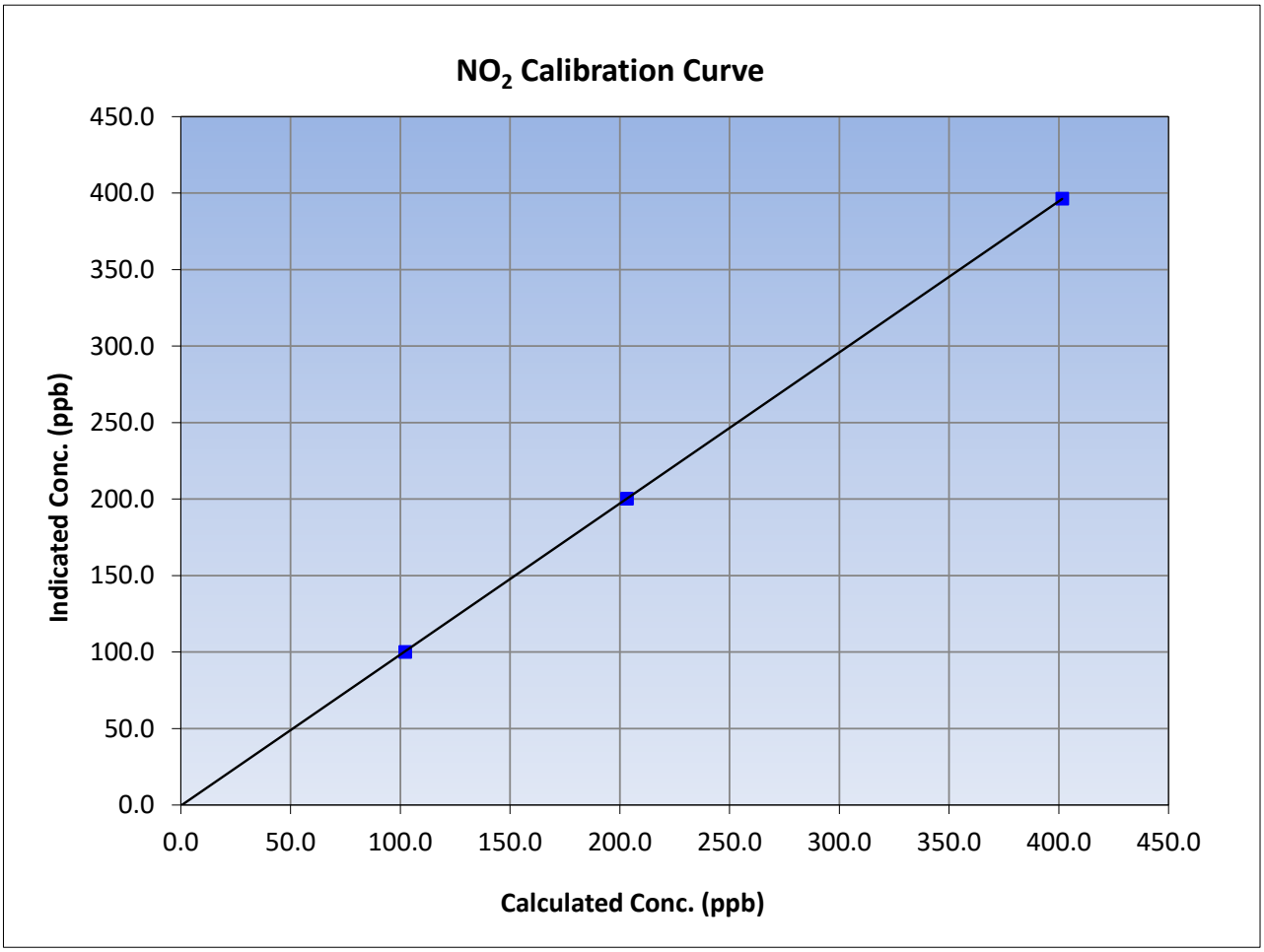
Version-04-2020

Station Information

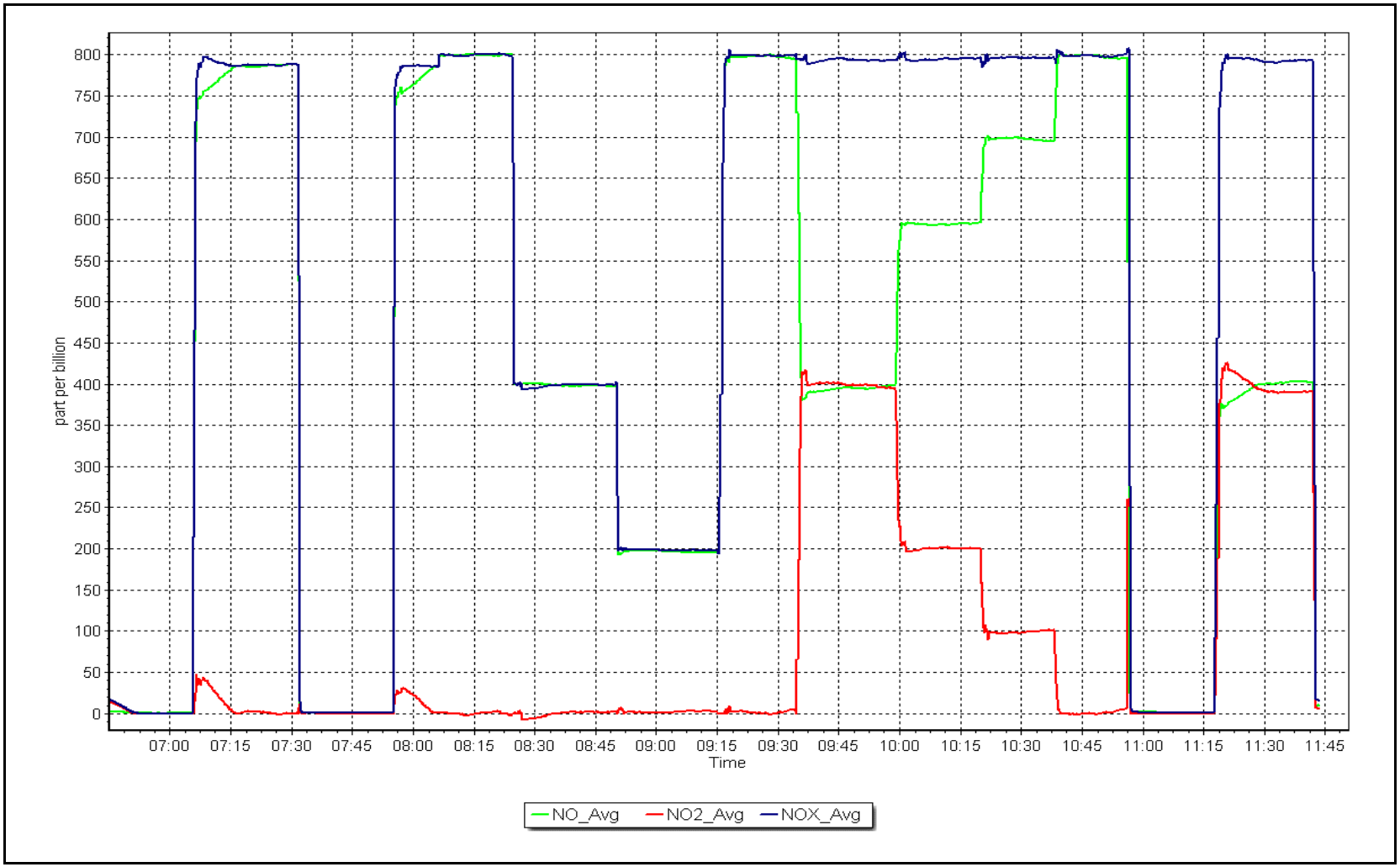
Calibration Date:	January 12, 2024	Previous Calibration:	December 11, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:43	End Time (MST):	11:43
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999996	≥0.995
401.5	396.3	1.0132			
203.2	200.3	1.0147	Slope	0.987754	0.90 - 1.10
102.2	100.1	1.0213			
			Intercept	-0.437615	+/-20



NO_X Calibration Plot Date: January 12, 2024 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	January 8, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	10:10	End time (MST):	12:52
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001229	1.002571	Backgd or Offset:	-3.5	-3.5
Calibration intercept:	0.760000	0.800000	Coeff or Slope:	1.011	1.011

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	5000	982.6	400.0	401.8	0.996
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.9	----
high point	5000	984.0	400.0	401.8	0.996
second point	5000	812.4	200.0	201.5	0.993
third point	5000	702.1	100.0	100.8	0.992
as left zero	5000	0.0	0.0	1.1	----
as left span	5000	984.8	400.0	401.7	0.996
				Average Correction Factor	0.993

Baseline Corr As found:	401.6	Previous response	401.3	*% 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: No adjustments and maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

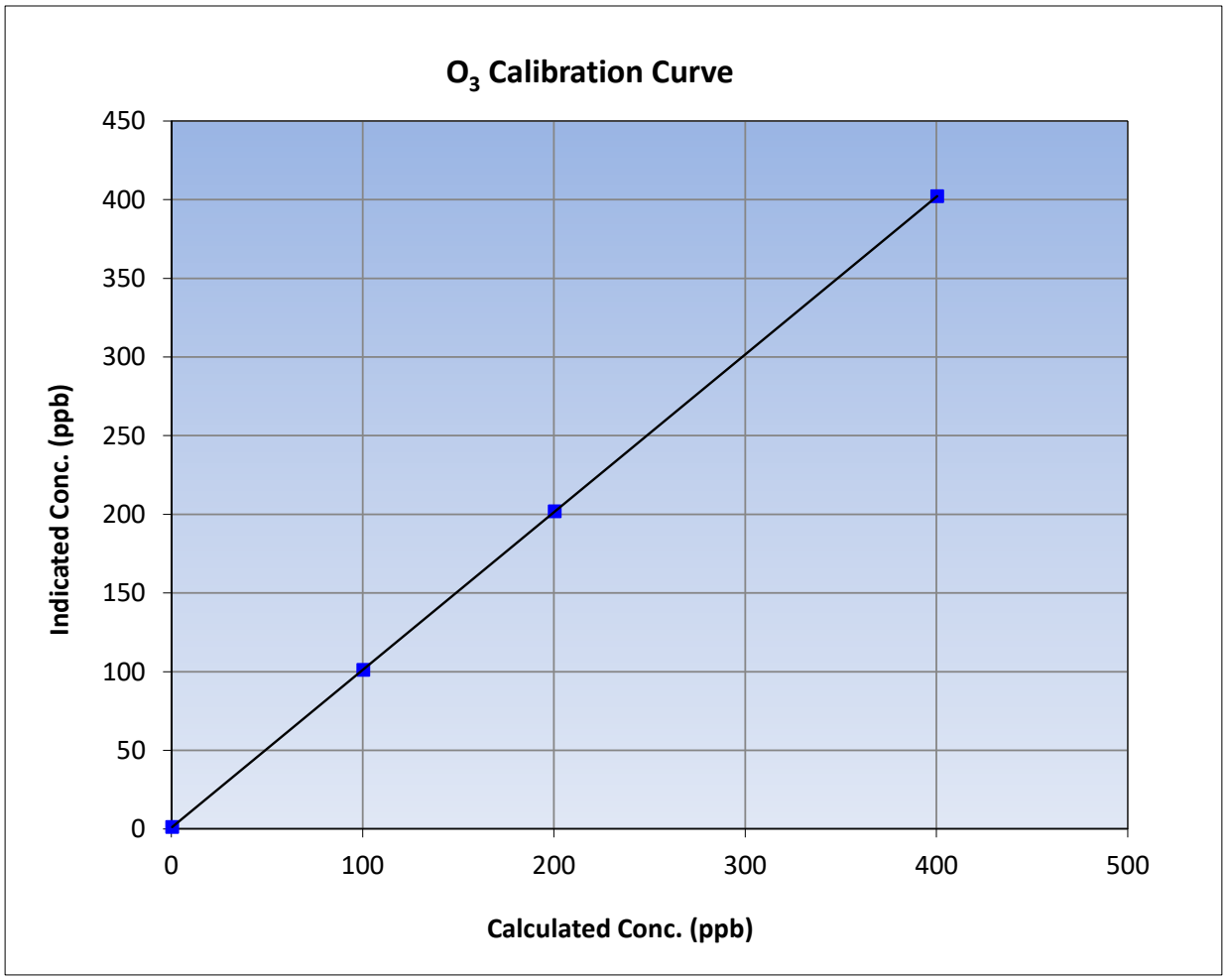
Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 12, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	10:10	End Time (MST):	12:52
Analyzer make:	API T400	Analyzer serial #:	2961

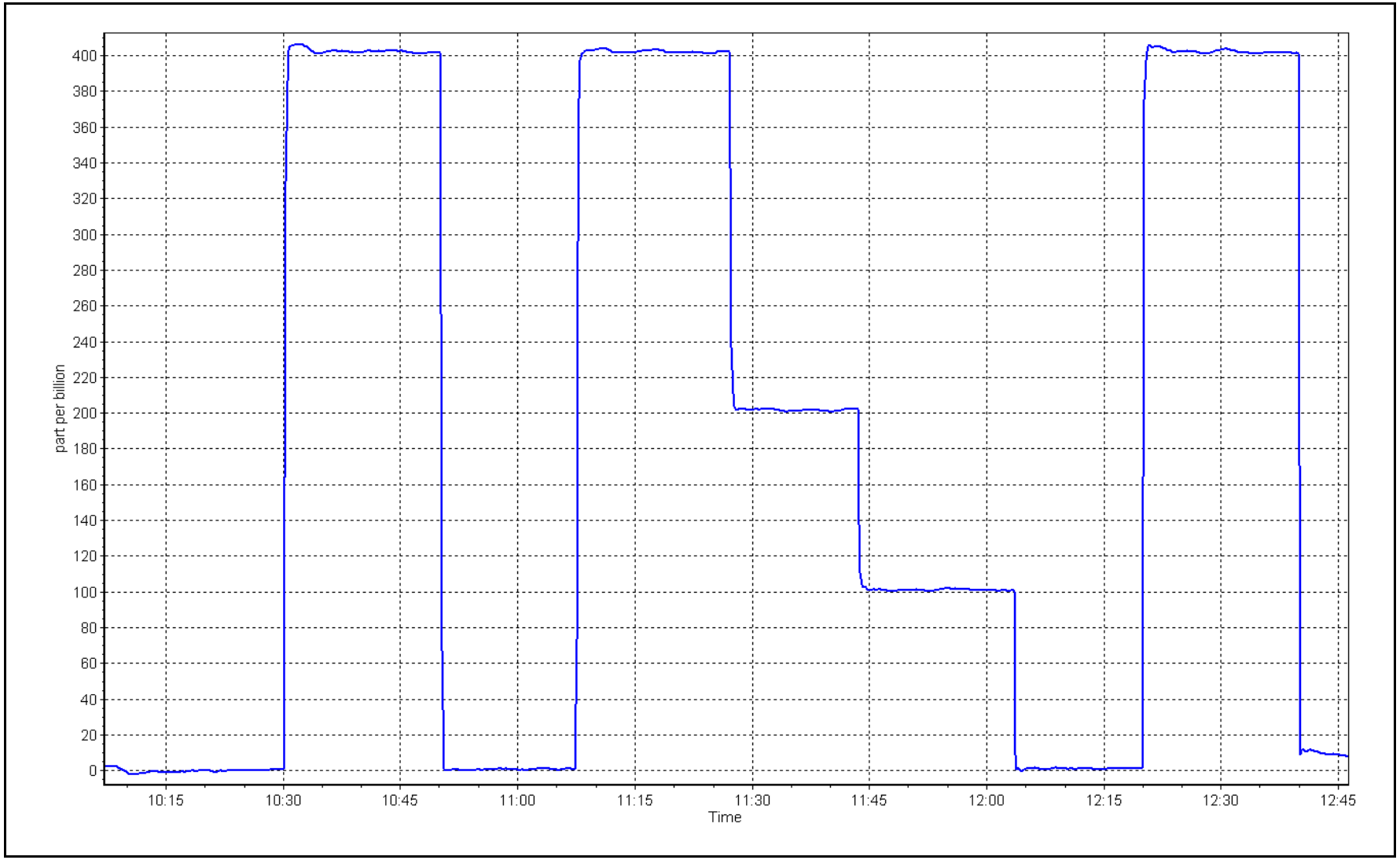
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.9	----
400.0	401.8	0.9955
200.0	201.5	0.9926
100.0	100.8	0.9921

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.002571	*0.90 - 1.10*
Intercept	0.800000	*+/- 5*



O_3 Calibration Plot Date: January 8, 2024 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:	January 17, 2024	Last Cal Date:	December 21, 2023
Start time (MST):	10:35	End time (MST):	11:10
Analyzer Make:	API T640	S/N:	321
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Deltacal	S/N:	1451
Temp/RH standard:	Deltacal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-19.2	-20.2	-19.2	☐	+/- 2 °C
P (mmHg)	731.8	733.4	731.8	☐	+/- 10 mmHg
flow (LPM)	5.00	5.13	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: January 17, 2024 Last Cal Date: December 21, 2023

PM w/o HEPA: 2.9 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: _____ <0.2 ug/m3

Disposable Filter Changed: _____

Annual Maintenance

Date Sample Tube Cleaned: November 28, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: No adjustments done. Leak check passed. Head cleaned.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	January 19, 2024	Last Cal Date:	December 8, 2023
Start time (MST):	10:15	End time (MST):	13:45
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007440	1.003770	Backgd or Offset:	9.1	9.1
Calibration intercept:	0.280000	0.040000	Coeff or Slope:	0.944	0.944

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	4920	80.0	800.3	804.3	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.7	----
high point	4920	80.0	800.3	803.7	0.996
second point	4960	40.0	400.2	401.4	0.997
third point	4980	20.0	200.1	200.2	0.999
as left zero	5000	0.0	0.0	0.7	----
as left span	4920	80.0	800.3	805.3	0.994
				Average Correction Factor	0.997

Baseline Corr As found:	803.90	Previous response	806.55	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

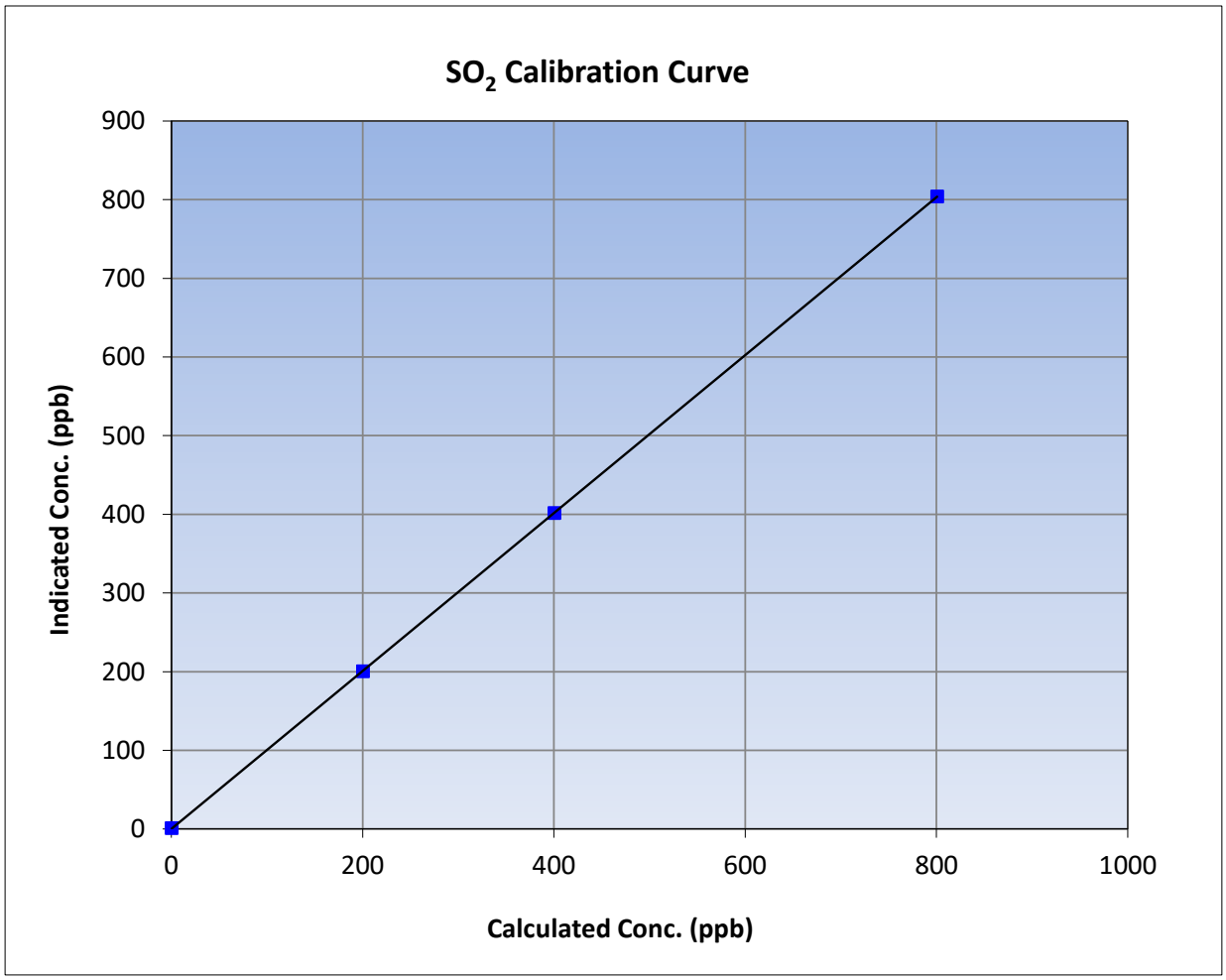
Station Information

Calibration Date:	January 19, 2024	Previous Calibration:	December 8, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:15	End Time (MST):	13:45
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

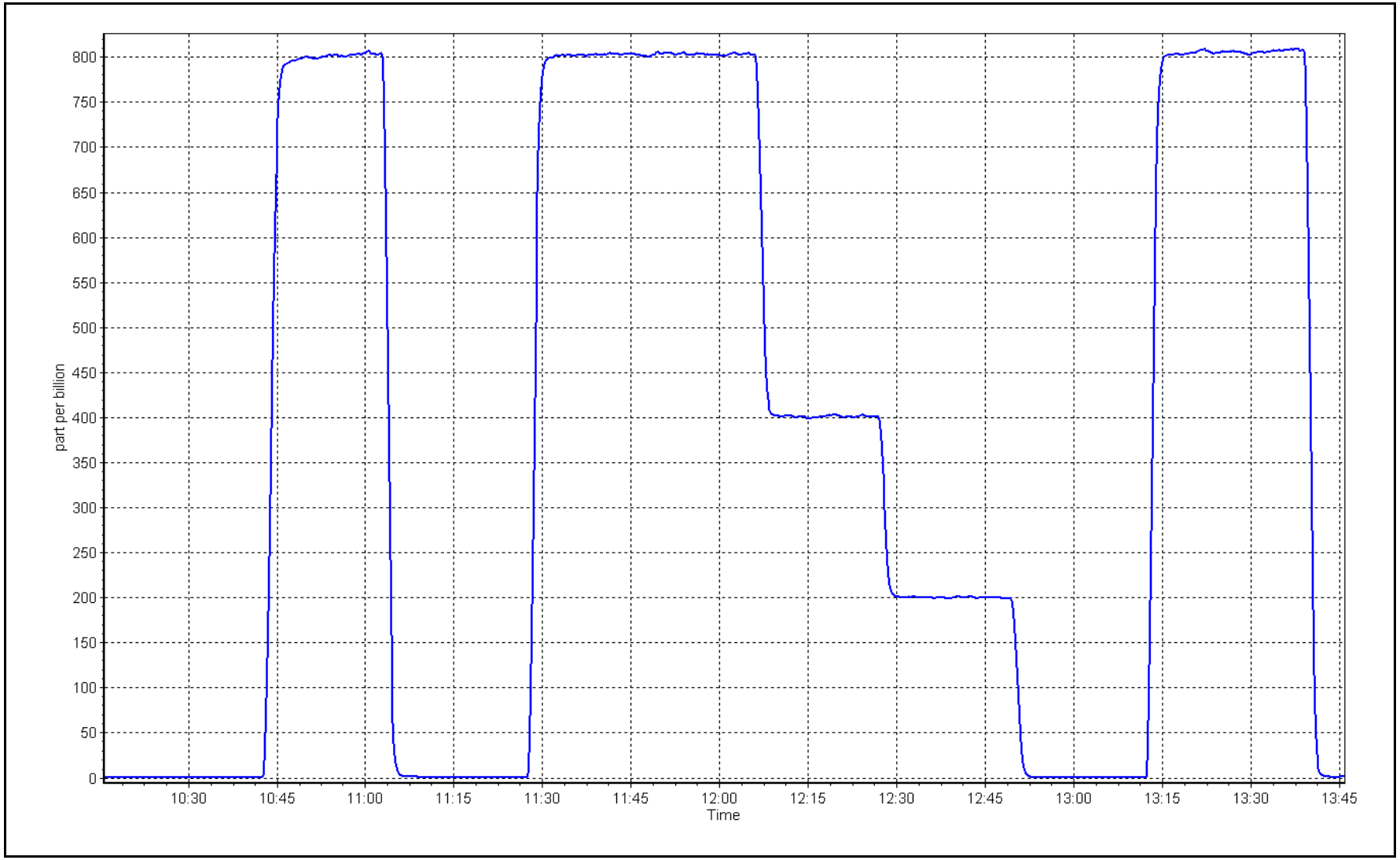
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
800.3	803.7	0.9958
400.2	401.4	0.9969
200.1	200.2	0.9994

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.003770	*0.90 - 1.10*
Intercept	0.040000	*+/-30*



SO2 Calibration Plot Date: January 19, 2024 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	January 4, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	10:07	End time (MST):	16:36
Reason:	Cylinder Change and Maintenance		

Calibration Standards

Cal Gas Concentration:	4.96	ppm	Cal Gas Exp Date:	November 15, 2026
Cal Gas Cylinder #:	DT0037363			
Removed Cal Gas Conc:	4.92	ppm	Rem Gas Exp Date:	February 9, 2024
Removed Gas Cyl #:	EY0002433		Diff between cyl:	-1.5%
Calibrator Make/Model:	API T700		Serial Number:	1845
ZAG Make/Model:	API T701H		Serial Number:	832

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1203169745	
Converter make:	Global		Converter serial #:	2022-196	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.988046	0.971240	Backgd or Offset:	2.18	2.18
Calibration intercept:	0.440521	0.762815	Coeff or Slope:	0.866	0.866

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4919	81.3	80.0	78.5	1.022
as found 2nd point	4960	40.7	40.0	40.5	0.994
as found 3rd point	4980	20.3	20.0	20.0	1.009
new cylinder response	4919	80.6	80.0	77.3	1.034

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.8	----
high point	4919	80.6	80.0	78.4	1.020
second point	4960	40.3	40.0	39.7	1.007
third point	4980	20.2	20.0	20.1	0.997
as left zero	5000	0.0	0.0	1.0	----
as left span	4919	80.6	80.0	76.8	1.041
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	1.008
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.3	Prev response:	79.48	*% change:	-1.5%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	0.979340	AF Intercept:	0.520256
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999755		

* = > +/-5% change initiates investigation

Notes: Completed multipoint as founds. Changed the external pump as a preventative maintenance. Changed the cal gas cylinder because its getting low. Instrument has a very slow response, could be the new gas. Will monitor and swap it out if needed. No adjustments made.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

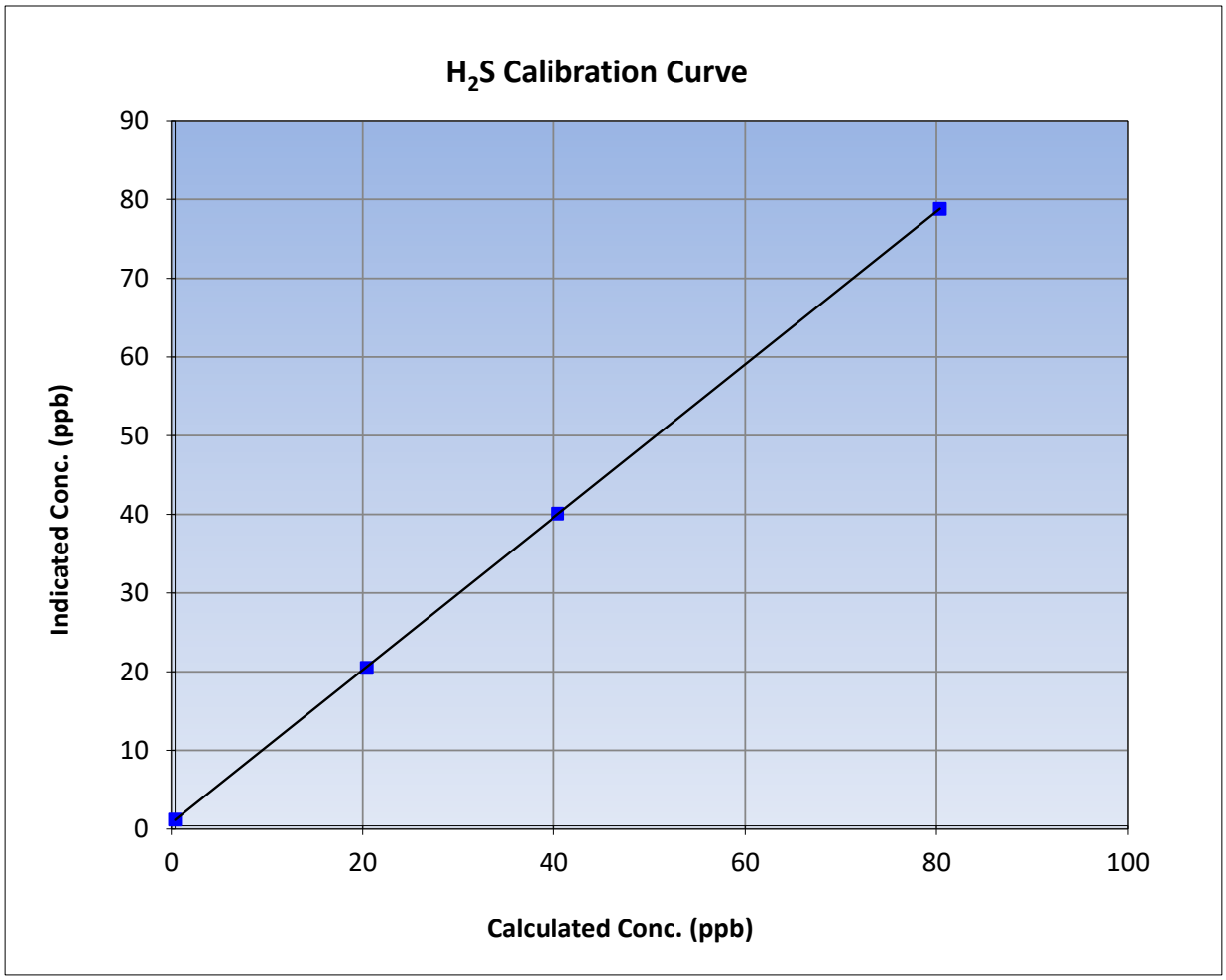
Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 12, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:07	End Time (MST):	16:36
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

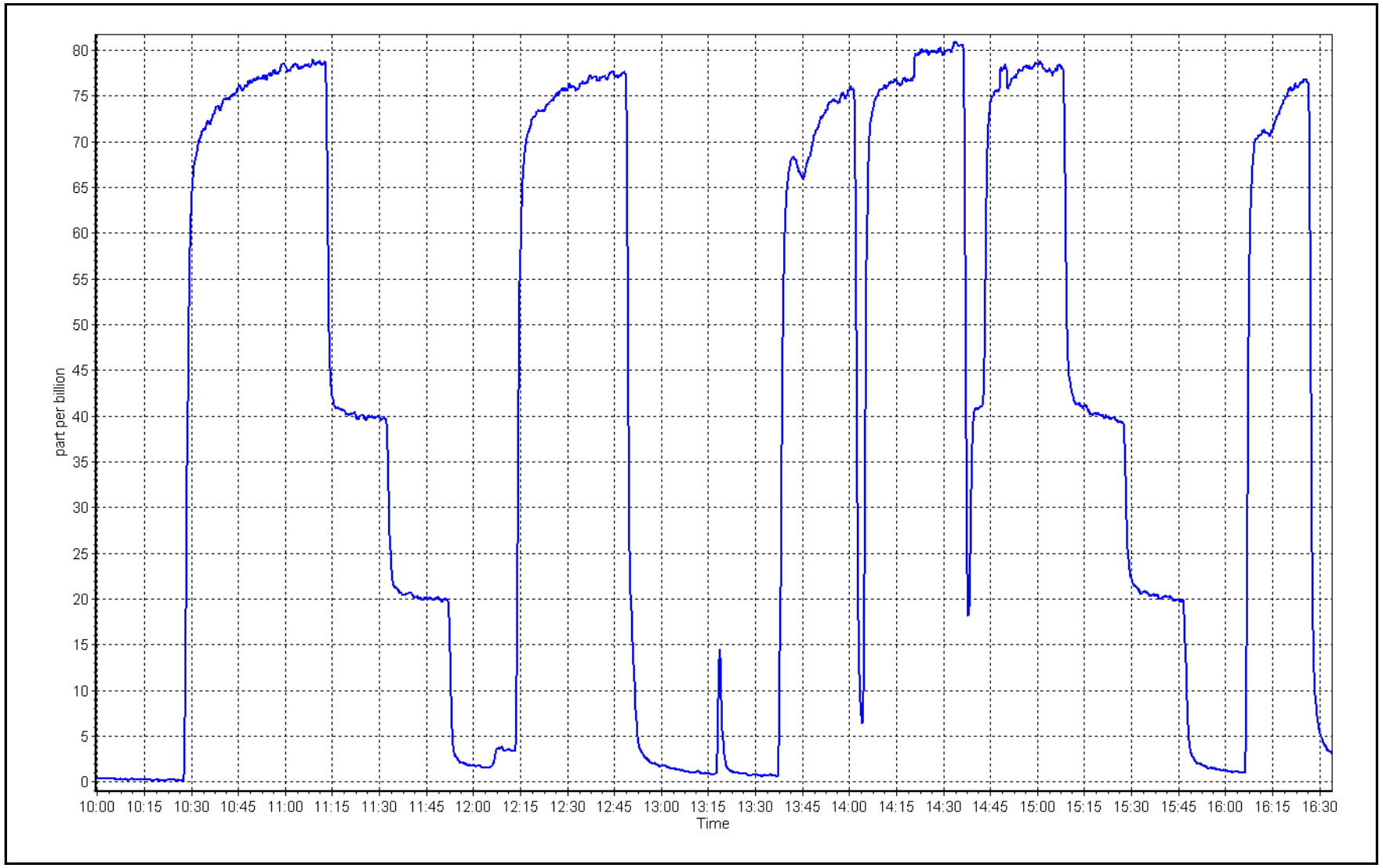
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
80.0	78.4	1.0199
40.0	39.7	1.0069
20.0	20.1	0.9969

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	0.971240	*0.90 - 1.10*
Intercept	0.762815	*+/-3*



H_2S Calibration Plot Date: January 4, 2024 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	January 9, 2024	Last Cal Date:	January 4, 2024
Start time (MST):	9:50	End time (MST):	11:55
Reason:	Removal		

Calibration Standards

Cal Gas Concentration:	4.96	ppm	Cal Gas Exp Date:	November 15, 2026
Cal Gas Cylinder #:	DT0037363			
Removed Cal Gas Conc:	4.96	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	1845
ZAG Make/Model:	API T701H		Serial Number:	832

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1203169745
Converter make:	Global		Converter serial #:	2022-196
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.971240		Backgd or Offset:	2.18	
Calibration intercept:	0.762815		Coeff or Slope:	0.866	

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4919	81.3	80.6	76.8	1.054
as found 2nd point	4960	40.7	40.4	39.6	1.027
as found 3rd point	4980	20.3	20.1	20.0	1.022
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
SO2 Scrubber Check					

Date of last scrubber change:		Ave Corr Factor	
Date of last converter efficiency test:			efficiency

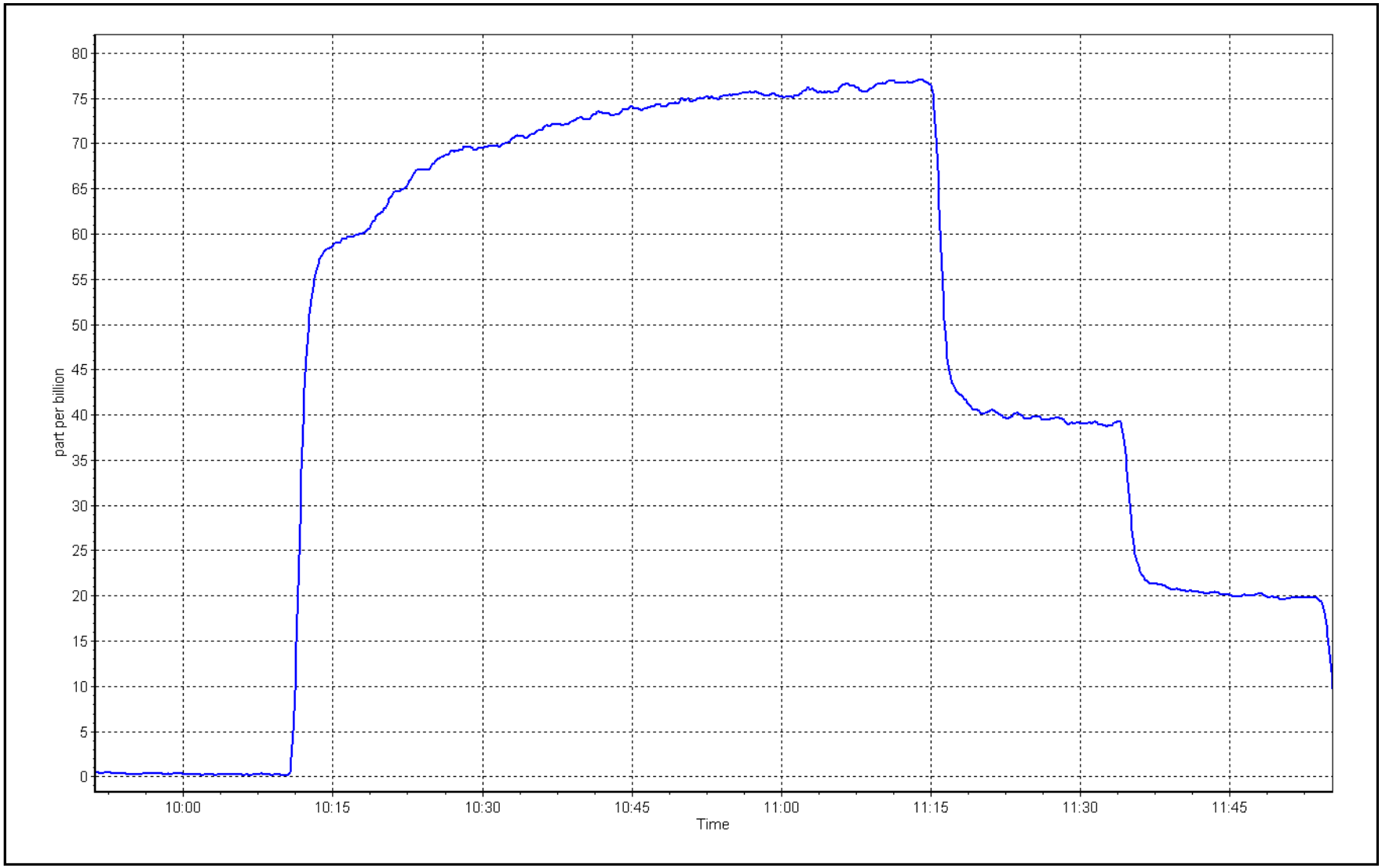
Baseline Corr As found:	76.5	Prev response:	79.09	*% change:	-3.4%
Baseline Corr 2nd AF pt:	39.3	AF Slope:	0.947493	AF Intercept:	0.740376
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999774		

* = > +/-5% change initiates investigation

Notes: Spans are very slow to reach target. Removal calibration to swap out the instrument.

Calibration Performed By: Max Farrell

H_2S Calibration Plot Date: January 9, 2024 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	January 10, 2024	Last Cal Date:	
Start time (MST):	10:23	End time (MST):	13:30
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	4.96	ppm	Cal Gas Exp Date:	November 15, 2026
Cal Gas Cylinder #:	DT0037363			
Removed Cal Gas Conc:	4.96	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			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 #:	1200326169
Converter make:	Global	Converter serial #:	2022225
Analyzer Range	0 - 100 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:		0.999261	Backgd or Offset:		1.27
Calibration intercept:		0.182265	Coeff or Slope:		1.022

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4919	80.6	80.0	80.0	1.000
second point	4960	40.3	40.0	40.3	0.992
third point	4980	20.2	20.0	20.2	0.992
as left zero	5000	0.0	0.0	0.6	----
as left span	4919	80.6	80.0	79.9	1.001
SO2 Scrubber Check	4920	80.0	800.0	0.6	----
Date of last scrubber change:				Ave Corr Factor	0.994
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: Changed the inlet filter. Ran a SO2 scrubber test after calibrator zero. Adjusted the span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

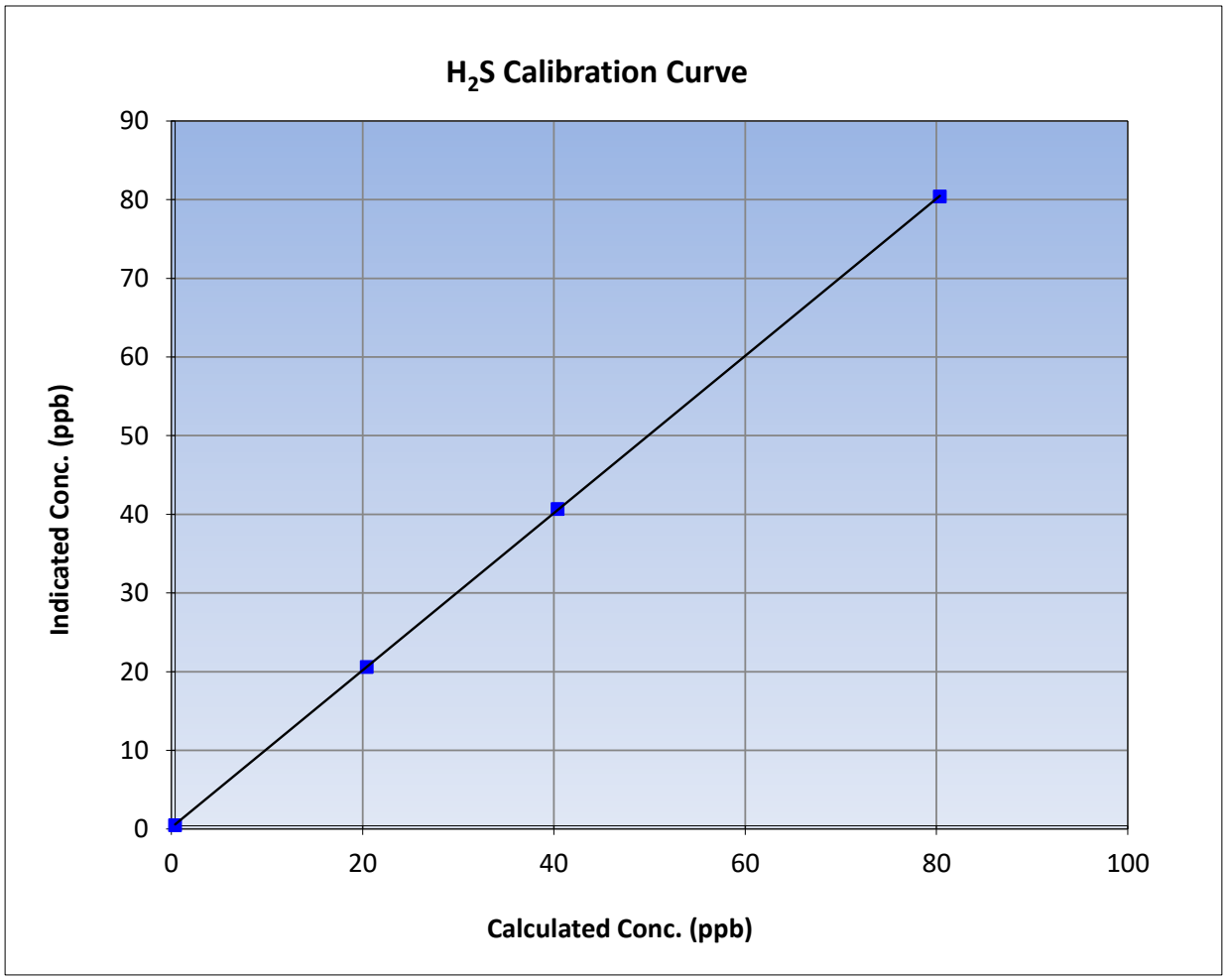
Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:23	End Time (MST):	13:30
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326169

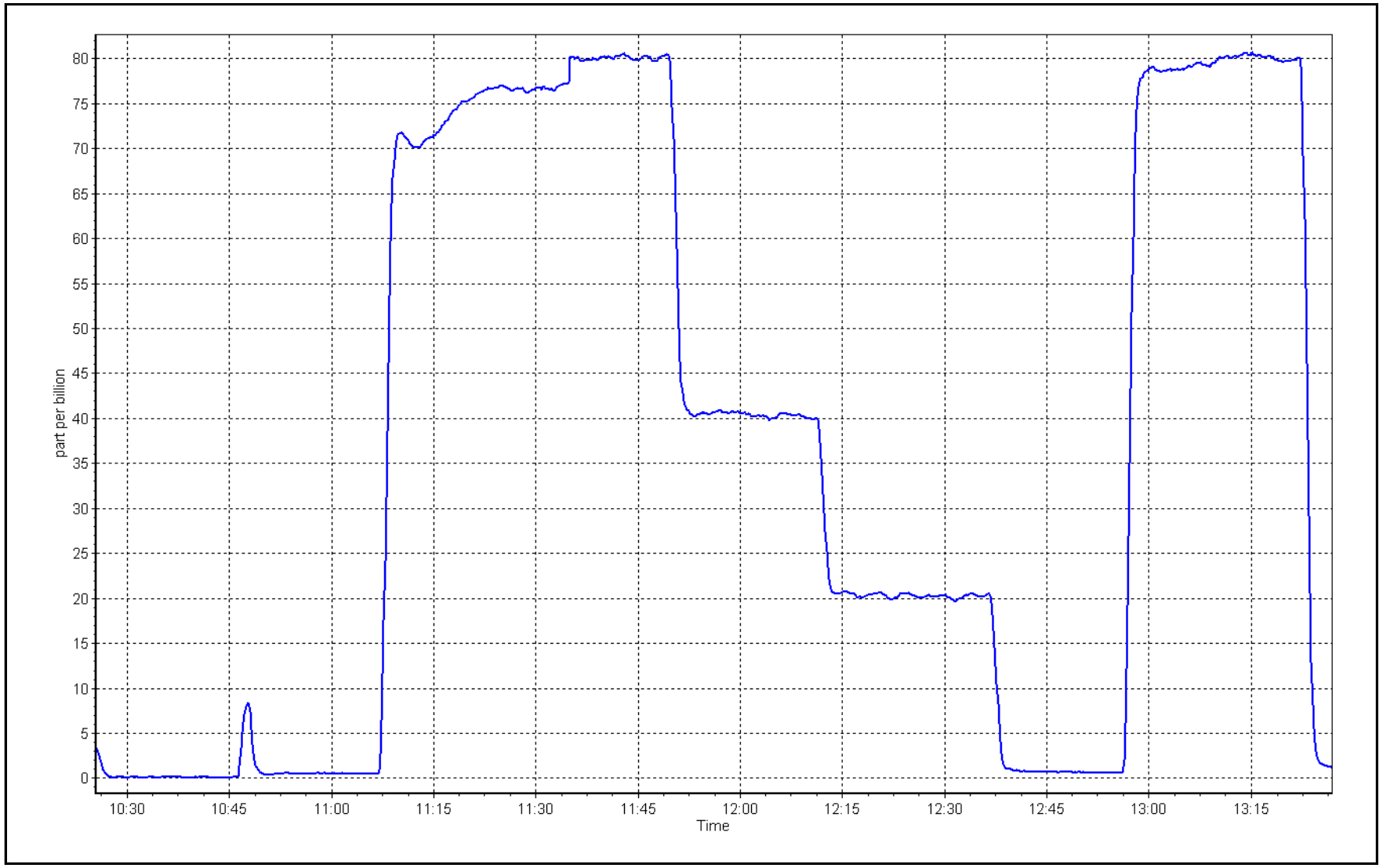
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.0	0.9995
40.0	40.3	0.9919
20.0	20.2	0.9920

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.999261	*0.90 - 1.10*
Intercept	0.182265	*+/-3*



H_2S Calibration Plot Date: January 10, 2024 Location: Mannix



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	January 19, 2024	Last Cal Date:	December 8, 2023
Start time (MST):	10:15	End time (MST):	13:45
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430011	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.61E-05	2.64E-05	NMHC SP Ratio:	4.48E-05	4.43E-05
CH4 Retention time:	15.00	15.20	NMHC Peak Area:	204322	206470
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	17.23	17.28	0.997
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	17.23	1.000
second point	4960	40.0	8.61	8.61	1.001
third point	4980	20.0	4.31	4.29	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.22	1.000
				Average Correction Factor	1.001
Baseline Corr AF:	17.28	Prev response	17.21	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	9.15	9.28	0.986
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	9.15	9.15	1.000
second point	4960	40.0	4.57	4.58	0.999
third point	4980	20.0	2.29	2.28	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.15	9.17	0.998
				Average Correction Factor	1.001
Baseline Corr AF:	9.28	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 *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.00	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	80.0	8.08	8.09	0.999
second point	4960	40.0	4.04	4.03	1.003
third point	4980	20.0	2.02	2.01	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.05	1.003
				Average Correction Factor	1.002
Baseline Corr AF:	8.00	Prev response	8.02	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999274	1.000521
THC Cal Offset:	-0.003400	-0.007800
CH4 Cal Slope:	0.993789	1.001401
CH4 Cal Offset:	-0.005600	-0.007000
NMHC Cal Slope:	1.003992	0.999969
NMHC Cal Offset:	0.002200	-0.001200

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

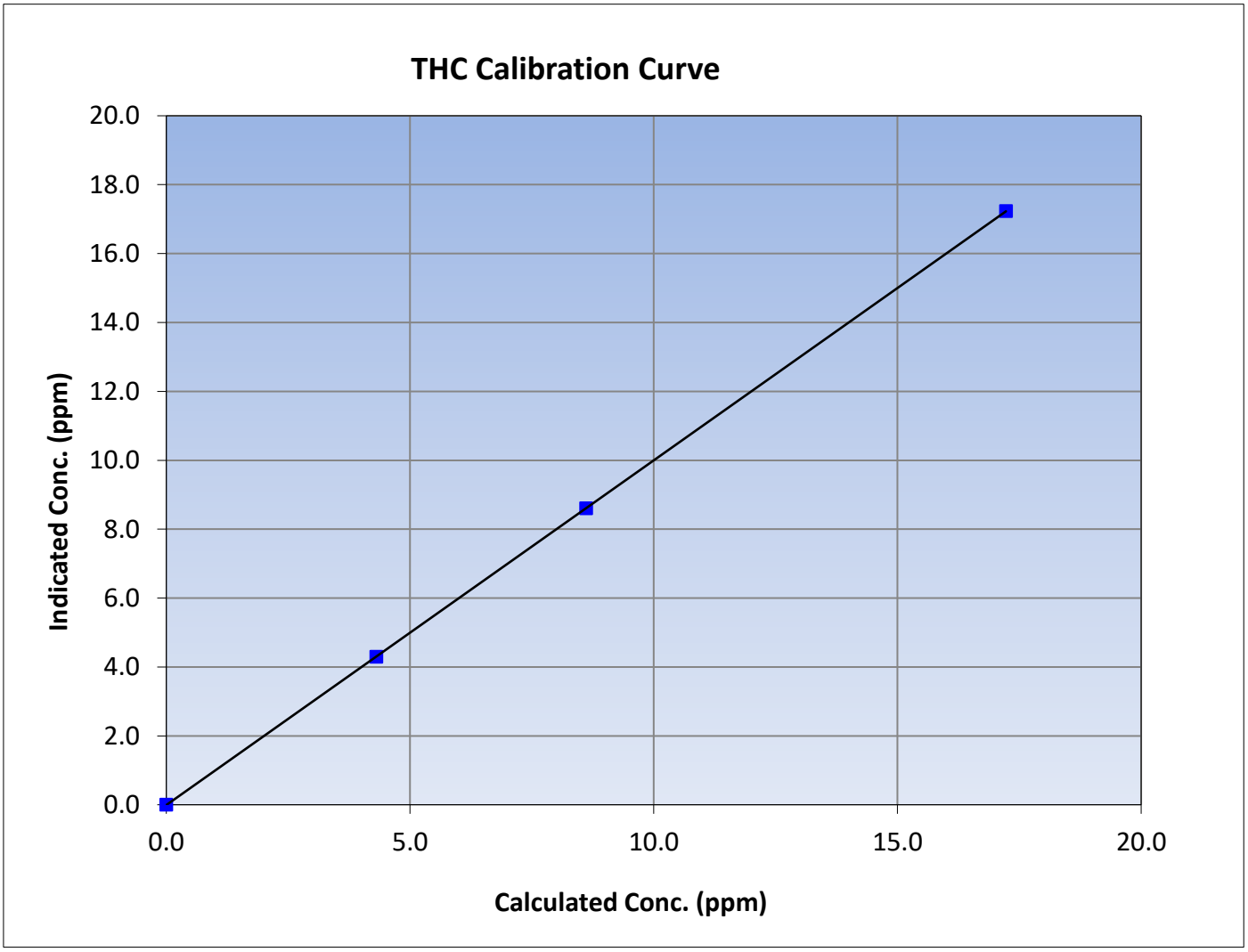
Version-06-2022

Station Information

Calibration Date:	January 19, 2024	Previous Calibration:	December 8, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	10:15	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
17.23	17.23	0.9997			
8.61	8.61	1.0008	Slope	1.000521	*0.90 - 1.10*
4.31	4.29	1.0031			
			Intercept	-0.007800	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

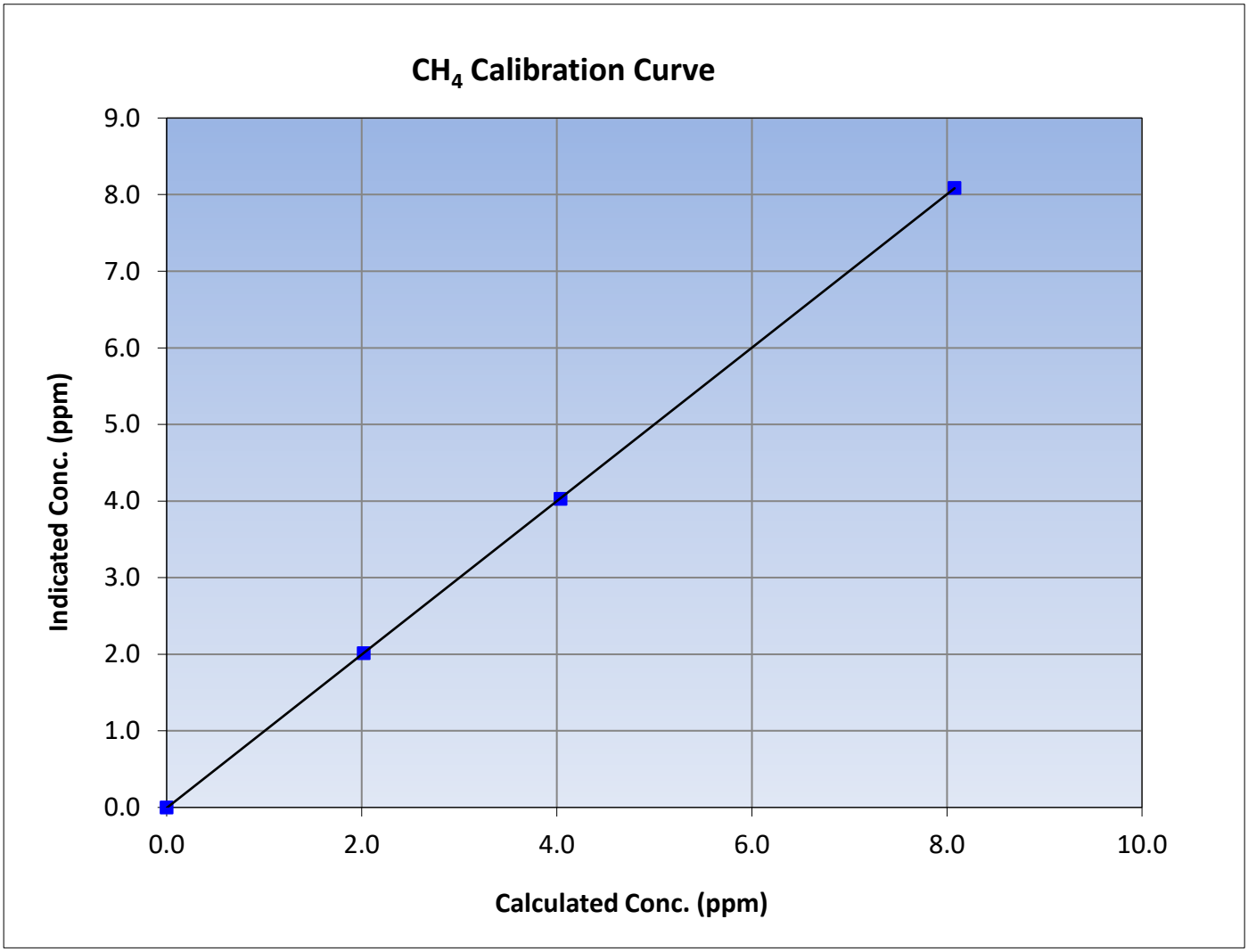
Version-06-2022

Station Information

Calibration Date:	January 19, 2024	Previous Calibration:	December 8, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	10:15	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
8.08	8.09	0.9988			
4.04	4.03	1.0025	Slope	1.001401	*0.90 - 1.10*
2.02	2.01	1.0038			
			Intercept	-0.007000	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

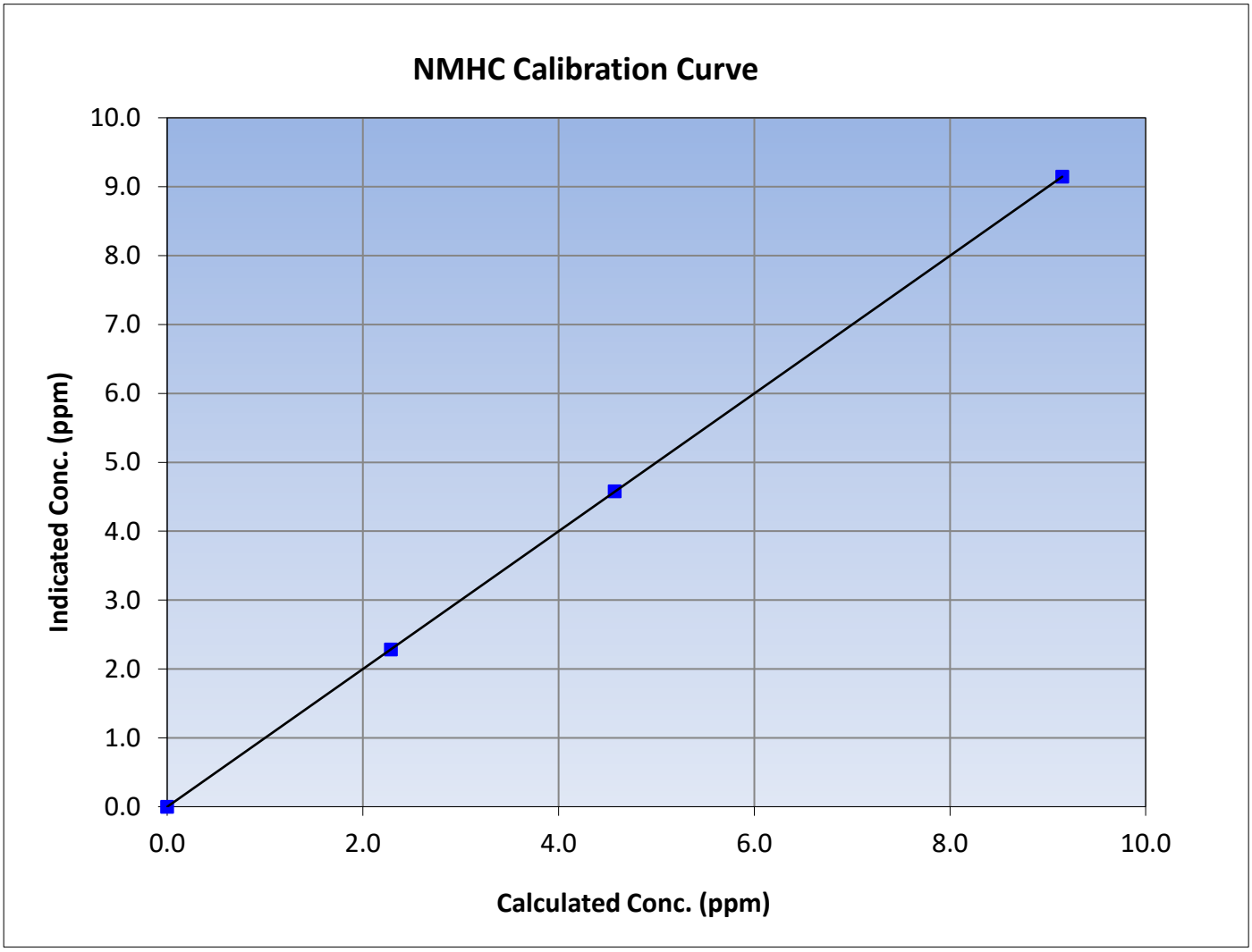
Version-06-2022

Station Information

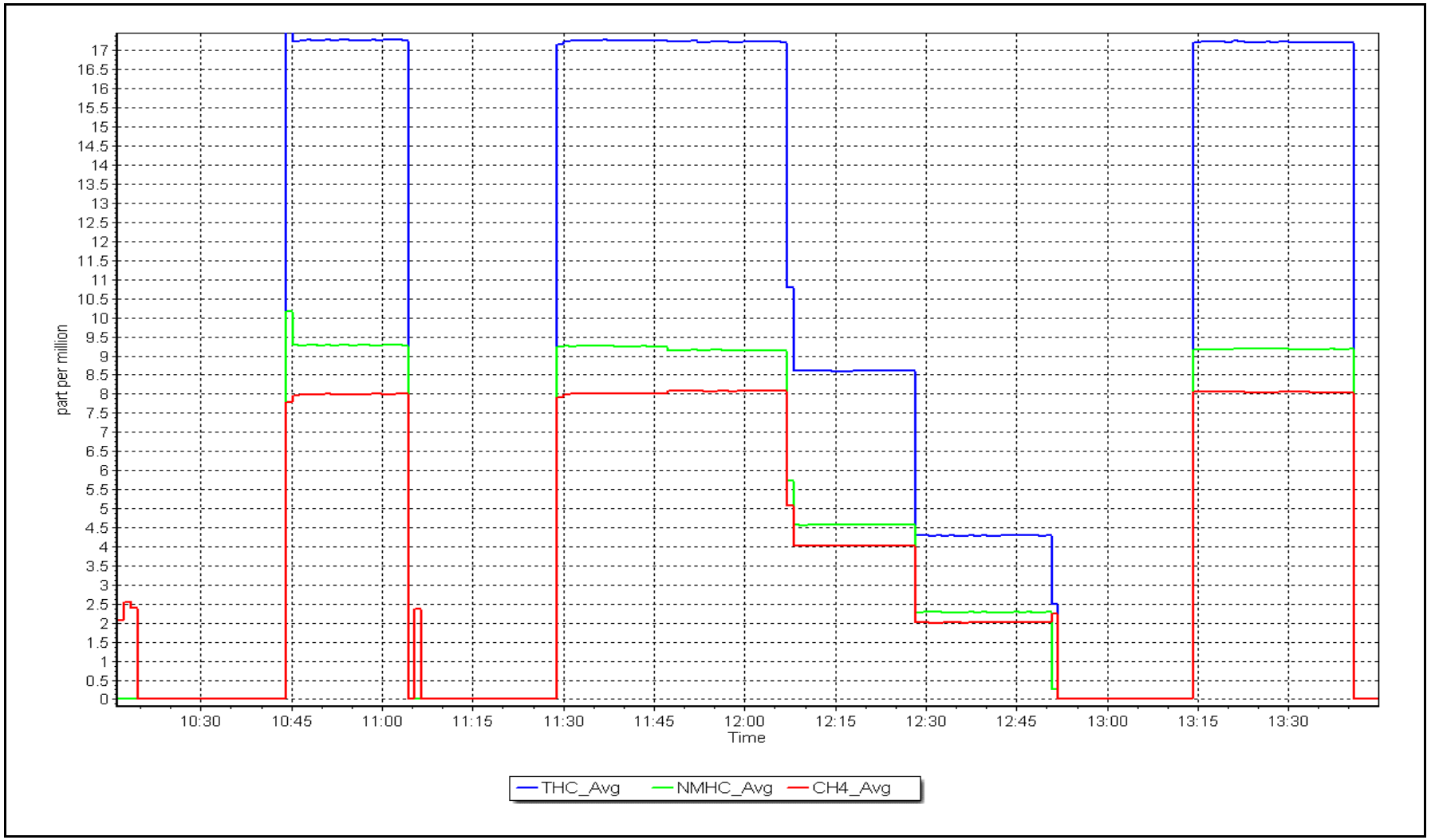
Calibration Date:	January 19, 2024	Previous Calibration:	December 8, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	10:15	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
9.15	9.15	1.0003			
4.57	4.58	0.9993	Slope	0.999969	*0.90 - 1.10*
2.29	2.28	1.0026			
			Intercept	-0.001200	*+/-0.5*



NMHC Calibration Plot Date: January 19, 2024 Location: Mannix



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	January 5, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	10:32	End time (MST):	14:50
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:	3566
ZAG Make/Model:	API T701		Serial Number:	5608

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003106	0.999660	Backgd or Offset:	17.7	17.7
Calibration intercept:	1.659655	1.240714	Coeff or Slope:	0.922	0.922

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4920	80.3	799.5	797.8	1.002
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	800.2	0.999
second point	4960	40.2	400.2	400.8	0.999
third point	4980	20.1	200.1	203.3	0.984
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.3	799.5	799.3	1.000
				Average Correction Factor	0.994

Baseline Corr As found:	797.90	Previous response	803.61	*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. No adjustments made. Maintenance completed to the H2 gen for the THC instrument after as founds.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

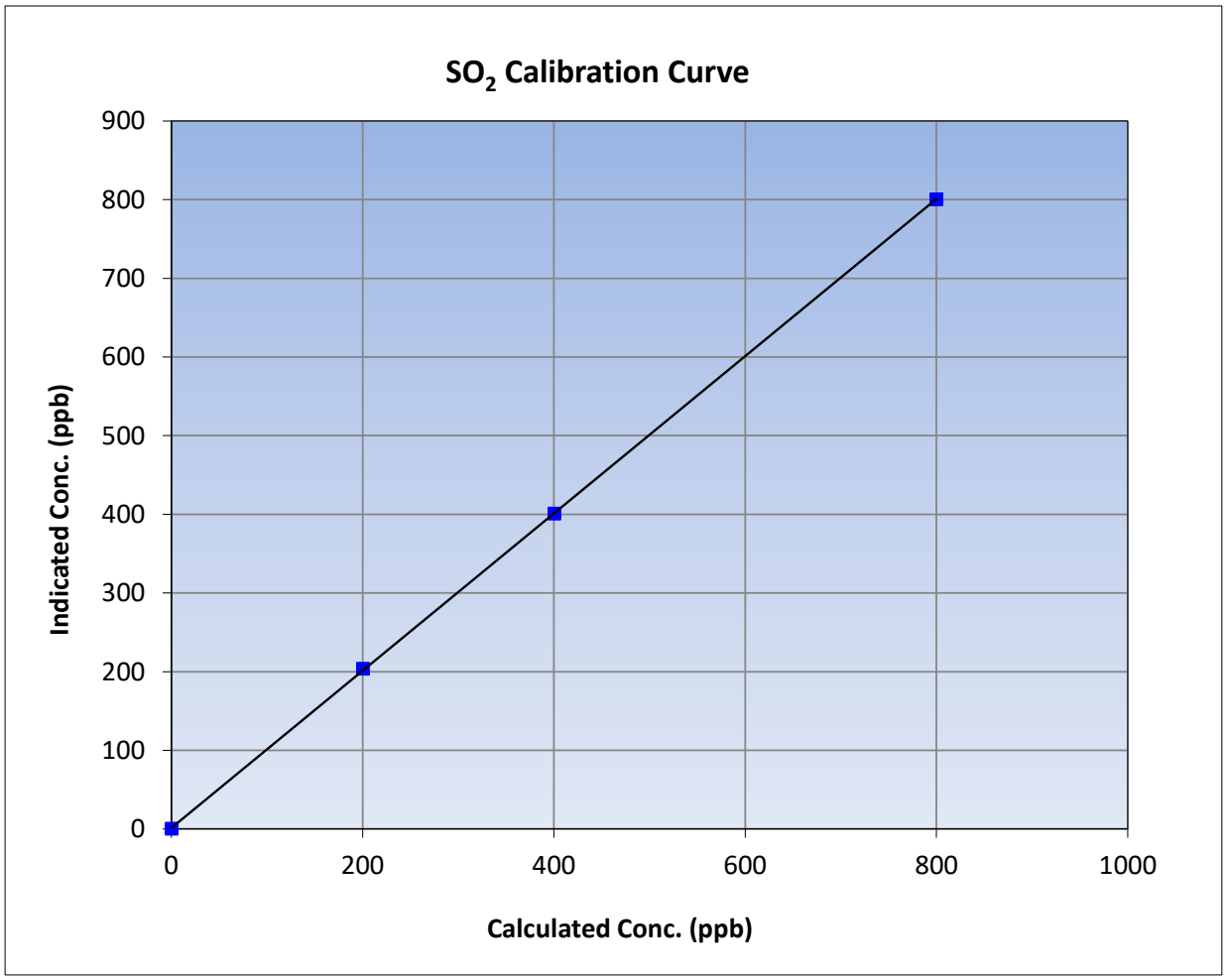
Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:32	End Time (MST):	14:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

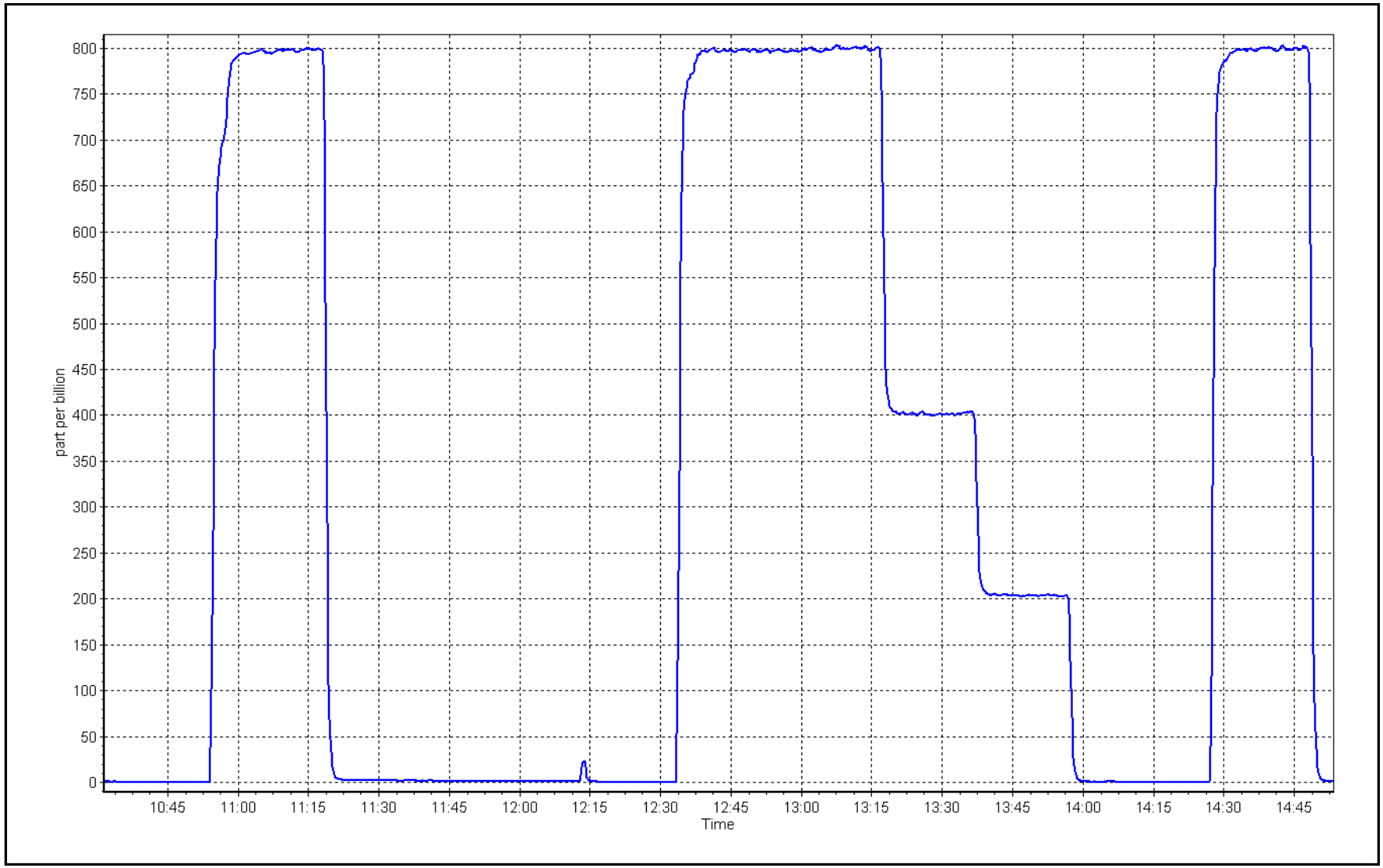
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.5	800.2	0.9991
400.2	400.8	0.9986
200.1	203.3	0.9843

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	0.999660	*0.90 - 1.10*
Intercept	1.240714	*+/-30*



SO2 Calibration Plot Date: January 5, 2024 Location: Patricia McInnes



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	January 18, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	9:31	End time (MST):	13:47
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.328	ppm	Cal Gas Exp Date:	February 14, 2025
Cal Gas Cylinder #:	CC506659			
Removed Cal Gas Conc:	5.328	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3566
ZAG Make/Model:	API T701		Serial Number:	4602

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1218153358	
Converter make:	CDN-101		Converter serial #:	517	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.991885	1.002314	Backgd or Offset:	2.01	1.95
Calibration intercept:	0.580307	0.440228	Coeff or Slope:	1.168	1.150

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4925	75.1	80.0	81.2	0.987
as found 2nd point	4963	37.5	40.0	41.2	0.972
as found 3rd point	4981	18.8	20.0	21.0	0.959
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4925	75.1	80.0	80.5	0.994
second point	4963	37.5	40.0	40.7	0.982
third point	4981	18.8	20.0	20.7	0.968
as left zero	5000	0.0	0.0	0.3	----
as left span	4925	75.1	80.0	80.7	0.992
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.981
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.1	Prev response:	79.96	*% change:	1.4%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.011741	AF Intercept:	0.460263
Baseline Corr 3rd AF pt:	20.9	AF Correlation:	0.999902		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

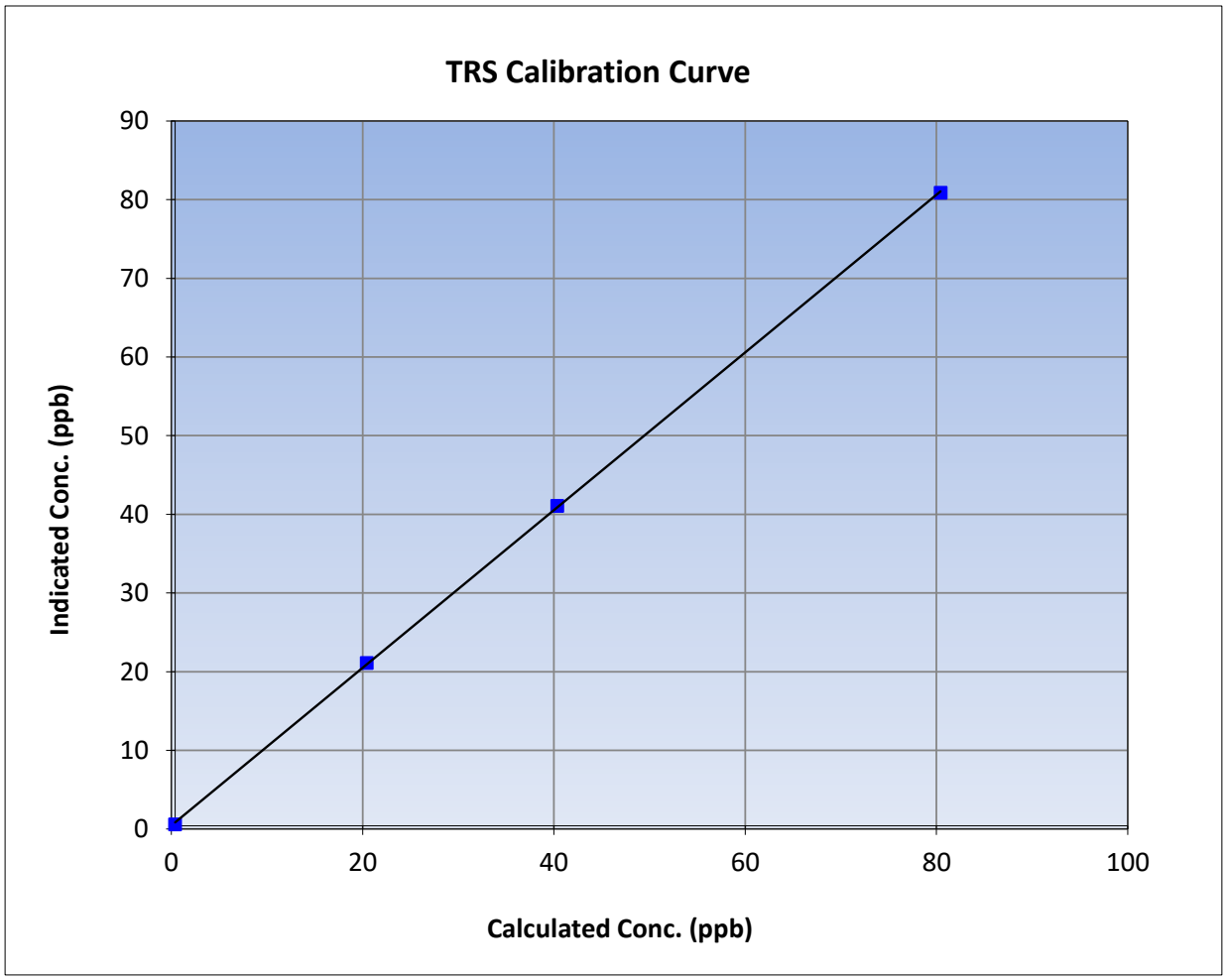
Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:31	End Time (MST):	13:47
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

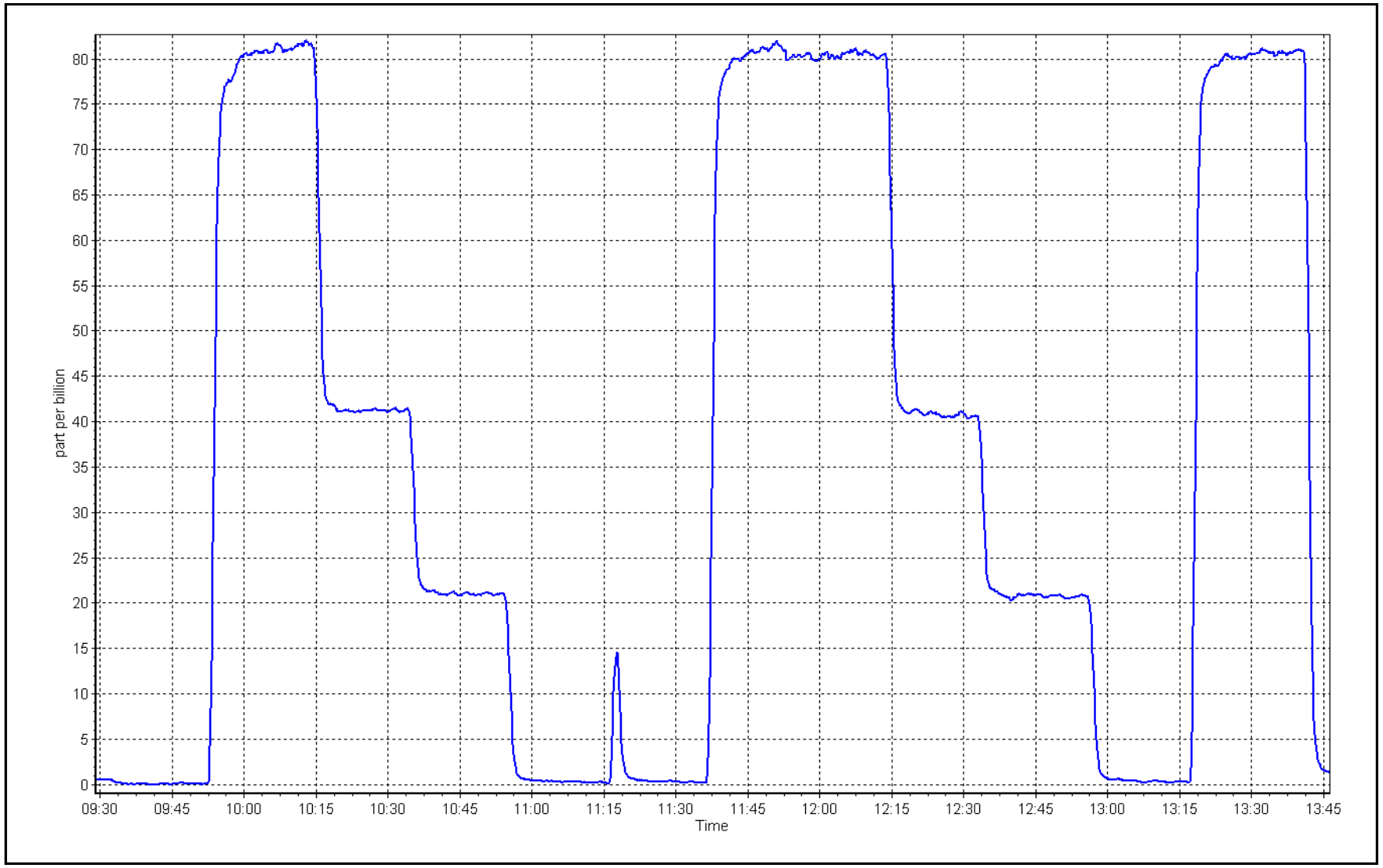
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.5	0.9941
40.0	40.7	0.9817
20.0	20.7	0.9678

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999955	*≥0.995*
Slope	1.002314	*0.90 - 1.10*
Intercept	0.440228	*+/-3*



TRS Calibration Plot Date: January 18, 2024 Location: Patricia McInnes



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	January 5, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	10:32	End time (MST):	14:50
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.17E-04	2.17E-04	NMHC SP Ratio:	4.91E-05	4.81E-05
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	184991	188492
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.01	----
as found span	4920	80.3	17.12	17.37	0.986
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	17.16	0.998
second point	4960	40.2	8.57	8.68	0.988
third point	4980	20.1	4.29	4.44	0.965
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.21	0.995
				Average Correction Factor	0.984
Baseline Corr AF:	17.36	Prev response	17.18	*% 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 / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.01	----
as found span	4919.7	80.3	9.07	9.36	0.969
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919.7	80.3	9.07	9.09	0.997
second point	4960	40.2	4.54	4.60	0.988
third point	4980	20.1	2.27	2.34	0.969
as left zero	5000	0.0	0.00	0.00	----
as left span	4919.7	80.3	9.07	9.17	0.989
				Average Correction Factor	0.985
Baseline Corr AF:	9.35	Prev response	9.13	*% change	2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919.7	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	4919.7	80.3	8.06	8.07	0.998
second point	4960	40.2	4.03	4.08	0.988
third point	4980	20.1	2.02	2.10	0.961
as left zero	5000	0.0	0.00	0.00	----
as left span	4919.7	80.3	8.06	8.04	1.001
				Average Correction Factor	0.982
Baseline Corr AF:	8.01	Prev response	8.05	*% 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

	Start	***Finish***
THC Cal Slope:	1.001451	1.000106
THC Cal Offset:	0.034020	0.074604
CH4 Cal Slope:	0.999322	0.999043
CH4 Cal Offset:	0.004445	0.039427
NMHC Cal Slope:	1.003545	1.001025
NMHC Cal Offset:	0.028776	0.034777

Notes: Changed the inlet filter and completed maintenance on the H2 generator after as founds. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

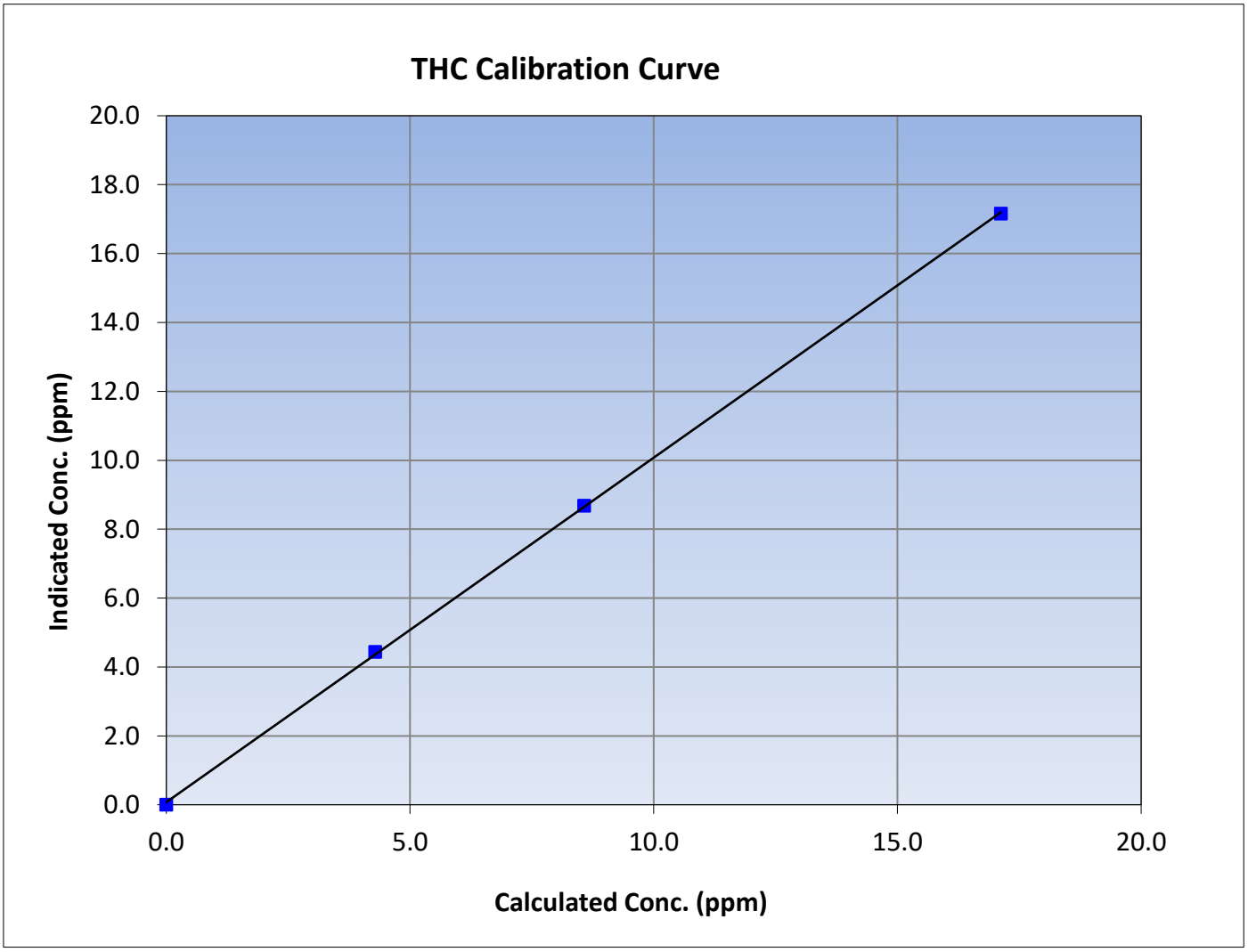
Version-06-2022

Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:32	End Time (MST):	14:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999913	≥0.995
17.12	17.16	0.9976			
8.57	8.68	0.9878	Slope	1.000106	0.90 - 1.10
4.29	4.44	0.9653			
			Intercept	0.074604	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

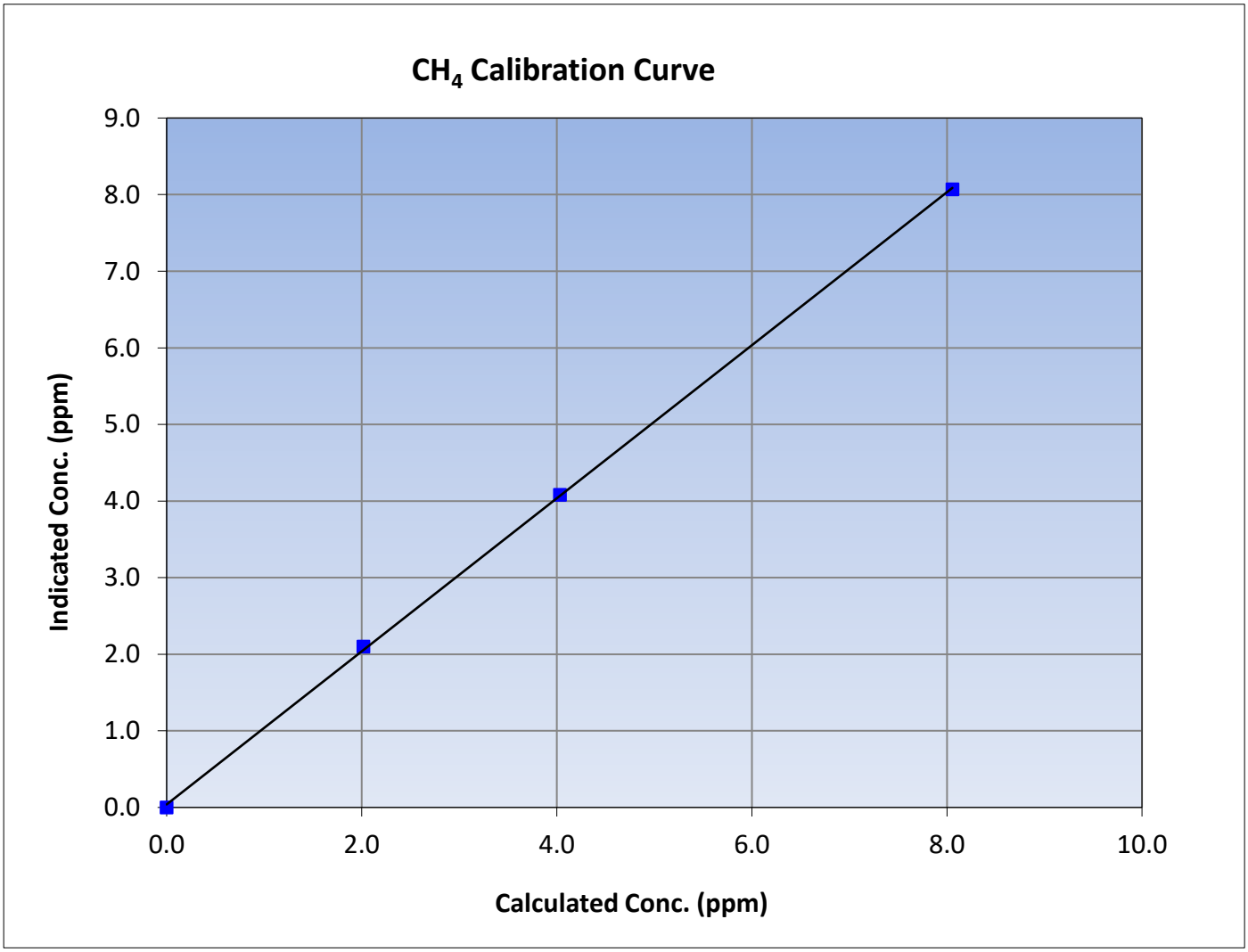
Version-06-2022

Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:32	End Time (MST):	14:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999888	*≥0.995*
8.06	8.07	0.9982			
4.03	4.08	0.9882	Slope	0.999043	*0.90 - 1.10*
2.02	2.10	0.9611			
			Intercept	0.039427	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

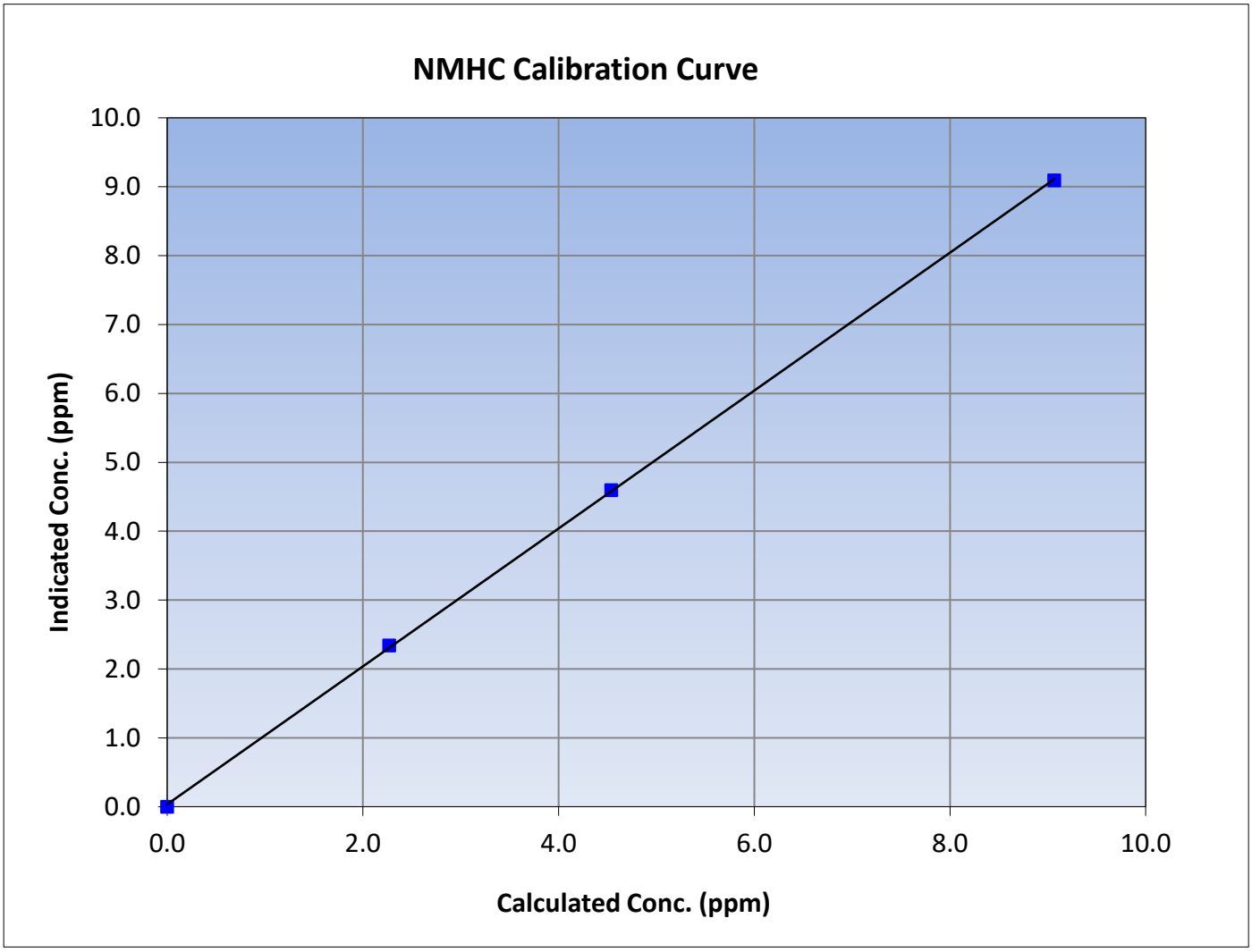
Version-06-2022

Station Information

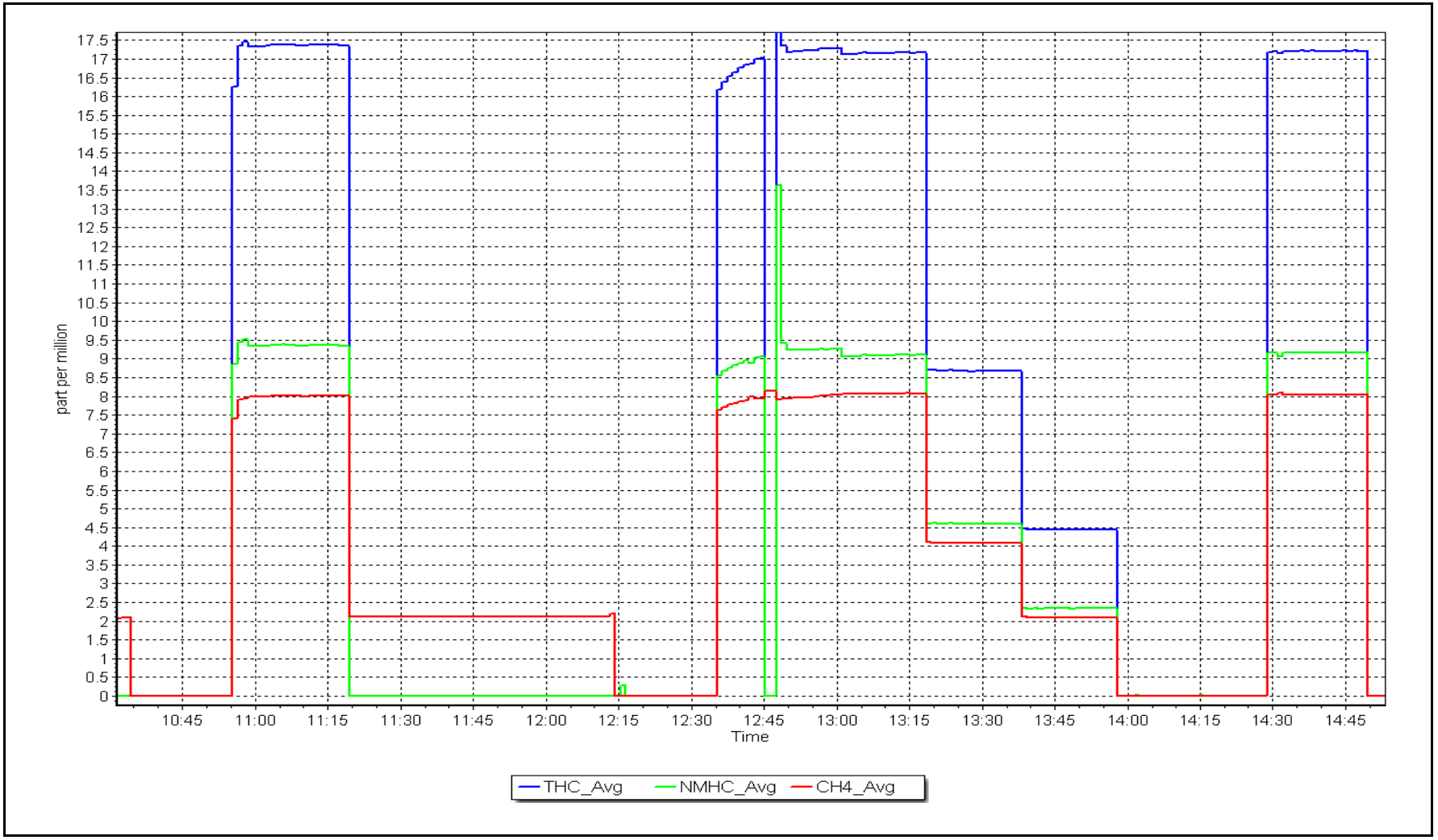
Calibration Date:	January 5, 2024	Previous Calibration:	December 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:32	End Time (MST):	14:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999933	≥0.995
9.07	9.09	0.9970			
4.54	4.60	0.9878	Slope	1.001025	0.90 - 1.10
2.27	2.34	0.9691			
			Intercept	0.034777	+/-0.5



NMHC Calibration Plot Date: January 5, 2024 Location: Patricia McInnes



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	January 8, 2024	Last Cal Date:	December 4, 2023
Start time (MST):	9:54	End time (MST):	14:46
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1172750022	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.825	0.825	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	0.987	0.987	NOX bkgnd or offset:	3.9	3.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	157.2	157.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.992028	0.998293
NO_X Cal Offset:	2.457352	1.916153
NO Cal Slope:	0.993713	0.999944
NO Cal Offset:	1.244073	1.062930
NO_2 Cal Slope:	0.998330	0.999549
NO_2 Cal Offset:	-0.223314	-1.654321

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	0.3	-0.5	----	----
as found span	4914	86.2	826.5	799.7	26.7	828.3	800.3	27.9	0.9978	0.9993
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.4	-0.2	----	----
high point	4914	86.2	826.5	799.7	26.7	826.0	800.4	25.6	1.0005	0.9992
second point	4957	43.1	413.2	399.9	13.4	415.5	401.3	14.2	0.9945	0.9964
third point	4978	21.6	207.1	200.4	6.7	210.4	202.1	8.4	0.9844	0.9917
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.7	-0.3	----	----
as left span	4914	86.2	826.5	799.7	26.7	819.5	794.6	24.8	1.0085	1.0065
								Average Correction Factor	0.9932	0.9958

Corrected As found	NO_X = 828.5 ppb	NO = 800.0 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	0.7%
Previous Response	NO_X = 822.3 ppb	NO = 795.9 ppb			*Percent Change	NO =	0.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.5	402.3	420.9	419.7	1.0029	99.7%
2nd GPT point (200 ppb O3)	796.5	601.5	221.7	219.9	1.0083	99.2%
3rd GPT point (100 ppb O3)	796.5	700.1	123.1	119.4	1.0312	97.0%
				Average Correction Factor	1.0141	98.6%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

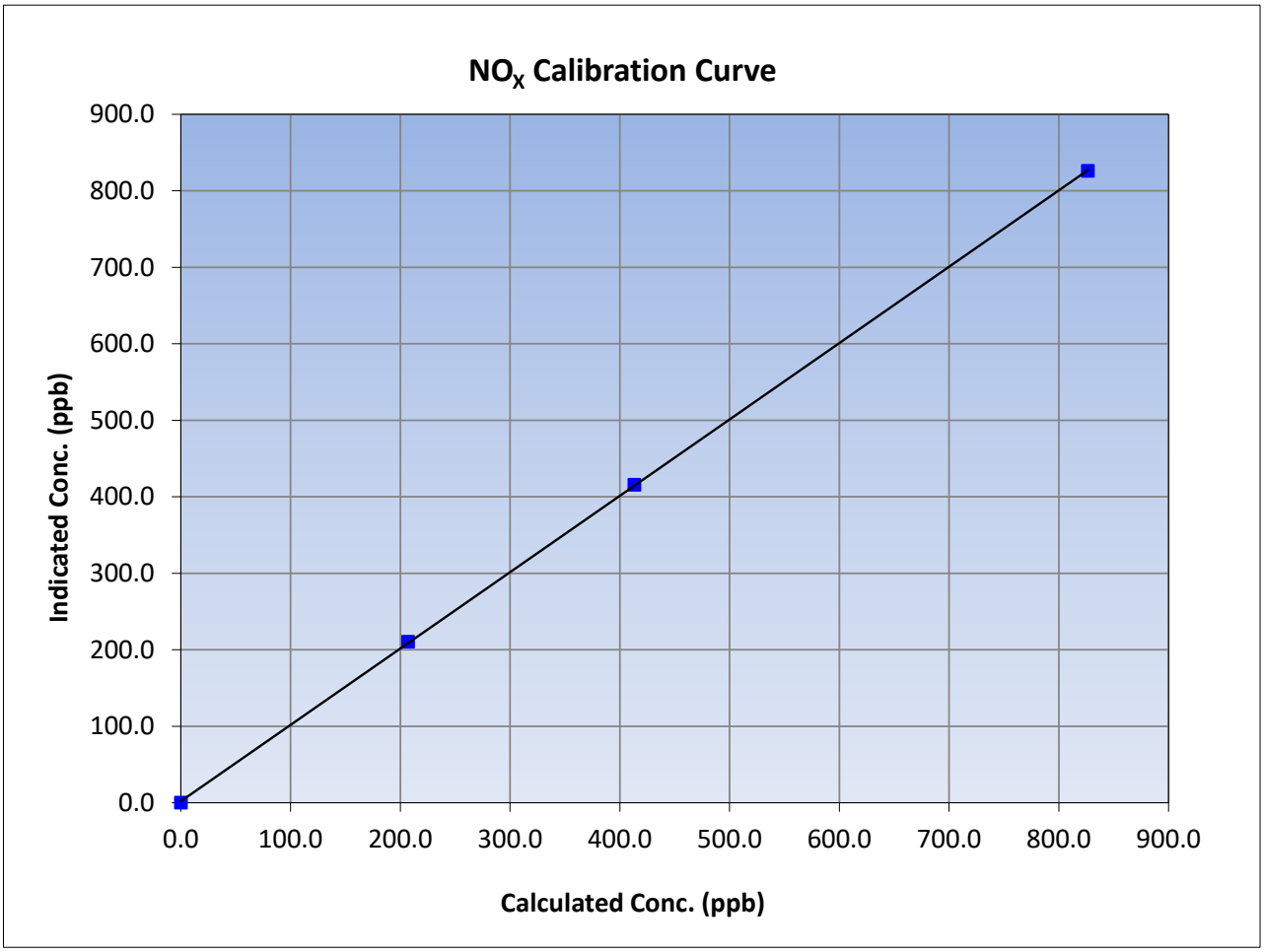
Version-04-2020

Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 4, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:54	End Time (MST):	14:46
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	0.999978	≥0.995
826.5	826.0	1.0005			
413.2	415.5	0.9945	Slope	0.998293	0.90 - 1.10
207.1	210.4	0.9844			
			Intercept	1.916153	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

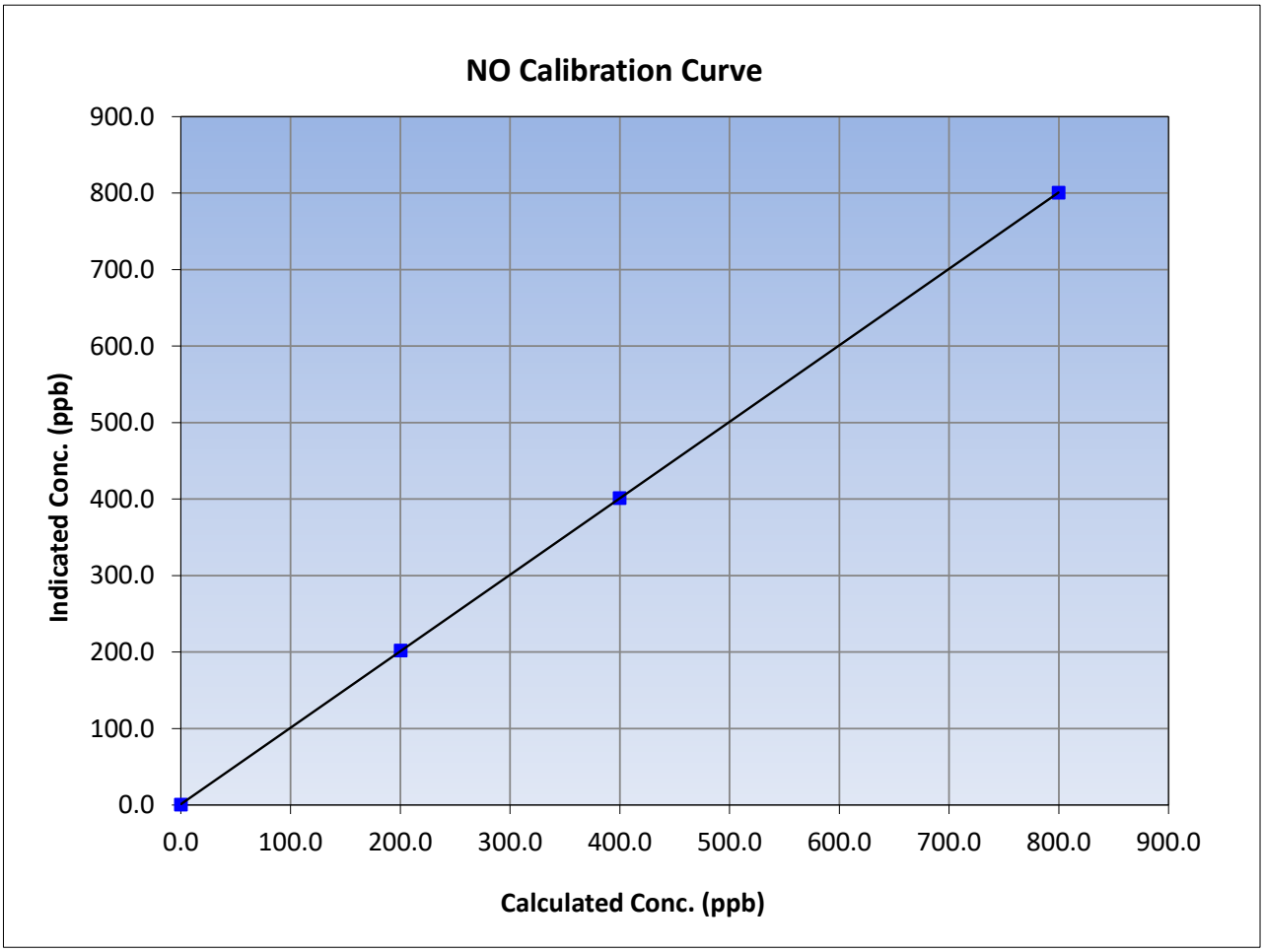
Version-04-2020

Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 4, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:54	End Time (MST):	14:46
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999997	≥0.995
799.7	800.4	0.9992			
399.9	401.3	0.9964	Slope	0.999944	0.90 - 1.10
200.4	202.1	0.9917			
			Intercept	1.062930	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

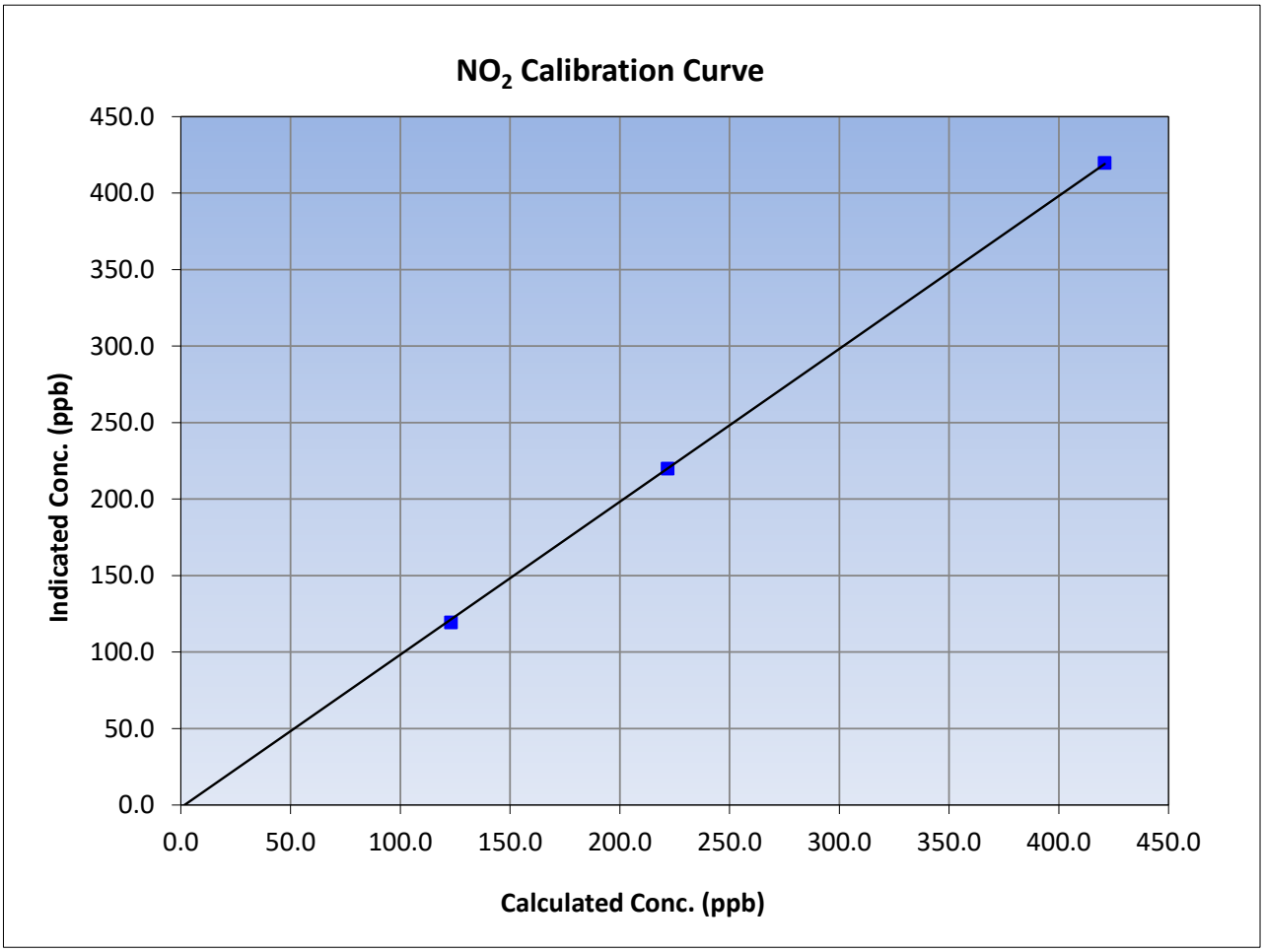
Version-04-2020

Station Information

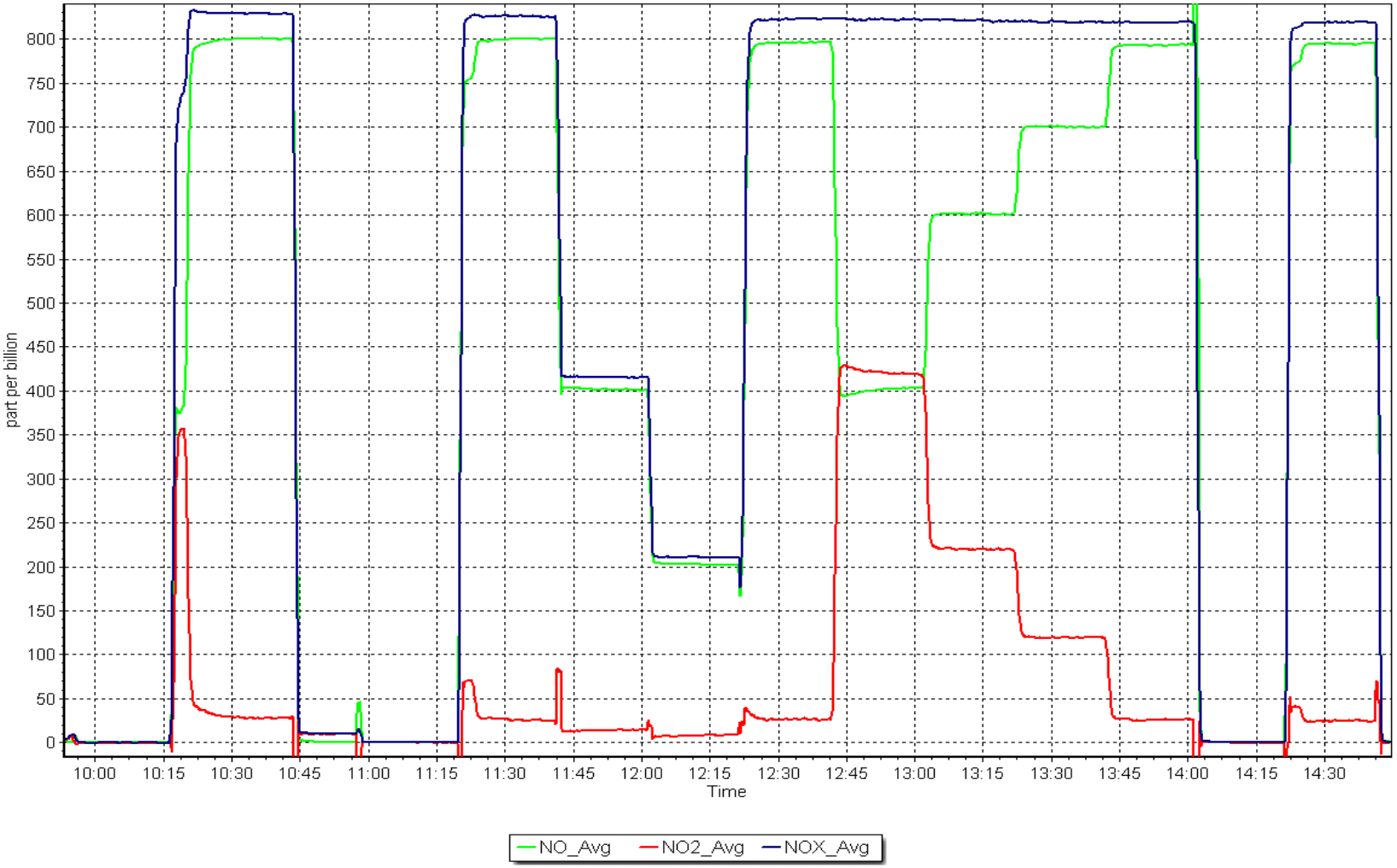
Calibration Date:	January 8, 2024	Previous Calibration:	December 4, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:54	End Time (MST):	14:46
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999931	≥0.995
420.9	419.7	1.0029			
221.7	219.9	1.0083	Slope	0.999549	0.90 - 1.10
123.1	119.4	1.0312			
			Intercept	-1.654321	+/-20



NO_X Calibration Plot Date: January 8, 2024 Location: Patricia McInnes



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	January 2, 2024	Last Cal Date:	December 18, 2023
Start time (MST):	11:52	End time (MST):	15:41
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007657	1.003886	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	-1.340000	-1.480000	Coeff or Slope:	1.039	1.026

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.3	----
as found span	5000	1303.0	400.0	402.4	0.994
as found 2nd point	5000	966.5	200.0	199.2	1.004
as found 3rd point	5000	794.3	100.0	98.0	1.020
calibrator zero	5000	800.0	0.0	0.1	----
high point	5000	1303.0	400.0	400.9	0.998
second point	5000	966.5	200.0	198.4	1.008
third point	5000	794.3	100.0	97.4	1.027
as left zero	5000	800.0	0.0	0.2	----
as left span	5000	1303.0	400.0	402.8	0.993
				Average Correction Factor	1.011

Baseline Corr As found:	402.7	Previous response	401.7	*% change	0.2%
Baseline Corr 2nd AF pt:	-203.2	AF Slope:	1.008257	AF Intercept:	-1.620000
Baseline Corr 3rd AF pt:	-101.2	AF Correlation:	0.999951		

* = > +/-5% change initiates investigation

Notes: Changed the external pump and the inlet filter after multipoint as founds. Adjusted the span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

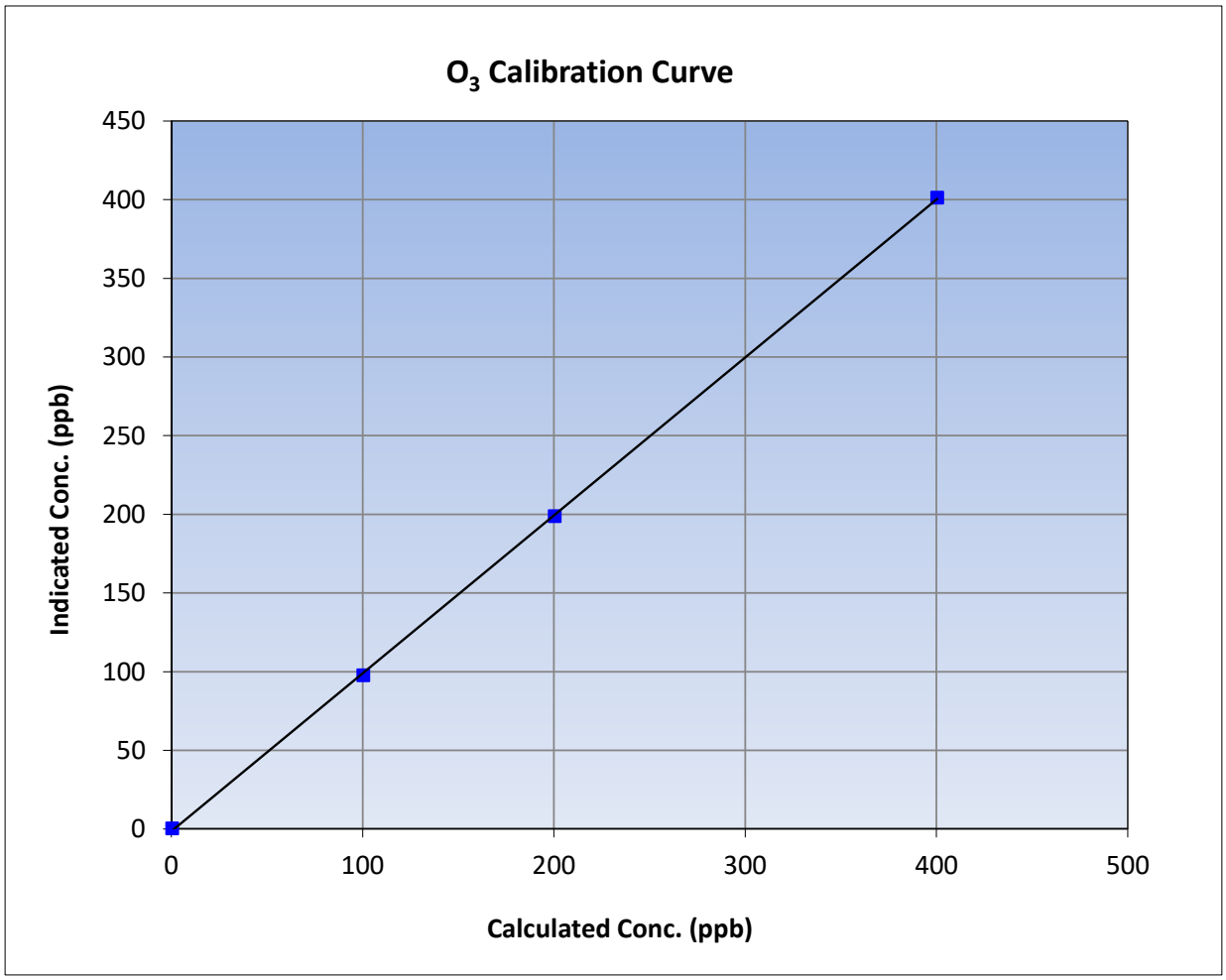
Station Information

Calibration Date:	January 2, 2024	Previous Calibration:	December 18, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	11:52	End Time (MST):	15:41
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

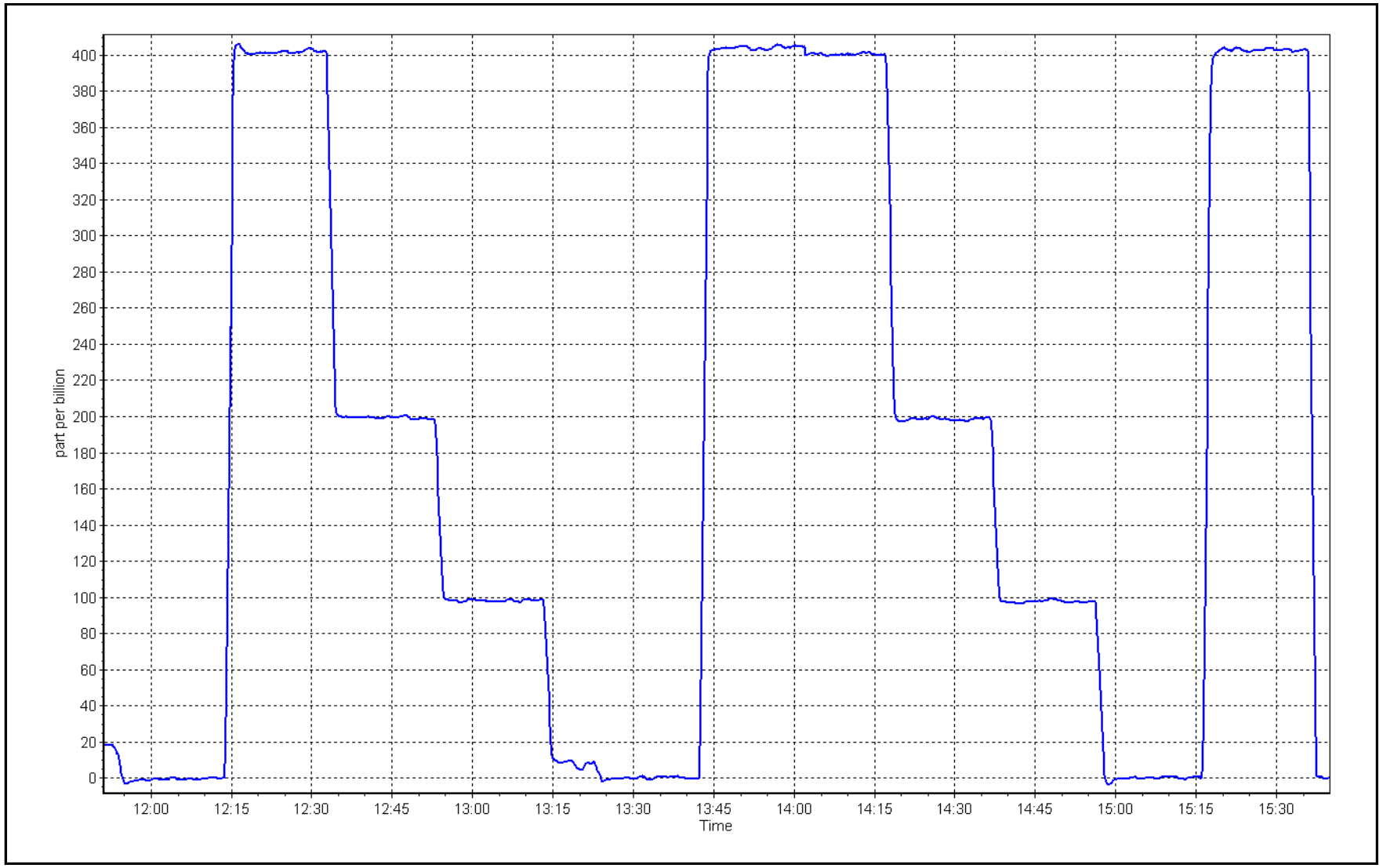
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	400.9	0.9978
200.0	198.4	1.0081
100.0	97.4	1.0267

Statistical Evaluation		Limits
Correlation Coefficient	0.999929	≥0.995
Slope	1.003886	0.90 - 1.10
Intercept	-1.480000	+/- 5



O_3 Calibration Plot Date: January 2, 2024 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:	January 18, 2024	Last Cal Date:	December 1, 2023
Start time (MST):	14:03	End time (MST):	15:01
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)	-15.5	-15.1	-15.5	☐	+/- 2 °C
P (mmHg)	741.7	743.8	741.7	☐	+/- 10 mmHg
flow (LPM)	5.02	5.15	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: January 18, 2024 Last Cal Date: December 1, 2023

PM w/o HEPA: 7.9 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: December 1, 2023 <0.2 ug/m3

Disposable Filter Changed: December 1, 2023

Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023

Date RH/T Sensor Cleaned: April 13, 2023

Notes: Quarterly calibrations completed last month. Leak check passed, no adjustments made.

Calibration by: Max Farrell

Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	January 16, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	9:28	End time (MST):	13:31
NH3 Cal Date:	January 16, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	13:32	End time (MST):	15:10
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	47.94	ppm	NO Gas Cylinder #:	T30YCWN
NO Cal Gas Conc:	46.39	ppm	NO Cal Gas Expiry:	April 11, 2025
Removed NOX Conc:	47.94	ppm	Removed Cylinder #:	NA
Removed NO Conc:	46.39	ppm	Removed cyl Expiry:	NA
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	76.29	ppm	NH3 Gas Cylinder #:	EB0108520
			NH3 Cal Gas Expiry:	August 22, 2024
Removed NH3 Conc:	76.29	ppm	Removed Cylinder #:	NA
NH3 gas Diff:			Removed cyl Expiry:	NA
Calibrator Model:	API T700		Serial Number:	3566
ZAG make/model:	API T701		Serial Number:	4602

Analyzer Information

Analyzer model:	Teledyne API T201	Analyzer serial #:	808
Converter model:	Teledyne API T501	Converter serial #:	484
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	4.80
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	26.6

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.854	0.854	TN coefficient:	0.849	0.849
NOX coefficient:	0.848	0.848	NO bkgrnd:	-0.985	-0.985
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-0.562	-0.562
NH3 coefficient:	0.891	0.891	TN bkgrnd:	5.018	5.018

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.997270	1.000699
NO_X Cal Offset:	0.936426	1.395952
NO Cal Slope:	0.997858	1.003275
NO Cal Offset:	0.443186	0.522150
NO_2 Cal Slope:	1.001189	0.994054
NO_2 Cal Offset:	-1.443145	-1.155779
NH3 Cal Slope:	1.005013	1.000855
NH3 Cal Offset:	3.755107	2.210125
TN Cal Slope:	1.011495	1.008599
TN Cal Offset:	4.256407	2.771030

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-1.9	0.2	-2.0	----	----
as found NO	4914	86.2	826.5	826.5	----	827.9	826.0	1.7	0.998	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.2	0.4	-1.6	----	----
high NO point	4914	86.2	826.5	826.5	----	828.0	828.0	0.0	0.998	----
NO/O3 point	4914	86.2	826.5	826.5	----	827.0	824.2	2.8	0.999	----
as found NH3	3417	82.6	1800.6	----	1800.6	1816.3	----	1801.7	0.991	0.999
new NH3 cyl rp	3417	82.6	1800.6	----	1800.6		----			
first NH3	3417	82.6	1800.6	----	1800.6	1816.3	----	1801.7	0.991	0.999
second NH3	3454	45.9	1000.5	----	1000.5	1014.7	----	1006.8	0.986	0.994
third NH3	3477	22.9	499.2	----	499.2	510.0	----	505.1	0.979	0.988
								Average Correction Factor	0.9987	0.9938

Corrected As found TN = 829.8 ppb NO_X = 825.8 ppb NH3 = 1803.7 ppb *Percent Change TN = -1.3%

Previous Response TN = 840.2 ppb NO_X = 825.1 ppb NH3 = 1813.4 ppb *Percent Change NO_X = 0.1%

*Percent Change NH3 = -0.5%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 89.1%

NH3 Current Converter Efficiency = 89.1%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	-1.9	----	----
as found span	4914	86.2	826.5	799.7	826.5	826.0	794.7	827.9	1.0005	1.0063
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.2	-1.2	----	----
high point	4914	86.2	826.5	799.7	826.5	828.0	803.0	828.0	0.9981	0.9959
second point	4957	43.1	413.2	399.9	413.2	415.2	401.0	416.5	0.9953	0.9972
third point	4978	21.6	207.1	200.4	207.1	209.8	202.5	211.2	0.9872	0.9897
								Average Correction Factor	0.9935	0.9943

Baseline Corr As fnd	TN =	829.8 ppb	NO_X =	825.8 ppb	NO =	794.7 ppb	*Percent Change TN = -1.3%
Previous Response	TN =	840.2 ppb	NO_X =	825.1 ppb	NO =	798.5 ppb	*Percent Change NO_X = 0.1%
							*Percent Change NO = -0.5%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	0.1	----	----
calibration zero	----	----	0.0	0.2	----	----
1st GPT point (400 ppb O3)	800.3	399.8	427.2	424.2	1.0071	99.3%
2nd GPT point (200 ppb O3)	800.3	600.2	226.8	224.0	1.0126	98.8%
3rd GPT point (100 ppb O3)	800.3	700.7	126.3	122.7	1.0295	97.1%
				Average Correction Factor	1.0164	98.4%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

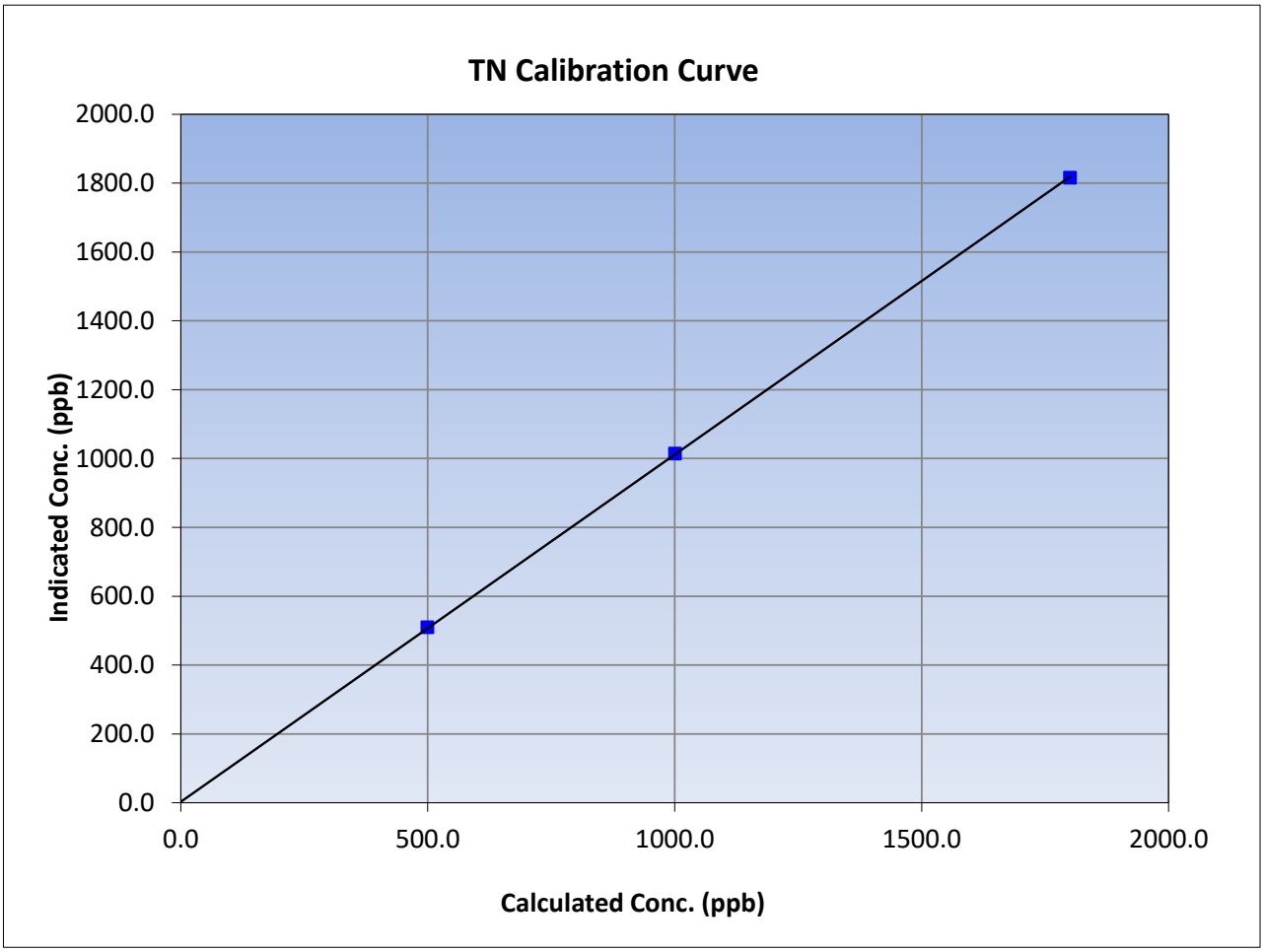
Version-05-2023

Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	December 6, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:28	End Time (MST):	13:31
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	-1.2	----	Correlation Coefficient	0.999975	≥0.995
1800.6	1816.3	0.9914			
1000.5	1014.7	0.9860	Slope	1.008599	0.90 - 1.10
499.2	510.0	0.9788			
			Intercept	2.771030	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

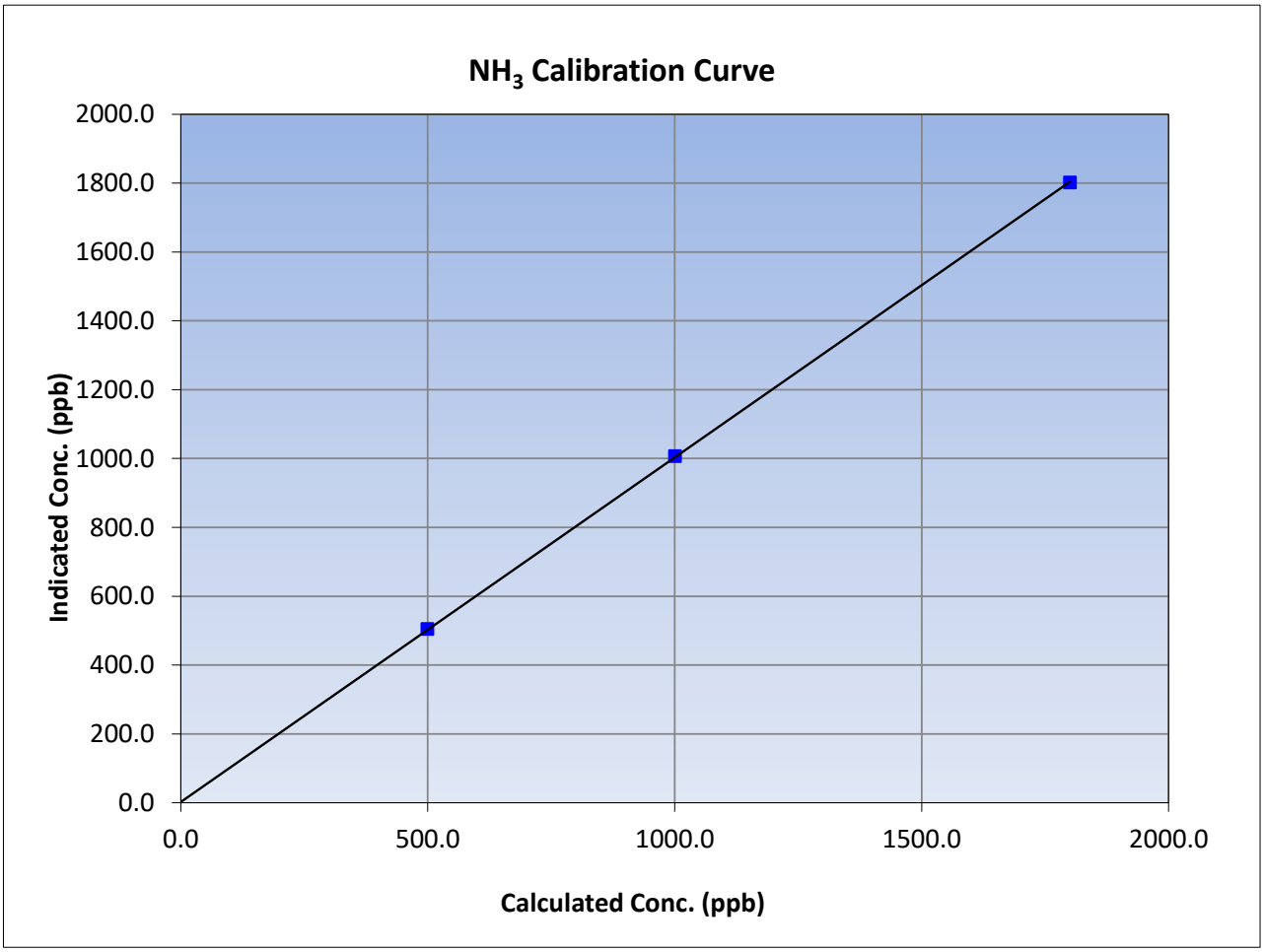
Version-05-2023

Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	December 6, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:28	End Time (MST):	13:31
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	-1.6	----	Correlation Coefficient	0.999976	≥0.995
1800.6	1801.7	0.9994			
1000.5	1006.8	0.9938	Slope	1.000855	0.90 - 1.10
499.2	505.1	0.9883			
			Intercept	2.210125	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

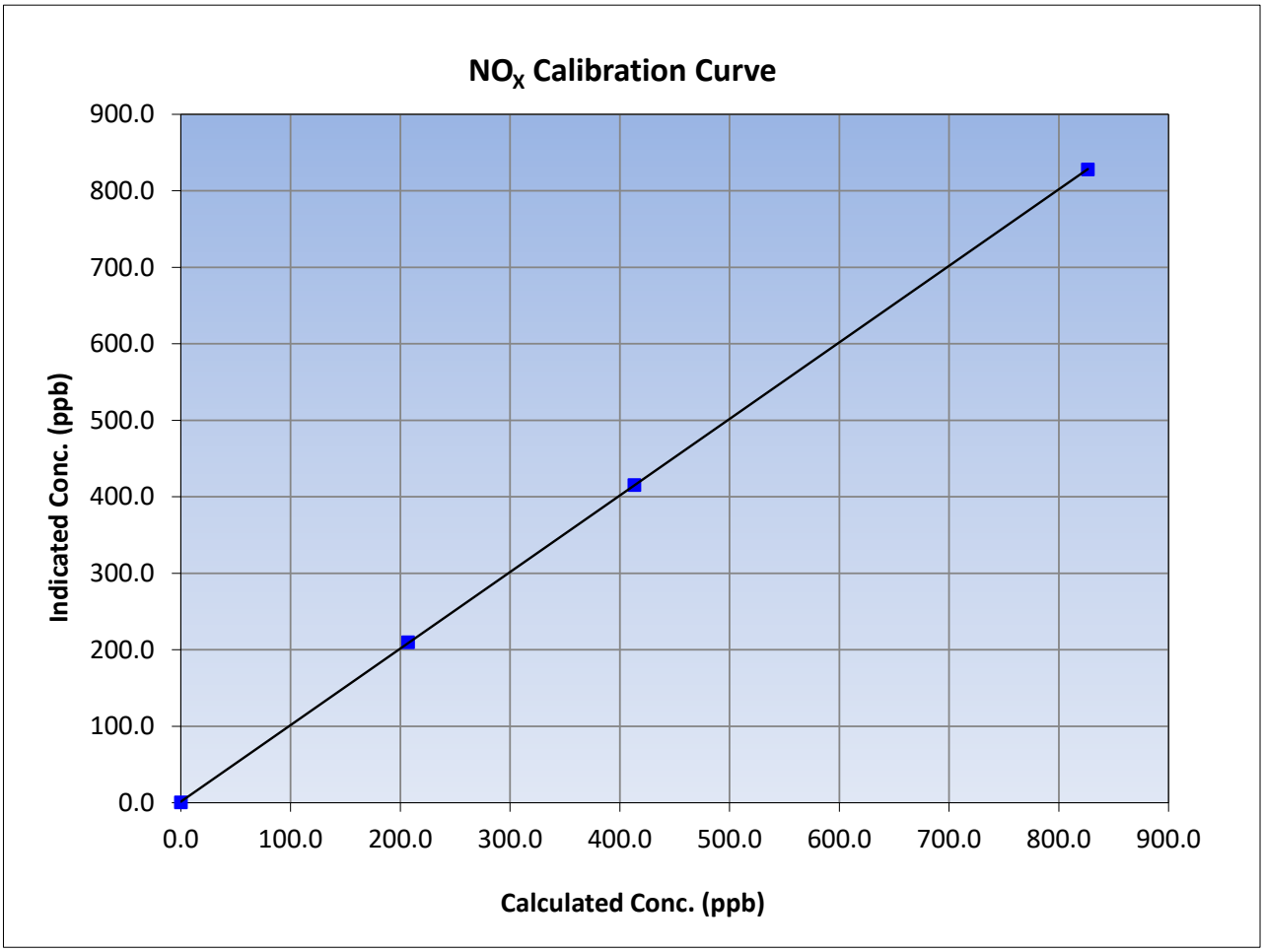
Version-05-2023

Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	December 6, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:28	End Time (MST):	13:31
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	0.4	----	Correlation Coefficient	0.999993	≥0.995
826.5	828.0	0.9981			
413.2	415.2	0.9953	Slope	1.000699	0.90 - 1.10
207.1	209.8	0.9872			
			Intercept	1.395952	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

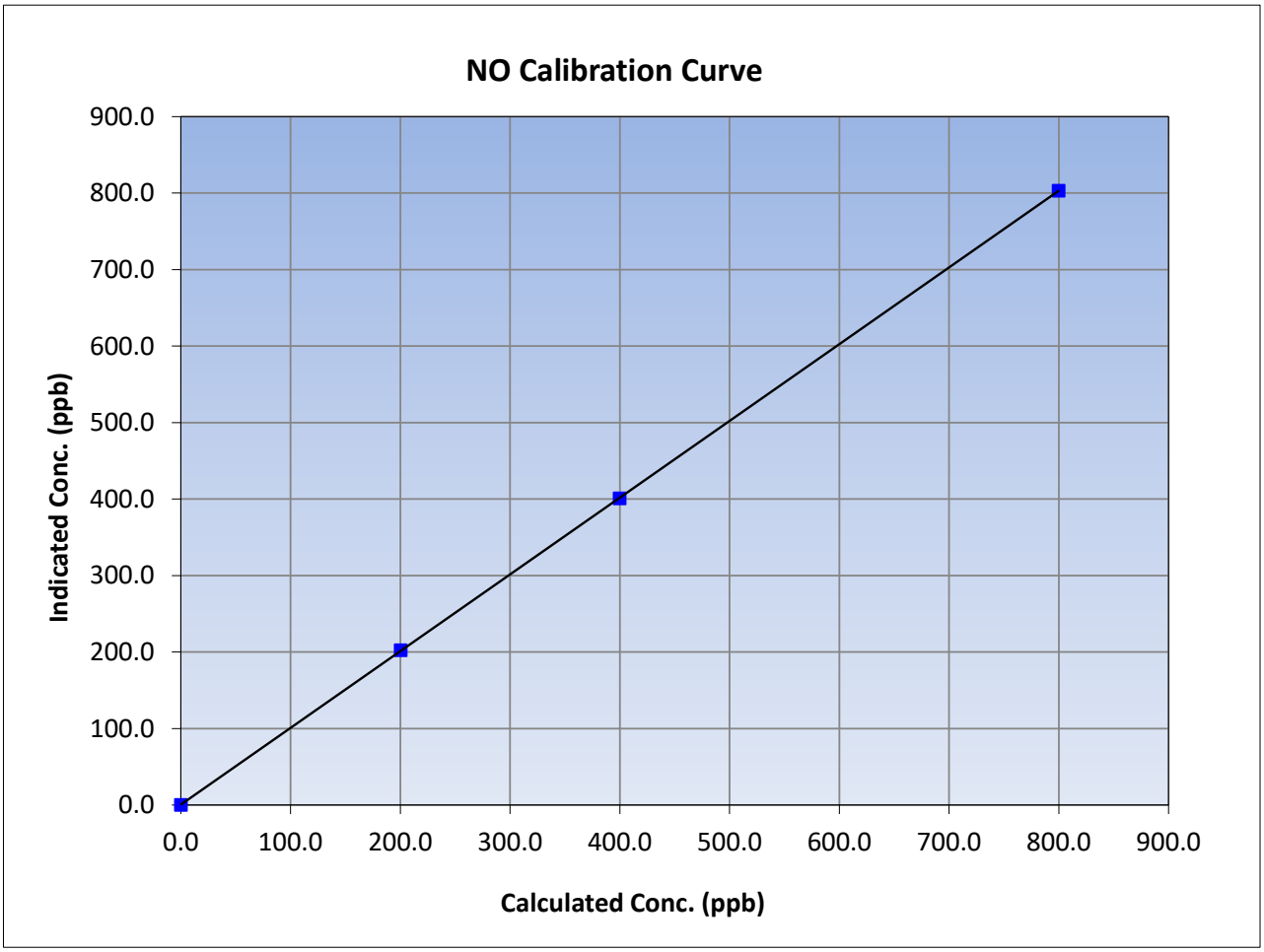
Version-05-2023

Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	December 6, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:28	End Time (MST):	13:31
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	0.999996	≥0.995
799.7	803.0	0.9959			
399.9	401.0	0.9972	Slope	1.003275	0.90 - 1.10
200.4	202.5	0.9897			
			Intercept	0.522150	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

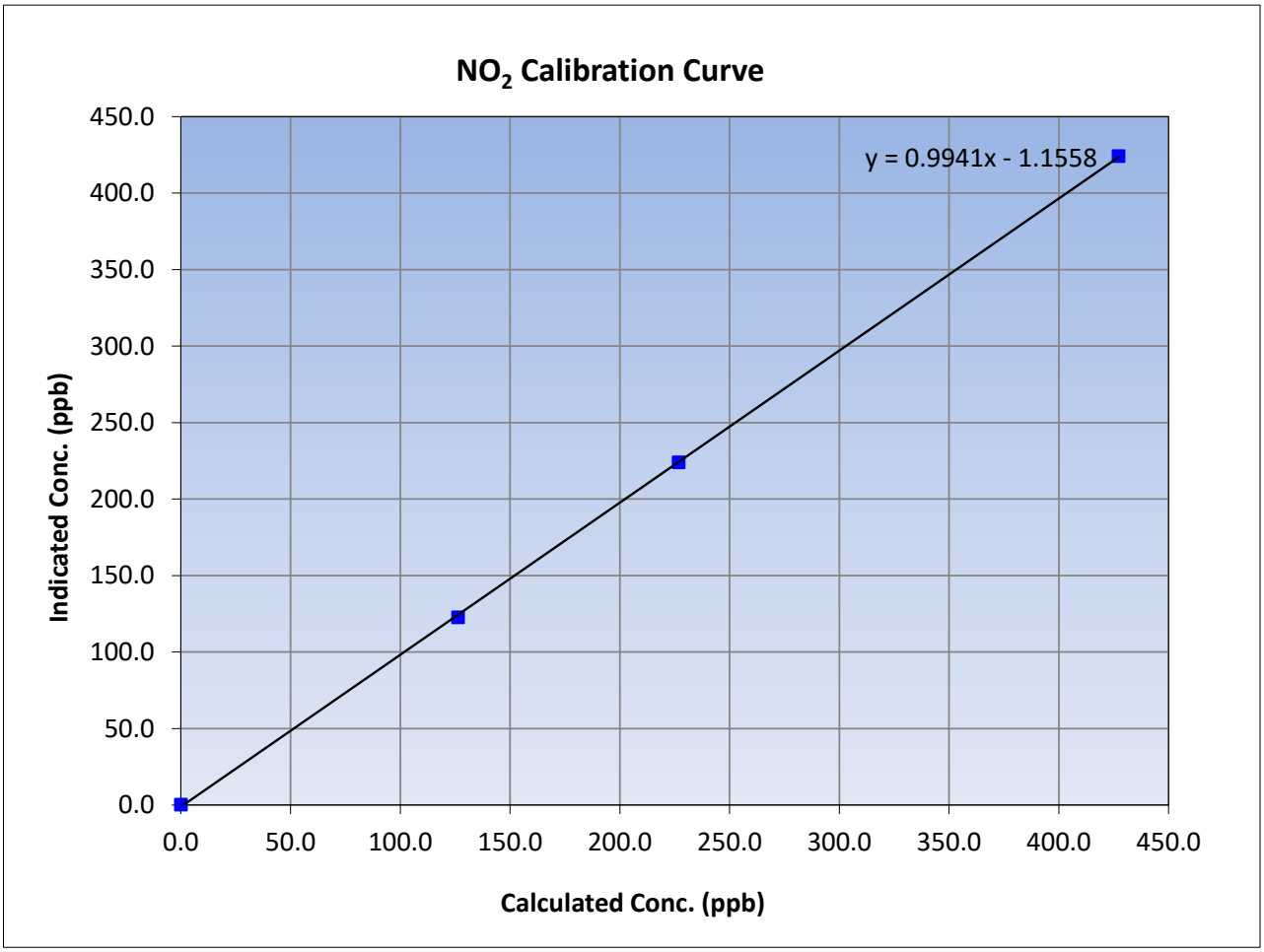
Version-05-2023

Station Information

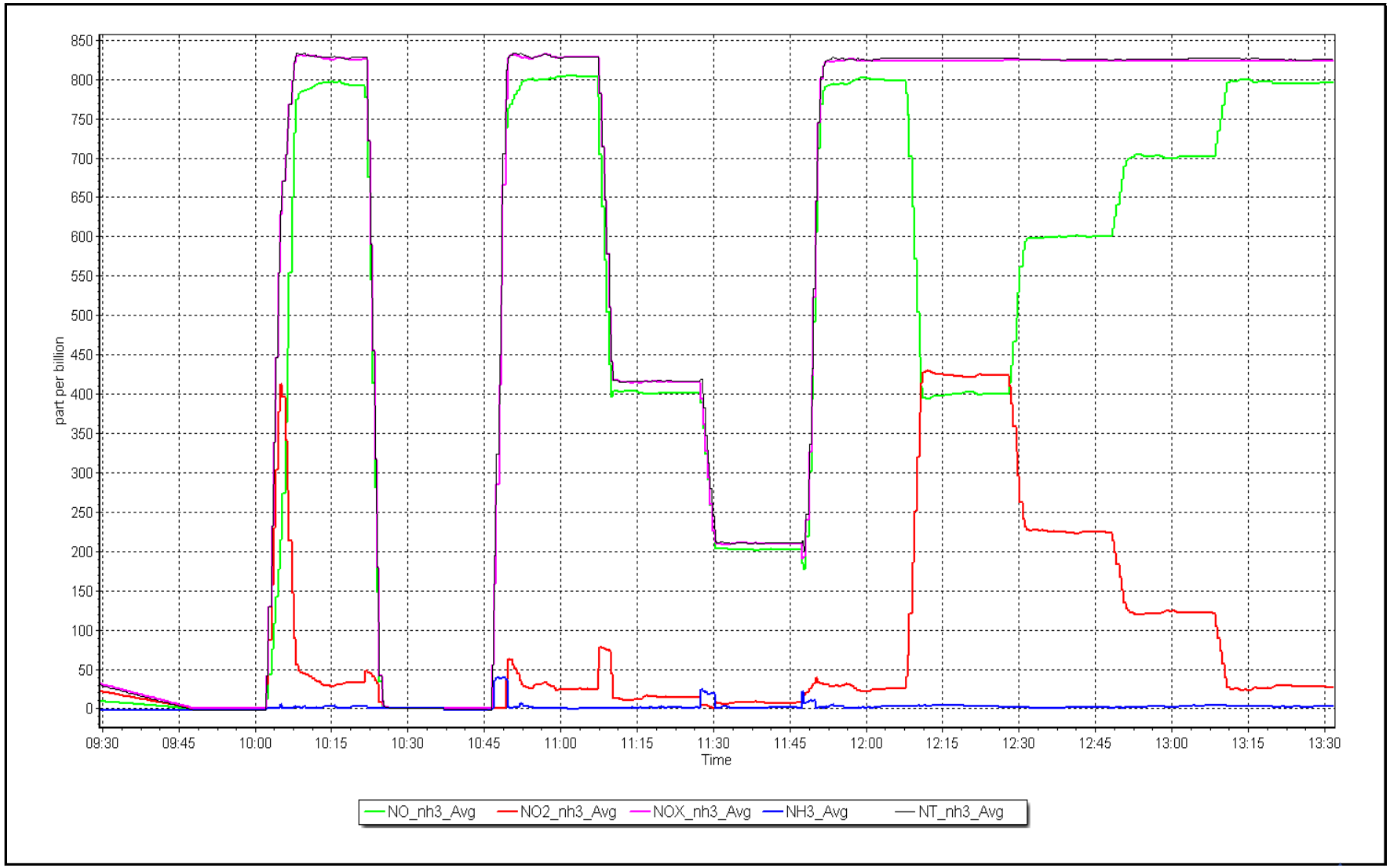
Calibration Date:	January 16, 2024	Previous Calibration:	December 6, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:28	End Time (MST):	13:31
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

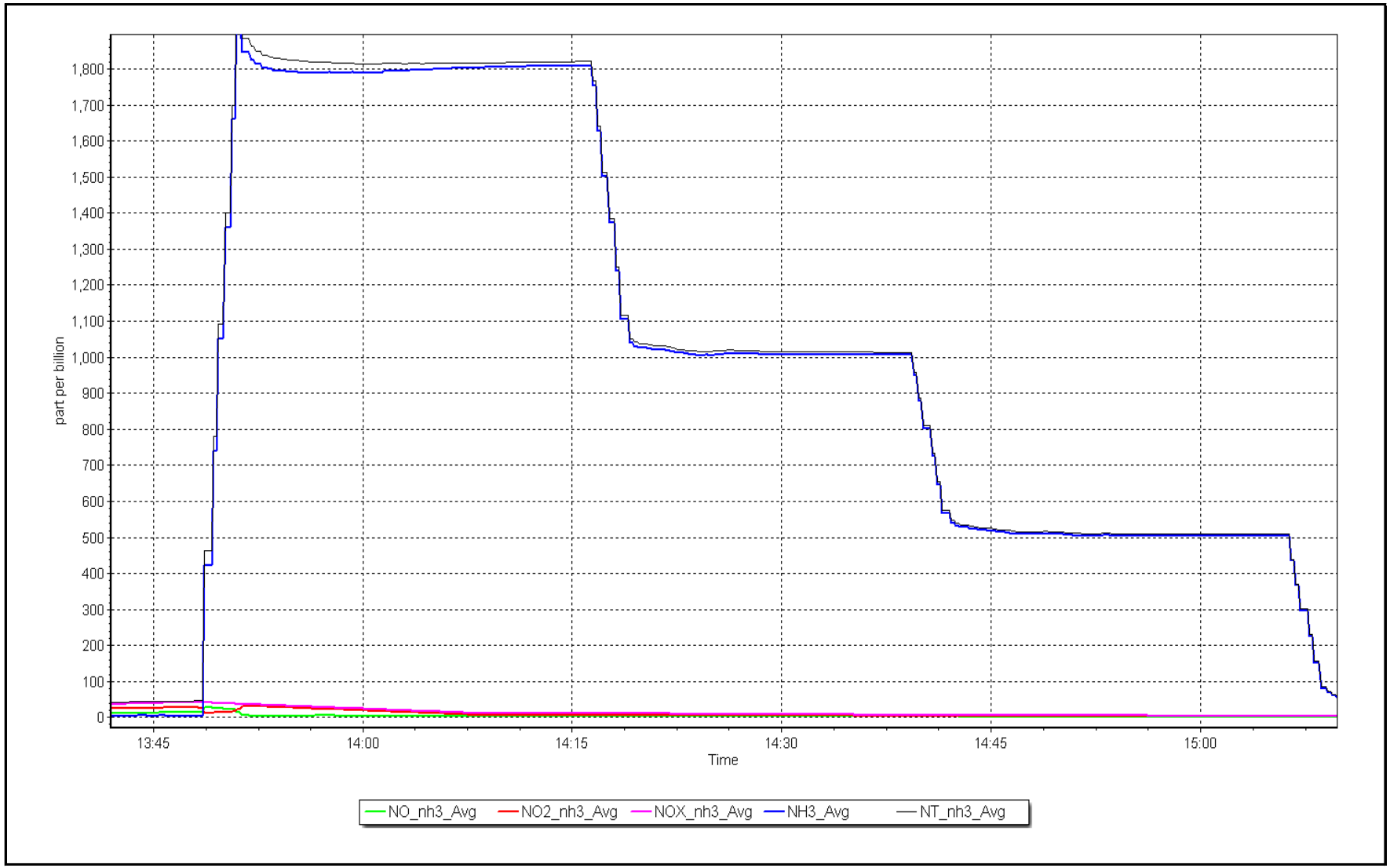
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999945	≥0.995
427.2	424.2	1.0071			
226.8	224.0	1.0126	Slope	0.994054	0.90 - 1.10
126.3	122.7	1.0295			
			Intercept	-1.155779	+/-20



NO_X Calibration Plot Date: January 16, 2024 Location: Patricia McInnes



NH_3 Calibration Plot Date: January 16, 2024 Location: Patricia McInnes



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	January 18, 2024	Last Cal Date:	December 15, 2023
Start time (MST):	10:20	End time (MST):	16:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.06	ppm	Cal Gas Exp Date:	March 10, 2031
Cal Gas Cylinder #:	CC320556			
Removed Cal Gas Conc:	50.52	ppm	Rem Gas Exp Date:	December 29, 2028
Removed Gas Cyl #:	CC282115		Diff between cyl:	-0.3%
Calibrator Make/Model:	API T700		Serial Number:	3805
ZAG Make/Model:	API 701H		Serial Number:	198

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998820	1.003653	Backgd or Offset:	2.59	2.62
Calibration intercept:	2.284124	2.143576	Coeff or Slope:	0.834	0.846

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.2	800.2	791.9	1.010
as found 2nd point					
as found 3rd point					
new cylinder response	4920	79.8	799.0	788.2	1.014
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	79.8	799.0	802.4	0.996
second point	4960	39.9	399.5	406.1	0.984
third point	4980	20.0	200.2	203.7	0.983
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	79.8	799.0	800.1	0.999
				Average Correction Factor	0.987

Baseline Corr As found:	791.90	Previous response	801.54	*% change	-1.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Calibration gas swapped out after as founds. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

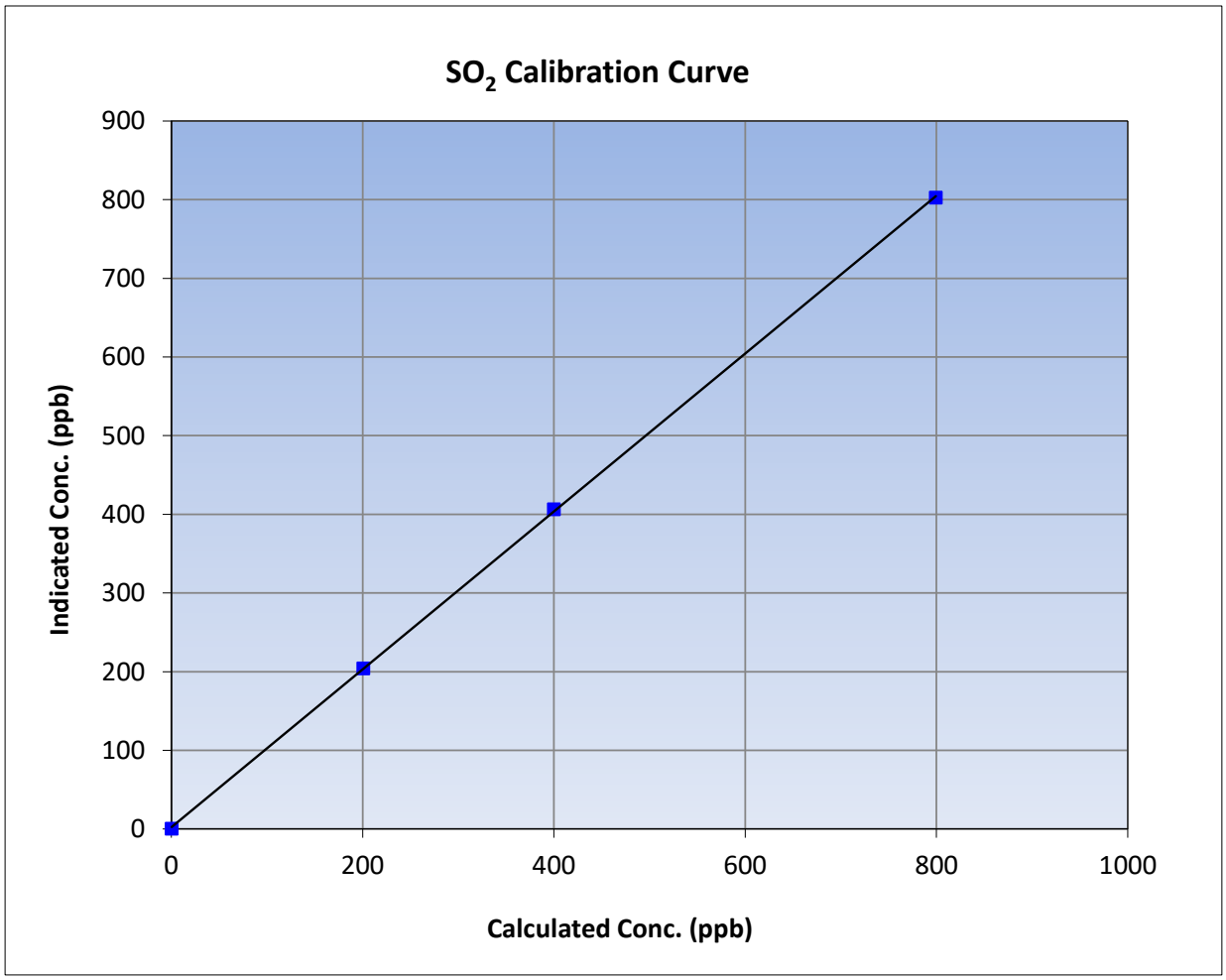
Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:20	End Time (MST):	16:00
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

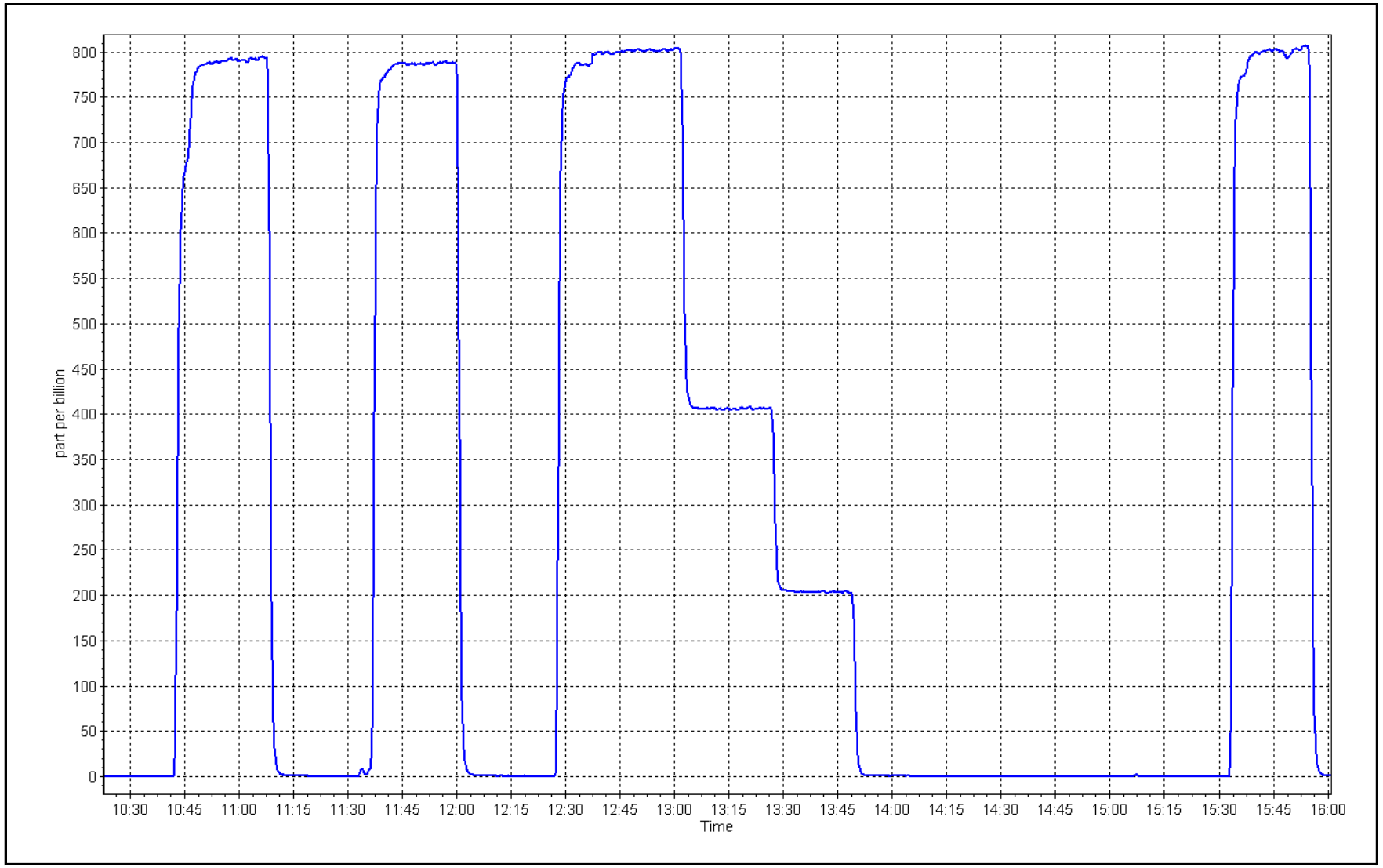
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.0	802.4	0.9957
399.5	406.1	0.9837
200.2	203.7	0.9830

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999955	*≥0.995*
Slope	1.003653	*0.90 - 1.10*
Intercept	2.143576	*+/-30*



SO2 Calibration Plot Date: January 18, 2024 Location: Athabasca Valley



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	January 9, 2024	Last Cal Date:	December 31, 2023
Start time (MST):	10:00	End time (MST):	14:00
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i LTE		Analyzer serial #:	1180540018	
Converter make:	CDN-101		Converter serial #:	551	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.012033	1.004826	Backgd or Offset:	2.35	2.40
Calibration intercept:	-0.062267	0.237795	Coeff or Slope:	0.893	0.906

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4925	75.5	79.3	77.8	1.020
as found 2nd point	4962	37.7	39.6	39.0	1.018
as found 3rd point	4981	18.9	19.8	19.4	1.028
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4925	75.5	79.3	79.9	0.993
second point	4962	37.7	39.6	40.1	0.988
third point	4981	18.9	19.9	20.2	0.983
as left zero	5000	0.0	0.0	0.6	----
as left span	4925	75.5	79.3	79.4	0.999
SO2 Scrubber Check	4920	79.2	800.4	0.4	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	0.988
Date of last converter efficiency test:		April 22, 2022		92.6%	efficiency

Baseline Corr As found:	77.7	Prev response:	80.16	*% change:	-3.2%
Baseline Corr 2nd AF pt:	38.9	AF Slope:	0.981028	AF Intercept:	0.057909
Baseline Corr 3rd AF pt:	19.3	AF Correlation:	0.999991		

* = > +/-5% change initiates investigation

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

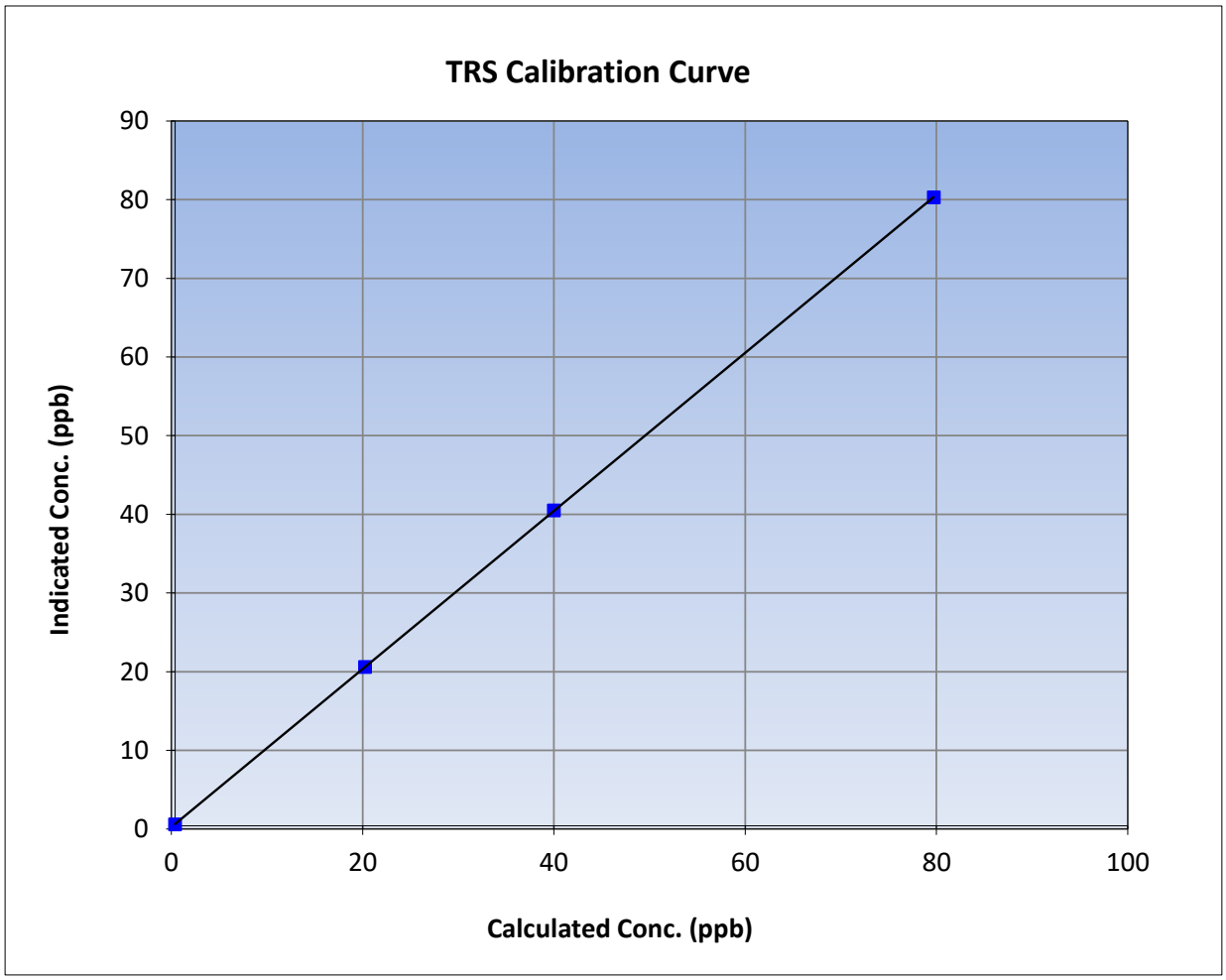
Station Information

Calibration Date:	January 9, 2024	Previous Calibration:	December 31, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:00	End Time (MST):	14:00
Analyzer make:	CDN-101	Analyzer serial #:	551

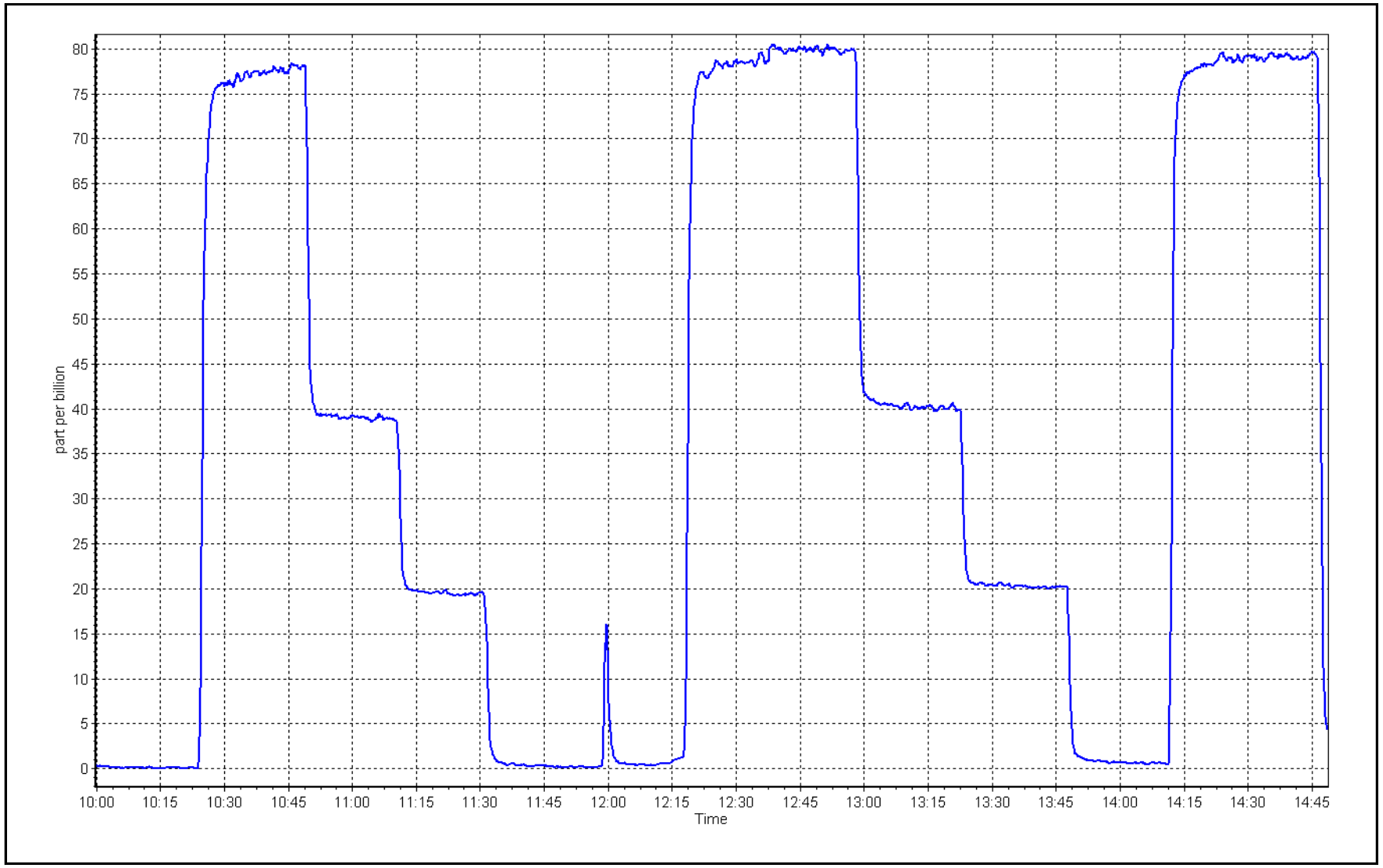
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
79.3	79.9	0.9926
39.6	40.1	0.9878
19.9	20.2	0.9830

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.004826	*0.90 - 1.10*
Intercept	0.237795	*+/-3*



TRS Calibration Plot Date: January 9, 2024 Location: Athabasca Valley



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	January 18, 2024	Last Cal Date:	December 15, 2023
Start time (MST):	10:20	End time (MST):	16:00
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC320556	Cal Gas Expiry Date:	March 10, 2031	
CH4 Cal Gas Conc.	496.0	ppm	CH4 Equiv Conc.	1059.8	ppm
C3H8 Cal Gas Conc.	205.0	ppm			
Removed Gas Cert:		CC282115	Removed Gas Expiry:	December 29, 2028	
Removed CH4 Conc.	501.2	ppm	CH4 Equiv Conc.	1075.1	ppm
Removed C3H8 Conc.	208.7	ppm	Diff between cyl (THC):	1.9%	
Diff between cyl (CH_4):	0.5%		Diff between cyl (NM):	3.2%	
Calibrator Model:	API T700		Serial Number:	3805	
ZAG make/model:	API 701H		Serial Number:	198	

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000251	N/A	NMHC SP Ratio:	4.42E-05	N/A
CH4 Retention time:	13.8	N/A	NMHC Peak Area:	205554	N/A
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	17.03	17.25	0.987
as found 2nd point					
as found 3rd point					
new cylinder response	4920	79.8	16.91	17.47	0.968
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	16.91	17.02	0.994
second point	4960	39.9	8.46	8.51	0.994
third point	4980	20.0	4.24	4.26	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	16.91	17.03	0.993
				Average Correction Factor	0.994
Baseline Corr AF:	17.25	Prev response	17.14	*% 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 / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	9.09	9.16	0.993
as found 2nd point					
as found 3rd point					
new cylinder response	4920	79.8	9.00	9.37	0.960
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	9.00	9.10	0.989
second point	4960	39.9	4.50	4.59	0.980
third point	4980	20.0	2.26	2.33	0.967
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	9.00	9.12	0.987
				Average Correction Factor	0.979
Baseline Corr AF:	9.16	Prev response	9.18	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.94	8.09	0.982
as found 2nd point					
as found 3rd point					
new cylinder response	4920	79.8	7.92	8.10	0.977
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	7.92	7.92	0.999
second point	4960	39.9	3.96	3.92	1.009
third point	4980	20.0	1.98	1.93	1.028
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	7.92	7.92	1.000
				Average Correction Factor	1.012
Baseline Corr AF:	8.09	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

	Start	***Finish***
THC Cal Slope:	1.006595	1.006214
THC Cal Offset:	0.000457	-0.000562
CH4 Cal Slope:	1.005894	1.002531
CH4 Cal Offset:	-0.023559	-0.029927
NMHC Cal Slope:	1.006942	1.009365
NMHC Cal Offset:	0.023816	0.028966

Notes: Calibration cylinder swapped out after as founds. Span adjusted. Could not get as left diagnostics due to instrument going offline during as lefts.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

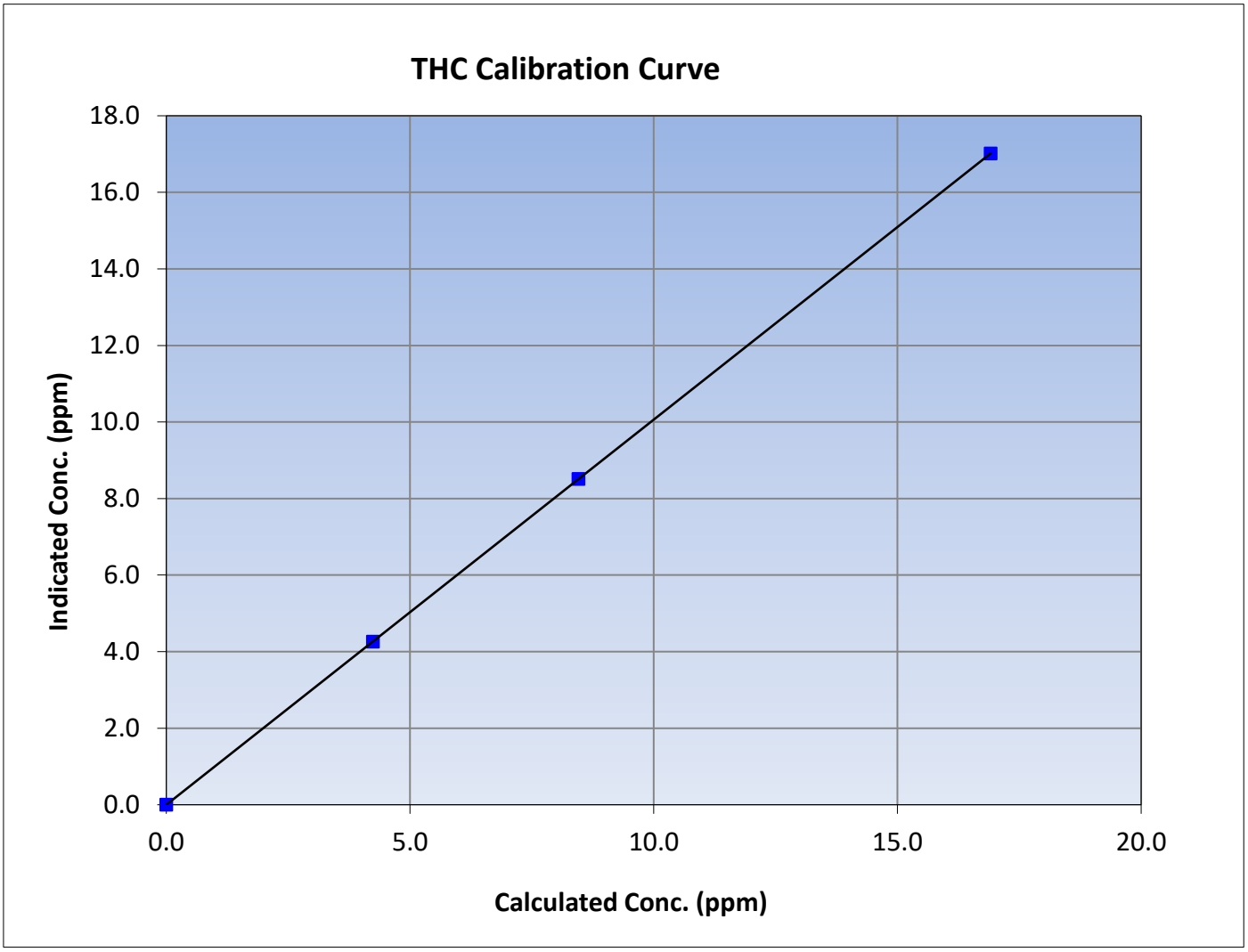
Version-06-2022

Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:20	End Time (MST):	16:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	1.000000	*≥0.995*
16.91	17.02	0.9939			
8.46	8.51	0.9935	Slope	1.006214	*0.90 - 1.10*
4.24	4.26	0.9946			
			Intercept	-0.000562	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

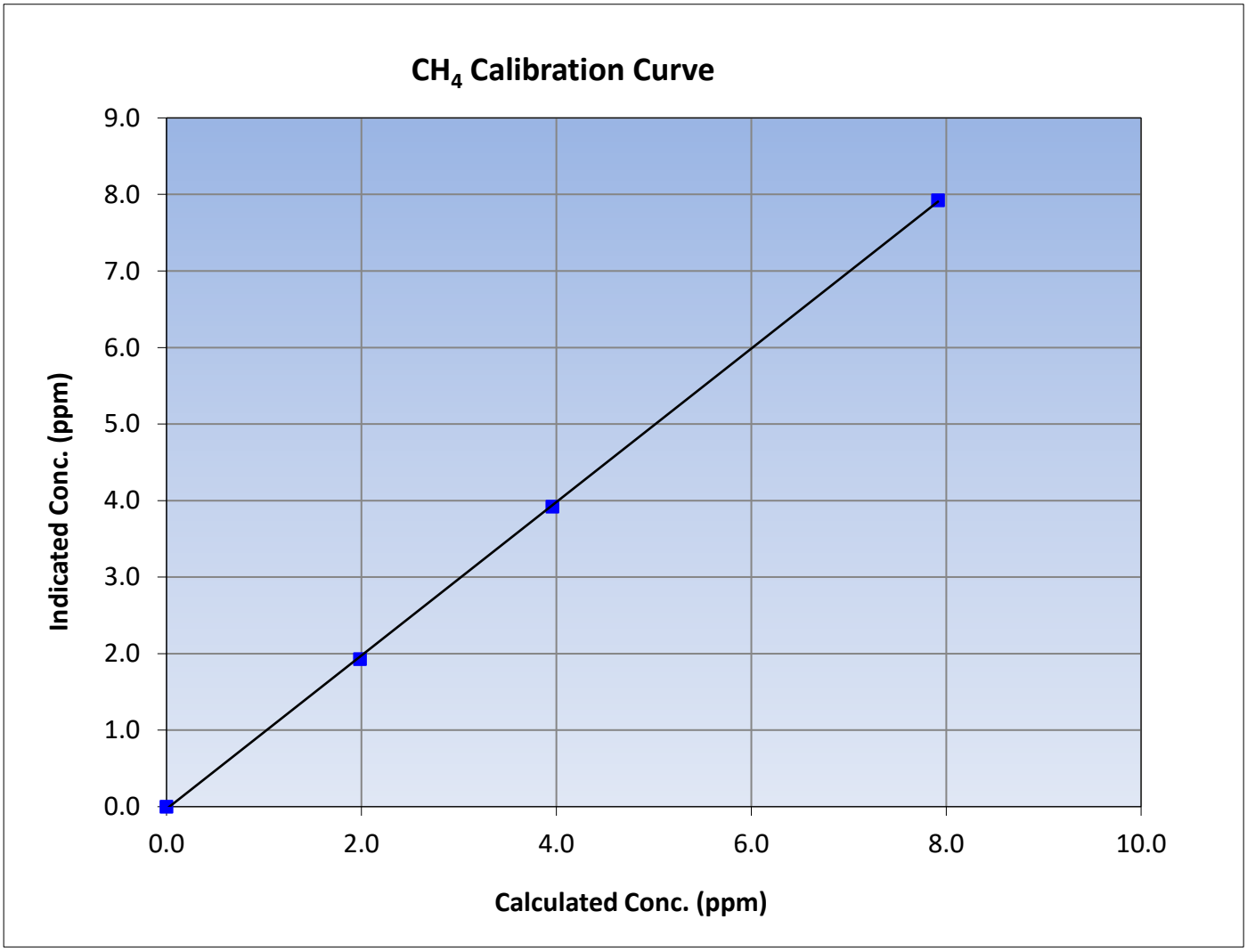
Version-06-2022

Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:20	End Time (MST):	16:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999935	*≥0.995*
7.92	7.92	0.9993			
3.96	3.92	1.0092	Slope	1.002531	*0.90 - 1.10*
1.98	1.93	1.0280			
			Intercept	-0.029927	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

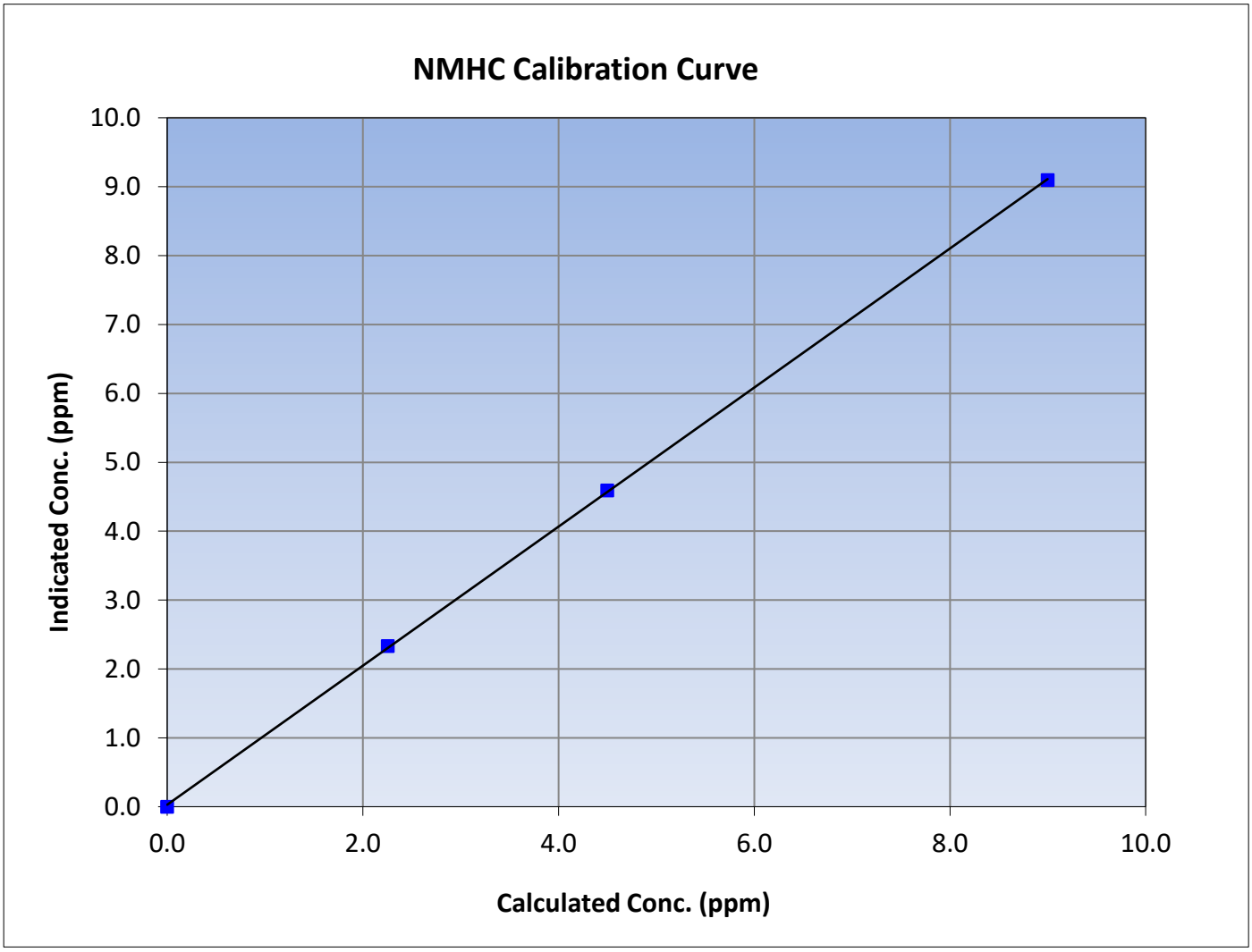
Version-06-2022

Station Information

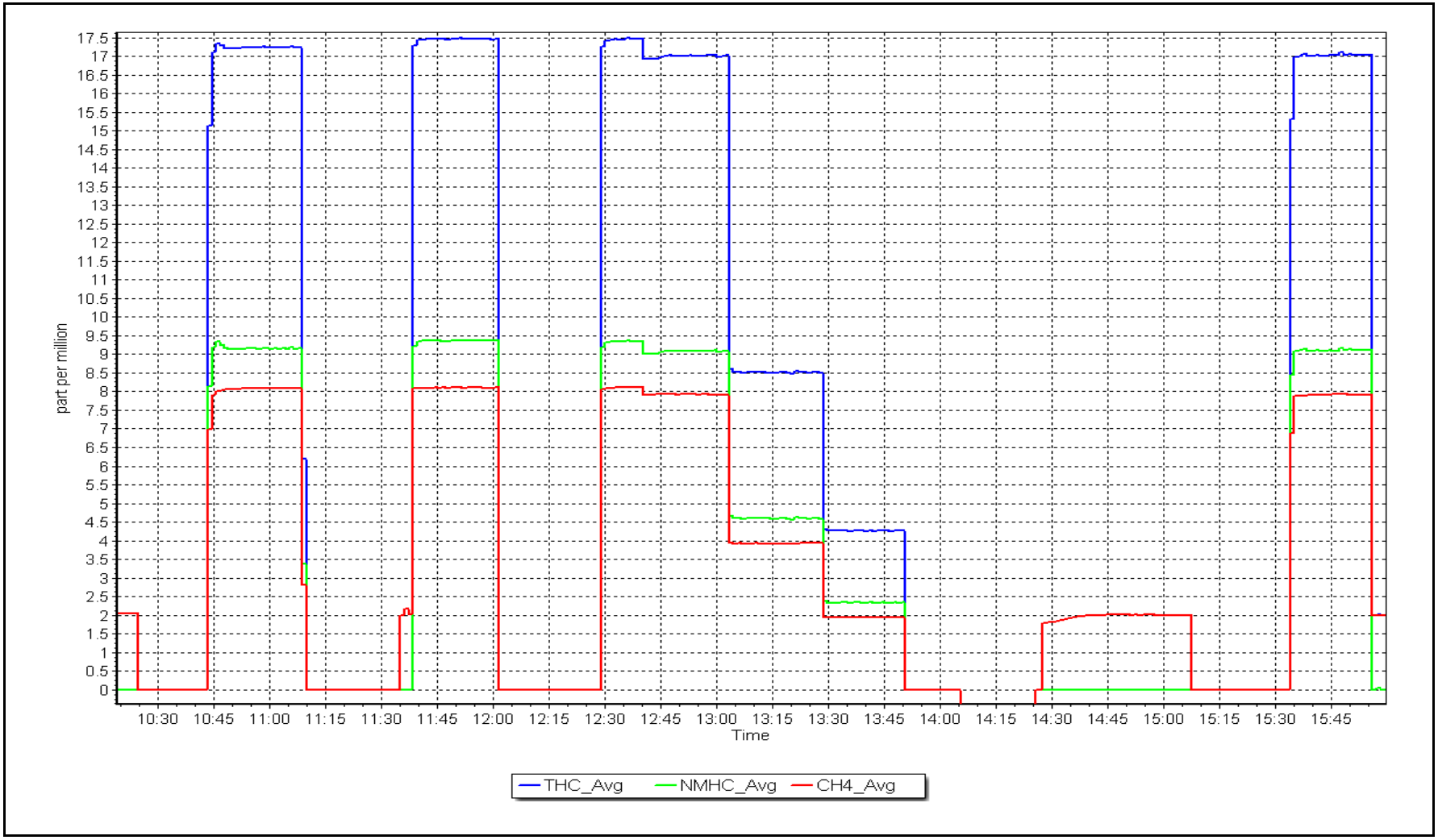
Calibration Date:	January 18, 2024	Previous Calibration:	December 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:20	End Time (MST):	16:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999953	≥0.995
9.00	9.10	0.9893			
4.50	4.59	0.9803	Slope	1.009365	0.90 - 1.10
2.26	2.33	0.9674			
			Intercept	0.028966	+/-0.5



NMHC Calibration Plot Date: January 18, 2024 Location: Athabasca Valley



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	January 5, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	10:20	End time (MST):	16:00
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.095	1.092	NO bkgnd or offset:	7.7	7.7
NOX coeff or slope:	0.994	0.994	NOX bkgnd or offset:	7.9	7.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	212.7	216.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999335	0.998118
NO_X Cal Offset:	1.718942	1.478599
NO Cal Slope:	1.000317	1.000317
NO Cal Offset:	1.435177	1.135182
NO_2 Cal Slope:	0.998685	1.000671
NO_2 Cal Offset:	0.269234	0.394845

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4920	80.2	816.7	800.7	16.0	821.5	804.0	17.6	0.9942	0.9959
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
high point	4920	80.2	816.7	800.7	16.0	815.6	801.2	14.4	1.0014	0.9994
second point	4960	40.1	408.4	400.4	8.0	411.0	403.1	8.0	0.9936	0.9932
third point	4980	20.0	203.7	199.7	4.0	205.2	201.4	3.8	0.9926	0.9915
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	4920	80.2	816.7	398.9	417.8	820.7	399.2	421.7	0.9952	0.9992
								Average Correction Factor	0.9959	0.9947

Corrected As found	NO_X = 821.6 ppb	NO = 804.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.5%
Previous Response	NO_X = 817.9 ppb	NO = 802.4 ppb		*Percent Change	NO =	0.2%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.4	396.6	417.8	418.4	0.9987	100.1%
2nd GPT point (200 ppb O3)	798.4	599.7	214.7	215.4	0.9969	100.3%
3rd GPT point (100 ppb O3)	798.4	698.4	116.0	116.7	0.9943	100.6%
				Average Correction Factor	0.9966	100.3%

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

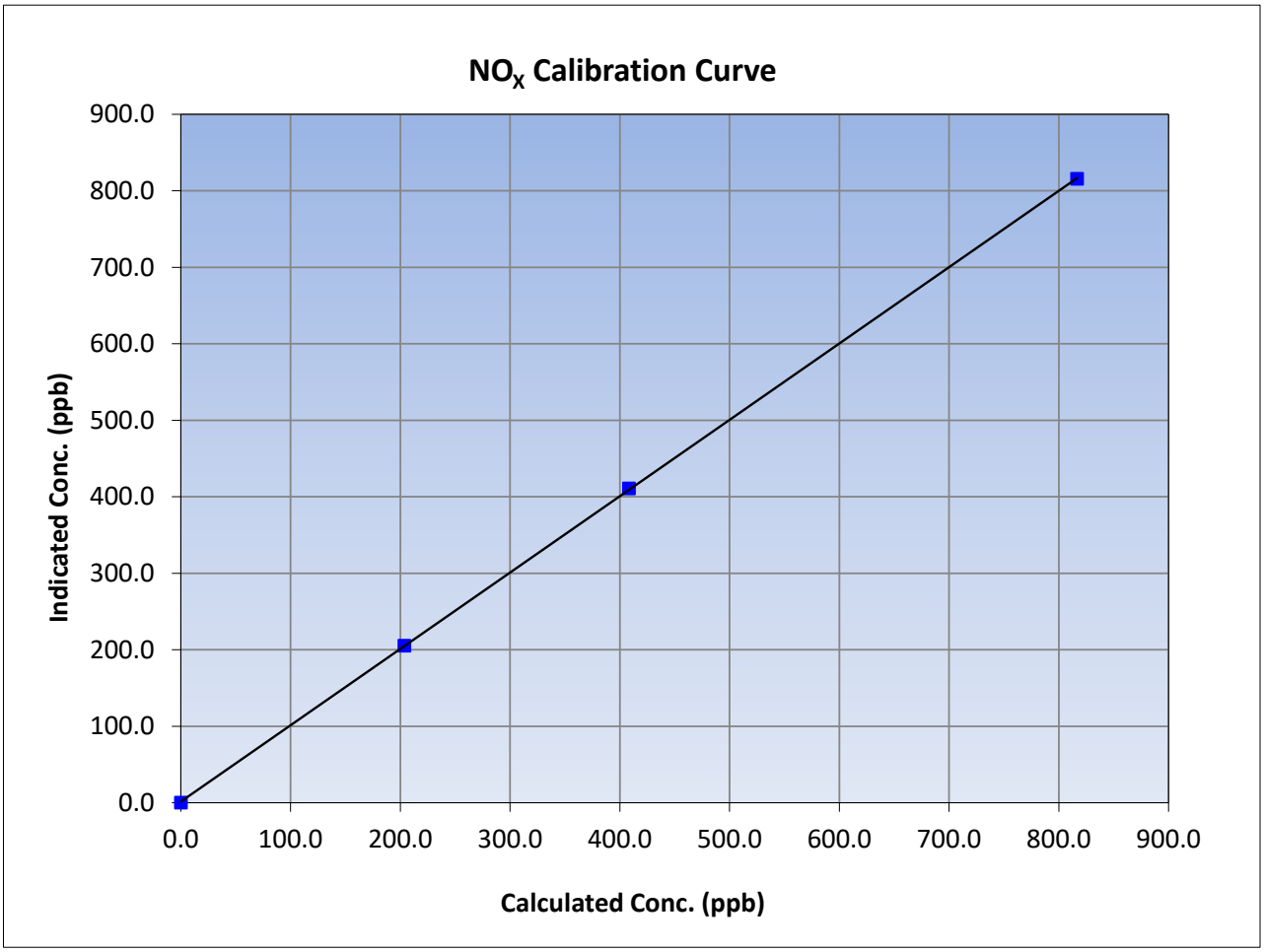
Version-04-2020

Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 13, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:20	End Time (MST):	16:00
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	0.999982	*≥0.995*
816.7	815.6	1.0014			
408.4	411.0	0.9936	Slope	0.998118	*0.90 - 1.10*
203.7	205.2	0.9926			
			Intercept	1.478599	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

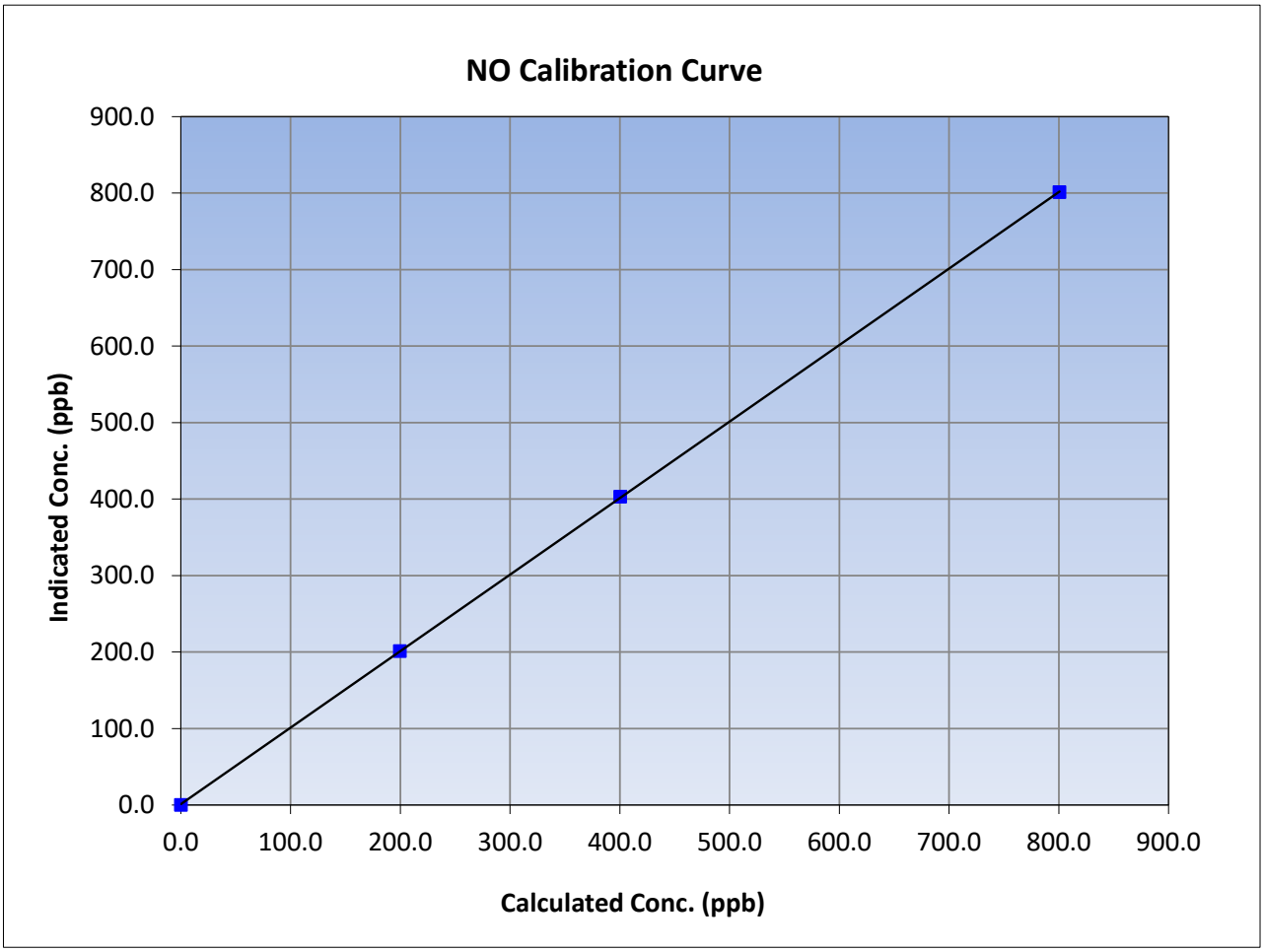
Version-04-2020

Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 13, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:20	End Time (MST):	16:00
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	0.0	----	Correlation Coefficient	0.999987	*≥0.995*
800.7	801.2	0.9994			
400.4	403.1	0.9932	Slope	1.000317	*0.90 - 1.10*
199.7	201.4	0.9915			
			Intercept	1.135182	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

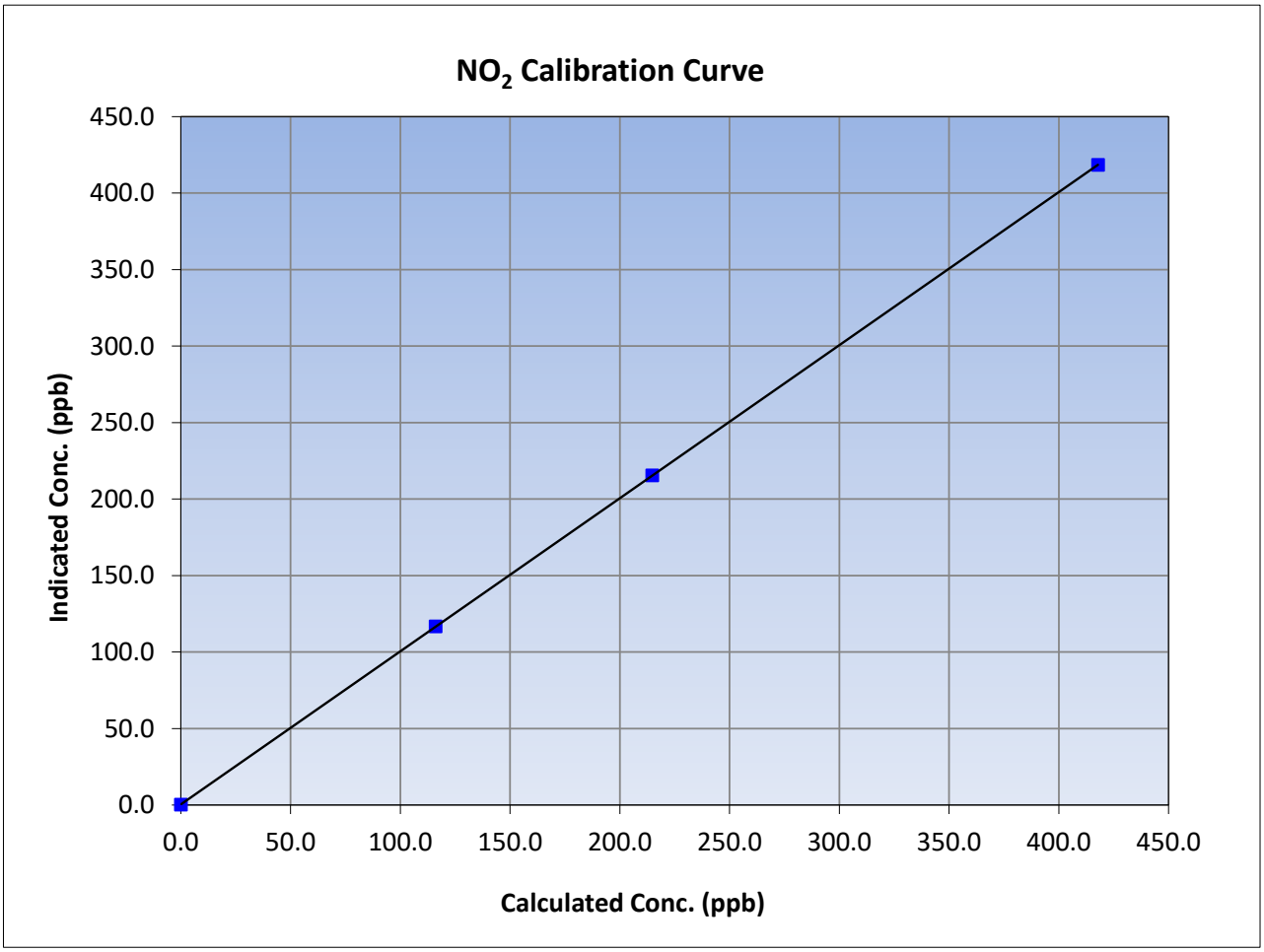
Version-04-2020

Station Information

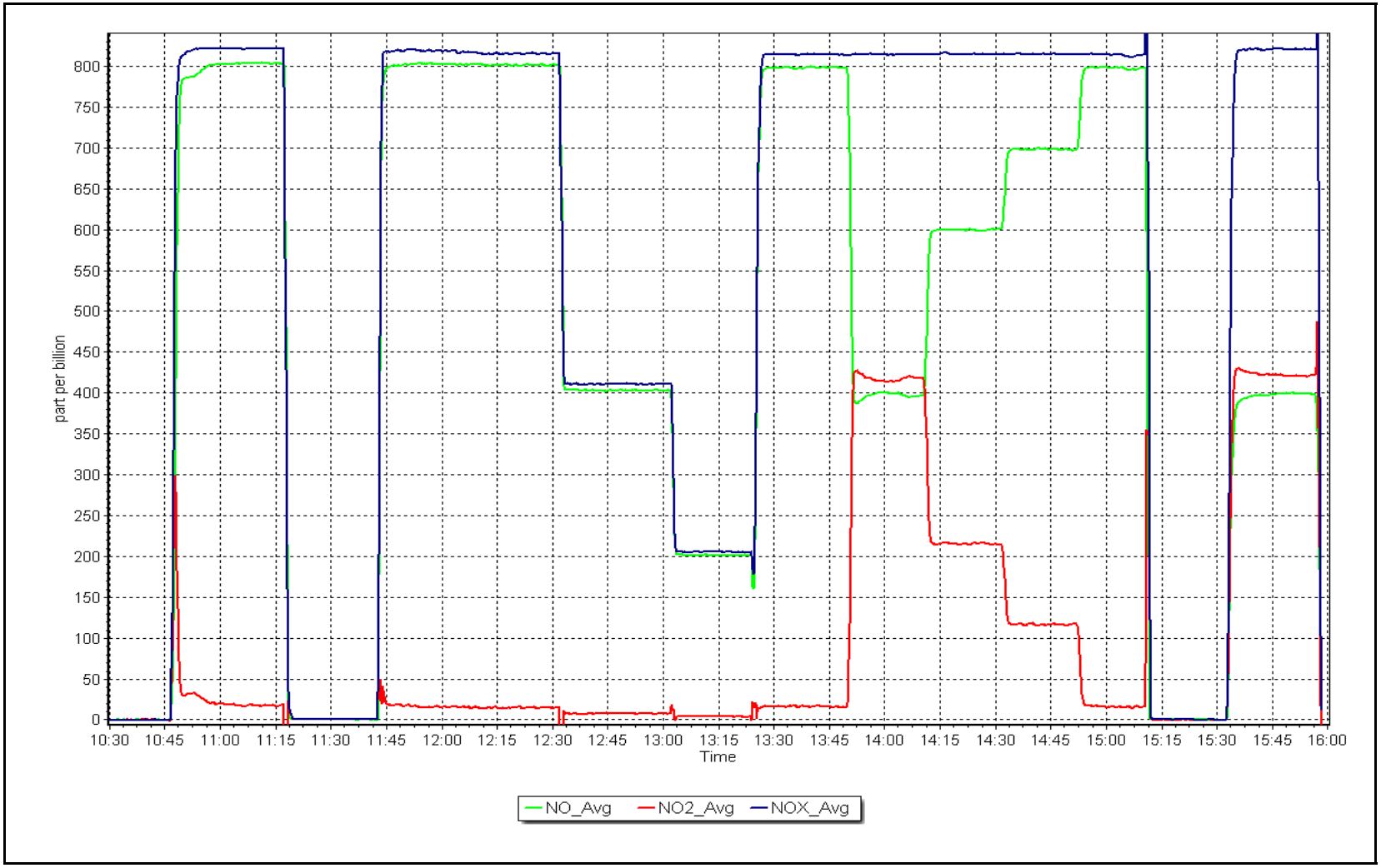
Calibration Date:	January 5, 2024	Previous Calibration:	December 13, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:20	End Time (MST):	16:00
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999999	*≥0.995*
417.8	418.4	0.9987			
214.7	215.4	0.9969	Slope	1.000671	*0.90 - 1.10*
116.0	116.7	0.9943			
			Intercept	0.394845	*+/-20*



NO_X Calibration Plot Date: January 5, 2024 Location: Athabasca Valley



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	January 12, 2024	Last Cal Date:	December 14, 2023
Start time (MST):	12:45	End time (MST):	15:52
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	Finish		Start	Finish
Calibration slope:	0.994743	0.995143	Backgd or Offset:	-2.7	-1.6
Calibration intercept:	0.420000	0.500000	Coeff or Slope:	1.549	1.549

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	5000	1414.8	400.0	397.1	1.007
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	1415.7	400.0	398.5	1.004
second point	5000	1039.9	200.0	199.5	1.003
third point	5000	856.2	100.0	100.3	0.997
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	1416.0	400.0	399.7	1.001
				Average Correction Factor	1.001

Baseline Corr As found:	396.7	Previous response	398.3	*% 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: Zero adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

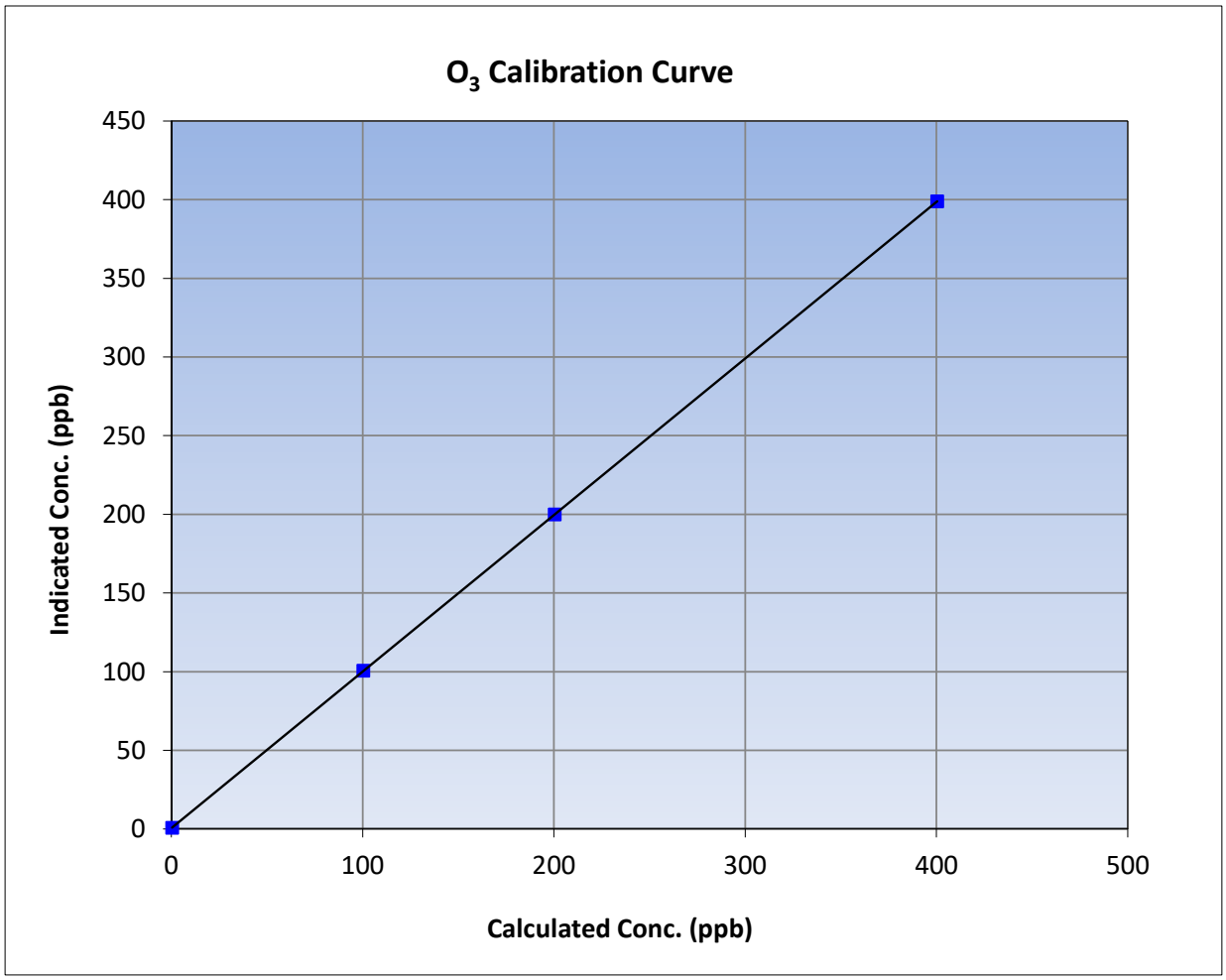
Station Information

Calibration Date:	January 12, 2024	Previous Calibration:	December 14, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	12:45	End Time (MST):	15:52
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

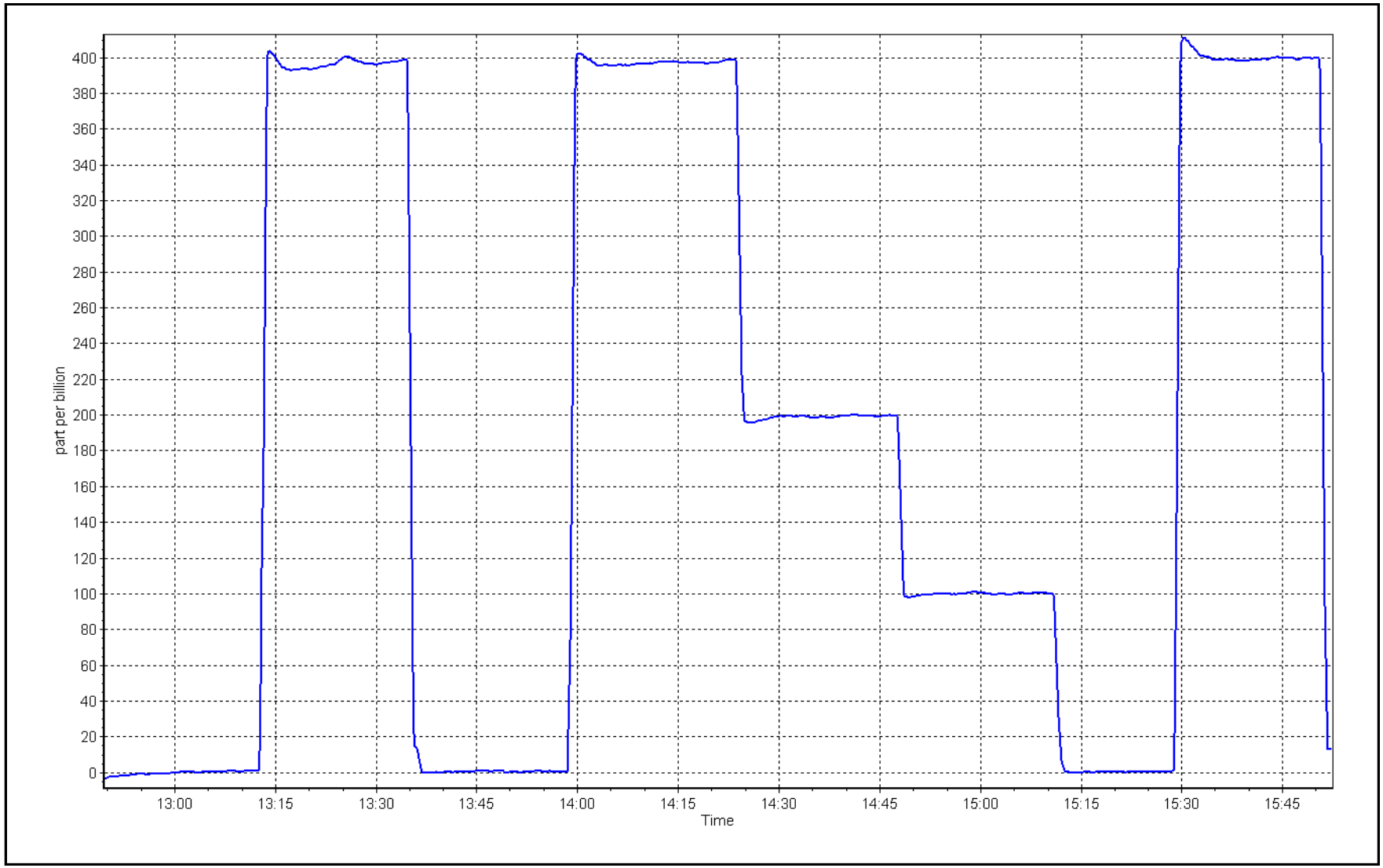
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	398.5	1.0038
200.0	199.5	1.0025
100.0	100.3	0.9970

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.995143	*0.90 - 1.10*
Intercept	0.500000	*+/- 5*



O_3 Calibration Plot Date: January 12, 2024 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:	January 18, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	14:03	End time (MST):	15:49
Analyzer Make:	API T640	S/N:	645
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)	-14.8	-15.7	-14.8	☐	+/- 2 °C
P (mmHg)	756.4	754.2	756.4	☐	+/- 10 mmHg
flow (LPM)	5.01	5.12	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: January 18, 2024 Last Cal Date: December 13, 2023

PM w/o HEPA: 3.5 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	N/A	N/A	N/A	☐	10.9 +/- 0.5

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

Date Optical Chamber Cleaned: N/A <0.2 ug/m3

Disposable Filter Changed: N/A

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: Inlet head trap jar was found shattered, replaced jar. Temp, flow and pressure checked. Leak check done.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	January 2, 2024	Last Cal Date:	December 8, 2023
Start time (MST):	11:50	End time (MST):	15:24
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000200	0.993944	Backgd or Offset:	4.331	4.425
Calibration intercept:	0.158544	0.080556	Coeff or Slope:	1.087	1.087

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.0	40.1	0.998
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	20.1	0.995
third point	4983	16.7	10.0	10.1	0.996
as left zero	5000	0.0	0.0	0.0	----
as left span	4933	66.7	40.0	39.8	1.006
				Average Correction Factor	0.999

Baseline Corr As found:	39.97	Prev response:	40.19	*% 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: Zero adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

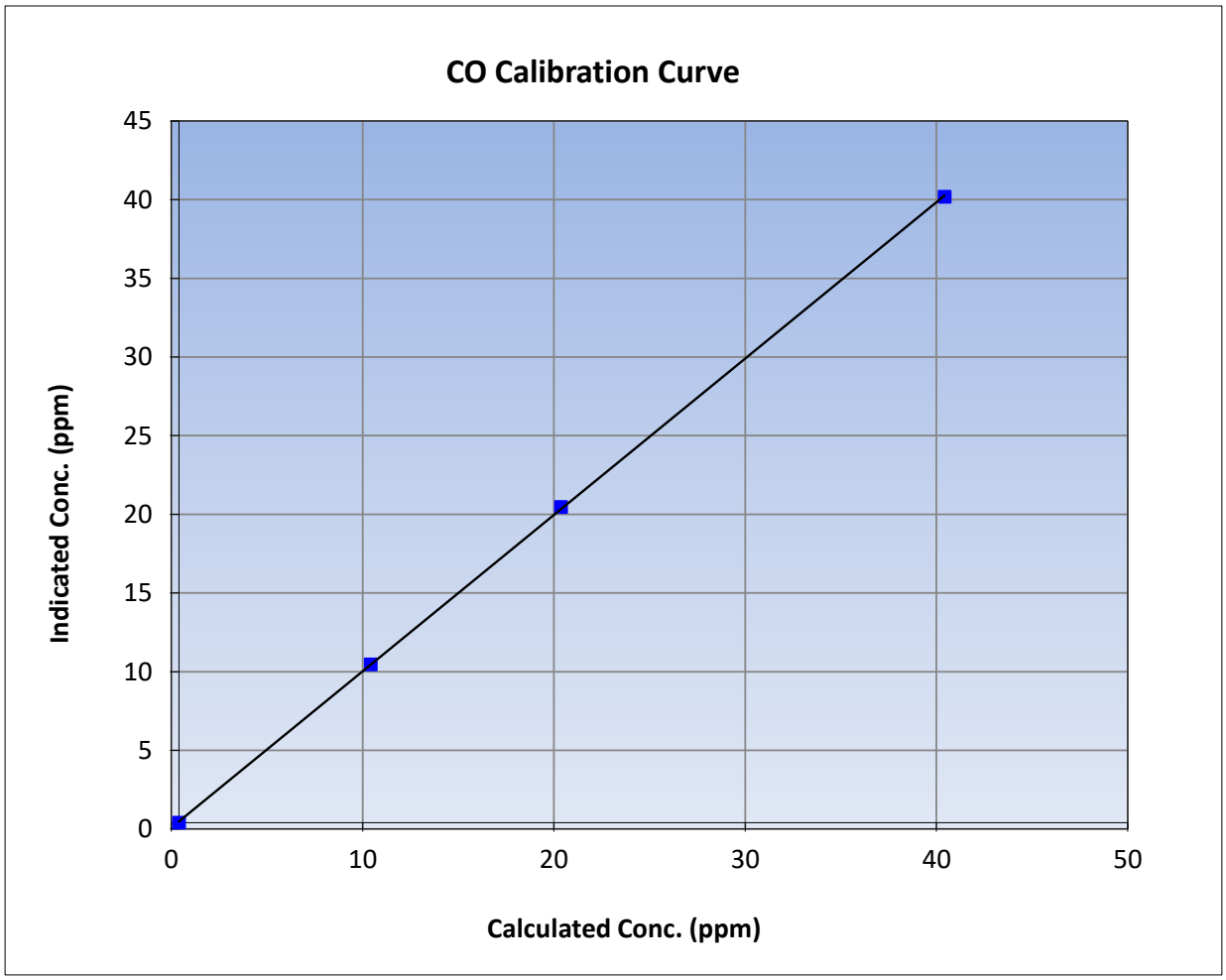
Station Information

Calibration Date:	January 2, 2024	Previous Calibration:	December 8, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	11:50	End Time (MST):	15:24
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

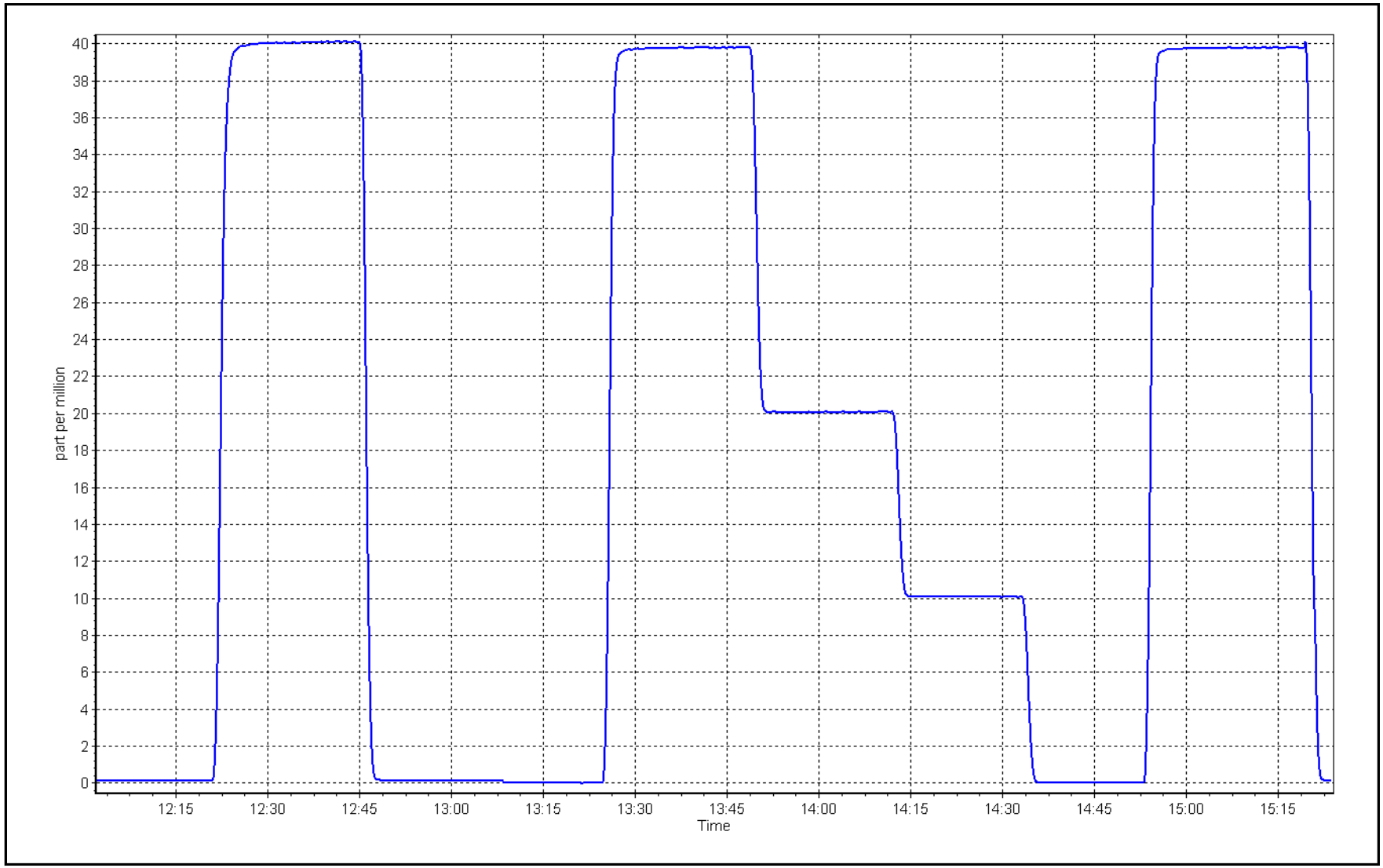
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	39.8	1.0058
20.0	20.1	0.9955
10.0	10.1	0.9961

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999966	*≥0.995*
Slope	0.993944	*0.90 - 1.10*
Intercept	0.080556	*+/-1.5*



CO Calibration Plot Date: January 2, 2024 Location: Athabasca Valley



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	January 18, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	15:22	End time (MST):	18:13
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:	135

Analyzer Information

Analyzer make: Thermo 43i-TLE Analyzer serial #: 1136451241

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.988680	1.002560	Backgd or Offset:	4.62	4.56
Calibration intercept:	-0.942140	-1.305017	Coeff or Slope:	0.965	0.989

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-3.0	----
as found span	4920	80.3	800.4	778.7	1.028
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-2.7	----
high point	4920	80.3	800.4	800.8	0.999
second point	4960	40.2	400.7	400.0	1.002
third point	4980	20.1	200.4	201.7	0.993
as left zero	5000	0.0	0.0	-2.5	----
as left span	4920	80.3	800.4	803.0	0.997
				Average Correction Factor	0.998

Baseline Corr As found:	781.70	Previous response	790.38	*% change	-1.1%

* = > +/-5% change initiates investigation

Notes: changed inlet filters after as founds. Made adjustment to span.

Calibration Performed By: Morgan Voyaguer

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

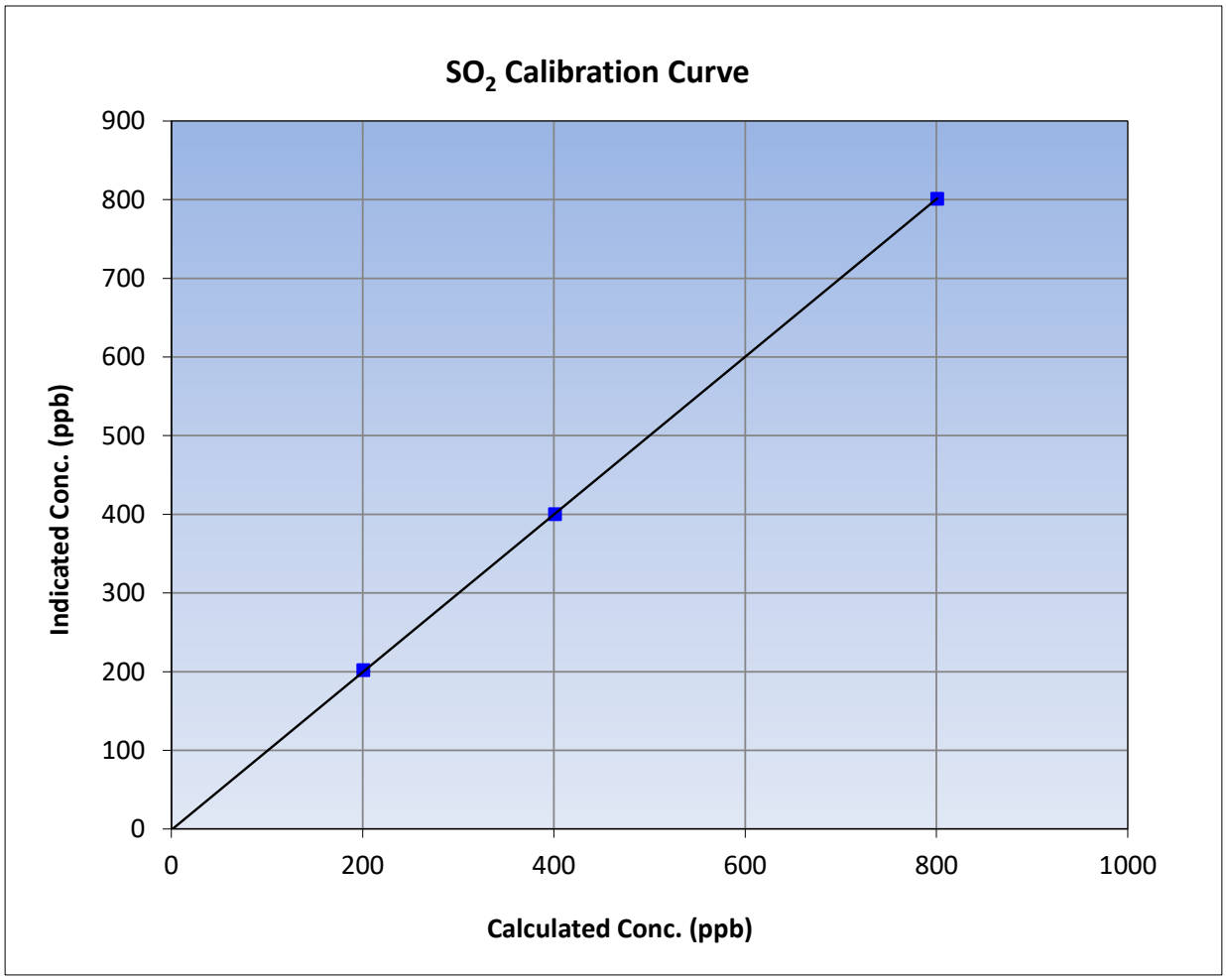
Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 13, 2023
Station Name:	December 13, 2023	Station Number:	Fort Chipewyan
Start Time (MST):	15:22	End Time (MST):	18:13
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

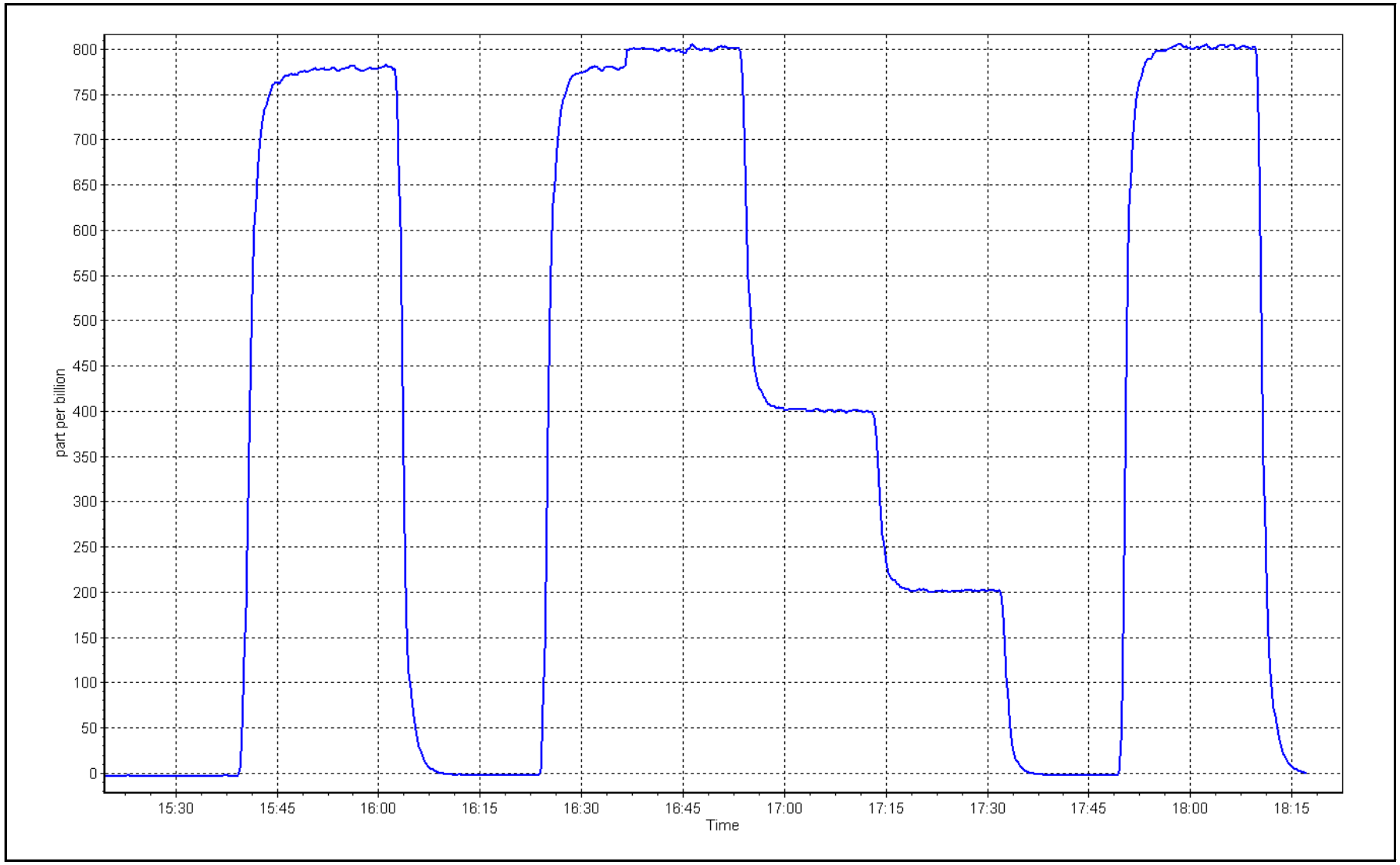
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-2.7	----
800.4	800.8	0.9995
400.7	400.0	1.0017
200.4	201.7	0.9933

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.002560	*0.90 - 1.10*
Intercept	-1.305017	*+/-30*



SO2 Calibration Plot Date: January 18, 2024 Location: Fort Chipewyan



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	January 31, 2024	Last Cal Date:	January 18, 2024
Start time (MST):	7:20	End time (MST):	22:30
Reason:	Maintenance		

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:	135

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002560	0.995420	Backgd or Offset:	4.56	1.86
Calibration intercept:	-1.305017	1.396452	Coeff or Slope:	0.989	0.989

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-3.1	----
as found span	4920	80.3	800.4	796.5	1.005
as found 2nd point	4960	40.2	400.7	396.2	1.011
as found 3rd point	4980	20.1	200.4	200.6	0.999
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4920	80.3	800.4	797.8	1.003
second point	4960	40.2	400.7	399.6	1.003
third point	4980	20.1	200.4	203.4	0.985
as left zero					
as left span					
				Average Correction Factor	0.997

Baseline Corr As found:	799.60	Previous response	801.13	*% change	-0.2%

* = > +/-5% change initiates investigation

Notes: Pump replaced after multipoint as founds. Zero adjusted only.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

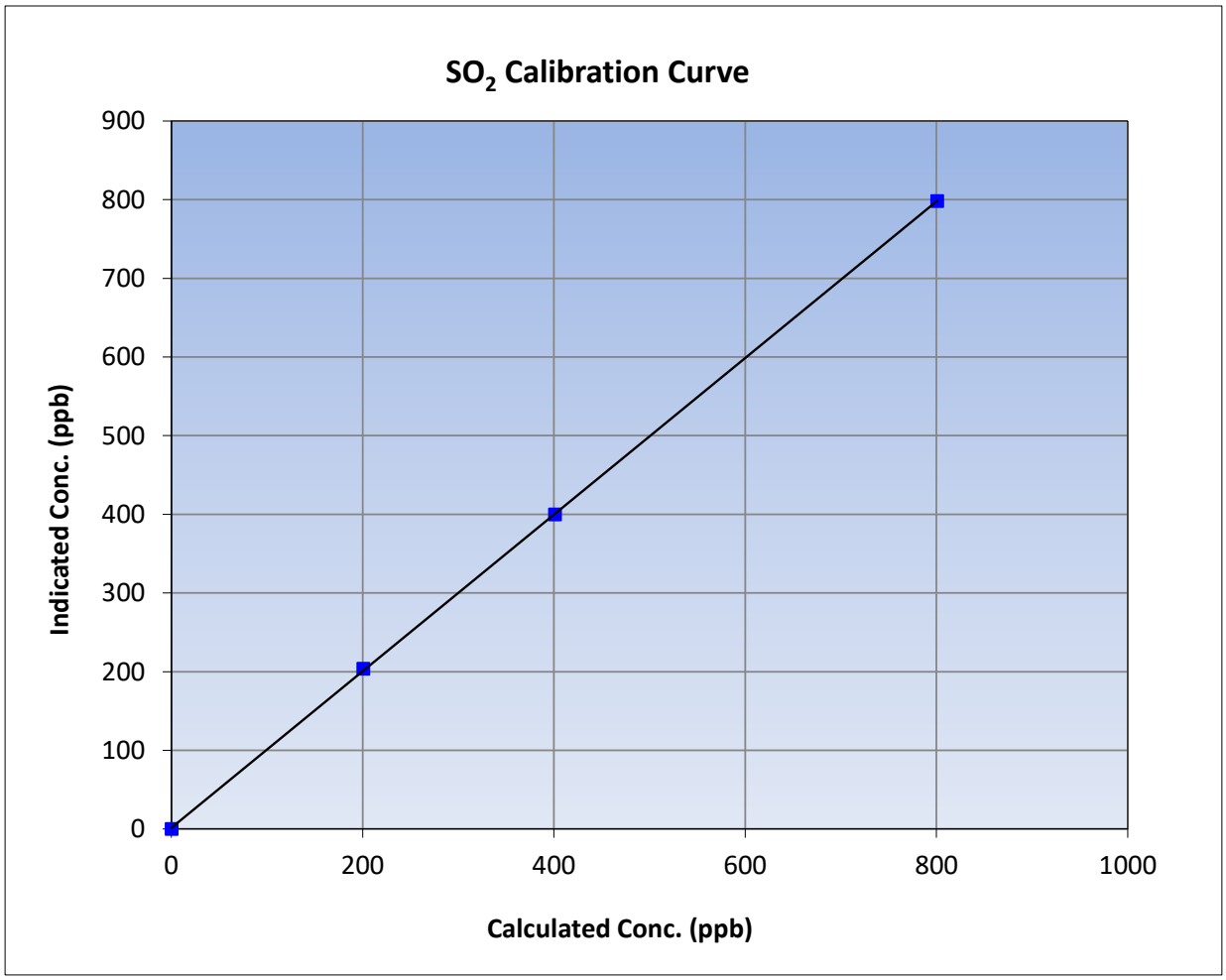
Station Information

Calibration Date:	January 31, 2024	Previous Calibration:	January 18, 2024
Station Name:	December 13, 2023	Station Number:	Fort Chipewyan
Start Time (MST):	7:20	End Time (MST):	22:30
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

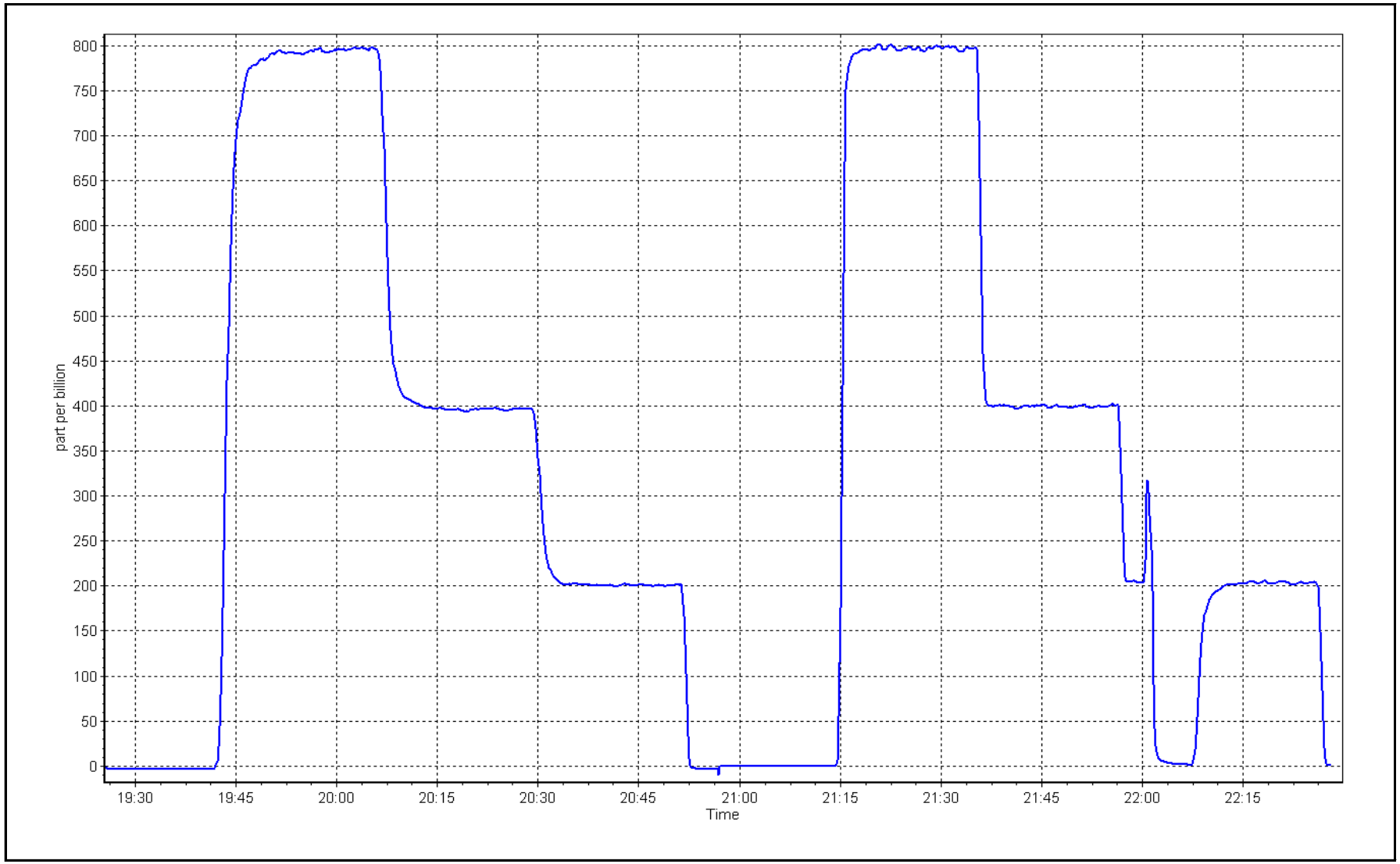
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.4	797.8	1.0032
400.7	399.6	1.0027
200.4	203.4	0.9850

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999972	*≥0.995*
Slope	0.995420	*0.90 - 1.10*
Intercept	1.396452	*+/-30*



SO2 Calibration Plot Date: January 31, 2024 Location: Fort Chipewyan



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	January 26, 2024	Last Cal Date:	December 15, 2023
Start time (MST):	14:46	End time (MST):	18:28
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:	135

Analyzer Information

Analyzer make:	Thermo 43iQ-TL		Analyzer serial #:	1203169744	
Converter make:	CDN-101		Converter serial #:	14639	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.988139	0.988284	Backgd or Offset:	0.99	0.99
Calibration intercept:	0.678668	0.598606	Coeff or Slope:	0.741	0.741

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.5	----
as found span	4920	80.5	80.0	79.4	1.014
as found 2nd point	4960	40.2	40.0	40.1	1.009
as found 3rd point	4980	20.1	20.0	20.5	0.999
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.5	----
high point	4920	80.5	80.0	79.6	1.005
second point	4960	40.2	40.0	40.2	0.994
third point	4980	20.1	20.0	20.4	0.979
as left zero	5000	0.0	0.0	0.6	----
as left span	4920	80.5	80.0	79.8	1.003
SO2 Scrubber Check	4919.7	80.3	803.0	0.1	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	0.993
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	78.9	Prev response:	79.74	*% change:	-1.1%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.985141	AF Intercept:	0.658554
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999982		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Matthew Courtoreille

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

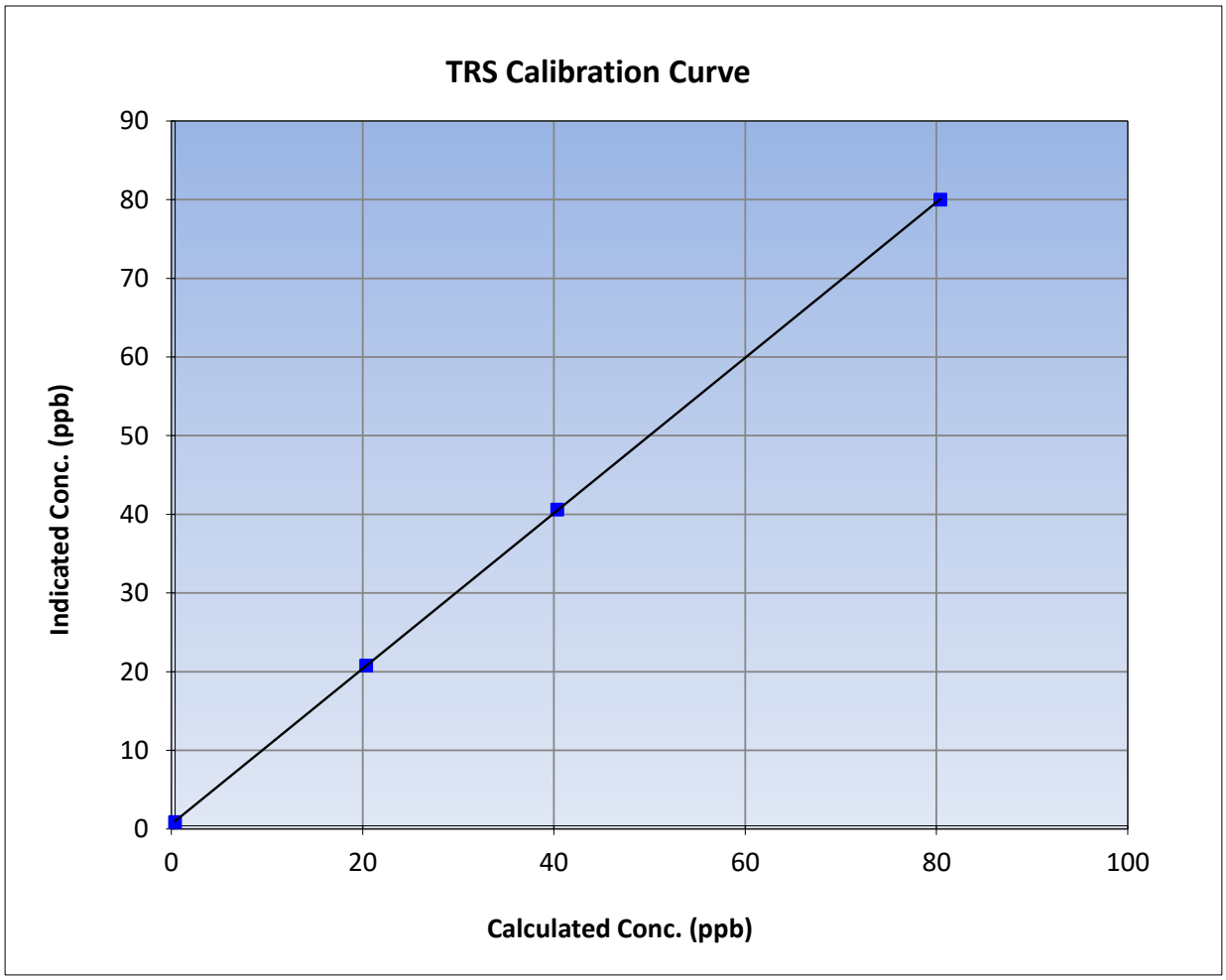
Station Information

Calibration Date:	January 26, 2024	Previous Calibration:	December 15, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	14:46	End Time (MST):	18:28
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

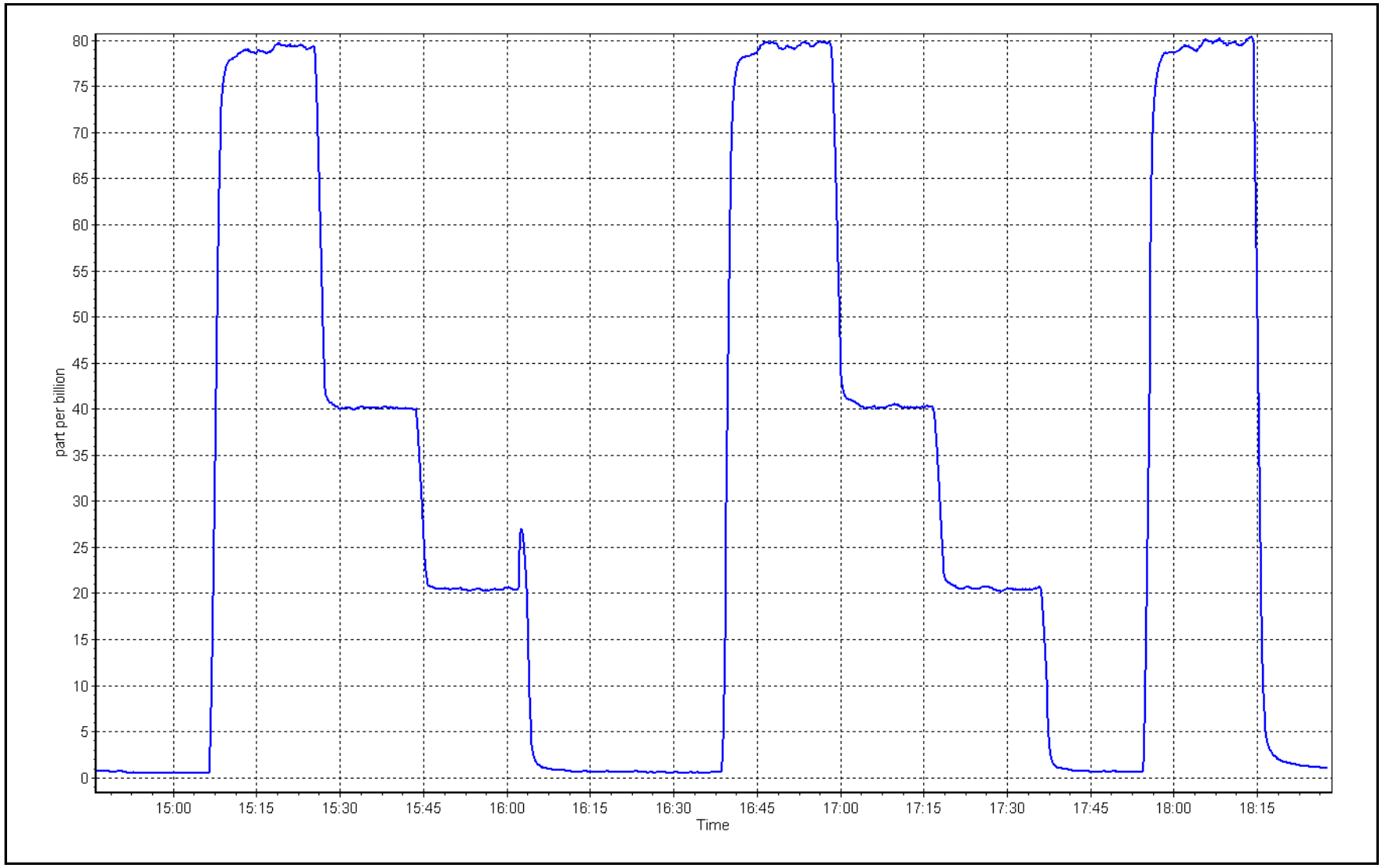
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
80.0	79.6	1.0051
40.0	40.2	0.9940
20.0	20.4	0.9794

Statistical Evaluation		Limits
Correlation Coefficient	0.999991	≥0.995
Slope	0.988284	0.90 - 1.10
Intercept	0.598606	+/-3



TRS Calibration Plot Date: January 26, 2024 Location: Fort Chipewyan



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	January 10, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	9:04	End time (MST):	13:32
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC363447		Cal Gas Expiry Date:	February 2, 2024	
NOX Cal Gas Conc:	48.80	ppm	NO Cal Gas Conc:	48.80	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	48.80	ppm	Removed Gas NO Conc:	48.80	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3252	
ZAG make/model:	Teledyne API T701H		Serial Number:	135	

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.138	1.138	NO bkgnd or offset:	10.4	10.3
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	11.3	11.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	141.2	141.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.993574	1.009182
NO_X Cal Offset:	-0.140000	1.020000
NO Cal Slope:	0.992303	1.007925
NO Cal Offset:	-0.220000	1.260000
NO_2 Cal Slope:	0.994878	1.010781
NO_2 Cal Offset:	0.734900	-3.206174

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-1.4	-0.4	-1.0	----	----
as found span	4918	82.0	800.3	800.3	0.0	808.3	806.6	1.8	0.9901	0.9922
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.3	-0.2	-1.0	----	----
high point	4918	82.0	800.3	800.3	0.0	808.4	808.1	-0.1	0.9900	0.9904
second point	4959	41.0	400.2	400.2	0.0	403.4	402.6	0.8	0.9920	0.9939
third point	4980	20.5	200.1	200.1	0.0	207.0	206.2	0.9	0.9666	0.9703
as left zero	5000	0.0	0.0	0.0	0.0	-1.3	-0.3	-1.0	----	----
as left span	4918	82.0	800.3	394.3	406.0	802.6	404.5	397.8	0.9972	0.9748
								Average Correction Factor	0.9828	0.9849

Corrected As found	NO_X = 809.7 ppb	NO = 807.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 1.8%		
Previous Response	NO_X = 795.0 ppb	NO = 793.9 ppb		*Percent Change	NO = 1.6%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	821.9	415.9	406.0	409.9	0.9905	101.0%
2nd GPT point (200 ppb O3)	821.9	612.9	209.0	202.4	1.0326	96.8%
3rd GPT point (100 ppb O3)	821.9	720.4	101.5	100.1	1.0140	98.6%
				Average Correction Factor	1.0124	98.8%

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

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

NO_X Calibration Summary

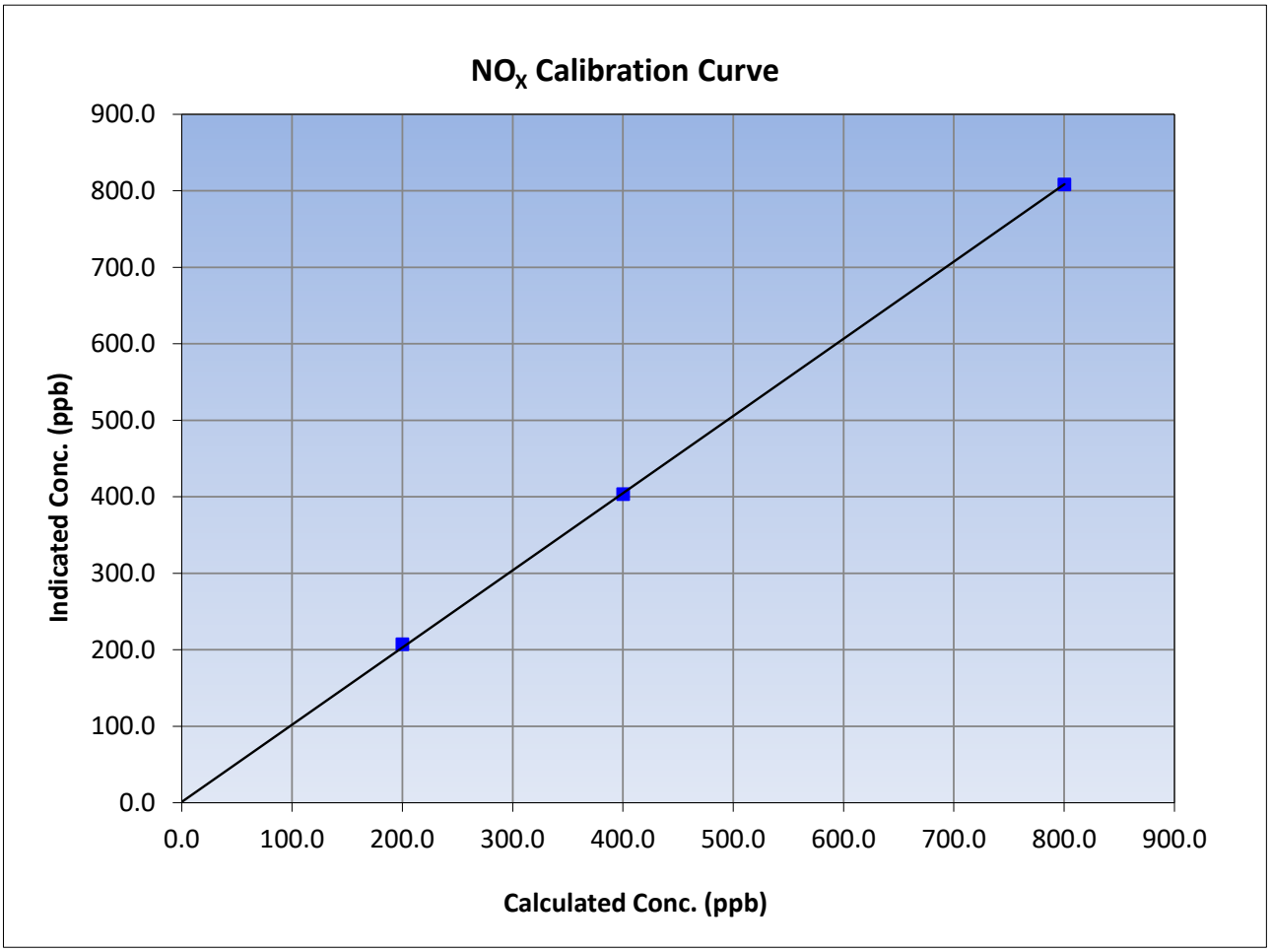
Version-04-2020

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:04	End Time (MST):	13:32
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	-1.3	----	Correlation Coefficient	0.999932	≥0.995
800.3	808.4	0.9900			
400.2	403.4	0.9920	Slope	1.009182	0.90 - 1.10
200.1	207.0	0.9666			
			Intercept	1.020000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

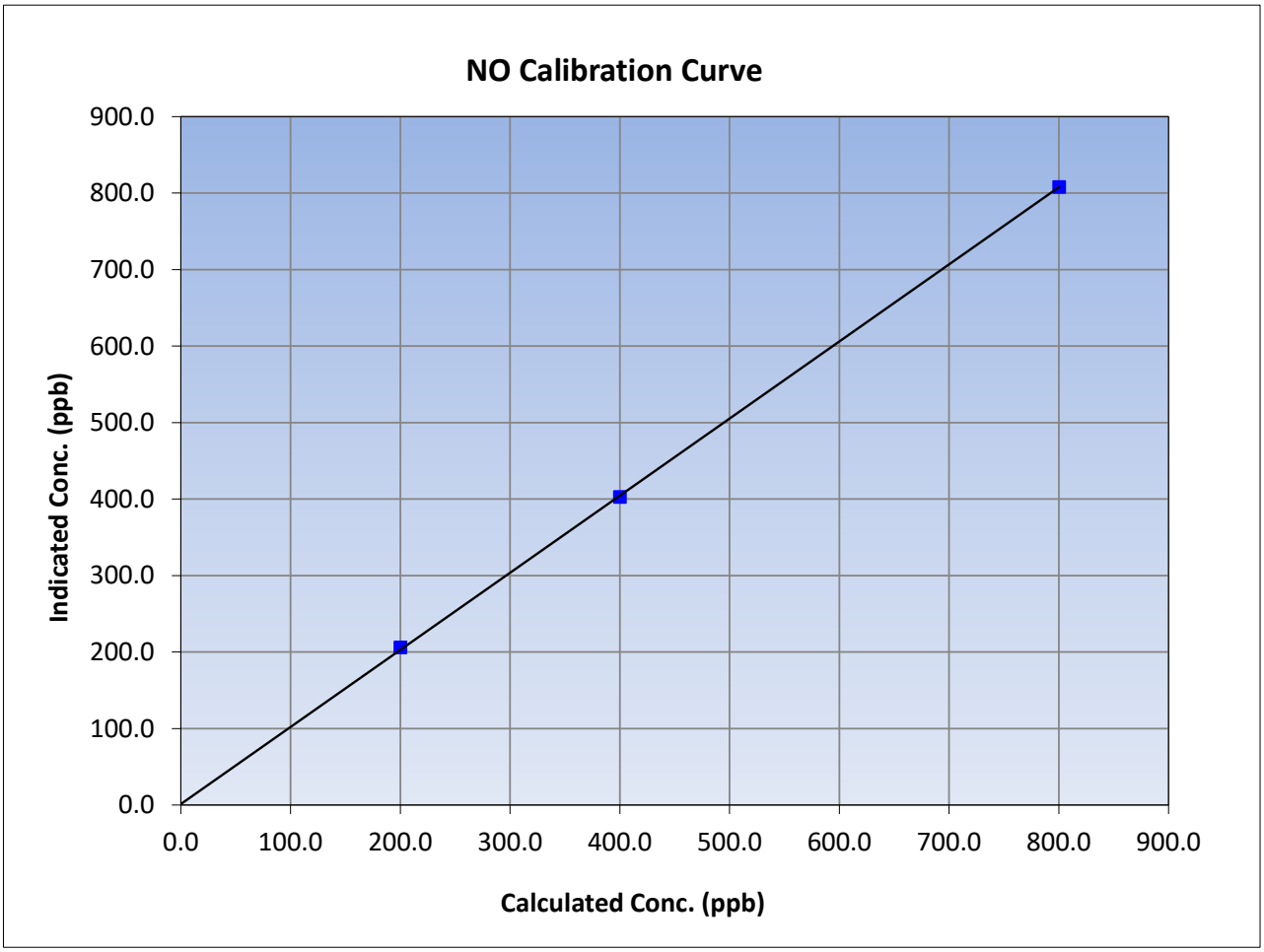
Version-04-2020

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:04	End Time (MST):	13:32
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	0.999953	≥0.995
800.3	808.1	0.9904			
400.2	402.6	0.9939	Slope	1.007925	0.90 - 1.10
200.1	206.2	0.9703			
			Intercept	1.260000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

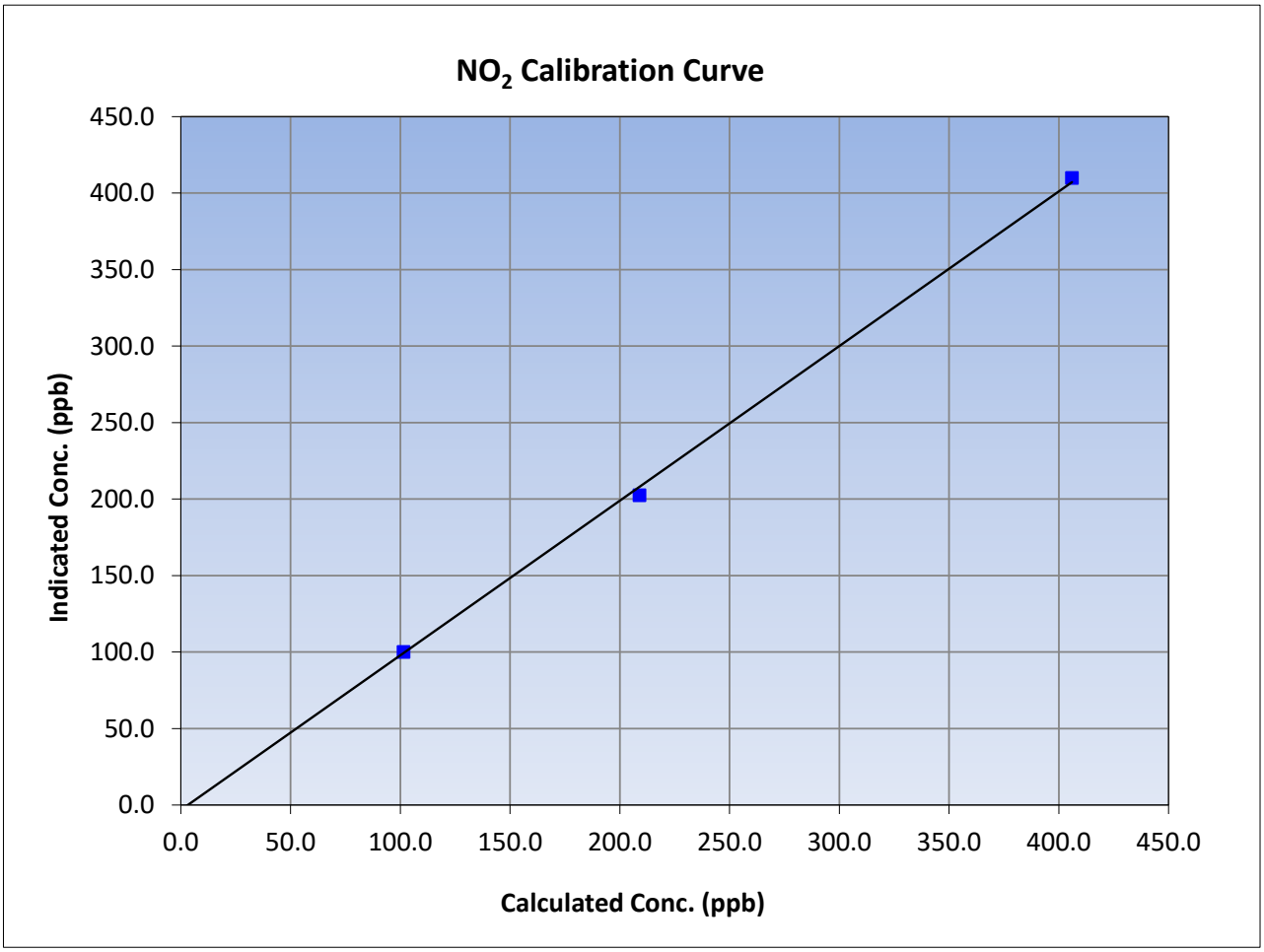
Version-04-2020

Station Information

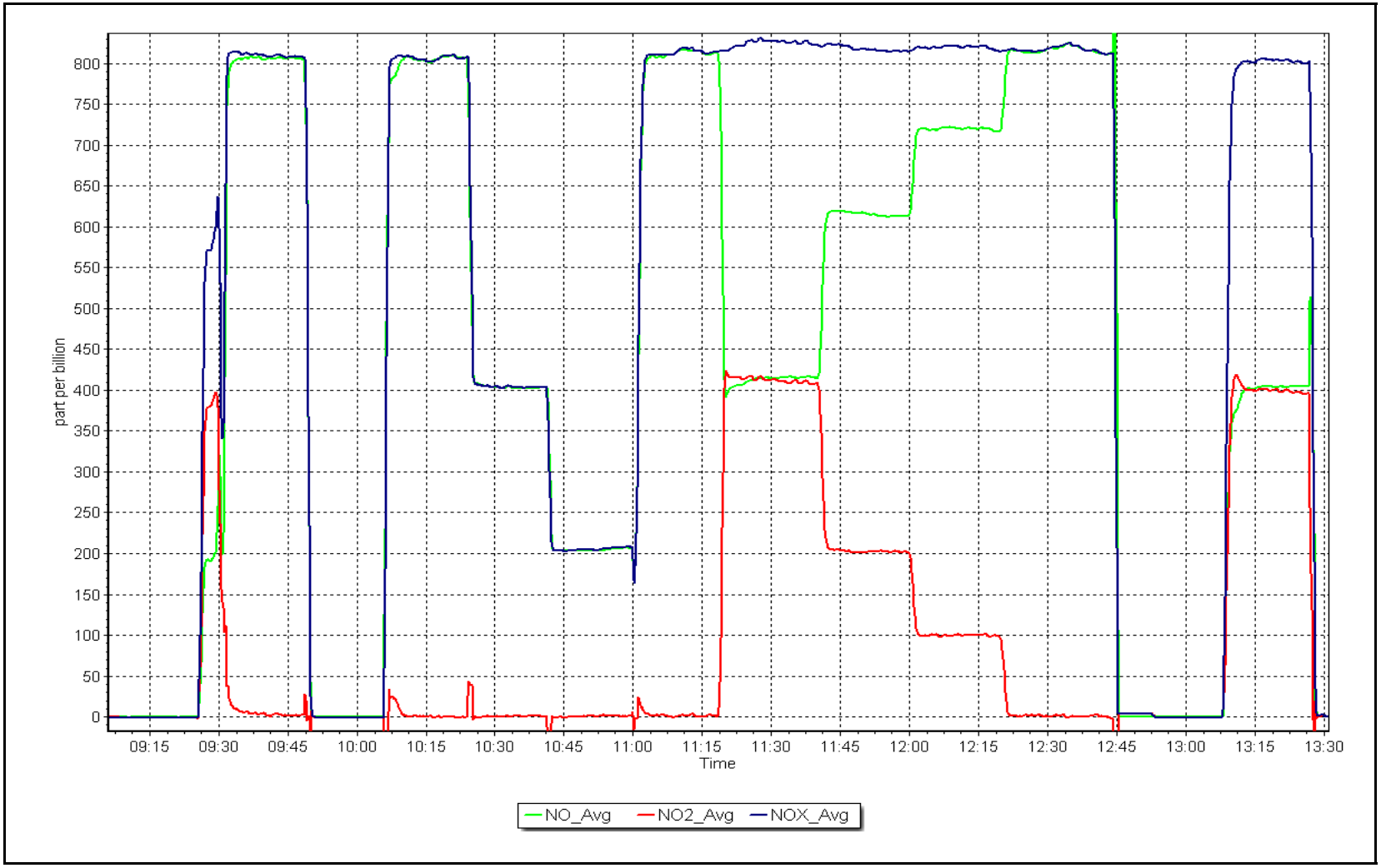
Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:04	End Time (MST):	13:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-1.0	----	Correlation Coefficient	0.999517	≥0.995
406.0	409.9	0.9905			
209.0	202.4	1.0326	Slope	1.010781	0.90 - 1.10
101.5	100.1	1.0140			
			Intercept	-3.206174	+/-20



NO_X Calibration Plot Date: January 10, 2024 Location: Fort Chipewyan



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	January 8, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	10:21	End time (MST):	12:53
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:	135

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.969000	0.976343	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	0.700000	0.340000	Coeff or Slope:	1.036	1.036

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	913.0	400.0	393.7	1.016
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	914.7	400.0	390.6	1.024
second point	5000	786.4	200.0	196.4	1.018
third point	5000	701.3	100.0	97.5	1.026
as left zero	5000	0.0	0.0	0.7	----
as left span	5000	963.3	400.0	393.3	1.017
				Average Correction Factor	1.023

Baseline Corr As found:	393.4	Previous response	388.3	*% 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: Changed out inlet filter after as found. No adjustments

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

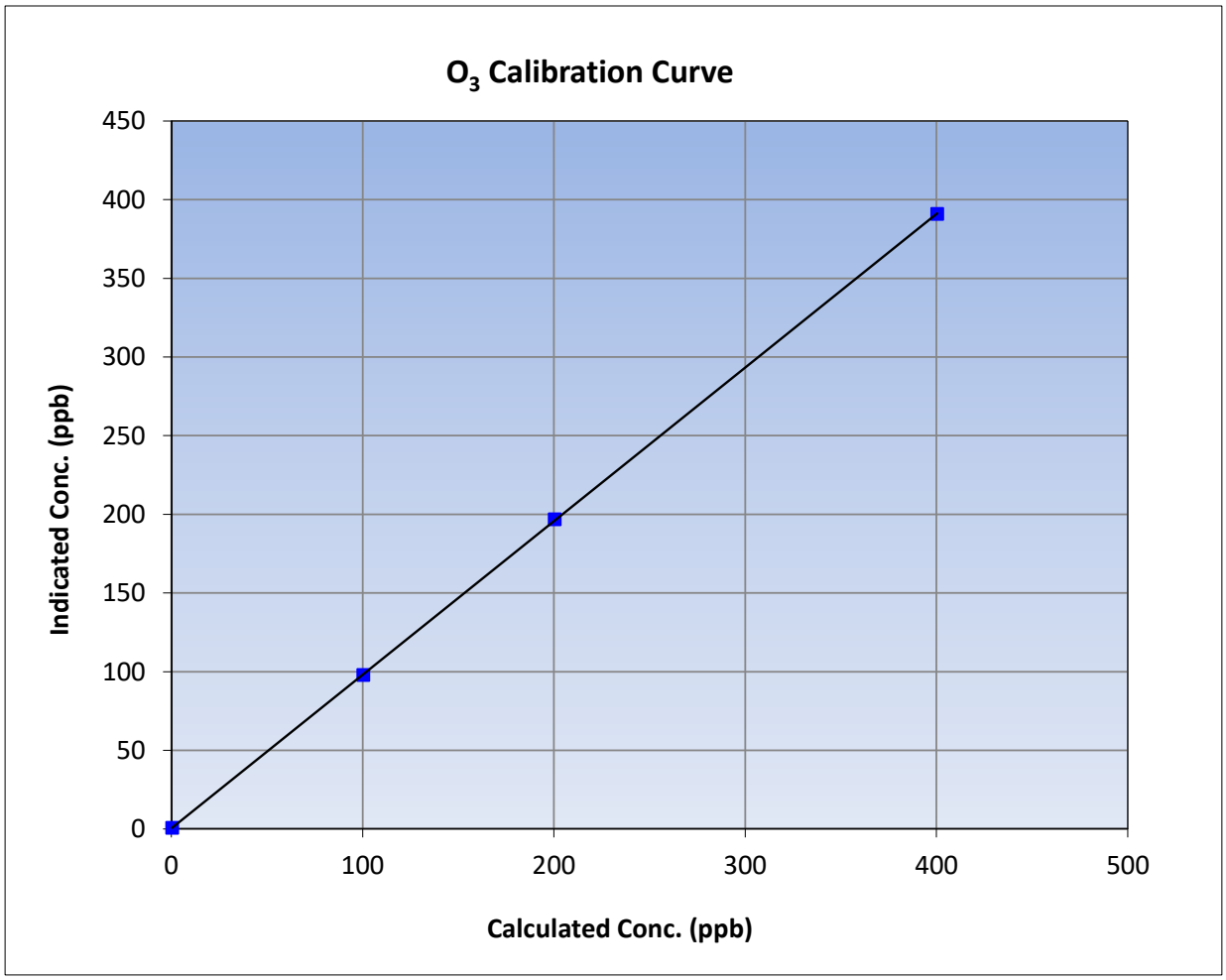
Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 7, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:21	End Time (MST):	12:53
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

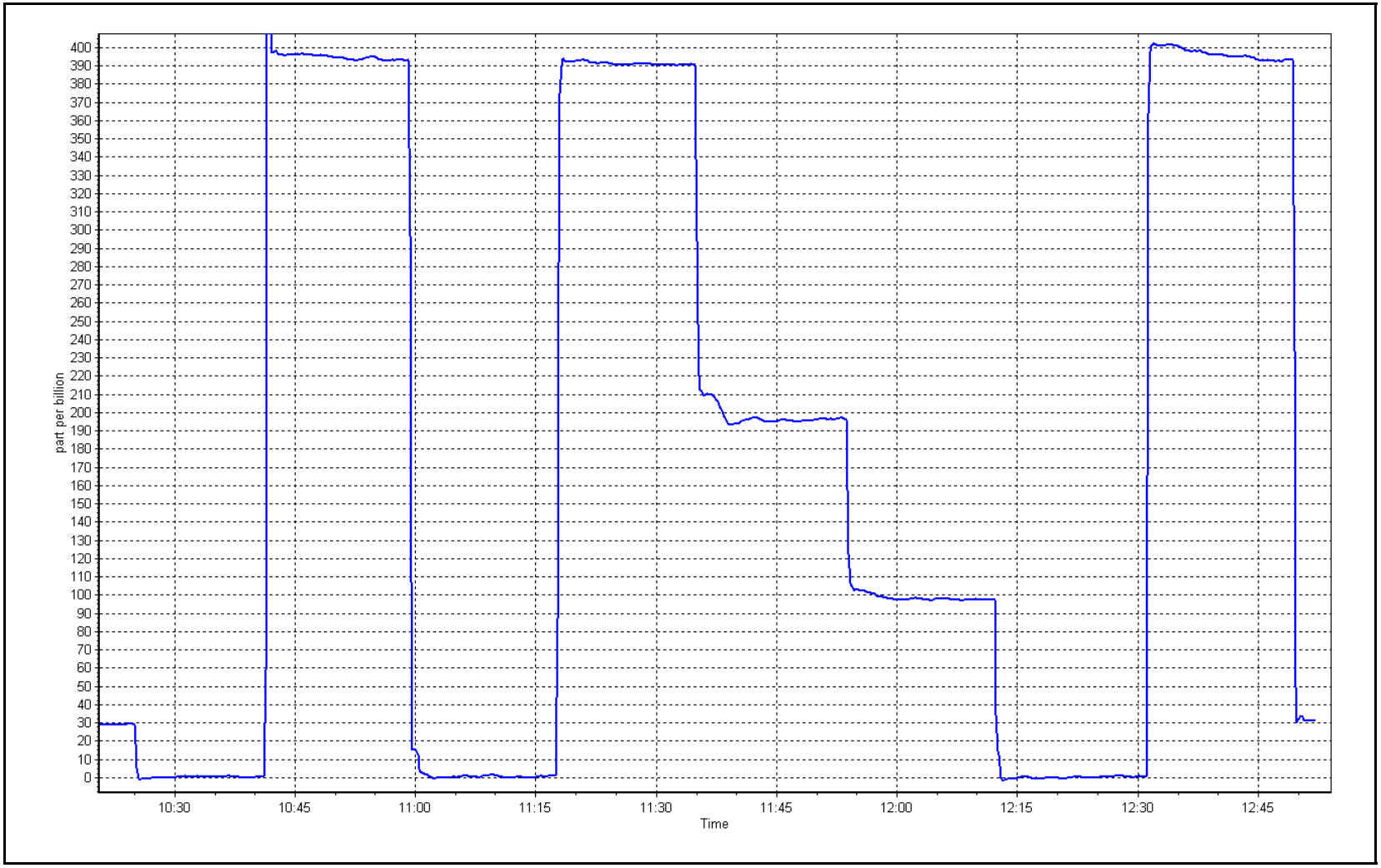
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	390.6	1.0241
200.0	196.4	1.0183
100.0	97.5	1.0256

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	0.976343	*0.90 - 1.10*
Intercept	0.340000	*+/- 5*



O_3 Calibration Plot Date: January 8, 2024 Location: Fort Chipewyan



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2024

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	January 31, 2024	Last Cal Date:	December 15, 2023
Start time (MST):	18:40	End time (MST):	19:10
Analyzer Make:	Teledyne API T640	S/N:	319
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388747
Temp/RH standard:	Alicat FP-25BT	S/N:	388747

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	1	-0.6	1	☐	+/- 2 °C
P (mmHg)	730.1	731.1	730.1	☐	+/- 10 mmHg
Flow (LPM)	5.01	5.08	5.01	☐	+/- 0.25 LPM
PW% (pump)	39	-----	39	☐	>80%
Zero Verification	PM w/o HEPA:	6.7	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

PM Inlet observation : Inlet Head Clean ☑ Alignment Factor On : ☑

Quarterly Calibration Test

SPAN DUST — Refractive Index: 11.3 — Expiry Date: 04-2019 — Lot No.: 100128-050-004

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

Date Optical Chamber Cleaned: December 15, 2023

Date Disposable Filter Changed: December 15, 2023

Post- maintenance Zero Verification: PM w/ HEPA: _____ <0.2 ug/m3

Annual Maintenance

Date Sample Tube Cleaned: July 25, 2023

Date RH/T Sensor Cleaned: July 25, 2023

Notes: Leak check passed. Flow, temperature, and pressure checked. No adjustments needed.

Calibration by: Devin Russell

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	January 18, 2024	Last Cal Date:	December 26, 2023
Start time (MST):	13:02	End time (MST):	15:24
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	3,030	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM014846			
Removed Cal Gas Conc:	3,030	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3252
ZAG Make/Model:	API T701H		Serial Number:	135

Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3505

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994764	0.989053	Backgd or Offset:	-0.014	-0.014
Calibration intercept:	0.168931	0.314884	Coeff or Slope:	0.998	0.998

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.19	----
as found span	4933	66.7	40.4	40.3	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4934	66.7	40.4	40.2	1.005
second point	4967	33.3	20.2	20.4	0.992
third point	4983	16.7	10.1	10.4	0.969
as left zero	5000	0.0	0.0	0.1	----
as left span	2960	40.0	40.4	40.4	1.000
				Average Correction Factor	0.989

Baseline Corr As found:	40.07	Prev response:	40.38	*% 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: Changed inlet filter after as founds. no adjustments made.

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

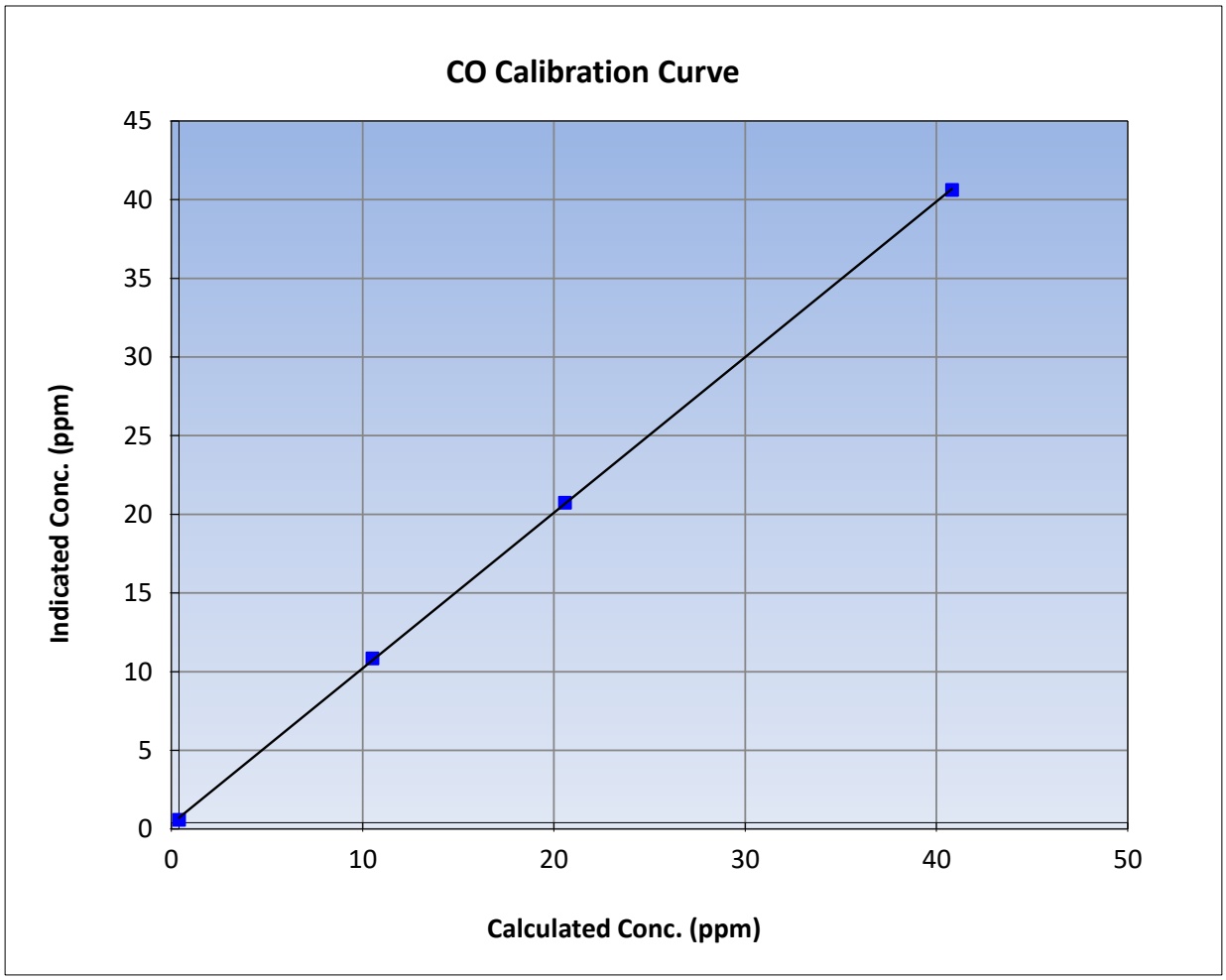
Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 26, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	13:02	End Time (MST):	15:24
Analyzer make:	API T300	Analyzer serial #:	3505

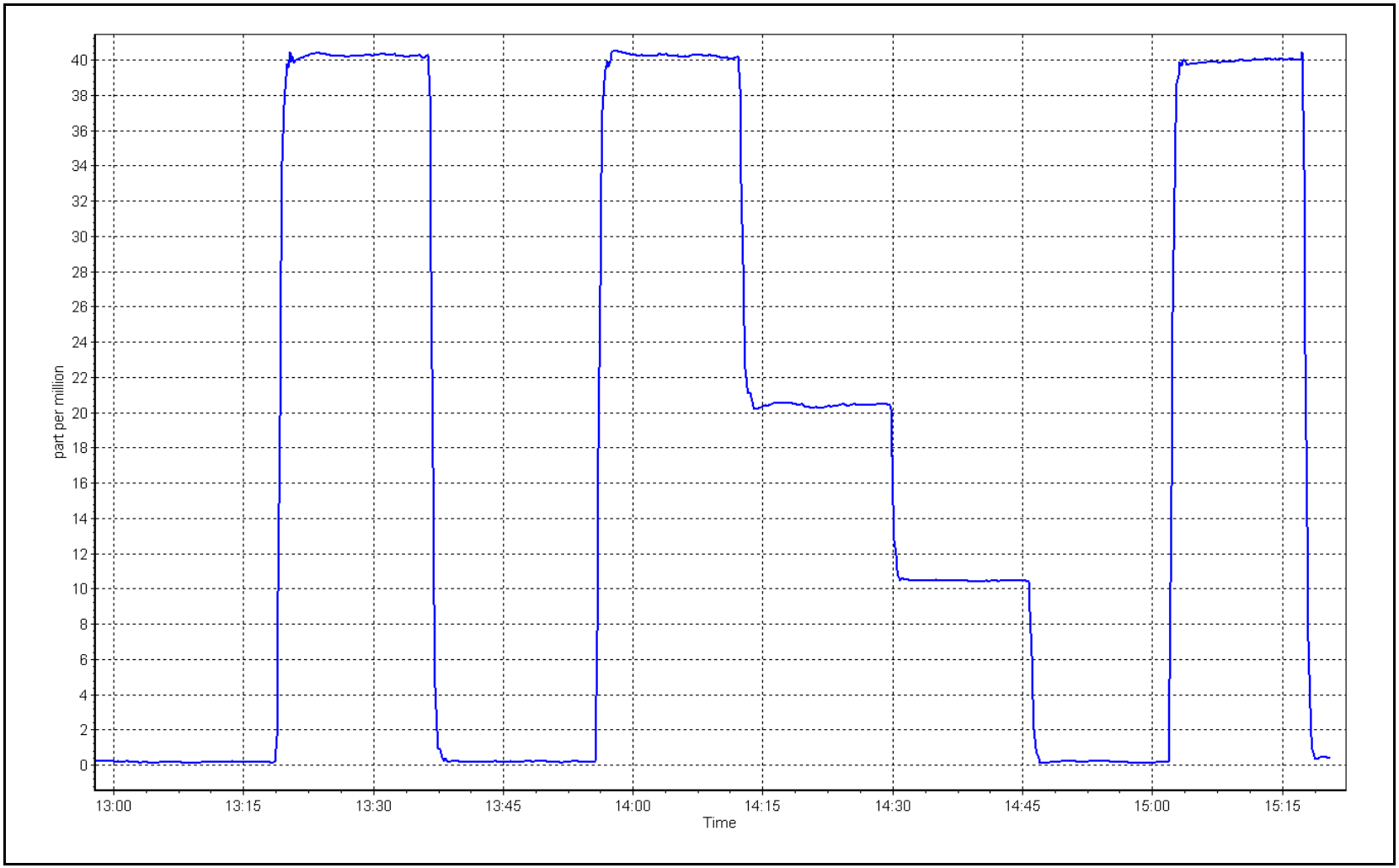
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
40.4	40.2	1.0048
20.2	20.4	0.9916
10.1	10.4	0.9694

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999955	*≥0.995*
Slope	0.989053	*0.90 - 1.10*
Intercept	0.314884	*+/-1.5*



CO Calibration Plot Date: January 18, 2024 Location: Fort Chipewyan



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	January 18, 2024	Last Cal Date:	December 26, 2023
Start time (MST):	8:55	End time (MST):	12:57
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM014846			
Removed Cal Gas Conc:	60,220	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3252
N2 Gen Make/Model:	NG 5000		Serial Number:	135

Analyzer Information

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

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001165	0.994632	Backgd or Offset:	-0.063	-0.063
Calibration intercept:	-2.460000	-6.520000	Coeff or Slope:	1.087	1.085

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	-0.8	----
as found span	2920	80.0	1605.9	1623.7	0.989
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	1599.9	1.004
second point	2960	40.0	802.9	771.0	1.041
third point	2980	20.0	401.5	398.3	1.008
as left zero	3000	0.0	0.0	1.9	----
as left span	2960	40.0	802.9	770.5	1.042
				Average Correction Factor	1.018

Baseline Corr As found:	1624.50	Prev response:	1605.28	*% change:	1.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as found. Made adjustments to span.

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

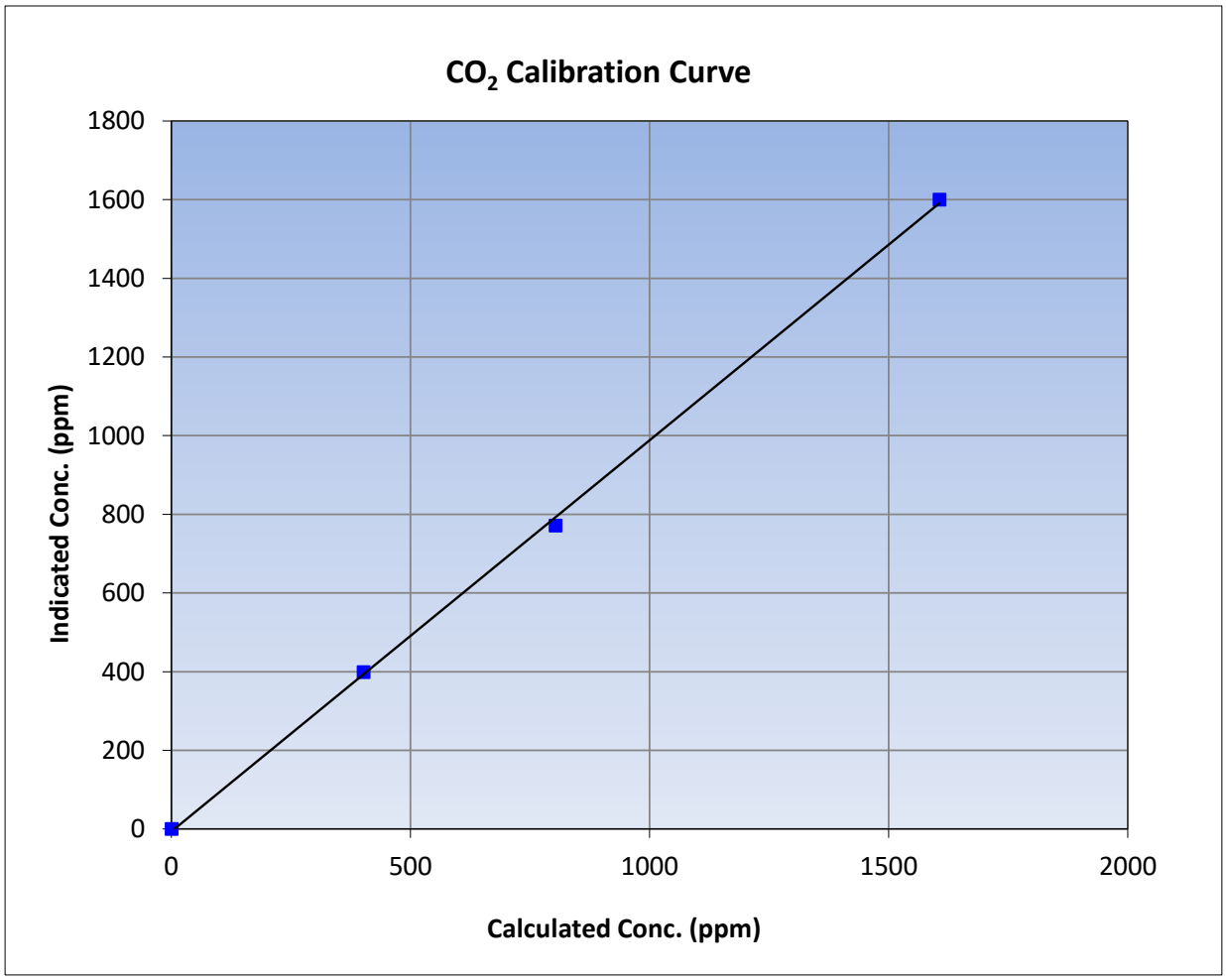
Station Information

Calibration Date	January 18, 2024	Previous Calibration	December 26, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	8:55	End Time (MST)	12:57
Analyzer make	Teledyne API T360	Analyzer serial #	289

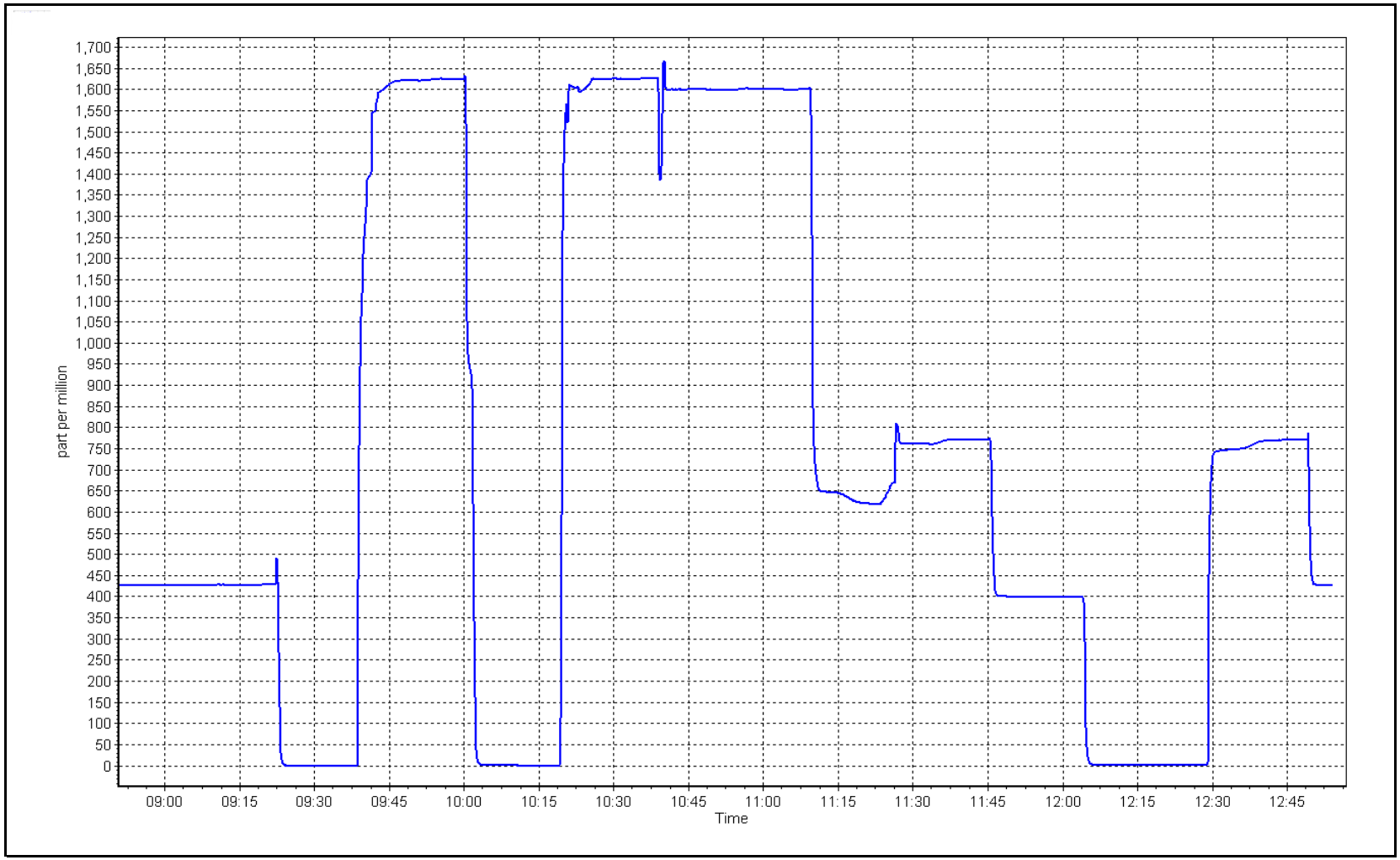
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.9	1599.9	1.0037
802.9	771.0	1.0414
401.5	398.3	1.0080

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999569	*≥0.995*
Slope	0.994632	*0.90 - 1.10*
Intercept	-6.520000	*+/-20*



CO_2 Calibration Plot Date: January 18, 2024 Location: Fort Chipewyan



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	January 4, 2024	Last Cal Date:	December 8, 2023
Start time (MST):	10:13	End time (MST):	13:36
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995778	0.997105	Backgd or Offset:	10.2	10.2
Calibration intercept:	0.410488	0.270160	Coeff or Slope:	0.962	0.955

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4919	80.2	801.5	808.3	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	80.2	801.5	799.1	1.003
second point	4959	40.1	400.8	400.8	1.000
third point	4980	20.0	199.8	199.0	1.004
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	80.2	801.5	803.1	0.998
				Average Correction Factor	1.002

Baseline Corr As found:	808.20	Previous response	798.51	*% change	1.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

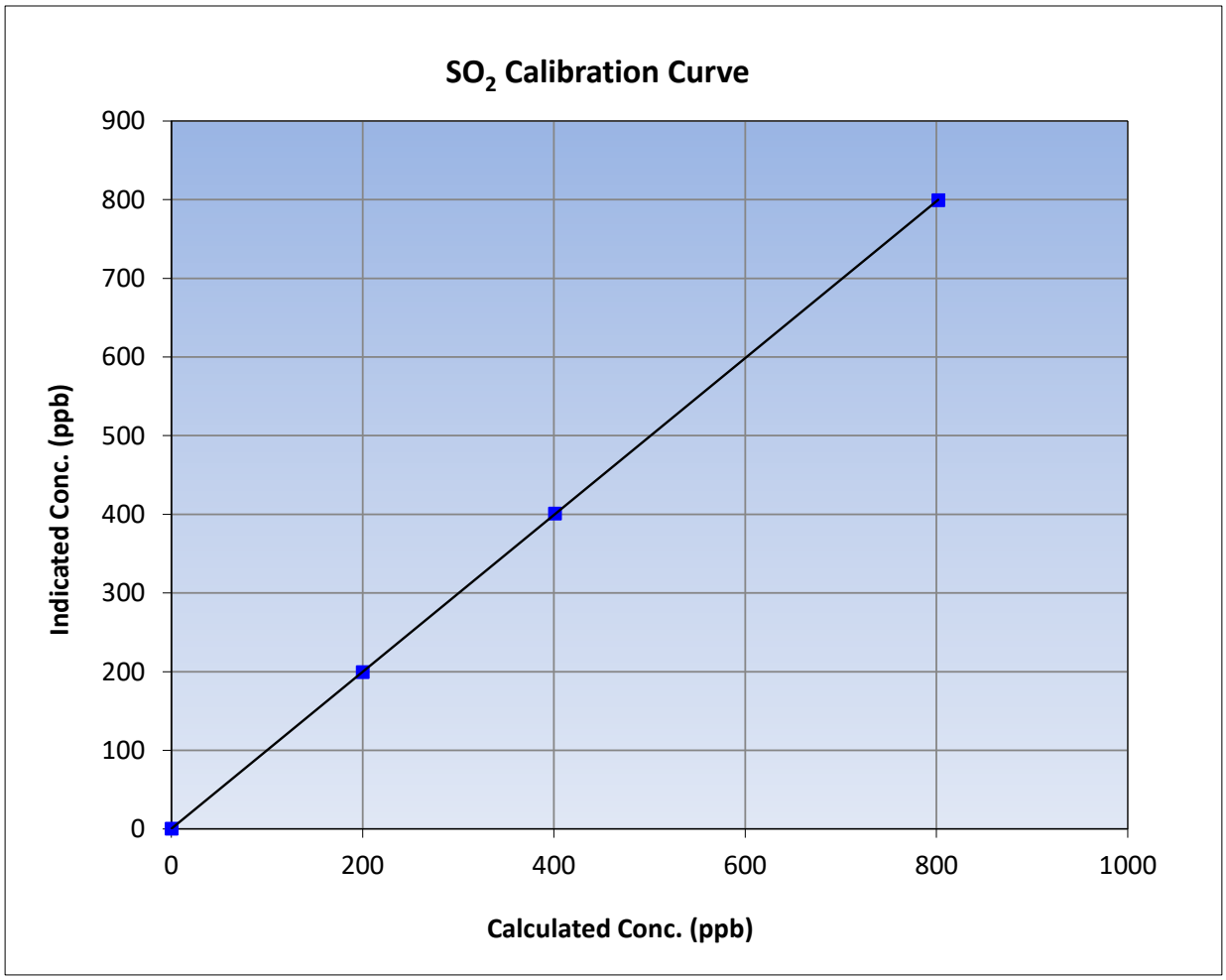
Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:13	End Time (MST):	13:36
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

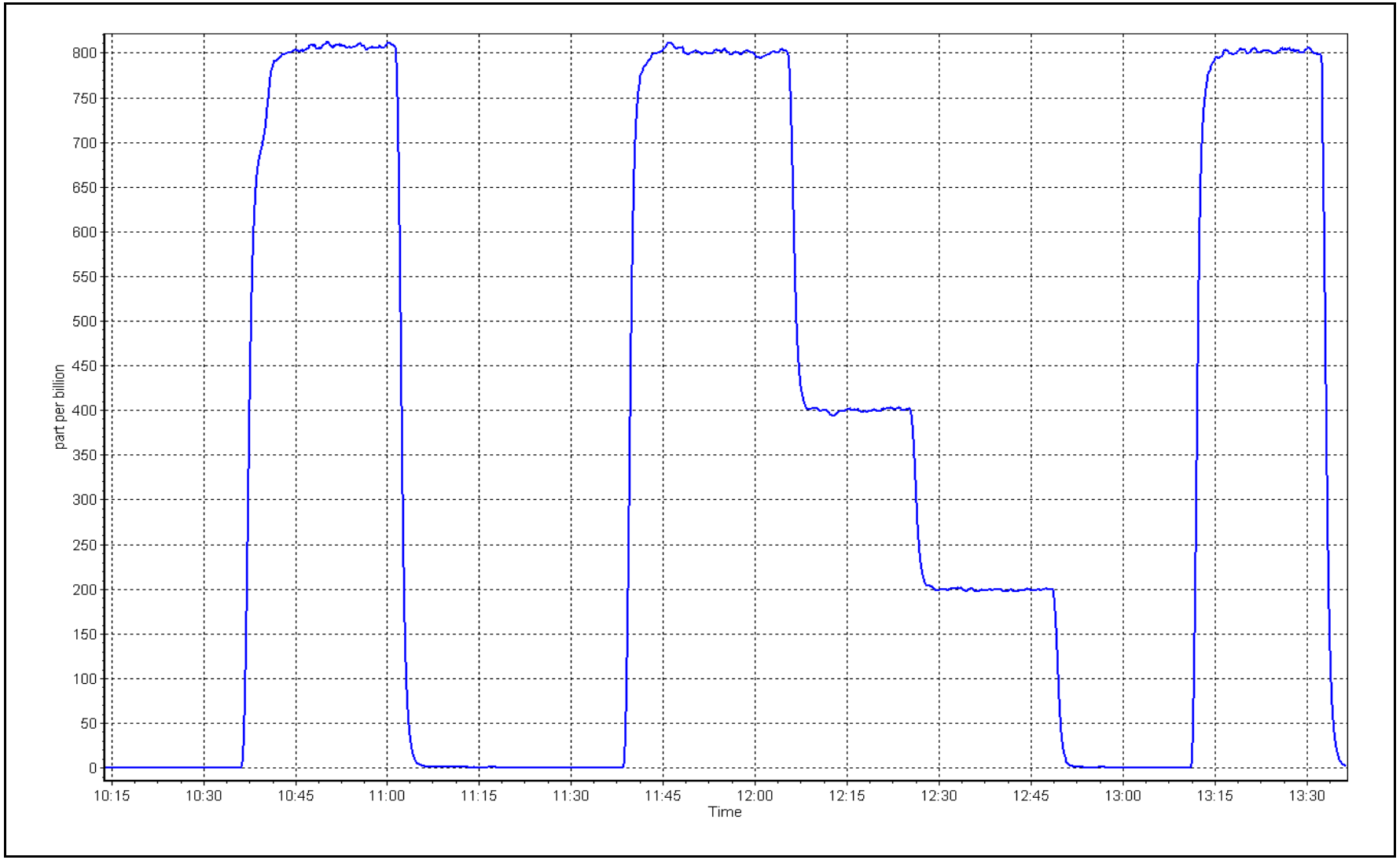
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
801.5	799.1	1.0030
400.8	400.8	0.9999
199.8	199.0	1.0042

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	0.997105	*0.90 - 1.10*
Intercept	0.270160	*+/-30*



SO2 Calibration Plot Date: January 4, 2024 Location: Barge Landing



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	January 9, 2024	Last Cal Date:	December 4, 2023
Start time (MST):	9:57	End time (MST):	14:11
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.171	ppm	Cal Gas Exp Date:	August 22, 2026
Cal Gas Cylinder #:	CC511415			
Removed Cal Gas Conc:	5.171	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3812
ZAG Make/Model:	API T701		Serial Number:	4888

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1331259320	
Converter make:	CDN-101		Converter serial #:	519	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006260	1.008544	Backgd or Offset:	2.88	2.88
Calibration intercept:	0.099474	0.119536	Coeff or Slope:	1.176	1.176

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4923	77.4	80.0	80.1	0.998
as found 2nd point	4961	38.7	40.0	40.3	0.991
as found 3rd point	4981	19.3	20.0	20.0	0.993
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4923	77.4	80.0	80.8	0.991
second point	4961	38.7	40.0	40.6	0.986
third point	4981	19.3	20.0	20.2	0.988
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.4	80.0	81.3	0.985
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.2	Prev response:	80.64	*% change:	-0.6%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.001977	AF Intercept:	-0.000569
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999984		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

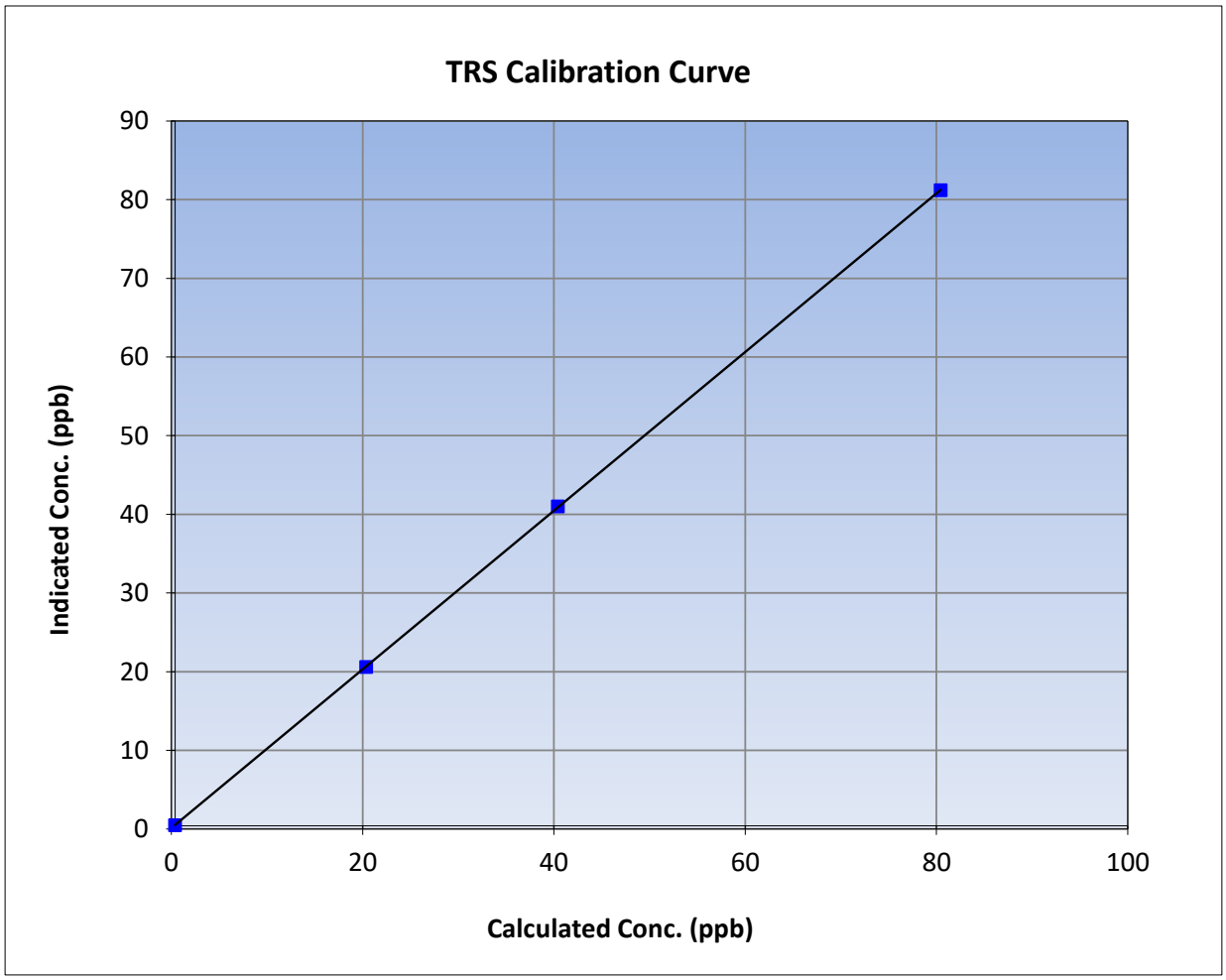
Station Information

Calibration Date:	January 9, 2024	Previous Calibration:	December 4, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:57	End Time (MST):	14:11
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

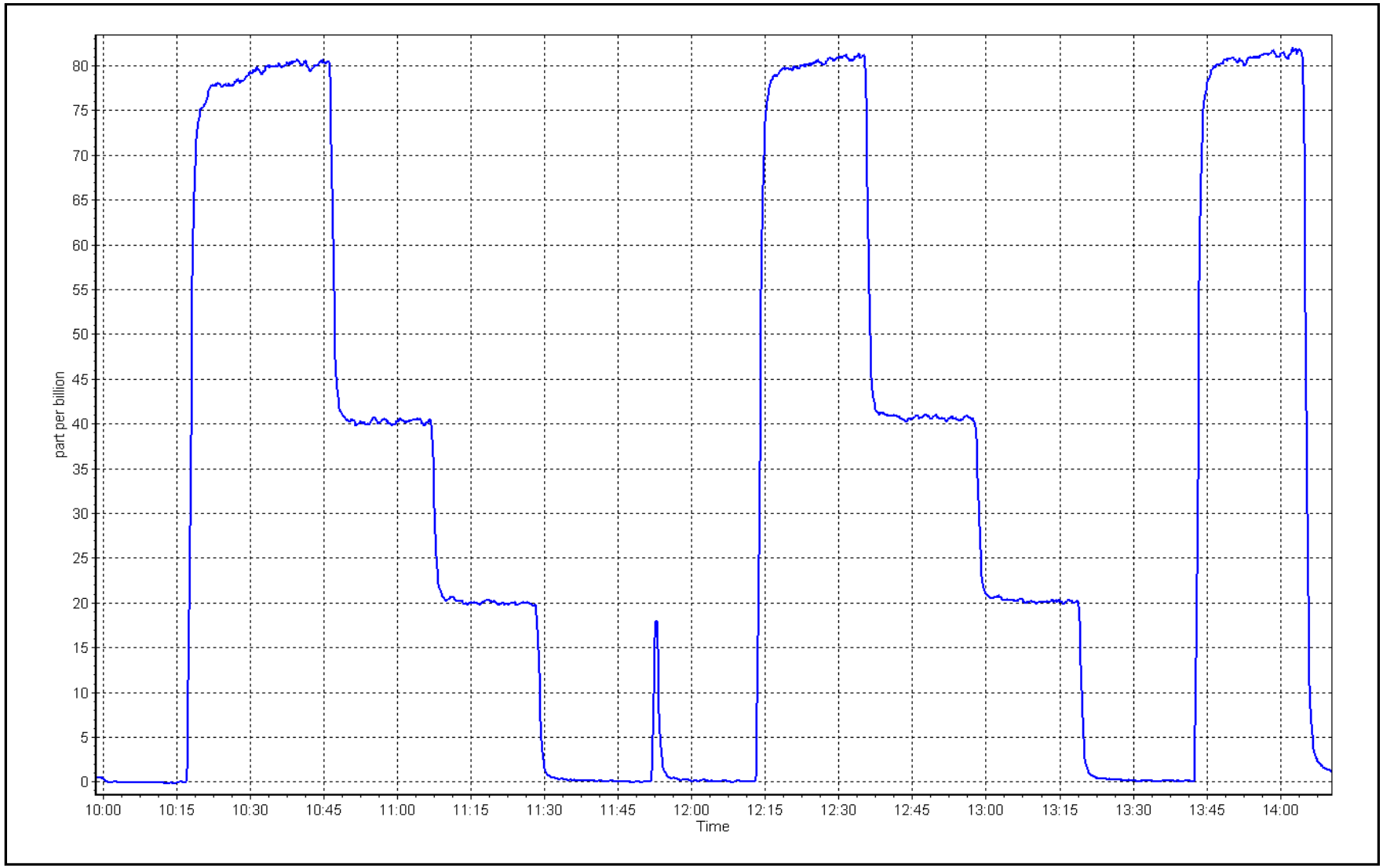
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.8	0.9906
40.0	40.6	0.9859
20.0	20.2	0.9881

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.008544	*0.90 - 1.10*
Intercept	0.119536	*+/-3*



TRS Calibration Plot Date: January 9, 2024 Location: Barge Landing



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	January 4, 2024	Last Cal Date:	December 8, 2023
Start time (MST):	10:13	End time (MST):	13:36
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.53E-04	2.58E-04	NMHC SP Ratio:	4.34E-05	4.37E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	210777	209298
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	17.12	16.97	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	80.2	17.12	17.14	0.999
second point	4960	40.1	8.56	8.57	0.999
third point	4980	20.0	4.27	4.29	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.17	0.997
				ge Correction Factor	0.998
Baseline Corr AF:	16.97	Prev response	17.11	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	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	9.13	1.000
second point	4960	40.1	4.57	4.56	1.001
third point	4980	20.0	2.28	2.28	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	9.14	9.15	0.998
				Average Correction Factor	1.000
Baseline Corr AF:	9.08	Prev response	9.18	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	7.98	7.89	1.012
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	4.01	0.996
third point	4980	20.0	1.99	2.01	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	8.03	0.995
				Average Correction Factor	0.995
Baseline Corr AF:	7.89	Prev response	7.93	*% 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

	Start	***Finish***
THC Cal Slope:	0.999422	1.000804
THC Cal Offset:	0.000050	0.005458
CH4 Cal Slope:	0.993236	1.001867
CH4 Cal Offset:	0.001649	0.006270
NMHC Cal Slope:	1.004440	0.999587
NMHC Cal Offset:	-0.000799	-0.000411

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

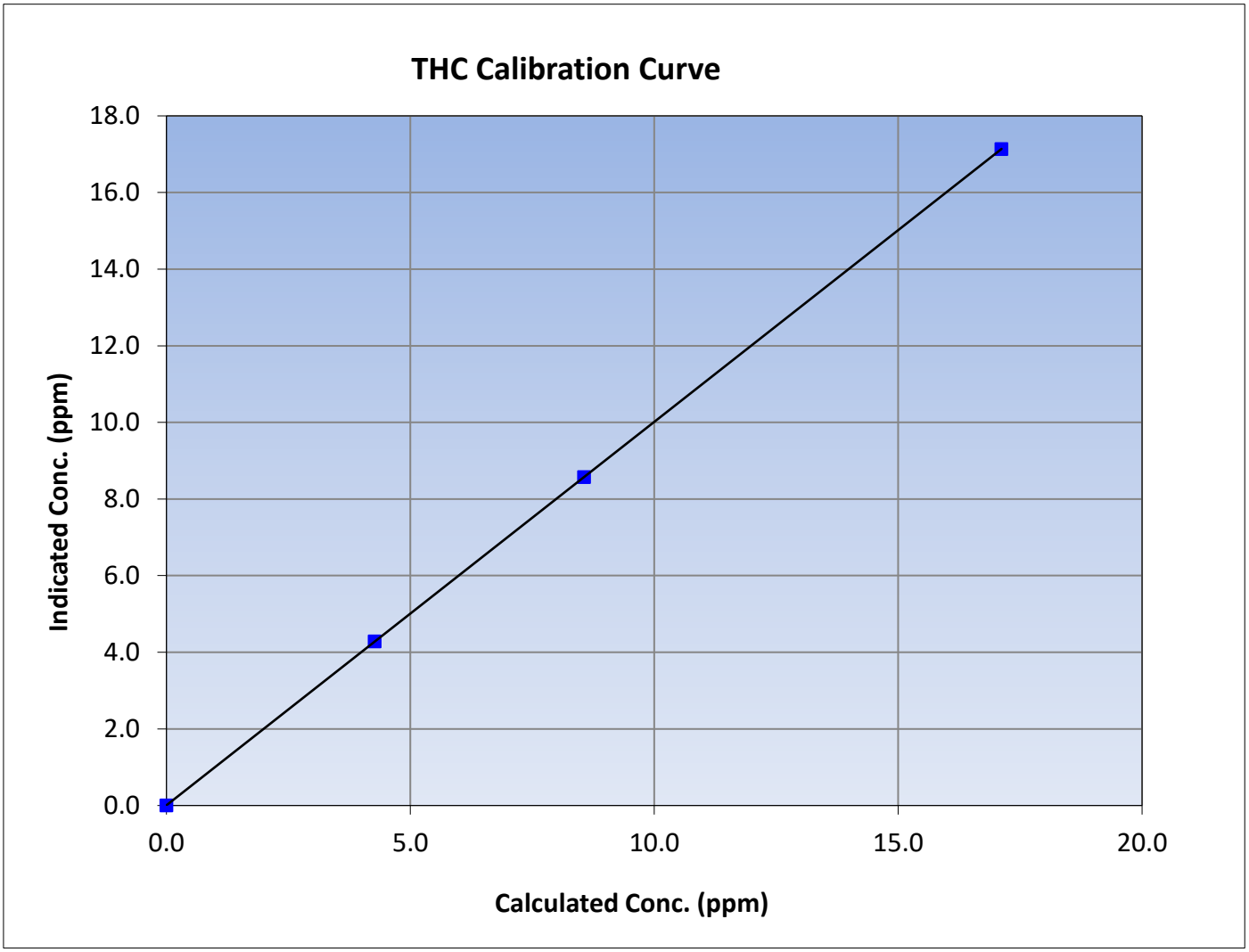
Version-06-2022

Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:13	End Time (MST):	13:36
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
17.12	17.14	0.9990			
8.56	8.57	0.9986	Slope	1.000804	*0.90 - 1.10*
4.27	4.29	0.9961			
			Intercept	0.005458	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

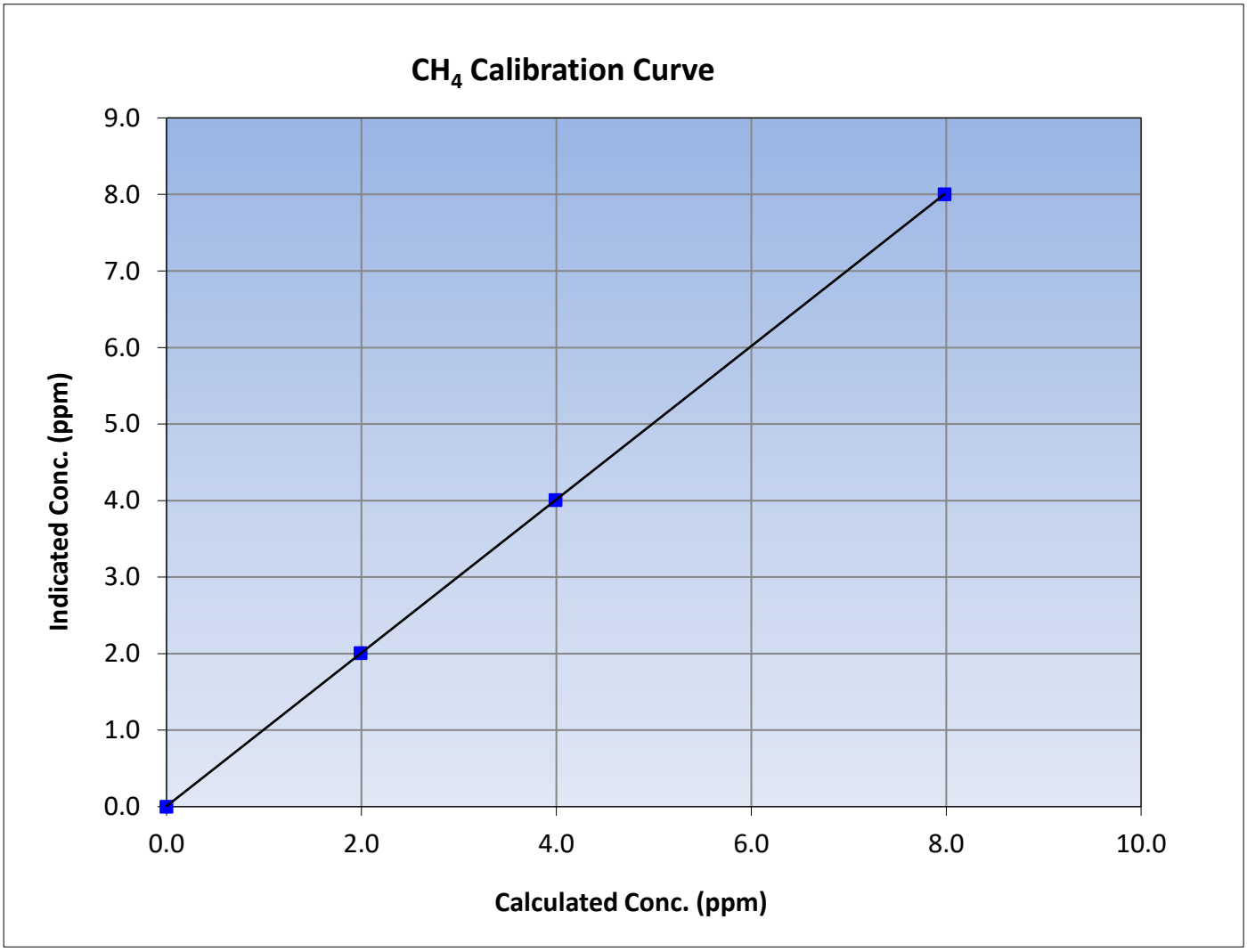
Version-06-2022

Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:13	End Time (MST):	13:36
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
7.98	8.00	0.9977			
3.99	4.01	0.9959	Slope	1.001867	0.90 - 1.10
1.99	2.01	0.9917			
			Intercept	0.006270	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

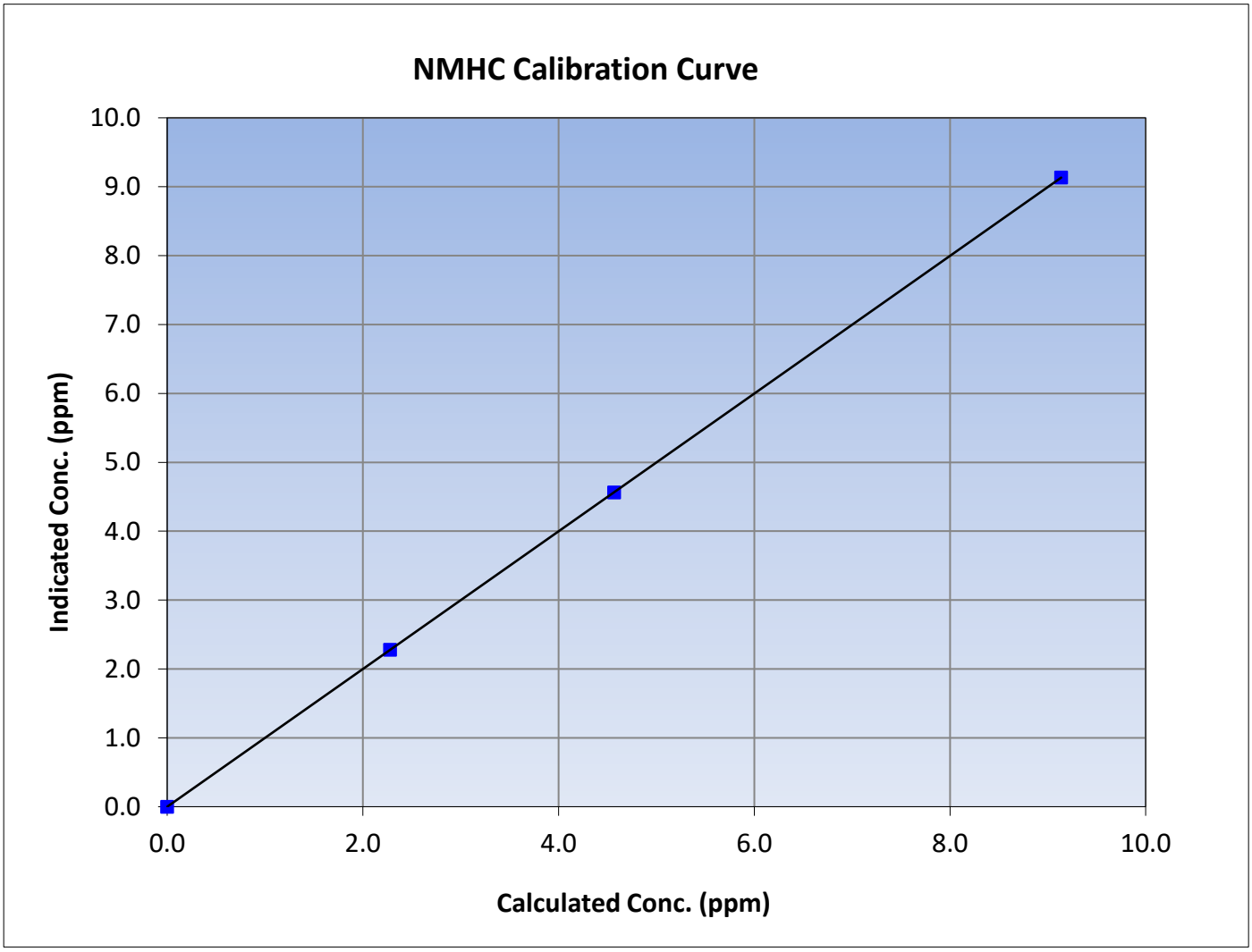
Version-06-2022

Station Information

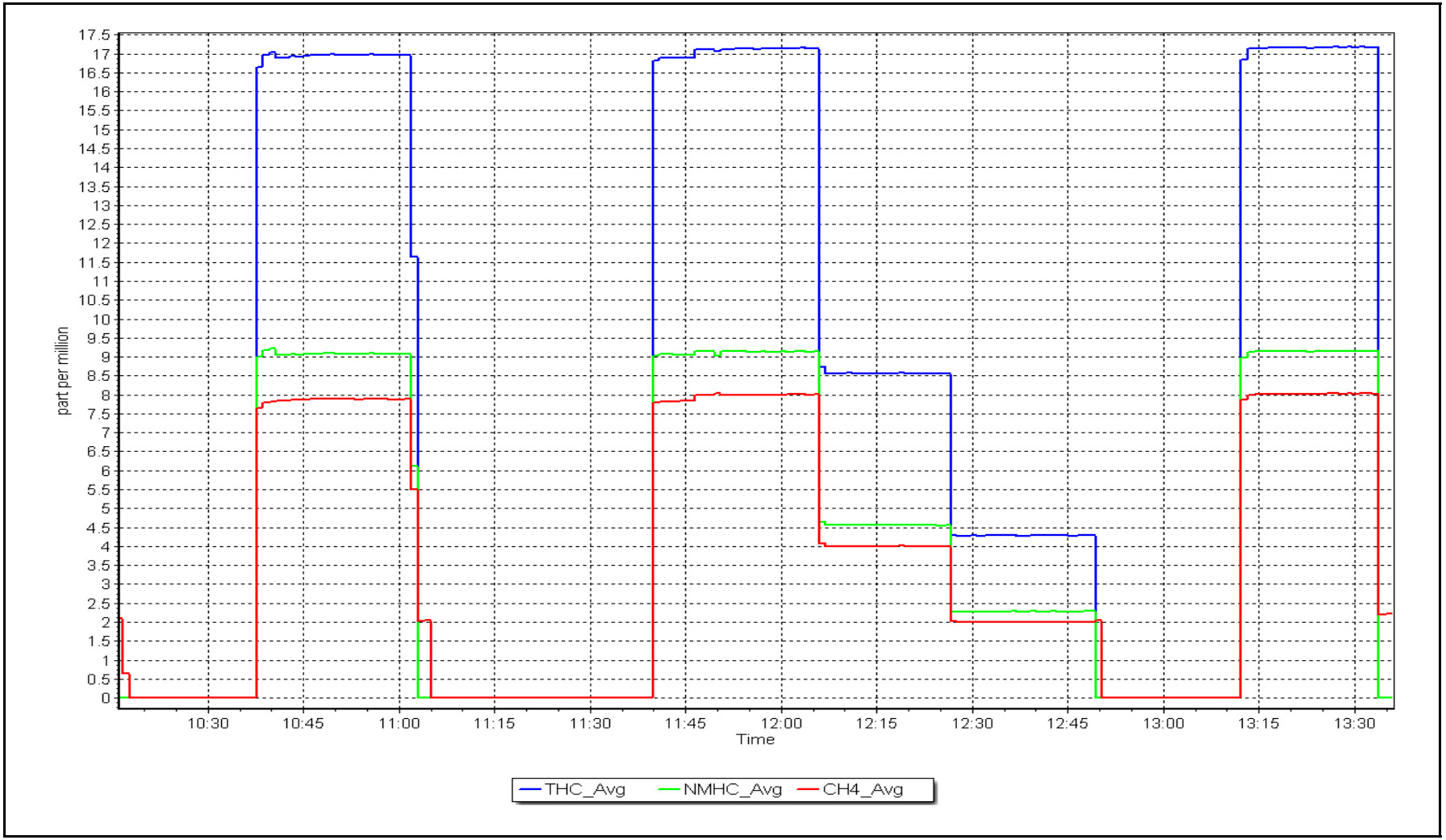
Calibration Date:	January 4, 2024	Previous Calibration:	December 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:13	End Time (MST):	13:36
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
9.14	9.13	1.0003			
4.57	4.56	1.0014	Slope	0.999587	*0.90 - 1.10*
2.28	2.28	0.9996			
			Intercept	-0.000411	*+/-0.5*



NMHC Calibration Plot Date: January 4, 2024 Location: Barge Landing



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	January 18, 2024	Last Cal Date:	December 5, 2023
Start time (MST):	10:31	End time (MST):	15:28
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1KDH		Cal Gas Expiry Date:	November 17, 2026	
NOX Cal Gas Conc:	47.38	ppm	NO Cal Gas Conc:	46.94	ppm
Removed Cylinder #:	DT0036634		Removed Gas Exp Date:	January 28, 2024	
Removed Gas NOX Conc:	50.00	ppm	Removed Gas NO Conc:	49.70	ppm
NOX gas Diff:	0.7%		NO gas Diff:	1.4%	
Calibrator Model:	API T700		Serial Number:	3812	
ZAG make/model:	API T701		Serial Number:	4888	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1426262593	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.151	1.092	NO bkgnd or offset:	10.5	10.0
NOX coeff or slope:	0.992	0.998	NOX bkgnd or offset:	10.8	10.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.4	180.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999604	0.999176
NO_X Cal Offset:	0.568998	0.418407
NO Cal Slope:	1.000613	0.999039
NO Cal Offset:	-0.472474	-0.303738
NO_2 Cal Slope:	1.001041	1.005229
NO_2 Cal Offset:	-0.216477	0.853830

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.1	-0.3	----	----
as found span	4919	80.5	805.1	800.3	4.8	841.6	833.9	7.7	0.957	0.960
as found 2nd										
as found 3rd										
new cyl resp	4915	85.3	808.3	800.7	7.5	851.4	847.2	4.2	0.949	0.945
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	0.1	-0.2	----	----
high point	4915	85.3	808.3	800.7	7.5	807.6	799.8	7.7	1.001	1.001
second point	4957	42.6	403.7	400.0	3.7	404.4	399.3	5.1	0.998	1.002
third point	4979	21.3	201.8	200.0	1.9	202.5	198.9	3.6	0.997	1.005
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2	----	----
as left span	4915	85.3	808.3	455.5	352.7	804.8	451.5	353.3	1.004	1.009
								Average Correction Factor	0.999	1.003

Corrected As found	NO_X = 842.0 ppb	NO = 834.0 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	4.4%
Previous Response	NO_X = 805.3 ppb	NO = 800.3 ppb			*Percent Change	NO =	4.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.4	449.2	352.7	355.0	0.994	100.7%
2nd GPT point (200 ppb O3)	794.4	662.4	139.5	141.6	0.985	101.5%
3rd GPT point (100 ppb O3)	794.4	726.7	75.2	77.4	0.972	102.9%
				Average Correction Factor	0.983	101.7%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

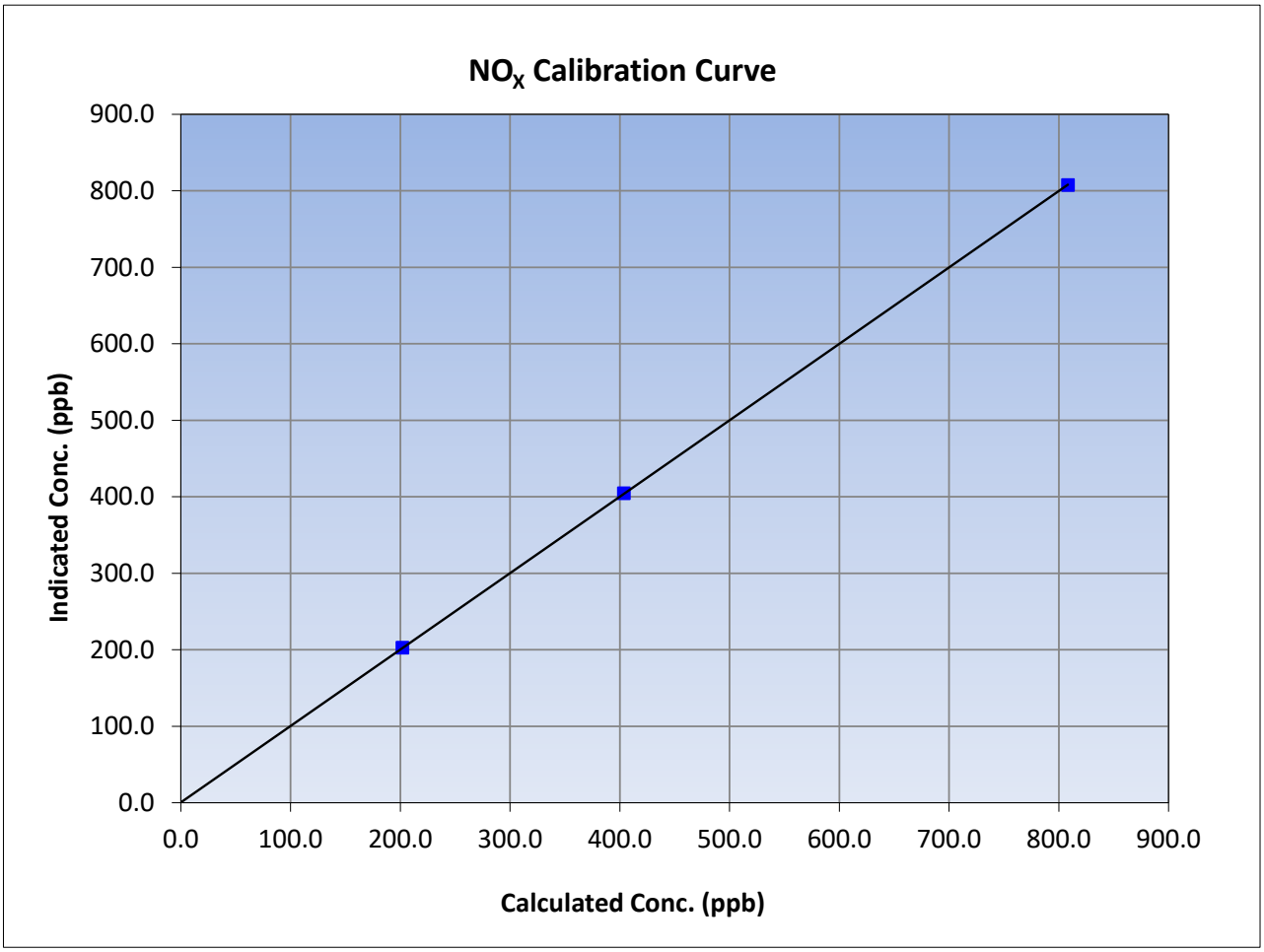
Version-04-2020

Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 5, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:31	End Time (MST):	15:28
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	-0.2	----	Correlation Coefficient	0.999997	≥0.995
808.3	807.6	1.0008			
403.7	404.4	0.9983	Slope	0.999176	0.90 - 1.10
201.8	202.5	0.9967			
			Intercept	0.418407	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

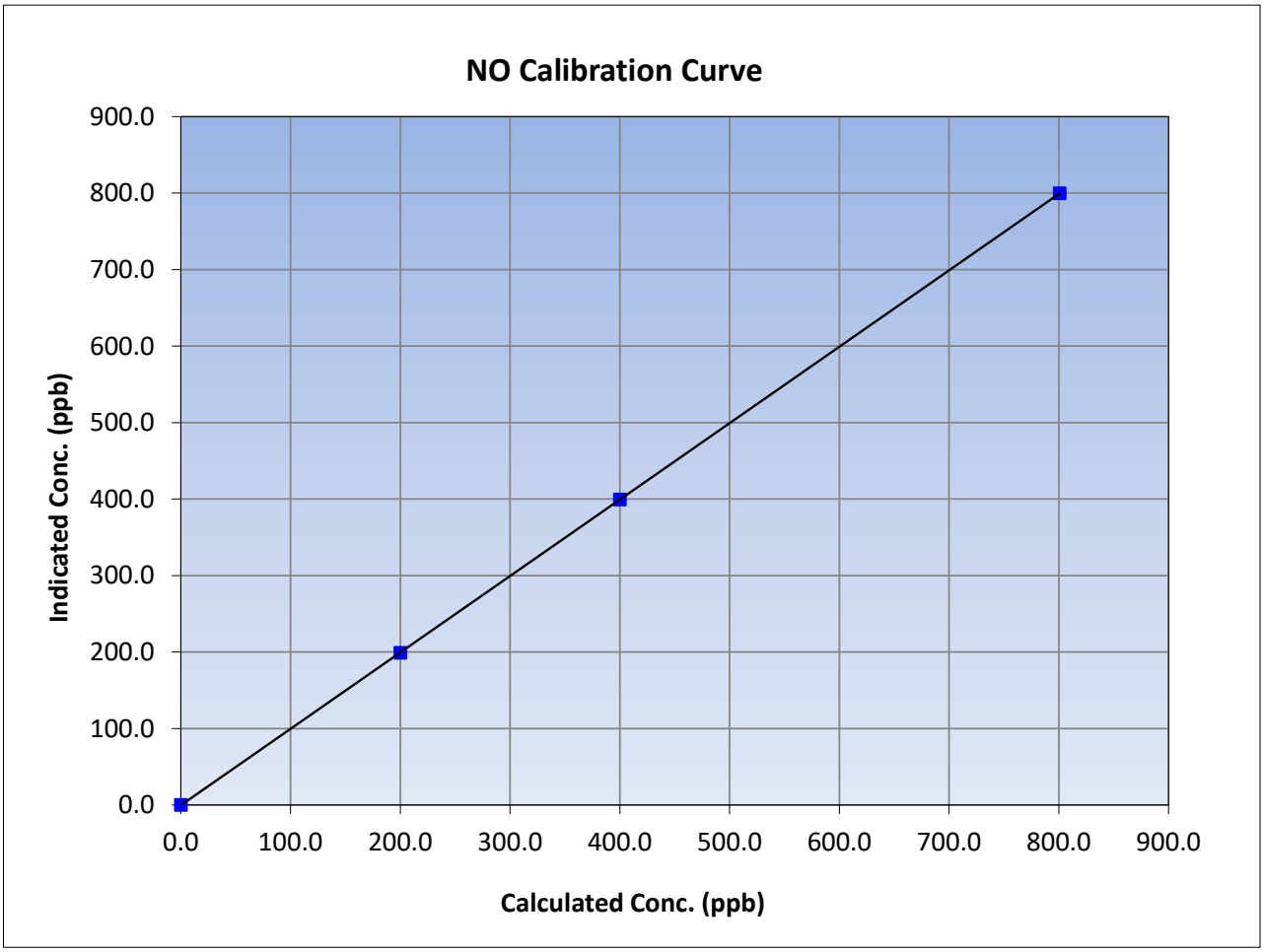
Version-04-2020

Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 5, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:31	End Time (MST):	15:28
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999999	*≥0.995*
800.7	799.8	1.0012			
400.0	399.3	1.0017	Slope	0.999039	*0.90 - 1.10*
200.0	198.9	1.0053			
			Intercept	-0.303738	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

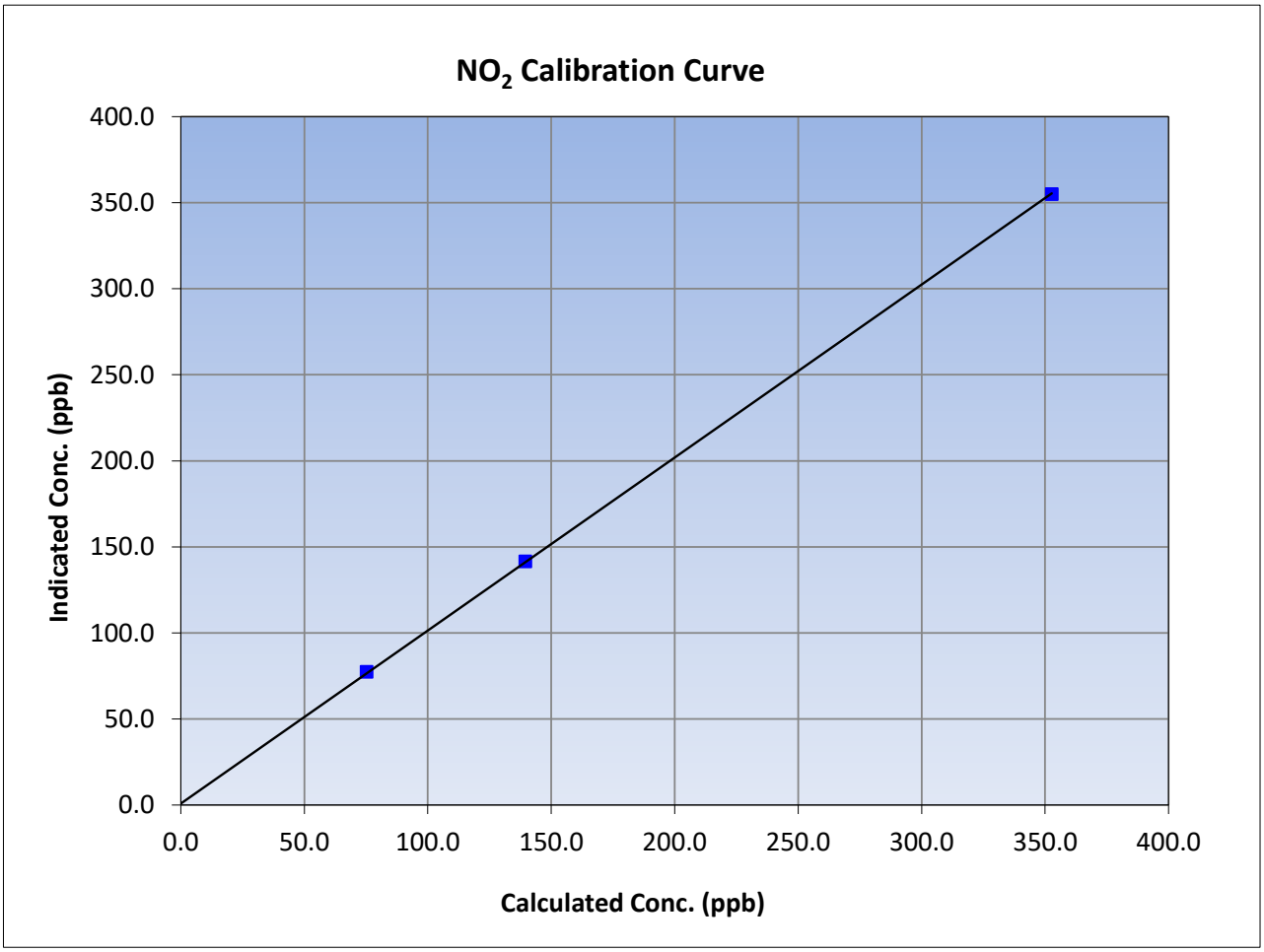
Version-04-2020

Station Information

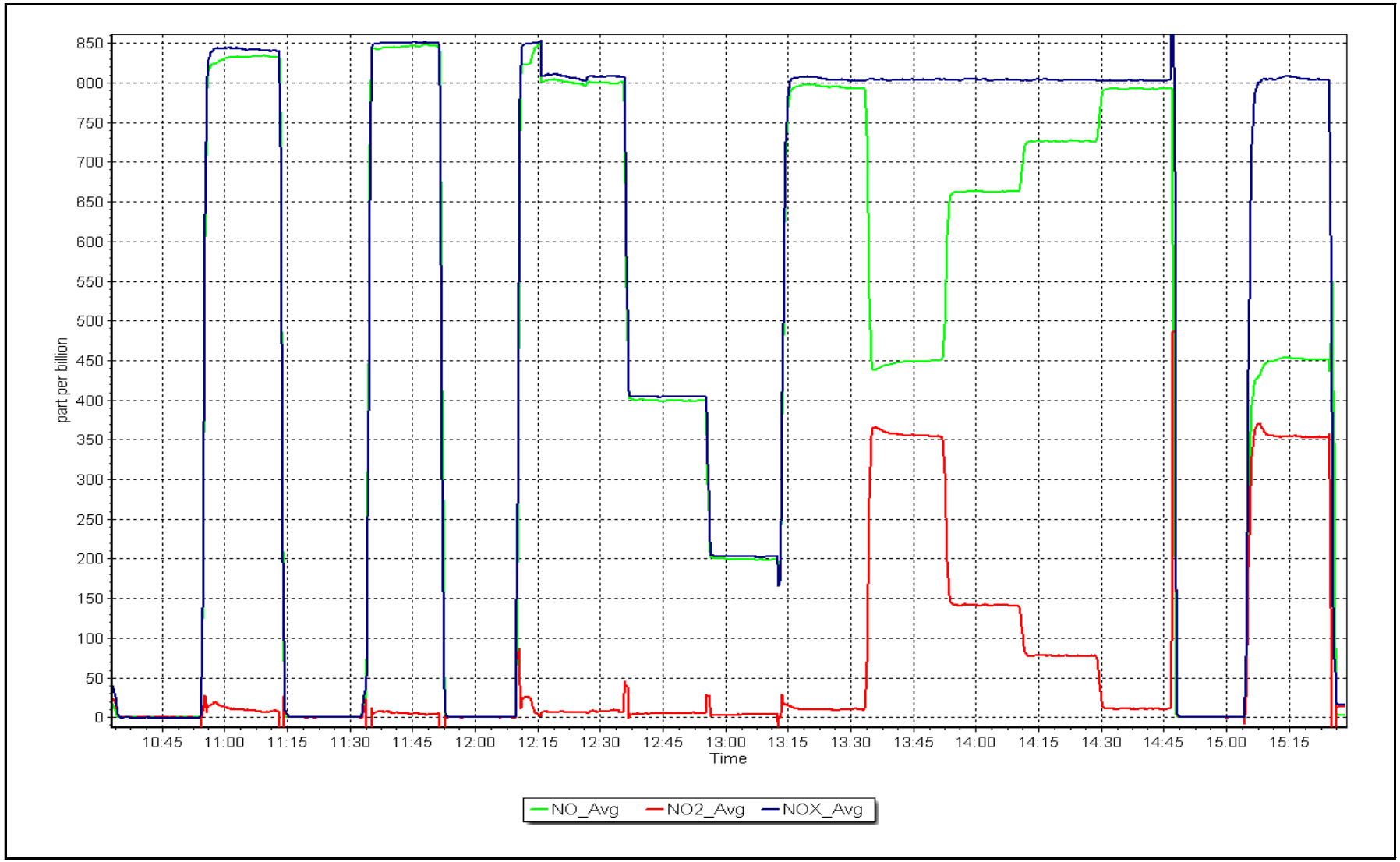
Calibration Date:	January 18, 2024	Previous Calibration:	December 5, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:31	End Time (MST):	15:28
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999965	≥0.995
352.7	355.0	0.9935			
139.5	141.6	0.9852	Slope	1.005229	0.90 - 1.10
75.2	77.4	0.9717			
			Intercept	0.853830	+/-20



NO_X Calibration Plot Date: January 18, 2024 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:	January 22, 2024	Last Cal Date:	December 8, 2023
Start time (MST):	10:29	End time (MST):	11:46
Analyzer Make:	API T640	S/N:	844
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388746
Temp/RH standard:	Alicat FP-25	S/N:	388746

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-22.20	-22.80	-22.20	☐	+/- 2 °C
P (mmHg)	731.20	738.38	731.20	☐	+/- 10 mmHg
flow (LPM)	4.97	4.90	4.97	☐	+/- 0.25 LPM

Leak Test: Date of check: January 22, 2024 Last Cal Date: December 8, 2023

PM w/o HEPA: 6.2 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	9.0	11.0	11.0	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 13.9 w/ HEPA: 0.0

Date Optical Chamber Cleaned: January 22, 2024 <0.2 ug/m3

Disposable Filter Changed: January 22, 2024

Annual Maintenance

Date Sample Tube Cleaned: August 23, 2023

Date RH/T Sensor Cleaned: August 23, 2023

Notes: Inlet head looks good. After maintenance PMT peak test was within limits. No adjustments made. Leak check passed.

Calibration by: Sean Bala

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Barge Landing	Station Number:	AMS 09
Calibration Date:	December 1, 2023	Prev Cal Date:	N/A
Start Time (MST):	12:00	End Time (MST):	14:10
Tower Height (m):	10.0	Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	B4128
WS Calibrator:	MetOne 053	Serial Number:	P15103

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

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999999	*≥0.9995*
Calculated slope		0.998550	*0.90 - 1.10*
Calculated intercept		0.034415	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	D14057
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	13:29	Calc Declination*:	13.72 Degrees
Deadband calc:	1.0 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	0.4	---
90	87.4	-0.7%
180	179.1	-0.3%
270	270.0	0.0%
357	356.4	-0.2%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999967	*≥0.9995*
Calculated slope		0.999287	*0.90 - 1.10*
Calculated intercept		0.863397	*+/- 4*

Notes: Installing new 10m WS/WD sensors.

Calibration Performed By: Max Farrell & Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	January 3, 2024	Last Cal Date:	December 19, 2023
Start time (MST):	10:17	End time (MST):	13:33
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998200	1.001184	Backgd or Offset:	14.6	14.6
Calibration intercept:	0.350846	-0.069544	Coeff or Slope:	1.034	1.034

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.6	----
as found span	4919	81.3	800.8	799.9	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.0	----
high point	4919	81.3	800.8	802.2	0.998
second point	4959	40.7	400.9	400.7	1.001
third point	4980	20.3	199.9	199.1	1.004
as left zero	5000	0.0	0.0	0.9	----
as left span	4919	81.3	800.8	800.2	1.001
				Average Correction Factor	1.001

Baseline Corr As found:	799.30	Previous response	799.67	*% 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 sample inlet filter after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

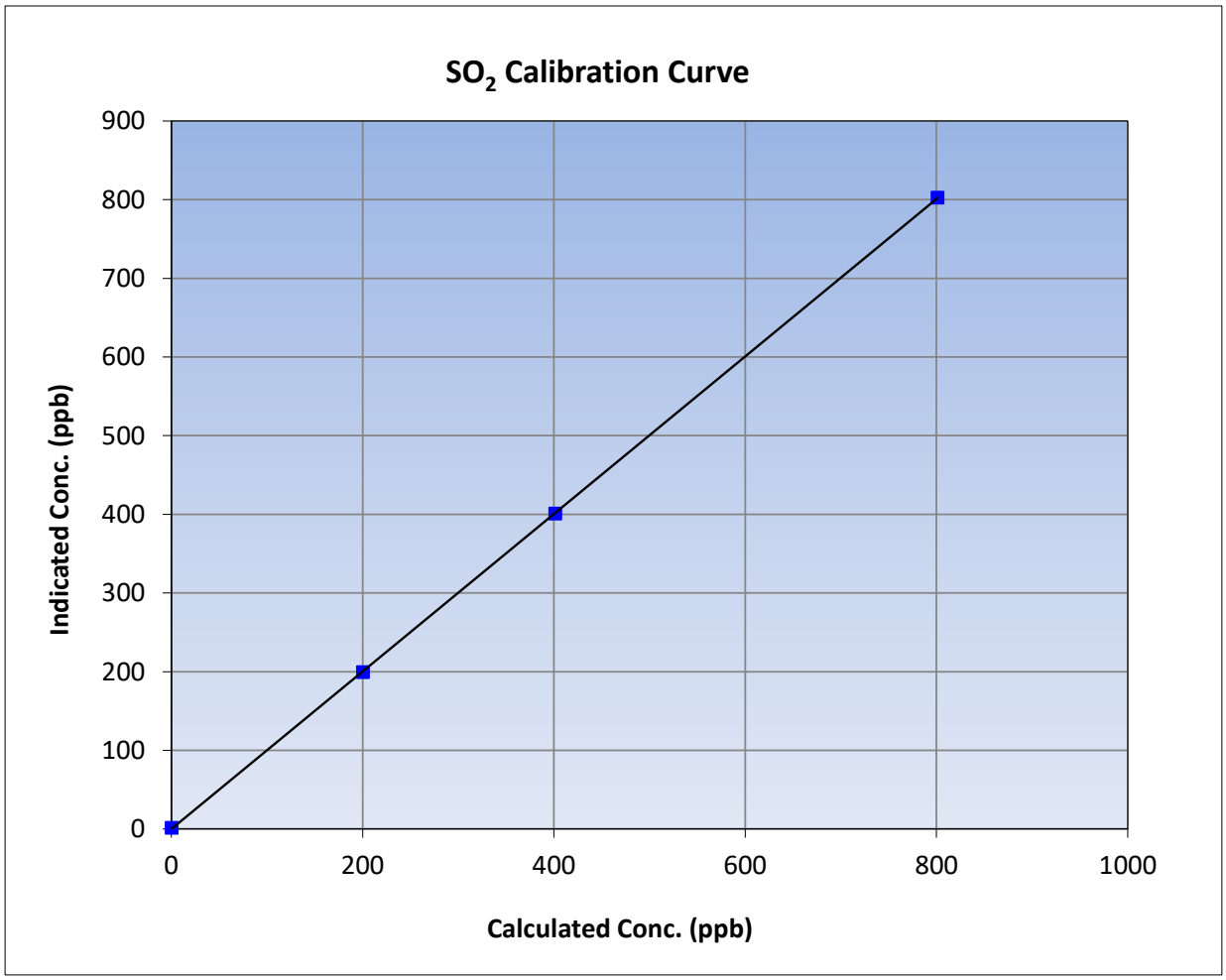
Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 19, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:17	End Time (MST):	13:33
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

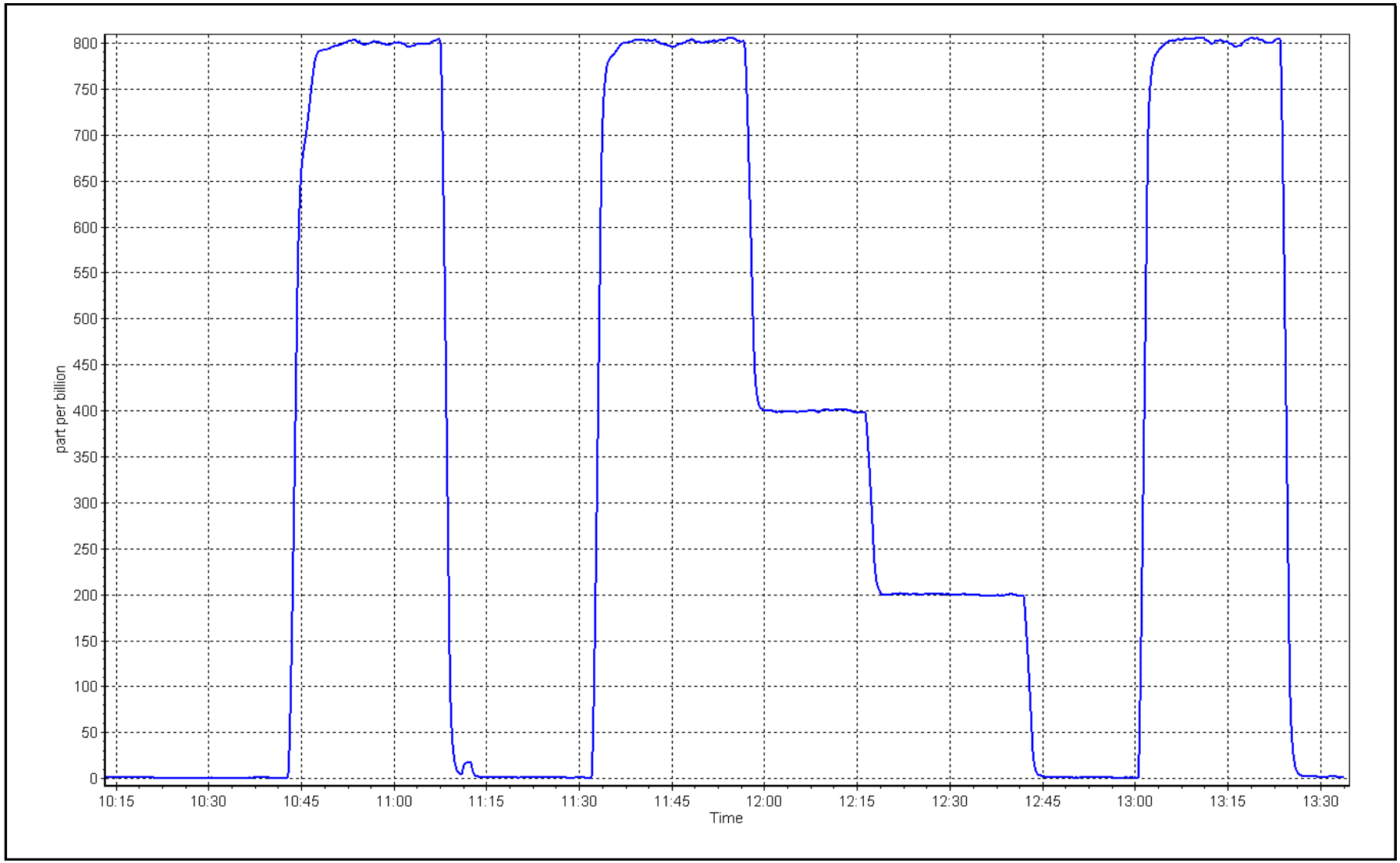
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.0	----
800.8	802.2	0.9982
400.9	400.7	1.0005
199.9	199.1	1.0042

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.001184	*0.90 - 1.10*
Intercept	-0.069544	*+/-30*



SO2 Calibration Plot Date: January 3, 2024 Location: Lower Camp



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	January 22, 2024	Last Cal Date:	December 20, 2023
Start time (MST):	11:12	End time (MST):	17:17
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 450iQ		Analyzer serial #:	CM20080003	
Converter make:	NA		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.009917	0.992455	Backgd or Offset:	14.8	15.9
Calibration intercept:	0.234284	-0.204215	Coeff or Slope:	1.001	1.015

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.4	----
as found span	4926	73.6	79.9	79.4	1.012
as found 2nd point	4963	36.8	40.0	39.9	1.012
as found 3rd point	4982	18.6	20.2	20.3	1.015
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4926	73.6	79.9	79.1	1.010
second point	4963	36.8	40.0	39.5	1.012
third point	4982	18.6	20.2	19.8	1.020
as left zero	5000	0.0	0.0	-0.4	----
as left span	4926	73.6	79.9	79.7	1.003
SO2 Scrubber Check	4919	81.1	811.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	1.014
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.0	Prev response:	80.95	*% change:	-2.5%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.988733	AF Intercept:	0.376111
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999999		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Adjusted both zero and span. Ran scrubber check after cal zero. Sox scrubber check passed after hydrating the scrubber beads.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

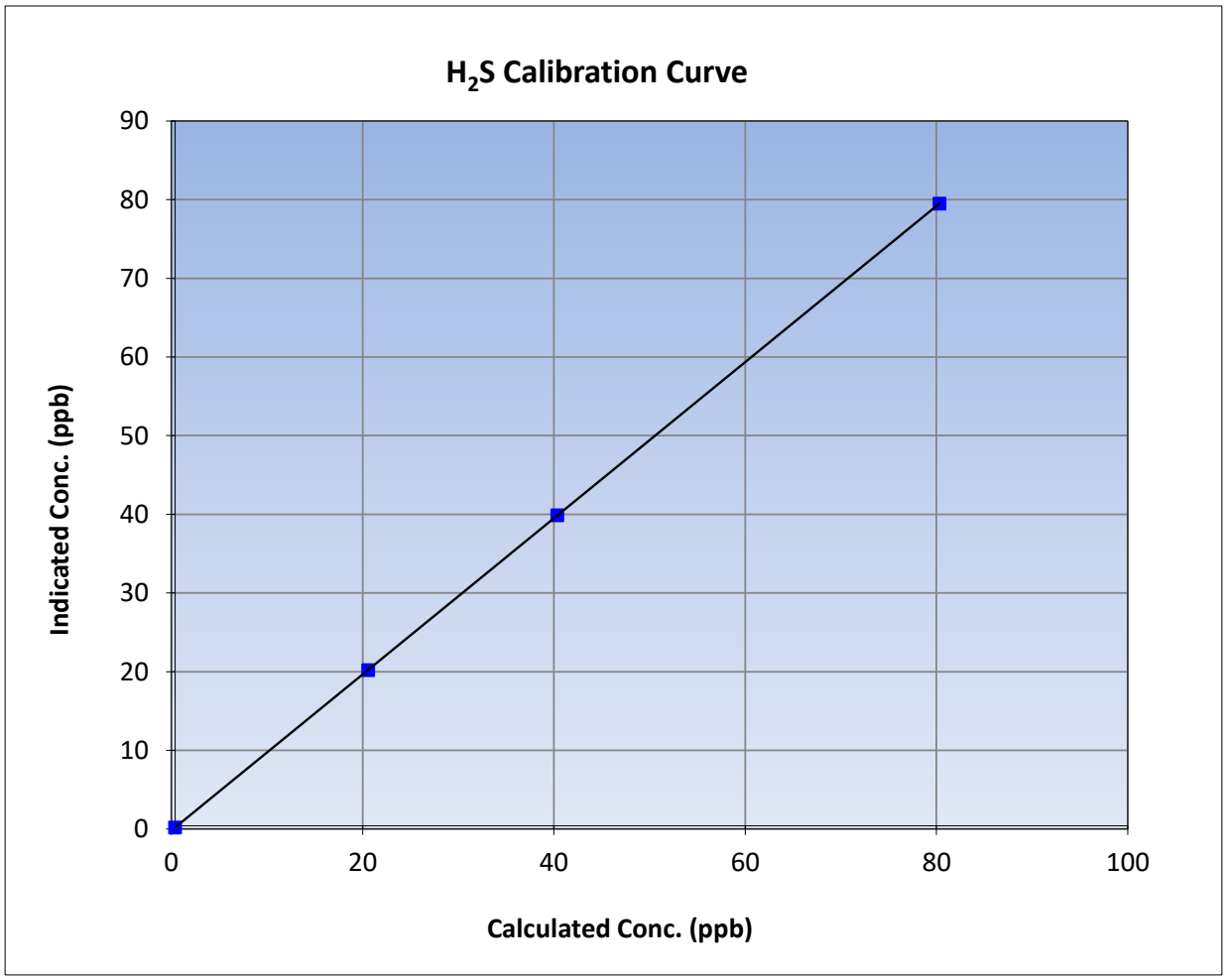
Station Information

Calibration Date:	January 22, 2024	Previous Calibration:	December 20, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	11:12	End Time (MST):	17:17
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

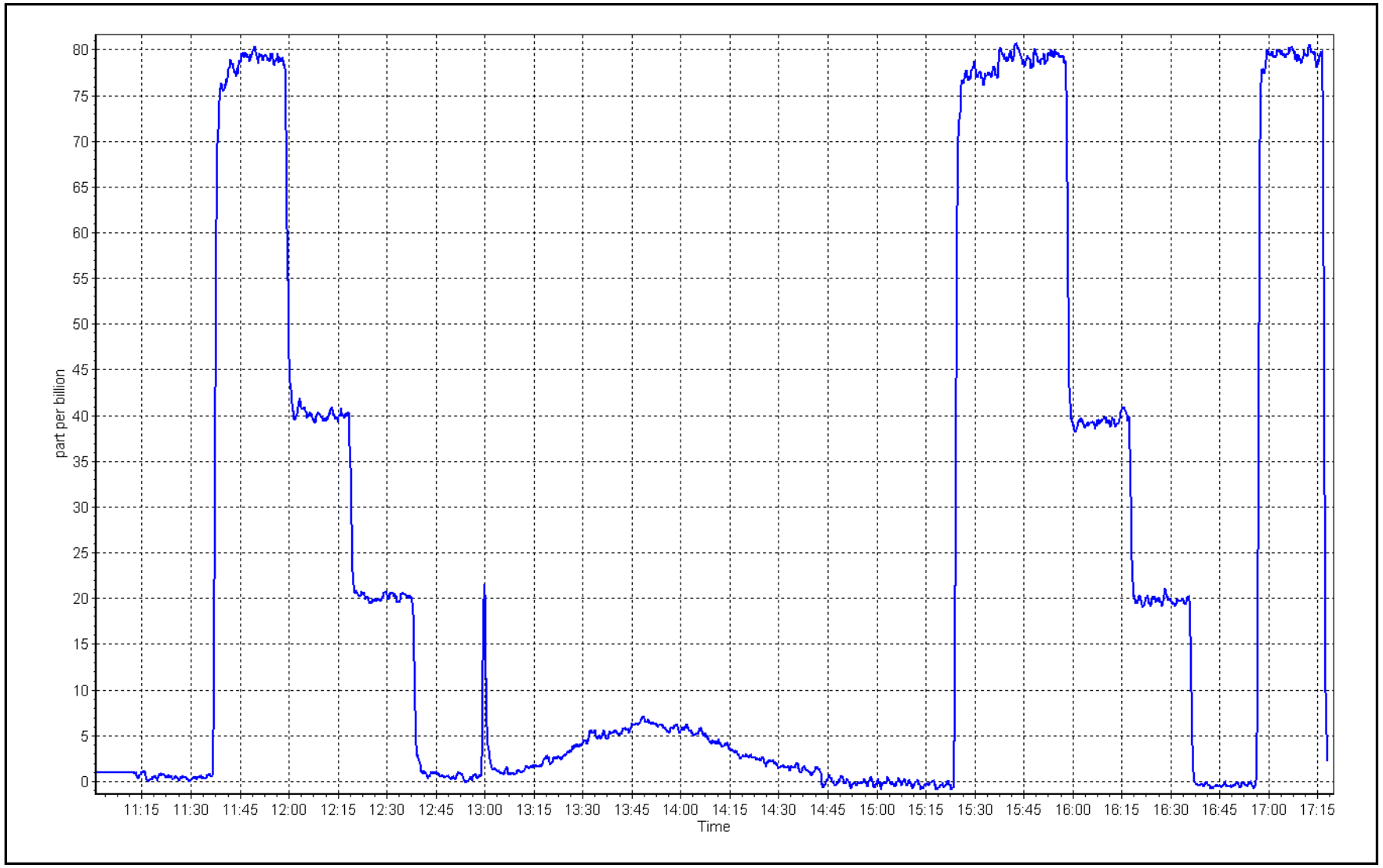
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
79.9	79.1	1.0104
40.0	39.5	1.0116
20.2	19.8	1.0199

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.992455	*0.90 - 1.10*
Intercept	-0.204215	*+/-3*



H_2S Calibration Plot Date: January 22, 2024 Location: Lower Camp



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	January 3, 2024	Last Cal Date:	December 19, 2023
Start time (MST):	10:17	End time (MST):	13:33
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.00E-04	3.00E-04	NMHC SP Ratio:	5.77E-05	5.77E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	158880	158880
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	17.35	17.29	1.004
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	17.33	1.001
second point	4959	40.7	8.69	8.64	1.005
third point	4980	20.3	4.33	4.32	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.41	0.997
				Average Correction Factor	1.003
Baseline Corr AF:	17.28	Prev response	17.36	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	9.19	9.21	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	9.19	9.22	0.997
second point	4959	40.7	4.60	4.60	1.001
third point	4980	20.3	2.29	2.30	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.22	0.997
				Average Correction Factor	0.998
Baseline Corr AF:	9.21	Prev response	9.21	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.07	1.011
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	8.11	1.006
second point	4959	40.7	4.09	4.05	1.010
third point	4980	20.3	2.04	2.02	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.19	0.996
				Average Correction Factor	1.009
Baseline Corr AF:	8.07	Prev response	8.15	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001730	0.998445
THC Cal Offset:	-0.022785	-0.009595
CH4 Cal Slope:	0.998587	0.993827
CH4 Cal Offset:	-0.005091	-0.006092
NMHC Cal Slope:	1.004174	1.002671
NMHC Cal Offset:	-0.017294	-0.003503

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

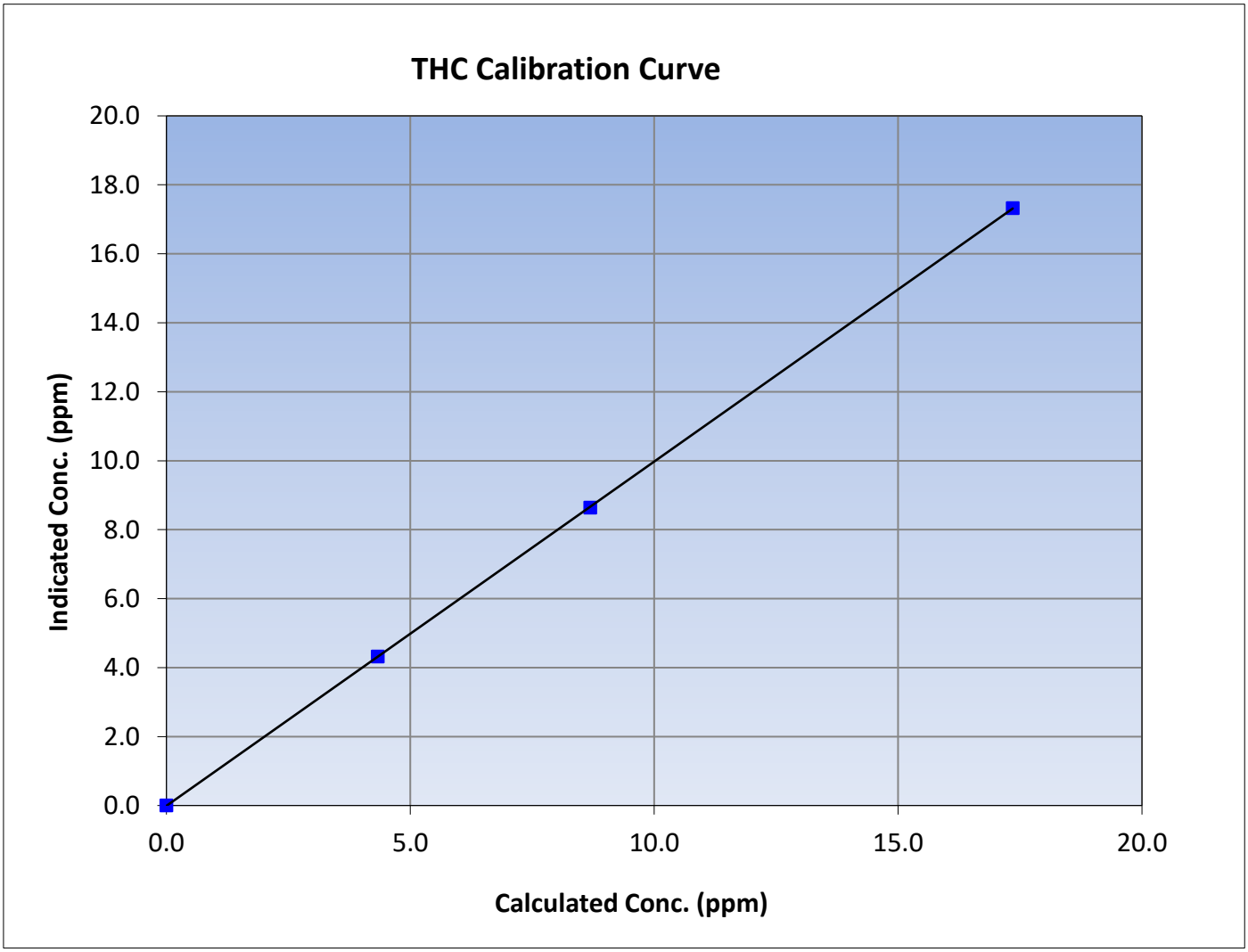
Version-06-2022

Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 19, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:17	End Time (MST):	13:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999995	≥0.995
17.35	17.33	1.0015			
8.69	8.64	1.0054	Slope	0.998445	0.90 - 1.10
4.33	4.32	1.0031			
			Intercept	-0.009595	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

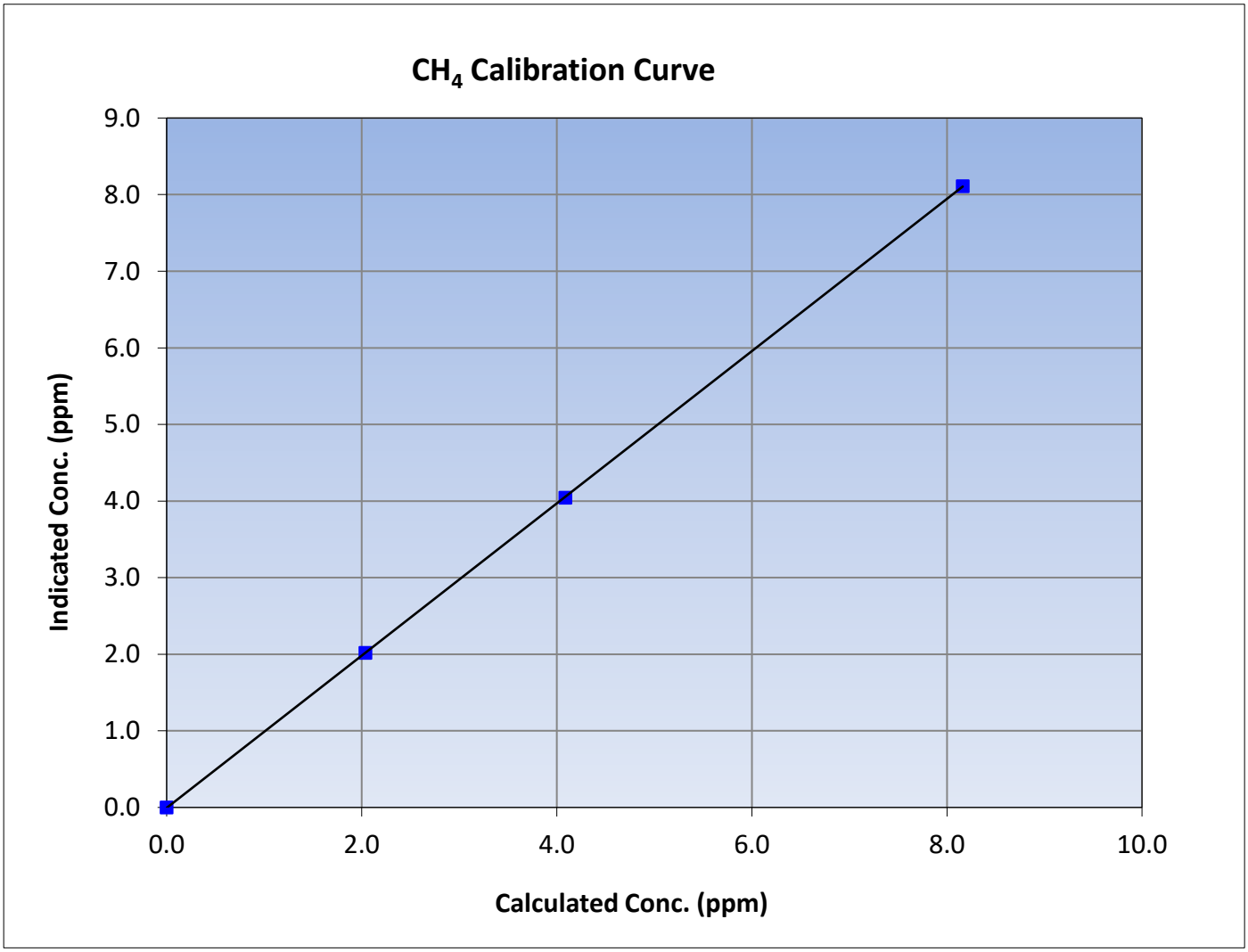
Version-06-2022

Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 19, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:17	End Time (MST):	13:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
8.16	8.11	1.0063			
4.09	4.05	1.0103	Slope	0.993827	*0.90 - 1.10*
2.04	2.02	1.0099			
			Intercept	-0.006092	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

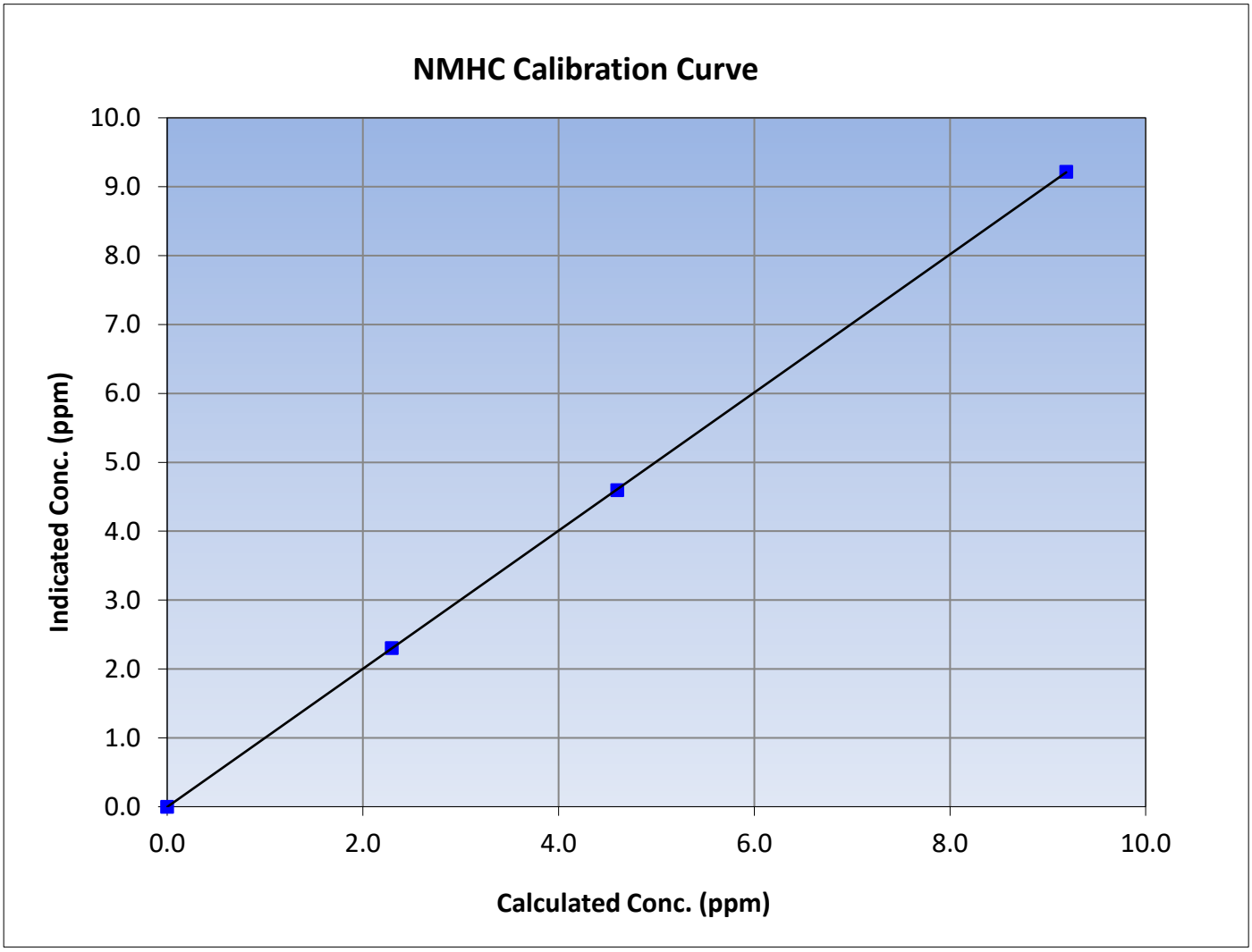
Version-06-2022

Station Information

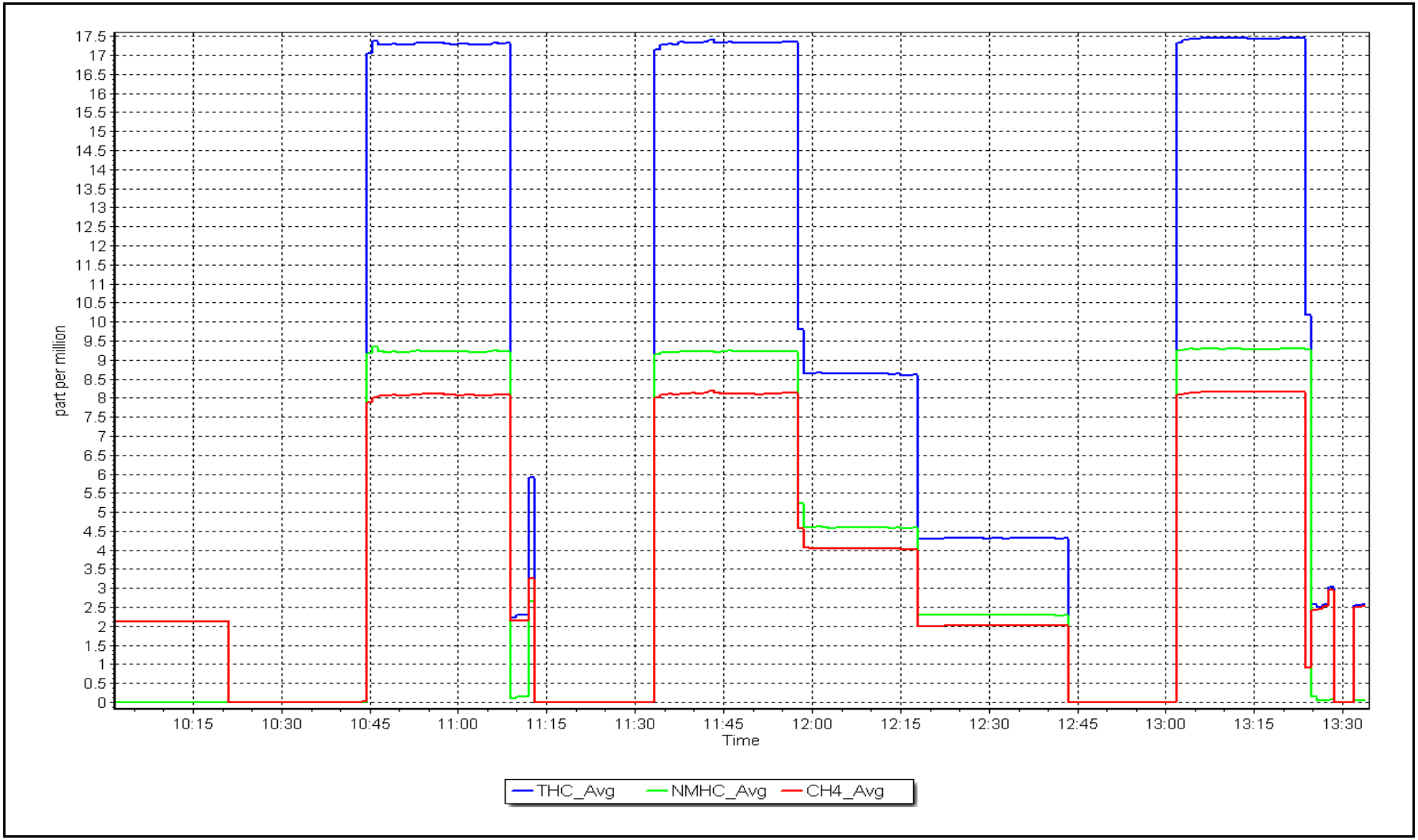
Calibration Date:	January 3, 2024	Previous Calibration:	December 19, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:17	End Time (MST):	13:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999995	≥0.995
9.19	9.22	0.9971			
4.60	4.60	1.0010	Slope	1.002671	0.90 - 1.10
2.29	2.30	0.9971			
			Intercept	-0.003503	+/-0.5



NMHC Calibration Plot Date: January 3, 2024 Location: Lower Camp



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	January 15, 2024	Last Cal Date:	December 18, 2023
Start time (MST):	10:26	End time (MST):	13:55
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make: API T100 Analyzer serial #: 599

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000755	1.003443	Backgd or Offset:	91.1	87.3
Calibration intercept:	-2.857974	-2.798230	Coeff or Slope:	0.709	0.713

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-1.4	----
as found span	4921	79.1	799.7	795.6	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.1	799.7	801.0	0.998
second point	4961	39.5	399.3	396.7	1.007
third point	4980	19.8	200.2	195.0	1.027
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.1	799.7	799.9	1.000
				Average Correction Factor	1.011

Baseline Corr As found:	797.00	Previous response	797.43	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

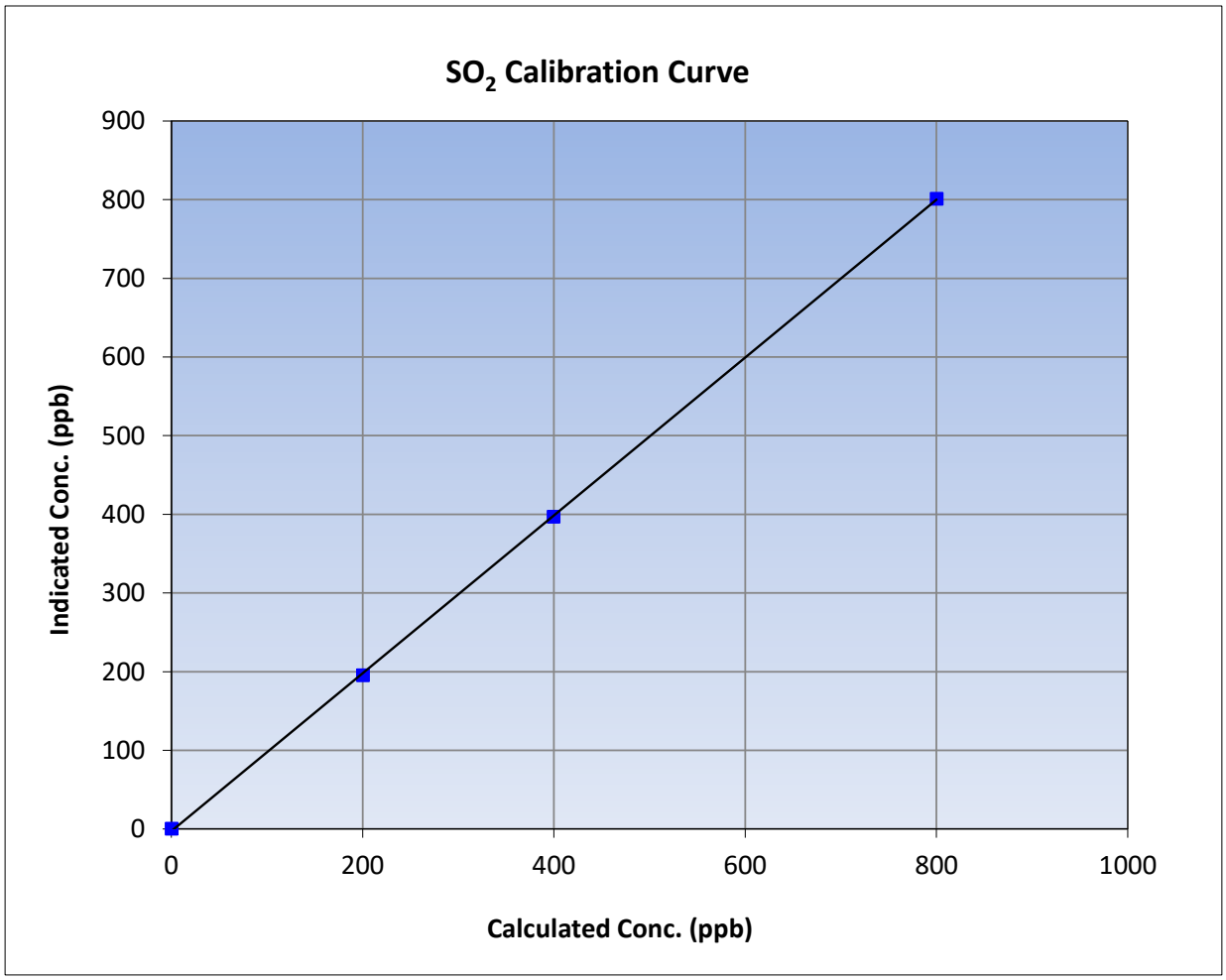
Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 18, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:26	End Time (MST):	13:55
Analyzer make:	API T100	Analyzer serial #:	599

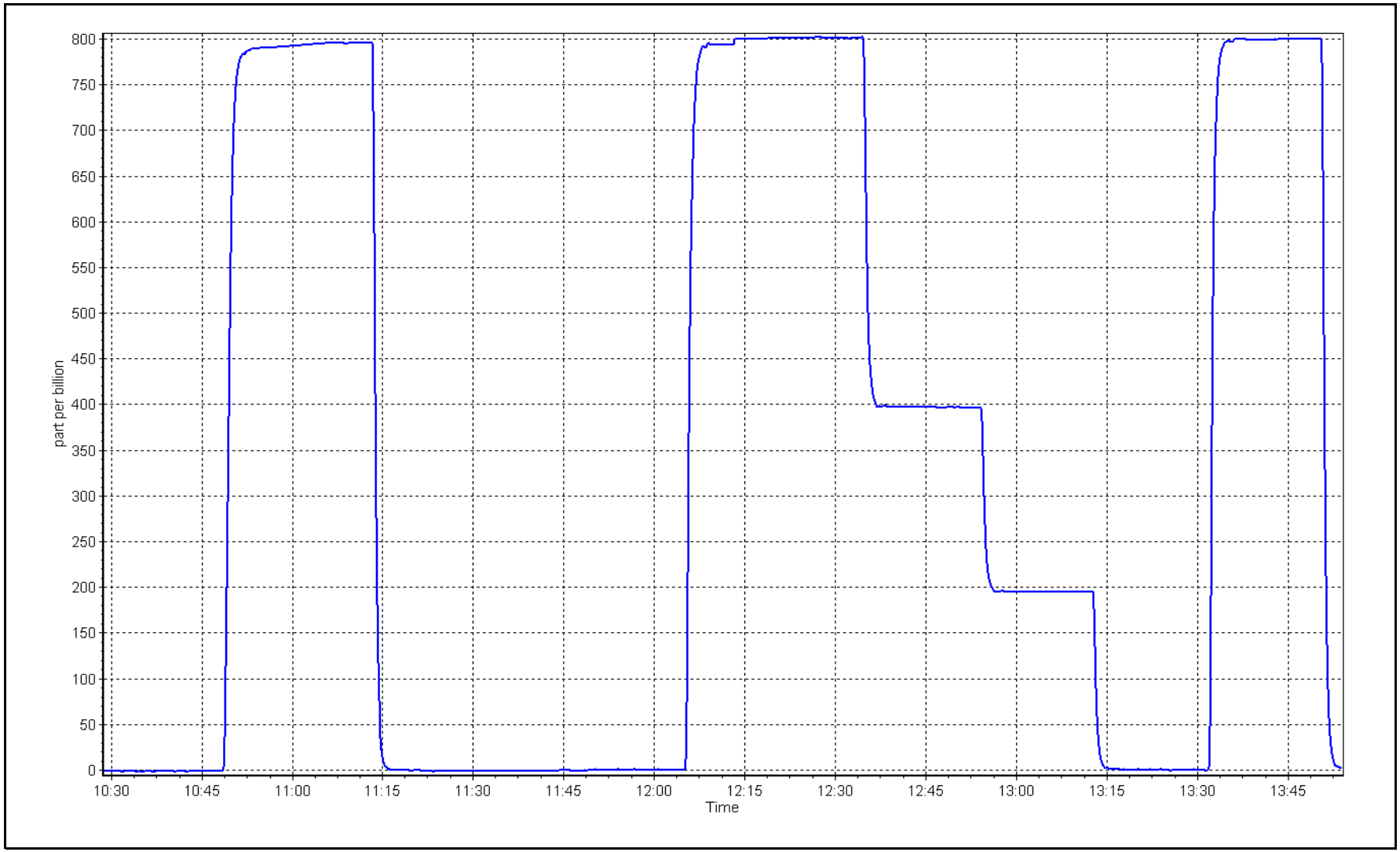
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.7	801.0	0.9984
399.3	396.7	1.0066
200.2	195.0	1.0266

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999940	*≥0.995*
Slope	1.003443	*0.90 - 1.10*
Intercept	-2.798230	*+/-30*



SO2 Calibration Plot Date: January 15, 2024 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:	January 17, 2024	Last Cal Date:	December 5, 2023
Start time (MST):	10:24	End time (MST):	15:16
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1180540017	
Converter make:	CDN-101		Converter serial #:	521	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997103	0.997527	Backgd or Offset:	3.77	4.15
Calibration intercept:	-0.142201	-0.182182	Coeff or Slope:	1.130	1.157

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4925	75.5	80.6	78.6	1.027
as found 2nd point	4962	37.7	40.3	39.1	1.032
as found 3rd point	4981	18.9	20.2	19.4	1.046
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4925	75.5	80.6	80.2	1.005
second point	4962	37.7	40.3	40.1	1.004
third point	4981	18.9	20.2	19.9	1.014
as left zero	5000	0.0	0.0	0.4	----
as left span	4925	75.5	80.6	79.6	1.013
SO2 Scrubber Check	4921	79.1	791.0	0.2	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.008
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	78.5	Prev response:	80.25	*% change:	-2.2%
Baseline Corr 2nd AF pt:	39.0	AF Slope:	0.974845	AF Intercept:	-0.082177
Baseline Corr 3rd AF pt:	19.3	AF Correlation:	0.999975		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

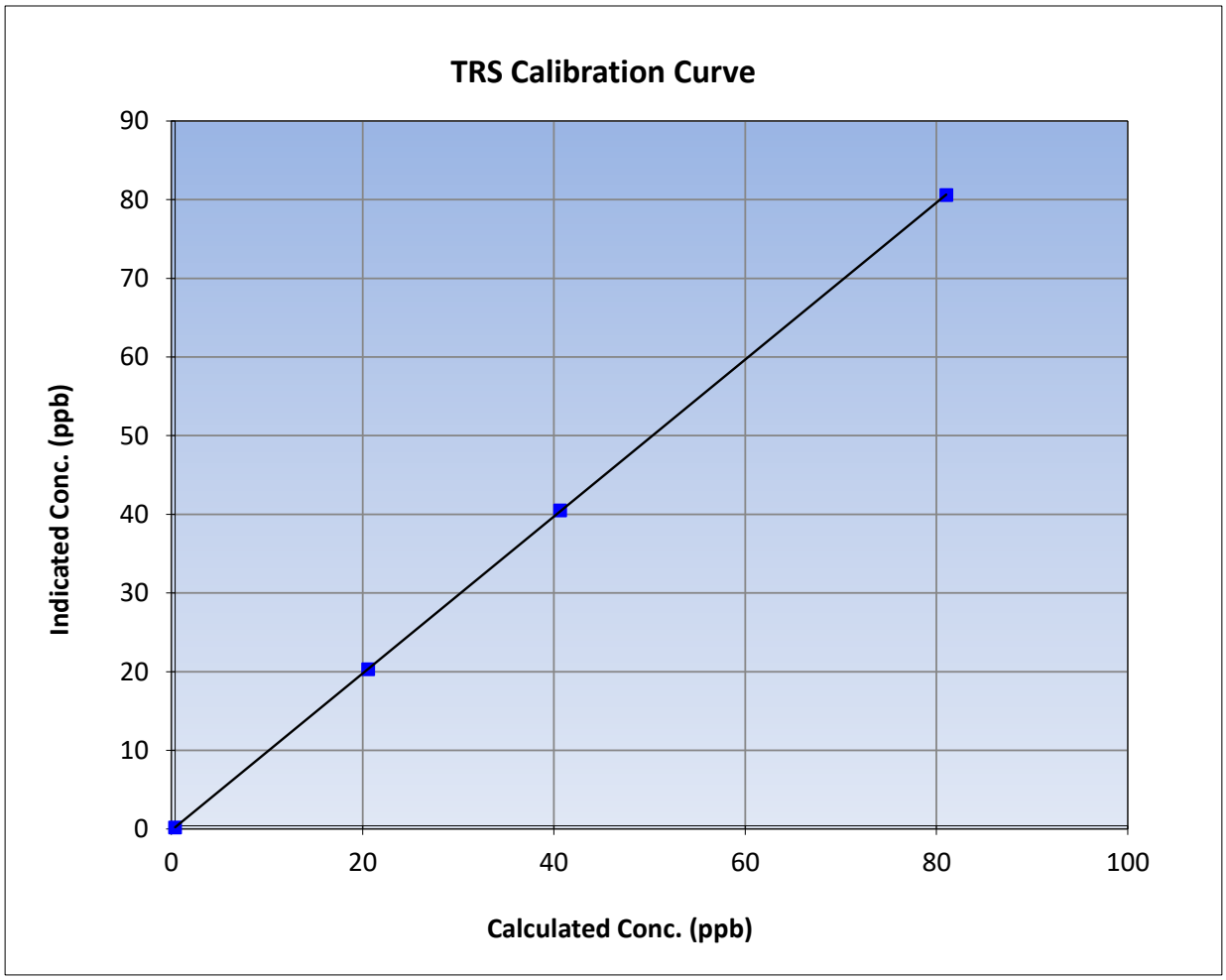
Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	December 5, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:24	End Time (MST):	15:16
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

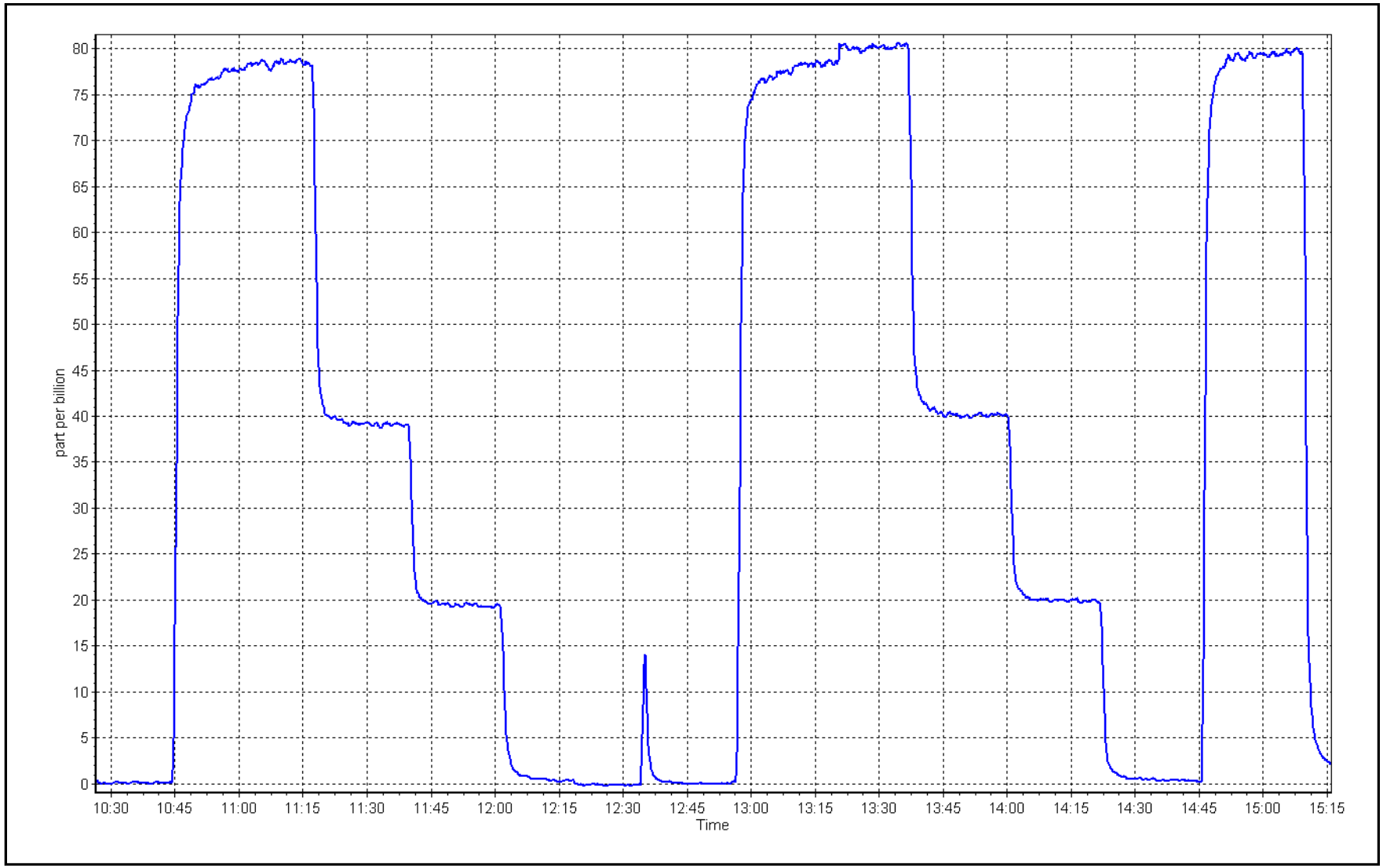
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.6	80.2	1.0053
40.3	40.1	1.0041
20.2	19.9	1.0144

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.997527	*0.90 - 1.10*
Intercept	-0.182182	*+/-3*



TRS Calibration Plot Date: January 17, 2024 Location: Fort McKay South



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	January 15, 2024	Last Cal Date:	December 18, 2023
Start time (MST):	10:26	End time (MST):	13:55
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.80E-04	2.94E-04	NMHC SP Ratio:	4.70E-05	4.74E-05
CH4 Retention time:	14.80	15.00	NMHC Peak Area:	193260	191512
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.01	----
as found span	4921	79.1	17.05	16.37	1.041
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	8.45	1.008
third point	4980	19.8	4.27	4.12	1.035
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	16.89	1.009
				Average Correction Factor	1.014
Baseline Corr AF:	16.37	Prev response	17.04	*% change	-4.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	9.08	8.99	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	9.08	9.08	1.000
second point	4961	39.5	4.53	4.48	1.013
third point	4980	19.8	2.27	2.18	1.042
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	9.08	8.88	1.022
				Average Correction Factor	1.018
Baseline Corr AF:	8.99	Prev response	9.08	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.01	----
as found span	4921	79.1	7.97	7.39	1.078
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	4961	39.5	3.98	3.97	1.002
third point	4980	19.8	1.99	1.94	1.027
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	8.01	0.995
				Average Correction Factor	1.009
Baseline Corr AF:	7.38	Prev response	7.96	*% change	-7.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.003916	1.002747
THC Cal Offset:	-0.069164	-0.071954
CH4 Cal Slope:	1.003456	1.003122
CH4 Cal Offset:	-0.030586	-0.024172
NMHC Cal Slope:	1.004193	1.002658
NMHC Cal Offset:	-0.038578	-0.047981

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

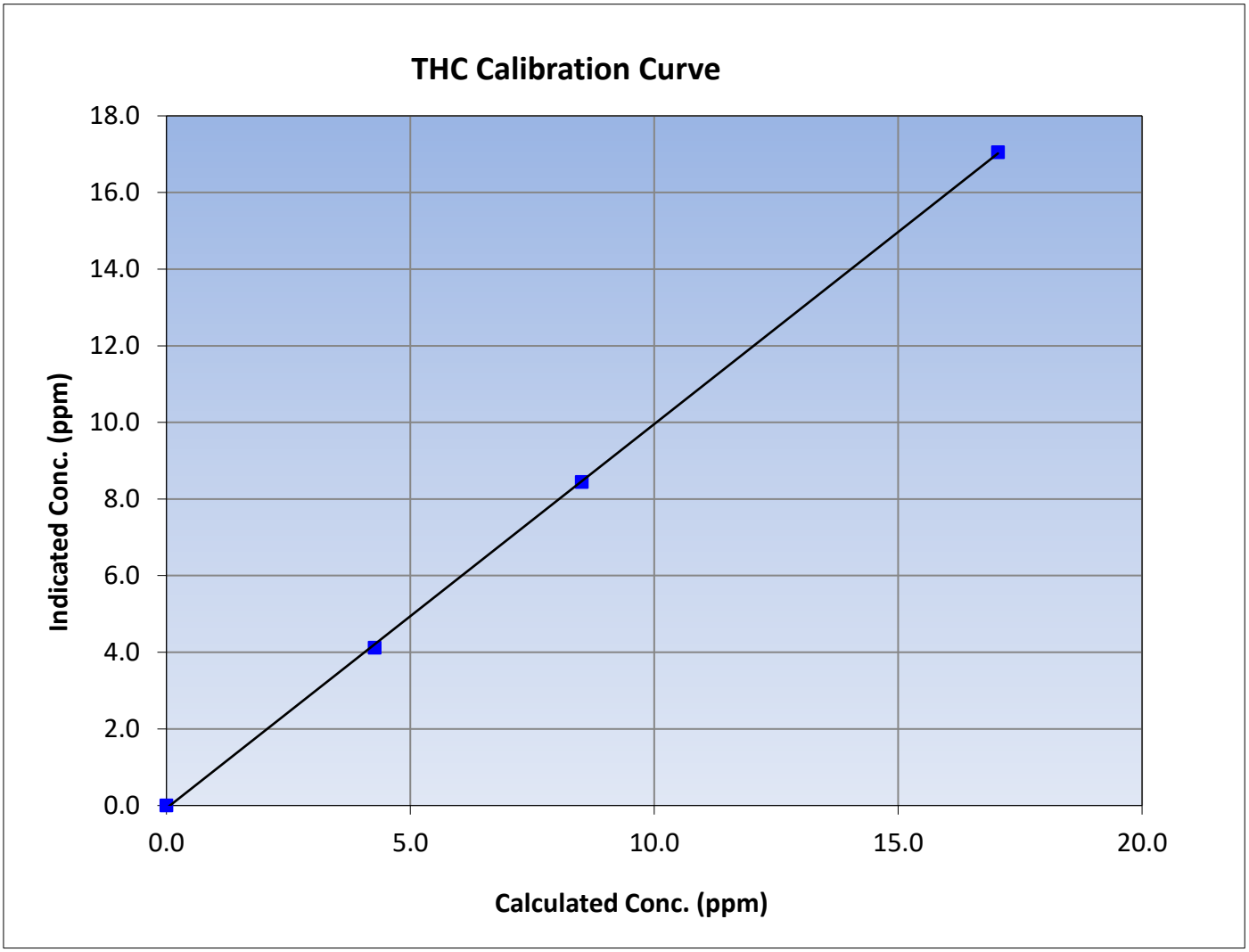
Version-06-2022

Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 18, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:26	End Time (MST):	13:55
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999916	≥0.995
17.05	17.05	0.9997			
8.51	8.45	1.0079	Slope	1.002747	0.90 - 1.10
4.27	4.12	1.0350			
			Intercept	-0.071954	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

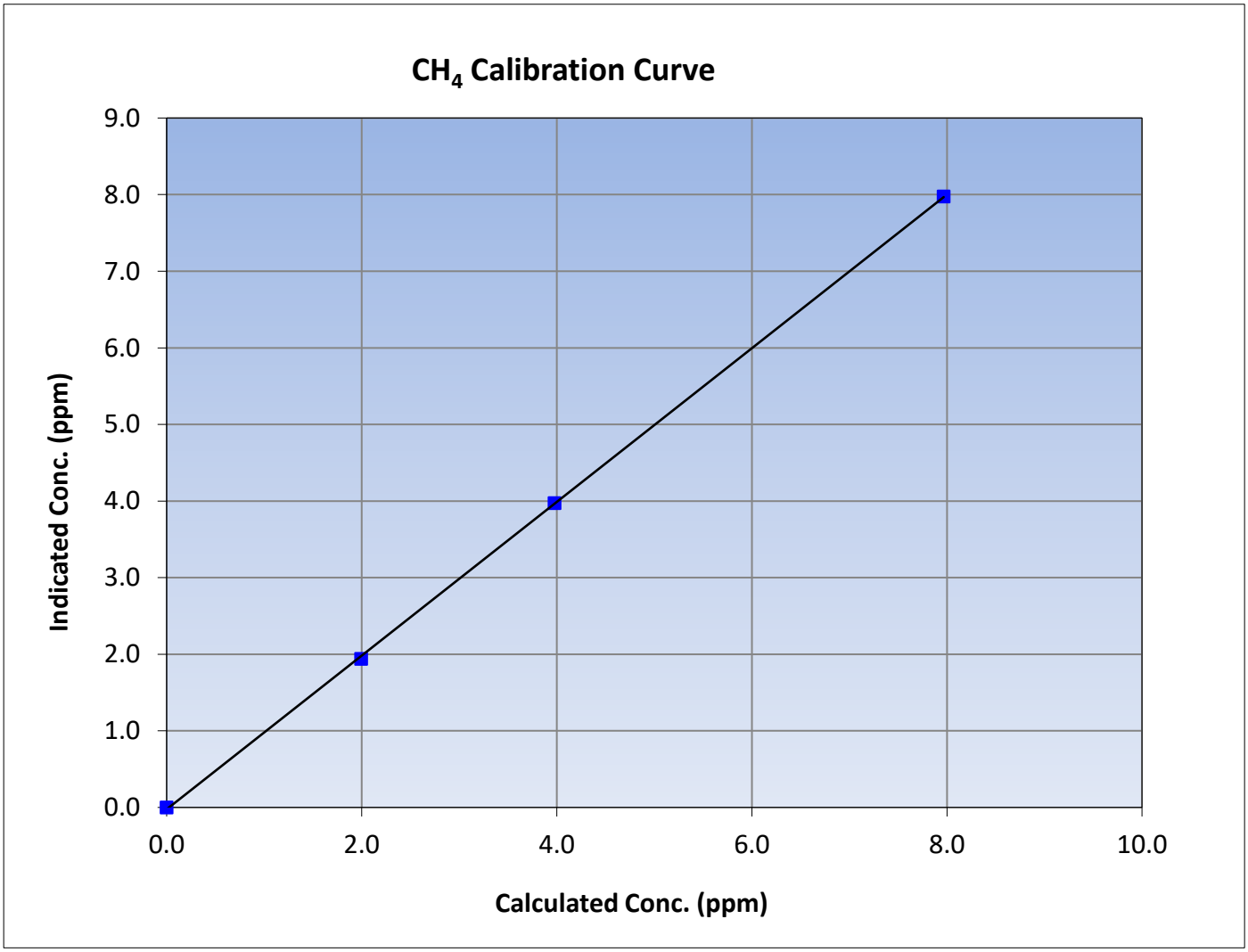
Version-06-2022

Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 18, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:26	End Time (MST):	13:55
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999946	≥0.995
7.97	7.97	0.9991			
3.98	3.97	1.0018	Slope	1.003122	0.90 - 1.10
1.99	1.94	1.0275			
			Intercept	-0.024172	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

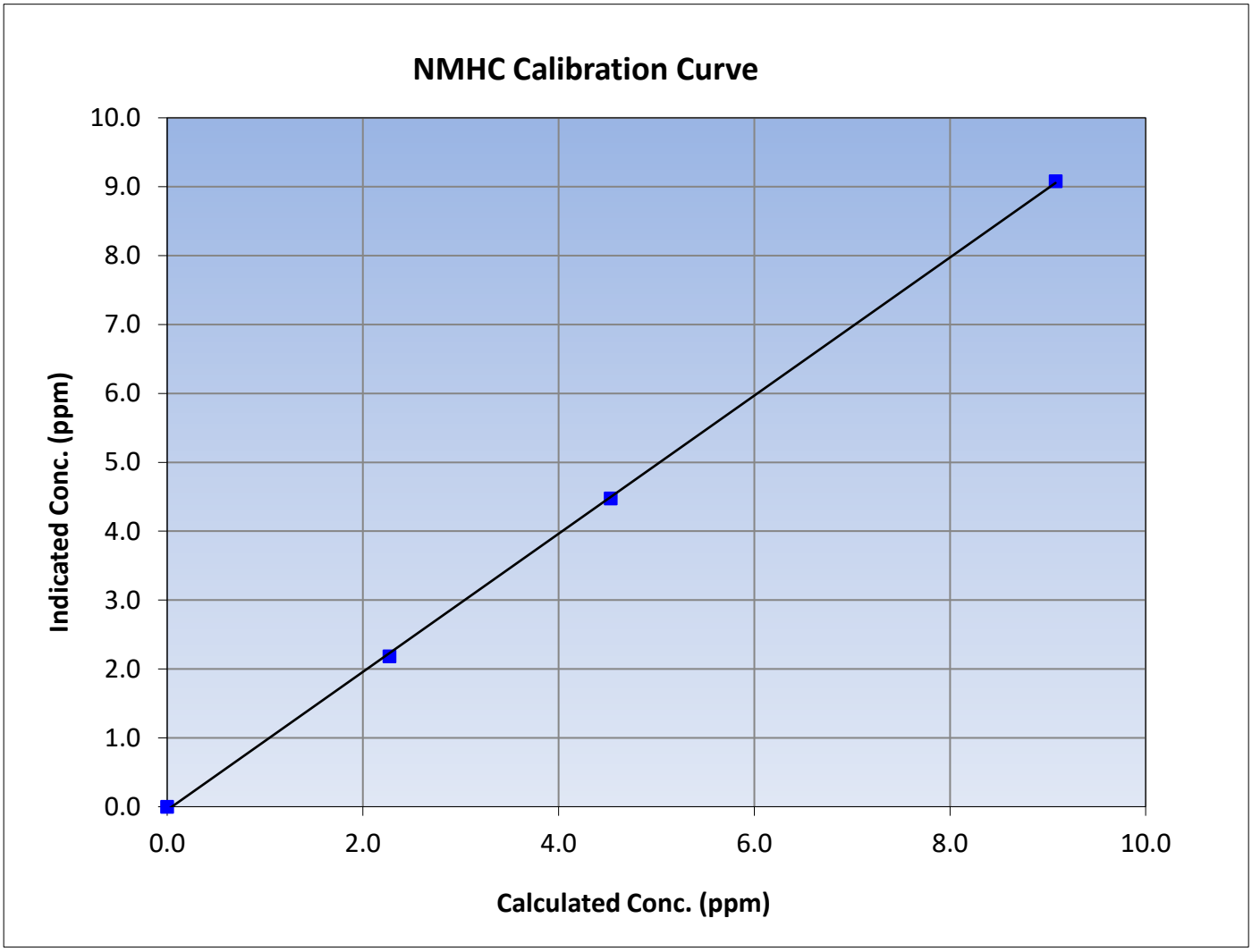
Version-06-2022

Station Information

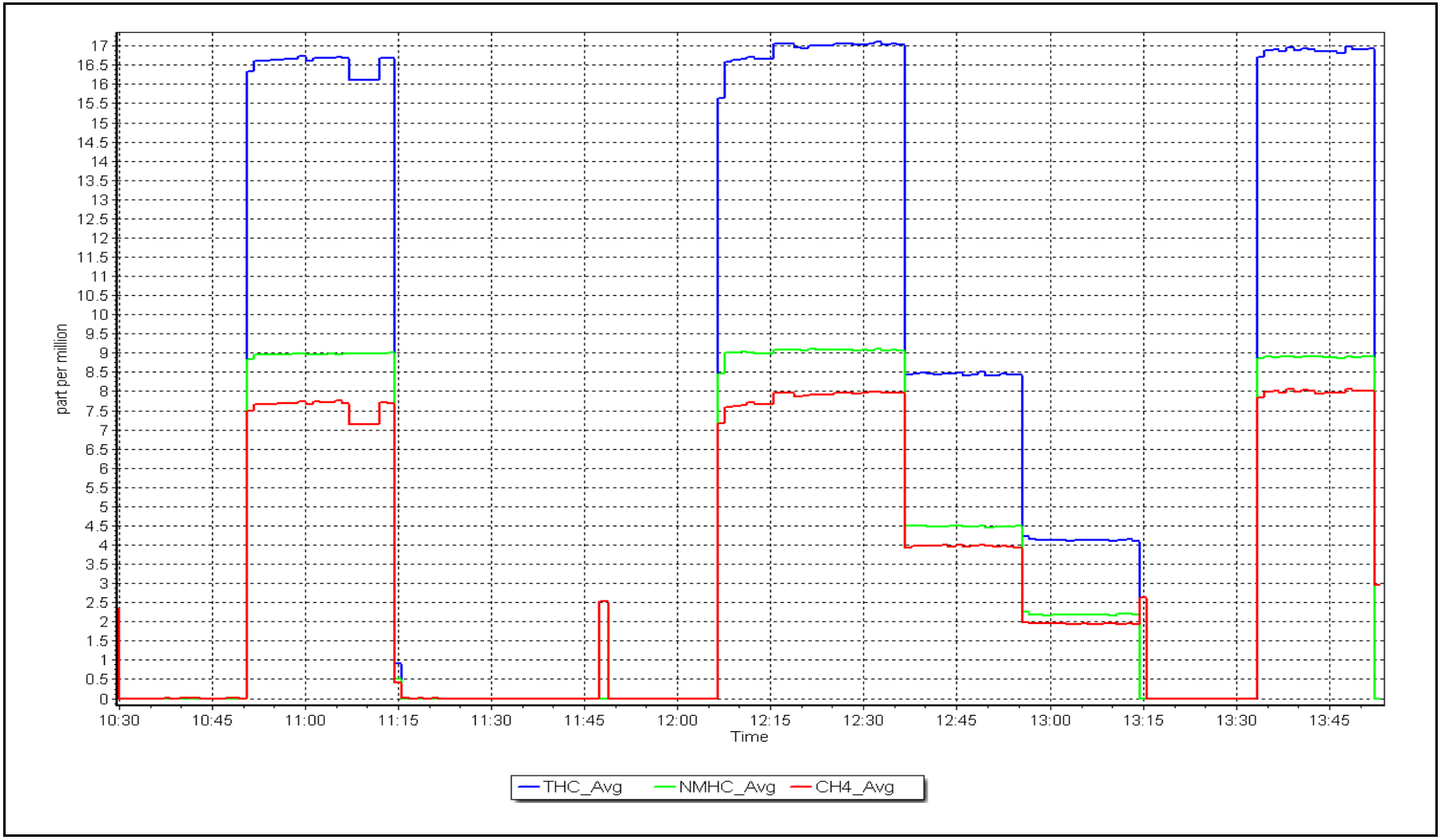
Calibration Date:	January 15, 2024	Previous Calibration:	December 18, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:26	End Time (MST):	13:55
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999873	≥0.995
9.08	9.08	1.0000			
4.53	4.48	1.0131	Slope	1.002658	0.90 - 1.10
2.27	2.18	1.0416			
			Intercept	-0.047981	+/-0.5



NMHC Calibration Plot Date: January 15, 2024 Location: Fort McKay South



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	January 25, 2024	Last Cal Date:	December 19, 2023
Start time (MST):	9:37	End time (MST):	14:42
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2UP1RP		Cal Gas Expiry Date:	November 17, 2026	
NOX Cal Gas Conc:	48.25	ppm	NO Cal Gas Conc:	47.88	ppm
Removed Cylinder #:	T2Y1P76		Removed Gas Exp Date:	December 11, 2023	
Removed Gas NOX Conc:	50.98	ppm	Removed Gas NO Conc:	49.32	ppm
NOX gas Diff:	-1.4%		NO gas Diff:	-0.1%	
Calibrator Model:	API T700		Serial Number:	2448	
ZAG make/model:	API T701		Serial Number:	1117	

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.136	1.133	NO bkgnd or offset:	12	10.9
NOX coeff or slope:	0.989	1.001	NOX bkgnd or offset:	12.0	11.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	160.5	160.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000174	1.001306
NO_X Cal Offset:	-2.251490	-2.253060
NO Cal Slope:	1.004205	1.003396
NO Cal Offset:	-3.125534	-3.151422
NO_2 Cal Slope:	1.001643	0.998110
NO_2 Cal Offset:	-0.703923	-0.700632

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-1.3	-1.3	0.0	----	----
as found span	4919	81.1	826.9	800.0	26.9	830.7	802.5	28.2	0.9954	0.9968
as found 2nd										
as found 3rd										
new cyl resp	4917	83.5	805.7	799.5	6.2	798.1	801.4	-3.4	1.0095	0.9976
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4917	83.5	805.7	799.5	6.2	805.6	800.6	4.9	1.0001	0.9986
second point	4958	41.8	403.4	400.3	3.1	400.5	397.0	3.5	1.0072	1.0083
third point	4979	20.9	201.7	200.1	1.5	197.6	194.6	3.0	1.0207	1.0285
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.4	0.1	----	----
as left span	4917	83.5	805.7	376.1	429.6	810.0	378.2	431.8	0.9947	0.9945
								Average Correction Factor	1.0093	1.0118

Corrected As found	NO_X = 832.0 ppb	NO = 803.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.9%
Previous Response	NO_X = 824.8 ppb	NO = 800.2 ppb		*Percent Change	NO =	0.4%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.2	373.8	429.6	428.5	1.0025	99.7%
2nd GPT point (200 ppb O3)	797.2	586.4	217.0	215.3	1.0078	99.2%
3rd GPT point (100 ppb O3)	797.2	691.8	111.6	110.1	1.0134	98.7%
				Average Correction Factor	1.0079	99.2%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

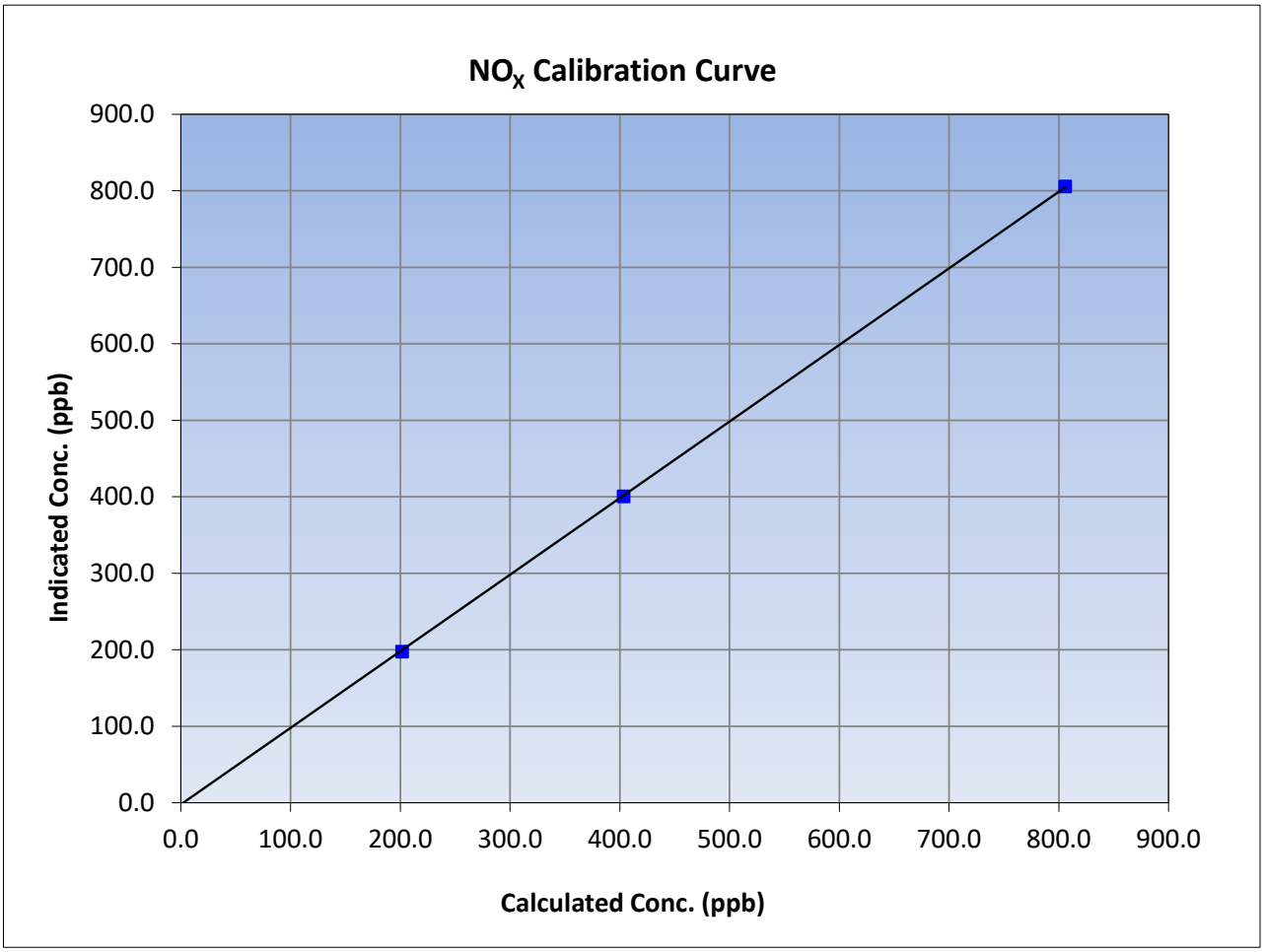
Version-04-2020

Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	December 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:37	End Time (MST):	14:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999967	≥0.995
805.7	805.6	1.0001			
403.4	400.5	1.0072	Slope	1.001306	0.90 - 1.10
201.7	197.6	1.0207			
			Intercept	-2.253060	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

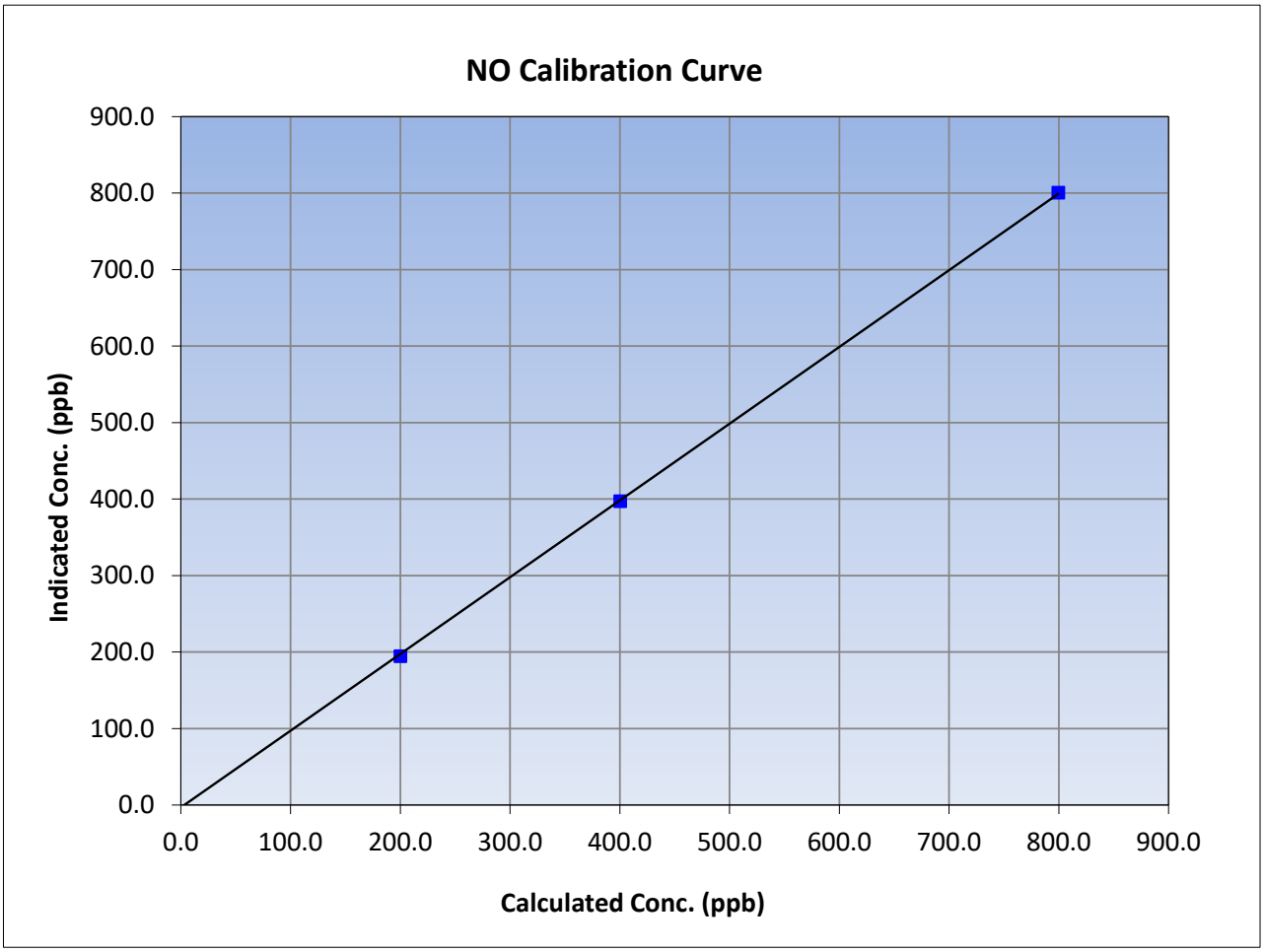
Version-04-2020

Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	December 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:37	End Time (MST):	14:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999934	≥0.995
799.5	800.6	0.9986			
400.3	397.0	1.0083	Slope	1.003396	0.90 - 1.10
200.1	194.6	1.0285			
			Intercept	-3.151422	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

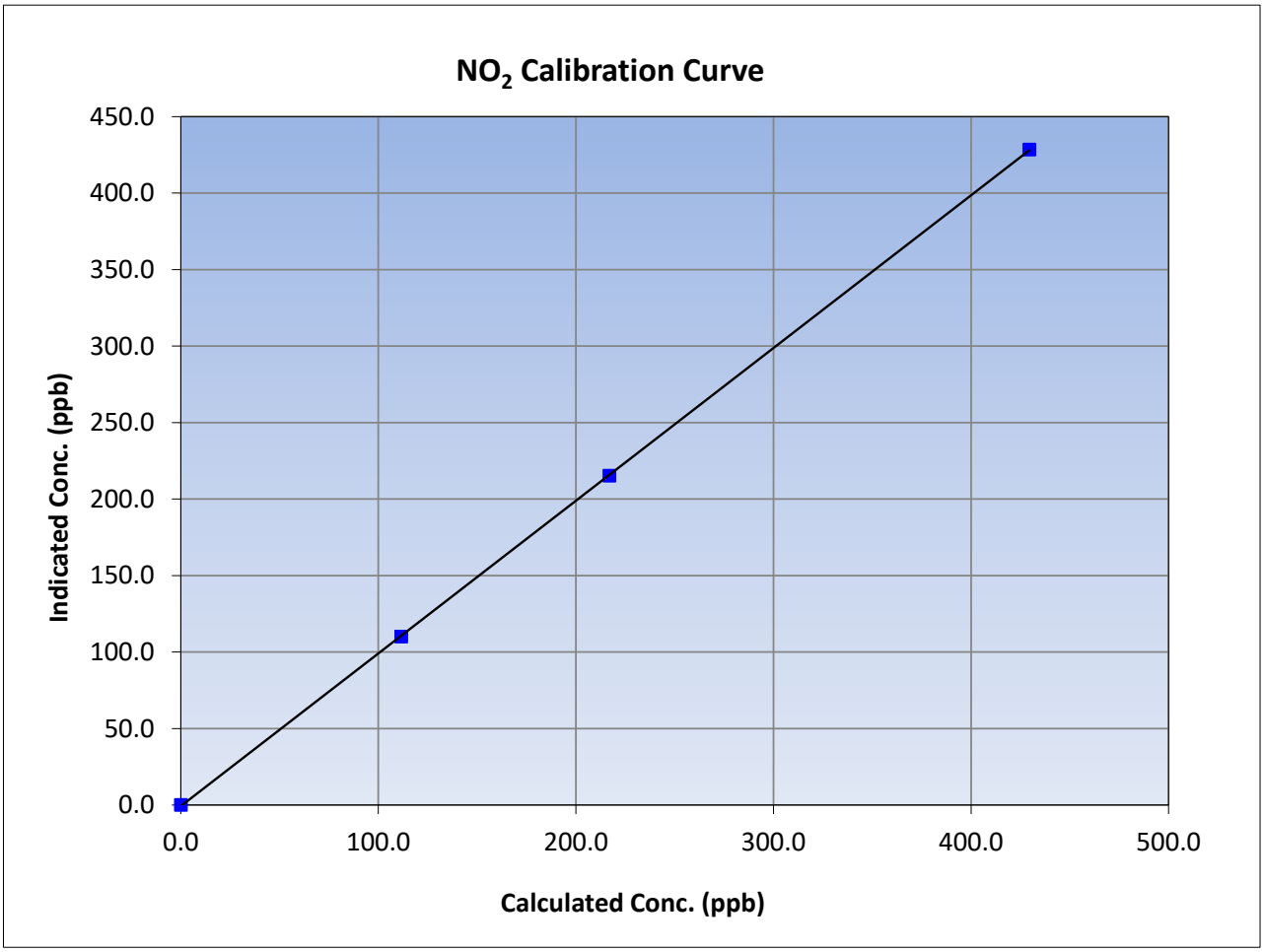
Version-04-2020

Station Information

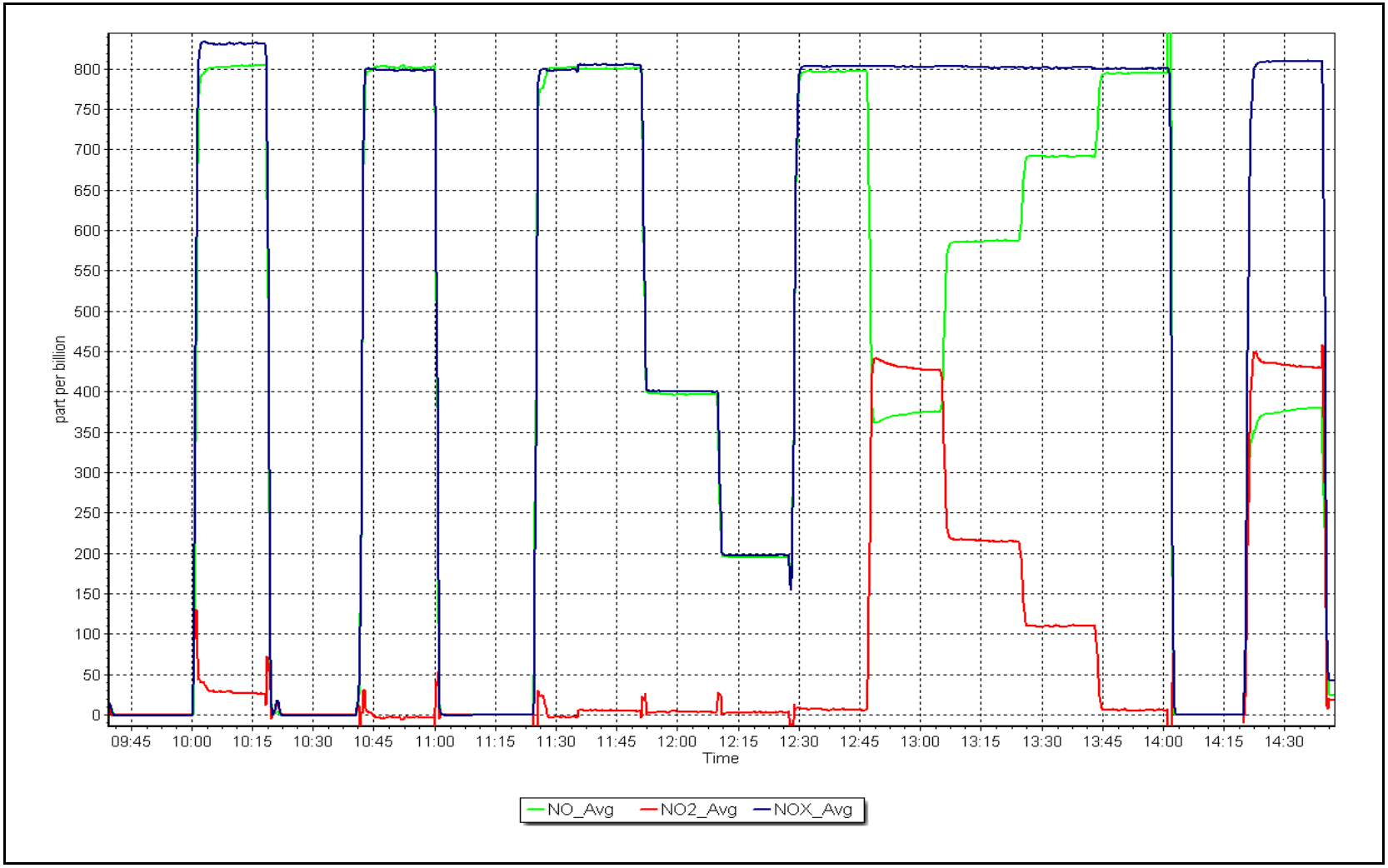
Calibration Date:	January 25, 2024	Previous Calibration:	December 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:37	End Time (MST):	14:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999987	≥0.995
429.6	428.5	1.0025			
217.0	215.3	1.0078	Slope	0.998110	0.90 - 1.10
111.6	110.1	1.0134			
			Intercept	-0.700632	+/-20



NO_X Calibration Plot Date: January 25, 2024 Location: Fort McKay South



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	January 5, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	10:02	End time (MST):	13:20
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	2448
ZAG Make/Model:	Teledyne API T701	Serial Number:	1117

Analyzer Information

Analyzer make:	Teledyne API T400	Analyzer serial #:	3871
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007857	1.000914	Backgd or Offset:	3.9	3.9
Calibration intercept:	0.000000	0.240000	Coeff or Slope:	0.971	0.971

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.7	----
as found span	5000	989.8	400.0	400.6	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.4	----
high point	5000	989.8	400.0	400.2	1.000
second point	5000	849.9	200.0	201.0	0.995
third point	5000	745.1	100.0	100.8	0.992
as left zero	5000	0.0	0.0	-0.6	----
as left span	5000	989.8	400.0	401.4	0.997
				Average Correction Factor	0.996

Baseline Corr As found:	401.3	Previous response	403.1	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

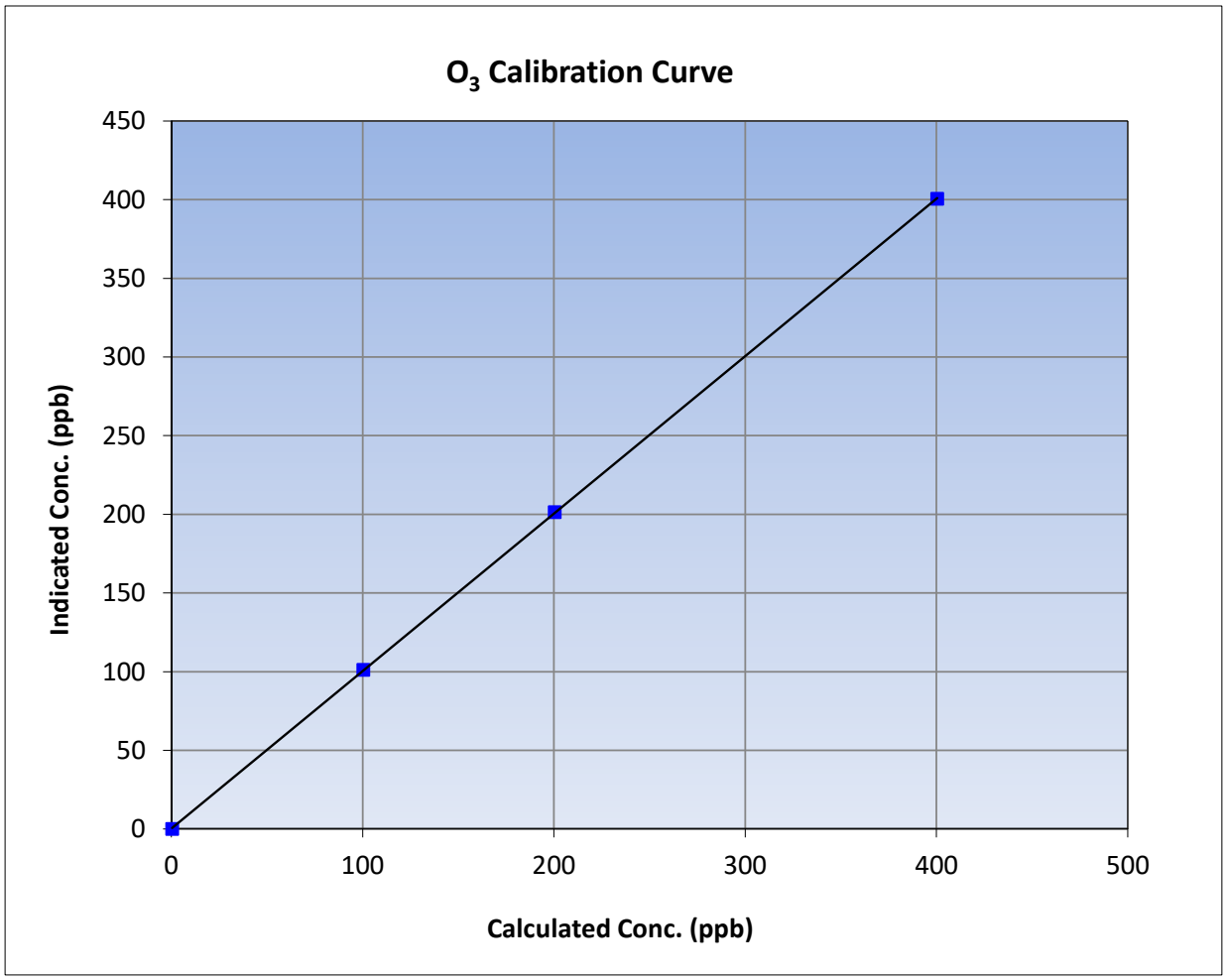
Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 13, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:02	End Time (MST):	13:20
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

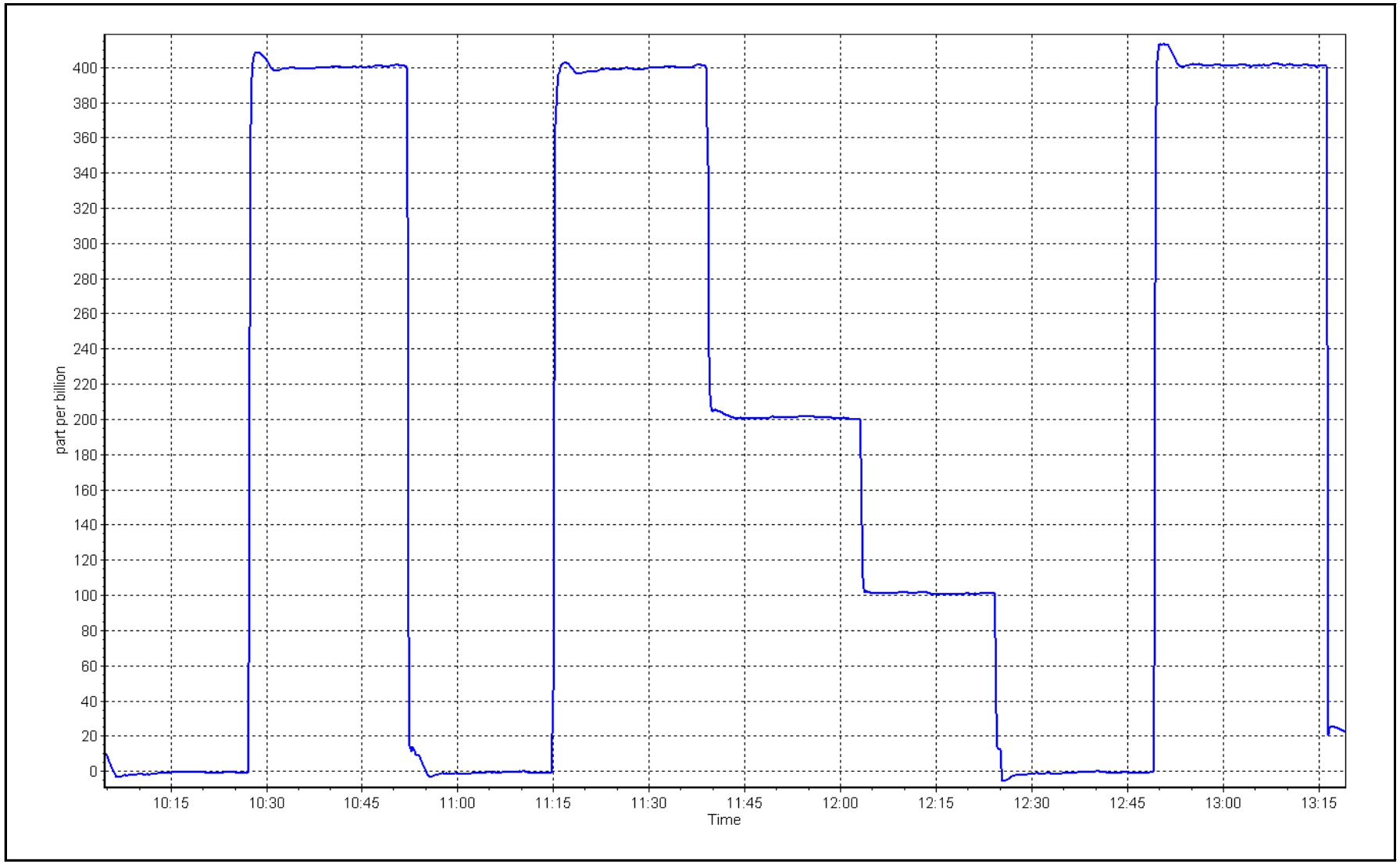
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.4	----
400.0	400.2	0.9995
200.0	201.0	0.9950
100.0	100.8	0.9921

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	1.000914	*0.90 - 1.10*
Intercept	0.240000	*+/- 5*



O_3 Calibration Plot Date: January 5, 2024 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:	January 22, 2024	Last Cal Date:	December 19, 2023
Start time (MST):	13:42	End time (MST):	14:43
Analyzer Make:	API T640	S/N:	1335
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388746
Temp/RH standard:	Alicat FP-25	S/N:	388746

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-17.70	-18.54	-17.70	☐	+/- 2 °C
P (mmHg)	735.20	737.20	735.20	☐	+/- 10 mmHg
flow (LPM)	4.92	4.81	4.92	☐	+/- 0.25 LPM

Leak Test: Date of check: January 22, 2024 Last Cal Date: December 19, 2023

PM w/o HEPA: 5.6 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	8.9	10.9	10.9	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 5.1 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: January 22, 2024

Disposable Filter Changed: January 22, 2024

Annual Maintenance

Date Sample Tube Cleaned: June 29, 2023

Date RH/T Sensor Cleaned: June 29, 2023

PMT peak test adjusted. Leak check passed.

Notes:

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	January 4, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	11:10	End time (MST):	14:30
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.95	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC279389			
Removed Cal Gas Conc:	49.95	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3060
ZAG Make/Model:	API T701H		Serial Number:	357

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 0710321322

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.984326	1.001175	Backgd or Offset:	25.3	25.6
Calibration intercept:	-1.112464	-1.861173	Coeff or Slope:	0.798	0.812

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.7	----
as found span	4938	80.3	799.3	780.2	1.024
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.2	----
high point	4938	80.3	799.3	800.3	0.999
second point	4979	40.2	400.1	395.9	1.011
third point	4998	20.2	201.1	197.2	1.020
as left zero	5000	0.0	0.0	1.0	----
as left span	4938	80.3	799.3	795.8	1.004
				Average Correction Factor	1.010

Baseline Corr As found:	779.50	Previous response	785.63	*% 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 span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

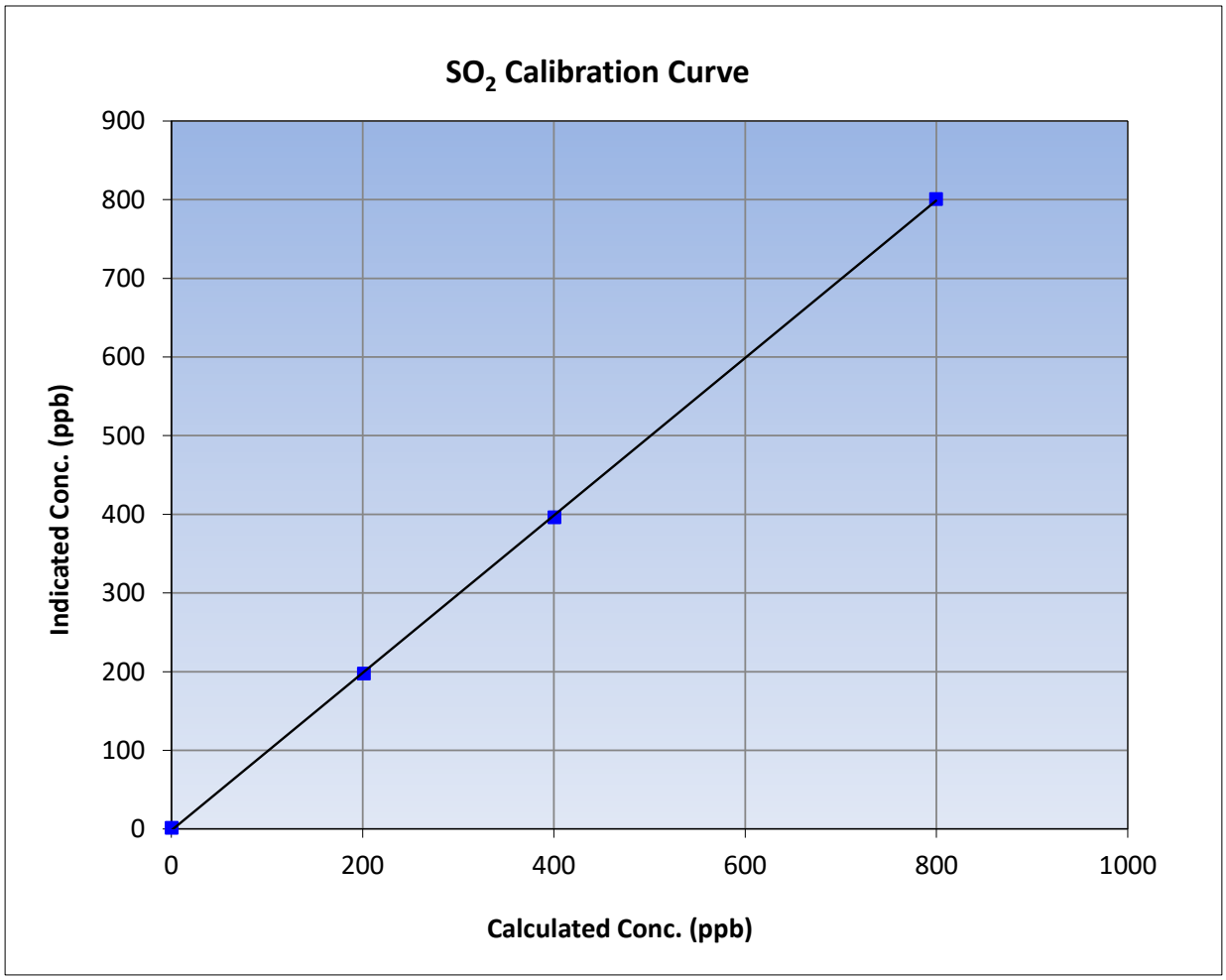
Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 7, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	11:10	End Time (MST):	14:30
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

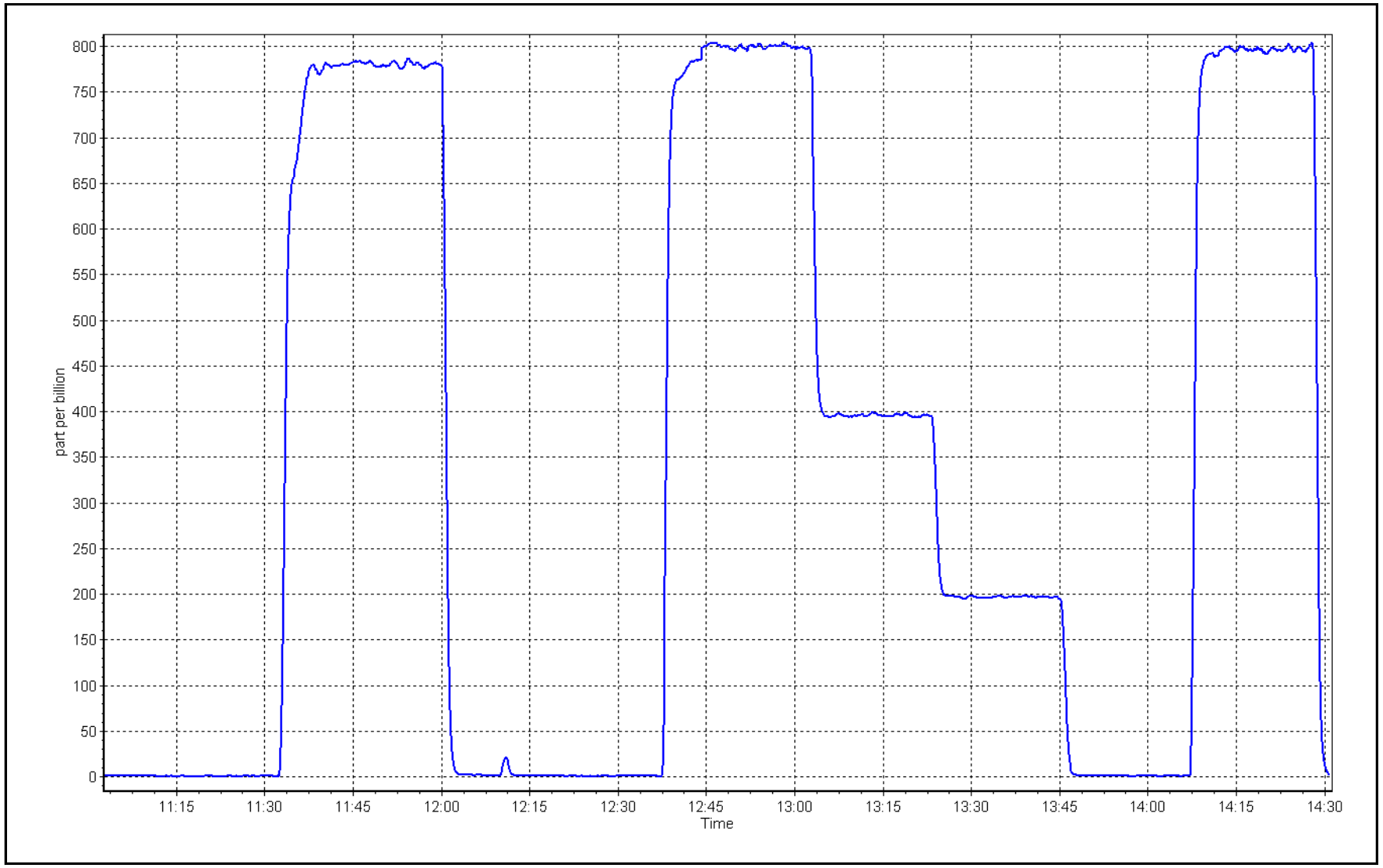
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.2	----
799.3	800.3	0.9987
400.1	395.9	1.0105
201.1	197.2	1.0196

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999926	*≥0.995*
Slope	1.001175	*0.90 - 1.10*
Intercept	-1.861173	*+/-30*



SO2 Calibration Plot Date: January 4, 2024 Location: Anzac



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	January 18, 2024	Last Cal Date:	December 5, 2023
Start time (MST):	10:50	End time (MST):	15:13
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.15	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC510379			
Removed Cal Gas Conc:	5.15	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3060
ZAG Make/Model:	API 701H		Serial Number:	357

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153582
Converter make:	CD Nova CDN-101		Converter serial #:	503
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.011740	1.012453	Backgd or Offset:	2.33	2.40
Calibration intercept:	-0.265448	-0.065392	Coeff or Slope:	0.992	1.043

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4938	77.9	80.0	77.4	1.032
as found 2nd point	4973	38.9	40.0	38.3	1.041
as found 3rd point	4997	19.5	20.0	19.0	1.048
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4938	77.9	80.0	80.9	0.988
second point	4973	38.9	40.0	40.5	0.987
third point	4997	19.5	20.0	19.9	1.006
as left zero	5000	0.0	0.0	0.3	----
as left span	4938	77.9	80.0	80.4	0.994
SO2 Scrubber Check	4936	80.3	800.4	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.993
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.5	Prev response:	80.66	*% change:	-4.1%
Baseline Corr 2nd AF pt:	38.4	AF Slope:	0.969763	AF Intercept:	-0.285258
Baseline Corr 3rd AF pt:	19.1	AF Correlation:	0.999970		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

TRS Calibration Summary

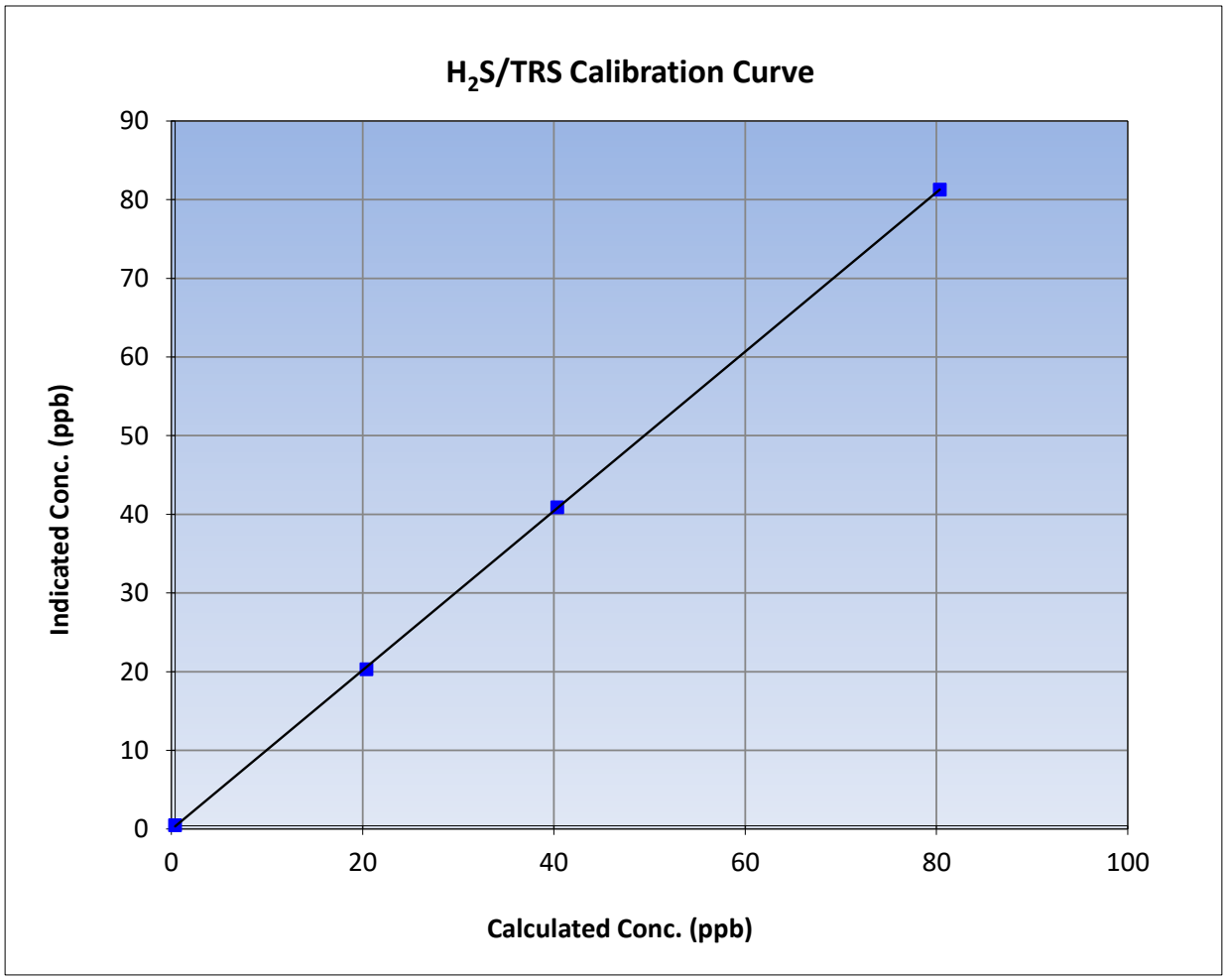
Version-11-2021

Station Information

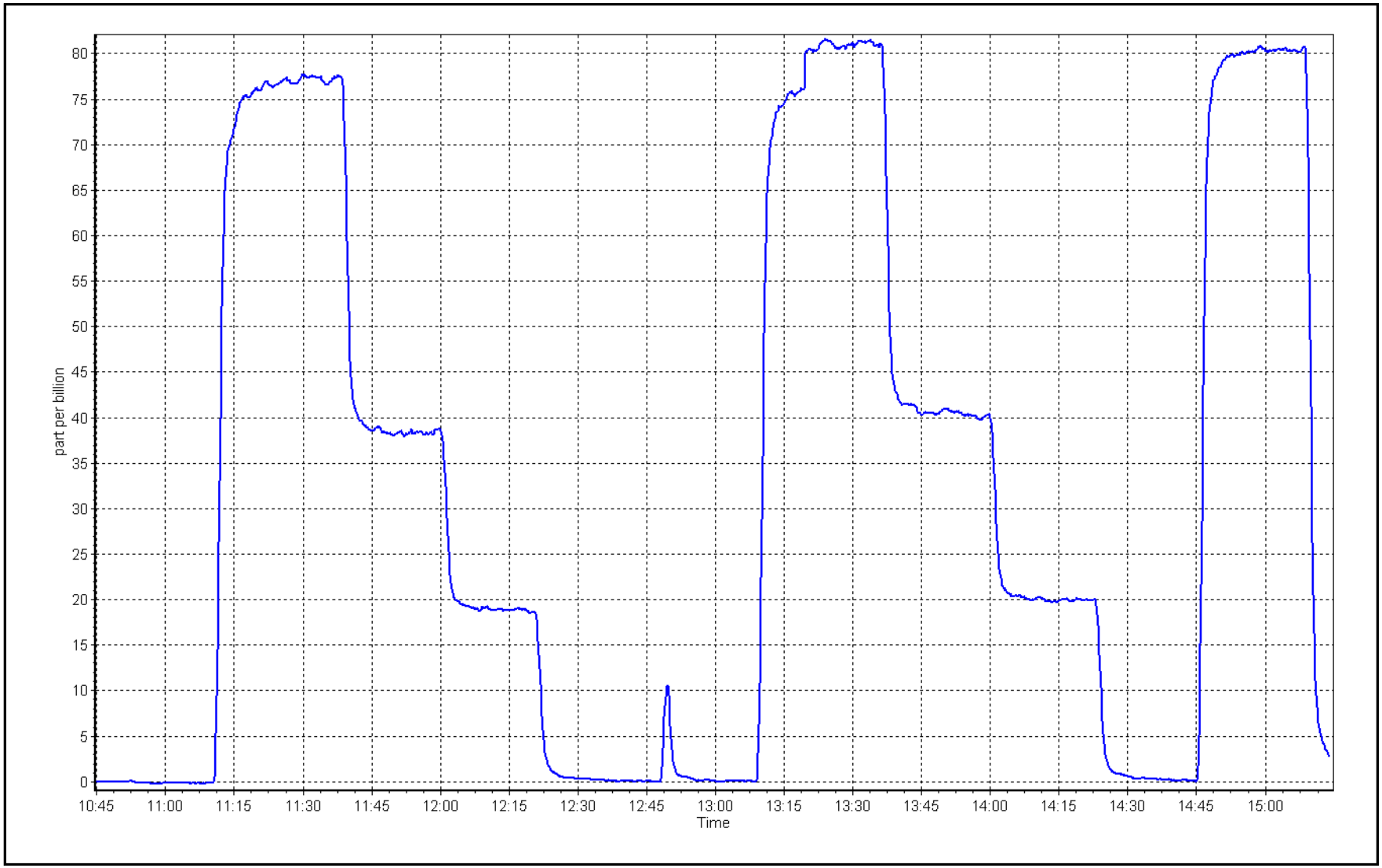
Calibration Date:	January 18, 2024	Previous Calibration:	December 5, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:50	End Time (MST):	15:13
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153582

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999965	*≥0.995*
80.0	80.9	0.9883			
40.0	40.5	0.9866	Slope	1.012453	*0.90 - 1.10*
20.0	19.9	1.0056			
			Intercept	-0.065392	*+/-3*



TRS Calibration Plot Date: January 18, 2024 Location: Anzac



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	January 4, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	11:10	End time (MST):	14:30
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3060	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.72E-04	3.89E-04	NMHC SP Ratio:	4.60E-05	4.60E-05
CH4 Retention time:	12.20	12.60	NMHC Peak Area:	198214	198370
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	17.10	16.83	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	17.10	17.20	0.994
second point	4979	40.2	8.56	8.49	1.008
third point	4998	20.2	4.30	4.23	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	17.10	17.15	0.997
				Average Correction Factor	1.007
Baseline Corr AF:	16.83	Prev response	17.18	*% change	-2.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	9.20	0.990
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	9.11	9.28	0.982
second point	4979	40.2	4.56	4.54	1.006
third point	4998	20.2	2.29	2.24	1.023
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	9.11	9.12	0.999
				Average Correction Factor	1.004
Baseline Corr AF:	9.20	Prev response	9.27	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	7.99	7.63	1.047
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	7.99	7.92	1.008
second point	4979	40.2	4.00	3.96	1.010
third point	4998	20.2	2.01	1.99	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	7.99	8.02	0.996
				Average Correction Factor	1.010
Baseline Corr AF:	7.63	Prev response	7.91	*% change	-3.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.007099	1.007150
THC Cal Offset:	-0.042334	-0.063715
CH4 Cal Slope:	0.992465	0.991854
CH4 Cal Offset:	-0.015977	-0.003590
NMHC Cal Slope:	1.019691	1.020347
NMHC Cal Offset:	-0.026156	-0.059525

Notes: Sample inlet filter and Nitrogen cylinder were changed after as founds. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

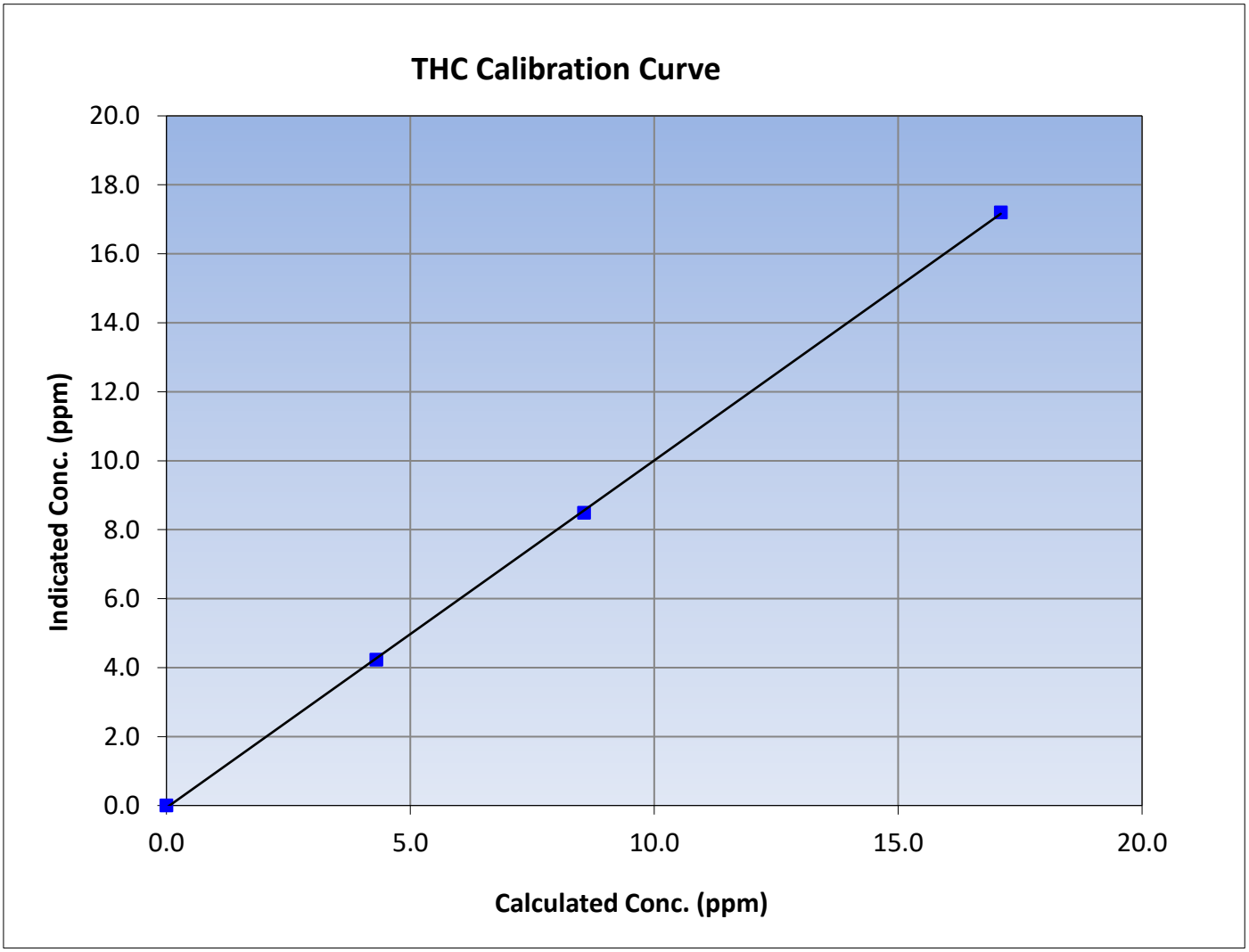
Version-06-2022

Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 7, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	11:10	End Time (MST):	14:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999927	≥0.995
17.10	17.20	0.9941			
8.56	8.49	1.0078	Slope	1.007150	0.90 - 1.10
4.30	4.23	1.0178			
			Intercept	-0.063715	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

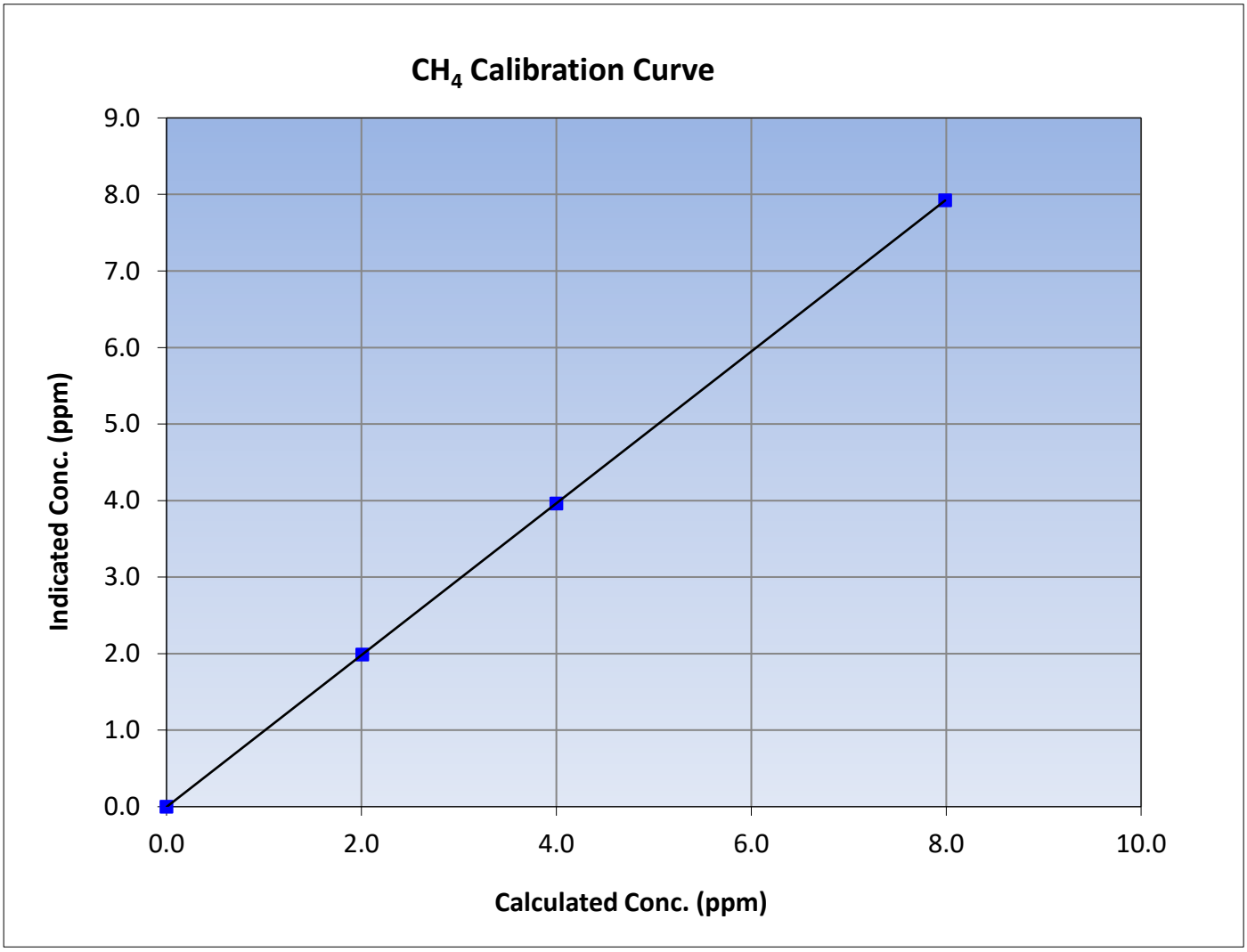
Version-06-2022

Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 7, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	11:10	End Time (MST):	14:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
7.99	7.92	1.0084			
4.00	3.96	1.0099	Slope	0.991854	*0.90 - 1.10*
2.01	1.99	1.0115			
			Intercept	-0.003590	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

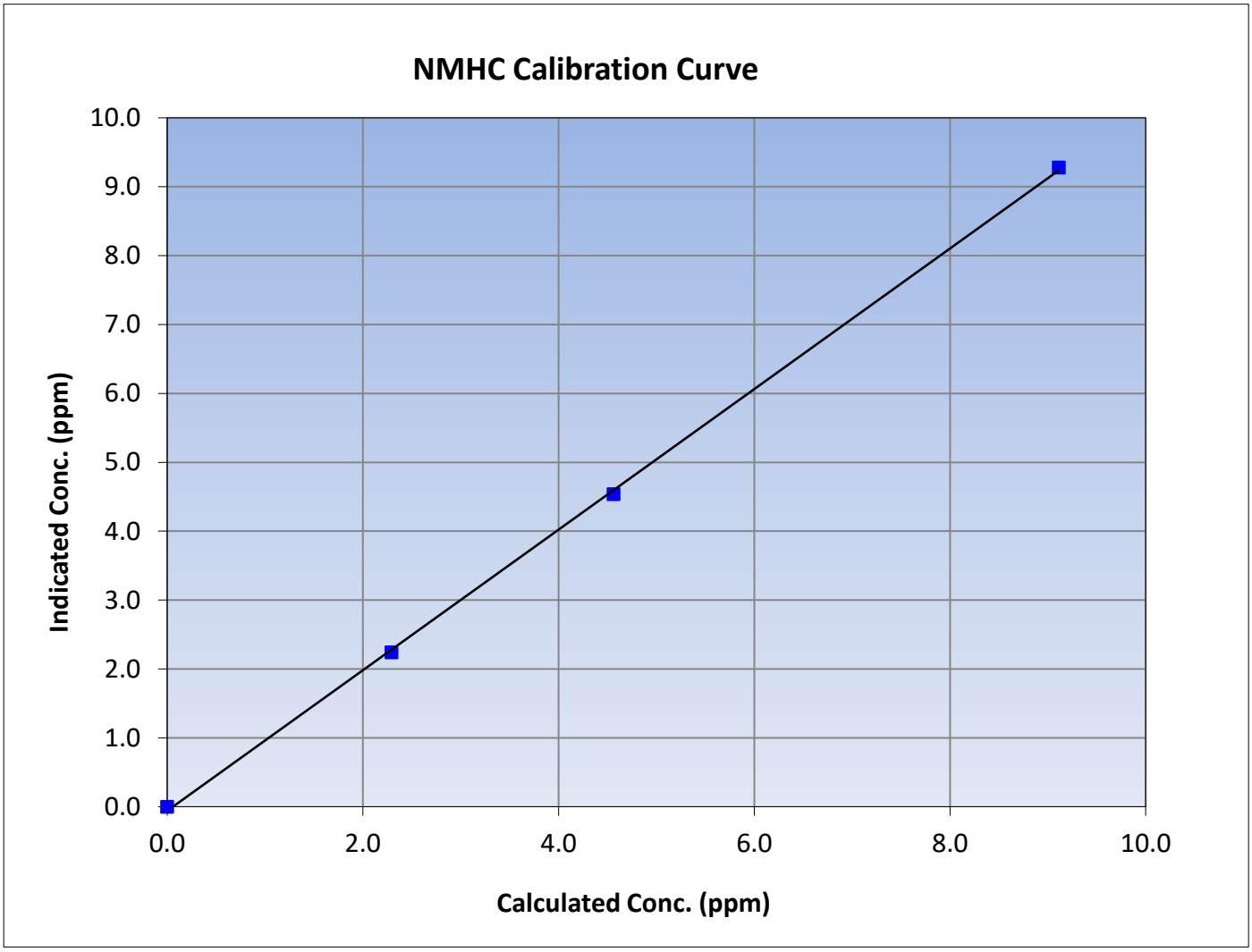
Version-06-2022

Station Information

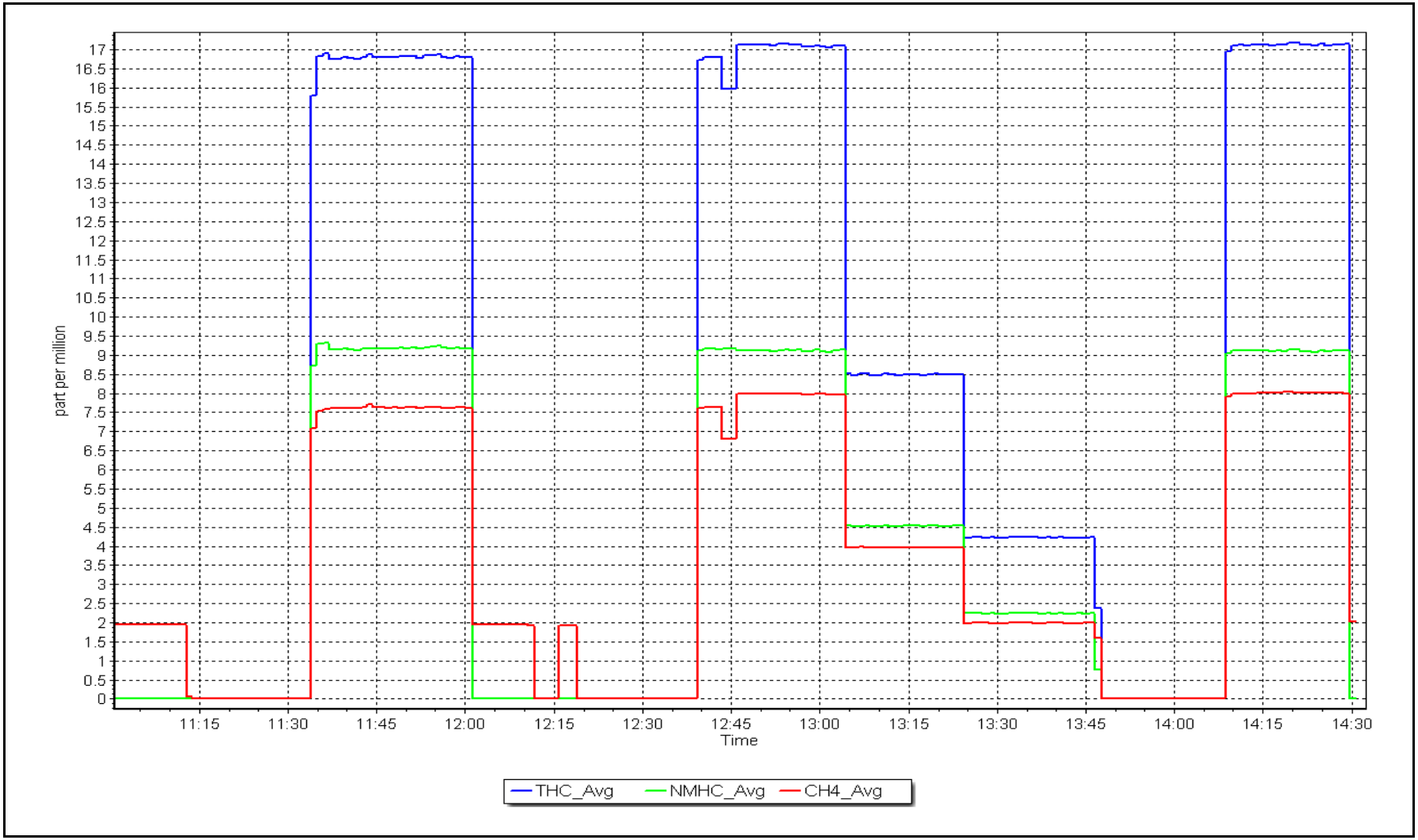
Calibration Date:	January 4, 2024	Previous Calibration:	December 7, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	11:10	End Time (MST):	14:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999783	≥0.995
9.11	9.28	0.9821			
4.56	4.54	1.0058	Slope	1.020347	0.90 - 1.10
2.29	2.24	1.0235			
			Intercept	-0.059525	+/-0.5



NMHC Calibration Plot Date: January 4, 2024 Location: Anzac



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	January 16, 2024	Last Cal Date:	January 4, 2024
Start time (MST):	11:10	End time (MST):	14:54
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3060	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.89E-04	4.20E-04	NMHC SP Ratio:	4.60E-05	4.60E-05
CH4 Retention time:	12.60	13.00	NMHC Peak Area:	198370	198389
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	17.10	16.56	1.033
as found 2nd point	4979	40.2	8.56	8.19	1.045
as found 3rd point	4998	20.2	4.30	4.08	1.055
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	17.10	17.05	1.003
second point	4979	40.2	8.56	8.50	1.007
third point	4998	20.2	4.30	4.25	1.014
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	17.10	17.14	0.998
				Average Correction Factor	1.008

Baseline Corr AF:	16.56	Prev response	17.16	*% change	-3.6%
Baseline Corr 2nd AF:	8.2	AF Slope:	0.969546	AF Intercept:	-0.054256
Baseline Corr 3rd AF:	4.1	AF Correlation:	0.999945	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	9.17	0.993
as found 2nd point	4979	40.2	4.56	4.52	1.009
as found 3rd point	4998	20.2	2.29	2.24	1.022
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	9.11	9.08	1.004
second point	4979	40.2	4.56	4.54	1.005
third point	4998	20.2	2.29	2.27	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	9.11	9.20	0.991
				Average Correction Factor	1.007

Baseline Corr AF:	9.17	Prev response	9.24	*% change	-0.7%
Baseline Corr 2nd AF:	4.5	AF Slope:	1.008095	AF Intercept:	-0.039867
Baseline Corr 3rd AF:	2.2	AF Correlation:	0.999903	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	7.99	7.39	1.081
as found 2nd point	4979	40.2	4.00	3.67	1.089
as found 3rd point	4998	20.2	2.01	1.84	1.094
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	7.99	7.97	1.002
second point	4979	40.2	4.00	3.96	1.010
third point	4998	20.2	2.01	1.98	1.015
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	7.99	7.94	1.006
				Average Correction Factor	1.009

Baseline Corr AF:	7.39	Prev response	7.92	*% change	-7.2%
Baseline Corr 2nd AF:	3.67	AF Slope:	0.925403	AF Intercept:	-0.013789
Baseline Corr 3rd AF:	1.84	AF Correlation:	0.999981	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.007150	0.997643
THC Cal Offset:	-0.063715	-0.024242
CH4 Cal Slope:	0.991854	0.998476
CH4 Cal Offset:	-0.003590	-0.016013
NMHC Cal Slope:	1.020347	0.996574
NMHC Cal Offset:	-0.059525	-0.007627

Notes: Adjusted the span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

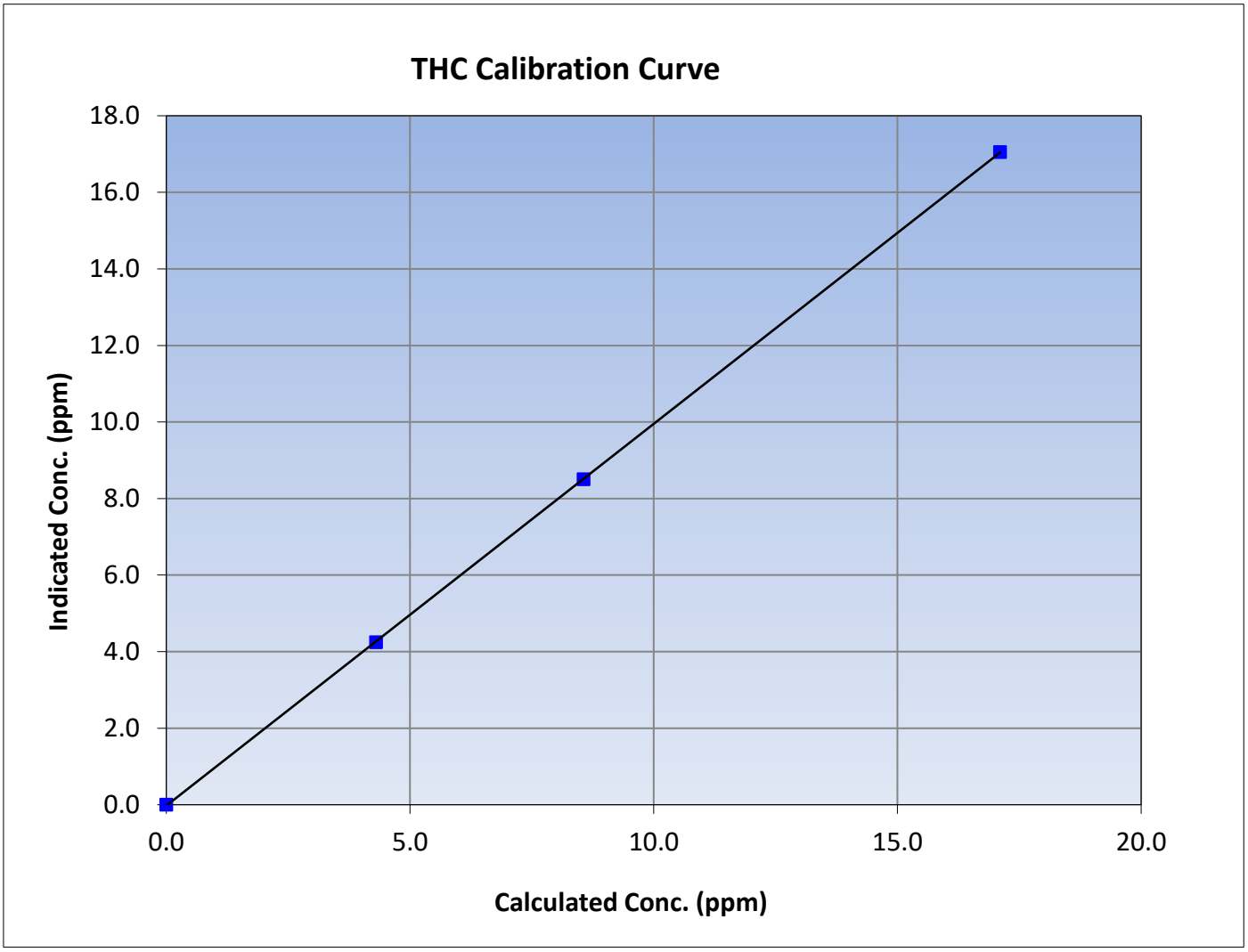
Version-06-2022

Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	January 4, 2024
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	11:10	End Time (MST):	14:54
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999991	≥0.995
17.10	17.05	1.0030			
8.56	8.50	1.0069	Slope	0.997643	0.90 - 1.10
4.30	4.25	1.0135			
			Intercept	-0.024242	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

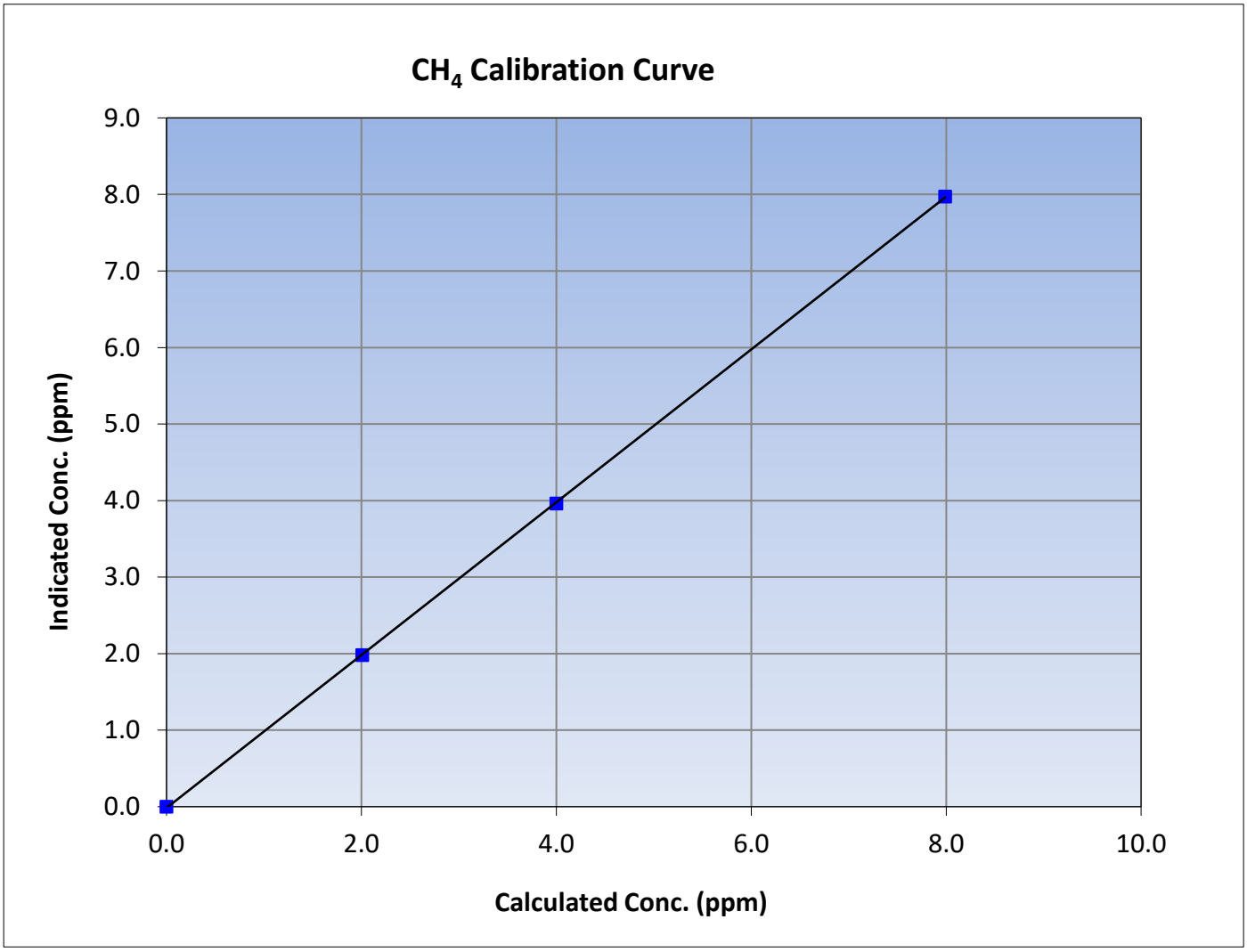
Version-06-2022

Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	January 4, 2024
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	11:10	End Time (MST):	14:54
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999979	*≥0.995*
7.99	7.97	1.0022			
4.00	3.96	1.0096	Slope	0.998476	*0.90 - 1.10*
2.01	1.98	1.0151			
			Intercept	-0.016013	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

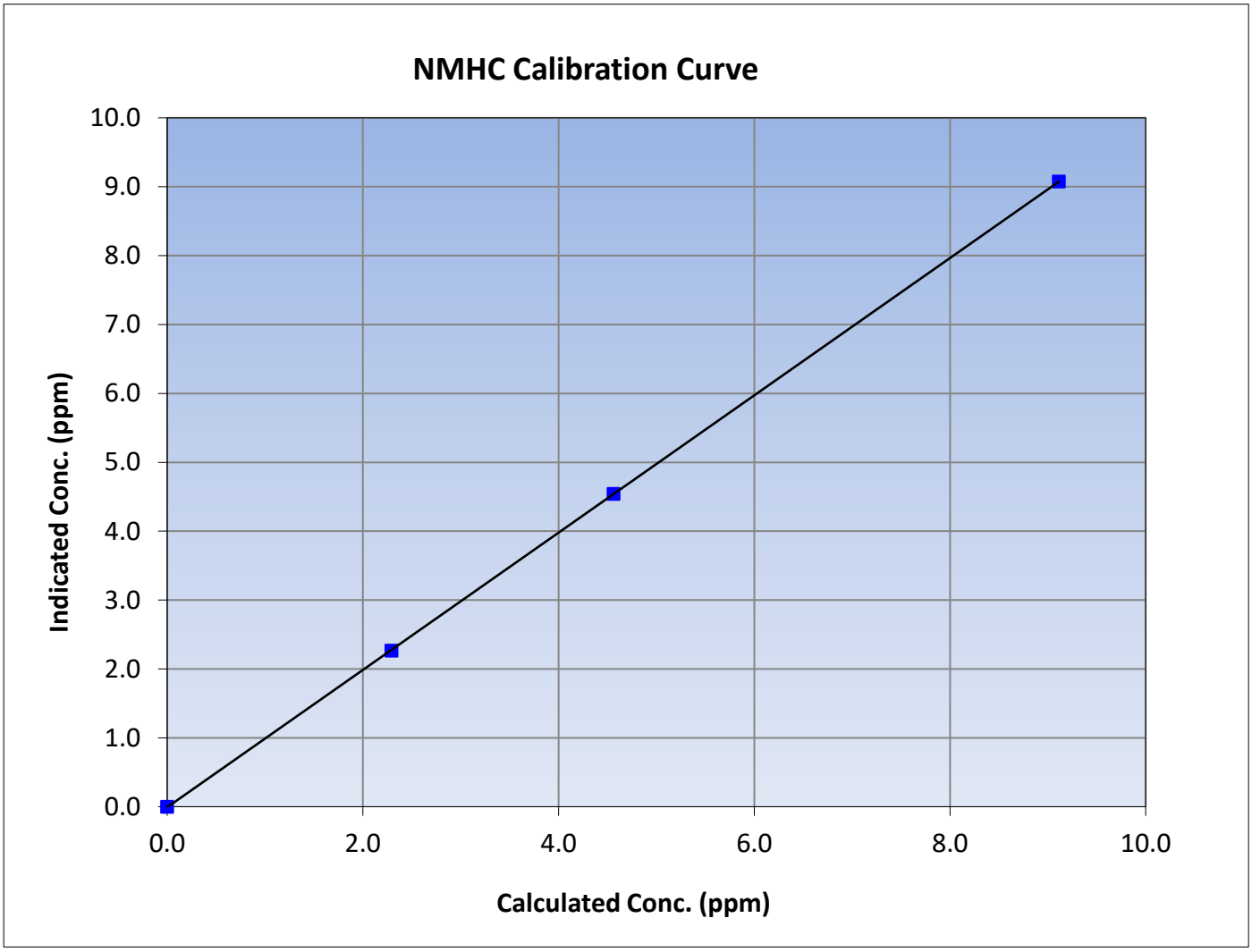
Version-06-2022

Station Information

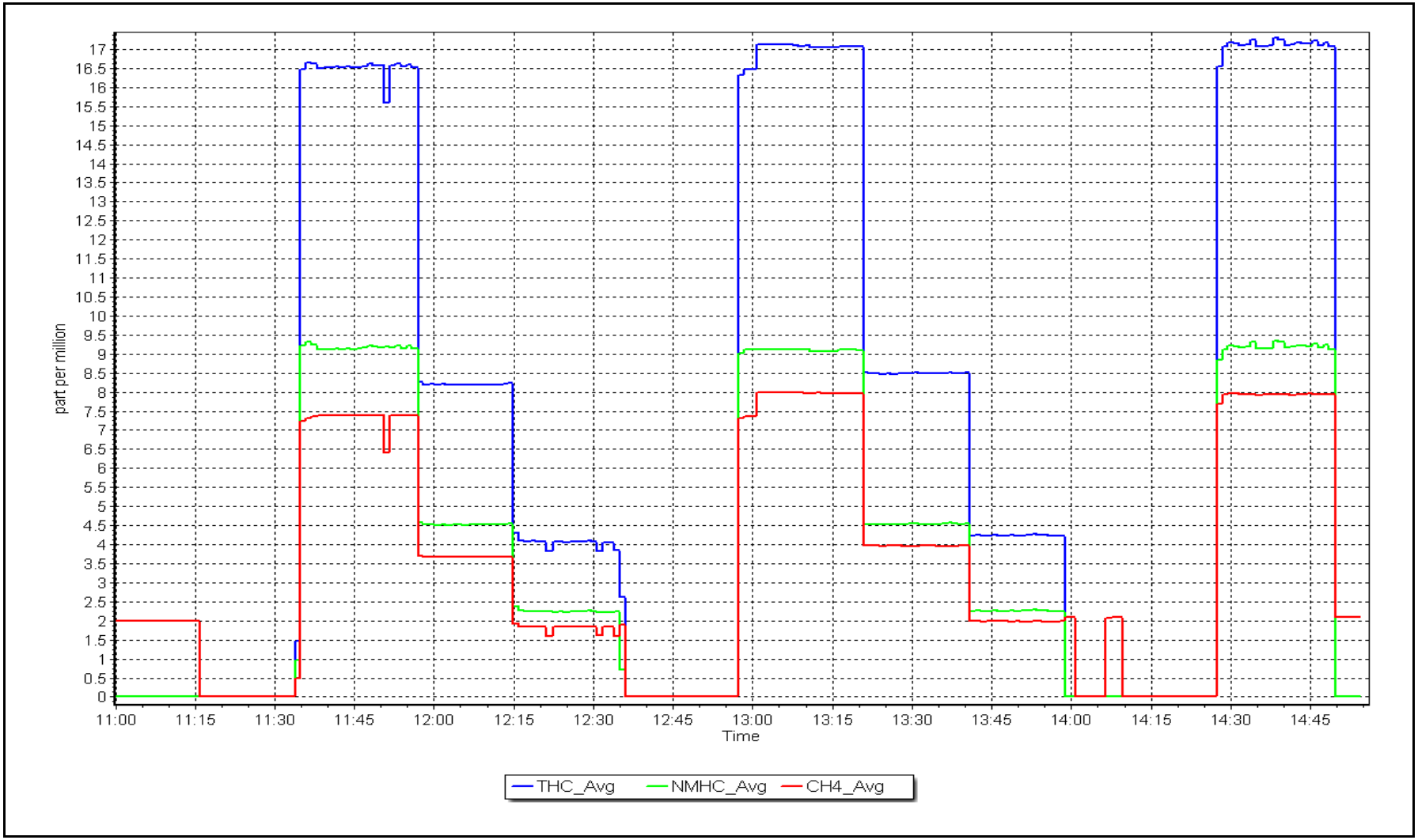
Calibration Date:	January 16, 2024	Previous Calibration:	January 4, 2024
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	11:10	End Time (MST):	14:54
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999995	≥0.995
9.11	9.08	1.0041			
4.56	4.54	1.0045	Slope	0.996574	0.90 - 1.10
2.29	2.27	1.0122			
			Intercept	-0.007627	+/-0.5



NMHC Calibration Plot Date: January 16, 2024 Location: Anzac



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	January 24, 2024	Last Cal Date:	January 16, 2024
Start time (MST):	10:14	End time (MST):	14:30
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3060	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	4.20E-04	4.72E-04	NMHC SP Ratio:	4.60E-05	4.80E-05
CH4 Retention time:	13.00	13.40	NMHC Peak Area:	198389	188364
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	17.10	15.87	1.078
as found 2nd point	4979	40.2	8.56	7.90	1.083
as found 3rd point	4998	20.2	4.30	3.95	1.091
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	17.10	17.13	0.998
second point	4979	40.2	8.56	8.51	1.007
third point	4998	20.2	4.30	4.26	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	17.10	17.14	0.998
				Average Correction Factor	1.005

Baseline Corr AF:	15.87	Prev response	17.04	*% change	-7.4%
Baseline Corr 2nd AF:	7.9	AF Slope:	0.928535	AF Intercept:	-0.026776
Baseline Corr 3rd AF:	3.9	AF Correlation:	0.999987	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	8.76	1.040
as found 2nd point	4979	40.2	4.56	4.33	1.055
as found 3rd point	4998	20.2	2.29	2.15	1.064
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	9.11	9.15	0.996
second point	4979	40.2	4.56	4.54	1.006
third point	4998	20.2	2.29	2.26	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	9.11	9.20	0.990
				Average Correction Factor	1.005
Baseline Corr AF:	8.76	Prev response	9.07	*% change	-3.6%
Baseline Corr 2nd AF:	4.3	AF Slope:	0.962578	AF Intercept:	-0.032175
Baseline Corr 3rd AF:	2.2	AF Correlation:	0.999927	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	7.99	7.11	1.124
as found 2nd point	4979	40.2	4.00	3.58	1.118
as found 3rd point	4998	20.2	2.01	1.79	1.122
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	7.99	7.98	1.001
second point	4979	40.2	4.00	3.97	1.008
third point	4998	20.2	2.01	2.00	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	7.99	7.94	1.006
				Average Correction Factor	1.005
Baseline Corr AF:	7.11	Prev response	7.96	*% change	-12.0%
Baseline Corr 2nd AF:	3.58	AF Slope:	0.889917	AF Intercept:	0.005397
Baseline Corr 3rd AF:	1.79	AF Correlation:	0.999990	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.997643	1.002215
THC Cal Offset:	-0.024242	-0.033495
CH4 Cal Slope:	0.998476	0.999209
CH4 Cal Offset:	-0.016013	-0.009829
NMHC Cal Slope:	0.996574	1.004825
NMHC Cal Offset:	-0.007627	-0.024066

Notes: Adjusted the span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

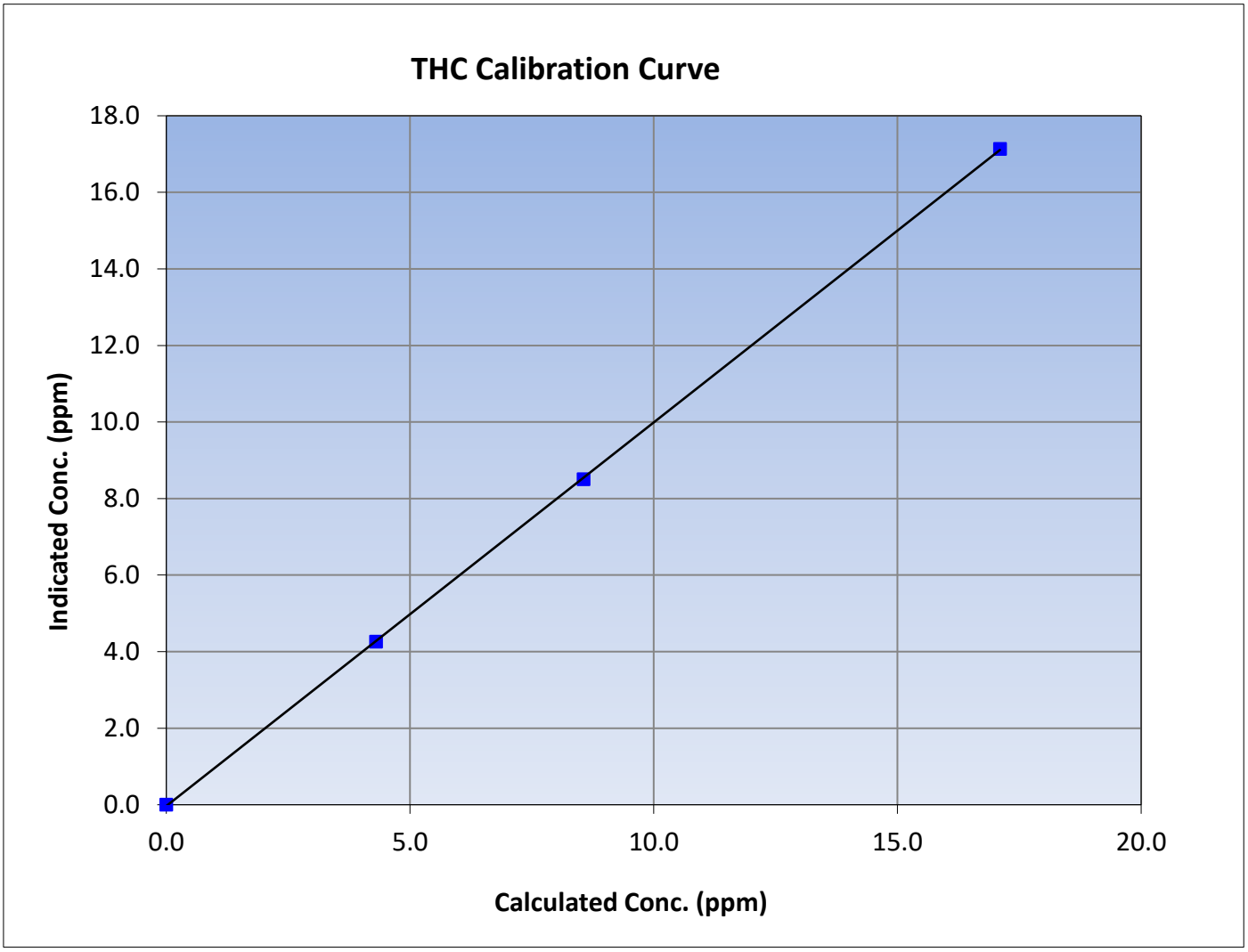
Version-06-2022

Station Information

Calibration Date:	January 24, 2024	Previous Calibration:	January 16, 2024
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:14	End Time (MST):	14:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999977	≥0.995
17.10	17.13	0.9983			
8.56	8.51	1.0065	Slope	1.002215	0.90 - 1.10
4.30	4.26	1.0097			
			Intercept	-0.033495	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

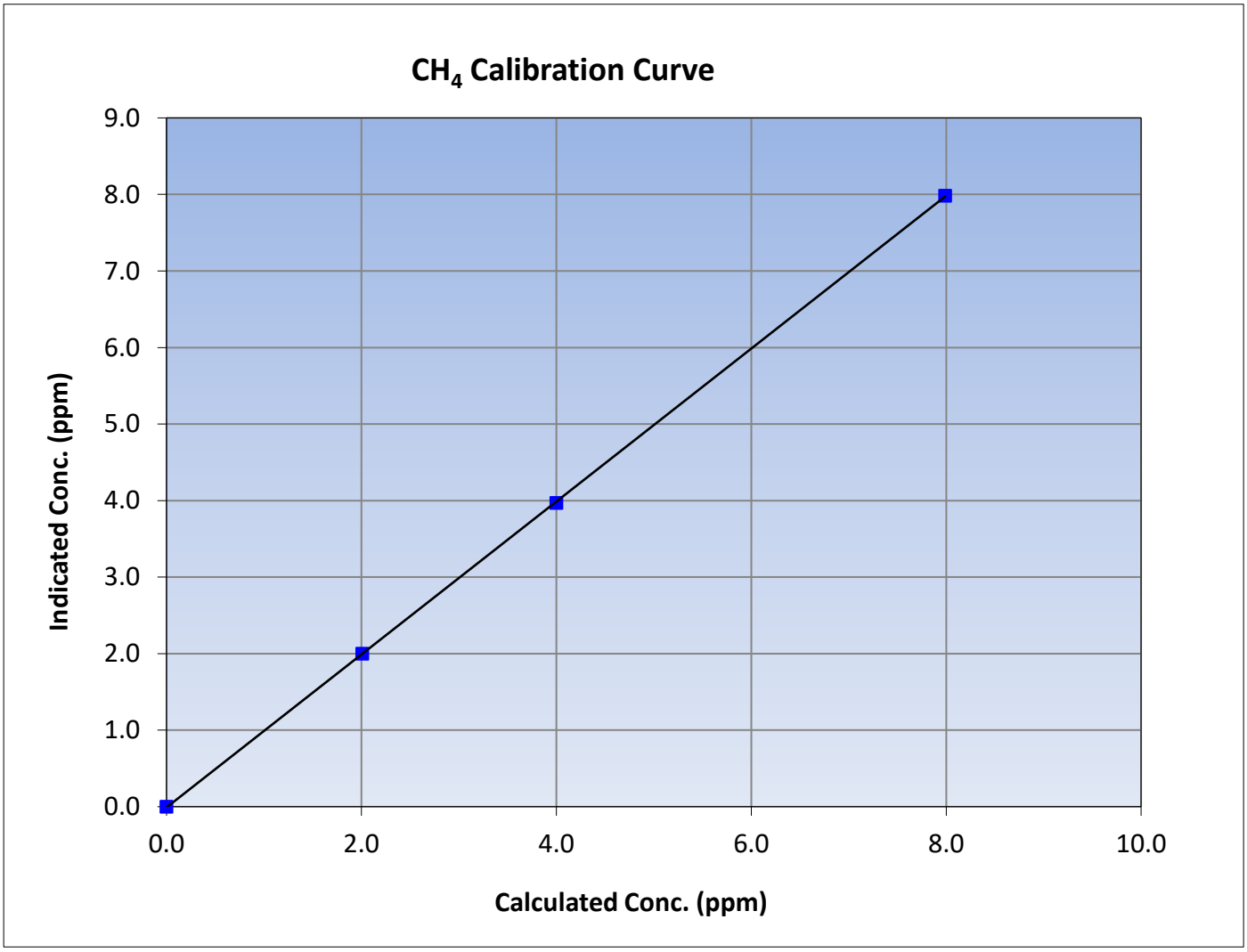
Version-06-2022

Station Information

Calibration Date:	January 24, 2024	Previous Calibration:	January 16, 2024
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:14	End Time (MST):	14:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999984	≥0.995
7.99	7.98	1.0008			
4.00	3.97	1.0081	Slope	0.999209	0.90 - 1.10
2.01	2.00	1.0059			
			Intercept	-0.009829	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

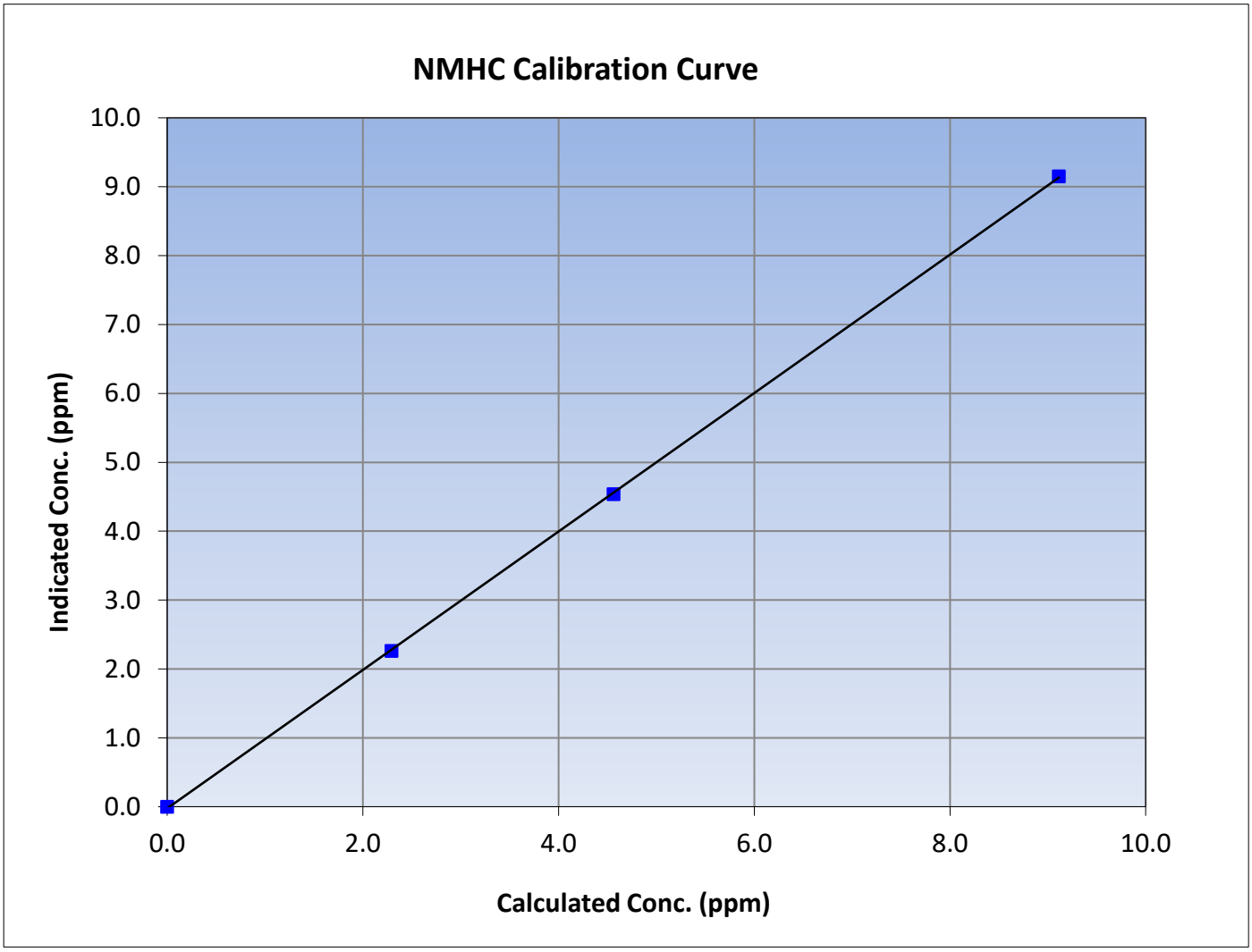
Version-06-2022

Station Information

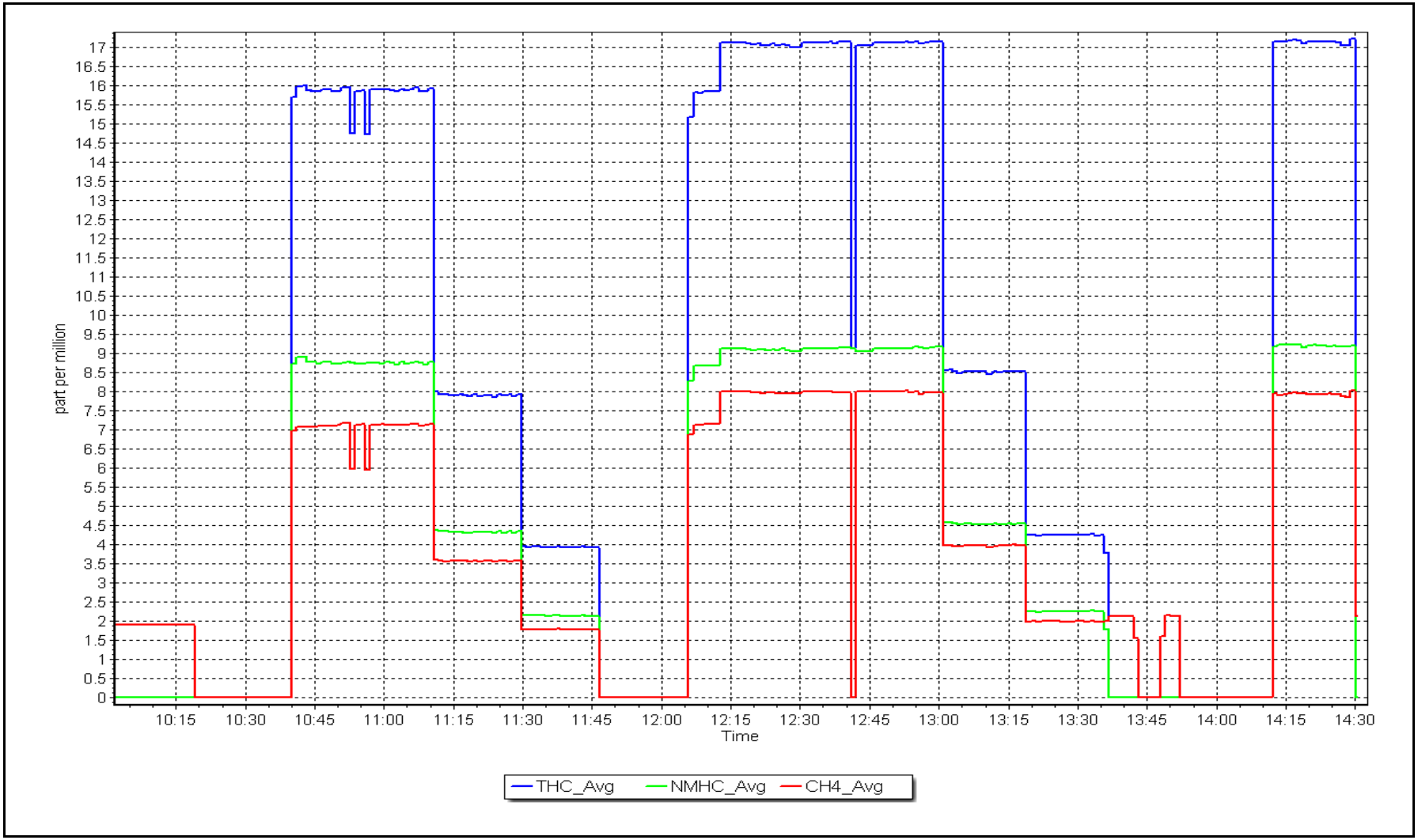
Calibration Date:	January 24, 2024	Previous Calibration:	January 16, 2024
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:14	End Time (MST):	14:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999964	≥0.995
9.11	9.15	0.9961			
4.56	4.54	1.0056	Slope	1.004825	0.90 - 1.10
2.29	2.26	1.0131			
			Intercept	-0.024066	+/-0.5



NMHC Calibration Plot Date: January 24, 2024 Location: Anzac



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	January 30, 2024	Last Cal Date:	January 24, 2024
Start time (MST):	9:56	End time (MST):	11:20
Reason:	Removal		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3060	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	4.72E-04	NA	NMHC SP Ratio:	4.80E-05	NA
CH4 Retention time:	13.40	NA	NMHC Peak Area:	188364	NA
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	17.10	16.08	1.063
as found 2nd point	4979	40.2	8.56	8.08	1.060
as found 3rd point	4998	20.2	4.30	4.02	1.071
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	16.08	Prev response	17.11	*% change	-6.4%
Baseline Corr 2nd AF:	8.1	AF Slope:	0.941139	AF Intercept:	-0.005949
Baseline Corr 3rd AF:	4.0	AF Correlation:	0.999989	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	8.80	1.036
as found 2nd point	4979	40.2	4.56	4.41	1.035
as found 3rd point	4998	20.2	2.29	2.18	1.050
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	8.80	Prev response	9.13	*% change	-3.8%
Baseline Corr 2nd AF:	4.4	AF Slope:	0.966685	AF Intercept:	-0.011819
Baseline Corr 3rd AF:	2.2	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 *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	7.99	7.28	1.097
as found 2nd point	4979	40.2	4.00	3.67	1.089
as found 3rd point	4998	20.2	2.01	1.83	1.096
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	7.28	Prev response	7.97	*% change	-9.5%
Baseline Corr 2nd AF:	3.67	AF Slope:	0.911756	AF Intercept:	0.006471
Baseline Corr 3rd AF:	1.83	AF Correlation:	0.999981	* = > +/-5% change initiates investigation	

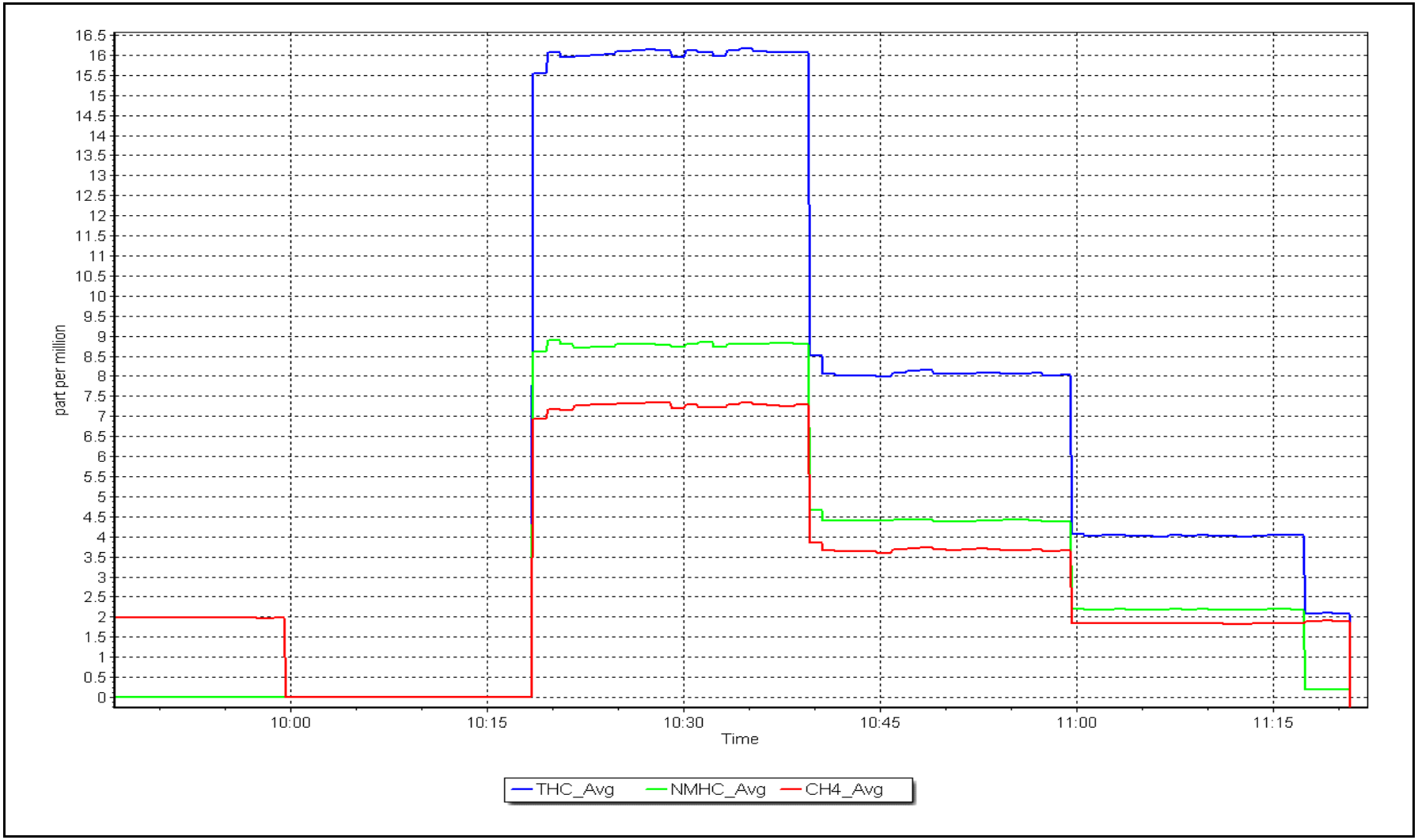
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002215	
THC Cal Offset:	-0.033495	
CH4 Cal Slope:	0.999209	
CH4 Cal Offset:	-0.009829	
NMHC Cal Slope:	1.004825	
NMHC Cal Offset:	-0.024066	

Notes: Removal only. Observed no changes in the analyzer's diagnostics, and there were no alarms, but internal maintenance may be required.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: January 30, 2024 Location: Anzac



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	January 31, 2024	Last Cal Date:	NA
Start time (MST):	10:32	End time (MST):	13:28
Reason:	Install		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3060	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	12227620776	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	NA	2.53E-04	NMHC SP Ratio:	NA	5.94E-05
CH4 Retention time:	NA	14.20	NMHC Peak Area:	NA	153300
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
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	4938	80.3	17.10	17.07	1.002
second point	4979	40.2	8.56	8.42	1.017
third point	4998	20.2	4.30	4.16	1.034
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	17.10	17.03	1.005
				Average Correction Factor	1.017

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
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	4938	80.3	9.11	9.09	1.003
second point	4979	40.2	4.56	4.49	1.016
third point	4998	20.2	2.29	2.22	1.031
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	9.11	9.05	1.007
				Average Correction Factor	1.017
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
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	4938	80.3	7.99	7.99	1.000
second point	4979	40.2	4.00	3.93	1.017
third point	4998	20.2	2.01	1.94	1.037
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	7.99	7.97	1.002
				Average Correction Factor	1.018
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:		1.000080
THC Cal Offset:		-0.078002
CH4 Cal Slope:		1.001814
CH4 Cal Offset:		-0.041197
NMHC Cal Slope:		0.998836
NMHC Cal Offset:		-0.037406

Notes: Installation. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

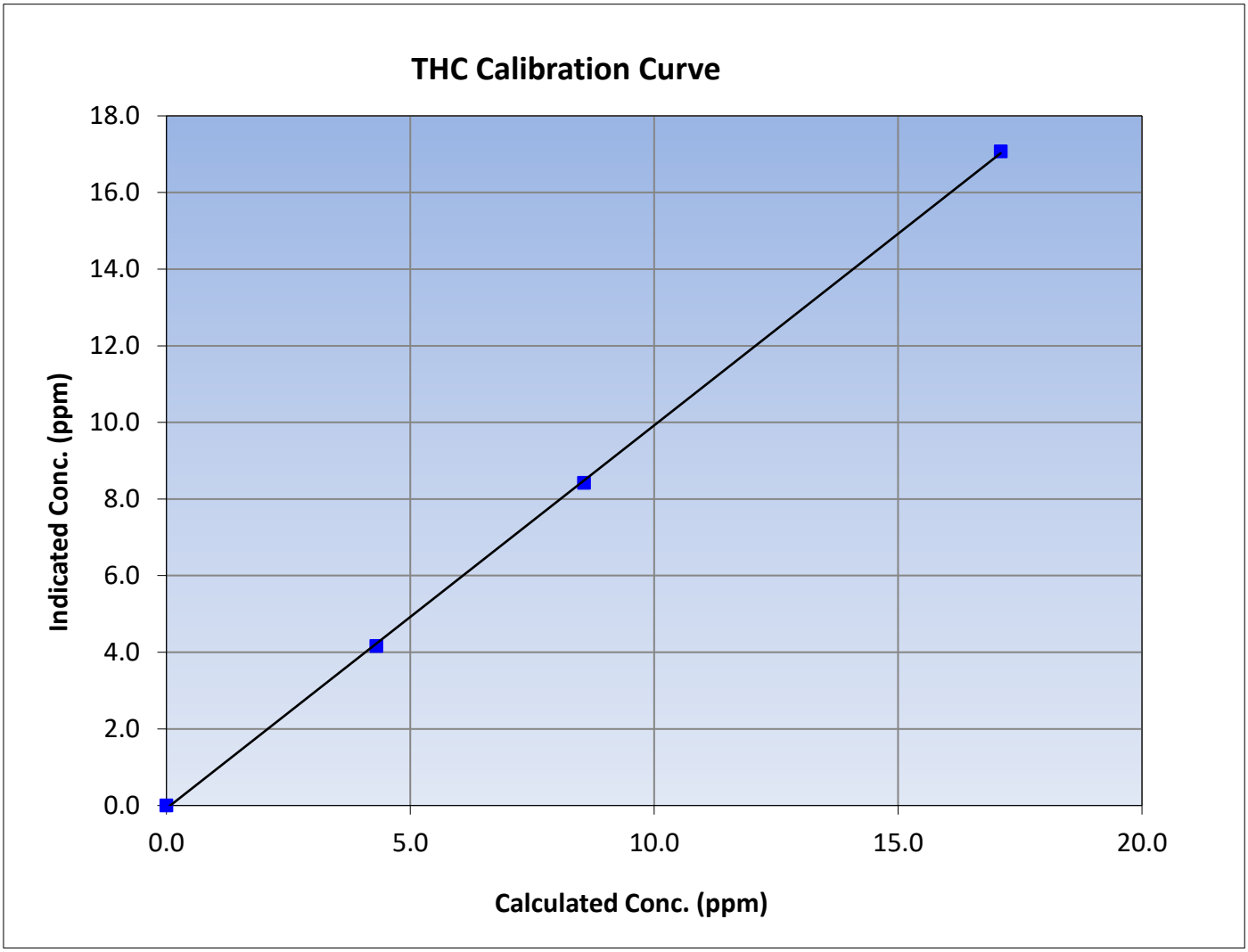
Version-06-2022

Station Information

Calibration Date:	January 31, 2024	Previous Calibration:	NA
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:32	End Time (MST):	13:28
Analyzer make:	Thermo 55i	Analyzer serial #:	12227620776

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999899	*≥0.995*
17.10	17.07	1.0017			
8.56	8.42	1.0166	Slope	1.000080	*0.90 - 1.10*
4.30	4.16	1.0337			
			Intercept	-0.078002	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

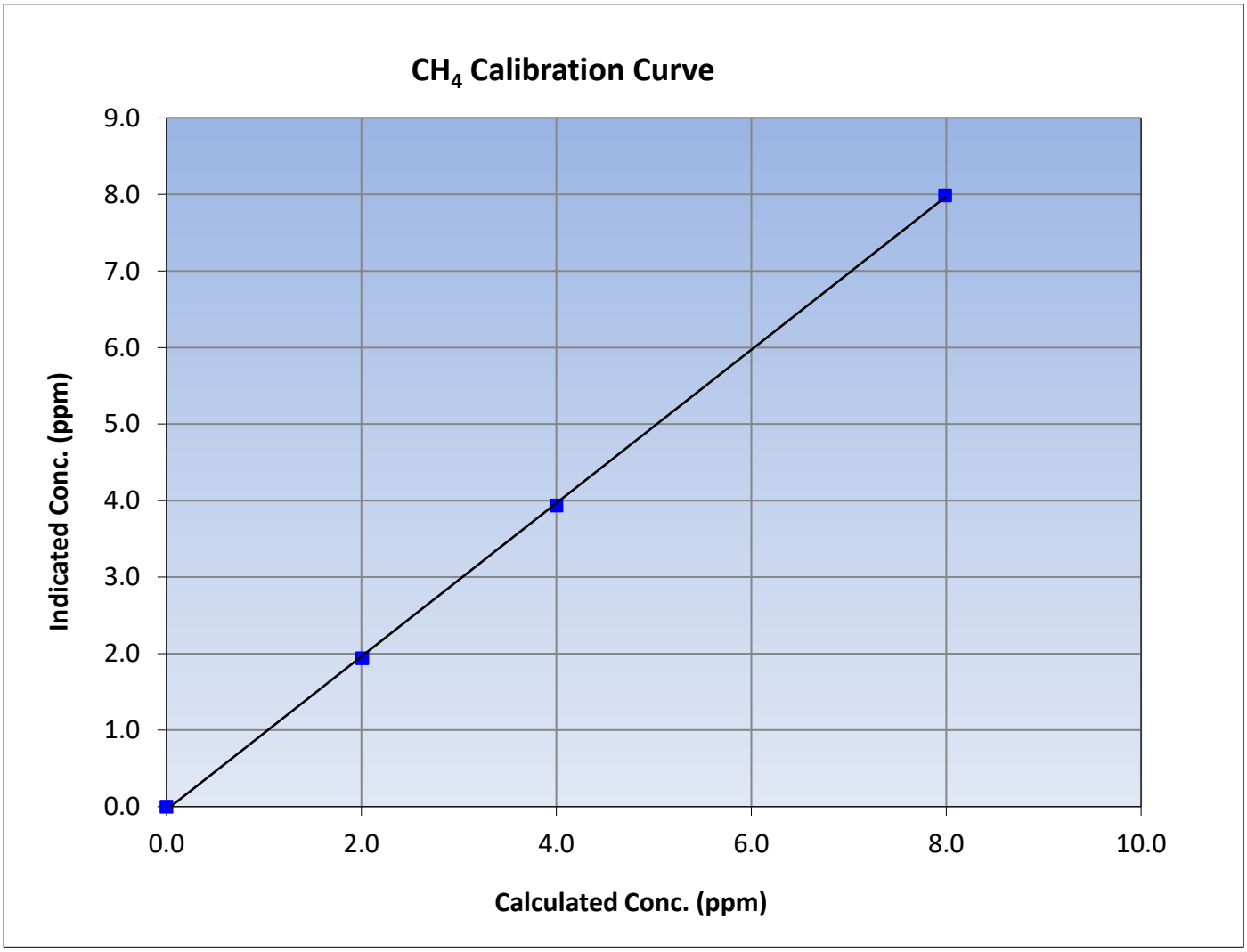
Version-06-2022

Station Information

Calibration Date:	January 31, 2024	Previous Calibration:	NA
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:32	End Time (MST):	13:28
Analyzer make:	Thermo 55i	Analyzer serial #:	12227620776

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999874	≥0.995
7.99	7.99	1.0003			
4.00	3.93	1.0165	Slope	1.001814	0.90 - 1.10
2.01	1.94	1.0371			
			Intercept	-0.041197	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

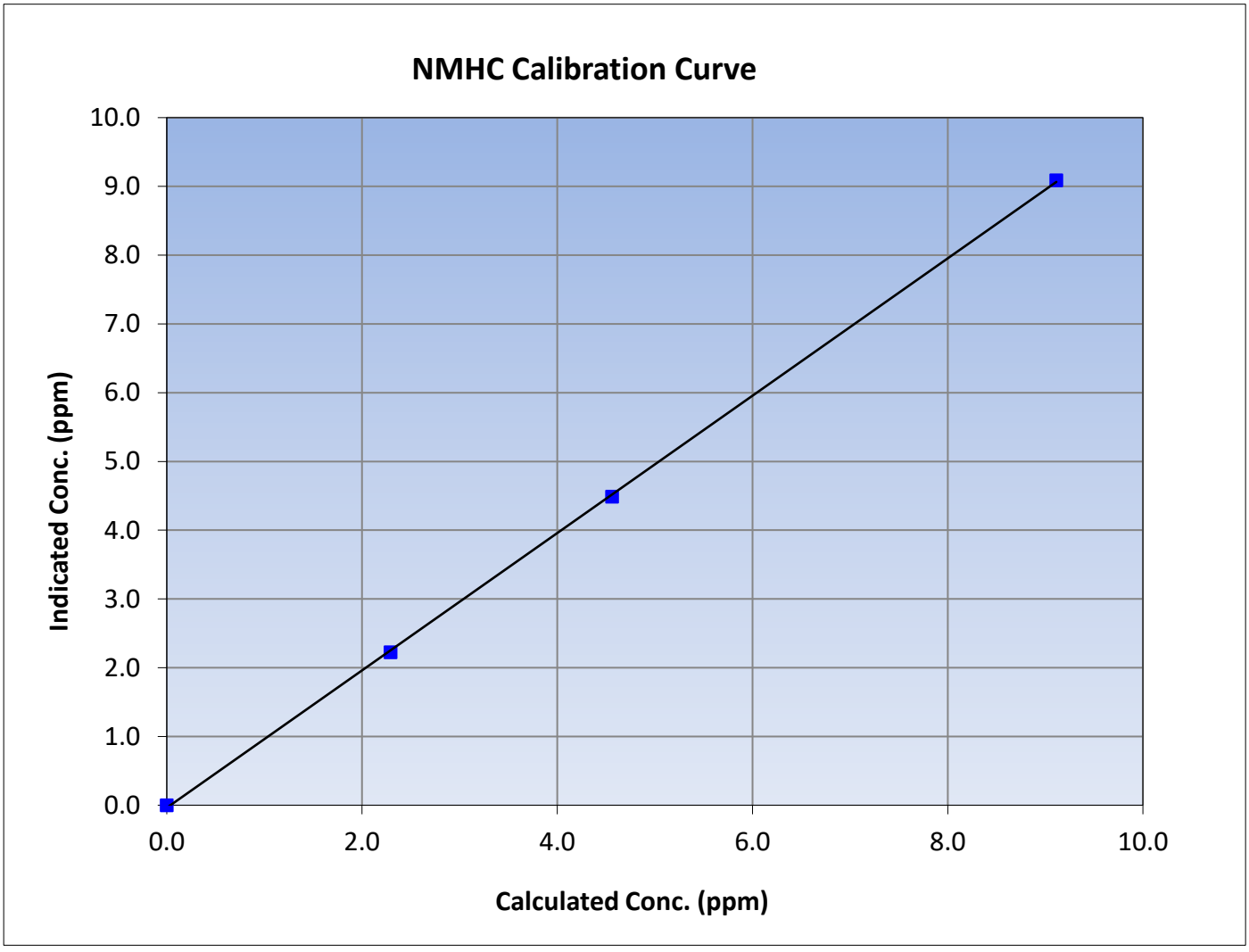
Version-06-2022

Station Information

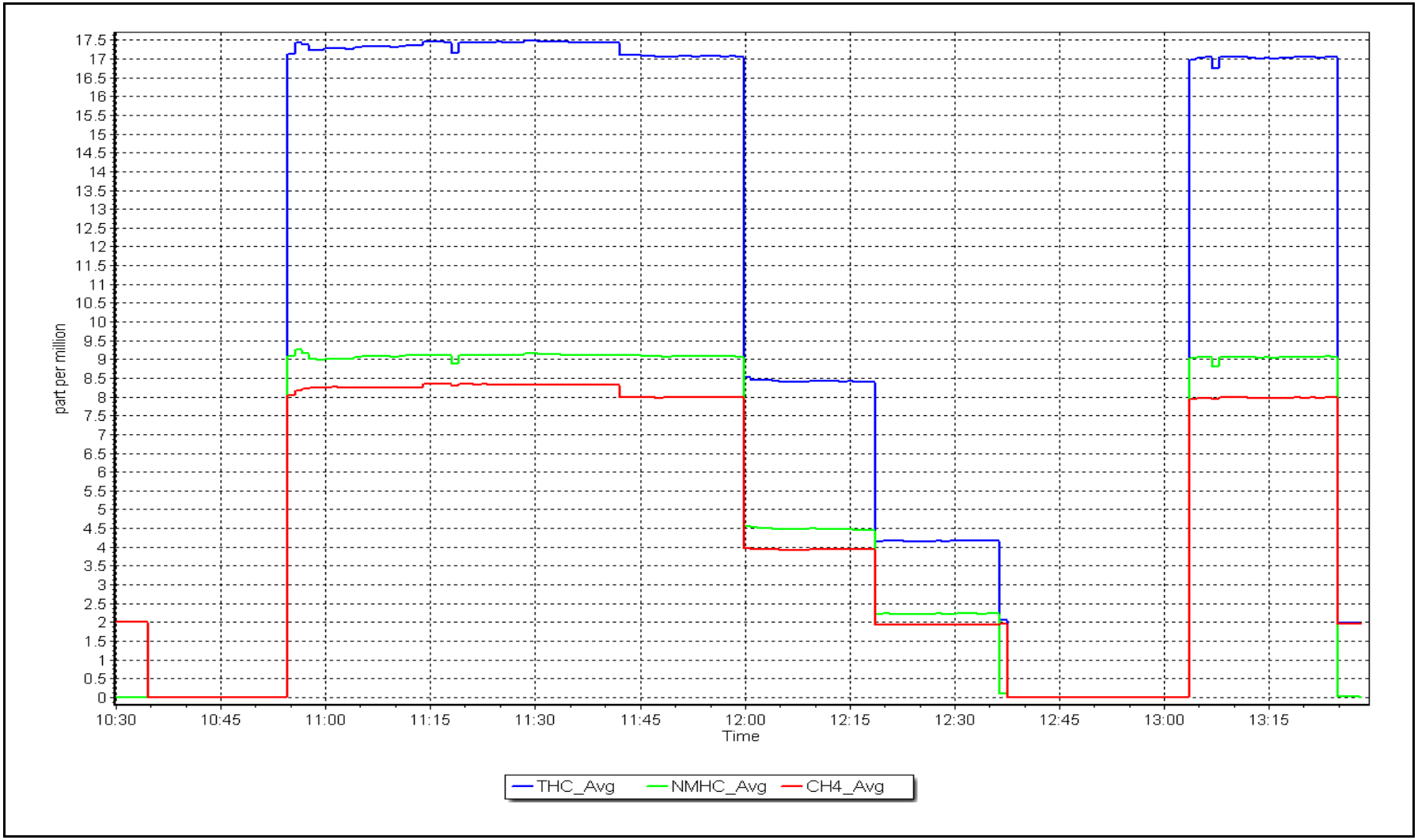
Calibration Date:	January 31, 2024	Previous Calibration:	NA
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:32	End Time (MST):	13:28
Analyzer make:	Thermo 55i	Analyzer serial #:	12227620776

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999918	≥0.995
9.11	9.09	1.0028			
4.56	4.49	1.0164	Slope	0.998836	0.90 - 1.10
2.29	2.22	1.0313			
			Intercept	-0.037406	+/-0.5



NMHC Calibration Plot Date: January 31, 2024 Location: Anzac



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	January 5, 2024	Last Cal Date:	December 4, 2023
Start time (MST):	10:50	End time (MST):	16:45
Reason:	Cylinder Change		

Calibration Standards

NO Gas Cylinder #:	DT0037092		Cal Gas Expiry Date:	May 16, 2031	
NOX Cal Gas Conc:	60.7	ppm	NO Cal Gas Conc:	60.4	ppm
Removed Cylinder #:	T2Y1P8D		Removed Gas Exp Date:	December 11, 2023	
Removed Gas NOX Conc:	50.9	ppm	Removed Gas NO Conc:	50.1	ppm
NOX gas Diff:	-1.7%		NO gas Diff:	-0.7%	
Calibrator Model:	Teledyne API T700		Serial Number:	3060	
ZAG make/model:	Teledyne API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1426262592	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.411	1.411	NO bkgnd or offset:	3.8	3.8
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.8	3.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	158.2	159.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001131	0.995638
NO_X Cal Offset:	-0.568562	-0.669728
NO Cal Slope:	1.001791	1.002181
NO Cal Offset:	-2.406556	-2.129361
NO_2 Cal Slope:	1.001950	0.992183
NO_2 Cal Offset:	0.975434	-0.766639

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.2	----	----
as found span	4936	80.2	814.1	800.2	13.9	825.8	807.6	18.1	0.9859	0.9908
as found 2nd										
as found 3rd										
new cyl resp	4934	66.3	804.8	800.9	4.0	802.8	802.6	0.3	1.0025	0.9978
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.1	----	----
high point	4934	66.3	804.8	800.9	4.0	800.8	801.2	-0.5	1.0050	0.9996
second point	4985	33.2	401.6	399.6	2.0	399.5	398.2	1.3	1.0052	1.0035
third point	5004	16.7	201.9	200.9	1.0	199.1	196.6	2.5	1.0141	1.0219
as left zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.1	----	----
as left span	4934	66.3	804.8	416.3	388.6	804.8	414.2	390.7	1.0000	1.0050
								Average Correction Factor	1.0081	1.0083

Corrected As found	NO_X =	825.9 ppb	NO =	807.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.4%
Previous Response	NO_X =	814.5 ppb	NO =	799.2 ppb		*Percent Change	NO =	1.1%
Baseline Corr 2nd pt	NO_X = NA	ppb	NO = NA	ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA	ppb	NO = NA	ppb	As found NO r^2:	NO Sl:	NO Int:	
					As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.0	415.4	388.6	385.4	1.0082	99.2%
2nd GPT point (200 ppb O3)	800.0	605.2	198.8	195.5	1.0168	98.4%
3rd GPT point (100 ppb O3)	800.0	704.8	99.2	97.1	1.0214	97.9%
				Average Correction Factor	1.0155	98.5%

Notes: Sample inlet filter and cal gas cylinder changed after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

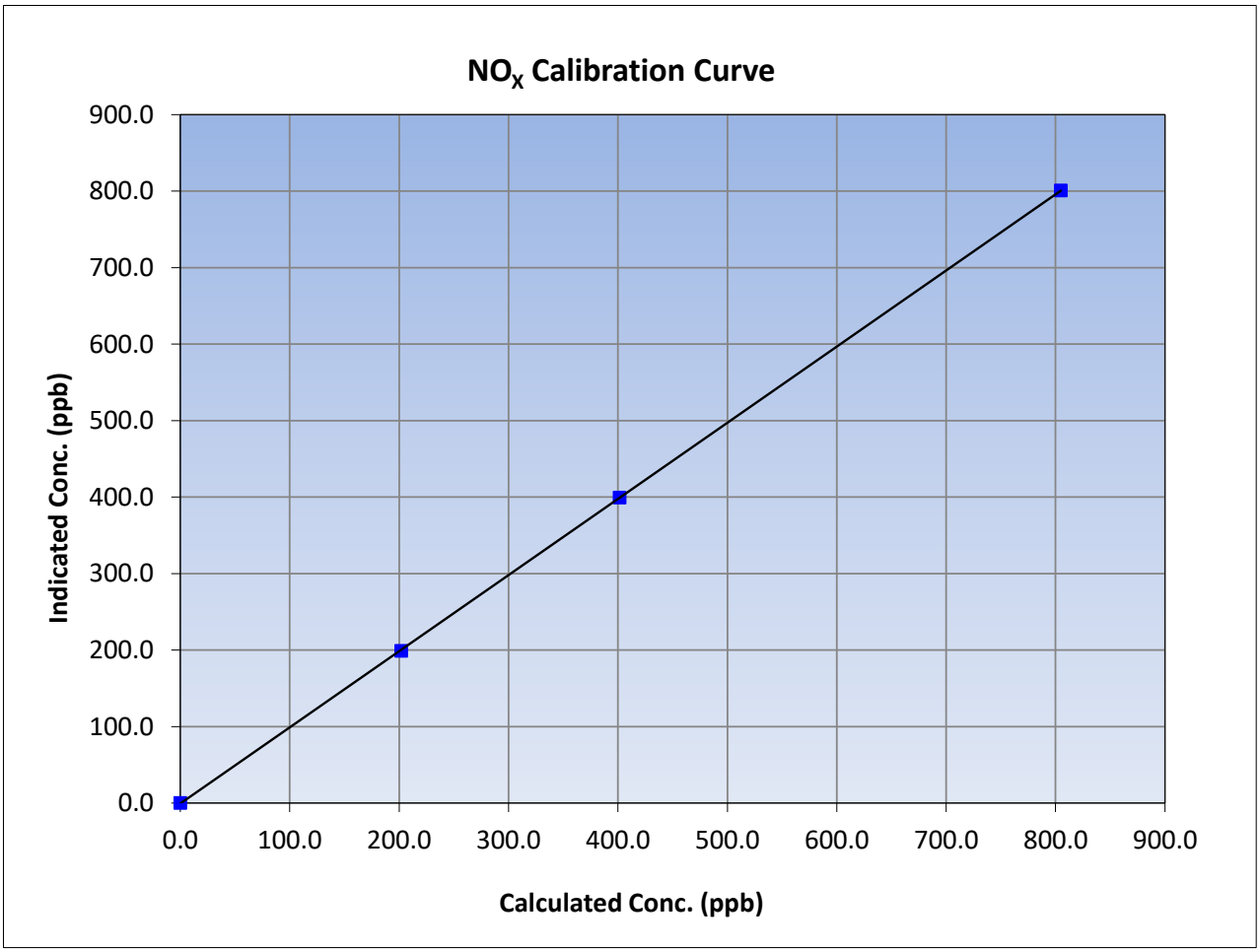
Version-04-2020

Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 4, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:50	End Time (MST):	16:45
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	0.999993	*≥0.995*
804.8	800.8	1.0050			
401.6	399.5	1.0052	Slope	0.995638	*0.90 - 1.10*
201.9	199.1	1.0141			
			Intercept	-0.669728	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

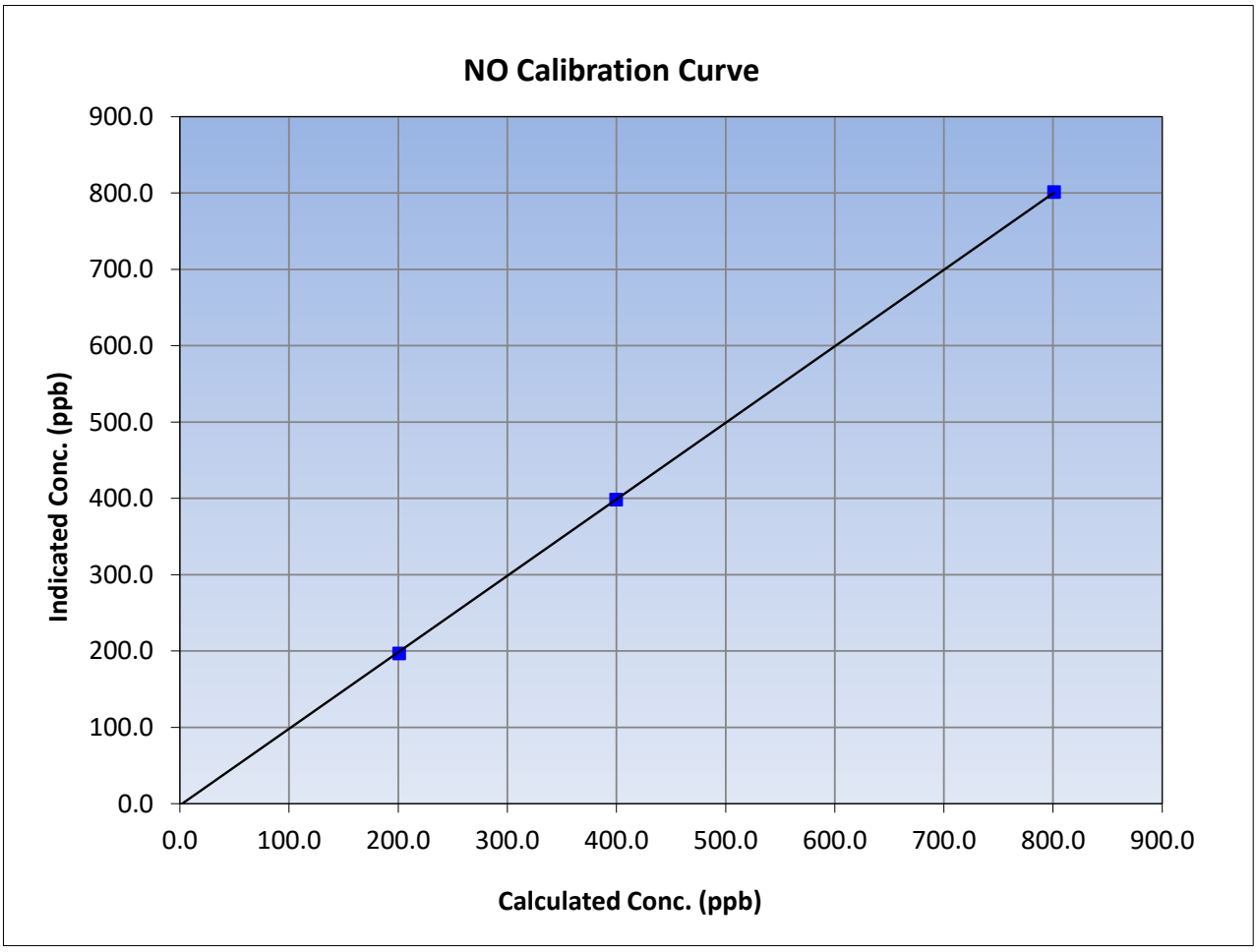
Version-04-2020

Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 4, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:50	End Time (MST):	16:45
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	0.999967	*≥0.995*
800.9	801.2	0.9996			
399.6	398.2	1.0035	Slope	1.002181	*0.90 - 1.10*
200.9	196.6	1.0219			
			Intercept	-2.129361	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

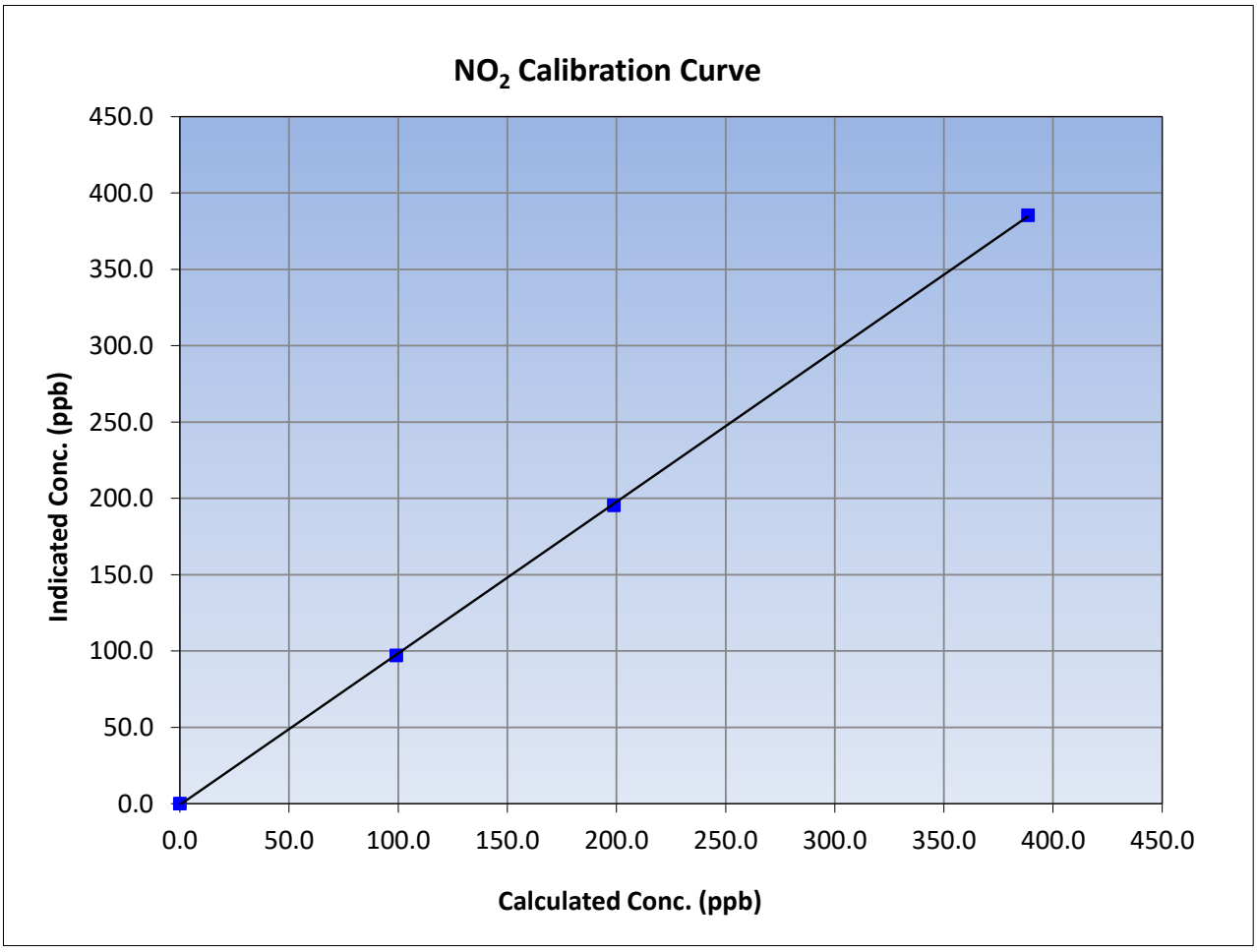
Version-04-2020

Station Information

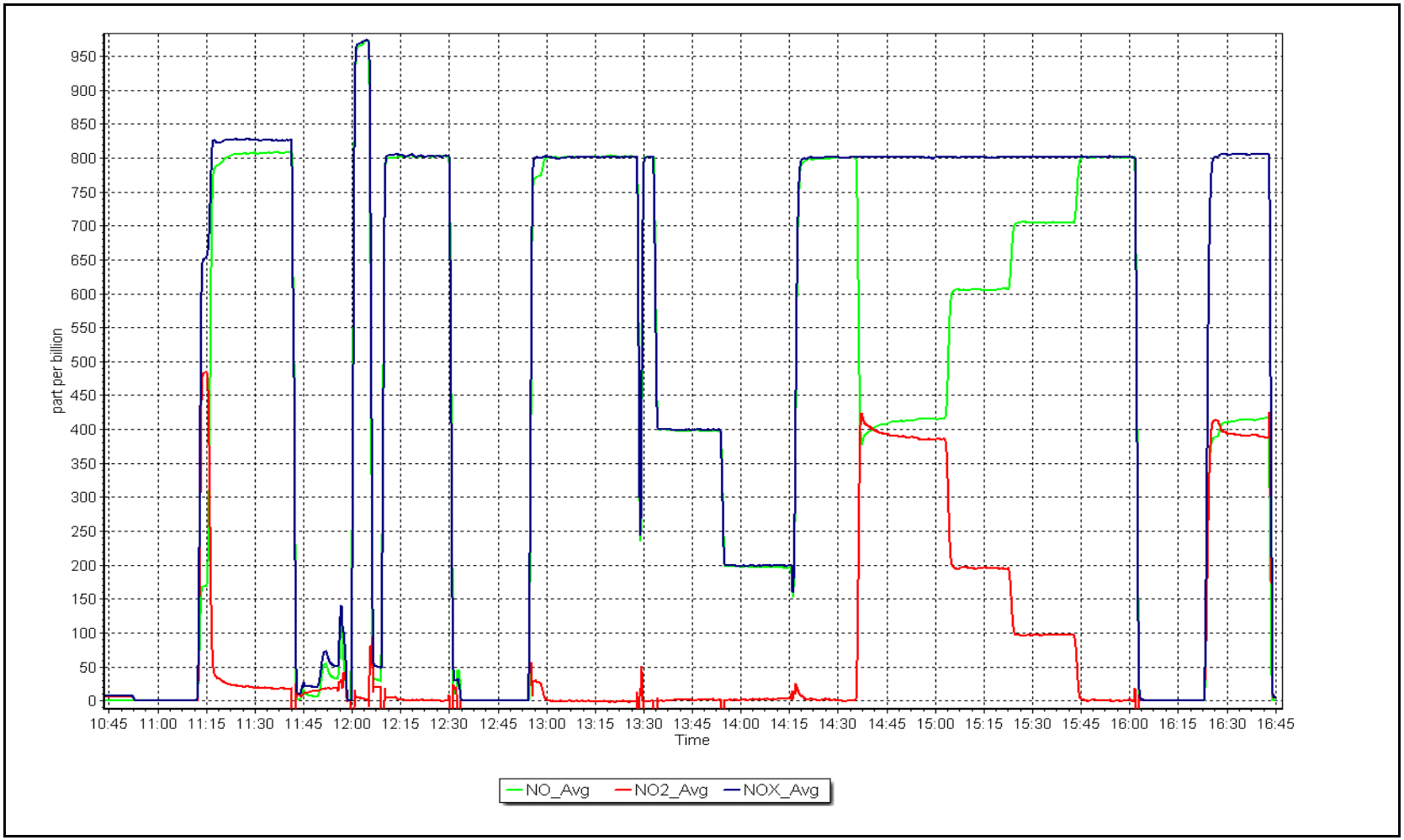
Calibration Date:	January 5, 2024	Previous Calibration:	December 4, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:50	End Time (MST):	16:45
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999971	≥0.995
388.6	385.4	1.0082			
198.8	195.5	1.0168	Slope	0.992183	0.90 - 1.10
99.2	97.1	1.0214			
			Intercept	-0.766639	+/-20



NO_X Calibration Plot Date: January 5, 2024 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	January 8, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	10:48	End time (MST):	13:46
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	API T700	Serial Number:	3060
ZAG Make/Model:	API 701H	Serial Number:	357

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002086	1.001343	Backgd or Offset:	1.4	1.4
Calibration intercept:	-0.040000	-0.260000	Coeff or Slope:	1.620	1.620

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	918.8	400.0	401.6	0.996
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	918.8	400.0	400.4	0.999
second point	5000	803.8	200.0	200.1	1.000
third point	5000	709.8	100.0	99.2	1.008
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	918.8	400.0	406.0	0.985
				Average Correction Factor	1.002

Baseline Corr As found:	401.3	Previous response	400.8	*% 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 required.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

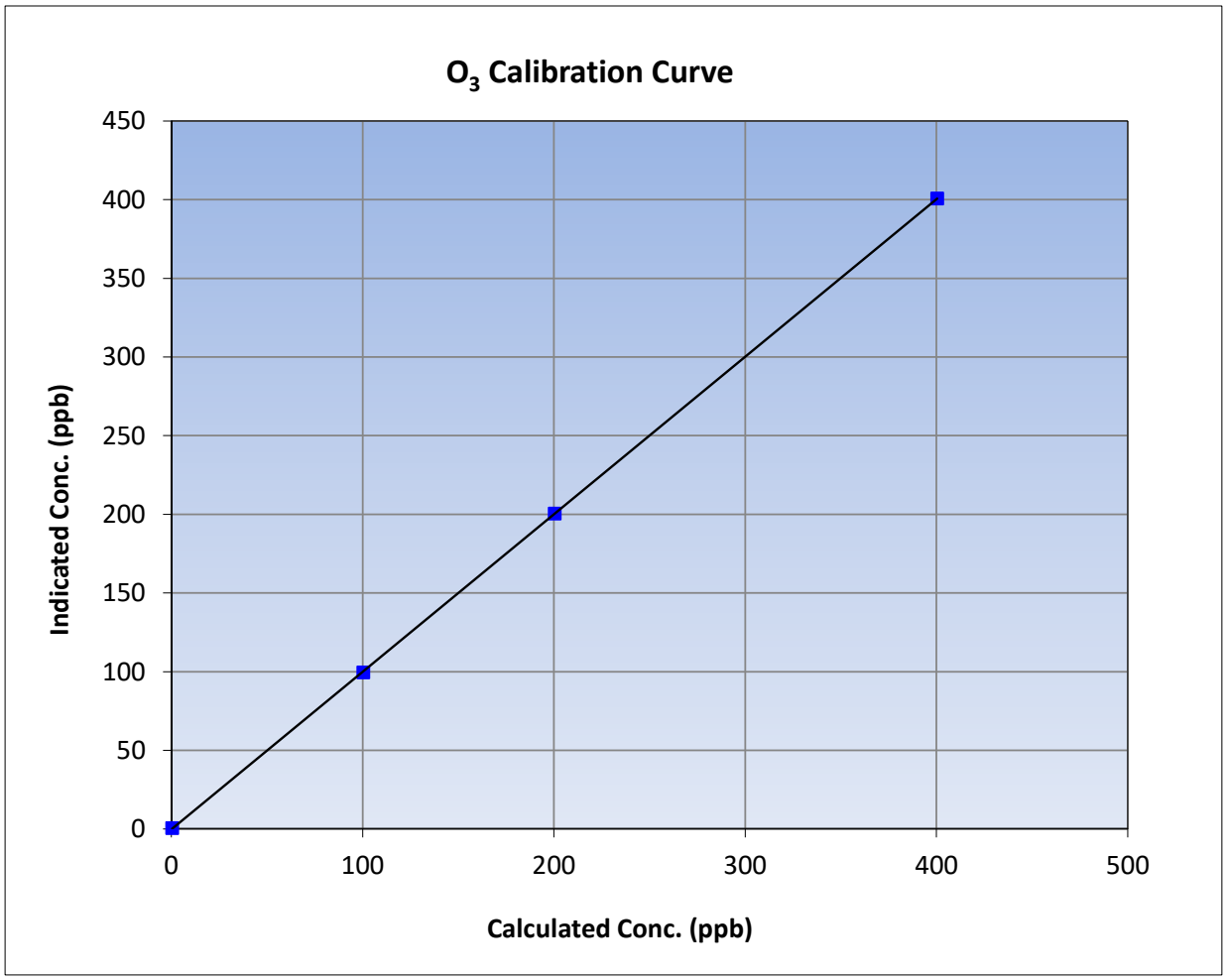
Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 6, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:48	End Time (MST):	13:46
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

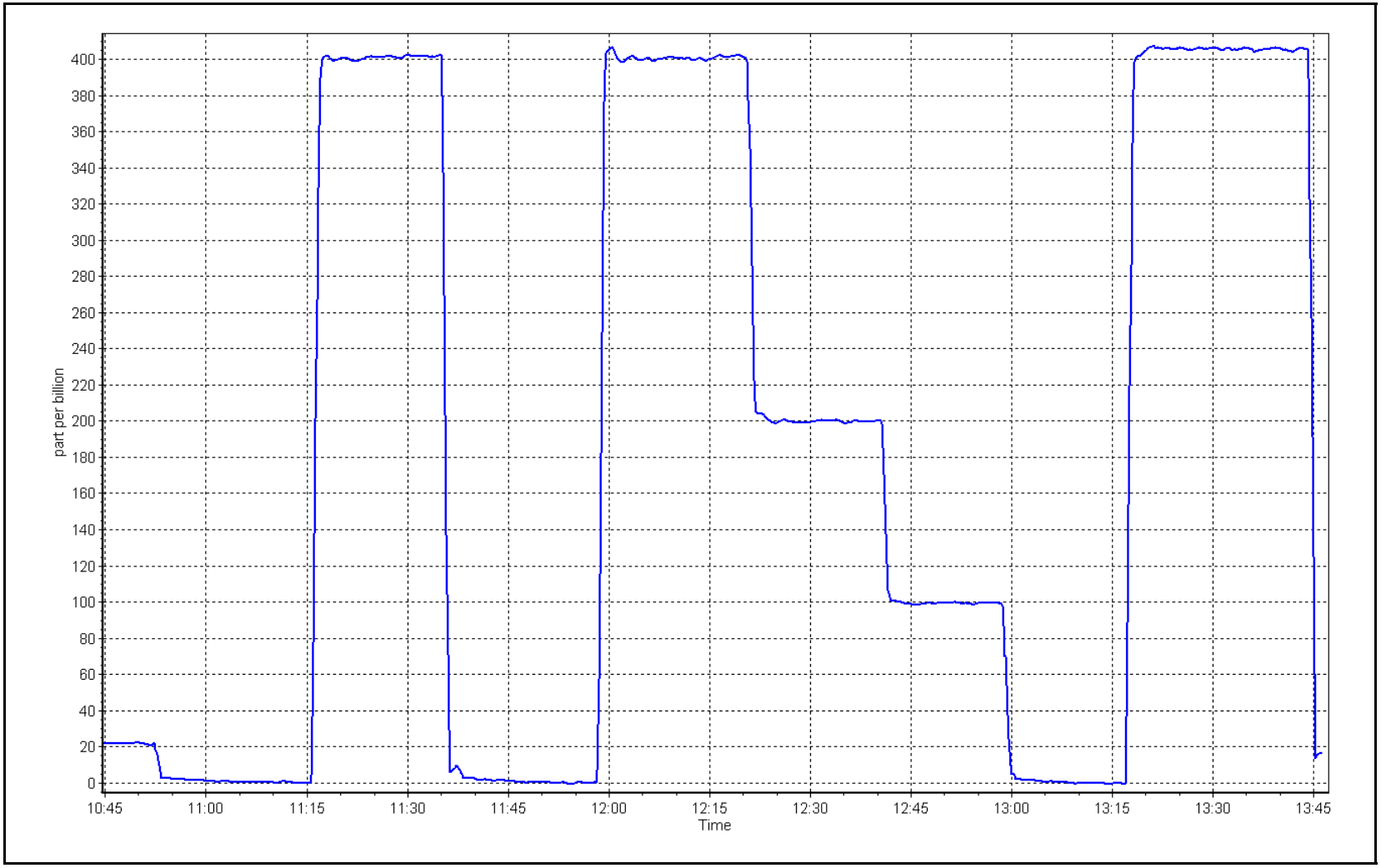
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	400.4	0.9990
200.0	200.1	0.9995
100.0	99.2	1.0081

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.001343	*0.90 - 1.10*
Intercept	-0.260000	*+/- 5*



O_3 Calibration Plot Date: January 8, 2024 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:	January 24, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	12:49	End time (MST):	13:05
Analyzer Make:	API T640	S/N:	825
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388749
Temp/RH standard:	Alicat FP-25	S/N:	388749

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-7.6	-7.3	-7.6	☐	+/- 2 °C
P (mmHg)	710.0	710.8	710.0	☐	+/- 10 mmHg
flow (LPM)	5.00	4.98	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: January 24, 2024 Last Cal Date: December 6, 2023

PM w/o HEPA: 13.0 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: December 6, 2023 <0.2 ug/m3

Disposable Filter Changed: December 6, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 6, 2023

Date RH/T Sensor Cleaned: July 6, 2023

Notes: No adjustments made. Leak check passed. Head cleaned.

Calibration by: Mohammed Kashif

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	January 8, 2024	Last Cal Date:	December 4, 2023
Start time (MST):	11:20	End time (MST):	14:38
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.38 ppm	Cal Gas Exp Date:	January 12, 2029
Cal Gas Cylinder #:	ALM066507		
Removed Cal Gas Conc:	50.38 ppm	Rem Gas Exp Date:	n/a
Removed Gas Cyl #:	n/a	Diff between cyl:	
Calibrator Make/Model:	API T700	Serial Number:	2449
ZAG Make/Model:	API 701H	Serial Number:	359

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1218153459

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.003981	1.004353	Backgd or Offset:	13.4	13.4
Calibration intercept:	-2.098863	-2.079066	Coeff or Slope:	1.111	1.111

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4921	79.4	800.0	800.0	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4921	79.4	800.0	803.0	0.996
second point	4960	39.7	400.0	397.2	1.007
third point	4980	19.8	199.5	196.8	1.014
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	79.4	800.1	804.8	0.994
				Average Correction Factor	1.006

Baseline Corr As found:	800.10	Previous response	801.06	*% 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: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

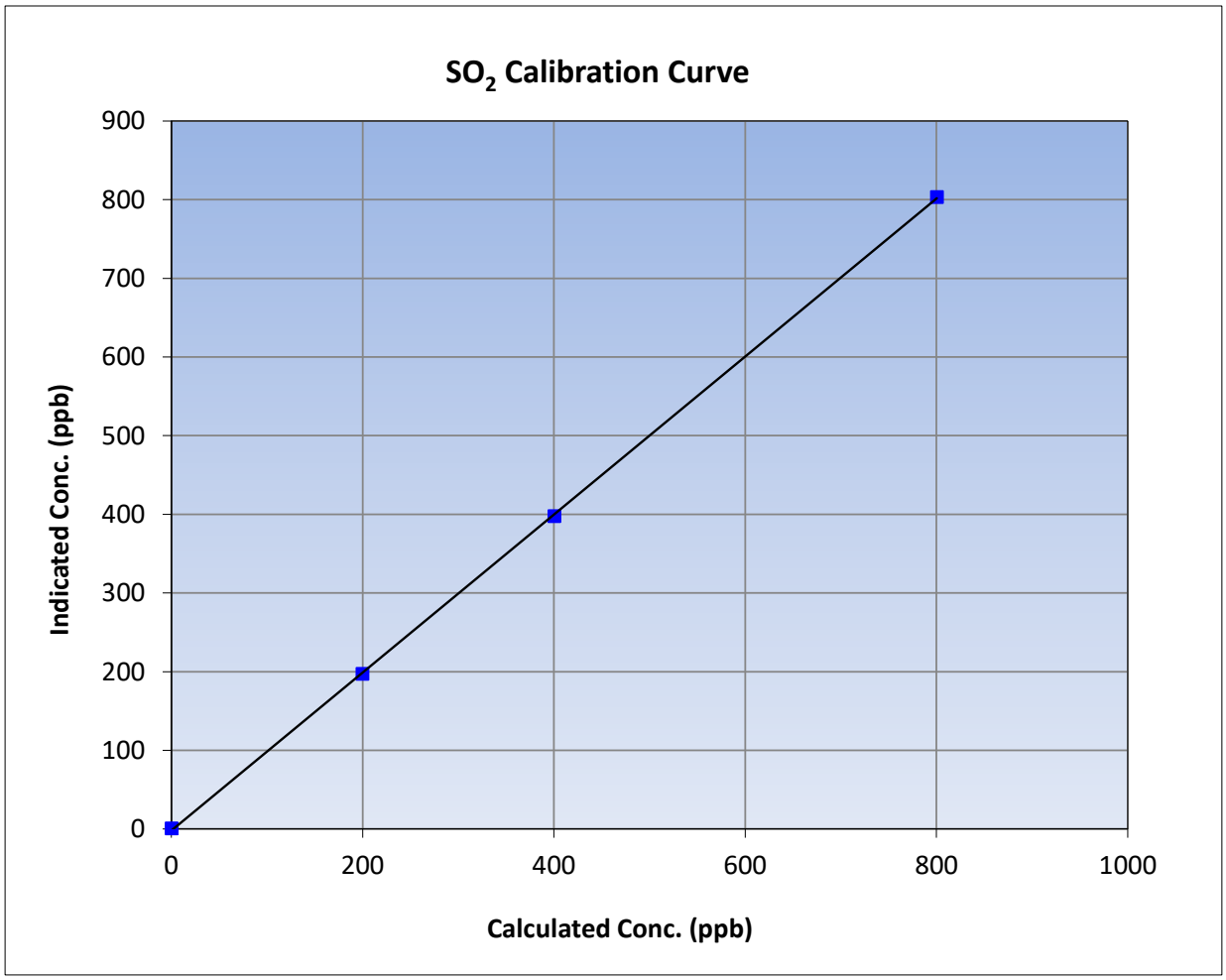
Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 4, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:20	End Time (MST):	14:38
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

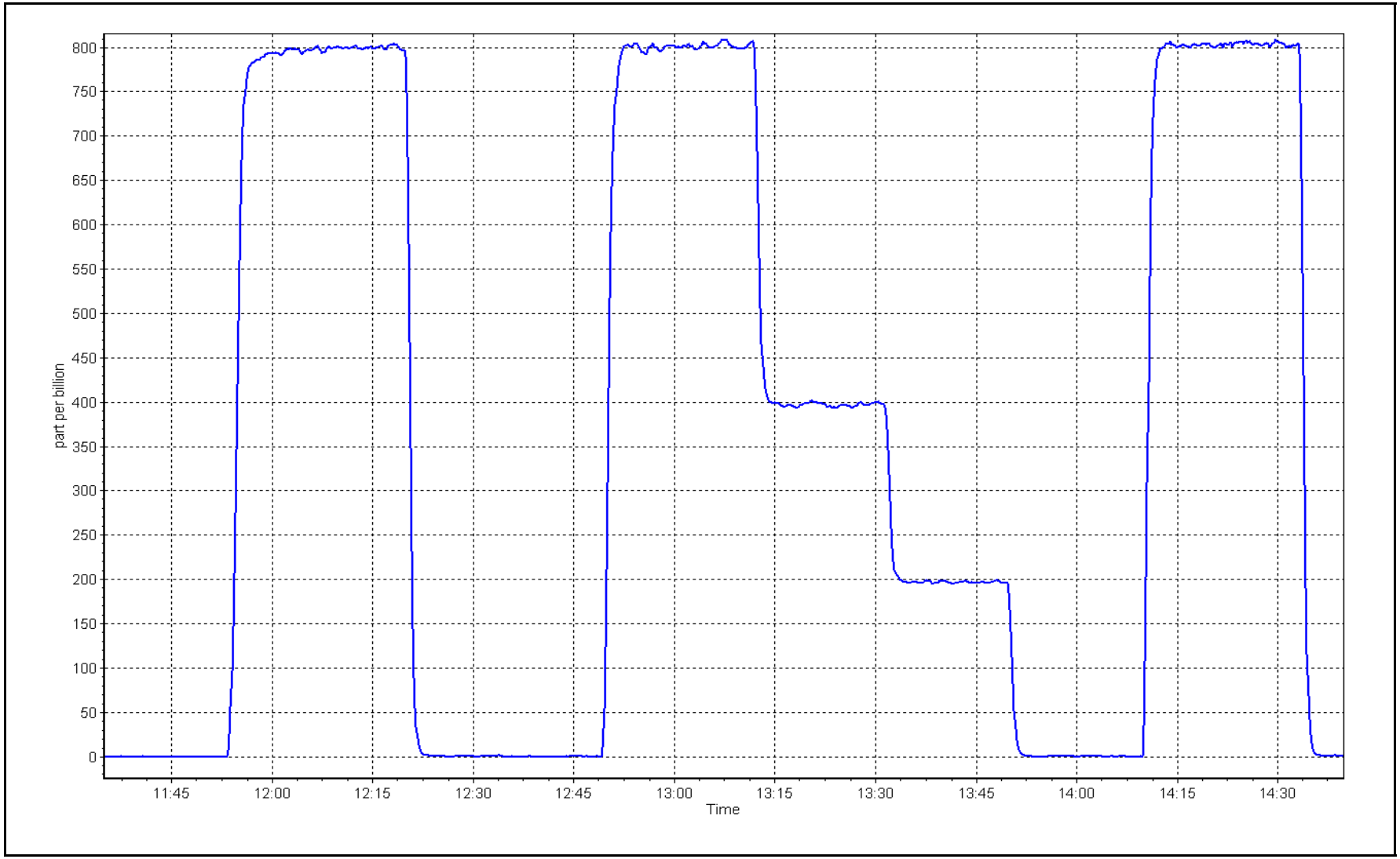
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.0	803.0	0.9962
400.0	397.2	1.0072
199.5	196.8	1.0138

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.004353	*0.90 - 1.10*
Intercept	-2.079066	*+/-30*



SO2 Calibration Plot Date: January 8, 2024 Location: Wapasu



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	January 29, 2024	Last Cal Date:	December 5, 2023
Start time (MST):	11:17	End time (MST):	15:49
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.076	ppm	Cal Gas Exp Date:	September 16, 2024
Cal Gas Cylinder #:	CC511852			
Removed Cal Gas Conc:	5.076	ppm	Rem Gas Exp Date:	n/a
Removed Gas Cyl #:	n/a		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2449
ZAG Make/Model:	API T701H		Serial Number:	359

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1218153583	
Converter make:	n/a		Converter serial #:	n/a	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005283	1.009996	Backgd or Offset:	12.2	12.2
Calibration intercept:	0.040787	-0.299186	Coeff or Slope:	1.114	1.114

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4921	78.8	80.0	80.6	0.995
as found 2nd point	4961	39.4	40.0	40.9	0.983
as found 3rd point	4980	19.7	20.0	20.6	0.980
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4921	78.8	80.0	80.5	0.994
second point	4961	39.4	40.0	40.2	0.995
third point	4980	19.7	20.0	19.7	1.015
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	78.8	80.0	80.0	1.000
SO2 Scrubber Check	4921	79.4	800.0	-0.1	----
Date of last scrubber change:		n/a		Ave Corr Factor	1.001
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	80.4	Prev response:	80.46	*% change:	-0.1%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.004425	AF Intercept:	0.420818
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999949		

* = > +/-5% change initiates investigation

Notes: Pump changed out after as founds. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

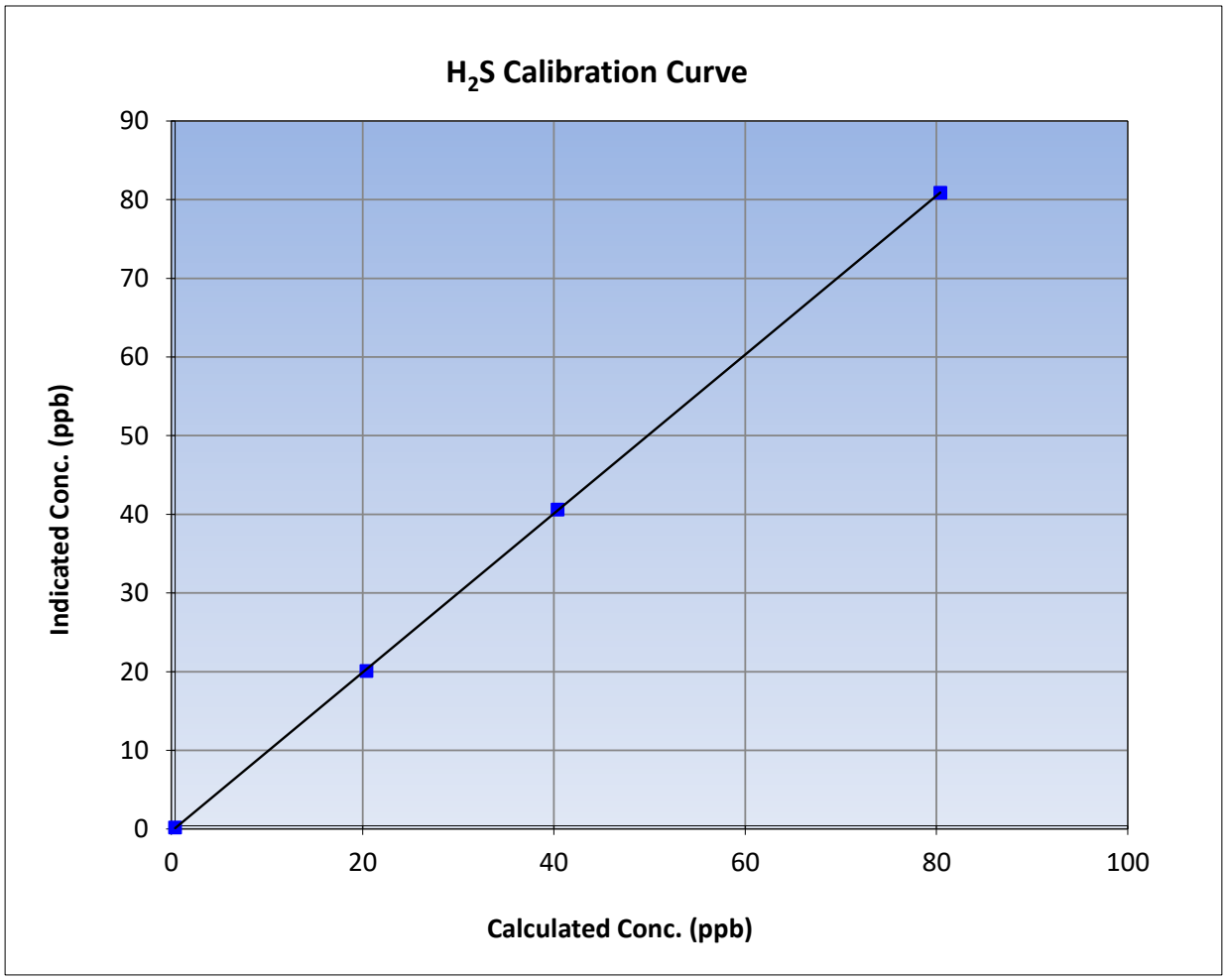
Station Information

Calibration Date:	January 29, 2024	Previous Calibration:	December 5, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:17	End Time (MST):	15:49
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

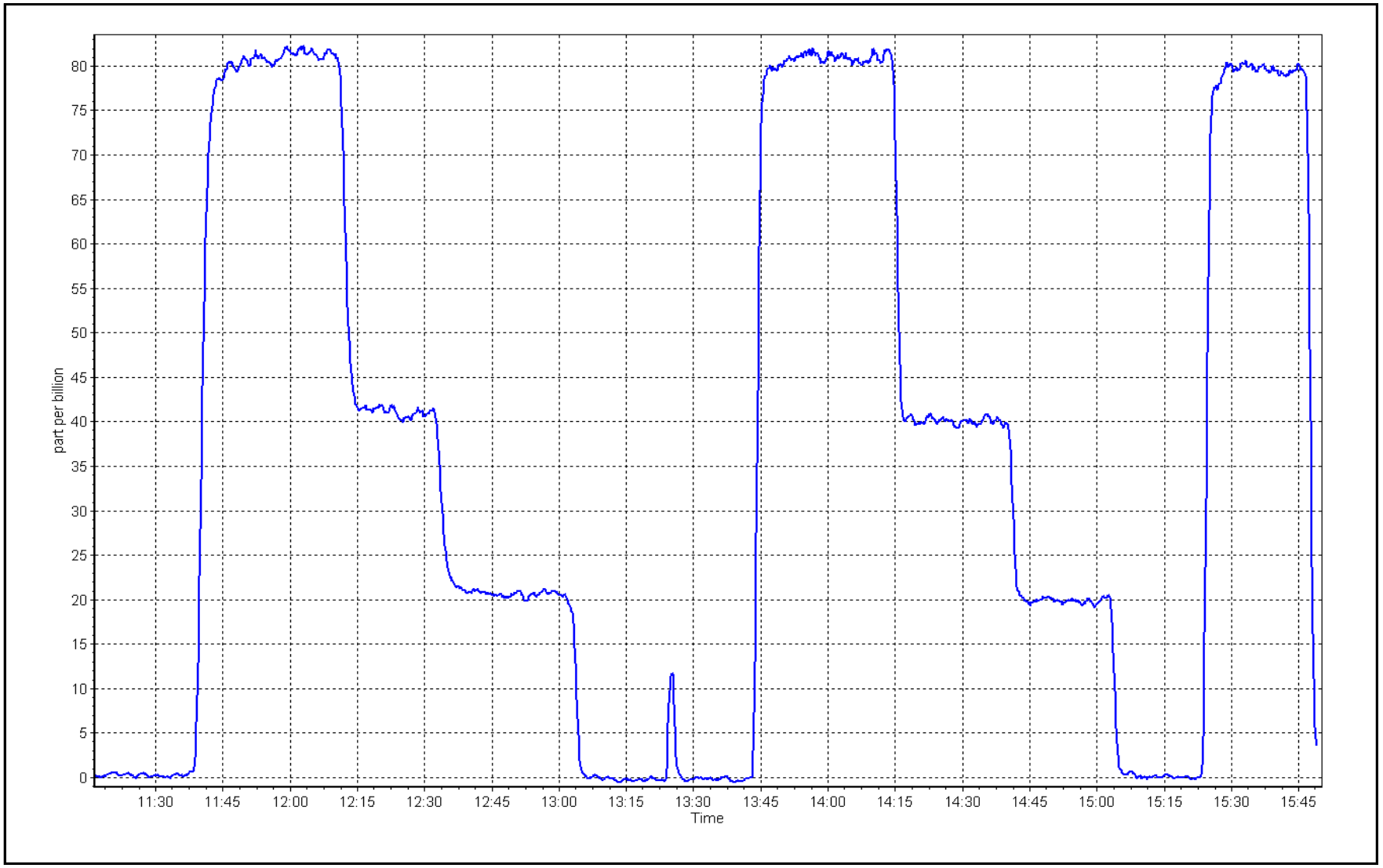
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	80.5	0.9938
40.0	40.2	0.9949
20.0	19.7	1.0153

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.009996	*0.90 - 1.10*
Intercept	-0.299186	*+/-3*



H_2S Calibration Plot Date: January 29, 2024 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	January 8, 2024	Last Cal Date:	December 21, 2023
Start time (MST):	11:20	End time (MST):	14:38
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		ALM066507	Cal Gas Expiry Date:	January 12, 2029	
CH4 Cal Gas Conc.	503.5	ppm	CH4 Equiv Conc.	1076.3	ppm
C3H8 Cal Gas Conc.	208.3	ppm			
Removed Gas Cert:		n/a	Removed Gas Expiry:	n/a	
Removed CH4 Conc.	503.5	ppm	CH4 Equiv Conc.	1076.3	ppm
Removed C3H8 Conc.	208.3	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	2449	
ZAG Make/Model:	API 701H		Serial Number:	359	

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1218153352	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.011452	0.993554	Background:	3.300	3.020
Calibration intercept:	-0.239261	0.002025	Coefficient:	4.451	4.390

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	-0.24	----
as found span	4921	79.4	17.09	17.01	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.06	----
high point	4921	79.4	17.09	17.03	1.004
second point	4960	39.7	8.55	8.42	1.015
third point	4980	19.8	4.26	4.21	1.013
as left zero	5000	0.0	0.00	0.01	----
as left span	4921	79.4	17.09	17.02	1.004
				Average Correction Factor	1.011

Baseline Corr As found:	17.25	Previous response	17.05	*% 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: Zero adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

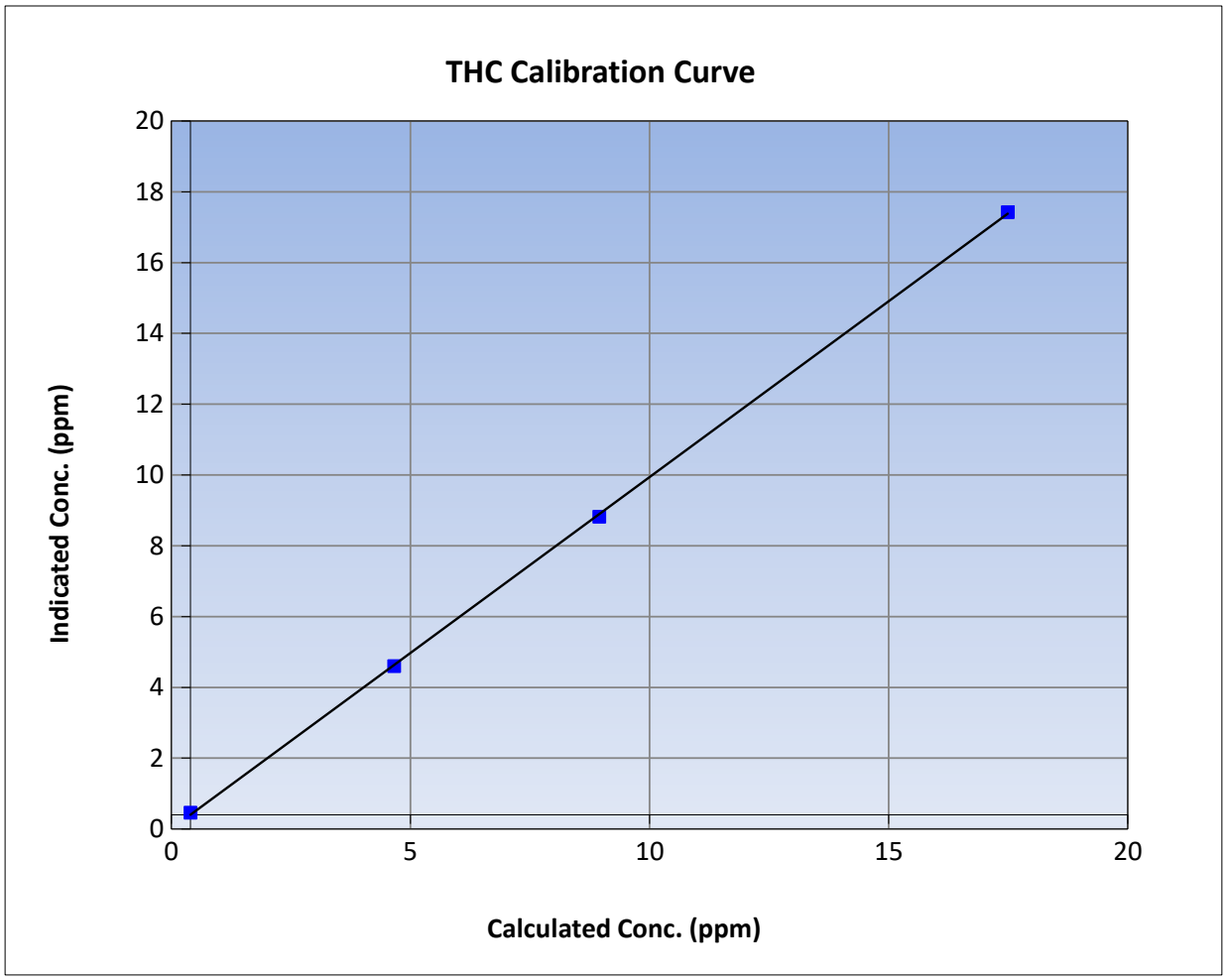
Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 21, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:20	End Time (MST):	14:38
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

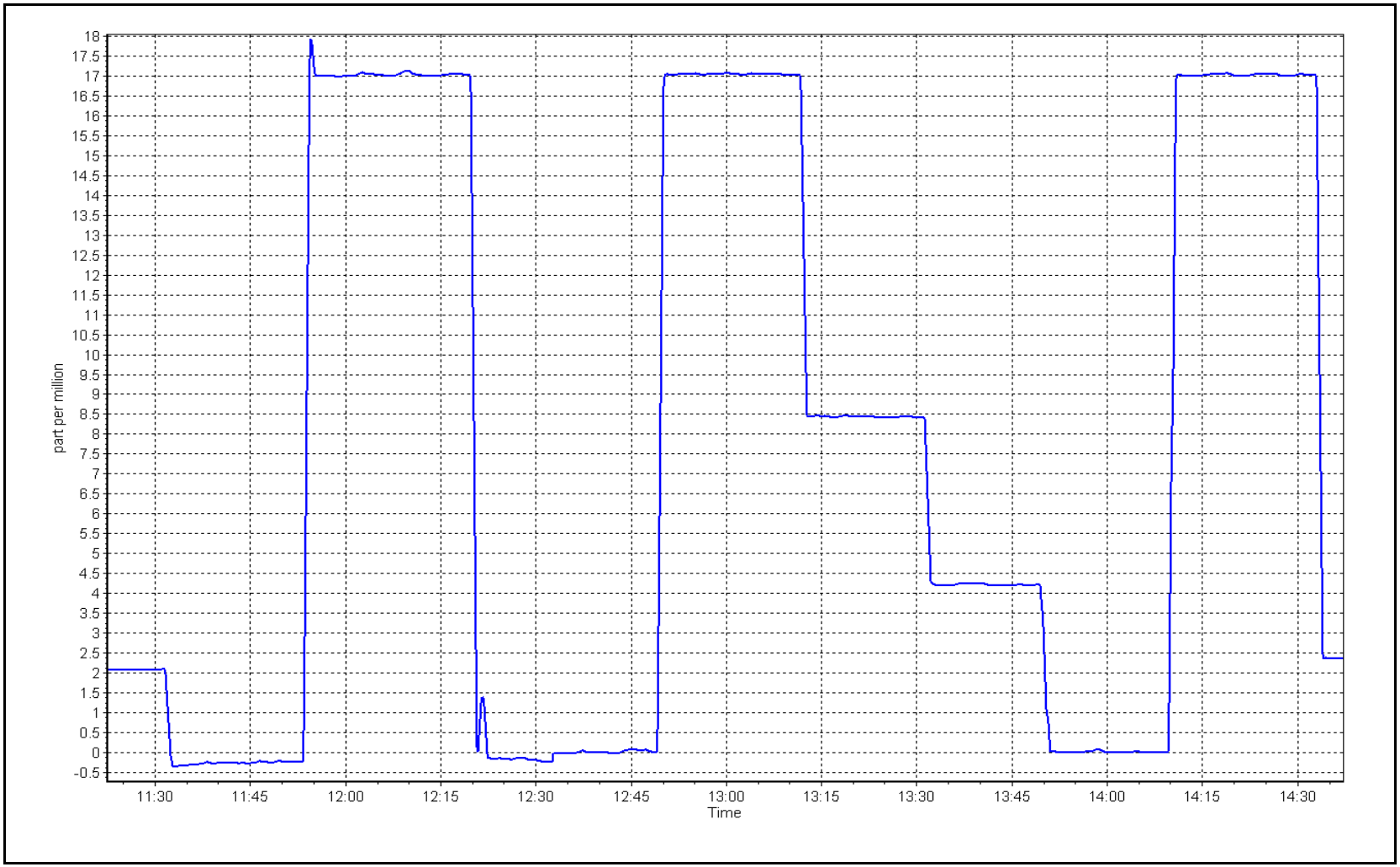
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.06	----
17.09	17.03	1.0039
8.55	8.42	1.0145
4.26	4.21	1.0134

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999931	*≥0.995*
Slope	0.993554	*0.90 - 1.10*
Intercept	0.002025	*+/-1.5*



THC Calibration Plot Date: January 8, 2024 Location: Wapasu



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	January 10, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	11:15	End time (MST):	15:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.264	1.250	NO bkgnd or offset:	8.1	8.1
NOX coeff or slope:	0.989	0.986	NOX bkgnd or offset:	8.1	8.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	326.0	326.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999676	1.003354
NO_X Cal Offset:	-3.080000	-4.920000
NO Cal Slope:	1.000330	1.006788
NO Cal Offset:	-2.740000	-5.500000
NO_2 Cal Slope:	1.004002	0.997030
NO_2 Cal Offset:	-0.063828	-0.662092

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.6	-0.1	----	----
as found span	4917	83.2	817.2	799.9	17.3	827.8	809.3	18.5	0.9872	0.9884
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
high point	4917	83.2	817.2	799.9	17.3	817.7	802.8	14.8	0.9994	0.9964
second point	4958	41.6	408.6	399.9	8.7	401.4	393.3	8.1	1.0179	1.0169
third point	4979	20.8	204.3	200.0	4.3	196.6	191.6	4.9	1.0392	1.0437
as left zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.5	-0.1	----	----
as left span	4917	83.2	817.2	393.8	423.4	816.8	392.6	424.1	1.0004	1.0029
								Average Correction Factor	1.0188	1.0190

Corrected As found	NO_X = 828.5 ppb	NO = 809.9 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	1.8%
Previous Response	NO_X = 813.8 ppb	NO = 797.4 ppb			*Percent Change	NO =	1.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.3	393.2	423.4	421.8	1.0038	99.6%
2nd GPT point (200 ppb O3)	799.3	594.4	222.2	220.6	1.0073	99.3%
3rd GPT point (100 ppb O3)	799.3	698.5	118.1	116.5	1.0138	98.6%
				Average Correction Factor	1.0083	99.2%

Notes: Change filters after as founds. Adjusted span only.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

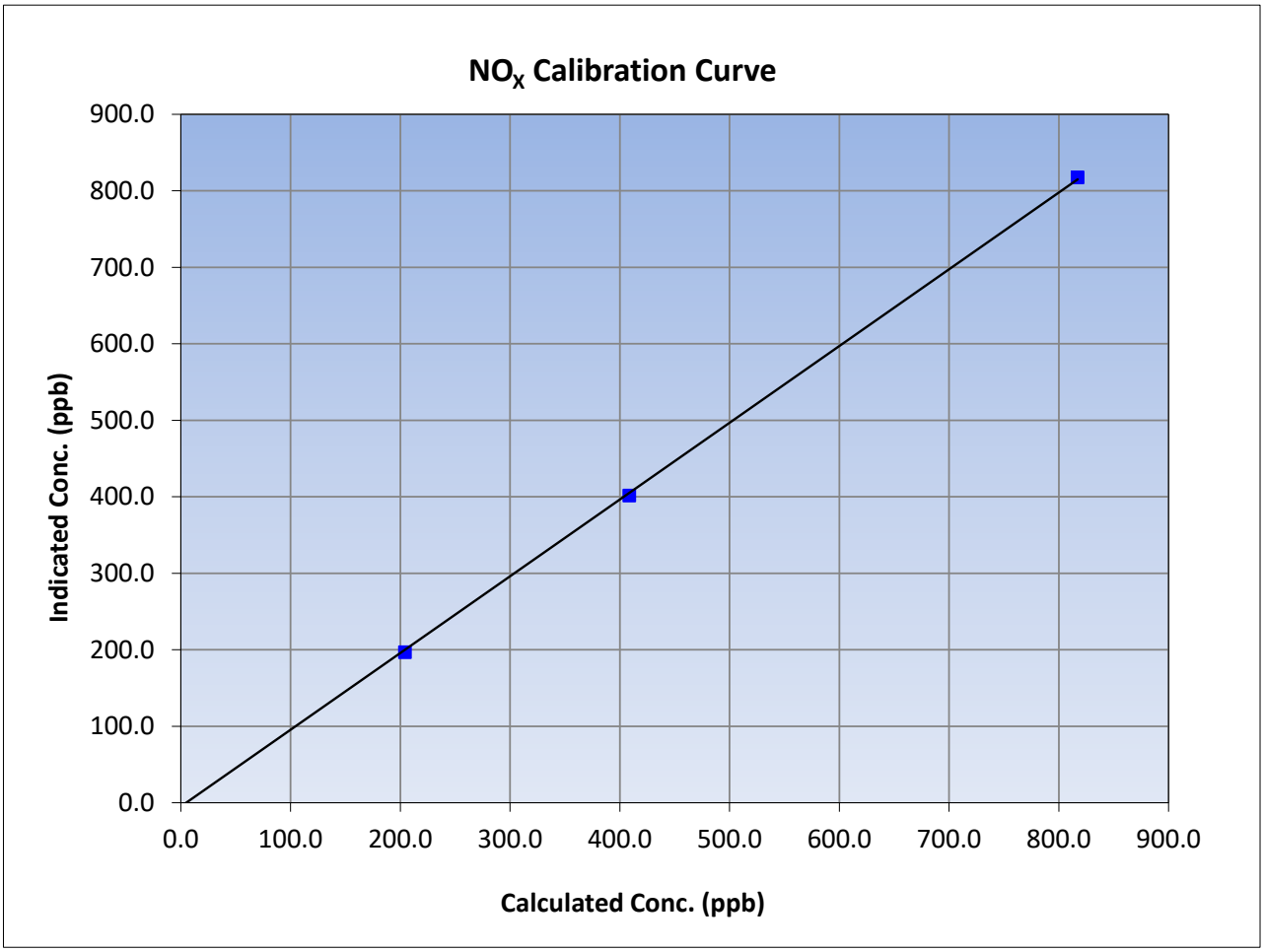
Version-04-2020

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:15	End Time (MST):	15:35
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.5	----	Correlation Coefficient	0.999858	≥0.995
817.2	817.7	0.9994			
408.6	401.4	1.0179	Slope	1.003354	0.90 - 1.10
204.3	196.6	1.0392			
			Intercept	-4.920000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

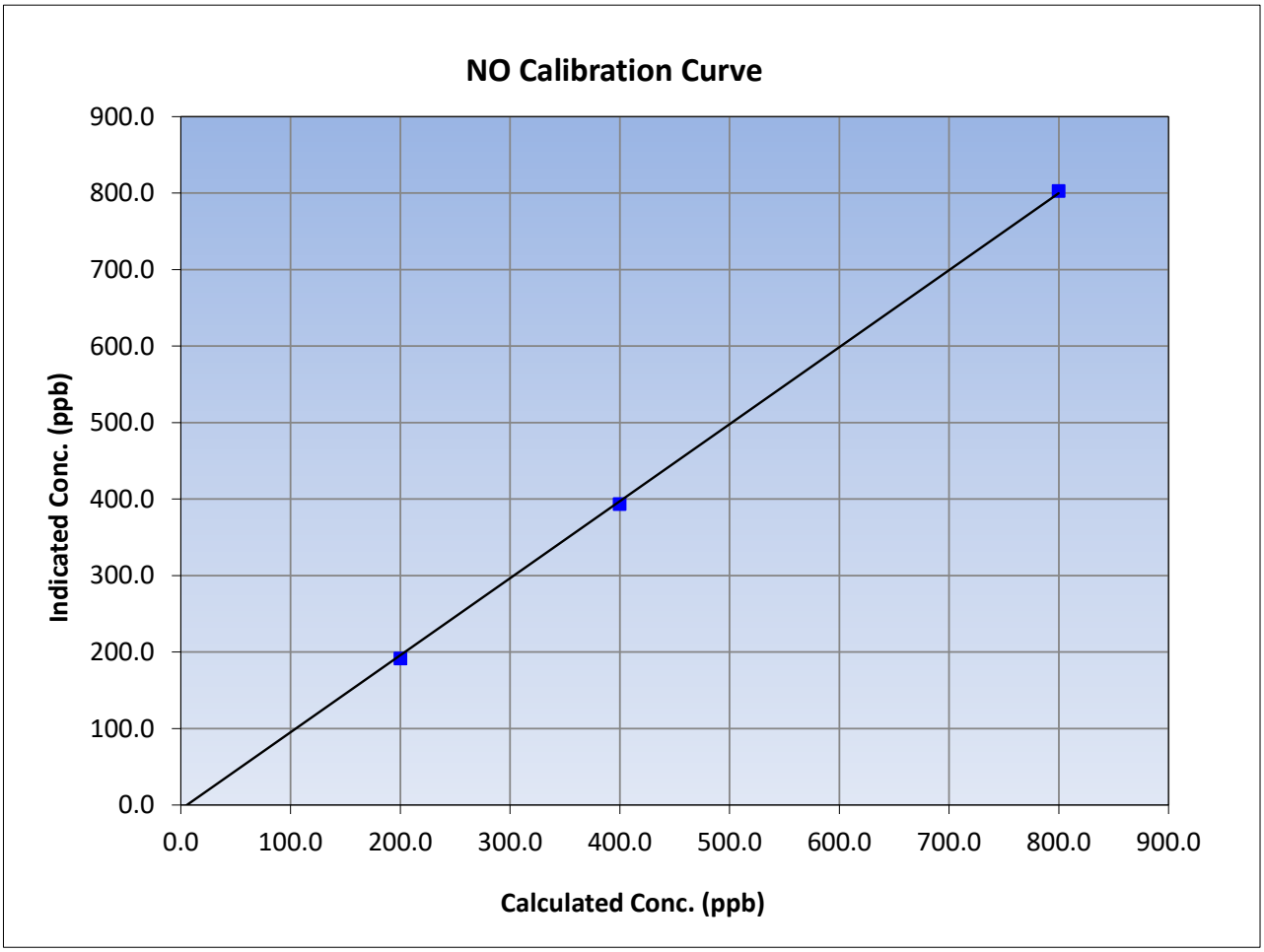
Version-04-2020

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:15	End Time (MST):	15:35
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.4	----	Correlation Coefficient	0.999809	*≥0.995*
799.9	802.8	0.9964			
399.9	393.3	1.0169	Slope	1.006788	*0.90 - 1.10*
200.0	191.6	1.0437			
			Intercept	-5.500000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

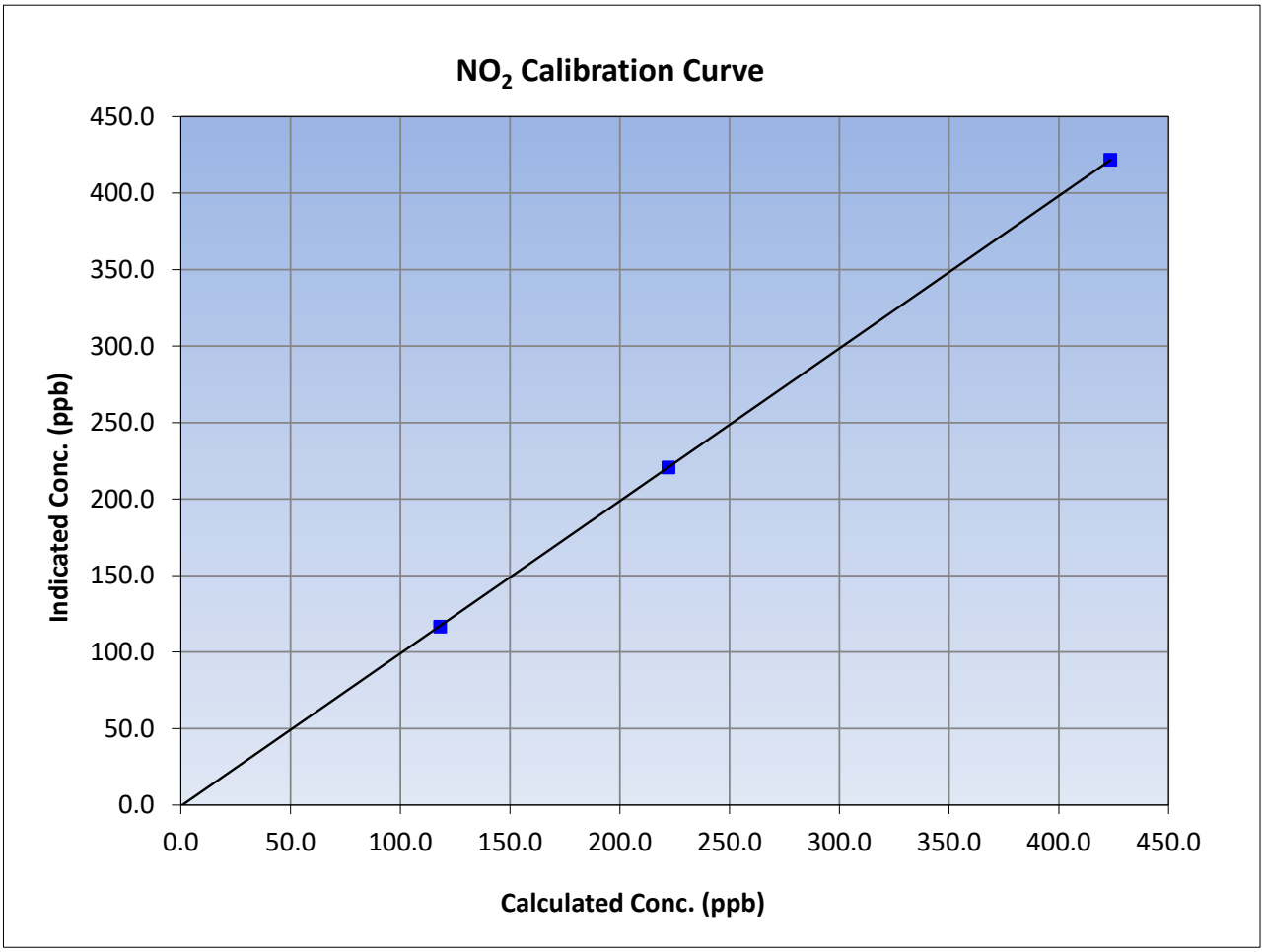
Version-04-2020

Station Information

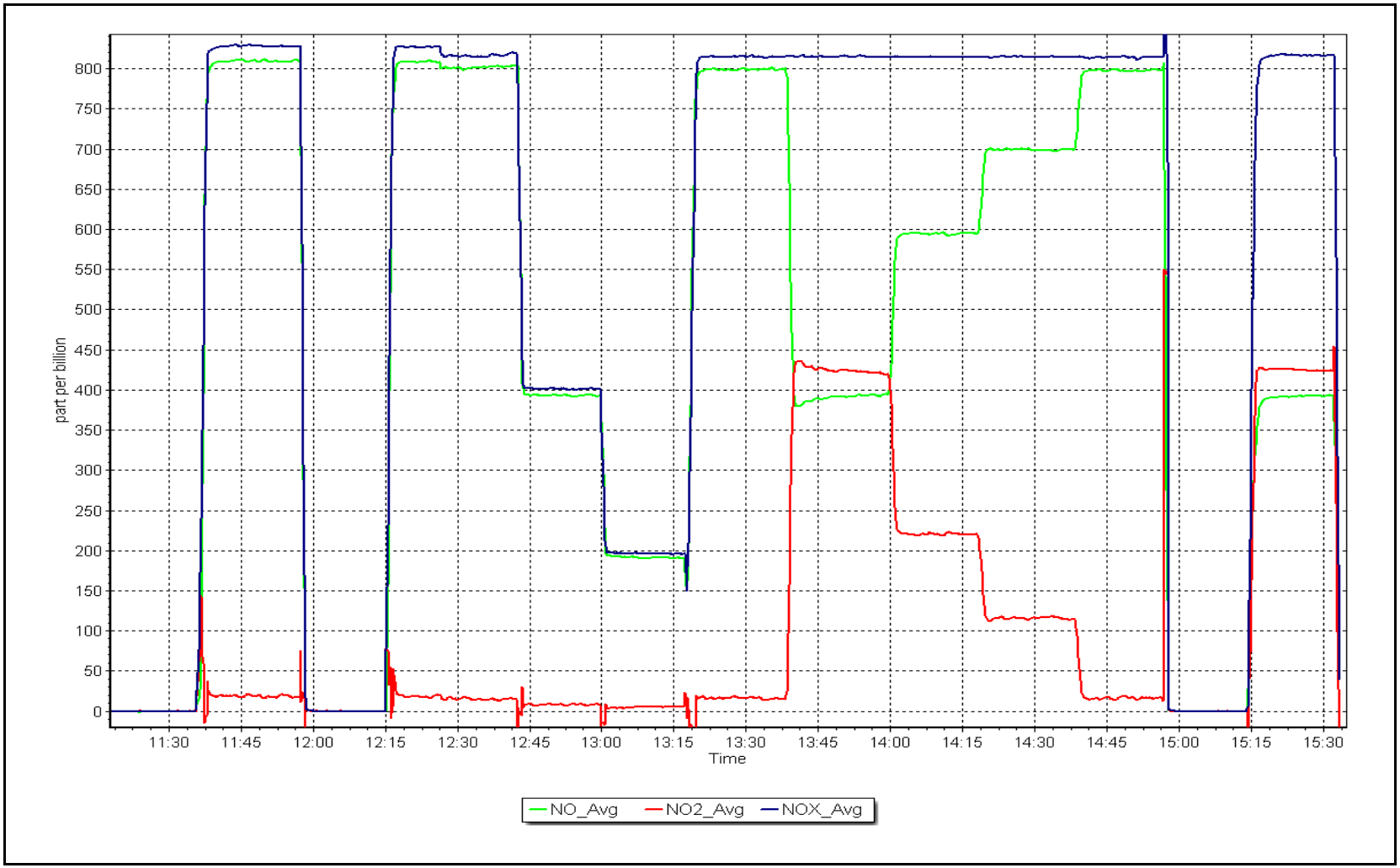
Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:15	End Time (MST):	15:35
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999991	≥0.995
423.4	421.8	1.0038			
222.2	220.6	1.0073	Slope	0.997030	0.90 - 1.10
118.1	116.5	1.0138			
			Intercept	-0.662092	+/-20



NO_X Calibration Plot Date: January 10, 2024 Location: Wapasu



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	January 4, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	11:30	End time (MST):	14:33
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	API T700	Serial Number:	2449
ZAG Make/Model:	API T701H	Serial Number:	359

Analyzer Information

Analyzer make:	API T400	Analyzer serial #:	3870
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002943	1.001714	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.540000	-0.500000	Coeff or Slope:	1.014	1.014

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.7	----
as found span	5000	1077.3	400.0	399.3	1.002
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	1077.3	400.0	400.6	0.999
second point	5000	900.3	200.0	199.4	1.003
third point	5000	789.5	100.0	98.9	1.011
as left zero	5000	0.0	0.0	0.6	----
as left span	5000	1077.3	400.0	404.8	0.988
				Average Correction Factor	1.004

Baseline Corr As found:	398.6	Previous response	400.6	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

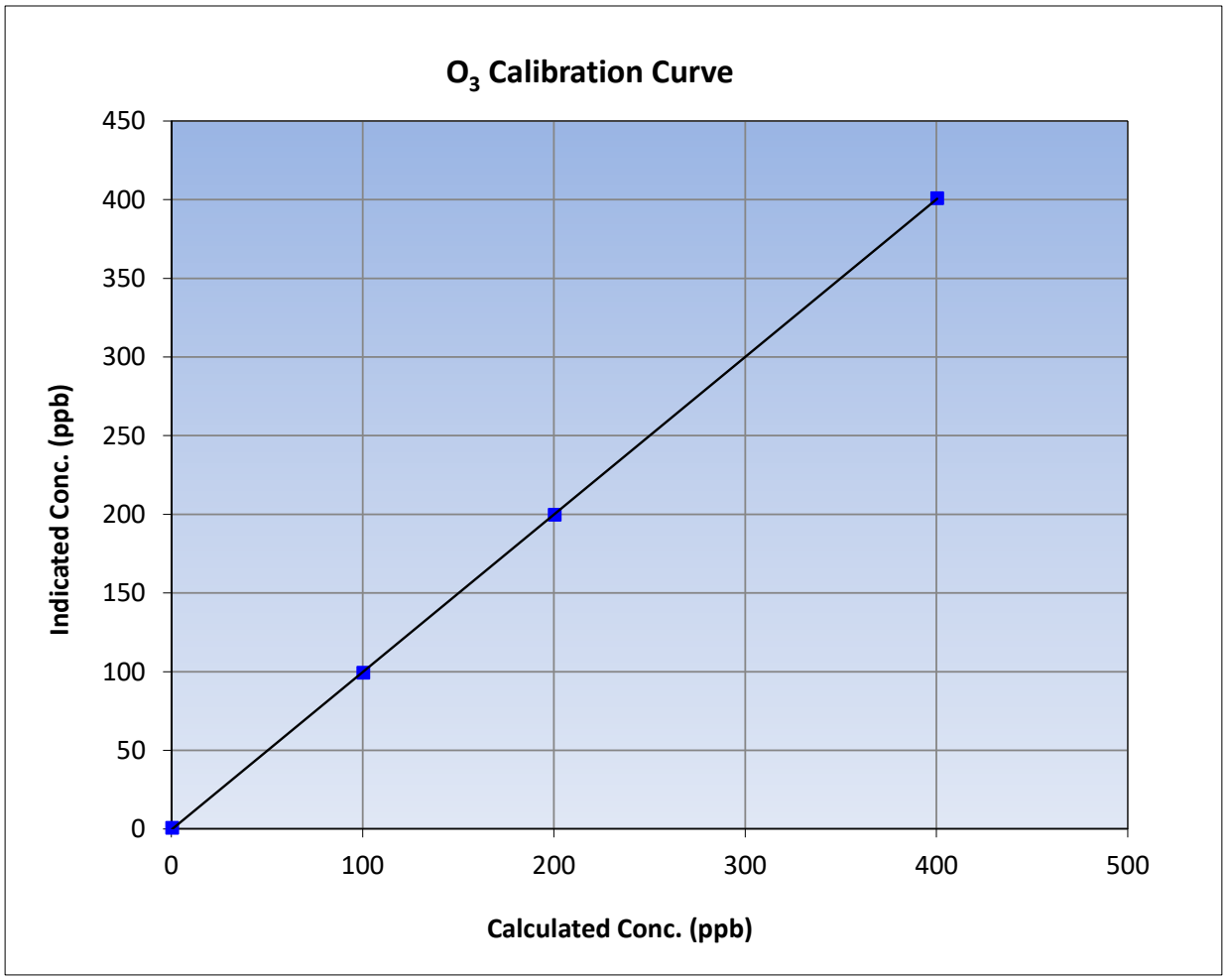
Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 6, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:30	End Time (MST):	14:33
Analyzer make:	API T400	Analyzer serial #:	3870

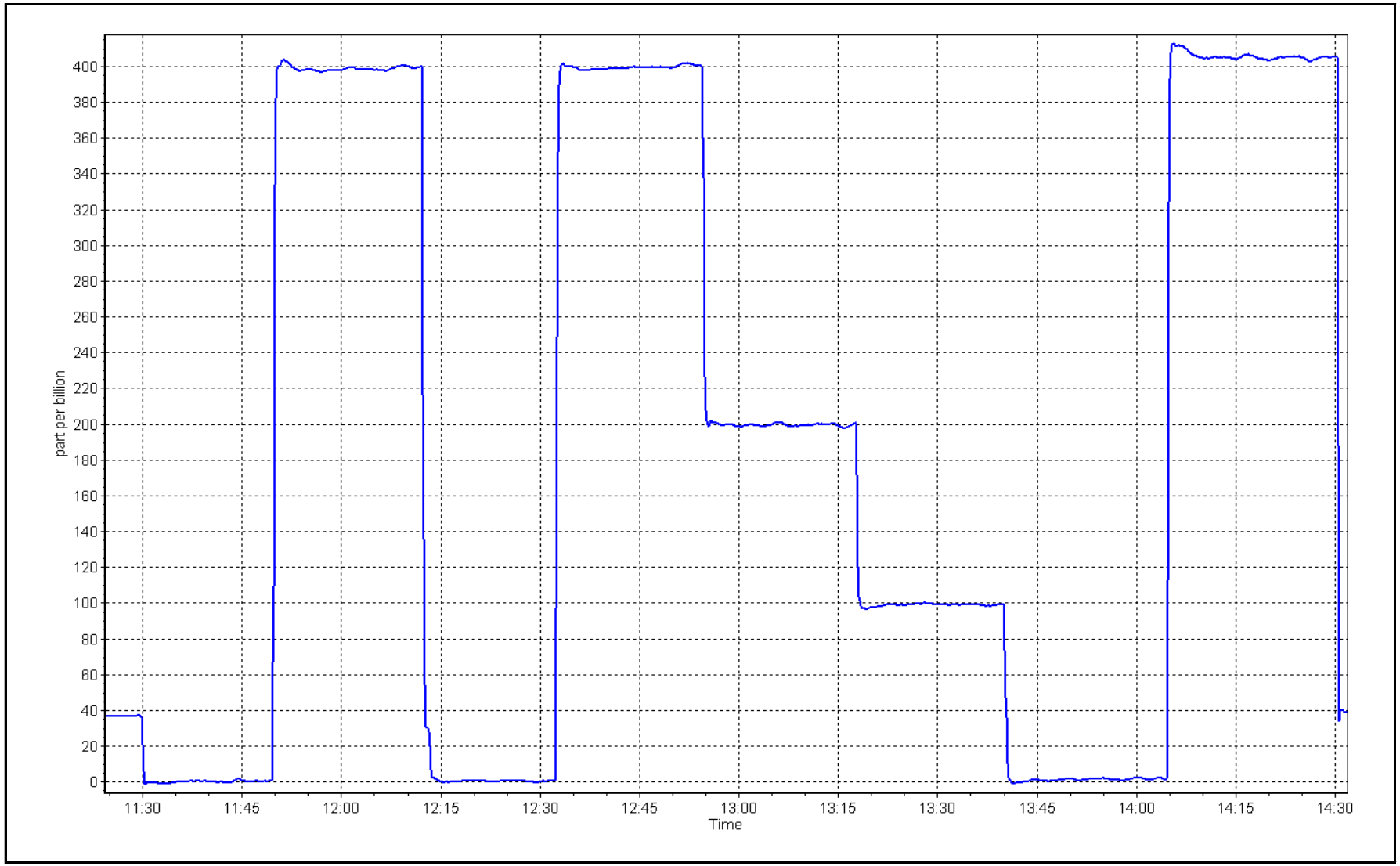
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	400.6	0.9985
200.0	199.4	1.0030
100.0	98.9	1.0111

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	1.001714	*0.90 - 1.10*
Intercept	-0.500000	*+/- 5*



O_3 Calibration Plot Date: January 4, 2024 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:	January 29, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	15:10	End time (MST):	15:46
Analyzer Make:	API T640	S/N:	1183
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388751
Temp/RH standard:	Alicat FP-25BT	S/N:	388751

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	8.6	8.1	8.6	☐	+/- 2 °C
P (mmHg)	707.5	704.2	707.5	☐	+/- 10 mmHg
flow (LPM)	4.97	4.95	4.97	☐	+/- 0.25 LPM

Leak Test: Date of check: January 29, 2024 Last Cal Date: December 7, 2023

PM w/o HEPA: 0.9 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: September 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: Temp, pressure and flow checked. Leak check passed.

Calibration by: Aswin Sasi Kumar

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	January 11, 2024	Last Cal Date:	December 19, 2023
Start time (MST):	11:45	End time (MST):	14:53
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.40	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC463851			
Removed Cal Gas Conc:	49.40	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
ZAG Make/Model:	Teledyne API 701H		Serial Number:	360

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: JC1501301453

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998520	1.005444	Backgd or Offset:	22.4	22.5
Calibration intercept:	-0.124003	-0.422589	Coeff or Slope:	0.803	0.813

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5009	0.0	0.0	0.5	----
as found span	4919	81.0	800.3	792.2	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.6	----
high point	4919	81.0	800.3	804.8	0.994
second point	4959	40.5	400.2	401.2	0.997
third point	4979	20.2	199.6	199.4	1.001
as left zero	5000	0.0	0.0	0.5	----
as left span	4919	81.0	800.3	804.4	0.995
				Average Correction Factor	0.998

Baseline Corr As found:	791.70	Previous response	798.97	*% 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: Inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

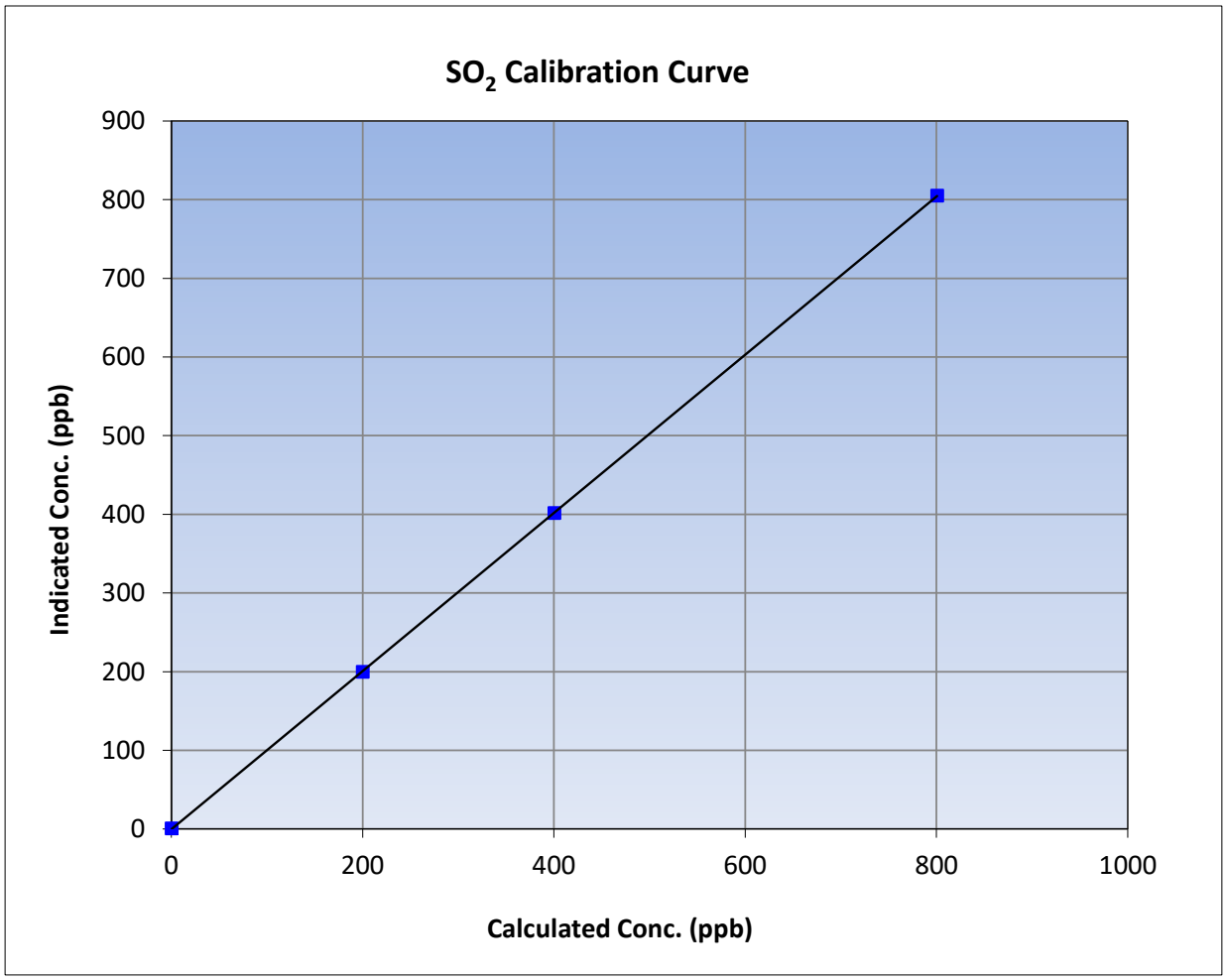
Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 19, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:45	End Time (MST):	14:53
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

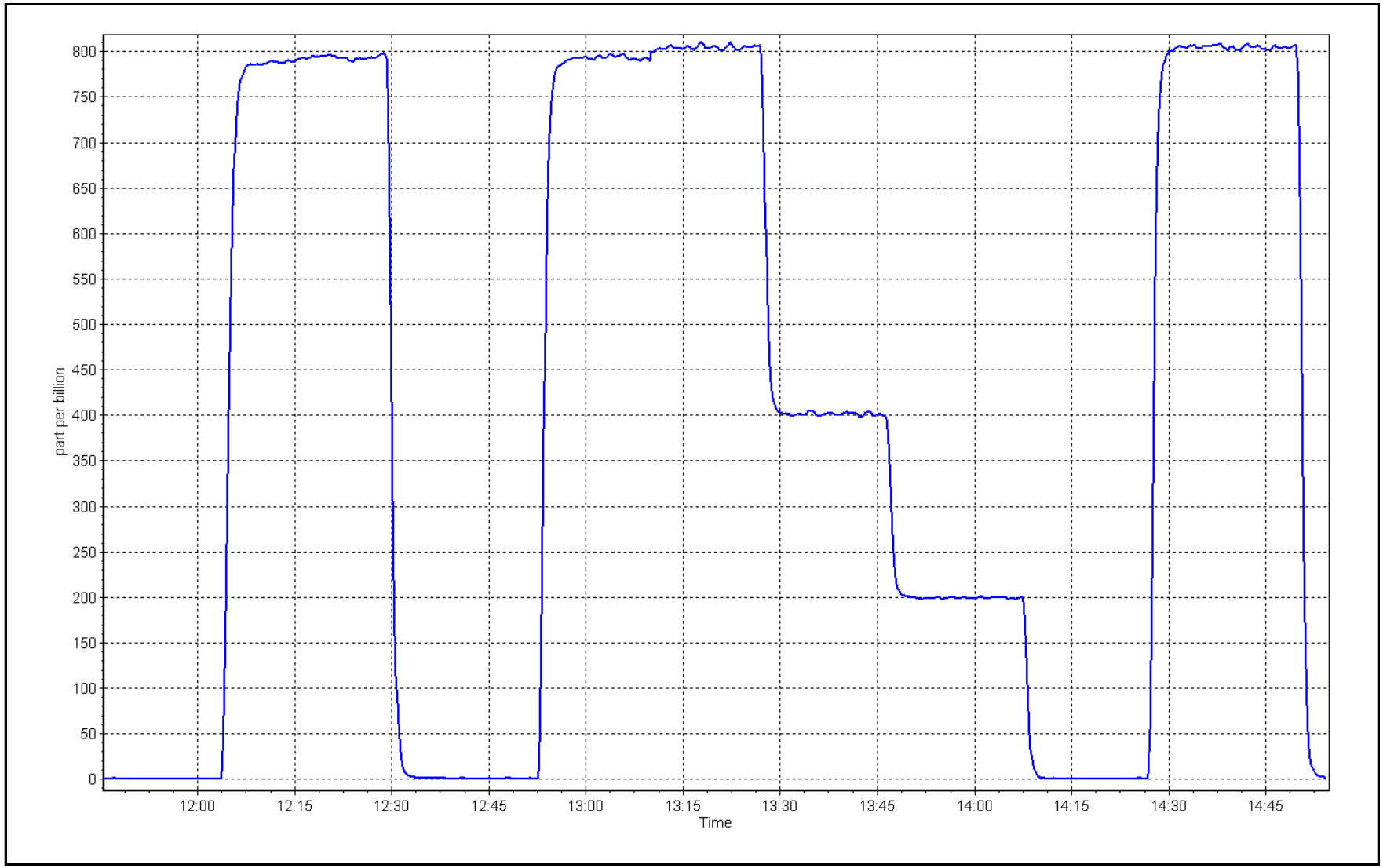
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
800.3	804.8	0.9944
400.2	401.2	0.9975
199.6	199.4	1.0010

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.005444	*0.90 - 1.10*
Intercept	-0.422589	*+/-30*



SO2 Calibration Plot Date: January 11, 2024 Location: Stony Mountain



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Stony Mountain	Station number:	AMS18
Calibration Date:	January 30, 2024	Last Cal Date:	December 21, 2023
Start time (MST):	11:15	End time (MST):	15:36
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.479	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC500395			
Removed Cal Gas Conc:	5.479	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
ZAG Make/Model:	Teledyne API T701		Serial Number:	360

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153359	
Converter make:	CD Nova CDN-101		Converter serial #:	555	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000015	1.000728	Backgd or Offset:	2.66	2.66
Calibration intercept:	0.540982	0.341016	Coeff or Slope:	1.157	1.157

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4927	73.0	80.0	82.1	0.977
as found 2nd point	4964	36.5	40.0	41.3	0.973
as found 3rd point	4983	18.3	20.0	20.6	0.983
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4927	73.0	80.0	80.3	0.996
second point	4964	36.5	40.0	40.6	0.985
third point	4983	18.3	20.0	20.3	0.988
as left zero	5000	0.0	0.0	0.4	----
as left span	4927	73.0	80.0	79.0	1.013
SO2 Scrubber Check	4923	77.1	771.0	0.0	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.990
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.9	Prev response:	80.54	*% change:	1.7%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.024592	AF Intercept:	0.180567
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999990		

* = > +/-5% change initiates investigation

Notes: Scrubber check completed after calibrator zero. No adjustments made.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

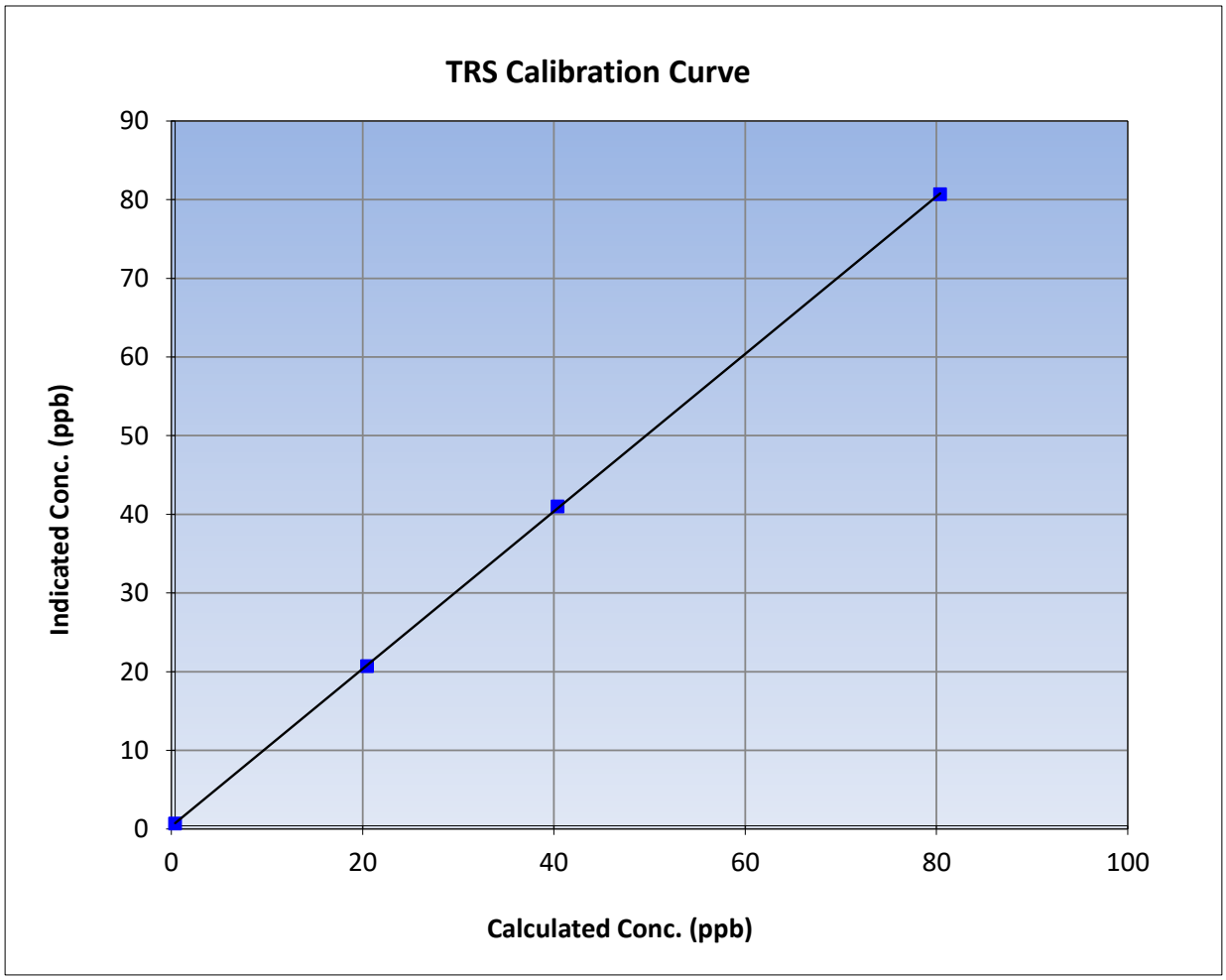
Station Information

Calibration Date:	January 30, 2024	Previous Calibration:	December 21, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	11:15	End Time (MST):	15:36
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

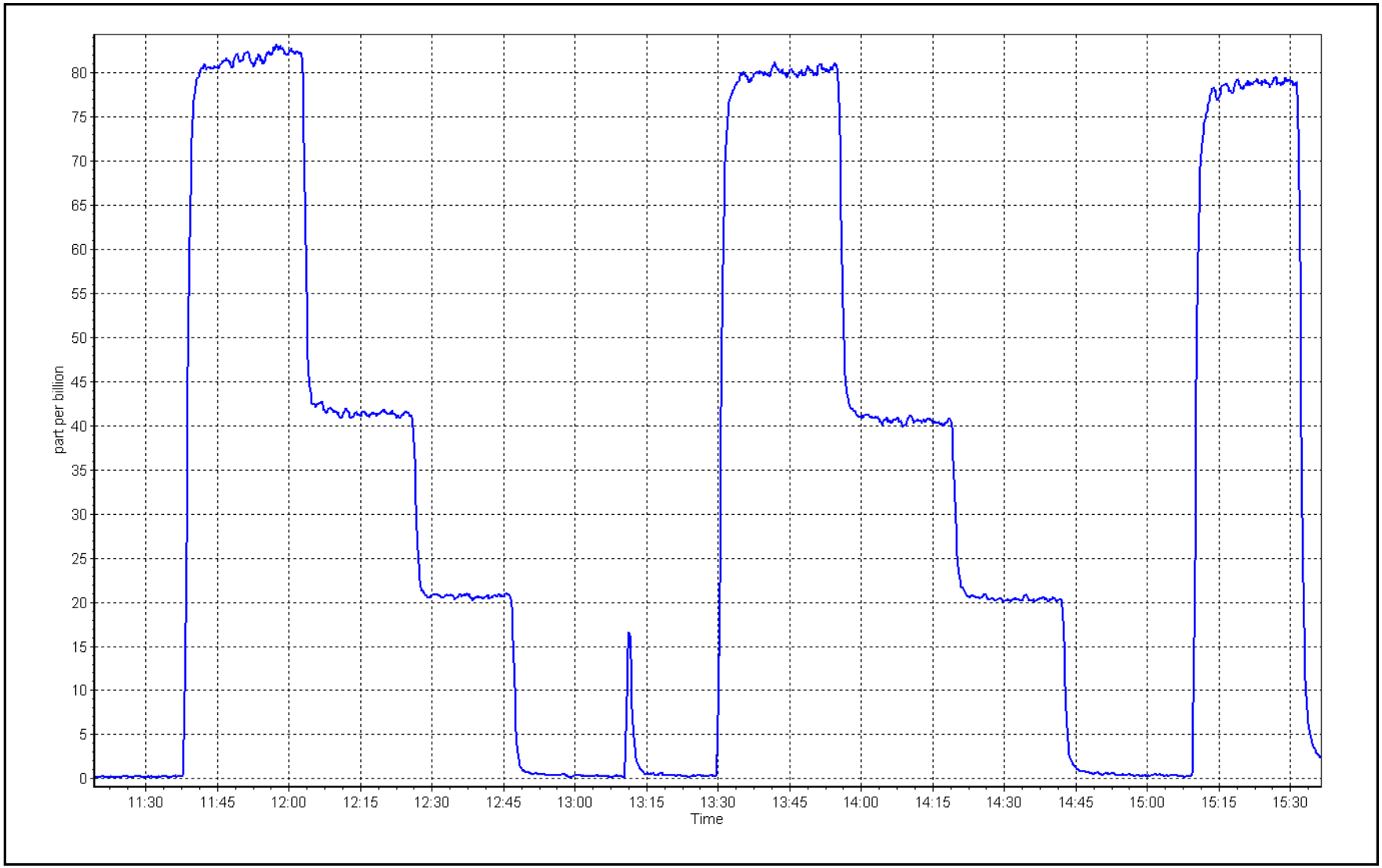
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	80.3	0.9962
40.0	40.6	0.9850
20.0	20.3	0.9876

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	1.000728	*0.90 - 1.10*
Intercept	0.341016	*+/-3*



TRS Calibration Plot Date: January 30, 2024 Location: Stony Mountain



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	January 11, 2024	Last Cal Date:	December 19, 2023
Start time (MST):	11:45	End time (MST):	14:53
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC463851	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
C3H8 Cal Gas Conc.	205.8	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
Removed C3H8 Conc.	205.8	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	2658	
ZAG make/model:	Teledyne API T701H		Serial Number:	360	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.24E-04	2.33E-04	NMHC SP Ratio:	5.04E-05	5.08E-05
CH4 Retention time:	12.7	13.1	NMHC Peak Area:	181790	180289
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	17.28	17.13	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	17.32	0.998
second point	4959	40.5	8.64	8.64	1.000
third point	4979	20.2	4.31	4.26	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.40	0.993
				Average Correction Factor	1.003

Baseline Corr AF:	17.13	Prev response	17.33	*% change	-1.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	9.05	1.013
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	0.999
second point	4959	40.5	4.58	4.61	0.995
third point	4979	20.2	2.29	2.28	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	9.17	9.24	0.992
				Average Correction Factor	0.999
Baseline Corr AF:	9.05	Prev response	9.17	*% change	-1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	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	8.14	0.996
second point	4959	40.5	4.06	4.03	1.006
third point	4979	20.2	2.02	1.98	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.17	0.994
				Average Correction Factor	1.008
Baseline Corr AF:	8.09	Prev response	8.16	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.004329	1.003258
THC Cal Offset:	-0.027780	-0.027185
CH4 Cal Slope:	1.010541	1.005442
CH4 Cal Offset:	-0.037005	-0.028409
NMHC Cal Slope:	0.998956	1.001076
NMHC Cal Offset:	0.009225	0.002223

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

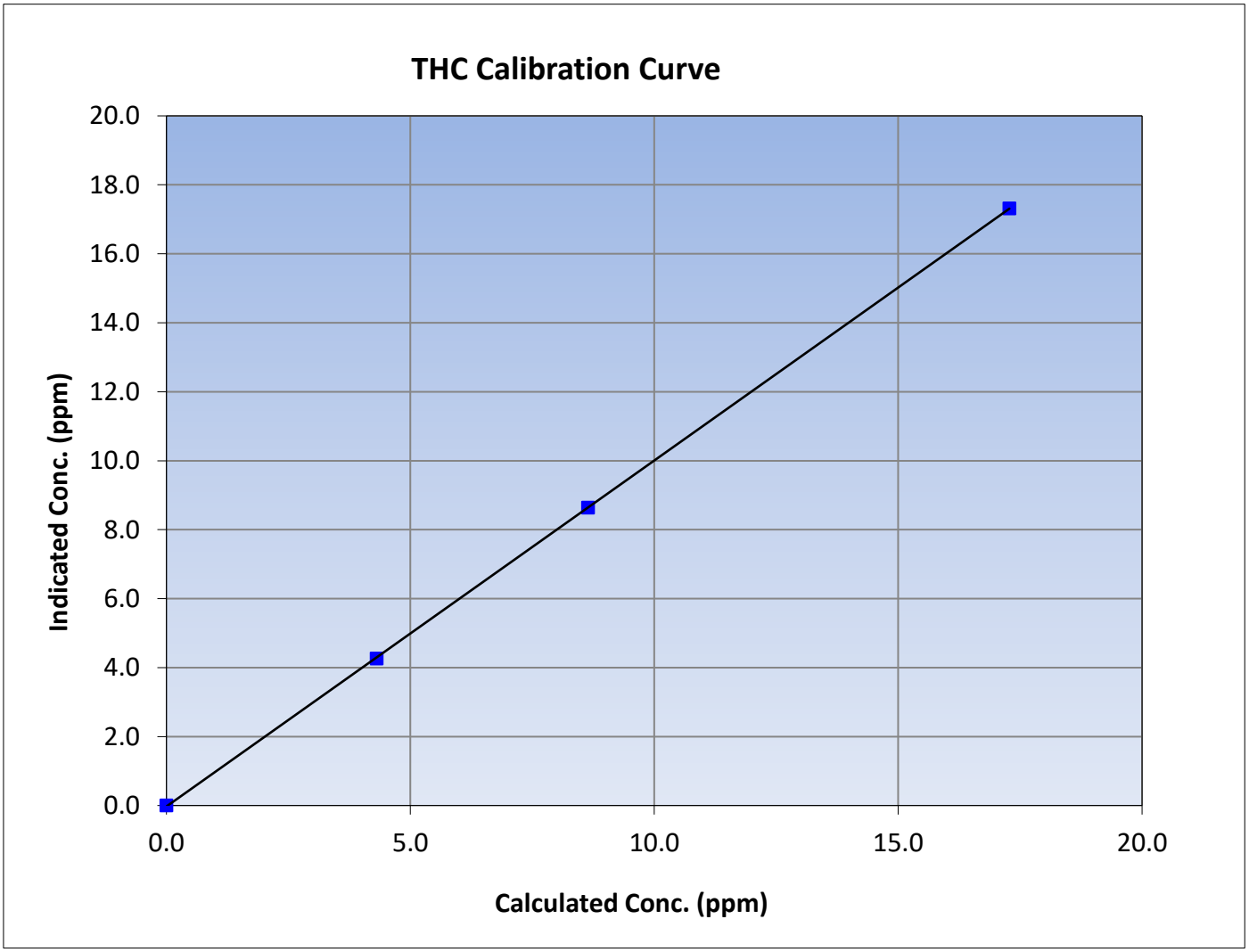
Version-06-2022

Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 19, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:45	End Time (MST):	14:53
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999987	*≥0.995*
17.28	17.32	0.9978			
8.64	8.64	1.0001	Slope	1.003258	*0.90 - 1.10*
4.31	4.26	1.0113			
			Intercept	-0.027185	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

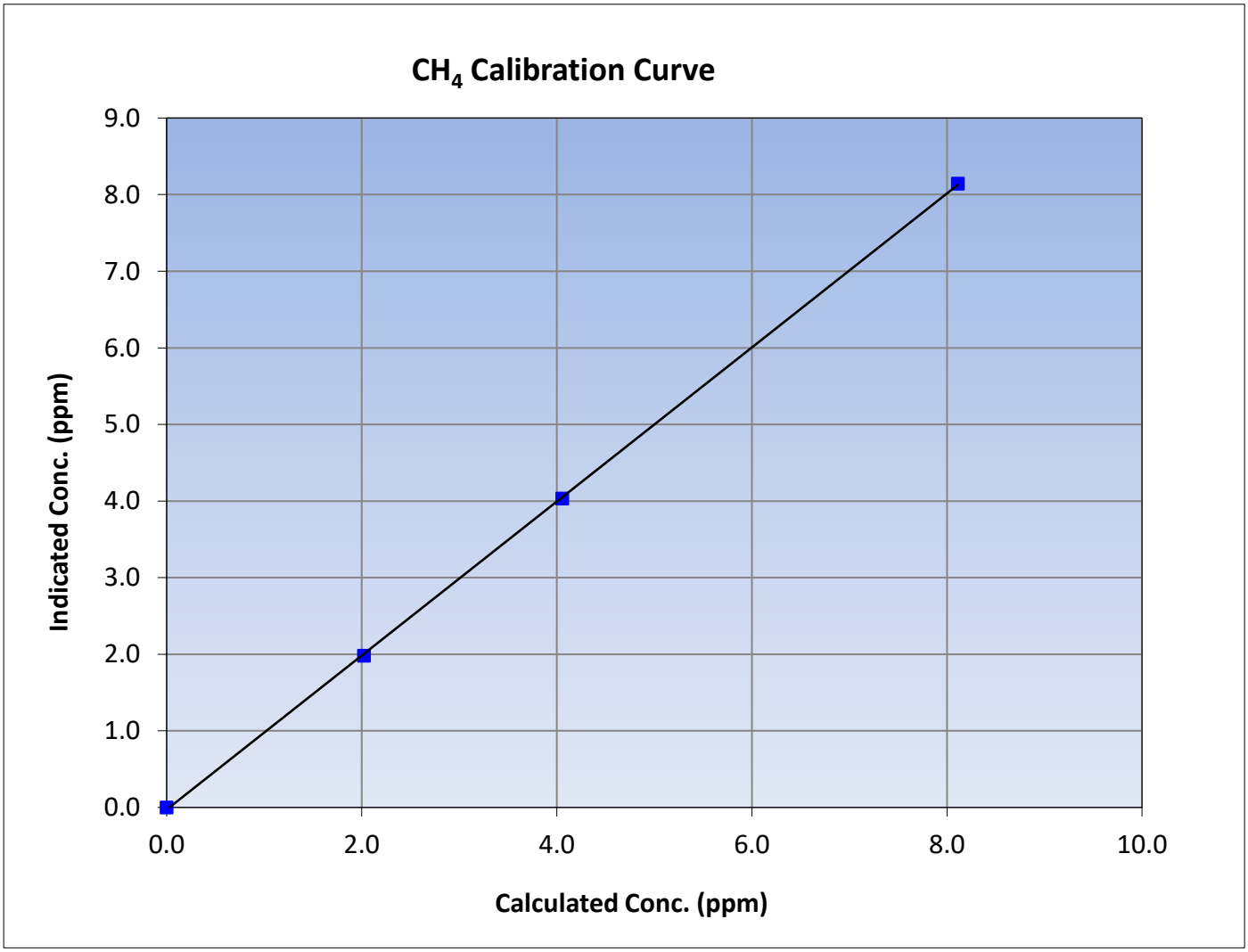
Version-06-2022

Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 19, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:45	End Time (MST):	14:53
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999944	*≥0.995*
8.11	8.14	0.9962			
4.06	4.03	1.0059	Slope	1.005442	*0.90 - 1.10*
2.02	1.98	1.0220			
			Intercept	-0.028409	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

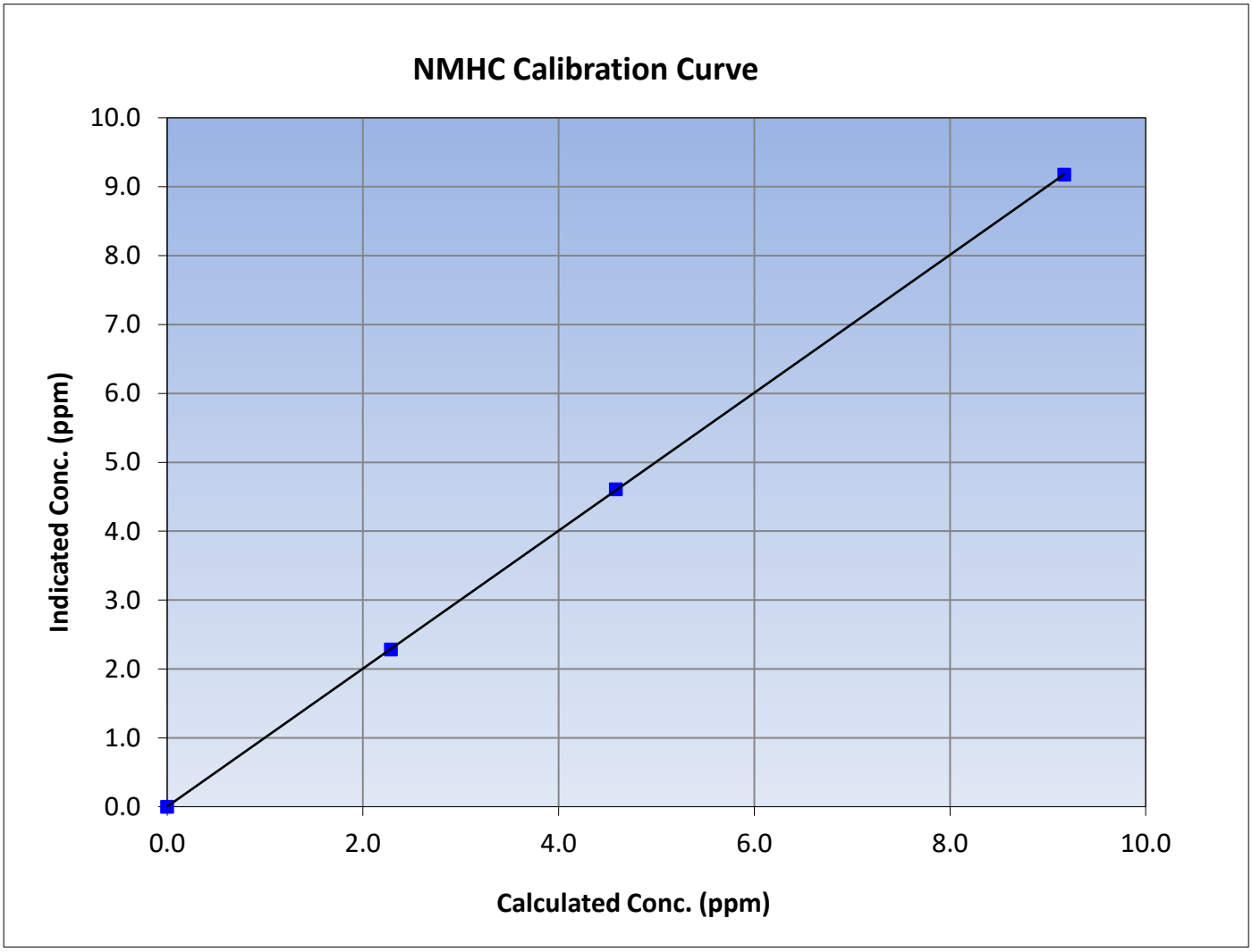
Version-06-2022

Station Information

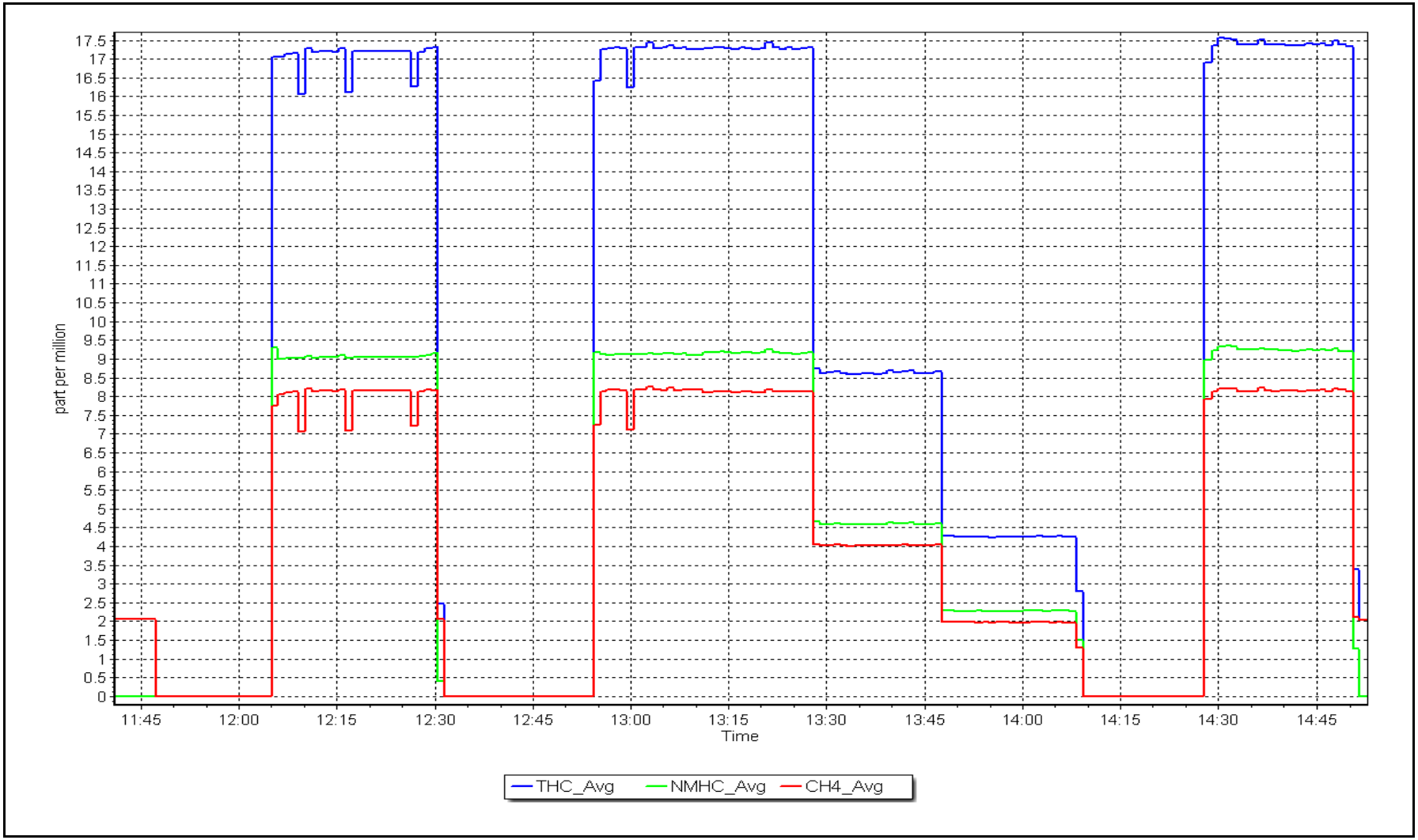
Calibration Date:	January 11, 2024	Previous Calibration:	December 19, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:45	End Time (MST):	14:53
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999991	*≥0.995*
9.17	9.17	0.9994			
4.58	4.61	0.9947	Slope	1.001076	*0.90 - 1.10*
2.29	2.28	1.0017			
			Intercept	0.002223	*+/-0.5*



NMHC Calibration Plot Date: January 11, 2024 Location: Stony Mountain



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	January 22, 2024	Last Cal Date:	January 11, 2024
Start time (MST):	11:40	End time (MST):	15:08
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:		CC463851	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
C3H8 Cal Gas Conc.	205.8	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
Removed C3H8 Conc.	205.8	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	2658	
ZAG make/model:	Teledyne API T701H		Serial Number:	360	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.33E-04	2.27E-04	NMHC SP Ratio:	5.08E-05	8.92E-05
CH4 Retention time:	13.1	12.7	NMHC Peak Area:	180289	102774
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	17.28	16.35	1.057
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	17.44	0.991
second point	4959	40.5	8.64	8.62	1.002
third point	4979	20.2	4.31	4.22	1.020
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.22	1.003
				Average Correction Factor	1.004
Baseline Corr AF:	16.35	Prev response	17.31	*% change	-5.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	8.89	1.031
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	9.32	0.984
second point	4959	40.5	4.58	4.61	0.995
third point	4979	20.2	2.29	2.26	1.014
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	9.17	9.12	1.006
				Average Correction Factor	0.998
Baseline Corr AF:	8.89	Prev response	9.18	*% change	-3.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	8.11	7.46	1.088
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	8.12	0.999
second point	4959	40.5	4.06	4.01	1.011
third point	4979	20.2	2.02	1.97	1.027
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.11	1.001
				Average Correction Factor	1.012
Baseline Corr AF:	7.46	Prev response	8.13	*% change	-9.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.003258	1.011154
THC Cal Offset:	-0.027185	-0.070367
CH4 Cal Slope:	1.005442	1.002808
CH4 Cal Offset:	-0.028409	-0.031814
NMHC Cal Slope:	1.001076	1.018713
NMHC Cal Offset:	0.002223	-0.038752

Notes: Dealing with dips on CH4. N2 changed after As Founds. Low counts on chromoatogram maybe leading to 9% low span. Input board calibrated. Carrier pressure increased 5psi, window adjusted.

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

THC Calibration Summary

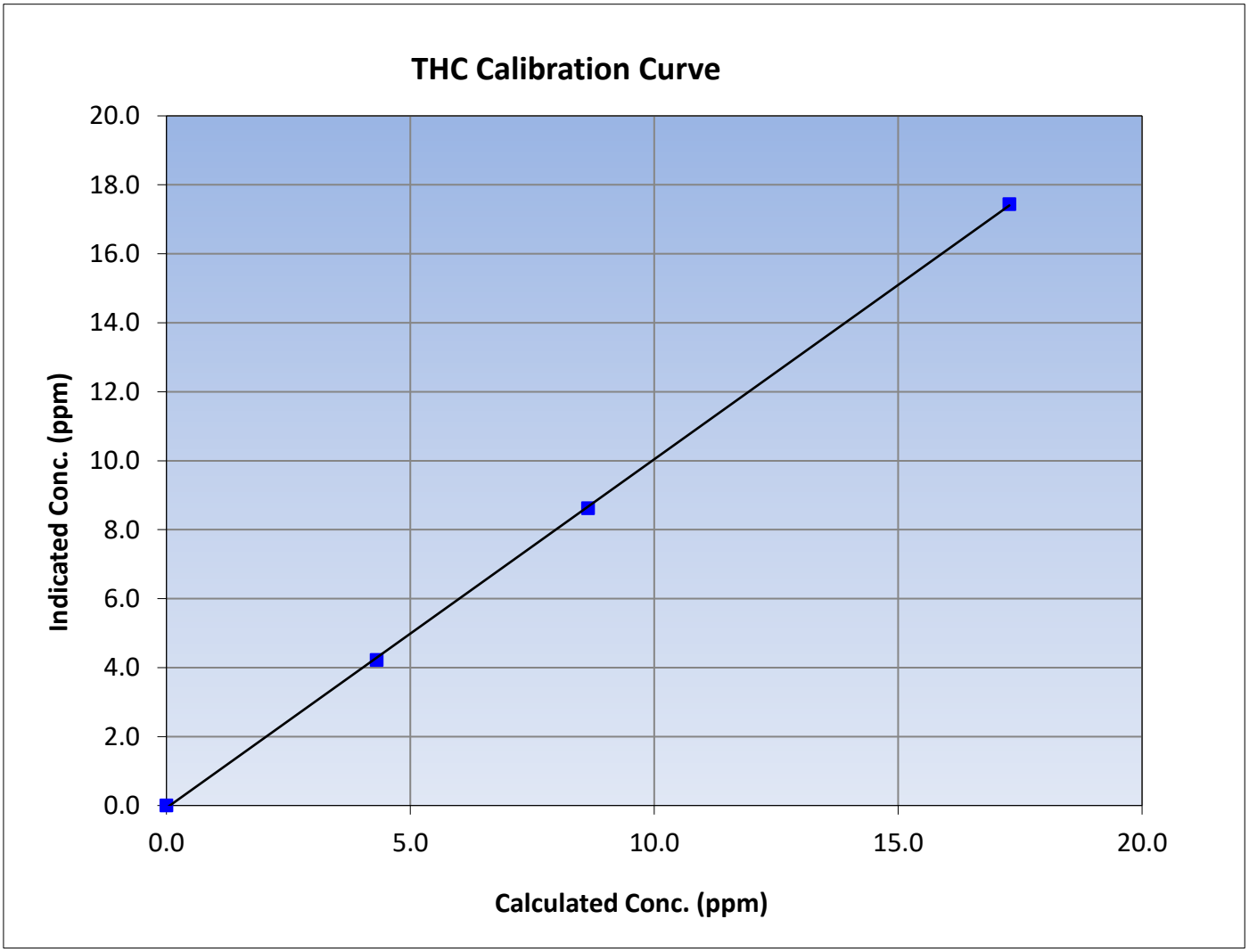
Version-06-2022

Station Information

Calibration Date:	January 22, 2024	Previous Calibration:	January 11, 2024
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:40	End Time (MST):	15:08
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999925	*≥0.995*
17.28	17.44	0.9908			
8.64	8.62	1.0021	Slope	1.011154	*0.90 - 1.10*
4.31	4.22	1.0204			
			Intercept	-0.070367	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

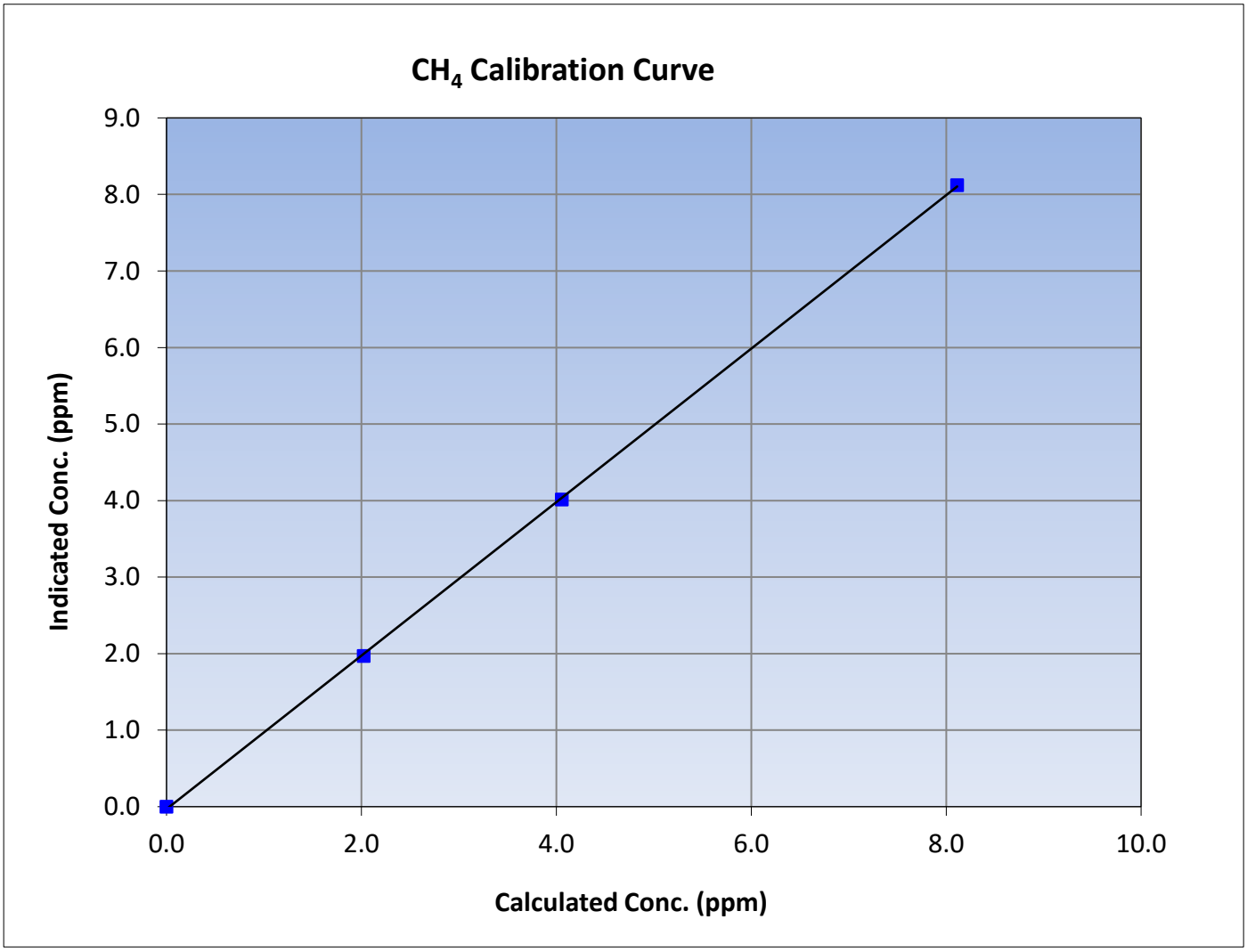
Version-06-2022

Station Information

Calibration Date:	January 22, 2024	Previous Calibration:	January 11, 2024
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:40	End Time (MST):	15:08
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999928	*≥0.995*
8.11	8.12	0.9989			
4.06	4.01	1.0107	Slope	1.002808	*0.90 - 1.10*
2.02	1.97	1.0272			
			Intercept	-0.031814	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

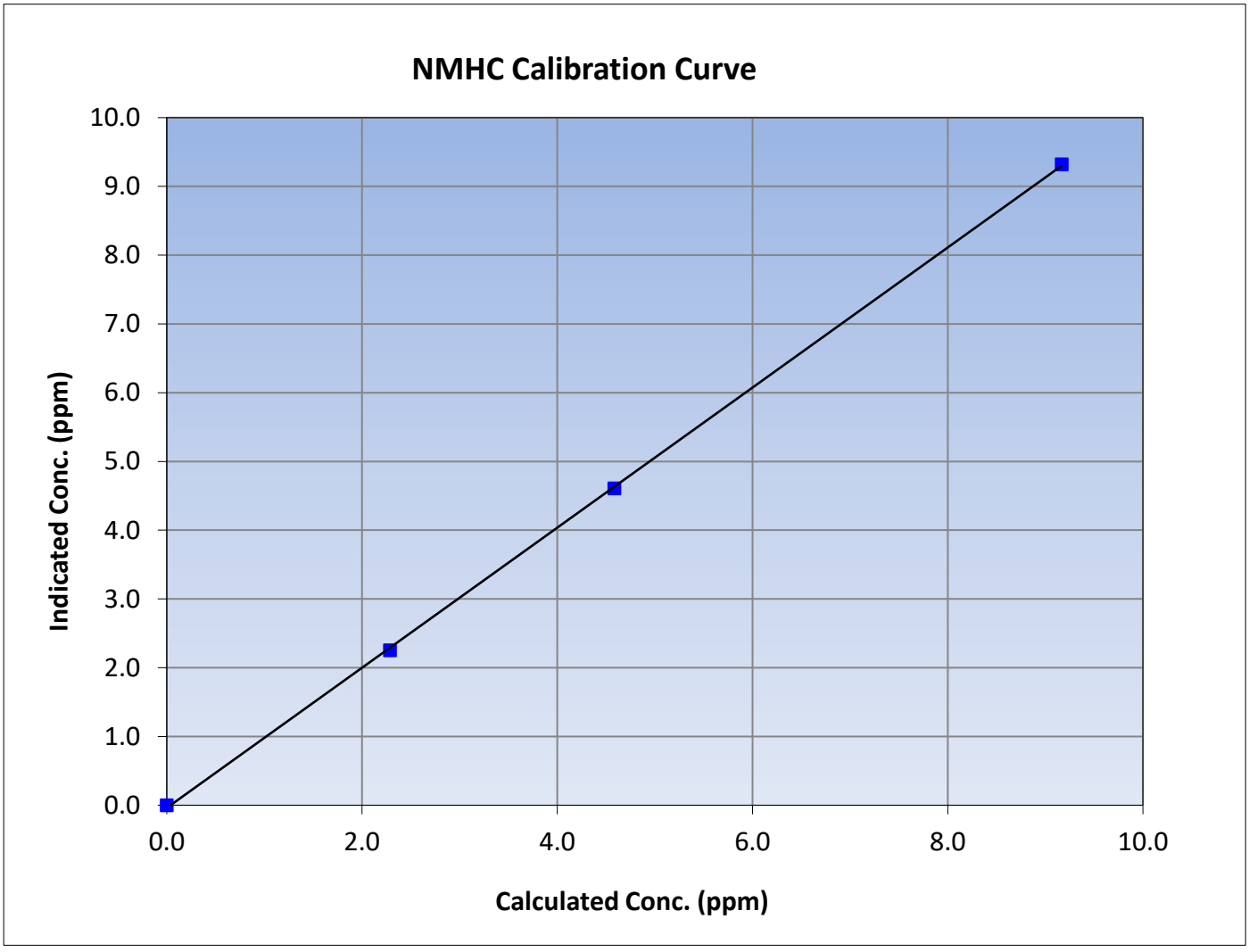
Version-06-2022

Station Information

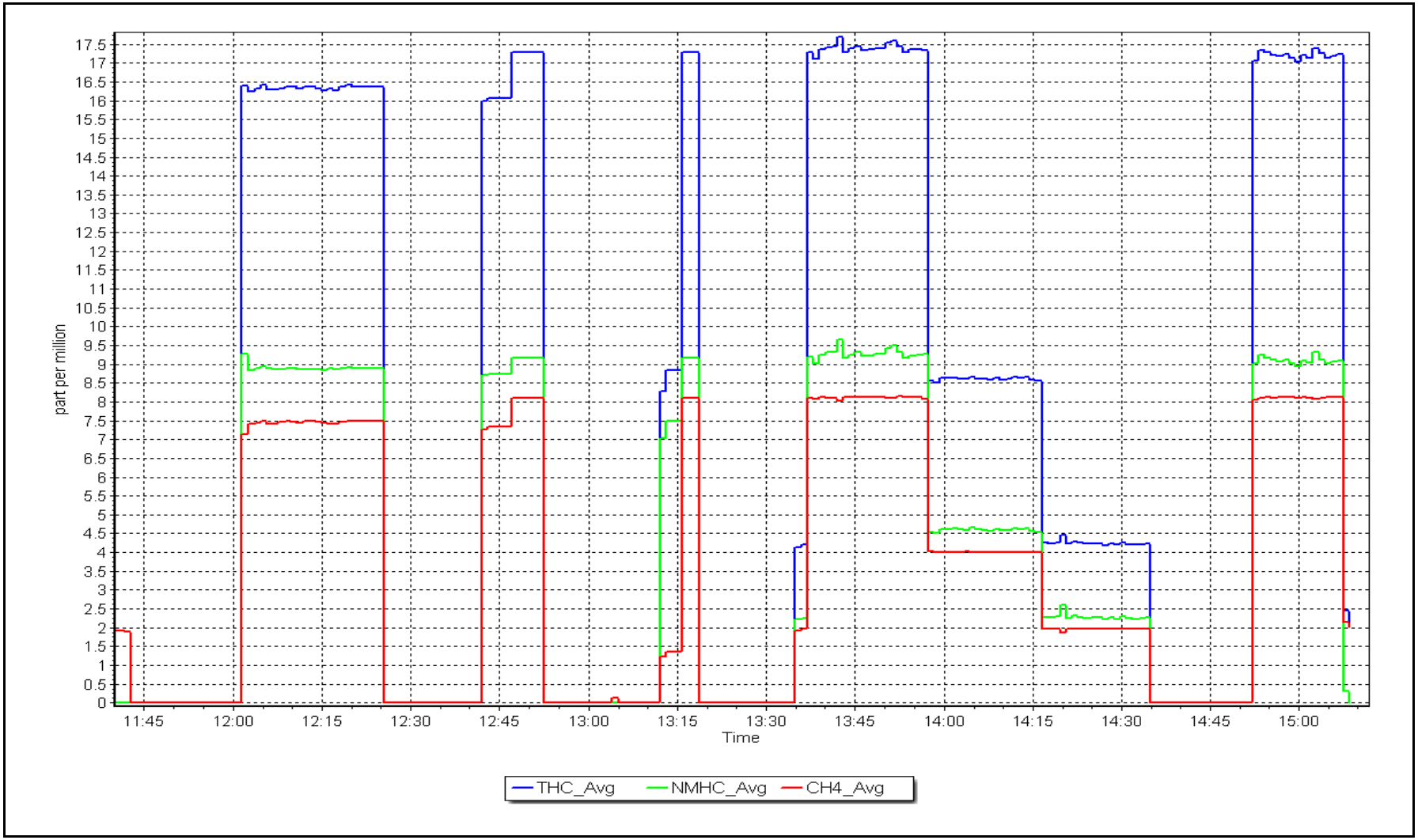
Calibration Date:	January 22, 2024	Previous Calibration:	January 11, 2024
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:40	End Time (MST):	15:08
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999921	≥0.995
9.17	9.32	0.9835			
4.58	4.61	0.9949	Slope	1.018713	0.90 - 1.10
2.29	2.26	1.0141			
			Intercept	-0.038752	+/-0.5



NMHC Calibration Plot Date: January 22, 2024 Location: Stony Mountain



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	January 23, 2024	Last Cal Date:	January 22, 2024
Start time (MST):	12:00	End time (MST):	N/A
Reason:	Removal		

Calibration Standards

Gas Cert Reference:		CC463851	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
C3H8 Cal Gas Conc.	205.8	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
Removed C3H8 Conc.	205.8	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	2658	
ZAG make/model:	Teledyne API T701H		Serial Number:	360	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.27E-04	N/A	NMHC SP Ratio:	8.92E-05	N/A
CH4 Retention time:	12.7	N/A	NMHC Peak Area:	102774	N/A
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	17.28	17.01	1.016
as found 2nd point	4959	40.5	8.64	8.43	1.025
as found 3rd point	4979	20.2	4.31	4.16	1.037
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	17.01	Prev response	17.40	*% change	-2.3%
Baseline Corr 2nd AF:	8.4	AF Slope:	0.985558	AF Intercept:	-0.049656
Baseline Corr 3rd AF:	4.2	AF Correlation:	0.999960	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	8.92	1.028
as found 2nd point	4959	40.5	4.58	4.46	1.029
as found 3rd point	4979	20.2	2.29	2.18	1.048
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	8.92	Prev response	9.30	*% change	-4.3%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.974470	AF Intercept:	-0.017839
Baseline Corr 3rd AF:	2.2	AF Correlation:	0.999973	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	8.11	8.09	1.003
as found 2nd point	4959	40.5	4.06	3.98	1.020
as found 3rd point	4979	20.2	2.02	1.97	1.026
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	8.09	Prev response	8.10	*% change	-0.2%
Baseline Corr 2nd AF:	3.98	AF Slope:	0.998088	AF Intercept:	-0.031816
Baseline Corr 3rd AF:	1.97	AF Correlation:	0.999901	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.011154	
THC Cal Offset:	-0.070367	
CH4 Cal Slope:	1.002808	
CH4 Cal Offset:	-0.031814	
NMHC Cal Slope:	1.018713	
NMHC Cal Offset:	-0.038752	

Notes: Dips still present after maintenance performed on January 22, 2024. Removing instrument for further maintenance back at the shop

Calibration Performed By: Aswin Sasi Kumar

NMHC Calibration Plot Date: January 23, 2024 Location: Stony Mountain

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	January 23, 2024	Last Cal Date:	
Start time (MST):	14:40	End time (MST):	16:49
Reason:	Install		

Calibration Standards

Gas Cert Reference:		CC463851	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
C3H8 Cal Gas Conc.	205.8	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
Removed C3H8 Conc.	205.8	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	2658	
ZAG make/model:	Teledyne API T701H		Serial Number:	360	

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1193585647
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:		3.13E-04	NMHC SP Ratio:		6.14E-05
CH4 Retention time:		16.2	NMHC Peak Area:		149456
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
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	4919	81.0	17.28	17.40	0.993
second point	4959	40.5	8.64	8.74	0.989
third point	4979	20.2	4.31	4.37	0.987
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.59	0.982
				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 / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
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	4919	81.0	9.17	9.27	0.989
second point	4959	40.5	4.58	4.64	0.987
third point	4979	20.2	2.29	2.34	0.976
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	9.17	9.42	0.973
				Average Correction Factor	0.984
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
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	4919	81.0	8.11	8.13	0.998
second point	4959	40.5	4.06	4.09	0.992
third point	4979	20.2	2.02	2.02	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.18	0.992
				Average Correction Factor	0.997
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:		1.006554
THC Cal Offset:		0.018647
CH4 Cal Slope:		1.002919
CH4 Cal Offset:		0.002793
NMHC Cal Slope:		1.009996
NMHC Cal Offset:		0.014455

Notes: Install calibration. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

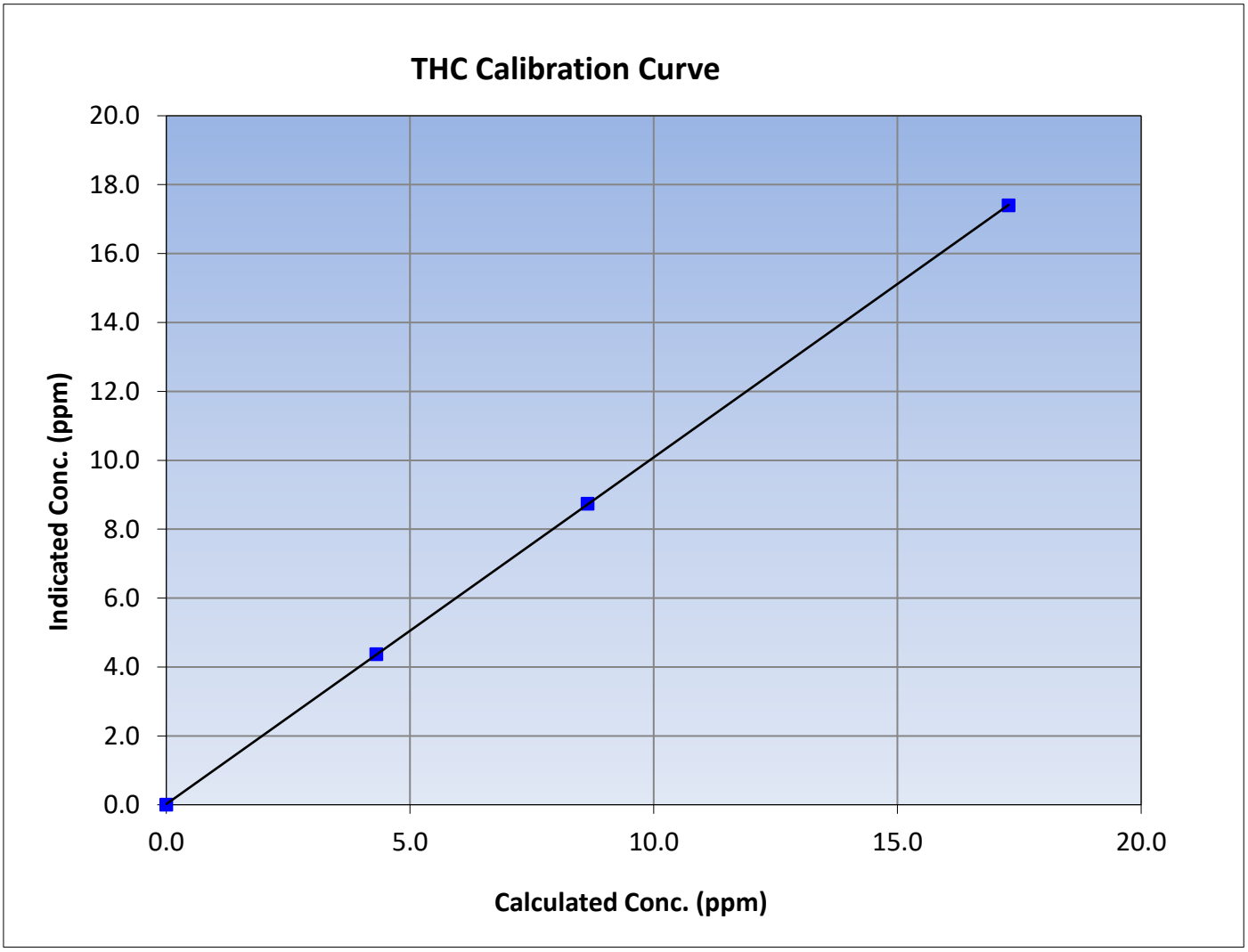
Version-06-2022

Station Information

Calibration Date:	January 23, 2024	Previous Calibration:	
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	14:40	End Time (MST):	16:49
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585647

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999993	≥0.995
17.28	17.40	0.9932			
8.64	8.74	0.9890	Slope	1.006554	0.90 - 1.10
4.31	4.37	0.9868			
			Intercept	0.018647	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

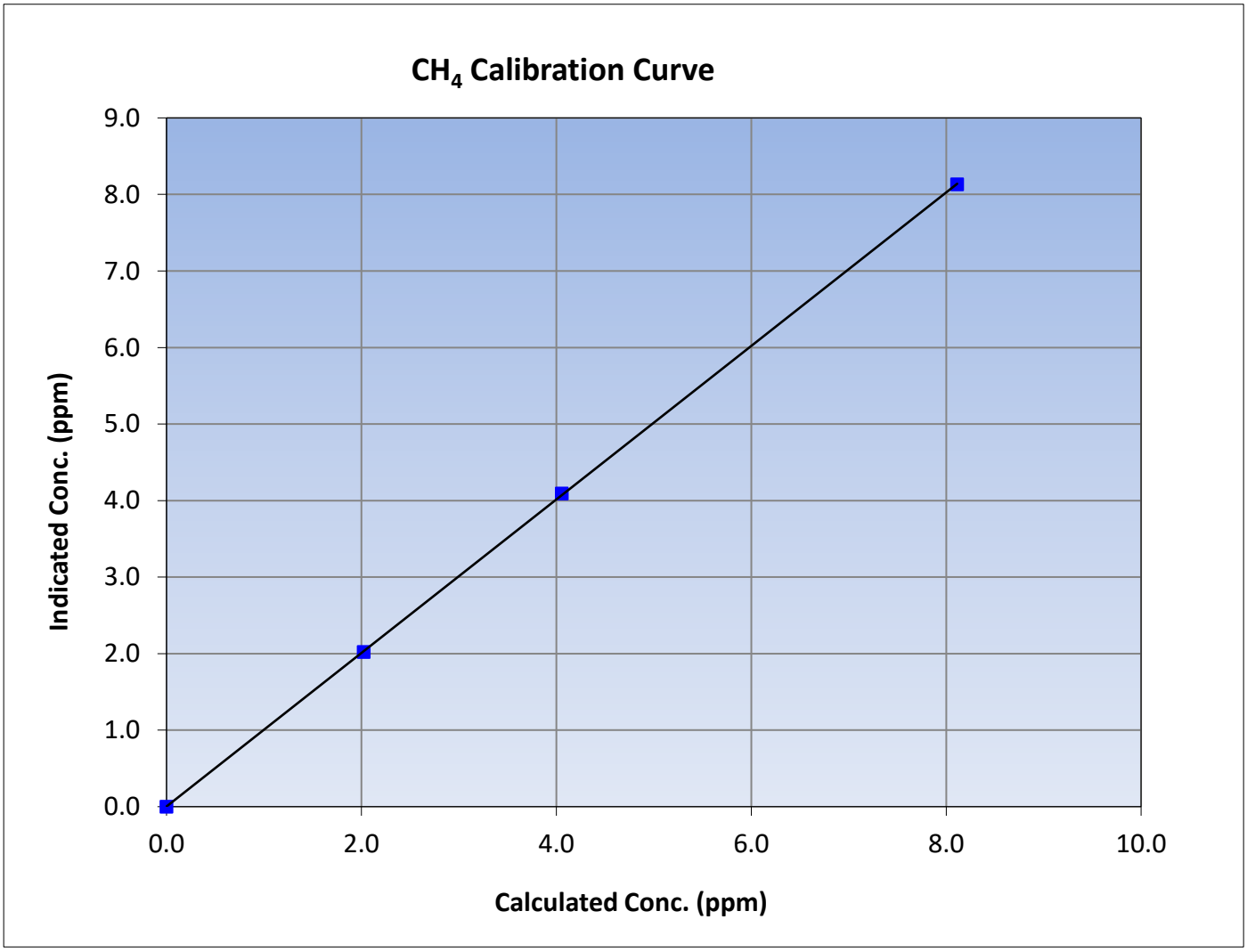
Version-06-2022

Station Information

Calibration Date:	January 23, 2024	Previous Calibration:	
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	14:40	End Time (MST):	16:49
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585647

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999985	*≥0.995*
8.11	8.13	0.9977			
4.06	4.09	0.9917	Slope	1.002919	*0.90 - 1.10*
2.02	2.02	1.0003			
			Intercept	0.002793	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

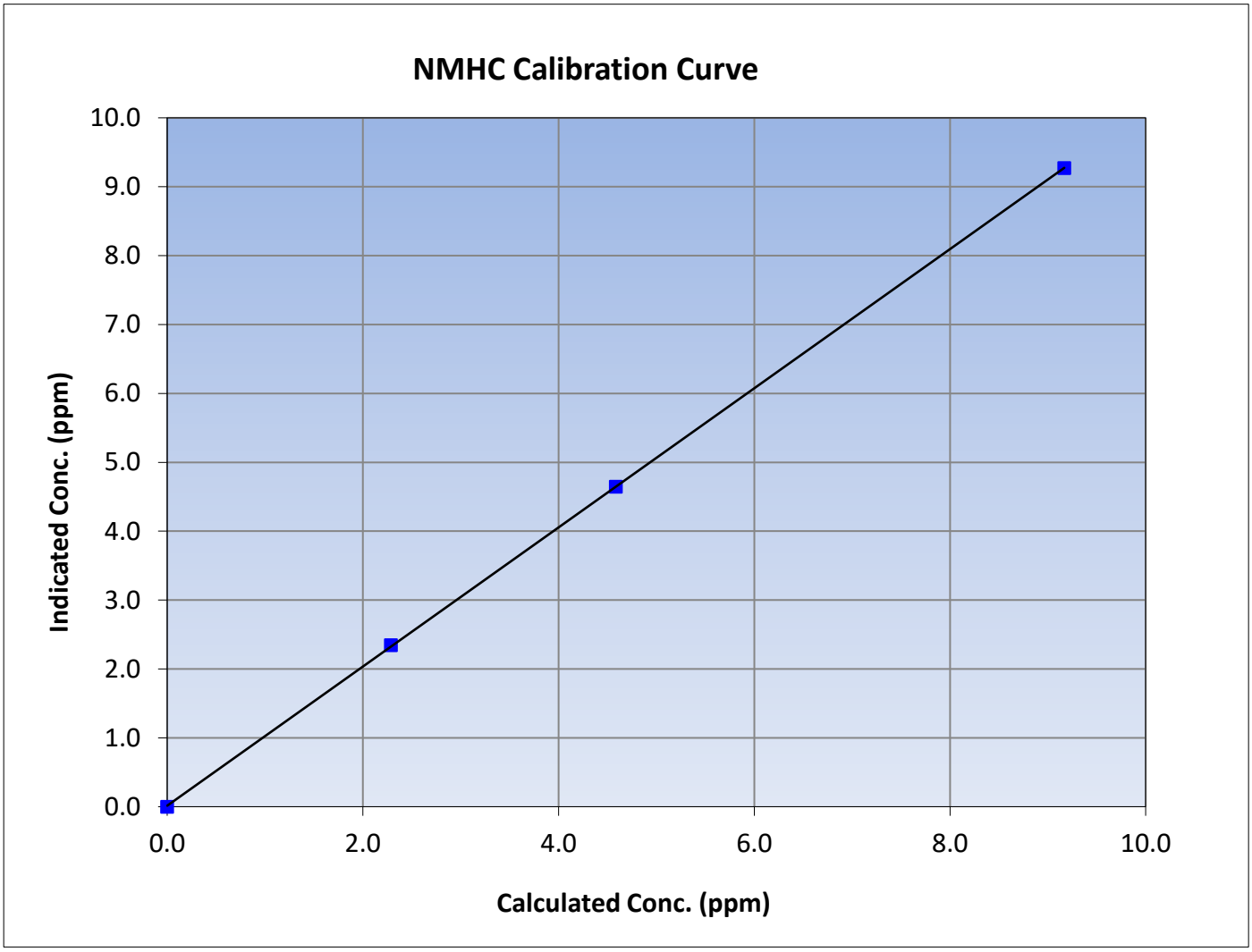
Version-06-2022

Station Information

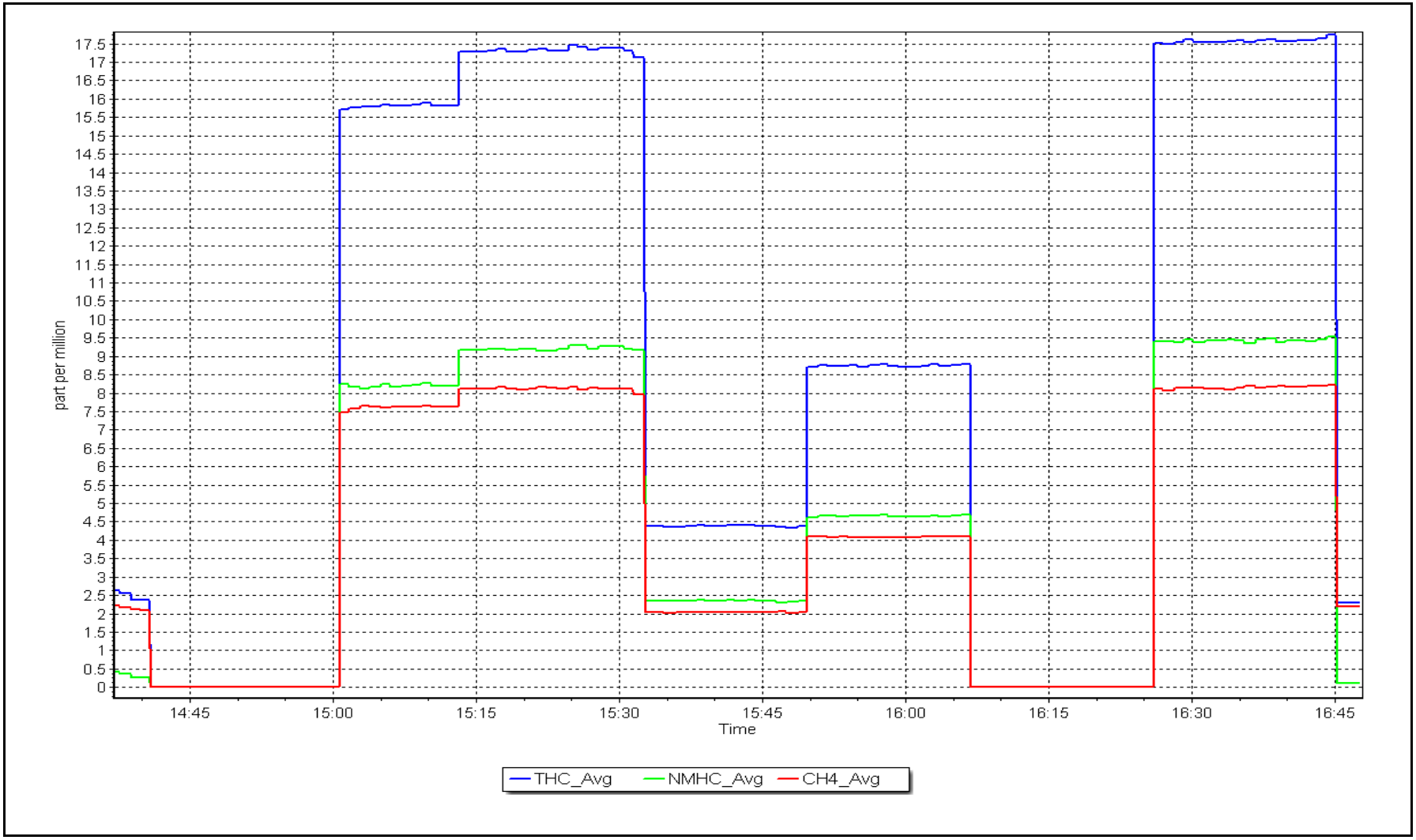
Calibration Date:	January 23, 2024	Previous Calibration:	
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	14:40	End Time (MST):	16:49
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585647

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999987	*≥0.995*
9.17	9.27	0.9890			
4.58	4.64	0.9872	Slope	1.009996	*0.90 - 1.10*
2.29	2.34	0.9756			
			Intercept	0.014455	*+/-0.5*



NMHC Calibration Plot Date: January 23, 2024 Location: Stony Mountain



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	January 25, 2024	Last Cal Date:	December 21, 2023
Start time (MST):	11:25	End time (MST):	16:02
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T26DHGA		Cal Gas Expiry Date:	November 17, 2026	
NOX Cal Gas Conc:	48.28	ppm	NO Cal Gas Conc:	47.58	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	48.28	ppm	Removed Gas NO Conc:	47.58	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	2658	
ZAG make/model:	Teledyne API T701		Serial Number:	13779	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.076	1.102	NO bkgnd or offset:	3.0	3.1
NOX coeff or slope:	0.988	0.988	NOX bkgnd or offset:	3.0	3.1
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	249.1	252.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001069	1.000344
NO_X Cal Offset:	-0.390046	-0.080000
NO Cal Slope:	1.001210	1.001207
NO Cal Offset:	-1.489996	-0.760000
NO_2 Cal Slope:	1.001477	0.998708
NO_2 Cal Offset:	1.056533	0.435337

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.3	-0.1	0.5	----	----
as found span	4916	84.0	811.1	799.3	11.8	790.7	778.5	12.2	1.0258	1.0268
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
high point	4916	84.0	811.1	799.3	11.8	811.1	799.6	11.6	1.0000	0.9997
second point	4958	42.0	405.6	399.7	5.9	406.5	399.9	6.6	0.9977	0.9994
third point	4979	21.0	202.8	199.8	2.9	201.8	198.1	3.7	1.0048	1.0088
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	4916	84.0	811.1	361.3	449.8	815.0	357.0	458.0	0.9952	1.0122
								Average Correction Factor	1.0008	1.0026

Corrected As found	NO_X = 790.4 ppb	NO = 778.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -2.7%		
Previous Response	NO_X = 811.6 ppb	NO = 798.8 ppb		*Percent Change	NO = -2.6%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.6	362.6	449.8	449.7	1.0001	100.0%
2nd GPT point (200 ppb O3)	800.6	587.2	225.2	224.9	1.0012	99.9%
3rd GPT point (100 ppb O3)	800.6	696.7	115.7	116.4	0.9936	100.6%
				Average Correction Factor	0.9983	100.2%

Notes: Calibration gas cylinder T2XX7ME removed on January 23, 2024. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

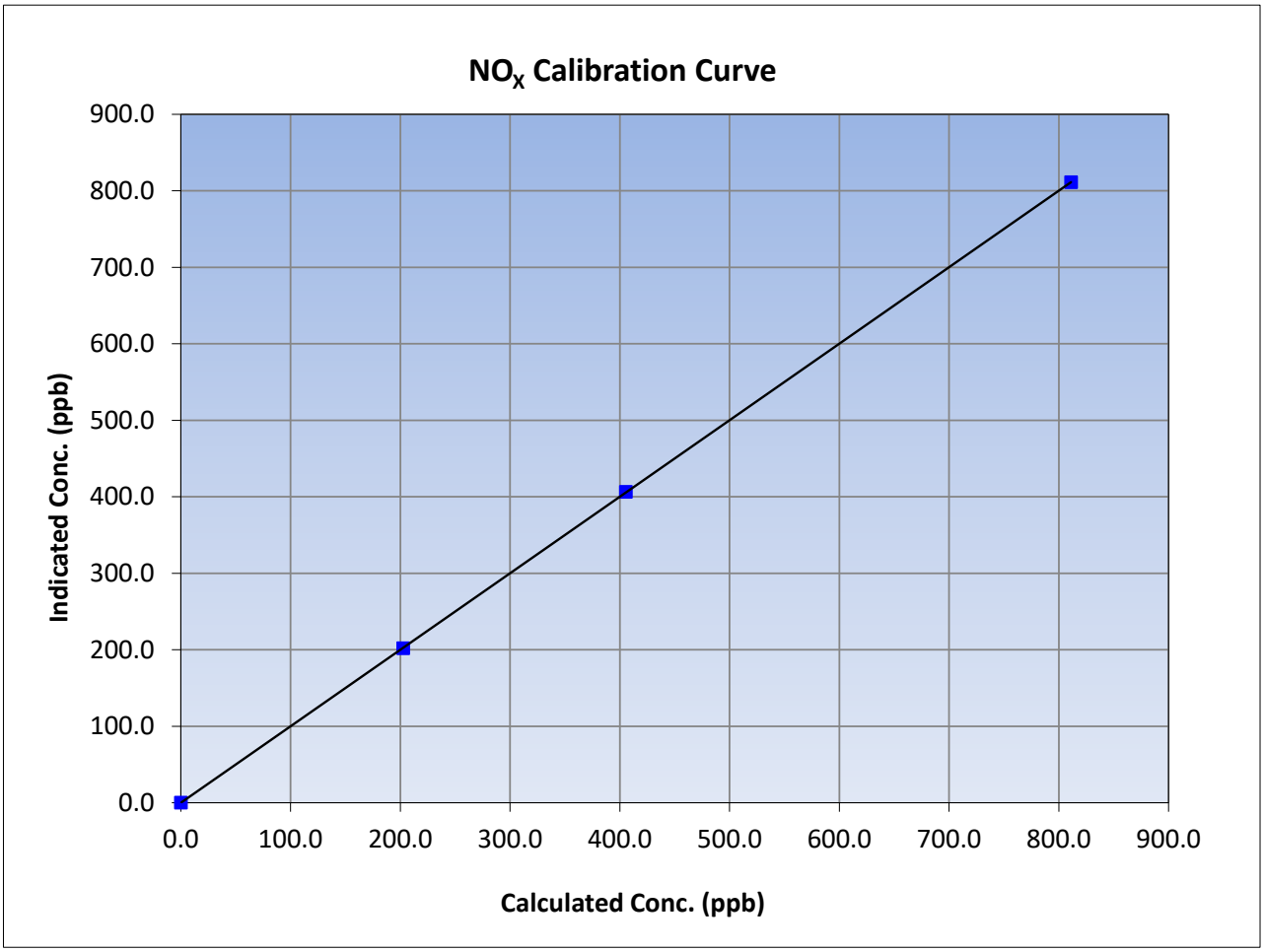
Version-04-2020

Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	December 21, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:25	End Time (MST):	16:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999995	≥0.995
811.1	811.1	1.0000			
405.6	406.5	0.9977	Slope	1.000344	0.90 - 1.10
202.8	201.8	1.0048			
			Intercept	-0.080000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

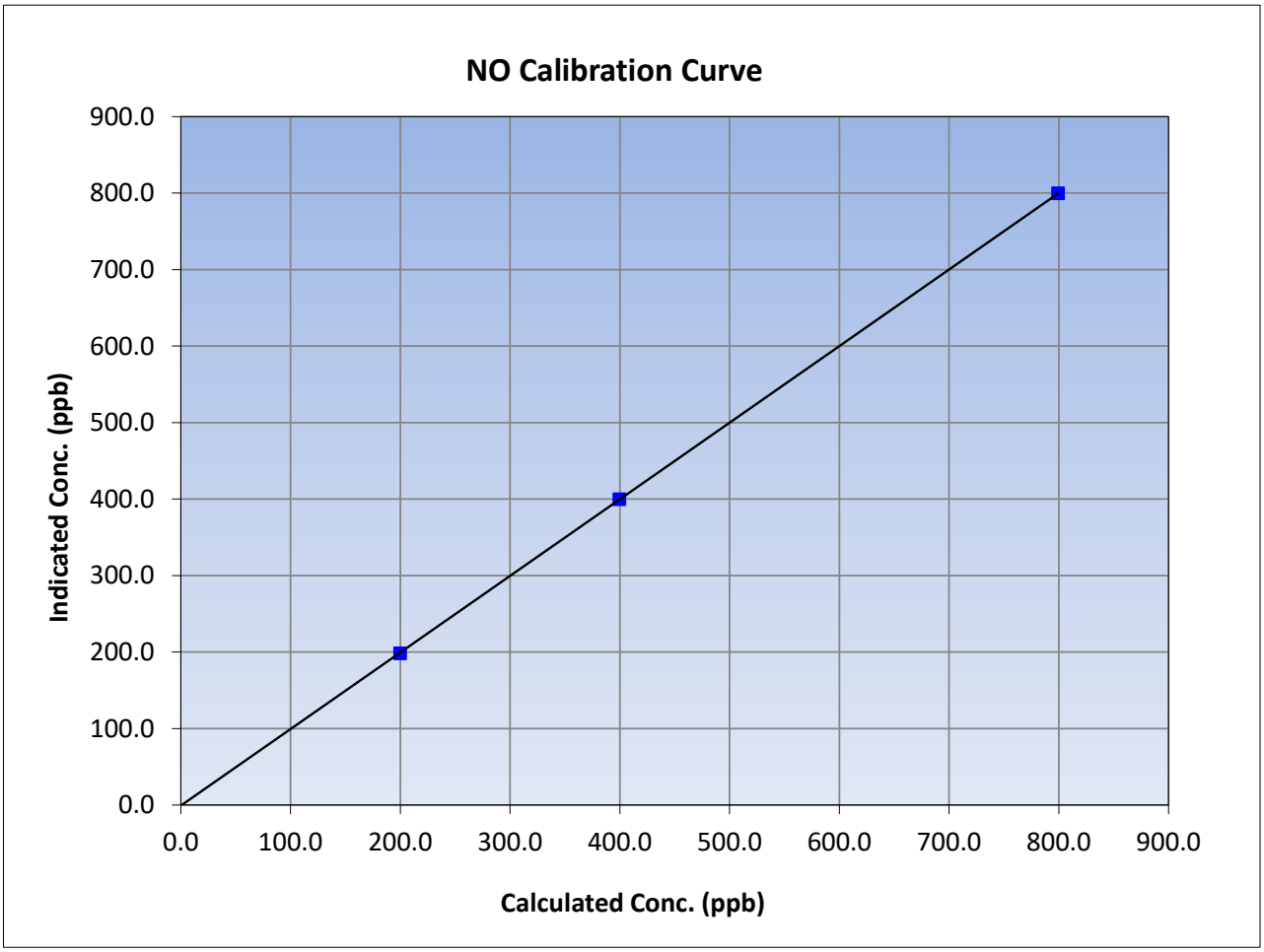
Version-04-2020

Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	December 21, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:25	End Time (MST):	16:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999994	≥0.995
799.3	799.6	0.9997			
399.7	399.9	0.9994	Slope	1.001207	0.90 - 1.10
199.8	198.1	1.0088			
			Intercept	-0.760000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

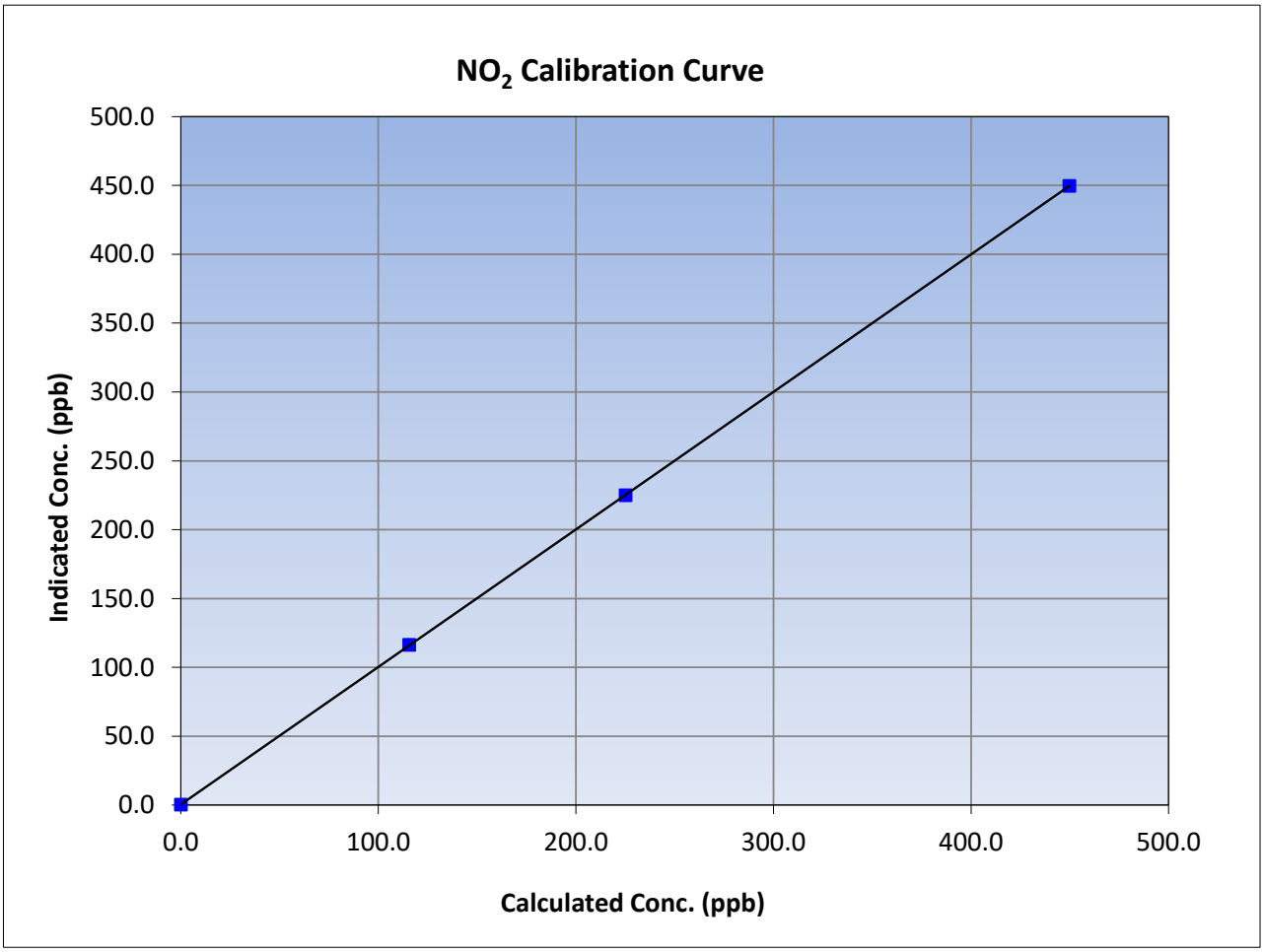
Version-04-2020

Station Information

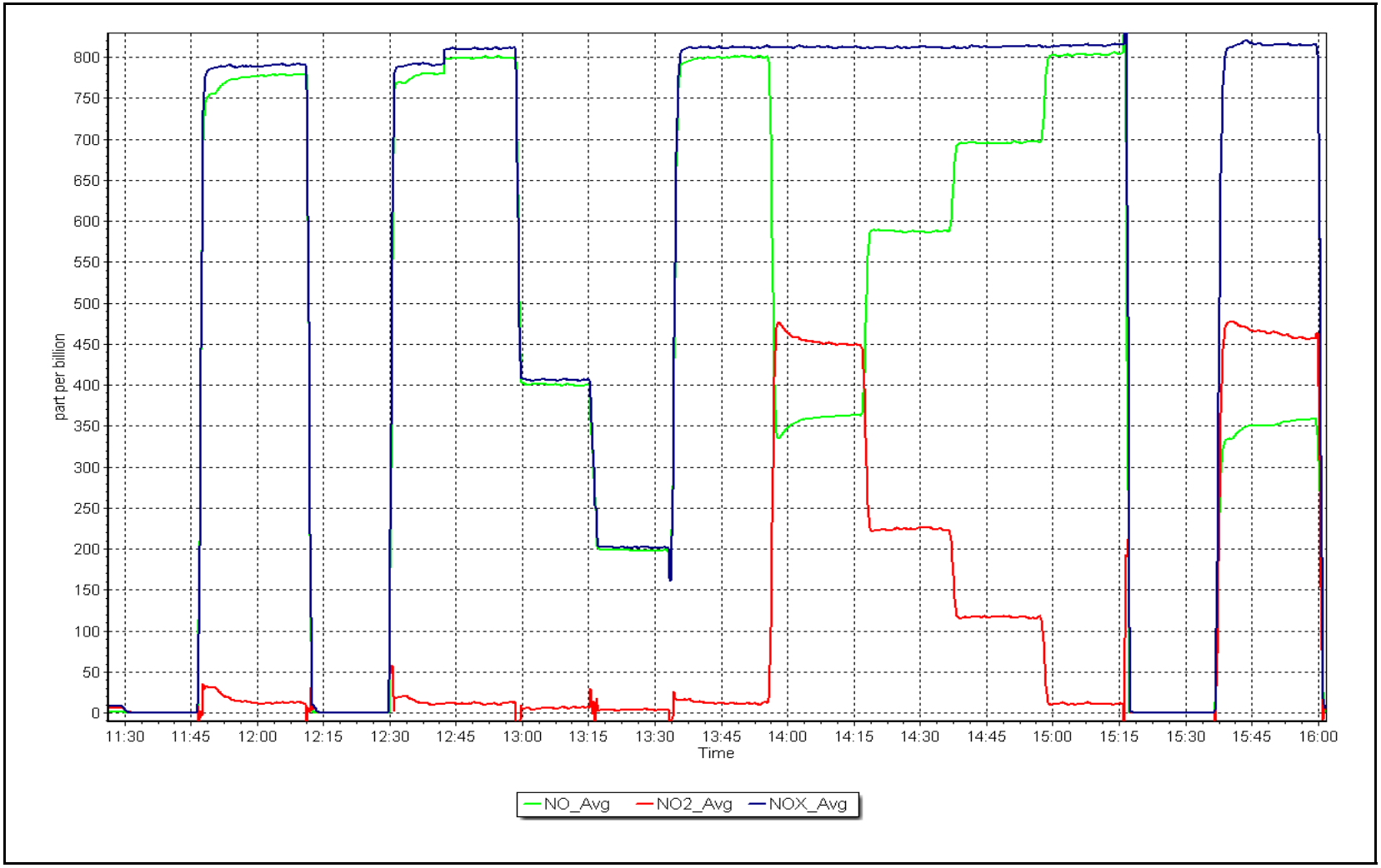
Calibration Date:	January 25, 2024	Previous Calibration:	December 21, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:25	End Time (MST):	16:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999996	≥0.995
449.8	449.7	1.0001			
225.2	224.9	1.0012	Slope	0.998708	0.90 - 1.10
115.7	116.4	0.9936			
			Intercept	0.435337	+/-20



NO_X Calibration Plot Date: January 25, 2024 Location: Stony Mountain



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS18
Calibration Date:	January 24, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	11:30	End time (MST):	15:30
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	2658
ZAG Make/Model:	Teledyne API 701H	Serial Number:	360

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002257	1.002743	Backgd or Offset:	2.4	-0.7
Calibration intercept:	-1.420000	0.020000	Coeff or Slope:	0.978	0.971

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	NA	0.0	-1.8	----
as found span	4804	1141.9	400.0	400.3	0.999
as found 2nd point	4804	884.5	200.0	201.1	0.995
as found 3rd point	4888	741.4	100.0	99.9	1.001
calibrator zero	5000	NA	0.0	0.0	----
high point	4888	1138.1	400.0	401.5	0.996
second point	4888	884.5	200.0	199.4	1.003
third point	4888	741.4	100.0	101.1	0.989
as left zero	5000	NA	0.0	0.0	----
as left span	4812	1097.9	400.0	404.0	0.990
				Average Correction Factor	0.996

Baseline Corr As found:	402.1	Previous response	399.5	*% change	0.7%
Baseline Corr 2nd AF pt:	202.9	AF Slope:	1.004771	AF Intercept:	-0.960000
Baseline Corr 3rd AF pt:	101.7	AF Correlation:	0.999972		

* = > +/-5% change initiates investigation

Notes: Pump changed out after multi-point as founds. Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

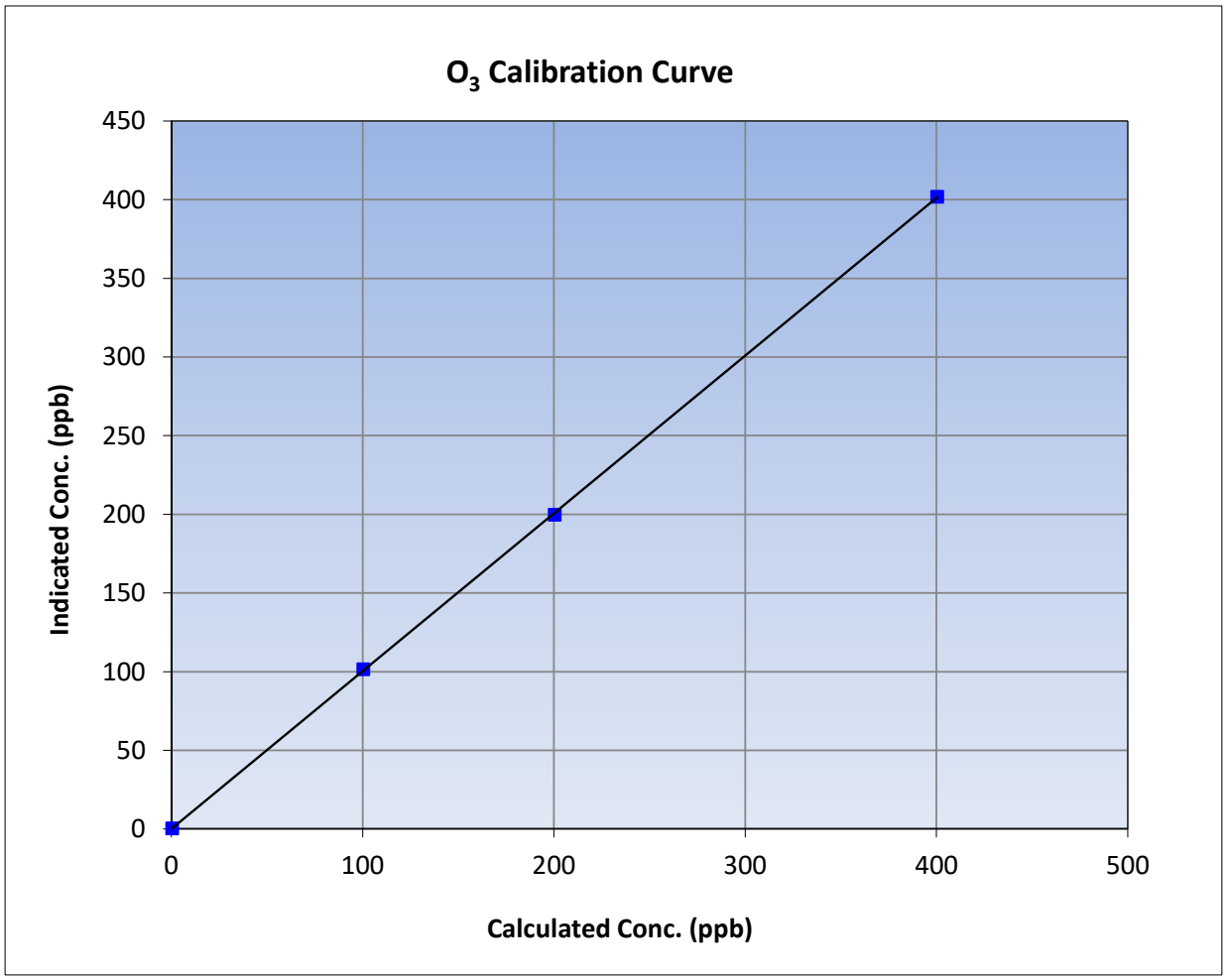
Station Information

Calibration Date:	January 24, 2024	Previous Calibration:	December 12, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	11:30	End Time (MST):	15:30
Analyzer make:	API T400	Analyzer serial #:	825

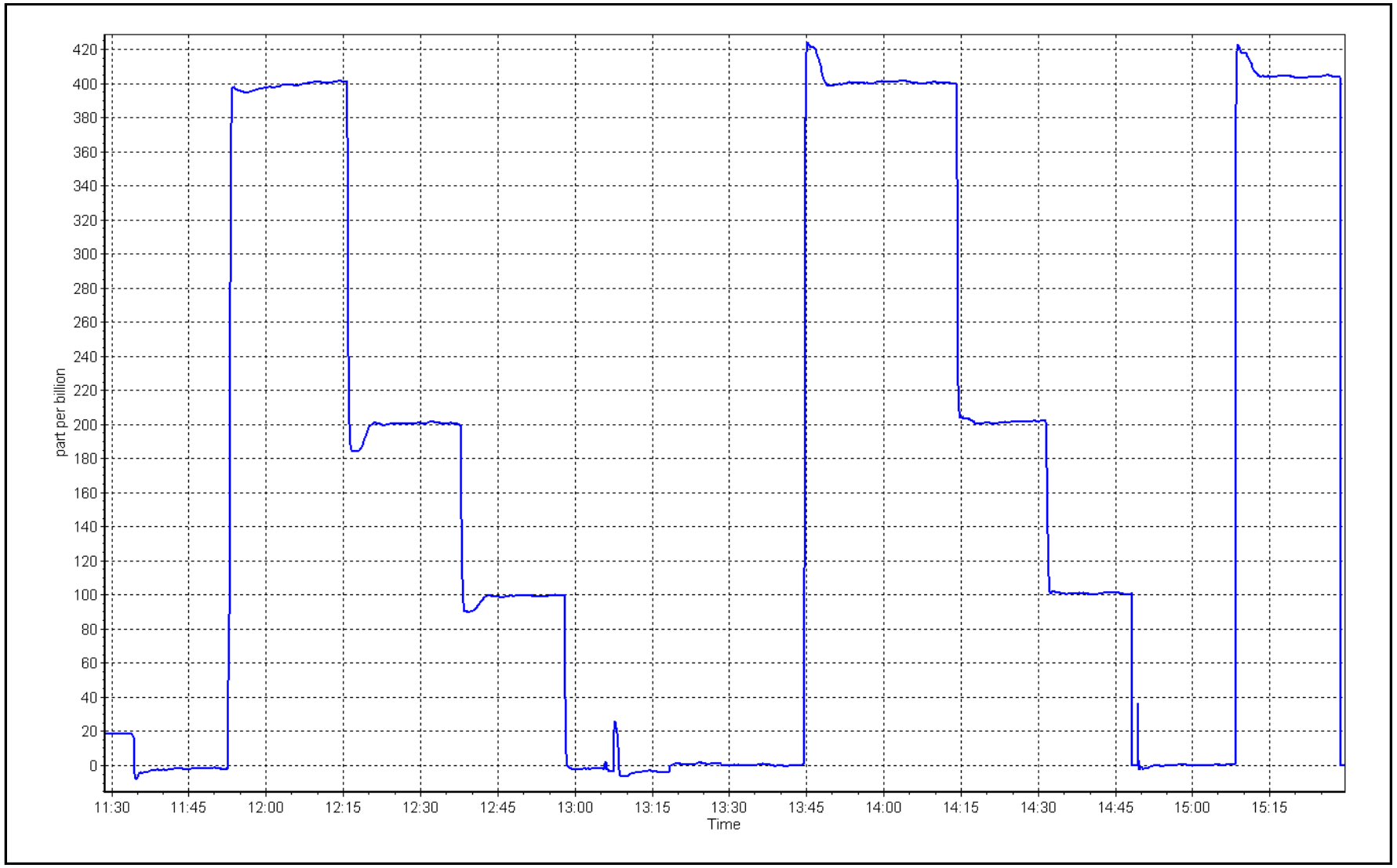
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	401.5	0.9963
200.0	199.4	1.0030
100.0	101.1	0.9891

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	1.002743	*0.90 - 1.10*
Intercept	0.020000	*+/- 5*



O_3 Calibration Plot Date: January 24, 2024 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:	January 30, 2024	Last Cal Date:	December 20, 2023
Start time (MST):	14:20	End time (MST):	15:27
Analyzer Make:	API T640	S/N:	1162
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	11.9	11.64	11.9	☐	+/- 2 °C
P (mmHg)	691.2	691.09	691.2	☐	+/- 10 mmHg
flow (LPM)	4.97	4.72	5.02	☑	+/- 0.25 LPM

Leak Test: Date of check: January 30, 2024 Last Cal Date: December 20, 2023

PM w/o HEPA: 0.8 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: September 25, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022

Date RH/T Sensor Cleaned: August 30, 2022

Notes: Flow adjusted.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	January 17, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	11:15	End time (MST):	14:15
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 T701H		Serial Number:	355

Analyzer Information

Analyzer make:	API T300		Analyzer serial #:	3504
Analyzer Range:	0 - 50 ppm			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.992948	0.999887	Backgd or Offset:	-0.010	-0.010
Calibration intercept:	0.219785	0.043782	Coeff or Slope:	0.906	0.908

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4933	66.7	40.7	41.1	0.991
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.7	40.7	1.001
second point	4966	33.3	20.3	20.5	0.990
third point	4983	16.7	10.2	10.2	1.001
as left zero	5000	0.0	0.0	0.0	----
as left span	4933	66.7	40.7	40.9	0.995
				Average Correction Factor	0.997

Baseline Corr As found:	40.89	Prev response:	40.62	*% change:	0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

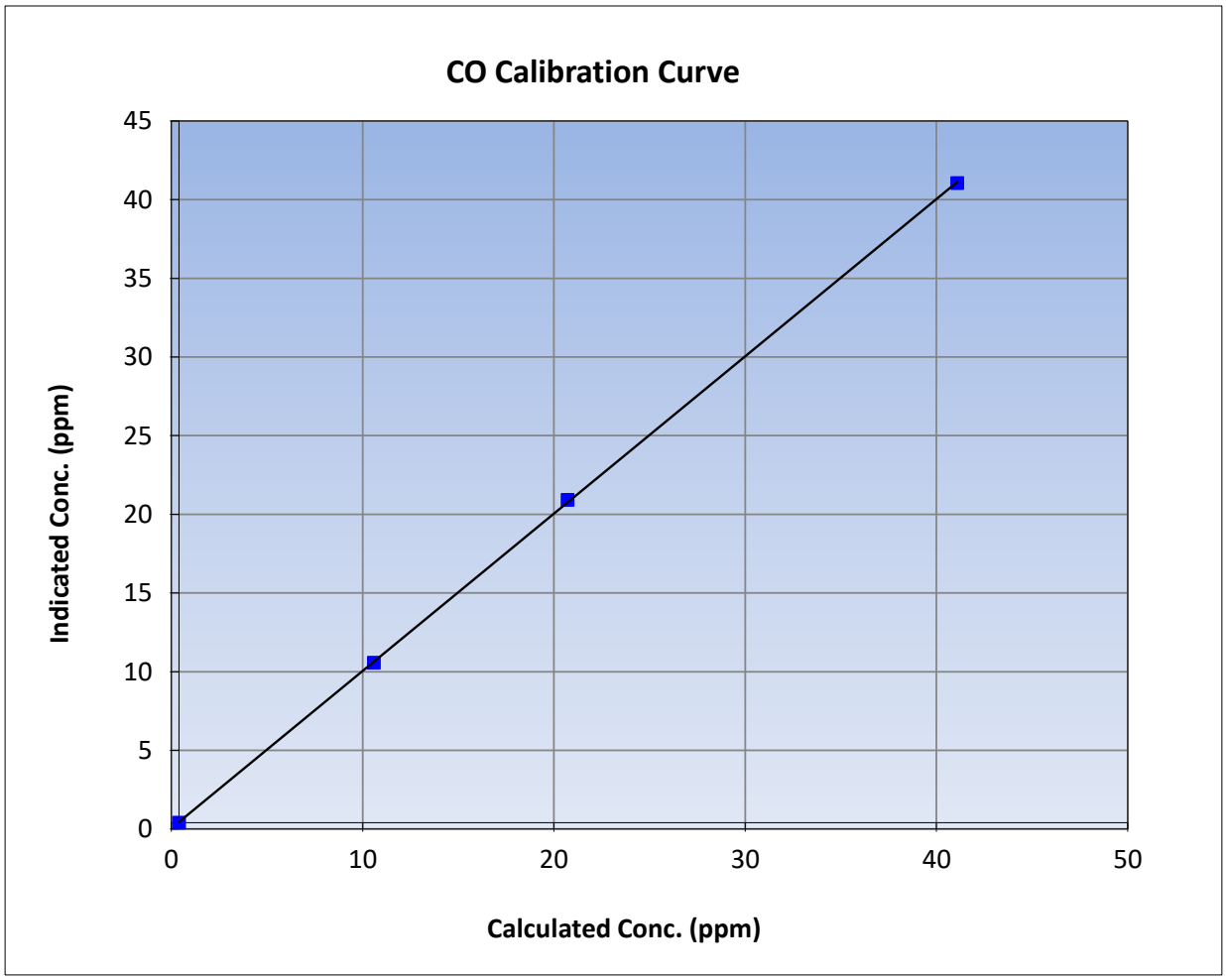
Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	December 12, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:15	End Time (MST):	14:15
Analyzer make:	API T300	Analyzer serial #:	3504

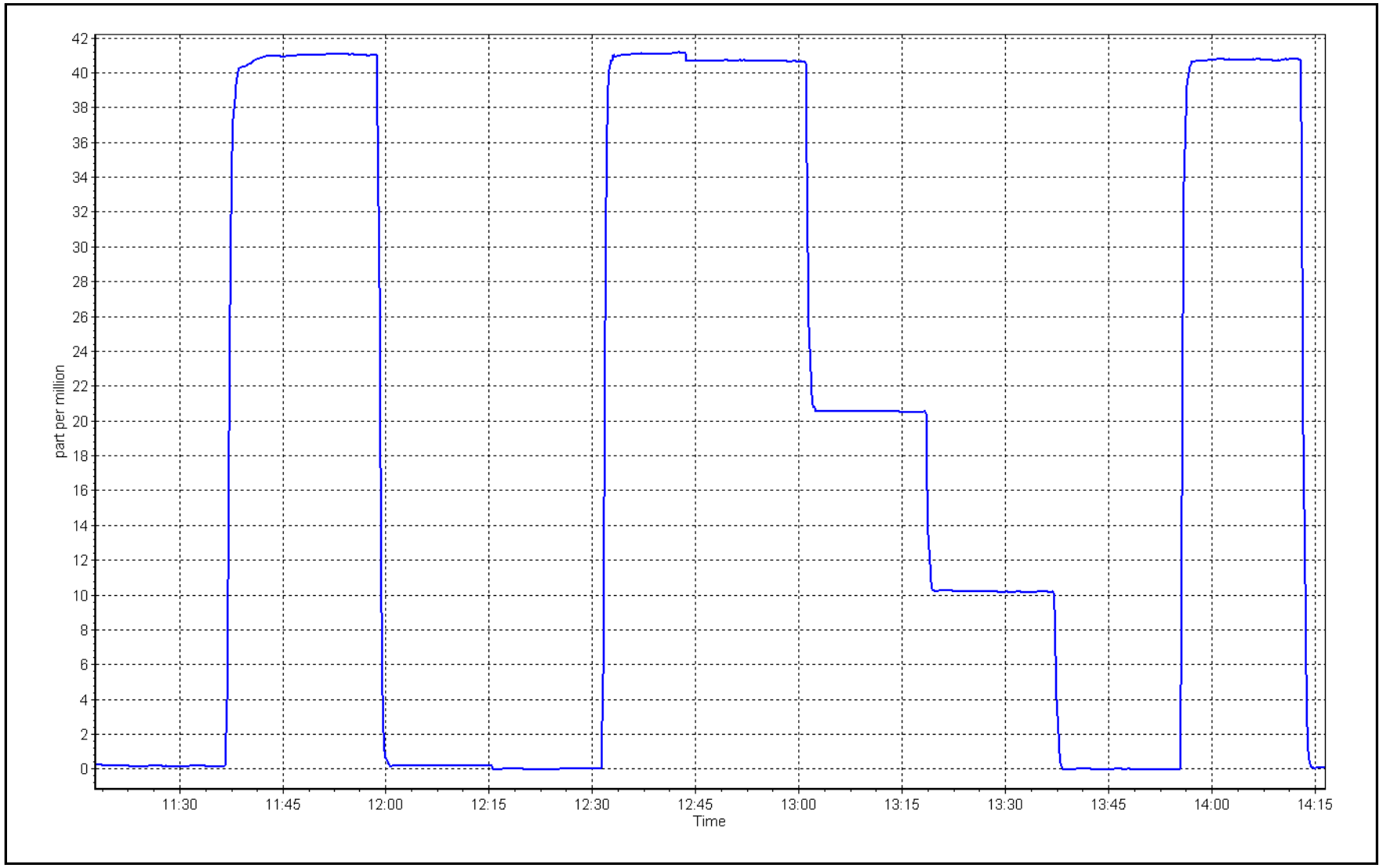
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.7	40.7	1.0007
20.3	20.5	0.9901
10.2	10.2	1.0007

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	0.999887	*0.90 - 1.10*
Intercept	0.043782	*+/-1.5*



CO Calibration Plot Date: January 17, 2024 Location: Stony Mountain



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	January 15, 2024	Last Cal Date:	December 20, 2023
Start time (MST):	11:37	End time (MST):	14:36
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2026
Cal Gas Cylinder #:	ALM063503			
Removed Cal Gas Conc:	60,220	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
N2 Gen Make/Model:	Peak Scientific		Serial Number:	771048317

Analyzer Information

Analyzer make: API T360 — Analyzer serial #: 489

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999080	0.996375	Backgd or Offset:	-0.037	-0.037
Calibration intercept:	-2.620000	-3.620000	Coeff or Slope:	0.938	0.938

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	0.2	----
as found span	2920	80.0	1605.9	1597.1	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	0.4	----
high point	2920	80.0	1605.9	1600.0	1.004
second point	2960	40.0	802.9	789.7	1.017
third point	2980	20.0	401.5	395.5	1.015
as left zero	3000	0.0	0.0	0.1	----
as left span	2930	80.0	1600.5	1594.9	1.004
				Average Correction Factor	1.012

Baseline Corr As found:	1596.90	Prev response:	1601.77	*% change:	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

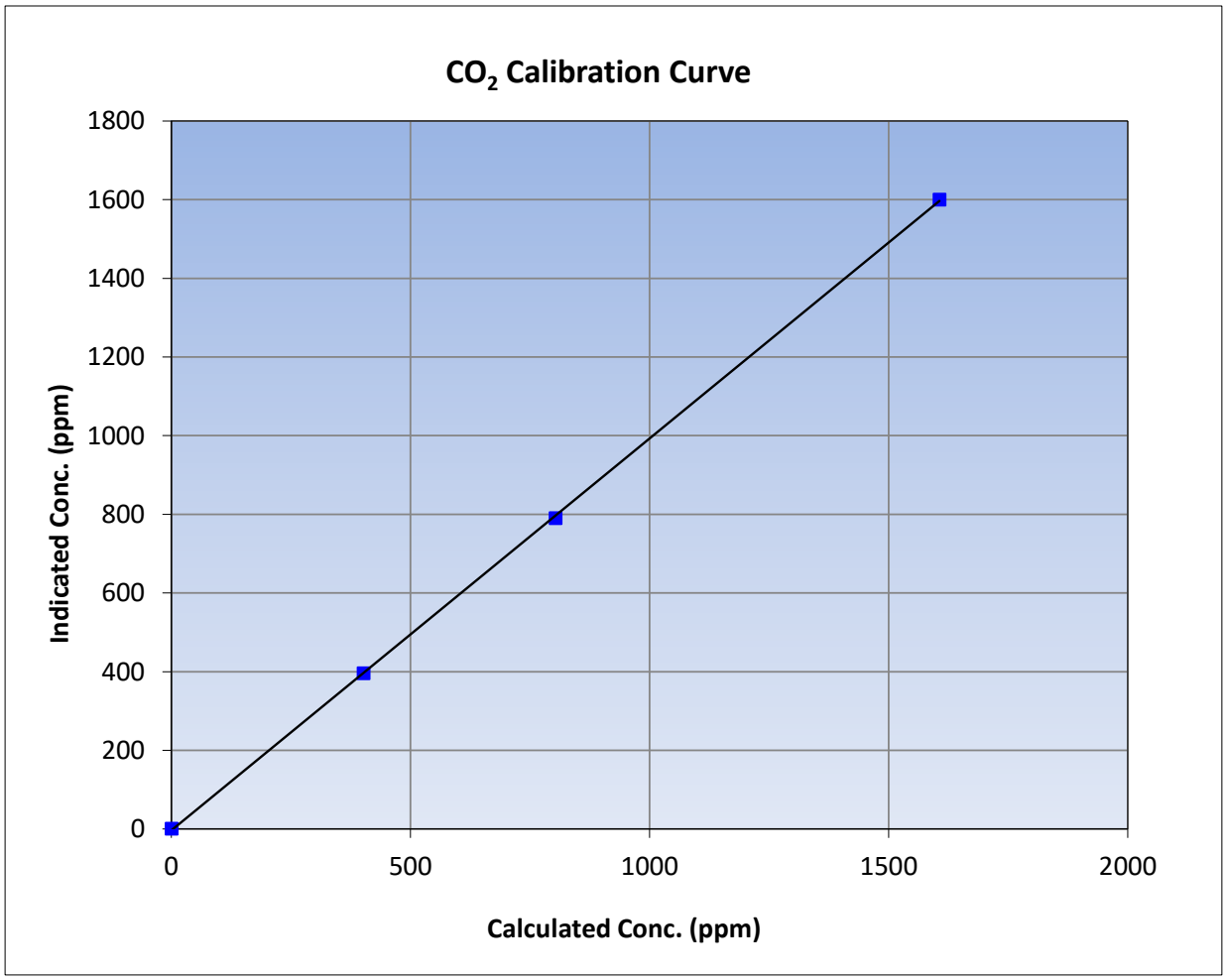
Station Information

Calibration Date	January 15, 2024	Previous Calibration	December 20, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	11:37	End Time (MST)	14:36
Analyzer make	API T360	Analyzer serial #	489

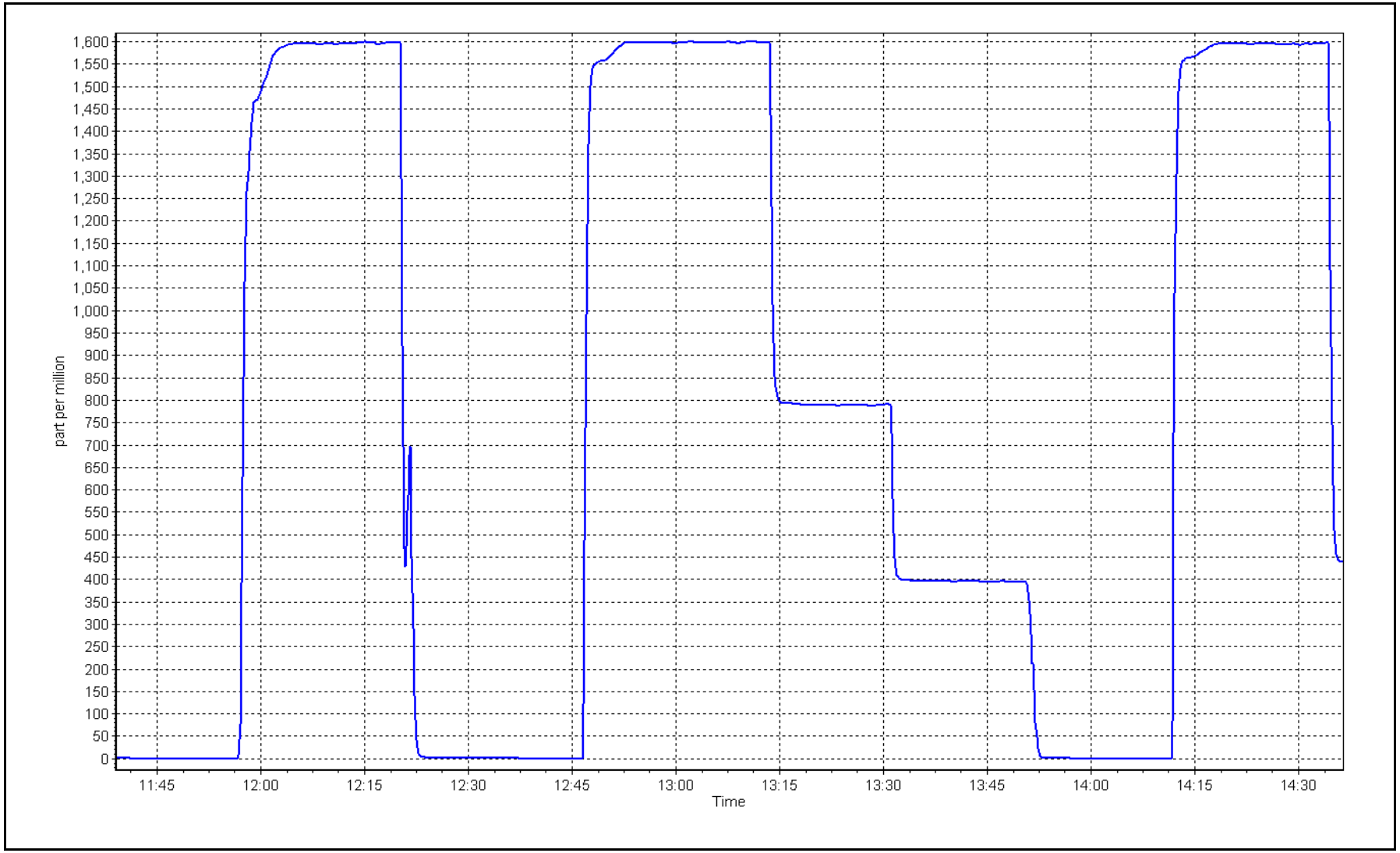
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
1605.9	1600.0	1.0037
802.9	789.7	1.0168
401.5	395.5	1.0151

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999947	*≥0.995*
Slope	0.996375	*0.90 - 1.10*
Intercept	-3.620000	*+/-10*



CO_2 Calibration Plot Date: January 15, 2024 Location: Stony Mountain



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	January 8, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	12:01	End time (MST):	15:55
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.29	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC716618			
Removed Cal Gas Conc:	49.29	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	1607
ZAG Make/Model:	API T701		Serial Number:	1118

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1410661308

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005909	0.996990	Backgd or Offset:	10.6	10.5
Calibration intercept:	-0.303040	0.518257	Coeff or Slope:	0.993	0.984

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	-0.3	----
as found span	4919	81.1	799.5	805.0	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.0	-0.1	----
high point	4919	81.1	799.5	797.2	1.003
second point	4959	40.6	400.3	400.1	1.000
third point	4980	20.3	200.1	200.5	0.998
as left zero	4999	0.0	0.0	-0.3	----
as left span	4919	81.1	799.5	800.0	0.999
				Average Correction Factor	1.000

Baseline Corr As found:	805.30	Previous response	803.89	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

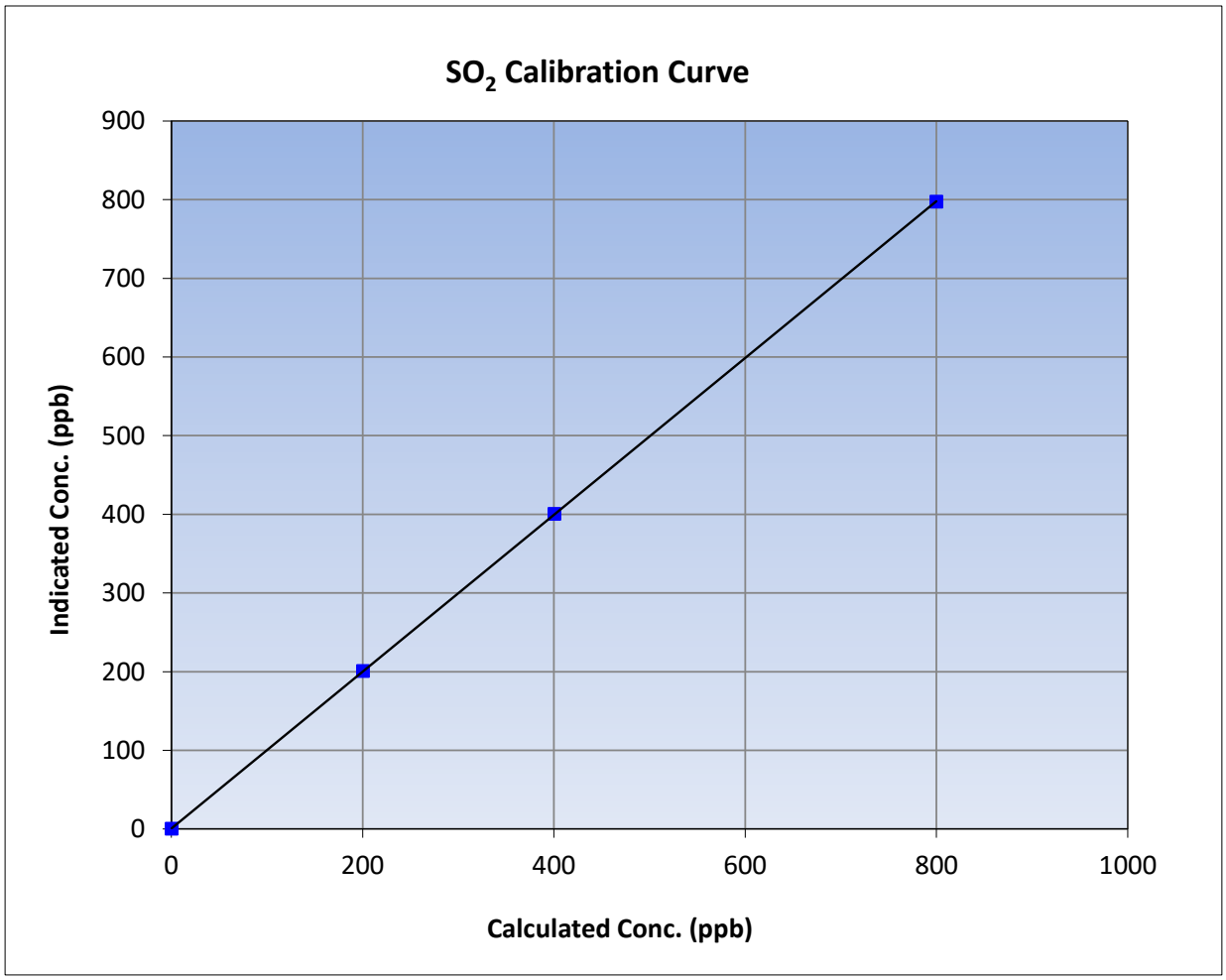
Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 13, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	12:01	End Time (MST):	15:55
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

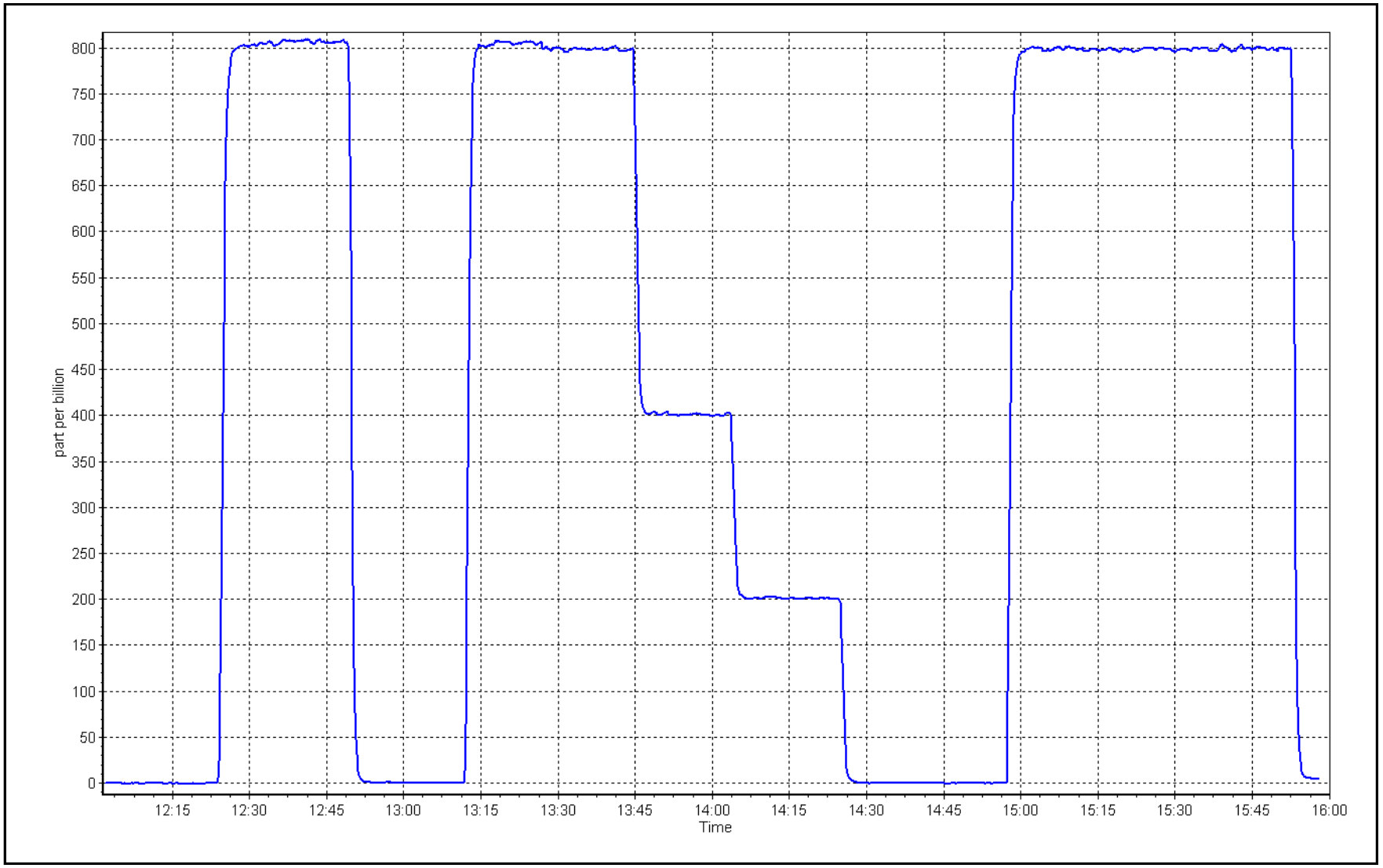
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
799.5	797.2	1.0028
400.3	400.1	1.0004
200.1	200.5	0.9980

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	0.996990	*0.90 - 1.10*
Intercept	0.518257	*+/-30*



SO2 Calibration Plot Date: January 8, 2024 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	January 22, 2024	Last Cal Date:	December 11, 2023
Start time (MST):	11:22	End time (MST):	16:49
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.114	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517427			
Removed Cal Gas Conc:	5.114	ppm	Rem Gas Exp Date:	n/a
Removed Gas Cyl #:	n/a		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1607
ZAG Make/Model:	Teledyne API T701		Serial Number:	1118

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680032	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000196	1.004771	Backgd or Offset:	2.82	3.38
Calibration intercept:	-0.061587	-0.021722	Coeff or Slope:	1.176	1.225

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4922	78.2	80.0	77.7	1.032
as found 2nd point	4961	39.1	40.0	39.1	1.028
as found 3rd point	4980	19.6	20.0	19.8	1.023
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4922	78.2	80.0	80.3	0.996
second point	4961	39.1	40.0	40.2	0.995
third point	4980	19.6	20.0	20.2	0.992
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	78.2	80.0	79.8	1.002
SO2 Scrubber Check	4922	78.3	800.2	0.0	----
Date of last scrubber change:		January 18, 2023		Ave Corr Factor	0.994
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	77.5	Prev response:	79.93	*% change:	-3.1%
Baseline Corr 2nd AF pt:	38.9	AF Slope:	0.968467	AF Intercept:	0.299057
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Ran SOx scrubber check after cal zero. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

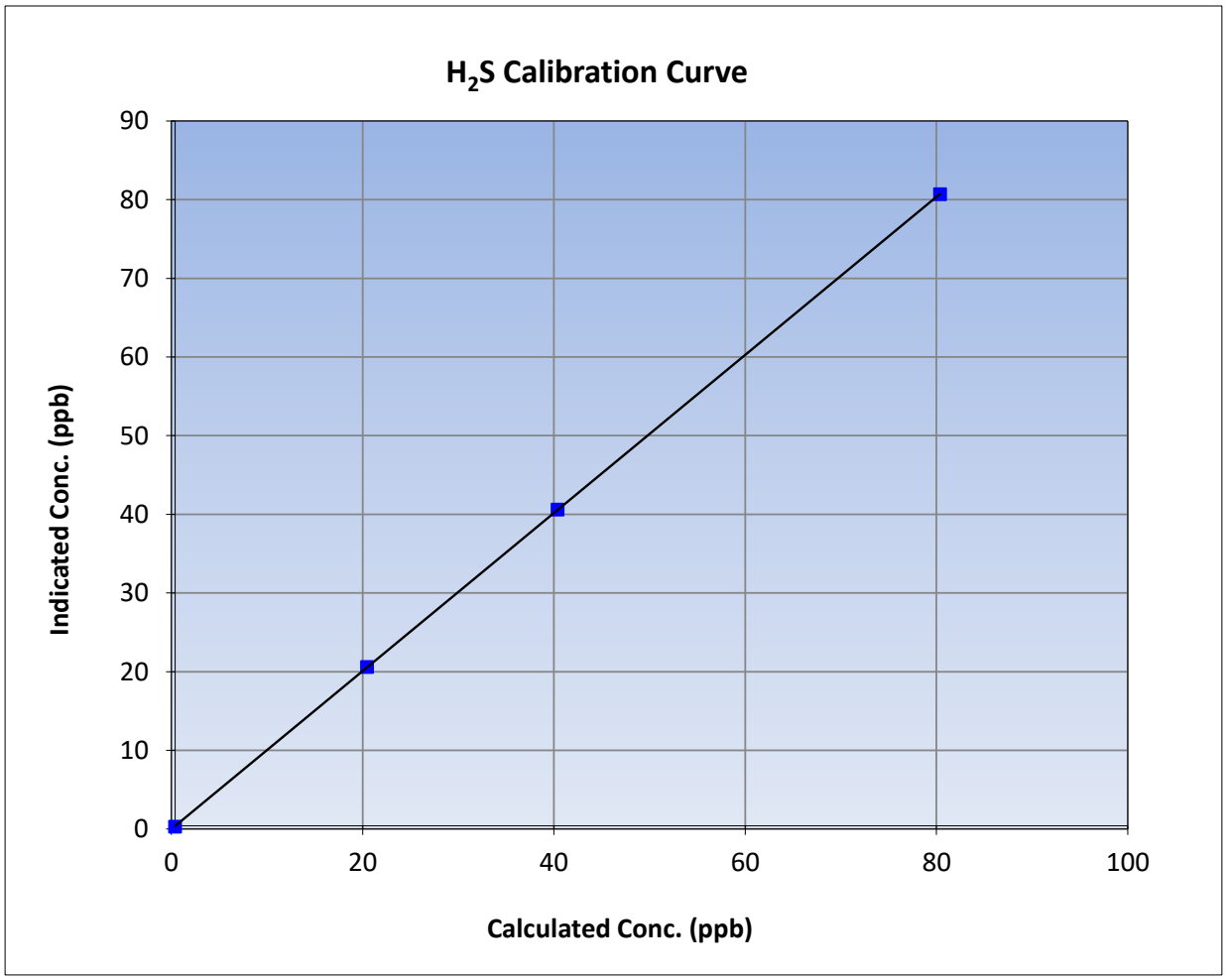
Station Information

Calibration Date:	January 22, 2024	Previous Calibration:	December 11, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	11:22	End Time (MST):	16:49
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680032

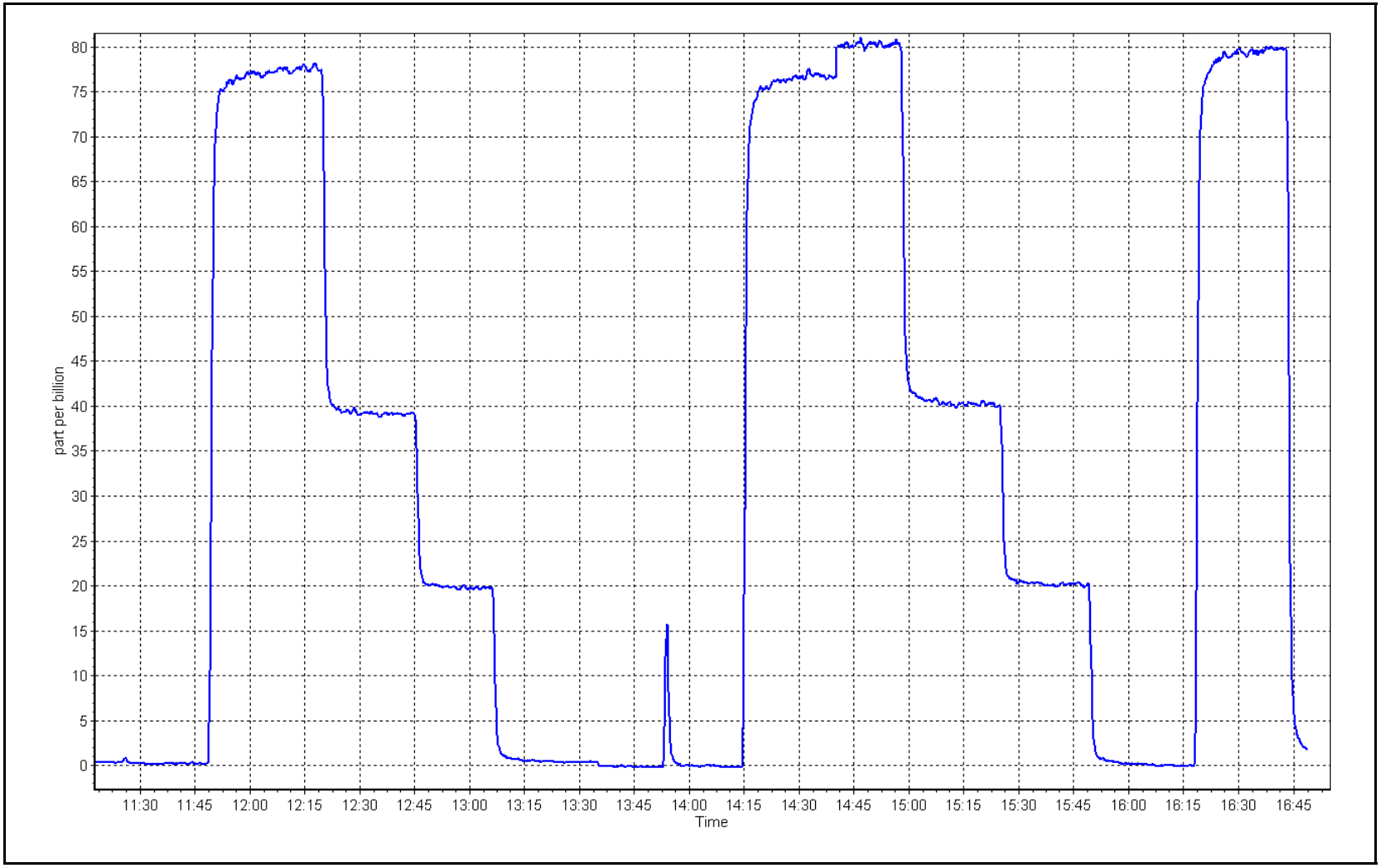
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.3	0.9960
40.0	40.2	0.9948
20.0	20.2	0.9925

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.004771	*0.90 - 1.10*
Intercept	-0.021722	*+/-3*



H_2S Calibration Plot Date: January 22, 2024 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	January 8, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	12:01	End time (MST):	15:55
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC716618	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	500.7	ppm	CH4 Equiv Conc.	1066.9	ppm
C3H8 Cal Gas Conc.	205.9	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	500.7	ppm	CH4 Equiv Conc.	1066.9	ppm
Removed C3H8 Conc.	205.9	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	1607	
ZAG Make/Model:	API T701		Serial Number:	1118	

Analyzer Information

Analyzer make: Thermo 51i-LT
Analyzer serial #: 1336160089
Analyzer Range: 0 - 20 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998011	0.995342	Background:	2.04	2.03
Calibration intercept:	0.042876	0.045092	Coefficient:	3.793	3.764

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.00	0.12	----
as found span	4919	81.1	17.31	17.50	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	0.08	----
high point	4919	81.1	17.31	17.31	1.000
second point	4959	40.6	8.66	8.58	1.010
third point	4980	20.3	4.33	4.37	0.990
as left zero	5000	0.0	0.00	0.02	----
as left span	4919	81.1	17.31	17.38	0.996
				Average Correction Factor	1.000

Baseline Corr As found:	17.38	Previous response	17.31	*% 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 filters after as founds. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

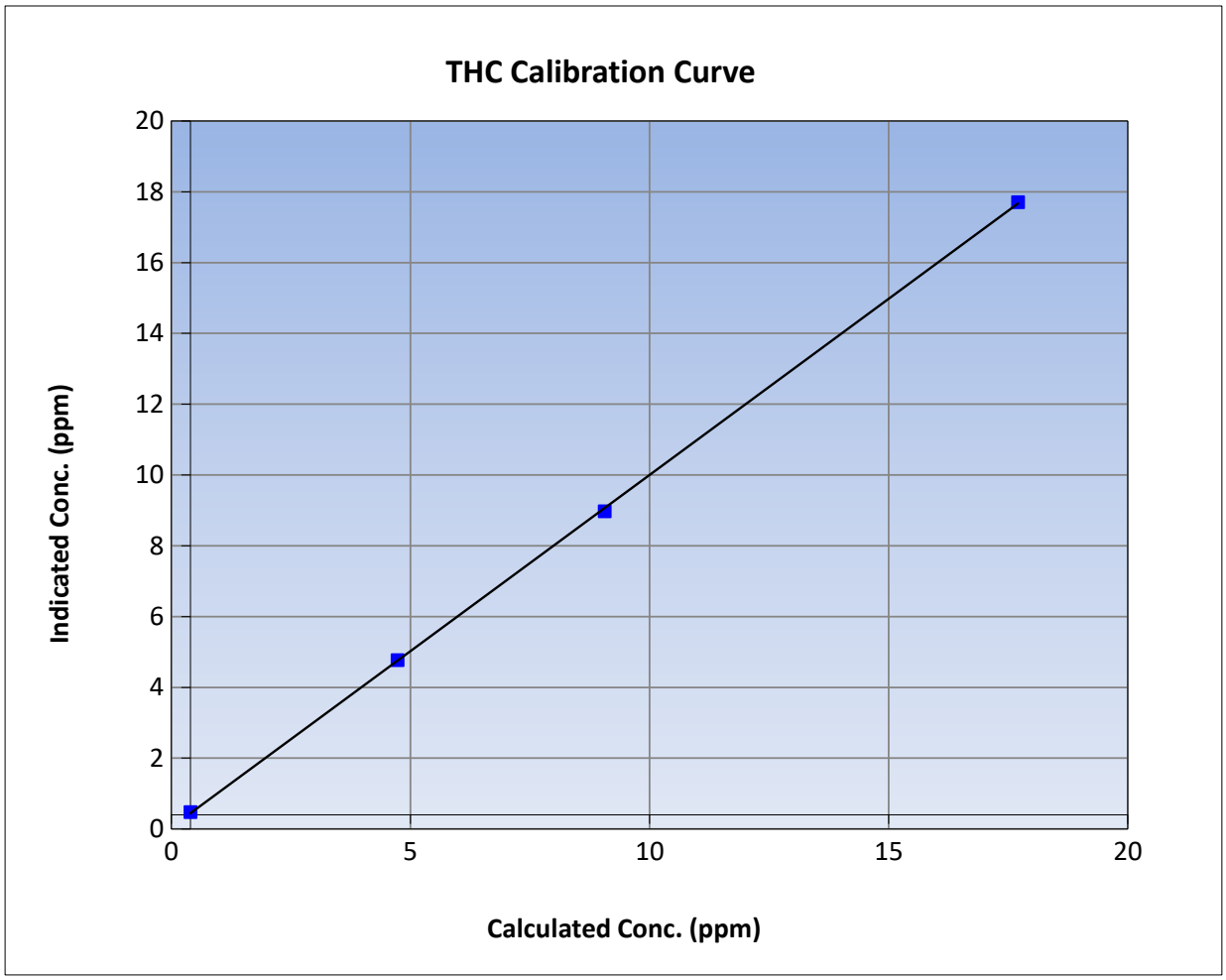
Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	December 13, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	12:01	End Time (MST):	15:55
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

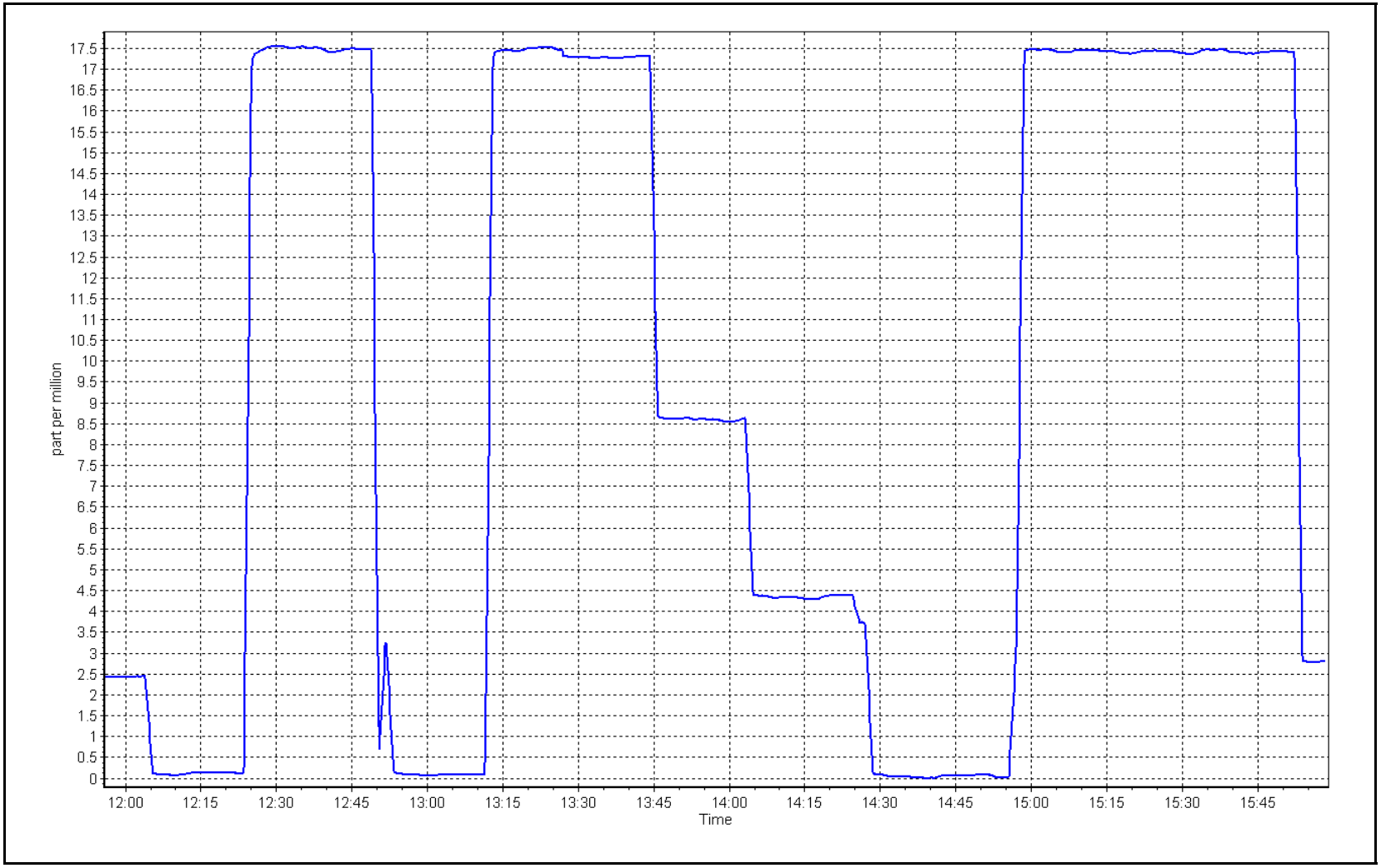
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.08	----
17.31	17.31	0.9997
8.66	8.58	1.0098
4.33	4.37	0.9905

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999933	*≥0.995*
Slope	0.995342	*0.90 - 1.10*
Intercept	0.045092	*+/-1.5*



THC Calibration Plot Date: January 8, 2024 Location: Firebag



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	January 23, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	11:17	End time (MST):	15:38
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	DT0044018		Cal Gas Expiry Date:	November 3, 2031	
NOX Cal Gas Conc:	48.9	ppm	NO Cal Gas Conc:	48.7	ppm
Removed Cylinder #:	n/a		Removed Gas Exp Date:	n/a	
Removed Gas NOX Conc:	48.9	ppm	Removed Gas NO Conc:	48.7	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1607	
ZAG make/model:	Teledyne API T701		Serial Number:	1118	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1410661309	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.089	1.089	NO bkgnd or offset:	7.6	7.6
NOX coeff or slope:	0.993	0.993	NOX bkgnd or offset:	7.7	7.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	215.5	217.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.005184	1.011351
NO_X Cal Offset:	0.260458	0.260390
NO Cal Slope:	1.007037	1.014424
NO Cal Offset:	-0.099613	-0.039625
NO_2 Cal Slope:	0.999988	1.000829
NO_2 Cal Offset:	-1.617748	-0.524220

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as found span	4919	81.0	792.2	788.9	3.2	810.0	807.0	2.6	0.9780	0.9776
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	81.5	797.1	793.8	3.3	806.0	805.0	0.5	0.9889	0.9861
second point	4959	40.7	398.0	396.4	1.6	403.6	402.7	0.9	0.9862	0.9844
third point	4980	20.4	199.5	198.7	0.8	202.0	201.2	0.8	0.9877	0.9876
as left zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4919	81.0	792.2	367.3	424.9	799.6	374.5	425.1	0.9907	0.9808
								Average Correction Factor	0.9876	0.9860

Corrected As found	NO_X = 810.3 ppb	NO = 807.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.7%
Previous Response	NO_X = 796.5 ppb	NO = 794.4 ppb		*Percent Change	NO =	1.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.5	375.9	424.9	424.8	1.0001	100.0%
2nd GPT point (200 ppb O3)	797.5	587.8	213.0	212.8	1.0008	99.9%
3rd GPT point (100 ppb O3)	797.5	694.5	106.3	105.0	1.0120	98.8%
				Average Correction Factor	1.0043	99.6%

Notes: Changed sample inlet filters after as founds. No adjustments made. Second high NO reference point used in GPT formulas.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

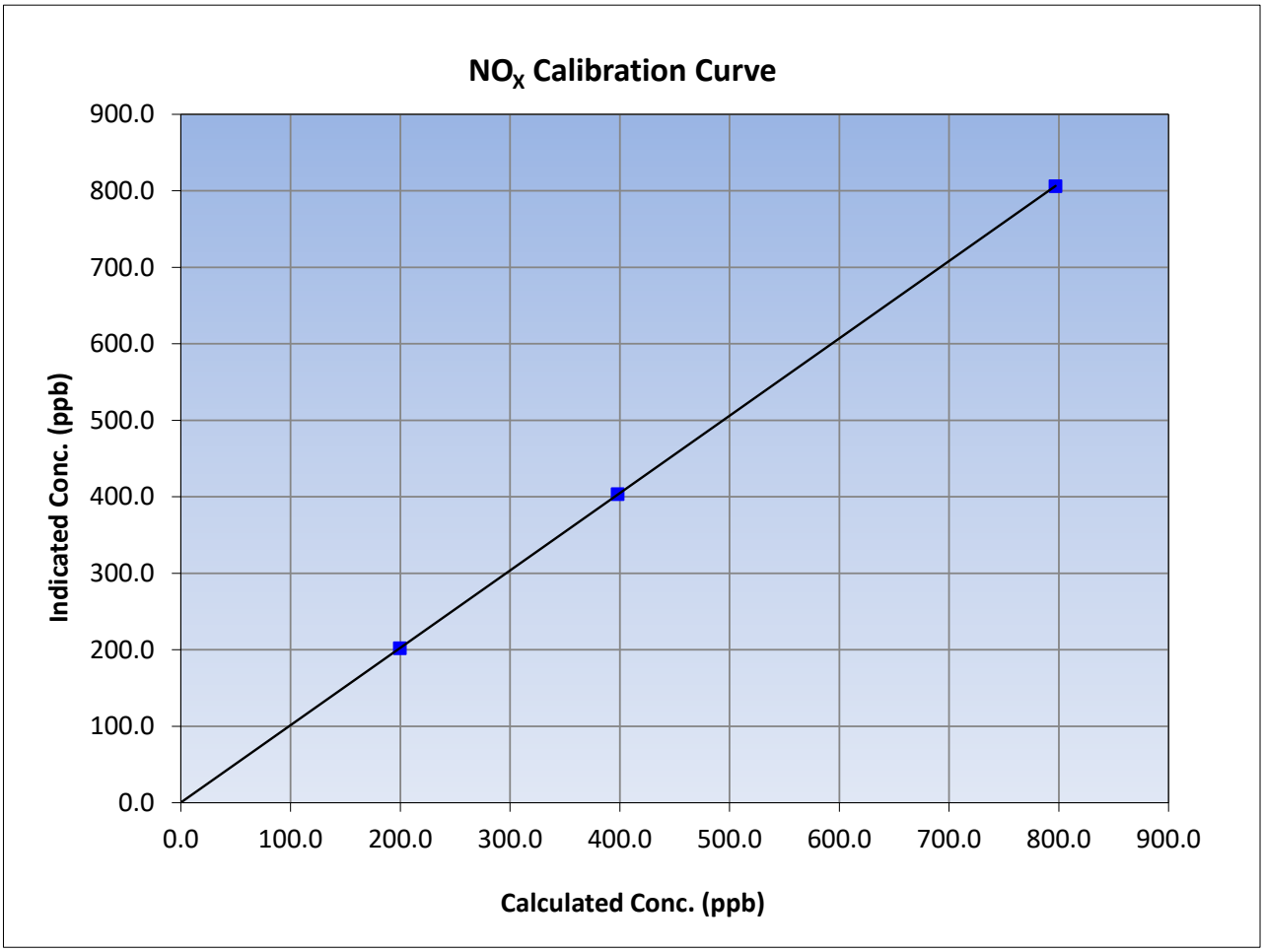
Version-04-2020

Station Information

Calibration Date:	January 23, 2024	Previous Calibration:	December 12, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:17	End Time (MST):	15:38
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	0.999998	≥0.995
797.1	806.0	0.9889			
398.0	403.6	0.9862	Slope	1.011351	0.90 - 1.10
199.5	202.0	0.9877			
			Intercept	0.260390	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

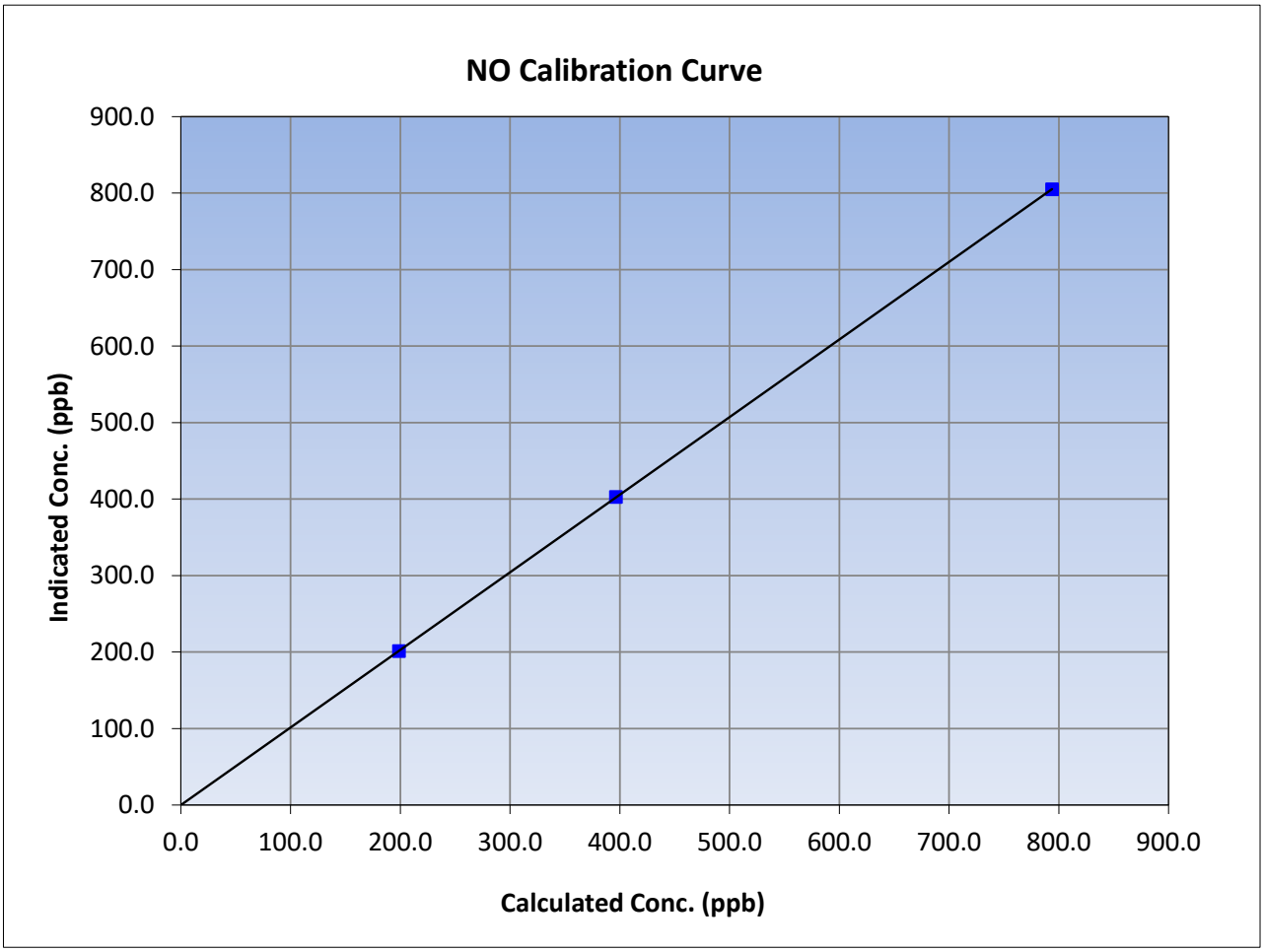
Version-04-2020

Station Information

Calibration Date:	January 23, 2024	Previous Calibration:	December 12, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:17	End Time (MST):	15:38
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	0.999999	*≥0.995*
793.8	805.0	0.9861			
396.4	402.7	0.9844	Slope	1.014424	*0.90 - 1.10*
198.7	201.2	0.9876			
			Intercept	-0.039625	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

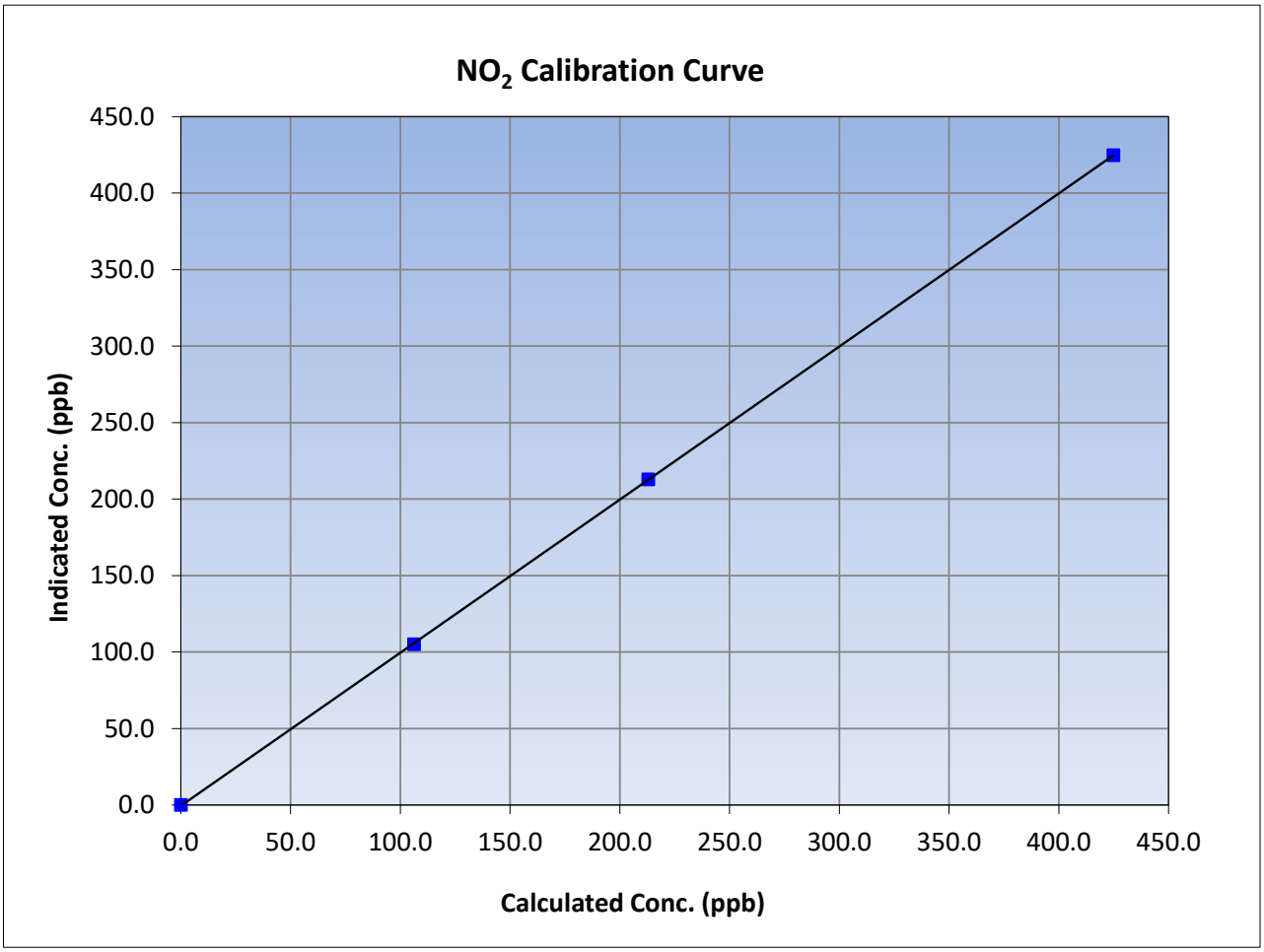
Version-04-2020

Station Information

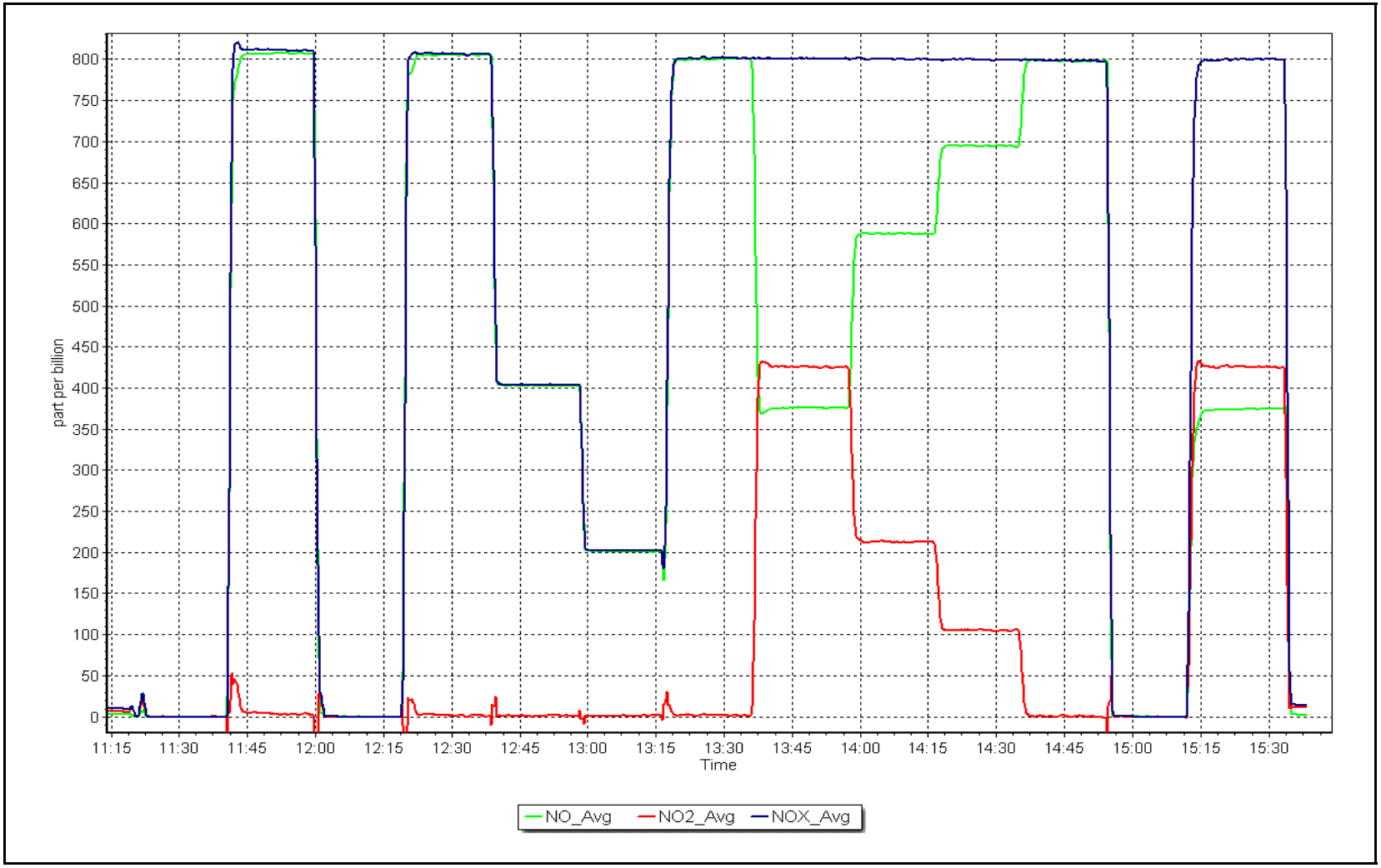
Calibration Date:	January 23, 2024	Previous Calibration:	December 12, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:17	End Time (MST):	15:38
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999990	≥0.995
424.9	424.8	1.0001			
213.0	212.8	1.0008	Slope	1.000829	0.90 - 1.10
106.3	105.0	1.0120			
			Intercept	-0.524220	+/-20



NO_X Calibration Plot Date: January 23, 2024 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	January 16, 2024	Last Cal Date:	December 4, 2023
Start time (MST):	8:25	End time (MST):	11:55
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.22 ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC306868		
Removed Cal Gas Conc:	49.22 ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA	Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700	Serial Number:	1220
ZAG Make/Model:	Teledyne API 701	Serial Number:	4522

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1501301450

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.991883	0.995124	Backgd or Offset:	18.7	19.1
Calibration intercept:	3.051032	2.791182	Coeff or Slope:	0.945	0.965

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4919	81.3	800.3	791.2	1.011
as found 2nd point	4959	40.7	400.7	397.8	1.007
as found 3rd point	4980	20.3	199.8	203.5	0.982
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4919	81.3	800.3	798.2	1.003
second point	4959	40.7	400.7	401.7	0.997
third point	4980	20.3	199.8	205.1	0.974
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	81.3	800.3	799.3	1.001
				Average Correction Factor	0.991

Baseline Corr As found:	791.00	Previous response	796.82	*% change	-0.7%
Baseline Corr 2nd AF pt:	397.60	AF Slope:	0.986157	AF Intercept:	2.831493
Baseline Corr 3rd AF pt:	203.30	AF Correlation:	0.999939		

* = > +/-5% change initiates investigation

Notes: Pump Flow was low, replaced pump. Span adjsuted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

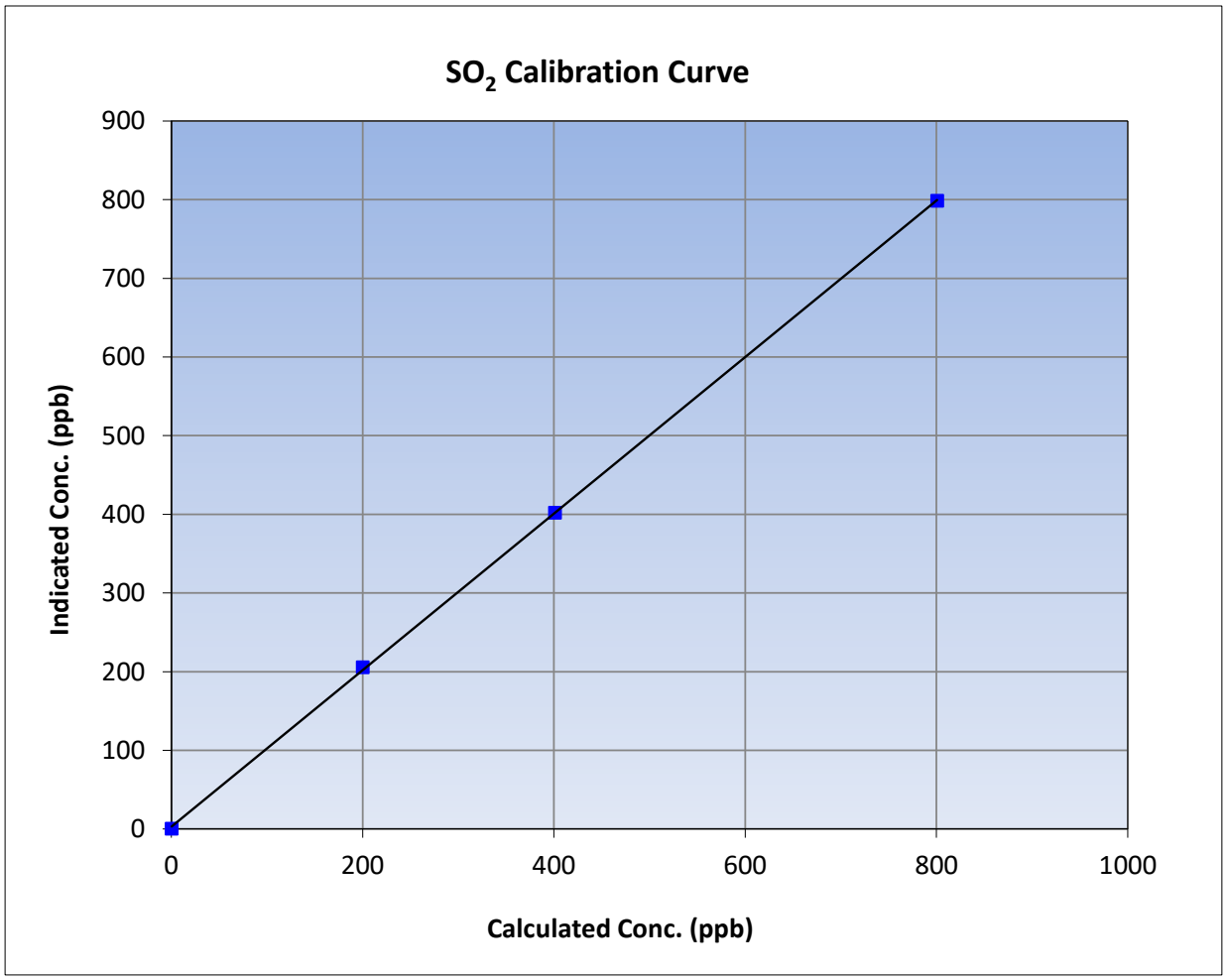
Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	December 4, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:25	End Time (MST):	11:55
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

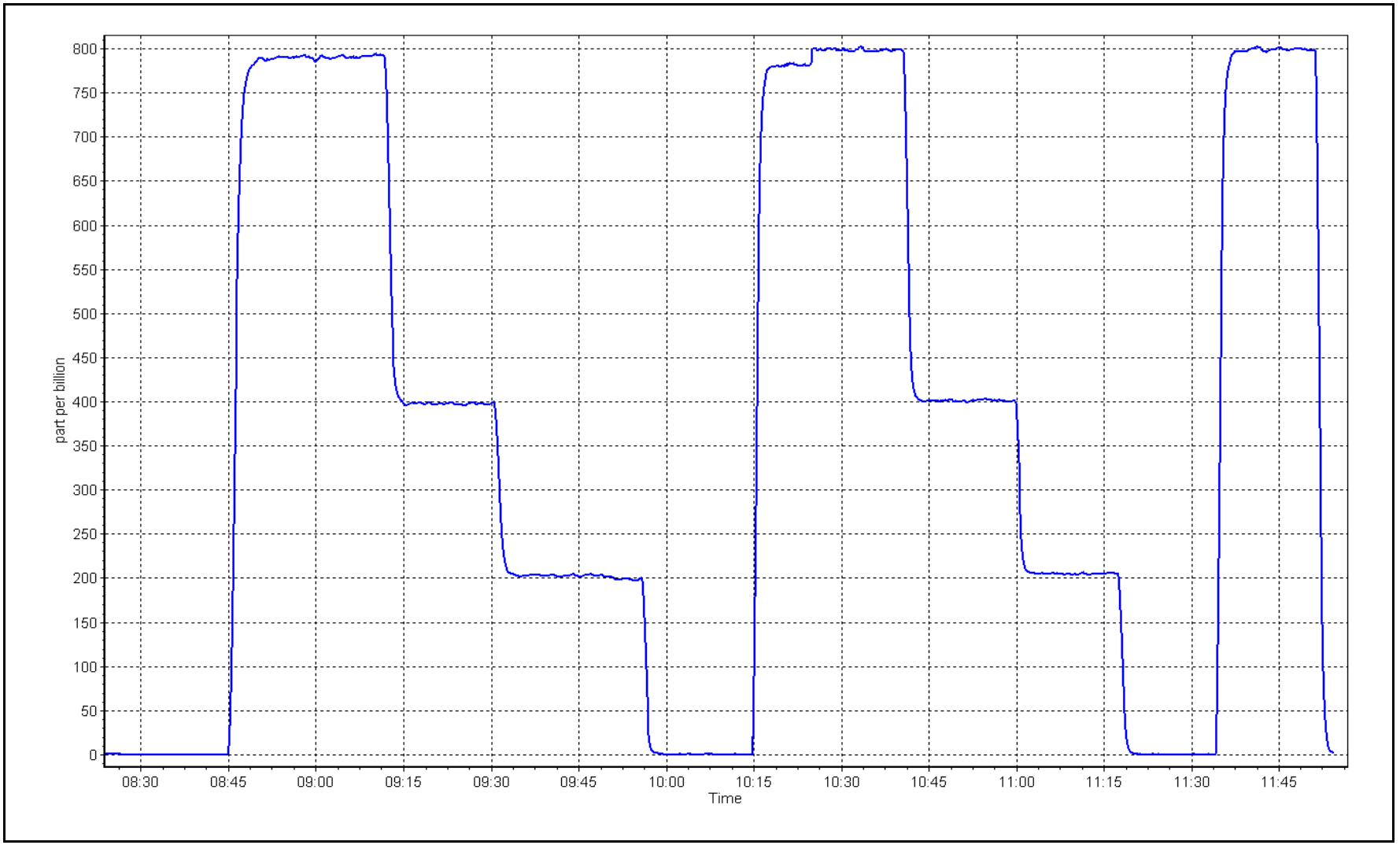
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.3	798.2	1.0026
400.7	401.7	0.9974
199.8	205.1	0.9743

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999942	*≥0.995*
Slope	0.995124	*0.90 - 1.10*
Intercept	2.791182	*+/-30*



SO2 Calibration Plot Date: January 16, 2024 Location: MacKay River



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	January 3, 2024	Last Cal Date:	December 5, 2023
Start time (MST):	8:44	End time (MST):	12:49
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.12	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC515997			
Removed Cal Gas Conc:	5.12	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1236656117	
Converter make:	Global		Converter serial #:	2022-226	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996103	0.991531	Backgd or Offset:	3.19	3.19
Calibration intercept:	0.439357	0.499365	Coeff or Slope:	1.113	1.113

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4922	78.1	80.0	80.4	0.996
as found 2nd point	4961	39.0	39.9	40.6	0.986
as found 3rd point	4980	19.5	20.0	20.6	0.974
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4922	78.1	80.0	79.7	1.004
second point	4961	39.0	40.0	40.3	0.992
third point	4980	19.5	20.0	20.6	0.970
as left zero	5000	0.0	0.0	0.3	----
as left span	4922	78.1	80.0	79.0	1.013
SO2 Scrubber Check	4982	81.3	802.8	0.0	----
Date of last scrubber change:		May 25, 2023		Ave Corr Factor	0.989
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.3	Prev response:	80.10	*% change:	0.2%
Baseline Corr 2nd AF pt:	40.5	AF Slope:	1.002738	AF Intercept:	0.359563
Baseline Corr 3rd AF pt:	20.5	AF Correlation:	0.999950		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

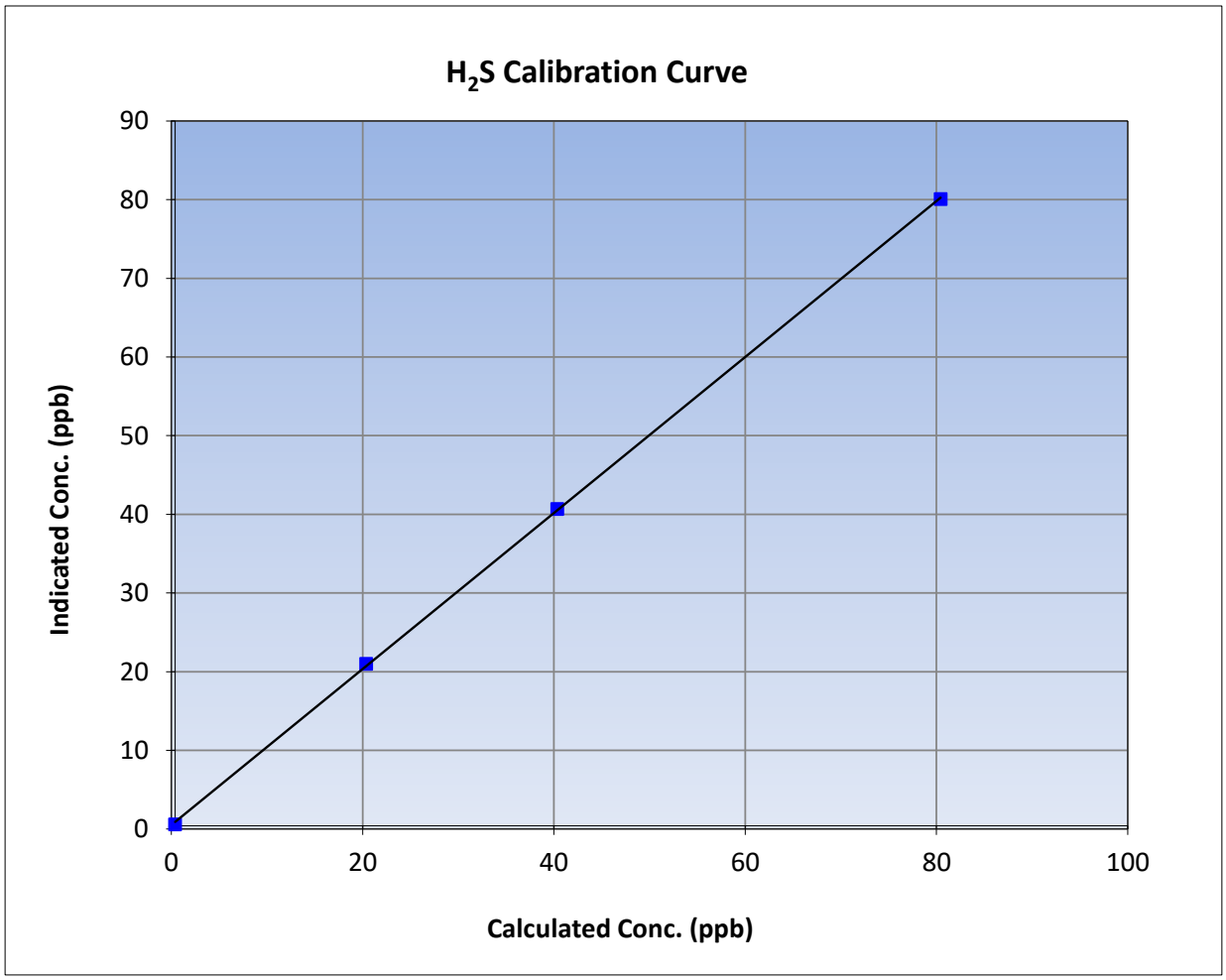
Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 5, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:44	End Time (MST):	12:49
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1236656117

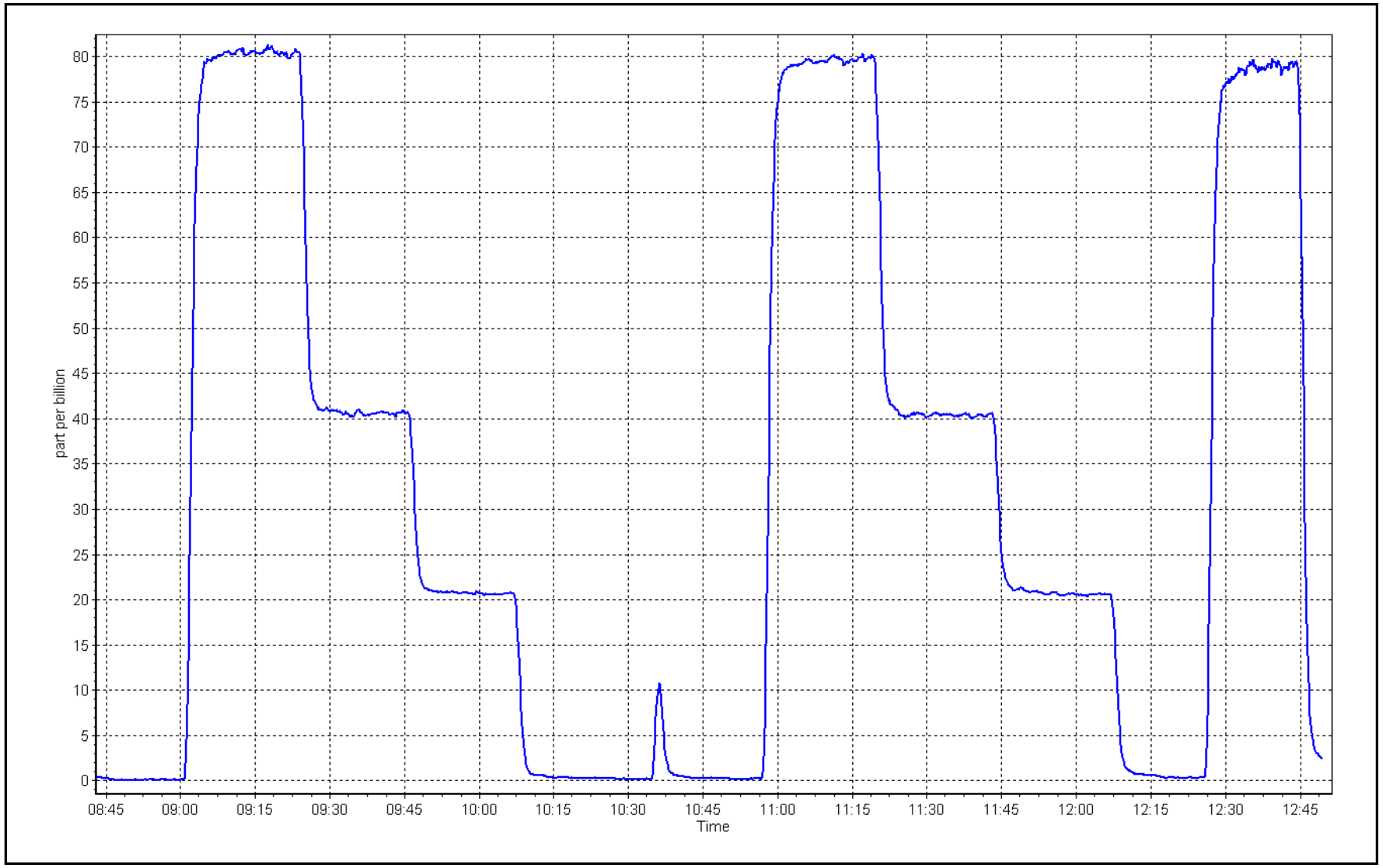
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.7	1.0042
40.0	40.3	0.9917
20.0	20.6	0.9702

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999935	*≥0.995*
Slope	0.991531	*0.90 - 1.10*
Intercept	0.499365	*+/-3*



H_2S Calibration Plot Date: January 3, 2024 Location: MacKay River



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	January 16, 2024	Last Cal Date:	December 4, 2023
Start time (MST):	8:25	End time (MST):	11:54
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC306868		Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	499.40	ppm	CH4 Equiv Conc.	1066.45	ppm
C3H8 Cal Gas Conc.	206.20	ppm			
Removed Gas Cert:	NA		Removed Gas Expiry:	NA	
Removed CH4 Conc.	499.40	ppm	CH4 Equiv Conc.	1066.45	ppm
Removed C3H8 Conc.	206.20	ppm	Diff between cyl:		
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220	
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1501663727	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997735	0.987892	Background:	3.110	3.110
Calibration intercept:	0.026586	0.076023	Coefficient:	5.590	5.590

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.09	----
as found span	4919	81.3	17.34	17.26	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4919	81.3	17.34	17.19	1.009
second point	4959	40.7	8.68	8.64	1.004
third point	4980	20.3	4.33	4.45	0.973
as left zero	5000	0.0	0.00	0.08	----
as left span	4919	81.3	17.34	17.26	1.005
				Average Correction Factor	0.995

Baseline Corr As found:	17.18	Previous response	17.33	*% 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: No Adjustments or maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

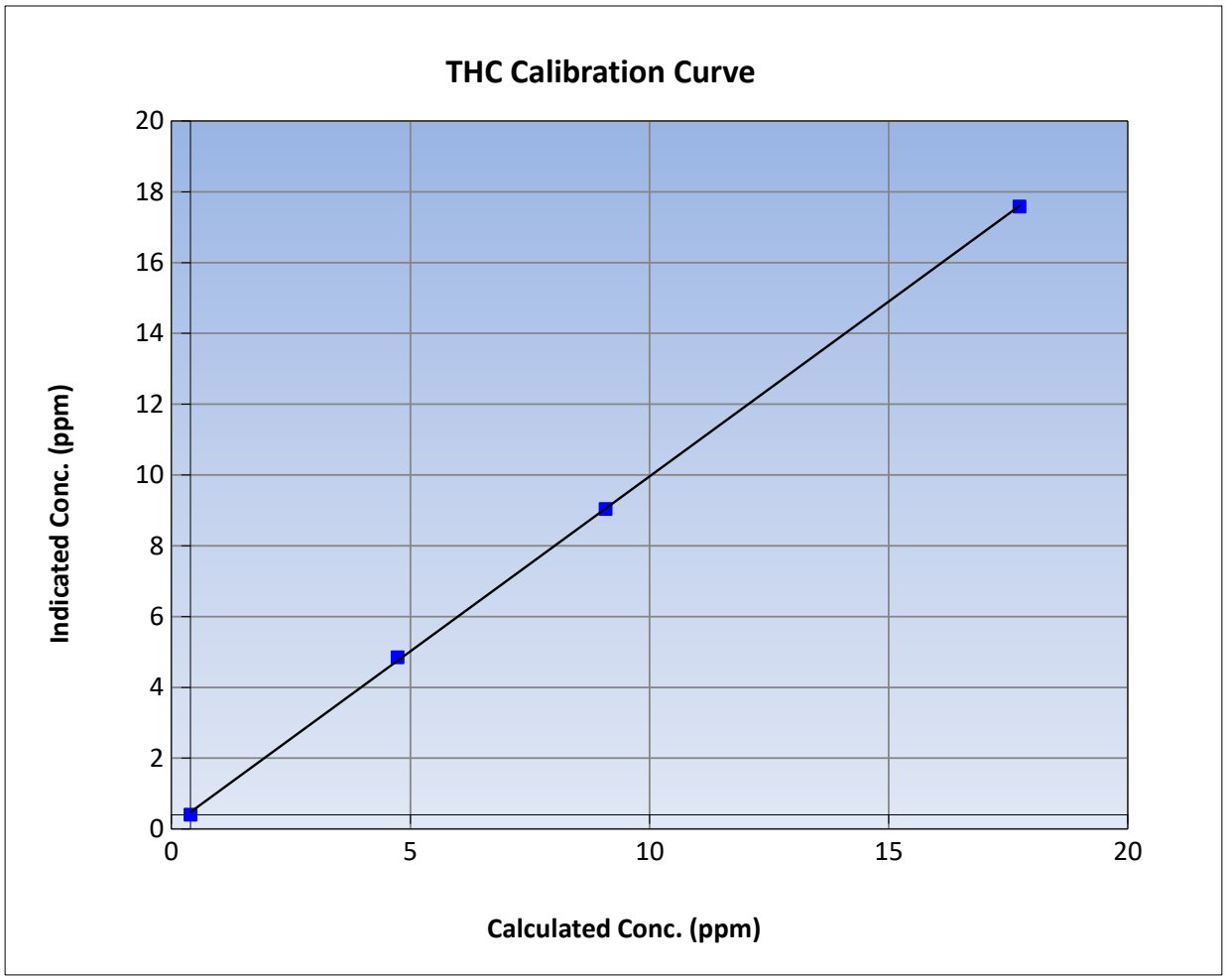
Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	December 4, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:25	End Time (MST):	11:54
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

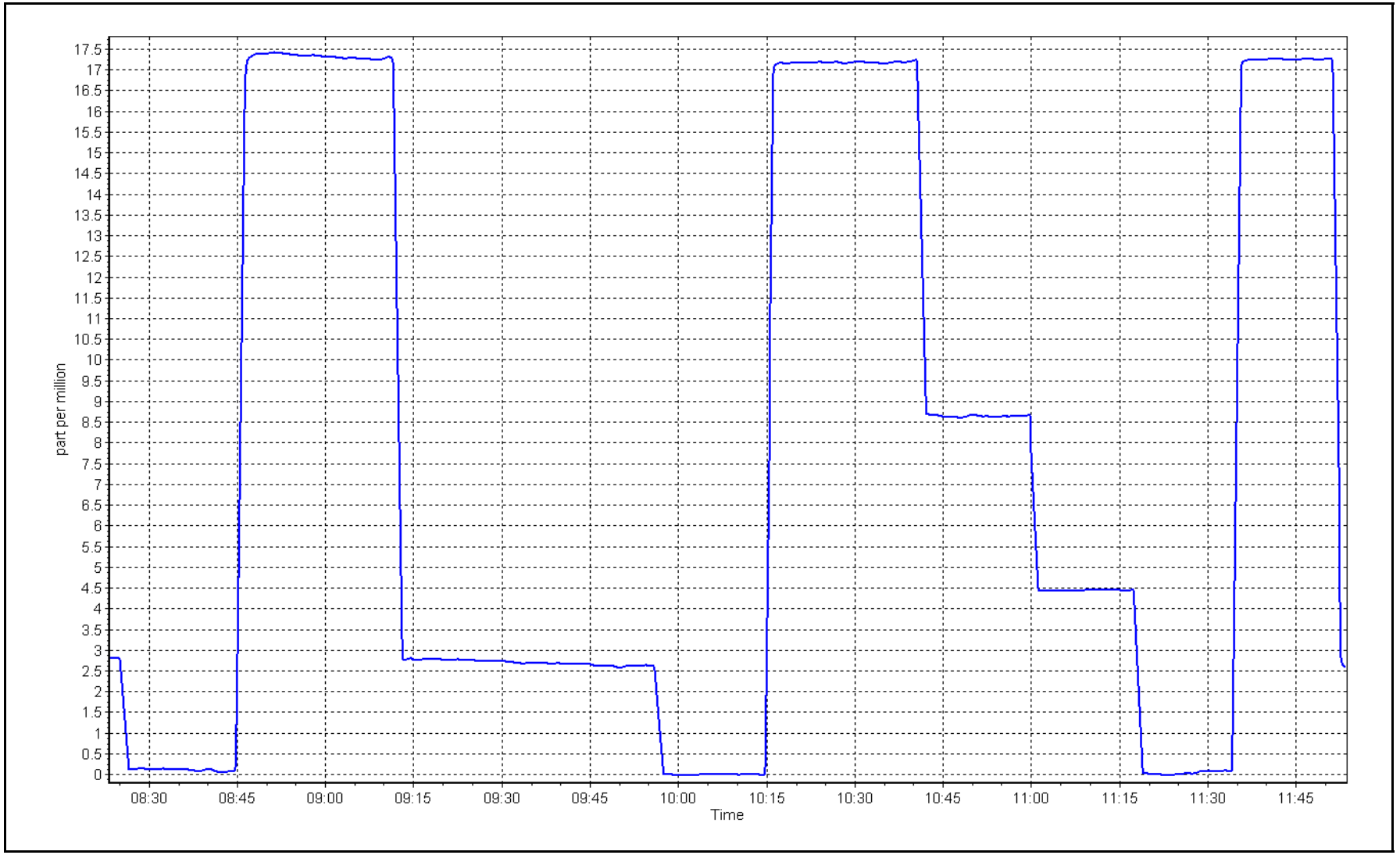
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.01	----
17.34	17.19	1.0089
8.68	8.64	1.0044
4.33	4.45	0.9729

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999910	*≥0.995*
Slope	0.987892	*0.90 - 1.10*
Intercept	0.076023	*+/-1.5*



THC Calibration Plot Date: January 16, 2024 Location: MacKay River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	January 4, 2024	Last Cal Date:	December 1, 2023
Start time (MST):	8:34	End time (MST):	11:25
Reason:	As Found	Clean reaction cell	

Calibration Standards

NO Gas Cylinder #:	T376265		Cal Gas Expiry Date:	April 13, 2025	
NOX Cal Gas Conc:	49.19	ppm	NO Cal Gas Conc:	48.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.19	ppm	Removed Gas NO Conc:	48.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1220	
ZAG make/model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1505164379	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.981	0.981	NO bkgnd or offset:	4.0	4.0
NOX coeff or slope:	0.997	0.997	NOX bkgnd or offset:	4.1	4.1
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	194.7	194.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.007887	
NO_X Cal Offset:	2.589374	
NO Cal Slope:	0.995492	
NO Cal Offset:	1.631214	
NO_2 Cal Slope:	1.005354	
NO_2 Cal Offset:	0.716865	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	0.0	----	----
as found span	4917	83.3	819.5	800.3	19.2	841.7	817.8	23.9	0.9736	0.9786
as found 2nd	4956	41.7	410.4	400.8	9.6	423.3	410.0	13.3	0.9696	0.9777
as found 3rd	4979	20.8	204.6	199.9	4.8	216.2	207.8	8.4	0.9465	0.9618
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 = 841.7 ppb	NO = 817.7 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	1.6%
Previous Response	NO_X = 828.5 ppb	NO = 798.3 ppb			*Percent Change	NO =	2.4%
Baseline Corr 2nd pt	NO_X = 423.3 ppb	NO = 409.9 ppb	As found	NO_X r^2: 0.999942	Nx Sl: 1.024870	Nx Int:	2.749
Baseline Corr 3rd pt	NO_X = 216.2 ppb	NO = 207.7 ppb	As found	NO r^2: 0.999978	NO Sl: 1.020292	NO Int:	1.570
			As found	NO_2 r^2: 0.999993	NO2 Sl: 1.012757	NO_2 Int:	-0.346

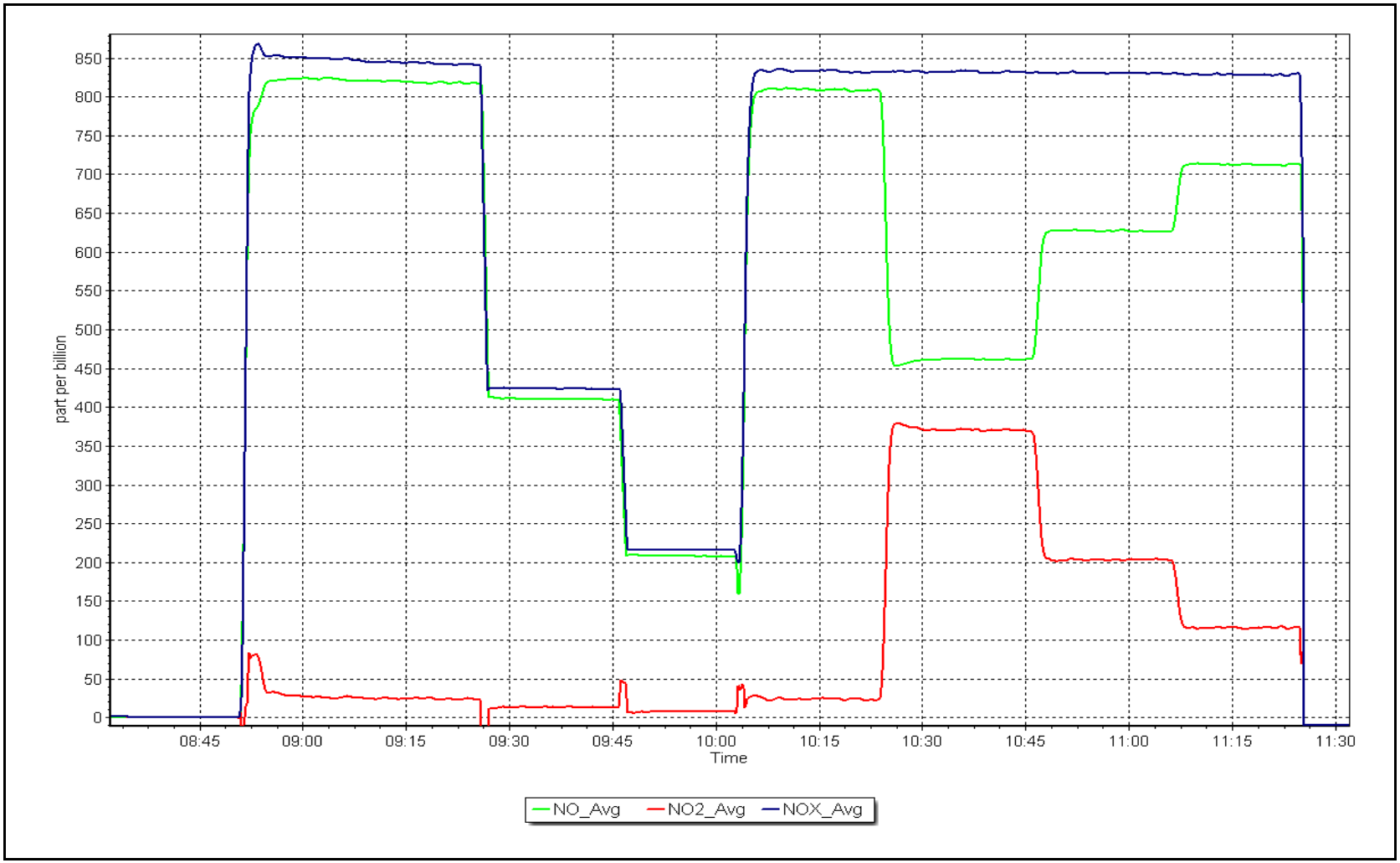
GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero	----	----	0.0	0.0	----	----
as found GPT point (400 ppb NO2)	808.4	461.5	366.1	370.5	0.9880	101.2%
as found GPT point (200 ppb NO2)	808.4	626.2	201.4	203.7	0.9885	101.2%
as found GPT point (100 ppb NO2)	808.4	712.1	115.5	116.0	0.9953	100.5%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: As founds to clean the reaction cell. NO and Nox spans still slowly dropping during calibration.

Calibration Performed By: Melissa Lemay

NO_X Calibration Plot Date: January 4, 2024 Location: MacKay River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	January 5, 2024	Last Cal Date:	January 4, 2024
Start time (MST):	8:10	End time (MST):	11:58
Reason:	Routine	Calibration after Cleaning reaction cell	

Calibration Standards

NO Gas Cylinder #:	T376265		Cal Gas Expiry Date:	April 13, 2025	
NOX Cal Gas Conc:	49.19	ppm	NO Cal Gas Conc:	48.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.19	ppm	Removed Gas NO Conc:	48.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1220	
ZAG make/model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1505164379	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.981	0.904	NO bkgnd or offset:	4.0	3.7
NOX coeff or slope:	0.997	0.992	NOX bkgnd or offset:	4.1	3.7
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	190.9	190.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.007887	0.991609
NO_X Cal Offset:	2.589374	3.242799
NO Cal Slope:	0.995492	0.992474
NO Cal Offset:	1.631214	2.102999
NO_2 Cal Slope:	1.005354	1.000326
NO_2 Cal Offset:	0.716865	-2.097451

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.4	0.0	----	----
high point	4917	83.3	819.5	800.3	19.2	814.8	795.8	19.1	1.0057	1.0057
second point	4958	41.7	410.3	400.7	9.6	410.3	399.8	10.5	0.9999	1.0022
third point	4979	20.8	204.6	199.9	4.8	209.8	202.7	7.1	0.9754	0.9860
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.4	0.1	----	----
as left span	4917	83.3	819.5	464.3	355.2	801.8	447.5	354.4	1.0220	1.0375
								Average Correction Factor	0.9937	0.9979

Corrected As found NO_X = NA ppb NO = NA ppb

Previous Response NO_X = NA ppb NO = NA ppb

Baseline Corr 2nd pt NO_X = NA ppb NO = NA ppb

Baseline Corr 3rd pt NO_X = NA ppb NO = NA ppb

* = > +/-5% change initiates investigation

*Percent Change NO_X = NA

*Percent Change NO = NA

As found NO_X r^2: Nx Sl: Nx Int:

As found NO r^2: NO Sl: NO Int:

As found NO_2 r^2: NO2 Sl: NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	786.2	450.2	355.2	354.5	1.0019	99.8%
2nd GPT point (200 ppb O3)	786.2	609.5	195.9	192.8	1.0159	98.4%
3rd GPT point (100 ppb O3)	786.2	692.9	112.5	108.0	1.0413	96.0%
				Average Correction Factor	1.0197	98.1%

Notes: Calibration after cleaning the reaction cell. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

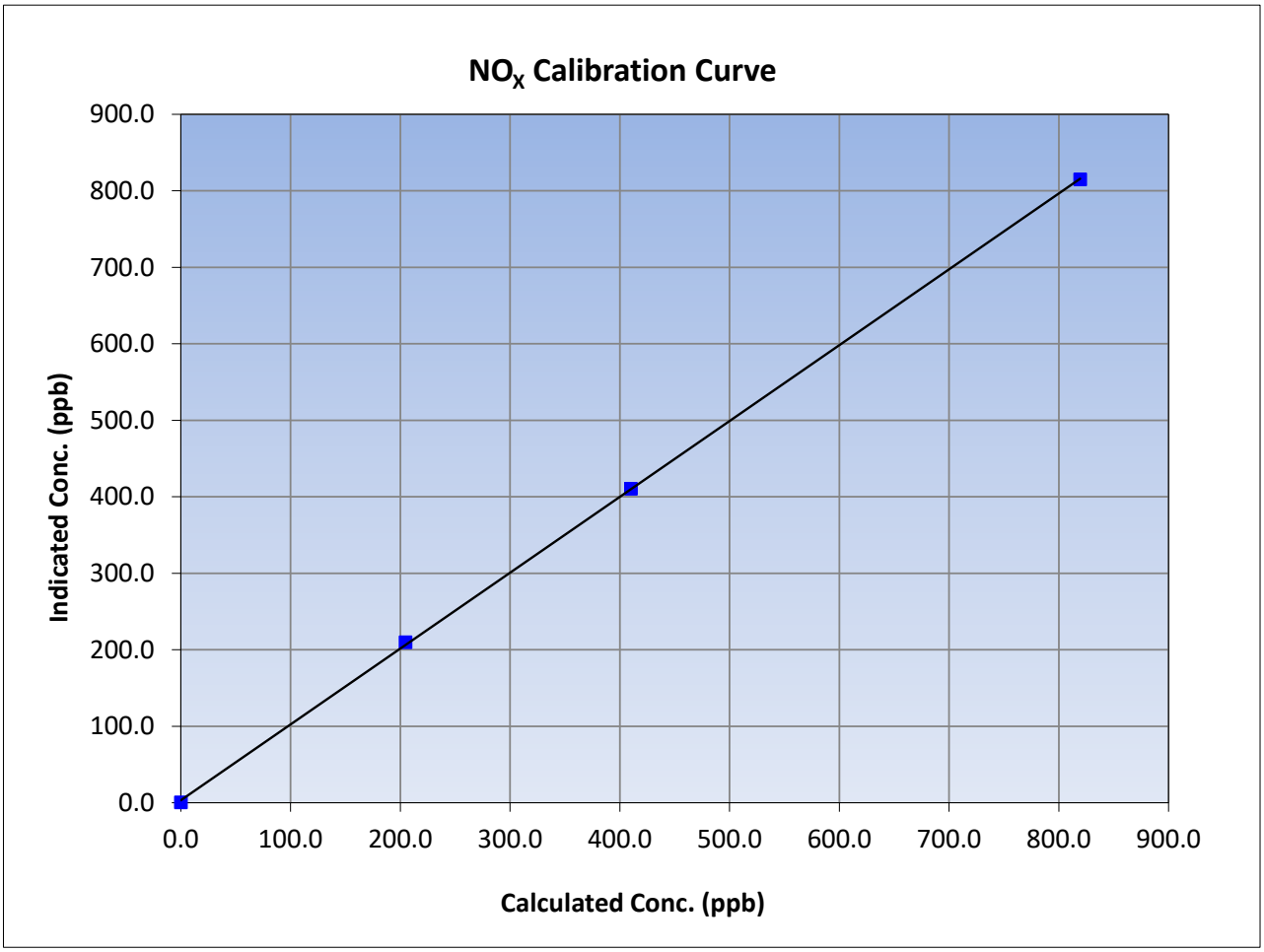
Version-04-2020

Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	January 4, 2024
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:10	End Time (MST):	11:58
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	0.4	----	Correlation Coefficient	0.999938	≥0.995
819.5	814.8	1.0057			
410.3	410.3	0.9999	Slope	0.991609	0.90 - 1.10
204.6	209.8	0.9754			
			Intercept	3.242799	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

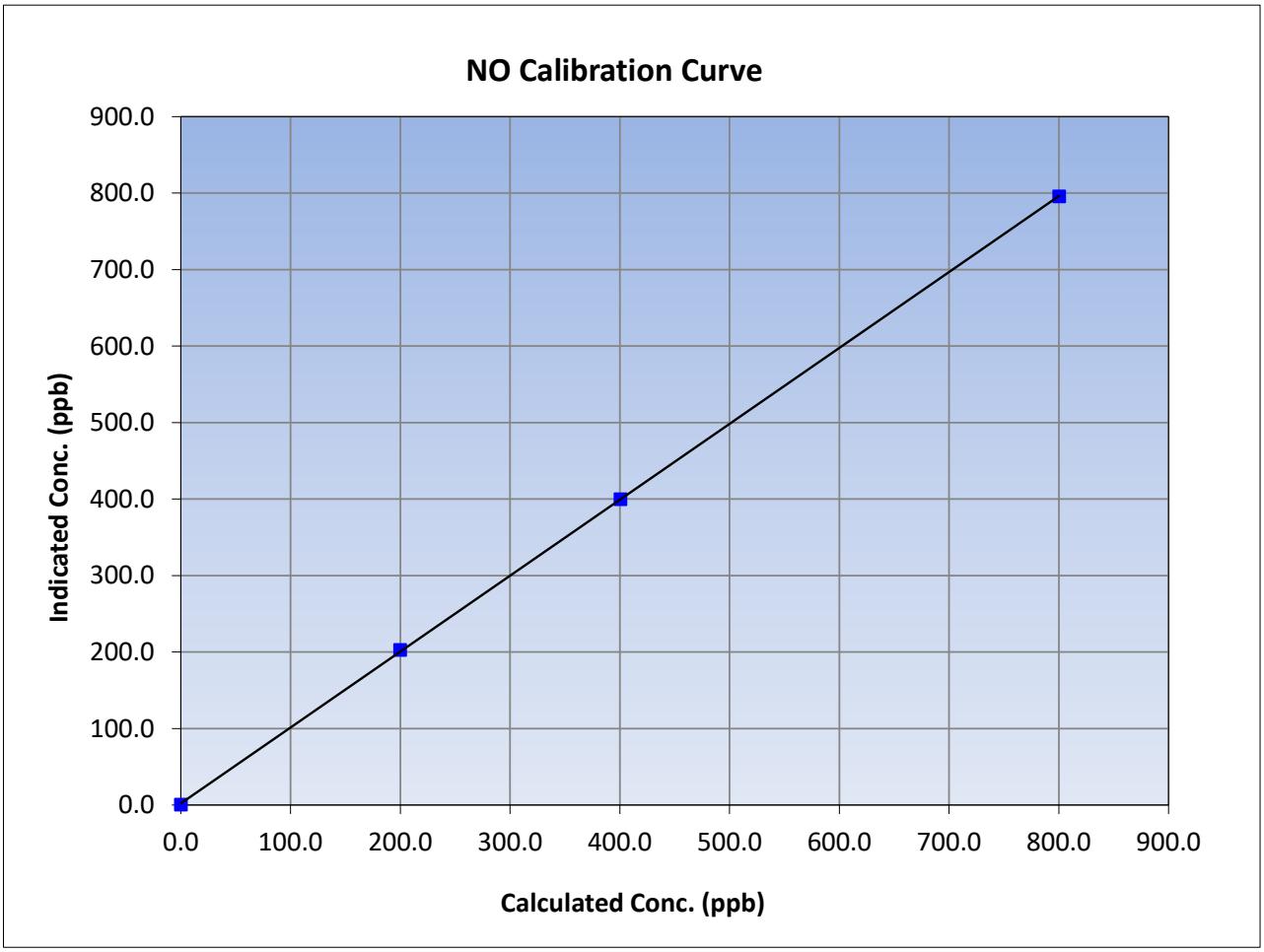
Version-04-2020

Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	January 4, 2024
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:10	End Time (MST):	11:58
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	0.4	----	Correlation Coefficient	0.999976	≥0.995
800.3	795.8	1.0057			
400.7	399.8	1.0022	Slope	0.992474	0.90 - 1.10
199.9	202.7	0.9860			
			Intercept	2.102999	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

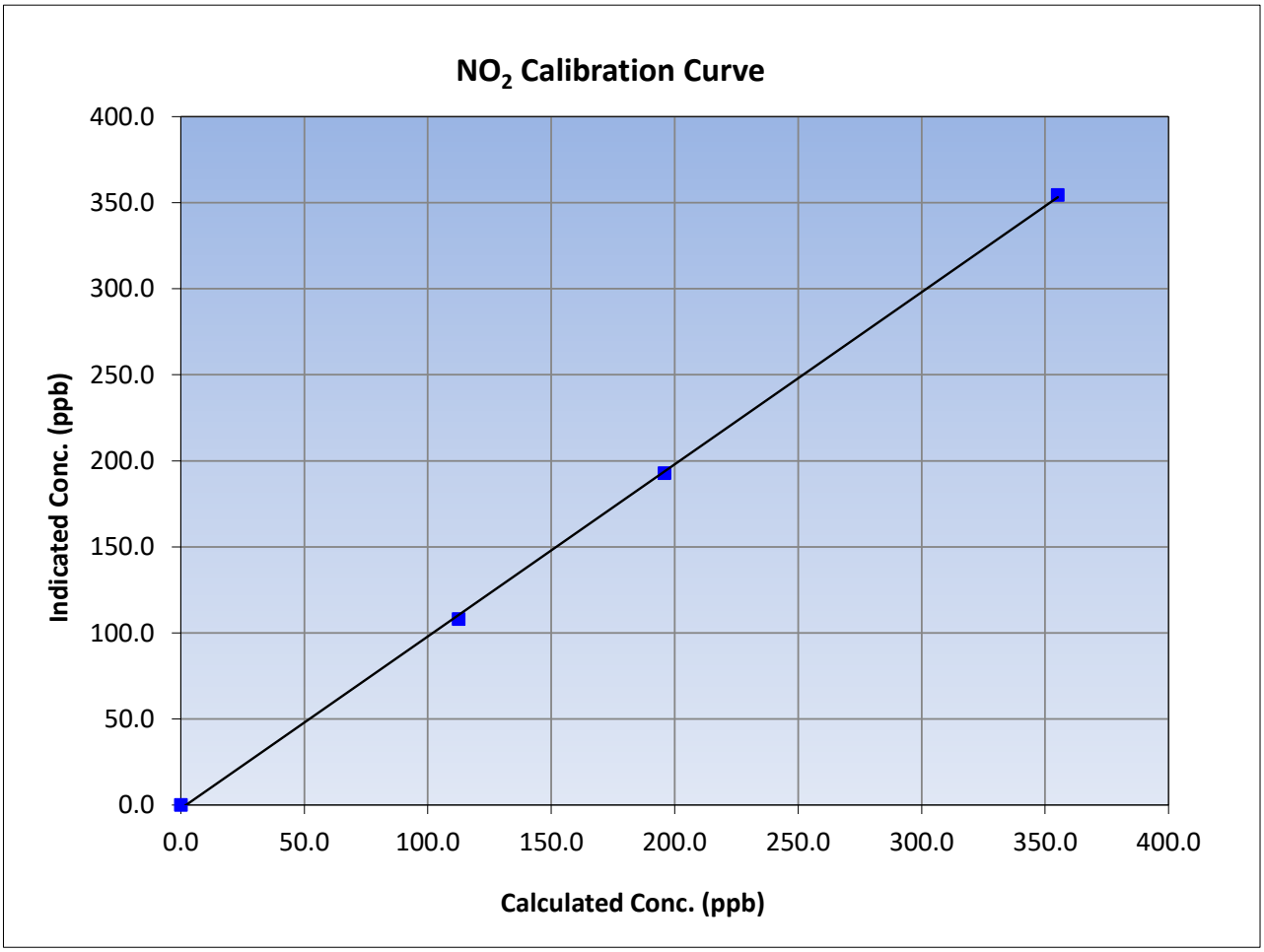
Version-04-2020

Station Information

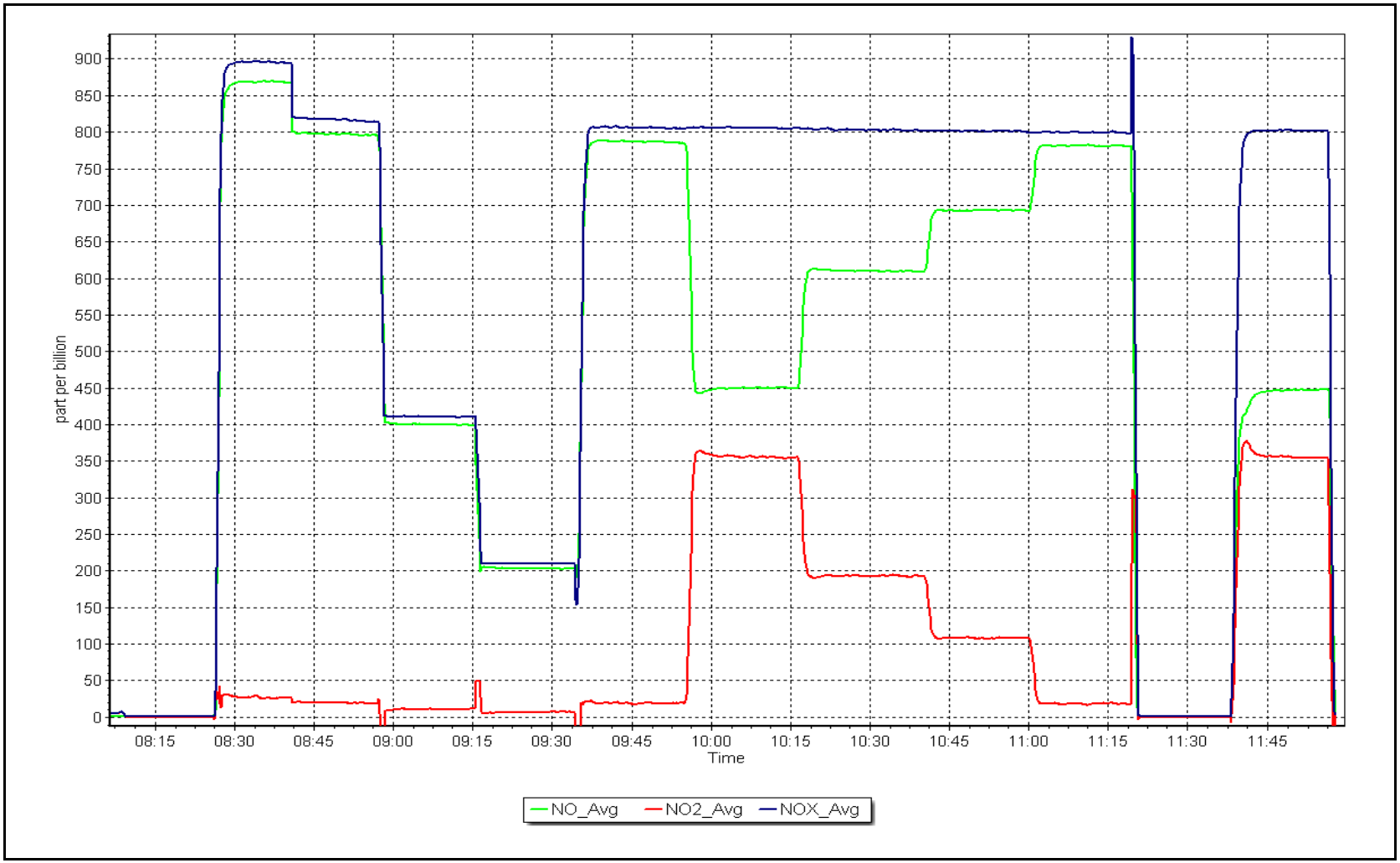
Calibration Date:	January 5, 2024	Previous Calibration:	January 4, 2024
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:10	End Time (MST):	11:58
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999807	≥0.995
355.2	354.5	1.0019			
195.9	192.8	1.0159	Slope	1.000326	0.90 - 1.10
112.5	108.0	1.0413			
			Intercept	-2.097451	+/-20



NO_X Calibration Plot Date: January 5, 2024 Location: MacKay River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	January 24, 2024	Last Cal Date:	January 5, 2024
Start time (MST):	8:05	End time (MST):	11:04
Reason:	As Found	Remove Internal Zero/Span Valve, replace O-ring	

Calibration Standards

NO Gas Cylinder #:	T376265		Cal Gas Expiry Date:	April 13, 2025	
NOX Cal Gas Conc:	49.19	ppm	NO Cal Gas Conc:	48.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.19	ppm	Removed Gas NO Conc:	48.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1220	
ZAG make/model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1505164379	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.904	0.904	NO bkgnd or offset:	3.7	3.7
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	3.7	3.7
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	188.2	188.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.991609	
NO_X Cal Offset:	3.242799	
NO Cal Slope:	0.992474	
NO Cal Offset:	2.102999	
NO_2 Cal Slope:	1.000326	
NO_2 Cal Offset:	-2.097451	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as found span	4917	83.3	819.5	800.3	19.2	806.5	786.5	20.0	1.0161	1.0175
as found 2nd	4958	41.7	410.3	400.7	9.6	405.0	394.1	10.9	1.0130	1.0167
as found 3rd	4979	20.8	204.6	199.9	4.8	206.1	199.4	6.6	0.9929	1.0023
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 = 806.4 ppb	NO = 786.5 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-1.2%
Previous Response	NO_X = 815.8 ppb	NO = 796.4 ppb			*Percent Change	NO =	-1.3%
Baseline Corr 2nd pt	NO_X = 404.9 ppb	NO = 394.1 ppb	As found	NO_X r^2: 0.999963	Nx Sl: 0.982294	Nx Int:	2.183
Baseline Corr 3rd pt	NO_X = 206.0 ppb	NO = 199.4 ppb	As found	NO r^2: 0.999983	NO Sl: 0.981522	NO Int:	1.263
			As found	NO_2 r^2: 0.999972	NO2 Sl: 1.012861	NO_2 Int:	-0.728

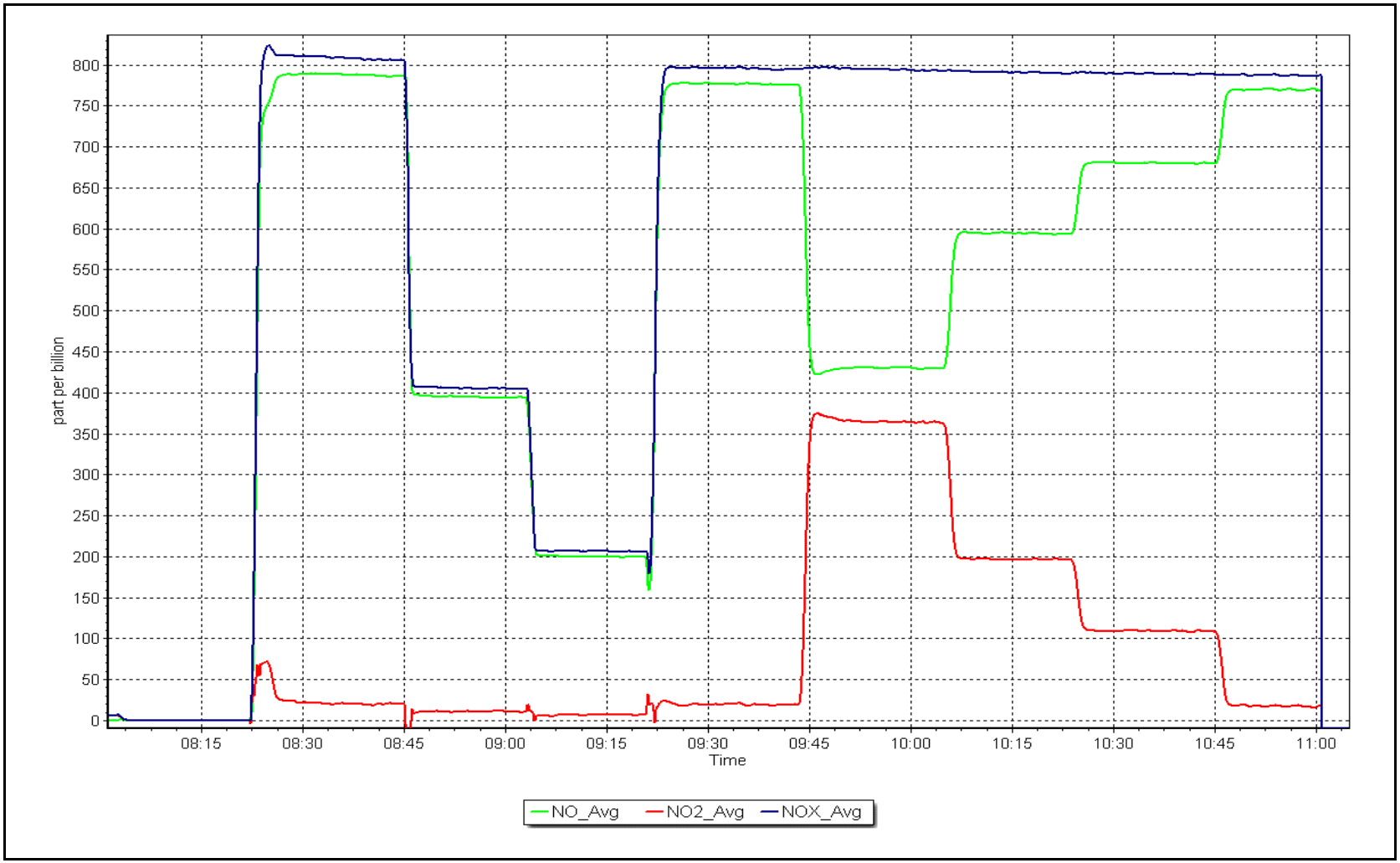
GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero	----	----	0.0	0.1	----	----
as found GPT point (400 ppb NO2)	769.9	429.6	359.5	363.9	0.9878	101.2%
as found GPT point (200 ppb NO2)	769.9	593.8	195.3	196.5	0.9937	100.6%
as found GPT point (100 ppb NO2)	769.9	680.0	109.1	108.9	1.0014	99.9%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: As founds to do maintenance on the analyzer. Due to drifting during the GPT the 2nd NO ref point used for as found GPT. Internal Valve removed, Reaction cell O ring replaced. Adjusted the PMT.

Calibration Performed By: Melissa Lemay

NO_X Calibration Plot Date: January 24, 2024 Location: MacKay River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	January 25, 2024	Last Cal Date:	January 24, 2024
Start time (MST):	7:46	End time (MST):	11:37
Reason:	Routine	Remove Internal Zero/Span Valve, replace O-ring, Adjusted the PMT	

Calibration Standards

NO Gas Cylinder #:	T376265		Cal Gas Expiry Date:	April 13, 2025	
NOX Cal Gas Conc:	49.19	ppm	NO Cal Gas Conc:	48.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.19	ppm	Removed Gas NO Conc:	48.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1220	
ZAG make/model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1505164379	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.904	0.990	NO bkgnd or offset:	3.7	2.8
NOX coeff or slope:	0.992	0.994	NOX bkgnd or offset:	3.7	3.0
NO2 coeff or slope:	0.995	1.000	Reaction cell Press:	164.5	164.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.991609	0.997760
NO_X Cal Offset:	3.242799	3.562350
NO Cal Slope:	0.992474	0.996944
NO Cal Offset:	2.102999	2.762658
NO_2 Cal Slope:	1.000326	1.002101
NO_2 Cal Offset:	-2.097451	-0.557879

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high point	4917	83.3	819.5	800.3	19.2	819.6	799.4	20.3	0.9998	1.0011
second point	4958	41.7	410.3	400.7	9.6	414.0	403.1	10.9	0.9910	0.9940
third point	4979	20.8	204.6	199.9	4.8	211.9	205.1	6.8	0.9657	0.9744
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	4917	83.3	819.5	444.6	374.9	818.3	441.7	376.7	1.0014	1.0066
								Average Correction Factor	0.9855	0.9898

Corrected As found	NO_X = NA	ppb	NO = NA	ppb	* = > +/-5% change initiates investigation			*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 Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA	ppb	NO = NA	ppb	As found	NO r^2:		NO Sl:	NO Int:	
					As found	NO_2 r^2:		NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.8	441.1	374.9	375.3	0.9988	100.1%
2nd GPT point (200 ppb O3)	796.8	611.9	204.1	203.9	1.0008	99.9%
3rd GPT point (100 ppb O3)	796.8	701.0	115.0	114.0	1.0084	99.2%
				Average Correction Factor	1.0027	99.7%

Notes: PMT adjusted, Zero/Span Valve removed, O ring replaced.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

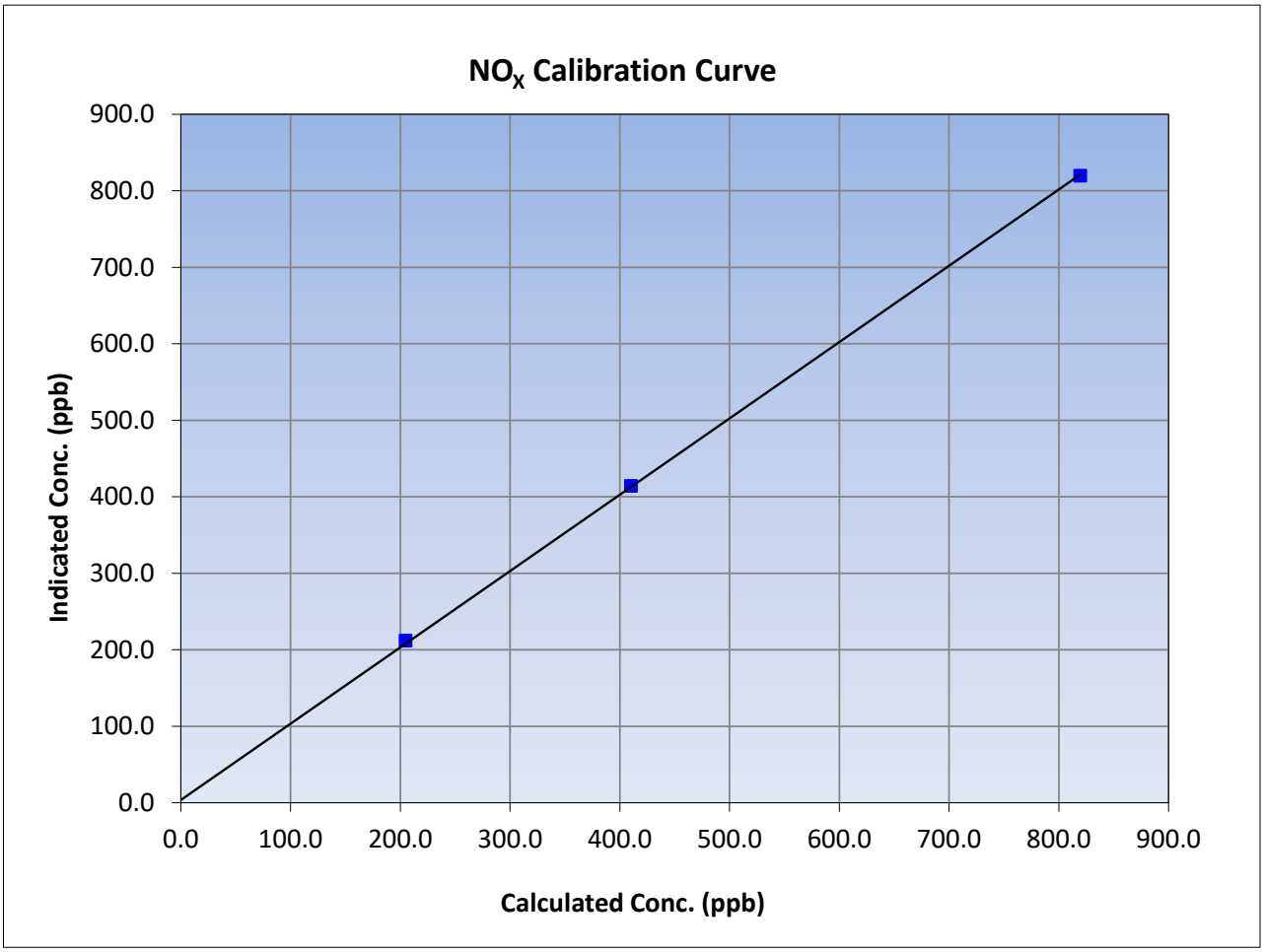
Version-04-2020

Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	January 24, 2024
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:46	End Time (MST):	11:37
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	0.999906	≥0.995
819.5	819.6	0.9998			
410.3	414.0	0.9910	Slope	0.997760	0.90 - 1.10
204.6	211.9	0.9657			
			Intercept	3.562350	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

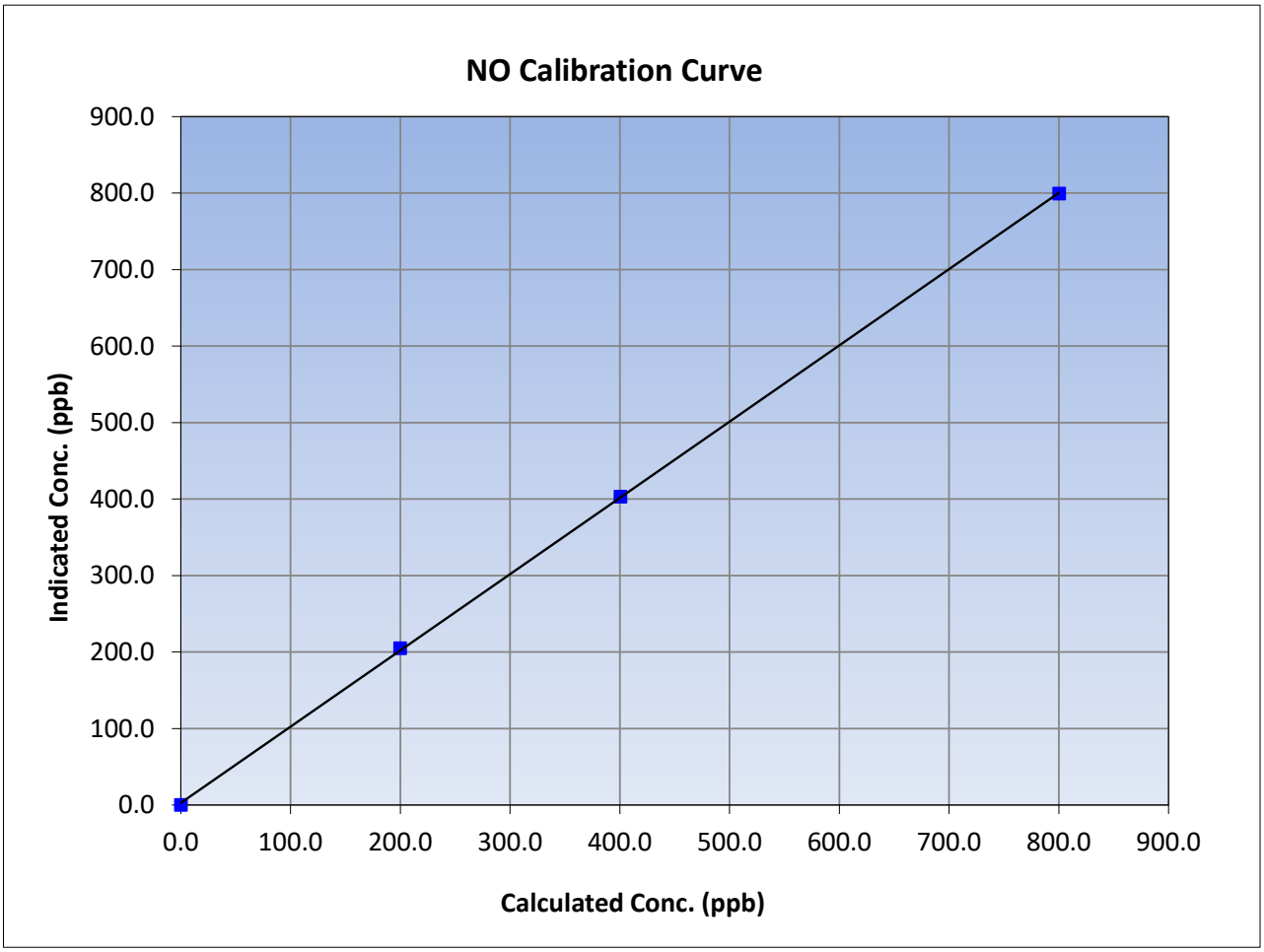
Version-04-2020

Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	January 24, 2024
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:46	End Time (MST):	11:37
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	0.999944	≥0.995
800.3	799.4	1.0011			
400.7	403.1	0.9940	Slope	0.996944	0.90 - 1.10
199.9	205.1	0.9744			
			Intercept	2.762658	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

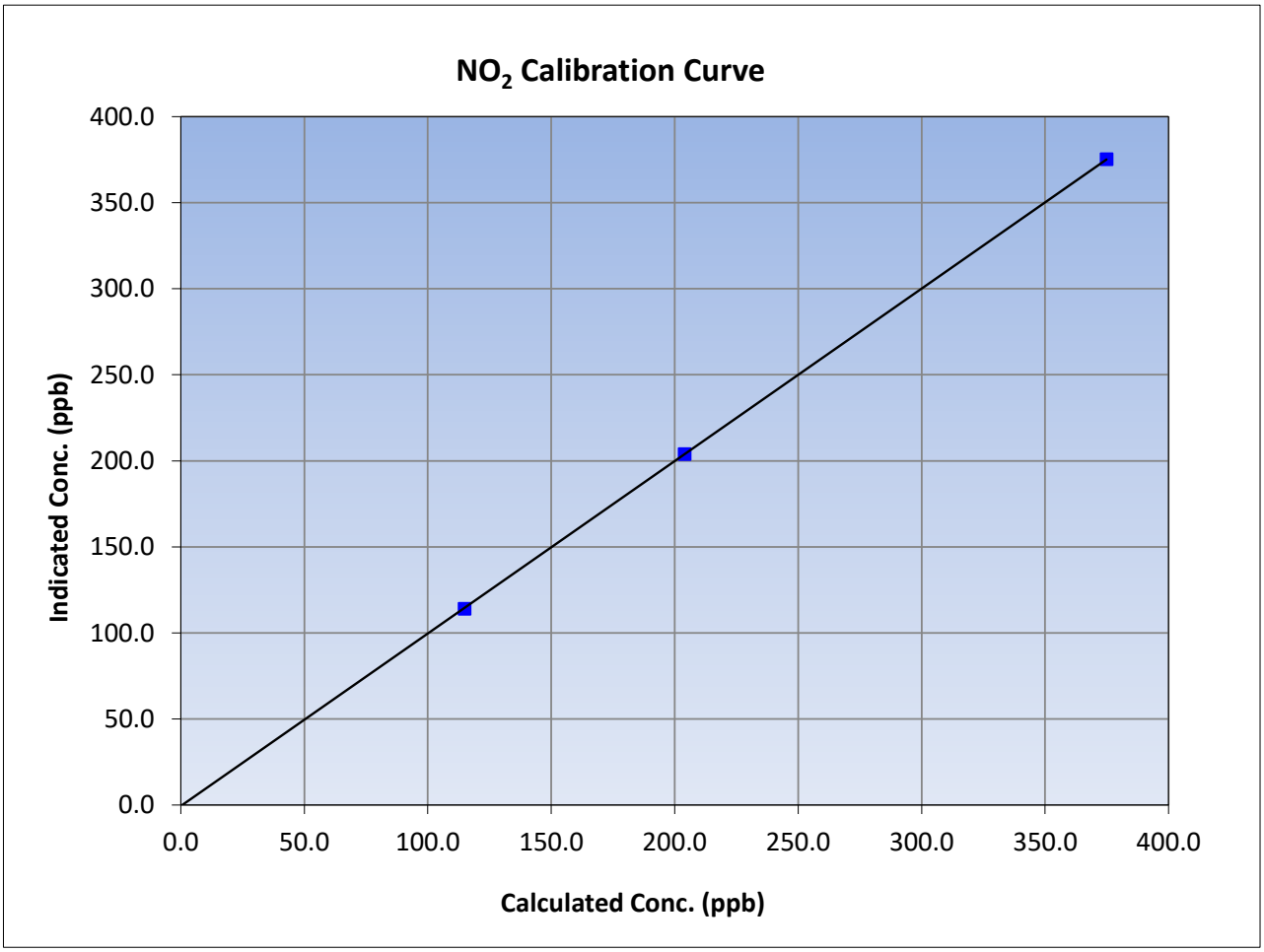
Version-04-2020

Station Information

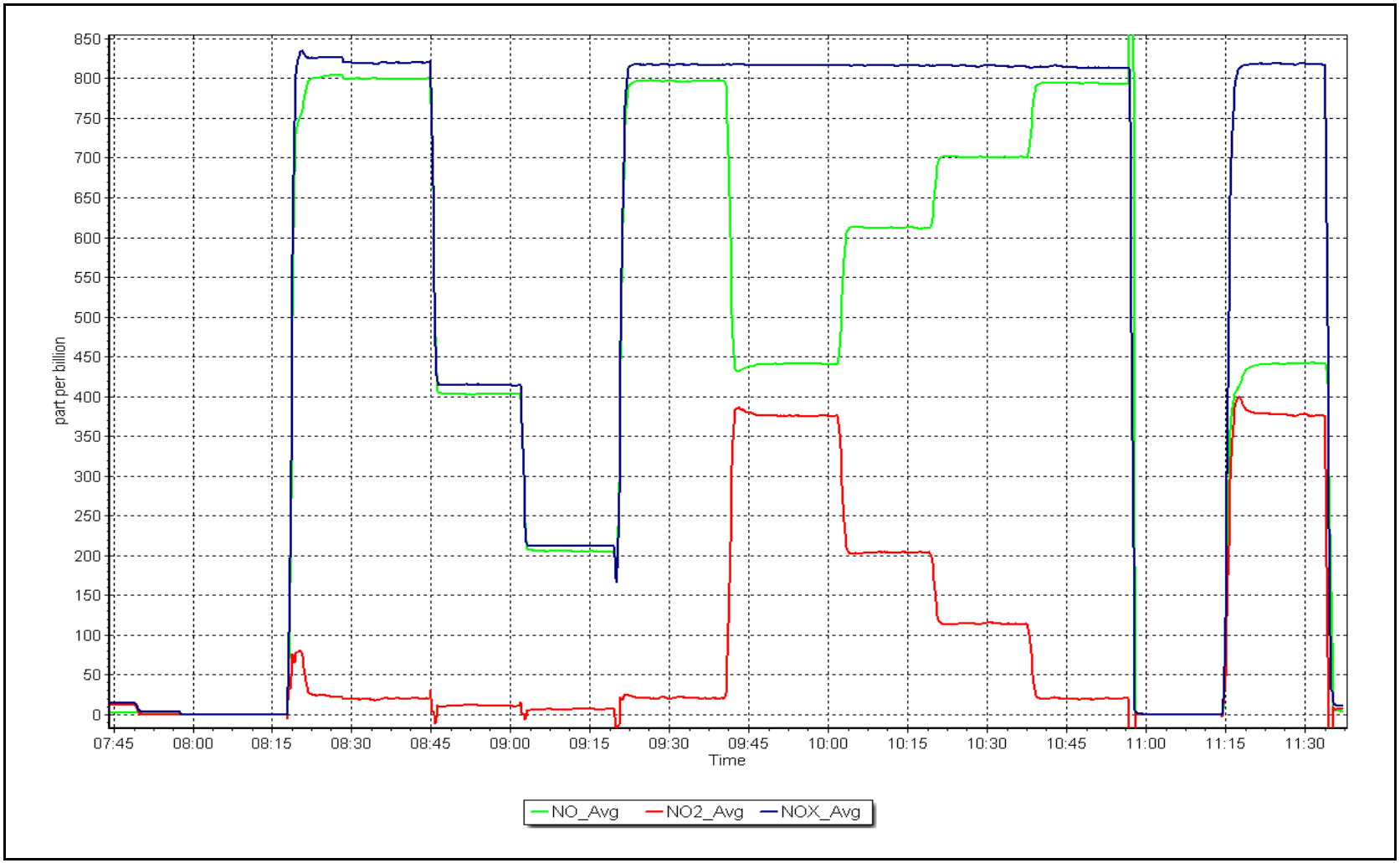
Calibration Date:	January 25, 2024	Previous Calibration:	January 24, 2024
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:46	End Time (MST):	11:37
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999991	≥0.995
374.9	375.3	0.9988			
204.1	203.9	1.0008	Slope	1.002101	0.90 - 1.10
115.0	114.0	1.0084			
			Intercept	-0.557879	+/-20



NO_X Calibration Plot Date: January 25, 2024 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	January 15, 2024	Last Cal Date:	December 4, 2023
Start time (MST):	11:59	End time (MST):	15:03
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.93	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC259455			
Removed Cal Gas Conc:	49.93	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3810
ZAG Make/Model:	Teledyne API 701		Serial Number:	691

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1428701363

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	0.995935	0.997790	Backgd or Offset:	28.6	28.3
Calibration intercept:	0.975766	1.075857	Coeff or Slope:	0.904	0.911

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5005	0.0	0.0	-0.1	----
as found span	4920	80.2	800.8	791.1	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	0.0	----
high point	4920	80.2	800.8	799.9	1.001
second point	4960	40.1	400.4	400.3	1.000
third point	4980	20.0	200.1	202.4	0.989
as left zero	5005	0.0	0.0	-0.1	----
as left span	4920	80.2	800.8	800.8	1.000
				Average Correction Factor	0.997

Baseline Corr As found:	791.20	Previous response	798.57	*% 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. Adjusted span only.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

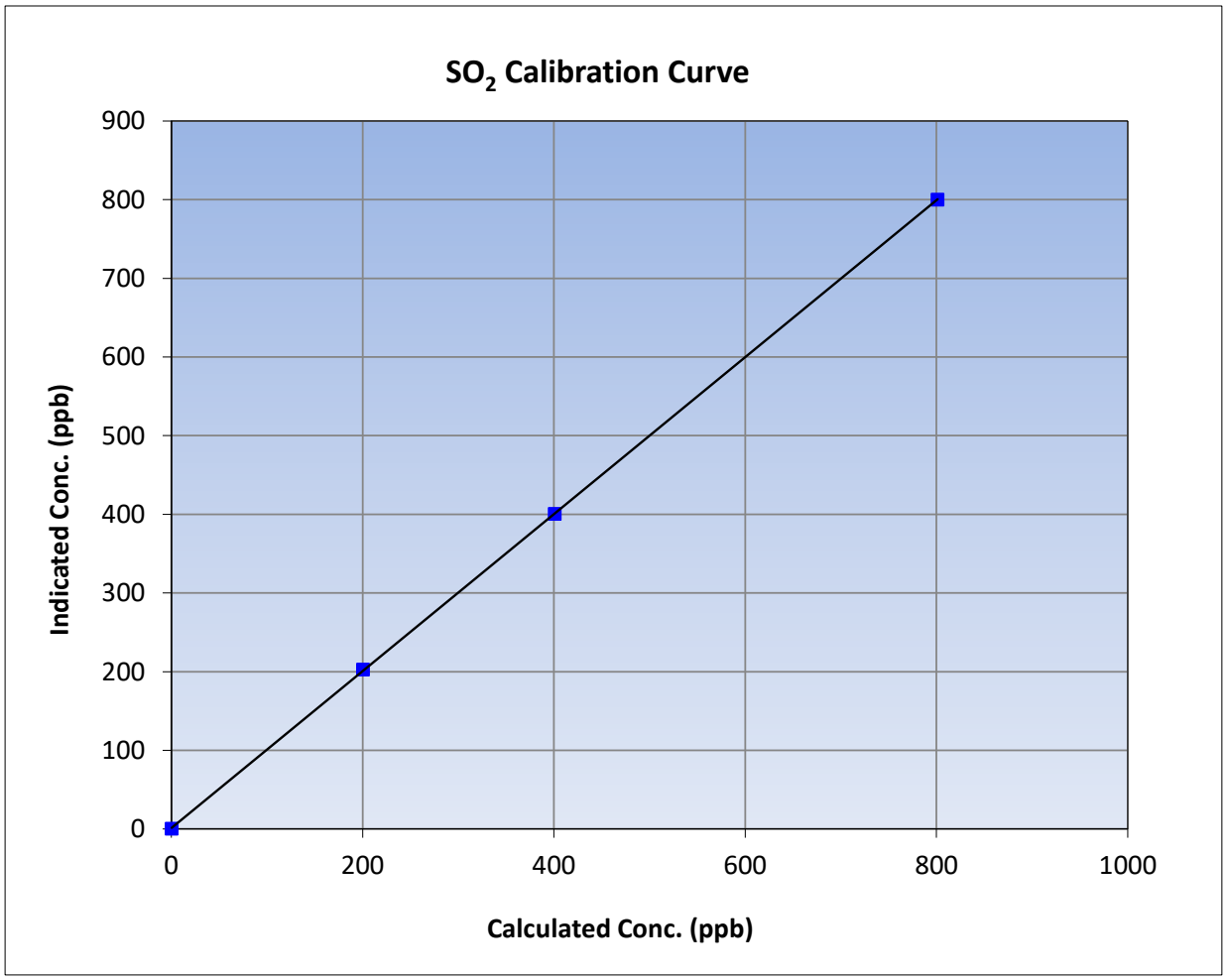
Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 4, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:59	End Time (MST):	15:03
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

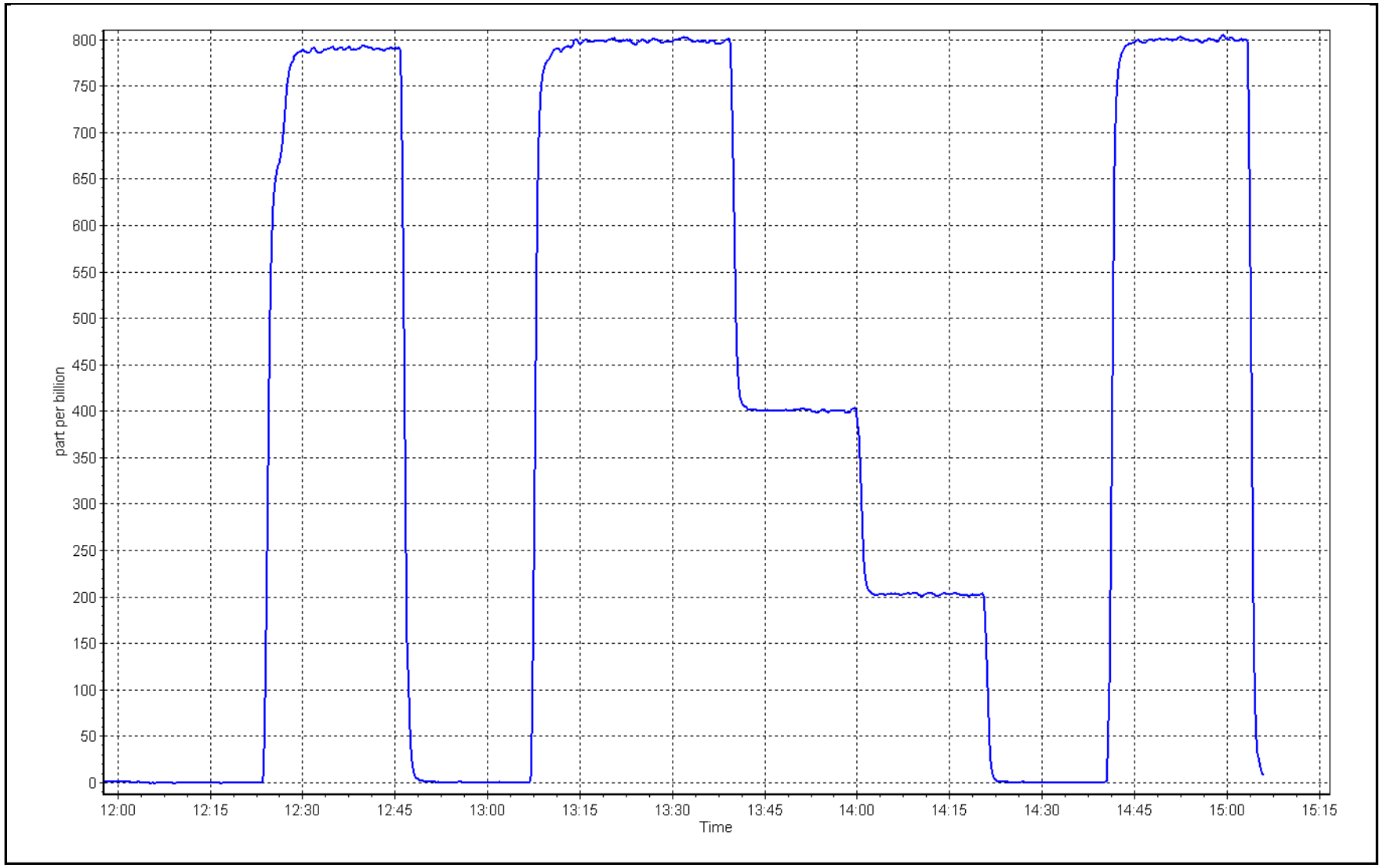
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.8	799.9	1.0012
400.4	400.3	1.0003
200.1	202.4	0.9887

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.997790	*0.90 - 1.10*
Intercept	1.075857	*+/-30*



SO2 Calibration Plot Date: January 15, 2024 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	January 24, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	10:56	End time (MST):	15:54
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.00	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC501204			
Removed Cal Gas Conc:	5.00	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3810
ZAG Make/Model:	Teledyne API 701H		Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1236656116
Converter make:	CD-Nova 101		Converter serial #:	NA
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995286	1.011429	Backgd or Offset:	2.4	2.44
Calibration intercept:	0.240000	0.300000	Coeff or Slope:	0.963	0.992

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4920	80.0	80.0	79.9	1.001
as found 2nd point	4960	40.0	40.0	40.0	1.000
as found 3rd point	4980	20.0	20.0	20.3	0.985
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	80.0	80.0	81.1	0.986
second point	4960	40.0	40.0	41.0	0.976
third point	4980	20.0	20.0	20.5	0.976
as left zero	5000	0.0	0.0	0.4	----
as left span	4920	80.0	80.0	80.9	0.989
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.979
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.9	Prev response:	79.86	*% change:	0.0%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.997429	AF Intercept:	0.140000
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999981		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds.Scrubber check done after calibrator zero and it passed. Adjusted span only.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

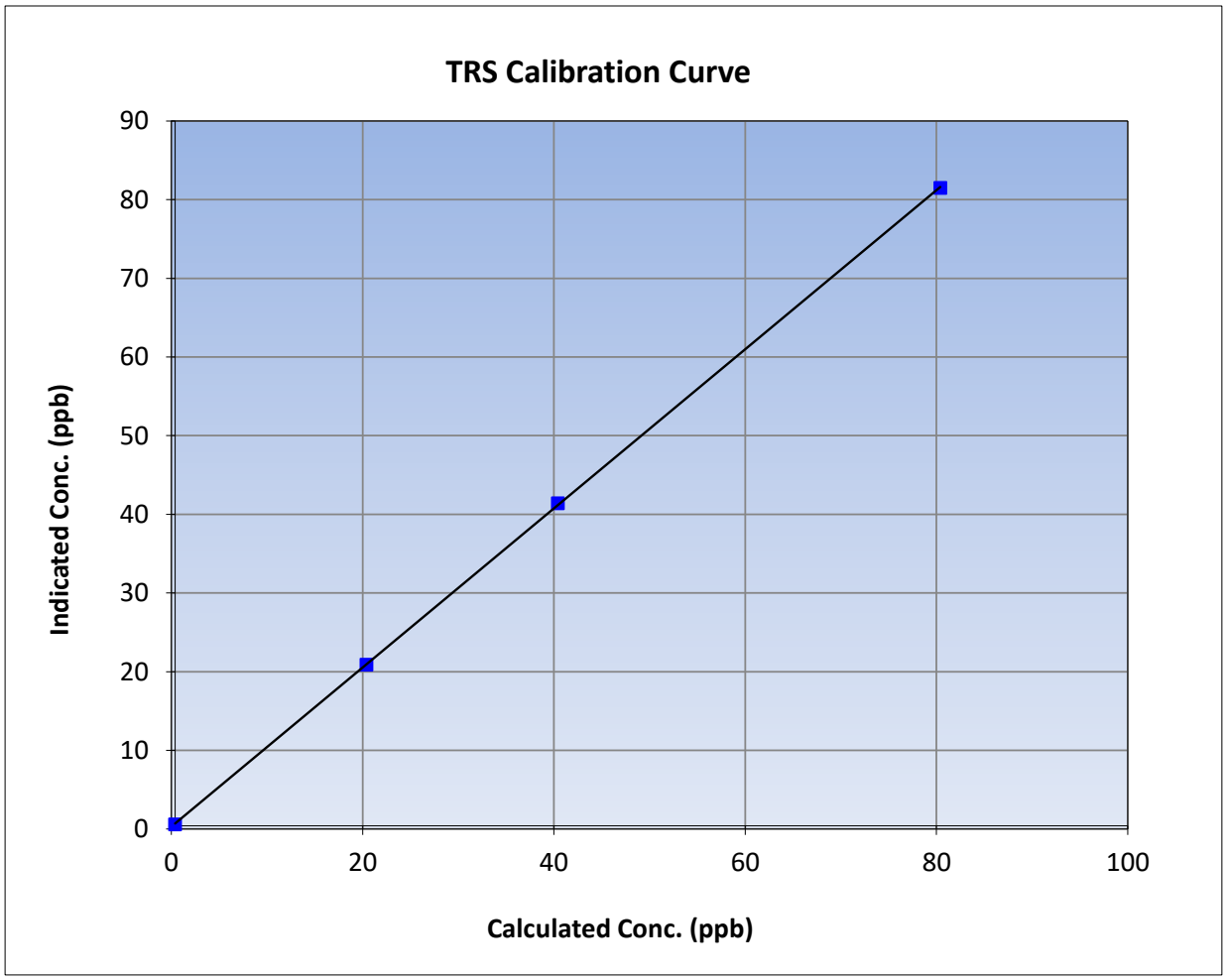
Station Information

Calibration Date:	January 24, 2024	Previous Calibration:	December 7, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:56	End Time (MST):	15:54
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

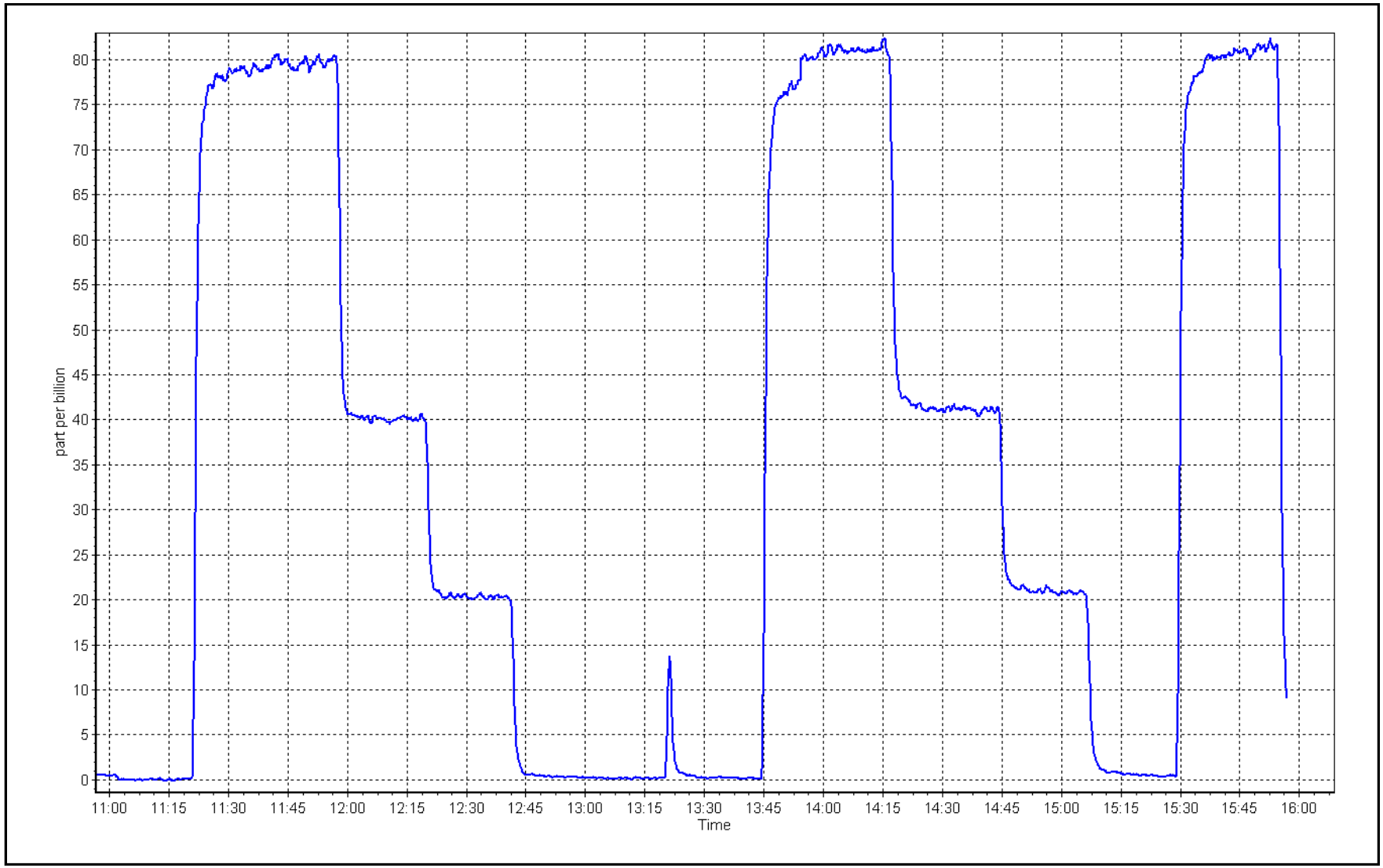
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	81.1	0.9864
40.0	41.0	0.9756
20.0	20.5	0.9756

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.011429	*0.90 - 1.10*
Intercept	0.300000	*+/-3*



TRS Calibration Plot Date: January 24, 2024 Location: Conklin



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	January 15, 2024	Last Cal Date:	December 14, 2023
Start time (MST):	11:59	End time (MST):	15:03
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701H		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1193585649	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.69E-04	3.86E-04	NMHC SP Ratio:	7.47E-05	7.53E-05
CH4 Retention time:	17.2	17.4	NMHC Peak Area:	122336	122333
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	16.88	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	80.2	17.13	17.02	1.006
second point	4960	40.1	8.56	8.56	1.000
third point	4980	20.0	4.28	4.34	0.987
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.00	1.007
				Average Correction Factor	0.998
Baseline Corr AF:	16.88	Prev response	17.11	*% 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 / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.11	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.11	1.003
second point	4960	40.1	4.57	4.58	0.998
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	9.10	1.004
				Average Correction Factor	0.995
Baseline Corr AF:	9.11	Prev response	9.15	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.77	1.028
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	7.90	1.011
second point	4960	40.1	3.99	3.98	1.003
third point	4980	20.0	2.00	2.02	0.990
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.89	1.012
				Average Correction Factor	1.001
Baseline Corr AF:	7.77	Prev response	7.96	*% change	-2.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.997358	0.992346
THC Cal Offset:	0.029967	0.043763
CH4 Cal Slope:	0.995501	0.988303
CH4 Cal Offset:	0.011557	0.021954
NMHC Cal Slope:	0.998993	0.995866
NMHC Cal Offset:	0.018610	0.021609

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

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

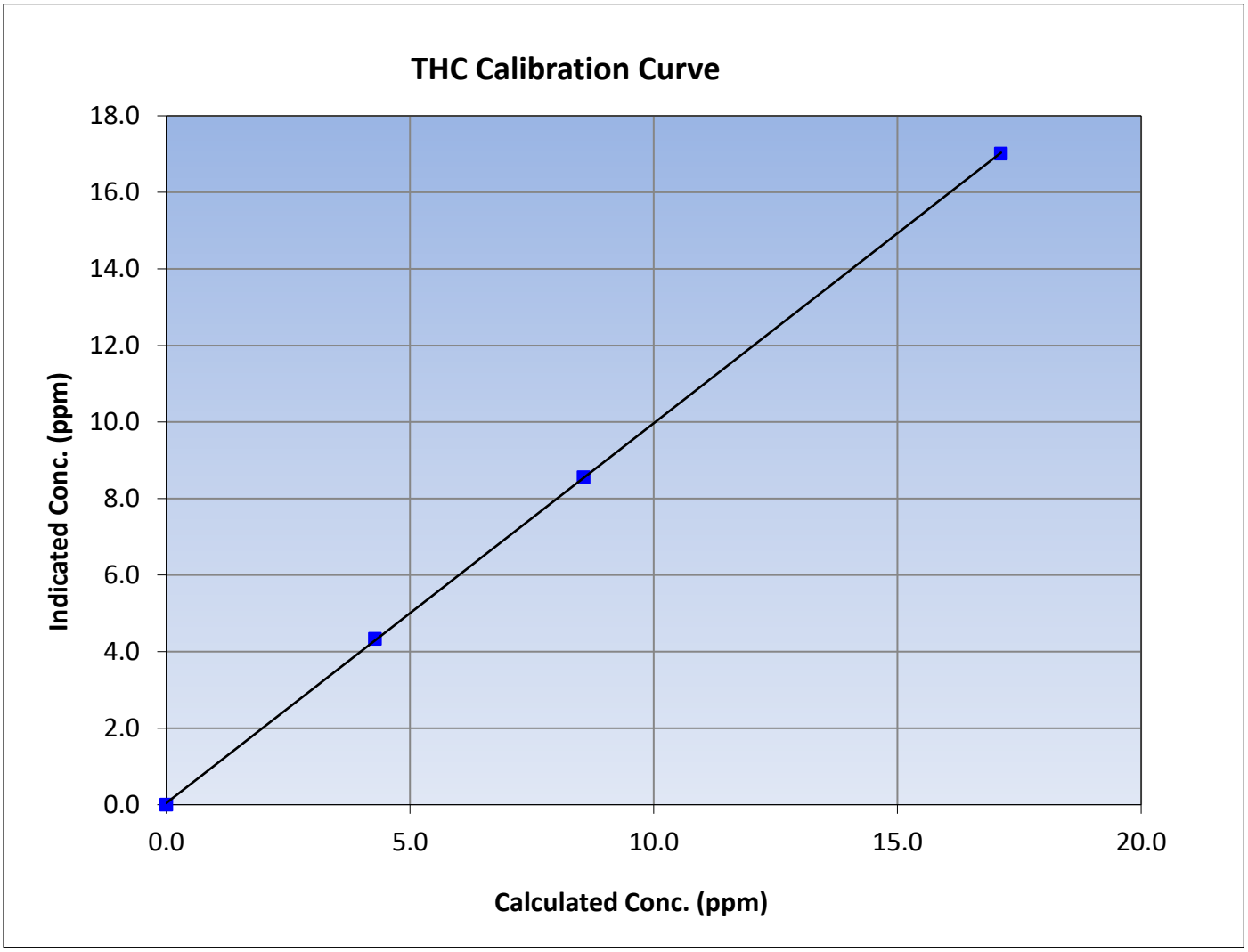
Version-06-2022

Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 14, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:59	End Time (MST):	15:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999970	≥0.995
17.13	17.02	1.0064			
8.56	8.56	1.0003	Slope	0.992346	0.90 - 1.10
4.28	4.34	0.9869			
			Intercept	0.043763	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

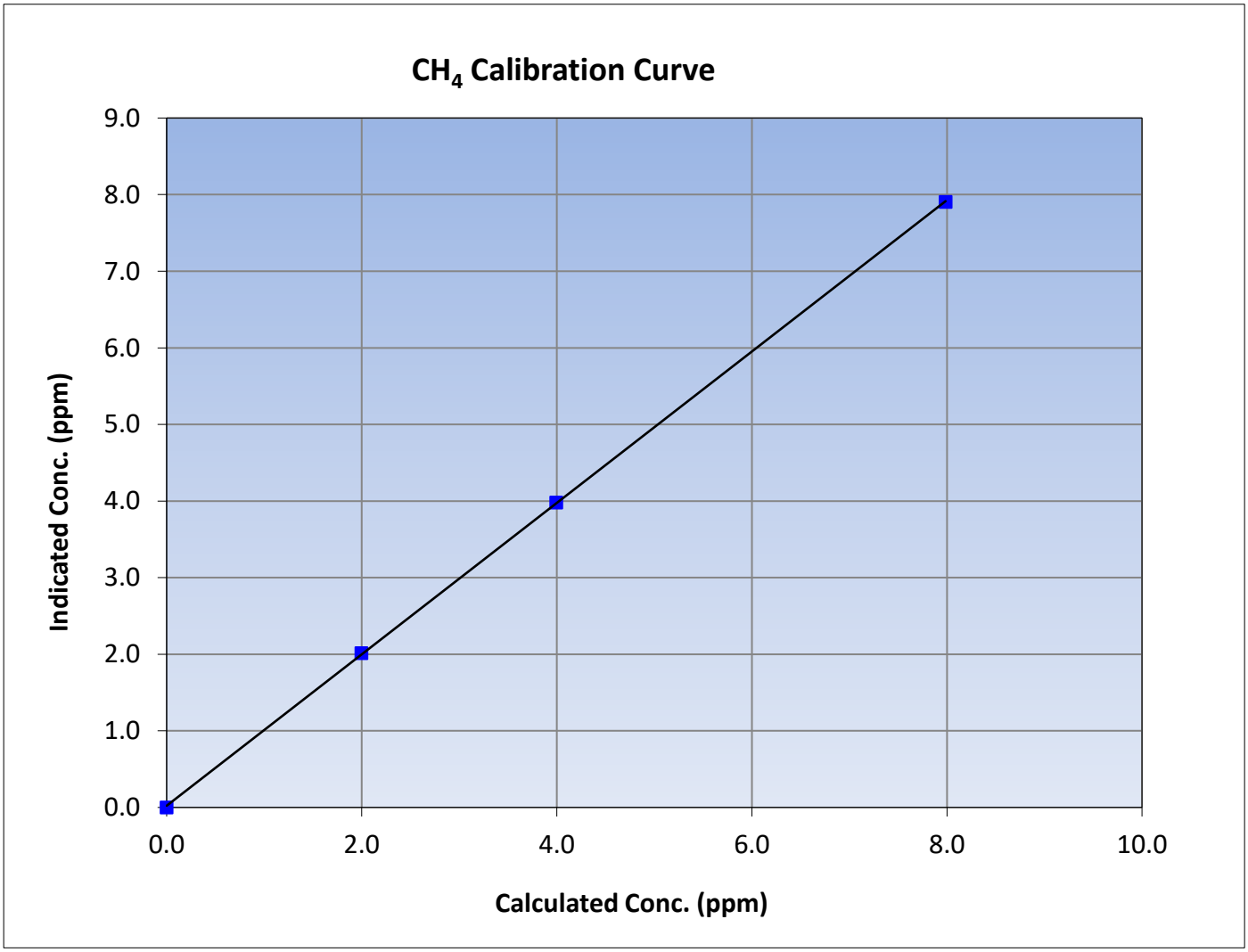
Version-06-2022

Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 14, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:59	End Time (MST):	15:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999965	≥0.995
7.99	7.90	1.0105			
3.99	3.98	1.0030	Slope	0.988303	0.90 - 1.10
2.00	2.02	0.9904			
			Intercept	0.021954	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

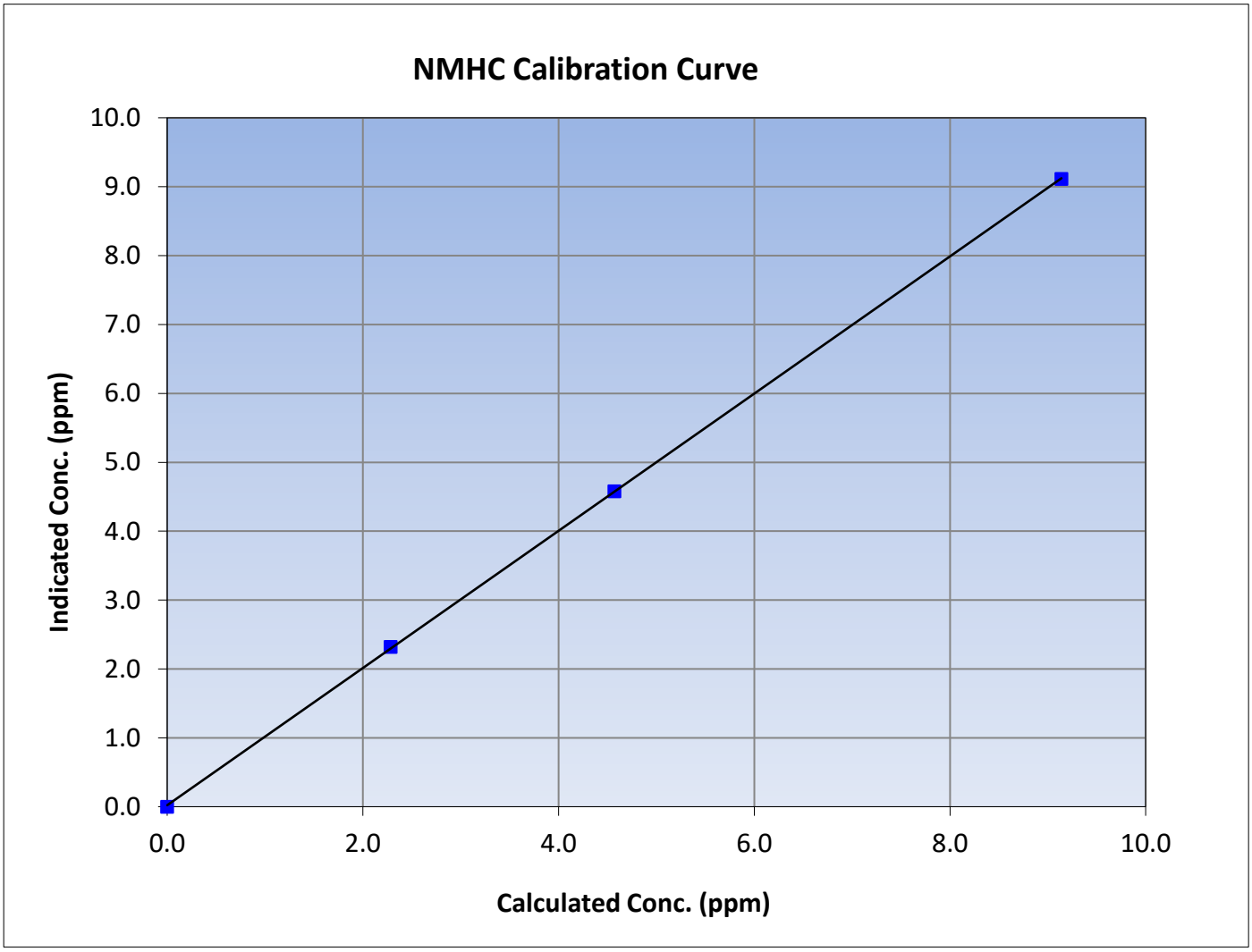
Version-06-2022

Station Information

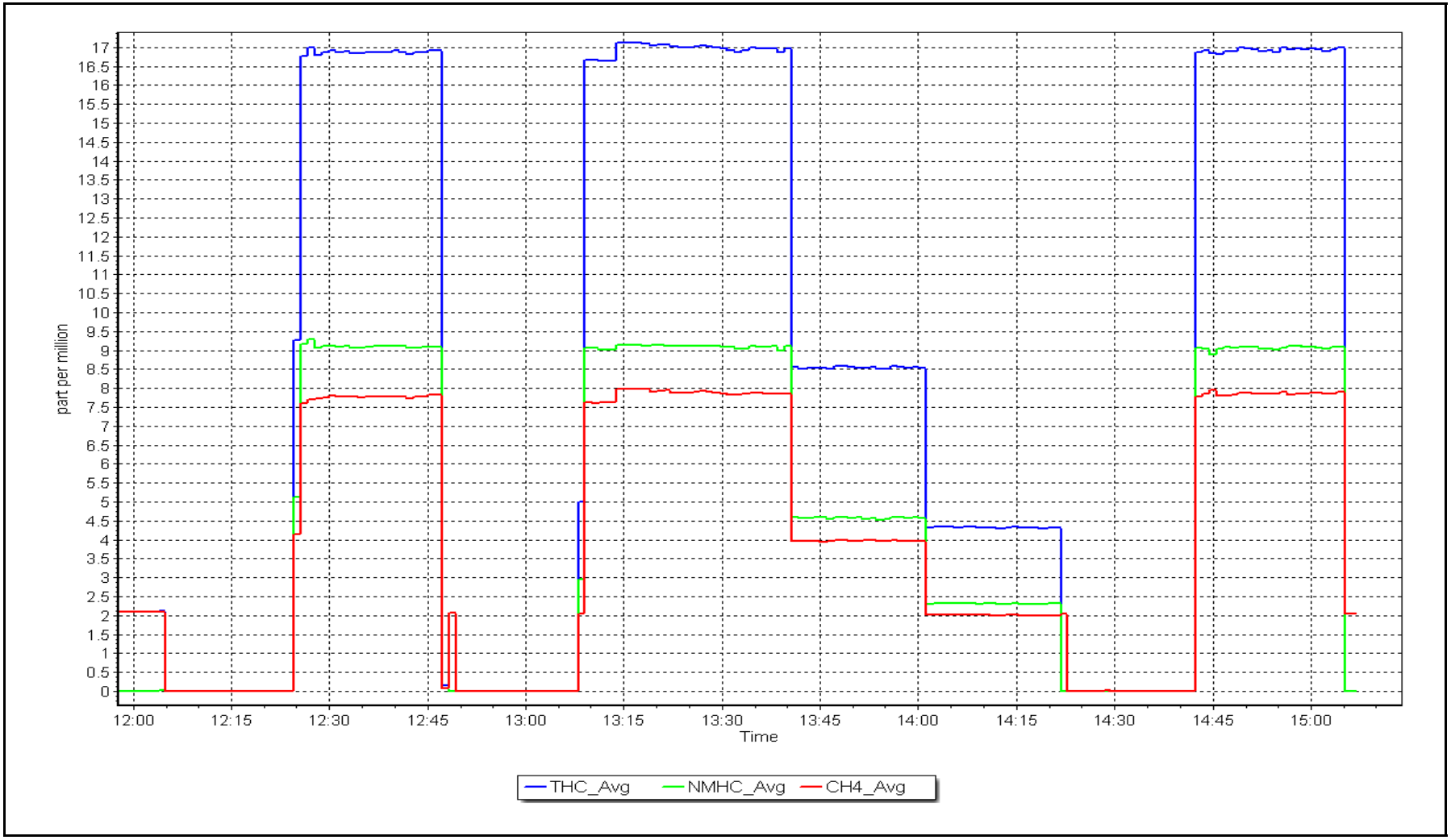
Calibration Date:	January 15, 2024	Previous Calibration:	December 14, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:59	End Time (MST):	15:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999973	*≥0.995*
9.14	9.11	1.0028			
4.57	4.58	0.9982	Slope	0.995866	*0.90 - 1.10*
2.28	2.32	0.9839			
			Intercept	0.021609	*+/-0.5*



NMHC Calibration Plot Date: January 15, 2024 Location: Conklin



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	January 25, 2024	Last Cal Date:	January 15, 2024
Start time (MST):	10:31	End time (MST):	12:58
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701H		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1193585649	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.69E-04	3.86E-04	NMHC SP Ratio:	7.47E-05	7.53E-05
CH4 Retention time:	17.2	17.4	NMHC Peak Area:	122336	122333
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	17.33	0.988
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	17.29	0.990
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.990

Baseline Corr AF:	17.33	Prev response	17.11	*% 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 / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.13	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.05	1.010
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.010
Baseline Corr AF:	9.13	Prev response	9.15	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	8.20	0.974
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	8.24	0.969
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.969
Baseline Corr AF:	8.20	Prev response	7.96	*% change	2.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

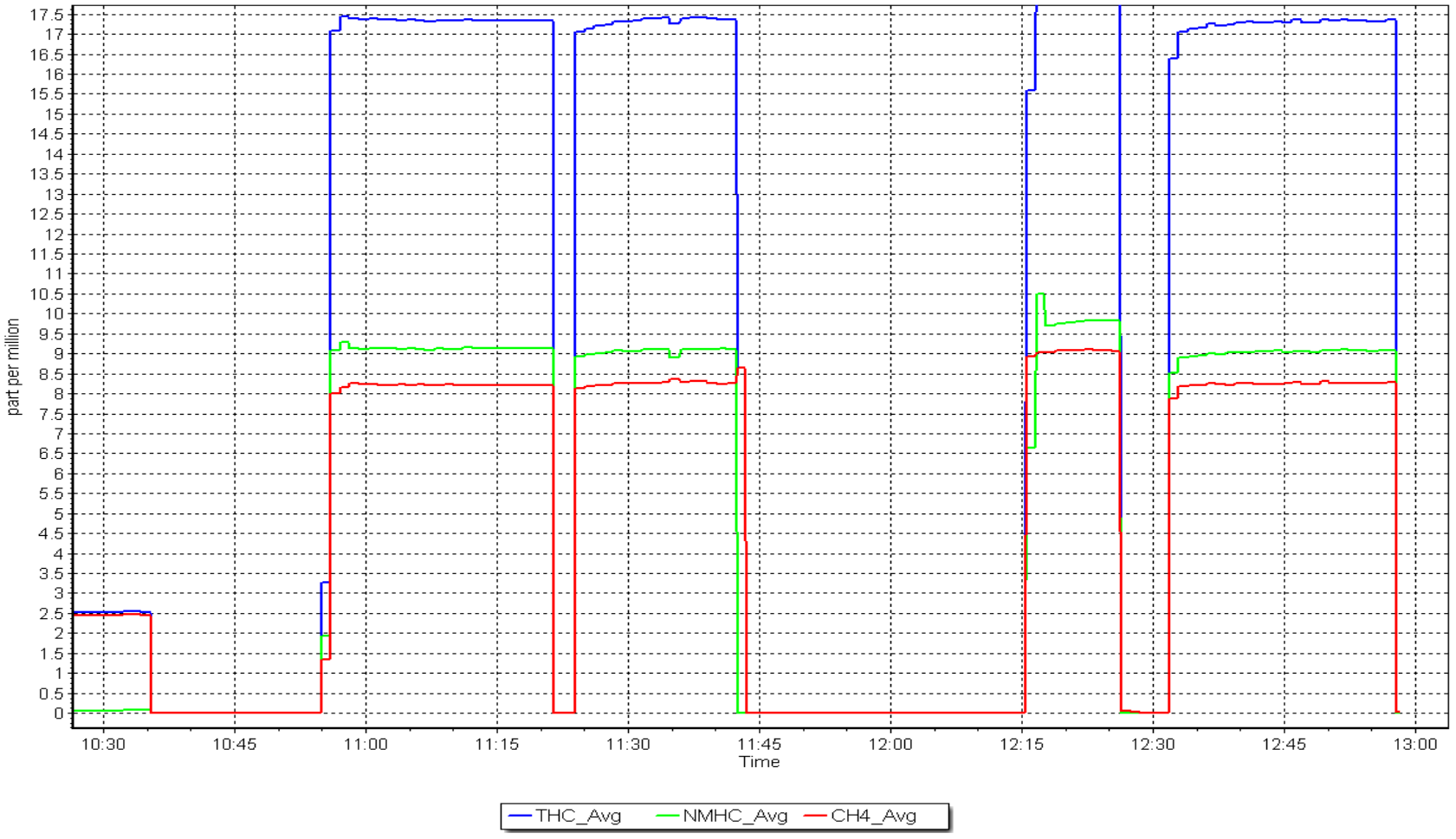
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.997358	1.009622
THC Cal Offset:	0.029967	0.000000
CH4 Cal Slope:	0.995501	1.031806
CH4 Cal Offset:	0.011557	0.000000
NMHC Cal Slope:	0.998993	0.990237
NMHC Cal Offset:	0.018610	0.000000

Notes: Changed H2 cylinder after as founds. No adjustment made.

Calibration Performed By: Jan Castro

NMHC Calibration Plot Date: January 25, 2024 Location: Conklin



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	January 19, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	9:41	End time (MST):	17:29
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	SA18828		Cal Gas Expiry Date:	November 3, 2031	
NOX Cal Gas Conc:	48.80	ppm	NO Cal Gas Conc:	48.80	ppm
Removed Cylinder #:	T2Y1P1H		Removed Gas Exp Date:	December 11, 2023	
Removed Gas NOX Conc:	51.09	ppm	Removed Gas NO Conc:	50.39	ppm
NOX gas Diff:	-0.1%		NO gas Diff:	0.0%	
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API T701H		Serial Number:	364	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.077	1.062	NO bkgnd or offset:	10.8	10.6
NOX coeff or slope:	0.999	0.983	NOX bkgnd or offset:	10.9	10.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	151.8	152.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.992390	0.997935
NO_X Cal Offset:	2.363089	2.088043
NO Cal Slope:	0.994482	0.999591
NO Cal Offset:	1.080383	1.508039
NO_2 Cal Slope:	0.991295	0.998906
NO_2 Cal Offset:	1.480919	0.745906

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.3	0.0	----	----
as found span	4921	79.4	811.2	800.1	11.1	833.1	816.8	16.4	0.9738	0.9796
as found 2nd										
as found 3rd										
new cyl resp	4918	82.0	800.3	800.3	0.0	821.0	817.0	4.3	0.9748	0.9796
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	800.0	801.0	-1.0	1.0004	0.9992
second point	4959	41.0	400.2	400.2	0.0	401.5	401.5	0.0	0.9967	0.9967
third point	4980	20.5	200.1	200.1	0.0	204.6	203.5	1.1	0.9778	0.9831
as left zero										
as left span										
								Average Correction Factor	0.9916	0.9930

Corrected As found NO_X = 833.3 ppb NO = 817.1 ppb

Previous Response NO_X = 807.4 ppb NO = 796.8 ppb

Baseline Corr 2nd pt NO_X = NA ppb NO = NA ppb

Baseline Corr 3rd pt NO_X = NA ppb NO = NA ppb

* = > +/-5% change initiates investigation

*Percent Change NO_X = 3.1%

*Percent Change NO = 2.5%

As found NO_X r^2: Nx Sl: Nx Int:

As found NO r^2: NO Sl: NO Int:

As found NO_2 r^2: NO2 Sl: ; NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.5	386.7	412.8	413.0	0.9995	100.0%
2nd GPT point (200 ppb O3)	799.5	595.7	203.8	203.8	1.0000	100.0%
3rd GPT point (100 ppb O3)	799.5	700.1	99.4	101.5	0.9793	102.1%
				Average Correction Factor	0.9929	100.7%

Notes: Changed the inlet filter and NOx cylinder after as founds. Adjusted Span only. Used the 2nd reference point because of drift. Did not do as left because it will be late to finish.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

NO_X Calibration Summary

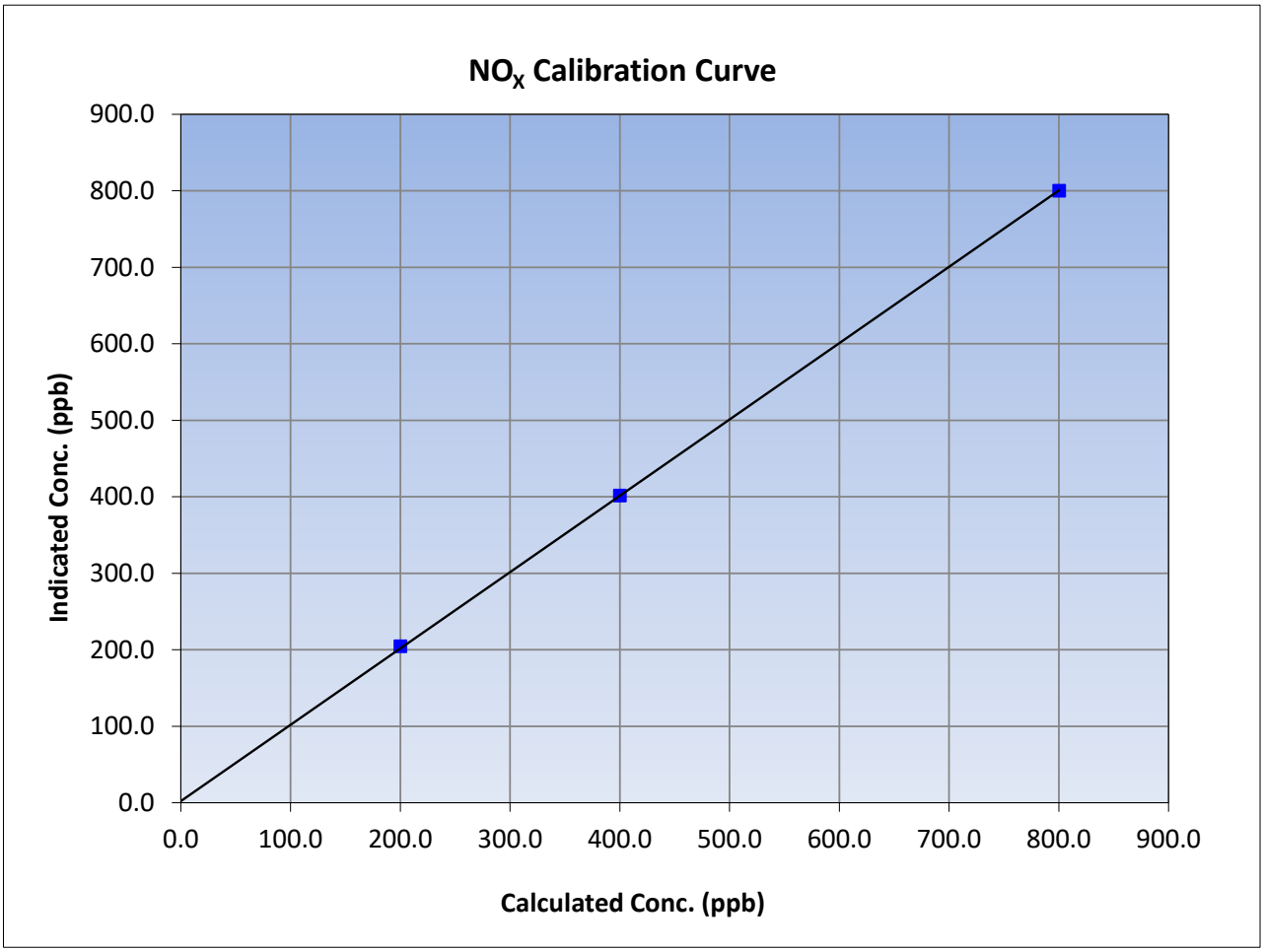
Version-04-2020

Station Information

Calibration Date:	January 19, 2024	Previous Calibration:	December 6, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	17:29
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	0.999961	*≥0.995*
800.3	800.0	1.0004			
400.2	401.5	0.9967	Slope	0.997935	*0.90 - 1.10*
200.1	204.6	0.9778			
			Intercept	2.088043	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

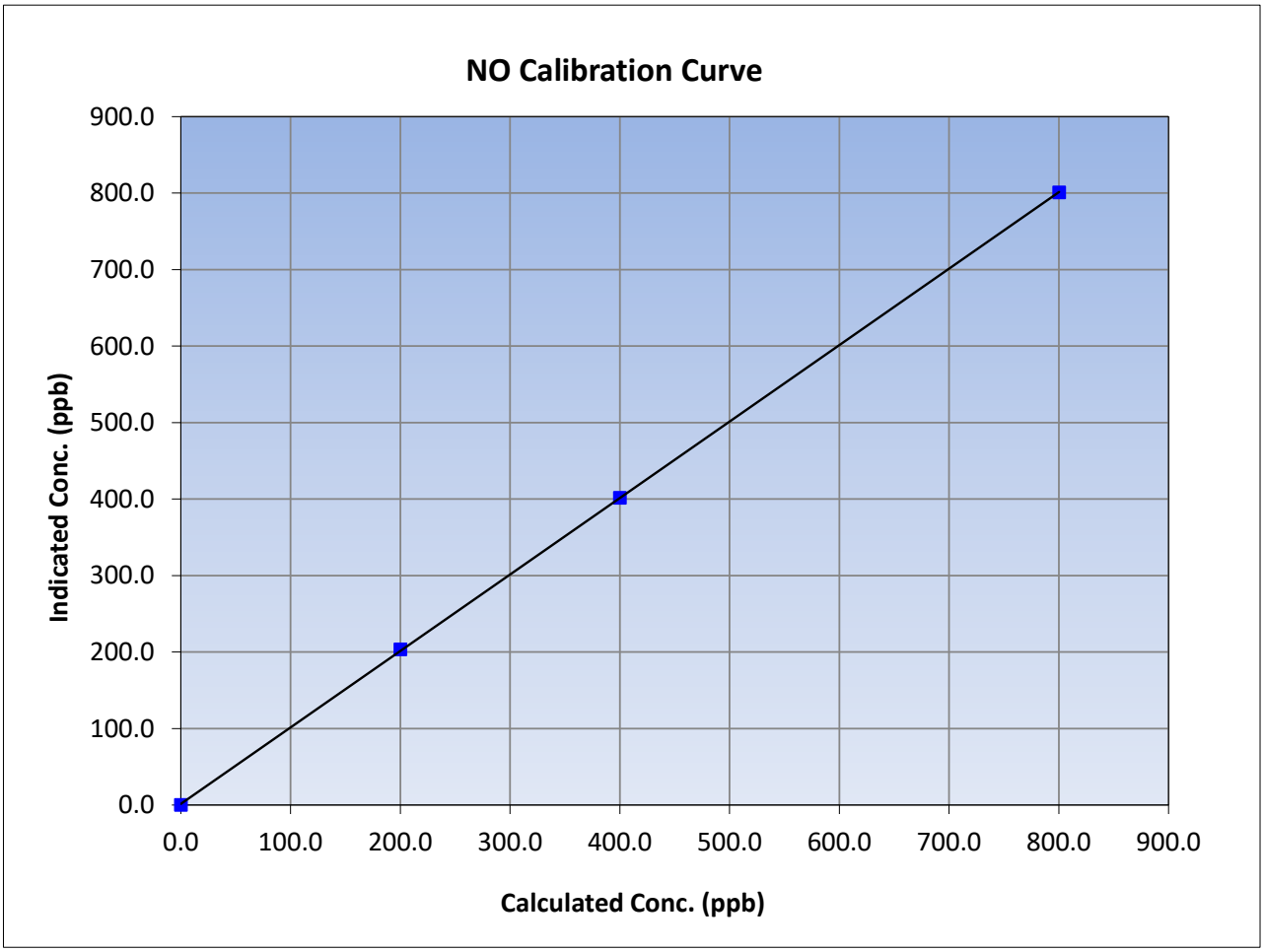
Version-04-2020

Station Information

Calibration Date:	January 19, 2024	Previous Calibration:	December 6, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	17:29
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999981	≥0.995
800.3	801.0	0.9992			
400.2	401.5	0.9967	Slope	0.999591	0.90 - 1.10
200.1	203.5	0.9831			
			Intercept	1.508039	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

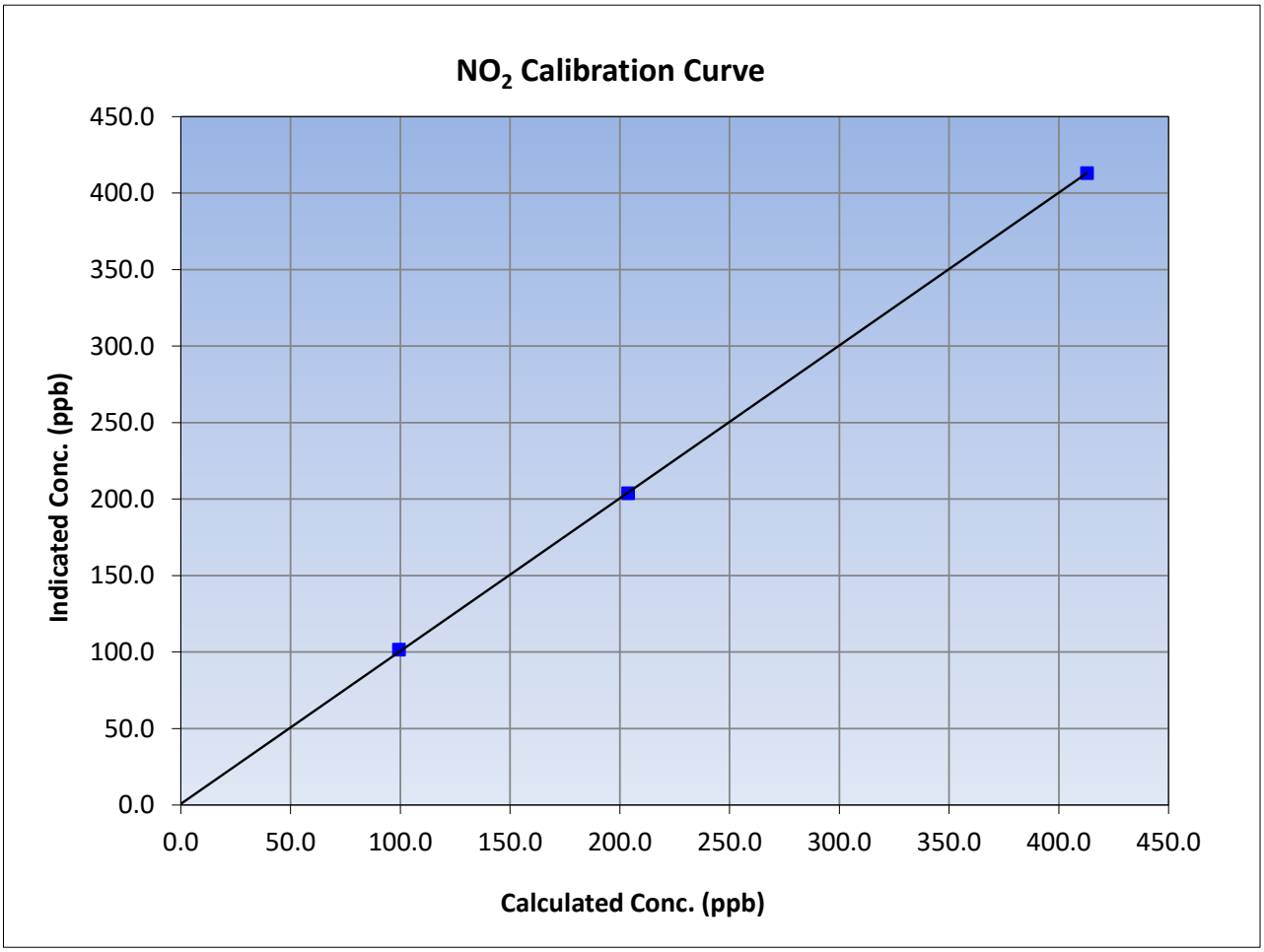
Version-04-2020

Station Information

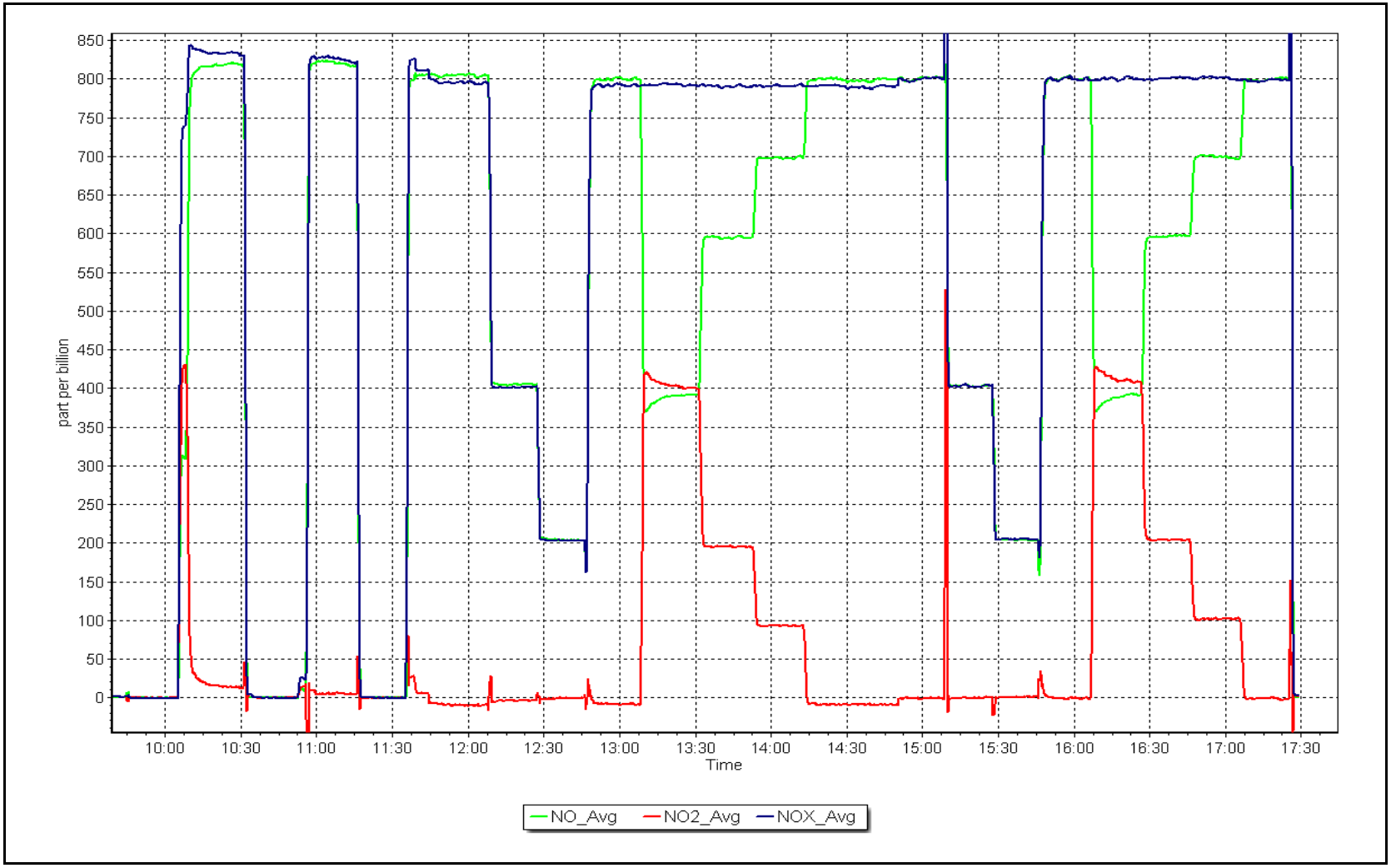
Calibration Date:	January 19, 2024	Previous Calibration:	December 6, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	17:29
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999966	≥0.995
412.8	413.0	0.9995			
203.8	203.8	1.0000	Slope	0.998906	0.90 - 1.10
99.4	101.5	0.9793			
			Intercept	0.745906	+/-20



NO_X Calibration Plot Date: January 19, 2024 Location: Conklin



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	January 12, 2024	Last Cal Date:	December 5, 2023
Start time (MST):	11:25	End time (MST):	14:35
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3810
ZAG Make/Model:	Teledyne API 701H	Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001229	1.000771	Backgd or Offset:	-1.2	-1.1
Calibration intercept:	0.260000	0.740000	Coeff or Slope:	0.999	1.005

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	950.9	400.0	400.8	0.998
second point	5000	804.0	200.0	201.1	0.995
third point	5000	703.6	100.0	101.4	0.986
as left zero	5000	0.0	0.0	0.8	----
as left span	5000	936.0	400.0	402.7	0.993
				Average Correction Factor	0.993

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: Pump DOA, replaced. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

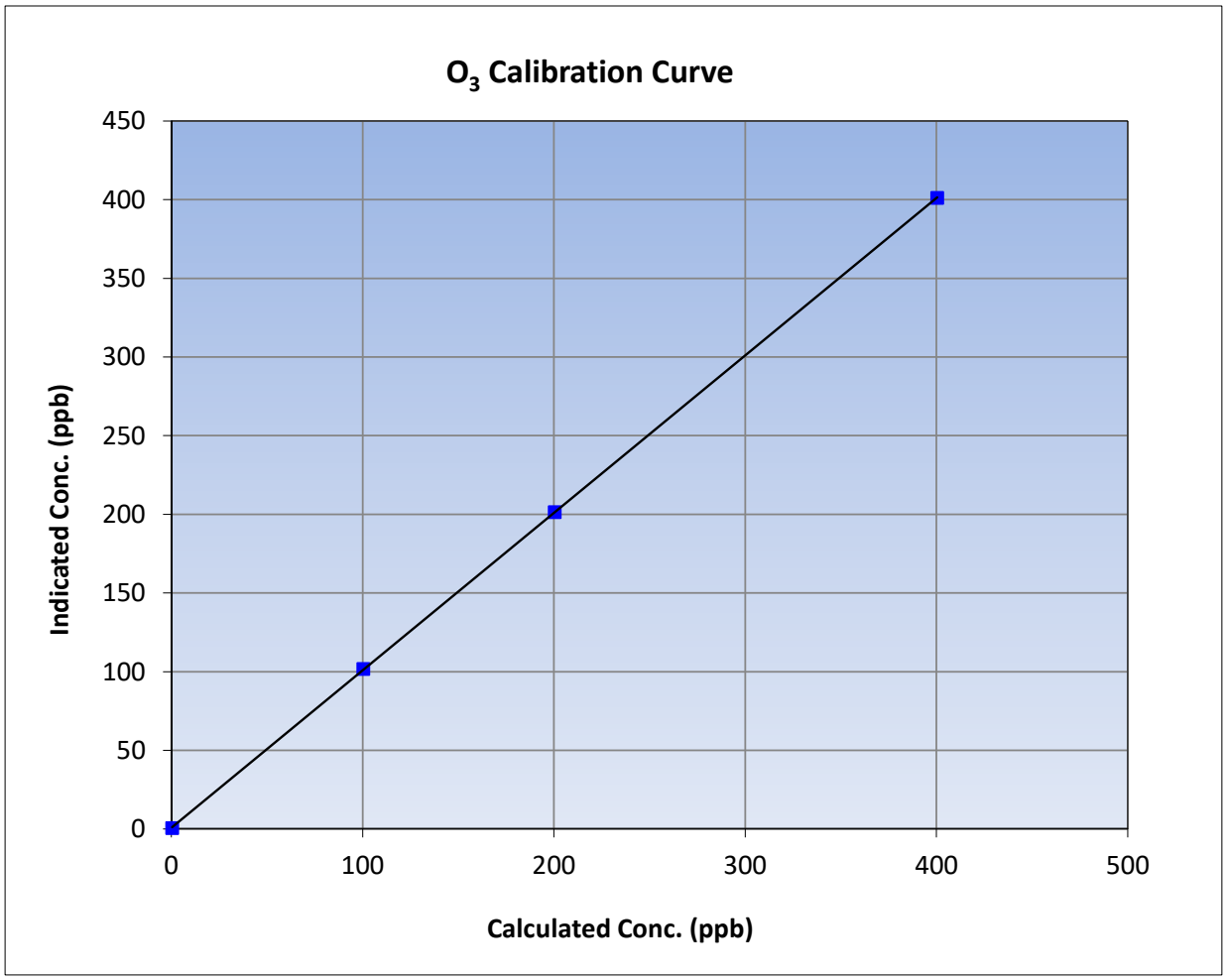
Station Information

Calibration Date:	January 12, 2024	Previous Calibration:	December 5, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:25	End Time (MST):	14:35
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

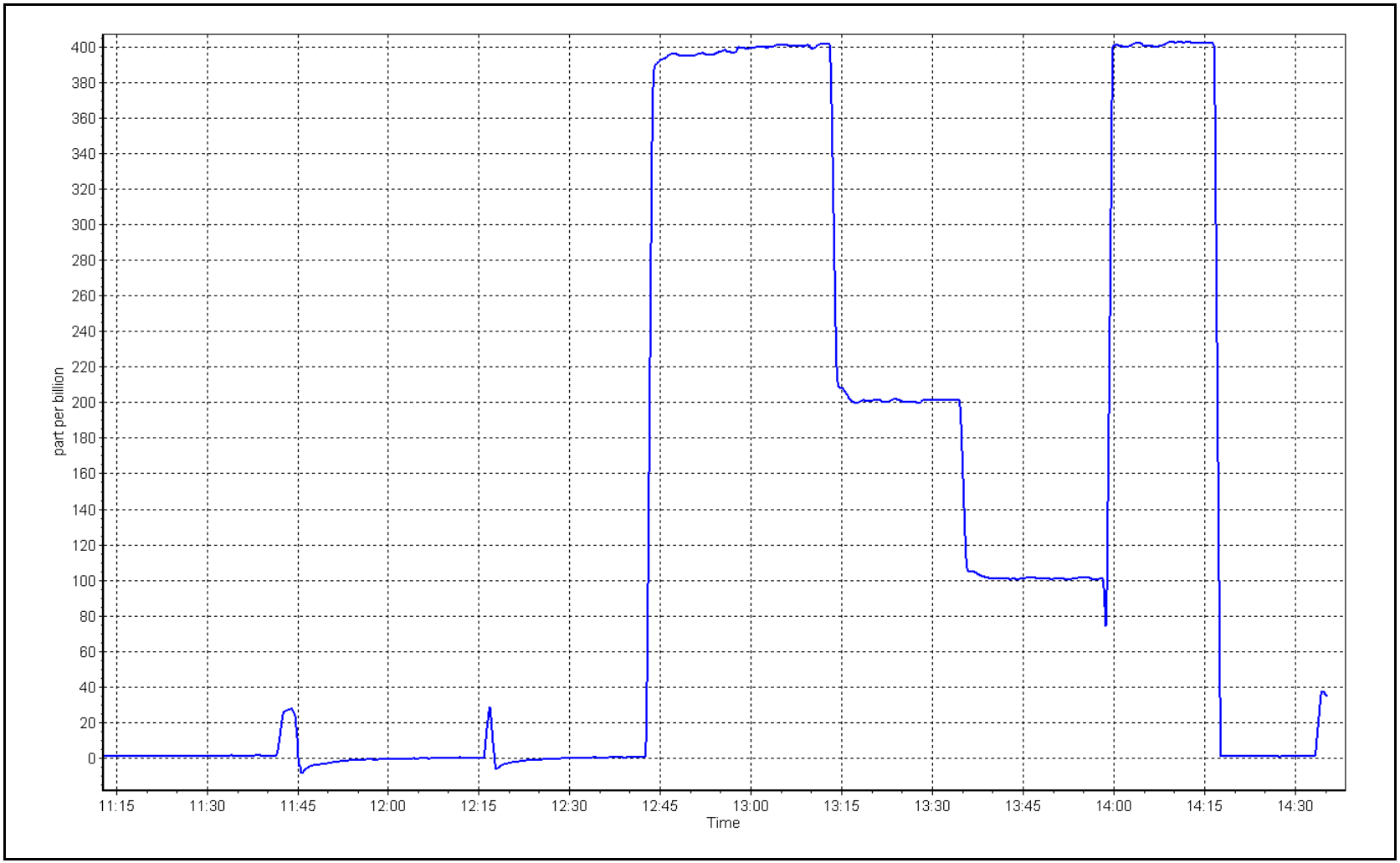
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	400.8	0.9980
200.0	201.1	0.9945
100.0	101.4	0.9862

Statistical Evaluation		Limits
Correlation Coefficient	0.999992	≥0.995
Slope	1.000771	0.90 - 1.10
Intercept	0.740000	+/- 5



O_3 Calibration Plot Date: January 12, 2024 Location: Conklin



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	January 25, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	11:36	End time (MST):	11:54
Analyzer Make:	API T640	S/N:	326
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	ALICAT	S/N:	388754
Temp/RH standard:	ALICAT	S/N:	388754

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	-8.20	-8.23	-8.20	☐	+/- 2 ^{o}C
P (mmHg)	705.00	706.53	705.00	☐	+/- 10 mmHg
flow (LPM)	5.02	5.08	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: January 25, 2024 Last Cal Date: December 7, 2023

PM w/o HEPA: 37.30 PM w/ HEPA: 0.00 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: December 7, 2023 <0.2 ug/m3

Disposable Filter Changed: December 7, 2023

Annual Maintenance

Date Sample Tube Cleaned: December 7, 2023

Date RH/T Sensor Cleaned: December 7, 2023

Notes: Verfied flow, temperature, and pressure. Leak check passed. No adjustment required.

Calibration by: Jan Castro

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	January 10, 2024	Last Cal Date:	December 5, 2023
Start time (MST):	9:50	End time (MST):	13:14
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.11	ppm	Cal Gas Exp Date:	January 18, 2029
Cal Gas Cylinder #:	CC281519			
Removed Cal Gas Conc:	50.11	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1152430006

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998449	1.002679	Backgd or Offset:	23.5	23.7
Calibration intercept:	0.164515	0.383769	Coeff or Slope:	1.015	1.035

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	79.8	799.8	788.4	1.014
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	802.1	0.997
second point	4960	39.9	399.9	401.7	0.995
third point	4980	20.0	200.4	201.5	0.995
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	79.8	799.8	804.0	0.995
				Average Correction Factor	0.996

Baseline Corr As found:	788.30	Previous response	798.71	*% 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: Changed the inlet filter after as founds. Adjusted span only.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

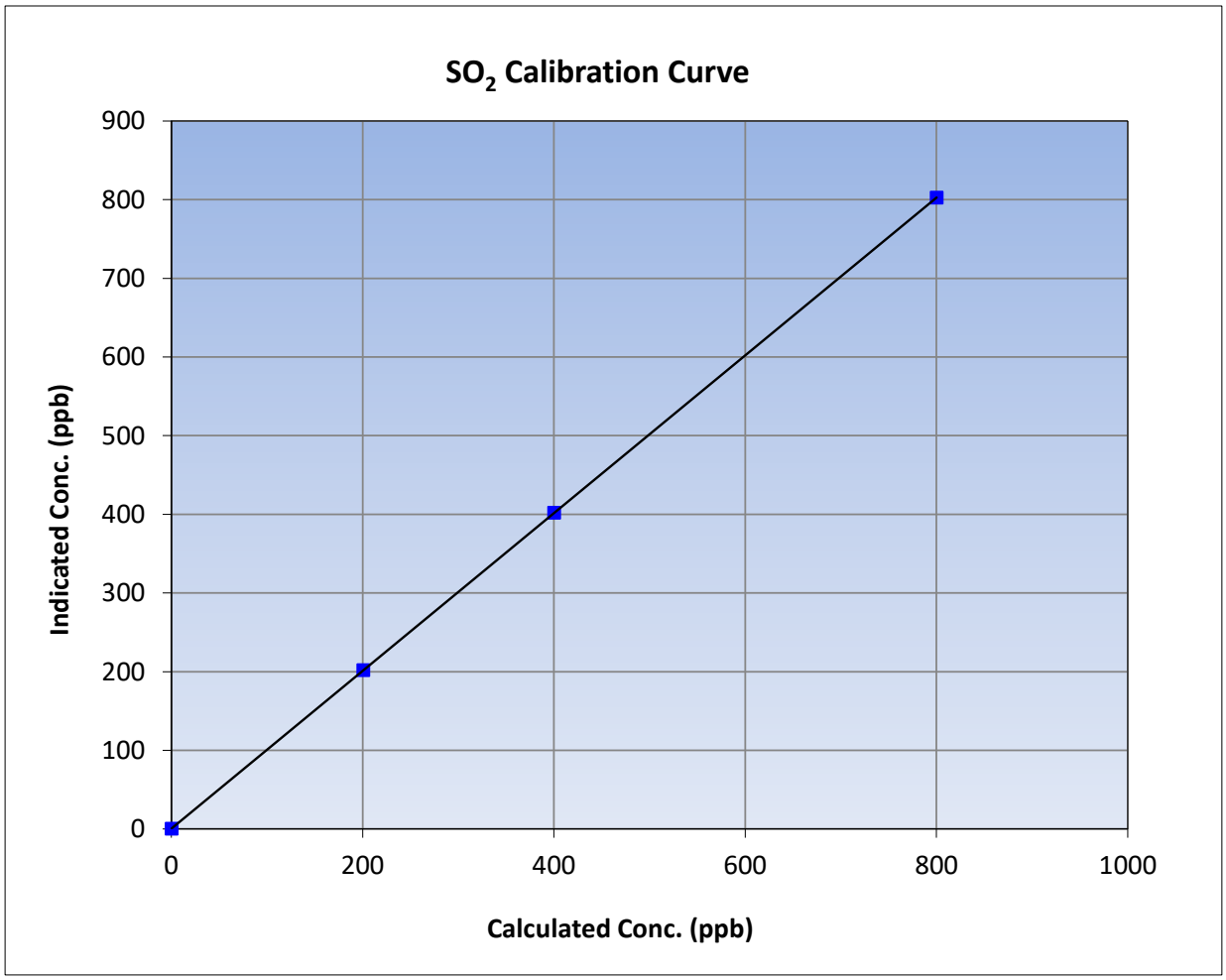
Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 5, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:50	End Time (MST):	13:14
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

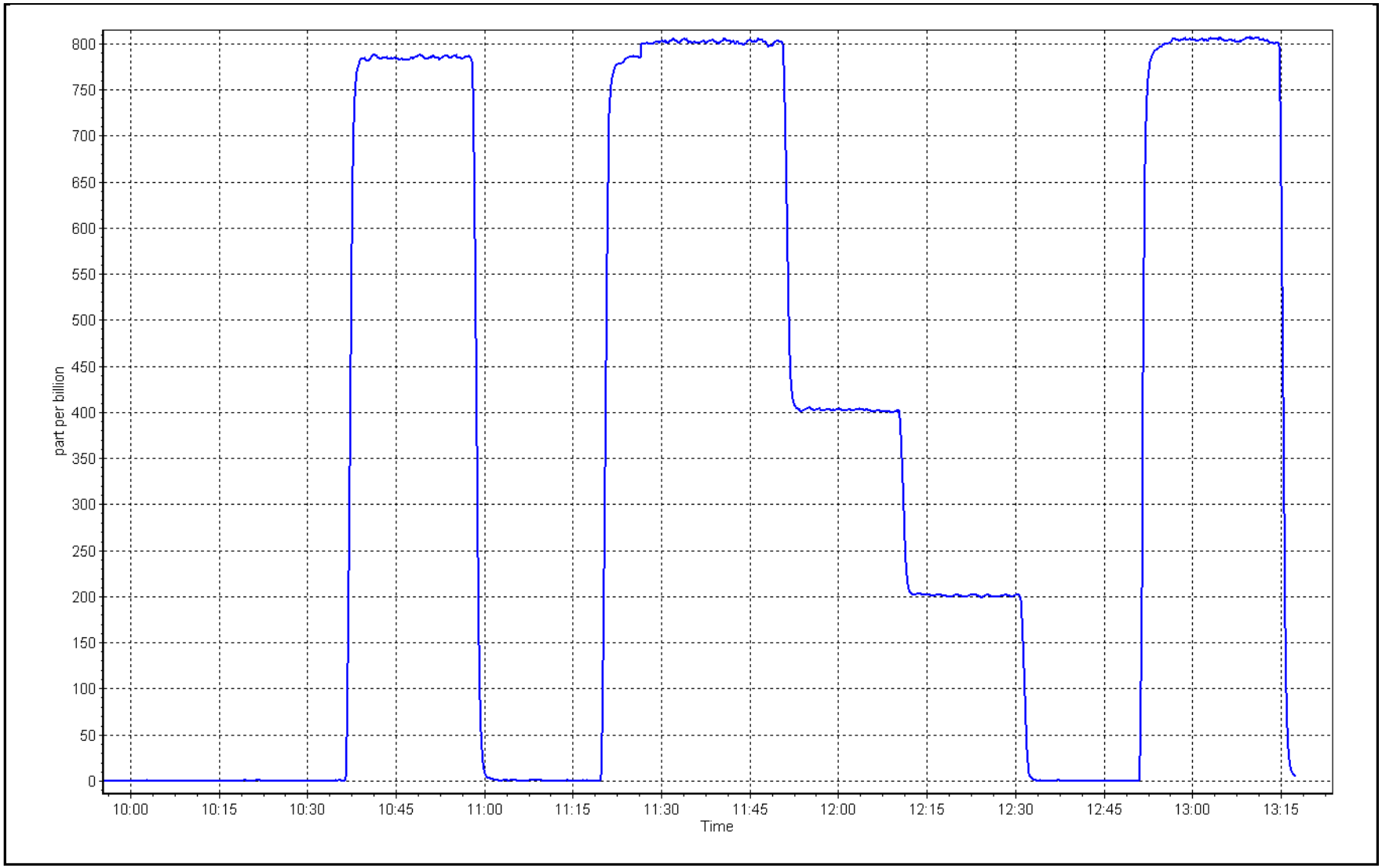
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.8	802.1	0.9971
399.9	401.7	0.9955
200.4	201.5	0.9947

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.002679	*0.90 - 1.10*
Intercept	0.383769	*+/-30*



SO2 Calibration Plot Date: January 10, 2024 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	January 24, 2024	Last Cal Date:	December 19, 2023
Start time (MST):	11:05	End time (MST):	15:22
Reason:	Cylinder Change		

Calibration Standards

Cal Gas Concentration:	5.02	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	CC424047			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	April 16, 2022
Removed Gas Cyl #:	DT0018680		Diff between cyl:	-1.3%
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				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997936	0.999522	Backgd or Offset:	3.59	3.71
Calibration intercept:	0.260962	0.500639	Coeff or Slope:	1.179	1.205

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4920	79.5	80.0	79.3	1.012
as found 2nd point					
as found 3rd point					
new cylinder response	4920	79.7	80.0	78.3	1.022

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	79.7	80.0	80.4	0.995
second point	4960	39.8	40.0	40.6	0.984
third point	4980	19.9	20.0	20.5	0.975
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	79.7	80.0	79.6	1.005
SO2 Scrubber Check	4920	79.8	798.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.985
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.0	Prev response:	80.08	*% change:	-1.4%
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: Swapped out the calibration gas after as founds. Changed the inlet filter after cylinder change. Ran a SO2 scrubber check after calibrator zero. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

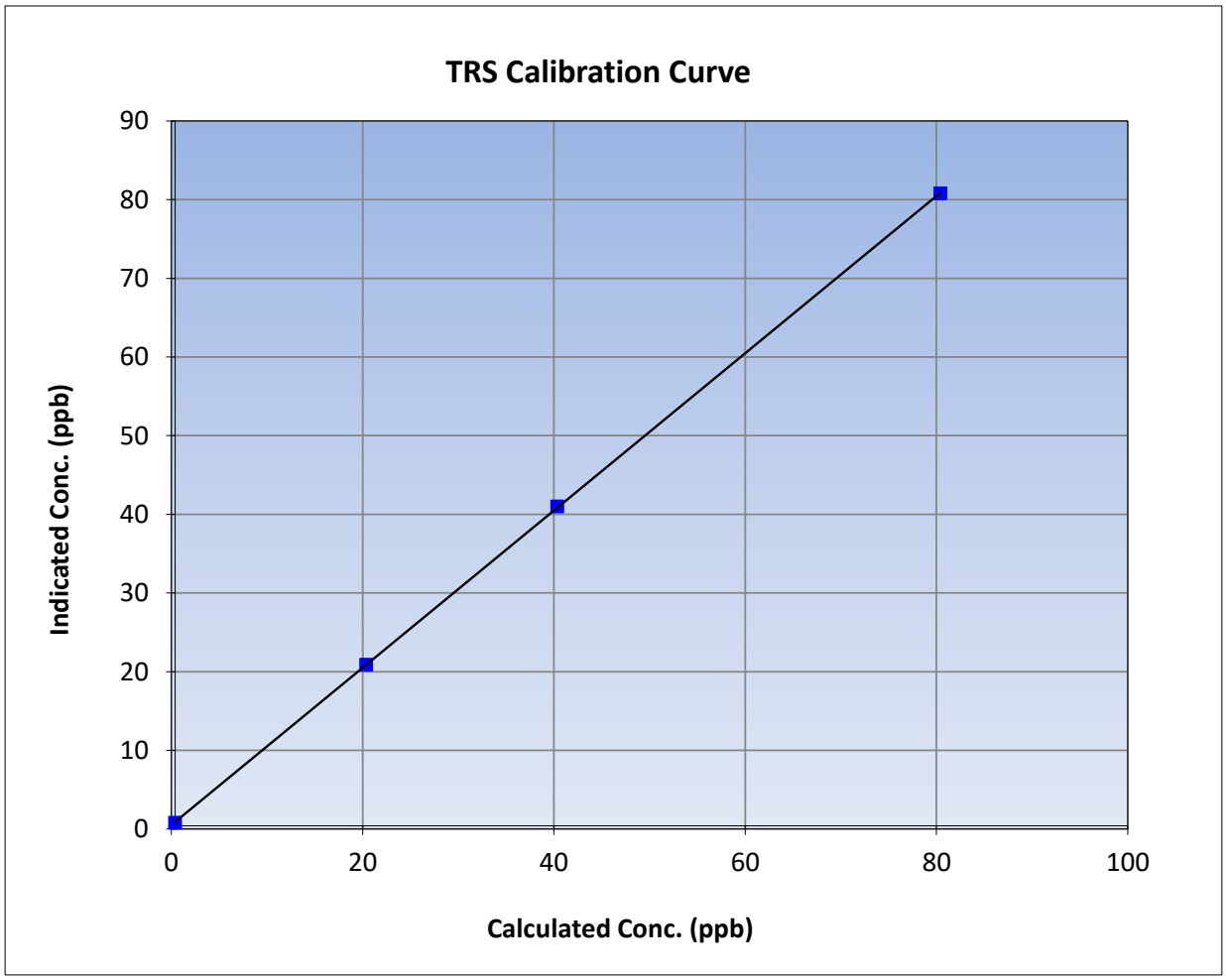
Station Information

Calibration Date:	January 24, 2024	Previous Calibration:	December 19, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	11:05	End Time (MST):	15:22
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

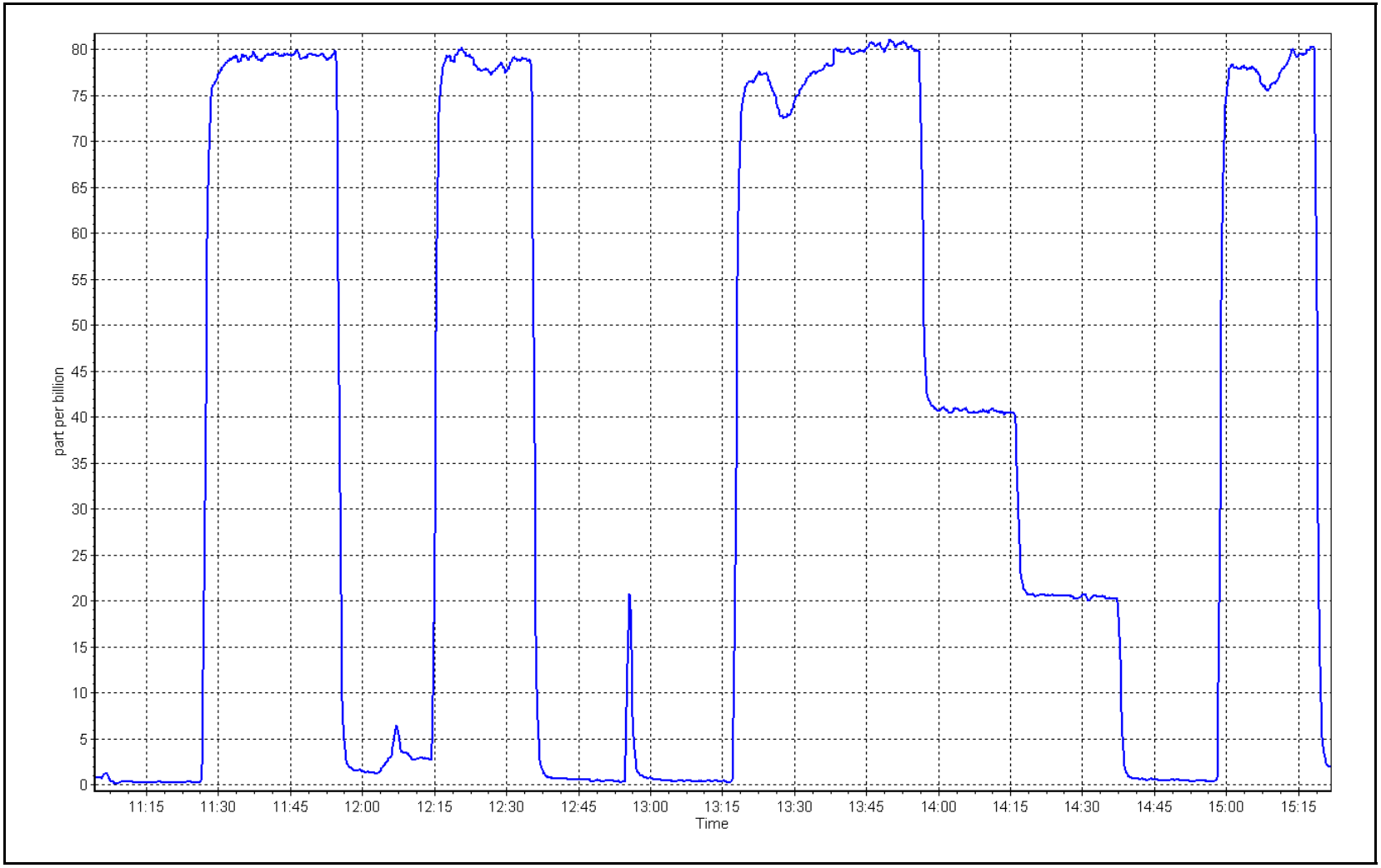
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	80.4	0.9953
40.0	40.6	0.9843
20.0	20.5	0.9746

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.999522	*0.90 - 1.10*
Intercept	0.500639	*+/-3*



TRS Calibration Plot Date: January 24, 2024 Location: Janvier



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	January 10, 2024	Last Cal Date:	December 5, 2023
Start time (MST):	9:50	End time (MST):	13:14
Reason:	Routine	Here to address dipping baseline	

Calibration Standards

Gas Cert Reference:	CC281519		Cal Gas Expiry Date:	January 18, 2029	
CH4 Cal Gas Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
C3H8 Cal Gas Conc.	208.4	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
Removed C3H8 Conc.	208.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API 700		Serial Number:	3806	
ZAG make/model:	Teledyne API 701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1331259520	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.560E-04	3.030E-04	NMHC SP Ratio:	5.17E-05	5.65E-05
CH4 Retention time:	15.2	15.6	NMHC Peak Area:	176965	164596
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.01	----
as found span	4920	79.8	17.17	15.32	1.121
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	17.16	1.000
second point	4960	39.9	8.59	8.62	0.996
third point	4980	20.0	4.30	4.36	0.988
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.11	1.004
				Average Correction Factor	0.995
Baseline Corr AF:	15.31	Prev response	17.17	*% change	-12.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	9.15	8.54	1.071
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	9.15	9.15	1.000
second point	4960	39.9	4.57	4.60	0.995
third point	4980	20.0	2.29	2.32	0.987
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	9.15	9.08	1.007
				Average Correction Factor	0.994
Baseline Corr AF:	8.54	Prev response	9.15	*% change	-7.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.01	----
as found span	4920	79.8	8.03	6.78	1.184
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	8.03	8.01	1.002
second point	4960	39.9	4.01	4.02	0.997
third point	4980	20.0	2.01	2.04	0.988
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.03	0.999
				Average Correction Factor	0.996
Baseline Corr AF:	6.77	Prev response	8.02	*% change	-18.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998979	0.998667
THC Cal Offset:	0.014795	0.030390
CH4 Cal Slope:	0.998920	0.997468
CH4 Cal Offset:	0.005636	0.014235
NMHC Cal Slope:	0.999269	0.999032
NMHC Cal Offset:	0.008959	0.017157

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

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

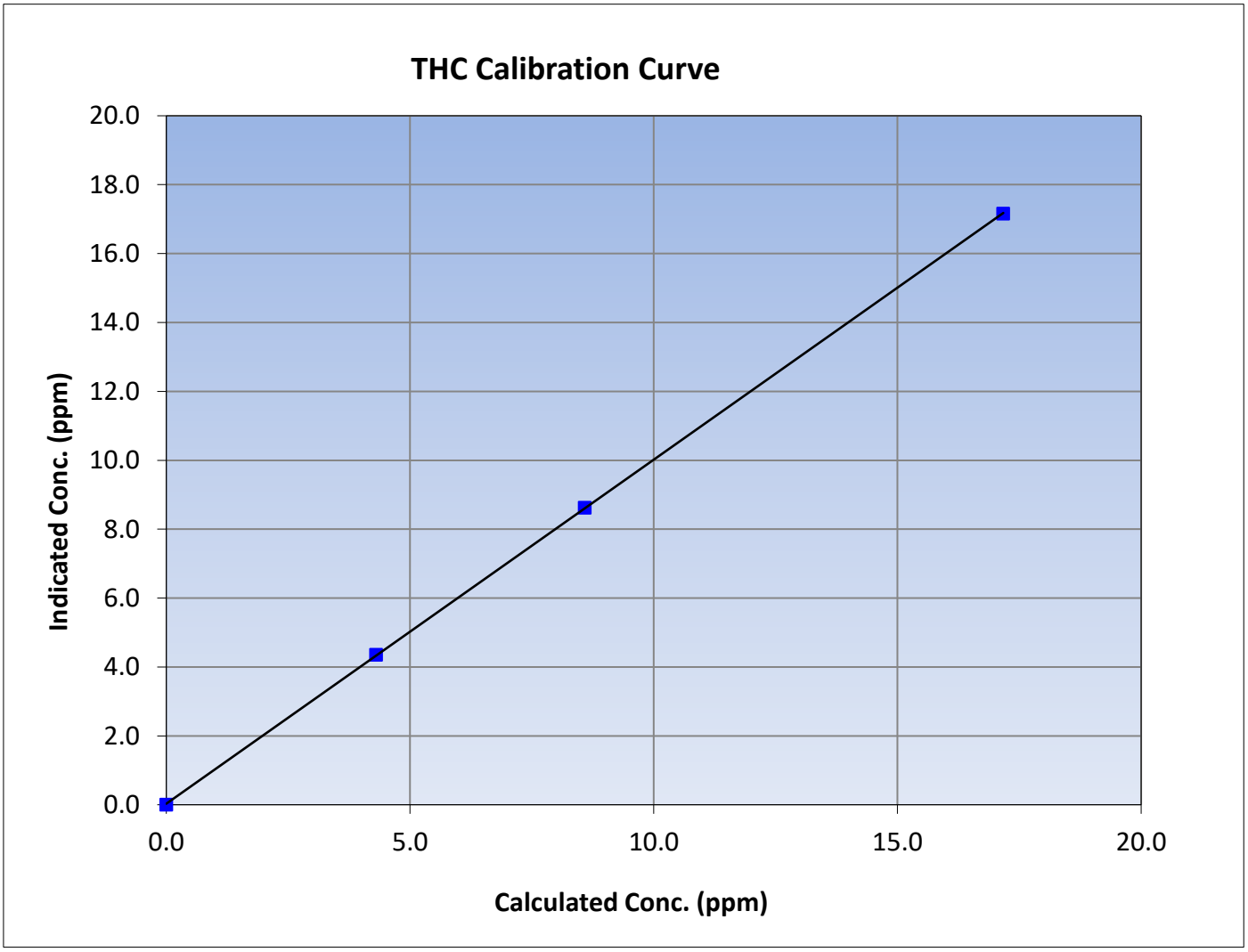
Version-06-2022

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 5, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:50	End Time (MST):	13:14
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999986	≥0.995
17.17	17.16	1.0005			
8.59	8.62	0.9959	Slope	0.998667	0.90 - 1.10
4.30	4.36	0.9875			
			Intercept	0.030390	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

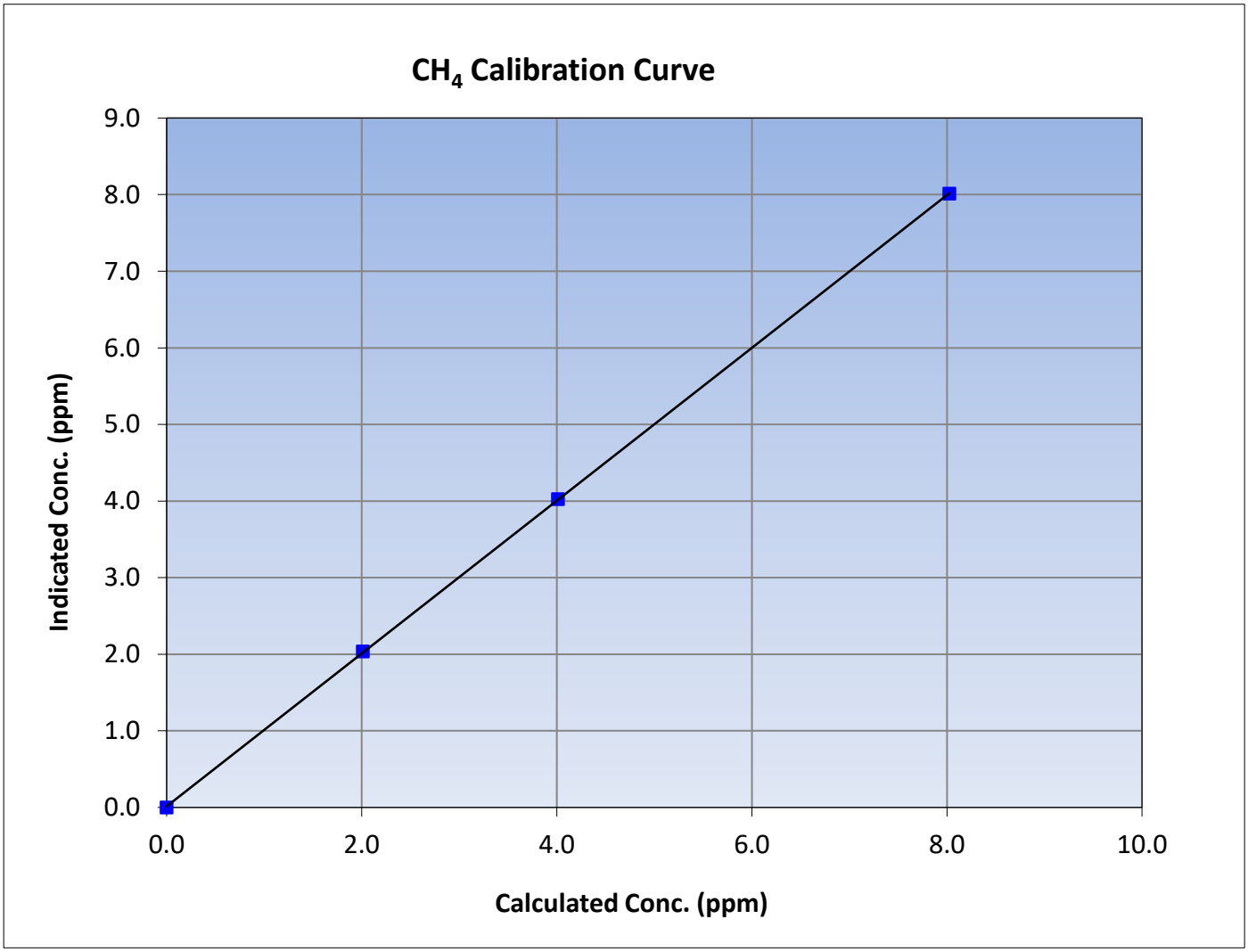
Version-06-2022

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 5, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:50	End Time (MST):	13:14
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999986	*≥0.995*
8.03	8.01	1.0016			
4.01	4.02	0.9974	Slope	0.997468	*0.90 - 1.10*
2.01	2.04	0.9883			
			Intercept	0.014235	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

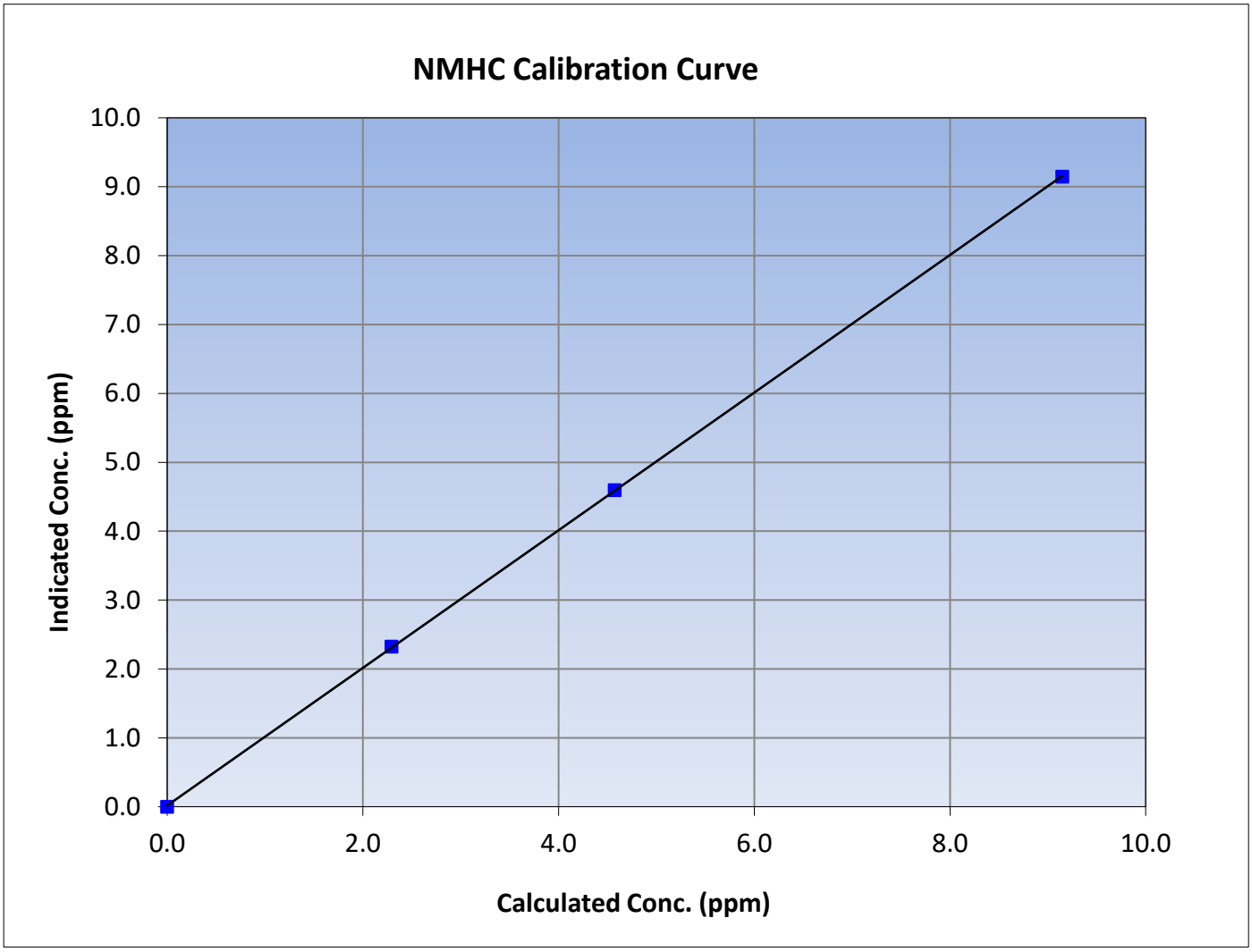
Version-06-2022

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 5, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:50	End Time (MST):	13:14
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999984	≥0.995
9.15	9.15	1.0001			
4.57	4.60	0.9949	Slope	0.999032	0.90 - 1.10
2.29	2.32	0.9868			
			Intercept	0.017157	+/-0.5



NMHC Calibration Plot Date: January 10, 2024 Location: Janvier

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	January 17, 2024	Last Cal Date:	January 10, 2024
Start time (MST):	10:52	End time (MST):	12:11
Reason:	Removal		

Calibration Standards

Gas Cert Reference:	CC281519		Cal Gas Expiry Date:	January 18, 2029	
CH4 Cal Gas Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
C3H8 Cal Gas Conc.	208.4	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
Removed C3H8 Conc.	208.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API 700		Serial Number:	3806	
ZAG make/model:	Teledyne API 701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1331259520	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.030E-04	3.030E-04	NMHC SP Ratio:	5.65E-05	5.65E-05
CH4 Retention time:	15.6	15.6	NMHC Peak Area:	164596	164596
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	17.17	18.45	0.931
as found 2nd point	4960	39.9	8.59	9.25	0.928
as found 3rd point	4980	20.0	4.30	4.67	0.922
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	18.45	Prev response	17.18	*% change	6.9%
Baseline Corr 2nd AF:	9.3	AF Slope:	1.073669	AF Intercept:	0.023477
Baseline Corr 3rd AF:	4.7	AF Correlation:	0.999992	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	9.15	9.55	0.958
as found 2nd point	4960	39.9	4.57	4.79	0.954
as found 3rd point	4980	20.0	2.29	2.42	0.949
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	9.55	Prev response	9.16	*% change	4.1%
Baseline Corr 2nd AF:	4.8	AF Slope:	1.043421	AF Intercept:	0.012460
Baseline Corr 3rd AF:	2.4	AF Correlation:	0.999992	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	8.89	0.903
as found 2nd point	4960	39.9	4.01	4.46	0.900
as found 3rd point	4980	20.0	2.01	2.25	0.892
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	8.89	Prev response	8.02	*% change	9.8%
Baseline Corr 2nd AF:	4.46	AF Slope:	1.106864	AF Intercept:	0.013020
Baseline Corr 3rd AF:	2.25	AF Correlation:	0.999990	* = > +/-5% change initiates investigation	

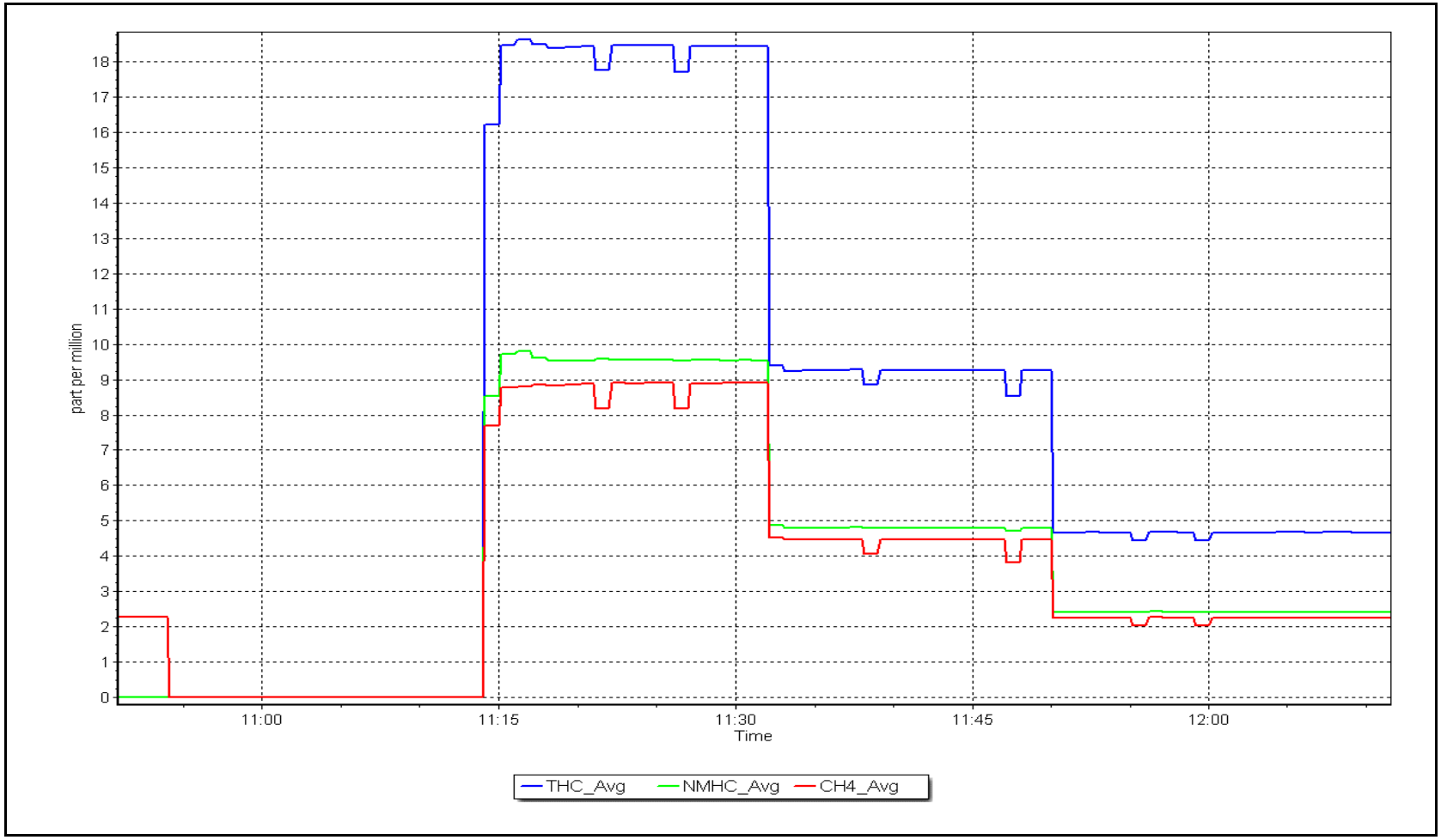
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998667	
THC Cal Offset:	0.030390	
CH4 Cal Slope:	0.997468	
CH4 Cal Offset:	0.014235	
NMHC Cal Slope:	0.999032	
NMHC Cal Offset:	0.017157	

Notes: Swapping out the instrument due to dips.

Calibration Performed By: Max Farrell

NMHC Calibration Plot Date: January 17, 2024 Location: Janvier



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	January 17, 2024	Last Cal Date:	
Start time (MST):	12:28	End time (MST):	14:41
Reason:	Install		

Calibration Standards

Gas Cert Reference:	CC281519		Cal Gas Expiry Date:	January 18, 2029	
CH4 Cal Gas Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
C3H8 Cal Gas Conc.	208.4	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
Removed C3H8 Conc.	208.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API 700		Serial Number:	3806	
ZAG make/model:	Teledyne API 701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:		2.940E-04	NMHC SP Ratio:		6.33E-05
CH4 Retention time:		13.2	NMHC Peak Area:		144559
Zero Chromatogram:		OFF	Flat Baseline:		OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
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	79.8	17.17	17.11	1.004
second point	4960	39.9	8.59	8.55	1.004
third point	4980	20.0	4.30	4.29	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.11	1.004
				Average Correction Factor	1.003

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
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	79.8	9.15	9.09	1.006
second point	4960	39.9	4.57	4.55	1.005
third point	4980	20.0	2.29	2.30	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	9.15	9.10	1.005
				Average Correction Factor	1.003
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
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	79.8	8.03	8.02	1.001
second point	4960	39.9	4.01	4.00	1.003
third point	4980	20.0	2.01	2.00	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.01	1.002
				Average Correction Factor	1.003
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:		0.996236
THC Cal Offset:		0.001413
CH4 Cal Slope:		0.999459
CH4 Cal Offset:		-0.005759
NMHC Cal Slope:		0.993433
NMHC Cal Offset:		0.007572

Notes: Swapped out the instrument due to dips and the H2 cylinder as it was getting low. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

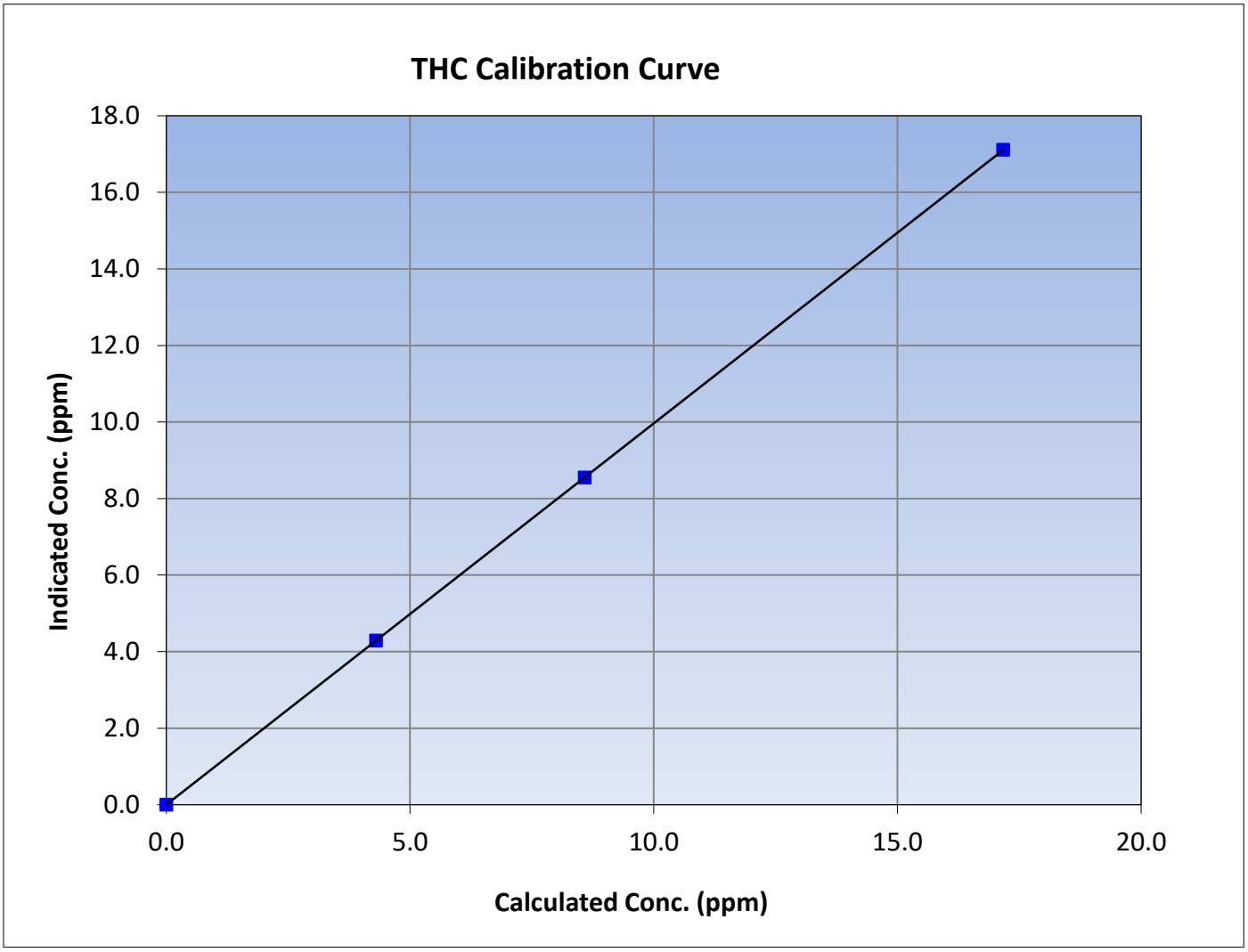
Version-06-2022

Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:28	End Time (MST):	14:41
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	1.000000	*≥0.995*
17.17	17.11	1.0036			
8.59	8.55	1.0042	Slope	0.996236	*0.90 - 1.10*
4.30	4.29	1.0022			
			Intercept	0.001413	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

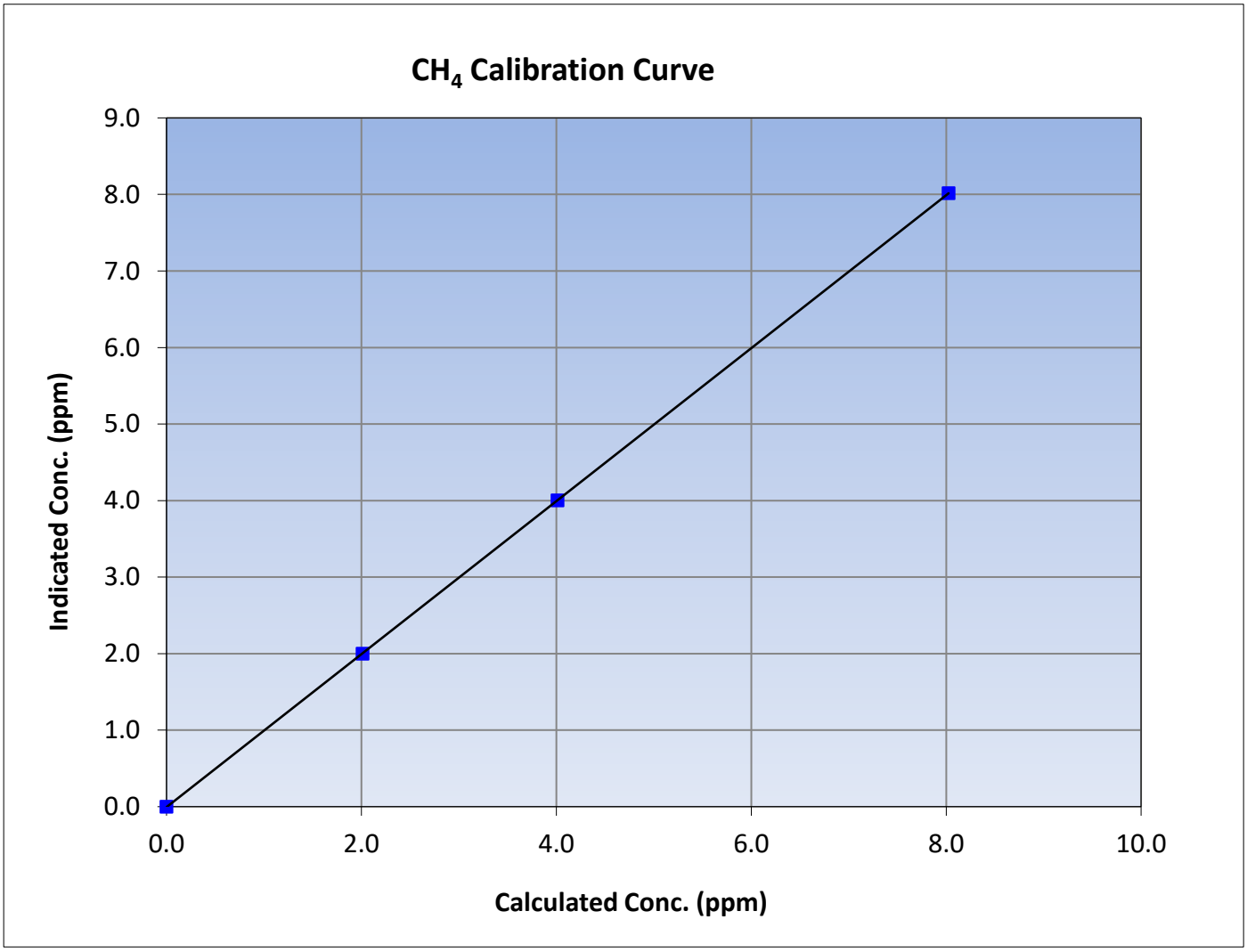
Version-06-2022

Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:28	End Time (MST):	14:41
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
8.03	8.02	1.0009			
4.01	4.00	1.0029	Slope	0.999459	*0.90 - 1.10*
2.01	2.00	1.0061			
			Intercept	-0.005759	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

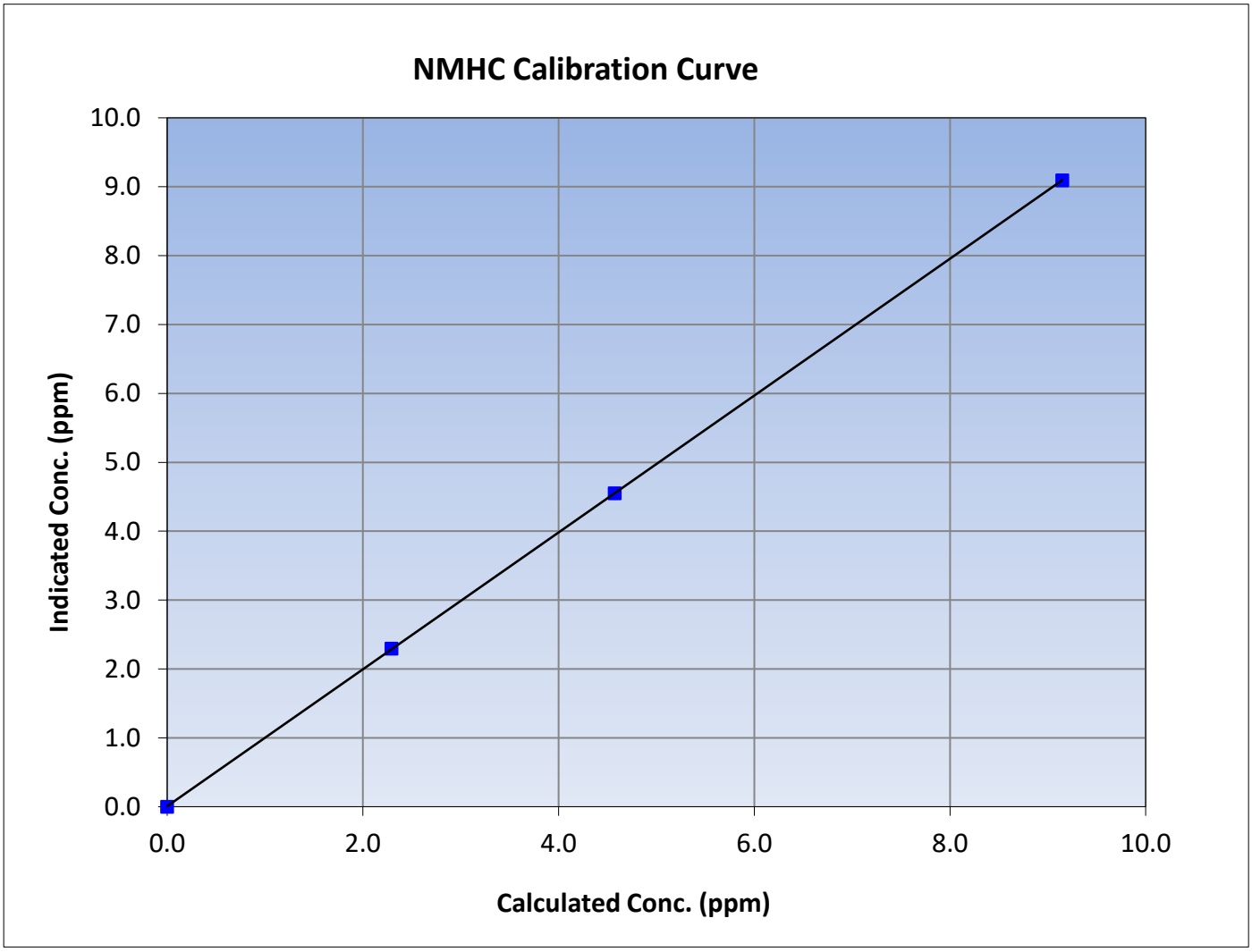
Version-06-2022

Station Information

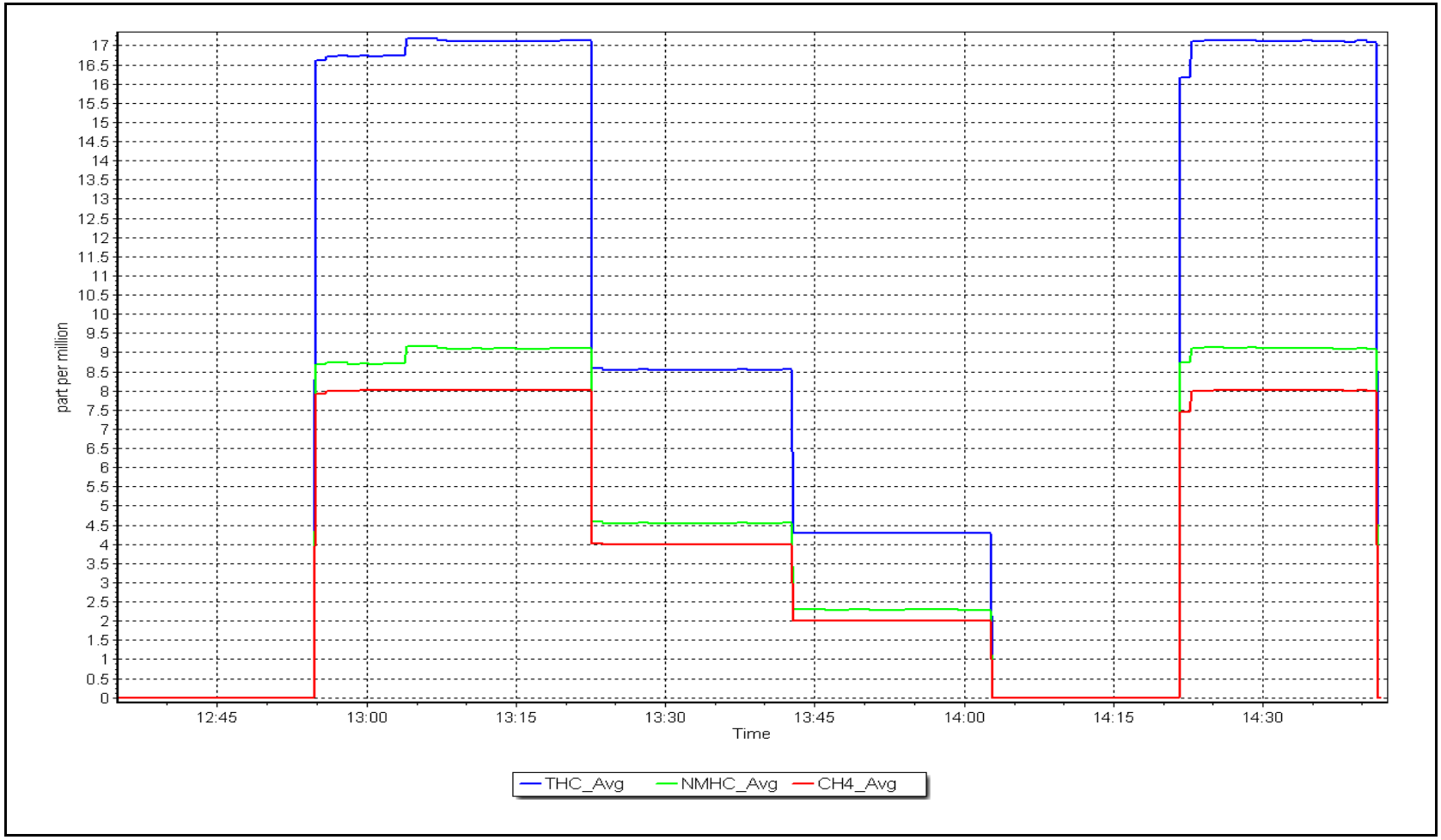
Calibration Date:	January 17, 2024	Previous Calibration:	
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:28	End Time (MST):	14:41
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999996	*≥0.995*
9.15	9.09	1.0061			
4.57	4.55	1.0049	Slope	0.993433	*0.90 - 1.10*
2.29	2.30	0.9989			
			Intercept	0.007572	*+/-0.5*



NMHC Calibration Plot Date: January 17, 2024 Location: Janvier



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	January 15, 2024	Last Cal Date:	December 15, 2023
Start time (MST):	11:16	End time (MST):	16:10
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	DT0047765		Cal Gas Expiry Date:	March 11, 2031	
NOX Cal Gas Conc:	48.90	ppm	NO Cal Gas Conc:	48.80	ppm
Removed Cylinder #:			Removed Gas Exp Date:		
Removed Gas NOX Conc:	48.90	ppm	Removed Gas NO Conc:	48.80	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3806	
ZAG make/model:	Teledyne API T701		Serial Number:	201	

Analyzer Information

Analyzer make: Analyzer serial #:

NOX Range (ppb): 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.834	0.854	NO bkgnd or offset:	-5.6	0.0
NOX coeff or slope:	0.827	0.849	NOX bkgnd or offset:	-3.9	-0.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.7	5.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.994409	1.000095
NO_X Cal Offset:	2.604040	1.384206
NO Cal Slope:	0.998646	1.000674
NO Cal Offset:	1.684010	0.024014
NO_2 Cal Slope:	0.995534	1.008342
NO_2 Cal Offset:	-1.435399	1.498437

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	1.6	2.2	-0.5	----	----
as found span	4918	82.0	802.0	800.3	1.6	773.7	767.4	6.3	1.0365	1.0429
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	4918	82.0	802.0	800.3	1.6	802.4	800.9	1.5	0.9995	0.9993
second point	4960	41.0	400.9	400.1	0.8	404.0	400.2	3.8	0.9923	0.9997
third point	4980	20.5	200.5	200.1	0.4	202.6	200.5	2.1	0.9895	0.9978
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.0	0.3	----	----
as left span	4918	82.0	802.0	424.6	377.3	797.1	406.4	390.7	1.0061	1.0448
								Average Correction Factor	0.9938	0.9989

Corrected As found	NO_X = 772.1 ppb	NO = 765.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-3.6%
Previous Response	NO_X = 800.1 ppb	NO = 800.9 ppb		*Percent Change	NO =	-4.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	802.4	426.7	377.3	381.0	0.9904	101.0%
2nd GPT point (200 ppb O3)	802.4	609.1	194.9	199.4	0.9776	102.3%
3rd GPT point (100 ppb O3)	802.4	706.7	97.3	100.8	0.9657	103.6%
				Average Correction Factor	0.9779	102.3%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

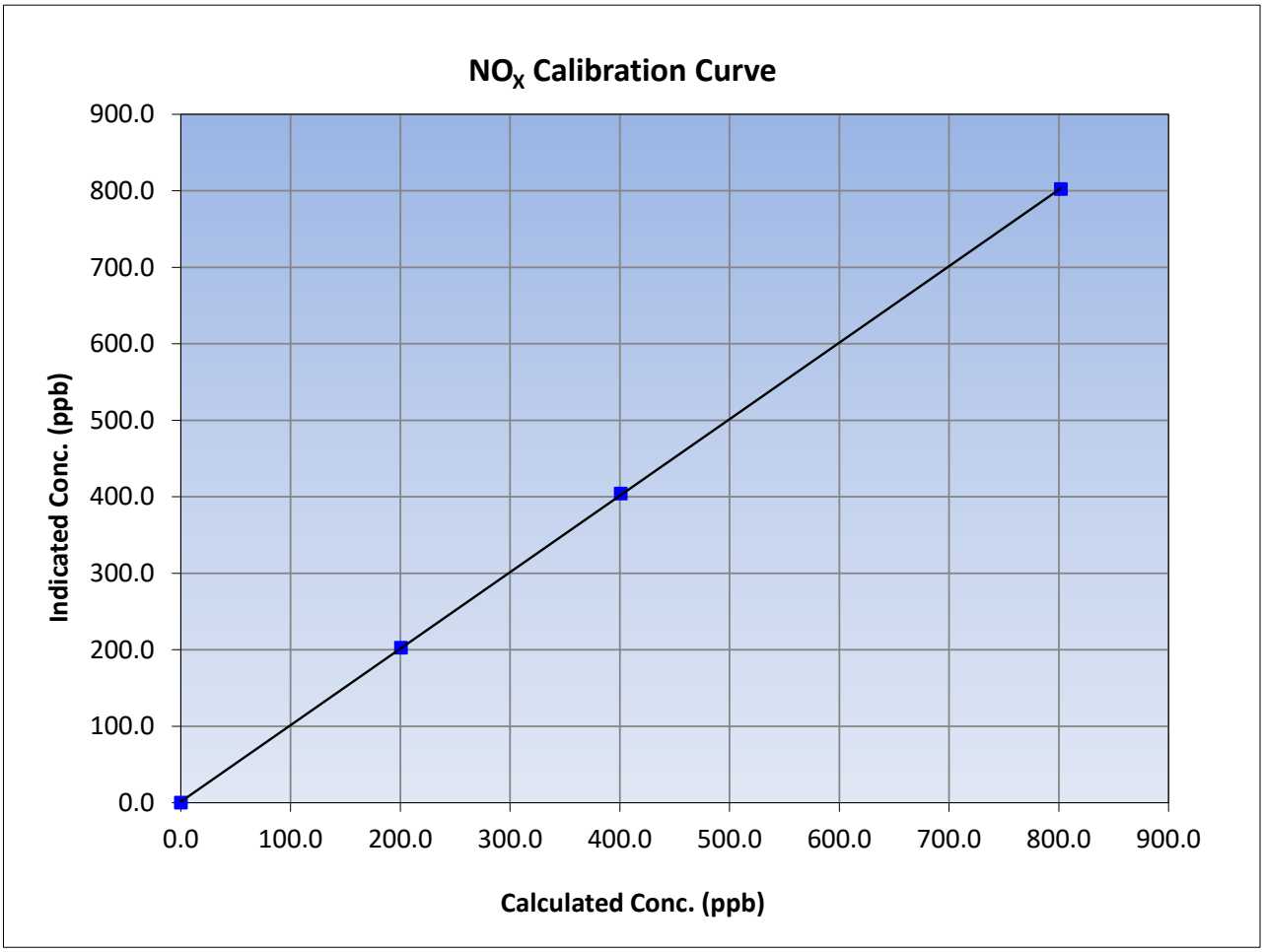
Version-04-2020

Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:16	End Time (MST):	16:10
Analyzer make:		Analyzer serial #:	

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999982	≥0.995
802.0	802.4	0.9995			
400.9	404.0	0.9923	Slope	1.000095	0.90 - 1.10
200.5	202.6	0.9895			
			Intercept	1.384206	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

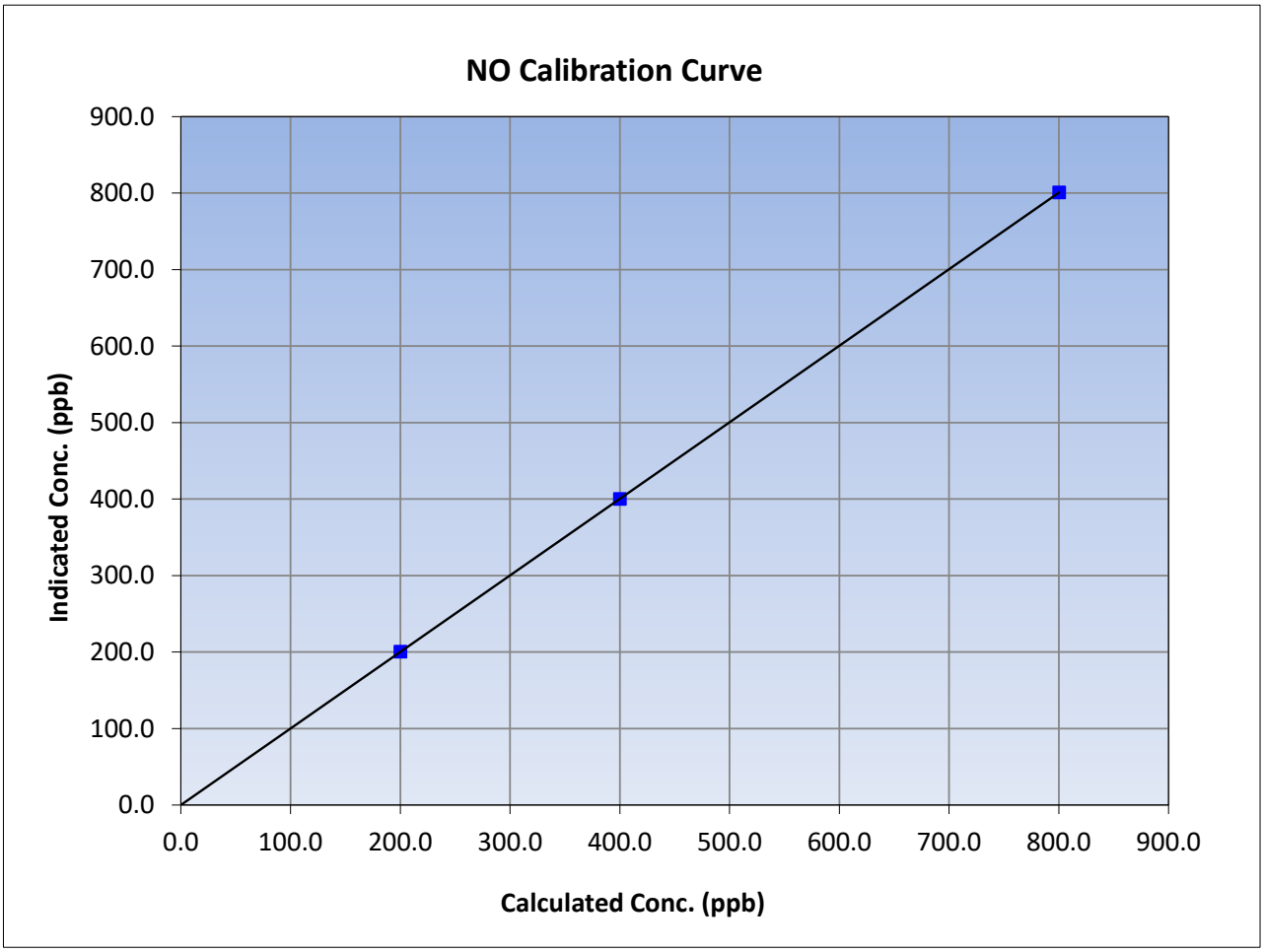
Version-04-2020

Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:16	End Time (MST):	16:10
Analyzer make:		Analyzer serial #:	

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	1.000000	≥0.995
800.3	800.9	0.9993			
400.1	400.2	0.9997	Slope	1.000674	0.90 - 1.10
200.1	200.5	0.9978			
			Intercept	0.024014	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

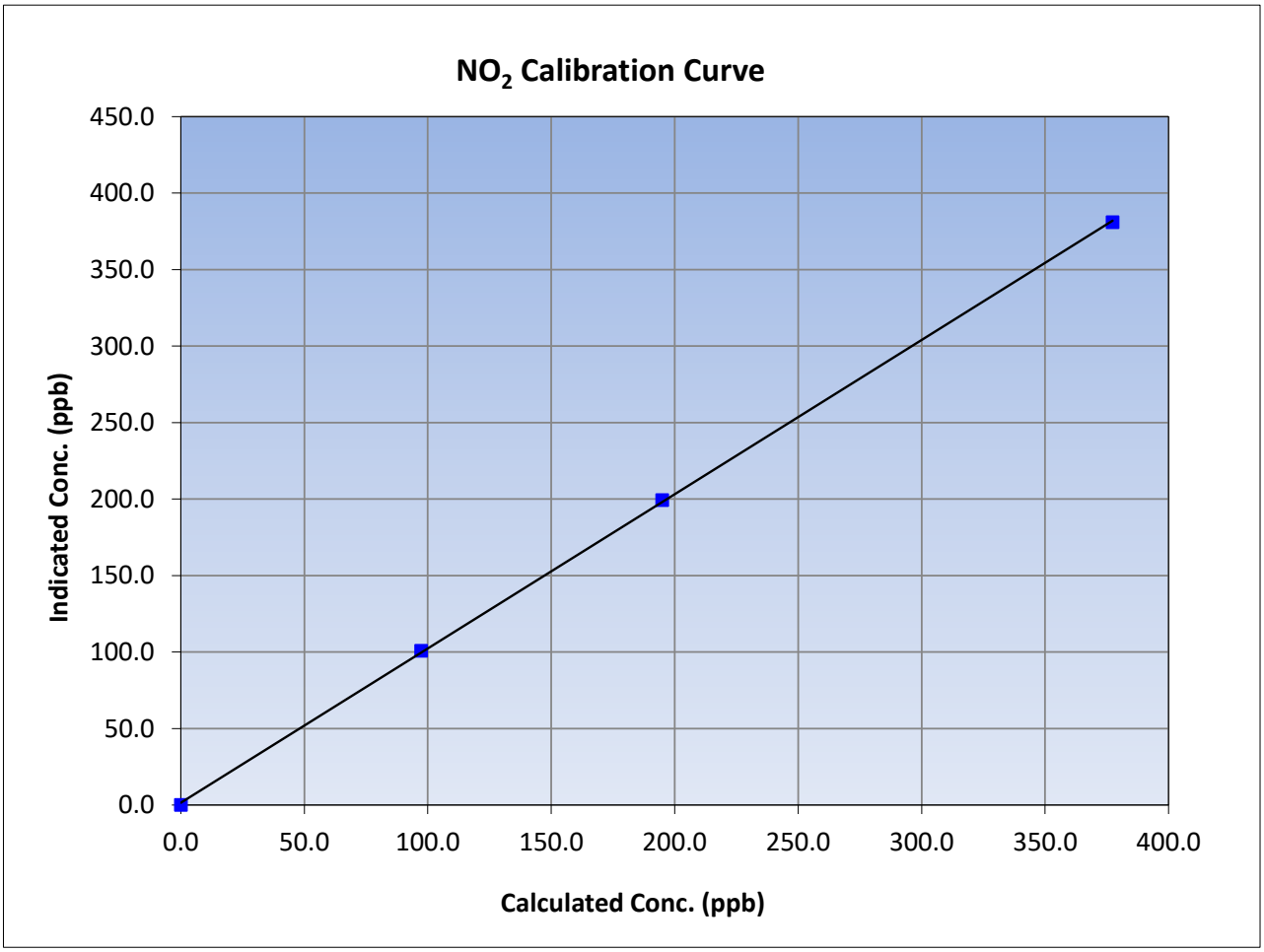
Version-04-2020

Station Information

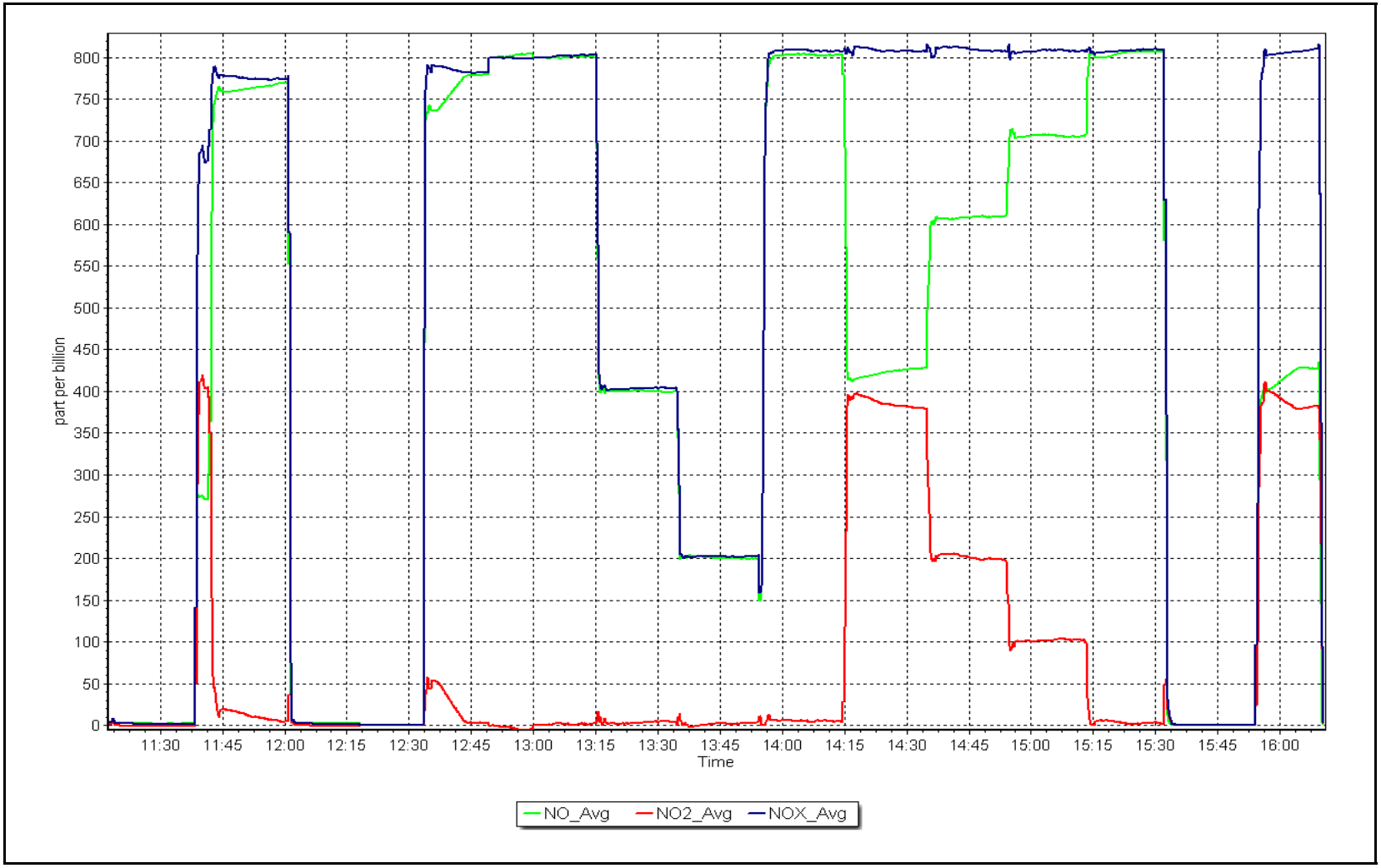
Calibration Date:	January 15, 2024	Previous Calibration:	December 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:16	End Time (MST):	16:10
Analyzer make:		Analyzer serial #:	

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999920	*≥0.995*
377.3	381.0	0.9904			
194.9	199.4	0.9776	Slope	1.008342	*0.90 - 1.10*
97.3	100.8	0.9657			
			Intercept	1.498437	*+/-20*



NO_X Calibration Plot Date: January 15, 2024 Location: Janvier



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	January 3, 2024	Last Cal Date:	December 11, 2023
Start time (MST):	11:32	End time (MST):	14:21
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3806
ZAG Make/Model:	Teledyne API T701H	Serial Number:	691

Analyzer Information

Analyzer make:	Teledyne API T400	Analyzer serial #:	7046
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003171	1.005200	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	0.820000	0.740000	Coeff or Slope:	1.021	1.021

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	0.1	----
as found span	4895	905.3	400.0	403.6	0.991
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.5	----
high point	4895	905.3	400.0	402.8	0.993
second point	4895	756.7	200.0	201.6	0.992
third point	4895	656.1	100.0	101.7	0.983
as left zero	5000	800.0	0.0	0.6	----
as left span	4895	904.3	400.0	403.0	0.993
				Average Correction Factor	0.989

Baseline Corr As found:	403.5	Previous response	402.1	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

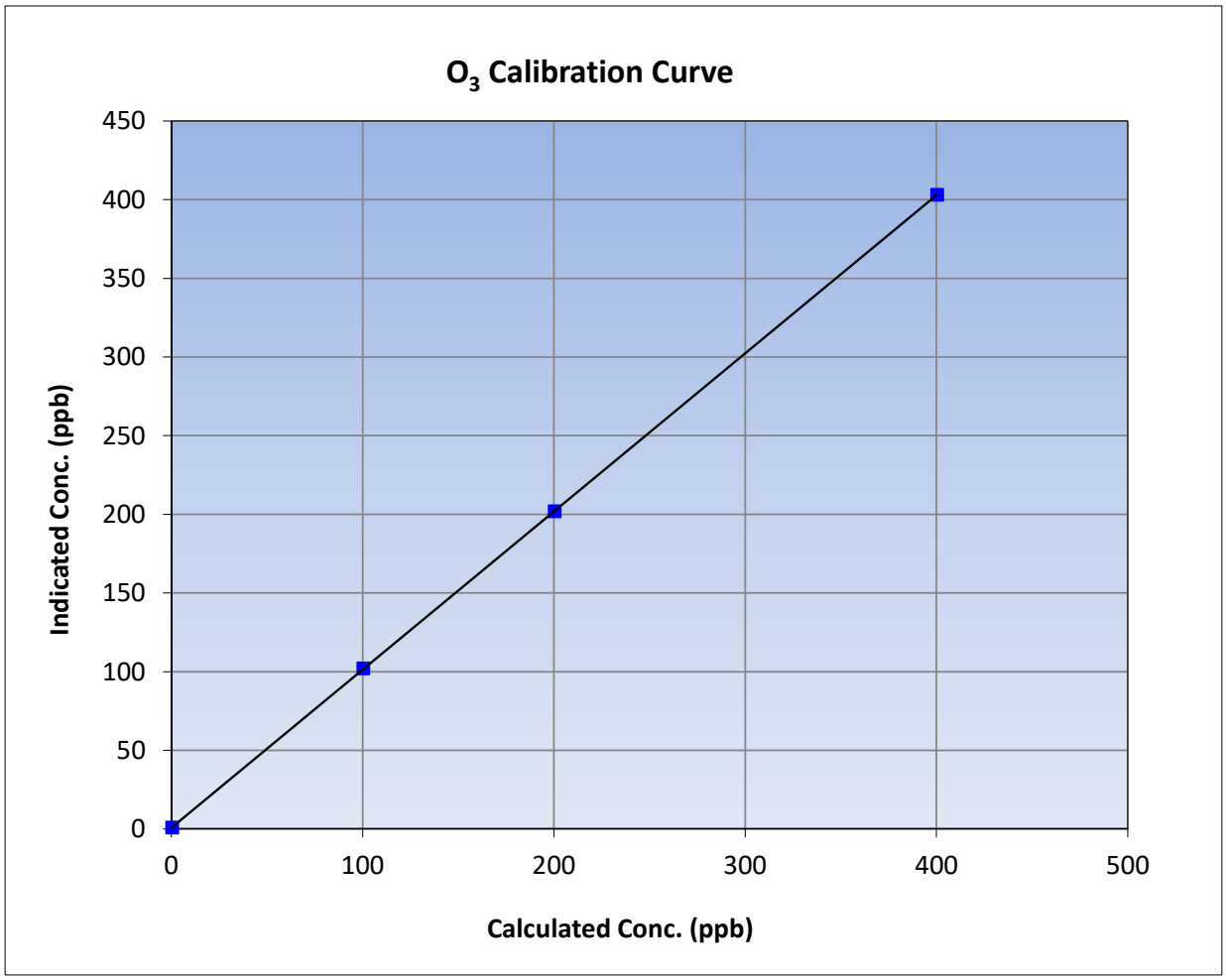
Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 11, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:32	End Time (MST):	14:21
Analyzer make:	Teledyne API T400	Analyzer serial #:	7046

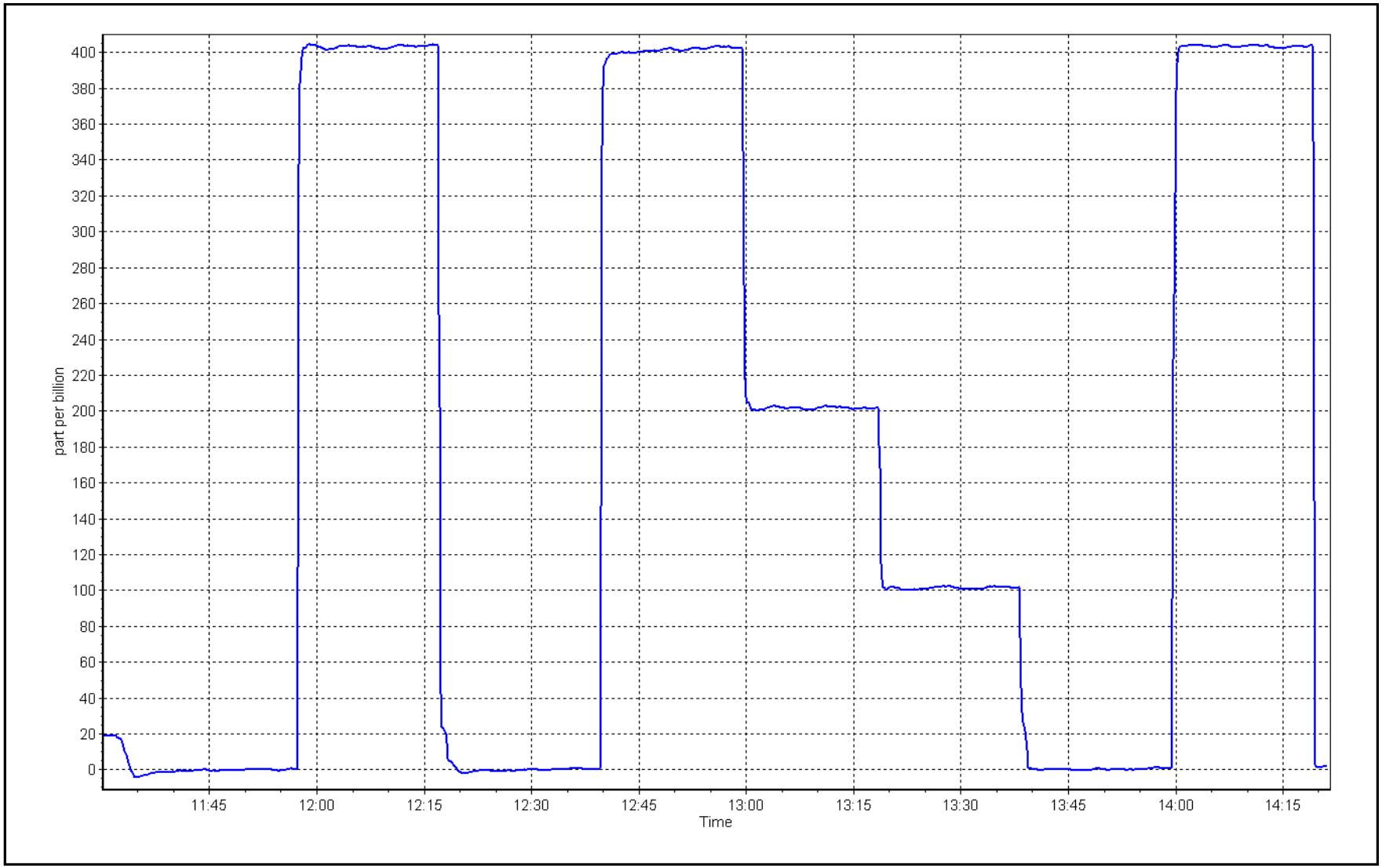
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
400.0	402.8	0.9930
200.0	201.6	0.9921
100.0	101.7	0.9833

Statistical Evaluation		Limits
Correlation Coefficient	0.999997	≥0.995
Slope	1.005200	0.90 - 1.10
Intercept	0.740000	+/- 5



O_3 Calibration Plot Date: January 3, 2024 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:	January 24, 2024	Last Cal Date:	December 15, 2023
Start time (MST):	13:00	End time (MST):	14:00
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)	-4.40	-4.70	-4.40	☐	+/- 2 °C
P (mmHg)	712.5	713.0	712.5	☐	+/- 10 mmHg
flow (LPM)	5.02	5.10	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: January 24, 2024 Last Cal Date: December 15, 2023

PM w/o HEPA: 3.9 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: January 24, 2024 <0.2 ug/m3

Disposable Filter Changed: January 24, 2024

Annual Maintenance

Date Sample Tube Cleaned: July 26, 2023

Date RH/T Sensor Cleaned: July 26, 2023

Notes: Monthly and quarterly calibration completed. After cleaning the optical chamber pump did not turn back on. Will be back tomorrow to complete maintenance.

Calibration by: Max Farrell

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	January 25, 2024	Last Cal Date:	January 24, 2024
Start time (MST):	9:15	End time (MST):	9:42
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)	-4.40	-4.70	-4.40	☐	+/- 2 °C
P (mmHg)	712.50	713.00	712.5	☐	+/- 10 mmHg
flow (LPM)	5.02	5.10	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: January 25, 2024 Last Cal Date: January 24, 2024

PM w/o HEPA: 3.90 PM w/ HEPA: 0.00 <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	10.10	10.10	10.90	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 38.90 w/ HEPA: 0.00

Date Optical Chamber Cleaned: January 24, 2024 <0.2 ug/m3

Disposable Filter Changed: January 24, 2024

Annual Maintenance

Date Sample Tube Cleaned: July 26, 2023

Date RH/T Sensor Cleaned: July 26, 2023

Notes: As found checks, optical chamber cleaning and filter change was completed on the 24th. Electrical connection was left disconnected by mistake which caused the pump to turn off, reconnected the line and the instrument is operating normal now. PMT adjustment completed and leak check passed.

Calibration by: Jan Castro

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	January 31, 2024	Last Cal Date:	January 25, 2024
Start time (MST):	11:35	End time (MST):	12:11
Analyzer Make:	Teledyne API T640	S/N:	325
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat	S/N:	388752
Temp/RH standard:	Alicat	S/N:	388752

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	6.50	5.96	6.50	☐	+/- 2 °C
P (mmHg)	713.4	714.5	713.4	☐	+/- 10 mmHg
flow (LPM)	5.04	5.09	5.04	☐	+/- 0.25 LPM

Leak Test: Date of check: January 31, 2024 Last Cal Date: January 25, 2024

PM w/o HEPA: 0.9 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: January 24, 2024 <0.2 ug/m3

Disposable Filter Changed: January 24, 2024

Annual Maintenance

Date Sample Tube Cleaned: July 26, 2023

Date RH/T Sensor Cleaned: July 26, 2023

Notes:

Verified flow, temperature, and pressure. Leak check passed.

Calibration by: Rene Chamberland

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Janvier	Station Number:	AMS 22
Calibration Date:	November 16, 2023	Prev Cal Date:	N/A
Start Time (MST):	13:00	End Time (MST):	14:10
Tower Height (m):	10.0	Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	D16121
WS Calibrator:	MetOne 053	Serial Number:	P15103

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

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999999	*≥0.9995*
Calculated slope		0.999473	*0.90 - 1.10*
Calculated intercept		0.026227	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	D14528
As Found Declination (deg east of True North):	N/A	As Left Declination (deg east of True North):	14
Solar noon time (MST):	13:25	Calc Declination*:	13.02 Degrees
Deadband calc:	4.1 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	2.0	---
90	86.7	-0.9%
180	178.0	-0.6%
270	266.9	-0.9%
357	354.9	-0.6%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999924	*≥0.9995*
Calculated slope		1.008921	*0.90 - 1.10*
Calculated intercept		0.114807	*+/- 4*

Notes: Installing new WS/WD sensors for the 10 meter tower, no issues to note. Used a compass to line up the crossarm.

Calibration Performed By: Max Farrell, Jan Castro

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS23
FORT HILLS

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	January 15, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	8:08	End time (MST):	10:58
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.76	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC281425			
Removed Cal Gas Conc:	49.76	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290012

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001895	0.999893	Backgd or Offset:	18.3	18.5
Calibration intercept:	-0.683633	-0.983326	Coeff or Slope:	1.058	1.063

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.5	----
as found span	4920	80.3	799.1	796.8	1.003
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	799.1	798.5	1.001
second point	4960	40.2	400.1	398.6	1.004
third point	4980	20.1	200.0	198.0	1.010
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.3	799.1	797.1	1.003
				Average Correction Factor	1.005

Baseline Corr As found:	796.30	Previous response	799.93	*% 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 maintenance done. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

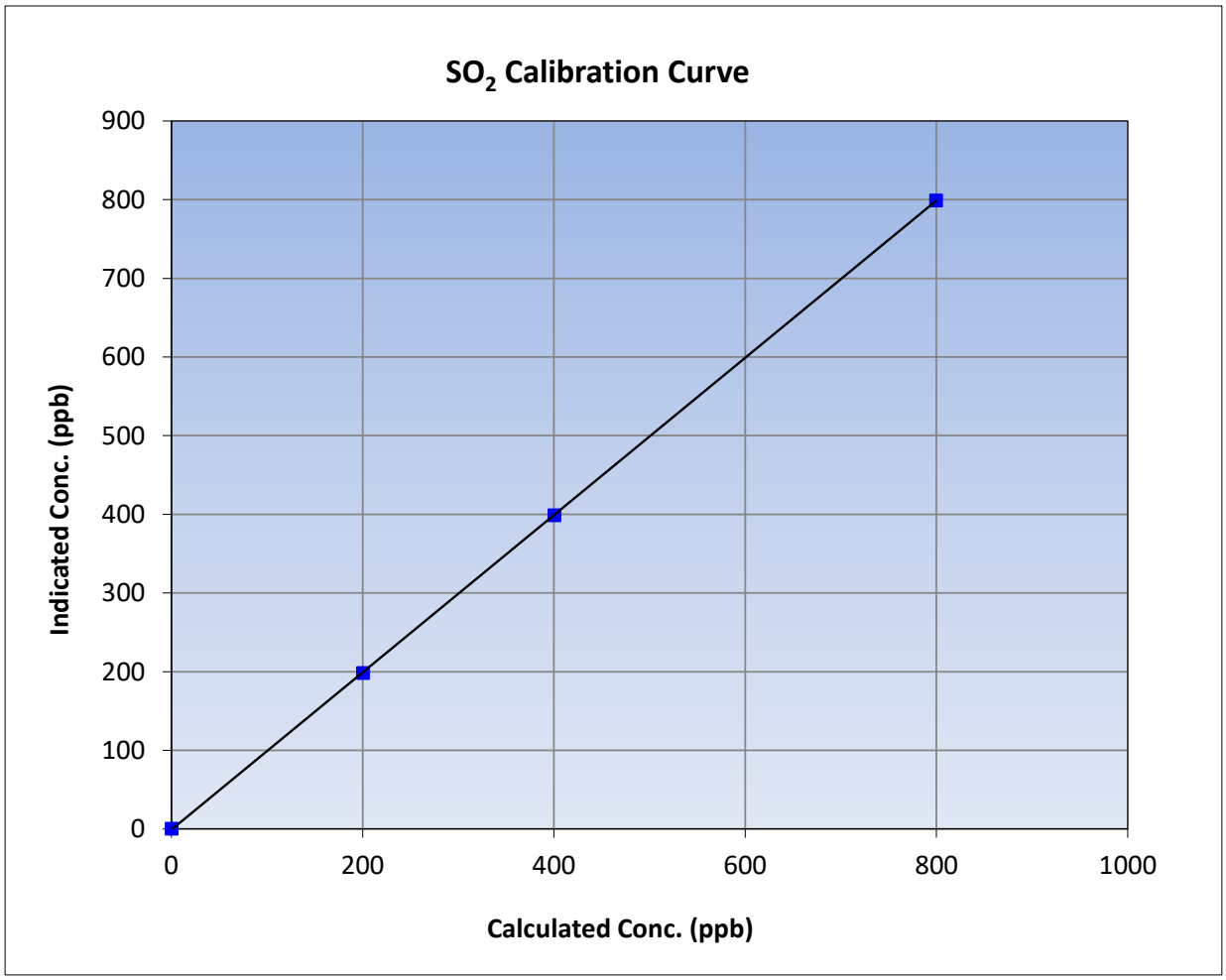
Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 13, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:08	End Time (MST):	10:58
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

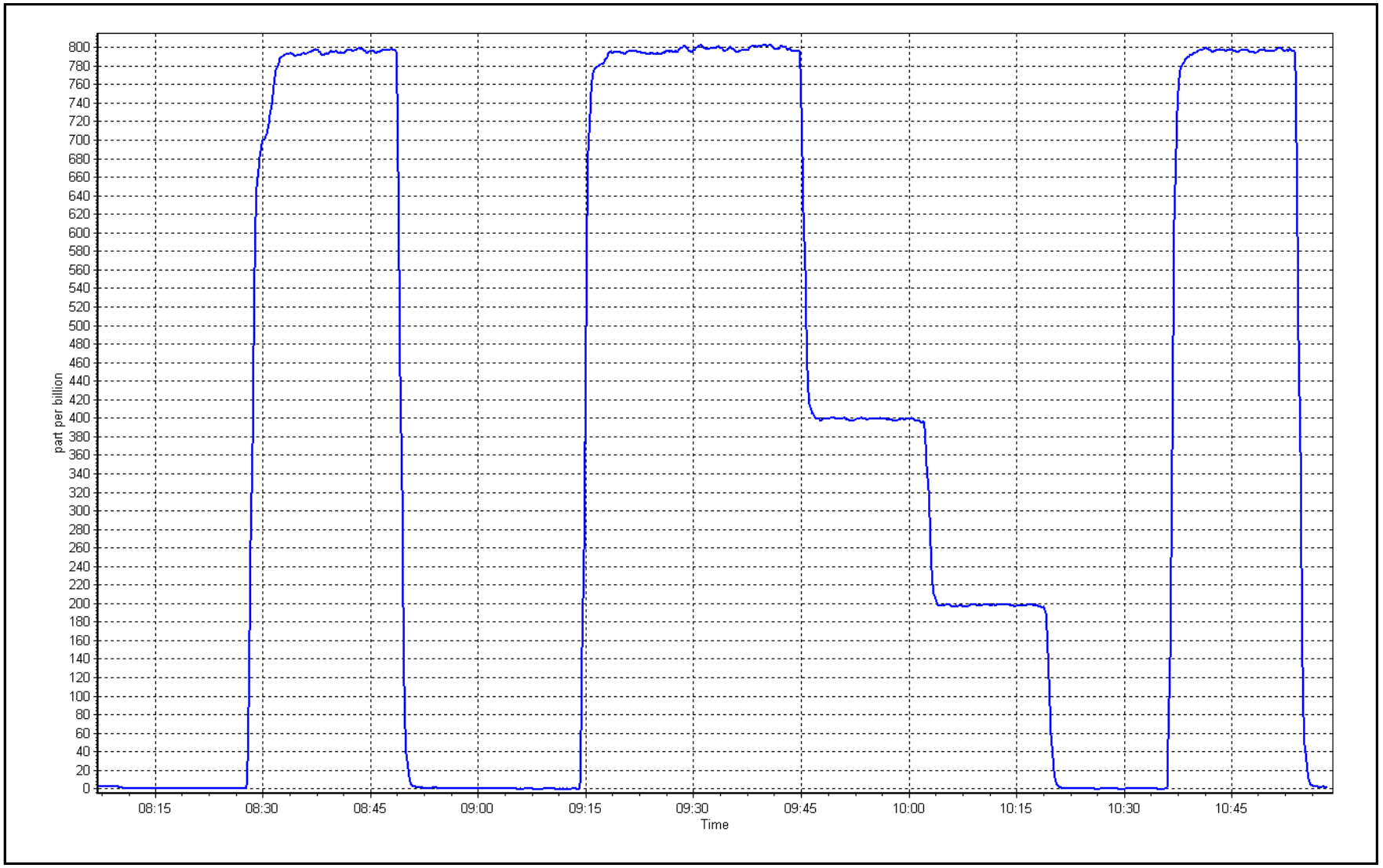
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.1	798.5	1.0007
400.1	398.6	1.0036
200.0	198.0	1.0103

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	0.999893	*0.90 - 1.10*
Intercept	-0.983326	*+/-30*



SO2 Calibration Plot Date: January 15, 2024 Location: Fort Hills



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	January 9, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	8:55	End time (MST):	12:56
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517372			
Removed Cal Gas Conc:	5.20	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1300156232	
Converter make:	CDN-101		Converter serial #:	594	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.991033	0.995462	Backgd or Offset:	1.19	1.19
Calibration intercept:	-0.198385	-0.178345	Coeff or Slope:	1.124	1.124

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4923	77.0	80.0	79.9	1.001
as found 2nd point	4962	38.5	40.0	39.8	1.005
as found 3rd point	4981	19.2	19.9	19.6	1.018
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.0	80.0	79.5	1.006
second point	4962	38.5	40.0	39.7	1.007
third point	4981	19.2	19.9	19.4	1.028
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.0	80.0	79.2	1.010
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.014
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.9	Prev response:	79.09	*% change:	1.0%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.999888	AF Intercept:	-0.158204
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999981		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

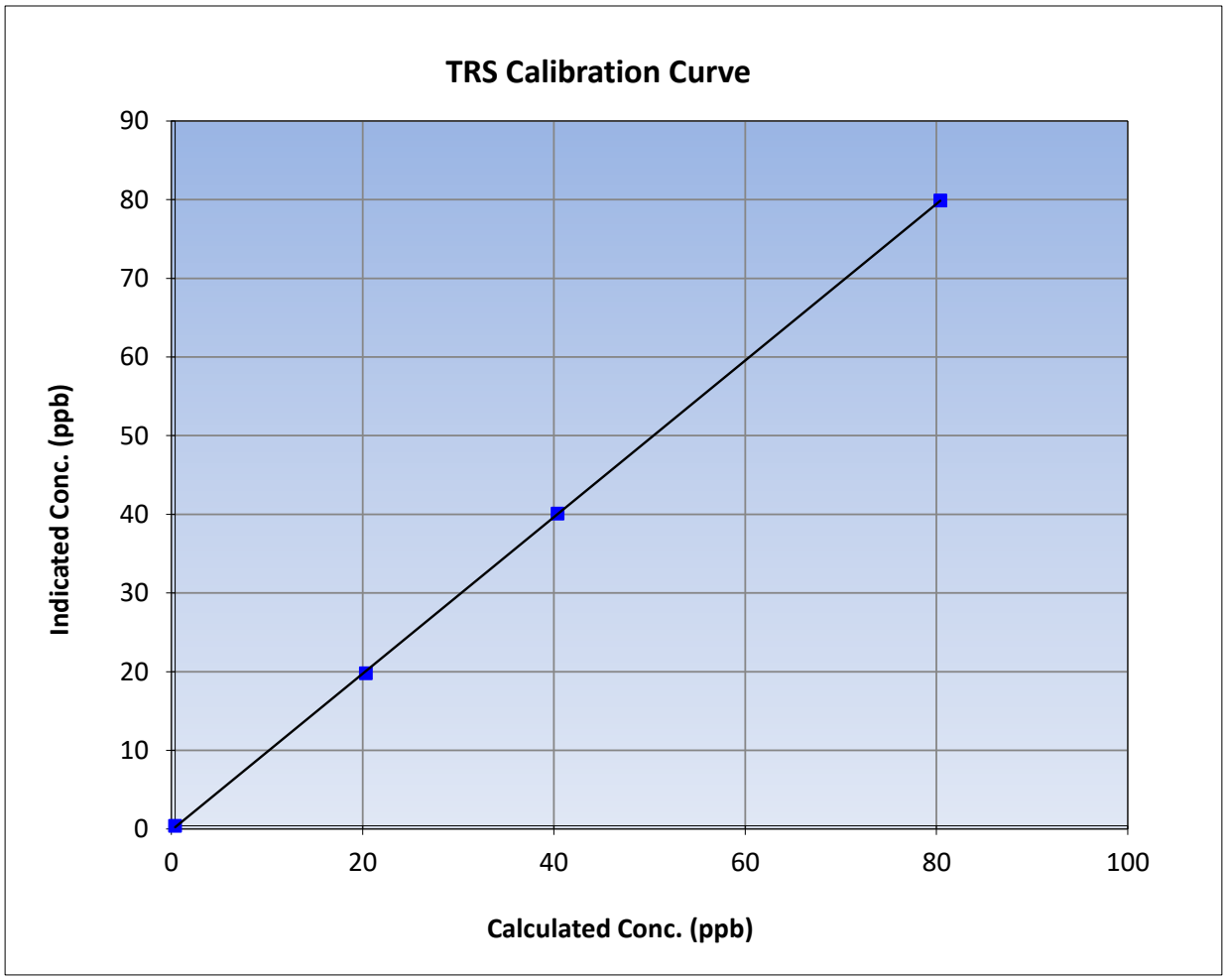
Station Information

Calibration Date:	January 9, 2024	Previous Calibration:	December 6, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:55	End Time (MST):	12:56
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1300156232

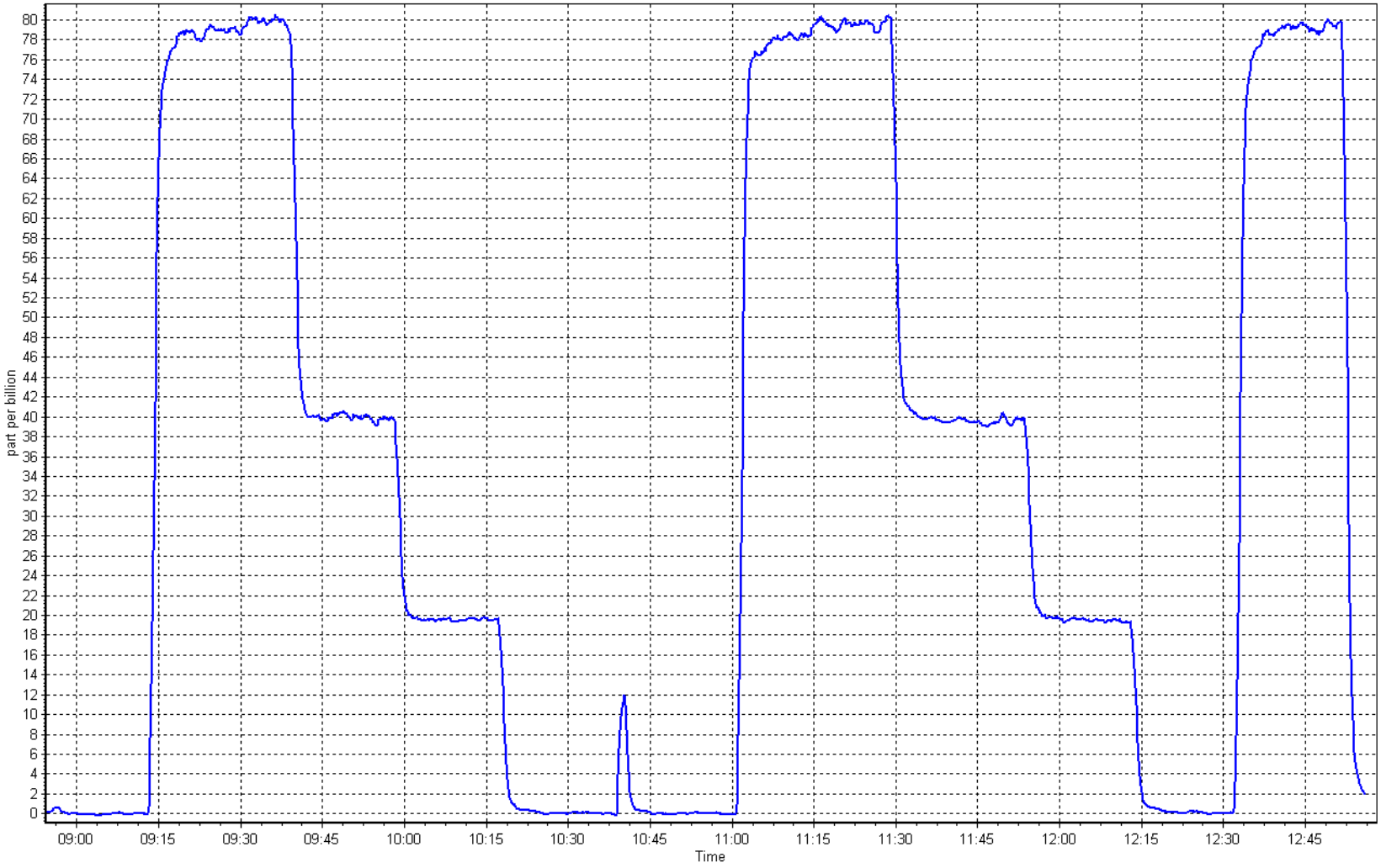
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.5	1.0063
40.0	39.7	1.0075
19.9	19.4	1.0282

Statistical Evaluation		Limits
Correlation Coefficient	0.999967	≥0.995
Slope	0.995462	0.90 - 1.10
Intercept	-0.178345	+/-3



TRS Calibration Plot Date: January 9, 2024 Location: Fort Hills



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	January 15, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	8:08	End time (MST):	10:56
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC281425	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	500.2	ppm	CH4 Equiv Conc.	1070.6	ppm
C3H8 Cal Gas Conc.	207.4	ppm			
Removed Gas Cert:		N/A	Removed Gas Expiry:	N/A	
Removed CH4 Conc.	500.2	ppm	CH4 Equiv Conc.	1070.6	ppm
Removed C3H8 Conc.	207.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	451	
ZAG make/model:	API T701		Serial Number:	5611	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1193585648	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.36E-04	2.31E-04	NMHC SP Ratio:	5.09E-05	4.93E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	180787	186451
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.19	17.69	0.972
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	17.33	0.992
second point	4960	40.2	8.61	8.64	0.996
third point	4980	20.1	4.30	4.34	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.32	0.993
				Average Correction Factor	0.993
Baseline Corr AF:	17.69	Prev response	17.24	*% change	2.6%
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 / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	9.16	9.50	0.964
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	9.16	9.22	0.993
second point	4960	40.2	4.59	4.62	0.993
third point	4980	20.1	2.29	2.35	0.975
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.19	0.997
				Average Correction Factor	0.987
Baseline Corr AF:	9.50	Prev response	9.19	*% change	3.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	8.20	0.980
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	8.12	0.989
second point	4960	40.2	4.02	4.02	1.000
third point	4980	20.1	2.01	1.99	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.13	0.988
				Average Correction Factor	1.001
Baseline Corr AF:	8.20	Prev response	8.05	*% 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

	Start	***Finish***
THC Cal Slope:	1.001568	1.007788
THC Cal Offset:	0.017601	-0.007208
CH4 Cal Slope:	1.004639	1.012164
CH4 Cal Offset:	-0.020048	-0.027257
NMHC Cal Slope:	1.000371	1.005072
NMHC Cal Offset:	0.031648	0.018048

Notes: Span adjusted. No Maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

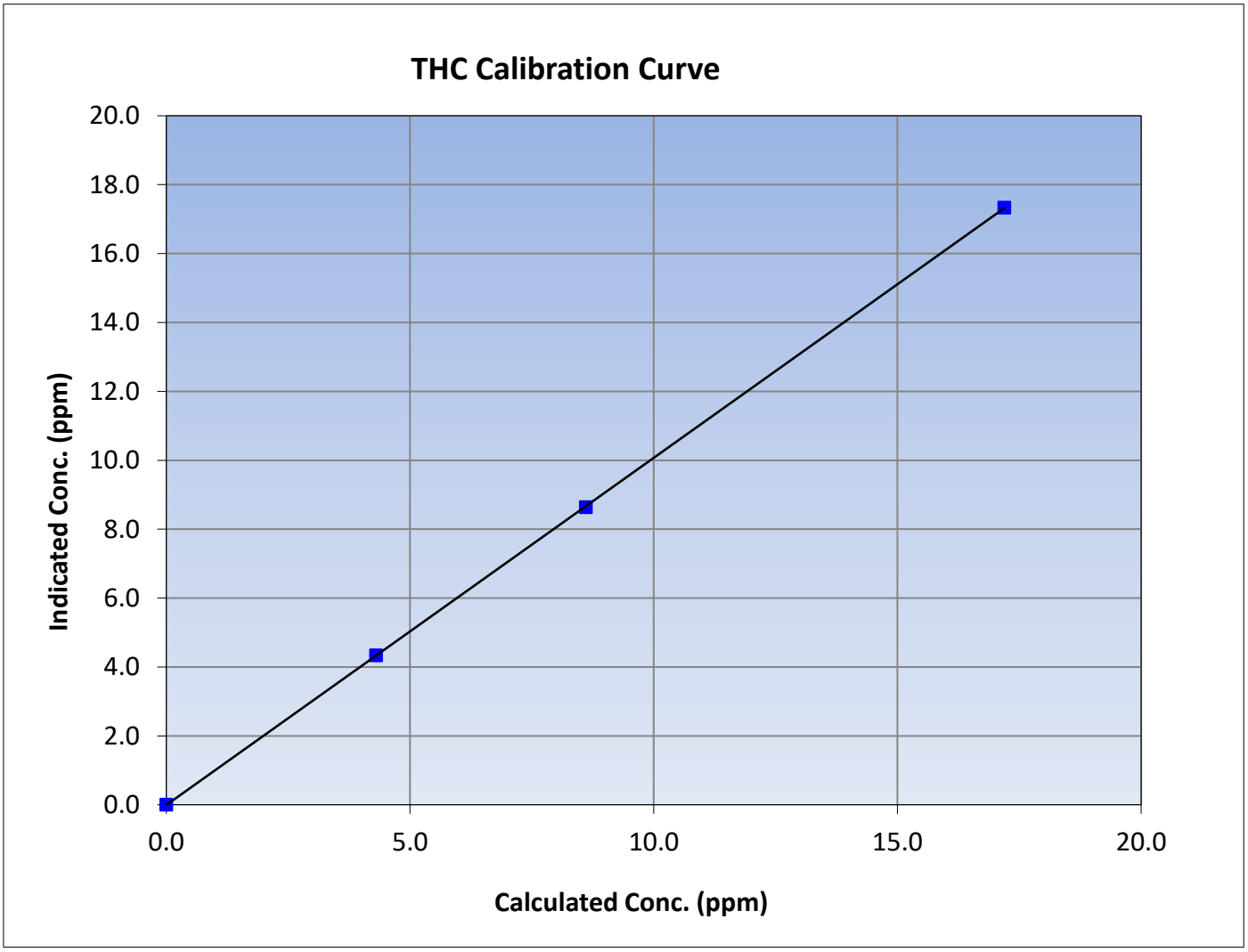
Version-06-2022

Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 13, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:08	End Time (MST):	10:56
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999994	*≥0.995*
17.19	17.33	0.9920			
8.61	8.64	0.9962	Slope	1.007788	*0.90 - 1.10*
4.30	4.34	0.9921			
			Intercept	-0.007208	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

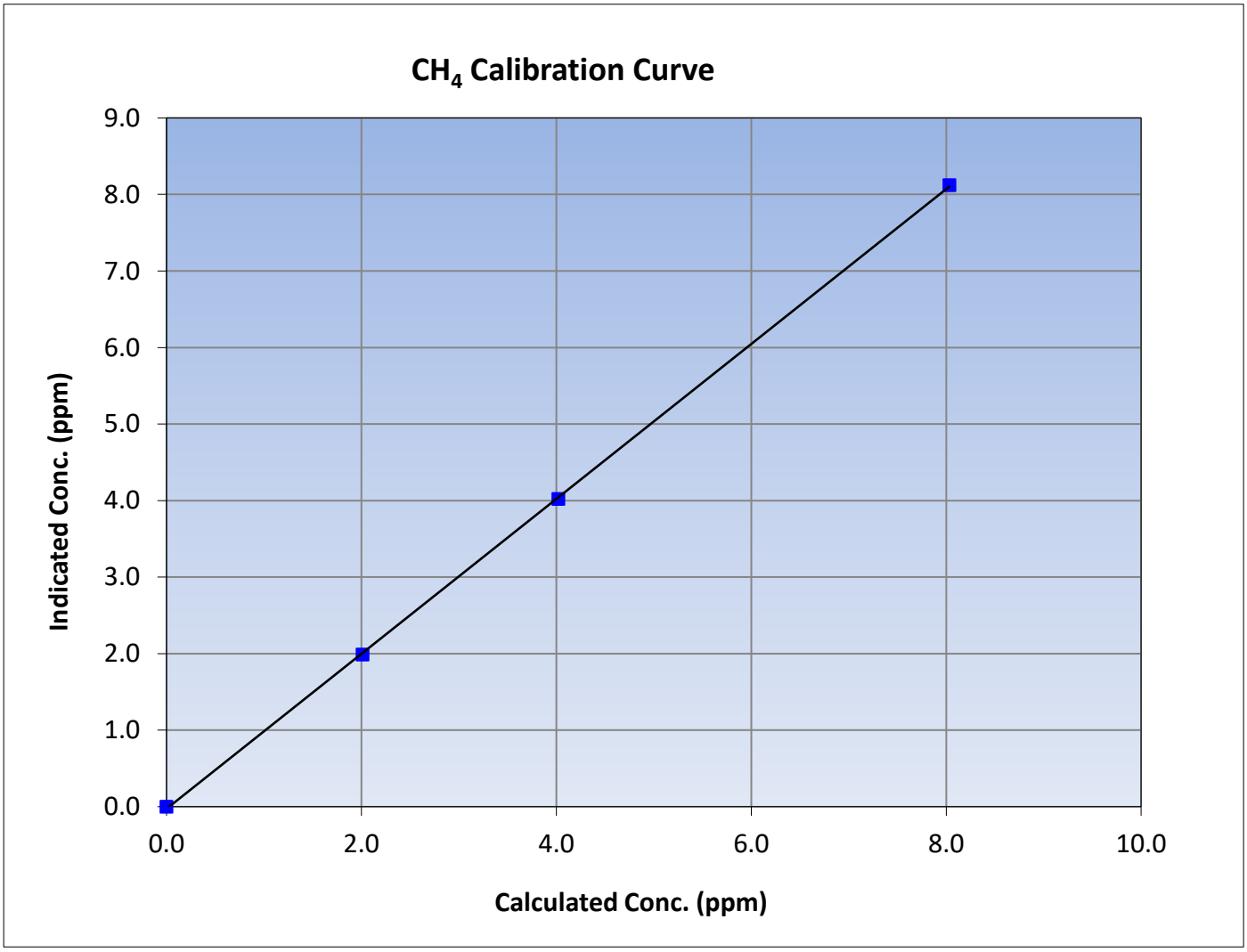
Version-06-2022

Station Information

Calibration Date:	January 15, 2024	Previous Calibration:	December 13, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:08	End Time (MST):	10:56
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999945	*≥0.995*
8.03	8.12	0.9893			
4.02	4.02	1.0004	Slope	1.012164	*0.90 - 1.10*
2.01	1.99	1.0120			
			Intercept	-0.027257	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

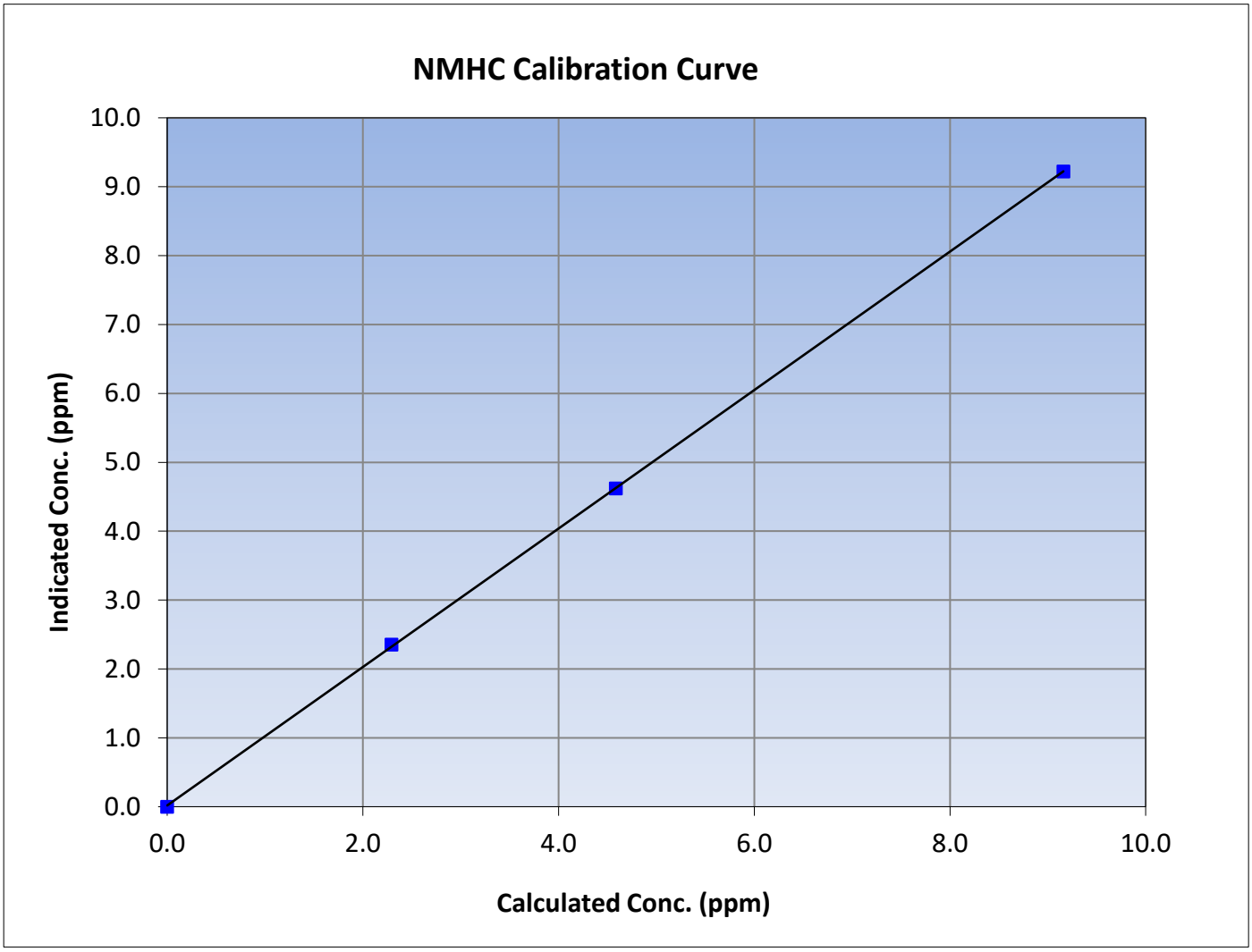
Version-06-2022

Station Information

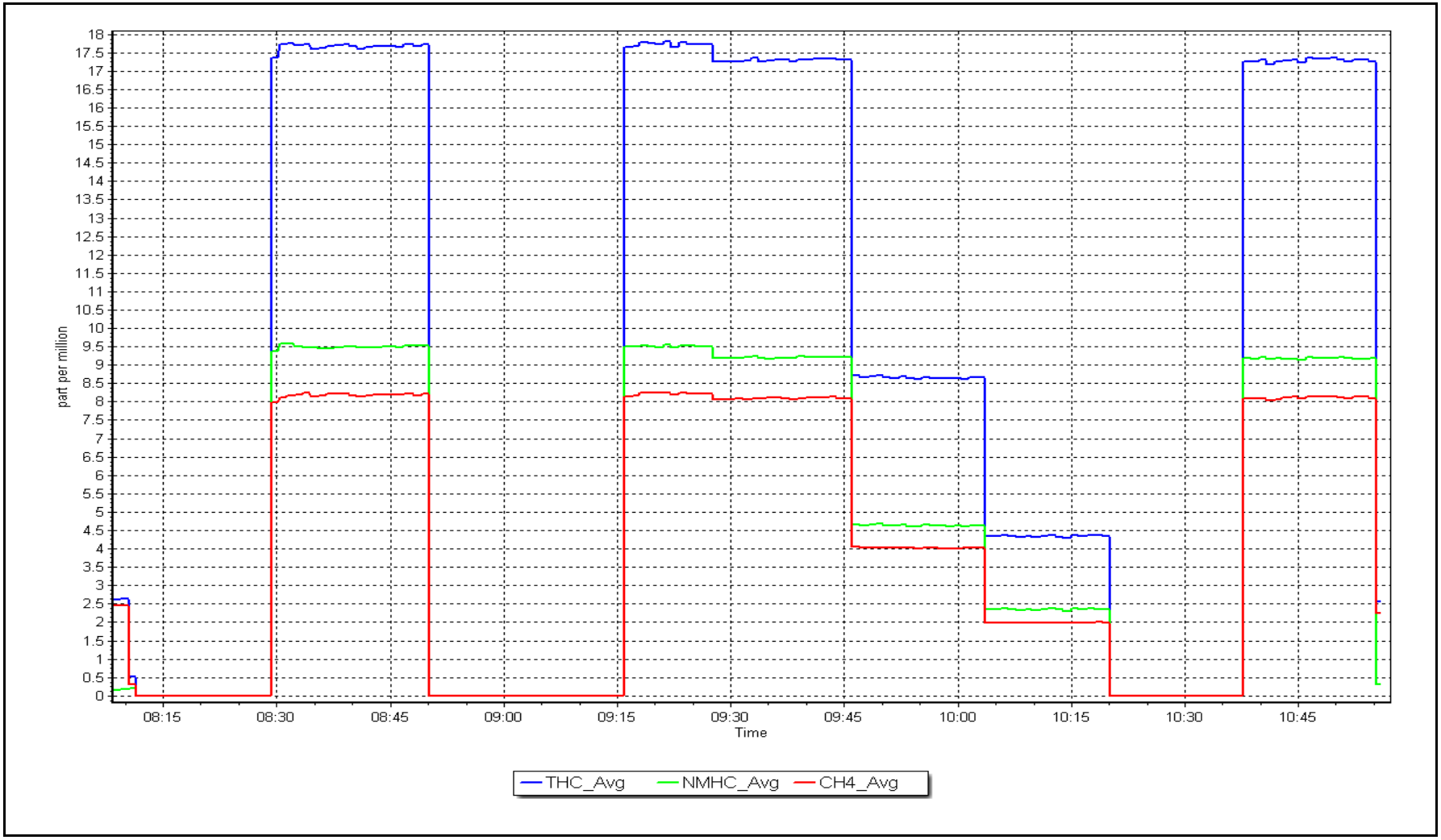
Calibration Date:	January 15, 2024	Previous Calibration:	December 13, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:08	End Time (MST):	10:56
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999974	≥0.995
9.16	9.22	0.9934			
4.59	4.62	0.9925	Slope	1.005072	0.90 - 1.10
2.29	2.35	0.9752			
			Intercept	0.018048	+/-0.5



NMHC Calibration Plot Date: January 15, 2024 Location: Fort Hills



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	January 10, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	7:35	End time (MST):	12:04
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC332703		Cal Gas Expiry Date:	January 28, 2024	
NOX Cal Gas Conc:	49.7	ppm	NO Cal Gas Conc:	49.7	ppm
Removed Cylinder #:	N/A		Removed Gas Exp Date:	N/A	
Removed Gas NOX Conc:	49.7	ppm	Removed Gas NO Conc:	49.7	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	451	
ZAG make/model:	Teledyne API T701		Serial Number:	5611	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1152430007	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.081	1.081	NO bkgnd or offset:	3	3
NOX coeff or slope:	0.989	0.989	NOX bkgnd or offset:	3.2	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	164.7	162

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999822	0.998780
NO_X Cal Offset:	0.304106	0.244003
NO Cal Slope:	1.001566	1.000209
NO Cal Offset:	-0.455910	-0.556171
NO_2 Cal Slope:	1.002916	0.999293
NO_2 Cal Offset:	-0.422416	-0.815351

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.2	----	----
as found span	4920	80.5	800.2	800.2	0.0	802.7	800.8	1.8	0.997	0.999
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high point	4920	80.5	800.2	800.2	0.0	798.8	799.6	-0.8	1.002	1.001
second point	4960	40.2	399.6	399.6	0.0	400.8	400.1	0.8	0.997	0.999
third point	4980	20.1	199.8	199.8	0.0	199.4	198.0	1.5	1.002	1.009
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as left span	4920	80.5	800.2	445.5	354.7	796.4	441.9	354.4	1.005	1.008
								Average Correction Factor	1.000	1.003

Corrected As found NO_X = 803.0 ppb NO = 800.9 ppb

Previous Response NO_X = 800.3 ppb NO = 801.0 ppb

Baseline Corr 2nd pt NO_X = NA ppb NO = NA ppb

Baseline Corr 3rd pt NO_X = NA ppb NO = NA ppb

* = > +/-5% change initiates investigation

*Percent Change NO_X = 0.3%

*Percent Change NO = 0.0%

As found NO_X r^2: Nx Sl: Nx Int:

As found NO r^2: NO Sl: NO Int:

As found NO_2 r^2: NO2 Sl: NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.0	442.3	354.7	353.9	1.002	99.8%
2nd GPT point (200 ppb O3)	797.0	621.8	175.2	174.2	1.006	99.4%
3rd GPT point (100 ppb O3)	797.0	706.1	90.9	89.1	1.020	98.0%
				Average Correction Factor	1.009	99.1%

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

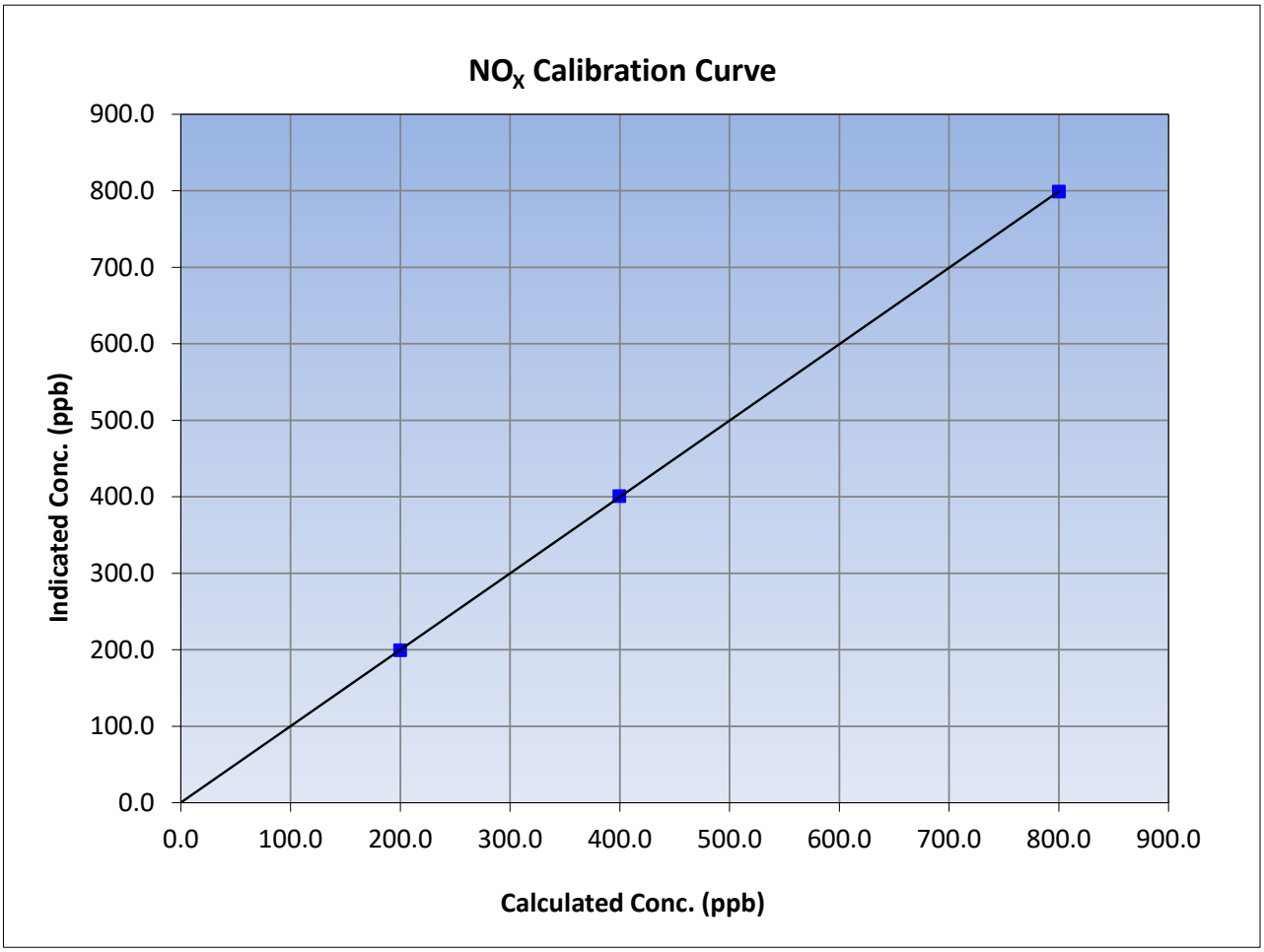
Version-04-2020

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	12:04
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	-0.2	----	Correlation Coefficient	0.999992	*≥0.995*
800.2	798.8	1.0017			
399.6	400.8	0.9969	Slope	0.998780	*0.90 - 1.10*
199.8	199.4	1.0020			
			Intercept	0.244003	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

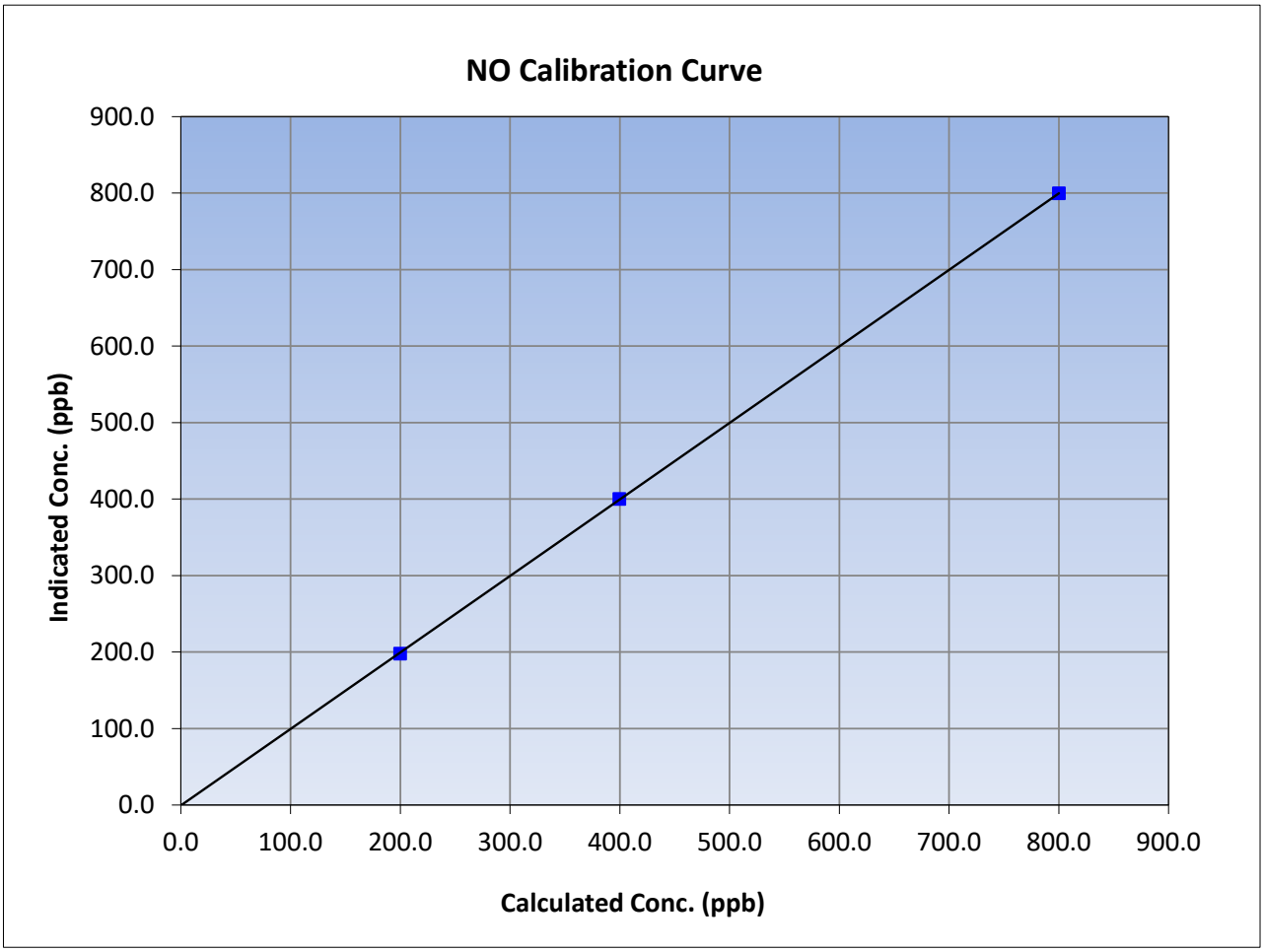
Version-04-2020

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	12:04
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999992	≥0.995
800.2	799.6	1.0007			
399.6	400.1	0.9987	Slope	1.000209	0.90 - 1.10
199.8	198.0	1.0090			
			Intercept	-0.556171	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

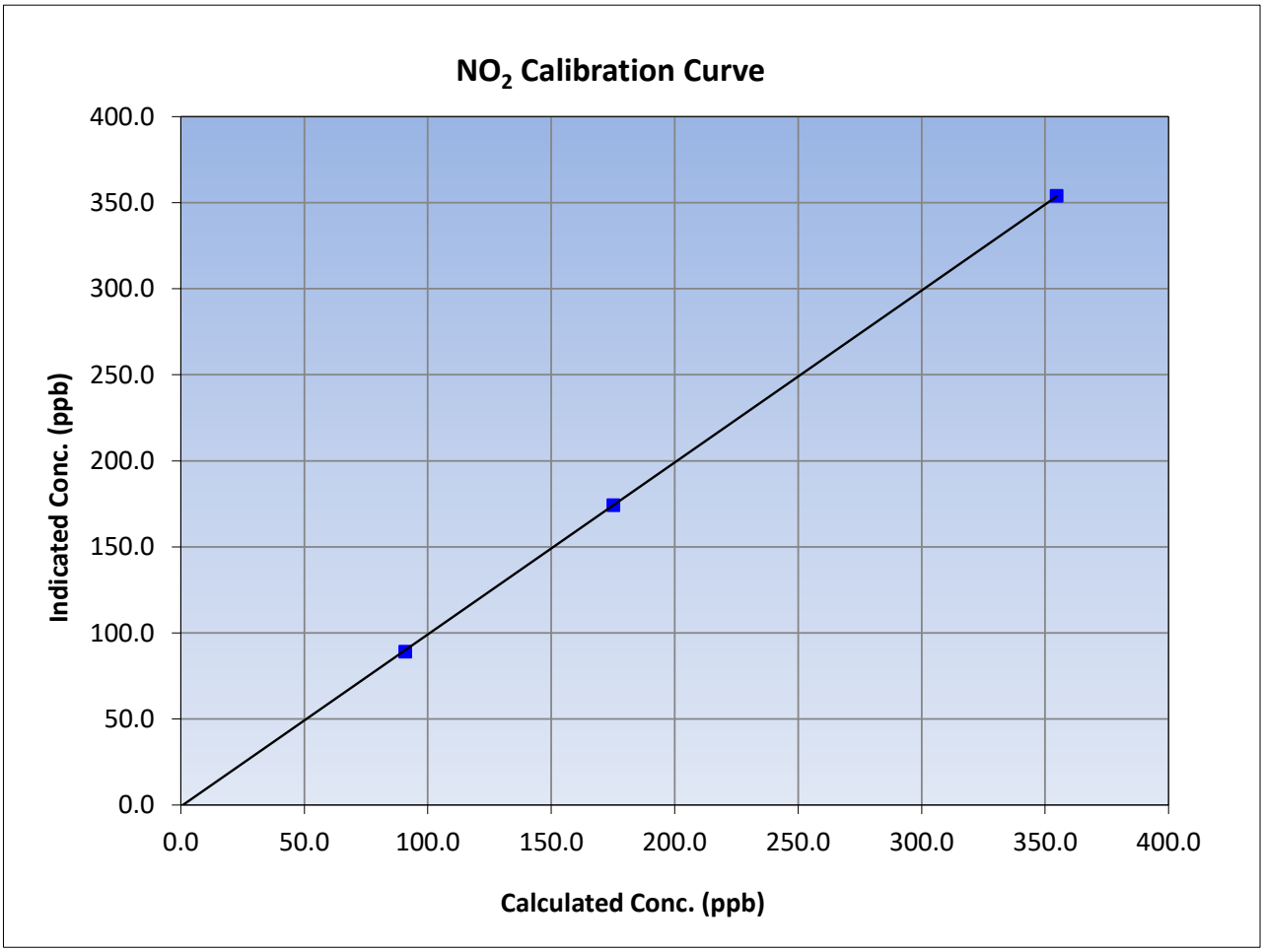
Version-04-2020

Station Information

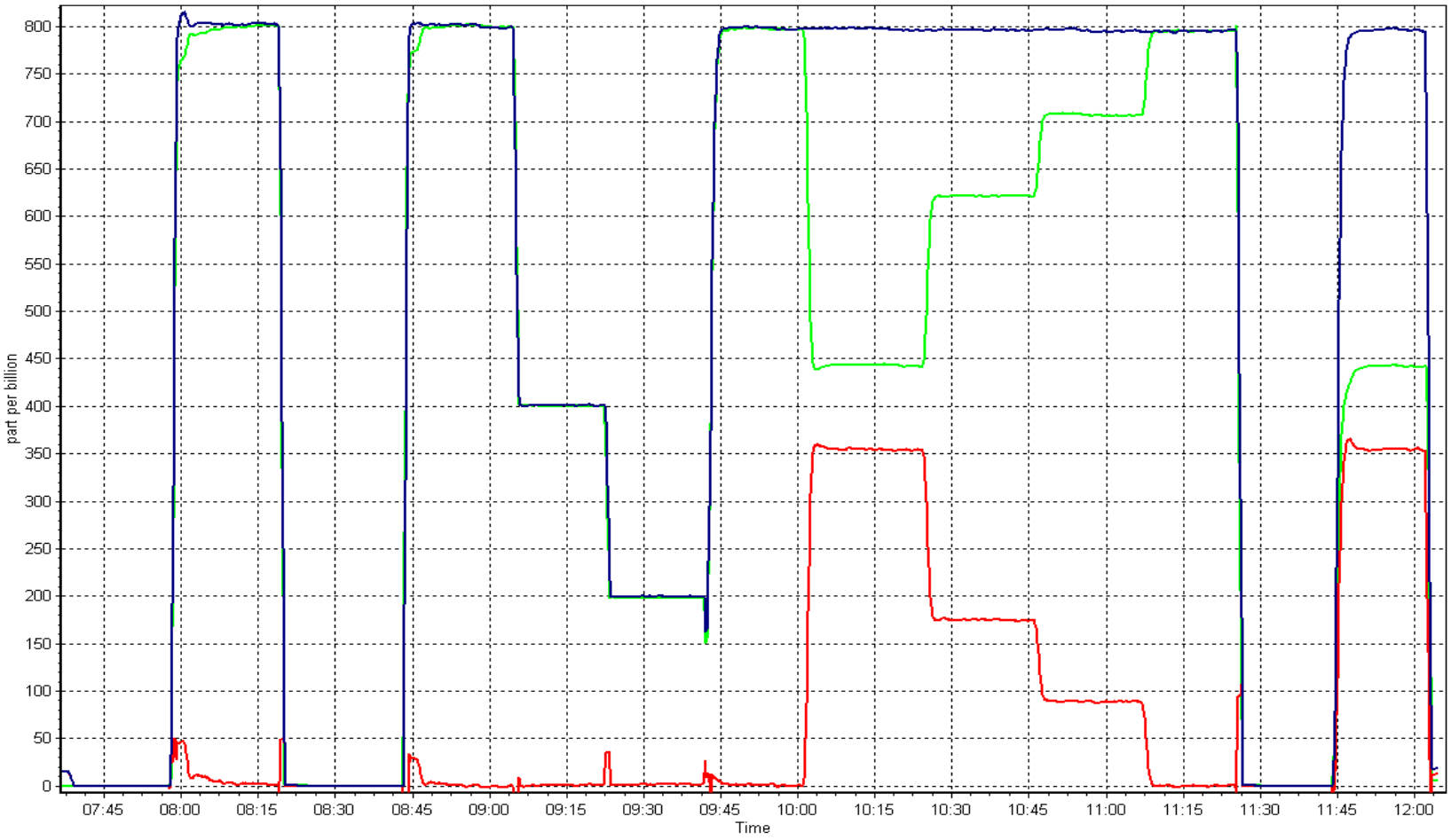
Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	12:04
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999979	≥0.995
354.7	353.9	1.0023			
175.2	174.2	1.0057	Slope	0.999293	0.90 - 1.10
90.9	89.1	1.0202			
			Intercept	-0.815351	+/-20



NO_X Calibration Plot Date: January 10, 2024 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:	January 15, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	10:59	End time (MST):	11:25
Analyzer Make:	API T640	S/N:	1546
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388753
Temp/RH standard:	Alicat FP-25BT	S/N:	388753

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-29.4	-29.7	-29.7	☐	+/- 2 °C
P (mmHg)	748.5	747.9	748.5	☐	+/- 10 mmHg
flow (LPM)	5.00	5.06	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: January 15, 2024 Last Cal Date: December 13, 2023

PM w/o HEPA: 6.8 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: November 20, 2023 <0.2 ug/m3

Disposable Filter Changed: November 20, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 17, 2023

Date RH/T Sensor Cleaned: October 17, 2023

No adjustments done. Leak check passed. Head cleaned.

Notes:

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25
WASKŌW OHCI PIMÂTISIWIN

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	January 22, 2024	Last Cal Date:	December 19, 2023
Start time (MST):	8:59	End time (MST):	12:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.54	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC437219			
Removed Cal Gas Conc:	50.54	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	4765

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1118148497

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999891	0.999234	Backgd or Offset:	11.0	11.4
Calibration intercept:	-0.656026	0.023996	Coeff or Slope:	1.020	1.050

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4921	79.2	800.5	775.4	1.032
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.2	800.5	799.9	1.001
second point	4960	39.6	400.3	400.2	1.000
third point	4980	19.8	200.1	199.8	1.002
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.2	800.5	805.7	0.994
				Average Correction Factor	1.001

Baseline Corr As found:	775.60	Previous response	799.78	*% change	-3.1%
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

SO_2 Calibration Summary

Version-01-2020

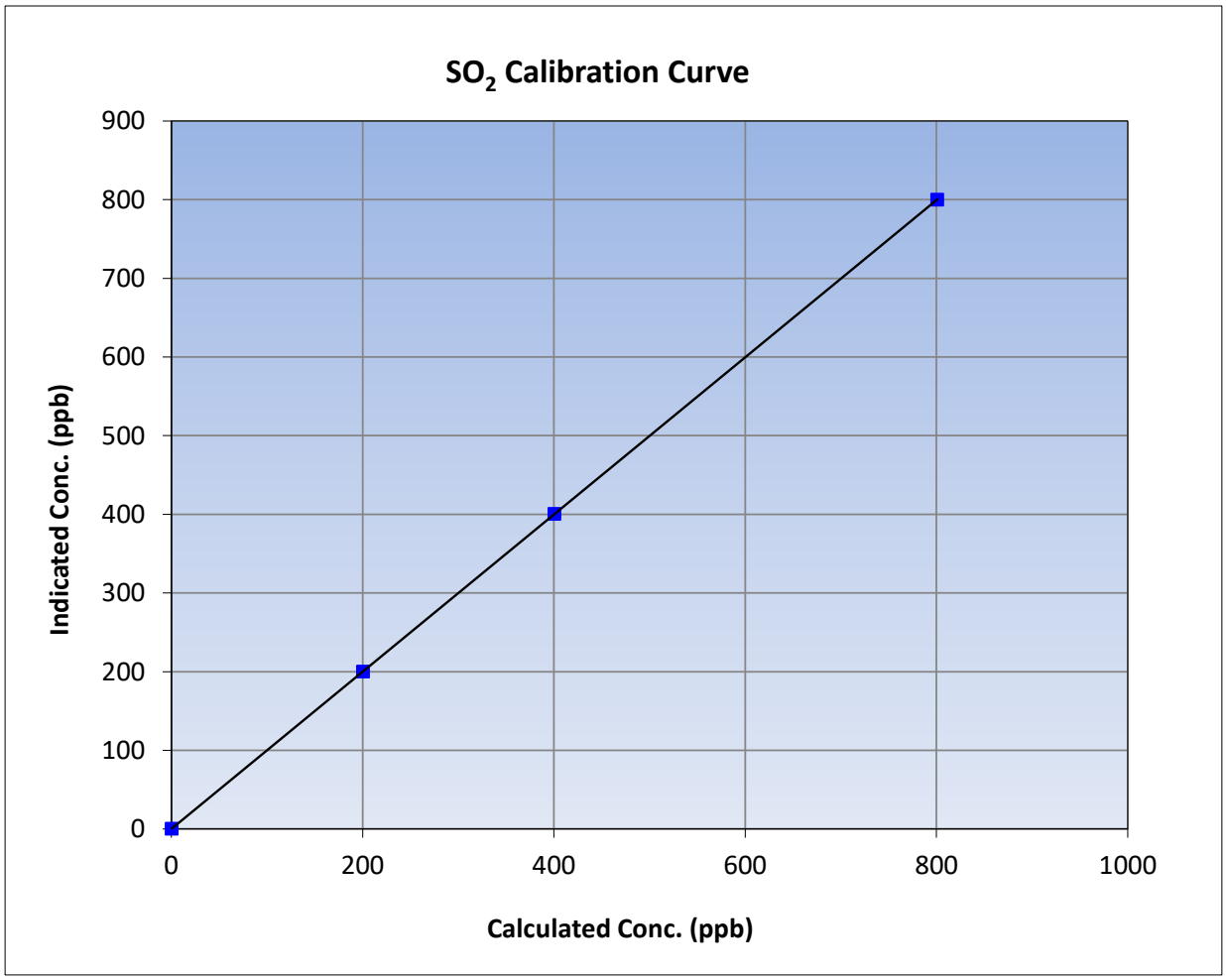
Station Information

Calibration Date:	January 22, 2024	Previous Calibration:	December 19, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	8:59	End Time (MST):	12:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

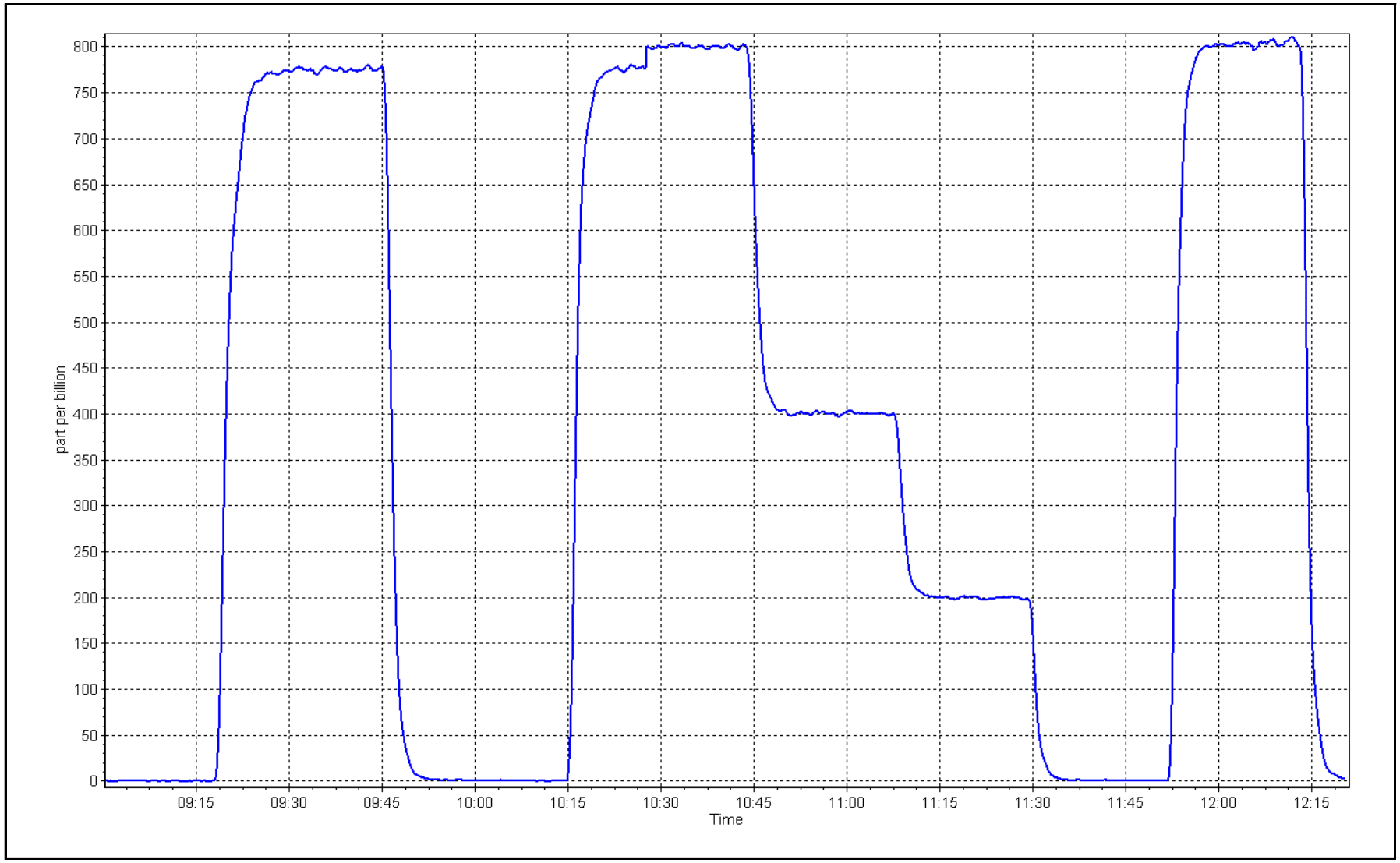
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.5	799.9	1.0008
400.3	400.2	1.0003
200.1	199.8	1.0017

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	0.999234	*0.90 - 1.10*
Intercept	0.023996	*+/-30*



SO2 Calibration Plot Date: January 22, 2024 Location: Waskow ohci Pimatisiwin



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	January 18, 2024	Last Cal Date:	December 15, 2023
Start time (MST):	7:14	End time (MST):	12:04
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.97	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC517099			
Removed Cal Gas Conc:	4.97	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	261

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1170050146	
Converter make:	Global G-150		Converter serial #:	2022-219	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003251	1.002531	Backgd or Offset:	3.30	3.30
Calibration intercept:	0.200000	0.300000	Coeff or Slope:	1.108	1.125

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	80.0	79.5	78.8	1.010
as found 2nd point	4960	40.0	39.7	39.6	1.006
as found 3rd point	4980	20.0	19.9	19.8	1.008
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4920	80.0	79.5	79.9	0.994
second point	4960	40.0	39.7	40.3	0.986
third point	4980	20.0	19.9	20.1	0.988
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.0	800.0	809.7	0.988
SO2 Scrubber Check	4921	79.2	800.0	0.0	----
Date of last scrubber change:		20-Jun-23		Ave Corr Factor	0.990
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.7	Prev response:	79.91	*% change:	-1.5%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.990593	AF Intercept:	0.140000
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

Notes: SOx scrubber checked after the calibrator zero. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

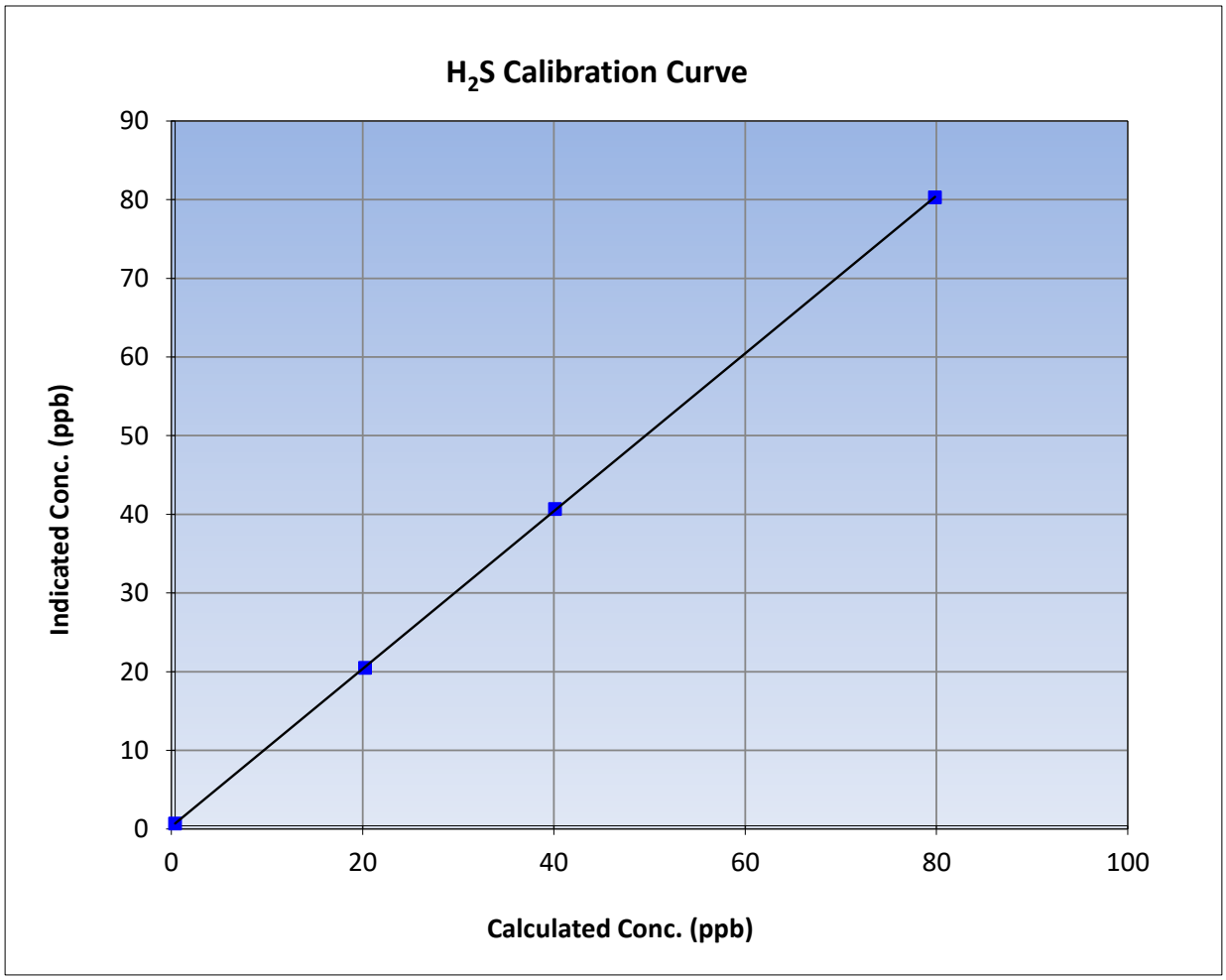
Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 15, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	7:14	End Time (MST):	12:04
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

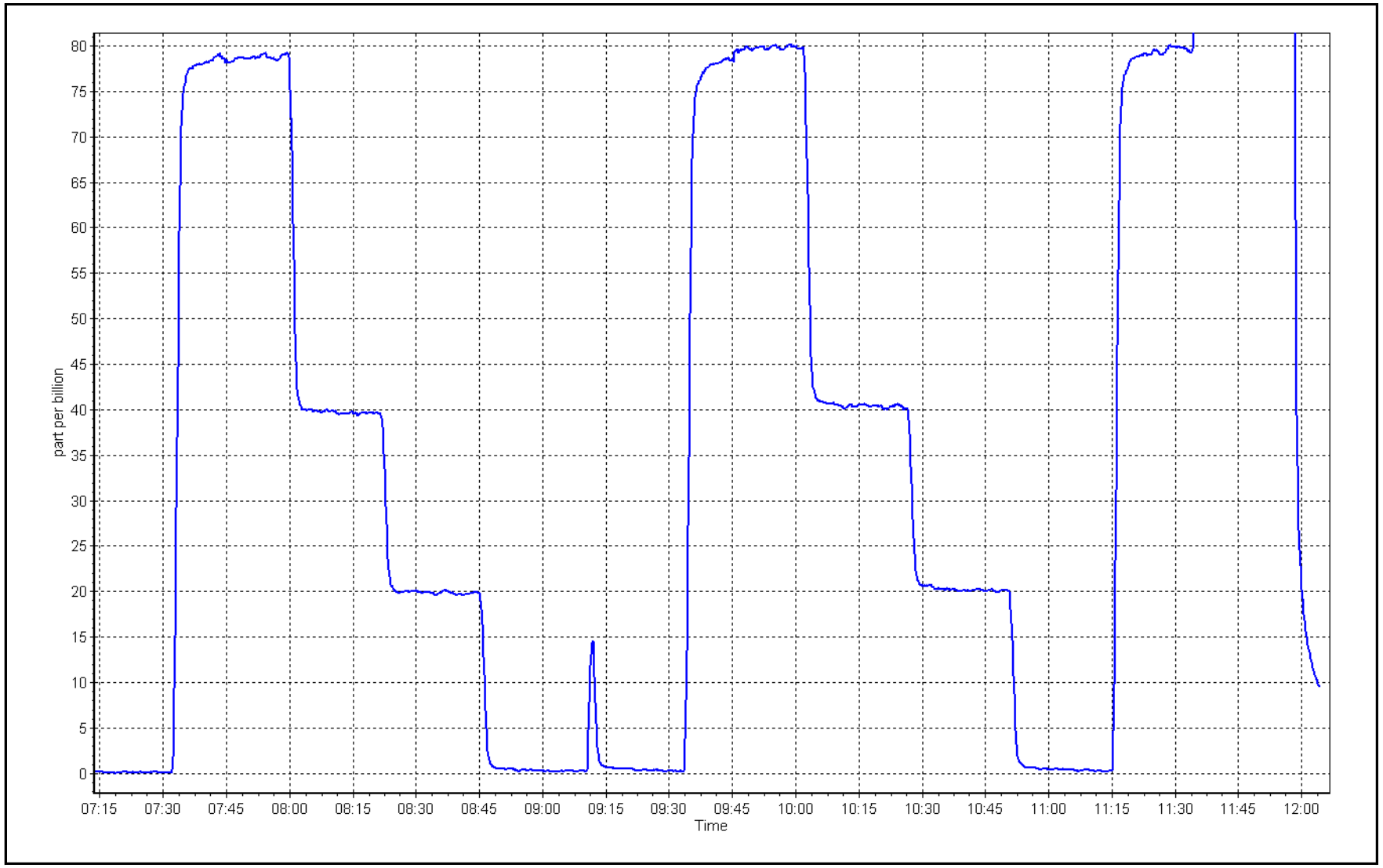
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
79.5	79.9	0.9944
39.7	40.3	0.9858
19.9	20.1	0.9883

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	1.002531	*0.90 - 1.10*
Intercept	0.300000	*+/-3*



H_2S Calibration Plot Date: January 18, 2024 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	January 23, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	10:28	End time (MST):	13:21
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.56	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC362134			
Removed Cal Gas Conc:	49.56	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	281
ZAG Make/Model:	API T701H		Serial Number:	832

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1173410001

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996949	0.997965	Backgd or Offset:	15.6	17.9
Calibration intercept:	0.370507	-0.124030	Coeff or Slope:	0.874	0.900

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	1.2	----
as found span	4919	80.8	800.9	775.9	1.032
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4919	80.8	800.9	799.3	1.002
second point	4960	40.4	400.4	399.1	1.003
third point	4980	20.2	200.2	199.9	1.002
as left zero	5000	0.0	0.0	0.0	----
as left span	4919	80.8	800.9	798.5	1.003
				Average Correction Factor	1.002

Baseline Corr As found:	774.70	Previous response	798.85	*% change	-3.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

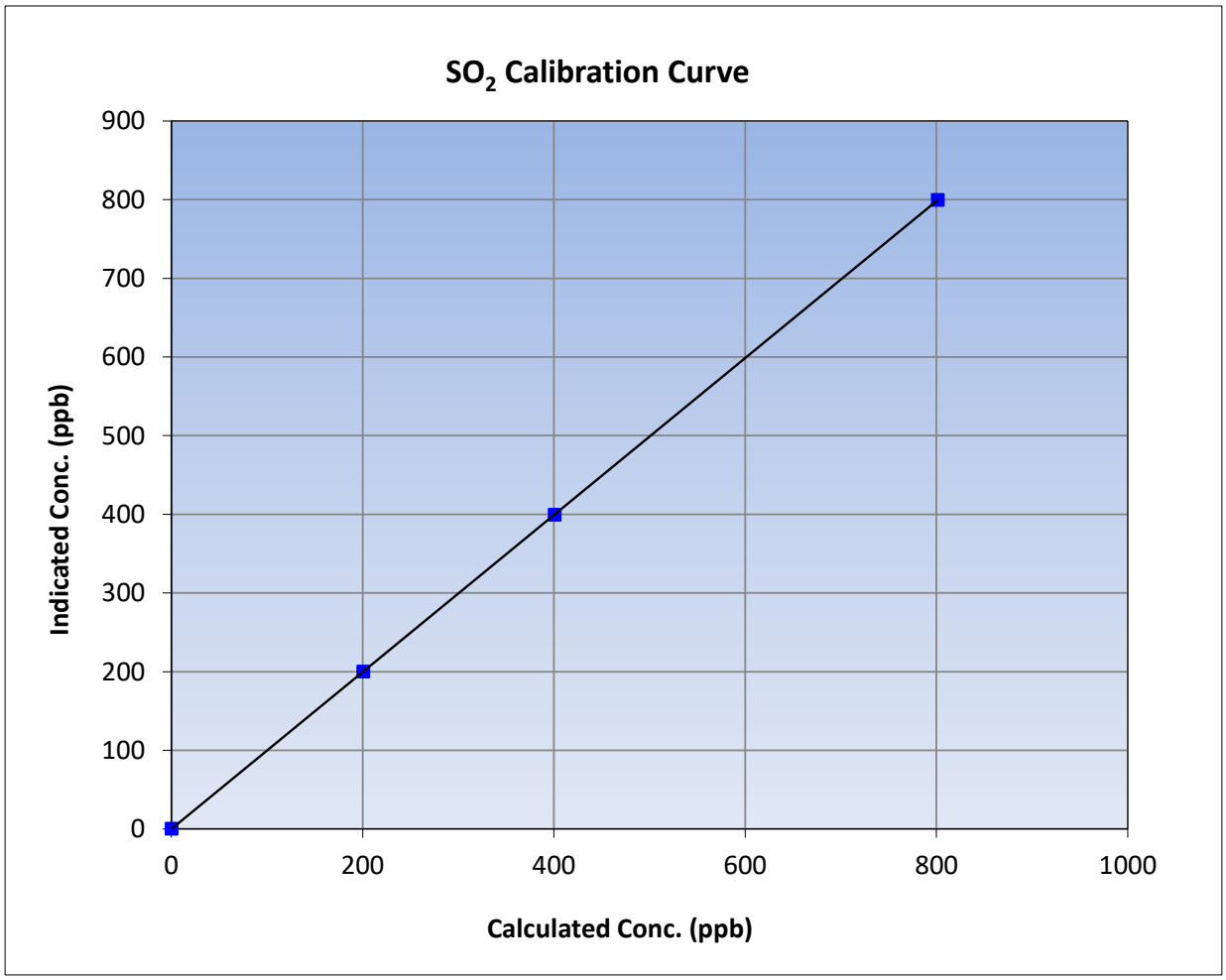
Station Information

Calibration Date:	January 23, 2024	Previous Calibration:	December 12, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:28	End Time (MST):	13:21
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

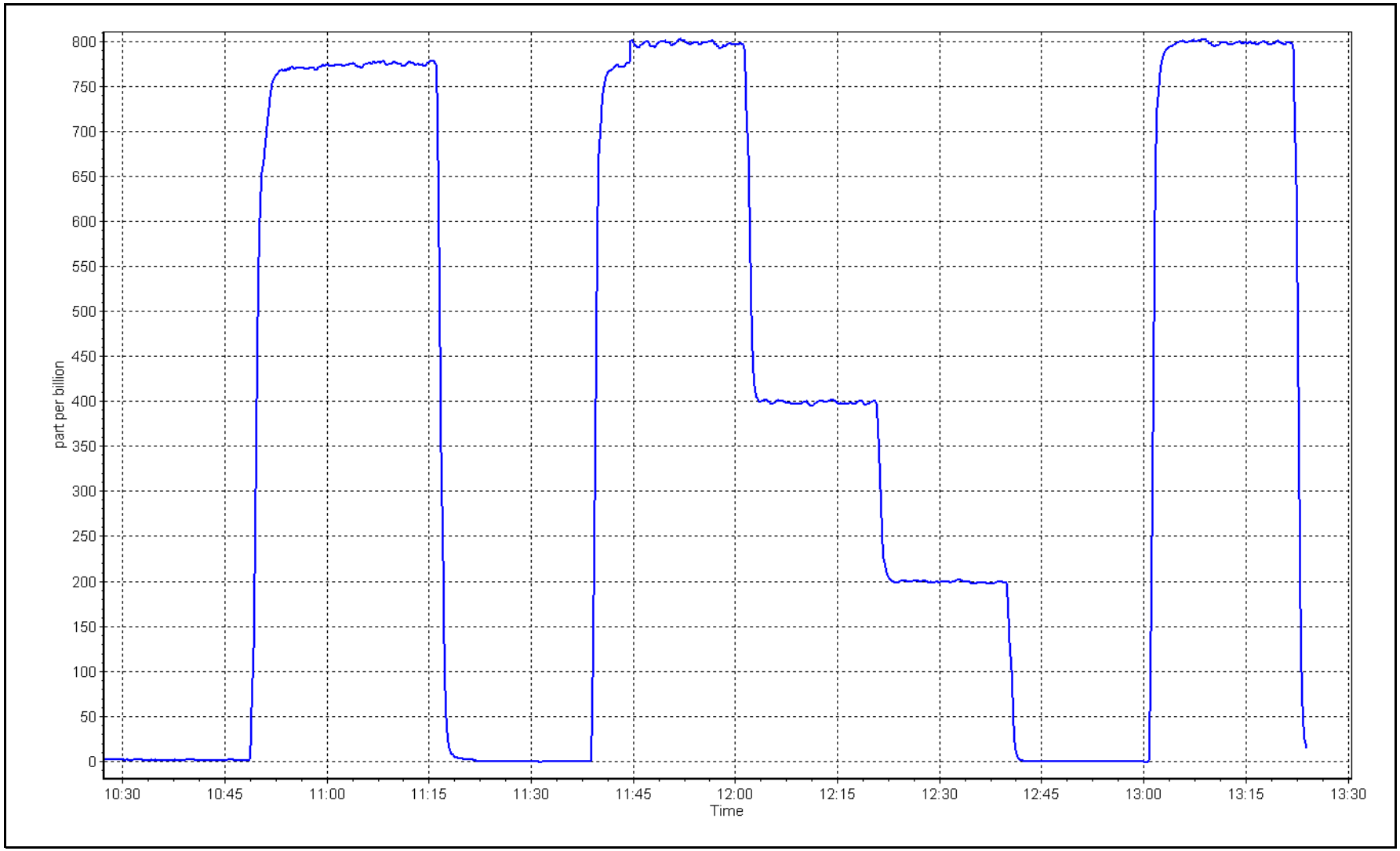
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.9	799.3	1.0020
400.4	399.1	1.0033
200.2	199.9	1.0016

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.997965	*0.90 - 1.10*
Intercept	-0.124030	*+/-30*



SO2 Calibration Plot Date: January 23, 2024 Location: Christina Lake



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Christina Lake	Station number:	AMS26
Calibration Date:	January 17, 2024	Last Cal Date:	December 19, 2023
Start time (MST):	9:15	End time (MST):	14:15
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.05	ppm	Cal Gas Exp Date:	November 15, 2026
Cal Gas Cylinder #:	DT0014831			
Removed Cal Gas Conc:	5.05	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3253
ZAG Make/Model:	API T701H		Serial Number:	832

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1180030032	
Converter make:	NA		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003426	1.001140	Backgd or Offset:	36.2	36.0
Calibration intercept:	-0.141605	0.238387	Coeff or Slope:	1.095	1.115

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.9	----
as found span	4921	79.2	80.0	78.9	1.002
as found 2nd point	4960	39.6	40.0	38.9	1.005
as found 3rd point	4980	19.8	20.0	19.4	0.985
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.2	80.0	80.2	0.997
second point	4960	39.6	40.0	40.5	0.988
third point	4980	19.8	20.0	20.3	0.985
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.2	80.0	80.9	0.989
SO2 Scrubber Check	4931	80.9	807.1	-0.5	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	0.990
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.8	Prev response:	80.12	*% change:	-0.4%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.995996	AF Intercept:	-0.781590
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999969		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. SO2 scrubber check after calibrator zero done and passed. Adjusted zero and span.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

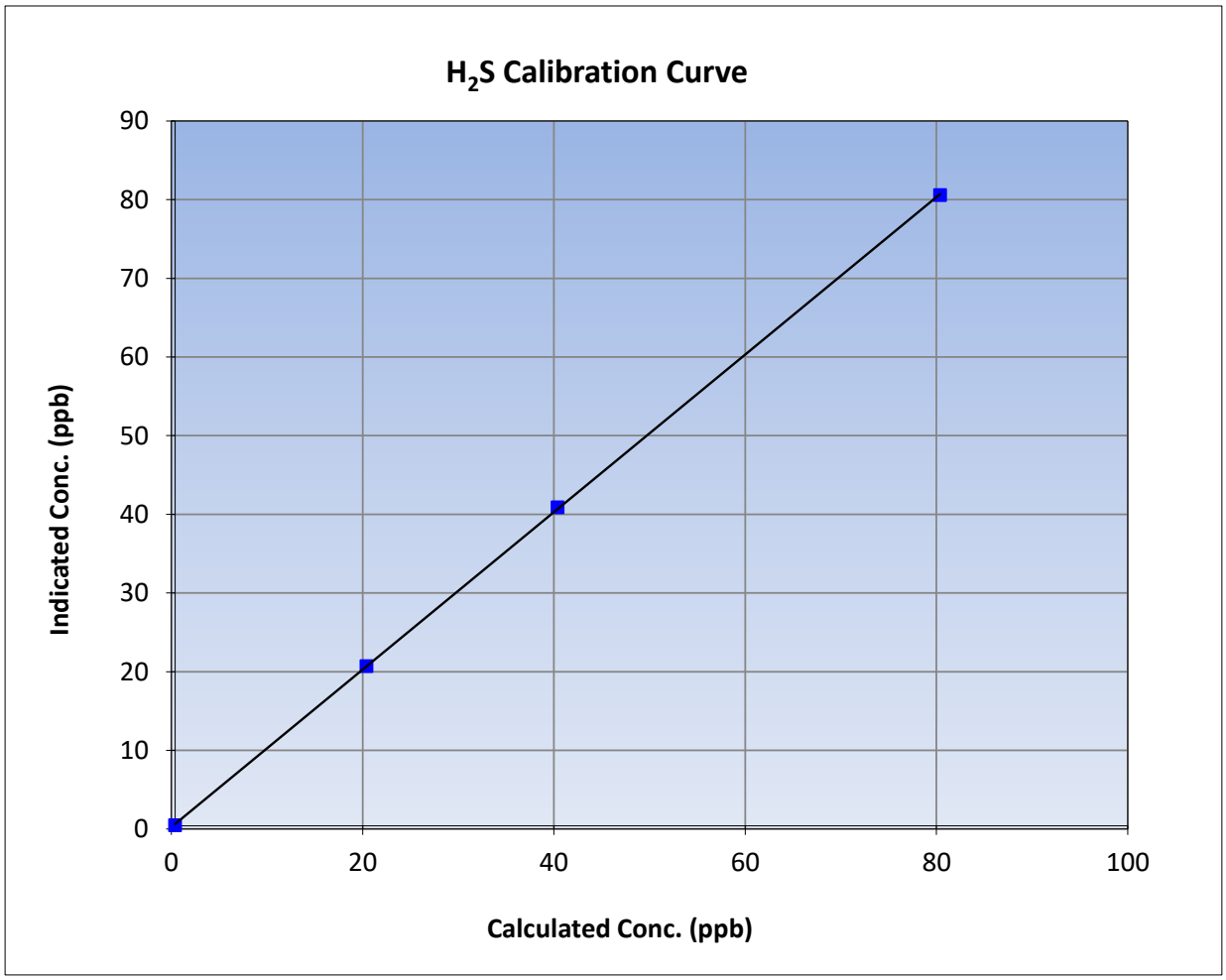
Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	December 19, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	9:15	End Time (MST):	14:15
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

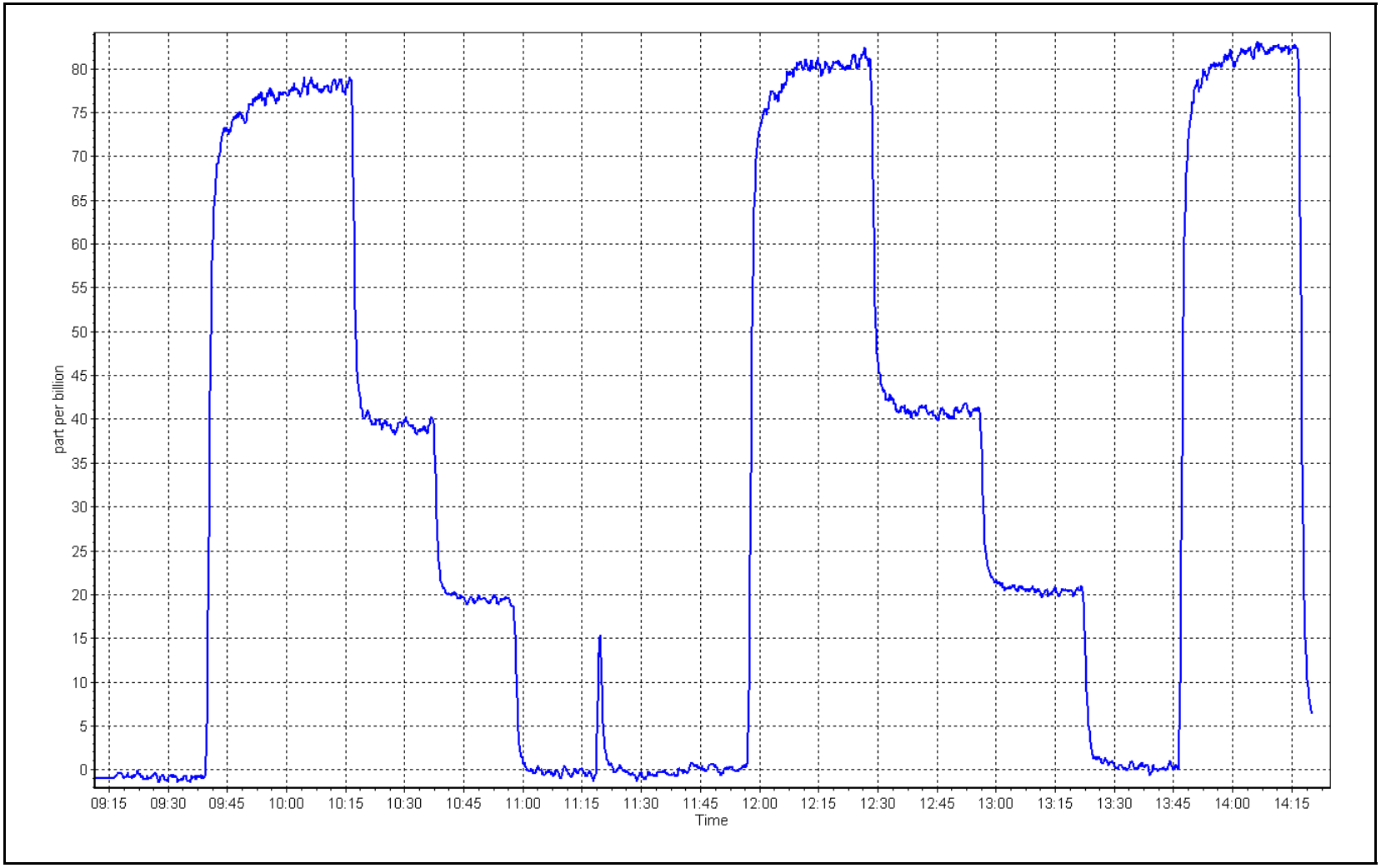
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.2	0.9974
40.0	40.5	0.9876
20.0	20.3	0.9852

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.001140	*0.90 - 1.10*
Intercept	0.238387	*+/-3*



H_2S Calibration Plot Date: January 17, 2024 Location: Christina Lake



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS26
Calibration Date:	January 16, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	11:17	End time (MST):	16:56
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC755290		Cal Gas Expiry Date:	January 3, 2031	
NOX Cal Gas Conc:	48.90	ppm	NO Cal Gas Conc:	48.70	ppm
Removed Cylinder #:	T2Y1P4C		Removed Gas Exp Date:	November 12, 2023	
Removed Gas NOX Conc:	50.82	ppm	Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:	0.5%		NO gas Diff:	0.4%	
Calibrator Model:	API T700		Serial Number:	3253	
ZAG make/model:	API T701H		Serial Number:	832	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.300	1.314	NO bkgnd or offset:	2.5	2.5
NOX coeff or slope:	0.997	0.990	NOX bkgnd or offset:	3.2	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	160.1	161.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996416	1.000236
NO_X Cal Offset:	0.160000	0.306500
NO Cal Slope:	0.995088	1.001429
NO Cal Offset:	0.080000	0.426316
NO_2 Cal Slope:	1.002313	0.997306
NO_2 Cal Offset:	-0.019410	-0.717929

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.1	-0.6	----	----
as found span	4920	80.0	813.1	800.3	12.8	812.0	796.6	15.1	1.0014	1.0047
as found 2nd										
as found 3rd										
new cyl resp	4918	82.1	802.9	799.6	3.3	806.0	798.9	6.7	0.9962	1.0009
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.6	0.1	-0.7	----	----
high point	4918	82.1	802.9	799.6	3.3	803.0	801.0	2.0	0.9999	0.9983
second point	4959	41.1	401.9	400.3	1.6	402.7	401.6	1.1	0.9981	0.9968
third point	4980	20.5	200.5	199.7	0.8	201.8	200.6	1.1	0.9934	0.9953
as left zero	5000	0.0	0.0	0.0	0.0	-0.7	0.0	-0.7	----	----
as left span	4918	82.1	802.9	400.7	402.2	796.2	413.9	382.4	1.0084	0.9682
								Average Correction Factor	0.9971	0.9968

Corrected As found	NO_X = 812.6 ppb	NO = 796.7 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	0.3%
Previous Response	NO_X = 810.4 ppb	NO = 796.5 ppb			*Percent Change	NO =	0.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.5	401.6	402.2	400.4	1.0045	99.6%
2nd GPT point (200 ppb O3)	800.5	606.9	196.9	195.6	1.0066	99.3%
3rd GPT point (100 ppb O3)	800.5	704.9	98.9	97.9	1.0101	99.0%
				Average Correction Factor	1.0070	99.3%

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

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

NO_X Calibration Summary

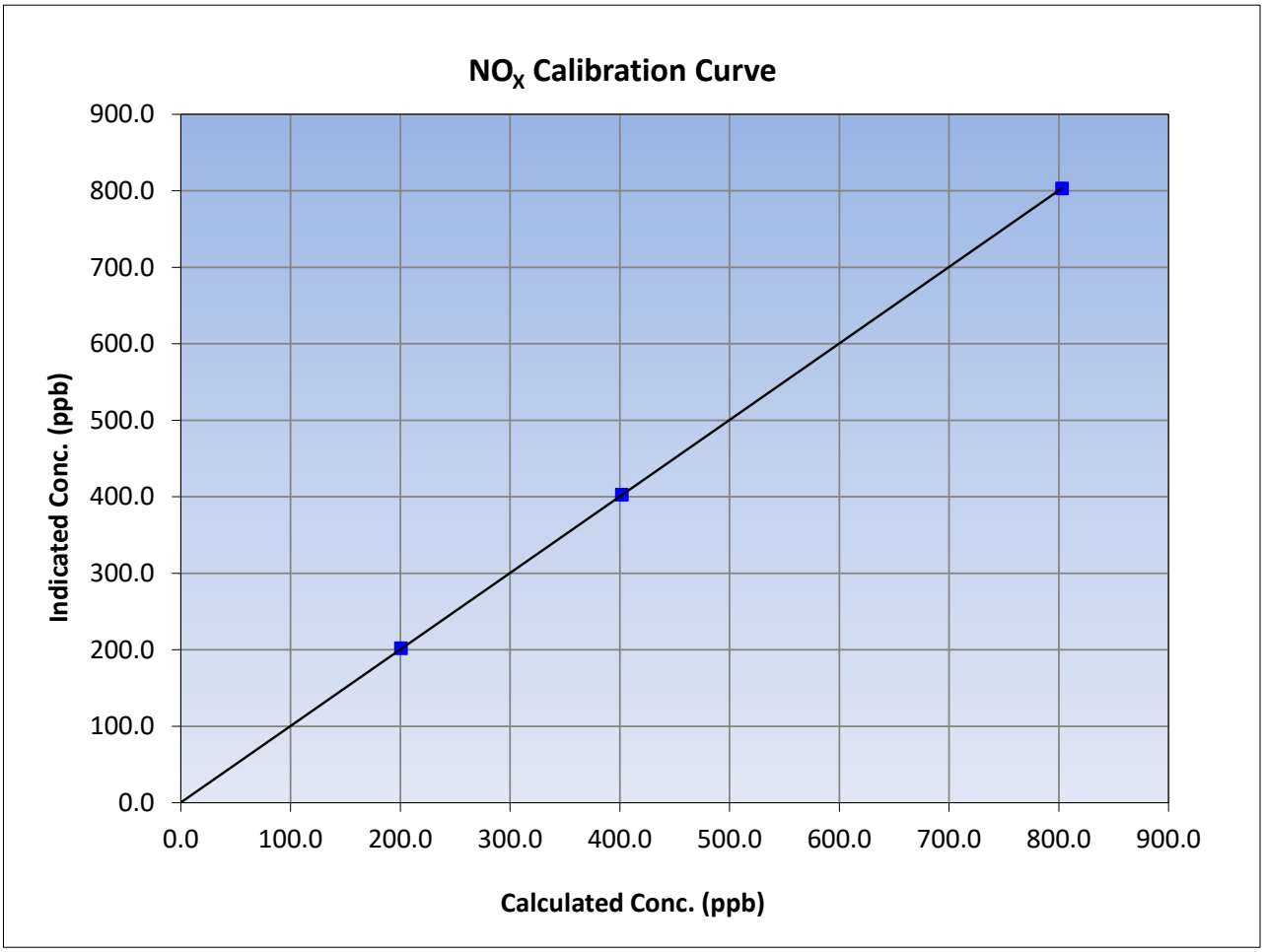
Version-04-2020

Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	December 13, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:17	End Time (MST):	16:56
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.6	----	Correlation Coefficient	0.999994	*≥0.995*
802.9	803.0	0.9999			
401.9	402.7	0.9981	Slope	1.000236	*0.90 - 1.10*
200.5	201.8	0.9934			
			Intercept	0.306500	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

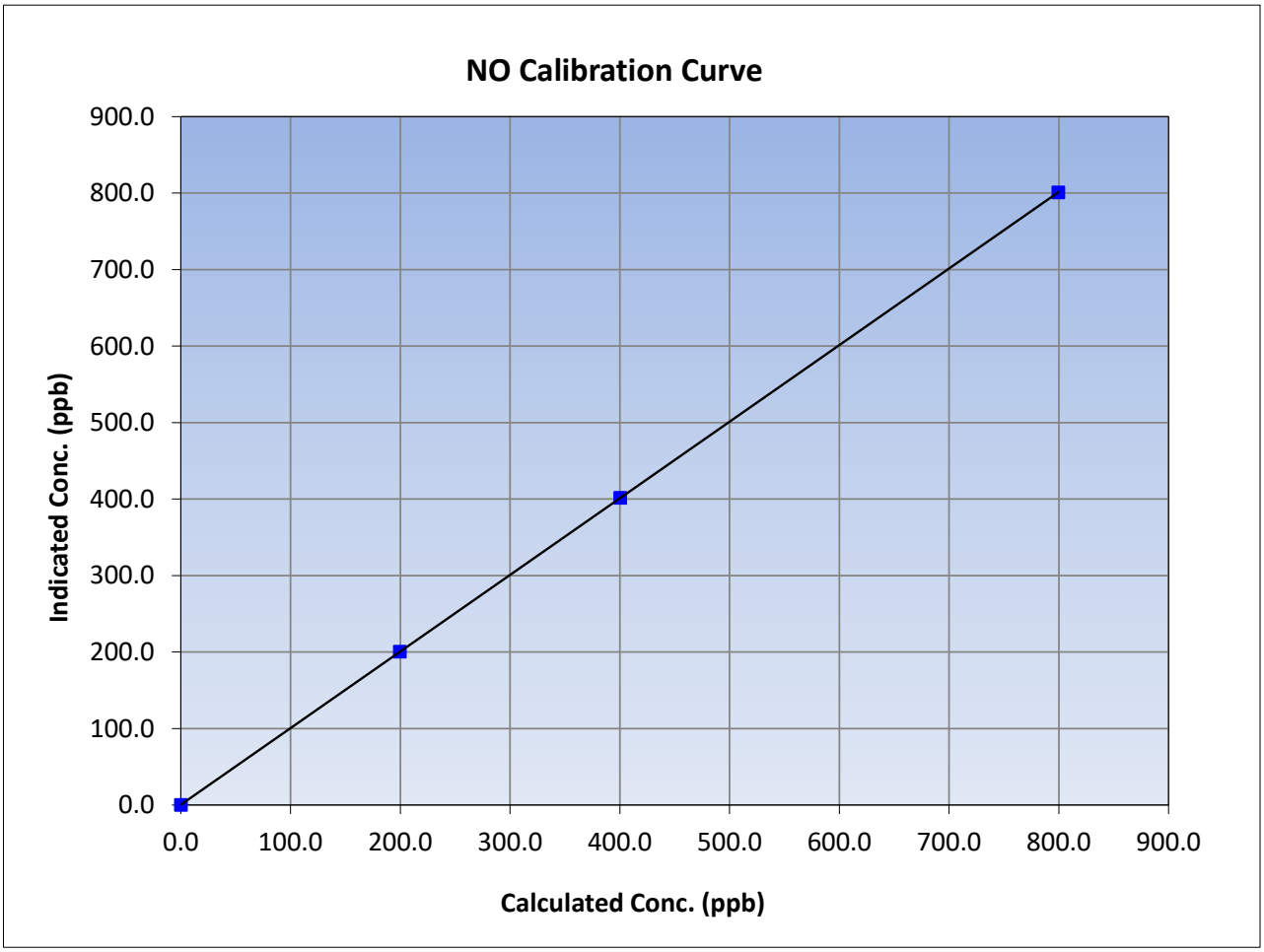
Version-04-2020

Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	December 13, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:17	End Time (MST):	16:56
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999999	≥0.995
799.6	801.0	0.9983			
400.3	401.6	0.9968	Slope	1.001429	0.90 - 1.10
199.7	200.6	0.9953			
			Intercept	0.426316	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

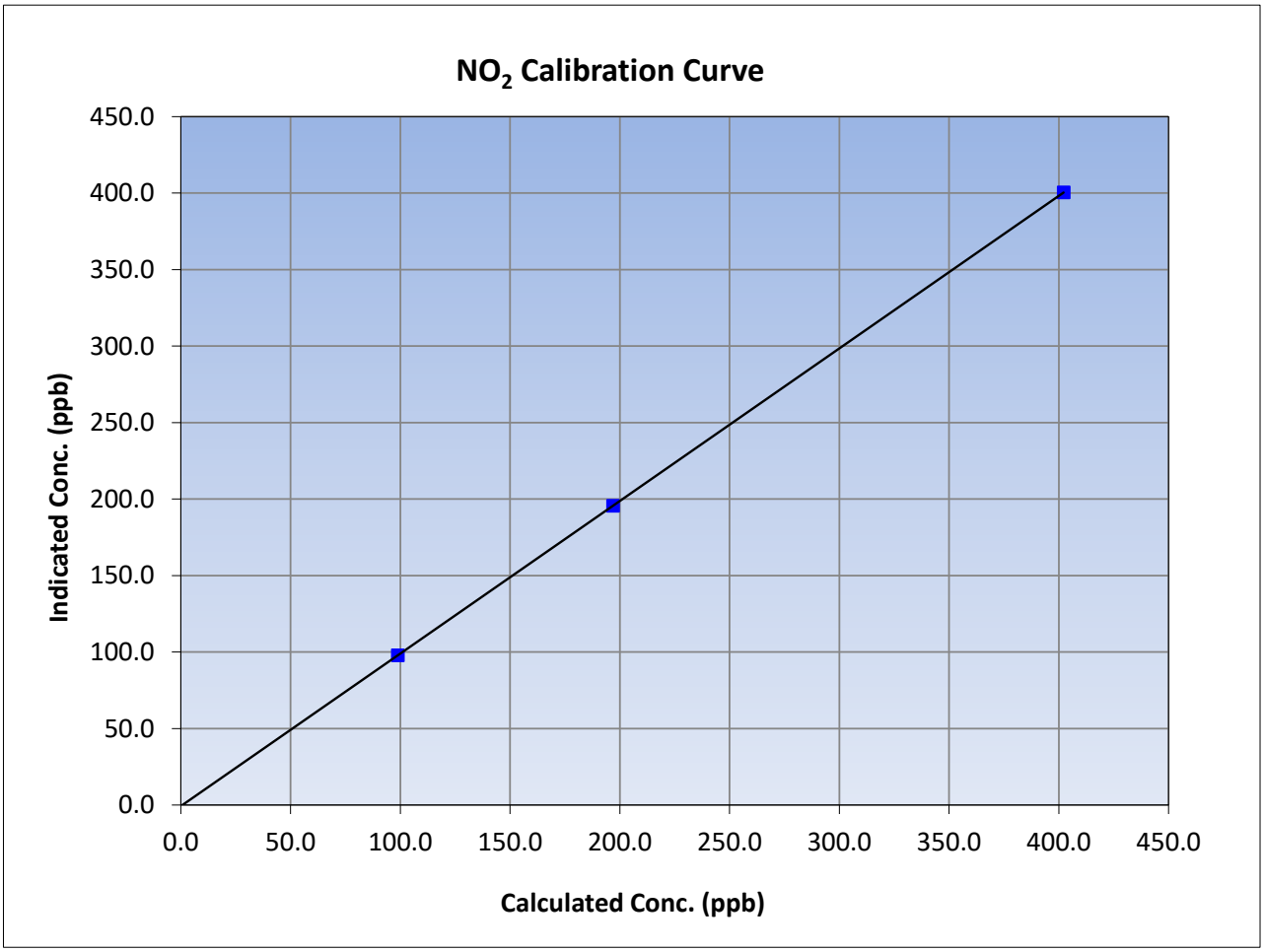
Version-04-2020

Station Information

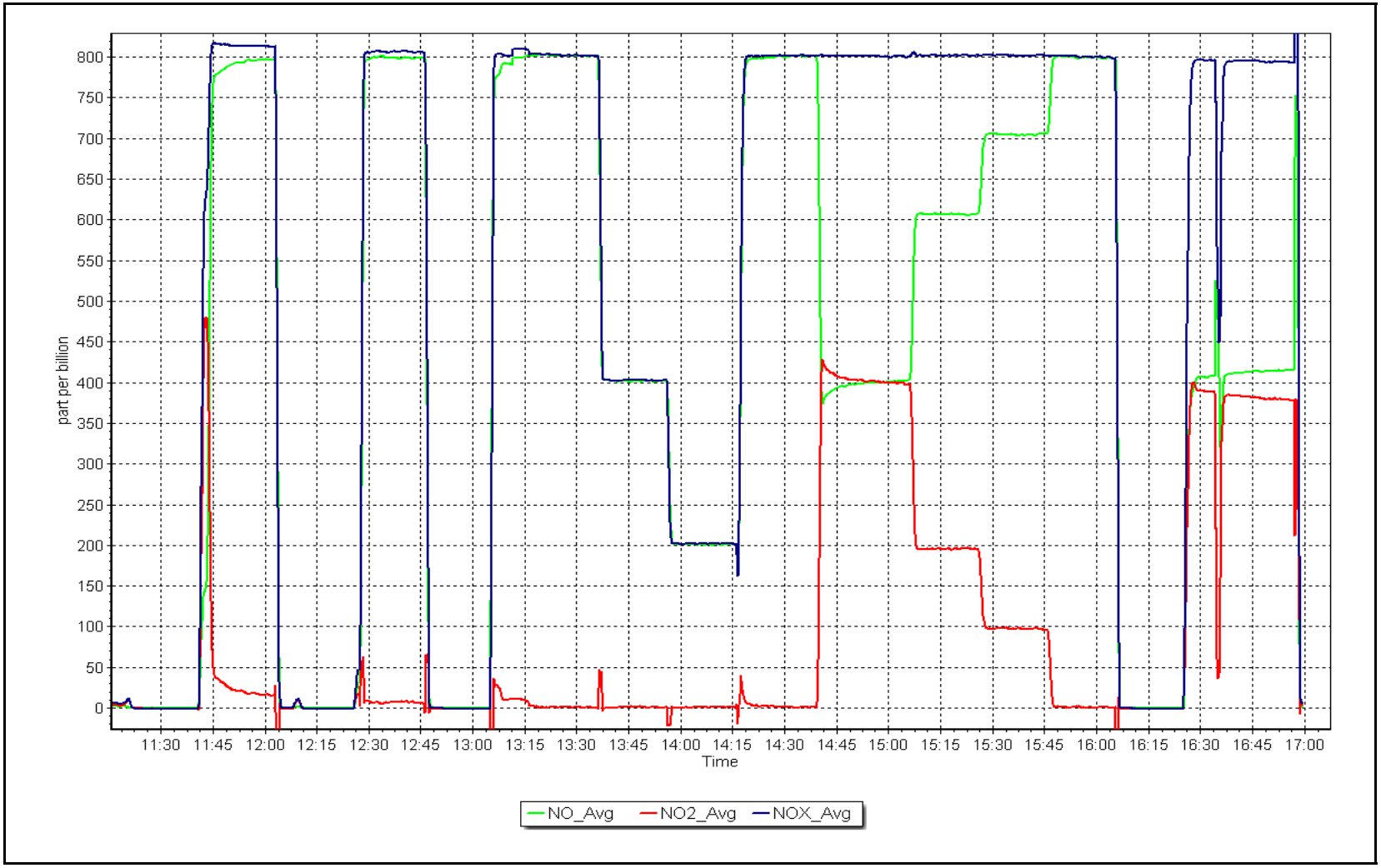
Calibration Date:	January 16, 2024	Previous Calibration:	December 13, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:17	End Time (MST):	16:56
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.7	----	Correlation Coefficient	1.000000	≥0.995
402.2	400.4	1.0045			
196.9	195.6	1.0066	Slope	0.997306	0.90 - 1.10
98.9	97.9	1.0101			
			Intercept	-0.717929	+/-20



NO_X Calibration Plot Date: January 16, 2024 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS 27
Calibration Date:	January 12, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	14:46	End time (MST):	17:35
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.58	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	SG9133974BAL			
Removed Cal Gas Conc:	50.58	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	268

Analyzer Information

Analyzer make: Thermo 43iQ — Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	0.989063	1.003874	Backgd or Offset:	7.6	7.8
Calibration intercept:	-2.298638	-2.957498	Coeff or Slope:	0.950	0.977

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.7	----
as found span	4921	79.1	800.2	780.7	1.025
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.9	----
high point	4921	79.1	800.2	801.8	0.998
second point	4961	39.5	399.5	397.5	1.005
third point	4980	19.8	200.3	193.4	1.036
as left zero	5000	0.0	0.0	0.9	----
as left span	4921	79.1	800.2	804.6	0.994
				Average Correction Factor	1.013

Baseline Corr As found:	780.00	Previous response	789.11	*% change	-1.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

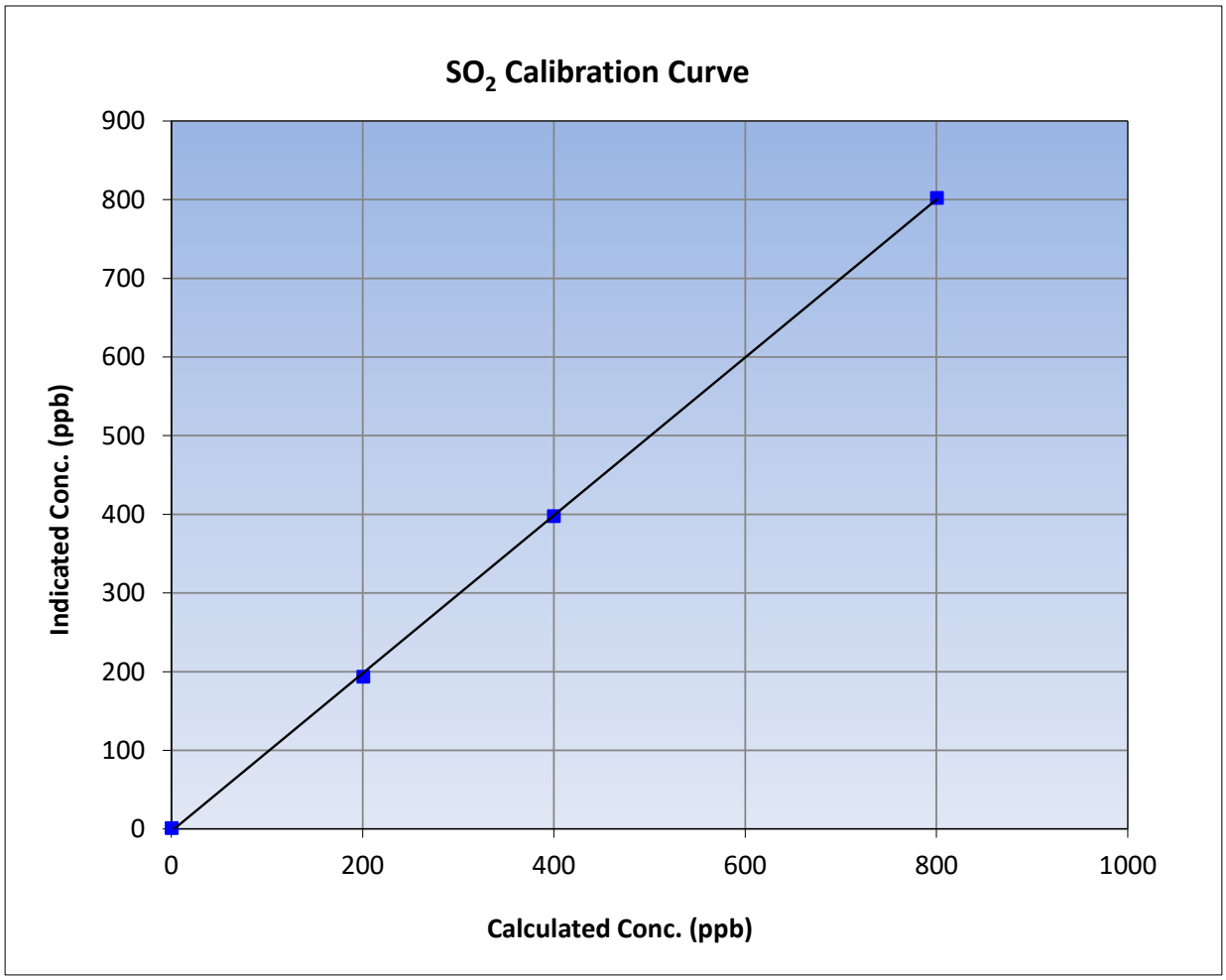
Station Information

Calibration Date:	January 12, 2024	Previous Calibration:	December 12, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	14:46	End Time (MST):	17:35
Analyzer make:	Thermo 43iQ	Analyzer serial #:	12124313138

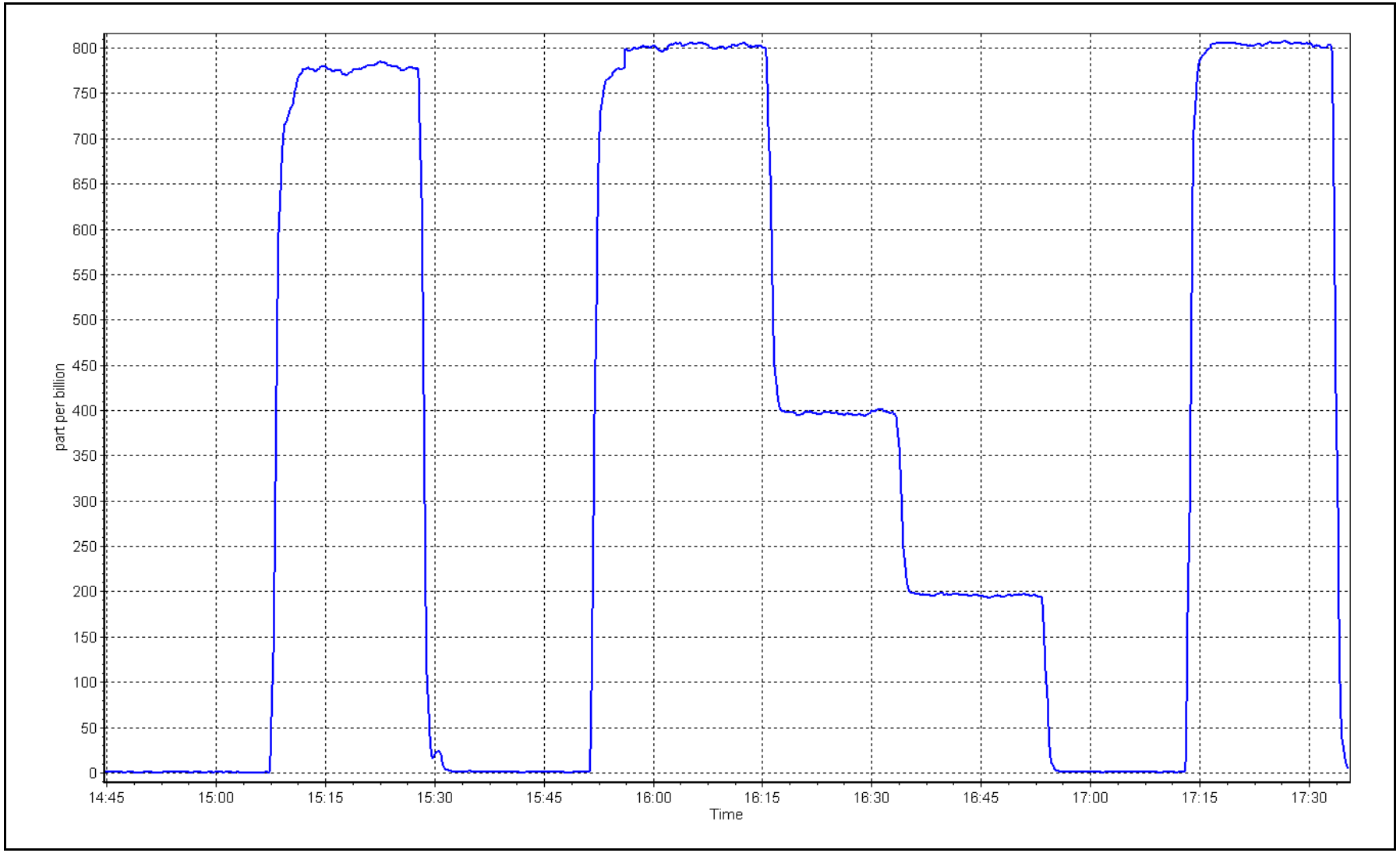
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.9	----
800.2	801.8	0.9980
399.5	397.5	1.0051
200.3	193.4	1.0357

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999887	*≥0.995*
Slope	1.003874	*0.90 - 1.10*
Intercept	-2.957498	*+/-30*



SO2 Calibration Plot Date: January 12, 2024 Location: Jackfish 2/3



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS 27
Calibration Date:	January 27, 2024	Last Cal Date:	NA
Start time (MST):	12:18	End time (MST):	14:27
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	50.58	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	SG9133974BAL			
Removed Cal Gas Conc:	50.58	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	268

Analyzer Information

Analyzer make: Thermo 43iQ-TL Analyzer serial #: 1203169745

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	NA	1.001831	Backgd or Offset:	NA	2.4
Calibration intercept:	NA	-0.817522	Coeff or Slope:	NA	0.774

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	79.1	800.2	801.0	0.999
second point	4961	39.5	399.5	400.1	0.999
third point	4980	19.8	200.3	197.8	1.013
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.1	800.2	798.1	1.003
				Average Correction Factor	1.003

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: Installation calibrations. Adjusted span only.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

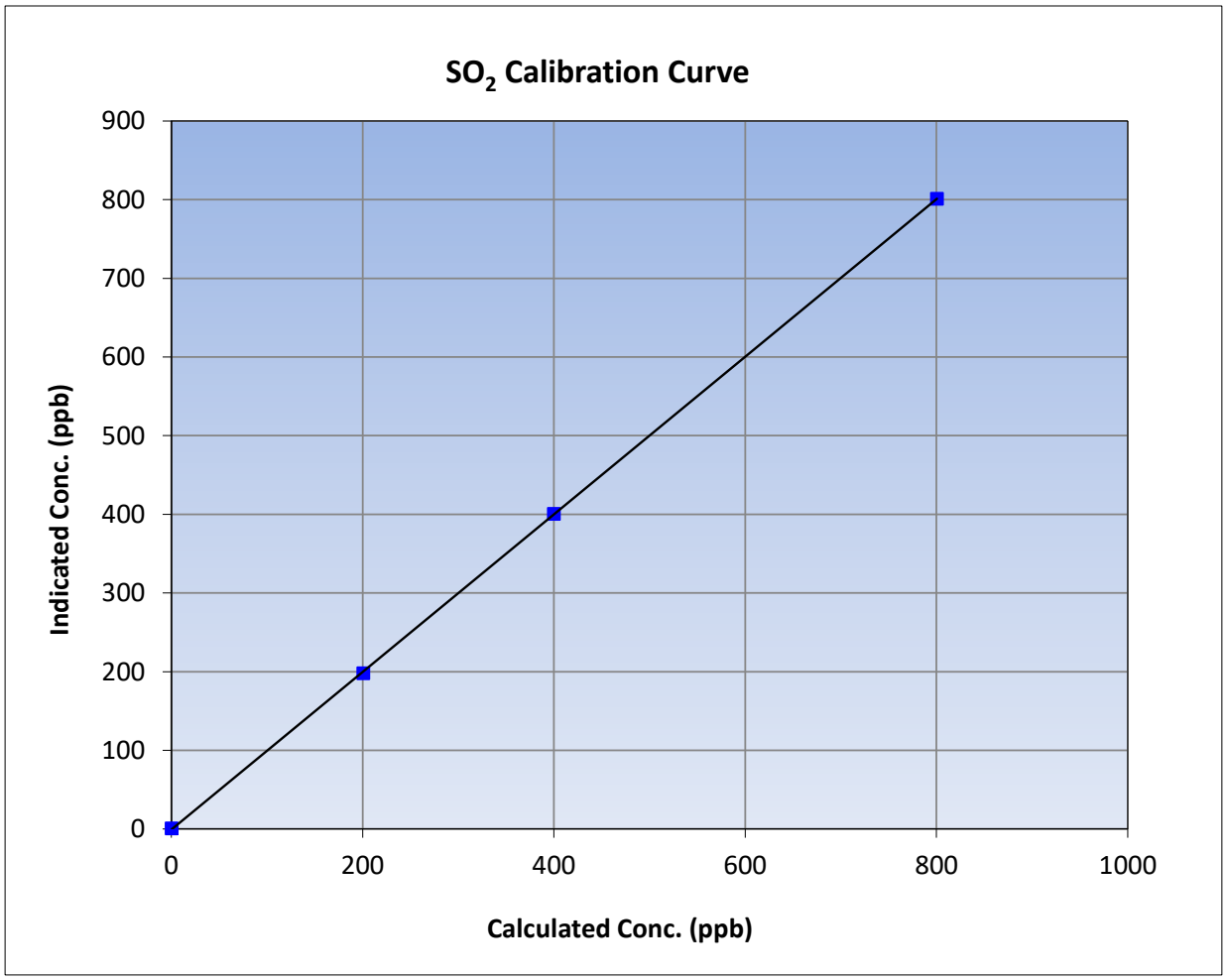
Station Information

Calibration Date:	January 27, 2024	Previous Calibration:	NA
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	12:18	End Time (MST):	14:27
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169745

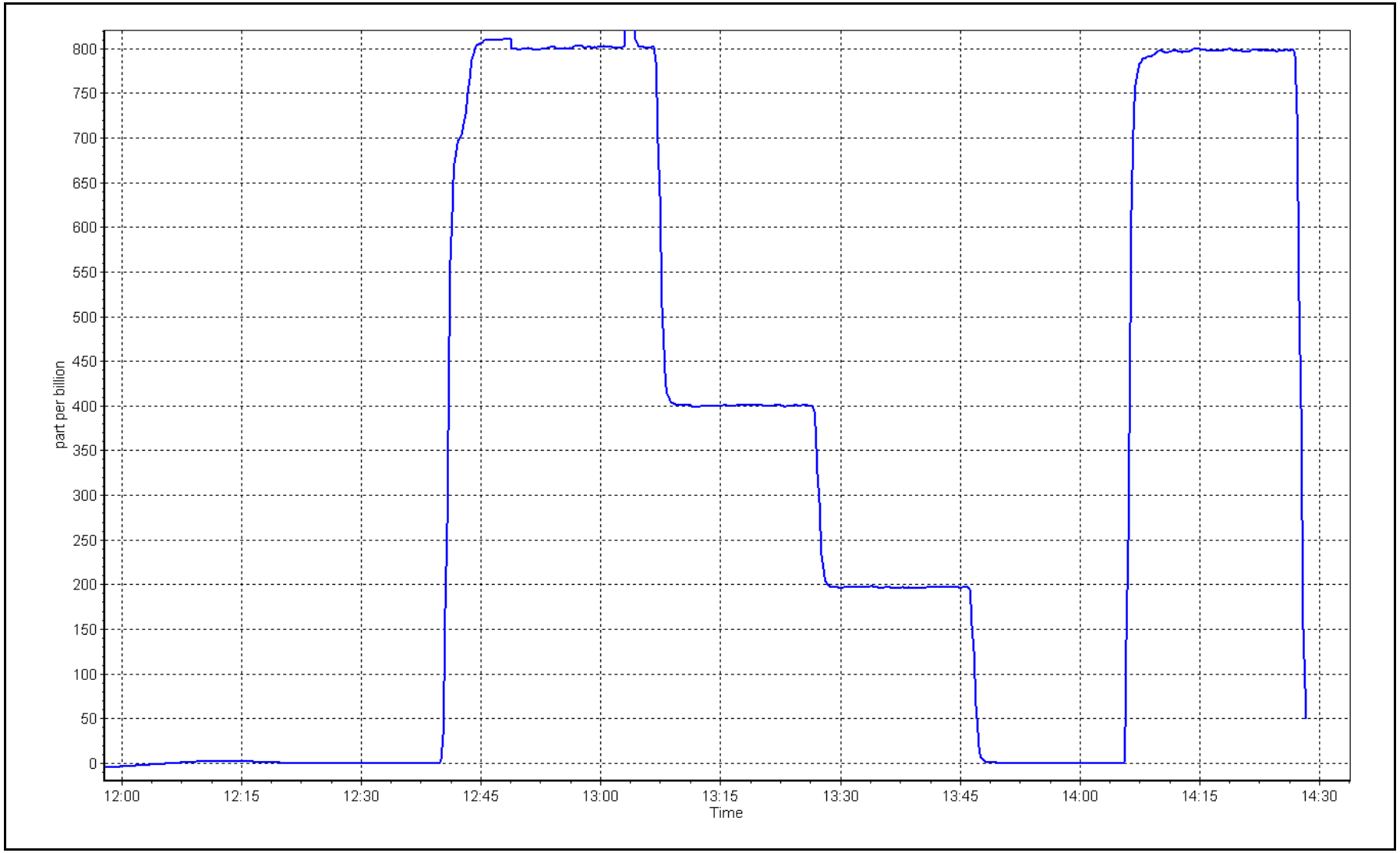
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.2	801.0	0.9990
399.5	400.1	0.9986
200.3	197.8	1.0127

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	1.001831	*0.90 - 1.10*
Intercept	-0.817522	*+/-30*



SO2 Calibration Plot Date: January 27, 2024 Location: Jackfish 2/3



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS27
Calibration Date:	January 12, 2024	Last Cal Date:	December 11, 2023
Start time (MST):	8:21	End time (MST):	14:45
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:	268

Analyzer Information

Analyzer make:	API T101		Analyzer serial #:	621	
Converter make:			Converter serial #:		
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007470	1.010462	Backgd or Offset:	29.9	29.9
Calibration intercept:	-0.217773	0.002360	Coeff or Slope:	0.953	1.013

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.4	----
as found span	4926	74.1	80.2	76.0	1.049
as found 2nd point	4963	37.0	40.0	37.9	1.045
as found 3rd point	4982	18.5	20.0	18.7	1.048
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4926	74.1	80.2	81.0	0.990
second point	4963	37.0	40.0	40.7	0.984
third point	4982	18.5	20.0	19.8	1.011
as left zero	5000	0.0	0.0	0.1	----
as left span	4926	74.1	80.2	80.6	0.995
SO2 Scrubber Check	4921	79.1	791.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	76.4	Prev response:	80.56	*% change:	-5.4%
Baseline Corr 2nd AF pt:	38.3	AF Slope:	0.953017	AF Intercept:	-0.358868
Baseline Corr 3rd AF pt:	19.1	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

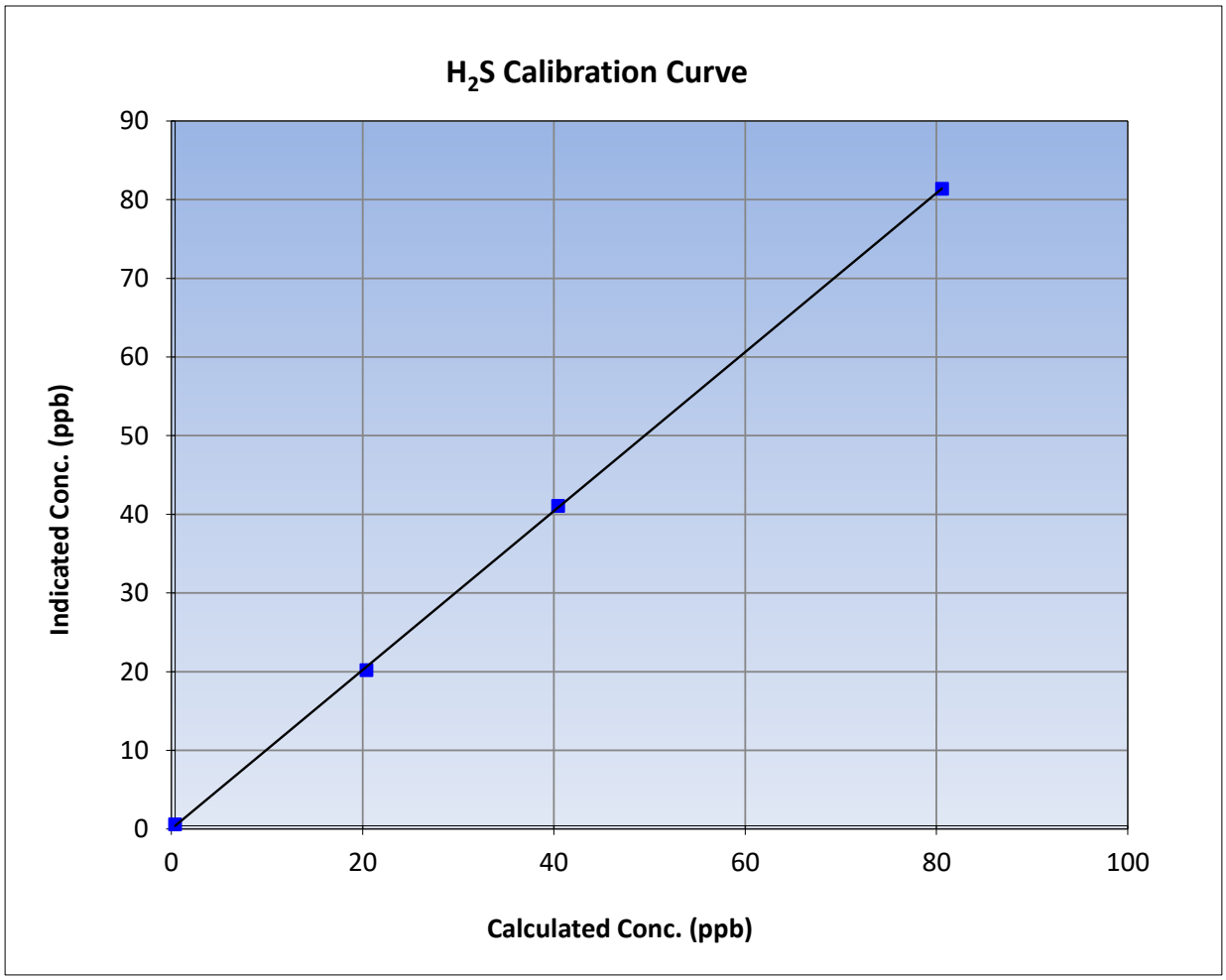
Station Information

Calibration Date:	January 12, 2024	Previous Calibration:	December 11, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	8:21	End Time (MST):	14:45
Analyzer make:	API T101	Analyzer serial #:	621

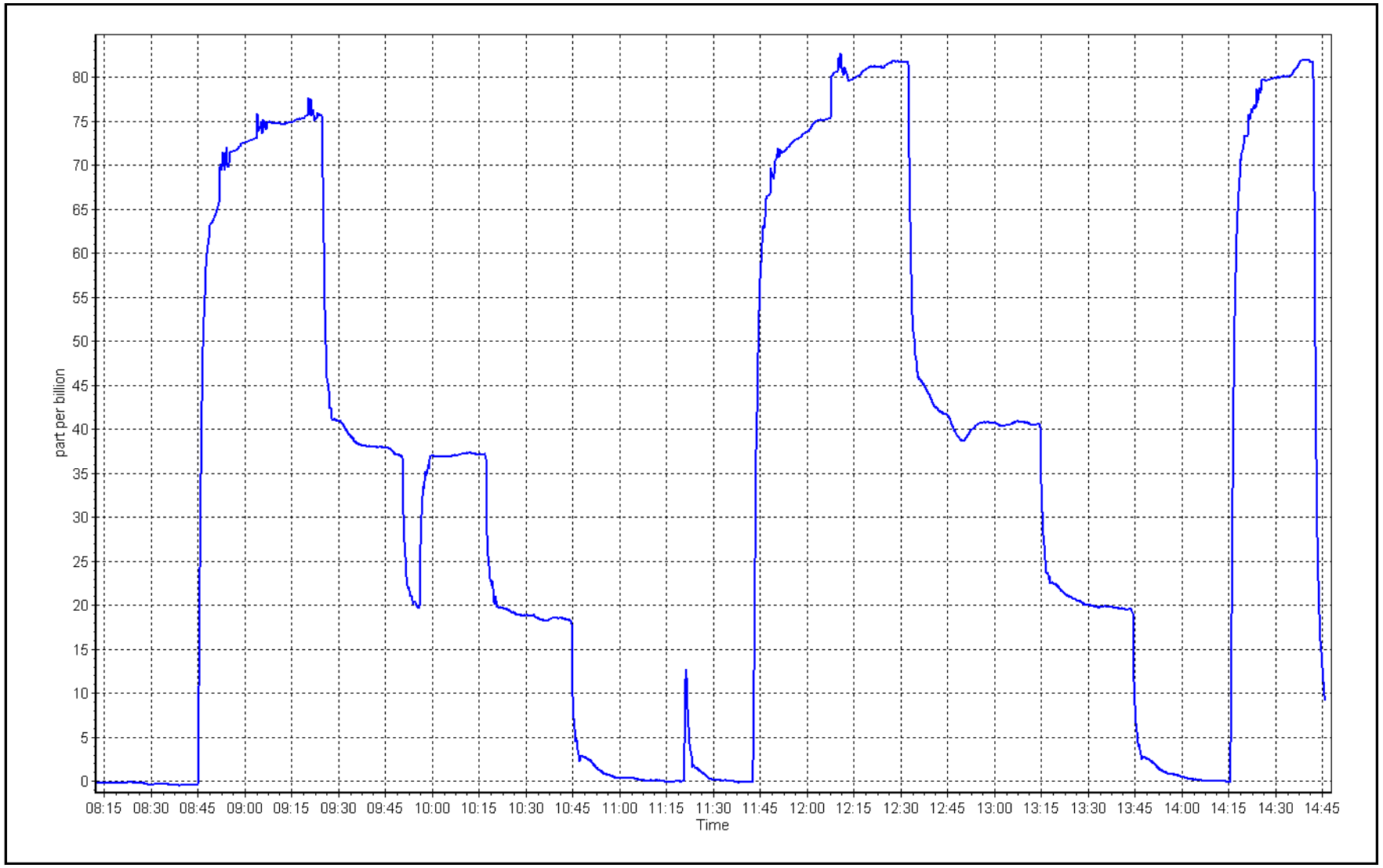
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.2	81.0	0.9898
40.0	40.7	0.9836
20.0	19.8	1.0109

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999922	*≥0.995*
Slope	1.010462	*0.90 - 1.10*
Intercept	0.002360	*+/-3*



H_2S Calibration Plot Date: January 12, 2024 Location: Jackfish 2/3



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS27
Calibration Date:	January 11, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	12:17	End time (MST):	17:58
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P35		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	51.44	ppm	NO Cal Gas Conc:	50.40	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.44	ppm	Removed Gas NO Conc:	50.40	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3811	
ZAG make/model:	API T701		Serial Number:	268	

Analyzer Information

Analyzer make:	API T200		Analyzer serial #:	722	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.193	1.193	NO bkgnd or offset:	0.3	0.3
NOX coeff or slope:	1.169	1.169	NOX bkgnd or offset:	1.2	1.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	3.2	3.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997956	0.992430
NO_X Cal Offset:	-3.637422	-3.538303
NO Cal Slope:	0.996647	0.998816
NO Cal Offset:	-3.021240	-3.680579
NO_2 Cal Slope:	0.990498	0.979539
NO_2 Cal Offset:	-1.079298	-1.570350

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.3	-0.4	----	----
as found span	4921	79.4	816.8	800.3	16.5	809.0	793.9	15.1	1.0096	1.0080
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.4	-0.6	----	----
high point	4921	79.4	816.8	800.3	16.5	808.9	798.3	10.6	1.0098	1.0025
second point	4960	39.7	408.5	400.2	8.3	399.8	392.2	7.6	1.0217	1.0204
third point	4980	19.8	203.7	199.6	4.1	195.4	192.8	2.6	1.0425	1.0352
as left zero	5000	0.0	0.0	0.0	0.0	0.9	0.9	0.0	----	----
as left span	4921	79.4	816.8	430.6	402.5	800.1	414.0	386.2	1.0209	1.0401
								Average Correction Factor	1.0247	1.0194

Corrected As found	NO_X = 809.7 ppb	NO = 794.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.2%
Previous Response	NO_X = 811.5 ppb	NO = 794.6 ppb		*Percent Change	NO = 0.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.7	410.7	402.5	393.4	1.0232	97.7%
2nd GPT point (200 ppb O3)	796.7	620.8	192.4	185.7	1.0362	96.5%
3rd GPT point (100 ppb O3)	796.7	711.2	102.0	97.9	1.0420	96.0%
				Average Correction Factor	1.0338	96.7%

Notes: Changed sample inlet filter after as founds. No adjustments made. Third GPT point barely passed intending to investigate further.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

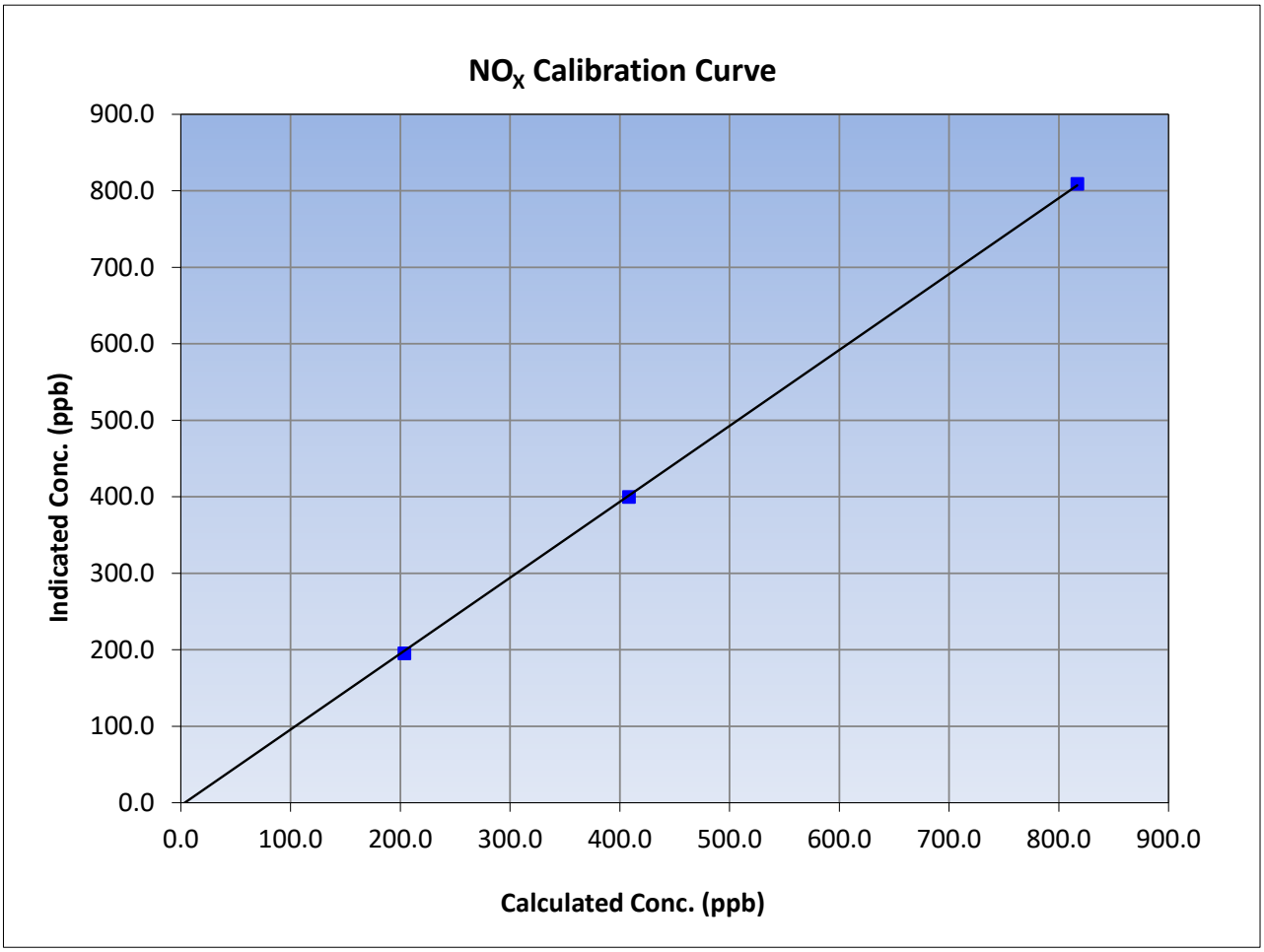
Version-04-2020

Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 12, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:17	End Time (MST):	17:58
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	0.999917	≥0.995
816.8	808.9	1.0098			
408.5	399.8	1.0217	Slope	0.992430	0.90 - 1.10
203.7	195.4	1.0425			
			Intercept	-3.538303	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

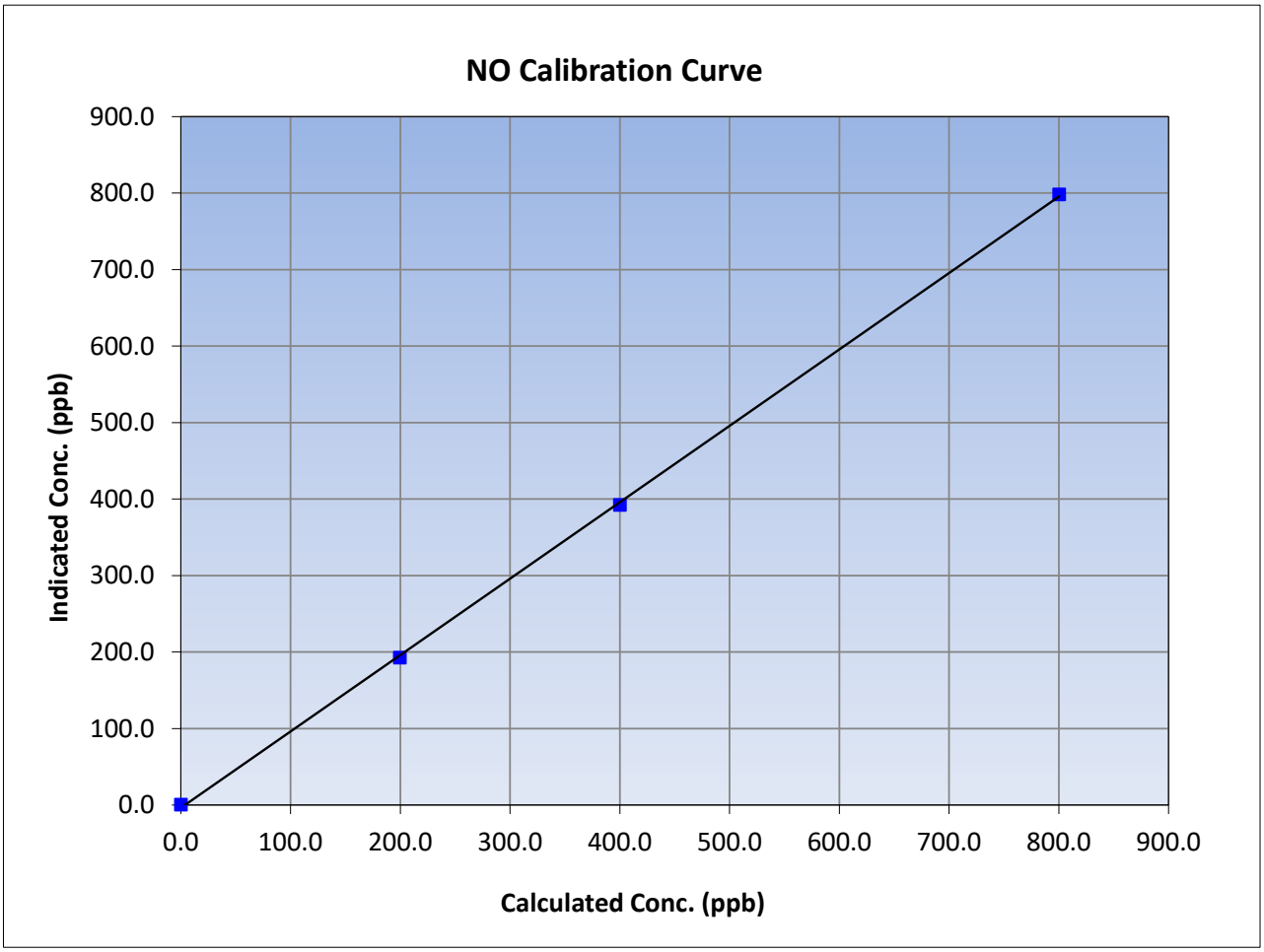
Version-04-2020

Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 12, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:17	End Time (MST):	17:58
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	0.4	----	Correlation Coefficient	0.999866	≥0.995
800.3	798.3	1.0025			
400.2	392.2	1.0204	Slope	0.998816	0.90 - 1.10
199.6	192.8	1.0352			
			Intercept	-3.680579	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

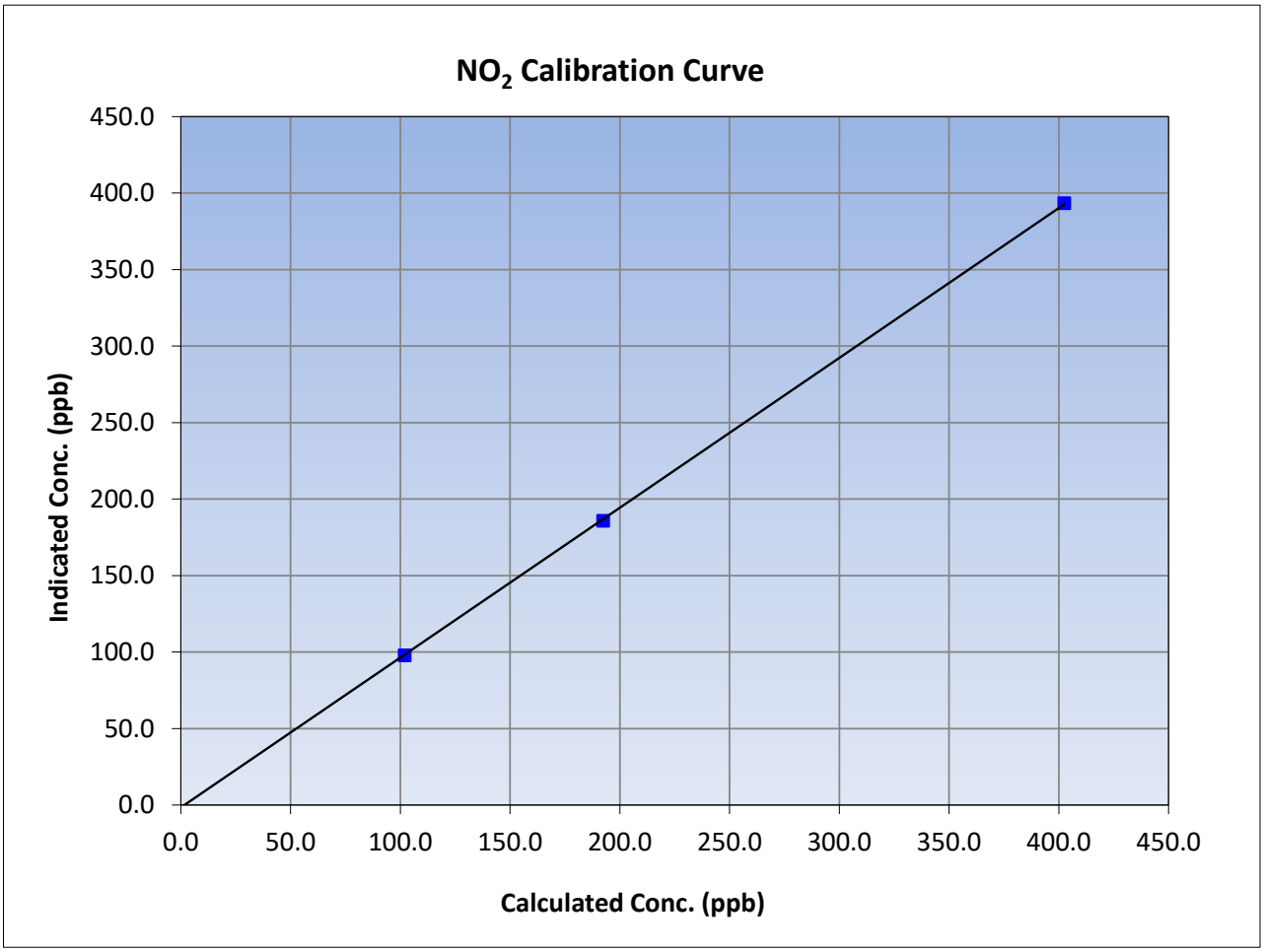
Version-04-2020

Station Information

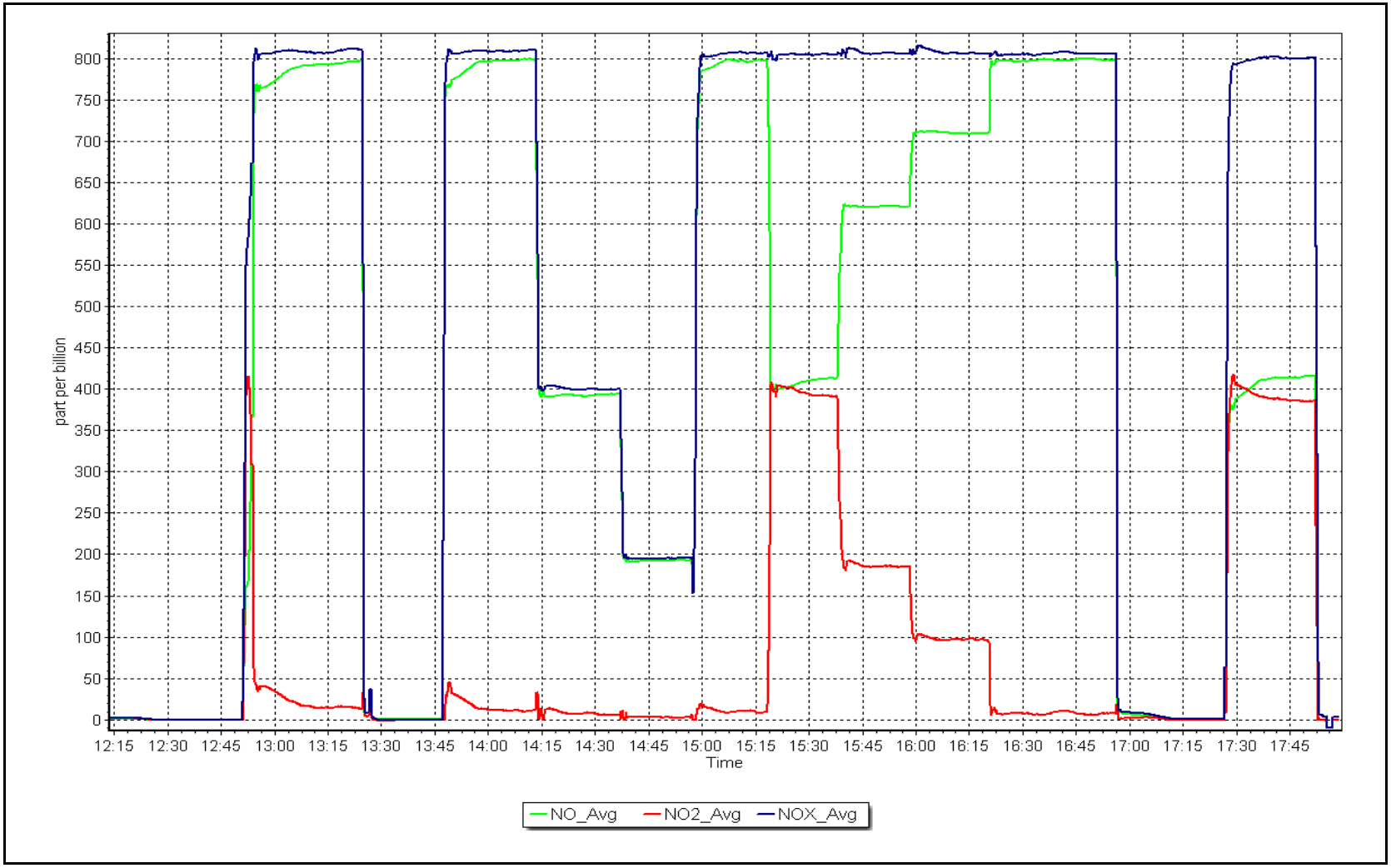
Calibration Date:	January 11, 2024	Previous Calibration:	December 12, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:17	End Time (MST):	17:58
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.6	----	Correlation Coefficient	0.999963	≥0.995
402.5	393.4	1.0232			
192.4	185.7	1.0362	Slope	0.979539	0.90 - 1.10
102.0	97.9	1.0420			
			Intercept	-1.570350	+/-20



NO_X Calibration Plot Date: January 11, 2024 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	January 5, 2024	Last Cal Date:	December 1, 2023
Start time (MST):	11:06	End time (MST):	15:58
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.21	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC356008			
Removed Cal Gas Conc:	49.21	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5472
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1170050150

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006697	1.001159	Backgd or Offset:	12.5	13.5
Calibration intercept:	-1.824842	-1.385825	Coeff or Slope:	0.937	0.976

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	4919	81.3	800.1	770.7	1.038
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4919	81.3	800.1	800.2	1.000
second point	4959	40.7	400.6	399.4	1.003
third point	4979	20.3	199.8	197.0	1.014
as left zero	5000	0.0	0.0	-0.1	----
as left span	4919	81.3	800.1	802.0	0.998
				Average Correction Factor	1.006

Baseline Corr As found:	770.30	Previous response	803.64	*% change	-4.3%
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 zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

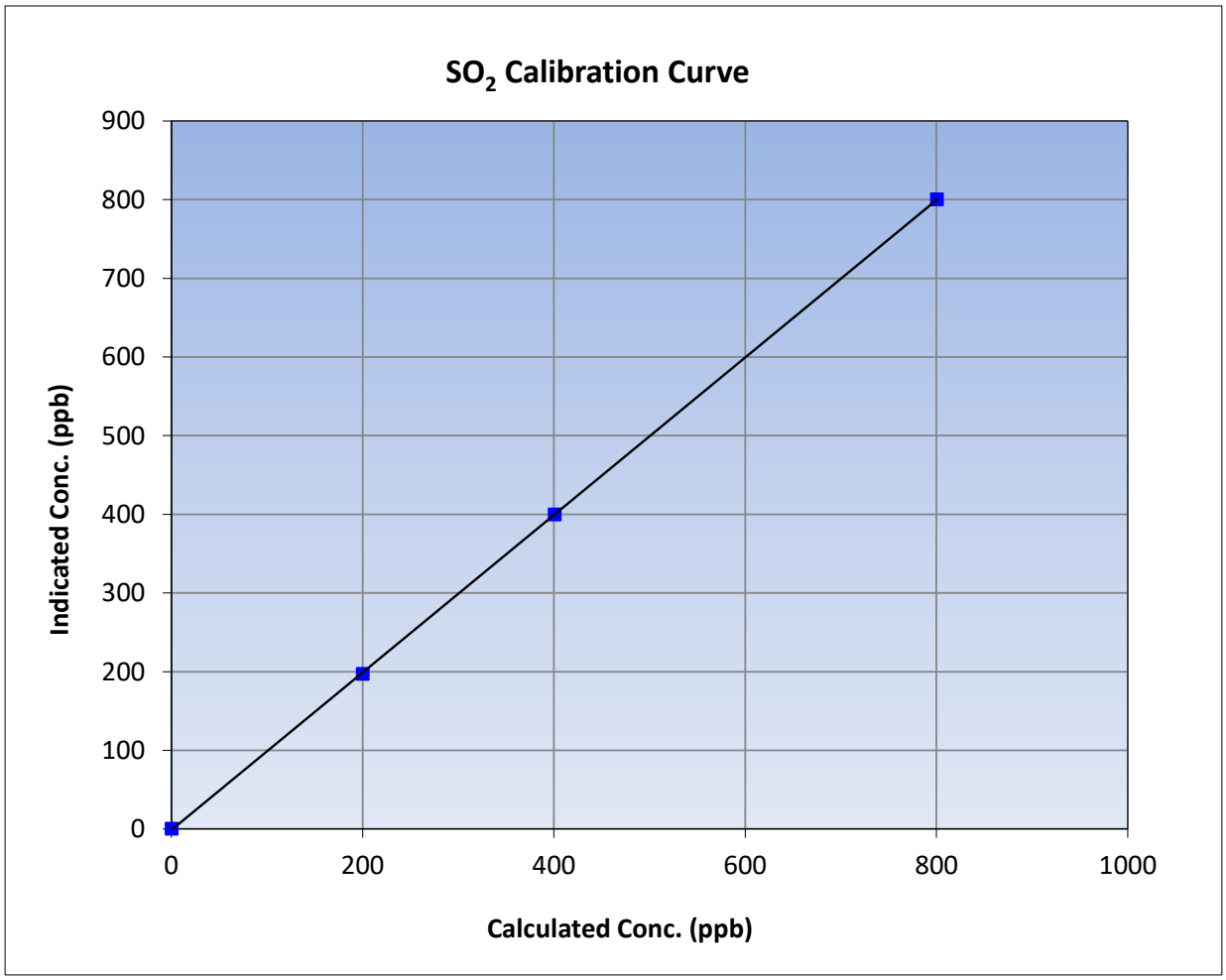
Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 1, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	11:06	End Time (MST):	15:58
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

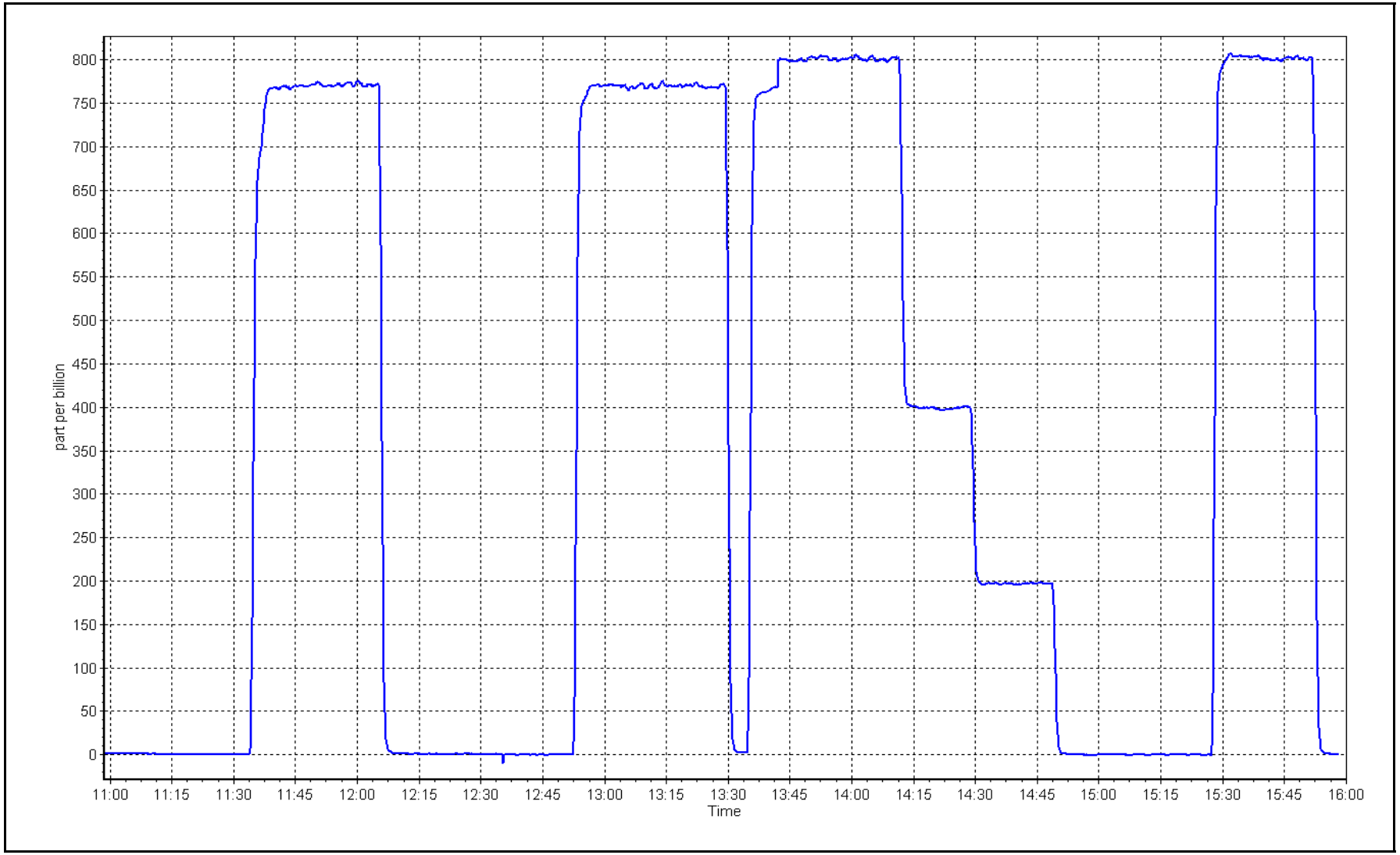
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.1	800.2	0.9999
400.6	399.4	1.0030
199.8	197.0	1.0143

Statistical Evaluation		Limits
Correlation Coefficient	0.999986	≥0.995
Slope	1.001159	0.90 - 1.10
Intercept	-1.385825	+/-30



SO2 Calibration Plot Date: January 5, 2024 Location: Surmont 2



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	January 3, 2024	Last Cal Date:	December 4, 2023
Start time (MST):	10:42	End time (MST):	15:02
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.391	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC508338			
Removed Cal Gas Conc:	5.391	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	CC508338		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5472
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make:	Thermo 43iQ-TLE		Analyzer serial #:	1200326170	
Converter make:	Global		Converter serial #:	2022-220	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003331	1.004616	Backgd or Offset:	0.92	0.92
Calibration intercept:	-0.082920	-0.102938	Coeff or Slope:	1.074	1.074

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4926	74.2	80.0	80.6	0.991
as found 2nd point	4963	37.2	40.1	40.3	0.993
as found 3rd point	4982	18.6	20.1	20.0	0.998
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.2	80.0	80.3	0.996
second point	4963	37.2	40.1	40.2	0.998
third point	4982	18.6	20.1	19.9	1.008
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	80.3	0.996
SO2 Scrubber Check	4919	81.3	813.0	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:	40.4	AF Slope:	1.009188	AF Intercept:	-0.163146
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999997		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. No adjustments made. Scrubber check done after cal zero, passed.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

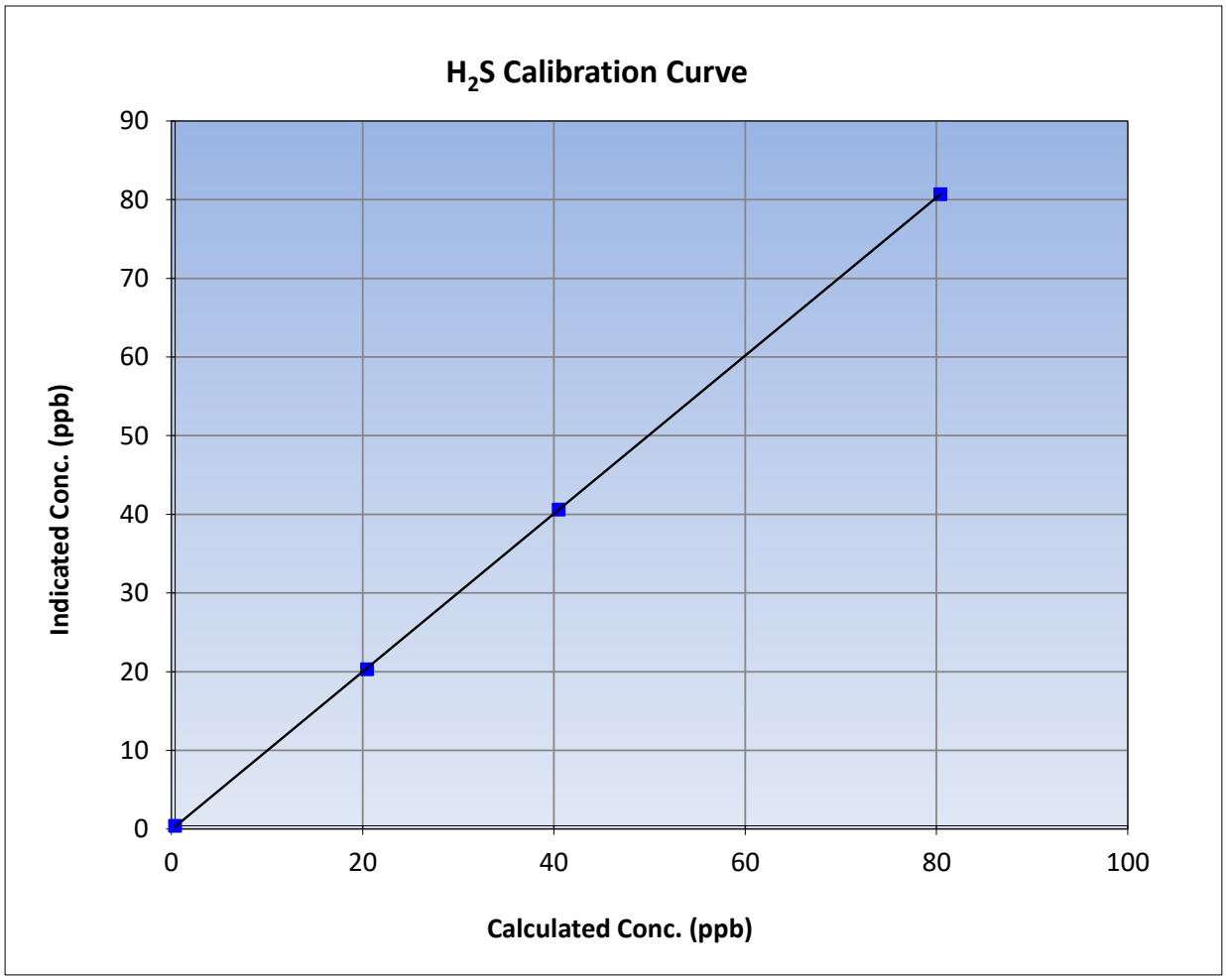
Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 4, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:42	End Time (MST):	15:02
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

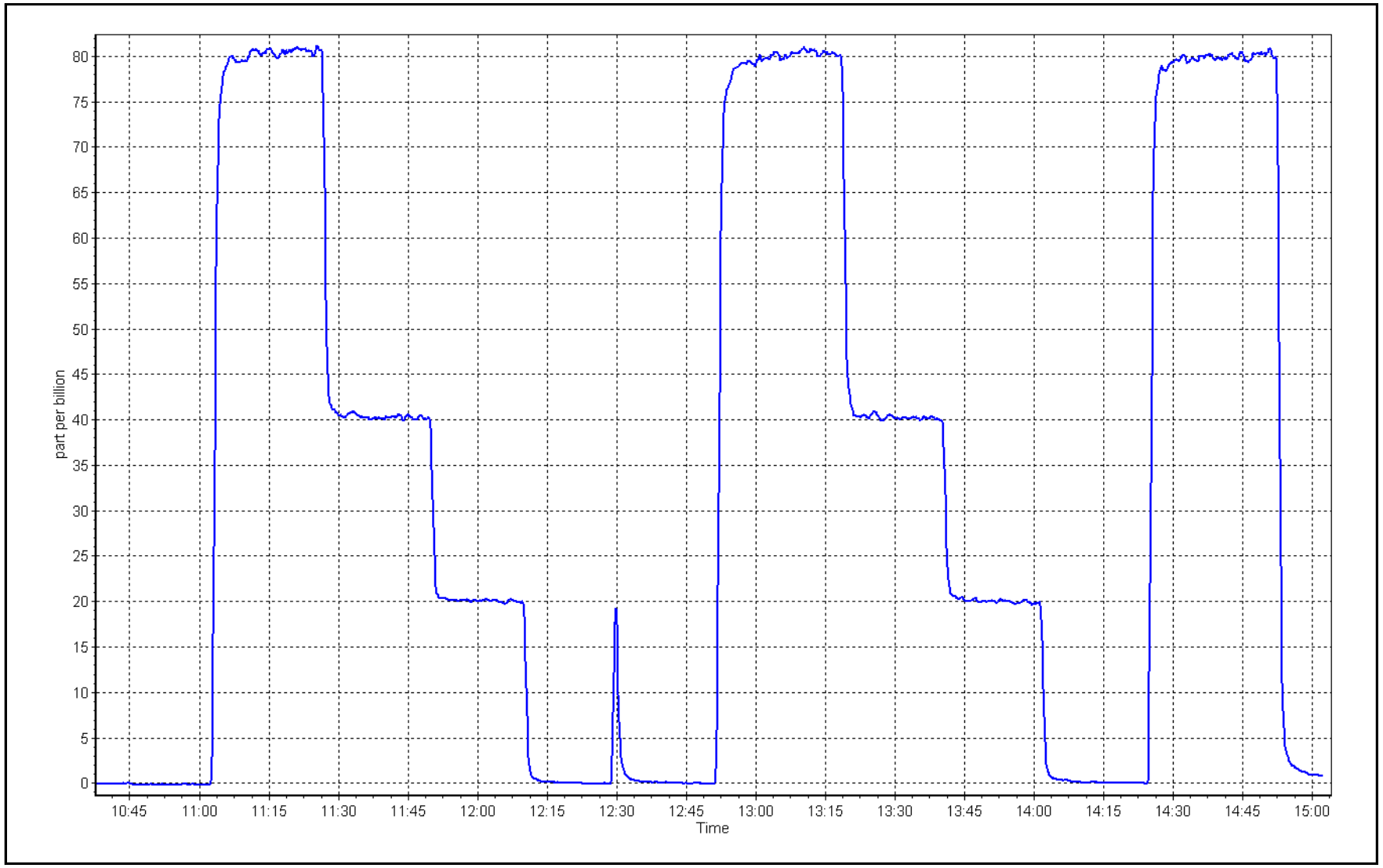
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.3	0.9963
40.1	40.2	0.9977
20.1	19.9	1.0077

Statistical Evaluation		Limits
Correlation Coefficient	0.999991	≥0.995
Slope	1.004616	0.90 - 1.10
Intercept	-0.102938	+/-3



H_2S Calibration Plot Date: January 3, 2024 Location: Surmont 2



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	January 5, 2024	Last Cal Date:	December 1, 2023
Start time (MST):	11:06	End time (MST):	15:58
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC356008		Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	499.0	ppm	CH4 Equiv Conc.	1064.7	ppm
C3H8 Cal Gas Conc.	205.7	ppm			
Removed Gas Cert:	NA		Removed Gas Expiry:	NA	
Removed CH4 Conc.	499.0	ppm	CH4 Equiv Conc.	1064.7	ppm
Removed C3H8 Conc.	205.7	ppm	Diff between cyl:		
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5472	
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297	

Analyzer Information

Analyzer make: Thermo 51i-LT
Analyzer serial #: 1170050149
Analyzer Range: 0 - 20 ppm

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.007452	1.001735	Background:	3.45	3.62
Calibration intercept:	-0.027439	-0.005651	Coefficient:	4.017	4.021

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.12	----
as found span	4918	81.3	17.31	17.60	0.984
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.02	----
high point	4918	81.3	17.31	17.36	0.997
second point	4959	40.6	8.65	8.62	1.003
third point	4979	20.3	4.32	4.31	1.003
as left zero	5000	0.0	0.00	0.13	----
as left span	4918	81.3	17.31	17.66	0.980
				Average Correction Factor	1.001

Baseline Corr As found:	17.48	Previous response	17.42	*% change	0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted zero and span. Excessive noise fixed after reconnecting ethernet cable.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

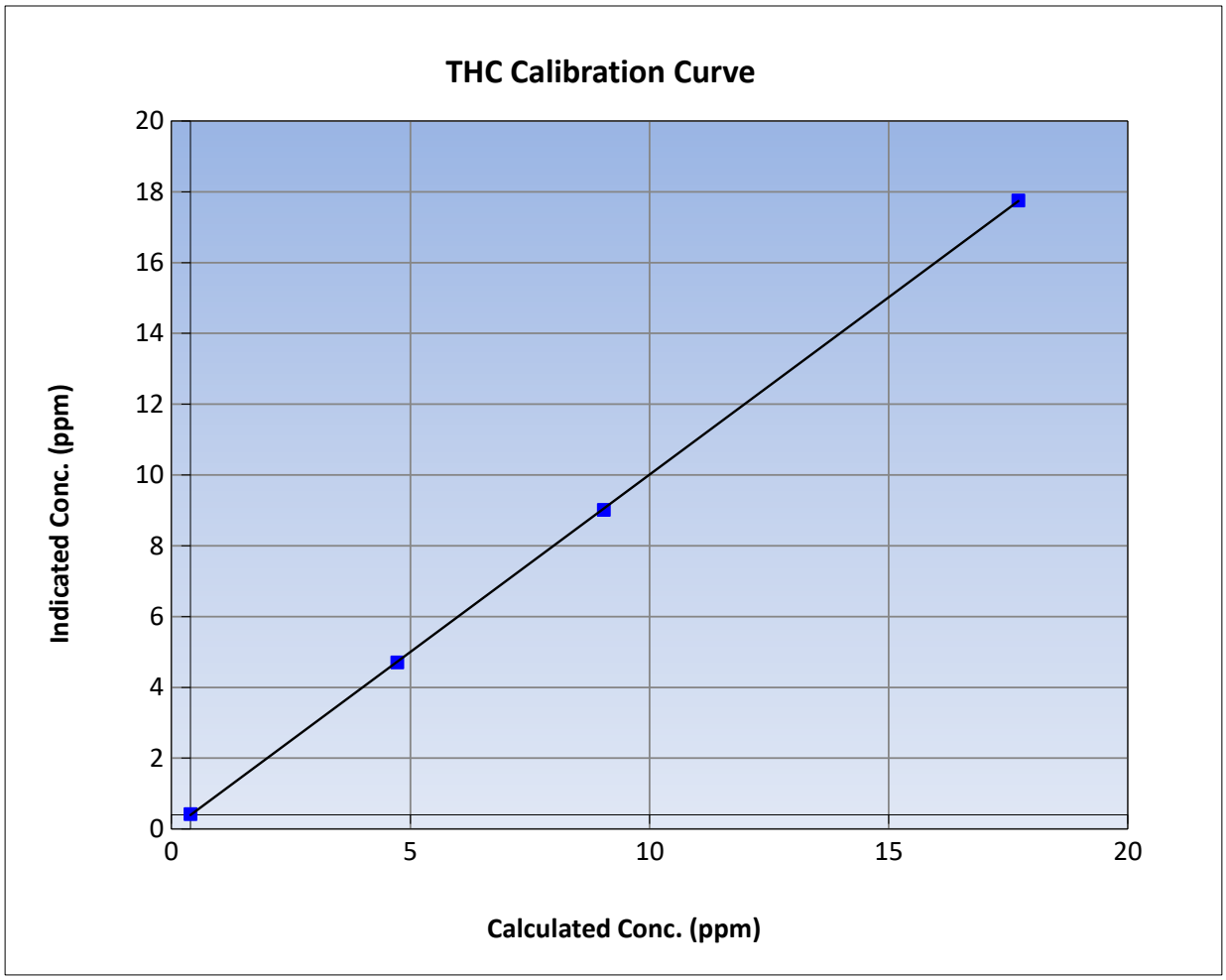
Station Information

Calibration Date:	January 5, 2024	Previous Calibration:	December 1, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	11:06	End Time (MST):	15:58
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

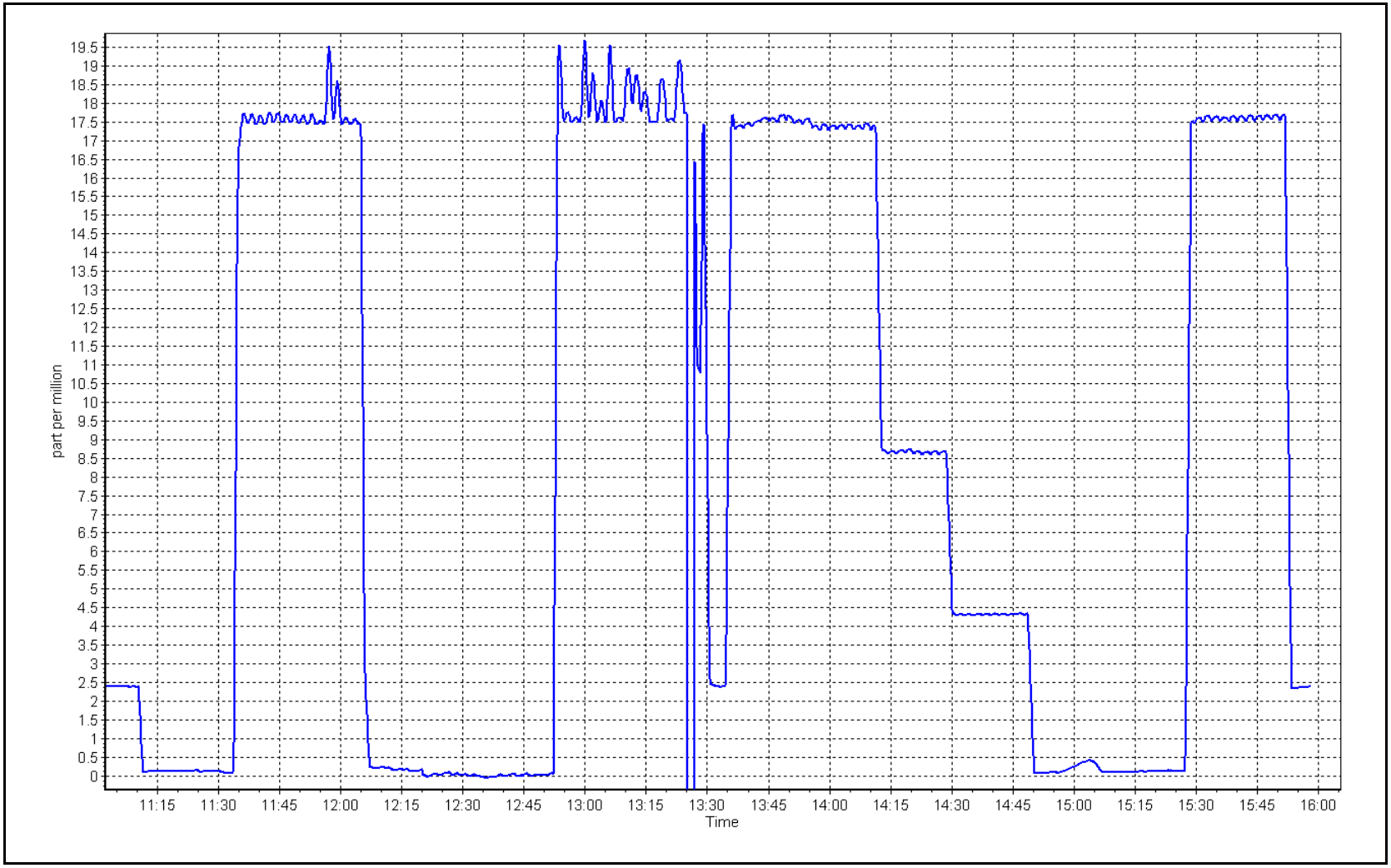
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.02	----
17.31	17.36	0.9974
8.65	8.62	1.0030
4.32	4.31	1.0033

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.001735	*0.90 - 1.10*
Intercept	-0.005651	*+/-1.5*



THC Calibration Plot Date: January 5, 2024 Location: Surmont 2



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	January 4, 2024	Last Cal Date:	December 5, 2023
Start time (MST):	10:46	End time (MST):	16:24
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T12YYFE	Cal Gas Expiry Date:	October 30, 2024	
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.46	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.46	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	5472	
ZAG make/model:	Teledyne API T701		Serial Number:	4297	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1170050148	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.374	1.390	NO bkgnd or offset:	1.3	1.4
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.5	176.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999051	0.998364
NO_X Cal Offset:	0.087651	-0.271978
NO Cal Slope:	1.000223	0.997476
NO Cal Offset:	-1.272240	-0.811525
NO_2 Cal Slope:	1.001015	1.004575
NO_2 Cal Offset:	0.481350	0.126759

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	----	----
as found span	4916	84.2	799.2	799.2	0.0	793.5	790.0	3.5	1.0072	1.0116
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4916	84.2	799.2	799.2	0.0	797.0	796.0	0.9	1.0028	1.0040
second point	4958	42.1	399.6	399.6	0.0	400.7	399.6	1.1	0.9973	1.0000
third point	4979	21.1	200.3	200.3	0.0	198.1	196.8	1.4	1.0110	1.0177
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as left span	4916	84.2	799.2	407.2	392.0	792.6	401.0	391.6	1.0083	1.0154
								Average Correction Factor	1.0037	1.0072

Corrected As found	NO_X = 793.7 ppb	NO = 790.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.6%
Previous Response	NO_X = 798.5 ppb	NO = 798.1 ppb		*Percent Change	NO = -1.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	792.4	400.4	392.0	394.3	0.9942	100.6%
2nd GPT point (200 ppb O3)	792.4	602.1	190.3	190.0	1.0016	99.8%
3rd GPT point (100 ppb O3)	792.4	698.6	93.8	95.4	0.9832	101.7%
				Average Correction Factor	0.9930	100.7%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

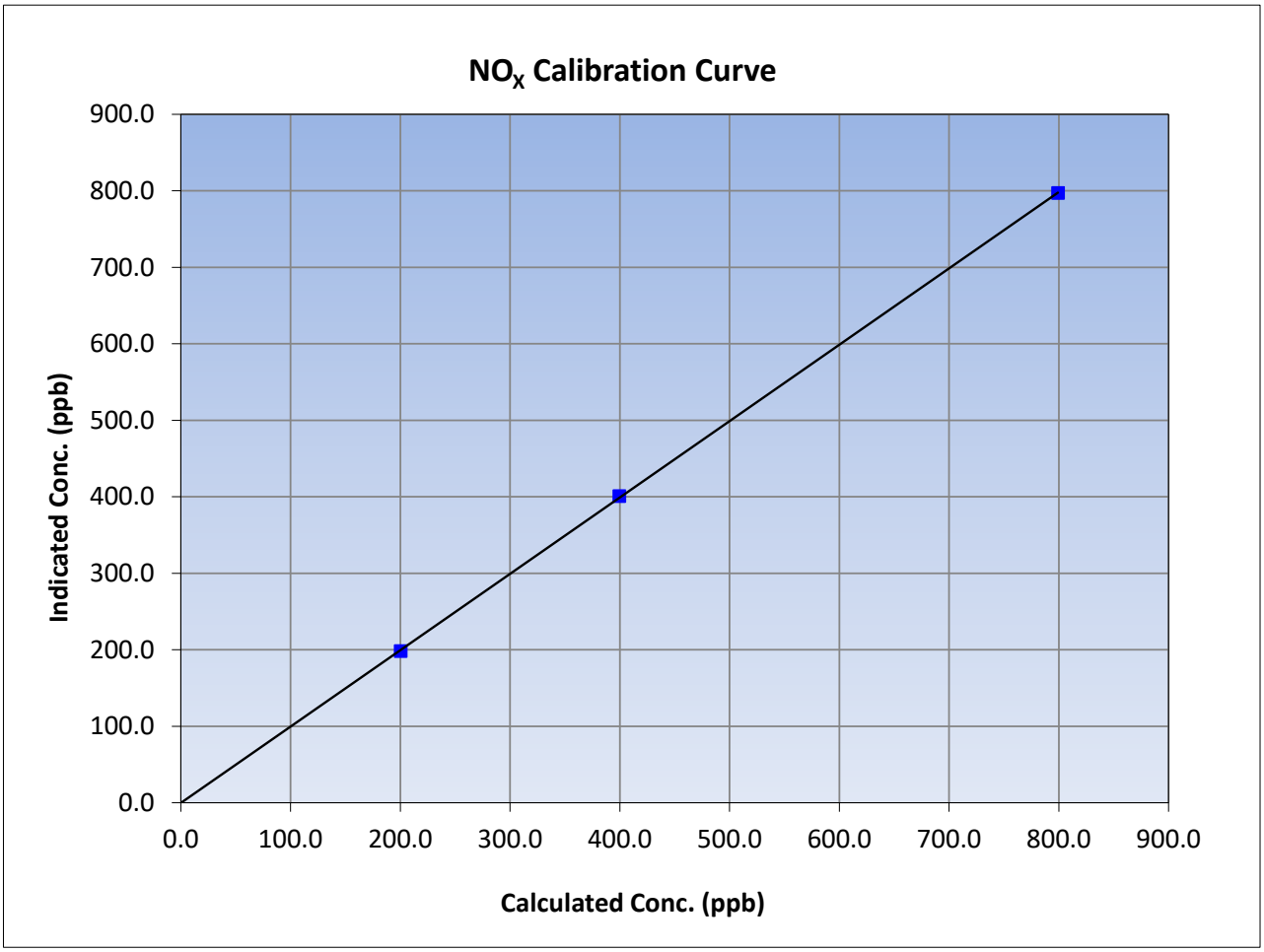
Version-04-2020

Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 5, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:46	End Time (MST):	16:24
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	0.999980	*≥0.995*
799.2	797.0	1.0028			
399.6	400.7	0.9973	Slope	0.998364	*0.90 - 1.10*
200.3	198.1	1.0110			
			Intercept	-0.271978	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

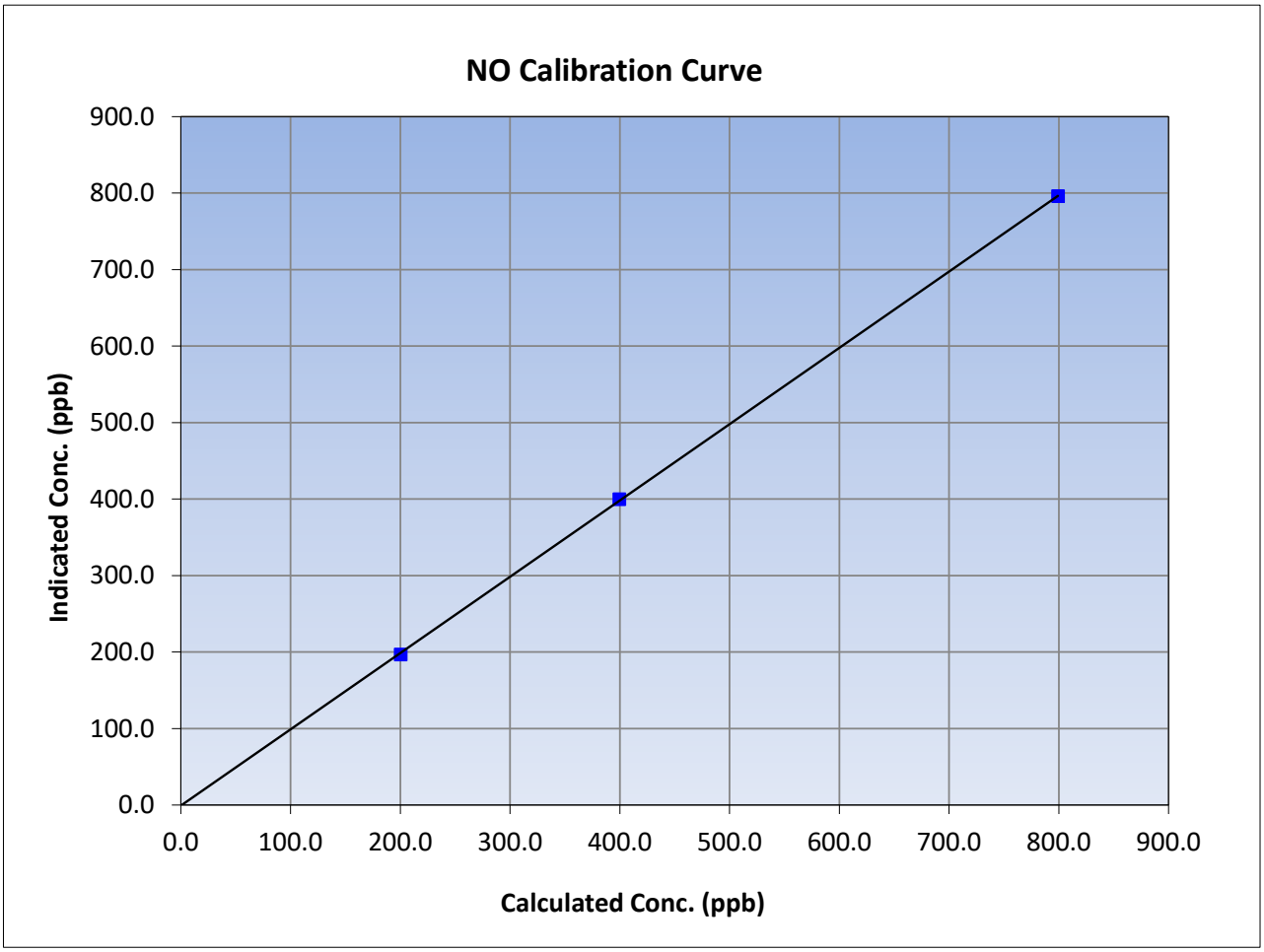
Version-04-2020

Station Information

Calibration Date:	January 4, 2024	Previous Calibration:	December 5, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:46	End Time (MST):	16:24
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	0.999975	≥0.995
799.2	796.0	1.0040			
399.6	399.6	1.0000	Slope	0.997476	0.90 - 1.10
200.3	196.8	1.0177			
			Intercept	-0.811525	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

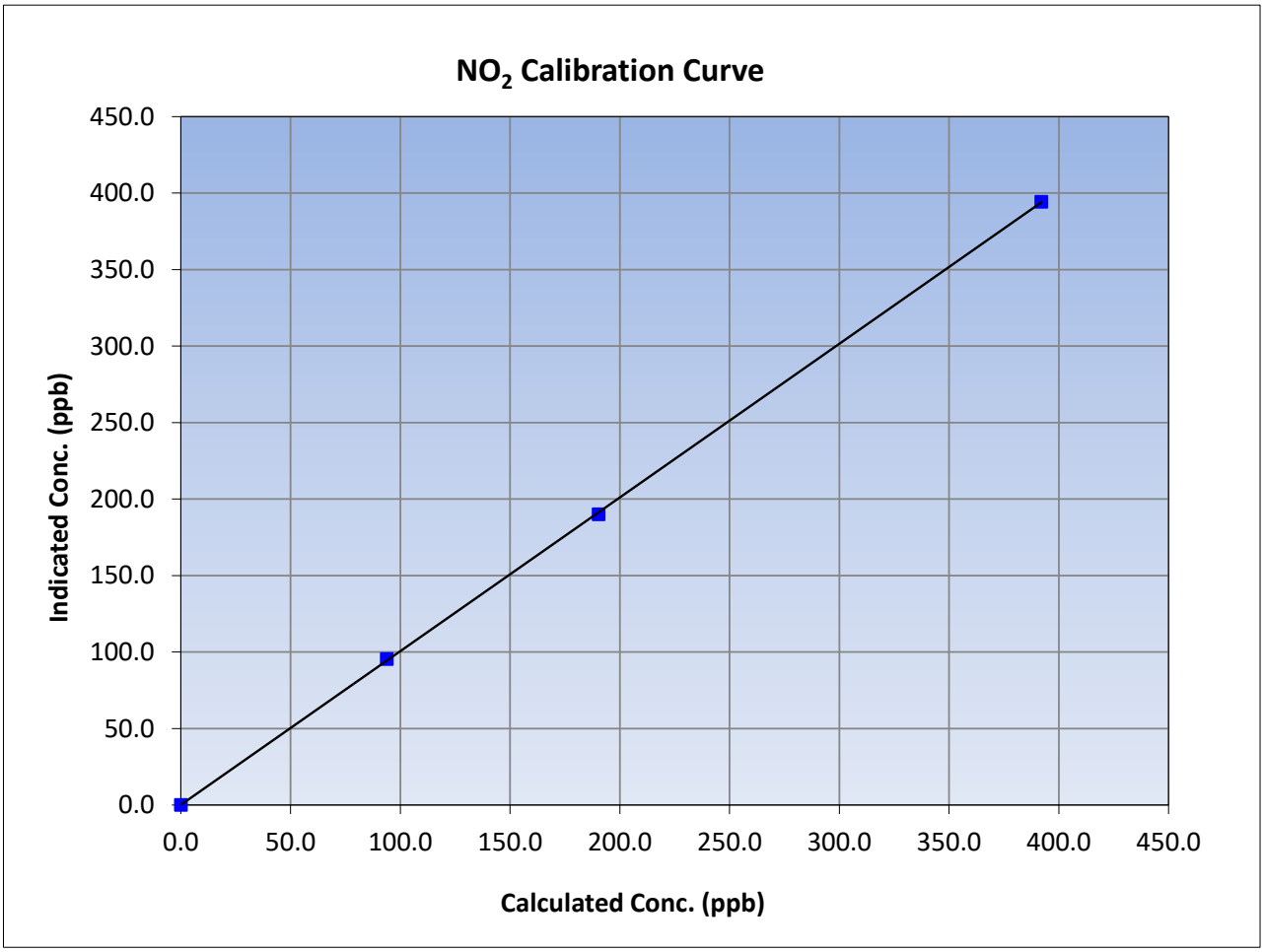
Version-04-2020

Station Information

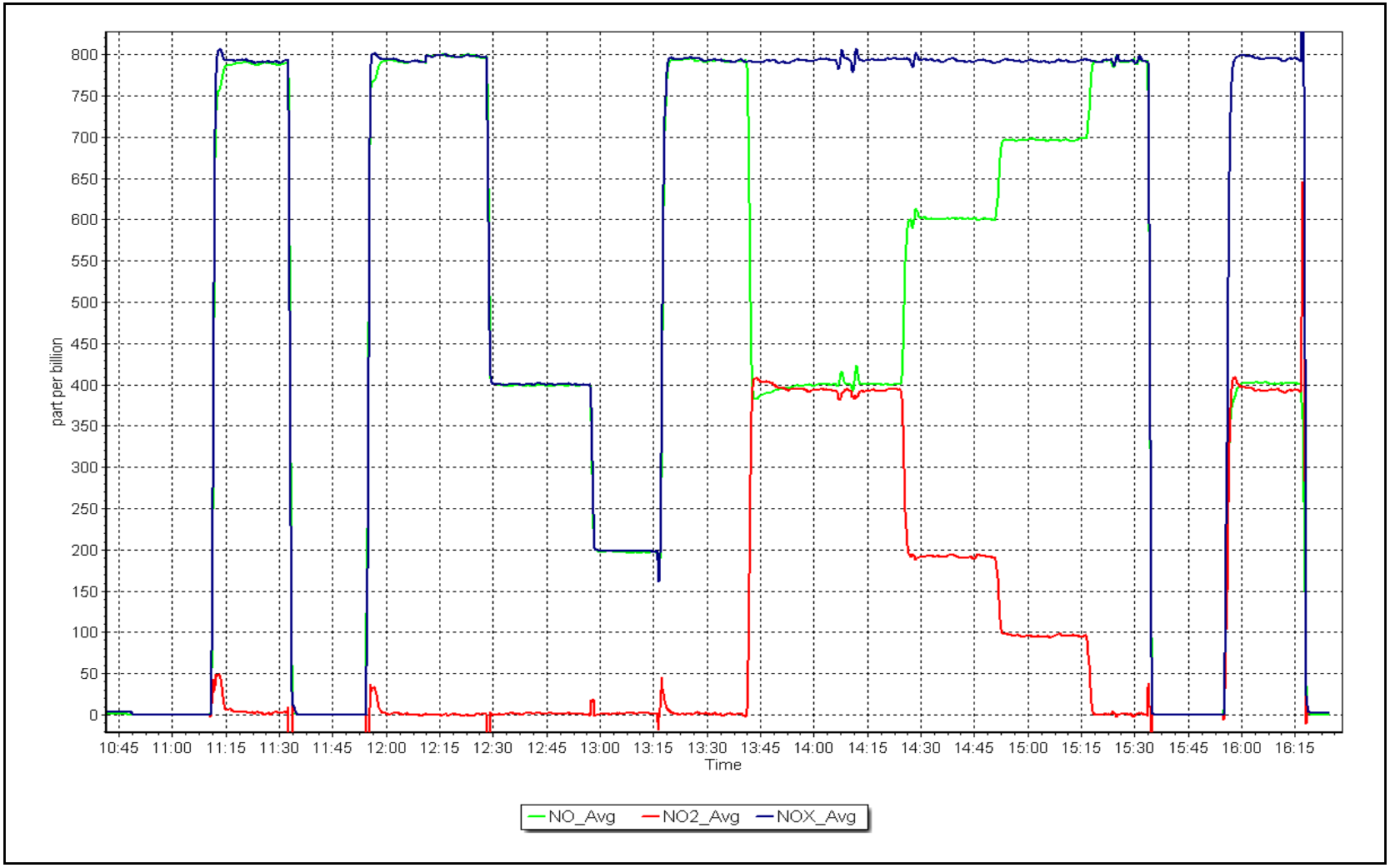
Calibration Date:	January 4, 2024	Previous Calibration:	December 5, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:46	End Time (MST):	16:24
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999966	≥0.995
392.0	394.3	0.9942			
190.3	190.0	1.0016	Slope	1.004575	0.90 - 1.10
93.8	95.4	0.9832			
			Intercept	0.126759	+/-20



NO_X Calibration Plot Date: January 4, 2024 Location: Surmont 2



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Surmont 2	Station number:	AMS 29
Calibration Date:	January 4, 2024	Last Cal Date:	December 1, 2023
Start time (MST):	11:40	End time (MST):	14:03
Analyzer Make:	API T640	S/N:	253
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)	-16.8	-17.27	-16.8	☐	+/- 2 °C
P (mmHg)	711.0	711.28	711.0	☐	+/- 10 mmHg
flow (LPM)	4.95	4.946	4.95	☐	+/- 0.25 LPM

Leak Test: Date of check: January 4, 2024 Last Cal Date: December 1, 2023

PM w/o HEPA: 2.9 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				☐	11.3 +/- 0.5

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

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

Disposable Filter Changed: October 25, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 25, 2023

Date RH/T Sensor Cleaned: October 25, 2023

Notes: No adjustments made. Leak check passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	January 3, 2024	Last Cal Date:	December 1, 2023
Start time (MST):	12:27	End time (MST):	15:33
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.53	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC494126			
Removed Cal Gas Conc:	50.53	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397
Analyzer Range	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999175	1.001174	Backgd or Offset:	9.5	9.5
Calibration intercept:	-2.535883	-1.736008	Coeff or Slope:	0.982	0.982

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4921	79.2	800.4	800.1	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.2	800.4	800.0	1.000
second point	4960	39.6	400.2	399.5	1.002
third point	4980	19.8	200.1	195.8	1.022
as left zero	5000	0.0	0.0	-0.1	----
as left span	4921	79.2	800.4	801.7	0.998
				Average Correction Factor	1.008

Baseline Corr As found:	800.40	Previous response	797.17	*% 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: Inlet filter changed after As Founds, no adjustments made.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

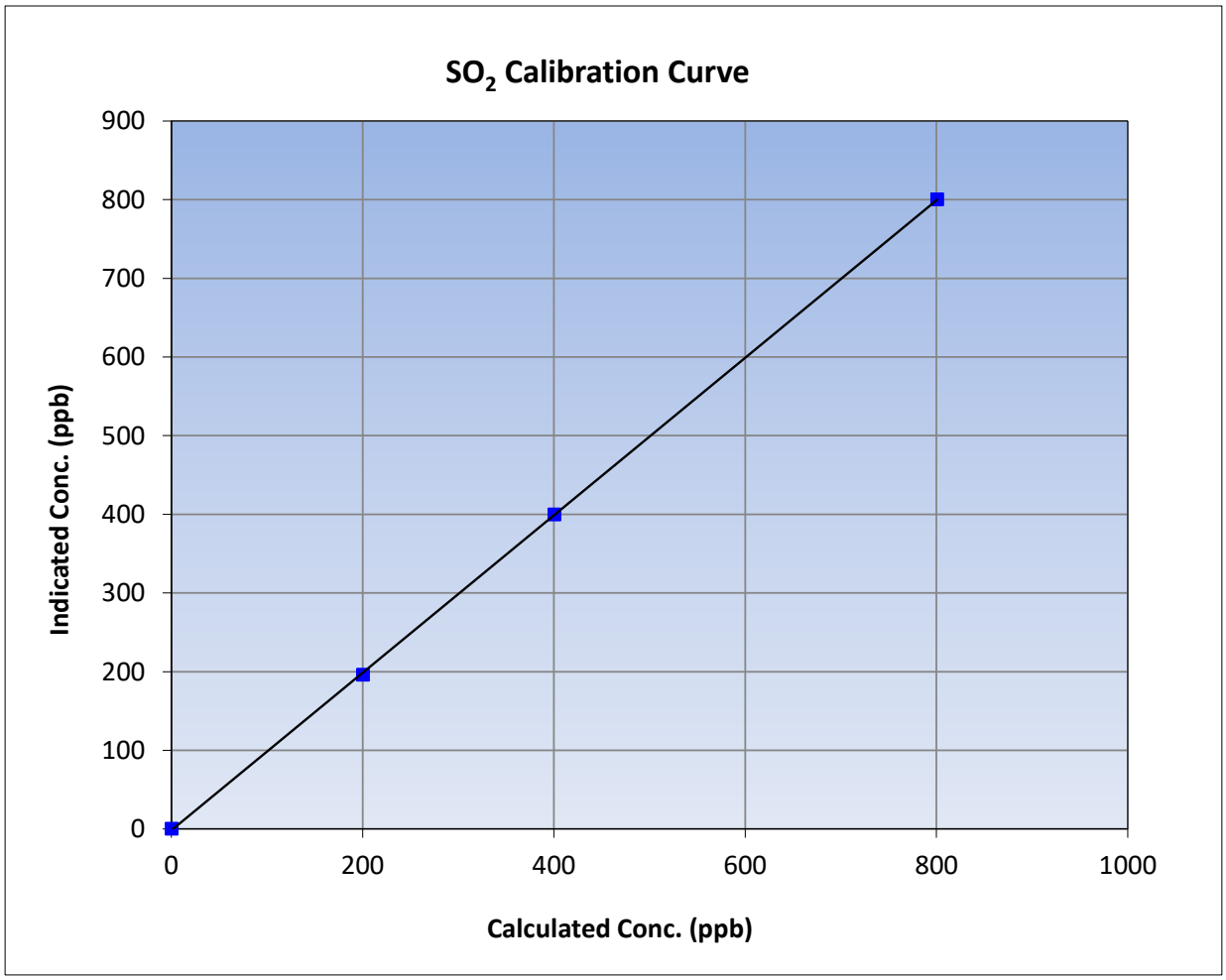
Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	12:27	End Time (MST):	15:33
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

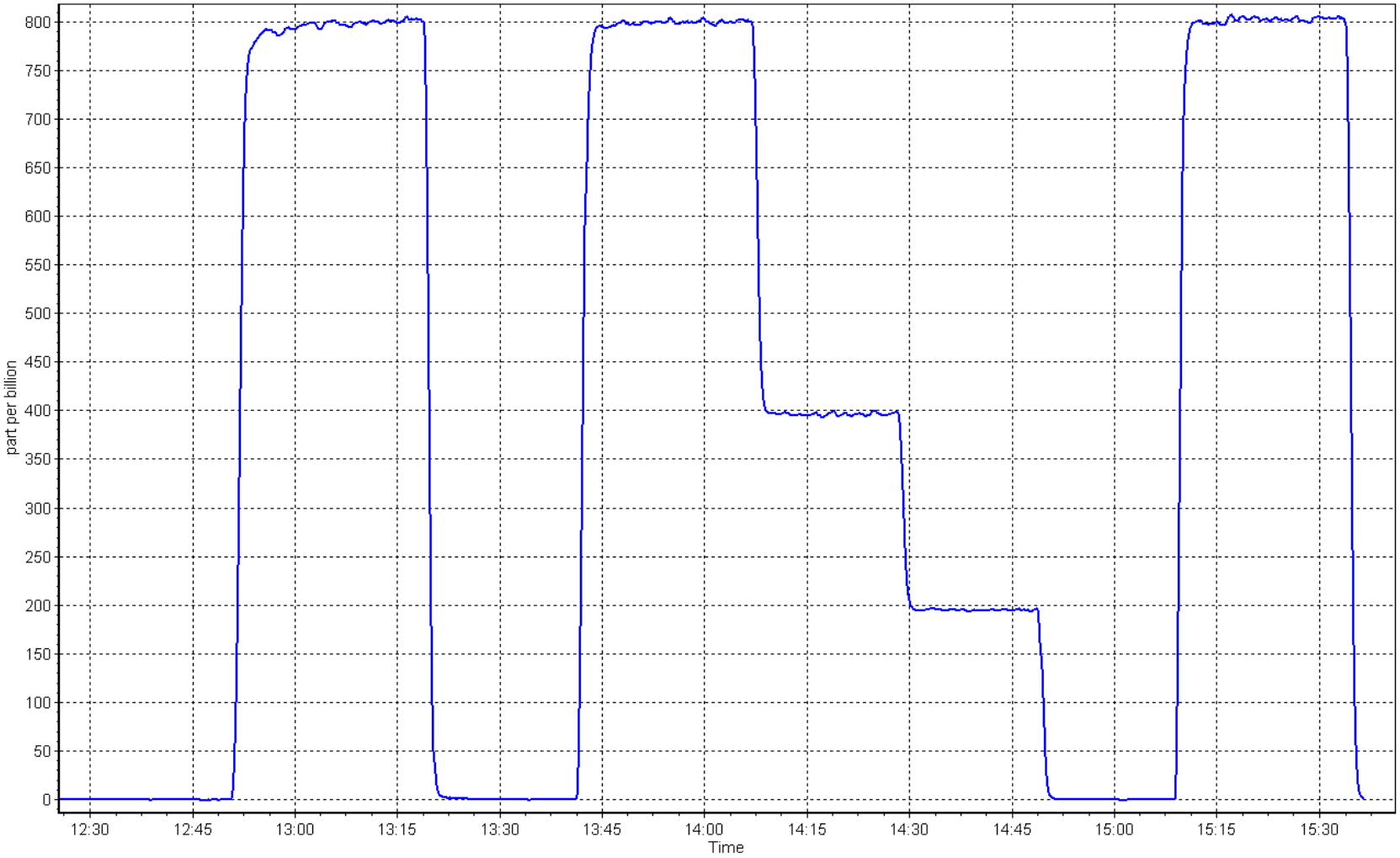
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.4	800.0	1.0005
400.2	399.5	1.0018
200.1	195.8	1.0220

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999967	*≥0.995*
Slope	1.001174	*0.90 - 1.10*
Intercept	-1.736008	*+/-30*



SO2 Calibration Plot Date: January 3, 2024 Location: Ells River



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Ells River	Station number:	AMS30
Calibration Date:	January 18, 2024	Last Cal Date:	December 15, 2023
Start time (MST):	10:40	End time (MST):	15:31
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.99	ppm	Cal Gas Exp Date:	November 15, 2026
Cal Gas Cylinder #:	CC505806			
Removed Cal Gas Conc:	5.08	ppm	Rem Gas Exp Date:	February 9, 2024
Removed Gas Cyl #:	EY0002443		Diff between cyl:	2.3%
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1410661331	
Converter make:	CDN - 101		Converter serial #:	562	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000065	1.005472	Backgd or Offset:	1.57	2.05
Calibration intercept:	0.020811	-0.120388	Coeff or Slope:	1.100	1.072

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	78.7	80.0	80.3	0.996
as found 2nd point					
as found 3rd point					
new cylinder response	4920	80.2	80.0	82.3	0.972

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4920	80.2	80.0	80.4	0.995
second point	4960	40.1	40.0	40.0	1.000
third point	4980	20.0	20.0	20.0	0.998
as left zero	5000	0.0	0.0	0.4	----
as left span	4920	80.2	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	0.998
Date of last converter efficiency test:		N/A			efficiency

Baseline Corr As found:	80.3	Prev response:	79.99	*% change:	0.4%
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: Change inlet filters and H2S cylinder after as founds. SOx scrubber check done after calibrator zero, passed. Adjusted zero and span.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

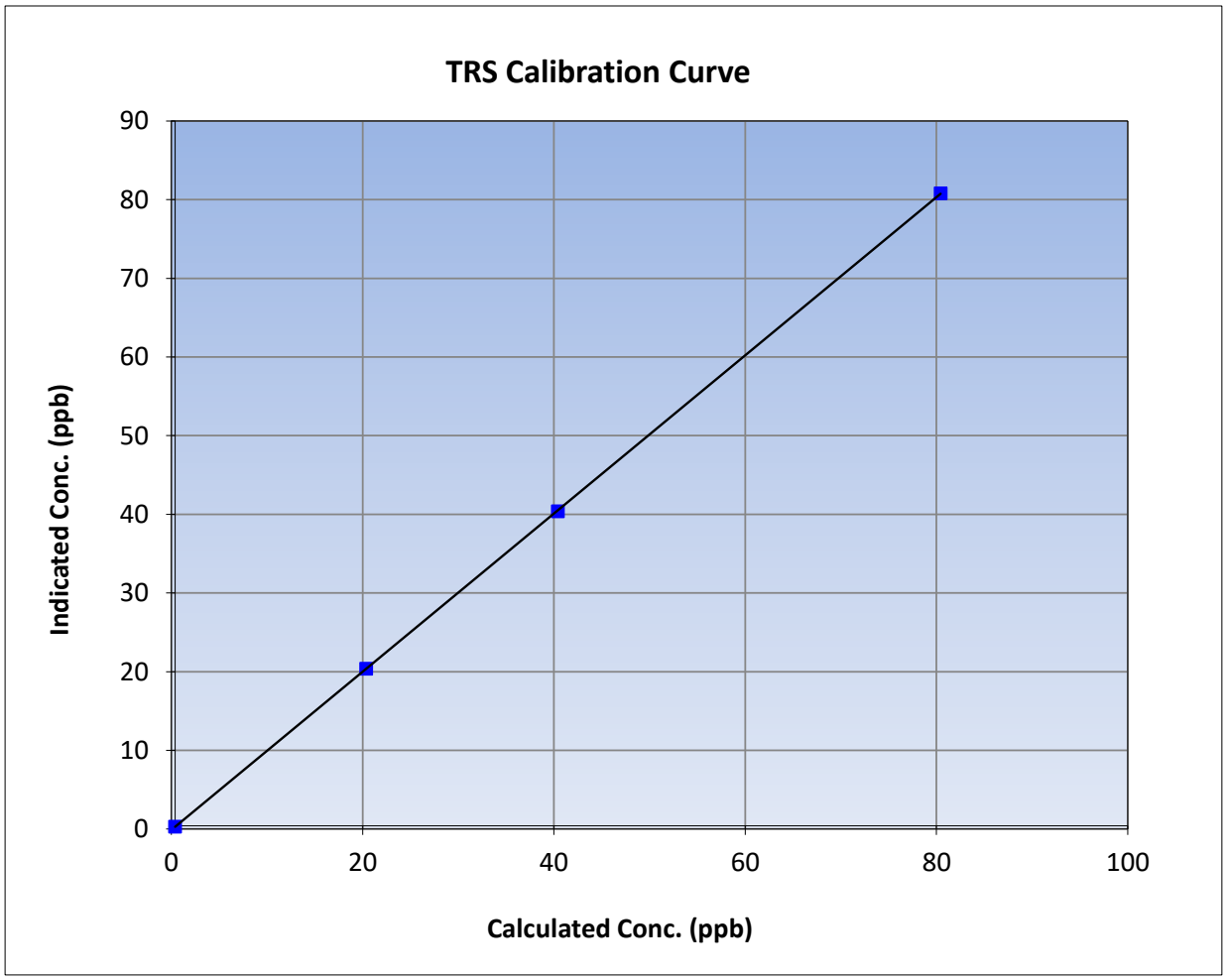
Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 15, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	10:40	End Time (MST):	15:31
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

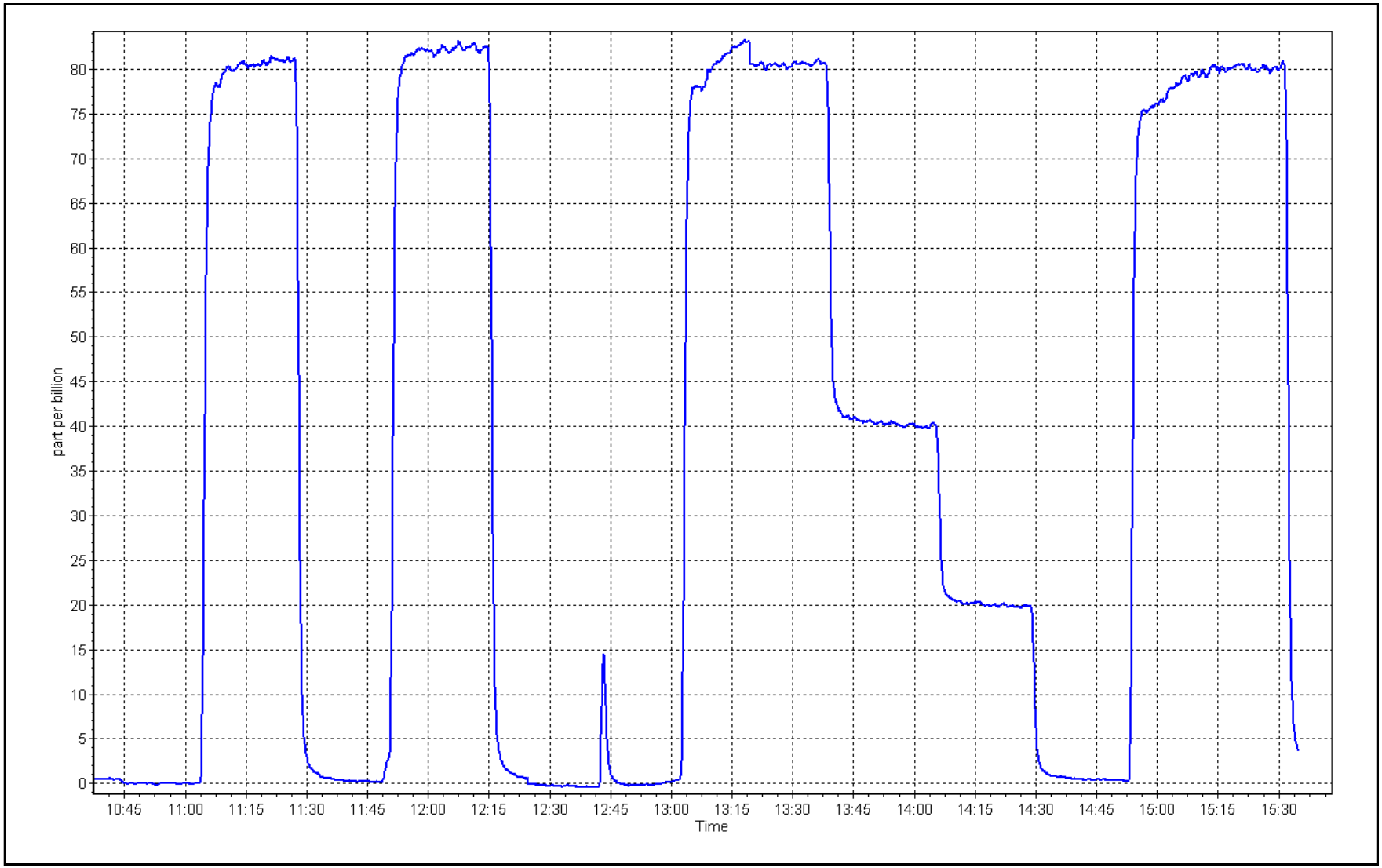
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.4	0.9955
40.0	40.0	1.0005
20.0	20.0	0.9980

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.005472	*0.90 - 1.10*
Intercept	-0.120388	*+/-3*



TRS Calibration Plot Date: January 18, 2024 Location: Ells River



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	January 3, 2024	Last Cal Date:	December 1, 2023
Start time (MST):	12:27	End time (MST):	15:33
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC494126	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1181490018	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.48E-04	2.51E-04	NMHC SP Ratio:	5.80E-05	6.00E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	157070	151854

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	17.03	16.73	1.018
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	17.07	0.997
second point	4960	39.6	8.51	8.49	1.003
third point	4980	19.8	4.26	4.19	1.015
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.05	0.999
				Average Correction Factor	1.005

Baseline Corr AF:	16.73	Prev response	16.93	*% change	-1.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	8.90	1.024
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	9.17	0.994
second point	4960	39.6	4.56	4.58	0.995
third point	4980	19.8	2.28	2.27	1.006
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.13	0.998
				Average Correction Factor	0.998
Baseline Corr AF:	8.90	Prev response	9.09	*% change	-2.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.91	7.83	1.011
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	7.90	1.002
second point	4960	39.6	3.96	3.91	1.012
third point	4980	19.8	1.98	1.93	1.026
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.92	1.000
				Average Correction Factor	1.013
Baseline Corr AF:	7.83	Prev response	7.84	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.996248	1.003892
THC Cal Offset:	-0.036338	-0.039540
CH4 Cal Slope:	0.992583	0.999470
CH4 Cal Offset:	-0.016756	-0.026357
NMHC Cal Slope:	0.999405	1.007395
NMHC Cal Offset:	-0.019981	-0.012583

Notes: Inlet filter changed after As Founds, adjusted span only.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

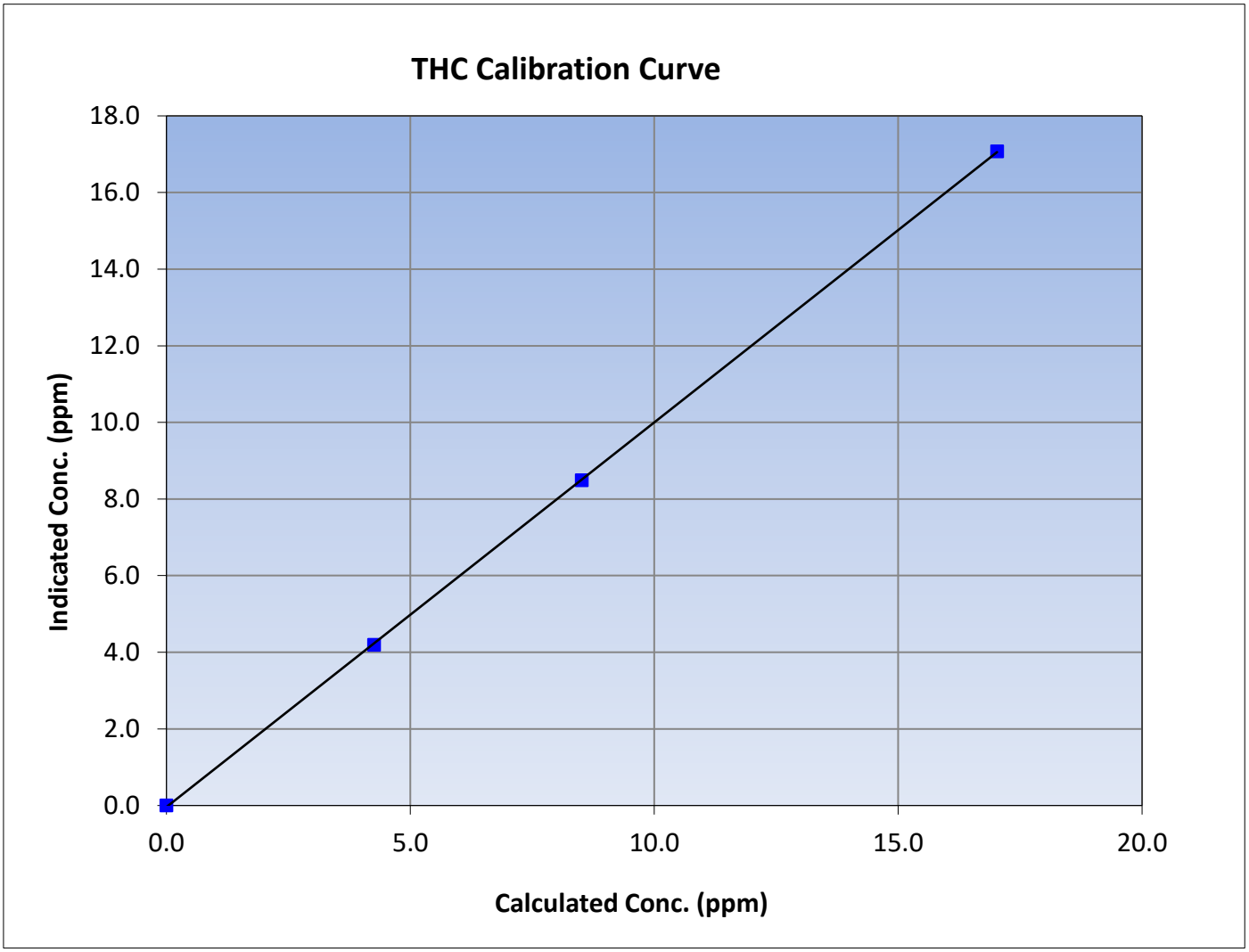
Version-01-2020

Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	12:27	End Time (MST):	15:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999975	≥0.995
17.03	17.07	0.9973			
8.51	8.49	1.0028	Slope	1.003892	0.90 - 1.10
4.26	4.19	1.0153			
			Intercept	-0.039540	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

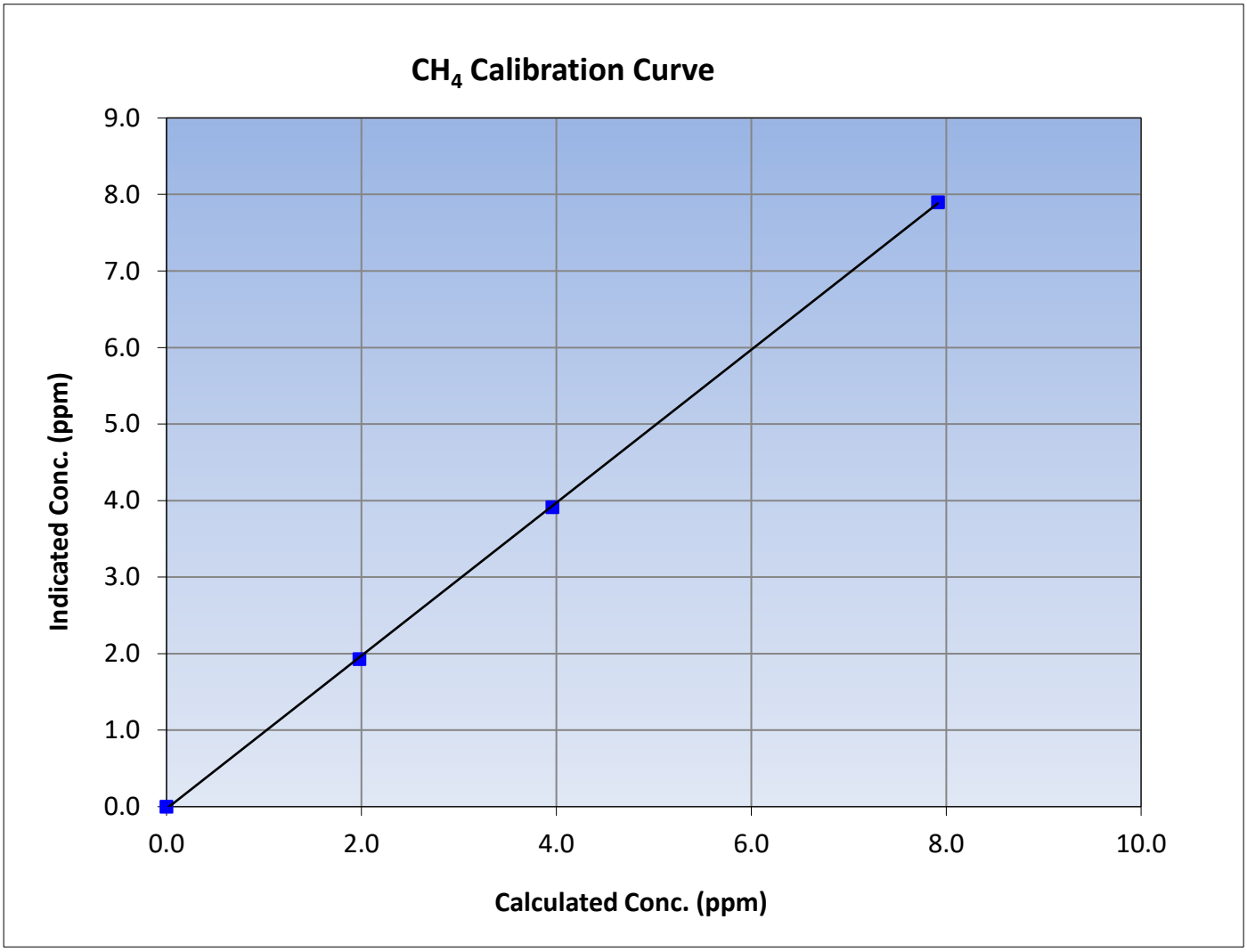
Version-01-2020

Station Information

Calibration Date:	January 3, 2024	Previous Calibration:	December 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	12:27	End Time (MST):	15:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999948	*≥0.995*
7.91	7.90	1.0020			
3.96	3.91	1.0117	Slope	0.999470	*0.90 - 1.10*
1.98	1.93	1.0264			
			Intercept	-0.026357	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

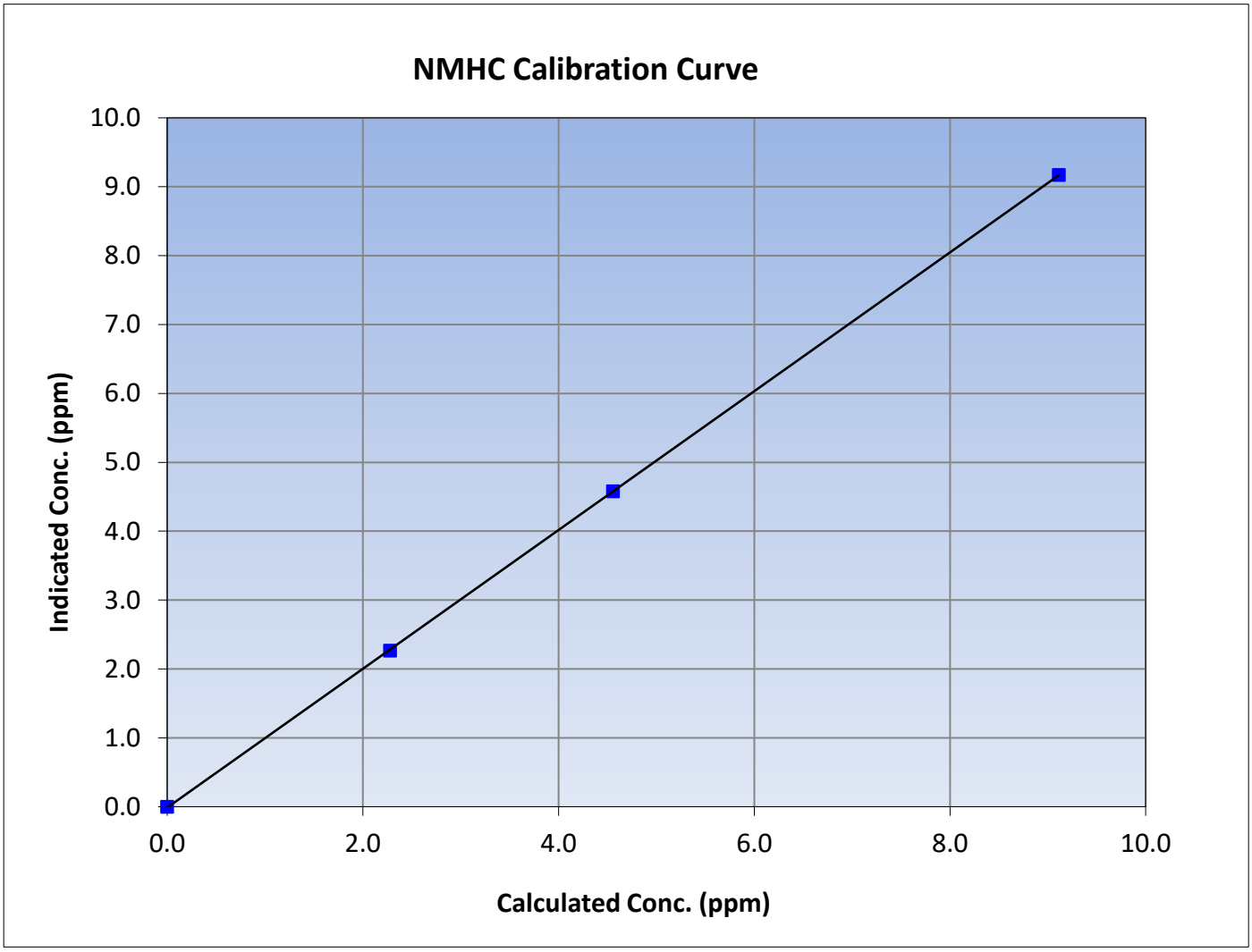
Version-01-2020

Station Information

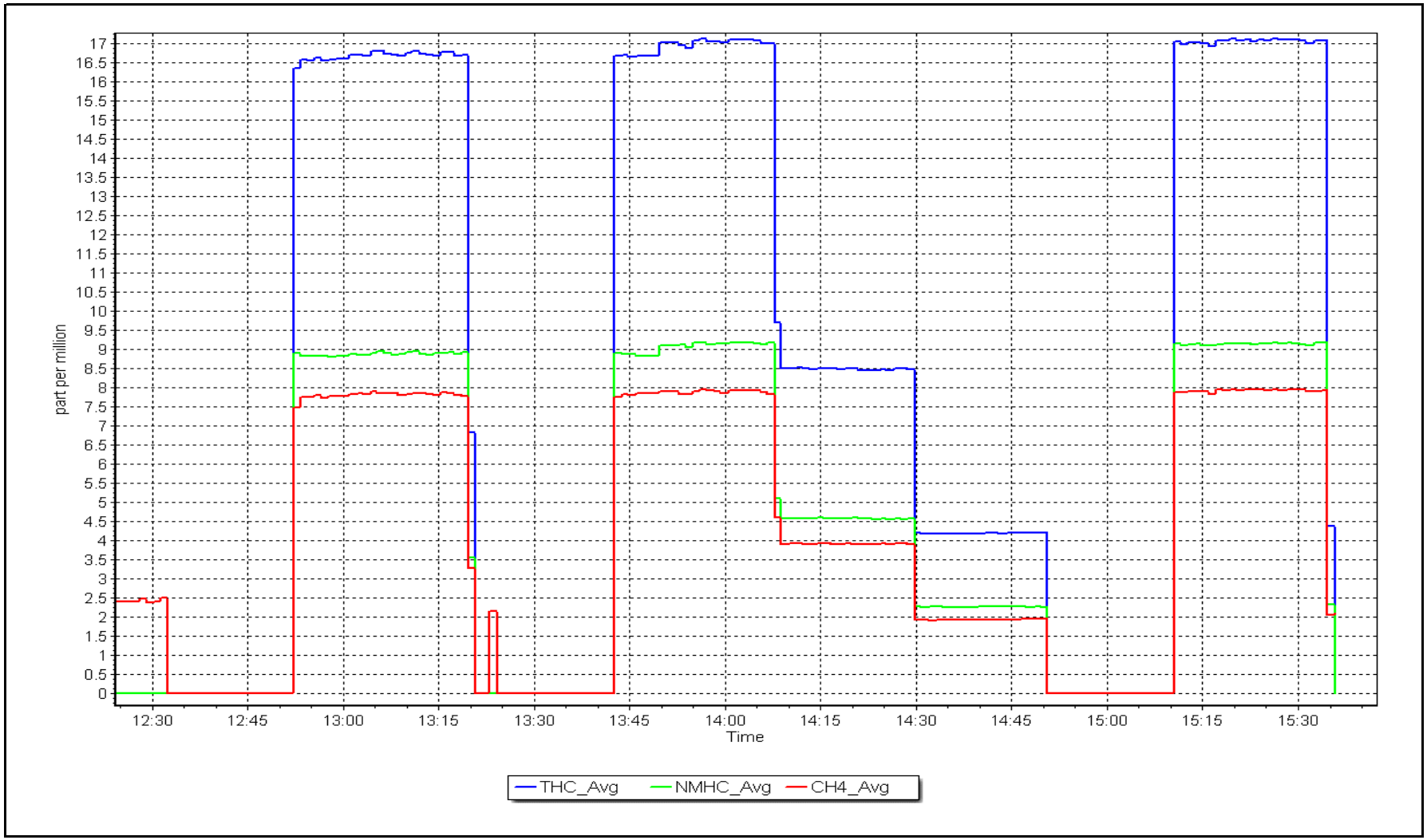
Calibration Date:	January 3, 2024	Previous Calibration:	December 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	12:27	End Time (MST):	15:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999990	≥0.995
9.11	9.17	0.9936			
4.56	4.58	0.9951	Slope	1.007395	0.90 - 1.10
2.28	2.27	1.0059			
			Intercept	-0.012583	+/-0.5



NMHC Calibration Plot Date: January 3, 2024 Location: Ells River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	January 11, 2024	Last Cal Date:	December 18, 2023
Start time (MST):	10:56	End time (MST):	16:37
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		DT0045703	Cal Gas Expiry Date:	May 16, 2031	
NOX Cal Gas Conc:	60.4	ppm	NO Cal Gas Conc:	60.1	ppm
Removed Cylinder #:		T2Y1P2R	Removed Gas Exp Date:	December 11, 2023	
Removed Gas NOX Conc:	50.83	ppm	Removed Gas NO Conc:	49.97	ppm
NOX gas Diff:	-1.0%		NO gas Diff:	-0.4%	
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	710321429
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.153	1.165	NO bkgnd or offset:	14.1	13.6
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	14.1	13.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	189.7	194.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000506	1.002653
NO_X Cal Offset:	-1.440000	-1.638433
NO Cal Slope:	0.998642	1.007289
NO Cal Offset:	-2.440000	-2.359365
NO_2 Cal Slope:	1.005022	0.981718
NO_2 Cal Offset:	0.180492	0.452475

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.9	-0.9	0.0	----	----
as found span	4920	80.0	813.3	799.5	13.8	812.0	795.9	16.5	1.0016	1.0045
as found 2nd										
as found 3rd										
new cyl resp	4933	66.6	804.5	800.5	4.0	795.6	793.7	1.8	1.0112	1.0086
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4933	66.6	804.5	800.5	4.0	806.0	805.0	1.2	0.9982	0.9944
second point	4967	33.3	402.3	400.3	2.0	400.3	400.1	0.2	1.0049	1.0004
third point	4983	16.6	200.5	199.5	1.0	198.3	196.1	2.1	1.0112	1.0175
as left zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as left span	4933	66.6	804.5	425.4	379.1	801.0	427.6	373.6	1.0044	0.9949
								Average Correction Factor	1.0048	1.0041

Corrected As found	NO_X = 812.9 ppb	NO = 796.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.1%
Previous Response	NO_X = 812.3 ppb	NO = 796.0 ppb		*Percent Change	NO =	0.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.9	423.8	379.1	371.8	1.0196	98.1%
2nd GPT point (200 ppb O3)	798.9	612.1	190.8	189.8	1.0052	99.5%
3rd GPT point (100 ppb O3)	798.9	700.1	102.8	100.6	1.0218	97.9%
				Average Correction Factor	1.0156	98.5%

Notes: Swapped NO gas cylinder#: T2Y1P2R with cylinder#: DT0045703. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

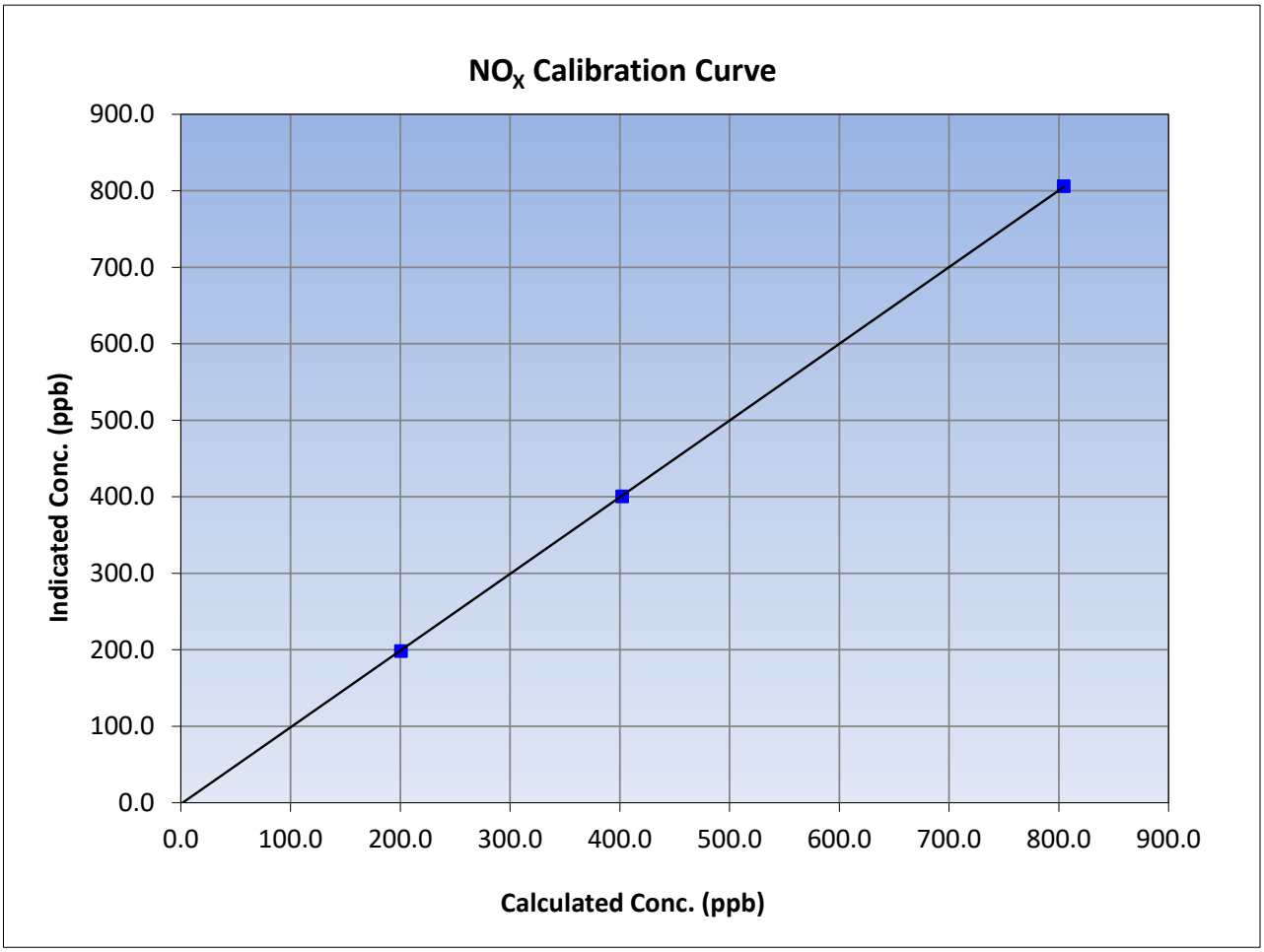
Version-04-2020

Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 18, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:56	End Time (MST):	16:37
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999982	≥0.995
804.5	806.0	0.9982			
402.3	400.3	1.0049	Slope	1.002653	0.90 - 1.10
200.5	198.3	1.0112			
			Intercept	-1.638433	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

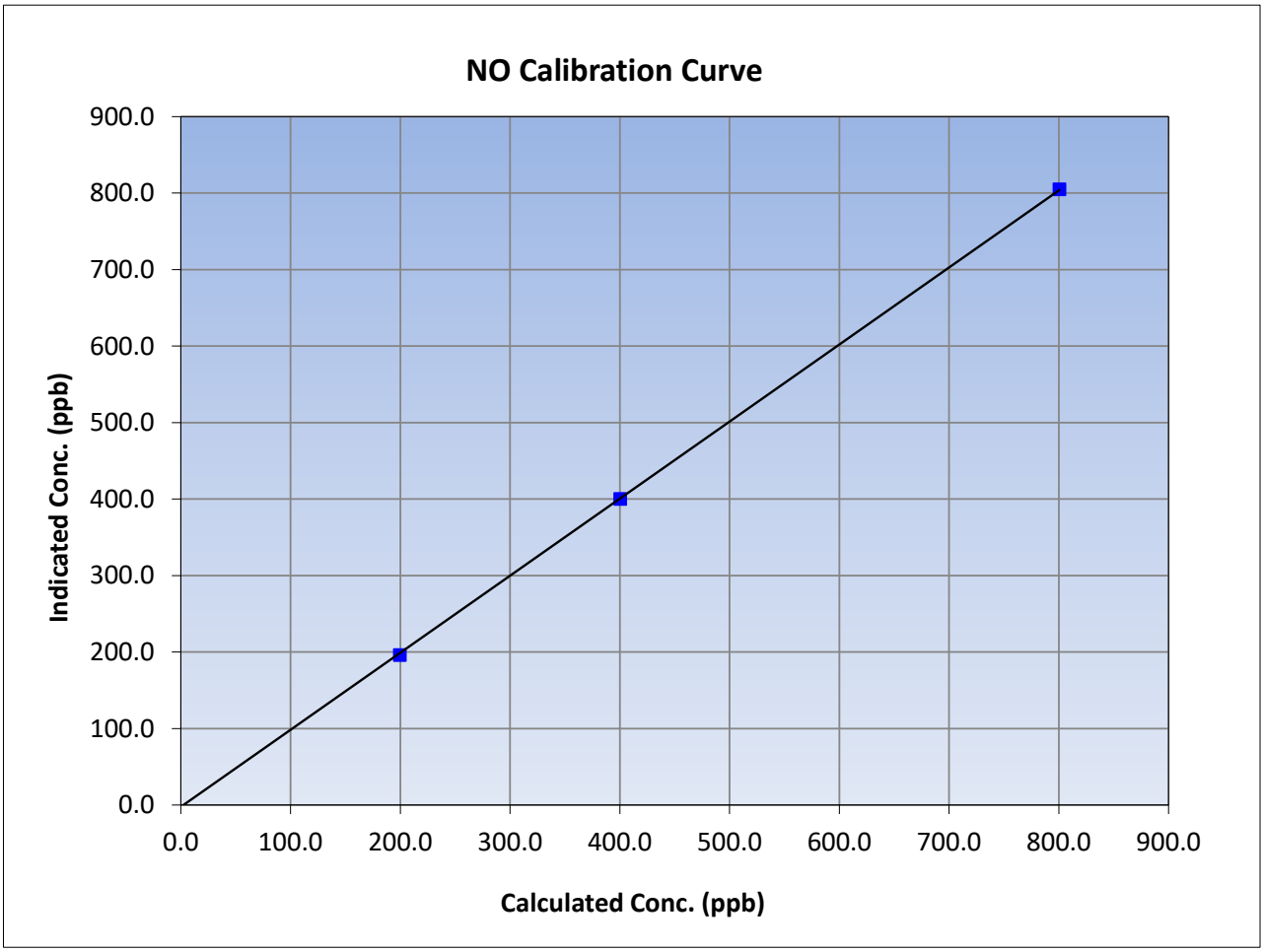
Version-04-2020

Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 18, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:56	End Time (MST):	16:37
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999963	≥0.995
800.5	805.0	0.9944			
400.3	400.1	1.0004	Slope	1.007289	0.90 - 1.10
199.5	196.1	1.0175			
			Intercept	-2.359365	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

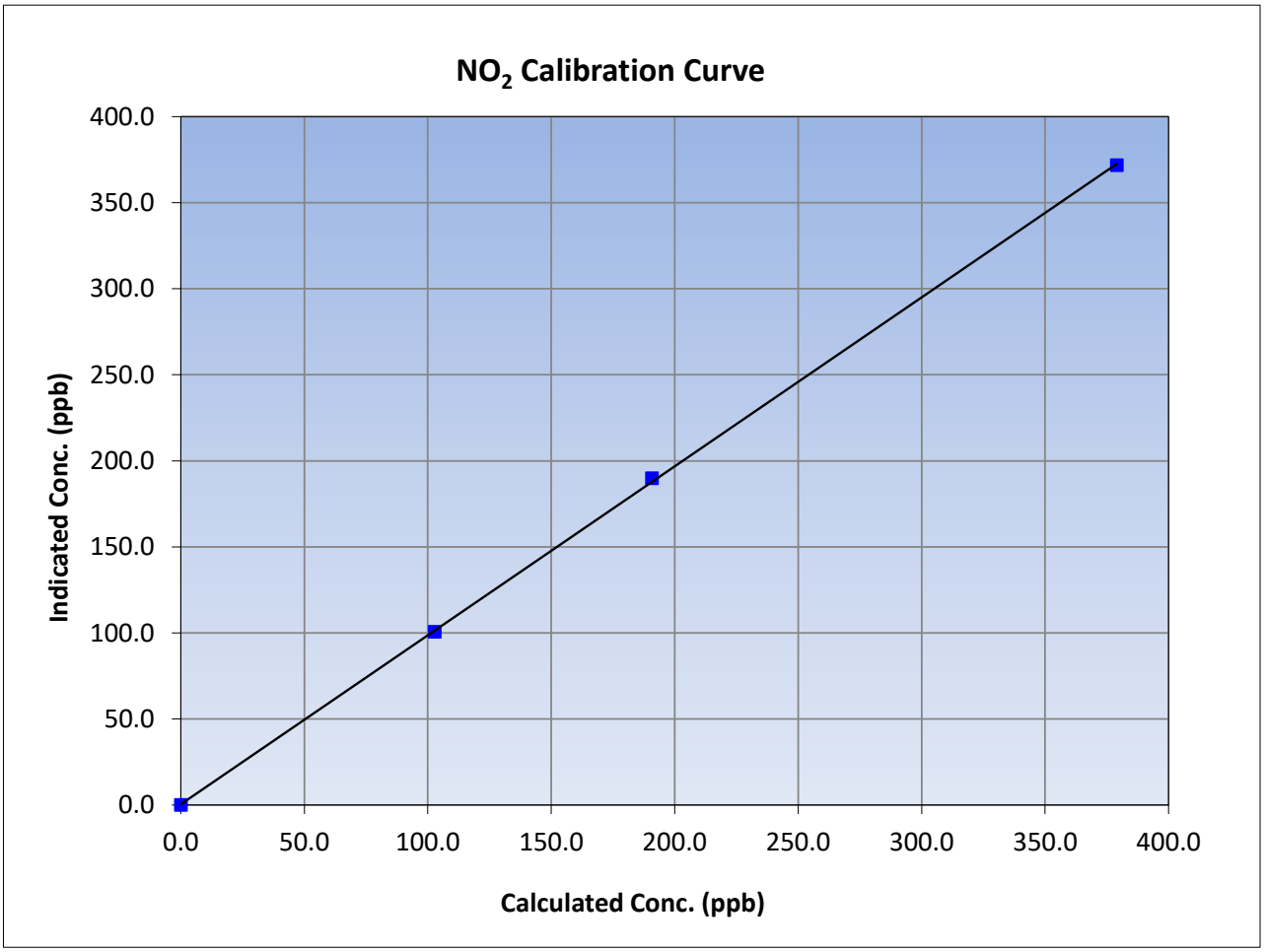
Version-04-2020

Station Information

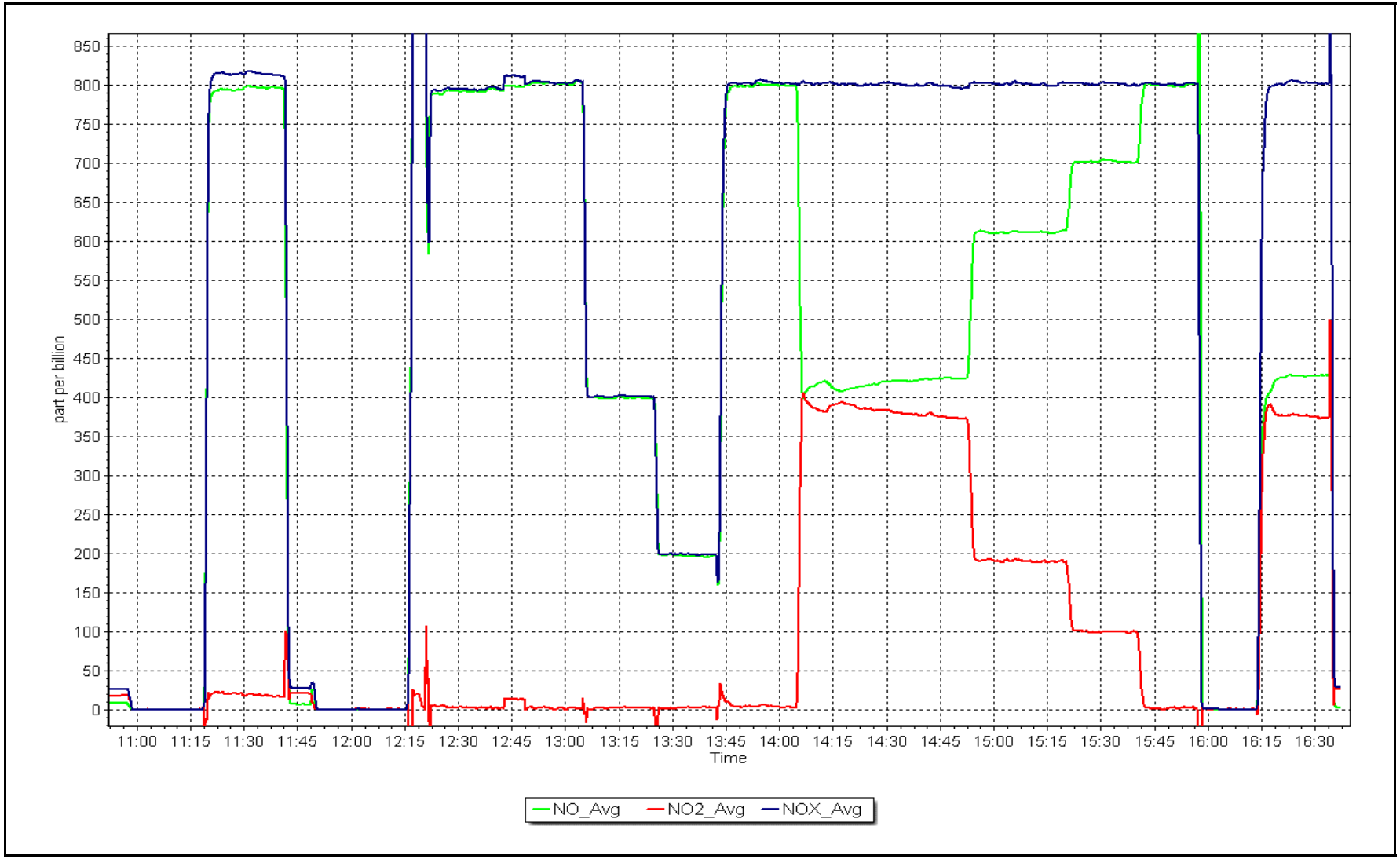
Calibration Date:	January 11, 2024	Previous Calibration:	December 18, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:56	End Time (MST):	16:37
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999925	≥0.995
379.1	371.8	1.0196			
190.8	189.8	1.0052	Slope	0.981718	0.90 - 1.10
102.8	100.6	1.0218			
			Intercept	0.452475	+/-20



NO_X Calibration Plot Date: January 11, 2024 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:	January 22, 2024	Last Cal Date:	December 18, 2023
Start time (MST):	10:36	End time (MST):	12:14
Analyzer Make:	API T640	S/N:	875
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388751
Temp/RH standard:	Alicat FP-25BT	S/N:	388751

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-22.30	-23.40	-22.30	☐	+/- 2 deg C
P (mmHg)	735.20	736.60	735.20	☐	+/- 10 mmHg
flow (LPM)	5.00	5.00	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: January 22, 2024 Last Cal Date: December 18, 2023

PM w/o HEPA: 5.30 PM w/ HEPA: 0.00 <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	9.00	11.00	11.00	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 5.30 w/ HEPA: 0.00 <0.2 ug/m3

Date Optical Chamber Cleaned: January 22, 2024

Disposable Filter Changed: January 22, 2024

Annual Maintenance

Date Sample Tube Cleaned: October 27, 2023

Date RH/T Sensor Cleaned: November 30, 2023

Notes: Verified flow, temperature and pressure. Leak check passed. No adjustment made.

Calibration by: Jan Castro

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS501
LEISMER

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	January 16, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	10:02	End time (MST):	13:10
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:		50.52 ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC274266			
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:	2659
ZAG Make/Model:	API 701		Serial Number:	4427

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290011

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999030	1.000572	Backgd or Offset:	19.2	20.3
Calibration intercept:	-1.115967	-1.756005	Coeff or Slope:	0.971	0.981

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	4921	79.2	800.2	790.9	1.012
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	799.2	1.001
second point	4960	39.6	400.2	399.2	1.002
third point	4980	19.8	200.1	196.1	1.020
as left zero	5000	0.0	0.0	-0.3	----
as left span	4921	79.2	800.2	800.2	1.000
				Average Correction Factor	1.008

Baseline Corr As found:	790.60	Previous response	798.31	*% 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: Changed inlet filter after as founds. Adjusted zero and span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

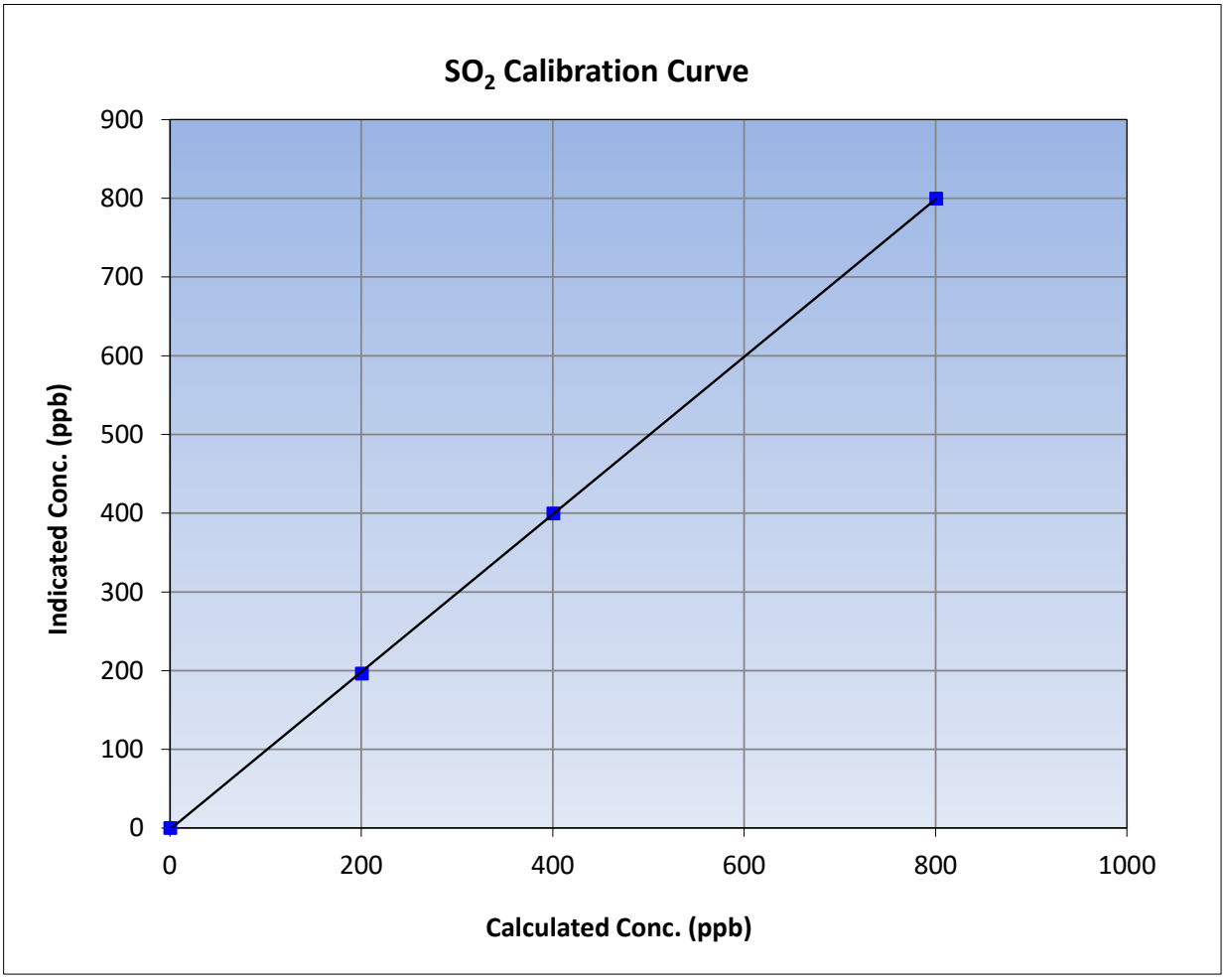
Station Information

Calibration Date:	January 16, 2024	Previous Calibration:	December 12, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	10:02	End Time (MST):	13:10
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

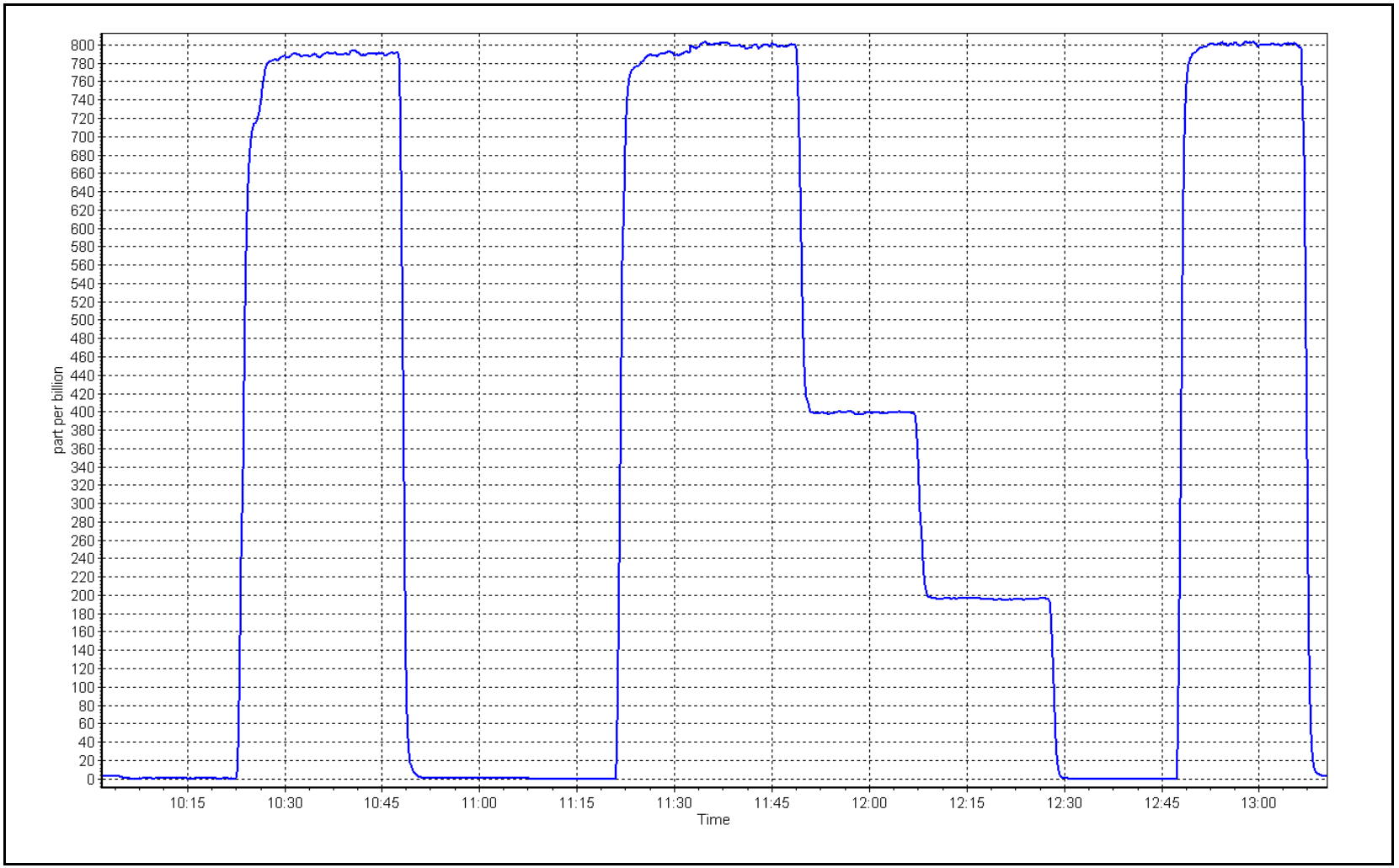
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
800.2	799.2	1.0013
400.2	399.2	1.0024
200.1	196.1	1.0202

Statistical Evaluation		Limits
Correlation Coefficient	0.999977	≥0.995
Slope	1.000572	0.90 - 1.10
Intercept	-1.756005	+/-30



SO2 Calibration Plot Date: January 16, 2024 Location: Leismer



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	January 23, 2024	Last Cal Date:	December 12, 2023
Start time (MST):	9:43	End time (MST):	13:48
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				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995716	0.999147	Backgd or Offset:	3.47	3.57
Calibration intercept:	-0.078455	0.001539	Coeff or Slope:	1.105	1.128

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4922	77.8	80.0	77.5	1.031
as found 2nd point	4961	38.9	40.0	38.9	1.025
as found 3rd point	4981	19.4	19.9	19.3	1.028
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4922	77.8	80.0	79.9	1.001
second point	4961	38.9	40.0	40.1	0.997
third point	4981	19.4	19.9	19.7	1.012
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	1.004
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	77.6	Prev response:	79.56	*% change:	-2.5%
Baseline Corr 2nd AF pt:	39.0	AF Slope:	0.970286	AF Intercept:	-0.038970
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Scrubber test done after calibrator zero. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

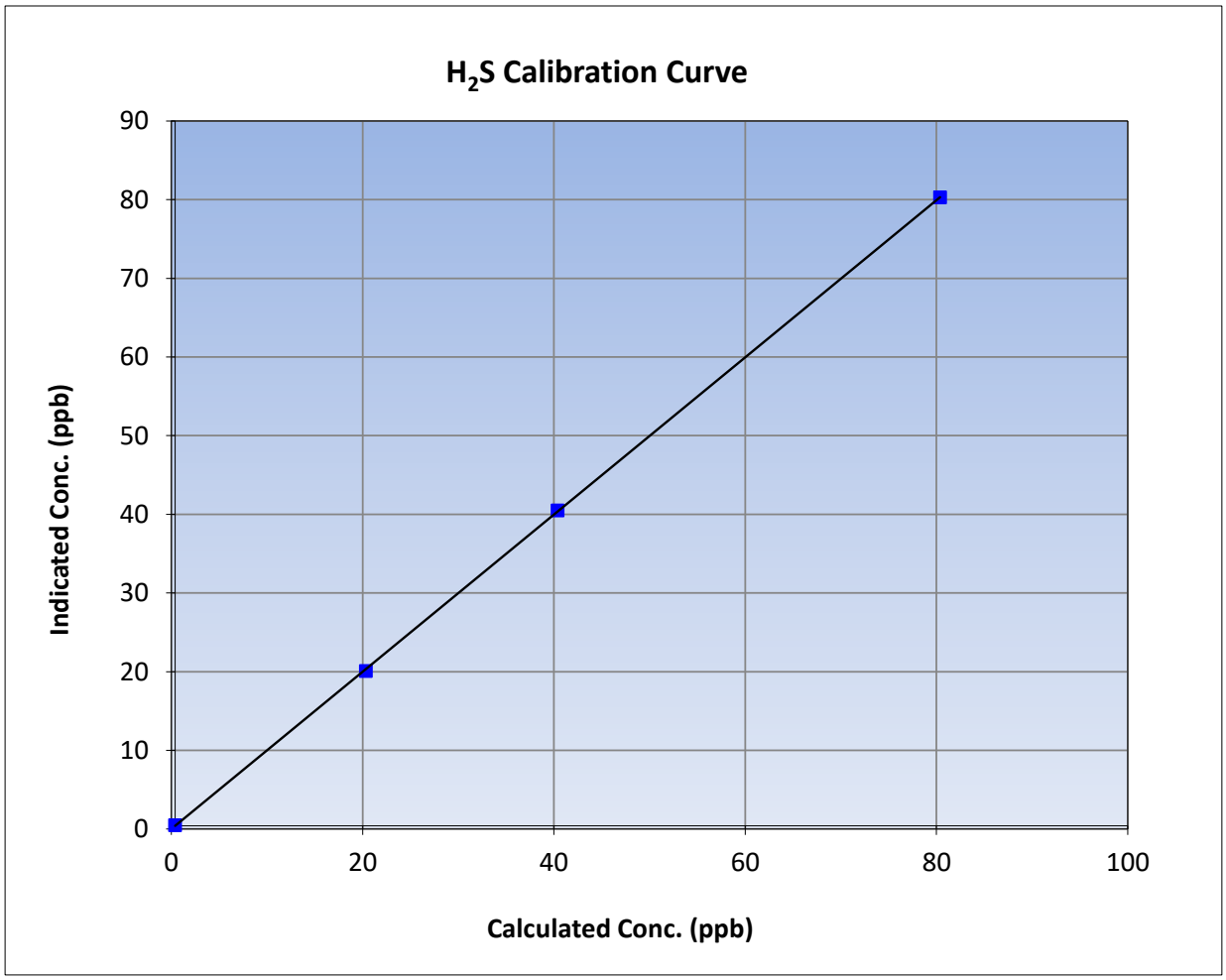
Station Information

Calibration Date:	January 23, 2024	Previous Calibration:	December 12, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:43	End Time (MST):	13:48
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

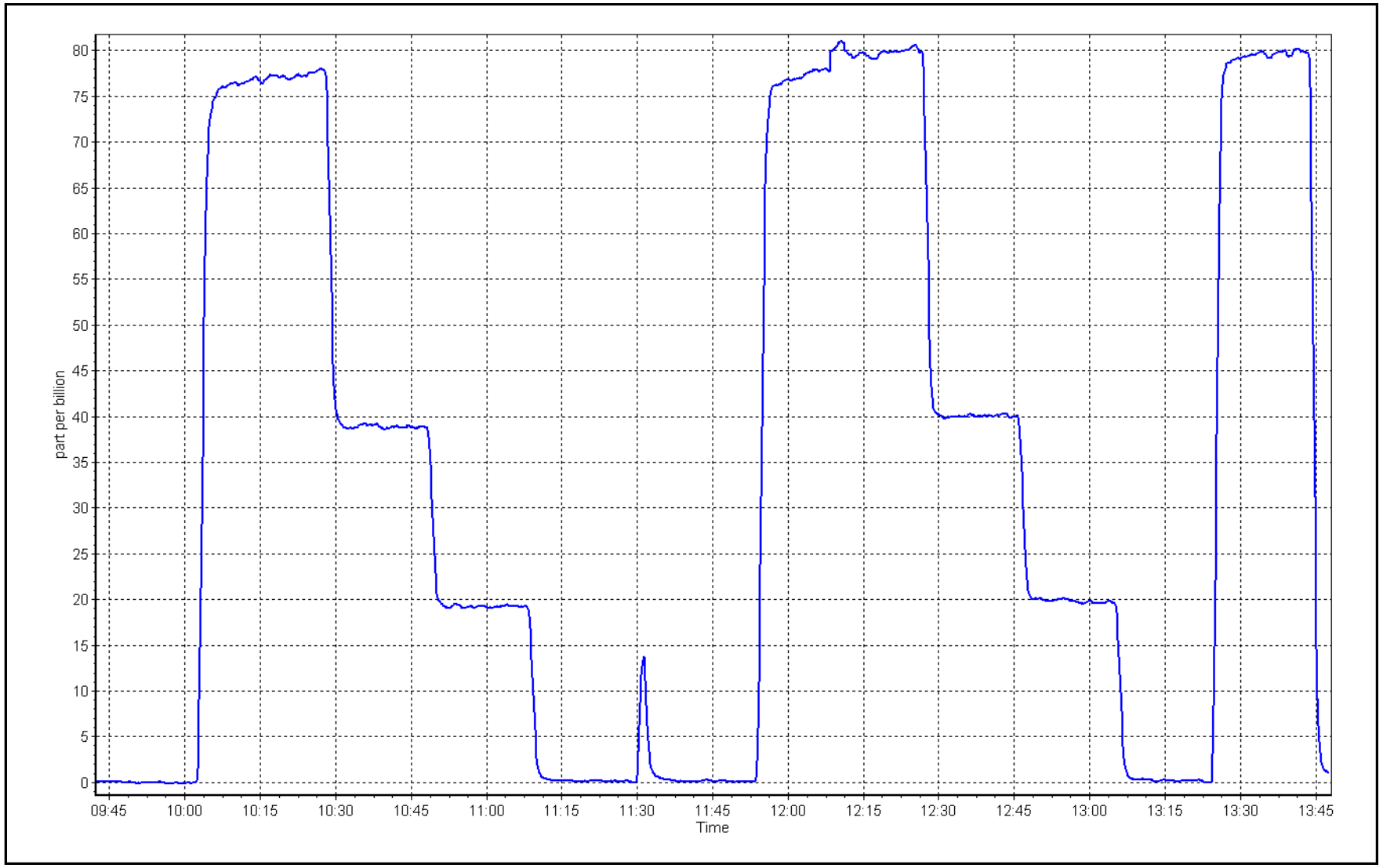
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.9	1.0010
40.0	40.1	0.9973
19.9	19.7	1.0123

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	0.999147	*0.90 - 1.10*
Intercept	0.001539	*+/-3*



H_2S Calibration Plot Date: January 23, 2024 Location: Leismer



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	January 24, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	9:41	End time (MST):	14:15
Reason:	Removal		

Calibration Standards

NO Gas Cylinder #:		T26811M	Cal Gas Expiry Date:	October 30, 2024	
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.39	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2659	
ZAG make/model:	API 701		Serial Number:	4427	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1218153356	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.238	1.186	NO bkgnd or offset:	3.7	3.5
NOX coeff or slope:	0.990	0.991	NOX bkgnd or offset:	3.6	3.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	166.2	166.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001988	1.001018
NO_X Cal Offset:	-4.067947	-1.427986
NO Cal Slope:	1.004511	1.002011
NO Cal Offset:	-4.907940	-2.907962
NO_2 Cal Slope:	0.999993	1.000174
NO_2 Cal Offset:	0.065389	0.184957

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.6	-0.1	0.7	----	----
as found span	4916	84.4	801.1	799.9	1.2	839.5	836.1	3.7	0.9542	0.9567
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.0	0.4	----	----
high point	4916	84.4	801.1	799.9	1.2	801.2	799.8	1.5	0.9998	1.0001
second point	4958	42.2	400.5	400.0	0.6	399.1	397.1	2.0	1.0036	1.0072
third point	4979	21.1	200.3	200.0	0.3	196.9	194.1	2.8	1.0172	1.0303
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	4916	84.4	801.1	412.8	388.3	797.1	412.1	384.9	1.0050	1.0016
								Average Correction Factor	1.0069	1.0125

Corrected As found	NO_X = 838.9 ppb	NO = 836.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	4.8%
Previous Response	NO_X = 798.6 ppb	NO = 798.6 ppb		*Percent Change	NO =	4.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.6	409.5	388.3	388.6	0.9992	100.1%
2nd GPT point (200 ppb O3)	796.6	612.2	185.6	185.8	0.9988	100.1%
3rd GPT point (100 ppb O3)	796.6	706.1	91.7	91.6	1.0009	99.9%
				Average Correction Factor	0.9996	100.0%

Notes: Changed inlet filter after as founds. Adjusted span. 3rd point was triggered after high point to check linearity.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

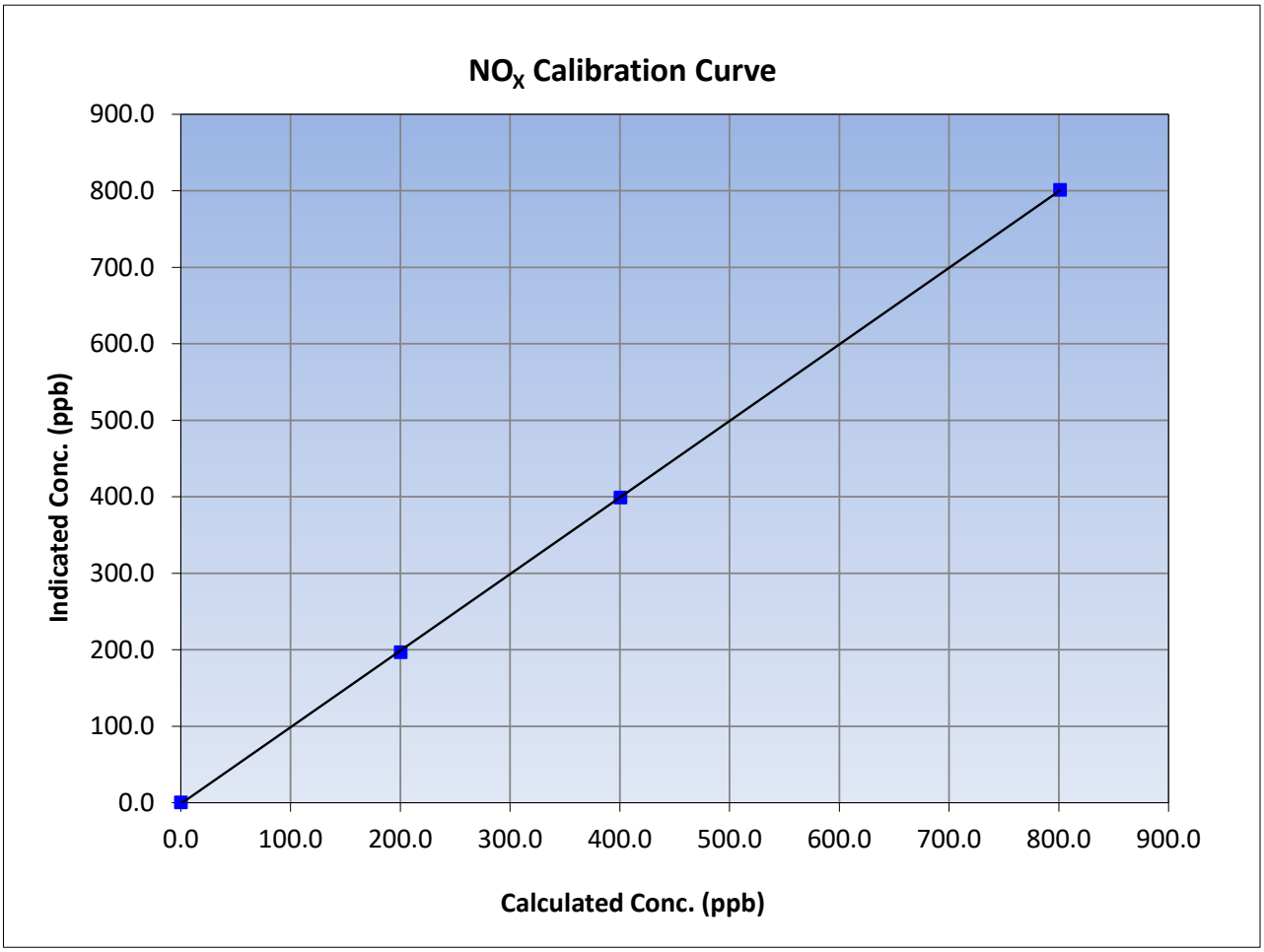
Version-04-2020

Station Information

Calibration Date:	January 24, 2024	Previous Calibration:	December 13, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:41	End Time (MST):	14:15
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

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
801.1	801.2	0.9998			
400.5	399.1	1.0036	Slope	1.001018	0.90 - 1.10
200.3	196.9	1.0172			
			Intercept	-1.427986	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

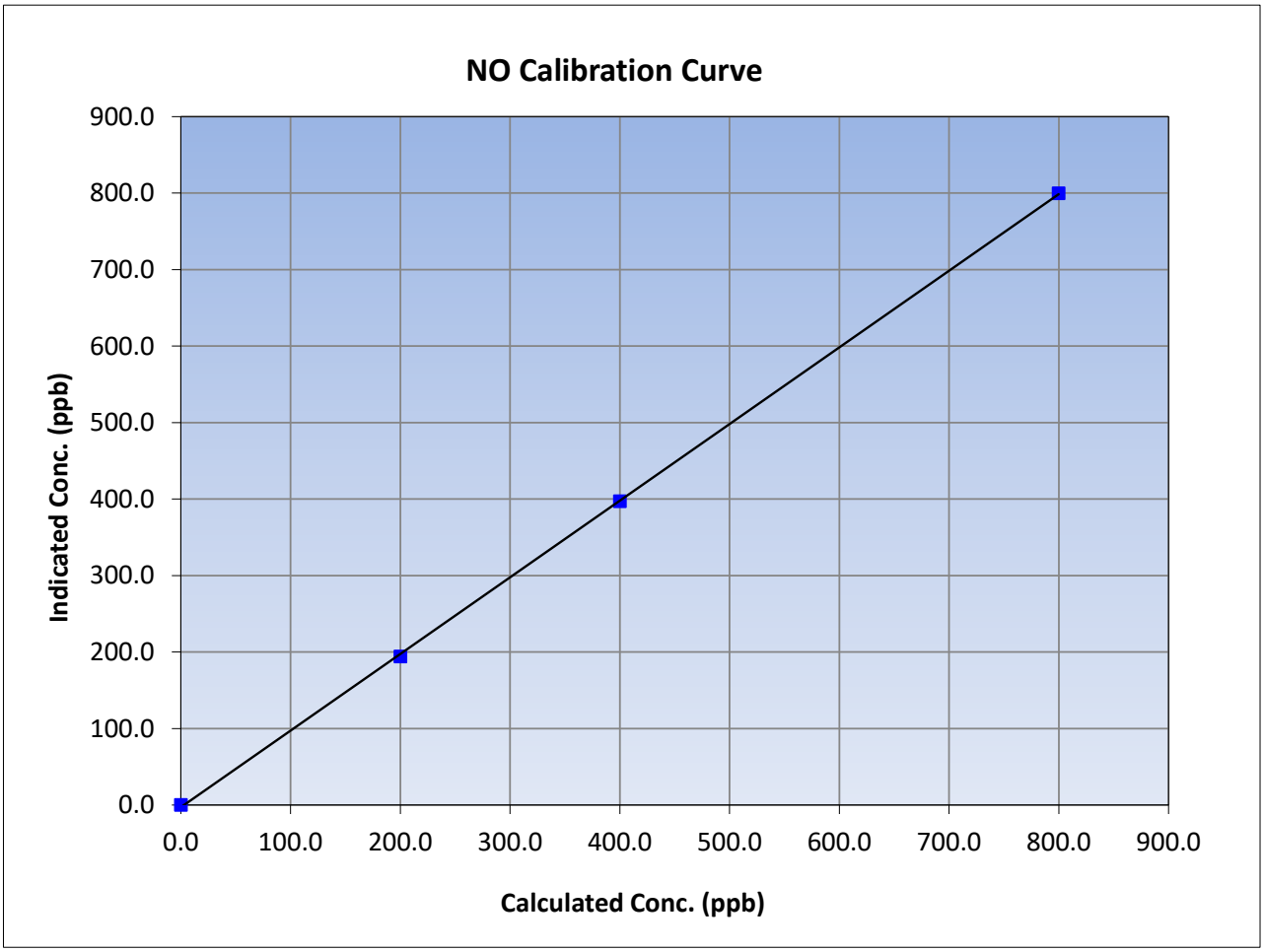
Version-04-2020

Station Information

Calibration Date:	January 24, 2024	Previous Calibration:	December 13, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:41	End Time (MST):	14:15
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999938	≥0.995
799.9	799.8	1.0001			
400.0	397.1	1.0072	Slope	1.002011	0.90 - 1.10
200.0	194.1	1.0303			
			Intercept	-2.907962	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

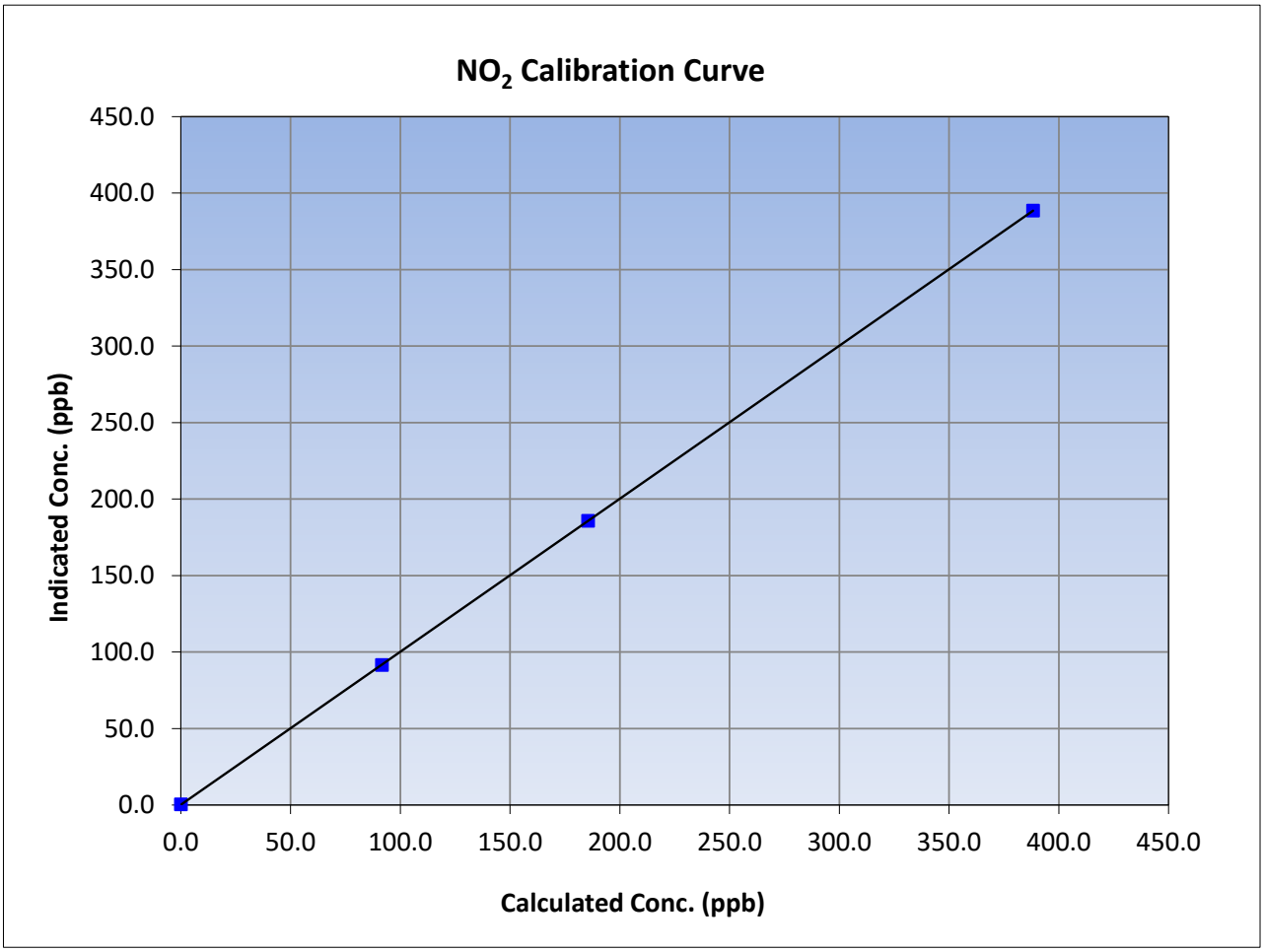
Version-04-2020

Station Information

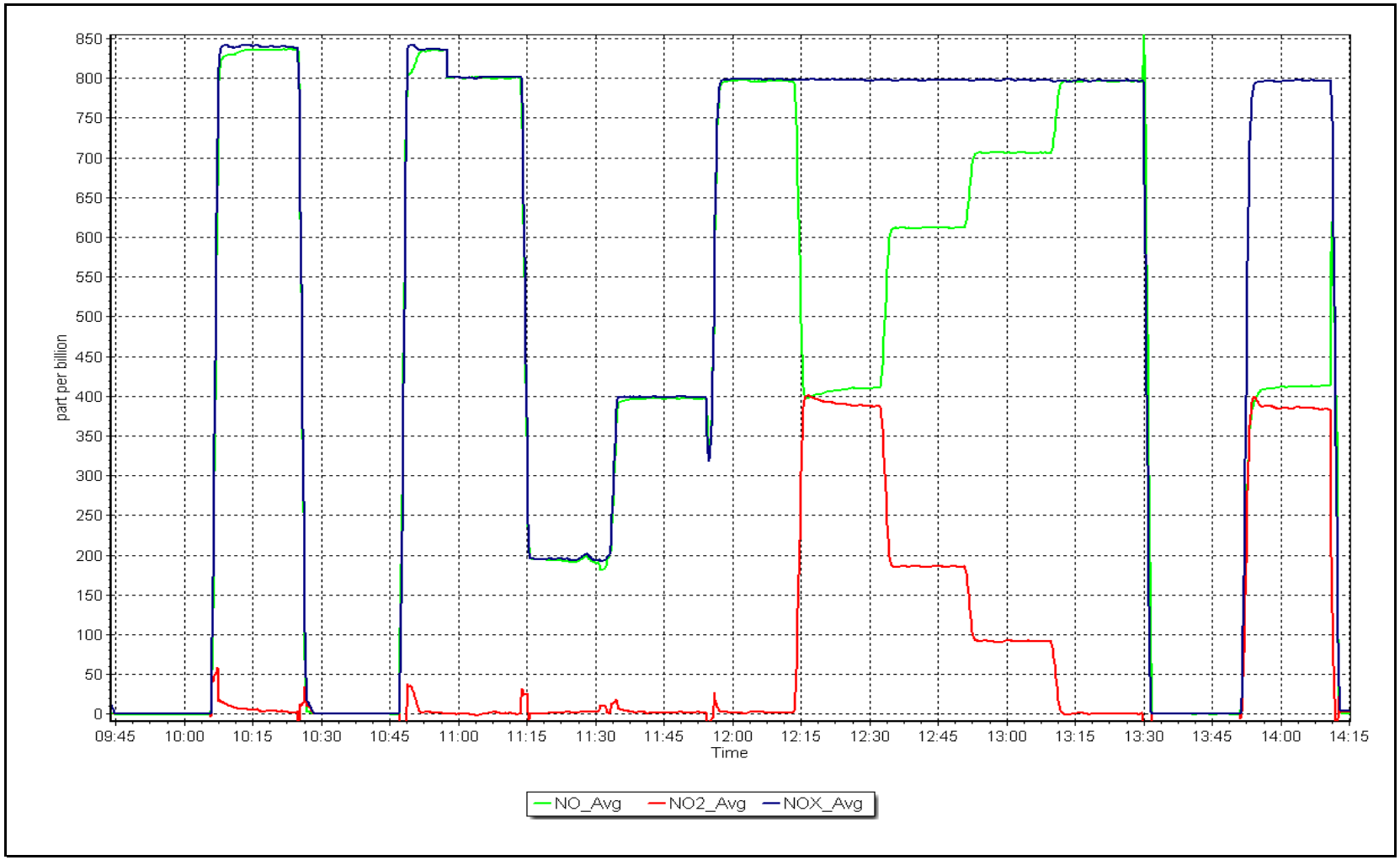
Calibration Date:	January 24, 2024	Previous Calibration:	December 13, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:41	End Time (MST):	14:15
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999998	≥0.995
388.3	388.6	0.9992			
185.6	185.8	0.9988	Slope	1.000174	0.90 - 1.10
91.7	91.6	1.0009			
			Intercept	0.184957	+/-20



NO_x Calibration Plot Date: January 24, 2024 Location: Leismer



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS505
SAWBONES BAY

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	January 11, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	8:21	End time (MST):	11:12
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	51.4	ppm	Cal Gas Exp Date:	February 15, 2029
Cal Gas Cylinder #:	EY0000672			
Removed Cal Gas Conc:	51.40	ppm	Rem Gas Exp Date:	February 15, 2029
Removed Gas Cyl #:	EY0000672		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5112
ZAG Make/Model:	Teledyne API T701H		Serial Number:	690

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 0710321323

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000723	1.001437	Backgd or Offset:	20.5	20.5
Calibration intercept:	-0.792239	-0.892107	Coeff or Slope:	0.994	0.994

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.5	----
as found span	4922	77.8	799.8	802.8	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4922	77.8	799.8	799.8	1.000
second point	4961	38.9	399.9	401.1	0.997
third point	4981	19.5	200.4	197.9	1.013
as left zero	5000	0.0	0.0	-0.5	----
as left span	4922	77.8	799.8	800.9	0.999
				Average Correction Factor	1.003

Baseline Corr As found:	803.30	Previous response	799.60	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter. No adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

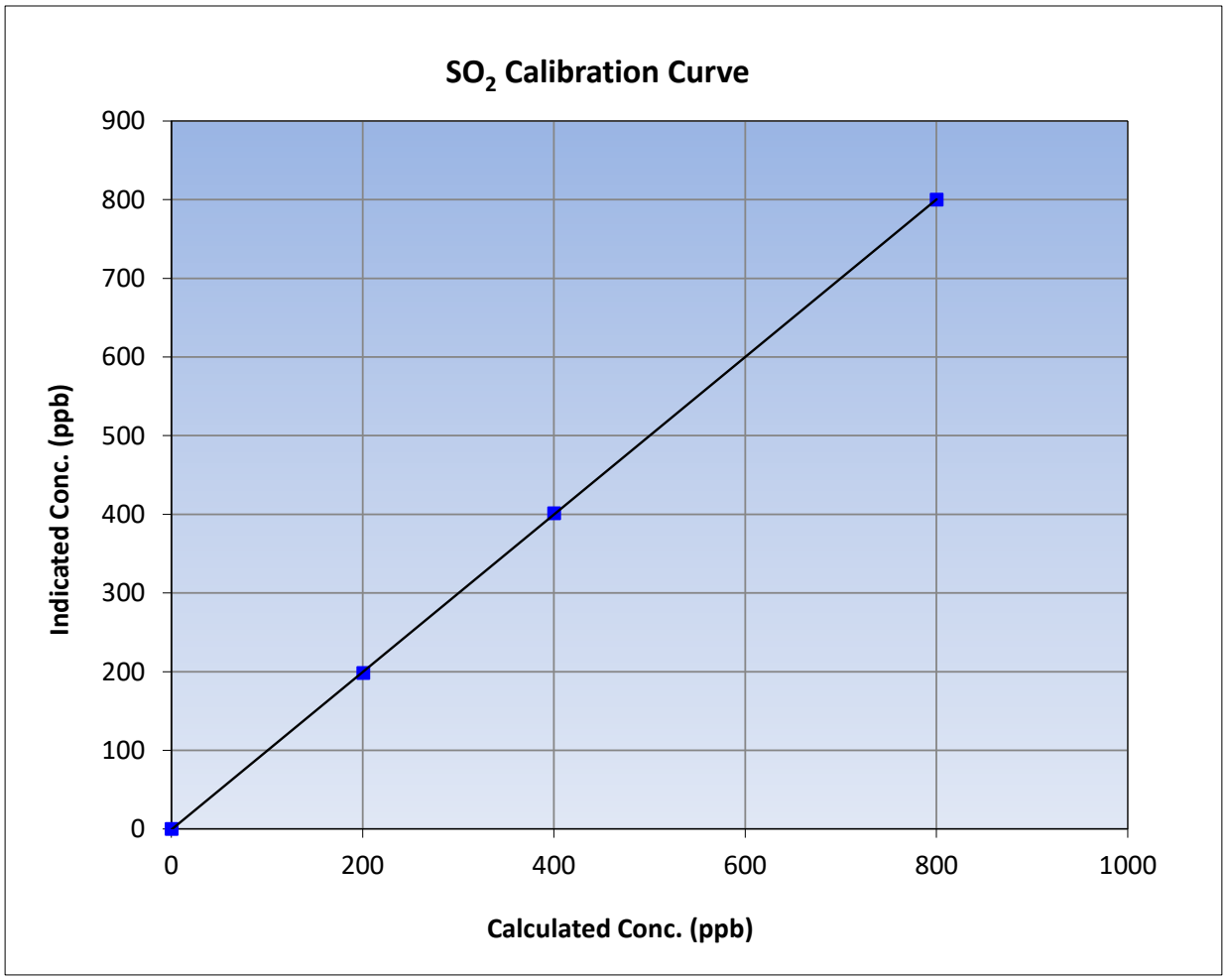
Station Information

Calibration Date:	January 11, 2024	Previous Calibration:	December 6, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:21	End Time (MST):	11:12
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321323

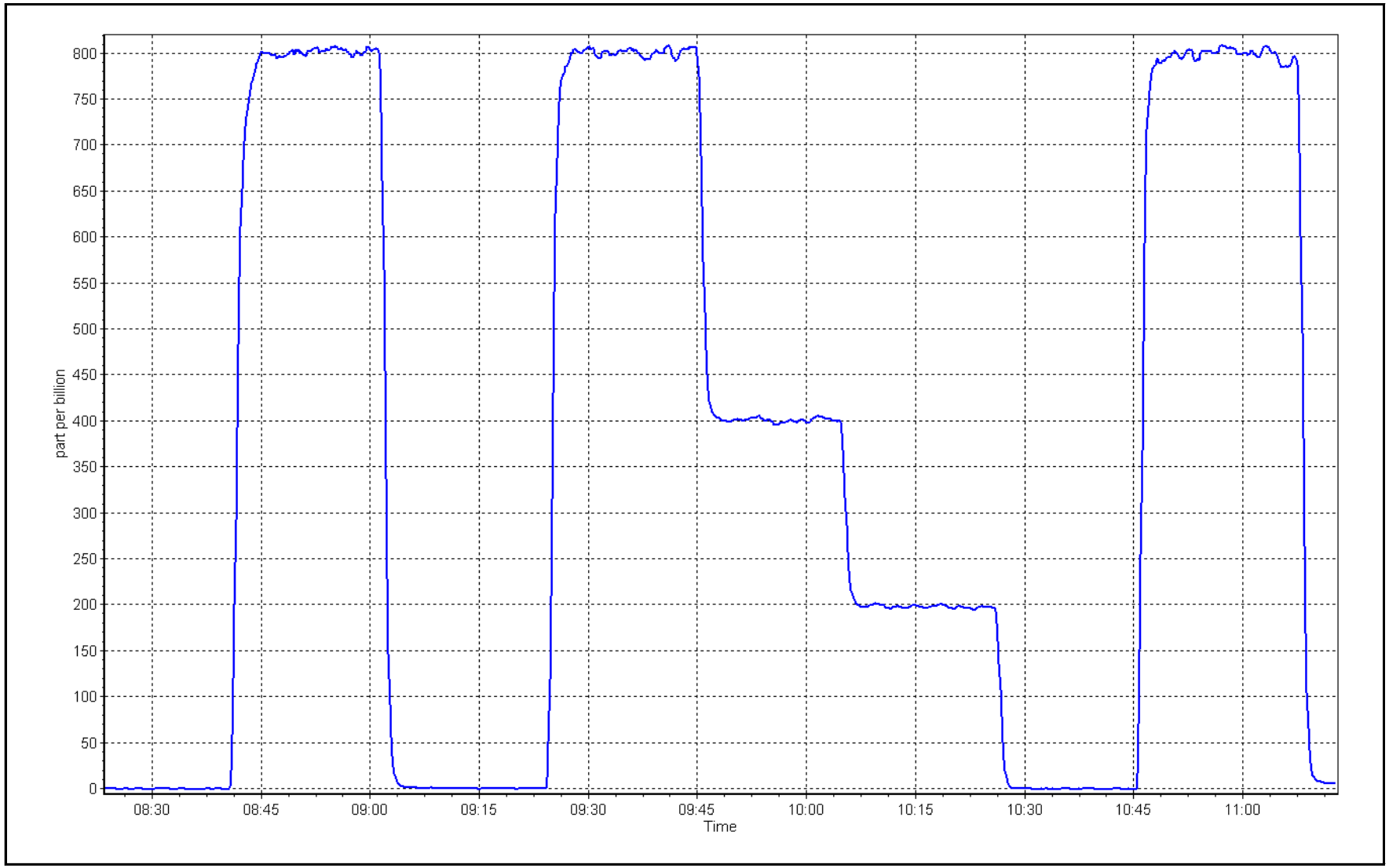
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
799.8	799.8	1.0000
399.9	401.1	0.9970
200.4	197.9	1.0128

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.001437	*0.90 - 1.10*
Intercept	-0.892107	*+/-30*



SO2 Calibration Plot Date: January 11, 2024 Location: Sawbones Bay



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	January 8, 2024	Last Cal Date:	NA
Start time (MST):	13:45	End time (MST):	15:59
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.15	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517397			
Removed Cal Gas Conc:	5.15	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledybe API T700		Serial Number:	5112
ZAG Make/Model:	Teledybe API T701		Serial Number:	690

Analyzer Information

Analyzer make:	Thermo 43iQ		Analyzer serial #:	12113311965	
Converter make:	Global 150		Converter serial #:	2022-224	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	NA	1.006361	Backgd or Offset:	NA	1.01
Calibration intercept:	NA	-0.218059	Coeff or Slope:	NA	1.119

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4922	77.7	80.0	80.4	0.995
second point	4961	38.8	40.0	39.9	1.002
third point	4981	19.4	20.0	19.8	1.009
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	77.7	80.0	79.9	1.002
SO2 Scrubber Check	4922	77.8	778.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.002
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: Install Calibration. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

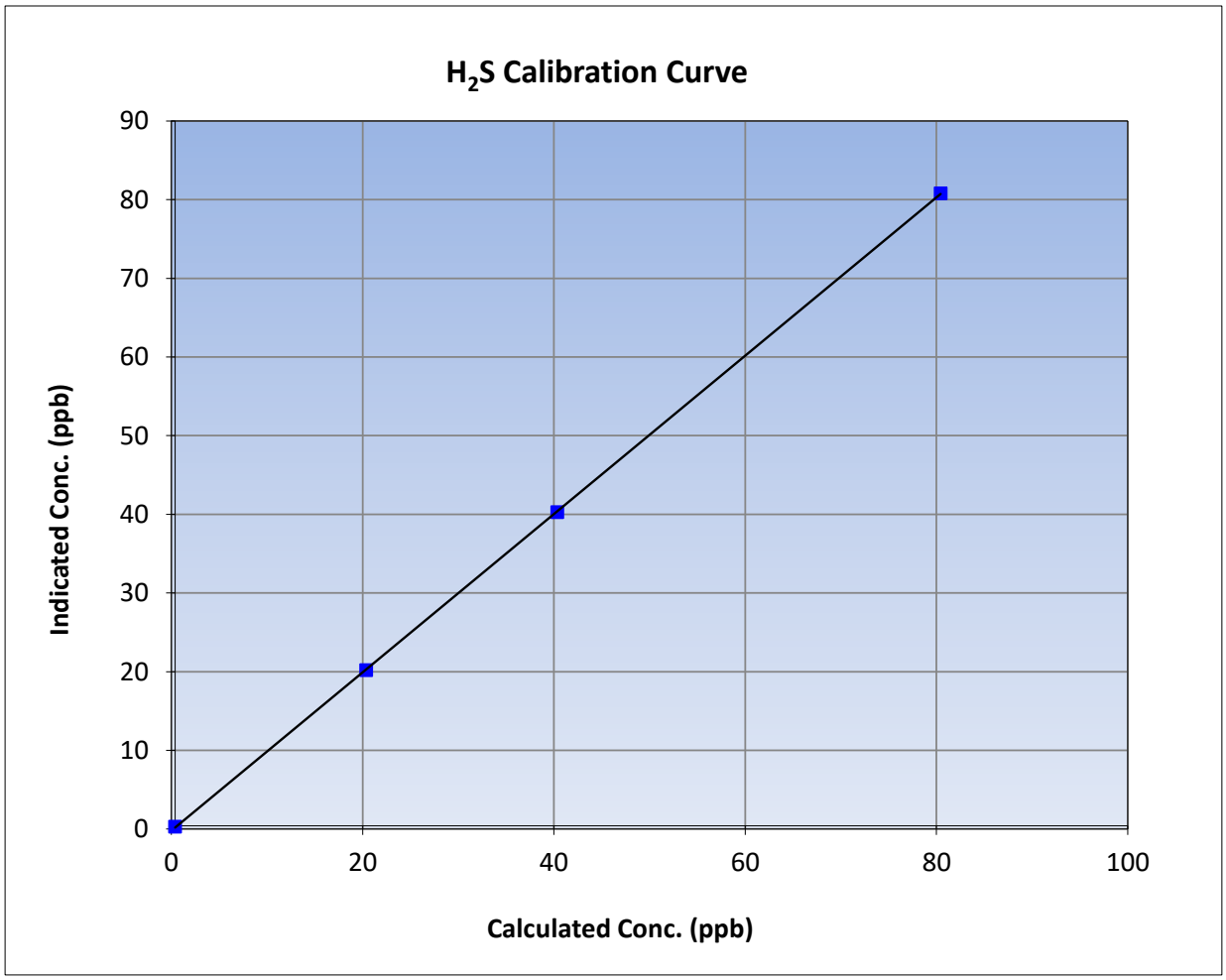
Station Information

Calibration Date:	January 8, 2024	Previous Calibration:	NA
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	13:45	End Time (MST):	15:59
Analyzer make:	Thermo 43iQ	Analyzer serial #:	12113311965

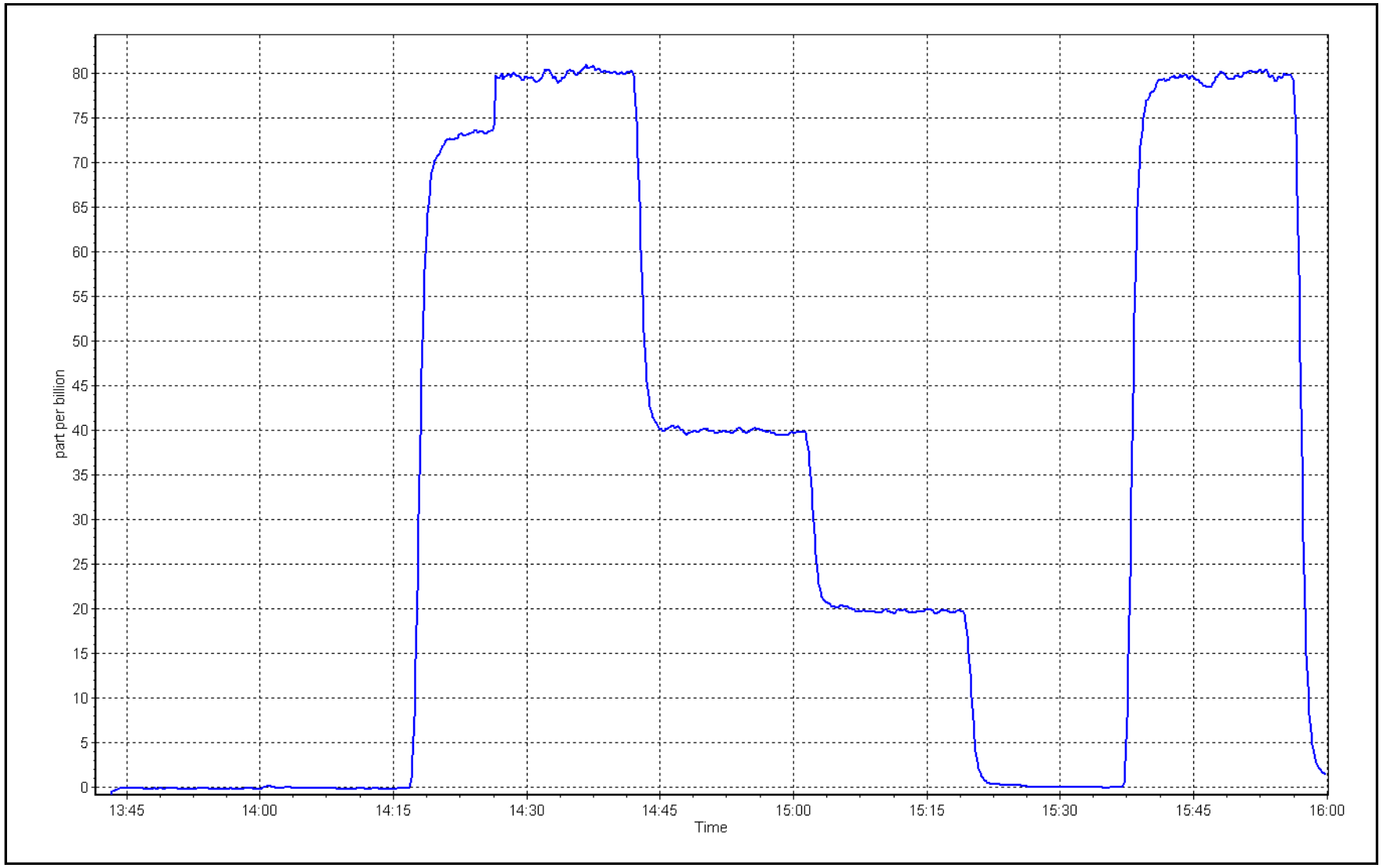
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.4	0.9955
40.0	39.9	1.0016
20.0	19.8	1.0091

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	1.006361	*0.90 - 1.10*
Intercept	-0.218059	*+/-3*



H_2S Calibration Plot Date: January 8, 2024 Location: Sawbones Bay



CALS_579

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	January 10, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	10:27	End time (MST):	14:44
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T1FY3PK		Cal Gas Expiry Date:	March 14, 2025	
NOX Cal Gas Conc:	47.94	ppm	NO Cal Gas Conc:	47.94	ppm
Removed Cylinder #:	T1FY3PK		Removed Gas Exp Date:	March 14, 2025	
Removed Gas NOX Conc:	47.94	ppm	Removed Gas NO Conc:	47.94	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	5112	
ZAG make/model:	API T701H		Serial Number:	690	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	4260
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.069	1.062	NO bkgnd or offset:	0.4	0.4
NOX coeff or slope:	1.065	1.060	NOX bkgnd or offset:	1.3	1.3
NO2 coeff or slope:	NA	NA	Reaction cell Press:	7.5	7.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003180	1.001378
NO_X Cal Offset:	-1.290916	-1.910345
NO Cal Slope:	1.004108	1.000734
NO Cal Offset:	-1.590759	-2.109999
NO_2 Cal Slope:	0.997701	0.999561
NO_2 Cal Offset:	-0.376391	0.319413

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.2	-0.4	----	----
as found span	4917	83.4	799.6	799.6	0.0	804.3	803.7	0.6	0.9941	0.9949
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.1	-0.3	----	----
high point	4917	83.4	799.6	799.6	0.0	799.4	799.0	0.3	1.0002	1.0007
second point	4958	41.7	399.8	399.8	0.0	398.1	397.2	0.9	1.0044	1.0067
third point	4979	20.9	200.4	200.4	0.0	197.0	196.3	0.7	1.0172	1.0209
as left zero	5000	0.0	0.0	0.0	0.0	-0.4	0.0	-0.4	----	----
as left span	4916	83.4	799.7	334.7	465.0	791.9	331.8	460.1	1.0099	1.0088
								Average Correction Factor	1.0073	1.0094

Corrected As found	NO_X = 805.0 ppb	NO = 803.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.5%
Previous Response	NO_X = 800.8 ppb	NO = 801.3 ppb		*Percent Change	NO =	0.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.4	329.4	465.0	464.8	1.0004	100.0%
2nd GPT point (200 ppb O3)	794.4	546.5	247.9	248.2	0.9988	100.1%
3rd GPT point (100 ppb O3)	794.4	647.2	147.2	148.3	0.9926	100.7%
				Average Correction Factor	0.9973	100.3%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

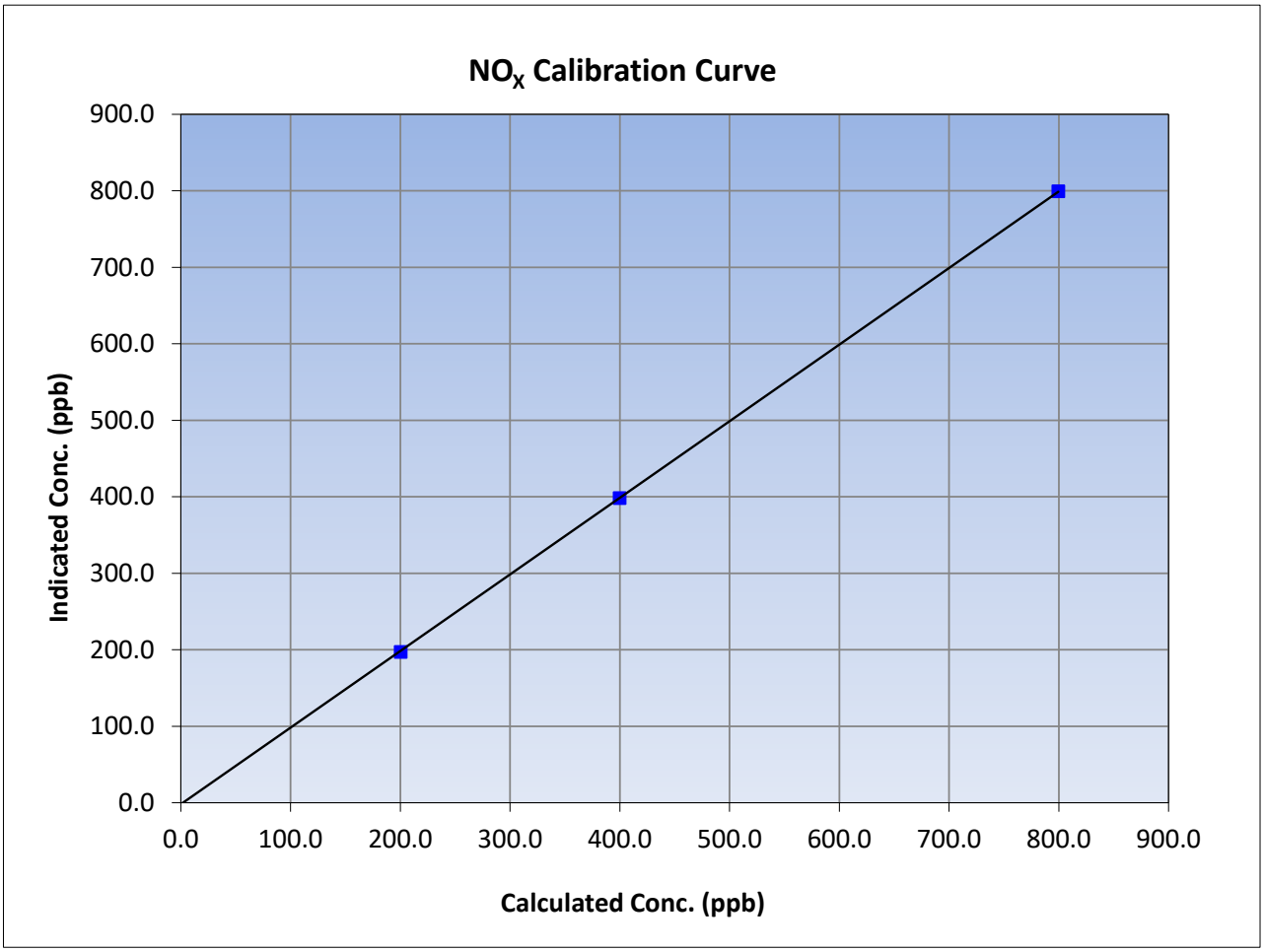
Version-04-2020

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	10:27	End Time (MST):	14:44
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.4	----	Correlation Coefficient	0.999983	≥0.995
799.6	799.4	1.0002			
399.8	398.1	1.0044	Slope	1.001378	0.90 - 1.10
200.4	197.0	1.0172			
			Intercept	-1.910345	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

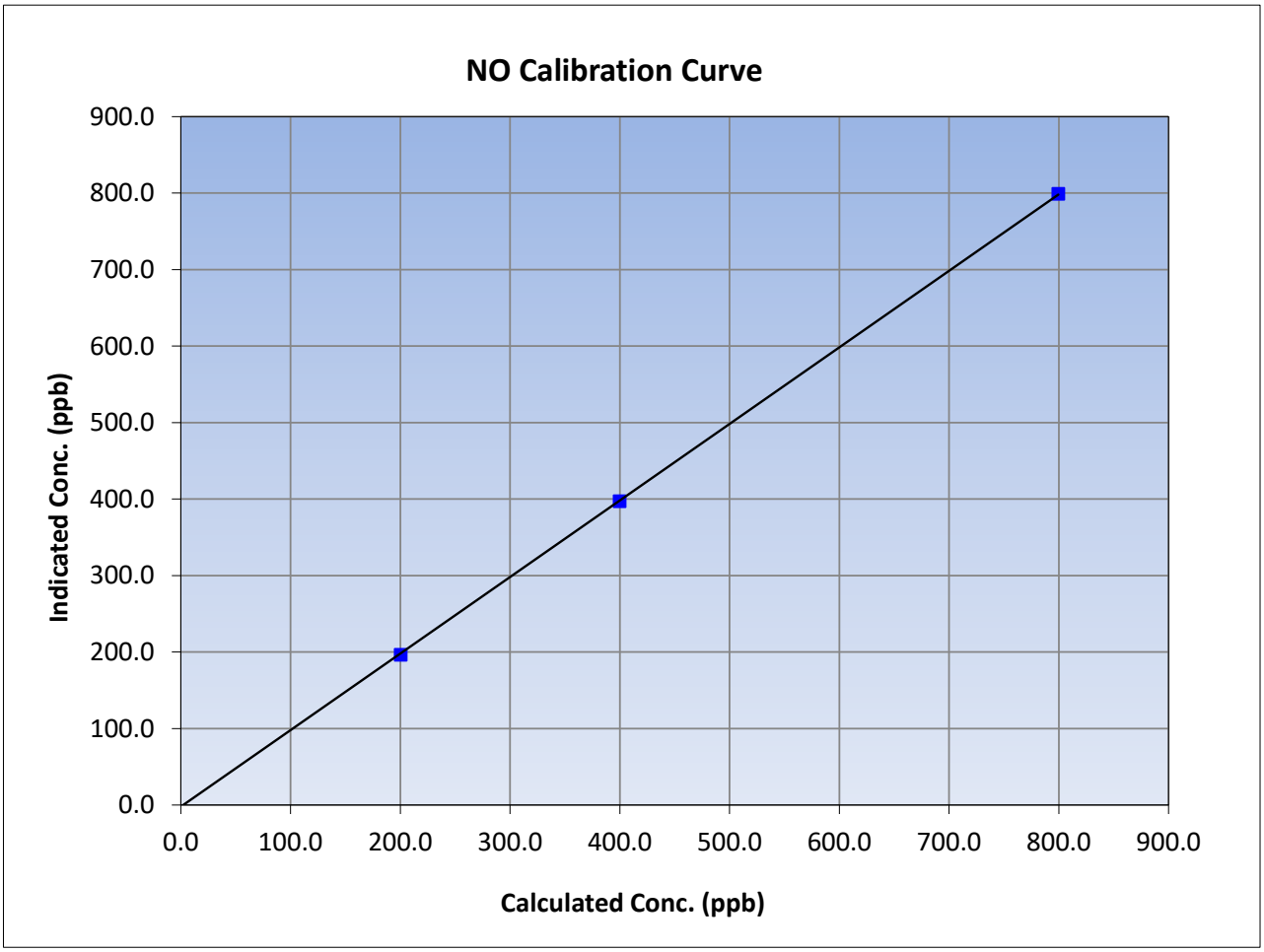
Version-04-2020

Station Information

Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	10:27	End Time (MST):	14:44
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999971	≥0.995
799.6	799.0	1.0007			
399.8	397.2	1.0067	Slope	1.000734	0.90 - 1.10
200.4	196.3	1.0209			
			Intercept	-2.109999	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

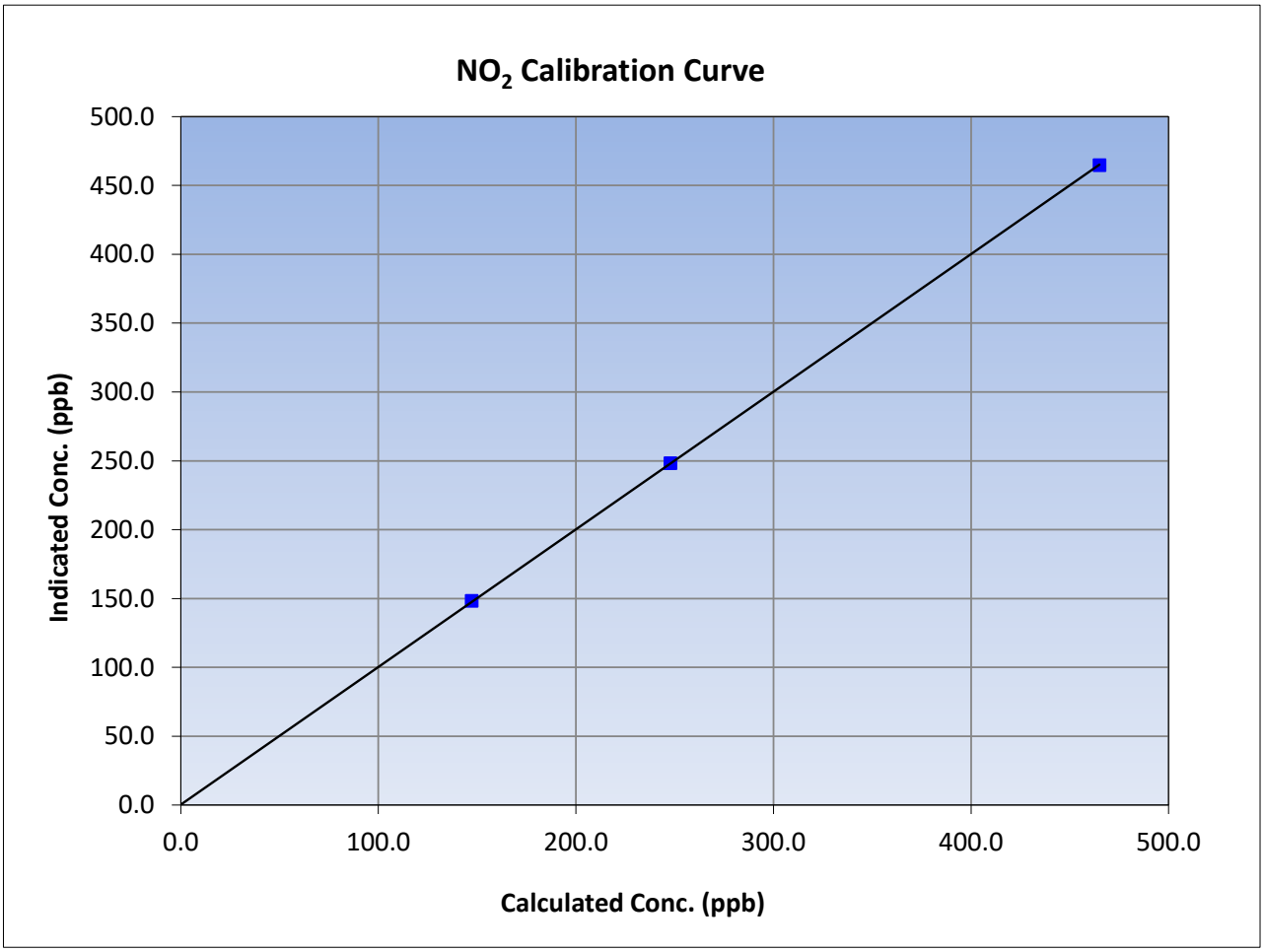
Version-04-2020

Station Information

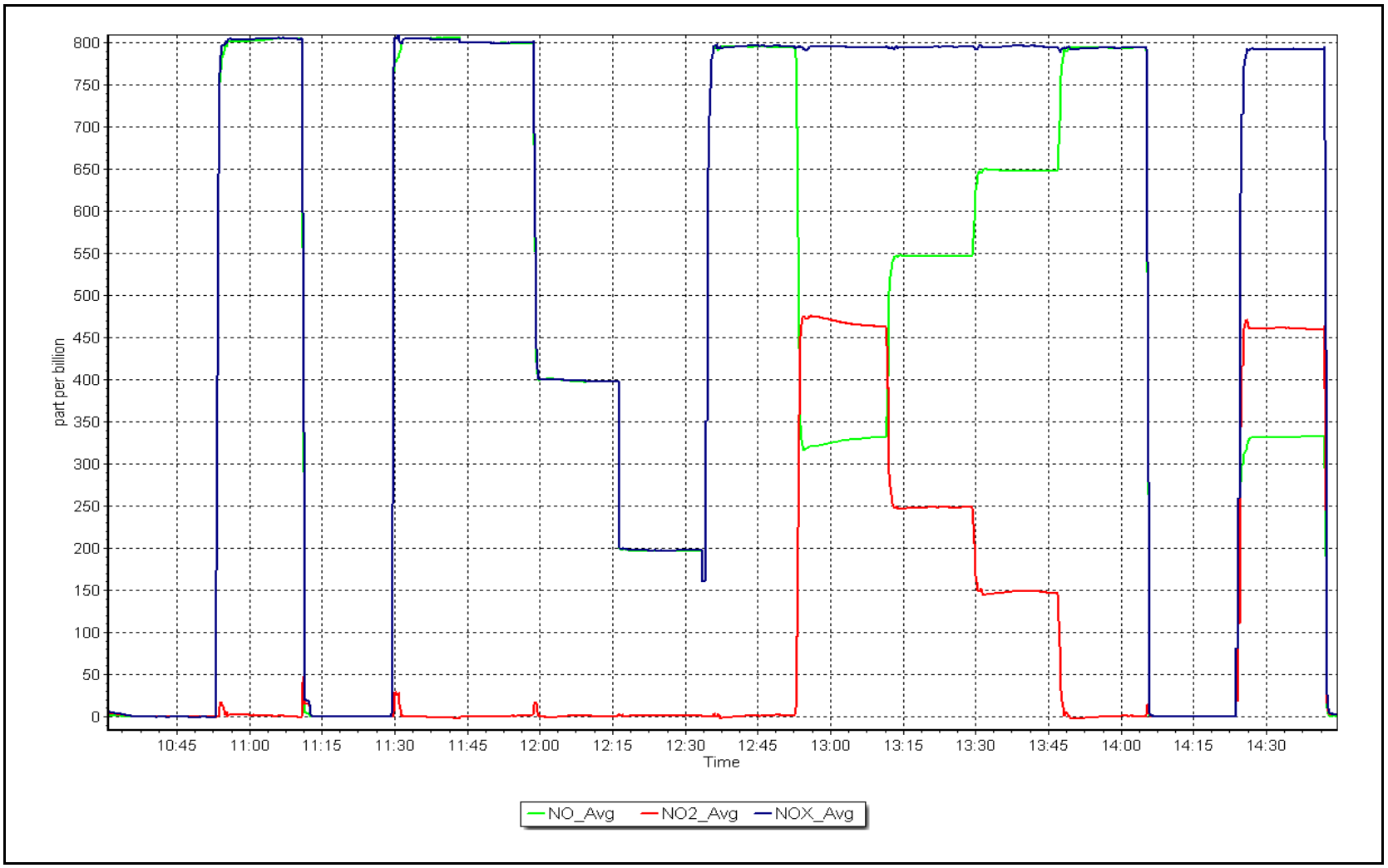
Calibration Date:	January 10, 2024	Previous Calibration:	December 7, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	10:27	End Time (MST):	14:44
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999989	≥0.995
465.0	464.8	1.0004			
247.9	248.2	0.9988	Slope	0.999561	0.90 - 1.10
147.2	148.3	0.9926			
			Intercept	0.319413	+/-20



NO_X Calibration Plot Date: January 10, 2024 Location: Sawbones Bay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS507
KIRBY SOUTH

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS 507
Calibration Date:	January 16, 2024	Last Cal Date:	December 24, 2023
Start time (MST):	12:24	End time (MST):	15:03
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	49.18	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC303554			
Removed Cal Gas Conc:	49.18	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make: Thermo 43iQ — Analyzer serial #: 1182340007

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.016010		Backgd or Offset:	20.2	20.3
Calibration intercept:	-0.008833		Coeff or Slope:	1.146	1.146

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.8	----
as found span	4919	81.3	799.6	811.0	0.986
as found 2nd point	4959	40.7	400.3	403.6	0.992
as found 3rd point	4980	20.3	199.7	203.3	0.982
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

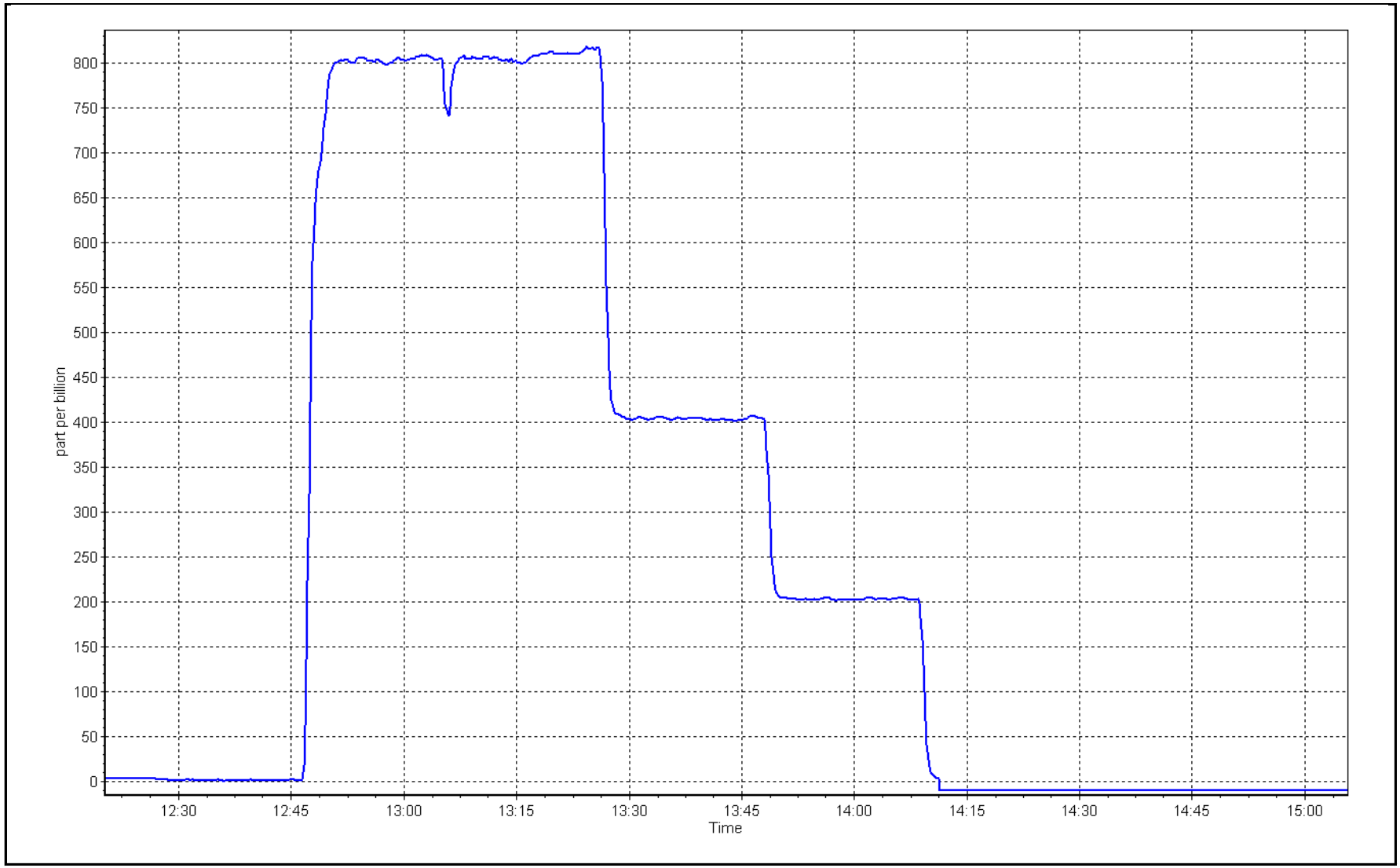
Baseline Corr As found:	810.20	Previous response	812.41	*% change	-0.3%
Baseline Corr 2nd AF pt:	402.80	AF Slope:	1.012737	AF Intercept:	0.311630
Baseline Corr 3rd AF pt:	202.50	AF Correlation:	0.999982		

* = > +/-5% change initiates investigation

Notes: MPAFs done, swapped out UV lamp. Instrument will be left flagged overnight and will be calibrated Jan 17.

Calibration Performed By: Braiden Boutilier

SO2 Calibration Plot Date: January 16, 2024 Location: Kirby South



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS 507
Calibration Date:	January 17, 2024	Last Cal Date:	January 16, 2024
Start time (MST):	12:32	End time (MST):	16:52
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.18	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC303554			
Removed Cal Gas Conc:	49.18	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make: Thermo 43iQ Analyzer serial #: 1182340007

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.016010	1.005405	Backgd or Offset:	20.2	24.6
Calibration intercept:	-0.008833	-1.048100	Coeff or Slope:	1.146	1.100

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.8	----
as found span	4919	81.3	799.6	811.0	0.986
as found 2nd point	4959	40.7	400.3	403.6	0.992
as found 3rd point	4980	20.3	199.7	203.3	0.982
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4919	81.3	799.6	804.0	0.995
second point	4959	40.7	400.3	398.9	1.004
third point	4980	20.3	199.7	200.4	0.996
as left zero	5000	0.0	0.0	-0.2	----
as left span	4919	81.3	799.6	796.6	1.004
				Average Correction Factor	0.998

Baseline Corr As found:	810.20	Previous response	812.41	*% change	-0.3%
Baseline Corr 2nd AF pt:	402.80	AF Slope:	1.012737	AF Intercept:	0.311630
Baseline Corr 3rd AF pt:	202.50	AF Correlation:	0.999982		

* = > +/-5% change initiates investigation

Notes: As founds done Jan 16 during maintenance. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

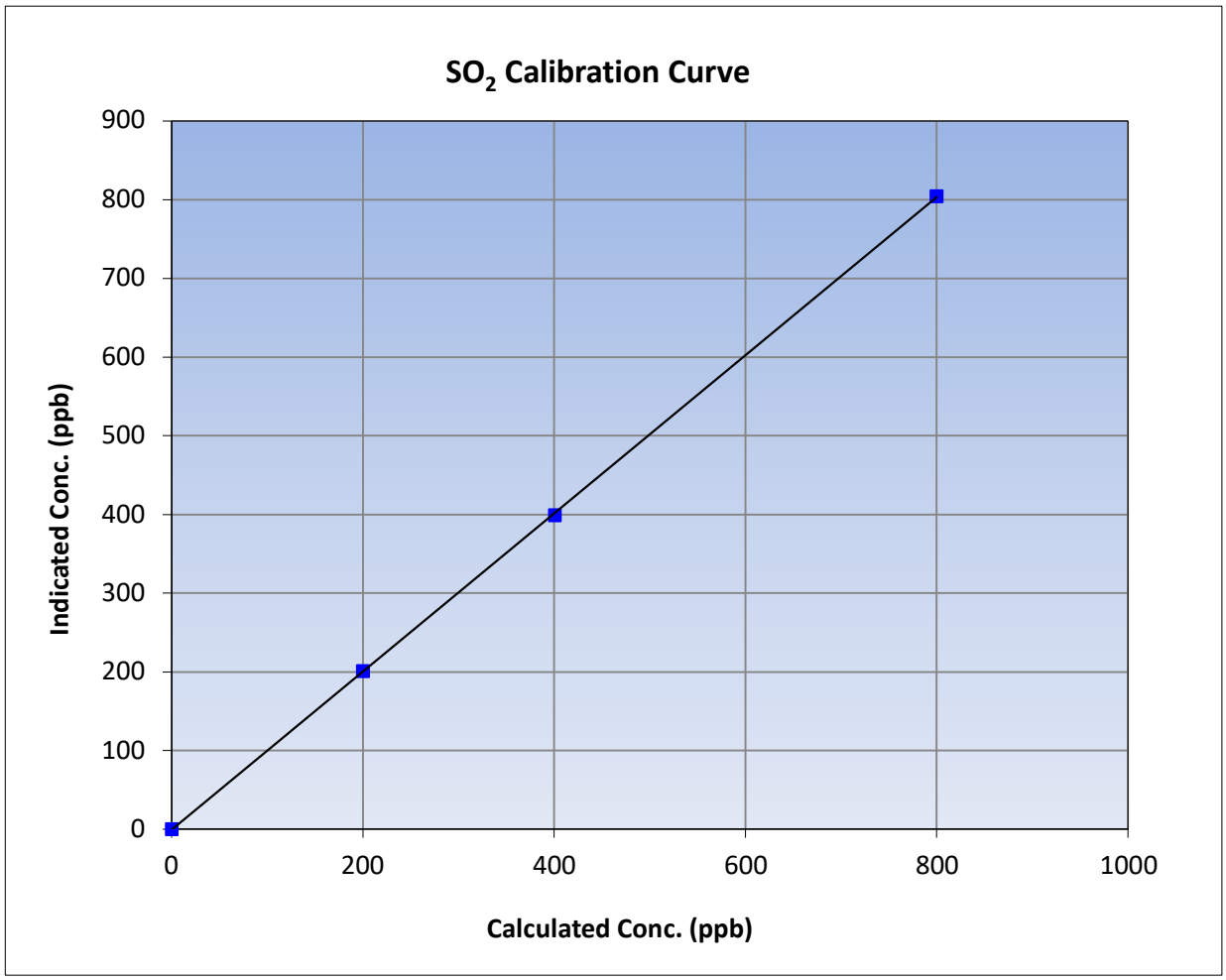
Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	January 16, 2024
Station Name:	Kirby South	Station Number:	AMS 507
Start Time (MST):	12:32	End Time (MST):	16:52
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

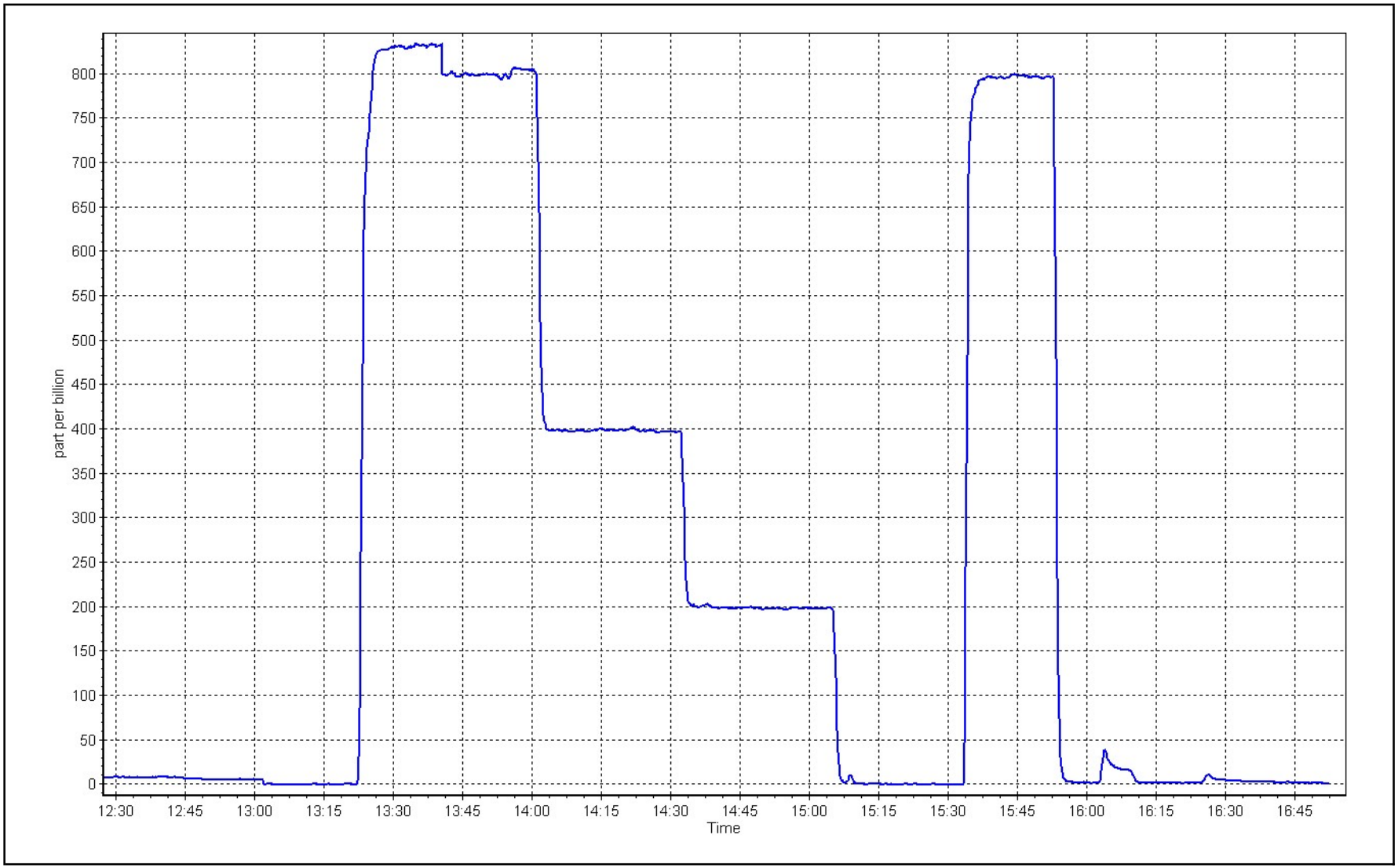
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
799.6	804.0	0.9946
400.3	398.9	1.0036
199.7	200.4	0.9963

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	1.005405	*0.90 - 1.10*
Intercept	-1.048100	*+/-30*



SO2 Calibration Plot Date: January 17, 2024 Location: Kirby South



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	January 17, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	12:29	End time (MST):	19:05
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.05	ppm	Cal Gas Exp Date:	November 15, 2026
Cal Gas Cylinder #:	DT0019762			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	CC517378		Diff between cyl:	2.4%
Calibrator Make/Model:	API T750		Serial Number:	281
ZAG Make/Model:	API T751H		Serial Number:	321

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002178	0.997813	Backgd or Offset:	1.81	1.74
Calibration intercept:	-0.081174	0.179050	Coeff or Slope:	1.079	1.052

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4923	77.4	80.0	79.6	1.005
as found 2nd point	4961	38.8	40.1	39.9	1.005
as found 3rd point	4981	19.3	19.9	20.2	0.987
new cylinder response	4921	79.2	80.0	81.6	0.980

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	79.2	80.0	80.1	0.999
second point	4960	39.6	40.0	39.8	1.005
third point	4980	19.8	20.0	20.3	0.985
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.2	80.0	78.7	1.016
SO2 Scrubber Check	4919	80.0	800.2	0.1	----
Date of last scrubber change:		25-Jul-23		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.6	Prev response:	80.07	*% change:	-0.6%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.993743	AF Intercept:	0.139102
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999975		

* = > +/-5% change initiates investigation

Notes: Changed cyl#: CC517378, with cyl#: DT0019762. Ran SOx scrubber check after cal zero. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

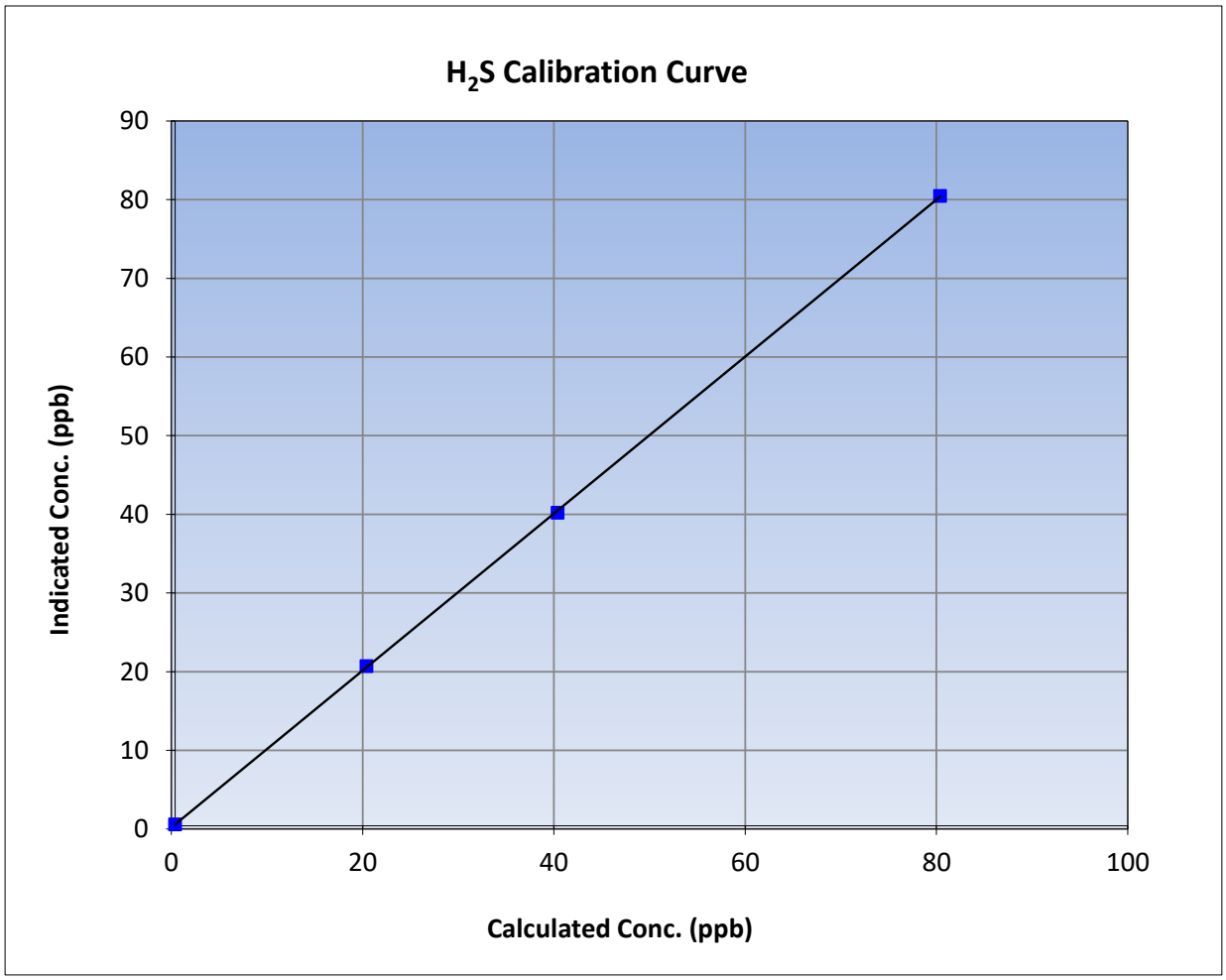
Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	December 7, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	12:29	End Time (MST):	19:05
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

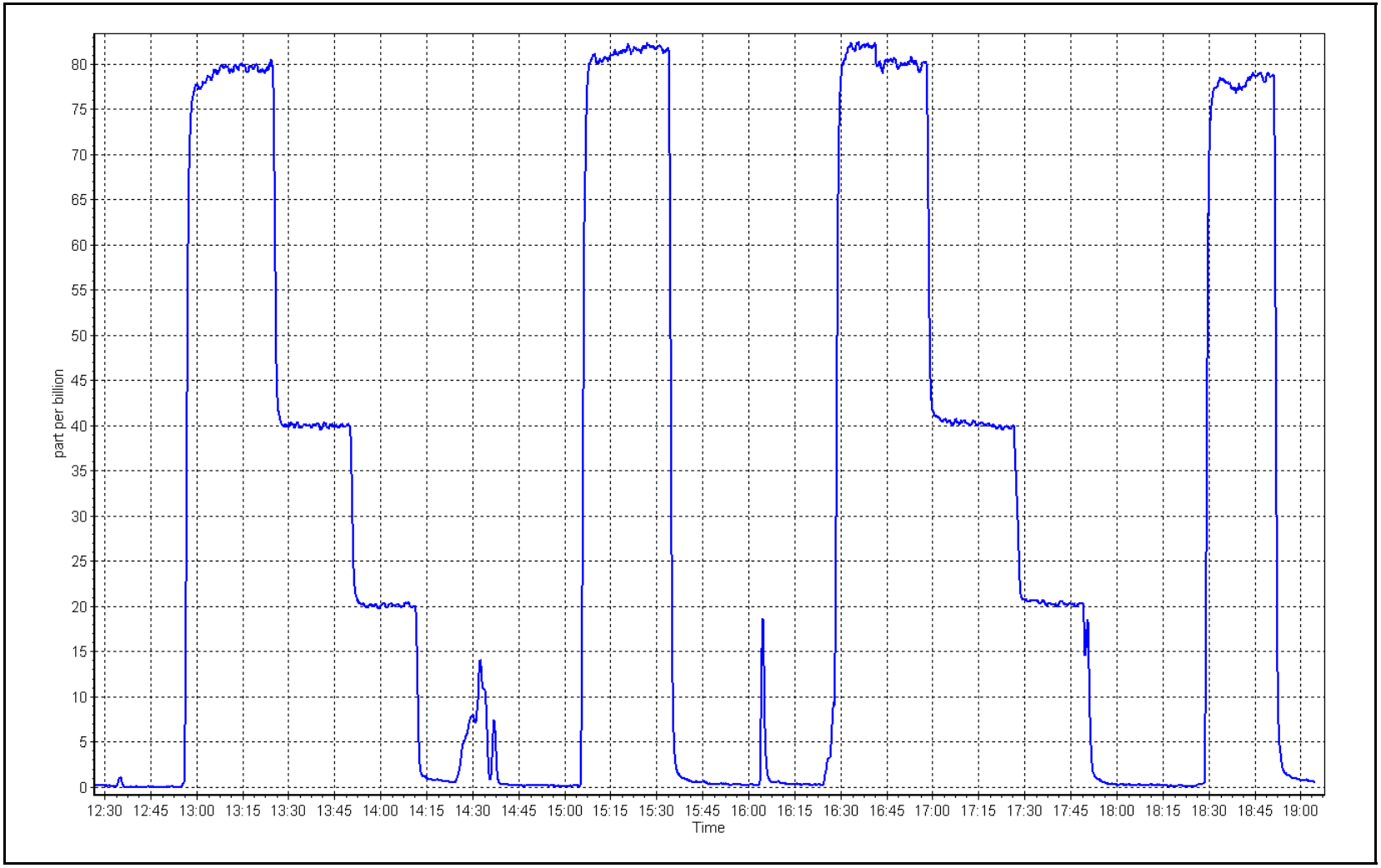
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.1	0.9987
40.0	39.8	1.0050
20.0	20.3	0.9852

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999965	*≥0.995*
Slope	0.997813	*0.90 - 1.10*
Intercept	0.179050	*+/-3*



H_2S Calibration Plot Date: January 17, 2024 Location: Kirby South



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	January 16, 2024	Last Cal Date:	December 7, 2023
Start time (MST):	12:24	End time (MST):	15:03
Reason:	As Found		

Calibration Standards

Gas Cert Reference:		CC303554	Cal Gas Expiry Date:	March 23, 2025	
CH4 Cal Gas Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
C3H8 Cal Gas Conc.	205.5	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
Removed C3H8 Conc.	205.5	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	3804	
ZAG Make/Model:	API T701H		Serial Number:	880	

Analyzer Information

Analyzer make:	Thermo 51i		Analyzer serial #:	1182340005	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001294		Background:	2.86	2.86
Calibration intercept:	-0.045008		Coefficient:	3.753	3.753

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.17	----
as found span	4919	81.3	17.26	17.40	0.992
as found 2nd point	4959	40.7	8.64	8.68	0.996
as found 3rd point	4980	20.3	4.31	4.35	0.992
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

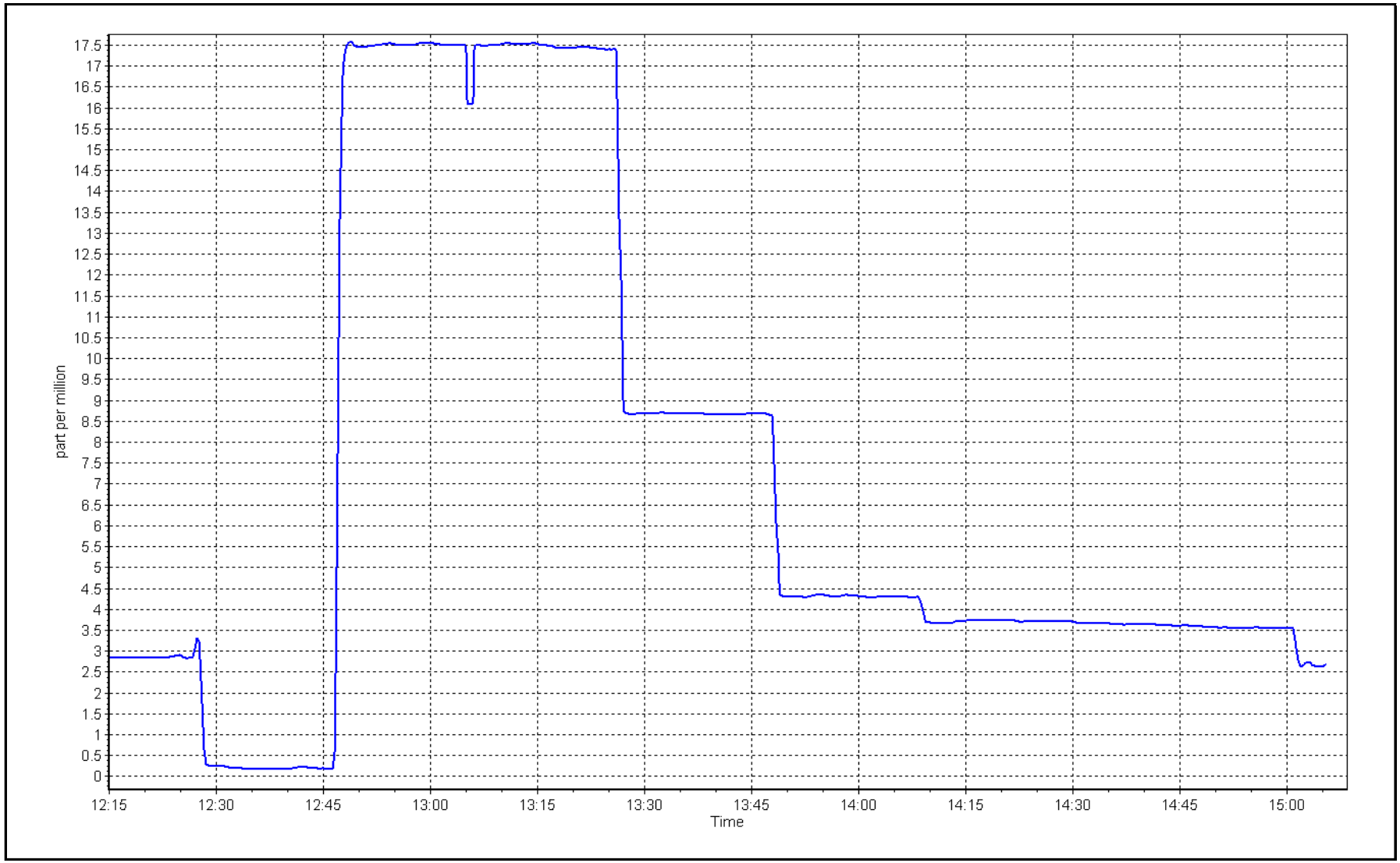
Baseline Corr As found:	17.23	Previous response	17.24	*% change	-0.1%
Baseline Corr 2nd AF pt:	8.51	AF Slope:	0.999776	AF Intercept:	0.097209
Baseline Corr 3rd AF pt:	4.18	AF Correlation:	0.999912		

* = > +/-5% change initiates investigation

Notes: MPAF's done with SO2 maintenance. Calibration will be performed Jan 17.

Calibration Performed By: Braiden Boutilier

THC Calibration Plot Date: January 16, 2024 Location: Kirby South



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	January 17, 2024	Last Cal Date:	January 16, 2024
Start time (MST):	12:24	End time (MST):	16:52
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC303554	Cal Gas Expiry Date:	March 23, 2025	
CH4 Cal Gas Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
C3H8 Cal Gas Conc.	205.5	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
Removed C3H8 Conc.	205.5	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	3804	
ZAG Make/Model:	API T701H		Serial Number:	880	

Analyzer Information

Analyzer make:	Thermo 51i		Analyzer serial #:	1182340005	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001294	0.993376	Background:	2.86	2.86
Calibration intercept:	-0.045008	0.069808	Coefficient:	3.753	3.753

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.17	----
as found span	4919	81.3	17.26	17.40	0.992
as found 2nd point	4959	40.7	8.64	8.68	0.996
as found 3rd point	4980	20.3	4.31	4.35	0.992
new cylinder response					
calibrator zero	5000	0.0	0.00	0.06	----
high point	4919	81.3	17.26	17.22	1.002
second point	4959	40.7	8.64	8.64	1.000
third point	4980	20.3	4.31	4.38	0.985
as left zero	5000	0.0	0.00	0.10	----
as left span	4919	81.3	17.26	17.35	0.995
				Average Correction Factor	0.996

Baseline Corr As found:	17.23	Previous response	17.24	*% change	-0.1%
Baseline Corr 2nd AF pt:	8.51	AF Slope:	0.999776	AF Intercept:	0.097209
Baseline Corr 3rd AF pt:	4.18	AF Correlation:	0.999912		

* = > +/-5% change initiates investigation

Notes: MPAF's done Jan 16 for SO2 maintenance. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

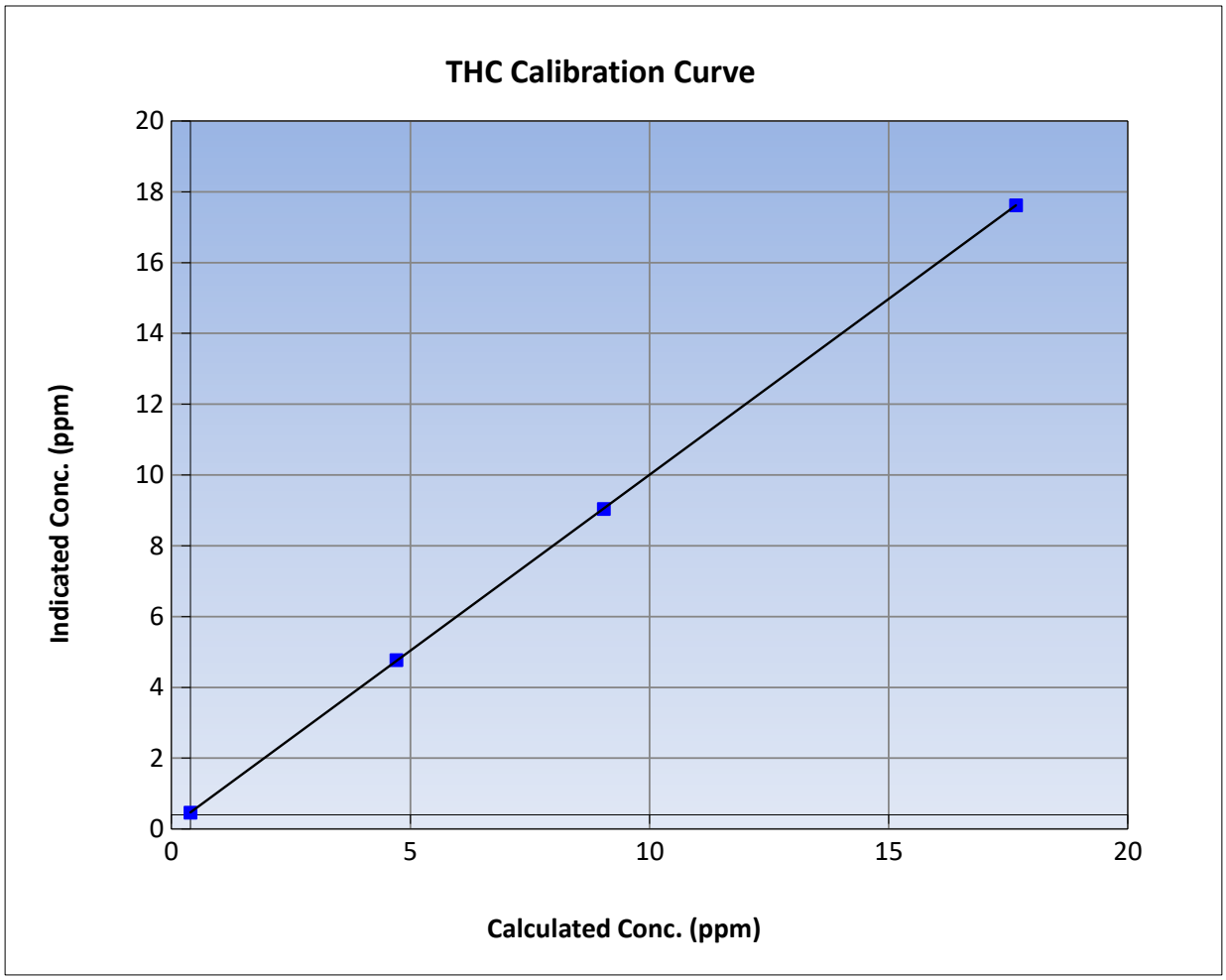
Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	January 16, 2024
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	12:24	End Time (MST):	16:52
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

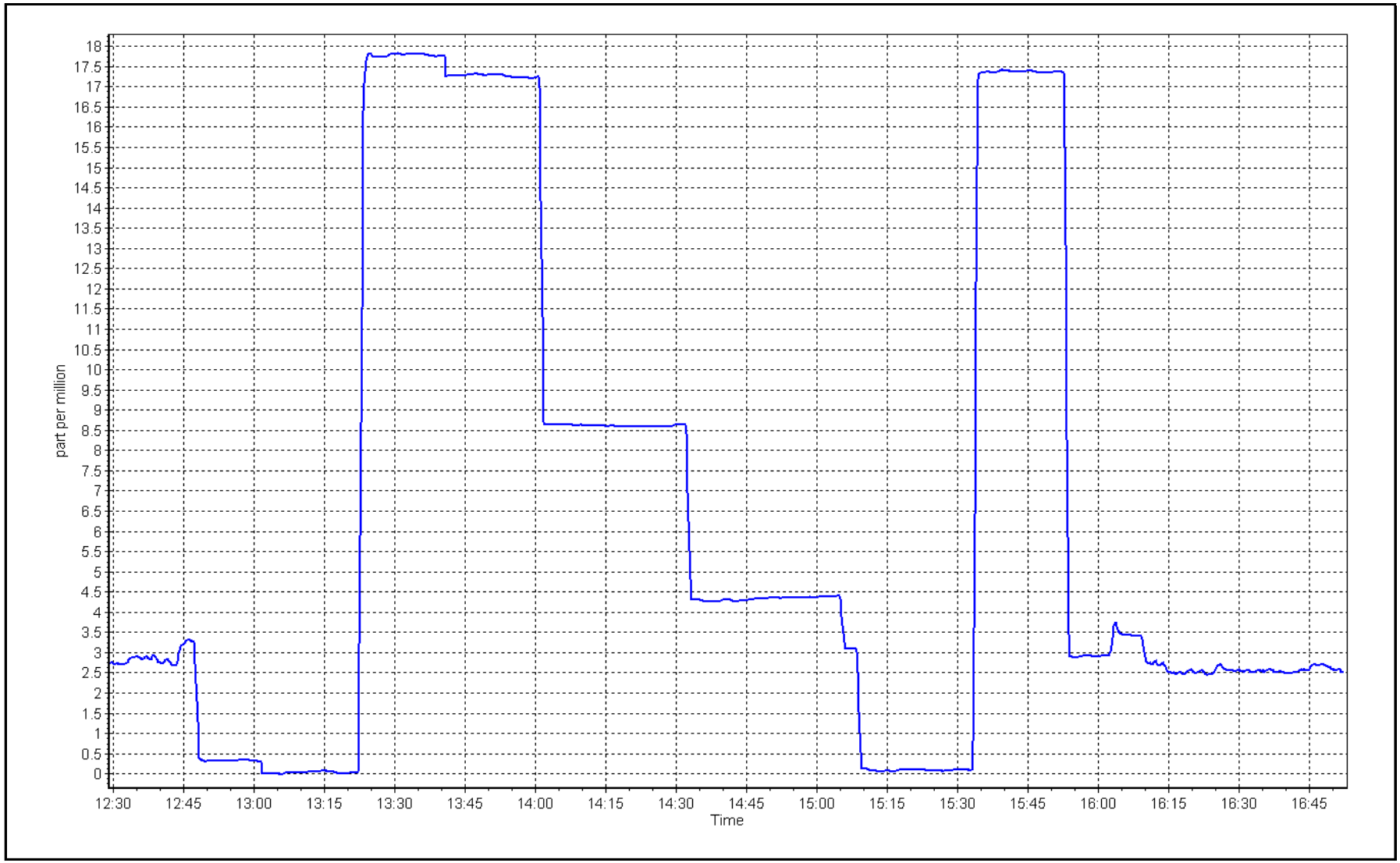
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.06	----
17.26	17.22	1.0025
8.64	8.64	1.0003
4.31	4.38	0.9852

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	0.993376	*0.90 - 1.10*
Intercept	0.069808	*+/-1.5*



THC Calibration Plot Date: January 17, 2024 Location: Kirby South



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	January 18, 2024	Last Cal Date:	December 6, 2023
Start time (MST):	8:51	End time (MST):	14:24
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T34ULGL	Cal Gas Expiry Date:	March 8, 2025	
NOX Cal Gas Conc:	49.39	ppm	NO Cal Gas Conc:	49.02	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.39	ppm	Removed Gas NO Conc:	49.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3804	
ZAG make/model:	API 701H		Serial Number:	880	

Analyzer Information

Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.397	1.397	NO bkgnd or offset:	1.7	1.7
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	1.8	1.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	202.87	209.21

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.002591	1.003862
NO_X Cal Offset:	-4.472891	-4.492458
NO Cal Slope:	1.001411	1.005411
NO Cal Offset:	-4.934867	-5.173949
NO_2 Cal Slope:	0.999171	0.997888
NO_2 Cal Offset:	0.864517	0.693913

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.6	0.0	----	----
as found span	4919	81.0	800.1	794.1	6.0	803.0	797.7	5.3	0.9964	0.9955
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
high point	4919	81.0	800.1	794.1	6.0	801.0	796.0	5.1	0.9989	0.9976
second point	4960	40.5	400.0	397.0	3.0	394.4	390.6	3.9	1.0142	1.0164
third point	4980	20.2	199.5	198.0	1.5	192.0	189.7	2.3	1.0392	1.0439
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
as left span	4919	81.0	800.1	413.9	386.2	792.8	408.9	383.9	1.0092	1.0123
								Average Correction Factor	1.0175	1.0193

Corrected As found	NO_X = 803.7 ppb	NO = 798.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.7%
Previous Response	NO_X = 797.7 ppb	NO = 790.3 ppb		*Percent Change	NO = 1.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.4	411.2	386.2	386.1	1.0002	100.0%
2nd GPT point (200 ppb O3)	791.4	623.5	173.9	173.5	1.0023	99.8%
3rd GPT point (100 ppb O3)	791.4	714.8	82.6	84.5	0.9774	102.3%
				Average Correction Factor	0.9933	100.7%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

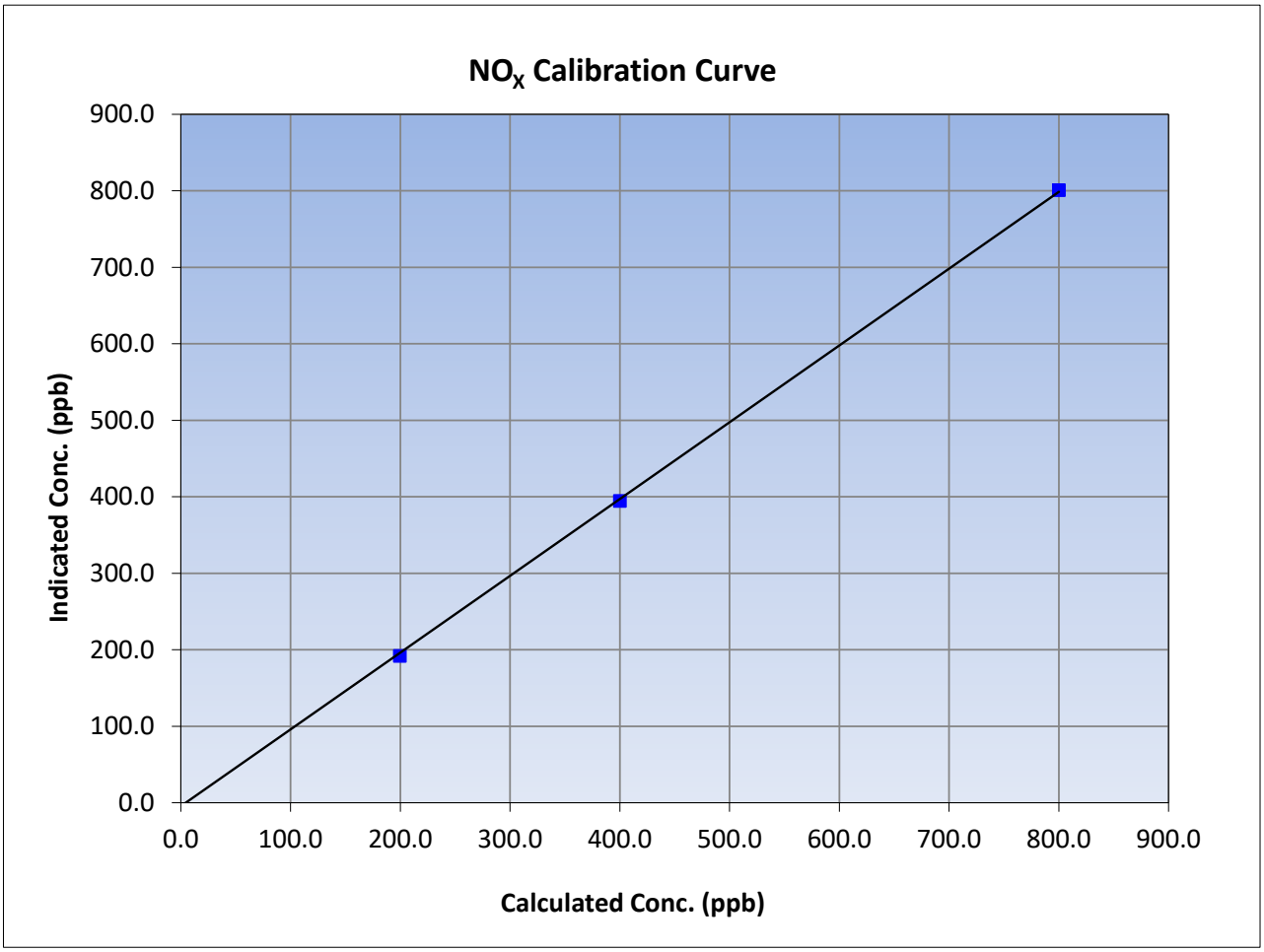
Version-04-2020

Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 6, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	8:51	End Time (MST):	14:24
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999874	≥0.995
800.1	801.0	0.9989			
400.0	394.4	1.0142	Slope	1.003862	0.90 - 1.10
199.5	192.0	1.0392			
			Intercept	-4.492458	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

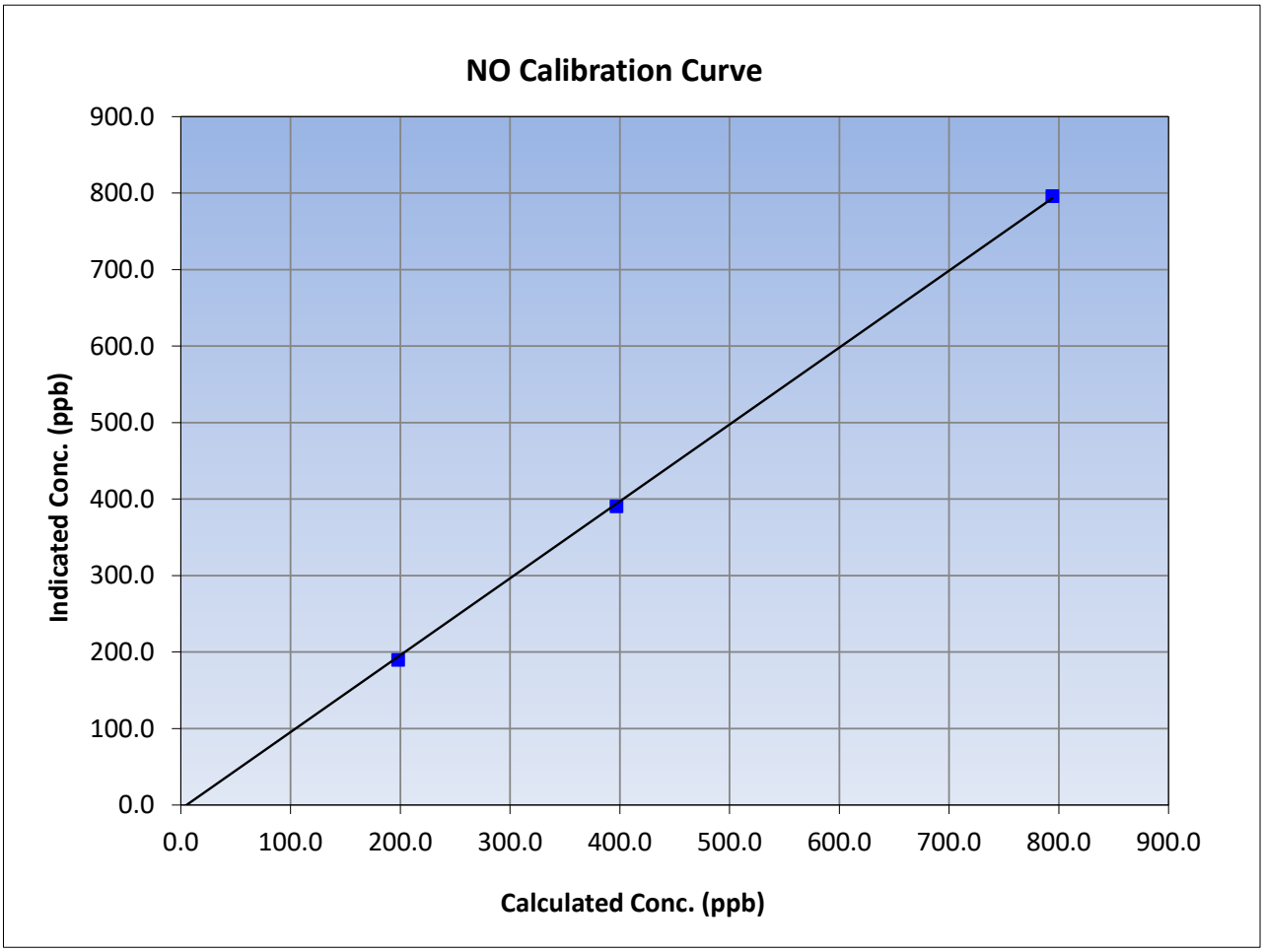
Version-04-2020

Station Information

Calibration Date:	January 18, 2024	Previous Calibration:	December 6, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	8:51	End Time (MST):	14:24
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999826	≥0.995
794.1	796.0	0.9976			
397.0	390.6	1.0164	Slope	1.005411	0.90 - 1.10
198.0	189.7	1.0439			
			Intercept	-5.173949	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

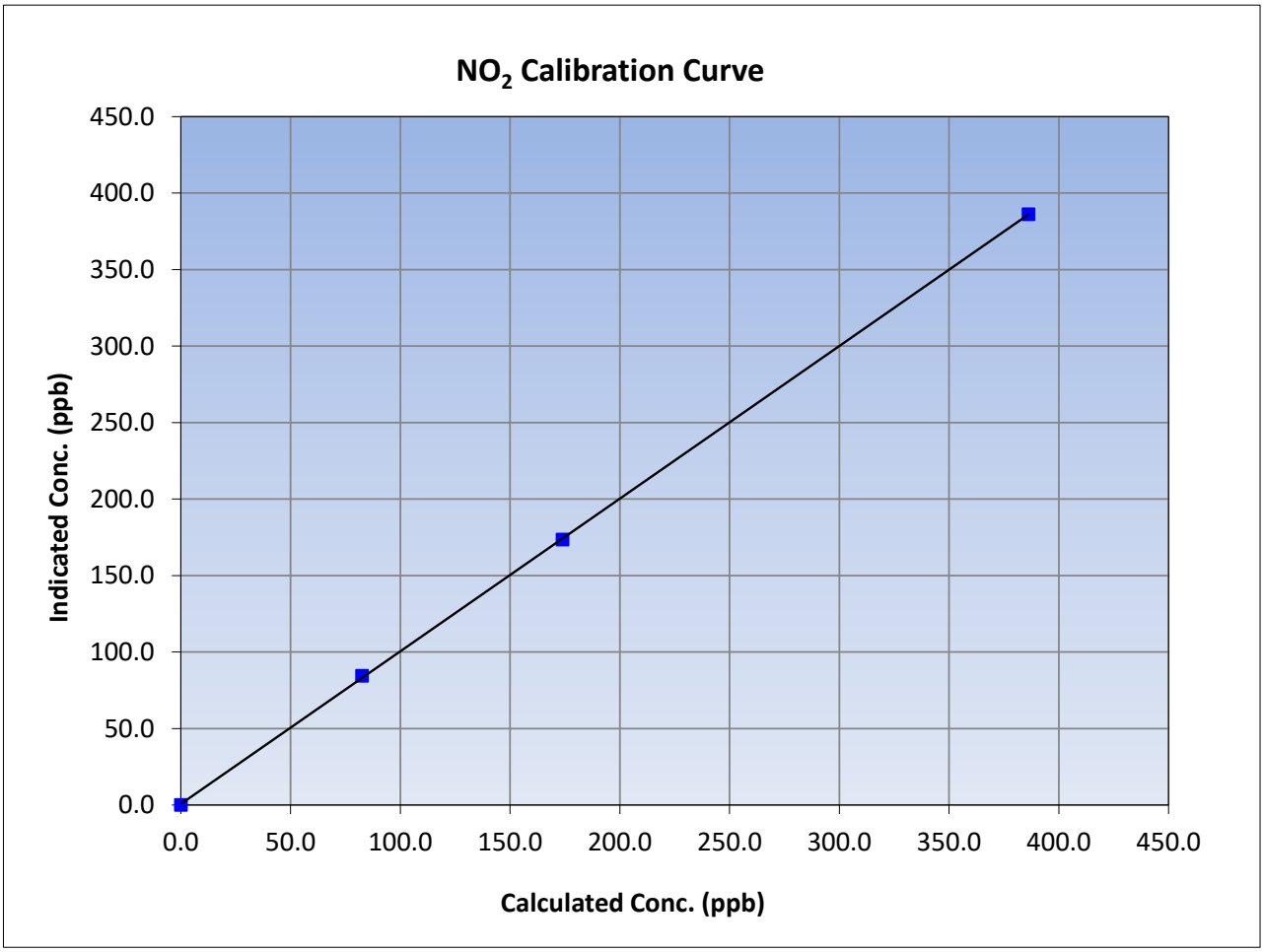
Version-04-2020

Station Information

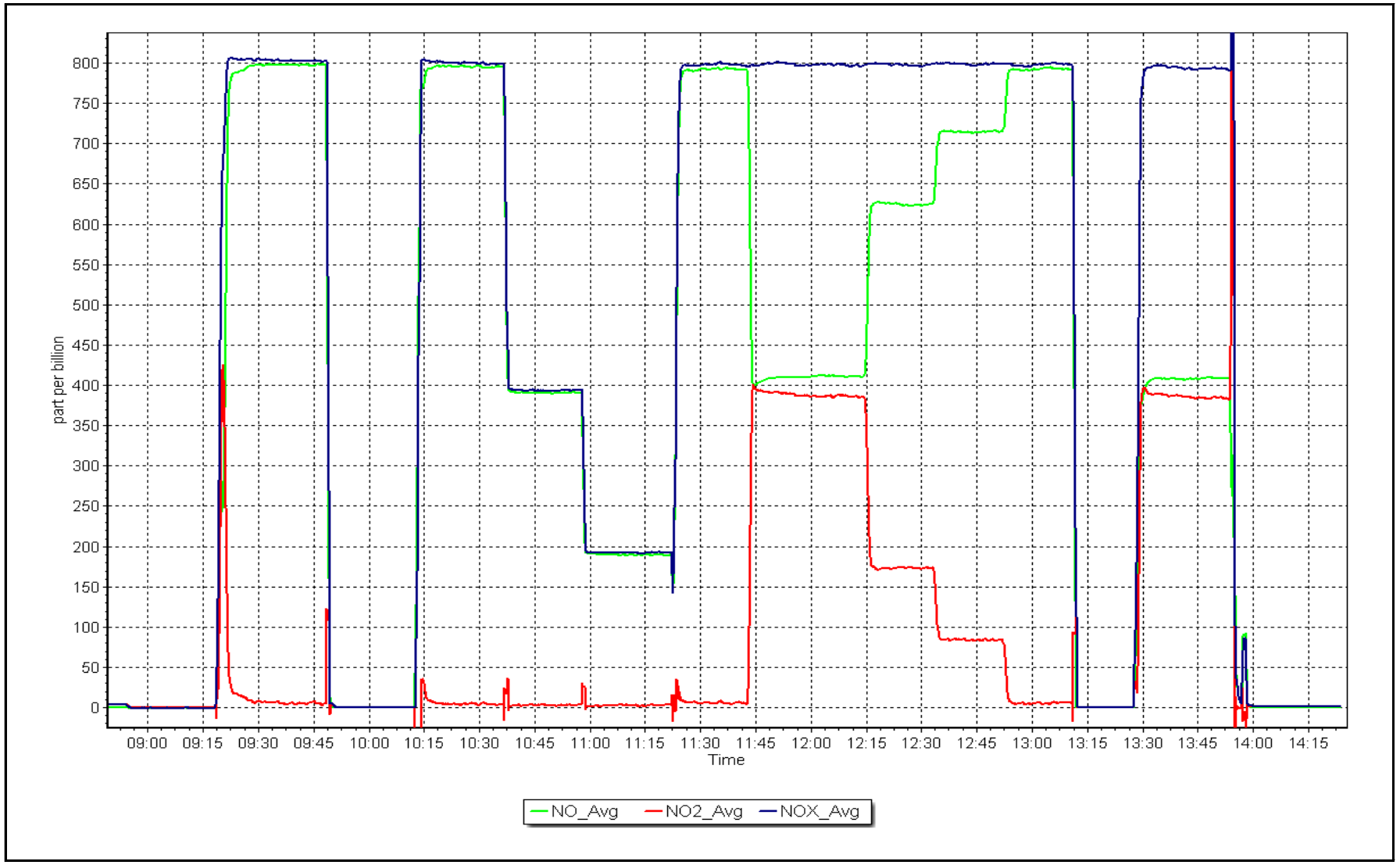
Calibration Date:	January 18, 2024	Previous Calibration:	December 6, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	8:51	End Time (MST):	14:24
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999965	≥0.995
386.2	386.1	1.0002			
173.9	173.5	1.0023	Slope	0.997888	0.90 - 1.10
82.6	84.5	0.9774			
			Intercept	0.693913	+/-20



NO_X Calibration Plot Date: January 18, 2024 Location: Kirby South



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS511
BLACKGOLD

JANUARY 2024

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

February 29, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	January 17, 2024	Last Cal Date:	December 14, 2023
Start time (MST):	12:22	End time (MST):	15:33
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.06 ppm	Cal Gas Exp Date:	January 5, 2029
Cal Gas Cylinder #:	CC147416		
Removed Cal Gas Conc:	50.06 ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA	Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700	Serial Number:	5258
ZAG Make/Model:	Teledyne API 701	Serial Number:	138

Analyzer Information

Analyzer make: Thermo scientific — Analyzer serial #: 1160290014

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002260	1.000172	Backgd or Offset:	35.4	36.5
Calibration intercept:	0.830491	2.710765	Coeff or Slope:	1.187	1.228

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	1.6	----
as found span	4926	79.9	799.0	774.7	1.031
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	2.0	----
high point	4926	79.9	799.0	801.4	0.997
second point	4968	40.0	399.8	403.3	0.991
third point	4987	20.0	200.0	203.2	0.984
as left zero	5000	0.0	0.0	1.9	----
as left span	4926	80.0	800.0	801.8	0.998
				Average Correction Factor	0.991

Baseline Corr As found:	773.10	Previous response	801.65	*% change	-3.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

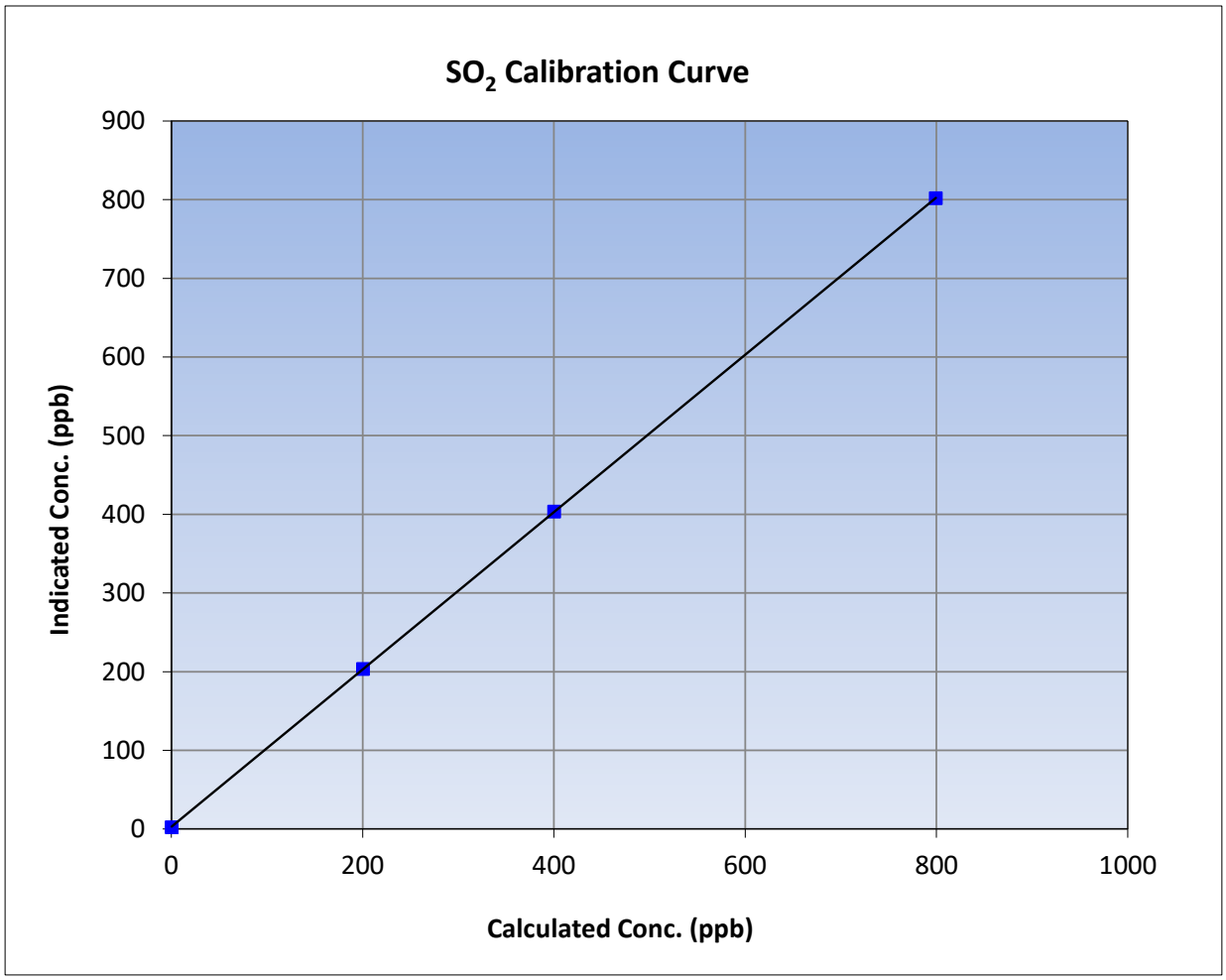
Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	December 14, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	12:22	End Time (MST):	15:33
Analyzer make:	Thermo scientific	Analyzer serial #:	1160290014

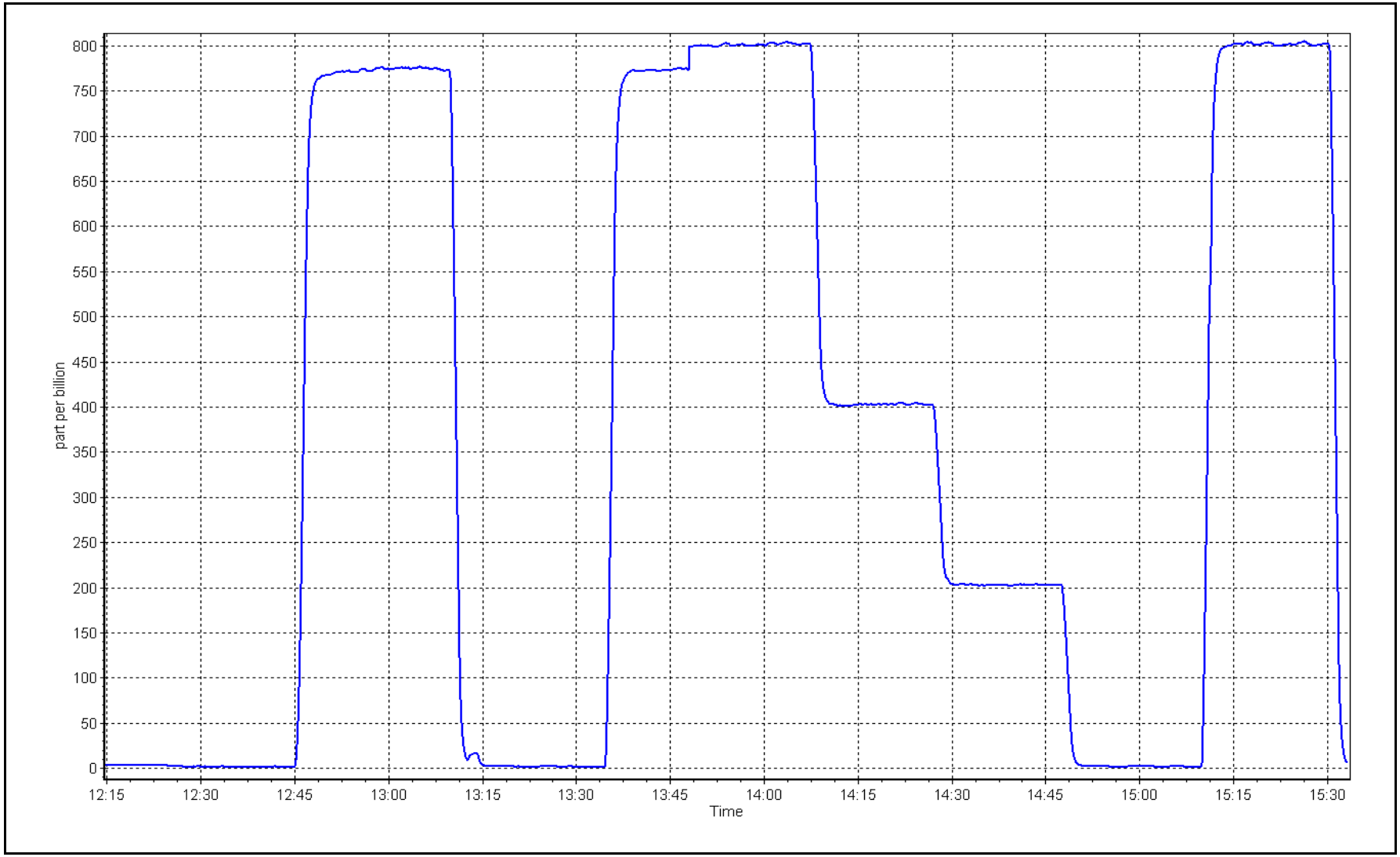
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	2.0	----
799.0	801.4	0.9970
399.8	403.3	0.9914
200.0	203.2	0.9841

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.000172	*0.90 - 1.10*
Intercept	2.710765	*+/-30*



SO2 Calibration Plot Date: January 17, 2024 Location: Blackgold



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	January 25, 2024	Last Cal Date:	December 13, 2023
Start time (MST):	11:19	End time (MST):	15:16
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.139	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC511397			
Removed Cal Gas Conc:	5.139	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2445
ZAG Make/Model:	API T701		Serial Number:	138

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1336160090
Converter make:	Global G150		Converter serial #:	2022-227
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.982906	0.977047	Backgd or Offset:	3.41	3.39
Calibration intercept:	0.001152	0.181198	Coeff or Slope:	1.159	1.159

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4922	77.8	80.0	78.4	1.021
as found 2nd point	4961	38.9	40.0	39.3	1.020
as found 3rd point	4981	19.5	20.0	19.9	1.012
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4922	77.8	80.0	78.3	1.021
second point	4961	38.9	40.0	39.3	1.017
third point	4981	19.5	20.0	19.7	1.017
as left zero	5000	0.0	0.0	0.2	----
as left span	4922	77.9	80.0	77.9	1.027
SO2 Scrubber Check	4920	80.0	800.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.019
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.3	Prev response:	78.60	*% change:	-0.4%
Baseline Corr 2nd AF pt:	39.2	AF Slope:	0.978479	AF Intercept:	0.181087
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999994		

* = > +/-5% change initiates investigation

Notes: Changed the sample 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

H_2S Calibration Summary

Version-11-2021

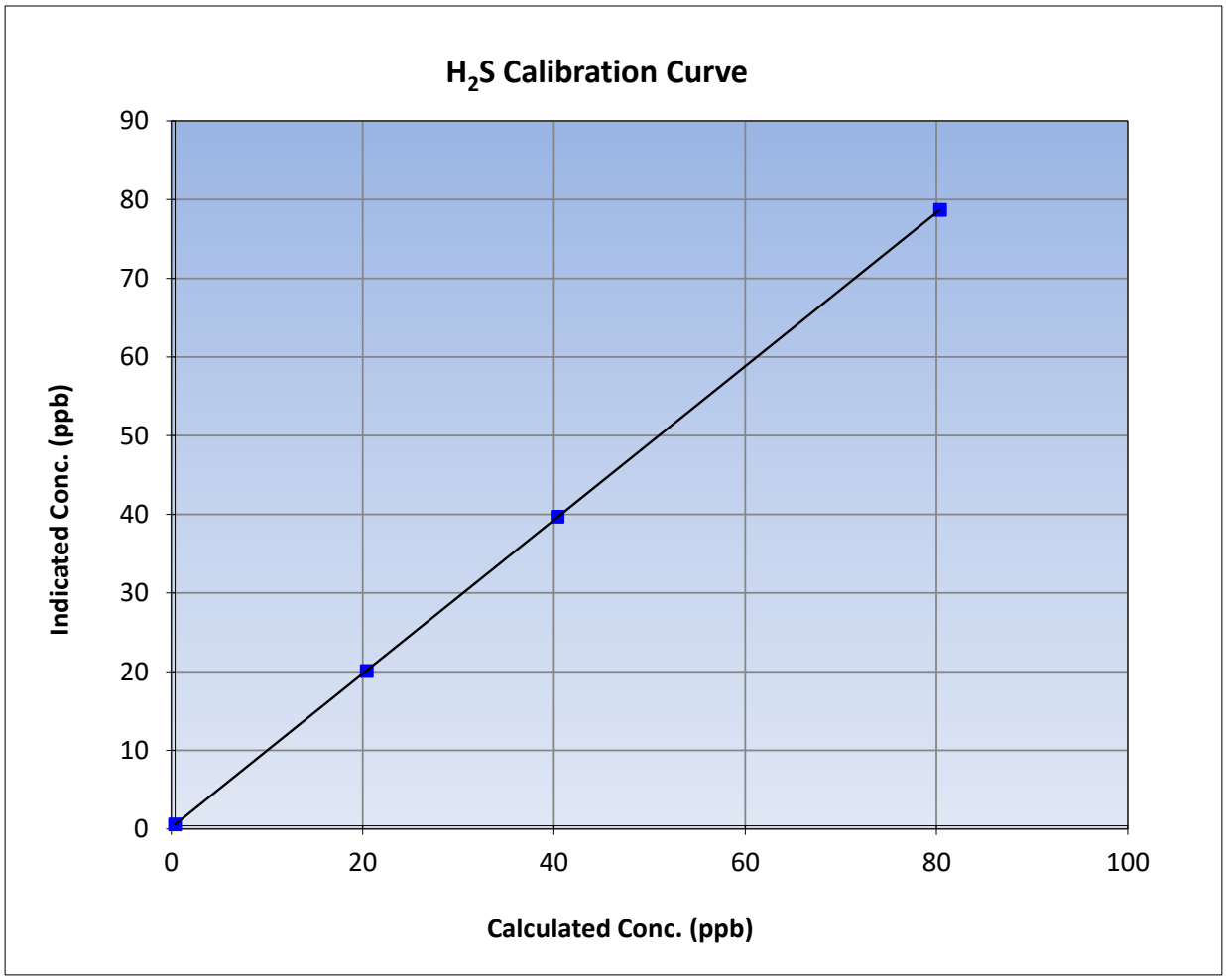
Station Information

Calibration Date:	January 25, 2024	Previous Calibration:	December 13, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	11:19	End Time (MST):	15:16
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

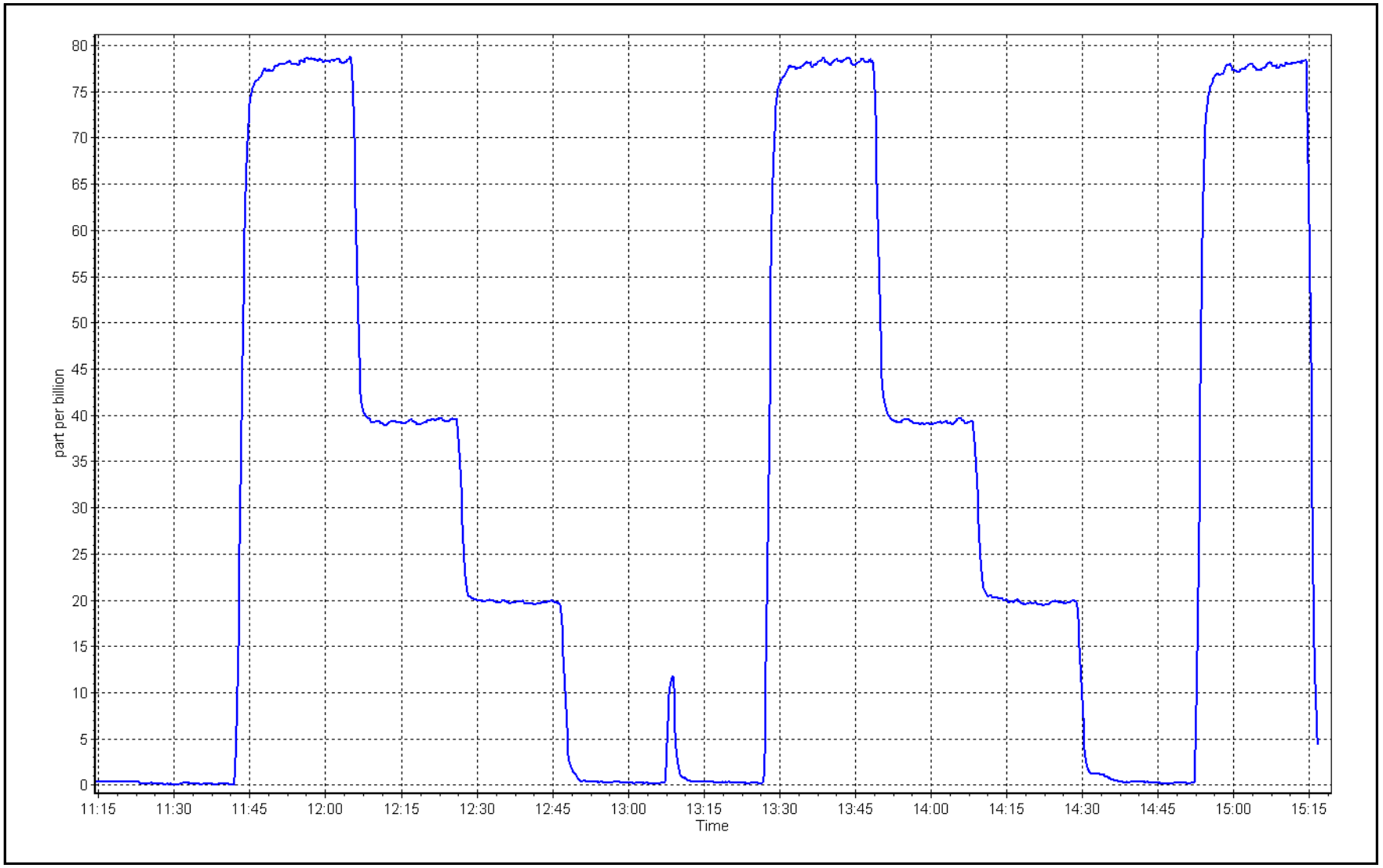
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	78.3	1.0213
40.0	39.3	1.0174
20.0	19.7	1.0173

Statistical Evaluation		Limits
Correlation Coefficient	0.999998	≥0.995
Slope	0.977047	0.90 - 1.10
Intercept	0.181198	+/-3



H_2S Calibration Plot Date: January 25, 2024 Location: Blackgold



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	January 17, 2024	Last Cal Date:	December 14, 2023
Start time (MST):	12:22	End time (MST):	15:33
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC147416		Cal Gas Expiry Date:	January 5, 2029	
CH4 Cal Gas Conc.	498.90	ppm	CH4 Equiv Conc.	1070.90	ppm
C3H8 Cal Gas Conc.	208.00	ppm			
Removed Gas Cert:	NA		Removed Gas Expiry:	NA	
Removed CH4 Conc.	498.90	ppm	CH4 Equiv Conc.	1070.90	ppm
Removed C3H8 Conc.	208.00	ppm	Diff between cyl:		
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5258	
ZAG Make/Model:	Teledyne API 701		Serial Number:	138	

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1317958295	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994672	0.996004	Background:	0.90	0.89
Calibration intercept:	0.019633	-0.004347	Coefficient:	0.575	0.567

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.05	----
as found span	4920	79.9	17.11	17.35	0.986
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.07	----
high point	4920	79.9	17.11	17.09	1.001
second point	4960	40.0	8.57	8.45	1.014
third point	4980	20.0	4.28	4.22	1.016
as left zero	5000	0.0	0.00	0.08	----
as left span	4926	80.0	17.11	17.16	0.997
				Average Correction Factor	1.010

Baseline Corr As found:	17.30	Previous response	17.04	*% change	1.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

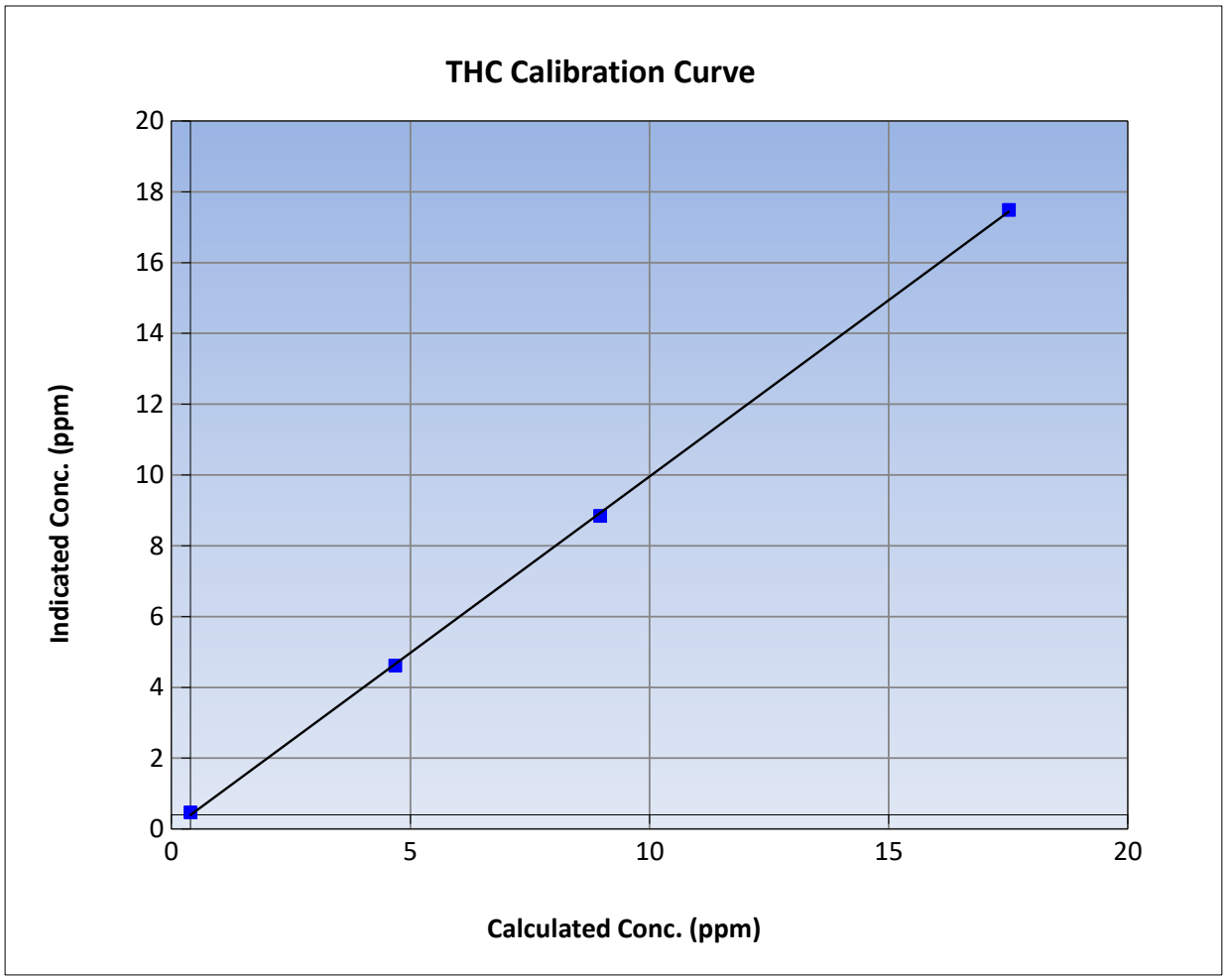
Station Information

Calibration Date:	January 17, 2024	Previous Calibration:	December 14, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	12:22	End Time (MST):	15:33
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1317958295

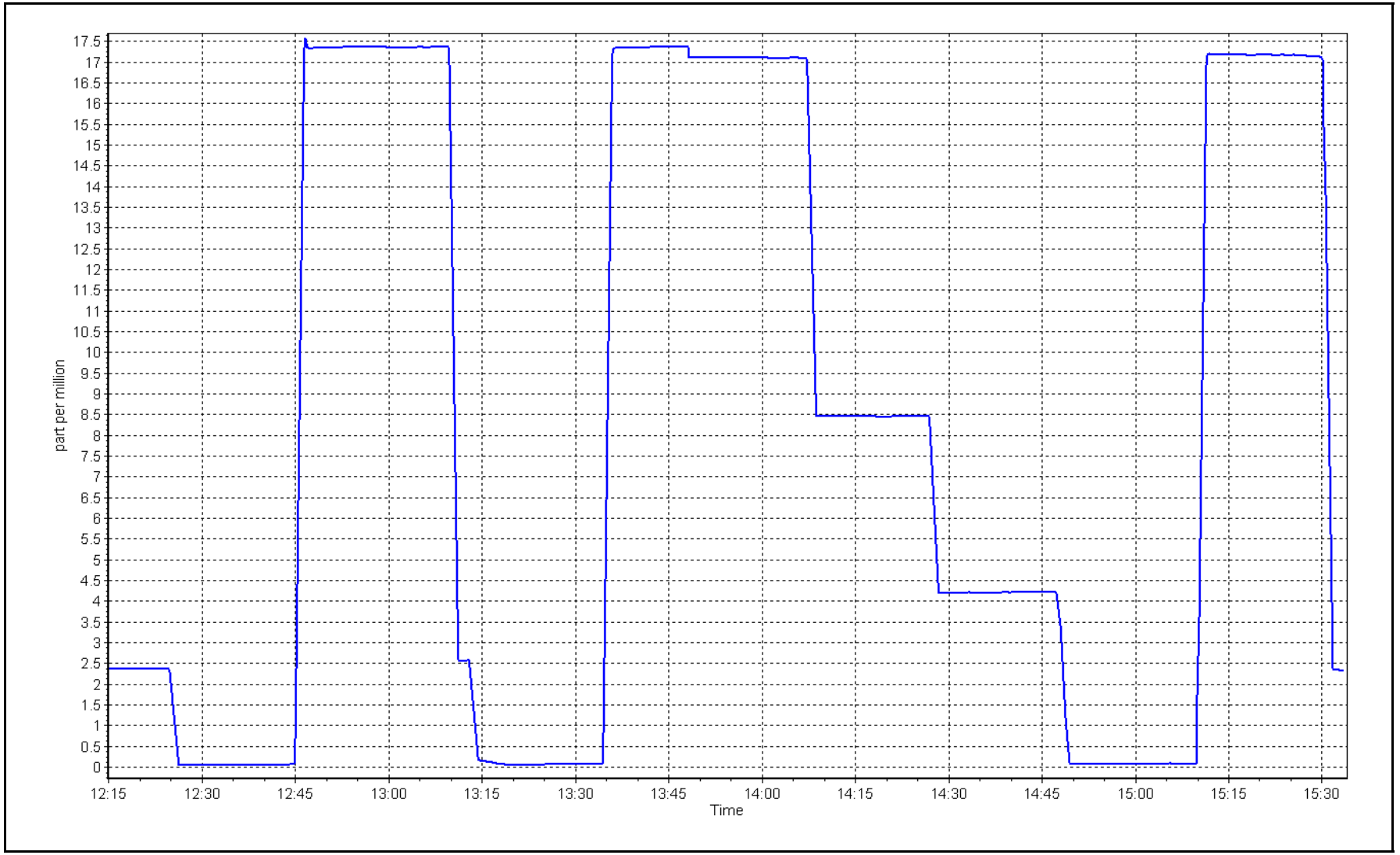
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.07	----
17.11	17.09	1.0012
8.57	8.45	1.0143
4.28	4.22	1.0156

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999893	*≥0.995*
Slope	0.996004	*0.90 - 1.10*
Intercept	-0.004347	*+/-1.5*



THC Calibration Plot Date: January 17, 2024 Location: Blackgold



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	January 9, 2024	Last Cal Date:	December 22, 2023
Start time (MST):	11:11	End time (MST):	16:14
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T0F8P52		Cal Gas Expiry Date:	August 16, 2026	
NOX Cal Gas Conc:	47.43	ppm	NO Cal Gas Conc:	47.43	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.43	ppm	Removed Gas NO Conc:	47.43	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	2445	
ZAG make/model:	Teledyne API T701		Serial Number:	138	

Analyzer Information

Analyzer make:	Teledyne API T200	Analyzer serial #:	7029
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.041	1.041	NO bkgnd or offset:	0.2	0.2
NOX coeff or slope:	1.038	1.038	NOX bkgnd or offset:	0.4	0.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.2	4.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.012843	1.002964
NO_X Cal Offset:	0.247028	-1.992779
NO Cal Slope:	1.011487	1.002150
NO Cal Offset:	-0.052956	-2.932730
NO_2 Cal Slope:	0.998436	1.004437
NO_2 Cal Offset:	1.931124	1.342612

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as found span	4916	84.4	800.6	800.6	0.0	792.4	789.6	2.8	1.0103	1.0139
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4916	84.4	800.6	800.6	0.0	802.0	801.0	1.1	0.9982	0.9994
second point	4958	42.2	400.3	400.3	0.0	398.2	396.1	2.1	1.0053	1.0106
third point	4979	21.1	200.2	200.2	0.0	197.1	195.3	1.7	1.0155	1.0249
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4916	84.4	800.6	429.3	371.3	798.0	433.6	364.4	1.0032	0.9900
								Average Correction Factor	1.0063	1.0116

Corrected As found	NO_X = 792.7 ppb	NO = 789.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.3%
Previous Response	NO_X = 811.1 ppb	NO = 809.7 ppb		*Percent Change	NO =	-2.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.0	425.7	371.3	373.5	0.9941	100.6%
2nd GPT point (200 ppb O3)	797.0	620.2	176.8	180.1	0.9817	101.9%
3rd GPT point (100 ppb O3)	797.0	707.4	89.6	92.3	0.9707	103.0%
				Average Correction Factor	0.9822	101.8%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

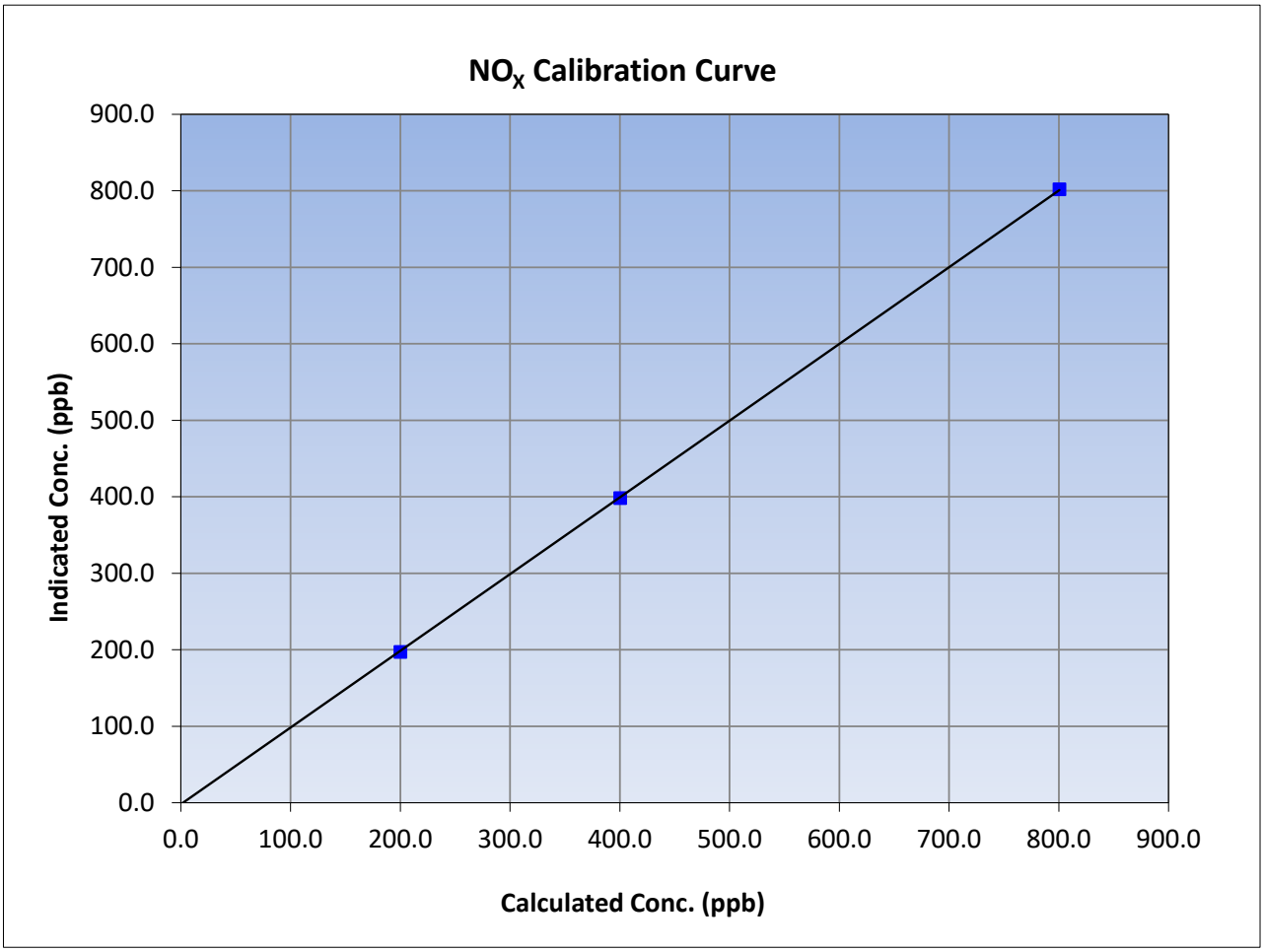
Version-04-2020

Station Information

Calibration Date:	January 9, 2024	Previous Calibration:	December 22, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	11:11	End Time (MST):	16:14
Analyzer make:	Teledyne API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999974	*≥0.995*
800.6	802.0	0.9982			
400.3	398.2	1.0053	Slope	1.002964	*0.90 - 1.10*
200.2	197.1	1.0155			
			Intercept	-1.992779	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

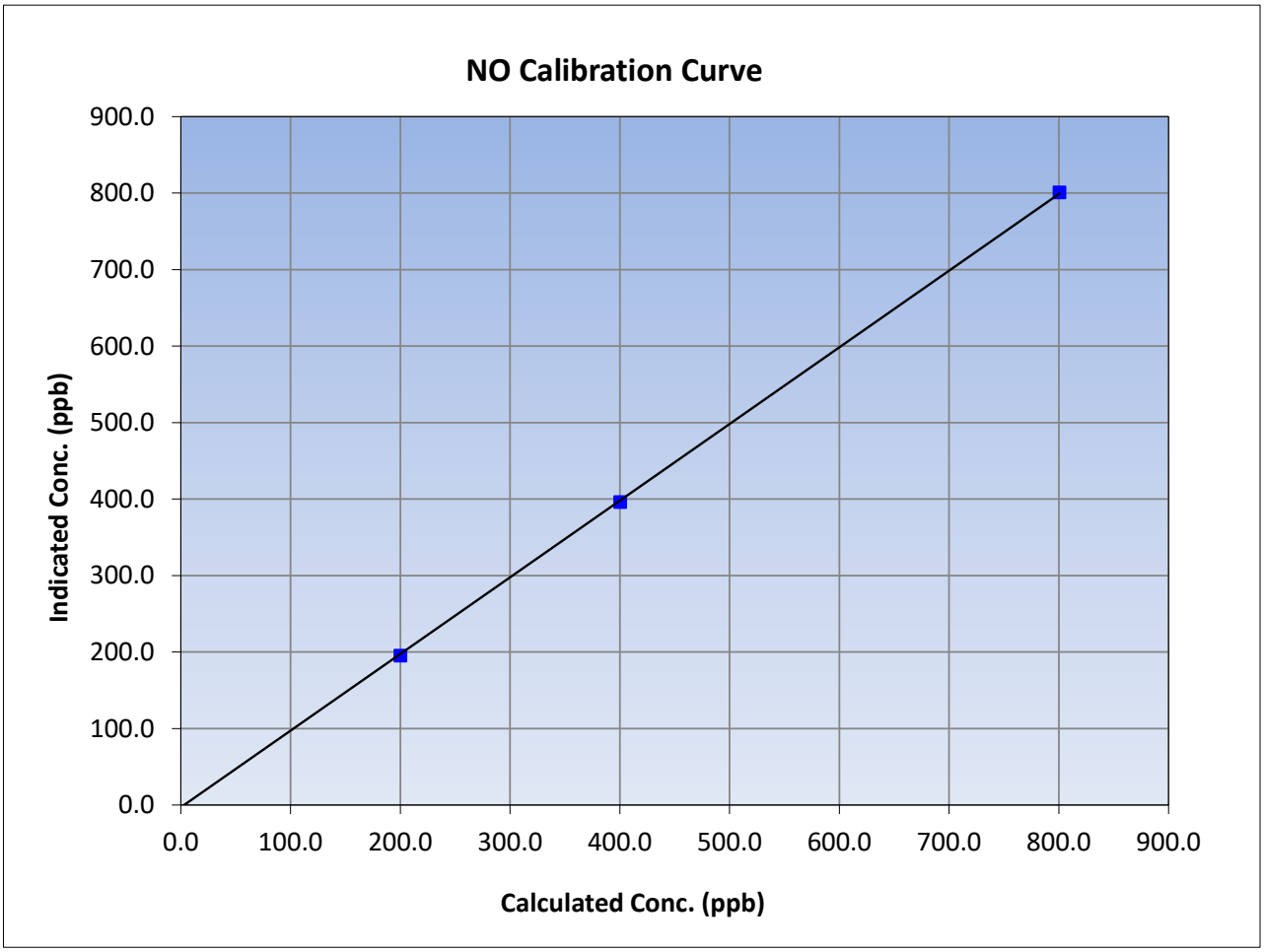
Version-04-2020

Station Information

Calibration Date:	January 9, 2024	Previous Calibration:	December 22, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	11:11	End Time (MST):	16:14
Analyzer make:	Teledyne API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999941	≥0.995
800.6	801.0	0.9994			
400.3	396.1	1.0106	Slope	1.002150	0.90 - 1.10
200.2	195.3	1.0249			
			Intercept	-2.932730	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

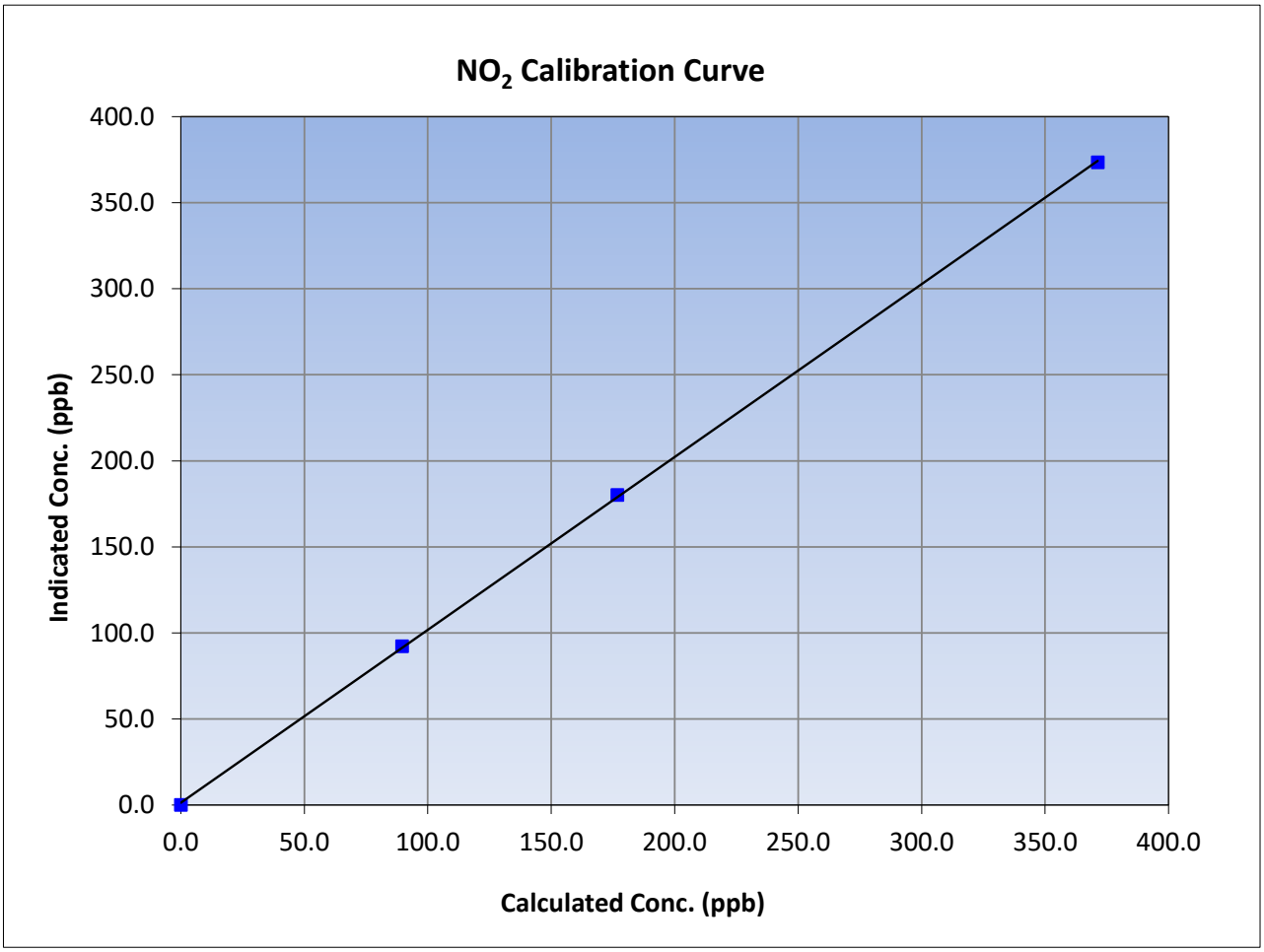
Version-04-2020

Station Information

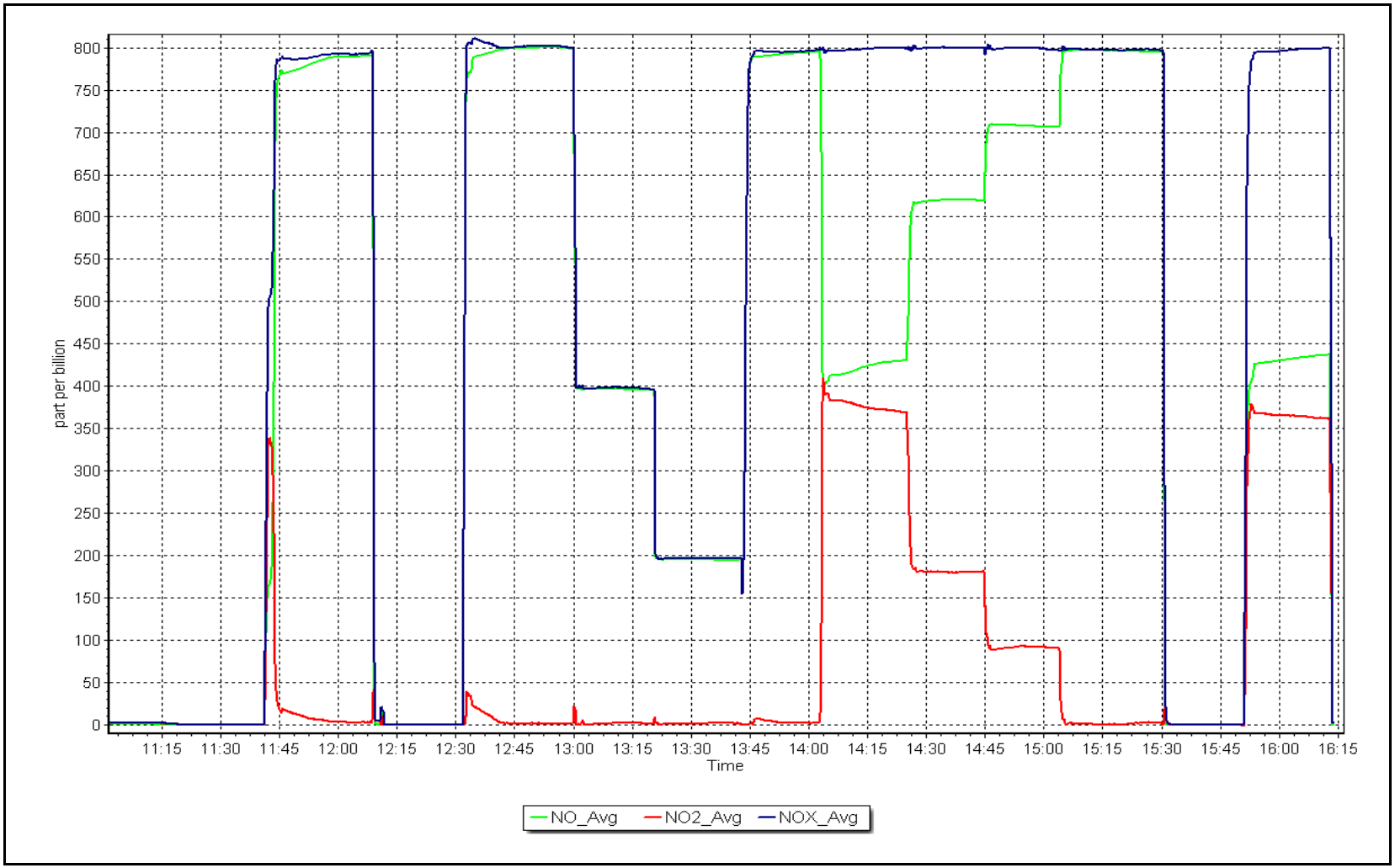
Calibration Date:	January 9, 2024	Previous Calibration:	December 22, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	11:11	End Time (MST):	16:14
Analyzer make:	Teledyne API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999938	≥0.995
371.3	373.5	0.9941			
176.8	180.1	0.9817	Slope	1.004437	0.90 - 1.10
89.6	92.3	0.9707			
			Intercept	1.342612	+/-20



NO_X Calibration Plot Date: January 9, 2024 Location: Blackgold



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End of Report